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Factory Workshop Manual

Make

Ford

Model

Bronco

Engine and year

V8-351 5.8L VIN G 2-bbl (1982)

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This manual was submitted by

Anonymous

Date

1st January 2018

Quick Test

TEST STEP	RESULT	ACTION TO TAKE
23 RECORD SERVICE CODES • Read and record all Service Code(s) displayed on TAB and TAD Lights • Service Code(s) are complete when CANP ON light only is illuminated. **NOTE:** Refer to Fig. 1 for instructions on how to read Service Code(s).	Service Code(s) Displayed ON:	
	Both TAB and TAD Lights and CANP Light went ON	GO to 24
	Either TAB or TAD Lights	GO to K8
	No Service Code(s) Displayed	GO to K7
	CANP Light did not go ON	GO to L7 with CANP Solenoid GO to L13 w/o CANP Solenoid
24 CHECK SERVICE CODE(S), AND GO TO APPROPRIATE DIAGNOSTIC PROCEDURE • For Service Code1-5, go directly to Pinpoint Test T1 • For all other Service Code(s), start by using the lowest numbered Service Code from Step 23, find the number in the RESULTS column, and proceed to the appropriate diagnostic procedure indicated in the ACTION TO TAKE column **CAUTION: Correct test results for Quick Test are dependent on proper operation of other related non-EEC components and systems. Listed at the start of each Pinpoint Test are the non-EEC areas impacting the results of the Quick Test. Verify these areas by using their proper Diagnostic Routine, Section 2, before continuing. The exact EEC areas, being diagnosed in each Pinpoint Test, is also listed.**	**CODE** / **TEST**	
	1-5 Memory Check	GO IMMEDIATELY to T1
	1-1 —	GO IMMEDIATELY to 25
	1-2 RPM	GO to N
	2-1 ECT	GO to E7
	2-2 MAP	GO to F7
	2-3 TP	GO to D11
	2-4 ACT	GO to S7
	3-1 EGR	GO to G12
	3-2 EGR CLOSED	GO to G12
	4-1 FUEL LEAN	GO to H
	4-2 FUEL RICH	GO to H
	4-3 ENGINE COLD	GO to C7
	4-4 THERMAC-TOR	GO to K10

Quick Test Service Codes 1-1 Through 4-4 (Tests Referred To Under Action To Take Are Pinpoint Tests)

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Quick Test Service Codes 1-1 Through 4-4 (Tests Referred To Under Action To Take Are Pinpoint Tests)

Cruise Control Module: Locations

Behind I/P At RH Side Of Steering Column

Cruise Control Module: Testing and Inspection

Use only a multi-meter of 5000 ohm/volt rating or higher when performing amplifier test.

``On'' Circuit Test

1. Turn ignition ``On.''

2. Connect a voltmeter between light blue wire w/black hash and ground on models exc. 1983-87 Ranger, 1984-87 Bronco II and 1986-87 Aerostar or white wire w/purple stripe and ground on 1983-87 Ranger, 1984-87 Bronco II and 1986-87 Aerostar.

3. Battery voltage should be indicated when ``On'' switch on steering column is depressed and held. If battery voltage is not indicated, check horn relay and perform control switch test.

4. Release ``On'' button. Voltmeter should indicate 7.8 volts indicating ``On'' circuit is engaged. If voltage does not remain, check amplifier ground, fuses or circuit breakers or replace amplifier with known good amplifier and repeat test.

5. Replace as necessary.

``Off'' Circuit Test

1. Turn ignition ``On.''

2. Connect a voltmeter between light blue wire w/black hash and ground.

3. Depress ``Off'' button. Voltage should drop to zero indicating ``On'' circuit is de-energized.

4. If voltage does not drop to zero, perform ``Control Switch Test.''

``Set-Accelerate'' Circuit Test

1. Turn ignition ``On.''

2. Connect a voltmeter between light blue wire w/black hash and ground.

3. Depress ``On'' switch, then hold ``Set-Accel'' button on steering wheel. Voltmeter should indicate 4.5 volts. Rotate steering wheel back and forth and check for voltmeter fluctuations. If reading varies more than .5 volts, perform ``Control Switch Test.''

``Coast'' Circuit Test

1. Turn ignition ``On.''

2. Connect a voltmeter between light blue wire w/black hash and ground.

3. Depress ``On'' switch, then depress and hold ``Coast'' button on steering wheel. Voltmeter should indicate 1.5 volts. Rotate steering wheel back and forth and check for voltage fluctuations. If reading varies more than .5 volts, perform ``Control Switch Test.''

``Resume'' Circuit Test

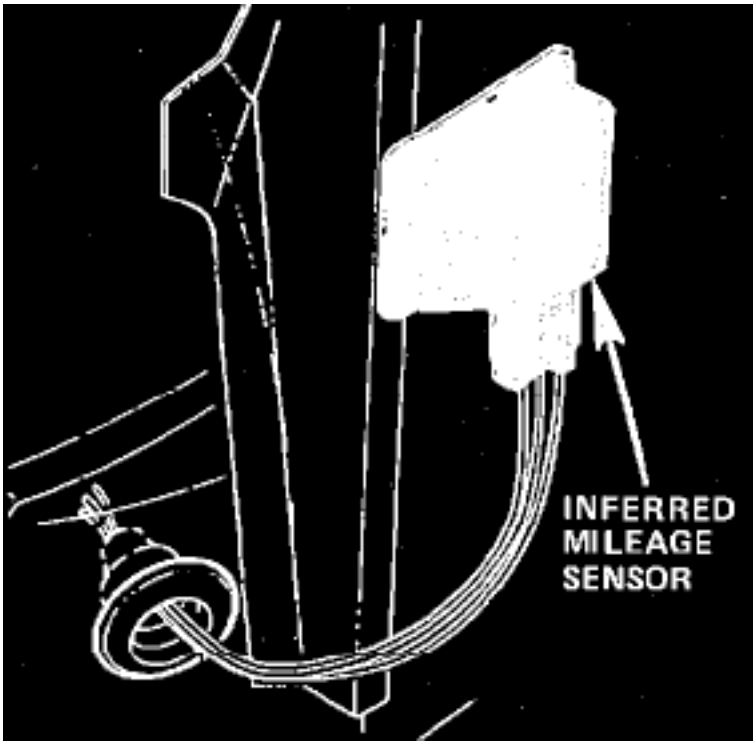
1. Turn ignition ``On.''

2. Connect a voltmeter between light blue wire w/black hash and ground.

3. Depress and hold ``Resume'' button. Voltmeter should indicate 6.5 volts.

If all circuits are functioning properly, perform ``Servo Assembly

Test" using a known good amplifier. Do not replace amplifier before performing servo test.



Fuel Distance/Mileage Module: Locations

Under LH Side Of I/P.

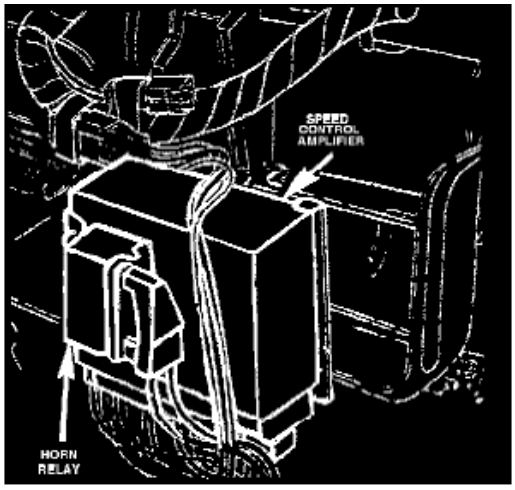
Under RH Side Of I/P

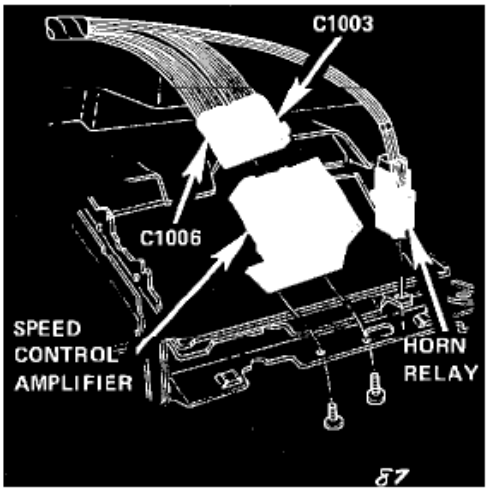
Applicable to: 1981-83

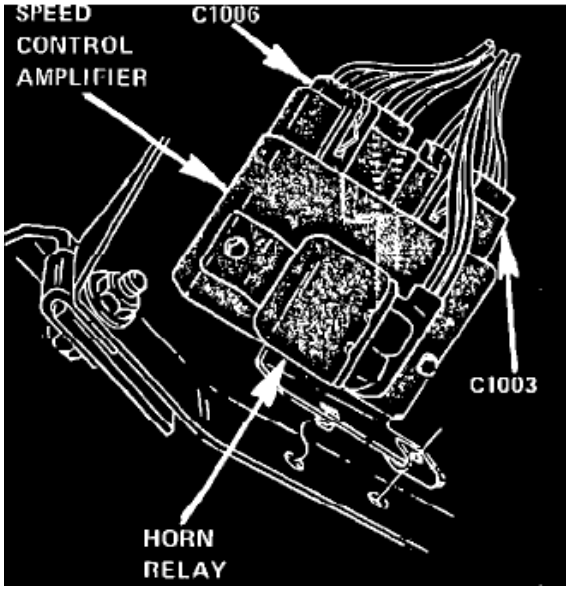
Fog/Driving Lamp Relay: Locations

Behind LH Side Of I/P

Ford Bronco Workshop Manual (V8-351 5.8L VIN G 2-bbl (1982))
Ford Workshop Manuals > Relays and Modules > Relays and Modules - Lighting and Horns > Horn Relay > Component Information > Locations





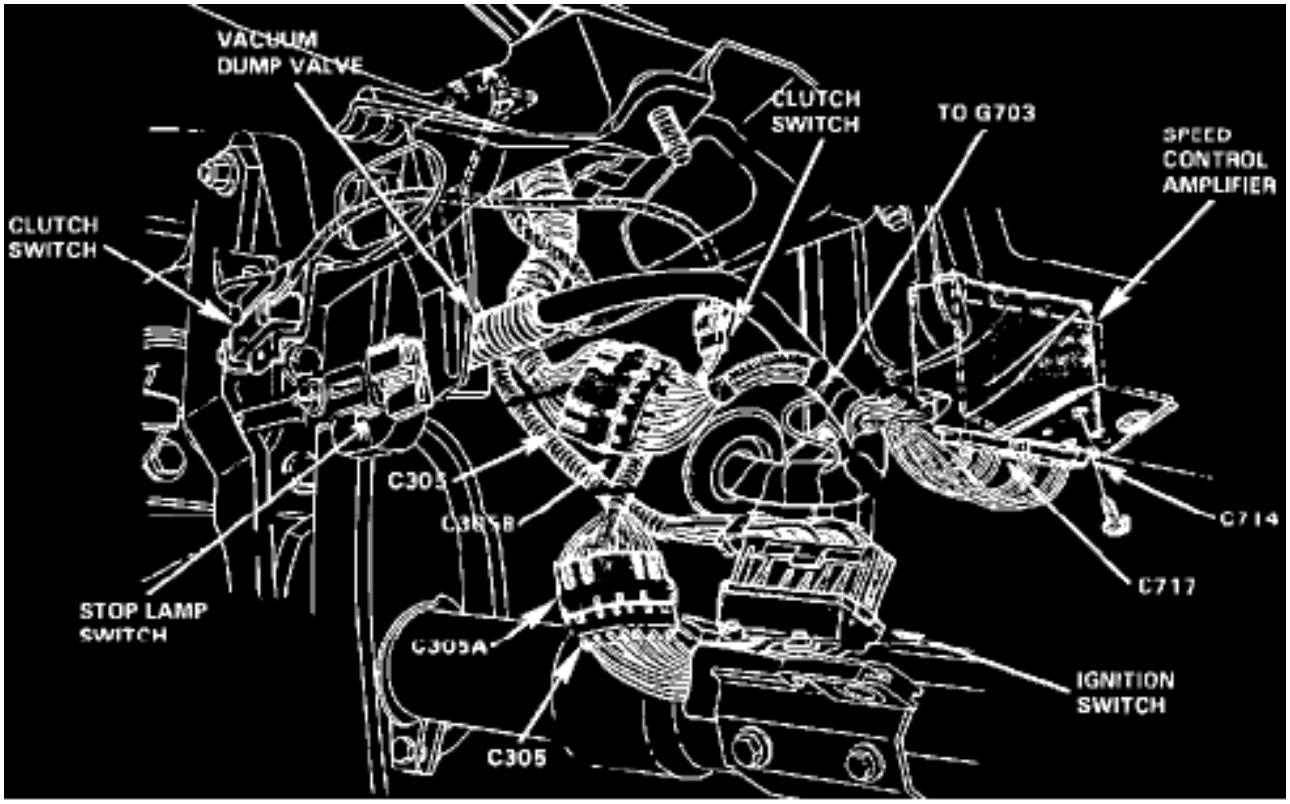


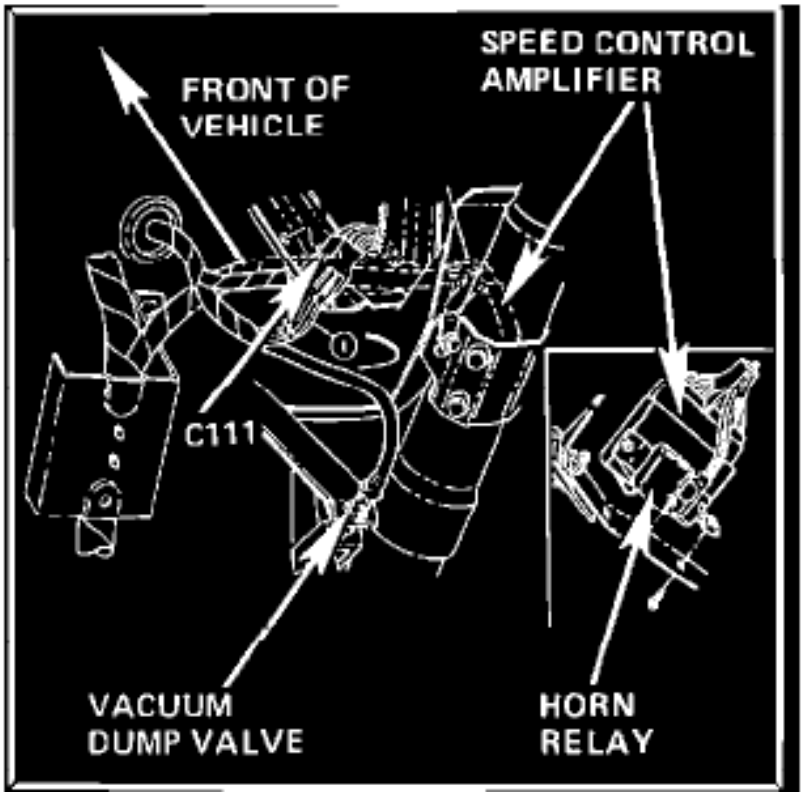
Horn Relay: Locations

Horn Relay Location

Under LH Side Of I/P.

Under LH Side Of I/P, With Speed Control


VACUUM DUMP VALVE
CLUTCH SWITCH
TO G703
SPEED CONTROL AMPLIFIER
CLUTCH SWITCH
C305
C714
C717
STOP LAMP SWITCH
C305A
IGNITION SWITCH
C305

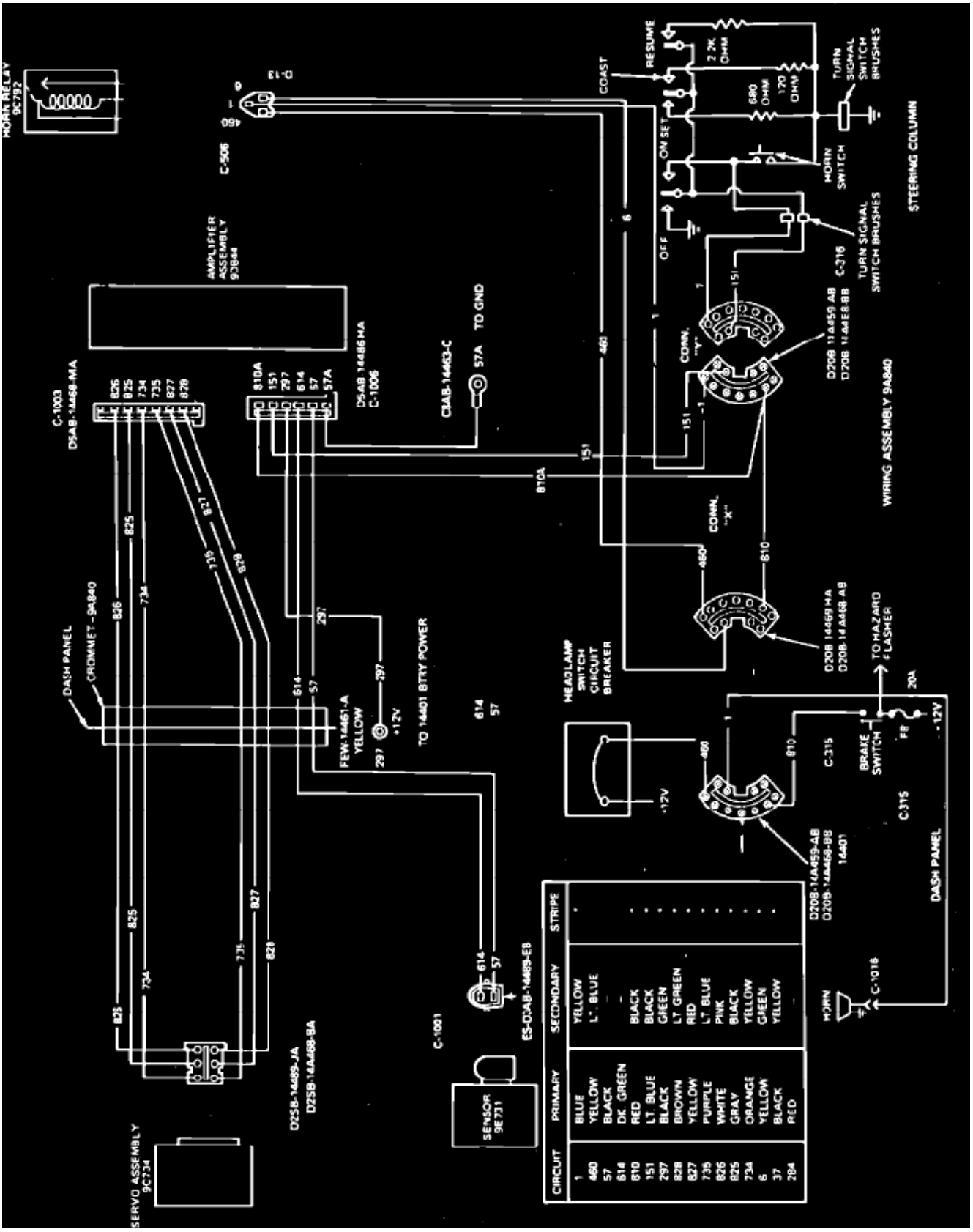

SPEED CONTROL AMPLIFIER
FRONT OF VEHICLE
C111
VACUUM DUMP VALVE
HORN RELAY

Underneath LH Side Of I/P

Below LH Side Of I/P

Horn Relay With Speed Control

Bronco F-150 thru F-350, E-150 thru E-350 and Super F Series The horn relay is use on vehicles equipped with speed control and is located under the left side of the instrument panel, left of the steering column and is mounted on the outboard attaching screw of the speed control amplifier module.


HORN RELAY 9C792
AMPLIFIER ASSEMBLY 9D844
C-1003 D5AB-14486-MA
D5AB-14486-MA C-1006
C-506
D-13
460
COAST
RESUME
ON SET
OFF
2.2K OHM
680 OHM
120 OHM
TURN SIGNAL SWITCH BRUSHES
HORN SWITCH
C-316
TURN SIGNAL SWITCH BRUSHES
STEERING COLUMN
CONN. "Y"
D2DB-14459-AB D2DB-14468-BB
WIRING ASSEMBLY 9A840
CONN. "X"
D2DB-14459-HA D2DB-14468-AB
TO HAZARD FLASHER
HEADLAMP SWITCH CIRCUIT BREAKER
BRAKE SWITCH
C-315
DASH PANEL
CROWNET - 9A840
FEW-14461-A YELLOW
TO 14401 BTTY POWER
+12V
-12V
D5AB-14463-C
57A TO GND
D5AB-14486-MA C-1006
810A
151
297
614
57
826
825
734
735
827
828
810
460
D2DB-14459-AB D2DB-14468-BB 14401
C-1018
HORN
SENSOR 9E731
ES-D5AB-14489-EB
C-1001
D2SB-14489-JA D2SB-14A468-BA
SERVO ASSEMBLY 9C734
CIRCUIT | PRIMARY | SECONDARY | STRIPE
1 | BLUE | YELLOW | -
460 | YELLOW | L. BLUE | -
57 | BLACK | - | -
614 | DK. GREEN | BLACK | -
810 | RED | BLACK | -
151 | LT. BLUE | GREEN | -
297 | BLACK | LT GREEN | -
828 | BROWN | RED | -
827 | YELLOW | LT. BLUE | -
735 | PURPLE | PINK | -
826 | WHITE | BLACK | -
825 | GRAY | YELLOW | -
734 | ORANGE | GREEN | -
6 | YELLOW | YELLOW | -
37 | BLACK | - | -
284 | RED | - | -

Horn Relay: Testing and Inspection

Fig. 3 Speed control wiring diagram. 1981---83 E-100-350 & 1984-87 E-150-350

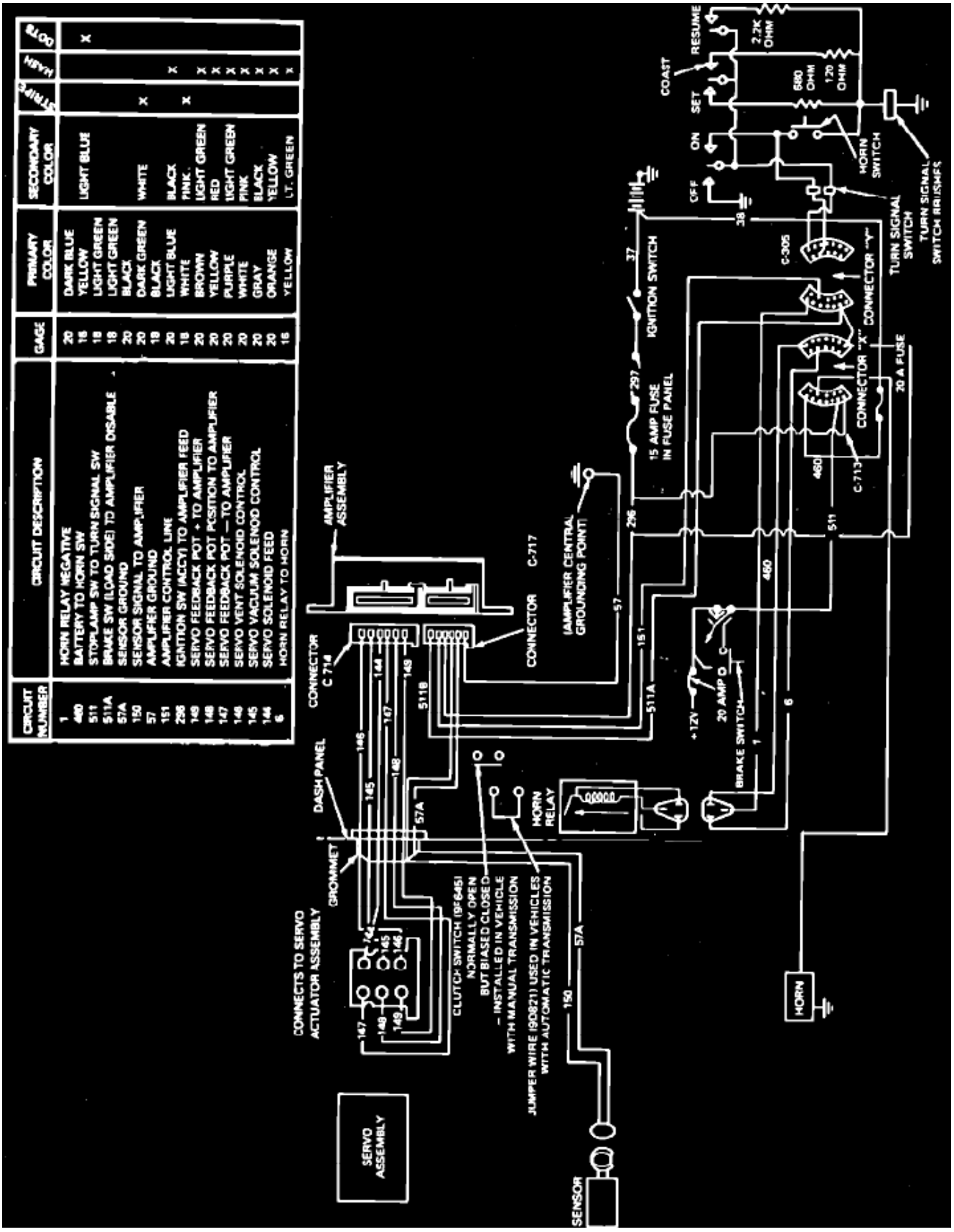

CIRCUIT NUMBER
CIRCUIT DESCRIPTION
GAGE
PRIMARY COLOR
SECONDARY COLOR
HORN
FLASH
BOTH
1 HORN RELAY NEGATIVE 20 DARK BLUE
460 BATTERY TO HORN SW 18 YELLOW
511 STOPLAMP SW TO TURN SIGNAL SW 18 LIGHT GREEN LIGHT BLUE X
511A BRAKE SW (LOAD SIDE) TO AMPLIFIER DISABLE 18 LIGHT GREEN
57A SENSOR GROUND 20 BLACK
150 SENSOR SIGNAL TO AMPLIFIER 20 DARK GREEN WHITE X
57 AMPLIFIER GROUND 18 BLACK
151 AMPLIFIER CONTROL LINE 20 LIGHT BLUE BLACK X
298 IGNITION SW (ACCY) TO AMPLIFIER FEED 18 WHITE PINK. X
149 SERVO FEEDBACK POT + TO AMPLIFIER 20 BROWN LIGHT GREEN X
148 SERVO FEEDBACK POT POSITION TO AMPLIFIER 20 YELLOW RED X
147 SERVO FEEDBACK POT — TO AMPLIFIER 20 PURPLE LIGHT GREEN X
146 SERVO VENT SOLENOID CONTROL 20 WHITE PINK X
145 SERVO VACUUM SOLENOID CONTROL 20 GRAY BLACK X
144 SERVO SOLENOID FEED 20 ORANGE YELLOW X
6 HORN RELAY TO HORN 16 YELLOW LT. GREEN X
AMPLIFIER ASSEMBLY
CONNECTOR C-714
CONNECTOR C-717
(AMPLIFIER CENTRAL GROUNDING POINT)
15 AMP FUSE IN FUSE PANEL
IGNITION SWITCH
DASH PANEL
GROMMET
CONNECTS TO SERVO ACTUATOR ASSEMBLY
SERVO ASSEMBLY
CLUTCH SWITCH (SF6451 NORMALLY OPEN BUT BIASED CLOSED – INSTALLED IN VEHICLE WITH MANUAL TRANSMISSION
JUMPER WIRE (90821) USED IN VEHICLES WITH AUTOMATIC TRANSMISSION
HORN RELAY
+12V
20 AMP
BRAKE SWITCH
SENSOR
HORN
COAST
RESUME
SET
ON
OFF
2.2K OHM
680 OHM
120 OHM
HORN SWITCH
TURN SIGNAL SWITCH
TURN SIGNAL SWITCH ARE SHOWN
C-305
CONNECTOR "Y"
CONNECTOR "X"
C-713
20 A FUSE
38
37
297
296
57
151
511A
460
511
6
1
144
145
146
147
148
149
57A
150
5118

Fig. 4 Speed control wiring diagram. 1981 F-100-350 & Bronco

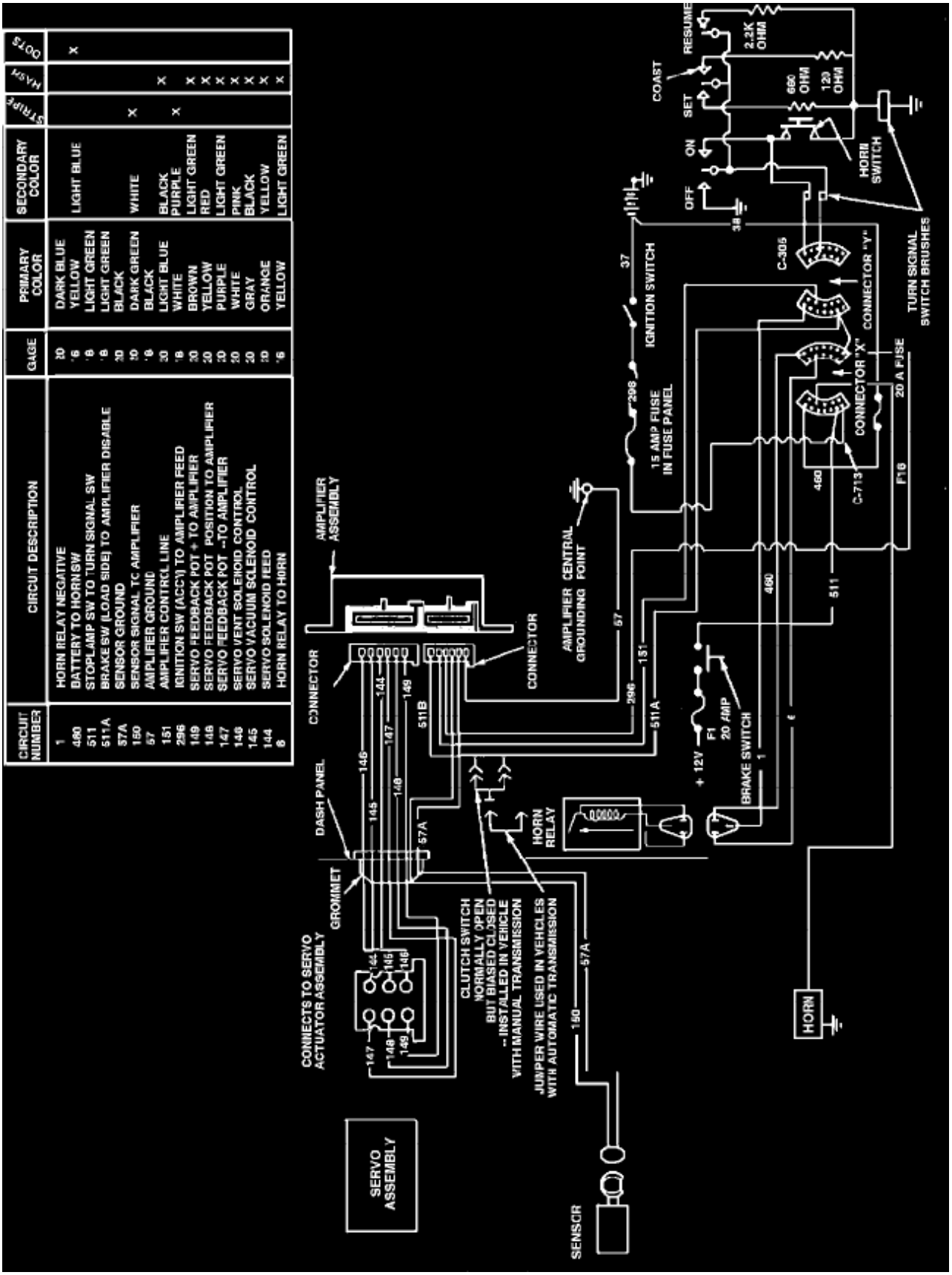

CIRCUIT NUMBER
CIRCUIT DESCRIPTION
GAGE
PRIMARY COLOR
SECONDARY COLOR
STRIPE
HASW
DOTS
1 HORN RELAY NEGATIVE 20 DARK BLUE
480 BATTERY TO HORN SW 18 YELLOW LIGHT BLUE X
511 STOPLAMP SW TO TURN SIGNAL SW 18 LIGHT GREEN
511A BRAKE SW (LOAD SIDE) TO AMPLIFIER DISABLE 18 LIGHT GREEN
57A SENSOR GROUND 20 BLACK
150 SENSOR SIGNAL TC AMPLIFIER 20 DARK GREEN WHITE X
57 AMPLIFIER GROUND 18 BLACK X X
151 AMPLIFIER CONTROL LINE 20 LIGHT BLUE BLACK X
296 IGNITION SW (ACC'I) TO AMPLIFIER FEED 18 WHITE PURPLE X
149 SERVO FEEDBACK POT + TO AMPLIFIER 20 BROWN LIGHT GREEN X X
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147 SERVO FEEDBACK POT --TO AMPLIFIER 20 PURPLE LIGHT GREEN X X
146 SERVO VENT SOLENOID CONTROL 20 WHITE PINK X X
145 SERVO VACUUM SOLENOID CONTROL 20 GRAY BLACK X X
144 SERVO SOLENOID FEED 20 ORANGE YELLOW X X
8 HORN RELAY TO HORN 18 YELLOW LIGHT GREEN X
SERVO ASSEMBLY
SENSOR
CONNECTS TO SERVO ACTUATOR ASSEMBLY
GROMMET
DASH PANEL
CONNECTOR
AMPLIFIER ASSEMBLY
CONNECTOR
CLUTCH SWITCH NORMALLY OPEN BUT BIASED CLOSED -- INSTALLED IN VEHICLE WITH MANUAL TRANSMISSION
JUMPER WIRE USED IN VEHICLES WITH AUTOMATIC TRANSMISSION
HORN RELAY
AMPLIFIER CENTRAL GROUNDING POINT
+ 12V
F1 20 AMP
BRAKE SWITCH
15 AMP FUSE IN FUSE PANEL
IGNITION SWITCH
20 A FUSE
F18
CONNECTOR "X"
CONNECTOR "Y"
C-713
C-305
TURN SIGNAL SWITCH BRUSHES
HORN SWITCH
COAST
RESUME
SET
ON
OFF
2.2K OHM
680 OHM
120 OHM
HORN

Fig. 5 Speed control wiring diagram. 1982---83 F-100-350, 1984---87 F-150-350 & 1982---87 Bronco

1981-87 Models Exc. 1983-87 Ranger, 1984-87 Bronco II & 1986-87 Aerostar

1. Locate horn relay wire connector marked X and Y, Figs. 3, 4 and 5.

2. Using connector X, locate wire 460, then using a suitable voltmeter, check for battery voltage at male side of connector.

3. Using connector Y, locate wire 1, then using a suitable voltmeter, check for battery voltage at female side of connector. Depress horn, voltmeter should read zero and horn should sound. If battery voltage remains, circuit is open. Connectors should remain connected during testing.

4. Check horn relay by momentarily grounding circuit 1 to chassis. This bypasses horn switch and horn should sound. If horn does not sound, check for battery voltage at connector X wire 6 during relay operation. If voltage is present at circuit 6 during relay operation, an open circuit is indicated between horn and connector X.

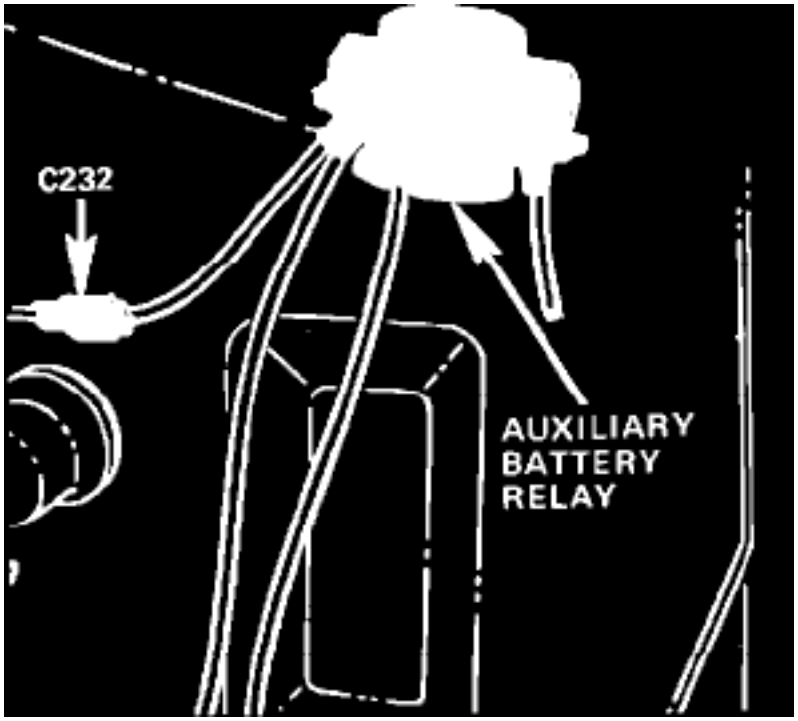
5. If relay does not operate with battery voltage present at circuit 460 and circuit 1 is grounded, replace relay.

Trailer Lighting Relay: Locations

On Dash Panel Below Junction Block

Trailer Lighting Module: Locations

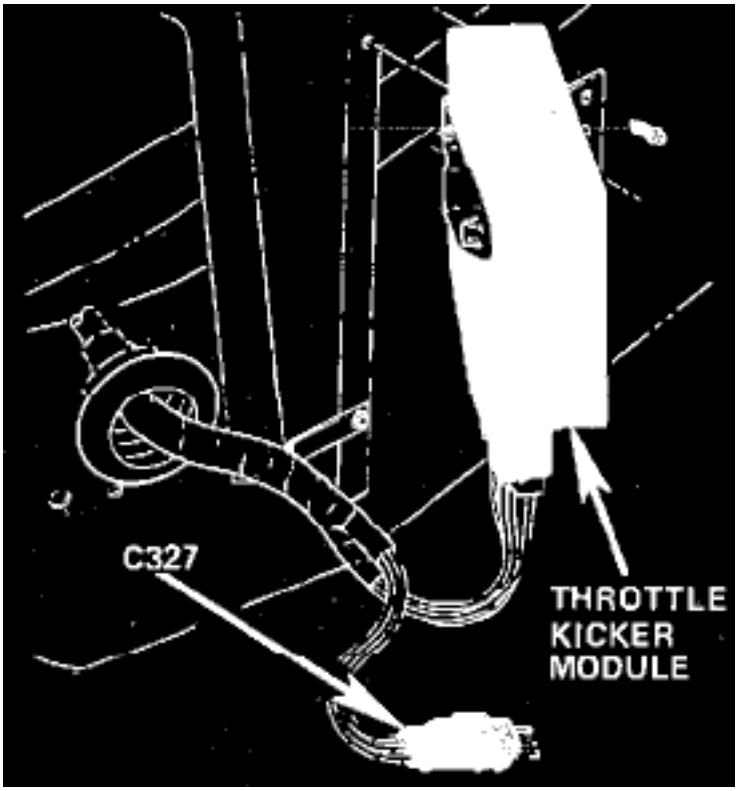
Attached To Brake Pedal



Power Protection Relay: Locations

LH Side Of Dash Panel

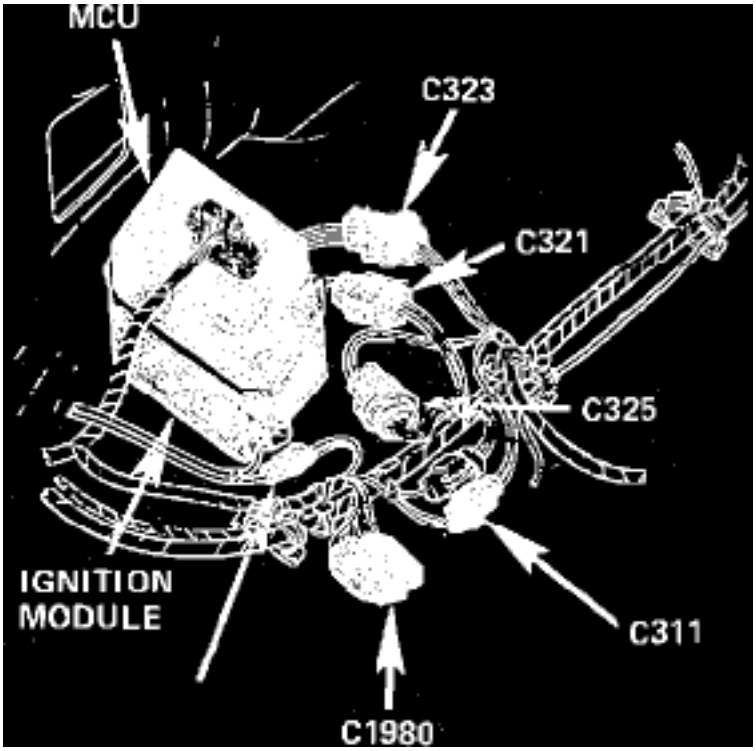
LH Side Of Dash Panel



Electronic Throttle Control Module: Locations

Under LH Side Of I/P

Under LH Side Of I/P

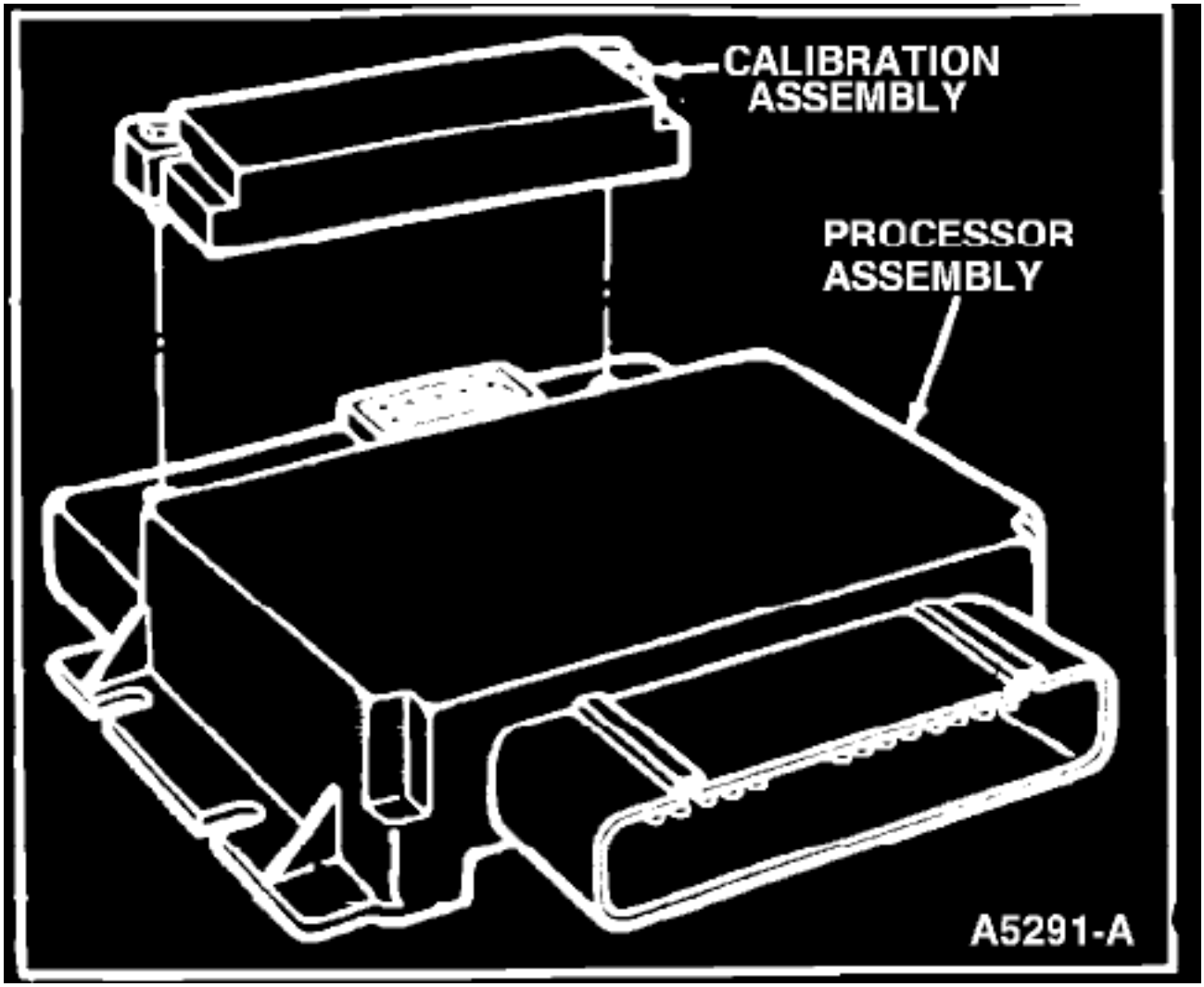


Engine Control Module: Locations

LH Inner Fender Well.

Above Ignition Module

Applicable to: 1981-83 w/MCU



Engine Control Module: Description and Operation

Fig. 7 Processor & calibration assembly

The Electronic Control Assembly (ECA), Fig. 7, is the brain of the system. It is a solid state pre-programmed micro-computer which consists of a processor assembly and a calibration assembly, Fig. 7. The processor assembly contains the electronic circuitry which performs the following functions within a fraction of a second:

a. Choose one of the sensor inputs for evaluation.

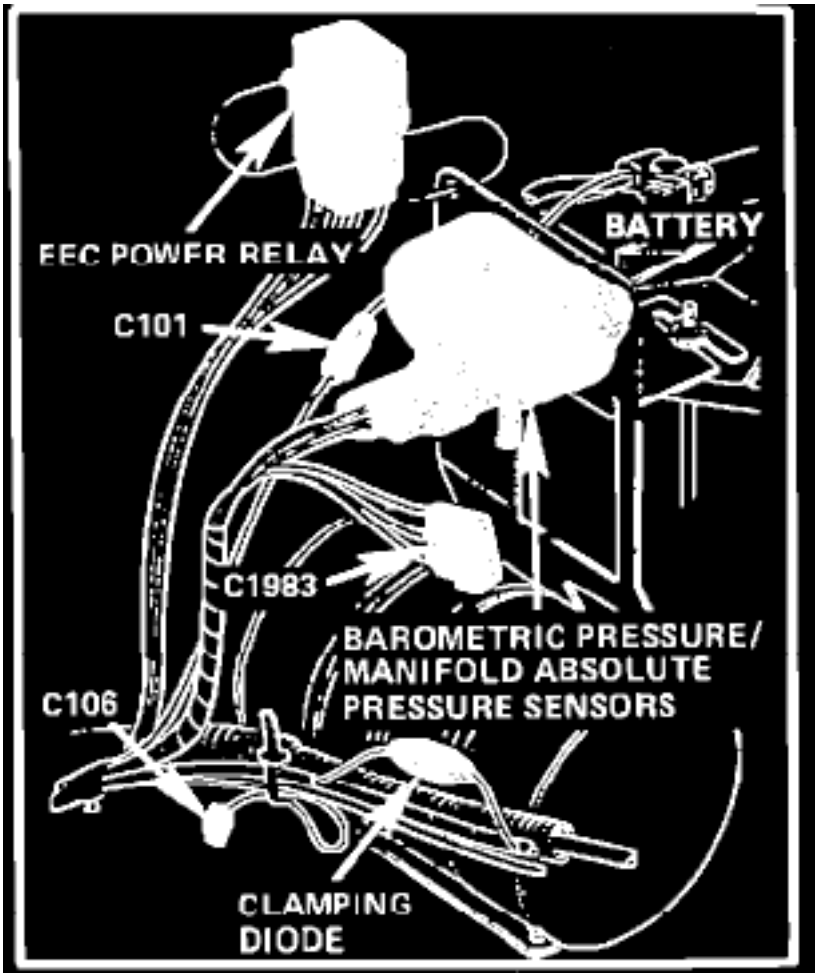
b. Converts the input to a form usable by the computer to use that signal for calculations.

c. Choose the proper operating strategy necessary for the operating conditions.

d. Perform spark, EGR, air/fuel ratio, canister purge, throttle kicker and other calculations.

e. Send electrical output control signals to the ignition module and control solenoids to adjust timing and dwell, EGR flow rate, thermactor air mode and throttle kicker mode.

The processor assembly also contains a separate power supply which provides a continuous reference voltage of about 9 volts nominal to the sensors. The calibration assembly, Fig. 7, contains electronic circuitry which provides calibration equations necessary for specific vehicle application for use by the processor assembly, and provides adjustments for octane problems. The calibration assembly is mounted on the processor assembly. The power relay supplies battery voltage to the EEC system and is mounted on the right hand side of the ECA mounting bracket. It also protects the ECA from possible damage due to reversed polarity.



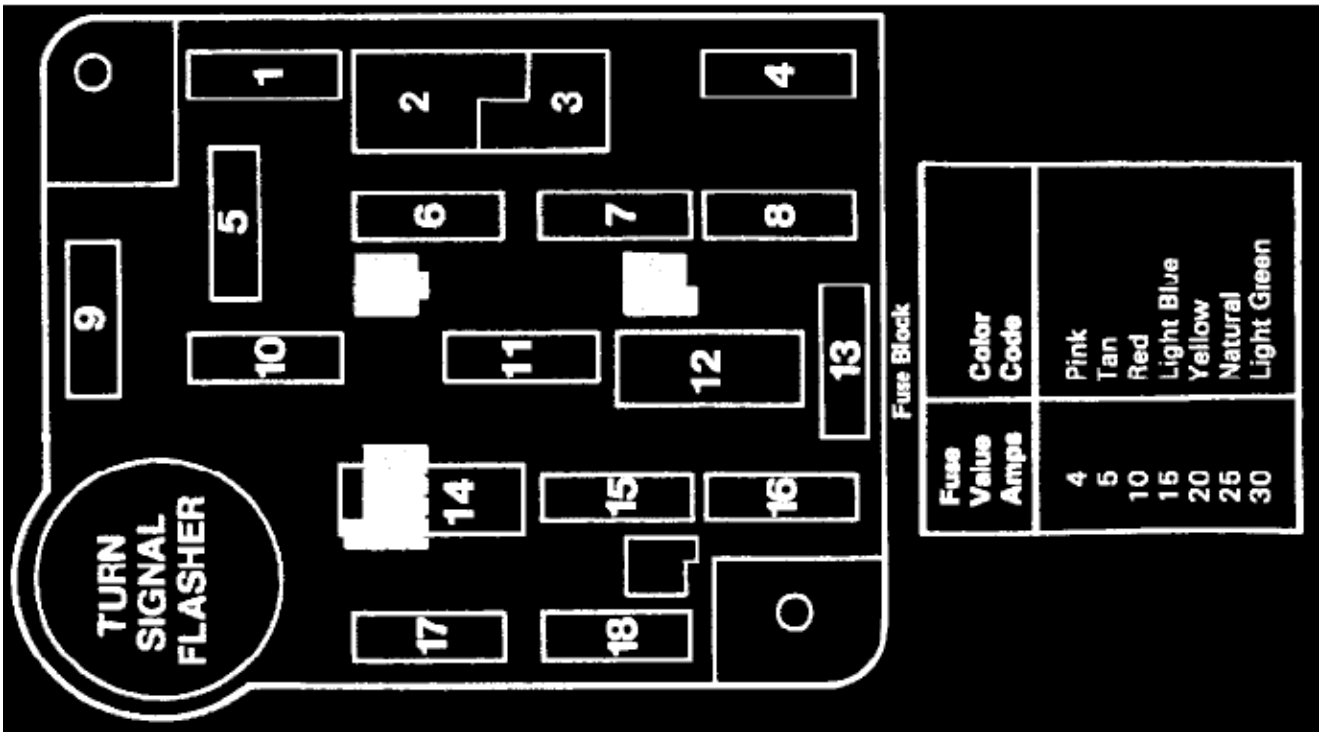
Main Relay (Computer/Fuel System): Locations

Forward Of RH Wheelwell At Battery.

RH Fender Apron

Applicable to: 1981-83

Fuse Position	Amps	Circuits Protected
1	20	Stop/Hazard Lights; Speed Control
2	--	(Not used)
3	--	(Not used)
4	15	Exterior Lights; Instrument Illumination
5	15	Turn Lights; Backup Lights
6	15	Speed Control; 4-Wheel Drive Indicator; Auxiliary Battery Control; Digital Clock; Auxiliary Heater; Feedback Carburetor Control
7	--	(Not used)
8	15	Courtesy, Dome, Cargo Lights; Warning Buzzer
9	30	Heater; A/C-Heater
10	--	(Not used)
11	15	Radio
12	25	Tailgate Power Window; Power Mirrors
13	30 c.b.	Power Door Locks
14	--	(Not used)
15	25	Tailgate Power Window
16	20 c.b.	Power Windows
17	10	Auxiliary Fuel Tank Selector
18	20	Horn; Cigar Lighter
	5	Instrument Illumination
	15	Seatbelt Buzzer; Warning Indicators; Carburetor Circuits; Tachometer; Choke Heater



Choke Relay: Locations

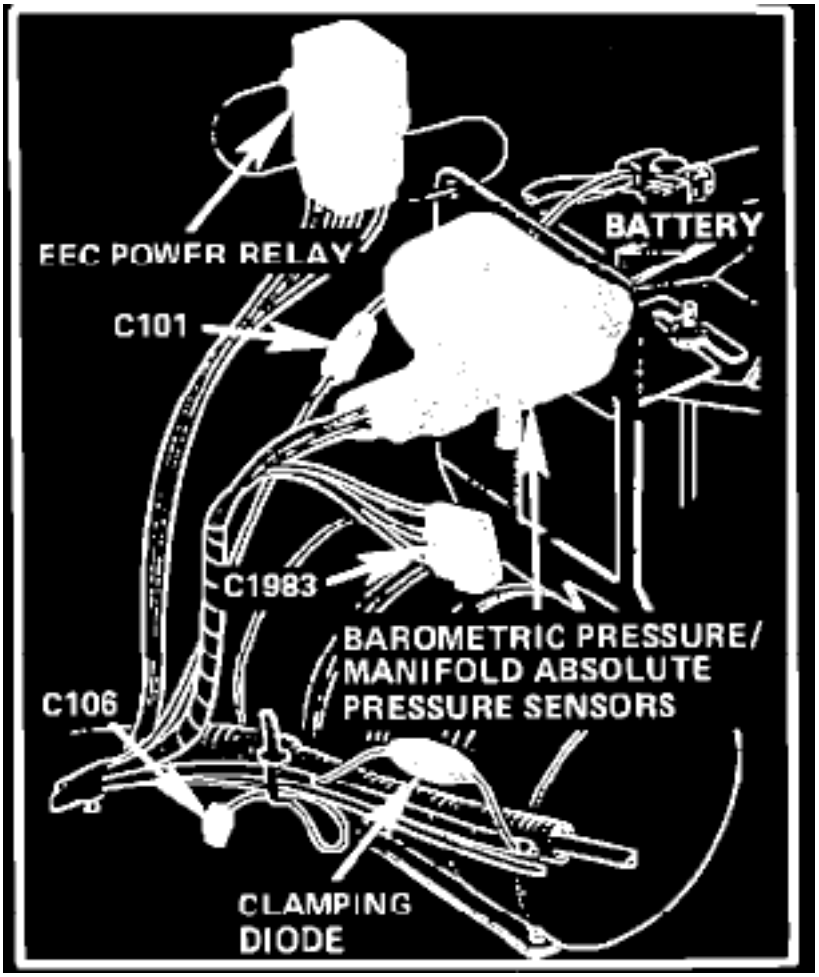
Fuse Block Description

Fuse Block

POWER DISTRIBUTION -

The alternator and battery are connected together at the starter relay hot terminal. Other circuits originate at the starter relay hot terminal and are protected by fuse links. Low power circuits are also protected by fuses.

- The ignition switch and light switch are powered at all times as are fuses 1, 4, 8, 10, and 16. The other fuses are powered through the ignition switch or the light switch.

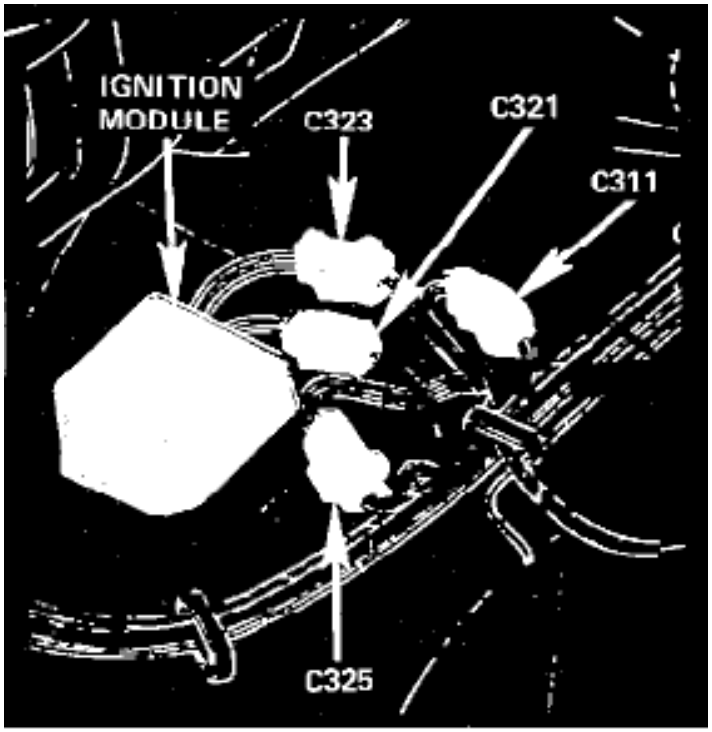


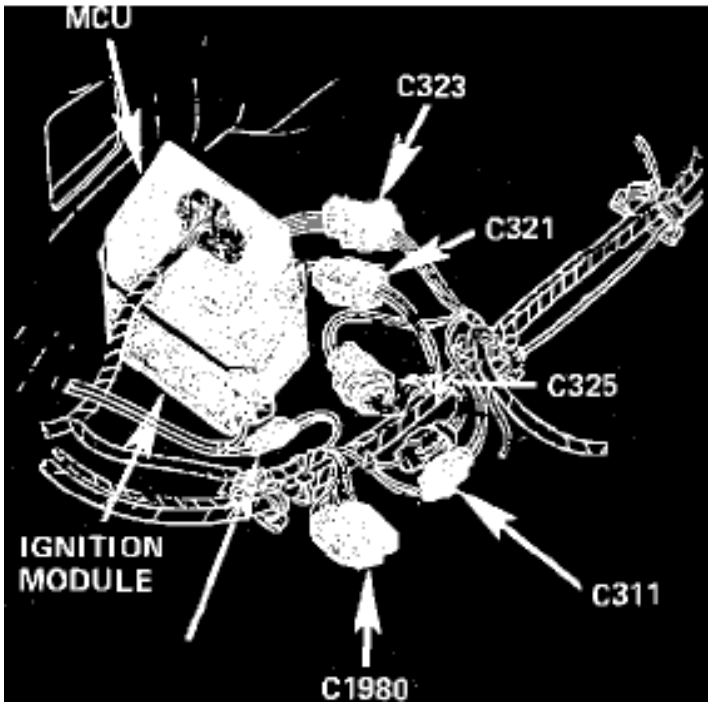
Main Relay (Computer/Fuel System): Locations

Forward Of RH Wheelwell At Battery.

RH Fender Apron

Applicable to: 1981-83


IGNITION MODULE
C323
C321
C311
C325


MCU
C323
C321
C325
IGNITION MODULE
C311
C1980

Ignition Control Module: Locations

LH Inner Fender Well.

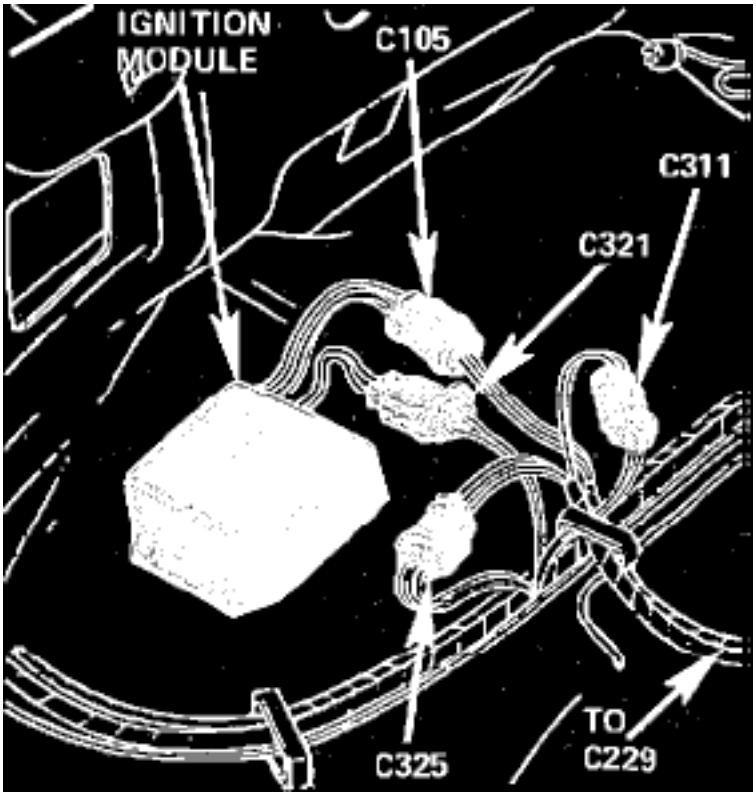
LH Inner Fender Well

Applicable to: 1981-83

LH Inner Fender Well.

LH Inner Fender Well

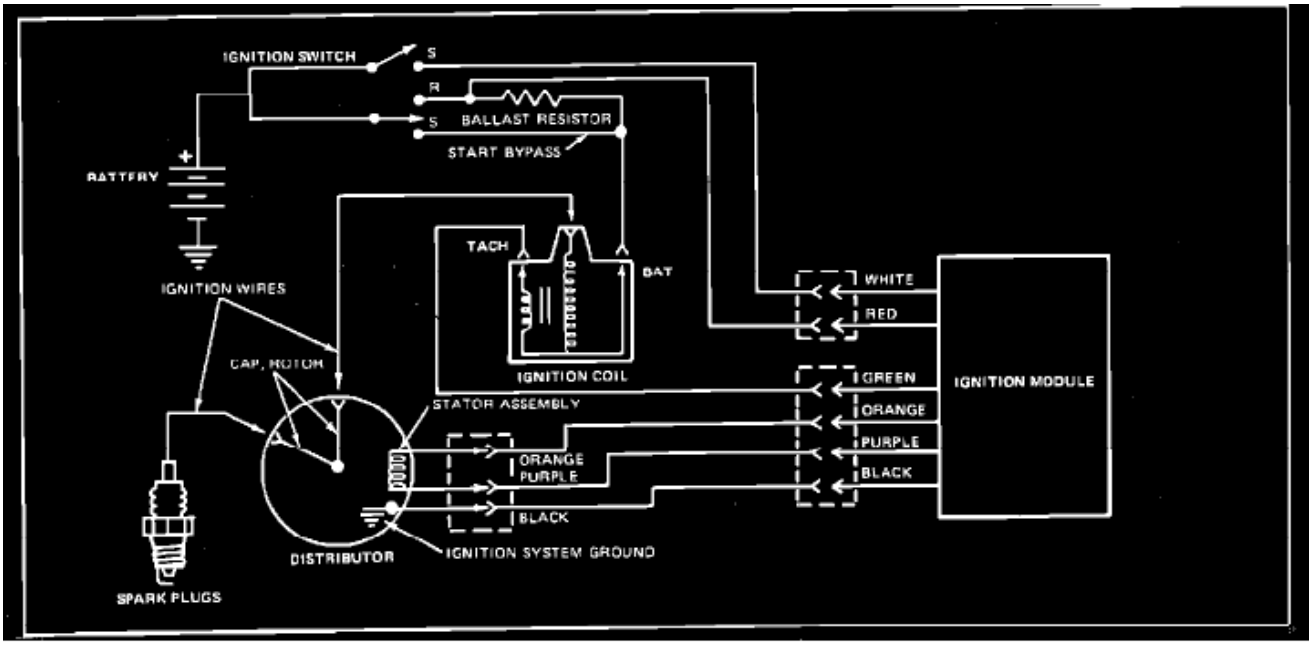
Applicable to: 1981-83 w/MCU

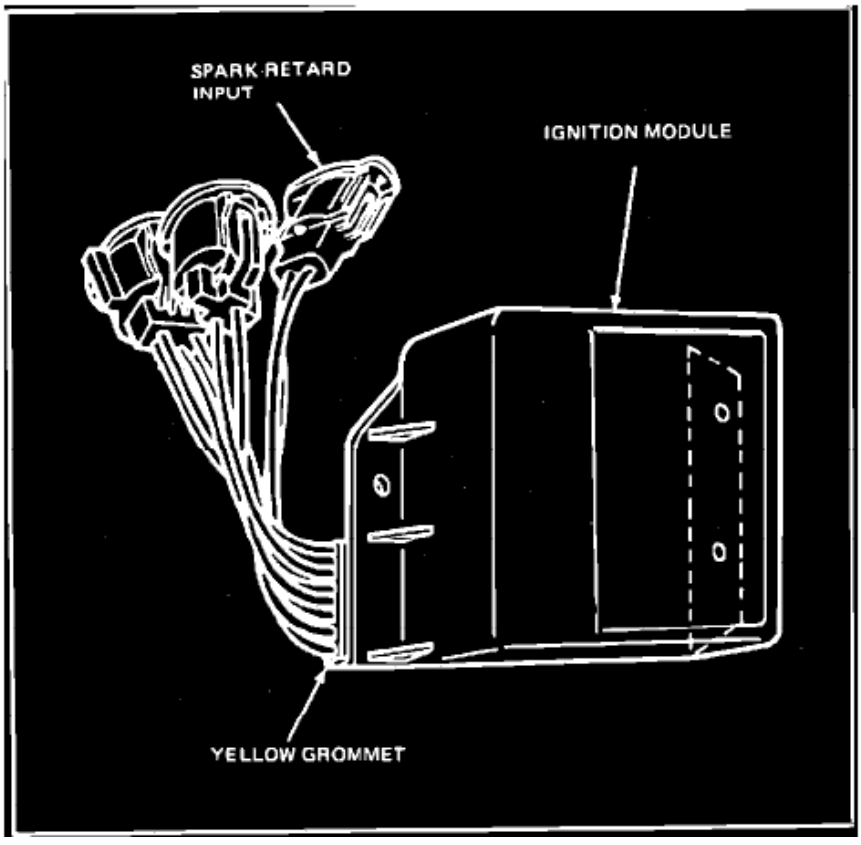


LH Inner Fender Well.

LH Inner Fender Well

Applicable to: 1981-83 w/EEC


IGNITION SWITCH
S
R
S
BALLAST RESISTOR
START BYPASS
BATTERY
+
IGNITION WIRES
TACH
BAT
IGNITION COIL
WHITE
RED
GREEN
ORANGE
PURPLE
BLACK
IGNITION MODULE
CAP, ROTOR
STATOR ASSEMBLY
ORANGE
PURPLE
BLACK
DISTRIBUTOR
IGNITION SYSTEM GROUND
SPARK PLUGS


SPARK RETARD INPUT
IGNITION MODULE
YELLOW GROMMET

Ignition Control Module: Description and Operation

Typical Ignition System

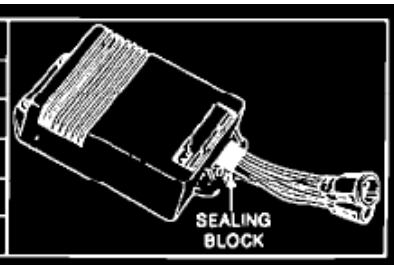
The Ignition Module shuts off the primary circuit each time it receives a pulse from the magnetic pick-up Fig. 9. A timing circuit in the ignition module turns the primary current back on after a short period of time. High voltage is created each time the magnetic field is built up and collapsed. The red ignition module wire provides operating voltage for the module's electronic components in the Run mode. The white module wire and start bypass provide increased voltage for the module and coil during Start mode.

Ignition Modules

Dura Spark II systems with UIM (Universal Ignition Module) Fig. 10 can respond to another control signal from either an Ignition Barometric Pressure Switch, Ignition Timing Vacuum Switch, or the Microprocessor Control Unit (MCU), depending on the engine calibration. Responding to this second signal, the UIM provides additional spark timing control for certain operating conditions by shutting off the ignition coil current flow at a different time than with just the distributor pick-up signal.

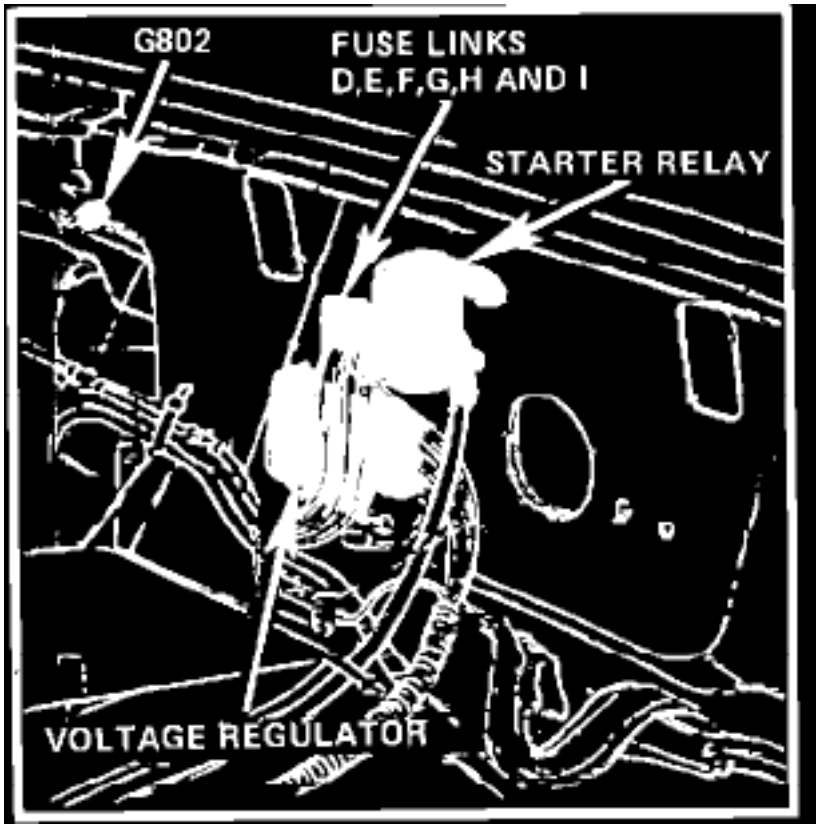
COLOR OF SEALING BLOCK*	TYPE OF IGNITION SYSTEM
Blue	Duraspark II
White	Duraspark II (Cranking Retard)
Yellow	Universal Ignition Module
Brown	Duraspark III (EEC-III System)
Blue (Module)	Thick-Film Ignition (TFI) Module

*Or Grommet.



Module Identification Chart

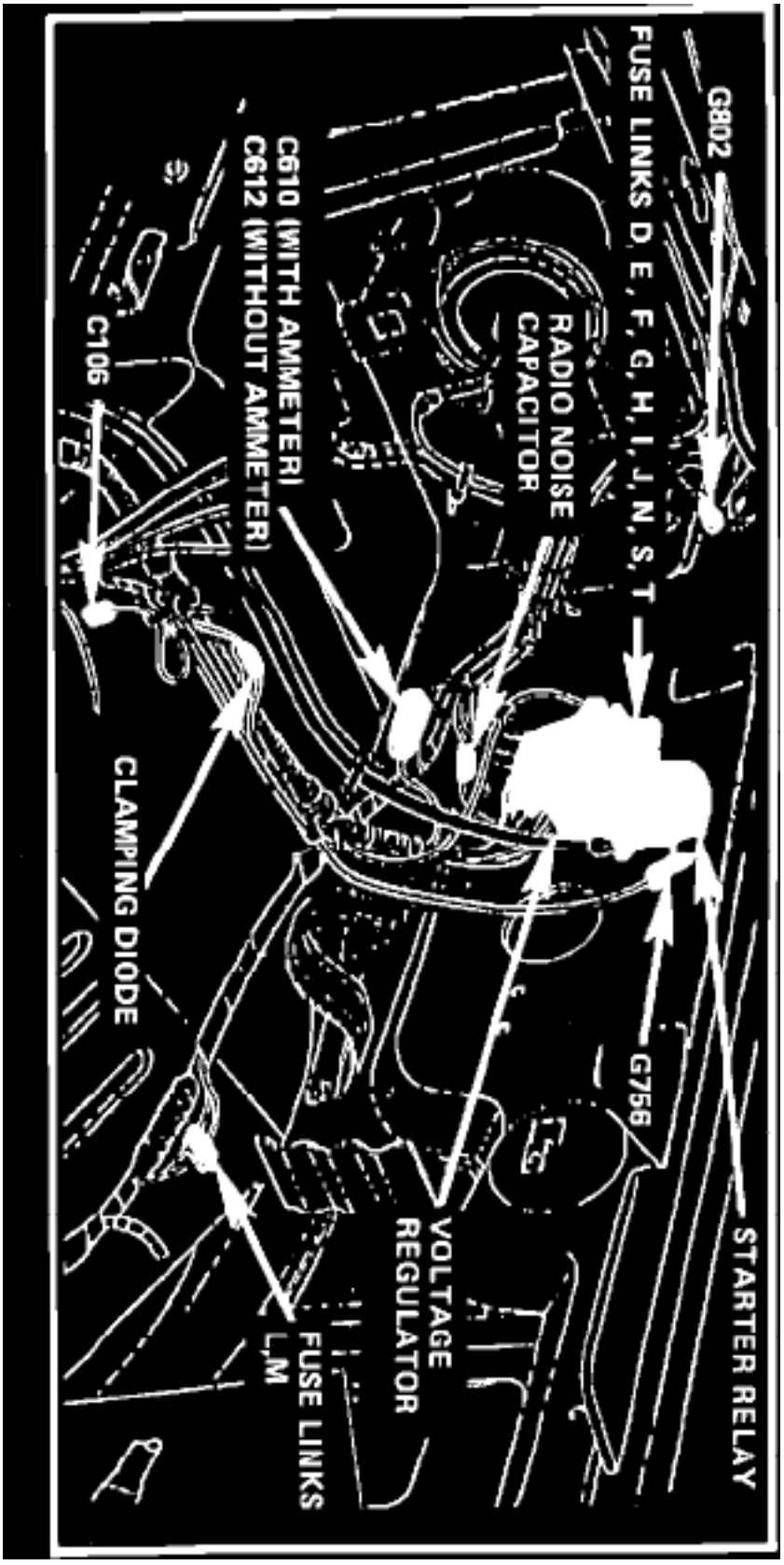
For proper ignition module identification refer to Fig. 1. The modules are not interchangeable, Dura Spark II has 6 wire connector while Dura Spark III has a 5 wire connector.



Starter Relay: Locations All Engine

RH Front Fender Apron

On RH Fender Apron


G802
FUSE LINKS D, E, F, G, H, I, J, N, S, T
RADIO NOISE CAPACITOR
C610 (WITH AMMETER)
C612 (WITHOUT AMMETER)
C106
CLAMPING DIODE
G756
STARTER RELAY
VOLTAGE REGULATOR
FUSE LINKS L,M

Starter Relay: Locations 1981-82 All & 1983-85 W/EEC

RH Front Fender Apron.

On RH Fender Apron

Applicable to: 1981-82 All & 1983-85 w/EEC

Heated Glass Element Relay: Locations

Under LH Corner Of I/P

Wiper Control Module: Locations

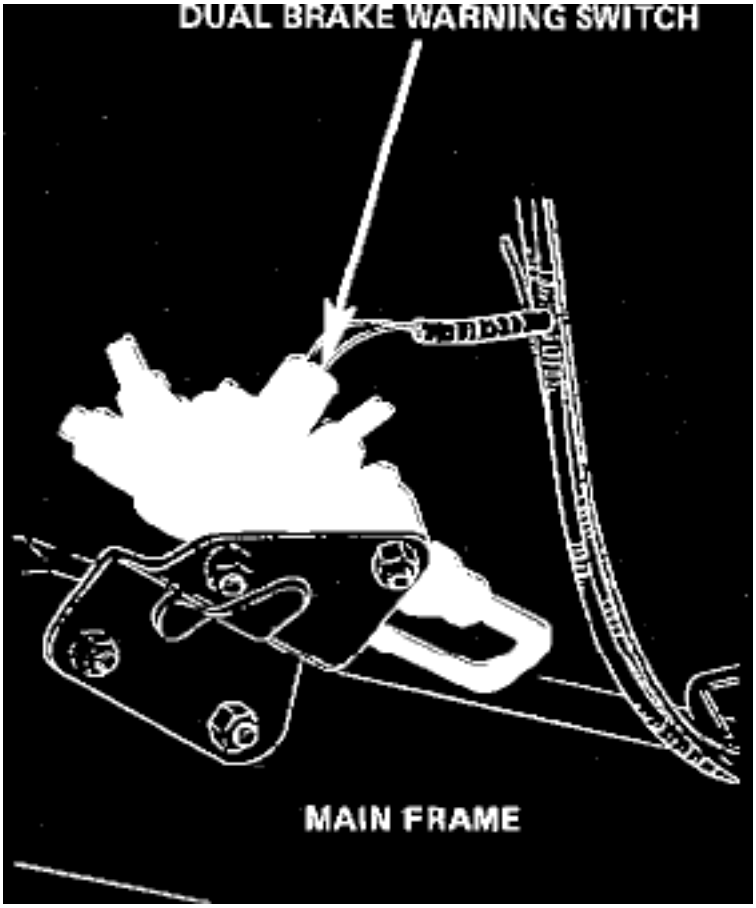
LH Side Of I/P

Power Door Lock Switch: Locations

In Respective Doors

Power Mirror Switch: Locations

In LH Door



Brake Fluid Pressure Sensor/Switch: Locations

RH Frame Mainmember, Behind Cab.

Attached To LH Frame Member

Applicable to: 1981-83

Engine	Year	Sensor	Resistance Ohms @ deg. F/C
All w/EEC IV	1983-90	Coolant, Air Charge	31,700-42,900 @ 68/20 13,650-18,650 @ 104/40 6500-8900 @ 140/60 3240-4440 @ 176/80 1770-2370 @ 212/100 980-1380 @ 248/115
All w/EEC III	1981-83	Coolant, Air Charge	1100-6000 1700-60,000

TEMPERATURE SENSORS

Coolant Temperature Sensor/Switch (For Computer): Description and Operation

This sensor incorporates a thermistor in a brass housing with an integral wiring connector extending from the body. This sensor is installed in the heater outlet fitting of the intake manifold. The thermistor is a resistor whose resistance value is high at low temperatures and decreases as the temperature rises. The computer applies a voltage to the sensor and monitors the resultant voltage drop across the thermistor.

Radiator Cooling Fan Temperature Sensor / Switch: Specifications Switch Torque

Switch Torque

Cooling Fan Switch 8-18 ft.lb

Ford Bronco Workshop Manual (V8-351 5.8L VIN G 2-bbl (1982))
Ford Workshop Manuals > Sensors and Switches > Sensors and Switches - Cooling System > Engine - Coolant Temperature Sensor/Switch > Temperature Sensor (Gauge) > Component Information > Technical Service Bulletins > Temperature Gauge - Reads Low/Erratic

Temperature Sensor (Gauge): Technical Service Bulletins Temperature Gauge - Reads Low/Erratic

Article No. 95-13-2

07/03/95

^ GAUGE - TEMPERATURE-READS IN LOW RANGE - ERRATIC READINGS

^ SERVICE PARTS - RETURN OF OBSOLETE TEMPERATURE SENDERS

FORD: 1981-94 ESCORT 1981-95 MUSTANG, THUNDERBIRD 1983-95 CROWN VICTORIA 1984-94 TEMPO 1986-95 TAURUS

LINCOLN-MERCURY: 1981-92 TOWN CAR 1981-95 COUGAR 1983-95 GRAND MARQUIS 1984-92 MARK VII 1984-94 TOPAZ 1986-95 SABLE 1987-89 TRACER 1991-94 TRACER 1993-95 MARK VIII

LIGHT TRUCK: 1982-95 BRONCO 1983-95 RANGER 1986-94 AEROSTAR 1990-95 F-150-350 SERIES 1991-95 EXPLORER 1992-95 ECONOLINE 1995 WINDSTAR

ISSUE: Temperature Sender F1SZ-10884-A with a build date code prior to 2774 (277th day of 1994) should be purged from your inventory and returned to your facing PDC. These parts are being made obsolete because of an incorrect crimp during assembly. Installing these parts on a vehicle could result in early loss of temperature sender function.

ACTION: Remove and return the suspect parts from your dealership's inventory. The obsolete parts should be withdrawn from your inventory and returned to your facing PDC within 30 days of this TSB.

NOTE:

USE TSB ARTICLE 93-24-8 FOR DIAGNOSIS PROCEDURE IN DETERMINING IF LOW GAUGE READINGS COULD BE ASSOCIATED WITH A TEMPERATURE SENDER CONCERN.

1. Perform 100% sort of all stock on hand.

2. Suspect stock has a build date code prior to 2774. Usable stock will have a build date code of 2774 or later.

NOTE:

DATE CODES ARE LOCATED ON THE SIDE OF THE SENDER HEX.

3. Usable stock can be returned to your inventory and released for normal sales.

4. Return suspect part (F1SZ-10884-A) to your facing PDC using the least expensive transportation.

5. If claim is processed electronically via DOES II, use return code "GB"; otherwise, complete a separate paper claim form FPS-340 using return code "J".

6. In the Remarks Section, write "Returned per TSB 95-13-2".

LIMITS

^ The returns must be received within 30 days from the date of this TSB.

^ Returns are restricted to the subject parts.

^ The parts returned must have been purchased from FCSD in accordance with Policy and Procedure Bulletin 4000.

CREDIT

Credit for parts and prepaid freight costs will be issued.

Replacement stock is available for ordering

PART NUMBER PART NAME

F1SZ-10884-A Temperature Sender

OTHER APPLICABLE ARTICLES: 93-24-8

WARRANTY STATUS: INFORMATION ONLY

OASIS CODES: 203000, 203200, 204000, 204200, 402000

Brake Switch (Cruise Control): Testing and Inspection

Perform this test only when brake application will not disconnect the speed control system.

1. Check operation of stop lamps by applying approximately 6 lbs. of pressure to brake pedal. If more than 6 lbs. is required, check brake pedal actuation and stop lamp switch.

2. If stop lamps do not function properly, check bulbs, circuit fuse or stop lamp switch.

3. If stop lamps function properly, check for battery voltage at 6 way connector using black wire w/green stripe on 1980 models, 1981-83 E-100-350 and 1984-87 E-150-350 series, or white wire w/pink stripe on 1981-82 F-100-350 and Bronco series, or white wire w/purple stripe on 1983 F-100-350, Bronco and Ranger, 1984-87 F-150-350, Ranger, 1984-87 Bronco II and 1986-87 Aerostar.

4. Depress brake pedal until stop lamps are illuminated. Check voltage at red wire w/black stripe on 1980 models, 1981-83 E-100-350 and 1984-87 E-150-350 models, or the light green wire on 1981-83 F-100-350 and Bronco, 1984-87 F-150-350 and Bronco, 1983-87 Ranger, 1984-87 Bronco II and 1986-87 Aerostar. The difference between the two voltage readings must not exceed 1.5 volts. If voltage is greater, a high resistance exists in the circuit and must be found and corrected.

Clutch Switch: Service and Repair

1. Remove bracket mounting screw(s).
2. Disconnect electrical connector and remove switch and bracket assembly.
3. Remove switch from bracket.
4. Reverse procedure to install.

Cruise Control Switch: Locations

In Steering Wheel Hub Assembly

Cruise Control Switch: Testing and Inspection

1980-87 Models Exc. 1983-87 Ranger, 1984-87 Bronco II & 1986 Aerostar Disconnect 6 way connector from control switch at the amplifier, then perform the following checks:

1. Connect a voltmeter between light blue-black hash lead and ground, then depress the ``On'' button and check for battery voltage.

2. Turn ignition ``Off,'' then connect an ohmmeter between light blue-black hash lead and ground.

3. Rotate steering wheel throughout its full range while making the following checks:

a. Depress ``Off'' button and check for a reading of 0-1 ohm. b. Depress ``Set'' button and check for a reading of 646-714 ohms. c. Depress and hold ``Coast'' switch and check for a reading of 114-126 ohms. d. On models with ``Resume,'' depress and hold ``Resume'' switch and check for a reading of approximately 2200 ohms.

4. If resistance values are not as specified, inspect wiring, slip rings, turn signal copper brushes, speed control switch and steering column for proper ground. Check for proper ground by connecting an ohmmeter between upper steering column flange and a suitable ground. Resistance should be less then 1/2 ohm. Rotate steering wheel throughout its full range and ensure flexible coupling has a resistance of less than 1 ohm.

Cruise Control Switch: Service and Repair

1. Remove steering wheel pad attaching screws from behind steering wheel.

2. While pulling pad away from steering wheel, disconnect horn and speed control wire connectors and remove pad.

3. Remove retaining nuts securing the speed control switches and trim plate retainer to the steering wheel pad.

4. Disconnect wiring connector on rear of steering wheel pad assembly, then remove switch and trim retainer assembly.

5. Remove speed control switches by snapping out of plastic retainer.

6. To remove the ground brush, remove steering wheel for access.

7. Snap the ground brush assembly out of the turn signal switch.

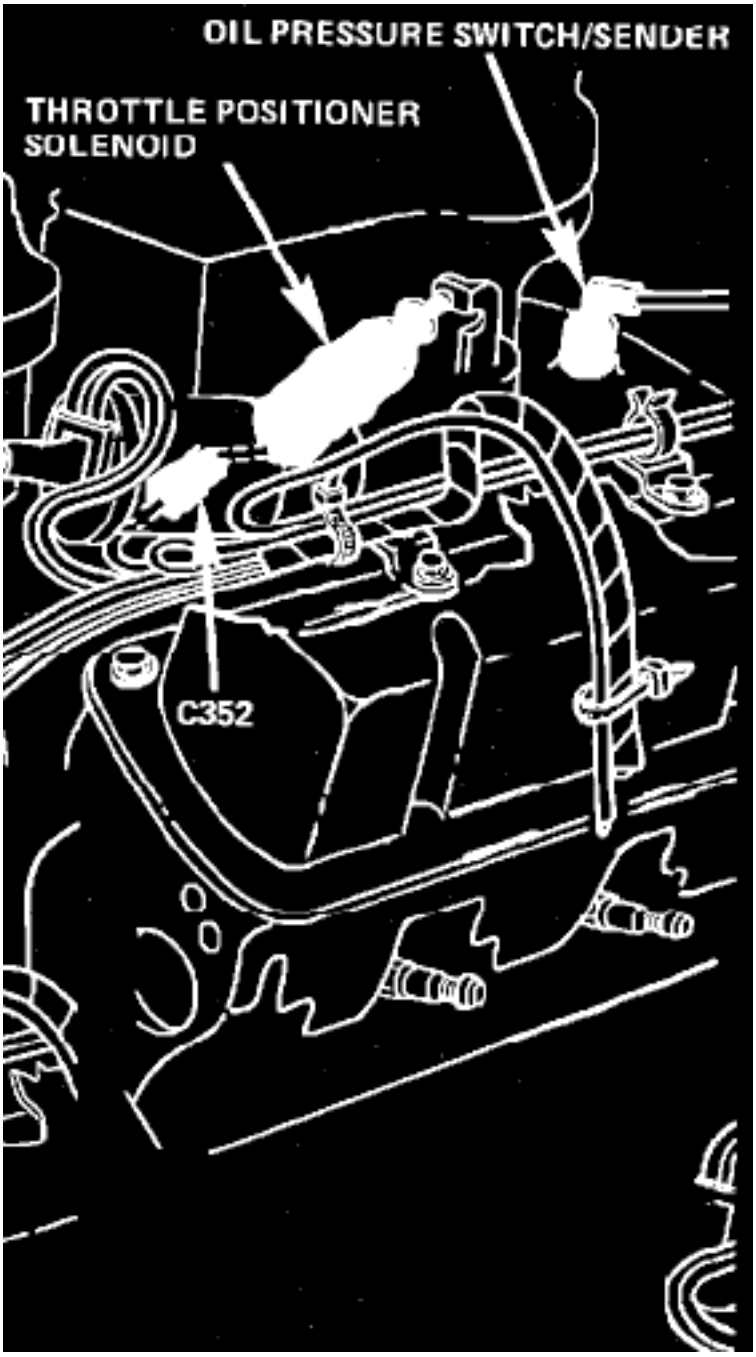
8. Reverse procedure to install.

Vehicle Speed Sensor/Transducer - Cruise Control: Testing and Inspection

1980-87 Models Exc. 1983-87 Ranger, 1984-87 Bronco II & 1986-87 Aerostar

1. Disconnect 6 way connector from amplifier assembly, then connect an ohmmeter between dark green wire w/white stripe and black wire on 1980 E-100-350, 1981-83 F-100-350 models and Bronco, and 1984-87 F-150-350 and Bronco, or green and black wire on 1980 F-100-350 and 1981-83 E-100-350 models and 1984-87 E-150-350 at the speed sensor end. A reading of 40 ohms should be obtained. A reading of 0 ohms indicates a shorted coil and an infinity reading indicates an open coil.

2. Replace sensor if a correct reading has not been obtained.

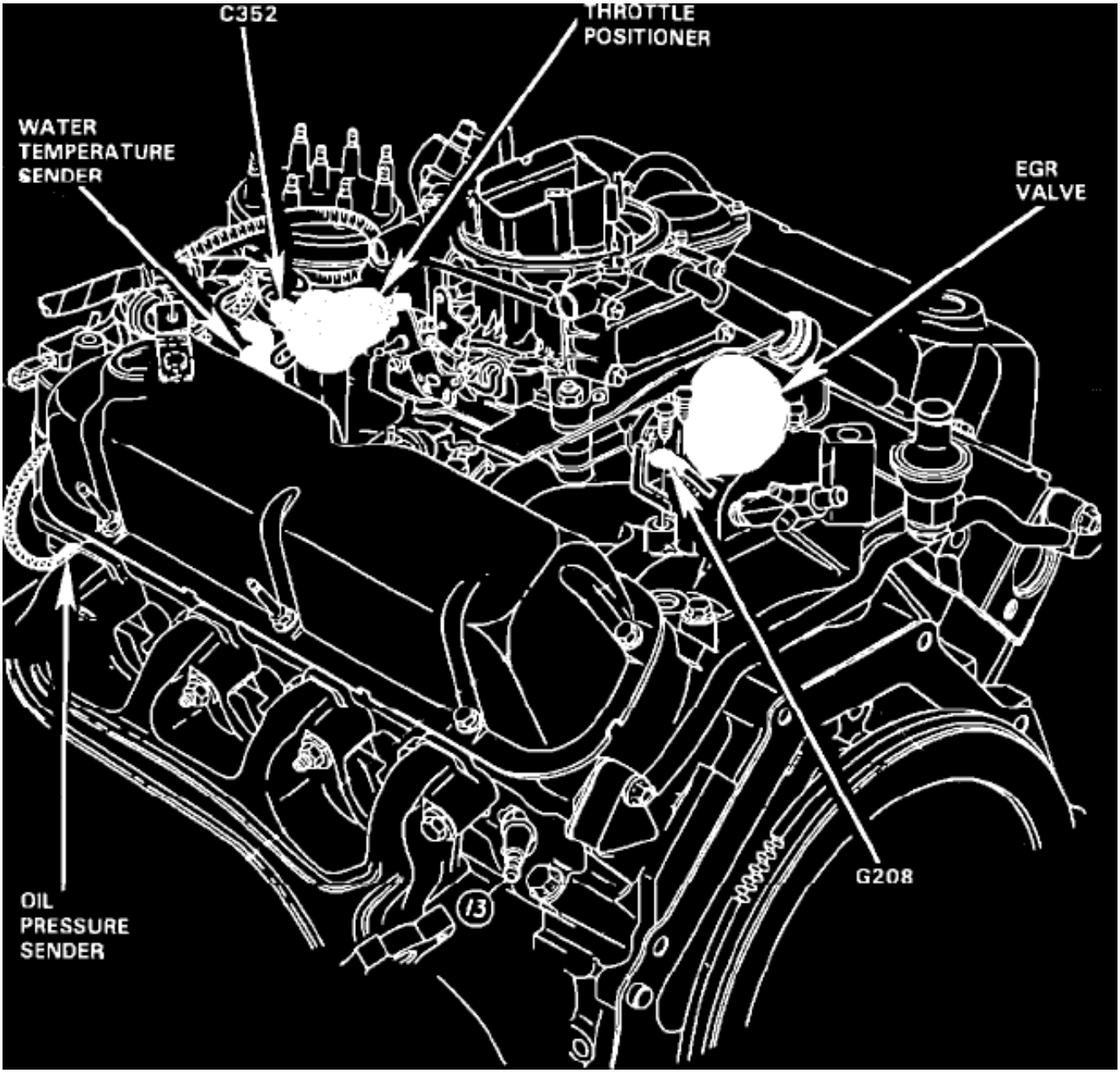


Oil Pressure Sender: Locations

LH Side Of Engine.

Rear Top Of Engine Block

Applicable to: 1981-82 V8-351M/5.8L & V8-400/6.6L Engines



LH Side Of Engine.

Rear Top Of Engine Block

Applicable to: 1985 V8-351/5.8L Engine w/4 Barrel Carb. Except Calif.

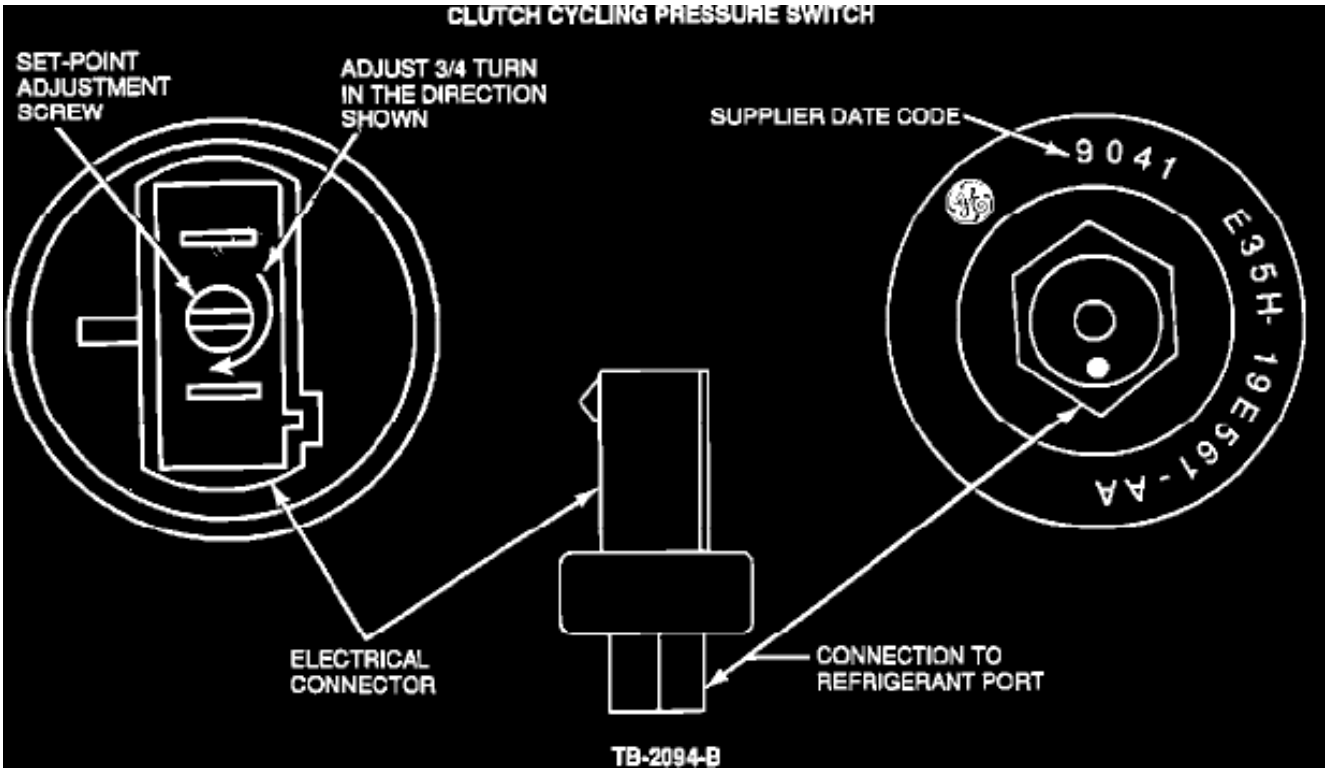
Blower Motor Switch: Locations Auxiliary Heater Switch

A/C COOLING FAN CONTROLLER

Under LH Side Of I/P

Blower Motor Switch: Locations Blower Control Switch

At Center Of I/P



Refrigerant Pressure Sensor / Switch: Customer Interest A/C System - Chemical/Refrigerator Type Odor

Article No. 91-15-5

07/24/91

AIR CONDITIONING - "REFRIGERATOR TYPE SMELL" OR "CHEMICAL TYPE ODOR" A/C SYSTEM - VEHICLES BUILT BEFORE 10/15/90

FORD: 1980-91 CROWN VICTORIA 1981-91 ESCORT 1982-83 FAIRMONT 1982-88 EXP 1982-91 MUSTANG, THUNDERBIRD 1983-86 LTD 1984-91 TEMPO 1986-91 TAURUS 1989-91 PROBE

LINCOLN-MERCURY: 1980-91 GRAND MARQUIS, MARK VII, TOWN CAR 1981-87 LYNX 1982-83

LN7, ZEPHYR

1982-86 CAPRI 1982-91 CONTINENTAL, COUGAR 1983-86 MARQUIS 1984-91 TOPAZ 1986-91 SABLE

LIGHT TRUCK: 1980-91 BRONCO, F-150-350 SERIES 1982-91 RANGER 1983-90 BRONCO II 1986-91 AEROSTAR 1988-91 ECONOLINE, F SUPER DUTY, F-47 1991 EXPLORER

This TSB article is being republished in its entirety to include Labor Standards for the Taurus, Sable and Probe vehicle models.

ISSUE: A "refrigerator type smell" or "chemical type" odor may come from some A/C systems. As the calibration of the clutch cycling pressure switch drifts downward, the evaporator core temperature may drop too low. This results in a "refrigerator type smell" or "chemical type" odor as the system cycles on and off.

Figure 1

ACTION: Install a new recalibrated clutch cycling pressure switch or adjust the existing/non-recalibrated clutch cycling pressure switch. The recalibrated switch can be identified by a specific supplier date code stamped near the fitting end of the switch, Figure 1.

^ Recalibrated switches built in the 1990 calendar year begin with the supplier date code 9041 and run through 9052.

^ Recalibrated switches built in the 1991 calendar year start with the supplier date code 9101 and run through 9152.

ADJUSTMENT PROCEDURE

Adjust the existing/non-recalibrated A/C cycling pressure switch by using the following service procedure.

1. Disconnect the body wiring harness.

2. Turn the set screw located between the two electrical terminals 3/4 turn clockwise (looking into the electrical connection) Figure 1.

3. Reconnect the body wiring harness.

PART NUMBER PART NAME CLASS

E35Y-19E561-A A/C Cycling Pressure Switch AM

OTHER APPLICABLE ARTICLES: NONE SUPERSEDES:

91-11-8

WARRANTY STATUS: Eligible Under Basic Warranty Coverage OPERATION DESCRIPTION

TIME

911505A Install A/C Cycling 0.3 Hr.

Pressure Switch - Town Car, Escort, Lynx, EXP And LN7.

911505B Install A/C Cycling 0.4 Hr.

Pressure Switch - Tempo/ Topaz, Taurus/Sable, Probe.

911505C Install A/C Cycling 0.5 Hr.

Pressure Switch - Crown Victoria, Grand Marquis, Mark VII, Continental, Thunderbird, Cougar, Fairmont, Zephyr, Mustang, Capri, LTD And Marquis.

911505D Install A/C Cycling 0.4 Hr.

Pressure Switch - All Light Trucks.

911505E Adjust A/C Cycling Switch - 0.2 Hr.

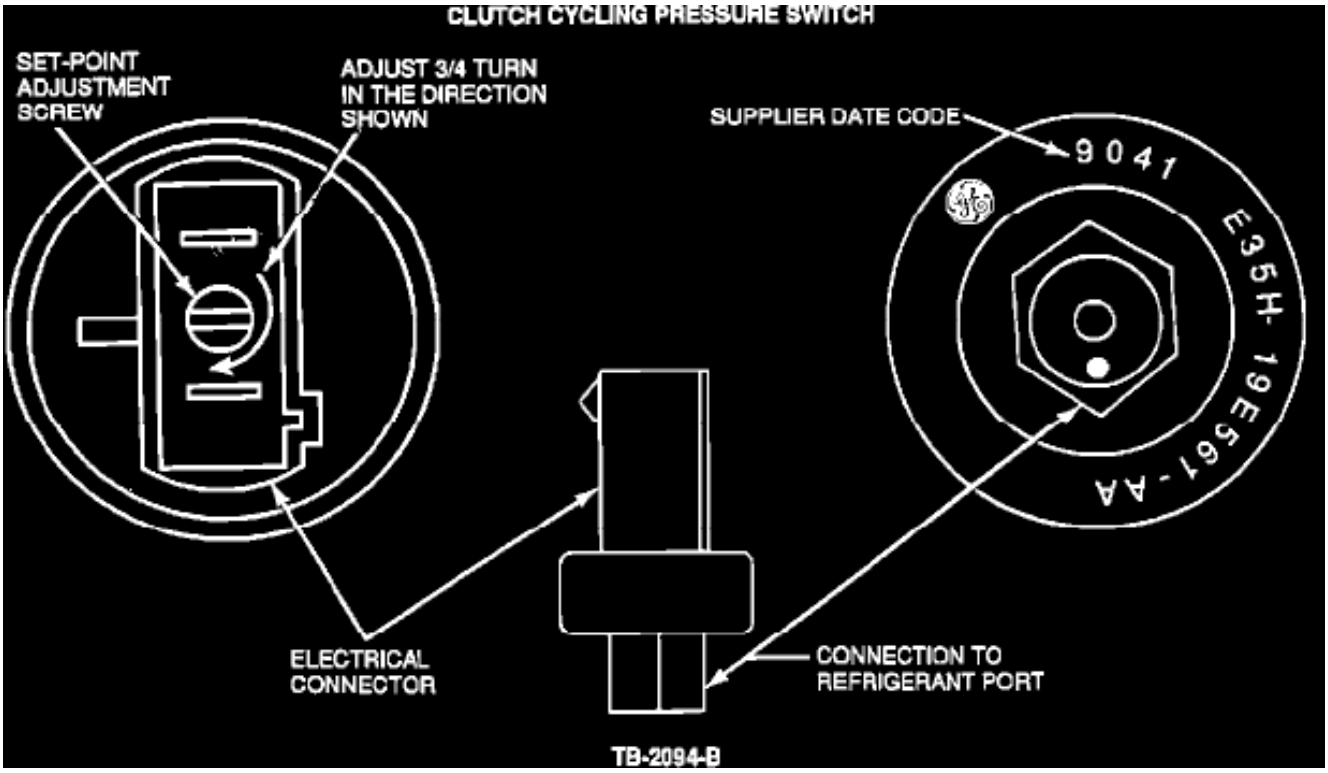
All

DEALER CODING

BASIC PART NO. CONDITION CODE

19E661 53

OASIS CODES: 208000, 208999



Refrigerant Pressure Sensor / Switch: All Technical Service Bulletins A/C System - Chemical/Refrigerator Type Odor

Article No. 91-15-5

07/24/91

AIR CONDITIONING - "REFRIGERATOR TYPE SMELL" OR "CHEMICAL TYPE ODOR" A/C SYSTEM - VEHICLES BUILT BEFORE 10/15/90

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LN7, ZEPHYR

1982-86 CAPRI 1982-91 CONTINENTAL, COUGAR 1983-86 MARQUIS 1984-91 TOPAZ 1986-91 SABLE

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2. Turn the set screw located between the two electrical terminals 3/4 turn clockwise (looking into the electrical connection) Figure 1.

3. Reconnect the body wiring harness.

PART NUMBER PART NAME CLASS

E35Y-19E561-A A/C Cycling Pressure Switch AM

OTHER APPLICABLE ARTICLES: NONE SUPERSEDES:

91-11-8

WARRANTY STATUS: Eligible Under Basic Warranty Coverage OPERATION DESCRIPTION

TIME

911505A Install A/C Cycling 0.3 Hr.

Pressure Switch - Town Car, Escort, Lynx, EXP And LN7.

911505B Install A/C Cycling 0.4 Hr.

Pressure Switch - Tempo/ Topaz, Taurus/Sable, Probe.

911505C Install A/C Cycling 0.5 Hr.

Pressure Switch - Crown Victoria, Grand Marquis, Mark VII, Continental, Thunderbird, Cougar, Fairmont, Zephyr, Mustang, Capri, LTD And Marquis.

911505D Install A/C Cycling 0.4 Hr.

Pressure Switch - All Light Trucks.

911505E Adjust A/C Cycling Switch - 0.2 Hr.

All

DEALER CODING

BASIC PART NO. CONDITION CODE

19E661 53

OASIS CODES: 208000, 208999

Refrigerant Pressure Sensor / Switch: All Technical Service Bulletins A/C - Pressure Cycling Switch Diagnostic Procedure

AIR CONDITIONING-CLUTCH PRESSURE CYCLING SWITCH DIAGNOSTIC PROCEDURE Article No. 89-14-10 FORD: 1980-89 CROWN VICTORIA 1981-89 ESCORT 1982-88 EXP 1982-89 MUSTANG, THUNDERBIRD 1983-86 LTD 1984-89 TEMPO

1986-89 TAURUS

LINCOLN-MERCURY: 1980-89 GRAND MARQUIS, MARK VI, MARK VII, TOWN CAR 1981-87 LYNX 1982-86 CAPRI 1982-89 CONTINENTAL, COUGAR 1983-86 MARQUIS 1984-89 TOPAZ 1986-89 SABLE

LIGHT TRUCK: 1980-89 BRONCO, F SERIES 1983-89 RANGER 1984-89 BRONCO II 1986-89 AEROSTAR 1988-89 ECONOLINE ISSUE:

Poor air conditioning cooling caused by low or no refrigerant charge often results in unnecessary replacement of the clutch cycling pressure switch. The switch is designed to work on system pressure. It closes at about 46 psi and opens at about 24.5 psi. It has a normal cycle (on and off) rate of 2 to 5 cycles per minute.

ACTION: If an inoperative or fast cycling pressure switch is found, use the following diagnostic charts before replacing the pressure switch.

DIAGNOSTIC PROCEDURE:

1. Connect a manifold gauge set to the service ports and check the system pressures. They should be above the closing pressure of the switch (46 psi).

2. If the A/C system pressures are above 46 psi and the clutch will not engage, proceed as follows:

^ Check the pressure switch harness connector and harness wires for a continuous open condition.

^ Check for an intermittent open or a poor connection between the connector and the pressure switch terminals.

a. If the harness connector and wires are OK, by-pass the pressure switch by jumping the two terminals of the connector. If the clutch still does not engage, THE PRESSURE SWITCH IS NOT DEFECTIVE. Refer to the respective EVTM for the clutch circuit schematic and circuit diagnosis. Repair as necessary.

3. Check the ambient temperature. If the ambient temperature is below 48~ F (9~ C), the system pressure will not be high enough to close the pressure switch (46 psi).

4. If the system does not contain refrigerant, the pressure will not be high enough to close the switch for compressor operation. Leak test, repair, evacuate and charge the system.

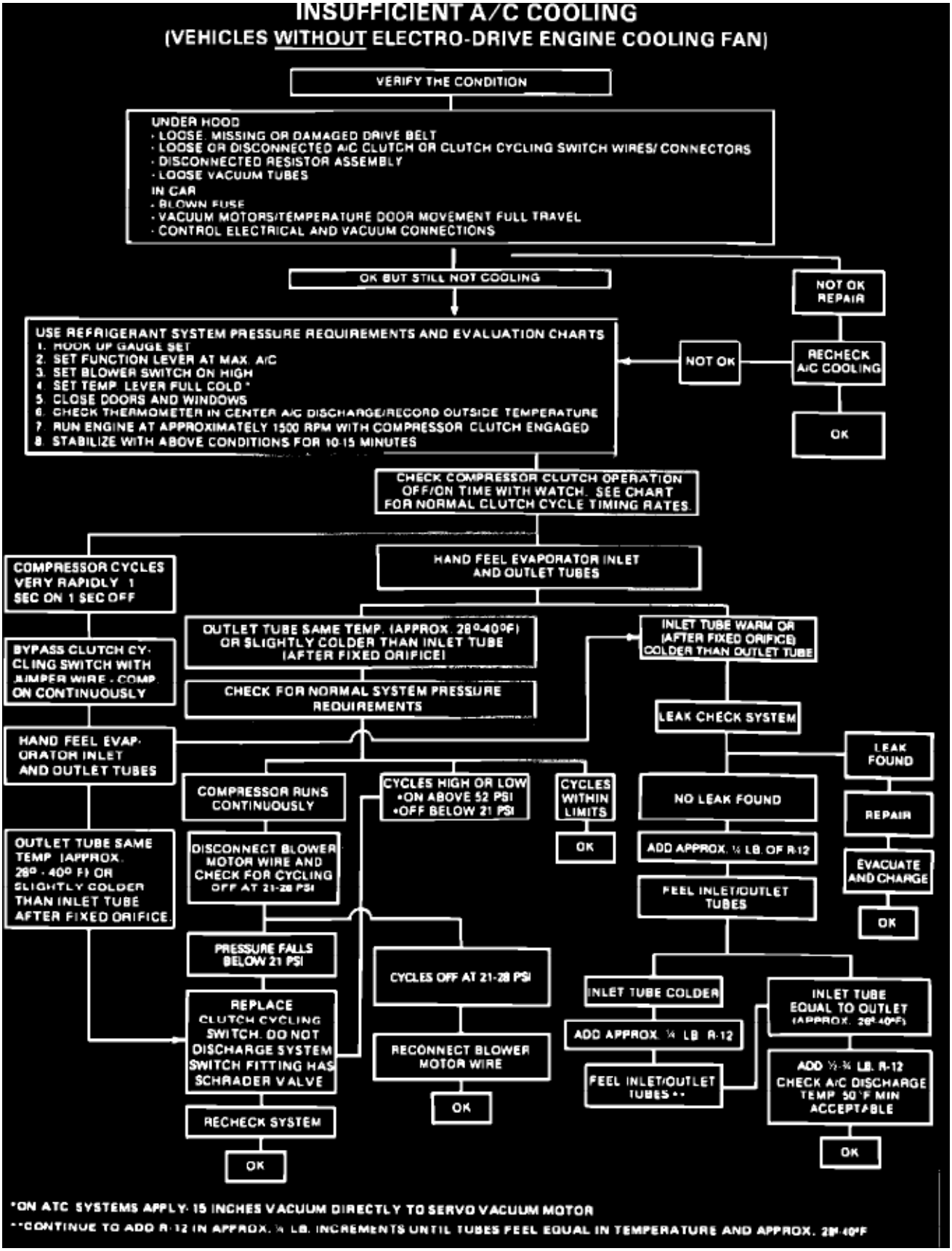

INSUFFICIENT A/C COOLING
(VEHICLES WITHOUT ELECTRO-DRIVE ENGINE COOLING FAN)
VERIFY THE CONDITION
UNDER HOOD
· LOOSE, MISSING OR DAMAGED DRIVE BELT
· LOOSE OR DISCONNECTED A/C CLUTCH OR CLUTCH CYCLING SWITCH WIRES/ CONNECTORS
· DISCONNECTED RESISTOR ASSEMBLY
· LOOSE VACUUM TUBES
IN CAR
· BLOWN FUSE
· VACUUM MOTORS/TEMPERATURE DOOR MOVEMENT FULL TRAVEL
· CONTROL ELECTRICAL AND VACUUM CONNECTIONS
OK BUT STILL NOT COOLING
NOT OK REPAIR
USE REFRIGERANT SYSTEM PRESSURE REQUIREMENTS AND EVALUATION CHARTS
1. HOOK UP GAUGE SET
2. SET FUNCTION LEVER AT MAX. A/C
3. SET BLOWER SWITCH ON HIGH
4. SET TEMP LEVER FULL COLD *
5. CLOSE DOORS AND WINDOWS
6. CHECK THERMOMETER IN CENTER A/C DISCHARGE/RECORD OUTSIDE TEMPERATURE
7. RUN ENGINE AT APPROXIMATELY 1500 RPM WITH COMPRESSOR CLUTCH ENGAGED
8. STABILIZE WITH ABOVE CONDITIONS FOR 10-15 MINUTES
NOT OK
RECHECK A/C COOLING
OK
CHECK COMPRESSOR CLUTCH OPERATION OFF/ON TIME WITH WATCH. SEE CHART FOR NORMAL CLUTCH CYCLE TIMING RATES.
COMPRESSOR CYCLES VERY RAPIDLY 1 SEC ON 1 SEC OFF
HAND FEEL EVAPORATOR INLET AND OUTLET TUBES
BYPASS CLUTCH CYCLING SWITCH WITH JUMPER WIRE - COMP. ON CONTINUOUSLY
OUTLET TUBE SAME TEMP. (APPROX. 28°-40°F) OR SLIGHTLY COLDER THAN INLET TUBE (AFTER FIXED ORIFICE)
INLET TUBE WARM OR (AFTER FIXED ORIFICE) COLDER THAN OUTLET TUBE
CHECK FOR NORMAL SYSTEM PRESSURE REQUIREMENTS
LEAK CHECK SYSTEM
HAND FEEL EVAPORATOR INLET AND OUTLET TUBES
LEAK FOUND
COMPRESSOR RUNS CONTINUOUSLY
CYCLES HIGH OR LOW
•ON ABOVE 52 PSI
•OFF BELOW 21 PSI
CYCLES WITHIN LIMITS
NO LEAK FOUND
REPAIR
OUTLET TUBE SAME TEMP (APPROX. 28° - 40° F) OR SLIGHTLY COLDER THAN INLET TUBE AFTER FIXED ORIFICE.
DISCONNECT BLOWER MOTOR WIRE AND CHECK FOR CYCLING OFF AT 21-28 PSI
OK
ADD APPROX. ¼ LB. OF R-12
EVACUATE AND CHARGE
FEEL INLET/OUTLET TUBES
OK
PRESSURE FALLS BELOW 21 PSI
CYCLES OFF AT 21-28 PSI
INLET TUBE COLDER
INLET TUBE EQUAL TO OUTLET (APPROX. 28°-40°F)
REPLACE CLUTCH CYCLING SWITCH. DO NOT DISCHARGE SYSTEM SWITCH FITTING HAS SCHRADER VALVE
RECONNECT BLOWER MOTOR WIRE
ADD APPROX. ¼ LB. R-12
ADD ½-¾ LB. R-12
FEEL INLET/OUTLET TUBES **
CHECK A/C DISCHARGE TEMP 50°F MIN ACCEPTABLE
OK
OK
RECHECK SYSTEM
OK
*ON ATC SYSTEMS APPLY 15 INCHES VACUUM DIRECTLY TO SERVO VACUUM MOTOR
**CONTINUE TO ADD R-12 IN APPROX. ¼ LB. INCREMENTS UNTIL TUBES FEEL EQUAL IN TEMPERATURE AND APPROX. 28°-40°F

Figure 1

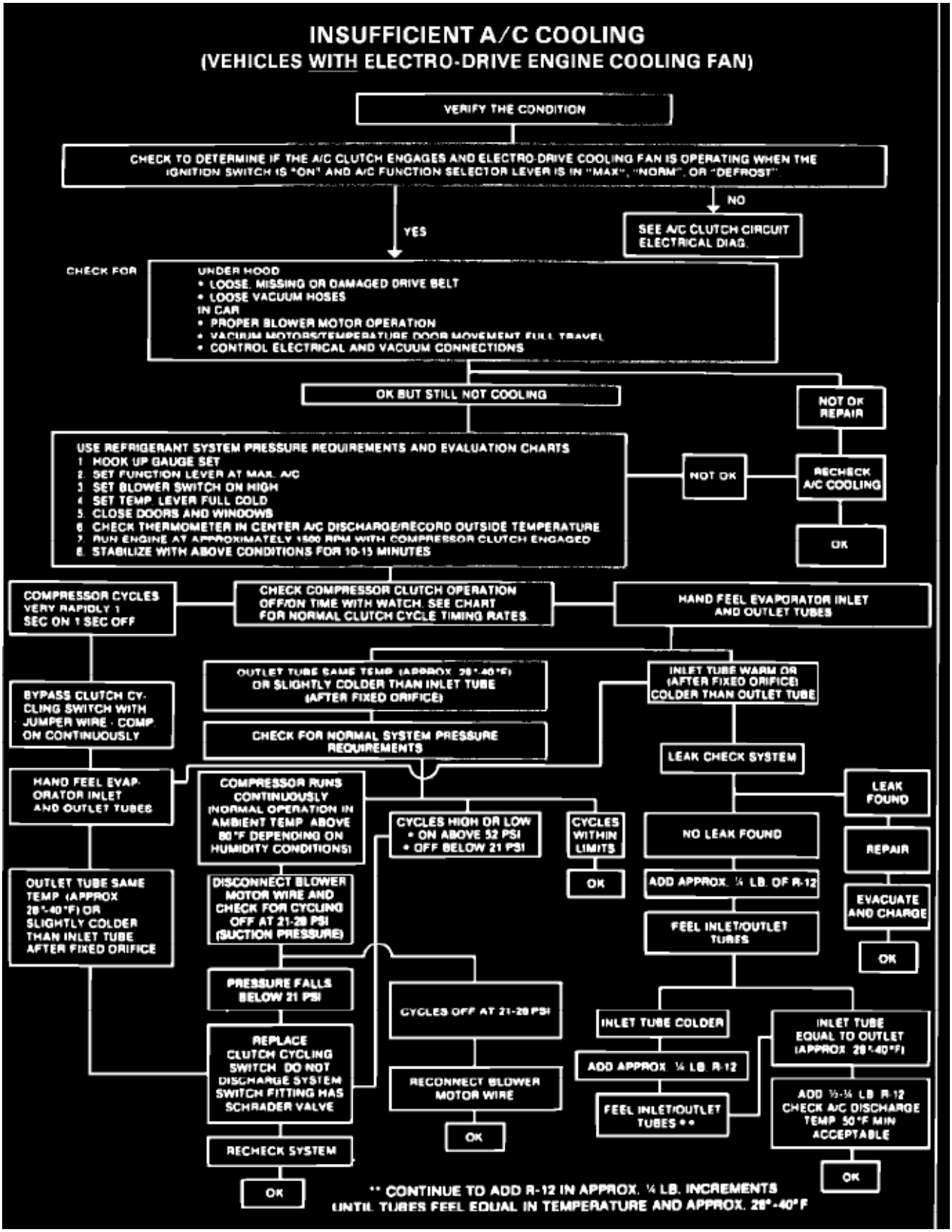

INSUFFICIENT A/C COOLING
(VEHICLES WITH ELECTRO-DRIVE ENGINE COOLING FAN)
VERIFY THE CONDITION
CHECK TO DETERMINE IF THE A/C CLUTCH ENGAGES AND ELECTRO-DRIVE COOLING FAN IS OPERATING WHEN THE IGNITION SWITCH IS "ON" AND A/C FUNCTION SELECTOR LEVER IS IN "MAX", "NORM", OR "DEFROST"
NO
SEE A/C CLUTCH CIRCUIT ELECTRICAL DIAG.
YES
CHECK FOR
UNDER HOOD
• LOOSE, MISSING OR DAMAGED DRIVE BELT
• LOOSE VACUUM HOSES
IN CAR
• PROPER BLOWER MOTOR OPERATION
• VACUUM MOTORS/TEMPERATURE DOOR MOVEMENT FULL TRAVEL
• CONTROL ELECTRICAL AND VACUUM CONNECTIONS
OK BUT STILL NOT COOLING
NOT OK REPAIR
USE REFRIGERANT SYSTEM PRESSURE REQUIREMENTS AND EVALUATION CHARTS
1. HOOK UP GAUGE SET
2. SET FUNCTION LEVER AT MAX. A/C
3. SET BLOWER SWITCH ON HIGH
4. SET TEMP. LEVER FULL COLD
5. CLOSE DOORS AND WINDOWS
6. CHECK THERMOMETER IN CENTER A/C DISCHARGE/RECORD OUTSIDE TEMPERATURE
7. RUN ENGINE AT APPROXIMATELY 1500 RPM WITH COMPRESSOR CLUTCH ENGAGED
8. STABILIZE WITH ABOVE CONDITIONS FOR 10-15 MINUTES
NOT OK
RECHECK A/C COOLING
OK
COMPRESSOR CYCLES VERY RAPIDLY 1 SEC ON 1 SEC OFF
CHECK COMPRESSOR CLUTCH OPERATION OFF/ON TIME WITH WATCH. SEE CHART FOR NORMAL CLUTCH CYCLE TIMING RATES.
HAND FEEL EVAPORATOR INLET AND OUTLET TUBES
BYPASS CLUTCH CYCLING SWITCH WITH JUMPER WIRE - COMP. ON CONTINUOUSLY
OUTLET TUBE SAME TEMP (APPROX. 28°-40°F) OR SLIGHTLY COLDER THAN INLET TUBE (AFTER FIXED ORIFICE)
CHECK FOR NORMAL SYSTEM PRESSURE REQUIREMENTS
INLET TUBE WARM OR (AFTER FIXED ORIFICE) COLDER THAN OUTLET TUBE
LEAK CHECK SYSTEM
HAND FEEL EVAPORATOR INLET AND OUTLET TUBES
COMPRESSOR RUNS CONTINUOUSLY (NORMAL OPERATION IN AMBIENT TEMP. ABOVE 80°F DEPENDING ON HUMIDITY CONDITIONS)
CYCLES HIGH OR LOW • ON ABOVE 52 PSI • OFF BELOW 21 PSI
CYCLES WITHIN LIMITS
OK
NO LEAK FOUND
ADD APPROX. ¼ LB. OF R-12
FEEL INLET/OUTLET TUBES
LEAK FOUND
REPAIR
EVACUATE AND CHARGE
OK
OUTLET TUBE SAME TEMP (APPROX 28°-40°F) OR SLIGHTLY COLDER THAN INLET TUBE AFTER FIXED ORIFICE
DISCONNECT BLOWER MOTOR WIRE AND CHECK FOR CYCLING OFF AT 21-28 PSI (SUCTION PRESSURE)
PRESSURE FALLS BELOW 21 PSI
REPLACE CLUTCH CYCLING SWITCH. DO NOT DISCHARGE SYSTEM. SWITCH FITTING HAS SCHRADER VALVE
RECHECK SYSTEM
OK
CYCLES OFF AT 21-28 PSI
RECONNECT BLOWER MOTOR WIRE
OK
INLET TUBE COLDER
ADD APPROX. ¼ LB. R-12
FEEL INLET/OUTLET TUBES **
INLET TUBE EQUAL TO OUTLET (APPROX. 28°-40°F)
ADD ½-¾ LB. R-12 CHECK A/C DISCHARGE TEMP. 50°F MIN. ACCEPTABLE
OK
** CONTINUE TO ADD R-12 IN APPROX. ¼ LB. INCREMENTS UNTIL TUBES FEEL EQUAL IN TEMPERATURE AND APPROX. 28°-40°F

Figure 2

5. If the pressures are above 46 psi and the clutch cycle rate is faster than the normal rate of 2 to 5 cycles per minute, the system is probably low on refrigerant. Check that the system contains the correct refrigerant charge by following the correct diagnostic chart (Figures 1 or 2).

WARRANTY STATUS: INFORMATION ONLY OASIS CODES:

2600, 2610

Refrigerant Pressure Sensor / Switch: All Technical Service Bulletins A/C - Pressure Cycling Switch Diagnostic Procedure

AIR CONDITIONING-CLUTCH PRESSURE CYCLING SWITCH DIAGNOSTIC PROCEDURE Article No. 89-14-10 FORD: 1980-89 CROWN VICTORIA 1981-89 ESCORT 1982-88 EXP 1982-89 MUSTANG, THUNDERBIRD 1983-86 LTD 1984-89 TEMPO

1986-89 TAURUS

LINCOLN-MERCURY: 1980-89 GRAND MARQUIS, MARK VI, MARK VII, TOWN CAR 1981-87 LYNX 1982-86 CAPRI 1982-89 CONTINENTAL, COUGAR 1983-86 MARQUIS 1984-89 TOPAZ 1986-89 SABLE

LIGHT TRUCK: 1980-89 BRONCO, F SERIES 1983-89 RANGER 1984-89 BRONCO II 1986-89 AEROSTAR 1988-89 ECONOLINE ISSUE:

Poor air conditioning cooling caused by low or no refrigerant charge often results in unnecessary replacement of the clutch cycling pressure switch. The switch is designed to work on system pressure. It closes at about 46 psi and opens at about 24.5 psi. It has a normal cycle (on and off) rate of 2 to 5 cycles per minute.

ACTION: If an inoperative or fast cycling pressure switch is found, use the following diagnostic charts before replacing the pressure switch.

DIAGNOSTIC PROCEDURE:

1. Connect a manifold gauge set to the service ports and check the system pressures. They should be above the closing pressure of the switch (46 psi).

2. If the A/C system pressures are above 46 psi and the clutch will not engage, proceed as follows:

^ Check the pressure switch harness connector and harness wires for a continuous open condition.

^ Check for an intermittent open or a poor connection between the connector and the pressure switch terminals.

a. If the harness connector and wires are OK, by-pass the pressure switch by jumping the two terminals of the connector. If the clutch still does not engage, THE PRESSURE SWITCH IS NOT DEFECTIVE. Refer to the respective EVTM for the clutch circuit schematic and circuit diagnosis. Repair as necessary.

3. Check the ambient temperature. If the ambient temperature is below 48~ F (9~ C), the system pressure will not be high enough to close the pressure switch (46 psi).

4. If the system does not contain refrigerant, the pressure will not be high enough to close the switch for compressor operation. Leak test, repair, evacuate and charge the system.

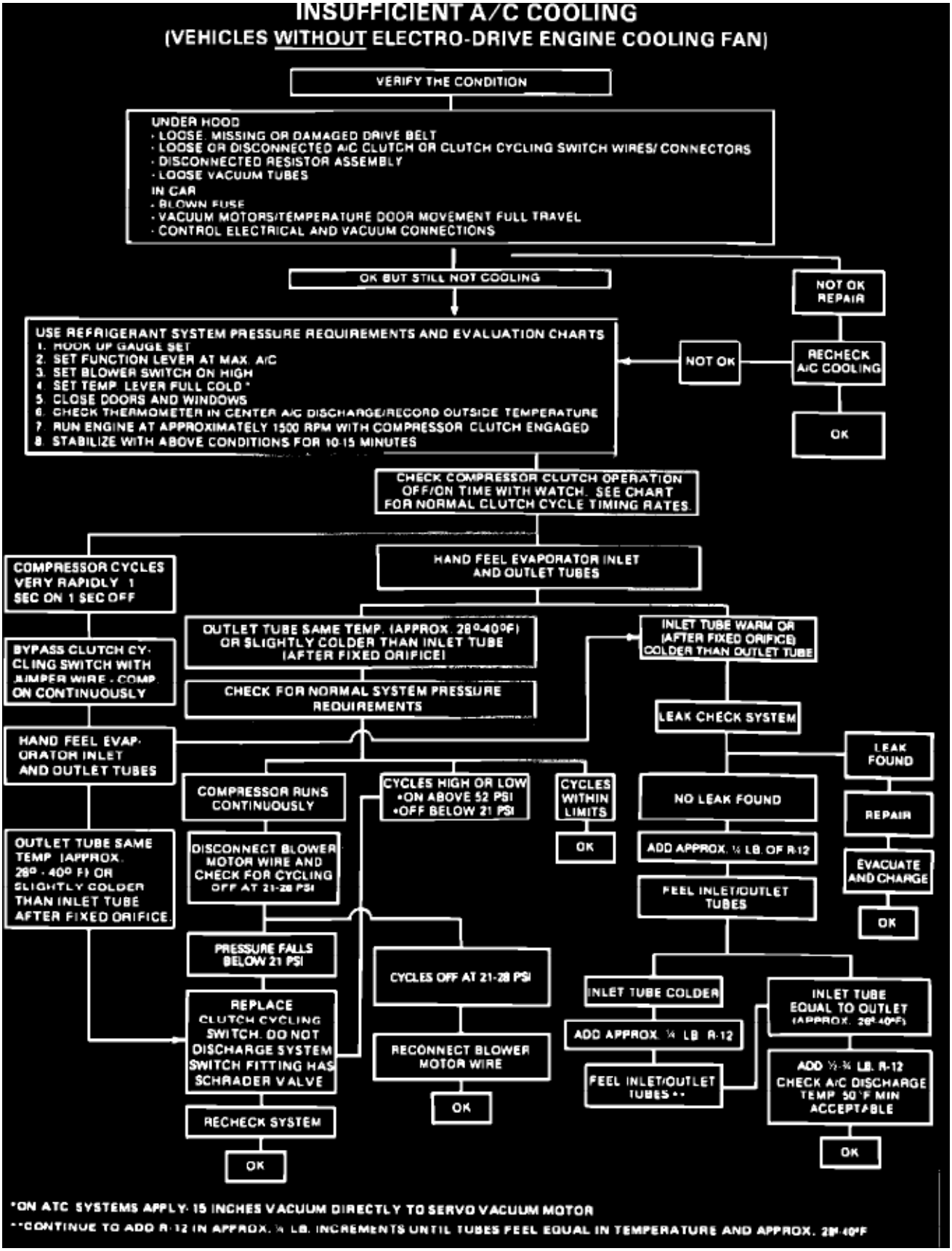

INSUFFICIENT A/C COOLING
(VEHICLES WITHOUT ELECTRO-DRIVE ENGINE COOLING FAN)
VERIFY THE CONDITION
UNDER HOOD
· LOOSE, MISSING OR DAMAGED DRIVE BELT
· LOOSE OR DISCONNECTED A/C CLUTCH OR CLUTCH CYCLING SWITCH WIRES/ CONNECTORS
· DISCONNECTED RESISTOR ASSEMBLY
· LOOSE VACUUM TUBES
IN CAR
· BLOWN FUSE
· VACUUM MOTORS/TEMPERATURE DOOR MOVEMENT FULL TRAVEL
· CONTROL ELECTRICAL AND VACUUM CONNECTIONS
OK BUT STILL NOT COOLING
NOT OK REPAIR
USE REFRIGERANT SYSTEM PRESSURE REQUIREMENTS AND EVALUATION CHARTS
1. HOOK UP GAUGE SET
2. SET FUNCTION LEVER AT MAX. A/C
3. SET BLOWER SWITCH ON HIGH
4. SET TEMP LEVER FULL COLD *
5. CLOSE DOORS AND WINDOWS
6. CHECK THERMOMETER IN CENTER A/C DISCHARGE/RECORD OUTSIDE TEMPERATURE
7. RUN ENGINE AT APPROXIMATELY 1500 RPM WITH COMPRESSOR CLUTCH ENGAGED
8. STABILIZE WITH ABOVE CONDITIONS FOR 10-15 MINUTES
NOT OK
RECHECK A/C COOLING
OK
CHECK COMPRESSOR CLUTCH OPERATION OFF/ON TIME WITH WATCH. SEE CHART FOR NORMAL CLUTCH CYCLE TIMING RATES.
COMPRESSOR CYCLES VERY RAPIDLY 1 SEC ON 1 SEC OFF
HAND FEEL EVAPORATOR INLET AND OUTLET TUBES
BYPASS CLUTCH CYCLING SWITCH WITH JUMPER WIRE - COMP. ON CONTINUOUSLY
OUTLET TUBE SAME TEMP. (APPROX. 28°-40°F) OR SLIGHTLY COLDER THAN INLET TUBE (AFTER FIXED ORIFICE)
INLET TUBE WARM OR (AFTER FIXED ORIFICE) COLDER THAN OUTLET TUBE
CHECK FOR NORMAL SYSTEM PRESSURE REQUIREMENTS
LEAK CHECK SYSTEM
HAND FEEL EVAPORATOR INLET AND OUTLET TUBES
LEAK FOUND
COMPRESSOR RUNS CONTINUOUSLY
CYCLES HIGH OR LOW
•ON ABOVE 52 PSI
•OFF BELOW 21 PSI
CYCLES WITHIN LIMITS
NO LEAK FOUND
REPAIR
OUTLET TUBE SAME TEMP (APPROX. 28° - 40° F) OR SLIGHTLY COLDER THAN INLET TUBE AFTER FIXED ORIFICE.
DISCONNECT BLOWER MOTOR WIRE AND CHECK FOR CYCLING OFF AT 21-28 PSI
OK
ADD APPROX. ¼ LB. OF R-12
EVACUATE AND CHARGE
FEEL INLET/OUTLET TUBES
OK
PRESSURE FALLS BELOW 21 PSI
CYCLES OFF AT 21-28 PSI
INLET TUBE COLDER
INLET TUBE EQUAL TO OUTLET (APPROX. 28°-40°F)
REPLACE CLUTCH CYCLING SWITCH. DO NOT DISCHARGE SYSTEM SWITCH FITTING HAS SCHRADER VALVE
RECONNECT BLOWER MOTOR WIRE
ADD APPROX. ¼ LB. R-12
ADD ½-¾ LB. R-12
FEEL INLET/OUTLET TUBES **
CHECK A/C DISCHARGE TEMP 50°F MIN ACCEPTABLE
OK
OK
RECHECK SYSTEM
OK
*ON ATC SYSTEMS APPLY 15 INCHES VACUUM DIRECTLY TO SERVO VACUUM MOTOR
**CONTINUE TO ADD R-12 IN APPROX. ¼ LB. INCREMENTS UNTIL TUBES FEEL EQUAL IN TEMPERATURE AND APPROX. 28°-40°F

Figure 1

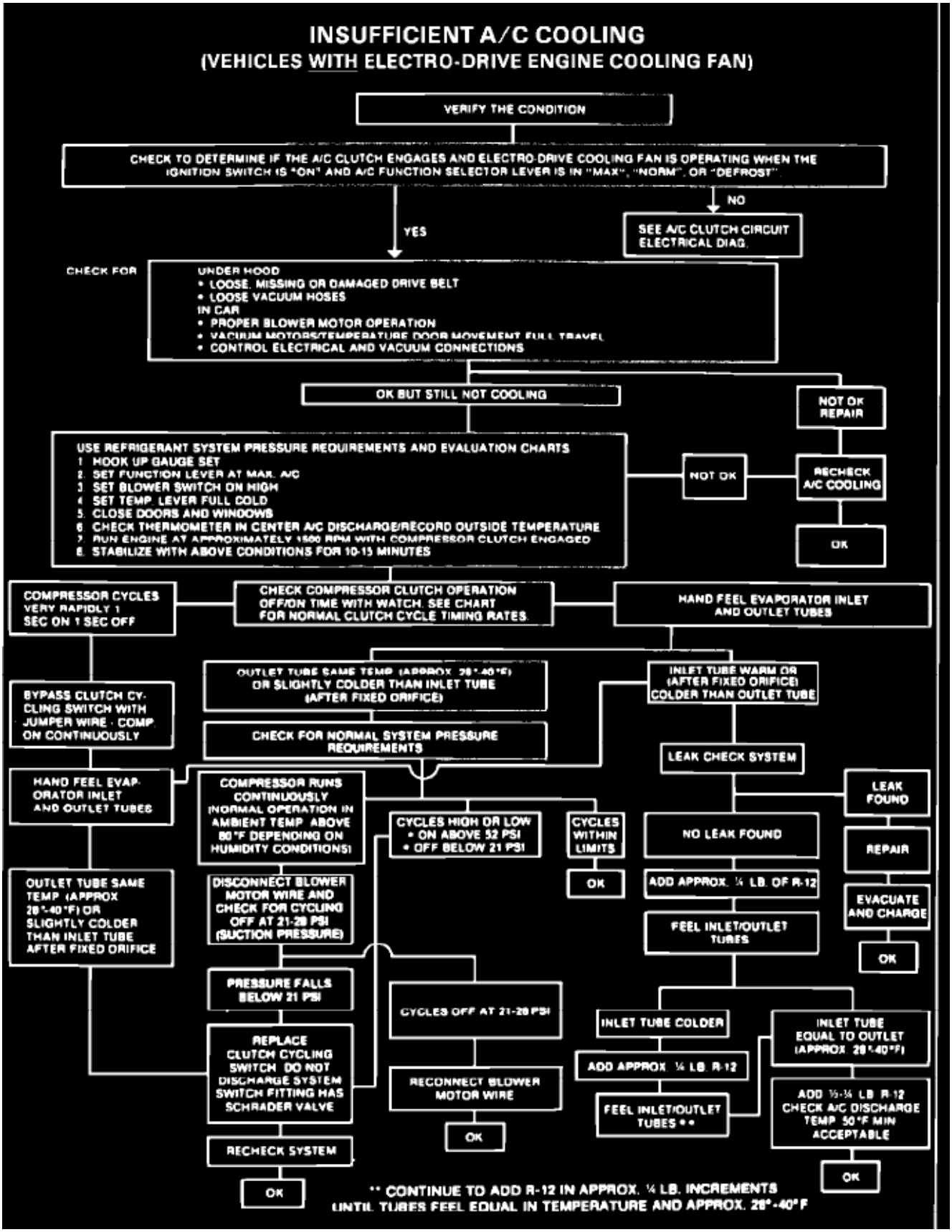

INSUFFICIENT A/C COOLING
(VEHICLES WITH ELECTRO-DRIVE ENGINE COOLING FAN)
VERIFY THE CONDITION
CHECK TO DETERMINE IF THE A/C CLUTCH ENGAGES AND ELECTRO-DRIVE COOLING FAN IS OPERATING WHEN THE IGNITION SWITCH IS "ON" AND A/C FUNCTION SELECTOR LEVER IS IN "MAX", "NORM", OR "DEFROST"
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SEE A/C CLUTCH CIRCUIT ELECTRICAL DIAG.
YES
CHECK FOR
UNDER HOOD
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• LOOSE VACUUM HOSES
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COMPRESSOR RUNS CONTINUOUSLY (NORMAL OPERATION IN AMBIENT TEMP. ABOVE 80°F DEPENDING ON HUMIDITY CONDITIONS)
CYCLES HIGH OR LOW • ON ABOVE 52 PSI • OFF BELOW 21 PSI
CYCLES WITHIN LIMITS
OK
NO LEAK FOUND
ADD APPROX. ¼ LB. OF R-12
FEEL INLET/OUTLET TUBES
LEAK FOUND
REPAIR
EVACUATE AND CHARGE
OK
OUTLET TUBE SAME TEMP (APPROX 28°-40°F) OR SLIGHTLY COLDER THAN INLET TUBE AFTER FIXED ORIFICE
DISCONNECT BLOWER MOTOR WIRE AND CHECK FOR CYCLING OFF AT 21-28 PSI (SUCTION PRESSURE)
PRESSURE FALLS BELOW 21 PSI
REPLACE CLUTCH CYCLING SWITCH. DO NOT DISCHARGE SYSTEM. SWITCH FITTING HAS SCHRADER VALVE
RECHECK SYSTEM
OK
CYCLES OFF AT 21-28 PSI
RECONNECT BLOWER MOTOR WIRE
OK
INLET TUBE COLDER
ADD APPROX. ¼ LB. R-12
FEEL INLET/OUTLET TUBES **
INLET TUBE EQUAL TO OUTLET (APPROX. 28°-40°F)
ADD ½-¾ LB. R-12 CHECK A/C DISCHARGE TEMP. 50°F MIN. ACCEPTABLE
OK
** CONTINUE TO ADD R-12 IN APPROX. ¼ LB. INCREMENTS UNTIL TUBES FEEL EQUAL IN TEMPERATURE AND APPROX. 28°-40°F

Figure 2

5. If the pressures are above 46 psi and the clutch cycle rate is faster than the normal rate of 2 to 5 cycles per minute, the system is probably low on refrigerant. Check that the system contains the correct refrigerant charge by following the correct diagnostic chart (Figures 1 or 2).

WARRANTY STATUS: INFORMATION ONLY OASIS CODES:

2600, 2610

Refrigerant Pressure Sensor / Switch: Locations

RH Side Of Dash Panel On Accumulator

Door Switch: Locations

LH Lower Cowl, Near Fuse Block

Fuel Gauge Sender: Locations Front Tank Fuel Gauge Sender

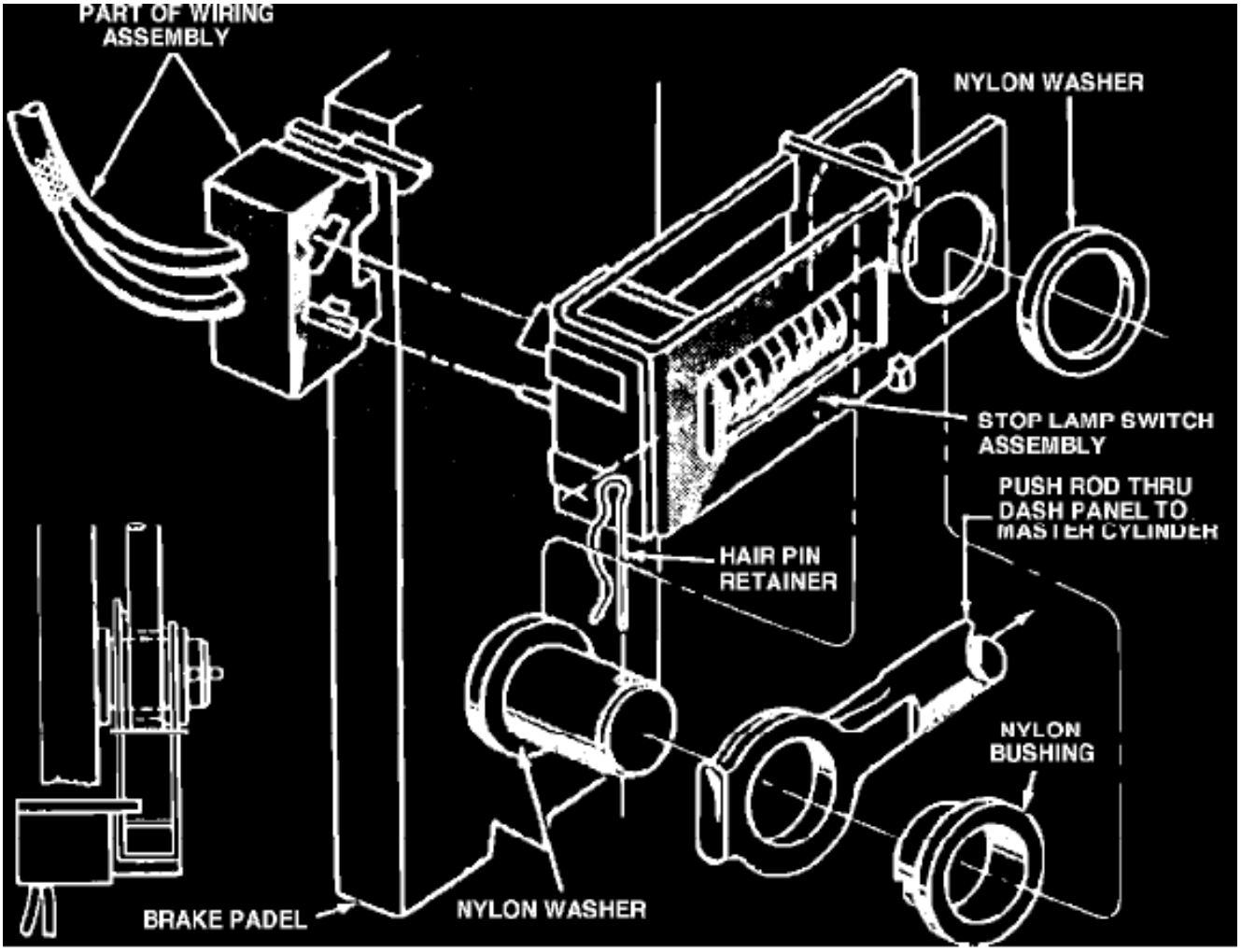
On Tank In Front Of Rear Axle

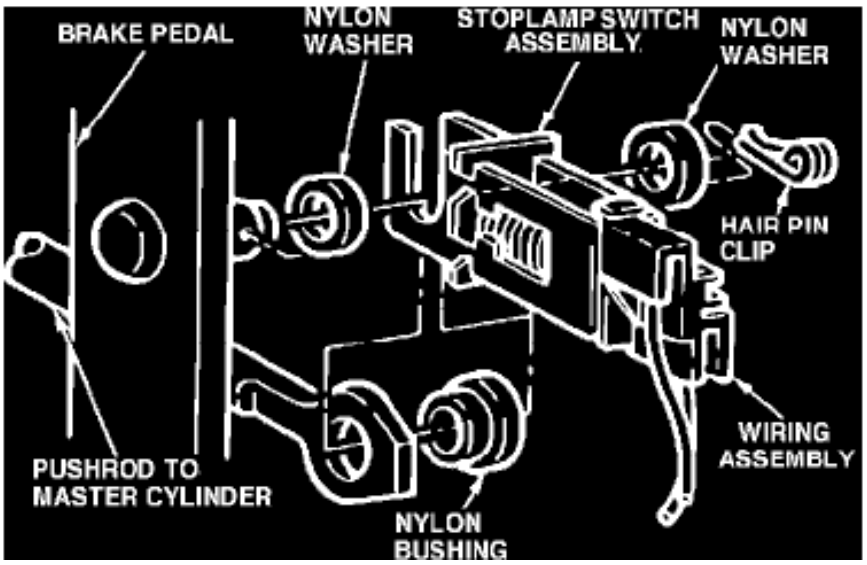
Fuel Gauge Sender: Locations Rear Tank Fuel Gauge Sender

On Tank Behind Rear Axle

Brake Light Switch: Locations

At Top Of Brake Pedal


PART OF WIRING ASSEMBLY
NYLON WASHER
STOP LAMP SWITCH ASSEMBLY
PUSH ROD THRU DASH PANEL TO MASTER CYLINDER
HAIR PIN RETAINER
NYLON BUSHING
BRAKE PADEL
NYLON WASHER


BRAKE PEDAL
NYLON WASHER
STOPLAMP SWITCH ASSEMBLY
NYLON WASHER
HAIR PIN CLIP
WIRING ASSEMBLY
PUSHROD TO MASTER CYLINDER
NYLON BUSHING

Brake Light Switch: Service and Repair

Fig. 6 Stop light switch replacement. Exc. 1980---83 E-100 w/manual brakes.

Fig. 7 Stop light switch replacement. 1980---83 E-100 w/manual brakes

1. Disconnect battery ground cable.

2. Disconnect electrical connector from switch, Figs. 6 and 7.

3. Remove hairpin retainer, then slide stop light switch, pushrod, nylon washers and bushings away from pedal and remove the switch from vehicle.

4. Reverse procedure to install. Ensure stop light switch wires are of sufficient length to allow full travel of the brake pedal.

Door Switch: Locations

LH Lower Cowl, Near Fuse Block

Fog/Driving Lamp Switch: Locations

Behind LH Side Of I/P

Headlamp Dimmer Switch: Locations

On Floor Pan, LH Side Of Cab

Headlamp Switch: Technical Service Bulletins Headlamp Light Switch - Schematic Revision

Article No. 91-11B-35

06/14/91

^ ELECTRICAL/VACUUM TROUBLESHOOTING MANUAL - 1981 - PAGES 40 AND 41 - EXTERIOR LIGHTS CONNECTIONS TO LIGHT SWITCH REVISED

^ ELECTRICAL/VACUUM TROUBLESHOOTING MANUAL - 1982 - PAGE 40 - EXTERIOR LIGHTS CONNECTIONS TO LIGHT SWITCH REVISED

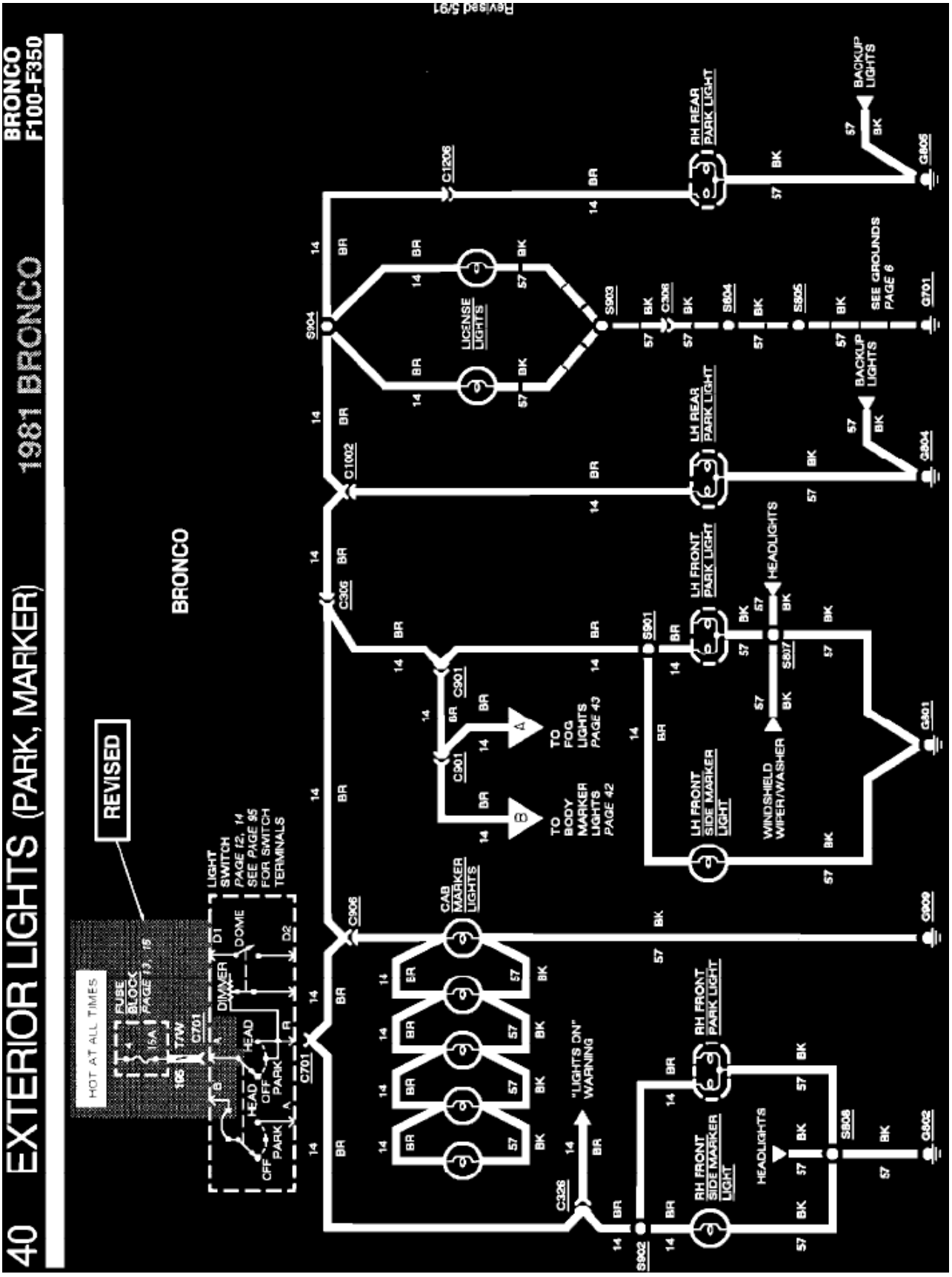
^ ELECTRICAL/VACUUM TROUBLESHOOTING MANUAL - 1984 - PAGE 34 - EXTERIOR LIGHTS CONNECTIONS TO LIGHT SWITCH REVISED

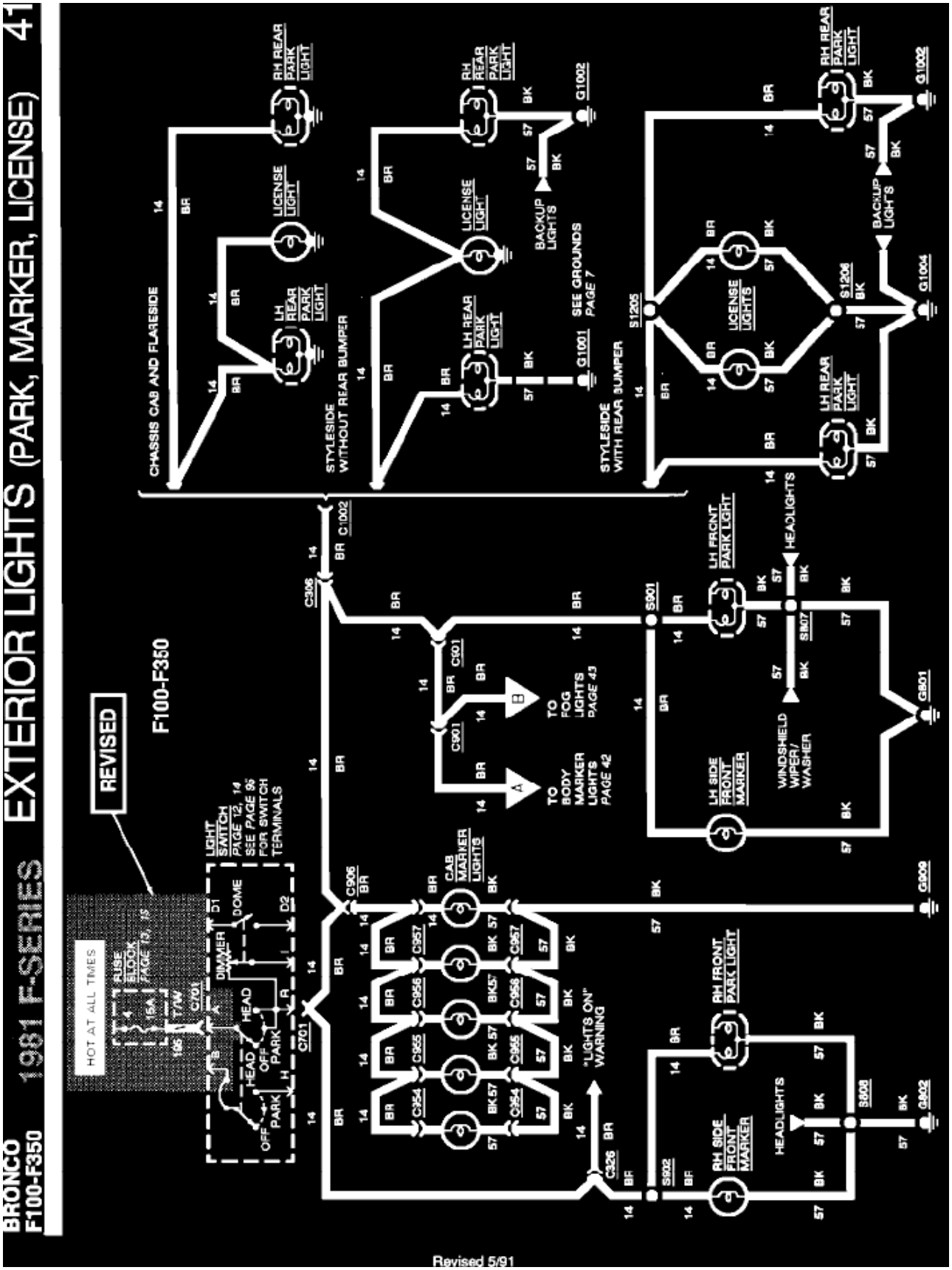
^ ELECTRICAL/VACUUM TROUBLESHOOTING MANUAL - 1985 - PAGE 34 - EXTERIOR LIGHTS CONNECTIONS TO LIGHT SWITCH REVISED

LIGHT TRUCK: 1981 F-150-350 SERIES 1981-82 BRONCO 1984-85 ECONOLINE

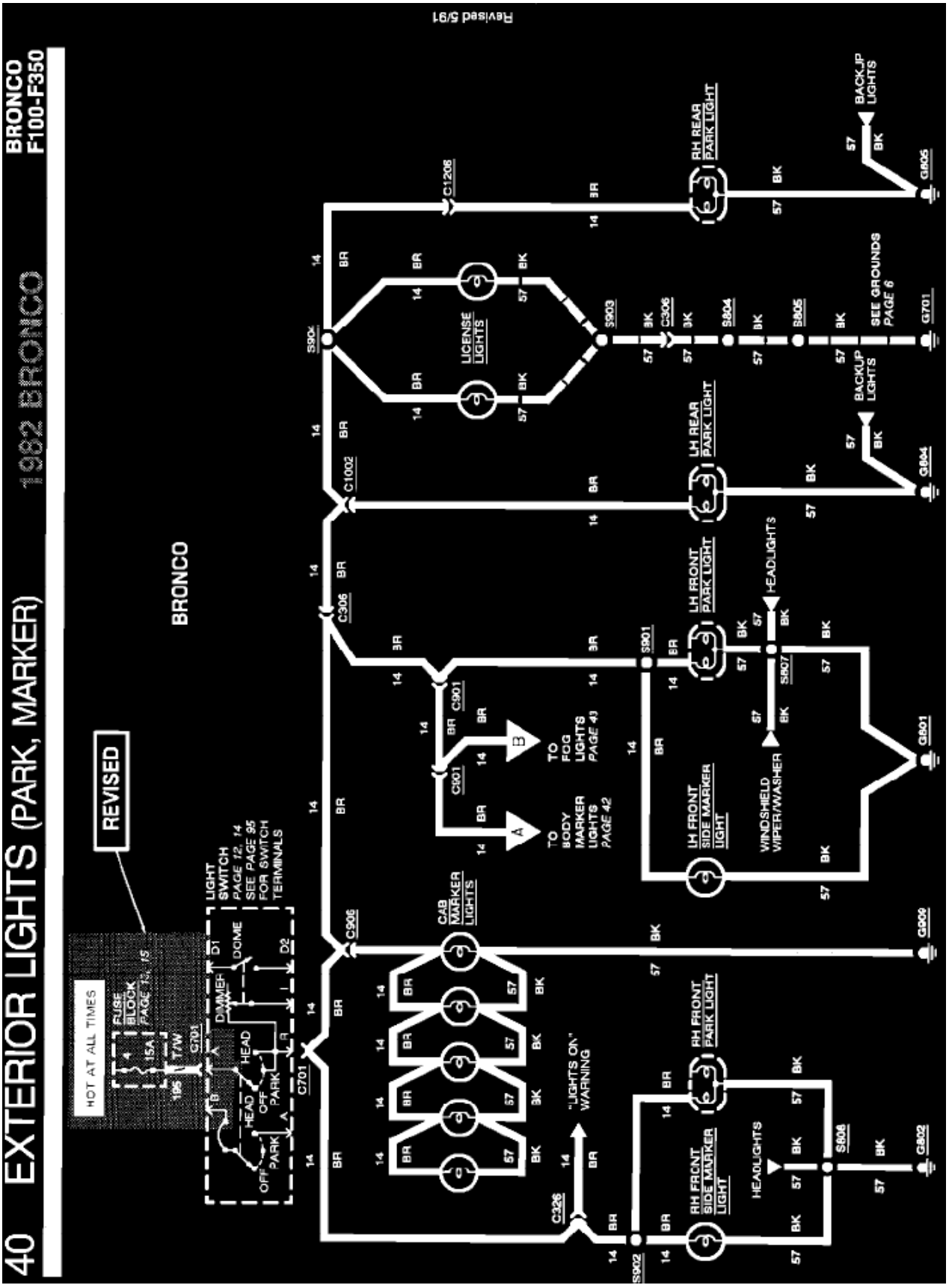
ISSUE: The connections of Exterior Lights (Marker, Park, License) to the Light Switch are inaccurately shown in the schematics of the following Electrical/Vacuum Troubleshooting Manuals:

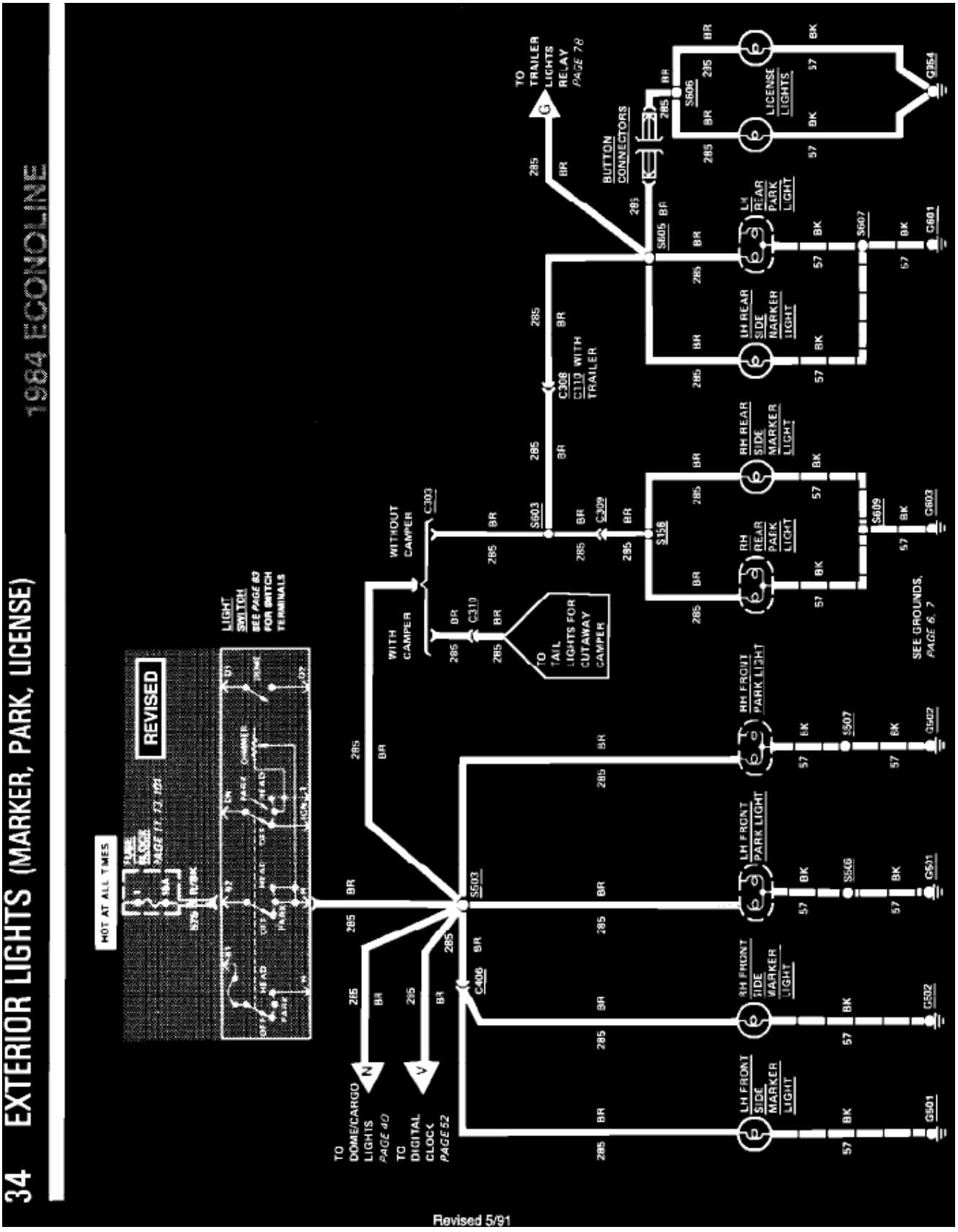
Ford Bronco Workshop Manual (V8-351 5.8L VIN G 2-bbl (1982))
Ford Workshop Manuals > Sensors and Switches > Sensors and Switches - Lighting and Horns > Headlamp Switch > Component Information > Technical Service Bulletins > Headlamp Light Switch - Schematic Revision > Page 195

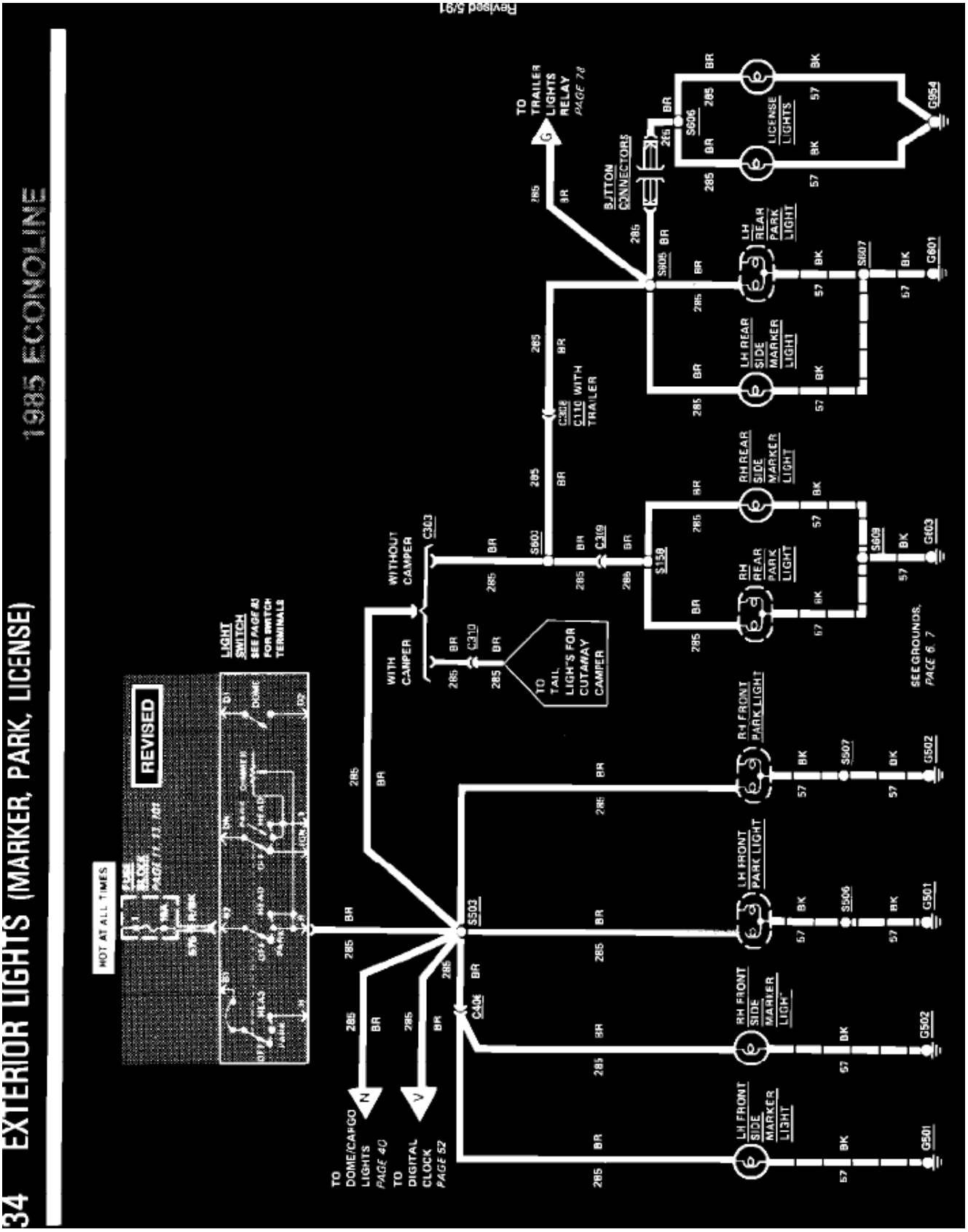



BRONCO
F100-F350
1981 F-SERIES EXTERIOR LIGHTS (PARK, MARKER, LICENSE) 41
REVISED
F100-F350
HOT AT ALL TIMES
FUSE BLOCK
LIGHT SWITCH
DIMMER
DOME
HEAD
OFF
PARK
CAB MARKER LIGHTS
"LIGHTS ON" WARNING
CHASSIS CAB AND FLARESIDE
STYLESIDE WITHOUT REAR BUMPER
STYLESIDE WITH REAR BUMPER
LICENSE LIGHT
LICENSE LIGHTS
LH REAR PARK LIGHT
RH REAR PARK LIGHT
BACKUP LIGHTS
SEE GROUNDS PAGE 7
TO BODY MARKER LIGHTS PAGE 42
TO FOG LIGHTS PAGE 43
LH FRONT PARK LIGHT
RH FRONT PARK LIGHT
LH SIDE FRONT MARKER
RH SIDE FRONT MARKER
HEADLIGHTS
WINDSHIELD WIPER/ WASHER
Revised 5/91

^ 1981 Bronco/F-Series Pages 40 and 41


40 EXTERIOR LIGHTS (PARK, MARKER)
1982 BRONCO
BRONCO F100-F350
Revised 5/91
REVISED
BRONCO
HOT AT ALL TIMES
FUSE BLOCK PAGE 13, 15
15A
T/W
C701
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LIGHT SWITCH PAGE 12, 14 SEE PAGE 95 FOR SWITCH TERMINALS
DIMMER
DOME
HEAD
OFF
PARK
D1
D2
C906
CAB MARKER LIGHTS
C901
TO BODY MARKER LIGHTS PAGE 42
TO FOG LIGHTS PAGE 43
C326
"LIGHTS ON" WARNING
S902
RH FRONT SIDE MARKER LIGHT
RH FRONT PARK LIGHT
HEADLIGHTS
S904
G902
G906
C306
C1002
S901
LH FRONT SIDE MARKER LIGHT
LH FRONT PARK LIGHT
HEADLIGHTS
S907
WINDSHIELD WIPER/WASHER
G901
S902
LICENSE LIGHTS
S903
C1206
LH REAR PARK LIGHT
RH REAR PARK LIGHT
BACKUP LIGHTS
S904
S905
G904
G905
SEE GROUNDS PAGE 6
G701
BR
BK
3R
ER
14
57


34 EXTERIOR LIGHTS (MARKER, PARK, LICENSE)
1984 ECONOLINE
REVISED
HOT AT ALL TIMES
LIGHT SWITCH
SEE PAGE 83 FOR SWITCH TERMINALS
TO DOME/CARGO LIGHTS PAGE 40
TO DIGITAL CLOCK PAGE 52
WITH CAMPER
WITHOUT CAMPER
TO TAIL LIGHTS FOR CUTAWAY CAMPER
TO TRAILER LIGHTS RELAY PAGE 78
BUTTON CONNECTORS
LH FRONT SIDE MARKER LIGHT
RH FRONT SIDE MARKER LIGHT
LH FRONT PARK LIGHT
RH FRONT PARK LIGHT
LH REAR SIDE MARKER LIGHT
RH REAR SIDE MARKER LIGHT
LH REAR PARK LIGHT
RH REAR PARK LIGHT
LICENSE LIGHTS
SEE GROUNDS, PAGE 6, 7
Revised 5/91


34 EXTERIOR LIGHTS (MARKER, PARK, LICENSE)
1985 ECONOLINE
Revised 5/91
REVISED
HOT AT ALL TIMES
LIGHT SWITCH
SEE PAGE 40 FOR SWITCH TERMINALS
TO DOME/CARGO LIGHTS PAGE 40
TO DIGITAL CLOCK PAGE 52
WITH CAMPER
WITHOUT CAMPER
TO TAIL LIGHTS FOR CUTAWAY CAMPER
C110 WITH TRAILER
TO TRAILER LIGHTS RELAY PAGE 74
SPLICE CONNECTIONS
LH FRONT SIDE MARKER LIGHT
RH FRONT SIDE MARKER LIGHT
LH FRONT PARK LIGHT
RH FRONT PARK LIGHT
LH REAR SIDE MARKER LIGHT
RH REAR SIDE MARKER LIGHT
LH REAR PARK LIGHT
RH REAR PARK LIGHT
LICENSE LIGHTS
SEE GROUNDS, PAGE 6 7

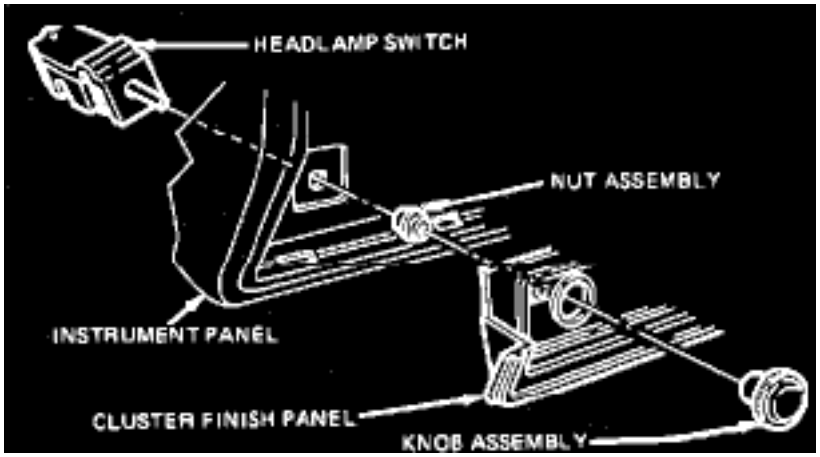
^ 1985 Econoline Page 34

ACTION: Refer to the pages in this TSB article for the revised schematics.

OTHER APPLICABLE ARTICLES: NONE

WARRANTY STATUS: INFORMATION ONLY

OASIS CODES: 290000



Headlamp Switch: Service and Repair

Fig. 6 Light Switch

F-100---350 & BRONCO

1. Disconnect battery ground cable.

2. Remove knobs from headlight switch, windshield wiper switch and fog light switch (if equipped). Use a suitable hook tool to release each knob lock tab.

3. Remove steering column shroud, then the cluster finish panel assembly, Fig. 5.

4. Remove switch attaching nut, Fig. 5.

5. Disconnect electrical connector from switch and remove switch from vehicle.

6. Reverse procedure to install.

Horn Switch: Locations

In Steering Wheel Hub Assembly

Turn Signal Switch: Locations

In Steering Column

Turn Signal Switch: Service and Repair

1. Disconnect battery ground cable.

2. Remove horn switch, then the steering wheel.

3. Remove turn signal switch lever by unscrewing from steering column.

4. On 1981---87 F-100---350 and Bronco models, remove lower steering column shroud.

5. On 1981---87 E-100---350 models, remove upper and lower steering column shrouds.

6. On all models, disconnect electrical connector from turn signal switch and remove switch attaching screws.

7. On all models with tilt column and 1980 E-100---350, F-100---350 and Bronco with fixed column, remove wires and terminals from steering column electrical connector, after noting color code and location of each connector. Remove plastic cover sleeve, if equipped, from wiring harness, then lift switch assembly out through top of column. On 1981---87 E-100---350 models equipped with tilt column and automatic transmission, disconnect transmission selector indicator light electrical connector from turn signal switch harness prior to removing the switch.

8. On all models with fixed column, except 1980 E-100---350, F-100---350 and Bronco, remove switch assembly by lifting out of column while guiding connector plug through opening in shift socket. On 1981---87 E-100---350 models equipped with fixed column and automatic transmission, remove transmission selector indicator light assembly with turn signal switch.

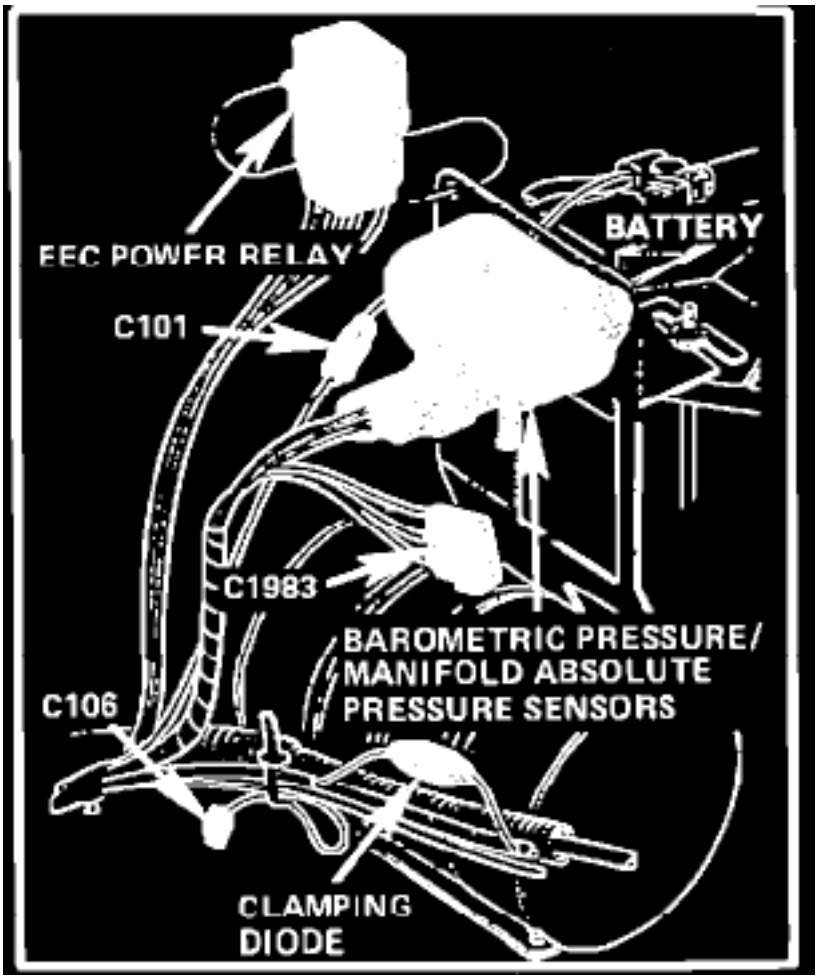
9. Reverse procedure to install.

With EEC IV, measured between BK/W wire and ground with ignition on and engine off.

Engine	Year	Voltage @ Altitude
All w/EEC IV	1983-90	1.55-1.63 @ 0
		1.52-1.60 @ 1000
		1.49-1.56 @ 2000
		1.46-1.54 @ 3000
		1.43-1.51 @ 4000
		1.39-1.48 @ 5000
		1.36-1.45 @ 6000
		1.34-1.43 @ 7000

Engine	Year	Resistance (ohms) @ Altitude
All w/EEC III	1981-83	7.6-8.4 @ 0-1500
		7.2-8.1 @ 1500-2500
		6.9-7.8 @ 2500-3500
		6.7-7.3 @ 3500-4500
		6.6-7.2 @ 4500-5500
		6.3-7.0 @ 5500-6500
		6.1-6.7 @ 6500-7500
		5.4-6.7 @ 7500 and up

MANIFOLD ABSOLUTE AND BAROMETRIC PRESSURE SENSORS

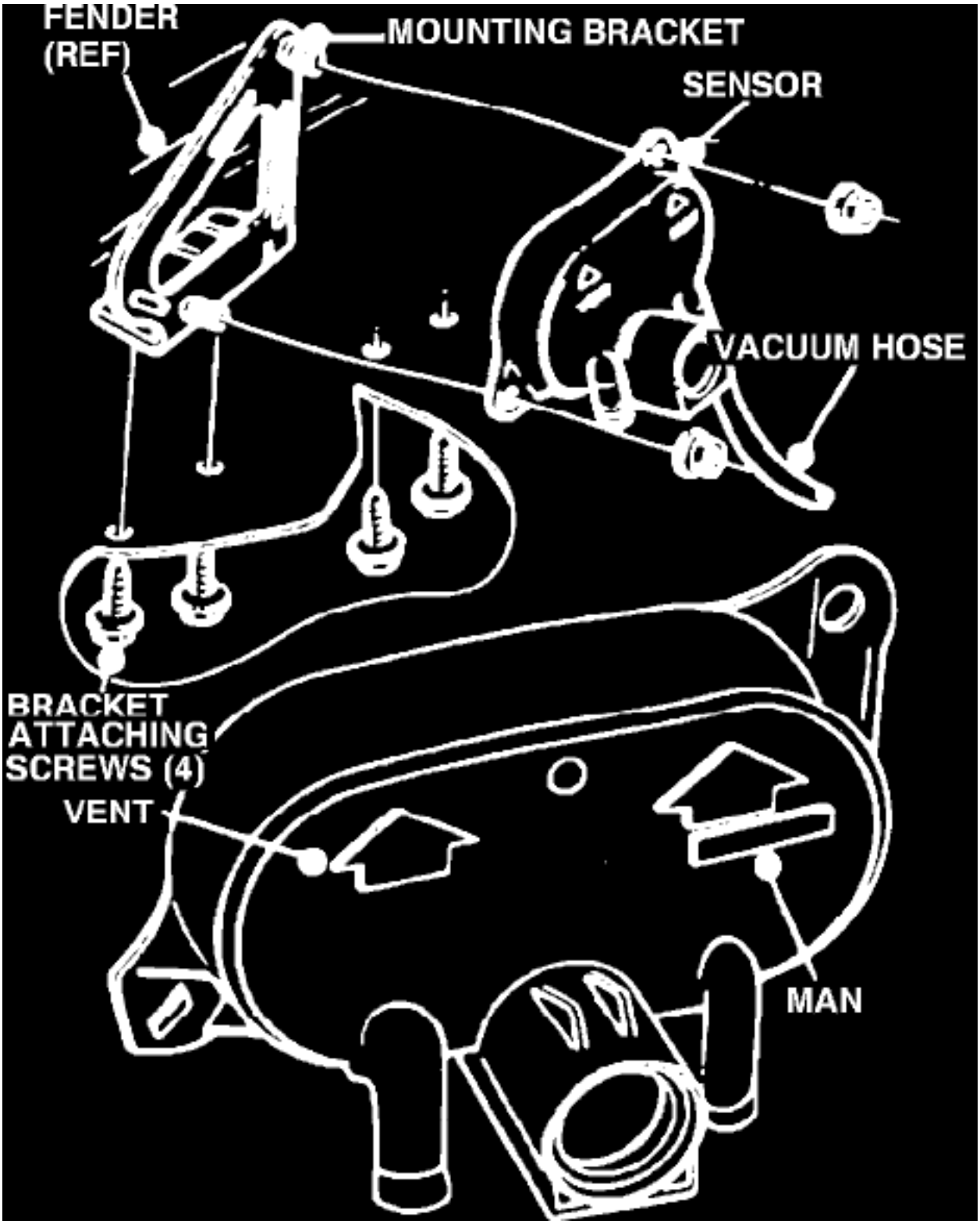


Barometric Pressure Sensor: Locations

Forward Of RH Wheelwell At Battery.

On Battery Support

Applicable to: 1981-83



Barometric Pressure Sensor: Description and Operation

Fig. 5 Barometric & manifold absolute pressure sensor

These two sensors, Fig. 5, are combined into one unit. The BMAP sensor monitors the absolute value of the intake manifold pressure and atmospheric pressure (manifold absolute pressure is defined as barometric pressure minus manifold vacuum). Atmospheric pressure changes are converted into an electrical signal and fed to the computer for evaluation. From this input, the computer determines the EGR flow requirements depending on the altitude at which the vehicle is being operated. Intake manifold pressure changes are converted by a pressure-sensing element and electrical circuit by the computer. The signal is used by the computer to determine part throttle spark advance, EGR flow rate and air/fuel ratio.

Barometric Pressure Sensor: Testing and Inspection Barometric Pressure Sensor

1. Disconnect switch from ignition module.

2. Connect suitable ohmmeter across switch terminals and compare resistance measured to values in chart.

3. Replace switch if resistance is not within specifications.

Engine	Year	Sensor	Resistance Ohms @ deg. F/C
All w/EEC IV	1983-90	Coolant, Air Charge	31,700-42,900 @ 68/20 13,650-18,650 @ 104/40 6500-8900 @ 140/60 3240-4440 @ 176/80 1770-2370 @ 212/100 980-1380 @ 248/115
All w/EEC III	1981-83	Coolant, Air Charge	1100-6000 1700-60,000

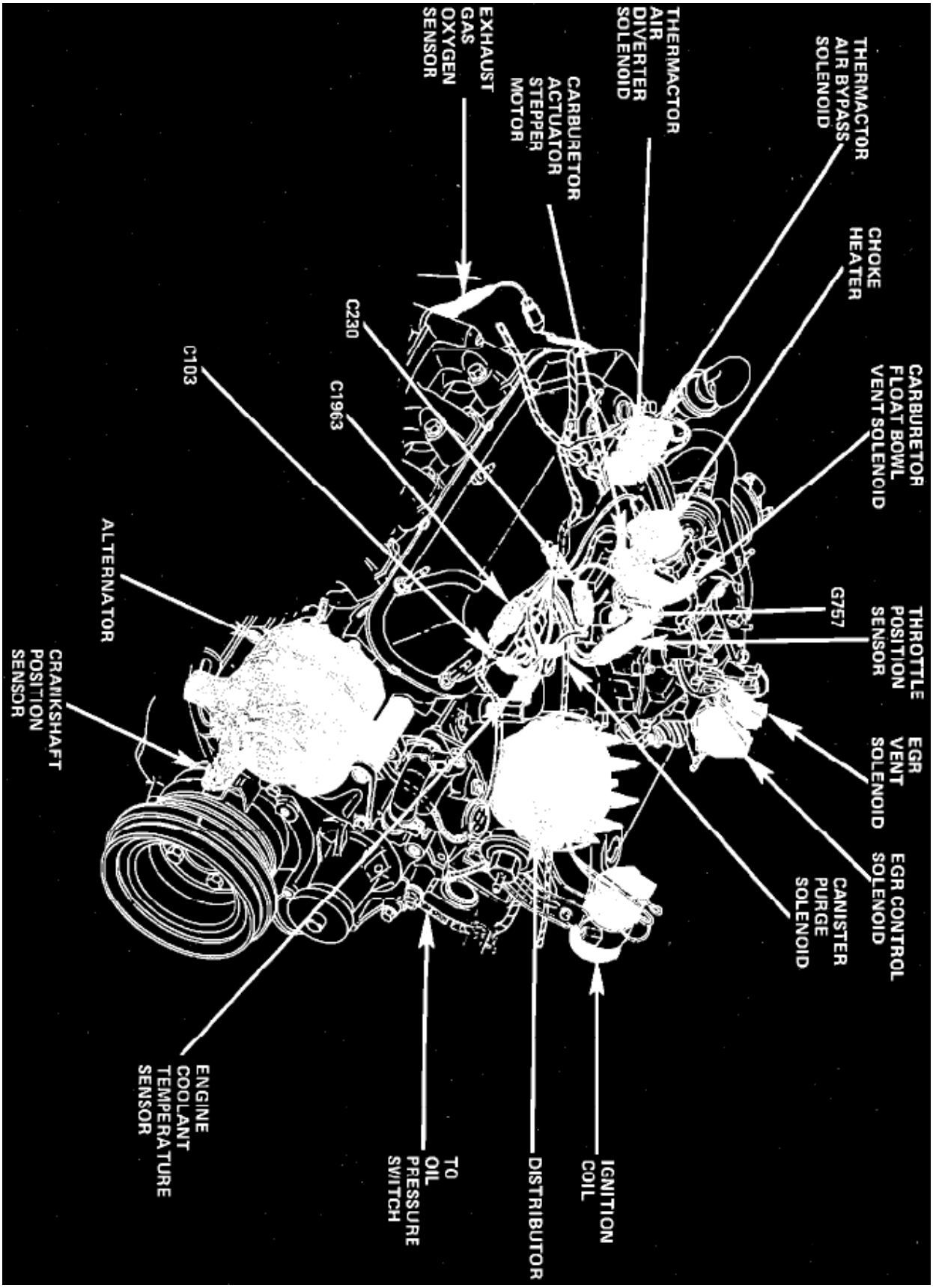
TEMPERATURE SENSORS

Coolant Temperature Sensor/Switch (For Computer): Description and Operation

This sensor incorporates a thermistor in a brass housing with an integral wiring connector extending from the body. This sensor is installed in the heater outlet fitting of the intake manifold. The thermistor is a resistor whose resistance value is high at low temperatures and decreases as the temperature rises. The computer applies a voltage to the sensor and monitors the resultant voltage drop across the thermistor.

Engine	Year	Resistance (ohms)
All w/EEC III	1981-83	100-640

CRANKSHAFT SENSOR

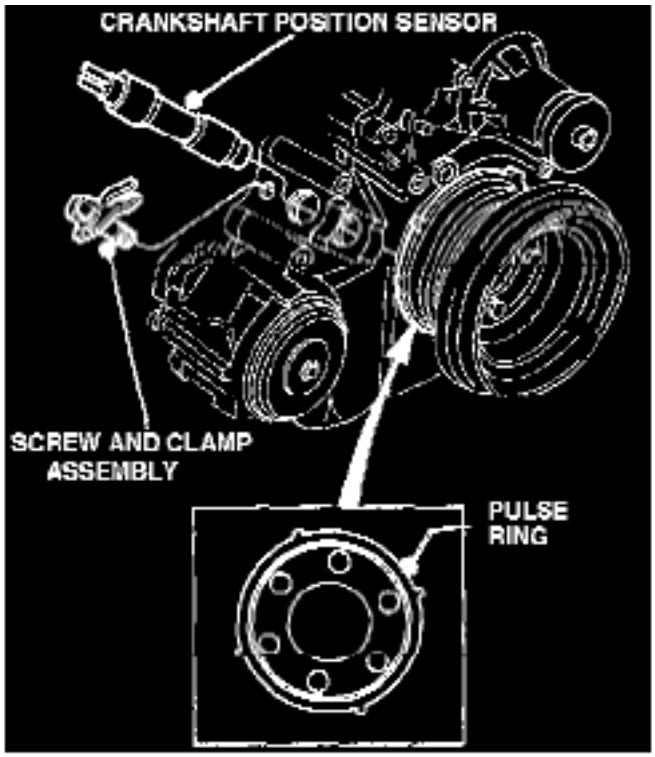


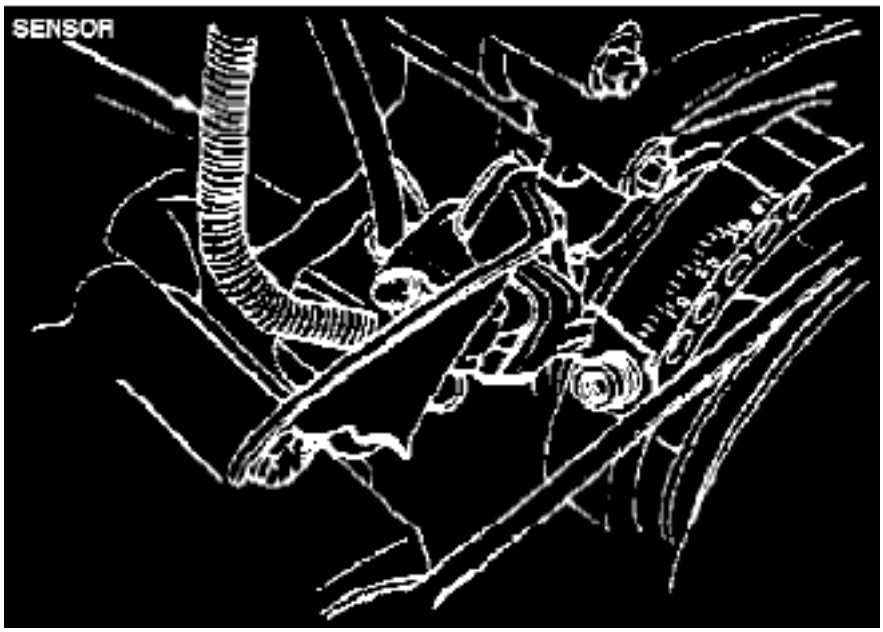
Crankshaft Position Sensor: Locations

Top RH Side Of Engine.

RH Front Of Engine

Applicable to: 1982-83 V8-302/5.0L & V8-351/5.8L Engines w/EEC





Crankshaft Position Sensor: Description and Operation

Fig.6 - Crankshaft Position Sensor

Fig.7 - Crankshaft Position Sensor

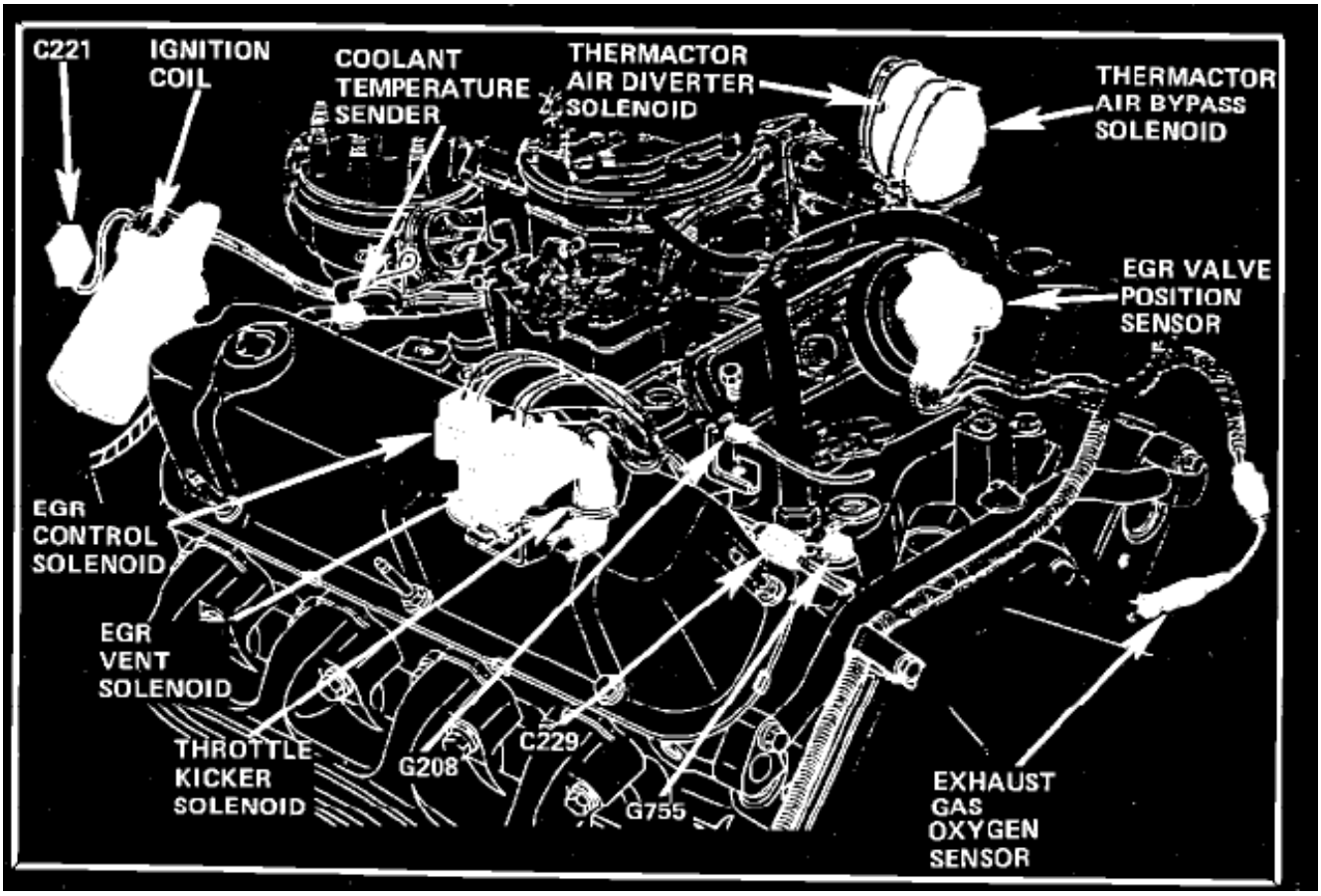
DESCRIPTION

The crankshaft vibration damper is fitted with a four-lobe "pulse ring" which provides the system with an accurate indication of when the pistons reach 10 BTDC. This indication is called the reference timing. Figs. 6 and 7.

The pulse ring is a powdered metal ring positioned on the crankshaft vibration damper during manufacture. It has four equally spaced lobes which represent crankshaft position when the pistons reach 10 BTDC.

During operation, the lobes on the pulse ring pass by the tip of the CP sensor. The pulse ring interrupts the magnetic field at the tip of the sensor. When the field is interrupted, an output signal is generated and sent to the ECA.

As the crankshaft turns, the ECA evaluates the electrical impulses to determine the exact position of the crankshaft at any given time. By the frequency of the impulses, the ECA can determine the engine speed. With these two factors, the ECA will determine the appropriate ignition timing advance required for best engine operation.

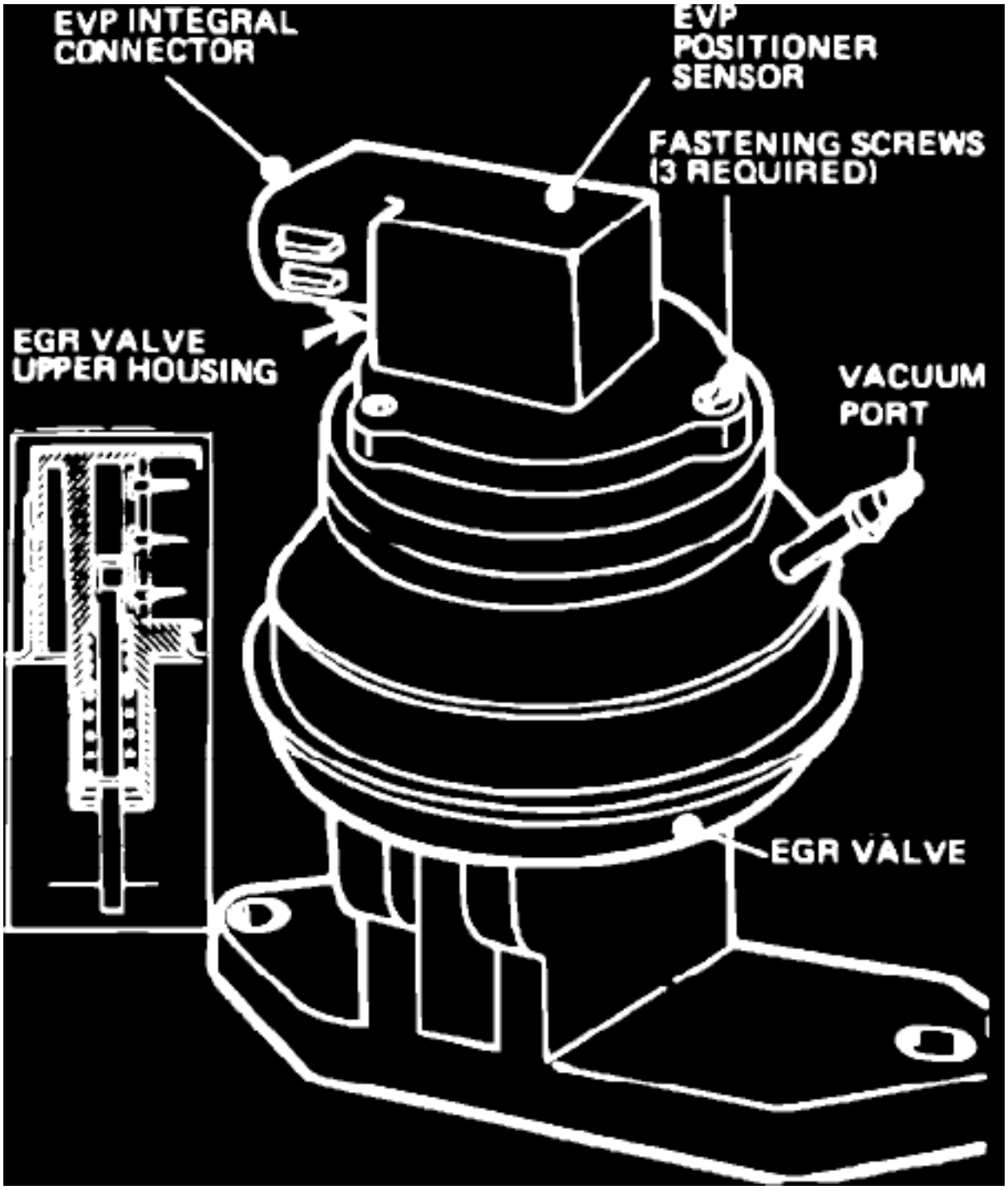


EGR Valve Position Sensor: Locations

LH Side Of Engine.

Rear Of Carburetor

Applicable to: 1982-83 V8-302/5.0L & V8-351/5.8L Engines w/EEC



EGR Valve Position Sensor: Description and Operation

Fig. 6 EGR valve position sensor

This sensor, Fig. 6, is used to monitor the EGR valve pintle position. The computer applies a reference voltage to the EVP sensor, and the resulting signal from the EVP sensor is proportional to the amount of exhaust gases flowing through the EGR valve pintle into the intake manifold.

Depending on the input from this and other sensors, the computer can increase or decrease EGR flow by activating or deactivating a pair of solenoid vacuum valves.

Engine	Year	Sensor	Resistance Ohms @ deg. F/C
All w/EEC IV	1983-90	Coolant, Air Charge	31,700-42,900 @ 68/20 13,650-18,650 @ 104/40 6500-8900 @ 140/60 3240-4440 @ 176/80 1770-2370 @ 212/100 980-1380 @ 248/115
All w/EEC III	1981-83	Coolant, Air Charge	1100-6000 1700-60,000

TEMPERATURE SENSORS

Intake Air Temperature Sensor: Description and Operation

DESCRIPTION

This sensor is used on models with fuel injection. It sends air temperature information to the Electronic Control Unit to make changes for air temperature variations.

Intake Air Temperature Sensor: Testing and Inspection Component Testing

NOTE: Prior to performing any test on this system, insure that temperature switch is above 65° F.

1. Disconnect connector from wiring harness.

2. Connect an ohmmeter or self-powered test light to temperature switch connector terminals.

3. Cool the switch to below 40° F by spraying with Refrigerant 12.

CAUTION: Do not spray refrigerant with engine running, as any refrigerant drawn into the carburetor and burned in the engine will produce poisonous phosgene gas. Conduct this procedure in well ventilated area.

4. When switch is cooled below 40° F. a.

On type 1 switches, the internal switch contacts should open. The ohmmeter should read maximum resistance or the test light should be off. If switch does not open below 40° F, replace switch.

b. On type 2 switches, the internal switch contacts should close. The ohmmeter should read zero resistance and the test light should be on. If test light does not go on or ohmmeter indicates a resistance of 1 ohm or more, replace switch.

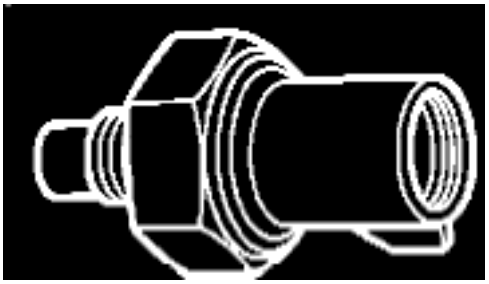
5. Increase switch temperature to above 70° F by placing palm of hand on metal surface of switch or by starting engine and allowing the exhaust manifold heat to increase the intake air temperature.

6. When switch temperature is above 70° F. a.

On type 1 switches, the internal switch contacts should close. The ohmmeter should read zero resistance and the test light should be on. If test light does not go on or ohmmeter indicates a resistance of 1 ohm or more, replace switch.

b. On type 2 switches, the internal switch contacts should open. The ohmmeter should read maximum resistance or the test light should be off. If switch does not open, replace switch.

c. If switch is replaced, check operation of new switch before connecting harness connector.



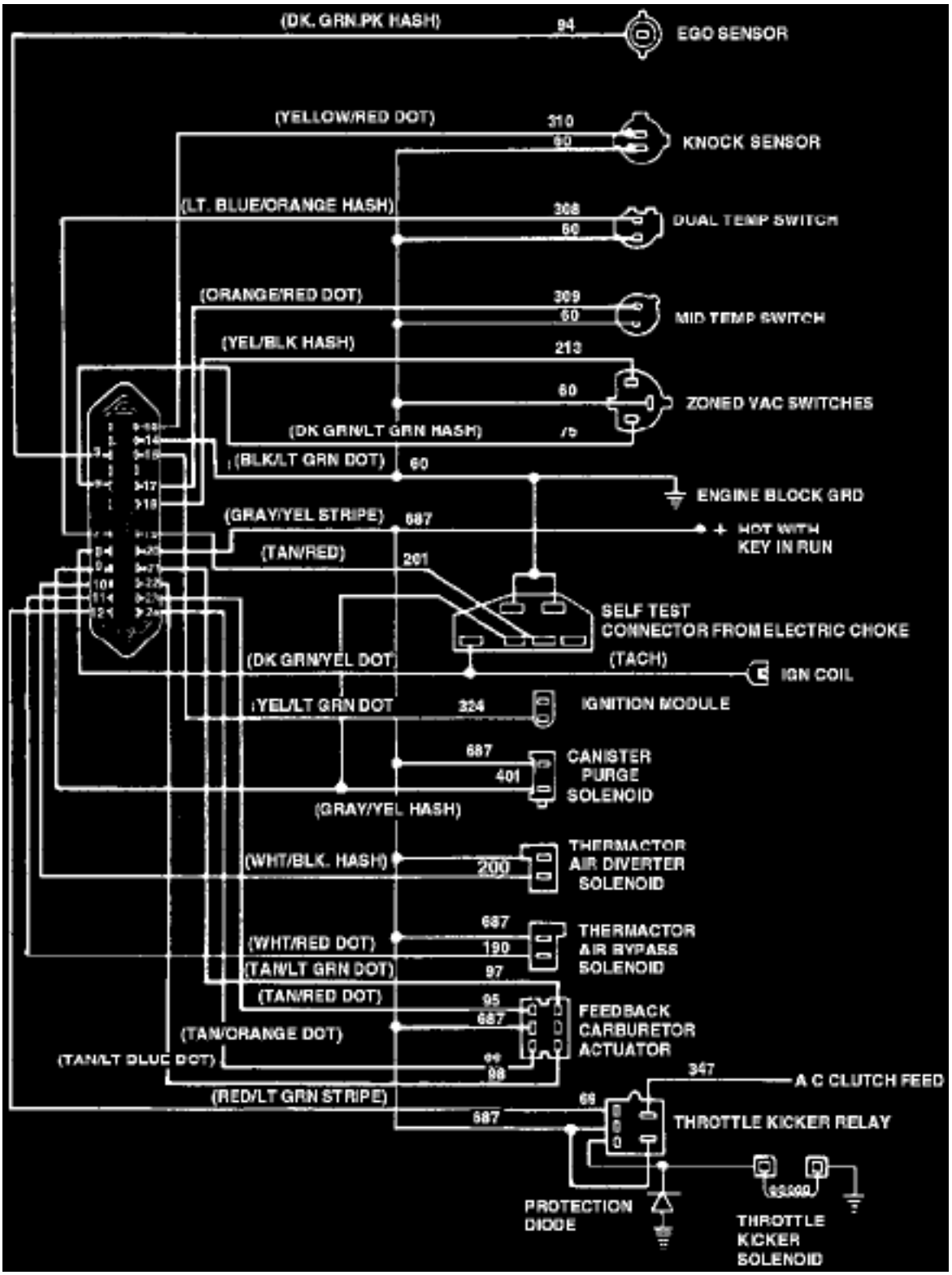
Knock Sensor: Description and Operation

Knock Sensor

The knock sensor, Fig. 11, is a piezo-electric accelerator accelerometer with the sensor designed to resonate at approximately the same frequency as the engine knock frequency.. The sensor uses the resonant frequency to mechanically amplify the engine knock frequency (5-6 KHz).

This method allows relatively large signals to be achieved without electrical amplification. The sensor has a thin circular piezoelectric ceramic disk which is bonded to a metal diaphragm. Electrical connections are made through a two-pin integral connector.

Ford Bronco Workshop Manual (V8-351 5.8L VIN G 2-bbl (1982))
Ford Workshop Manuals > Sensors and Switches > Sensors and Switches - Powertrain Management > Sensors and Switches - Computers and Control Systems > Knock Sensor > Component Information > Testing and Inspection > Component Testing



Knock Sensor: Testing and Inspection Component Testing

Fig.8 - MCU System Wiring Circuit

1. Make sure that the following three steps are properly conducted in order to simulate spark knock conditions and determine that spark detection

system is inoperative. If not, repeat test to verify problem. a. Make sure that engine is at normal operating temperature. Run engine at 2000 rpm for 2 minutes, then turn key off. Immediately restart engine

and allow to idle.

b. Observe voltmeter and vacuum gauge for initialization pulses after restarting the engine. The throttle kicker will also extend (increase engine

speed) and remain on throughout the test.

c. On vehicles with spark knock sensor, when initial pulses occur, immediately simulate spark knock by placing a 3/8 inch extension on manifold

near base of knock sensor. Tap end of extension with a small hammer for about 15 seconds.

2. Disconnect jumper wire from self-test trigger input circuit 201. 3. With ignition key off, disconnect vehicle harness from spark knock sensor. 4. Using a torque wrench and a 1 1/8 inch deep socket, make sure that spark sensor is torqued to 12-18 ft. lbs. If sensor is properly torqued, proceed

to next step. If not, torque to specifications.

5. Disconnect vehicle harness from MCU and spark sensor. Connect one lead of an ohmmeter to circuit 310 of vehicle harness and other lead to

engine block, Fig. 8. If resistance is 1000 ohms or more, proceed to next step. If resistance is less than 1000 ohms, repair short to ground in circuit 301.

6. With key off and knock sensor harness disconnected, check circuit 310 of vehicle harness for continuity. If resistance is 10 ohms or less, continue

to next step. If resistance is greater than 10 ohms, repair circuit 310.

7. Check circuit 60 of vehicle harness for continuity between knock sensor and MCU, Fig. 8. If resistance is 10 ohms or less, reconnect harness

connector to MCU and proceed to next step. If resistance is greater than 10 ohms, service circuit 60.

8. Reconnect jumper wire to circuits 201 and 60 of VIP connector, Fig. 8. 9. Connect a test lamp to positive terminal of battery, then disconnect knock sensor from vehicle harness.

10. Perform "Engine Running Functional Test" procedure. When the four initialization pulses occur, continuously tap circuit 310 of the vehicle

harness connector, which mates to the knock sensor connector, with the probe end for 5 seconds while observing voltmeter pulses. If a code 25 is

observed, replace MCU. If any other code is observed, replace spark knock sensor.

SPARK KNOCK, ONLY AT WIDE OPEN THROTTLE AND/OR POOR PERFORMANCE/MILEAGE

1. If engine has a spark knock sensor, disconnect it. 2. Make sure that ignition timing is within specifications. 3. With engine running at normal operating temperature, disconnect the two wire ignition module connector (yellow wire is circuit 324 and

black/white wire is circuit 69) from vehicle harness. Using a jumper wire, jump the wires together at the ignition module and note ignition timing. Remove jumper wire and note ignition timing. If timing retards 16-20 degrees, reconnect ignition module and proceed to next step. If timing does not retard 16-20 degrees, replace ignition module and repeat steps 1, 2 and 3.

4. With engine at normal operating temperature, set high cam on lowest step that will maintain engine speed greater than 1200 rpm. Note ignition

timing, then disconnect and plug vacuum hose from zone vacuum switch and again note timing. If timing retards more than 5 degrees, on engines with spark knock sensor, proceed to step 6, on all other engines MCU system is okay. If timing does not retard more than 5 degrees, proceed to next step.

5. With engine still at 1200 rpm, disconnect ignition module (connector with yellow and black/white wires). If timing retards, check circuit 324 for

short to ground. If circuit is okay, replace MCU unit and retest. If timing does not retard, check circuit 324 for open circuit. If circuit is okay, Replace MCU unit and retest.

6. On engines with spark knock sensor, reconnect sensor. Repeat Engine Running Functional Test, but do not simulate knock by taping sensor. If

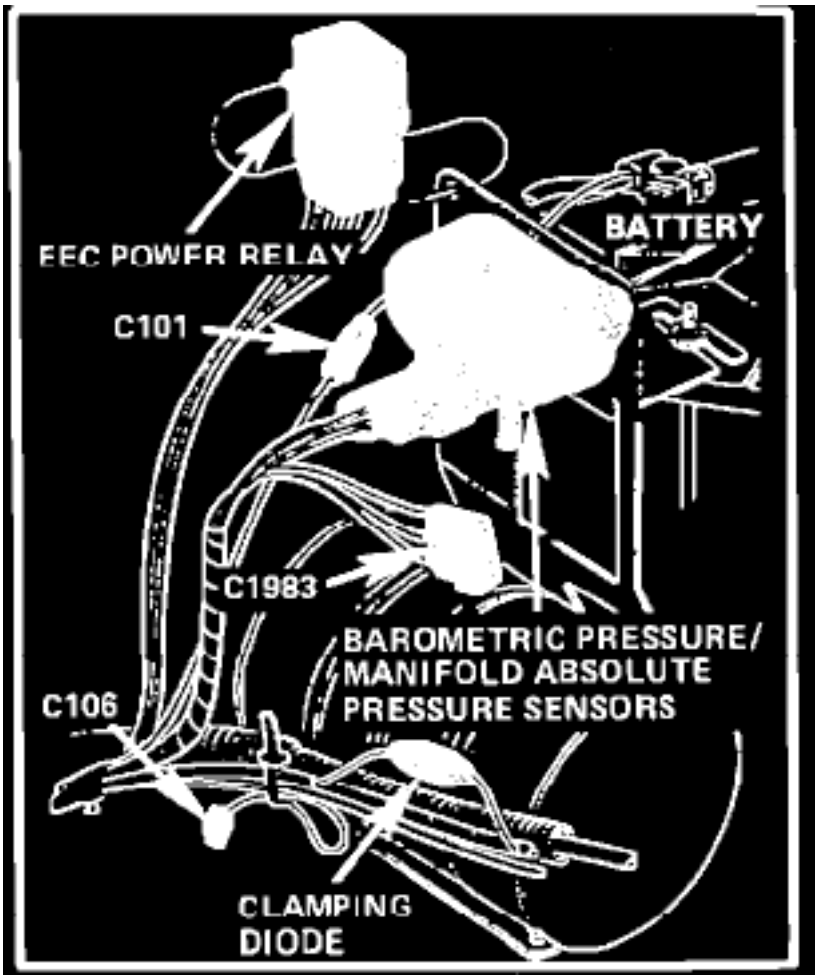
service code 25 appears, MCU system is okay, testing is completed. If any other service code appears, replace knock sensor and retest.

With EEC IV, measured between BK/W wire and ground with ignition on and engine off.

Engine	Year	Voltage @ Altitude
All w/EEC IV	1983-90	1.55-1.63 @ 0
		1.52-1.60 @ 1000
		1.49-1.56 @ 2000
		1.46-1.54 @ 3000
		1.43-1.51 @ 4000
		1.39-1.48 @ 5000
		1.36-1.45 @ 6000
		1.34-1.43 @ 7000

Engine	Year	Resistance (ohms) @ Altitude
All w/EEC III	1981-83	7.6-8.4 @ 0-1500
		7.2-8.1 @ 1500-2500
		6.9-7.8 @ 2500-3500
		6.7-7.3 @ 3500-4500
		6.6-7.2 @ 4500-5500
		6.3-7.0 @ 5500-6500
		6.1-6.7 @ 6500-7500
		5.4-6.7 @ 7500 and up

MANIFOLD ABSOLUTE AND BAROMETRIC PRESSURE SENSORS

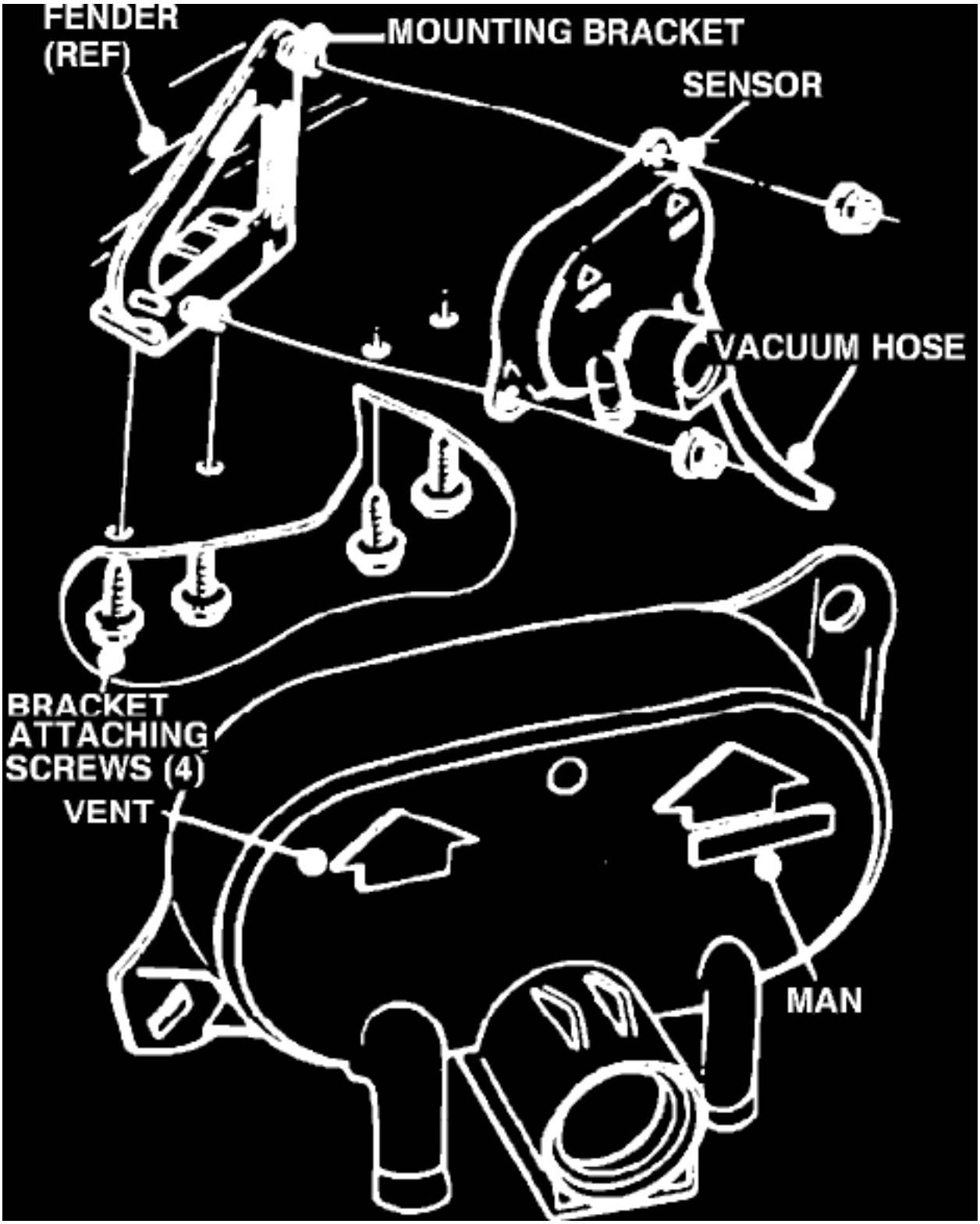


Manifold Pressure/Vacuum Sensor: Locations

Forward Of RH Wheelwell At Battery.

On Battery Support

Applicable to: 1981-83



Manifold Pressure/Vacuum Sensor: Description and Operation

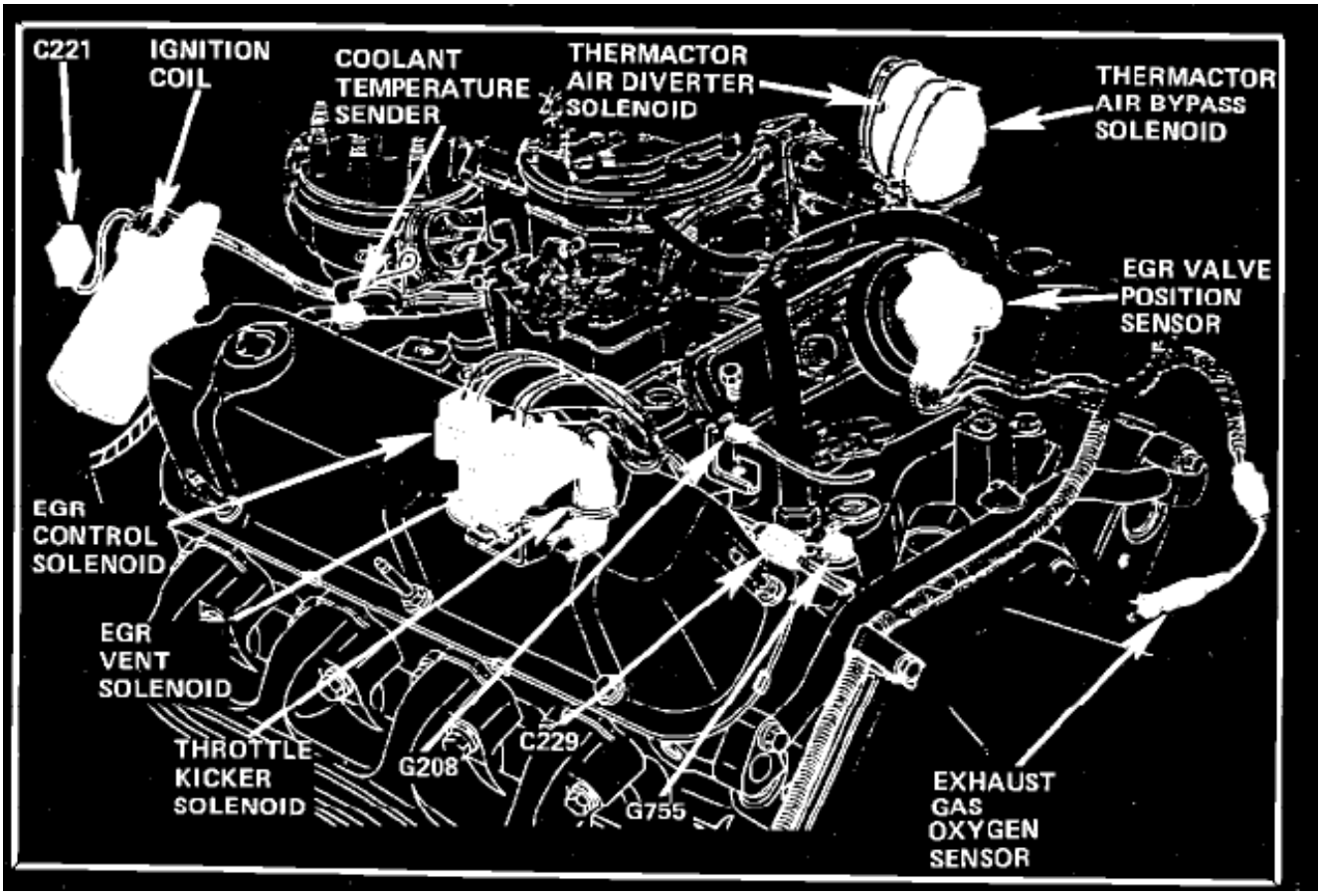
Fig. 5 Barometric & manifold absolute pressure sensor

DESCRIPTION

These two sensors, Fig. 5, are combined into one unit. The BMAP sensor monitors the absolute value of the intake manifold pressure and atmospheric pressure (manifold absolute pressure is defined as barometric pressure minus manifold vacuum).

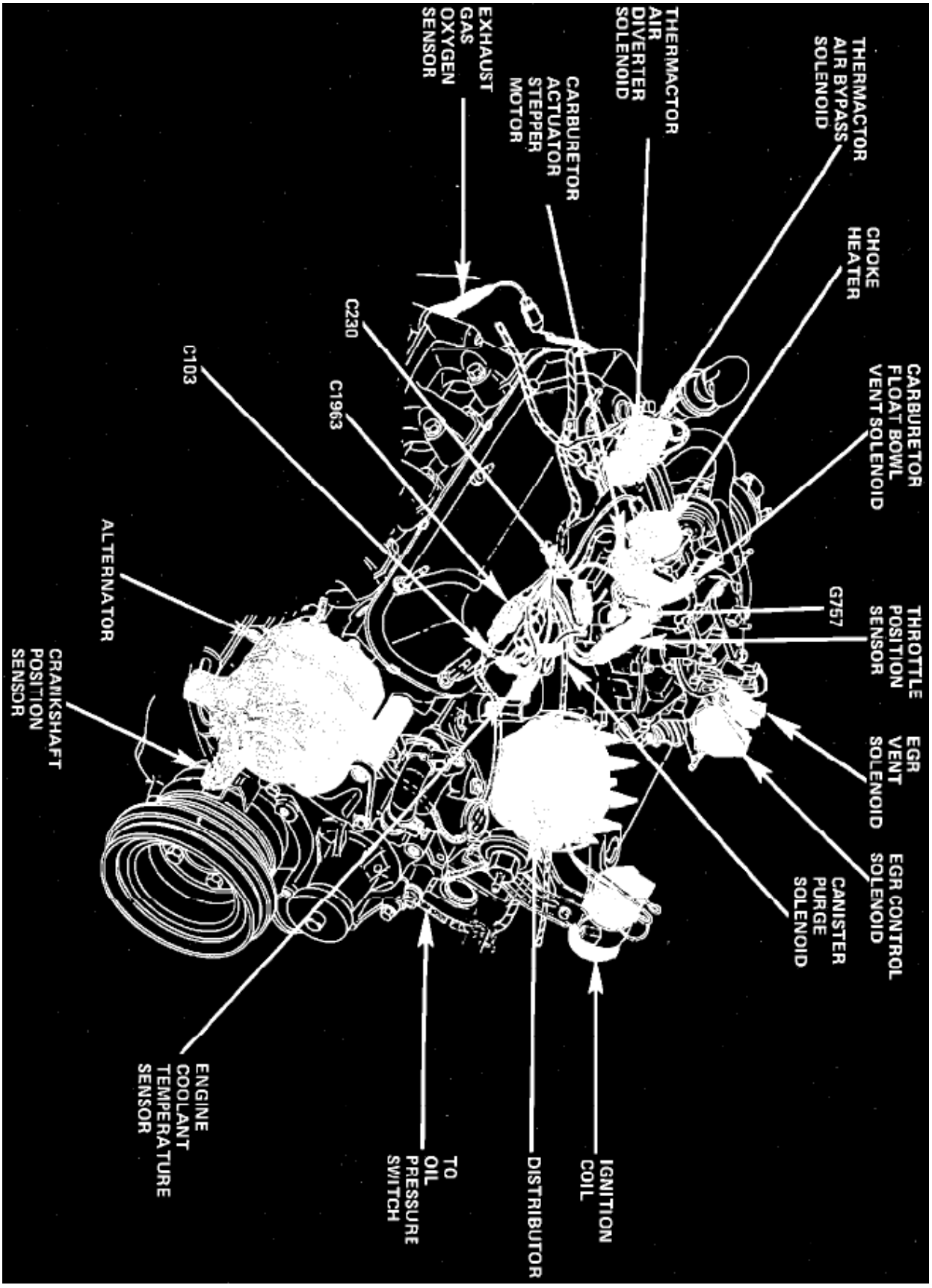
Atmospheric pressure changes are converted into an electrical signal and fed to the computer for evaluation. From this input, the computer determines the EGR flow requirements depending on the altitude at which the vehicle is being operated.

Intake manifold pressure changes are converted by a pressure-sensing element and electrical circuit by the computer. The signal is used by the computer to determine part throttle spark advance, EGR flow rate and air/fuel ratio.



Oxygen Sensor: Locations

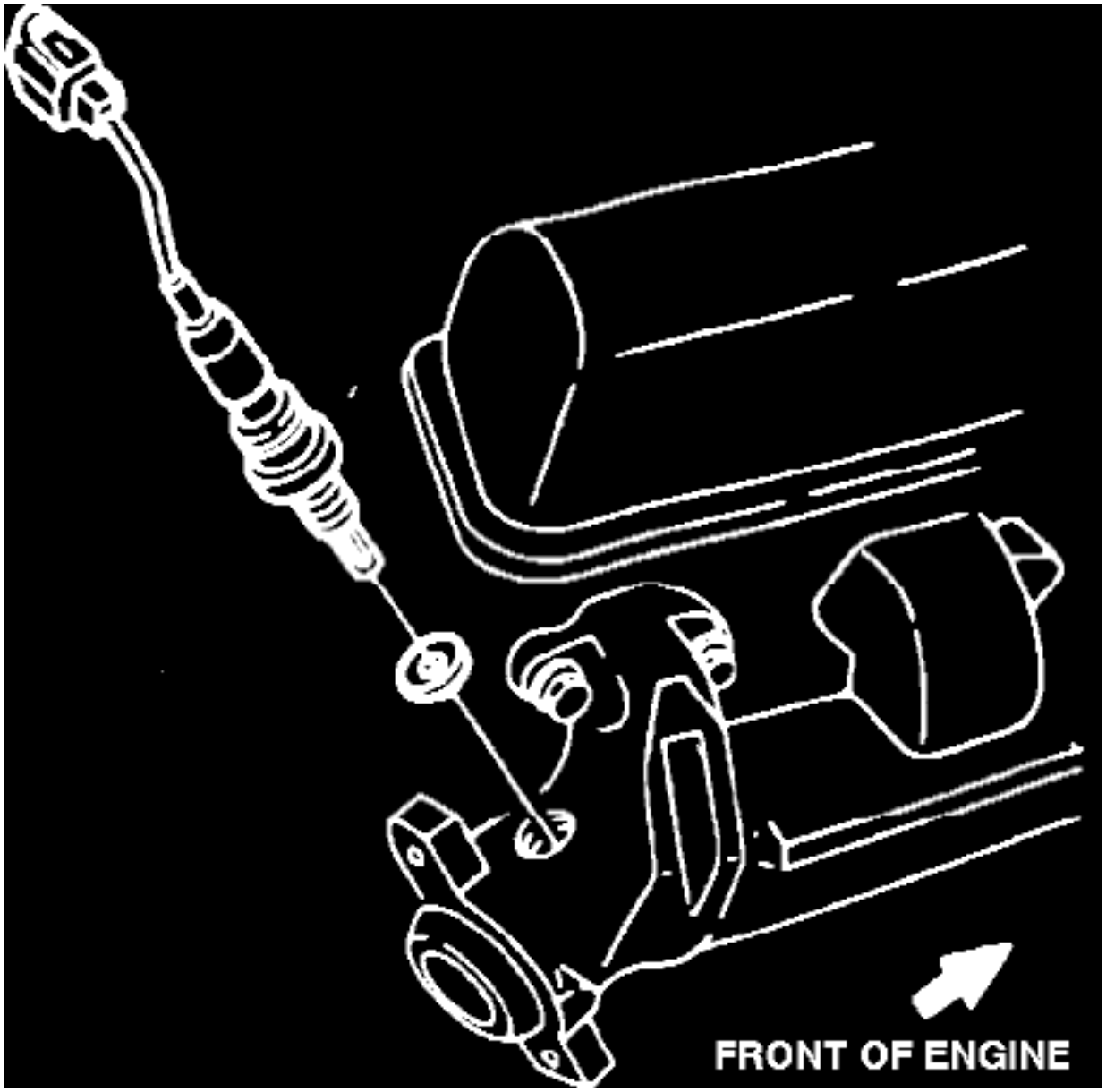
LH Side Of Engine.


THERMACTOR AIR BYPASS SOLENOID
CHOKE HEATER
CARBURETOR FLOAT BOWL VENT SOLENOID
THERMACTOR AIR DIVERTER SOLENOID
CARBURETOR ACTUATOR STEPPER MOTOR
EXHAUST GAS OXYGEN SENSOR
C230
C1963
C103
G757
THROTTLE POSITION SENSOR
EGR VENT SOLENOID
EGR CONTROL SOLENOID
CANISTER PURGE SOLENOID
ALTERNATOR
CRANKSHAFT POSITION SENSOR
IGNITION COIL
DISTRIBUTOR
TO OIL PRESSURE SWITCH
ENGINE COOLANT TEMPERATURE SENSOR

Top RH Side Of Engine.

Rear RH Side Of Engine On Manifold

Applicable to: 1982-83 V8-302/5.0L & V8-351/5.8L Engines w/EEC



Oxygen Sensor: Description and Operation

Fig. 4 Exhaust gas oxygen sensor

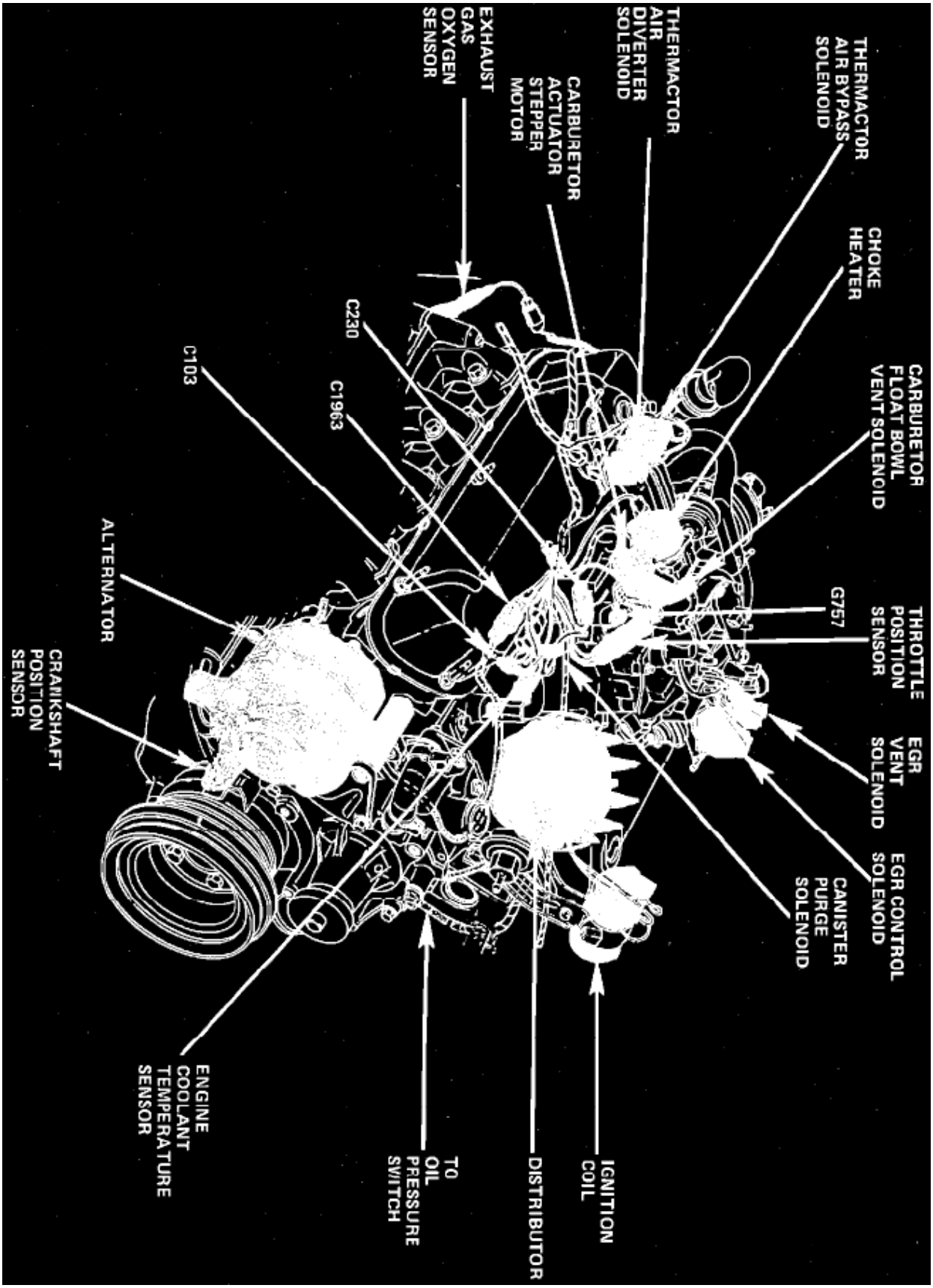
This sensor, Fig. 4, is installed in the exhaust manifold and provides information to the ECA as to the oxygen content of the exhaust gases. It monitors the oxygen content of the exhaust gases and generates an output of .6 to 1.0 volt when detecting a rich exhaust gas mixture (absence of oxygen) and less than .2 volts when detecting a lean mixture (presence of oxygen). This constantly changing voltage signal is sent to the ECA for analysis. The outer surface of the sensor is a threaded steel housing and shell. The sensor body is protected by a shield pressed into the housing where it projects into the exhaust manifold. Exhaust gases contact the sensor body by entering through flutes in the sensor shield. A vent is provided in the shell to allow atmospheric air to enter the inner portion of the sensor body. The sensor connects to the vehicle wiring harness with a connector that is attached to the inner (positive) terminal. The shell is the negative terminal

of the sensor and provides the return signal path through the engine block.

		TPS Voltage	
Engine	Year	Minimum	Maximum
All w/EEC III	1981	1.80-2.40	6.0 min.
All w/EEC III	1982-83	1.60-2.40	6.0 min.
All w/EEC IV	1984-88	0.90-1.00†	—
2.3L	1989-90	.34	4.84
2.9L	1989-90	.34	4.84
3.0L	1989-90	.34	4.84
4.0L	1990	.34	4.84
4.9L	1989-90	.20	4.84
5.0L	1989-90	.20	4.84
5.6L, 7.5L	1989-90	.20	4.84
w/4-speed AT	1989-90	.34	4.84

† Adjustable units only.

THROTTLE POSITION SENSOR SPECIFICATIONS

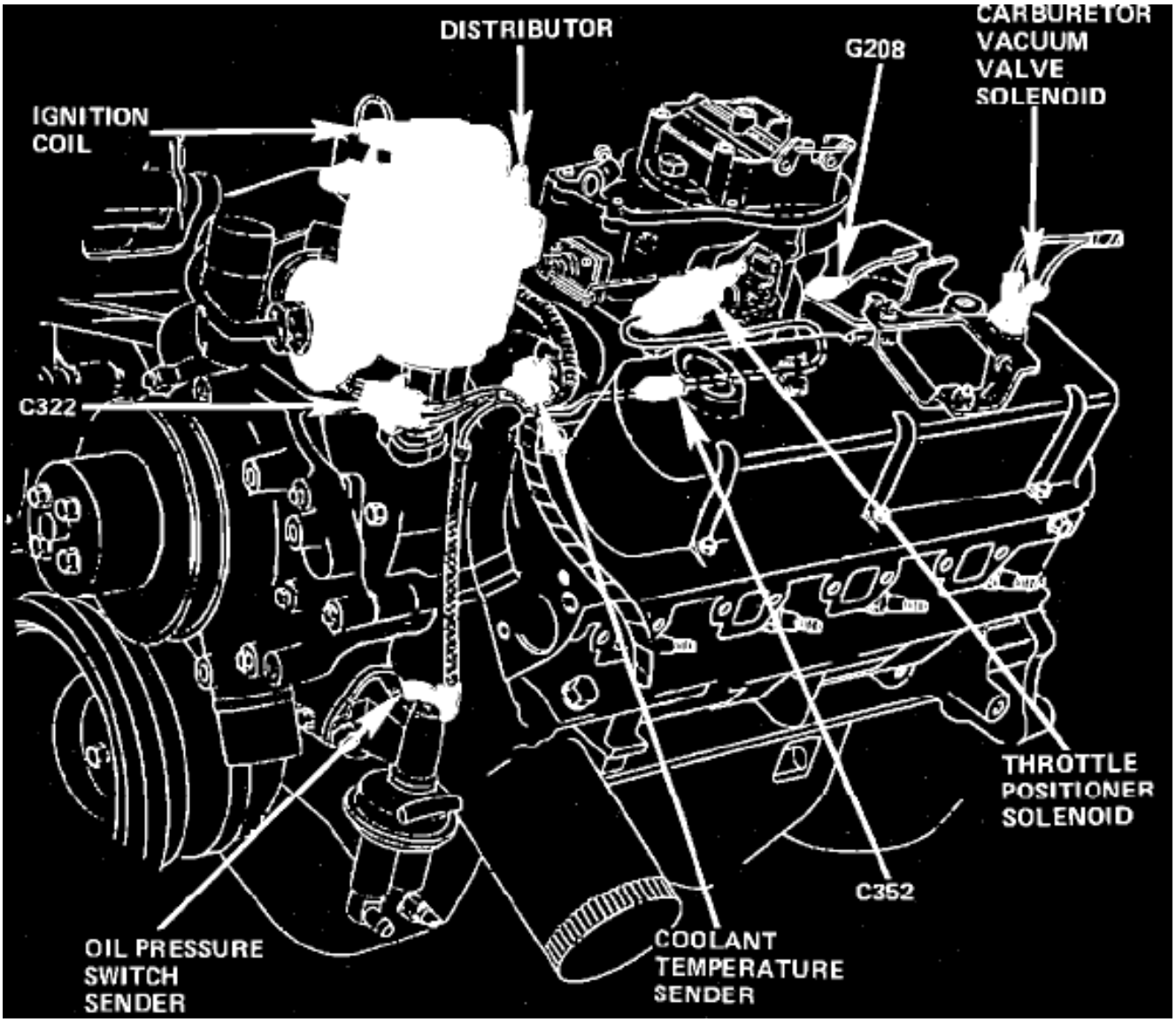


Throttle Position Sensor: Locations

Top RH Side Of Engine.

RH Rear Of Carburetor

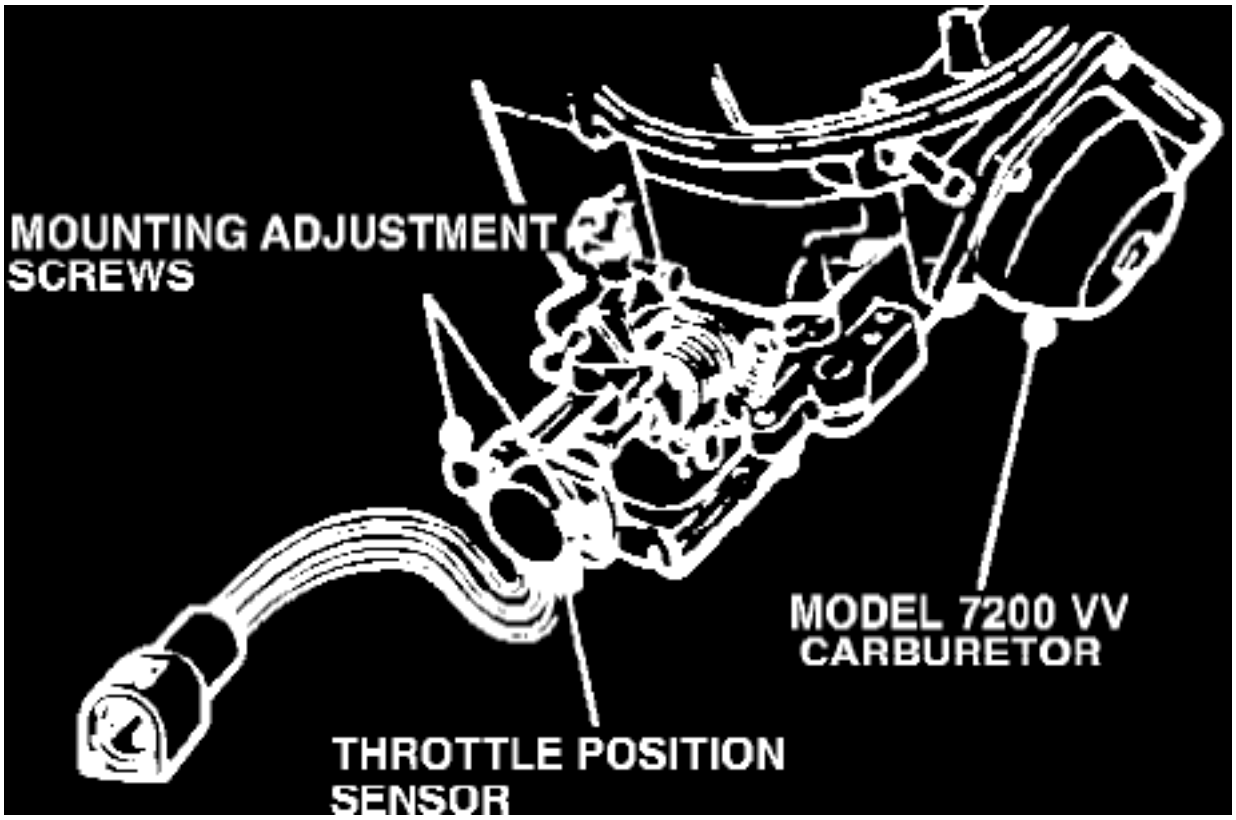
Applicable to: 1982-83 V8-302/5.0L & V8-351/5.8L Engines w/EEC



LH Side Of Engine.

RH Rear Of Carburetor

Applicable to: 1982-83 V8-255/4.2L & V8-302/5.0L Engines



Throttle Position Sensor: Description and Operation

Fig. 2 Throttle position sensor (typical)

This sensor, Fig. 2, is basically a rheostat switch attached to the carburetor throttle shaft and responds to throttle valve angle changes. The throttle angles are classified into three operating modes as follows:

a. Closed Throttle (Idle or Deceleration)

b. Part Throttle

c. Wide Open Throttle (Maximum Acceleration)

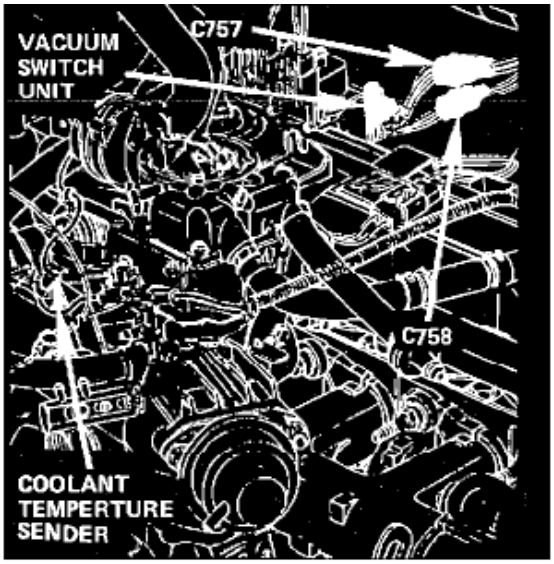
The ECA applies a reference voltage of about 9 volts to the sensor. The resultant sensor voltage supplied to the ECA, which is determined by the throttle position, is used by the ECA to determine the proper amount of spark advance, EGR flow, air/fuel ratio and thermactor air mode. The throttle position sensor mounting holes are slotted to permit adjustment. If the sensor is replaced, it must be correctly positioned or incorrect throttle information will be sent to the ECA. The adjustment requires use of special electronic test equipment.

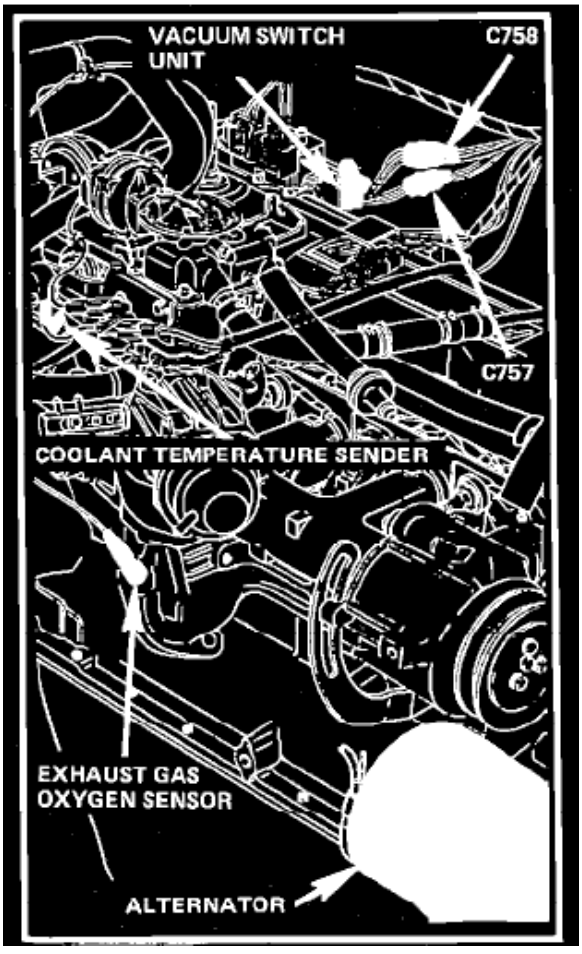
Throttle Position Sensor: Adjustments

Engines with EEC III Turn ignition to RUN position and remove vacuum hose from throttle kicker, as equipped. With engine not running, compare voltage reading against specifications and adjust as needed.

Engines with EEC IV Connect positive probe of DVOM along terminal C (lower) of TPS and connect negative probe along terminal A (upper). Turn ignition on but do not start vehicle. Adjust TPS to specified value.

Ford Bronco Workshop Manual (V8-351 5.8L VIN G 2-bbl (1982))
Ford Workshop Manuals > Sensors and Switches > Sensors and Switches - Powertrain Management > Sensors and Switches - Computers and Control Systems > Vacuum Switch > Component Information > Locations





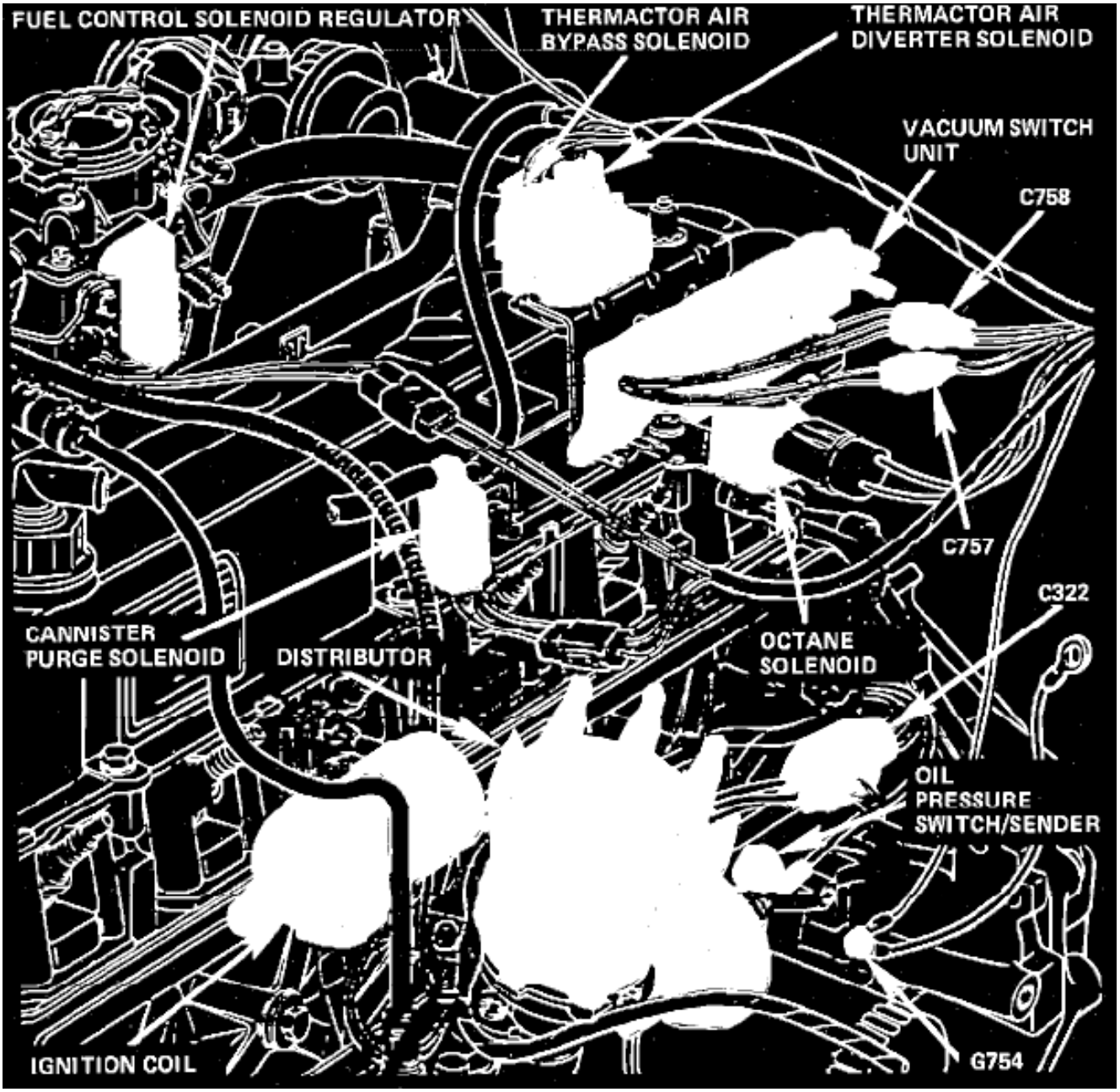
Vacuum Switch: Locations

RH Side Of Engine.

Center Rear Of Engine On Valve Cover

Applicable to: 1982-83 6-300/4.9L Engine

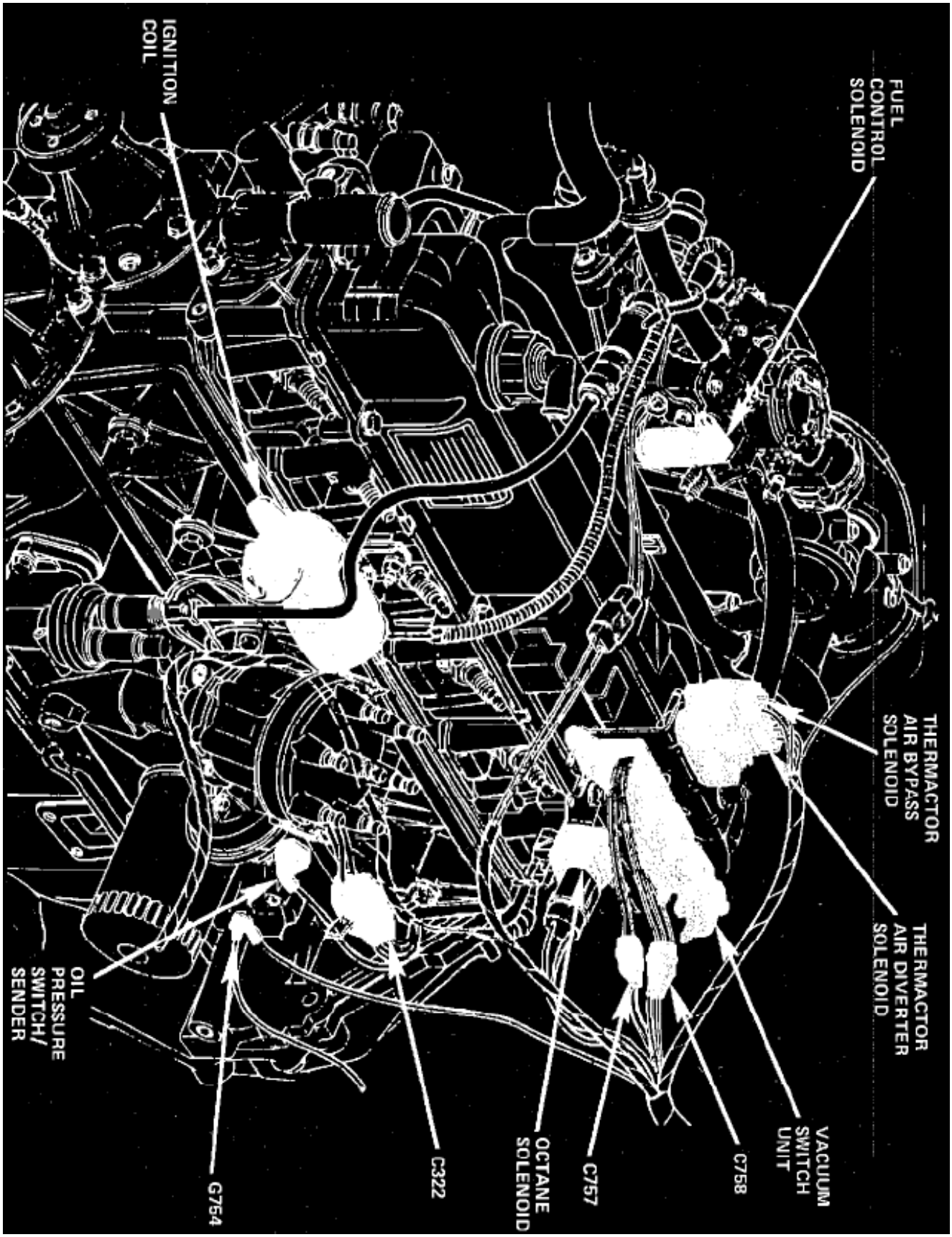
RH Side Of Engine.



LH Side Of Engine.

Center Rear Of Engine On Valve Cover

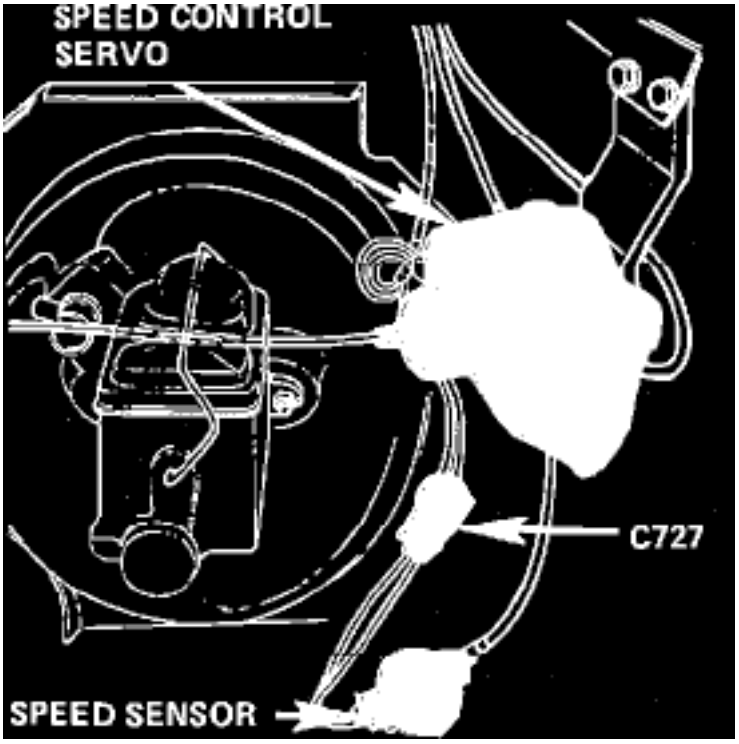
Applicable to: 1981 6-300/4.9L Engine w/MCU


FUEL CONTROL SOLENOID
IGNITION COIL
THERMACTOR AIR BYPASS SOLENOID
THERMACTOR AIR DIVERTER SOLENOID
VACUUM SWITCH UNIT
C758
C757
OCTANE SOLENOID
C322
G754
OIL PRESSURE SWITCH/ SENDER

LH Side Of Engine.

Center Rear Of Engine On Valve Cover

Applicable to: 1982-83 6-300/4.9L Engine w/MCU



Vehicle Speed Sensor: Locations

LH Side Of Dash Panel.

Below LH Side Of Master Brake Cylinder

Applicable to: V8 Engine

Vehicle Speed Sensor: Testing and Inspection Speed Sensor Test

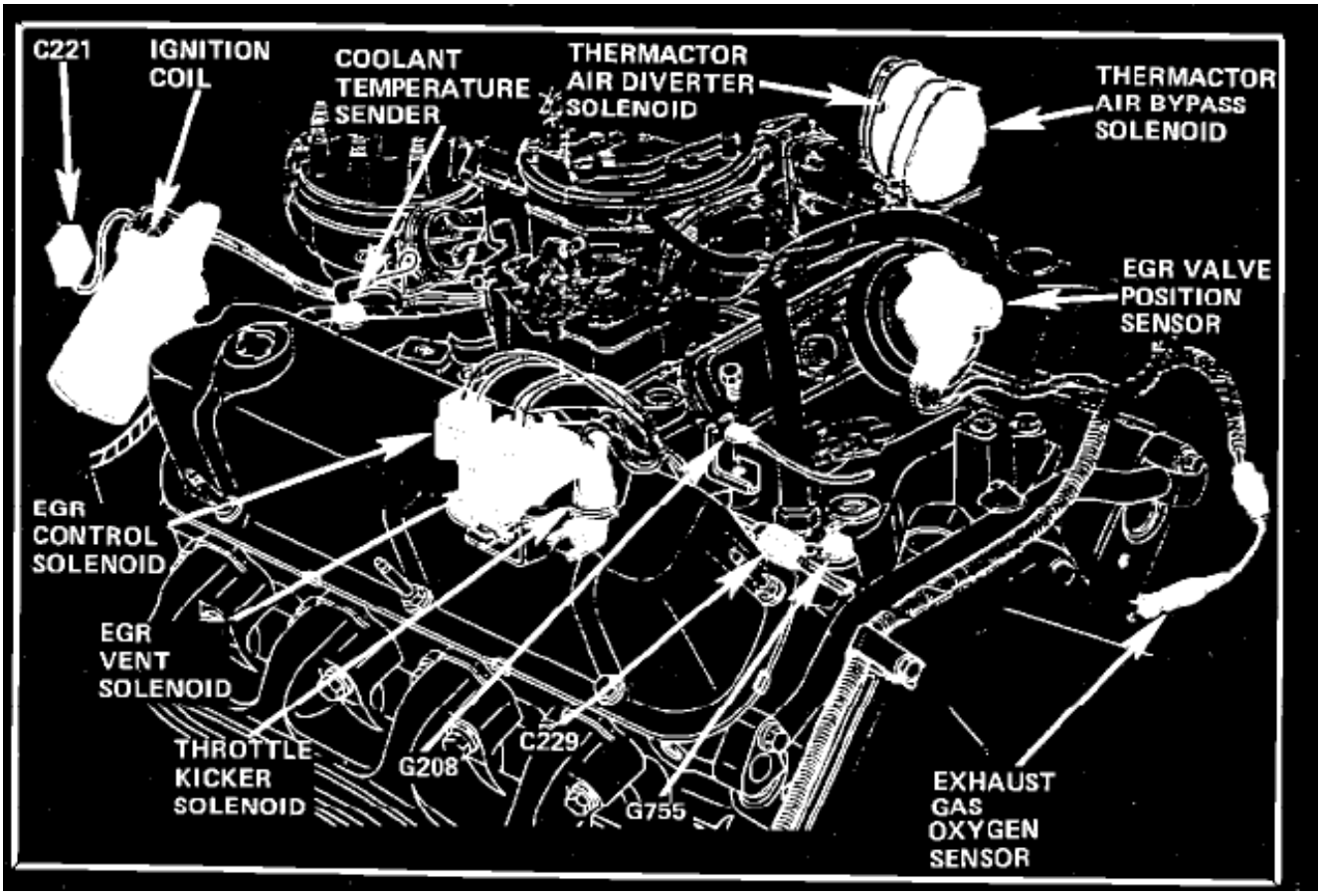
1980-87 Models Exc. 1983-87 Ranger, 1984-87 Bronco II & 1986-87 Aerostar

1. Disconnect 6 way connector from amplifier assembly, then connect an ohmmeter between dark green wire w/white stripe and black wire on 1980 E-100-350, 1981-83 F-100-350 models and Bronco, and 1984-87 F-150-350 and Bronco, or green and black wire on 1980 F-100-350 and 1981-83 E-100-350 models and 1984-87 E-150-350 at the speed sensor end. A reading of 40 ohms should be obtained. A reading of 0 ohms indicates a shorted coil and an infinity reading indicates an open coil.

2. Replace sensor if a correct reading has not been obtained.

Vehicle Speed Sensor: Service and Repair

1. Separate electrical connector leading to the amplifier assembly.
2. Disconnect upper and lower speedometer cables at the speed sensor. Remove speed sensor.
3. Reverse procedure to install.

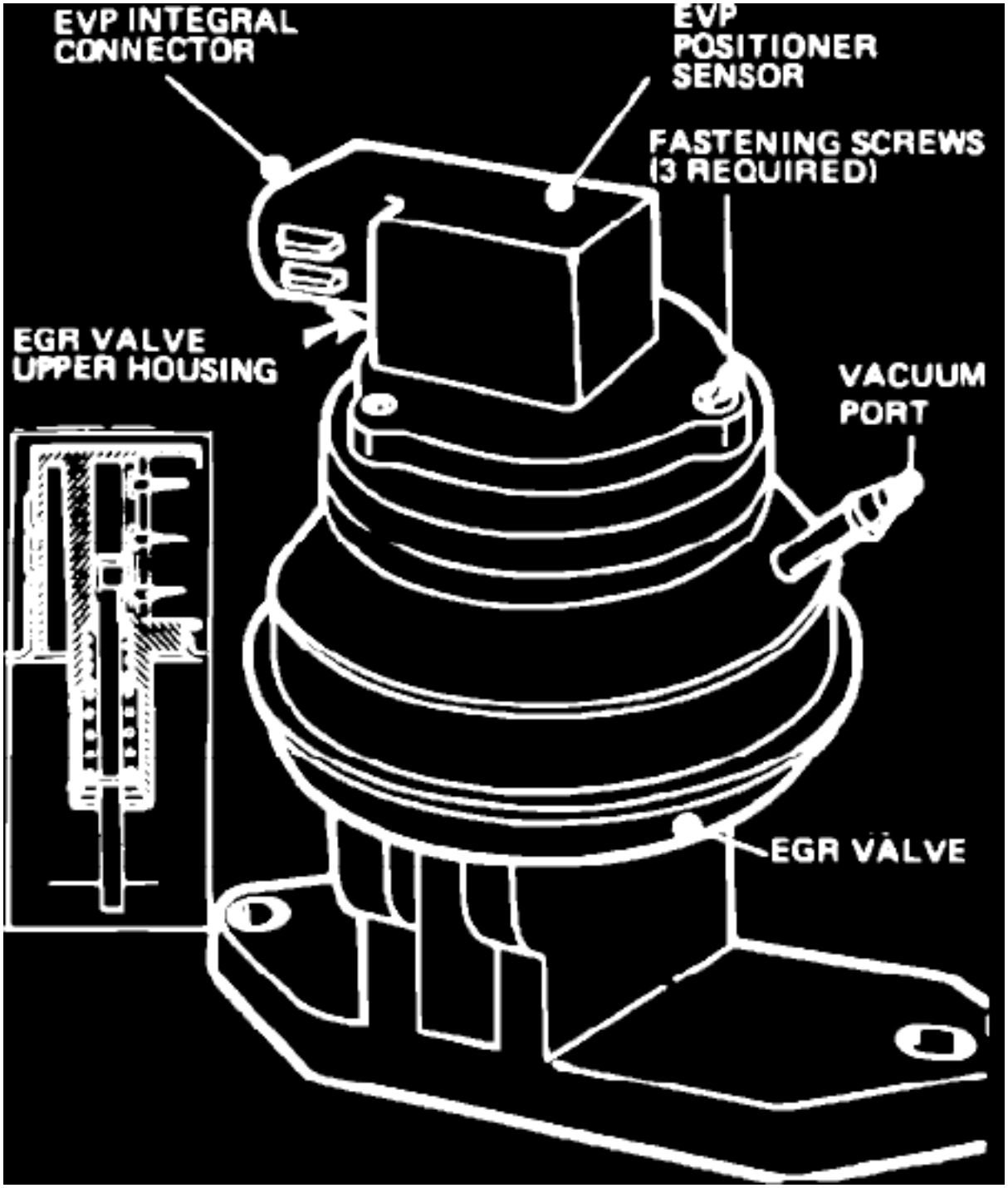


EGR Valve Position Sensor: Locations

LH Side Of Engine.

Rear Of Carburetor

Applicable to: 1982-83 V8-302/5.0L & V8-351/5.8L Engines w/EEC



EGR Valve Position Sensor: Description and Operation

Fig. 6 EGR valve position sensor

This sensor, Fig. 6, is used to monitor the EGR valve pintle position. The computer applies a reference voltage to the EVP sensor, and the resulting signal from the EVP sensor is proportional to the amount of exhaust gases flowing through the EGR valve pintle into the intake manifold.

Depending on the input from this and other sensors, the computer can increase or decrease EGR flow by activating or deactivating a pair of solenoid vacuum valves.

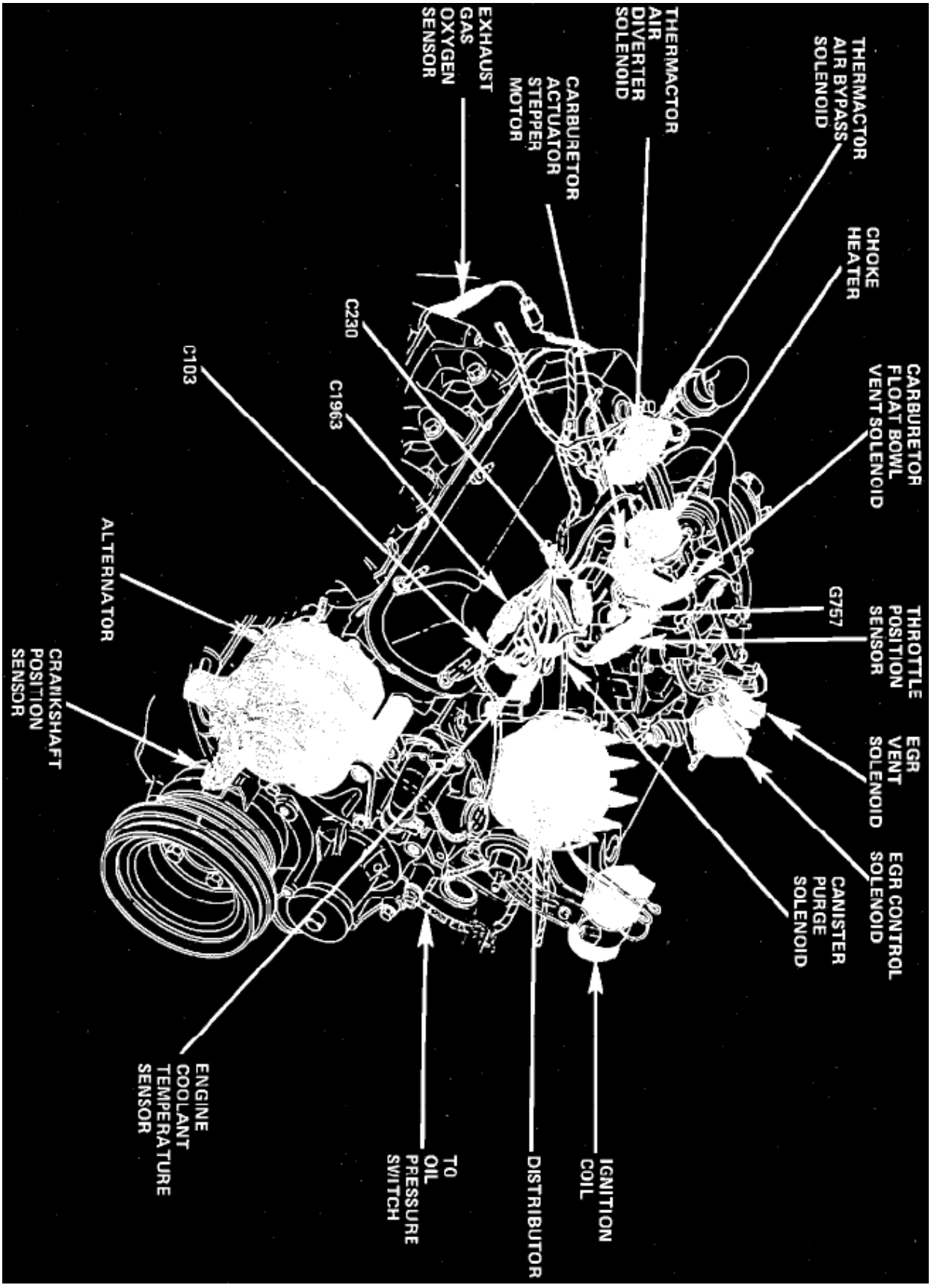
Fuel Tank Selector Switch: Locations

Center Of I/P

Engine	Year	TPS Voltage	
		Minimum	Maximum
All w/EEC III	1981	1.80-2.40	6.0 min.
All w/EEC III	1982-83	1.60-2.40	6.0 min.
All w/EEC IV	1984-88	0.90-1.00†	—
2.3L	1989-90	.34	4.84
2.9L	1989-90	.34	4.84
3.0L	1989-90	.34	4.84
4.0L	1990	.34	4.84
4.9L	1989-90	.20	4.84
5.0L	1989-90	.20	4.84
5.6L, 7.5L	1989-90	.20	4.84
w/4-speed AT	1989-90	.34	4.84

† Adjustable units only.

THROTTLE POSITION SENSOR SPECIFICATIONS

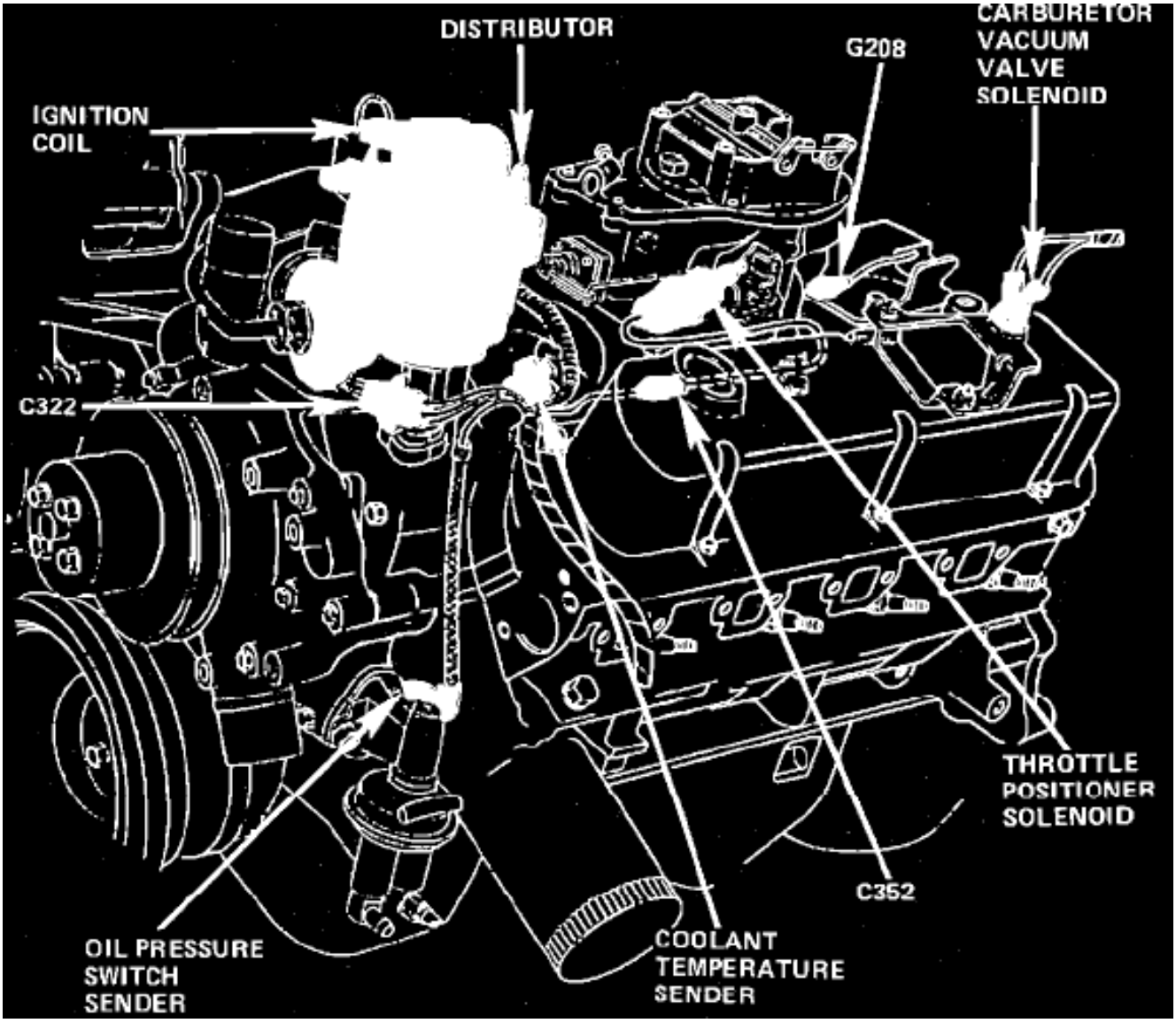

THERMACTOR AIR BYPASS SOLENOID
CHOKE HEATER
CARBURETOR FLOAT BOWL VENT SOLENOID
THERMACTOR AIR DIVERTER SOLENOID
CARBURETOR ACTUATOR STEPPER MOTOR
EXHAUST GAS OXYGEN SENSOR
C230
C1963
C103
G757
THROTTLE POSITION SENSOR
EGR VENT SOLENOID
EGR CONTROL SOLENOID
CANISTER PURGE SOLENOID
ALTERNATOR
CRANKSHAFT POSITION SENSOR
IGNITION COIL
DISTRIBUTOR
TO OIL PRESSURE SWITCH
ENGINE COOLANT TEMPERATURE SENSOR

Throttle Position Sensor: Locations

Top RH Side Of Engine.

RH Rear Of Carburetor

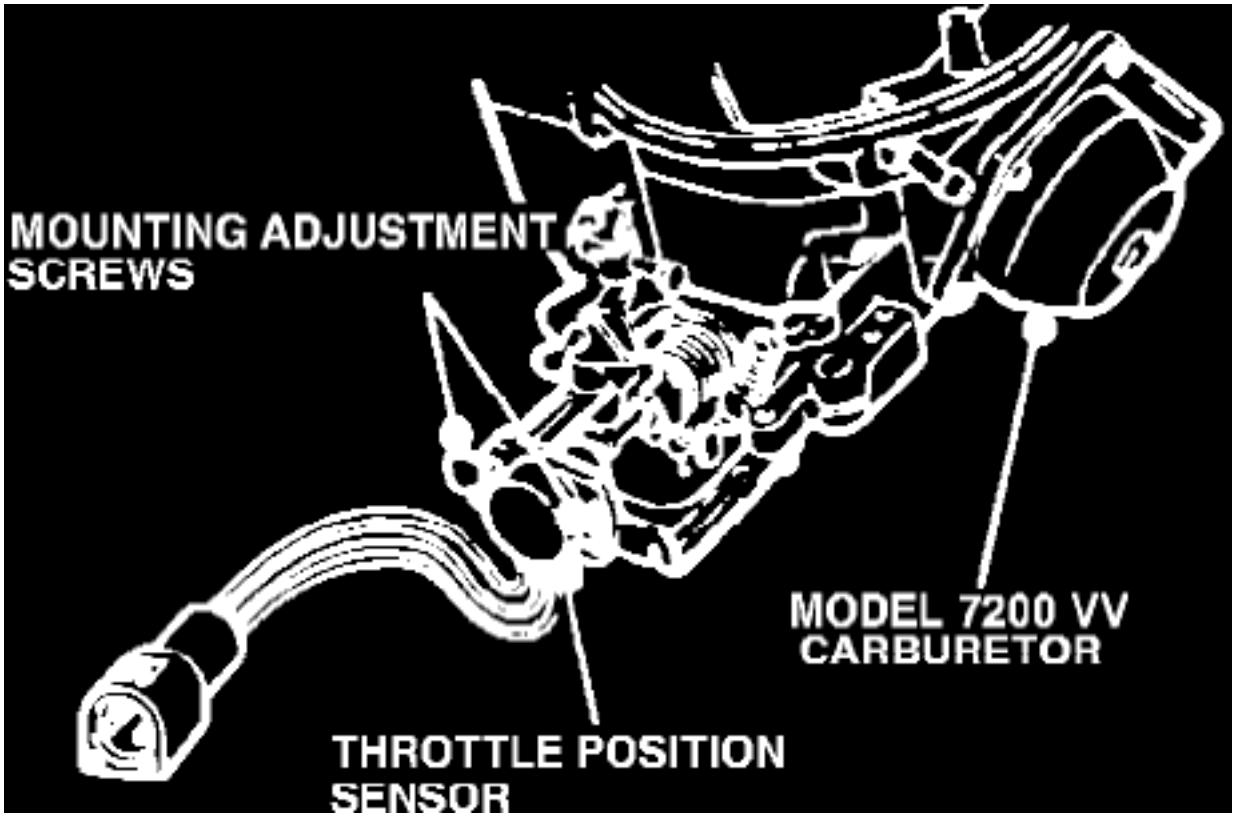
Applicable to: 1982-83 V8-302/5.0L & V8-351/5.8L Engines w/EEC



LH Side Of Engine.

RH Rear Of Carburetor

Applicable to: 1982-83 V8-255/4.2L & V8-302/5.0L Engines



Throttle Position Sensor: Description and Operation

Fig. 2 Throttle position sensor (typical)

This sensor, Fig. 2, is basically a rheostat switch attached to the carburetor throttle shaft and responds to throttle valve angle changes. The throttle angles are classified into three operating modes as follows:

a. Closed Throttle (Idle or Deceleration)

b. Part Throttle

c. Wide Open Throttle (Maximum Acceleration)

The ECA applies a reference voltage of about 9 volts to the sensor. The resultant sensor voltage supplied to the ECA, which is determined by the throttle position, is used by the ECA to determine the proper amount of spark advance, EGR flow, air/fuel ratio and thermactor air mode. The throttle position sensor mounting holes are slotted to permit adjustment. If the sensor is replaced, it must be correctly positioned or incorrect throttle information will be sent to the ECA. The adjustment requires use of special electronic test equipment.

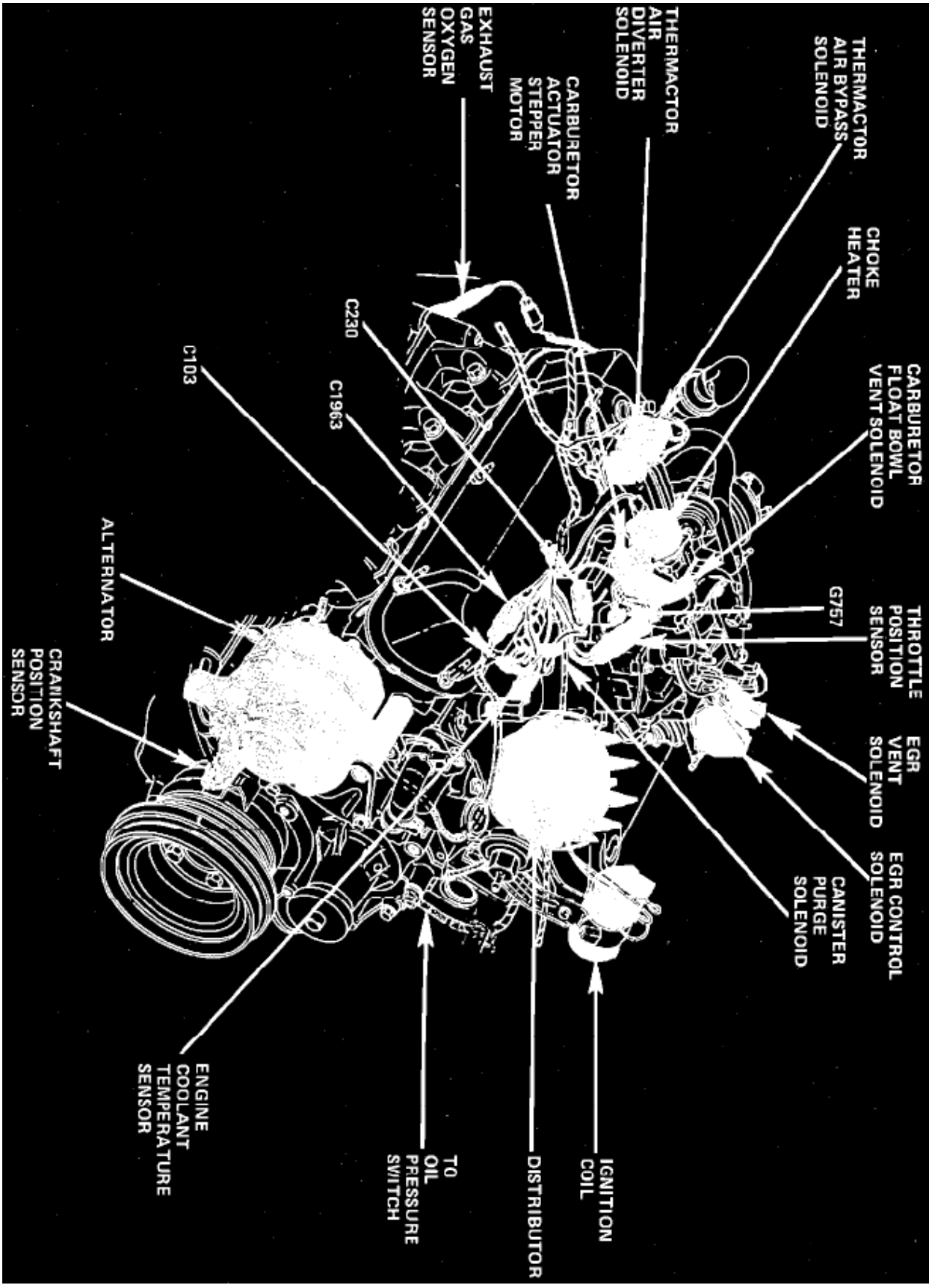
Throttle Position Sensor: Adjustments

Engines with EEC III Turn ignition to RUN position and remove vacuum hose from throttle kicker, as equipped. With engine not running, compare voltage reading against specifications and adjust as needed.

Engines with EEC IV Connect positive probe of DVOM along terminal C (lower) of TPS and connect negative probe along terminal A (upper). Turn ignition on but do not start vehicle. Adjust TPS to specified value.

Engine	Year	Resistance (ohms)
All w/EEC III	1981-83	100-640

CRANKSHAFT SENSOR

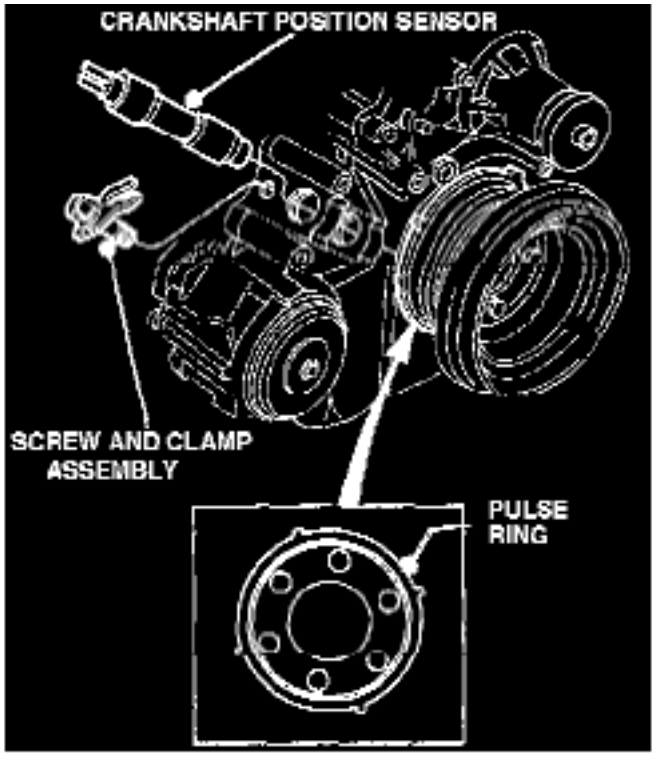

THERMACTOR AIR BYPASS SOLENOID
CHOKE HEATER
CARBURETOR FLOAT BOWL VENT SOLENOID
THERMACTOR AIR DIVERTER SOLENOID
CARBURETOR ACTUATOR STEPPER MOTOR
EXHAUST GAS OXYGEN SENSOR
C230
C1963
C103
G757
THROTTLE POSITION SENSOR
EGR VENT SOLENOID
EGR CONTROL SOLENOID
CANISTER PURGE SOLENOID
ALTERNATOR
CRANKSHAFT POSITION SENSOR
IGNITION COIL
DISTRIBUTOR
TO OIL PRESSURE SWITCH
ENGINE COOLANT TEMPERATURE SENSOR

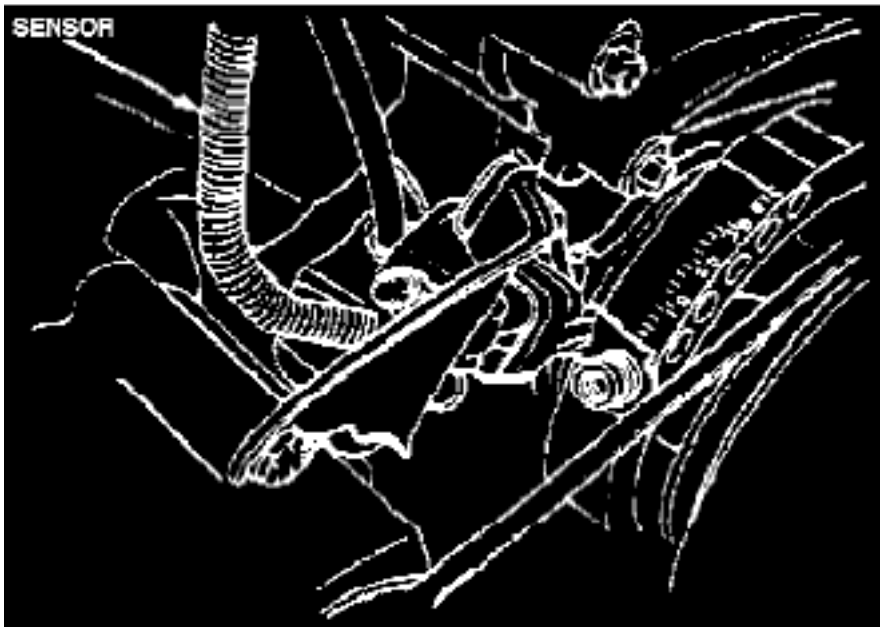
Crankshaft Position Sensor: Locations

Top RH Side Of Engine.

RH Front Of Engine

Applicable to: 1982-83 V8-302/5.0L & V8-351/5.8L Engines w/EEC





Crankshaft Position Sensor: Description and Operation

Fig.6 - Crankshaft Position Sensor

Fig.7 - Crankshaft Position Sensor

DESCRIPTION

The crankshaft vibration damper is fitted with a four-lobe "pulse ring" which provides the system with an accurate indication of when the pistons reach 10 BTDC. This indication is called the reference timing. Figs. 6 and 7.

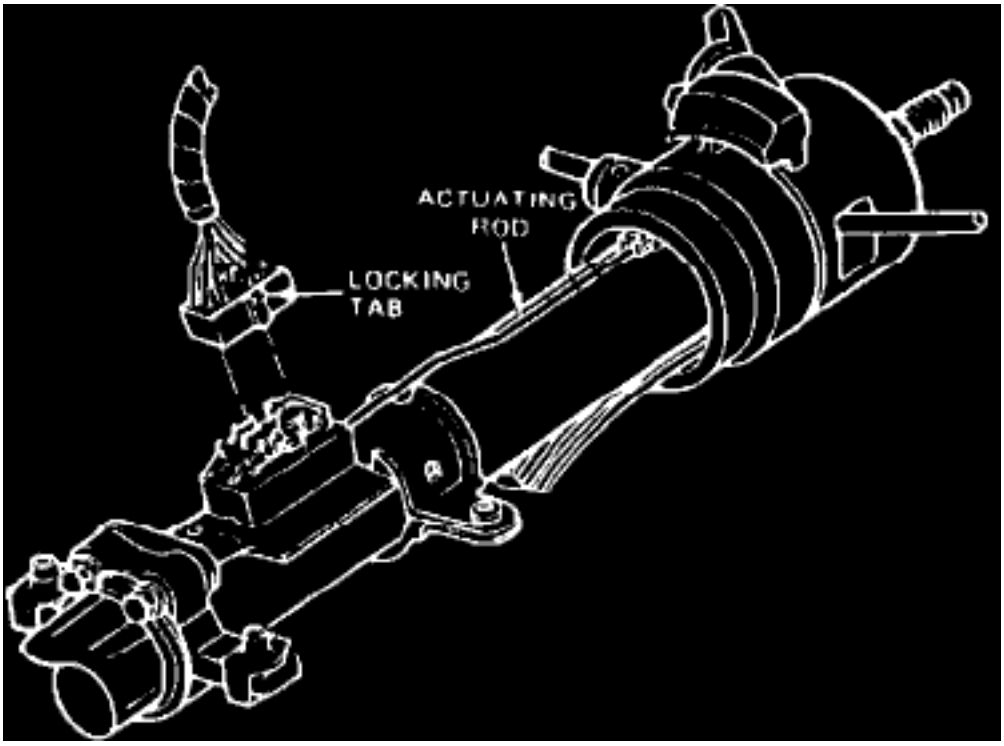
The pulse ring is a powdered metal ring positioned on the crankshaft vibration damper during manufacture. It has four equally spaced lobes which represent crankshaft position when the pistons reach 10 BTDC.

During operation, the lobes on the pulse ring pass by the tip of the CP sensor. The pulse ring interrupts the magnetic field at the tip of the sensor. When the field is interrupted, an output signal is generated and sent to the ECA.

As the crankshaft turns, the ECA evaluates the electrical impulses to determine the exact position of the crankshaft at any given time. By the frequency of the impulses, the ECA can determine the engine speed. With these two factors, the ECA will determine the appropriate ignition timing advance required for best engine operation.

Ignition Switch: Locations

Attached To Steering Column



Ignition Switch: Service and Repair

Fig. 3 Ignition switch replacement

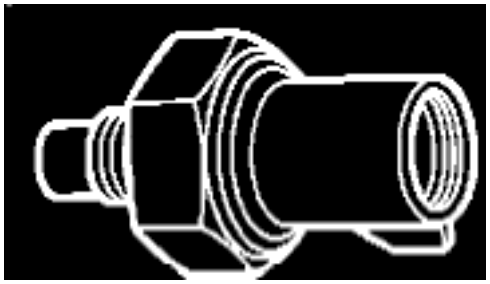
1. Disconnect battery ground cable.

2. Remove steering column shroud and lower the steering column.

3. Disconnect electrical connector from switch, then remove 2 switch attaching nuts.

4. Lift switch up to disengage actuator rod, then remove switch from vehicle, Fig. 3.

5. Reverse procedure to install.

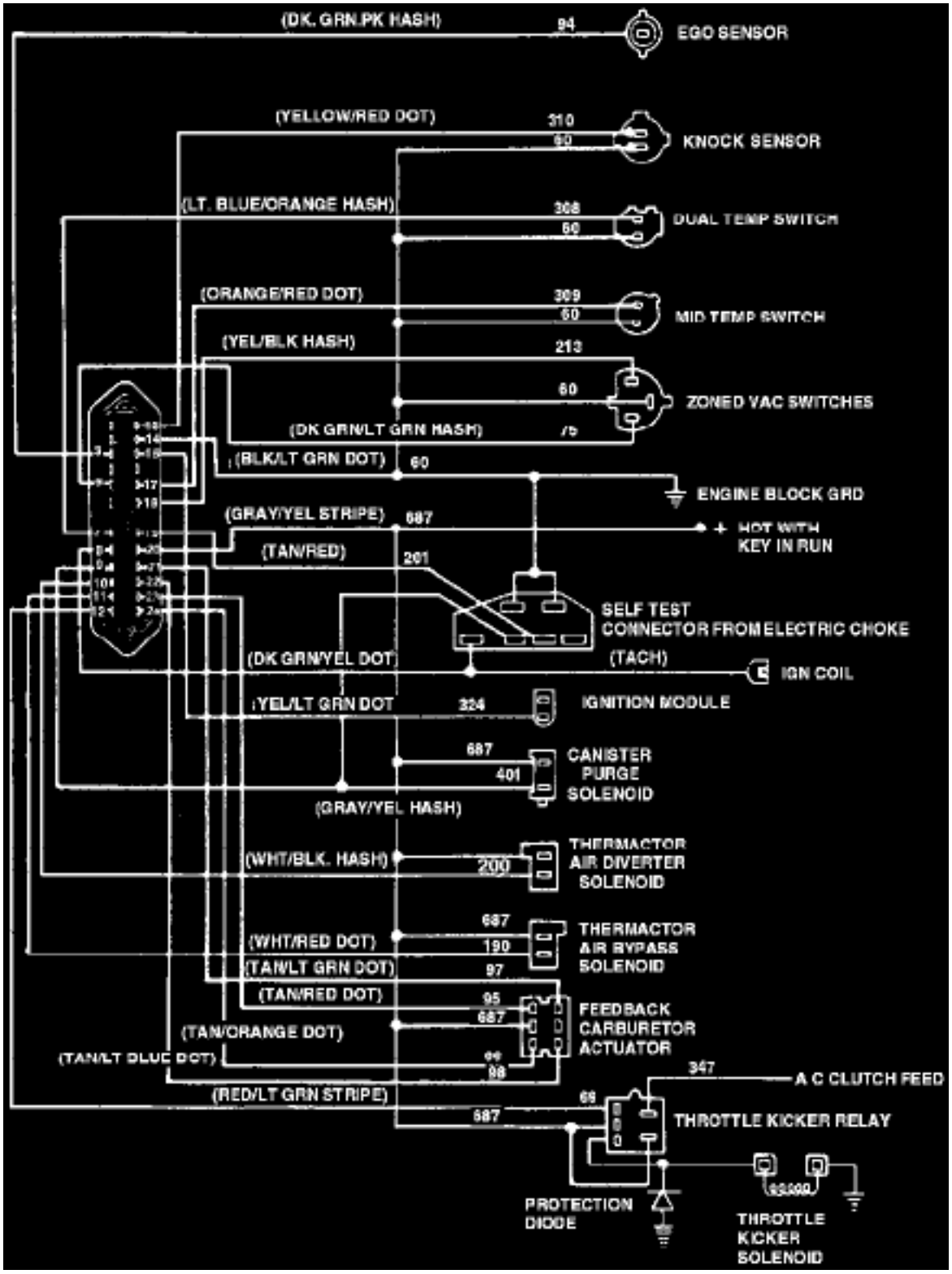


Knock Sensor: Description and Operation

Knock Sensor

The knock sensor, Fig. 11, is a piezo-electric accelerator accelerometer with the sensor designed to resonate at approximately the same frequency as the engine knock frequency.. The sensor uses the resonant frequency to mechanically amplify the engine knock frequency (5-6 KHz).

This method allows relatively large signals to be achieved without electrical amplification. The sensor has a thin circular piezoelectric ceramic disk which is bonded to a metal diaphragm. Electrical connections are made through a two-pin integral connector.



Knock Sensor: Testing and Inspection Component Testing

Fig.8 - MCU System Wiring Circuit

1. Make sure that the following three steps are properly conducted in order to simulate spark knock conditions and determine that spark detection

system is inoperative. If not, repeat test to verify problem. a. Make sure that engine is at normal operating temperature. Run engine at 2000 rpm for 2 minutes, then turn key off. Immediately restart engine

and allow to idle.

b. Observe voltmeter and vacuum gauge for initialization pulses after restarting the engine. The throttle kicker will also extend (increase engine

speed) and remain on throughout the test.

c. On vehicles with spark knock sensor, when initial pulses occur, immediately simulate spark knock by placing a 3/8 inch extension on manifold

near base of knock sensor. Tap end of extension with a small hammer for about 15 seconds.

2. Disconnect jumper wire from self-test trigger input circuit 201. 3. With ignition key off, disconnect vehicle harness from spark knock sensor. 4. Using a torque wrench and a 1 1/8 inch deep socket, make sure that spark sensor is torqued to 12-18 ft. lbs. If sensor is properly torqued, proceed

to next step. If not, torque to specifications.

5. Disconnect vehicle harness from MCU and spark sensor. Connect one lead of an ohmmeter to circuit 310 of vehicle harness and other lead to

engine block, Fig. 8. If resistance is 1000 ohms or more, proceed to next step. If resistance is less than 1000 ohms, repair short to ground in circuit 301.

6. With key off and knock sensor harness disconnected, check circuit 310 of vehicle harness for continuity. If resistance is 10 ohms or less, continue

to next step. If resistance is greater than 10 ohms, repair circuit 310.

7. Check circuit 60 of vehicle harness for continuity between knock sensor and MCU, Fig. 8. If resistance is 10 ohms or less, reconnect harness

connector to MCU and proceed to next step. If resistance is greater than 10 ohms, service circuit 60.

8. Reconnect jumper wire to circuits 201 and 60 of VIP connector, Fig. 8. 9. Connect a test lamp to positive terminal of battery, then disconnect knock sensor from vehicle harness.

10. Perform "Engine Running Functional Test" procedure. When the four initialization pulses occur, continuously tap circuit 310 of the vehicle

harness connector, which mates to the knock sensor connector, with the probe end for 5 seconds while observing voltmeter pulses. If a code 25 is

observed, replace MCU. If any other code is observed, replace spark knock sensor.

SPARK KNOCK, ONLY AT WIDE OPEN THROTTLE AND/OR POOR PERFORMANCE/MILEAGE

1. If engine has a spark knock sensor, disconnect it. 2. Make sure that ignition timing is within specifications. 3. With engine running at normal operating temperature, disconnect the two wire ignition module connector (yellow wire is circuit 324 and

black/white wire is circuit 69) from vehicle harness. Using a jumper wire, jump the wires together at the ignition module and note ignition timing. Remove jumper wire and note ignition timing. If timing retards 16-20 degrees, reconnect ignition module and proceed to next step. If timing does not retard 16-20 degrees, replace ignition module and repeat steps 1, 2 and 3.

4. With engine at normal operating temperature, set high cam on lowest step that will maintain engine speed greater than 1200 rpm. Note ignition

timing, then disconnect and plug vacuum hose from zone vacuum switch and again note timing. If timing retards more than 5 degrees, on engines with spark knock sensor, proceed to step 6, on all other engines MCU system is okay. If timing does not retard more than 5 degrees, proceed to next step.

5. With engine still at 1200 rpm, disconnect ignition module (connector with yellow and black/white wires). If timing retards, check circuit 324 for

short to ground. If circuit is okay, replace MCU unit and retest. If timing does not retard, check circuit 324 for open circuit. If circuit is okay, Replace MCU unit and retest.

6. On engines with spark knock sensor, reconnect sensor. Repeat Engine Running Functional Test, but do not simulate knock by taping sensor. If

service code 25 appears, MCU system is okay, testing is completed. If any other service code appears, replace knock sensor and retest.

Seat Belt Buckle Switch: Locations

In Driver's Seat Belt Buckle

Clutch Switch: Locations

At Top Of Clutch Pedal

Clutch Switch: Testing and Inspection

Manual Transmission Vehicles Only This switch functions magnetically. Do not use magnetized tools near this switch.

1. If the switch is open when the clutch pedal is released, speed control will not operate. This must be corrected before making any other tests. Use only a multimeter of 5000 ohm/volt rating or higher when performing the clutch switch test.

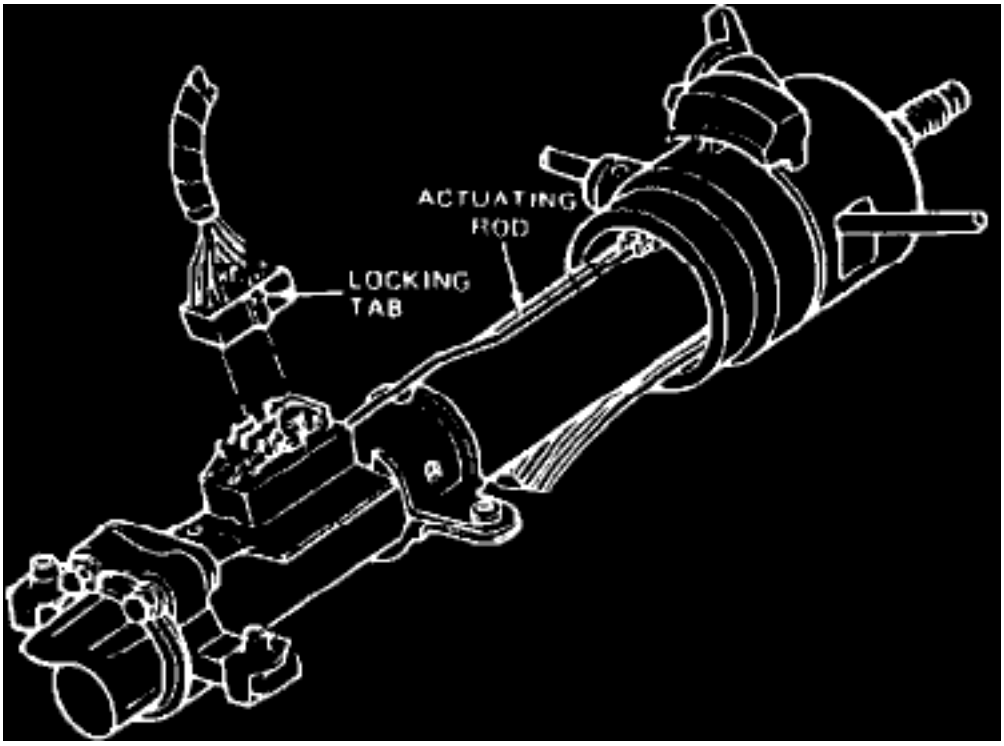
2. Disconnect switch pigtail connector from speed control harness connector and connect an ohmmeter to the two switch connector terminals.

3. With clutch pedal in the fully released position, the resistance should be less than 5 ohms. With clutch pedal fully depressed, the circuit should be open.

4. If switch does not function as described, remove and replace switch.

Ignition Switch: Locations

Attached To Steering Column



Ignition Switch: Service and Repair

Fig. 3 Ignition switch replacement

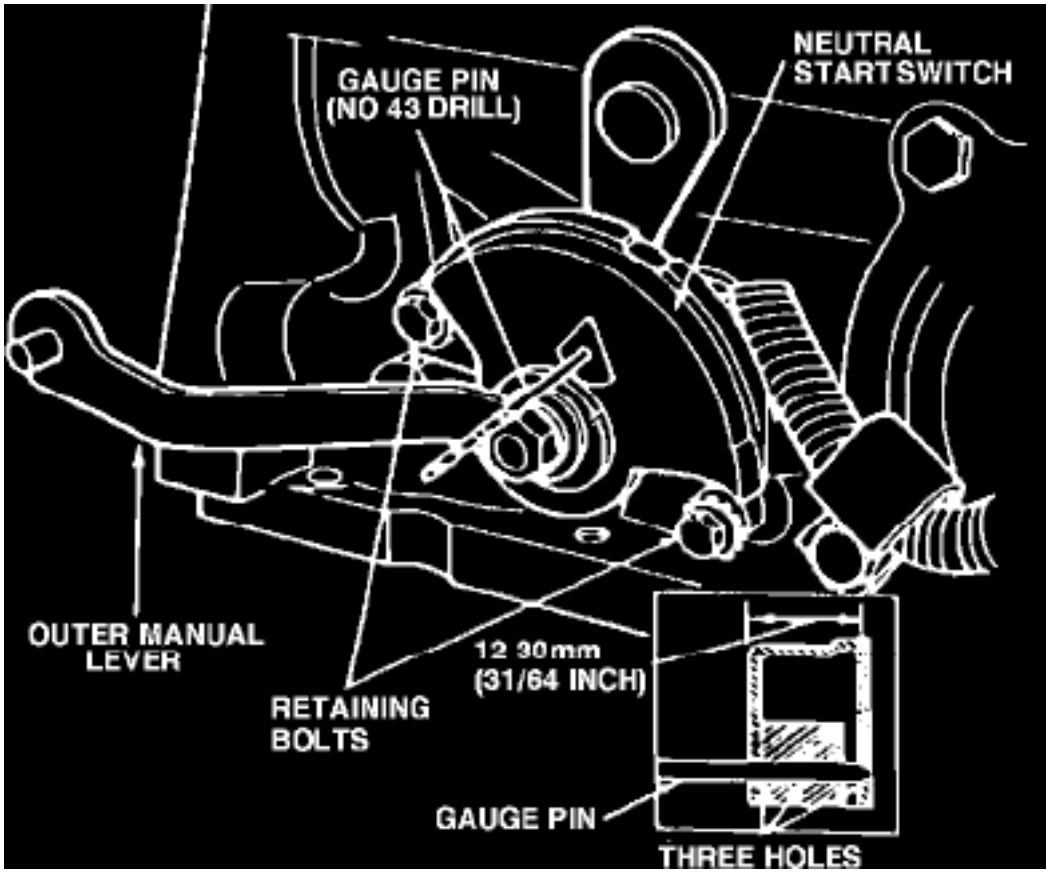
1. Disconnect battery ground cable.

2. Remove steering column shroud and lower the steering column.

3. Disconnect electrical connector from switch, then remove 2 switch attaching nuts.

4. Lift switch up to disengage actuator rod, then remove switch from vehicle, Fig. 3.

5. Reverse procedure to install.



Neutral Safety Switch: Service and Repair

Fig. 8 Neutral safety switch replacement. Exc. automatic overdrive transmission

EXC. AUTOMATIC OVERDRIVE TRANSMISSION

1. Disconnect battery ground cable.

2. Remove downshift linkage rod return spring from low-reverse servo cover.

3. Apply penetrating oil to outer lever attaching nut, then remove transmission downshift outer lever attaching nut and lever.

4. Remove neutral safety switch attaching bolts, then disconnect electrical connectors and remove switch from vehicle.

5. To install, position switch on transmission and secure with attaching bolts. Do not tighten bolts at this time.

6. Place transmission manual lever in neutral position, then insert a .091 inch gauge pin through gauge pin holes, Fig. 8.

7. Tighten switch attaching bolts, then remove gauge pin.

8. Install outer downshift lever and retaining nut.

9. Install downshift linkage rod return spring between lever and retaining clip on low-reverse servo cover.

10. Reconnect electrical connectors, then check operation of switch.

W/AUTOMATIC OVERDRIVE TRANSMISSION

1. Disconnect battery ground cable.

2. Raise and support vehicle.

3. Disconnect electrical connector at neutral safety switch, lifting connector straight up.

4. Using suitable socket, remove neutral safety switch and O-ring seal.

5. Reverse procedure to install, installing new O-ring seal.

Power Window Safety Switch: Locations

At Center Of Tailgate

Power Window Switch: Locations Master Power Window Switch

In LH Door

Power Window Switch: Locations RH Window Control

In RH Door

Power Window Switch: Locations Tailgate Power Window Regulator Switch

LH Side Of Tailgate

Ford Bronco Workshop Manual (V8-351 5.8L VIN G 2-bbl (1982))
Ford Workshop Manuals > Sensors and Switches > Sensors and Switches - Wiper and Washer Systems > Washer Fluid Level Switch > Component Information > Technical Service Bulletins > Customer Interest for Washer Fluid Level Switch: > 84219 > Oct > 84 > Wiper/Washer - Low Fluid Warning Light Stays On

Washer Fluid Level Switch: Customer Interest Wiper/Washer - Low Fluid Warning Light Stays On

Article No. 84-21-9

WIPER/WASHER - LOW FLUID WARNING LIGHT STAYS ON

FORD ALL MODEL YEARS AND ALL CAR LINES WITH LOW FLUID WARNING LIGHT

LINCOLN-MERCURY ALL MODEL YEARS AND ALL CAR LINES WITH LOW FLUID WARNING LIGHT

LIGHT TRUCKS ALL MODEL YEARS AND ALL LINES WITH LOW FLUID WARNING LIGHT

On some vehicles equipped with low fluid warning light, the light may stay on even when the washer reservoir is full. This is caused by using washer fluid concentrate (C9AZ-19550-A/B) that has not been mixed with water according to the instructions. The undiluted washer solution is absorbed by the float resulting in the float sinking.

When filling the washer reservoir with washer fluid concentrate (C9AZ-19550-A/B), the instructions on the can must be followed. Mixing the concentrated washer fluid with water will stop the float from sinking.

OTHER APPLICABLE ARTICLES: None WARRANTY STATUS: "INFORMATION ONLY"

Ford Bronco Workshop Manual (V8-351 5.8L VIN G 2-bbl (1982))
Ford Workshop Manuals > Sensors and Switches > Sensors and Switches - Wiper and Washer Systems > Washer Fluid Level Switch > Component Information > Technical Service Bulletins > All Technical Service Bulletins for Washer Fluid Level Switch: > 84219 > Oct > 84 > Wiper/Washer - Low Fluid Warning Light Stays On

Washer Fluid Level Switch: All Technical Service Bulletins Wiper/Washer - Low Fluid Warning Light Stays On

Article No. 84-21-9

WIPER/WASHER - LOW FLUID WARNING LIGHT STAYS ON

FORD ALL MODEL YEARS AND ALL CAR LINES WITH LOW FLUID WARNING LIGHT

LINCOLN-MERCURY ALL MODEL YEARS AND ALL CAR LINES WITH LOW FLUID WARNING LIGHT

LIGHT TRUCKS ALL MODEL YEARS AND ALL LINES WITH LOW FLUID WARNING LIGHT

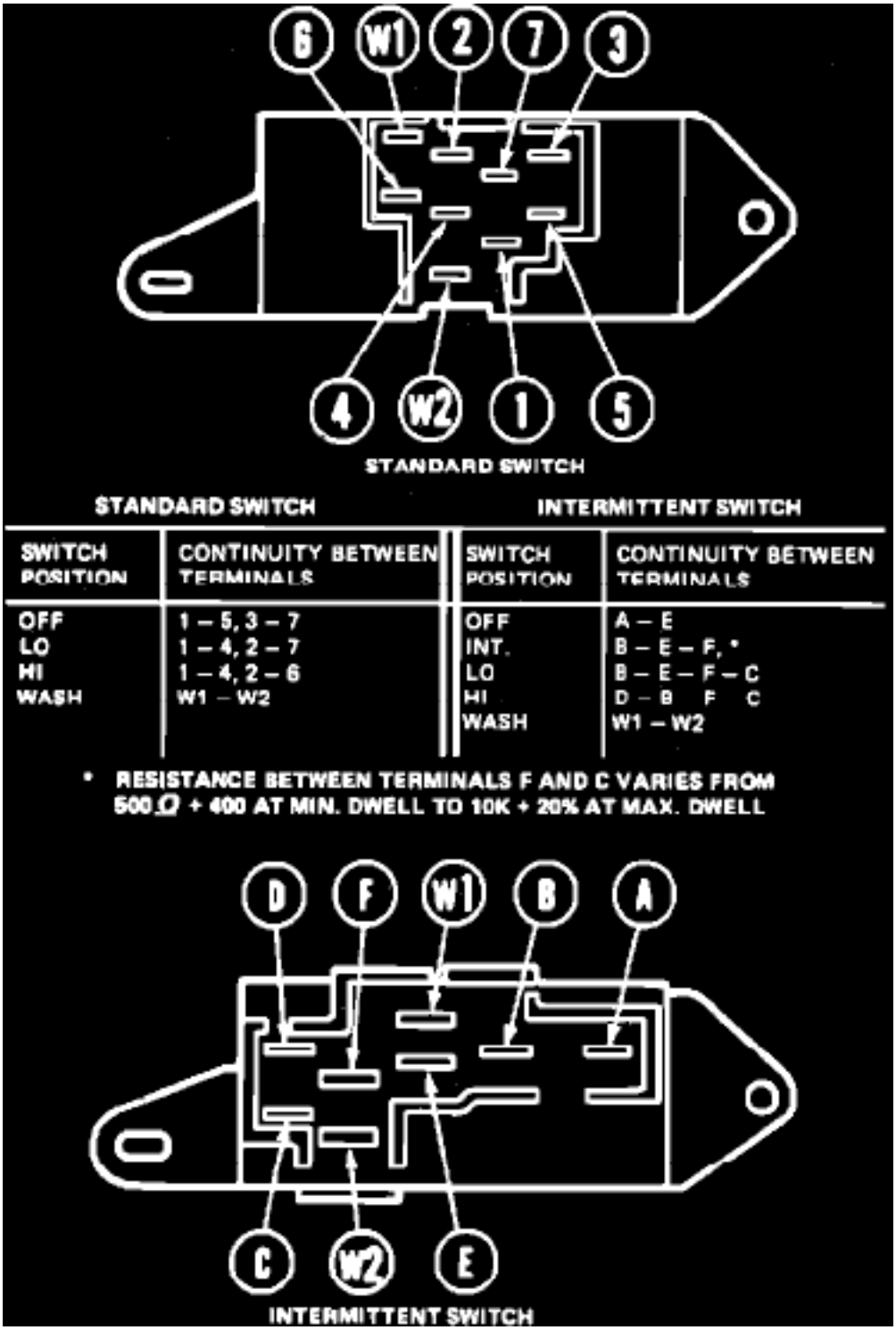
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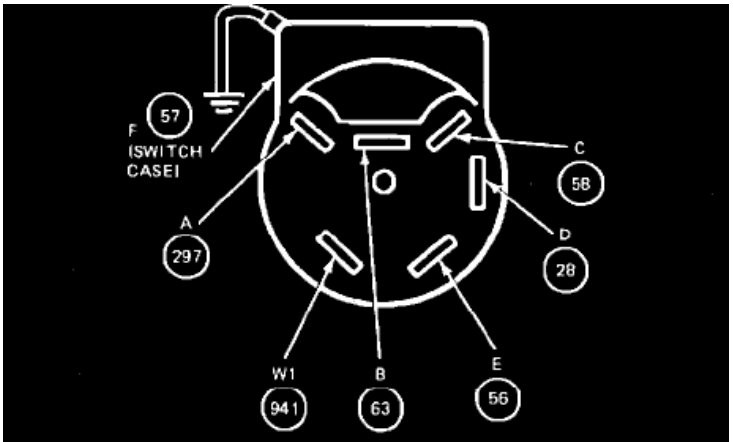
Wiper Switch: Locations

LH Side Of I/P



Wiper Switch: Testing and Inspection

Fig. 4 Wiper Switch Continuity Test

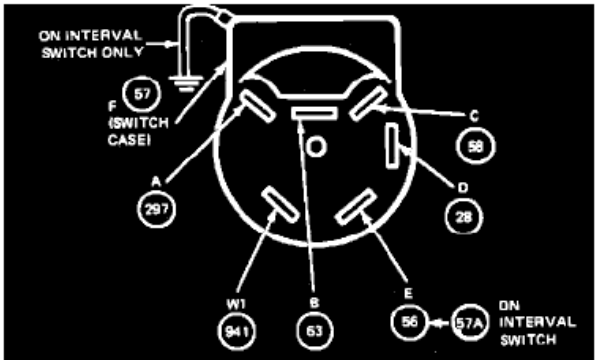


INTERMITTENT SWITCH

SWITCH POSITION	CONTINUITY BETWEEN TERMINALS
OFF (PARK)	A – B
	D – E
LOW	A – B
	D – E – F
HIGH	D – E – F
	A – B – C
INTERMITTENT	A-B, E-F
	VARIABLE RESISTANCE BETWEEN D – E 200-1000 OHMS MAX. 5600 – 8400 ohms
WASH	A-B-W1

2-SPEED SWITCH

SWITCH POSITION	CONTINUITY BETWEEN TERMINALS
OFF (PARK)	C – D
	A – B
LOW	A – B – C
HIGH	A – B – E
WASH	A-B-W1



INTERVAL SWITCH

SWITCH POSITION	CONTINUITY BETWEEN TERMINALS
OFF (PARK)	A – B
	D – E
LOW	A – B
	D – E – F
HIGH	D – E – F
	A – B – C
INTERVAL	A-B, E-F
	VARIABLE RESISTANCE BETWEEN D – E 200-1000 OHMS MAX. 5600 – 8400 ohms
WASH	A-B-W1

2-SPEED SWITCH

SWITCH POSITION	CONTINUITY BETWEEN TERMINALS
OFF (PARK)	C – D
	A – B
LOW	A – B – C
HIGH	A – B – E
WASH	A-B-W1

Fig. 5 Testing wiper switch continuity. 1980 Bronco & F-100---350

Fig. 5 Wiper Switch Continuity Test

1. Check continuity between switch terminals, Figs. 4 through 6.

2. To detect marginal operation of switch, rotate or slide switch control knob while each reading is being taken.

3. If switch does not show continuity or if poor continuity exists at any switch position, replace switch.

Wiper Switch: Service and Repair

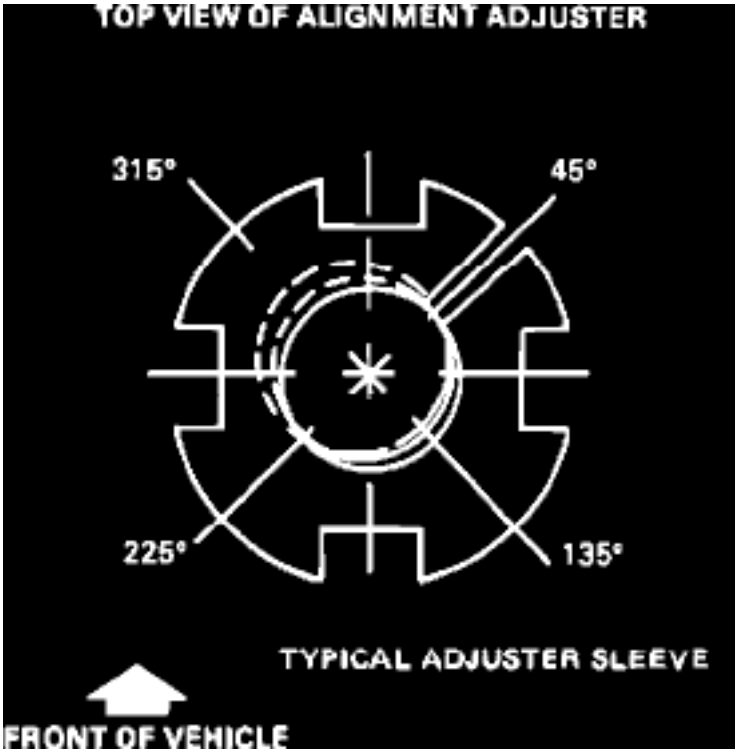
F-100---350 & BRONCO

1. Disconnect battery ground cable.

2. Remove wiper switch knob, bezel nut and bezel.

3. Pull switch down from under instrument panel, then disconnect electrical connector and remove switch from vehicle.

4. Reverse procedure to install.



Alignment: Customer Interest Steering - Pull or Drift

Article No. 89-21-10

^ STEERING - PULL OR DRIFT - CASTER SPLIT - NEW

SERVICE ADJUSTERS - 4X4 MODELS

^ SUSPENSION - FRONT - NEW SERVICE CASTER ADJUSTERS - 4X4 MODELS

LIGHT TRUCK: 1980-89 BRONCO, F-150, F-250, F-350 1983-89 RANGER 1984-89 BRONCO II

Figure 1

This TSB article is being republished in its entirety to correct the service parts for the Caster Adjusters.

ISSUE: Two new alignment adjusters are now available for service. These new parts provide one degree of caster adjustment along with one degree of camber. Steering pull may be caused by caster split. The affected trucks are 4x4 Twin Traction Beam vehicles.

ACTION: Use the following procedure to determine the position of the service adjuster sleeve. Refer to the appropriate Light Truck Shop Manual, Section 14-21 for installation details.

The new alignment adjusters are similiar to the current camber adjusters. The one exception is the rotational position of the adjuster sleeve to obtain the desired adjustment.

ADJUSTER SLEEVE APPLICATION FOR RANGER BRONCO II, BRONCO, AND F-150

1. Measure and record the alignment readings.

2. Determine what alignment adjuster sleeves are on the truck.

NOTE: IF AFTERMARKET ADJUSTER SLEEVES HAVE BEEN INSTALLED, IT WILL BE NECESSARY TO FIND OUT WHAT CASTER AND CAMBER SLEEVES WERE USED.

If the adjuster sleeve is not marked or cannot be identified, install a 0 degree adjuster sleeve to use as a reference point.

3. Determine what adjuster sleeve change is required. Take your desired alignment (what you want to end up with) and compare it to the readings taken in Step 1 to determine the change.

4. Pick the adjuster sleeve that will get you the closest to the desired alignment.

5. Install and position the adjuster sleeve, Figure 1.

Refer to the appropriate Light Truck Shop Manual, Section 14-21 for service details. See the following caster adjuster sleeve chart and camber adjuster sleeve chart for the correct service parts.

CAMBER ADJUSTER SLEEVE APPLICATION CHART

SERVICE PART

APPLICATION VALUE NUMBER

F Series/Bronco - 0~ E0TZ-3B440-A

4x4

1/2~ E0TZ-3B440-B

1~ E0TZ-3B440-C

1-1/2~ E0TZ-3B440-D

Ranger/ Bronco II - 0~ E3TZ-3B440-A

4x4

1/2~ E3TZ-3B440-B

1~ E3TZ-3B440-C

1-1/2~ E3TZ-3B440-D

ADJUSTER ORIENTATION CHART

CAMBER CASTER CAMBER CASTER

POSITION LEFT LEFT RIGHT RIGHT

OF SLOT SIDE SIDE SIDE SIDE

45~ +1~ -1~ -1~ -1~

135~ -1~ -1~ + 1~ -1~

225~ -1~ +1~ +1~ +1~

315~ +1~ +1~ -1~ +1~

6. Recheck the alignment to make sure you arrived at the desired values.

CASTER WEDGE APPLICATION: F-250/350 4X4

The caster angle on the F-250 4x4 can be adjusted by inserting a wedge between the spring and the axle. Refer to the appropriate model year Light Truck Shop Manual, page 14-01-14 for installation details. See the following application chart for the correct service part.

CASTER WEDGE APPLICATION CHART

SERVICE PART

APPLICATION VALUE NUMBER

F-250/350 - 0~ E0TZ-5A313-A

4x4

1~ E0TZ-5A313-C

2~ E0TZ-5A313-B

NOTE: F-350 4X4 TWIN TRACTION BEAM - CASTER AND CASTER SPLITS ARE ADJUSTABLE USING WEDGES. F-350 4X4 MONOBEAM - CASTER SPLITS ARE NOT ADJUSTABLE. A CASTER CHANGE FOR BOTH WHEELS IS ACCOMPLISHED USING WEDGES.

PART NUMBER PART NAME CLASS

E9TZ-3B440-F Caster Adjuster - B

F-Series/Bronco

E9TZ-3B440-G Caster Adjuster - B

Ranger/Bronco II

E0TZ-3B440-A Camber Adjuster - AM

F-Series/Bronco

E0TZ-3B440-B Camber Adjuster - AM

F-Series/Bronco

E0TZ-3B440-C Camber Adjuster - AM

F-Series/Bronco

E0TZ-3B440-D Camber Adjuster - AM

F-Series/Bronco

E3TZ-3B440-A Camber Adjuster - BM

Ranger/Bronco II

E3TZ-3B440-B Camber Adjuster - AM

Ranger/Bronco II

E3TZ-3B440-C Camber Adjuster - AM

Ranger/Bronco II

E3TZ-3B440-D Camber Adjuster - AM

Ranger/Bronco II

E0TZ-5A313-A Caster Wedge C

E0TZ-5A313-B Caster Wedge BM

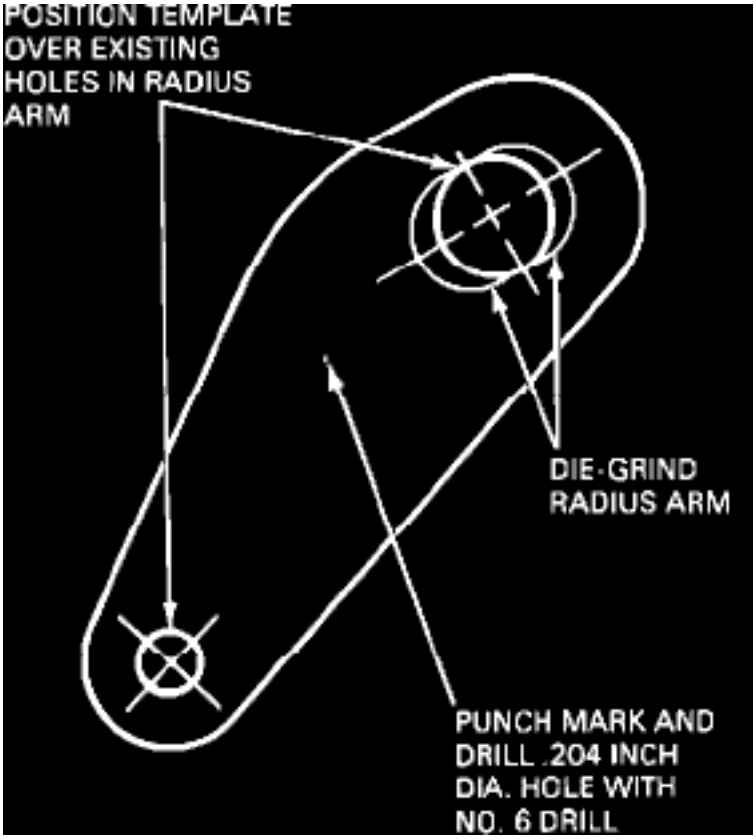
E0TZ-5A313-C Caster Wedge RM

OTHER APPLICABLE ARTICLES: 87-4-16 SUPERSEDES:

89-19-13, date 9/20 89

WARRANTY STATUS: INFORMATION ONLY OASIS CODES:

3100, 3200, 3300



Alignment: Customer Interest Steering - Pulling or Drifting

^ STEERING - PULL OR DRIFT - CASTER Article No.

ADJUSTMENT SERVICE KIT 87-4-16

^ SUSPENSION - FRONT - CASTER ADJUSTMENT SERVICE KIT

LIGHT TRUCK 1980-86 F-150 (4x4), BRONCO ISSUE:

A steering drift or pull may be caused by excessive front wheel side-to-side caster angle differences.

ACTION: If a front axle alignment check shows excessive (more than 3/4 degree split) side-to-side caster angle difference causing the vehicle to drift or pull, install a new caster adjustment kit (E0TZ-3K064-A) which allows the front axle side-to-side caster angles to be changed up to 2-1/2 degrees in 1/2 degree increments. New front axle to radius arm brackets must also be replaced when the caster kit is installed. Refer to the following service procedure for step-by-step instructions.

NOTE THE FOLLOWING INFORMATION BEFORE DOING WORK ON THE VEHICLE.

To correct caster side-to-side difference of up to 1- 1/2 degrees, install a caster adjuster plate on the radius arm that has the lower caster reading. Adjuster plates are identified R.H. and L.H.

To correct caster side-to-side difference more than 1-1/2 degrees, install the caster plate on both radius arms. Installing both plates will allow a caster split change of 2-1/2 degrees (+1-1/2 degrees

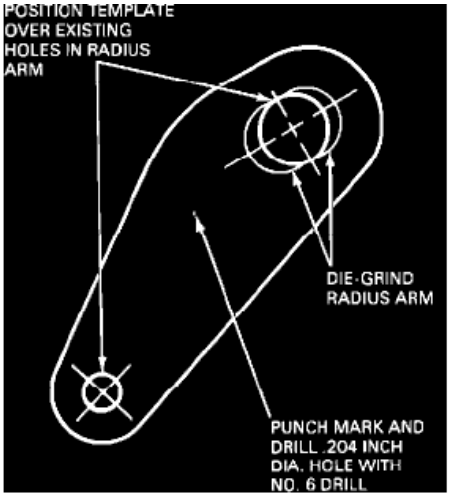
on the low caster side, -1 degree on the high caster side).

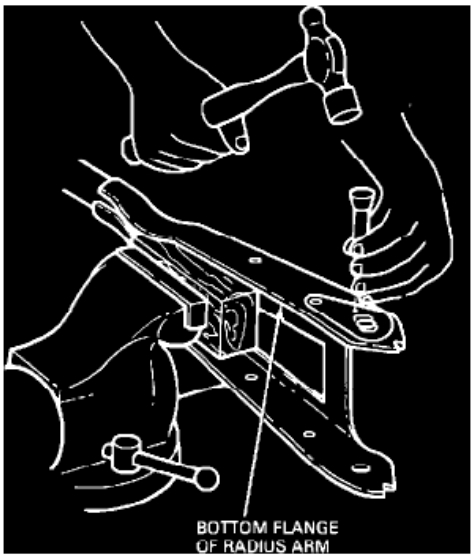
1. Remove radius arm from vehicle.

Figure 14 - Article 87-4-16

2. Locate the template, included in the kit, on the bottom flange of radius arm over the existing holes, as shown in Figure 14.

NOTE: Right arm adjustment is shown. One template is used to modify both right and left hand arms. When modifying right arm, position template with printed side down (printed side up for left arm).


POSITION TEMPLATE OVER EXISTING HOLES IN RADIUS ARM
DIE-GRIND RADIUS ARM
PUNCH MARK AND DRILL .204 INCH DIA. HOLE WITH NO. 6 DRILL


BOTTOM FLANGE OF RADIUS ARM

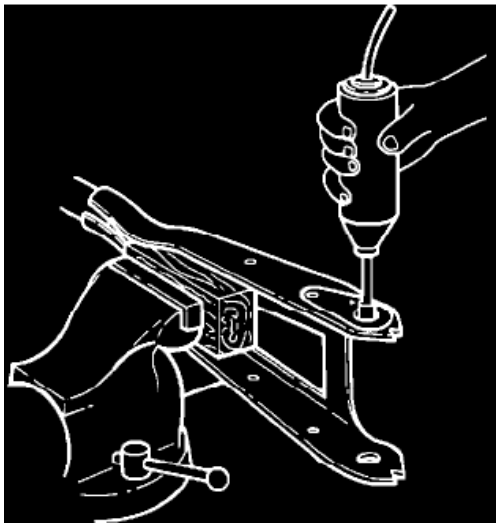
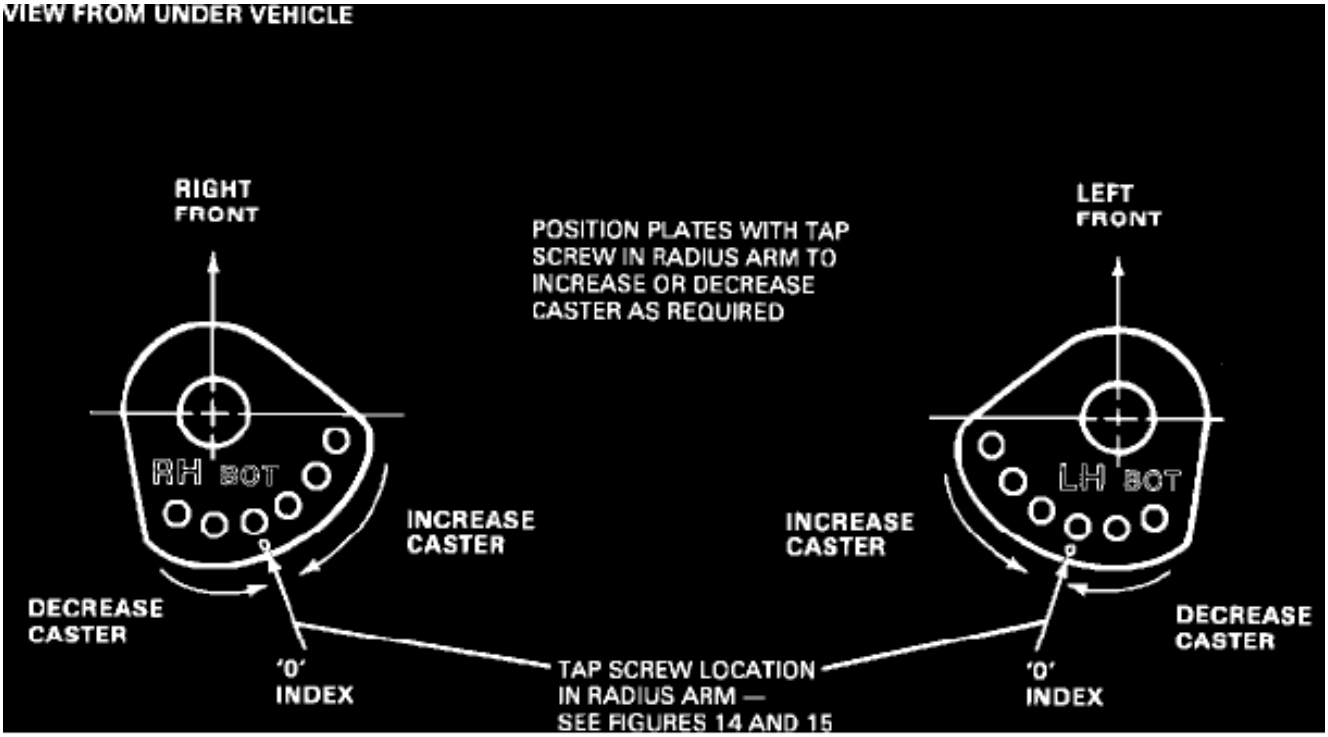


Figure 14 - Article 87-4-16

Figure 15 - Article 87-4-16



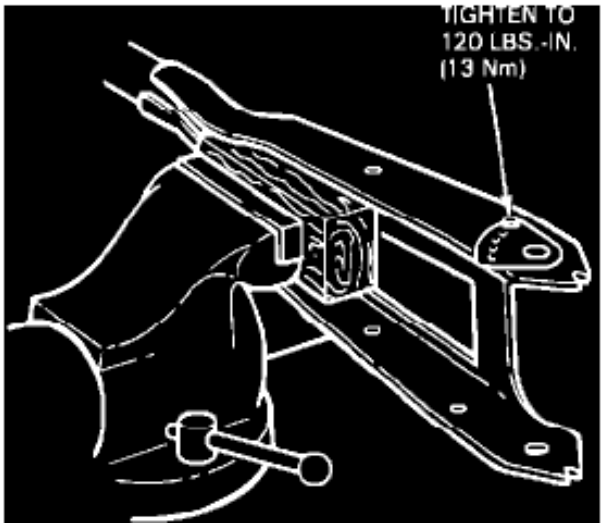


Figure 16 - Article 87-4-16

3. With template secure, punch mark radius arm at the small hole in the template, as shown in Figures 14 and 15. Mark radius arm, and diegrind a slot at the axle attaching hole the same size as the slot in the template, see Figure 16. De-burr the surface; avoid rounding the edges of the slot.

Figure 13 - Article 87-4-16

4. Use a No. 6 drill to make a .204 inch diameter through hole at the punch mark. Line up the caster adjuster plate on the radius arm to obtain the required change in caster, see Figure 13.

Figure 17 - Article 87-4-16

NOTE: Each hole changes caster approximately 1/2 degree + or - from the "0" index hole.

5. Install the tap screw to 120 in.lbs. (13 N-m) torque.

6. Reinstall radius arm with a new bracket (front axle to radius arm). The new bracket has a larger "jaw" spacing to fit over caster adjuster plate.

^ For non-quad shock vehicles, install bracket E7TZ-3B446-A.

^ For quad shock vehicles, install bracket E7TZ-18112-A, R.H. or E7TZ-18113-A, L.H.

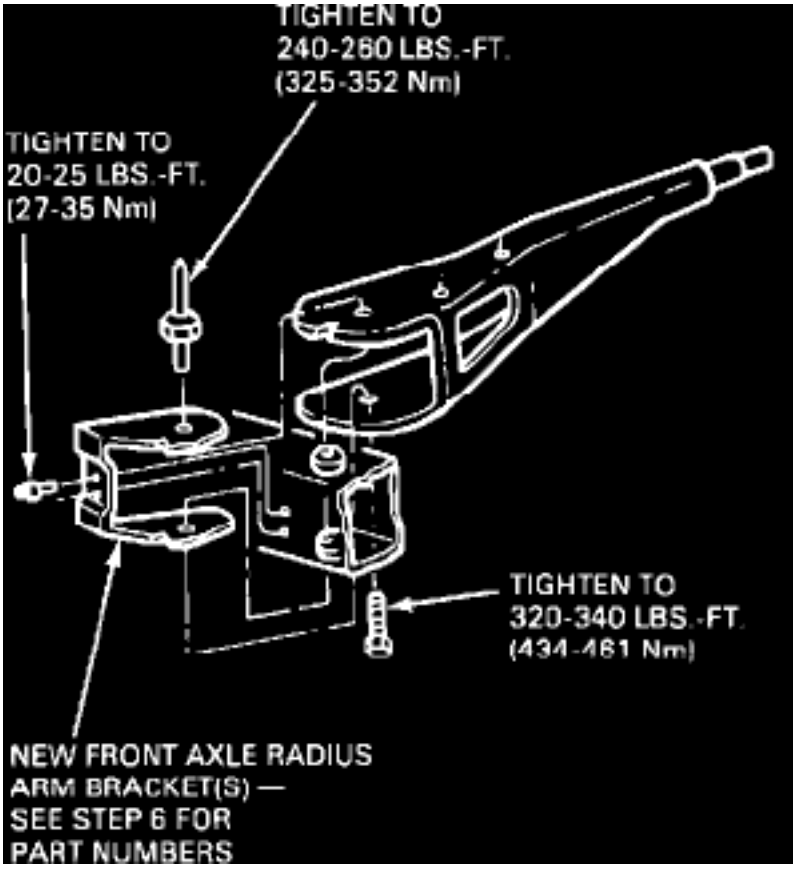


Figure 18 - Article 87-4-16

7. Tighten upper stud/bolt to 240-260 ft.lbs. (325-352 N-m) torque, Figure 18.

8. Tighten lower bolt to 320-340 ft.lbs. (434-461 N-m) torque, Figure 18.

9. Tighten front axle radius arm bracket bolts to 20-26 ft.lbs. (27-35 N-m) torque, Figure 18.

10. Arc weld caster adjuster plate to radius arm with a 1/4 inch-long bead along two sides of the plate.

11. Reset toe to specification. PART NUMBER

PART NAME CLASS

E0TZ-3K064-A Caster Kit CG

E7TZ-3B446-A Bracket - Radius Arm C

E7TZ-18112-A Bracket - Radius Arm CG

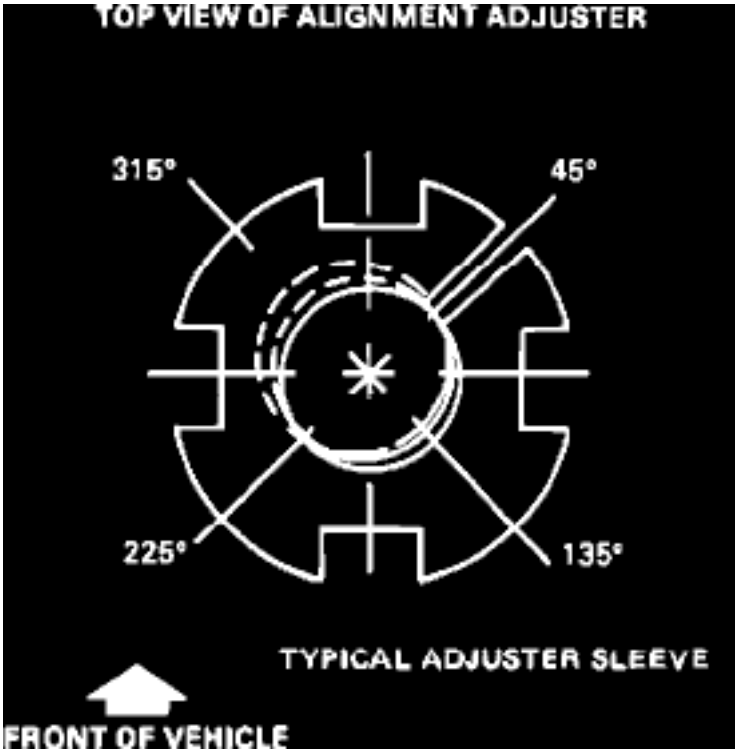
E7TZ-18113-A Bracket - Radius Arm CG

OTHER APPLICABLE ARTICLES: None WARRANTY STATUS: Reimbursable within the provisions of the Warranty and Policy Manual OPERATION: SP870416A - Caster kit one side TIME:

2.1 Hrs.

OPERATION: SP870416B - Caster kit both sides TIME:

3.5 Hrs. DLR. CODING: Basic Part No. FRONT - Code: 07



Alignment: All Technical Service Bulletins Steering - Pull or Drift

Article No. 89-21-10

^ STEERING - PULL OR DRIFT - CASTER SPLIT - NEW

SERVICE ADJUSTERS - 4X4 MODELS

^ SUSPENSION - FRONT - NEW SERVICE CASTER ADJUSTERS - 4X4 MODELS

LIGHT TRUCK: 1980-89 BRONCO, F-150, F-250, F-350 1983-89 RANGER 1984-89 BRONCO II

Figure 1

This TSB article is being republished in its entirety to correct the service parts for the Caster Adjusters.

ISSUE: Two new alignment adjusters are now available for service. These new parts provide one degree of caster adjustment along with one degree of camber. Steering pull may be caused by caster split. The affected trucks are 4x4 Twin Traction Beam vehicles.

ACTION: Use the following procedure to determine the position of the service adjuster sleeve. Refer to the appropriate Light Truck Shop Manual, Section 14-21 for installation details.

The new alignment adjusters are similiar to the current camber adjusters. The one exception is the rotational position of the adjuster sleeve to obtain the desired adjustment.

ADJUSTER SLEEVE APPLICATION FOR RANGER BRONCO II, BRONCO, AND F-150

1. Measure and record the alignment readings.

2. Determine what alignment adjuster sleeves are on the truck.

NOTE: IF AFTERMARKET ADJUSTER SLEEVES HAVE BEEN INSTALLED, IT WILL BE NECESSARY TO FIND OUT WHAT CASTER AND CAMBER SLEEVES WERE USED.

If the adjuster sleeve is not marked or cannot be identified, install a 0 degree adjuster sleeve to use as a reference point.

3. Determine what adjuster sleeve change is required. Take your desired alignment (what you want to end up with) and compare it to the readings taken in Step 1 to determine the change.

4. Pick the adjuster sleeve that will get you the closest to the desired alignment.

5. Install and position the adjuster sleeve, Figure 1.

Refer to the appropriate Light Truck Shop Manual, Section 14-21 for service details. See the following caster adjuster sleeve chart and camber adjuster sleeve chart for the correct service parts.

CAMBER ADJUSTER SLEEVE APPLICATION CHART

SERVICE PART

APPLICATION VALUE NUMBER

F Series/Bronco - 0~ E0TZ-3B440-A

4x4

1/2~ E0TZ-3B440-B

1~ E0TZ-3B440-C

1-1/2~ E0TZ-3B440-D

Ranger/ Bronco II - 0~ E3TZ-3B440-A

4x4

1/2~ E3TZ-3B440-B

1~ E3TZ-3B440-C

1-1/2~ E3TZ-3B440-D

ADJUSTER ORIENTATION CHART

CAMBER CASTER CAMBER CASTER

POSITION LEFT LEFT RIGHT RIGHT

OF SLOT SIDE SIDE SIDE SIDE

45~ +1~ -1~ -1~ -1~

135~ -1~ -1~ + 1~ -1~

225~ -1~ +1~ +1~ +1~

315~ +1~ +1~ -1~ +1~

6. Recheck the alignment to make sure you arrived at the desired values.

CASTER WEDGE APPLICATION: F-250/350 4X4

The caster angle on the F-250 4x4 can be adjusted by inserting a wedge between the spring and the axle. Refer to the appropriate model year Light Truck Shop Manual, page 14-01-14 for installation details. See the following application chart for the correct service part.

CASTER WEDGE APPLICATION CHART

SERVICE PART

APPLICATION VALUE NUMBER

F-250/350 - 0~ E0TZ-5A313-A

4x4

1~ E0TZ-5A313-C

2~ E0TZ-5A313-B

NOTE: F-350 4X4 TWIN TRACTION BEAM - CASTER AND CASTER SPLITS ARE ADJUSTABLE USING WEDGES. F-350 4X4 MONOBEAM - CASTER SPLITS ARE NOT ADJUSTABLE. A CASTER CHANGE FOR BOTH WHEELS IS ACCOMPLISHED USING WEDGES.

PART NUMBER PART NAME CLASS

E9TZ-3B440-F Caster Adjuster - B

F-Series/Bronco

E9TZ-3B440-G Caster Adjuster - B

Ranger/Bronco II

E0TZ-3B440-A Camber Adjuster - AM

F-Series/Bronco

E0TZ-3B440-B Camber Adjuster - AM

F-Series/Bronco

E0TZ-3B440-C Camber Adjuster - AM

F-Series/Bronco

E0TZ-3B440-D Camber Adjuster - AM

F-Series/Bronco

E3TZ-3B440-A Camber Adjuster - BM

Ranger/Bronco II

E3TZ-3B440-B Camber Adjuster - AM

Ranger/Bronco II

E3TZ-3B440-C Camber Adjuster - AM

Ranger/Bronco II

E3TZ-3B440-D Camber Adjuster - AM

Ranger/Bronco II

E0TZ-5A313-A Caster Wedge C

E0TZ-5A313-B Caster Wedge BM

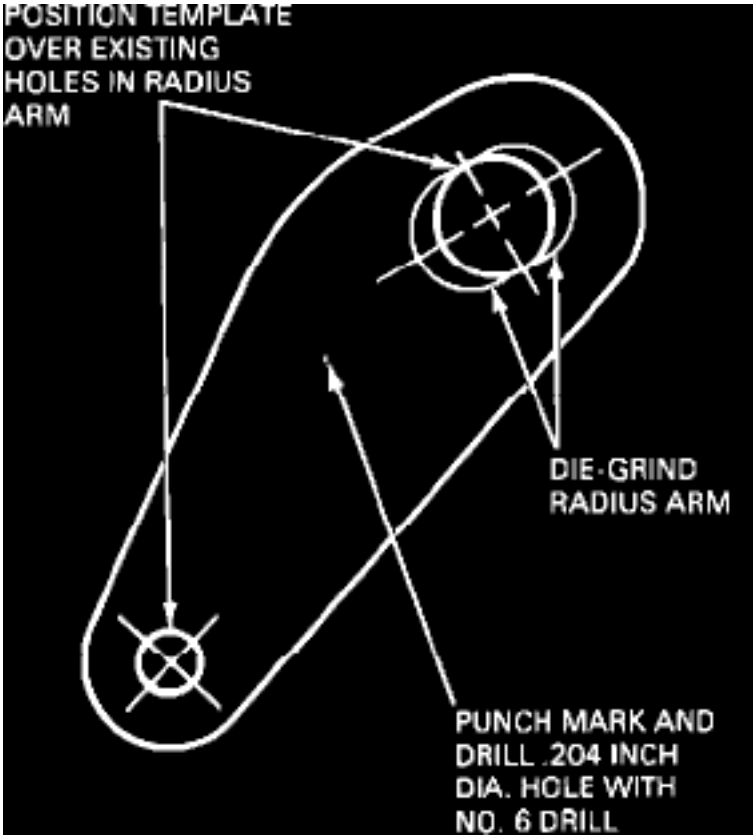
E0TZ-5A313-C Caster Wedge RM

OTHER APPLICABLE ARTICLES: 87-4-16 SUPERSEDES:

89-19-13, date 9/20 89

WARRANTY STATUS: INFORMATION ONLY OASIS CODES:

3100, 3200, 3300



Alignment: All Technical Service Bulletins Steering - Pulling or Drifting

^ STEERING - PULL OR DRIFT - CASTER Article No.

ADJUSTMENT SERVICE KIT 87-4-16

^ SUSPENSION - FRONT - CASTER ADJUSTMENT SERVICE KIT

LIGHT TRUCK 1980-86 F-150 (4x4), BRONCO ISSUE:

A steering drift or pull may be caused by excessive front wheel side-to-side caster angle differences.

ACTION: If a front axle alignment check shows excessive (more than 3/4 degree split) side-to-side caster angle difference causing the vehicle to drift or pull, install a new caster adjustment kit (E0TZ-3K064-A) which allows the front axle side-to-side caster angles to be changed up to 2-1/2 degrees in 1/2 degree increments. New front axle to radius arm brackets must also be replaced when the caster kit is installed. Refer to the following service procedure for step-by-step instructions.

NOTE THE FOLLOWING INFORMATION BEFORE DOING WORK ON THE VEHICLE.

To correct caster side-to-side difference of up to 1- 1/2 degrees, install a caster adjuster plate on the radius arm that has the lower caster reading. Adjuster plates are identified R.H. and L.H.

To correct caster side-to-side difference more than 1-1/2 degrees, install the caster plate on both radius arms. Installing both plates will allow a caster split change of 2-1/2 degrees (+1-1/2 degrees

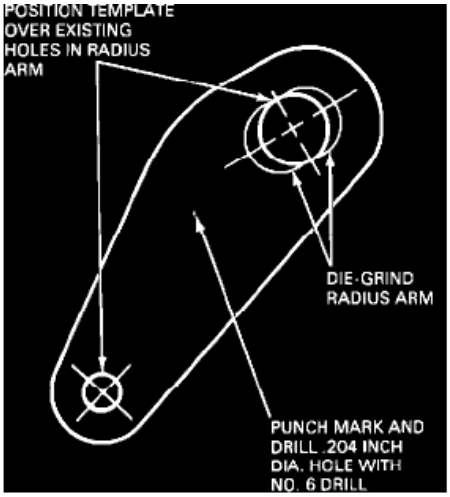
on the low caster side, -1 degree on the high caster side).

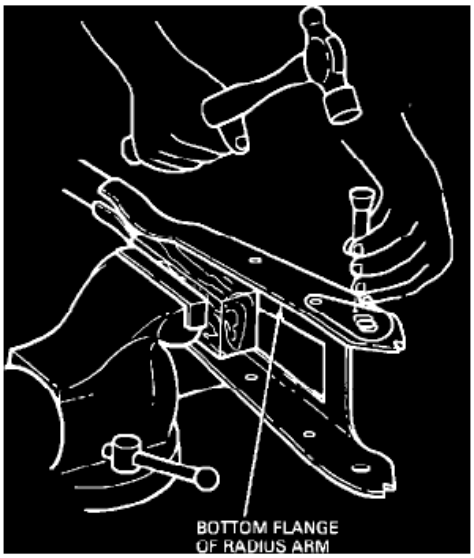
1. Remove radius arm from vehicle.

Figure 14 - Article 87-4-16

2. Locate the template, included in the kit, on the bottom flange of radius arm over the existing holes, as shown in Figure 14.

NOTE: Right arm adjustment is shown. One template is used to modify both right and left hand arms. When modifying right arm, position template with printed side down (printed side up for left arm).


POSITION TEMPLATE OVER EXISTING HOLES IN RADIUS ARM
DIE-GRIND RADIUS ARM
PUNCH MARK AND DRILL .204 INCH DIA. HOLE WITH NO. 6 DRILL


BOTTOM FLANGE OF RADIUS ARM

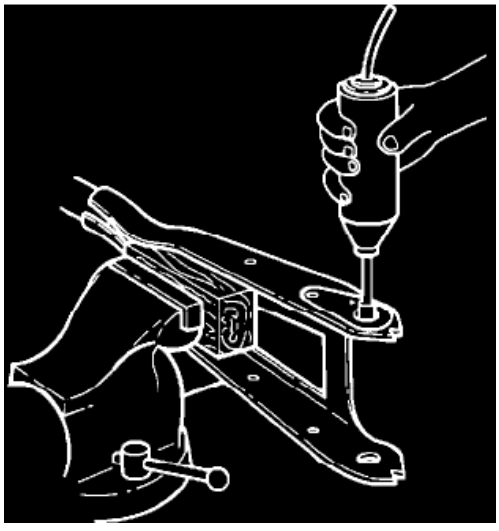
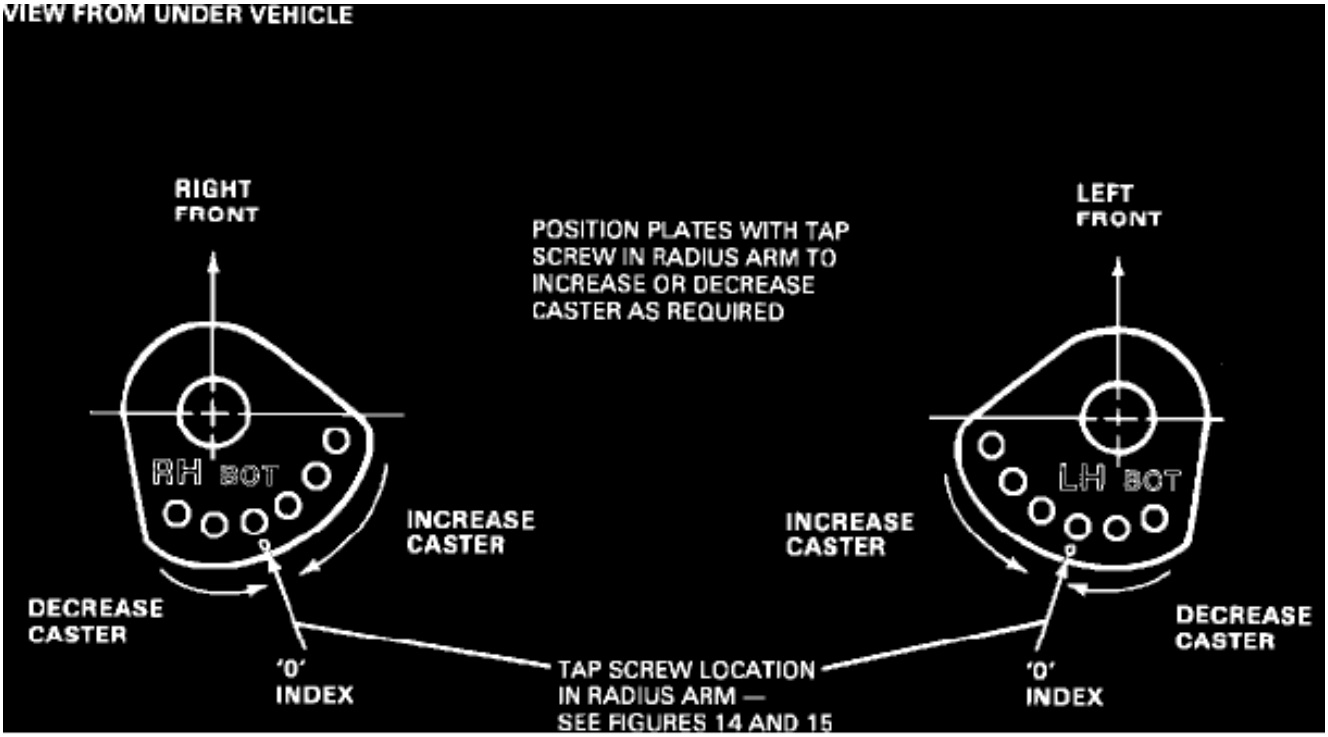


Figure 14 - Article 87-4-16

Figure 15 - Article 87-4-16



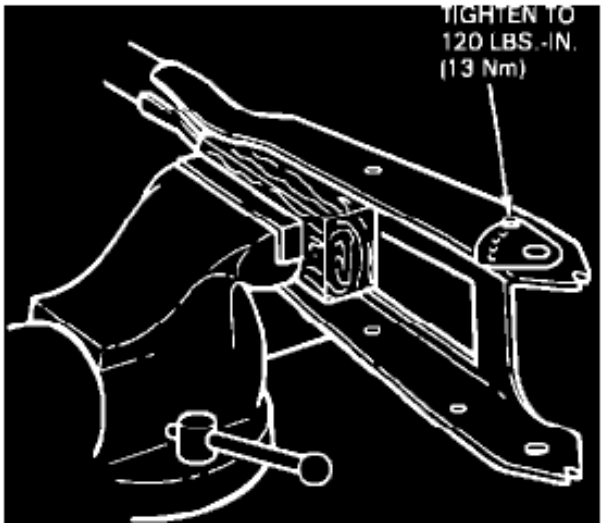


Figure 16 - Article 87-4-16

3. With template secure, punch mark radius arm at the small hole in the template, as shown in Figures 14 and 15. Mark radius arm, and diegrind a slot at the axle attaching hole the same size as the slot in the template, see Figure 16. De-burr the surface; avoid rounding the edges of the slot.

Figure 13 - Article 87-4-16

4. Use a No. 6 drill to make a .204 inch diameter through hole at the punch mark. Line up the caster adjuster plate on the radius arm to obtain the required change in caster, see Figure 13.

Figure 17 - Article 87-4-16

NOTE: Each hole changes caster approximately 1/2 degree + or - from the "0" index hole.

5. Install the tap screw to 120 in.lbs. (13 N-m) torque.

6. Reinstall radius arm with a new bracket (front axle to radius arm). The new bracket has a larger "jaw" spacing to fit over caster adjuster plate.

^ For non-quad shock vehicles, install bracket E7TZ-3B446-A.

^ For quad shock vehicles, install bracket E7TZ-18112-A, R.H. or E7TZ-18113-A, L.H.

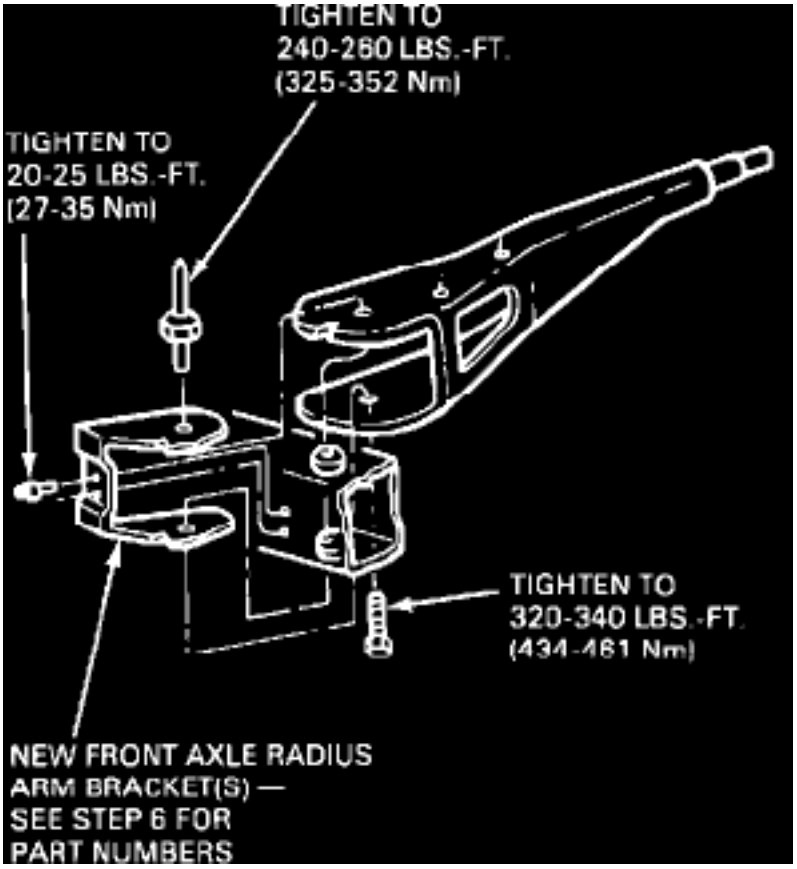


Figure 18 - Article 87-4-16

7. Tighten upper stud/bolt to 240-260 ft.lbs. (325-352 N-m) torque, Figure 18.

8. Tighten lower bolt to 320-340 ft.lbs. (434-461 N-m) torque, Figure 18.

9. Tighten front axle radius arm bracket bolts to 20-26 ft.lbs. (27-35 N-m) torque, Figure 18.

10. Arc weld caster adjuster plate to radius arm with a 1/4 inch-long bead along two sides of the plate.

11. Reset toe to specification. PART NUMBER

PART NAME CLASS

E0TZ-3K064-A Caster Kit CG

E7TZ-3B446-A Bracket - Radius Arm C

E7TZ-18112-A Bracket - Radius Arm CG

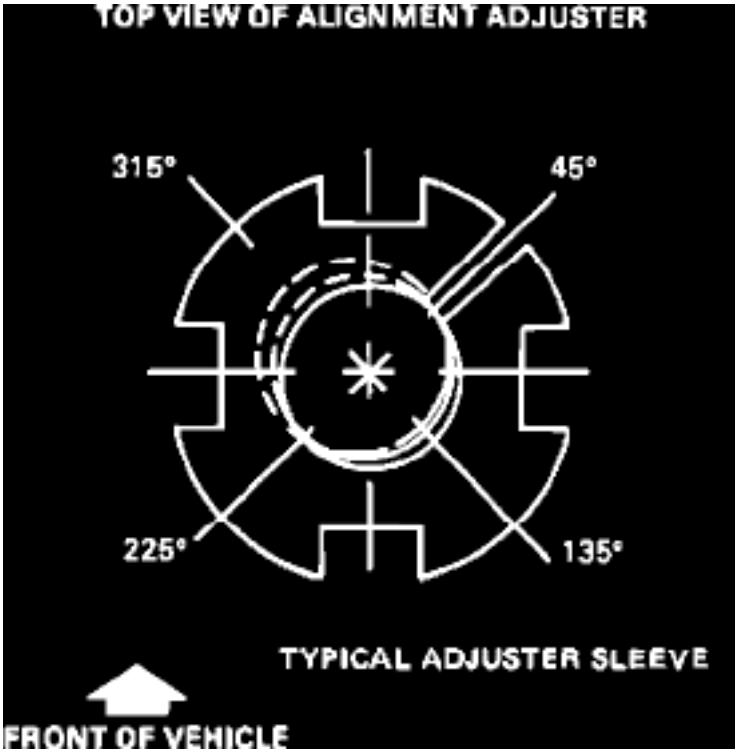
E7TZ-18113-A Bracket - Radius Arm CG

OTHER APPLICABLE ARTICLES: None WARRANTY STATUS: Reimbursable within the provisions of the Warranty and Policy Manual OPERATION: SP870416A - Caster kit one side TIME:

2.1 Hrs.

OPERATION: SP870416B - Caster kit both sides TIME:

3.5 Hrs. DLR. CODING: Basic Part No. FRONT - Code: 07



Alignment: By Symptom

Technical Service Bulletin # 892110 Date: 891018

Steering - Pull or Drift

Article No. 89-21-10

^ STEERING - PULL OR DRIFT - CASTER SPLIT - NEW

SERVICE ADJUSTERS - 4X4 MODELS

^ SUSPENSION - FRONT - NEW SERVICE CASTER ADJUSTERS - 4X4 MODELS

LIGHT TRUCK: 1980-89 BRONCO, F-150, F-250, F-350 1983-89 RANGER 1984-89 BRONCO II

Figure 1

This TSB article is being republished in its entirety to correct the service parts for the Caster Adjusters.

ISSUE: Two new alignment adjusters are now available for service. These new parts provide one degree of caster adjustment along with one degree of camber. Steering pull may be caused by caster split. The affected trucks are 4x4 Twin Traction Beam vehicles.

ACTION: Use the following procedure to determine the position of the service adjuster sleeve. Refer to the appropriate Light Truck Shop Manual, Section 14-21 for installation details.

The new alignment adjusters are similiar to the current camber adjusters. The one exception is the rotational position of the adjuster sleeve to obtain the desired adjustment.

ADJUSTER SLEEVE APPLICATION FOR RANGER BRONCO II, BRONCO, AND F-150

1. Measure and record the alignment readings.

2. Determine what alignment adjuster sleeves are on the truck.

NOTE: IF AFTERMARKET ADJUSTER SLEEVES HAVE BEEN INSTALLED, IT WILL BE NECESSARY TO FIND OUT WHAT CASTER AND CAMBER SLEEVES WERE USED.

If the adjuster sleeve is not marked or cannot be identified, install a 0 degree adjuster sleeve to use as a reference point.

3. Determine what adjuster sleeve change is required. Take your desired alignment (what you want to end up with) and compare it to the readings taken in Step 1 to determine the change.

4. Pick the adjuster sleeve that will get you the closest to the desired alignment.

5. Install and position the adjuster sleeve, Figure 1.

Refer to the appropriate Light Truck Shop Manual, Section 14-21 for service details. See the following caster adjuster sleeve chart and camber adjuster sleeve chart for the correct service parts.

CAMBER ADJUSTER SLEEVE APPLICATION CHART

SERVICE PART

APPLICATION VALUE NUMBER

F Series/Bronco - 0~ E0TZ-3B440-A

4x4

1/2~ E0TZ-3B440-B

1~ E0TZ-3B440-C

1-1/2~ E0TZ-3B440-D

Ranger/ Bronco II - 0~ E3TZ-3B440-A

4x4

1/2~ E3TZ-3B440-B

1~ E3TZ-3B440-C

1-1/2~ E3TZ-3B440-D

ADJUSTER ORIENTATION CHART

CAMBER CASTER CAMBER CASTER

POSITION LEFT LEFT RIGHT RIGHT

OF SLOT SIDE SIDE SIDE SIDE

45~ +1~ -1~ -1~ -1~

135~ -1~ -1~ + 1~ -1~

225~ -1~ +1~ +1~ +1~

315~ +1~ +1~ -1~ +1~

6. Recheck the alignment to make sure you arrived at the desired values.

CASTER WEDGE APPLICATION: F-250/350 4X4

The caster angle on the F-250 4x4 can be adjusted by inserting a wedge between the spring and the axle. Refer to the appropriate model year Light Truck Shop Manual, page 14-01-14 for installation details. See the following application chart for the correct service part.

CASTER WEDGE APPLICATION CHART

SERVICE PART

APPLICATION VALUE NUMBER

F-250/350 - 0~ E0TZ-5A313-A

4x4

1~ E0TZ-5A313-C

2~ E0TZ-5A313-B

NOTE: F-350 4X4 TWIN TRACTION BEAM - CASTER AND CASTER SPLITS ARE ADJUSTABLE USING WEDGES. F-350 4X4 MONOBEAM - CASTER SPLITS ARE NOT ADJUSTABLE. A CASTER CHANGE FOR BOTH WHEELS IS ACCOMPLISHED USING WEDGES.

PART NUMBER PART NAME CLASS

E9TZ-3B440-F Caster Adjuster - B

F-Series/Bronco

E9TZ-3B440-G Caster Adjuster - B

Ranger/Bronco II

E0TZ-3B440-A Camber Adjuster - AM

F-Series/Bronco

E0TZ-3B440-B Camber Adjuster - AM

F-Series/Bronco

E0TZ-3B440-C Camber Adjuster - AM

F-Series/Bronco

E0TZ-3B440-D Camber Adjuster - AM

F-Series/Bronco

E3TZ-3B440-A Camber Adjuster - BM

Ranger/Bronco II

E3TZ-3B440-B Camber Adjuster - AM

Ranger/Bronco II

E3TZ-3B440-C Camber Adjuster - AM

Ranger/Bronco II

E3TZ-3B440-D Camber Adjuster - AM

Ranger/Bronco II

E0TZ-5A313-A Caster Wedge C

E0TZ-5A313-B Caster Wedge BM

E0TZ-5A313-C Caster Wedge RM

OTHER APPLICABLE ARTICLES: 87-4-16 SUPERSEDES:

89-19-13, date 9/20 89

WARRANTY STATUS: INFORMATION ONLY OASIS CODES:

3100, 3200, 3300

Technical Service Bulletin # 87416 Date: 870225

Steering - Pulling or Drifting

^ STEERING - PULL OR DRIFT - CASTER Article No.

ADJUSTMENT SERVICE KIT 87-4-16

^ SUSPENSION - FRONT - CASTER ADJUSTMENT SERVICE KIT

LIGHT TRUCK 1980-86 F-150 (4x4), BRONCO ISSUE:

A steering drift or pull may be caused by excessive front wheel side-to-side caster angle differences.

ACTION: If a front axle alignment check shows excessive (more than 3/4 degree split) side-to-side caster angle difference causing the vehicle to drift or pull, install a new caster adjustment kit

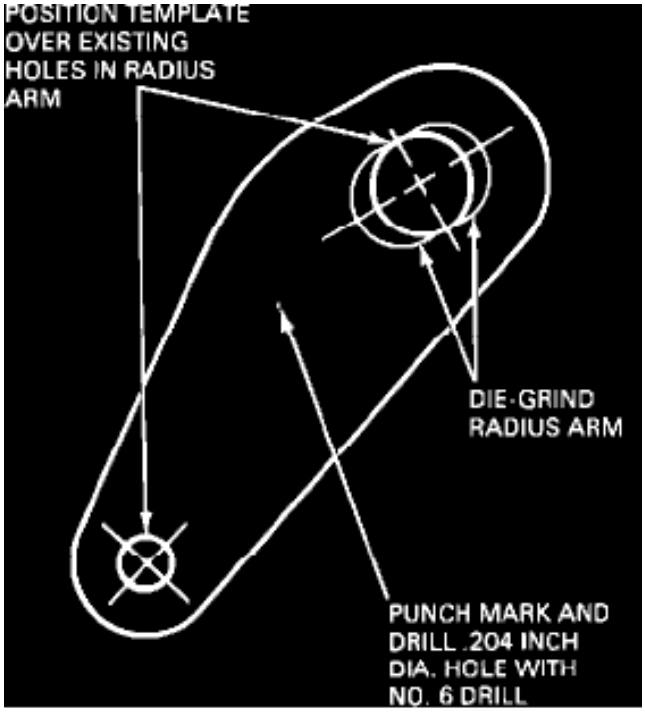
(E0TZ-3K064-A) which allows the front axle side-to-side caster angles to be changed up to 2-1/2 degrees in 1/2 degree increments. New front axle to radius arm brackets must also be replaced when the caster kit is installed. Refer to the following service procedure for step-by-step instructions.

NOTE THE FOLLOWING INFORMATION BEFORE DOING WORK ON THE VEHICLE.

To correct caster side-to-side difference of up to 1- 1/2 degrees, install a caster adjuster plate on the radius arm that has the lower caster reading. Adjuster plates are identified R.H. and L.H.

To correct caster side-to-side difference more than 1-1/2 degrees, install the caster plate on both radius arms. Installing both plates will allow a caster split change of 2-1/2 degrees (+1-1/2 degrees on the low caster side, -1 degree on the high caster side).

1. Remove radius arm from vehicle.


POSITION TEMPLATE OVER EXISTING HOLES IN RADIUS ARM
DIE-GRIND RADIUS ARM
PUNCH MARK AND DRILL .204 INCH DIA. HOLE WITH NO. 6 DRILL

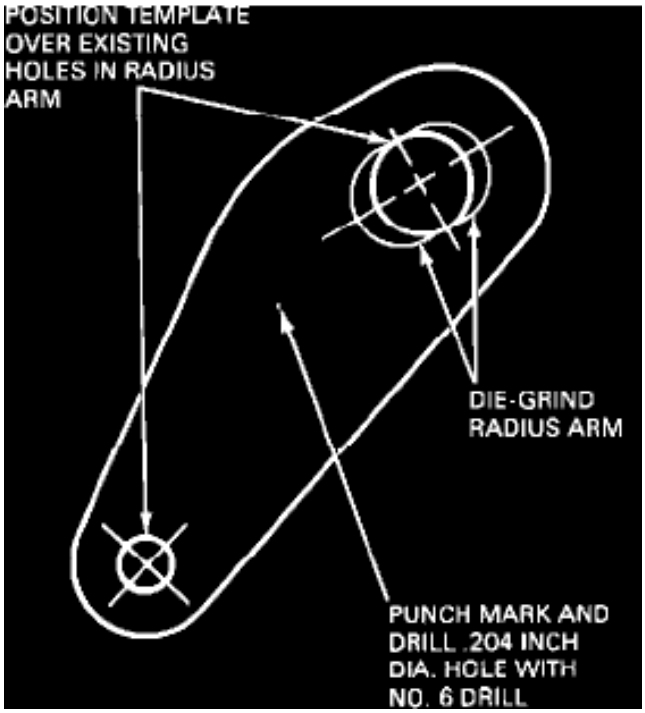
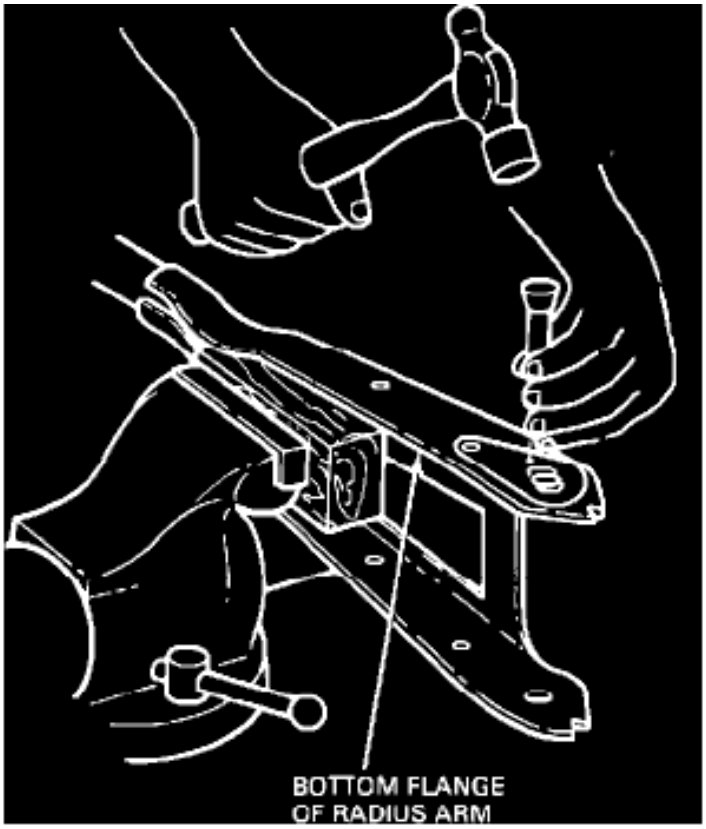

POSITION TEMPLATE OVER EXISTING HOLES IN RADIUS ARM
DIE-GRIND RADIUS ARM
PUNCH MARK AND DRILL .204 INCH DIA. HOLE WITH NO. 6 DRILL

Figure 14 - Article 87-4-16

2. Locate the template, included in the kit, on the bottom flange of radius arm over the existing holes, as shown in Figure 14.

NOTE: Right arm adjustment is shown. One template is used to modify both right and left hand arms. When modifying right arm, position template with printed side down (printed side up for left arm).

Figure 14 - Article 87-4-16


BOTTOM FLANGE
OF RADIUS ARM

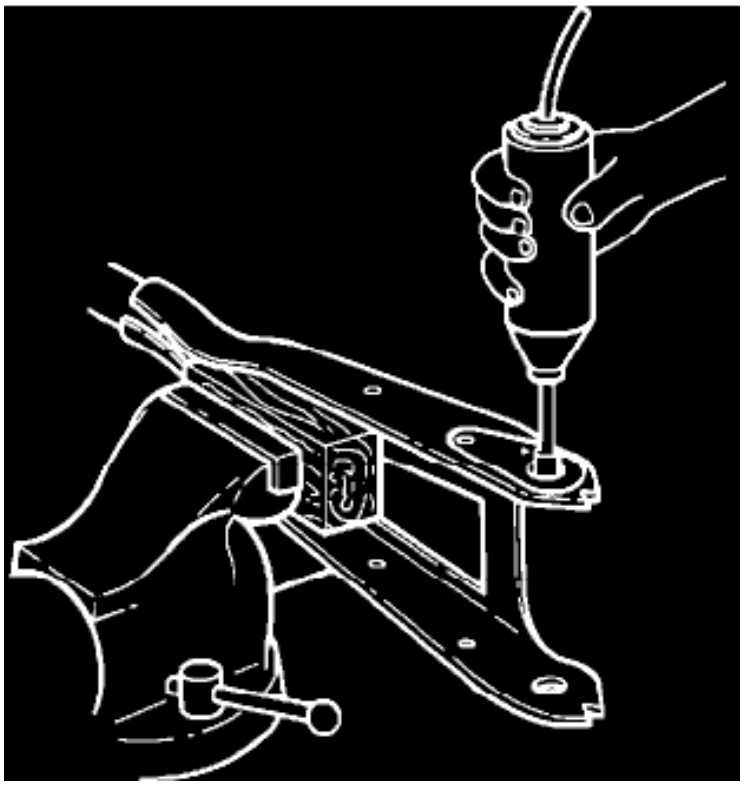
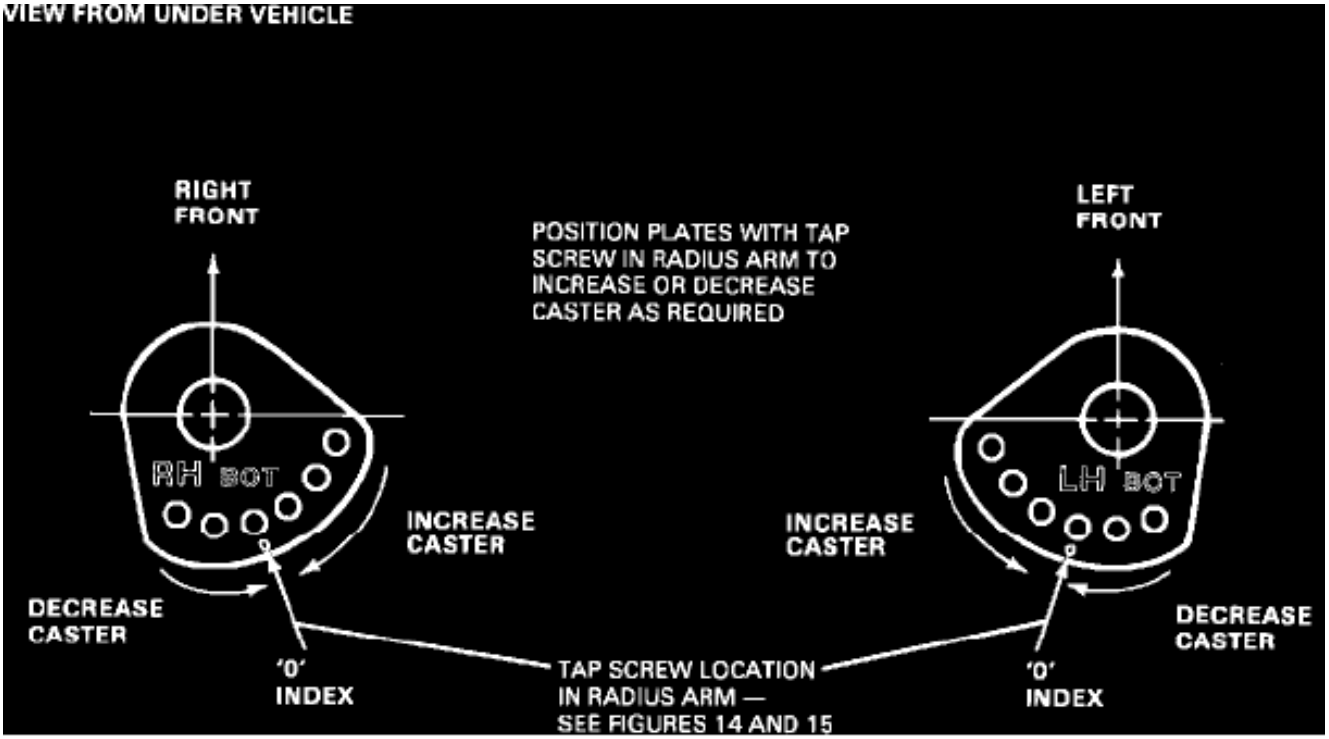


Figure 15 - Article 87-4-16

Figure 16 - Article 87-4-16

3. With template secure, punch mark radius arm at the small hole in the template, as shown in Figures 14 and 15. Mark radius arm, and diegrind a slot at the axle attaching hole the same size as the slot in the template, see Figure 16. De-burr the surface; avoid rounding the edges of the slot.



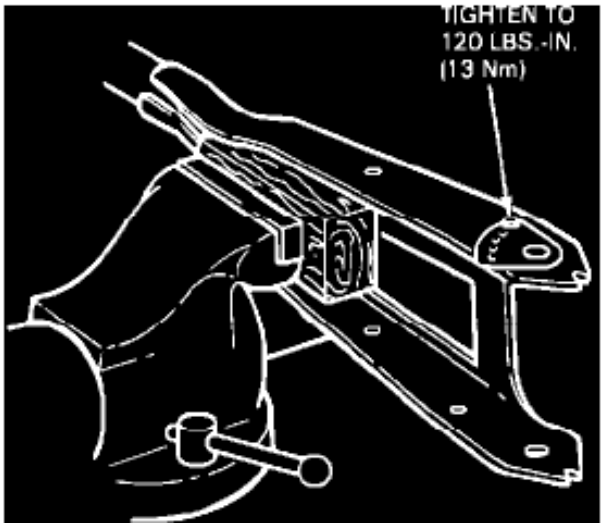


Figure 13 - Article 87-4-16

4. Use a No. 6 drill to make a .204 inch diameter through hole at the punch mark. Line up the caster adjuster plate on the radius arm to obtain the required change in caster, see Figure 13.

Figure 17 - Article 87-4-16

NOTE: Each hole changes caster approximately 1/2 degree + or - from the "0" index hole.

5. Install the tap screw to 120 in.lbs. (13 N-m) torque.

6. Reinstall radius arm with a new bracket (front axle to radius arm). The new bracket has a larger "jaw" spacing to fit over caster adjuster plate.

^ For non-quad shock vehicles, install bracket E7TZ-3B446-A.

^ For quad shock vehicles, install bracket E7TZ-18112-A, R.H. or E7TZ-18113-A, L.H.

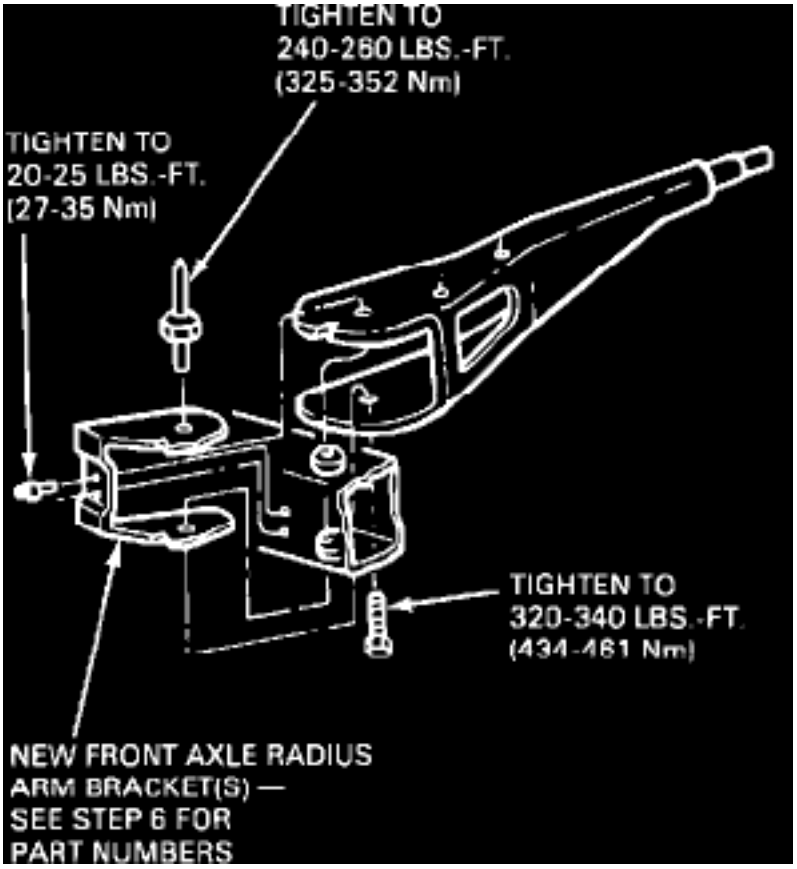


Figure 18 - Article 87-4-16

7. Tighten upper stud/bolt to 240-260 ft.lbs. (325-352 N-m) torque, Figure 18.

8. Tighten lower bolt to 320-340 ft.lbs. (434-461 N-m) torque, Figure 18.

9. Tighten front axle radius arm bracket bolts to 20-26 ft.lbs. (27-35 N-m) torque, Figure 18.

10. Arc weld caster adjuster plate to radius arm with a 1/4 inch-long bead along two sides of the plate.

11. Reset toe to specification. PART NUMBER

PART NAME CLASS

E0TZ-3K064-A Caster Kit CG

E7TZ-3B446-A Bracket - Radius Arm C

E7TZ-18112-A Bracket - Radius Arm CG

E7TZ-18113-A Bracket - Radius Arm CG

OTHER APPLICABLE ARTICLES: None WARRANTY STATUS: Reimbursable within the provisions of the Warranty and Policy Manual OPERATION: SP870416A - Caster kit one side TIME:

2.1 Hrs.

OPERATION: SP870416B - Caster kit both sides TIME:

3.5 Hrs. DLR. CODING: Basic Part No. FRONT - Code: 07

Technical Service Bulletin # 892110 Date: 891018

Steering - Pull or Drift

Article No. 89-21-10

^ STEERING - PULL OR DRIFT - CASTER SPLIT - NEW

SERVICE ADJUSTERS - 4X4 MODELS

^ SUSPENSION - FRONT - NEW SERVICE CASTER ADJUSTERS - 4X4 MODELS

LIGHT TRUCK: 1980-89 BRONCO, F-150, F-250, F-350 1983-89 RANGER 1984-89 BRONCO II

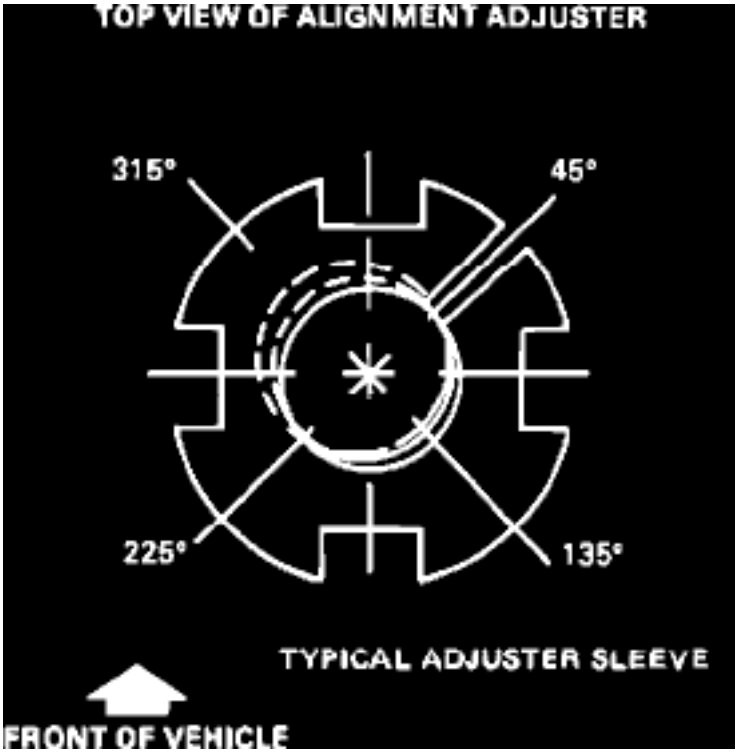


Figure 1

This TSB article is being republished in its entirety to correct the service parts for the Caster Adjusters.

ISSUE: Two new alignment adjusters are now available for service. These new parts provide one degree of caster adjustment along with one degree of camber. Steering pull may be caused by caster split. The affected trucks are 4x4 Twin Traction Beam vehicles.

ACTION: Use the following procedure to determine the position of the service adjuster sleeve. Refer to the appropriate Light Truck Shop Manual, Section 14-21 for installation details.

The new alignment adjusters are similiar to the current camber adjusters. The one exception is the rotational position of the adjuster sleeve to obtain the desired adjustment.

ADJUSTER SLEEVE APPLICATION FOR RANGER BRONCO II, BRONCO, AND F-150

1. Measure and record the alignment readings.

2. Determine what alignment adjuster sleeves are on the truck.

NOTE: IF AFTERMARKET ADJUSTER SLEEVES HAVE BEEN INSTALLED, IT WILL BE NECESSARY TO FIND OUT WHAT CASTER AND CAMBER SLEEVES WERE USED.

If the adjuster sleeve is not marked or cannot be identified, install a 0 degree adjuster sleeve to use as a reference point.

3. Determine what adjuster sleeve change is required. Take your desired alignment (what you want to end up with) and compare it to the readings taken in Step 1 to determine the change.

4. Pick the adjuster sleeve that will get you the closest to the desired alignment.

5. Install and position the adjuster sleeve, Figure 1.

Refer to the appropriate Light Truck Shop Manual, Section 14-21 for service details. See the following caster adjuster sleeve chart and camber adjuster sleeve chart for the correct service parts.

CAMBER ADJUSTER SLEEVE APPLICATION CHART

SERVICE PART

APPLICATION VALUE NUMBER

F Series/Bronco - 0~ E0TZ-3B440-A

4x4

1/2~ E0TZ-3B440-B

1~ E0TZ-3B440-C

1-1/2~ E0TZ-3B440-D

Ranger/ Bronco II - 0~ E3TZ-3B440-A

4x4

1/2~ E3TZ-3B440-B

1~ E3TZ-3B440-C

1-1/2~ E3TZ-3B440-D

ADJUSTER ORIENTATION CHART

CAMBER CASTER CAMBER CASTER

POSITION LEFT LEFT RIGHT RIGHT

OF SLOT SIDE SIDE SIDE SIDE

45~ +1~ -1~ -1~ -1~

135~ -1~ -1~ + 1~ -1~

225~ -1~ +1~ +1~ +1~

315~ +1~ +1~ -1~ +1~

6. Recheck the alignment to make sure you arrived at the desired values.

CASTER WEDGE APPLICATION: F-250/350 4X4

The caster angle on the F-250 4x4 can be adjusted by inserting a wedge between the spring and the axle. Refer to the appropriate model year Light Truck Shop Manual, page 14-01-14 for installation details. See the following application chart for the correct service part.

CASTER WEDGE APPLICATION CHART

SERVICE PART

APPLICATION VALUE NUMBER

F-250/350 - 0~ E0TZ-5A313-A

4x4

1~ E0TZ-5A313-C

2~ E0TZ-5A313-B

NOTE: F-350 4X4 TWIN TRACTION BEAM - CASTER AND CASTER SPLITS ARE ADJUSTABLE USING WEDGES. F-350 4X4 MONOBEAM - CASTER SPLITS ARE NOT ADJUSTABLE. A CASTER CHANGE FOR BOTH WHEELS IS ACCOMPLISHED USING WEDGES.

PART NUMBER PART NAME CLASS

E9TZ-3B440-F Caster Adjuster - B

F-Series/Bronco

E9TZ-3B440-G Caster Adjuster - B

Ranger/Bronco II

E0TZ-3B440-A Camber Adjuster - AM

F-Series/Bronco

E0TZ-3B440-B Camber Adjuster - AM

F-Series/Bronco

E0TZ-3B440-C Camber Adjuster - AM

F-Series/Bronco

E0TZ-3B440-D Camber Adjuster - AM

F-Series/Bronco

E3TZ-3B440-A Camber Adjuster - BM

Ranger/Bronco II

E3TZ-3B440-B Camber Adjuster - AM

Ranger/Bronco II

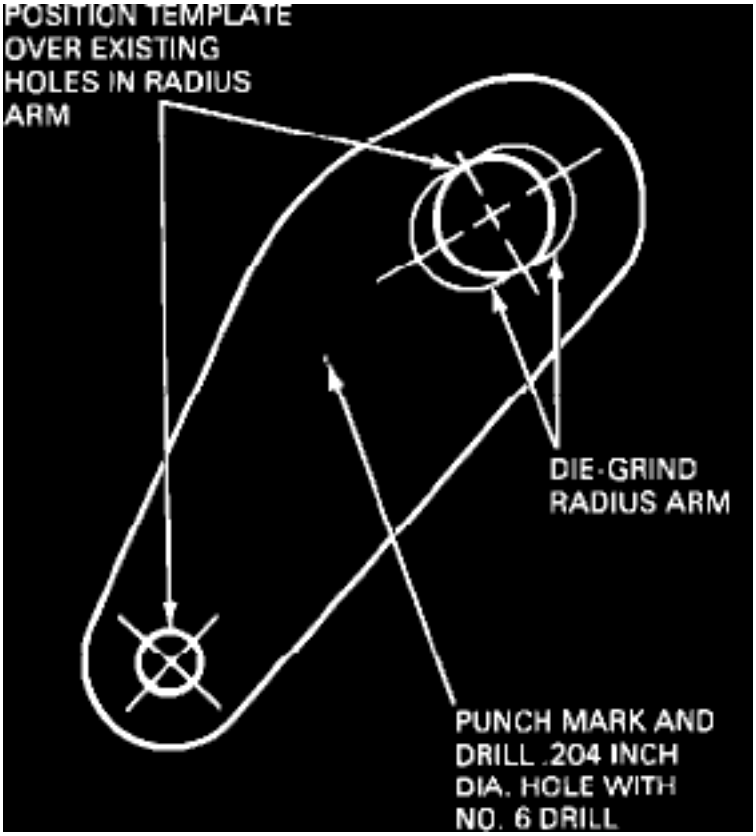
E3TZ-3B440-C Camber Adjuster - AM

Ranger/Bronco II

E3TZ-3B440-D Camber Adjuster - AM

Ranger/Bronco II

E0TZ-5A313-A Caster Wedge C



E0TZ-5A313-B Caster Wedge BM

E0TZ-5A313-C Caster Wedge RM

OTHER APPLICABLE ARTICLES: 87-4-16 SUPERSEDES:

89-19-13, date 9/20 89

WARRANTY STATUS: INFORMATION ONLY OASIS CODES:

3100, 3200, 3300

Technical Service Bulletin # 87416 Date: 870225

Steering - Pulling or Drifting

^ STEERING - PULL OR DRIFT - CASTER Article No.

ADJUSTMENT SERVICE KIT 87-4-16

^ SUSPENSION - FRONT - CASTER ADJUSTMENT SERVICE KIT

LIGHT TRUCK 1980-86 F-150 (4x4), BRONCO ISSUE:

A steering drift or pull may be caused by excessive front wheel side-to-side caster angle differences.

ACTION: If a front axle alignment check shows excessive (more than 3/4 degree split) side-to-side caster angle difference causing the vehicle to drift or pull, install a new caster adjustment kit (E0TZ-3K064-A) which allows the front axle side-to-side caster angles to be changed up to 2-1/2 degrees in 1/2 degree increments. New front axle to radius arm brackets must also be replaced when the caster kit is installed. Refer to the following service procedure for step-by-step instructions.

NOTE THE FOLLOWING INFORMATION BEFORE DOING WORK ON THE VEHICLE.

To correct caster side-to-side difference of up to 1- 1/2 degrees, install a caster adjuster plate on the radius arm that has the lower caster reading. Adjuster plates are identified R.H. and L.H.

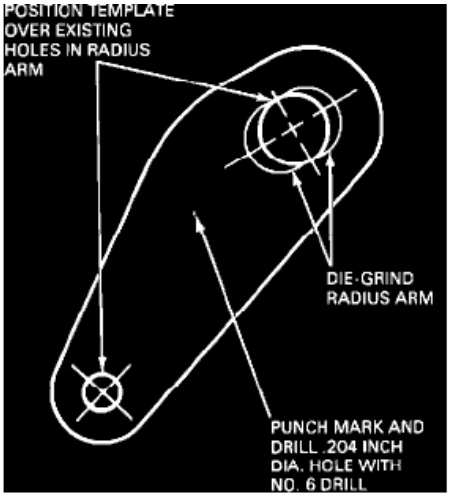
To correct caster side-to-side difference more than 1-1/2 degrees, install the caster plate on both radius arms. Installing both plates will allow a caster split change of 2-1/2 degrees (+1-1/2 degrees on the low caster side, -1 degree on the high caster side).

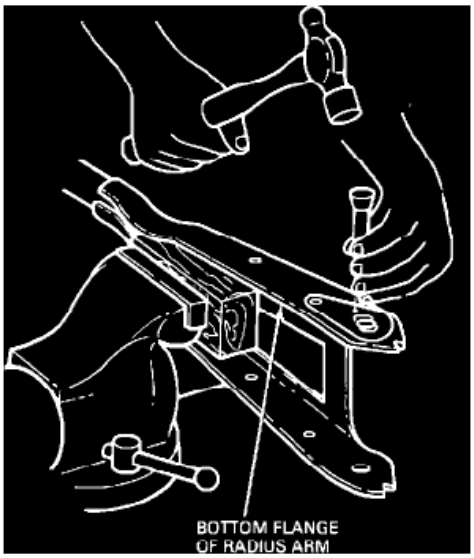
1. Remove radius arm from vehicle.

Figure 14 - Article 87-4-16

2. Locate the template, included in the kit, on the bottom flange of radius arm over the existing holes, as shown in Figure 14.

NOTE: Right arm adjustment is shown. One template is used to modify both right and left hand arms. When modifying right arm, position template with printed side down (printed side up for left arm).


POSITION TEMPLATE OVER EXISTING HOLES IN RADIUS ARM
DIE-GRIND RADIUS ARM
PUNCH MARK AND DRILL .204 INCH DIA. HOLE WITH NO. 6 DRILL


BOTTOM FLANGE OF RADIUS ARM

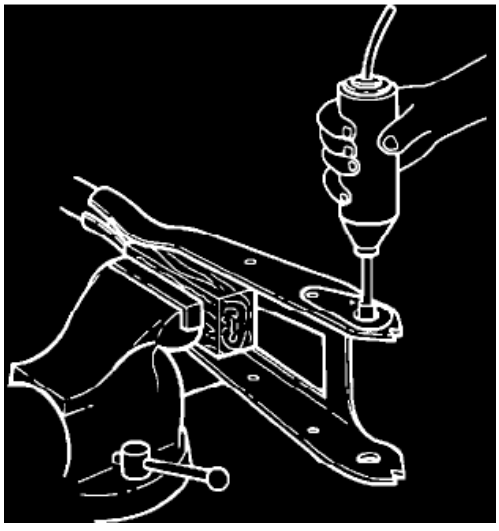
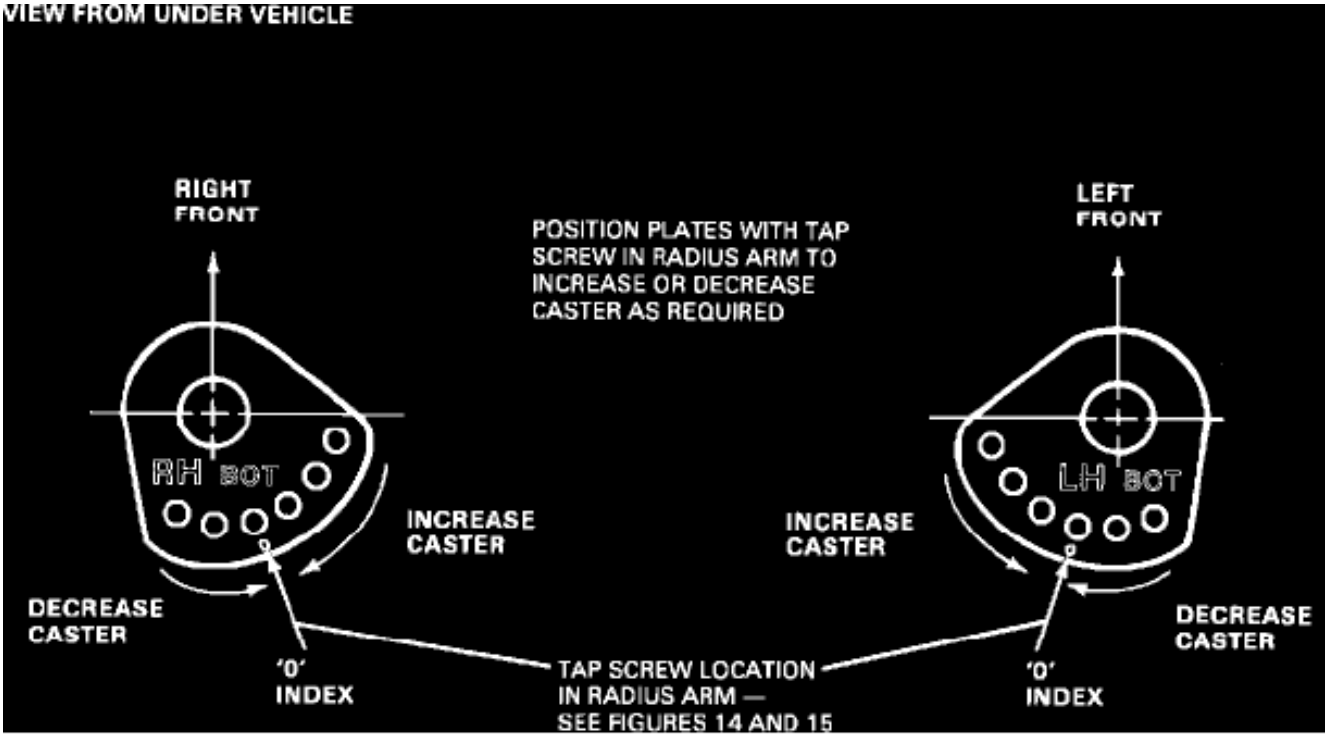


Figure 14 - Article 87-4-16

Figure 15 - Article 87-4-16



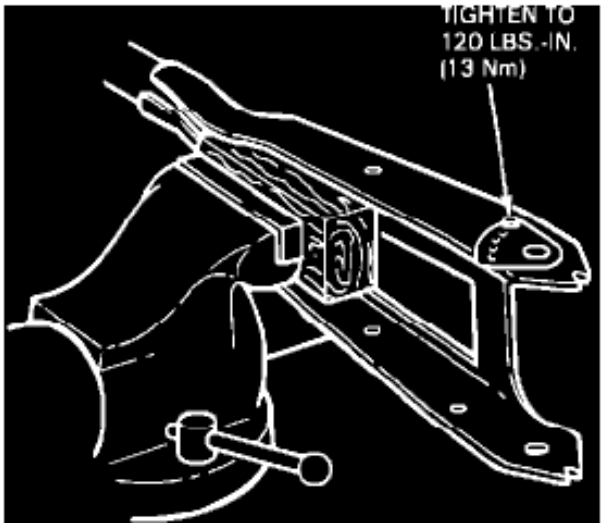


Figure 16 - Article 87-4-16

3. With template secure, punch mark radius arm at the small hole in the template, as shown in Figures 14 and 15. Mark radius arm, and diegrind a slot at the axle attaching hole the same size as the slot in the template, see Figure 16. De-burr the surface; avoid rounding the edges of the slot.

Figure 13 - Article 87-4-16

4. Use a No. 6 drill to make a .204 inch diameter through hole at the punch mark. Line up the caster adjuster plate on the radius arm to obtain the required change in caster, see Figure 13.

Figure 17 - Article 87-4-16

NOTE: Each hole changes caster approximately 1/2 degree + or - from the "0" index hole.

5. Install the tap screw to 120 in.lbs. (13 N-m) torque.

6. Reinstall radius arm with a new bracket (front axle to radius arm). The new bracket has a larger "jaw" spacing to fit over caster adjuster plate.

^ For non-quad shock vehicles, install bracket E7TZ-3B446-A.

^ For quad shock vehicles, install bracket E7TZ-18112-A, R.H. or E7TZ-18113-A, L.H.

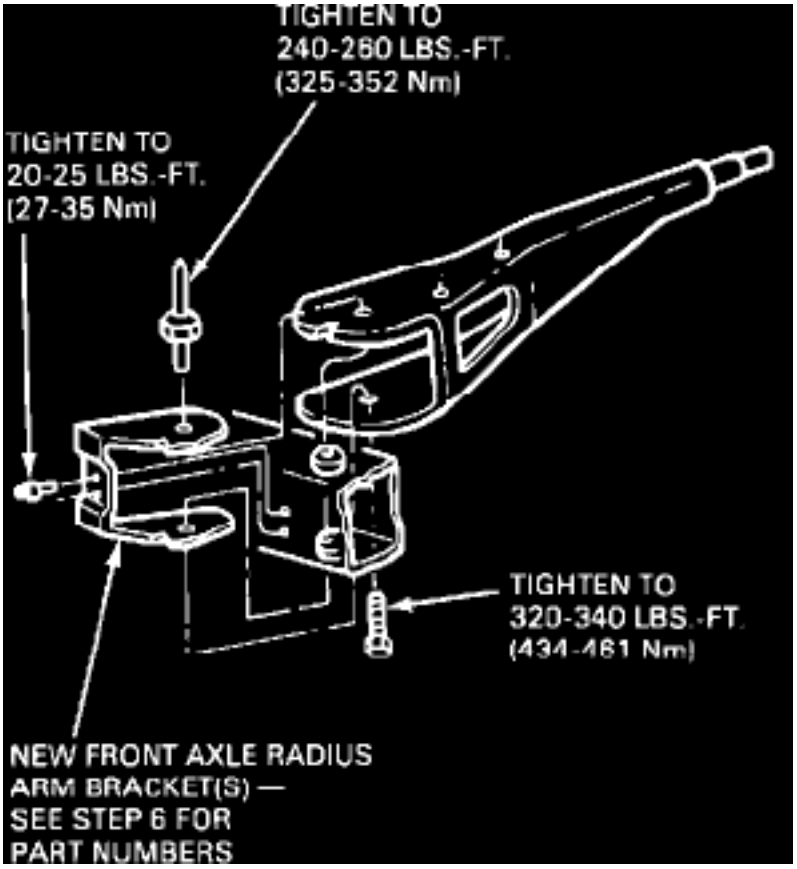


Figure 18 - Article 87-4-16

7. Tighten upper stud/bolt to 240-260 ft.lbs. (325-352 N-m) torque, Figure 18.

8. Tighten lower bolt to 320-340 ft.lbs. (434-461 N-m) torque, Figure 18.

9. Tighten front axle radius arm bracket bolts to 20-26 ft.lbs. (27-35 N-m) torque, Figure 18.

10. Arc weld caster adjuster plate to radius arm with a 1/4 inch-long bead along two sides of the plate.

11. Reset toe to specification. PART NUMBER

PART NAME CLASS

E0TZ-3K064-A Caster Kit CG

E7TZ-3B446-A Bracket - Radius Arm C

E7TZ-18112-A Bracket - Radius Arm CG

E7TZ-18113-A Bracket - Radius Arm CG

OTHER APPLICABLE ARTICLES: None WARRANTY STATUS: Reimbursable within the provisions of the Warranty and Policy Manual OPERATION: SP870416A - Caster kit one side TIME:

2.1 Hrs.

OPERATION: SP870416B - Caster kit both sides TIME:

3.5 Hrs. DLR. CODING: Basic Part No. FRONT - Code: 07

Alignment: Specifications

Camber Caster Toe

Ride Height 2.00-2.25 in --- --- 1/16 in

2.25-2.75 in --- --- 1/16 in

2.75-3.25 in -2 1/2 to -1/4 deg +6 to +9 deg 1/16 in

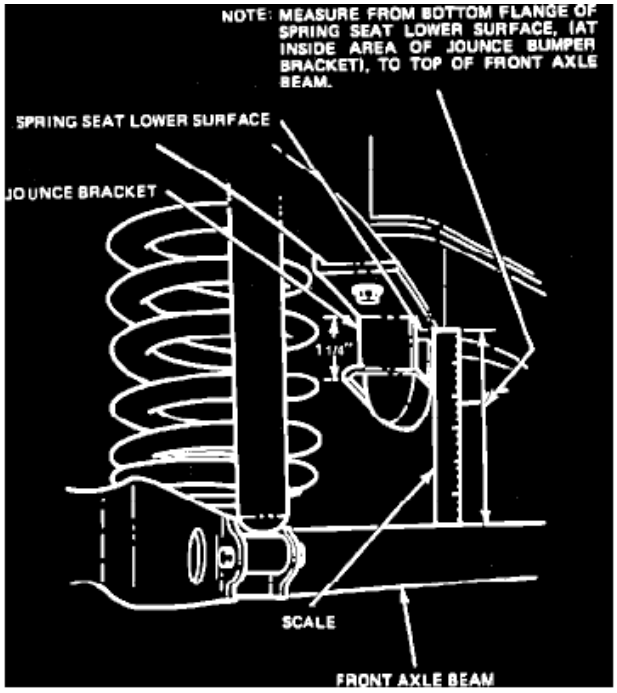
3.25-3.50 in -1 3/4 to +1/2 deg +5 to +8 deg 1/16 in

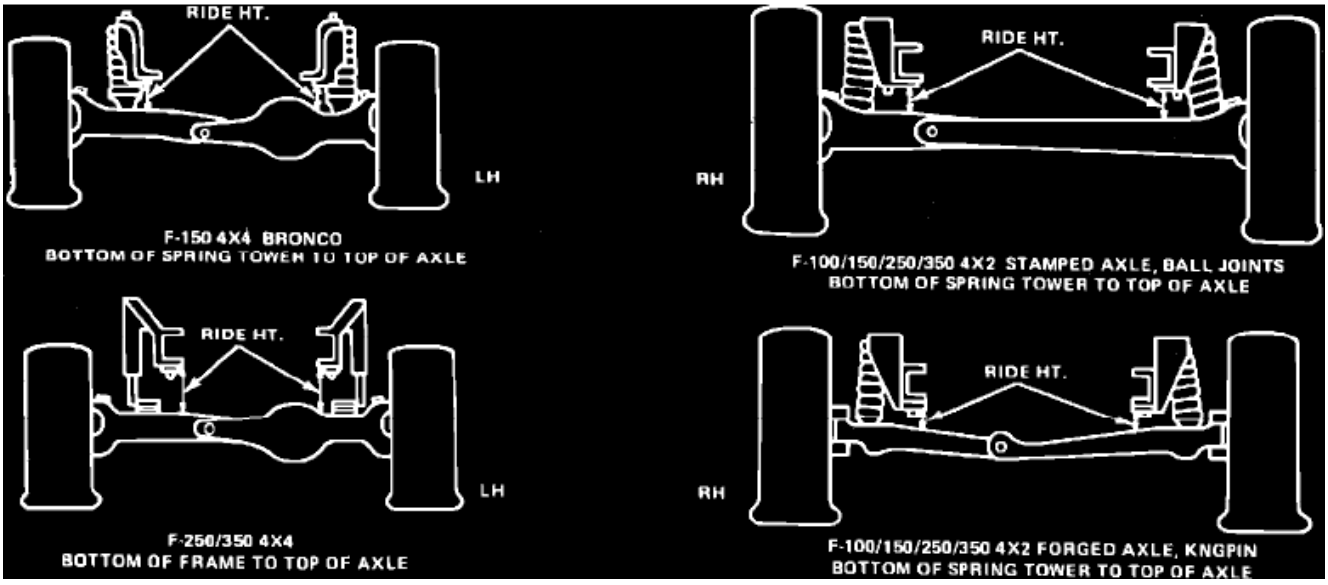
3.50-4.00 in -3/4 to +1 1/2 deg +4 to +7 deg 1/16 in

4.00-4.25 in 0 to +2 1/4 deg +3 to +6 deg 1/16 in

4.25-4.75 in +1 to +3 1/4 deg +2 to +5 deg 1/16 in

4.75-5.00 in +1 3/4 to +4 deg +1 to +4 deg 1/16 in





Alignment: Service and Repair

Fig. 1 Measuring Ride Height

Fig. 7 Measuring riding height. 1980---85 F-100---350 & Bronco

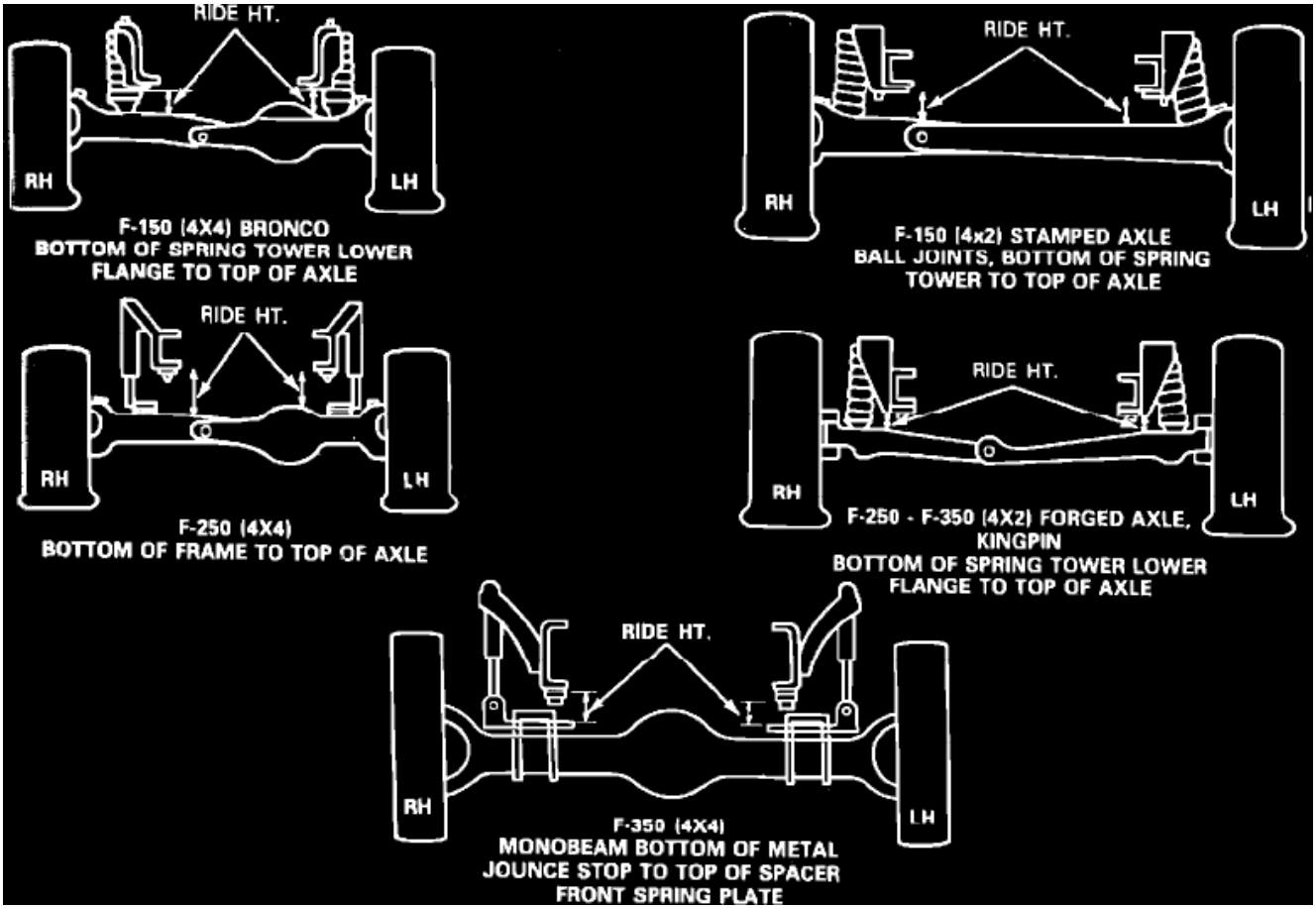
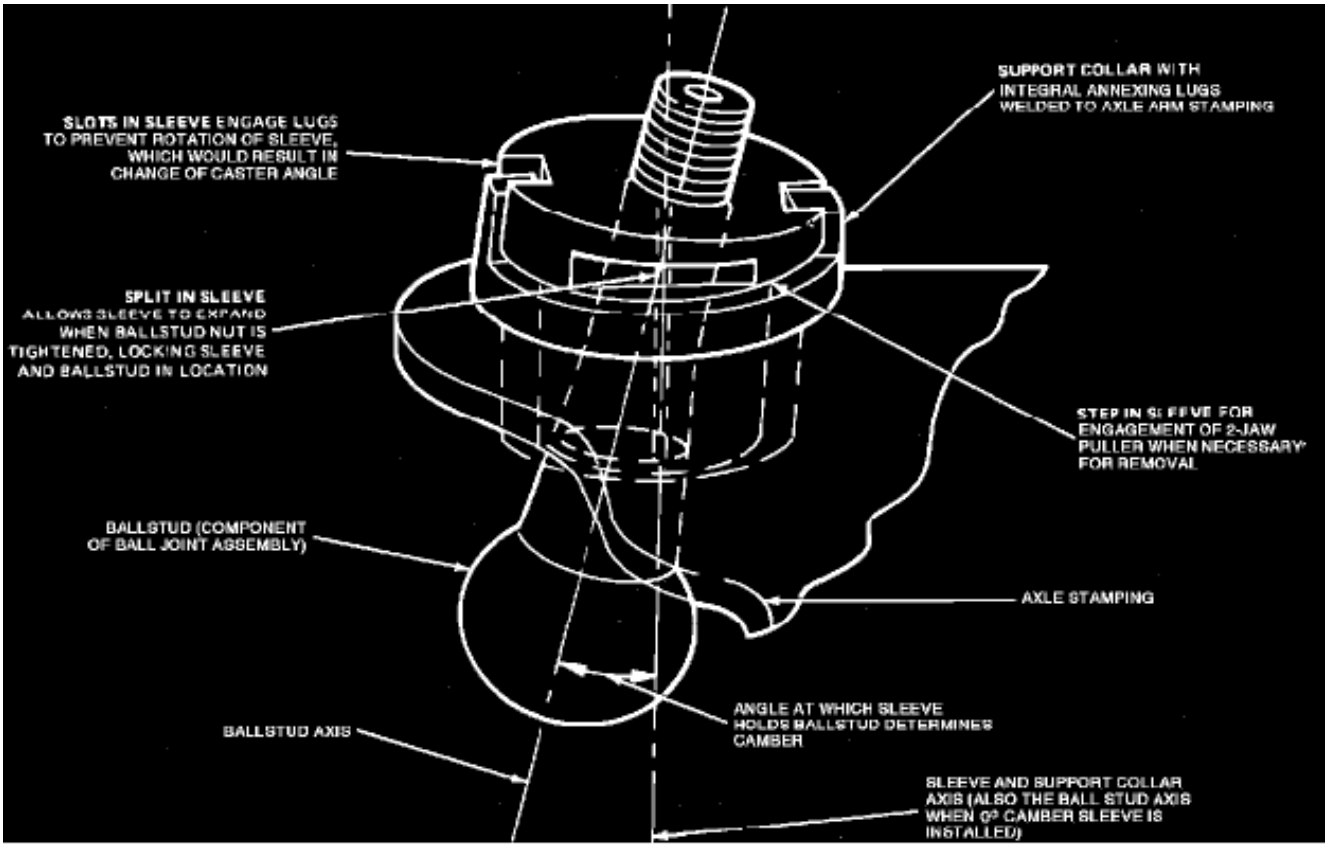


Fig. 8 Measuring Riding Height

Prior to checking caster and camber, ensure vehicle front ride height is within {1/8} inch side to side 1980-87 E-100-350. On 1980-87 F-100-350 models, the left side ride height should be within 0-{3/8} inch higher than the right side ride height. On 1980-87 F-150-350 (4x4) and Bronco, the front ride heights should be within {3/16} inch side to side. Refer to Figs. 6, 7 and 8. If the vehicle ride heights are not within specifications, redistribute load on loaded vehicles or slightly load empty vehicles on one side. If the ride heights cannot be brought within specifications, verify correct spring installation. The ride height variations stated, are for checking purposes only. The vehicle does not have to operate within these specifications. Check and correct as necessary all tire inflation pressures, then check front tires for the same size, ply rating and load range. Check front wheel bearings and adjust as necessary. If all the above checks have been made, check wheel alignment with suitable alignment equipment. Using the ride heights obtained earlier, compare caster and camber readings to those listed in the ``Wheel Alignment Specifications Chart''. If the caster and camber angles exceed the specifications, inspect front end for damaged suspension components. Replace as necessary. Alignment equipment indicates a true reading only when the vehicle's frame is horizontal. Therefore, if the frame is not level (due to tire, spring or load differences), the caster angle reading must be modified to compensate for the frame angles. If the front is higher than the rear, subtract the amount of angle from the reading. If the front is lower than the rear, add the angle. To check frame angle, use a spirit protractor, and take the frame angle measurement on the lower frame flange at the flat area immediately adjacent to the rear spring front hanger.

1980-85 4 X 2 MODELS EXC. 1982-85 F-100-350 W/BALL JOINTS

The camber and caster angles are designed into the front end and are not adjustable.



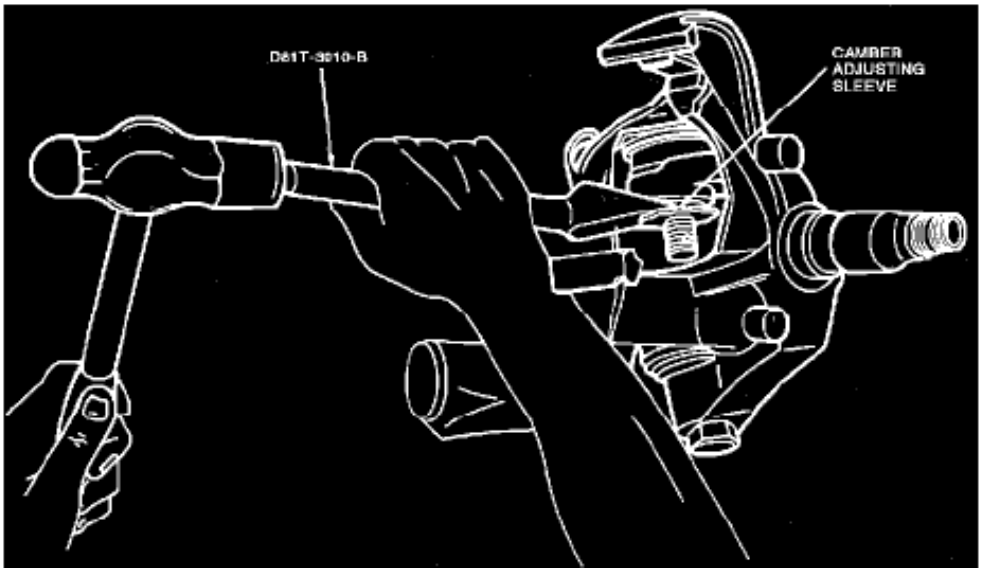


Fig. 3 Camber Adjustment

Fig. 4 Removing Caster/Camber Adjustment Sleeve

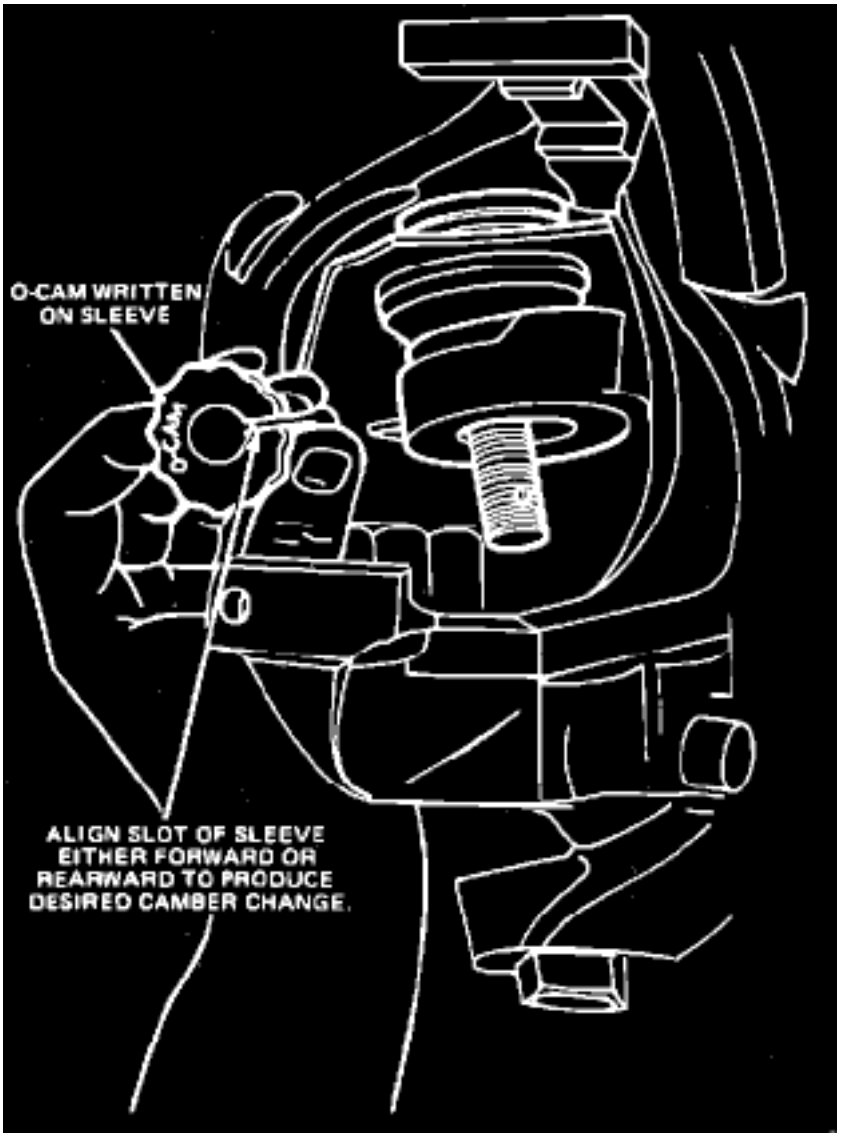


Fig. 5 Caster/Camber Adjustment

1980-87 F-150-350 4 X 4 & BRONCO, 1982-87 F-100-350 4 X 2 W/BALL JOINTS The caster angle on 1981-87 F-250-350 4 x 4 models with leaf spring front suspension can be adjusted by inserting a shim between the spring and axle. Shims are available in increments of 0°, 1° and 2°. The 0° shim is used to adjust side to side ride height when an angled shim is installed on the opposite side of the axle. On all other models, the caster angle is designed into the axle and is not adjustable. The camber angle may be adjusted by means of mounting sleeves placed on the upper ball joint, Figs. 9, 10 and 11. Four sleeves are available in {1/2}° camber increments to allow a 3° range of adjustment from - 1 {1/2}° to +1 {1/2}°.

TOE-IN, ADJUST Check the steering wheel spoke position when the front wheels are in the straight ahead position. If the spokes are not in the normal position, they can be adjusted while toe-in is being adjusted.

1. Loosen clamp bolts on each tie rod end sleeve.

2. Adjust toe-in. If steering wheel spokes are in their normal position, lengthen or shorten both rods equally to obtain correct toe-in. If spokes are not in normal position, make necessary rod adjustments to obtain correct toe-in and steering wheel spoke alignment.

Fuel Pressure: Specifications

SPECIFICATIONS

Pressure ..... 6.0-8.0 PSI Volume ..... 1 pint in 20 seconds

NOTE: Measurements taken with engine idling.

Fuel Pressure: Testing and Inspection

PRESSURE TEST

1. Connect a suitable pressure gauge (0-15 PSI) to the carburetor end of the fuel line.

WARNING: Use care to prevent combustion of spilled fuel.

2. Start the engine (it should be able to run for over 30 seconds on the fuel in the carburetor bowl) and read the pressure after 10 seconds. If pump

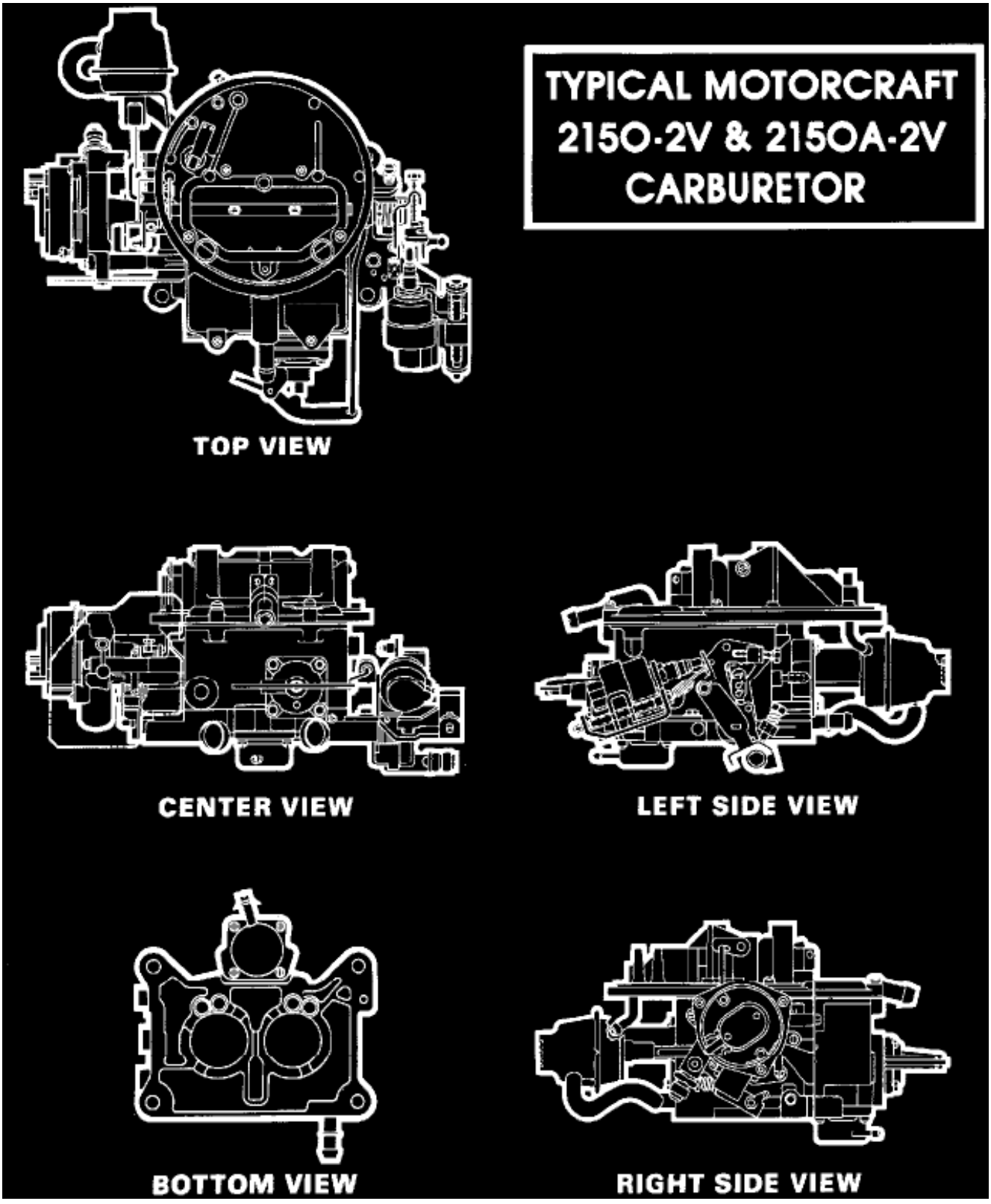
pressure is too low or too high install a new fuel pump.

Fuel Pump Pressure ..... 6.0-8.0 PSI

3. Reconnect fuel line at filter and install air cleaner.

		SLOW		FAST		
Engine	Year	Man. Trans.	Auto. Trans.	Man. Trans.	Auto. Trans.	Step of Cam
5.8L (351)	1982	750	600 D	1700	1650 P	2nd High
AC speed-up	1982	850	—			
w/decal ABF, ABJ	1982	—	550 D	—	2000 P	High
AC speed-up	1982	—	625 D			
Canada	1982	750	600 D	1700	1650 P	2nd High
shutdown idle	1982	850	—			
w/decal ABH	1982	—	550 D	—	2000 P	High
AC speed-up	1982	—	625 D			
5.8L (351) Windsor	1982	750	—	1700	—	2nd High
5.8L (351) Windsor	1982	—	550 D	—	2000 P	High
AC speed-up	1982	—	625 D			
5.8L (351)	1983	750	625 D	1700	2000 P	High
AC speed-up	1983	850	—			
shutdown idle	1983	—	575 D			
w/decal DEY, DFR	1983	600	—	1650	—	2nd High
California	1983	—	600 D	—	1650 P	2nd High

IDLE SPEED SPECIFICATIONS

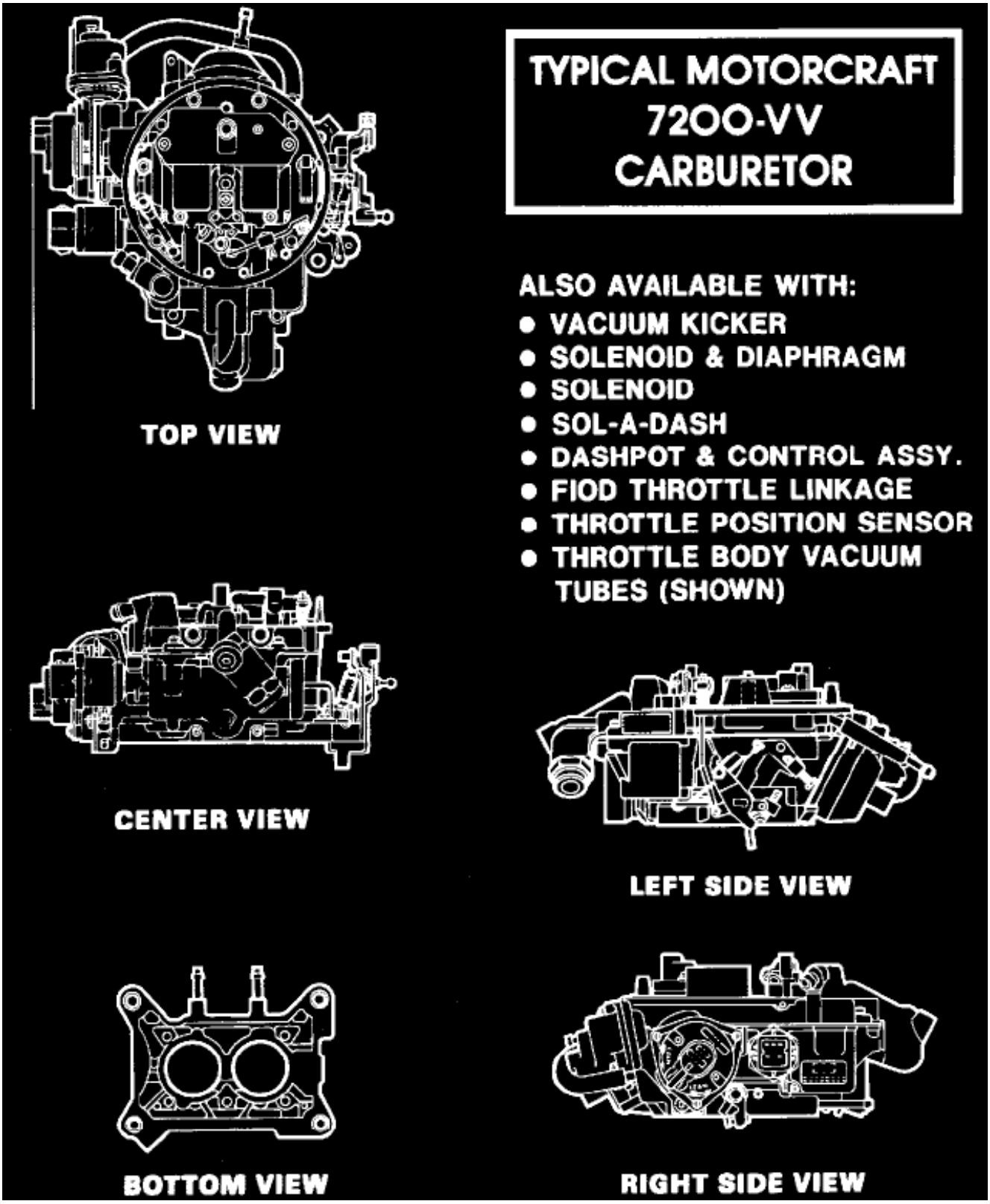


Idle Speed: Adjustments Curb Idle Speed

Identification

CARBURETOR IDENTIFICATION

2150-2V, 2150A-2V Carburetor

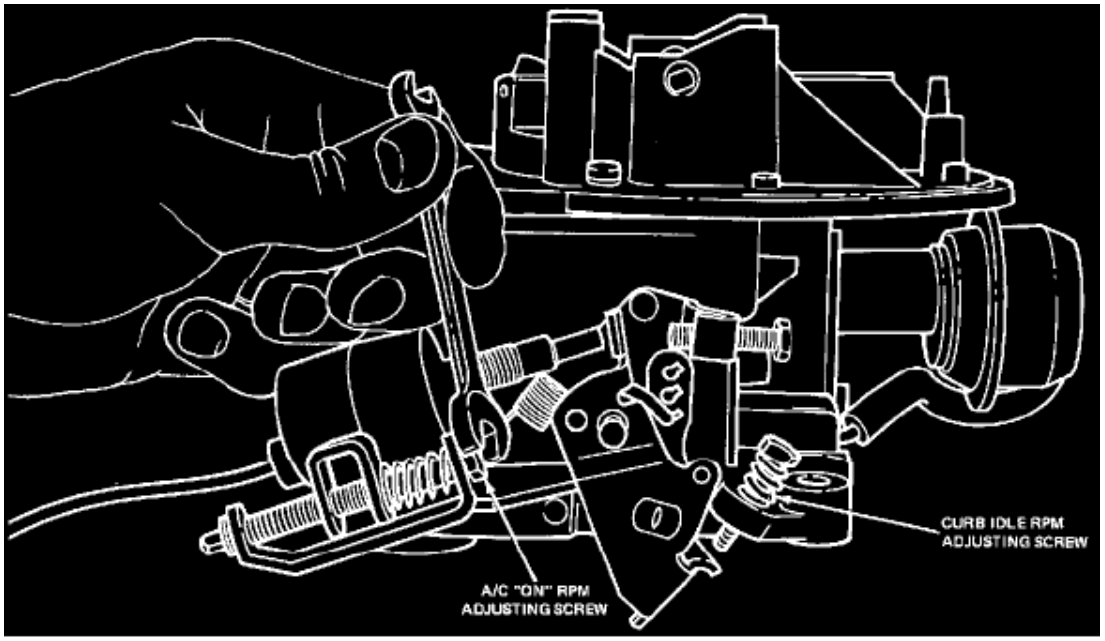


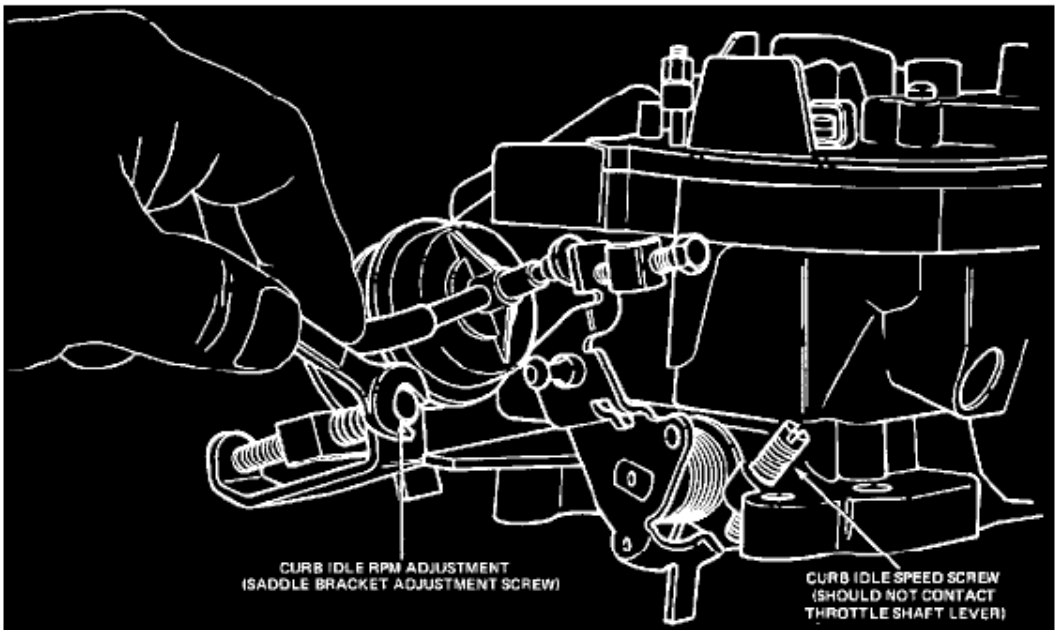
Variable Venturi, 7200-VV Carburetor

Type 2150-2V

CURB IDLE SPEED ADJUSTMENT

- Place the transmission in Neutral (manual) or Park (automatic).
- Bring engine to normal operating temperature (upper radiator hose hot).
- Place the transmission in the specified gear. See: Specifications


CURB IDLE RPM
ADJUSTING SCREW
A/C "ON" RPM
ADJUSTING SCREW


CURB IDLE RPM ADJUSTMENT
(SADDLE BRACKET ADJUSTMENT SCREW)
CURB IDLE SPEED SCREW
(SHOULD NOT CONTACT
THROTTLE SHAFT LEVER)

- Check curb idle rpm. Adjust to specification. See: Specifications

- Place the transmission in Neutral (manual) or Park (automatic). Rev the engine momentarily. Place the transmission in specified position, and recheck curb idle rpm. Readjust if required.

Type 7200-VV Carburetor

CURB IDLE SPEED ADJUSTMENT

- Place the transmission in Neutral (manual) or Park (automatic).

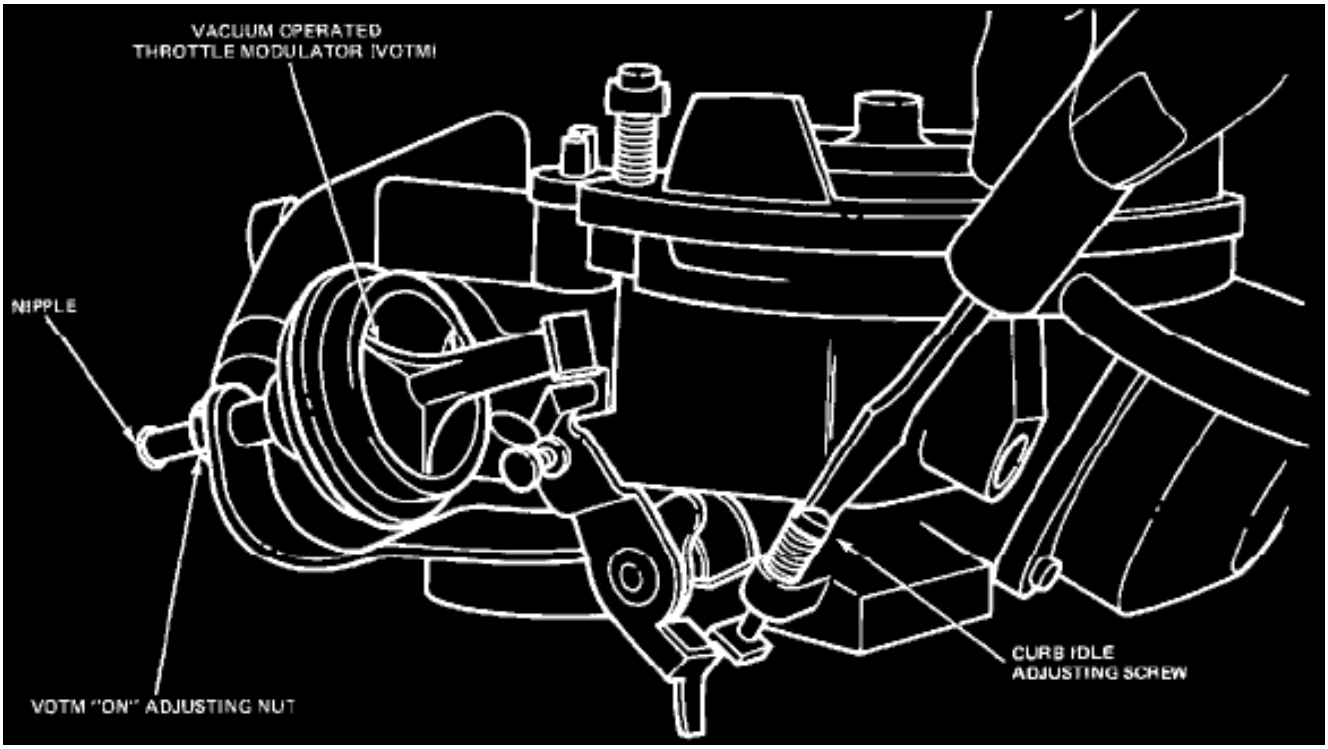
- Bring the engine to normal operating temperature.

- Disconnect purge hose on canister side of evaporator purge solenoid. Check to ensure that purge vacuum is present (solenoid has opened, will require a 3-5 minute wait after starting engine, followed by a short time at part throttle. Reconnect purge hose.

- Disconnect and plug the vacuum hose to the Vacuum Operated Throttle Modulator (VOTM) kicker.

- Place the transmission in specified position. See: Specifications

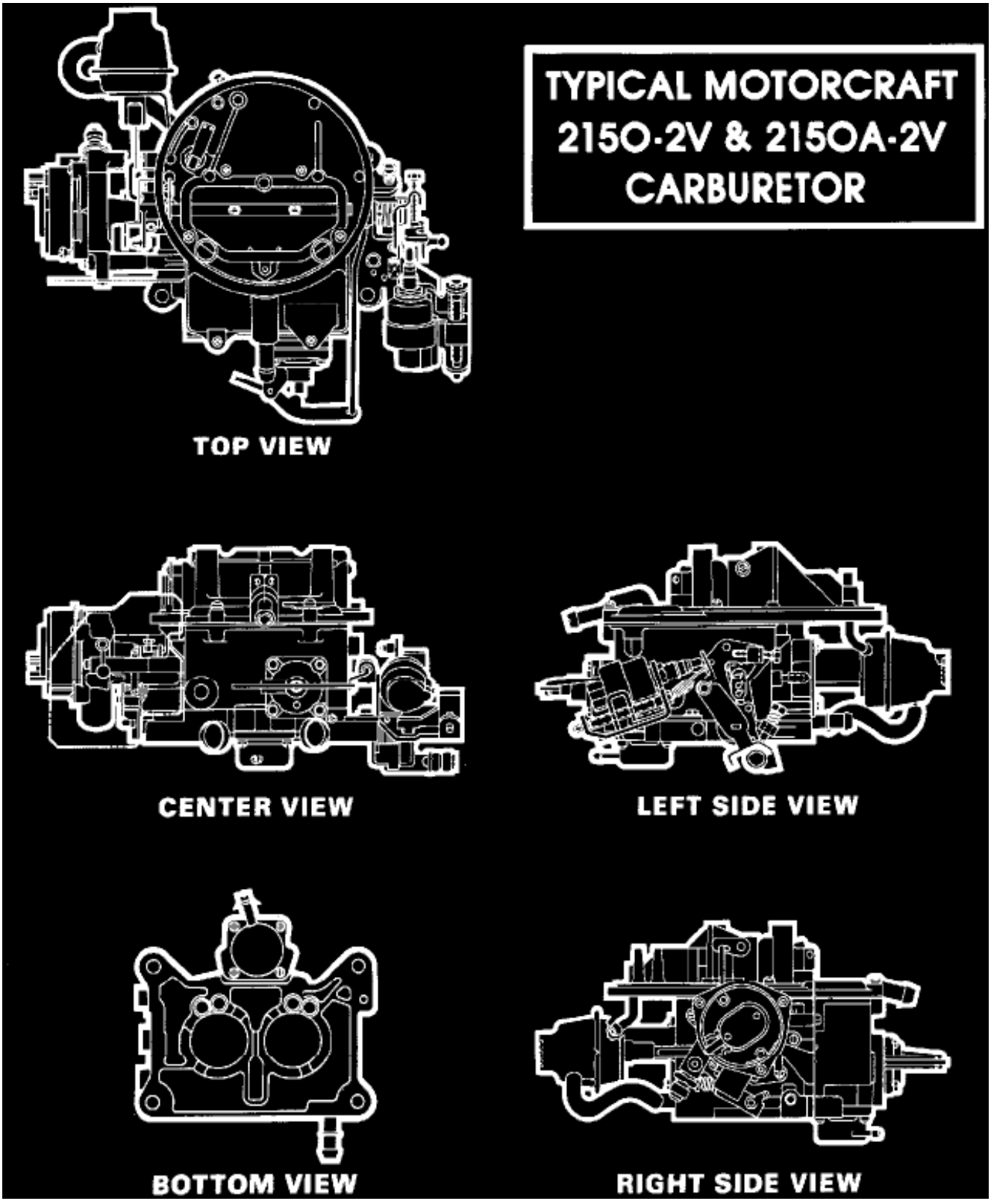
With Automatic Transmission



With Manual Transmission

- Check/adjust curb idle rpm. See: Specifications

- Place the transmission in Neutral or Park. Rev the engine momentarily. Place the transmission in specified position and recheck curb idle rpm. Readjust if required.

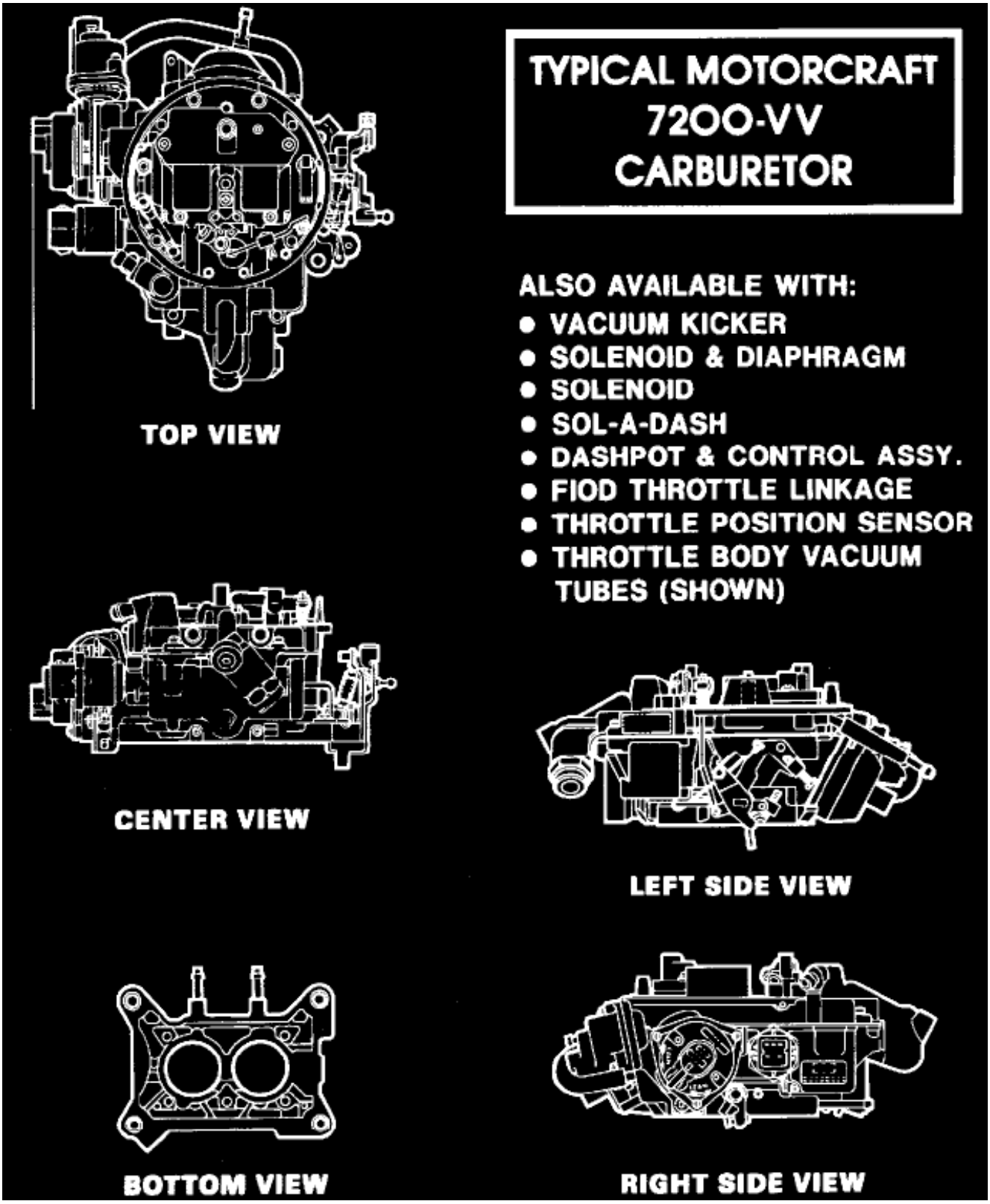


Idle Speed: Adjustments Fast Idle Speed

Identification

CARBURETOR IDENTIFICATION

2150-2V, 2150A-2V Carburetor

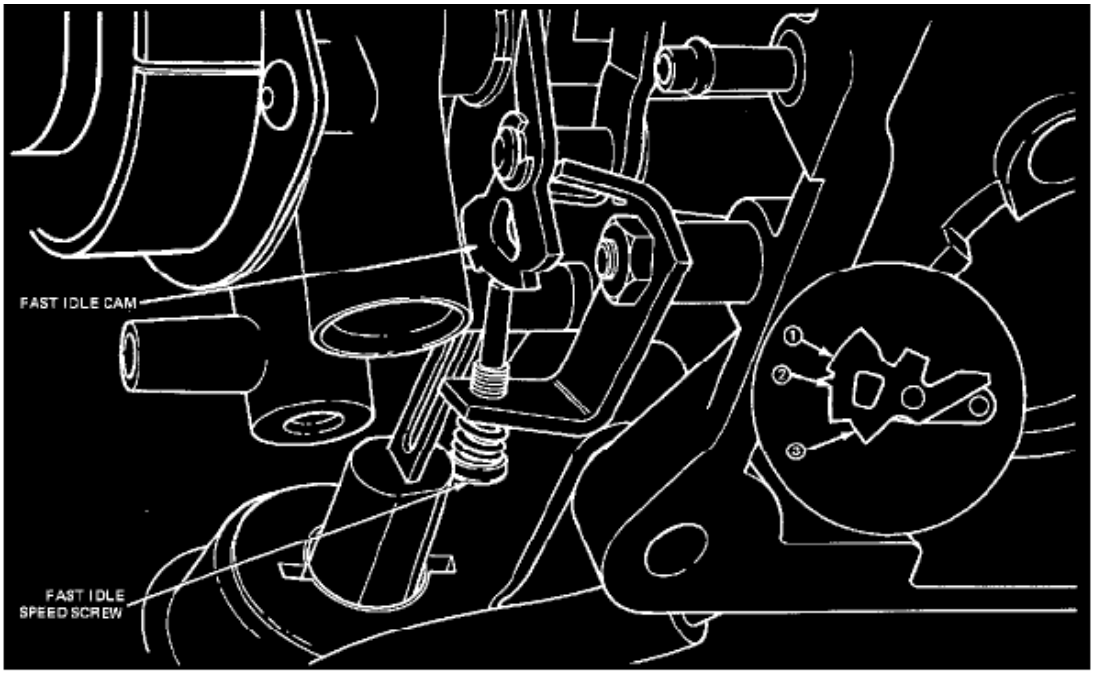


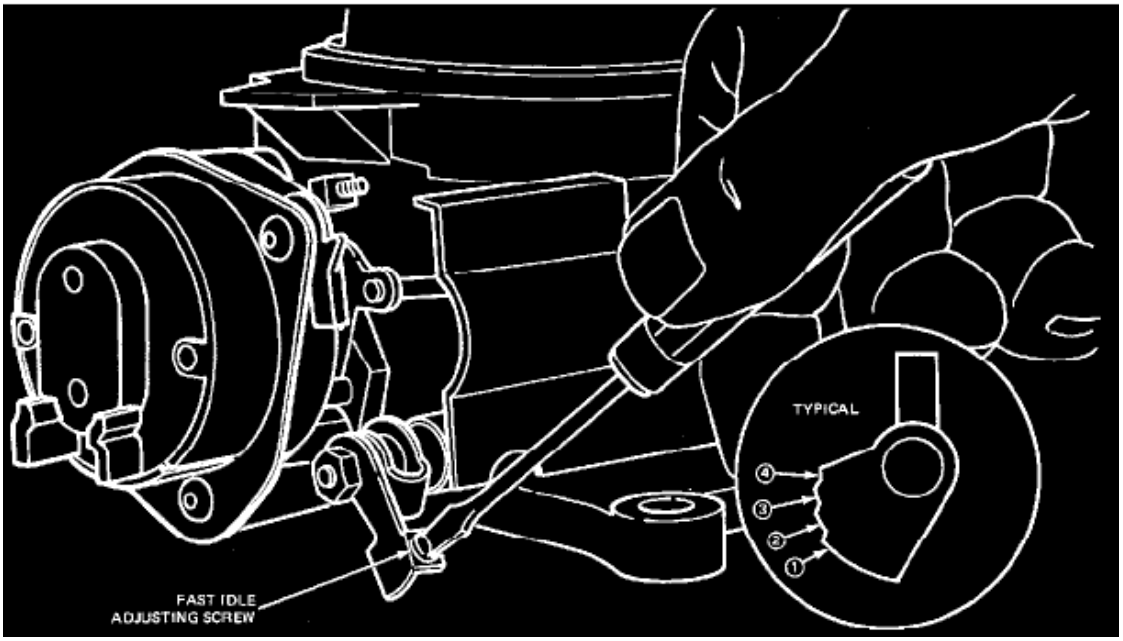
Variable Venturi, 7200-VV Carburetor

Type 2150-2V Carburetor

FAST IDLE SPEED ADJUSTMENT

- Place the transmission in Park (automatic) or Neutral (manual).
- Bring the engine to normal operating temperature.
- Disconnect the vacuum hose at the EGR valve and plug.


FAST IDLE CAM
FAST IDLE SPEED SCREW
1
2
3


TYPICAL
FAST IDLE ADJUSTING SCREW
4
3
2
1

- Place the fast idle adjustment mechanism on top step of fast idle cam. Check/adjust fast idle rpm to specification. See: Specifications

- Recheck for repeatability.

- Remove the plug from the EGR vacuum hose and reconnect.

Type 7200-VV Carburetor

FAST IDLE SPEED ADJUSTMENT

- Place the transmission in Neutral (manual) or Park (automatic).

- Bring the engine to normal operating temperature.

- Disconnect purge hose on canister side of evaporator purge solenoid. Check to ensure that purge vacuum is present (solenoid has opened, will require a 3-5 minute wait after starting engine, followed by a short time at part throttle. Reconnect purge hose.

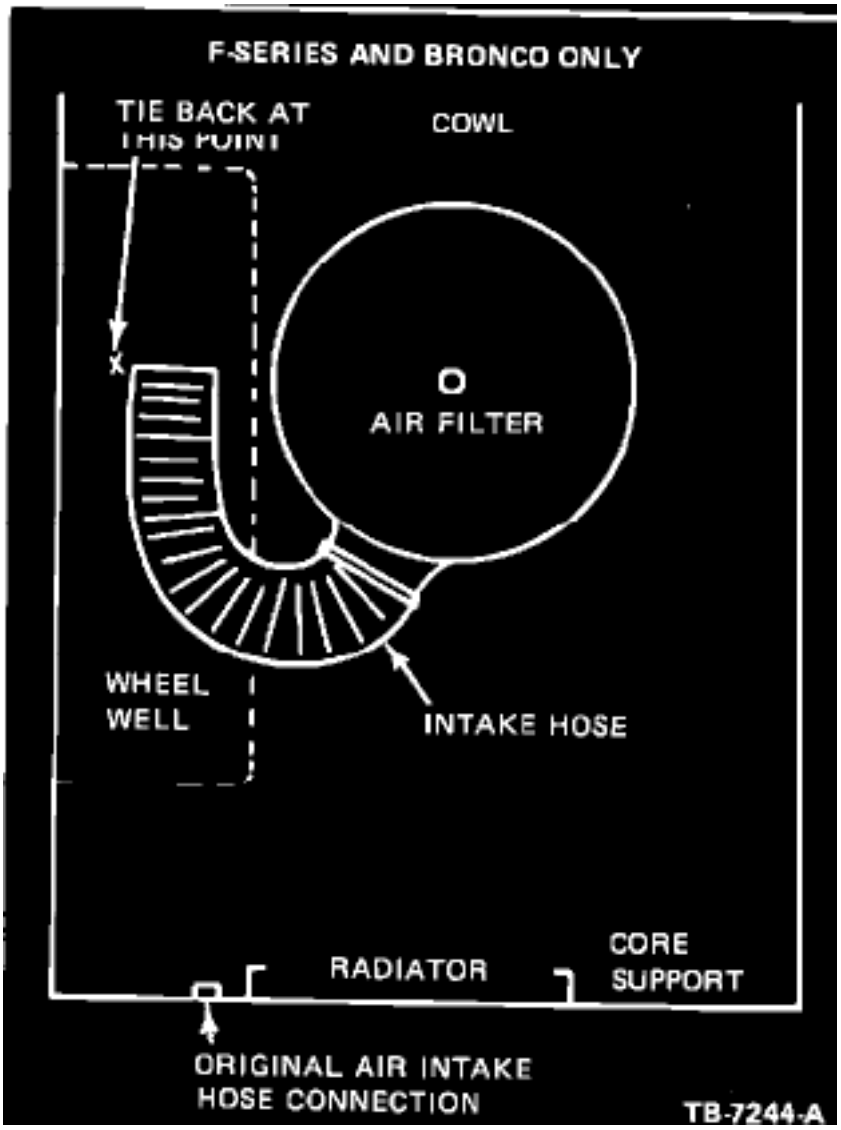
-

Disconnect the vacuum hose at the EGR valve and plug.

- Place the fast idle adjustment mechanism on the second step of the fast idle cam.

- Check/adjust fast idle rpm to specification. Recheck for repeatability. See: Specifications

- Remove the plug from the EGR vacuum hose and reconnect.



Air Cleaner Housing: Technical Service Bulletins Air Cleaner - Sealing Procedure

Article No. 83-25-21-S

AIR CLEANER SEALING - 4.9L (1982-83 F-SERIES AND BRONCO ONLY) AND ALL UNITS WITH 5.0L, 5.8L OR 7.5L ENGINES. UNITS OPERATED IN DUSTY AND/OR OFF-ROAD CONDITIONS -

ARTICLE ALSO INCLUDES SEALING OF 7200VV CARBURETOR ON UNITS SO EQUIPPED

LIGHT TRUCKS 1980-83 E, F AND BRONCO

This is a re-write of TSB 83-25-21 (December 12, 1983). The air cleaner part numbers listed in the TSB are of insufficient detail and are therefore being deleted from the TSB.

Due to the variety of different air cleaners used, part numbers have not been included in this TSB. See your normal parts listing for these part numbers.

The subject vehicles operated in dusty/off-road conditions may experience an air cleaner sealing concern which could lead to engine oil consumption or, on 7200 VV carburetor equipped vehicles, a poor running condition. The following procedure should minimize these concerns.

1. Remove the air cleaner assembly from the engine and remove any loose debris from inside the tray. Replace the air cleaner assembly (9600) on all 1983 4.9L, 5.0L, 5.8L and, 7.5L equipped light trucks except the 1983 Econoline with the 4.9L engine.

Due to the variety of different air cleaners used, part numbers have not been included in this TSB. See your normal parts listings for these part numbers.

2. Wipe the sealing surfaces clean on the tray and cover and inspect for any dents or damage that would prevent a good seal. Replace any damaged components.

3. Inspect the air cleaner to carburetor gasket for proper installation. If the gasket appears crimped or damaged, replace it with a new sticky-back gasket. Prior to replacing the gasket, clean the carburetor flange. Install the new gasket sticky side down and press all the gasket down to assure a tight bond.

Gasket parts numbers: 4.9L - C8DZ-9654-A, 5.0L/5.8L/7.5L - D8ZZ-9654-A.

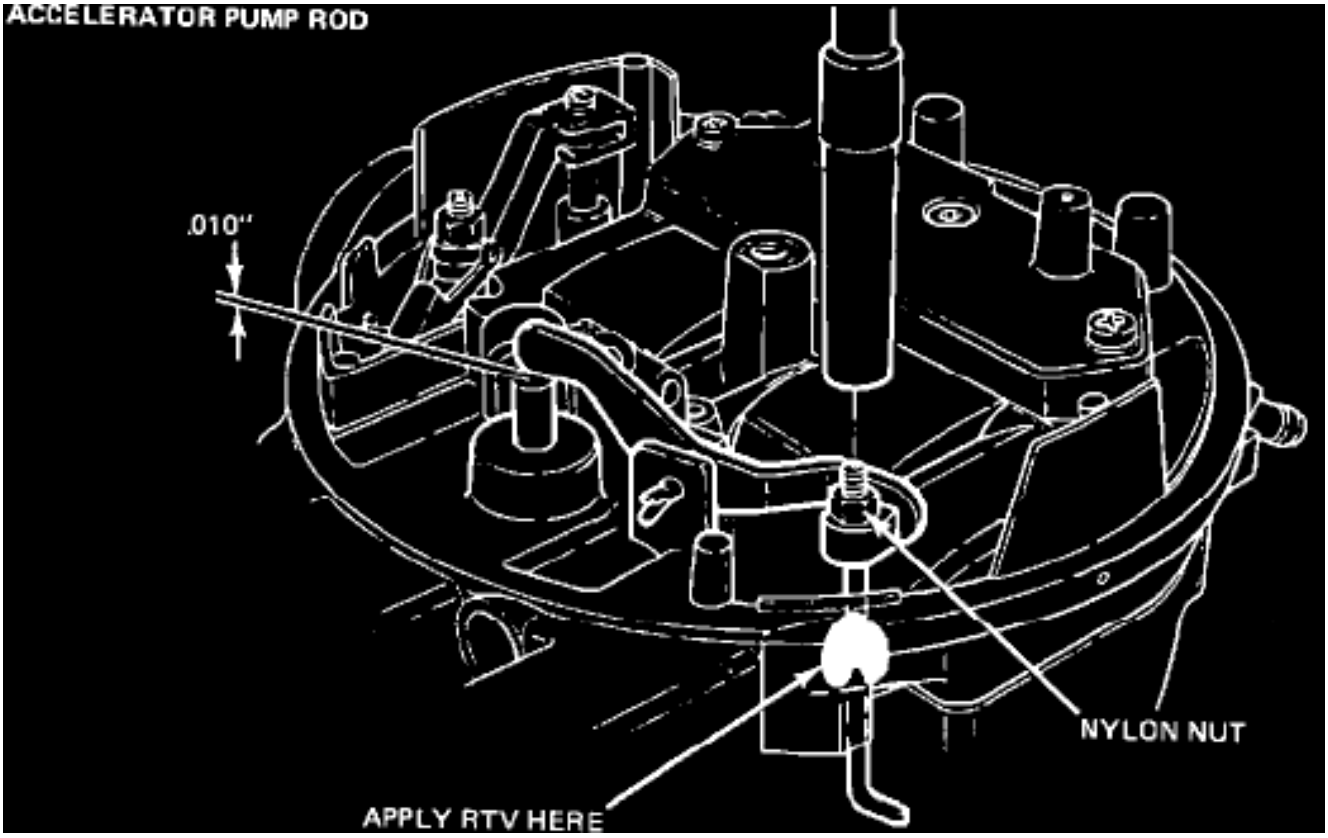
FIGURE 24

4. For F-Series and Bronco only, relocate the zip tube inlet. a) Detach the zip tube inlet from the radiator support. b) Move the inlet to the top rear of the wheel wellhousing per Figure 24. c) Secure the zip tube to the top of the housing with a nylon tie-down

strap. NOTE: At high temperatures, an octane ping may occur. If it persists, the zip tube must be reinstalled to the radiator support. 5.

Replace the PCV filter. For 4.9L, 5.0L-2V, 5.8L-2V and 7.5L-4V engines replace the PCV filter in the air cleaner with an in-line filter.

a. Remove and discard the crankcase breather cap to PCV filter hose (closure hose), PCV filter in the air cleaner, the adapter at the air cleaner and the adapter retaining clip.



b. Drill a 5/16" hole in the side wall of the air cleaner approximately 12" to the rear of the existing crankcase closure hole for 5.0L and 5.8L and approximately 6" to the rear on 7.5L. (The 4.9L does not need a new hole).

c. Install a 1/2" hose (E2AZ-6853-A) to the existing adaptor in the valve cover oil fill cap (2 pcs. 2-5/8" long for 4.9L, 18" long for 5.0L/5.8L, 12" long for 7.5L).

d. At a convenient location, cut the hose and install an in-line filter E2AZ-6A768-A for 5.0L, 5.8L and 7.5L. On the 4.9L, install the filter between the 2-5/8" long pieces installed in (c.).

NOTE: Install the filter with the wire mesh toward the oil fill cap. The mesh can be seen by looking into the end of the filter assembly.

e. Install an adapter E43Z-9E606-A in the air cleaner and attach using a retaining clip 383741-S. Center the adapter elbow in the new hole for 5.0L, 5.8L and 7.5L. Use the existing PCV filter (closure) pack hole for 4.9L.

f. Cut the PCV filter (closure) hose to proper length and attach to the adapter.

g. Plug the old hole in the tray with plug 377678-S for 5.0L, 5.8L and 7.5L only.

FIGURE 25

6. For 5.0L and 5.8L engines with a 7200 VV carburetor, clean and seal the carburetor to prevent dirt migration through the choke rod and accelerator pump rod holes (Refer to Figure 25).

a. Remove the carburetor from the vehicle.

b. Without disassembling the carburetor, thoroughly clean with Ford Automatic Choke Cleaner or equivalent, all of the choke linkage and accelerator pump linkage on the top and sides of the carburetor. Pay particular attention to the top and bottom of the upper body casting around the choke and accelerator pump rods. Allow cleaner to evaporate or blow dry with shop air.

c. Remove stepper motor, gasket, pintle and spring. Clean pintle and pintle cavity in main body casting thoroughly with Ford Automatic Choke Cleaner or equivalent. Do not re-install stepper motor at this time.

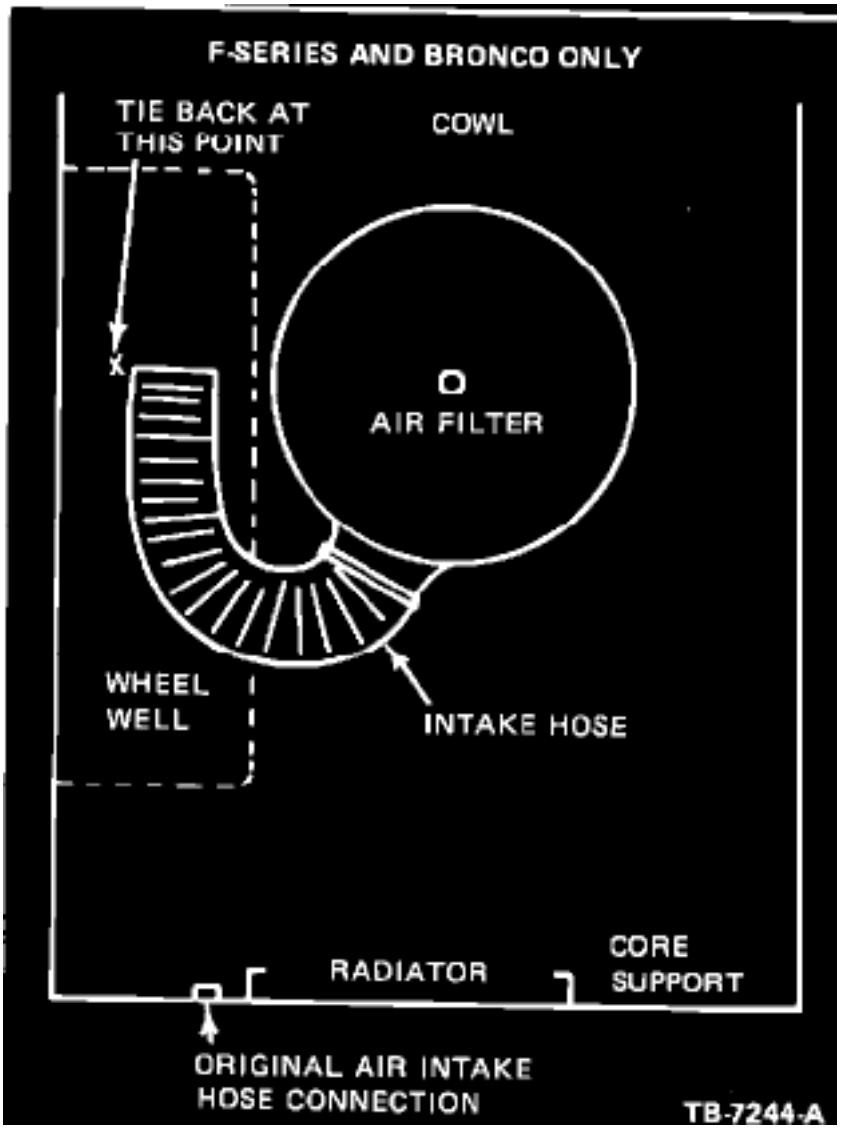


FIGURE 24

d. Hold throttle lever in the wide-open throttle position to raise the accelerator pump rod. With a toothpick, or other sharp tool, apply any commercially available silicone RTV (such as Dow Corning "Silastic") to the top side of the upper body casting around the accelerator pump rod (Figure 24). Fill the hole completely around the rods from the top side only and release the throttle lever.

e. With a rubber band, tie the throttle lever in closed-throttle position. Push fast idle cam to "off" position so that choke rod is fully raised. Fast idle cam should remain in "off" position.

f. With a toothpick, apply silicone RTV to bottom side of upper body casting around the choke shaft rod. Fill the hole completely around the rod from the bottom side only.

g. Install the spring, pintle, gasket, and stepper motor.

h. Allow carburetor to stand at room temperature for 24 hours without disturbing silicone RTV.

i. After 24-hour cure, remove rubber band from throttle lever, and open throttle to break (free) accelerator pump rod from silicone RTV. Bulk of RTV sealant should remain attached to upper body.

j. Manually exercise choke linkage to break (free) choke rod from silicone RTV. Bulk of RTV sealant should remain attached to upper body.

k. Re-install carburetor on vehicle.

7. Re-install and secure the air cleaner assembly as follows:

a. Set the air cleaner tray assembly on the carburetor and check that nothing is preventing the tray seating securely and completely sealing the flange.

b. Connect and secure the vacuum hoses.

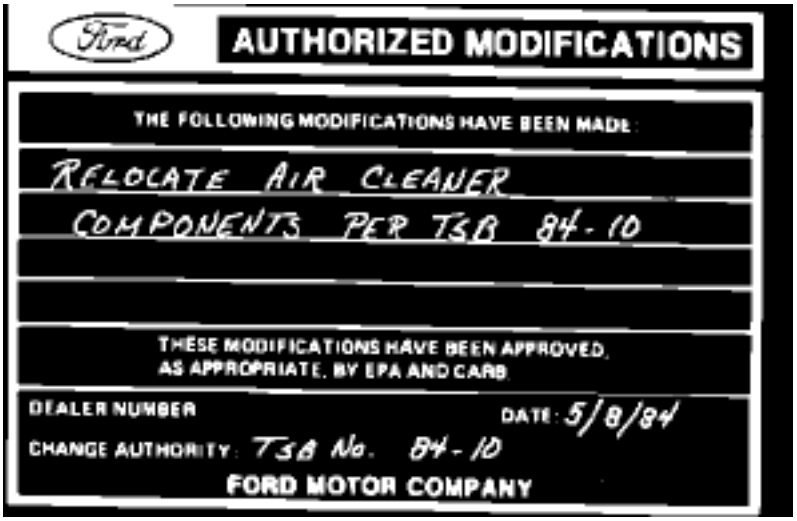
c. Install and seat a new heavy duty air cleaner element in the tray. Use E2TZ-9601-B (FA-732) for 4.9L and E0TZ-9601-A (FA-688) for 5.0L/5.8L. Use non-heavy duty element for 7.5L.

NOTE: Use of incorrect element will allow dirt to be ingested and will damage the engine.

d. Install the air cleaner cover and place the washer grommet rubber side down. Torque the wing nut hand tight (20 in.lbs.). Try to rotate the air cleaner assembly slightly. If it resists rotation, sealing to the carburetor is assured.

e. Connect the crankcase filter hose securely.

f. Install the heat riser tube. Connect the fresh air zip tube.



Obtain an Authorized Modifications decal and list the date, dealer number and summary of alterations performed. Select a prominent place adjacent to the Vehicle Emission Control Information decal suitable for installing the Authorized Modifications decal. Clean the area, install the decal and cover it with a clear plastic decal shield. PART NUMBER

PART NAME CLASS

E2AZ-6A768-A PCV Filter C

E2AZ-6853-A 1/2" PCV Hose C

E43Z-9E606-A Adapter C

E2TZ-9601-B Air Filter Element AM

E0TZ-9601-A Air Filter Element AM

C6TZ-9697-A Washer AM

D8ZZ-9654-A Gasket A

377678-S Plug BR

E3AZ-19562-A RTV Sealer A

390013-S36B Wing Nut S

C8DZ-9654-A Gasket AM

OTHER APPLICABLE ARTICLES: 83-25-21 WARRANTY STATUS: Reimbursable within the provisions of the Warranty and Policy Manual. OPERATION: SP9600C84 TIME:

6 cyl. - 0.5 Hr. 8 cyl. - 1.1 Hrs. DLR. CODING: Basic Part No. 9600 Code: 49

Fuel Filter: Technical Service Bulletins Fuel Filter - Replacement Information

Article No. 85-6-10

FUEL FILTER REPLACEMENT INFORMATION - ALL WITH FUEL FILTERS ATTACHED TO THE CARBURETOR AND/OR FUEL LINE WITH A RUBBER HOSE

FORD ALL 1985 AND PRIOR

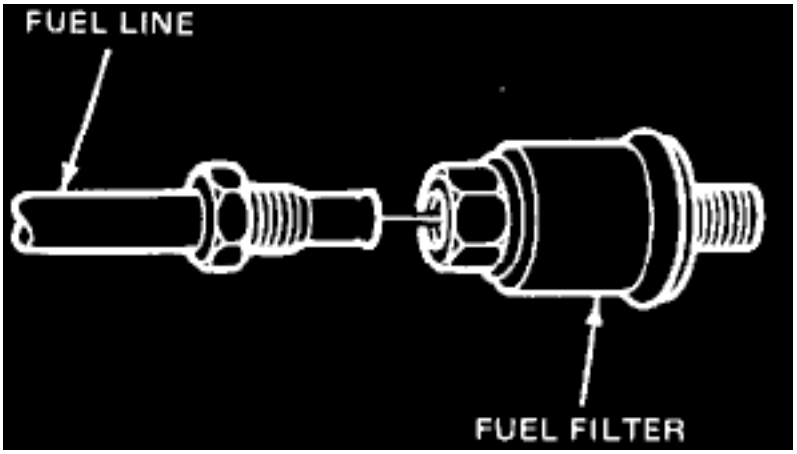
LINCOLN-MERCURY ALL 1985 AND PRIOR

LIGHT TRUCK ALL 1985 AND PRIOR

New fuel connector hoses and clamps should be used whenever a fuel filter is replaced.

Due to possible deterioration of hose materials which may result if a vehicle is fueled with gasoline containing excessive levels of methanol or ethanol, a new fuel hose and clamps should be installed when the fuel filter is changed. DO NOT REUSE OLD HOSES OR CLAMPS.

OTHER APPLICABLE ARTICLES: NONE WARRANTY STATUS: "INFORMATION ONLY"



Fuel Filter: Service and Repair Screw In Type

REMOVAL

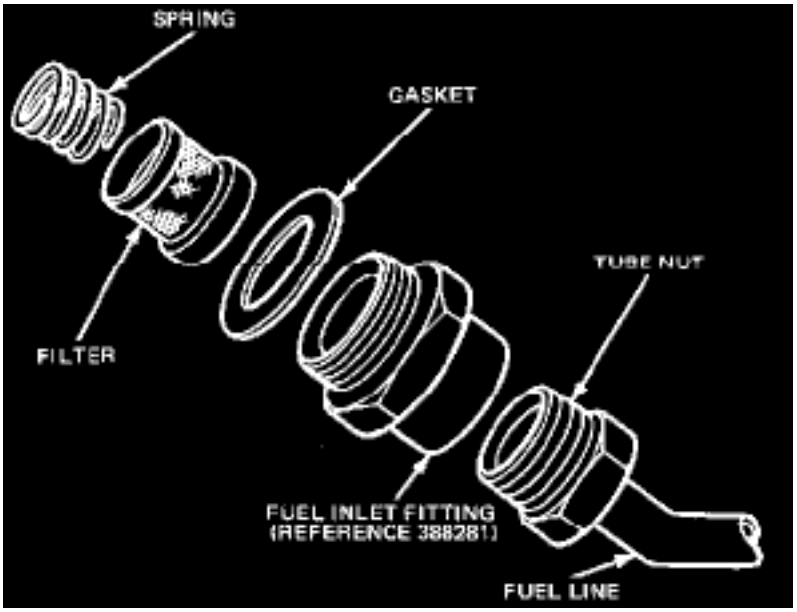
1. Remove the air cleaner assembly. 2. Loosen and remove the fuel tube from the filter. 3. Unscrew the filter from the carburetor.

INSTALLATION

1. Apply one drop of thread sealer to the external thread of a new filter. Thread the filter into the carburetor inlet port. 2. Tighten the filter to 9.0-11.0 Nm (80-100 in-lbs). 3. Apply ESE-M2C39-E or equivalent oil to the fuel supply tube nut and flare , and hand start the nut into the fuel filter inlet approximately two

threads.

4. Use an 11/16 inch wrench on the fuel filter to prevent the filter from rotating. Tighten the fuel filter to supply tube nut to 20-24 Nm (15-18 ft-lb). 5. Install air cleaner assembly. 6. Start the engine and check for fuel leaks.



Fuel Filter: Service and Repair Inlet Fitting Type

REMOVAL

- Remove the air cleaner.

- Hold the fuel filter inlet hex nut with a backup wrench and unscrew the fuel line tube nut from the fuel filter inlet.

WARNING: Use care to prevent combustion from fuel spillage.

- Unscrew the fuel inlet fitting.

-

Remove the gasket, filter and spring.

- Discard the gasket and filter.

INSTALLATION

- Install the spring, new filter and gasket.

- Hand start the fuel inlet fitting into the carburetor then, tighten to 10-24 Nm (90-125 lb-in).

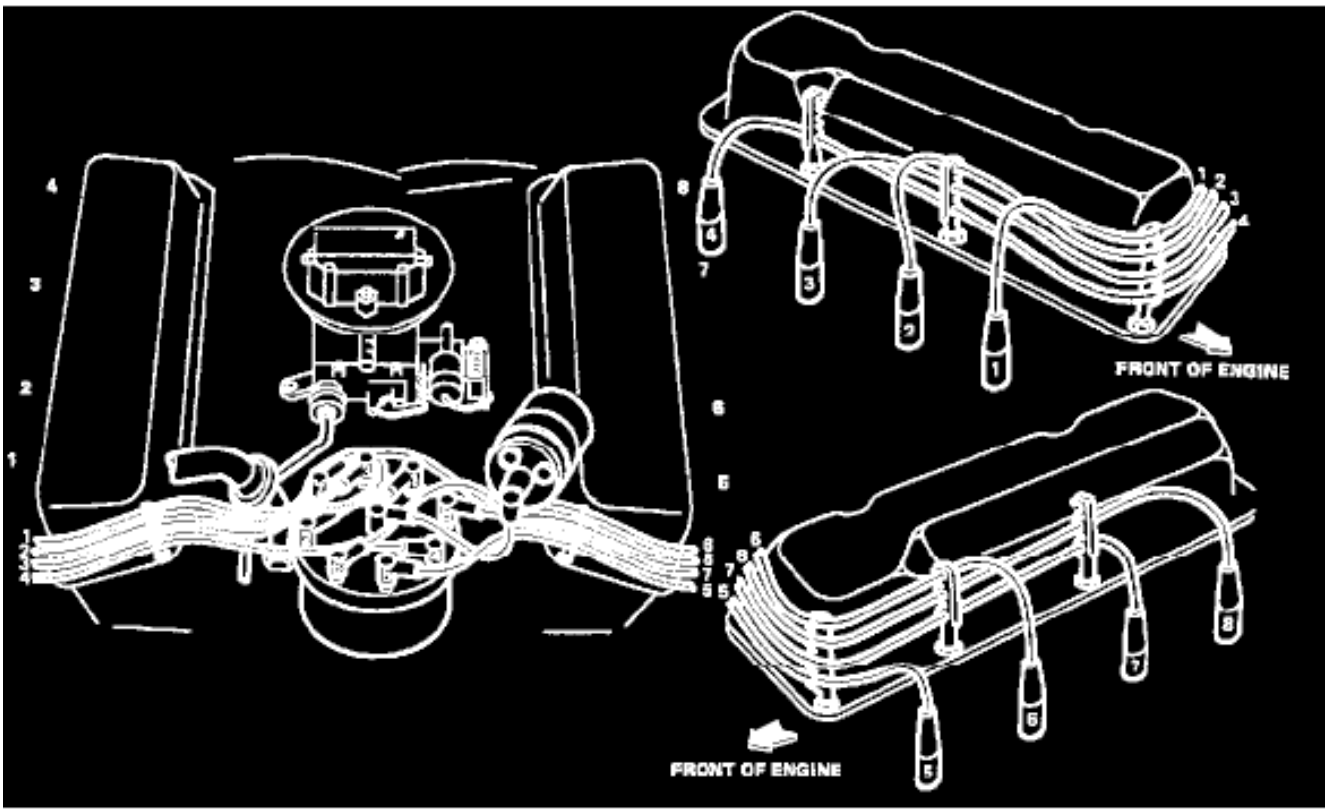
- Apply oil, ESE-M2C39-E or equivalent to the fuel tube nut threads and tube flare.

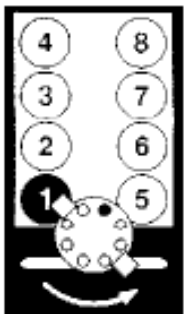
- Hand start the fuel line tube nut into the fuel inlet fitting (approximately two threads).

- Use a backup wrench on the fuel inlet fitting while tightening the fuel line tube nut to 20-24 Nm (15-18 lb-ft).

- Start the engine and check for fuel leak.

- Install the air cleaner.

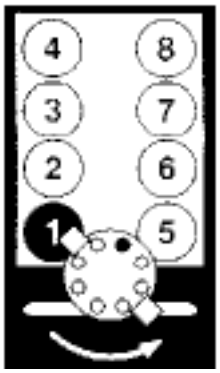




Firing Order: Specifications With EEC III

With EEC III The cylinders are numbered 1-4 on the Right side, starting with the front, and 5-8 on the left side, ending with the rear. Because of the unique dual level rotor used by the EEC-III Ignition system, the engine's firing order cannot be read off the top of

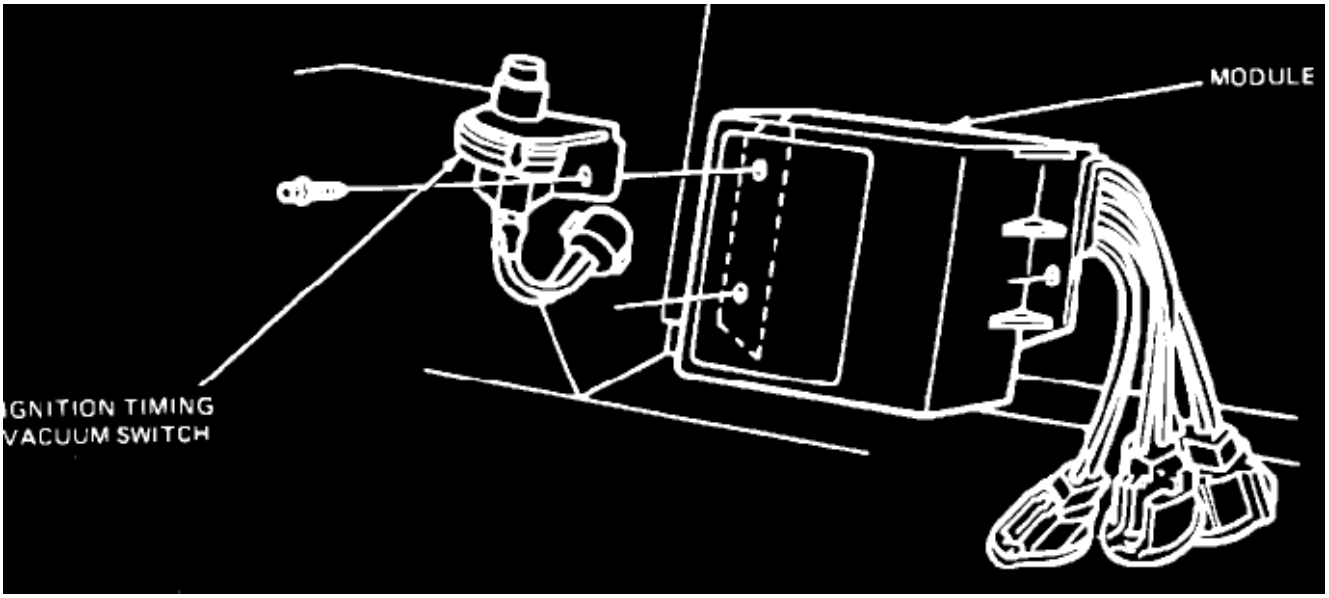
Firing Order 1-3-7-2-6-5-4-8



Firing Order: Specifications Without EEC III

Without EEC III

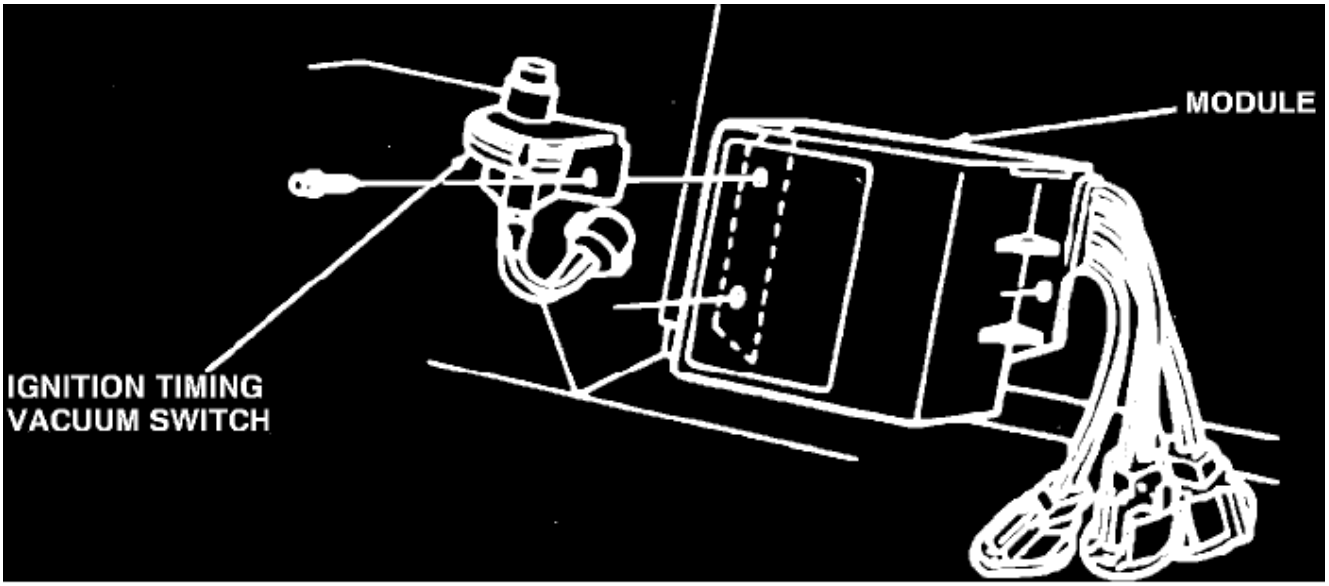
Firing Order 1-3-7-2-6-5-4-8



Ignition Timing Connector: Description and Operation

Fig. 20 Ignition Timing Vacuum Switch

Below vacuum setting, this switch, Fig. 20, used on some vehicles, is open and signals the ignition module to retard spark timing. The switch is closed above the vacuum setting and the ignition module is in the non-retard spark timing mode. Calibration resistors inside the switch control the amount of retard.



Part Number	Vacuum Setting ± 1.7 kPa (Inches Hg ± 0.5 In.)	Resistance Value (Ohms)
E1AE-12A265-BA	Less than 11.8 (3.5)	3,200 - 3,350
	Greater than 11.8 (3.5)	2,150 - 2,250
E1SE-12A265-BA	Less than 30 (9)	3,250 - 3,370
	Greater than 30 (9)	2,150 - 2,250
E1TE-12A265-CA	Less than 10 (3)	2,800 - 2,870
	Greater than 10 (3)	2,150 - 2,250
E25E-12A265-AA	Less than 13.5 (4)	2,800 - 2,870
	Greater than 13.5 (4)	2,150 - 2,250

Ignition Timing Connector: Testing and Inspection

Ignition Timing Vacuum Switch

Ignition Timing Vacuum Switch Test Chart

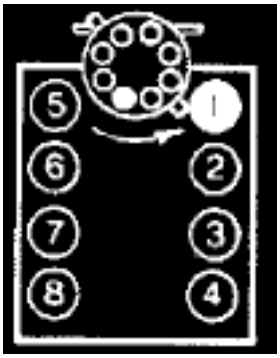
1. Disconnect switch from ignition module.

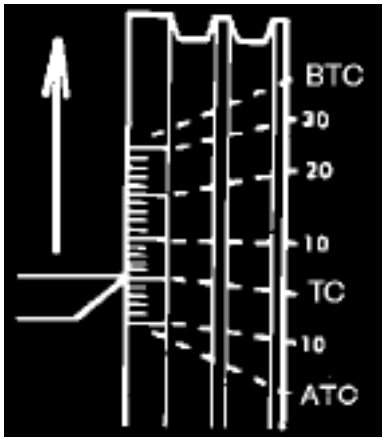
2. Connect suitable ohmmeter across switch terminals and compare resistance measured to ``less than'' values in the Ignition Timing vacuum Switch Test chart.

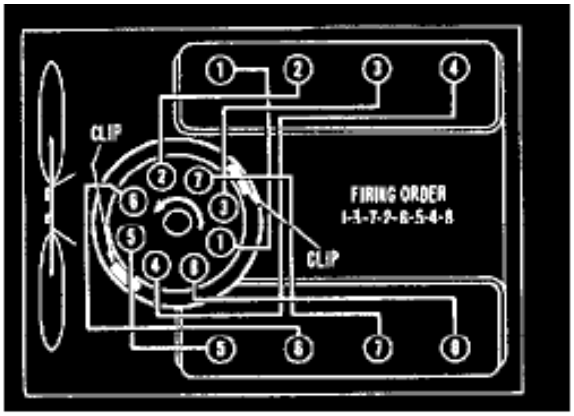
3. Apply vacuum to switch, using an outside vacuum source. Compare resistance now measured across switch terminals to ``greater than'' values in the Ignition Timing vacuum Switch Test chart.

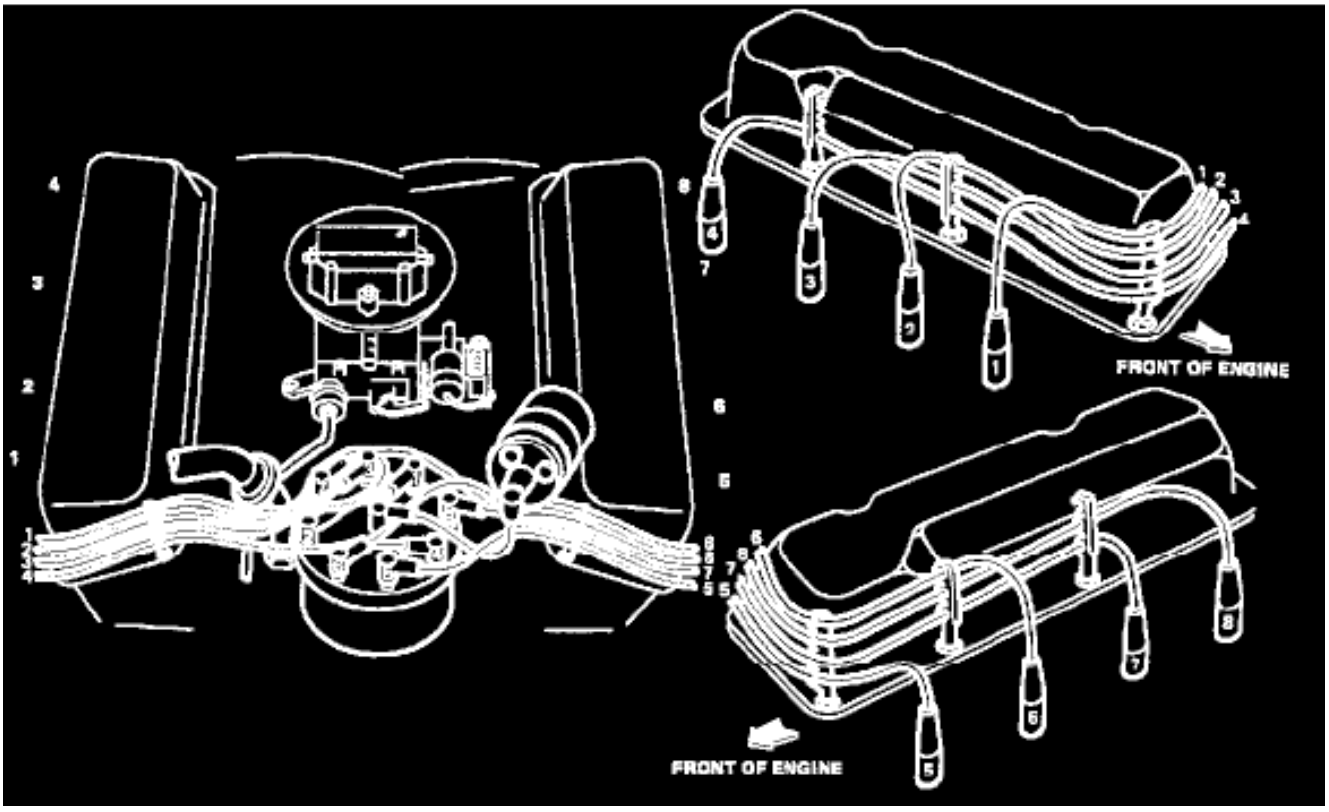
4. Replace switch if resistance is not within specifications.


5
1
6
2
7
3
8
4


5
1
6
2
7
3
8
4


BTC
30
20
10
TC
10
ATC

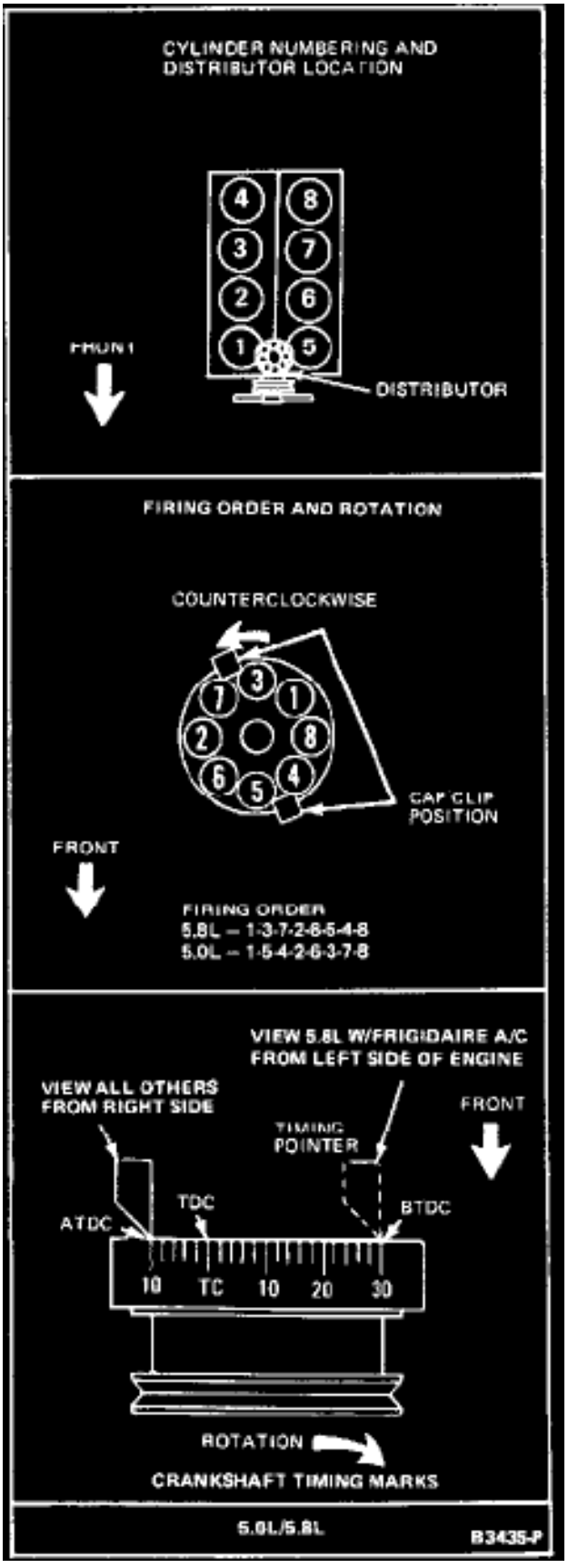




Ignition Cable: Diagrams

Spark Plug Wire Routing

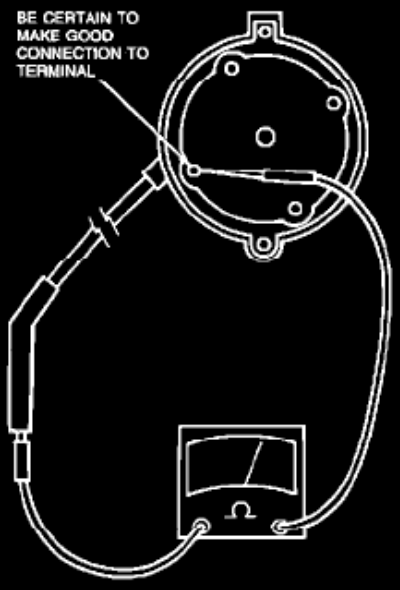
Ford F 250 5.8L Firing Order


CYLINDER NUMBERING AND DISTRIBUTOR LOCATION
4
8
3
7
2
6
1
5
FRONT
DISTRIBUTOR
FIRING ORDER AND ROTATION
COUNTERCLOCKWISE
7
3
1
2
8
6
5
4
CAP CLIP POSITION
FRONT
FIRING ORDER
5.8L – 1-3-7-2-6-5-4-8
5.0L – 1-5-4-2-6-3-7-8
VIEW 5.8L W/FRIGIDAIRE A/C FROM LEFT SIDE OF ENGINE
VIEW ALL OTHERS FROM RIGHT SIDE
FRONT
TIMING POINTER
TDC
ATDC
BTDC
10
TC
10
20
30
ROTATION
CRANKSHAFT TIMING MARKS
5.0L/5.8L
B3435-P

Spark Plug Wire Resistance

Test 3

TEST STEP	RESULT	ACTION TO TAKE
1. Remove distributor cap from distributor. 2. Check for spark plug wires firmly seated on cap. 3. Disconnect spark plug end of suspect wire(s). 4. Measure resistance from terminal in cap to spark plug terminal. 5. Reinstall distributor cap and connect spark plug wire to spark plug. CAUTION **Do not, under any circumstances, puncture a spark plug wire when measuring resistance. Measure only as instructed.** 6. **Was resistance less than 7,000 ohms per foot?**	Yes ▶	Spark plug wire resistance OK.
	No ▶	REPLACE spark plug wire(s).



Ignition Cable: Testing and Inspection

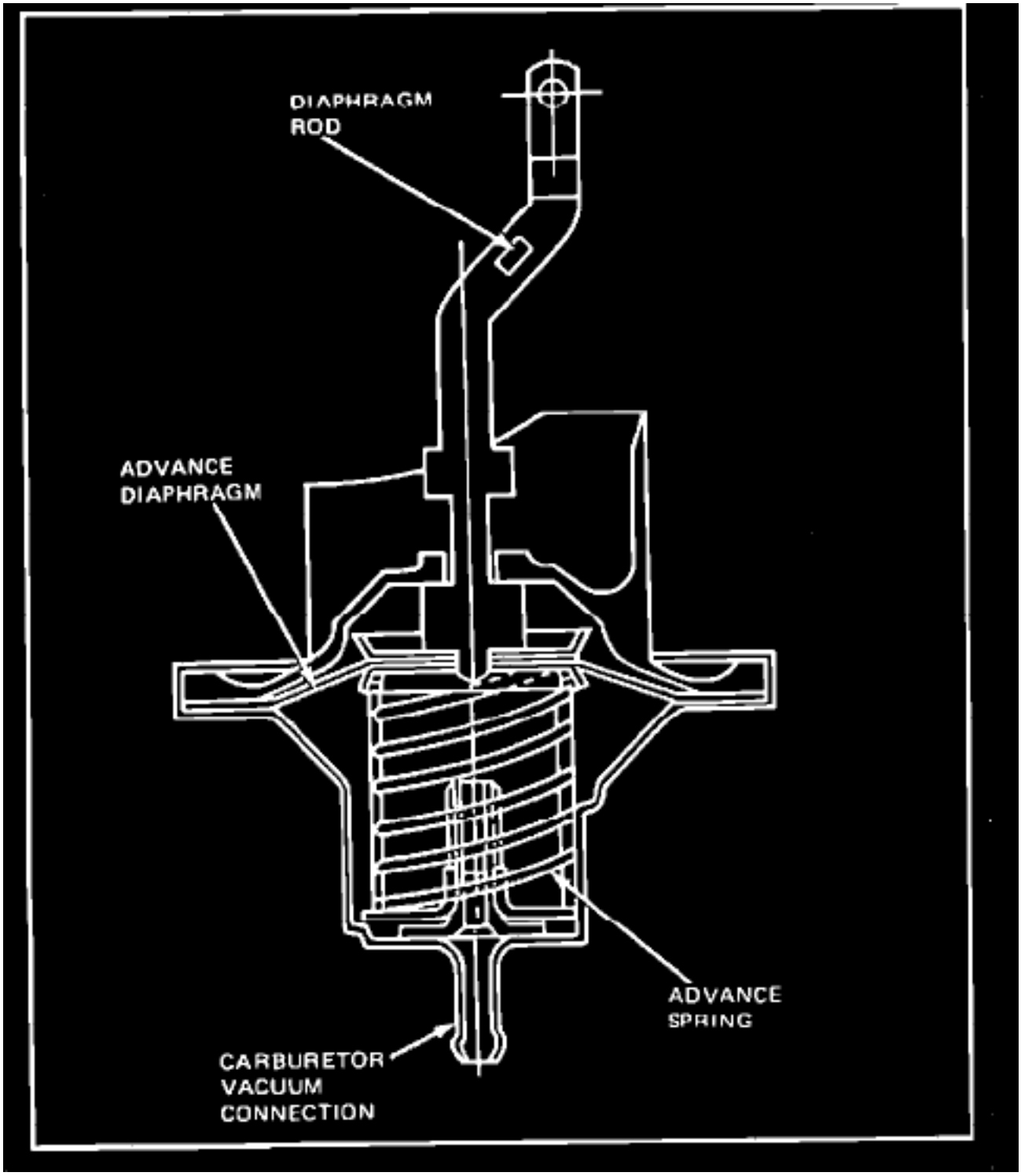
Spark Plug Wire Resistance

*** UPDATED BY TSB #85-9-33

Engine degrees at engine rpm, no load, in addition to basic timing setting.
Mechanical advance distributors only.

Engine	Trans-mission	Year	Distributor Number	Degrees @ 2500 RPM	
				Total	Centrifugal
351M	MT & AT	1981	D7TE-AHA	11.5-20.6	2.0-6.1
5.8L (351)M	MT & AT	1981	E0UE-CA	36.8-46.4	11.3-15.9
5.8L (351)M	MT & AT	1981	E1TE-EA	35.2-44.5	9.7-14.0
351 Windsor	MT & AT	1981-82	D7TE-ABA	9.4-19.5	0-5
351 Windsor	AT	1981-82	D7UE-JA	7.5-12.8	2.0-6.3
351 Windsor	MT	1981-83	D7UE-LA	14.5-23.7	5.0-9.2
5.8L (351)W	AT	1981	D1UE-EA	25.5-36.0	0-5.5
5.8L (351)W	AT	1981-82	D1UE-FA	27.4-37.7	1.9-7.2
5.8L (351)W	AT	1981-82	D1UE-GA	25.5-35.9	0-5.4
5.8L (351)W	MT	1982-83	E2TE-KA	12.7-22.1	7.2-11.6
5.8L (351)W	MT	1982-83	E2TE-SA	8.7-18.0	3.2-7.5
5.8L (351) 2V	MT & AT	1983-84	D7UE-LA	14.5-23.7	5.0-9.2
5.8L (351) 2V	MT & AT	1982-86	E2TE-UA	9.9-21.0	4.4-9.5
5.8L (351) 4V	AT	1984-86	E4TE-EA	27.8-37.0	10.3-14.5
5.8L (351) 4V	MT	1985-86	E5TE-NA	22.1-31.9	4.6-9.4
5.8L (351) 4V	AT	1985-86	E5TE-MA	20.7-30.5	3.2-8
5.8L (351) 4V	MT & AT	1985-87	E5TE-RA	23.0-32.5	9.5-14.0

DISTRIBUTOR TIMING ADVANCE

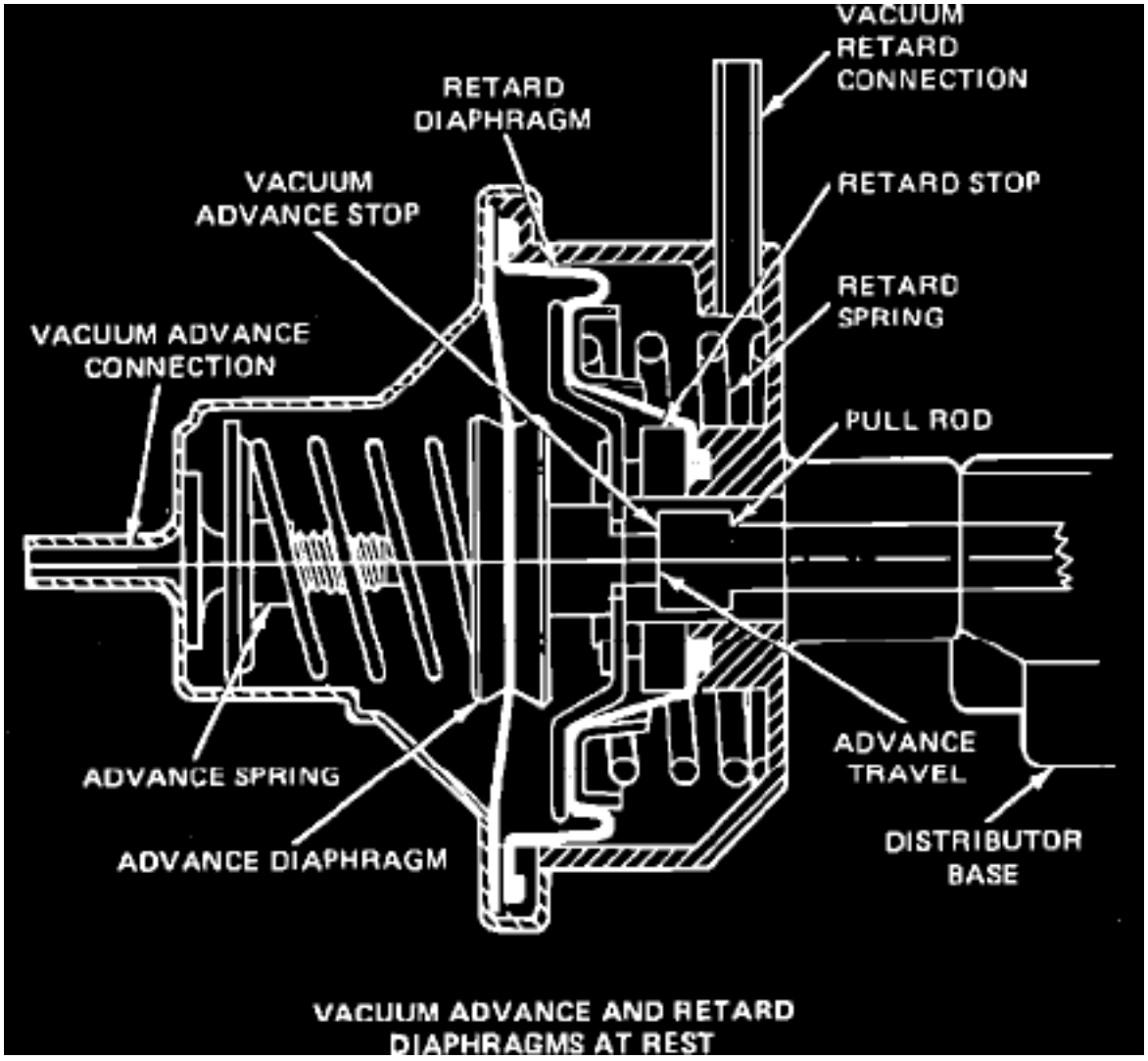


Distributor Advance Unit: Description and Operation Vacuum Spark Advance Mechanism

The vacuum spark control mechanism can provide spark advance if a single diaphragm assembly is used or spark advance and retard if a dual diaphragm assembly is used. The diaphragm assembly used depends on the engine calibration.

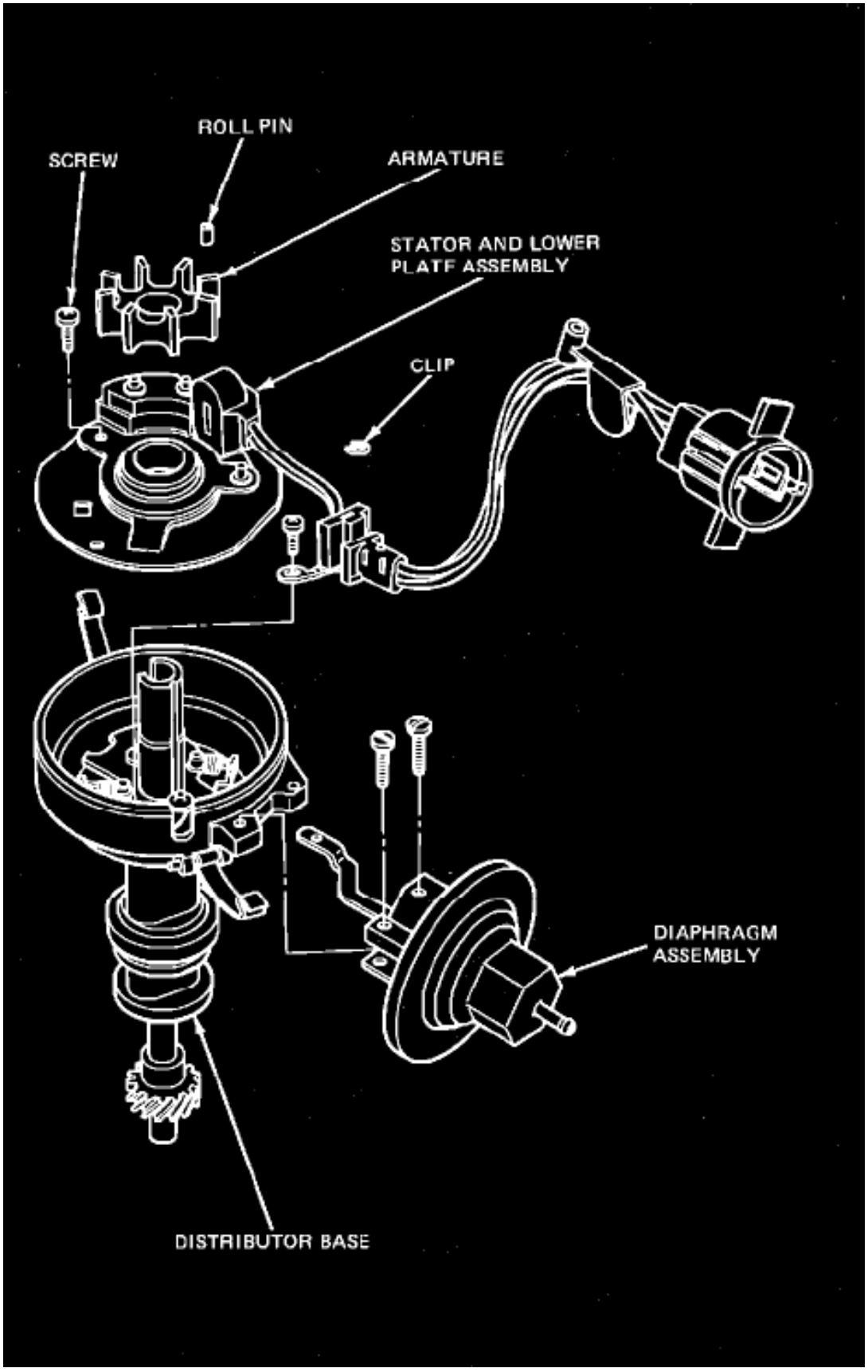
Single Diaphragm Assembly

SINGLE DIAPHRAGM ASSEMBLY The single diaphragm assembly, Fig. 11, also changes the armature to stator relationship to give spark advance. The stator assembly position is changed by means of vacuum being applied to the diaphragm assembly. Vacuum applied to the diaphragm assembly causes the diaphragm and attached diaphragm rod to move, compressing the advance spring, which controls the rate of advance. The movement of the diaphragm rod, which is attached to the stator assembly, makes the the stator assembly move with respect to the armature. This changes the initial armature to stator relationship set during initial timing, causing spark advance. The stator assembly is mounted on the lower plate assembly which with the diaphragm assembly, is attached to the distributor base.



Dual Diaphragm Assembly

DUAL DIAPHRAGM ASSEMBLY The dual diaphragm assembly, Fig. 12, obtains spark advance in the same manner as the single diaphragm assembly. In this case vacuum applied to the vacuum advance port causes the advance diaphragm and attached rod to move, otherwise the action is the same. Spark retard is done by applying vacuum to the vacuum retard port. This causes the retard diaphragm to move, compressing the retard spring, which controls the rate of spark retard. Compressing the retard spring allows the diaphragm rod stop to move due to the force applied by the advance spring pushing against it by means of the diaphragm rod. The result is the diaphragm rod moves causing the attached stator assembly to change position with respect to the armature. In this instance the direction of the stator assembly movement is opposite that occurring during vacuum advance, resulting in spark retard. NOTE: Any vacuum applied to the advance port overrides any spark retard caused by vacuum being applied to the retard port.


ROLL PIN
SCREW
ARMATURE
STATOR AND LOWER PLATF ASSEMBLY
CLIP
DIAPHRAGM ASSEMBLY
DISTRIBUTOR BASE

Distributor Advance Unit: Description and Operation Centrifugal Spark Advance Mechanism

Distributor - Exploded view

The centrifugal advance mechanism varies the relationship of the armature to the stator assembly. The armature is mounted to the sleeve and plate assembly which rotates in relation to the distributor shaft. The rotation is a result of the centrifugal weights moving in response to engine RPM. The movement of the weights change the initial relationship of the armature to the stator assembly by rotating the sleeve and plate assembly ahead of its static position on the distributor shaft Fig. 1. This produces spark advance. The rate of movement of the weights is controlled by calibrated springs.

Distributor Advance Unit: Service and Repair

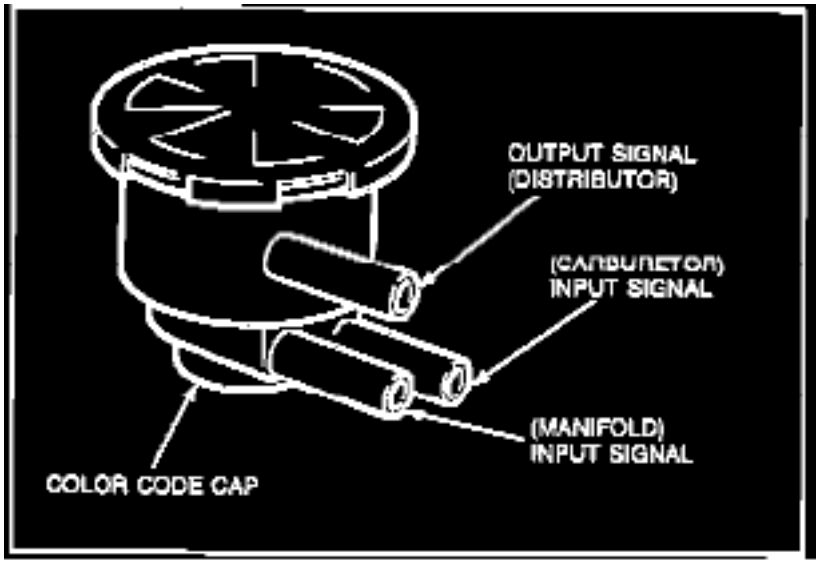
1. Remove distributor cap and rotor.

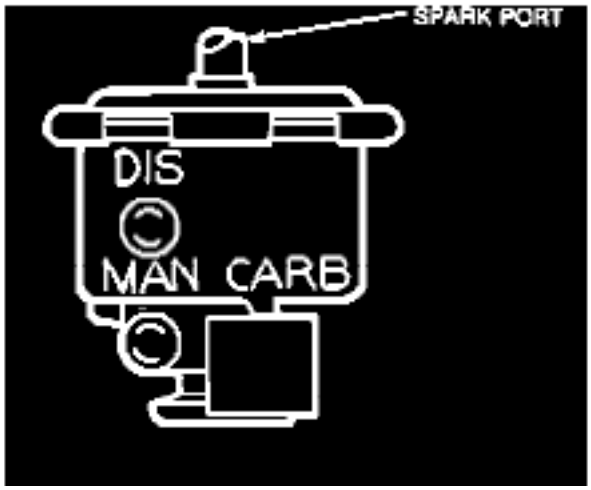
2. Disconnect vacuum lines, then remove snap ring that secures vacuum advance link to pickup assembly.

3. Remove vacuum advance attaching screws, then tilt unit downward to disconnect link.

4. Carefully remove unit from distributor.

5. Reverse procedure to install.





Distributor Vacuum Control: Description and Operation

3-Port Vacuum Regulator

Vacuum Regulator (3 & 4 Port)

Three port, Fig. 27, regulators and four port, Fig. 28, regulators are used to control the vacuum advance to the distributor. During engine idle conditions, the manifold vacuum signal is reduced to a constant output signal. Off idle, the output signal equals the spark port.

Distributor Vacuum Control: Testing and Inspection Distributor Modulator Valve Assembly

1. Turn ignition key to ``ON'' and check resistance at solenoid terminals.

2. If solenoid resistance is not 51---108 ohms, replace solenoid.

Distributor Vacuum Control: Testing and Inspection Vacuum Regulator

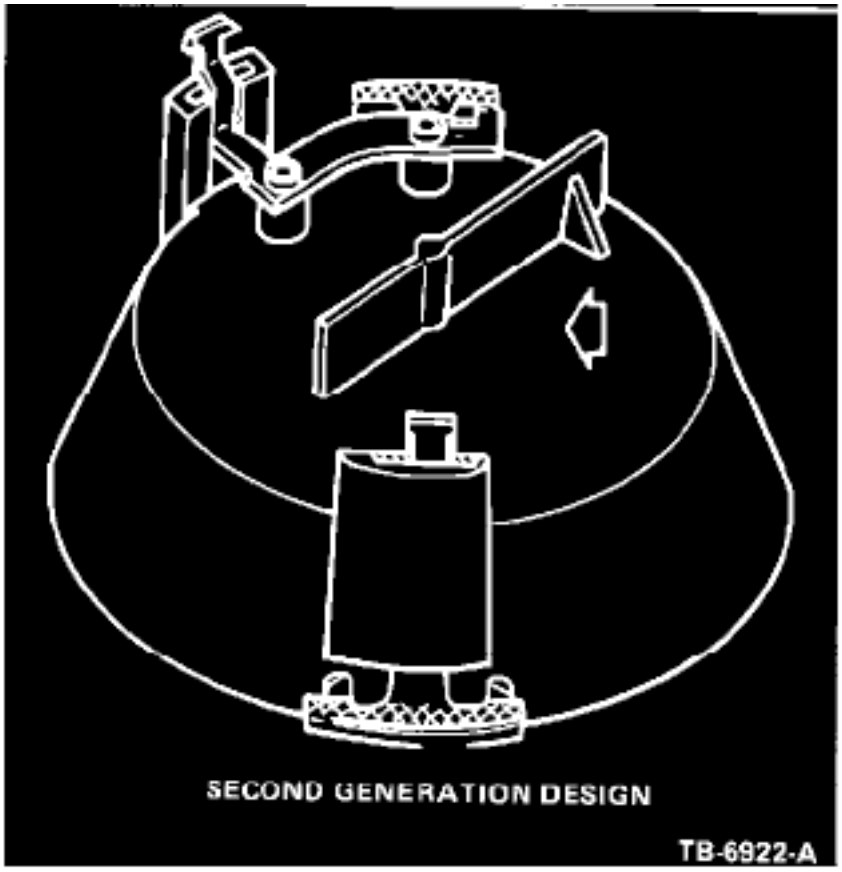
Procedure

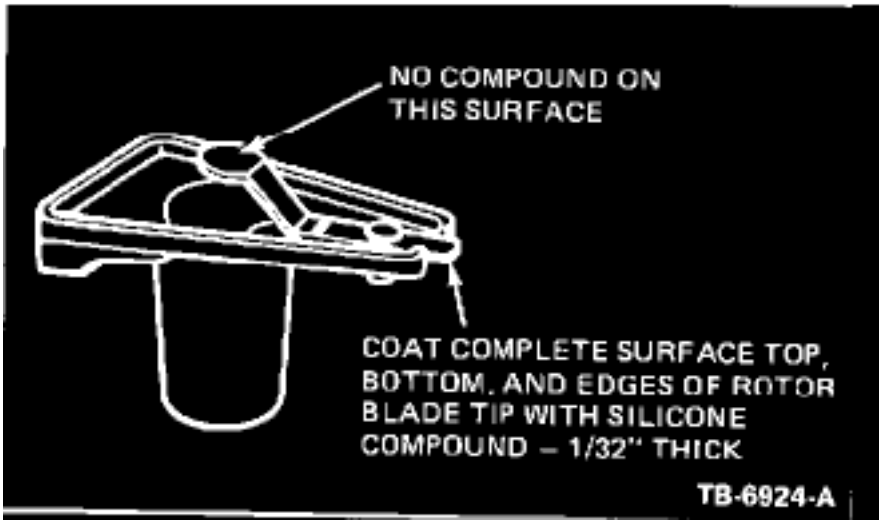
1. Disconnect vacuum line from distributor port and connect a vacuum gauge.

2. With engine at idle, the vacuum gauge reading should be within 1 inch Hg. vacuum of the calibration point. The calibration point of each valve can

be identified according to color code as follows: Black, 6 inches Hg.; green, 7 inches Hg.; red, 8 inches Hg.

3. Replace valve if not within specifications.





Ignition Rotor: Technical Service Bulletins Ignition Rotor - Alignment Procedure

Article No. 83-8-14

EEC III/DISTRIBUTOR - PROCEDURE FOR SETTING ROTOR ALIGNMENT 5.0L/5.8L EEC EQUIPPED LIGHT TRUCKS

LIGHT TRUCKS 1981/83 BRONCO, F-SERIES AND ECONOLINE

The following information and procedures are issued to clarify the proper setting of distributor rotor alignment on the subject vehicles. This reference publication supersedes all other printed material on subject.

FIGURE 12

FIGURE 13

For 1981 through 1983 model year vehicles, EEC distributors used on the EEC Systems had the "second generation" rotor (Figure 12). The 1983 model 5.0L EEC equipped Light Truck employs a conventional rotor (Figure 13). PROCEDURE FOR ROTOR ALIGNMENT:

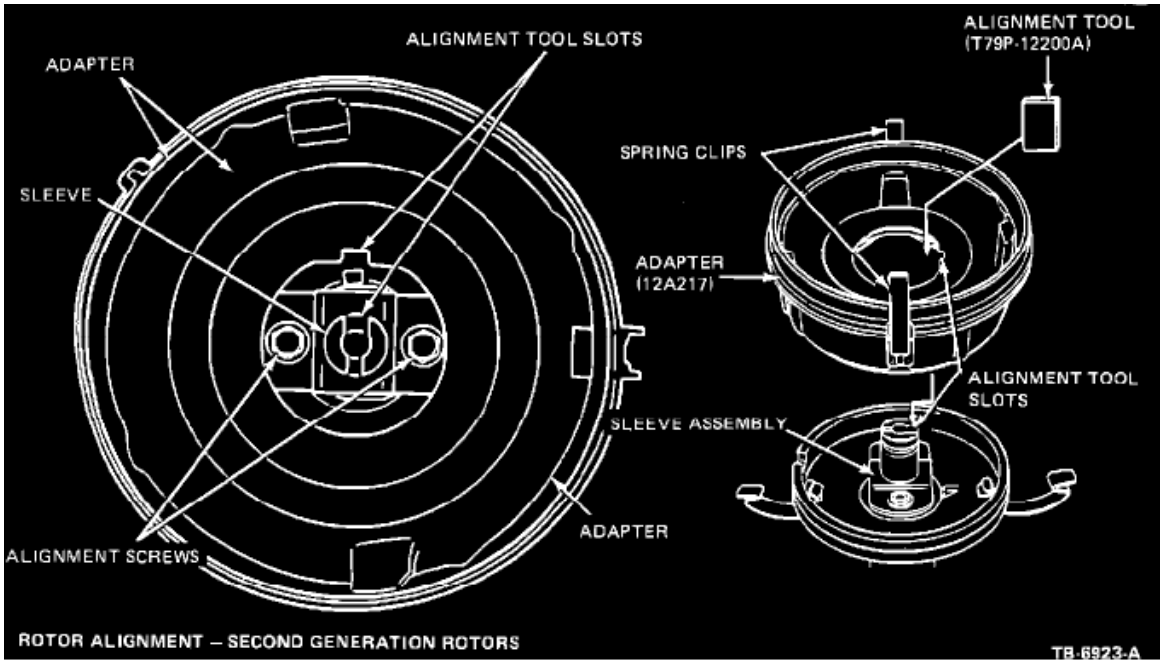
1. Remove the distributor cap and wires and position them to one side.

2. Remove the rotor.

3. To check rotor alignment:

a. Rotate the engine until the No. 1 piston is on the compression stroke. NOTE: Verification of being on the compression stroke is essential to correct rotor alignment. If the piston is on the exhaust stroke, the rotor can be misaligned by 180~.

b. Slowly rotate the engine until the alignment tool can be installed.


ALIGNMENT TOOL SLOTS
ALIGNMENT TOOL (T79P-12200A)
ADAPTER
SLEEVE
SPRING CLIPS
ADAPTER (12A217)
ALIGNMENT TOOL SLOTS
SLEEVE ASSEMBLY
ADAPTER
ALIGNMENT SCREWS
ROTOR ALIGNMENT – SECOND GENERATION ROTORS
TB-6923-A

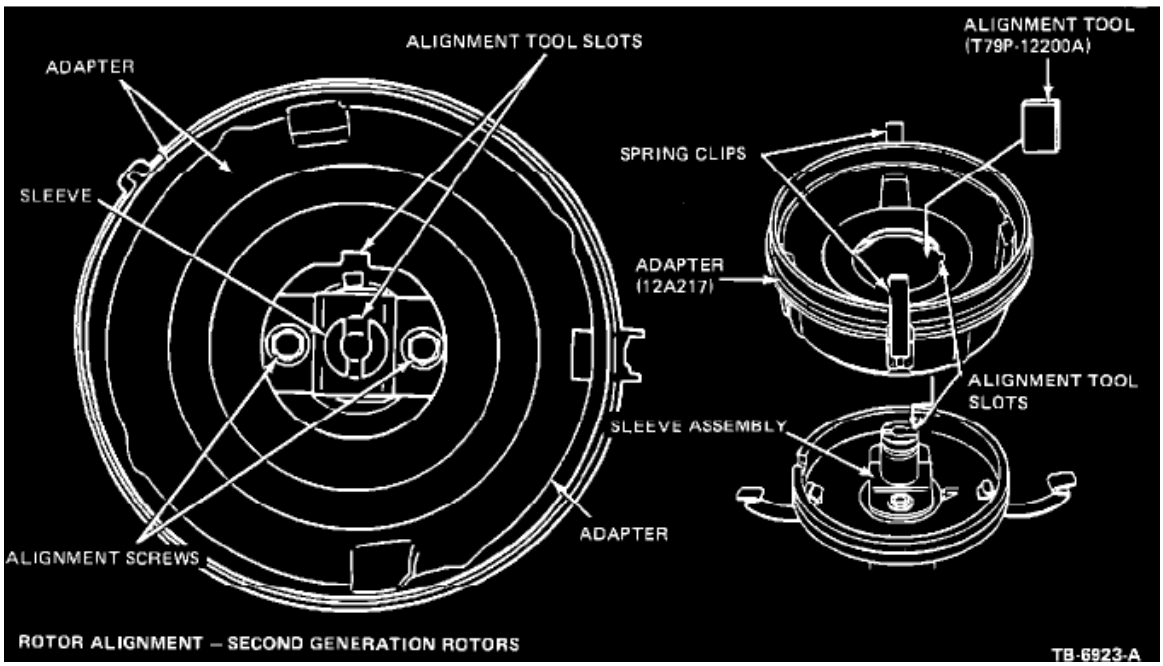

ALIGNMENT TOOL SLOTS
ALIGNMENT TOOL (T79P-12200A)
ADAPTER
SLEEVE
SPRING CLIPS
ADAPTER (12A217)
ALIGNMENT TOOL SLOTS
SLEEVE ASSEMBLY
ADAPTER
ALIGNMENT SCREWS
ROTOR ALIGNMENT – SECOND GENERATION ROTORS
TB-6923-A

FIGURE 14

c. The T79P-12200-A tool mounts between the slot on the sleeve and the slot (cut out) on the adapter (Figure 14).

d. Read the timing mark on the damper indicated by the timing pointer.

e. If the timing mark is specification, TDC +/- 4~, the rotor alignment is satisfactory. The alignment tool can be removed.

TO ADJUST ROTOR ALIGNMENT:

1. Remove the distributor cap by loosening the two spring clips holding the cap of the distributor adapter. Remove rotor.

2. Rotate engine until No. 1 piston is on the compression stroke. (See Step 3a above).

3. Slowly rotate the engine until the timing pointer is aligned with the specified timing mark. (TDC +/- 4~).

4. Loosen the two sleeve assembly adjustment screws and rotate the sleeve until the alignment tool T79P-

FIGURE 14

12200-A fits into the alignment slots on the sleeve and the adapter (Figure 14). 5.

Tighten the adjustment screw to 2.8-3.9 N-m (25-30 lb.in.). Remove alignment tool.

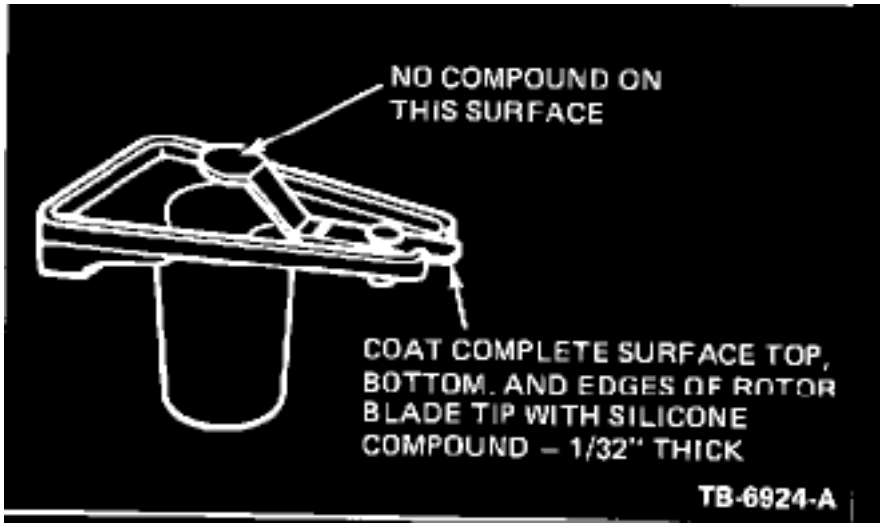


FIGURE 13

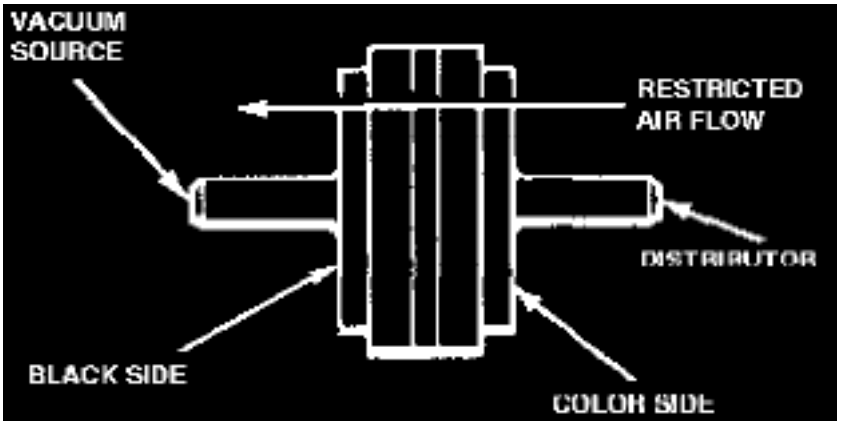
6. If the vehicle is a 1983 model equipped with a 5.0L engine, coat the rotor with silicone grease as shown in Figure 13.

7. Reinstall distributor cap and rotor making sure wires are firmly seated in the distributor cap terminal housings and on the spark plugs.

OTHER APPLICABLE ARTICLES: None WARRANTY STATUS: "INFORMATION ONLY"

Distributor Plate W/ Pick-up Sensor: Service and Repair

1. Remove distributor cap and rotor.
2. Remove vacuum advance unit and magnetic pickup assembly.
3. Remove attaching screws and lift base plate from distributor.
4. Reverse procedure to install.



Vacuum Spark Delay Valve: Description and Operation

Fig.25 - Spark Delay Valve

This unit is used in conjunction with some of the other Ford systems. Its purpose is to further reduce emissions by delaying the spark advance during rapid acceleration and by cutting off advance immediately upon deceleration. Fig. 25.

This plastic disc-shaped valve is installed in the carburetor vacuum line at the distributor advance diaphragm. It is a one way valve and will not operate if installed backwards. The black side of the valve must be toward the carburetor. This valve cannot be repaired.

NOTE: On all systems which employ the dual diaphragm distributor the line which has high vacuum at idle (normal operating temperature) is

connected to the secondary (retard) side of the distributor vacuum advance unit. This is the connection closest to the distributor cap.

Color	Number Value
White	5
Yellow	10
Blue	15
Green	20
Red	30

Year	Color	I.D. No.	Time in Seconds	
			Min.	Max.
1974–76	Black/Gray	1	1	4
	Black/Brown	2	2	5
	Black/White	5	4	12
	Black/Yellow	10	5.8	14
	Black/Blue	15	7	16
	Black/Green	20	9	20
	Black/Orange	30	13	24
	Black/Red	40	15	28
1977–82	Black/Gray	1	.6	1.6
	Black/Brown	2	1	3
	Black/White	5	2.7	9.3
	Black/Yellow	10	4.5	13.2
	Black/Blue	15	6.8	18.8
	Black/Green	20	8	26
	Black/Orange	30	11.6	38
	Black/Red	40	14	47.2
	White/Pink①	5	2.7	9.3
	White/Brown①	2	1	3
	White/Green①	20	8	26
	White/Yellow①	10	4.5	13.2
	White/Gray①	1	.6	1.6
	White/Blue①	20	8	26
	White/Red①	40	14	47.2

①—Retard Delay Valve Only

Vacuum Spark Delay Valve: Testing and Inspection

Fig.36 - SDV Valve Color Coding

Fig.37 - Spark Delay Valve (SDV) Specifications Chart

Refer to Figs. 36 & 37 for number value by color code.

NOTE: To perform the following procedure, an external vacuum source capable of maintaining a minimum constant 10 inches Hg. is required.

Mono Delay Valve

1. Set external vacuum source to 10 inches Hg. and connect black side of delay valve to vacuum source.

2. Connect a vacuum gauge with a 24 inch hose to colored side of delay valve.

3. Apply 10 inches Hg. vacuum and observe time in seconds for gauge to read 0-8 inches Hg. The minimum and maximum time for gauge to read 8

inches Hg. should be as shown in Fig. 37.

Dual Delay Valve

1. Set external vacuum source to 10 inches Hg. and connect vacuum gauge with a 24 inch hose to DIST nipple of delay valve.

2. Connect black side of delay valve and CARB nipple of delay valve to vacuum source.

NOTE: Avoid applying vacuum to CARB nipple while applying vacuum to black side of valve.

3. Apply 10 inches Hg. of vacuum and observe time in seconds for gauge to read from 0-8 inches Hg. The minimum and maximum time for gauge to

read 8 inches Hg. should be as shown in Fig. 37.

Retard Delay Valve

1. Set external vacuum source to 10 inches Hg. and connect colored side of delay valve to vacuum source.

2. Connect a vacuum gauge with a 24 inch hose to white side of delay valve.

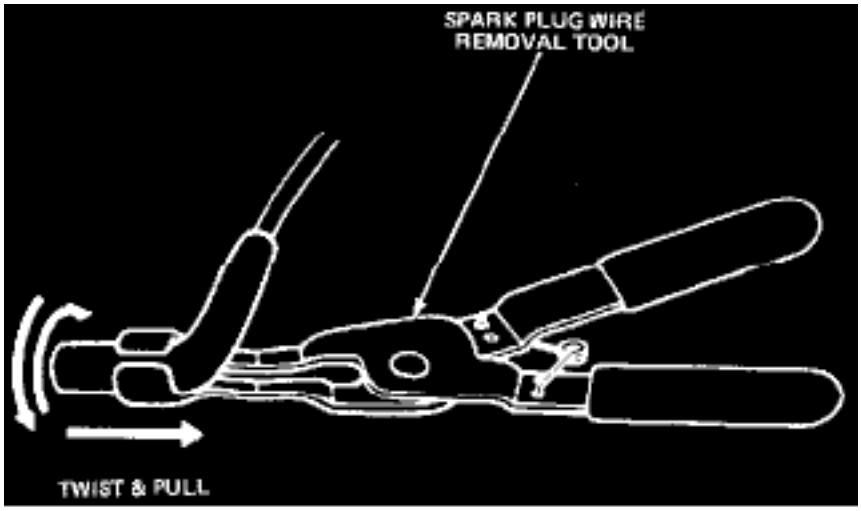
3. Apply 10 inches Hg. of vacuum and observe time in seconds for gauge to read from 0-8 inches Hg. The minimum and maximum time for gauge to

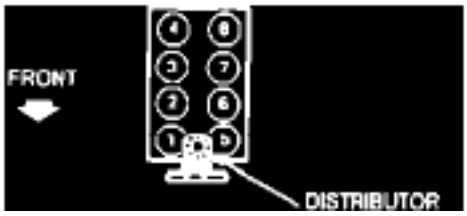
read 8 inches Hg. should be as shown in Fig. 37.

Spark Plug: Specifications

SPARK PLUGS

Gap ..... 0.044 in Torque ..... 14-20 Nm (10-15 ft-lbs)





Spark Plug: Service and Repair

REMOVAL

- Remove the wire from each spark plug by grasping the molded boot with tool T74P-6666-A or equivalent. Twist the boot until it loosens and then pull it off the spark plug. Do not pull on the wire, as the connection may become damaged.

- Any wire damaged must be replaced. Each original spark plug wire is numbered for the cylinder to which it is designated. If wires are not numbered, each wire should be numbered as to the plug from which it was removed.

- Clean the area around each spark plug port with compressed air.

- Using the proper size spark plug socket remove the spark plugs.

INSTALLATION

-

Check the gap on each new spark plug and set to specification. See: Specifications

Cylinder Numbering And Distributor Location

- Install each spark plug and tighten to 14-20 Nm (10-15 ft-lbs).

- Coat the inside of each spark plug boot with silicone dielectric compound. Connect each spark plug wire to the plug from which it was removed. Be sure each wire is fully depressed on each plug and molded boot is firmly in place.

Maximum PSI	Minimum PSI	Maximum PSI	Minimum PSI	Maximum PSI	Minimum PSI	Maximum PSI	Minimum PSI
134	101	164	123	194	145	224	168
136	102	166	124	196	147	226	169
138	104	168	126	198	148	228	171
140	105	170	127	200	150	230	172
142	107	172	129	202	151	232	174
144	108	174	131	204	153	234	175
146	110	176	132	206	154	236	177
148	111	178	133	208	156	238	178
150	113	180	135	210	157	240	180
152	114	182	136	212	158	242	181
154	115	184	138	214	160	244	183
156	117	186	140	216	162	246	184
158	118	188	141	218	163	248	186
160	120	190	142	220	165	250	187
162	121	192	144	222	166		

Compression Check: Testing and Inspection

COMPRESSION TEST

1. Ensure oil in crankcase is of the correct viscosity and at proper level and battery is properly charged. Operate vehicle until engine is at normal

operating temperature. Turn OFF ignition switch, then remove all spark plugs.

2. Set throttle plates (and choke plates, if equipped) in wide-open position. 3. Install a compression gauge such as Rotunda Compression Tester 059-00009 or equivalent in No. 1 cylinder. 4. Install an auxiliary starter switch in starting circuit. With ignition switch in the OFF position, and using auxiliary starter switch, crank engine at

least five compression strokes and record highest reading. Note the approximate number of compression strokes required to obtain the highest reading.

5. Repeat test on each cylinder cranking the engine approximately the same number of compression strokes.

TEST CONCLUSION

1. The indicated compression pressures are considered within specification if the lowest reading cylinder is within 75 percent of the highest. 2. If one or more cylinders read low, squirt approximately one tablespoon of heavy SAE 50 weight or equivalent engine oil on top of the pistons in

the low reading cylinders. Repeat compression pressure check on these cylinders. a. If compression improves considerably, piston rings are at fault. b. If compression does not improve, valves are sticking or seating poorly. c. If two adjacent cylinders indicate low compression pressures and squirting oil on pistons does not increase compression, cause may be a

cylinder head gasket leak between cylinders. Engine oil and/or coolant in cylinders could result from this problem.

Compression Pressure Limit Chart

NOTE: Refer to the compression pressure limit chart for pressure specifications.

Valve Clearance: Specifications

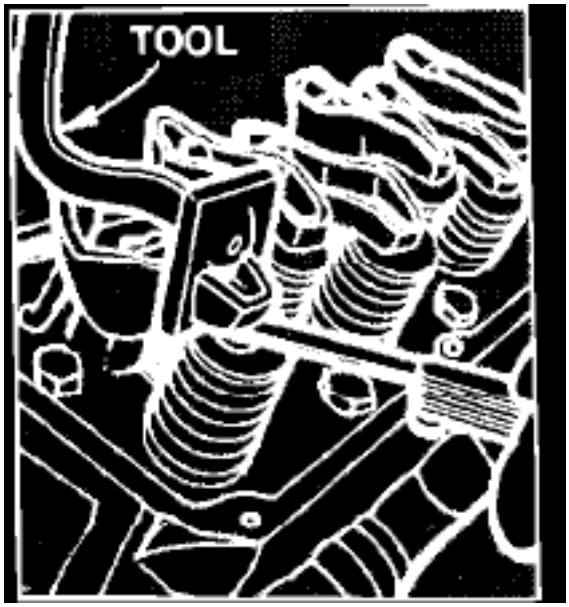
ENGINE YEAR CLEARANCE

V6-232 82-83 .088-.189 V8-255 81-82 .123-.173 6-300 80-87 .125-.175 V8-302 80-87 .096-.165 V8-351M 80-81 .125 V8-351W 80-87 .123-.173 V8-400 80-82 .175 V8-460 80-87 .100-.150

On engines with hydraulic lifters, clearance specified is at valve stem tip with lifter collapsed.

Valve Clearance: Locations

FRONT TO REAR 6-300 E-I-E-I-E-I-E-I-E-I-E-I V6-232 Right I-E-I-E-I-E V6-232 Left E-I-E-I-E-I V8-255, 302 Left Bank E-I-E-I-E-I-E-I V8-255, 302 Right Bank I-E-I-E-I-E-I-E V8-351, 400 Right Bank I-E-I-E-I-E-I-E V8-351, 400 Left Bank E-I-E-I-E-I-E-I V8-460 Left Bank E-I-E-I-E-I-E-I V8-460 Right Bank I-E-I-E-I-E-I-E



Valve Clearance: Adjustments

Fig. 21 Compressing valve lifter with tool to check clearance on engines with hydraulic valve lifters

V8 ENGINES To provide a means to compensate for dimensional changes in the valve train and provide for valve adjustment, .060 inch shorter or longer pushrods are available. If the valve clearance is less than the minimum, the .060 inch shorter pushrod should be used. If the clearance is more than the maximum, the longer pushrod should be used. To check the valve clearance, proceed as follows:

1. Mark crankshaft pulley at three locations, with No. 1 location at TDC timing mark (end of compression stroke), location No. 2 one full turn (360°) clockwise from TDC and No. 3 location one quarter turn clockwise (90°) from position No. 2.

2. Turn crankshaft to number 1 location, then compress valve lifter using tool T71P-6513-A or equivalent, Fig. 21, and check the clearance on the following valves:

V8-255, 302, 460 No. 1 Intake No. 1 Exhaust No. 7 Intake No. 5 Exhaust No. 8 Intake No. 4 Exhaust V8-351 & 400 No. 1 Intake No. 1 Exhaust No. 4 Intake No. 3 Exhaust No. 8 Intake No. 7 Exhaust

3. Turn crankshaft to number 2 location, then compress valve lifter using tool T71P-6513-A or equivalent, Fig. 21, and check the clearance on the following valves:

V8-255, 302, 460 No. 5 Intake No. 2 Exhaust No. 4 Intake No. 6 Exhaust V8-351 & 400 No. 3 Intake No. 2 Exhaust No. 7 Intake No. 6 Exhaust

4. Turn crankshaft to number 3 location, then compress valve lifter using tool T71P-6513-A or equivalent, Fig. 21, and check the clearance on the following valves:

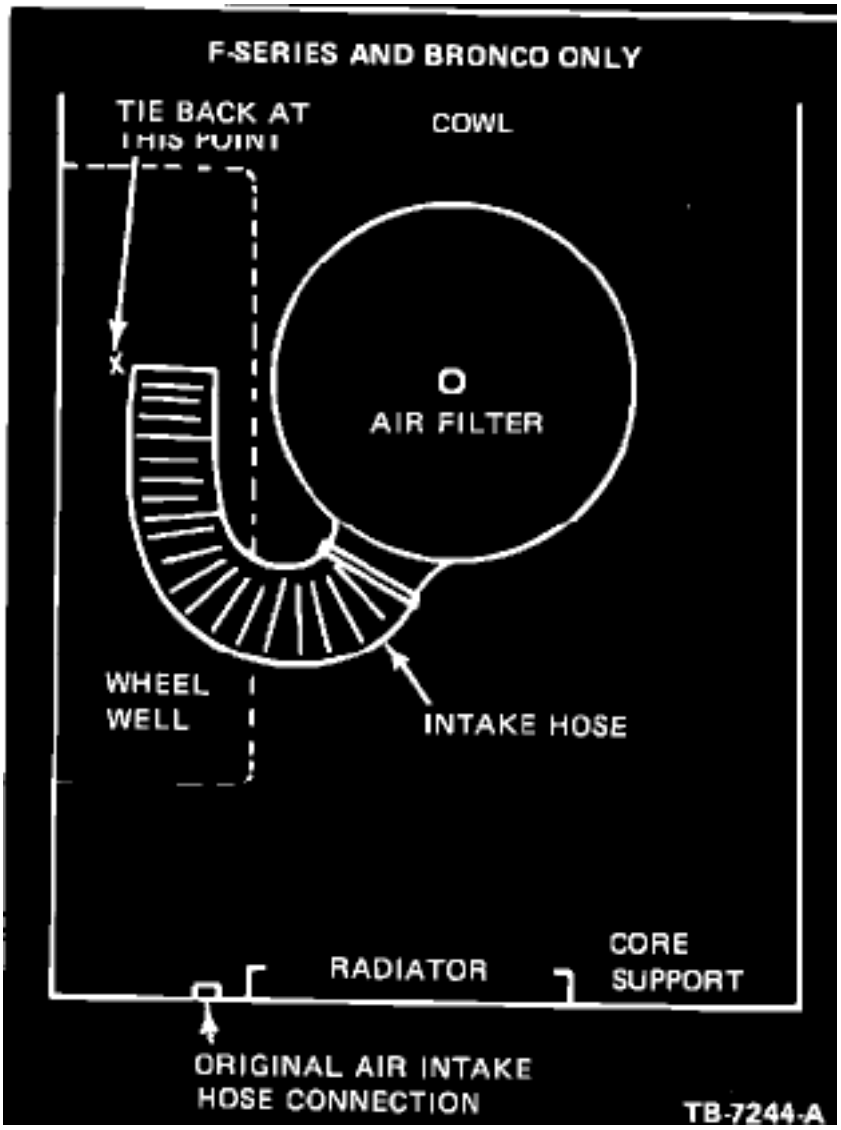
V8-255, 302, 460 No. 2 Intake No. 7 Exhaust No. 3 Intake No. 3 Exhaust No. 6 Intake No. 8 Exhaust V8-351 & 400 No. 2 Intake No. 4 Exhaust No. 5 Intake No. 5 Exhaust No. 6 Intake No. 8 Exhaust

Drive Belt: Specifications

A belt in operation 10 minutes is considered a used belt. 1988-89 Automatic tensioner used. Deflection method: Table lists deflection at midpoint of belt segment. Strand Tension method: Use a strand tension gauge. Measurements are in pounds.

Drive Belt: Adjustments

A belt in operation 10 minutes is considered a used belt. 1988-89 Automatic tensioner used. Deflection method: Table lists deflection at midpoint of belt segment. Strand Tension method: Use a strand tension gauge. Measurements are in pounds.



Air Cleaner Housing: Technical Service Bulletins Air Cleaner - Sealing Procedure

Article No. 83-25-21-S

AIR CLEANER SEALING - 4.9L (1982-83 F-SERIES AND BRONCO ONLY) AND ALL UNITS WITH 5.0L, 5.8L OR 7.5L ENGINES. UNITS OPERATED IN DUSTY AND/OR OFF-ROAD CONDITIONS -

ARTICLE ALSO INCLUDES SEALING OF 7200VV CARBURETOR ON UNITS SO EQUIPPED

LIGHT TRUCKS 1980-83 E, F AND BRONCO

This is a re-write of TSB 83-25-21 (December 12, 1983). The air cleaner part numbers listed in the TSB are of insufficient detail and are therefore being deleted from the TSB.

Due to the variety of different air cleaners used, part numbers have not been included in this TSB. See your normal parts listing for these part numbers.

The subject vehicles operated in dusty/off-road conditions may experience an air cleaner sealing concern which could lead to engine oil consumption or, on 7200 VV carburetor equipped vehicles, a poor running condition. The following procedure should minimize these concerns.

1. Remove the air cleaner assembly from the engine and remove any loose debris from inside the tray. Replace the air cleaner assembly (9600) on all 1983 4.9L, 5.0L, 5.8L and, 7.5L equipped light trucks except the 1983 Econoline with the 4.9L engine.

Due to the variety of different air cleaners used, part numbers have not been included in this TSB. See your normal parts listings for these part numbers.

2. Wipe the sealing surfaces clean on the tray and cover and inspect for any dents or damage that would prevent a good seal. Replace any damaged components.

3. Inspect the air cleaner to carburetor gasket for proper installation. If the gasket appears crimped or damaged, replace it with a new sticky-back gasket. Prior to replacing the gasket, clean the carburetor flange. Install the new gasket sticky side down and press all the gasket down to assure a tight bond.

Gasket parts numbers: 4.9L - C8DZ-9654-A, 5.0L/5.8L/7.5L - D8ZZ-9654-A.

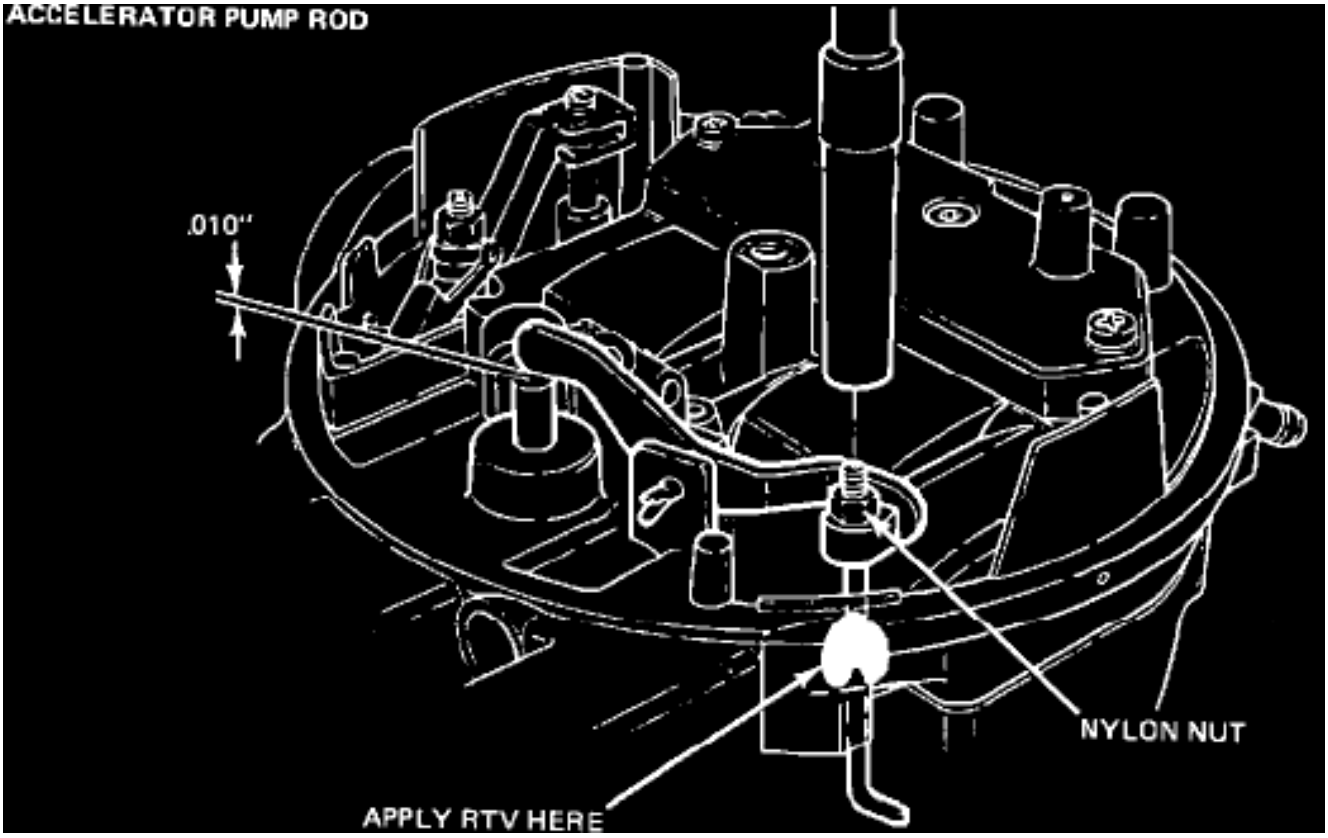
FIGURE 24

4. For F-Series and Bronco only, relocate the zip tube inlet. a) Detach the zip tube inlet from the radiator support. b) Move the inlet to the top rear of the wheel wellhousing per Figure 24. c) Secure the zip tube to the top of the housing with a nylon tie-down

strap. NOTE: At high temperatures, an octane ping may occur. If it persists, the zip tube must be reinstalled to the radiator support. 5.

Replace the PCV filter. For 4.9L, 5.0L-2V, 5.8L-2V and 7.5L-4V engines replace the PCV filter in the air cleaner with an in-line filter.

a. Remove and discard the crankcase breather cap to PCV filter hose (closure hose), PCV filter in the air cleaner, the adapter at the air cleaner and the adapter retaining clip.



b. Drill a 5/16" hole in the side wall of the air cleaner approximately 12" to the rear of the existing crankcase closure hole for 5.0L and 5.8L and approximately 6" to the rear on 7.5L. (The 4.9L does not need a new hole).

c. Install a 1/2" hose (E2AZ-6853-A) to the existing adaptor in the valve cover oil fill cap (2 pcs. 2-5/8" long for 4.9L, 18" long for 5.0L/5.8L, 12" long for 7.5L).

d. At a convenient location, cut the hose and install an in-line filter E2AZ-6A768-A for 5.0L, 5.8L and 7.5L. On the 4.9L, install the filter between the 2-5/8" long pieces installed in (c.).

NOTE: Install the filter with the wire mesh toward the oil fill cap. The mesh can be seen by looking into the end of the filter assembly.

e. Install an adapter E43Z-9E606-A in the air cleaner and attach using a retaining clip 383741-S. Center the adapter elbow in the new hole for 5.0L, 5.8L and 7.5L. Use the existing PCV filter (closure) pack hole for 4.9L.

f. Cut the PCV filter (closure) hose to proper length and attach to the adapter.

g. Plug the old hole in the tray with plug 377678-S for 5.0L, 5.8L and 7.5L only.

FIGURE 25

6. For 5.0L and 5.8L engines with a 7200 VV carburetor, clean and seal the carburetor to prevent dirt migration through the choke rod and accelerator pump rod holes (Refer to Figure 25).

a. Remove the carburetor from the vehicle.

b. Without disassembling the carburetor, thoroughly clean with Ford Automatic Choke Cleaner or equivalent, all of the choke linkage and accelerator pump linkage on the top and sides of the carburetor. Pay particular attention to the top and bottom of the upper body casting around the choke and accelerator pump rods. Allow cleaner to evaporate or blow dry with shop air.

c. Remove stepper motor, gasket, pintle and spring. Clean pintle and pintle cavity in main body casting thoroughly with Ford Automatic Choke Cleaner or equivalent. Do not re-install stepper motor at this time.

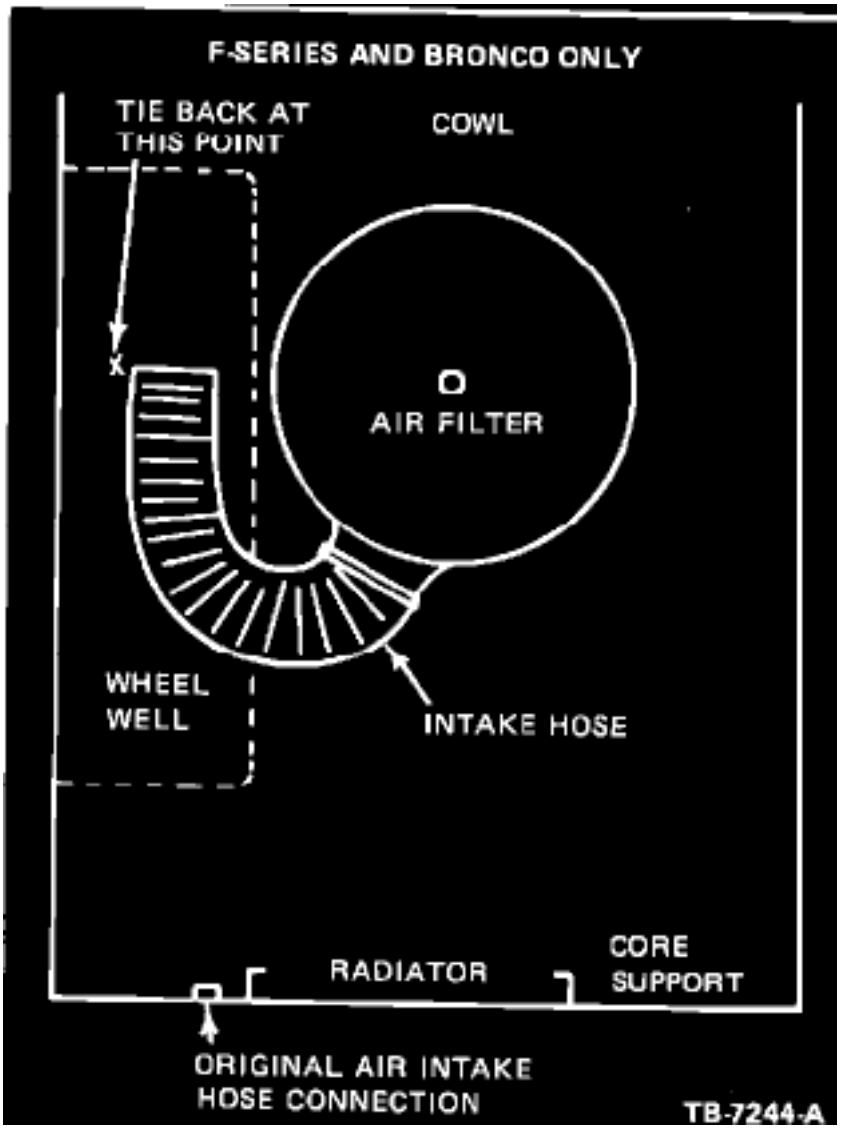


FIGURE 24

d. Hold throttle lever in the wide-open throttle position to raise the accelerator pump rod. With a toothpick, or other sharp tool, apply any commercially available silicone RTV (such as Dow Corning "Silastic") to the top side of the upper body casting around the accelerator pump rod (Figure 24). Fill the hole completely around the rods from the top side only and release the throttle lever.

e. With a rubber band, tie the throttle lever in closed-throttle position. Push fast idle cam to "off" position so that choke rod is fully raised. Fast idle cam should remain in "off" position.

f. With a toothpick, apply silicone RTV to bottom side of upper body casting around the choke shaft rod. Fill the hole completely around the rod from the bottom side only.

g. Install the spring, pintle, gasket, and stepper motor.

h. Allow carburetor to stand at room temperature for 24 hours without disturbing silicone RTV.

i. After 24-hour cure, remove rubber band from throttle lever, and open throttle to break (free) accelerator pump rod from silicone RTV. Bulk of RTV sealant should remain attached to upper body.

j. Manually exercise choke linkage to break (free) choke rod from silicone RTV. Bulk of RTV sealant should remain attached to upper body.

k. Re-install carburetor on vehicle.

7. Re-install and secure the air cleaner assembly as follows:

a. Set the air cleaner tray assembly on the carburetor and check that nothing is preventing the tray seating securely and completely sealing the flange.

b. Connect and secure the vacuum hoses.

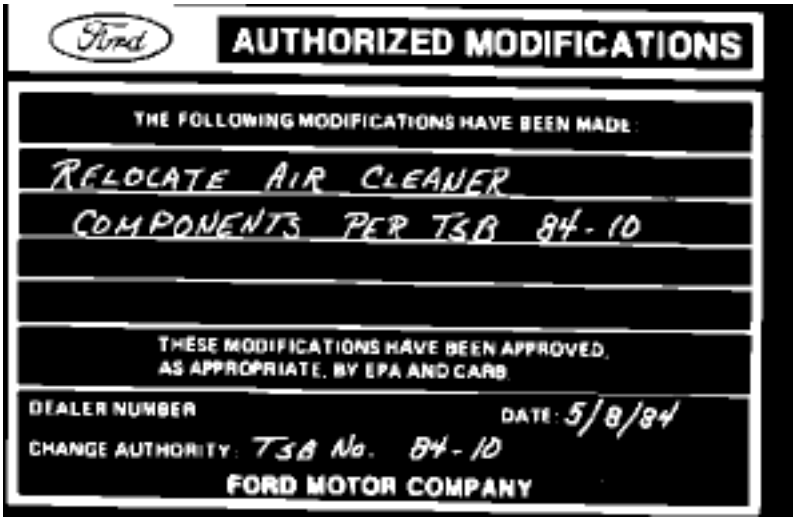
c. Install and seat a new heavy duty air cleaner element in the tray. Use E2TZ-9601-B (FA-732) for 4.9L and E0TZ-9601-A (FA-688) for 5.0L/5.8L. Use non-heavy duty element for 7.5L.

NOTE: Use of incorrect element will allow dirt to be ingested and will damage the engine.

d. Install the air cleaner cover and place the washer grommet rubber side down. Torque the wing nut hand tight (20 in.lbs.). Try to rotate the air cleaner assembly slightly. If it resists rotation, sealing to the carburetor is assured.

e. Connect the crankcase filter hose securely.

f. Install the heat riser tube. Connect the fresh air zip tube.



Obtain an Authorized Modifications decal and list the date, dealer number and summary of alterations performed. Select a prominent place adjacent to the Vehicle Emission Control Information decal suitable for installing the Authorized Modifications decal. Clean the area, install the decal and cover it with a clear plastic decal shield. PART NUMBER

PART NAME CLASS

E2AZ-6A768-A PCV Filter C

E2AZ-6853-A 1/2" PCV Hose C

E43Z-9E606-A Adapter C

E2TZ-9601-B Air Filter Element AM

E0TZ-9601-A Air Filter Element AM

C6TZ-9697-A Washer AM

D8ZZ-9654-A Gasket A

377678-S Plug BR

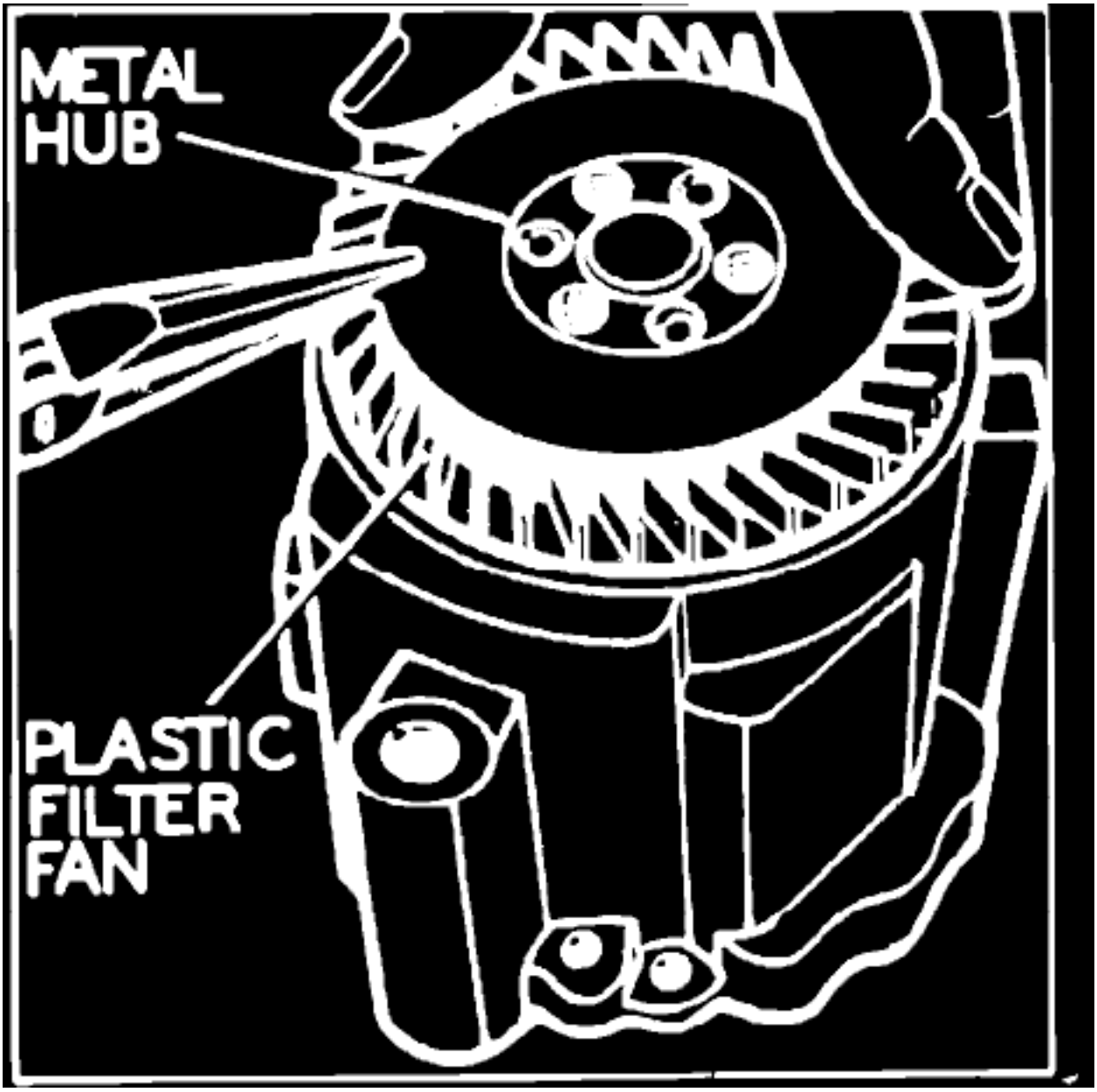
E3AZ-19562-A RTV Sealer A

390013-S36B Wing Nut S

C8DZ-9654-A Gasket AM

OTHER APPLICABLE ARTICLES: 83-25-21 WARRANTY STATUS: Reimbursable within the provisions of the Warranty and Policy Manual. OPERATION: SP9600C84 TIME:

6 cyl. - 0.5 Hr. 8 cyl. - 1.1 Hrs. DLR. CODING: Basic Part No. 9600 Code: 49



Air Injection Filter: Service and Repair

Fig. 68 Removing centrifugal type air pump filter

Centrifugal Filter Fan, Replace

1. Remove drive pulley and outer disc from air pump.

2. Remove filter fan from pump, Fig. 90.

NOTE: Do not attempt to remove the metal drive hub.

3. Install new filter fan using the pulley and bolts. Alternately tighten bolts to draw fan down evenly.

NOTE: A slight interference between the fan and housing is normal. A new fan may make noise during initial operation, until it's outer diameter sealing lip has worn in, after approximately 20-30 miles of operation.

Fuel Filter: Technical Service Bulletins Fuel Filter - Replacement Information

Article No. 85-6-10

FUEL FILTER REPLACEMENT INFORMATION - ALL WITH FUEL FILTERS ATTACHED TO THE CARBURETOR AND/OR FUEL LINE WITH A RUBBER HOSE

FORD ALL 1985 AND PRIOR

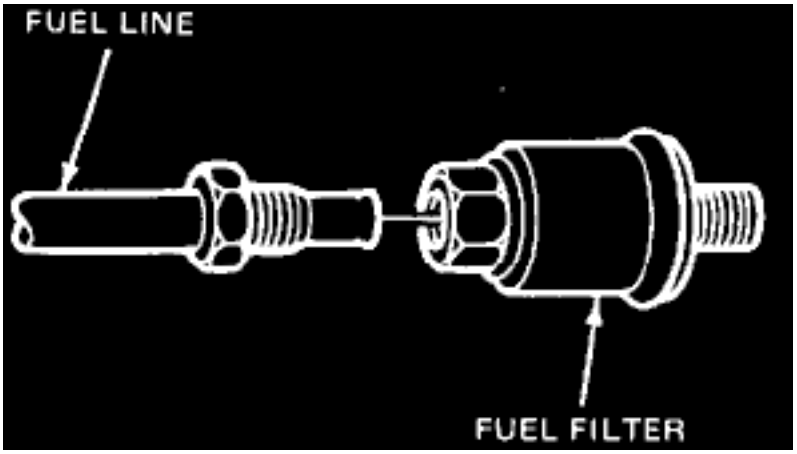
LINCOLN-MERCURY ALL 1985 AND PRIOR

LIGHT TRUCK ALL 1985 AND PRIOR

New fuel connector hoses and clamps should be used whenever a fuel filter is replaced.

Due to possible deterioration of hose materials which may result if a vehicle is fueled with gasoline containing excessive levels of methanol or ethanol, a new fuel hose and clamps should be installed when the fuel filter is changed. DO NOT REUSE OLD HOSES OR CLAMPS.

OTHER APPLICABLE ARTICLES: NONE WARRANTY STATUS: "INFORMATION ONLY"



Fuel Filter: Service and Repair Screw In Type

REMOVAL

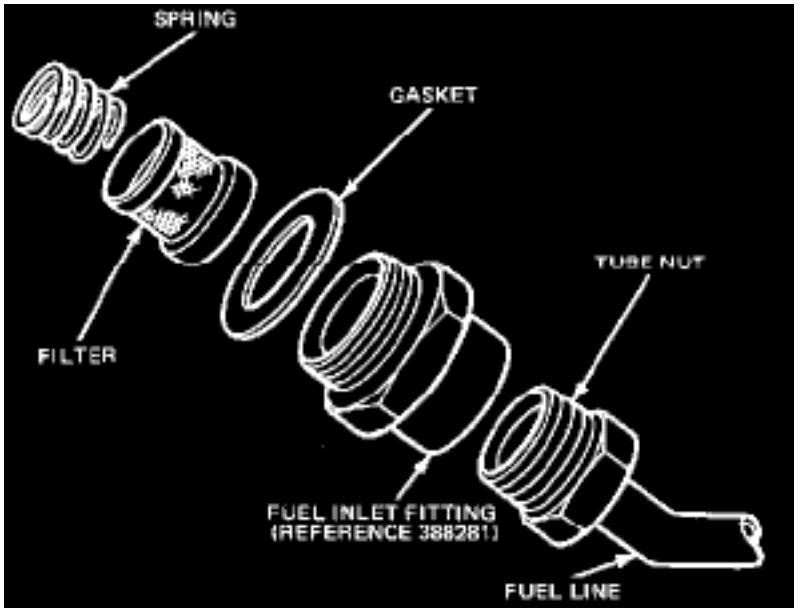
1. Remove the air cleaner assembly. 2. Loosen and remove the fuel tube from the filter. 3. Unscrew the filter from the carburetor.

INSTALLATION

1. Apply one drop of thread sealer to the external thread of a new filter. Thread the filter into the carburetor inlet port. 2. Tighten the filter to 9.0-11.0 Nm (80-100 in-lbs). 3. Apply ESE-M2C39-E or equivalent oil to the fuel supply tube nut and flare , and hand start the nut into the fuel filter inlet approximately two

threads.

4. Use an 11/16 inch wrench on the fuel filter to prevent the filter from rotating. Tighten the fuel filter to supply tube nut to 20-24 Nm (15-18 ft-lb). 5. Install air cleaner assembly. 6. Start the engine and check for fuel leaks.



Fuel Filter: Service and Repair Inlet Fitting Type

REMOVAL

- Remove the air cleaner.

- Hold the fuel filter inlet hex nut with a backup wrench and unscrew the fuel line tube nut from the fuel filter inlet.

WARNING: Use care to prevent combustion from fuel spillage.

- Unscrew the fuel inlet fitting.

-

Remove the gasket, filter and spring.

- Discard the gasket and filter.

INSTALLATION

- Install the spring, new filter and gasket.

- Hand start the fuel inlet fitting into the carburetor then, tighten to 10-24 Nm (90-125 lb-in).

- Apply oil, ESE-M2C39-E or equivalent to the fuel tube nut threads and tube flare.

- Hand start the fuel line tube nut into the fuel inlet fitting (approximately two threads).

- Use a backup wrench on the fuel inlet fitting while tightening the fuel line tube nut to 20-24 Nm (15-18 lb-ft).

- Start the engine and check for fuel leak.

- Install the air cleaner.

Technical Service Bulletin # 98-12-5 Date: 980622

A/C - Filtering Refrigerant After Compressor Replacement

Article No. 98-12-5

06/22/98

AIR CONDITIONING - FILTERING REFRIGERANT

AFTER A/C COMPRESSOR REPLACEMENT - SERVICE TIPS

FORD: 1980-98 CROWN VICTORIA 1981-98 ESCORT 1982-83 FAIRMONT 1982-88 EXP 1982-97 THUNDERBIRD 1982-98 MUSTANG 1983-86 LTD 1984-94 TEMPO 1986-98 TAURUS 1988-93 FESTIVA 1989-97 PROBE 1994-98 ASPIRE 1995-98 CONTOUR

LINCOLN-MERCURY: 1980-98 GRAND MARQUIS, TOWN CAR 1982-83 ZEPHYR 1982-86 CAPRI 1982-87 LN7 1982-97 COUGAR 1982-98 CONTINENTAL 1983-86 MARQUIS 1984-92 MARK VII 1984-94 TOPAZ 1986-98 SABLE 1991-94 CAPRI 1991-98 TRACER 1993-98 MARK VIII 1995-98-MYSTIQUE 1999 COUGAR

LIGHT TRUCK: 1980-96 BRONCO 1980-97 F SUPER DUTY 1980-98 ECONOLINE, F-150, F-150, F-350 1983-98 RANGER 1984-90 BRONCO II 1986-97 AEROSTAR 1988-97 F-47 1991-98 EXPLORER 1993-98 VILLAGER 1995-98 WINDSTAR 1997-98 EXPEDITION, MOUNTAINEER 1999 SUPER DUTY F SERIES

This TSB article is being republished in its entirety to revise the Service Procedure and to update the model years.

ISSUE Vehicles that have and inoperative A/C compressor, due to internal causes, MUST have the refrigerant system cleaned to remove any debris or contaminants that may be present to prevent damage to the replacement compressor.

ACTION

Install a Service Filter Kit in the refrigerant system prior to installing the replacement compressor. Refer to the following Service Procedure for details.

OTHER APPLICABLE ARTICLES: NONE

SUPERSEDES: 96-15-5

WARRANTY STATUS: Eligible Under The Provisions Of Bumper To Bumper Warranty Coverage For 1992-99 Models And 1991 Lincolns, Basic Warranty Coverage For All Other Models And Major Component Warranty Coverage For All Other Lincoins

OPERATION DESCRIPTION TIME

981205A Kit Installation 1.2 Hrs.

981205B Extra Time For Refrigerant 0.4 Hr.

(R-12) Recovery

DEALER CODING

CONDITION

BASIC PART NO. CODE

19703 49

OASIS CODES: 208000, 208999

Service Procedure

THIS PROCEDURE IS OPTIONAL IF THE SYSTEM IS FLUSHED USING THE ROTUNDA A/C FLUSHER.

CAUTION

THIS FILTERING PROCEDURE MAY BE USED FOR EITHER R-12 OR R-134a REFRIGERANT SYSTEMS. BECAUSE THE TWO (2) SYSTEMS USE DIFFERENT REFRIGERANT OILS AND BECAUSE THE COMPRESSOR COULD BE DAMAGED IF THE WRONG OIL IS USED, SYSTEM IDENTIFICATION IS VERY IMPORTANT. BE SURE SYSTEM IS CORRECTLY IDENTIFIED BEFORE STARTING THE FILTERING PROCEDURE.

Each Service Filter Kit includes the following items:

^ One (1) Pancake Filter (to be installed in the liquid line between the condenser and the orifice tube)

^ One (1) Instruction Sheet

NOTE

ON 1993-94 RANGER/EXPLORER VEHICLES, TECHNICIANS MAY EXPERIENCE DIFFICULTY WHEN CONNECTING THE PANCAKE FILTER HOSE FITTINGS TO THE EVAPORATOR INLET WITH THE ORIFICE TUBE INSTALLED. REMOVE THE OFFICE TUBE AND RUN THE SYSTEM FOR 1 HOUR AS DESCRIBED IN THE FILTERING PROCEDURE. REINSTALL THE ORIFICE TUBE AFTER FILTERING IS COMPLETE.

CAUTION

FOLLOW ALL REFRIGERANT SYSTEM SAFETY AND SERVICE PRECAUTIONS OUTLINED IN THE APPROPRIATE SERVICE OR WORKSHOP MANUAL.

1. Before removing any refrigerant system components, recover the refrigerant from the system following the recycling methods outlined In the appropriate Service/Workshop Manual.

2. Remove the suction accumulator/drier assembly and drain the oil into a calibrated container.

3. Install a new suction accumulator/drier and add new refrigerant oil to replace the old oil. The quantity of the new oil to be added is the amount to match that drained from the old accumulator plus 60 mL (2 oz). Refer to the Dealer Master Parts Catalog for the correct suction accumulator/drier part number.

CAUTION

REMEMBER TO USE MOTORCRAFT YN-9-A REFRIGERANT COMPRESSOR OIL WITH R-12 SYSTEMS AND MOTORCRAFT YN-12-C REFRIGERANT COMPRESSOR OIL WITH R-134a SYSTEMS. FAILURE TO USE THE CORRECT REFRIGERANT OIL MAY RESULT IN DAMAGE TO SYSTEM COMPONENTS.

4. Install a new orifice tube. Refer to the Dealer Master Parts Catalog for the correct orifice tube part number. If the orifice tube in the vehicle is located in the liquid line between the condenser and the evaporator, replace the liquid line assembly.

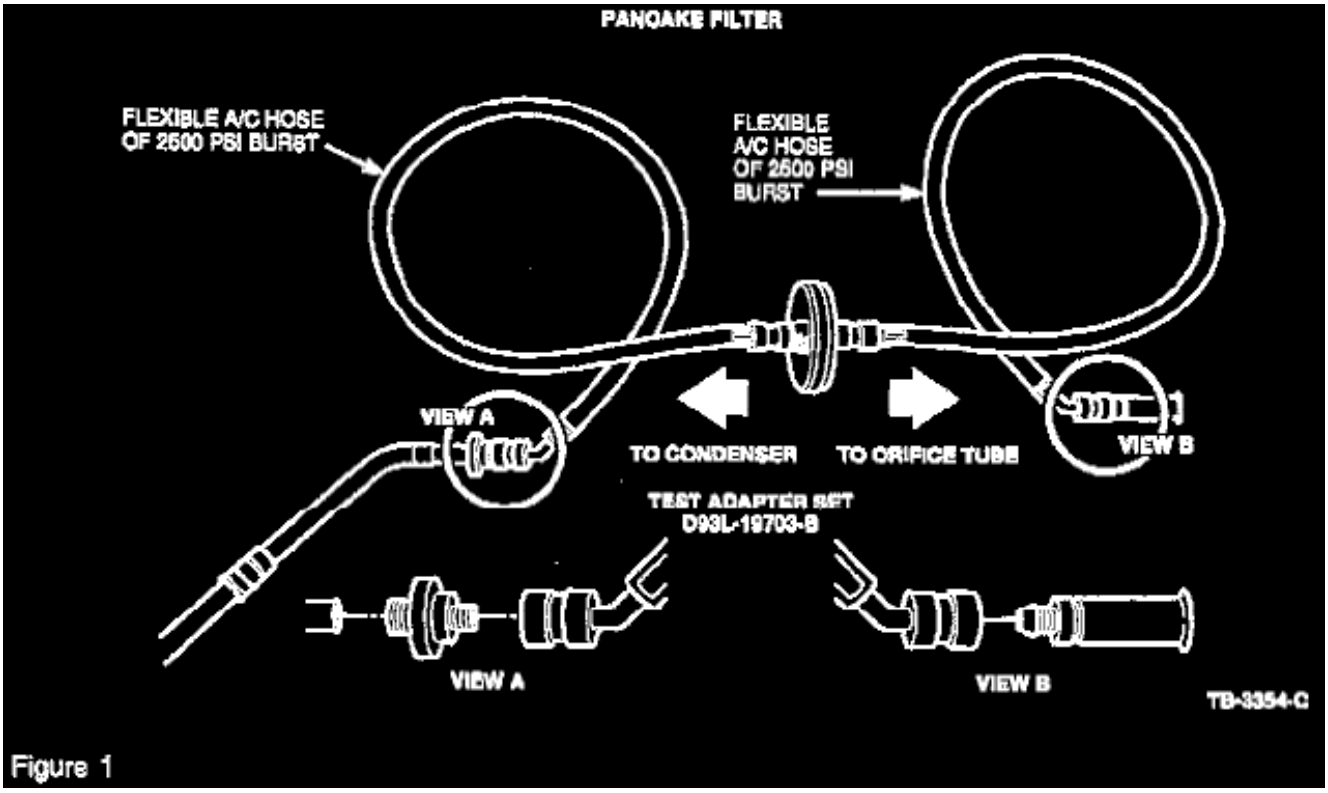


Figure 1

5. Install pancake filter in the liquid line between the condenser and the orifice tube, Figure 1.

a. Be sure orifice inlet is toward the condenser.

b. Connections can be made using Test Adapter Set D93L-19703-B, or equivalent, and flexible refrigerant hose of 2500 psi burst rating. Individual fittings are also available.

6. Remove the old compressor following Service/Workshop Manual procedures. Drain the oil into a calibrated container.

7. Drain the oil from the replacement compressor into a clean calibrated container.

NOTE:

IT WILL BE NECESSARY TO TRANSFER THE MAGNET CLUTCH FROM THE OLD COMPRESSOR TO THE REPLACEMENT COMPRESSOR. FOLLOW SERVICE/WORKSHOP MANUAL PROCEDURES.

8. A new FX-15 service compressor contains 207 mL (7 oz.) of R-12 refrigerant oil. A new FS-10 service compressor does not contain any oil and can be used with an R-12 or an R-134a system.

CAUTION

REMEMBER TO USE YN-9-A (MINERAL) OIL WITH R-12 SYSTEMS AND YN-12-C (PAG) OIL WITH R-134a SYSTEMS. FAILURE TO USE THE CORRECT REFRIGERANT OIL MAY RESULT IN DAMAGE TO SYSTEM COMPONENTS.

^ If the amount of oil drained from the removed compressor is between 90 and 148 mL (3-5 oz), pour the same amount of clean refrigerant oil into the new compressor.

^ If the amount of oil drained from the old compressor is greater than 90 mL (3 oz), pour 90 mL (3 oz) of clean refrigerant oil into the new compressor.

9. Install the new compressor following Service/Workshop Manual procedures. Make sure all mounting bolts are tightened properly. Check the tension of the compressor drive belt. Adjust if necessary.

10. Evacuate, charge and leak test the system, following Service/Workshop Manual procedures.

11. Check all refrigerant system hoses, lines and the position of the newly-installed filters to make sure they do not interfere with other engine compartment components. If necessary, use tie straps to make adjustments.

12. Set the A/C control on Max A/C, high blower and temperature control at full cold.

a. Start engine and let idle briefly.

b. Be sure A/C system is operating properly.

13. Gradually bring the engine up to 1200 rpm by running it at lower rpms for short periods (first at 800 rpm, then at 1000 rpm). Set the engine at 1200 rpm and run it for an hour with the A/C system operating.

14. Stop the engine.

NOTE:

IT WILL BE NECESSARY TO RECOVER THE SYSTEM REFRIGERANT CHARGE BEFORE PROCEEDING.

15. Allow the engine to cool sufficiently to remove the fittings, flexible hoses and pancake filter from the liquid line.

16. Discard the filter. It can be used one (1) tie only.

17. Reconnect the liquid line back into the system.

18. Evacuate, charge and leak test the system. Make any necessary adjustments.

19. Check the operation of the system in all models.

PART NUMBER PART NAME

F8VZ-19E773-AA Filter Kit

F73Z-19577-AA Refrigerant Oil - Motorcraft YN-9-A (For R-12 Refrigerant Systems Only)

F7AZ-19589-DA Refrigerant Oil - Motorcraft YN-12-C (PAG-Type Oil For R-134a Refrigerant Systems Only)

NOTE

THE TOTAL REPAIR TIME IS FOR INSTALLING SERVICE FILTER KIT PER INSTRUCTIONS THIS INCLUDES INSTALLATION OF AND DISCARD OF FILTER. REFER TO SERVICE LABOR TIME STANDARDS MANUALS IF ADDITIONAL LABOR OPERATIONS ARE REQUIRED.

Hoses: Service Precautions

SERVICE PRECAUTIONS

To prevent vehicle damage, always observe the following precautions: -

After servicing a hose, check for leaks before and after test driving the vehicle.

- Always use the correct size hose. Do not use standard sized hose in place of metric hose or vice versa.

-

Always use the correct type of hose. Never use vacuum hose in place of fuel hose. Never use heater hose in place of PCV hose.

- When replacing hoses which are attached to the engine on one end and the frame or body on the other end, always leave sufficient length to compensate for engine movement (from torque).

Coolant: Technical Service Bulletins Recycled Engine Coolant - Service Tips

Article No. 95-18-2

09/11/95

^ COOLANT - USE OF RECYCLED ENGINE, COOLANT - SERVICE TIP

^ COOLING SYSTEM - USE OF RECYCLED ENGINE, COOLANT - SERVICE TIP

FORD: 1980 and after CROWN VICTORIA, MUSTANG, THUNDERBIRD 1981 and after ESCORT 1982-88 EXP 1984-94 TEMPO 1986 and after TAURUS 1988-93 FESTIVA 1989 and after PROBE 1994 and after ASPIRE 1995 and after CONTOUR

LINCOLN-MERCURY: 1980 and after CONTINENTAL, COUGAR, GRAND MARQUIS, TOWN CAR 1981-86 CAPRI 1981-87 LYNX 1984-92 MARK VII 1984-94 TOPAZ 1986 and after SABLE 1987-89 TRACER 1991-94 CAPRI 1991 and after TRACER 1993 and after MARK VIII 1995 and after MYSTIQUE

MERKUR: 1985-89 XR4TI 1988-89 SCORPIO

LIGHT TRUCK: 1980 and after F-150-350 SERIES 1981 and after ECONOLINE 1982 and after BRONCO 1983 and after RANGER 1984-90 BRONCO II 1986 and after AEROSTAR 1988 and after F SUPER DUTY 1991 and after EXPLORER 1993 and after VILLAGER 1995 and after WINDSTAR

This TSB is being republished in its entirety to include warranty information when using recycled coolant

ISSUE: Ford Motor Company authorizes the use of recycled engine coolant that, when properly processed and reinhibited, meets Ford specification ESE-M97B44-A. At this time, the Rotunda Coolant Recycler (181-00003) process is the only approved coolant recycling method available through Ford that is capable of producing recycled engine coolant that meets Ford specification ESE-M97B44-A.

ACTION: Refer to the following Service Procedure for coolant processing and reinhibiting using Rotunda Coolant Recycler (181-00003).

NOTE:

WHILE TESTING SHOWS THAT RECYCLED ENGINE COOLANT CAN PROVIDE ACCEPTABLE PERFORMANCE, THE COOLANT PRODUCED FROM ROTUNDA EQUIPMENT IS INTENDED FOR USE WITHIN DEALERSHIPS ON WARRANTY AND CUSTOMER PAY REPAIRS ONLY AND NOT INTENDED FOR RETAIL SALE. THERE ARE REGULATORY, PACKAGING AND LABELING CONCERNS

ASSOCIATED WITH THE RETAIL SALE OF CHEMICAL PRODUCTS.

CAUTION:

THE REINHIBITOR CHEMICALS PROVIDED WITH THIS EQUIPMENT ARE NOT APPROPRIATE FOR USE ON MEDIUM/HEAVY TRUCK APPLICATIONS.

WARNING:

ROTUNDA PREMIUM COOLANT REINHIBITORS # 1 AND # 2 HAVE BEEN SPECIFICALLY FORMULATED TO WORK WITH ROTUNDA COOLANT RECYCLER (181-00003).

USE OF ANY OTHER CHEMICAL ADDITIVES WITH THIS SYSTEM WILL VOID ALL WARRANTIES FOR THE EQUIPMENT AND FOR THE FINAL COOLANT PRODUCT.

SERVICE PROCEDURE

DIRECTIONS FOR PROCESSING USED ENGINE COOLANT WITH ROTUNDA COOLANT RECYCLER

1. Close the drain valve on the unit.

2. Open the fill valve.

3. Pour used engine coolant into the funnel on the side of the unit.

NOTE:

MAXIMUM CAPACITY 15 25 GALLONS (95 L).

4. Insert the outlet hoses of the recycler into clean, properly labeled containers. One (1) container is for the outlet process water and the other container is for distilled ethylene glycol.

5. Push the "ON" switch on the front to start the operation. The unit will process 1 gallon (3.8 L) per hour of operation and will automatically shut off when cycle is complete.

6. Add reinhibitor following the directions in this article.

7. Open the drain valve to drain the residue from the distillation vessel. Dispose of residue in accordance with all local. state and federal regulations.

ADDING REINHIBITOR CHEMICALS

1. Process the coolant according to the directions listed in this article

2. Thoroughly mix 4 fl oz (118 ml) of Reinhibitor # 1 to each gallon of distilled ethylene glycol.

3. Thoroughly mix 4 fl oz (118 ml) of Reinhibitor # 2 to each gallon of distilled ethylene glycol.

4. Mix well.

5. Check the pH level of the coolant. The pH level must be between 9 and 11.

6. Add enough water to the concentrated coolant to produce a 50/50 mixture of coolant and water.

NOTE:

THE CONCENTRATED COOLANT MUST BE MIXED WITH WATER TO MEET THE NECESSARY ENGINE FREEZE PROTECTION.

7. Check the coolant freeze point of the 50% coolant solution. Freeze point should be -34°F (-37°C).

Consult the Rotunda Coolant Recycler Manual for more detailed operating instructions. Call 1-800-ROTUNDA, 8 AM to 8 PM EST, for inquiries regarding the Rotunda Coolant Recycler and to order the Reinhibitor (187-R0001).

PART NUMBER PART NAME

Rotunda # 187-R0001 Rotunda Premium Coolant Reinhibitor

WARRANTY CLAIMS: Dealer can claim recycled engine coolant by Ford approved process via a warranty repair on an 1863 claim as follows:

Part Number: RECCOOL (not a valid part number, but it is recognized on an 1863 claim).

Quantity: Indicate the number of QUARTS of recycled coolant used.

OTHER APPLICABLE ARTICLES: NONE SUPERSEDES: 95-16-6 WARRANTY STATUS: INFORMATION ONLY OASIS CODES: 402000

Coolant: Capacity Specifications

Less A/C System Capacity Note: Exc. models with super cooling, 15 qts.; models with super cooling, 16 qts.

With A/C System Capacity 16 qt (US)

Coolant: Fluid Type Specifications

COOLING SYSTEM FLUID, PREMIUM

Ford Part No.

U.S.A (Except Oregon)
.....
E2FZ-19549-AA or -B Canada .....
..... CXC-8-B Oregon .....
.....
F5FZ-19549-CC

Ford Specification .....
..... ESE-M97B44-A

COOLING SYSTEM FLUSH

Ford Part No. .....
..... F1AZ-19A503-A Ford Specification .....
..... ESR-M14P7-A

Coolant Mixture with Water .....
..... 50%

Warning: Do not mix coolant types. Check the owners manual or refer to your local dealer for the correct coolant type.

Fluid - A/T: Customer Interest A/T - Synthetic Fluid Availability

Article No. 86-11-17

TRANSMISSION - AUTOMATIC - NEW SYNTHETIC DEXRON II ALL WEATHER AUTOMATIC TRANSMISSION FLUID

FORD 1986 and PRIOR ESCORT, EXP, FORD, LTD, THUNDERBIRD, MUSTANG, TEMPO; 1986 TAURUS

LINCOLN-MERCURY 1982-83 LN7; 1986 and PRIOR LYNX, MERCURY, MARQUIS, COUGAR, CAPRI, TOPAZ, LINCOLN, MARK, CONTINENTAL; 1986 SABLE

LIGHT TRUCK 1986 and PRIOR E, F SERIES, BRONCO, BRONCO II, RANGER

A new synthetic Dexron II automatic transmission fluid specification number ESR-M2C163-A2, part number E6AZ-19582-B is now available. This fluid will maintain a more constant viscosity through a wider range of temperatures.

In the event a vehicle will be operated in extremely cold temperatures for an extended period of time, remove all existing fluid from the transmission (using the procedure shown in the applicable 1986 Car or Light Truck Shop Manual) and replace with the new synthetic Dexron II fluid, E6AZ-19582-B. The synthetic fluid is year 'round fluid and will not require replacement for warmer weather.

CAUTION: DO NOT use synthetic Dexron II fluid in transmissions designed to use Type "F" fluid.

PART NUMBER PART NAME CLASS

E6AZ-19582-B Synthetic Dexron Oil V

Automatic Transmission Oil

OTHER APPLICABLE ARTICLES: None WARRANTY STATUS: "INFORMATION ONLY"

Fluid - A/T: All Technical Service Bulletins A/T - Mercon V ATF Usage

TSB 06-14-4

07/24/06

MERCON ATF IS BEING REPLACED BY MERCON V ATF AS A SERVICE FLUID.

FORD: 1980-1997 Crown Victoria 1981-1997 Mustang, Thunderbird 1981-2003 Escort 1986-1993 Festiva 1986-1997 Taurus 1989-1997 Probe 1994-1997 Aspire 1995-2000 Contour 1980-1996 Bronco 1981-2003 F-150 1981-2004 E-Series, F-Super Duty 1983-1996 Ranger 1986-1996 Aerostar 1991-1997 Explorer 1993-2004 F-53 Motorhome Chassis 1995-1998 Windstar 1997-2004 Expedition 2000-2005 Excursion 2001-2007 Escape 1987-2000 F-B-Series 2000-2007 F-650, F-750

LINCOLN: 1980-1997 Town Car 1981-1997 Continental 1993-1997 Mark VIII 1998-2004 Navigator 2002-2003 Blackwood

MERCURY: 1980-1997 Grand Marquis 1981-1997 Cougar 1986-1997 Sable 1987-1999 Tracer 1995-2000 Mystique 1999-2002 Cougar 1993-2002 Villager 1997 Mountaineer 2005-2007 Mariner

MERKUR: 1985-1989 XR4TI

This article supersedes TSB 01-15-7 to update the vehicle application chart.

ISSUE MERCON(R) Automatic Transmission Fluid is being replaced by MERCON(R) V as a service fluid.

ACTION Beginning immediately all automatic transmission / transaxle applications requiring MERCON(R) can now be serviced using MERCON(R) V or MERCON(R) Automatic Transmission Fluid or dual usage fluids labeled MERCON(R) / MERCON(R) V. After July 1, 2007, MERCON(R) Automatic Transmission Fluid will no longer be manufactured, therefore, availability of this fluid will only continue for however long it takes to deplete what remains in inventory.

SERVICE PROCEDURE

AUTOMATIC TRANSMISSION FLUID CHART

TRANSMISSIONS

TRANSAXLES

Specific service fluids (listed to the right) are called for depending on the type of transmisson and the year the transmission was built. It is important to use the correct fluid, each fluid exhibits different properties and should be used only in the transmisson for which they were designed. The vehicle owner or rebuilder should use the type of fluid printed in the owners guide or on the automatic transmission fluid level indicator. Refer to your scheduled maintenance guide to determine the correct service interval. Failure to use the recommended fluid may affect transmisson performance and durability.

CAUTION:
DO NOT USE SUPPLEMENTAL TRANSMISSION FLUID ADDITIVES, TREATMENTS OR CLEANING AGENTS. The use of these materials may affect transmission operation and result in damage to internal transmission components.

CAUTION:
MERCON® SP, Motorcraft® Premium Automatic Transmission Fluid and Motorcraft® M5 ATF's are unique fluids and MUST be used in applications recommending that particular fluid. Use of any other fluid may cause reduced functionality or transmission damage.

CAUTION:
The functional characteristics of fluids for the CVT transmissions are very different than those of other ATF's. Use of a fluid other than Motorcraft® Continuously Variable Chain Type Transmission Fluid or one labeled as meeting MERCON® C may cause severe transmission damage.

FAILURE TO USE RECOMMENDED FLUID WILL AFFECT TRANSMISSION PERFORMANCE. REFER TO OWNERS MANUAL AND/OR FLUID LEVEL INDICATOR FOR PROPER FLUID TYPE.

V **MERCON® V**
- Part number XT-5-QM (Quarts) and XT-5-DM (55 Gallon Drum) Ford Specification is MERCON® V.

NOTE: AUTOMATIC TRANSMISSIONS REQUIRING MERCON® V SHOULD ONLY BE SERVICED WITH MERCON® V, OR FLUID FROM A CONTAINER THAT IS SPECIFIED AS A DUAL USAGE FLUID: MERCON®/MERCON®V.

SP **MERCON® SP**
- Part number XT-6-QSP (Quarts) and XT-6-DSP (55 Gallon Drum) Ford Specification is MERCON® SP.

CVT **CONTINUOUSLY VARIABLE CHAIN TYPE**
- Part number XT-7-QCFT (Quarts)

P **PREMIUM AUTOMATIC TRANSMISSION FLUID**
- Part number XT-8-QAW.

M5 **MAZDA SPECIFIC FLUID**
- Part number XT-9-QMM5.

V M **MERCON® - Part number XT-2-QDX (Quarts) and XT-2-DDX (55 Gallon Drum) or, MERCON® V - Part number XT-5-QM (Quarts) and XT-5-DM (55 Gallon Drum)**

NOTE: AUTOMATIC TRANSMISSIONS REQUIRING MERCON® CAN NOW BE SERVICED WITH MERCON®, MERCON® V, OR, DUAL USAGE FLUIDS LABELED MERCON®/MERCON®V.

TB-8592-D

Figure 1

Service automatic transmissions requiring MERCON(R) with MERCON(R) V or MERCON(R) Automatic Transmission Fluid or dual usage fluids labeled MERCON(R) / MERCON(R) V

For proper fluid application on current and past model vehicles equipped with automatic transmissions I transaxles refer to the fluid usage chart. (Figure 1)

CAUTION

AUTOMATIC TRANSMISSIONS / TRANSAXLES THAT REQUIRE MERCON® V SHOULD STILL ONLY USE MERCON(R) V OR DUAL USAGE FLUID LABELED MERCON(R) / MERCON(R) V.

PART NUMBER	PART NAME
XT-2-QDX	MERCON® (Quart)
XT-2-DDX	MERCON® (55 Gal. Drum)
XT-5-QM	MERCON® V (Quart)
XT-5-DM	MERCON® V (55 Gal. Drum)

NOTE: The information in Technical Service Bulletins is intended for use by trained, professional technicians with the knowledge, tools, and equipment to do the job properly and safely. It informs these technicians of conditions that may occur on some vehicles, or provides information that could assist in proper vehicle service. The procedures should not be performed by "do-it-yourselfers". Do not assume that a condition described affects your car or truck. Contact a Ford, Lincoln, or Mercury dealership to determine whether the Bulletin applies to your vehicle.

CAUTION

MERCON(R) SP, MOTORCRAFT PREMIUM AUTOMATIC TRANSMISSION FLUID AND MOTORCRAFT M5 ATFS ARE UNIQUE FLUIDS AND MUST BE USED IN APPLICATIONS RECOMMENDING THAT PARTICULAR FLUID.

USE OF ANY OTHER FLUID MAY CAUSE REDUCED FUNCTIONALITY OR TRANSMISSION DAMAGE.

CAUTION

THE FUNCTIONAL CHARACTERISTICS OF FLUIDS FOR CVT TRANSMISSIONS ARE VERY DIFFERENT THAN THOSE OF OTHER AUTOMATIC TRANSMISSION FLUIDS (ATFS).

USE OF A FLUID OTHER THAN MOTORCRAFT CONTINUOUSLY VARIABLE CHAIN TYPE TRANSMISSION FLUID OR ONE LABELED AS MEETING MERCON(R) C WILL CAUSE FUNCTIONALITY CONCERNS AND INTERNAL TRANSMISSION DAMAGE.

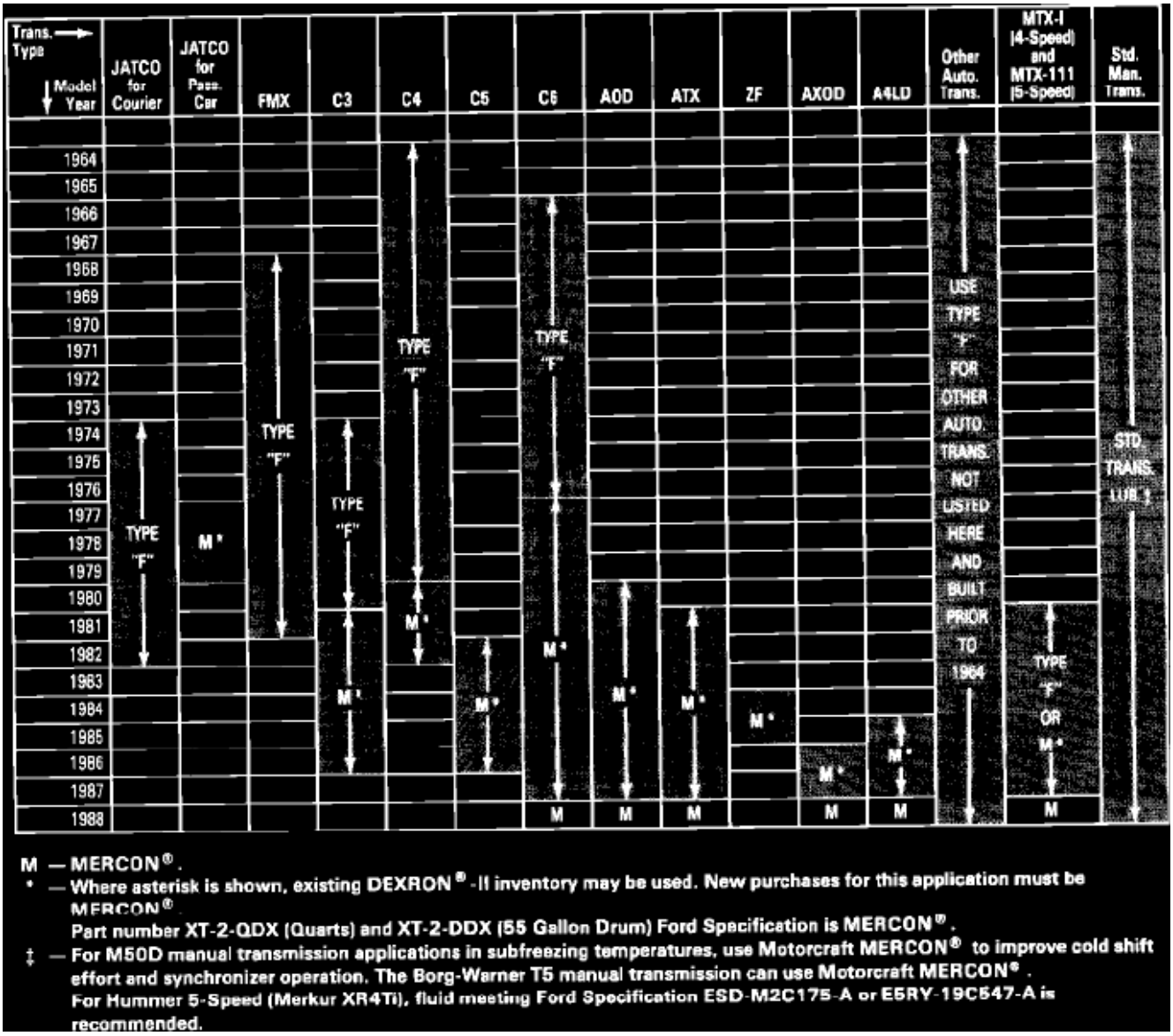
CAUTION

DO NOT USE AUTOMATIC TRANSMISSION FLUID SUPPLEMENTS, ADDITIVES, TREATMENTS OR CLEANING AGENTS.

Parts Block

WARRANTY STATUS: Information Only

Disclaimer



Fluid - A/T: All Technical Service Bulletins A/T, M/T - New `Mercon' Transmission Fluid

TRANSMISSION - AUTOMATIC/MANUAL - Article No.

NEW FLUID AND USAGE CHART 87-18-14

FORD: 1986 And Prior LTD 1988 And Prior ESCORT, TEMPO, MUSTANG, TAURUS, THUNDERBIRD, FORD

LINCOLN-MERCURY: 1986 And Prior CAPRI, MARQUIS 1987 And Prior LYNX 1988 And Prior TOPAZ, SABLE, COUGAR, MERCURY, MARK VII, CONTINENTAL, LINCOLN TOWN CAR

MERKUR: 1985-88 XR4Ti 1988 SCORPIO

LIGHT TRUCK: 1988 And Prior E SERIES, F SERIES, BRONCO, RANGER, BRONCO II, AEROSTAR

ISSUE: A new Transmission Fluid, MERCON (Ford Specification "MERCON") (XT-2- QDX, Quart), (XT-2-DDX, 55 Gallon Drum) is available for service. Use of the Motorcraft "MERCON" transmission fluid, where specified, will improve cold weather shift effort and synchronized operation.

ACTION: The chart on page 44 of this TSB gives transmission fluid applications for automatic transmissions and certain manual transmissions for Ford, Lincoln-Mercury, and Merkur vehicles.

NOTE: The use of MERCON is NOT RECOMMENDED for power steering systems. The manual transmission lubricant for the 1985 Merkur XR4Ti is a semi-synthetic oil. When adding oil to the transmission, use only E5RY-19C547-A (Ford Specification ESD-M2C175-A) or equivalent.

PART NUMBER PART NAME CLASS

XT-2-QDX MERCON - Quart V

XT-2-DDX MERCON - 55 Gallon V

Drum

E5RY-19C547-A Semi-Synthetic Oil B

OTHER APPLICABLE ARTICLES: 82-9-9 Supersedes 85-1-15, 85-6-7 WARRANTY STATUS: "INFORMATION ONLY"

Fluid - A/T: All Technical Service Bulletins A/T - Synthetic Fluid Availability

Article No. 86-11-17

TRANSMISSION - AUTOMATIC - NEW SYNTHETIC DEXRON II ALL WEATHER AUTOMATIC TRANSMISSION FLUID

FORD 1986 and PRIOR ESCORT, EXP, FORD, LTD, THUNDERBIRD, MUSTANG, TEMPO; 1986 TAURUS

LINCOLN-MERCURY 1982-83 LN7; 1986 and PRIOR LYNX, MERCURY, MARQUIS, COUGAR, CAPRI, TOPAZ, LINCOLN, MARK, CONTINENTAL; 1986 SABLE

LIGHT TRUCK 1986 and PRIOR E, F SERIES, BRONCO, BRONCO II, RANGER

A new synthetic Dexron II automatic transmission fluid specification number ESR-M2C163-A2, part number E6AZ-19582-B is now available. This fluid will maintain a more constant viscosity through a wider range of temperatures.

In the event a vehicle will be operated in extremely cold temperatures for an extended period of time, remove all existing fluid from the transmission (using the procedure shown in the applicable 1986 Car or Light Truck Shop Manual) and replace with the new synthetic Dexron II fluid, E6AZ-19582-B. The synthetic fluid is year 'round fluid and will not require replacement for warmer weather.

CAUTION: DO NOT use synthetic Dexron II fluid in transmissions designed to use Type "F" fluid.

PART NUMBER PART NAME CLASS

E6AZ-19582-B Synthetic Dexron Oil V

Automatic Transmission Oil

OTHER APPLICABLE ARTICLES: None WARRANTY STATUS: "INFORMATION ONLY"

Fluid - A/T: All Technical Service Bulletins A/T - Mercon V ATF Usage

TSB 06-14-4

07/24/06

MERCON ATF IS BEING REPLACED BY MERCON V ATF AS A SERVICE FLUID.

FORD: 1980-1997 Crown Victoria 1981-1997 Mustang, Thunderbird 1981-2003 Escort 1986-1993 Festiva 1986-1997 Taurus 1989-1997 Probe 1994-1997 Aspire 1995-2000 Contour 1980-1996 Bronco 1981-2003 F-150 1981-2004 E-Series, F-Super Duty 1983-1996 Ranger 1986-1996 Aerostar 1991-1997 Explorer 1993-2004 F-53 Motorhome Chassis 1995-1998 Windstar 1997-2004 Expedition 2000-2005 Excursion 2001-2007 Escape 1987-2000 F-B-Series 2000-2007 F-650, F-750

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MERCURY: 1980-1997 Grand Marquis 1981-1997 Cougar 1986-1997 Sable 1987-1999 Tracer 1995-2000 Mystique 1999-2002 Cougar 1993-2002 Villager 1997 Mountaineer 2005-2007 Mariner

MERKUR: 1985-1989 XR4TI

This article supersedes TSB 01-15-7 to update the vehicle application chart.

ISSUE MERCON(R) Automatic Transmission Fluid is being replaced by MERCON(R) V as a service fluid.

ACTION Beginning immediately all automatic transmission / transaxle applications requiring MERCON(R) can now be serviced using MERCON(R) V or MERCON(R) Automatic Transmission Fluid or dual usage fluids labeled MERCON(R) / MERCON(R) V. After July 1, 2007, MERCON(R) Automatic Transmission Fluid will no longer be manufactured, therefore, availability of this fluid will only continue for however long it takes to deplete what remains in inventory.

SERVICE PROCEDURE

AUTOMATIC TRANSMISSION FLUID CHART

TRANSMISSIONS

TRANSAXLES

Specific service fluids (listed to the right) are called for depending on the type of transmisson and the year the transmission was built. It is important to use the correct fluid, each fluid exhibits different properties and should be used only in the transmisson for which they were designed. The vehicle owner or rebuilder should use the type of fluid printed in the owners guide or on the automatic transmission fluid level indicator. Refer to your scheduled maintenance guide to determine the correct service interval. Failure to use the recommended fluid may affect transmisson performance and durability.

CAUTION:
DO NOT USE SUPPLEMENTAL TRANSMISSION FLUID ADDITIVES, TREATMENTS OR CLEANING AGENTS. The use of these materials may affect transmission operation and result in damage to internal transmission components.

CAUTION:
MERCON® SP, Motorcraft® Premium Automatic Transmission Fluid and Motorcraft® M5 ATF's are unique fluids and MUST be used in applications recommending that particular fluid. Use of any other fluid may cause reduced functionality or transmission damage.

CAUTION:
The functional characteristics of fluids for the CVT transmissions are very different than those of other ATF's. Use of a fluid other than Motorcraft® Continuously Variable Chain Type Transmission Fluid or one labeled as meeting MERCON® C may cause severe transmission damage.

FAILURE TO USE RECOMMENDED FLUID WILL AFFECT TRANSMISSION PERFORMANCE. REFER TO OWNERS MANUAL AND/OR FLUID LEVEL INDICATOR FOR PROPER FLUID TYPE.

V **MERCON® V**
- Part number XT-5-QM (Quarts) and XT-5-DM (55 Gallon Drum) Ford Specification is MERCON® V.

NOTE: AUTOMATIC TRANSMISSIONS REQUIRING MERCON® V SHOULD ONLY BE SERVICED WITH MERCON® V, OR FLUID FROM A CONTAINER THAT IS SPECIFIED AS A DUAL USAGE FLUID: MERCON®/MERCON®V.

SP **MERCON® SP**
- Part number XT-6-QSP (Quarts) and XT-6-DSP (55 Gallon Drum) Ford Specification is MERCON® SP.

CVT **CONTINUOUSLY VARIABLE CHAIN TYPE**
- Part number XT-7-QCFT (Quarts)

P **PREMIUM AUTOMATIC TRANSMISSION FLUID**
- Part number XT-8-QAW.

M5 **MAZDA SPECIFIC FLUID**
- Part number XT-9-QMM5.

V M **MERCON® - Part number XT-2-QDX (Quarts) and XT-2-DDX (55 Gallon Drum) or, MERCON® V - Part number XT-5-QM (Quarts) and XT-5-DM (55 Gallon Drum)**

NOTE: AUTOMATIC TRANSMISSIONS REQUIRING MERCON® CAN NOW BE SERVICED WITH MERCON®, MERCON® V, OR, DUAL USAGE FLUIDS LABELED MERCON®/MERCON®V.

TB-8592-D

Figure 1

Service automatic transmissions requiring MERCON(R) with MERCON(R) V or MERCON(R) Automatic Transmission Fluid or dual usage fluids labeled MERCON(R) / MERCON(R) V

For proper fluid application on current and past model vehicles equipped with automatic transmissions I transaxles refer to the fluid usage chart. (Figure 1)

CAUTION

AUTOMATIC TRANSMISSIONS / TRANSAXLES THAT REQUIRE MERCON® V SHOULD STILL ONLY USE MERCON(R) V OR DUAL USAGE FLUID LABELED MERCON(R) / MERCON(R) V.

PART NUMBER	PART NAME
XT-2-QDX	MERCON® (Quart)
XT-2-DDX	MERCON® (55 Gal. Drum)
XT-5-QM	MERCON® V (Quart)
XT-5-DM	MERCON® V (55 Gal. Drum)

NOTE: The information in Technical Service Bulletins is intended for use by trained, professional technicians with the knowledge, tools, and equipment to do the job properly and safely. It informs these technicians of conditions that may occur on some vehicles, or provides information that could assist in proper vehicle service. The procedures should not be performed by "do-it-yourselfers". Do not assume that a condition described affects your car or truck. Contact a Ford, Lincoln, or Mercury dealership to determine whether the Bulletin applies to your vehicle.

CAUTION

MERCON(R) SP, MOTORCRAFT PREMIUM AUTOMATIC TRANSMISSION FLUID AND MOTORCRAFT M5 ATFS ARE UNIQUE FLUIDS AND MUST BE USED IN APPLICATIONS RECOMMENDING THAT PARTICULAR FLUID.

USE OF ANY OTHER FLUID MAY CAUSE REDUCED FUNCTIONALITY OR TRANSMISSION DAMAGE.

CAUTION

THE FUNCTIONAL CHARACTERISTICS OF FLUIDS FOR CVT TRANSMISSIONS ARE VERY DIFFERENT THAN THOSE OF OTHER AUTOMATIC TRANSMISSION FLUIDS (ATFS).

USE OF A FLUID OTHER THAN MOTORCRAFT CONTINUOUSLY VARIABLE CHAIN TYPE TRANSMISSION FLUID OR ONE LABELED AS MEETING MERCON(R) C WILL CAUSE FUNCTIONALITY CONCERNS AND INTERNAL TRANSMISSION DAMAGE.

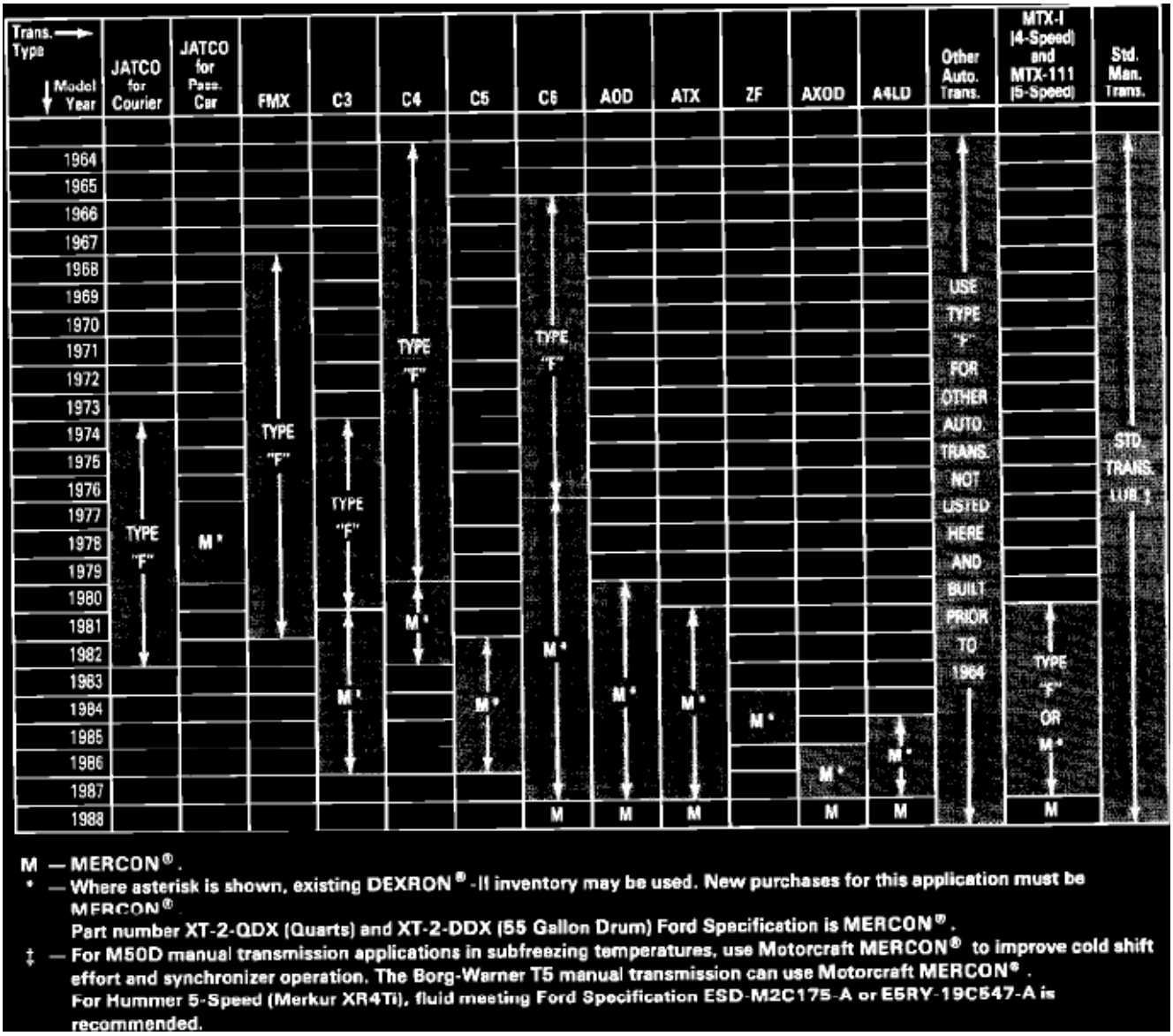
CAUTION

DO NOT USE AUTOMATIC TRANSMISSION FLUID SUPPLEMENTS, ADDITIVES, TREATMENTS OR CLEANING AGENTS.

Parts Block

WARRANTY STATUS: Information Only

Disclaimer



Fluid - A/T: All Technical Service Bulletins A/T, M/T - New `Mercon' Transmission Fluid

TRANSMISSION - AUTOMATIC/MANUAL - Article No.

NEW FLUID AND USAGE CHART 87-18-14

FORD: 1986 And Prior LTD 1988 And Prior ESCORT, TEMPO, MUSTANG, TAURUS, THUNDERBIRD, FORD

LINCOLN-MERCURY: 1986 And Prior CAPRI, MARQUIS 1987 And Prior LYNX 1988 And Prior TOPAZ, SABLE, COUGAR, MERCURY, MARK VII, CONTINENTAL, LINCOLN TOWN CAR

MERKUR: 1985-88 XR4Ti 1988 SCORPIO

LIGHT TRUCK: 1988 And Prior E SERIES, F SERIES, BRONCO, RANGER, BRONCO II, AEROSTAR

ISSUE: A new Transmission Fluid, MERCON (Ford Specification "MERCON") (XT-2- QDX, Quart), (XT-2-DDX, 55 Gallon Drum) is available for service. Use of the Motorcraft "MERCON" transmission fluid, where specified, will improve cold weather shift effort and synchronized operation.

ACTION: The chart on page 44 of this TSB gives transmission fluid applications for automatic transmissions and certain manual transmissions for Ford, Lincoln-Mercury, and Merkur vehicles.

NOTE: The use of MERCON is NOT RECOMMENDED for power steering systems. The manual transmission lubricant for the 1985 Merkur XR4Ti is a semi-synthetic oil. When adding oil to the transmission, use only E5RY-19C547-A (Ford Specification ESD-M2C175-A) or equivalent.

PART NUMBER PART NAME CLASS

XT-2-QDX MERCON - Quart V

XT-2-DDX MERCON - 55 Gallon V

Drum

E5RY-19C547-A Semi-Synthetic Oil B

OTHER APPLICABLE ARTICLES: 82-9-9 Supersedes 85-1-15, 85-6-7 WARRANTY STATUS: "INFORMATION ONLY"

Fluid - A/T: Specifications

Type MERCON(R) Automatic Transmission Fluid

CAPACITY, Initial Refill*: C-6 5.0 qt (US)

With the engine at operating temperature, shift

transmission through all gears. Check fluid level in PARK

and add fluid as needed

Others 3.0 qt (US)

Fluid - A/T: Specifications

Type MA(MERCON (R) Automatic Transmission Fluid)

CAPACITY, Total Fill: Tempo, Topaz 8.3 qt (US)

Others 9.8 qt (US)

DRIVETRAIN LUBRICANTS

	MANUAL TRANSMISSIONS										M/T RELATED		
	4 Spd. T18	4 Spd. NPG 435	M40D TOD	4 Spd. T19	5 Spd. TMA	5 Spd. MMC FM145	5 Spd. MMC FM146	5 Spd. R1 Mazda	5 Spd. R2 Mazda	5 Spd. ZF S5-42	Speedometer Driven Gear	Shift Lever Lower Ball End - MMC	Shift Lever Seat/Cap 435, T18, T19
1980	1	1	1								2		2
1981	1	1	1								2		2
1982	1	1	1								2		2
1983	1	1	1	1	5	1					3	2	2
1984	1	1	1	1	5	1					3	2	2
1985	1	1	1	1	5	1					3	2	2
1986	1	1	1	1	5	1					3	2	2
1987	1	1	1	1	5	1				4	3	2	2
1988	1						1	4	4	4	3	2	2
1989							1	4	4	4	3	2	2

LEGEND

Service Part	Description	Specification
1: D8DZ-19C547-A	Standard Transmission Lubricant	ESP M2C83C
2: C1AZ-19590-BA	Long Life Lubricant (Molybdenum Disulfide)	ESA M1CA75B
3: D0AZ-19584-AA D7AZ-19584-AA	Multi-Purpose Grease	ESR M1C159A ESB M1C93A ESB M1C106B
4: XT-2-QDX	Mercon	Mercon, Dexron II ESP-M2C166-H (Type H) ESP-M2C138-CJ (Type A)

Service Part	Description	Specification
5: E5RY-19C547-A	Merkur Synthentic Gear Oil (Dana Axles)	ESD M2C175A
6: C6AZ-19580-E	Additive Friction Modifier	ESW M2C105A
7: C8AZ-19B546-A	Disc Brake Caliper Slide Grease	EST M2C118A
8: D7AZ-19590-A		ESA M1C172A
9: E8TZ-19590-A	Grease	ESA M1C198A
10: E1TZ-19590-A	Automatic Hublock Grease	ESL M1C193 A

DRIVETRAIN LUBRICANTS

	FRONT DRIVE AXLES				TRANSFER CASE					HUBLOCKS			
	Gear Lubricants	Friction Modifier	Upper/Lower Brake Caliper Rails	Wheel and Spindle Bearings, U-Joints and Wheel End Oil Seals	BW 13-45	BW 13-50	BW 13-56	NPG 208	Shift Lever Ball End	R & B II Manual Hublock	R & B II Auto. Hublock	F & B Manual Hublock	F & B Auto. Hublock
1980	6	7	8	9	4	4	4	4	2	2	2	2	11
1981	6	7	8	9	4	4	4	4	2	2	2	2	11
1982	6	7	8	9	4	4	4	4	2	2	2	2	11
1983	6	7	8	9	4	4	4	4	2	2	2	2	11
1984	6	7	8	9	4	4	4	4	2	2	2	2	11
1985	6	7	8	9	4	4	4	4	2	2	2	2	11
1986	6	7	8	9	4	4	4	4	2	2	2	2	11
1987	6	7	8	9	4	4	4	4	2	2	2	2	11
1988	6	7	8	9	4	4	4	4	2	2	2	2	11
1989	6	7	8	9	4	4	4	4	2	2	2	2	11

LEGEND

Service Part	Description	Specification
1: D8DZ-19C547-A	Standard Transmission Lubricant	ESP M2C83C
2: C1AZ-19590-BA	Long Life Lubricant (Molybdenum Disulfide)	ESA M1CA75B
3: D0AZ-19584-AA D7AZ-19584-AA	Multi-Purpose Grease	ESR M1C159A ESB M1C93A ESB M1C106B
4: XT-2-QDX	Mercon	Mercon, Dexron II ESP-M2C166-H (Type H) ESP-M2C138-CJ (Type A)

Service Part	Description	Specification
5: E5RY-19C547-A	Merkur Synthentic Gear Oil (Dana Axles)	ESD M2C175A
6: C6AZ-19580-E	Additive Friction Modifier	ESW M2C105A
7: C8AZ-19B546-A	Disc Brake Caliper Slide Grease	EST M2C118A
8: D7AZ-19590-A		ESA M1C172A
9: E8TZ-19590-A	Grease	ESA M1C198A
10: E1TZ-19590-A	Automatic Hublock Grease	ESL M1C193 A

Article No. 89-8-16

^ DRIVETRAIN - LUBRICATION USAGE

^ TRANSMISSION - MANUAL - LUBRICATION USAGE

LIGHT TRUCK: 1980-89 BRONCO, ECONOLINE, F-150, F-250, F-350 1983-89 RANGER 1984-89 BRONCO II 1986-89 AEROSTAR

ISSUE: A quick reference manual transmission fluid usage chart and a quick reference drivetrain lubrication usage chart for light trucks has been put together to assist technicians in the event service is required.

FIGURE 1

FIGURE 2

ACTION: Refer to the transmission fluid application chart in Figure 1 for the correct fluid usage. Refer to the drivetrain lubrication application chart in Figure 2 for the correct lubricant usage.

PART NUMBER PART NAME CLASS

D8DZ-19C547-A Standard Transmission BG

Lubricant - 5 gallons C1AZ-19590-BA

Long Life Lubricant B

(molybdenum disulfide) - 14.5 ounces

DOAZ-19584-AA Multi-Purpose Grease - 4 ounce B

tube

D7AZ-19584-AA Multi-Purpose Grease - 15 B

ounce aerosol can

XT-2-QDX Transmission Fluid (Mercon) - V

quart can (pkg. of 12)

C6AZ-19580-E Gear Oil (Dana axle) - 1 gallon AG

C8AZ-19B546-A Additive Friction Modifier - 4 AM

ounce bottle

D7AZ-19590-A Disc Brake Caliper Slide AM

Grease - 4 ounce tube

E8TZ-19590-A Grease - 14.5 ounces B

E1TZ-19590-A Automatic Hublock Grease - 5 B

ounce tube

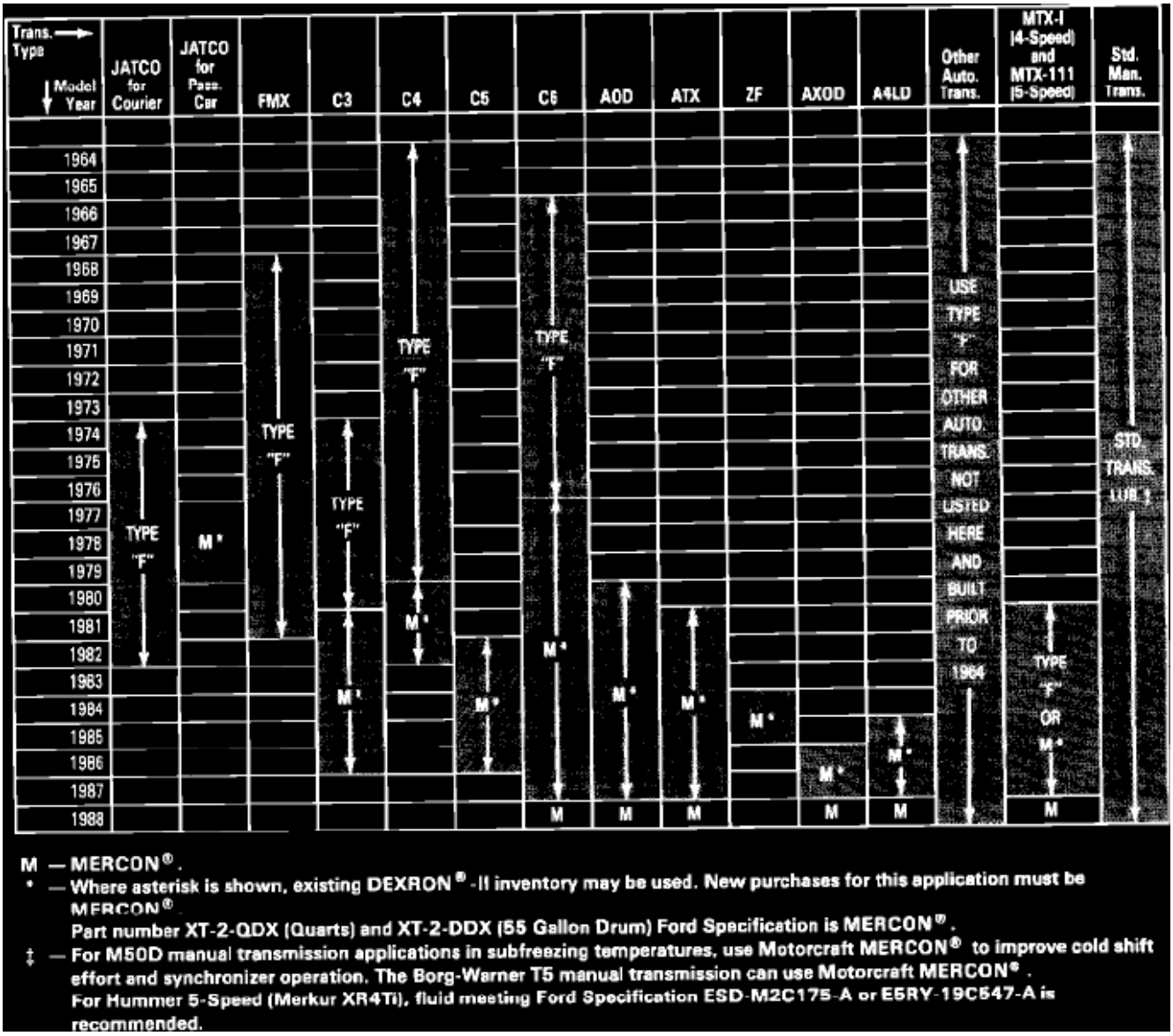
E5RY-19C547-A Merkur Synthetic Manual B

Transmission Fluid

OTHER APPLICABLE ARTICLES: None

WARRANTY STATUS: INFORMATION ONLY

OASIS CODES: 5970



Fluid - M/T: Technical Service Bulletins A/T, M/T - New `Mercon' Transmission Fluid

TRANSMISSION - AUTOMATIC/MANUAL - Article No.

NEW FLUID AND USAGE CHART 87-18-14

FORD: 1986 And Prior LTD 1988 And Prior ESCORT, TEMPO, MUSTANG, TAURUS, THUNDERBIRD, FORD

LINCOLN-MERCURY: 1986 And Prior CAPRI, MARQUIS 1987 And Prior LYNX 1988 And Prior TOPAZ, SABLE, COUGAR, MERCURY, MARK VII, CONTINENTAL, LINCOLN TOWN CAR

MERKUR: 1985-88 XR4Ti 1988 SCORPIO

LIGHT TRUCK: 1988 And Prior E SERIES, F SERIES, BRONCO, RANGER, BRONCO II, AEROSTAR

ISSUE: A new Transmission Fluid, MERCON (Ford Specification "MERCON") (XT-2- QDX, Quart), (XT-2-DDX, 55 Gallon Drum) is available for service. Use of the Motorcraft "MERCON" transmission fluid, where specified, will improve cold weather shift effort and synchronized operation.

ACTION: The chart on page 44 of this TSB gives transmission fluid applications for automatic transmissions and certain manual transmissions for Ford, Lincoln-Mercury, and Merkur vehicles.

NOTE: The use of MERCON is NOT RECOMMENDED for power steering systems. The manual transmission lubricant for the 1985 Merkur XR4Ti is a semi-synthetic oil. When adding oil to the transmission, use only E5RY-19C547-A (Ford Specification ESD-M2C175-A) or equivalent.

PART NUMBER PART NAME CLASS

XT-2-QDX MERCON - Quart V

XT-2-DDX MERCON - 55 Gallon V

Drum

E5RY-19C547-A Semi-Synthetic Oil B

OTHER APPLICABLE ARTICLES: 82-9-9 Supersedes 85-1-15, 85-6-7 WARRANTY STATUS: "INFORMATION ONLY"

Fluid - M/T: Specifications

TYPE 80W EP

CAPACITY, Refill: 3-speed 3.5 pt (US)

4-speed ex. OD 7.0 pt (US)

W/OD 4.5 pt (US)

DRIVETRAIN LUBRICANTS

	MANUAL TRANSMISSIONS										M/T RELATED		
	4 Spd. T18	4 Spd. NPG 435	M40D TOD	4 Spd. T19	5 Spd. TMA	5 Spd. MMC FM145	5 Spd. MMC FM146	5 Spd. R1 Mazda	5 Spd. R2 Mazda	5 Spd. ZF S5-42	Speedometer Driven Gear	Shift Lever Lower Ball End - MMC	Shift Lever Seal/Cap 435, T18, T19
1980	1	1	1								2		2
1981	1	1	1								2		2
1982	1	1	1								2		2
1983	1	1	1	1	5	1					3	2	2
1984	1	1	1	1	5	1					3	2	2
1985	1	1	1	1	5	1					3	2	2
1986	1	1	1	1	5	1					3	2	2
1987	1	1	1	1	5	1				4	3	2	2
1988	1						1	4	4	4	3	2	2
1989							1	4	4	4	3	2	2

LEGEND

Service Part	Description	Specification
1: D8DZ-19C547-A	Standard Transmission Lubricant	ESP M2C83C
2: C1AZ-19590-BA	Long Life Lubricant (Molybdenum Disulfide)	ESA M1CA75B
3: D0AZ-19584-AA D7AZ-19584-AA	Multi-Purpose Grease	ESR M1C159A ESB M1C93A ESB M1C106B
4: XT-2-QDX	Mercon	Mercon, Dexron II ESP-M2C166-H (Type H) ESP-M2C138-CJ (Type A)

Service Part	Description	Specification
5: E5RY-19C547-A	Merkur Synthentic Gear Oil (Dana Axles)	ESD M2C175A
6: C6AZ-19580-E	Additive Friction Modifier	ESW M2C105A
7: C8AZ-19B546-A	Disc Brake Caliper Slide Grease	EST M2C118A
8: D7AZ-19590-A		ESA M1C172A
9: E8TZ-19590-A	Grease	ESA M1C198A
10: E1TZ-19590-A	Automatic Hublock Grease	ESL M1C193 A

DRIVETRAIN LUBRICANTS

	FRONT DRIVE AXLES				TRANSFER CASE					HUBLOCKS			
	Gear Lubricants	Friction Modifier	Upper/Lower Brake Caliper Rails	Wheel and Spindle Bearings, U-Joints and Wheel End Oil Seals	BW 13-45	BW 13-50	BW 13-56	NPG 208	Shift Lever Ball End	R & B II Manual Hublock	R & B II Auto. Hublock	F & B Manual Hublock	F & B Auto. Hublock
1980	6	7	8	9	4	4	4	4	2	2	2	2	11
1981	6	7	8	9	4	4	4	4	2	2	2	2	11
1982	6	7	8	9	4	4	4	4	2	2	2	2	11
1983	6	7	8	9	4	4	4	4	2	2	2	2	11
1984	6	7	8	9	4	4	4	4	2	2	2	2	11
1985	6	7	8	9	4	4	4	4	2	2	2	2	11
1986	6	7	8	9	4	4	4	4	2	2	2	2	11
1987	6	7	8	9	4	4	4	4	2	2	2	2	11
1988	6	7	8	9	4	4	4	4	2	2	2	2	11
1989	6	7	8	9	4	4	4	4	2	2	2	2	11

LEGEND

Service Part	Description	Specification
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3: D0AZ-19584-AA D7AZ-19584-AA	Multi-Purpose Grease	ESR M1C159A ESB M1C93A ESB M1C106B
4: XT-2-QDX	Mercon	Mercon, Dexron II ESP-M2C166-H (Type H) ESP-M2C138-CJ (Type A)

Service Part	Description	Specification
5: E5RY-19C547-A	Merkur Synthentic Gear Oil (Dana Axles)	ESD M2C175A
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7: C8AZ-19B546-A	Disc Brake Caliper Slide Grease	EST M2C118A
8: D7AZ-19590-A		ESA M1C172A
9: E8TZ-19590-A	Grease	ESA M1C198A
10: E1TZ-19590-A	Automatic Hublock Grease	ESL M1C193 A

Article No. 89-8-16

^ DRIVETRAIN - LUBRICATION USAGE

^ TRANSMISSION - MANUAL - LUBRICATION USAGE

LIGHT TRUCK: 1980-89 BRONCO, ECONOLINE, F-150, F-250, F-350 1983-89 RANGER 1984-89 BRONCO II 1986-89 AEROSTAR

ISSUE: A quick reference manual transmission fluid usage chart and a quick reference drivetrain lubrication usage chart for light trucks has been put together to assist technicians in the event service is required.

FIGURE 1

FIGURE 2

ACTION: Refer to the transmission fluid application chart in Figure 1 for the correct fluid usage. Refer to the drivetrain lubrication application chart in Figure 2 for the correct lubricant usage.

PART NUMBER PART NAME CLASS

D8DZ-19C547-A Standard Transmission BG

Lubricant - 5 gallons C1AZ-19590-BA

Long Life Lubricant B

(molybdenum disulfide) - 14.5 ounces

DOAZ-19584-AA Multi-Purpose Grease - 4 ounce B

tube

D7AZ-19584-AA Multi-Purpose Grease - 15 B

ounce aerosol can

XT-2-QDX Transmission Fluid (Mercon) - V

quart can (pkg. of 12)

C6AZ-19580-E Gear Oil (Dana axle) - 1 gallon AG

C8AZ-19B546-A Additive Friction Modifier - 4 AM

ounce bottle

D7AZ-19590-A Disc Brake Caliper Slide AM

Grease - 4 ounce tube

E8TZ-19590-A Grease - 14.5 ounces B

E1TZ-19590-A Automatic Hublock Grease - 5 B

ounce tube

E5RY-19C547-A Merkur Synthetic Manual B

Transmission Fluid

OTHER APPLICABLE ARTICLES: None

WARRANTY STATUS: INFORMATION ONLY

OASIS CODES: 5970

Fluid - Differential: Technical Service Bulletins Front/Rear Drive Axles - Lubricant Drain/Fill Procedure

Article No. 83-3-23

FRONT AND REAR DRIVE AXLES - LUBRICANT DRAIN AND FILL PROCEDURE

LIGHT TRUCKS 1979-83 F100-350, BRONCO, E100-350, RANGER, BRONCO II

The following is the recommended procedure for draining axle lubricant from front and/or rear driving axles on all light truck models.

1. Drive the vehicle for 10-15 miles at highway speed to warm axle lubricant to operating temperature and minimum viscosity.

2. Raise the vehicle on a hoist and place a drain pan under the axle to be drained.

3. Wire brush the filler plug area of the axle housing cover or carrier assembly to prevent possible entry of dirt, rust, etc. into the axle assembly.

4. Remove the axle lubricant fill plug.

5. Using a suitable suction-type utility pump (manual or powered), drain the axle lubricant from the axle by inserting the pump suction hose through axle filler plug hole down into the lowest portion of the axle carrier housing removing all the lubricant.

6. Fill the axle housing with the specified amount and type of lubricant as shown on the following specification charts.

7. Install the filler plug and torque as shown on the following specification charts.

FRONT/REAR DRIVING AXLE SPECIFICATION CHARTS

I. Filler Rug Torque Chart

Axle Fill Plug Torque -

All Dana Front/Rear 20-30 Ft.Lbs.

- Ford Built Rear Axles 25-50 Ft.Lbs.

II. Axle Lubricant Capacities - Econoline

Approximate Capacity (1) U.S. Pints (2) Ford Standard and Traction-Lok

5.5 (3)

(E-100/150)

Dana Standard and Limited Slip 6.0 (4)

(E-250, Model 60/61-2)

Dana Standard and Limited Slip 6.5 (4)

(Model 70), Dual Rear Wheels

Ford Standard and Traction-Lok 5.5

(E-250 Van)

Dana Standard and Limited Slip 6.0 (4)

(Model 61-1) Single Rear Wheels

(1) Service refill capacities are determined by filling to the bottom of the filler hole.

(2) All Ford Conventional and Traction-Lok Rear Axles -

Use ESP-M2C154-A All Dana Conventional and Limited-Slip Rear Axles - Use ESW-M2C105-A

(3) Add 4 ounces of EST-M2C118-A (Friction Modifier C8AZ-19B546-A) for complete fill of Ford TractionLok axle.

(4) Add 4 ounces of EST-M2C118-A (Friction Modifier C8AZ-19B546-A) for complete refill of Dana Rear Limited-Slip Axle.

III. Axle Lubricant Capacities - Bronco Chart

Approximate Capacity (1) U.S. Pints Front Axle (5) Dana

3.8 (3)

Rear Axle (4) Ford 5.5 (2)

(1) Refill Capacity is determined by filling to the bottom of the filler hole.

(2) All Ford Conventional and Traction-Lok Rear Axles -

Use ESP-M2C154-A.

(3) All Dana Conventional and Limited-Slip Front Drive

Axles - Use ESW-M2C105-A.

(4) Add 4 ounces of EST-M2C118-A (Friction Modifier C8AZ-19B546-A) for complete fill of Ford TractionLok Axle (1979-1982).

(5) Add 2 ounces of EST-M2C118-A (Friction Modifier C8AZ-19B546-A) for complete refill of Dana Front Limited-Slip Axle.

IV. Axle Lubricant Capacities - F100 - F350 (4x2/4x4)

Approximate Capacity (1) U.S. Measure Axle Model (4)

Truck Type (Pints)

Ford 8.8" and 9" F100/150/250 5.5 (3)

Dana 44-IFS (Front Axle) F150/250 (4x4) 3.8

Dana 60 (Rear) F250 6.0

Dana 61-2 (Rear) F250 6.0

Dana 50-IFS (Front Axle) F250/350 (4x4) Heavy 4.1

Duty & Snow Plow

Dana 70 (Rear) F350 DRW Chassis Cab 6.5

Dana 70 HD (Rear) F350 DRW Regular Cab 7.4

Dana 61-1 (Rear F250/350 SRW 6.0

(1) Service refill capacities are determined by filling to the

bottom of the filler hole.

(2) Add EST-M2C118-A (Friction Modifier Part No. C8AZ-19B546-A) for complete refill of Dana LimitedSlip axles. Add 4 ounces for F250/350 Rear. For F150 & F250 4x4 add 2 ounces to front axle.

(3) Add 4 ounces of EST-M2C118-A (Friction Modifier C8AZ-19B546-A) for complete fill of Ford TractionLok Axle (1979-1982).

(4) All Ford Conventional and Traction-Lok Rear Axles -

Use ESP-M2C154-A. All Dana Conventional and Limited-Slip Front/Rear Axles - Use ESW-M2C105-A.

V. Axle Lubricant Capacities - Ranger 4x2/4x4, Bronco II

Approximate Capacities

U.S. Imperial

Measure Measure

(Pints) (Pints) Liters

Rear Ford 6-3/4 Ring Gear (1)(4) 3.0 2.5 1.4

Rear Ford 7.5 Ring Gear (2)(4) 5.0 (6) 4.2 2.4

Dana 28 Front Axle (4x4 Only)(3)(5) 1.0 (7) 0.83 0.45

Bronco II Ford 7.5 Ring Gear(2)(4) 5.5 (6) 4.6 2.6

(1) Fill to 3/8 in. +/- 1/8 in. (9.5 mm +/- 3 mm) below bottom of fill hole. Base GVW axle with 2.0L engine and 2.3L engine with automatic.

(2) Fill to 1/2 in. +/- 1/8 in. (12.7 mm t 3 mm) below bottom of fill hole. Optional GVW or 2.3L engine.

(3) Fill to 1/2 in. +/- 1/8 in. (12.7 mm + 3 mm) below bottom of fill hole.

(4) All Ford Conventional and Traction-Lok Rear Axles -

Use ESP-M2C154-A.

(5) All Dana Conventional and Limited-Slip Front Axles - Use ESW-M2C105-A.

(6) Add 4 ounces of EST-M2C118-A (Friction Modifier C8AZ-19B546-A) for complete fill of Ford TractionLok Axle.

(7) Add 1/2 ounce of EST-M2C118-A (Friction Modifier C8AZ-19B546-A) for complete refill of Dana Front Limited-Slip Axle.

PART NUMBER PART NAME CLASS

E0AZ-19580-A Lubricant-ESP-M2C154-A AM

C6AZ-19580-E Lubricant-ESW-M2C105-A AG

C8AZ-19B546-A Friction Modifier-EST-M2C118-A A

OTHER APPLICABLE ARTICLES: None WARRANTY STATUS: "INFORMATION ONLY"

Fluid - Differential: Capacity Specifications

TYPE: Standard 90 HP

Limited-Slip 90 HP*

CAPACITY, Refill: Front: All models 4.0 pt (US)

LIMITED-SLIP OR TRACTION-LOK IDENTIFICATION: Letter &

number on plate on door lock pillar

Rear: Dana 60 5.0 pt (US)

Dana 61 6.0 pt (US)

1982 70 HD 7.4 pt (US)

1981 Econoline w/Dana 70 7.0 pt (US)

Others 6.5 pt (US)

Fluid - Differential: Fluid Type Specifications

BL Self-adjusting Brake Lubricant

EC Ethylene Glycol Coolant

Mix 50/50 with water to at least -20°F (-29°C) protection

EP Extreme Pressure Gear Lubricant

Ford Part No. D8DZ-19C547-A

FA Automatic Transmission Fluid, Type F

GL-5 Gear Oil, API Service GL-5

HBH Hydraulic Brake Fluid, Extra

Heavy-Duty

HP Hypoid Gear Oil

Ford Part No. E0AZ-19580-A

HP* Hypoid Gear Oil for Limited-Slip

or Traction-Lok Differential

LM Lithium Grease, with Polyethylene

LS Steering Gear Lubricant

MA MERCONAutomatic Transmission

Fluid

MH Manifold Heat Valve Solvent

SG Motor Oil, API Service SG

DRIVETRAIN LUBRICANTS

	MANUAL TRANSMISSIONS										M/T RELATED		
	4 Spd. T18	4 Spd. NPG 435	M40D TOD	4 Spd. T19	5 Spd. TMA	5 Spd. MMC FM145	5 Spd. MMC FM146	5 Spd. R1 Mazda	5 Spd. R2 Mazda	5 Spd. ZF S5-42	Speedometer Driven Gear	Shift Lever Lower Ball End - MMC	Shift Lever Seal/Cap 435, T18, T19
1980	1	1	1								2		2
1981	1	1	1								2		2
1982	1	1	1								2		2
1983	1	1	1	1	5	1					3	2	2
1984	1	1	1	1	5	1					3	2	2
1985	1	1	1	1	5	1					3	2	2
1986	1	1	1	1	5	1					3	2	2
1987	1	1	1	1	5	1				4	3	2	2
1988	1						1	4	4	4	3	2	2
1989							1	4	4	4	3	2	2

LEGEND

Service Part	Description	Specification
1: D8DZ-19C547-A	Standard Transmission Lubricant	ESP M2C83C
2: C1AZ-19590-BA	Long Life Lubricant (Molybdenum Disulfide)	ESA M1CA75B
3: D0AZ-19584-AA D7AZ-19584-AA	Multi-Purpose Grease	ESR M1C159A ESB M1C93A ESB M1C106B
4: XT-2-QDX	Mercon	Mercon, Dexron II ESP-M2C166-H (Type H) ESP-M2C138-CJ (Type A)

Service Part	Description	Specification
5: E5RY-19C547-A	Merkur Synthentic Gear Oil (Dana Axles)	ESD M2C175A
6: C6AZ-19580-E	Additive Friction Modifier	ESW M2C105A
7: C8AZ-19B546-A	Disc Brake Caliper Slide Grease	EST M2C118A
8: D7AZ-19590-A		ESA M1C172A
9: E8TZ-19590-A	Grease	ESA M1C198A
10: E1TZ-19590-A	Automatic Hublock Grease	ESL M1C193 A

DRIVETRAIN LUBRICANTS

	FRONT DRIVE AXLES				TRANSFER CASE					HUBLOCKS			
	Gear Lubricants	Friction Modifier	Upper/Lower Brake Caliper Rails	Wheel and Spindle Bearings, U-Joints and Wheel End Oil Seals	BW 13-45	BW 13-50	BW 13-56	NPG 208	Shift Lever Ball End	R & B II Manual Hublock	R & B II Auto. Hublock	F & B Manual Hublock	F & B Auto. Hublock
1980	6	7	8	9	4	4	4	4	2	2	2	2	11
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Service Part	Description	Specification
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2: C1AZ-19590-BA	Long Life Lubricant (Molybdenum Disulfide)	ESA M1CA75B
3: D0AZ-19584-AA D7AZ-19584-AA	Multi-Purpose Grease	ESR M1C159A ESB M1C93A ESB M1C106B
4: XT-2-QDX	Mercon	Mercon, Dexron II ESP-M2C166-H (Type H) ESP-M2C138-CJ (Type A)

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6: C6AZ-19580-E	Additive Friction Modifier	ESW M2C105A
7: C8AZ-19B546-A	Disc Brake Caliper Slide Grease	EST M2C118A
8: D7AZ-19590-A		ESA M1C172A
9: E8TZ-19590-A	Grease	ESA M1C198A
10: E1TZ-19590-A	Automatic Hublock Grease	ESL M1C193 A

Article No. 89-8-16

^ DRIVETRAIN - LUBRICATION USAGE

^ TRANSMISSION - MANUAL - LUBRICATION USAGE

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FIGURE 1

FIGURE 2

ACTION: Refer to the transmission fluid application chart in Figure 1 for the correct fluid usage. Refer to the drivetrain lubrication application chart in Figure 2 for the correct lubricant usage.

PART NUMBER PART NAME CLASS

D8DZ-19C547-A Standard Transmission BG

Lubricant - 5 gallons C1AZ-19590-BA

Long Life Lubricant B

(molybdenum disulfide) - 14.5 ounces

DOAZ-19584-AA Multi-Purpose Grease - 4 ounce B

tube

D7AZ-19584-AA Multi-Purpose Grease - 15 B

ounce aerosol can

XT-2-QDX Transmission Fluid (Mercon) - V

quart can (pkg. of 12)

C6AZ-19580-E Gear Oil (Dana axle) - 1 gallon AG

C8AZ-19B546-A Additive Friction Modifier - 4 AM

ounce bottle

D7AZ-19590-A Disc Brake Caliper Slide AM

Grease - 4 ounce tube

E8TZ-19590-A Grease - 14.5 ounces B

E1TZ-19590-A Automatic Hublock Grease - 5 B

ounce tube

E5RY-19C547-A Merkur Synthetic Manual B

Transmission Fluid

OTHER APPLICABLE ARTICLES: None

WARRANTY STATUS: INFORMATION ONLY

OASIS CODES: 5970

Fluid - Transfer Case: Capacity Specifications

TYPE MERCON(R) Automatic Transmission Fluid

CAPACITY, Refill: NP208 7.0 pt (US)

Warner 1345 6.5 pt (US)

Warner 1350 Ranger 3.0 pt (US)

Fluid - Transfer Case: Fluid Type Specifications

BL Self-adjusting Brake Lubricant

EC Ethylene Glycol Coolant

Mix 50/50 with water to at least -20°F (-29°C) protection

EP Extreme Pressure Gear Lubricant

Ford Part No. D8DZ-19C547-A

FA Automatic Transmission Fluid, Type F

GL-5 Gear Oil, API Service GL-5

HBH Hydraulic Brake Fluid, Extra

Heavy-Duty

HP Hypoid Gear Oil

Ford Part No. E0AZ-19580-A

HP* Hypoid Gear Oil for Limited-Slip

or Traction-Lok Differential

LM Lithium Grease, with Polyethylene

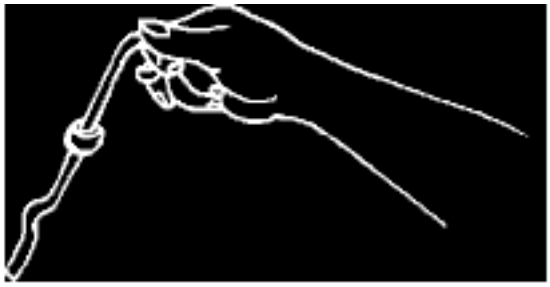
LS Steering Gear Lubricant

MA MERCONAutomatic Transmission

Fluid

MH Manifold Heat Valve Solvent

SG Motor Oil, API Service SG







Engine Oil: Technical Service Bulletins Engine - Oil Level Checking Procedure

Article No. 85-25-20

OIL DIPSTICK - ENGINE OIL LEVEL CHECKING PROCEDURE - GASOLINE ENGINES

LIGHT TRUCK 1986 AND PRIOR

MEDIUM/HEAVY TRUCK 1986 AND PRIOR

Figure 17 - Dipstick

To correctly check the engine oil level, the vehicle must be parked on a level surface. Allow a few minutes after shutting the engine off for oil to drain down before checking. For consistent oil level readings, insert the dipstick with the loop of the handle as shown in Figure 17.

Figure 18 - Dipstick - Calibration

Figure 19 - Dipstick - Calibration

Dipsticks in Ford vehicles do not incorporate a Full mark. Instead, the dipstick will have marks indicating a Safe range and an Add range as shown in Figure 18 or 19. When the correct amount of oil is in the engine, the oil level indication will be in the Safe range or above the Minimum mark, but not necessarily at the top of the Safe range or at the Maximum mark.

When the indicated oil level is in the Add range put one quart of oil in the engine. Recheck the oil level to determine if the oil level is now in the Safe range or above the Minimum mark.

Add and recheck oil level one quart at a time until the oil level indicator moves into the Safe range or above the Minimum mark. Do not add additional oil to bring the level to the top of the Safe range or to the Maximum mark since this may result in overfill and increased oil consumption. If the accuracy of the engine oil dipstick is in doubt, it may be verified in the following manner:

^ Drain the oil and install a new filter.

^ Put in the specified amount of oil for an oil and filter change. (See owner guide)

^ Start the engine and operate a few minutes.

^ Shut off the engine and allow a few minutes for the oil to drain down.

^ Check the oil level with the dipstick.

^ If the oil level does not indicate in the Safe range or above the Minimum mark, rework or replace the dipstick.

OTHER APPLICABLE ARTICLES: None WARRANTY STATUS: "INFORMATION ONLY"

Engine Oil: Capacity Specifications

Engine oil capacity ..... 5.0 Qts.(4.7L)

Note: Add 1 Qt. with filter change.

Engine Oil: Fluid Type Specifications

BL Self-adjusting Brake Lubricant

EC Ethylene Glycol Coolant

Mix 50/50 with water to at least -20°F (-29°C) protection

EP Extreme Pressure Gear Lubricant

Ford Part No. D8DZ-19C547-A

FA Automatic Transmission Fluid, Type F

GL-5 Gear Oil, API Service GL-5

HBH Hydraulic Brake Fluid, Extra

Heavy-Duty

HP Hypoid Gear Oil

Ford Part No. E0AZ-19580-A

HP* Hypoid Gear Oil for Limited-Slip

or Traction-Lok Differential

LM Lithium Grease, with Polyethylene

LS Steering Gear Lubricant

MA MERCONAutomatic Transmission

Fluid

MH Manifold Heat Valve Solvent

SG Motor Oil, API Service SG

Technical Service Bulletin # 98-12-5 Date: 980622

A/C - Filtering Refrigerant After Compressor Replacement

Article No. 98-12-5

06/22/98

AIR CONDITIONING - FILTERING REFRIGERANT

AFTER A/C COMPRESSOR REPLACEMENT - SERVICE TIPS

FORD: 1980-98 CROWN VICTORIA 1981-98 ESCORT 1982-83 FAIRMONT 1982-88 EXP 1982-97 THUNDERBIRD 1982-98 MUSTANG 1983-86 LTD 1984-94 TEMPO 1986-98 TAURUS 1988-93 FESTIVA 1989-97 PROBE 1994-98 ASPIRE 1995-98 CONTOUR

LINCOLN-MERCURY: 1980-98 GRAND MARQUIS, TOWN CAR 1982-83 ZEPHYR 1982-86 CAPRI 1982-87 LN7 1982-97 COUGAR 1982-98 CONTINENTAL 1983-86 MARQUIS 1984-92 MARK VII 1984-94 TOPAZ 1986-98 SABLE 1991-94 CAPRI 1991-98 TRACER 1993-98 MARK VIII 1995-98-MYSTIQUE 1999 COUGAR

LIGHT TRUCK: 1980-96 BRONCO 1980-97 F SUPER DUTY 1980-98 ECONOLINE, F-150, F-150, F-350 1983-98 RANGER 1984-90 BRONCO II 1986-97 AEROSTAR 1988-97 F-47 1991-98 EXPLORER 1993-98 VILLAGER 1995-98 WINDSTAR 1997-98 EXPEDITION, MOUNTAINEER 1999 SUPER DUTY F SERIES

This TSB article is being republished in its entirety to revise the Service Procedure and to update the model years.

ISSUE Vehicles that have and inoperative A/C compressor, due to internal causes, MUST have the refrigerant system cleaned to remove any debris or contaminants that may be present to prevent damage to the replacement compressor.

ACTION

Install a Service Filter Kit in the refrigerant system prior to installing the replacement compressor. Refer to the following Service Procedure for details.

OTHER APPLICABLE ARTICLES: NONE

SUPERSEDES: 96-15-5

WARRANTY STATUS: Eligible Under The Provisions Of Bumper To Bumper Warranty Coverage For 1992-99 Models And 1991 Lincolns, Basic Warranty Coverage For All Other Models And Major Component Warranty Coverage For All Other Lincoins

OPERATION DESCRIPTION TIME

981205A Kit Installation 1.2 Hrs.

981205B Extra Time For Refrigerant 0.4 Hr.

(R-12) Recovery

DEALER CODING

CONDITION

BASIC PART NO. CODE

19703 49

OASIS CODES: 208000, 208999

Service Procedure

THIS PROCEDURE IS OPTIONAL IF THE SYSTEM IS FLUSHED USING THE ROTUNDA A/C FLUSHER.

CAUTION

THIS FILTERING PROCEDURE MAY BE USED FOR EITHER R-12 OR R-134a REFRIGERANT SYSTEMS. BECAUSE THE TWO (2) SYSTEMS USE DIFFERENT REFRIGERANT OILS AND BECAUSE THE COMPRESSOR COULD BE DAMAGED IF THE WRONG OIL IS USED, SYSTEM IDENTIFICATION IS VERY IMPORTANT. BE SURE SYSTEM IS CORRECTLY IDENTIFIED BEFORE STARTING THE FILTERING PROCEDURE.

Each Service Filter Kit includes the following items:

^ One (1) Pancake Filter (to be installed in the liquid line between the condenser and the orifice tube)

^ One (1) Instruction Sheet

NOTE

ON 1993-94 RANGER/EXPLORER VEHICLES, TECHNICIANS MAY EXPERIENCE DIFFICULTY WHEN CONNECTING THE PANCAKE FILTER HOSE FITTINGS TO THE EVAPORATOR INLET WITH THE ORIFICE TUBE INSTALLED. REMOVE THE OFFICE TUBE AND RUN THE SYSTEM FOR 1 HOUR AS DESCRIBED IN THE FILTERING PROCEDURE. REINSTALL THE ORIFICE TUBE AFTER FILTERING IS COMPLETE.

CAUTION

FOLLOW ALL REFRIGERANT SYSTEM SAFETY AND SERVICE PRECAUTIONS OUTLINED IN THE APPROPRIATE SERVICE OR WORKSHOP MANUAL.

1. Before removing any refrigerant system components, recover the refrigerant from the system following the recycling methods outlined In the appropriate Service/Workshop Manual.

2. Remove the suction accumulator/drier assembly and drain the oil into a calibrated container.

3. Install a new suction accumulator/drier and add new refrigerant oil to replace the old oil. The quantity of the new oil to be added is the amount to match that drained from the old accumulator plus 60 mL (2 oz). Refer to the Dealer Master Parts Catalog for the correct suction accumulator/drier part number.

CAUTION

REMEMBER TO USE MOTORCRAFT YN-9-A REFRIGERANT COMPRESSOR OIL WITH R-12 SYSTEMS AND MOTORCRAFT YN-12-C REFRIGERANT COMPRESSOR OIL WITH R-134a SYSTEMS. FAILURE TO USE THE CORRECT REFRIGERANT OIL MAY RESULT IN DAMAGE TO SYSTEM COMPONENTS.

4. Install a new orifice tube. Refer to the Dealer Master Parts Catalog for the correct orifice tube part number. If the orifice tube in the vehicle is located in the liquid line between the condenser and the evaporator, replace the liquid line assembly.

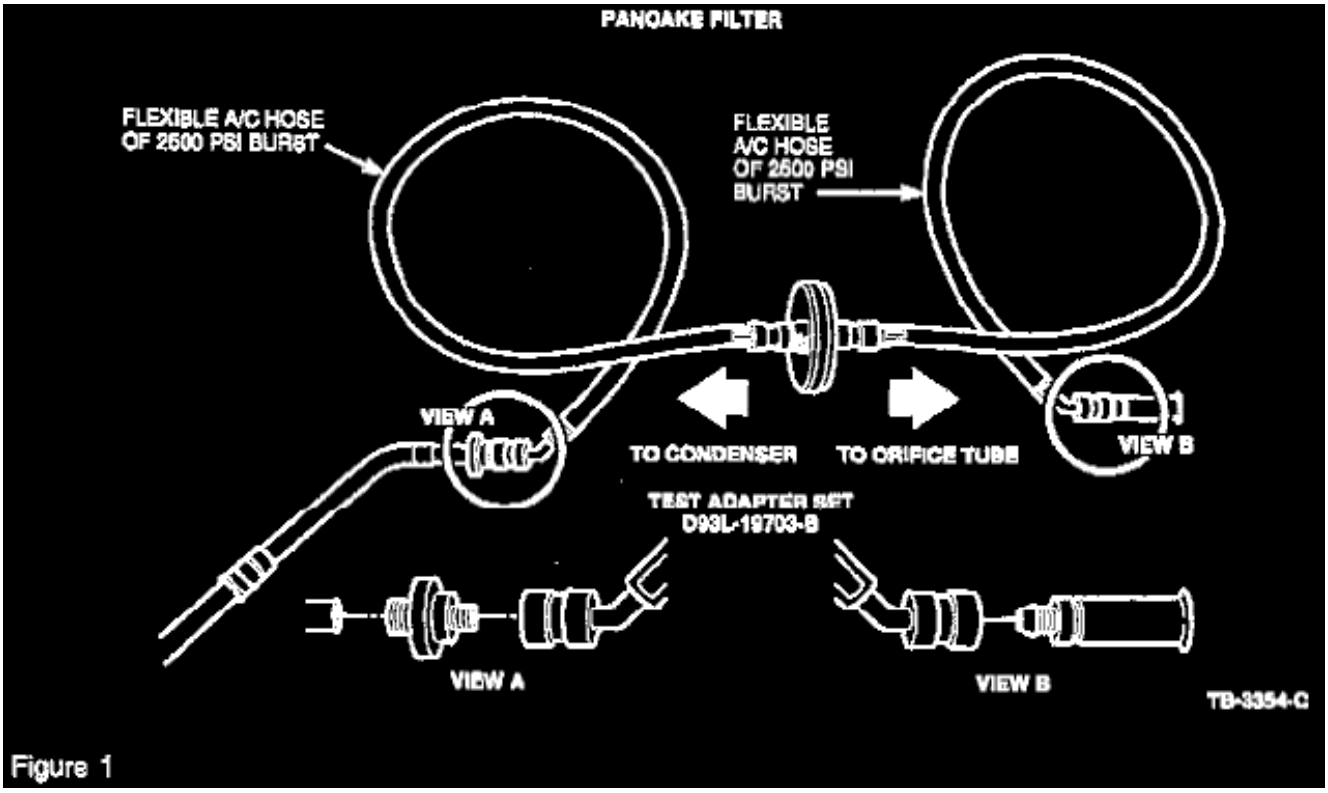


Figure 1

5. Install pancake filter in the liquid line between the condenser and the orifice tube, Figure 1.

a. Be sure orifice inlet is toward the condenser.

b. Connections can be made using Test Adapter Set D93L-19703-B, or equivalent, and flexible refrigerant hose of 2500 psi burst rating. Individual fittings are also available.

6. Remove the old compressor following Service/Workshop Manual procedures. Drain the oil into a calibrated container.

7. Drain the oil from the replacement compressor into a clean calibrated container.

NOTE:

IT WILL BE NECESSARY TO TRANSFER THE MAGNET CLUTCH FROM THE OLD COMPRESSOR TO THE REPLACEMENT COMPRESSOR. FOLLOW SERVICE/WORKSHOP MANUAL PROCEDURES.

8. A new FX-15 service compressor contains 207 mL (7 oz.) of R-12 refrigerant oil. A new FS-10 service compressor does not contain any oil and can be used with an R-12 or an R-134a system.

CAUTION

REMEMBER TO USE YN-9-A (MINERAL) OIL WITH R-12 SYSTEMS AND YN-12-C (PAG) OIL WITH R-134a SYSTEMS. FAILURE TO USE THE CORRECT REFRIGERANT OIL MAY RESULT IN DAMAGE TO SYSTEM COMPONENTS.

^ If the amount of oil drained from the removed compressor is between 90 and 148 mL (3-5 oz), pour the same amount of clean refrigerant oil into the new compressor.

^ If the amount of oil drained from the old compressor is greater than 90 mL (3 oz), pour 90 mL (3 oz) of clean refrigerant oil into the new compressor.

9. Install the new compressor following Service/Workshop Manual procedures. Make sure all mounting bolts are tightened properly. Check the tension of the compressor drive belt. Adjust if necessary.

10. Evacuate, charge and leak test the system, following Service/Workshop Manual procedures.

11. Check all refrigerant system hoses, lines and the position of the newly-installed filters to make sure they do not interfere with other engine compartment components. If necessary, use tie straps to make adjustments.

12. Set the A/C control on Max A/C, high blower and temperature control at full cold.

a. Start engine and let idle briefly.

b. Be sure A/C system is operating properly.

13. Gradually bring the engine up to 1200 rpm by running it at lower rpms for short periods (first at 800 rpm, then at 1000 rpm). Set the engine at 1200 rpm and run it for an hour with the A/C system operating.

14. Stop the engine.

NOTE:

IT WILL BE NECESSARY TO RECOVER THE SYSTEM REFRIGERANT CHARGE BEFORE PROCEEDING.

15. Allow the engine to cool sufficiently to remove the fittings, flexible hoses and pancake filter from the liquid line.

16. Discard the filter. It can be used one (1) tie only.

17. Reconnect the liquid line back into the system.

18. Evacuate, charge and leak test the system. Make any necessary adjustments.

19. Check the operation of the system in all models.

PART NUMBER PART NAME

F8VZ-19E773-AA Filter Kit

F73Z-19577-AA Refrigerant Oil - Motorcraft YN-9-A (For R-12 Refrigerant Systems Only)

F7AZ-19589-DA Refrigerant Oil - Motorcraft YN-12-C (PAG-Type Oil For R-134a Refrigerant Systems Only)

NOTE

THE TOTAL REPAIR TIME IS FOR INSTALLING SERVICE FILTER KIT PER INSTRUCTIONS THIS INCLUDES INSTALLATION OF AND DISCARD OF FILTER. REFER TO SERVICE LABOR TIME STANDARDS MANUALS IF ADDITIONAL LABOR OPERATIONS ARE REQUIRED.

Refrigerant: Technical Service Bulletins Air Conditioning - Use of Correct Fluorescent Tracer Dye

Article No. 93-20-6

09/29/93

AIR CONDITIONING - USE OF CORRECT FLUORESCENT TRACER DYE - SERVICE TIP

FORD: 1980-93 CROWN VICTORIA 1981-93 ESCORT 1982-83 FAIRMONT 1982-88 EXP 1982-93 MUSTANG, THUNDERBIRD 1983-86 LTD 1984-93 TEMPO 1986-93 TAURUS 1988-93 FESTIVA 1989-93 PROBE

LINCOLN-MERCURY: 1980-93 GRAND MARQUIS, TOWN CAR 1981-87 LYNX 1982-83 LN7, ZEPHYR 1982-86 CAPRI 1982-93 CONTINENTAL, COUGAR 1983-86 MARQUIS 1984-92 MARK VII 1984-93 TOPAZ 1986-93 SABLE 1991-93 CAPRI, TRACER

LIGHT TRUCK: 1980-93 BRONCO, ECONOLINE, F-150-350 SERIES 1983-93 RANGER 1984-90 BRONCO II 1986-93 AEROSTAR 1988-93 F-47 1991-93 EXPLORER 1993 VILLAGER

ISSUE: Use of untested, unapproved fluorescent tracer dyes for A/C system leak checking may damage the air conditioning system. Some of these materials may not be compatible with Ford A/C systems.

ACTION: When leak-checking an R-12 A/C system with a "black light", use only Rotunda-supplied Part No. 112-R0027, Fluoro-Lite brand dye. No other dyes have been approved by Ford Motor Company.

NOTE: 112-R0027 DYE IS NOT COMPATIBLE WITH R-134a REFRIGERANT.

OTHER APPLICABLE ARTICLES: NONE WARRANTY STATUS: INFORMATION ONLY OASIS CODES: 208999

Refrigerant: Technical Service Bulletins R-12 Refrigerant - Substitutes

Article No. 94-14-3

07/13/94

Air Conditioning - Use Of R-12 Refrigerant Substitutes - Service Tip

FORD: 1980-93 CROWN VICTORIA 1981-93 ESCORT 1982-83 FAIRMONT 1982-88 EXP 1982-93 MUSTANG, THUNDERBIRD 1983-86 LTD 1984-93 TEMPO 1986-93 TAURUS 1988-93 FESTIVA 1989-93 PROBE

LINCOLN-MERCURY: 1980-93 GRAND MARQUIS, TOWN CAR 1981-87 LYNX 1982-83 LN7, ZEPHYR 1982-86 CAPRI 1982-93 CONTINENTAL, COUGAR 1983-86 MARQUIS 1984-92 MARK VII 1984-93 TOPAZ 1986-93 SABLE 1991-93 CAPRI, TRACER

MERKUR: 1986-89 SCORPIO, XR4TI

LIGHT TRUCK: 1980-93 BRONCO, ECONOLINE, F-150-350 SERIES 1983-93 RANGER 1984-90 BRONCO II 1986-93 AEROSTAR 1988-93 F-47 1991-93 EXPLORER 1992-94 F-53 1993 VILLAGER

MEDIUM/HEAVY TRUCK: 1954-90 C SERIES 1970-94 L SERIES 1979-90 CL-9000, CL-CLT-9000 SERIES 1980-94 F SERIES 1986-94 CARGO SERIES

This TSB is being republished in its entirety to include Heavy Truck models.

ISSUE:

A number of manufacturers are producing refrigerant products which are described as being direct replacements for refrigerant R-12. The use of any unauthorized substitute refrigerant may severely damage the A/C system components.

ACTION:

If service is required, use only NEW or RECYCLED refrigerant R-12.

Ford Motor Company has not tested or approved any R-12 refrigerant substitute at this time. R-134a is approved only for systems which specify R-134a,

and is not compatible with R-12 systems.

R-22 likewise, is not compatible with R-12 systems.

CAUTION:

USING ANY UNAUTHORIZED SUBSTITUTE REFRIGERANT FOR R-12 MAY RESULT IN SEVERE DAMAGE TO THE A/C SYSTEM COMPONENTS.

OTHER APPLICABLE ARTICLES: 91-9-7

SUPERSEDES: 93-23-11

WARRANTY STATUS: INFORMATION ONLY

OASIS CODES: 208000, 208999, 290000

Refrigerant: Technical Service Bulletins A/C - R12 Refrigerant Substitutes Service Tip

Article No. 96-17-10

08/12/96

AIR CONDITIONING - USE OF R-12 REFRIGERANT SUBSTITUTES - SERVICE TIP

FORD: 1980-93 CROWN VICTORIA 1981-93 ESCORT 1982-83 FAIRMONT 1982-88 EXP 1982-93 MUSTANG, THUNDERBIRD 1983-86 LTD 1984-94 TEMPO 1986-93 TAURUS 1988-93 FESTIVA 1989-93 PROBE

LINCOLN-MERCURY: 1980-93 GRAND MARQUIS, TOWN CAR 1981-87 LYNX 1982-83 LN7, ZEPHYR 1982-86 CAPRI 1982-93 COUGAR 1982-94 CONTINENTAL 1983-86 MARQUIS 1984-92 MARK VII 1984-94 TOPAZ 1986-93 SABLE 1991-93 CAPRI, TRACER

MERKUR: 1985-89 XR4TI 1988-90 SCORPIO

LIGHT TRUCK: 1980-93 BRONCO, ECONOLINE, F SUPER DUTY, F-150-350 SERIES 1983-93 RANGER 1984-90 BRONCO II 1986-93 AEROSTAR 1988-93 F-47 1991-93 EXPLORER 1993 VILLAGER

MEDIUM/HEAVY TRUCK: 1985-94 CARGO SERIES, F & B SERIES, L SERIES

This TSB article is being republished in its entirety to list Environmental Protection Agency (EPA) reviewed NC substitutes for R-12 refrigerant.

ISSUE: A number of manufacturers are producing refrigerant products which are described as being direct replacements for refrigerant R-12.

ACTION: If service is required, use only new or of known quality recycled refrigerant R-12. Ford Motor Company has approved R-134a as the only refrigerant substitute for R-12.

CAUTION:

USING ANY UNAUTHORIZED SUBSTITUTE REFRIGERANT FOR R-12 MAY RESULT IN SEVERE DAMAGE TO THE A/C SYSTEM COMPONENTS.

INFORMATION FROM THE EPA

				Components Percentage							
Brand Name (1)	Ford Approved	Status (2)	Date	HCFC 22	HCFC 124	HCFC 142b	HFC 134a	HFC 152a	Propane (R-290)	Butane (R-600)	Iso-butane (R-600a)
HFC-134a	Yes	ASU	3/18/94				100%				
R-401C	No	ASU	3/18/94	33%	52%			15%			
FRIGC FR-12	No	ASU	6/13/95		39%		59%			2%	
Freezone (3)	No	ASU	5/22/96			19%	70%				
R-406A / GHG / McCool (4)	No	P	5/22/96	55%		41%					4%
GHG-X4 / Autofrost / Chill-It (4)	No	P	5/22/96	51%	28.5%	16.5%					4%
Hot Shot / Kar Kool (4)	No	P	5/22/96	50%	39%	9.5%					1.5%
GHG-HP (4)	No	P	5/22/96	65%		31%					4%
FREEZ-12	No	Under Review				20%	80%				

(1) R-401A (made by DuPont), R-401B (DuPont), R-409A (Elf Atochem), Care 30 (Calor Gas), Adak-29/Adak-12 (TACIP International) and ES-12R (Interveet) have not been submitted for review in motor vehicle air conditioning, and it is therefore illegal to use them in such systems.

(2) See article for details on legality of use according to Status:
- ASU = acceptable subject to fittings, labeling, and no drop-in use conditions
- P = proposed acceptable subject to use conditions; open to public comment so decision is not final
- UNA = unacceptable; illegal for use as CFC-12 substitutes in motor vehicle air conditioners

(3) Freezone contains 2% of a lubricant

(4) Additional use condition: MUST BE USED WITH BARRIER HOSES

This information has been taken from EPA documents to address Ford specific applications and recommendations. Further EPA information on ozone-depleting substances and regulations regarding its handling can be found on the Internet at World Wide Web site: http://www.epa.gov/ozone/

In 1994, EPA established the Significant New Alternatives Policy (SNAP) program to review alternatives to ozone-depleting substances like R-12. EPA examines new substitutes for their ozone depleting, global warming, flammability, and toxicity characteristics. The SNAP process does not test these substitutes for A/C system compatibility, reliability, durability, or performance.

Under the SNAP rule, each new refrigerant must be used in accordance with the following conditions:

1. Unique Fittings - Each new refrigerant must be used with a unique set of fittings to prevent the accidental mixing of different refrigerants.

2. Unique Equipment - Each refrigerant must have dedicated recovery/recycling equipment for that refrigerant.

3. Labels - Whether a vehicle is originally designed to use a new refrigerant or is retrofitted, the technician must apply a detailed label giving specific information about the alternative. This label covers up information about the old refrigerant and provides valuable details on the alternative and how it was used. The technician is required to fill in their name, company performing the retrofit, address and the date retrofitted.

4. Remove Original Refrigerant - The original R-12 must be removed from the system prior to charging with the new refrigerant. This will guarantee that the largest amount of clean R-12 is available for use in vehicles that still need it.

				Reason Unacceptable
Brand Name (1)	Ford Approved	Status (2)	Date	HCFC 22, HCFC 124, HCFC 142b, HFC 134a, HFC 152a, Propane (R-290), Butane (R-600), Iso-butane (R-600a)
Ikon-12	No	ASU	5/22/96	Composition claimed as confidential business information
OZ-12	No	UNA	3/18/94	Flammable blend of hydrocarbons; insufficient data to demonstrate safety
R-176	No	UNA	3/18/94	Contains CFC-12, which is inappropriate in a CFC-12 substitute
HC-12a	No	UNA	6/13/95	Flammable blend of hydrocarbons; insufficient data to demonstrate safety
R-405A	No	UNA	6/13/95	Contains a perfluorocarbon, which has extremely high global warming potential and lifetime

(1) R-401A (made by DuPont), R-401B (DuPont), R-409A (Elf Atochem), Care 30 (Calor Gas), Adak-29/Adak-12 (TACIP International) and ES-12H (Intervest) have not been submitted for review in motor vehicle air conditioning, and it is therefore illegal to use them in such systems.

(2) See article for details on legality of use according to Status:

- ASU = acceptable subject to fittings, labeling, and no drop-in use conditions
- P = proposed acceptable subject to use conditions; open to public comment so decision is not final
- UNA = unacceptable; illegal for use as CFC-12 substitutes in motor vehicle air conditioners

(3) Freezone contains 2% of a lubricant

(4) Additional use condition; MUST BE USED WITH BARRIER HOSES

A summary of the refrigerants reviewed under EPA's SNAP program for use in motor vehicle air conditioning systems is in the table.

OTHER APPLICABLE ARTICLES: 91-9-7, 96-15-7

SUPERSEDES: 93-23-11

WARRANTY STATUS: INFORMATION ONLY

OASIS CODES: 208000, 208999, 290000

Refrigerant: Capacity Specifications

A/C Refrigerant Capacity ..... 54 oz

Refrigerant: Fluid Type Specifications

Type	Refrigerant 12 (R-12) Ford Part Number
	D4AZ-19B519-A

Refrigerant Oil: Capacity Specifications

Refrigerant Oil ..... 10 OZ

Refrigerant Oil: Fluid Type Specifications

Compressor ..... 500 viscosity (C9AZ-19557-B or Motorcraft VN-2 or equivalent)

Brake Bleeding: Service and Repair

Bleed primary and secondary hydraulic brake systems separately, bleeding longest line first on each system. Do not allow reservoir to run dry during bleeding operation. Never reuse fluid that has been drained from hydraulic system.

1. Loosen master cylinder to hydraulic line nuts and wrap shop cloths around tubing below fitting to absorb escaping brake fluid.

2. Depress brake pedal slowly by hand to floor of cab, forcing air trapped in master cylinder out at fitting.

3. Hold pedal down and tighten fittings, then release brake pedal. Releasing brake pedal before fittings are tightened will allow air to enter the master cylinder.

4. Repeat steps 1 through 3 until air ceases to escape at fittings and brake pedal is firm.

5. Bleed rear brakes as follows:

a. Pump pedal several times, then hold pedal down firmly. b. With pedal firmly depressed, open bleeder screw on one rear brake until pedal fades to floor, then close bleeder valve. c. Repeat procedure until a continuous flow of brake fluid is released from bleeder valve. d. Repeat steps 5a through 5c on other rear brake.

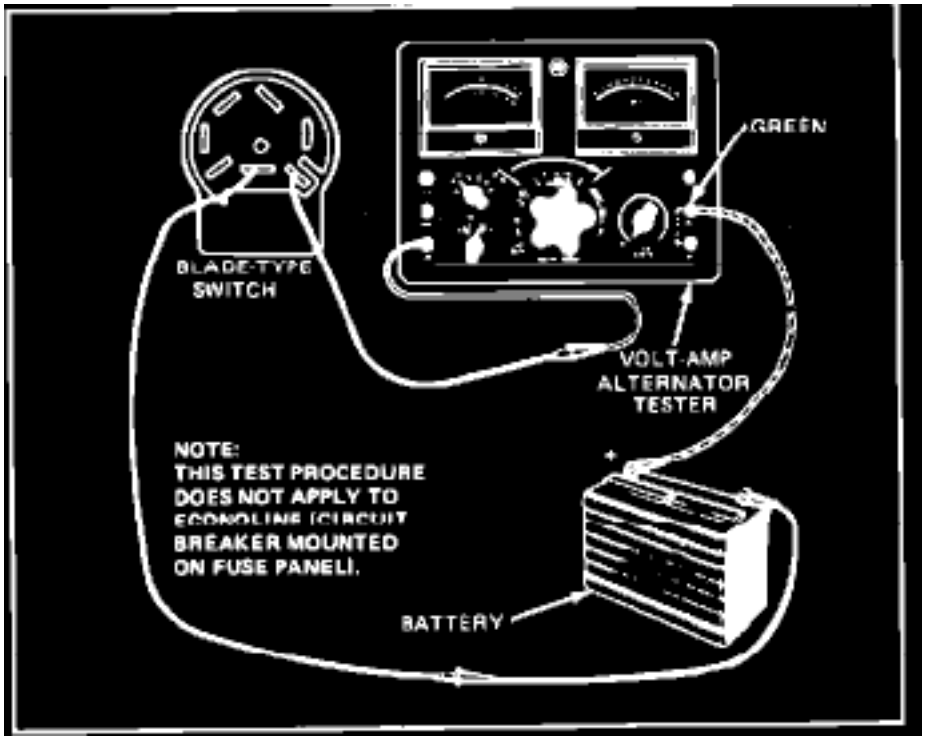
6. Bleed front brakes using same procedure as for rear brakes.

7. Fill master cylinder reservoirs to {1/4} inch from top of reservoirs.

8. Centralize the pressure differential control valve, if applicable, as follows:

a. Turn ignition switch to ``ACC'' or ``On'' position. b. Push brake pedal down, allowing piston to center itself, turning off warning light. c. Turn ignition switch to ``OFF'' position.

9. Check brake operation and ensure pedal is firm, then road test vehicle.



Circuit Breaker: Testing and Inspection

BRONCO & F-100---350 SERIES The circuit breaker is located in the wiper control switch on all rotary switches. For slide wiper control switches, the circuit breaker is located in the fuse panel. All pin terminal switches have a circuit breaker rating of 8 {1/4} amps. All blade terminal switches have a rating of 7 amps. Two separate tests are necessary to check for correct circuit breaker operation when circuit breaker is part of wiper switch.

Fig. 3 Testing circuit breaker. Bronco & F-100---350 Series

Test 1

1. Short tester leads together and adjust current draw until it equals circuit breaker rating.

2. Connect switch to tester, Fig. 3.

3. Leave switch connected to tester for 10 minutes, holding current reading on multimeter at rated current. If circuit breaker opens, replace wiper switch assembly.

Test 2

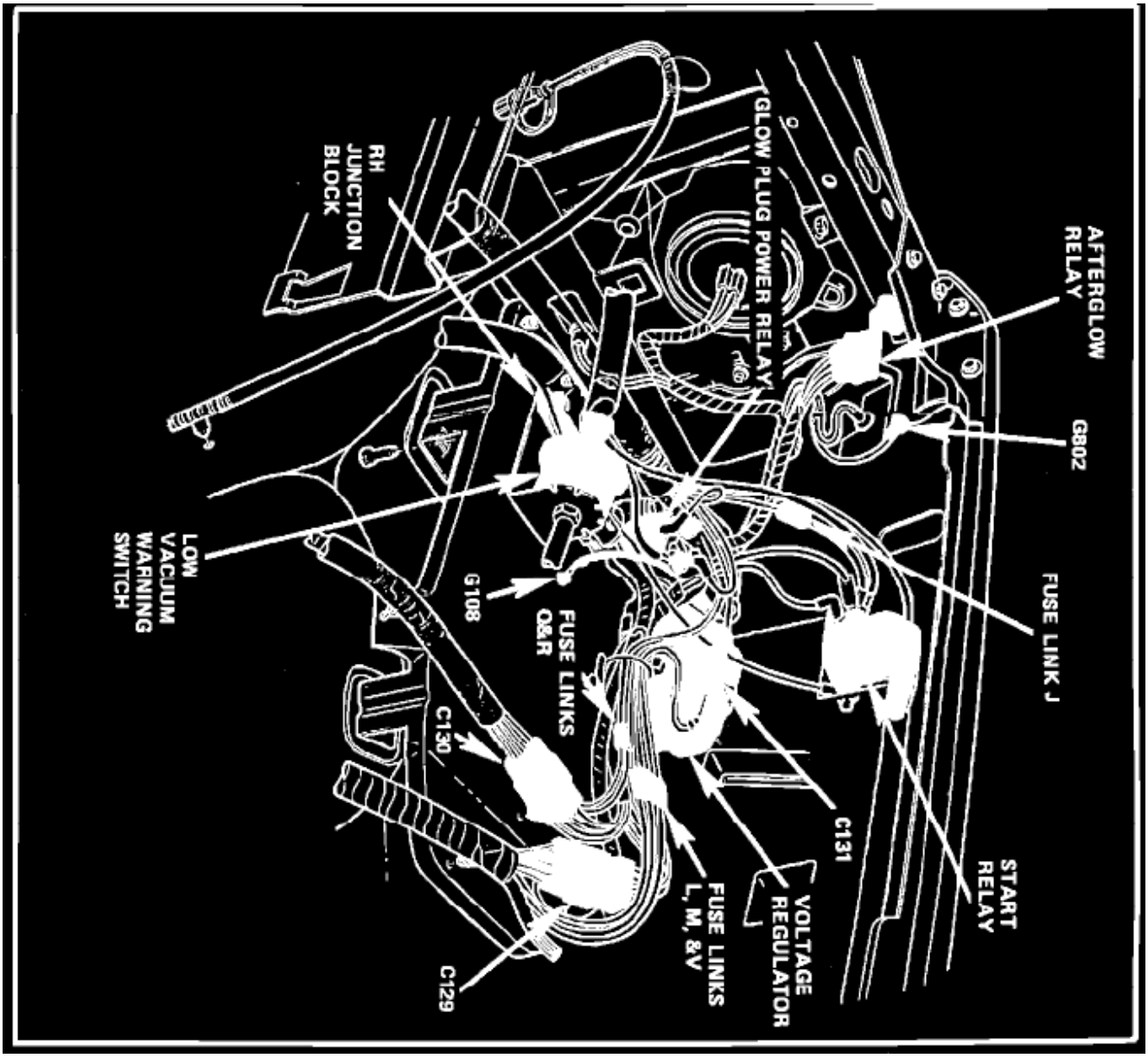
1. Short tester leads together and adjust current draw until it equals circuit breaker rating.

2. Connect switch to tester, Fig. 3.

3. Hold current reading on multimeter at twice the rated current of circuit breaker. If it takes more than 30 seconds for tester reading to drop to zero, replace wiper switch assembly.

Fuse: Locations

On Harness Near Fuse Panel

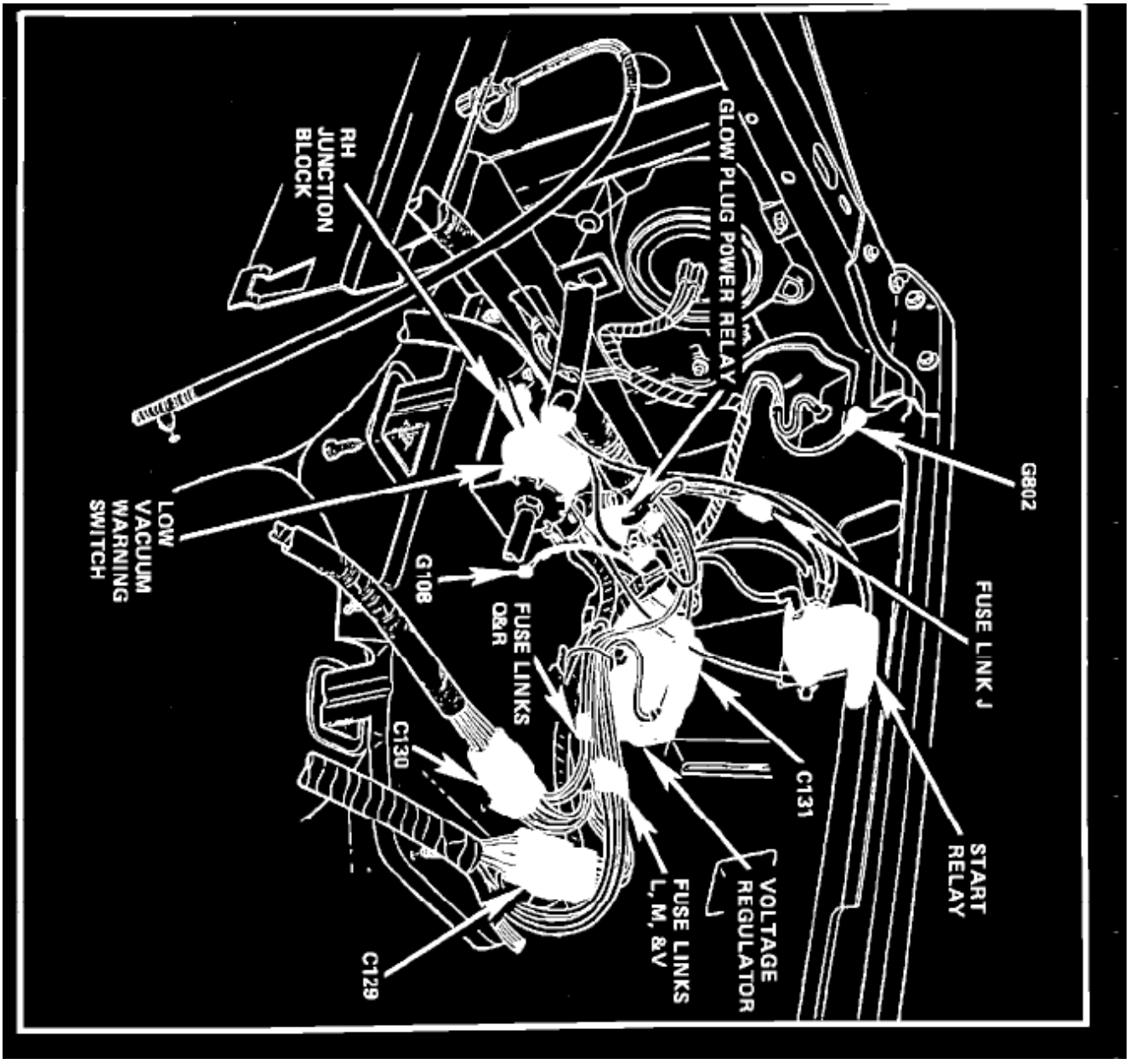


Fusible Link: Locations Fuse Link J

RH Fender Apron.

LH Front Fender Well

Applicable to: 1983 V8-420/6.9L Diesel Engine



RH Fender Apron.

LH Front Fender Well

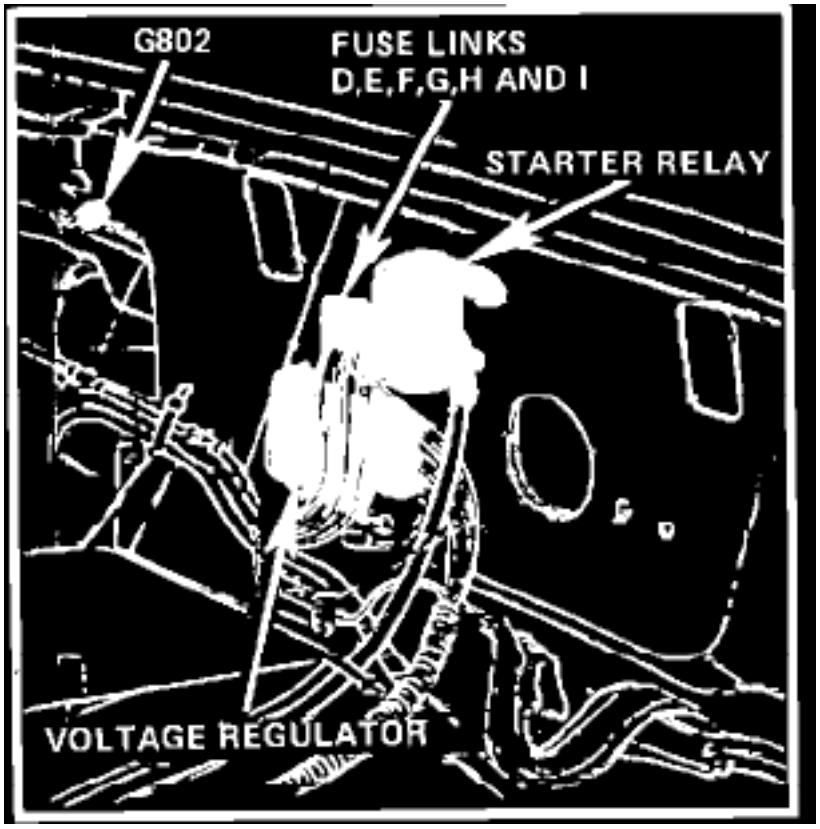
Applicable to: 1984 V8-420/6.9L Diesel Engine

Fusible Link: Locations Fuse Link P

LH Side Of Dash Panel

Fusible Link: Locations Fuse Links A, B, C & K

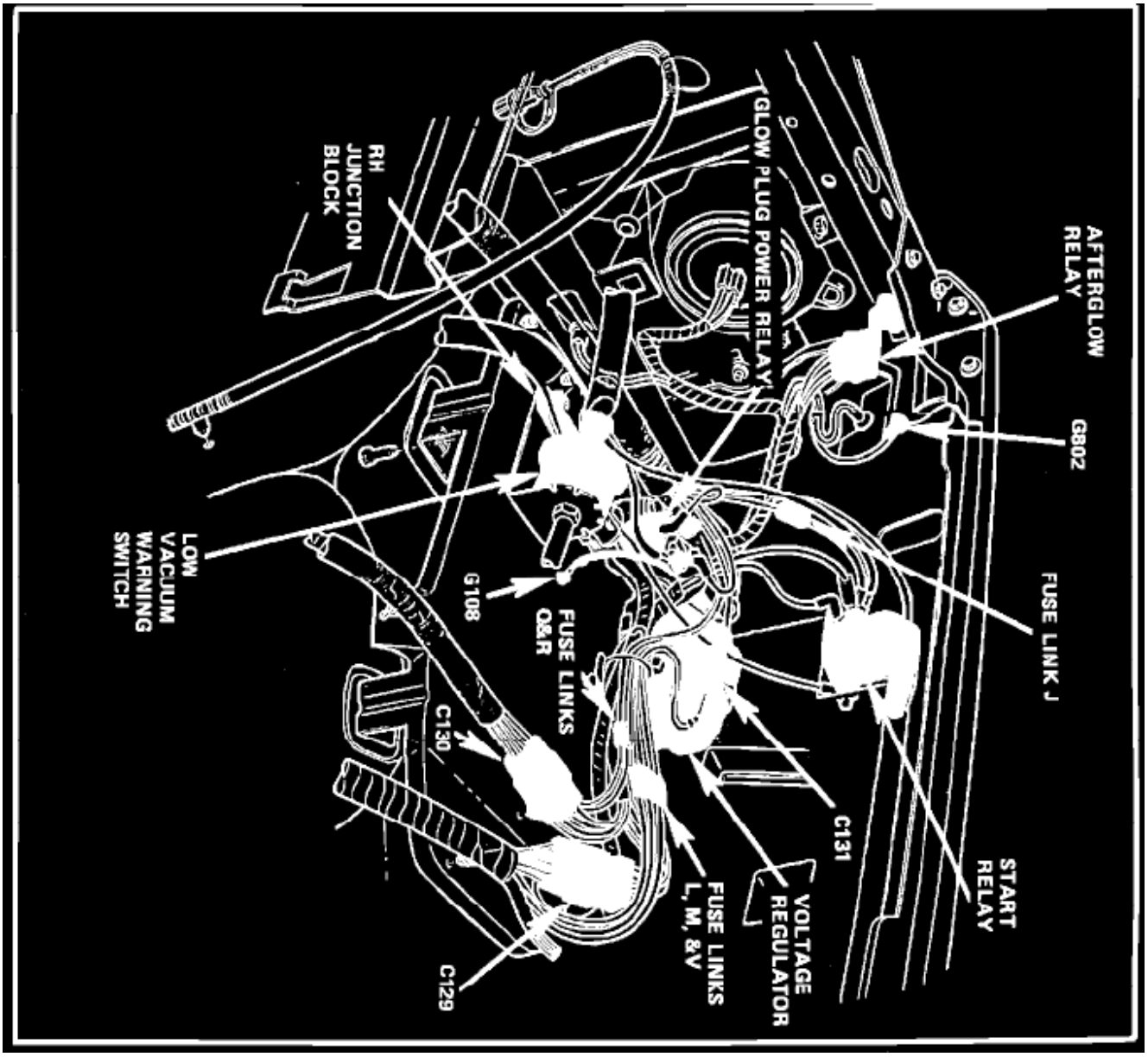
Near Junction Block Or Auxiliary Battery Relay



Fusible Link: Locations Fuse Links D, E, F, G, H & I

RH Front Fender Apron

At Starter Relay



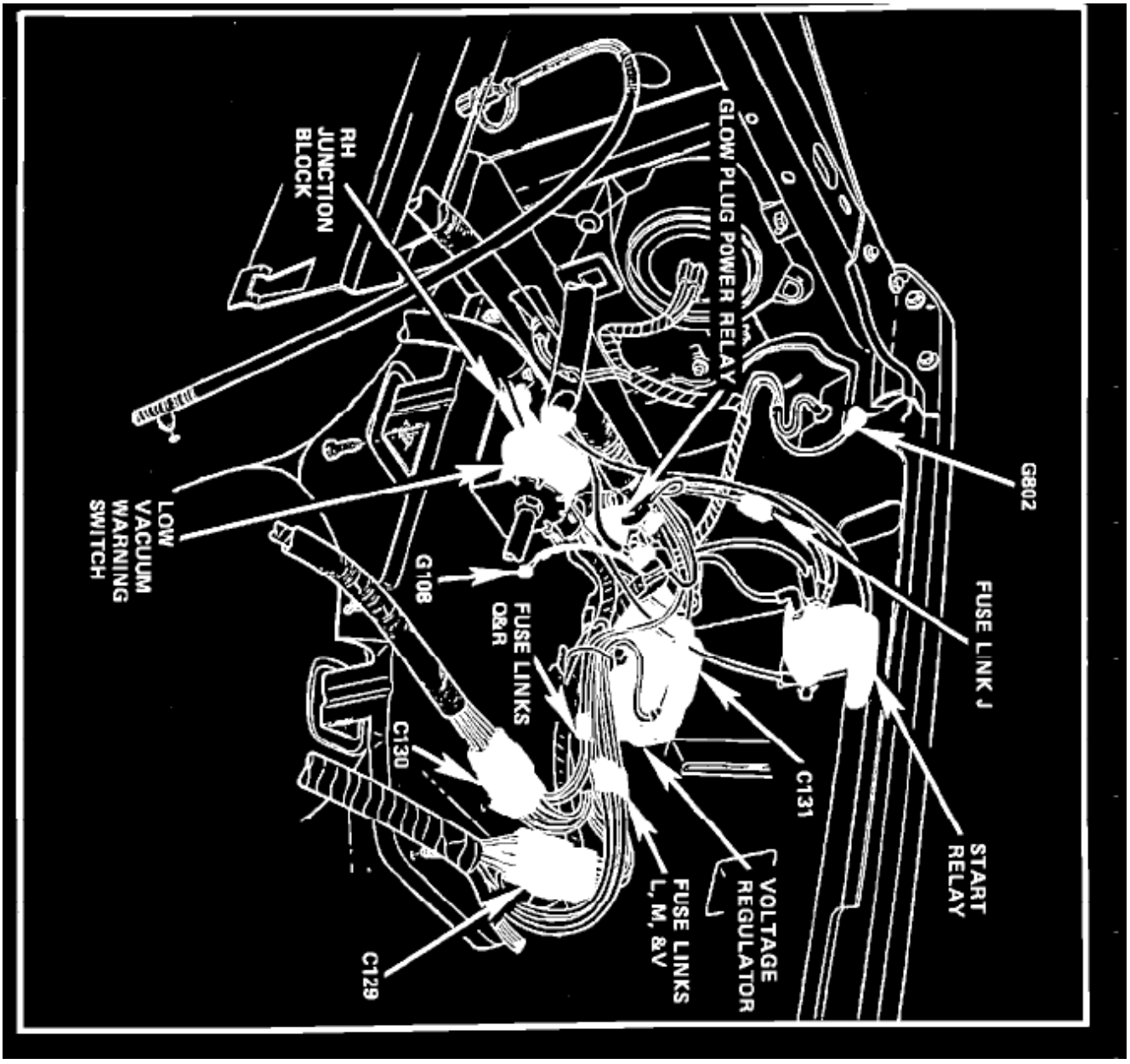
Fusible Link: Locations

Fuse Link J

RH Fender Apron.

LH Front Fender Well

Applicable to: 1983 V8-420/6.9L Diesel Engine



RH Fender Apron.

LH Front Fender Well

Applicable to: 1984 V8-420/6.9L Diesel Engine

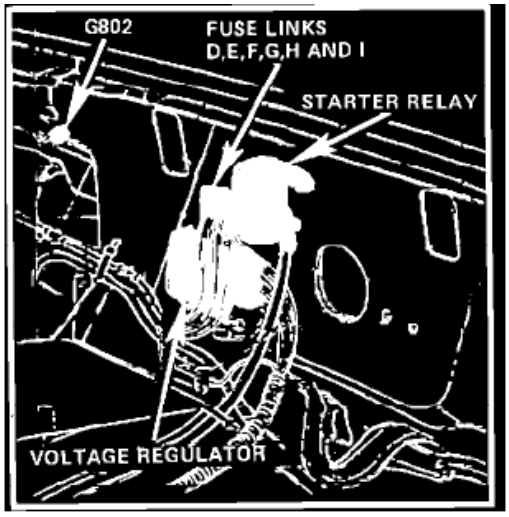
Fuse Link P

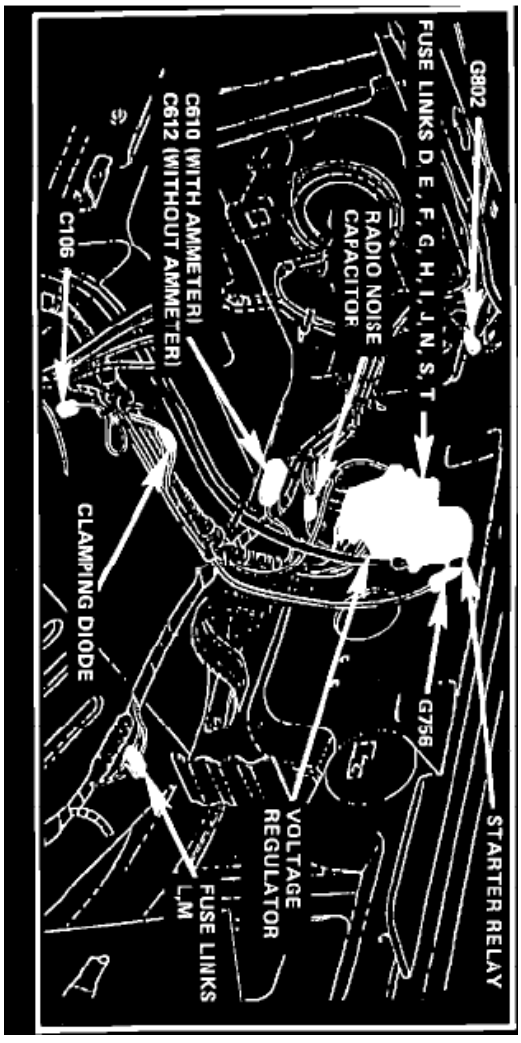
LH Side Of Dash Panel

Fuse Links A, B, C & K

Near Junction Block Or Auxiliary Battery Relay

Fuse Links D, E, F, G, H & I


G802
FUSE LINKS
D,E,F,G,H AND I
STARTER RELAY
VOLTAGE REGULATOR


G802
FUSE LINKS D, E, F, G, H, I, J, N, S, T
RADIO NOISE CAPACITOR
C610 (WITH AMMETER)
C612 (WITHOUT AMMETER)
C106
CLAMPING DIODE
G756
VOLTAGE REGULATOR
FUSE LINKS L,M
STARTER RELAY

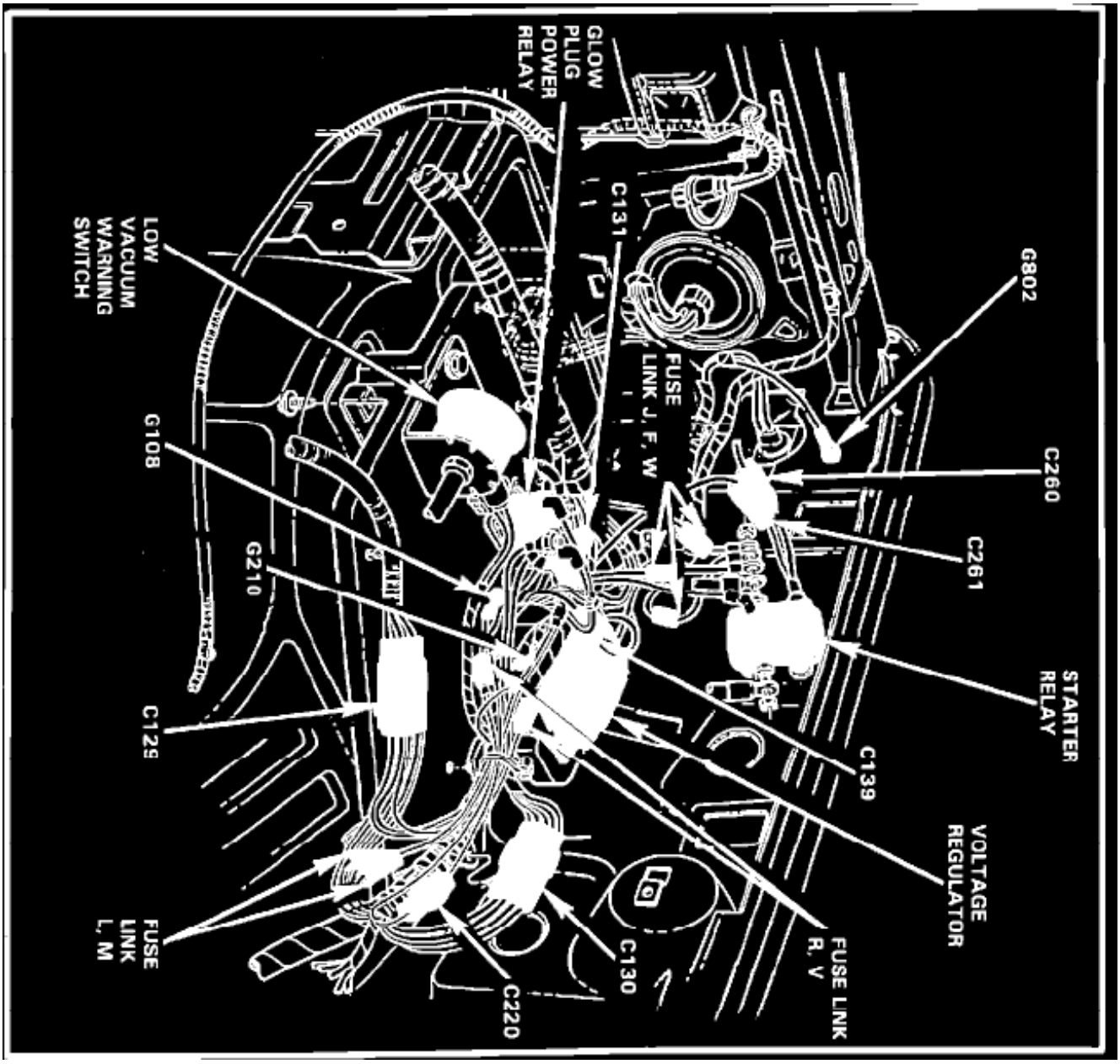
RH Front Fender Apron

At Starter Relay

Fuse Links D, E, F, G, H, I, J, N, S & T

RH Front Fender Apron.

At Starter Relay



Applicable to: 1981-82 All & 1983-85 w/EEC

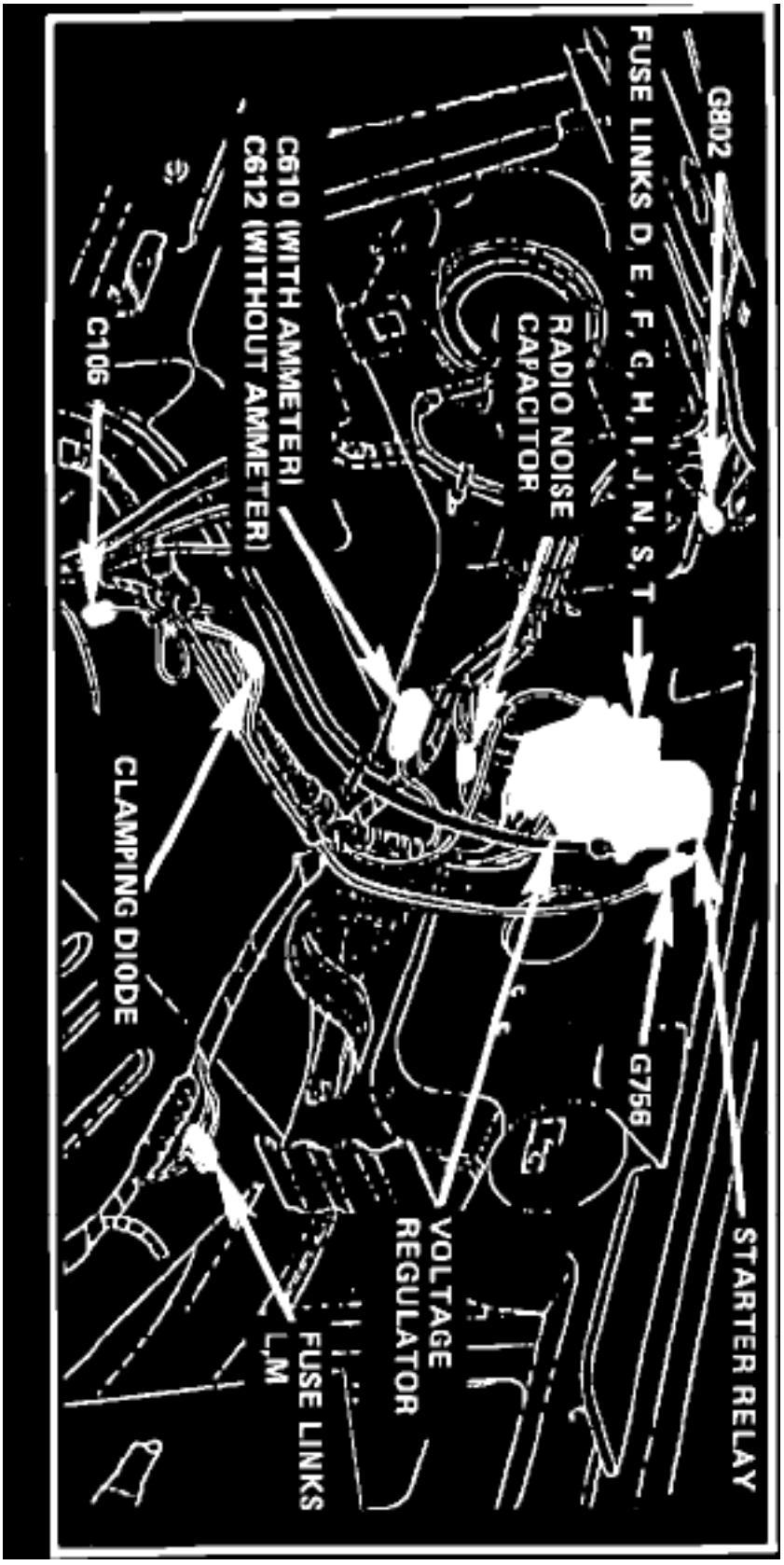
Fuse Links F, J & W

RH Fender Apron.

At Starter Relay

Applicable to: 1985 V8-420/6.9L Diesel Engine

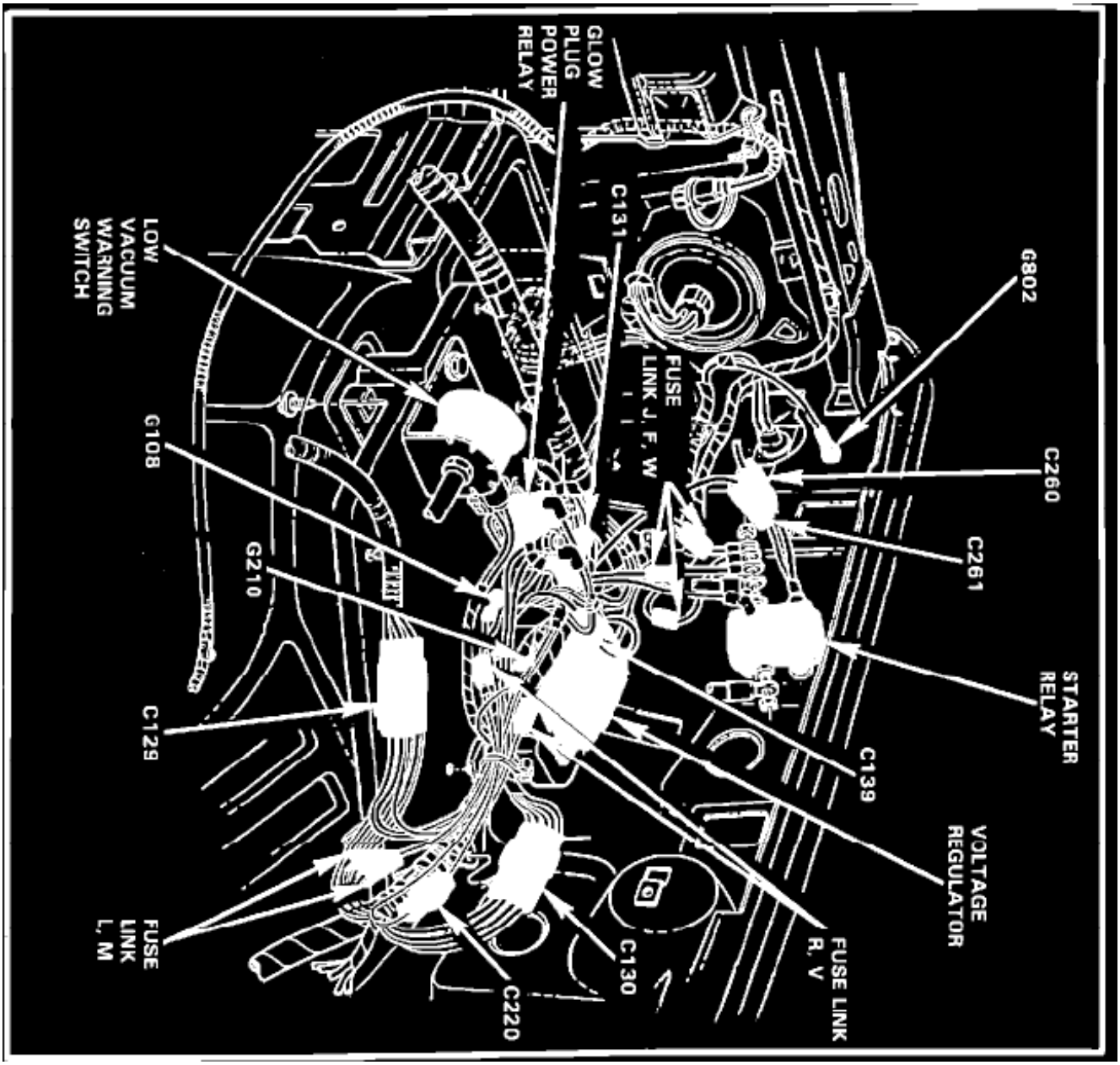
Fuse Links L & M


G802
FUSE LINKS D, E, F, G, H, I, J, N, S, T
RADIO NOISE CAPACITOR
C610 (WITH AMMETER)
C612 (WITHOUT AMMETER)
C106
CLAMPING DIODE
G756
STARTER RELAY
VOLTAGE REGULATOR
FUSE LINKS L,M

RH Front Fender Apron.

RH Fender Apron

Applicable to: 1981-82 All & 1983-85 w/EEC

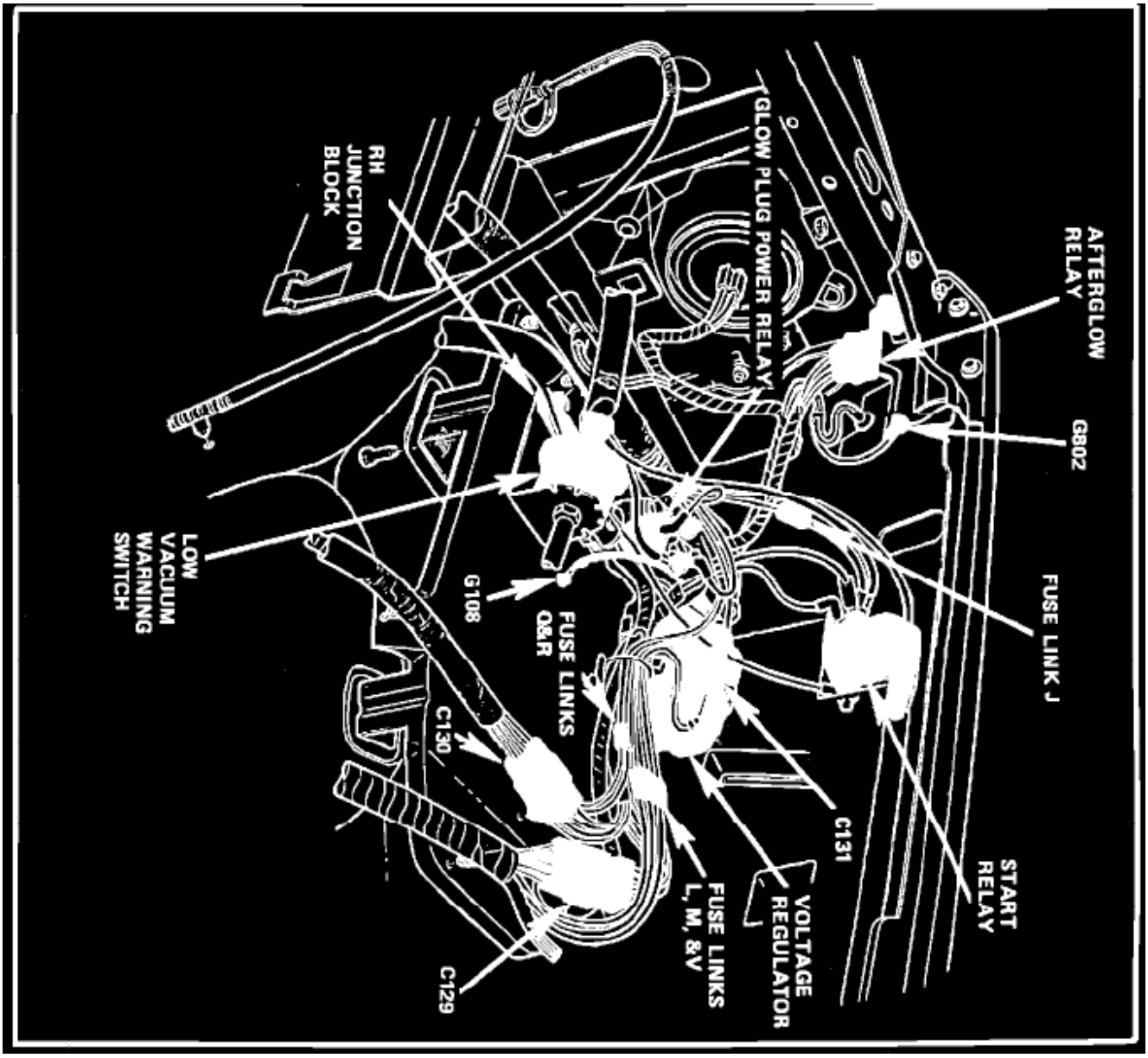


RH Fender Apron.

RH Fender Apron

Applicable to: 1985 V8-420/6.9L Diesel Engine

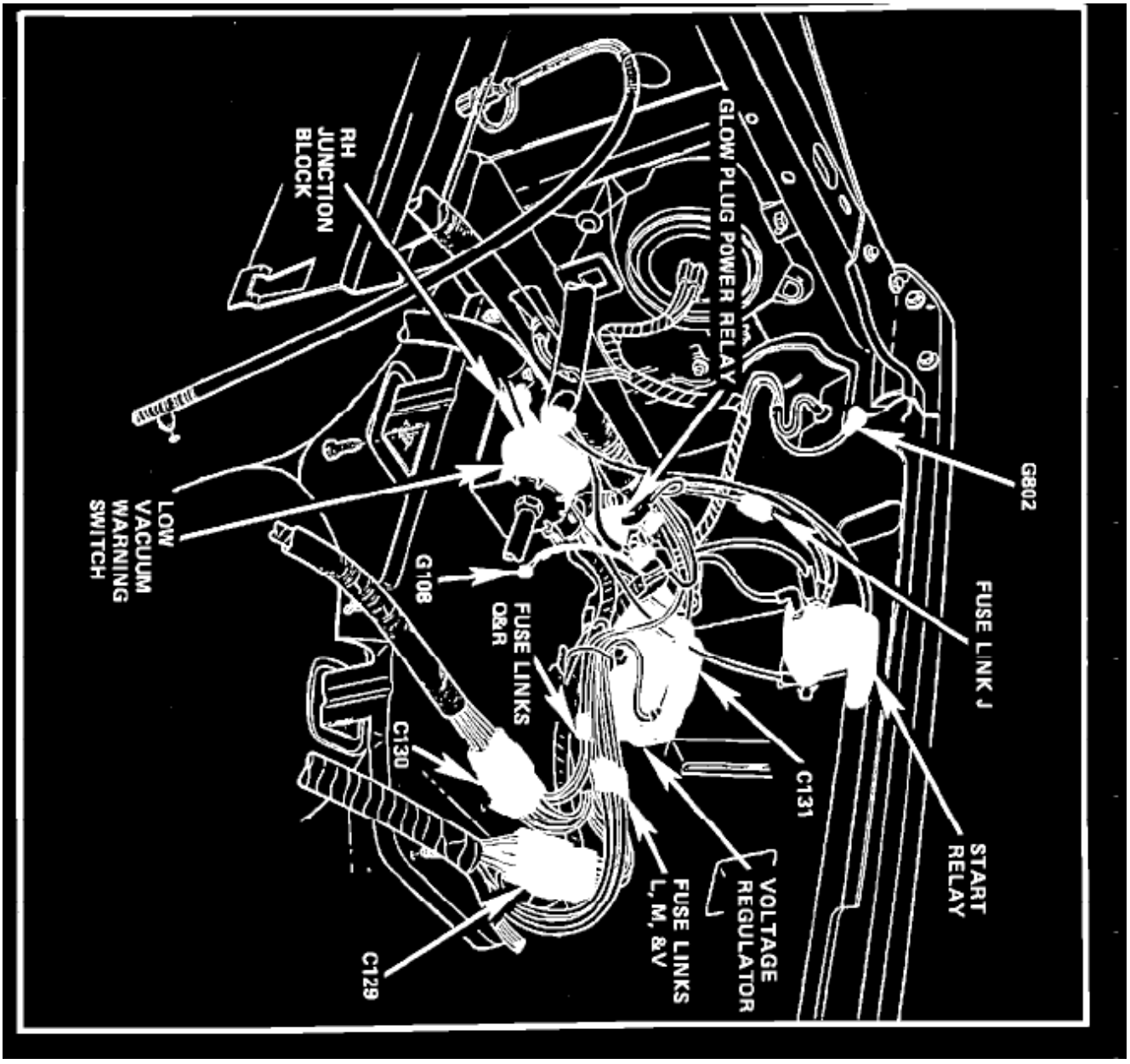
Fuse Links L, M & V



RH Fender Apron.

RH Fender Apron

Applicable to: 1983 V8-420/6.9L Diesel Engine



RH Fender Apron.

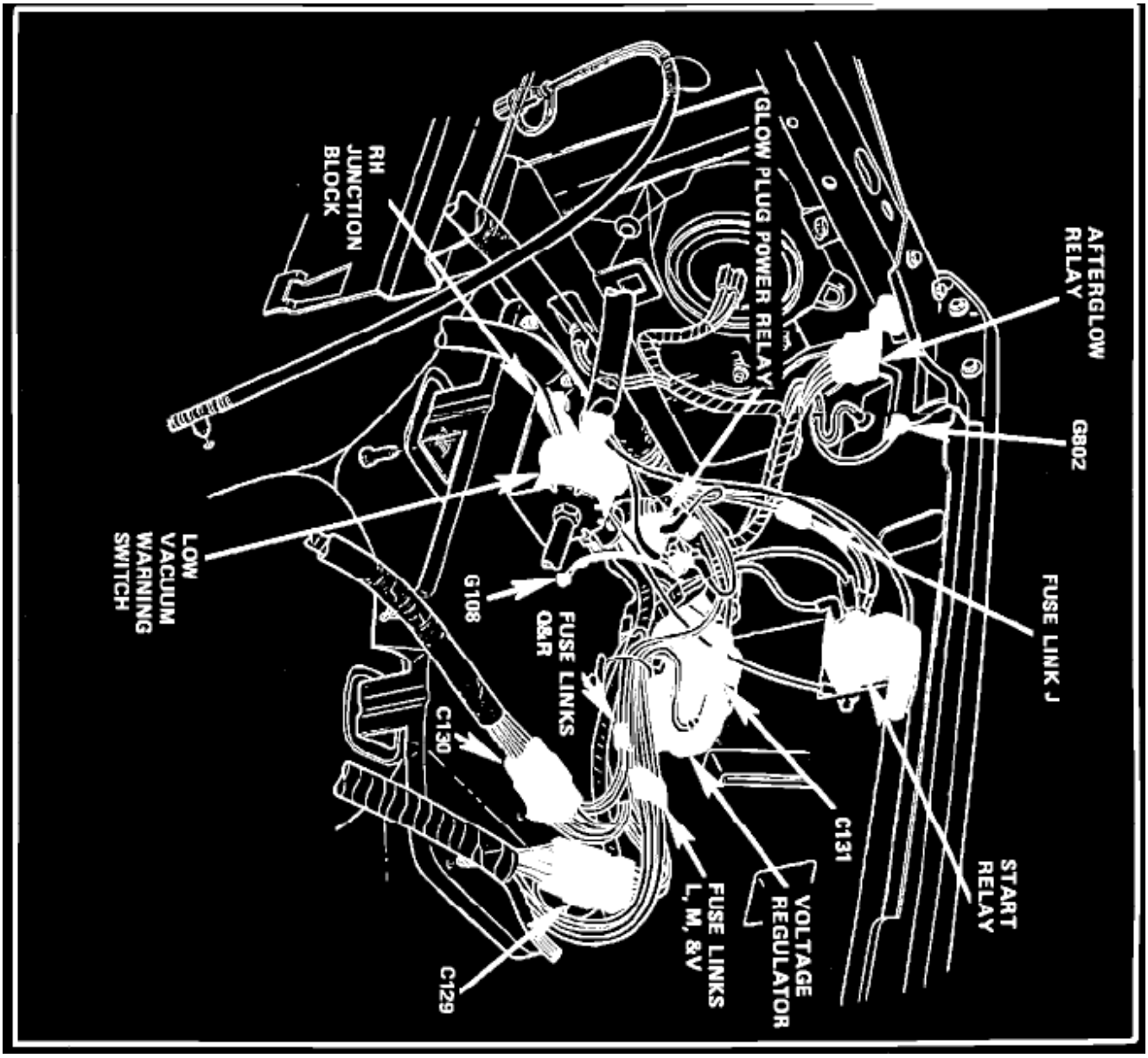
RH Fender Apron

Applicable to: 1984 V8-420/6.9L Diesel Engine

Fuse Links L, M, Q, R, V & W

RH Fender Apron

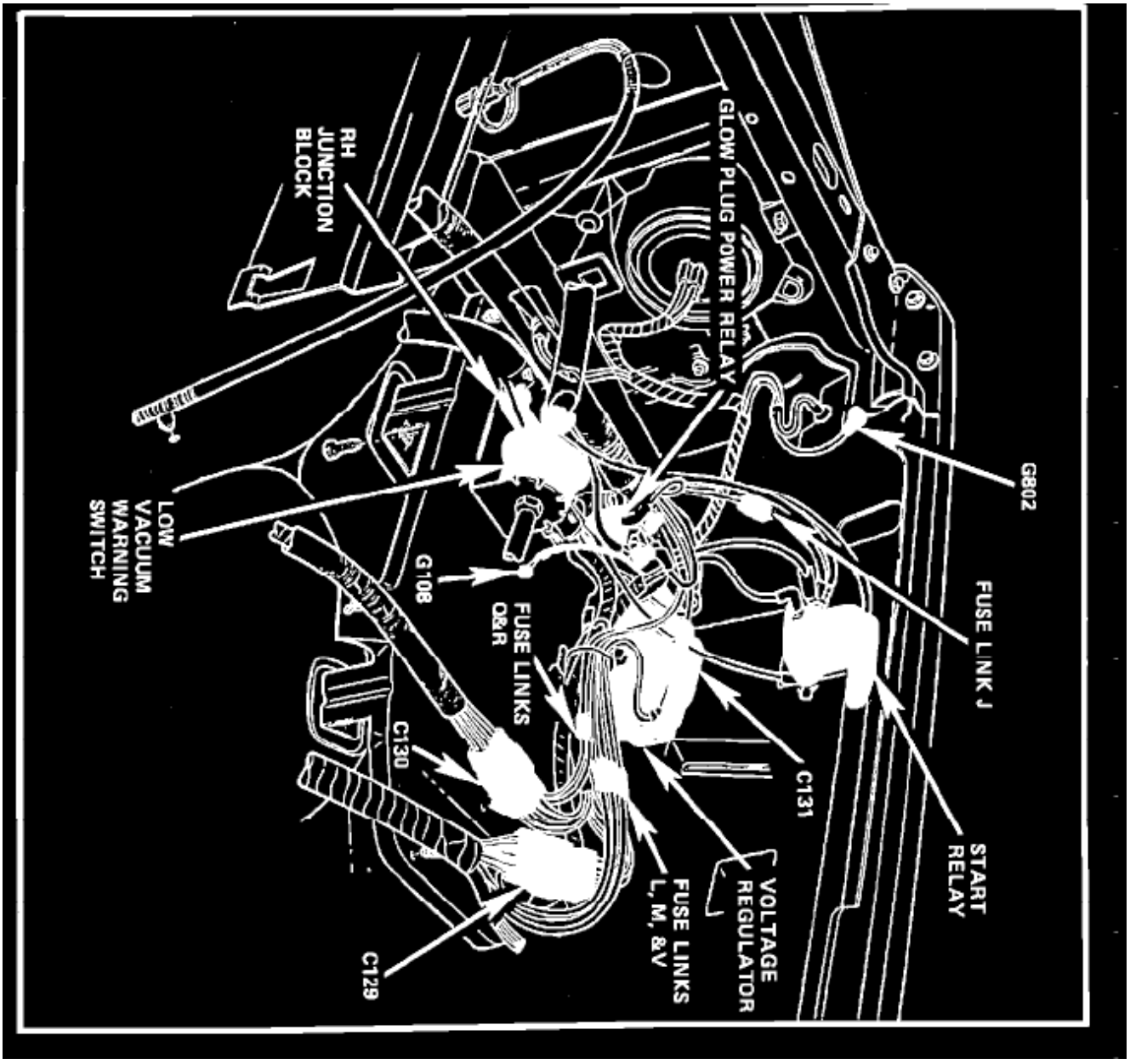
Fuse Links Q & R



RH Fender Apron.

RH Fender Apron

Applicable to: 1983 V8-420/6.9L Diesel Engine

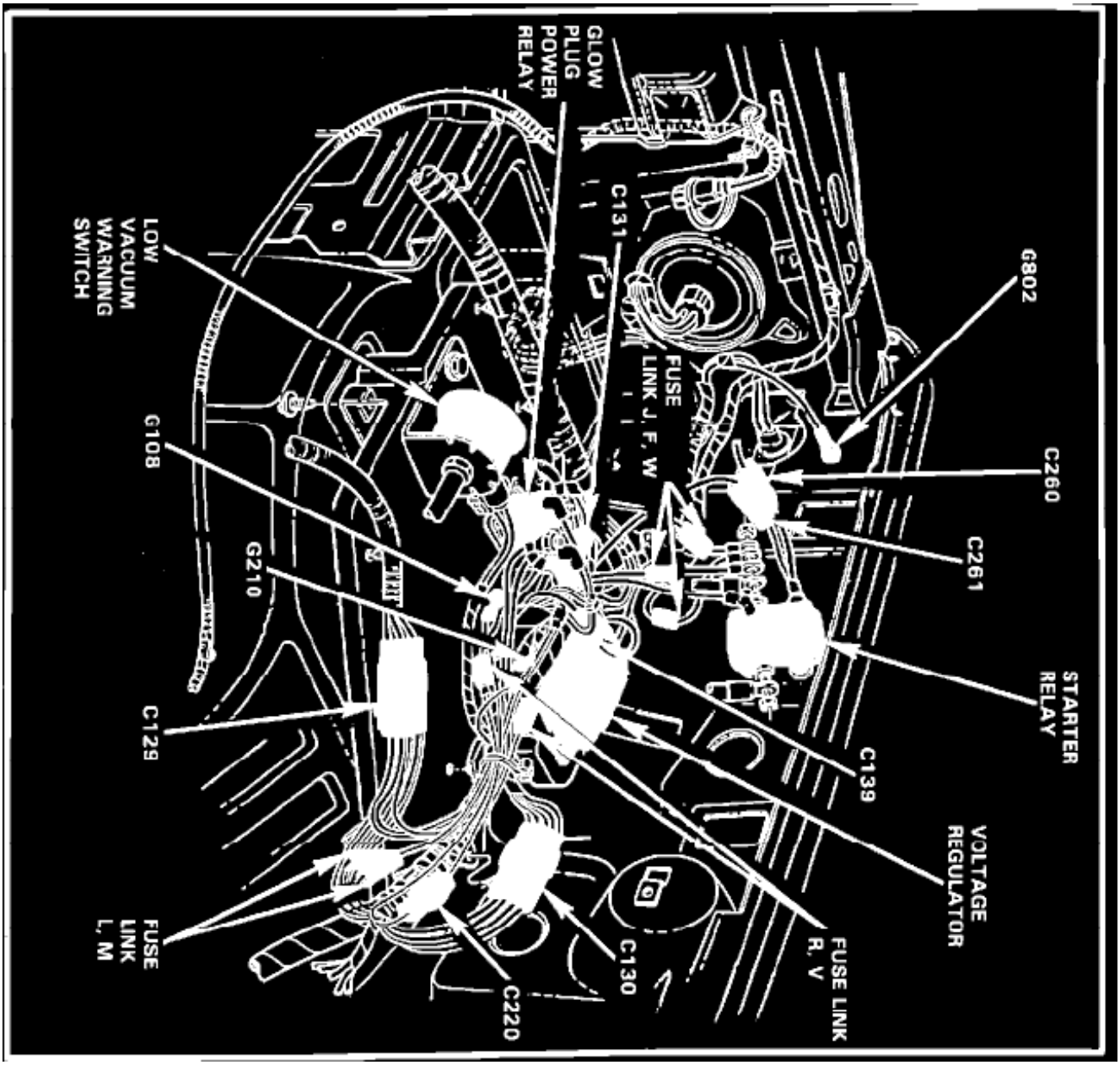


RH Fender Apron.

RH Fender Apron

Applicable to: 1984 V8-420/6.9L Diesel Engine

Fuse Links R & V



RH Fender Apron.

RH Fender Apron

Applicable to: 1985 V8-420/6.9L Diesel Engine

Service Reminder Indicators: Service Precautions

SERVICE PRECAUTION

All Service Reminder Indicators should be investigated or serviced immediately. Vehicle damage may result if the indicator is ignored.

Tires: Technical Service Bulletins Steering - Pull/Drift Diagnostic Procedures

Article No. 84-19-19

STEERING PULL/DRIFT/ROADABILITY - DIAGNOSTIC PROCEDURES

LIGHT TRUCKS 1980-84 F100-350, BRONCO, ECONOLINE

Section 19 of the 1983 and 1984 Light Truck Shop Manuals provides procedures to resolve most roadability concerns experienced to date. These procedures can be applied to any 1980 and later model light trucks.

When servicing 4 wheel drive vehicles with limited slip front axles, front tire circumference is the most probable cause if the pull is only present when the hubs are locked. Installing the two most evenly matched tires on the front axle should resolve the concern.

OTHER APPLICABLE ARTICLES: None WARRANTY STATUS: "INFORMATION ONLY"

Wheels: Technical Service Bulletins Transmission/Transfer Case - Banging When Braking

Article No. 83-7-26

NOISE - CLATTERING/BANGING OF TRANSMISSION/TRANSFER CASE DURING BRAKING

LIGHT TRUCKS 1981-83 F-150/350, BRONCO

Gear "banging" type noise during braking can be caused by rear wheel brake shudder "shaking" the transmission/transfer case even if it is not felt by the driver. The brake shudder may be caused by the rear wheels warping the brake drum. For F150 and Bronco with styled wheels, refer to TSB-82-10-15. For F250/350 with standard wheels, refer to TSB 83-7-19. Transmission or transfer case service actions should not be performed until confirming that brake shudder is not the causal factor.

OTHER APPLICABLE ARTICLES: 83-7-19; 82-10-15; 82-15-14 WARRANTY STATUS: "INFORMATION ONLY"

Wheel Bearing: Adjustments

4 WHEEL DRIVE MODELS

1980 F-350, 1980-82 F-250, 1980-85 F-150 & Bronco & 1984-85 F-250 Exc. w/Dana 501FS Axle

If vehicle is equipped with free running lock-out hubs, refer to ``Front Wheel Drive Section'' for removal and installation procedures. On 1985 Bronco and F-150-250 4 x 4 models built after June 30, 1985, a one piece spindle bearing locknut was used, requiring a revised procedure.

When removing manual hub, use spanner wrench PN P84-171-2 or equivalent. Insert spanner wrench tangs into four slots on nut assembly, apply inward pressure to unlock bearing nut locking splines and turn counterclockwise to loosen nut.

When installing, thread the new one piece locknut onto spindle with metal stamping inboard., ensuring I. D. key on metal stamping enters spindle keyway. Insert spanner wrench tangs into four slots on locknut assembly, apply inward pressure to unlock bearing nut locking splines and torque nut to 50-60 ft. lbs. to seat wheel bearings. Back off nut approximately 180 degrees, then torque to 15 ft. lbs.

New spindles have been released with a wider keyway. The one piece locknut can only be used with new spindles. Prior design level lock nuts will continue to be available for servicing of old spindles.

1. Raise vehicle and support with stands.

2. Remove hub assembly, then, using tool No. T59T-1197-B and a torque wrench, torque bearing inner adjusting nut to 50 ft. lbs. while rotating wheel back and forth to seat bearings.

3. Back out adjusting nut 1/4 turn on 1980 models, or 1/8 turn on 1981-85 models, and assemble lock tab and outer locknut.

4. Torque locknut to 50 ft. lbs. on 1980 models, or 150 ft. lbs. on 1981-85 models. Bend at least one tab into a slot on both the inner adjusting nut and outer locknut.

5. Final endplay of wheel when installed on spindle should be .001-.006 inch.

6. Install hub assembly.

Wheel Bearing: Service and Repair

4 WHEEL DRIVE MODELS

1. Raise and support front of vehicle and remove front wheels.

2. On models equipped with locking hubs, remove hubs as described in ``Front Wheel Drive Section''.

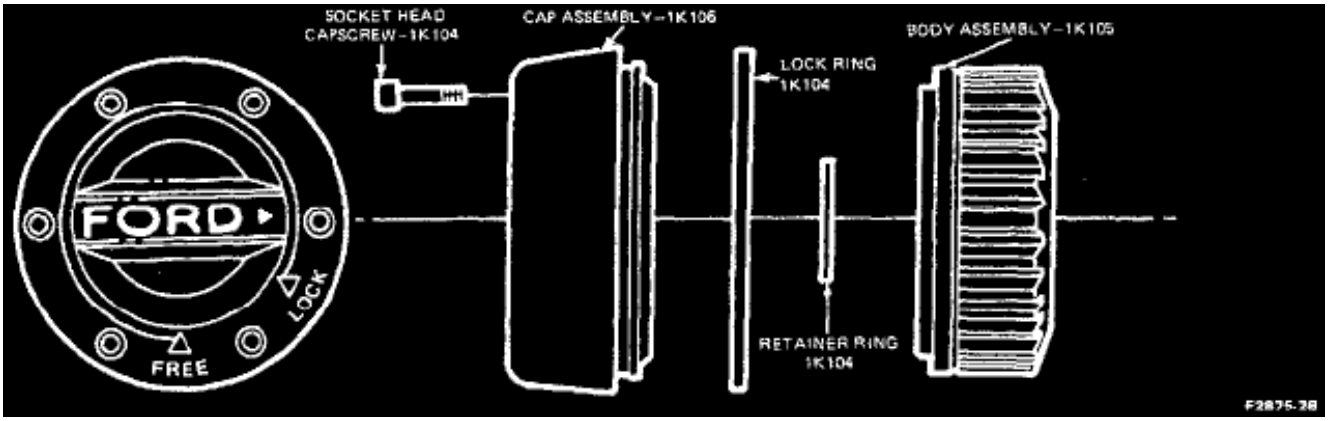
3. On 1980---81 models, remove front hub grease cap.

4. On 1980---81 models, remove driving hub snap ring, then the splined driving hub and pressure spring.

5. On all models, remove wheel bearing locknut, lock ring and adjusting nut, then the hub and disc assembly. The outer bearing and roller assembly will slide out when the hub is removed.

6. Remove inner bearing and grease seal from wheel hub using a suitable driving tool on 1980---81 models or a puller on 1982---87 models.

7. Reverse procedure to install. Adjust bearings as described under ``Wheel Bearings, Adjust''.



Wheel Hub (Locking): Service and Repair

Manual Locking Hub (Warner)

1980---87 F-150---350 & BRONCO W/MANUAL HUBS

Removal & Disassembly

1. Remove cap assembly capscrews and the cap assembly, Fig. 5.

2. Remove snap ring from end of axle shaft.

3. Remove lock ring from wheel hub groove.

4. Remove body assembly from wheel hub. If necessary, a puller may be used to remove body assembly.

Assembly & Installation

1. Install body assembly onto wheel hub, Fig. 5.

2. Install lock ring into hub groove, then the snap ring onto axle shaft.

3. Install cap assembly and torque capscrews to 35---50 inch lbs.

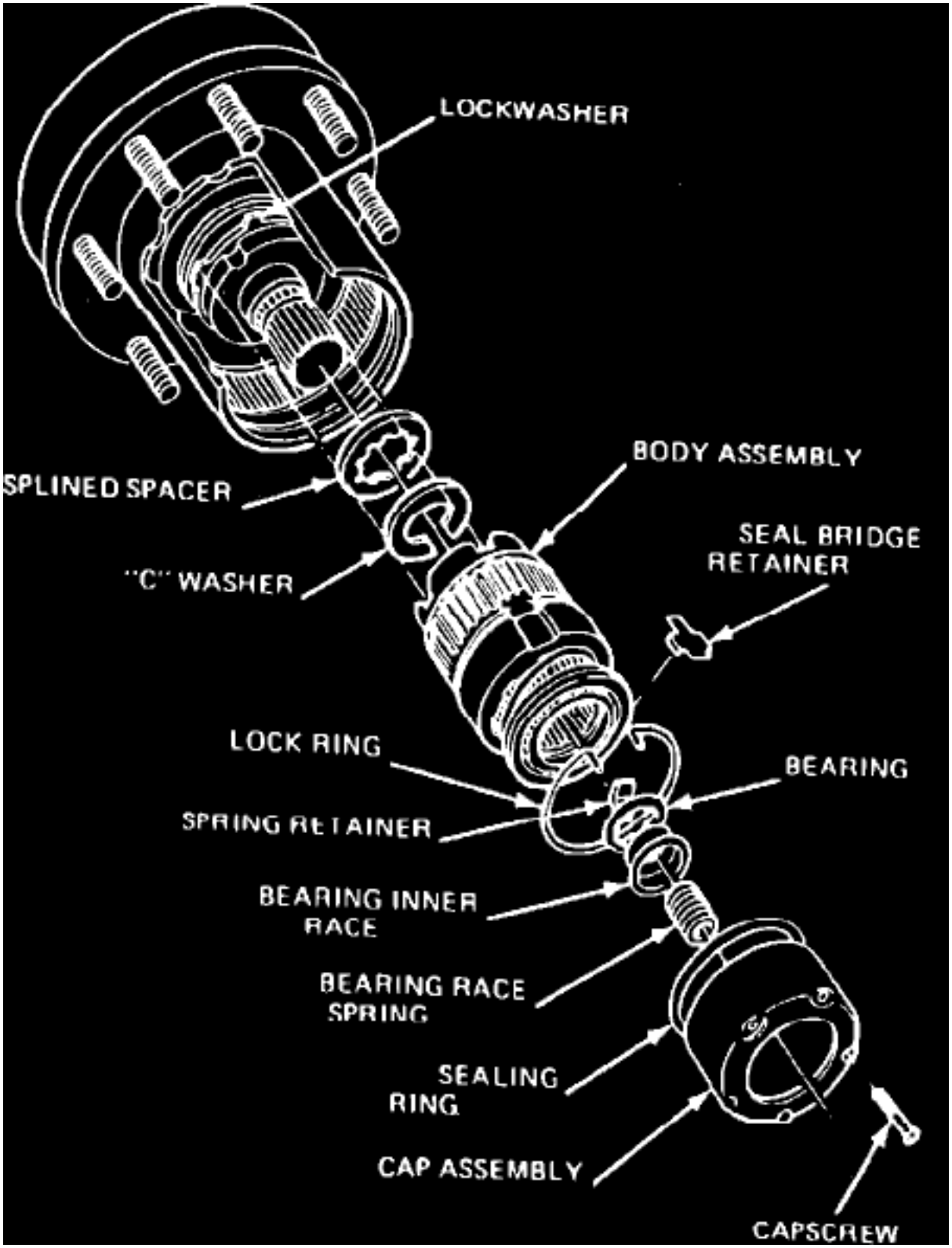


Fig. 6 Automatic front locking hub. 1980---87 F-150---350 & Bronco

1982-87 F-150-250 & BRONCO W/AUTOMATIC HUBS

Removal & Disassembly

1. Remove cap assembly capscrews and the cap assembly, Fig. 6. Avoid dropping ball bearing, bearing race and retainer when removing cap.

2. Remove rubber seal, then the seal bridge retainer from retainer ring space.

3. Remove retainer ring by closing ends with suitable pliers while pulling hub lock from wheel hub.

4. If wheel hub and spindle are to be removed, remove C-washer from stub shaft groove, splined spacer from shaft and the wheel bearing lock nuts and lock washer.

Assembly & Installation

1. Install wheel bearing locknut and lock washer. Torque locknut to 150 ft. lbs.

2. Install splined spacer and C-washer on axle shaft.

3. Install locking hub assembly into hub, ensuring large tangs are aligned with lock washer and splines align with hub and axle shaft splines, Fig. 6.

4. Install retainer ring by closing ends with suitable pliers while pushing locking hub assembly into wheel hub.

5. Install seal bridge retainer, narrow end first.

6. Install rubber seal, then the cap assembly. Torque cap screws alternately and evenly to 40---50 inch lbs.

Wheel Fastener: Technical Service Bulletins Lug Nuts - Proper Installation/Torqueing Procedure

Article No. 98-5A-4

^ BRAKES - PREVENTING BRAKE VIBRATION - SERVICE TIP

^ WHEELS - PROPER LUG TORQUE PROCEDURES - SERVICE TIP

FORD: 1972-97 THUNDERBIRD 1976-86 LTD 1976-97 MUSTANG 1981-97 CROWN VICTORIA 1982-88 EXP 1982-98 ESCORT 1984-94 TEMPO 1986-97 TAURUS 1988-93 FESTIVA 1989-97 PROBE 1994-97 ASPIRE 1995-98 CONTOUR

LINCOLN-MERCURY: 1979-83 MONARCH, ZEPHYR 1979-97 COUGAR 1980-83 MARK VI 1980-98 CONTINENTAL, TOWN CAR 1981-86 LYNX 1983-86 MARQUIS 1984-92 MARK VII 1984-94 TOPAZ 1986-97 SABLE 1987-89 TRACER 1987-97 GRAND MARQUIS 1991-94 CAPRI 1991-97 TRACER 1993-98 MARK VIII 1995-98 MYSTIQUE

LIGHT TRUCK: 1979-96 BRONCO 1979-97 ECONOLINE, F-150-350 SERIES 1984-90 BRONCO II 1984-97 RANGER 1986-97 AEROSTAR 1988-97 F SUPER DUTY 1991-97 EXPLORER 1993-97 VILLAGER 1995-98 WINDSTAR 1997 EXPEDITION 1998 NAVIGATOR

ISSUE: The use of air impact tools to tighten wheel lug nuts can lead to overtightened and/or unevenly tightened wheel lug nuts. Air impact tools typically used for wheel lug nut removal and installation can generate up to 475 N.m (350 lb-ft) of torque. Overtightened and/or unevenly torqued wheel lug nuts may cause:

^ Brake vibration

^ Distortion of the wheel hub

^ Distortion of the brake rotor

ACCUTORQ SOCKETS

VEHICLE	YEAR	SIZE	LB-FT TORQUE	TOOL COLOR
FORD				
Aspire	1994-97	21mm	80	Light Brown
Contour	1995-96	19mm-3/4"	100	Grey
Crown Victoria	1981-97	13/16"	100	Dark Brown
Escort ZX2	1998	21mm	80	Light Brown
Escort	1991-98	21mm	80	Light Brown
Escort	1982-90	19mm-3/4"	100	Grey
EXP	1982-88	19mm-3/4"	100	Grey
Festiva	1988-93	21mm	80	Light Brown
Granada	1975-82	13/16"	100	Dark Brown
LTD	1975-86	13/16"	100	Dark Brown
Mustang	1979-97	13/16"	100	Dark Brown
Probe	1989-97	21mm	80	Light Brown
Taurus	1986-97	19mm-3/4"	100	Grey
Tempo	1984-94	19mm-3/4"	100	Grey
Thunderbird	1967-97	19mm-3/4"	100	Grey
Thunderbird	1972-86	13/16"	100	Dark Brown
LINCOLN				
All Models	1980-98	13/16"	100	Dark Brown
MERCURY				
Capri	1991-94	21mm	80	Light Brown
Capri	1979-86	13/16"	100	Dark Brown
Cougar	1967-97	19mm-3/4"	100	Grey
Cougar	1979-86	13/16"	100	Dark Brown
Lynx	1981-86	19mm-3/4"	100	Grey
Marquis	1983-86	13/16"	100	Dark Brown
Mystique	1996-98	19mm-3/4"	100	Grey
Monarch, Zephyr	1979-83	13/16"	100	Dark Brown
Sable	1986-97	19mm-3/4"	100	Grey
Topaz	1984-94	19mm-3/4"	100	Grey
Tracer	1991-97	21mm	80	Light Brown
Tracer	1987-89	21mm	80	Light Brown
Grand Marquis	1987-97	19mm-3/4"	100	Grey
LIGHT TRUCK				
E-150/F-150	1975-97	13/16"	100	Dark Brown
E/F-250/350	1989-97	7/8"	140	Turquoise
E/F-250/350 (Dual Rears)	1994-97	7/8"	140	Turquoise
F-Super Duty	1998 97		140	N/A
Aerostar	1986-97	19mm-3/4"	100	Grey
Bronco	1975-96	13/16"	100	Dark Brown
Bronco II	1984-90	19mm-3/4"	100	Grey
Courier	1979-83	21mm	65	Black
Explorer	1991-97	13/16"	100	Dark Brown
Ranger	1984-97	19mm-3/4"	100	Grey
Windstar	1995-98	13/16"	100	Dark Brown
Villager	1993-97	21mm	80	Light Brown
Expedition	1997	19mm-3/4"	100	Grey
Navigator	1998	19mm-3/4"	100	Grey

TD-4106-B

Figure 1

^ Brake rotor runout

^ Damage to the wheel

^ Damage to the wheel nuts and studs

ACTION: All wheel lug nuts should only be tightened to specification using a torque wrench or by using the Rotunda ACCUTORO 164-R0314 or equivalent on a 1/2" drive air impact tool. The "ACCUTORO" lug nut sockets limit the torque of the air impact tool, preventing overtightening or uneven tightening of the wheel lug nuts. The torque limiting devices (regulators) on air impact tools will not reduce the output torque enough to prevent overtightening of the wheel lug nuts.

NOTE:

REFER TO THE APPROPRIATE SERVICE MANUAL OR THE CHART IN FIGURE 1 FOR THE CORRECT WHEEL LUG NUT TORQUE SPECIFICATION. THE CHART IN FIGURE 1 ALSO PROVIDES THE CORRECT "ACCUTORO" LUG NUT SOCKET TO USE.

The "ACCUTORO" socket is intended for lug nut installation, not removal. When using the "ACCUTORO" socket, the output torque of the air impact tool must be set to 217-339 N.m (160-250 lb-ft), usually this will be the lowest setting on the air impact tool.

The "ACCUTORO" lug nut sockets are available through Rotunda Equipment. The four-piece set (164-R0314) fits most Ford Motor Company cars and light trucks. The tool set consists of four (4) lug nut sockets and a storage case. The set can be ordered by calling Rotunda Equipment at 1-800-ROT-UNDA (768-8632).

CAUTION:

AIR IMPACT TOOLS SHOULD NOT BE USED TO TIGHTEN WHEEL LUG NUTS UNLESS THE "ACCUTORO" LUG NUT SOCKET OF THE CORRECT SPECIFICATION IS USED.

NOTE:

DO NOT USE AIR IMPACT TOOLS ON LOCKING WHEEL LUG NUTS. THEY ARE TO BE HAND-TORQUED ONLY.

OTHER APPLICABLE ARTICLES: NONE

SUPERSEDES: 97-17-6

WARRANTY STATUS: INFORMATION ONLY

OASIS CODES: 301000, 303000, 306000

Maximum PSI	Minimum PSI	Maximum PSI	Minimum PSI	Maximum PSI	Minimum PSI	Maximum PSI	Minimum PSI
134	101	164	123	194	145	224	168
136	102	166	124	196	147	226	169
138	104	168	126	198	148	228	171
140	105	170	127	200	150	230	172
142	107	172	129	202	151	232	174
144	108	174	131	204	153	234	175
146	110	176	132	206	154	236	177
148	111	178	133	208	156	238	178
150	113	180	135	210	157	240	180
152	114	182	136	212	158	242	181
154	115	184	138	214	160	244	183
156	117	186	140	216	162	246	184
158	118	188	141	218	163	248	186
160	120	190	142	220	165	250	187
162	121	192	144	222	166		

Compression Check: Testing and Inspection

COMPRESSION TEST

1. Ensure oil in crankcase is of the correct viscosity and at proper level and battery is properly charged. Operate vehicle until engine is at normal

operating temperature. Turn OFF ignition switch, then remove all spark plugs.

2. Set throttle plates (and choke plates, if equipped) in wide-open position. 3. Install a compression gauge such as Rotunda Compression Tester 059-00009 or equivalent in No. 1 cylinder. 4. Install an auxiliary starter switch in starting circuit. With ignition switch in the OFF position, and using auxiliary starter switch, crank engine at

least five compression strokes and record highest reading. Note the approximate number of compression strokes required to obtain the highest reading.

5. Repeat test on each cylinder cranking the engine approximately the same number of compression strokes.

TEST CONCLUSION

1. The indicated compression pressures are considered within specification if the lowest reading cylinder is within 75 percent of the highest. 2. If one or more cylinders read low, squirt approximately one tablespoon of heavy SAE 50 weight or equivalent engine oil on top of the pistons in

the low reading cylinders. Repeat compression pressure check on these cylinders. a. If compression improves considerably, piston rings are at fault. b. If compression does not improve, valves are sticking or seating poorly. c. If two adjacent cylinders indicate low compression pressures and squirting oil on pistons does not increase compression, cause may be a

cylinder head gasket leak between cylinders. Engine oil and/or coolant in cylinders could result from this problem.

Compression Pressure Limit Chart

NOTE: Refer to the compression pressure limit chart for pressure specifications.

Camshaft: Specifications Camshaft Clearance Specifications

Camshaft Clearance Specifications

Camshaft Journal Diameter No. 1 2.0805-2.0815 in

No. 2 2.0655-2.0665 in

No. 3 2.0505-2.0515 in

No. 4 2.0355-2.0365 in

No. 5 2.0205-2.0215 in

Camshaft Bearing Inside Diameter No. 1 2.0825-2.0835 in

No. 2 2.0675-2.0685 in

No. 3 2.0525-2.0535 in

No. 4 2.0375-2.0385 in

No. 5 2.0225-2.0235 in

Camshaft Bearing Clearance .001-.003 in

Note: Service Limit -- 0.006 in

Camshaft End Play .001-.007 in

Note: Service Limit -- 0.009 in

Camshaft Runout Max. 0.005 in

Camshaft: Service and Repair

V8 ENGINES

1. On Econoline models except V8-351M and 400 engines, remove grille.

2. On all models, drain cooling system, then disconnect all lines and hoses from radiator and remove radiator.

3. Remove intake manifold, then the rocker arm covers.

4. Loosen rocker arms, then remove pushrods and valve lifters in sequence.

5. Remove timing case cover and timing chain as previously described.

6. On models equipped with A/C, remove A/C condenser attaching bolts and position condenser aside.

7. On all models, remove camshaft thrust plate and carefully slide camshaft out through front of engine.

8. Reverse procedure to install.

Lifter / Lash Adjuster: Specifications

Lifter Bore Diameter .8752-.8767 in

Lifter Diameter .8740-.8745 in

Lifter To Bore Clearance .0007-.0027 in

Note: Service Limit -- 0.005 in

Lifter / Lash Adjuster: Service and Repair

V6-232, V8-255, 302, 351, 400, & 460

1. Remove intake manifold.

2. Remove rocker arm covers. Loosen rocker arm stud nuts or bolts and rotate rocker arms to the side.

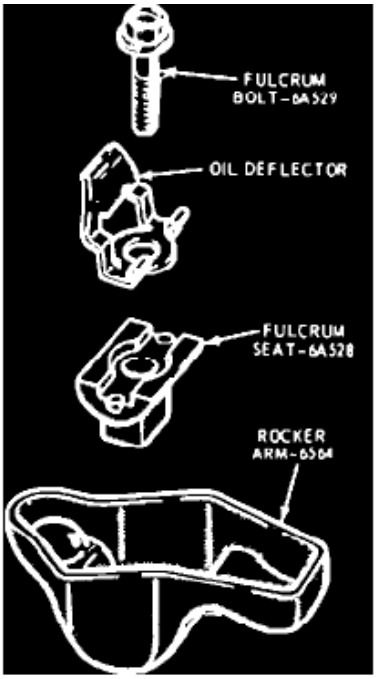
3. Remove pushrods in sequence so they can be installed in their original bores.

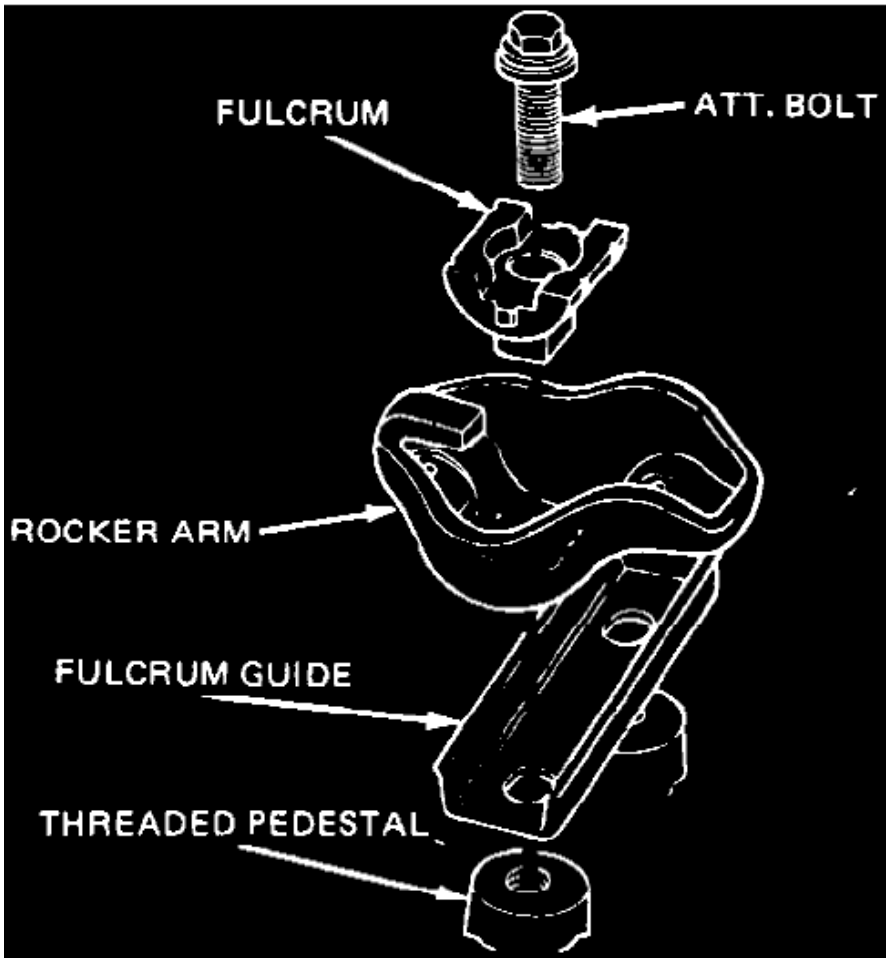
4. Using a magnet, remove the lifters and place them in a numbered rack so they can be installed in their original bores. If lifters are stuck in their bores, it may be necessary to use a plier-type tool to remove them.

5. The internal parts of each lifter are matched sets. Do not intermix parts.

Rocker Arm Assembly: Specifications

Rocker Arm To Cylinder Head Bolts 18-25 ft.lb


FULCRUM BOLT - 6A529
OIL DEFLECTOR
FULCRUM SEAT - 6A528
ROCKER ARM - 6564


FULCRUM
ATT. BOLT
ROCKER ARM
FULCRUM GUIDE
THREADED PEDESTAL

Rocker Arm Assembly: Service and Repair

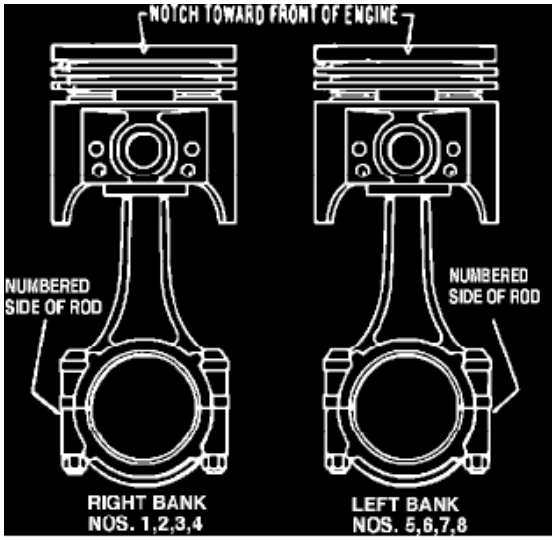
Fig. 23 Rocker arm assembly

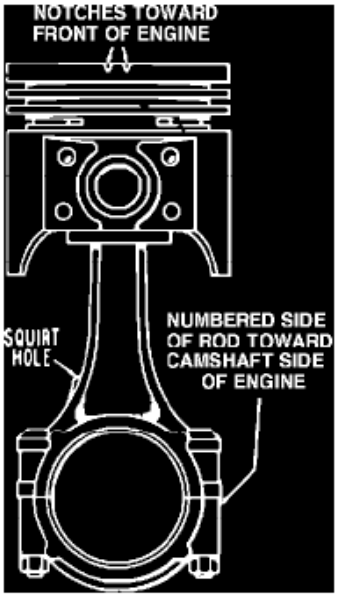
Fig. 24 Rocker Arm Assembly

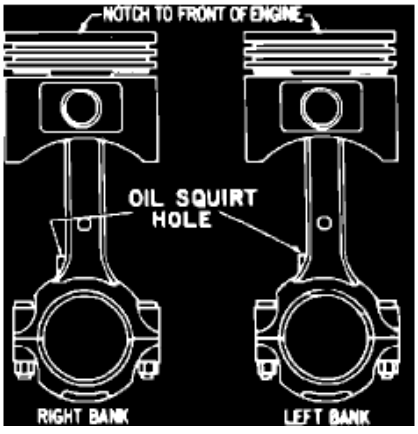
V6-232, V8-255, 302, 351M, 351W, 400 & 460 & 1985-87 6-300 The rocker arm is supported by a fulcrum bolt which fits through the fulcrum seat and threads into the cylinder head. To disassemble, remove the bolt, oil deflector, fulcrum seat and rocker arm, Figs. 26 and 27. 1981-82 models equipped with V8-255, 302 and 351W engines with low profile rocker arm fulcrums (part No. E1TZ-6A528-A) may experience excessive oil displacement when engine is operated for extended periods during high ambient temperatures. This problem may be corrected by replacing original rocker arm fulcrums with part No. D7AZ-6A528-A.

Connecting Rod: Specifications

Connecting Rod Cap Bolts 40-45 ft.lb


NOTCH TOWARD FRONT OF ENGINE
NUMBERED SIDE OF ROD
NUMBERED SIDE OF ROD
RIGHT BANK NOS. 1,2,3,4
LEFT BANK NOS. 5,6,7,8


NOTCHES TOWARD FRONT OF ENGINE
SQUIRT HOLE
NUMBERED SIDE OF ROD TOWARD CAMSHAFT SIDE OF ENGINE


NOTCH TO FRONT OF ENGINE
OIL SQUIRT HOLE
RIGHT BANK
LEFT BANK

Connecting Rod: Service and Repair

Fig. 28 Piston & rod assembly

Fig. 29 Piston & rod assembly

Fig. 35 Piston & rod assembly. V6-232

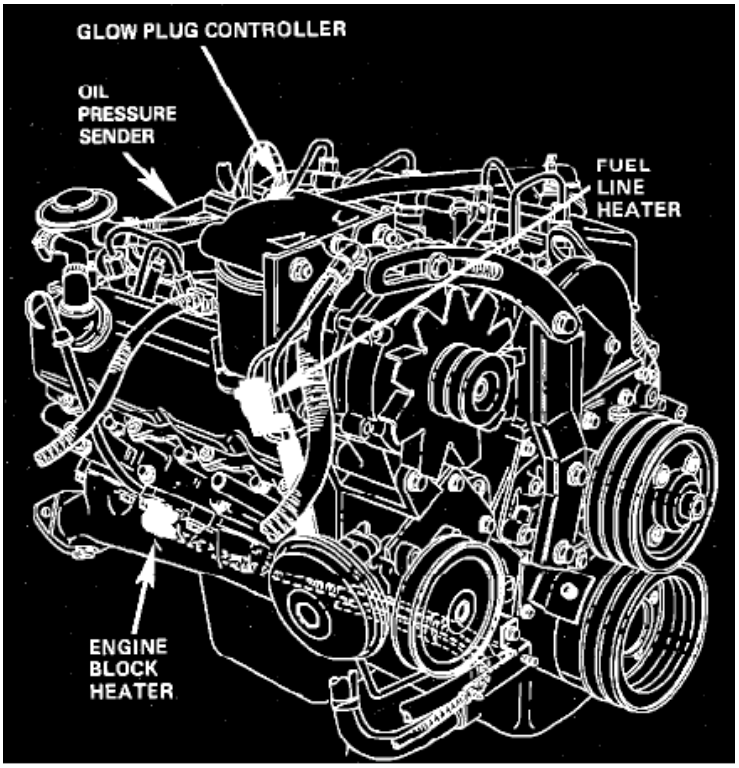
Lubricate all parts with light engine oil. Position the connecting rod in the piston and push the pin into place, Figs. 33, 34 and 35. Insert new piston pin retainers (when used) by spiralling them into the piston with the fingers. Do not use pliers. Replacement pistons for the following 6-300 equipped vehicles have an increased ring land, which raises the top compression ring .035 inch:

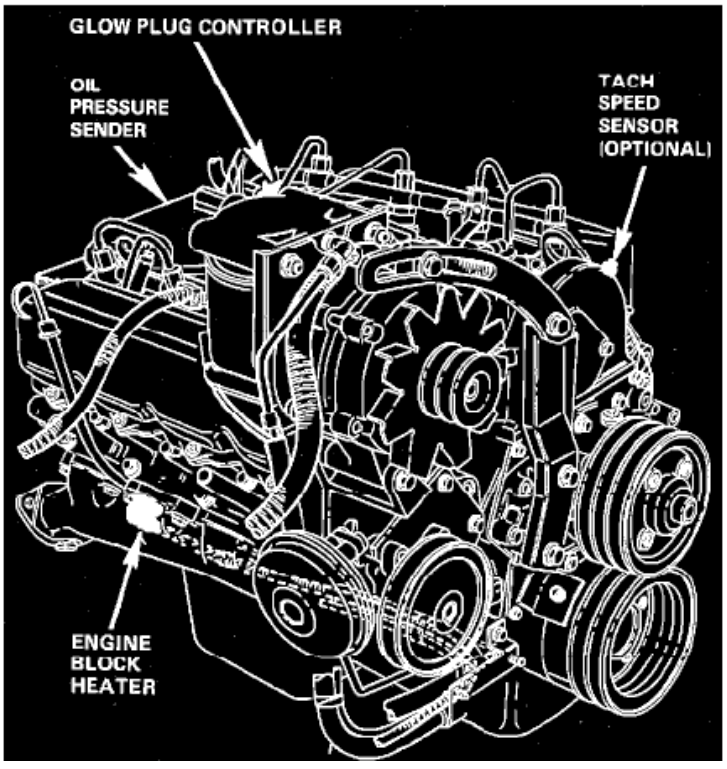
1980-81 E & F-100-250 & Bronco except heavy duty. Before installing the new piston, the cylinder ridge must be removed to ensure that the top compression ring does not contact the ridge or deposits formed at the top of the cylinder bore. When removing the ridge, do not cut into the ring travel area more than {1/32} inch.

Crankshaft: Specifications Main Cap Torque

Main Cap Torque

Main Bearing Cap Bolts 95- 105 ft.lb


GLOW PLUG CONTROLLER
OIL PRESSURE SENDER
FUEL LINE HEATER
ENGINE BLOCK HEATER


GLOW PLUG CONTROLLER
OIL PRESSURE SENDER
TACH SPEED SENSOR (OPTIONAL)
ENGINE BLOCK HEATER

Engine Block Heater: Locations

RH Side Of Engine.

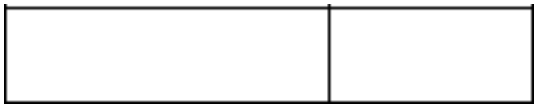
Lower RH Side Of Engine

Applicable to: 1983-84 V8-420/6.9L Diesel Engine

RH Side Of Engine.

Lower RH Side Of Engine

Applicable to: 1985 V8-420/6.9L Diesel Engine



Harmonic Balancer - Crankshaft Pulley: Specifications

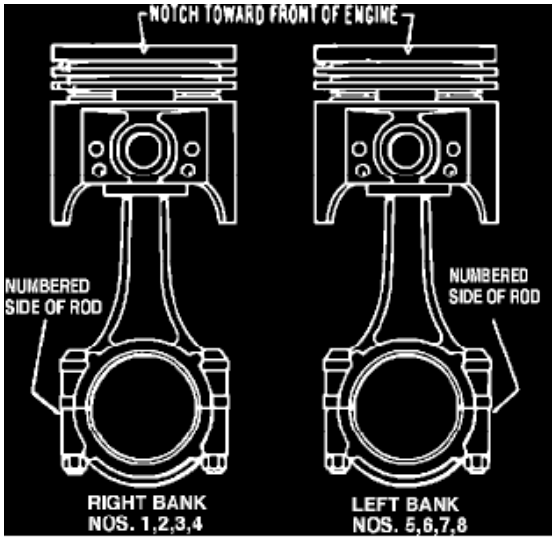
Crankshaft Pulley 70-90 ft.lb

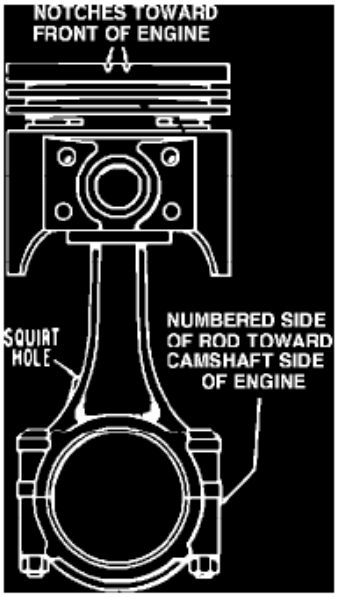
Piston: Specifications

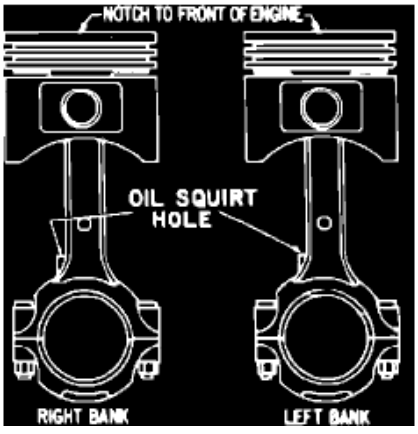
Piston Diameter coded red 3.9978 - 3.9984 in

coded blue 3.9990 - 3.9996 in

Piston Clearance .0018-.0026 in


NOTCH TOWARD FRONT OF ENGINE
NUMBERED SIDE OF ROD
NUMBERED SIDE OF ROD
RIGHT BANK NOS. 1,2,3,4
LEFT BANK NOS. 5,6,7,8


NOTCHES TOWARD FRONT OF ENGINE
SQUIRT HOLE
NUMBERED SIDE OF ROD TOWARD CAMSHAFT SIDE OF ENGINE


NOTCH TO FRONT OF ENGINE
OIL SQUIRT HOLE
RIGHT BANK
LEFT BANK

Piston: Service and Repair

Fig. 28 Piston & rod assembly

Fig. 29 Piston & rod assembly

Fig. 35 Piston & rod assembly. V6-232

Lubricate all parts with light engine oil. Position the connecting rod in the piston and push the pin into place, Figs. 33, 34 and 35. Insert new piston pin retainers (when used) by spiralling them into the piston with the fingers. Do not use pliers. Replacement pistons for the following 6-300 equipped vehicles have an increased ring land, which raises the top compression ring .035 inch:

1980-81 E & F-100-250 & Bronco except heavy duty. Before installing the new piston, the cylinder ridge must be removed to ensure that the top compression ring does not contact the ridge or deposits formed at the top of the cylinder bore. When removing the ridge, do not cut into the ring travel area more than {1/32} inch.

Piston Pin: Specifications

Piston Pin Diameter .9119-.9124 in

Pin to Piston Bore Clearance .0003-.0005 in

Piston Ring: Specifications

End Gap, Compression Ring 0.01 in

End Gap, Oil Ring 0.01 in

Side Clearance, Top Compression Ring 0.0019 - 0.0036 in

Side Clearance, Second Compression Ring 0.002 - 0.004 in

Valve Clearance: Specifications

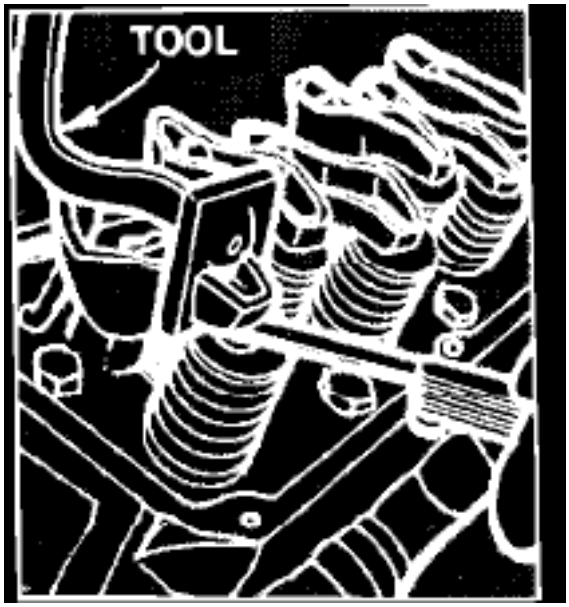
ENGINE YEAR CLEARANCE

V6-232 82-83 .088-.189 V8-255 81-82 .123-.173 6-300 80-87 .125-.175 V8-302 80-87 .096-.165 V8-351M 80-81 .125 V8-351W 80-87 .123-.173 V8-400 80-82 .175 V8-460 80-87 .100-.150

On engines with hydraulic lifters, clearance specified is at valve stem tip with lifter collapsed.

Valve Clearance: Locations

FRONT TO REAR 6-300 E-I-E-I-E-I-E-I-E-I-E-I V6-232 Right I-E-I-E-I-E V6-232 Left E-I-E-I-E-I V8-255, 302 Left Bank E-I-E-I-E-I-E-I V8-255, 302 Right Bank I-E-I-E-I-E-I-E V8-351, 400 Right Bank I-E-I-E-I-E-I-E V8-351, 400 Left Bank E-I-E-I-E-I-E-I V8-460 Left Bank E-I-E-I-E-I-E-I V8-460 Right Bank I-E-I-E-I-E-I-E



Valve Clearance: Adjustments

Fig. 21 Compressing valve lifter with tool to check clearance on engines with hydraulic valve lifters

V8 ENGINES To provide a means to compensate for dimensional changes in the valve train and provide for valve adjustment, .060 inch shorter or longer pushrods are available. If the valve clearance is less than the minimum, the .060 inch shorter pushrod should be used. If the clearance is more than the maximum, the longer pushrod should be used. To check the valve clearance, proceed as follows:

1. Mark crankshaft pulley at three locations, with No. 1 location at TDC timing mark (end of compression stroke), location No. 2 one full turn (360°) clockwise from TDC and No. 3 location one quarter turn clockwise (90°) from position No. 2.

2. Turn crankshaft to number 1 location, then compress valve lifter using tool T71P-6513-A or equivalent, Fig. 21, and check the clearance on the following valves:

V8-255, 302, 460 No. 1 Intake No. 1 Exhaust No. 7 Intake No. 5 Exhaust No. 8 Intake No. 4 Exhaust V8-351 & 400 No. 1 Intake No. 1 Exhaust No. 4 Intake No. 3 Exhaust No. 8 Intake No. 7 Exhaust

3. Turn crankshaft to number 2 location, then compress valve lifter using tool T71P-6513-A or equivalent, Fig. 21, and check the clearance on the following valves:

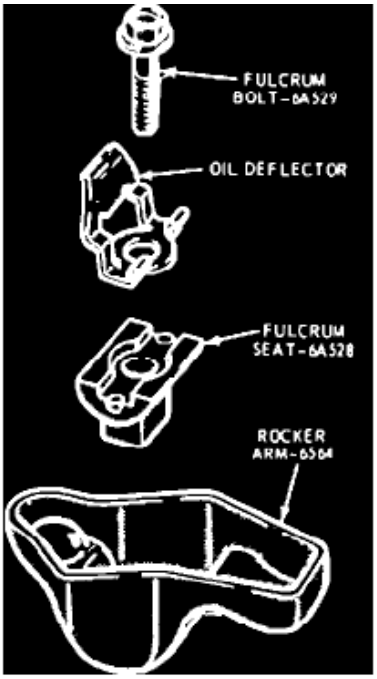
V8-255, 302, 460 No. 5 Intake No. 2 Exhaust No. 4 Intake No. 6 Exhaust V8-351 & 400 No. 3 Intake No. 2 Exhaust No. 7 Intake No. 6 Exhaust

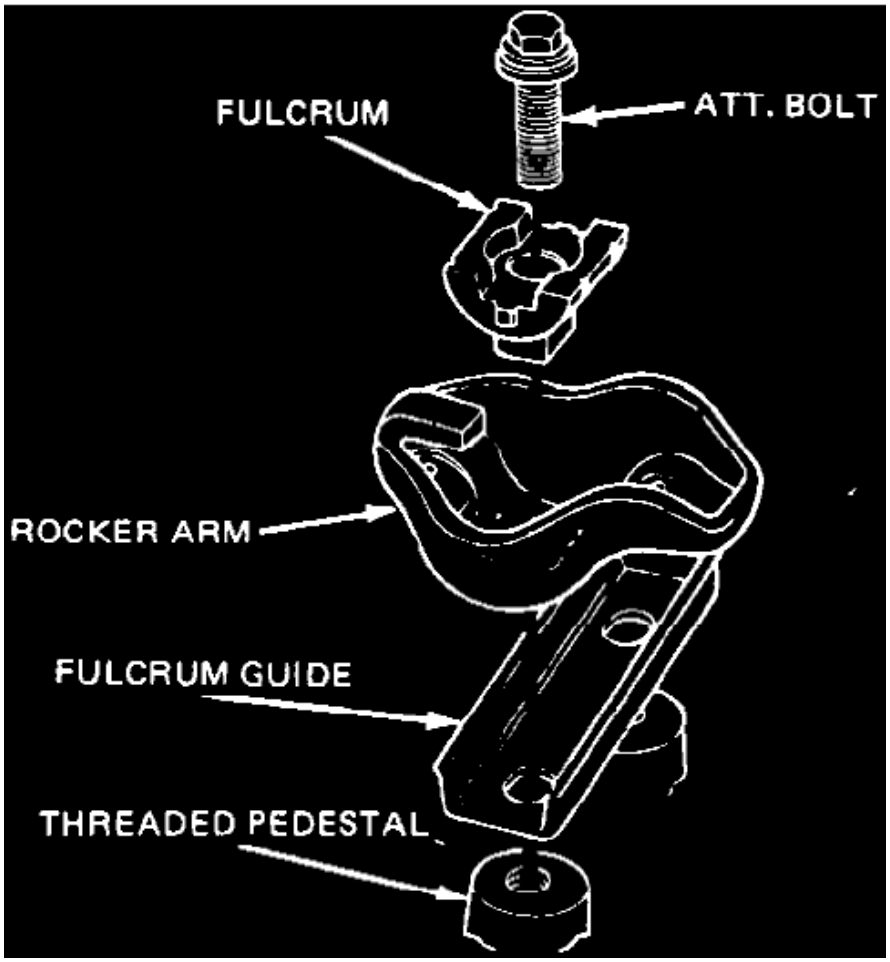
4. Turn crankshaft to number 3 location, then compress valve lifter using tool T71P-6513-A or equivalent, Fig. 21, and check the clearance on the following valves:

V8-255, 302, 460 No. 2 Intake No. 7 Exhaust No. 3 Intake No. 3 Exhaust No. 6 Intake No. 8 Exhaust V8-351 & 400 No. 2 Intake No. 4 Exhaust No. 5 Intake No. 5 Exhaust No. 6 Intake No. 8 Exhaust

Rocker Arm Assembly: Specifications

Rocker Arm To Cylinder Head Bolts 18-25 ft.lb


FULCRUM BOLT - 6A529
OIL DEFLECTOR
FULCRUM SEAT - 6A528
ROCKER ARM - 6564


FULCRUM
ATT. BOLT
ROCKER ARM
FULCRUM GUIDE
THREADED PEDESTAL

Rocker Arm Assembly: Service and Repair

Fig. 23 Rocker arm assembly

Fig. 24 Rocker Arm Assembly

V6-232, V8-255, 302, 351M, 351W, 400 & 460 & 1985-87 6-300 The rocker arm is supported by a fulcrum bolt which fits through the fulcrum seat and threads into the cylinder head. To disassemble, remove the bolt, oil deflector, fulcrum seat and rocker arm, Figs. 26 and 27. 1981-82 models equipped with V8-255, 302 and 351W engines with low profile rocker arm fulcrums (part No. E1TZ-6A528-A) may experience excessive oil displacement when engine is operated for extended periods during high ambient temperatures. This problem may be corrected by replacing original rocker arm fulcrums with part No. D7AZ-6A528-A.

Valve Cover Gasket: Technical Service Bulletins Seals For Rocker Cover, Oil Pan, and Crankshaft

Article No. 83-13-6

LEAKS - OIL - CURRENT SEALS FOR ROCKER COVER, OIL PAN, AND CRANKSHAFT

FORD 1983 AND PRIOR

LINCOLN-MERCURY 1983 AND PRIOR

LIGHT TRUCKS 1983 AND PRIOR

MEDIUM/HEAVY TRUCKS 1983 AND PRIOR

The following charts outline current gasket identification for rocker cover, oil pan, and crankshaft seal applications to provide the most effective sealing. Those rocker cover and oil pan applications that use "High Swell Material" are shown by an asterisk (*).

ROCKER COVER GASKETS

Engine Year Part Number Class

1.6L 1981-83 E3FZ-6584-A* A

2.3L 1977-83 E2ZZ-6584-A A

3.3L 1977-83 E3BZ-6584-A* A

4.1L 1977-80 E3BZ-6584-A* A

3.8L 1982-83 RTV

1983 E3DZ-6584-A* A

w/metal rocker cover 4.2L

1980-82 E3AZ-6584-A* A

4.9L 1977-83 E3TZ-6584-C* A

5.0L, 5.0L HO 1977-83 E3AZ-6584-A* A

5.8L (W) 1977-83 E3AZ-6584-A* A

5.8L (M) 1980-82 D00Z-6584-A A

6.6L 1973-79 D00Z-6584-A A

6.1L 1983 E3TZ-6584-E* A

7.0L 1980-82 E3TZ-6584-E* A

7.5L 1979-79 E3TZ-6584-E* A

OIL PAN GASKETS

Engine Year Part Number Class

1.6L 1981-83 E1FZ-6781-A A

2.3L 1977-83 E2ZZ-6781-A AM

3.3L 1977-83 D0DZ-6781-A* A

3.8L 1982-83 RTV

4.1L 1977-80 D0DZ-6781-B A

4.2 1980-82 D9AZ-6781-A A

4.9L 1977-83 E3TZ-6781-B* A

5.0L 1977-83 D9AZ-6781-A A

5.8L (W) 1977-83 D0AZ-6781-C* A

5.8L (M), 6.6L 1977-82 D0AZ-6781-D A

6.1L 1983 D9HZ-6781-A AQ

7.0L 1982 D9HZ-6781-A AQ

7.5L 1977-81 E0UZ-6781-A A

*High Swell Material.

Engine	Year	Part Number Front	Class	Part Number Rear	Class
1.6L	1981-83	E1FZ-6700-A	A	E1FZ-6701-A*	A
2.3L	1977-83	D4FZ-6700-A	A	E2ZZ-6701-A*	AM
				D4FZ-6701-A#	A
3.3L	1977-83	CODE-6700-A	A	C9OZ-6701-A@	A
				C9AZ-6701-B#	AM
3.8L	1982-83	D0AZ-6700-A	A	E2ZZ-6701-A* (After 1/3/83)	AM
				C9OZ-6701-A@ (Before 1/3/83)	A
				D4FZ-6701-A#	A
4.1L	1977-80	C3AZ-6700-A	A	C9OZ-6701-A@	A
				D4FZ-6701-A#	A
4.2L	1980-82	D0AZ-6700-A	A	C9OZ-6701-A@	A
				D4FZ-6701-A#	A
4.9L	1977-82	C3AZ-6700-A	A	C5AZ-6701-B*	A
	1983	C3AZ-6700-A	A	E3TZ-6701-C*	A
5.0L	1977-83	D0AZ-6700-A	A	E2ZZ-6701-A* (After 12/5/83)	A
				C9OZ-6701-A@ (Before 12/5/83)	A
				D4FZ-6701-A#	A
5.8L (W)	1977-83	D0AZ-6700-A	A	E3TZ-6701-C* (After 6/15/83)	A
				C9OZ-6701-A@ (Before 6/15/83)	A
				D0OZ-6701-A#	A
5.8L (M), 6.6L	1977-82	D0AZ-6700-A	A	C9OZ-6701-A@	A
				D0OZ-6701-A#	A
6.1L, 7.0L	1979-83	D9HZ-6700-A	AQ	C9AZ-6701-A#	A
7.5L	1979-83	C3AZ-6700-A	A	C9AZ-6701-A#	A

* — One Piece
\# — Two Piece
@ — Rope

ARTICLE SUPERSEDED:83-5-7WARRANTY STATUS:"INFORMATION ONLY"

CRANKSHAFT SEAL

Valve Guide: Specifications

Guide, Inside Diameter .3433-.3443 in

Valve Guide: Service and Repair

Valve guides in these engines are an integral part of the head and, therefore, cannot be removed. For service, guides can be reamed oversize to accommodate one of three service valves with oversize stems (.003 inch, .015 inch and .030 inch). Check the valve stem clearance of each valve (after cleaning) in its respective valve guide. If the clearance exceeds the service limits of .004 inch of the intake or .005 inch on the exhaust, ream the valve guides to accommodate the next oversize diameter valve.

Valve Seat: Specifications

Seat Width, Intake .060-.080 in

Seat Width, Exhaust .060-.080 in

Runout 0.002 in

Valve Spring: Specifications

Free Length Intake 2.04 in

Free Length Exhaust 1.85 in

Out Of Square Limit 0.078 in

Installed Height Intake 1.765-1.797 in

Installed Height Exhaust 1.578-1.609 in

Spring Pressure, Closed, Intake 74-82 lbf at 1.78 in

Spring Pressure, Closed, Exhaust 76-84 lbf at 1.60 in

Spring Pressure, Open, Intake 190-210 lbf at 1.36 in

Spring Pressure, Open, Exhaust 190-210 lbf at 1.20 in

Valve: Specifications

Stem Diameter Intake .3416-.3423 in

Stem Diameter Exhaust .3411-.3418 in

Maximum Tip Refinish 0.01 in

Face Angle 44 deg

Margin Intake 1/32 in

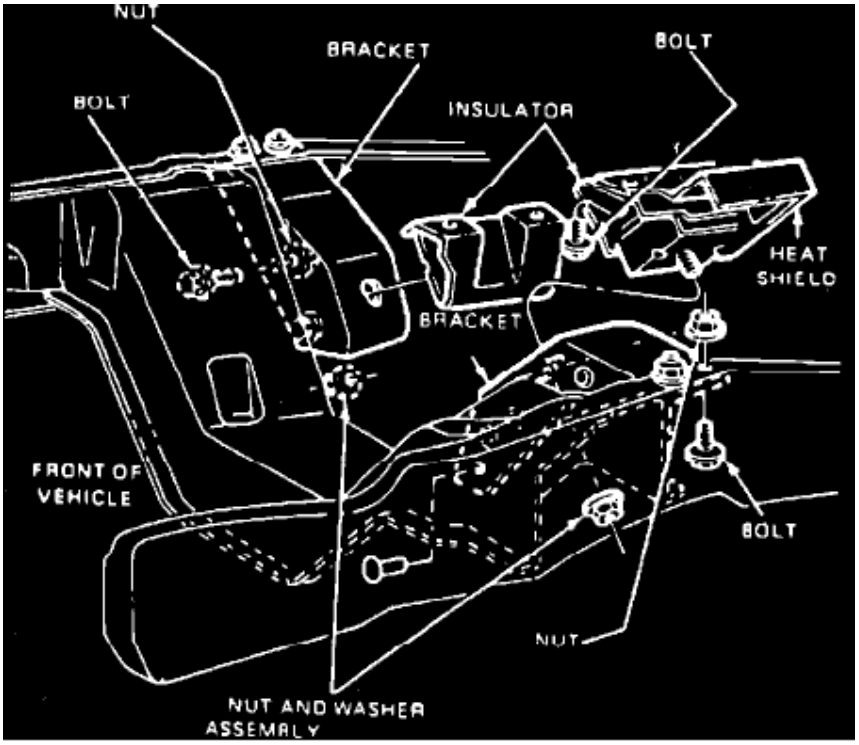
Margin Exhaust 1/32 in

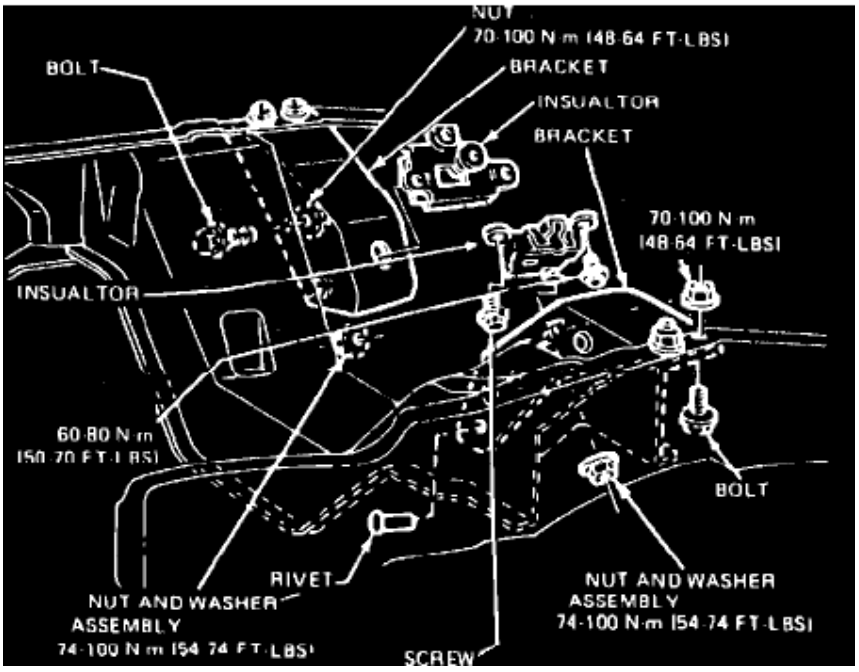
Drive Belt: Specifications

A belt in operation 10 minutes is considered a used belt. 1988-89 Automatic tensioner used. Deflection method: Table lists deflection at midpoint of belt segment. Strand Tension method: Use a strand tension gauge. Measurements are in pounds.

Drive Belt: Adjustments

A belt in operation 10 minutes is considered a used belt. 1988-89 Automatic tensioner used. Deflection method: Table lists deflection at midpoint of belt segment. Strand Tension method: Use a strand tension gauge. Measurements are in pounds.


NUT
BRACKET
BOLT
BOLT
INSULATOR
HEAT SHIELD
BRACKET
FRONT OF VEHICLE
BOLT
NUT
NUT AND WASHER ASSEMBLY


NUT
70-100 N·m (48-64 FT-LBS)
BOLT
BRACKET
INSUALTOR
BRACKET
70-100 N·m
(48-64 FT-LBS)
INSUALTOR
60-80 N·m
(50-70 FT-LBS)
BOLT
RIVET
NUT AND WASHER ASSEMBLY
74-100 N·m (54-74 FT-LBS)
NUT AND WASHER ASSEMBLY
74-100 N·m (54-74 FT-LBS)
SCREW

Engine Mount: Service and Repair

Fig. 7 Engine mounts. F-100---350 & Bronco w/V8-255, 302, 351W engine

F-100-350 & Bronco

1. Remove fan shroud attaching bolts and position shroud over fan.

2. Remove insulator-to-chassis bracket attaching nut and washer.

3. Raise engine slightly, then remove insulator attaching bolts and the insulator, Fig. 7. When removing lefthand insulator, the heat shield must also be removed.

4. Reverse procedure to install.

Fig. 8 Engine mounts. 1980---82 F-100---350 & Bronco w/V8-351M, 400 engine

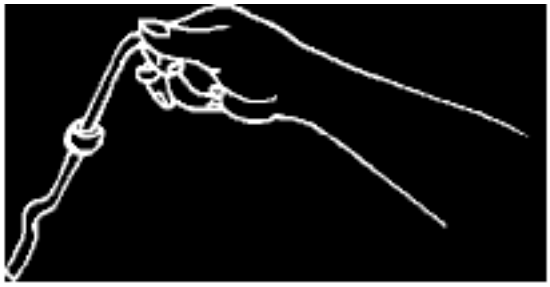
V8-351M & 400 1980-82 F-100-350 & Bronco

1. Remove fan shroud attaching bolts and position shroud over fan.

2. Remove insulator-to-chassis bracket attaching nut and washer, Fig. 8.

3. Raise engine slightly, then remove insulator attaching bolts and the insulator.

4. Reverse procedure to install.







Engine Oil: Technical Service Bulletins Engine - Oil Level Checking Procedure

Article No. 85-25-20

OIL DIPSTICK - ENGINE OIL LEVEL CHECKING PROCEDURE - GASOLINE ENGINES

LIGHT TRUCK 1986 AND PRIOR

MEDIUM/HEAVY TRUCK 1986 AND PRIOR

Figure 17 - Dipstick

To correctly check the engine oil level, the vehicle must be parked on a level surface. Allow a few minutes after shutting the engine off for oil to drain down before checking. For consistent oil level readings, insert the dipstick with the loop of the handle as shown in Figure 17.

Figure 18 - Dipstick - Calibration

Figure 19 - Dipstick - Calibration

Dipsticks in Ford vehicles do not incorporate a Full mark. Instead, the dipstick will have marks indicating a Safe range and an Add range as shown in Figure 18 or 19. When the correct amount of oil is in the engine, the oil level indication will be in the Safe range or above the Minimum mark, but not necessarily at the top of the Safe range or at the Maximum mark.

When the indicated oil level is in the Add range put one quart of oil in the engine. Recheck the oil level to determine if the oil level is now in the Safe range or above the Minimum mark.

Add and recheck oil level one quart at a time until the oil level indicator moves into the Safe range or above the Minimum mark. Do not add additional oil to bring the level to the top of the Safe range or to the Maximum mark since this may result in overfill and increased oil consumption. If the accuracy of the engine oil dipstick is in doubt, it may be verified in the following manner:

^ Drain the oil and install a new filter.

^ Put in the specified amount of oil for an oil and filter change. (See owner guide)

^ Start the engine and operate a few minutes.

^ Shut off the engine and allow a few minutes for the oil to drain down.

^ Check the oil level with the dipstick.

^ If the oil level does not indicate in the Safe range or above the Minimum mark, rework or replace the dipstick.

OTHER APPLICABLE ARTICLES: None WARRANTY STATUS: "INFORMATION ONLY"

Engine Oil: Capacity Specifications

Engine oil capacity ..... 5.0 Qts.(4.7L)

Note: Add 1 Qt. with filter change.

Engine Oil: Fluid Type Specifications

BL Self-adjusting Brake Lubricant

EC Ethylene Glycol Coolant

Mix 50/50 with water to at least -20°F (-29°C) protection

EP Extreme Pressure Gear Lubricant

Ford Part No. D8DZ-19C547-A

FA Automatic Transmission Fluid, Type F

GL-5 Gear Oil, API Service GL-5

HBH Hydraulic Brake Fluid, Extra

Heavy-Duty

HP Hypoid Gear Oil

Ford Part No. E0AZ-19580-A

HP* Hypoid Gear Oil for Limited-Slip

or Traction-Lok Differential

LM Lithium Grease, with Polyethylene

LS Steering Gear Lubricant

MA MERCONAutomatic Transmission

Fluid

MH Manifold Heat Valve Solvent

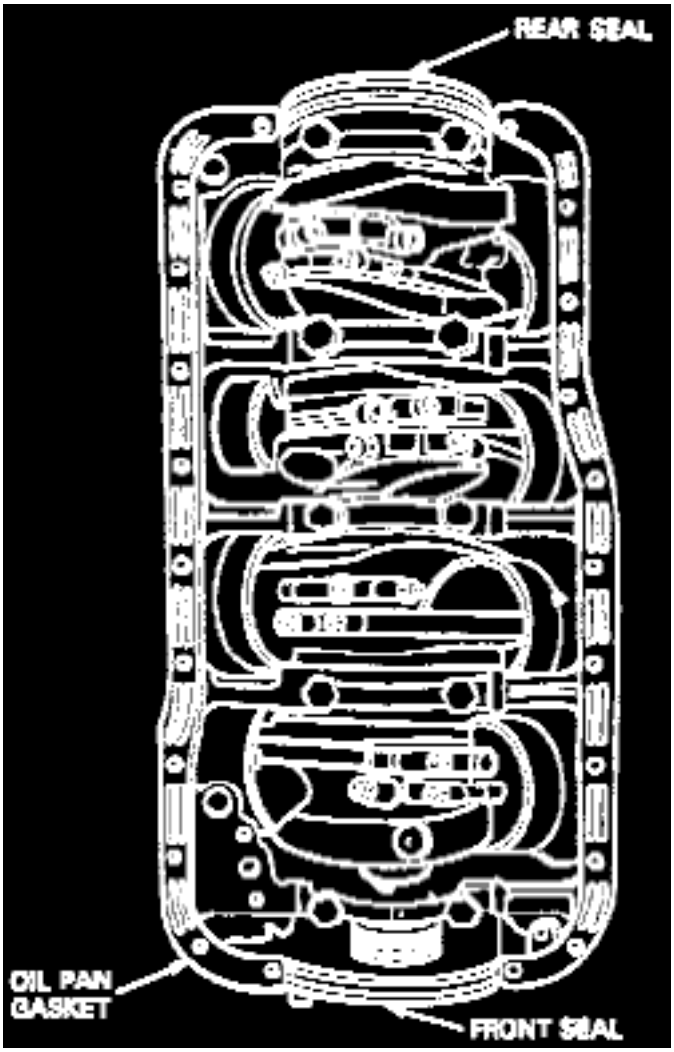
SG Motor Oil, API Service SG

Oil Pan: Service and Repair Removal

1. Remove the oil dipstick (on pan entry models only). 2. Remove the bolts attaching the fan shroud to the radiator and position the shroud over the fan. 3. Remove the nuts and lockwashers attaching the engine support insulators to the chassis bracket. 4. If equipped with an automatic transmission, disconnect the oil cooler line at the left side of the radiator. 5. Raise the engine and place wood blocks under the engine supports. 6. Drain the crankcase. 7. Remove the oil pan attaching bolts and lower the oil pan onto the crossmember. 8. Remove the two bolts attaching the oil pump pick up tube to the oil pump. Remove nut attaching oil pump pickup tube to the number 3 main

bearing cap stud. Lower the pick-up tube and screen into the oil pan.

9. Remove the oil pan from the vehicle.



Oil Pan: Service and Repair Installation

1. Clean oil pan, inlet tube and gasket surfaces. Inspect the gasket sealing surface for damages and distortion due to overtightening of the bolts.

Repair and straighten as required.

2. Position a new oil pan gasket and seals to the cylinder block. 3. Position the oil pick up tube and screen to the oil pump and install the lower attaching bolt and gasket loosely. Install nut attaching to number 3

main bearing cap stud.

4. Place the oil pan on the crossmember. Install the upper pick-up tube bolt. Tighten the pick-up tube bolts to specifications. 5. Position the oil pan to the cylinder block and install the attaching bolts. Tighten to 13 - 14 N.m (9 - 11 ft. lbs.). 6. Raise the engine and move the wood blocks. Lower the engine and install the insulator to chassis bracket nuts and washers. Tighten the nuts to 73 -

100 N.m (54 - 74 ft. lbs.).

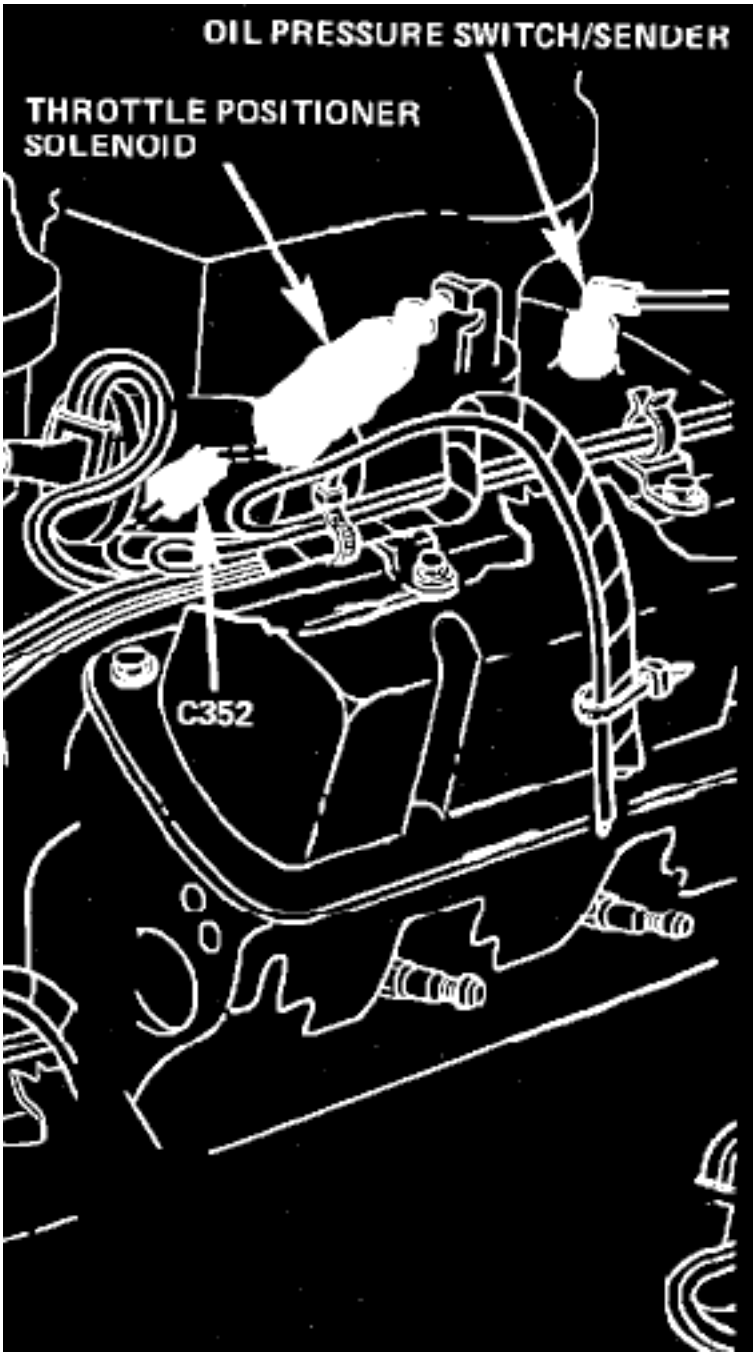
7. if equipped with an automatic transmission, connect the oil cooler line at the radiator. 8. stall the fan shroud attaching bolts. 9. Fill the crankcase with the proper grade and quantity of engine oil. Install the oil dipstick. Start the engine and operate it until it reaches normal

operating temperature, then check for leaks.

Oil Pressure Gauge: Testing and Inspection

This oil pressure indicating system incorporates an instrument voltage regulator, electrical oil pressure gauge and a sending unit which are connected in series. The sending unit consists of a diaphragm, contact and a variable resistor. As oil pressure increases or decreases, the diaphragm actuated the contact on the variable resistor, in turn controlling current flow to the gauge. When oil pressure is low, the resistance of the variable resistor is high, restricting current flow to the gauge, in turn indicating low oil pressure. As oil pressure increases, the resistance of the variable resistor is lowered, permitting an increased current flow to the gauge, resulting in an increased gauge reading.

TROUBLESHOOTING A special tester is required to diagnose this type gauge. Follow instructions included with the tester.

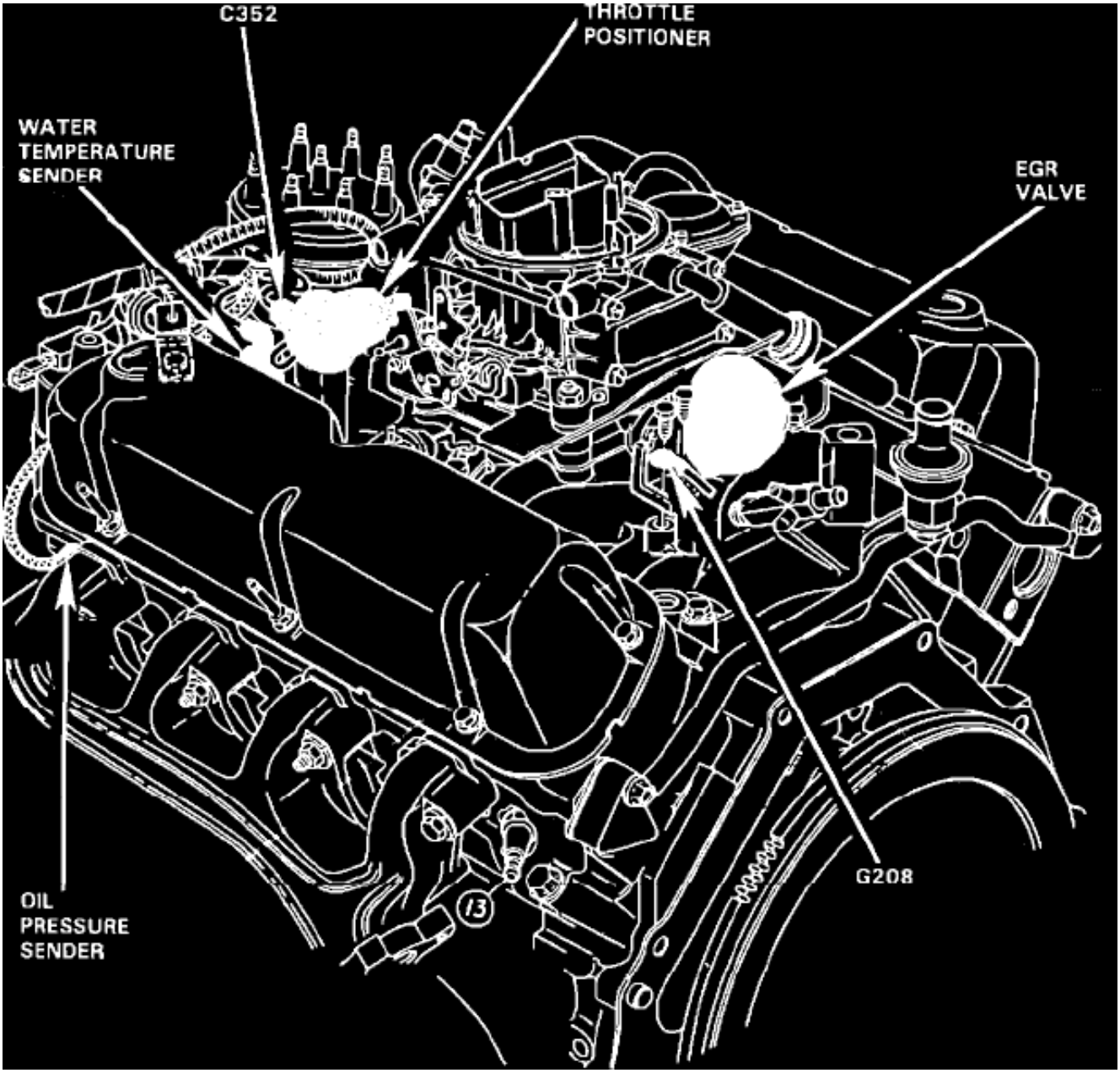


Oil Pressure Sender: Locations

LH Side Of Engine.

Rear Top Of Engine Block

Applicable to: 1981-82 V8-351M/5.8L & V8-400/6.6L Engines



LH Side Of Engine.

Rear Top Of Engine Block

Applicable to: 1985 V8-351/5.8L Engine w/4 Barrel Carb. Except Calif.

Oil Pressure Warning Lamp/Indicator: Testing and Inspection

Many trucks utilize a warning light on the instrument panel in place of the conventional dash indicating gauge to warn the driver when the oil pressure is dangerously low. The warning light is wired in series with the ignition switch and the engine unit--which is an oil pressure switch. The oil pressure switch contains a diaphragm and a set of contacts. When the ignition switch is turned on, the warning light circuit is energized and the circuit is completed through the closed contacts in the pressure switch. When the engine is started, build-up of oil pressure compresses the diaphragm, opening the contacts, thereby breaking the circuit and putting out the light.

TROUBLESHOOTING The oil pressure warning light should go on when the ignition is turned on. If it does not light, disconnect the wire from the engine unit and ground the wire to the frame or cylinder block. Then if the warning light still does not go on with the ignition switch on, replace the bulb. If the warning light goes on when the wire is grounded to the frame or cylinder block, the engine unit should be checked for being loose or poorly grounded. If the unit is found to be tight and properly grounded, it should be removed and a new one installed. (The presence of sealing compound on the threads of the engine unit will cause a poor ground). If the warning light remains lit when it normally should be out, replace the engine unit before proceeding further to determine the cause for a low pressure indication. The warning light will sometimes light up or flicker when the engine is idling, even though the oil pressure is adequate. However, the light should go out when the engine speed is increased.

Oil Pump: Specifications

Rotor Backlash 0.012 in

Note: Maximum inner and outer rotor tip clearance.

Rotor To Body Clearance 0.001-0.003 in

Rotor End Clearance 0.004 in

Note: Measured between pump cover mounting surface & end

of gear using suitable straightedge & feeler gauges.

Maximum

Maximum Cover Flatness Variation N/A

Note: Pump should be replaced if cover is damaged, scored

or worn.

Driveshaft To Pump Body Clearance 0.0015-0.0030 in

Relief Valve To Body Clearance 0.0015-0.0030 in

Relief Spring Pressure 18.2-20.2 lbf at 2.49 in

Oil Pump: Service and Repair Removal and Installation

V8 ENGINES

On some models, the oil pump must be removed when removing the oil pan. These models are indicated in the ``Oil Pan, Replace''

procedures.

1. Remove oil pan as previously described.

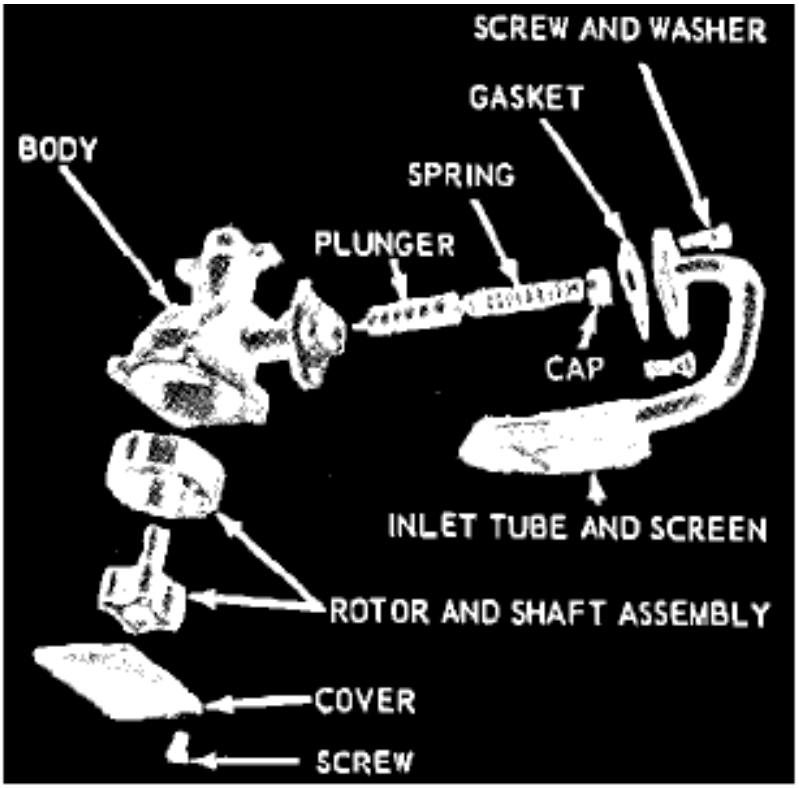
2. Remove oil pump attaching bolts and the oil pump.

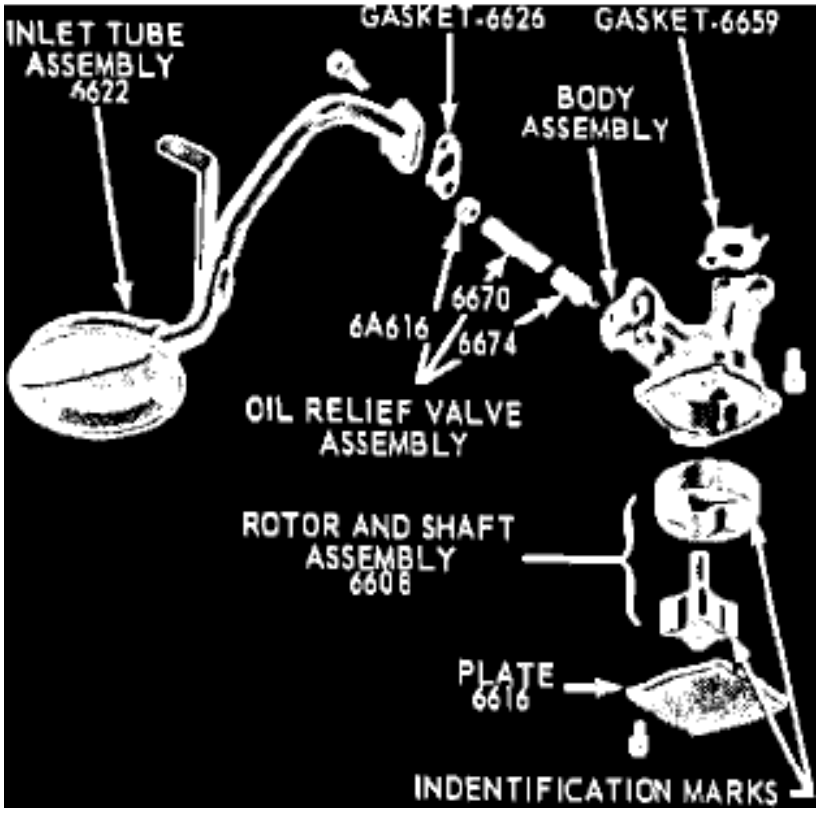
3. To install, prime pump with engine oil and apply sealant to gasket.

4. Insert distributor intermediate shaft, making sure that it is properly seated, then install oil pump. Do not force pump into place if it will not

readily seat, as the intermediate shaft may be misaligned with distributor shaft. To align, rotate intermediate shaft until pump can be seated without applying force.

5. Install oil pan.


SCREW AND WASHER
GASKET
BODY
SPRING
PLUNGER
CAP
INLET TUBE AND SCREEN
ROTOR AND SHAFT ASSEMBLY
COVER
SCREW


INLET TUBE ASSEMBLY 6622
GASKET-6626
GASKET-6659
BODY ASSEMBLY
6670
6A616
6674
OIL RELIEF VALVE ASSEMBLY
ROTOR AND SHAFT ASSEMBLY 6608
PLATE 6616
INDENTIFICATION MARKS

Oil Pump: Service and Repair Service

Fig. 42 Oil pump. 6-300

Fig. 43 Oil pump. V8-255, 302, 351W

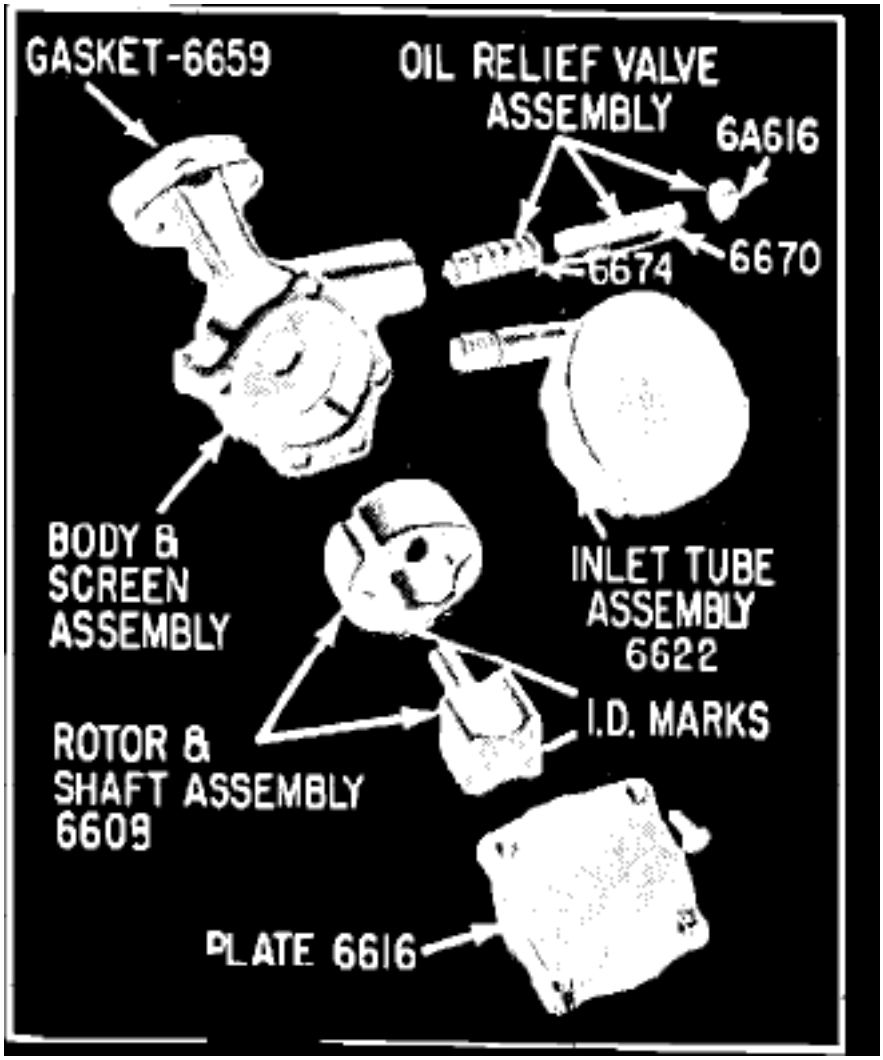


Fig. 44 Oil pump assembly. 351M & 400

ROTOR TYPE PUMP

1. To disassemble, Figs. 42, 43 and 44, remove cover, inner rotor and shaft assembly and outer race. Remove staking marks at relief valve chamber cap. Insert a self-threading sheet metal screw of proper diameter into oil pressure relief valve chamber cap and pull cap out of chamber. Then remove spring and plunger.

2. To assemble, install pressure relief valve plunger, spring and a new cap. Stake cap in place. Install outer race, inner rotor and shaft. Be sure identification dimple mark on outer race is facing outward and on the same side as dimple on rotor. Inner rotor and shaft and outer race are furnished only as a unit. One part should not be replaced without replacing the other.

3. Install pump cover.

Intake Manifold: Technical Service Bulletins Service Labor Time Standards Revision

REVISED SERVICE LABOR TIME STANDARDS Article No. 87-8-20

LIGHT TRUCK: 1981-84 F-100/350, ECONOLINE, BRONCO

ISSUE: Labor operations 9424A, (Intake manifold - remove and install or replace) and 9631A (Accelerator pump diaphragm or piston rod (carburetor) - replace) have been revised.

ACTION: The new labor allowances are as follows:

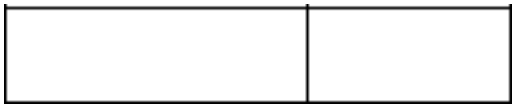
Operation 9424A Intake Manifold - Remove and Install or Replace

New allowance for 1981-84 Econoline (5.0L and 5.8L) . . . . . 3.2 Hrs.

Operation 9631A Accelerator Pump, Diaphragm or Piston Rod (Carburetor) - Replace

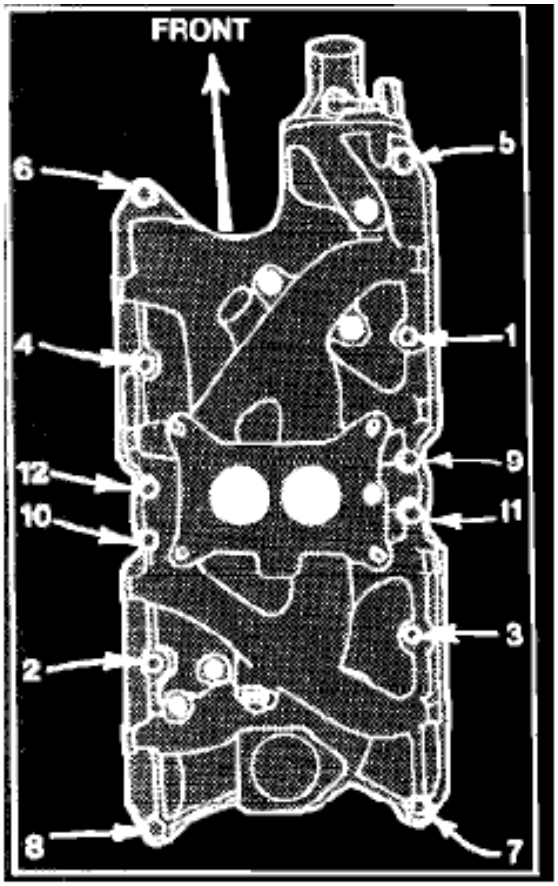
New allowance for all 8-cyl. engines (1984 only) . . . . . 1.3 Hrs.

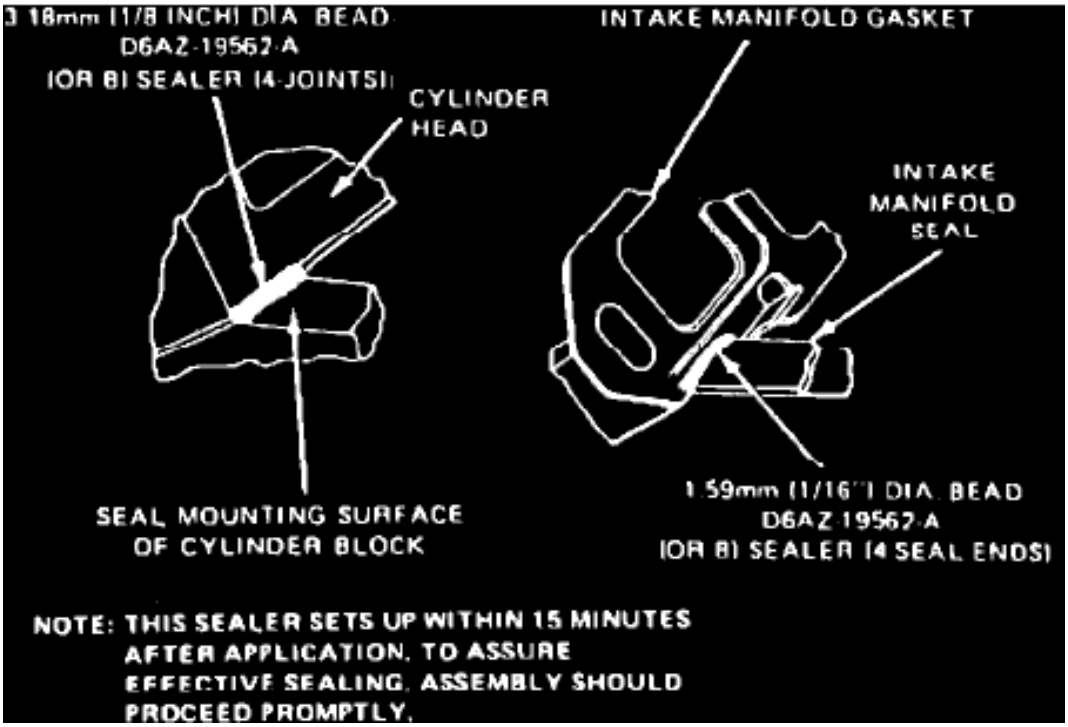
OTHER APPLICABLE ARTICLES: None WARRANTY STATUS: "INFORMATION ONLY"



Intake Manifold: Specifications

Intake Manifold 23-25 ft.lb


FRONT
6
5
4
1
12
9
10
11
3
2
8
7


3.18mm (1/8 INCH) DIA. BEAD
D6AZ-19562-A
(OR B) SEALER (4 JOINTS)
CYLINDER HEAD
INTAKE MANIFOLD GASKET
INTAKE MANIFOLD SEAL
SEAL MOUNTING SURFACE OF CYLINDER BLOCK
1.59mm (1/16") DIA. BEAD
D6AZ-19562-A
(OR B) SEALER (4 SEAL ENDS)
NOTE: THIS SEALER SETS UP WITHIN 15 MINUTES AFTER APPLICATION. TO ASSURE EFFECTIVE SEALING, ASSEMBLY SHOULD PROCEED PROMPTLY.

Intake Manifold: Service and Repair

Fig. 13 Intake manifold tightening sequence. V8-255, 302 & V8-351W

Fig. 20 Intake manifold installation. V8 engines

V8-255, 302 & 351W

1. Drain cooling system, then remove air cleaner with intake duct assembly and crankcase ventilation hose.

2. Disconnect accelerator cable and speed control linkage (if equipped) from carburetor or throttle body. Remove accelerator cable bracket, then disconnect kickdown rod from carburetor or throttle body on models equipped with automatic transmission. Disconnect electric choke, carburetor solenoid electrical connectors or EEC connector, if equipped.

3. Disconnect high tension lead and wires from ignition coil.

4. Disconnect ignition wires from spark plugs, then remove wires and bracket assembly from rocker arm cover attaching stud.

5. Remove distributor cap and ignition wires as an assembly.

6. Disconnect fuel inlet line from carburetor or throttle body.

7. Disconnect vacuum hoses from distributor, then remove distributor and disconnect evaporative hoses, if equipped.

8. Disconnect upper radiator hose from coolant outlet housing.

9. Disconnect electrical connector from coolant temperature sending unit, then remove heater hose from intake manifold.

10. Remove water pump bypass hose from coolant outlet housing, then disconnect crankcase vent hose from rocker arm cover.

11. Remove intake manifold attaching bolts, then the intake manifold, carburetor or throttle body as an assembly.

12. Reverse procedure to install. Apply sealer as shown in Fig. 20. Torque manifold attaching bolts to 23-25 ft-lbs in sequence as shown in Fig. 13.

Oil Pressure Gauge: Testing and Inspection

This oil pressure indicating system incorporates an instrument voltage regulator, electrical oil pressure gauge and a sending unit which are connected in series. The sending unit consists of a diaphragm, contact and a variable resistor. As oil pressure increases or decreases, the diaphragm actuated the contact on the variable resistor, in turn controlling current flow to the gauge. When oil pressure is low, the resistance of the variable resistor is high, restricting current flow to the gauge, in turn indicating low oil pressure. As oil pressure increases, the resistance of the variable resistor is lowered, permitting an increased current flow to the gauge, resulting in an increased gauge reading.

TROUBLESHOOTING A special tester is required to diagnose this type gauge. Follow instructions included with the tester.

Oil Pressure Warning Lamp/Indicator: Testing and Inspection

Many trucks utilize a warning light on the instrument panel in place of the conventional dash indicating gauge to warn the driver when the oil pressure is dangerously low. The warning light is wired in series with the ignition switch and the engine unit--which is an oil pressure switch. The oil pressure switch contains a diaphragm and a set of contacts. When the ignition switch is turned on, the warning light circuit is energized and the circuit is completed through the closed contacts in the pressure switch. When the engine is started, build-up of oil pressure compresses the diaphragm, opening the contacts, thereby breaking the circuit and putting out the light.

TROUBLESHOOTING The oil pressure warning light should go on when the ignition is turned on. If it does not light, disconnect the wire from the engine unit and ground the wire to the frame or cylinder block. Then if the warning light still does not go on with the ignition switch on, replace the bulb. If the warning light goes on when the wire is grounded to the frame or cylinder block, the engine unit should be checked for being loose or poorly grounded. If the unit is found to be tight and properly grounded, it should be removed and a new one installed. (The presence of sealing compound on the threads of the engine unit will cause a poor ground). If the warning light remains lit when it normally should be out, replace the engine unit before proceeding further to determine the cause for a low pressure indication. The warning light will sometimes light up or flicker when the engine is idling, even though the oil pressure is adequate. However, the light should go out when the engine speed is increased.

Crankshaft Main Bearing Seal: Technical Service Bulletins Seals For Rocker Cover, Oil Pan, and Crankshaft

Article No. 83-13-6

LEAKS - OIL - CURRENT SEALS FOR ROCKER COVER, OIL PAN, AND CRANKSHAFT

FORD 1983 AND PRIOR

LINCOLN-MERCURY 1983 AND PRIOR

LIGHT TRUCKS 1983 AND PRIOR

MEDIUM/HEAVY TRUCKS 1983 AND PRIOR

The following charts outline current gasket identification for rocker cover, oil pan, and crankshaft seal applications to provide the most effective sealing. Those rocker cover and oil pan applications that use "High Swell Material" are shown by an asterisk (*).

ROCKER COVER GASKETS

Engine Year Part Number Class

1.6L 1981-83 E3FZ-6584-A* A

2.3L 1977-83 E2ZZ-6584-A A

3.3L 1977-83 E3BZ-6584-A* A

4.1L 1977-80 E3BZ-6584-A* A

3.8L 1982-83 RTV

1983 E3DZ-6584-A* A

w/metal rocker cover 4.2L

1980-82 E3AZ-6584-A* A

4.9L 1977-83 E3TZ-6584-C* A

5.0L, 5.0L HO 1977-83 E3AZ-6584-A* A

5.8L (W) 1977-83 E3AZ-6584-A* A

5.8L (M) 1980-82 D00Z-6584-A A

6.6L 1973-79 D00Z-6584-A A

6.1L 1983 E3TZ-6584-E* A

7.0L 1980-82 E3TZ-6584-E* A

7.5L 1979-79 E3TZ-6584-E* A

OIL PAN GASKETS

Engine Year Part Number Class

1.6L 1981-83 E1FZ-6781-A A

2.3L 1977-83 E2ZZ-6781-A AM

3.3L 1977-83 D0DZ-6781-A* A

3.8L 1982-83 RTV

4.1L 1977-80 D0DZ-6781-B A

4.2 1980-82 D9AZ-6781-A A

4.9L 1977-83 E3TZ-6781-B* A

5.0L 1977-83 D9AZ-6781-A A

5.8L (W) 1977-83 D0AZ-6781-C* A

5.8L (M), 6.6L 1977-82 D0AZ-6781-D A

6.1L 1983 D9HZ-6781-A AQ

7.0L 1982 D9HZ-6781-A AQ

7.5L 1977-81 E0UZ-6781-A A

*High Swell Material.

Engine	Year	Part Number Front	Class	Part Number Rear	Class
1.6L	1981-83	E1FZ-6700-A	A	E1FZ-6701-A*	A
2.3L	1977-83	D4FZ-6700-A	A	E2ZZ-6701-A*	AM
				D4FZ-6701-A#	A
3.3L	1977-83	CODE-6700-A	A	C9OZ-6701-A@	A
				C9AZ-6701-B#	AM
3.8L	1982-83	DOAZ-6700-A	A	E2ZZ-6701-A* (After 1/3/83)	AM
				C9OZ-6701-A@ (Before 1/3/83)	A
				D4FZ-6701-A#	A
4.1L	1977-80	C3AZ-6700-A	A	C9OZ-6701-A@	A
				D4FZ-6701-A#	A
4.2L	1980-82	DOAZ-6700-A	A	C9OZ-6701-A@	A
				D4FZ-6701-A#	A
4.9L	1977-82	C3AZ-6700-A	A	C5AZ-6701-B*	A
	1983	C3AZ-6700-A	A	E3TZ-6701-C*	A
5.0L	1977-83	DOAZ-6700-A	A	E2ZZ-6701-A* (After 12/5/83)	A
				C9OZ-6701-A@ (Before 12/5/83)	A
				D4FZ-6701-A#	A
5.8L (W)	1977-83	DOAZ-6700-A	A	E3TZ-6701-C* (After 6/15/83)	A
				C9OZ-6701-A@ (Before 6/15/83)	A
				D0OZ-6701-A#	A
5.8L (M), 6.6L	1977-82	DOAZ-6700-A	A	C9OZ-6701-A@	A
				D0OZ-6701-A#	A
6.1L, 7.0L	1979-83	D9HZ-6700-A	AQ	C9AZ-6701-A#	A
7.5L	1979-83	C3AZ-6700-A	A	C9AZ-6701-A#	A

* — One Piece
\# — Two Piece
@ — Rope

ARTICLE SUPERSEDED:83-5-7WARRANTY STATUS:"INFORMATION ONLY"

CRANKSHAFT SEAL

Crankshaft Main Bearing Seal: Technical Service Bulletins Crankshaft Seal - Leaks, Air Pressure Test

Article No. 86-3-14

LEAK OIL - CRANKSHAFT SEAL - AIR PRESSURE TEST

FORD 1986 and Prior FORD, THUNDERBIRD, LTD, ESCORT, FAIRMONT, MUSTANG, EXP, TAURUS

LINCOLN-MERCURY 1986 and Prior LINCOLN, MARK, CONTINENTAL, MERCURY, MARQUIS, COUGAR, CAPRI, LYNX, LN7, SABLE

LIGHT TRUCK 1986 and Prior RANGER, BRONCO II, AEROSTAR, E AND F SERIES

To prevent repeat servicing on engines suspected of oil leakage at the crankshaft seal, determine if the leak is actually from the seal or from another source such as the rear pan seal or galley plugs. The one-piece rear crankshaft seal is released for all passenger car and light truck engines and has proven to be more reliable than the rope or split lip design formerly used.

Performing the oil leak air pressure check outlined in all Car and Truck Powertrain Shop Manuals, Section 21- 01 will accurately identify the location of the leak and can verify correction after servicing before the transmission is reinstalled.

OTHER APPLICABLE ARTICLES: 80-15-5, 83-14-8 WARRANTY STATUS: "INFORMATION ONLY"

Crankshaft Main Bearing Seal: Specifications

Main Bearing Cap Bolt Torque	129-142 Nm (95-105 ft-lbs)

Crankshaft Main Bearing Seal: Service and Repair Removal

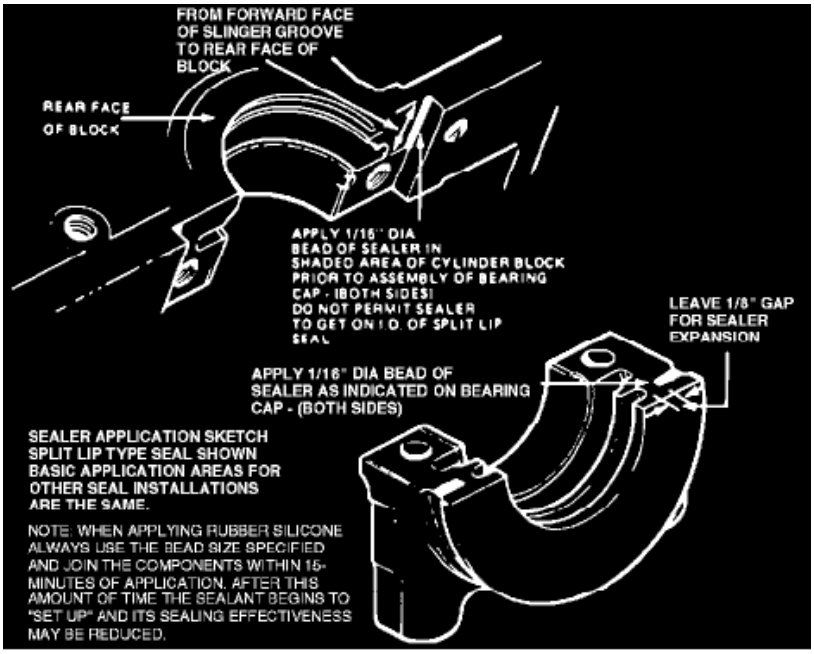
A split lip-type crankshaft rear oil seal is provided for servicing these engines. 1. Remove the oil pan and the oil pump, if required. 2. Loosen all the crankshaft main bearing cap bolts, thereby lowering the crankshaft slightly but not to exceed 0.794 mm (1/32 inch).

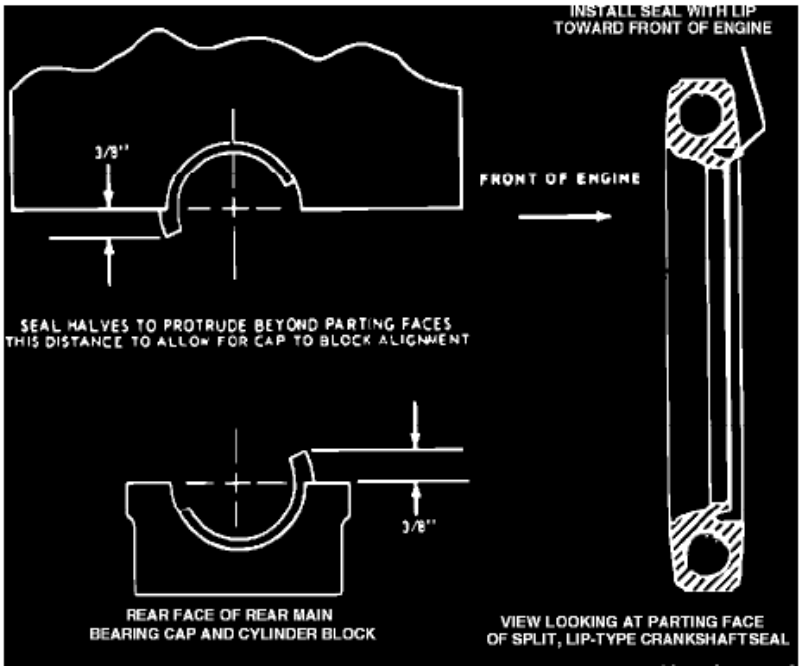
CAUTION: Use care to prevent scratching or damaging the crankshaft sealing surfaces.

3. Remove the rear crankshaft main bearing cap, and remove the crankshaft rear oil seal from the rear crankshaft main bearing cap and cylinder

block. On the cylinder block half of the crankshaft rear oil seal use a seal removal tool, or install a small metal screw in one end of the crankshaft rear oil seal, and PULL on the screw to remove the crankshaft rear oil seal.

4. Remove the oil seal retaining pin from the bearing cap if so equipped. The pin is not used with the split-lip seal.


FROM FORWARD FACE OF SLINGER GROOVE TO REAR FACE OF BLOCK
REAR FACE OF BLOCK
APPLY 1/16" DIA BEAD OF SEALER IN SHADED AREA OF CYLINDER BLOCK PRIOR TO ASSEMBLY OF BEARING CAP - (BOTH SIDES) DO NOT PERMIT SEALER TO GET ON I.D. OF SPLIT LIP SEAL
LEAVE 1/8" GAP FOR SEALER EXPANSION
APPLY 1/16" DIA BEAD OF SEALER AS INDICATED ON BEARING CAP - (BOTH SIDES)
SEALER APPLICATION SKETCH SPLIT LIP TYPE SEAL SHOWN BASIC APPLICATION AREAS FOR OTHER SEAL INSTALLATIONS ARE THE SAME.
NOTE: WHEN APPLYING RUBBER SILICONE ALWAYS USE THE BEAD SIZE SPECIFIED AND JOIN THE COMPONENTS WITHIN 15-MINUTES OF APPLICATION. AFTER THIS AMOUNT OF TIME THE SEALANT BEGINS TO "SET UP" AND ITS SEALING EFFECTIVENESS MAY BE REDUCED.


INSTALL SEAL WITH LIP TOWARD FRONT OF ENGINE
3/8"
FRONT OF ENGINE
SEAL HALVES TO PROTRUDE BEYOND PARTING FACES THIS DISTANCE TO ALLOW FOR CAP TO BLOCK ALIGNMENT
3/8"
REAR FACE OF REAR MAIN BEARING CAP AND CYLINDER BLOCK
VIEW LOOKING AT PARTING FACE OF SPLIT, LIP-TYPE CRANKSHAFT SEAL

Crankshaft Main Bearing Seal: Service and Repair Installation

1. Carefully clean the seal groove in the rear crankshaft main bearing cap and cylinder block with a brush and solvent such as lacquer thinner, Extra

Strength Spot and Stain Remover. Also, clean the area where sealer is later to be applied. Dry the area thoroughly, so that no solvent touches the crankshaft rear oil seal.

2. Dip the split lip-type seal halves in clean engine oil.

CAUTION: Be sure no rubber has been shaved from the outside diameter of the crankshaft rear oil seal by the bottom edge of the groove. Do not allow oil to get on the sealer area.

3. Carefully install the upper half of the crankshaft rear oil seal (cylinder block) into its groove with undercut side of crankshaft rear oil seal toward

the FRONT of the engine, by ROTATING it on the seal journal of the crankshaft until approximately 9.53 mm (3/8 inch) protrudes below the parting surface.

4. Tighten the remaining crankshaft main bearing cap bolts to specifications.

Crankshaft rear oil seal installation

5. Install the lower half of the crankshaft rear oil seal in the rear crankshaft main bearing cap with undercut side of crankshaft rear oil seal toward the

FRONT of the engine. Allow the crankshaft rear oil seal to protrude approximately 9.53 mm (3/8 inch) above the parting surface to mate with the upper half of the crankshaft rear oil seal when the rear crankshaft main bearing cap is installed.

6. Apply a continuous even 1.59 mm (1/16 inch) diameter bead of RTV Silicone Rubber Sealer or equivalent to the areas shown in the image,

following the procedures given in the illustration.

NOTE: When applying rubber silicone always use the bead size specified and join the components within 15 minutes of application. After this amount of time the sealant begins to "set-up" and its sealing effectiveness may be reduced.

7. Install the rear crankshaft main bearing cap. Tighten the bolts to specifications. 8. Install the oil pump and oil pan. Fill the crankcase with the proper amount and type of oil. 9. Operate the engine and check for oil leaks.

Oil Pan Gasket: Technical Service Bulletins Seals For Rocker Cover, Oil Pan, and Crankshaft

Article No. 83-13-6

LEAKS - OIL - CURRENT SEALS FOR ROCKER COVER, OIL PAN, AND CRANKSHAFT

FORD 1983 AND PRIOR

LINCOLN-MERCURY 1983 AND PRIOR

LIGHT TRUCKS 1983 AND PRIOR

MEDIUM/HEAVY TRUCKS 1983 AND PRIOR

The following charts outline current gasket identification for rocker cover, oil pan, and crankshaft seal applications to provide the most effective sealing. Those rocker cover and oil pan applications that use "High Swell Material" are shown by an asterisk (*).

ROCKER COVER GASKETS

Engine Year Part Number Class

1.6L 1981-83 E3FZ-6584-A* A

2.3L 1977-83 E2ZZ-6584-A A

3.3L 1977-83 E3BZ-6584-A* A

4.1L 1977-80 E3BZ-6584-A* A

3.8L 1982-83 RTV

1983 E3DZ-6584-A* A

w/metal rocker cover 4.2L

1980-82 E3AZ-6584-A* A

4.9L 1977-83 E3TZ-6584-C* A

5.0L, 5.0L HO 1977-83 E3AZ-6584-A* A

5.8L (W) 1977-83 E3AZ-6584-A* A

5.8L (M) 1980-82 D00Z-6584-A A

6.6L 1973-79 D00Z-6584-A A

6.1L 1983 E3TZ-6584-E* A

7.0L 1980-82 E3TZ-6584-E* A

7.5L 1979-79 E3TZ-6584-E* A

OIL PAN GASKETS

Engine Year Part Number Class

1.6L 1981-83 E1FZ-6781-A A

2.3L 1977-83 E2ZZ-6781-A AM

3.3L 1977-83 D0DZ-6781-A* A

3.8L 1982-83 RTV

4.1L 1977-80 D0DZ-6781-B A

4.2 1980-82 D9AZ-6781-A A

4.9L 1977-83 E3TZ-6781-B* A

5.0L 1977-83 D9AZ-6781-A A

5.8L (W) 1977-83 D0AZ-6781-C* A

5.8L (M), 6.6L 1977-82 D0AZ-6781-D A

6.1L 1983 D9HZ-6781-A AQ

7.0L 1982 D9HZ-6781-A AQ

7.5L 1977-81 E0UZ-6781-A A

*High Swell Material.

Engine	Year	Part Number Front	Class	Part Number Rear	Class
1.6L	1981-83	E1FZ-6700-A	A	E1FZ-6701-A*	A
2.3L	1977-83	D4FZ-6700-A	A	E2ZZ-6701-A*	AM
				D4FZ-6701-A#	A
3.3L	1977-83	CODE-6700-A	A	C9OZ-6701-A@	A
				C9AZ-6701-B#	AM
3.8L	1982-83	DOAZ-6700-A	A	E2ZZ-6701-A* (After 1/3/83)	AM
				C9OZ-6701-A@ (Before 1/3/83)	A
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				D4FZ-6701-A#	A
4.2L	1980-82	DOAZ-6700-A	A	C9OZ-6701-A@	A
				D4FZ-6701-A#	A
4.9L	1977-82	C3AZ-6700-A	A	C5AZ-6701-B*	A
	1983	C3AZ-6700-A	A	E3TZ-6701-C*	A
5.0L	1977-83	DOAZ-6700-A	A	E2ZZ-6701-A* (After 12/5/83)	A
				C9OZ-6701-A@ (Before 12/5/83)	A
				D4FZ-6701-A#	A
5.8L (W)	1977-83	DOAZ-6700-A	A	E3TZ-6701-C* (After 6/15/83)	A
				C9OZ-6701-A@ (Before 6/15/83)	A
				D0OZ-6701-A#	A
5.8L (M), 6.6L	1977-82	DOAZ-6700-A	A	C9OZ-6701-A@	A
				D0OZ-6701-A#	A
6.1L, 7.0L	1979-83	D9HZ-6700-A	AO	C9AZ-6701-A#	A
7.5L	1979-83	C3AZ-6700-A	A	C9AZ-6701-A#	A

* — One Piece
\# — Two Piece
@ — Rope

ARTICLE SUPERSEDED:83-5-7WARRANTY STATUS:"INFORMATION ONLY"

CRANKSHAFT SEAL

Valve Cover Gasket: Technical Service Bulletins Seals For Rocker Cover, Oil Pan, and Crankshaft

Article No. 83-13-6

LEAKS - OIL - CURRENT SEALS FOR ROCKER COVER, OIL PAN, AND CRANKSHAFT

FORD 1983 AND PRIOR

LINCOLN-MERCURY 1983 AND PRIOR

LIGHT TRUCKS 1983 AND PRIOR

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The following charts outline current gasket identification for rocker cover, oil pan, and crankshaft seal applications to provide the most effective sealing. Those rocker cover and oil pan applications that use "High Swell Material" are shown by an asterisk (*).

ROCKER COVER GASKETS

Engine Year Part Number Class

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4.1L 1977-80 E3BZ-6584-A* A

3.8L 1982-83 RTV

1983 E3DZ-6584-A* A

w/metal rocker cover 4.2L

1980-82 E3AZ-6584-A* A

4.9L 1977-83 E3TZ-6584-C* A

5.0L, 5.0L HO 1977-83 E3AZ-6584-A* A

5.8L (W) 1977-83 E3AZ-6584-A* A

5.8L (M) 1980-82 D00Z-6584-A A

6.6L 1973-79 D00Z-6584-A A

6.1L 1983 E3TZ-6584-E* A

7.0L 1980-82 E3TZ-6584-E* A

7.5L 1979-79 E3TZ-6584-E* A

OIL PAN GASKETS

Engine Year Part Number Class

1.6L 1981-83 E1FZ-6781-A A

2.3L 1977-83 E2ZZ-6781-A AM

3.3L 1977-83 D0DZ-6781-A* A

3.8L 1982-83 RTV

4.1L 1977-80 D0DZ-6781-B A

4.2 1980-82 D9AZ-6781-A A

4.9L 1977-83 E3TZ-6781-B* A

5.0L 1977-83 D9AZ-6781-A A

5.8L (W) 1977-83 D0AZ-6781-C* A

5.8L (M), 6.6L 1977-82 D0AZ-6781-D A

6.1L 1983 D9HZ-6781-A AQ

7.0L 1982 D9HZ-6781-A AQ

7.5L 1977-81 E0UZ-6781-A A

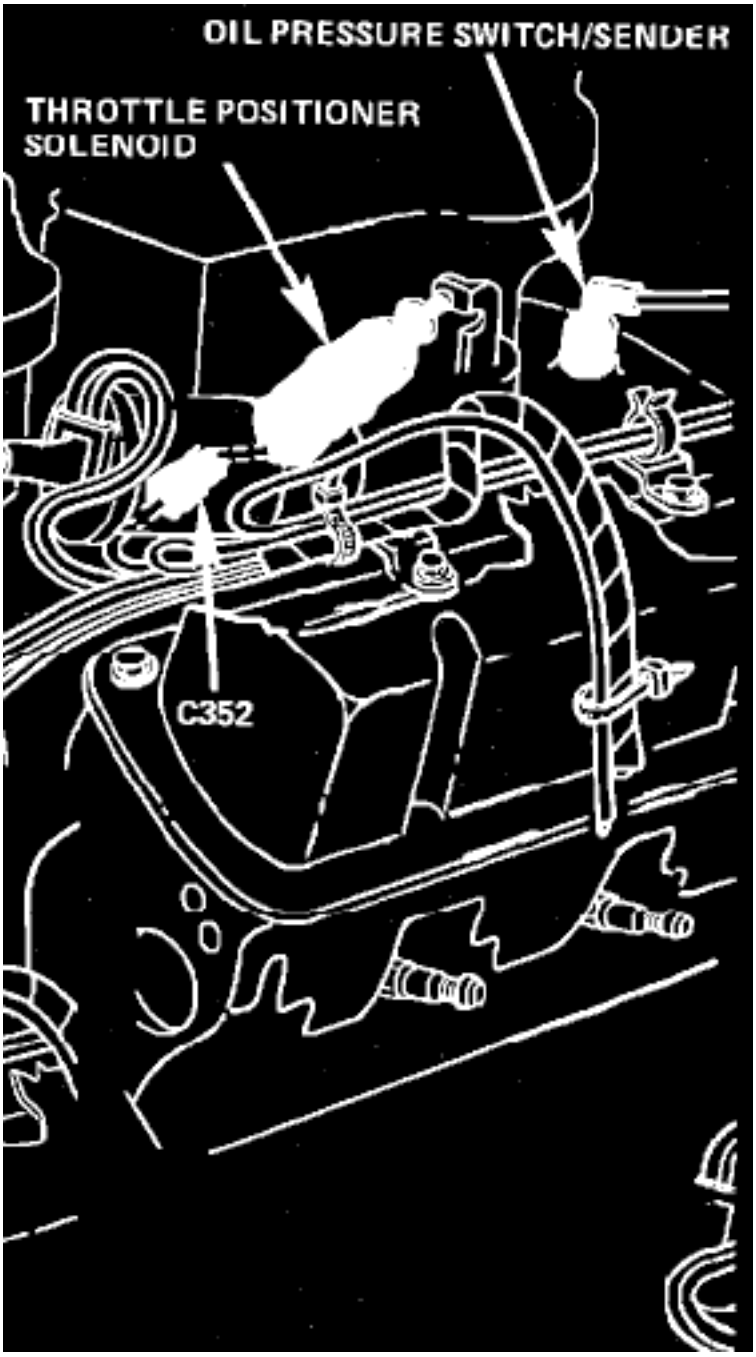
*High Swell Material.

Engine	Year	Part Number Front	Class	Part Number Rear	Class
1.6L	1981-83	E1FZ-6700-A	A	E1FZ-6701-A*	A
2.3L	1977-83	D4FZ-6700-A	A	E2ZZ-6701-A*	AM
				D4FZ-6701-A#	A
3.3L	1977-83	CODE-6700-A	A	C9OZ-6701-A@	A
				C9AZ-6701-B#	AM
3.8L	1982-83	DOAZ-6700-A	A	E2ZZ-6701-A* (After 1/3/83)	AM
				C9OZ-6701-A@ (Before 1/3/83)	A
				D4FZ-6701-A#	A
4.1L	1977-80	C3AZ-6700-A	A	C9OZ-6701-A@	A
				D4FZ-6701-A#	A
4.2L	1980-82	DOAZ-6700-A	A	C9OZ-6701-A@	A
				D4FZ-6701-A#	A
4.9L	1977-82	C3AZ-6700-A	A	C5AZ-6701-B*	A
	1983	C3AZ-6700-A	A	E3TZ-6701-C*	A
5.0L	1977-83	DOAZ-6700-A	A	E2ZZ-6701-A* (After 12/5/83)	A
				C9OZ-6701-A@ (Before 12/5/83)	A
				D4FZ-6701-A#	A
5.8L (W)	1977-83	DOAZ-6700-A	A	E3TZ-6701-C* (After 6/15/83)	A
				C9OZ-6701-A@ (Before 6/15/83)	A
				D0OZ-6701-A#	A
5.8L (M), 6.6L	1977-82	DOAZ-6700-A	A	C9OZ-6701-A@	A
				D0OZ-6701-A#	A
6.1L, 7.0L	1979-83	D9HZ-6700-A	AQ	C9AZ-6701-A#	A
7.5L	1979-83	C3AZ-6700-A	A	C9AZ-6701-A#	A

* — One Piece
\# — Two Piece
@ — Rope

ARTICLE SUPERSEDED:83-5-7WARRANTY STATUS:"INFORMATION ONLY"

CRANKSHAFT SEAL

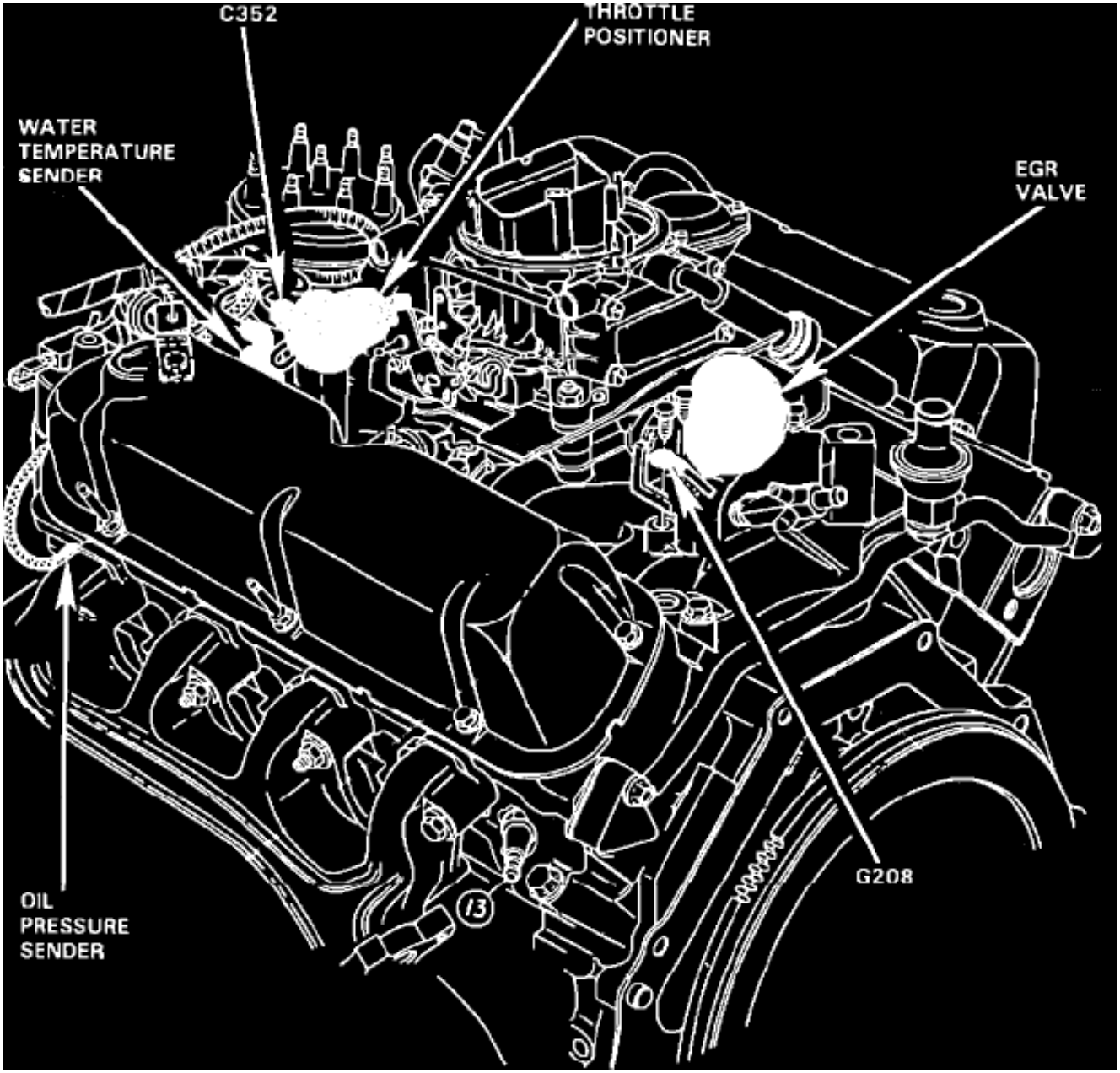


Oil Pressure Sender: Locations

LH Side Of Engine.

Rear Top Of Engine Block

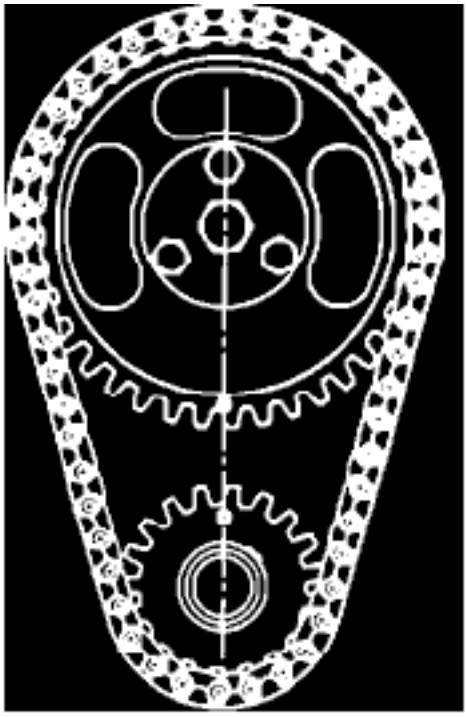
Applicable to: 1981-82 V8-351M/5.8L & V8-400/6.6L Engines

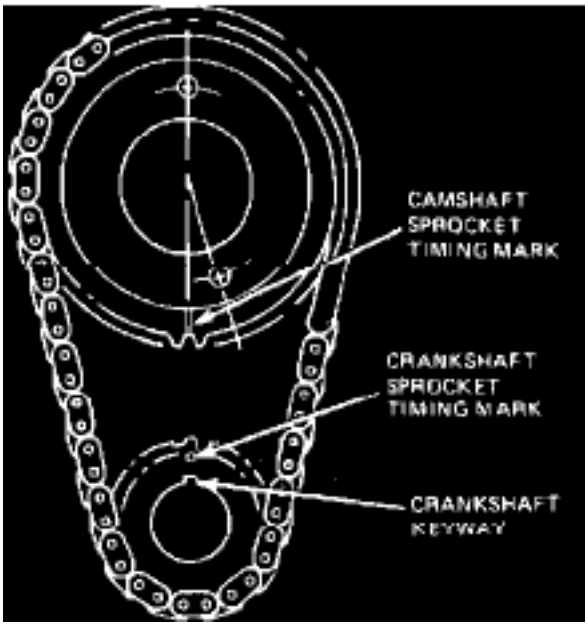


LH Side Of Engine.

Rear Top Of Engine Block

Applicable to: 1985 V8-351/5.8L Engine w/4 Barrel Carb. Except Calif.





Timing Chain: Service and Repair

Fig. 27 Valve timing alignment marks

Fig. 32 Timing marks aligned for correct valve timing. 1982 V6-232

V6-232, V8-255, 302, 351, 400 & 460 After removing the cover as outlined previously, remove the crankshaft front oil slinger, if equipped. On V6-232 engines, remove camshaft thrust button and spring from end of camshaft. Crank the engine until the timing marks are aligned as shown in Figs. 31 and 32. Remove camshaft sprocket retaining bolt, washer and fuel pump eccentric. Slide sprockets and chain forward and remove them as an assembly. Reverse the order of the foregoing procedure to install the chain and sprockets, being sure the timing marks are properly aligned.

Timing Cover: Service and Repair

F-100-150 & Bronco

1. Drain cooling system, then remove fan shroud attaching bolts and position shroud over fan.

2. Disconnect hoses from water pump, then remove drive belts, fan, fan spacer and pulley.

3. Loosen alternator pivot bolt and the alternator adjusting arm-to-water pump attaching bolt.

4. Remove crankshaft pulley and vibration damper.

5. Disconnect fuel outlet line from fuel pump, then remove fuel pump attaching bolts and position pump aside.

6. On all models, remove timing case cover-to-oil pan attaching bolts.

7. Cut oil pan gasket flush with cylinder block face, then remove timing case cover and water pump as an assembly.

8. Reverse procedure to install. Apply RTV sealant to oil pan gasket surfaces.

V8-351M & 400

1. Drain cooling system and disconnect battery cables.

2. Remove fan shroud attaching bolts and slide shroud rearward.

3. Remove fan and fan spacer from water pump shaft.

4. On models equipped with A/C, remove A/C compressor drive belt lower idler pulley and compressor mount-to-water pump bracket.

5. On all models, remove alternator drive belt, power steering pump drive belt (if equipped) and water pump pulley.

6. Remove alternator bracket and power steering pump bracket (if equipped) from water pump and position aside.

7. Disconnect heater hose and lower radiator hose from water pump.

8. Remove crankshaft pulley, vibration damper and timing pointer.

9. Remove timing case cover-to-cylinder block attaching bolts, then the timing case cover and water pump as an assembly.

10. Reverse procedure to install. Apply suitable sealant to cylinder block and timing case cover gasket surfaces.

Fuel Pressure: Specifications

SPECIFICATIONS

Pressure ..... 6.0-8.0 PSI Volume ..... 1 pint in 20 seconds

NOTE: Measurements taken with engine idling.

Fuel Pressure: Testing and Inspection

PRESSURE TEST

1. Connect a suitable pressure gauge (0-15 PSI) to the carburetor end of the fuel line.

WARNING: Use care to prevent combustion of spilled fuel.

2. Start the engine (it should be able to run for over 30 seconds on the fuel in the carburetor bowl) and read the pressure after 10 seconds. If pump

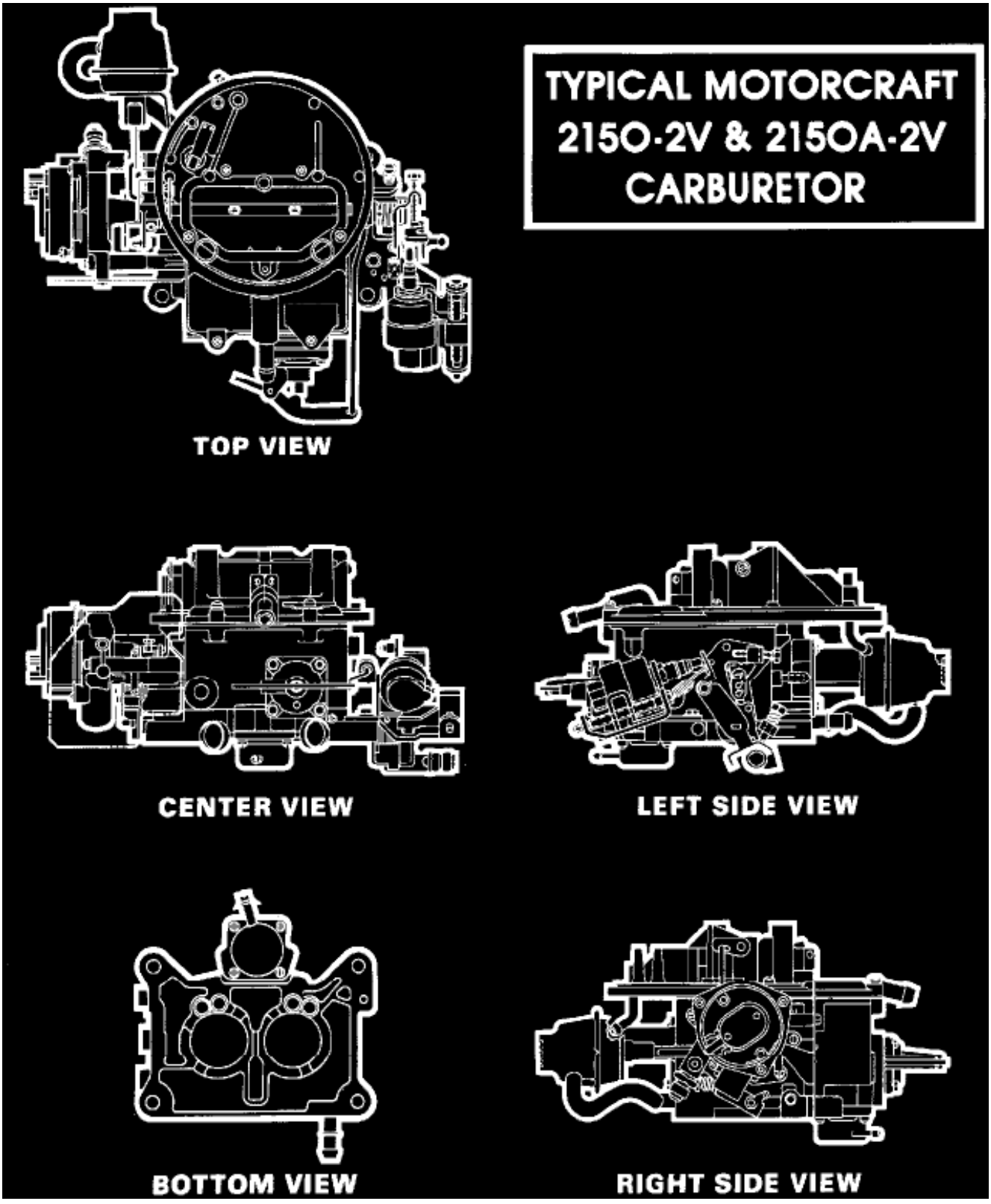
pressure is too low or too high install a new fuel pump.

Fuel Pump Pressure ..... 6.0-8.0 PSI

3. Reconnect fuel line at filter and install air cleaner.

		SLOW		FAST		
Engine	Year	Man. Trans.	Auto. Trans.	Man. Trans.	Auto. Trans.	Step of Cam
5.8L (351)	1982	750	600 D	1700	1650 P	2nd High
AC speed-up	1982	850	—			
w/decal ABF, ABJ	1982	—	550 D	—	2000 P	High
AC speed-up	1982	—	625 D			
Canada	1982	750	600 D	1700	1650 P	2nd High
shutdown idle	1982	850	—			
w/decal ABH	1982	—	550 D	—	2000 P	High
AC speed-up	1982	—	625 D			
5.8L (351) Windsor	1982	750	—	1700	—	2nd High
5.8L (351) Windsor	1982	—	550 D	—	2000 P	High
AC speed-up	1982	—	625 D			
5.8L (351)	1983	750	625 D	1700	2000 P	High
AC speed-up	1983	850	—			
shutdown idle	1983	—	575 D			
w/decal DEY, DFR	1983	600	—	1650	—	2nd High
California	1983	—	600 D	—	1650 P	2nd High

IDLE SPEED SPECIFICATIONS

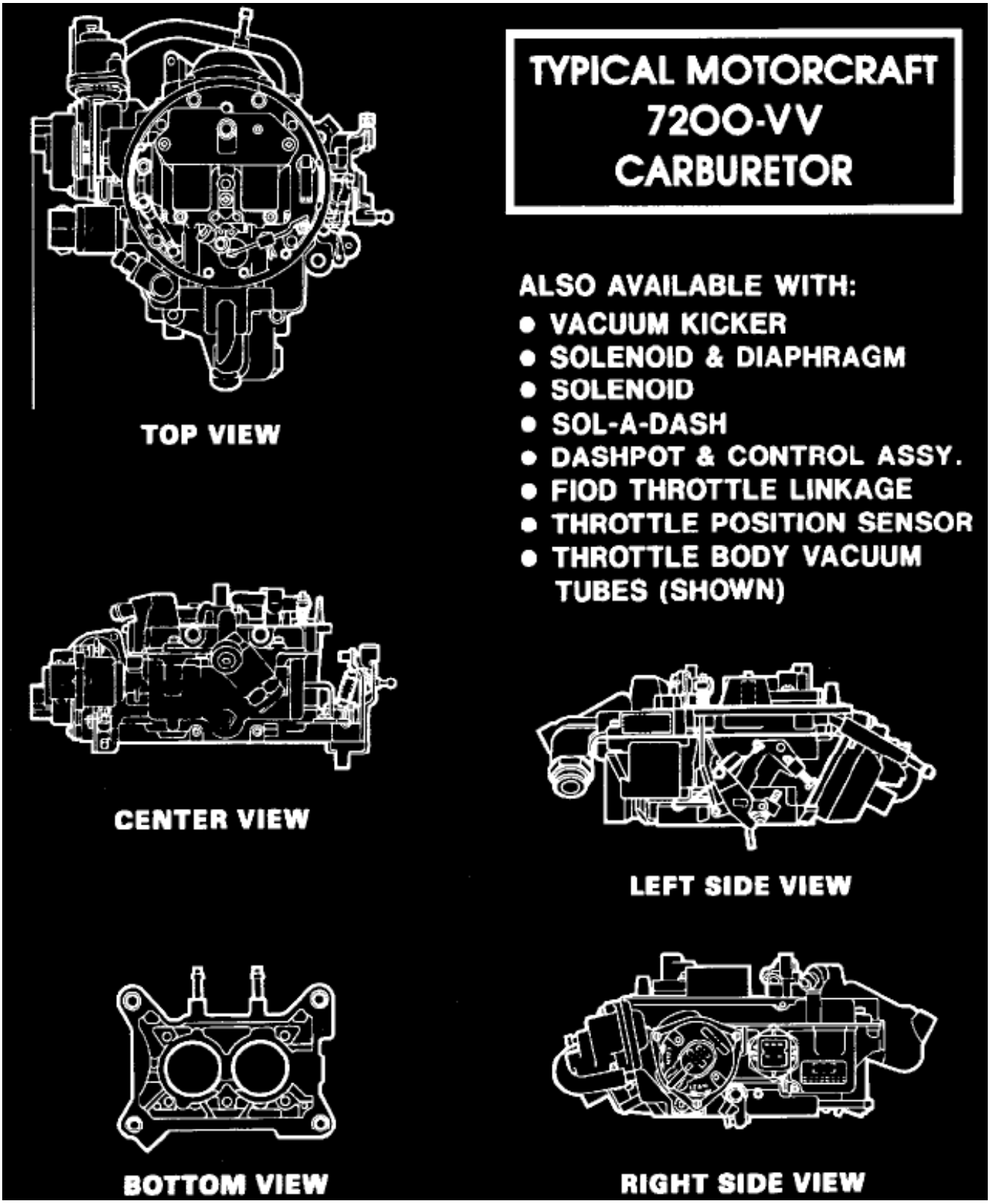


Idle Speed: Adjustments Curb Idle Speed

Identification

CARBURETOR IDENTIFICATION

2150-2V, 2150A-2V Carburetor

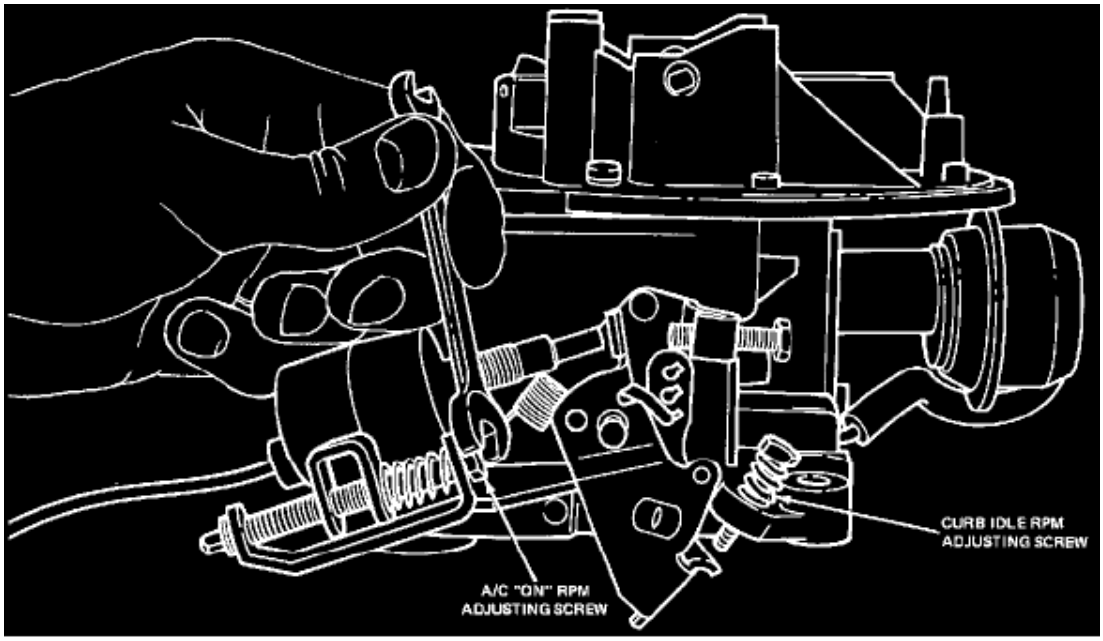


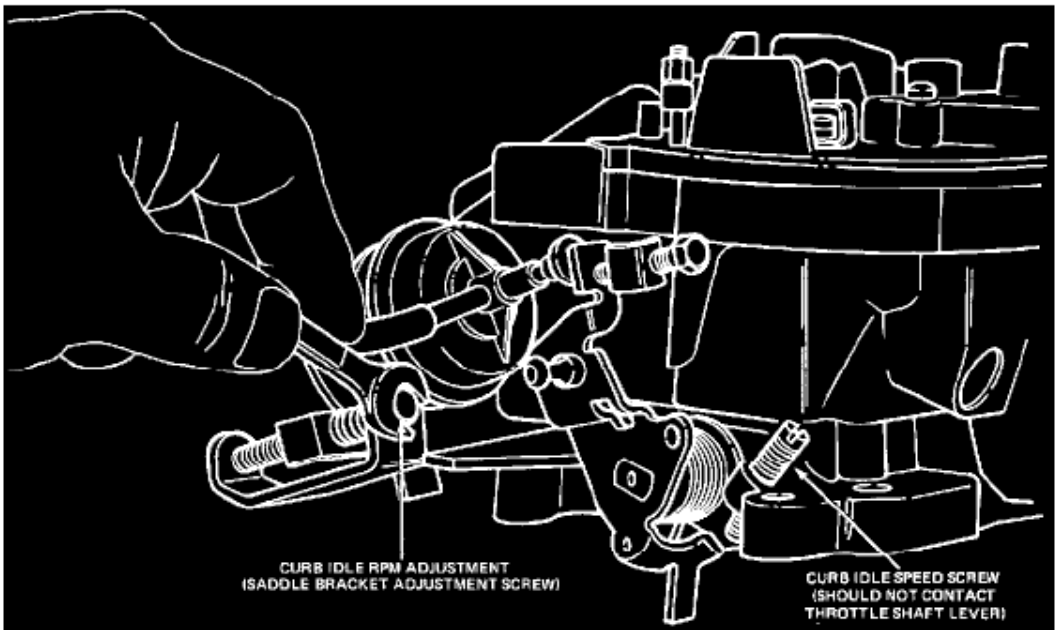
Variable Venturi, 7200-VV Carburetor

Type 2150-2V

CURB IDLE SPEED ADJUSTMENT

- Place the transmission in Neutral (manual) or Park (automatic).
- Bring engine to normal operating temperature (upper radiator hose hot).
- Place the transmission in the specified gear. See: Specifications


CURB IDLE RPM
ADJUSTING SCREW
A/C "ON" RPM
ADJUSTING SCREW


CURB IDLE RPM ADJUSTMENT
(SADDLE BRACKET ADJUSTMENT SCREW)
CURB IDLE SPEED SCREW
(SHOULD NOT CONTACT
THROTTLE SHAFT LEVER)

- Check curb idle rpm. Adjust to specification. See: Specifications

- Place the transmission in Neutral (manual) or Park (automatic). Rev the engine momentarily. Place the transmission in specified position, and recheck curb idle rpm. Readjust if required.

Type 7200-VV Carburetor

CURB IDLE SPEED ADJUSTMENT

- Place the transmission in Neutral (manual) or Park (automatic).

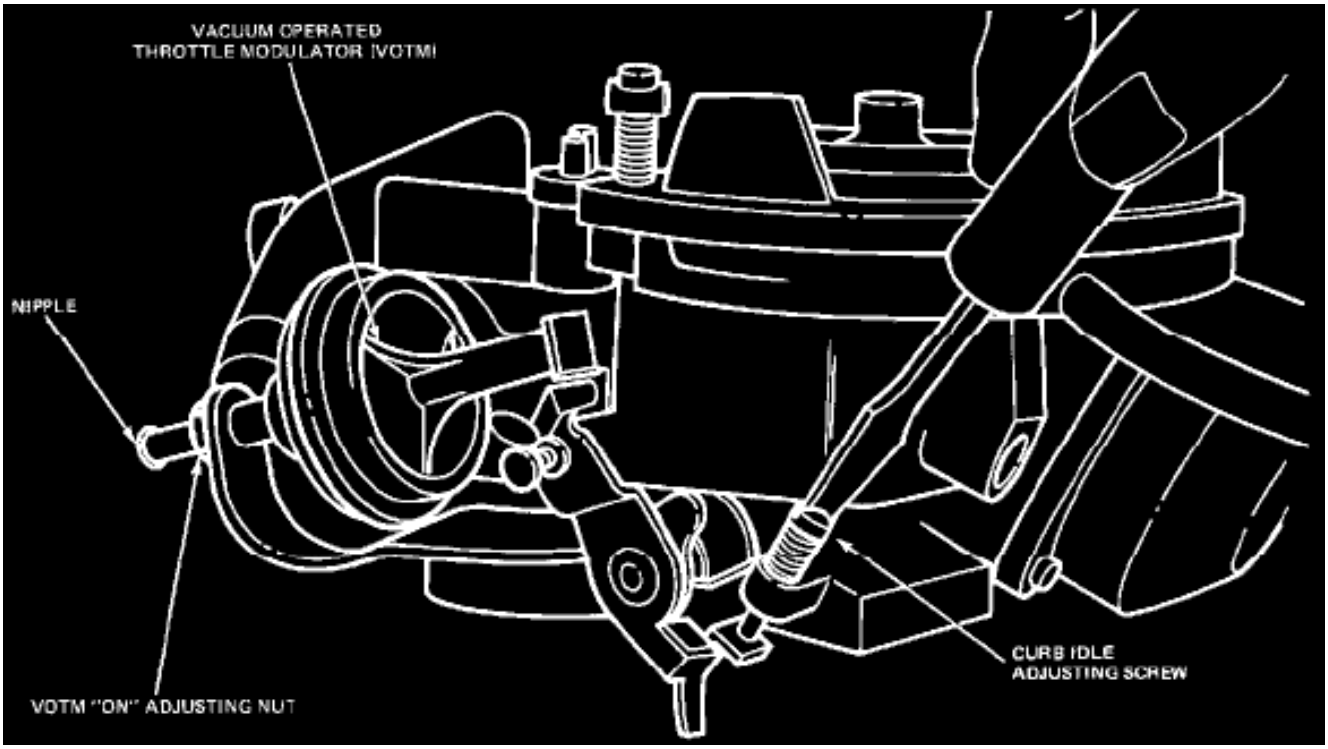
- Bring the engine to normal operating temperature.

- Disconnect purge hose on canister side of evaporator purge solenoid. Check to ensure that purge vacuum is present (solenoid has opened, will require a 3-5 minute wait after starting engine, followed by a short time at part throttle. Reconnect purge hose.

- Disconnect and plug the vacuum hose to the Vacuum Operated Throttle Modulator (VOTM) kicker.

- Place the transmission in specified position. See: Specifications

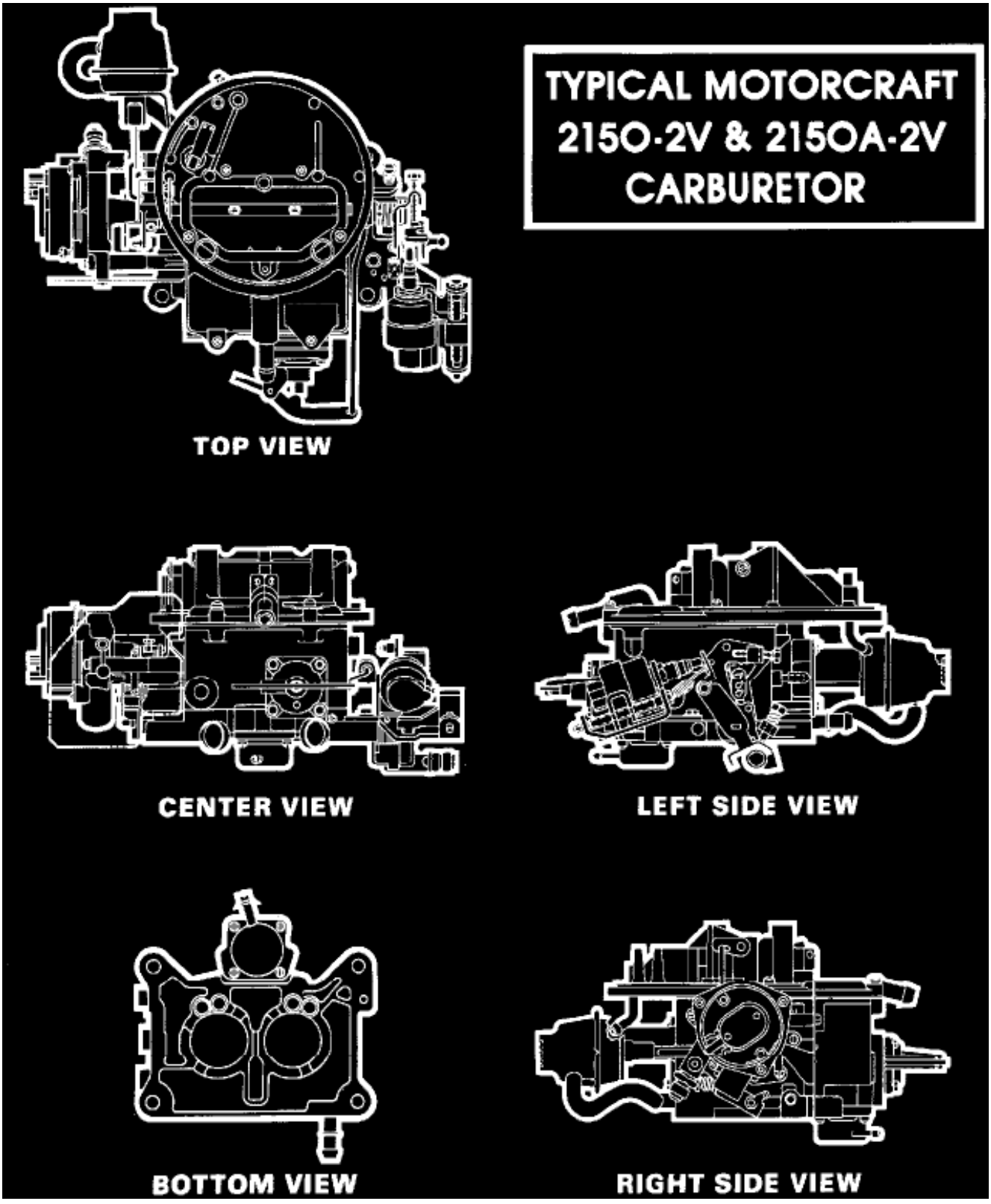
With Automatic Transmission



With Manual Transmission

- Check/adjust curb idle rpm. See: Specifications

- Place the transmission in Neutral or Park. Rev the engine momentarily. Place the transmission in specified position and recheck curb idle rpm. Readjust if required.

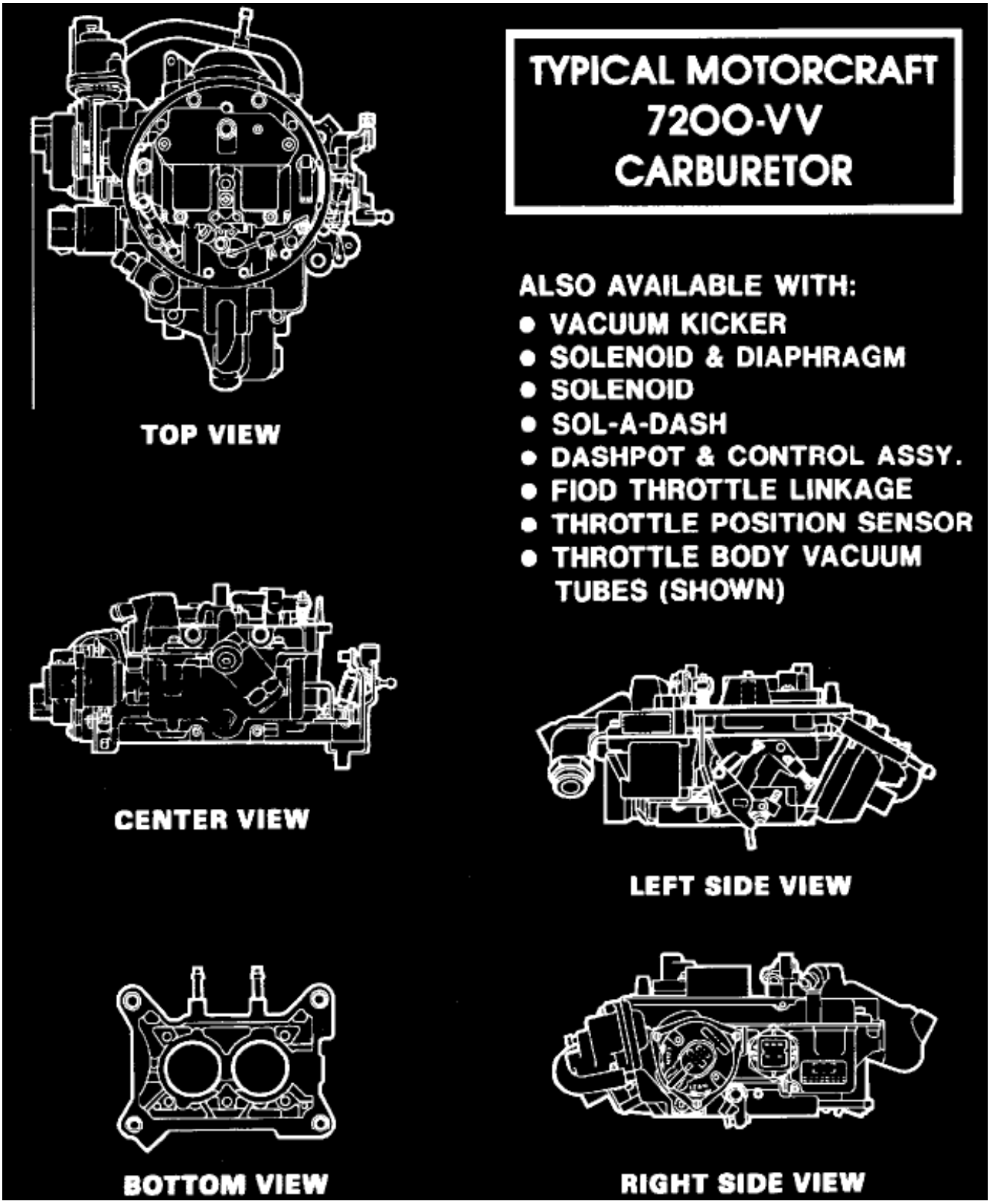


Idle Speed: Adjustments Fast Idle Speed

Identification

CARBURETOR IDENTIFICATION

2150-2V, 2150A-2V Carburetor

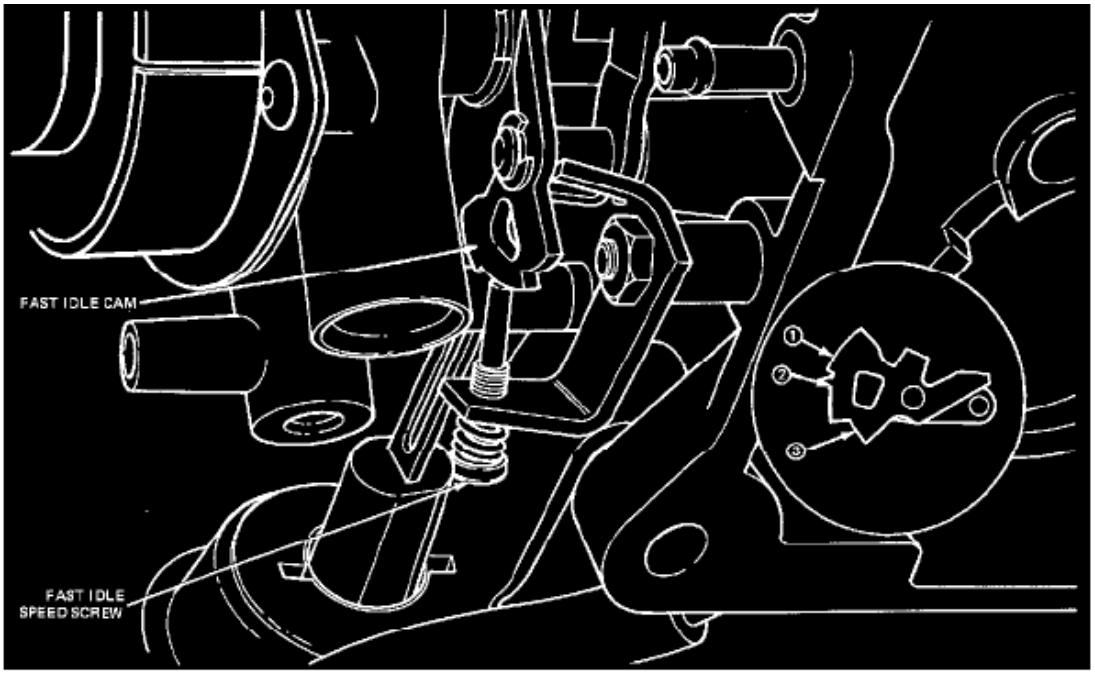


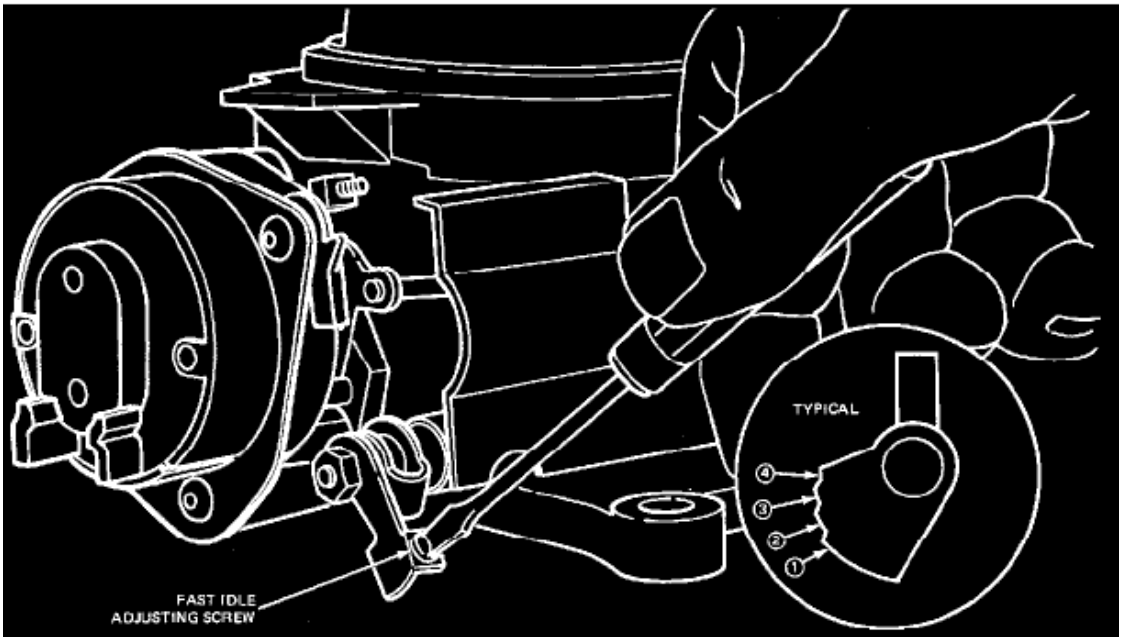
Variable Venturi, 7200-VV Carburetor

Type 2150-2V Carburetor

FAST IDLE SPEED ADJUSTMENT

- Place the transmission in Park (automatic) or Neutral (manual).
- Bring the engine to normal operating temperature.
- Disconnect the vacuum hose at the EGR valve and plug.


FAST IDLE CAM
1
2
3
FAST IDLE
SPEED SCREW


TYPICAL
4
3
2
1
FAST IDLE
ADJUSTING SCREW

- Place the fast idle adjustment mechanism on top step of fast idle cam. Check/adjust fast idle rpm to specification. See: Specifications

- Recheck for repeatability.

- Remove the plug from the EGR vacuum hose and reconnect.

Type 7200-VV Carburetor

FAST IDLE SPEED ADJUSTMENT

- Place the transmission in Neutral (manual) or Park (automatic).

- Bring the engine to normal operating temperature.

- Disconnect purge hose on canister side of evaporator purge solenoid. Check to ensure that purge vacuum is present (solenoid has opened, will require a 3-5 minute wait after starting engine, followed by a short time at part throttle. Reconnect purge hose.

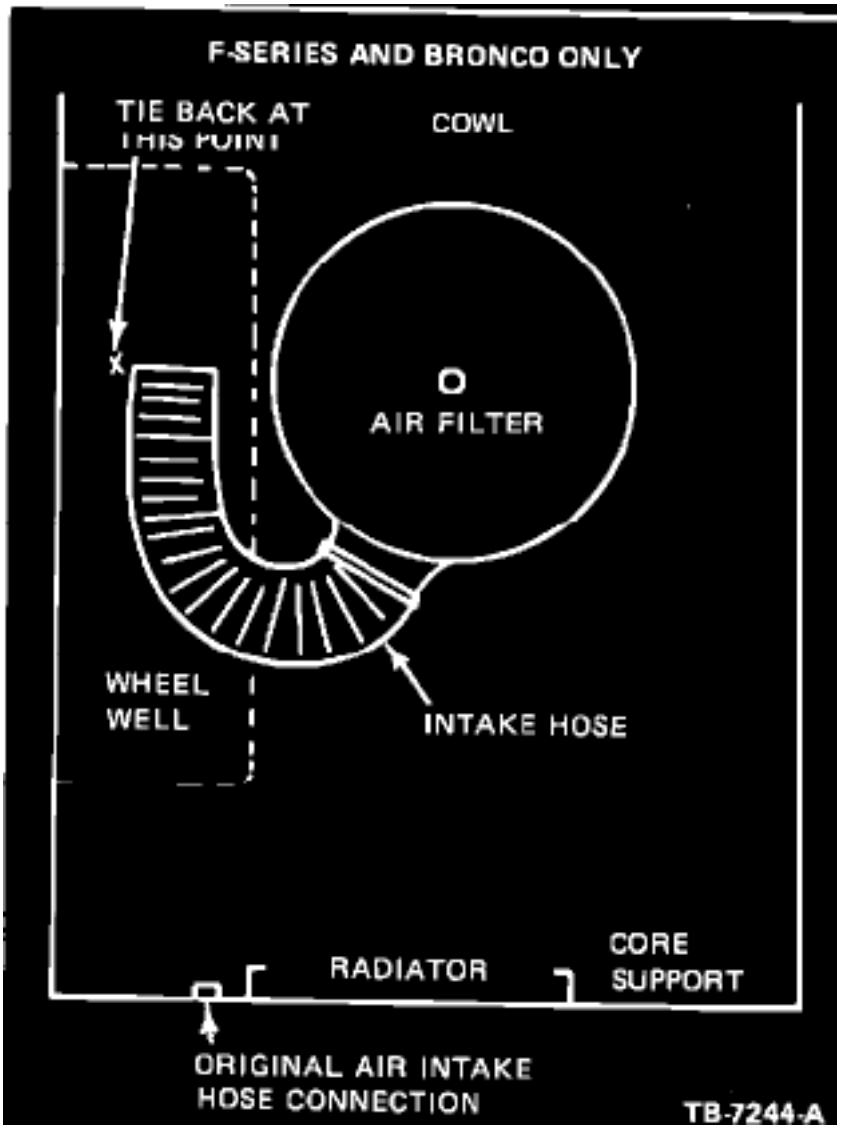
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Disconnect the vacuum hose at the EGR valve and plug.

- Place the fast idle adjustment mechanism on the second step of the fast idle cam.

- Check/adjust fast idle rpm to specification. Recheck for repeatability. See: Specifications

- Remove the plug from the EGR vacuum hose and reconnect.



Air Cleaner Housing: Technical Service Bulletins Air Cleaner - Sealing Procedure

Article No. 83-25-21-S

AIR CLEANER SEALING - 4.9L (1982-83 F-SERIES AND BRONCO ONLY) AND ALL UNITS WITH 5.0L, 5.8L OR 7.5L ENGINES. UNITS OPERATED IN DUSTY AND/OR OFF-ROAD CONDITIONS -

ARTICLE ALSO INCLUDES SEALING OF 7200VV CARBURETOR ON UNITS SO EQUIPPED

LIGHT TRUCKS 1980-83 E, F AND BRONCO

This is a re-write of TSB 83-25-21 (December 12, 1983). The air cleaner part numbers listed in the TSB are of insufficient detail and are therefore being deleted from the TSB.

Due to the variety of different air cleaners used, part numbers have not been included in this TSB. See your normal parts listing for these part numbers.

The subject vehicles operated in dusty/off-road conditions may experience an air cleaner sealing concern which could lead to engine oil consumption or, on 7200 VV carburetor equipped vehicles, a poor running condition. The following procedure should minimize these concerns.

1. Remove the air cleaner assembly from the engine and remove any loose debris from inside the tray. Replace the air cleaner assembly (9600) on all 1983 4.9L, 5.0L, 5.8L and, 7.5L equipped light trucks except the 1983 Econoline with the 4.9L engine.

Due to the variety of different air cleaners used, part numbers have not been included in this TSB. See your normal parts listings for these part numbers.

2. Wipe the sealing surfaces clean on the tray and cover and inspect for any dents or damage that would prevent a good seal. Replace any damaged components.

3. Inspect the air cleaner to carburetor gasket for proper installation. If the gasket appears crimped or damaged, replace it with a new sticky-back gasket. Prior to replacing the gasket, clean the carburetor flange. Install the new gasket sticky side down and press all the gasket down to assure a tight bond.

Gasket parts numbers: 4.9L - C8DZ-9654-A, 5.0L/5.8L/7.5L - D8ZZ-9654-A.

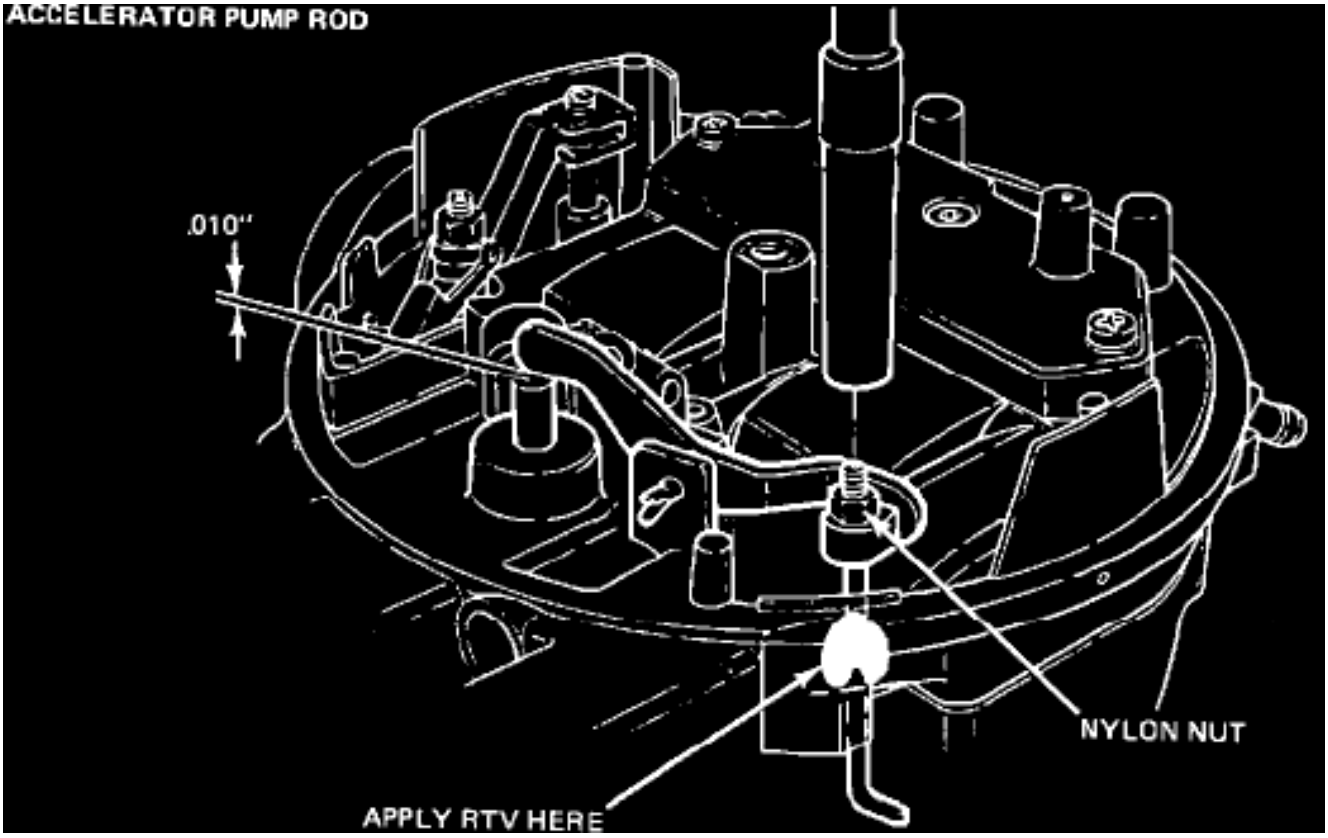
FIGURE 24

4. For F-Series and Bronco only, relocate the zip tube inlet. a) Detach the zip tube inlet from the radiator support. b) Move the inlet to the top rear of the wheel wellhousing per Figure 24. c) Secure the zip tube to the top of the housing with a nylon tie-down

strap. NOTE: At high temperatures, an octane ping may occur. If it persists, the zip tube must be reinstalled to the radiator support. 5.

Replace the PCV filter. For 4.9L, 5.0L-2V, 5.8L-2V and 7.5L-4V engines replace the PCV filter in the air cleaner with an in-line filter.

a. Remove and discard the crankcase breather cap to PCV filter hose (closure hose), PCV filter in the air cleaner, the adapter at the air cleaner and the adapter retaining clip.



b. Drill a 5/16" hole in the side wall of the air cleaner approximately 12" to the rear of the existing crankcase closure hole for 5.0L and 5.8L and approximately 6" to the rear on 7.5L. (The 4.9L does not need a new hole).

c. Install a 1/2" hose (E2AZ-6853-A) to the existing adaptor in the valve cover oil fill cap (2 pcs. 2-5/8" long for 4.9L, 18" long for 5.0L/5.8L, 12" long for 7.5L).

d. At a convenient location, cut the hose and install an in-line filter E2AZ-6A768-A for 5.0L, 5.8L and 7.5L. On the 4.9L, install the filter between the 2-5/8" long pieces installed in (c.).

NOTE: Install the filter with the wire mesh toward the oil fill cap. The mesh can be seen by looking into the end of the filter assembly.

e. Install an adapter E43Z-9E606-A in the air cleaner and attach using a retaining clip 383741-S. Center the adapter elbow in the new hole for 5.0L, 5.8L and 7.5L. Use the existing PCV filter (closure) pack hole for 4.9L.

f. Cut the PCV filter (closure) hose to proper length and attach to the adapter.

g. Plug the old hole in the tray with plug 377678-S for 5.0L, 5.8L and 7.5L only.

FIGURE 25

6. For 5.0L and 5.8L engines with a 7200 VV carburetor, clean and seal the carburetor to prevent dirt migration through the choke rod and accelerator pump rod holes (Refer to Figure 25).

a. Remove the carburetor from the vehicle.

b. Without disassembling the carburetor, thoroughly clean with Ford Automatic Choke Cleaner or equivalent, all of the choke linkage and accelerator pump linkage on the top and sides of the carburetor. Pay particular attention to the top and bottom of the upper body casting around the choke and accelerator pump rods. Allow cleaner to evaporate or blow dry with shop air.

c. Remove stepper motor, gasket, pintle and spring. Clean pintle and pintle cavity in main body casting thoroughly with Ford Automatic Choke Cleaner or equivalent. Do not re-install stepper motor at this time.

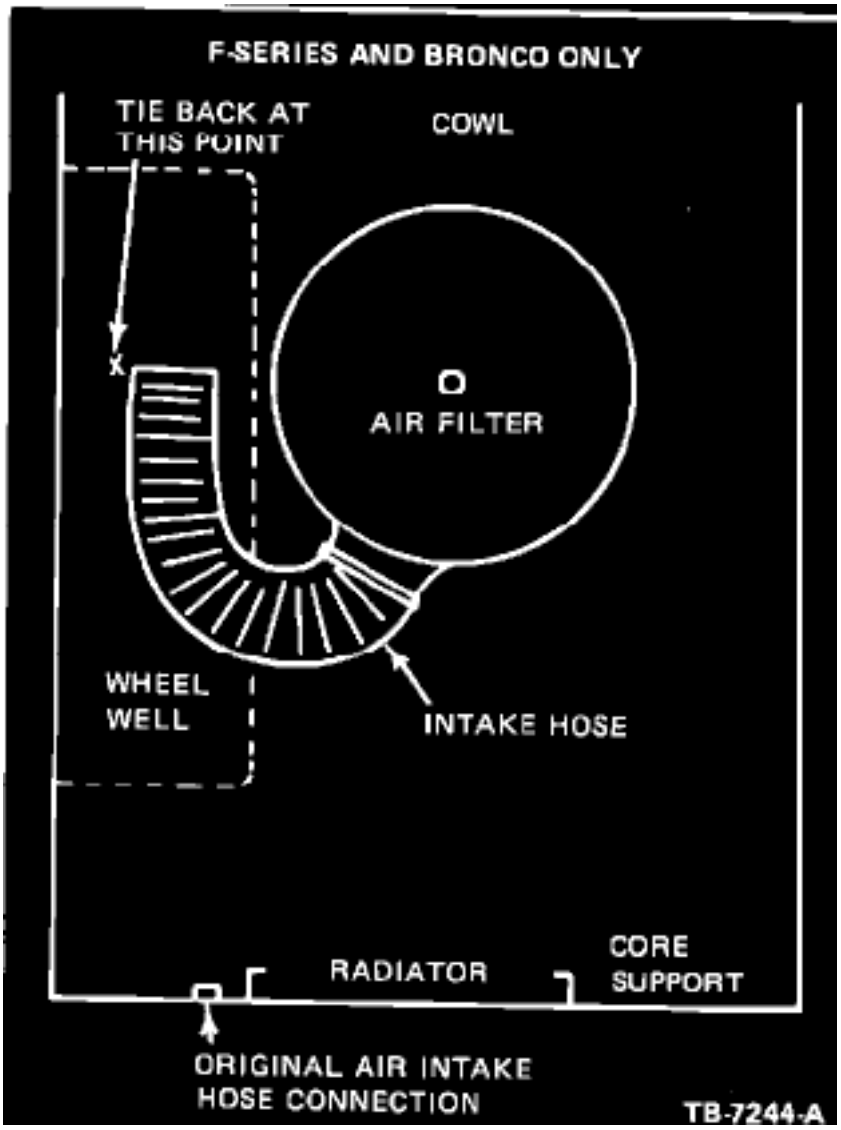


FIGURE 24

d. Hold throttle lever in the wide-open throttle position to raise the accelerator pump rod. With a toothpick, or other sharp tool, apply any commercially available silicone RTV (such as Dow Corning "Silastic") to the top side of the upper body casting around the accelerator pump rod (Figure 24). Fill the hole completely around the rods from the top side only and release the throttle lever.

e. With a rubber band, tie the throttle lever in closed-throttle position. Push fast idle cam to "off" position so that choke rod is fully raised. Fast idle cam should remain in "off" position.

f. With a toothpick, apply silicone RTV to bottom side of upper body casting around the choke shaft rod. Fill the hole completely around the rod from the bottom side only.

g. Install the spring, pintle, gasket, and stepper motor.

h. Allow carburetor to stand at room temperature for 24 hours without disturbing silicone RTV.

i. After 24-hour cure, remove rubber band from throttle lever, and open throttle to break (free) accelerator pump rod from silicone RTV. Bulk of RTV sealant should remain attached to upper body.

j. Manually exercise choke linkage to break (free) choke rod from silicone RTV. Bulk of RTV sealant should remain attached to upper body.

k. Re-install carburetor on vehicle.

7. Re-install and secure the air cleaner assembly as follows:

a. Set the air cleaner tray assembly on the carburetor and check that nothing is preventing the tray seating securely and completely sealing the flange.

b. Connect and secure the vacuum hoses.

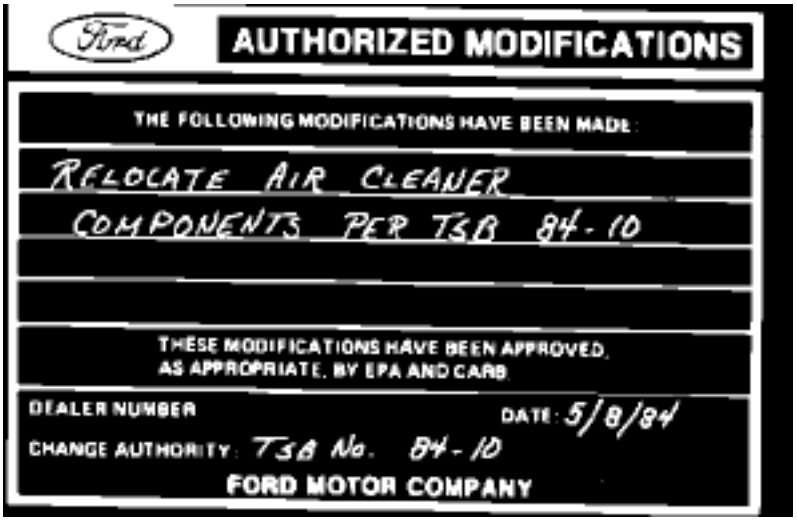
c. Install and seat a new heavy duty air cleaner element in the tray. Use E2TZ-9601-B (FA-732) for 4.9L and E0TZ-9601-A (FA-688) for 5.0L/5.8L. Use non-heavy duty element for 7.5L.

NOTE: Use of incorrect element will allow dirt to be ingested and will damage the engine.

d. Install the air cleaner cover and place the washer grommet rubber side down. Torque the wing nut hand tight (20 in.lbs.). Try to rotate the air cleaner assembly slightly. If it resists rotation, sealing to the carburetor is assured.

e. Connect the crankcase filter hose securely.

f. Install the heat riser tube. Connect the fresh air zip tube.



Obtain an Authorized Modifications decal and list the date, dealer number and summary of alterations performed. Select a prominent place adjacent to the Vehicle Emission Control Information decal suitable for installing the Authorized Modifications decal. Clean the area, install the decal and cover it with a clear plastic decal shield. PART NUMBER

PART NAME CLASS

E2AZ-6A768-A PCV Filter C

E2AZ-6853-A 1/2" PCV Hose C

E43Z-9E606-A Adapter C

E2TZ-9601-B Air Filter Element AM

E0TZ-9601-A Air Filter Element AM

C6TZ-9697-A Washer AM

D8ZZ-9654-A Gasket A

377678-S Plug BR

E3AZ-19562-A RTV Sealer A

390013-S36B Wing Nut S

C8DZ-9654-A Gasket AM

OTHER APPLICABLE ARTICLES: 83-25-21 WARRANTY STATUS: Reimbursable within the provisions of the Warranty and Policy Manual. OPERATION: SP9600C84 TIME:

6 cyl. - 0.5 Hr. 8 cyl. - 1.1 Hrs. DLR. CODING: Basic Part No. 9600 Code: 49

Fuel Filter: Technical Service Bulletins Fuel Filter - Replacement Information

Article No. 85-6-10

FUEL FILTER REPLACEMENT INFORMATION - ALL WITH FUEL FILTERS ATTACHED TO THE CARBURETOR AND/OR FUEL LINE WITH A RUBBER HOSE

FORD ALL 1985 AND PRIOR

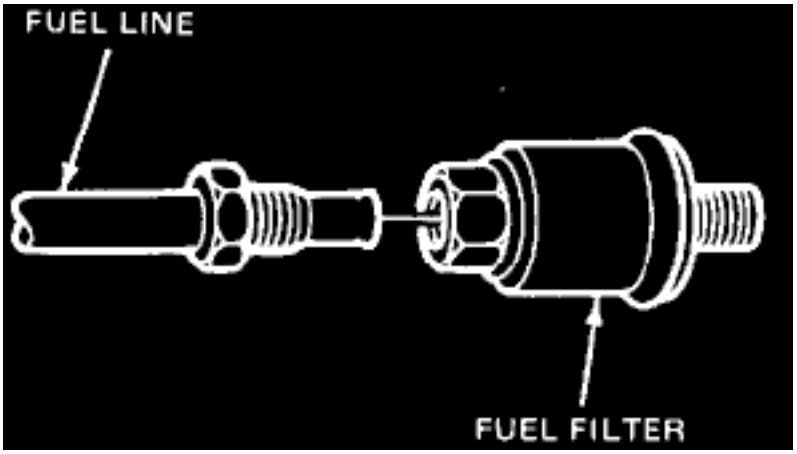
LINCOLN-MERCURY ALL 1985 AND PRIOR

LIGHT TRUCK ALL 1985 AND PRIOR

New fuel connector hoses and clamps should be used whenever a fuel filter is replaced.

Due to possible deterioration of hose materials which may result if a vehicle is fueled with gasoline containing excessive levels of methanol or ethanol, a new fuel hose and clamps should be installed when the fuel filter is changed. DO NOT REUSE OLD HOSES OR CLAMPS.

OTHER APPLICABLE ARTICLES: NONE WARRANTY STATUS: "INFORMATION ONLY"



Fuel Filter: Service and Repair Screw In Type

REMOVAL

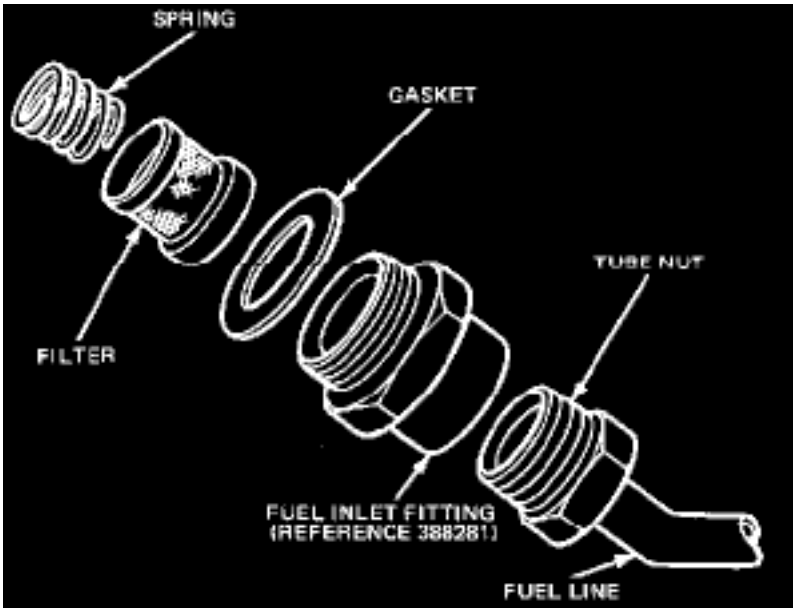
1. Remove the air cleaner assembly. 2. Loosen and remove the fuel tube from the filter. 3. Unscrew the filter from the carburetor.

INSTALLATION

1. Apply one drop of thread sealer to the external thread of a new filter. Thread the filter into the carburetor inlet port. 2. Tighten the filter to 9.0-11.0 Nm (80-100 in-lbs). 3. Apply ESE-M2C39-E or equivalent oil to the fuel supply tube nut and flare , and hand start the nut into the fuel filter inlet approximately two

threads.

4. Use an 11/16 inch wrench on the fuel filter to prevent the filter from rotating. Tighten the fuel filter to supply tube nut to 20-24 Nm (15-18 ft-lb). 5. Install air cleaner assembly. 6. Start the engine and check for fuel leaks.



Fuel Filter: Service and Repair Inlet Fitting Type

REMOVAL

- Remove the air cleaner.

- Hold the fuel filter inlet hex nut with a backup wrench and unscrew the fuel line tube nut from the fuel filter inlet.

WARNING: Use care to prevent combustion from fuel spillage.

- Unscrew the fuel inlet fitting.

-

Remove the gasket, filter and spring.

- Discard the gasket and filter.

INSTALLATION

- Install the spring, new filter and gasket.

- Hand start the fuel inlet fitting into the carburetor then, tighten to 10-24 Nm (90-125 lb-in).

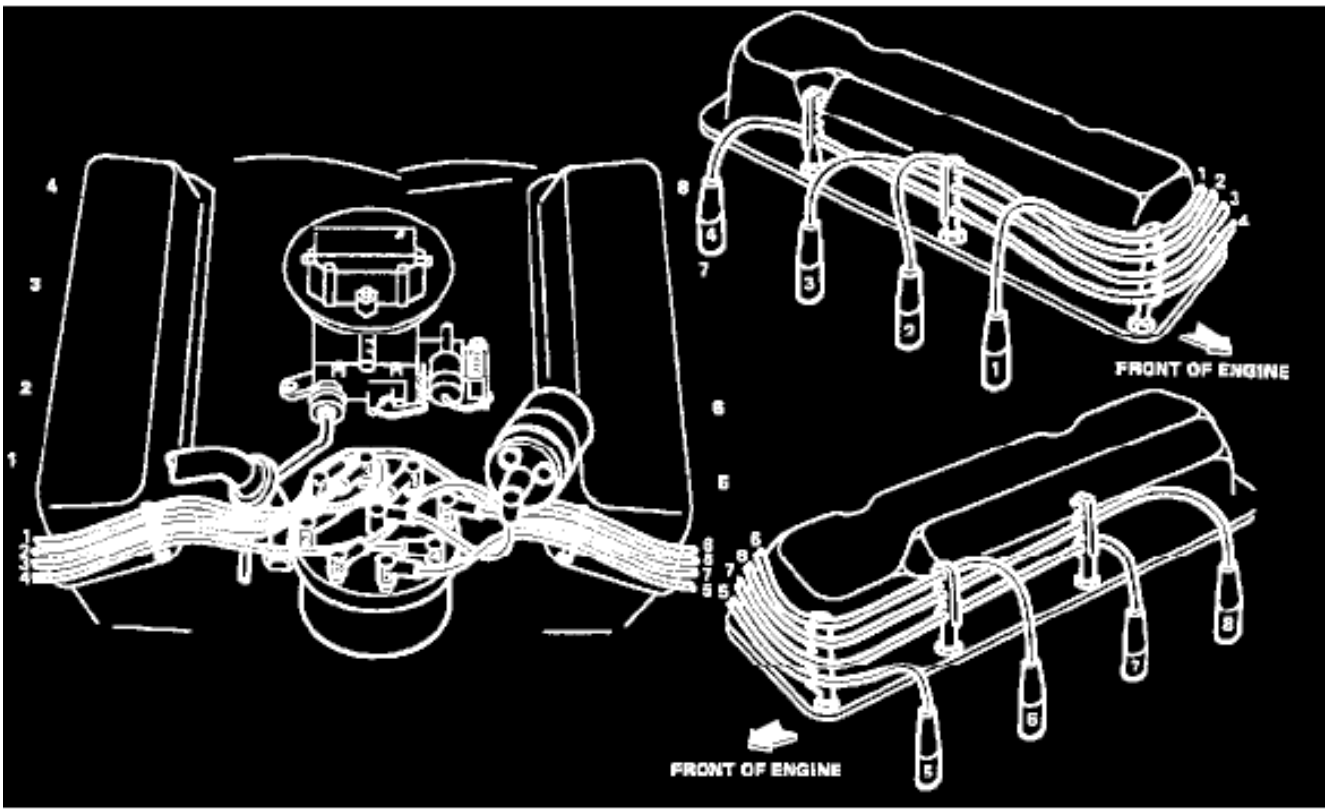
- Apply oil, ESE-M2C39-E or equivalent to the fuel tube nut threads and tube flare.

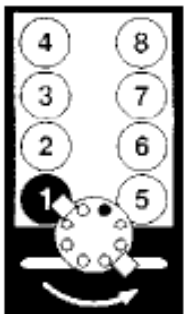
- Hand start the fuel line tube nut into the fuel inlet fitting (approximately two threads).

- Use a backup wrench on the fuel inlet fitting while tightening the fuel line tube nut to 20-24 Nm (15-18 lb-ft).

- Start the engine and check for fuel leak.

- Install the air cleaner.

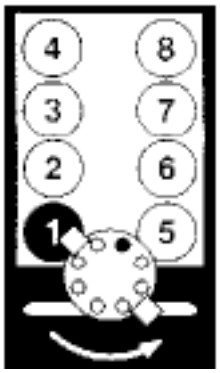




Firing Order: Specifications With EEC III

With EEC III The cylinders are numbered 1-4 on the Right side, starting with the front, and 5-8 on the left side, ending with the rear. Because of the unique dual level rotor used by the EEC-III Ignition system, the engine's firing order cannot be read off the top of

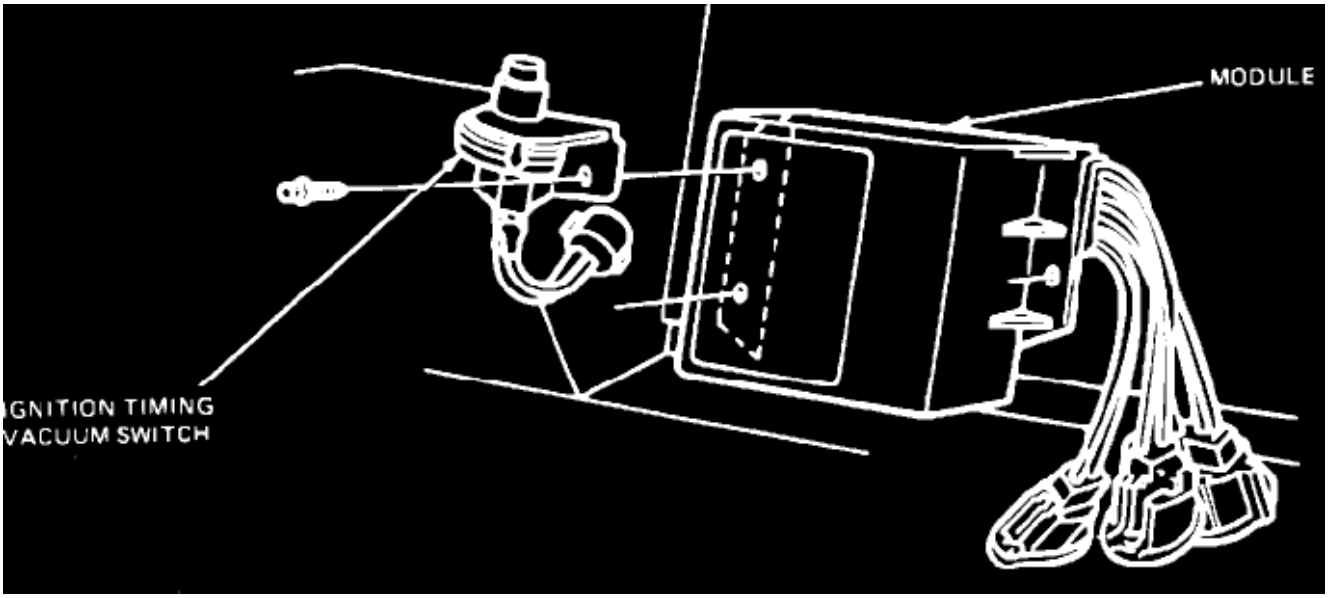
Firing Order 1-3-7-2-6-5-4-8



Firing Order: Specifications Without EEC III

Without EEC III

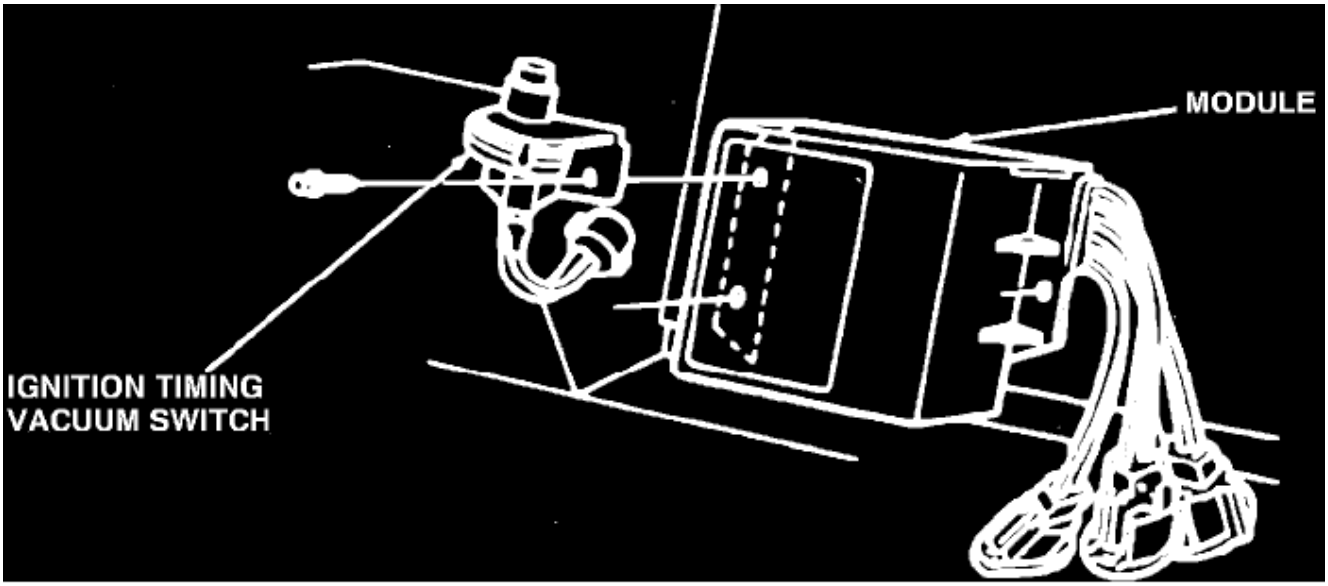
Firing Order 1-3-7-2-6-5-4-8



Ignition Timing Connector: Description and Operation

Fig. 20 Ignition Timing Vacuum Switch

Below vacuum setting, this switch, Fig. 20, used on some vehicles, is open and signals the ignition module to retard spark timing. The switch is closed above the vacuum setting and the ignition module is in the non-retard spark timing mode. Calibration resistors inside the switch control the amount of retard.



Part Number	Vacuum Setting ± 1.7 kPa (Inches Hg ± 0.5 In.)	Resistance Value (Ohms)
E1AE-12A265-BA	Less than 11.8 (3.5)	3,200 - 3,350
	Greater than 11.8 (3.5)	2,150 - 2,250
E1SE-12A265-BA	Less than 30 (9)	3,250 - 3,370
	Greater than 30 (9)	2,150 - 2,250
E1TE-12A265-CA	Less than 10 (3)	2,800 - 2,870
	Greater than 10 (3)	2,150 - 2,250
E25E-12A265-AA	Less than 13.5 (4)	2,800 - 2,870
	Greater than 13.5 (4)	2,150 - 2,250

Ignition Timing Connector: Testing and Inspection

Ignition Timing Vacuum Switch

Ignition Timing Vacuum Switch Test Chart

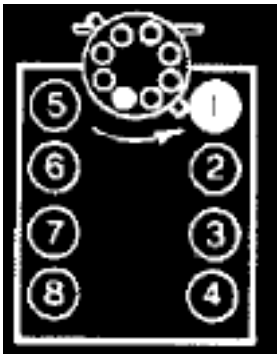
1. Disconnect switch from ignition module.

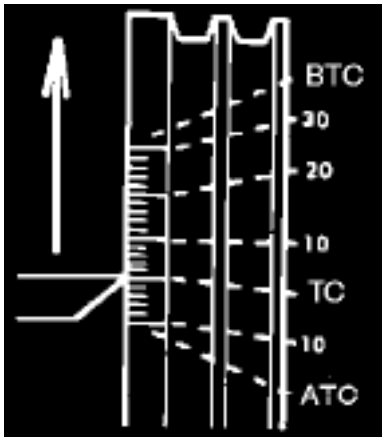
2. Connect suitable ohmmeter across switch terminals and compare resistance measured to ``less than'' values in the Ignition Timing vacuum Switch Test chart.

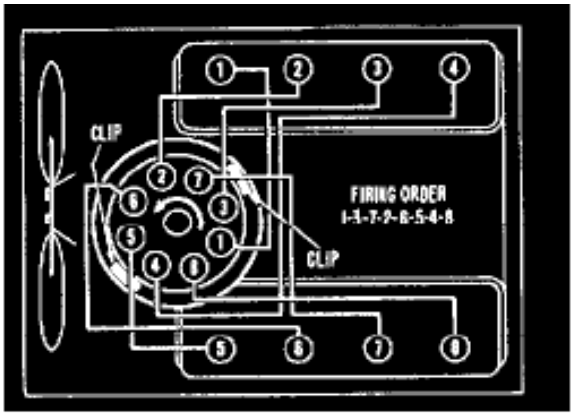
3. Apply vacuum to switch, using an outside vacuum source. Compare resistance now measured across switch terminals to ``greater than'' values in the Ignition Timing vacuum Switch Test chart.

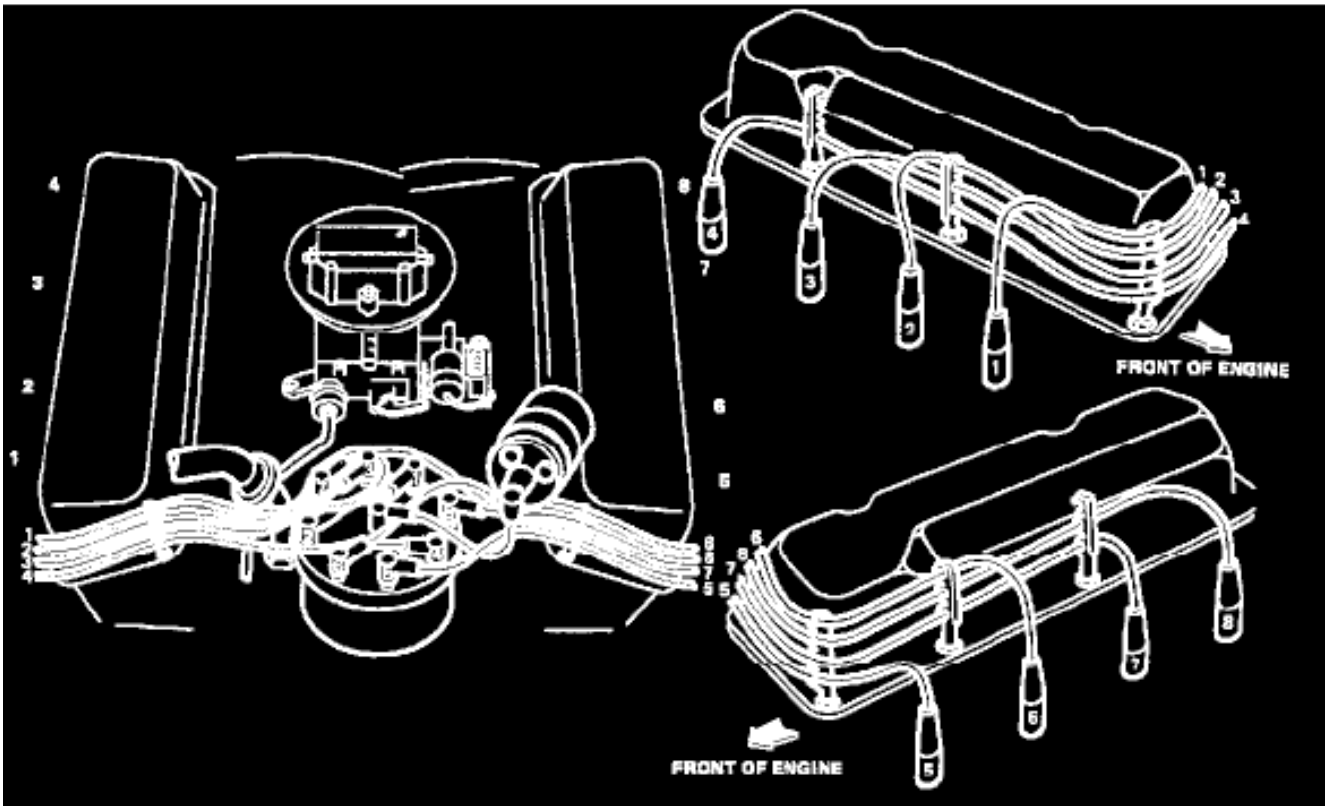
4. Replace switch if resistance is not within specifications.


5
1
6
2
7
3
8
4


5
1
6
2
7
3
8
4


BTC
30
20
10
TC
10
ATC

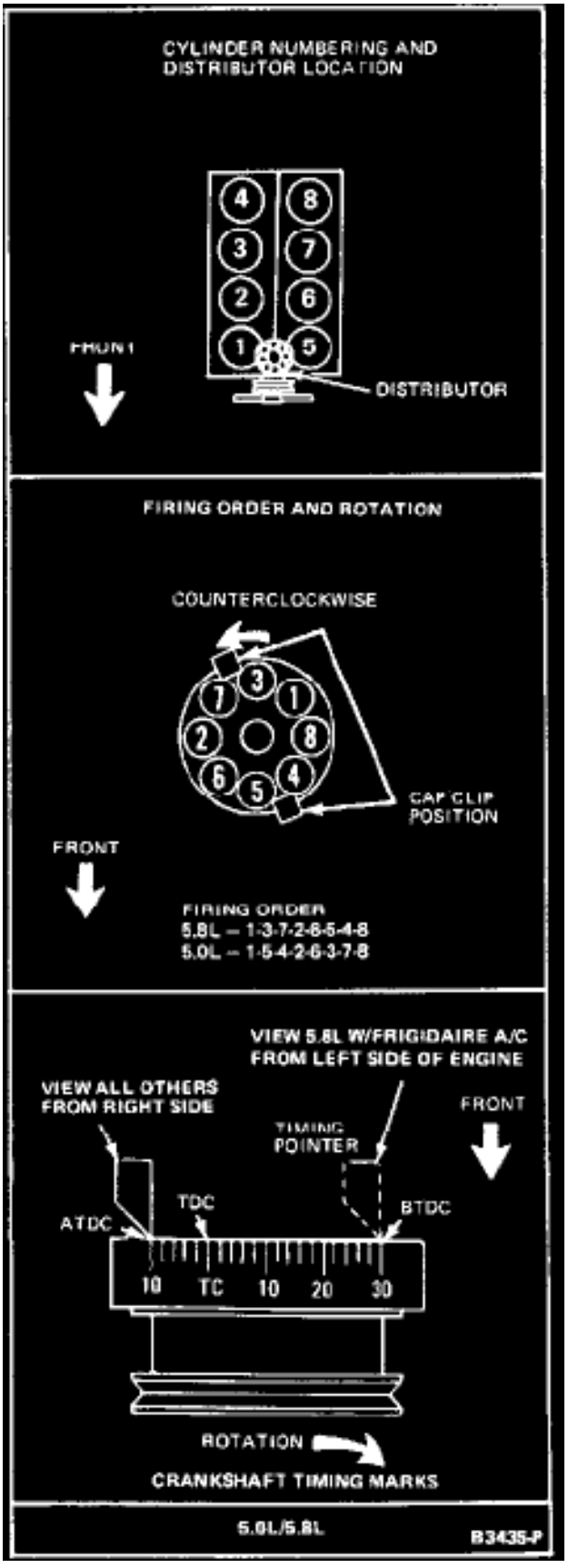




Ignition Cable: Diagrams

Spark Plug Wire Routing

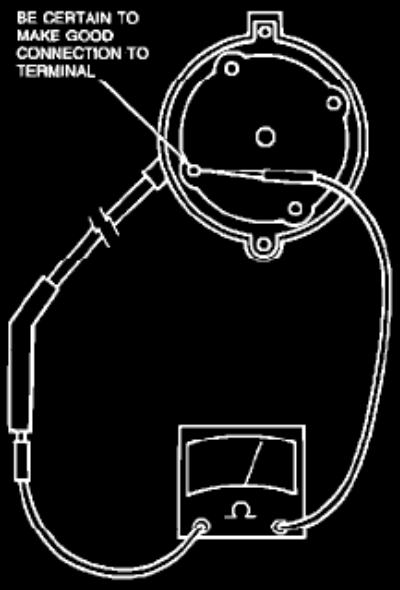
Ford F 250 5.8L Firing Order


CYLINDER NUMBERING AND DISTRIBUTOR LOCATION
4
8
3
7
2
6
1
5
FRONT
DISTRIBUTOR
FIRING ORDER AND ROTATION
COUNTERCLOCKWISE
7
3
1
2
8
6
5
4
CAP CLIP POSITION
FRONT
FIRING ORDER
5.8L – 1-3-7-2-6-5-4-8
5.0L – 1-5-4-2-6-3-7-8
VIEW 5.8L W/FRIGIDAIRE A/C FROM LEFT SIDE OF ENGINE
VIEW ALL OTHERS FROM RIGHT SIDE
FRONT
TIMING POINTER
TDC
ATDC
BTDC
10
TC
10
20
30
ROTATION
CRANKSHAFT TIMING MARKS
5.0L/5.8L
B3435-P

Spark Plug Wire Resistance

Test 3

TEST STEP	RESULT	ACTION TO TAKE
1. Remove distributor cap from distributor. 2. Check for spark plug wires firmly seated on cap. 3. Disconnect spark plug end of suspect wire(s). 4. Measure resistance from terminal in cap to spark plug terminal. 5. Reinstall distributor cap and connect spark plug wire to spark plug. CAUTION **Do not, under any circumstances, puncture a spark plug wire when measuring resistance. Measure only as instructed.** 6. **Was resistance less than 7,000 ohms per foot?**	Yes ▶	Spark plug wire resistance OK.
	No ▶	REPLACE spark plug wire(s).



Ignition Cable: Testing and Inspection

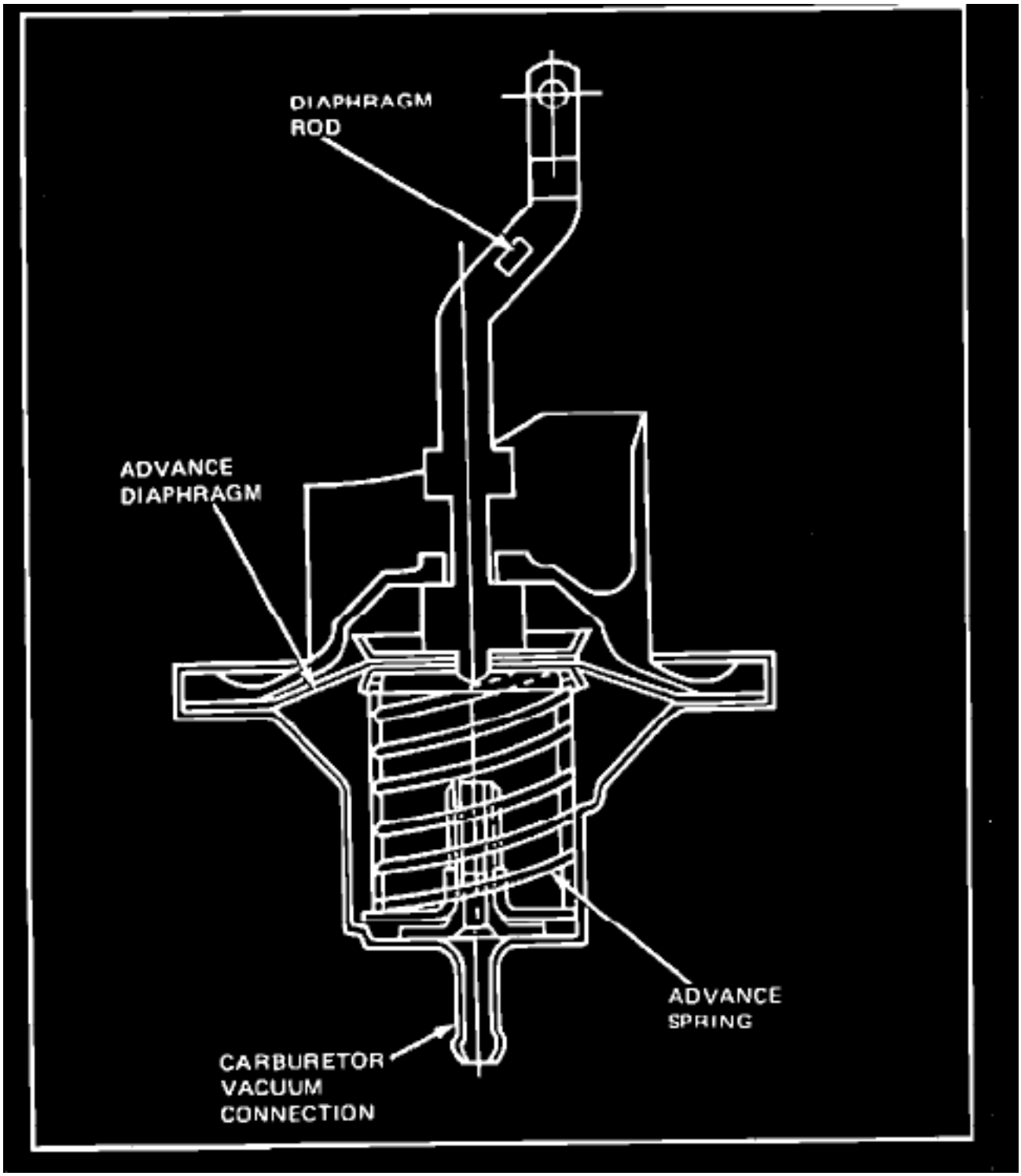
Spark Plug Wire Resistance

*** UPDATED BY TSB #85-9-33

Engine degrees at engine rpm, no load, in addition to basic timing setting.
Mechanical advance distributors only.

Engine	Trans-mission	Year	Distributor Number	Degrees @ 2500 RPM	
				Total	Centrifugal
351M	MT & AT	1981	D7TE-AHA	11.5-20.6	2.0-6.1
5.8L (351)M	MT & AT	1981	E0UE-CA	36.8-46.4	11.3-15.9
5.8L (351)M	MT & AT	1981	E1TE-EA	35.2-44.5	9.7-14.0
351 Windsor	MT & AT	1981-82	D7TE-ABA	9.4-19.5	0-5
351 Windsor	AT	1981-82	D7UE-JA	7.5-12.8	2.0-6.3
351 Windsor	MT	1981-83	D7UE-LA	14.5-23.7	5.0-9.2
5.8L (351)W	AT	1981	D1UE-EA	25.5-36.0	0-5.5
5.8L (351)W	AT	1981-82	D1UE-FA	27.4-37.7	1.9-7.2
5.8L (351)W	AT	1981-82	D1UE-GA	25.5-35.9	0-5.4
5.8L (351)W	MT	1982-83	E2TE-KA	12.7-22.1	7.2-11.6
5.8L (351)W	MT	1982-83	E2TE-SA	8.7-18.0	3.2-7.5
5.8L (351) 2V	MT & AT	1983-84	D7UE-LA	14.5-23.7	5.0-9.2
5.8L (351) 2V	MT & AT	1982-86	E2TE-UA	9.9-21.0	4.4-9.5
5.8L (351) 4V	AT	1984-86	E4TE-EA	27.8-37.0	10.3-14.5
5.8L (351) 4V	MT	1985-86	E5TE-NA	22.1-31.9	4.6-9.4
5.8L (351) 4V	AT	1985-86	E5TE-MA	20.7-30.5	3.2-8
5.8L (351) 4V	MT & AT	1985-87	E5TE-RA	23.0-32.5	9.5-14.0

DISTRIBUTOR TIMING ADVANCE



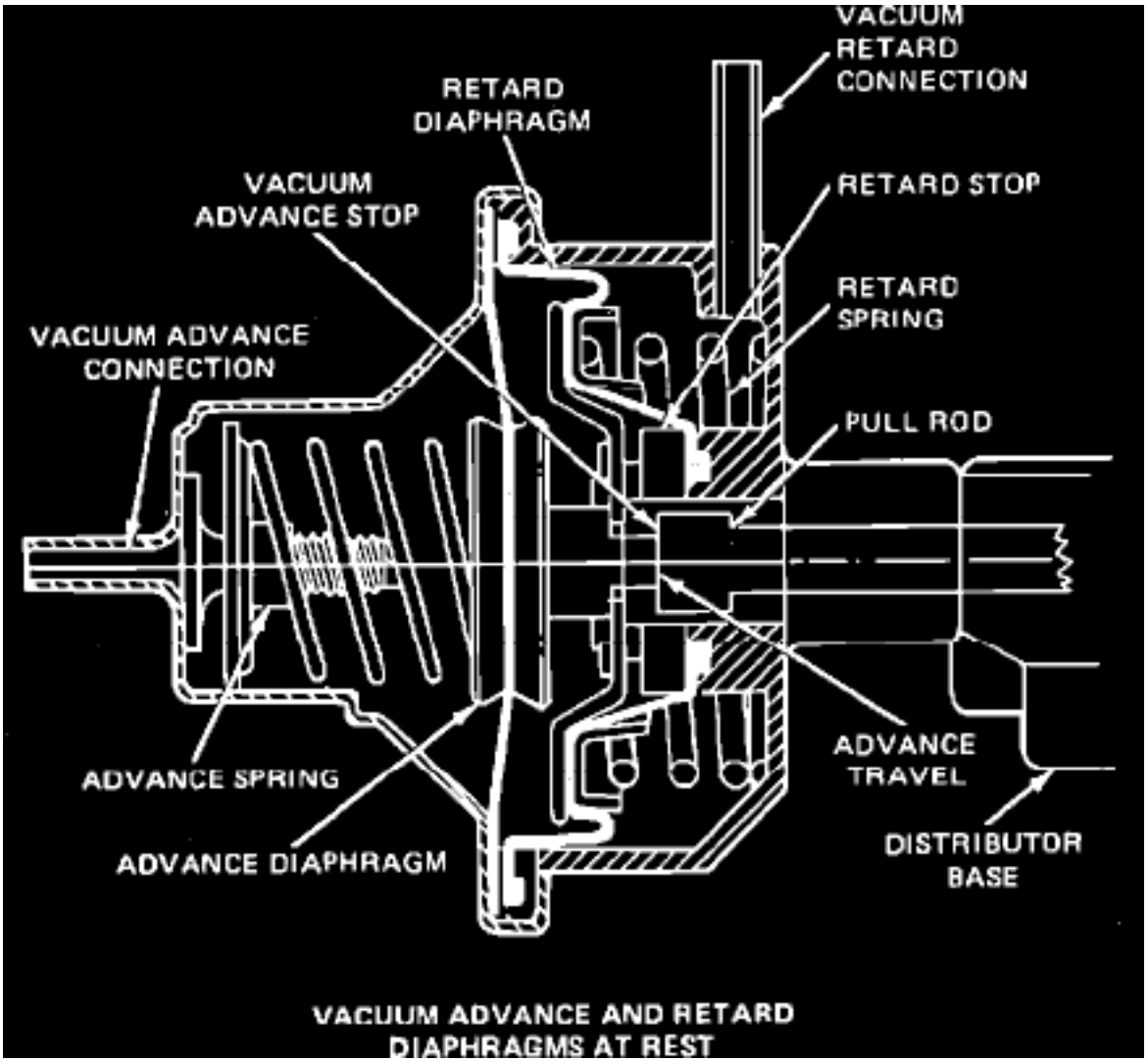
Distributor Advance Unit: Description and Operation Vacuum Spark Advance Mechanism

The vacuum spark control mechanism can provide spark advance if a single diaphragm assembly is used or spark advance and retard if a dual diaphragm assembly is used. The diaphragm

assembly used depends on the engine calibration.

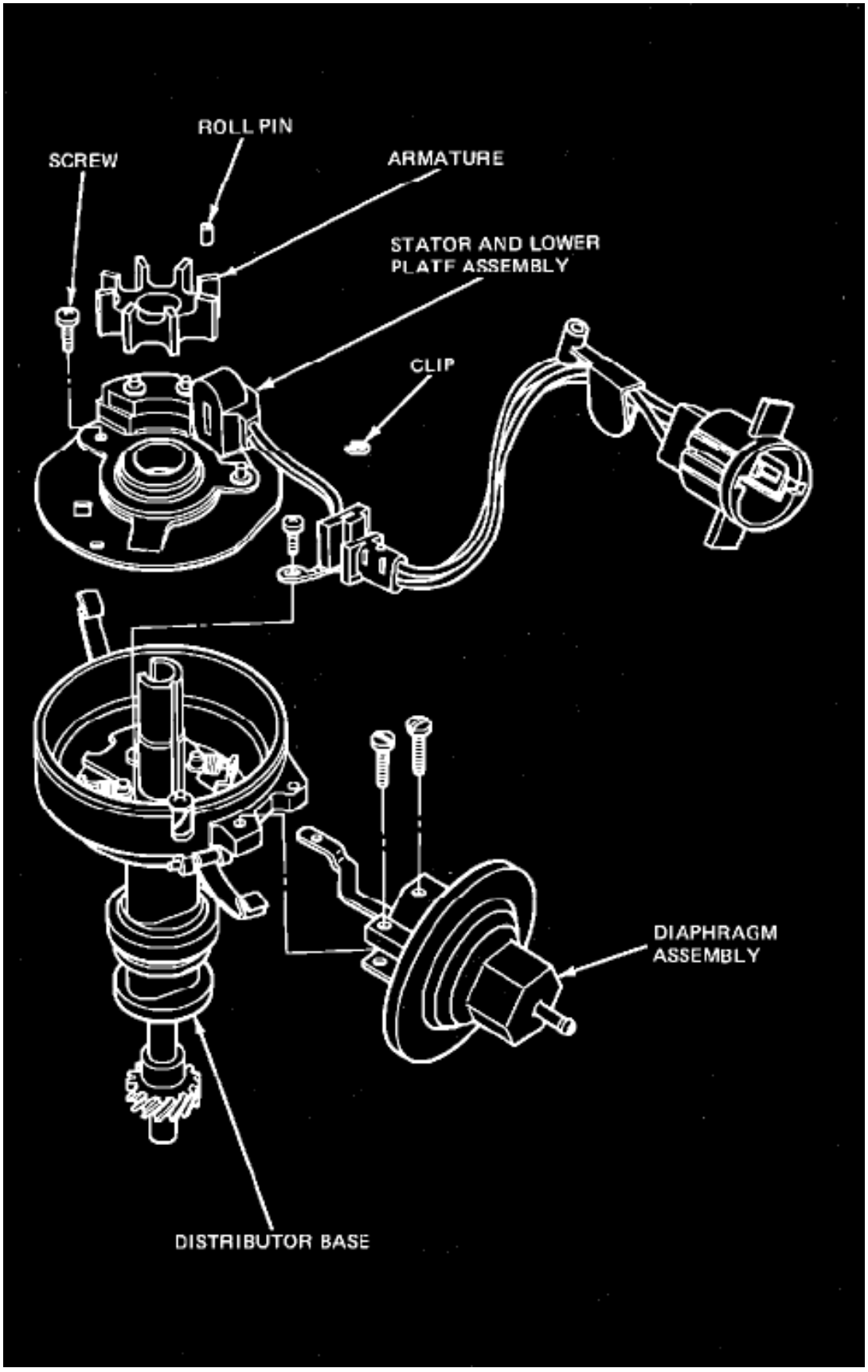
Single Diaphragm Assembly

SINGLE DIAPHRAGM ASSEMBLY The single diaphragm assembly, Fig. 11, also changes the armature to stator relationship to give spark advance. The stator assembly position is changed by means of vacuum being applied to the diaphragm assembly. Vacuum applied to the diaphragm assembly causes the diaphragm and attached diaphragm rod to move, compressing the advance spring, which controls the rate of advance. The movement of the diaphragm rod, which is attached to the stator assembly, makes the the stator assembly move with respect to the armature. This changes the initial armature to stator relationship set during initial timing, causing spark advance. The stator assembly is mounted on the lower plate assembly which with the diaphragm assembly, is attached to the distributor base.



Dual Diaphragm Assembly

DUAL DIAPHRAGM ASSEMBLY The dual diaphragm assembly, Fig. 12, obtains spark advance in the same manner as the single diaphragm assembly. In this case vacuum applied to the vacuum advance port causes the advance diaphragm and attached rod to move, otherwise the action is the same. Spark retard is done by applying vacuum to the vacuum retard port. This causes the retard diaphragm to move, compressing the retard spring, which controls the rate of spark retard. Compressing the retard spring allows the diaphragm rod stop to move due to the force applied by the advance spring pushing against it by means of the diaphragm rod. The result is the diaphragm rod moves causing the attached stator assembly to change position with respect to the armature. In this instance the direction of the stator assembly movement is opposite that occurring during vacuum advance, resulting in spark retard. NOTE: Any vacuum applied to the advance port overrides any spark retard caused by vacuum being applied to the retard port.



Distributor Advance Unit: Description and Operation Centrifugal Spark Advance Mechanism

Distributor - Exploded view

The centrifugal advance mechanism varies the relationship of the armature to the stator assembly. The armature is mounted to the sleeve and plate assembly which rotates in relation to the distributor shaft. The rotation is a result of the centrifugal weights moving in response to engine RPM. The movement of the weights change the initial relationship of the armature to the stator assembly by rotating the sleeve and plate assembly ahead of its static position on the distributor shaft Fig. 1. This produces spark advance. The rate of movement of the weights is controlled by calibrated springs.

Distributor Advance Unit: Service and Repair

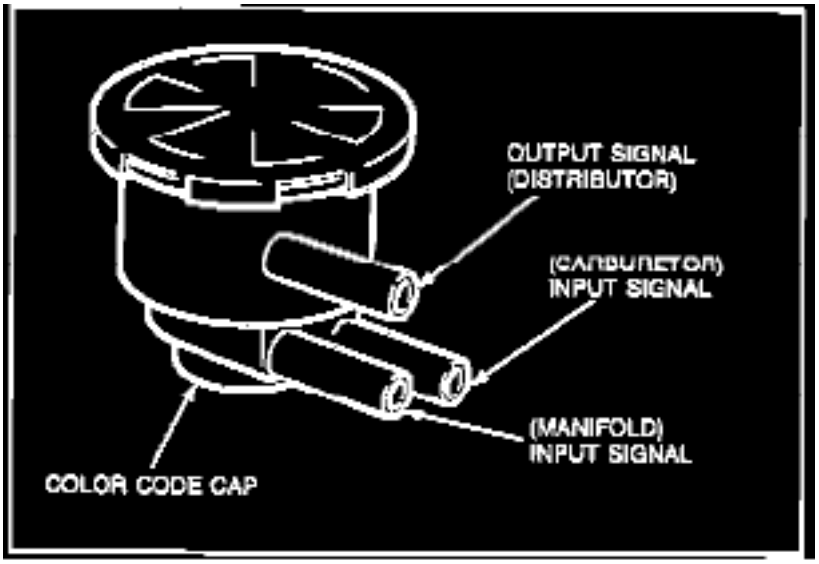
1. Remove distributor cap and rotor.

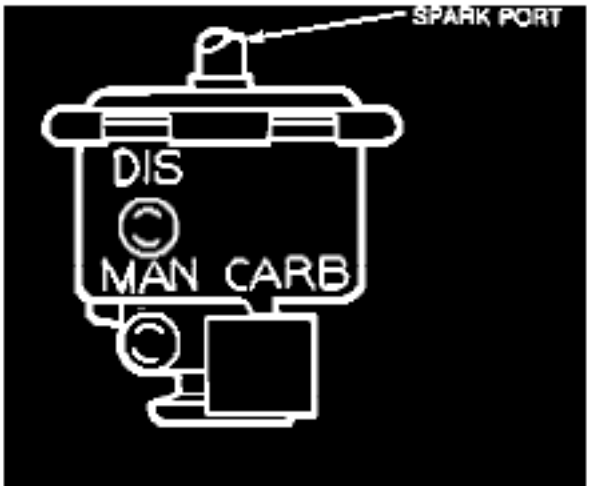
2. Disconnect vacuum lines, then remove snap ring that secures vacuum advance link to pickup assembly.

3. Remove vacuum advance attaching screws, then tilt unit downward to disconnect link.

4. Carefully remove unit from distributor.

5. Reverse procedure to install.





Distributor Vacuum Control: Description and Operation

3-Port Vacuum Regulator

Vacuum Regulator (3 & 4 Port)

Three port, Fig. 27, regulators and four port, Fig. 28, regulators are used to control the vacuum advance to the distributor. During engine idle conditions, the manifold vacuum signal is reduced to a constant output signal. Off idle, the output signal equals the spark port.

Distributor Vacuum Control: Testing and Inspection Distributor Modulator Valve Assembly

1. Turn ignition key to ``ON'' and check resistance at solenoid terminals.

2. If solenoid resistance is not 51---108 ohms, replace solenoid.

Distributor Vacuum Control: Testing and Inspection Vacuum Regulator

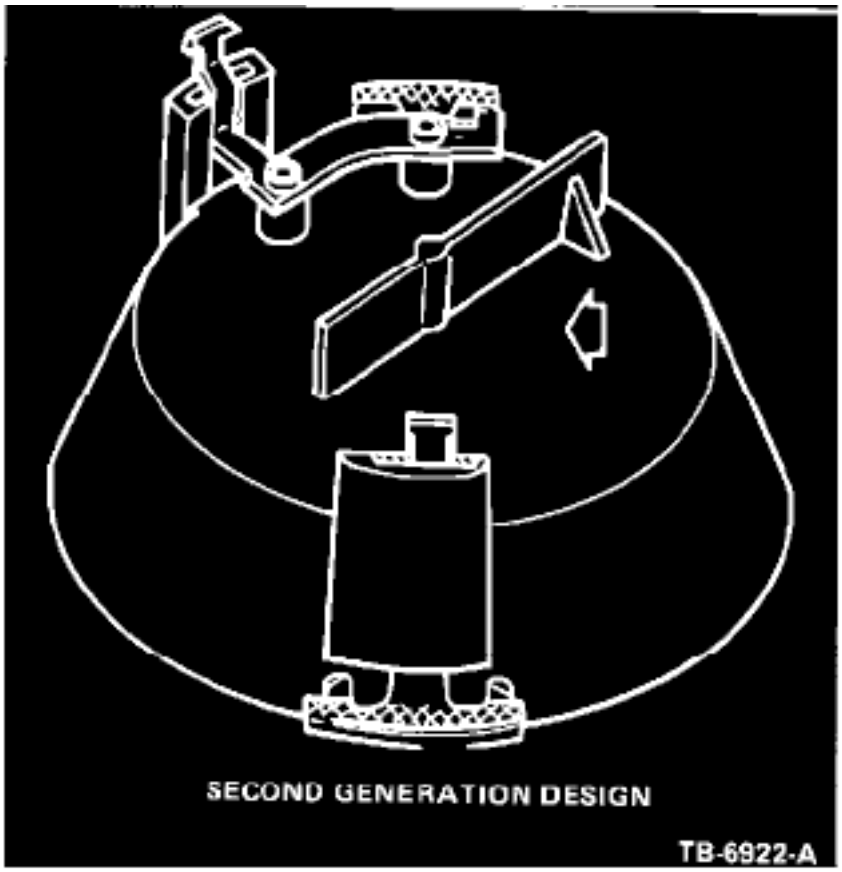
Procedure

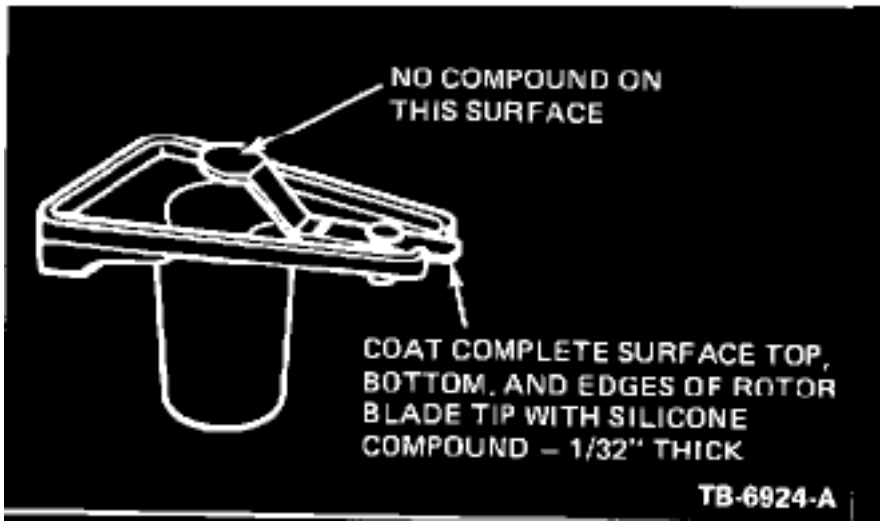
1. Disconnect vacuum line from distributor port and connect a vacuum gauge.

2. With engine at idle, the vacuum gauge reading should be within 1 inch Hg. vacuum of the calibration point. The calibration point of each valve can

be identified according to color code as follows: Black, 6 inches Hg.; green, 7 inches Hg.; red, 8 inches Hg.

3. Replace valve if not within specifications.





Ignition Rotor: Technical Service Bulletins Ignition Rotor - Alignment Procedure

Article No. 83-8-14

EEC III/DISTRIBUTOR - PROCEDURE FOR SETTING ROTOR ALIGNMENT 5.0L/5.8L EEC EQUIPPED LIGHT TRUCKS

LIGHT TRUCKS 1981/83 BRONCO, F-SERIES AND ECONOLINE

The following information and procedures are issued to clarify the proper setting of distributor rotor alignment on the subject vehicles. This reference publication supersedes all other printed material on subject.

FIGURE 12

FIGURE 13

For 1981 through 1983 model year vehicles, EEC distributors used on the EEC Systems had the "second generation" rotor (Figure 12). The 1983 model 5.0L EEC equipped Light Truck employs a conventional rotor (Figure 13). PROCEDURE FOR ROTOR ALIGNMENT:

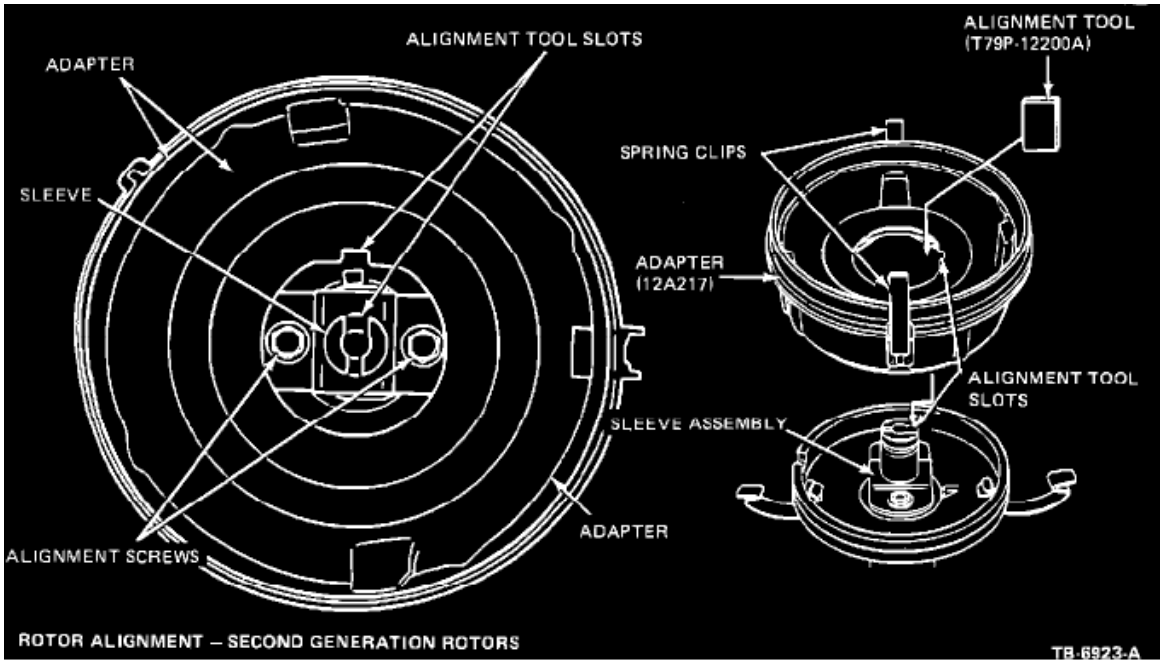
1. Remove the distributor cap and wires and position them to one side.

2. Remove the rotor.

3. To check rotor alignment:

a. Rotate the engine until the No. 1 piston is on the compression stroke. NOTE: Verification of being on the compression stroke is essential to correct rotor alignment. If the piston is on the exhaust stroke, the rotor can be misaligned by 180~.

b. Slowly rotate the engine until the alignment tool can be installed.


ALIGNMENT TOOL SLOTS
ALIGNMENT TOOL (T79P-12200A)
ADAPTER
SLEEVE
SPRING CLIPS
ADAPTER (12A217)
ALIGNMENT TOOL SLOTS
SLEEVE ASSEMBLY
ADAPTER
ALIGNMENT SCREWS
ROTOR ALIGNMENT – SECOND GENERATION ROTORS
TB-6923-A

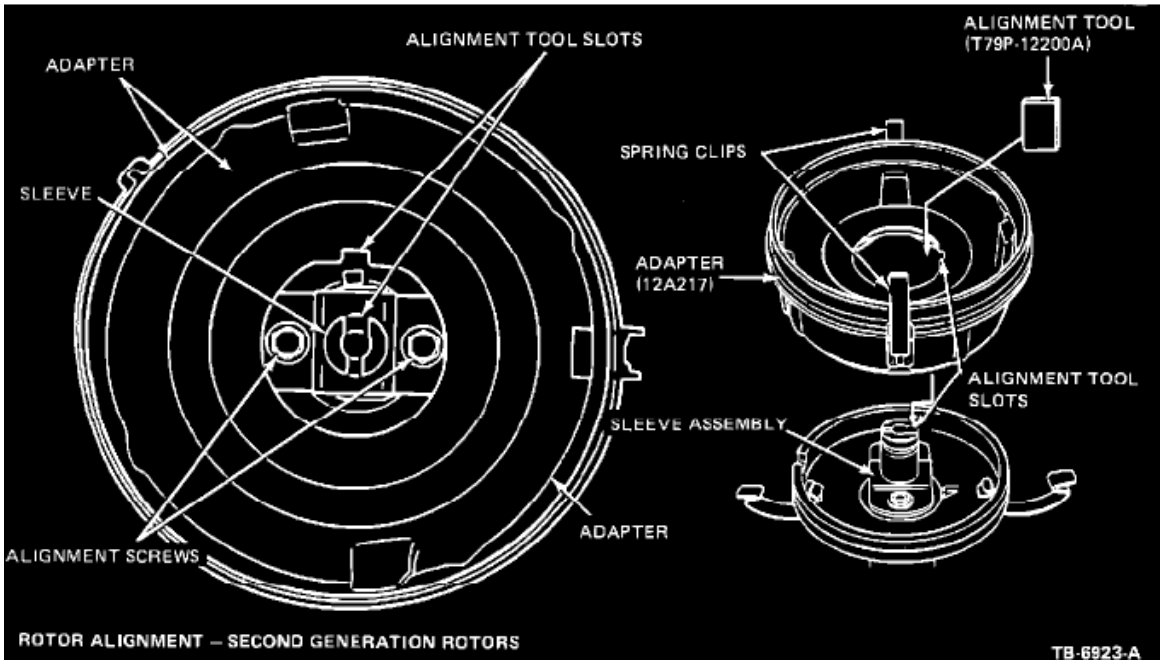

ALIGNMENT TOOL SLOTS
ALIGNMENT TOOL (T79P-12200A)
ADAPTER
SLEEVE
SPRING CLIPS
ADAPTER (12A217)
ALIGNMENT TOOL SLOTS
SLEEVE ASSEMBLY
ADAPTER
ALIGNMENT SCREWS
ROTOR ALIGNMENT – SECOND GENERATION ROTORS
TB-6923-A

FIGURE 14

c. The T79P-12200-A tool mounts between the slot on the sleeve and the slot (cut out) on the adapter (Figure 14).

d. Read the timing mark on the damper indicated by the timing pointer.

e. If the timing mark is specification, TDC +/- 4~, the rotor alignment is satisfactory. The alignment tool can be removed.

TO ADJUST ROTOR ALIGNMENT:

1. Remove the distributor cap by loosening the two spring clips holding the cap of the distributor adapter. Remove rotor.

2. Rotate engine until No. 1 piston is on the compression stroke. (See Step 3a above).

3. Slowly rotate the engine until the timing pointer is aligned with the specified timing mark. (TDC +/- 4~).

4. Loosen the two sleeve assembly adjustment screws and rotate the sleeve until the alignment tool T79P-

FIGURE 14

12200-A fits into the alignment slots on the sleeve and the adapter (Figure 14). 5.

Tighten the adjustment screw to 2.8-3.9 N-m (25-30 lb.in.). Remove alignment tool.

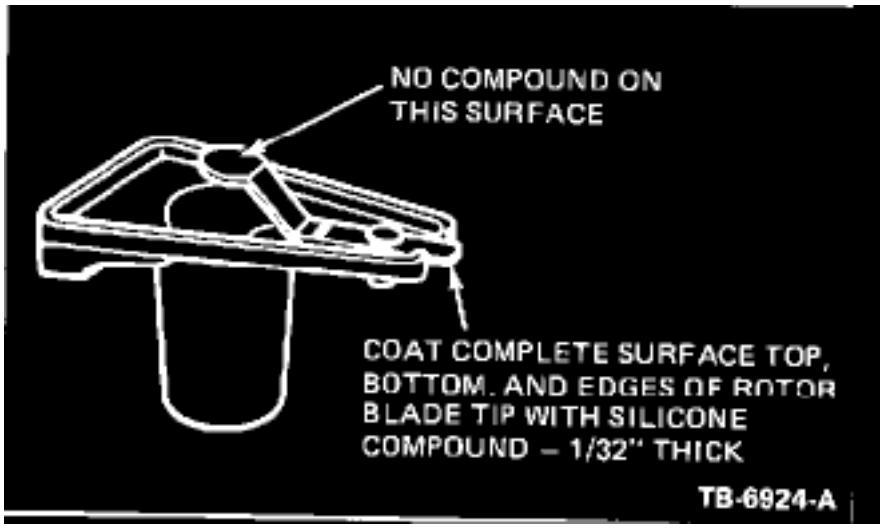


FIGURE 13

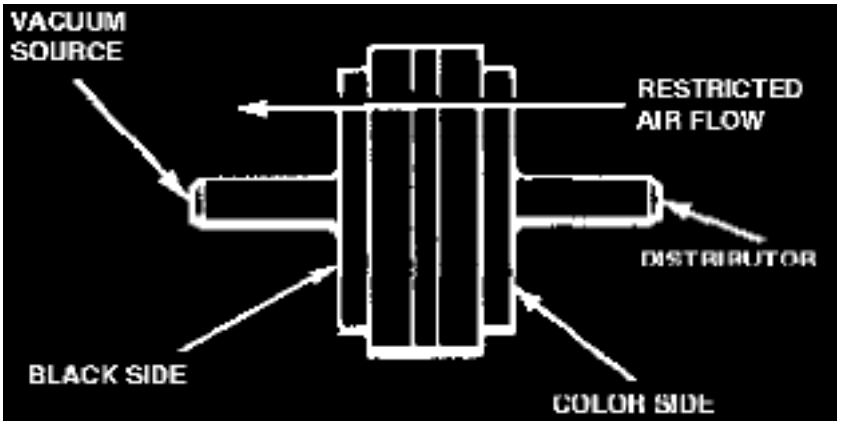
6. If the vehicle is a 1983 model equipped with a 5.0L engine, coat the rotor with silicone grease as shown in Figure 13.

7. Reinstall distributor cap and rotor making sure wires are firmly seated in the distributor cap terminal housings and on the spark plugs.

OTHER APPLICABLE ARTICLES: None WARRANTY STATUS: "INFORMATION ONLY"

Distributor Plate W/ Pick-up Sensor: Service and Repair

1. Remove distributor cap and rotor.
2. Remove vacuum advance unit and magnetic pickup assembly.
3. Remove attaching screws and lift base plate from distributor.
4. Reverse procedure to install.



Vacuum Spark Delay Valve: Description and Operation

Fig.25 - Spark Delay Valve

This unit is used in conjunction with some of the other Ford systems. Its purpose is to further reduce emissions by delaying the spark advance during rapid acceleration and by cutting off advance immediately upon deceleration. Fig. 25.

This plastic disc-shaped valve is installed in the carburetor vacuum line at the distributor advance diaphragm. It is a one way valve and will not operate if installed backwards. The black side of the valve must be toward the carburetor. This valve cannot be repaired.

NOTE: On all systems which employ the dual diaphragm distributor the line which has high vacuum at idle (normal operating temperature) is

connected to the secondary (retard) side of the distributor vacuum advance unit. This is the connection closest to the distributor cap.

Color	Number Value
White	5
Yellow	10
Blue	15
Green	20
Red	30

Year	Color	I.D. No.	Time in Seconds	
			Min.	Max.
1974–76	Black/Gray	1	1	4
	Black/Brown	2	2	5
	Black/White	5	4	12
	Black/Yellow	10	5.8	14
	Black/Blue	15	7	16
	Black/Green	20	9	20
	Black/Orange	30	13	24
	Black/Red	40	15	28
1977–82	Black/Gray	1	.6	1.6
	Black/Brown	2	1	3
	Black/White	5	2.7	9.3
	Black/Yellow	10	4.5	13.2
	Black/Blue	15	6.8	18.8
	Black/Green	20	8	26
	Black/Orange	30	11.6	38
	Black/Red	40	14	47.2
	White/Pink①	5	2.7	9.3
	White/Brown①	2	1	3
	White/Green①	20	8	26
	White/Yellow①	10	4.5	13.2
	White/Gray①	1	.6	1.6
	White/Blue①	20	8	26
	White/Red①	40	14	47.2

①—Retard Delay Valve Only

Vacuum Spark Delay Valve: Testing and Inspection

Fig.36 - SDV Valve Color Coding

Fig.37 - Spark Delay Valve (SDV) Specifications Chart

Refer to Figs. 36 & 37 for number value by color code.

NOTE: To perform the following procedure, an external vacuum source capable of maintaining a minimum constant 10 inches Hg. is required.

Mono Delay Valve

1. Set external vacuum source to 10 inches Hg. and connect black side of delay valve to vacuum source.

2. Connect a vacuum gauge with a 24 inch hose to colored side of delay valve.

3. Apply 10 inches Hg. vacuum and observe time in seconds for gauge to read 0-8 inches Hg. The minimum and maximum time for gauge to read 8

inches Hg. should be as shown in Fig. 37.

Dual Delay Valve

1. Set external vacuum source to 10 inches Hg. and connect vacuum gauge with a 24 inch hose to DIST nipple of delay valve.

2. Connect black side of delay valve and CARB nipple of delay valve to vacuum source.

NOTE: Avoid applying vacuum to CARB nipple while applying vacuum to black side of valve.

3. Apply 10 inches Hg. of vacuum and observe time in seconds for gauge to read from 0-8 inches Hg. The minimum and maximum time for gauge to

read 8 inches Hg. should be as shown in Fig. 37.

Retard Delay Valve

1. Set external vacuum source to 10 inches Hg. and connect colored side of delay valve to vacuum source.

2. Connect a vacuum gauge with a 24 inch hose to white side of delay valve.

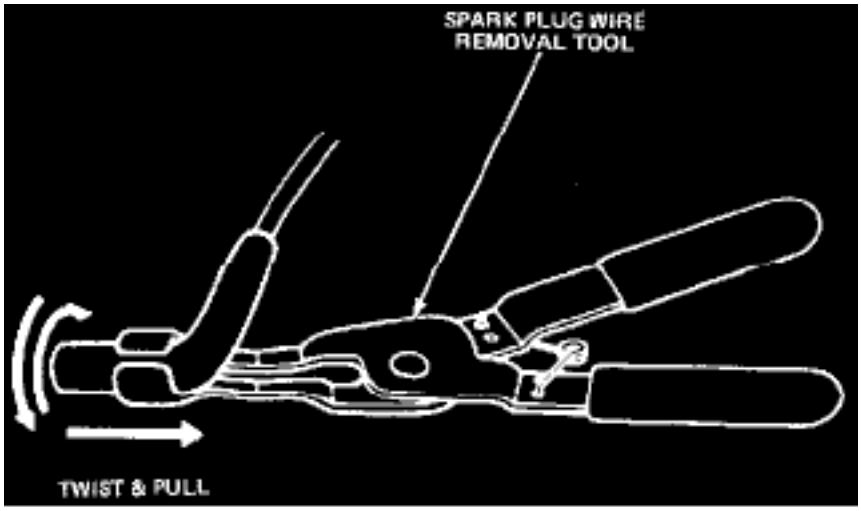
3. Apply 10 inches Hg. of vacuum and observe time in seconds for gauge to read from 0-8 inches Hg. The minimum and maximum time for gauge to

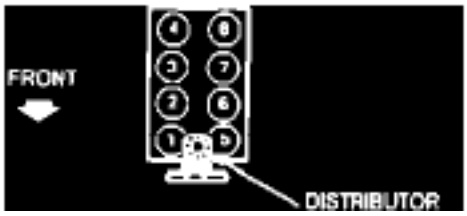
read 8 inches Hg. should be as shown in Fig. 37.

Spark Plug: Specifications

SPARK PLUGS

Gap ..... 0.044 in Torque ..... 14-20 Nm (10-15 ft-lbs)





Spark Plug: Service and Repair

REMOVAL

- Remove the wire from each spark plug by grasping the molded boot with tool T74P-6666-A or equivalent. Twist the boot until it loosens and then pull it off the spark plug. Do not pull on the wire, as the connection may become damaged.

- Any wire damaged must be replaced. Each original spark plug wire is numbered for the cylinder to which it is designated. If wires are not numbered, each wire should be numbered as to the plug from which it was removed.

- Clean the area around each spark plug port with compressed air.

- Using the proper size spark plug socket remove the spark plugs.

INSTALLATION

-

Check the gap on each new spark plug and set to specification. See: Specifications

Cylinder Numbering And Distributor Location

- Install each spark plug and tighten to 14-20 Nm (10-15 ft-lbs).

- Coat the inside of each spark plug boot with silicone dielectric compound. Connect each spark plug wire to the plug from which it was removed. Be sure each wire is fully depressed on each plug and molded boot is firmly in place.

Maximum PSI	Minimum PSI	Maximum PSI	Minimum PSI	Maximum PSI	Minimum PSI	Maximum PSI	Minimum PSI
134	101	164	123	194	145	224	168
136	102	166	124	196	147	226	169
138	104	168	126	198	148	228	171
140	105	170	127	200	150	230	172
142	107	172	129	202	151	232	174
144	108	174	131	204	153	234	175
146	110	176	132	206	154	236	177
148	111	178	133	208	156	238	178
150	113	180	135	210	157	240	180
152	114	182	136	212	158	242	181
154	115	184	138	214	160	244	183
156	117	186	140	216	162	246	184
158	118	188	141	218	163	248	186
160	120	190	142	220	165	250	187
162	121	192	144	222	166		

Compression Check: Testing and Inspection

COMPRESSION TEST

1. Ensure oil in crankcase is of the correct viscosity and at proper level and battery is properly charged. Operate vehicle until engine is at normal

operating temperature. Turn OFF ignition switch, then remove all spark plugs.

2. Set throttle plates (and choke plates, if equipped) in wide-open position. 3. Install a compression gauge such as Rotunda Compression Tester 059-00009 or equivalent in No. 1 cylinder. 4. Install an auxiliary starter switch in starting circuit. With ignition switch in the OFF position, and using auxiliary starter switch, crank engine at

least five compression strokes and record highest reading. Note the approximate number of compression strokes required to obtain the highest reading.

5. Repeat test on each cylinder cranking the engine approximately the same number of compression strokes.

TEST CONCLUSION

1. The indicated compression pressures are considered within specification if the lowest reading cylinder is within 75 percent of the highest. 2. If one or more cylinders read low, squirt approximately one tablespoon of heavy SAE 50 weight or equivalent engine oil on top of the pistons in

the low reading cylinders. Repeat compression pressure check on these cylinders. a. If compression improves considerably, piston rings are at fault. b. If compression does not improve, valves are sticking or seating poorly. c. If two adjacent cylinders indicate low compression pressures and squirting oil on pistons does not increase compression, cause may be a

cylinder head gasket leak between cylinders. Engine oil and/or coolant in cylinders could result from this problem.

Compression Pressure Limit Chart

NOTE: Refer to the compression pressure limit chart for pressure specifications.

Valve Clearance: Specifications

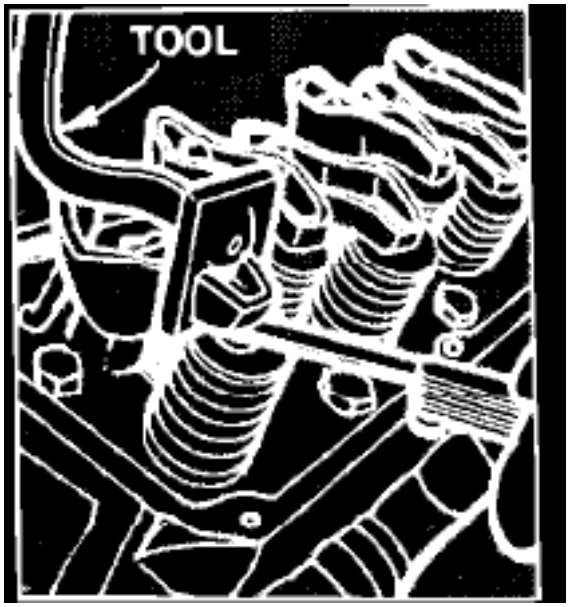
ENGINE YEAR CLEARANCE

V6-232 82-83 .088-.189 V8-255 81-82 .123-.173 6-300 80-87 .125-.175 V8-302 80-87 .096-.165 V8-351M 80-81 .125 V8-351W 80-87 .123-.173 V8-400 80-82 .175 V8-460 80-87 .100-.150

On engines with hydraulic lifters, clearance specified is at valve stem tip with lifter collapsed.

Valve Clearance: Locations

FRONT TO REAR 6-300 E-I-E-I-E-I-E-I-E-I-E-I V6-232 Right I-E-I-E-I-E V6-232 Left E-I-E-I-E-I V8-255, 302 Left Bank E-I-E-I-E-I-E-I V8-255, 302 Right Bank I-E-I-E-I-E-I-E V8-351, 400 Right Bank I-E-I-E-I-E-I-E V8-351, 400 Left Bank E-I-E-I-E-I-E-I V8-460 Left Bank E-I-E-I-E-I-E-I V8-460 Right Bank I-E-I-E-I-E-I-E



Valve Clearance: Adjustments

Fig. 21 Compressing valve lifter with tool to check clearance on engines with hydraulic valve lifters

V8 ENGINES To provide a means to compensate for dimensional changes in the valve train and provide for valve adjustment, .060 inch shorter or longer pushrods are available. If the valve clearance is less than the minimum, the .060 inch shorter pushrod should be used. If the clearance is more than the maximum, the longer pushrod should be used. To check the valve clearance, proceed as follows:

1. Mark crankshaft pulley at three locations, with No. 1 location at TDC timing mark (end of compression stroke), location No. 2 one full turn (360°) clockwise from TDC and No. 3 location one quarter turn clockwise (90°) from position No. 2.

2. Turn crankshaft to number 1 location, then compress valve lifter using tool T71P-6513-A or equivalent, Fig. 21, and check the clearance on the following valves:

V8-255, 302, 460 No. 1 Intake No. 1 Exhaust No. 7 Intake No. 5 Exhaust No. 8 Intake No. 4 Exhaust V8-351 & 400 No. 1 Intake No. 1 Exhaust No. 4 Intake No. 3 Exhaust No. 8 Intake No. 7 Exhaust

3. Turn crankshaft to number 2 location, then compress valve lifter using tool T71P-6513-A or equivalent, Fig. 21, and check the clearance on the following valves:

V8-255, 302, 460 No. 5 Intake No. 2 Exhaust No. 4 Intake No. 6 Exhaust V8-351 & 400 No. 3 Intake No. 2 Exhaust No. 7 Intake No. 6 Exhaust

4. Turn crankshaft to number 3 location, then compress valve lifter using tool T71P-6513-A or equivalent, Fig. 21, and check the clearance on the following valves:

V8-255, 302, 460 No. 2 Intake No. 7 Exhaust No. 3 Intake No. 3 Exhaust No. 6 Intake No. 8 Exhaust V8-351 & 400 No. 2 Intake No. 4 Exhaust No. 5 Intake No. 5 Exhaust No. 6 Intake No. 8 Exhaust

Water Pump: Service and Repair

]All water pumps have a sealed bearing integral with the water pump shaft. The bearing requires no lubrication. A bleed hole in the pump housing allows water that may leak past the seal to be thrown out by the slinger. This is not a lubrication hole. If the pump is damaged and requires repair, replace it with a new pump or a rebuilt one.

F-100-350 & Bronco

1. Drain cooling system.

2. Remove fan shroud attaching bolts and position shroud over fan.

3. Disconnect lower radiator hose, heater hose and bypass hose from water pump.

4. Remove drive belts, fan, spacer, water pump pulley and fan shroud.

5. Loosen alternator pivot bolt and alternator adjusting arm-to-water pump attaching bolt.

6. Remove water pump attaching bolts and the water pump.

7. Reverse procedure to install.

V8-351M & 400

1. Disconnect battery ground cable, then drain cooling system.

2. Remove fan shroud attaching bolts and slide shroud rearward.

3. Remove fan and fan spacer.

4. On models equipped with A/C, remove A/C compressor drive belt, lower idler pulley and compressor mount-to-water pump bracket.

5. On all models, remove alternator drive belt and power steering pump drive belt (if equipped).

6. Remove water pump pulley, then the alternator bracket from water pump.

7. On models equipped with power steering, unfasten steering pump bracket from water pump and position aside.

8. On all models, disconnect lower radiator hose and heater hose from water pump.

9. Remove water pump attaching bolts and the water pump.

10. Reverse procedure to install.

Coolant: Technical Service Bulletins Recycled Engine Coolant - Service Tips

Article No. 95-18-2

09/11/95

^ COOLANT - USE OF RECYCLED ENGINE, COOLANT - SERVICE TIP

^ COOLING SYSTEM - USE OF RECYCLED ENGINE, COOLANT - SERVICE TIP

FORD: 1980 and after CROWN VICTORIA, MUSTANG, THUNDERBIRD 1981 and after ESCORT 1982-88 EXP 1984-94 TEMPO 1986 and after TAURUS 1988-93 FESTIVA 1989 and after PROBE 1994 and after ASPIRE 1995 and after CONTOUR

LINCOLN-MERCURY: 1980 and after CONTINENTAL, COUGAR, GRAND MARQUIS, TOWN CAR 1981-86 CAPRI 1981-87 LYNX 1984-92 MARK VII 1984-94 TOPAZ 1986 and after SABLE 1987-89 TRACER 1991-94 CAPRI 1991 and after TRACER 1993 and after MARK VIII 1995 and after MYSTIQUE

MERKUR: 1985-89 XR4TI 1988-89 SCORPIO

LIGHT TRUCK: 1980 and after F-150-350 SERIES 1981 and after ECONOLINE 1982 and after BRONCO 1983 and after RANGER 1984-90 BRONCO II 1986 and after AEROSTAR 1988 and after F SUPER DUTY 1991 and after EXPLORER 1993 and after VILLAGER 1995 and after WINDSTAR

This TSB is being republished in its entirety to include warranty information when using recycled coolant

ISSUE: Ford Motor Company authorizes the use of recycled engine coolant that, when properly processed and reinhibited, meets Ford specification ESE-M97B44-A. At this time, the Rotunda Coolant Recycler (181-00003) process is the only approved coolant recycling method available through Ford that is capable of producing recycled engine coolant that meets Ford specification ESE-M97B44-A.

ACTION: Refer to the following Service Procedure for coolant processing and reinhibiting using Rotunda Coolant Recycler (181-00003).

NOTE:

WHILE TESTING SHOWS THAT RECYCLED ENGINE COOLANT CAN PROVIDE ACCEPTABLE PERFORMANCE, THE COOLANT PRODUCED FROM ROTUNDA EQUIPMENT IS INTENDED FOR USE WITHIN DEALERSHIPS ON WARRANTY AND CUSTOMER PAY REPAIRS ONLY AND NOT INTENDED FOR RETAIL SALE. THERE ARE REGULATORY, PACKAGING AND LABELING CONCERNS

ASSOCIATED WITH THE RETAIL SALE OF CHEMICAL PRODUCTS.

CAUTION:

THE REINHIBITOR CHEMICALS PROVIDED WITH THIS EQUIPMENT ARE NOT APPROPRIATE FOR USE ON MEDIUM/HEAVY TRUCK APPLICATIONS.

WARNING:

ROTUNDA PREMIUM COOLANT REINHIBITORS # 1 AND # 2 HAVE BEEN SPECIFICALLY FORMULATED TO WORK WITH ROTUNDA COOLANT RECYCLER (181-00003).

USE OF ANY OTHER CHEMICAL ADDITIVES WITH THIS SYSTEM WILL VOID ALL WARRANTIES FOR THE EQUIPMENT AND FOR THE FINAL COOLANT PRODUCT.

SERVICE PROCEDURE

DIRECTIONS FOR PROCESSING USED ENGINE COOLANT WITH ROTUNDA COOLANT RECYCLER

1. Close the drain valve on the unit.

2. Open the fill valve.

3. Pour used engine coolant into the funnel on the side of the unit.

NOTE:

MAXIMUM CAPACITY 15 25 GALLONS (95 L).

4. Insert the outlet hoses of the recycler into clean, properly labeled containers. One (1) container is for the outlet process water and the other container is for distilled ethylene glycol.

5. Push the "ON" switch on the front to start the operation. The unit will process 1 gallon (3.8 L) per hour of operation and will automatically shut off when cycle is complete.

6. Add reinhibitor following the directions in this article.

7. Open the drain valve to drain the residue from the distillation vessel. Dispose of residue in accordance with all local. state and federal regulations.

ADDING REINHIBITOR CHEMICALS

1. Process the coolant according to the directions listed in this article

2. Thoroughly mix 4 fl oz (118 ml) of Reinhibitor # 1 to each gallon of distilled ethylene glycol.

3. Thoroughly mix 4 fl oz (118 ml) of Reinhibitor # 2 to each gallon of distilled ethylene glycol.

4. Mix well.

5. Check the pH level of the coolant. The pH level must be between 9 and 11.

6. Add enough water to the concentrated coolant to produce a 50/50 mixture of coolant and water.

NOTE:

THE CONCENTRATED COOLANT MUST BE MIXED WITH WATER TO MEET THE NECESSARY ENGINE FREEZE PROTECTION.

7. Check the coolant freeze point of the 50% coolant solution. Freeze point should be -34°F (-37°C).

Consult the Rotunda Coolant Recycler Manual for more detailed operating instructions. Call 1-800-ROTUNDA, 8 AM to 8 PM EST, for inquiries regarding the Rotunda Coolant Recycler and to order the Reinhibitor (187-R0001).

PART NUMBER PART NAME

Rotunda # 187-R0001 Rotunda Premium Coolant Reinhibitor

WARRANTY CLAIMS: Dealer can claim recycled engine coolant by Ford approved process via a warranty repair on an 1863 claim as follows:

Part Number: RECCOOL (not a valid part number, but it is recognized on an 1863 claim).

Quantity: Indicate the number of QUARTS of recycled coolant used.

OTHER APPLICABLE ARTICLES: NONE SUPERSEDES: 95-16-6 WARRANTY STATUS: INFORMATION ONLY OASIS CODES: 402000

Coolant: Capacity Specifications

Less A/C System Capacity Note: Exc. models with super cooling, 15 qts.; models with super cooling, 16 qts.

With A/C System Capacity 16 qt (US)

Coolant: Fluid Type Specifications

COOLING SYSTEM FLUID, PREMIUM

Ford Part No.

U.S.A (Except Oregon)
.....
E2FZ-19549-AA or -B Canada .....
..... CXC-8-B Oregon .....
.....
F5FZ-19549-CC

Ford Specification .....
..... ESE-M97B44-A

COOLING SYSTEM FLUSH

Ford Part No. .....
..... F1AZ-19A503-A Ford Specification .....
..... ESR-M14P7-A

Coolant Mixture with Water .....
..... 50%

Warning: Do not mix coolant types. Check the owners manual or refer to your local dealer for the correct coolant type.

Radiator Cooling Fan Temperature Sensor / Switch: Specifications Switch Torque

Switch Torque

Cooling Fan Switch 8-18 ft.lb

Fan Blade: Testing and Inspection Inspection

WARNING: Do not operate engine until fan has first been inspected for cracks and/or separations. If a fan blade is found to be bent or damaged in any way, do not attempt to repair or reuse damaged part. Proper balance is essential in fan assembly operation. Balance cannot be assured once a fan assembly has been found to be bent or damaged and failure may occur during operation, creating an extremely dangerous condition. Always replace damaged fan assembly.

Place fan on flat surface with leading edge facing down. If there is a clearance between fan blade touching surface and opposite blade of more than .090 inch (2 mm), replace fan.

Fan Blade: Testing and Inspection Looseness

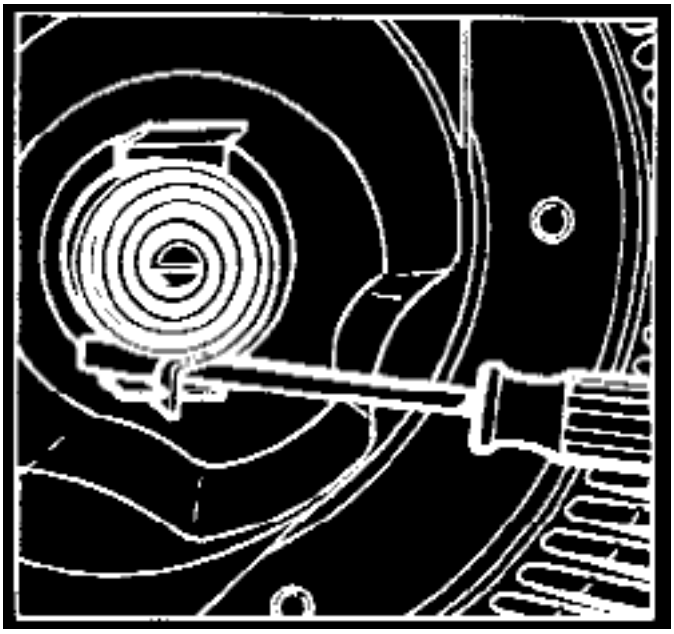
Lateral movement can be observed at the fan blade tip under various temperature conditions because of the type bearing used. This movement should not exceed 1/4 inch (6.5 mm) as measured at the fan tip. If this lateral movement does not exceed specifications, there is no cause for replacement.

Fan Clutch: Testing and Inspection Fan Clutch Fluid Leak

Small fluid leaks do not generally affect the operation of the unit. These leaks generally occur around the area of the bearing assembly, but if the leaks appear to be excessive, engine overheating may occur. Check for clutch and fan free-wheeling by attempting to rotate fan and clutch assembly by hand five times. If no drag is felt, replace clutch.

Fan Clutch: Testing and Inspection Fan Clutch Noise

Fan clutch noise can sometimes be noticed when clutch is engaged for maximum cooling. Clutch noise is also noticeable within the first few minutes after starting engine while clutch is redistributing the silicone fluid back to its normal, disengaged operating condition after settling for long periods of time (over night). However, continuous fan noise or an excessive roar indicates the clutch assembly is locked-up due to internal failure. This condition can be checked by attempting to manually rotate fan. If fan cannot be rotated manually or there is a rough, abrasive feel as fan is rotated, the clutch should be replaced.



Fan Clutch: Testing and Inspection Fan Clutch Operational Test

Do not operate the engine until the fan has been first checked for possible cracks and separations. Run engine at a fast idle speed (1000 RPM) until normal operating temperature is reached. This process can be done more quickly by blocking off the front of the radiator with cardboard. Regardless of temperatures, unit must be operated for at least five minutes immediately before being tested. Stop engine and using a glove or a cloth to protect the hand, immediately check the effort required to turn the fan. If considerable effort is required, it can be assumed that coupling is operating satisfactorily. If very little effort is required to turn the fan, it is an indication that the coupling is not operating properly and should be replaced.

Bi-Metallic Coiled Spring Removal

The clutch fan may be tested while vehicle is being driven. To check, disconnect the bimetal spring, Fig. 2, and rotate 90° counterclockwise. This disables the temperature-controlled, free-wheeling feature and the clutch performs like a conventional fan. If this cures the overheating condition, replace the clutch fan.

Engine	Year	Sensor	Resistance Ohms @ deg. F/C
All w/EEC IV	1983-90	Coolant, Air Charge	31,700-42,900 @ 68/20 13,650-18,650 @ 104/40 6500-8900 @ 140/60 3240-4440 @ 176/80 1770-2370 @ 212/100 980-1380 @ 248/115
All w/EEC III	1981-83	Coolant, Air Charge	1100-6000 1700-60,000

TEMPERATURE SENSORS

Coolant Temperature Sensor/Switch (For Computer): Description and Operation

This sensor incorporates a thermistor in a brass housing with an integral wiring connector extending from the body. This sensor is installed in the heater outlet fitting of the intake manifold. The thermistor is a resistor whose resistance value is high at low temperatures and decreases as the temperature rises. The computer applies a voltage to the sensor and monitors the resultant voltage drop across the thermistor.

Radiator Cooling Fan Temperature Sensor / Switch: Specifications Switch Torque

Switch Torque

Cooling Fan Switch 8-18 ft.lb

Temperature Sensor (Gauge): Technical Service Bulletins Temperature Gauge - Reads Low/Erratic

Article No. 95-13-2

07/03/95

^ GAUGE - TEMPERATURE-READS IN LOW RANGE - ERRATIC READINGS

^ SERVICE PARTS - RETURN OF OBSOLETE TEMPERATURE SENDERS

FORD: 1981-94 ESCORT 1981-95 MUSTANG, THUNDERBIRD 1983-95 CROWN VICTORIA 1984-94 TEMPO 1986-95 TAURUS

LINCOLN-MERCURY: 1981-92 TOWN CAR 1981-95 COUGAR 1983-95 GRAND MARQUIS 1984-92 MARK VII 1984-94 TOPAZ 1986-95 SABLE 1987-89 TRACER 1991-94 TRACER 1993-95 MARK VIII

LIGHT TRUCK: 1982-95 BRONCO 1983-95 RANGER 1986-94 AEROSTAR 1990-95 F-150-350 SERIES 1991-95 EXPLORER 1992-95 ECONOLINE 1995 WINDSTAR

ISSUE: Temperature Sender F1SZ-10884-A with a build date code prior to 2774 (277th day of 1994) should be purged from your inventory and returned to your facing PDC. These parts are being made obsolete because of an incorrect crimp during assembly. Installing these parts on a vehicle could result in early loss of temperature sender function.

ACTION: Remove and return the suspect parts from your dealership's inventory. The obsolete parts should be withdrawn from your inventory and returned to your facing PDC within 30 days of this TSB.

NOTE:

USE TSB ARTICLE 93-24-8 FOR DIAGNOSIS PROCEDURE IN DETERMINING IF LOW GAUGE READINGS COULD BE ASSOCIATED WITH A TEMPERATURE SENDER CONCERN.

1. Perform 100% sort of all stock on hand.

2. Suspect stock has a build date code prior to 2774. Usable stock will have a build date code of 2774 or later.

NOTE:

DATE CODES ARE LOCATED ON THE SIDE OF THE SENDER HEX.

3. Usable stock can be returned to your inventory and released for normal sales.

4. Return suspect part (F1SZ-10884-A) to your facing PDC using the least expensive transportation.

5. If claim is processed electronically via DOES II, use return code "GB"; otherwise, complete a separate paper claim form FPS-340 using return code "J".

6. In the Remarks Section, write "Returned per TSB 95-13-2".

LIMITS

^ The returns must be received within 30 days from the date of this TSB.

^ Returns are restricted to the subject parts.

^ The parts returned must have been purchased from FCSD in accordance with Policy and Procedure Bulletin 4000.

CREDIT

Credit for parts and prepaid freight costs will be issued.

Replacement stock is available for ordering

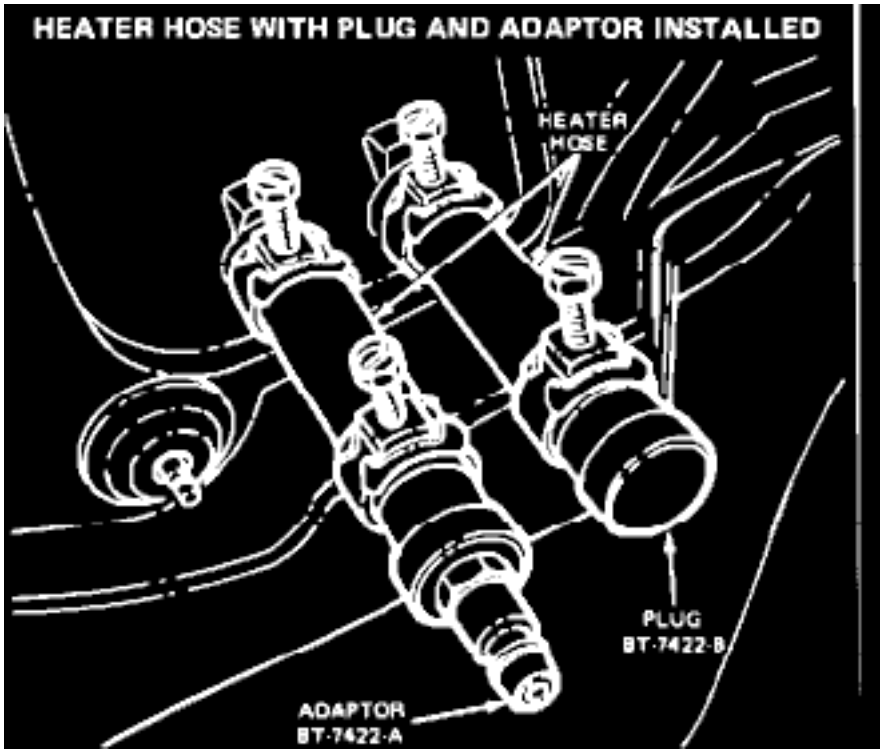
PART NUMBER PART NAME

F1SZ-10884-A Temperature Sender

OTHER APPLICABLE ARTICLES: 93-24-8

WARRANTY STATUS: INFORMATION ONLY

OASIS CODES: 203000, 203200, 204000, 204200, 402000



Heater Core: Technical Service Bulletins Heater Core - Leakage Diagnostic Tips

Article No. 85-8-2

HEATER CORE - LEAK - DIAGNOSTIC TIPS

FORD ALL

LINCOLN-MERCURY ALL

LIGHT TRUCK ALL

Good heater cores are being returned through the parts return system coded as leaking. Complaints of leaking may be caused by an inadequate seal between the heater hose and the heater core tubes allowing coolant to follow the tube to the heater core, leak into the passenger compartment and appear as a leaking heater core.

When diagnosing a suspect heater core leak, inspect the hose to heater core tube attachment to assure the connection is not leaking. If a leaking connection is found, correct the leak. If the connection appears not to be leaking, leak test the heater core before removing it from the vehicle using the following procedure:

HEATER CORE LEAK TEST

Pressure Test 1.

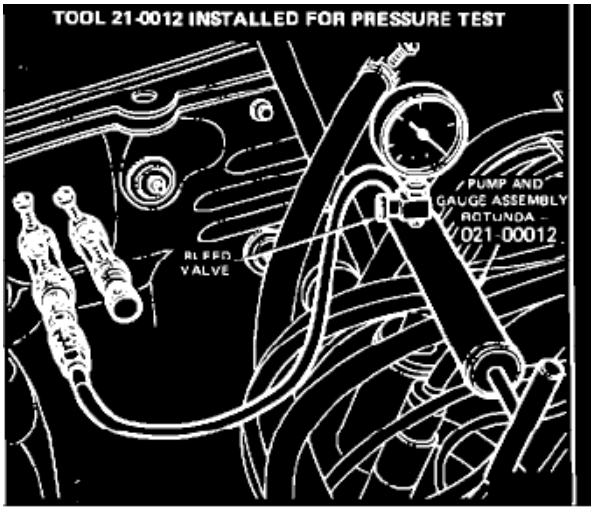
Drain the coolant from the cooling system.

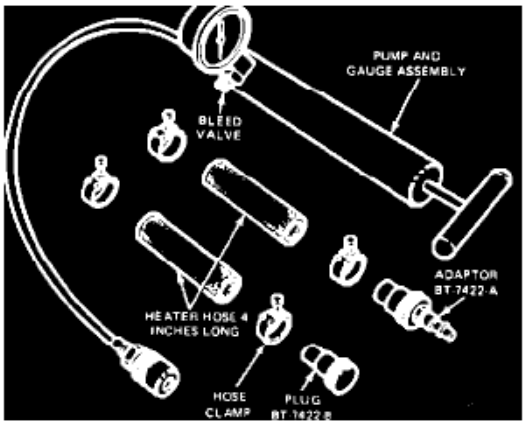
2. Disconnect the heater hoses from the heater core tubes.

3. Install a short piece of heater hose (approximately 4 inches long) on each heater core tube.

Figure 1

4. Fill the heater core and hoses with water and install plug BT-7422-B and adapter BT-7422-A from Rotunda model 021-00012 or equivalent in the hose ends (Figure 1). Secure the hoses, plug and adapter with hose clamps.


TOOL 21-0012 INSTALLED FOR PRESSURE TEST
PUMP AND GAUGE ASSEMBLY ROTUNDA 021-00012
BLEED VALVE


PUMP AND GAUGE ASSEMBLY
BLEED VALVE
ADAPTOR BT-7422-A
HEATER HOSE 4 INCHES LONG
HOSE CLAMP
PLUG BT-7422-B

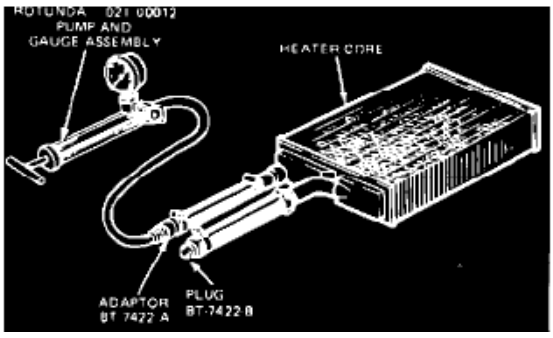

ROTUNDA 021-00012 PUMP AND GAUGE ASSEMBLY
HEATER CORE
ADAPTOR BT-7422-A
PLUG BT-7422-B

Figure 2

Figure 3 - TOOL 021-00012 WITH HEATER HOSE AND CLAMPS

5. Attach the pump and gauge assembly Rotunda model 021-00012 or equivalent to the adapter (Figure 2). Close the bleed valve at the base of the gauge and pump 30 psi of air pressure into the heater core (Figure 3).

6. Observe the pressure gauge for a minimum of three minutes. The pressure should not drop.

7. If the pressure does not drop, no leaks are indicated.

8. If the pressure drops, check the hose connections to the core tubes for leaks. If the hoses do not leak, remove the heater core from the vehicle and perform the bench test.

Bench Test 1.

Drain all coolant from the heater core.

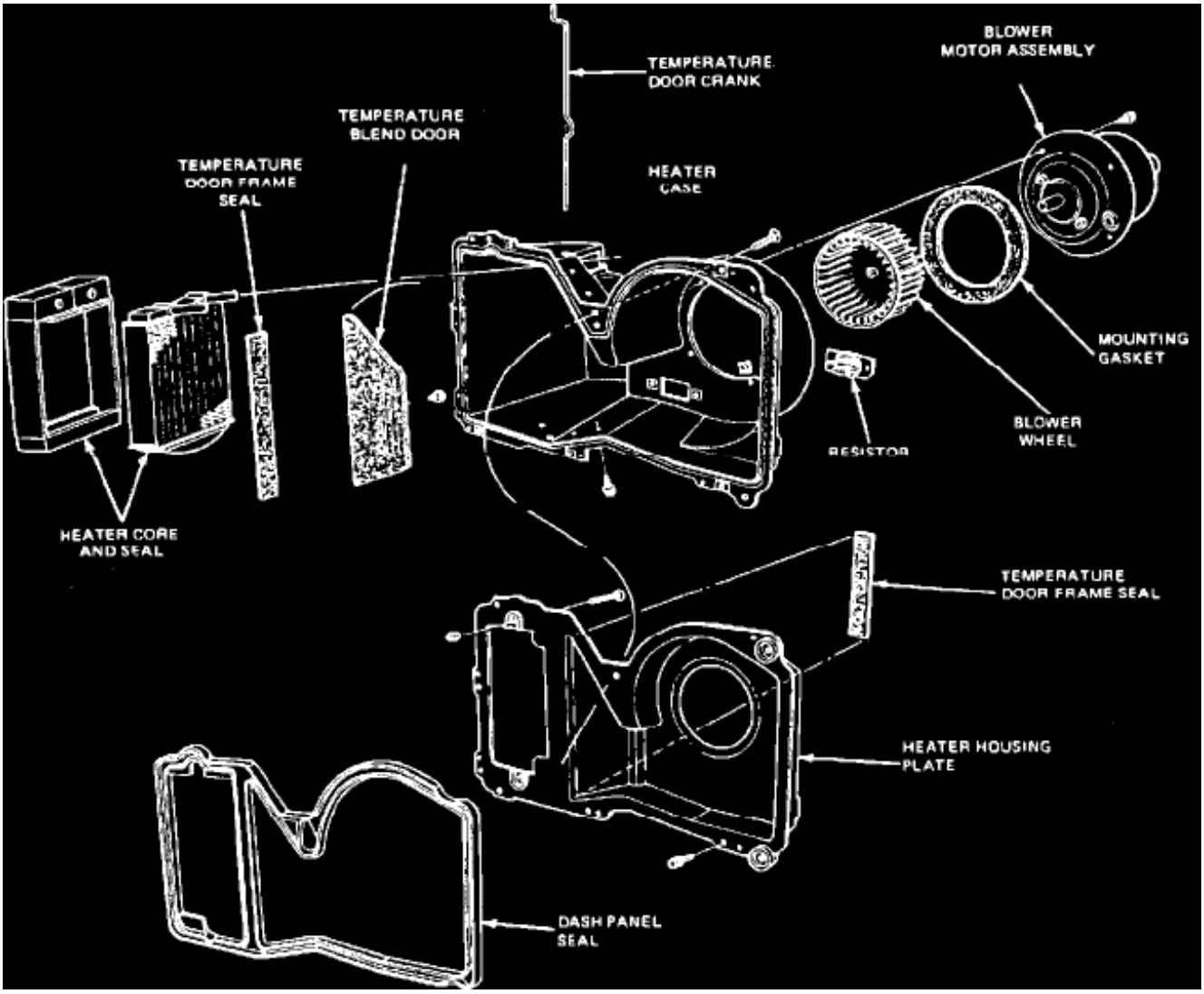
Figure 4 - HEATER CORE BENCH TEST

2. Connect the 4-inch test hoses with plug and adapter to the core tubes. Then connect the air pump and gauge assembly to the adapter (Figure 4).

3. Apply 30 psi of air pressure to the heater core with Rotunda model 021-00012 or equivalent, and submerge the core in water.

4. If a leak is observed, service or replace the heater core as necessary.

OTHER APPLICABLE ARTICLES: NONE WARRANTY STATUS: "INFORMATION ONLY"



Heater Core: Service and Repair

Fig. 13 Heater core replacement. F-100---350 & Bronco less air conditioning

F-100---350 & BRONCO Less Air Conditioning

1. Disconnect battery ground cable.

2. Disconnect cable from temperature blend door and the mounting bracket from top of heater assembly.

3. Disconnect blower motor and resistor electrical connectors.

4. Disconnect and plug hoses from heater core.

5. Working under instrument panel, remove 2 nuts on 1980---81 models, or 3 nuts on 1982---87 models, attaching left side of heater assembly and right side of plenum to dash.

6. On 1980---81 models, remove screw attaching top center of heater assembly to dash.

7. On all models, remove 2 screws attaching right side of heater assembly to dash, then lift heater assembly out of vehicle.

8. Remove heater housing plate attaching screws, nut and bolt and the plate.

9. On 1980---82 models, remove 3 heater core frame attaching screws and the frame.

10. On all models, slide heater core and seal out of heater assembly, Fig. 13.

11. Reverse procedure to install.

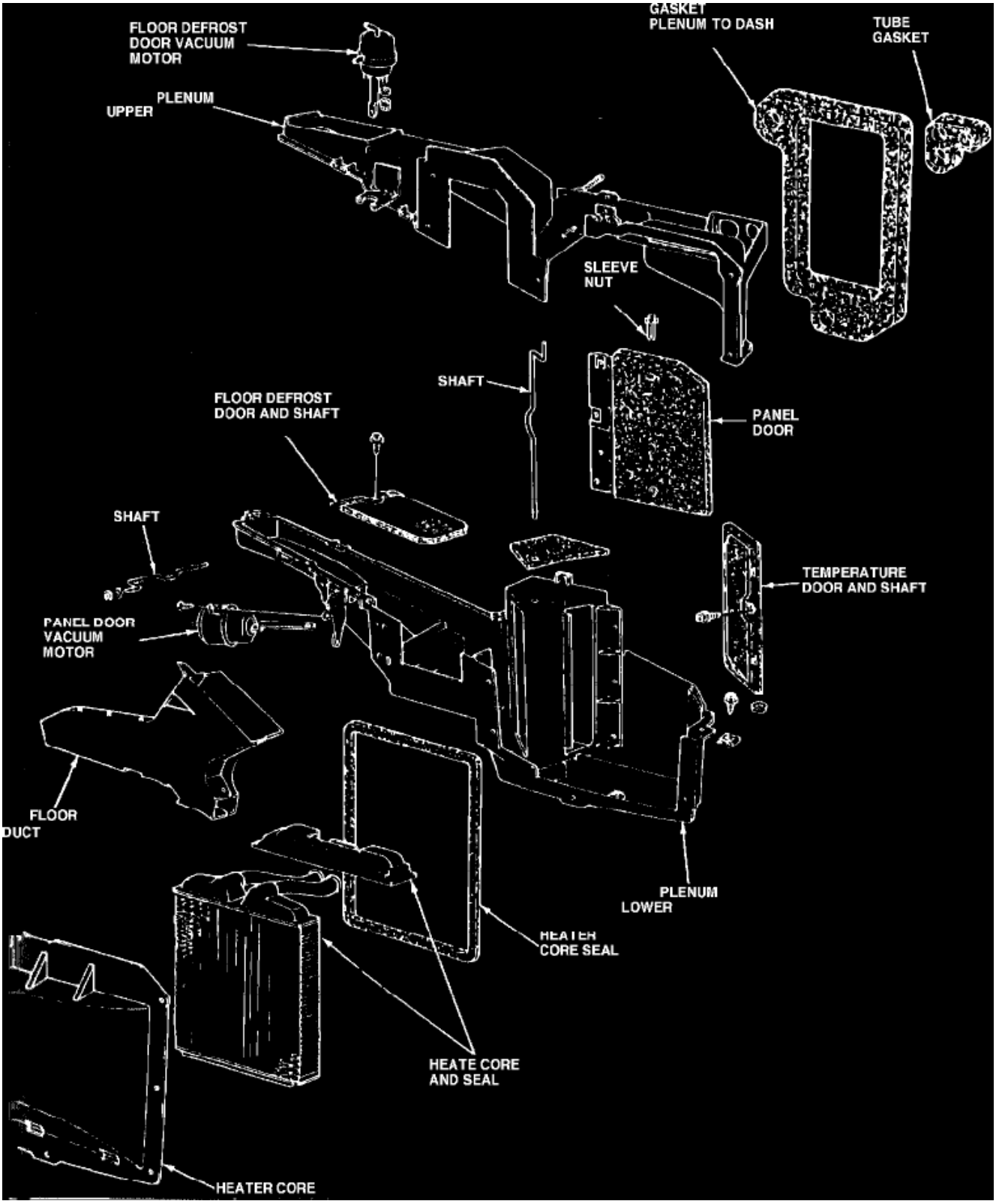


Fig. 14 Heater core replacement. F-100---350 & Bronco w/air conditioning

W/Air Conditioning

1. Disconnect battery ground cable.
2. Disconnect and plug hoses from heater core.
3. Remove glove compartment liner.
4. Remove 8 heater core cover attaching screws and the cover.
5. Remove heater core from plenum, Fig. 14.
6. Reverse procedure to install.

Temperature Gauge: Testing and Inspection Dash Gauge Test

Gauge failures are often caused by defective wiring or grounds. The first step in locating trouble should be a thorough inspection of all wiring, terminals and printed circuits. If wiring is secured by clamps, check to see whether the insulation has been severed, thereby grounding the wire. In the case of a fuel gauge installation, rust may cause failure by corrosion at the ground connection of the tank unit. The Constant Voltage Regulator (CVR) type indicator is a bimetal-resistance type system consisting of an Instrument Voltage Regulator (IVR), an indicator gauge, and a variable resistance sending unit. Current to the system is applied to the gauge terminals by the IVR, which maintains an average-pulsating value of 5 volts. The indicator gauge consists of a pointer which is attached to a wire-wound bimetal strip. Current passing through the coil heats the bimetal strip, causing the pointer to move. As more current passes through the coil, heat increases, moving the pointer farther. The circuit is completed through a sending unit which contains a variable resistor. When resistance is high, less current is allowed to pass through the gauge, and the pointer moves very little. As resistance decreases due to changing conditions in system being monitored, more current passes through gauge coil, causing pointer to move farther. Do not apply battery voltage to system or ground output terminals of IVR, as damage to system components or wiring circuits may result.

DASH GAUGE TEST

1. Disconnect battery ground cable and remove gauge from vehicle.

2. Connect ohmmeter between gauge terminals and read coil winding resistance.

3. An upward movement of ohmmeter needle from 10 ohms to 14 ohms is normal, as test current of ohmmeter causes a temperature rise in gauge coil windings.

4. If ohmmeter reads below 10 ohms or above 14 ohms, gauge is defective.

Temperature Gauge: Testing and Inspection Electrical Temperature Gauges

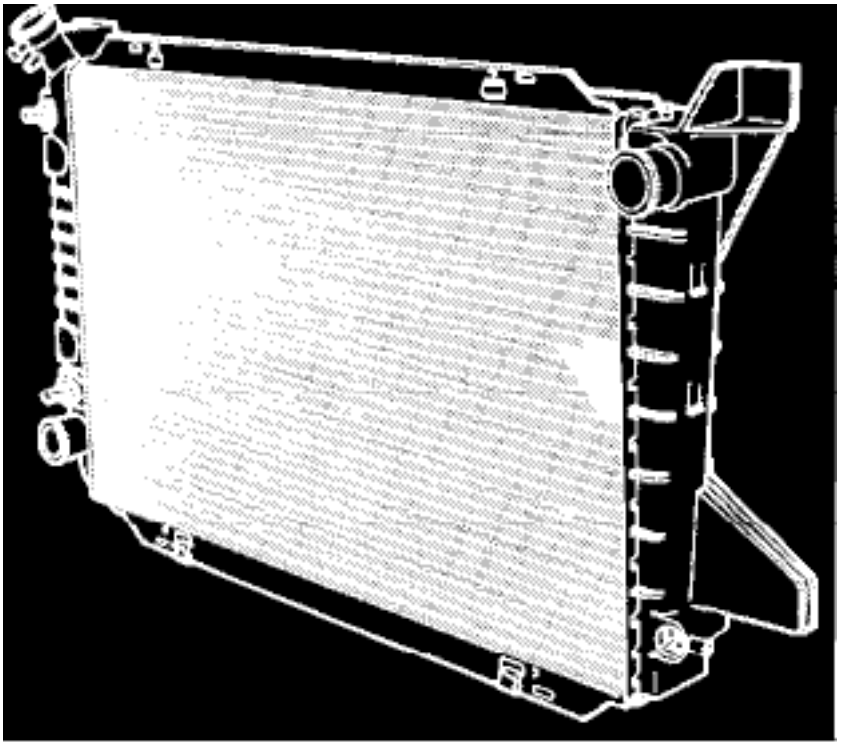
This temperature indicating system consists of a sending unit, located on the cylinder head, electrical temperature gauge and an instrument voltage regulator. As engine temperature increases or decreases, the resistance of the sending unit changes, in turn controlling current flow to the gauge. When engine temperature is low, the resistance of the sending unit is high, restricting current flow to the gauge, in turn indicating low engine temperature. As engine temperature increases, the resistance of the ending unit decreases, permitting an increased current flow to the gauge, resulting in an increased temperature reading.

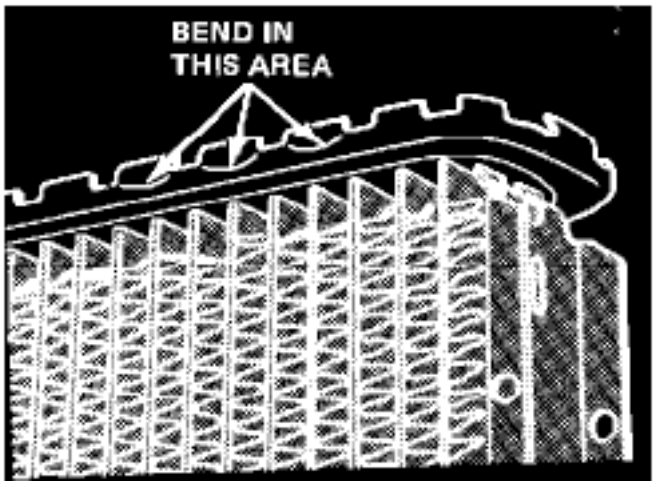
TROUBLESHOOTING A special tester is required to diagnose this type gauge. Follow instructions included with the tester.

Temperature Warning Lamp/Indicator: Testing and Inspection

A bimetal temperature switch located in the cylinder head control the operation of a temperature indicator light with a red lens. If the engine cooling system is not functioning properly and coolant temperature exceeds a predetermined value, the warning light will illuminate.

TROUBLESHOOTING If the red light is not lit when the engine is being cranked, check for a burned out bulb, an open in the light circuit, or a defective ignition switch. If the red light is lit when the engine is running, check the wiring between light and switch for a ground, defective temperature switch, or overheated cooling system. As a test circuit to check whether the red bulb is functioning properly, a wire which is connected to the ground terminal of the ignition switch is tapped into its circuit. When the ignition is in the ``Start'' (engine cranking) position, the ground terminal is grounded inside the switch and the red bulb will be lit. When the engine is started and the ignition switch is in the ``On'' position, the test circuit is opened and the bulb is then controlled by the temperature switch.





Radiator: Technical Service Bulletins Radiators - Shop Manual Supplement

Article No. 85-12-26

RADIATORS - SHOP MANUAL SUPPLEMENTAL INFORMATION - SECTION 27-04

LIGHT TRUCK F SERIES, BRONCO

F Series/Bronco Aluminum Core Radiators

FIGURE 15 NYLON TANK VACUUM BRAZED ALUMINUM RADIATOR - F SERIES & BRONCO WITH GASOLINE ENGINE

The crossflow fin and tube design radiator used on F Series and Bronco vehicles with a gasoline engine is constructed with a vacuum brazed aluminum core and nylon end tanks (Figure 15). The nylon end tanks are attached to the aluminum core by bending tabs on the core header over the edge of the nylon tank. An O-ring gasket is placed between the nylon tank and the radiator core header to achieve a seal between the tank and the header. The nylon tanks are a molded one-piece design with the mounting brackets part of each tank.

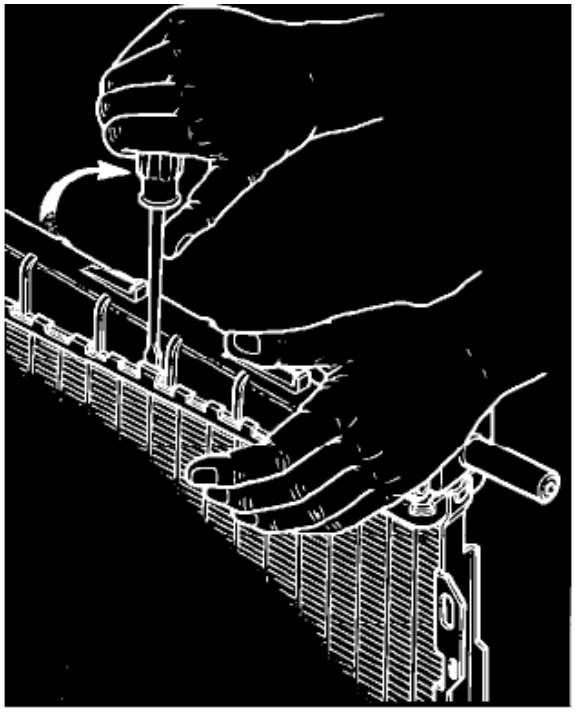
Figure 16 - Header Tabs

REMOVAL AND INSTALLATION

Radiator Tank - Removal

The radiator tanks are molded, glass-filled nylon and are attached to the core header by bending the header tabs (Figure 16) over the edge of the tank. When removing a nylon tank, a screwdriver or one of the various special tools available can be used to open the header tabs. Some of these tools, including a screwdriver, may cause a small section of the header side to bend with the tabs as they are opened. This slight deformation is permissible, provided the tabs are opened only enough for tank removal. The header sides will usually return to the normal position when the tabs are crimped during tank installation. Procedures are given for tank removal using a screwdriver or a Burroughs Tool BT-8260. Follow the manufacturer's instructions for other radiator tab opening and closing tools.

With Screwdriver



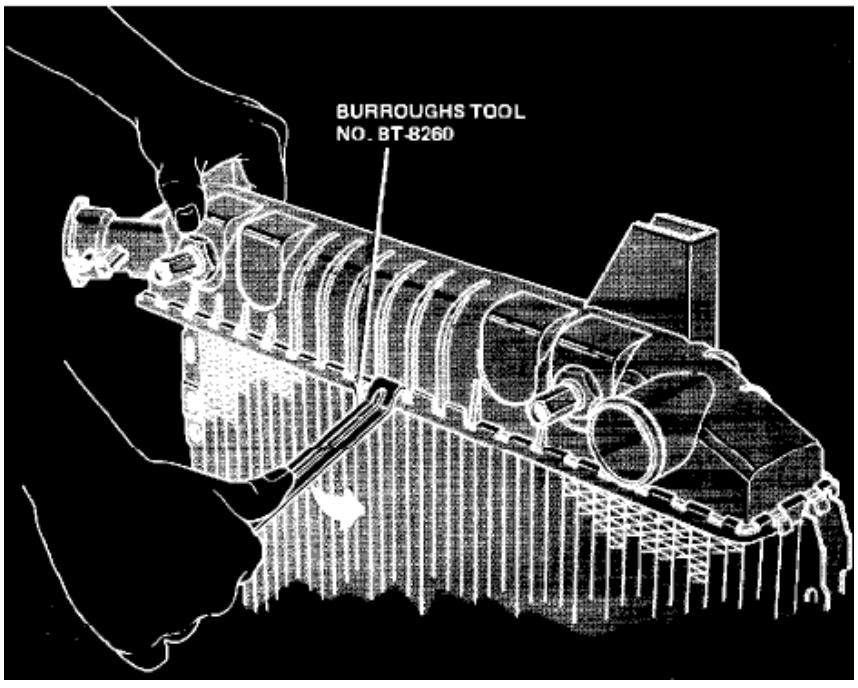

BURROUGHS TOOL
NO. BT-8260

Figure 17 - Opening Header Tabs

1. Insert the end of a medium tip screwdriver between the end of the header tab and the tank (Figure 17). Then, press the screwdriver blade against the tank to bend (pry) the tab away from the tank edge. Repeat this procedure for each tab.

NOTE: Bend (open) the tabs only enough for tank removal.

2. Lift the tank from the core header when all of the header tabs are bent away from the tank edge.

3. Remove the O-ring gasket from the header.

Figure 18 - Opening Header Tabs

With Tool BT-8260

1. Insert the end of Tool BT-8260 between the end of the header tab and the tank (Figure 18). Then, push the tool handle down toward the core to bend the tab away from the radiator tank. Do not open the tabs more than is necessary for tank removal.

2. Repeat Step 1 for each header tab. Then, lift the tank from the header.

3. Remove the O-ring gasket from the header.



Installation

NOTE: If any header tabs are missing from an aluminum core, the core should be replaced.

1. Inspect the seal surface of the radiator core header to be sure it is clean and free of foreign material or damage.

Figure 19

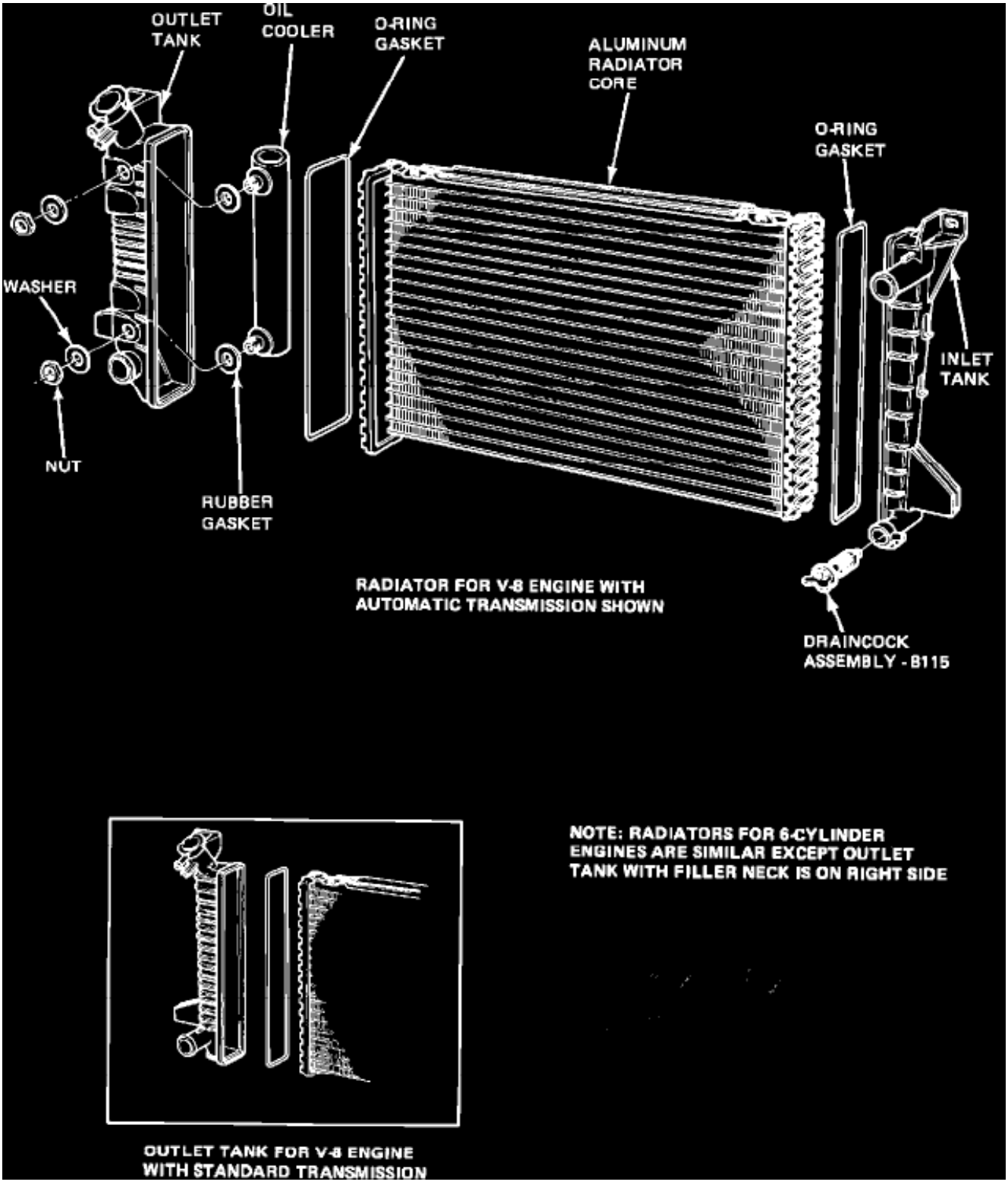


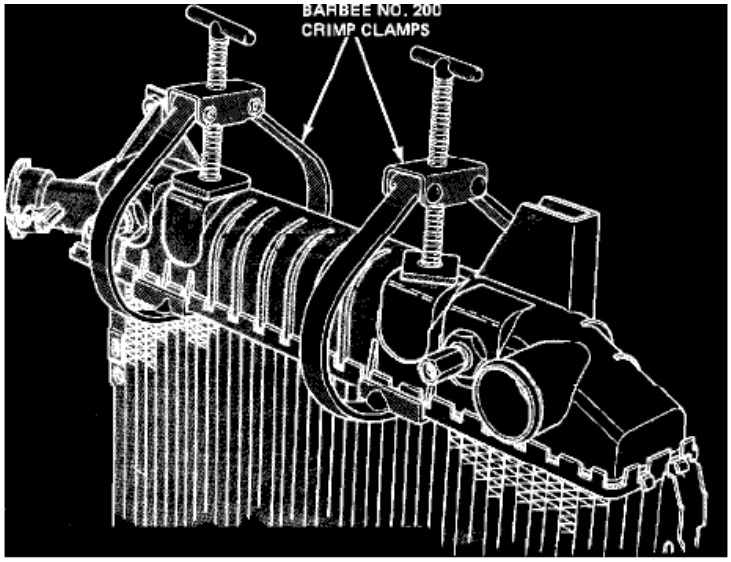
Figure 20 - RADIATOR DISASSEMBLED - F-150 THROUGH F-350 AND BRONCO

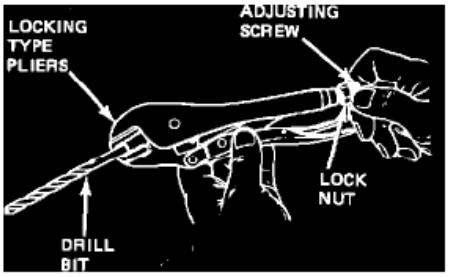
2. Check the new O-ring to be sure it is not twisted (Figure 19).

3. Dip the new O-ring gasket in glycol or silicone or equivalent lubricant, and place the gasket in the header groove.

4. If the outlet tank is being replaced and is equipped with an oil cooler, (Figure 20), transfer the oil cooler from the replaced tank to the new tank as outlined.

5. Position the tank to the header using care not to scratch the tank sealing surfaces with the header tabs. Be sure the top and bottom of the tank is positioned properly with the other tank.


BARBEE NO. 200
CRIMP CLAMPS


LOCKING
TYPE
PLIERS
ADJUSTING
SCREW
LOCK
NUT
DRILL
BIT

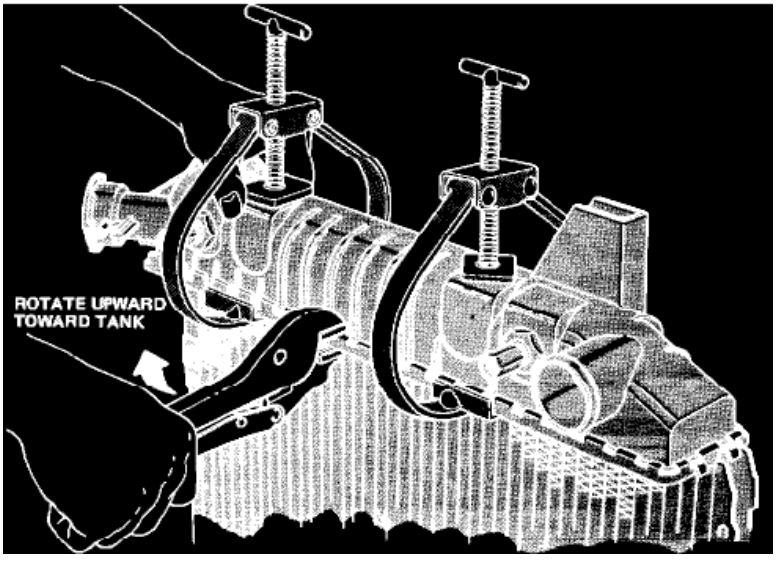

ROTATE UPWARD
TOWARD TANK

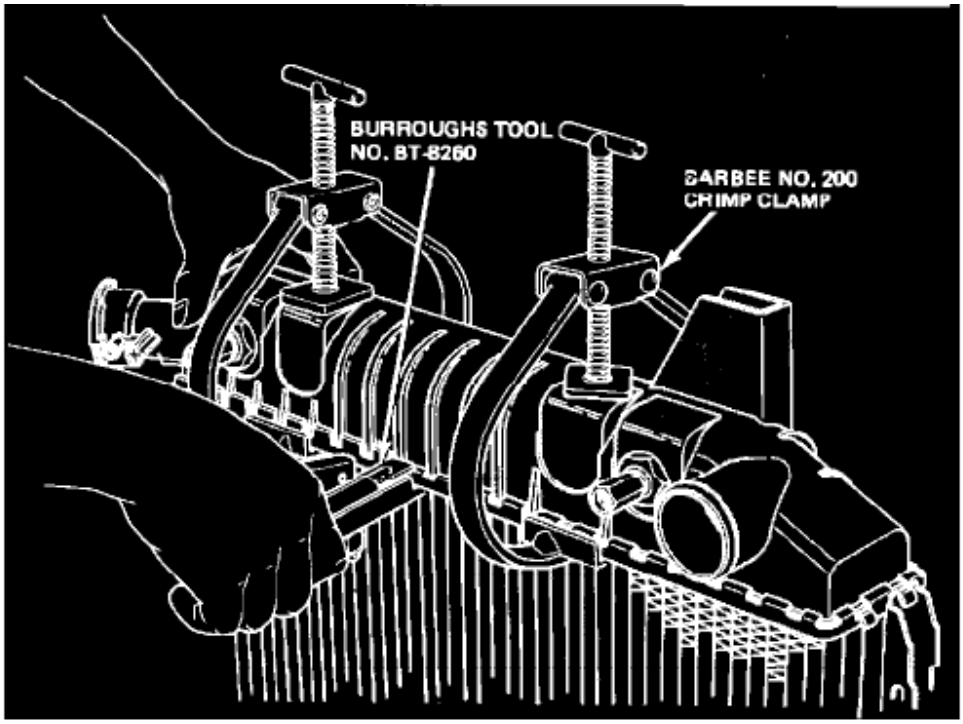
Figure 21 - TANK CLAMPED TO HEADER FOR CRIMPING - F SERIES AND BRONCO

Figure 22 - LOCKING TYPE PLIERS

6. Clamp the tank in position on the header with two header clamps as shown (Figure 21). Tighten the header clamps to compress the O-ring gasket.

7. If locking-type pliers are used to squeeze the header tabs against the tank, install a hex nut on the pliers adjusting screw.

8. With the jaws of the locking-type pliers closed and locked, turn the adjusting screw to position the jaws against the shank of a 13/32 inch drill bit. Then tighten the hex nut on the adjusting screw against the handle to lock the adjustment in place (Figure 22).


BURROUGHS TOOL
NO. BT-8260
CARBEE NO. 200
CRIMP CLAMP

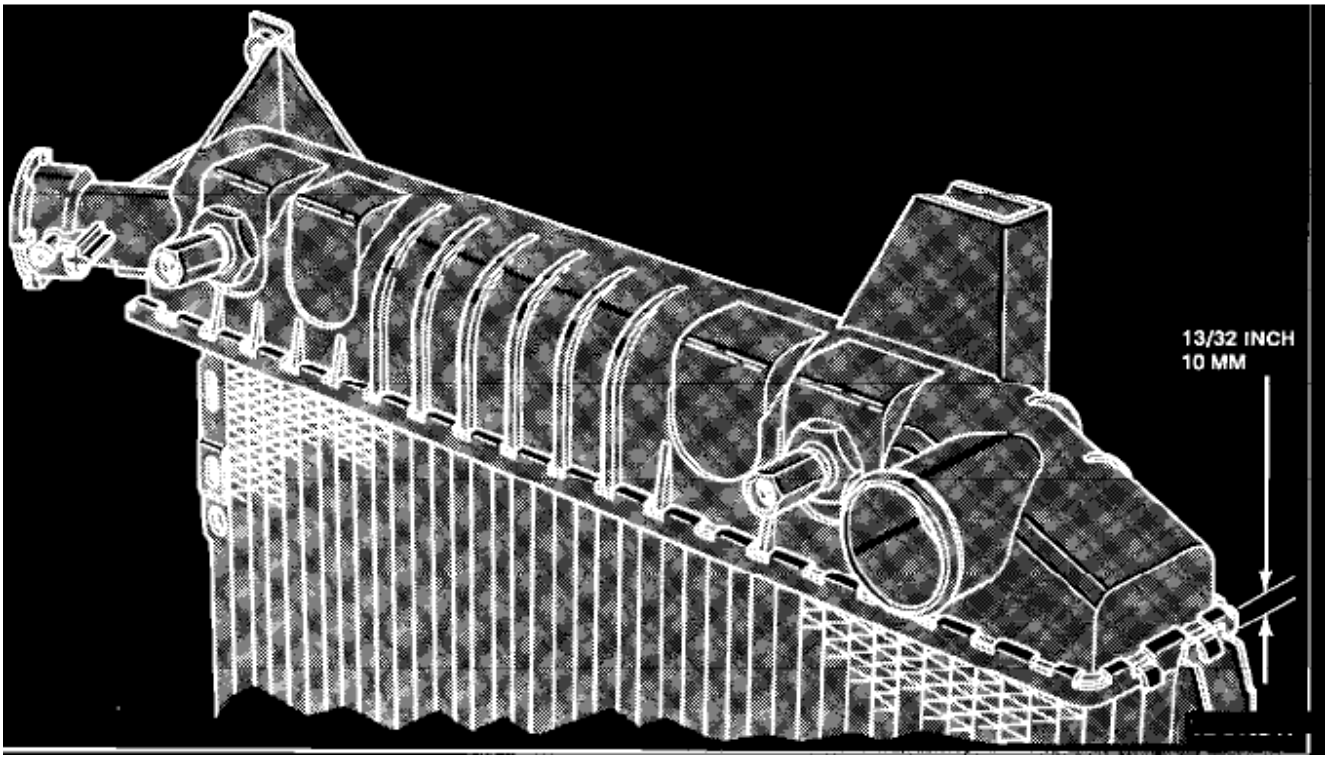

13/32 INCH
10 MM

Figure 23 - CRIMPING HEADER TABS WITH LOCKING TYPE PLIERS - F SERIES AND BRONCO

Figure 24 - CRIMPING HEADER TABS WITH BURROUGHS TOOL NO. BT 8260 - F SERIES AND BRONCO

9. Squeeze the header tabs down against the lip of the tank base with the locking-type pliers while rotating the pliers toward the tank (Figure 23).

10. If a special crimping tool is used such as the one shown in Figure 24, follow the manufacturer's instructions.

Figure 25 - CRIMP ASSEMBLED HEIGHT - F SERIES AND BRONCO RADIATOR

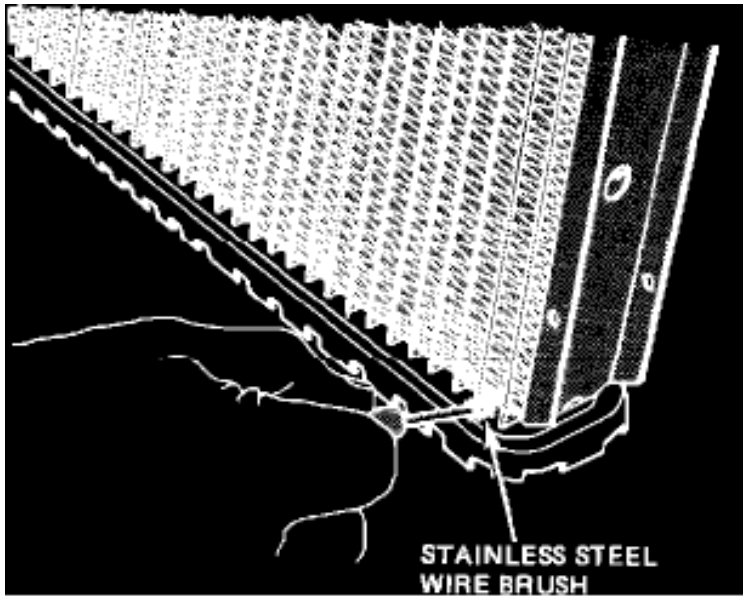
NOTE: It is, however, important that the assembled height of the crimp be 13/32 inch when measured from the bottom of the header to the top of the tab (Figure 25).

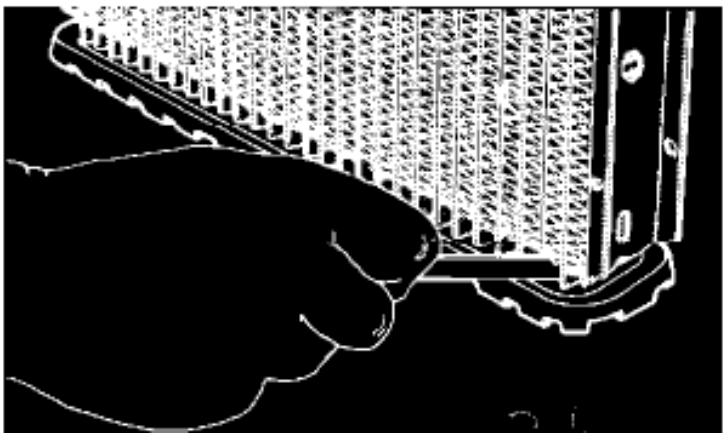
11. Remove the header clamps and squeeze the header tabs down that were behind the clamps.

12. Leak test the radiator at 145 kPag (21 psig). Most minor leaks at the header to tank seal can be corrected by again squeezing the header tabs down against the tank lip in the area of the indicated leak.

Radiator Core Repair

The only approved repair method for the aluminum radiator core requires a two-component epoxy material. The materials and supplies necessary to


STAINLESS STEEL
WIRE BRUSH



repair the aluminum core radiator are:

^ EPOXI-PATCH KIT No. 6C Aluminum Hysol Division of the Dexter Corporation Olean, New York 14760

^ Sandpaper and/or emery paper - 80 or 100 grit.

^ Stainless steel wire brush No. 23151, or equivalent Milwaukee Brush Manufacturing Company Menomonee Falls, Wisconsin 53501

^ 375 watt heating lamp

^ Mixing card and spatulas

Figure 26 - Repair Procedure

Repair Procedure

1. Thoroughly clean the area around the leak with a stainless steel wire brush and, if necessary,emery paper to get to hard-to-reach areas. Use the brush on the epoxy as well as on the aluminum (Figure 26).

CAUTION: Do not use wire brushes that are not stainless steel.

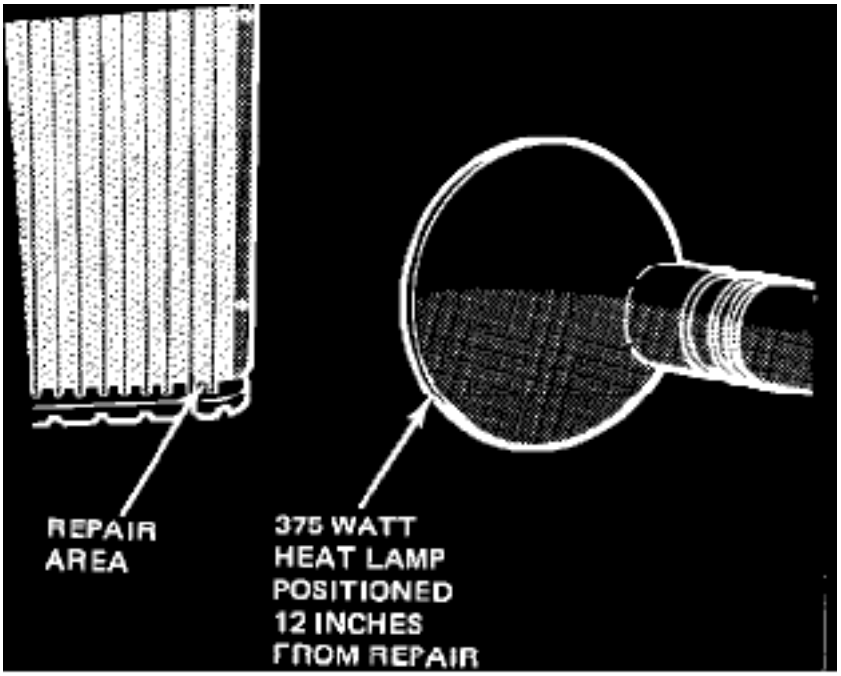
2. Squeeze a bead (length) of repair material resin (Part A) on a clean, dry, disposable flat mixing surface. Use uniform pressure to obtain an even bead.

WARNING: OBSERVE ALL CAUTIONS AND WARNINGS PRINTED ON THE REPAIR MANUAL CONTAINERS.

3. Squeeze an equal bead (length) of hardener (Part B) parallel to the Part A bead. Mix Parts A and B together.

Figure 27 - Repair Procedure

4. If it is necessary to have the epoxy flow to obtain a satisfactory repair, warm the core around the leak with a 375 watt heat lamp. Then apply the repair material to the leak (Figure 27).



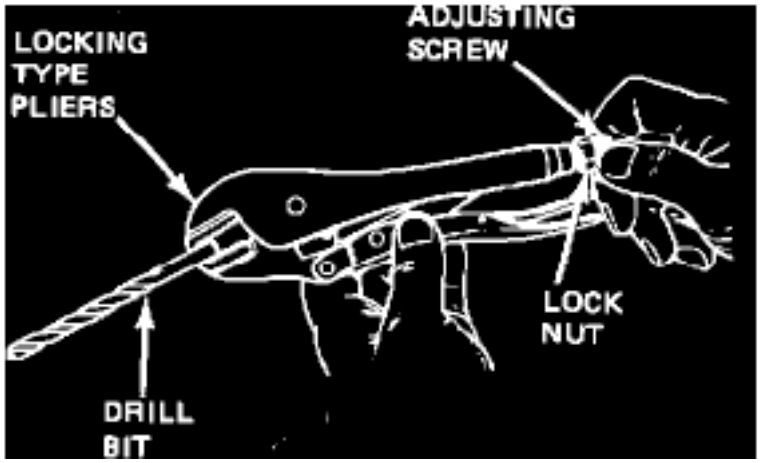


Figure 28 - Repair Procedure

5. Position the 375 watt heat lamp 305 mm (12 inches) from the repair and allow the repair to cure for two hours (Figure 28).

CAUTION: Do not position the heat lamp closer to the repair area than 305 mm (12 inches). Do not use a heat gun or overheat the repair material.

Figure 22 - LOCKING TYPE PLIERS

6. Leak test the repair by clamping the tank to the header with No. 200 crimp clamps or equivalent (Figure 22).

7. After a successful leak test, install the radiator tank as outlined.

Oil Cooler Transfer or Replacement - Removal

1. Remove the outlet tank from the radiator as outlined.

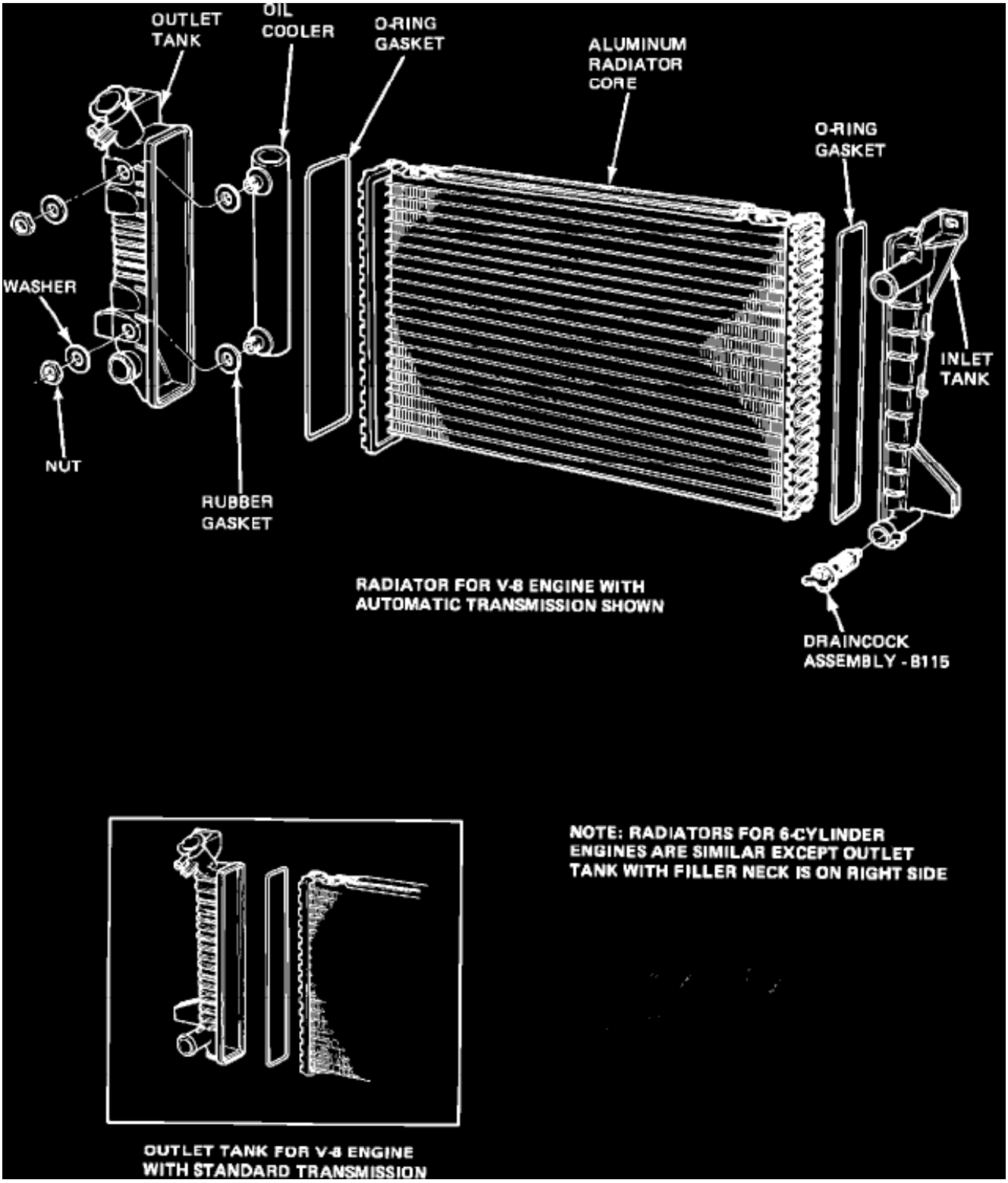


Figure 20 - RADIATOR DISASSEMBLED - F-150 THROUGH F-350 AND BRONCO

2. Remove the retaining nuts and washers from the oil cooler inlet and outlet connections. Then, lift the oil cooler from the radiator outlet tank (Figure 20).

3. Remove the rubber gaskets from the oil cooler inlet and outlet connections if the oil cooler is to be reused.

Installation

1. Install new rubber gaskets on the oil cooler inlet and outlet connections (Figure 20).

2. Position the oil cooler to the radiator outlet tank and insert the inlet and outlet connections through the holes in the outlet tank.

3. Install the flat washer and nut on each oil cooler connection to retain the oil cooler in the radiator outlet tank.

4. Tighten the oil cooler retaining nuts to 12-15 Nm (9-11 ft.lbs.).

5. Install the outlet tank on the radiator core header as outlined.

OTHER APPLICABLE ARTICLES: None WARRANTY STATUS: "INFORMATION ONLY"

Radiator Cap: Specifications

Release Pressure 13 psi

Engine	Year	Sensor	Resistance Ohms @ deg. F/C
All w/EEC IV	1983-90	Coolant, Air Charge	31,700-42,900 @ 68/20 13,650-18,650 @ 104/40 6500-8900 @ 140/60 3240-4440 @ 176/80 1770-2370 @ 212/100 980-1380 @ 248/115
All w/EEC III	1981-83	Coolant, Air Charge	1100-6000 1700-60,000

TEMPERATURE SENSORS

Coolant Temperature Sensor/Switch (For Computer): Description and Operation

This sensor incorporates a thermistor in a brass housing with an integral wiring connector extending from the body. This sensor is installed in the heater outlet fitting of the intake manifold. The thermistor is a resistor whose resistance value is high at low temperatures and decreases as the temperature rises. The computer applies a voltage to the sensor and monitors the resultant voltage drop across the thermistor.

Radiator Cooling Fan Temperature Sensor / Switch: Specifications Switch Torque

Switch Torque

Cooling Fan Switch 8-18 ft.lb

Temperature Sensor (Gauge): Technical Service Bulletins Temperature Gauge - Reads Low/Erratic

Article No. 95-13-2

07/03/95

^ GAUGE - TEMPERATURE-READS IN LOW RANGE - ERRATIC READINGS

^ SERVICE PARTS - RETURN OF OBSOLETE TEMPERATURE SENDERS

FORD: 1981-94 ESCORT 1981-95 MUSTANG, THUNDERBIRD 1983-95 CROWN VICTORIA 1984-94 TEMPO 1986-95 TAURUS

LINCOLN-MERCURY: 1981-92 TOWN CAR 1981-95 COUGAR 1983-95 GRAND MARQUIS 1984-92 MARK VII 1984-94 TOPAZ 1986-95 SABLE 1987-89 TRACER 1991-94 TRACER 1993-95 MARK VIII

LIGHT TRUCK: 1982-95 BRONCO 1983-95 RANGER 1986-94 AEROSTAR 1990-95 F-150-350 SERIES 1991-95 EXPLORER 1992-95 ECONOLINE 1995 WINDSTAR

ISSUE: Temperature Sender F1SZ-10884-A with a build date code prior to 2774 (277th day of 1994) should be purged from your inventory and returned to your facing PDC. These parts are being made obsolete because of an incorrect crimp during assembly. Installing these parts on a vehicle could result in early loss of temperature sender function.

ACTION: Remove and return the suspect parts from your dealership's inventory. The obsolete parts should be withdrawn from your inventory and returned to your facing PDC within 30 days of this TSB.

NOTE:

USE TSB ARTICLE 93-24-8 FOR DIAGNOSIS PROCEDURE IN DETERMINING IF LOW GAUGE READINGS COULD BE ASSOCIATED WITH A TEMPERATURE SENDER CONCERN.

1. Perform 100% sort of all stock on hand.

2. Suspect stock has a build date code prior to 2774. Usable stock will have a build date code of 2774 or later.

NOTE:

DATE CODES ARE LOCATED ON THE SIDE OF THE SENDER HEX.

3. Usable stock can be returned to your inventory and released for normal sales.

4. Return suspect part (F1SZ-10884-A) to your facing PDC using the least expensive transportation.

5. If claim is processed electronically via DOES II, use return code "GB"; otherwise, complete a separate paper claim form FPS-340 using return code "J".

6. In the Remarks Section, write "Returned per TSB 95-13-2".

LIMITS

^ The returns must be received within 30 days from the date of this TSB.

^ Returns are restricted to the subject parts.

^ The parts returned must have been purchased from FCSD in accordance with Policy and Procedure Bulletin 4000.

CREDIT

Credit for parts and prepaid freight costs will be issued.

Replacement stock is available for ordering

PART NUMBER PART NAME

F1SZ-10884-A Temperature Sender

OTHER APPLICABLE ARTICLES: 93-24-8

WARRANTY STATUS: INFORMATION ONLY

OASIS CODES: 203000, 203200, 204000, 204200, 402000

Temperature Gauge: Testing and Inspection Dash Gauge Test

Gauge failures are often caused by defective wiring or grounds. The first step in locating trouble should be a thorough inspection of all wiring, terminals and printed circuits. If wiring is secured by clamps, check to see whether the insulation has been severed, thereby grounding the wire. In the case of a fuel gauge installation, rust may cause failure by corrosion at the ground connection of the tank unit. The Constant Voltage Regulator (CVR) type indicator is a bimetal-resistance type system consisting of an Instrument Voltage Regulator (IVR), an indicator gauge, and a variable resistance sending unit. Current to the system is applied to the gauge terminals by the IVR, which maintains an average-pulsating value of 5 volts. The indicator gauge consists of a pointer which is attached to a wire-wound bimetal strip. Current passing through the coil heats the bimetal strip, causing the pointer to move. As more current passes through the coil, heat increases, moving the pointer farther. The circuit is completed through a sending unit which contains a variable resistor. When resistance is high, less current is allowed to pass through the gauge, and the pointer moves very little. As resistance decreases due to changing conditions in system being monitored, more current passes through gauge coil, causing pointer to move farther. Do not apply battery voltage to system or ground output terminals of IVR, as damage to system components or wiring circuits may result.

DASH GAUGE TEST

1. Disconnect battery ground cable and remove gauge from vehicle.

2. Connect ohmmeter between gauge terminals and read coil winding resistance.

3. An upward movement of ohmmeter needle from 10 ohms to 14 ohms is normal, as test current of ohmmeter causes a temperature rise in gauge coil windings.

4. If ohmmeter reads below 10 ohms or above 14 ohms, gauge is defective.

Temperature Gauge: Testing and Inspection Electrical Temperature Gauges

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TROUBLESHOOTING A special tester is required to diagnose this type gauge. Follow instructions included with the tester.

Temperature Warning Lamp/Indicator: Testing and Inspection

A bimetal temperature switch located in the cylinder head control the operation of a temperature indicator light with a red lens. If the engine cooling system is not functioning properly and coolant temperature exceeds a predetermined value, the warning light will illuminate.

TROUBLESHOOTING If the red light is not lit when the engine is being cranked, check for a burned out bulb, an open in the light circuit, or a defective ignition switch. If the red light is lit when the engine is running, check the wiring between light and switch for a ground, defective temperature switch, or overheated cooling system. As a test circuit to check whether the red bulb is functioning properly, a wire which is connected to the ground terminal of the ignition switch is tapped into its circuit. When the ignition is in the ``Start'' (engine cranking) position, the ground terminal is grounded inside the switch and the red bulb will be lit. When the engine is started and the ignition switch is in the ``On'' position, the test circuit is opened and the bulb is then controlled by the temperature switch.

Water Pump: Service and Repair

]All water pumps have a sealed bearing integral with the water pump shaft. The bearing requires no lubrication. A bleed hole in the pump housing allows water that may leak past the seal to be thrown out by the slinger. This is not a lubrication hole. If the pump is damaged and requires repair, replace it with a new pump or a rebuilt one.

F-100-350 & Bronco

1. Drain cooling system.

2. Remove fan shroud attaching bolts and position shroud over fan.

3. Disconnect lower radiator hose, heater hose and bypass hose from water pump.

4. Remove drive belts, fan, spacer, water pump pulley and fan shroud.

5. Loosen alternator pivot bolt and alternator adjusting arm-to-water pump attaching bolt.

6. Remove water pump attaching bolts and the water pump.

7. Reverse procedure to install.

V8-351M & 400

1. Disconnect battery ground cable, then drain cooling system.

2. Remove fan shroud attaching bolts and slide shroud rearward.

3. Remove fan and fan spacer.

4. On models equipped with A/C, remove A/C compressor drive belt, lower idler pulley and compressor mount-to-water pump bracket.

5. On all models, remove alternator drive belt and power steering pump drive belt (if equipped).

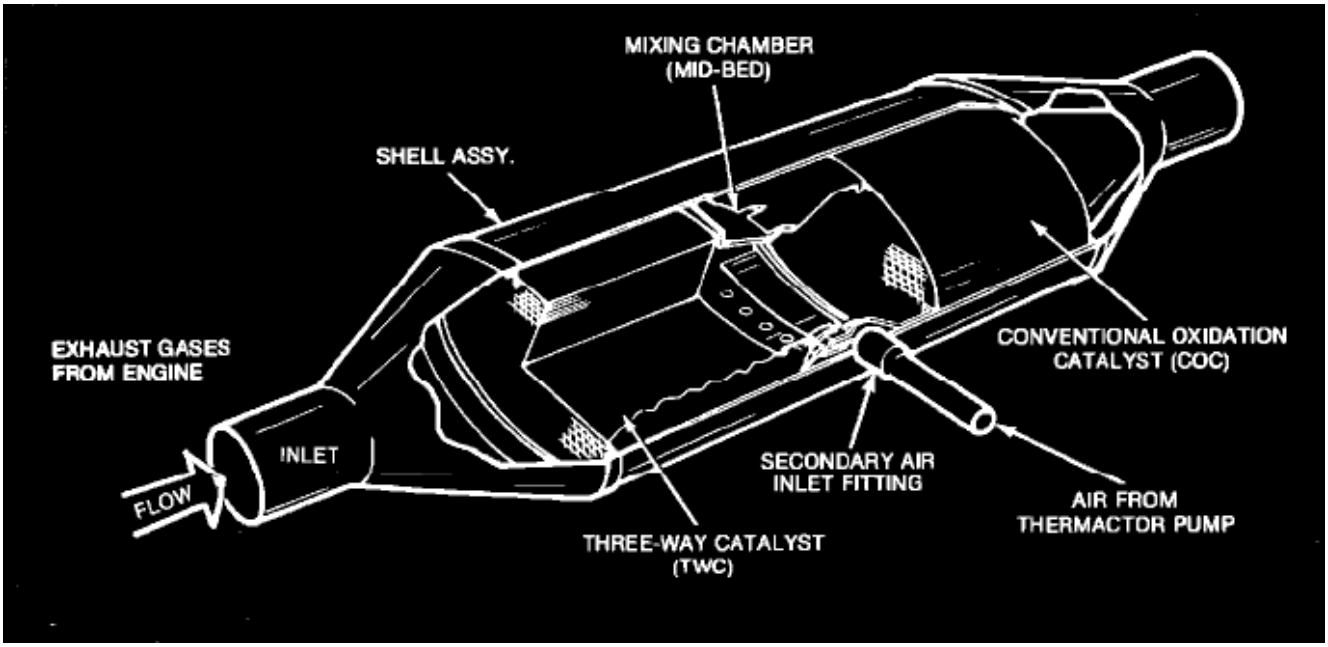
6. Remove water pump pulley, then the alternator bracket from water pump.

7. On models equipped with power steering, unfasten steering pump bracket from water pump and position aside.

8. On all models, disconnect lower radiator hose and heater hose from water pump.

9. Remove water pump attaching bolts and the water pump.

10. Reverse procedure to install.

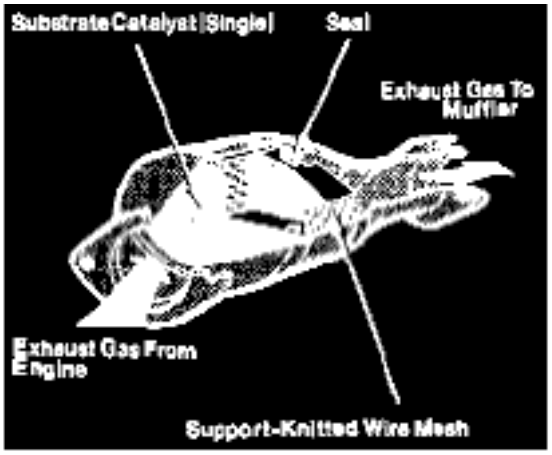


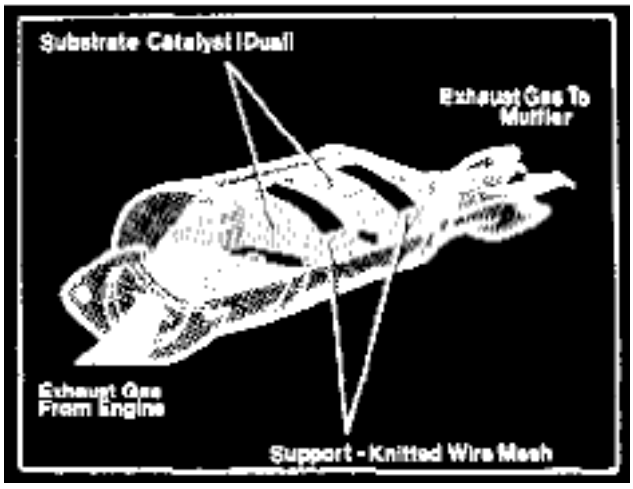
Catalytic Converter: Description and Operation Dual Catalytic Converter

Fig. 17 Dual catalytic converter

This converter consists of two catalytic converters in one shell, with a mixing chamber in between the two, Fig. 17. Each converter is composed of a ceramic ``honey comb'' coated with a rhodium/platinum catalyst designed to control oxides of nitrogen (NOx), unburned hydrocarbons (HC) and carbon monoxide (CO), and is therefore called a ``three way catalyst'' (TWC). The rear converter is coated with platinum catalyst and is called a ``conventional'' oxidation catalyst'' (COC) converter. The platinum catalyst is also called a ``two way catalyst'' since it only acts on two of the major pollutants, HC and CO.

The TWC converter acts on the exhaust gases from the engine. As the gases flow from the TWC to the COC converter, they mix with air from the thermactor pump injected into the mixing chamber or ``mid-bed''. This air is required for proper oxidation of HC and CO in the COC converter.





Catalytic Converter: Description and Operation General Description

Fig.8 - Catalytic Converter With Single Substrate Catalyst

Fig.9 - Catalytic Converter With Dual Substrate Catalyst

The catalytic converter is an emission control device added to the exhaust system to effectively reduce the levels of carbon monoxide (CO), hydrocarbons (HC), and in some cases oxides of nitrogen (NOx), entering the atmosphere. The converter permits a faster chemical reaction to take place and although it enters into the chemical reaction, it remains unchanged, ready to repeat the process.

The catalyst in these converters is structured in the form of a honeycomb monolithic composition, Figs. 8 and 9. The catalyst consists of a porous substrate of an inert material, coated with platinum and other noble metals (the catalytically active materials).

NOTE: Phase II Catalytic Converters or Dual Catalytic Converters which also control the NOx emissions, are used on some 1978-82 vehicles.

During engine operation, all of the exhaust gases flow through the converter where a chemical change takes place. This change causes the temperature inside the converter to be higher than the temperature of the exhaust gases when they leave the engine. Due to this increase in heat, the converter is insulated so that its outside temperature is about the same temperature as the muffler. However, due to its solid mass, the converter remains hot much longer than the muffler.

The body of the catalytic converter is made of stainless steel designed to last the life of the vehicle. Excessive heat can bulge or distort the converter. Since excessive heat built up is not the fault of the converter, the carburetion or ignition system should be checked whenever a converter is damaged by overheating.

Although all vehicles with catalytic converter must use unleaded fuel, small amounts of leaded fuel can be used in case of an emergency. To prevent adding leaded fuel, the fuel tank filler nozzle has a built-in restrictor.

Heat shields are used on some vehicles to protect chassis components, passenger compartment, and other areas from heat damage that may be caused by the catalytic converter.

TEST STEP	RESULT ▶	ACTION TO TAKE
B0 VISUAL INSPECTION • Visually inspect exhaust system. • **Is exhaust system visually OK?**	Yes ▶ No ▶	GO to [B1]. REPLACE any collapsed exhaust components. If problem is not corrected, GO to [B1].
B1 VACUUM TEST • Attach vacuum gauge to intake manifold vacuum source. • Hook up tachometer. • Start engine and gradually increase speed to 2000 rpm with transmission in NEUTRAL. • **Is the manifold vacuum above 16 inches of mercury?**	Yes ▶ No ▶	**No restriction in exhaust system. REFER to Diagnostic Routine Lack of Power, in Computerized Engine Controls.** GO to [B2].
B2 VACUUM TEST — EXHAUST DISCONNECTED • Turn engine Off. • Disconnect exhaust system at exhaust manifold(s). • Repeat vacuum test. • **Is the manifold vacuum above 16 inches of mercury?**	Yes ▶ No ▶	GO to [B3]. GO to [B4].

Catalytic Converter: Testing and Inspection

Blocked or restricted exhaust system usually results in lack of power or popping through the intake system. Verify that this condition is not caused by ignition timing problems, then proceed with diagnosis.

Catalyst and Exhaust Systems

TEST STEP	RESULT ▶	ACTION TO TAKE
B3 VACUUM TEST — CATALYTIC CONVERTER(S) ON/MUFFLER(S) OFF		
• Turn engine Off. • Reconnect exhaust system at exhaust manifold(s). • Disconnect muffler(s). • Repeat vacuum test. • **Is the manifold vacuum above 16 inches of mercury?**	Yes ▶ No ▶	REPLACE muffler(s). REPLACE catalytic converter and inspect muffler to be sure converter debris has not entered muffler.
B4 EXHAUST MANIFOLD RESTRICTED		
• Remove the exhaust manifold(s). Inspect the ports for casting flash by dropping a length of chain into each port. **NOTE: Do not use a wire or light to check ports. The restriction may be large enough for them to pass through but small enough to cause excessive back pressure at high engine rpm.** • **Is a restriction present?**	Yes ▶ No ▶	REMOVE casting flash. If flash cannot be removed, REPLACE exhaust manifold(s). **REFER to Diagnostic Routine Lack of Power, in Computerized Engine Controls.**

Catalyst and Exhaust Systems

Exhaust Manifold: Specifications

Exhaust Manifold 18-24 ft.lb

Exhaust Manifold: Service and Repair

V8-255, 302 & 351W

1. Disconnect battery ground cable.

2. Remove air cleaner and intake duct assembly including crankcase ventilation hose.

3. Remove bolts attaching air cleaner inlet duct, if equipped.

4. Disconnect exhaust pipes at manifolds.

5. Remove exhaust manifold heat shields with attaching bolts and flat washers, if equipped.

6. Remove oil dipstick tube assembly, speed control bracket and exhaust heat control valve from left side exhaust manifold, if equipped, then remove exhaust manifold.

7. Reverse procedure to install, torquing attaching bolts to specifications from centermost bolts outward.

V8-351M & 400

1. Disconnect battery ground cable.

2. When removing right side manifold, remove air cleaner, intake duct and heat shield.

3. When removing left side manifold, remove oil filter.

4. On 1980-82 models, remove oil dipstick and tube assembly and speed control bracket from left side exhaust manifold, if equipped.

5. On vehicles equipped with column selector and automatic transmission, disconnect selector lever cross shaft.

6. On all models, disconnect exhaust pipe at manifold and remove spark plug heat shields.

7. Remove exhaust manifold attaching bolts and the exhaust manifold.

8. Reverse procedure to install, torquing attaching bolts to specifications from center most bolts outward.

Muffler: Technical Service Bulletins Muffler - Unnecessary Replacement

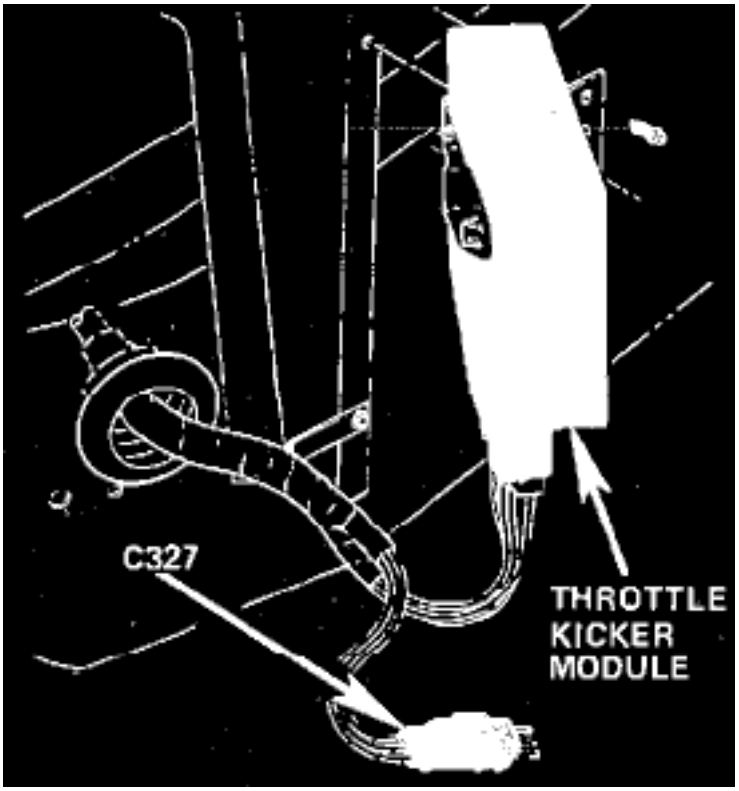
Article No. 83-11-11

EXHAUST - MUFFLER - POWER LOW - UNNECESSARY MUFFLER REPLACEMENT

LIGHT TRUCKS 1982 AND LATER LIGHT TRUCKS

Mufflers are being replaced on leaded fuel vehicles in an effort to resolve concerns of "lack of power" or poor performance", apparently in the belief that a plugged muffler is the cause. Although plugging with lead deposits was possible on certain models prior to the 1982 Model Year, muffler modifications incorporated on 1982 and later models make this an unlikely cause of the concern. Thus, replacing mufflers on the newer model vehicles normally will not satisfy the customer. Prior to replacing any muffler believed to be restricted, a vacuum check as described in Section 26-01 of the Light Truck Shop Manual should be performed.

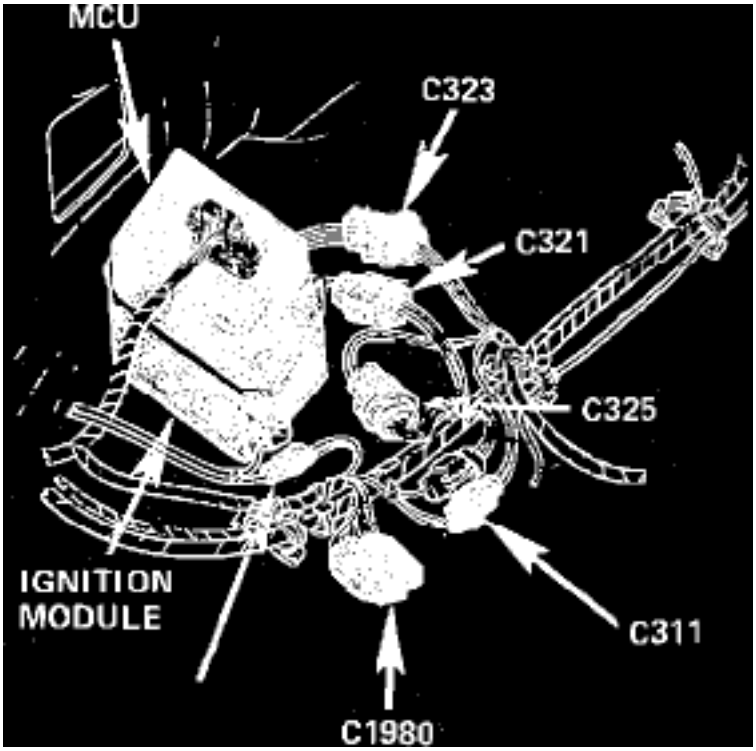
OTHER APPLICABLE ARTICLES: None WARRANTY STATUS: "INFORMATION ONLY"



Electronic Throttle Control Module: Locations

Under LH Side Of I/P

Under LH Side Of I/P

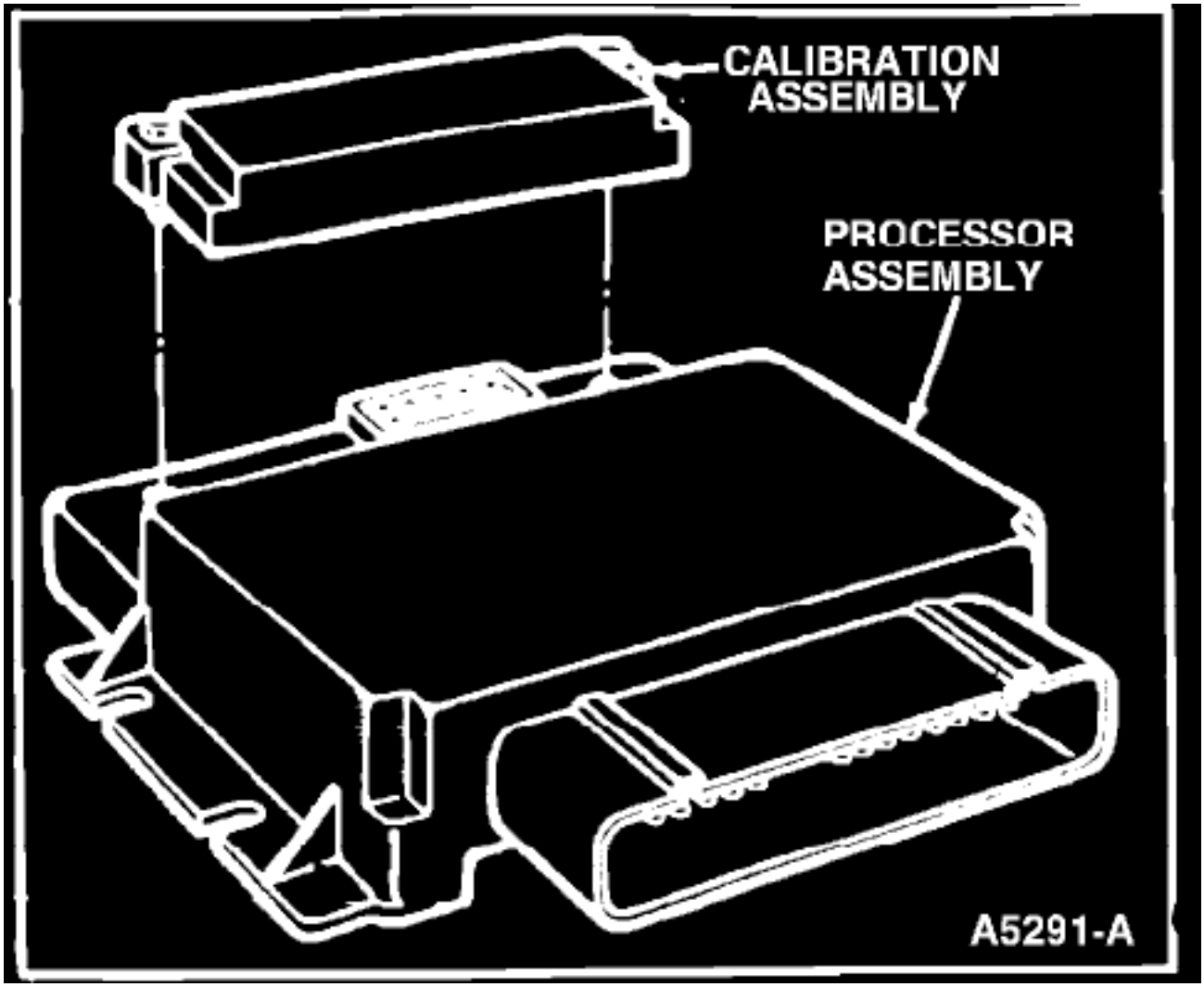


Engine Control Module: Locations

LH Inner Fender Well.

Above Ignition Module

Applicable to: 1981-83 w/MCU



Engine Control Module: Description and Operation

Fig. 7 Processor & calibration assembly

The Electronic Control Assembly (ECA), Fig. 7, is the brain of the system. It is a solid state pre-programmed micro-computer which consists of a processor assembly and a calibration assembly, Fig. 7. The processor assembly contains the electronic circuitry which performs the following functions within a fraction of a second:

a. Choose one of the sensor inputs for evaluation.

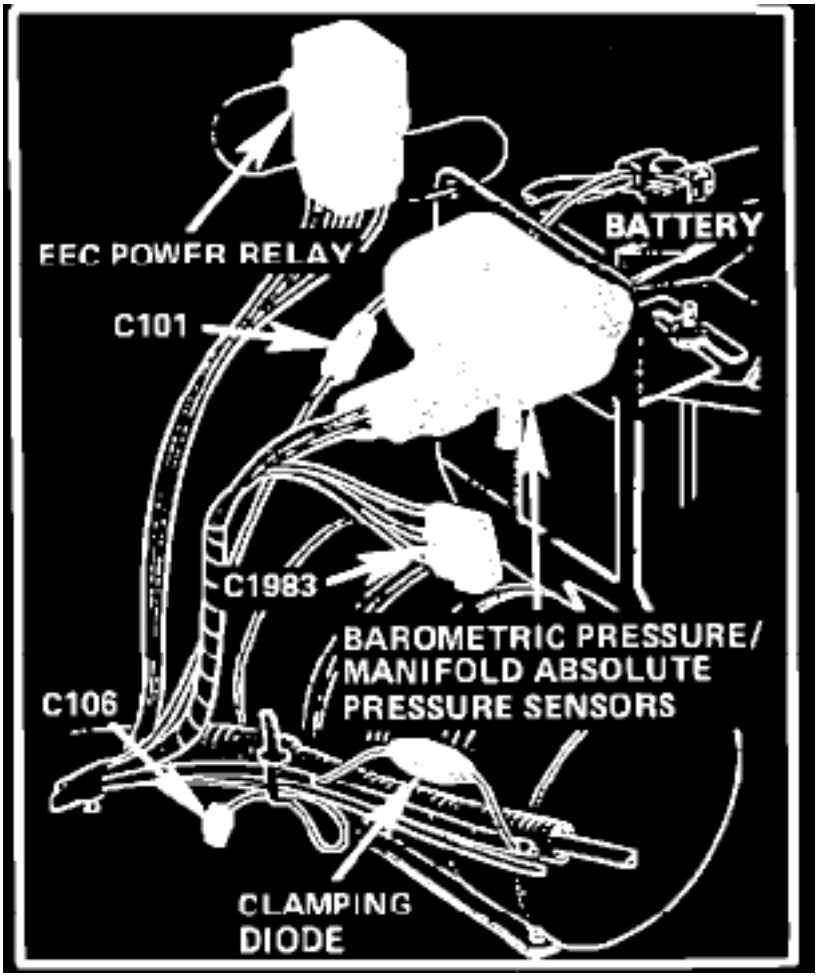
b. Converts the input to a form usable by the computer to use that signal for calculations.

c. Choose the proper operating strategy necessary for the operating conditions.

d. Perform spark, EGR, air/fuel ratio, canister purge, throttle kicker and other calculations.

e. Send electrical output control signals to the ignition module and control solenoids to adjust timing and dwell, EGR flow rate, thermactor air mode and throttle kicker mode.

The processor assembly also contains a separate power supply which provides a continuous reference voltage of about 9 volts nominal to the sensors. The calibration assembly, Fig. 7, contains electronic circuitry which provides calibration equations necessary for specific vehicle application for use by the processor assembly, and provides adjustments for octane problems. The calibration assembly is mounted on the processor assembly. The power relay supplies battery voltage to the EEC system and is mounted on the right hand side of the ECA mounting bracket. It also protects the ECA from possible damage due to reversed polarity.



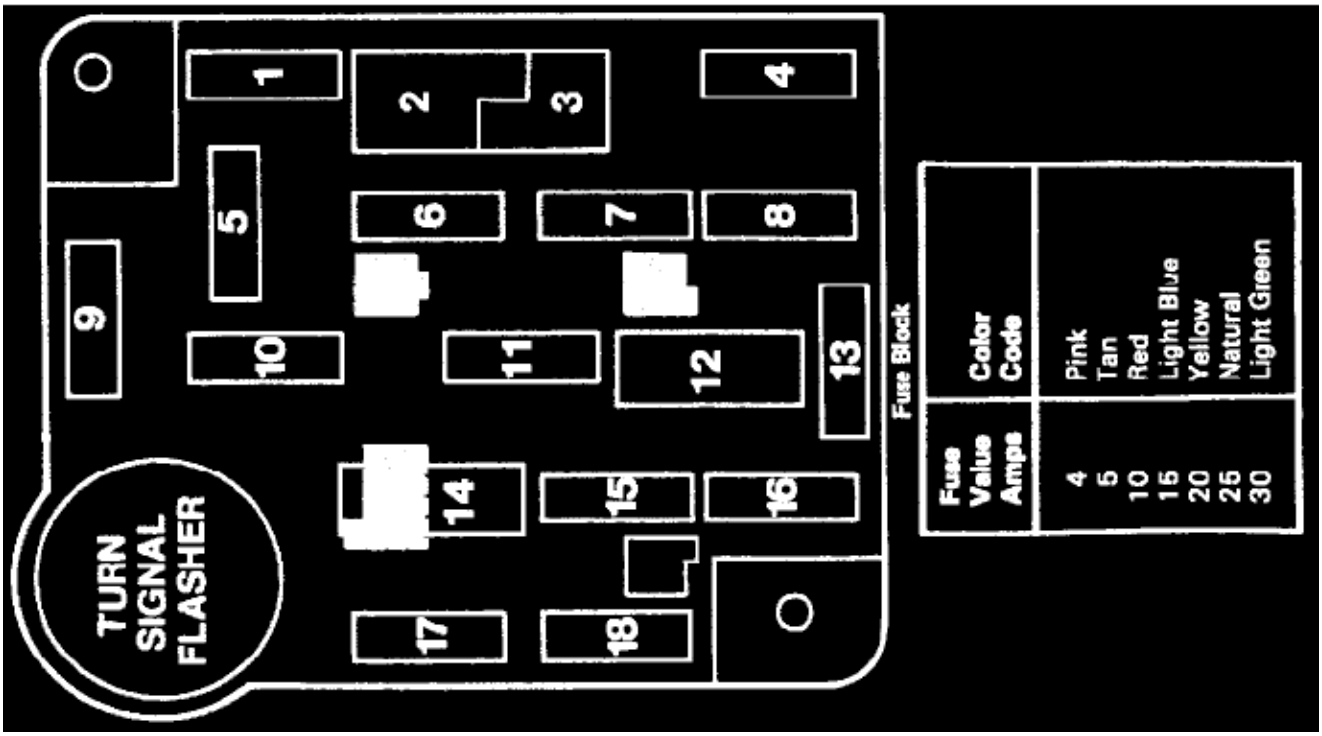
Main Relay (Computer/Fuel System): Locations

Forward Of RH Wheelwell At Battery.

RH Fender Apron

Applicable to: 1981-83

Fuse Position	Amps	Circuits Protected
1	20	Stop/Hazard Lights; Speed Control
2	--	(Not used)
3	--	(Not used)
4	15	Exterior Lights; Instrument Illumination
5	15	Turn Lights; Backup Lights
6	15	Speed Control; 4-Wheel Drive Indicator; Auxiliary Battery Control; Digital Clock; Auxiliary Heater; Feedback Carburetor Control
7	--	(Not used)
8	15	Courtesy, Dome, Cargo Lights; Warning Buzzer
9	30	Heater; A/C-Heater
10	--	(Not used)
11	15	Radio
12	25	Tailgate Power Window; Power Mirrors
13	30 c.b.	Power Door Locks
14	--	(Not used)
15	25	Tailgate Power Window
16	20 c.b.	Power Windows
17	10	Auxiliary Fuel Tank Selector
18	20	Horn; Cigar Lighter
	5	Instrument Illumination
	15	Seatbelt Buzzer; Warning Indicators; Carburetor Circuits; Tachometer; Choke Heater



Choke Relay: Locations

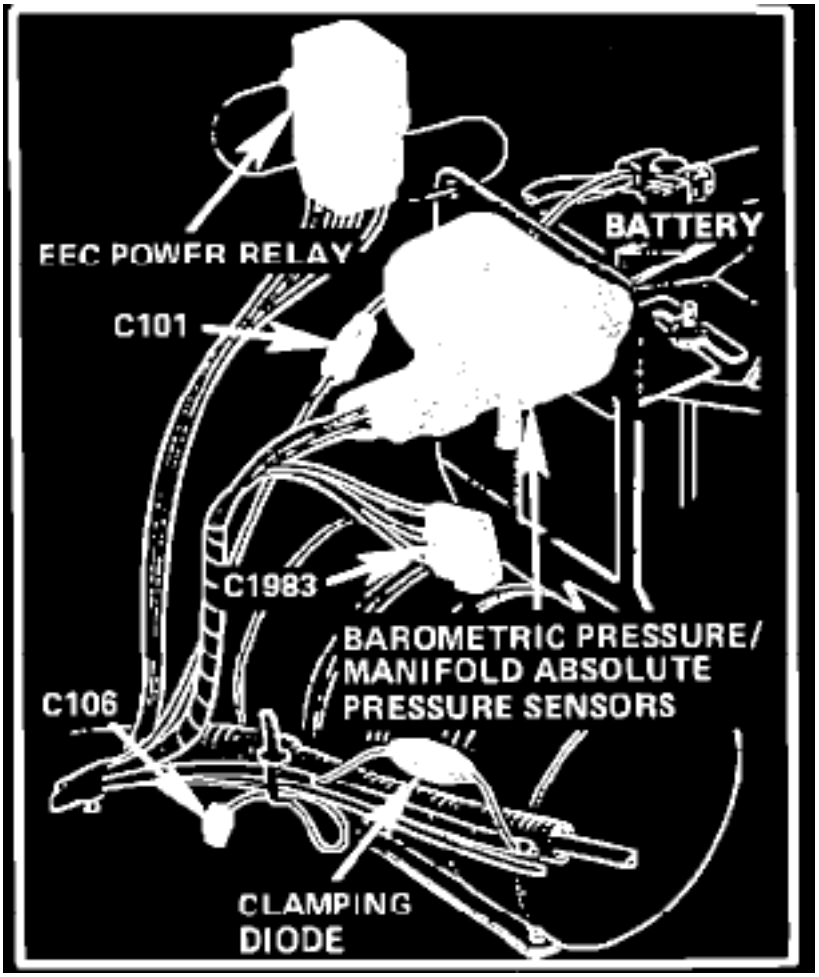
Fuse Block Description

Fuse Block

POWER DISTRIBUTION -

The alternator and battery are connected together at the starter relay hot terminal. Other circuits originate at the starter relay hot terminal and are protected by fuse links. Low power circuits are also protected by fuses.

- The ignition switch and light switch are powered at all times as are fuses 1, 4, 8, 10, and 16. The other fuses are powered through the ignition switch or the light switch.

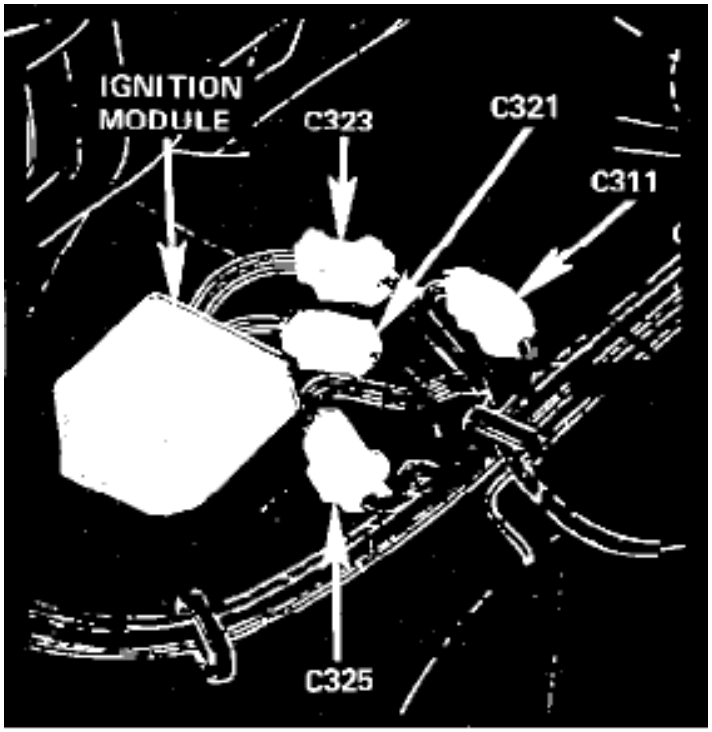


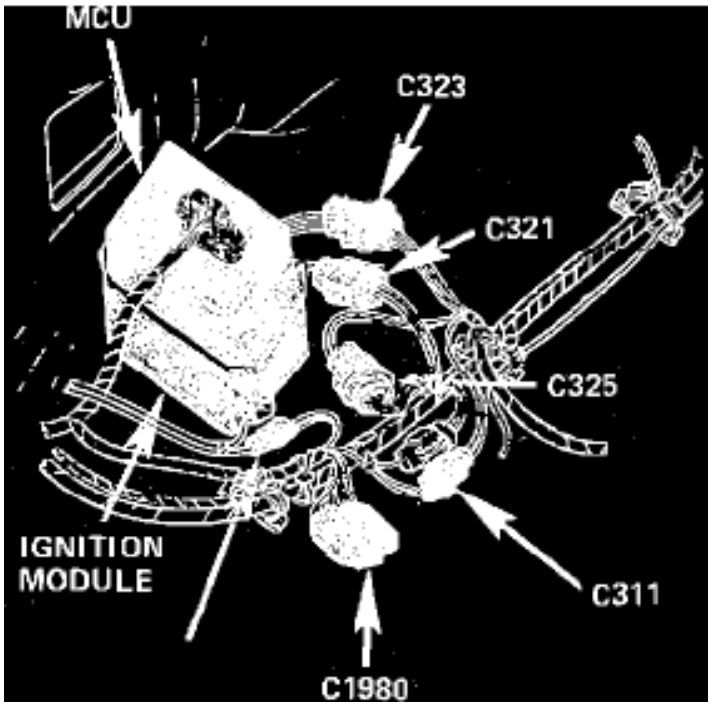
Main Relay (Computer/Fuel System): Locations

Forward Of RH Wheelwell At Battery.

RH Fender Apron

Applicable to: 1981-83


IGNITION
MODULE
C323
C321
C311
C325


MCU
C323
C321
C325
IGNITION
MODULE
C311
C1980

Ignition Control Module: Locations

LH Inner Fender Well.

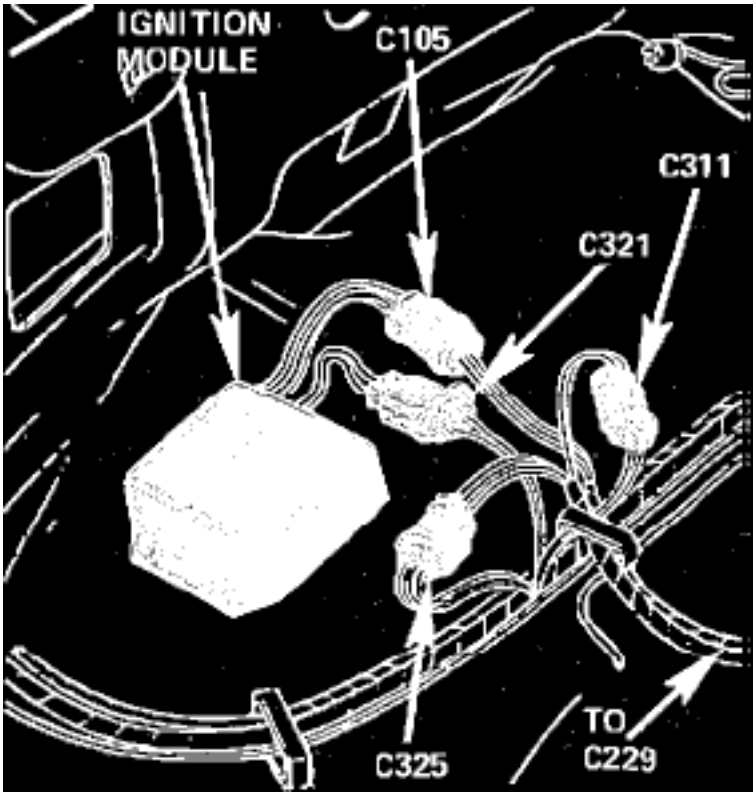
LH Inner Fender Well

Applicable to: 1981-83

LH Inner Fender Well.

LH Inner Fender Well

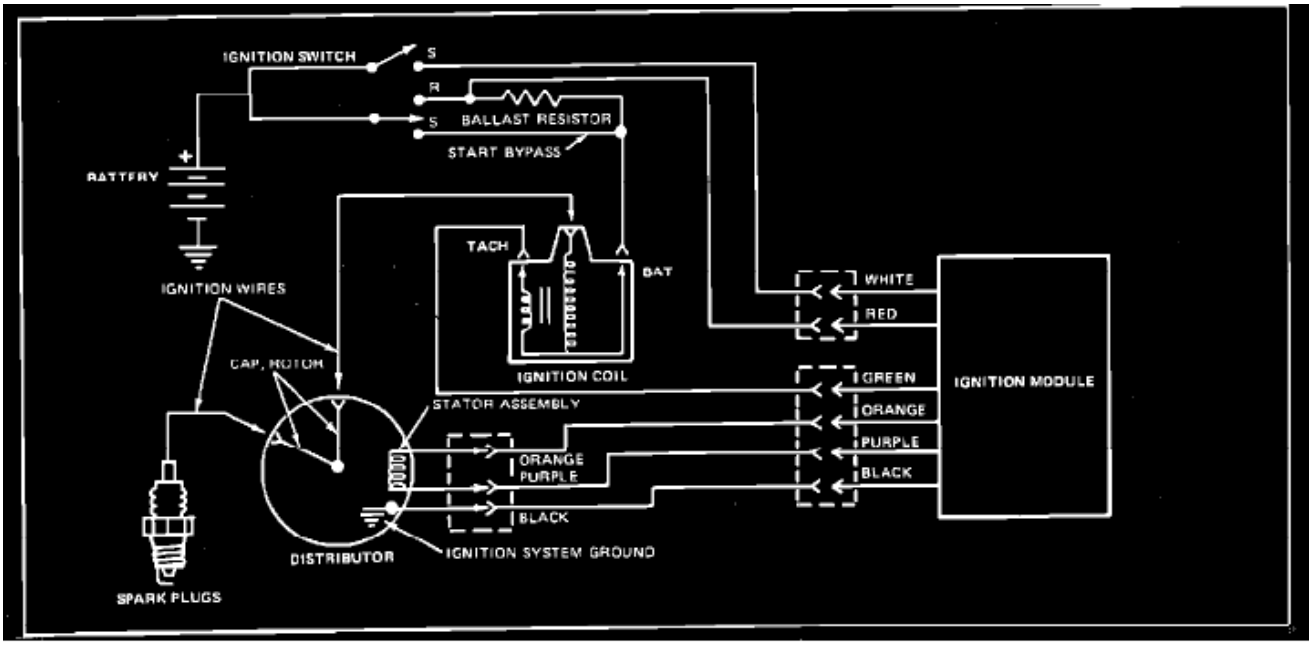
Applicable to: 1981-83 w/MCU

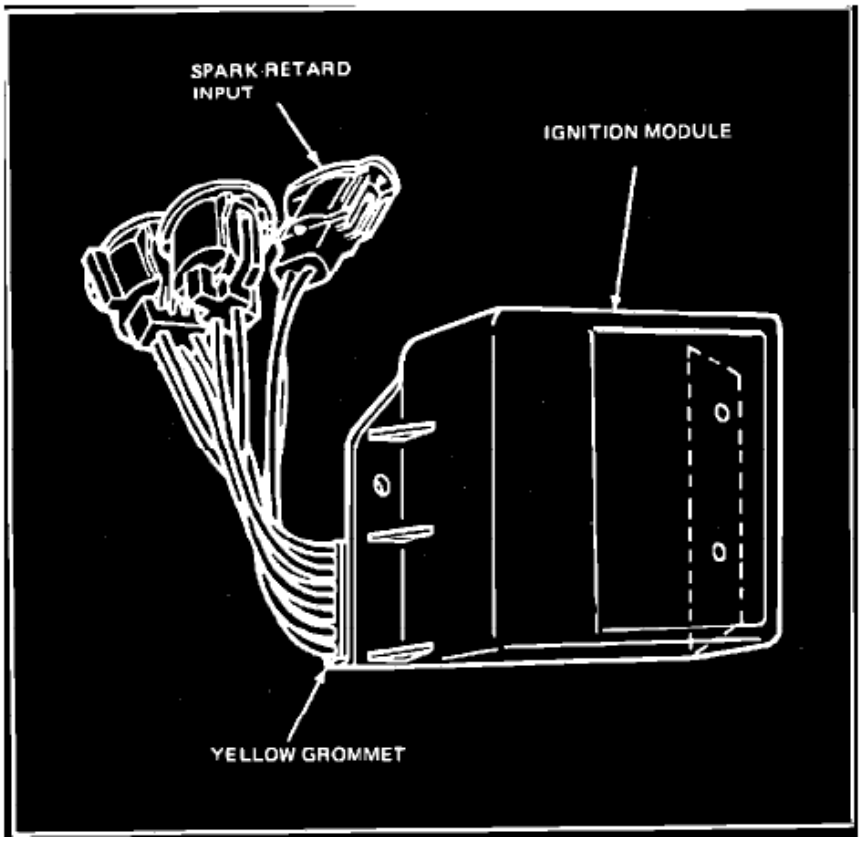


LH Inner Fender Well.

LH Inner Fender Well

Applicable to: 1981-83 w/EEC


IGNITION SWITCH
S
R
S
BALLAST RESISTOR
START BYPASS
BATTERY
+
IGNITION WIRES
TACH
BAT
IGNITION COIL
WHITE
RED
GREEN
ORANGE
PURPLE
BLACK
IGNITION MODULE
CAP, ROTOR
STATOR ASSEMBLY
ORANGE
PURPLE
BLACK
DISTRIBUTOR
IGNITION SYSTEM GROUND
SPARK PLUGS


SPARK RETARD INPUT
IGNITION MODULE
YELLOW GROMMET

Ignition Control Module: Description and Operation

Typical Ignition System

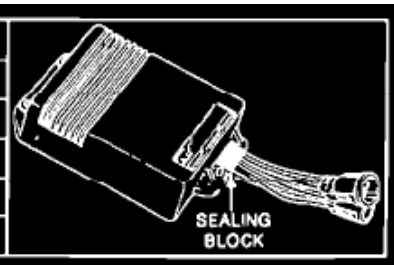
The Ignition Module shuts off the primary circuit each time it receives a pulse from the magnetic pick-up Fig. 9. A timing circuit in the ignition module turns the primary current back on after a short period of time. High voltage is created each time the magnetic field is built up and collapsed. The red ignition module wire provides operating voltage for the module's electronic components in the Run mode. The white module wire and start bypass provide increased voltage for the module and coil during Start mode.

Ignition Modules

Dura Spark II systems with UIM (Universal Ignition Module) Fig. 10 can respond to another control signal from either an Ignition Barometric Pressure Switch, Ignition Timing Vacuum Switch, or the Microprocessor Control Unit (MCU), depending on the engine calibration. Responding to this second signal, the UIM provides additional spark timing control for certain operating conditions by shutting off the ignition coil current flow at a different time than with just the distributor pick-up signal.

COLOR OF SEALING BLOCK*	TYPE OF IGNITION SYSTEM
Blue	Duraspark II
White	Duraspark II (Cranking Retard)
Yellow	Universal Ignition Module
Brown	Duraspark III (EEC-III System)
Blue (Module)	Thick-Film Ignition (TFI) Module

*Or Grommet.



Module Identification Chart

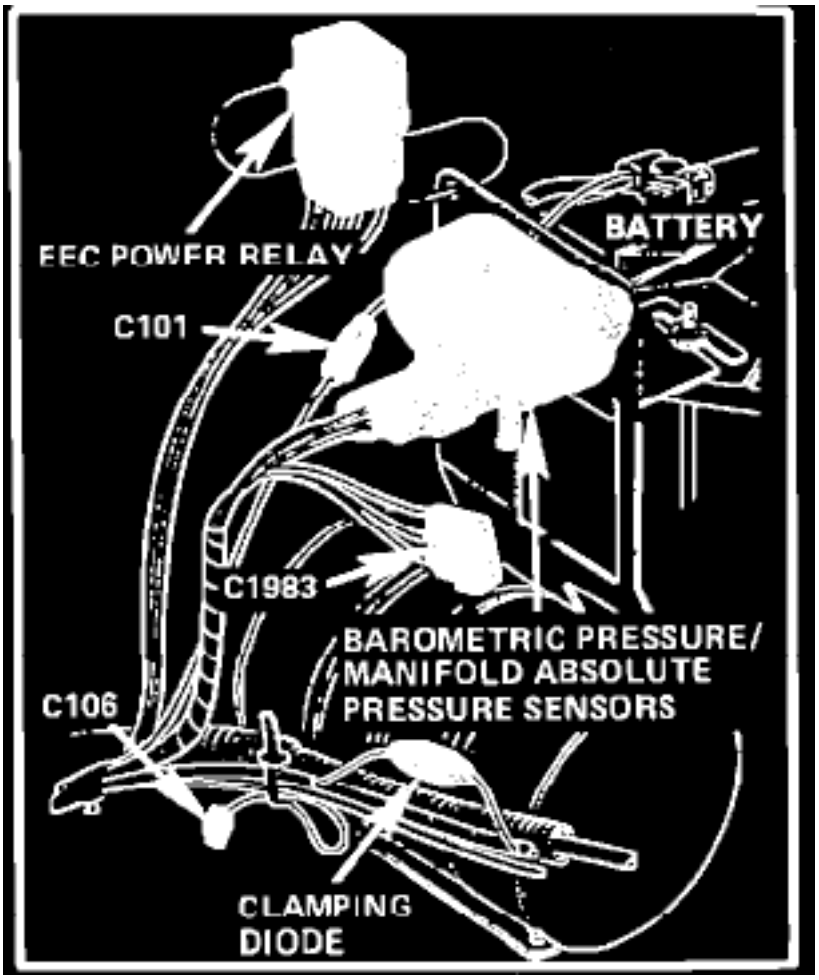
For proper ignition module identification refer to Fig. 1. The modules are not interchangeable, Dura Spark II has 6 wire connector while Dura Spark III has a 5 wire connector.

With EEC IV, measured between BK/W wire and ground with ignition on and engine off.

Engine	Year	Voltage @ Altitude
All w/EEC IV	1983-90	1.55-1.63 @ 0
		1.52-1.60 @ 1000
		1.49-1.56 @ 2000
		1.46-1.54 @ 3000
		1.43-1.51 @ 4000
		1.39-1.48 @ 5000
		1.36-1.45 @ 6000
		1.34-1.43 @ 7000

Engine	Year	Resistance (ohms) @ Altitude
All w/EEC III	1981-83	7.6-8.4 @ 0-1500
		7.2-8.1 @ 1500-2500
		6.9-7.8 @ 2500-3500
		6.7-7.3 @ 3500-4500
		6.6-7.2 @ 4500-5500
		6.3-7.0 @ 5500-6500
		6.1-6.7 @ 6500-7500
		5.4-6.7 @ 7500 and up

MANIFOLD ABSOLUTE AND BAROMETRIC PRESSURE SENSORS

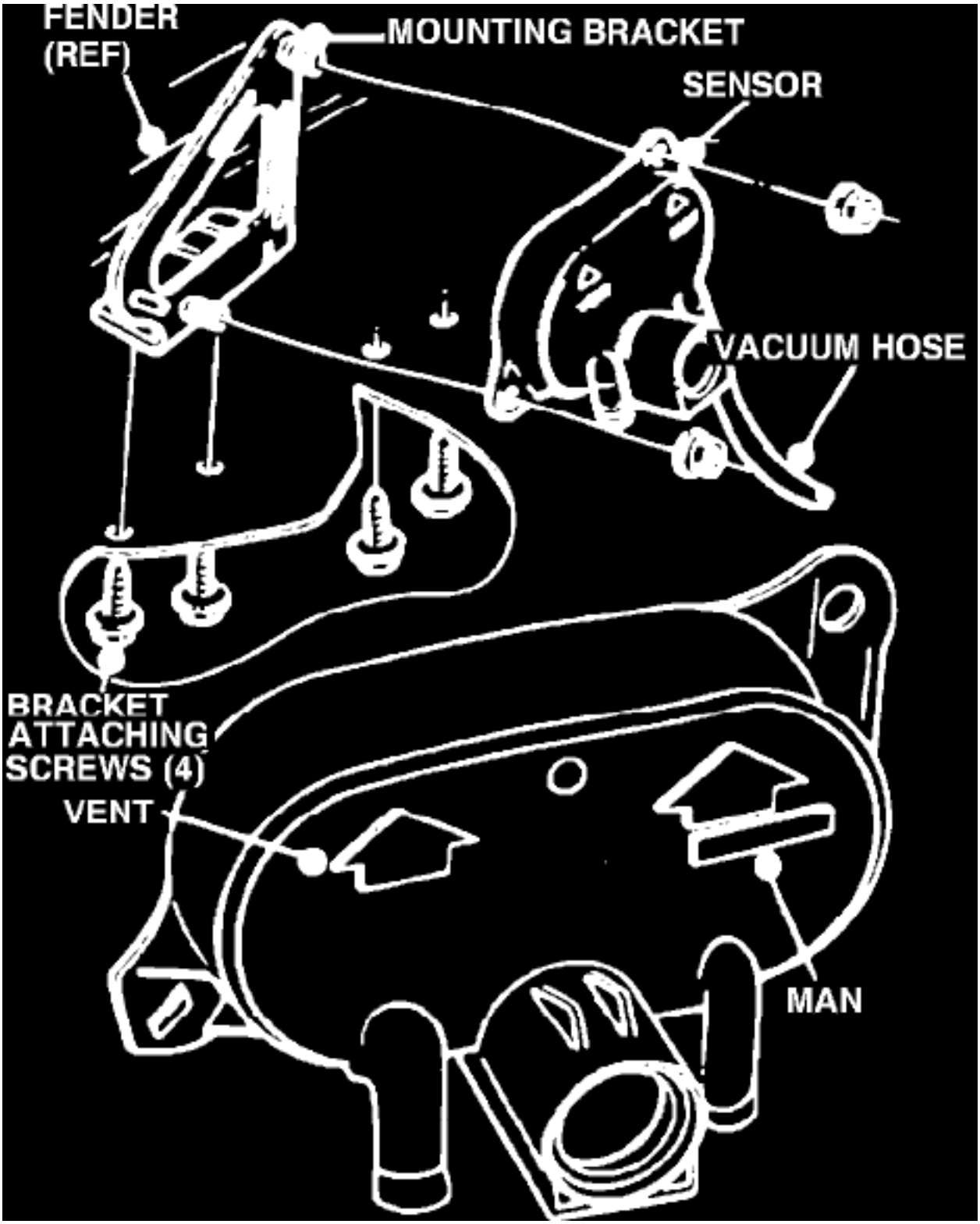


Barometric Pressure Sensor: Locations

Forward Of RH Wheelwell At Battery.

On Battery Support

Applicable to: 1981-83



Barometric Pressure Sensor: Description and Operation

Fig. 5 Barometric & manifold absolute pressure sensor

These two sensors, Fig. 5, are combined into one unit. The BMAP sensor monitors the absolute value of the intake manifold pressure and atmospheric pressure (manifold absolute pressure is defined as barometric pressure minus manifold vacuum). Atmospheric pressure changes are converted into an electrical signal and fed to the computer for evaluation. From this input, the computer determines the EGR flow requirements depending on the altitude at which the vehicle is being operated. Intake manifold pressure changes are converted by a pressure-sensing element and electrical circuit by the computer. The signal is used by the computer to determine part throttle spark advance, EGR flow rate and air/fuel ratio.

Barometric Pressure Sensor: Testing and Inspection Barometric Pressure Sensor

1. Disconnect switch from ignition module.

2. Connect suitable ohmmeter across switch terminals and compare resistance measured to values in chart.

3. Replace switch if resistance is not within specifications.

Engine	Year	Sensor	Resistance Ohms @ deg. F/C
All w/EEC IV	1983-90	Coolant, Air Charge	31,700-42,900 @ 68/20 13,650-18,650 @ 104/40 6500-8900 @ 140/60 3240-4440 @ 176/80 1770-2370 @ 212/100 980-1380 @ 248/115
All w/EEC III	1981-83	Coolant, Air Charge	1100-6000 1700-60,000

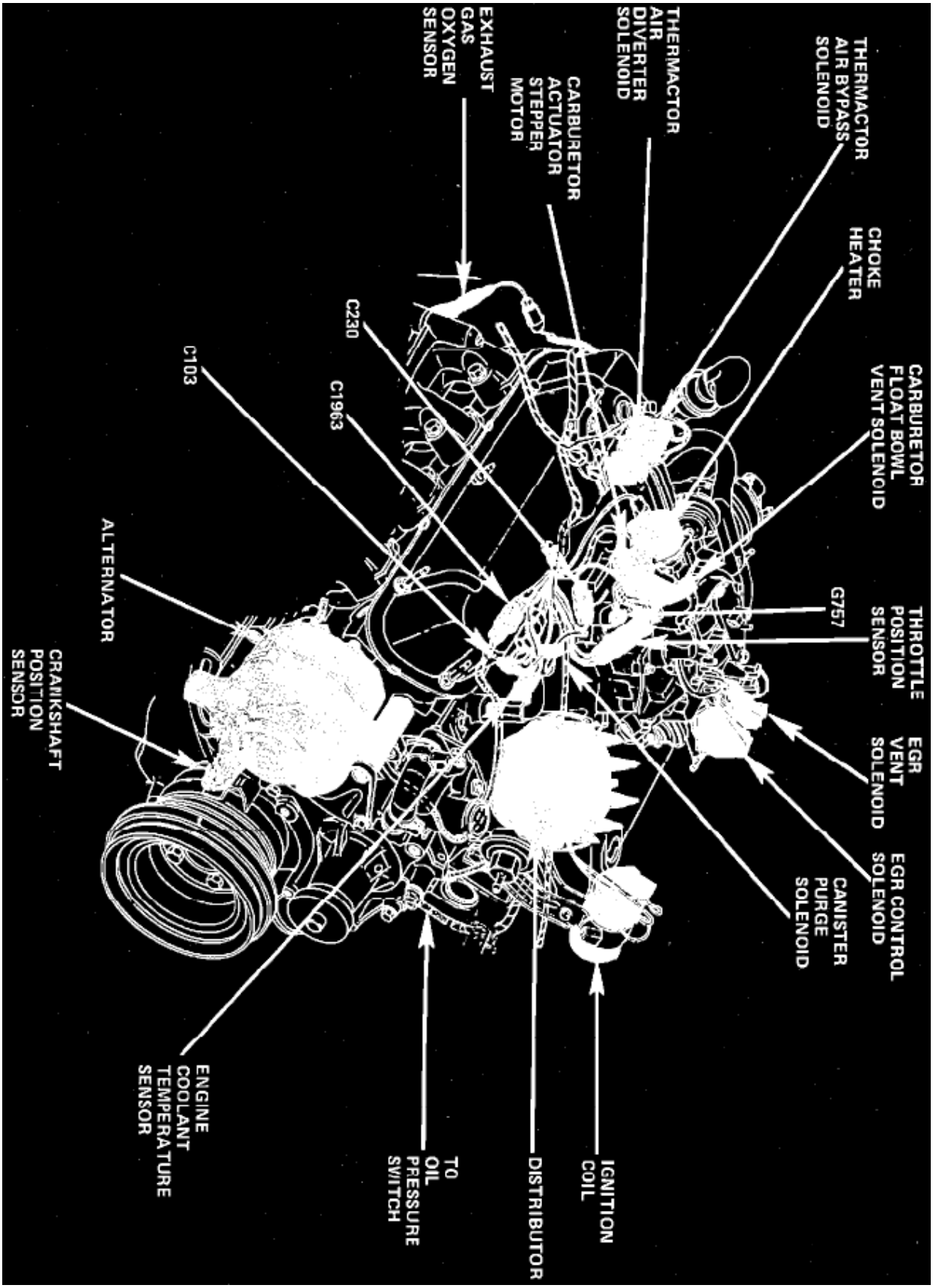
TEMPERATURE SENSORS

Coolant Temperature Sensor/Switch (For Computer): Description and Operation

This sensor incorporates a thermistor in a brass housing with an integral wiring connector extending from the body. This sensor is installed in the heater outlet fitting of the intake manifold. The thermistor is a resistor whose resistance value is high at low temperatures and decreases as the temperature rises. The computer applies a voltage to the sensor and monitors the resultant voltage drop across the thermistor.

Engine	Year	Resistance (ohms)
All w/EEC III	1981-83	100-640

CRANKSHAFT SENSOR

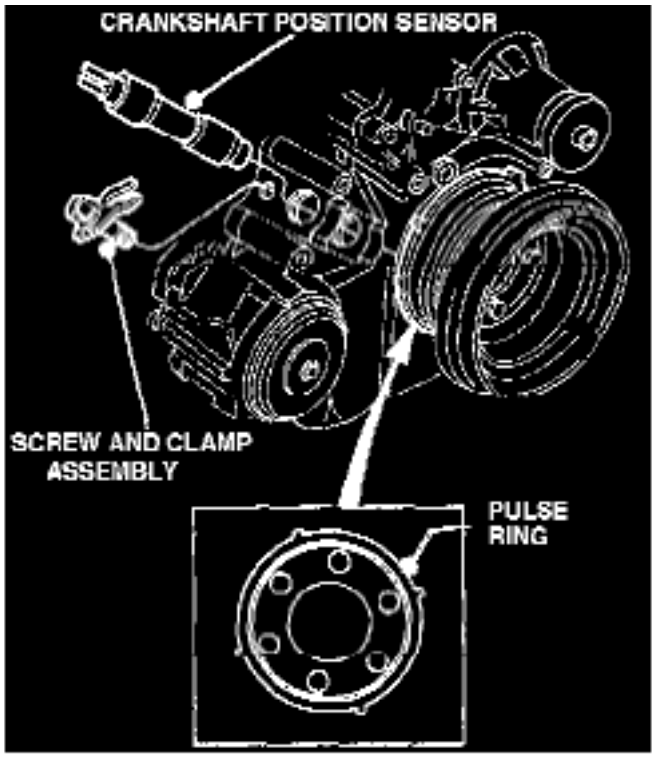


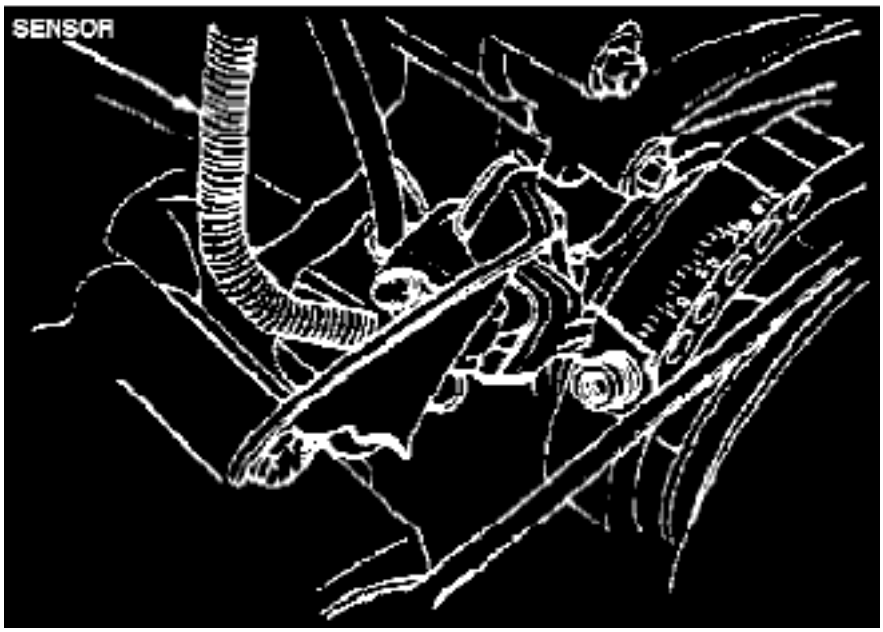
Crankshaft Position Sensor: Locations

Top RH Side Of Engine.

RH Front Of Engine

Applicable to: 1982-83 V8-302/5.0L & V8-351/5.8L Engines w/EEC





Crankshaft Position Sensor: Description and Operation

Fig.6 - Crankshaft Position Sensor

Fig.7 - Crankshaft Position Sensor

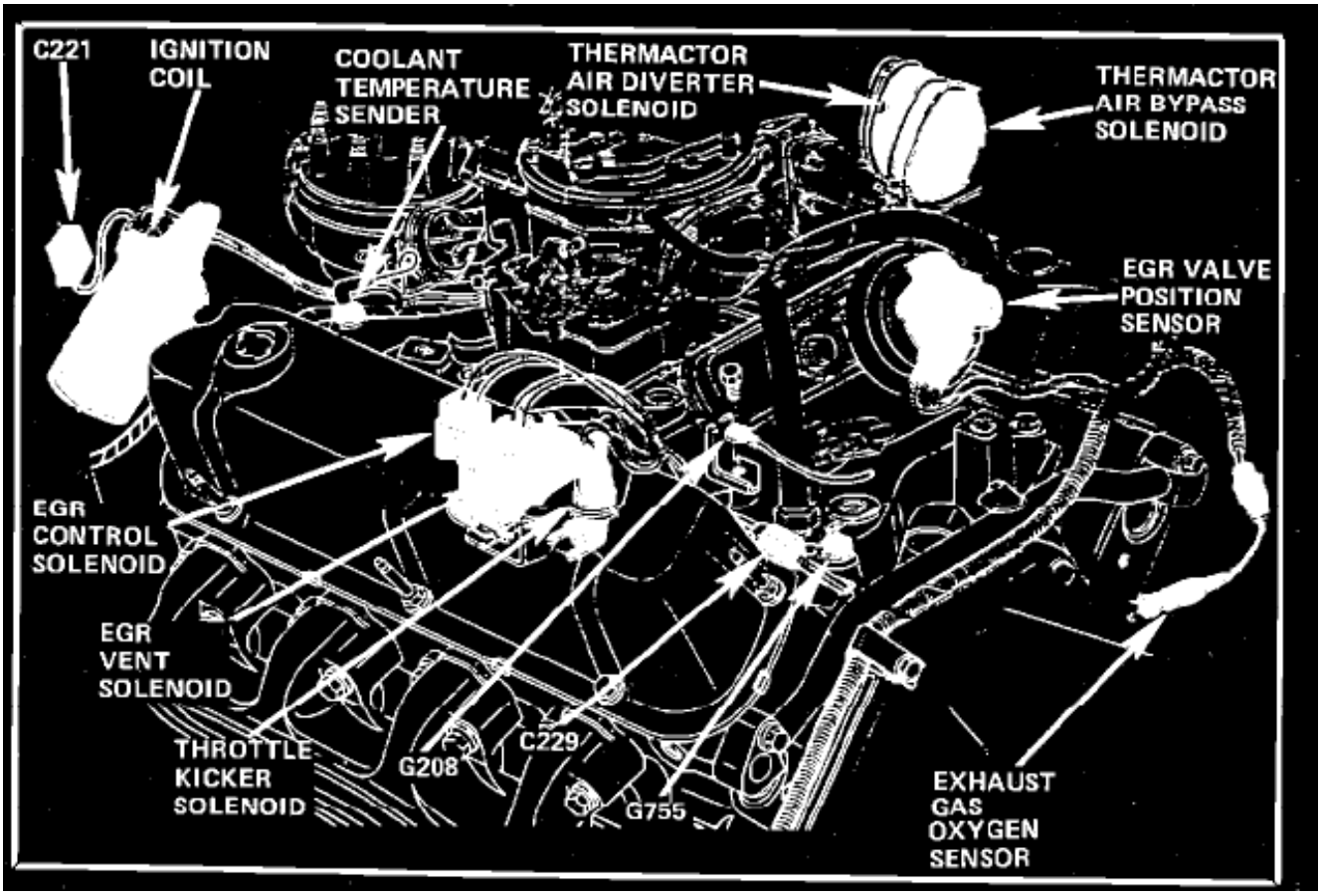
DESCRIPTION

The crankshaft vibration damper is fitted with a four-lobe "pulse ring" which provides the system with an accurate indication of when the pistons reach 10 BTDC. This indication is called the reference timing. Figs. 6 and 7.

The pulse ring is a powdered metal ring positioned on the crankshaft vibration damper during manufacture. It has four equally spaced lobes which represent crankshaft position when the pistons reach 10 BTDC.

During operation, the lobes on the pulse ring pass by the tip of the CP sensor. The pulse ring interrupts the magnetic field at the tip of the sensor. When the field is interrupted, an output signal is generated and sent to the ECA.

As the crankshaft turns, the ECA evaluates the electrical impulses to determine the exact position of the crankshaft at any given time. By the frequency of the impulses, the ECA can determine the engine speed. With these two factors, the ECA will determine the appropriate ignition timing advance required for best engine operation.

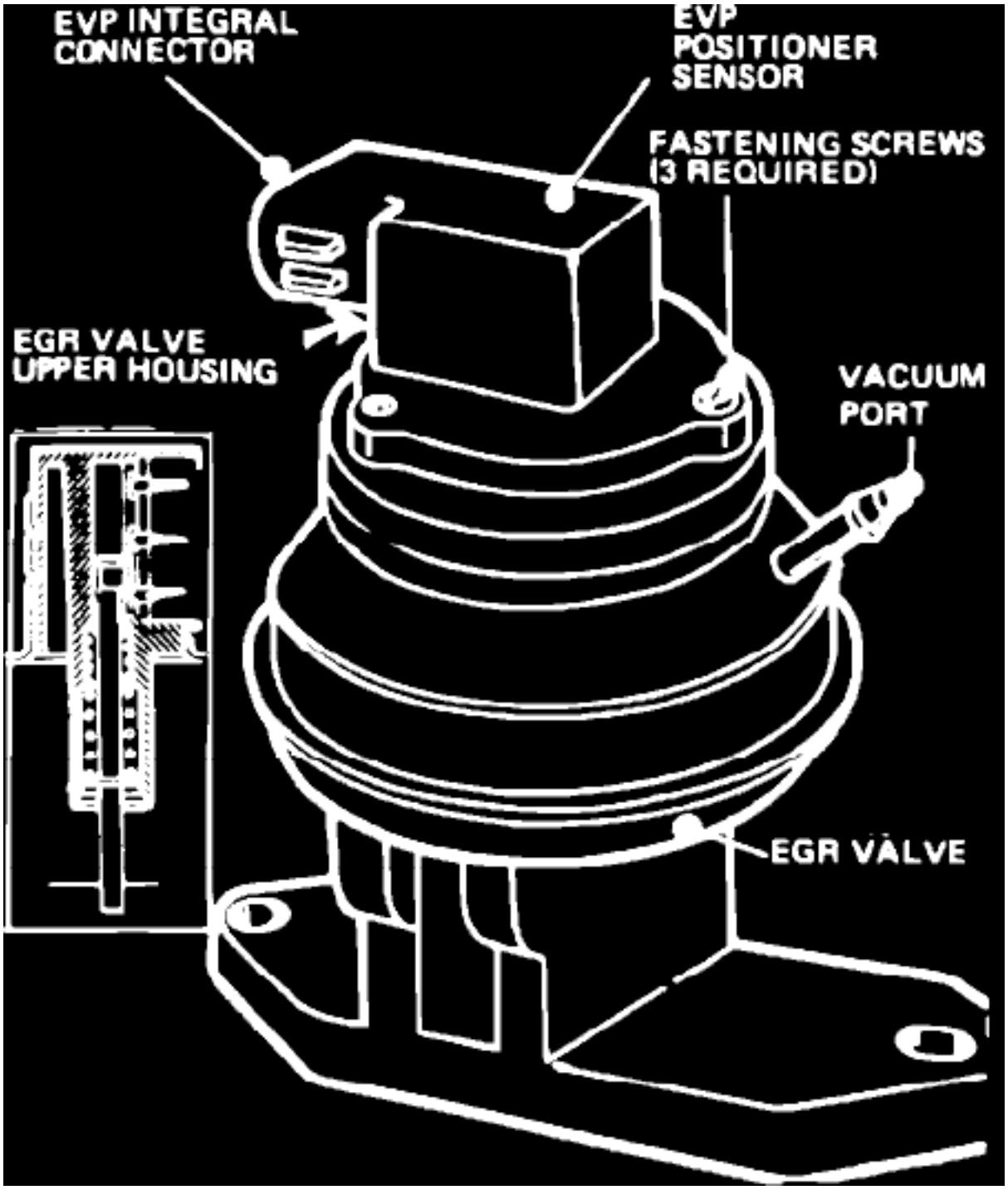


EGR Valve Position Sensor: Locations

LH Side Of Engine.

Rear Of Carburetor

Applicable to: 1982-83 V8-302/5.0L & V8-351/5.8L Engines w/EEC



EGR Valve Position Sensor: Description and Operation

Fig. 6 EGR valve position sensor

This sensor, Fig. 6, is used to monitor the EGR valve pintle position. The computer applies a reference voltage to the EVP sensor, and the resulting signal from the EVP sensor is proportional to the amount of exhaust gases flowing through the EGR valve pintle into the intake manifold.

Depending on the input from this and other sensors, the computer can increase or decrease EGR flow by activating or deactivating a pair of solenoid vacuum valves.

Engine	Year	Sensor	Resistance Ohms @ deg. F/C
All w/EEC IV	1983-90	Coolant, Air Charge	31,700-42,900 @ 68/20 13,650-18,650 @ 104/40 6500-8900 @ 140/60 3240-4440 @ 176/80 1770-2370 @ 212/100 980-1380 @ 248/115
All w/EEC III	1981-83	Coolant, Air Charge	1100-6000 1700-60,000

TEMPERATURE SENSORS

Intake Air Temperature Sensor: Description and Operation

DESCRIPTION

This sensor is used on models with fuel injection. It sends air temperature information to the Electronic Control Unit to make changes for air temperature variations.

Intake Air Temperature Sensor: Testing and Inspection Component Testing

NOTE: Prior to performing any test on this system, insure that temperature switch is above 65° F.

1. Disconnect connector from wiring harness.

2. Connect an ohmmeter or self-powered test light to temperature switch connector terminals.

3. Cool the switch to below 40° F by spraying with Refrigerant 12.

CAUTION: Do not spray refrigerant with engine running, as any refrigerant drawn into the carburetor and burned in the engine will produce poisonous phosgene gas. Conduct this procedure in well ventilated area.

4. When switch is cooled below 40° F. a.

On type 1 switches, the internal switch contacts should open. The ohmmeter should read maximum resistance or the test light should be off. If switch does not open below 40° F, replace switch.

b. On type 2 switches, the internal switch contacts should close. The ohmmeter should read zero resistance and the test light should be on. If test light does not go on or ohmmeter indicates a resistance of 1 ohm or more, replace switch.

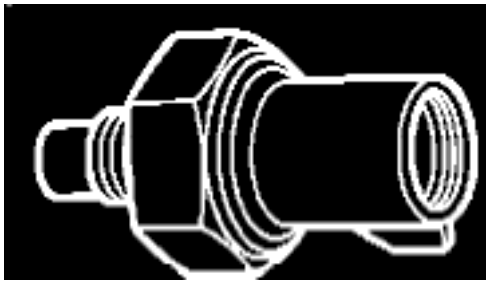
5. Increase switch temperature to above 70° F by placing palm of hand on metal surface of switch or by starting engine and allowing the exhaust manifold heat to increase the intake air temperature.

6. When switch temperature is above 70° F. a.

On type 1 switches, the internal switch contacts should close. The ohmmeter should read zero resistance and the test light should be on. If test light does not go on or ohmmeter indicates a resistance of 1 ohm or more, replace switch.

b. On type 2 switches, the internal switch contacts should open. The ohmmeter should read maximum resistance or the test light should be off. If switch does not open, replace switch.

c. If switch is replaced, check operation of new switch before connecting harness connector.

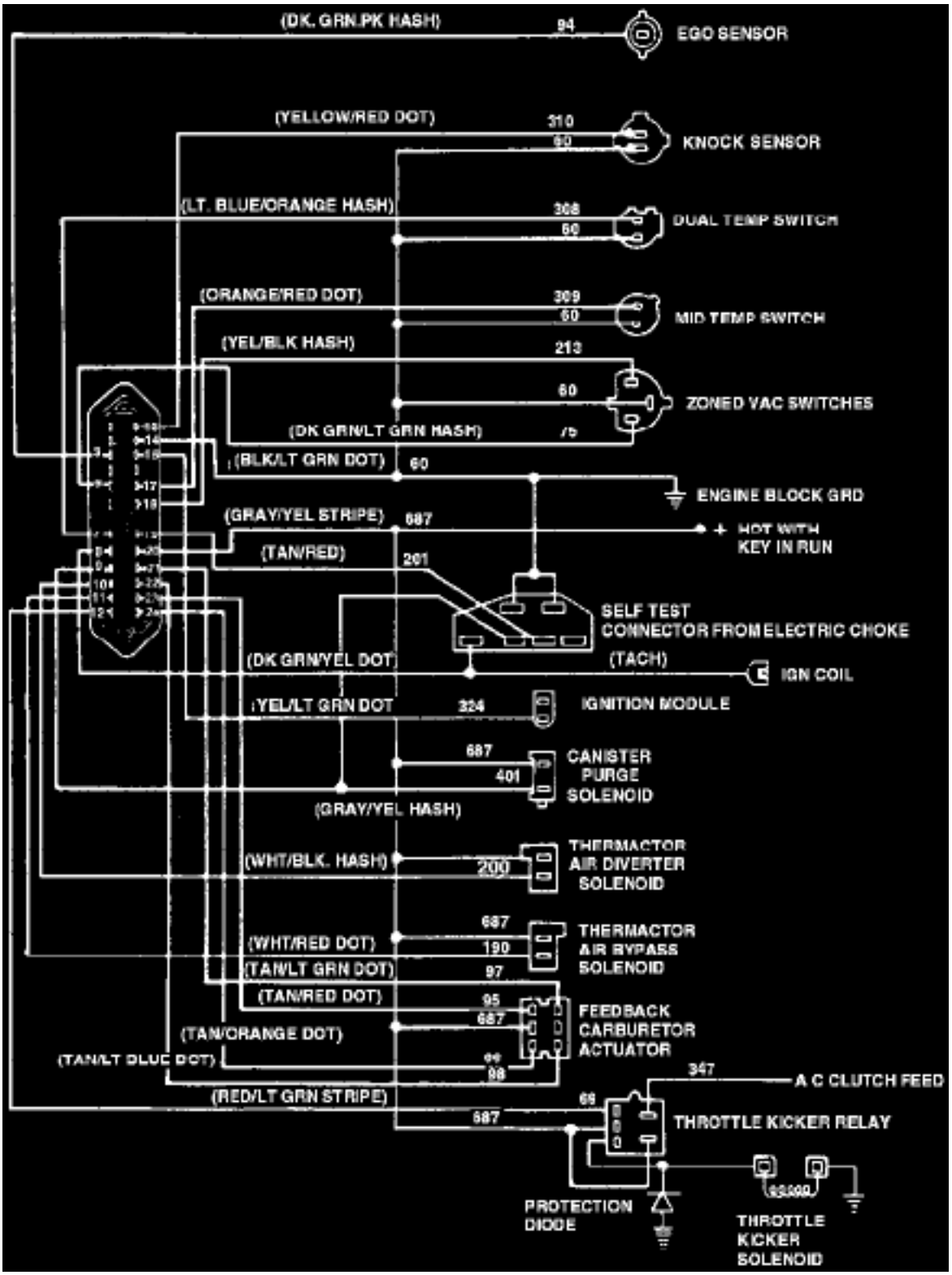


Knock Sensor: Description and Operation

Knock Sensor

The knock sensor, Fig. 11, is a piezo-electric accelerator accelerometer with the sensor designed to resonate at approximately the same frequency as the engine knock frequency.. The sensor uses the resonant frequency to mechanically amplify the engine knock frequency (5-6 KHz).

This method allows relatively large signals to be achieved without electrical amplification. The sensor has a thin circular piezoelectric ceramic disk which is bonded to a metal diaphragm. Electrical connections are made through a two-pin integral connector.



Knock Sensor: Testing and Inspection Component Testing

Fig.8 - MCU System Wiring Circuit

1. Make sure that the following three steps are properly conducted in order to simulate spark knock conditions and determine that spark detection

system is inoperative. If not, repeat test to verify problem. a. Make sure that engine is at normal operating temperature. Run engine at 2000 rpm for 2 minutes, then turn key off. Immediately restart engine

and allow to idle.

b. Observe voltmeter and vacuum gauge for initialization pulses after restarting the engine. The throttle kicker will also extend (increase engine

speed) and remain on throughout the test.

c. On vehicles with spark knock sensor, when initial pulses occur, immediately simulate spark knock by placing a 3/8 inch extension on manifold

near base of knock sensor. Tap end of extension with a small hammer for about 15 seconds.

2. Disconnect jumper wire from self-test trigger input circuit 201. 3. With ignition key off, disconnect vehicle harness from spark knock sensor. 4. Using a torque wrench and a 1 1/8 inch deep socket, make sure that spark sensor is torqued to 12-18 ft. lbs. If sensor is properly torqued, proceed

to next step. If not, torque to specifications.

5. Disconnect vehicle harness from MCU and spark sensor. Connect one lead of an ohmmeter to circuit 310 of vehicle harness and other lead to

engine block, Fig. 8. If resistance is 1000 ohms or more, proceed to next step. If resistance is less than 1000 ohms, repair short to ground in circuit 301.

6. With key off and knock sensor harness disconnected, check circuit 310 of vehicle harness for continuity. If resistance is 10 ohms or less, continue

to next step. If resistance is greater than 10 ohms, repair circuit 310.

7. Check circuit 60 of vehicle harness for continuity between knock sensor and MCU, Fig. 8. If resistance is 10 ohms or less, reconnect harness

connector to MCU and proceed to next step. If resistance is greater than 10 ohms, service circuit 60.

8. Reconnect jumper wire to circuits 201 and 60 of VIP connector, Fig. 8. 9. Connect a test lamp to positive terminal of battery, then disconnect knock sensor from vehicle harness.

10. Perform "Engine Running Functional Test" procedure. When the four initialization pulses occur, continuously tap circuit 310 of the vehicle

harness connector, which mates to the knock sensor connector, with the probe end for 5 seconds while observing voltmeter pulses. If a code 25 is

observed, replace MCU. If any other code is observed, replace spark knock sensor.

SPARK KNOCK, ONLY AT WIDE OPEN THROTTLE AND/OR POOR PERFORMANCE/MILEAGE

1. If engine has a spark knock sensor, disconnect it. 2. Make sure that ignition timing is within specifications. 3. With engine running at normal operating temperature, disconnect the two wire ignition module connector (yellow wire is circuit 324 and

black/white wire is circuit 69) from vehicle harness. Using a jumper wire, jump the wires together at the ignition module and note ignition timing. Remove jumper wire and note ignition timing. If timing retards 16-20 degrees, reconnect ignition module and proceed to next step. If timing does not retard 16-20 degrees, replace ignition module and repeat steps 1, 2 and 3.

4. With engine at normal operating temperature, set high cam on lowest step that will maintain engine speed greater than 1200 rpm. Note ignition

timing, then disconnect and plug vacuum hose from zone vacuum switch and again note timing. If timing retards more than 5 degrees, on engines with spark knock sensor, proceed to step 6, on all other engines MCU system is okay. If timing does not retard more than 5 degrees, proceed to next step.

5. With engine still at 1200 rpm, disconnect ignition module (connector with yellow and black/white wires). If timing retards, check circuit 324 for

short to ground. If circuit is okay, replace MCU unit and retest. If timing does not retard, check circuit 324 for open circuit. If circuit is okay, Replace MCU unit and retest.

6. On engines with spark knock sensor, reconnect sensor. Repeat Engine Running Functional Test, but do not simulate knock by taping sensor. If

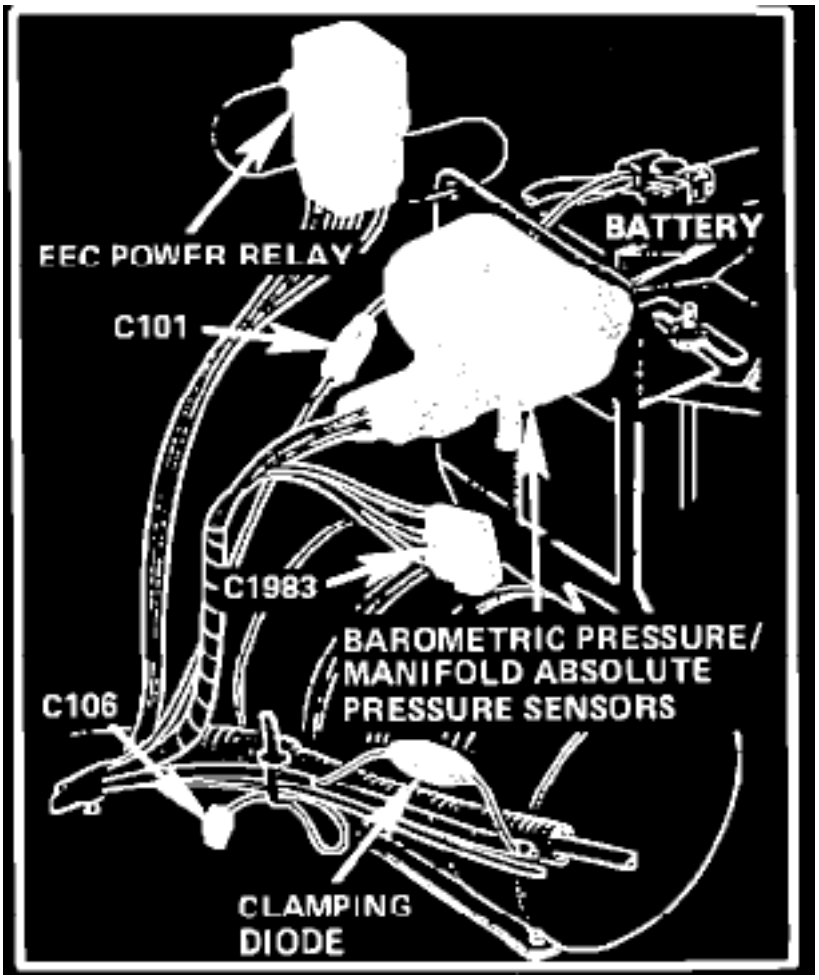
service code 25 appears, MCU system is okay, testing is completed. If any other service code appears, replace knock sensor and retest.

With EEC IV, measured between BK/W wire and ground with ignition on and engine off.

Engine	Year	Voltage @ Altitude
All w/EEC IV	1983-90	1.55-1.63 @ 0 1.52-1.60 @ 1000 1.49-1.56 @ 2000 1.46-1.54 @ 3000 1.43-1.51 @ 4000 1.39-1.48 @ 5000 1.36-1.45 @ 6000 1.34-1.43 @ 7000

Engine	Year	Resistance (ohms) @ Altitude
All w/EEC III	1981-83	7.6-8.4 @ 0-1500 7.2-8.1 @ 1500-2500 6.9-7.8 @ 2500-3500 6.7-7.3 @ 3500-4500 6.6-7.2 @ 4500-5500 6.3-7.0 @ 5500-6500 6.1-6.7 @ 6500-7500 5.4-6.7 @ 7500 and up

MANIFOLD ABSOLUTE AND BAROMETRIC PRESSURE SENSORS

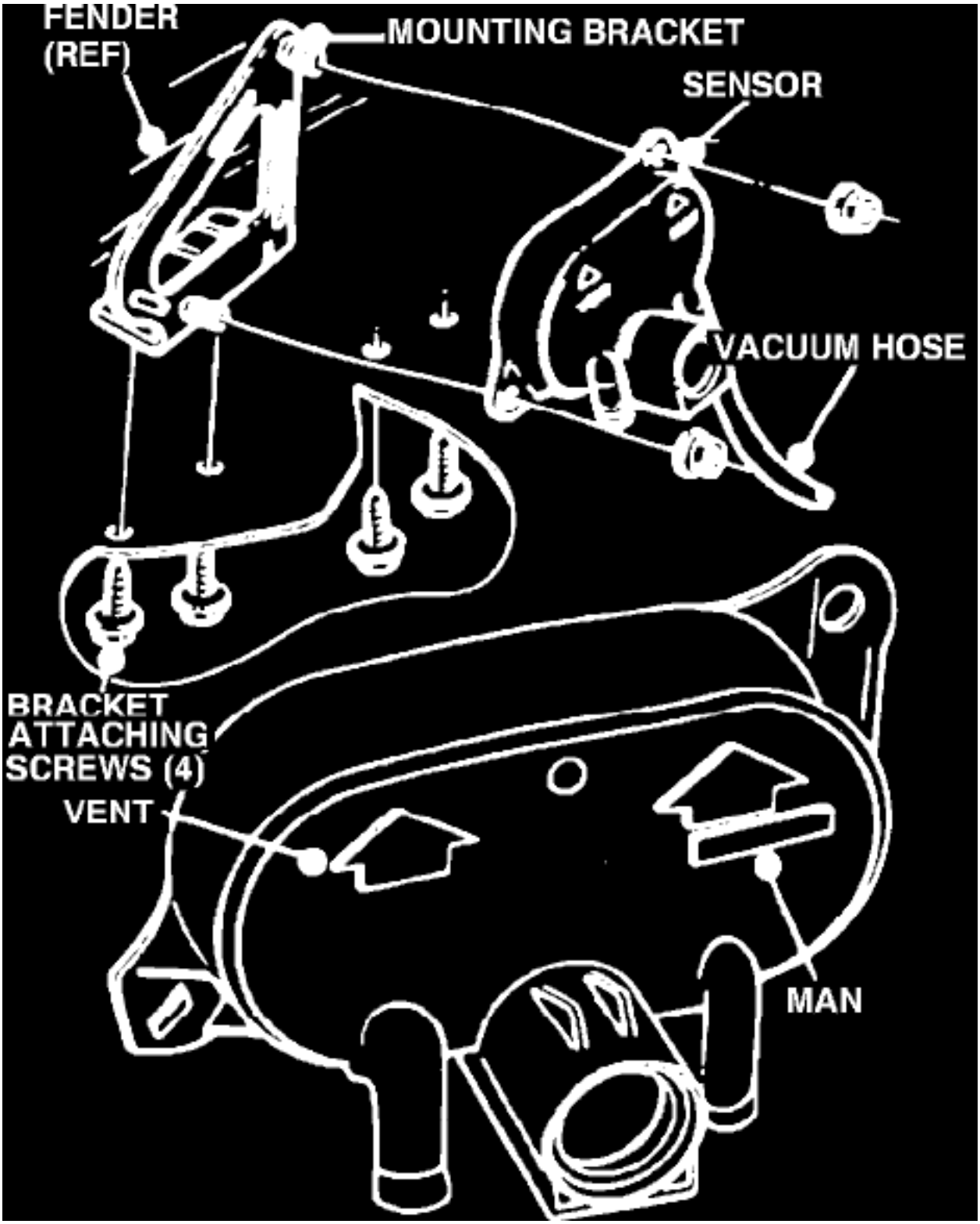


Manifold Pressure/Vacuum Sensor: Locations

Forward Of RH Wheelwell At Battery.

On Battery Support

Applicable to: 1981-83



Manifold Pressure/Vacuum Sensor: Description and Operation

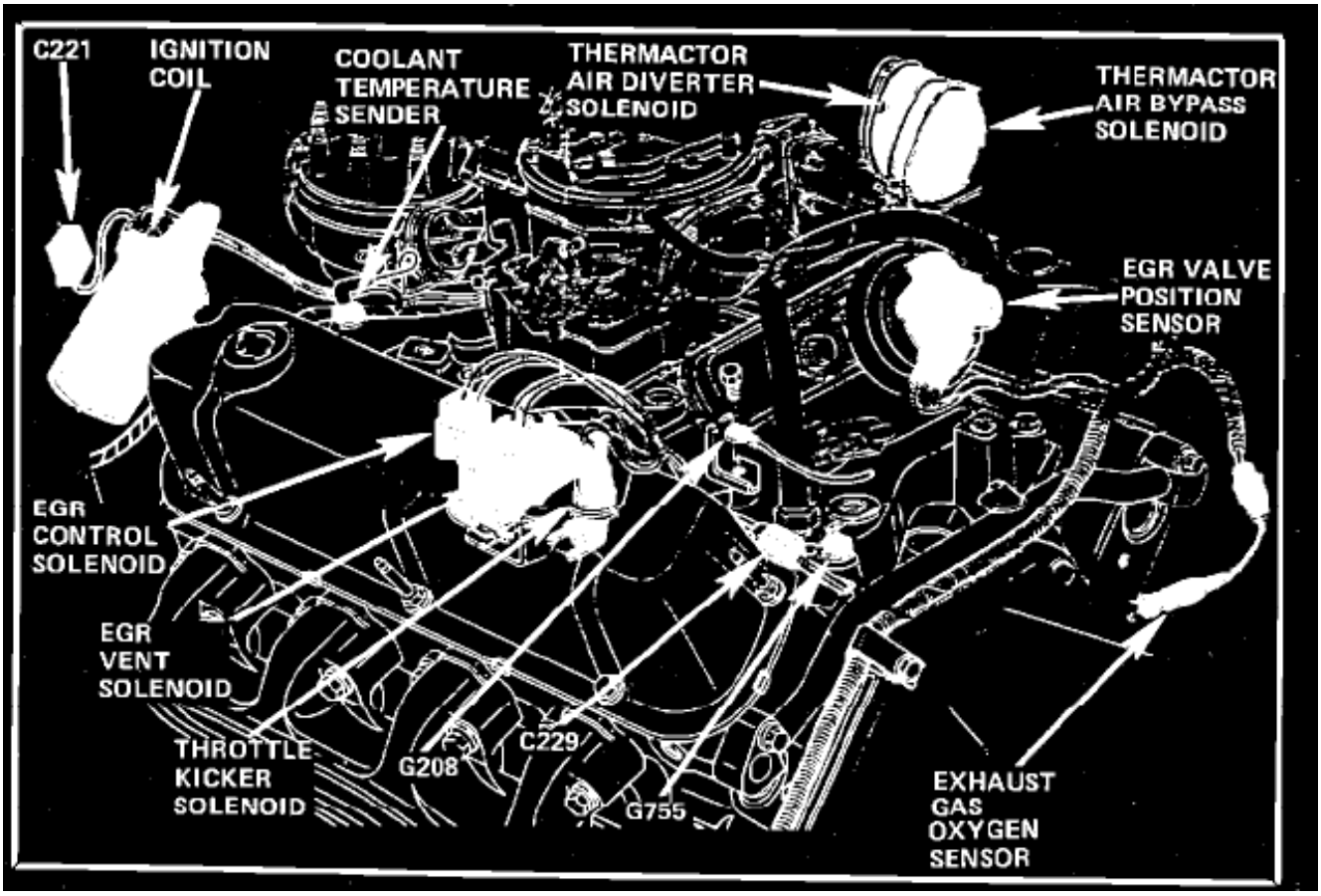
Fig. 5 Barometric & manifold absolute pressure sensor

DESCRIPTION

These two sensors, Fig. 5, are combined into one unit. The BMAP sensor monitors the absolute value of the intake manifold pressure and atmospheric pressure (manifold absolute pressure is defined as barometric pressure minus manifold vacuum).

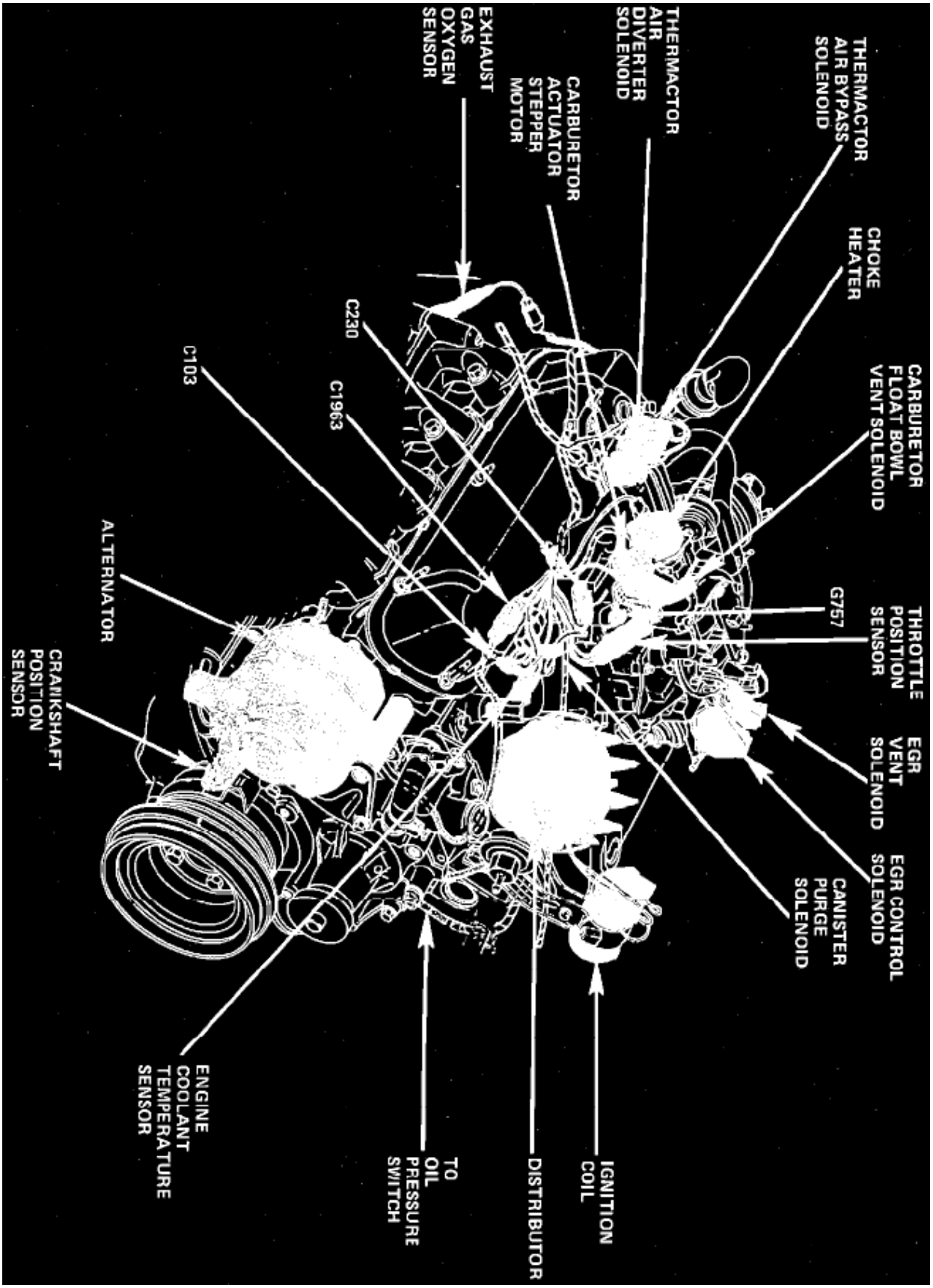
Atmospheric pressure changes are converted into an electrical signal and fed to the computer for evaluation. From this input, the computer determines the EGR flow requirements depending on the altitude at which the vehicle is being operated.

Intake manifold pressure changes are converted by a pressure-sensing element and electrical circuit by the computer. The signal is used by the computer to determine part throttle spark advance, EGR flow rate and air/fuel ratio.



Oxygen Sensor: Locations

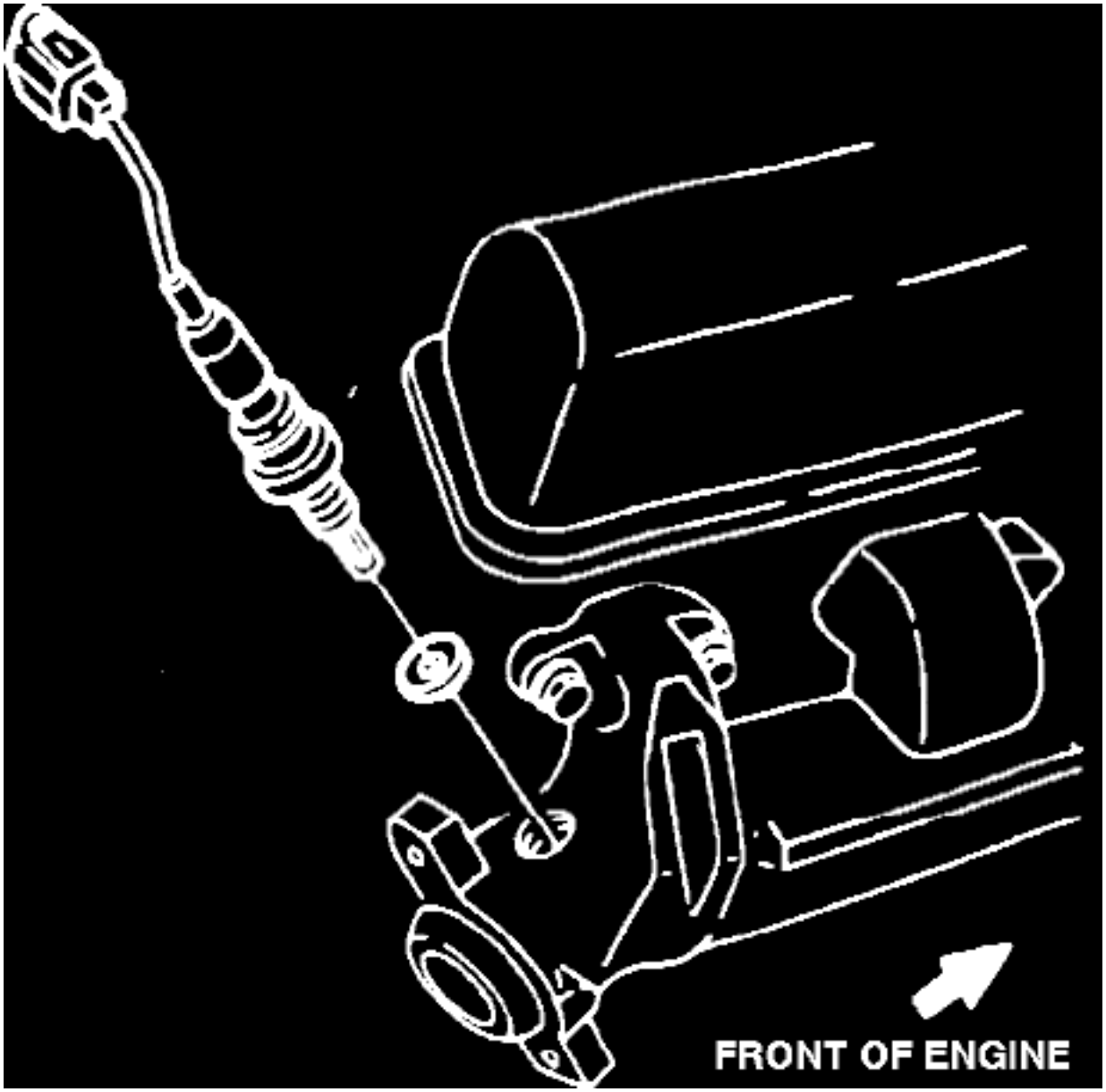
LH Side Of Engine.


THERMACTOR AIR BYPASS SOLENOID
CHOKE HEATER
CARBURETOR FLOAT BOWL VENT SOLENOID
THERMACTOR AIR DIVERTER SOLENOID
CARBURETOR ACTUATOR STEPPER MOTOR
EXHAUST GAS OXYGEN SENSOR
C230
C1963
C103
G757
THROTTLE POSITION SENSOR
EGR VENT SOLENOID
EGR CONTROL SOLENOID
CANISTER PURGE SOLENOID
ALTERNATOR
CRANKSHAFT POSITION SENSOR
ENGINE COOLANT TEMPERATURE SENSOR
TO OIL PRESSURE SWITCH
DISTRIBUTOR
IGNITION COIL

Top RH Side Of Engine.

Rear RH Side Of Engine On Manifold

Applicable to: 1982-83 V8-302/5.0L & V8-351/5.8L Engines w/EEC



Oxygen Sensor: Description and Operation

Fig. 4 Exhaust gas oxygen sensor

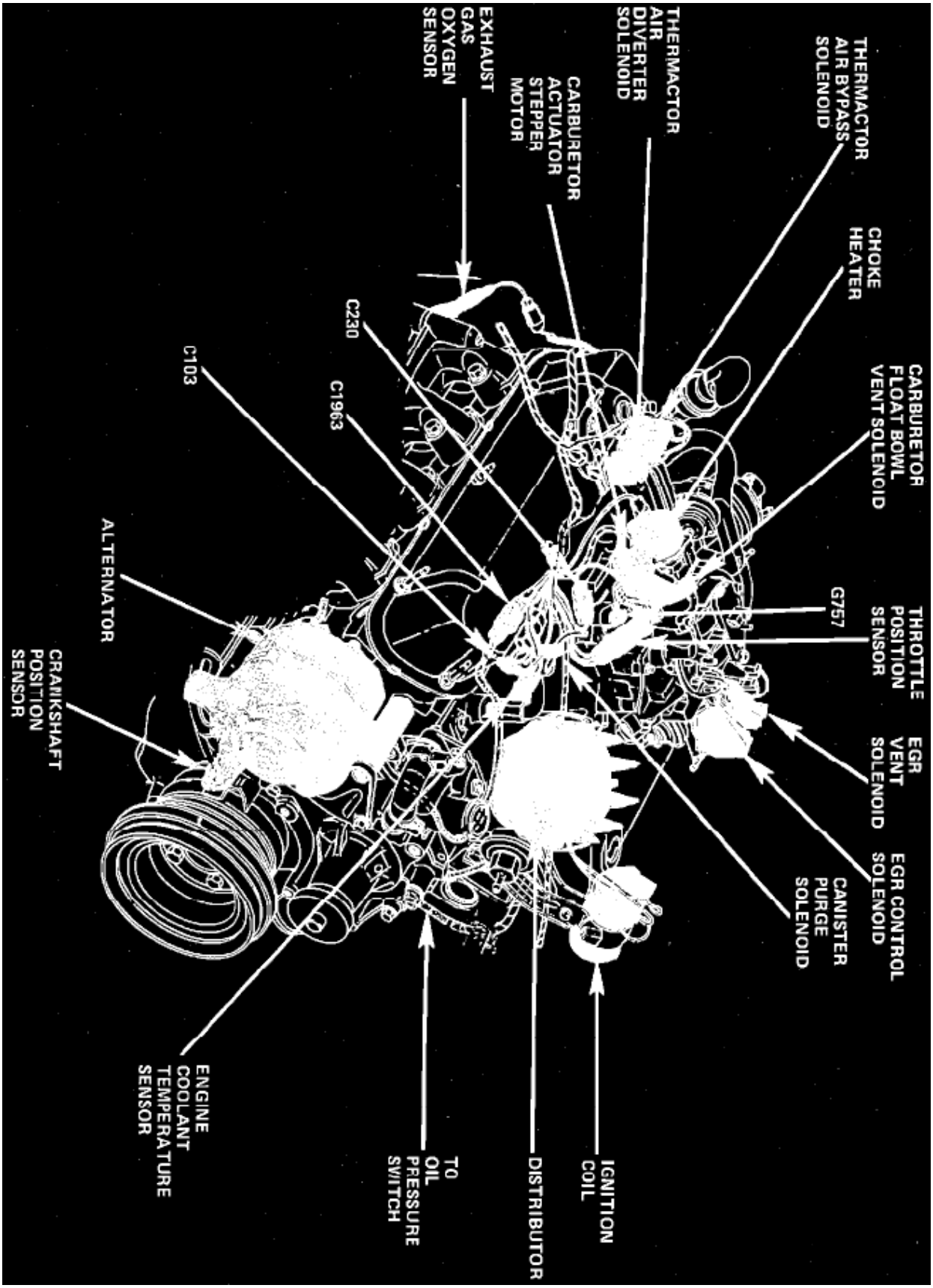
This sensor, Fig. 4, is installed in the exhaust manifold and provides information to the ECA as to the oxygen content of the exhaust gases. It monitors the oxygen content of the exhaust gases and generates an output of .6 to 1.0 volt when detecting a rich exhaust gas mixture (absence of oxygen) and less than .2 volts when detecting a lean mixture (presence of oxygen). This constantly changing voltage signal is sent to the ECA for analysis. The outer surface of the sensor is a threaded steel housing and shell. The sensor body is protected by a shield pressed into the housing where it projects into the exhaust manifold. Exhaust gases contact the sensor body by entering through flutes in the sensor shield. A vent is provided in the shell to allow atmospheric air to enter the inner portion of the sensor body. The sensor connects to the vehicle wiring harness with a connector that is attached to the inner (positive) terminal. The shell is the negative terminal

of the sensor and provides the return signal path through the engine block.

Engine	Year	TPS Voltage	
		Minimum	Maximum
All w/EEC III	1981	1.80-2.40	6.0 min.
All w/EEC III	1982-83	1.60-2.40	6.0 min.
All w/EEC IV	1984-88	0.90-1.00†	—
2.3L	1989-90	.34	4.84
2.9L	1989-90	.34	4.84
3.0L	1989-90	.34	4.84
4.0L	1990	.34	4.84
4.9L	1989-90	.20	4.84
5.0L	1989-90	.20	4.84
5.6L, 7.5L	1989-90	.20	4.84
w/4-speed AT	1989-90	.34	4.84

† Adjustable units only.

THROTTLE POSITION SENSOR SPECIFICATIONS

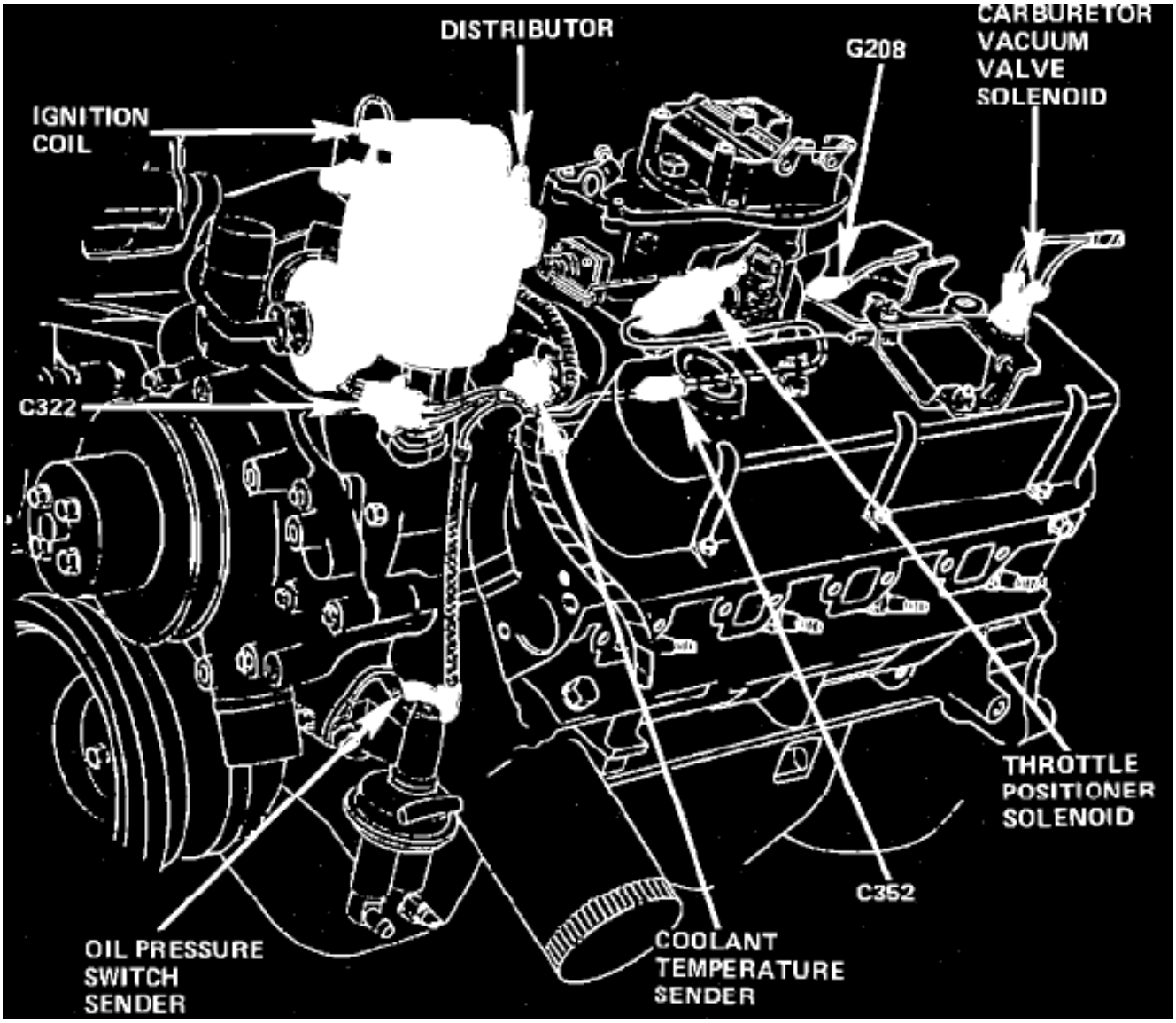


Throttle Position Sensor: Locations

Top RH Side Of Engine.

RH Rear Of Carburetor

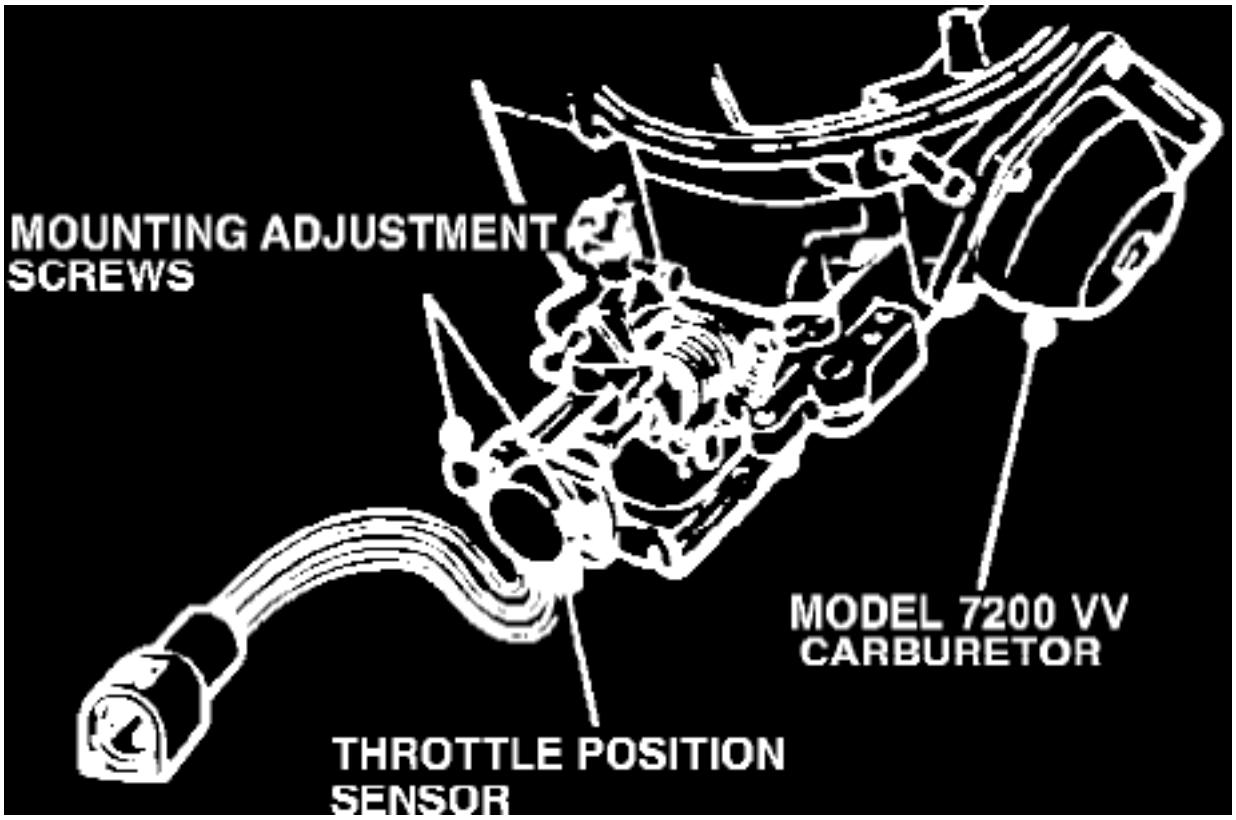
Applicable to: 1982-83 V8-302/5.0L & V8-351/5.8L Engines w/EEC



LH Side Of Engine.

RH Rear Of Carburetor

Applicable to: 1982-83 V8-255/4.2L & V8-302/5.0L Engines



Throttle Position Sensor: Description and Operation

Fig. 2 Throttle position sensor (typical)

This sensor, Fig. 2, is basically a rheostat switch attached to the carburetor throttle shaft and responds to throttle valve angle changes. The throttle angles are classified into three operating modes as follows:

a. Closed Throttle (Idle or Deceleration)

b. Part Throttle

c. Wide Open Throttle (Maximum Acceleration)

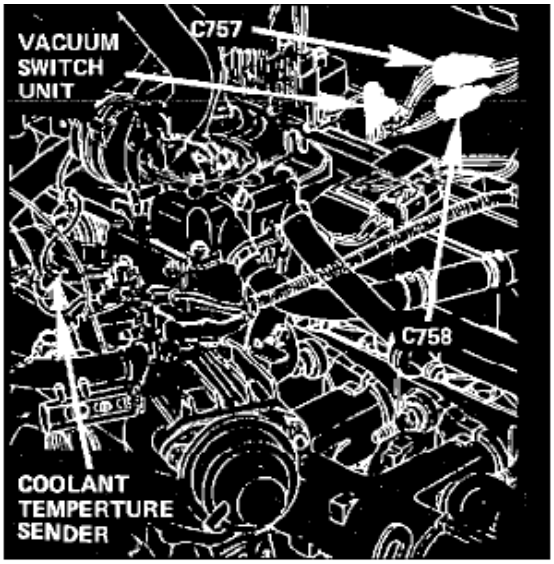
The ECA applies a reference voltage of about 9 volts to the sensor. The resultant sensor voltage supplied to the ECA, which is determined by the throttle position, is used by the ECA to determine the proper amount of spark advance, EGR flow, air/fuel ratio and thermactor air mode. The throttle position sensor mounting holes are slotted to permit adjustment. If the sensor is replaced, it must be correctly positioned or incorrect throttle information will be sent to the ECA. The adjustment requires use of special electronic test equipment.

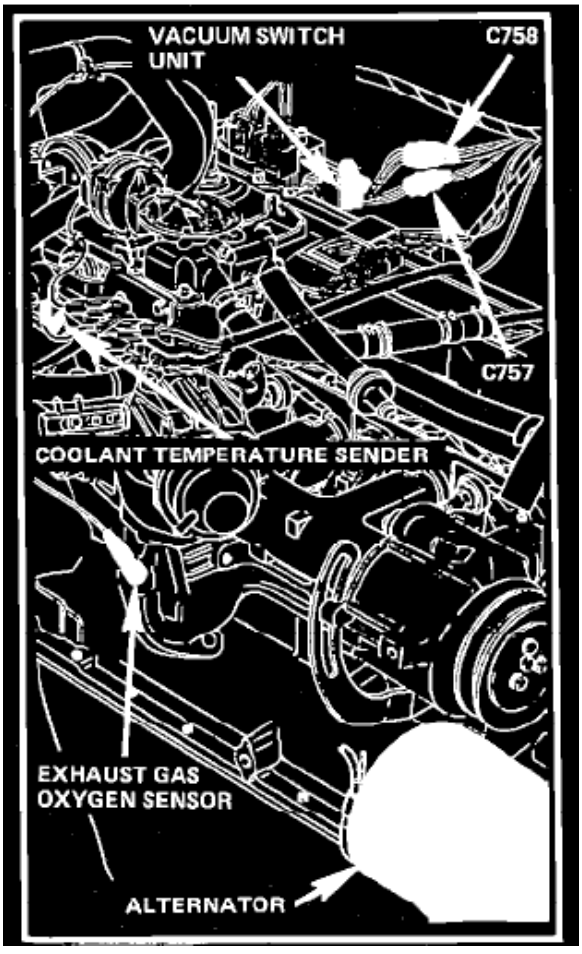
Throttle Position Sensor: Adjustments

Engines with EEC III Turn ignition to RUN position and remove vacuum hose from throttle kicker, as equipped. With engine not running, compare voltage reading against specifications and adjust as needed.

Engines with EEC IV Connect positive probe of DVOM along terminal C (lower) of TPS and connect negative probe along terminal A (upper). Turn ignition on but do not start vehicle. Adjust TPS to specified value.

Ford Bronco Workshop Manual (V8-351 5.8L VIN G 2-bbl (1982))
Ford Workshop Manuals > Powertrain Management > Sensors and Switches - Powertrain Management > Sensors and Switches - Computers and Control Systems > Vacuum Switch > Component Information > Locations





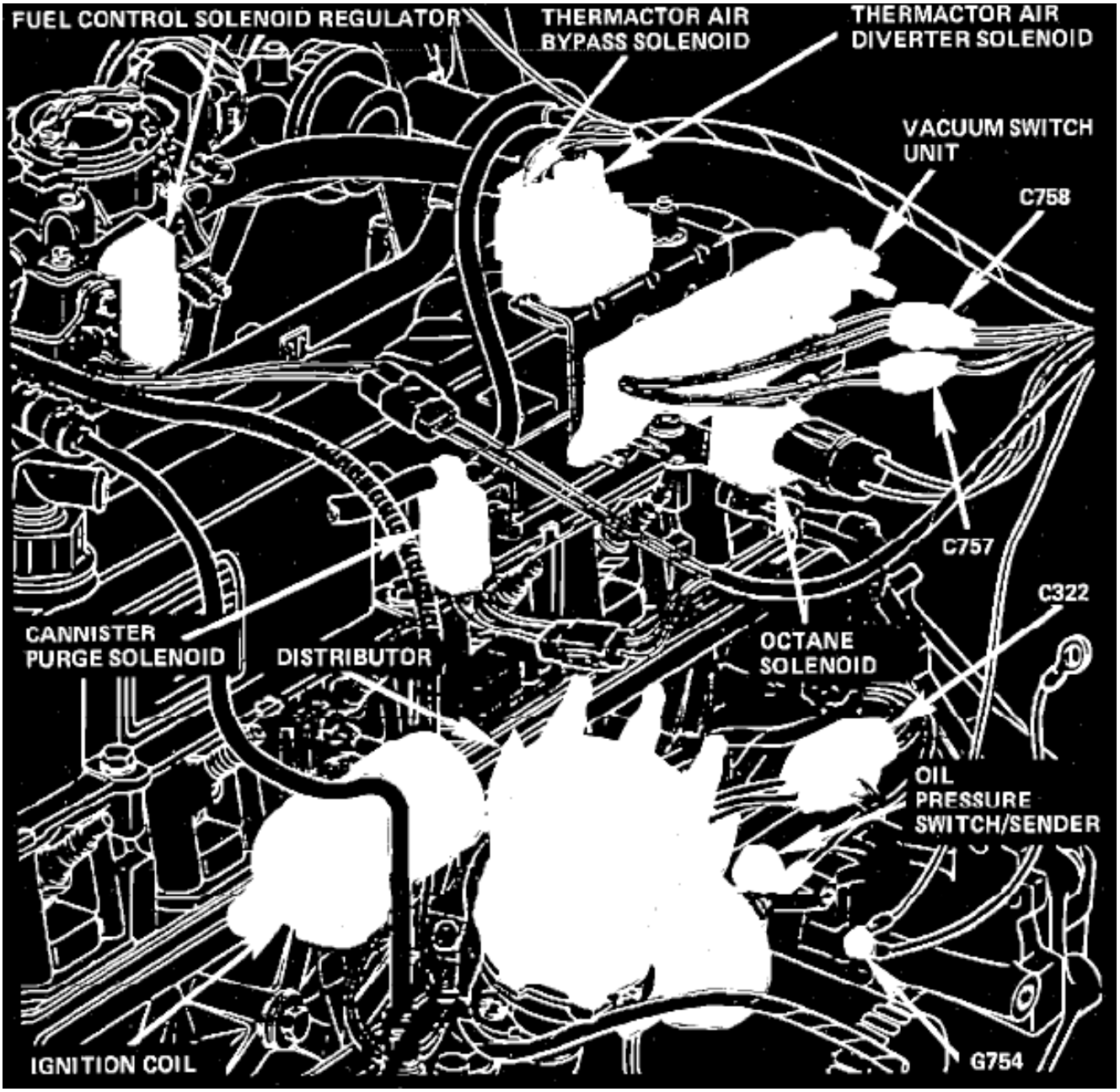
Vacuum Switch: Locations

RH Side Of Engine.

Center Rear Of Engine On Valve Cover

Applicable to: 1982-83 6-300/4.9L Engine

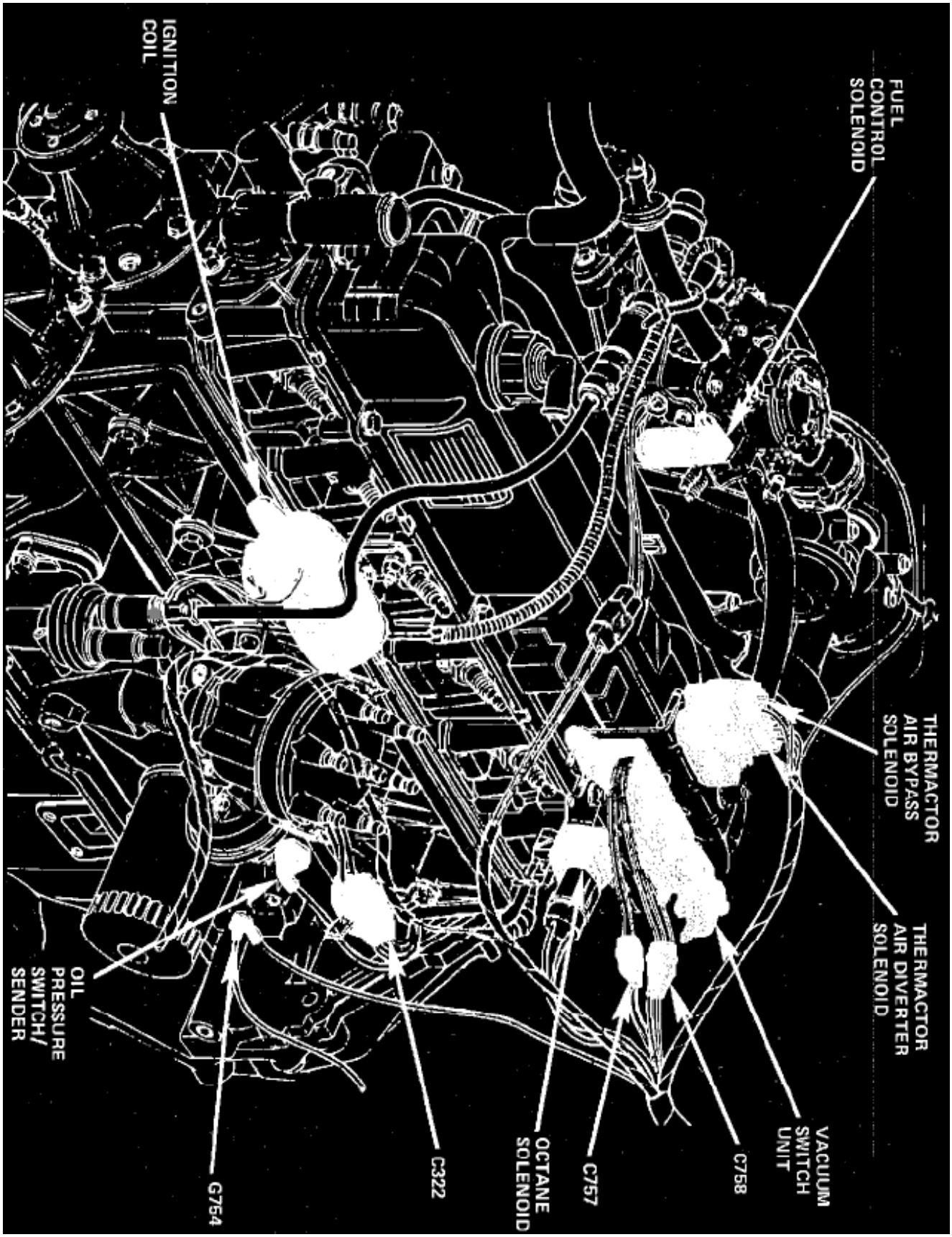
RH Side Of Engine.



LH Side Of Engine.

Center Rear Of Engine On Valve Cover

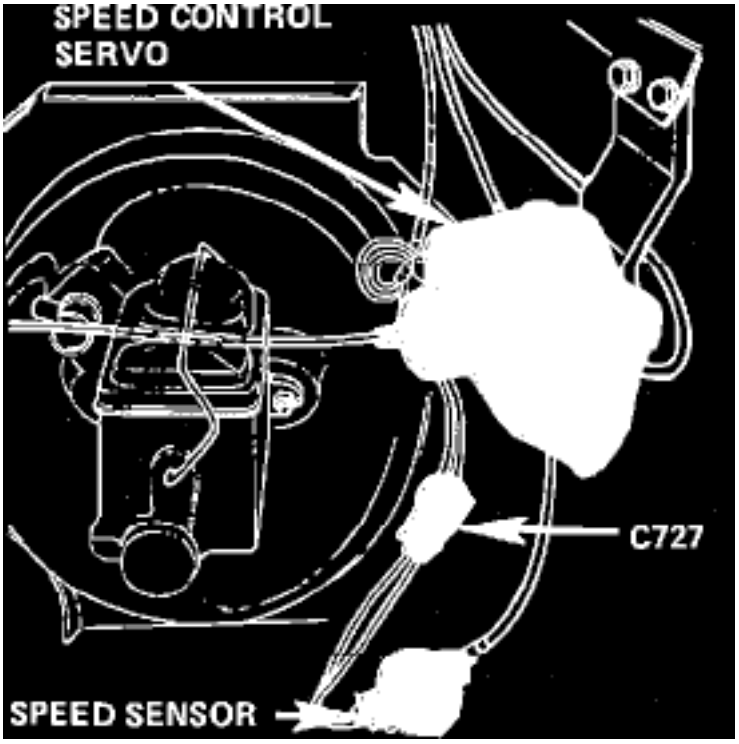
Applicable to: 1981 6-300/4.9L Engine w/MCU


FUEL CONTROL SOLENOID
THERMACTOR AIR BYPASS SOLENOID
THERMACTOR AIR DIVERTER SOLENOID
VACUUM SWITCH UNIT
C758
C757
OCTANE SOLENOID
C322
G754
OIL PRESSURE SWITCH/ SENDER
IGNITION COIL

LH Side Of Engine.

Center Rear Of Engine On Valve Cover

Applicable to: 1982-83 6-300/4.9L Engine w/MCU



Vehicle Speed Sensor: Locations

LH Side Of Dash Panel.

Below LH Side Of Master Brake Cylinder

Applicable to: V8 Engine

Vehicle Speed Sensor: Testing and Inspection Speed Sensor Test

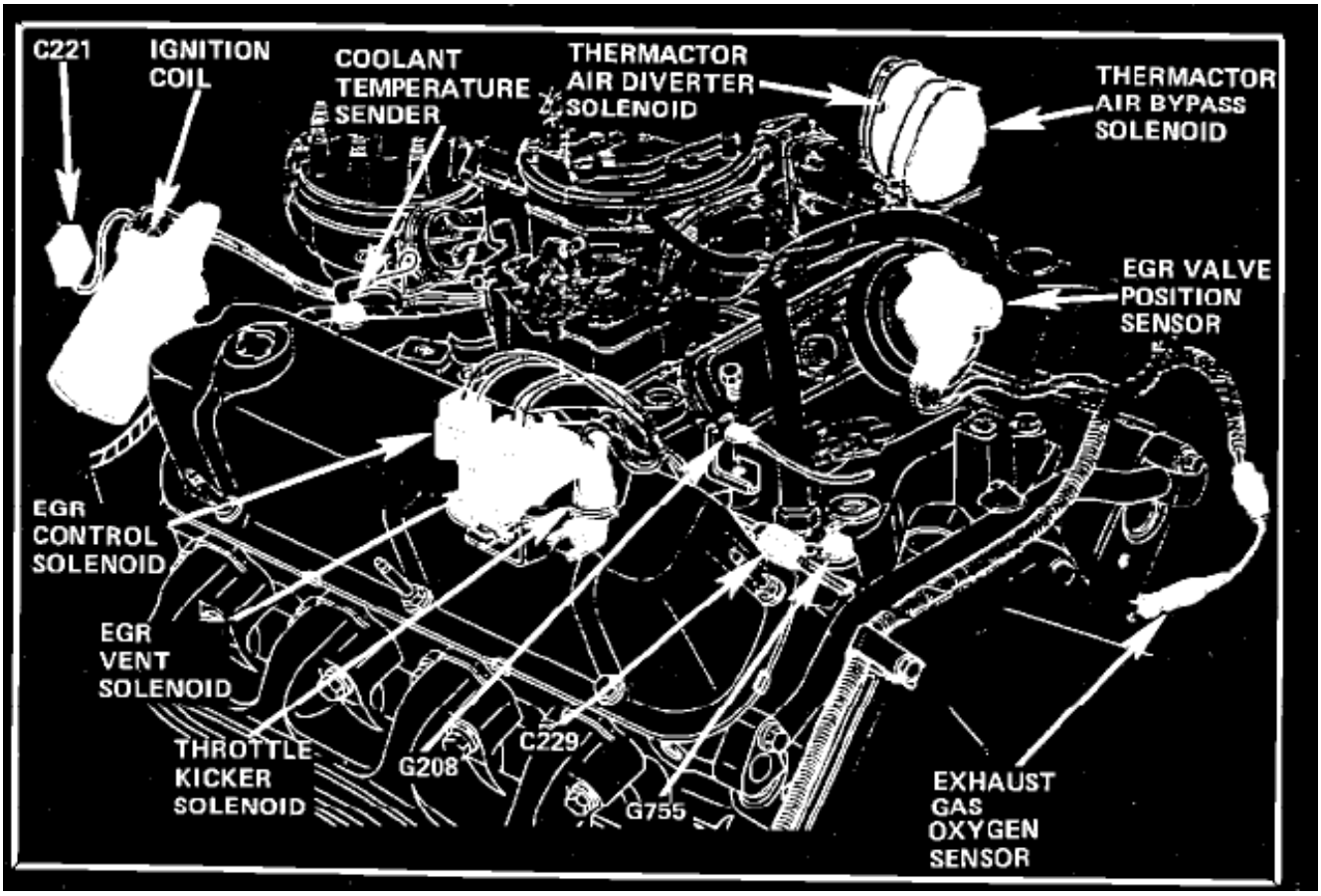
1980-87 Models Exc. 1983-87 Ranger, 1984-87 Bronco II & 1986-87 Aerostar

1. Disconnect 6 way connector from amplifier assembly, then connect an ohmmeter between dark green wire w/white stripe and black wire on 1980 E-100-350, 1981-83 F-100-350 models and Bronco, and 1984-87 F-150-350 and Bronco, or green and black wire on 1980 F-100-350 and 1981-83 E-100-350 models and 1984-87 E-150-350 at the speed sensor end. A reading of 40 ohms should be obtained. A reading of 0 ohms indicates a shorted coil and an infinity reading indicates an open coil.

2. Replace sensor if a correct reading has not been obtained.

Vehicle Speed Sensor: Service and Repair

1. Separate electrical connector leading to the amplifier assembly.
2. Disconnect upper and lower speedometer cables at the speed sensor. Remove speed sensor.
3. Reverse procedure to install.

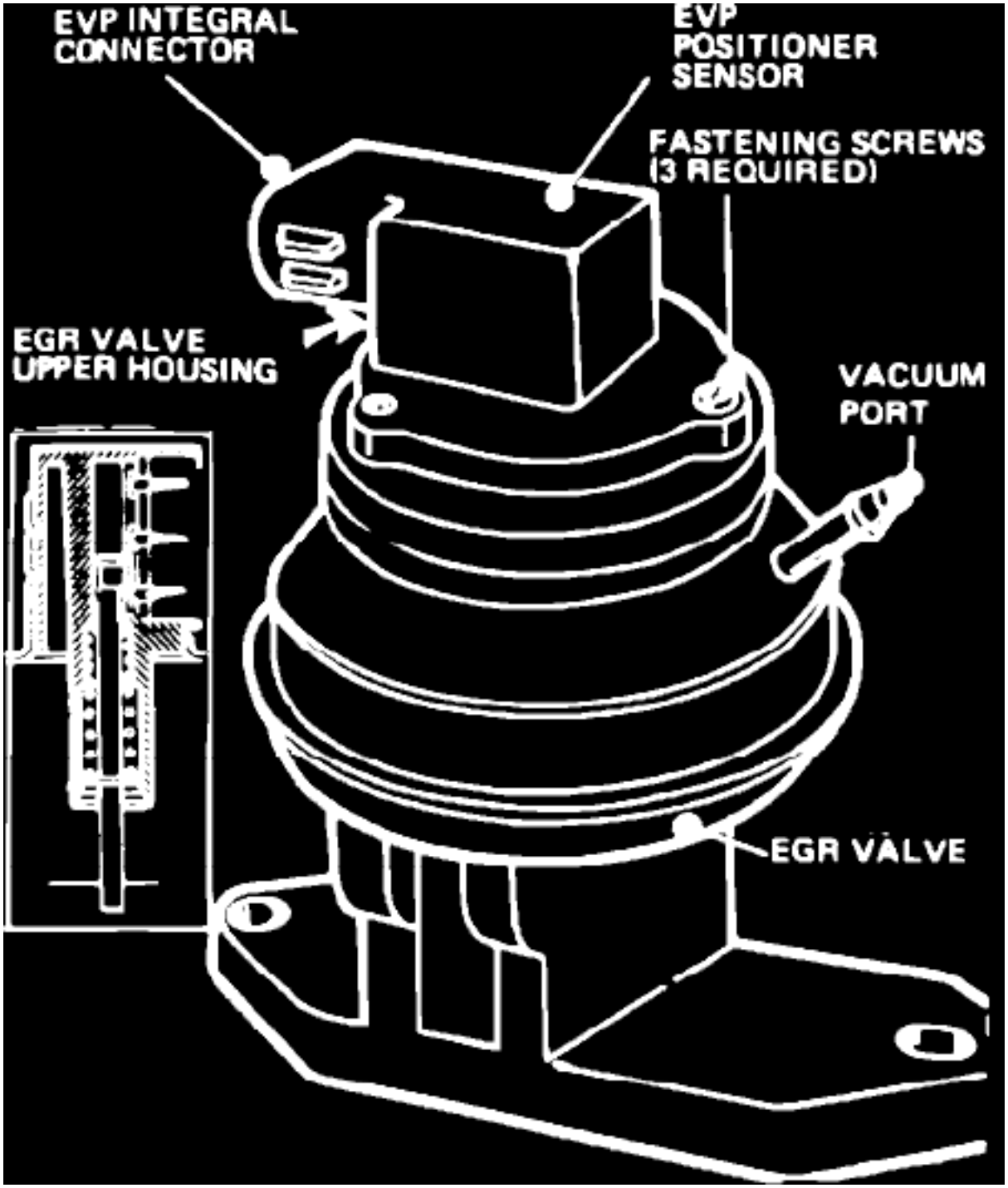


EGR Valve Position Sensor: Locations

LH Side Of Engine.

Rear Of Carburetor

Applicable to: 1982-83 V8-302/5.0L & V8-351/5.8L Engines w/EEC



EGR Valve Position Sensor: Description and Operation

Fig. 6 EGR valve position sensor

This sensor, Fig. 6, is used to monitor the EGR valve pintle position. The computer applies a reference voltage to the EVP sensor, and the resulting signal from the EVP sensor is proportional to the amount of exhaust gases flowing through the EGR valve pintle into the intake manifold.

Depending on the input from this and other sensors, the computer can increase or decrease EGR flow by activating or deactivating a pair of solenoid vacuum valves.

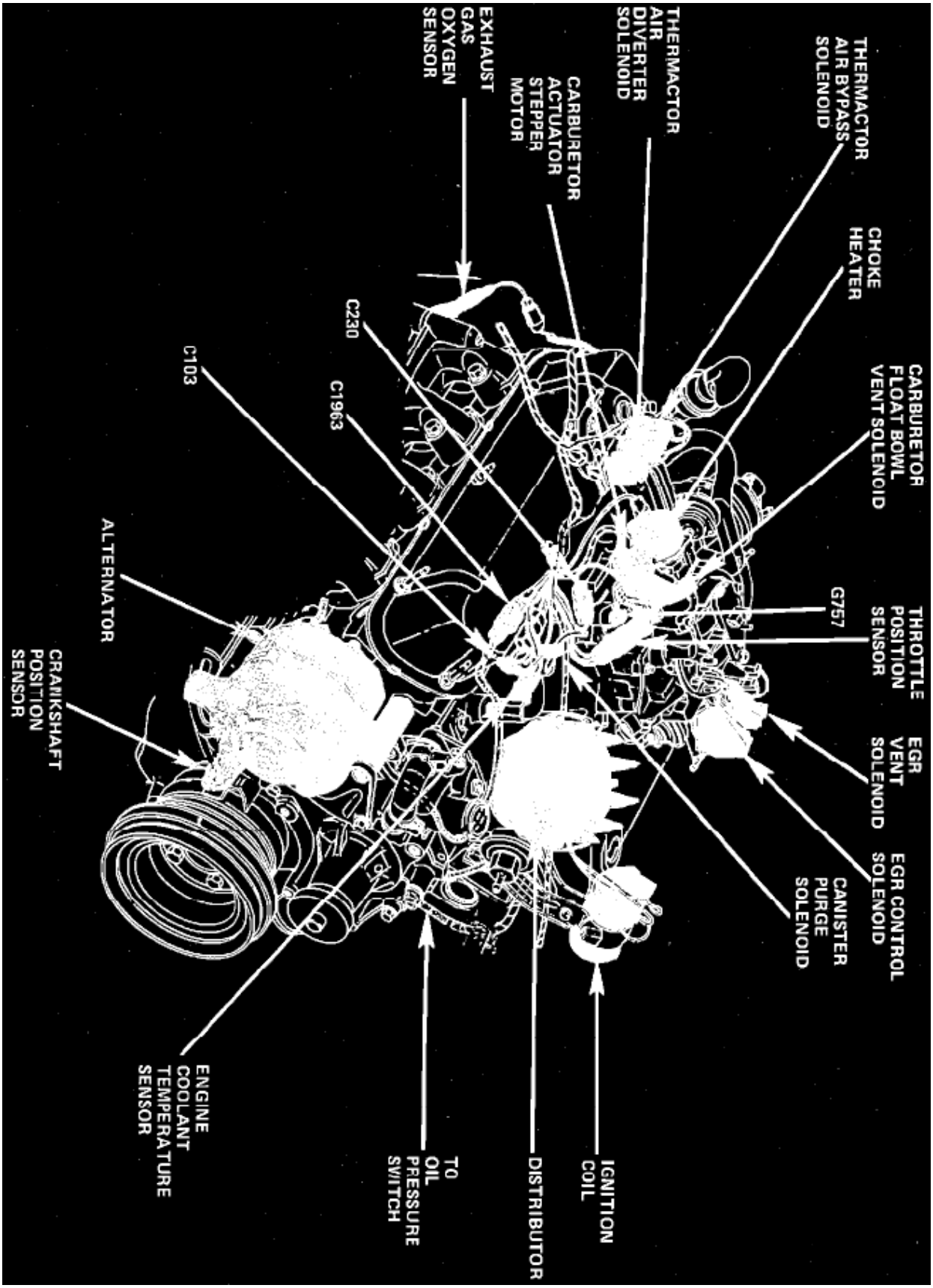
Fuel Tank Selector Switch: Locations

Center Of I/P

Engine	Year	TPS Voltage	
		Minimum	Maximum
All w/EEC III	1981	1.80-2.40	6.0 min.
All w/EEC III	1982-83	1.60-2.40	6.0 min.
All w/EEC IV	1984-88	0.90-1.00†	—
2.3L	1989-90	.34	4.84
2.9L	1989-90	.34	4.84
3.0L	1989-90	.34	4.84
4.0L	1990	.34	4.84
4.9L	1989-90	.20	4.84
5.0L	1989-90	.20	4.84
5.6L, 7.5L	1989-90	.20	4.84
w/4-speed AT	1989-90	.34	4.84

† Adjustable units only.

THROTTLE POSITION SENSOR SPECIFICATIONS

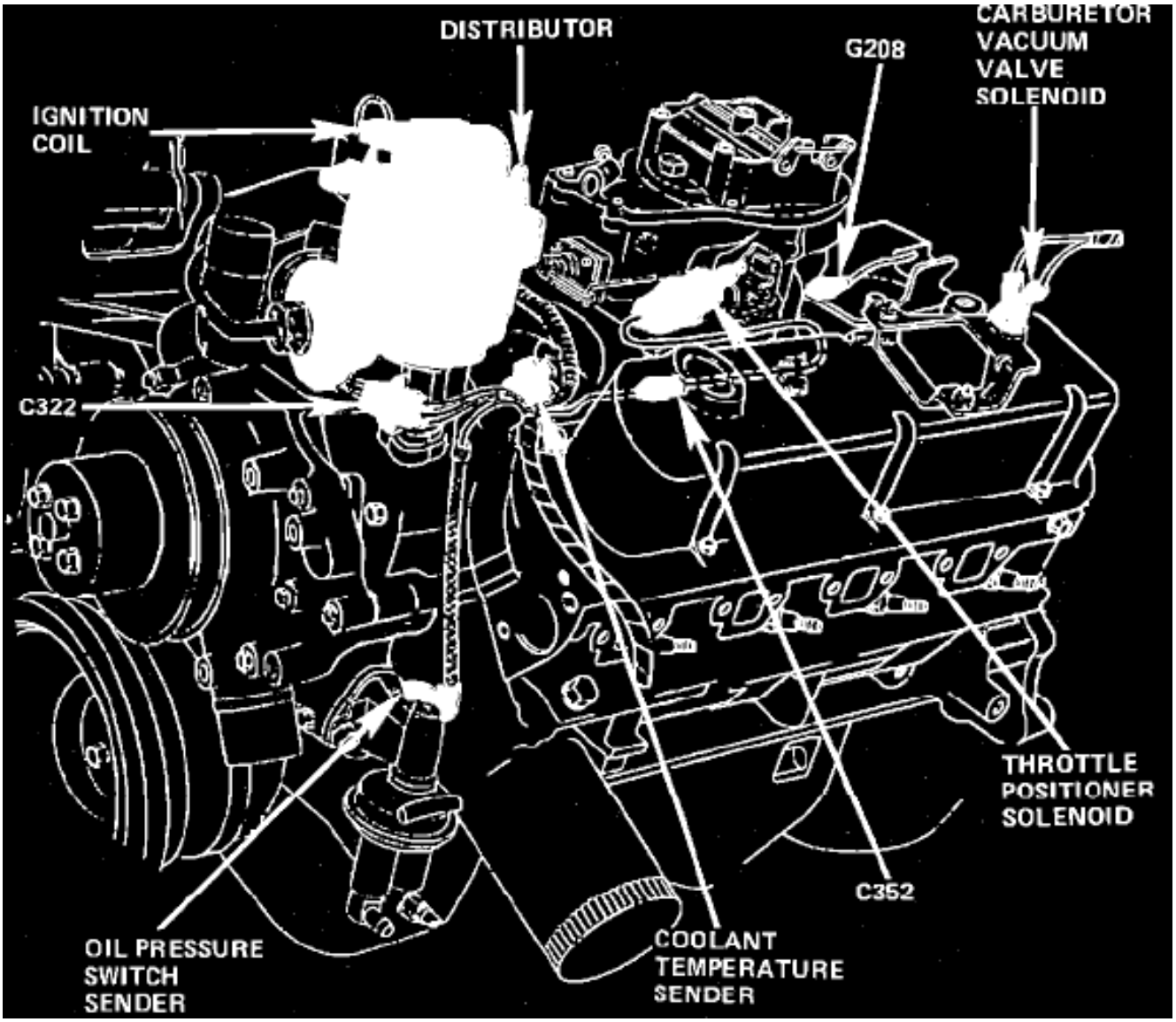


Throttle Position Sensor: Locations

Top RH Side Of Engine.

RH Rear Of Carburetor

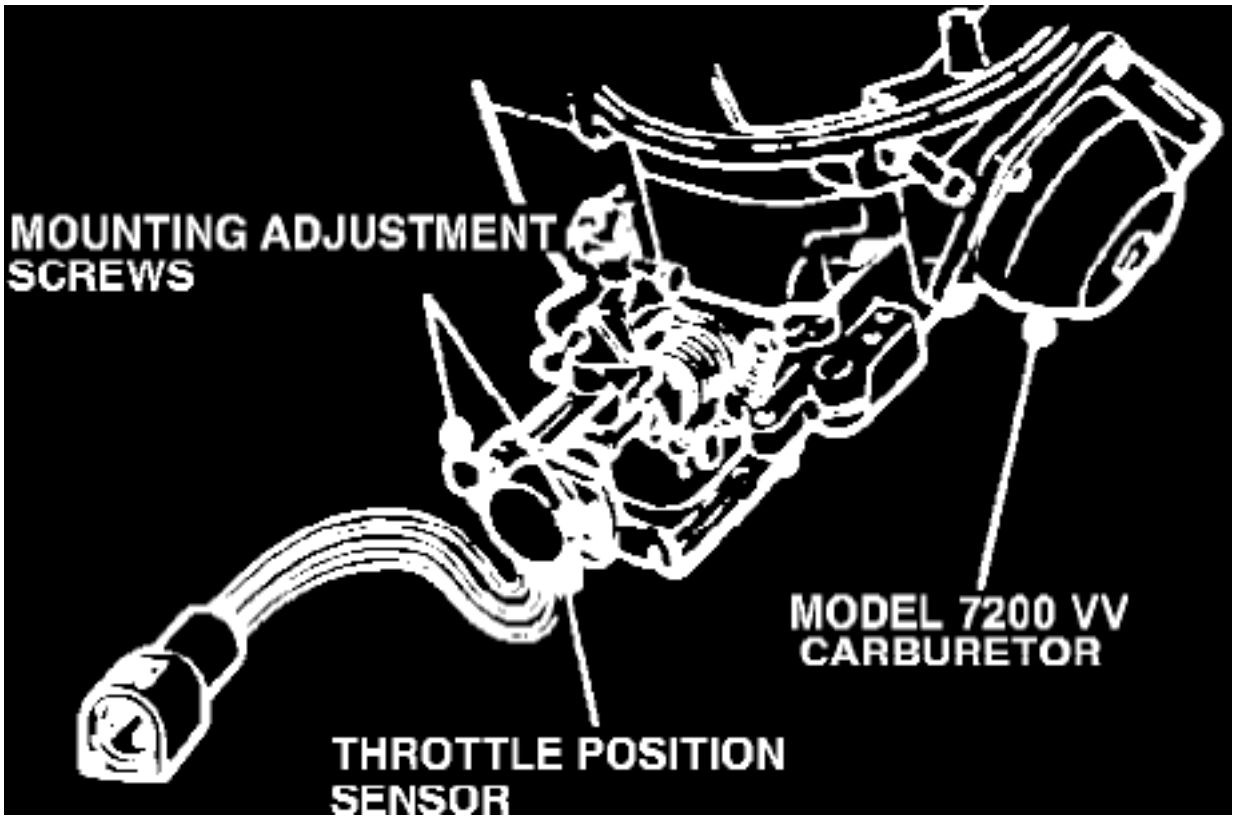
Applicable to: 1982-83 V8-302/5.0L & V8-351/5.8L Engines w/EEC



LH Side Of Engine.

RH Rear Of Carburetor

Applicable to: 1982-83 V8-255/4.2L & V8-302/5.0L Engines



Throttle Position Sensor: Description and Operation

Fig. 2 Throttle position sensor (typical)

This sensor, Fig. 2, is basically a rheostat switch attached to the carburetor throttle shaft and responds to throttle valve angle changes. The throttle angles are classified into three operating modes as follows:

a. Closed Throttle (Idle or Deceleration)

b. Part Throttle

c. Wide Open Throttle (Maximum Acceleration)

The ECA applies a reference voltage of about 9 volts to the sensor. The resultant sensor voltage supplied to the ECA, which is determined by the throttle position, is used by the ECA to determine the proper amount of spark advance, EGR flow, air/fuel ratio and thermactor air mode. The throttle position sensor mounting holes are slotted to permit adjustment. If the sensor is replaced, it must be correctly positioned or incorrect throttle information will be sent to the ECA. The adjustment requires use of special electronic test equipment.

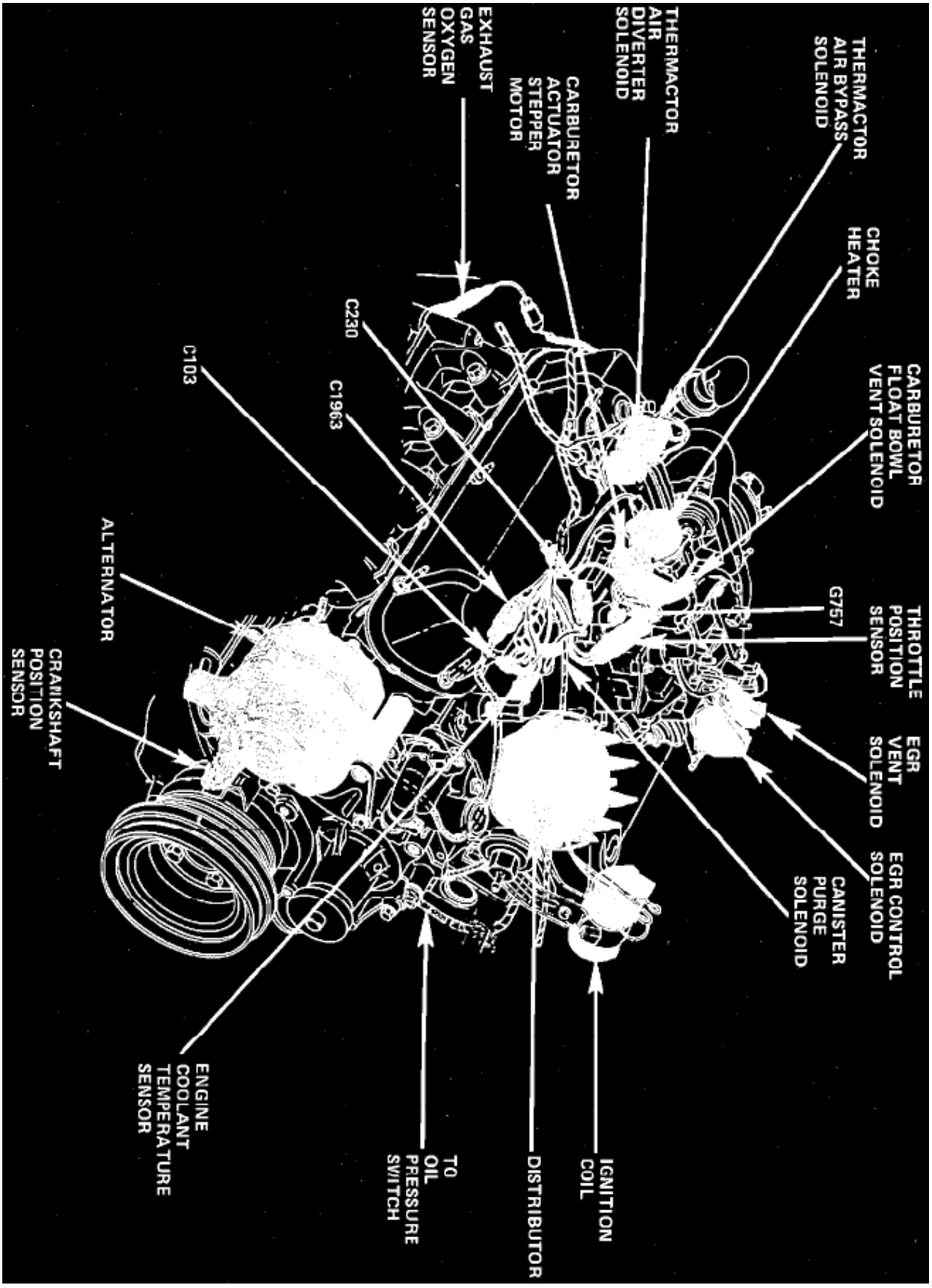
Throttle Position Sensor: Adjustments

Engines with EEC III Turn ignition to RUN position and remove vacuum hose from throttle kicker, as equipped. With engine not running, compare voltage reading against specifications and adjust as needed.

Engines with EEC IV Connect positive probe of DVOM along terminal C (lower) of TPS and connect negative probe along terminal A (upper). Turn ignition on but do not start vehicle. Adjust TPS to specified value.

Engine	Year	Resistance (ohms)
All w/EEC III	1981-83	100-640

CRANKSHAFT SENSOR

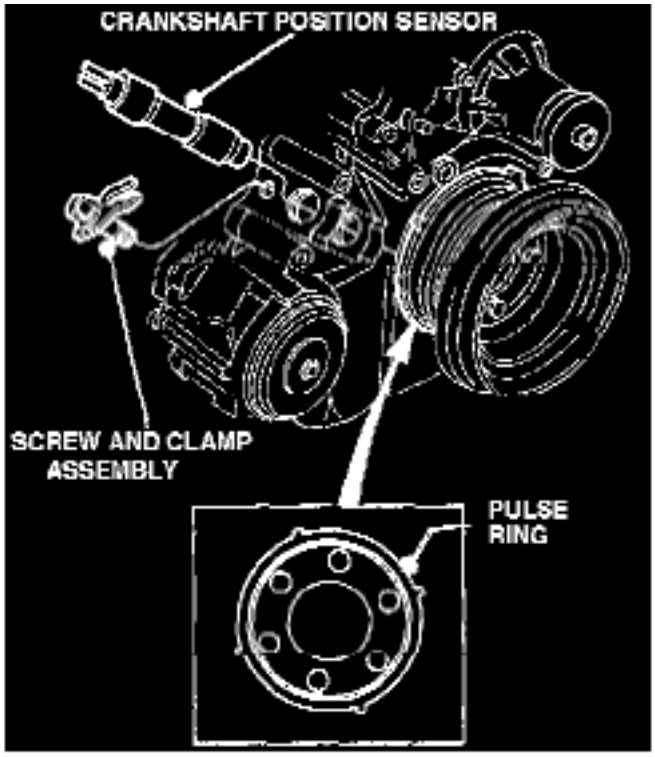

THERMACTOR AIR BYPASS SOLENOID
CHOKE HEATER
CARBURETOR FLOAT BOWL VENT SOLENOID
THERMACTOR AIR DIVERTER SOLENOID
CARBURETOR ACTUATOR STEPPER MOTOR
EXHAUST GAS OXYGEN SENSOR
C230
C1963
C103
G757
THROTTLE POSITION SENSOR
EGR VENT SOLENOID
EGR CONTROL SOLENOID
CANISTER PURGE SOLENOID
ALTERNATOR
CRANKSHAFT POSITION SENSOR
IGNITION COIL
DISTRIBUTOR
TO OIL PRESSURE SWITCH
ENGINE COOLANT TEMPERATURE SENSOR

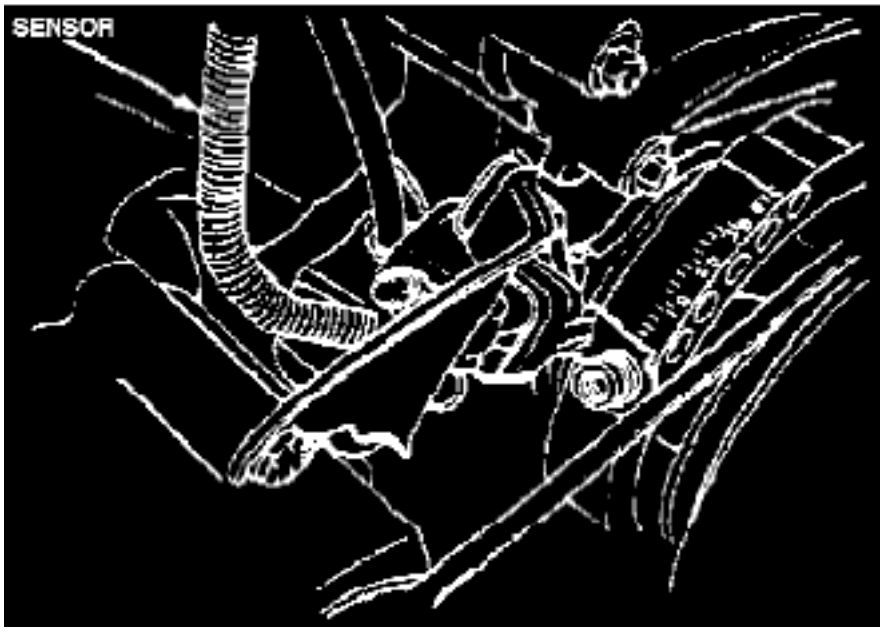
Crankshaft Position Sensor: Locations

Top RH Side Of Engine.

RH Front Of Engine

Applicable to: 1982-83 V8-302/5.0L & V8-351/5.8L Engines w/EEC





Crankshaft Position Sensor: Description and Operation

Fig.6 - Crankshaft Position Sensor

Fig.7 - Crankshaft Position Sensor

DESCRIPTION

The crankshaft vibration damper is fitted with a four-lobe "pulse ring" which provides the system with an accurate indication of when the pistons reach 10 BTDC. This indication is called the reference timing. Figs. 6 and 7.

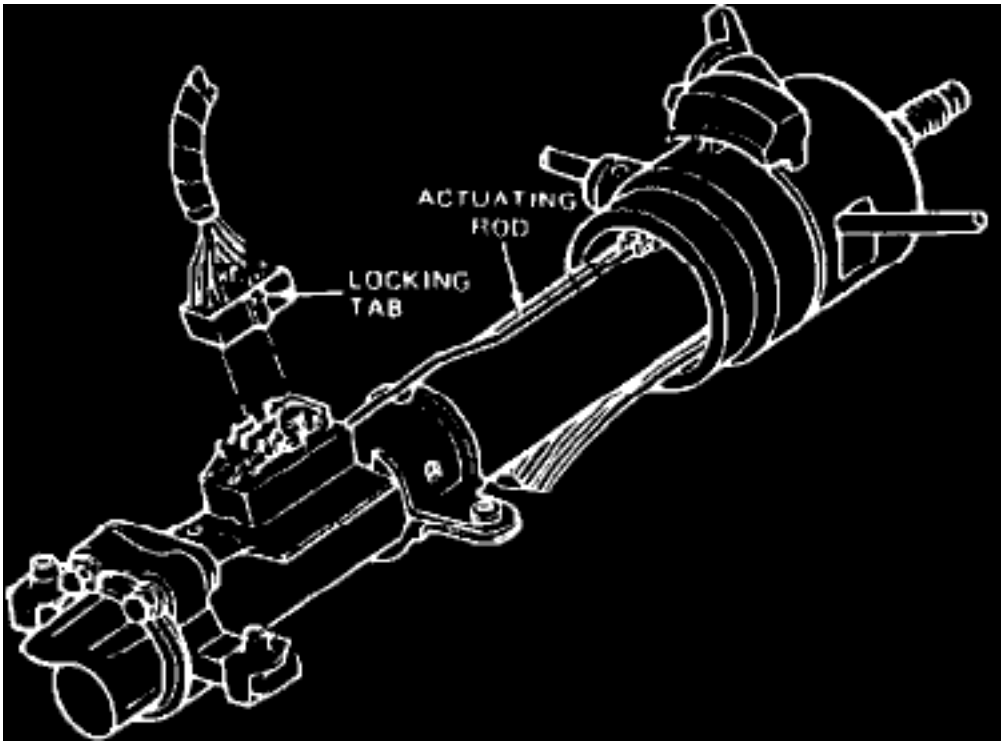
The pulse ring is a powdered metal ring positioned on the crankshaft vibration damper during manufacture. It has four equally spaced lobes which represent crankshaft position when the pistons reach 10 BTDC.

During operation, the lobes on the pulse ring pass by the tip of the CP sensor. The pulse ring interrupts the magnetic field at the tip of the sensor. When the field is interrupted, an output signal is generated and sent to the ECA.

As the crankshaft turns, the ECA evaluates the electrical impulses to determine the exact position of the crankshaft at any given time. By the frequency of the impulses, the ECA can determine the engine speed. With these two factors, the ECA will determine the appropriate ignition timing advance required for best engine operation.

Ignition Switch: Locations

Attached To Steering Column



Ignition Switch: Service and Repair

Fig. 3 Ignition switch replacement

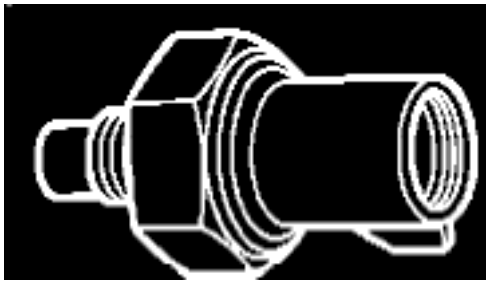
1. Disconnect battery ground cable.

2. Remove steering column shroud and lower the steering column.

3. Disconnect electrical connector from switch, then remove 2 switch attaching nuts.

4. Lift switch up to disengage actuator rod, then remove switch from vehicle, Fig. 3.

5. Reverse procedure to install.

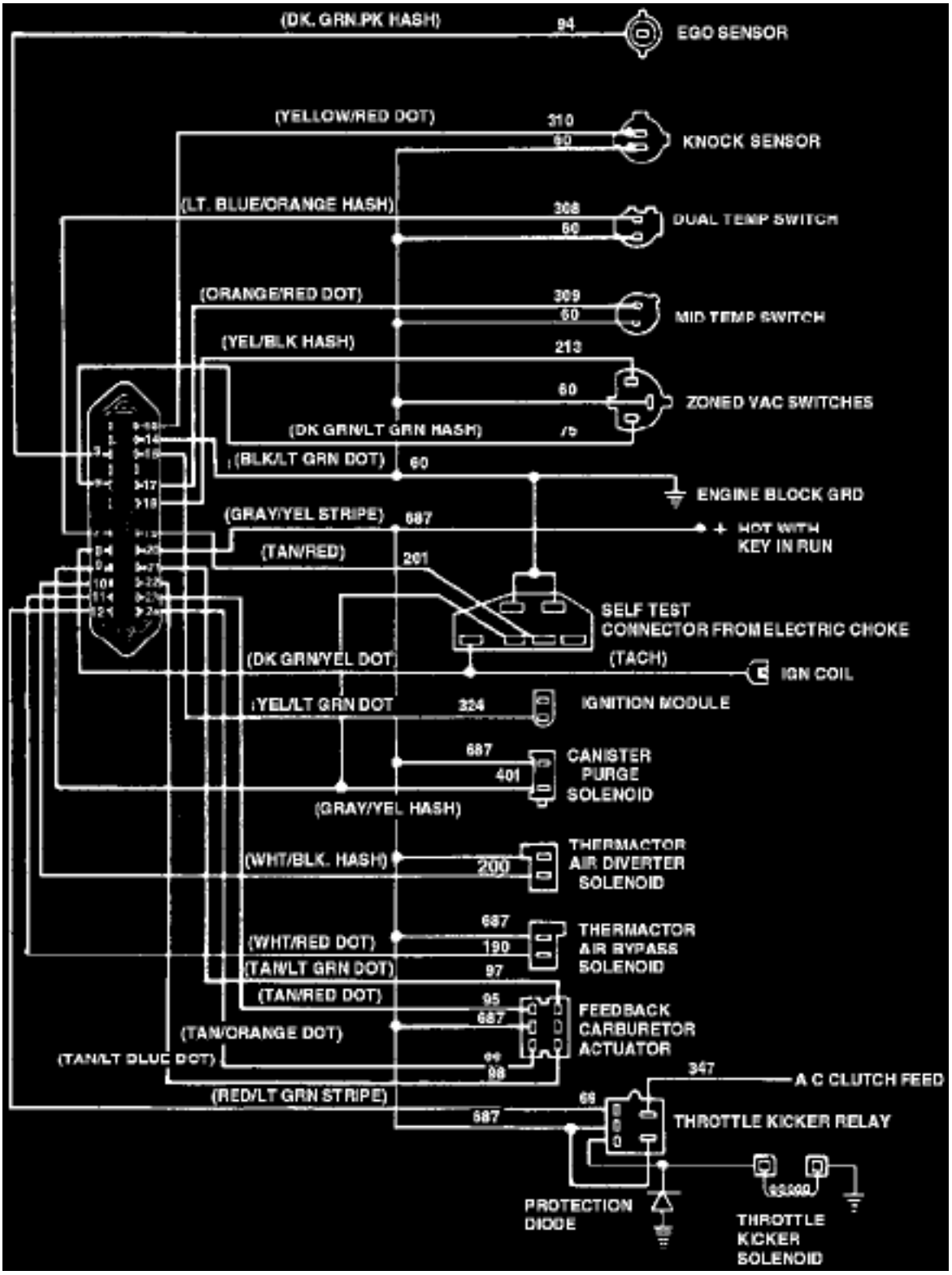


Knock Sensor: Description and Operation

Knock Sensor

The knock sensor, Fig. 11, is a piezo-electric accelerator accelerometer with the sensor designed to resonate at approximately the same frequency as the engine knock frequency.. The sensor uses the resonant frequency to mechanically amplify the engine knock frequency (5-6 KHz).

This method allows relatively large signals to be achieved without electrical amplification. The sensor has a thin circular piezoelectric ceramic disk which is bonded to a metal diaphragm. Electrical connections are made through a two-pin integral connector.



Knock Sensor: Testing and Inspection Component Testing

Fig.8 - MCU System Wiring Circuit

1. Make sure that the following three steps are properly conducted in order to simulate spark knock conditions and determine that spark detection

system is inoperative. If not, repeat test to verify problem. a. Make sure that engine is at normal operating temperature. Run engine at 2000 rpm for 2 minutes, then turn key off. Immediately restart engine

and allow to idle.

b. Observe voltmeter and vacuum gauge for initialization pulses after restarting the engine. The throttle kicker will also extend (increase engine

speed) and remain on throughout the test.

c. On vehicles with spark knock sensor, when initial pulses occur, immediately simulate spark knock by placing a 3/8 inch extension on manifold

near base of knock sensor. Tap end of extension with a small hammer for about 15 seconds.

2. Disconnect jumper wire from self-test trigger input circuit 201. 3. With ignition key off, disconnect vehicle harness from spark knock sensor. 4. Using a torque wrench and a 1 1/8 inch deep socket, make sure that spark sensor is torqued to 12-18 ft. lbs. If sensor is properly torqued, proceed

to next step. If not, torque to specifications.

5. Disconnect vehicle harness from MCU and spark sensor. Connect one lead of an ohmmeter to circuit 310 of vehicle harness and other lead to

engine block, Fig. 8. If resistance is 1000 ohms or more, proceed to next step. If resistance is less than 1000 ohms, repair short to ground in circuit 301.

6. With key off and knock sensor harness disconnected, check circuit 310 of vehicle harness for continuity. If resistance is 10 ohms or less, continue

to next step. If resistance is greater than 10 ohms, repair circuit 310.

7. Check circuit 60 of vehicle harness for continuity between knock sensor and MCU, Fig. 8. If resistance is 10 ohms or less, reconnect harness

connector to MCU and proceed to next step. If resistance is greater than 10 ohms, service circuit 60.

8. Reconnect jumper wire to circuits 201 and 60 of VIP connector, Fig. 8. 9. Connect a test lamp to positive terminal of battery, then disconnect knock sensor from vehicle harness.

10. Perform "Engine Running Functional Test" procedure. When the four initialization pulses occur, continuously tap circuit 310 of the vehicle

harness connector, which mates to the knock sensor connector, with the probe end for 5 seconds while observing voltmeter pulses. If a code 25 is

observed, replace MCU. If any other code is observed, replace spark knock sensor.

SPARK KNOCK, ONLY AT WIDE OPEN THROTTLE AND/OR POOR PERFORMANCE/MILEAGE

1. If engine has a spark knock sensor, disconnect it. 2. Make sure that ignition timing is within specifications. 3. With engine running at normal operating temperature, disconnect the two wire ignition module connector (yellow wire is circuit 324 and

black/white wire is circuit 69) from vehicle harness. Using a jumper wire, jump the wires together at the ignition module and note ignition timing. Remove jumper wire and note ignition timing. If timing retards 16-20 degrees, reconnect ignition module and proceed to next step. If timing does not retard 16-20 degrees, replace ignition module and repeat steps 1, 2 and 3.

4. With engine at normal operating temperature, set high cam on lowest step that will maintain engine speed greater than 1200 rpm. Note ignition

timing, then disconnect and plug vacuum hose from zone vacuum switch and again note timing. If timing retards more than 5 degrees, on engines with spark knock sensor, proceed to step 6, on all other engines MCU system is okay. If timing does not retard more than 5 degrees, proceed to next step.

5. With engine still at 1200 rpm, disconnect ignition module (connector with yellow and black/white wires). If timing retards, check circuit 324 for

short to ground. If circuit is okay, replace MCU unit and retest. If timing does not retard, check circuit 324 for open circuit. If circuit is okay, Replace MCU unit and retest.

6. On engines with spark knock sensor, reconnect sensor. Repeat Engine Running Functional Test, but do not simulate knock by taping sensor. If

service code 25 appears, MCU system is okay, testing is completed. If any other service code appears, replace knock sensor and retest.

Fuel Pressure: Specifications

SPECIFICATIONS

Pressure ..... 6.0-8.0 PSI Volume ..... 1 pint in 20 seconds

NOTE: Measurements taken with engine idling.

Fuel Pressure: Testing and Inspection

PRESSURE TEST

1. Connect a suitable pressure gauge (0-15 PSI) to the carburetor end of the fuel line.

WARNING: Use care to prevent combustion of spilled fuel.

2. Start the engine (it should be able to run for over 30 seconds on the fuel in the carburetor bowl) and read the pressure after 10 seconds. If pump

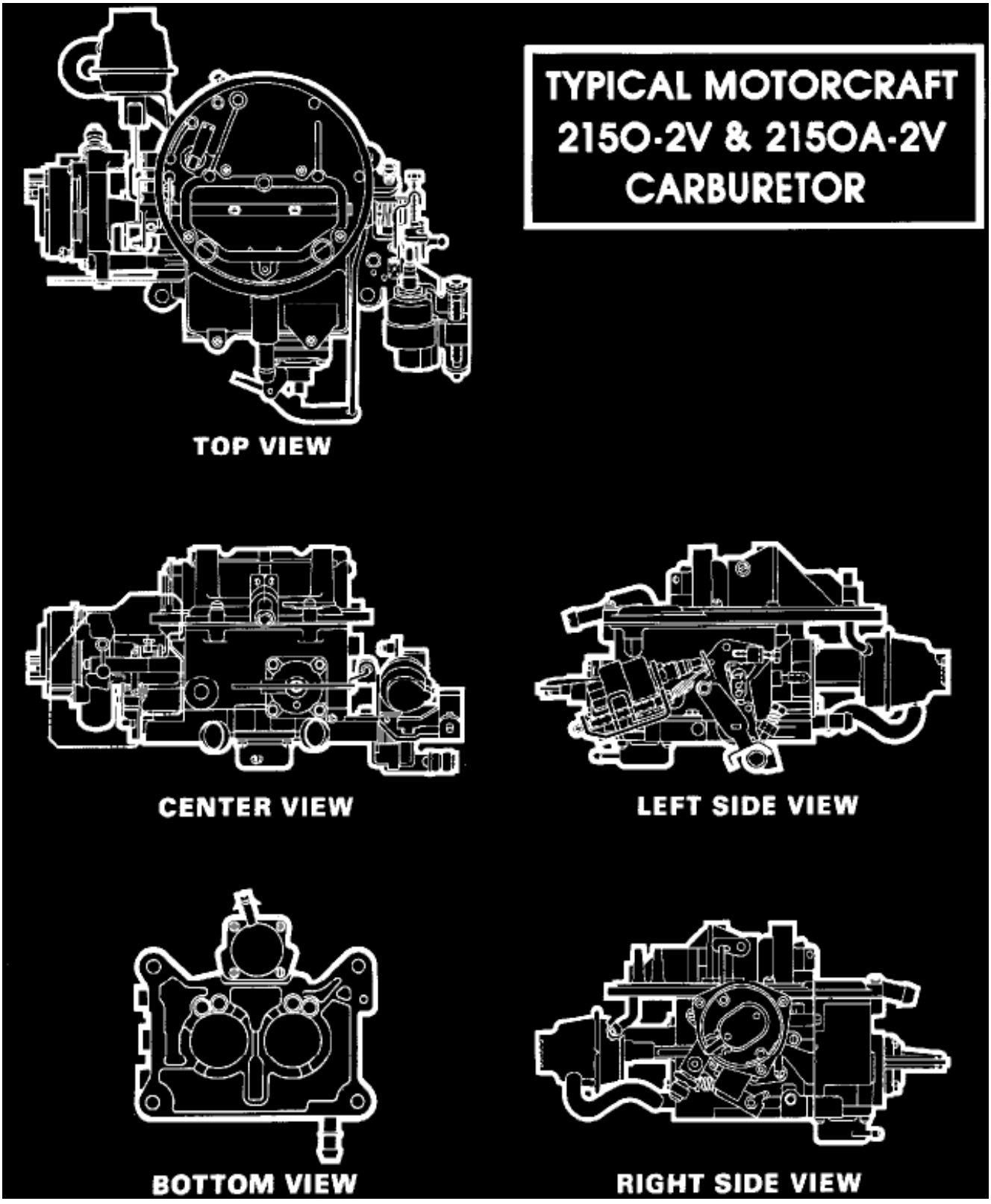
pressure is too low or too high install a new fuel pump.

Fuel Pump Pressure ..... 6.0-8.0 PSI

3. Reconnect fuel line at filter and install air cleaner.

		SLOW		FAST		
Engine	Year	Man. Trans.	Auto. Trans.	Man. Trans.	Auto. Trans.	Step of Cam
5.8L (351)	1982	750	600 D	1700	1650 P	2nd High
AC speed-up	1982	850	—			
w/decal ABF, ABJ	1982	—	550 D	—	2000 P	High
AC speed-up	1982	—	625 D			
Canada	1982	750	600 D	1700	1650 P	2nd High
shutdown idle	1982	850	—			
w/decal ABH	1982	—	550 D	—	2000 P	High
AC speed-up	1982	—	625 D			
5.8L (351) Windsor	1982	750	—	1700	—	2nd High
5.8L (351) Windsor	1982	—	550 D	—	2000 P	High
AC speed-up	1982	—	625 D			
5.8L (351)	1983	750	625 D	1700	2000 P	High
AC speed-up	1983	850	—			
shutdown idle w/decal	1983	—	575 D			
DEY, DFR	1983	600	—	1650	—	2nd High
California	1983	—	600 D	—	1650 P	2nd High

IDLE SPEED SPECIFICATIONS

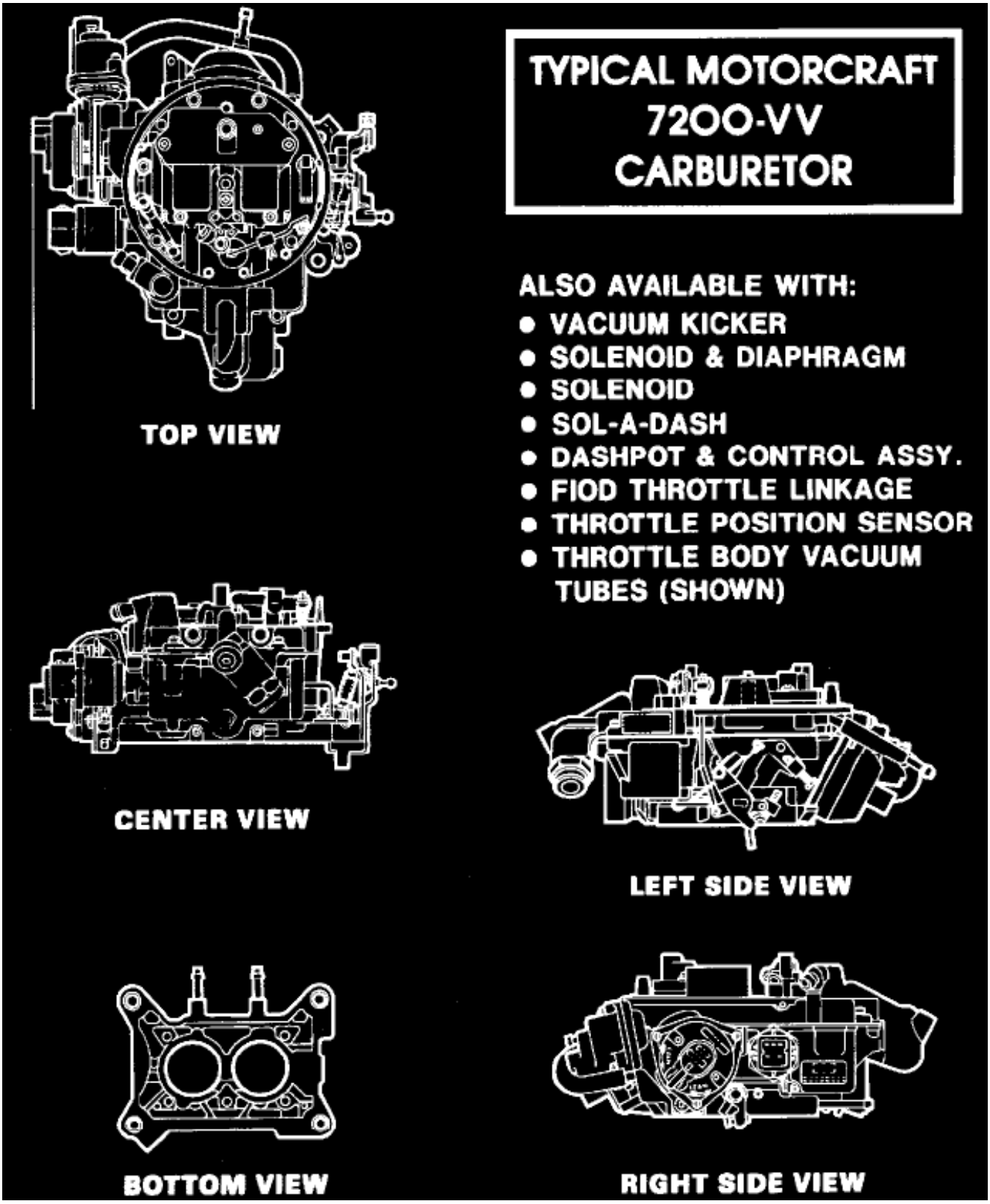


Idle Speed: Adjustments Curb Idle Speed

Identification

CARBURETOR IDENTIFICATION

2150-2V, 2150A-2V Carburetor

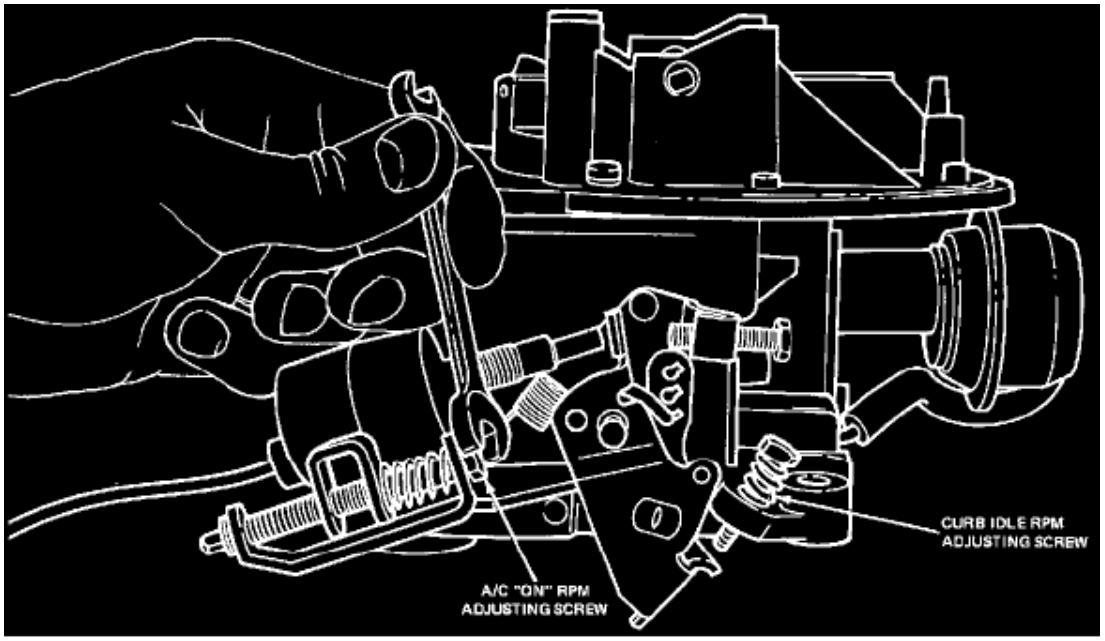


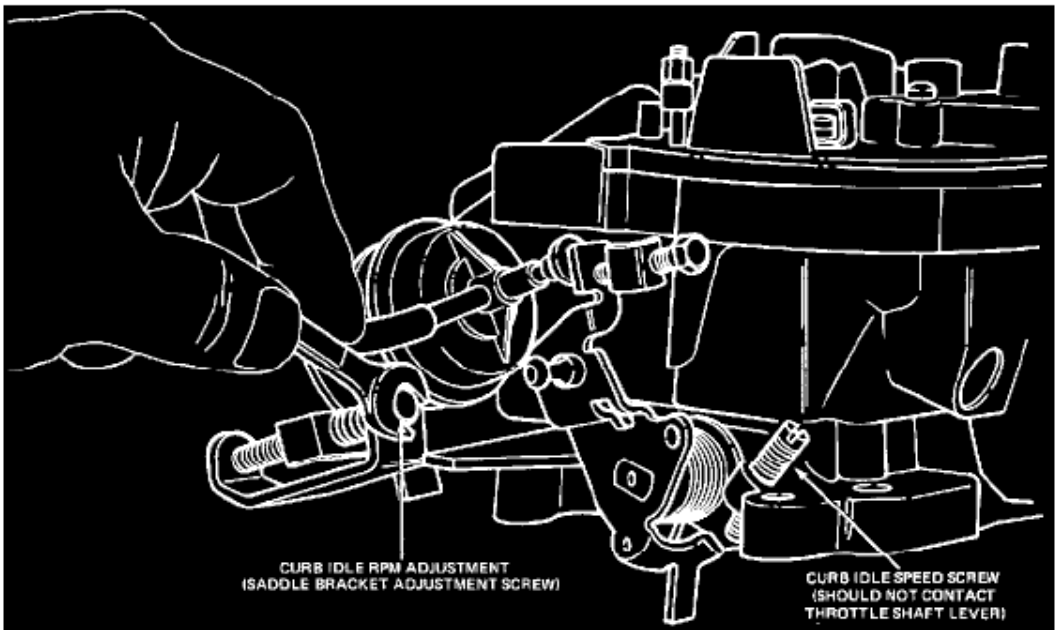
Variable Venturi, 7200-VV Carburetor

Type 2150-2V

CURB IDLE SPEED ADJUSTMENT

- Place the transmission in Neutral (manual) or Park (automatic).
- Bring engine to normal operating temperature (upper radiator hose hot).
- Place the transmission in the specified gear. See: Specifications


CURB IDLE RPM
ADJUSTING SCREW
A/C "ON" RPM
ADJUSTING SCREW


CURB IDLE RPM ADJUSTMENT
(SADDLE BRACKET ADJUSTMENT SCREW)
CURB IDLE SPEED SCREW
(SHOULD NOT CONTACT
THROTTLE SHAFT LEVER)

- Check curb idle rpm. Adjust to specification. See: Specifications

- Place the transmission in Neutral (manual) or Park (automatic). Rev the engine momentarily. Place the transmission in specified position, and recheck curb idle rpm. Readjust if required.

Type 7200-VV Carburetor

CURB IDLE SPEED ADJUSTMENT

- Place the transmission in Neutral (manual) or Park (automatic).

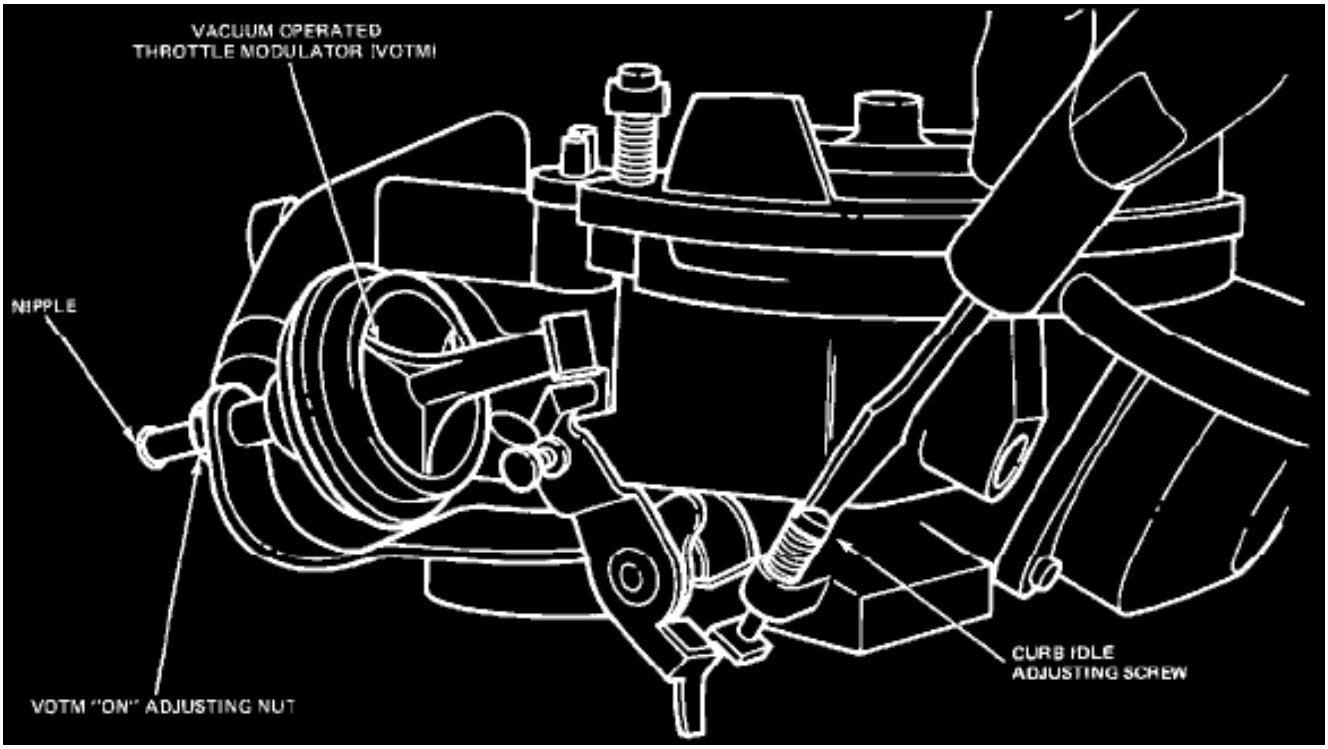
- Bring the engine to normal operating temperature.

- Disconnect purge hose on canister side of evaporator purge solenoid. Check to ensure that purge vacuum is present (solenoid has opened, will require a 3-5 minute wait after starting engine, followed by a short time at part throttle. Reconnect purge hose.

- Disconnect and plug the vacuum hose to the Vacuum Operated Throttle Modulator (VOTM) kicker.

- Place the transmission in specified position. See: Specifications

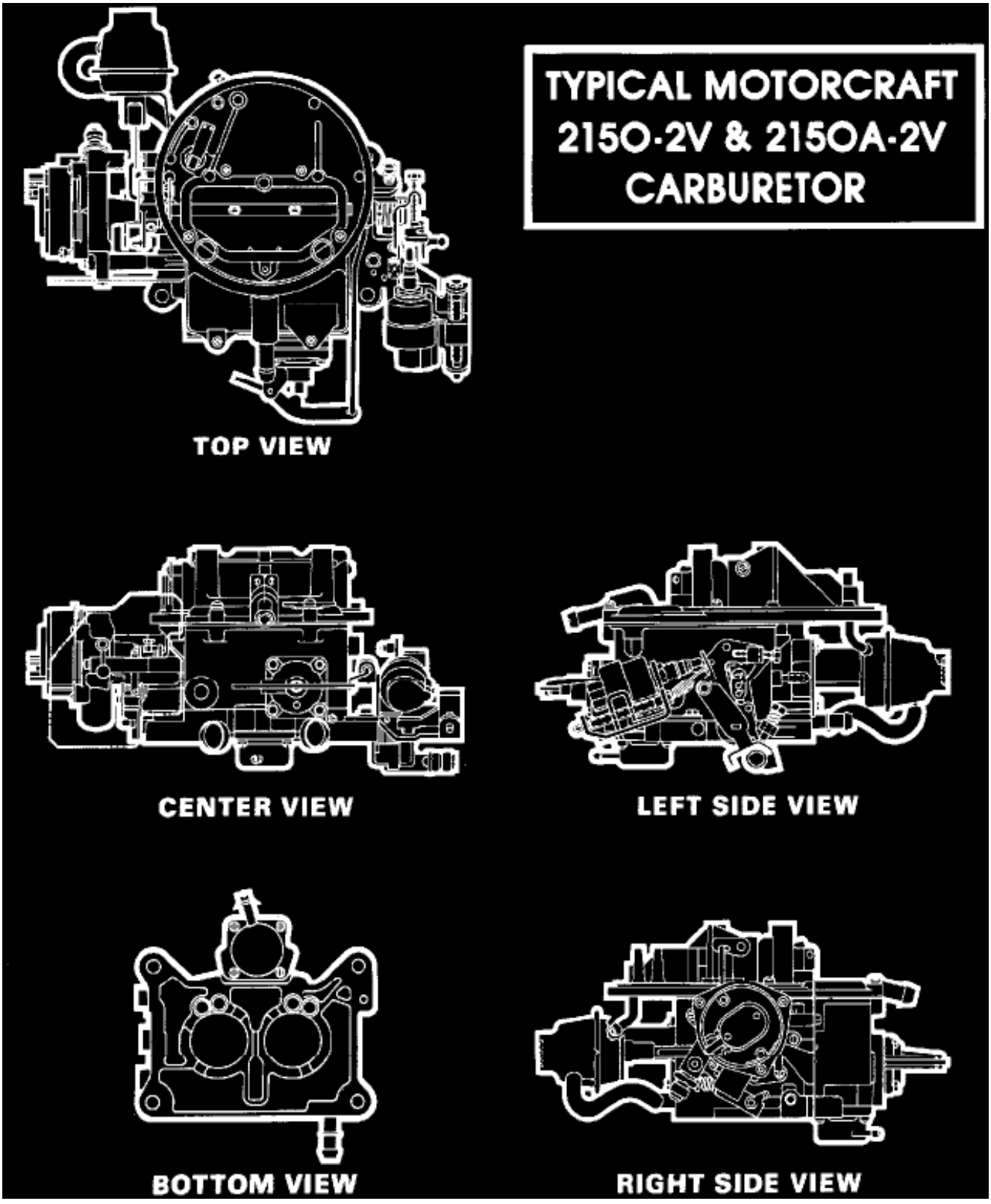
With Automatic Transmission



With Manual Transmission

- Check/adjust curb idle rpm. See: Specifications

- Place the transmission in Neutral or Park. Rev the engine momentarily. Place the transmission in specified position and recheck curb idle rpm. Readjust if required.

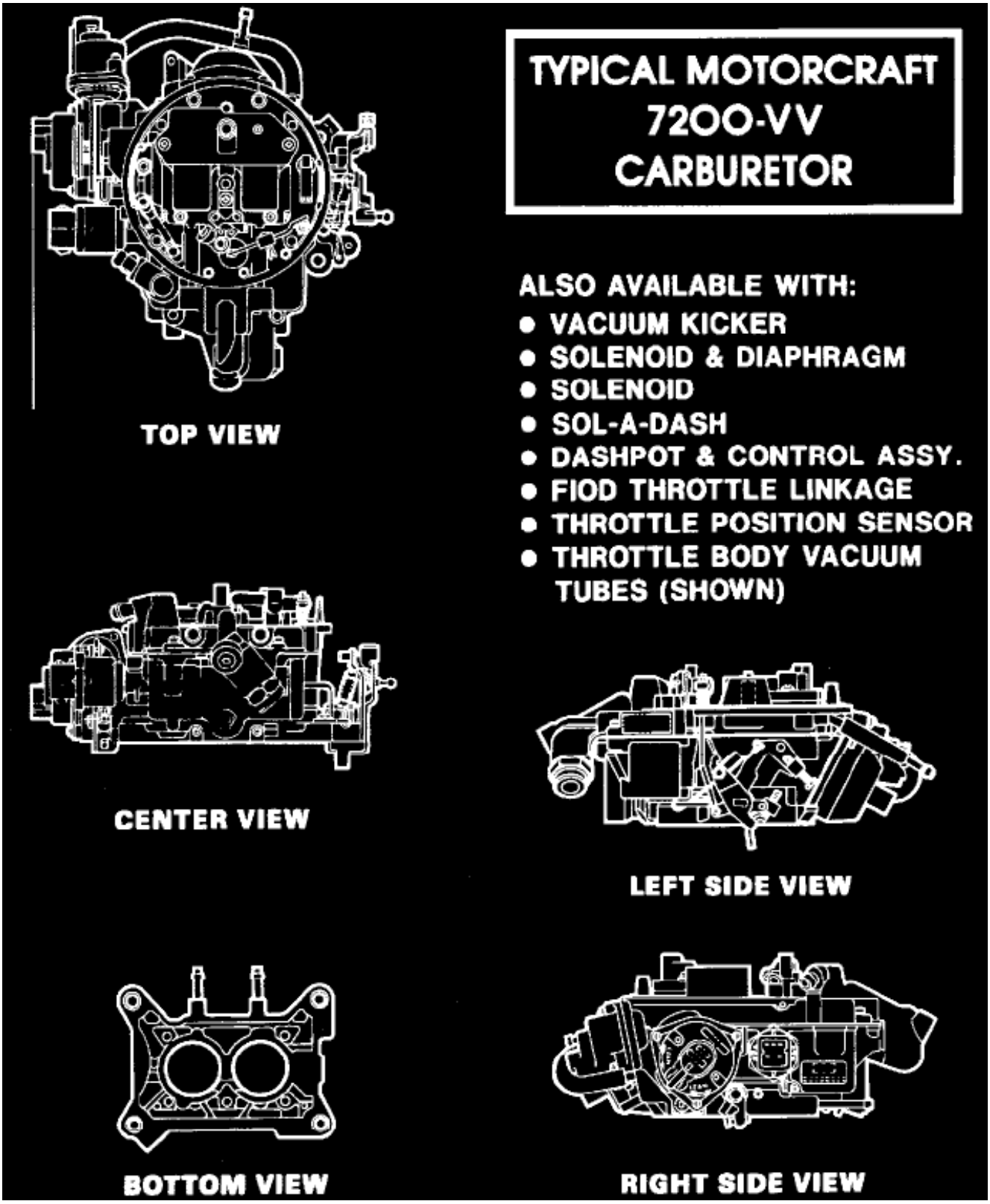


Idle Speed: Adjustments Fast Idle Speed

Identification

CARBURETOR IDENTIFICATION

2150-2V, 2150A-2V Carburetor

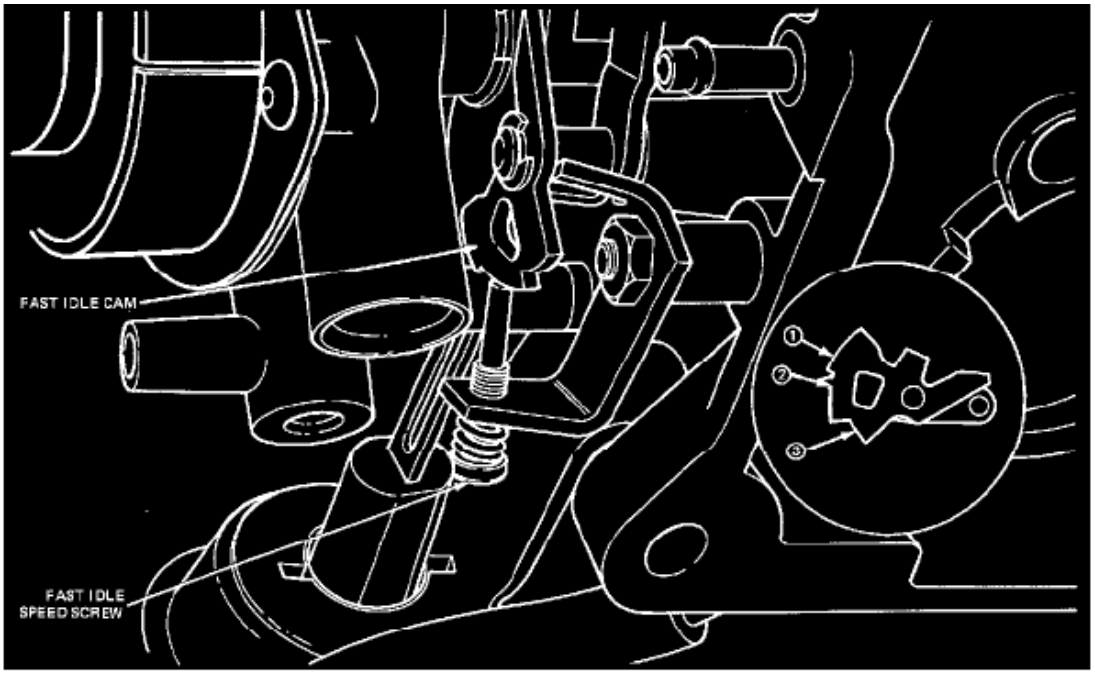


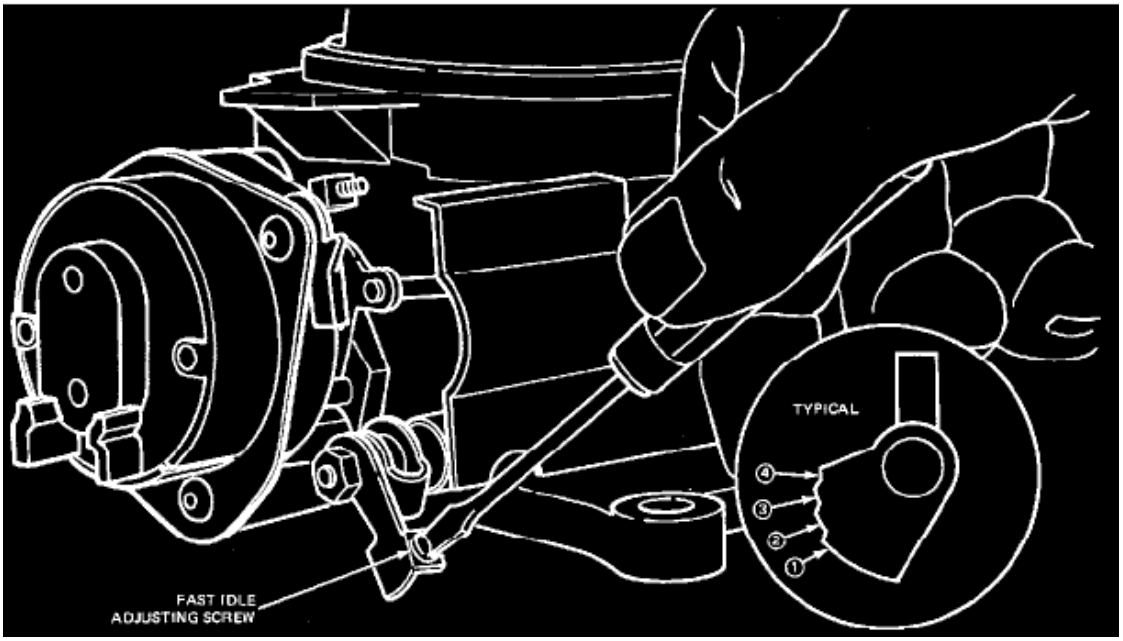
Variable Venturi, 7200-VV Carburetor

Type 2150-2V Carburetor

FAST IDLE SPEED ADJUSTMENT

- Place the transmission in Park (automatic) or Neutral (manual).
- Bring the engine to normal operating temperature.
- Disconnect the vacuum hose at the EGR valve and plug.


FAST IDLE CAM
FAST IDLE SPEED SCREW
1
2
3


TYPICAL
FAST IDLE ADJUSTING SCREW
4
3
2
1

- Place the fast idle adjustment mechanism on top step of fast idle cam. Check/adjust fast idle rpm to specification. See: Specifications

- Recheck for repeatability.

- Remove the plug from the EGR vacuum hose and reconnect.

Type 7200-VV Carburetor

FAST IDLE SPEED ADJUSTMENT

- Place the transmission in Neutral (manual) or Park (automatic).

- Bring the engine to normal operating temperature.

- Disconnect purge hose on canister side of evaporator purge solenoid. Check to ensure that purge vacuum is present (solenoid has opened, will require a 3-5 minute wait after starting engine, followed by a short time at part throttle. Reconnect purge hose.

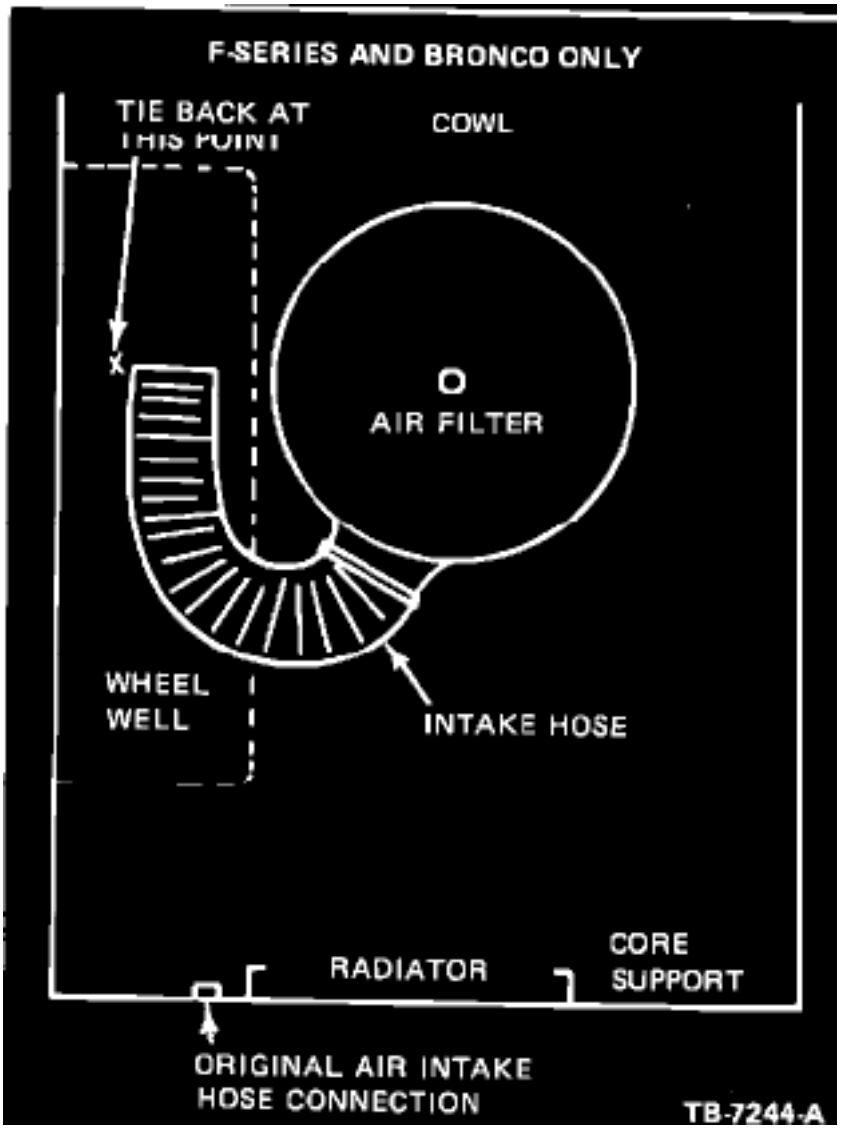
-

Disconnect the vacuum hose at the EGR valve and plug.

- Place the fast idle adjustment mechanism on the second step of the fast idle cam.

- Check/adjust fast idle rpm to specification. Recheck for repeatability. See: Specifications

- Remove the plug from the EGR vacuum hose and reconnect.



Air Cleaner Housing: Technical Service Bulletins Air Cleaner - Sealing Procedure

Article No. 83-25-21-S

AIR CLEANER SEALING - 4.9L (1982-83 F-SERIES AND BRONCO ONLY) AND ALL UNITS WITH 5.0L, 5.8L OR 7.5L ENGINES. UNITS OPERATED IN DUSTY AND/OR OFF-ROAD CONDITIONS -

ARTICLE ALSO INCLUDES SEALING OF 7200VV CARBURETOR ON UNITS SO EQUIPPED

LIGHT TRUCKS 1980-83 E, F AND BRONCO

This is a re-write of TSB 83-25-21 (December 12, 1983). The air cleaner part numbers listed in the TSB are of insufficient detail and are therefore being deleted from the TSB.

Due to the variety of different air cleaners used, part numbers have not been included in this TSB. See your normal parts listing for these part numbers.

The subject vehicles operated in dusty/off-road conditions may experience an air cleaner sealing concern which could lead to engine oil consumption or, on 7200 VV carburetor equipped vehicles, a poor running condition. The following procedure should minimize these concerns.

1. Remove the air cleaner assembly from the engine and remove any loose debris from inside the tray. Replace the air cleaner assembly (9600) on all 1983 4.9L, 5.0L, 5.8L and, 7.5L equipped light trucks except the 1983 Econoline with the 4.9L engine.

Due to the variety of different air cleaners used, part numbers have not been included in this TSB. See your normal parts listings for these part numbers.

2. Wipe the sealing surfaces clean on the tray and cover and inspect for any dents or damage that would prevent a good seal. Replace any damaged components.

3. Inspect the air cleaner to carburetor gasket for proper installation. If the gasket appears crimped or damaged, replace it with a new sticky-back gasket. Prior to replacing the gasket, clean the carburetor flange. Install the new gasket sticky side down and press all the gasket down to assure a tight bond.

Gasket parts numbers: 4.9L - C8DZ-9654-A, 5.0L/5.8L/7.5L - D8ZZ-9654-A.

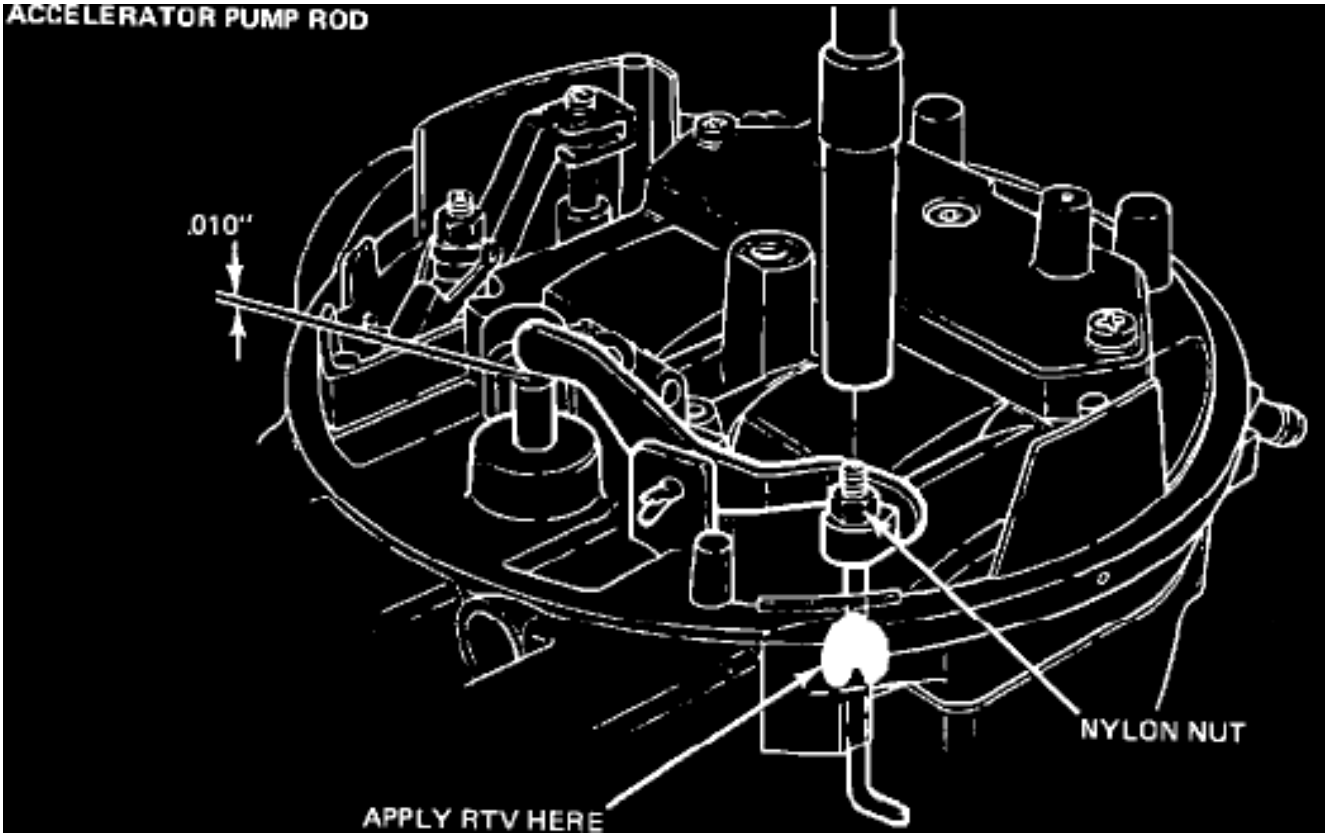
FIGURE 24

4. For F-Series and Bronco only, relocate the zip tube inlet. a) Detach the zip tube inlet from the radiator support. b) Move the inlet to the top rear of the wheel wellhousing per Figure 24. c) Secure the zip tube to the top of the housing with a nylon tie-down

strap. NOTE: At high temperatures, an octane ping may occur. If it persists, the zip tube must be reinstalled to the radiator support. 5.

Replace the PCV filter. For 4.9L, 5.0L-2V, 5.8L-2V and 7.5L-4V engines replace the PCV filter in the air cleaner with an in-line filter.

a. Remove and discard the crankcase breather cap to PCV filter hose (closure hose), PCV filter in the air cleaner, the adapter at the air cleaner and the adapter retaining clip.



b. Drill a 5/16" hole in the side wall of the air cleaner approximately 12" to the rear of the existing crankcase closure hole for 5.0L and 5.8L and approximately 6" to the rear on 7.5L. (The 4.9L does not need a new hole).

c. Install a 1/2" hose (E2AZ-6853-A) to the existing adaptor in the valve cover oil fill cap (2 pcs. 2-5/8" long for 4.9L, 18" long for 5.0L/5.8L, 12" long for 7.5L).

d. At a convenient location, cut the hose and install an in-line filter E2AZ-6A768-A for 5.0L, 5.8L and 7.5L. On the 4.9L, install the filter between the 2-5/8" long pieces installed in (c.).

NOTE: Install the filter with the wire mesh toward the oil fill cap. The mesh can be seen by looking into the end of the filter assembly.

e. Install an adapter E43Z-9E606-A in the air cleaner and attach using a retaining clip 383741-S. Center the adapter elbow in the new hole for 5.0L, 5.8L and 7.5L. Use the existing PCV filter (closure) pack hole for 4.9L.

f. Cut the PCV filter (closure) hose to proper length and attach to the adapter.

g. Plug the old hole in the tray with plug 377678-S for 5.0L, 5.8L and 7.5L only.

FIGURE 25

6. For 5.0L and 5.8L engines with a 7200 VV carburetor, clean and seal the carburetor to prevent dirt migration through the choke rod and accelerator pump rod holes (Refer to Figure 25).

a. Remove the carburetor from the vehicle.

b. Without disassembling the carburetor, thoroughly clean with Ford Automatic Choke Cleaner or equivalent, all of the choke linkage and accelerator pump linkage on the top and sides of the carburetor. Pay particular attention to the top and bottom of the upper body casting around the choke and accelerator pump rods. Allow cleaner to evaporate or blow dry with shop air.

c. Remove stepper motor, gasket, pintle and spring. Clean pintle and pintle cavity in main body casting thoroughly with Ford Automatic Choke Cleaner or equivalent. Do not re-install stepper motor at this time.

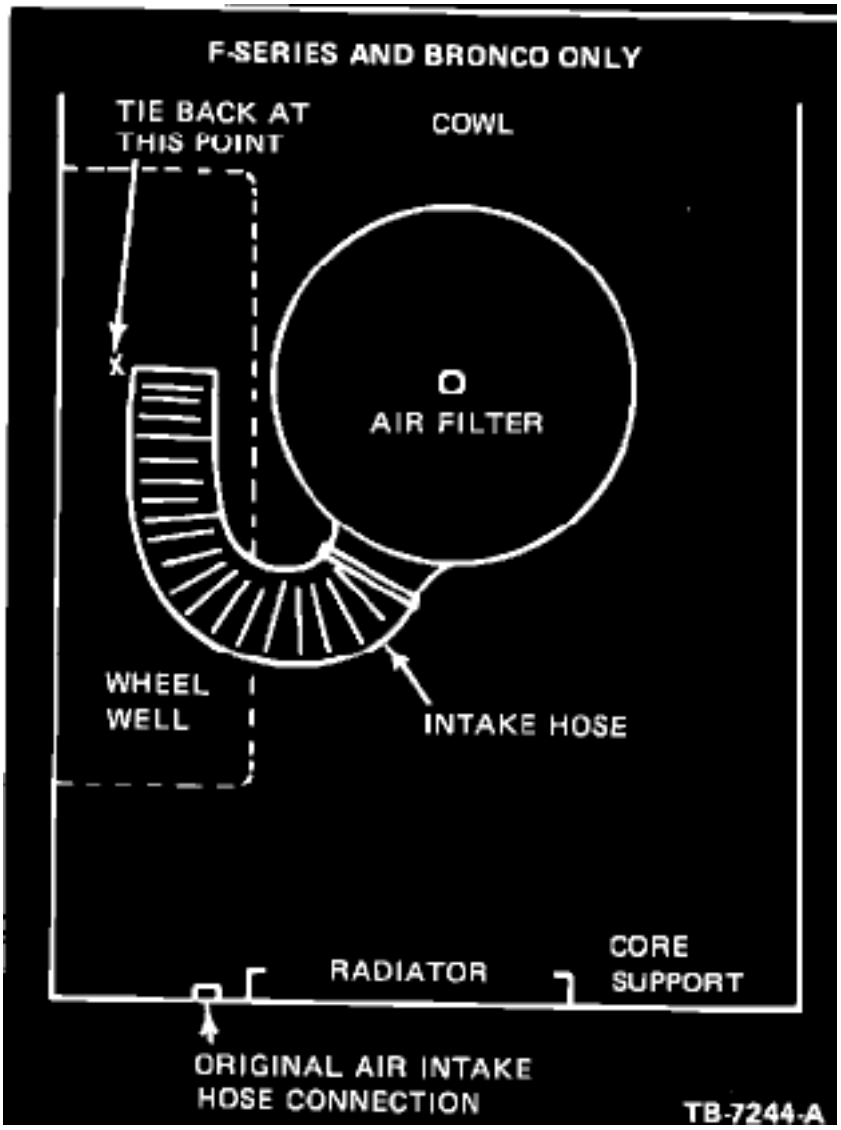


FIGURE 24

d. Hold throttle lever in the wide-open throttle position to raise the accelerator pump rod. With a toothpick, or other sharp tool, apply any commercially available silicone RTV (such as Dow Corning "Silastic") to the top side of the upper body casting around the accelerator pump rod (Figure 24). Fill the hole completely around the rods from the top side only and release the throttle lever.

e. With a rubber band, tie the throttle lever in closed-throttle position. Push fast idle cam to "off" position so that choke rod is fully raised. Fast idle cam should remain in "off" position.

f. With a toothpick, apply silicone RTV to bottom side of upper body casting around the choke shaft rod. Fill the hole completely around the rod from the bottom side only.

g. Install the spring, pintle, gasket, and stepper motor.

h. Allow carburetor to stand at room temperature for 24 hours without disturbing silicone RTV.

i. After 24-hour cure, remove rubber band from throttle lever, and open throttle to break (free) accelerator pump rod from silicone RTV. Bulk of RTV sealant should remain attached to upper body.

j. Manually exercise choke linkage to break (free) choke rod from silicone RTV. Bulk of RTV sealant should remain attached to upper body.

k. Re-install carburetor on vehicle.

7. Re-install and secure the air cleaner assembly as follows:

a. Set the air cleaner tray assembly on the carburetor and check that nothing is preventing the tray seating securely and completely sealing the flange.

b. Connect and secure the vacuum hoses.

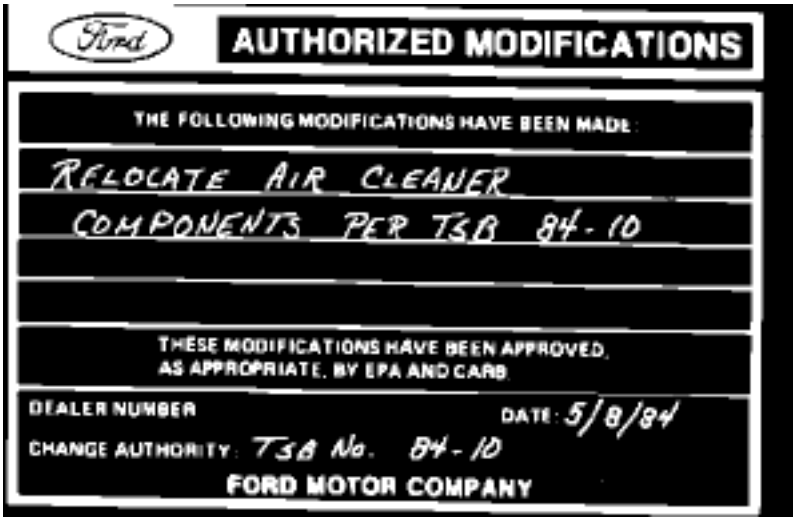
c. Install and seat a new heavy duty air cleaner element in the tray. Use E2TZ-9601-B (FA-732) for 4.9L and E0TZ-9601-A (FA-688) for 5.0L/5.8L. Use non-heavy duty element for 7.5L.

NOTE: Use of incorrect element will allow dirt to be ingested and will damage the engine.

d. Install the air cleaner cover and place the washer grommet rubber side down. Torque the wing nut hand tight (20 in.lbs.). Try to rotate the air cleaner assembly slightly. If it resists rotation, sealing to the carburetor is assured.

e. Connect the crankcase filter hose securely.

f. Install the heat riser tube. Connect the fresh air zip tube.



Obtain an Authorized Modifications decal and list the date, dealer number and summary of alterations performed. Select a prominent place adjacent to the Vehicle Emission Control Information decal suitable for installing the Authorized Modifications decal. Clean the area, install the decal and cover it with a clear plastic decal shield. PART NUMBER

PART NAME CLASS

E2AZ-6A768-A PCV Filter C

E2AZ-6853-A 1/2" PCV Hose C

E43Z-9E606-A Adapter C

E2TZ-9601-B Air Filter Element AM

E0TZ-9601-A Air Filter Element AM

C6TZ-9697-A Washer AM

D8ZZ-9654-A Gasket A

377678-S Plug BR

E3AZ-19562-A RTV Sealer A

390013-S36B Wing Nut S

C8DZ-9654-A Gasket AM

OTHER APPLICABLE ARTICLES: 83-25-21 WARRANTY STATUS: Reimbursable within the provisions of the Warranty and Policy Manual. OPERATION: SP9600C84 TIME:

6 cyl. - 0.5 Hr. 8 cyl. - 1.1 Hrs. DLR. CODING: Basic Part No. 9600 Code: 49

Fuel Filter: Technical Service Bulletins Fuel Filter - Replacement Information

Article No. 85-6-10

FUEL FILTER REPLACEMENT INFORMATION - ALL WITH FUEL FILTERS ATTACHED TO THE CARBURETOR AND/OR FUEL LINE WITH A RUBBER HOSE

FORD ALL 1985 AND PRIOR

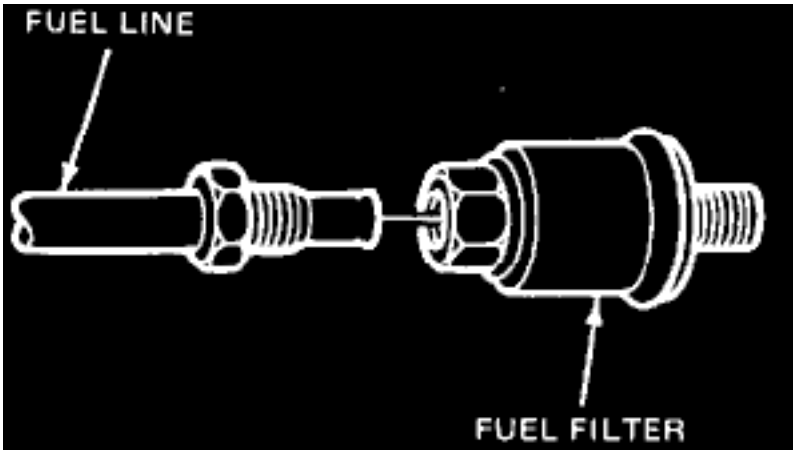
LINCOLN-MERCURY ALL 1985 AND PRIOR

LIGHT TRUCK ALL 1985 AND PRIOR

New fuel connector hoses and clamps should be used whenever a fuel filter is replaced.

Due to possible deterioration of hose materials which may result if a vehicle is fueled with gasoline containing excessive levels of methanol or ethanol, a new fuel hose and clamps should be installed when the fuel filter is changed. DO NOT REUSE OLD HOSES OR CLAMPS.

OTHER APPLICABLE ARTICLES: NONE WARRANTY STATUS: "INFORMATION ONLY"



Fuel Filter: Service and Repair Screw In Type

REMOVAL

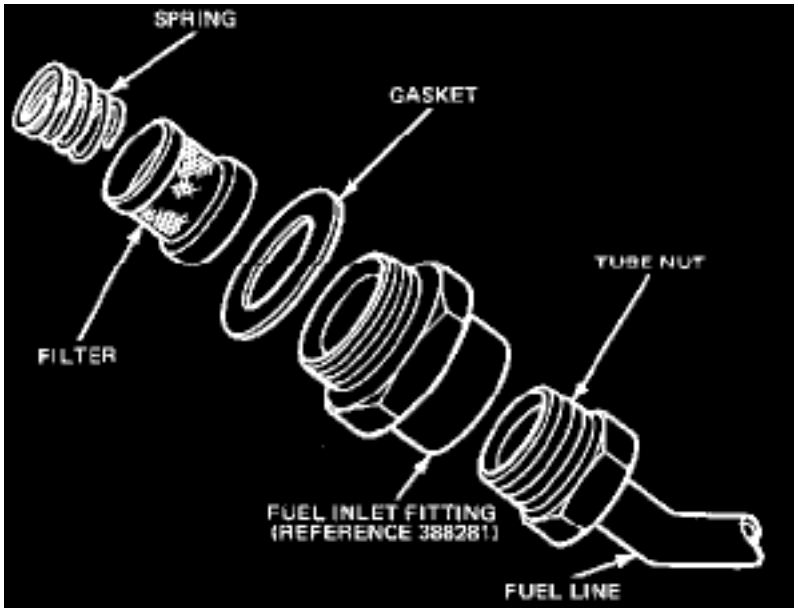
1. Remove the air cleaner assembly. 2. Loosen and remove the fuel tube from the filter. 3. Unscrew the filter from the carburetor.

INSTALLATION

1. Apply one drop of thread sealer to the external thread of a new filter. Thread the filter into the carburetor inlet port. 2. Tighten the filter to 9.0-11.0 Nm (80-100 in-lbs). 3. Apply ESE-M2C39-E or equivalent oil to the fuel supply tube nut and flare , and hand start the nut into the fuel filter inlet approximately two

threads.

4. Use an 11/16 inch wrench on the fuel filter to prevent the filter from rotating. Tighten the fuel filter to supply tube nut to 20-24 Nm (15-18 ft-lb). 5. Install air cleaner assembly. 6. Start the engine and check for fuel leaks.



Fuel Filter: Service and Repair Inlet Fitting Type

REMOVAL

- Remove the air cleaner.

- Hold the fuel filter inlet hex nut with a backup wrench and unscrew the fuel line tube nut from the fuel filter inlet.

WARNING: Use care to prevent combustion from fuel spillage.

- Unscrew the fuel inlet fitting.

-

Remove the gasket, filter and spring.

- Discard the gasket and filter.

INSTALLATION

- Install the spring, new filter and gasket.

- Hand start the fuel inlet fitting into the carburetor then, tighten to 10-24 Nm (90-125 lb-in).

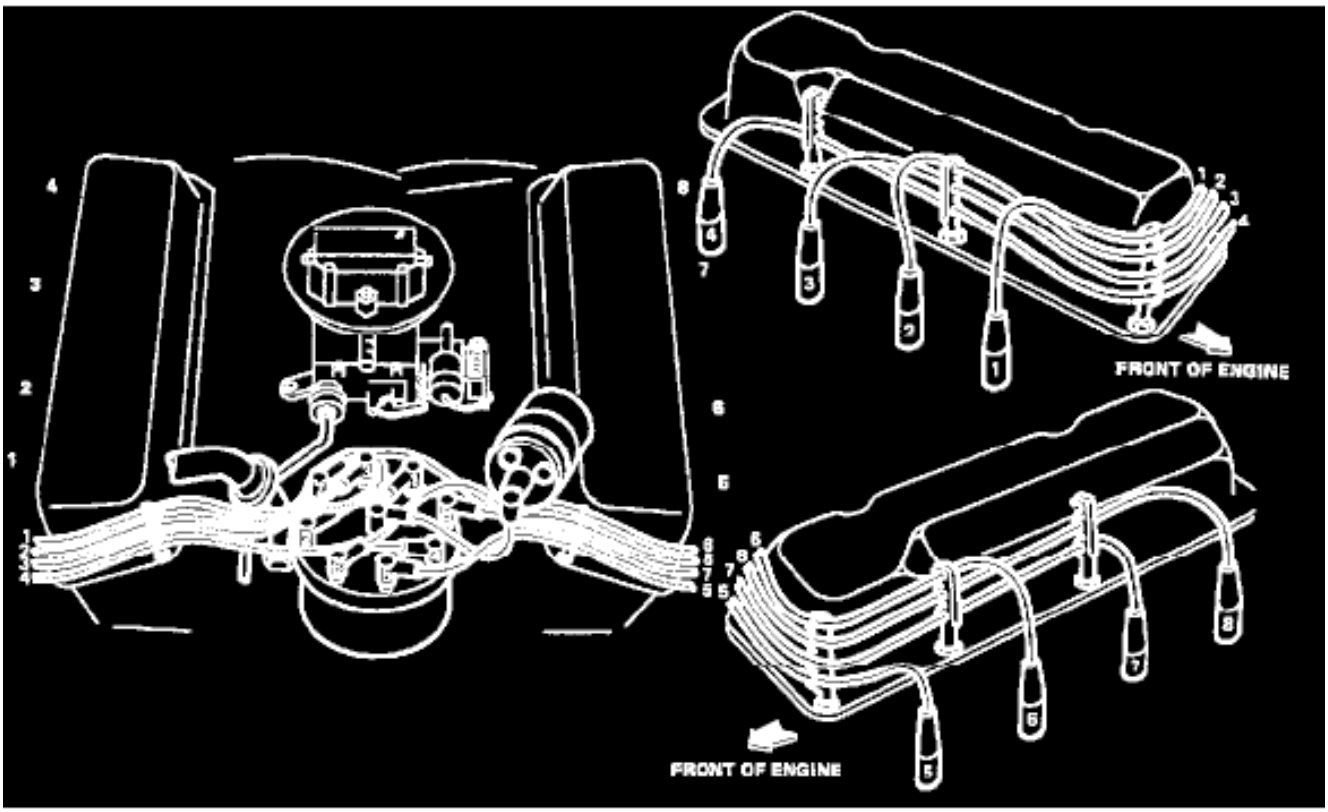
- Apply oil, ESE-M2C39-E or equivalent to the fuel tube nut threads and tube flare.

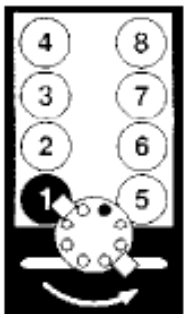
- Hand start the fuel line tube nut into the fuel inlet fitting (approximately two threads).

- Use a backup wrench on the fuel inlet fitting while tightening the fuel line tube nut to 20-24 Nm (15-18 lb-ft).

- Start the engine and check for fuel leak.

- Install the air cleaner.

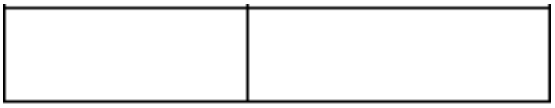


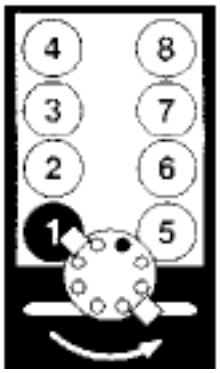


Firing Order: Specifications With EEC III

With EEC III The cylinders are numbered 1-4 on the Right side, starting with the front, and 5-8 on the left side, ending with the rear. Because of the unique dual level rotor used by the EEC-III Ignition system, the engine's firing order cannot be read off the top of

Firing Order 1-3-7-2-6-5-4-8

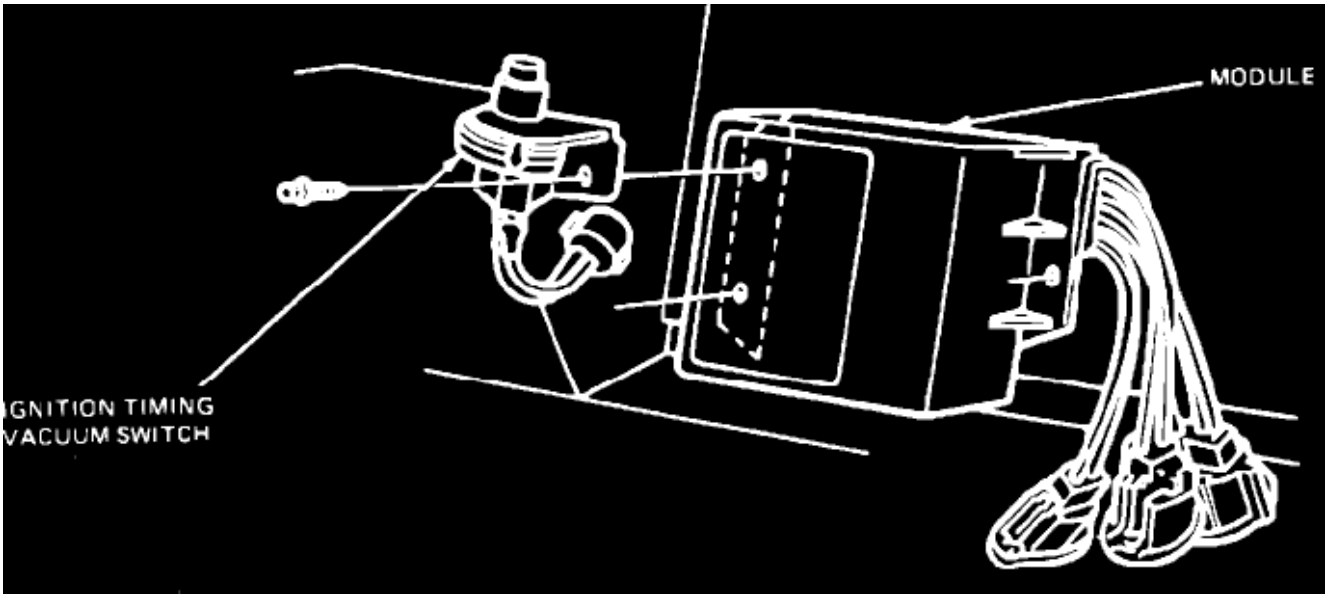




Firing Order: Specifications Without EEC III

Without EEC III

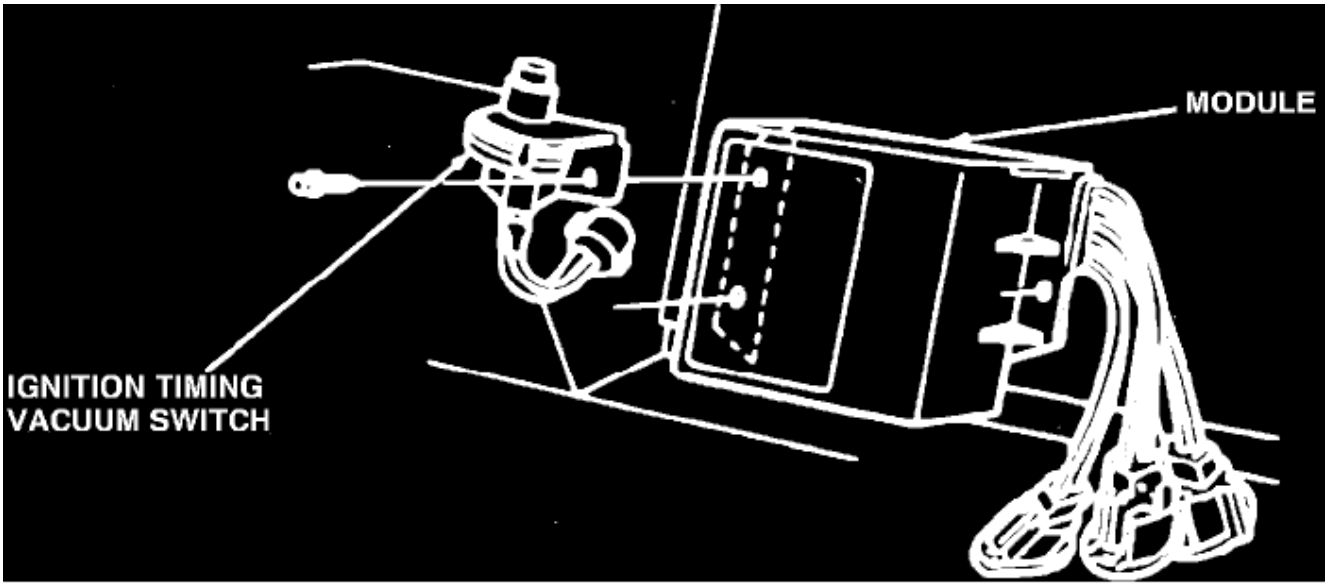
Firing Order 1-3-7-2-6-5-4-8



Ignition Timing Connector: Description and Operation

Fig. 20 Ignition Timing Vacuum Switch

Below vacuum setting, this switch, Fig. 20, used on some vehicles, is open and signals the ignition module to retard spark timing. The switch is closed above the vacuum setting and the ignition module is in the non-retard spark timing mode. Calibration resistors inside the switch control the amount of retard.



Part Number	Vacuum Setting ± 1.7 kPa (Inches Hg ± 0.5 In.)	Resistance Value (Ohms)
E1AE-12A265-BA	Less than 11.8 (3.5)	3,200 - 3,350
	Greater than 11.8 (3.5)	2,150 - 2,250
E1SE-12A265-BA	Less than 30 (9)	3,250 - 3,370
	Greater than 30 (9)	2,150 - 2,250
E1TE-12A265-CA	Less than 10 (3)	2,800 - 2,870
	Greater than 10 (3)	2,150 - 2,250
E25E-12A265-AA	Less than 13.5 (4)	2,800 - 2,870
	Greater than 13.5 (4)	2,150 - 2,250

Ignition Timing Connector: Testing and Inspection

Ignition Timing Vacuum Switch

Ignition Timing Vacuum Switch Test Chart

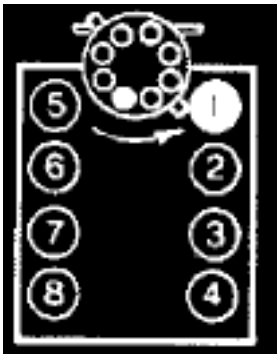
1. Disconnect switch from ignition module.

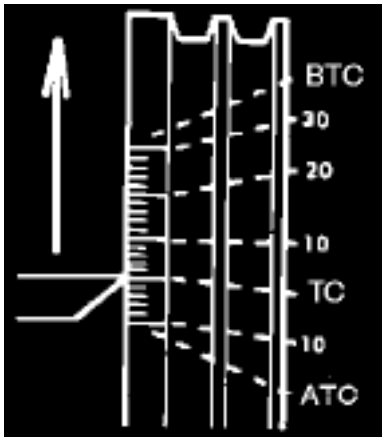
2. Connect suitable ohmmeter across switch terminals and compare resistance measured to ``less than'' values in the Ignition Timing vacuum Switch Test chart.

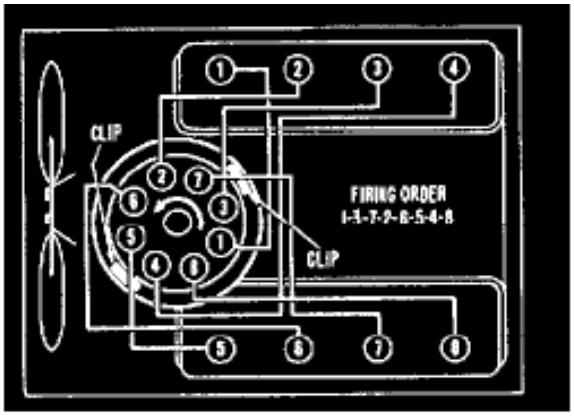
3. Apply vacuum to switch, using an outside vacuum source. Compare resistance now measured across switch terminals to ``greater than'' values in the Ignition Timing vacuum Switch Test chart.

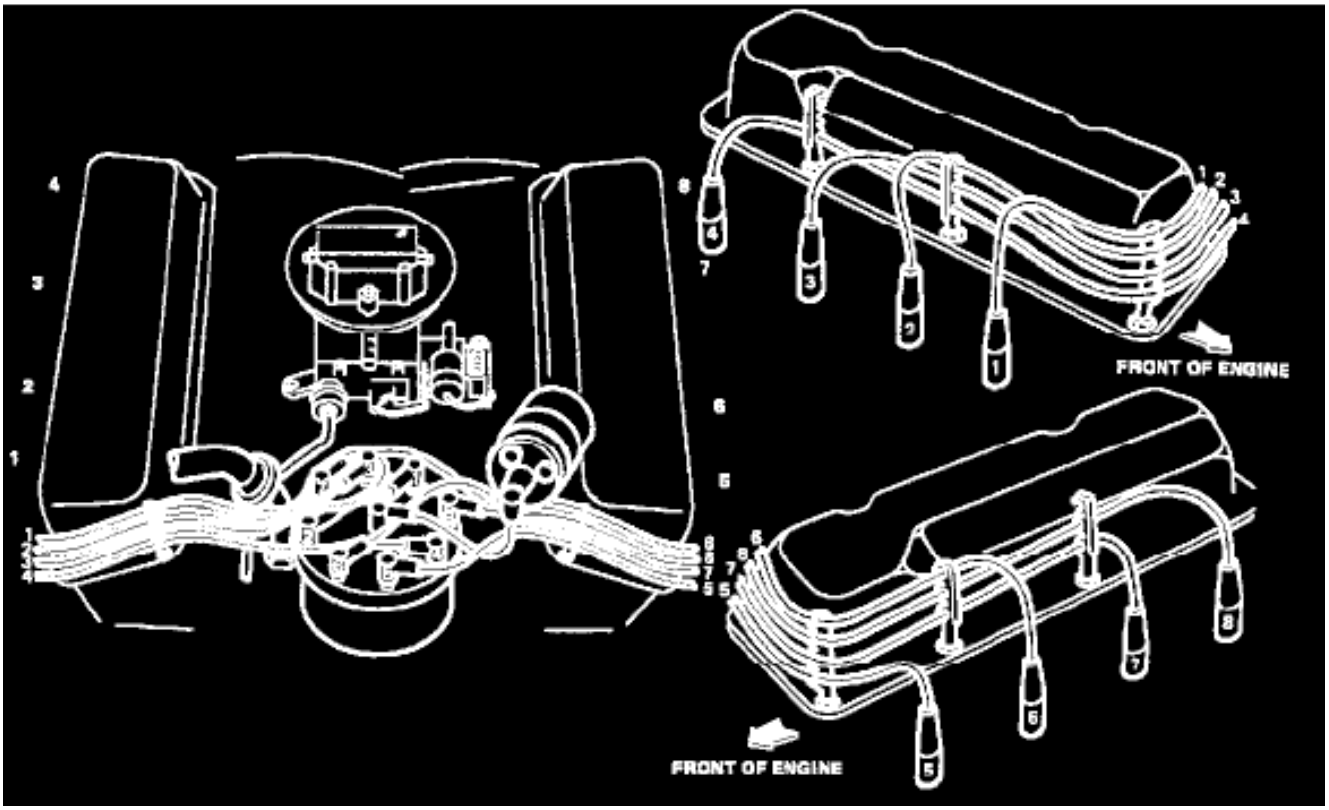
4. Replace switch if resistance is not within specifications.


5
1
6
2
7
3
8
4


5
1
6
2
7
3
8
4


BTC
30
20
10
TC
10
ATC

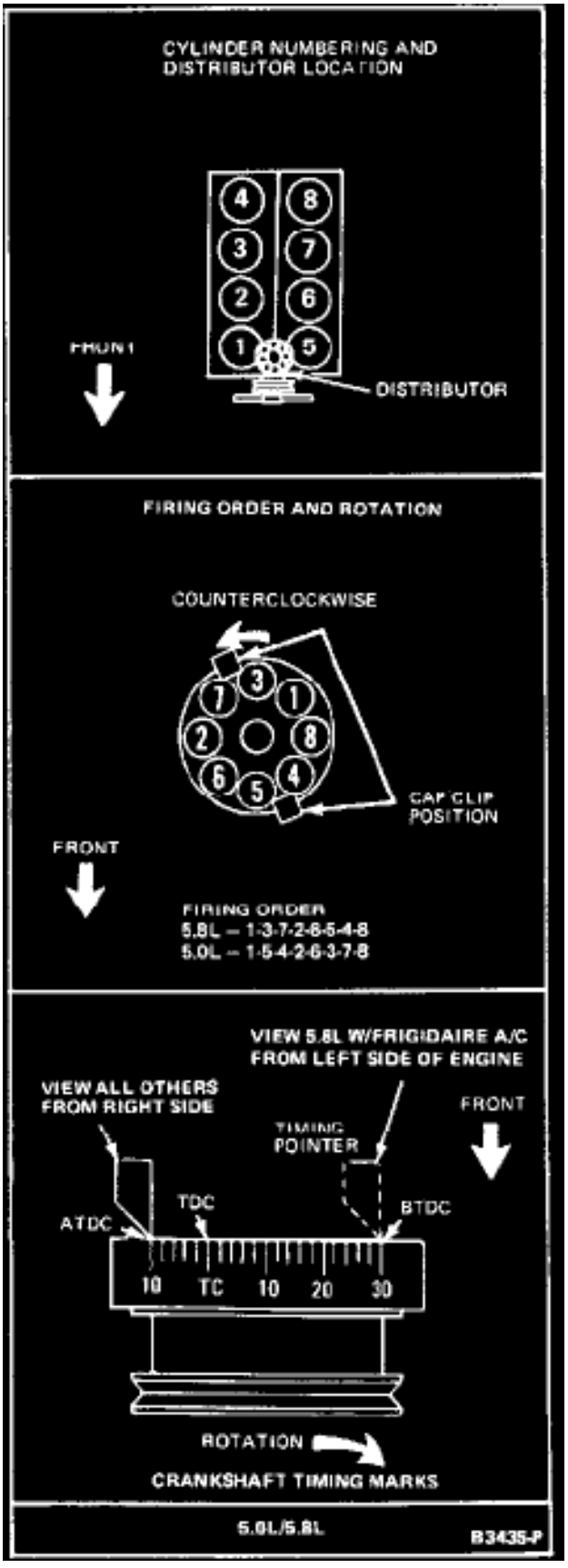




Ignition Cable: Diagrams

Spark Plug Wire Routing

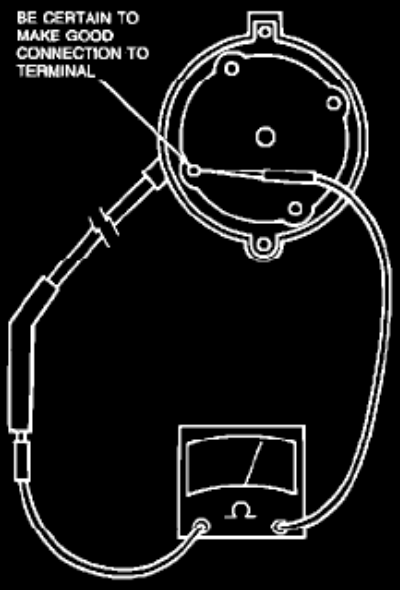
Ford F 250 5.8L Firing Order


CYLINDER NUMBERING AND DISTRIBUTOR LOCATION
4
8
3
7
2
6
1
5
FRONT
DISTRIBUTOR
FIRING ORDER AND ROTATION
COUNTERCLOCKWISE
7
3
1
2
8
6
5
4
CAP CLIP POSITION
FRONT
FIRING ORDER
5.8L – 1-3-7-2-6-5-4-8
5.0L – 1-5-4-2-6-3-7-8
VIEW 5.8L W/FRIGIDAIRE A/C FROM LEFT SIDE OF ENGINE
VIEW ALL OTHERS FROM RIGHT SIDE
FRONT
TIMING POINTER
TDC
ATDC
BTDC
10
TC
10
20
30
ROTATION
CRANKSHAFT TIMING MARKS
5.0L/5.8L
B3435-P

Spark Plug Wire Resistance

Test 3

TEST STEP	RESULT	ACTION TO TAKE
1. Remove distributor cap from distributor. 2. Check for spark plug wires firmly seated on cap. 3. Disconnect spark plug end of suspect wire(s). 4. Measure resistance from terminal in cap to spark plug terminal. 5. Reinstall distributor cap and connect spark plug wire to spark plug. **CAUTION** **Do not, under any circumstances, puncture a spark plug wire when measuring resistance. Measure only as instructed.** 6. **Was resistance less than 7,000 ohms per foot?**	Yes ▶	Spark plug wire resistance OK.
	No ▶	REPLACE spark plug wire(s).



Ignition Cable: Testing and Inspection

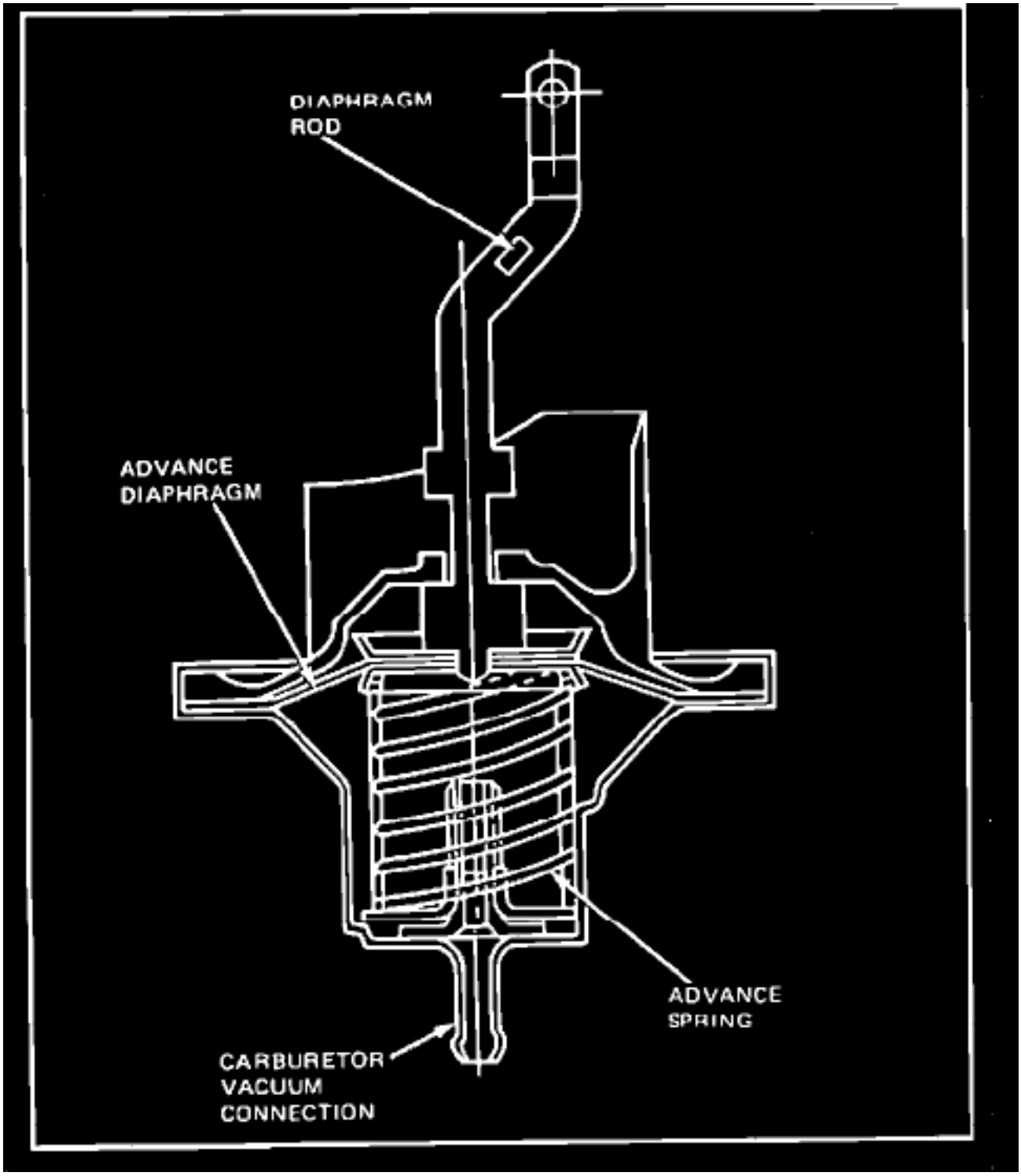
Spark Plug Wire Resistance

*** UPDATED BY TSB #85-9-33

Engine degrees at engine rpm, no load, in addition to basic timing setting.
Mechanical advance distributors only.

Engine	Trans-mission	Year	Distributor Number	Degrees @ 2500 RPM	
				Total	Centrifugal
351M	MT & AT	1981	D7TE-AHA	11.5-20.6	2.0-6.1
5.8L (351)M	MT & AT	1981	E0UE-CA	36.8-46.4	11.3-15.9
5.8L (351)M	MT & AT	1981	E1TE-EA	35.2-44.5	9.7-14.0
351 Windsor	MT & AT	1981-82	D7TE-ABA	9.4-19.5	0-5
351 Windsor	AT	1981-82	D7UE-JA	7.5-12.8	2.0-6.3
351 Windsor	MT	1981-83	D7UE-LA	14.5-23.7	5.0-9.2
5.8L (351)W	AT	1981	D1UE-EA	25.5-36.0	0-5.5
5.8L (351)W	AT	1981-82	D1UE-FA	27.4-37.7	1.9-7.2
5.8L (351)W	AT	1981-82	D1UE-GA	25.5-35.9	0-5.4
5.8L (351)W	MT	1982-83	E2TE-KA	12.7-22.1	7.2-11.6
5.8L (351)W	MT	1982-83	E2TE-SA	8.7-18.0	3.2-7.5
5.8L (351) 2V	MT & AT	1983-84	D7UE-LA	14.5-23.7	5.0-9.2
5.8L (351) 2V	MT & AT	1982-86	E2TE-UA	9.9-21.0	4.4-9.5
5.8L (351) 4V	AT	1984-86	E4TE-EA	27.8-37.0	10.3-14.5
5.8L (351) 4V	MT	1985-86	E5TE-NA	22.1-31.9	4.6-9.4
5.8L (351) 4V	AT	1985-86	E5TE-MA	20.7-30.5	3.2-8
5.8L (351) 4V	MT & AT	1985-87	E5TE-RA	23.0-32.5	9.5-14.0

DISTRIBUTOR TIMING ADVANCE

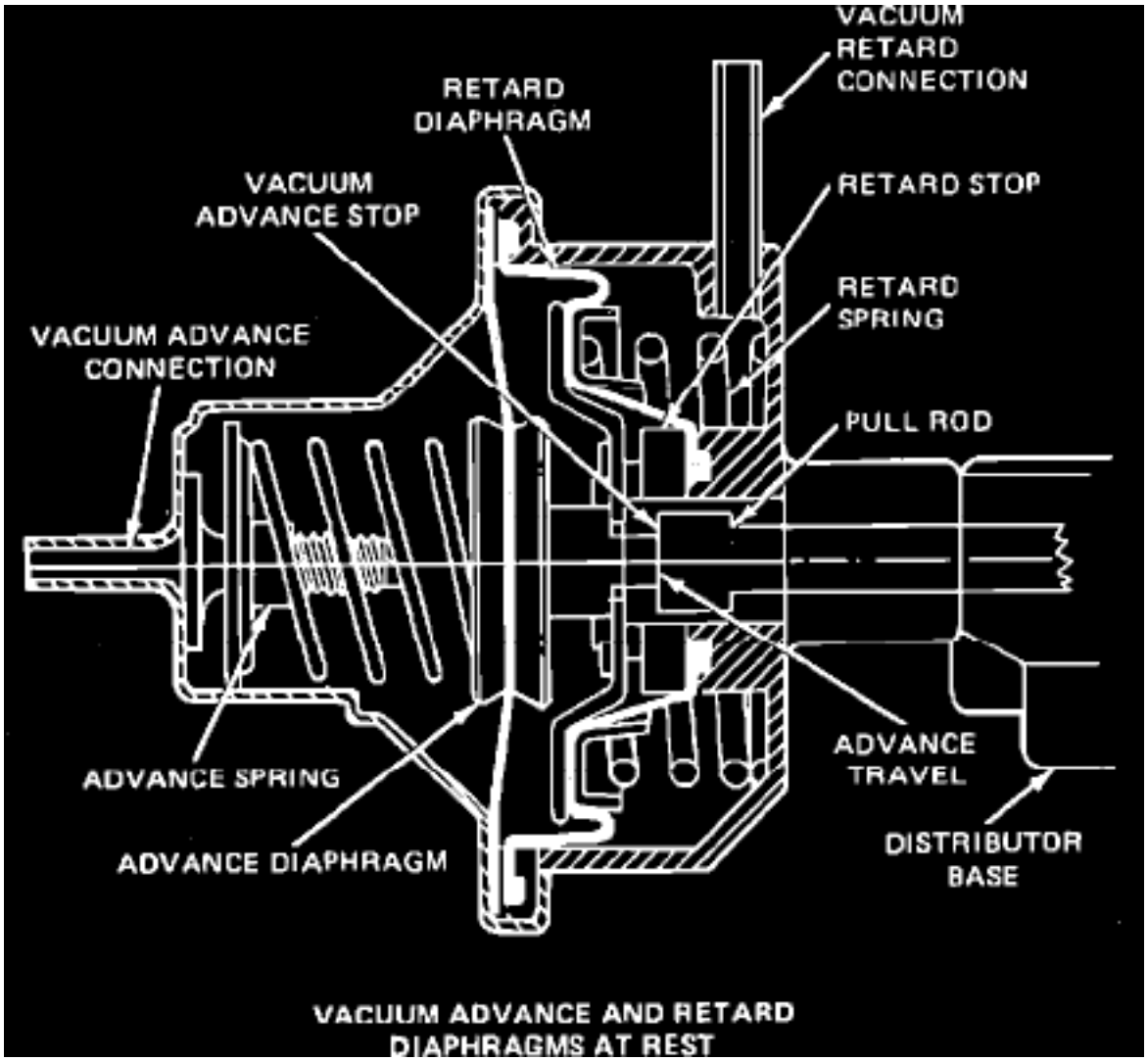


Distributor Advance Unit: Description and Operation Vacuum Spark Advance Mechanism

The vacuum spark control mechanism can provide spark advance if a single diaphragm assembly is used or spark advance and retard if a dual diaphragm assembly is used. The diaphragm assembly used depends on the engine calibration.

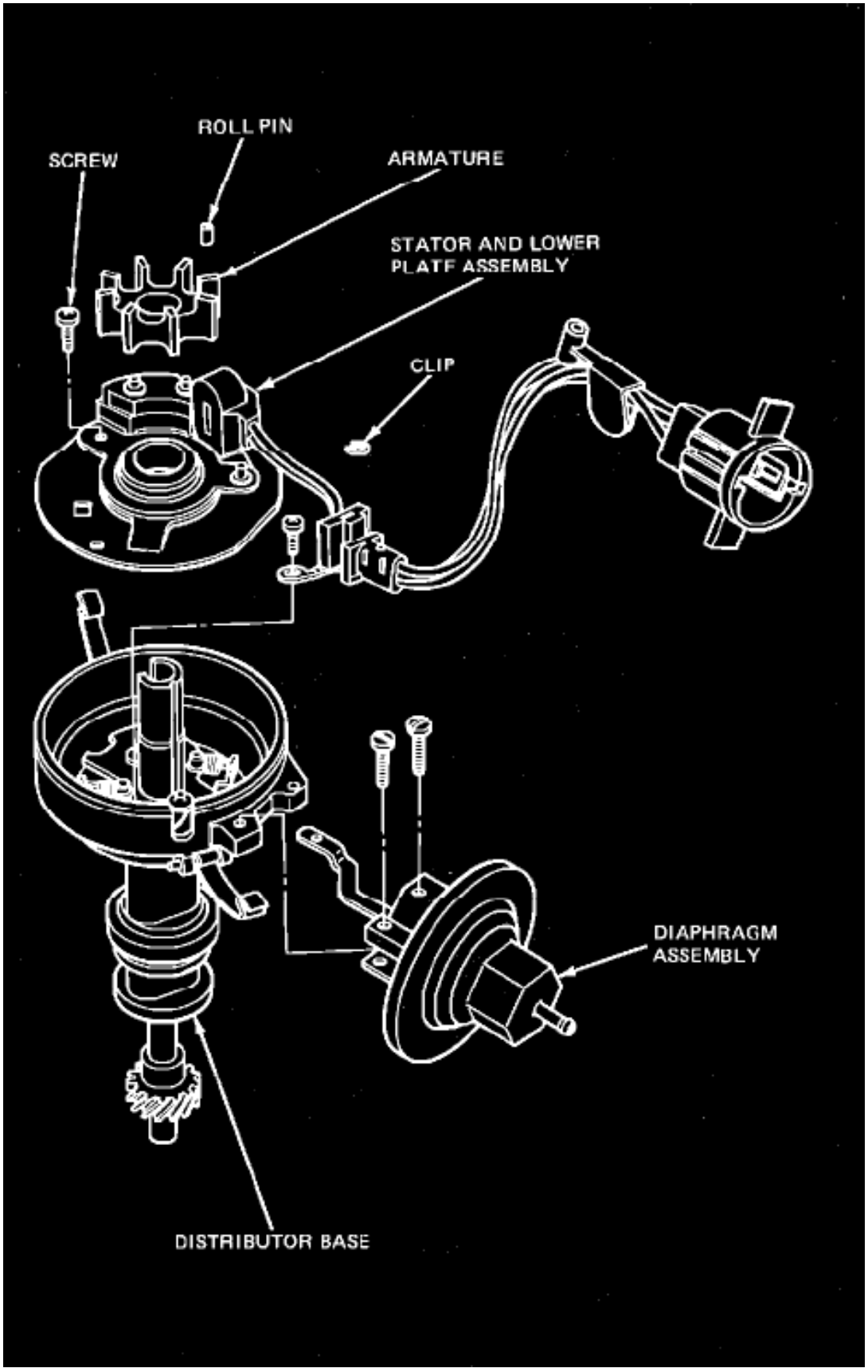
Single Diaphragm Assembly

SINGLE DIAPHRAGM ASSEMBLY The single diaphragm assembly, Fig. 11, also changes the armature to stator relationship to give spark advance. The stator assembly position is changed by means of vacuum being applied to the diaphragm assembly. Vacuum applied to the diaphragm assembly causes the diaphragm and attached diaphragm rod to move, compressing the advance spring, which controls the rate of advance. The movement of the diaphragm rod, which is attached to the stator assembly, makes the the stator assembly move with respect to the armature. This changes the initial armature to stator relationship set during initial timing, causing spark advance. The stator assembly is mounted on the lower plate assembly which with the diaphragm assembly, is attached to the distributor base.



Dual Diaphragm Assembly

DUAL DIAPHRAGM ASSEMBLY The dual diaphragm assembly, Fig. 12, obtains spark advance in the same manner as the single diaphragm assembly. In this case vacuum applied to the vacuum advance port causes the advance diaphragm and attached rod to move, otherwise the action is the same. Spark retard is done by applying vacuum to the vacuum retard port. This causes the retard diaphragm to move, compressing the retard spring, which controls the rate of spark retard. Compressing the retard spring allows the diaphragm rod stop to move due to the force applied by the advance spring pushing against it by means of the diaphragm rod. The result is the diaphragm rod moves causing the attached stator assembly to change position with respect to the armature. In this instance the direction of the stator assembly movement is opposite that occurring during vacuum advance, resulting in spark retard. NOTE: Any vacuum applied to the advance port overrides any spark retard caused by vacuum being applied to the retard port.



Distributor Advance Unit: Description and Operation Centrifugal Spark Advance Mechanism

Distributor - Exploded view

The centrifugal advance mechanism varies the relationship of the armature to the stator assembly. The armature is mounted to the sleeve and plate assembly which rotates in relation to the distributor shaft. The rotation is a result of the centrifugal weights moving in response to engine RPM. The movement of the weights change the initial relationship of the armature to the stator assembly by rotating the sleeve and plate assembly ahead of its static position on the distributor shaft Fig. 1. This produces spark advance. The rate of movement of the weights is controlled by calibrated springs.

Distributor Advance Unit: Service and Repair

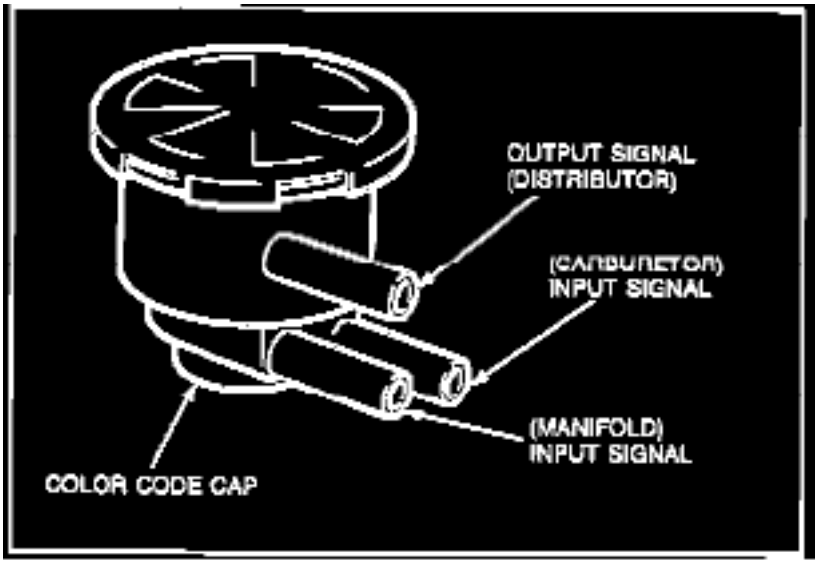
1. Remove distributor cap and rotor.

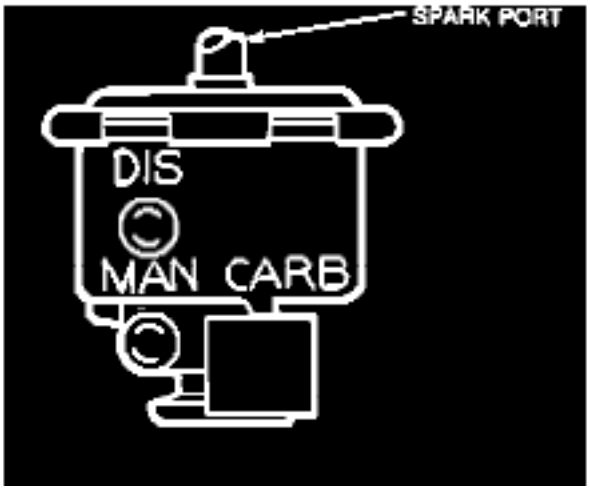
2. Disconnect vacuum lines, then remove snap ring that secures vacuum advance link to pickup assembly.

3. Remove vacuum advance attaching screws, then tilt unit downward to disconnect link.

4. Carefully remove unit from distributor.

5. Reverse procedure to install.





Distributor Vacuum Control: Description and Operation

3-Port Vacuum Regulator

Vacuum Regulator (3 & 4 Port)

Three port, Fig. 27, regulators and four port, Fig. 28, regulators are used to control the vacuum advance to the distributor. During engine idle conditions, the manifold vacuum signal is reduced to a constant output signal. Off idle, the output signal equals the spark port.

Distributor Vacuum Control: Testing and Inspection Distributor Modulator Valve Assembly

1. Turn ignition key to ``ON'' and check resistance at solenoid terminals.

2. If solenoid resistance is not 51---108 ohms, replace solenoid.

Distributor Vacuum Control: Testing and Inspection Vacuum Regulator

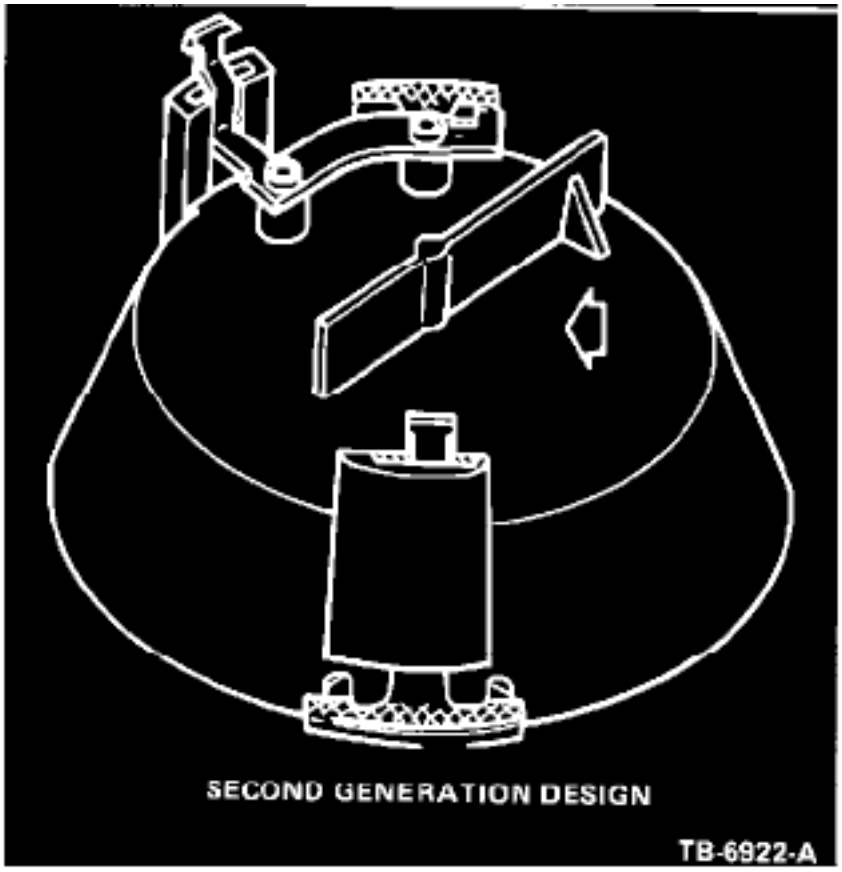
Procedure

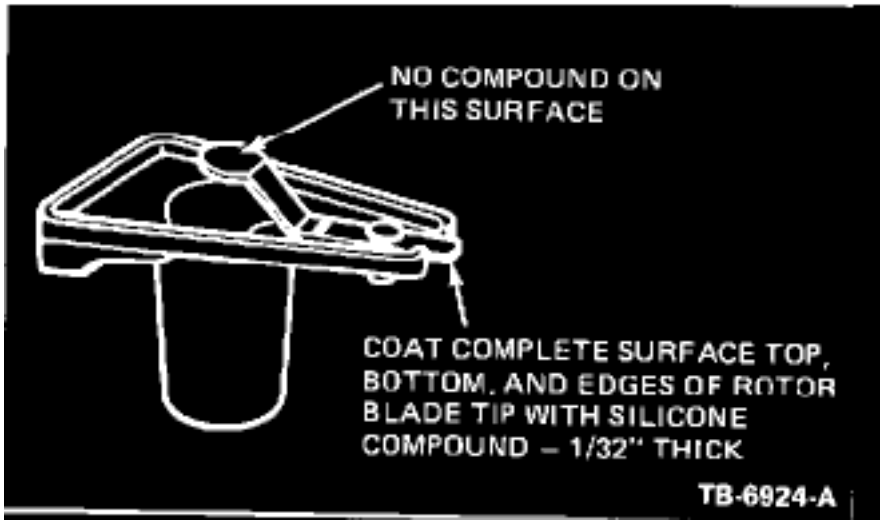
1. Disconnect vacuum line from distributor port and connect a vacuum gauge.

2. With engine at idle, the vacuum gauge reading should be within 1 inch Hg. vacuum of the calibration point. The calibration point of each valve can

be identified according to color code as follows: Black, 6 inches Hg.; green, 7 inches Hg.; red, 8 inches Hg.

3. Replace valve if not within specifications.





Ignition Rotor: Technical Service Bulletins Ignition Rotor - Alignment Procedure

Article No. 83-8-14

EEC III/DISTRIBUTOR - PROCEDURE FOR SETTING ROTOR ALIGNMENT 5.0L/5.8L EEC EQUIPPED LIGHT TRUCKS

LIGHT TRUCKS 1981/83 BRONCO, F-SERIES AND ECONOLINE

The following information and procedures are issued to clarify the proper setting of distributor rotor alignment on the subject vehicles. This reference publication supersedes all other printed material on subject.

FIGURE 12

FIGURE 13

For 1981 through 1983 model year vehicles, EEC distributors used on the EEC Systems had the "second generation" rotor (Figure 12). The 1983 model 5.0L EEC equipped Light Truck employs a conventional rotor (Figure 13). PROCEDURE FOR ROTOR ALIGNMENT:

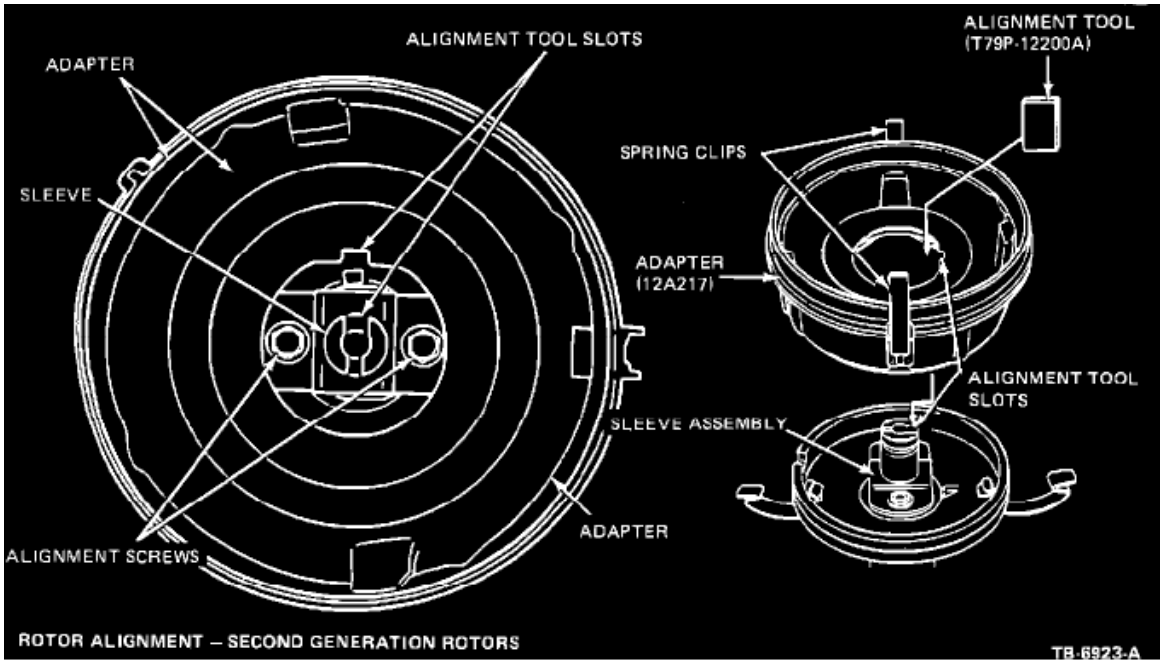
1. Remove the distributor cap and wires and position them to one side.

2. Remove the rotor.

3. To check rotor alignment:

a. Rotate the engine until the No. 1 piston is on the compression stroke. NOTE: Verification of being on the compression stroke is essential to correct rotor alignment. If the piston is on the exhaust stroke, the rotor can be misaligned by 180~.

b. Slowly rotate the engine until the alignment tool can be installed.


ALIGNMENT TOOL SLOTS
ALIGNMENT TOOL (T79P-12200A)
ADAPTER
SLEEVE
SPRING CLIPS
ADAPTER (12A217)
ALIGNMENT TOOL SLOTS
SLEEVE ASSEMBLY
ADAPTER
ALIGNMENT SCREWS
ROTOR ALIGNMENT – SECOND GENERATION ROTORS
TB-6923-A

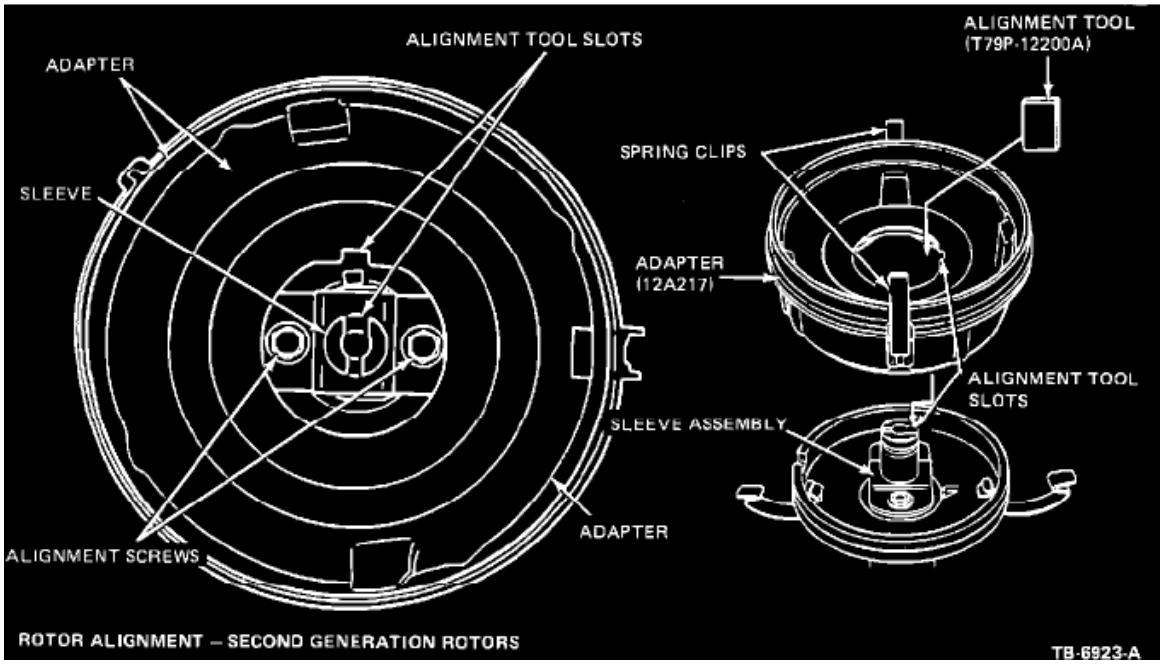

ALIGNMENT TOOL SLOTS
ALIGNMENT TOOL (T79P-12200A)
ADAPTER
SLEEVE
SPRING CLIPS
ADAPTER (12A217)
ALIGNMENT TOOL SLOTS
SLEEVE ASSEMBLY
ADAPTER
ALIGNMENT SCREWS
ROTOR ALIGNMENT – SECOND GENERATION ROTORS
TB-6923-A

FIGURE 14

c. The T79P-12200-A tool mounts between the slot on the sleeve and the slot (cut out) on the adapter (Figure 14).

d. Read the timing mark on the damper indicated by the timing pointer.

e. If the timing mark is specification, TDC +/- 4~, the rotor alignment is satisfactory. The alignment tool can be removed.

TO ADJUST ROTOR ALIGNMENT:

1. Remove the distributor cap by loosening the two spring clips holding the cap of the distributor adapter. Remove rotor.

2. Rotate engine until No. 1 piston is on the compression stroke. (See Step 3a above).

3. Slowly rotate the engine until the timing pointer is aligned with the specified timing mark. (TDC +/- 4~).

4. Loosen the two sleeve assembly adjustment screws and rotate the sleeve until the alignment tool T79P-

FIGURE 14

12200-A fits into the alignment slots on the sleeve and the adapter (Figure 14). 5.

Tighten the adjustment screw to 2.8-3.9 N-m (25-30 lb.in.). Remove alignment tool.

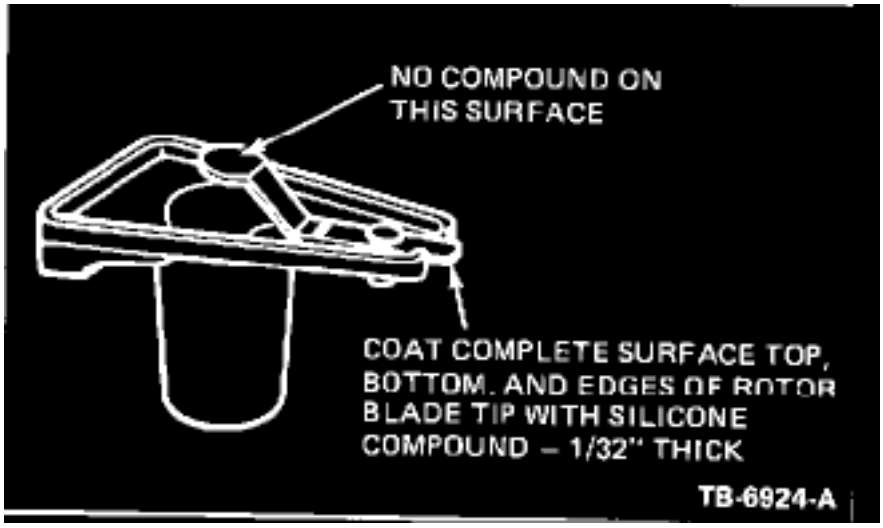


FIGURE 13

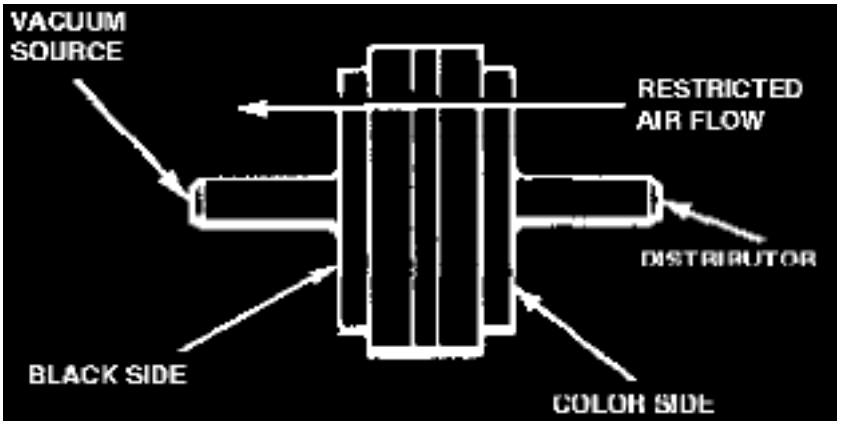
6. If the vehicle is a 1983 model equipped with a 5.0L engine, coat the rotor with silicone grease as shown in Figure 13.

7. Reinstall distributor cap and rotor making sure wires are firmly seated in the distributor cap terminal housings and on the spark plugs.

OTHER APPLICABLE ARTICLES: None WARRANTY STATUS: "INFORMATION ONLY"

Distributor Plate W/ Pick-up Sensor: Service and Repair

1. Remove distributor cap and rotor.
2. Remove vacuum advance unit and magnetic pickup assembly.
3. Remove attaching screws and lift base plate from distributor.
4. Reverse procedure to install.



Vacuum Spark Delay Valve: Description and Operation

Fig.25 - Spark Delay Valve

This unit is used in conjunction with some of the other Ford systems. Its purpose is to further reduce emissions by delaying the spark advance during rapid acceleration and by cutting off advance immediately upon deceleration. Fig. 25.

This plastic disc-shaped valve is installed in the carburetor vacuum line at the distributor advance diaphragm. It is a one way valve and will not operate if installed backwards. The black side of the valve must be toward the carburetor. This valve cannot be repaired.

NOTE: On all systems which employ the dual diaphragm distributor the line which has high vacuum at idle (normal operating temperature) is

connected to the secondary (retard) side of the distributor vacuum advance unit. This is the connection closest to the distributor cap.

Color	Number Value
White	5
Yellow	10
Blue	15
Green	20
Red	30

Year	Color	I.D. No.	Time in Seconds	
			Min.	Max.
1974–76	Black/Gray	1	1	4
	Black/Brown	2	2	5
	Black/White	5	4	12
	Black/Yellow	10	5.8	14
	Black/Blue	15	7	16
	Black/Green	20	9	20
	Black/Orange	30	13	24
	Black/Red	40	15	28
1977–82	Black/Gray	1	.6	1.6
	Black/Brown	2	1	3
	Black/White	5	2.7	9.3
	Black/Yellow	10	4.5	13.2
	Black/Blue	15	6.8	18.8
	Black/Green	20	8	26
	Black/Orange	30	11.6	38
	Black/Red	40	14	47.2
	White/Pink①	5	2.7	9.3
	White/Brown①	2	1	3
	White/Green①	20	8	26
	White/Yellow①	10	4.5	13.2
	White/Gray①	1	.6	1.6
	White/Blue①	20	8	26
	White/Red①	40	14	47.2

①—Retard Delay Valve Only

Vacuum Spark Delay Valve: Testing and Inspection

Fig.36 - SDV Valve Color Coding

Fig.37 - Spark Delay Valve (SDV) Specifications Chart

Refer to Figs. 36 & 37 for number value by color code.

NOTE: To perform the following procedure, an external vacuum source capable of maintaining a minimum constant 10 inches Hg. is required.

Mono Delay Valve

1. Set external vacuum source to 10 inches Hg. and connect black side of delay valve to vacuum source.

2. Connect a vacuum gauge with a 24 inch hose to colored side of delay valve.

3. Apply 10 inches Hg. vacuum and observe time in seconds for gauge to read 0-8 inches Hg. The minimum and maximum time for gauge to read 8

inches Hg. should be as shown in Fig. 37.

Dual Delay Valve

1. Set external vacuum source to 10 inches Hg. and connect vacuum gauge with a 24 inch hose to DIST nipple of delay valve.

2. Connect black side of delay valve and CARB nipple of delay valve to vacuum source.

NOTE: Avoid applying vacuum to CARB nipple while applying vacuum to black side of valve.

3. Apply 10 inches Hg. of vacuum and observe time in seconds for gauge to read from 0-8 inches Hg. The minimum and maximum time for gauge to

read 8 inches Hg. should be as shown in Fig. 37.

Retard Delay Valve

1. Set external vacuum source to 10 inches Hg. and connect colored side of delay valve to vacuum source.

2. Connect a vacuum gauge with a 24 inch hose to white side of delay valve.

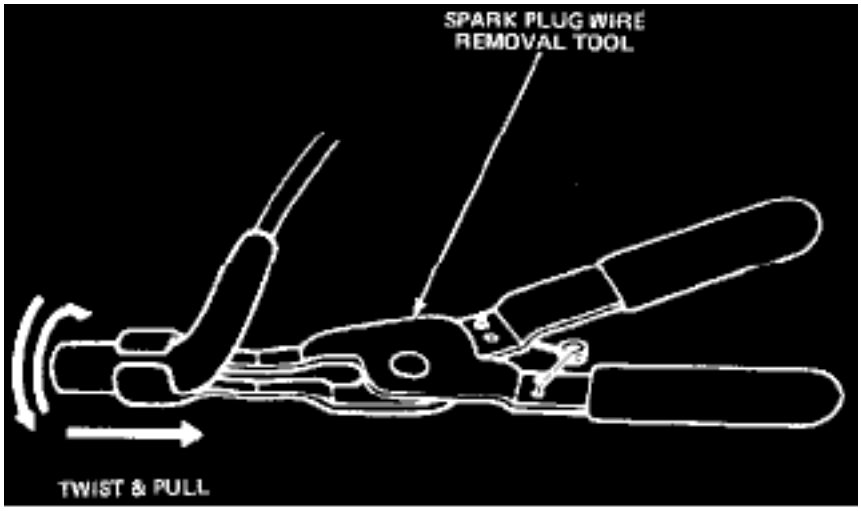
3. Apply 10 inches Hg. of vacuum and observe time in seconds for gauge to read from 0-8 inches Hg. The minimum and maximum time for gauge to

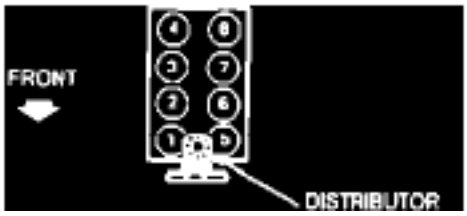
read 8 inches Hg. should be as shown in Fig. 37.

Spark Plug: Specifications

SPARK PLUGS

Gap ..... 0.044 in Torque ..... 14-20 Nm (10-15 ft-lbs)





Spark Plug: Service and Repair

REMOVAL

- Remove the wire from each spark plug by grasping the molded boot with tool T74P-6666-A or equivalent. Twist the boot until it loosens and then pull it off the spark plug. Do not pull on the wire, as the connection may become damaged.

- Any wire damaged must be replaced. Each original spark plug wire is numbered for the cylinder to which it is designated. If wires are not numbered, each wire should be numbered as to the plug from which it was removed.

- Clean the area around each spark plug port with compressed air.

- Using the proper size spark plug socket remove the spark plugs.

INSTALLATION

-

Check the gap on each new spark plug and set to specification. See: Specifications

Cylinder Numbering And Distributor Location

- Install each spark plug and tighten to 14-20 Nm (10-15 ft-lbs).

- Coat the inside of each spark plug boot with silicone dielectric compound. Connect each spark plug wire to the plug from which it was removed. Be sure each wire is fully depressed on each plug and molded boot is firmly in place.

Maximum PSI	Minimum PSI	Maximum PSI	Minimum PSI	Maximum PSI	Minimum PSI	Maximum PSI	Minimum PSI
134	101	164	123	194	145	224	168
136	102	166	124	196	147	226	169
138	104	168	126	198	148	228	171
140	105	170	127	200	150	230	172
142	107	172	129	202	151	232	174
144	108	174	131	204	153	234	175
146	110	176	132	206	154	236	177
148	111	178	133	208	156	238	178
150	113	180	135	210	157	240	180
152	114	182	136	212	158	242	181
154	115	184	138	214	160	244	183
156	117	186	140	216	162	246	184
158	118	188	141	218	163	248	186
160	120	190	142	220	165	250	187
162	121	192	144	222	166		

Compression Check: Testing and Inspection

COMPRESSION TEST

1. Ensure oil in crankcase is of the correct viscosity and at proper level and battery is properly charged. Operate vehicle until engine is at normal

operating temperature. Turn OFF ignition switch, then remove all spark plugs.

2. Set throttle plates (and choke plates, if equipped) in wide-open position. 3. Install a compression gauge such as Rotunda Compression Tester 059-00009 or equivalent in No. 1 cylinder. 4. Install an auxiliary starter switch in starting circuit. With ignition switch in the OFF position, and using auxiliary starter switch, crank engine at

least five compression strokes and record highest reading. Note the approximate number of compression strokes required to obtain the highest reading.

5. Repeat test on each cylinder cranking the engine approximately the same number of compression strokes.

TEST CONCLUSION

1. The indicated compression pressures are considered within specification if the lowest reading cylinder is within 75 percent of the highest. 2. If one or more cylinders read low, squirt approximately one tablespoon of heavy SAE 50 weight or equivalent engine oil on top of the pistons in

the low reading cylinders. Repeat compression pressure check on these cylinders. a. If compression improves considerably, piston rings are at fault. b. If compression does not improve, valves are sticking or seating poorly. c. If two adjacent cylinders indicate low compression pressures and squirting oil on pistons does not increase compression, cause may be a

cylinder head gasket leak between cylinders. Engine oil and/or coolant in cylinders could result from this problem.

Compression Pressure Limit Chart

NOTE: Refer to the compression pressure limit chart for pressure specifications.

Valve Clearance: Specifications

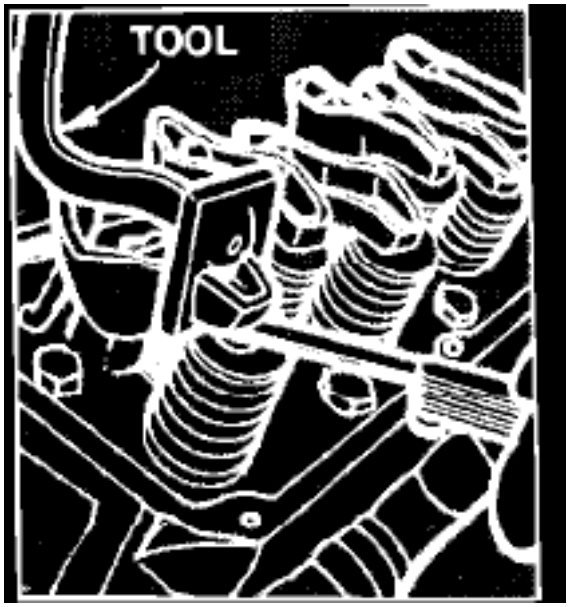
ENGINE YEAR CLEARANCE

V6-232 82-83 .088-.189 V8-255 81-82 .123-.173 6-300 80-87 .125-.175 V8-302 80-87 .096-.165 V8-351M 80-81 .125 V8-351W 80-87 .123-.173 V8-400 80-82 .175 V8-460 80-87 .100-.150

On engines with hydraulic lifters, clearance specified is at valve stem tip with lifter collapsed.

Valve Clearance: Locations

FRONT TO REAR 6-300 E-I-E-I-E-I-E-I-E-I-E-I V6-232 Right I-E-I-E-I-E V6-232 Left E-I-E-I-E-I V8-255, 302 Left Bank E-I-E-I-E-I-E-I V8-255, 302 Right Bank I-E-I-E-I-E-I-E V8-351, 400 Right Bank I-E-I-E-I-E-I-E V8-351, 400 Left Bank E-I-E-I-E-I-E-I V8-460 Left Bank E-I-E-I-E-I-E-I V8-460 Right Bank I-E-I-E-I-E-I-E



Valve Clearance: Adjustments

Fig. 21 Compressing valve lifter with tool to check clearance on engines with hydraulic valve lifters

V8 ENGINES To provide a means to compensate for dimensional changes in the valve train and provide for valve adjustment, .060 inch shorter or longer pushrods are available. If the valve clearance is less than the minimum, the .060 inch shorter pushrod should be used. If the clearance is more than the maximum, the longer pushrod should be used. To check the valve clearance, proceed as follows:

1. Mark crankshaft pulley at three locations, with No. 1 location at TDC timing mark (end of compression stroke), location No. 2 one full turn (360°) clockwise from TDC and No. 3 location one quarter turn clockwise (90°) from position No. 2.

2. Turn crankshaft to number 1 location, then compress valve lifter using tool T71P-6513-A or equivalent, Fig. 21, and check the clearance on the following valves:

V8-255, 302, 460 No. 1 Intake No. 1 Exhaust No. 7 Intake No. 5 Exhaust No. 8 Intake No. 4 Exhaust V8-351 & 400 No. 1 Intake No. 1 Exhaust No. 4 Intake No. 3 Exhaust No. 8 Intake No. 7 Exhaust

3. Turn crankshaft to number 2 location, then compress valve lifter using tool T71P-6513-A or equivalent, Fig. 21, and check the clearance on the following valves:

V8-255, 302, 460 No. 5 Intake No. 2 Exhaust No. 4 Intake No. 6 Exhaust V8-351 & 400 No. 3 Intake No. 2 Exhaust No. 7 Intake No. 6 Exhaust

4. Turn crankshaft to number 3 location, then compress valve lifter using tool T71P-6513-A or equivalent, Fig. 21, and check the clearance on the following valves:

V8-255, 302, 460 No. 2 Intake No. 7 Exhaust No. 3 Intake No. 3 Exhaust No. 6 Intake No. 8 Exhaust V8-351 & 400 No. 2 Intake No. 4 Exhaust No. 5 Intake No. 5 Exhaust No. 6 Intake No. 8 Exhaust

Engine	Year	Sensor	Resistance Ohms @ deg. F/C
All w/EEC IV	1983-90	Coolant, Air Charge	31,700-42,900 @ 68/20 13,650-18,650 @ 104/40 6500-8900 @ 140/60 3240-4440 @ 176/80 1770-2370 @ 212/100 980-1380 @ 248/115
All w/EEC III	1981-83	Coolant, Air Charge	1100-6000 1700-60,000

TEMPERATURE SENSORS

Intake Air Temperature Sensor: Description and Operation

DESCRIPTION

This sensor is used on models with fuel injection. It sends air temperature information to the Electronic Control Unit to make changes for air temperature variations.

Intake Air Temperature Sensor: Testing and Inspection Component Testing

NOTE: Prior to performing any test on this system, insure that temperature switch is above 65° F.

1. Disconnect connector from wiring harness.

2. Connect an ohmmeter or self-powered test light to temperature switch connector terminals.

3. Cool the switch to below 40° F by spraying with Refrigerant 12.

CAUTION: Do not spray refrigerant with engine running, as any refrigerant drawn into the carburetor and burned in the engine will produce poisonous phosgene gas. Conduct this procedure in well ventilated area.

4. When switch is cooled below 40° F. a.

On type 1 switches, the internal switch contacts should open. The ohmmeter should read maximum resistance or the test light should be off. If switch does not open below 40° F, replace switch.

b. On type 2 switches, the internal switch contacts should close. The ohmmeter should read zero resistance and the test light should be on. If test light does not go on or ohmmeter indicates a resistance of 1 ohm or more, replace switch.

5. Increase switch temperature to above 70° F by placing palm of hand on metal surface of switch or by starting engine and allowing the exhaust manifold heat to increase the intake air temperature.

6. When switch temperature is above 70° F. a.

On type 1 switches, the internal switch contacts should close. The ohmmeter should read zero resistance and the test light should be on. If test light does not go on or ohmmeter indicates a resistance of 1 ohm or more, replace switch.

b. On type 2 switches, the internal switch contacts should open. The ohmmeter should read maximum resistance or the test light should be off. If switch does not open, replace switch.

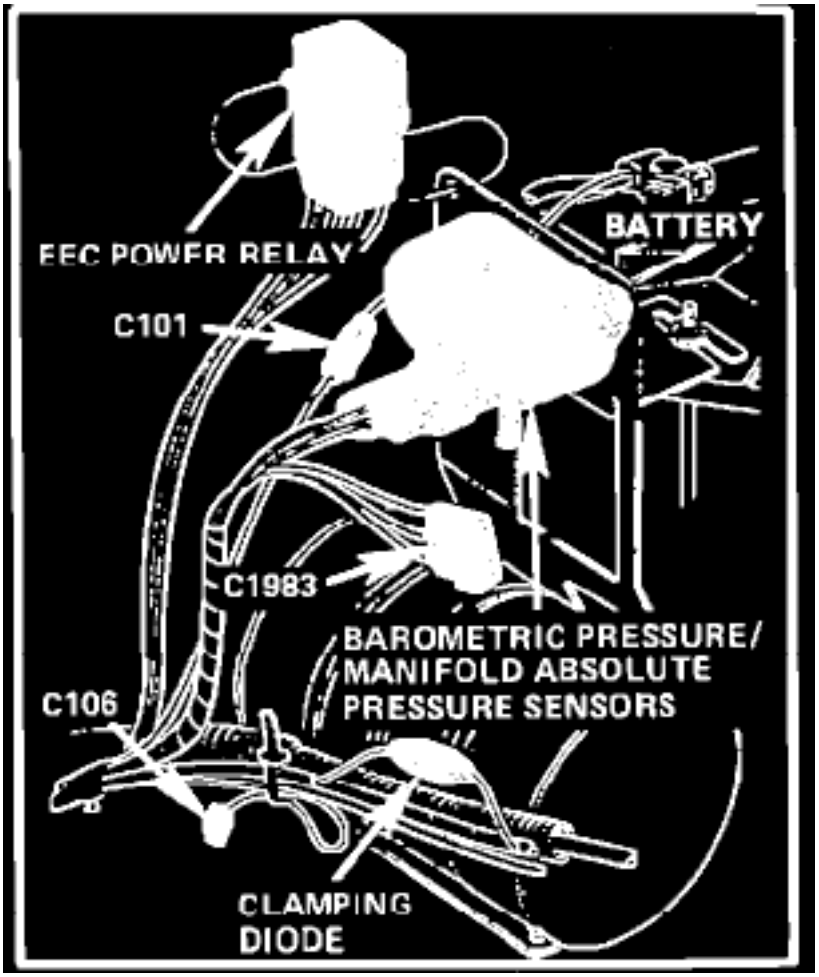
c. If switch is replaced, check operation of new switch before connecting harness connector.

With EEC IV, measured between BK/W wire and ground with ignition on and engine off.

Engine	Year	Voltage @ Altitude
All w/EEC IV	1983-90	1.55-1.63 @ 0
		1.52-1.60 @ 1000
		1.49-1.56 @ 2000
		1.46-1.54 @ 3000
		1.43-1.51 @ 4000
		1.39-1.48 @ 5000
		1.36-1.45 @ 6000
		1.34-1.43 @ 7000

Engine	Year	Resistance (ohms) @ Altitude
All w/EEC III	1981-83	7.6-8.4 @ 0-1500
		7.2-8.1 @ 1500-2500
		6.9-7.8 @ 2500-3500
		6.7-7.3 @ 3500-4500
		6.6-7.2 @ 4500-5500
		6.3-7.0 @ 5500-6500
		6.1-6.7 @ 6500-7500
		5.4-6.7 @ 7500 and up

MANIFOLD ABSOLUTE AND BAROMETRIC PRESSURE SENSORS

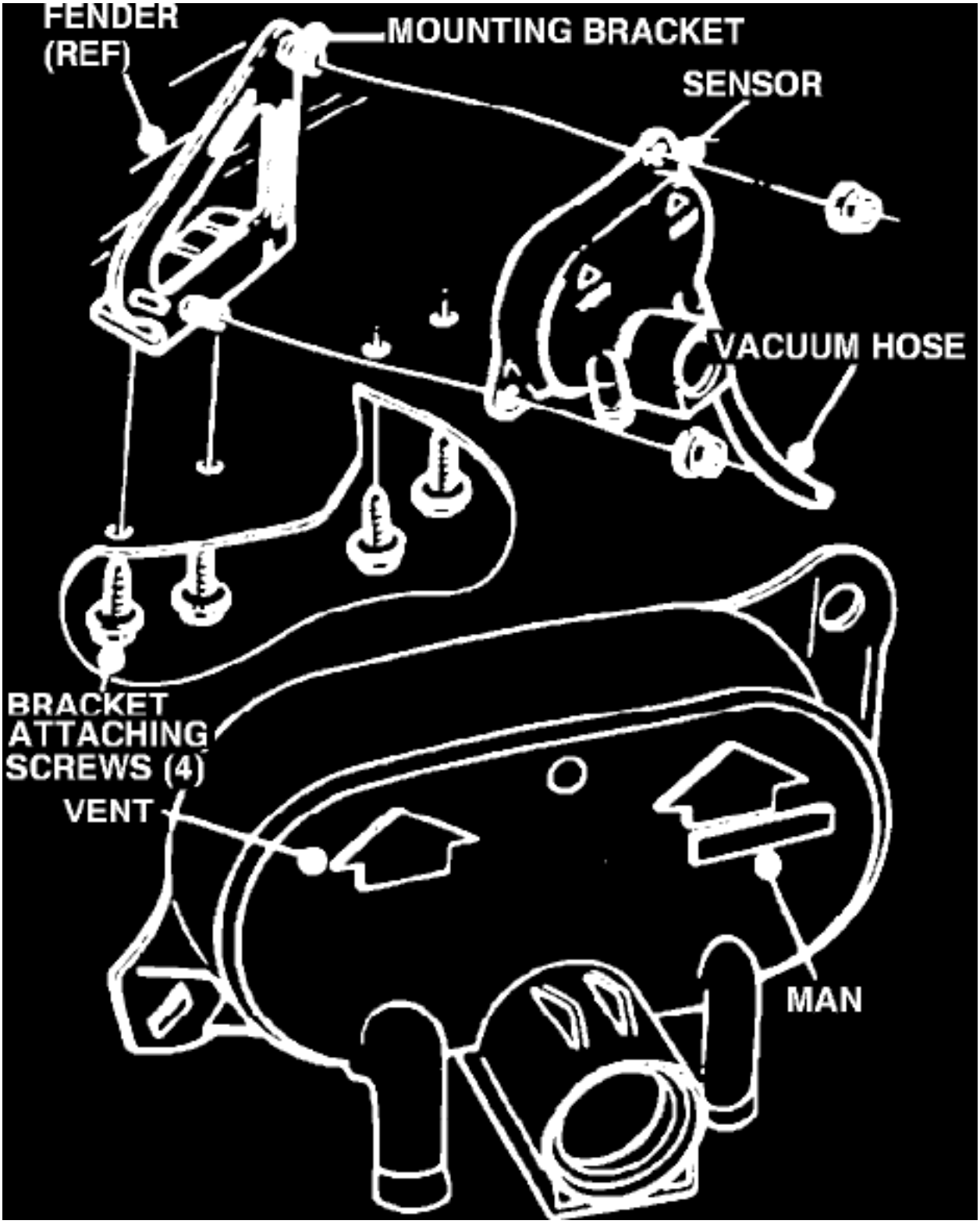


Barometric Pressure Sensor: Locations

Forward Of RH Wheelwell At Battery.

On Battery Support

Applicable to: 1981-83



Barometric Pressure Sensor: Description and Operation

Fig. 5 Barometric & manifold absolute pressure sensor

These two sensors, Fig. 5, are combined into one unit. The BMAP sensor monitors the absolute value of the intake manifold pressure and atmospheric pressure (manifold absolute pressure is defined as barometric pressure minus manifold vacuum). Atmospheric pressure changes are converted into an electrical signal and fed to the computer for evaluation. From this input, the computer determines the EGR flow requirements depending on the altitude at which the vehicle is being operated. Intake manifold pressure changes are converted by a pressure-sensing element and electrical circuit by the computer. The signal is used by the computer to determine part throttle spark advance, EGR flow rate and air/fuel ratio.

Barometric Pressure Sensor: Testing and Inspection Barometric Pressure Sensor

1. Disconnect switch from ignition module.

2. Connect suitable ohmmeter across switch terminals and compare resistance measured to values in chart.

3. Replace switch if resistance is not within specifications.

Engine	Year	Sensor	Resistance Ohms @ deg. F/C
All w/EEC IV	1983-90	Coolant, Air Charge	31,700-42,900 @ 68/20 13,650-18,650 @ 104/40 6500-8900 @ 140/60 3240-4440 @ 176/80 1770-2370 @ 212/100 980-1380 @ 248/115
All w/EEC III	1981-83	Coolant, Air Charge	1100-6000 1700-60,000

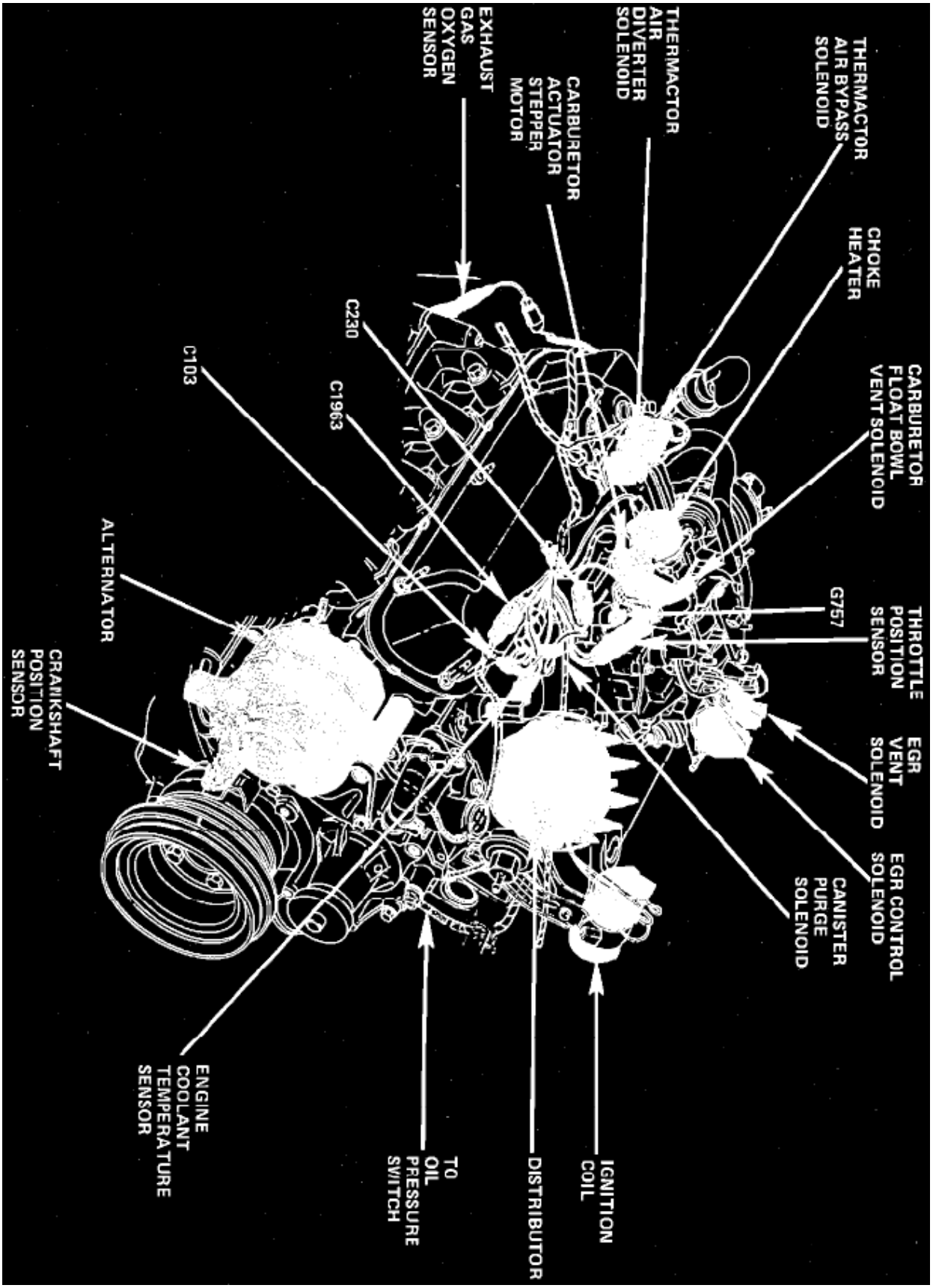
TEMPERATURE SENSORS

Coolant Temperature Sensor/Switch (For Computer): Description and Operation

This sensor incorporates a thermistor in a brass housing with an integral wiring connector extending from the body. This sensor is installed in the heater outlet fitting of the intake manifold. The thermistor is a resistor whose resistance value is high at low temperatures and decreases as the temperature rises. The computer applies a voltage to the sensor and monitors the resultant voltage drop across the thermistor.

Engine	Year	Resistance (ohms)
All w/EEC III	1981-83	100-640

CRANKSHAFT SENSOR

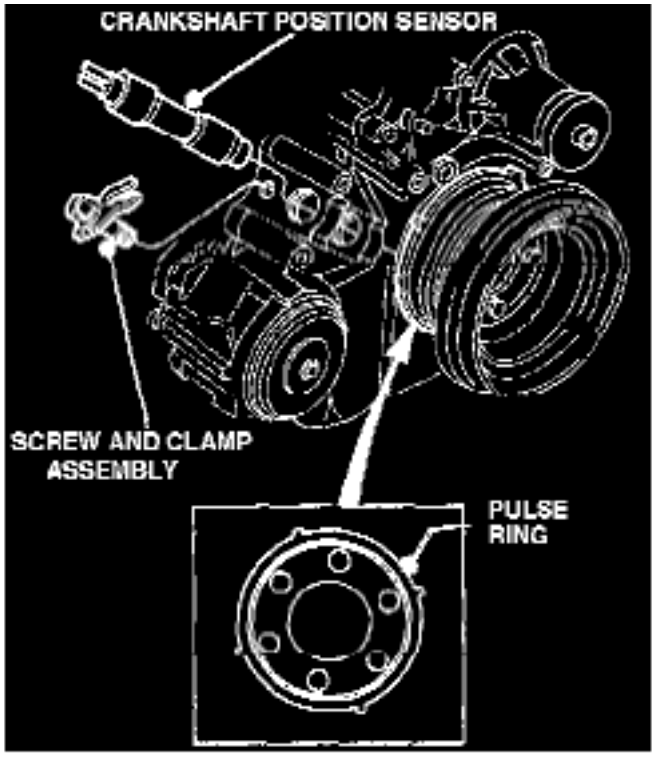

THERMACTOR AIR BYPASS SOLENOID
CHOKE HEATER
CARBURETOR FLOAT BOWL VENT SOLENOID
THERMACTOR AIR DIVERTER SOLENOID
CARBURETOR ACTUATOR STEPPER MOTOR
EXHAUST GAS OXYGEN SENSOR
C230
C1963
C103
G757
THROTTLE POSITION SENSOR
EGR VENT SOLENOID
EGR CONTROL SOLENOID
CANISTER PURGE SOLENOID
ALTERNATOR
CRANKSHAFT POSITION SENSOR
IGNITION COIL
DISTRIBUTOR
TO OIL PRESSURE SWITCH
ENGINE COOLANT TEMPERATURE SENSOR

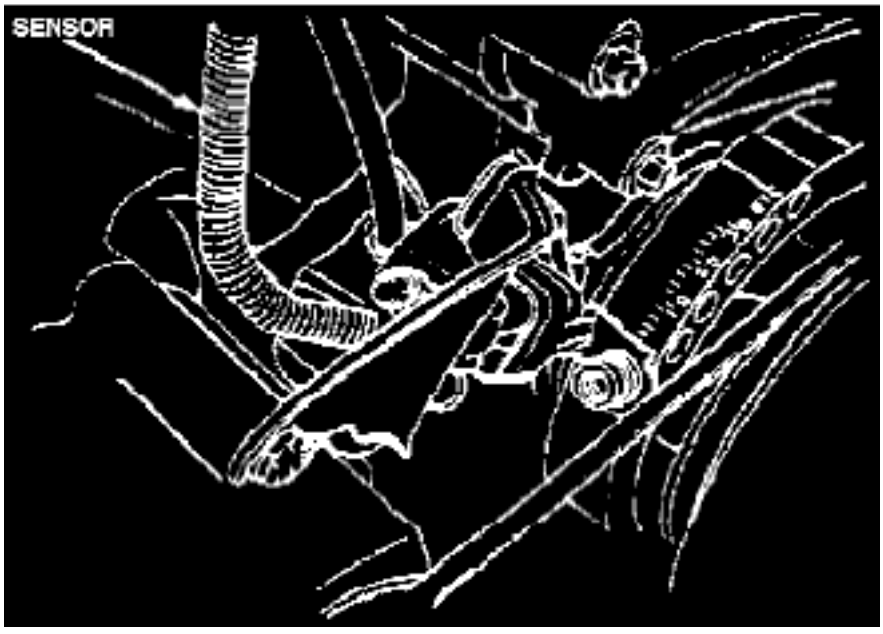
Crankshaft Position Sensor: Locations

Top RH Side Of Engine.

RH Front Of Engine

Applicable to: 1982-83 V8-302/5.0L & V8-351/5.8L Engines w/EEC





Crankshaft Position Sensor: Description and Operation

Fig.6 - Crankshaft Position Sensor

Fig.7 - Crankshaft Position Sensor

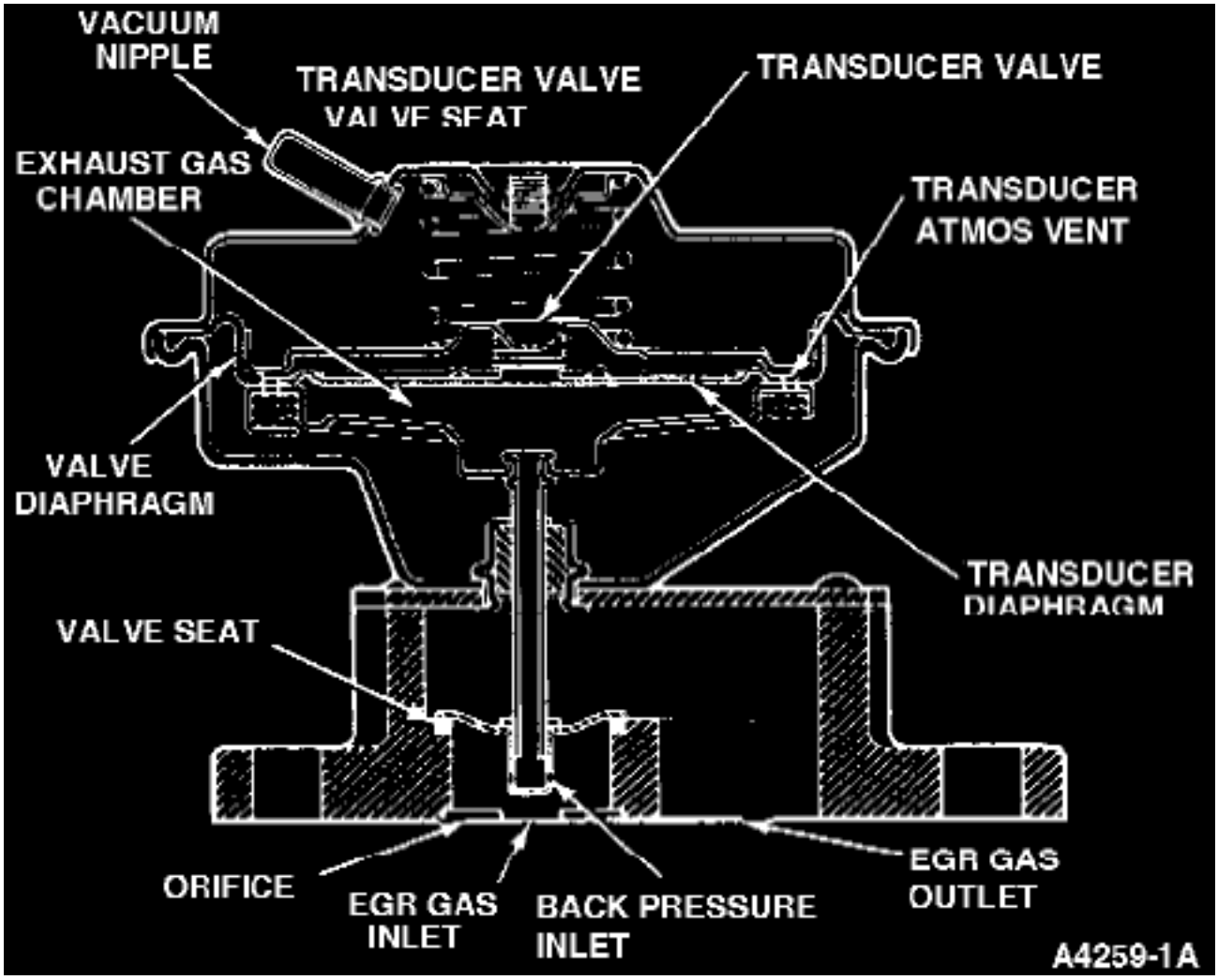
DESCRIPTION

The crankshaft vibration damper is fitted with a four-lobe "pulse ring" which provides the system with an accurate indication of when the pistons reach 10 BTDC. This indication is called the reference timing. Figs. 6 and 7.

The pulse ring is a powdered metal ring positioned on the crankshaft vibration damper during manufacture. It has four equally spaced lobes which represent crankshaft position when the pistons reach 10 BTDC.

During operation, the lobes on the pulse ring pass by the tip of the CP sensor. The pulse ring interrupts the magnetic field at the tip of the sensor. When the field is interrupted, an output signal is generated and sent to the ECA.

As the crankshaft turns, the ECA evaluates the electrical impulses to determine the exact position of the crankshaft at any given time. By the frequency of the impulses, the ECA can determine the engine speed. With these two factors, the ECA will determine the appropriate ignition timing advance required for best engine operation.

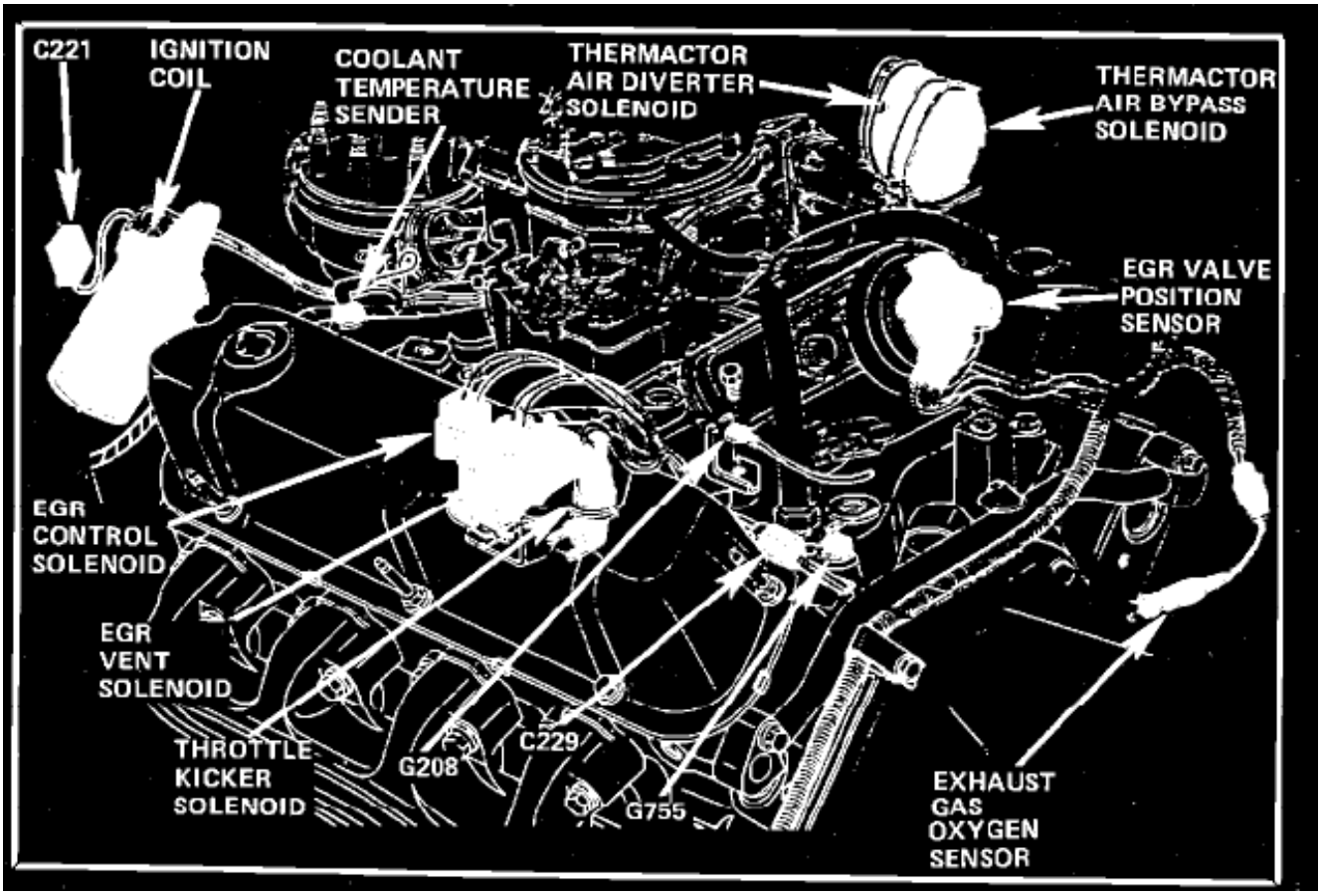


EGR Backpressure Transducer: Description and Operation

Fig.49 - Integral EGR Valve Exhaust Back-pressure Transducer

This valve, Fig. 49, performs the same function as the non-integral back pressure transducer used on some systems. The valve assembly has an internal exhaust gas chamber with a transducer diaphragm which senses exhaust back pressure through a hollow stem. When back pressure is low, vacuum is bled through the transducer valve and the EGR valve stem remains closed. When back pressure increases, the transducer diaphragm moves up and closes the transducer valve vacuum bleed hole.

With the vacuum bleed closed, the EGR valve opens, allowing exhaust gas to flow into the intake manifold. Because the EGR outlet is always exposed to manifold vacuum and EGR gas inlet flow is restricted by an orifice, back pressure at the transducer drops when the EGR valve opens. When the back pressure drops, the vacuum bleed hole opens, closing the EGR valve and allowing pressure to build up again. The cycle is continually repeated, modulating the flow of exhaust gas into the intake manifold.

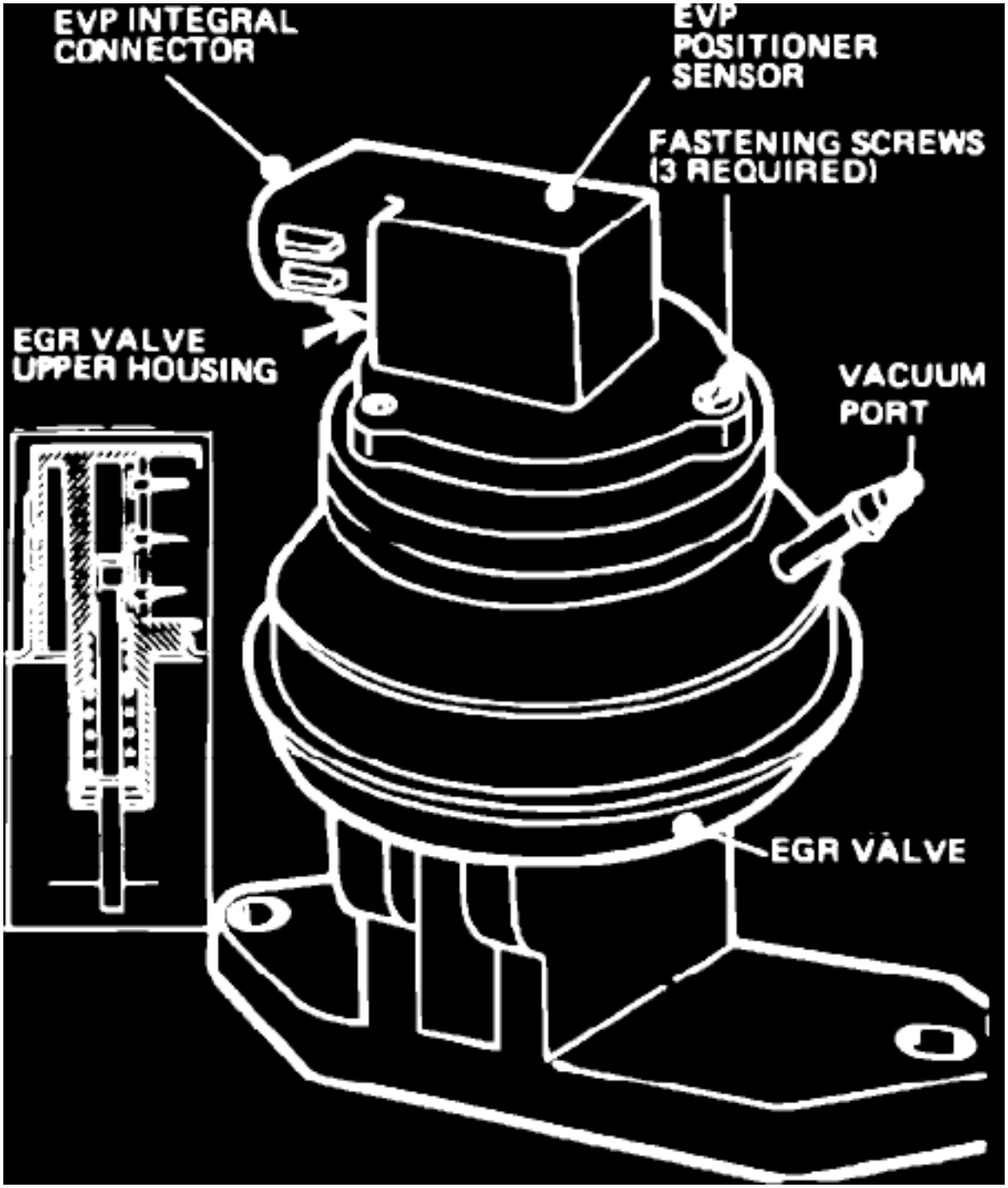


EGR Valve Position Sensor: Locations

LH Side Of Engine.

Rear Of Carburetor

Applicable to: 1982-83 V8-302/5.0L & V8-351/5.8L Engines w/EEC

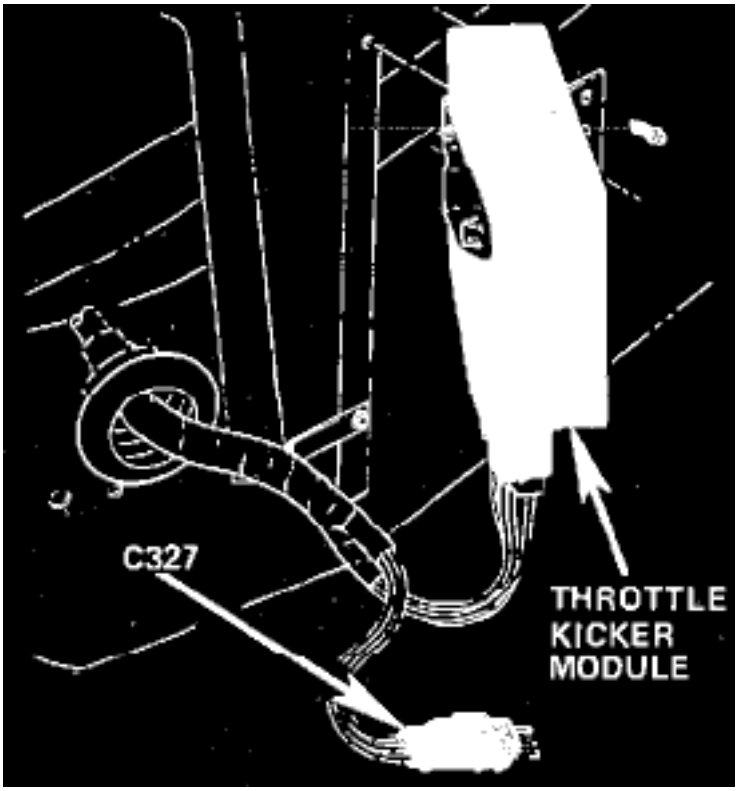


EGR Valve Position Sensor: Description and Operation

Fig. 6 EGR valve position sensor

This sensor, Fig. 6, is used to monitor the EGR valve pintle position. The computer applies a reference voltage to the EVP sensor, and the resulting signal from the EVP sensor is proportional to the amount of exhaust gases flowing through the EGR valve pintle into the intake manifold.

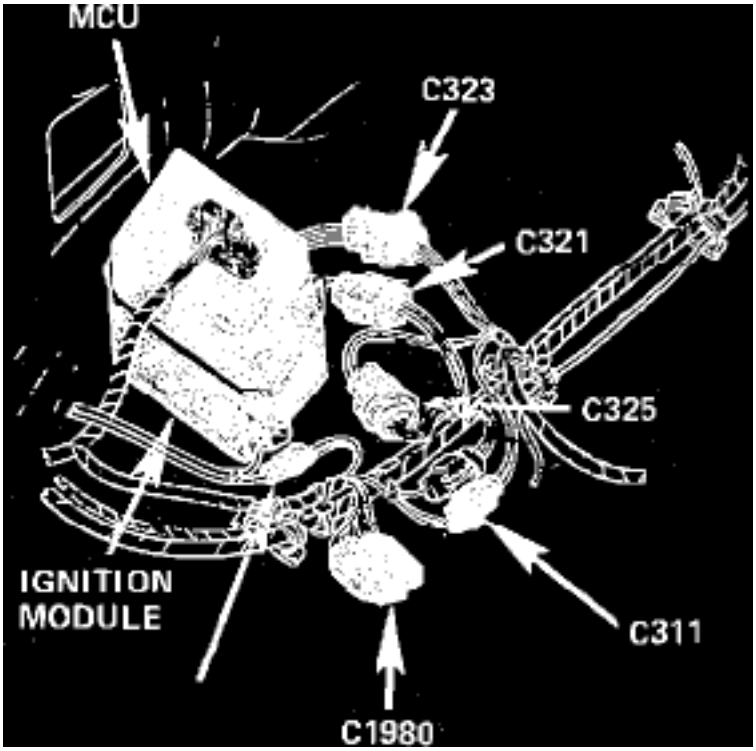
Depending on the input from this and other sensors, the computer can increase or decrease EGR flow by activating or deactivating a pair of solenoid vacuum valves.



Electronic Throttle Control Module: Locations

Under LH Side Of I/P

Under LH Side Of I/P

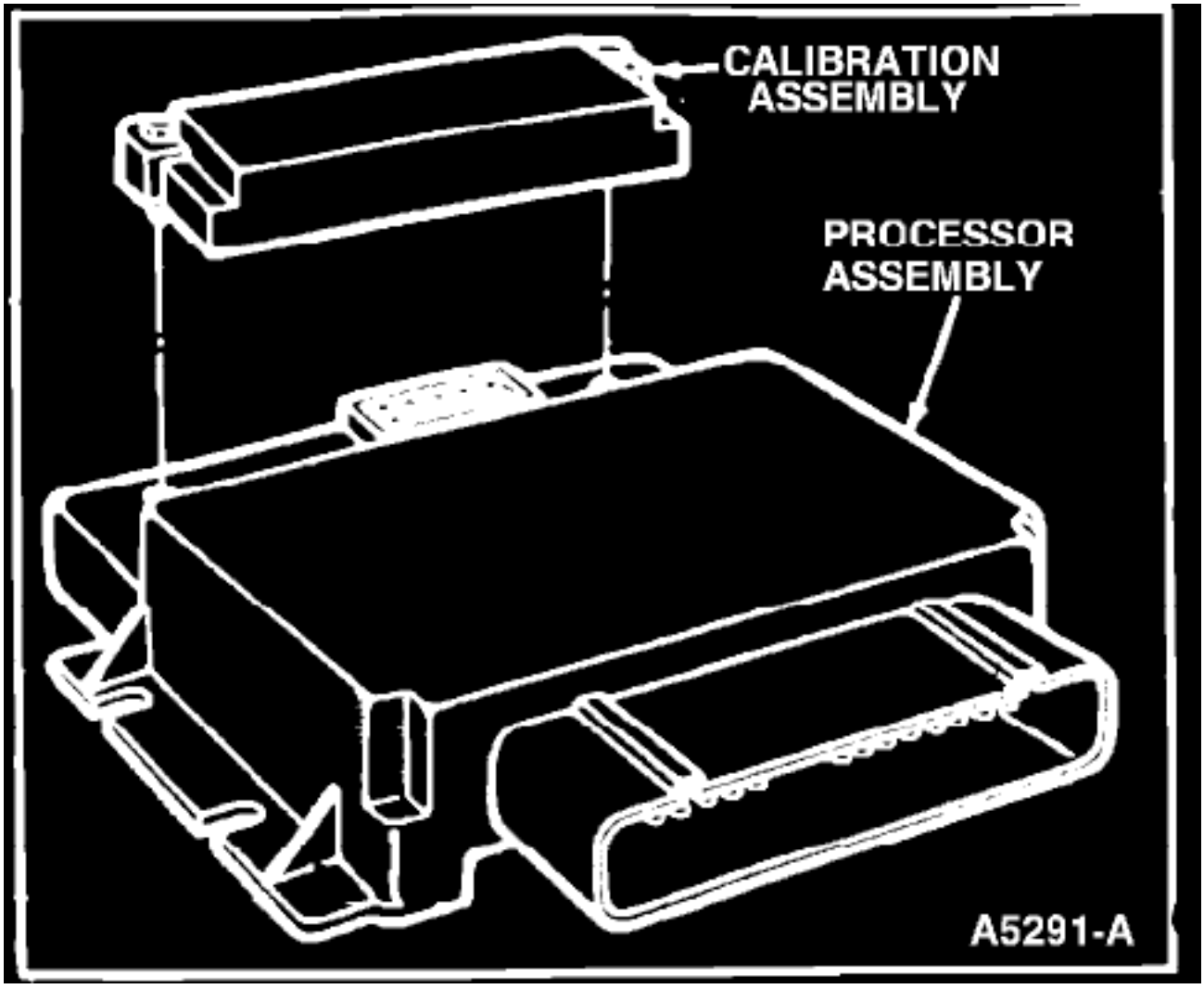


Engine Control Module: Locations

LH Inner Fender Well.

Above Ignition Module

Applicable to: 1981-83 w/MCU



Engine Control Module: Description and Operation

Fig. 7 Processor & calibration assembly

The Electronic Control Assembly (ECA), Fig. 7, is the brain of the system. It is a solid state pre-programmed micro-computer which consists of a processor assembly and a calibration assembly, Fig. 7. The processor assembly contains the electronic circuitry which performs the following functions within a fraction of a second:

a. Choose one of the sensor inputs for evaluation.

b. Converts the input to a form usable by the computer to use that signal for calculations.

c. Choose the proper operating strategy necessary for the operating conditions.

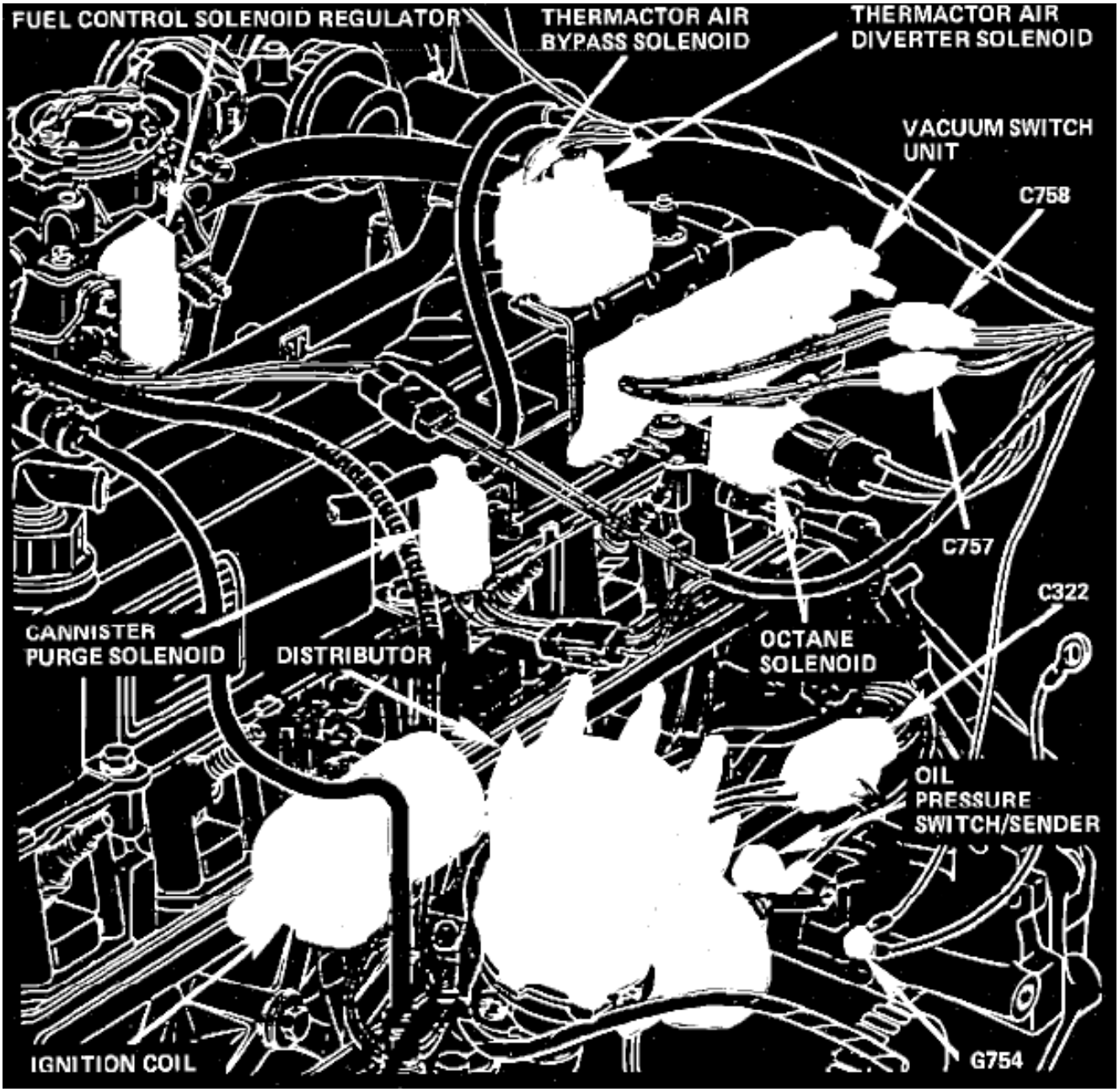
d. Perform spark, EGR, air/fuel ratio, canister purge, throttle kicker and other calculations.

e. Send electrical output control signals to the ignition module and control solenoids to adjust timing and dwell, EGR flow rate, thermactor air mode and throttle kicker mode.

The processor assembly also contains a separate power supply which provides a continuous reference voltage of about 9 volts nominal to the sensors. The calibration assembly, Fig. 7, contains electronic circuitry which provides calibration equations necessary for specific vehicle application for use by the processor assembly, and provides adjustments for octane problems. The calibration assembly is mounted on the processor assembly. The power relay supplies battery voltage to the EEC system and is mounted on the right hand side of the ECA mounting bracket. It also protects the ECA from possible damage due to reversed polarity.

Engine	Year	Resistance (ohms)
4.9L 1V YFA	1983-86	30-60
5.0L, 5.8L 2V 2150	1981-86	15-30

MIXTURE CONTROL SOLENOID - CARBURETTED ENGINES

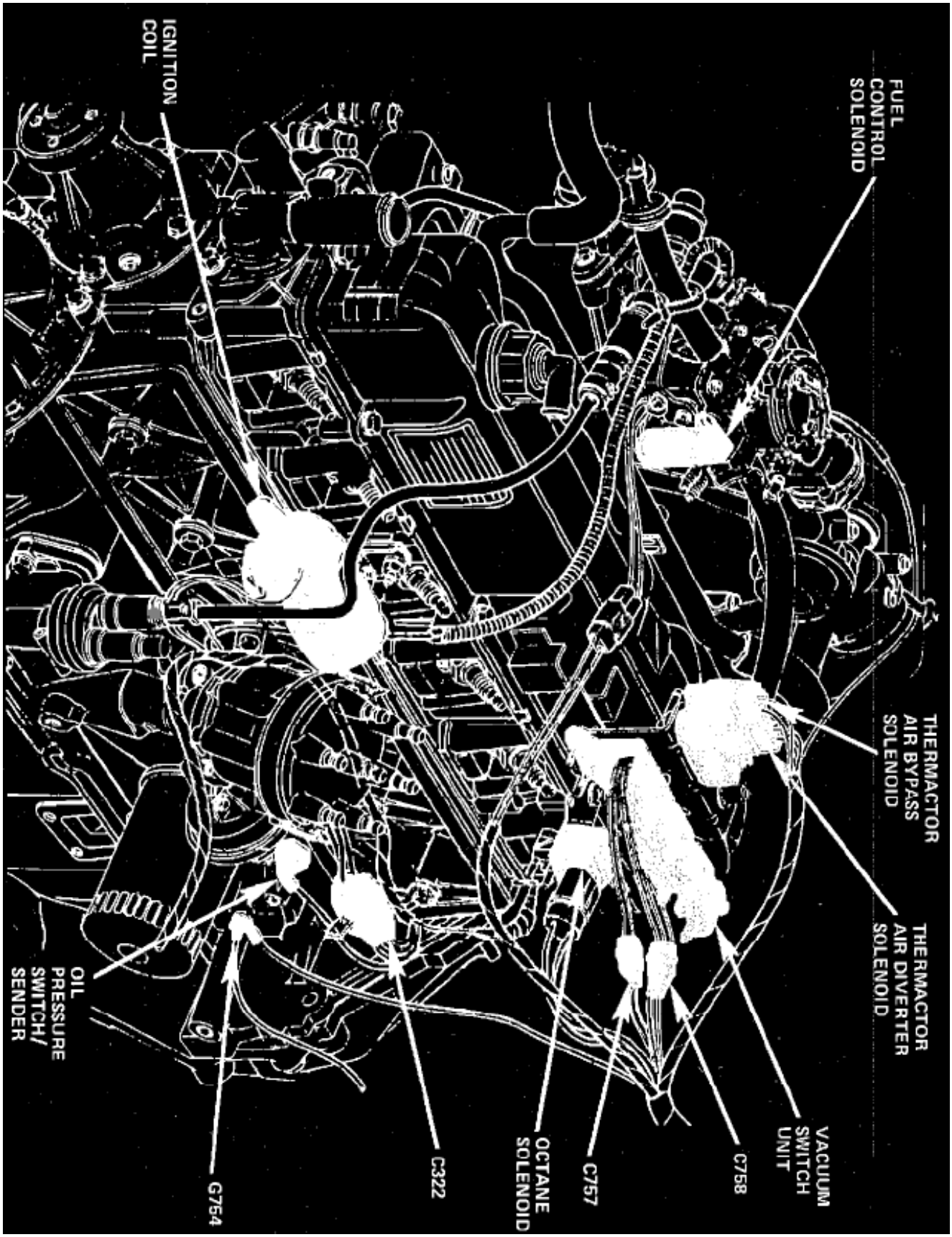


Feedback Control Solenoid: Locations

LH Side Of Engine.

Beside Carburetor

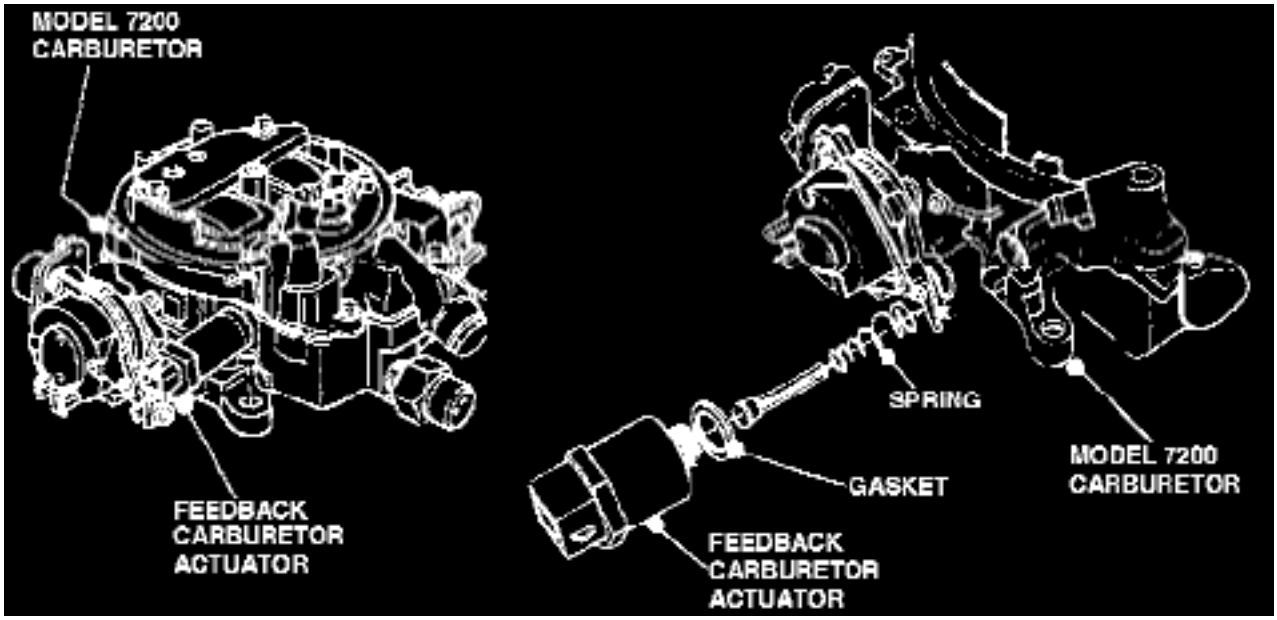
Applicable to: 1981 6-300/4.9L Engine w/MCU


FUEL CONTROL SOLENOID
IGNITION COIL
THERMACTOR AIR BYPASS SOLENOID
THERMACTOR AIR DIVERTER SOLENOID
VACUUM SWITCH UNIT
C758
C757
OCTANE SOLENOID
C322
G754
OIL PRESSURE SWITCH/ SENDER

LH Side Of Engine.

Beside Carburetor

Applicable to: 1982-83 6-300/4.9L Engine w/MCU



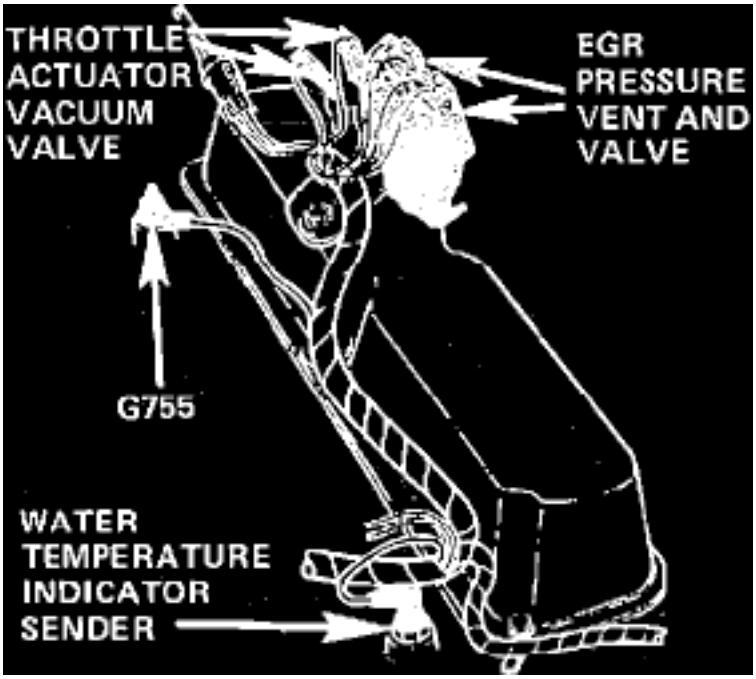
Feedback Control Solenoid: Description and Operation

Fig.23 - Feedback Carburetor Actuator

This actuator, Fig. 23, is used to control the carburetor air/fuel ratio. The ECA uses inputs from sensors such as the exhaust gas oxygen, barometric pressure, etc., to calculate the correct signals to maintain a desired air/fuel ratio.

The FBCA is a stepper motor mounted on the right side of the 7200 carburetor. The FBCA has four separate armature windings, and each one is sequentially energized by the ECA in order to obtain the necessary control of the carburetor metering rods. The motor varies the position of the metering valve in the carburetor to regulate the amount of control vacuum exposed to the fuel bowl. The vacuum lowers the amount of pressure in the fuel bowl causing a leaner air fuel mixture.

During engine cranking and immediately after the engine starts, the ECA will set the FBCA at a calibration dependent upon initial position. The FBCA position is dependent upon ECA calculations of various engine sensor inputs.

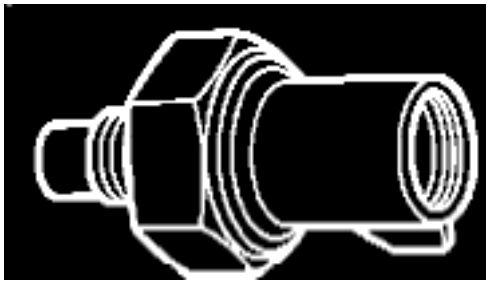


Idle Speed Vacuum Solenoid Valve: Locations

RH Side Of Engine.

On LH Valve Cover

Applicable to: 1982-83 V8-302/5.0L & V8-351/5.8L Engines w/EEC

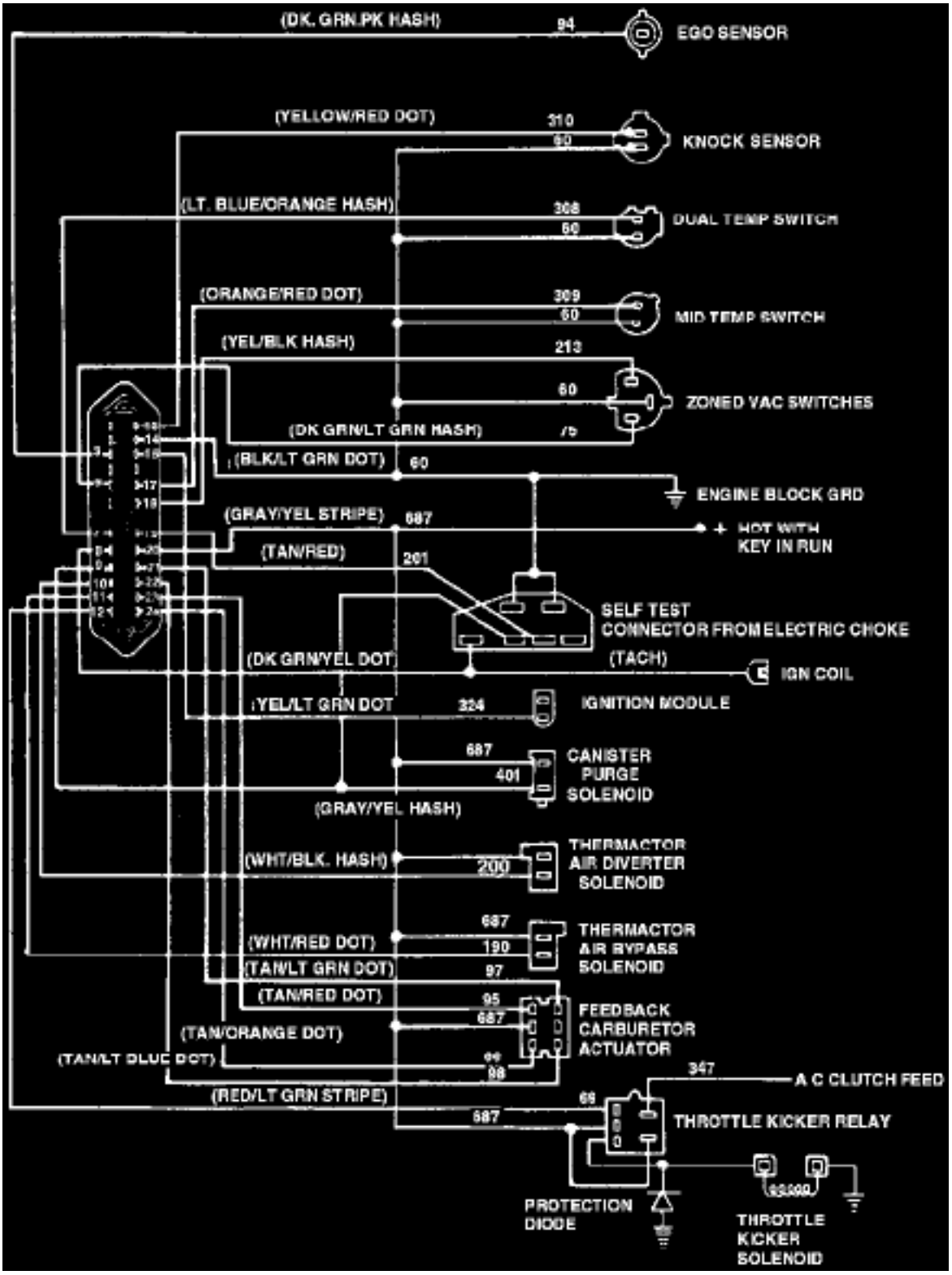


Knock Sensor: Description and Operation

Knock Sensor

The knock sensor, Fig. 11, is a piezo-electric accelerator accelerometer with the sensor designed to resonate at approximately the same frequency as the engine knock frequency.. The sensor uses the resonant frequency to mechanically amplify the engine knock frequency (5-6 KHz).

This method allows relatively large signals to be achieved without electrical amplification. The sensor has a thin circular piezoelectric ceramic disk which is bonded to a metal diaphragm. Electrical connections are made through a two-pin integral connector.



Knock Sensor: Testing and Inspection Component Testing

Fig.8 - MCU System Wiring Circuit

1. Make sure that the following three steps are properly conducted in order to simulate spark knock conditions and determine that spark detection

system is inoperative. If not, repeat test to verify problem. a. Make sure that engine is at normal operating temperature. Run engine at 2000 rpm for 2 minutes, then turn key off. Immediately restart engine

and allow to idle.

b. Observe voltmeter and vacuum gauge for initialization pulses after restarting the engine. The throttle kicker will also extend (increase engine

speed) and remain on throughout the test.

c. On vehicles with spark knock sensor, when initial pulses occur, immediately simulate spark knock by placing a 3/8 inch extension on manifold

near base of knock sensor. Tap end of extension with a small hammer for about 15 seconds.

2. Disconnect jumper wire from self-test trigger input circuit 201. 3. With ignition key off, disconnect vehicle harness from spark knock sensor. 4. Using a torque wrench and a 1 1/8 inch deep socket, make sure that spark sensor is torqued to 12-18 ft. lbs. If sensor is properly torqued, proceed

to next step. If not, torque to specifications.

5. Disconnect vehicle harness from MCU and spark sensor. Connect one lead of an ohmmeter to circuit 310 of vehicle harness and other lead to

engine block, Fig. 8. If resistance is 1000 ohms or more, proceed to next step. If resistance is less than 1000 ohms, repair short to ground in circuit 301.

6. With key off and knock sensor harness disconnected, check circuit 310 of vehicle harness for continuity. If resistance is 10 ohms or less, continue

to next step. If resistance is greater than 10 ohms, repair circuit 310.

7. Check circuit 60 of vehicle harness for continuity between knock sensor and MCU, Fig. 8. If resistance is 10 ohms or less, reconnect harness

connector to MCU and proceed to next step. If resistance is greater than 10 ohms, service circuit 60.

8. Reconnect jumper wire to circuits 201 and 60 of VIP connector, Fig. 8. 9. Connect a test lamp to positive terminal of battery, then disconnect knock sensor from vehicle harness.

10. Perform "Engine Running Functional Test" procedure. When the four initialization pulses occur, continuously tap circuit 310 of the vehicle

harness connector, which mates to the knock sensor connector, with the probe end for 5 seconds while observing voltmeter pulses. If a code 25 is

observed, replace MCU. If any other code is observed, replace spark knock sensor.

SPARK KNOCK, ONLY AT WIDE OPEN THROTTLE AND/OR POOR PERFORMANCE/MILEAGE

1. If engine has a spark knock sensor, disconnect it. 2. Make sure that ignition timing is within specifications. 3. With engine running at normal operating temperature, disconnect the two wire ignition module connector (yellow wire is circuit 324 and

black/white wire is circuit 69) from vehicle harness. Using a jumper wire, jump the wires together at the ignition module and note ignition timing. Remove jumper wire and note ignition timing. If timing retards 16-20 degrees, reconnect ignition module and proceed to next step. If timing does not retard 16-20 degrees, replace ignition module and repeat steps 1, 2 and 3.

4. With engine at normal operating temperature, set high cam on lowest step that will maintain engine speed greater than 1200 rpm. Note ignition

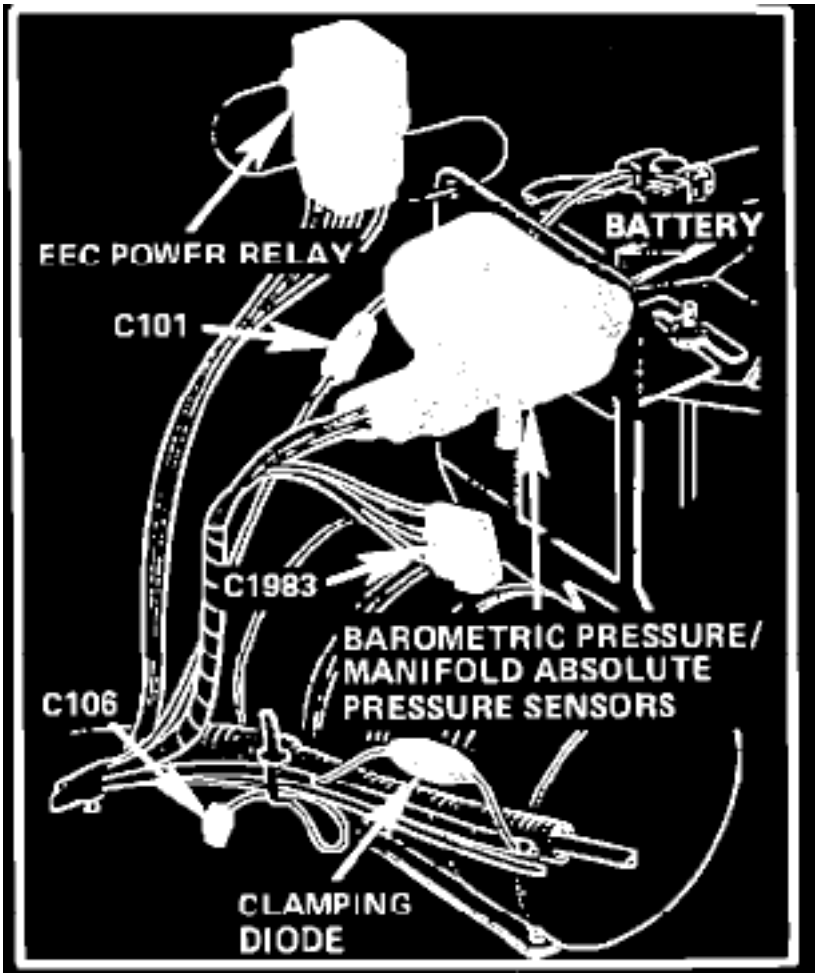
timing, then disconnect and plug vacuum hose from zone vacuum switch and again note timing. If timing retards more than 5 degrees, on engines with spark knock sensor, proceed to step 6, on all other engines MCU system is okay. If timing does not retard more than 5 degrees, proceed to next step.

5. With engine still at 1200 rpm, disconnect ignition module (connector with yellow and black/white wires). If timing retards, check circuit 324 for

short to ground. If circuit is okay, replace MCU unit and retest. If timing does not retard, check circuit 324 for open circuit. If circuit is okay, Replace MCU unit and retest.

6. On engines with spark knock sensor, reconnect sensor. Repeat Engine Running Functional Test, but do not simulate knock by taping sensor. If

service code 25 appears, MCU system is okay, testing is completed. If any other service code appears, replace knock sensor and retest.



Main Relay (Computer/Fuel System): Locations

Forward Of RH Wheelwell At Battery.

RH Fender Apron

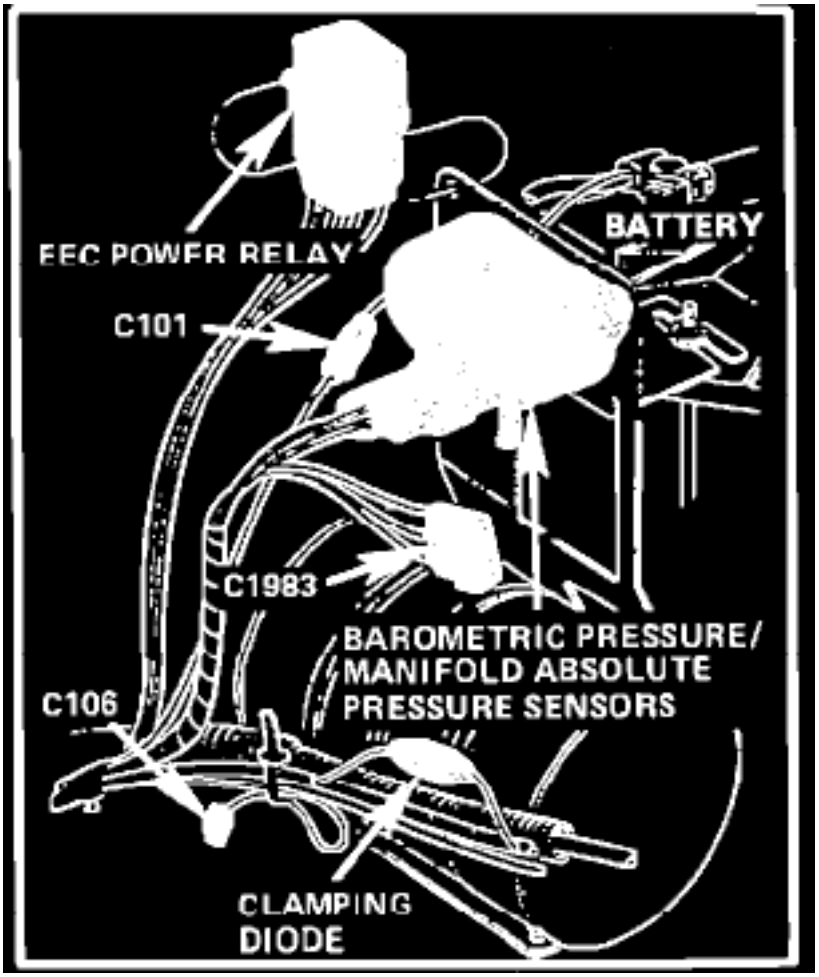
Applicable to: 1981-83

With EEC IV, measured between BK/W wire and ground with ignition on and engine off.

Engine	Year	Voltage @ Altitude
All w/EEC IV	1983-90	1.55-1.63 @ 0 1.52-1.60 @ 1000 1.49-1.56 @ 2000 1.46-1.54 @ 3000 1.43-1.51 @ 4000 1.39-1.48 @ 5000 1.36-1.45 @ 6000 1.34-1.43 @ 7000

Engine	Year	Resistance (ohms) @ Altitude
All w/EEC III	1981-83	7.6-8.4 @ 0-1500 7.2-8.1 @ 1500-2500 6.9-7.8 @ 2500-3500 6.7-7.3 @ 3500-4500 6.6-7.2 @ 4500-5500 6.3-7.0 @ 5500-6500 6.1-6.7 @ 6500-7500 5.4-6.7 @ 7500 and up

MANIFOLD ABSOLUTE AND BAROMETRIC PRESSURE SENSORS

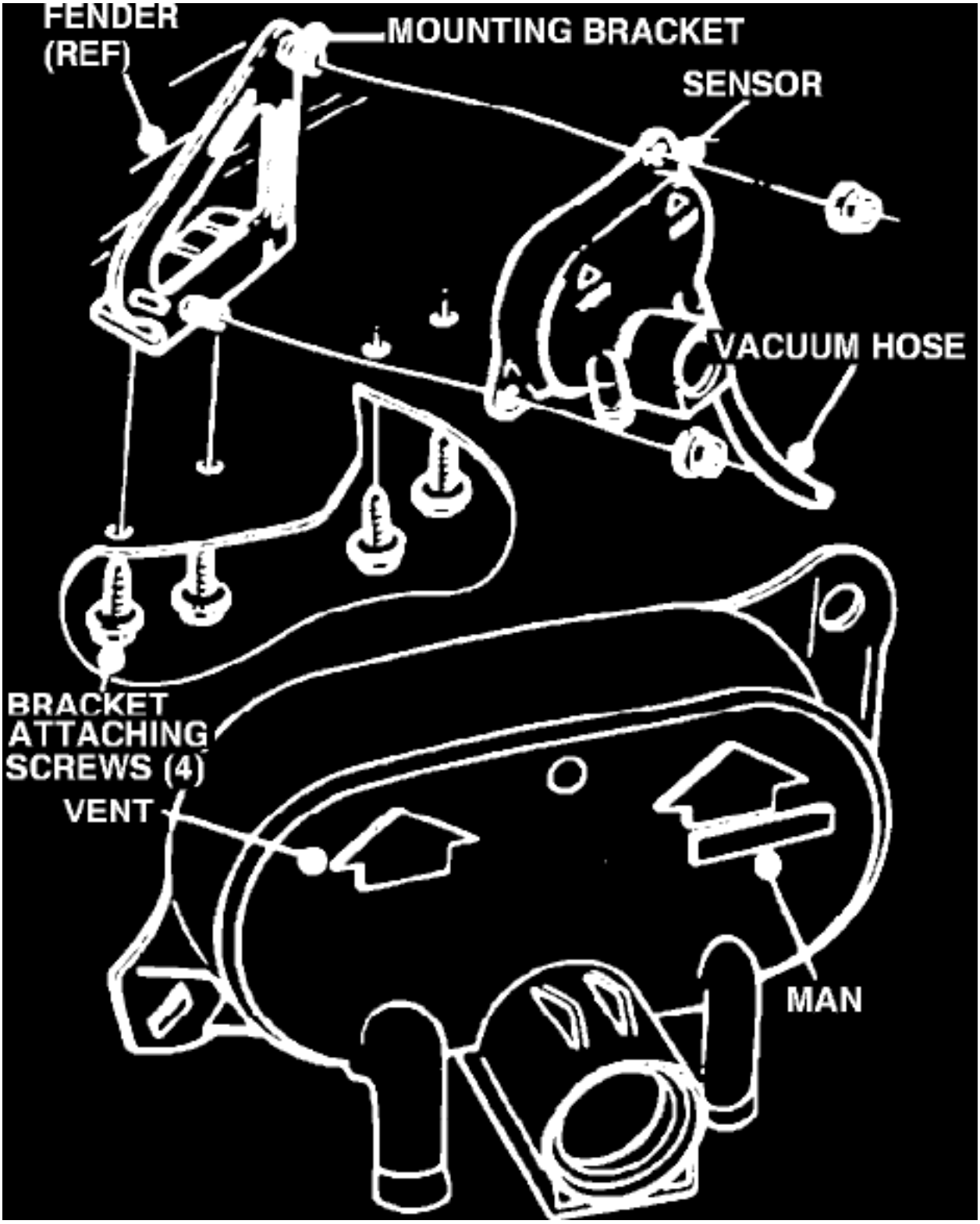


Manifold Pressure/Vacuum Sensor: Locations

Forward Of RH Wheelwell At Battery.

On Battery Support

Applicable to: 1981-83



Manifold Pressure/Vacuum Sensor: Description and Operation

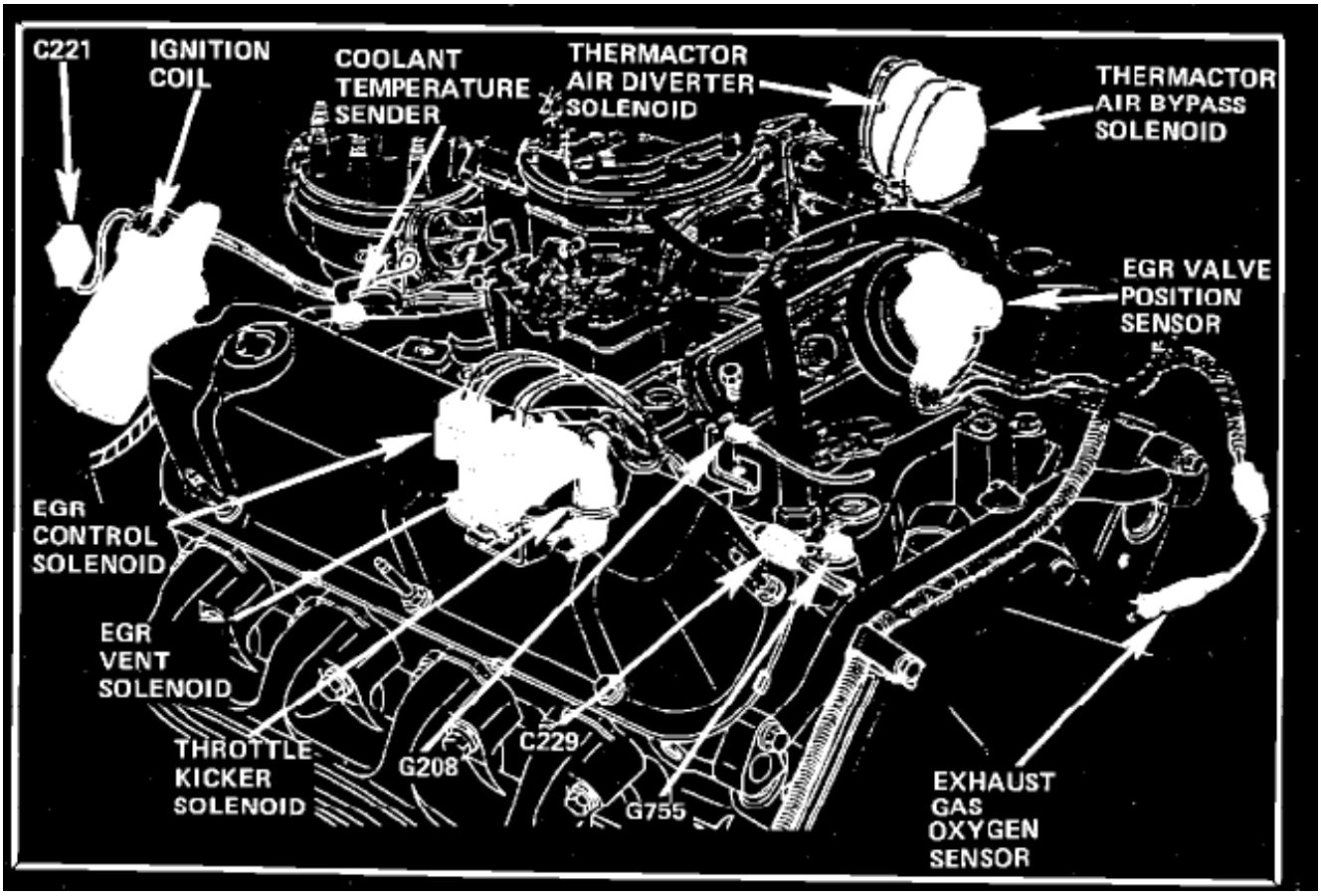
Fig. 5 Barometric & manifold absolute pressure sensor

DESCRIPTION

These two sensors, Fig. 5, are combined into one unit. The BMAP sensor monitors the absolute value of the intake manifold pressure and atmospheric pressure (manifold absolute pressure is defined as barometric pressure minus manifold vacuum).

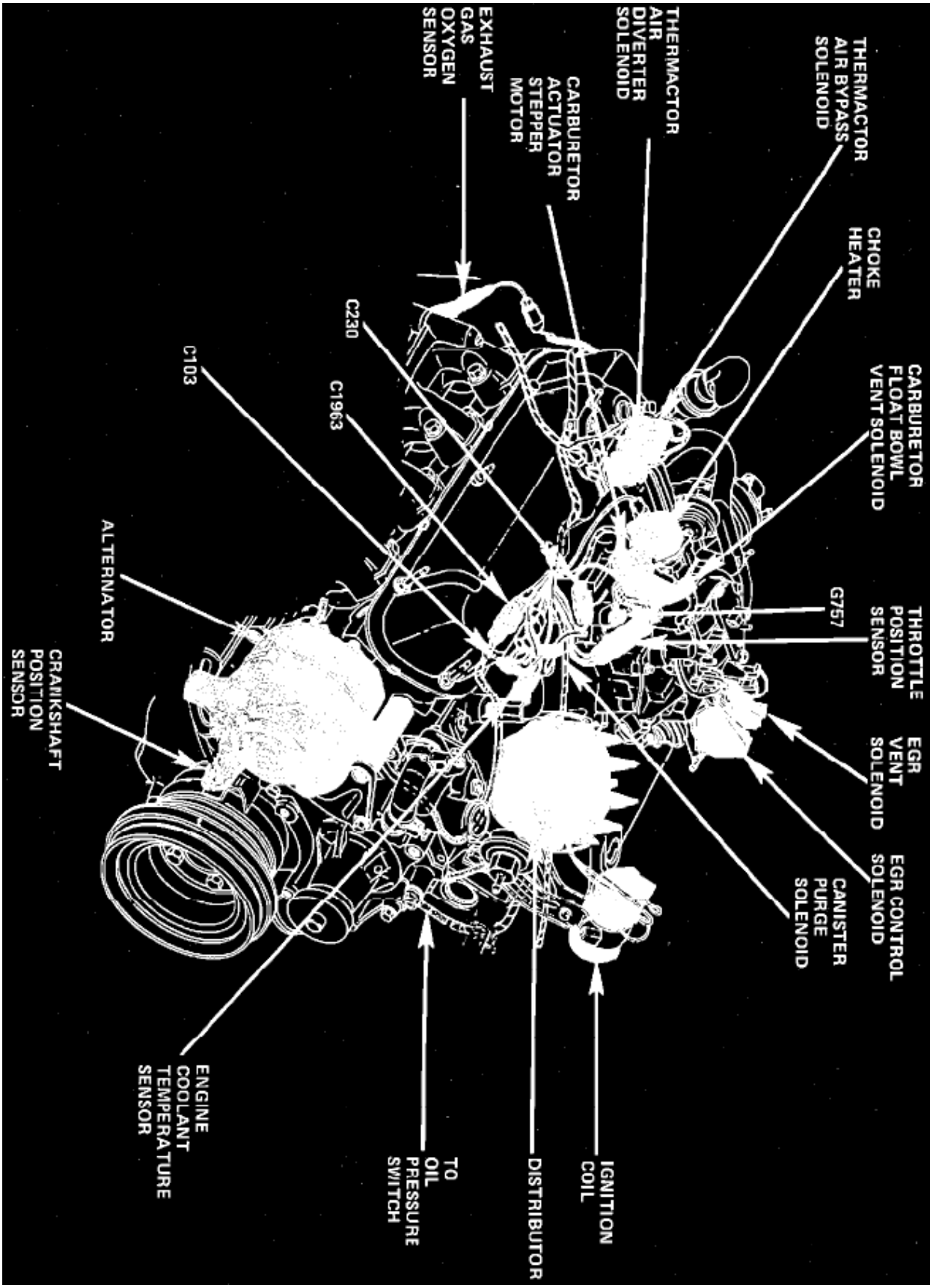
Atmospheric pressure changes are converted into an electrical signal and fed to the computer for evaluation. From this input, the computer determines the EGR flow requirements depending on the altitude at which the vehicle is being operated.

Intake manifold pressure changes are converted by a pressure-sensing element and electrical circuit by the computer. The signal is used by the computer to determine part throttle spark advance, EGR flow rate and air/fuel ratio.



Oxygen Sensor: Locations

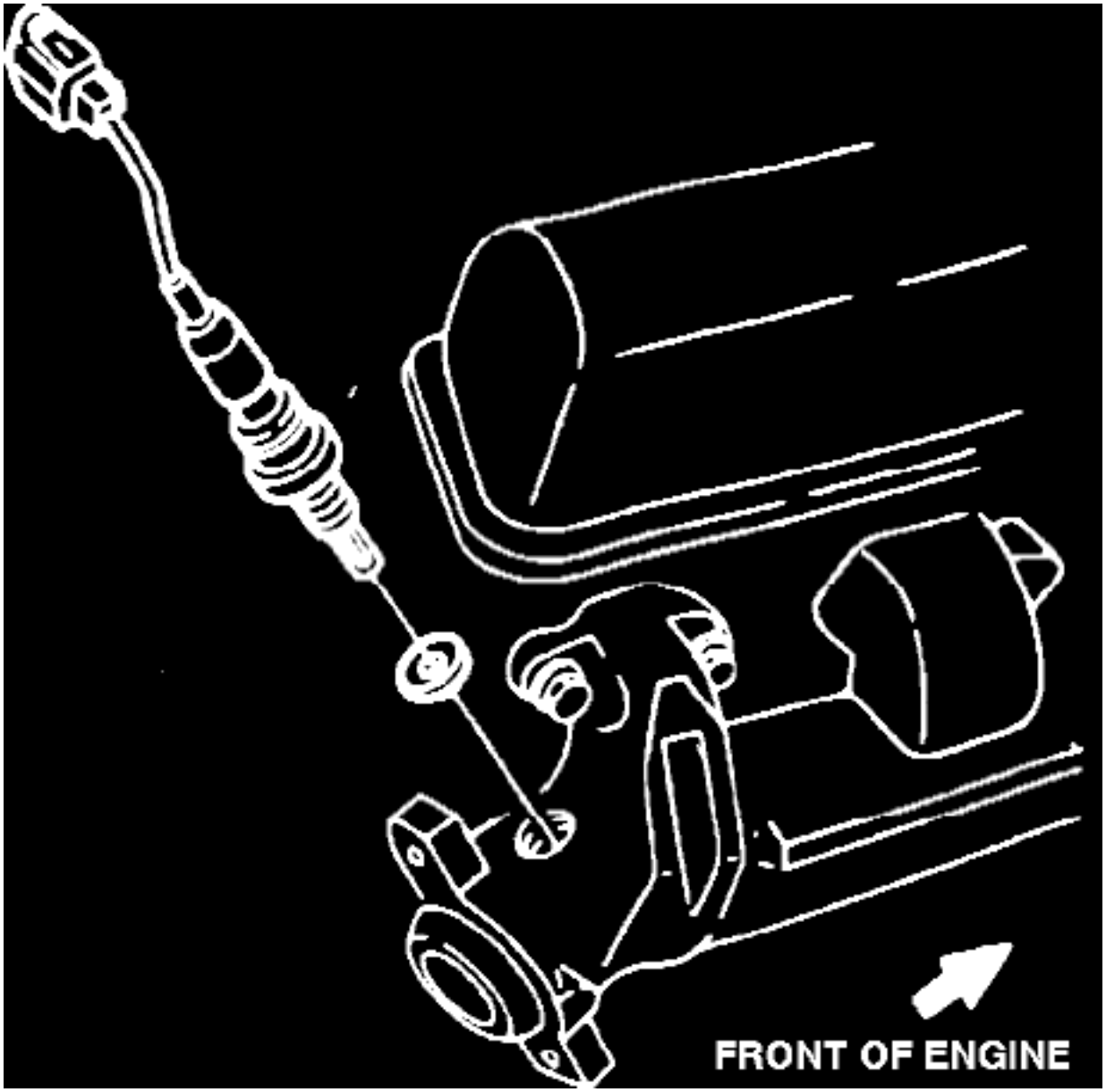
LH Side Of Engine.


THERMACTOR AIR BYPASS SOLENOID
CHOKE HEATER
CARBURETOR FLOAT BOWL VENT SOLENOID
THERMACTOR AIR DIVERTER SOLENOID
CARBURETOR ACTUATOR STEPPER MOTOR
EXHAUST GAS OXYGEN SENSOR
C230
C1963
C103
G757
THROTTLE POSITION SENSOR
EGR VENT SOLENOID
EGR CONTROL SOLENOID
CANISTER PURGE SOLENOID
ALTERNATOR
CRANKSHAFT POSITION SENSOR
IGNITION COIL
DISTRIBUTOR
TO OIL PRESSURE SWITCH
ENGINE COOLANT TEMPERATURE SENSOR

Top RH Side Of Engine.

Rear RH Side Of Engine On Manifold

Applicable to: 1982-83 V8-302/5.0L & V8-351/5.8L Engines w/EEC

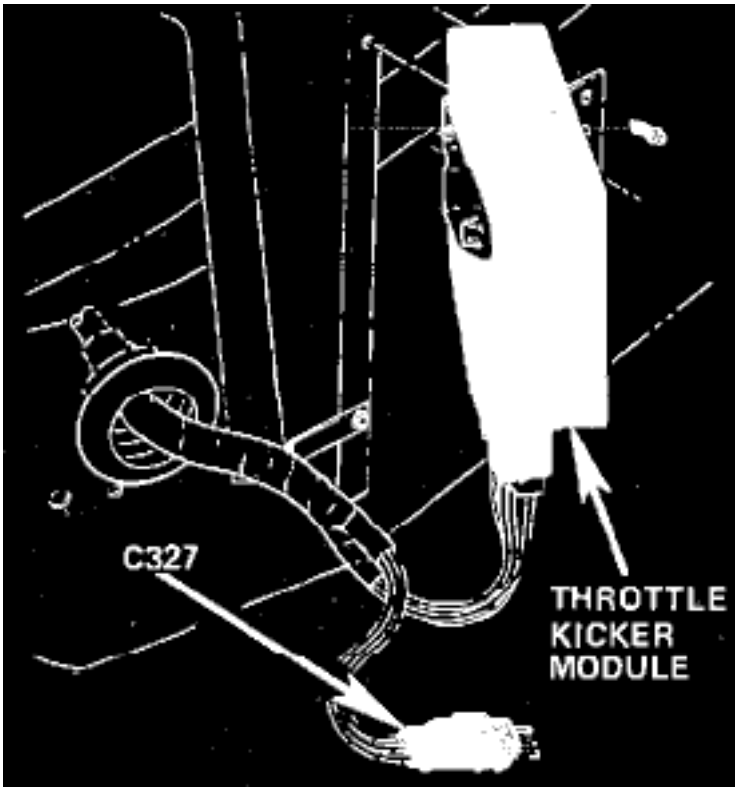


Oxygen Sensor: Description and Operation

Fig. 4 Exhaust gas oxygen sensor

This sensor, Fig. 4, is installed in the exhaust manifold and provides information to the ECA as to the oxygen content of the exhaust gases. It monitors the oxygen content of the exhaust gases and generates an output of .6 to 1.0 volt when detecting a rich exhaust gas mixture (absence of oxygen) and less than .2 volts when detecting a lean mixture (presence of oxygen). This constantly changing voltage signal is sent to the ECA for analysis. The outer surface of the sensor is a threaded steel housing and shell. The sensor body is protected by a shield pressed into the housing where it projects into the exhaust manifold. Exhaust gases contact the sensor body by entering through flutes in the sensor shield. A vent is provided in the shell to allow atmospheric air to enter the inner portion of the sensor body. The sensor connects to the vehicle wiring harness with a connector that is attached to the inner (positive) terminal. The shell is the negative terminal

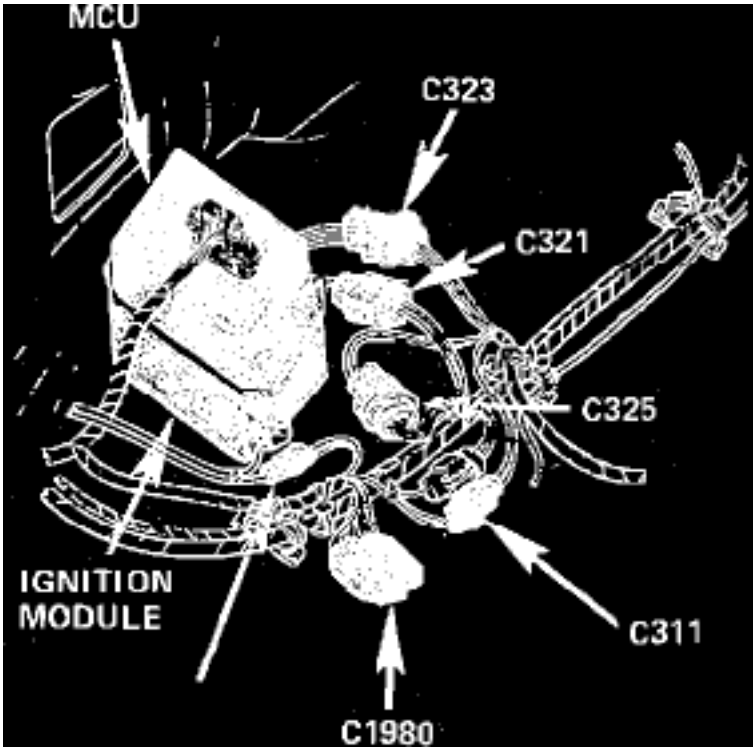
of the sensor and provides the return signal path through the engine block.



Electronic Throttle Control Module: Locations

Under LH Side Of I/P

Under LH Side Of I/P

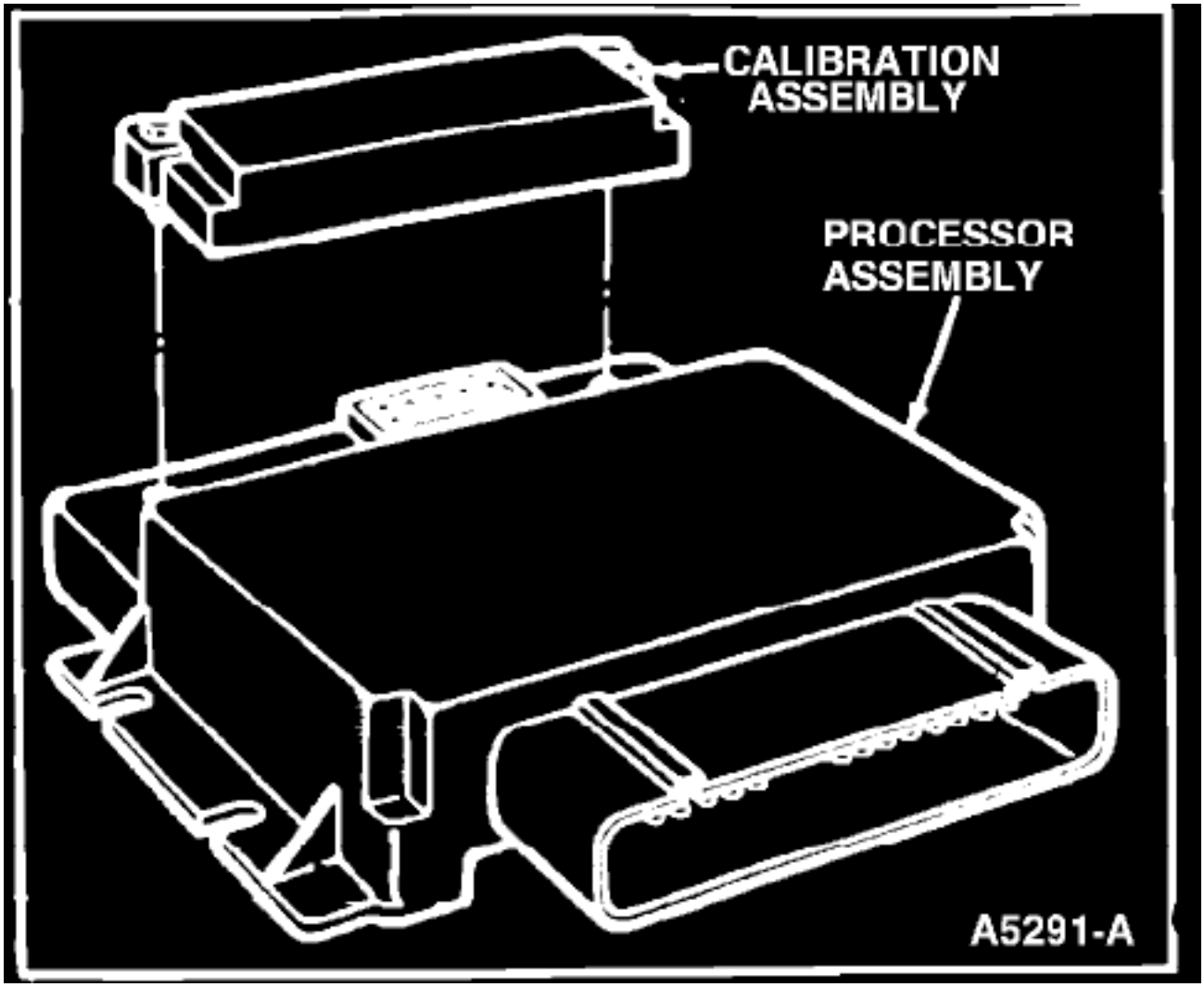


Engine Control Module: Locations

LH Inner Fender Well.

Above Ignition Module

Applicable to: 1981-83 w/MCU



Engine Control Module: Description and Operation

Fig. 7 Processor & calibration assembly

The Electronic Control Assembly (ECA), Fig. 7, is the brain of the system. It is a solid state pre-programmed micro-computer which consists of a processor assembly and a calibration assembly, Fig. 7. The processor assembly contains the electronic circuitry which performs the following functions within a fraction of a second:

a. Choose one of the sensor inputs for evaluation.

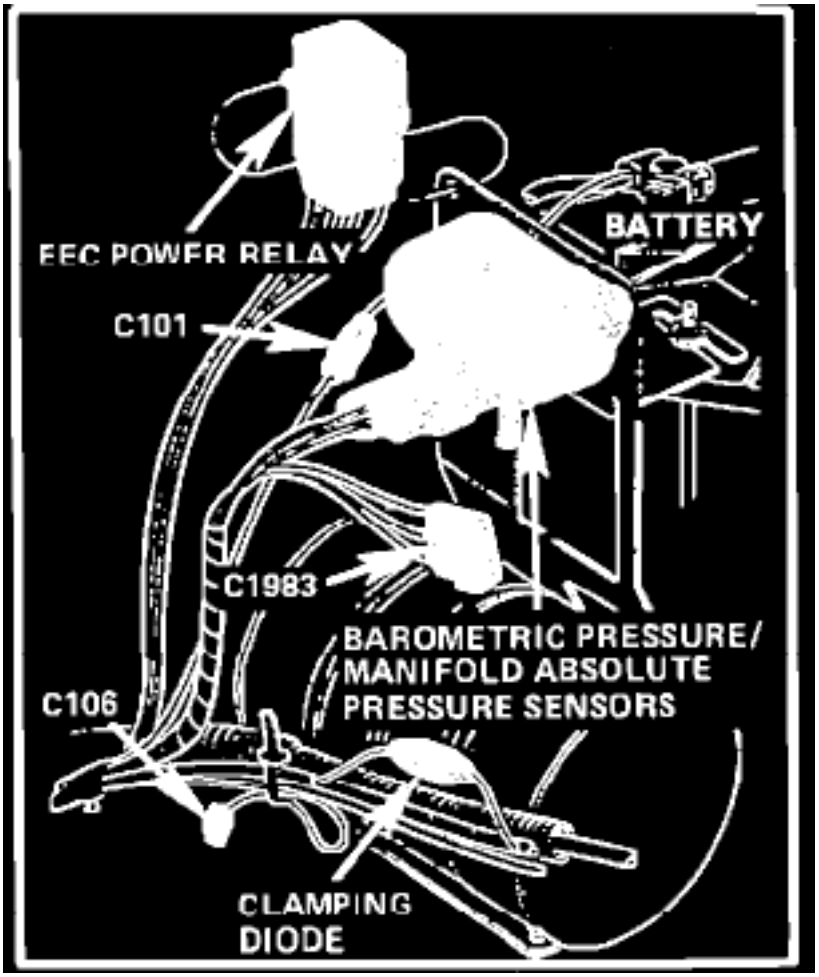
b. Converts the input to a form usable by the computer to use that signal for calculations.

c. Choose the proper operating strategy necessary for the operating conditions.

d. Perform spark, EGR, air/fuel ratio, canister purge, throttle kicker and other calculations.

e. Send electrical output control signals to the ignition module and control solenoids to adjust timing and dwell, EGR flow rate, thermactor air mode and throttle kicker mode.

The processor assembly also contains a separate power supply which provides a continuous reference voltage of about 9 volts nominal to the sensors. The calibration assembly, Fig. 7, contains electronic circuitry which provides calibration equations necessary for specific vehicle application for use by the processor assembly, and provides adjustments for octane problems. The calibration assembly is mounted on the processor assembly. The power relay supplies battery voltage to the EEC system and is mounted on the right hand side of the ECA mounting bracket. It also protects the ECA from possible damage due to reversed polarity.



Main Relay (Computer/Fuel System): Locations

Forward Of RH Wheelwell At Battery.

RH Fender Apron

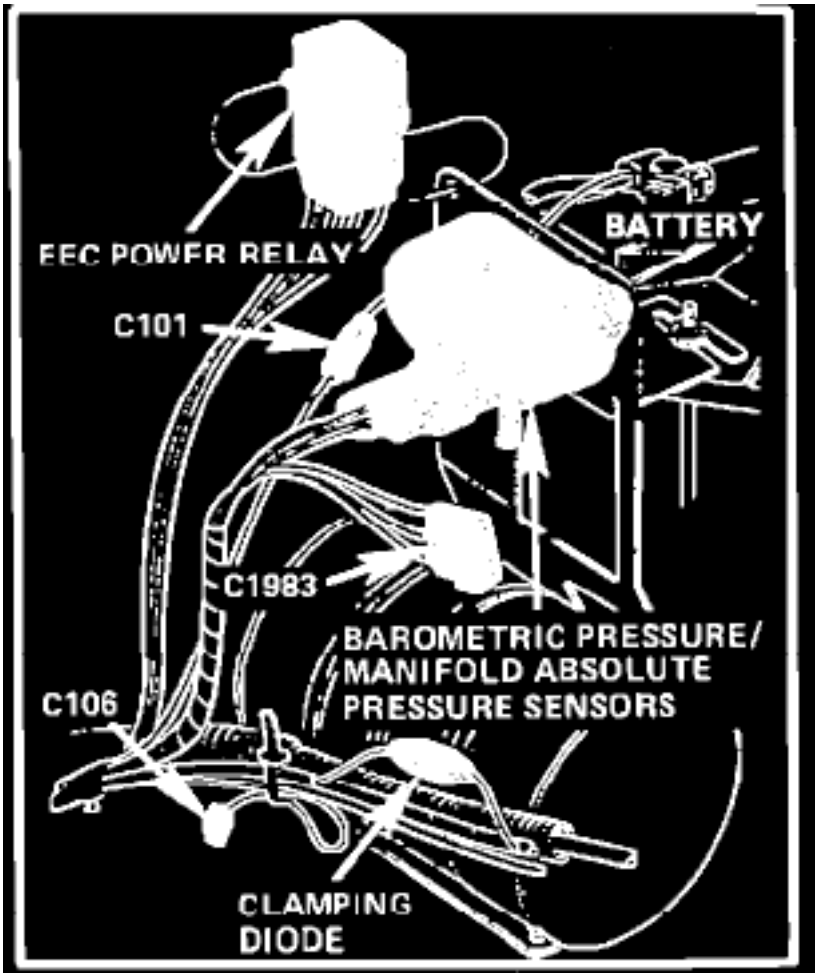
Applicable to: 1981-83

With EEC IV, measured between BK/W wire and ground with ignition on and engine off.

Engine	Year	Voltage @ Altitude
All w/EEC IV	1983-90	1.55-1.63 @ 0
		1.52-1.60 @ 1000
		1.49-1.56 @ 2000
		1.46-1.54 @ 3000
		1.43-1.51 @ 4000
		1.39-1.48 @ 5000
		1.36-1.45 @ 6000
		1.34-1.43 @ 7000

Engine	Year	Resistance (ohms) @ Altitude
All w/EEC III	1981-83	7.6-8.4 @ 0-1500
		7.2-8.1 @ 1500-2500
		6.9-7.8 @ 2500-3500
		6.7-7.3 @ 3500-4500
		6.6-7.2 @ 4500-5500
		6.3-7.0 @ 5500-6500
		6.1-6.7 @ 6500-7500
		5.4-6.7 @ 7500 and up

MANIFOLD ABSOLUTE AND BAROMETRIC PRESSURE SENSORS

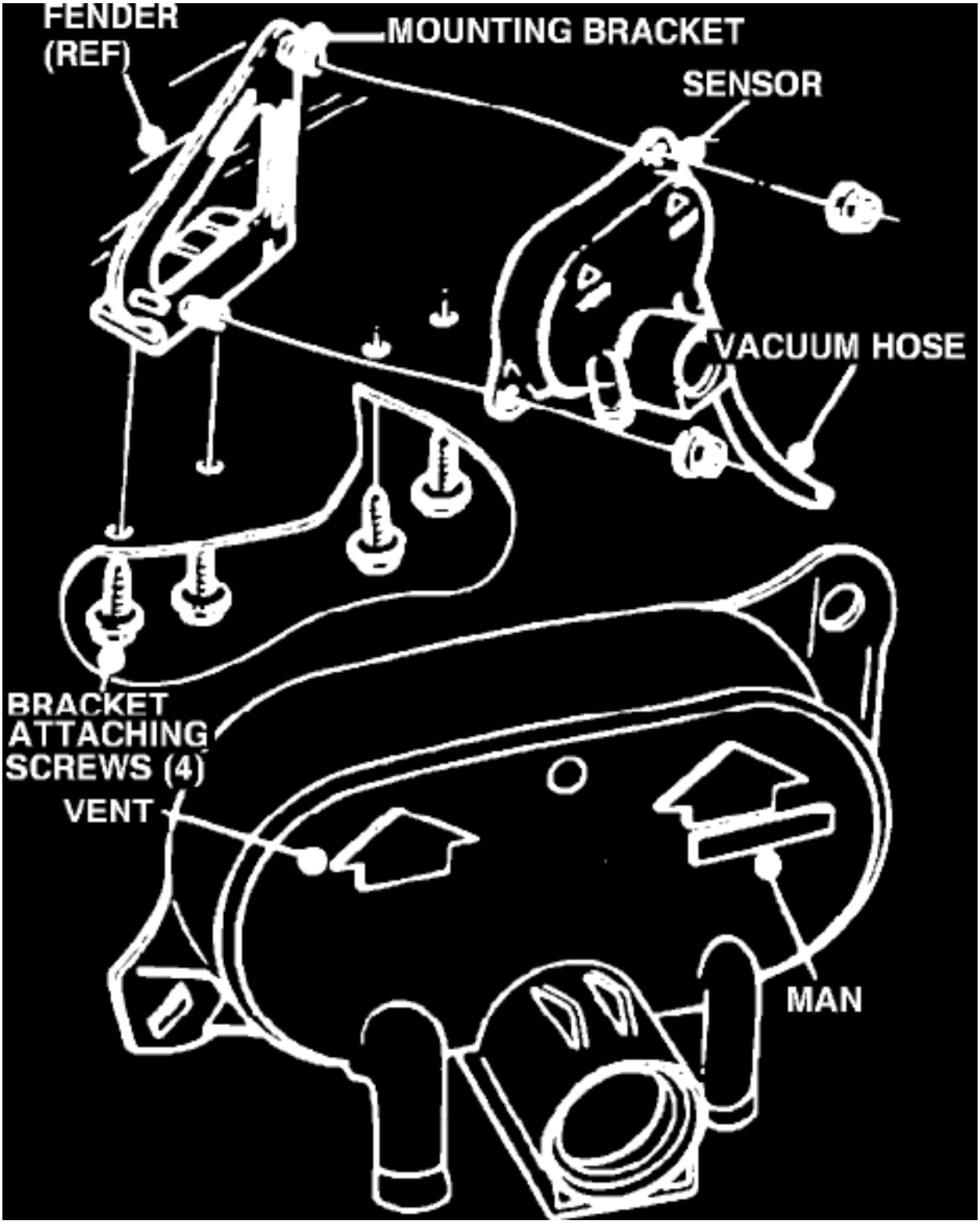


Barometric Pressure Sensor: Locations

Forward Of RH Wheelwell At Battery.

On Battery Support

Applicable to: 1981-83



Barometric Pressure Sensor: Description and Operation

Fig. 5 Barometric & manifold absolute pressure sensor

These two sensors, Fig. 5, are combined into one unit. The BMAP sensor monitors the absolute value of the intake manifold pressure and atmospheric pressure (manifold absolute pressure is defined as barometric pressure minus manifold vacuum). Atmospheric pressure changes are converted into an electrical signal and fed to the computer for evaluation. From this input, the computer determines the EGR flow requirements depending on the altitude at which the vehicle is being operated. Intake manifold pressure changes are converted by a pressure-sensing element and electrical circuit by the computer. The signal is used by the computer to determine part throttle spark advance, EGR flow rate and air/fuel ratio.

Barometric Pressure Sensor: Testing and Inspection Barometric Pressure Sensor

1. Disconnect switch from ignition module.

2. Connect suitable ohmmeter across switch terminals and compare resistance measured to values in chart.

3. Replace switch if resistance is not within specifications.

Engine	Year	Sensor	Resistance Ohms @ deg. F/C
All w/EEC IV	1983-90	Coolant, Air Charge	31,700-42,900 @ 68/20 13,650-18,650 @ 104/40 6500-8900 @ 140/60 3240-4440 @ 176/80 1770-2370 @ 212/100 980-1380 @ 248/115
All w/EEC III	1981-83	Coolant, Air Charge	1100-6000 1700-60,000

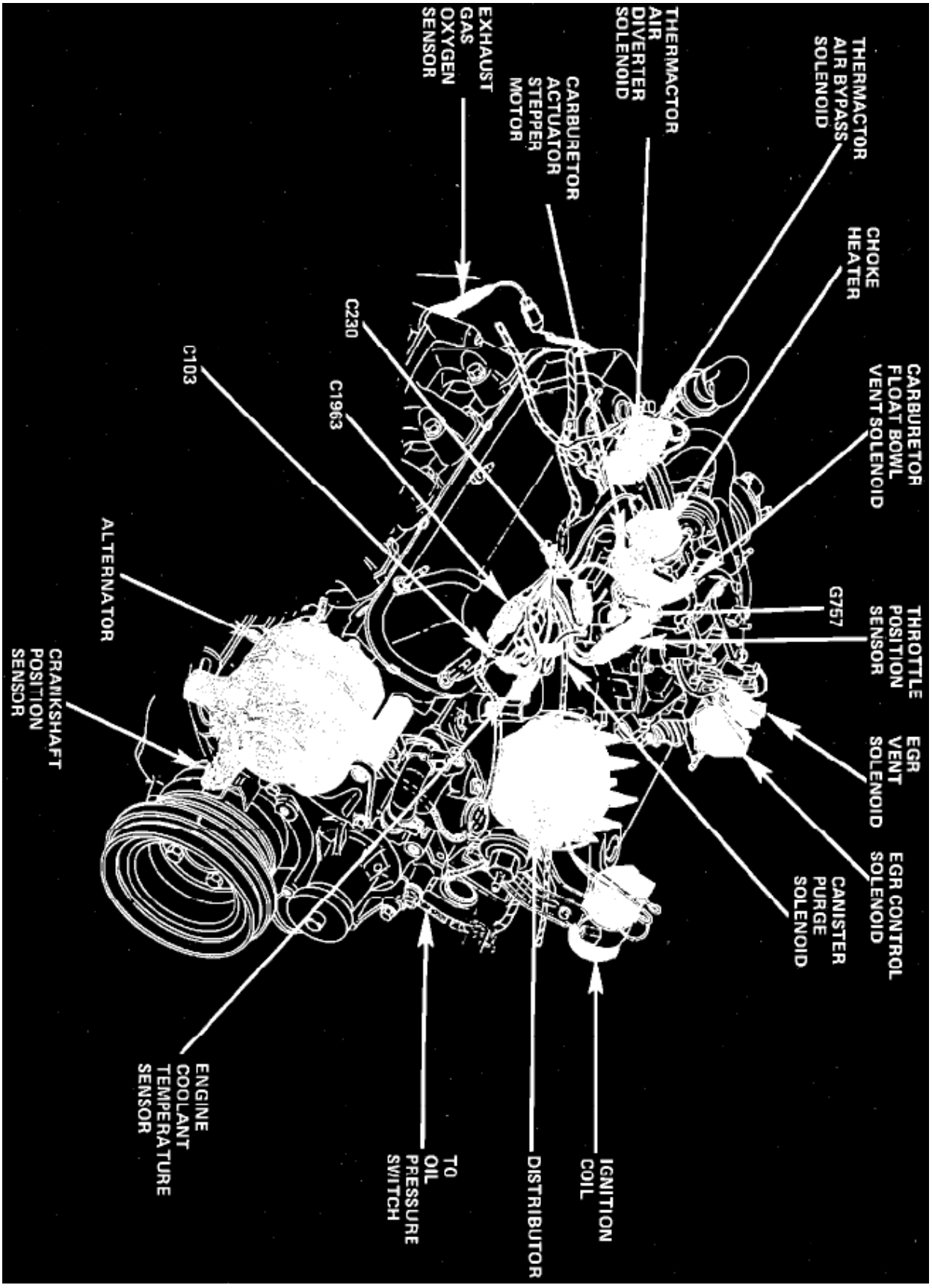
TEMPERATURE SENSORS

Coolant Temperature Sensor/Switch (For Computer): Description and Operation

This sensor incorporates a thermistor in a brass housing with an integral wiring connector extending from the body. This sensor is installed in the heater outlet fitting of the intake manifold. The thermistor is a resistor whose resistance value is high at low temperatures and decreases as the temperature rises. The computer applies a voltage to the sensor and monitors the resultant voltage drop across the thermistor.

Engine	Year	Resistance (ohms)
All w/EEC III	1981-83	100-640

CRANKSHAFT SENSOR

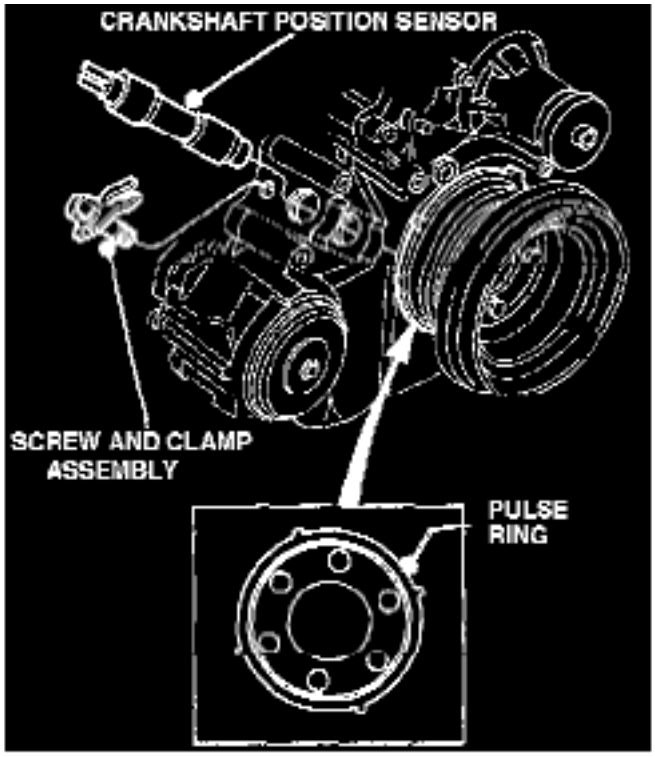

THERMACTOR AIR BYPASS SOLENOID
CHOKE HEATER
CARBURETOR FLOAT BOWL VENT SOLENOID
THERMACTOR AIR DIVERTER SOLENOID
CARBURETOR ACTUATOR STEPPER MOTOR
EXHAUST GAS OXYGEN SENSOR
C230
C1963
C103
G757
THROTTLE POSITION SENSOR
EGR VENT SOLENOID
EGR CONTROL SOLENOID
CANISTER PURGE SOLENOID
ALTERNATOR
CRANKSHAFT POSITION SENSOR
IGNITION COIL
DISTRIBUTOR
TO OIL PRESSURE SWITCH
ENGINE COOLANT TEMPERATURE SENSOR

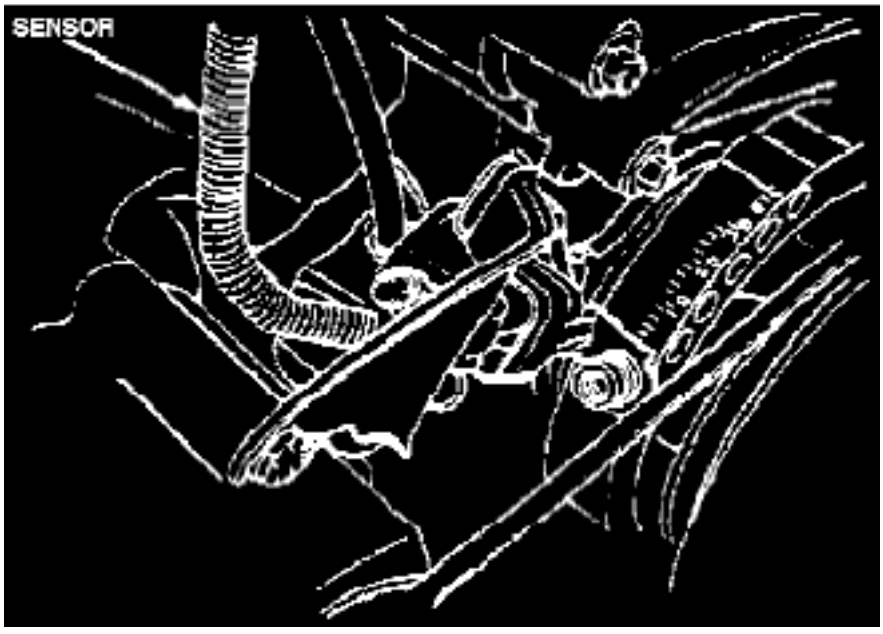
Crankshaft Position Sensor: Locations

Top RH Side Of Engine.

RH Front Of Engine

Applicable to: 1982-83 V8-302/5.0L & V8-351/5.8L Engines w/EEC





Crankshaft Position Sensor: Description and Operation

Fig.6 - Crankshaft Position Sensor

Fig.7 - Crankshaft Position Sensor

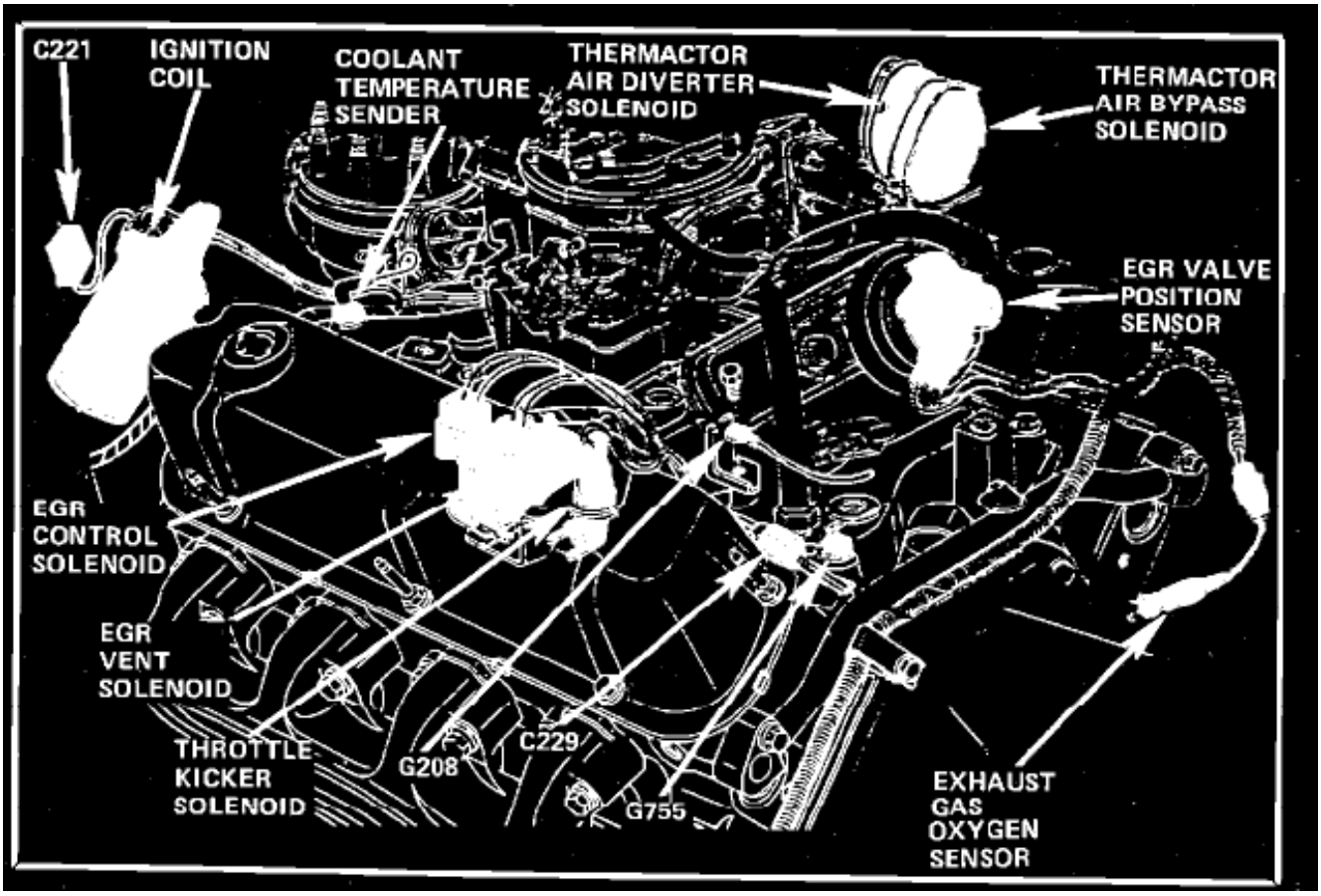
DESCRIPTION

The crankshaft vibration damper is fitted with a four-lobe "pulse ring" which provides the system with an accurate indication of when the pistons reach 10 BTDC. This indication is called the reference timing. Figs. 6 and 7.

The pulse ring is a powdered metal ring positioned on the crankshaft vibration damper during manufacture. It has four equally spaced lobes which represent crankshaft position when the pistons reach 10 BTDC.

During operation, the lobes on the pulse ring pass by the tip of the CP sensor. The pulse ring interrupts the magnetic field at the tip of the sensor. When the field is interrupted, an output signal is generated and sent to the ECA.

As the crankshaft turns, the ECA evaluates the electrical impulses to determine the exact position of the crankshaft at any given time. By the frequency of the impulses, the ECA can determine the engine speed. With these two factors, the ECA will determine the appropriate ignition timing advance required for best engine operation.

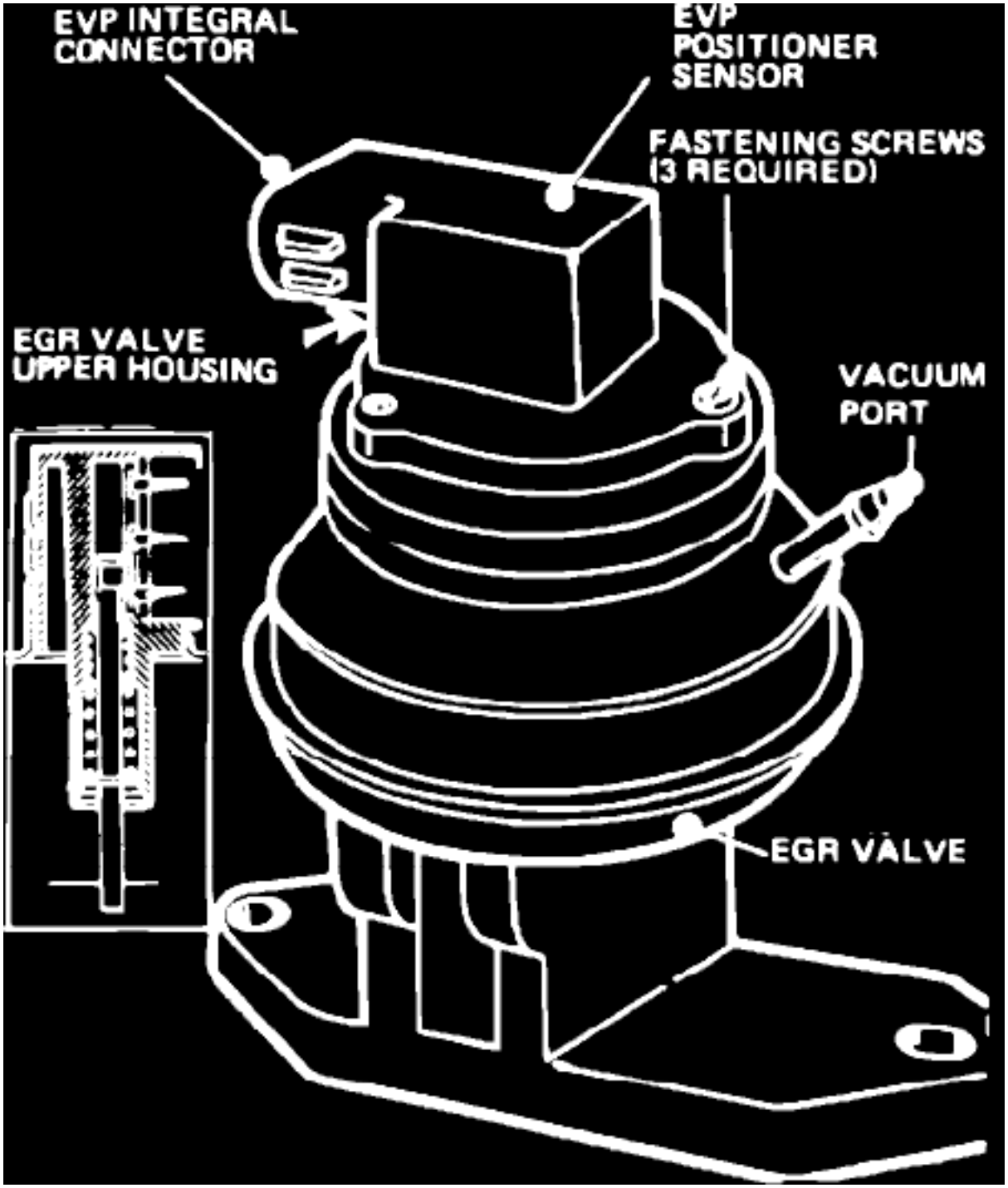


EGR Valve Position Sensor: Locations

LH Side Of Engine.

Rear Of Carburetor

Applicable to: 1982-83 V8-302/5.0L & V8-351/5.8L Engines w/EEC



EGR Valve Position Sensor: Description and Operation

Fig. 6 EGR valve position sensor

This sensor, Fig. 6, is used to monitor the EGR valve pintle position. The computer applies a reference voltage to the EVP sensor, and the resulting signal from the EVP sensor is proportional to the amount of exhaust gases flowing through the EGR valve pintle into the intake manifold.

Depending on the input from this and other sensors, the computer can increase or decrease EGR flow by activating or deactivating a pair of solenoid vacuum valves.

Engine	Year	Sensor	Resistance Ohms @ deg. F/C
All w/EEC IV	1983-90	Coolant, Air Charge	31,700-42,900 @ 68/20 13,650-18,650 @ 104/40 6500-8900 @ 140/60 3240-4440 @ 176/80 1770-2370 @ 212/100 980-1380 @ 248/115
All w/EEC III	1981-83	Coolant, Air Charge	1100-6000 1700-60,000

TEMPERATURE SENSORS

Intake Air Temperature Sensor: Description and Operation

DESCRIPTION

This sensor is used on models with fuel injection. It sends air temperature information to the Electronic Control Unit to make changes for air temperature variations.

Intake Air Temperature Sensor: Testing and Inspection Component Testing

NOTE: Prior to performing any test on this system, insure that temperature switch is above 65° F.

1. Disconnect connector from wiring harness.

2. Connect an ohmmeter or self-powered test light to temperature switch connector terminals.

3. Cool the switch to below 40° F by spraying with Refrigerant 12.

CAUTION: Do not spray refrigerant with engine running, as any refrigerant drawn into the carburetor and burned in the engine will produce poisonous phosgene gas. Conduct this procedure in well ventilated area.

4. When switch is cooled below 40° F. a.

On type 1 switches, the internal switch contacts should open. The ohmmeter should read maximum resistance or the test light should be off. If switch does not open below 40° F, replace switch.

b. On type 2 switches, the internal switch contacts should close. The ohmmeter should read zero resistance and the test light should be on. If test light does not go on or ohmmeter indicates a resistance of 1 ohm or more, replace switch.

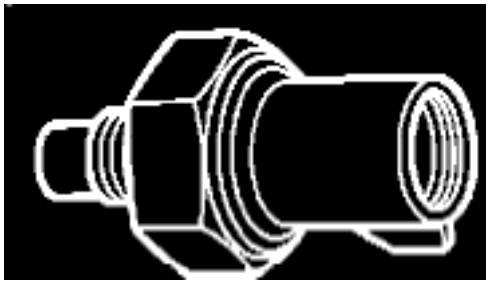
5. Increase switch temperature to above 70° F by placing palm of hand on metal surface of switch or by starting engine and allowing the exhaust manifold heat to increase the intake air temperature.

6. When switch temperature is above 70° F. a.

On type 1 switches, the internal switch contacts should close. The ohmmeter should read zero resistance and the test light should be on. If test light does not go on or ohmmeter indicates a resistance of 1 ohm or more, replace switch.

b. On type 2 switches, the internal switch contacts should open. The ohmmeter should read maximum resistance or the test light should be off. If switch does not open, replace switch.

c. If switch is replaced, check operation of new switch before connecting harness connector.

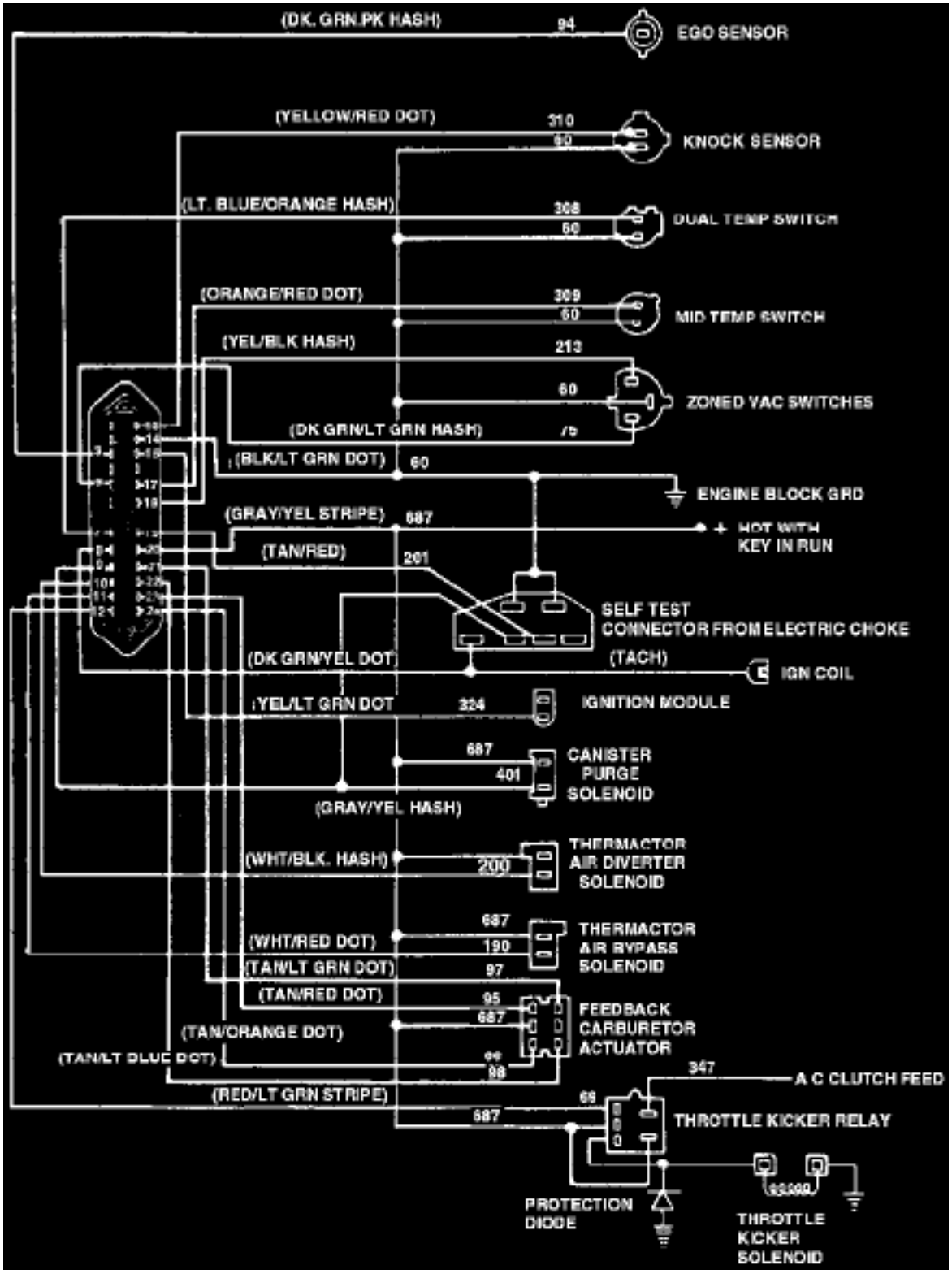


Knock Sensor: Description and Operation

Knock Sensor

The knock sensor, Fig. 11, is a piezo-electric accelerator accelerometer with the sensor designed to resonate at approximately the same frequency as the engine knock frequency.. The sensor uses the resonant frequency to mechanically amplify the engine knock frequency (5-6 KHz).

This method allows relatively large signals to be achieved without electrical amplification. The sensor has a thin circular piezoelectric ceramic disk which is bonded to a metal diaphragm. Electrical connections are made through a two-pin integral connector.



Knock Sensor: Testing and Inspection Component Testing

Fig.8 - MCU System Wiring Circuit

1. Make sure that the following three steps are properly conducted in order to simulate spark knock conditions and determine that spark detection

system is inoperative. If not, repeat test to verify problem. a. Make sure that engine is at normal operating temperature. Run engine at 2000 rpm for 2 minutes, then turn key off. Immediately restart engine

and allow to idle.

b. Observe voltmeter and vacuum gauge for initialization pulses after restarting the engine. The throttle kicker will also extend (increase engine

speed) and remain on throughout the test.

c. On vehicles with spark knock sensor, when initial pulses occur, immediately simulate spark knock by placing a 3/8 inch extension on manifold

near base of knock sensor. Tap end of extension with a small hammer for about 15 seconds.

2. Disconnect jumper wire from self-test trigger input circuit 201. 3. With ignition key off, disconnect vehicle harness from spark knock sensor. 4. Using a torque wrench and a 1 1/8 inch deep socket, make sure that spark sensor is torqued to 12-18 ft. lbs. If sensor is properly torqued, proceed

to next step. If not, torque to specifications.

5. Disconnect vehicle harness from MCU and spark sensor. Connect one lead of an ohmmeter to circuit 310 of vehicle harness and other lead to

engine block, Fig. 8. If resistance is 1000 ohms or more, proceed to next step. If resistance is less than 1000 ohms, repair short to ground in circuit 301.

6. With key off and knock sensor harness disconnected, check circuit 310 of vehicle harness for continuity. If resistance is 10 ohms or less, continue

to next step. If resistance is greater than 10 ohms, repair circuit 310.

7. Check circuit 60 of vehicle harness for continuity between knock sensor and MCU, Fig. 8. If resistance is 10 ohms or less, reconnect harness

connector to MCU and proceed to next step. If resistance is greater than 10 ohms, service circuit 60.

8. Reconnect jumper wire to circuits 201 and 60 of VIP connector, Fig. 8. 9. Connect a test lamp to positive terminal of battery, then disconnect knock sensor from vehicle harness.

10. Perform "Engine Running Functional Test" procedure. When the four initialization pulses occur, continuously tap circuit 310 of the vehicle

harness connector, which mates to the knock sensor connector, with the probe end for 5 seconds while observing voltmeter pulses. If a code 25 is

observed, replace MCU. If any other code is observed, replace spark knock sensor.

SPARK KNOCK, ONLY AT WIDE OPEN THROTTLE AND/OR POOR PERFORMANCE/MILEAGE

1. If engine has a spark knock sensor, disconnect it. 2. Make sure that ignition timing is within specifications. 3. With engine running at normal operating temperature, disconnect the two wire ignition module connector (yellow wire is circuit 324 and

black/white wire is circuit 69) from vehicle harness. Using a jumper wire, jump the wires together at the ignition module and note ignition timing. Remove jumper wire and note ignition timing. If timing retards 16-20 degrees, reconnect ignition module and proceed to next step. If timing does not retard 16-20 degrees, replace ignition module and repeat steps 1, 2 and 3.

4. With engine at normal operating temperature, set high cam on lowest step that will maintain engine speed greater than 1200 rpm. Note ignition

timing, then disconnect and plug vacuum hose from zone vacuum switch and again note timing. If timing retards more than 5 degrees, on engines with spark knock sensor, proceed to step 6, on all other engines MCU system is okay. If timing does not retard more than 5 degrees, proceed to next step.

5. With engine still at 1200 rpm, disconnect ignition module (connector with yellow and black/white wires). If timing retards, check circuit 324 for

short to ground. If circuit is okay, replace MCU unit and retest. If timing does not retard, check circuit 324 for open circuit. If circuit is okay, Replace MCU unit and retest.

6. On engines with spark knock sensor, reconnect sensor. Repeat Engine Running Functional Test, but do not simulate knock by taping sensor. If

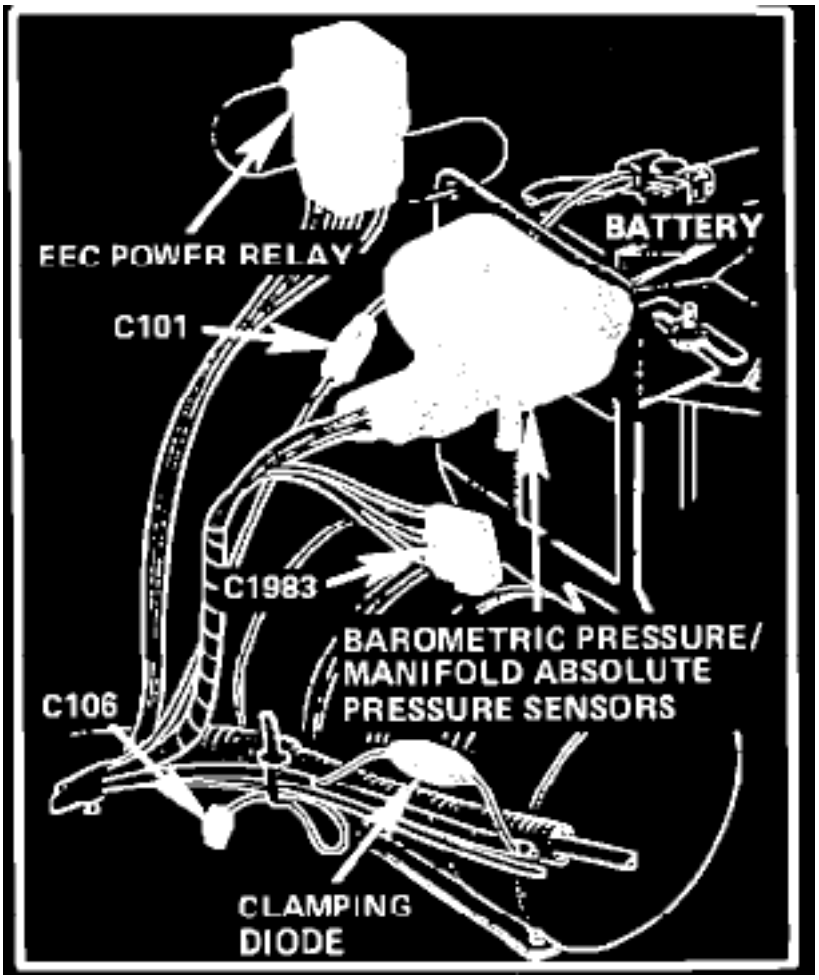
service code 25 appears, MCU system is okay, testing is completed. If any other service code appears, replace knock sensor and retest.

With EEC IV, measured between BK/W wire and ground with ignition on and engine off.

Engine	Year	Voltage @ Altitude
All w/EEC IV	1983-90	1.55-1.63 @ 0
		1.52-1.60 @ 1000
		1.49-1.56 @ 2000
		1.46-1.54 @ 3000
		1.43-1.51 @ 4000
		1.39-1.48 @ 5000
		1.36-1.45 @ 6000
		1.34-1.43 @ 7000

Engine	Year	Resistance (ohms) @ Altitude
All w/EEC III	1981-83	7.6-8.4 @ 0-1500
		7.2-8.1 @ 1500-2500
		6.9-7.8 @ 2500-3500
		6.7-7.3 @ 3500-4500
		6.6-7.2 @ 4500-5500
		6.3-7.0 @ 5500-6500
		6.1-6.7 @ 6500-7500
		5.4-6.7 @ 7500 and up

MANIFOLD ABSOLUTE AND BAROMETRIC PRESSURE SENSORS

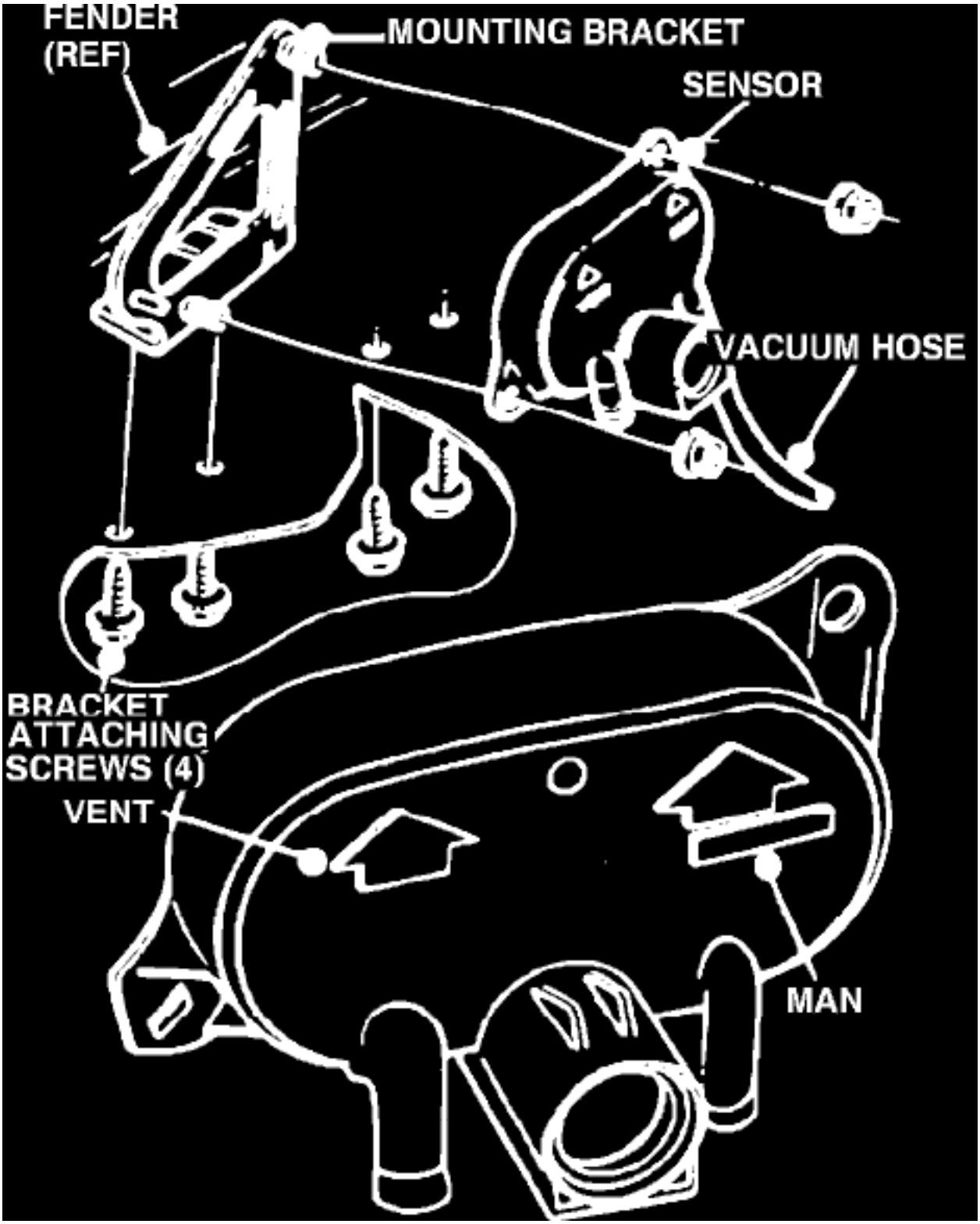


Manifold Pressure/Vacuum Sensor: Locations

Forward Of RH Wheelwell At Battery.

On Battery Support

Applicable to: 1981-83



Manifold Pressure/Vacuum Sensor: Description and Operation

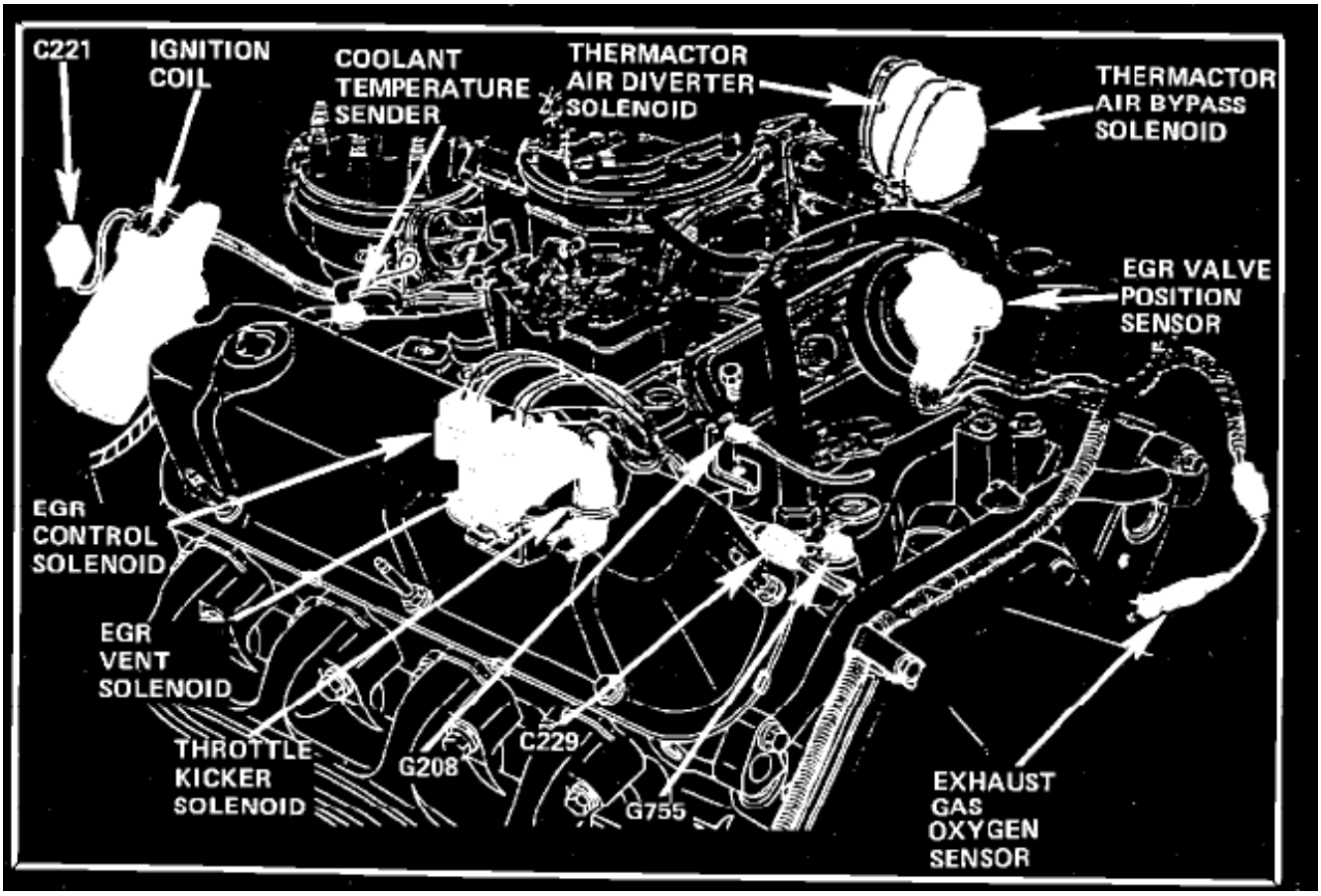
Fig. 5 Barometric & manifold absolute pressure sensor

DESCRIPTION

These two sensors, Fig. 5, are combined into one unit. The BMAP sensor monitors the absolute value of the intake manifold pressure and atmospheric pressure (manifold absolute pressure is defined as barometric pressure minus manifold vacuum).

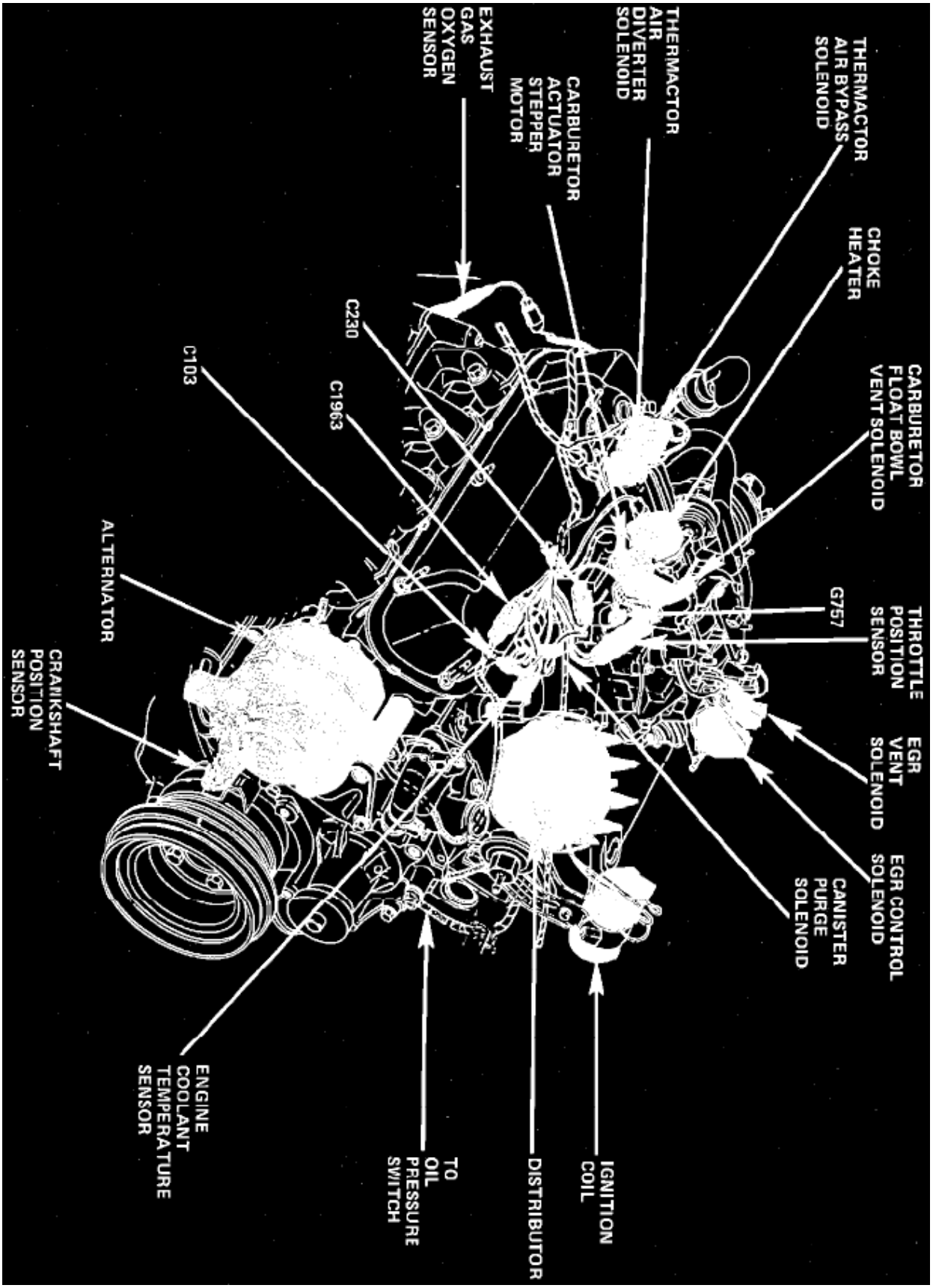
Atmospheric pressure changes are converted into an electrical signal and fed to the computer for evaluation. From this input, the computer determines the EGR flow requirements depending on the altitude at which the vehicle is being operated.

Intake manifold pressure changes are converted by a pressure-sensing element and electrical circuit by the computer. The signal is used by the computer to determine part throttle spark advance, EGR flow rate and air/fuel ratio.



Oxygen Sensor: Locations

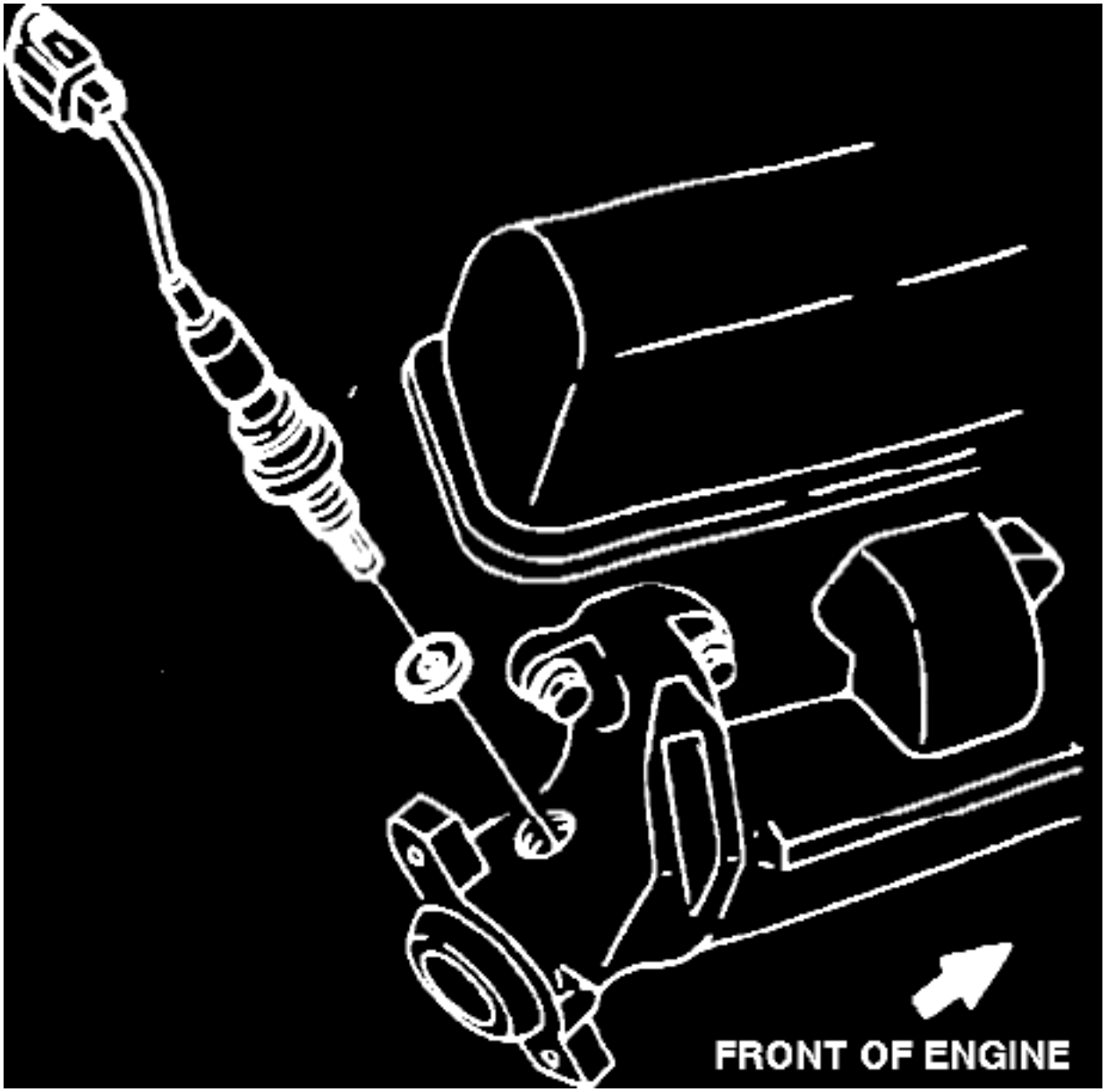
LH Side Of Engine.


THERMACTOR AIR BYPASS SOLENOID
CHOKE HEATER
CARBURETOR FLOAT BOWL VENT SOLENOID
THERMACTOR AIR DIVERTER SOLENOID
CARBURETOR ACTUATOR STEPPER MOTOR
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C230
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THROTTLE POSITION SENSOR
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EGR CONTROL SOLENOID
CANISTER PURGE SOLENOID
ALTERNATOR
CRANKSHAFT POSITION SENSOR
IGNITION COIL
DISTRIBUTOR
TO OIL PRESSURE SWITCH
ENGINE COOLANT TEMPERATURE SENSOR

Top RH Side Of Engine.

Rear RH Side Of Engine On Manifold

Applicable to: 1982-83 V8-302/5.0L & V8-351/5.8L Engines w/EEC



Oxygen Sensor: Description and Operation

Fig. 4 Exhaust gas oxygen sensor

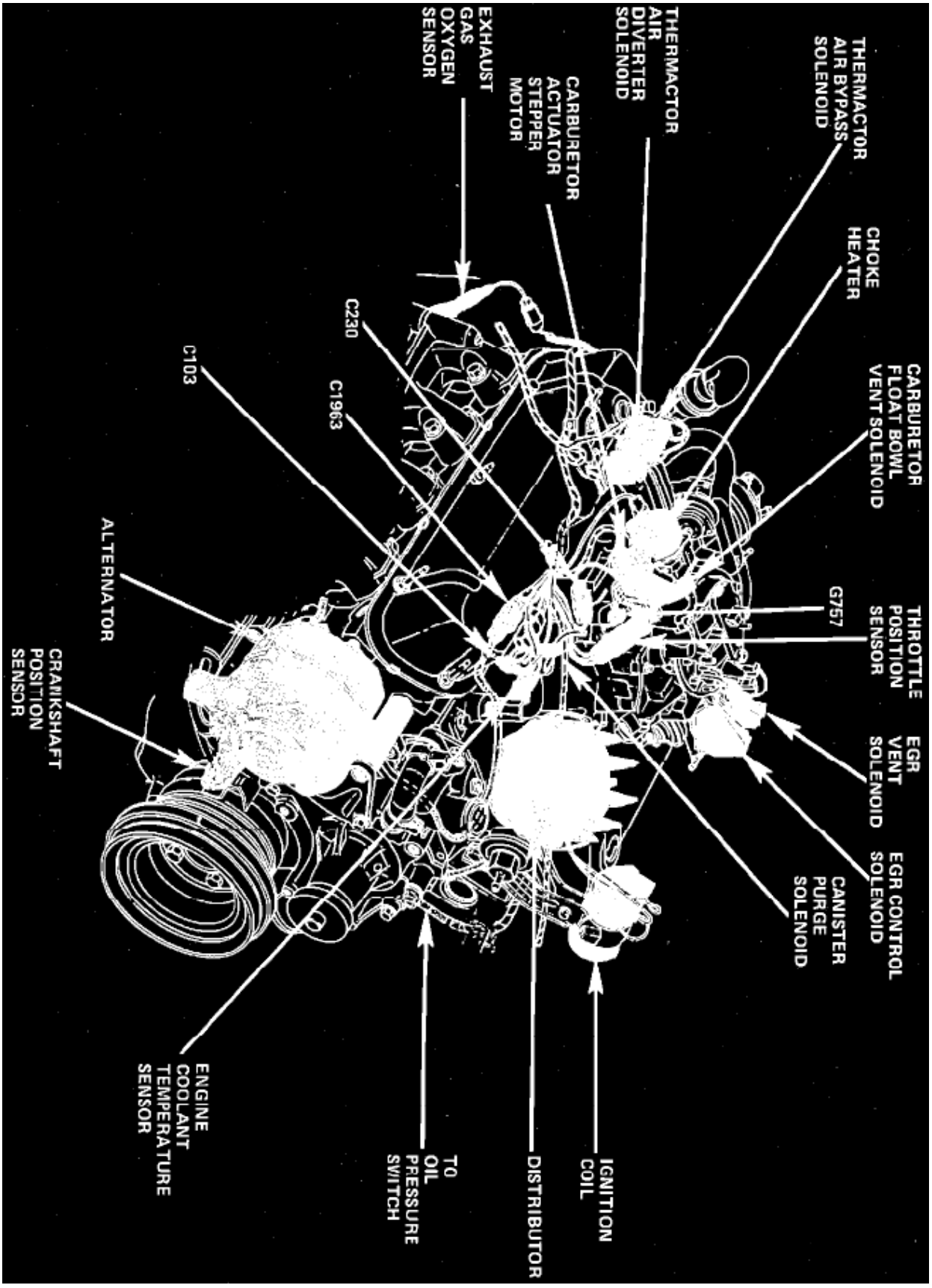
This sensor, Fig. 4, is installed in the exhaust manifold and provides information to the ECA as to the oxygen content of the exhaust gases. It monitors the oxygen content of the exhaust gases and generates an output of .6 to 1.0 volt when detecting a rich exhaust gas mixture (absence of oxygen) and less than .2 volts when detecting a lean mixture (presence of oxygen). This constantly changing voltage signal is sent to the ECA for analysis. The outer surface of the sensor is a threaded steel housing and shell. The sensor body is protected by a shield pressed into the housing where it projects into the exhaust manifold. Exhaust gases contact the sensor body by entering through flutes in the sensor shield. A vent is provided in the shell to allow atmospheric air to enter the inner portion of the sensor body. The sensor connects to the vehicle wiring harness with a connector that is attached to the inner (positive) terminal. The shell is the negative terminal

of the sensor and provides the return signal path through the engine block.

Engine	Year	TPS Voltage	
		Minimum	Maximum
All w/EEC III	1981	1.80-2.40	6.0 min.
All w/EEC III	1982-83	1.60-2.40	6.0 min.
All w/EEC IV	1984-88	0.90-1.00†	—
2.3L	1989-90	.34	4.84
2.9L	1989-90	.34	4.84
3.0L	1989-90	.34	4.84
4.0L	1990	.34	4.84
4.9L	1989-90	.20	4.84
5.0L	1989-90	.20	4.84
5.6L, 7.5L	1989-90	.20	4.84
w/4-speed AT	1989-90	.34	4.84

† Adjustable units only.

THROTTLE POSITION SENSOR SPECIFICATIONS

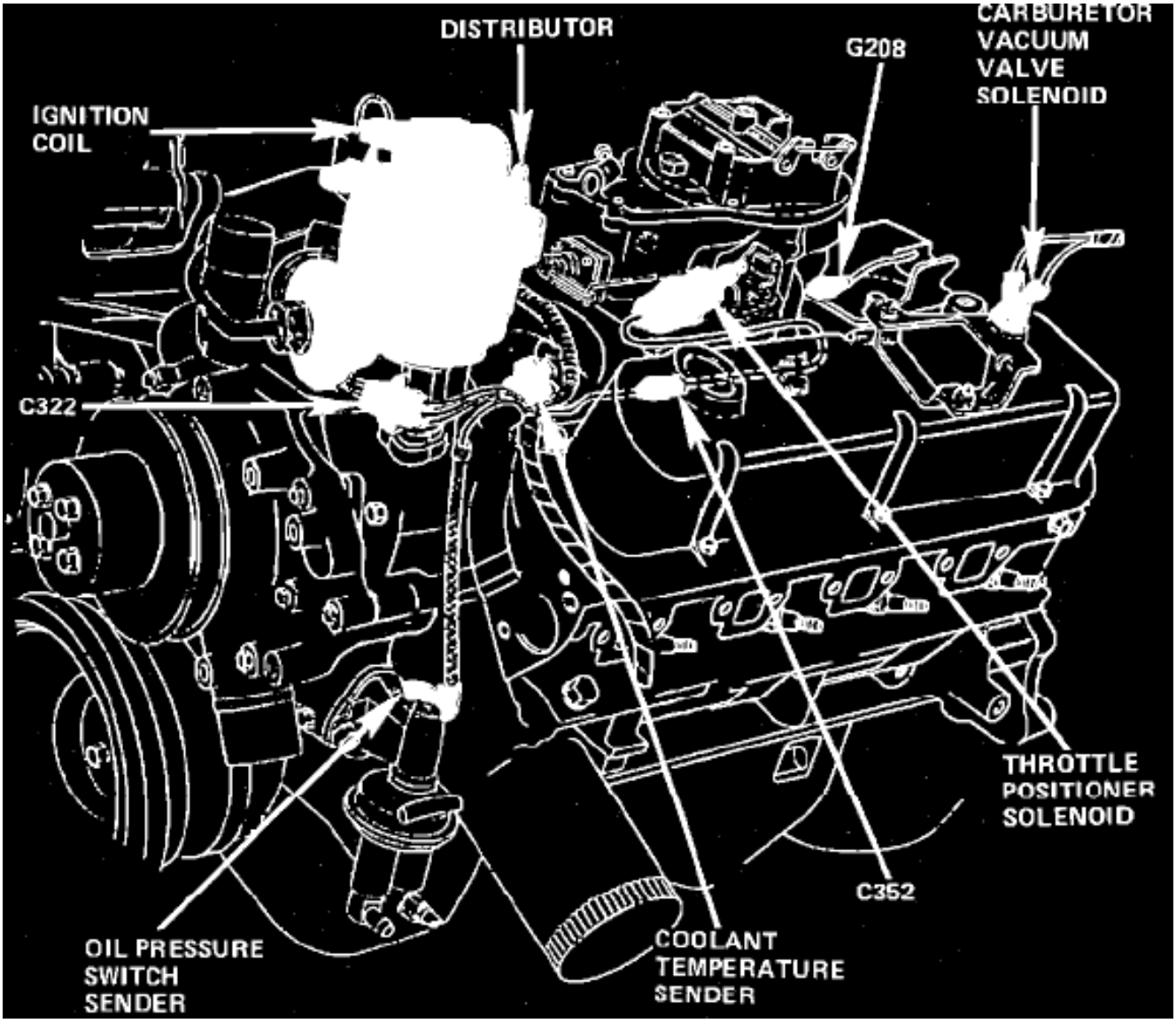

THERMACTOR AIR BYPASS SOLENOID
CHOKE HEATER
CARBURETOR FLOAT BOWL VENT SOLENOID
THERMACTOR AIR DIVERTER SOLENOID
CARBURETOR ACTUATOR STEPPER MOTOR
EXHAUST GAS OXYGEN SENSOR
C230
C1963
C103
G757
THROTTLE POSITION SENSOR
EGR VENT SOLENOID
EGR CONTROL SOLENOID
CANISTER PURGE SOLENOID
ALTERNATOR
CRANKSHAFT POSITION SENSOR
ENGINE COOLANT TEMPERATURE SENSOR
TO OIL PRESSURE SWITCH
DISTRIBUTOR
IGNITION COIL

Throttle Position Sensor: Locations

Top RH Side Of Engine.

RH Rear Of Carburetor

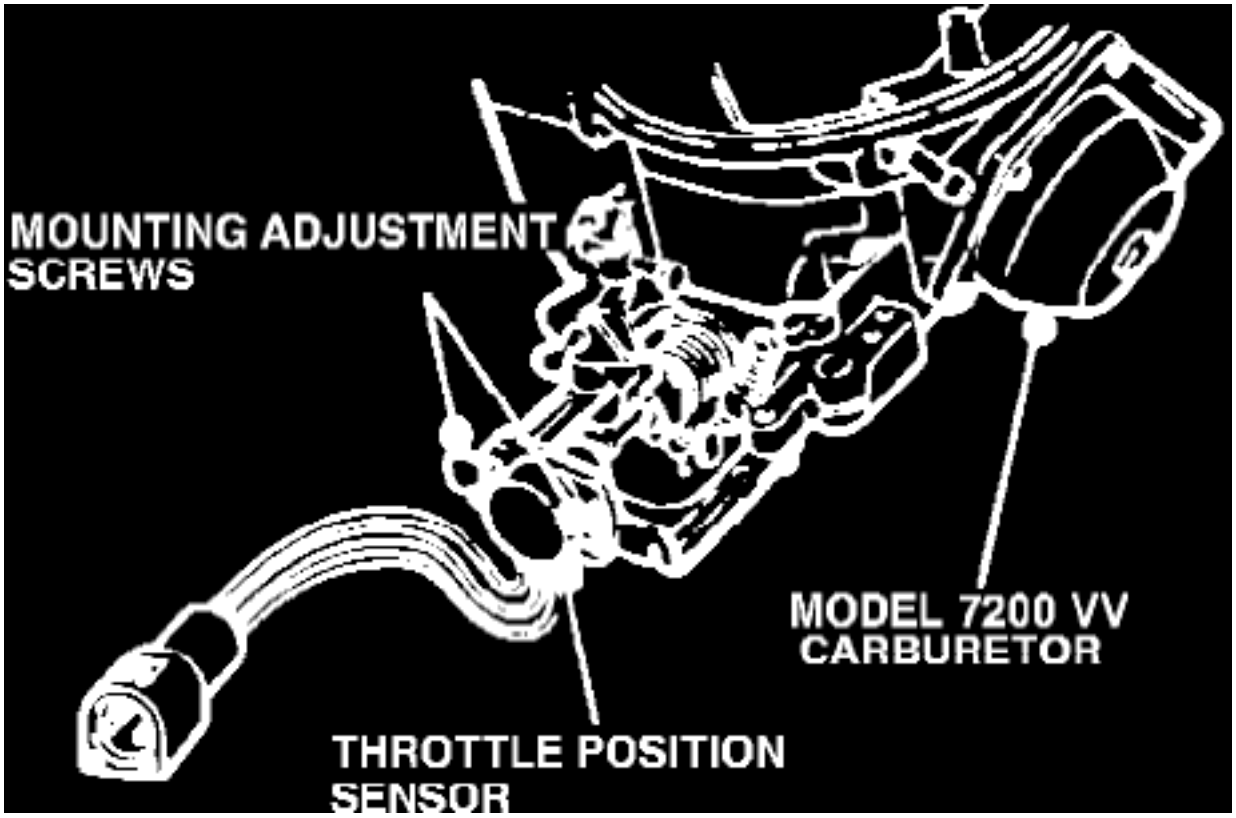
Applicable to: 1982-83 V8-302/5.0L & V8-351/5.8L Engines w/EEC



LH Side Of Engine.

RH Rear Of Carburetor

Applicable to: 1982-83 V8-255/4.2L & V8-302/5.0L Engines



Throttle Position Sensor: Description and Operation

Fig. 2 Throttle position sensor (typical)

This sensor, Fig. 2, is basically a rheostat switch attached to the carburetor throttle shaft and responds to throttle valve angle changes. The throttle angles are classified into three operating modes as follows:

a. Closed Throttle (Idle or Deceleration)

b. Part Throttle

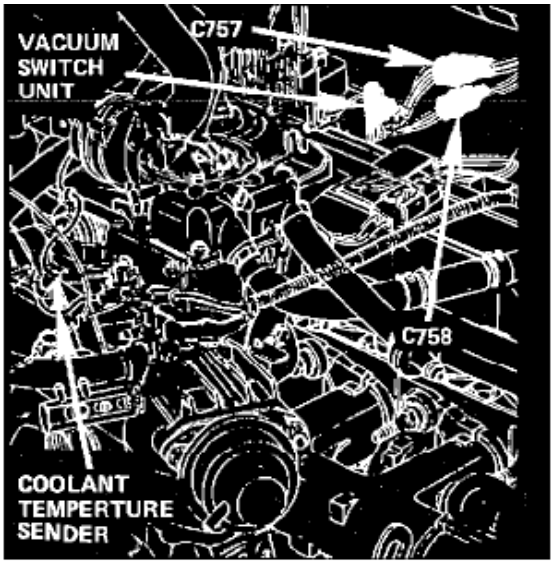
c. Wide Open Throttle (Maximum Acceleration)

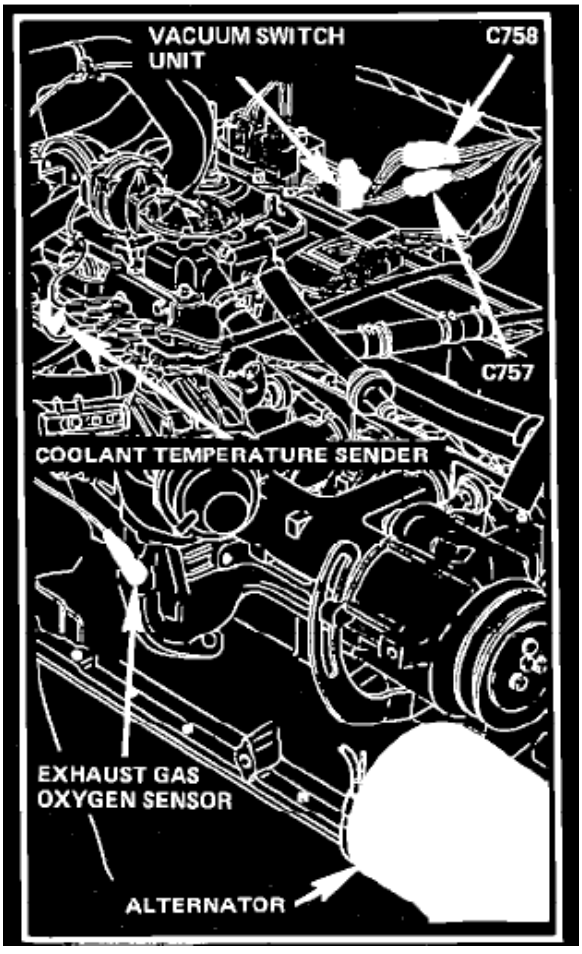
The ECA applies a reference voltage of about 9 volts to the sensor. The resultant sensor voltage supplied to the ECA, which is determined by the throttle position, is used by the ECA to determine the proper amount of spark advance, EGR flow, air/fuel ratio and thermactor air mode. The throttle position sensor mounting holes are slotted to permit adjustment. If the sensor is replaced, it must be correctly positioned or incorrect throttle information will be sent to the ECA. The adjustment requires use of special electronic test equipment.

Throttle Position Sensor: Adjustments

Engines with EEC III Turn ignition to RUN position and remove vacuum hose from throttle kicker, as equipped. With engine not running, compare voltage reading against specifications and adjust as needed.

Engines with EEC IV Connect positive probe of DVOM along terminal C (lower) of TPS and connect negative probe along terminal A (upper). Turn ignition on but do not start vehicle. Adjust TPS to specified value.


VACUUM SWITCH UNIT
C757
C758
COOLANT TEMPERTURE SENDER


VACUUM SWITCH UNIT
C758
C757
COOLANT TEMPERATURE SENDER
EXHAUST GAS OXYGEN SENSOR
ALTERNATOR

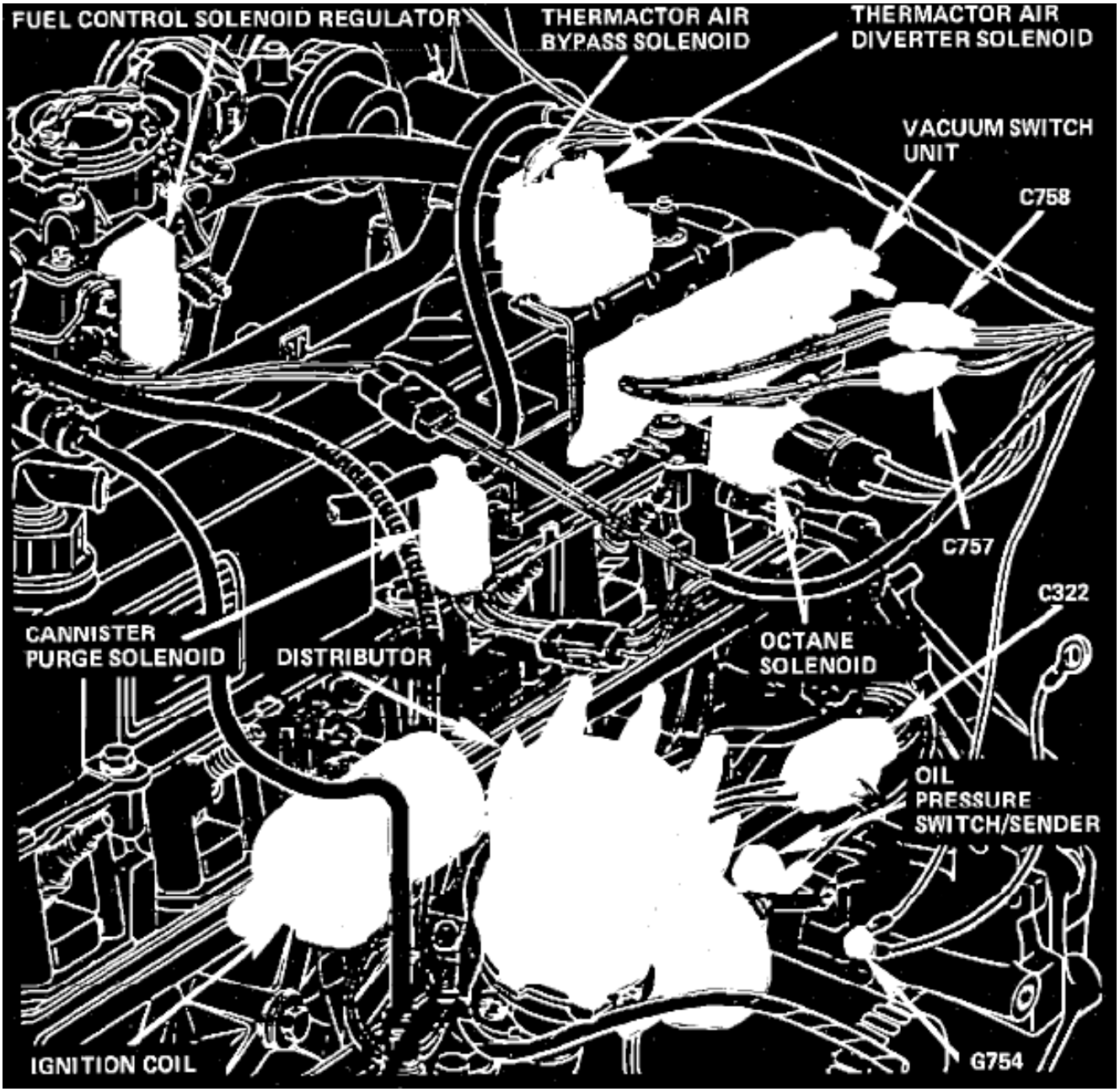
Vacuum Switch: Locations

RH Side Of Engine.

Center Rear Of Engine On Valve Cover

Applicable to: 1982-83 6-300/4.9L Engine

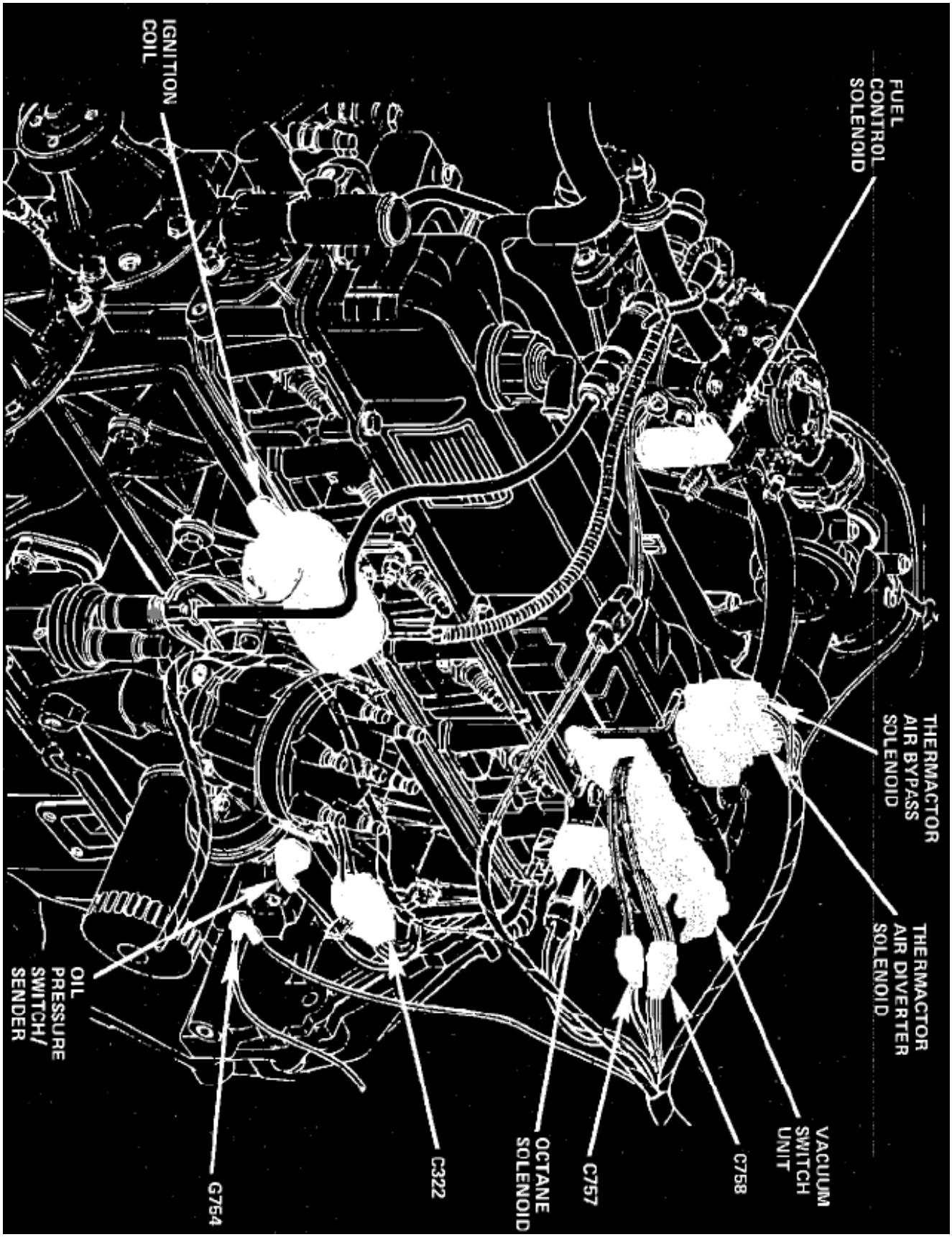
RH Side Of Engine.



LH Side Of Engine.

Center Rear Of Engine On Valve Cover

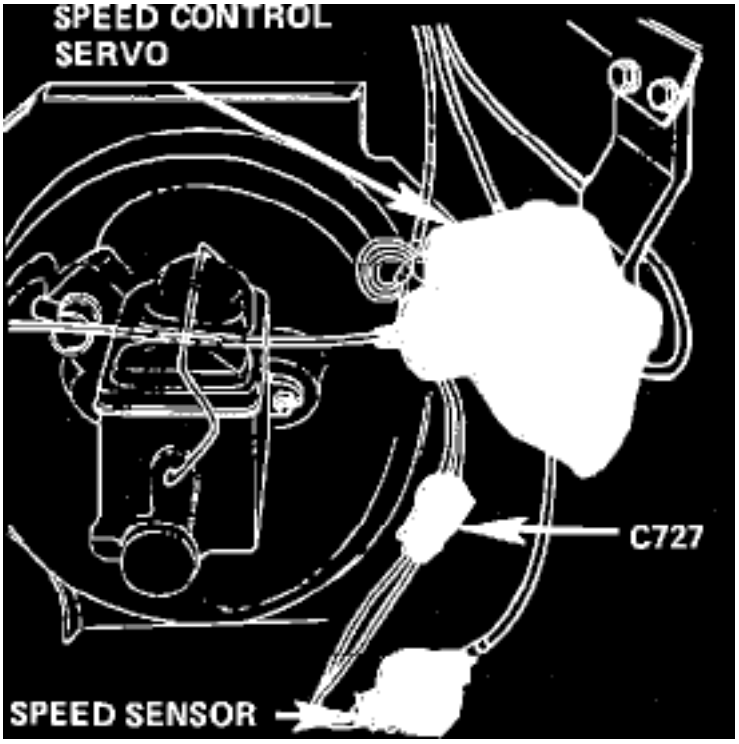
Applicable to: 1981 6-300/4.9L Engine w/MCU


FUEL CONTROL SOLENOID
IGNITION COIL
THERMACTOR AIR BYPASS SOLENOID
THERMACTOR AIR DIVERTER SOLENOID
VACUUM SWITCH UNIT
C758
C757
OCTANE SOLENOID
C322
G754
OIL PRESSURE SWITCH/ SENDER

LH Side Of Engine.

Center Rear Of Engine On Valve Cover

Applicable to: 1982-83 6-300/4.9L Engine w/MCU



Vehicle Speed Sensor: Locations

LH Side Of Dash Panel.

Below LH Side Of Master Brake Cylinder

Applicable to: V8 Engine

Vehicle Speed Sensor: Testing and Inspection Speed Sensor Test

1980-87 Models Exc. 1983-87 Ranger, 1984-87 Bronco II & 1986-87 Aerostar

1. Disconnect 6 way connector from amplifier assembly, then connect an ohmmeter between dark green wire w/white stripe and black wire on 1980 E-100-350, 1981-83 F-100-350 models and Bronco, and 1984-87 F-150-350 and Bronco, or green and black wire on 1980 F-100-350 and 1981-83 E-100-350 models and 1984-87 E-150-350 at the speed sensor end. A reading of 40 ohms should be obtained. A reading of 0 ohms indicates a shorted coil and an infinity reading indicates an open coil.

2. Replace sensor if a correct reading has not been obtained.

Vehicle Speed Sensor: Service and Repair

1. Separate electrical connector leading to the amplifier assembly.

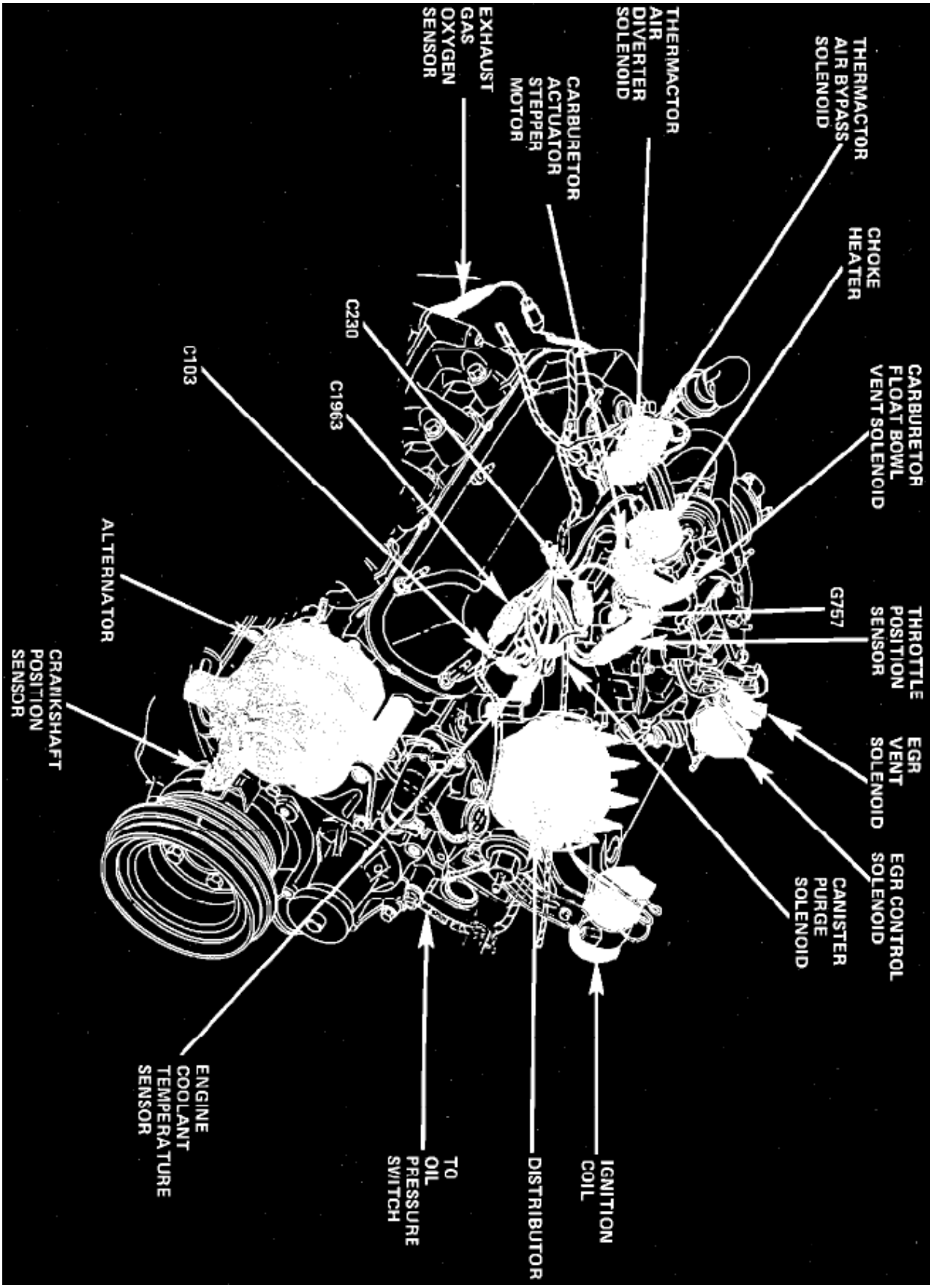
2. Disconnect upper and lower speedometer cables at the speed sensor. Remove speed sensor.

3. Reverse procedure to install.

Engine	Year	TPS Voltage	
		Minimum	Maximum
All w/EEC III	1981	1.80-2.40	6.0 min.
All w/EEC III	1982-83	1.60-2.40	6.0 min.
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THROTTLE POSITION SENSOR SPECIFICATIONS

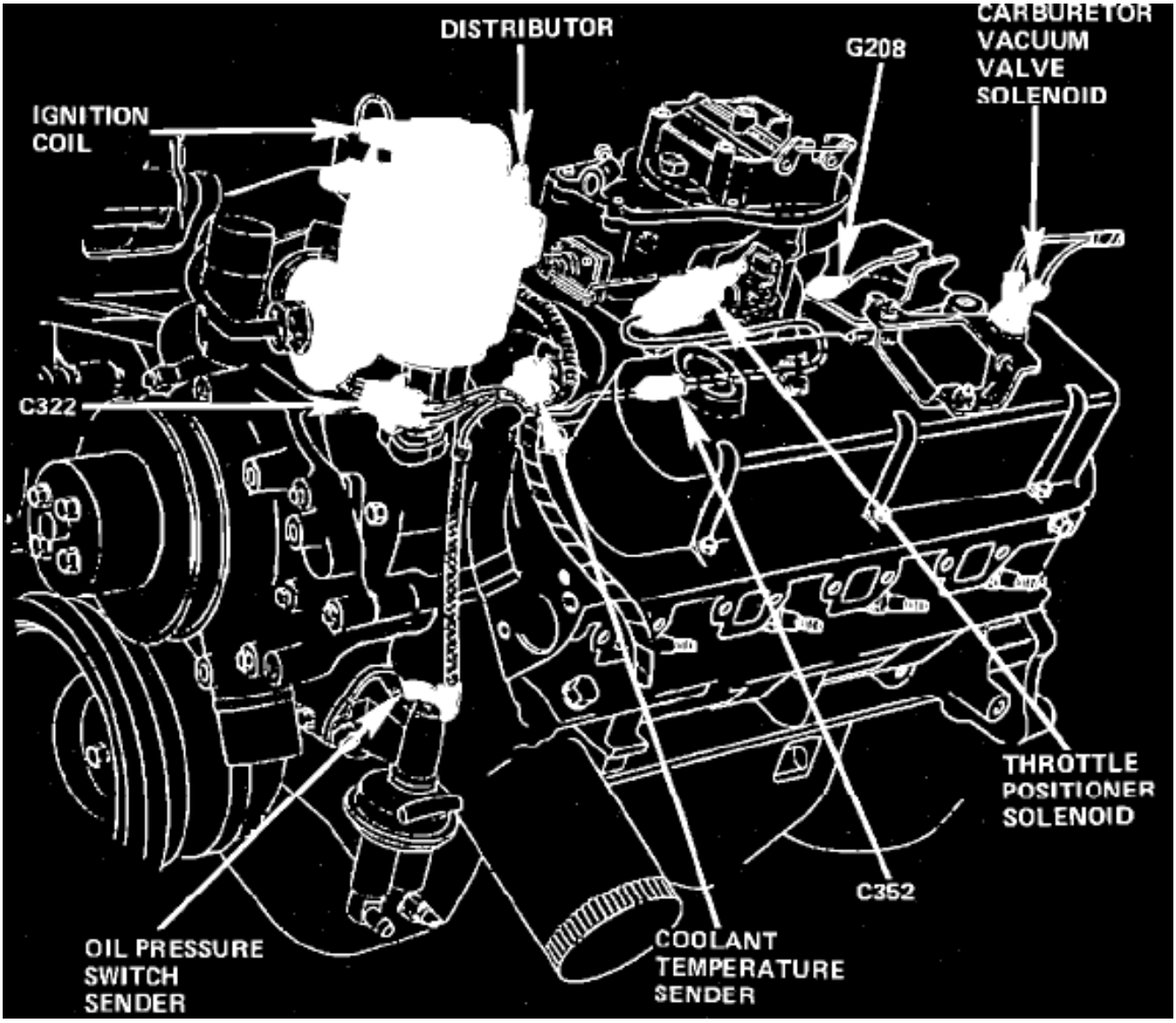

THERMACTOR AIR BYPASS SOLENOID
CHOKE HEATER
CARBURETOR FLOAT BOWL VENT SOLENOID
THERMACTOR AIR DIVERTER SOLENOID
CARBURETOR ACTUATOR STEPPER MOTOR
EXHAUST GAS OXYGEN SENSOR
C230
C1963
C103
G757
THROTTLE POSITION SENSOR
EGR VENT SOLENOID
EGR CONTROL SOLENOID
CANISTER PURGE SOLENOID
ALTERNATOR
CRANKSHAFT POSITION SENSOR
IGNITION COIL
DISTRIBUTOR
TO OIL PRESSURE SWITCH
ENGINE COOLANT TEMPERATURE SENSOR

Throttle Position Sensor: Locations

Top RH Side Of Engine.

RH Rear Of Carburetor

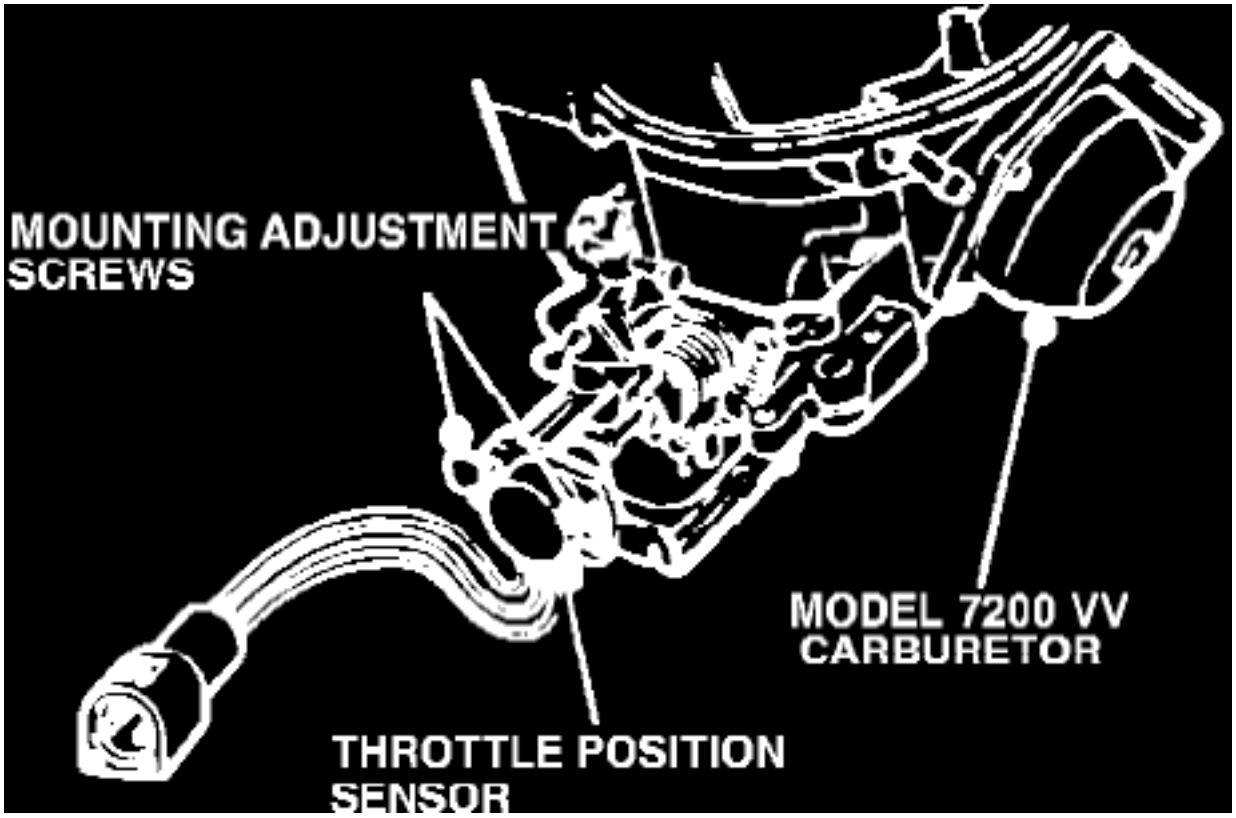
Applicable to: 1982-83 V8-302/5.0L & V8-351/5.8L Engines w/EEC



LH Side Of Engine.

RH Rear Of Carburetor

Applicable to: 1982-83 V8-255/4.2L & V8-302/5.0L Engines



Throttle Position Sensor: Description and Operation

Fig. 2 Throttle position sensor (typical)

This sensor, Fig. 2, is basically a rheostat switch attached to the carburetor throttle shaft and responds to throttle valve angle changes. The throttle angles are classified into three operating modes as follows:

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c. Wide Open Throttle (Maximum Acceleration)

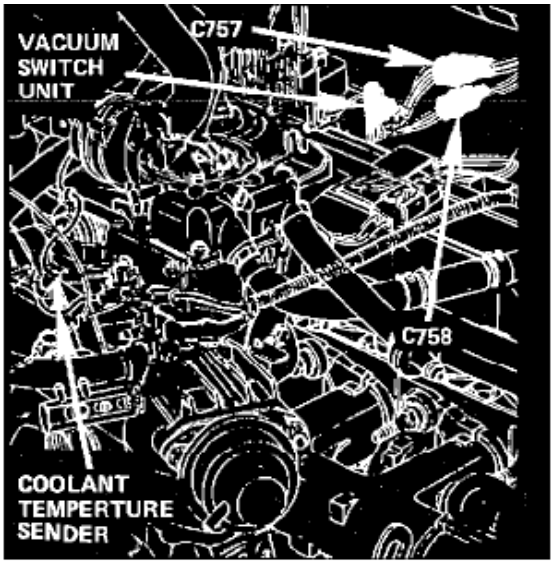
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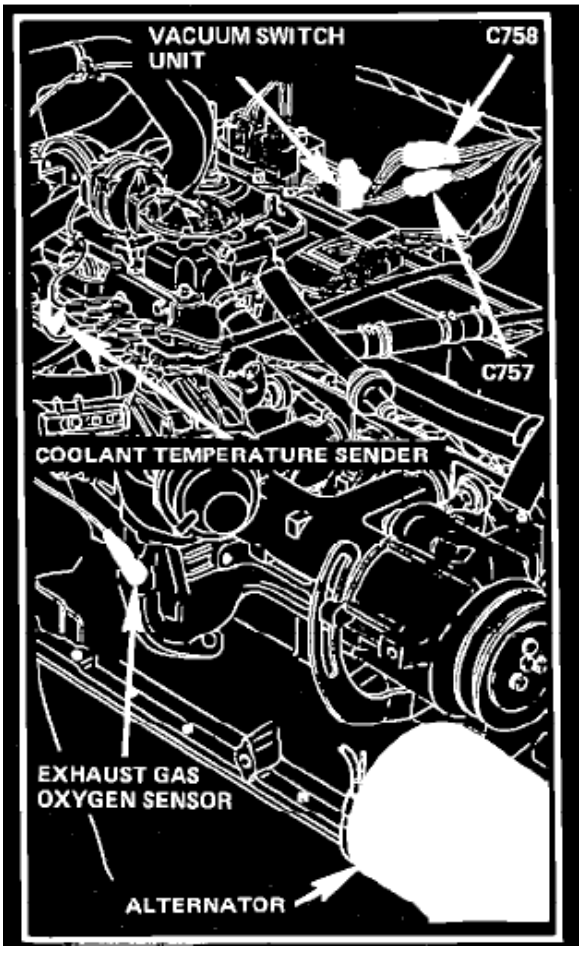
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Ford Bronco Workshop Manual (V8-351 5.8L VIN G 2-bbl (1982))
Ford Workshop Manuals > Powertrain Management > Computers and Control Systems > Vacuum Switch > Component Information > Locations





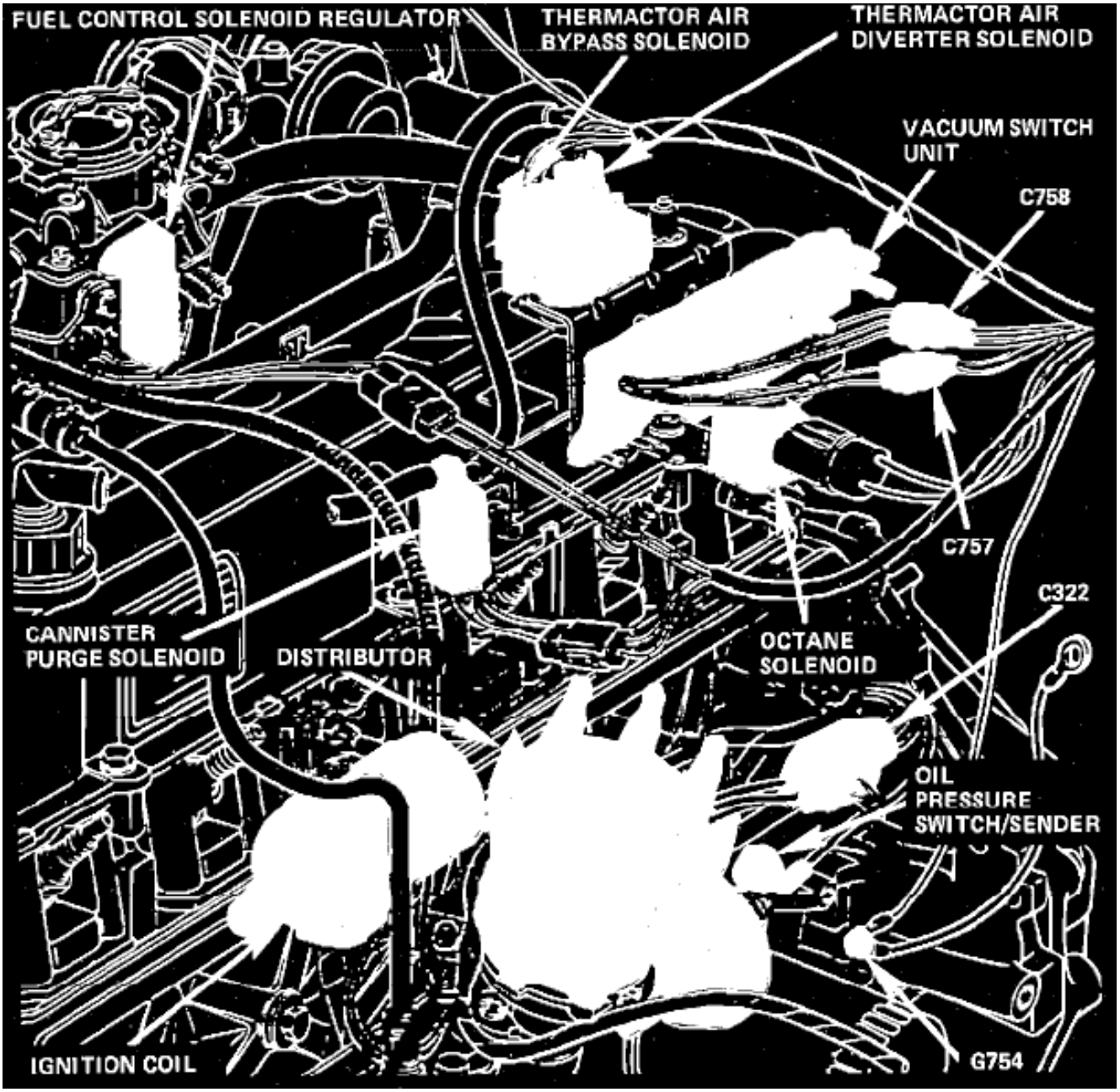
Vacuum Switch: Locations

RH Side Of Engine.

Center Rear Of Engine On Valve Cover

Applicable to: 1982-83 6-300/4.9L Engine

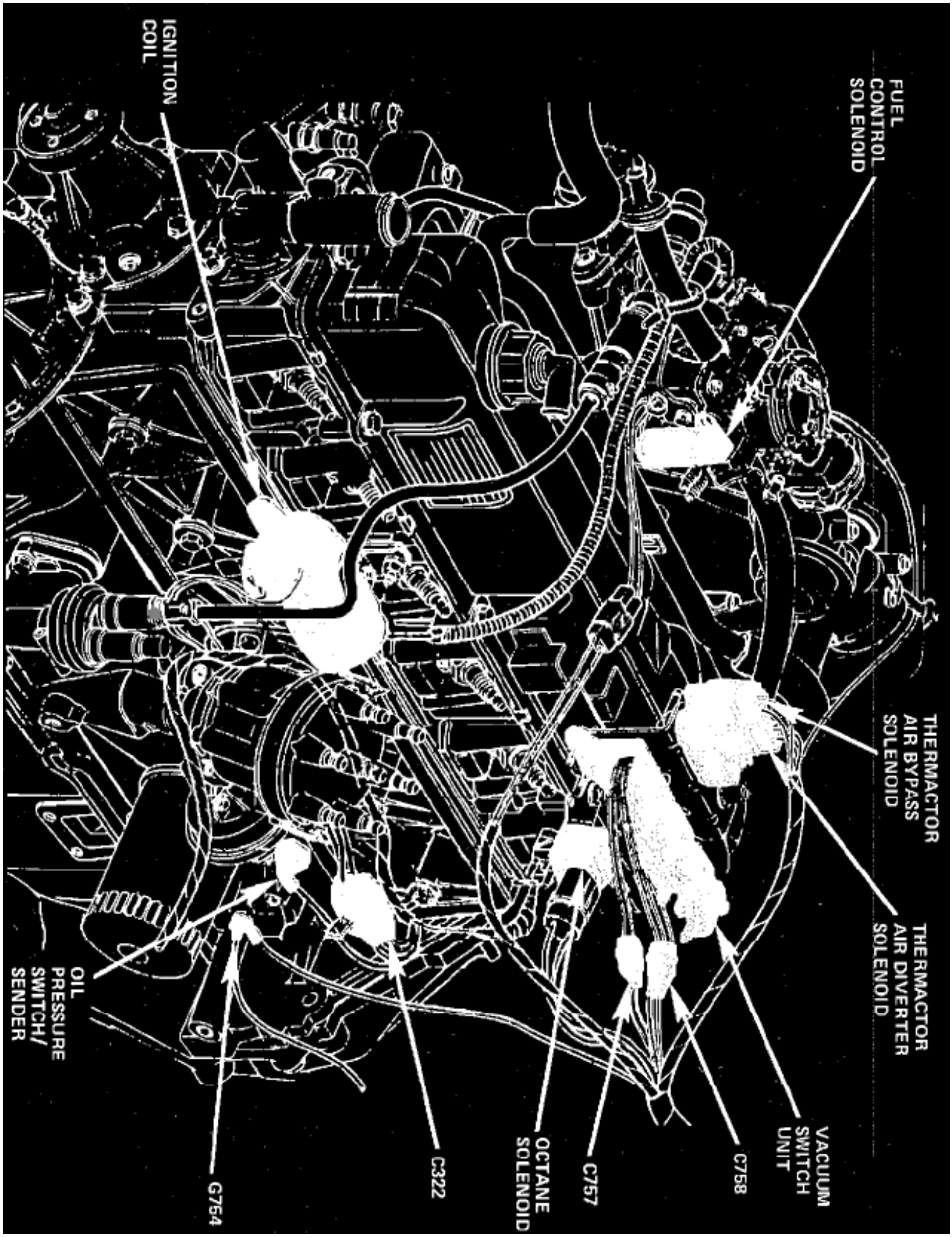
RH Side Of Engine.



LH Side Of Engine.

Center Rear Of Engine On Valve Cover

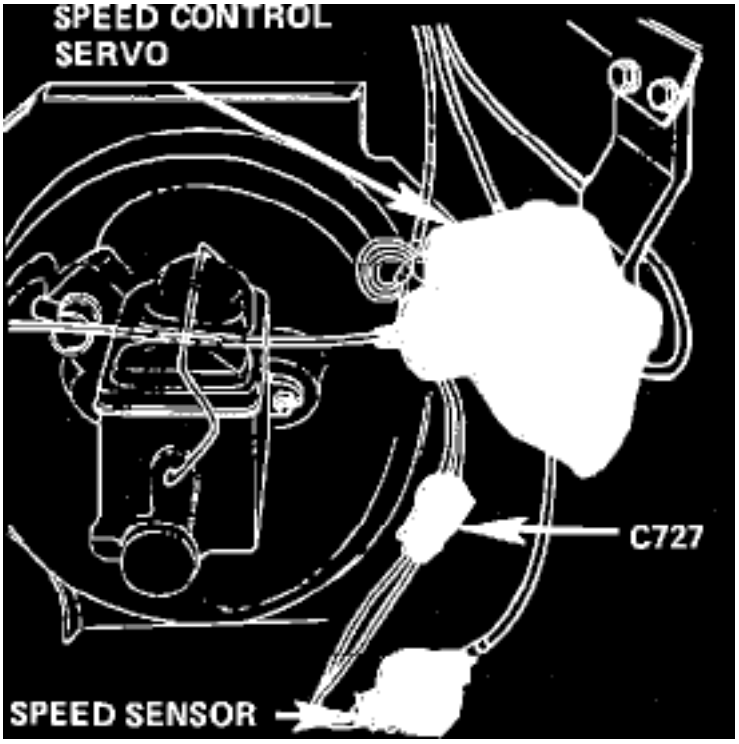
Applicable to: 1981 6-300/4.9L Engine w/MCU


FUEL CONTROL SOLENOID
IGNITION COIL
THERMACTOR AIR BYPASS SOLENOID
THERMACTOR AIR DIVERTER SOLENOID
VACUUM SWITCH UNIT
C758
C757
OCTANE SOLENOID
C322
G754
OIL PRESSURE SWITCH/ SENDER

LH Side Of Engine.

Center Rear Of Engine On Valve Cover

Applicable to: 1982-83 6-300/4.9L Engine w/MCU



Vehicle Speed Sensor: Locations

LH Side Of Dash Panel.

Below LH Side Of Master Brake Cylinder

Applicable to: V8 Engine

Vehicle Speed Sensor: Testing and Inspection Speed Sensor Test

1980-87 Models Exc. 1983-87 Ranger, 1984-87 Bronco II & 1986-87 Aerostar

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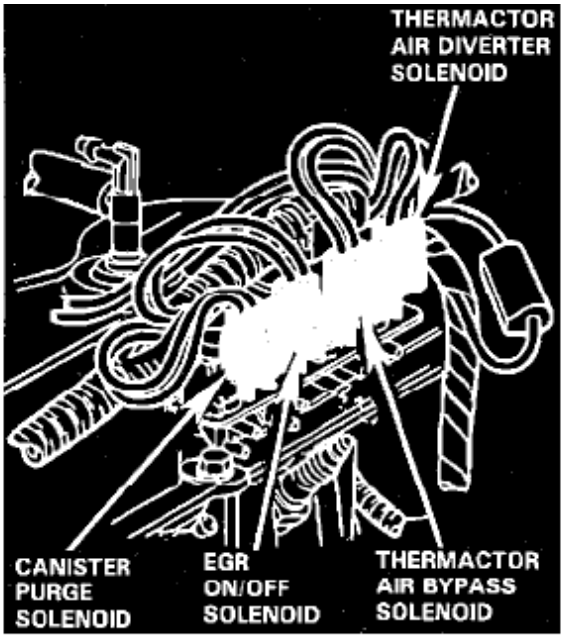
2. Replace sensor if a correct reading has not been obtained.

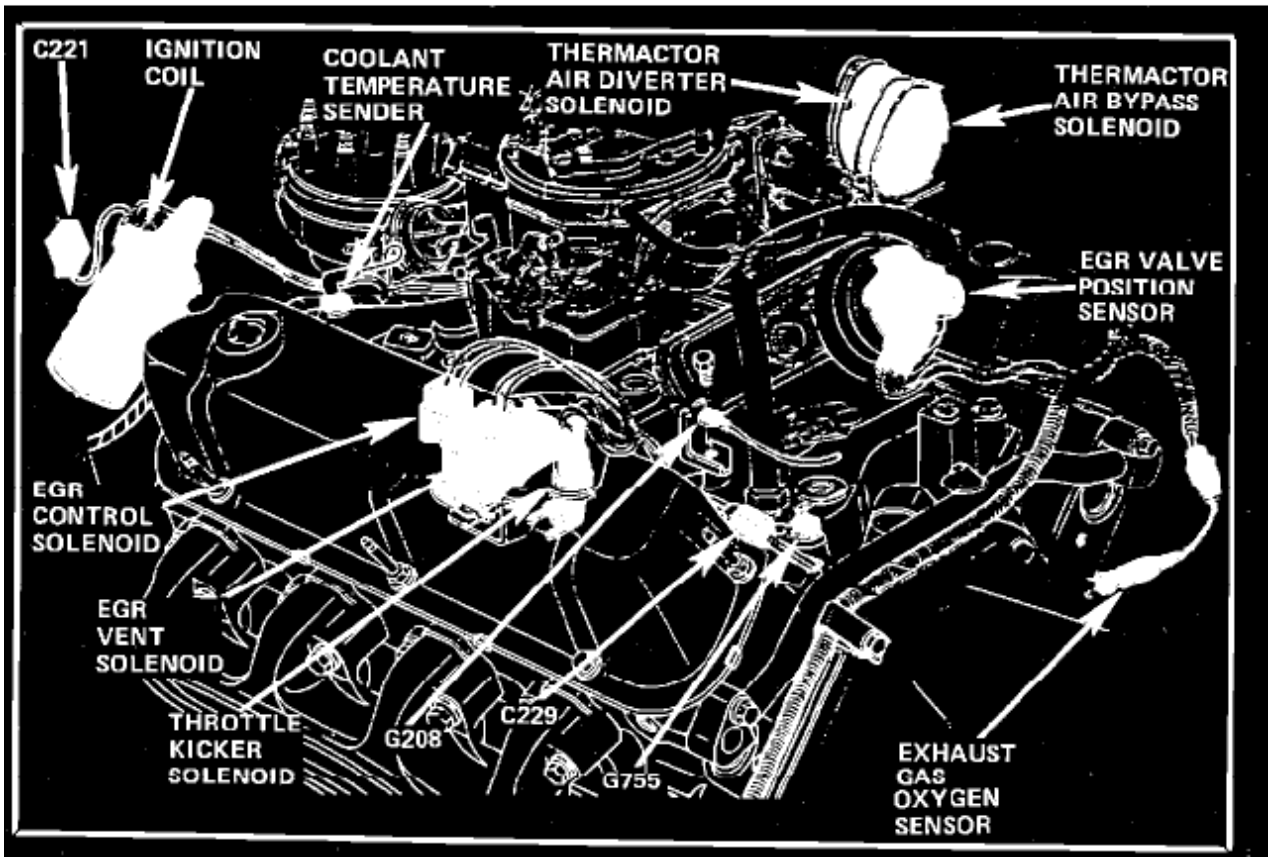
Vehicle Speed Sensor: Service and Repair

1. Separate electrical connector leading to the amplifier assembly.

2. Disconnect upper and lower speedometer cables at the speed sensor. Remove speed sensor.

3. Reverse procedure to install.


THERMACTOR
AIR DIVERTER
SOLENOID
CANISTER
PURGE
SOLENOID
EGR
ON/OFF
SOLENOID
THERMACTOR
AIR BYPASS
SOLENOID


C221
IGNITION
COIL
COOLANT
TEMPERATURE
SENDER
THERMACTOR
AIR DIVERTER
SOLENOID
THERMACTOR
AIR BYPASS
SOLENOID
EGR VALVE
POSITION
SENSOR
EGR
CONTROL
SOLENOID
EGR
VENT
SOLENOID
THROTTLE
KICKER
SOLENOID
G208
C229
G755
EXHAUST
GAS
OXYGEN
SENSOR

Air Diverter Solenoid: Locations Thermactor Air Bypass (TAB) Solenoid

LH Side Of Engine.

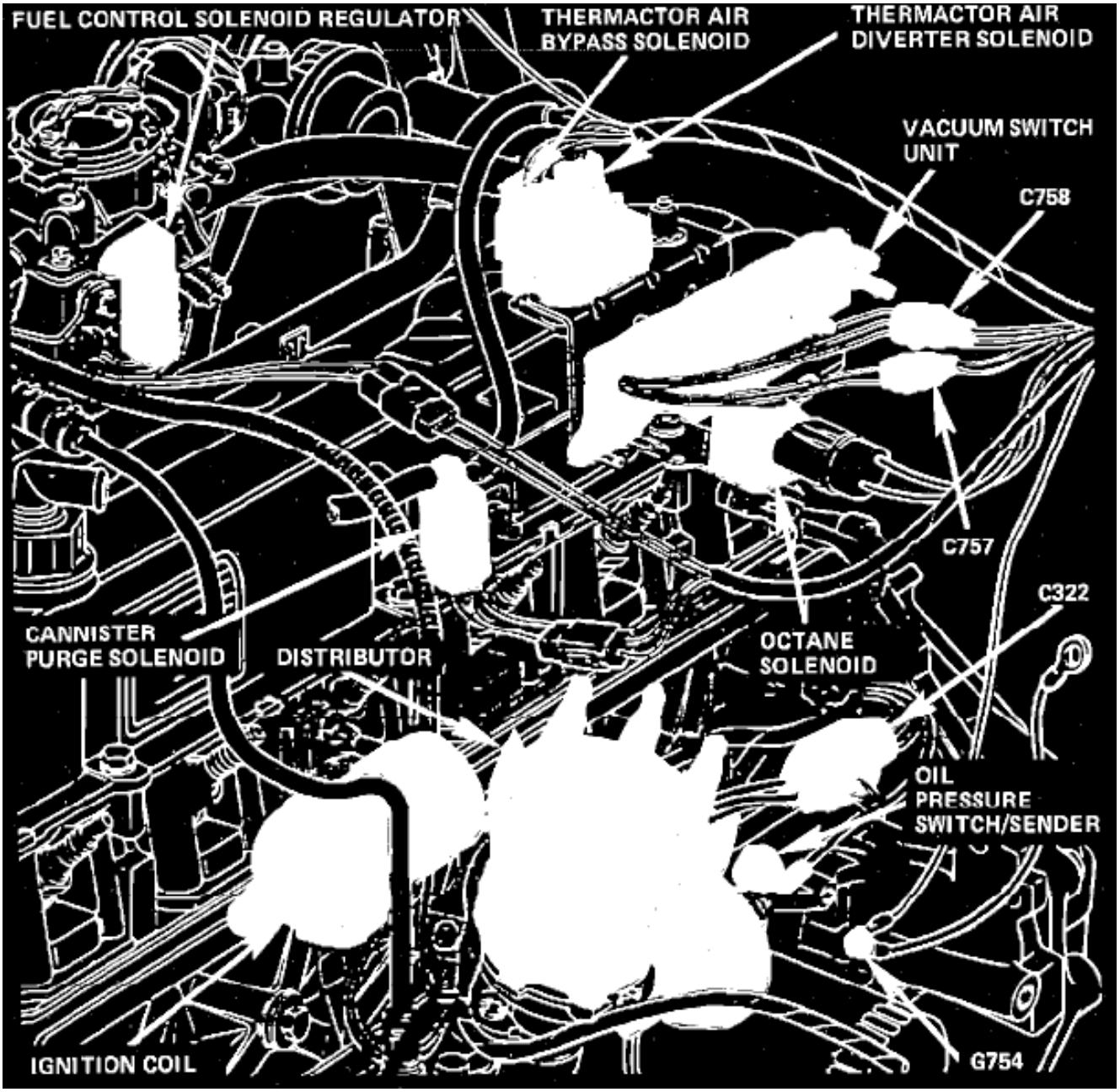
Near Rear Of RH Rocker Cover

Applicable to: 1985 6-300/4.9L High Altitude Engine w/Auto. Trans. (Under 8500 Lbs. GVW)

LH Side Of Engine.

Near Rear Of RH Rocker Cover

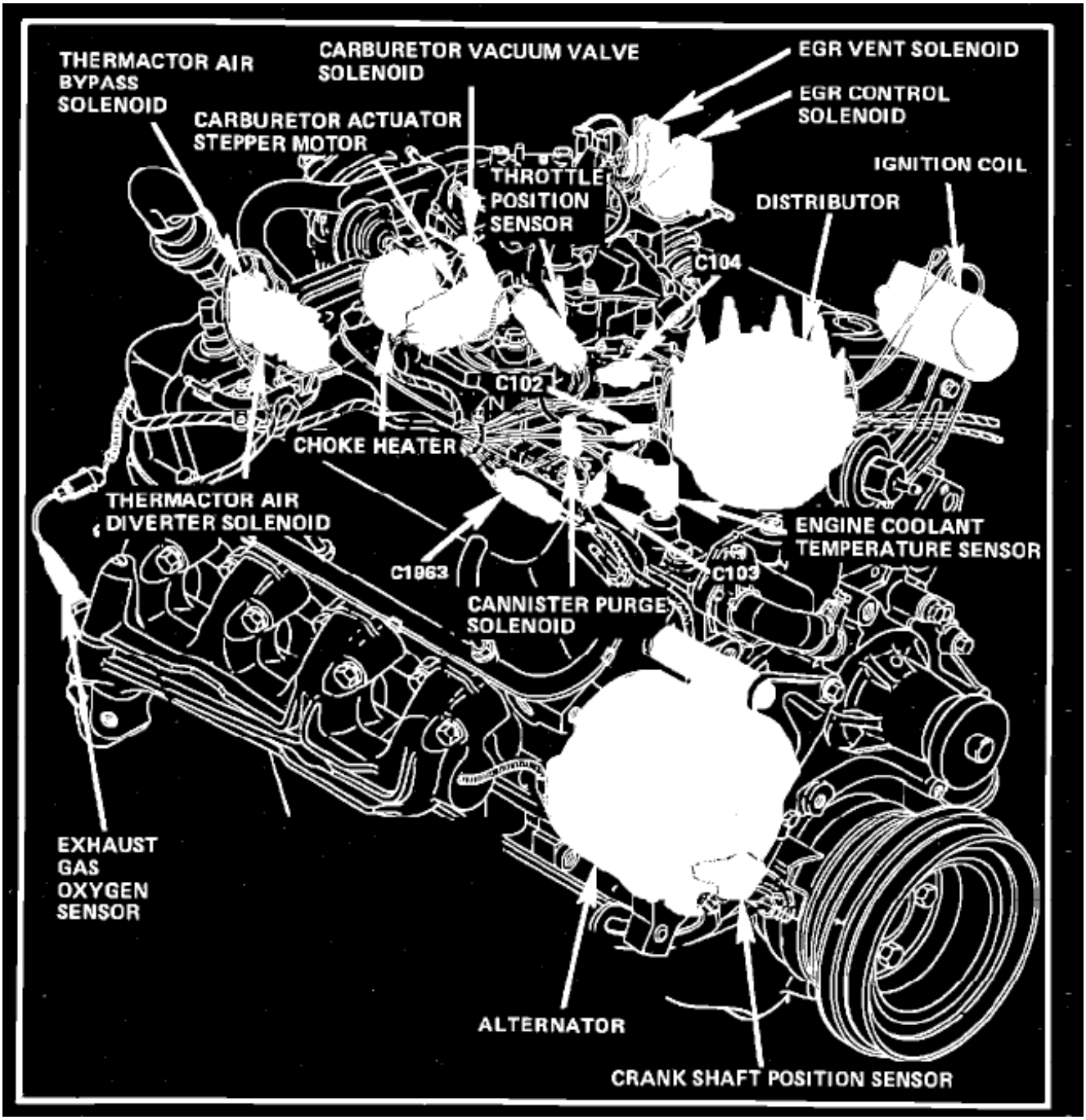
Applicable to: 1982-83 V8-302/5.0L & V8-351/5.8L Engines w/EEC



LH Side Of Engine.

Near Rear Of RH Rocker Cover

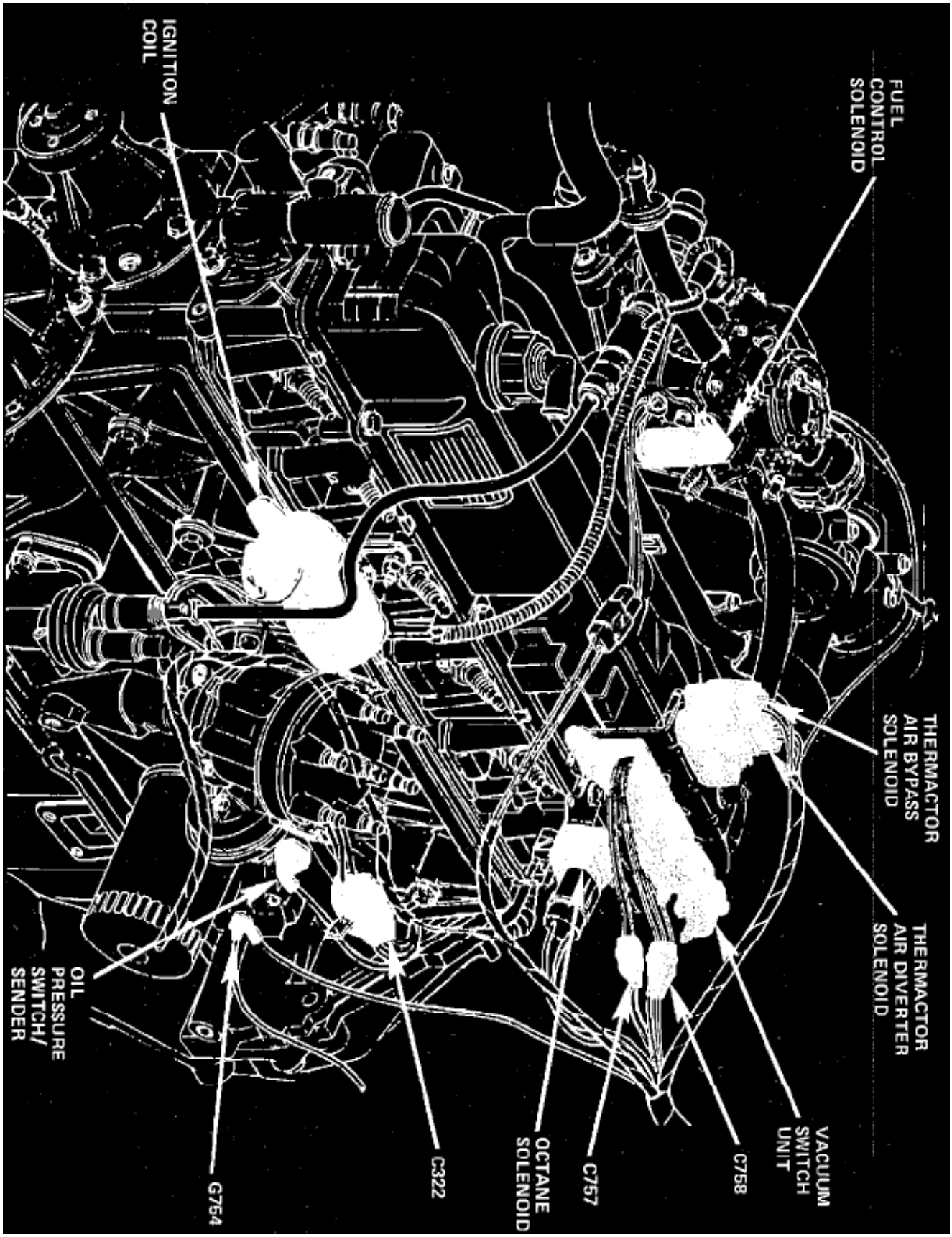
Applicable to: 1981 6-300/4.9L Engine w/MCU



RH Side Of Engine.

Near Rear Of RH Rocker Cover

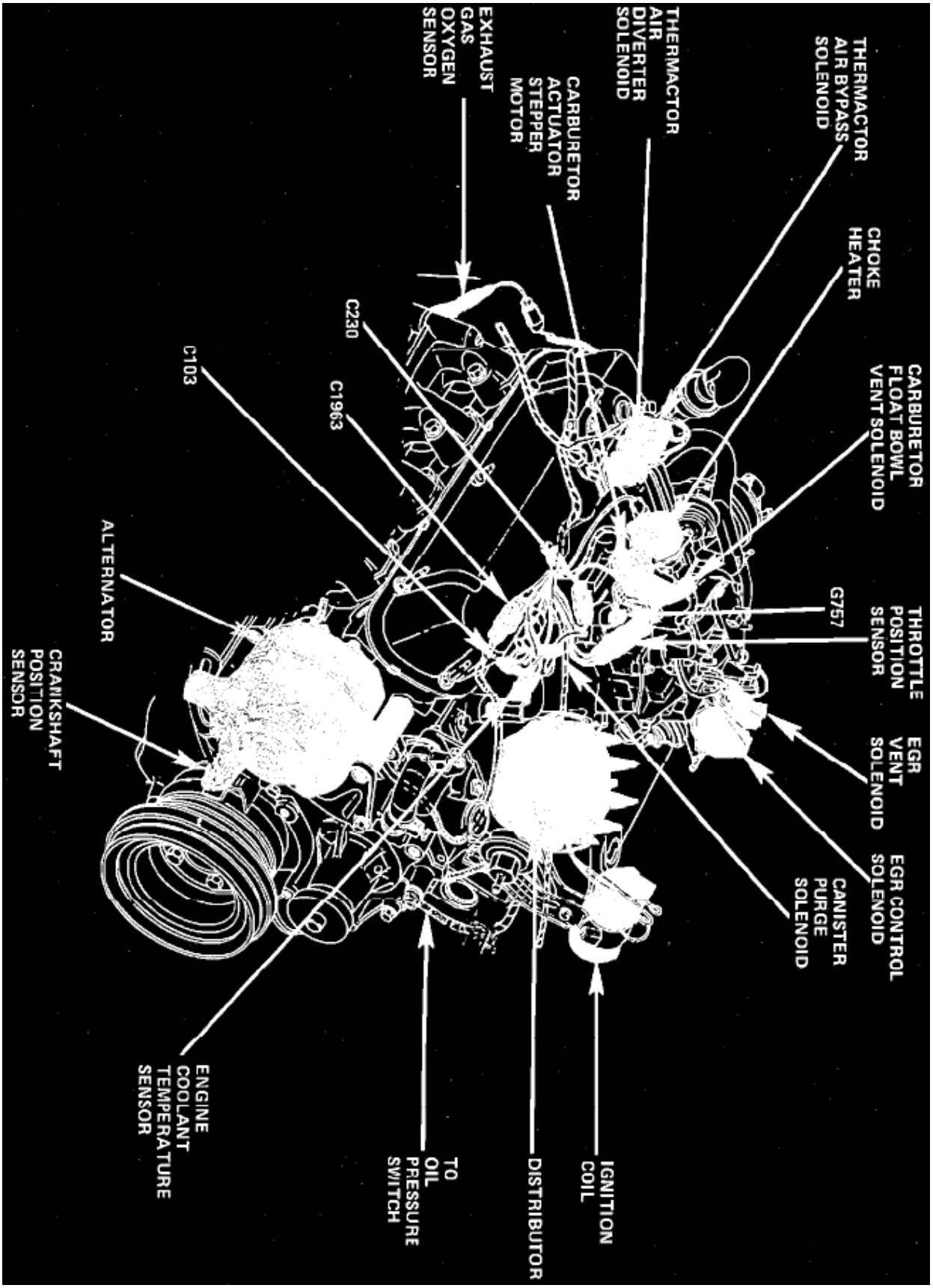
Applicable to: 1981 V8-302/5.0L & V8-351/5.8L Engines w/EEC


FUEL CONTROL SOLENOID
IGNITION COIL
THERMACTOR AIR BYPASS SOLENOID
THERMACTOR AIR DIVERTER SOLENOID
VACUUM SWITCH UNIT
C758
C757
OCTANE SOLENOID
C322
G754
OIL PRESSURE SWITCH/ SENDER

LH Side Of Engine.

Near Rear Of RH Rocker Cover

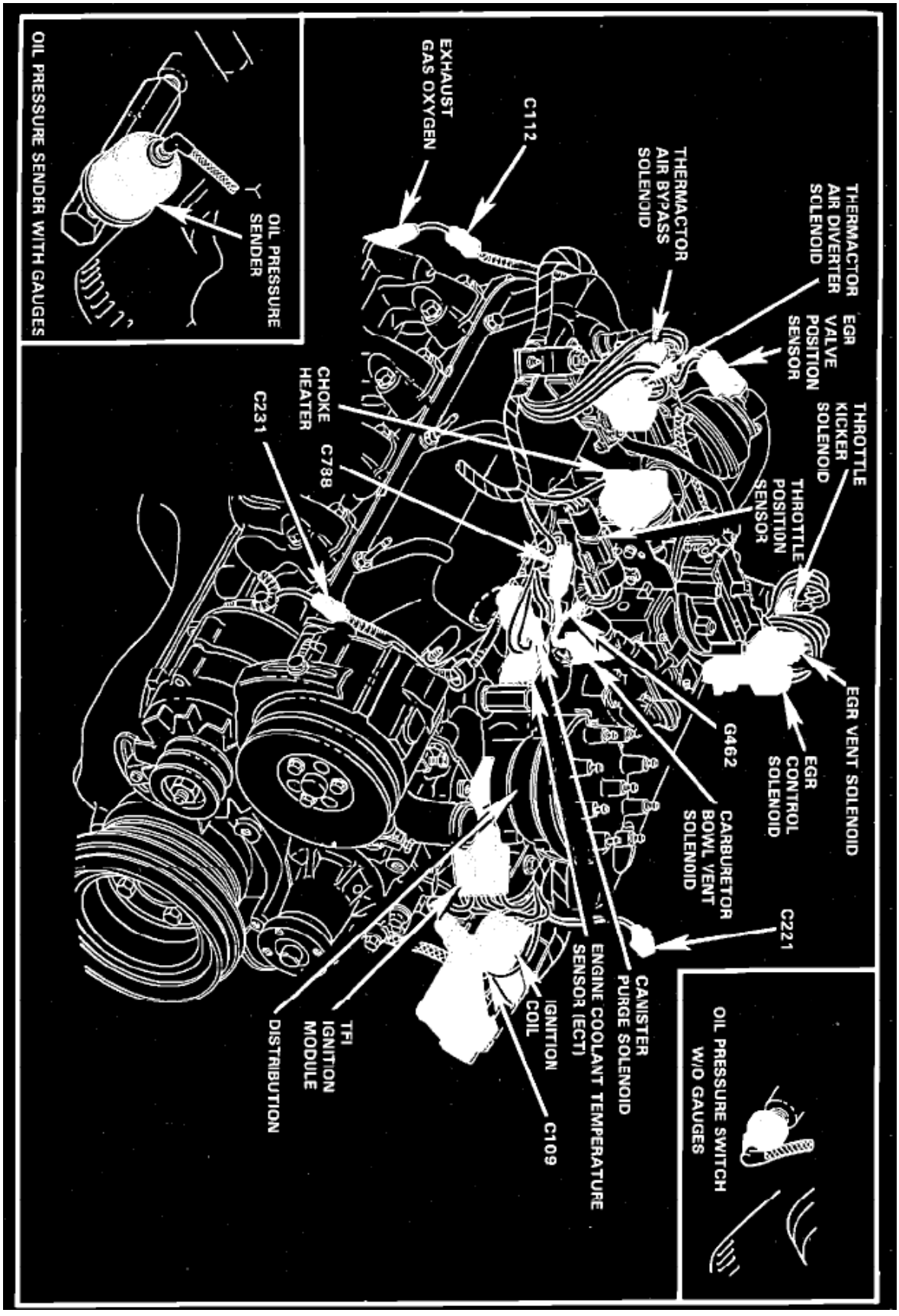
Applicable to: 1982-83 6-300/4.9L Engine w/MCU


THERMACTOR AIR BYPASS SOLENOID
CHOKE HEATER
CARBURETOR FLOAT BOWL VENT SOLENOID
THERMACTOR AIR DIVERTER SOLENOID
CARBURETOR ACTUATOR STEPPER MOTOR
EXHAUST GAS OXYGEN SENSOR
C230
C1963
C103
G757
THROTTLE POSITION SENSOR
EGR VENT SOLENOID
EGR CONTROL SOLENOID
CANISTER PURGE SOLENOID
ALTERNATOR
CRANKSHAFT POSITION SENSOR
IGNITION COIL
DISTRIBUTOR
TO OIL PRESSURE SWITCH
ENGINE COOLANT TEMPERATURE SENSOR

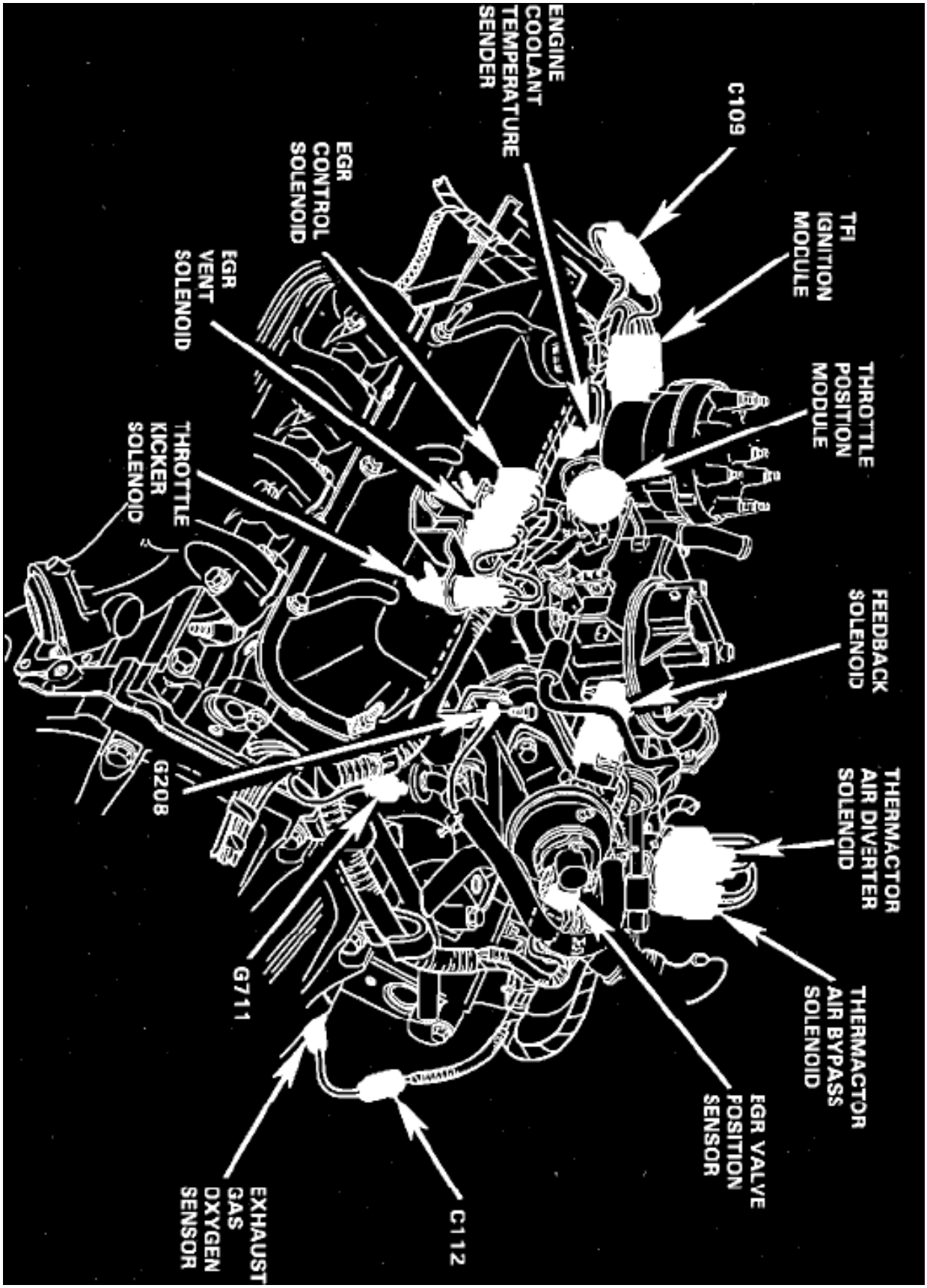
Top RH Side Of Engine.

Near Rear Of RH Rocker Cover

Applicable to: 1982-83 V8-302/5.0L & V8-351/5.8L Engines w/EEC


THERMACTOR AIR DIVERTER SOLENOID
EGR VALVE POSITION SENSOR
THROTTLE KICKER SOLENOID
THERMACTOR AIR BYPASS SOLENOID
THROTTLE POSITION SENSOR
EXHAUST GAS OXYGEN
C112
CHOKE HEATER
C231
C238
EGR VENT SOLENOID
EGR CONTROL SOLENOID
G462
CARBURETOR BOWL VENT SOLENOID
C221
CANISTER PURGE SOLENOID
ENGINE COOLANT TEMPERATURE SENSOR (ECT)
IGNITION COIL
C109
TFI IGNITION MODULE
DISTRIBUTION
OIL PRESSURE SENDER
OIL PRESSURE SENDER WITH GAUGES
OIL PRESSURE SWITCH W/O GAUGES

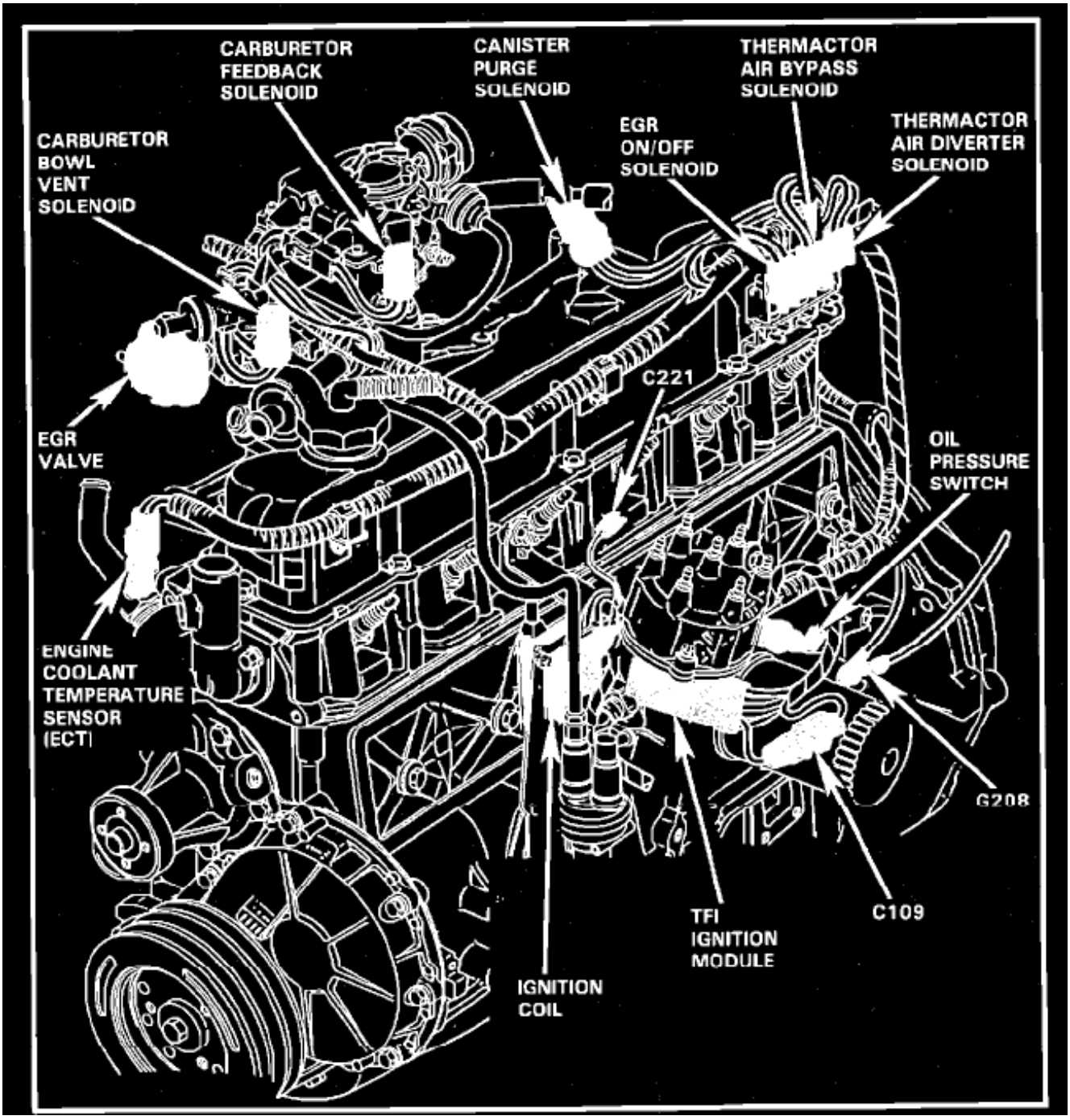
RH Side Of Engine. 5.0 5.8


ENGINE COOLANT TEMPERATURE SENDER
C109
TFI IGNITION MODULE
THROTTLE POSITION MODULE
EGR CONTROL SOLENOID
EGR VENT SOLENOID
THROTTLE KICKER SOLENOID
FEEDBACK SOLENOID
THERMACTOR AIR DIVERTER SOLENOID
THERMACTOR AIR BYPASS SOLENOID
EGR VALVE POSITION SENSOR
G208
G711
C112
EXHAUST GAS OXYGEN SENSOR

LH Side Of Engine. 5.0 5.8

Near Rear Of RH Rocker Cover

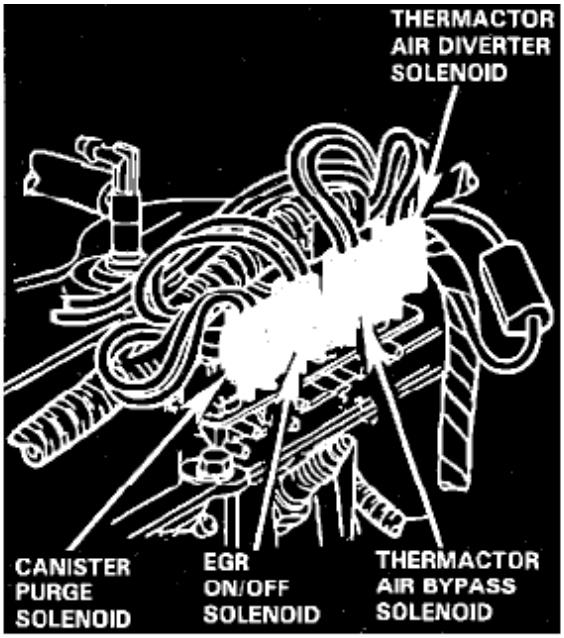
Applicable to: 1984-85 V8-351/5.8L & Carbureted V8-302/5.0L Engines w/EEC-IV (Under 8500 Lbs. GVW)

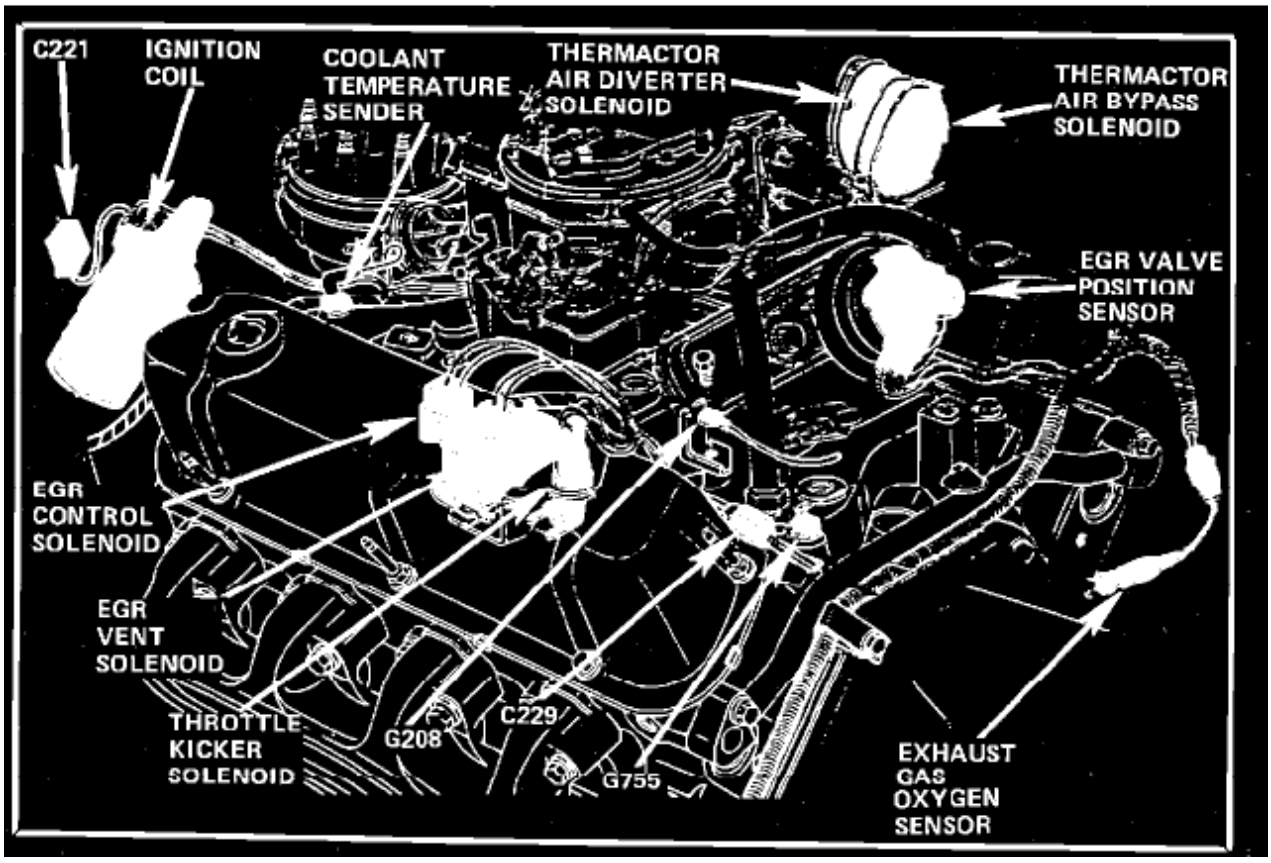


LH Side Of Engine.

Near Rear Of RH Rocker Cover

Applicable to: 1985 6-300/4.9L Engine w/EEC IV (Under 8500 Lbs. GVW)


THERMACTOR
AIR DIVERTER
SOLENOID
CANISTER
PURGE
SOLENOID
EGR
ON/OFF
SOLENOID
THERMACTOR
AIR BYPASS
SOLENOID


C221
IGNITION
COIL
COOLANT
TEMPERATURE
SENDER
THERMACTOR
AIR DIVERTER
SOLENOID
THERMACTOR
AIR BYPASS
SOLENOID
EGR VALVE
POSITION
SENSOR
EGR
CONTROL
SOLENOID
EGR
VENT
SOLENOID
THROTTLE
KICKER
SOLENOID
G208
C229
G755
EXHAUST
GAS
OXYGEN
SENSOR

Air Diverter Solenoid: Locations Thermactor Air Diverter (TAD) Solenoid

LH Side Of Engine.

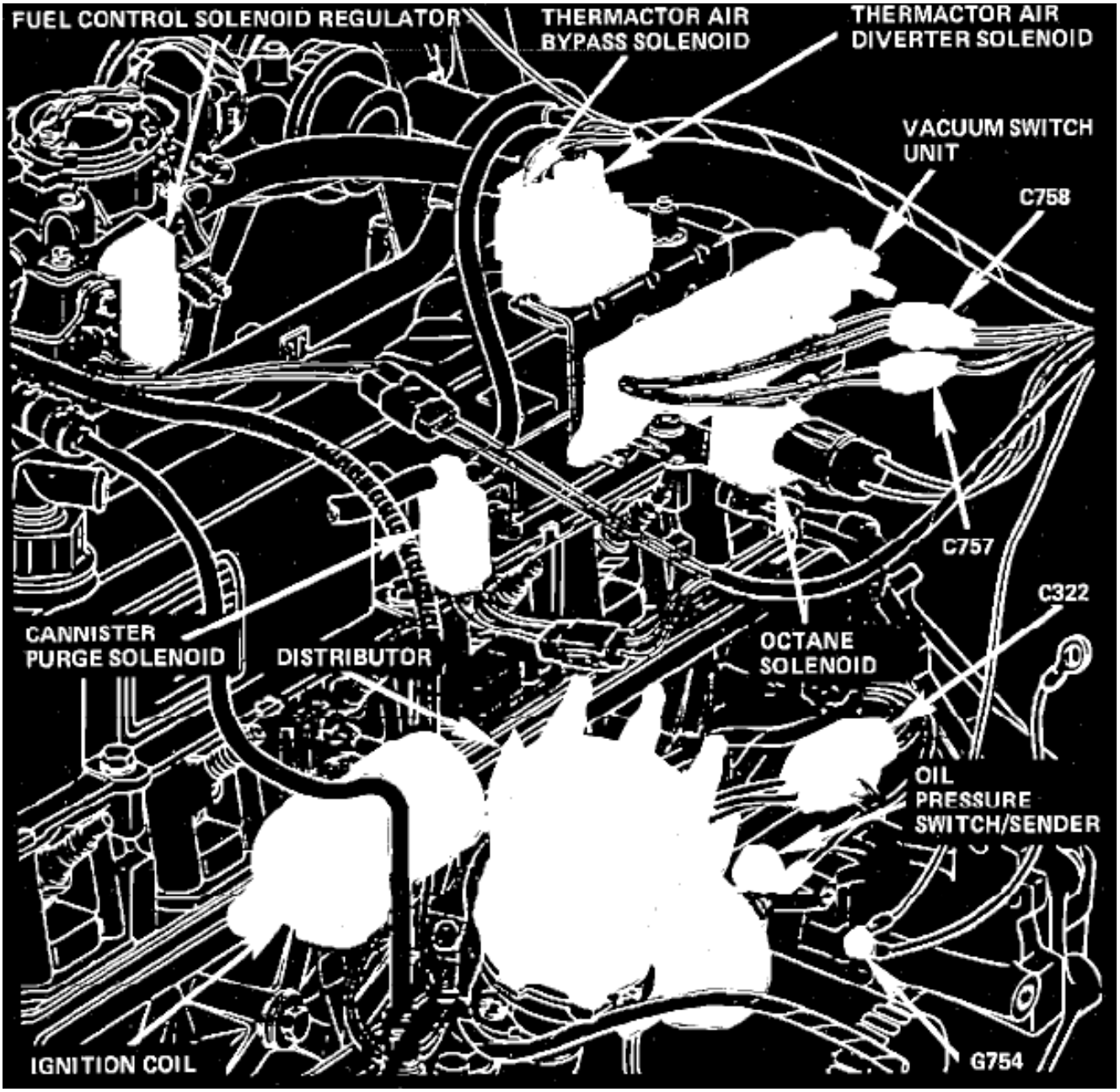
Near Rear Of RH Rocker Cover

Applicable to: 1985 6-300/4.9L High Altitude Engine w/Auto. Trans. (Under 8500 Lbs. GVW)

LH Side Of Engine.

Near Rear Of RH Rocker Cover

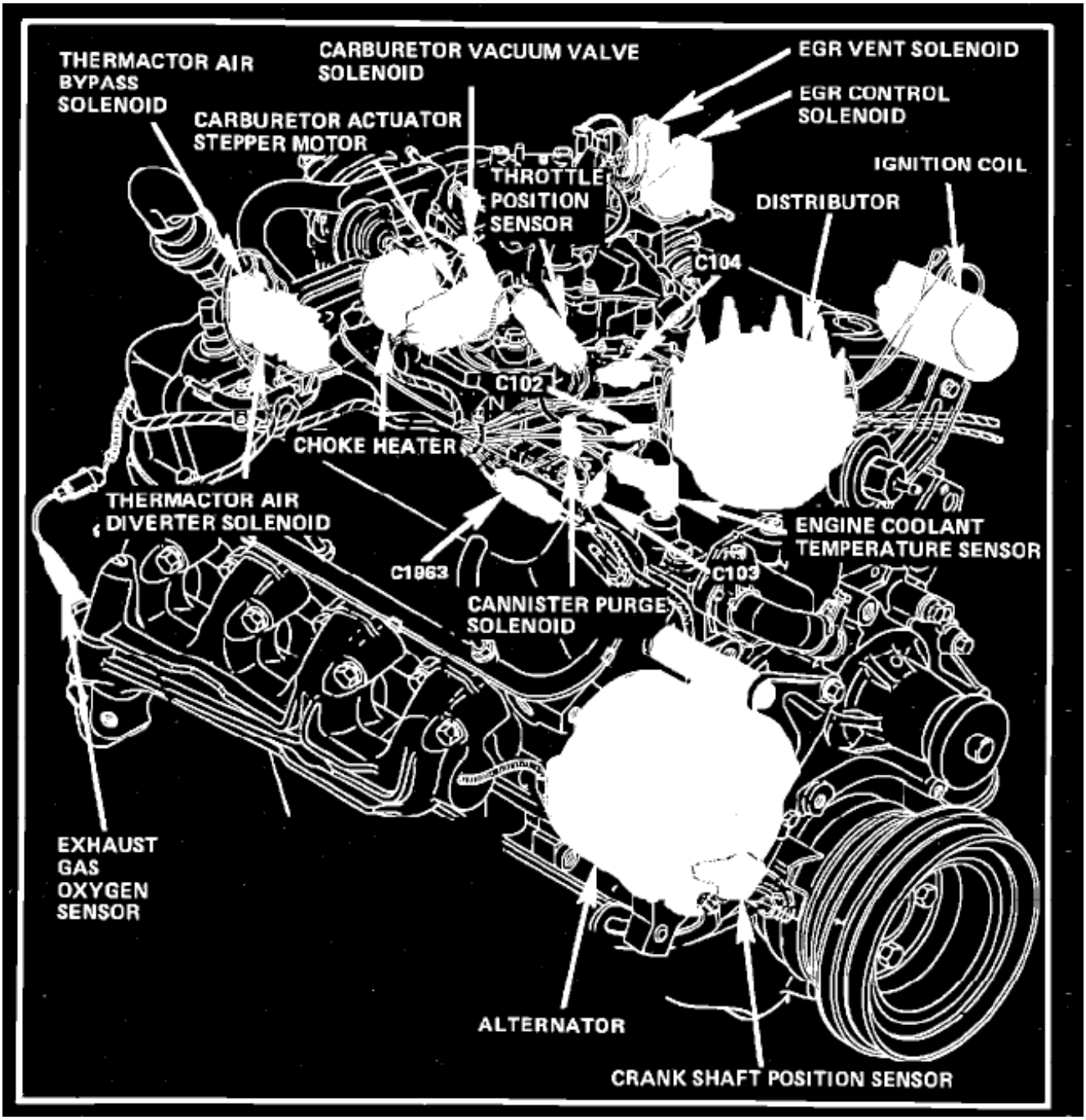
Applicable to: 1982-83 V8-302/5.0L & V8-351/5.8L Engines w/EEC



LH Side Of Engine.

Near Rear Of RH Rocker Cover

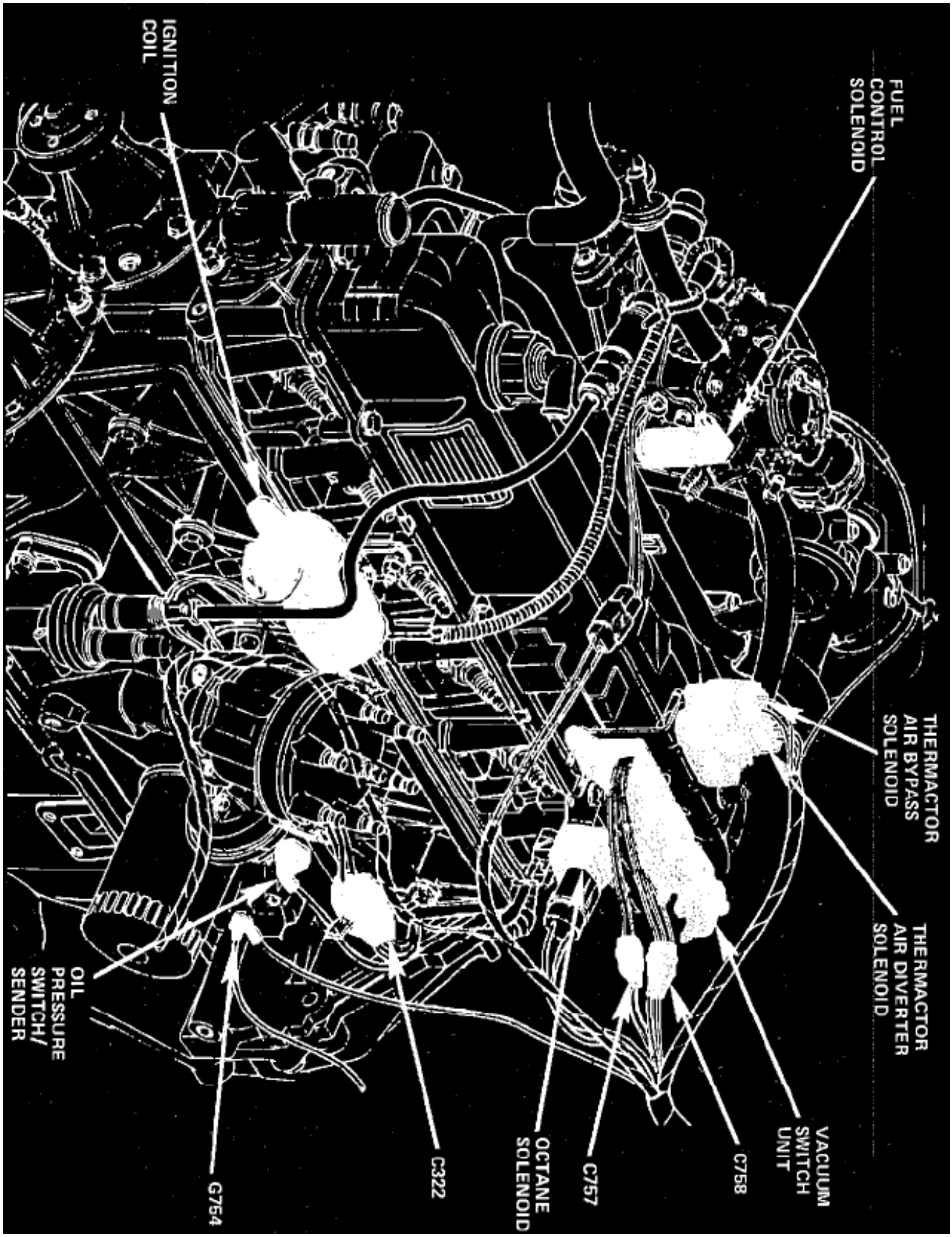
Applicable to: 1981 6-300/4.9L Engine w/MCU



RH Side Of Engine.

Near Rear Of RH Rocker Cover

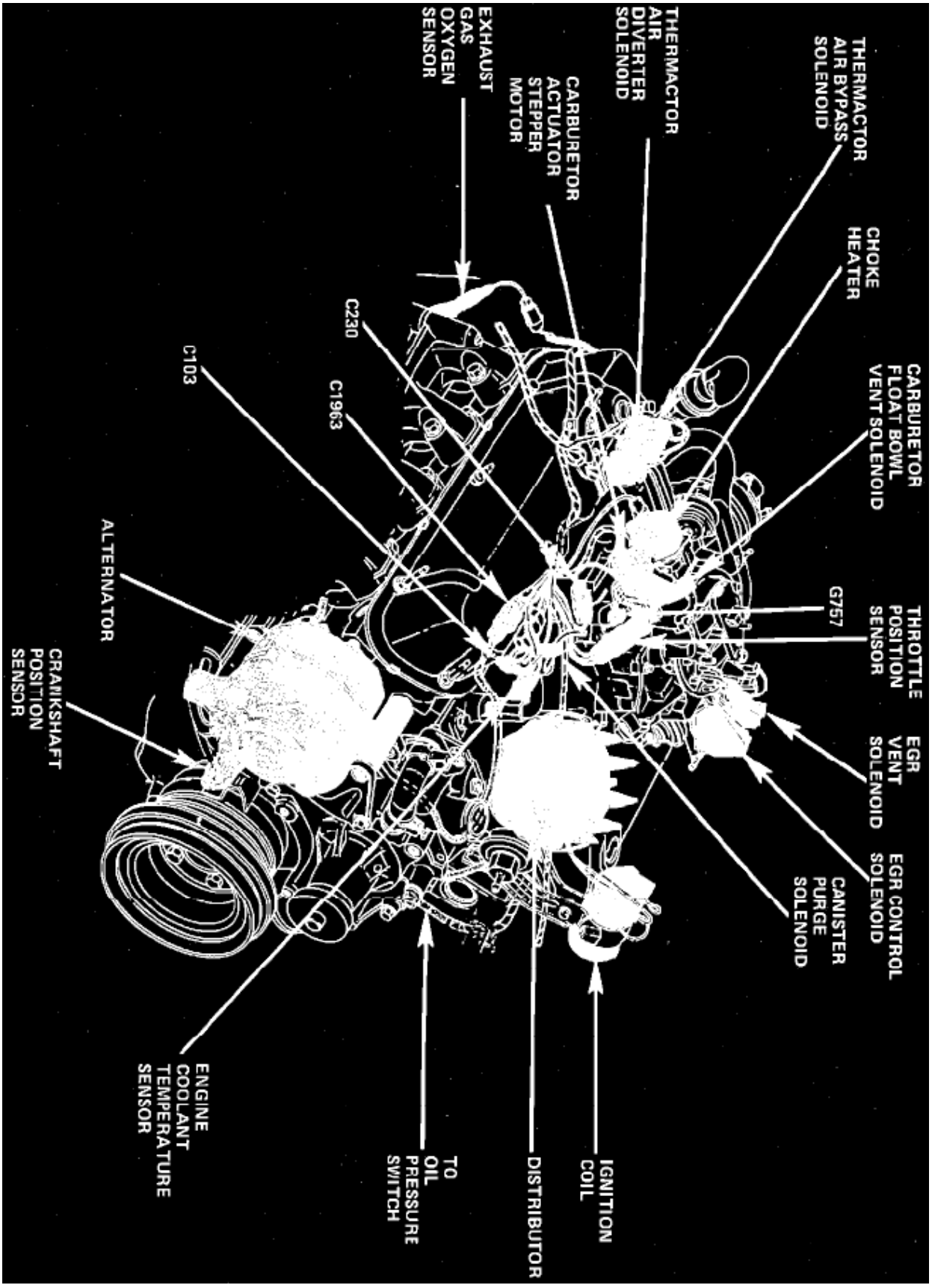
Applicable to: 1981 V8-302/5.0L & V8-351/5.8L Engines w/EEC


FUEL CONTROL SOLENOID
IGNITION COIL
THERMACTOR AIR BYPASS SOLENOID
THERMACTOR AIR DIVERTER SOLENOID
VACUUM SWITCH UNIT
C758
C757
OCTANE SOLENOID
C322
G754
OIL PRESSURE SWITCH/ SENDER

LH Side Of Engine.

Near Rear Of RH Rocker Cover

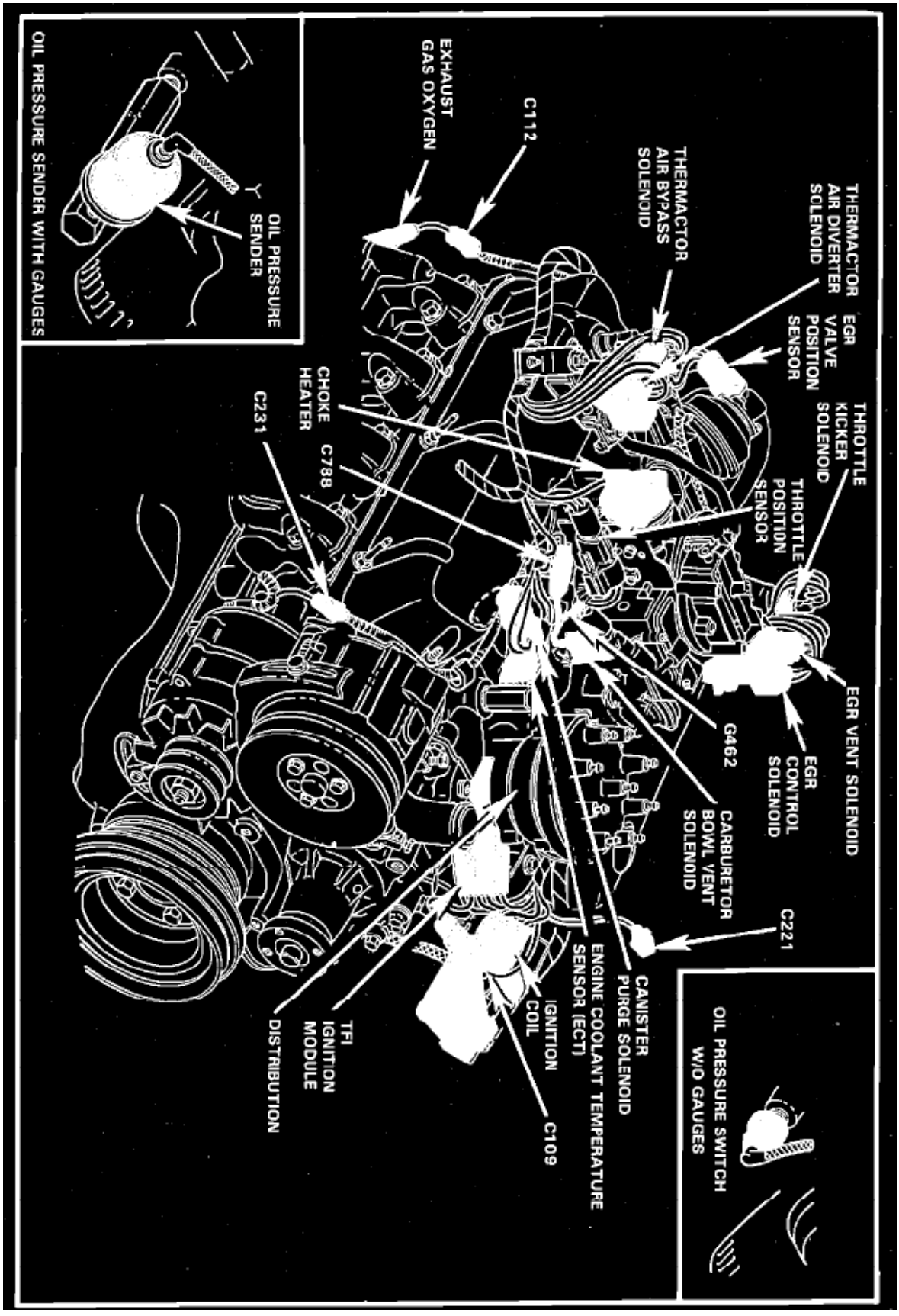
Applicable to: 1982-83 6-300/4.9L Engine w/MCU


THERMACTOR AIR BYPASS SOLENOID
CHOKE HEATER
CARBURETOR FLOAT BOWL VENT SOLENOID
THERMACTOR AIR DIVERTER SOLENOID
CARBURETOR ACTUATOR STEPPER MOTOR
EXHAUST GAS OXYGEN SENSOR
C230
C1963
C103
G757
THROTTLE POSITION SENSOR
EGR VENT SOLENOID
EGR CONTROL SOLENOID
CANISTER PURGE SOLENOID
ALTERNATOR
CRANKSHAFT POSITION SENSOR
IGNITION COIL
DISTRIBUTOR
TO OIL PRESSURE SWITCH
ENGINE COOLANT TEMPERATURE SENSOR

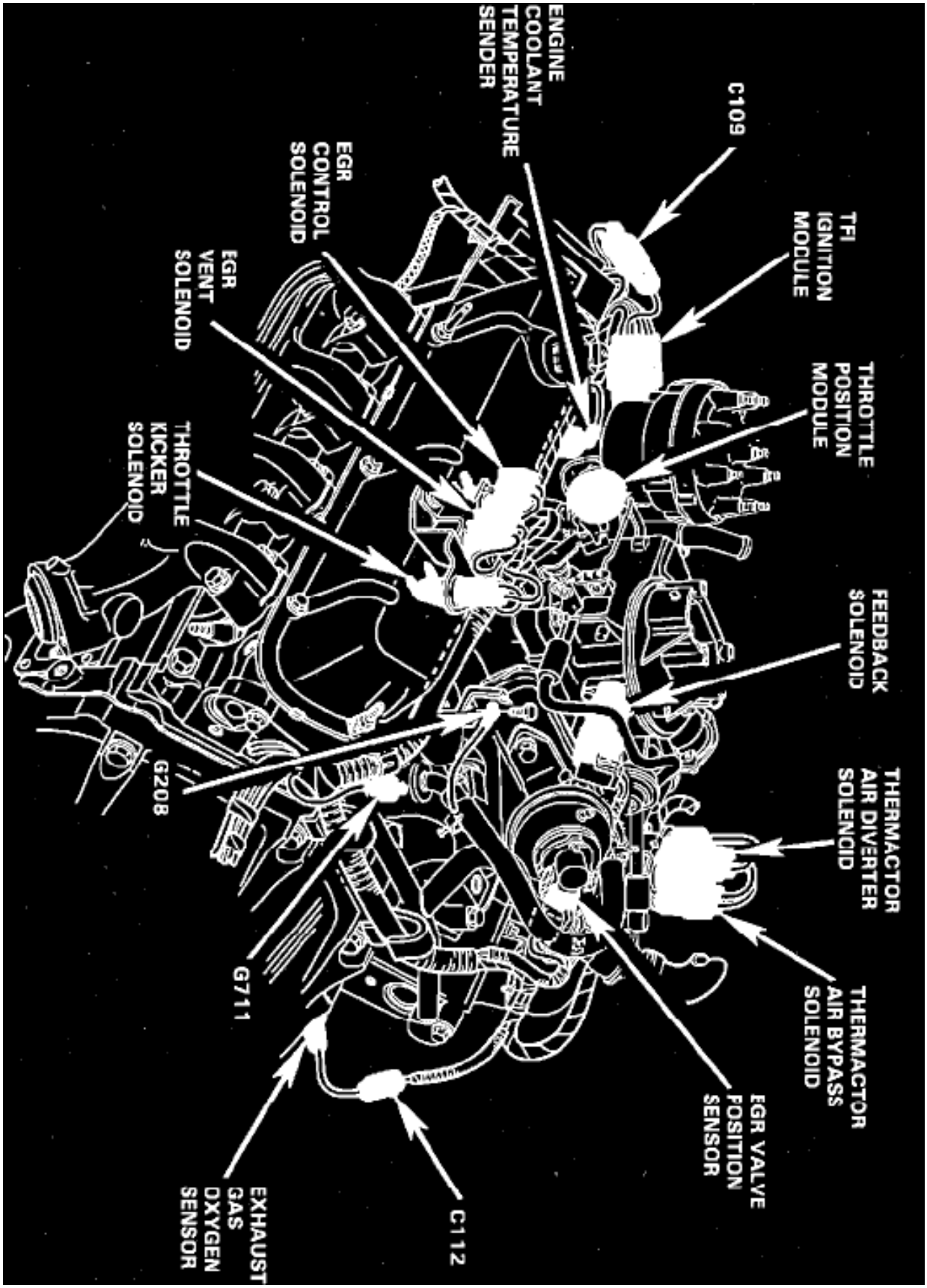
Top RH Side Of Engine.

Near Rear Of RH Rocker Cover

Applicable to: 1982-83 V8-302/5.0L & V8-351/5.8L Engines w/EEC


THERMACTOR AIR DIVERTER SOLENOID
EGR VALVE POSITION SENSOR
THROTTLE KICKER SOLENOID
THERMACTOR AIR BYPASS SOLENOID
THROTTLE POSITION SENSOR
EXHAUST GAS OXYGEN
C112
CHOKE HEATER
C231
C238
EGR VENT SOLENOID
EGR CONTROL SOLENOID
G462
CARBURETOR BOWL VENT SOLENOID
C221
CANISTER PURGE SOLENOID
ENGINE COOLANT TEMPERATURE SENSOR (ECT)
IGNITION COIL
C109
TFI IGNITION MODULE
DISTRIBUTION
OIL PRESSURE SENDER
OIL PRESSURE SENDER WITH GAUGES
OIL PRESSURE SWITCH W/O GAUGES

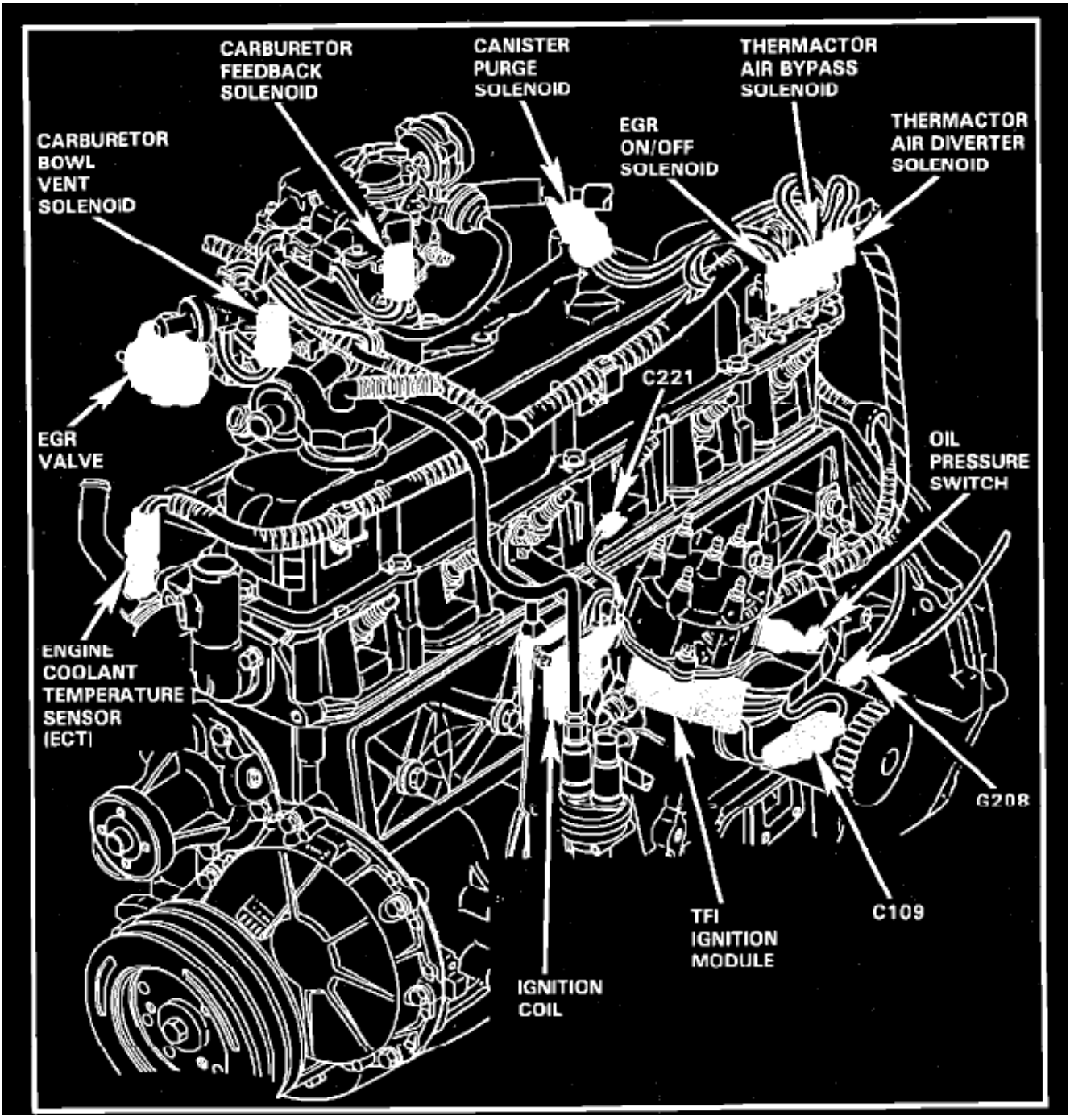
RH Side Of Engine. 5.0 5.8


ENGINE COOLANT TEMPERATURE SENDER
C109
TFI IGNITION MODULE
THROTTLE POSITION MODULE
EGR CONTROL SOLENOID
EGR VENT SOLENOID
THROTTLE KICKER SOLENOID
FEEDBACK SOLENOID
THERMACTOR AIR DIVERTER SOLENOID
THERMACTOR AIR BYPASS SOLENOID
EGR VALVE POSITION SENSOR
G208
G711
C112
EXHAUST GAS OXYGEN SENSOR

LH Side Of Engine. 5.0 5.8

Near Rear Of RH Rocker Cover

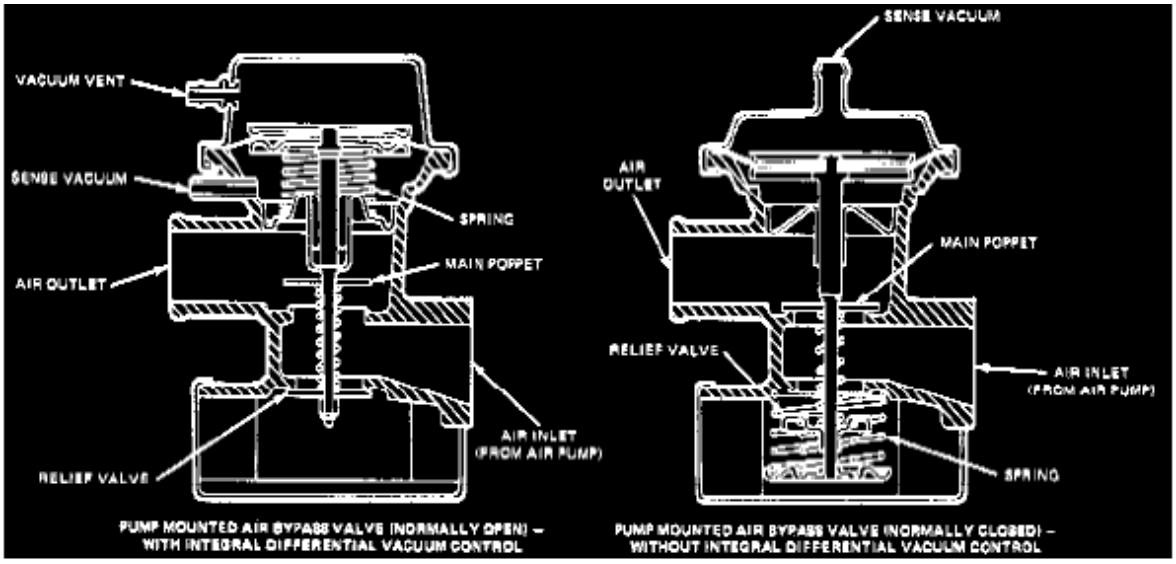
Applicable to: 1984-85 V8-351/5.8L & Carbureted V8-302/5.0L Engines w/EEC-IV (Under 8500 Lbs. GVW)

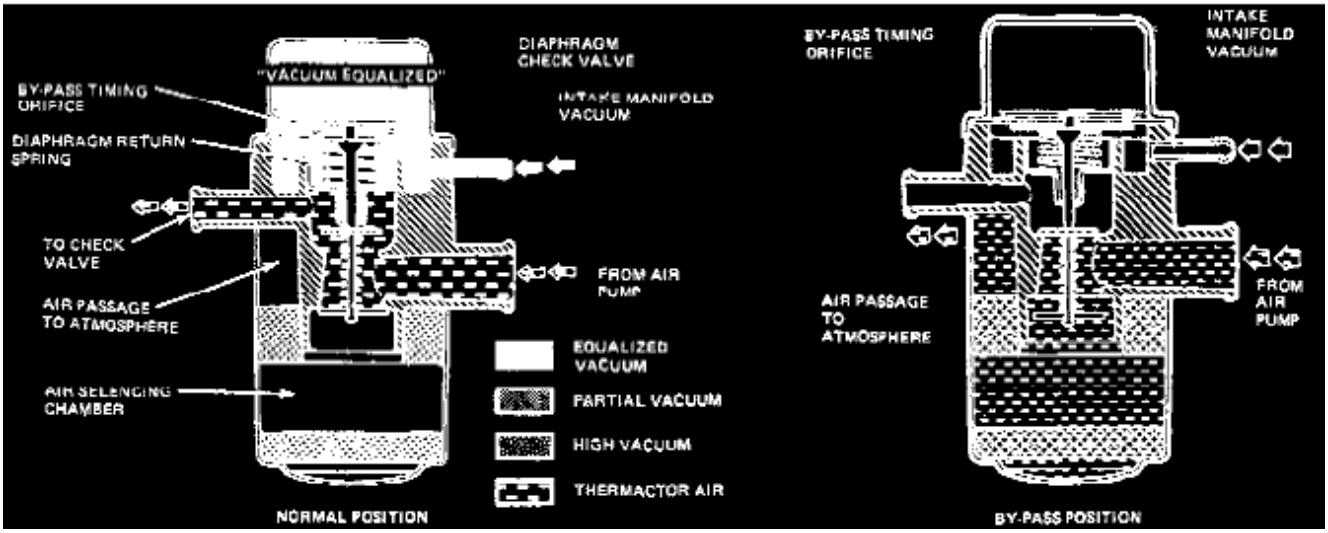


LH Side Of Engine.

Near Rear Of RH Rocker Cover

Applicable to: 1985 6-300/4.9L Engine w/EEC IV (Under 8500 Lbs. GVW)

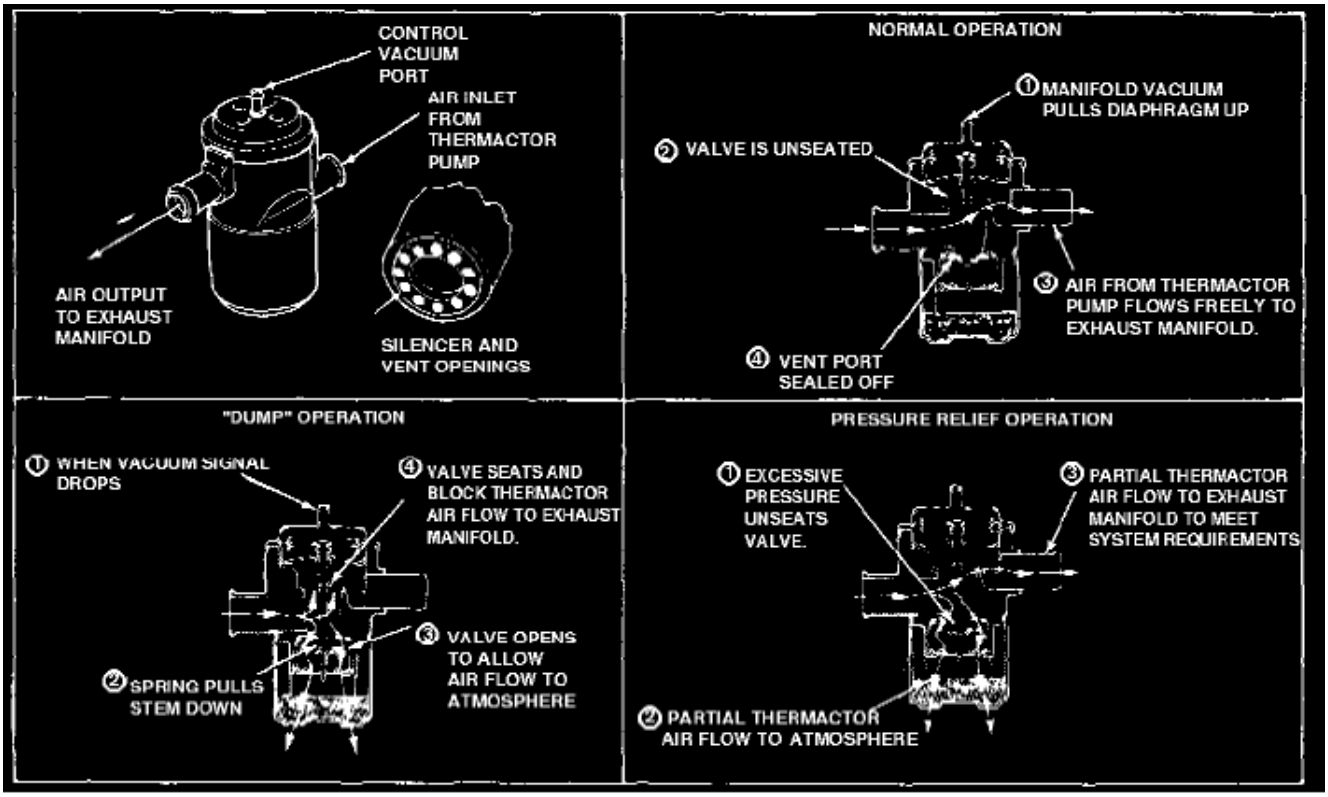




Air Diverter Valve: Description and Operation

Fig.71 - Air Pump Mounted Timed Air Bypass Valve

Fig.72 - Timed Air Bypass Valve



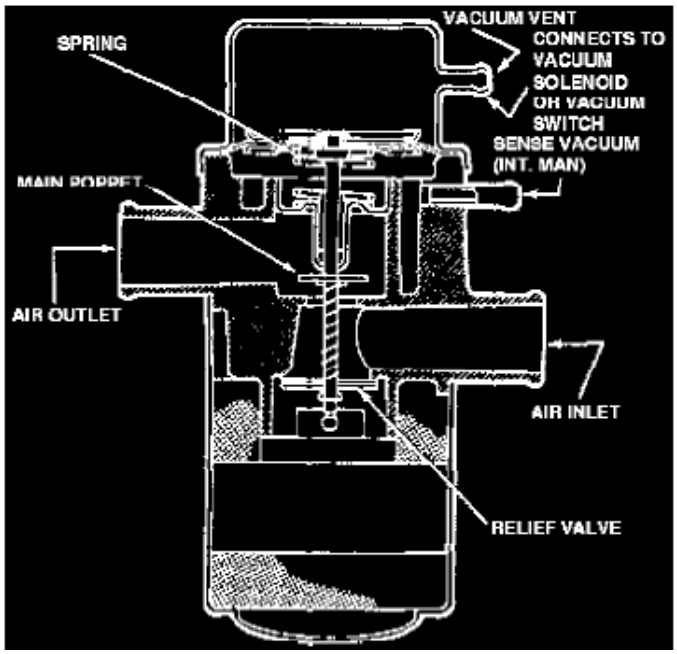


Fig.73 - Normally Closed Timed Air Bypass Valve

Fig.74 - Timed Air Bypass Valve With Integral Function

DESCRIPTION

Some 1966-67 vehicles use a bypass type anti-backfire valve in place of the "gulp" type system. The valve operates at all times and all output air from the air pump is routed through it. The air flow to the manifolds is temporarily interrupted and diverted to the air pump air cleaner during deceleration.

The air bypass system on 1968-82 vehicles serves the same purpose as earlier types, but three different types of bypass valves are used, depending on application. These are: a timed bypass valve, a normally closed bypass valve, or a timed bypass valve with an integral vacuum function. They are mounted "in-line," or on the air pump. Figs. 71, 72, 73, and 74.

On systems using a timed bypass valve, Figs. 71 and 72, during normal operation, vacuum is equalized on both sides of the diaphragm. The diaphragm return spring holds the valve closed, and allows air to flow to the exhaust ports. During deceleration, the sudden rise of intake manifold vacuum under the diaphragm overcomes return spring pressure and pulls the valve down. The air flow is then momentarily diverted to atmosphere, because vacuum is quickly equalized again on both sides of the diaphragm through a small orifice in the diaphragm.

The normally closed timed bypass valve, Fig. 73, is used on vehicles with catalytic converter. During normal operation, engine manifold vacuum applied through the vacuum differential valve (VDV) holds the valve upward, allowing thermactor air to flow to the exhaust manifolds and blocking the vent port. When intake manifold vacuum rises or drops sharply, the VDV operates and momentarily cuts off the vacuum to the bypass valve.

The spring pulls the stem down, seating the valve to cut off pump air to the exhaust manifolds and dumping the dump valve to momentarily divert the air to atmosphere. If air pump pressure becomes excessive or there is a restriction in the system, the excess pressure will unseat the valve in the lower portion of the bypass valve and allow a partial flow of pump air to the atmosphere, while at the same time, the valve in the upper part of the bypass is still unseated, allowing a partial flow of pump air to the exhaust manifold to meet system requirements.

The timed air bypass valve with an integral vacuum differential function, Fig. 74, is used on some thermactor systems. This valve contains an integral vacuum differential function, therefore a separate vacuum differential valve (VLV) is not required. When the vent is blocked, the valve functions as a timed bypass valve with a VDV. However, when the vent is open to atmospheric pressure, and a vacuum of 4 inches Hg or more is applied to the source port, the valve goes to the dump mode.

Air Diverter Valve: Testing and Inspection Normally Closed (Type 1) Solenoid Vacuum Valve

Note:

A type 1 solenoid vacuum valve is used in conjunction with a type 1 air cleaner temperature switch.

Procedure:

1. Start engine and allow to reach normal operating temperature. Make sure that ambient air around air cleaner is above 65° F.

2. With engine idling, disconnect vacuum hose to thermactor air bypass valve. Thermactor air should exhaust in atmosphere through exhaust ports in

end of valve silencer cover. Reconnect vacuum hose.

NOTE: Vacuum supply hose must always be connected to bottom vacuum fitting on solenoid vacuum valve.

3. Disconnect vacuum supply hose at solenoid valve, and check for vacuum by placing finger over end of hose. There should be vacuum with engine

idling. If not, check vacuum hose and vacuum source for leaks or obstructions.

4. Disconnect solenoid vacuum valve wiring connector and determine which terminal has 12 volts with ignition in the run position. Use a test light;

connect one end to terminal and other end to ground.

5. Connect wire with 12 volts battery voltage to solenoid vacuum valve. With engine idling, ground other exposed terminal on solenoid vacuum

valve to chassis ground. Thermactor air should not be dumped.

6. Reconnect wire disconnected in step 4 to solenoid vacuum valve. Thermactor air should not be dumped.

7. Replace solenoid vacuum valve if operation is not as specified in steps 5 and 6.

Air Diverter Valve: Testing and Inspection Normally Open (Type 2) Solenoid Vacuum Valve

Note:

A type 2 solenoid vacuum valve is used in conjunction with a type 2 air cleaner temperature switch.

Procedure

1. Start engine and allow to reach normal operating temperature. Make sure that ambient air around air cleaner is above 65° F.

2. With engine idling, disconnect vacuum hose to thermactor air bypass valve. Thermactor air should exhaust to atmosphere through exhaust ports in

end of valve silencer cover. Reconnect vacuum hose.

NOTE: Vacuum hose must be connected to black input nozzle on solenoid valve.

3. Disconnect wiring to solenoid valve and determine which wire has 12 volts when ignition switch is in the run position. Use a test light; connect one

end to wire and other end to ground.

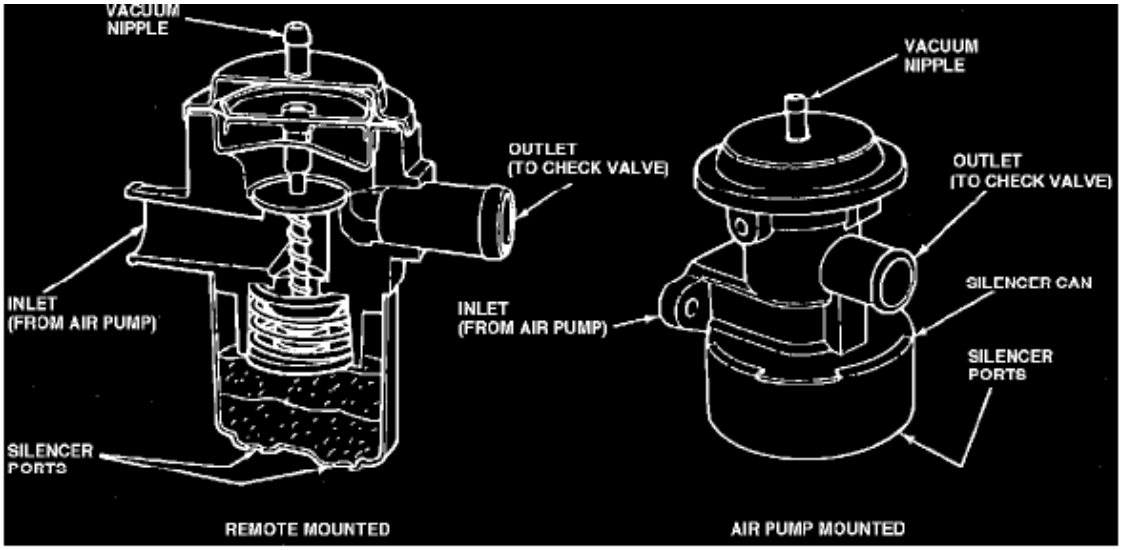
4. Connect wire power supply wire to solenoid vacuum valve, then with engine at normal idle, ground other exposed terminal on solenoid vacuum

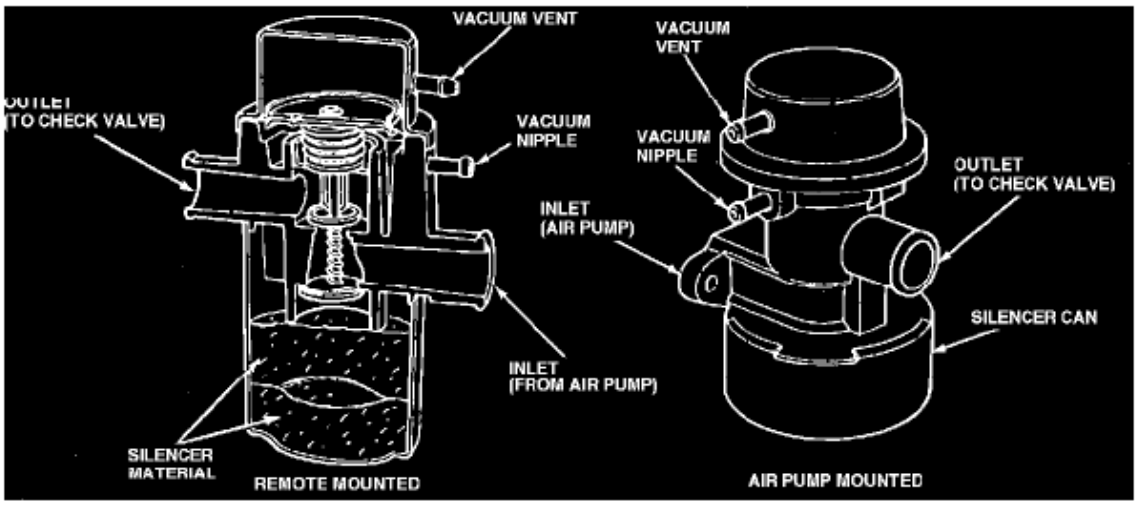
valve to ground. Thermactor air should be exhausted to atmosphere.

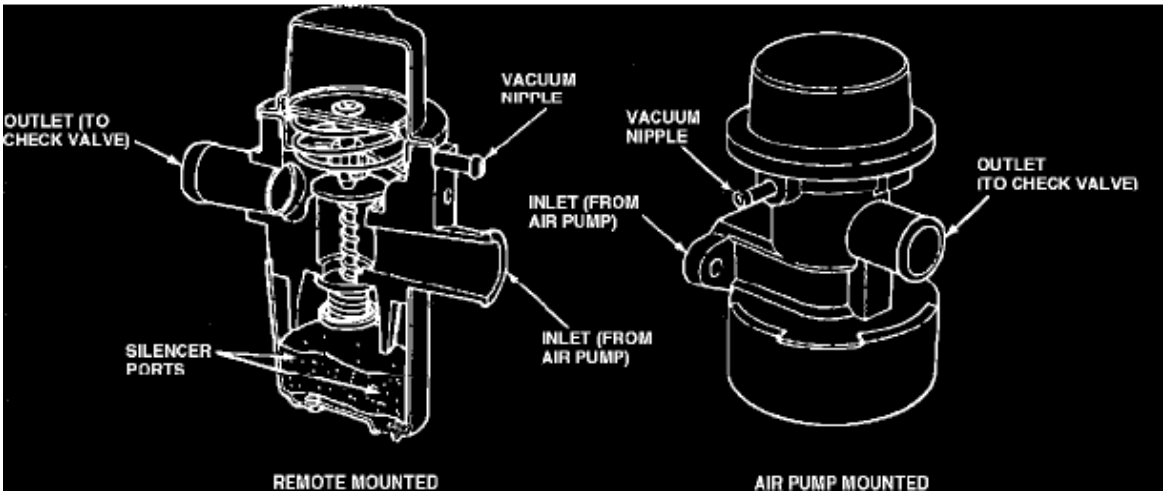
5. Reconnect other wire to solenoid vacuum valve. Thermactor air should not be dumped to atmosphere.

6. Replace solenoid vacuum valve if operation is not as specified in steps 4 and 5.

Ford Bronco Workshop Manual (V8-351 5.8L VIN G 2-bbl (1982))
Ford Workshop Manuals > Powertrain Management > Emission Control Systems > Air Injection > Air Injection Bypass Valve > Component Information > Description and Operation







Air Injection Bypass Valve: Description and Operation

Normally closed timed air bypass valve.

Normally open timed air bypass valve with vacuum vent.

Normally open timed air bypass valve less vacuum vent.

The air bypass system serves the same purpose as earlier types, but three different types of bypass valves are used, depending on application. These are: normally closed bypass valve, normally open bypass valve with vacuum vent and normally open bypass valve without vacuum vent. They are mounted "inline", or on the air pump, Figs. 85, 86 and 87.

The normally closed timed bypass valve, Fig. 85, is used on vehicles with catalytic converter. During normal operation, engine manifold vacuum applied through the vacuum differential valve (VDV) holds the valve upward, allowing thermactor air to flow to the exhaust manifolds and blocking the vent port. When intake manifold vacuum rises or drops sharply, the VDV operates and momentarily cuts off the vacuum to the bypass valve. The spring

pulls the stem down, seating the valve to cut off pump air to the exhaust manifolds and dumping the dump valve to momentarily divert the air to atmosphere. If air pump pressure becomes excessive or there is a restriction in the system, the excess pressure will unseat the valve in the lower portion of the bypass valve and allow a partial flow of pump air the atmosphere, while at the same time, the valve in the upper part of the bypass is still unseated, allowing a partial flow of pump air to the exhaust manifold to meet system requirements. The normally open timed bypass valve with vacuum vents, Fig. 86, provides a timed air dump during deceleration and when differences in vacuum pressure between the signal port and vent port occur. The signal port must have 3 inches Hg more vacuum than the vent port to prevent the valve from dumping. The valve is used to protect catalyst overheating. The normally open timed bypass valve without vacuum vents supplies air to the exhaust system with a higher than normal vacuum signal during cold start, short idles is applied, pump air is dumped through the silencer ports of the valve, Fig. 87.

Air Injection Bypass Valve: Testing and Inspection

Normally Closed

1. Disconnect air supply hose at valve outlet, then remove vacuum line and check if vacuum is present at vacuum nipple.

2. Remove any restrictors or delay valves in vacuum line. Before proceeding to step 3, ensure vacuum is present at vacuum nipple.

3. Reconnect vacuum line to nipple, then accelerate engine to 1500 RPM.

4. Air pump supply should be present at air bypass valve outlet. Disconnect vacuum line, air at outlet should stop and air pump supply air should be present at silencer port.

5. If above step proves incorrect, check air pump, then bypass valve.

Normally Open With Vacuum Vents

1. Disconnect air pump supply line at outlet, then vacuum lines from vacuum nipple and vacuum vent.

2. Accelerate engine to 1500 RPM, air pump supply air should be present at outlet.

3. Using suitable vacuum hose, connect vacuum nipple to intake manifold vacuum. No air should be present at valve outlet, all air should bypass through silencer ports.

4. Using the same vacuum hose as above step, cap vacuum vent and accelerate engine to 2000 RPM. Air pump supply air should be interrupted when throttle is released.

5. If above steps prove incorrect, check air pump, then bypass valve.

Normally Open Without Vacuum Vent

1. Disconnect air supply line at valve outlet, then vacuum line at vacuum nipple.

2. Accelerate engine to 1500 RPM, air pump supply air should be present at outlet.

3. Using suitable vacuum hose, connect vacuum nipple to intake manifold vacuum. Air at outlet should decrease or shut off.

4. Air pump supply air should be present at silencer ports.

5. If above steps prove incorrect, check air pump, then bypass valve.

Air Injection Check Valve: Description and Operation

This valve, used on some vehicles, allows thermactor air to enter exhaust port drillings, but prevents reverse flow of exhaust gases in event of improper operation of system components. This valve is located between bypass valve and exhaust port drillings, either on air manifold or engine.

Air Injection Check Valve: Testing and Inspection

1. Check valves should be inspected whenever the hose is disconnected from the valve or check valve failure is suspected.

NOTE: Any indication of exhaust gases in the air pump indicates check valve failure.

2. Orally blow through the check valve (toward air manifold) then attempt to suck back. Flow should be toward air manifold only.

3. When replacing a check valve, be careful not to bend or twist the air manifold.

Air Injection Check Valve: Service and Repair

PROCEDURE

1. Disconnect air supply valve from hose and, using a 1 1/4 inch crow-foot wrench, remove check valve.

2. Clean threads on air manifold adapter using a wire brush, then install new check valve.

Air Injection Control Valve: Customer Interest EGR Valve - Poor Performance/Fuel Economy

Article No. 83-4-25

POWER LOW/POOR FUEL ECONOMY/ PART THROTTLE RESPONSE - INCOMPATABILITY WITH EXISTING SELF-TEST PROCEDURES - 5.8L(W) ENGINE USED IN 49 STATES

LIGHT TRUCKS 1982/83 F SERIES AND BRONCO

CALIBRATIONS: 1-63T-R12, 1-64T-R12, 2-64Y-R11, 2-63Y-R11, 1-63T-R13, 2-63Y-R12, 1-64T-R13, 2-64Y-R12

On approximately December 15, 1982, the 5.8L(W) EEC engine calibrations used in under 8500 lb. GVW Bronco and F Series Light Trucks were revised to incorporate a new EGR valve and a new thermactor air control valve (the new thermactor valve is used on the automatic transmission vehicles only). This engine calibration revision was implemented to improve engine power and fuel economy. The new calibration numbers are: 1-63T-R13, 2-63Y-R12, 1-64T-R13, and 2-64Y-R12. A 49 State vehicle built prior to this calibration revision may be updated to the new level EGR/air control valve. The calibrations that are eligible for the revision are: 1-63T-R12, 1-64T-R12, 2-63Y-R11, and 2-64Y-R11.

The new revised automatic transmission production calibration, and any automatic transmission vehicle updated will require a new self-test procedure be used when diagnosing the EEC system.

Listed below are procedures for updating a vehicle with the power/fuel economy concern followed by a new self-test procedure to be used on these revised calibrations:

Procedure for revising calibrations with customer concerns.

1. Verify the vehicle is of the above applicable engine calibration level.

Calibrations: 1-63T-R12, 2-63Y-R11 - Manual Transmission 3.54/3.55/3.50 Axle Ratio Only

A. Remove and discard EGR valve (E0AE-9F483-AA) and replace with EGR valve (E0AZ-9F483-C). Refer to pertinent Truck Shop Manual for torque specification.

B. Locate engine code tag and with a Sharpie Pen, advance the calibration levels from R11 to R12 and R12 to R13 consecutively.

Calibrations: 1-64T-R12, 2-64Y-R11 - Automatic Transmission 3.55/3.54/3.50 Axle Ratio Only

A. Remove and discard EGR valve (E0AE-9F483-AA) and replace with EGR valve (E0AZ-9F483-C). Refer to pertinent Truck Shop Manual for torque specifications.

B. Remove and discard thermactor air control valve (D8EE-9F491-AA) and replace with control valve (E3AZ-9F491-A). Be sure to orient valve in same position as original.

C. Locate engine code tag and with a Sharpie Pen, advance the calibration levels from R11 to R12 and R12 to R13.

NOTE: Ensure that all hoses are secure and there are no air, vacuum or exhaust leaks.

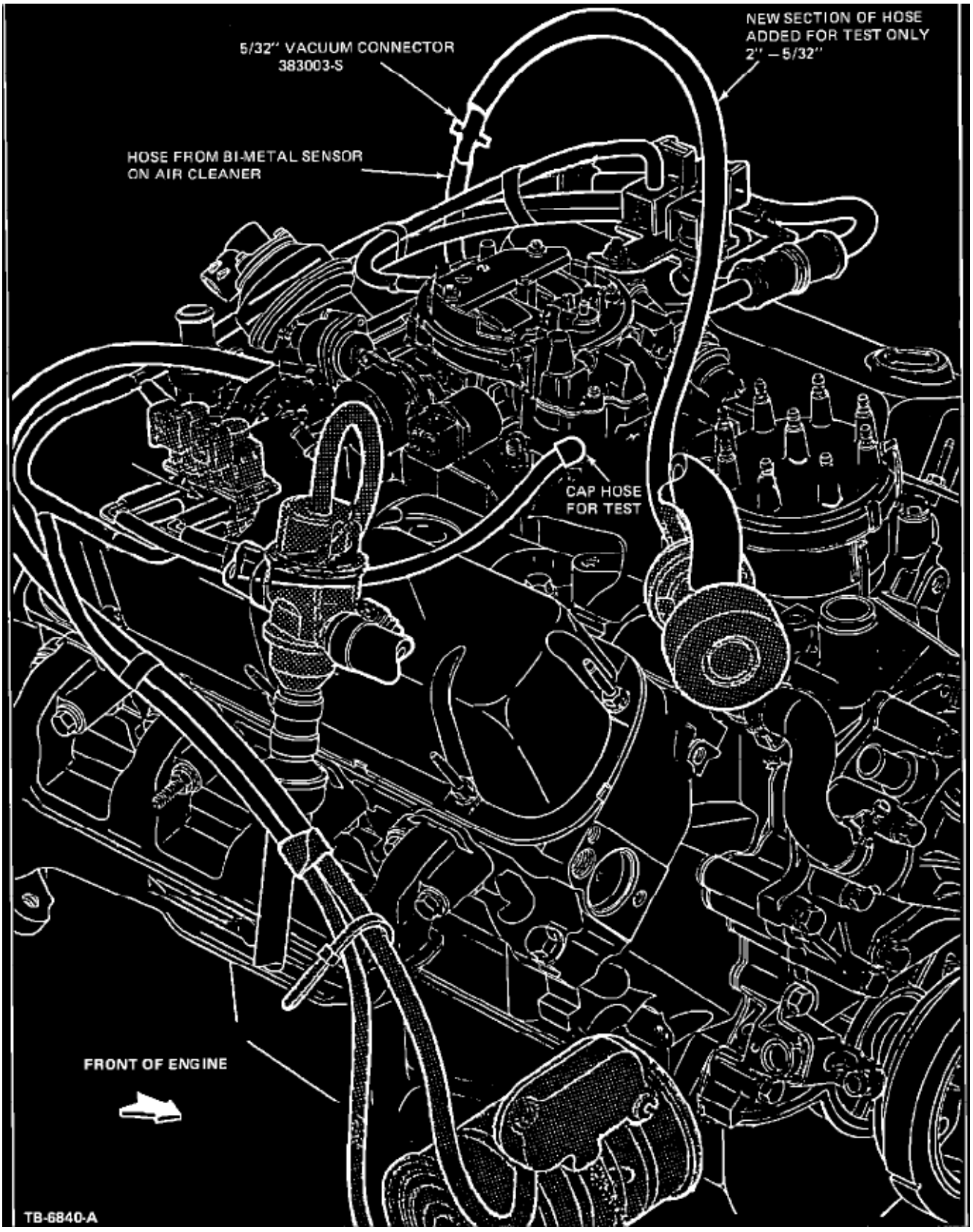

NEW SECTION OF HOSE ADDED FOR TEST ONLY 2" – 5/32"
5/32" VACUUM CONNECTOR 383003-S
HOSE FROM BI-METAL SENSOR ON AIR CLEANER
CAP HOSE FOR TEST
FRONT OF ENGINE
TB-6840-A

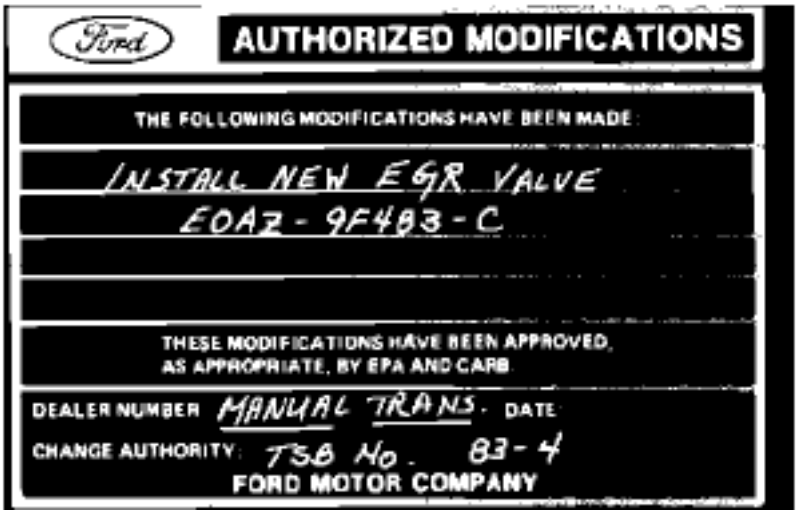
Figure 12

Procedure for self-testing automatic transmission vehicles with revised calibrations:

With the introduction of production calibrations 1-63T-R13, 2-63Y-R12, 1-64T-R13, and 2-64Y-R12 and the revision to the above-mentioned service calibrations, it is possible to obtain service code 11 or service code "44" when self-testing a properly operating EEC system. If a code "11" is produced, you may assume the system is functioning properly. If a code "44" is produced, the EEC system must be subjected to the following NEW quick test procedure:

1. After connecting the EEC III tester, (step 2 of quick test), disconnect and plug the vacuum hose coming from the thermactor air bypass valve (Figure 12). Remove the manifold vacuum line (black with red tracer) from the air cleaner bi-metal sensor (on top of the air cleaner lid) and install a 5/32" vacuum connector in the end of the hose. Install a 2 ft. section of 5/32" vacuum hose between the connector and the thermactor bypass valve (Figure 12).





2. Proceed with quick test at Step 3. A code "11" service code will be generated if the EEC III system is OK. If any other service codes are displayed at this time, including a "44" code, go to the referenced pinpoint test.

After all testing and/or services are completed, remove the 2" test hose and 5/32" connector and re-install manifold vacuum hose to the air cleaner bi-metal. Reconnect the hose to the thermactor bypass valve. Care should be taken to reconnect all hoses disconnected during the test.

Obtain an Authorized Modifications decal and list the date, dealer number and summary of alterations performed. Select a prominent place adjacent to the Vehicle Emission Control Information decal suitable for installing the Authorized Modifications decal. Clean the area, install the decal and cover it with a clear plastic decal shield. PART NUMBER

PART NAME CLASS

E0AZ-9F483-C EGR Valve R

E3AZ-9F491-A Air Control Valve C

OTHER APPLICABLE ARTICLES: None WARRANTY STATUS: Reimbursable within the provisions of the Warranty and Policy Manual. OPERATION: M TIME:

"Actual Time" as defined in the Warranty and Policy Manual. DLR. CODING: Basic Part No. DRIVE Code: 53

Air Injection Control Valve: All Technical Service Bulletins EGR Valve - Poor Performance/Fuel Economy

Article No. 83-4-25

POWER LOW/POOR FUEL ECONOMY/ PART THROTTLE RESPONSE - INCOMPATABILITY WITH EXISTING SELF-TEST PROCEDURES - 5.8L(W) ENGINE USED IN 49 STATES

LIGHT TRUCKS 1982/83 F SERIES AND BRONCO

CALIBRATIONS: 1-63T-R12, 1-64T-R12, 2-64Y-R11, 2-63Y-R11, 1-63T-R13, 2-63Y-R12, 1-64T-R13, 2-64Y-R12

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The new revised automatic transmission production calibration, and any automatic transmission vehicle updated will require a new self-test procedure be used when diagnosing the EEC system.

Listed below are procedures for updating a vehicle with the power/fuel economy concern followed by a new self-test procedure to be used on these revised calibrations:

Procedure for revising calibrations with customer concerns.

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A. Remove and discard EGR valve (E0AE-9F483-AA) and replace with EGR valve (E0AZ-9F483-C). Refer to pertinent Truck Shop Manual for torque specification.

B. Locate engine code tag and with a Sharpie Pen, advance the calibration levels from R11 to R12 and R12 to R13 consecutively.

Calibrations: 1-64T-R12, 2-64Y-R11 - Automatic Transmission 3.55/3.54/3.50 Axle Ratio Only

A. Remove and discard EGR valve (E0AE-9F483-AA) and replace with EGR valve (E0AZ-9F483-C). Refer to pertinent Truck Shop Manual for torque specifications.

B. Remove and discard thermactor air control valve (D8EE-9F491-AA) and replace with control valve (E3AZ-9F491-A). Be sure to orient valve in same position as original.

C. Locate engine code tag and with a Sharpie Pen, advance the calibration levels from R11 to R12 and R12 to R13.

NOTE: Ensure that all hoses are secure and there are no air, vacuum or exhaust leaks.

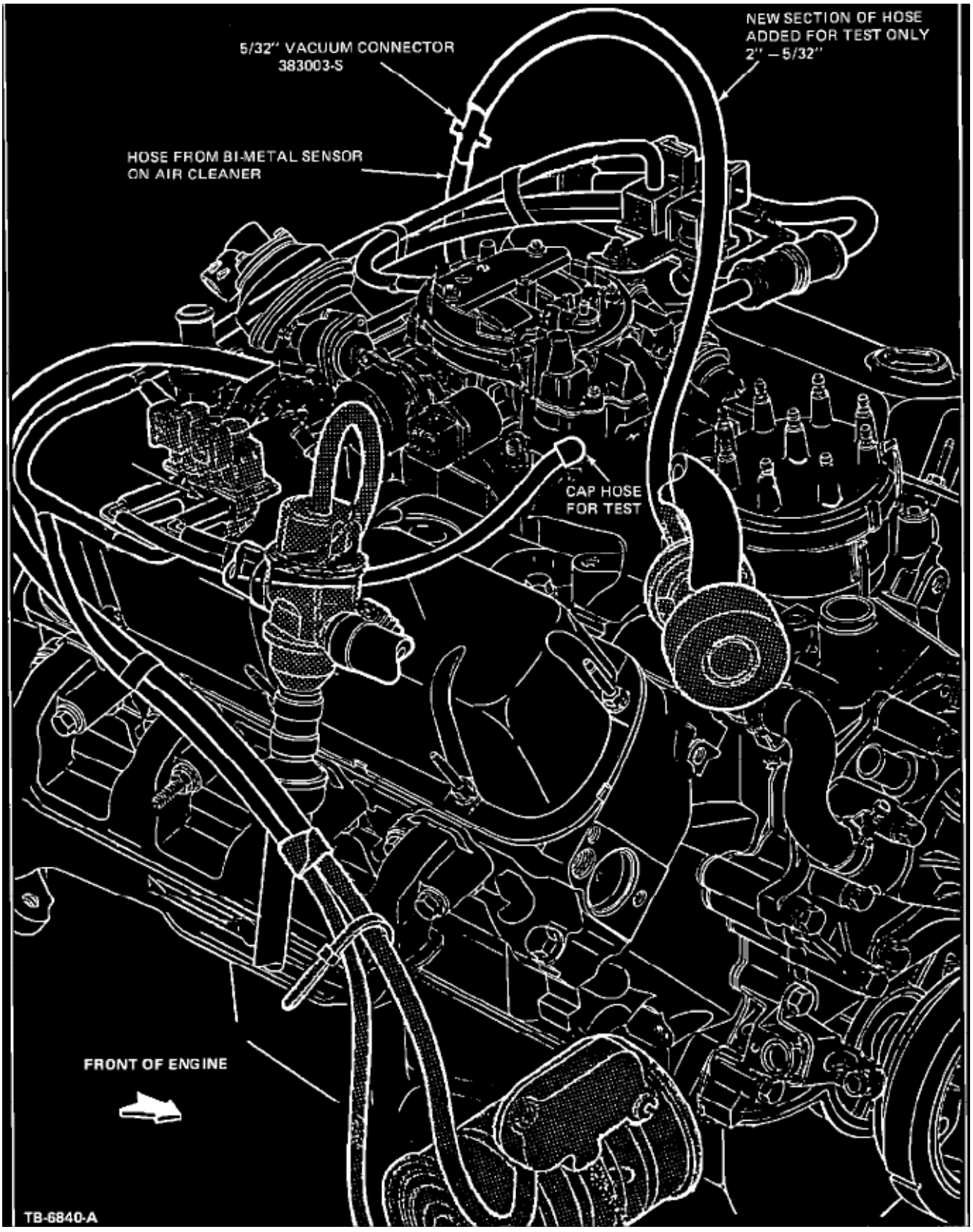

NEW SECTION OF HOSE ADDED FOR TEST ONLY 2" – 5/32"
5/32" VACUUM CONNECTOR 383003-S
HOSE FROM BI-METAL SENSOR ON AIR CLEANER
CAP HOSE FOR TEST
FRONT OF ENGINE
TB-6840-A

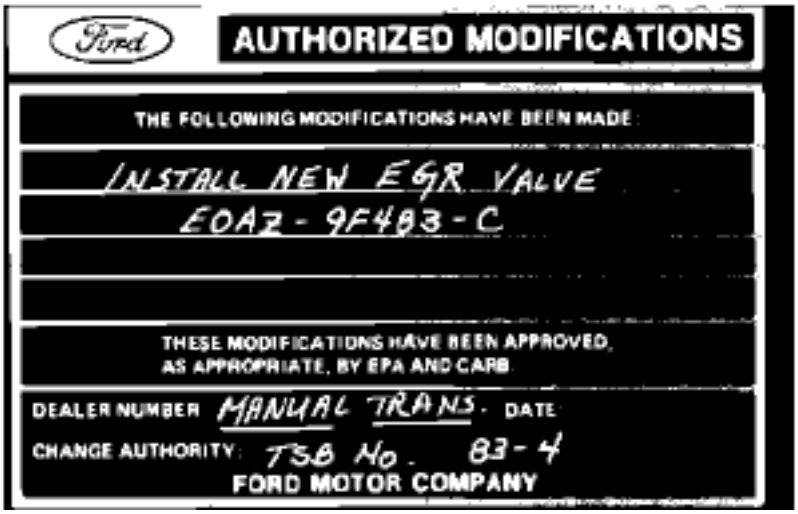
Figure 12

Procedure for self-testing automatic transmission vehicles with revised calibrations:

With the introduction of production calibrations 1-63T-R13, 2-63Y-R12, 1-64T-R13, and 2-64Y-R12 and the revision to the above-mentioned service calibrations, it is possible to obtain service code 11 or service code "44" when self-testing a properly operating EEC system. If a code "11" is produced, you may assume the system is functioning properly. If a code "44" is produced, the EEC system must be subjected to the following NEW quick test procedure:

1. After connecting the EEC III tester, (step 2 of quick test), disconnect and plug the vacuum hose coming from the thermactor air bypass valve (Figure 12). Remove the manifold vacuum line (black with red tracer) from the air cleaner bi-metal sensor (on top of the air cleaner lid) and install a 5/32" vacuum connector in the end of the hose. Install a 2 ft. section of 5/32" vacuum hose between the connector and the thermactor bypass valve (Figure 12).





2. Proceed with quick test at Step 3. A code "11" service code will be generated if the EEC III system is OK. If any other service codes are displayed at this time, including a "44" code, go to the referenced pinpoint test.

After all testing and/or services are completed, remove the 2" test hose and 5/32" connector and re-install manifold vacuum hose to the air cleaner bi-metal. Reconnect the hose to the thermactor bypass valve. Care should be taken to reconnect all hoses disconnected during the test.

Obtain an Authorized Modifications decal and list the date, dealer number and summary of alterations performed. Select a prominent place adjacent to the Vehicle Emission Control Information decal suitable for installing the Authorized Modifications decal. Clean the area, install the decal and cover it with a clear plastic decal shield. PART NUMBER

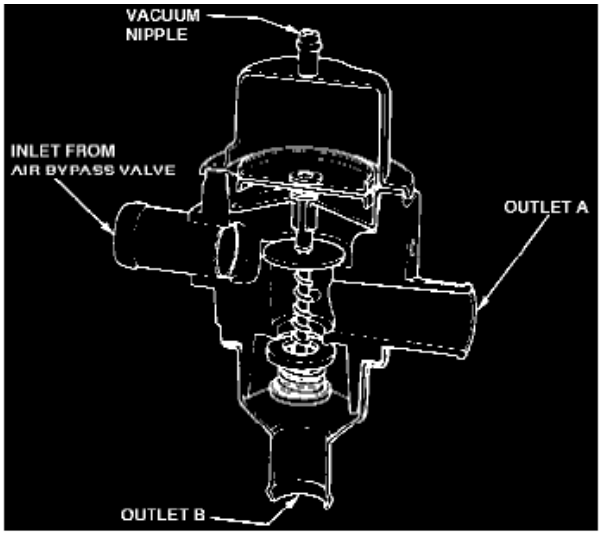
PART NAME CLASS

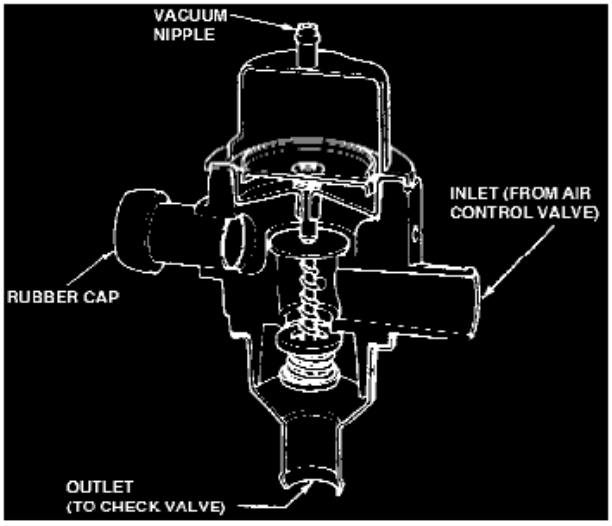
E0AZ-9F483-C EGR Valve R

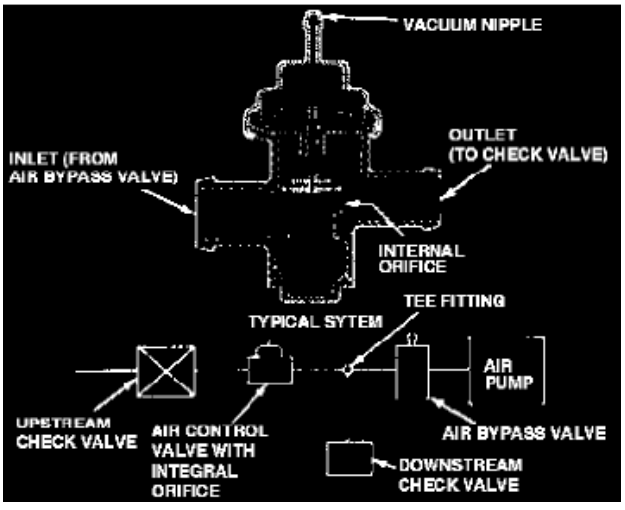
E3AZ-9F491-A Air Control Valve C

OTHER APPLICABLE ARTICLES: None WARRANTY STATUS: Reimbursable within the provisions of the Warranty and Policy Manual. OPERATION: M TIME:

"Actual Time" as defined in the Warranty and Policy Manual. DLR. CODING: Basic Part No. DRIVE Code: 53


VACUUM NIPPLE
INLET FROM AIR BYPASS VALVE
OUTLET A
OUTLET B


VACUUM NIPPLE
INLET (FROM AIR CONTROL VALVE)
RUBBER CAP
OUTLET (TO CHECK VALVE)


VACUUM NIPPLE
OUTLET (TO CHECK VALVE)
INLET (FROM AIR BYPASS VALVE)
INTERNAL ORIFICE
TEE FITTING
TYPICAL SYTEM
AIR PUMP
UPSTREAM CHECK VALVE
AIR CONTROL VALVE WITH INTEGRAL ORIFICE
AIR BYPASS VALVE
DOWNSTREAM CHECK VALVE

Air Injection Control Valve: Description and Operation Air Supply Control Valves

Fig.75 - Standard Air Control Valve

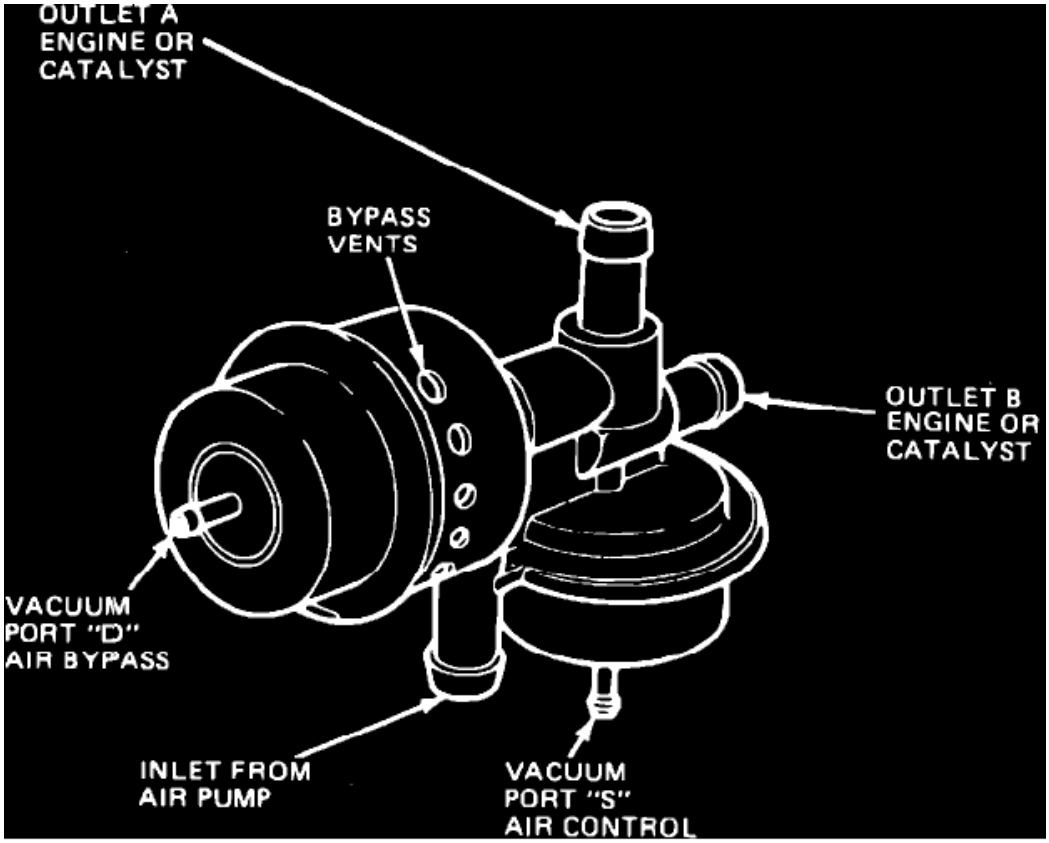
Fig.76 - Air Control & Shut Off Valve

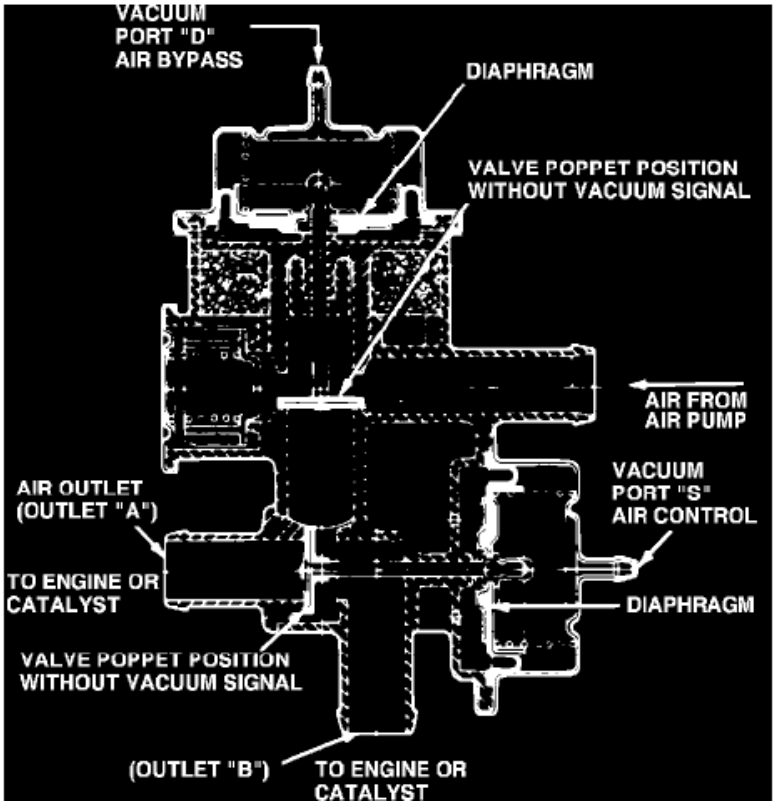
Fig.77 - Air Control & Shut Off Valve With Orifice

DESCRIPTION

These valves are used to direct air pump output to the exhaust manifold or downstream to the catalyst system depending on the engine control modes.

Three types of valves are used, the standard air control valve, Fig. 75, the air control/shut off valve with orifice, Fig. 76, and the air control/shut off valve, Fig. 77.


OUTLET A
ENGINE OR
CATALYST
BYPASS
VENTS
OUTLET B
ENGINE OR
CATALYST
VACUUM
PORT "D"
AIR BYPASS
INLET FROM
AIR PUMP
VACUUM
PORT "S"
AIR CONTROL


VACUUM
PORT "D"
AIR BYPASS
DIAPHRAGM
VALVE POPPET POSITION
WITHOUT VACUUM SIGNAL
AIR FROM
AIR PUMP
VACUUM
PORT "S"
AIR CONTROL
AIR OUTLET
(OUTLET "A")
TO ENGINE OR
CATALYST
DIAPHRAGM
VALVE POPPET POSITION
WITHOUT VACUUM SIGNAL
(OUTLET "B")
TO ENGINE OR
CATALYST

Air Injection Control Valve: Description and Operation Combination Air Bypass/Air Control Valves

Fig. 70 Normally open combination air bypass/air control valve less bleed

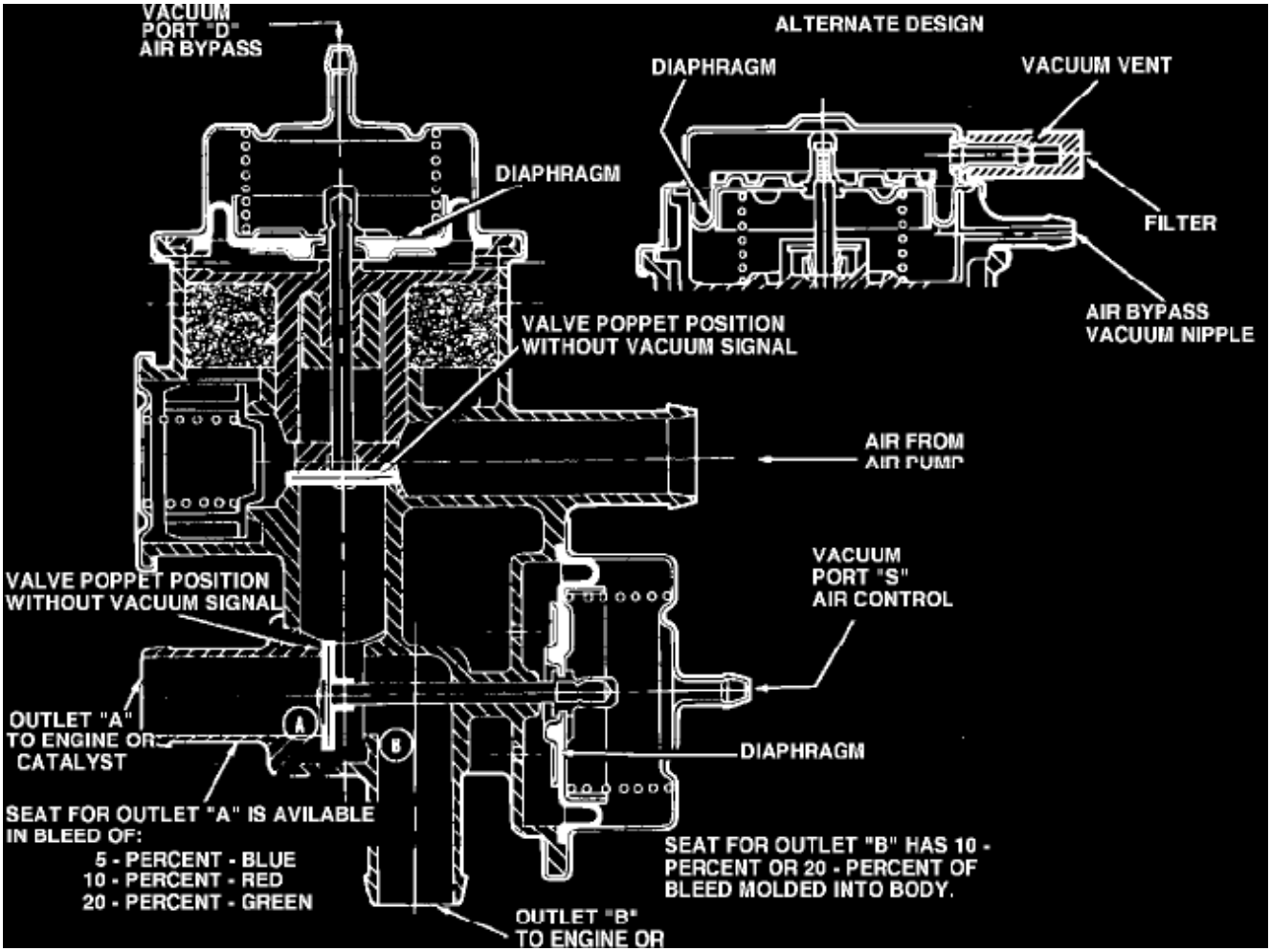
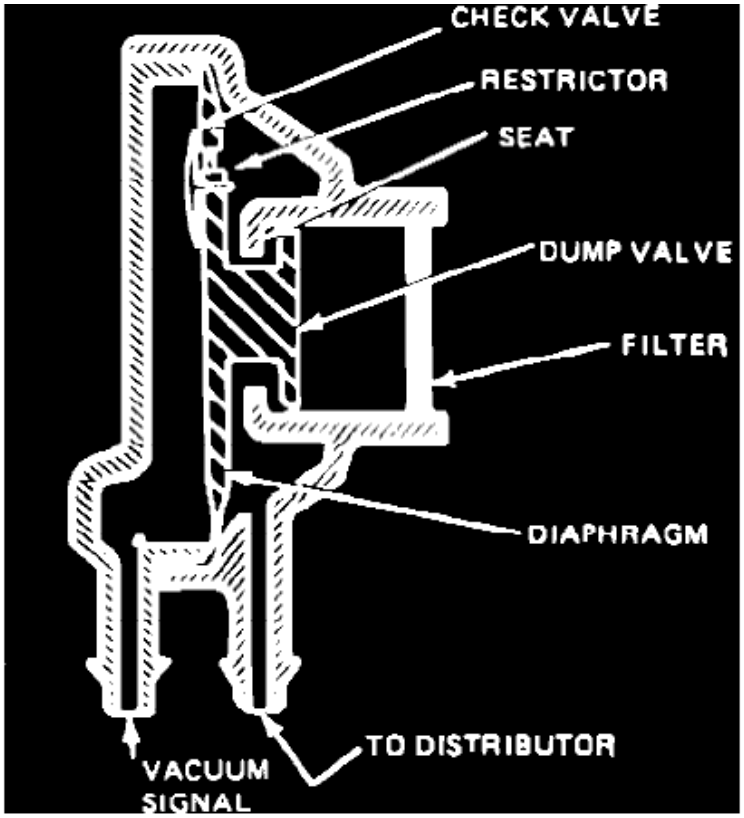


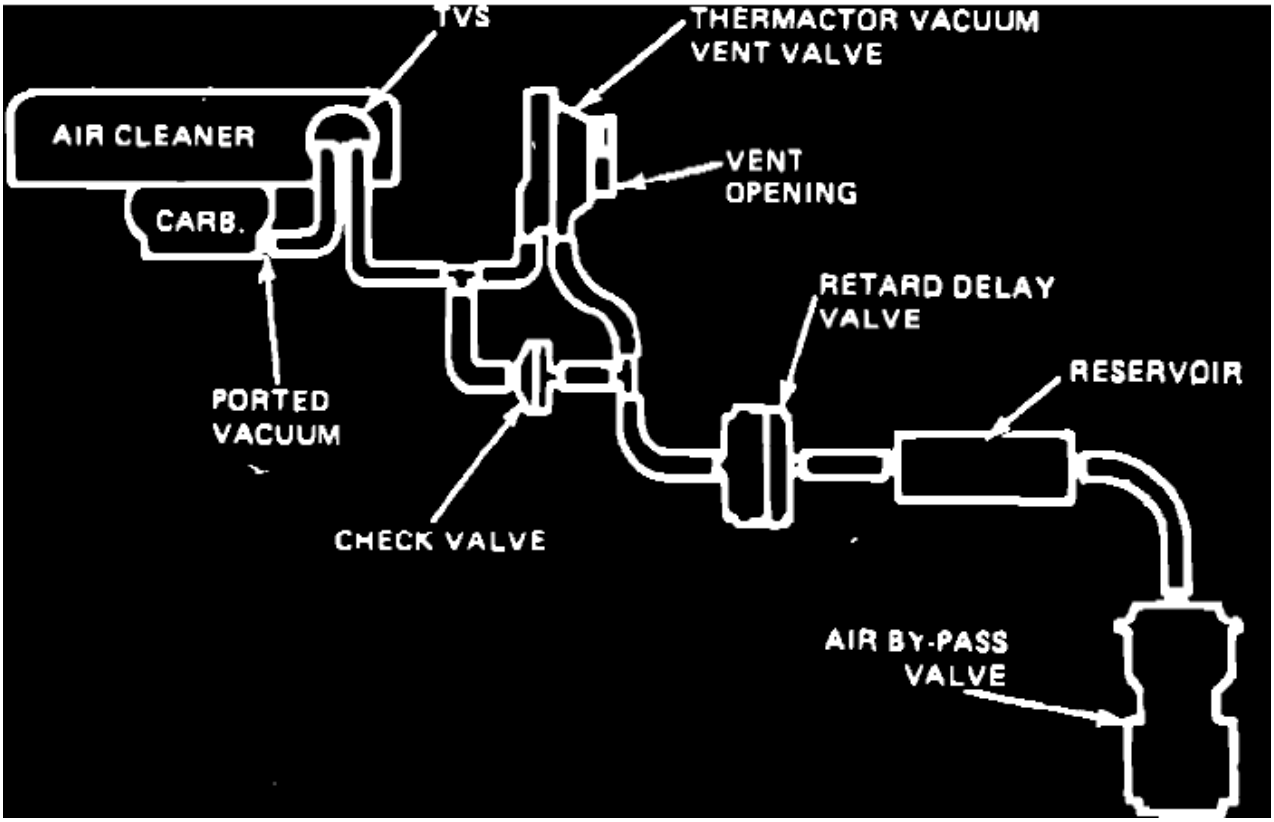
Fig. 71 Normally closed combination air bypass/air control valve less bleed

Fig. 72 Normally closed combination air bypass/air control valve with bleed

These valves, used on some 1982---87 vehicles, combine the function of the air bypass valve and the air control valve.

Three types of valves are used, a normally open valve, Fig. 70, a normally closed valve without bleed, Fig. 71, and a normally closed valve with bleed, Fig. 72.


CHECK VALVE
RESTRICTOR
SEAT
DUMP VALVE
FILTER
DIAPHRAGM
TO DISTRIBUTOR
VACUUM SIGNAL


TVS
THERMACTOR VACUUM VENT VALVE
AIR CLEANER
VENT OPENING
CARB.
RETARD DELAY VALVE
RESERVOIR
PORTED VACUUM
CHECK VALVE
AIR BY-PASS VALVE

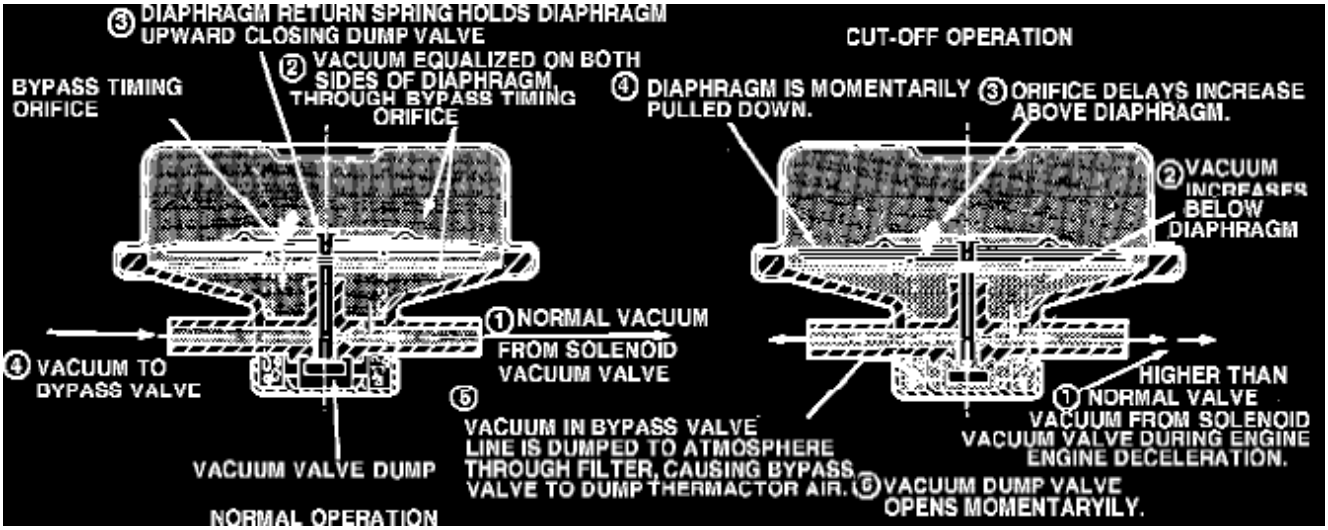
Air Injection Control Valve: Description and Operation Thermactor Vacuum Vent Valve

Fig. 76 Thermactor vacuum vent valve

Fig. 77 Thermactor vacuum vent valve schematic (typical)

This valve, Figs. 76 and 77, is used on some engines equipped with variable venturi carburetor. It provides the air for the thermactor retard delay valve and air bypass valve during idle modes to deactivate the thermactor system after a controlled period of time. Application of vacuum from the carburetor to both ports of the thermactor vacuum vent causes the dump valve to seat and vacuum to be applied to the rest of the system. Removal

of vacuum during idle modes results in unseating of the dump valve, opening of the vent and allowing air to enter the system to reduce the vacuum previously applied to the retard delay valve.

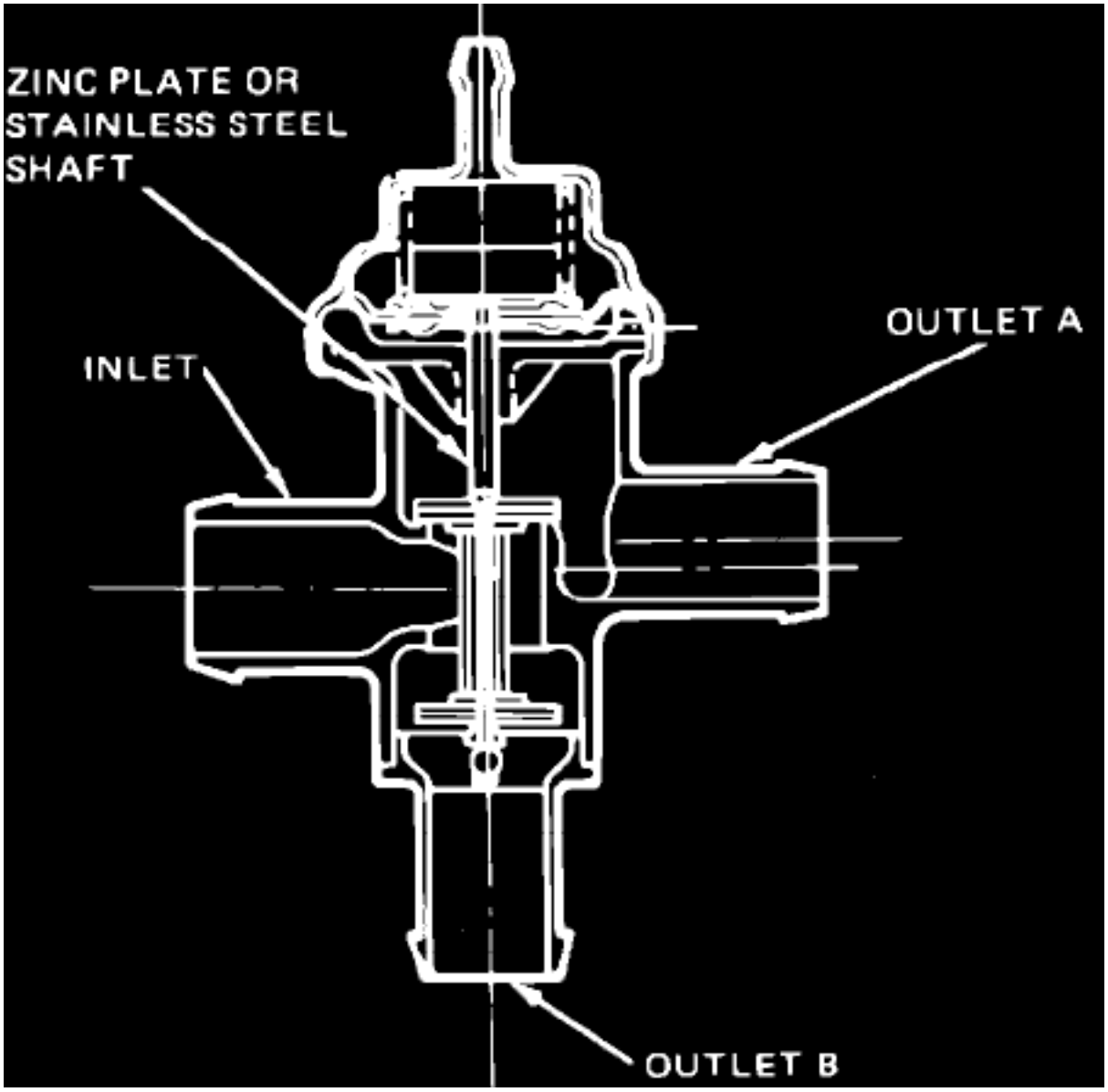


Air Injection Control Valve: Description and Operation Vacuum Differential Valve (VDV)

Fig. 78 Vacuum Differential Valve (VDV)

On some vehicles with the Thermactor system and catalytic converters, a VDV, Fig. 78, is used to control the operation of the air bypass valve. Under normal operation, vacuum applied through the VDV holds the valve upward, blocking the vent port and allowing Thermactor air flow. During acceleration or deceleration or in case of system failure, the VDV momentarily cuts off vacuum flow to the bypass valve, diverting the Thermactor air flow to atmosphere.

In case of excessive pressure or system restriction, the excess pressure will unseat the valve in the lower part of the bypass valve, allowing a partial flow of air to atmosphere. At the same time, the valve in the upper part of the valve remains unseated allowing a partial flow of air to the exhaust manifold.



Air Injection Control Valve: Testing and Inspection Air Control Valve

Fig. 67 Standard air control valve. 1983---87

Standard Air Control Valve

1. Run engine at 1500 RPM and disconnect air supply hose at inlet, Fig. 67. There should be air flow at hose. Reconnect air supply hose at valve inlet.

2. Disconnect air supply hoses at outlets A and B and the vacuum line at the vacuum nipple.

3. Run engine at 1500 RPM. There should be air flow at outlet B but little or no air flow at outlet A.

4. Run engine at 1500 RPM and connect a direct vacuum line from any manifold vacuum fitting to air control valve vacuum nipple. There should be air flow at outlet A but little or no air flow at outlet

B.

5. Connect all vacuum hoses at original positions. If valve does not function correctly, replace valve.

AIR CONTROL/SHUT-OFF VALVE

1. Start engine and run at idle, disconnect vacuum supply hose from vacuum nipple, and disconnect inlet hose from valve. Suction should be felt at valve opening.

2. Apply manifold vacuum to vacuum nipple. No suction should be felt at valve inlet opening.

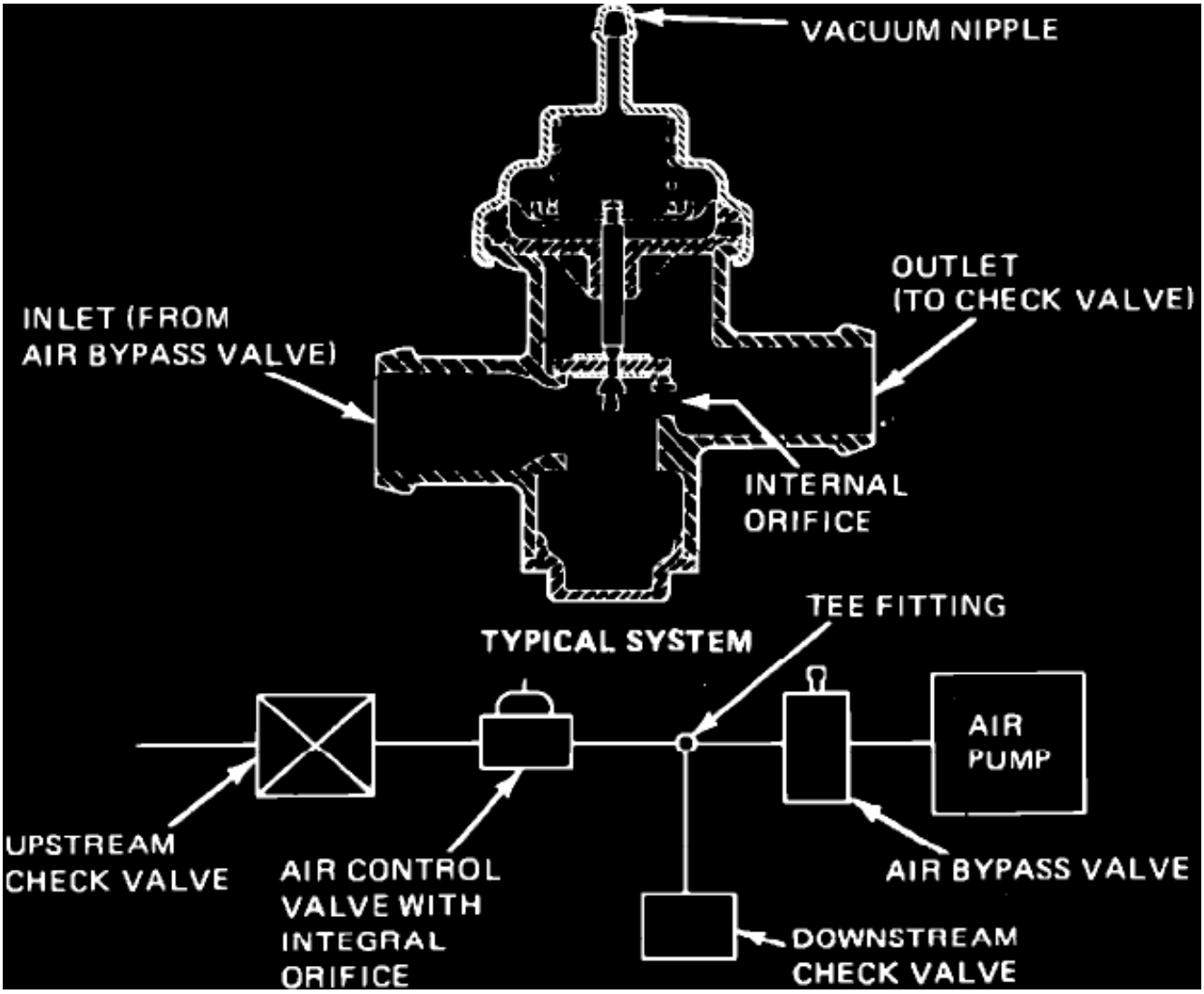


Fig. 69 Air control & shut off valve with orifice. 1983

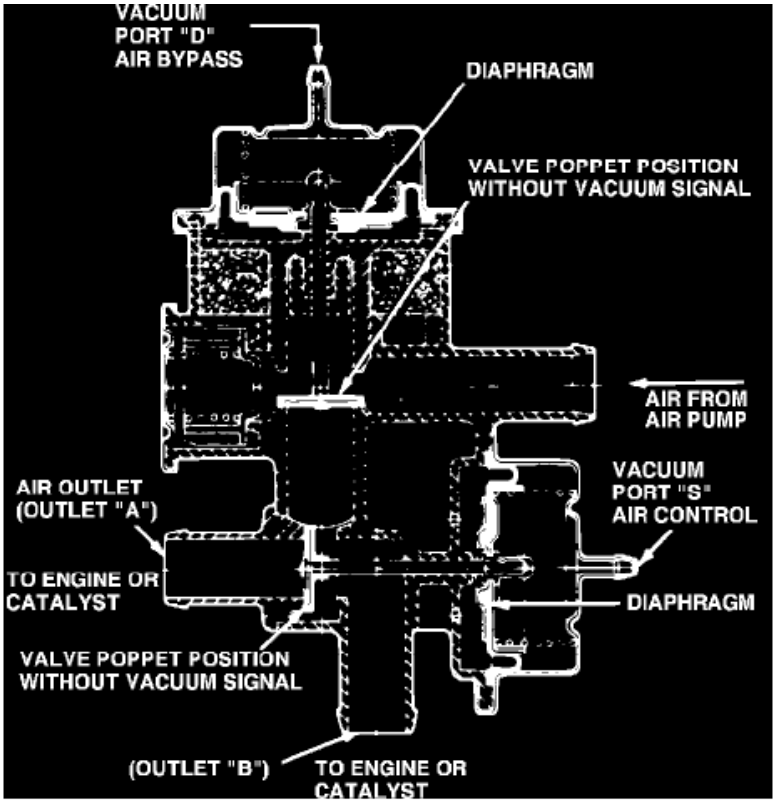
AIR CONTROL/SHUT-OFF VALVE WITH ORIFICE

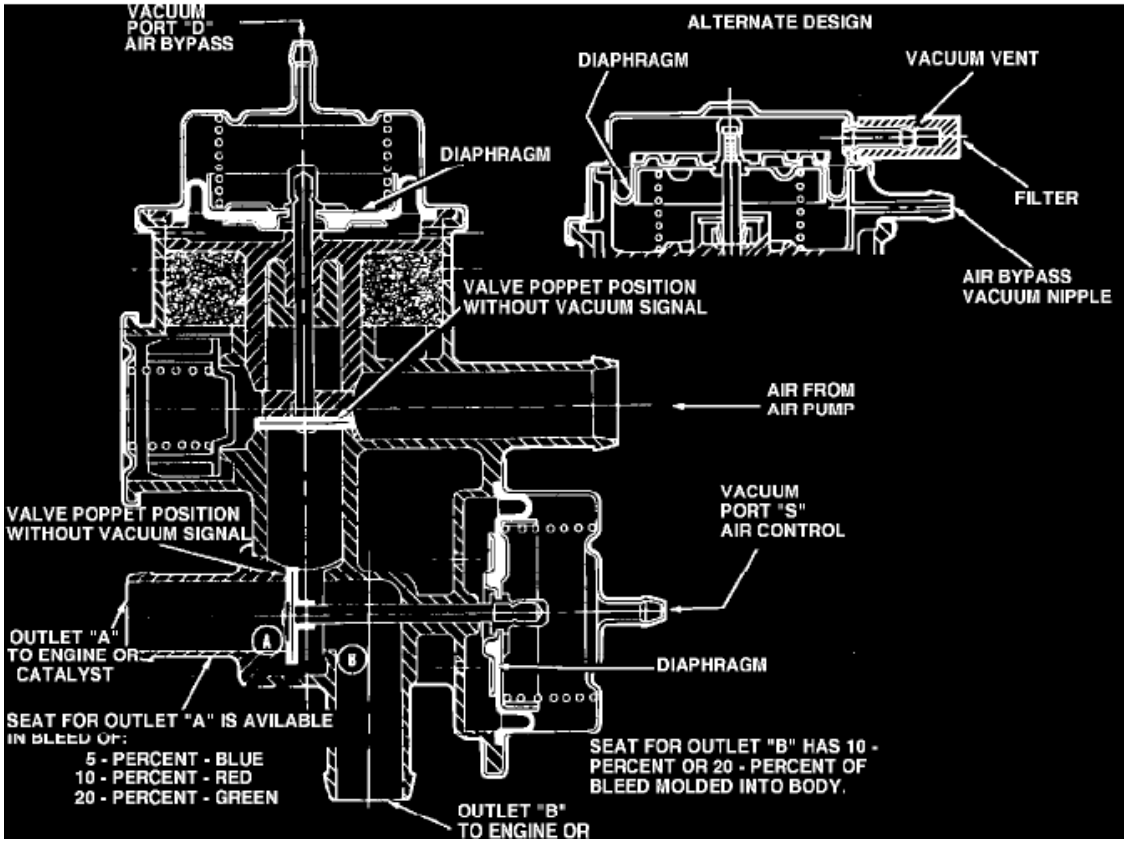
1. Disconnect valve inlet supply hose and ensure that there is air flow to valve inlet, Fig. 69, then reconnect air supply hose.

2. Run engine at 1500 RPM and disconnect air supply hose at valve outlet and the vacuum hose at vacuum nipple. There should be air flow at valve outlet.

3. Connect a direct vacuum line from any manifold fitting to valve vacuum nipple. There should be a noticeable increase in air flow at valve outlet.

4. Connect all vacuum hoses at original positions.


VACUUM
PORT "D"
AIR BYPASS
DIAPHRAGM
VALVE POPPET POSITION
WITHOUT VACUUM SIGNAL
AIR FROM
AIR PUMP
VACUUM
PORT "S"
AIR CONTROL
AIR OUTLET
(OUTLET "A")
TO ENGINE OR
CATALYST
DIAPHRAGM
VALVE POPPET POSITION
WITHOUT VACUUM SIGNAL
(OUTLET "B")
TO ENGINE OR
CATALYST


VACUUM
PORT "D"
AIR BYPASS
ALTERNATE DESIGN
DIAPHRAGM
VACUUM VENT
DIAPHRAGM
FILTER
AIR BYPASS
VACUUM NIPPLE
VALVE POPPET POSITION
WITHOUT VACUUM SIGNAL
AIR FROM
AIR PUMP
VACUUM
PORT "S"
AIR CONTROL
VALVE POPPET POSITION
WITHOUT VACUUM SIGNAL
OUTLET "A"
TO ENGINE OR
CATALYST
A
B
DIAPHRAGM
SEAT FOR OUTLET "A" IS AVILABLE
IN BLEED OF:
5 - PERCENT - BLUE
10 - PERCENT - RED
20 - PERCENT - GREEN
SEAT FOR OUTLET "B" HAS 10 -
PERCENT OR 20 - PERCENT OF
BLEED MOLDED INTO BODY.
OUTLET "B"
TO ENGINE OR

Air Injection Control Valve: Testing and Inspection Combination Air Bypass/Air Control Valves

Fig. 71 Normally closed combination air bypass/air control valve less bleed

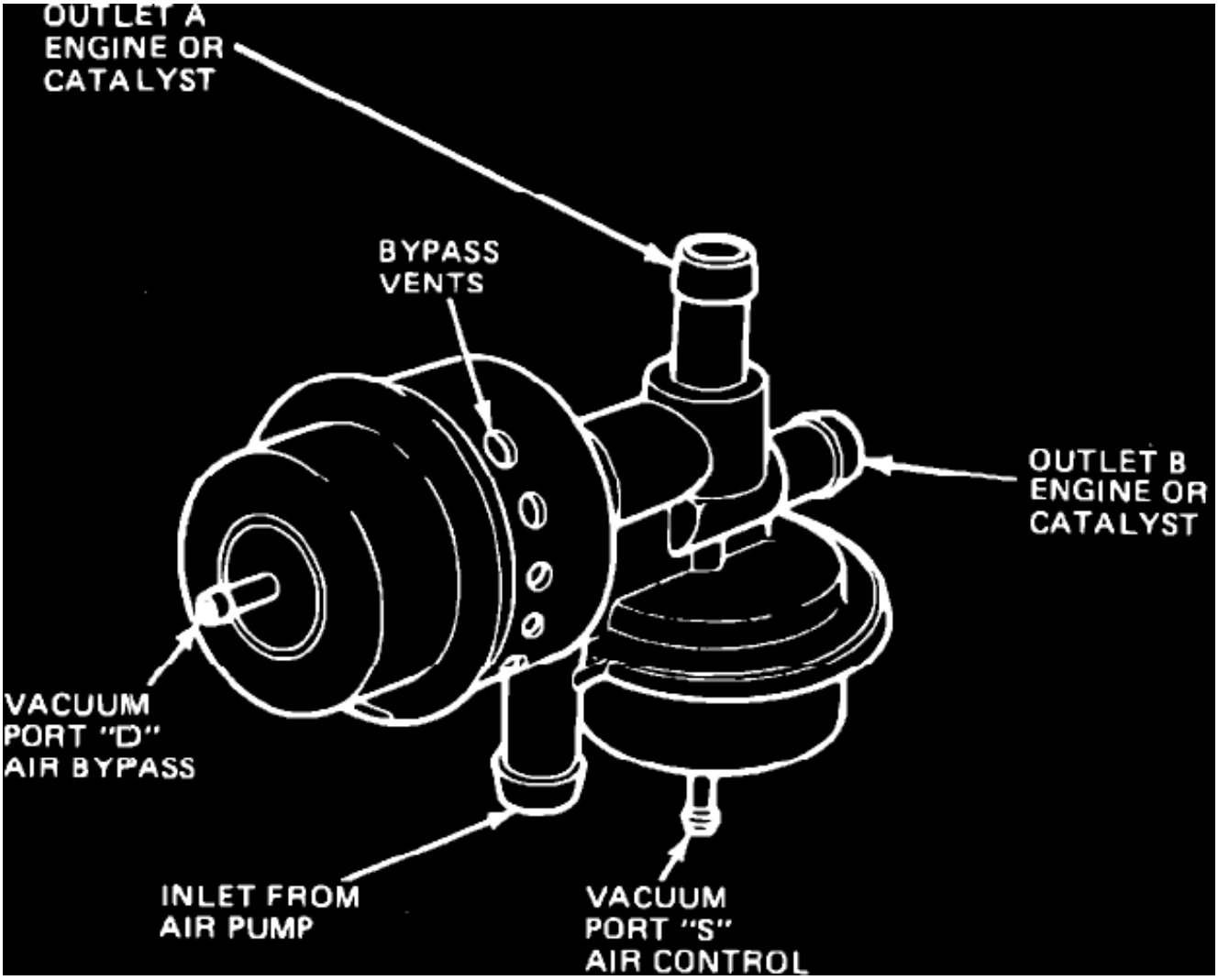


Fig. 72 Normally closed combination air bypass/air control valve with bleed

NORMALLY CLOSED VALVES

1. Disconnect hoses from outlets A and B, Figs. 71 and 72.

2. Disconnect and plug vacuum line to port D.

3. Run engine at 1500 RPM. There should be air flow at bypass vents.

4. Reconnect vacuum line to port D and disconnect and plug vacuum line to port S, then ensure that vacuum is present in line to vacuum port D.

5. Run engine at 1500 RPM. There should be air flow at outlet B but no air flow at outlet A.

6. Apply 8---10 inches Hg vacuum to port S and run engine at 1500 RPM. There should be air flow at outlet A.

7. On bleed type valve, some lesser amount of air will flow from outlet A or B and the main discharge will change when vacuum is applied to port S. If there is a small air tap attached to the

inlet tube from the air pump, air flow should be present during engine operation.

Fig. 70 Normally open combination air bypass/air control valve less bleed

NORMALLY OPEN VALVES

1. Disconnect hoses from outlets A and B, Fig. 70.

2. Disconnect and plug vacuum lines to ports D and S.

3. Run engine at 1500 RPM. There should be air flow at outlet B.

4. Apply 8---10 inches Hg vacuum to port S and run engine at 1500 RPM. There should be air flow at outlet A.

5. Reconnect vacuum line to port D and ensure that vacuum is present.

6. Run engine at 1500 RPM. Air should flow out of bypass vents.

7. Reconnect vacuum hoses to original positions.

Air Injection Control Valve: Testing and Inspection Thermactor Vacuum Vent Valve

1. If necessary, remove air cleaner assembly.

2. Disconnect vacuum tubing or connector block from valve, noting location of tubing. It may be necessary to remove valve from bracket or air cleaner tray to gain access to vacuum ports on valve.

3. Connect the black vacuum port to a manifold vacuum source.

4. Connect an external vacuum source to white body vacuum port.

5. With engine idling in neutral, apply 10 inches Hg vacuum to white port and trap. If vacuum cannot be obtained, replace valve.

6. Remove manifold vacuum source line from black port. The trapped vacuum should drop to zero. If not, replace valve.

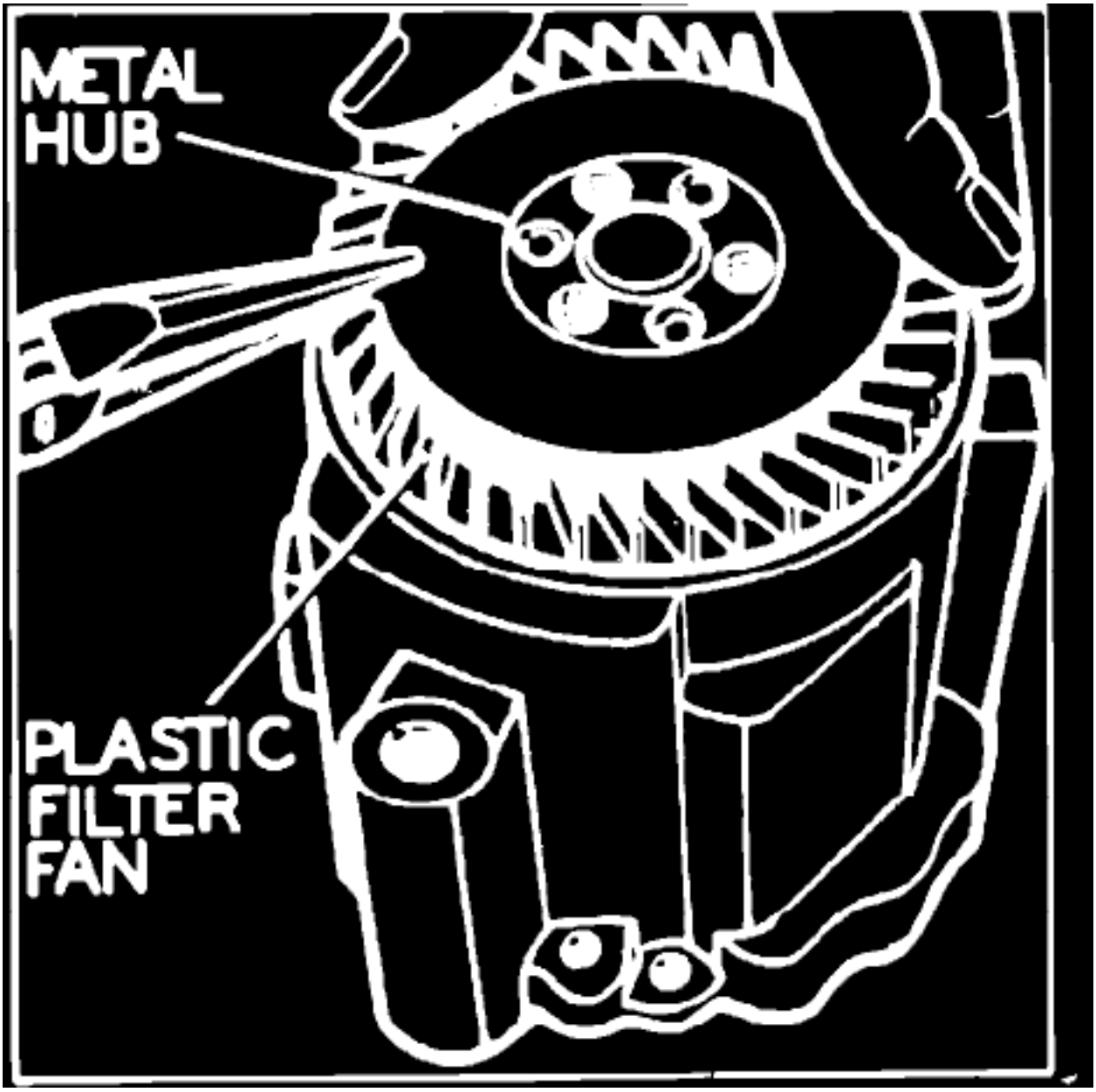
Air Injection Control Valve: Testing and Inspection Vacuum Differential Valve (VDV)

1. Start engine and allow to reach normal operating temperature with transmission in Park or Neutral and parking brake applied.

2. Stop engine and remove air bypass valve to air manifold check valve hose and bypass valve. On systems with two check valves, remove both hoses. Connect tachometer to engine.

3. Start engine, then with hand placed over bypass valve outlet connections, accelerate engine to 2500 RPM and release throttle, allowing engine to return to normal idle. During deceleration, the air flow in the valve outlet should be felt or heard to momentarily diminish or stop and then resume to normal air flow. Air flow will be discharged through the exhaust ports in the end of the bypass valve silencer cover.

4. If bypass valve does not function as described in step 3, check to make sure that decel valve is receiving a vacuum signal. If it is, the decel valve is defective and should be replaced.



Air Injection Filter: Service and Repair

Fig. 68 Removing centrifugal type air pump filter

Centrifugal Filter Fan, Replace

1. Remove drive pulley and outer disc from air pump.

2. Remove filter fan from pump, Fig. 90.

NOTE: Do not attempt to remove the metal drive hub.

3. Install new filter fan using the pulley and bolts. Alternately tighten bolts to draw fan down evenly.

NOTE: A slight interference between the fan and housing is normal. A new fan may make noise during initial operation, until it's outer diameter sealing lip has worn in, after approximately 20-30 miles of operation.

Air Injection Hose/Tube: Testing and Inspection

CAUTION:

The hoses used with this system are made of special material to withstand high temperature. No other type should be used.

Procedure:

1. Inspect all hoses and tubes for deterioration or cracks.

2. Check hose and tube routing as interference may cause wear.

3. Check all hose and tube connections.

4. Check the pressure side of the system for leaks with a soapy water solution. With the pump running, bubbles will form if a leak exists.

5. When replacing any hose or tube, note routing before removal.

Air Injection Manifold: Testing and Inspection

CAUTION:

The hoses used with this system are made of special material to withstand high temperature. No other type should be used.

Procedure:

1. Inspect all hoses and tubes for deterioration or cracks.

2. Check hose and tube routing as interference may cause wear.

3. Check all hose and tube connections.

4. Check the pressure side of the system for leaks with a soapy water solution. With the pump running, bubbles will form if a leak exists.

5. When replacing any hose or tube, note routing before removal.

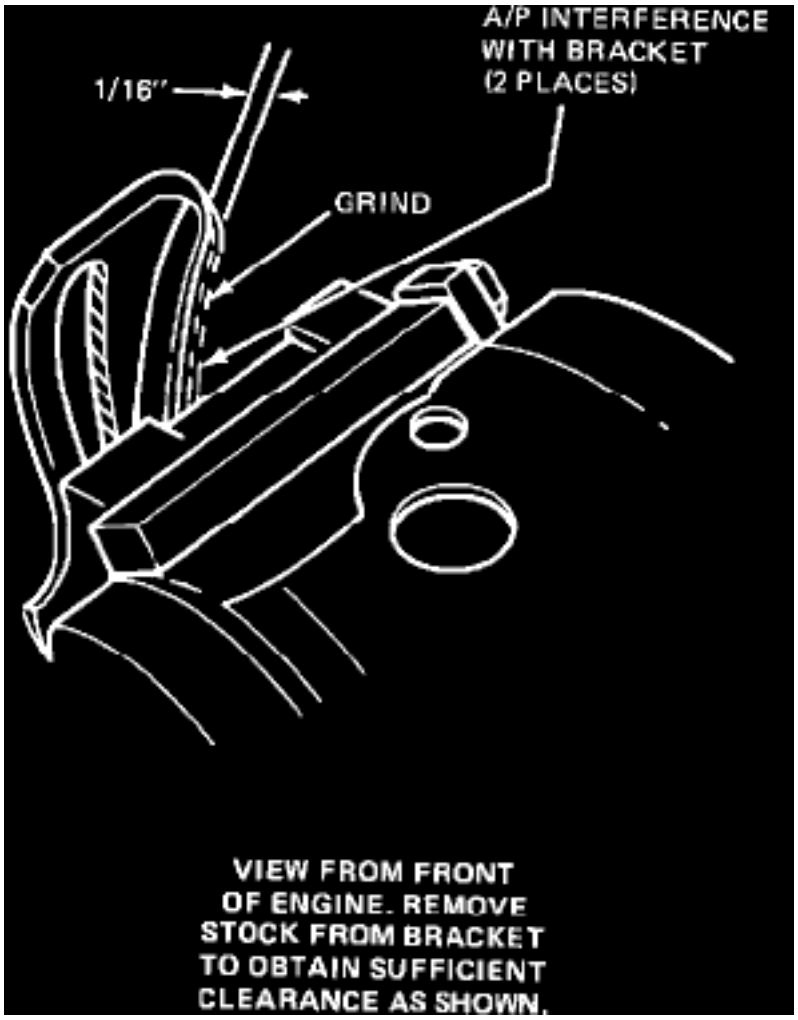
Air Injection Manifold: Service and Repair

PROCEDURE

1. Disconnect air supply hose from check valve and position hose aside.

2. Unscrew air manifold to cylinder head coupling nuts until free of the cylinder head, then remove air manifold.

3. Reverse procedure to install.



Air Injection Pump: Customer Interest Exhaust Air Pump - Moaning Noise

Article No. 83-16-21

NOISE - POWERTRAIN MOAN - AT APPROXIMATELY 2,000 RPM - 5.8L UNITS

LIGHT TRUCKS 1980-83 E, F AND BRONCO

FIGURE 29

A drumming and/or moaning noise, at approximately 2,000 RPM, may be the result of the exhaust air pump adjustment arm flange being too wide. The flange may contact the body of the air pump preventing proper pump to bracket fit (Figure 29). Visual inspection can confirm if the condition is present. To service this condition, the following procedure is recommended:

1. Loosen alternator and air pump adjustment slot and pivot bolts.

2. Move the alternator and air pump to a position that will allow the removal of both the alternator and air pump drive belts.

3. Remove the air pump adjustment slot bolt and alternator pivot bolt from the alternator bracket, then remove the air pump adjustment arm.

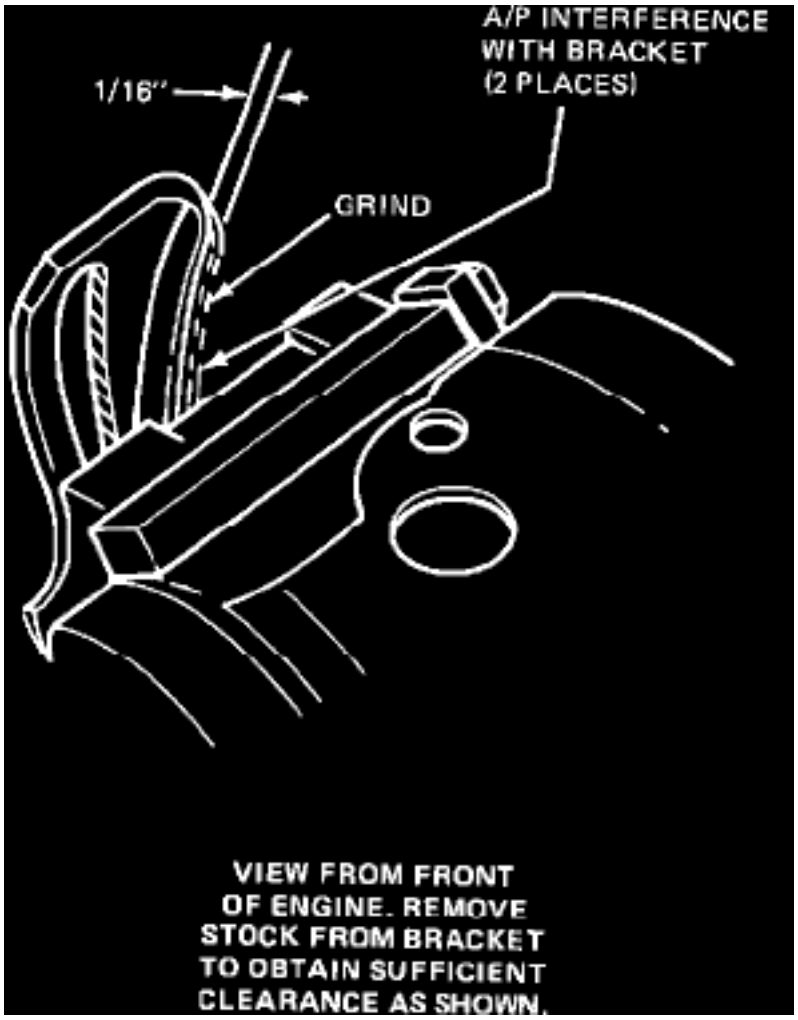


FIGURE 29

4. Grind .0625" (1/16 inch) off entire flange radius of air pump adjustment arm (Figure 29). Ensure there are no sharp burrs remaining.

5. Install air pump adjustment arm and install alternator and air pump drive belts by reversing procedure of steps 1 through 3.

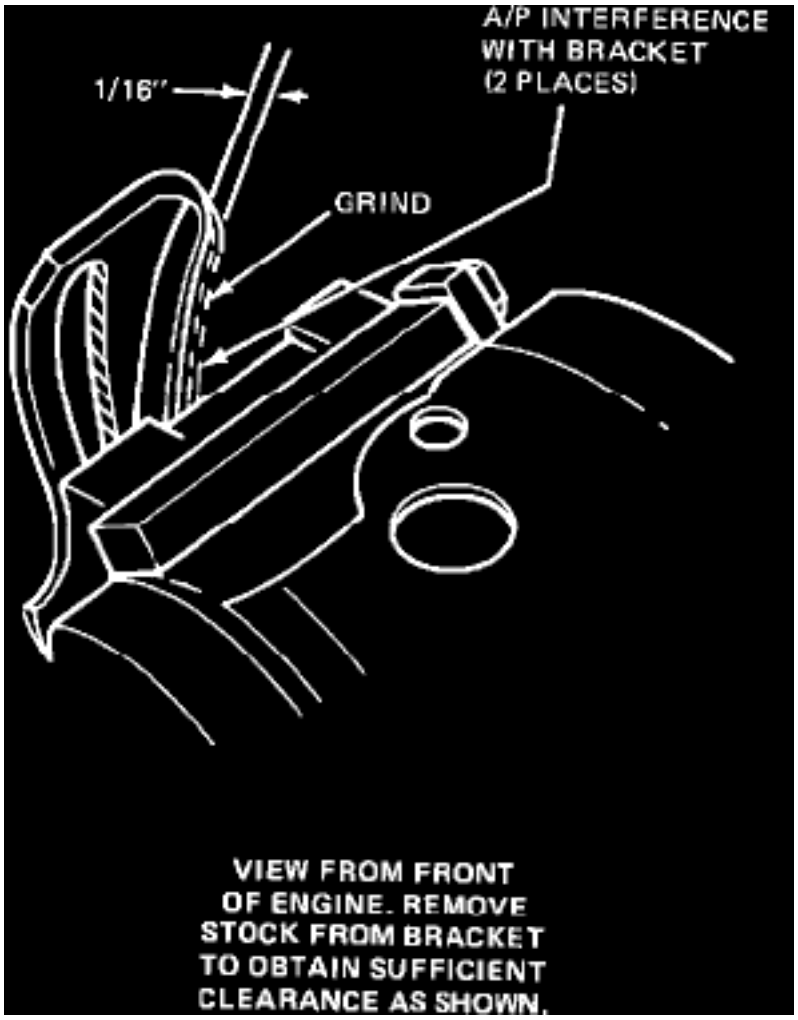
6. Tension alternator belt 110-130 lbs. and tension air pump belt 80-100 lbs.

7. Torque bolts as follows: adjustment slot bolts (alternator and air pump); 24-34 ft.lbs. Air pump pivot bolt; 35-50 ft.lbs. Alternator pivot bolt; 45-55 ft.lbs.

8. Start engine to ensure noise has been eliminated and that all accessory drive components are positioned and functioning properly.

OTHER APPLICABLE ARTICLES: None WARRANTY STATUS: Reimbursable within the provisions of the Warranty and Policy Manual. OPERATION: SP9452A83 TIME:

0.4 Hr. DLR. CODING: Basic Part No. 9B452 Code: 16



Air Injection Pump: All Technical Service Bulletins Exhaust Air Pump - Moaning Noise

Article No. 83-16-21

NOISE - POWERTRAIN MOAN - AT APPROXIMATELY 2,000 RPM - 5.8L UNITS

LIGHT TRUCKS 1980-83 E, F AND BRONCO

FIGURE 29

A drumming and/or moaning noise, at approximately 2,000 RPM, may be the result of the exhaust air pump adjustment arm flange being too wide. The flange may contact the body of the air pump preventing proper pump to bracket fit (Figure 29). Visual inspection can confirm if the condition is present. To service this condition, the following procedure is recommended:

1. Loosen alternator and air pump adjustment slot and pivot bolts.

2. Move the alternator and air pump to a position that will allow the removal of both the alternator and air pump drive belts.

3. Remove the air pump adjustment slot bolt and alternator pivot bolt from the alternator bracket, then remove the air pump adjustment arm.

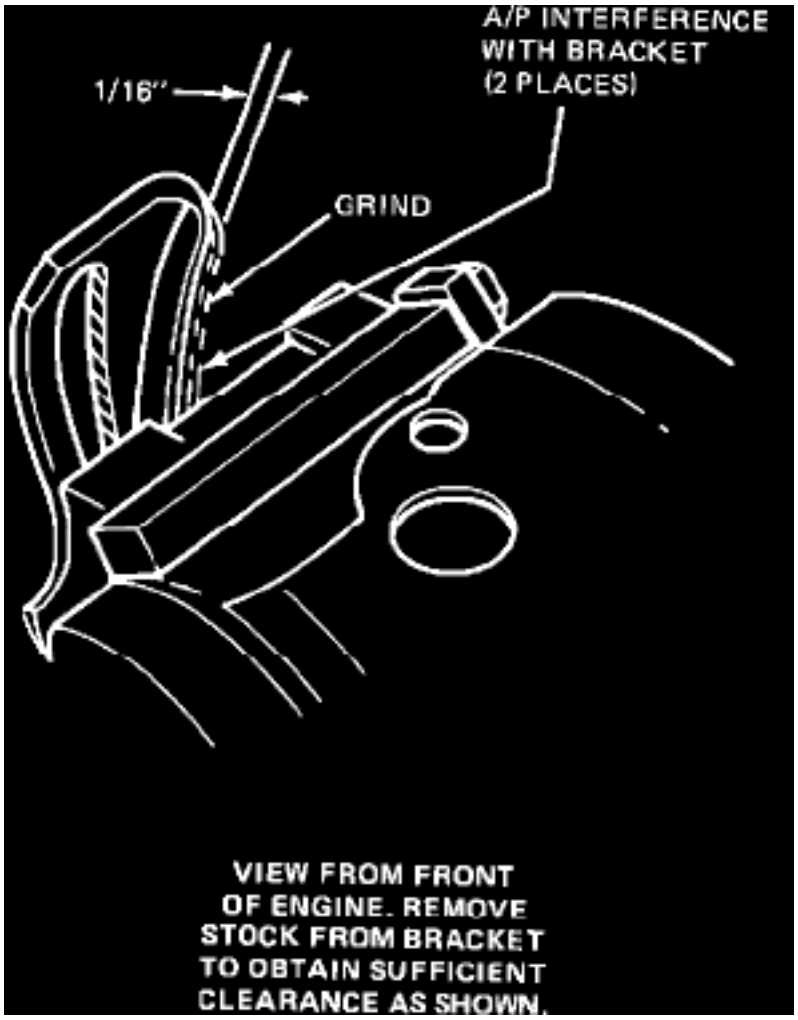


FIGURE 29

4. Grind .0625" (1/16 inch) off entire flange radius of air pump adjustment arm (Figure 29). Ensure there are no sharp burrs remaining.

5. Install air pump adjustment arm and install alternator and air pump drive belts by reversing procedure of steps 1 through 3.

6. Tension alternator belt 110-130 lbs. and tension air pump belt 80-100 lbs.

7. Torque bolts as follows: adjustment slot bolts (alternator and air pump); 24-34 ft.lbs. Air pump pivot bolt; 35-50 ft.lbs. Alternator pivot bolt; 45-55 ft.lbs.

8. Start engine to ensure noise has been eliminated and that all accessory drive components are positioned and functioning properly.

OTHER APPLICABLE ARTICLES: None WARRANTY STATUS: Reimbursable within the provisions of the Warranty and Policy Manual. OPERATION: SP9452A83 TIME:

0.4 Hr. DLR. CODING: Basic Part No. 9B452 Code: 16

Air Injection Pump: Testing and Inspection

PROCEDURE

1. Remove air cleaner, then inspect all hoses and hose connections for leaks. Correct as necessary. Check belt tension and correct as necessary.

2. With transmission in Park or Neutral with parking brake applied, start engine and allow it to reach normal operating temperature.

3. Stop engine. Disconnect air supply hose(s) from air pump to air bypass valve from pump.

4. Install Rotunda T57L-9486-A or equivalent thermactor test gauge in end of hose disconnected from bypass valve. Secure hose with clamp to

prevent it from blowing out. On side or cover mounted bypass valves, install an elbow and hose adapter, then install test gauge.

CAUTION: Position air pump supply tester so that air blast emitted will be harmlessly dissipated.

5. Connect tachometer to engine and start engine. Slowly increase engine speed to 1000 rpm while observing pressure at gauge. Air pump pressure

should be at least 2 1/4 psi. If rotunda tool is not used, increase engine speed to 1500 rpm and place hand over open hose. Air flow should be heard and felt.

6. If air pump output pressure is not at least 2 1/4 psi, or if air flow is not heard and felt, replace pump and repeat test.

Air Injection Pump: Service and Repair Air Injection Pump, Replace

1. Disconnect air inlet and outlet hoses from air pump.

2. Remove drive belt and mounting bolts from pump and remove the pump.

3. Reverse procedure to install.

Air Injection Pump: Service and Repair Air Pump Relief Valve, Replace

NOTE:

The air pump does not have to be disassembled to replace the relief valve; however, it must be removed from the engine.

PROCEDURE

1. Install Tool T66L-9A486-D on air pump and remove relief valve using a suitable slide hammer.

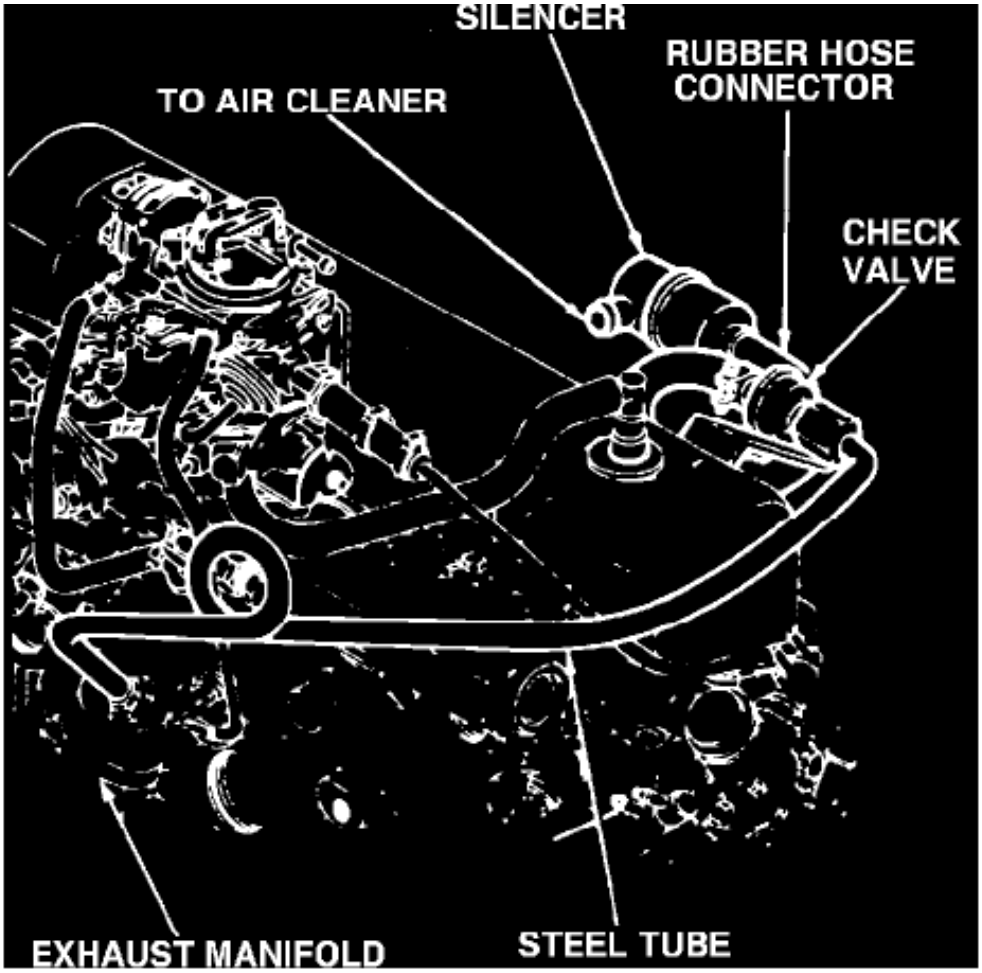
2. To install relief valve, use Tool T66L- 9A4S6-B and lightly hammer the valve until it is seated.

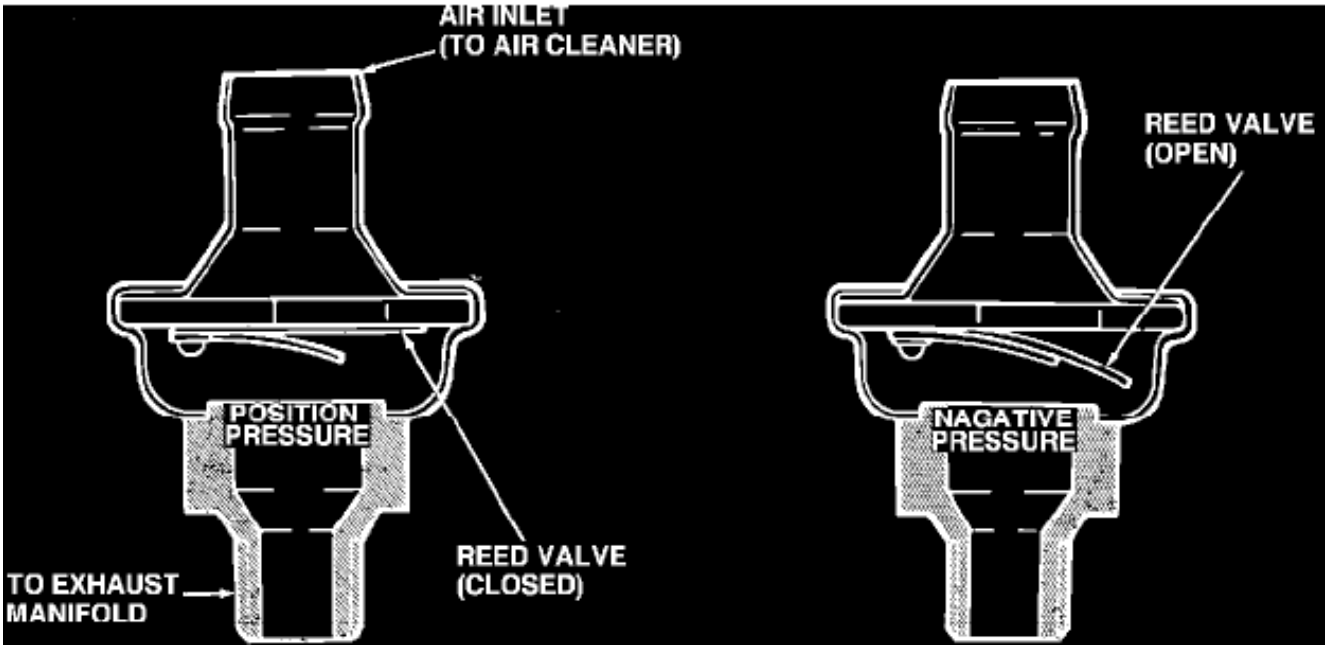
Air Injection Pump: Service and Repair Relief Valve Pressure Setting Plug, Replace

PROCEDURE

1. Compress shoulders of pressure setting plug together and pull plug out of relief valve.

2. Install new valve into relief valve hole by pressing against its center with a suitable tool.


SILENCER
RUBBER HOSE CONNECTOR
TO AIR CLEANER
CHECK VALVE
EXHAUST MANIFOLD
STEEL TUBE

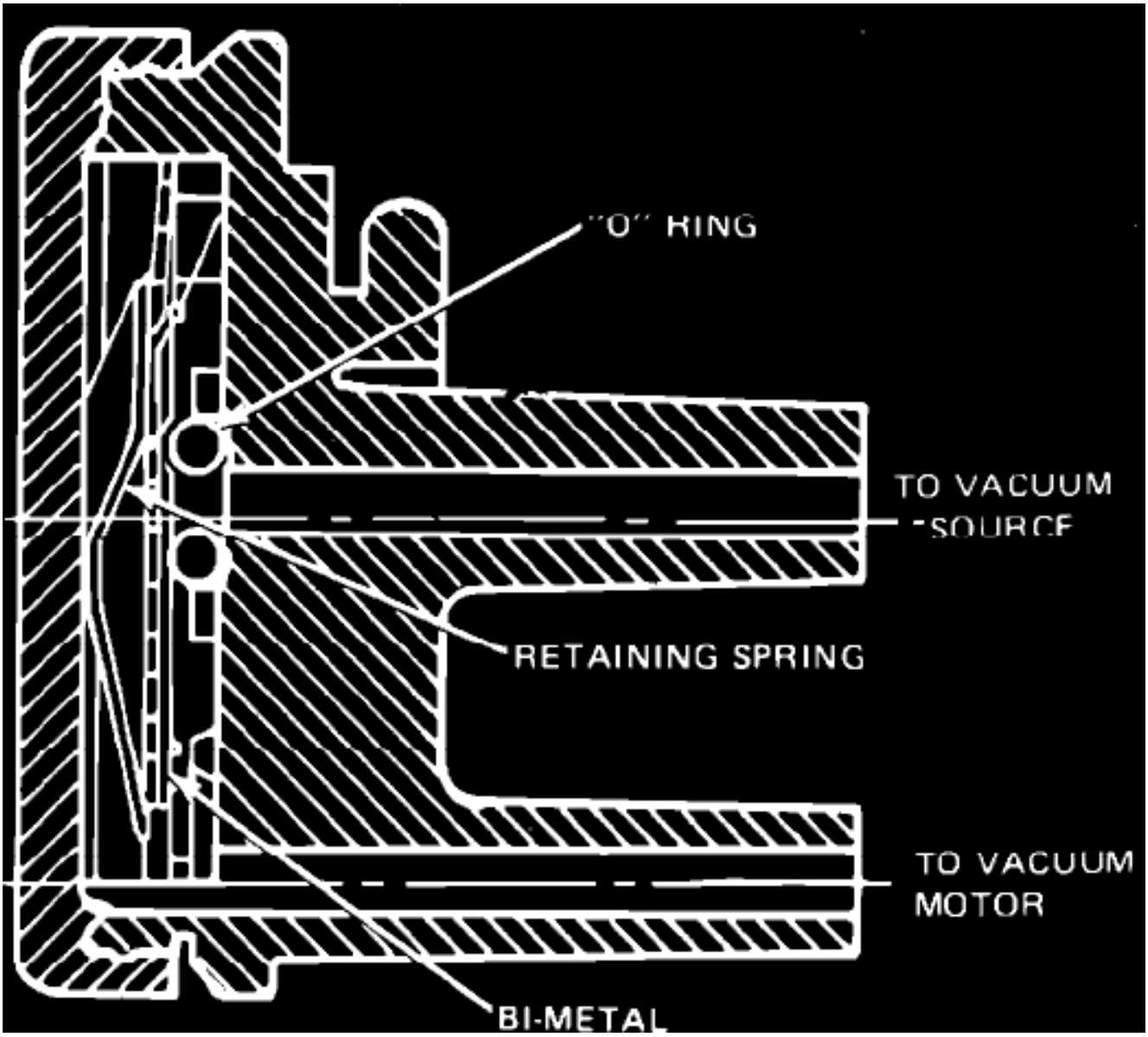

AIR INLET (TO AIR CLEANER)
REED VALVE (OPEN)
POSITION PRESSURE
NAGATIVE PRESSURE
REED VALVE (CLOSED)
TO EXHAUST MANIFOLD

Pulsed Secondary Air Injection: Description and Operation

Fig. 79 Thermactor II system (typical)

Fig. 80 Thermactor II pulse air valve operation

Some engines are equipped with this type of exhaust air injection system, Fig. 79, which does not have an air pump. The system uses the natural pulses of the exhaust system to draw air into the exhaust manifold. The system is regulated by a pulse air valve. The valve, Fig. 80, is connected to the air cleaner with a hose and to the exhaust manifold with a metal tube. Some pulse air valves closely resemble the standard Thermactor check valves, but are not interchangeable with them. When pressure inside the exhaust manifold is more than the pressure in the air cleaner, the reed in the pulse air valve is closed. When pressure in the exhaust manifold is lower than in the air cleaner, the reed opens and allows air to be drawn into the exhaust manifold.



Thermal Vacuum Valve: Description and Operation

Fig. 27 Temperature vacuum switch--TVS

This switch, Fig. 27, used on some vehicles, has a bimetal disc which locates itself in one of two positions, depending on its temperature. One position allows free air flow in the vacuum line; and the other blocks air flow by sealing itself against the O-ring. The switching temperature is below the range of normal engine operating temperature.

The TVS may be used to control the vacuum signal to the thermactor dump valve, to reduce emissions.

The normally open TVS may block the purge vacuum signal to provide satisfactory cold driveability and reduce cold engine emissions. It may be also used to hold off EGR operation during cold engine operation.

The normally closed TVS may allow cold spark advance to provide satisfactory cold engine driveability.

Thermal Vacuum Valve: Testing and Inspection Electric PVS High Temp Coolant Lock Out Vacuum

1975-82 Vehicles With Catalytic Converter

1. Disconnect vacuum line from air bypass valve to PVS valve at air bypass valve and connect to vacuum gauge.

2. With transmission in Park or Neutral and parking brake applied, start engine and allow to idle.

3. With engine at normal operating temperature, there should be a vacuum reading. If not, PVS is defective and should be replaced.

Thermal Vacuum Valve: Testing and Inspection Temperature Vacuum Switch (TVS)

1982-83

1. Apply 16 inches Hg to motor side of valve and trap. Cool to test temperature. Switch should hold vacuum as follows:

a. White TVS--normally open. At 40° F must hold 5 inches Hg for 30 seconds. Should not hold vacuum above 80° F. b. Brown TVS--normally open. At 5° F must hold 5 inches Hg for 30 seconds. Should not hold vacuum above 40° F. c. Purple TVS--normally open. At 30° F must hold 5 inches for 30 seconds. Should not hold vacuum above 60° F. d. Red TVS--normally closed. At 80° F or higher must hold 5 inches Hg for 30 seconds. Should not hold vacuum below 40° F.

Thermal Vacuum Valve: Testing and Inspection Thermactor PVS (With 2 Connectors)

PROCEDURE

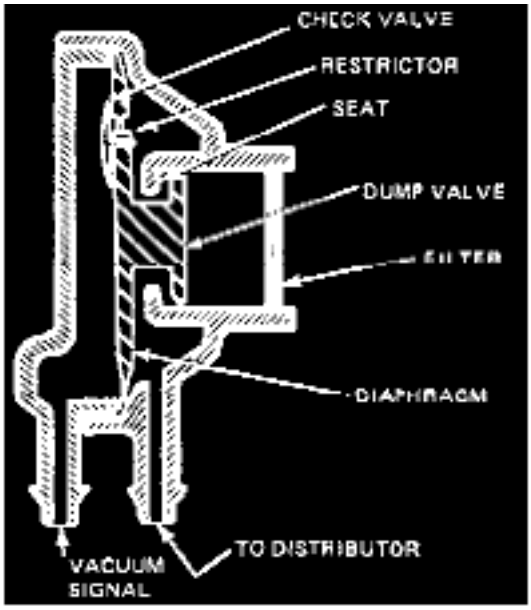
1. Disconnect both vacuum hoses at PVS valve. Connect vacuum gauge to bottom connector on PVS.

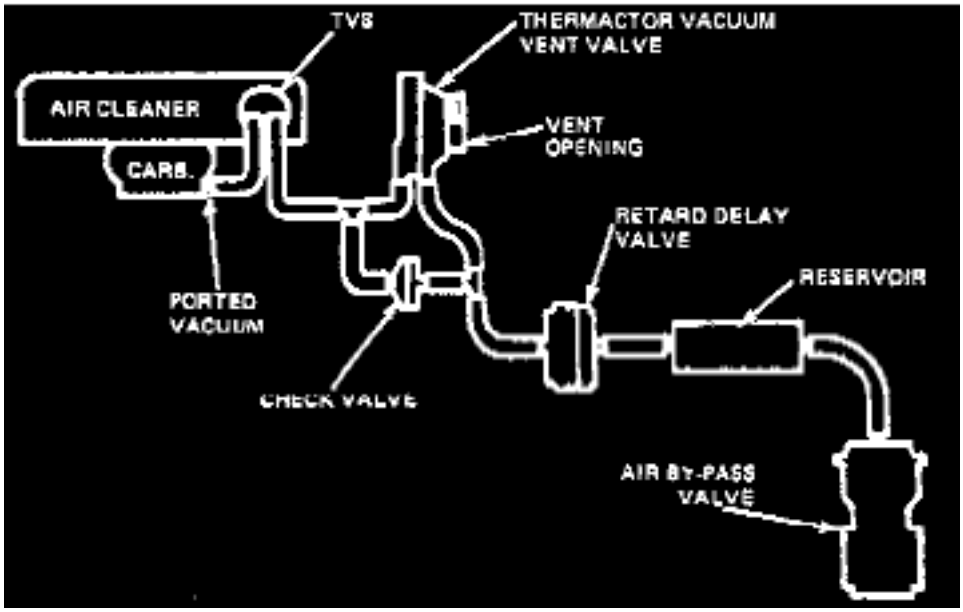
2. Using an external vacuum source, apply at least 10 inches Hg vacuum to top connector. With engine cold, there should be no vacuum reading. If

there is, replace PVS.

3. Start engine and allow to reach normal operating temperature. With 10 inches Hg vacuum applied, there should be a vacuum reading. If not, PVS

is defective and should be replaced.





Vacuum Check Valve: Description and Operation Thermactor Vacuum Vent Valve

Fig.86 - Thermactor Vacuum Vent Valve

Fig.87 - Thermactor Vacuum Vent Valve Schematic

DESCRIPTION

This valve, Figs. 86 and 87, is used on some 1978-82 engines equipped with variable venturi carburetor. It provides the air for the thermactor retard delay valve and air bypass valve during idle

modes to deactivate the thermactor system after a controlled period of time.

Application of vacuum from the carburetor to both ports of the thermactor vacuum vent causes the dump valve to seat and vacuum to be applied to the rest of the system. Removal of vacuum during idle modes results in unseating of the dump valve, opening of the vent and allowing air to enter the system to reduce the vacuum previously applied to the retard delay valve.

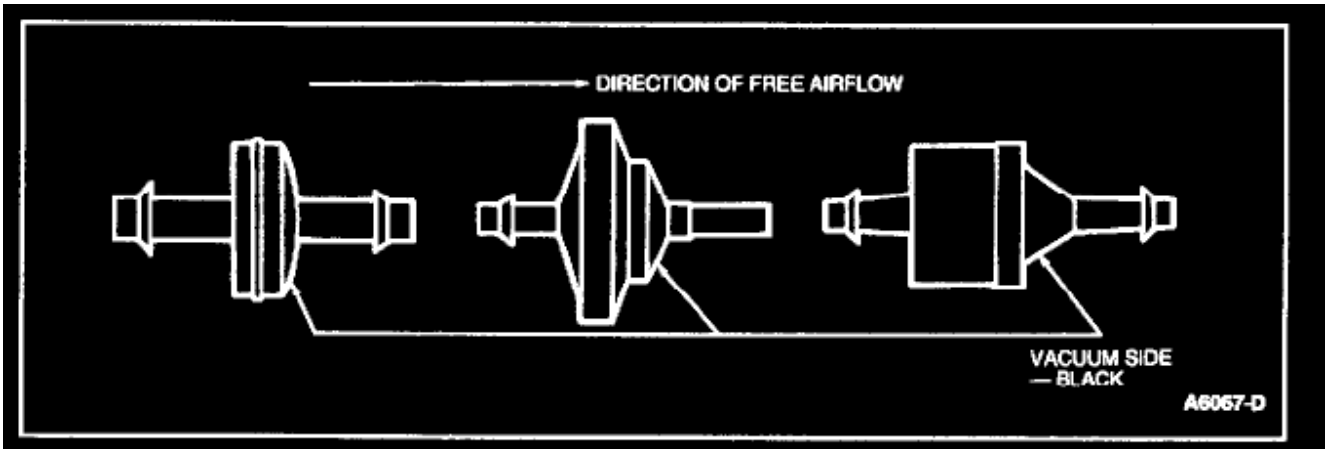


Figure 125: Vacuum Check Valve

Vacuum Check Valve: Description and Operation Vacuum Check Valve

Vacuum Check Valve

The vacuum check valve , Fig. 31, blocks air flow in one direction. It allows free air flow in the other direction. The check side of this valve will hold the highest vacuum on the vacuum side.

Vacuum Check Valve: Testing and Inspection Thermactor Vacuum Vent Valve

PROCEDURE

1. If necessary, remove air cleaner assembly.

2. Disconnect vacuum tubing or connector block from valve, noting location of tubing.

NOTE: It may be necessary to remove valve from bracket or air cleaner tray to gain access to vacuum ports on valve.

3. Connect the black vacuum port to a manifold vacuum source.

4. Connect an external vacuum source to white body vacuum port.

5. With engine idling in neutral, apply 10 inches Hg vacuum to white port and trap. If vacuum cannot be obtained, replace valve.

6. Remove manifold vacuum source line from black port. The trapped vacuum should drop to zero. If not, replace valve.

Vacuum Check Valve: Testing and Inspection Vacuum Check Valve

To check vacuum check valve, use a suitable hand held vacuum pump and apply 16 inches Hg vacuum to the check portion of valve. Maintain vacuum. If vacuum applied remains above 15 inches Hg vacuum for approximately 10 seconds, the vacuum check valve is operating properly. If not, replace vacuum check valve.

Vacuum Check Valve: Testing and Inspection Vacuum Reservoir Check Valve

NOTE:

This valve is used on some vehicles equipped with catalytic converter.

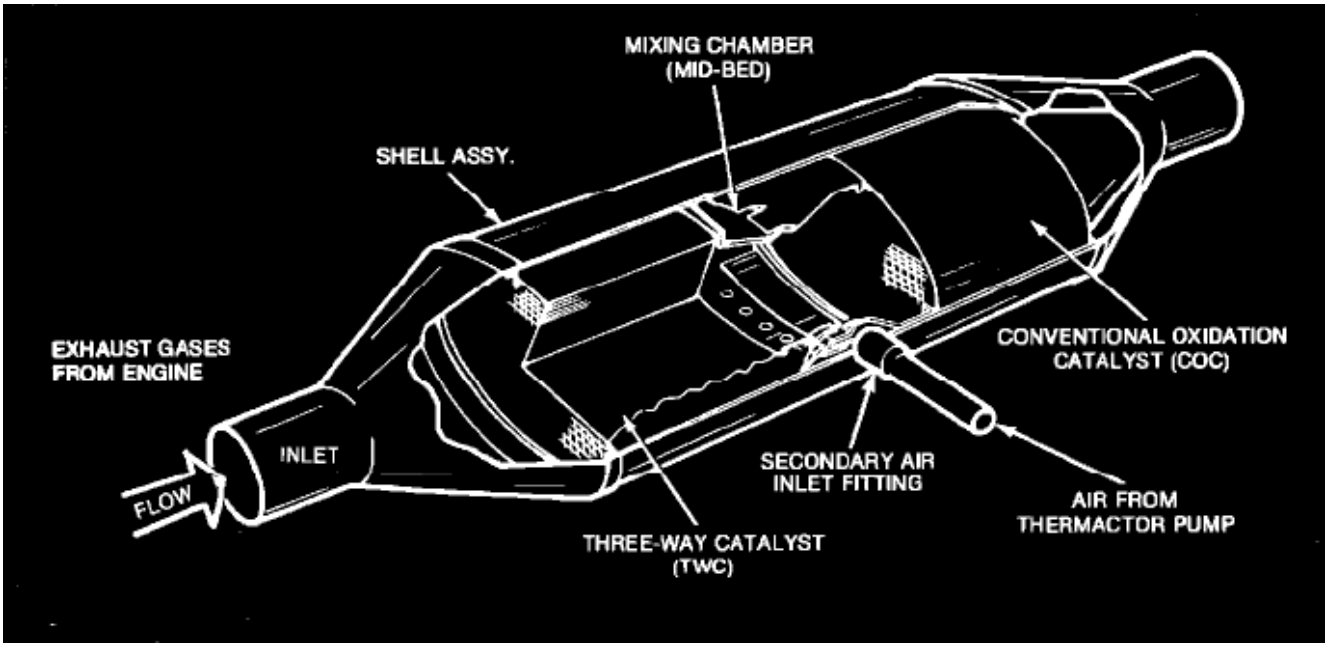
PROCEDURE

1. Disconnect vacuum hose on reservoir which connects to electric solenoid valve vacuum nipple.

2. Connect a 0-30 inch Hg vacuum gauge to reservoir using a suitable length of hose.

3. Disconnect manifold vacuum hose from reservoir and connect an external vacuum source to the nipple. Apply 14 inches Hg vacuum to reservoir

and trap. Vacuum reading on gauge should not drop more than 1 inch Hg in one minute. If it does, replace reservoir.

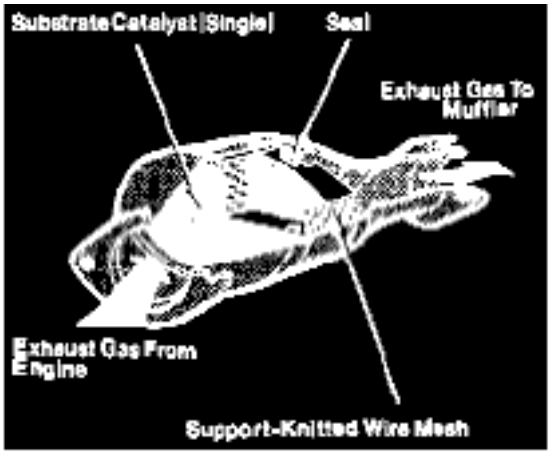


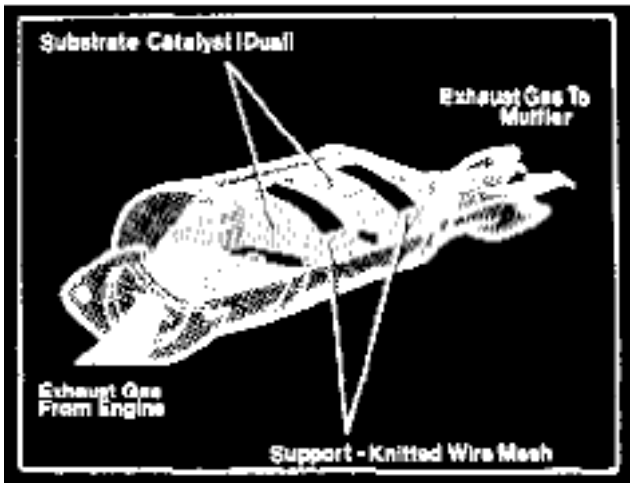
Catalytic Converter: Description and Operation Dual Catalytic Converter

Fig. 17 Dual catalytic converter

This converter consists of two catalytic converters in one shell, with a mixing chamber in between the two, Fig. 17. Each converter is composed of a ceramic ``honey comb'' coated with a rhodium/platinum catalyst designed to control oxides of nitrogen (NOx), unburned hydrocarbons (HC) and carbon monoxide (CO), and is therefore called a ``three way catalyst'' (TWC). The rear converter is coated with platinum catalyst and is called a ``conventional'' oxidation catalyst'' (COC) converter. The platinum catalyst is also called a ``two way catalyst'' since it only acts on two of the major pollutants, HC and CO.

The TWC converter acts on the exhaust gases from the engine. As the gases flow from the TWC to the COC converter, they mix with air from the thermactor pump injected into the mixing chamber or ``mid-bed''. This air is required for proper oxidation of HC and CO in the COC converter.





Catalytic Converter: Description and Operation General Description

Fig.8 - Catalytic Converter With Single Substrate Catalyst

Fig.9 - Catalytic Converter With Dual Substrate Catalyst

The catalytic converter is an emission control device added to the exhaust system to effectively reduce the levels of carbon monoxide (CO), hydrocarbons (HC), and in some cases oxides of nitrogen (NOx), entering the atmosphere. The converter permits a faster chemical reaction to take place and although it enters into the chemical reaction, it remains unchanged, ready to repeat the process.

The catalyst in these converters is structured in the form of a honeycomb monolithic composition, Figs. 8 and 9. The catalyst consists of a porous substrate of an inert material, coated with platinum and other noble metals (the catalytically active materials).

NOTE: Phase II Catalytic Converters or Dual Catalytic Converters which also control the NOx emissions, are used on some 1978-82 vehicles.

During engine operation, all of the exhaust gases flow through the converter where a chemical change takes place. This change causes the temperature inside the converter to be higher than the temperature of the exhaust gases when they leave the engine. Due to this increase in heat, the converter is insulated so that its outside temperature is about the same temperature as the muffler. However, due to its solid mass, the converter remains hot much longer than the muffler.

The body of the catalytic converter is made of stainless steel designed to last the life of the vehicle. Excessive heat can bulge or distort the converter. Since excessive heat built up is not the fault of the converter, the carburetion or ignition system should be checked whenever a converter is damaged by overheating.

Although all vehicles with catalytic converter must use unleaded fuel, small amounts of leaded fuel can be used in case of an emergency. To prevent adding leaded fuel, the fuel tank filler nozzle has a built-in restrictor.

Heat shields are used on some vehicles to protect chassis components, passenger compartment, and other areas from heat damage that may be caused by the catalytic converter.

TEST STEP	RESULT ▶	ACTION TO TAKE
B0 VISUAL INSPECTION		
• Visually inspect exhaust system. • **Is exhaust system visually OK?**	Yes ▶ No ▶	GO to [B1]. REPLACE any collapsed exhaust components. If problem is not corrected, GO to [B1].
B1 VACUUM TEST		
• Attach vacuum gauge to intake manifold vacuum source. • Hook up tachometer. • Start engine and gradually increase speed to 2000 rpm with transmission in NEUTRAL. • **Is the manifold vacuum above 16 inches of mercury?**	Yes ▶ No ▶	**No restriction in exhaust system. REFER to Diagnostic Routine Lack of Power, in Computerized Engine Controls.** GO to [B2].
B2 VACUUM TEST — EXHAUST DISCONNECTED		
• Turn engine Off. • Disconnect exhaust system at exhaust manifold(s). • Repeat vacuum test. • **Is the manifold vacuum above 16 inches of mercury?**	Yes ▶ No ▶	GO to [B3]. GO to [B4].

Catalytic Converter: Testing and Inspection

Blocked or restricted exhaust system usually results in lack of power or popping through the intake system. Verify that this condition is not caused by ignition timing problems, then proceed with diagnosis.

Catalyst and Exhaust Systems

TEST STEP	RESULT ▶	ACTION TO TAKE
B3 VACUUM TEST — CATALYTIC CONVERTER(S) ON/MUFFLER(S) OFF		
• Turn engine Off. • Reconnect exhaust system at exhaust manifold(s). • Disconnect muffler(s). • Repeat vacuum test. • **Is the manifold vacuum above 16 inches of mercury?**	Yes ▶ No ▶	REPLACE muffler(s). REPLACE catalytic converter and inspect muffler to be sure converter debris has not entered muffler.
B4 EXHAUST MANIFOLD RESTRICTED		
• Remove the exhaust manifold(s). Inspect the ports for casting flash by dropping a length of chain into each port. **NOTE: Do not use a wire or light to check ports. The restriction may be large enough for them to pass through but small enough to cause excessive back pressure at high engine rpm.** • **Is a restriction present?**	Yes ▶ No ▶	REMOVE casting flash. If flash cannot be removed, REPLACE exhaust manifold(s). **REFER to Diagnostic Routine Lack of Power, in Computerized Engine Controls.**

Catalyst and Exhaust Systems

EFE Valve: Mechanical Specifications

PVS Body Color Opening Temperature

Black 92-98 F

Blue 125-131 F

Purple 157-163 F

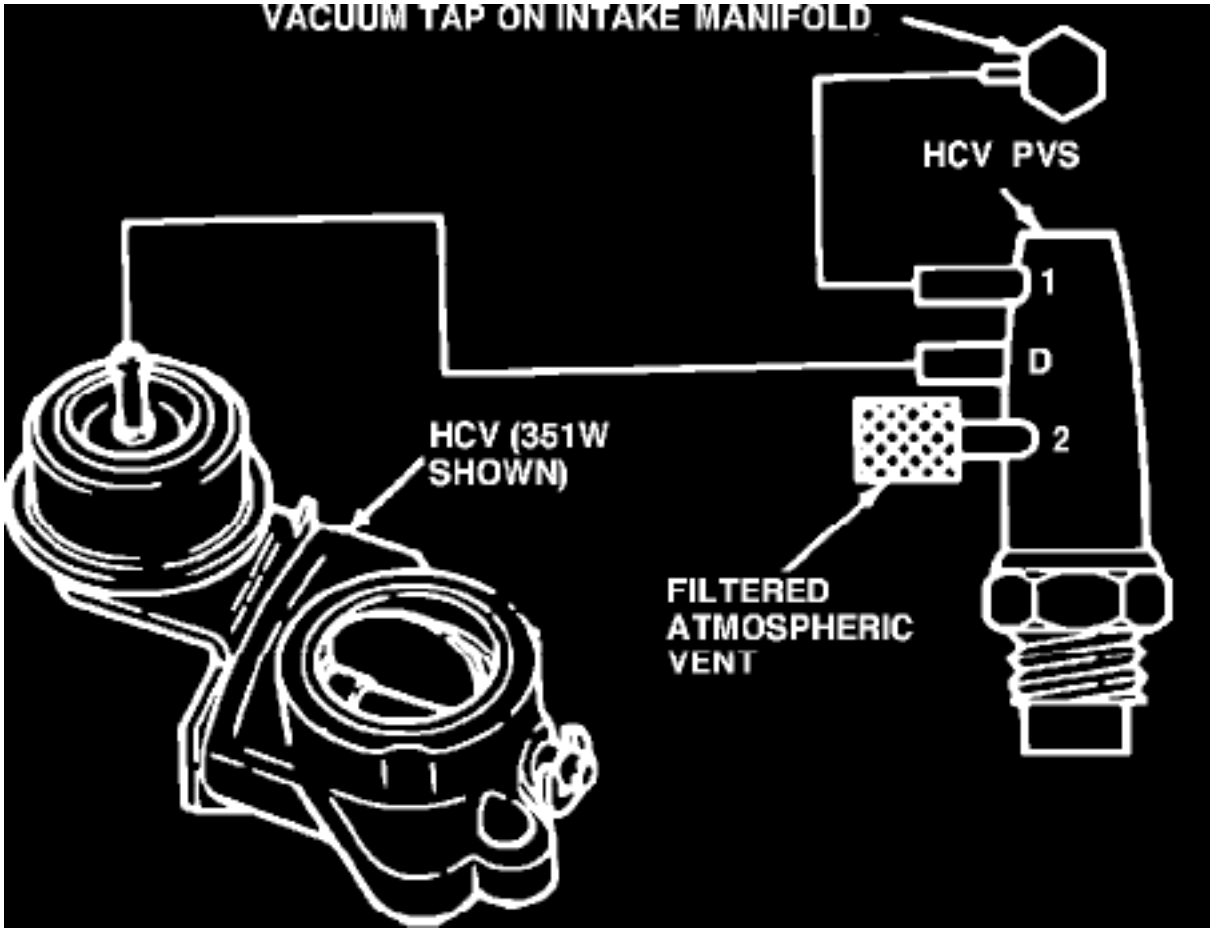
EFE Valve: Pressure, Vacuum and Temperature Specifications

PVS Body Color Opening Temperature

Black 92-98 F

Blue 125-131 F

Purple 157-163 F

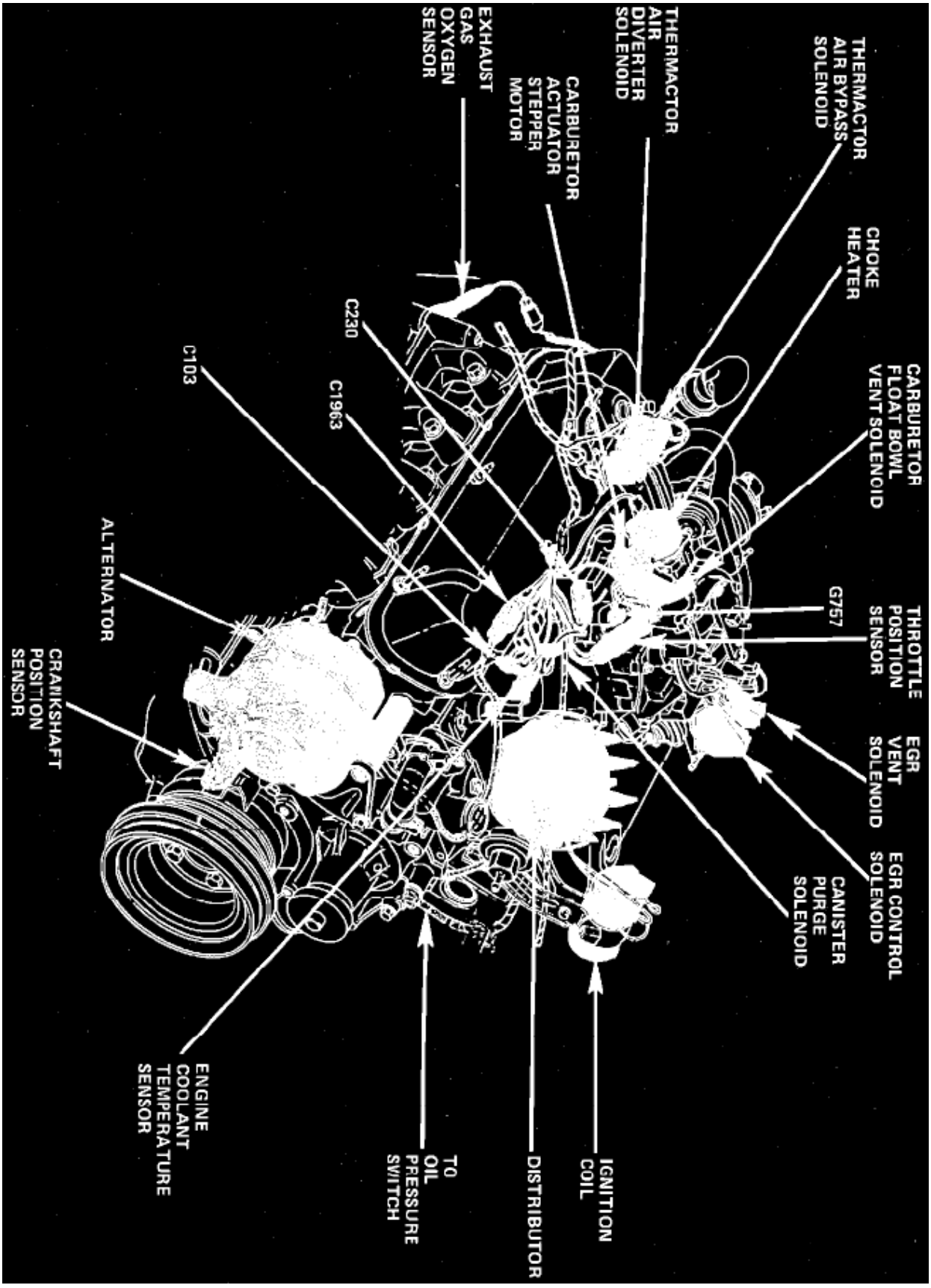


EFE Valve: Description and Operation

Fig. 16 Exhaust heat control valve--HCV

Used on some V8 engines, this system, Fig. 16, provides quick induction system warm-up for better cold engine fuel vaporization. A vacuum operated heat control valve mounted between the exhaust manifold and pipe, directs a portion of the exhaust gases through the intake manifold during engine warm-up. On cold starts, manifold vacuum is directed to the heat control valve (HCV) through the top two ports in HCV PVS (ported vacuum switch), closing the HCV. When engine coolant temperature reaches a predetermined value, the PVS closes off vacuum and vents the PVS allowing the HCV to close under spring tension. The three PVS valves used may be identified as follows:

Ford Bronco Workshop Manual (V8-351 5.8L VIN G 2-bbl (1982))
Ford Workshop Manuals > Powertrain Management > Emission Control Systems > Evaporative Emissions System > Bowl Vent Solenoid > Component Information > Locations

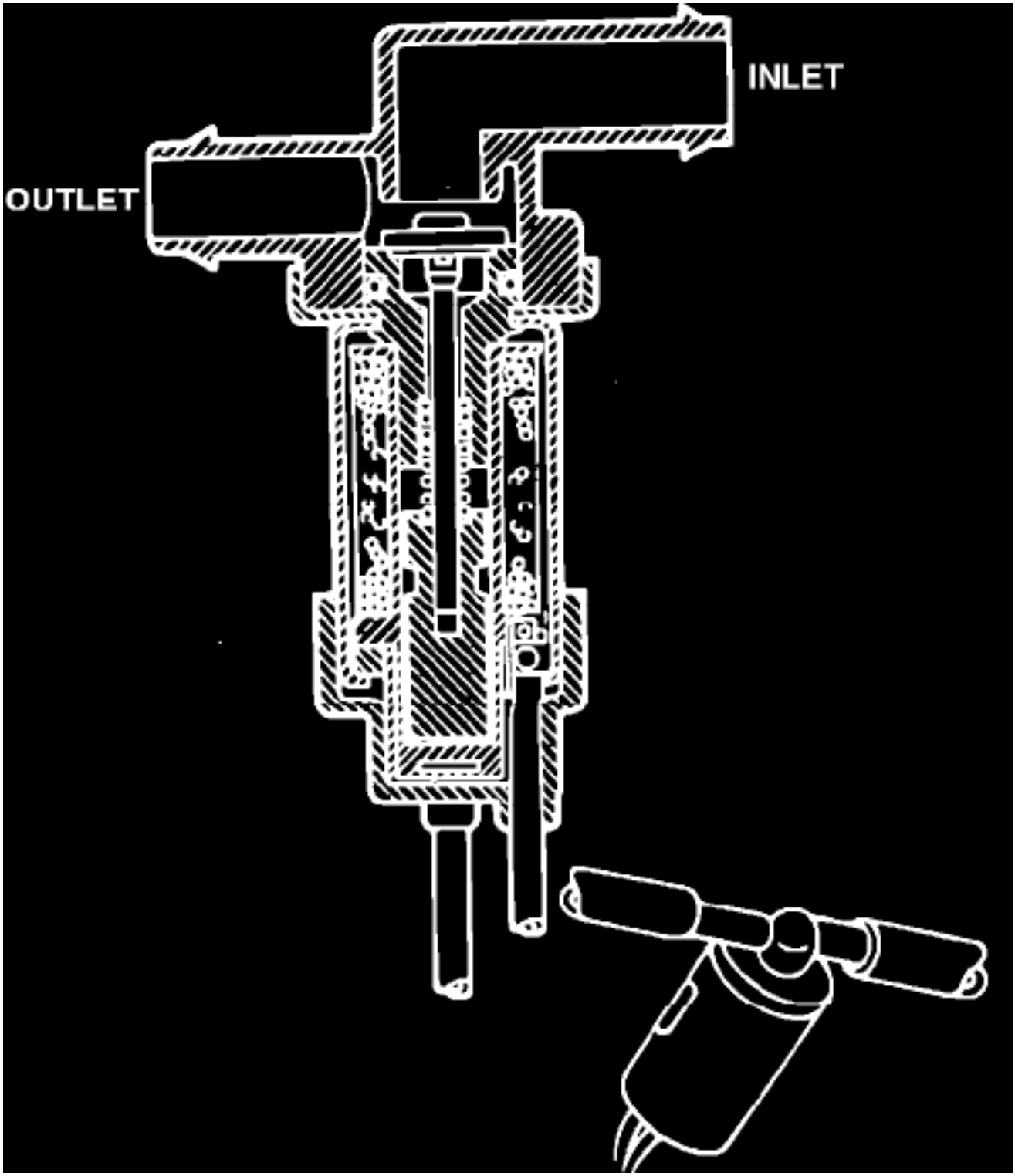


Bowl Vent Solenoid: Locations

Top RH Side Of Engine.

Mounted On Side Of Carburetor

Applicable to: 1982-83 V8-302/5.0L & V8-351/5.8L Engines w/EEC



Bowl Vent Solenoid: Description and Operation

Fig. 9 Carburetor fuel bowl solenoid vent valve

This valve, Fig. 9, used on some vehicles, is a normally open valve located in the fuel bowl vent line to the carbon canister. When the engine is running, the valve closes off the fuel bowl vent line. When the engine is shut off, the vent line returns to the normally open condition.

Bowl Vent Solenoid: Testing and Inspection

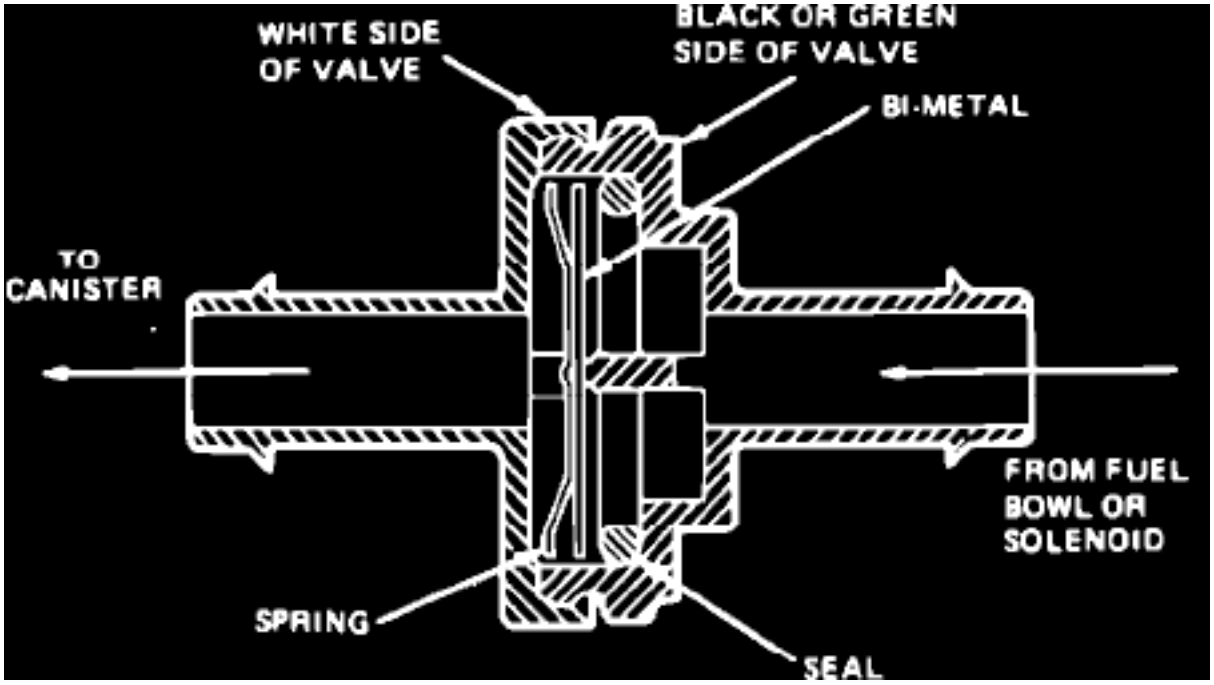
Apply 12 volts to valve. The valve should close, allowing no air to pass.

NOTE: If a lean fuel mixture is suspected of causing a problem, inspect either the solenoid vent valve or the fuel bowl vent valve for proper closing during engine operation. If the valve opens, allowing purged vacuum to affect fuel bowl balanced air pressure, the carburetor will give a leaner air/fuel mixture. On EEC equipped engines with a 7200 VV feedback carburetor (back-suction type only), the opposite (rich mixture) will result from an open or leaking valve.

CAUTION: The utmost care should be exercised when using a torch in the area of the fuel evaporation system as an open flame near these hoses may cause a fire and ultimate explosion.

NOTE: Vapor line hoses used in these systems are made from a special rubber material. Bulk service hoses are available for service and will be marked "EVAP". Ordinary fuel hoses should not be used. They are subject to deterioration and may clog system.

CAUTION: Installation of a fill cap from a non-emission fuel tank will render the system inoperative, since the non-emission fill cap is vented and the system must be sealed to function properly. Also if a non-vented fill cap is installed on a conventional tank, the result will be a serious deformation or a total collapse of the fuel tank.



Bowl Vent Valve: Description and Operation

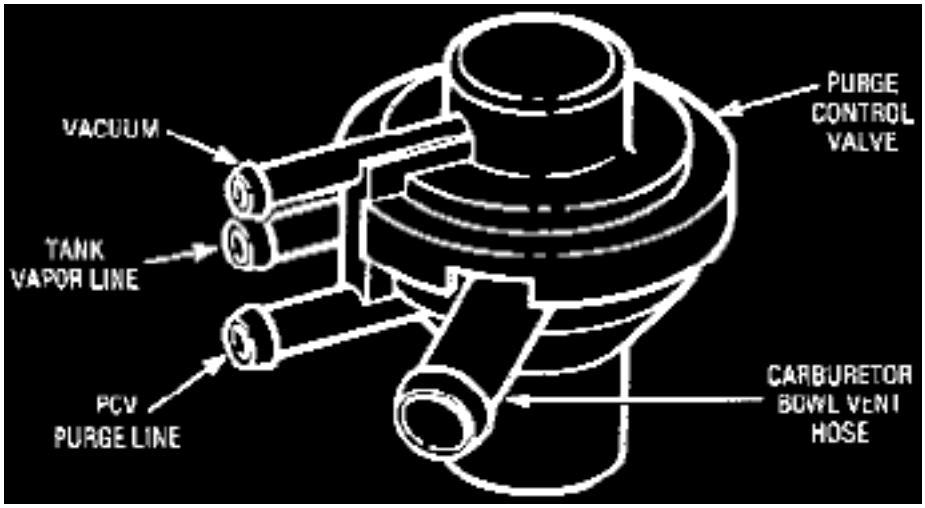
Fig. 10 Carburetor fuel bowl thermal vent valve

The thermal vent valve, Fig. 10, used on some vehicles, is a temperature actuated on/off valve, that is inserted in the carburetor to carbon canister vent line. This valve is closed when the engine compartment is cold, preventing fuel tank vapors, generated when the fuel tank heats up before the engine compartment, from being vented through the carburetor bowl.

Bowl Vent Valve: Testing and Inspection

1. With ambient temperature at or below 90° F, ensure that valve is fully closed.

2. With ambient temperature at or above 120° F, ensure that valve is fully open.



Canister Purge Control Valve: Description and Operation

Fig.55 - Purge Control Valve

DESCRIPTION

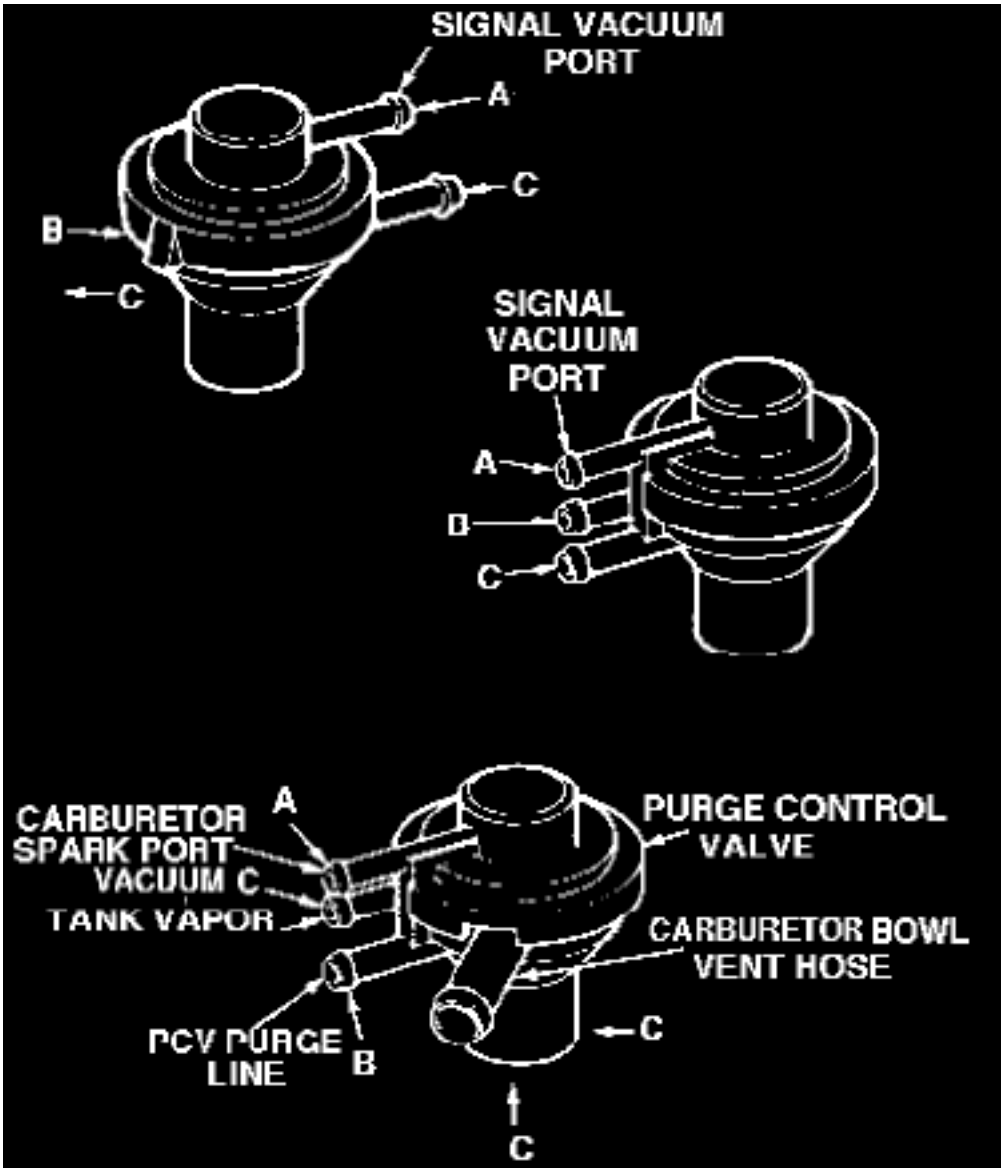
This valve, Fig. 55, is installed on the carbon canister and controls the flow of fuel vapors during various engine operating modes. The control is provided by a vacuum signal from either the spark port, EGR port or intake manifold and opens or closes the valve accordingly.

When the engine is off, the vapors from the fuel tank and carburetor fuel bowl are routed through the purge control valve and into the carbon canister for storage.

During normal cruise conditions, spark port or EGR vacuum is strong enough to open the orifice in the purge control valve to allow fuel vapors to flow from the carburetor canister through the purge line to a connection in the PCV tube or into the carburetor spacer. At the same time, the vapors from the fuel tank are also directed into the purge line.

At idle and low speed cruise conditions, spark port or EGR port vacuum is not strong enough to open the orifice in the purge control valve so that the fuel vapors are then routed to the carbon canister.

NOTE: On some vehicles fuel vapors are not purged during low engine speeds because the additional fuel vapors will affect the fuel air mixture, resulting in a reduction of idle quality and an increase in exhaust emissions. On vehicles not affected by this purging, manifold vacuum is used to actuate the purge control valve and control the purging of fuel vapors since spark port or EGR port vacuum is too weak.

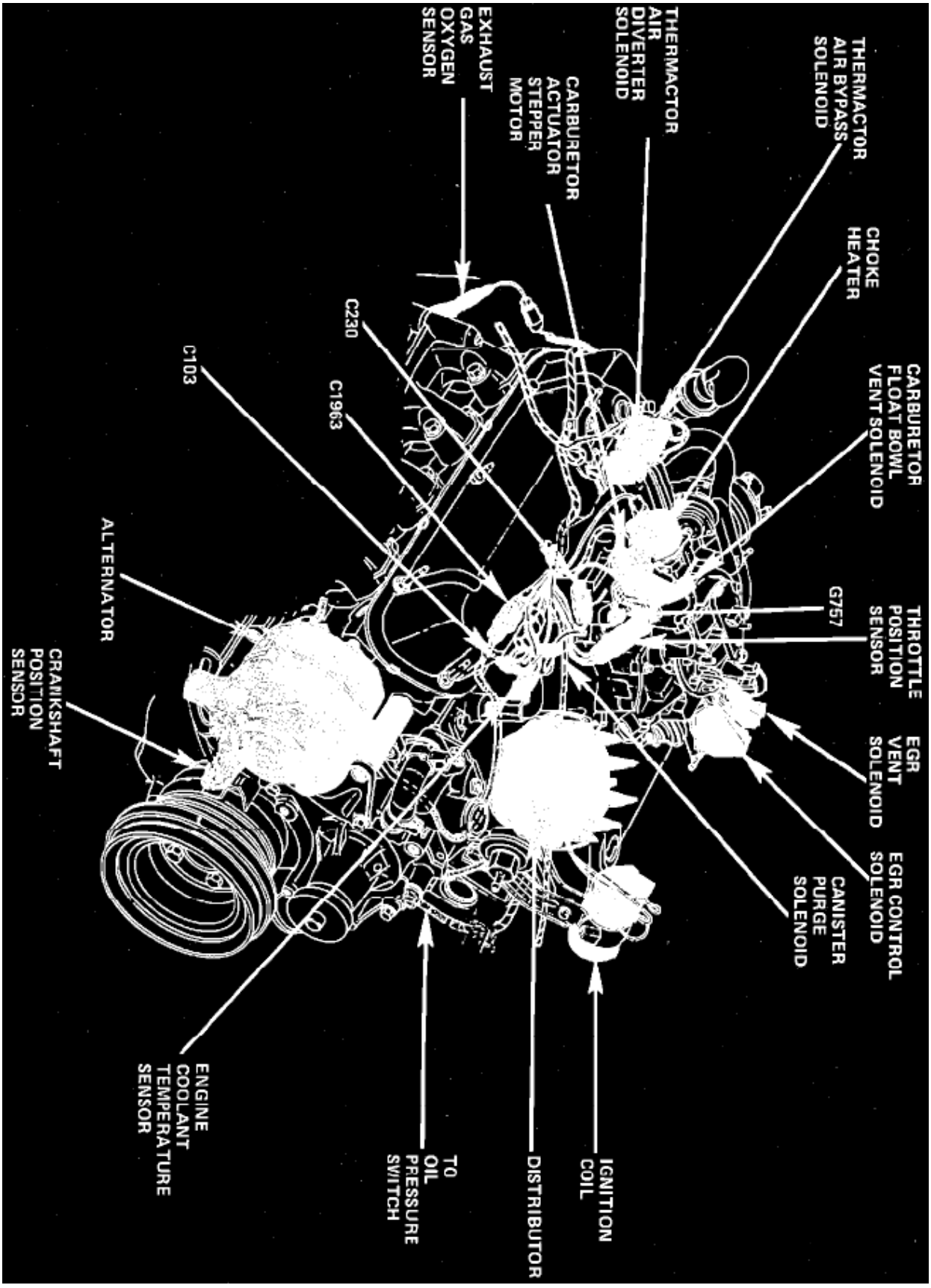


Canister Purge Control Valve: Testing and Inspection

Fig.63 - Purge Control Valves

Apply 16 inches Hg vacuum to port A. Air should pass between ports B and C.

Ford Bronco Workshop Manual (V8-351 5.8L VIN G 2-bbl (1982))
Ford Workshop Manuals > Powertrain Management > Emission Control Systems > Evaporative Emissions System > Canister Purge Solenoid > Component Information > Locations

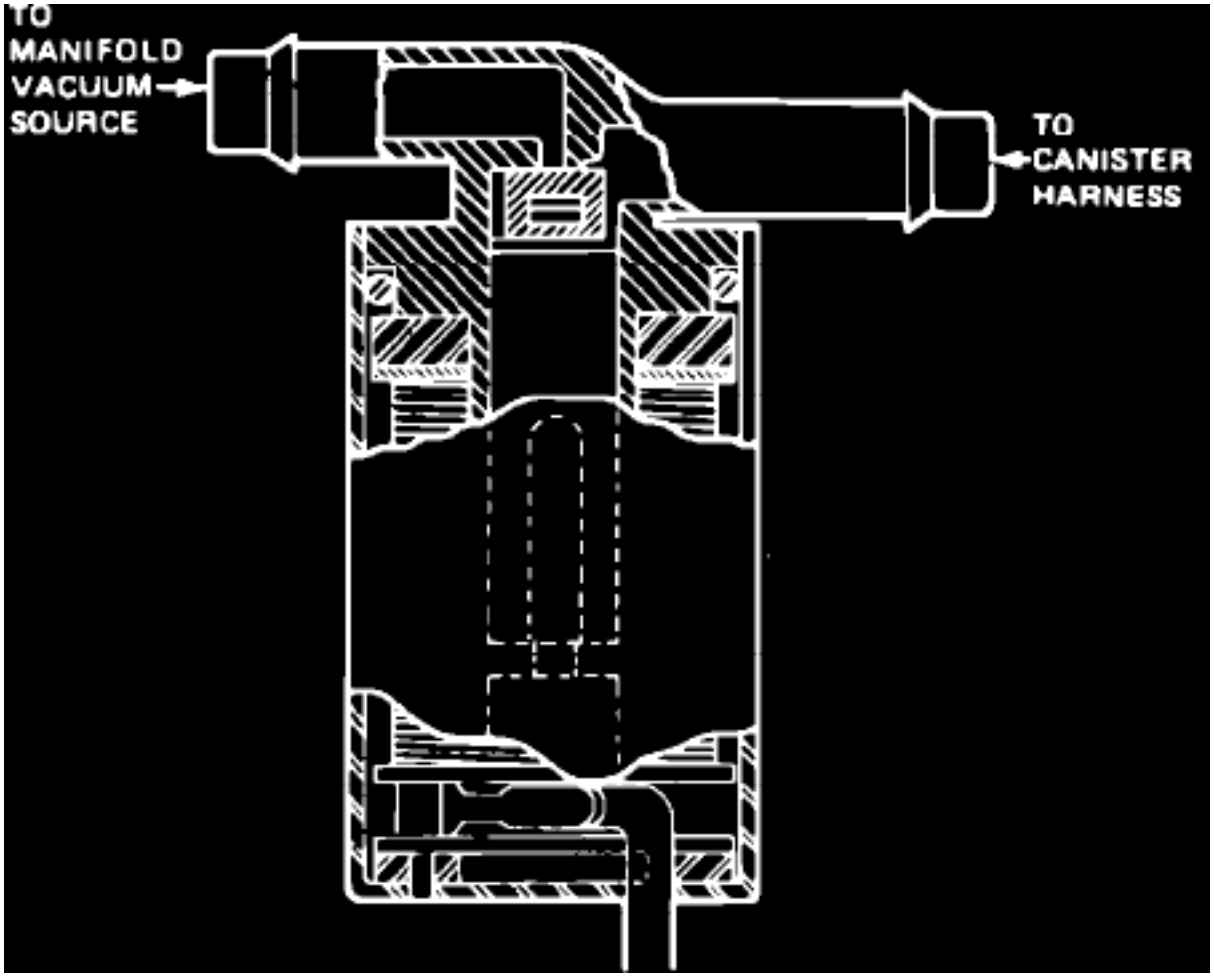


Canister Purge Solenoid: Locations

Top RH Side Of Engine.

RH Front Of Carburetor

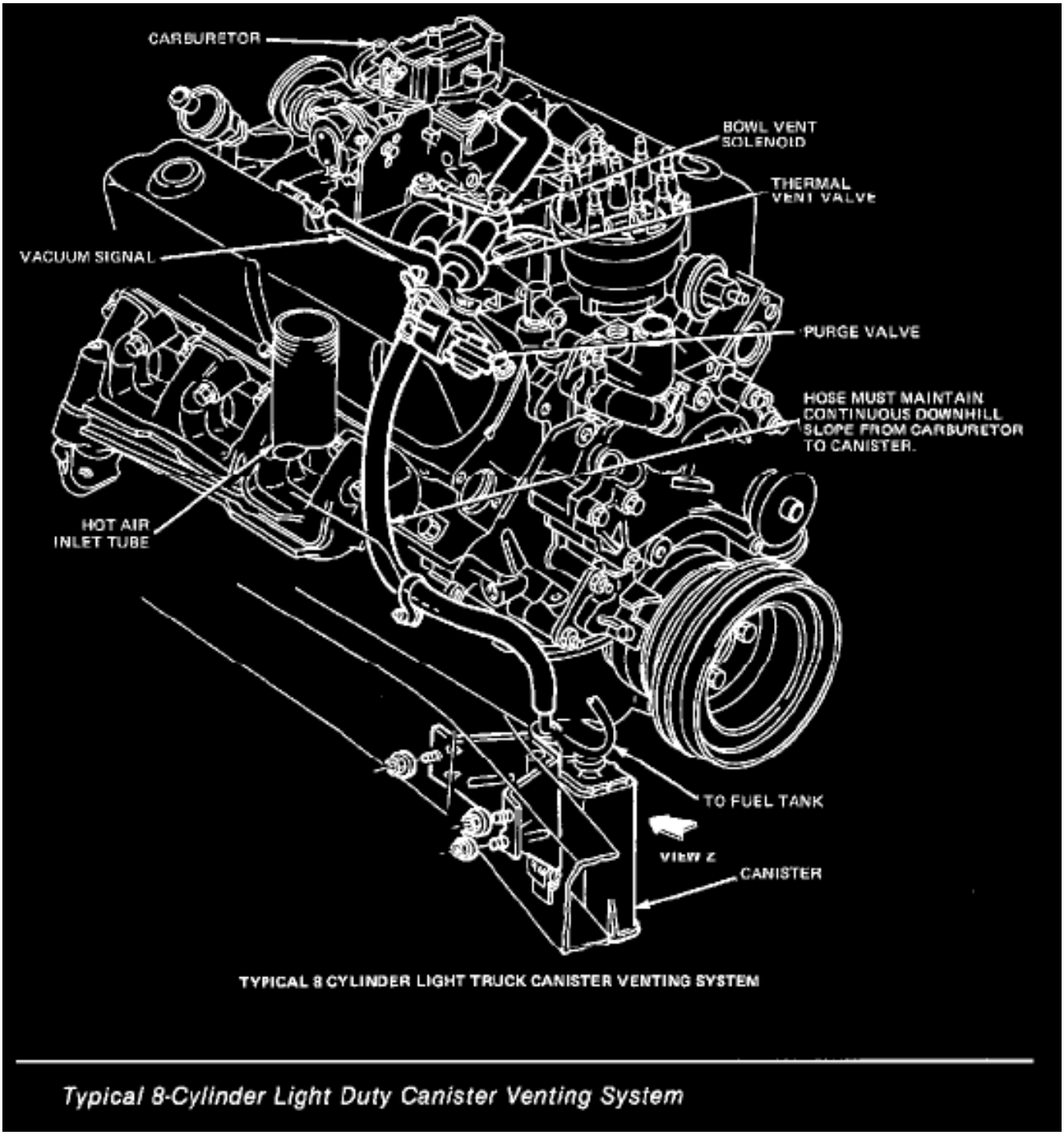
Applicable to: 1982-83 V8-302/5.0L & V8-351/5.8L Engines w/EEC



Canister Purge Solenoid: Description and Operation

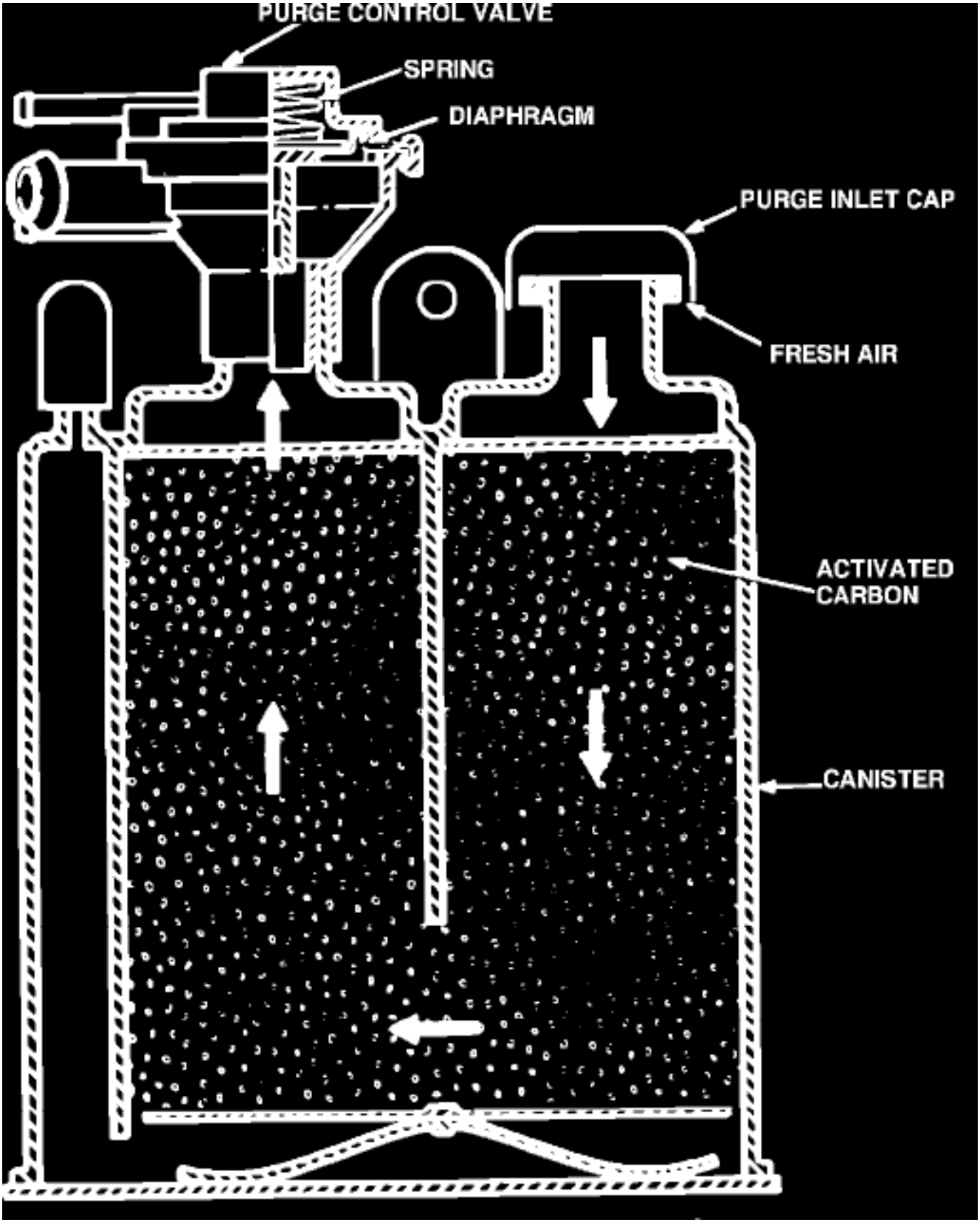
Fig. 52 Canister purge solenoid

This valve, Fig. 52, used on some vehicles, controls the flow of vapors from the carbon canister to the intake manifold during various engine operating modes. This is a normally closed valve that is opened by a signal from the electronic engine control assembly to control carbon canister purging.



Typical 8-Cylinder Light Duty Canister Venting System

Evaporative Emission Control Canister: Locations


PURGE CONTROL VALVE
SPRING
DIAPHRAGM
PURGE INLET CAP
FRESH AIR
ACTIVATED CARBON
CANISTER

Evaporative Emission Control Canister: Description and Operation

Fig. 53 Charcoal canister w/purge control valve

WITH PURGE CONTROL VALVE

The carbon canister stores fuel vapors from the fuel tank and carburetor until the engine is started. Fuel vapors enter the top of the purge side of the canister, Fig. 53, and travel in a ``U'' shape pattern to the fresh air vent side. Vapor flow to the engine is controlled by the purge control valve.

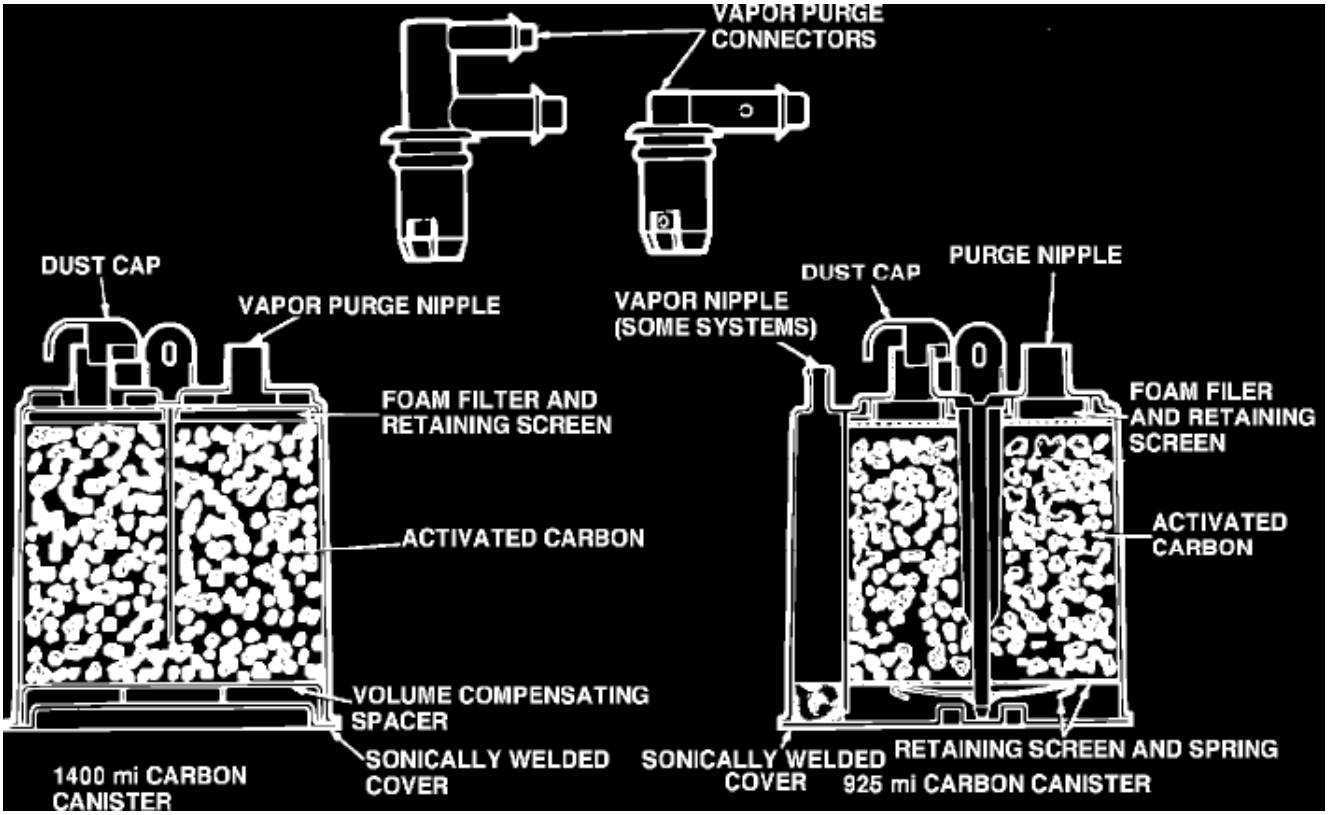
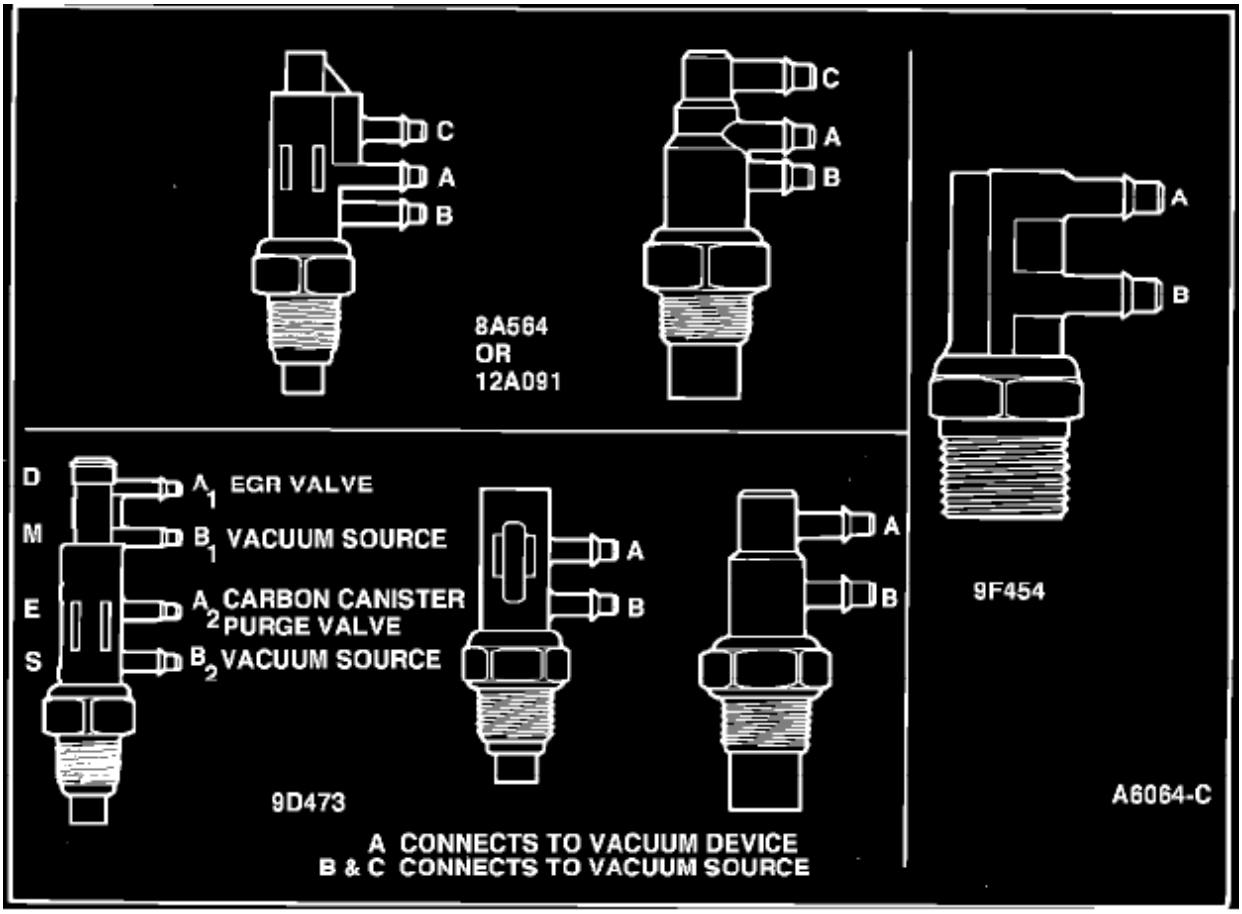


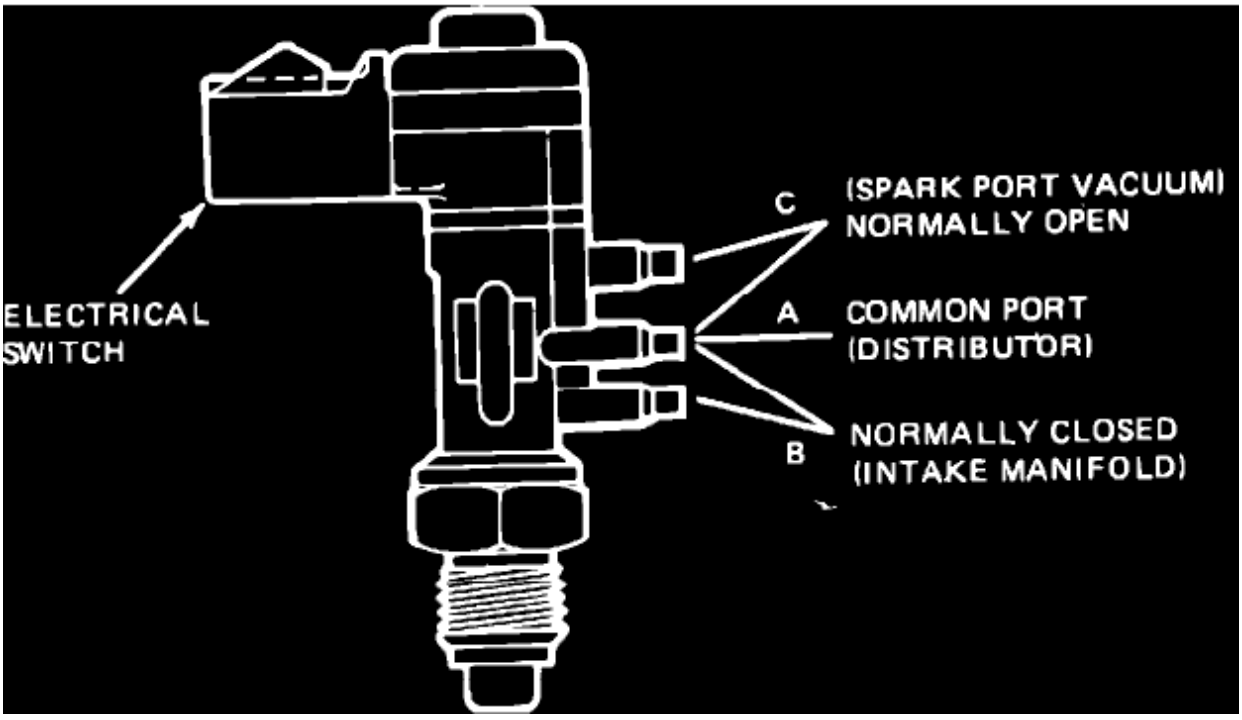
Fig. 54 Charcoal canister less purge control valve

WITHOUT PURGE CONTROL VALVE

The carbon canister, Fig. 54, stores fuel vapors from the fuel tank and carburetor bowl until the engine is started. At this time, fuel vapors are purged from the canister into the engine for combustion. Depending on application, either a 925ml or 1400ml canister is used.

On vehicles equipped with a dual canister system, two canisters are linked together and the second canister is used for ``spill over'' fuel vapors.


C
A
B
8A564
OR
12A091
C
A
B
A
B
9F454
D
M
E
S
A1 EGR VALVE
B1 VACUUM SOURCE
A2 CARBON CANISTER PURGE VALVE
B2 VACUUM SOURCE
A
B
A
B
9D473
A6064-C
A CONNECTS TO VACUUM DEVICE
B & C CONNECTS TO VACUUM SOURCE

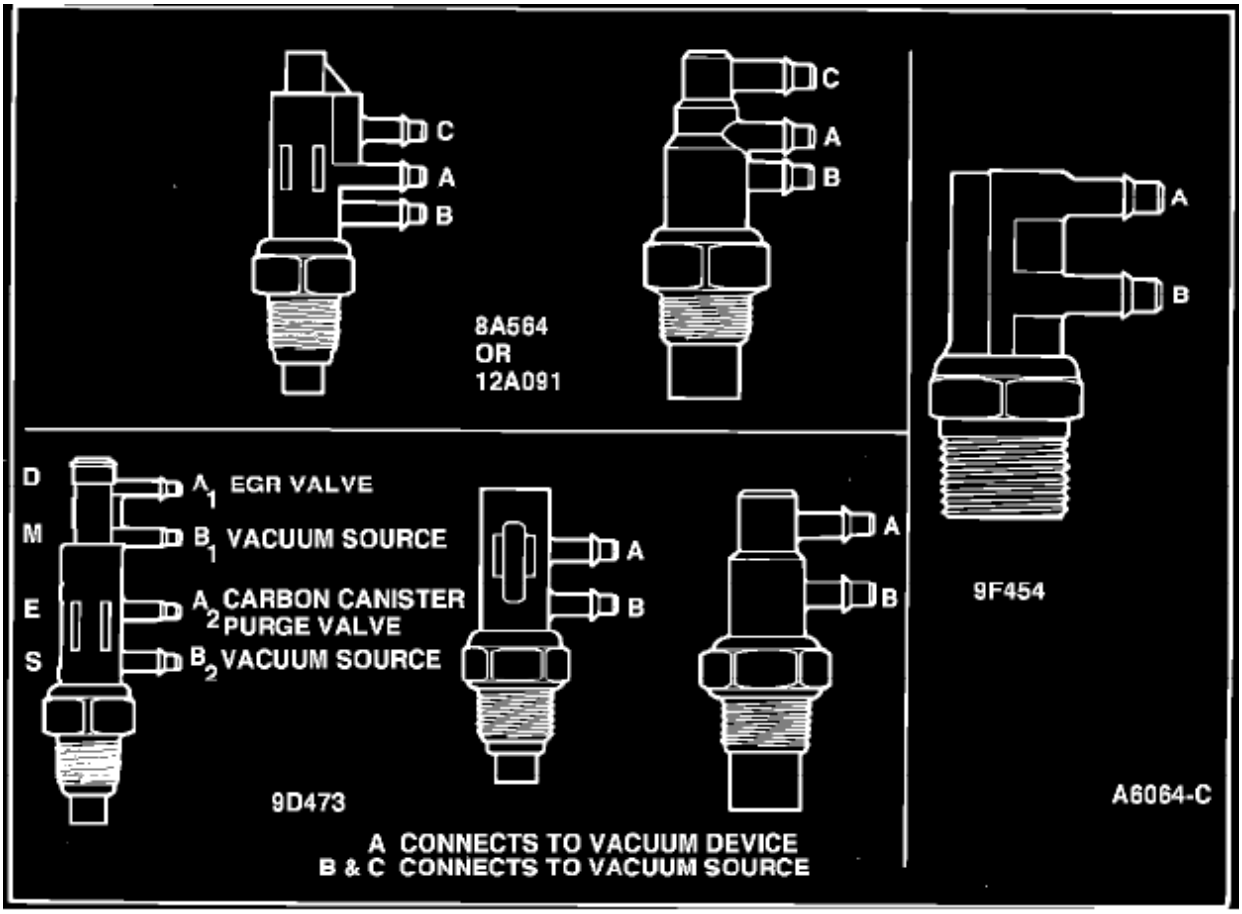

ELECTRICAL SWITCH
C
(SPARK PORT VACUUM)
NORMALLY OPEN
A
COMMON PORT
(DISTRIBUTOR)
B
NORMALLY CLOSED
(INTAKE MANIFOLD)

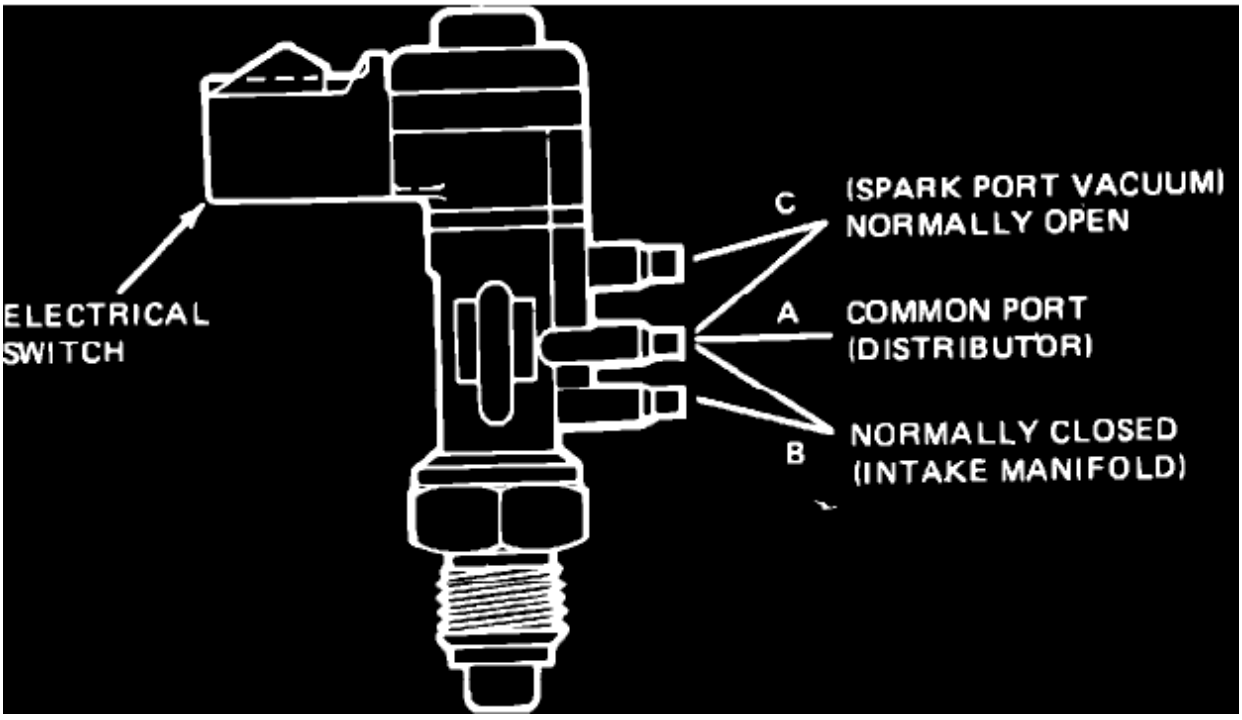
Thermal Vacuum Valve - EVAP: Description and Operation

Fig. 22 Ported vacuum switches & vacuum control valves

Fig. 23 Electrical vacuum switch

These switches, Figs. 22 and 23, used on some vehicles, control vacuum to emission components during engine warm-up.The 2-port and 4-port types open when coolant temperature reaches a predetermined value. The 3-port type switches vacuum from the center to the top or bottom ports. Electrical switches can be opened or closed until the PVS is fully cycled. All PVS units are temperature-activated and have a specific opening and closing temperature.


C
A
B
8A564
OR
12A091
C
A
B
A
B
9F454
D
M
E
S
A1 EGR VALVE
B1 VACUUM SOURCE
A2 CARBON CANISTER PURGE VALVE
B2 VACUUM SOURCE
A
B
9D473
A
B
A6064-C
A CONNECTS TO VACUUM DEVICE
B & C CONNECTS TO VACUUM SOURCE


ELECTRICAL SWITCH
C
(SPARK PORT VACUUM)
NORMALLY OPEN
A
COMMON PORT
(DISTRIBUTOR)
B
NORMALLY CLOSED
(INTAKE MANIFOLD)

Thermal Vacuum Valve - EVAP: Testing and Inspection

Fig. 22 Ported vacuum switches & vacuum control valves

Fig. 23 Electrical vacuum switch

VACUUM SWITCH TEST

1. With engine cold, turn ignition key to ``ON,'' connect vacuum gauge to port A, Figs. 22 and 23, and a vacuum source to port B and then C. There

should be no vacuum flow from A to B but there should be vacuum from A to C.

2. Start engine and run until it reaches normal operating temperature, then apply vacuum to port B and then port C. There should be vacuum from A

to B but no vacuum from A to C. On 4-port valve, check A1 to B1 and A2 to B2 separately.

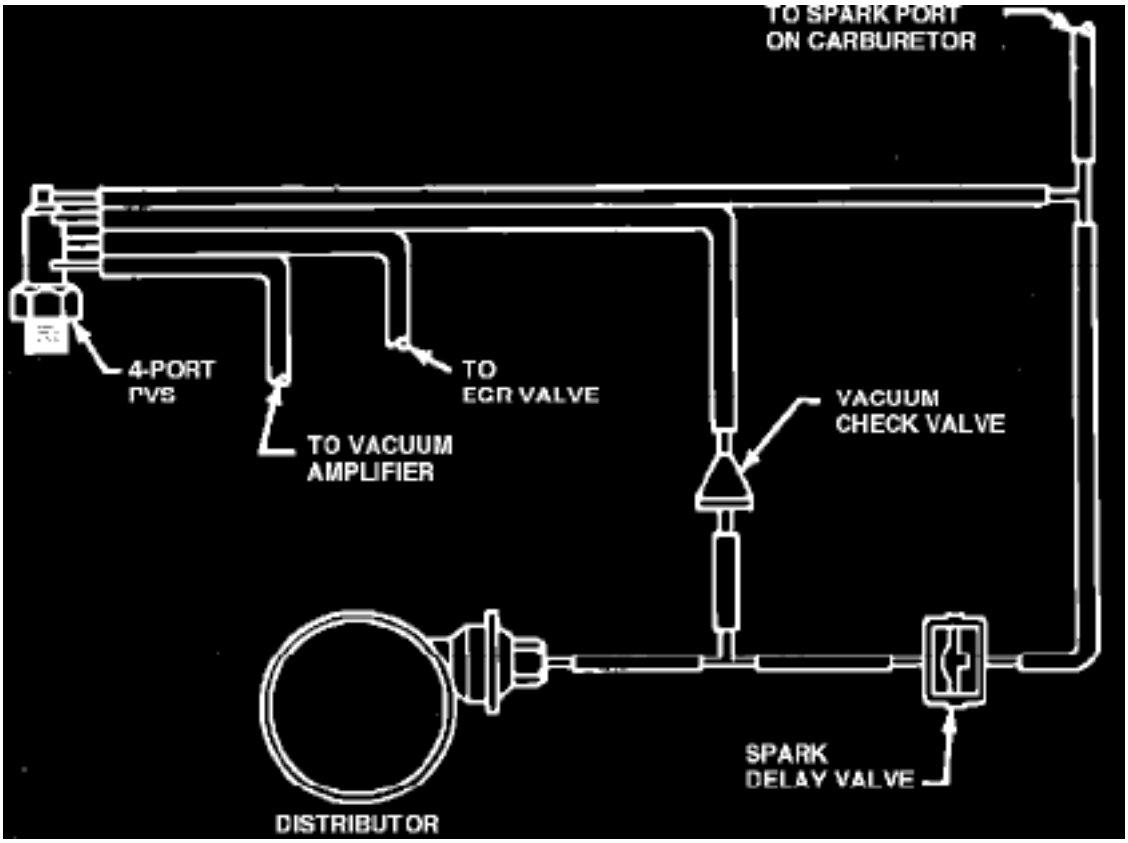
3. If vacuum flow is not as described, replace valve.

Vacuum Delay Valve: Description and Operation Cold Start Spark Hold (CSSH)

This system, used on some vehicles, provides momentary spark advance hold during acceleration when the engine is cold, to provide improved cold engine acceleration.

When engine coolant temperature is less than 128~ F, the CSSH PVS is closed and the distributor vacuum signal travels through the restrictor.

When the engine is started cold, high vacuum acts on the vacuum advance unit to provide maximum advance. During acceleration, the high vacuum in the vacuum advance unit is slowly bled down through the restrictor, providing a modified vacuum advance during the initial stage of acceleration.

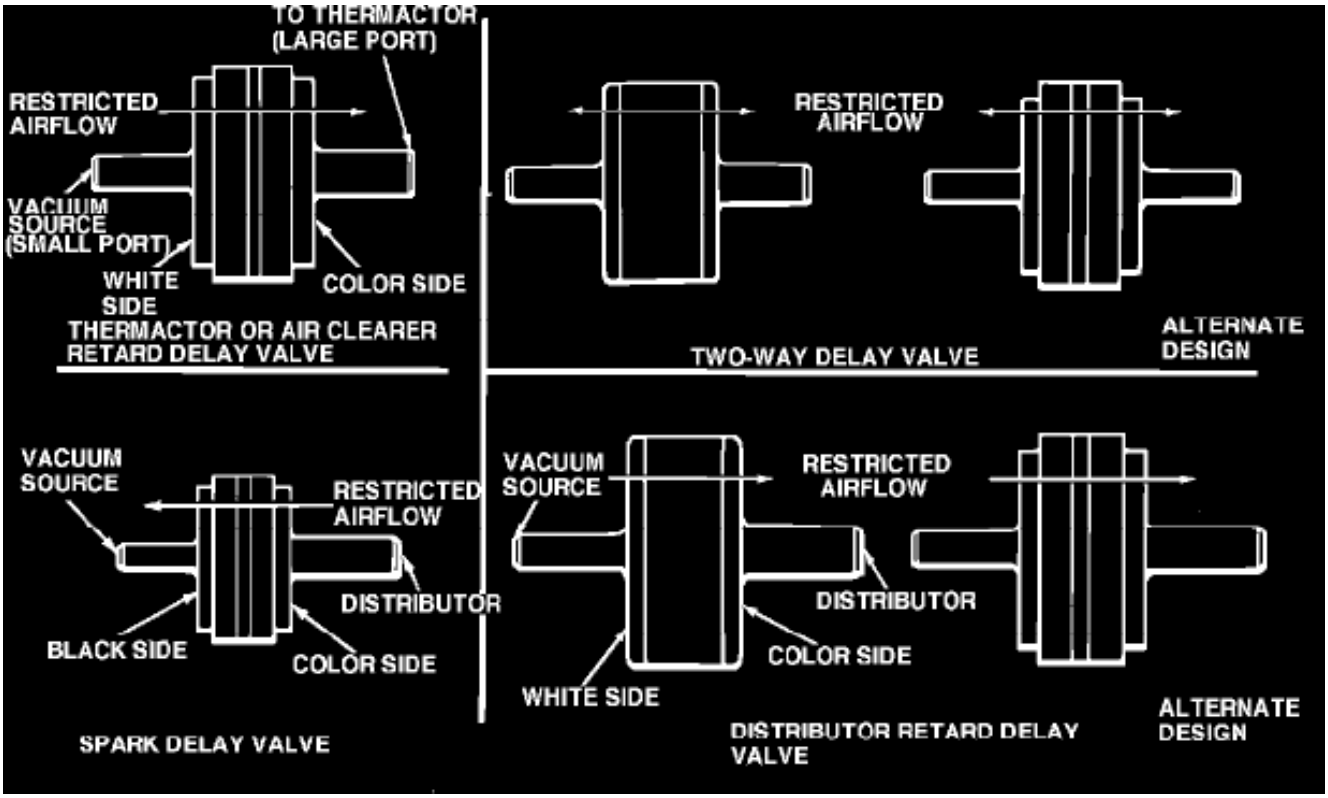


Vacuum Delay Valve: Description and Operation Delay Vacuum Bypass (DVB)

Delay vacuum bypass system - DVB

Some vehicles are equipped with a delay vacuum bypass system as a part of the spark delay system (SDV).

On all vehicles, Fig. 16, the DVB system is activated by a ported vacuum switch (PVS) and allows full spark port vacuum to the distributor vacuum advance when coolant is below PVS opening temperature. The system uses a spark delay valve (SDV), a check valve, and a 4 port PVS. When closed, the two bottom ports of the PVS are used. After opening, the top two ports are used, allowing vacuum to be routed through the SDV.



Vacuum Delay Valve: Description and Operation Vacuum Delay Valves

Fig. 32 Vacuum delay valve--VDV

This valve, Fig. 32, used on some vehicles, further reduces emissions by delaying the spark advance during rapid acceleration and by cutting off advance immediately upon deceleration. This is a one-way valve and will not operate if installed backwards.

On all systems which employ the dual diaphragm distributor, the line which has high vacuum at idle (normal operating temperature) is connected to the secondary (retard) side of the distributor vacuum advance unit. This is the connection closest to the distributor cap.

Vacuum Delay Valve: Testing and Inspection Cold Start Spark Advance System (CSSA)

NOTE:

If engine is pinging, perform steps 1 thru 4.

1. Connect tachometer and start engine.

CAUTION: Do not leave transmission in drive for more than 15 second while performing steps 2 and 4.

2. With parking brake applied, brake pedal depressed and transmission in drive, accelerate engine and observe RPM at which spark knock or pinging occurs.

3. Place transmission in neutral and accelerate engine to 1500 RPM to allow transmission to cool. Repeat this step three times.

4. Disconnect and plug vacuum advance line from distributor. Repeat step 2 to record RPM.

5. If spark knock or pinging reoccurred, stop engine and proceed to next step. If spark knock or pinging did not reoccur, the CSSA PVS and/or retard delay valve (if used) is faulty. Repair or replace as necessary.

6. Remove spark delay valve (SDV), or vacuum check valve, or spark delay valve and check as described further on.

7. Using a T-fitting, connect a vacuum gauge to distributor advance hose and disconnect and plug vacuum hose from bottom port of Cold Start PVS.

8. With engine idling at normal operating temperature, there should be no vacuum reading. If vacuum is obtained, the Cold Start PVS should be replaced.

9. Reconnect hose to bottom port of Cold Start PVS and disconnect and plug hose from top port of Cold Start PVS.

10. On vehicles with a cooling PVS, check vacuum at distributor with engine at normal idle. If reading is 2 inches Hg or less, the cooling PVS is operating properly. If vacuum reading is greater than specified, disconnect and plug the top vacuum line from the carburetor to the cooling PVS. If reading is still greater than specified, the cooling PVS should be replaced.

11. With engine idling in neutral, momentarily open the throttle half way.

12. Observe vacuum gauge for a quick rise and fall as throttle is opened and closed. If vacuum is obtained, the spark advance system is operating properly. If no vacuum is obtained, check vacuum line for leakage or obstruction and correct as necessary.

Vacuum Delay Valve: Testing and Inspection Delay Vacuum Bypass (DVB)

1. Remove air cleaner.

2. Remove spark delay valve. (Refer to Spark Delay Valve section for test procedure for this unit.) Replace spark delay valve with a connector. Remove vacuum line at distributor and install a vacuum line at distributor and install a T-fitting and a vacuum gauge.

3. With transmission in neutral and engine idling at normal operating temperature, open throttle to 1/2 open position.

4. Open and close throttle as noted in Step 3 while watching vacuum reading. A quick rise and fall should be noted. If vacuum is indicated, check the vacuum lines, evaporative canister purge valve. T-fitting, and carburetor vacuum port for blockage. Correct as necessary.

5. Turn off engine and replace the spark delay valve (tested before reinstalling as noted in Step 2). Remove vacuum gauge and T-fitting and replace vacuum hoses.

6. Remove vacuum check valve and test. (Refer to Spark Delay Valve section for test procedure for this unit). Replace if defective. Reinstall valve.

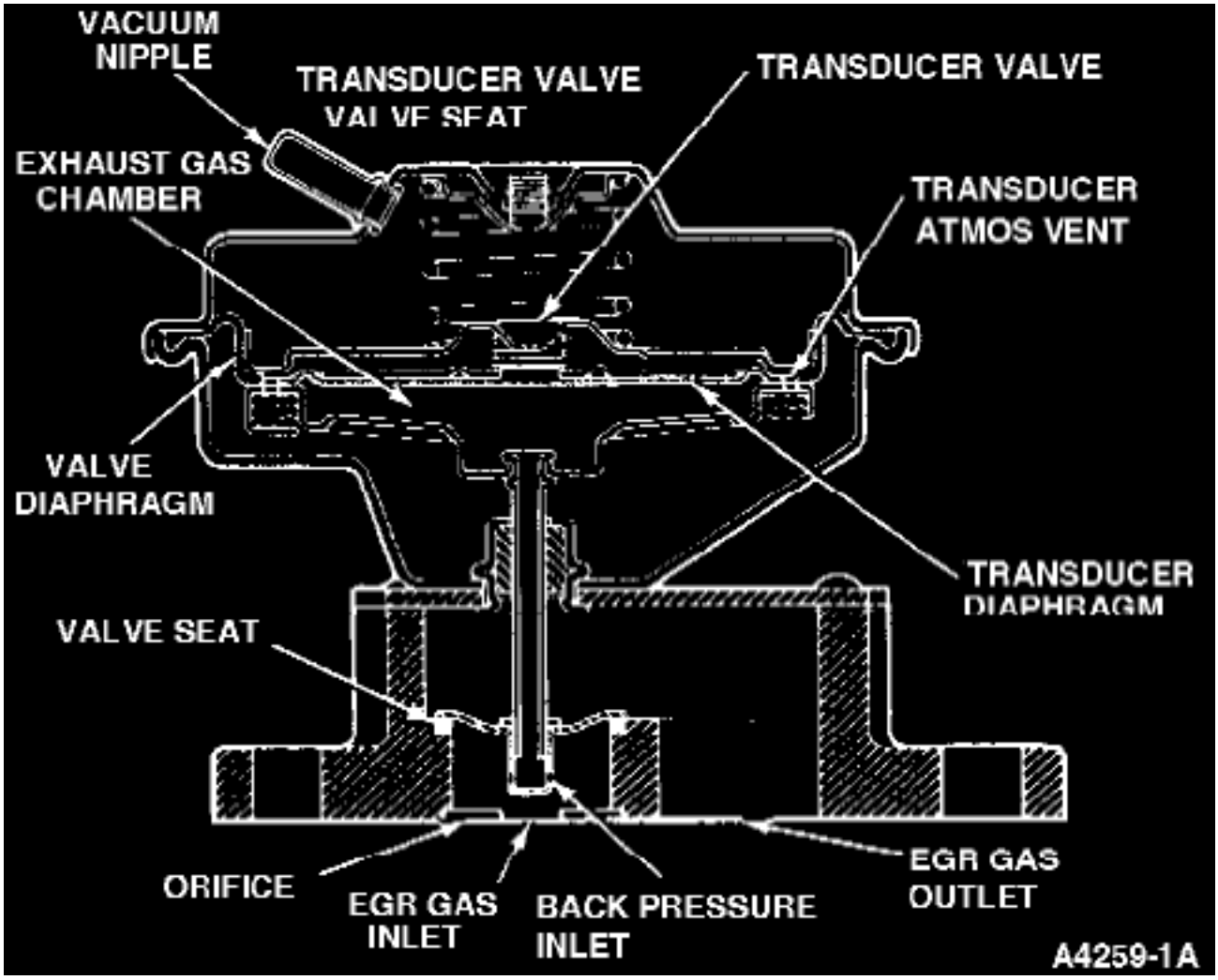
7. Install a T-fitting between the check valve and the PVS. Connect a vacuum gauge at this point.

8. With transmission in neutral and engine idling at normal operating temperature, open throttle to 1/2 position. Note vacuum reading at steady 1/2 throttle. If reading is 2 inches Hg or less, PVS unit is good. If more than 2 inches Hg is indicated, PVS is defective and must be replaced.

9. Remove vacuum gauge and return all vacuum lines to original location. Reinstall air cleaner assembly.

Vacuum Delay Valve: Testing and Inspection Vacuum Delay Valve

Using a suitable hand held vacuum pump, apply vacuum to both sides of valve. On valve with one side black or white and the other side a different color , vacuum should build up in one side but not the other. On valve with both side the same color, vacuum should build up on both sides before visibly decreasing. If valve does not function in this manner, it should be replaced.



EGR Backpressure Transducer: Description and Operation

Fig.49 - Integral EGR Valve Exhaust Back-pressure Transducer

This valve, Fig. 49, performs the same function as the non-integral back pressure transducer used on some systems. The valve assembly has an internal exhaust gas chamber with a transducer diaphragm which senses exhaust back pressure through a hollow stem. When back pressure is low, vacuum is bled through the transducer valve and the EGR valve stem remains closed. When back pressure increases, the transducer diaphragm moves up and closes the transducer valve vacuum bleed hole.

With the vacuum bleed closed, the EGR valve opens, allowing exhaust gas to flow into the intake manifold. Because the EGR outlet is always exposed to manifold vacuum and EGR gas inlet flow is restricted by an orifice, back pressure at the transducer drops when the EGR valve opens. When the back pressure drops, the vacuum bleed hole opens, closing the EGR valve and allowing pressure to build up again. The cycle is continually repeated, modulating the flow of exhaust gas into the intake manifold.

EGR Control Solenoid: Technical Service Bulletins EGR Solenoids - Contamination

Article No. 85-13-5

EGR SOLENOIDS - CONTAMINATION

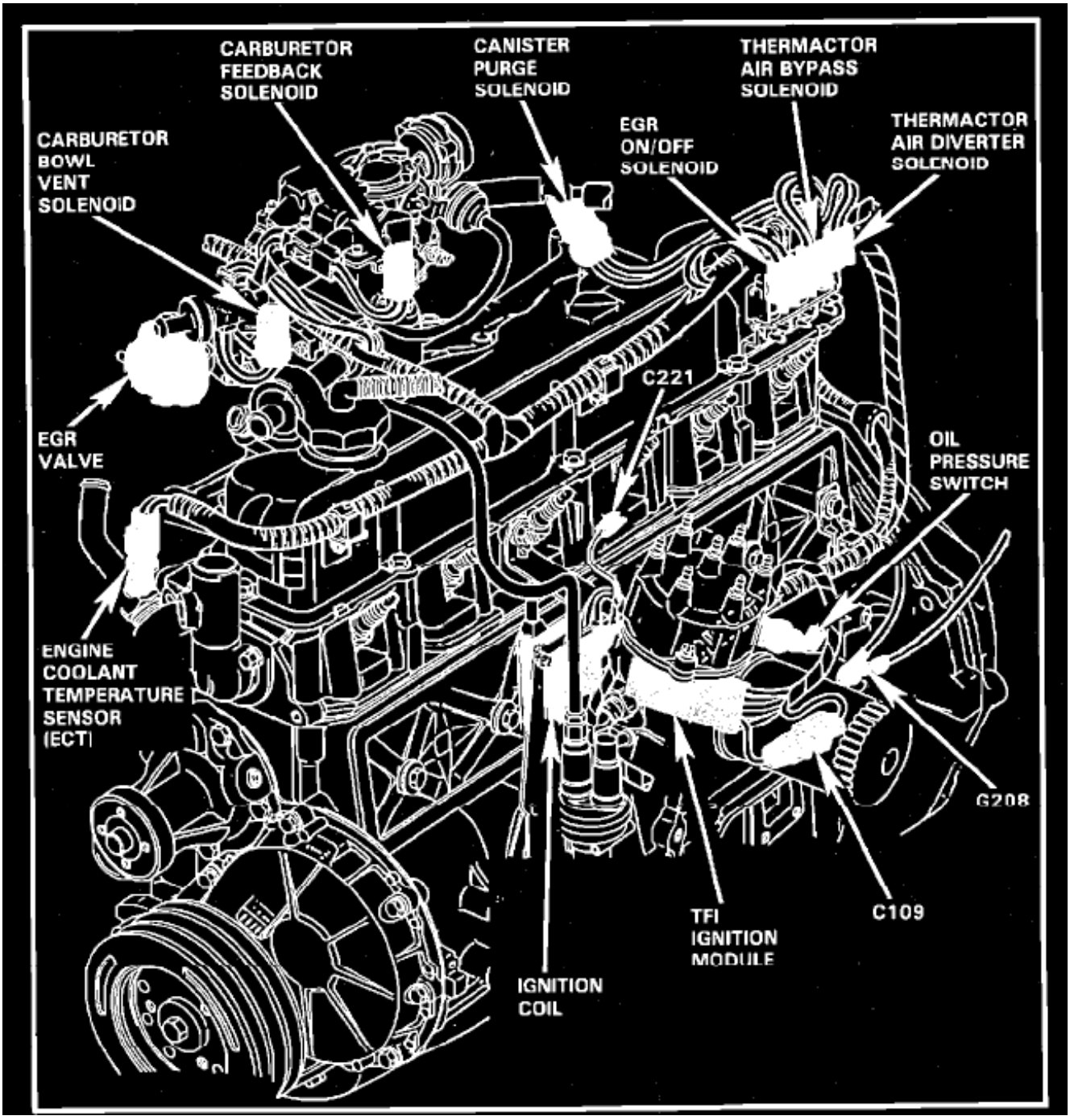
FORD 1980-1985 ALL WITH ELECTRONIC EGR CONTROL AND VENT SOLENOIDS

LINCOLN-MERCURY 1980-1985 ALL WITH ELECTRONIC EGR CONTROL AND VENT SOLENOIDS

The use of starter fluids (ether and xylene), choke and/or fuel injector cleaners, can contaminate the EGR control and vent solenoids EGRC/EGRY. These solvents may affect the upper elastomer tip of the solenoid armature, causing an inoperative condition.

Care must also be used to avoid getting these starter fluids into the vacuum harness, and contaminating these emission components in this way.

OTHER APPLICABLE ARTICLES: None WARRANTY STATUS: "INFORMATION ONLY"



EGR Control Solenoid: Locations

LH Side Of Engine.

Attached To Valve Cover

Applicable to: 1985 6-300/4.9L Engine w/EEC IV (Under 8500 Lbs. GVW)

EGR Electronic Vacuum Regulator Solenoid: Technical Service Bulletins EGR Solenoids - Contamination

Article No. 85-13-5

EGR SOLENOIDS - CONTAMINATION

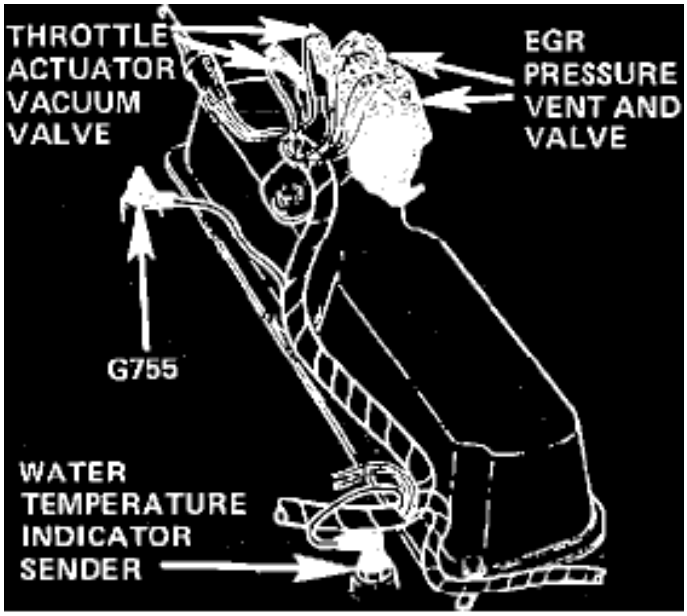
FORD 1980-1985 ALL WITH ELECTRONIC EGR CONTROL AND VENT SOLENOIDS

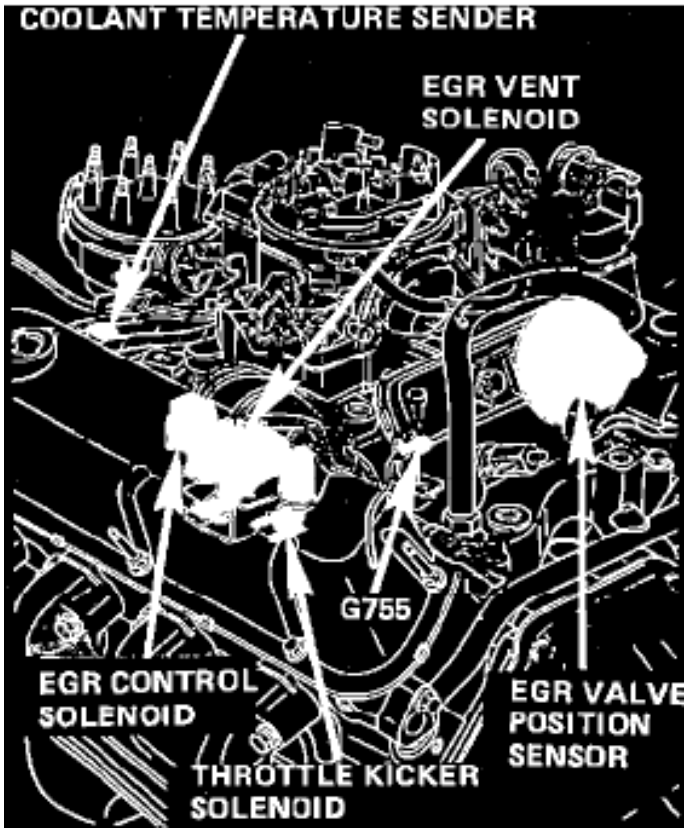
LINCOLN-MERCURY 1980-1985 ALL WITH ELECTRONIC EGR CONTROL AND VENT SOLENOIDS

The use of starter fluids (ether and xylene), choke and/or fuel injector cleaners, can contaminate the EGR control and vent solenoids EGRC/EGRY. These solvents may affect the upper elastomer tip of the solenoid armature, causing an inoperative condition.

Care must also be used to avoid getting these starter fluids into the vacuum harness, and contaminating these emission components in this way.

OTHER APPLICABLE ARTICLES: None WARRANTY STATUS: "INFORMATION ONLY"


THROTTLE ACTUATOR VACUUM VALVE
EGR PRESSURE VENT AND VALVE
G755
WATER TEMPERATURE INDICATOR SENDER


COOLANT TEMPERATURE SENDER
EGR VENT SOLENOID
G755
EGR CONTROL SOLENOID
THROTTLE KICKER SOLENOID
EGR VALVE POSITION SENSOR

EGR Electronic Vacuum Regulator Solenoid: Locations

RH Side Of Engine.

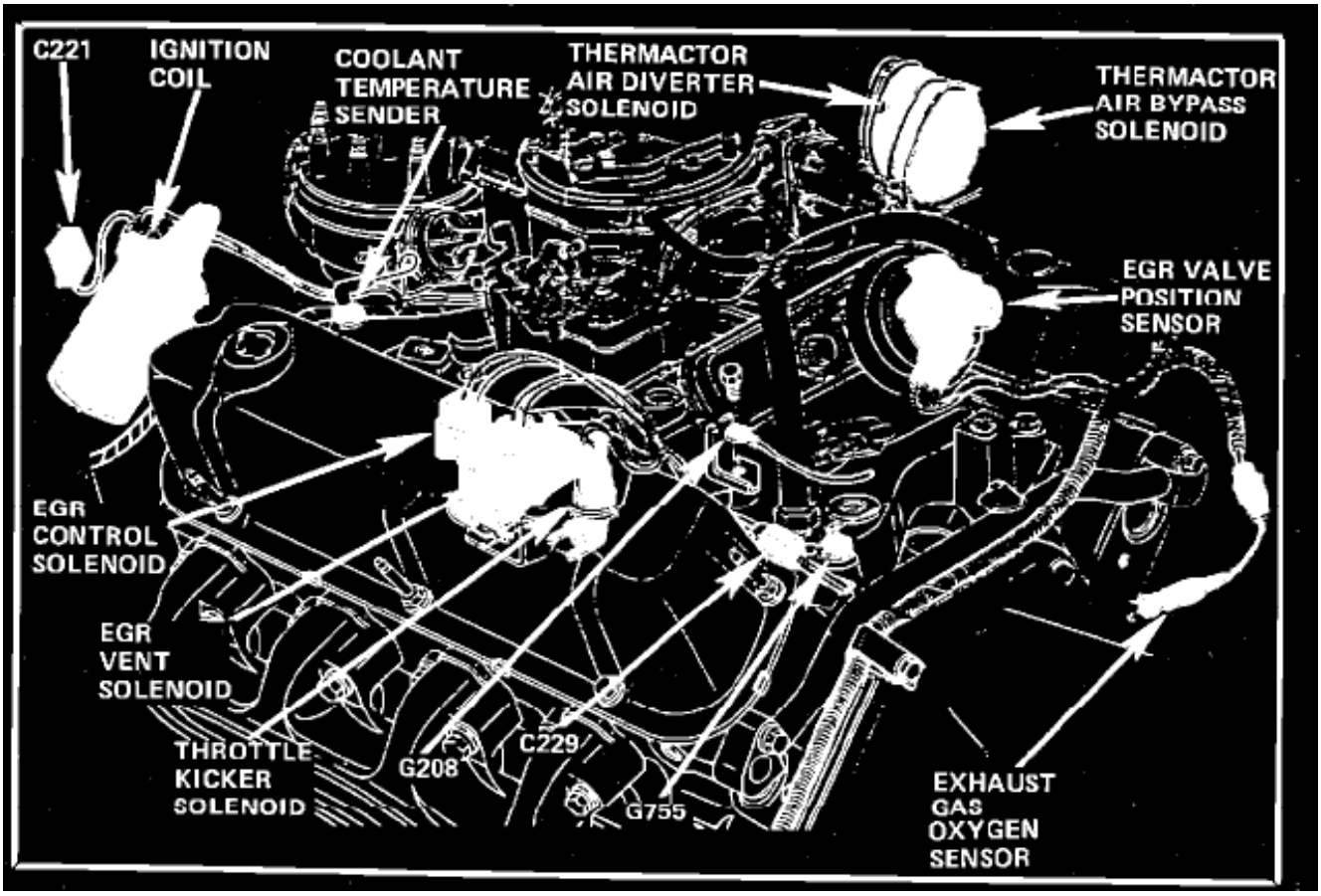
LH Valve Cover

Applicable to: 1982-83 V8-302/5.0L & V8-351/5.8L Engines w/EEC

LH Side Of Engine.

LH Valve Cover

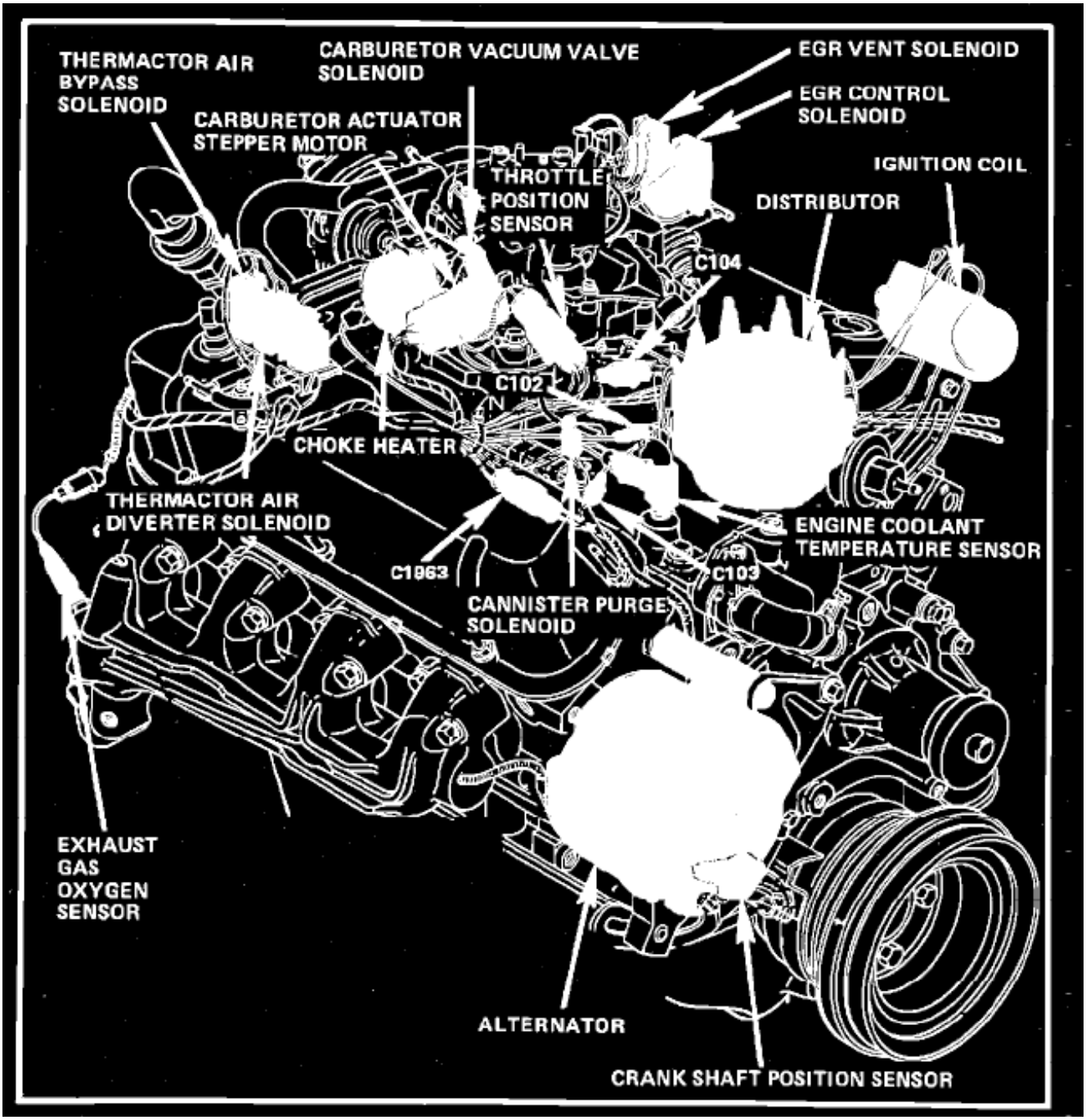
Applicable to: 1981 V8-302/5.0L & V8-352/5.8L Engines w/EEC



LH Side Of Engine.

LH Valve Cover

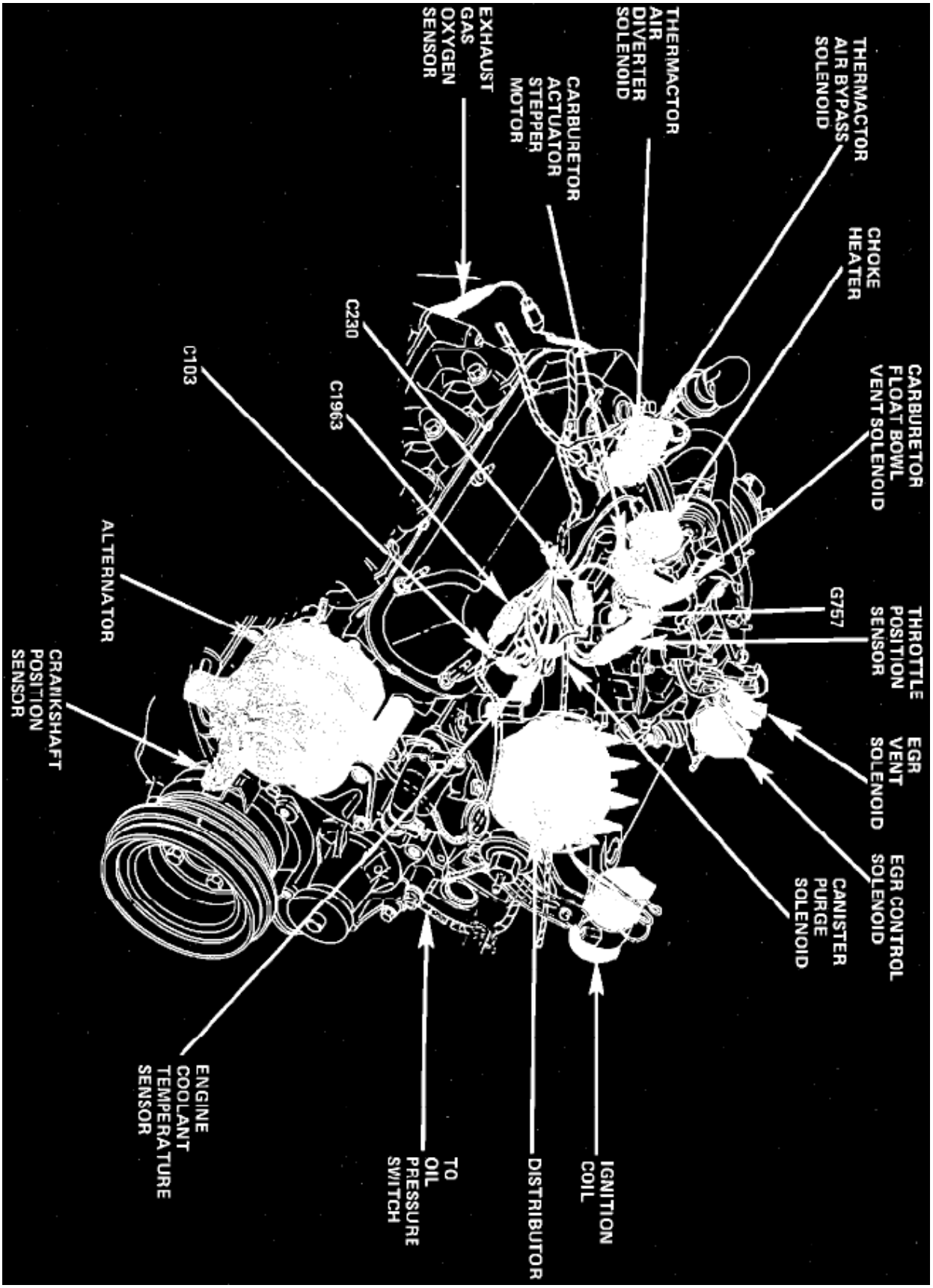
Applicable to: 1982-83 V8-302/5.0L & V8-351/5.8L Engines w/EEC



RH Side Of Engine.

LH Valve Cover

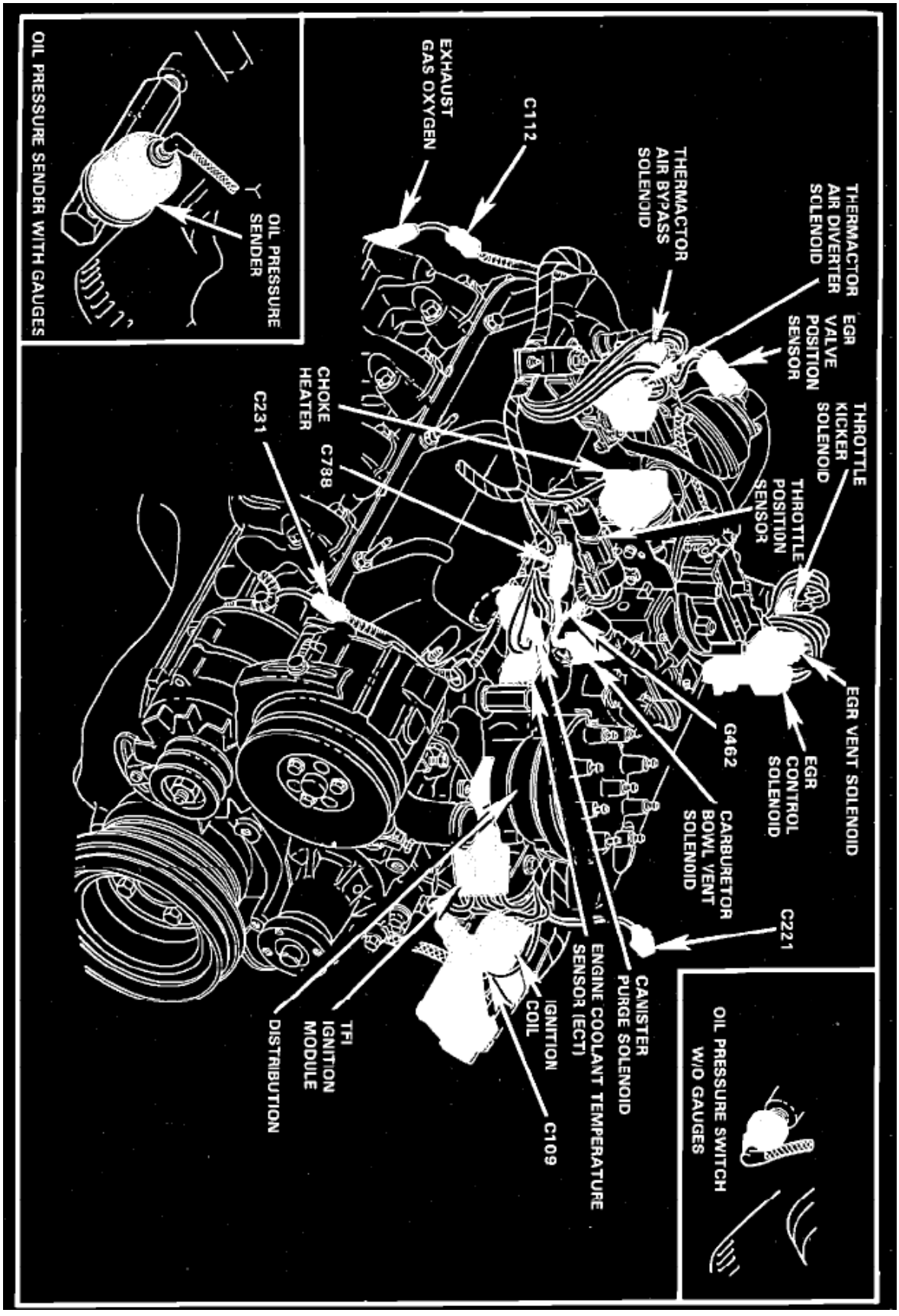
Applicable to: 1981 V8-302/5.0L & V8-351/5.8L Engines w/EEC


THERMACTOR AIR BYPASS SOLENOID
CHOKE HEATER
CARBURETOR FLOAT BOWL VENT SOLENOID
THERMACTOR AIR DIVERTER SOLENOID
CARBURETOR ACTUATOR STEPPER MOTOR
EXHAUST GAS OXYGEN SENSOR
C230
C1963
C103
G757
THROTTLE POSITION SENSOR
EGR VENT SOLENOID
EGR CONTROL SOLENOID
CANISTER PURGE SOLENOID
ALTERNATOR
CRANKSHAFT POSITION SENSOR
ENGINE COOLANT TEMPERATURE SENSOR
TO OIL PRESSURE SWITCH
DISTRIBUTOR
IGNITION COIL

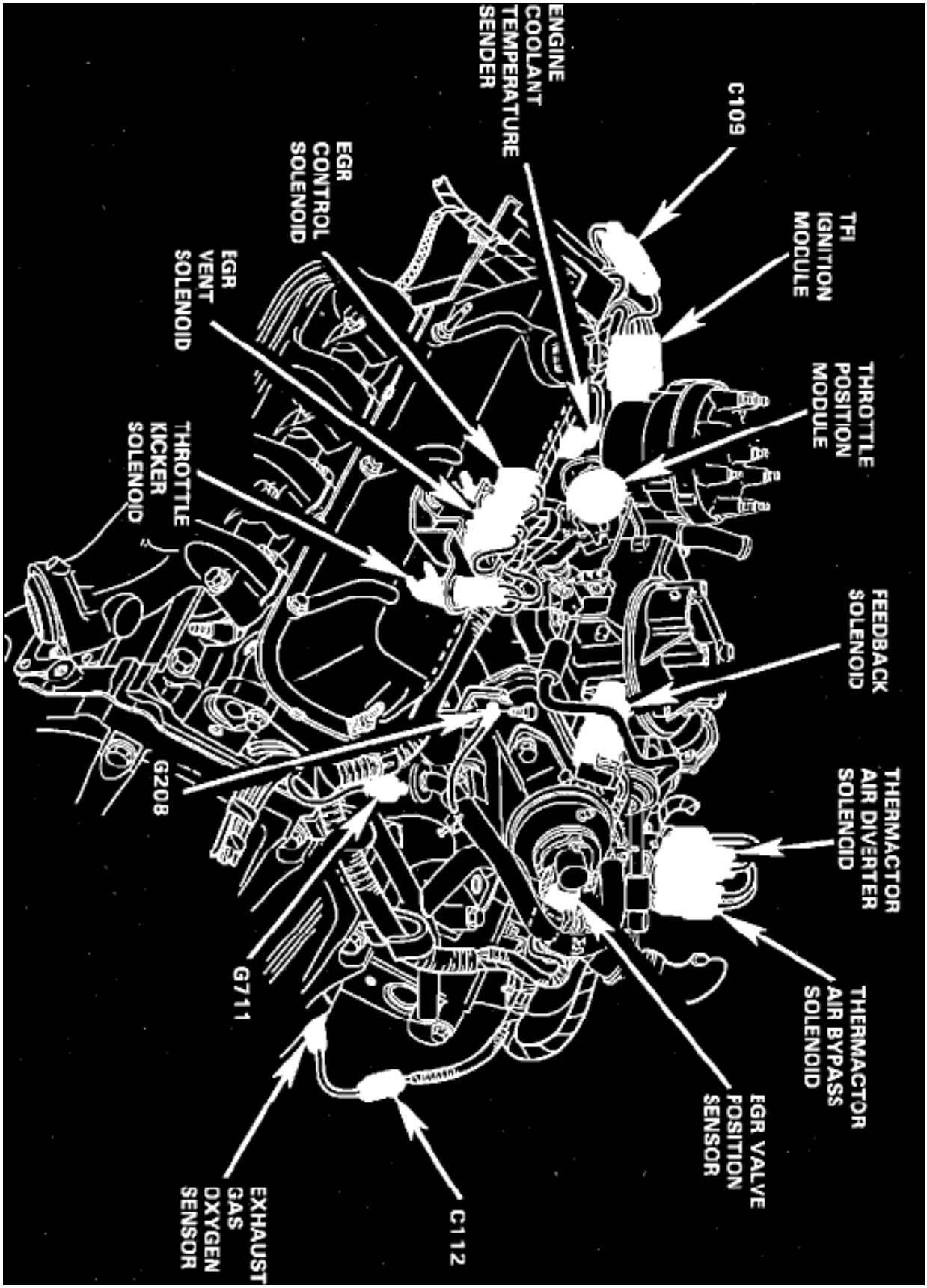
Top RH Side Of Engine.

LH Valve Cover

Applicable to: 1982-83 V8-302/5.0L & V8-351/5.8L Engines w/EEC


THERMACTOR AIR DIVERTER SOLENOID
EGR VALVE POSITION SENSOR
THROTTLE KICKER SOLENOID
THERMACTOR AIR BYPASS SOLENOID
THROTTLE POSITION SENSOR
EXHAUST GAS OXYGEN
C112
EGR VENT SOLENOID
EGR CONTROL SOLENOID
G462
CARBURETOR BOWL VENT SOLENOID
C221
CANISTER PURGE SOLENOID
ENGINE COOLANT TEMPERATURE SENSOR (ECT)
IGNITION COIL
C109
TFI IGNITION MODULE
DISTRIBUTION
CHOKE HEATER
C231
C738
OIL PRESSURE SENDER
OIL PRESSURE SENDER WITH GAUGES
OIL PRESSURE SWITCH W/O GAUGES

RH Side Of Engine. 5.0 5.8


ENGINE COOLANT TEMPERATURE SENDER
C109
TFI IGNITION MODULE
THROTTLE POSITION MODULE
EGR CONTROL SOLENOID
EGR VENT SOLENOID
THROTTLE KICKER SOLENOID
G208
G711
FEEDBACK SOLENOID
THERMACTOR AIR DIVERTER SOLENOID
THERMACTOR AIR BYPASS SOLENOID
EGR VALVE POSITION SENSOR
C112
EXHAUST GAS OXYGEN SENSOR

LH Side Of Engine. 5.0 5.8

LH Valve Cover

Applicable to: 1984-85 V8-351/5.8L & Carbureted V8-302/5.0L Engines w/EEC-IV (Under 8500 Lbs. GVW)

EGR Valve: Customer Interest EGR Valve - Poor Performance/Fuel Economy

Article No. 83-4-25

POWER LOW/POOR FUEL ECONOMY/ PART THROTTLE RESPONSE - INCOMPATABILITY WITH EXISTING SELF-TEST PROCEDURES - 5.8L(W) ENGINE USED IN 49 STATES

LIGHT TRUCKS 1982/83 F SERIES AND BRONCO

CALIBRATIONS: 1-63T-R12, 1-64T-R12, 2-64Y-R11, 2-63Y-R11, 1-63T-R13, 2-63Y-R12, 1-64T-R13, 2-64Y-R12

On approximately December 15, 1982, the 5.8L(W) EEC engine calibrations used in under 8500 lb. GVW Bronco and F Series Light Trucks were revised to incorporate a new EGR valve and a new thermactor air control valve (the new thermactor valve is used on the automatic transmission vehicles only). This engine calibration revision was implemented to improve engine power and fuel economy. The new calibration numbers are: 1-63T-R13, 2-63Y-R12, 1-64T-R13, and 2-64Y-R12. A 49 State vehicle built prior to this calibration revision may be updated to the new level EGR/air control valve. The calibrations that are eligible for the revision are: 1-63T-R12, 1-64T-R12, 2-63Y-R11, and 2-64Y-R11.

The new revised automatic transmission production calibration, and any automatic transmission vehicle updated will require a new self-test procedure be used when diagnosing the EEC system.

Listed below are procedures for updating a vehicle with the power/fuel economy concern followed by a new self-test procedure to be used on these revised calibrations:

Procedure for revising calibrations with customer concerns.

1. Verify the vehicle is of the above applicable engine calibration level.

Calibrations: 1-63T-R12, 2-63Y-R11 - Manual Transmission 3.54/3.55/3.50 Axle Ratio Only

A. Remove and discard EGR valve (E0AE-9F483-AA) and replace with EGR valve (E0AZ-9F483-C). Refer to pertinent Truck Shop Manual for torque specification.

B. Locate engine code tag and with a Sharpie Pen, advance the calibration levels from R11 to R12 and R12 to R13 consecutively.

Calibrations: 1-64T-R12, 2-64Y-R11 - Automatic Transmission 3.55/3.54/3.50 Axle Ratio Only

A. Remove and discard EGR valve (E0AE-9F483-AA) and replace with EGR valve (E0AZ-9F483-C). Refer to pertinent Truck Shop Manual for torque specifications.

B. Remove and discard thermactor air control valve (D8EE-9F491-AA) and replace with control valve (E3AZ-9F491-A). Be sure to orient valve in same position as original.

C. Locate engine code tag and with a Sharpie Pen, advance the calibration levels from R11 to R12 and R12 to R13.

NOTE: Ensure that all hoses are secure and there are no air, vacuum or exhaust leaks.

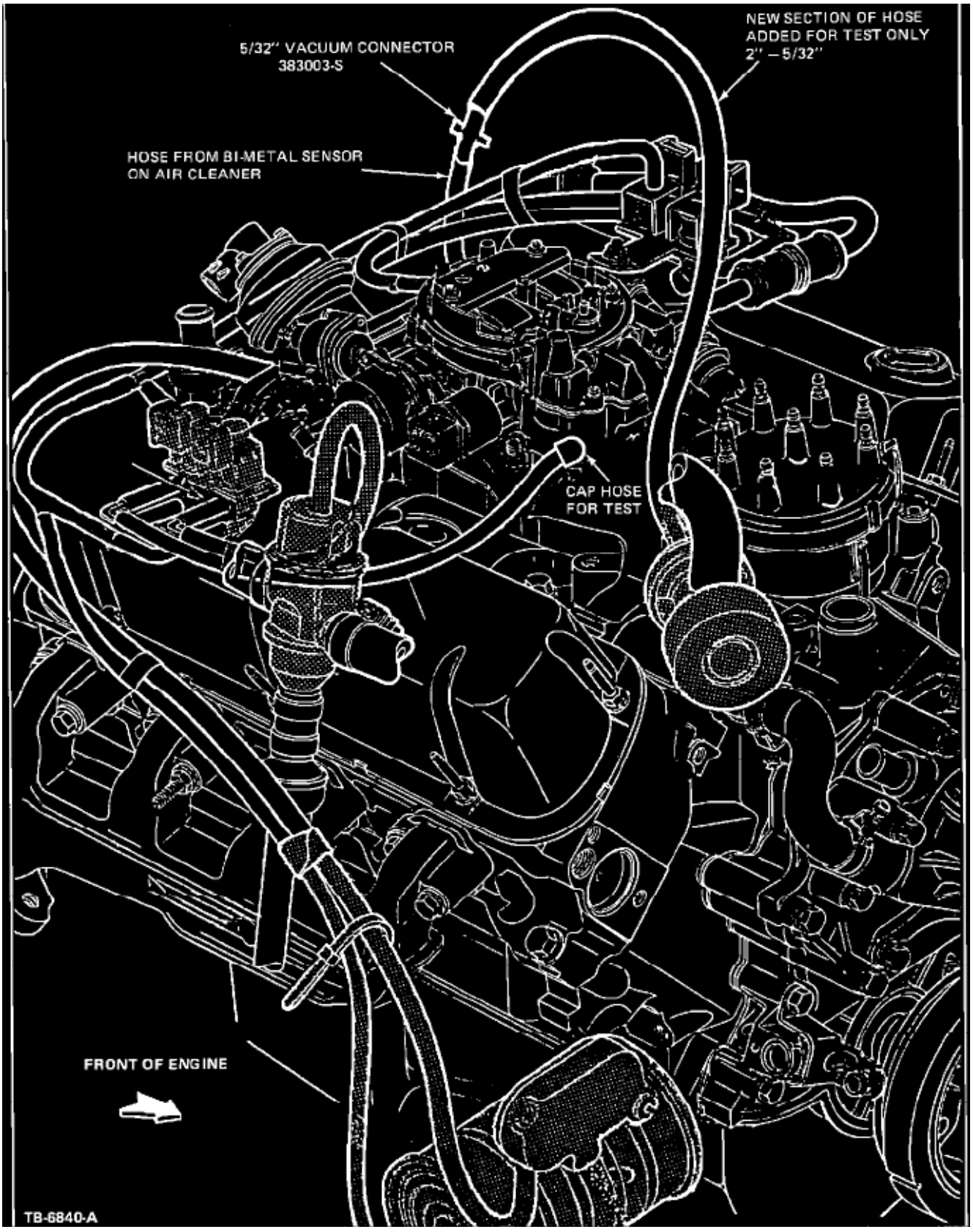

NEW SECTION OF HOSE ADDED FOR TEST ONLY 2" – 5/32"
5/32" VACUUM CONNECTOR 383003-S
HOSE FROM BI-METAL SENSOR ON AIR CLEANER
CAP HOSE FOR TEST
FRONT OF ENGINE
TB-6840-A

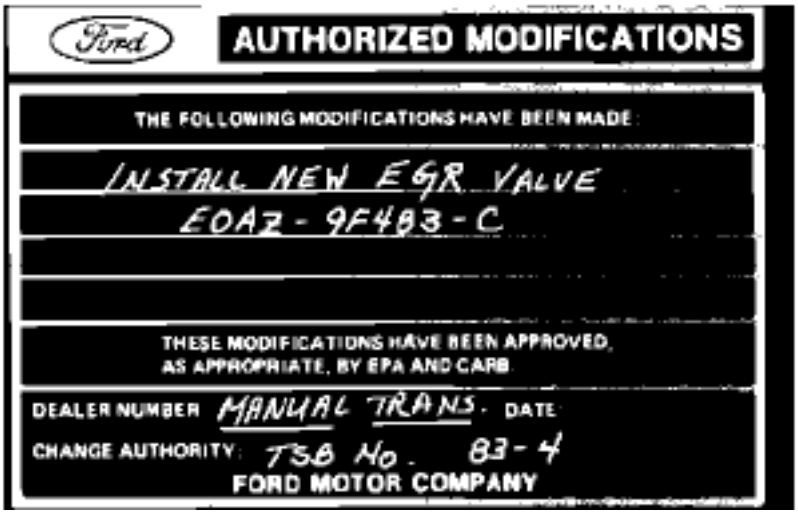
Figure 12

Procedure for self-testing automatic transmission vehicles with revised calibrations:

With the introduction of production calibrations 1-63T-R13, 2-63Y-R12, 1-64T-R13, and 2-64Y-R12 and the revision to the above-mentioned service calibrations, it is possible to obtain service code 11 or service code "44" when self-testing a properly operating EEC system. If a code "11" is produced, you may assume the system is functioning properly. If a code "44" is produced, the EEC system must be subjected to the following NEW quick test procedure:

1. After connecting the EEC III tester, (step 2 of quick test), disconnect and plug the vacuum hose coming from the thermactor air bypass valve (Figure 12). Remove the manifold vacuum line (black with red tracer) from the air cleaner bi-metal sensor (on top of the air cleaner lid) and install a 5/32" vacuum connector in the end of the hose. Install a 2 ft. section of 5/32" vacuum hose between the connector and the thermactor bypass valve (Figure 12).





2. Proceed with quick test at Step 3. A code "11" service code will be generated if the EEC III system is OK. If any other service codes are displayed at this time, including a "44" code, go to the referenced pinpoint test.

After all testing and/or services are completed, remove the 2" test hose and 5/32" connector and re-install manifold vacuum hose to the air cleaner bi-metal. Reconnect the hose to the thermactor bypass valve. Care should be taken to reconnect all hoses disconnected during the test.

Obtain an Authorized Modifications decal and list the date, dealer number and summary of alterations performed. Select a prominent place adjacent to the Vehicle Emission Control Information decal suitable for installing the Authorized Modifications decal. Clean the area, install the decal and cover it with a clear plastic decal shield. PART NUMBER

PART NAME CLASS

E0AZ-9F483-C EGR Valve R

E3AZ-9F491-A Air Control Valve C

OTHER APPLICABLE ARTICLES: None WARRANTY STATUS: Reimbursable within the provisions of the Warranty and Policy Manual. OPERATION: M TIME:

"Actual Time" as defined in the Warranty and Policy Manual. DLR. CODING: Basic Part No. DRIVE Code: 53

EGR Valve: All Technical Service Bulletins EGR Valve - Poor Performance/Fuel Economy

Article No. 83-4-25

POWER LOW/POOR FUEL ECONOMY/ PART THROTTLE RESPONSE - INCOMPATABILITY WITH EXISTING SELF-TEST PROCEDURES - 5.8L(W) ENGINE USED IN 49 STATES

LIGHT TRUCKS 1982/83 F SERIES AND BRONCO

CALIBRATIONS: 1-63T-R12, 1-64T-R12, 2-64Y-R11, 2-63Y-R11, 1-63T-R13, 2-63Y-R12, 1-64T-R13, 2-64Y-R12

On approximately December 15, 1982, the 5.8L(W) EEC engine calibrations used in under 8500 lb. GVW Bronco and F Series Light Trucks were revised to incorporate a new EGR valve and a new thermactor air control valve (the new thermactor valve is used on the automatic transmission vehicles only). This engine calibration revision was implemented to improve engine power and fuel economy. The new calibration numbers are: 1-63T-R13, 2-63Y-R12, 1-64T-R13, and 2-64Y-R12. A 49 State vehicle built prior to this calibration revision may be updated to the new level EGR/air control valve. The calibrations that are eligible for the revision are: 1-63T-R12, 1-64T-R12, 2-63Y-R11, and 2-64Y-R11.

The new revised automatic transmission production calibration, and any automatic transmission vehicle updated will require a new self-test procedure be used when diagnosing the EEC system.

Listed below are procedures for updating a vehicle with the power/fuel economy concern followed by a new self-test procedure to be used on these revised calibrations:

Procedure for revising calibrations with customer concerns.

1. Verify the vehicle is of the above applicable engine calibration level.

Calibrations: 1-63T-R12, 2-63Y-R11 - Manual Transmission 3.54/3.55/3.50 Axle Ratio Only

A. Remove and discard EGR valve (E0AE-9F483-AA) and replace with EGR valve (E0AZ-9F483-C). Refer to pertinent Truck Shop Manual for torque specification.

B. Locate engine code tag and with a Sharpie Pen, advance the calibration levels from R11 to R12 and R12 to R13 consecutively.

Calibrations: 1-64T-R12, 2-64Y-R11 - Automatic Transmission 3.55/3.54/3.50 Axle Ratio Only

A. Remove and discard EGR valve (E0AE-9F483-AA) and replace with EGR valve (E0AZ-9F483-C). Refer to pertinent Truck Shop Manual for torque specifications.

B. Remove and discard thermactor air control valve (D8EE-9F491-AA) and replace with control valve (E3AZ-9F491-A). Be sure to orient valve in same position as original.

C. Locate engine code tag and with a Sharpie Pen, advance the calibration levels from R11 to R12 and R12 to R13.

NOTE: Ensure that all hoses are secure and there are no air, vacuum or exhaust leaks.

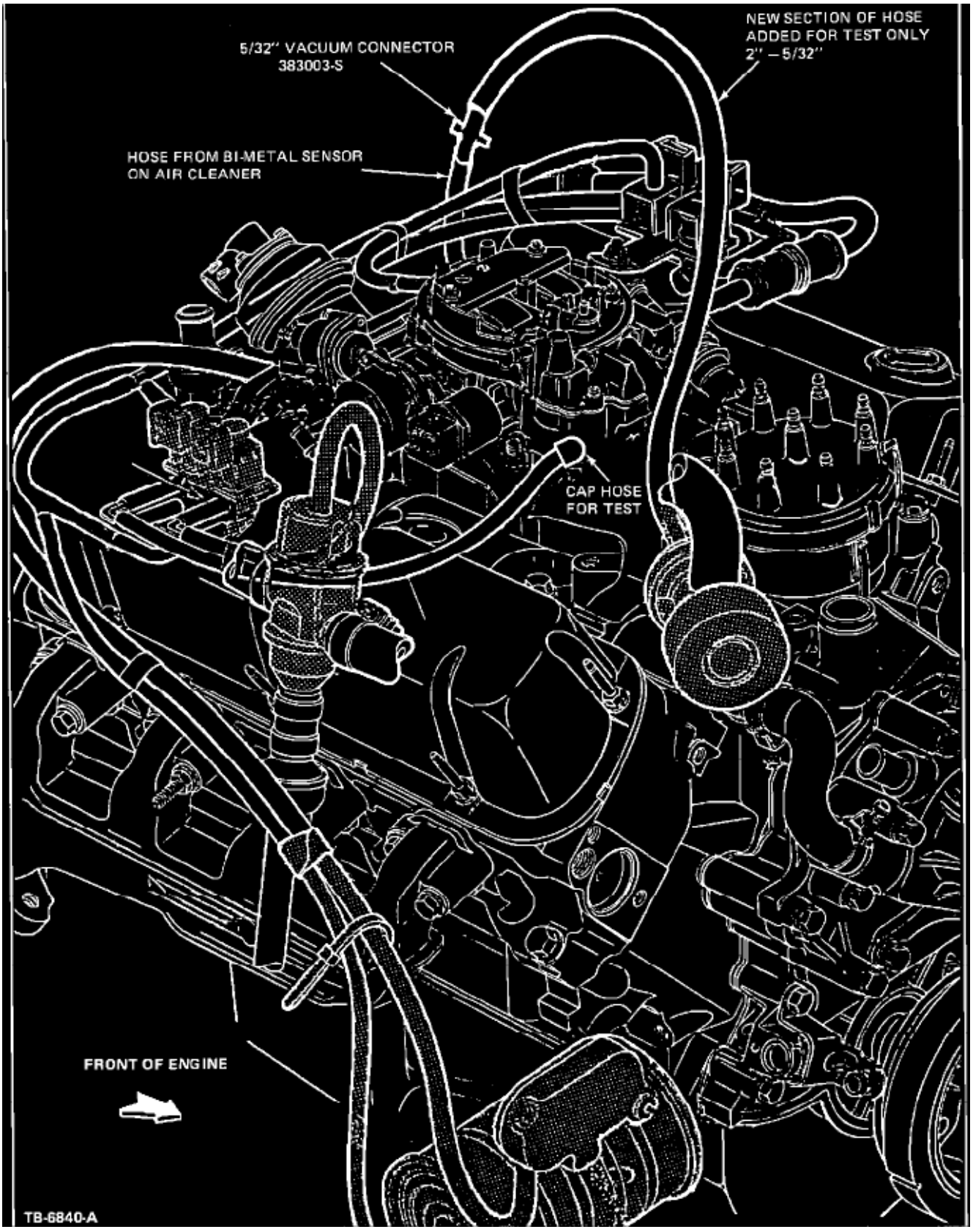

NEW SECTION OF HOSE ADDED FOR TEST ONLY 2" – 5/32"
5/32" VACUUM CONNECTOR 383003-S
HOSE FROM BI-METAL SENSOR ON AIR CLEANER
CAP HOSE FOR TEST
FRONT OF ENGINE
TB-6840-A

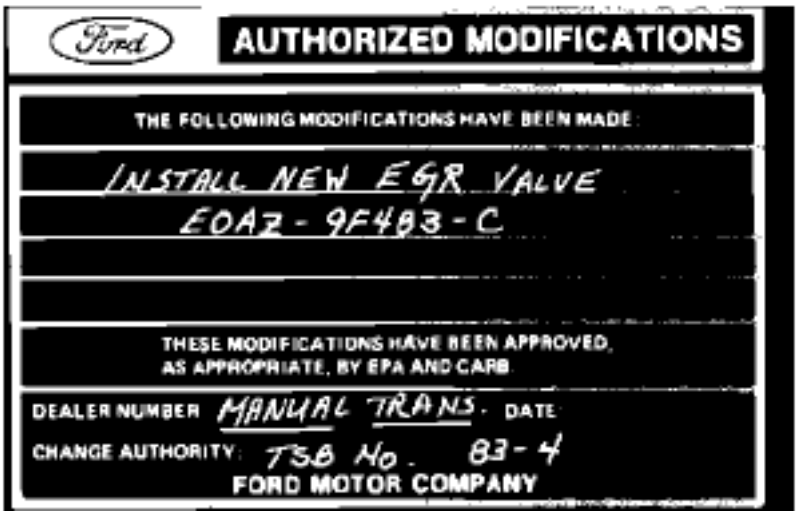
Figure 12

Procedure for self-testing automatic transmission vehicles with revised calibrations:

With the introduction of production calibrations 1-63T-R13, 2-63Y-R12, 1-64T-R13, and 2-64Y-R12 and the revision to the above-mentioned service calibrations, it is possible to obtain service code 11 or service code "44" when self-testing a properly operating EEC system. If a code "11" is produced, you may assume the system is functioning properly. If a code "44" is produced, the EEC system must be subjected to the following NEW quick test procedure:

1. After connecting the EEC III tester, (step 2 of quick test), disconnect and plug the vacuum hose coming from the thermactor air bypass valve (Figure 12). Remove the manifold vacuum line (black with red tracer) from the air cleaner bi-metal sensor (on top of the air cleaner lid) and install a 5/32" vacuum connector in the end of the hose. Install a 2 ft. section of 5/32" vacuum hose between the connector and the thermactor bypass valve (Figure 12).





2. Proceed with quick test at Step 3. A code "11" service code will be generated if the EEC III system is OK. If any other service codes are displayed at this time, including a "44" code, go to the referenced pinpoint test.

After all testing and/or services are completed, remove the 2" test hose and 5/32" connector and re-install manifold vacuum hose to the air cleaner bi-metal. Reconnect the hose to the thermactor bypass valve. Care should be taken to reconnect all hoses disconnected during the test.

Obtain an Authorized Modifications decal and list the date, dealer number and summary of alterations performed. Select a prominent place adjacent to the Vehicle Emission Control Information decal suitable for installing the Authorized Modifications decal. Clean the area, install the decal and cover it with a clear plastic decal shield. PART NUMBER

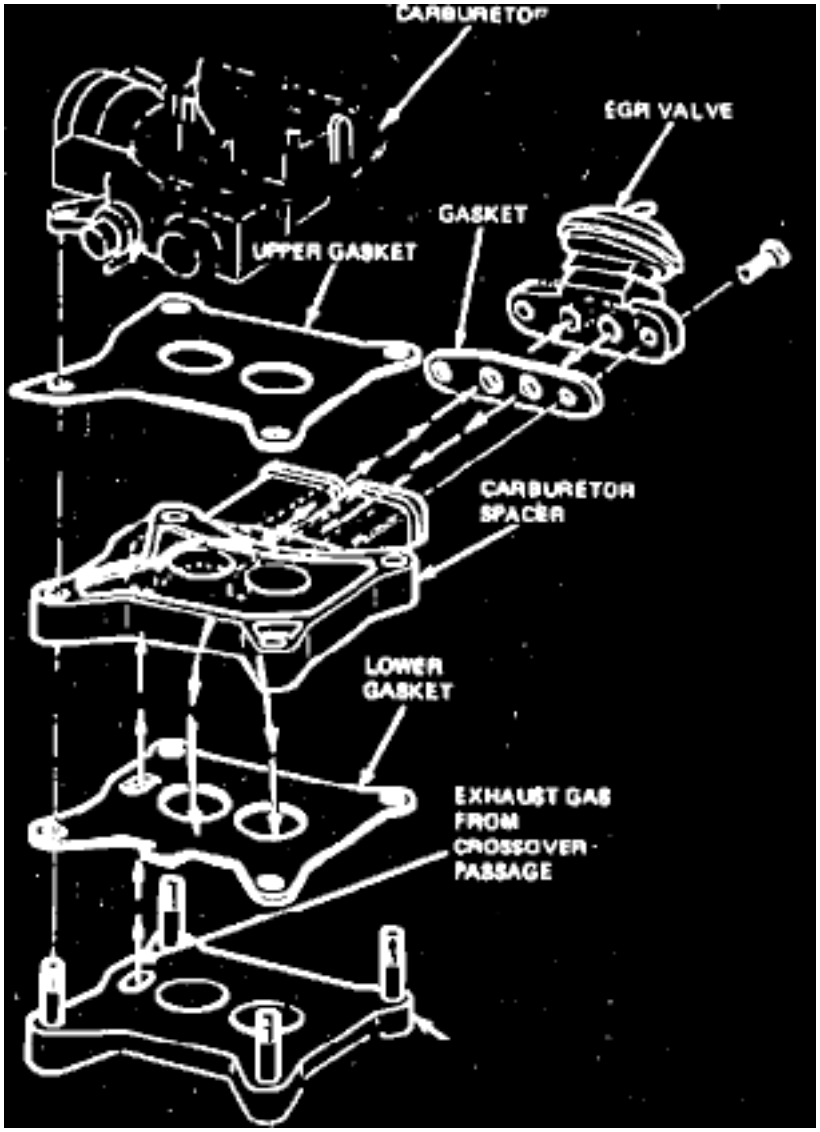
PART NAME CLASS

E0AZ-9F483-C EGR Valve R

E3AZ-9F491-A Air Control Valve C

OTHER APPLICABLE ARTICLES: None WARRANTY STATUS: Reimbursable within the provisions of the Warranty and Policy Manual. OPERATION: M TIME:

"Actual Time" as defined in the Warranty and Policy Manual. DLR. CODING: Basic Part No. DRIVE Code: 53



EGR Valve: Description and Operation

In this system the exhaust gases are reintroduced to the combustion cycle, therefore diluting the air fuel mixture entering the combustion chambers. Dilution of the incoming mixture lowers peak flame temperatures during combustion and thus limits the formation of nitrogen oxides (NOx).

Fig. 46 Spacer entry EGR connection

Some engines use the ``Spacer Entry'' EGR System which has the EGR valve mounted on the carburetor spacer, Fig. 46. The exhaust gases are taken from a drilled passage in the exhaust crossover of the intake manifold. The exhaust gas is then routed through a metered EGR valve to a passage in the carburetor spacer and fed into the primary bore.

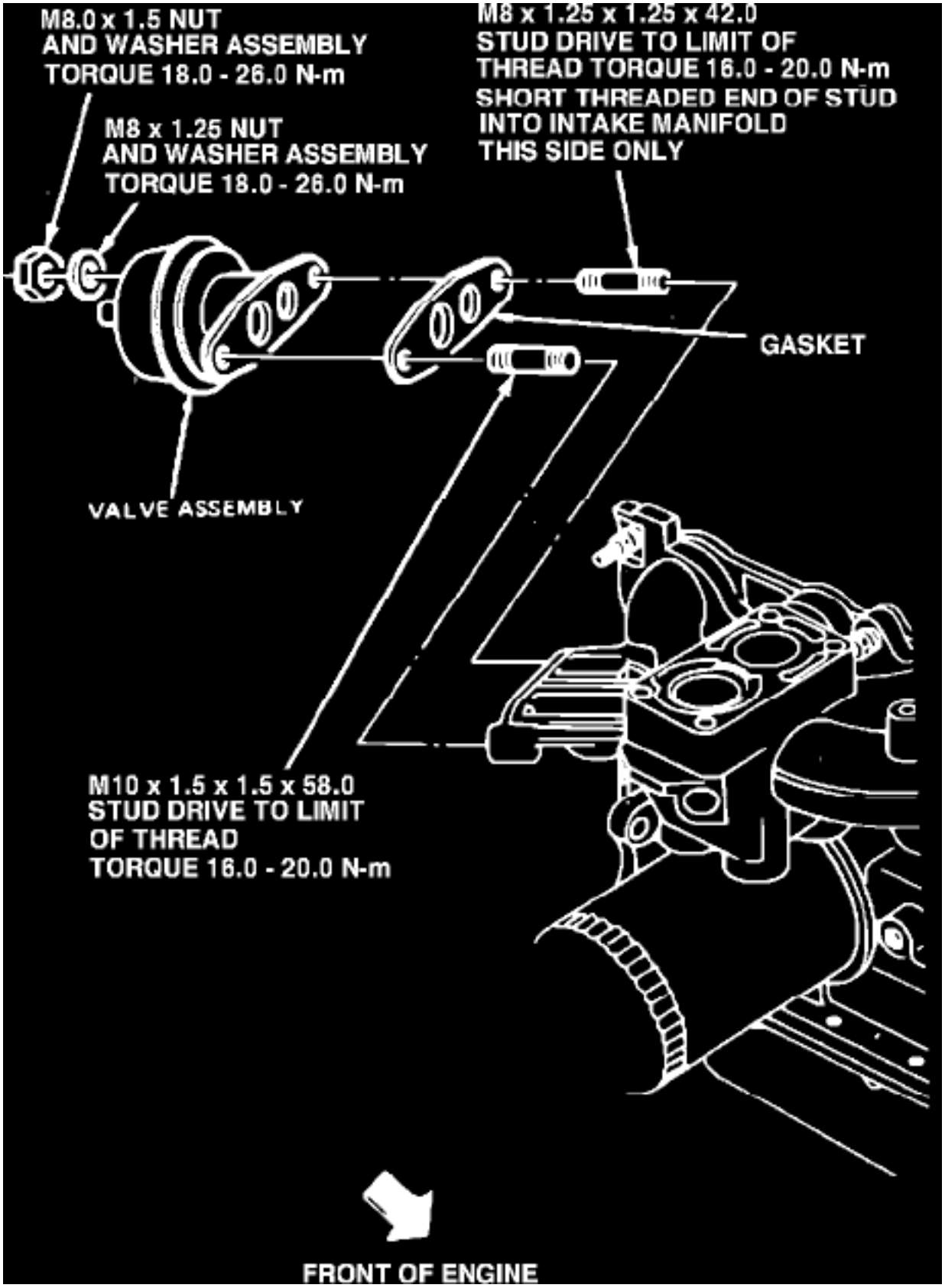
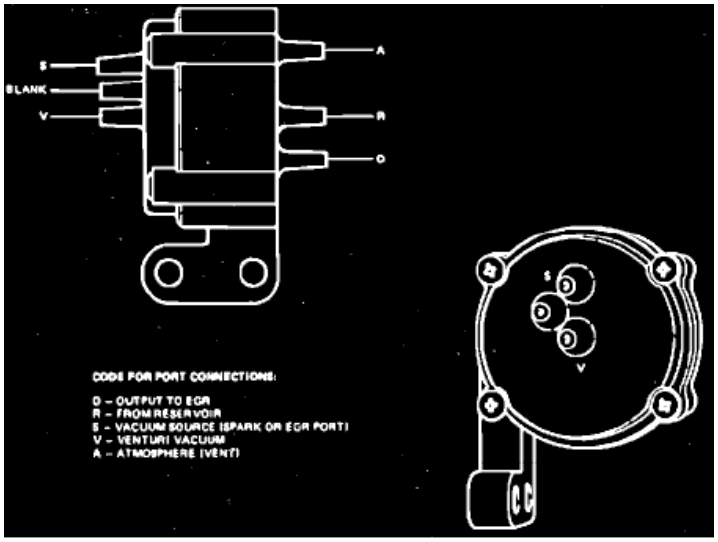

M8.0 x 1.5 NUT
AND WASHER ASSEMBLY
TORQUE 18.0 - 26.0 N-m
M8 x 1.25 NUT
AND WASHER ASSEMBLY
TORQUE 18.0 - 26.0 N-m
M8 x 1.25 x 1.25 x 42.0
STUD DRIVE TO LIMIT OF
THREAD TORQUE 16.0 - 20.0 N-m
SHORT THREADED END OF STUD
INTO INTAKE MANIFOLD
THIS SIDE ONLY
GASKET
VALVE ASSEMBLY
M10 x 1.5 x 1.5 x 58.0
STUD DRIVE TO LIMIT
OF THREAD
TORQUE 16.0 - 20.0 N-m
FRONT OF ENGINE

Fig. 47 Intake manifold mounted EGR connection

On some engines, the EGR system routes exhaust gas directly from the exhaust manifold, Fig. 47.

Two variables control the operation of the EGR system, 1) engine coolant temperature and 2) engine or carburetor vacuum. When engine coolant temperature is below the specified level, the EGR system is locked out by a temperature controlled vacuum switch. This vacuum switch is installed in series with the EGR valve. This valve receives vacuum from a port in the carburetor body. When the valve is closed due to lower coolant temperature, no vacuum is applied to the EGR valve and no exhaust gas is fed to the air-fuel mixture. When the engine coolant temperature reaches the specified level, the valve opens allowing vacuum to be applied to the EGR valve. Exhaust gas is then fed to the air-fuel mixture.

The second factor controlling EGR operation is carburetor vacuum. The location of the EGR port in the carburetor determines at what point vacuum is sent to the EGR valve. Vacuum should be fed to the EGR vacuum control valve when the primary throttle plate reaches a position corresponding to a road speed of approximately 20 mph under light acceleration.


S
BLANK
V
A
R
O
CODE FOR PORT CONNECTIONS:
O – OUTPUT TO EGR
R – FROM RESERVOIR
S – VACUUM SOURCE (SPARK OR EGR PORT)
V – VENTURI VACUUM
A – ATMOSPHERE (VENT)

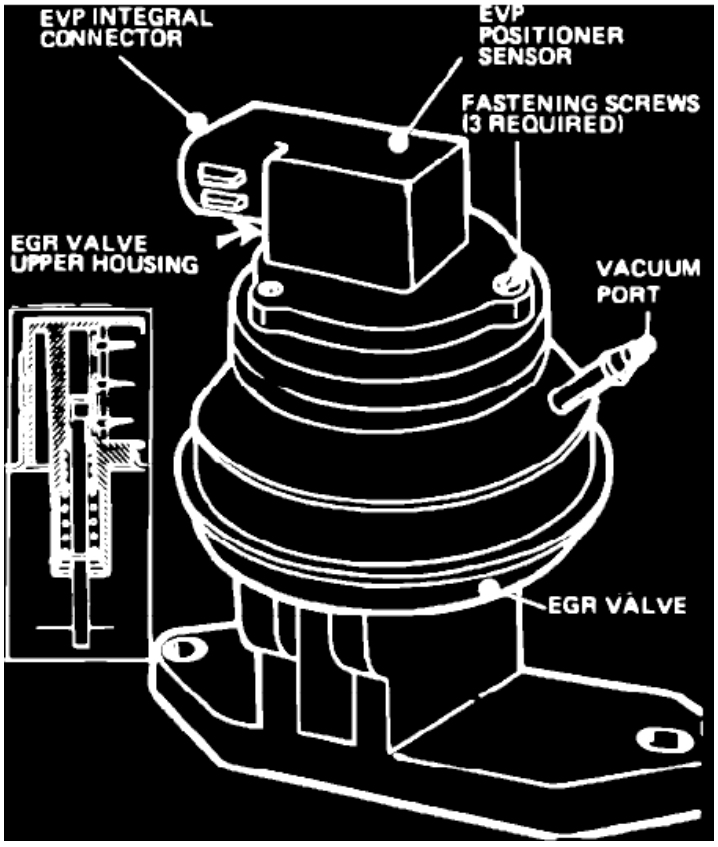
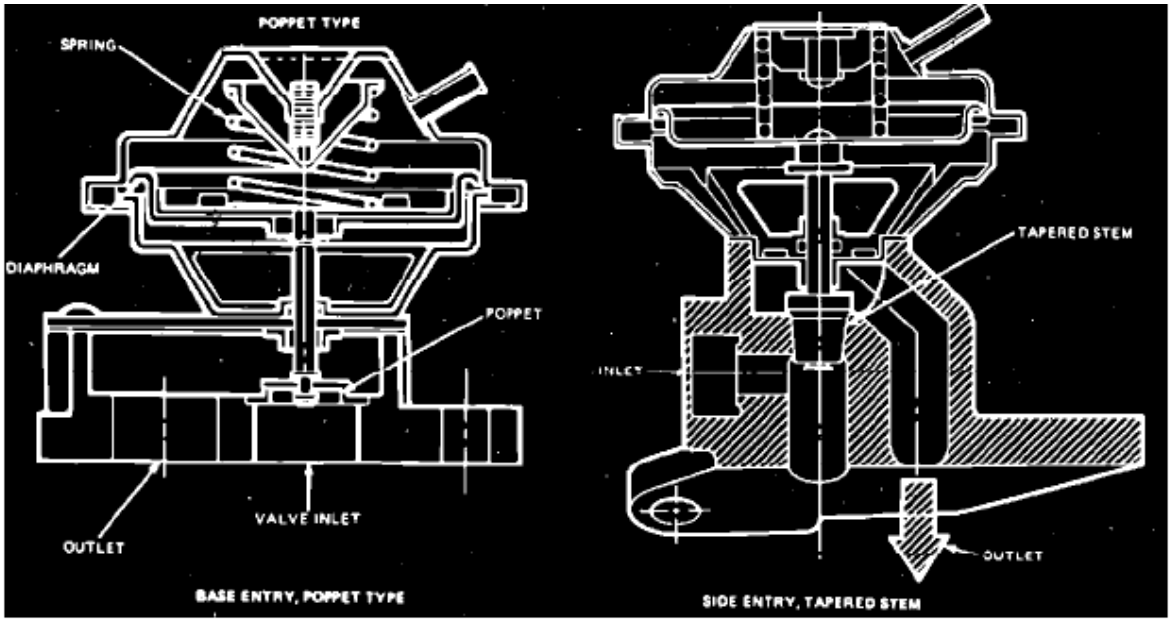

EVP INTEGRAL CONNECTOR
EVP POSITIONER SENSOR
FASTENING SCREWS (3 REQUIRED)
EGR VALVE UPPER HOUSING
VACUUM PORT
EGR VALVE

Fig. 48 Venturi vacuum amplifier

A Venturi Vacuum Amplifier, Fig. 48, uses a weak venturi vacuum signal to produce a strong intake manifold vacuum to operate the EGR valve, thereby achieving an accurate, repeatable and almost exact proportion between venturi airflow and EGR flow. This assists in controlling oxides of nitrogen with minimal sacrifice in driveability.

There are four basic types of EGR valves: the ported type, the integral back pressure type, the electronic-sonic type and the valve and transducer assembly type

The electronic-sonic type valve is used with the EEC system.


POPPET TYPE
SPRING
DIAPHRAGM
POPPET
VALVE INLET
OUTLET
BASE ENTRY, POPPET TYPE
TAPERED STEM
INLET
OUTLET
SIDE ENTRY, TAPERED STEM

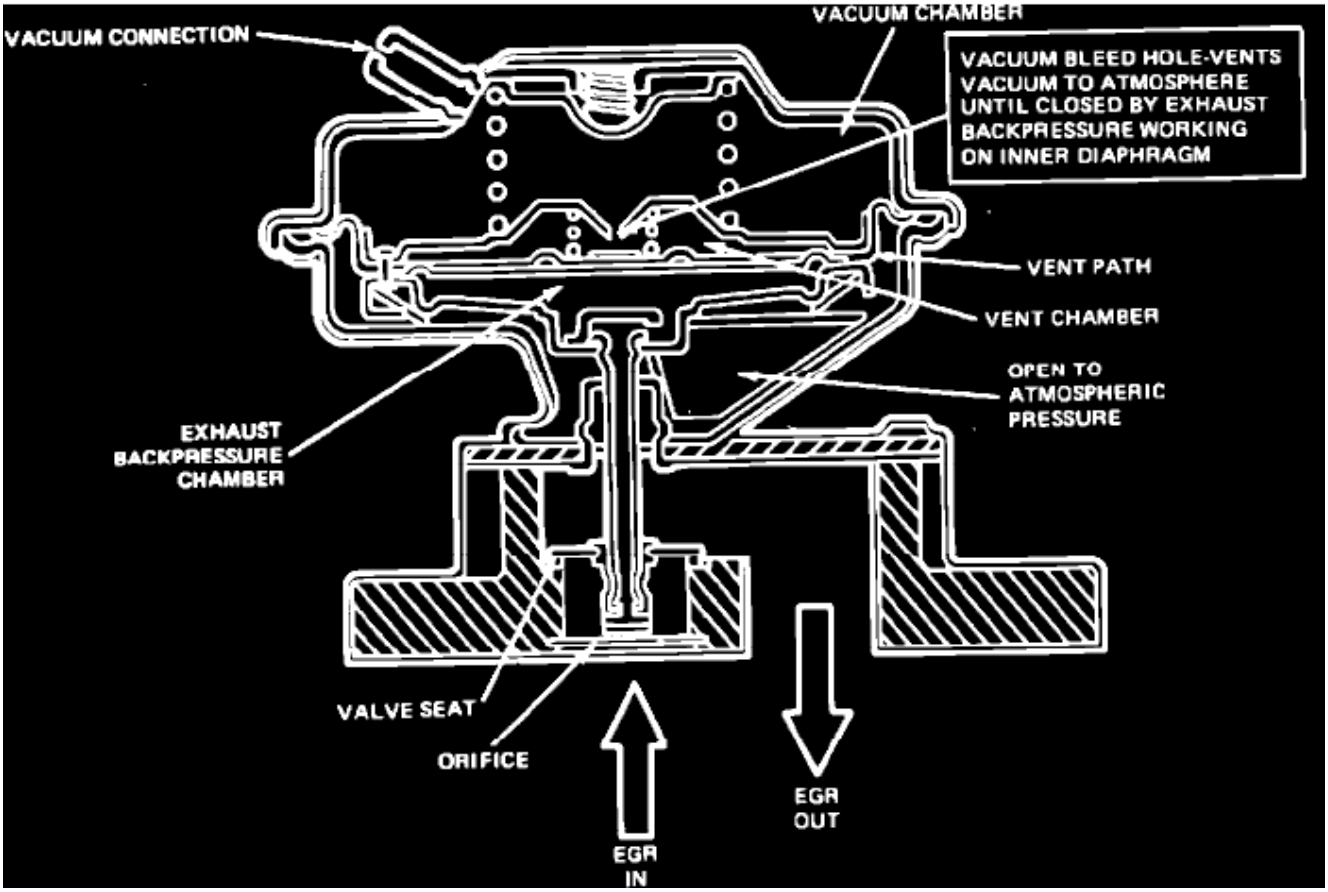

VACUUM CONNECTION
VACUUM CHAMBER
VACUUM BLEED HOLE-VENTS VACUUM TO ATMOSPHERE UNTIL CLOSED BY EXHAUST BACKPRESSURE WORKING ON INNER DIAPHRAGM
VENT PATH
VENT CHAMBER
OPEN TO ATMOSPHERIC PRESSURE
EXHAUST BACKPRESSURE CHAMBER
VALVE SEAT
ORIFICE
EGR IN
EGR OUT

Fig. 6 EGR valve position sensor

This sensor, Fig. 6, is used to monitor the EGR valve pintle position. The computer applies a reference voltage to the EVP sensor, and the resulting signal from the EVP sensor is proportional to the amount of exhaust gases flowing through the EGR valve pintle into the intake manifold. Depending on the input from this and other sensors, the computer can increase or decrease EGR flow by activating or deactivating a pair of solenoid vacuum valves.

Fig. 49 Ported type EGR valves

Ported type valves, Fig. 49, may be of the poppet or tapered stem design and can have base or side entry. The two passages connecting the exhaust system to intake manifold are blocked by a valve which is opened by vacuum and closed by spring pressure.

Fig. 50 Integral back pressure transducer EGR valve

The integral back pressure transducer valve, Fig. 50, cannot be opened by vacuum until the bleed hole is closed by exhaust back pressure. When open, the valve oscillates at a level dependent on the exhaust back pressure flowing through the orifice. Valve opening increases as signal vacuum and exhaust back pressure increases.

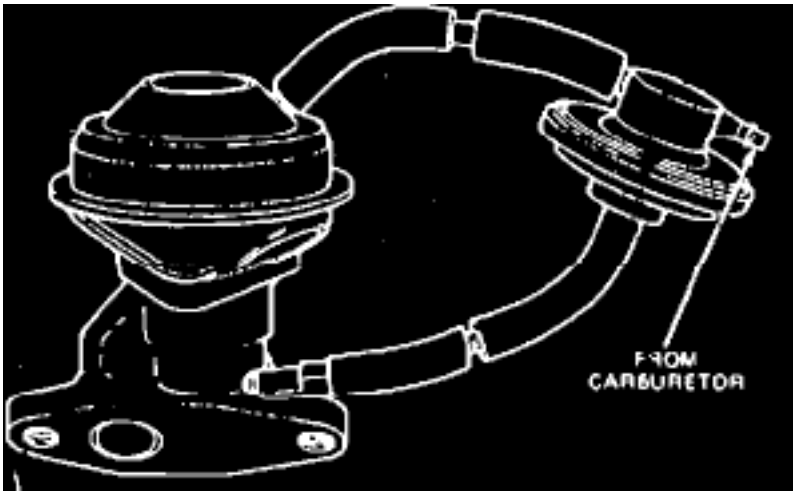
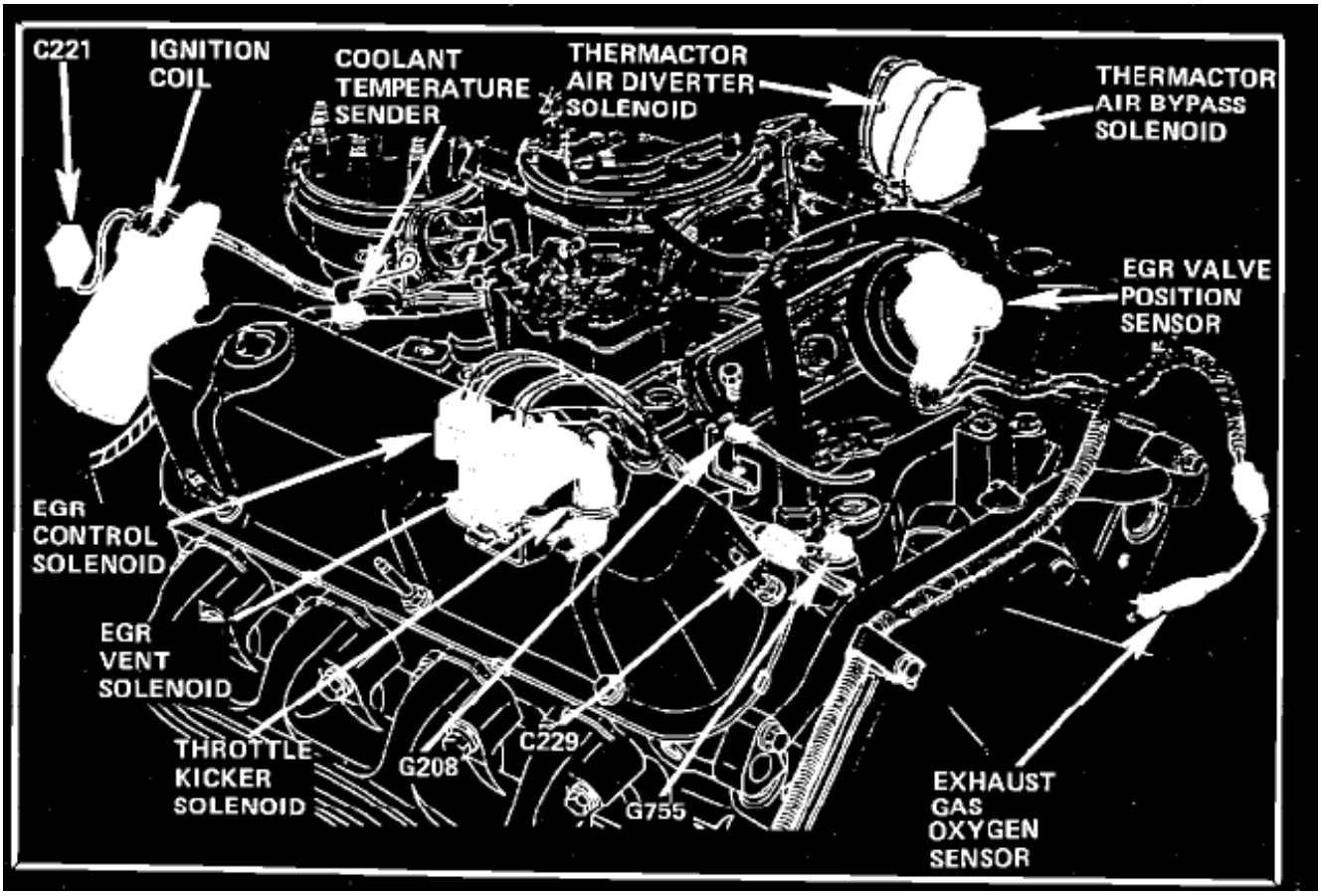


Fig. 51 EGR valve w/remote back pressure transducer

Some vehicles use an EGR valve with a remote back pressure transducer, Fig. 51. This assembly operates the same as the EGR valve with integral back pressure transducer valve and is serviced only as an assembly.

Some vehicles use a variable transducer type EGR valve and consists of three components; a vacuum regulator, EGR valve and a flow control orifice. The regulator modulates the vacuum signal to the EGR valve using two back pressure inputs. One input is the standard vehicle back pressure and the other is the back pressure down stream of the flow control orifice. The control chamber pickup is in the EGR tube and the flow control orifice is integral with the upstream EGR tube connector.

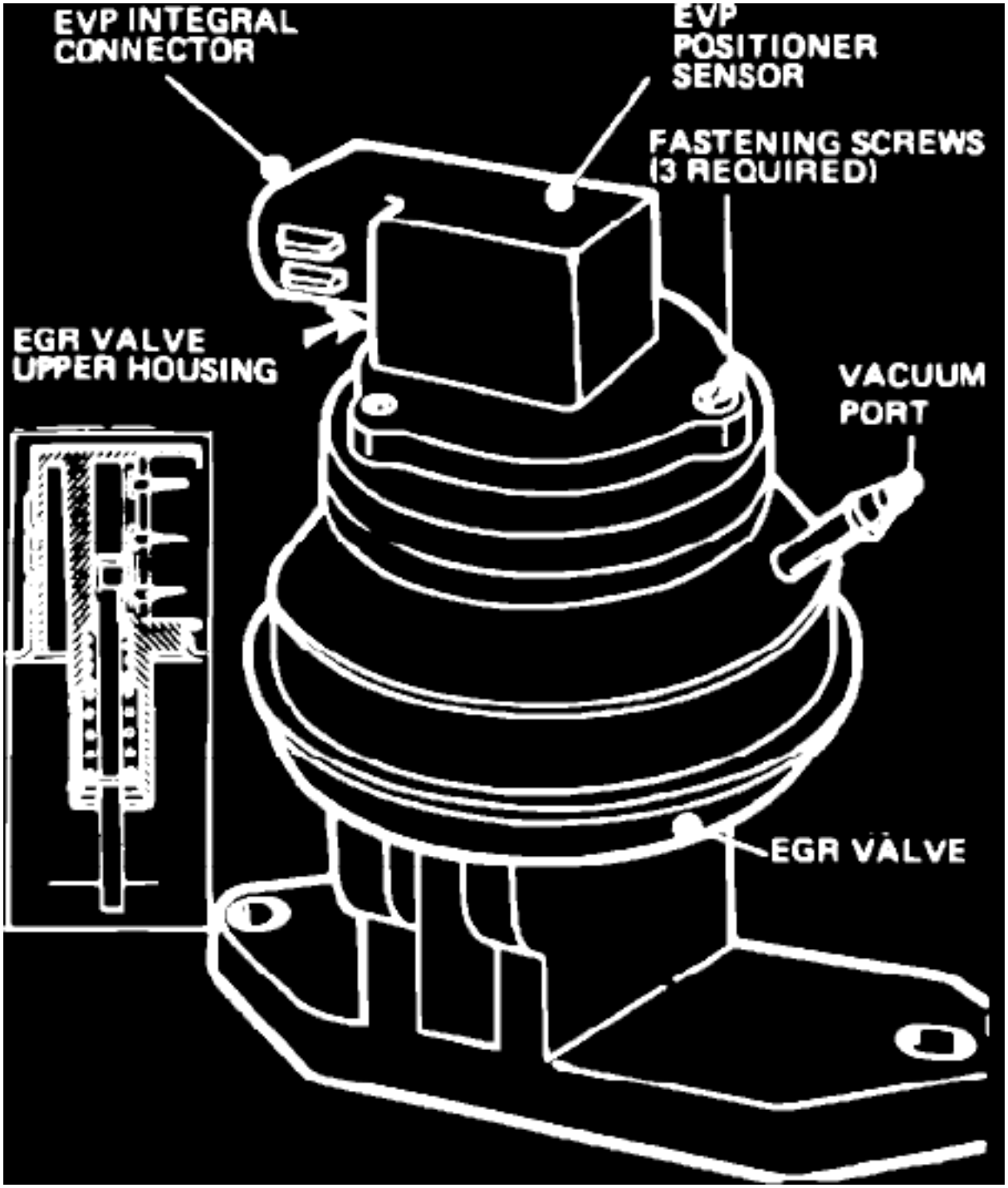


EGR Valve Position Sensor: Locations

LH Side Of Engine.

Rear Of Carburetor

Applicable to: 1982-83 V8-302/5.0L & V8-351/5.8L Engines w/EEC



EGR Valve Position Sensor: Description and Operation

Fig. 6 EGR valve position sensor

This sensor, Fig. 6, is used to monitor the EGR valve pintle position. The computer applies a reference voltage to the EVP sensor, and the resulting signal from the EVP sensor is proportional to the amount of exhaust gases flowing through the EGR valve pintle into the intake manifold.

Depending on the input from this and other sensors, the computer can increase or decrease EGR flow by activating or deactivating a pair of solenoid vacuum valves.

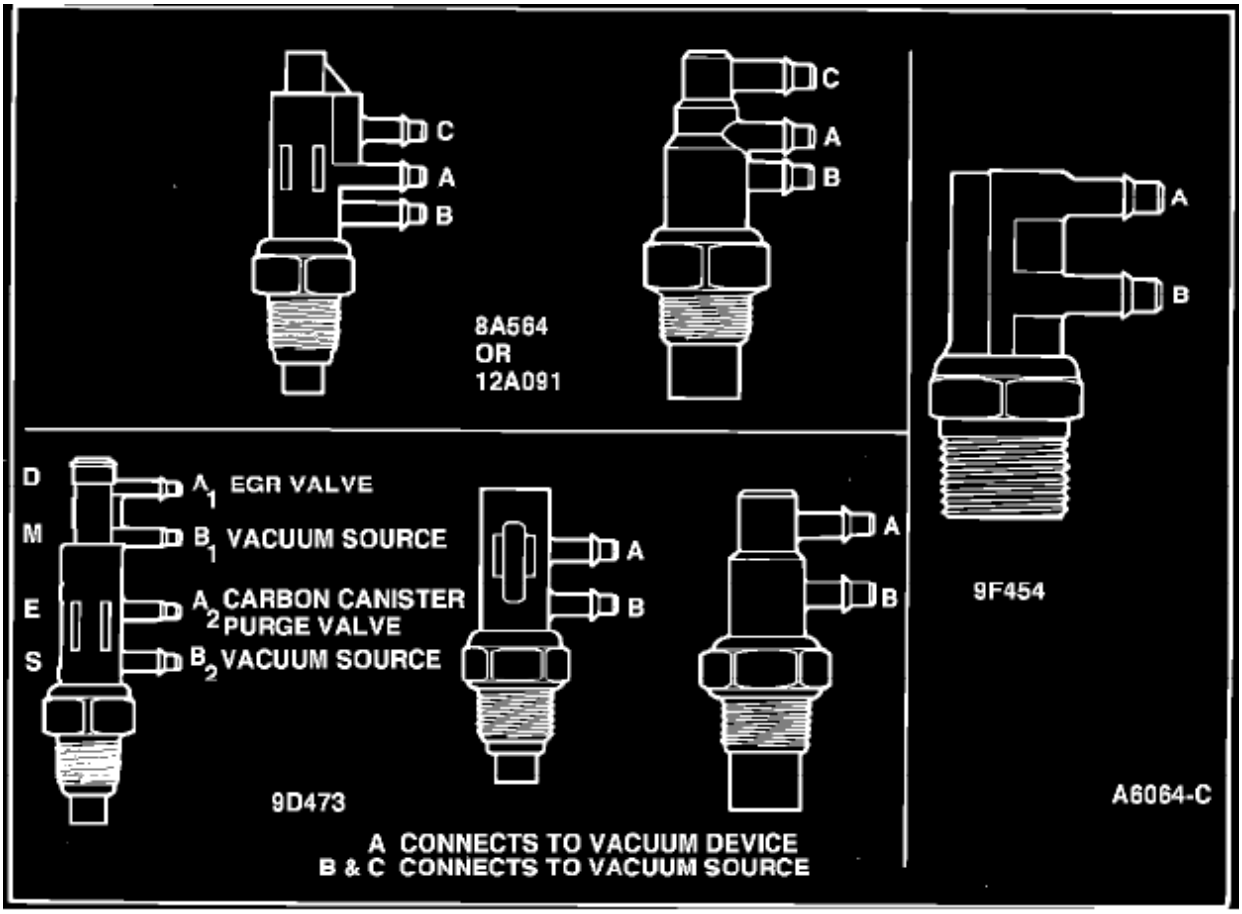
Exhaust Pressure Regulator Vacuum Valve: Testing and Inspection

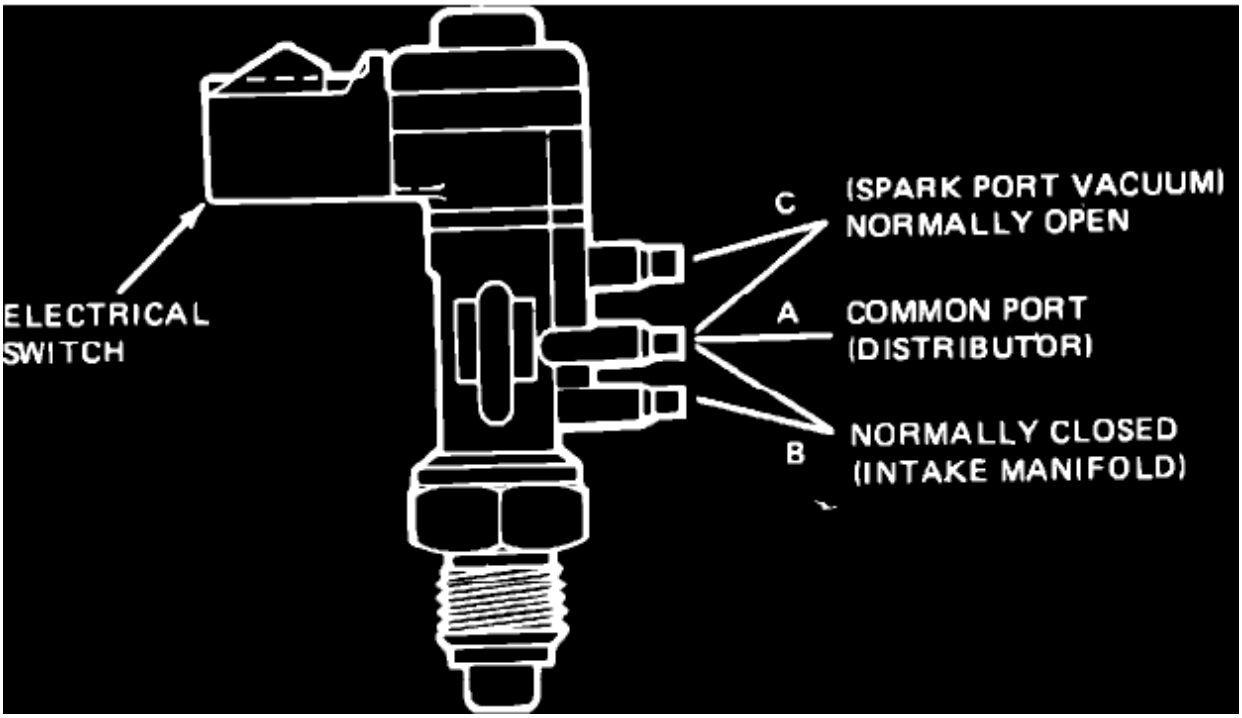
1. Run engine at normal operating temperature and set throttle on high cam on 4-140 engine or on kickdown step on other engines.

2. Connect vacuum gauge to EGR side of load control valve and note reading.

3. Apply a vacuum of at least 6 inches Hg to venturi port of valve. If gauge does not drop to zero, replace valve.

Ford Bronco Workshop Manual (V8-351 5.8L VIN G 2-bbl (1982))
Ford Workshop Manuals > Powertrain Management > Emission Control Systems > Exhaust Gas Recirculation > Thermal Vacuum Valve, EGR > Component Information > Description and Operation



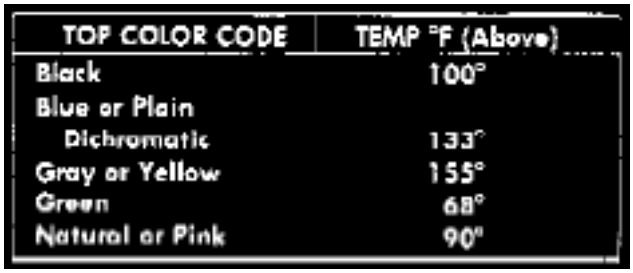


Thermal Vacuum Valve: Description and Operation

Fig. 22 Ported vacuum switches & vacuum control valves

Fig. 23 Electrical vacuum switch

These switches, Figs. 22 and 23, used on some vehicles, control vacuum to emission components during engine warm-up.The 2-port and 4-port types open when coolant temperature reaches a predetermined value. The 3-port type switches vacuum from the center to the top or bottom ports. Electrical switches can be opened or closed until the PVS is fully cycled. All PVS units are temperature-activated and have a specific opening and closing temperature.



TOP COLOR CODE	TEMP °F (Above)
Black	100°
Blue or Plain Dichromatic	133°
Gray or Yellow	155°
Green	68°
Natural or Pink	90°

Thermal Vacuum Valve: Testing and Inspection

Fig.50 - EGR-PVS Opening Temperature Chart

Switches With Two Connectors

1. Disconnect both vacuum hoses at switch. Connect a vacuum gauge to either connector on switch. Connect an external vacuum source at least 10

inches Hg or manifold vacuum to other connector on switch.

2. Start engine and allow coolant to exceed the calibration temperature of the switch as indicated in chart in Fig. 50, according to color code.

3. If there is no vacuum reading after coolant temperature exceeds the calibration point of the switch, the PVS switch is defective and should be

replaced. If there is a vacuum reading, the switch is functioning properly.

Switches With Three Connectors

1. Disconnect EGR vacuum hose at carburetor and connect manifold vacuum or external vacuum source to hose.

2. Disconnect EGR vacuum hose at EGR valve and connect vacuum gauge to hose.

3. Start engine and allow coolant temperature to exceed calibration point of switch as indicated in chart in Fig. 50, according to color code.

4. There should be a vacuum reading at gauge after coolant temperature exceeds calibration point of switch. If not, the switch is defective and should

be replaced.

Switches With Four Connectors

1. Disconnect vacuum hoses at PVS valve, then connect a vacuum gauge to either port marked D and M, and connect an external vacuum source to

other port.

2. Start engine and allow coolant temperature to exceed calibration point of PVS valve as indicated in Fig. 50, according to color code.

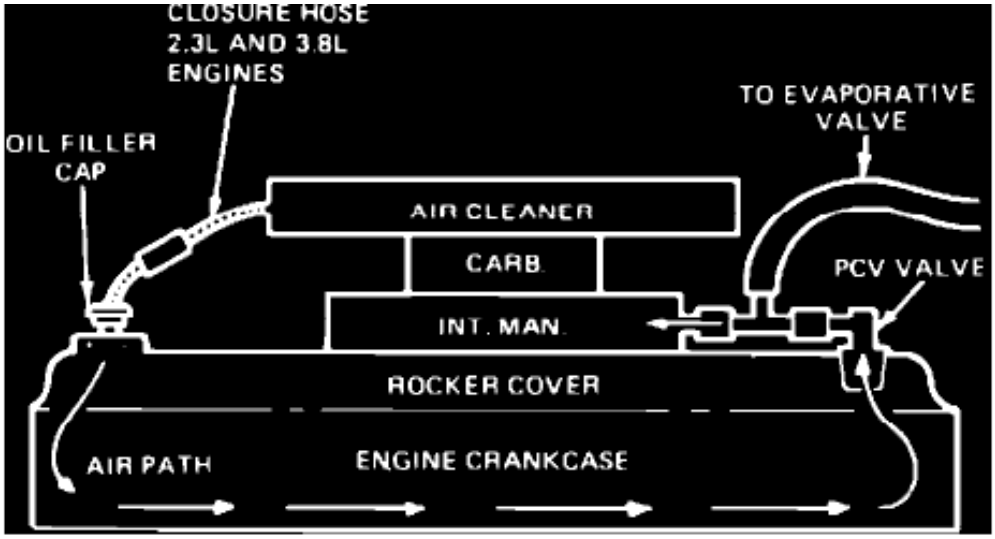
3. If there is a vacuum reading after coolant temperature has exceeded calibration temperature of PVS valve, valve is defective and should be

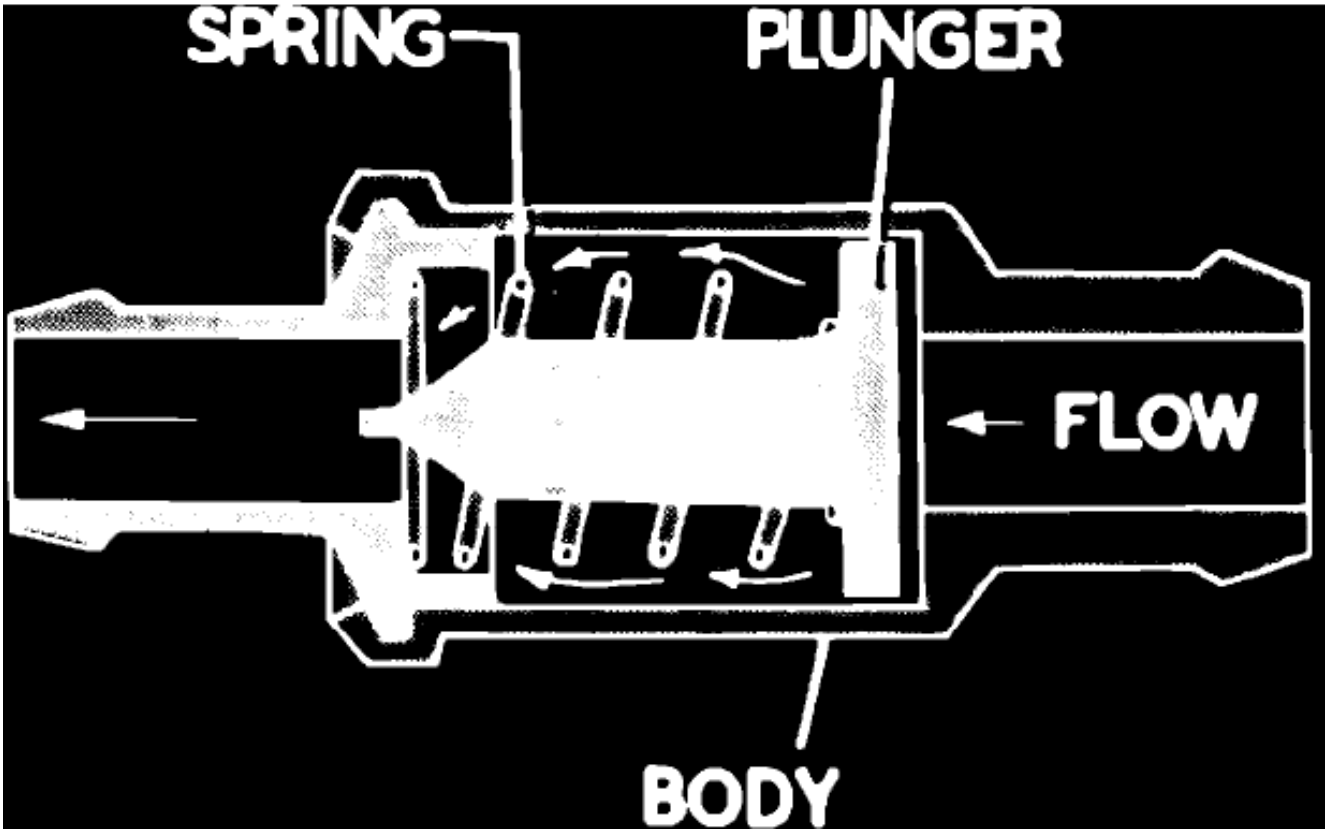
replaced. If there is no vacuum reading, that portion of valve is functioning properly.

4. Connect vacuum gauge to either bottom ports marked E and S and other port to vacuum supply.

5. There should be a vacuum reading at gauge with coolant temperature above the calibration point of the PVS valve. If not, the PVS valve is

defective and should be replaced.





Positive Crankcase Ventilation Valve: Description and Operation

Fig. 62 Typical PCV system

Fig. 63 Typical PCV valve

All engines produce small amounts of blowby gases which seep past the piston rings and into the crankcase. These blowby gases are the result of the high pressures developed within the combustion chamber during the combustion process, and contain undesirable pollutants. To prevent blow-by gases from entering atmosphere while allowing proper crankcase ventilation, all engines use a PCV system, Fig. 62.

The PCV system prevents blowby gases from escaping by routing them through a vacuum controlled ventilating valve and a hose into the intake manifold. The blowby gases mix with the air/fuel mixture and are burned in the combustion chambers. When the engine is running, fresh air is drawn into the crankcase through a tube or hose connected to the air cleaner housing.

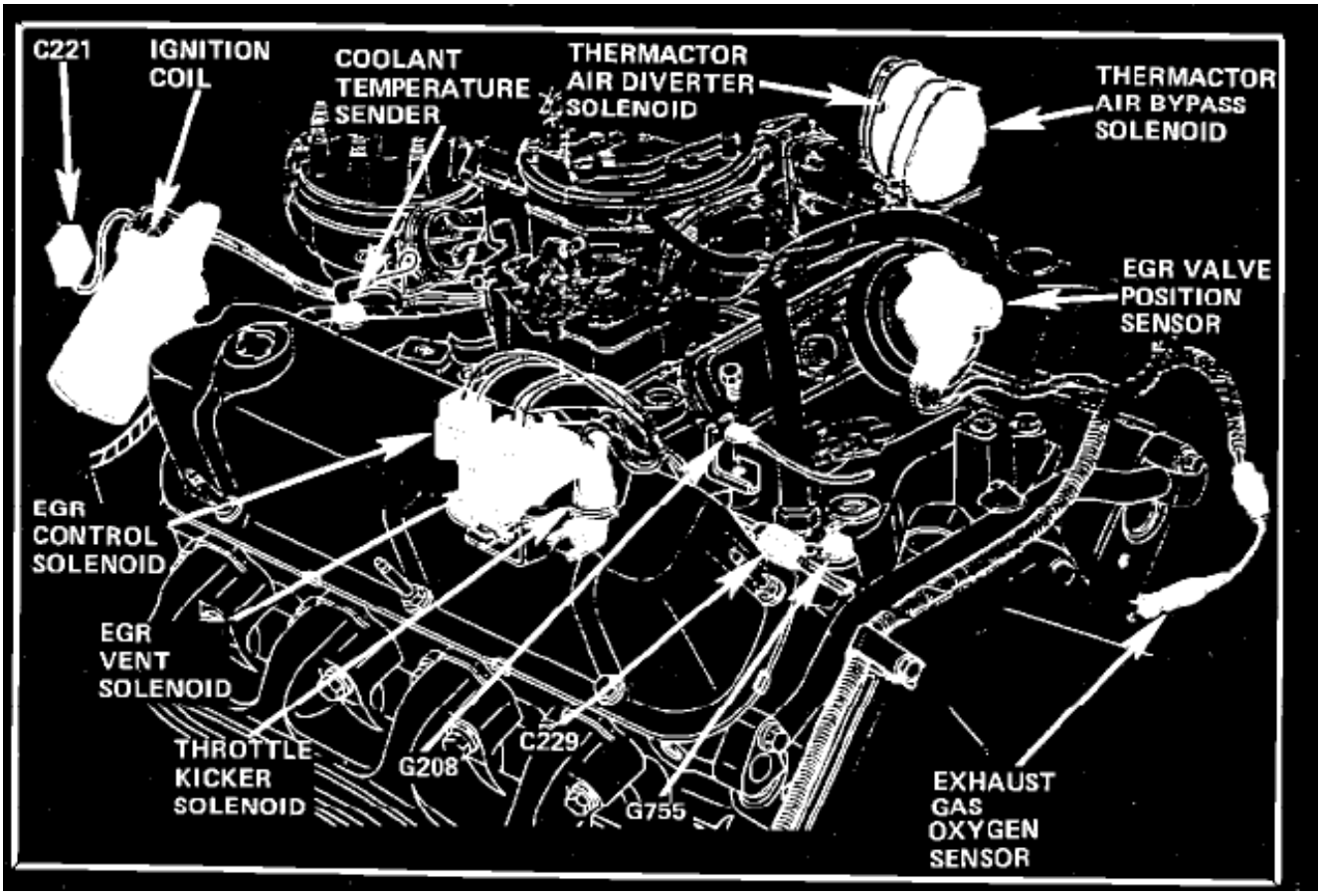
The PCV valve, Fig. 63, consists of a needle valve, spring and housing. When the engine is off, the spring holds the needle valve closed to stop vapors from entering the intake manifold. When the engine is running, manifold vacuum unseats the valve allowing crankcase vapors to enter the intake manifold. In case of a backfire in the intake manifold, the valve closes, stopping the backflow and preventing ignition of fumes in the crankcase. During certain engine conditions, more blowby gases are created than the ventilator valve can handle. The excess is returned through the air intake tube to the air cleaner and carburetor where it is burned in the engine.

Positive Crankcase Ventilation Valve: Testing and Inspection

1. Pull end of PCV valve out of valve cover. If valve rattles when shaken, proceed to step 2. If not, replace valve.

2. Disconnect vacuum hose from air cleaner and feel for vacuum at hose with engine at idle. If vacuum is felt, system is satisfactory. If no vacuum is felt, check for obstructions in PCV system or a leaking evaporative valve.

3. Disconnect evaporative hose, then cap the tee fitting and retest. If vacuum is now felt, PCV system is satisfactory. Check evaporative system. If no vacuum is felt, check for vacuum back through the system and inspect rocker cover gasket for leaks. Repair or replace components as necessary.

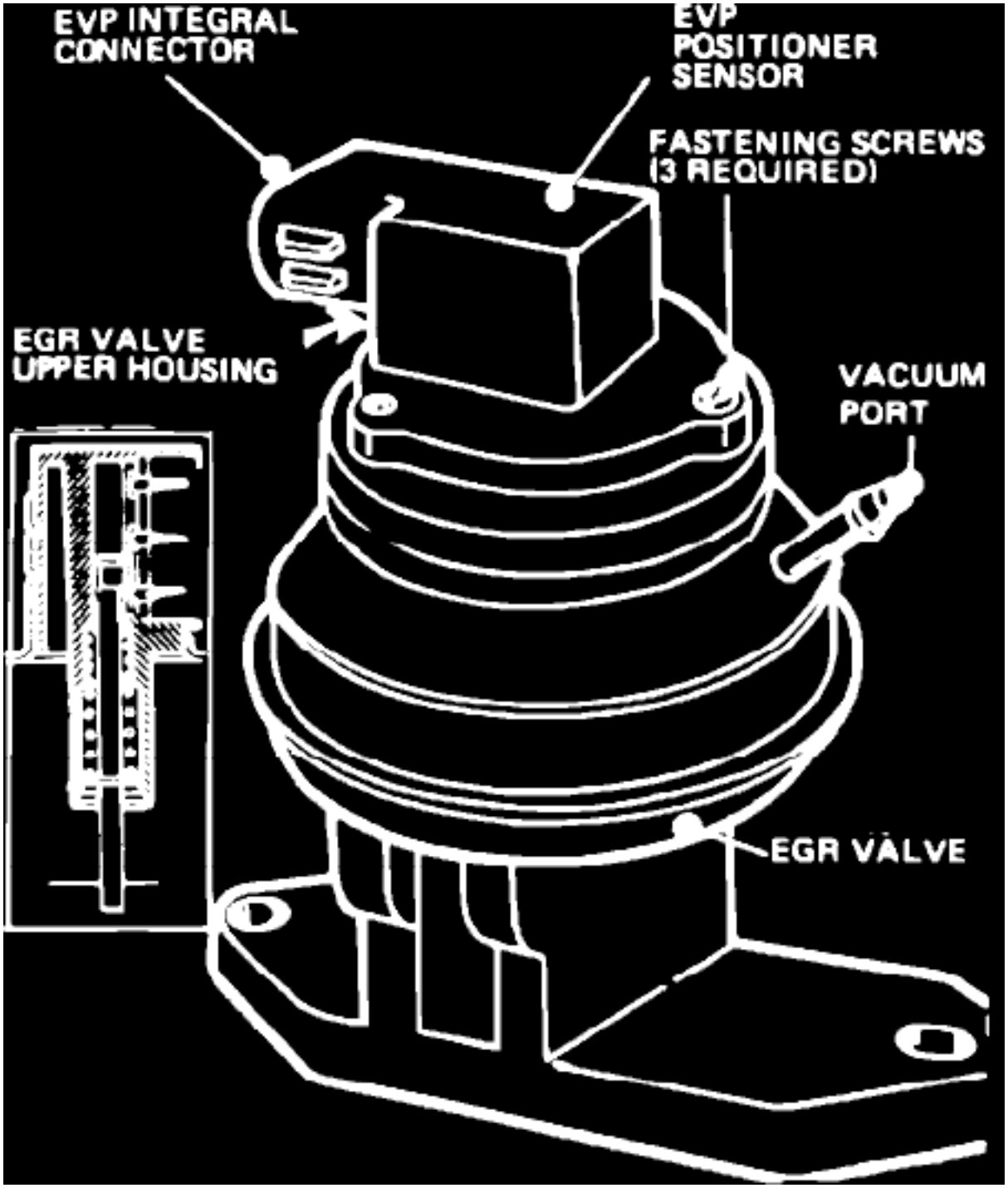


EGR Valve Position Sensor: Locations

LH Side Of Engine.

Rear Of Carburetor

Applicable to: 1982-83 V8-302/5.0L & V8-351/5.8L Engines w/EEC

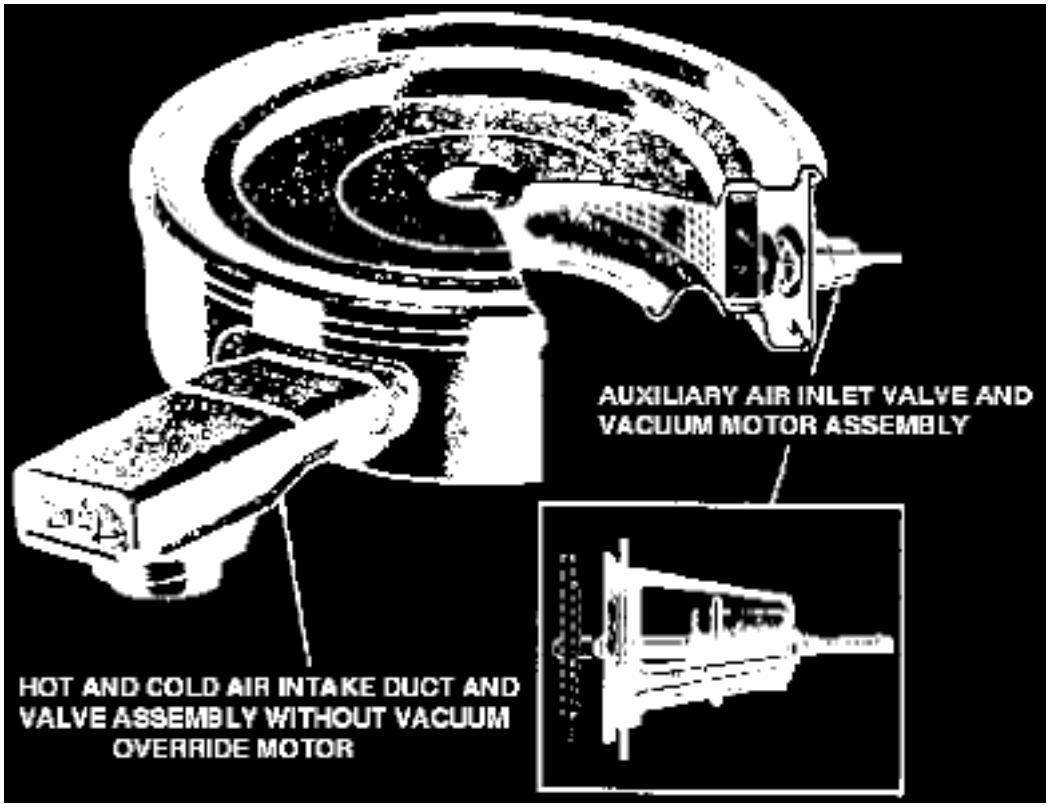


EGR Valve Position Sensor: Description and Operation

Fig. 6 EGR valve position sensor

This sensor, Fig. 6, is used to monitor the EGR valve pintle position. The computer applies a reference voltage to the EVP sensor, and the resulting signal from the EVP sensor is proportional to the amount of exhaust gases flowing through the EGR valve pintle into the intake manifold.

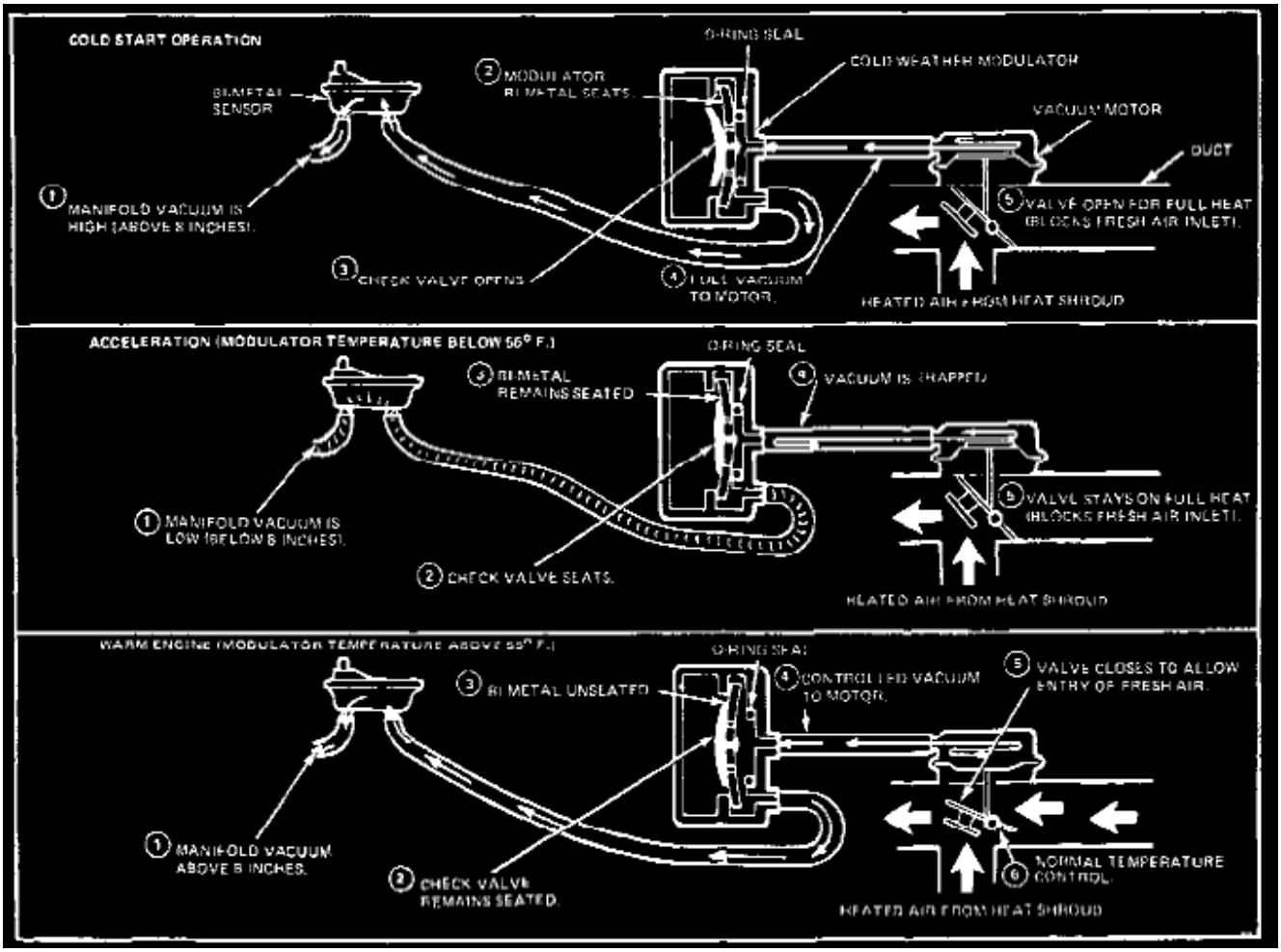
Depending on the input from this and other sensors, the computer can increase or decrease EGR flow by activating or deactivating a pair of solenoid vacuum valves.



Thermostatic Air Cleaner Vacuum Switch: Description and Operation Auxiliary Air Inlet Valve

Fig.5 - Auxiliary Air Inlet Valve

The auxiliary air inlet valve is mounted on the outside of the air cleaner housing and serves to allow outside air to bypass the heated air inlet system when the engine is under load. When manifold vacuum is low, a spring in the vacuum motor allows the valve to open, providing an additional flow of air into the air cleaner housing, Fig. 5.



Thermostatic Air Cleaner Vacuum Switch: Description and Operation Cold Weather Modulator

Fig.4 - Cold Weather Modulator

This modulator, Fig. 4, located in the air cleaner housing of some 1975-82 Ford vehicles, prevents the air cleaner door from opening to non-heated outside air at ambient temperatures below 55° F. At ambient temperatures above 55° F., the modulator is inoperative. During acceleration at ambient temperatures below 55° F., the modulator located in-line between the bi-metal sensor and vacuum duct motor, will close off vacuum to the motor and hold the duct open.

Thermostatic Air Cleaner Vacuum Switch: Testing and Inspection

Procedure

1. Cool modulator to below 40° F (except black modulator) or 20° F (black modulator). Allow enough time for modulator temperature to stabilize

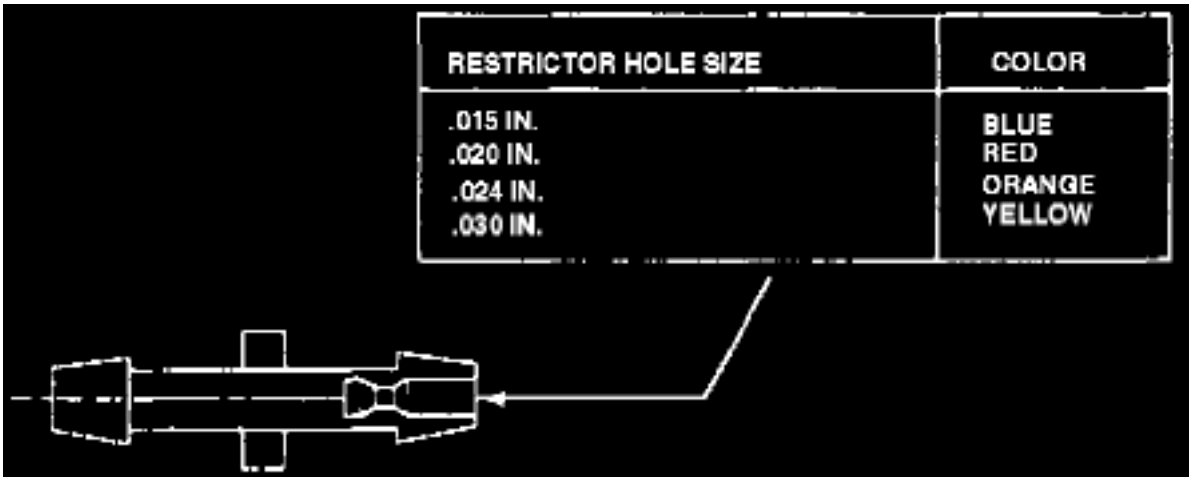
and modulator valve to close.

2. On 1975-76 systems, use an external vacuum source and apply at least 16 inches Hg vacuum to vacuum motor side and trap vacuum by pinching

hose. Modulator must hold at least 14 inches Hg vacuum for 60 seconds. If not, replace modulator.

3. On 1977-80 systems, use a 24 inch length of 1/4 inch hose between cold weather modulator and vacuum gauge. Using an external vacuum source,

apply at least 16 inches Hg vacuum to vacuum motor side of modulator and trap vacuum by pinching hose. The modulator must hold at least 5 inches Hg vacuum for 30 seconds. If not, replace modulator.



Vacuum Restrictor: Description and Operation

Fig.30 - Vacuum Restrictor

The orifice type flow restrictor, Fig. 30, is used on some systems to control the flow rate and or timing characteristics to the following systems:

a. EGR valve timing (opening and closing).

b. Part throttle spark advance.

c. Purge system.

d. Thermactor system

The flow rate through the restrictor is the same in both directions. If blocked, it should be replaced.

Fuel Pressure: Specifications

SPECIFICATIONS

Pressure ..... 6.0-8.0 PSI Volume ..... 1 pint in 20 seconds

NOTE: Measurements taken with engine idling.

Fuel Pressure: Testing and Inspection

PRESSURE TEST

1. Connect a suitable pressure gauge (0-15 PSI) to the carburetor end of the fuel line.

WARNING: Use care to prevent combustion of spilled fuel.

2. Start the engine (it should be able to run for over 30 seconds on the fuel in the carburetor bowl) and read the pressure after 10 seconds. If pump

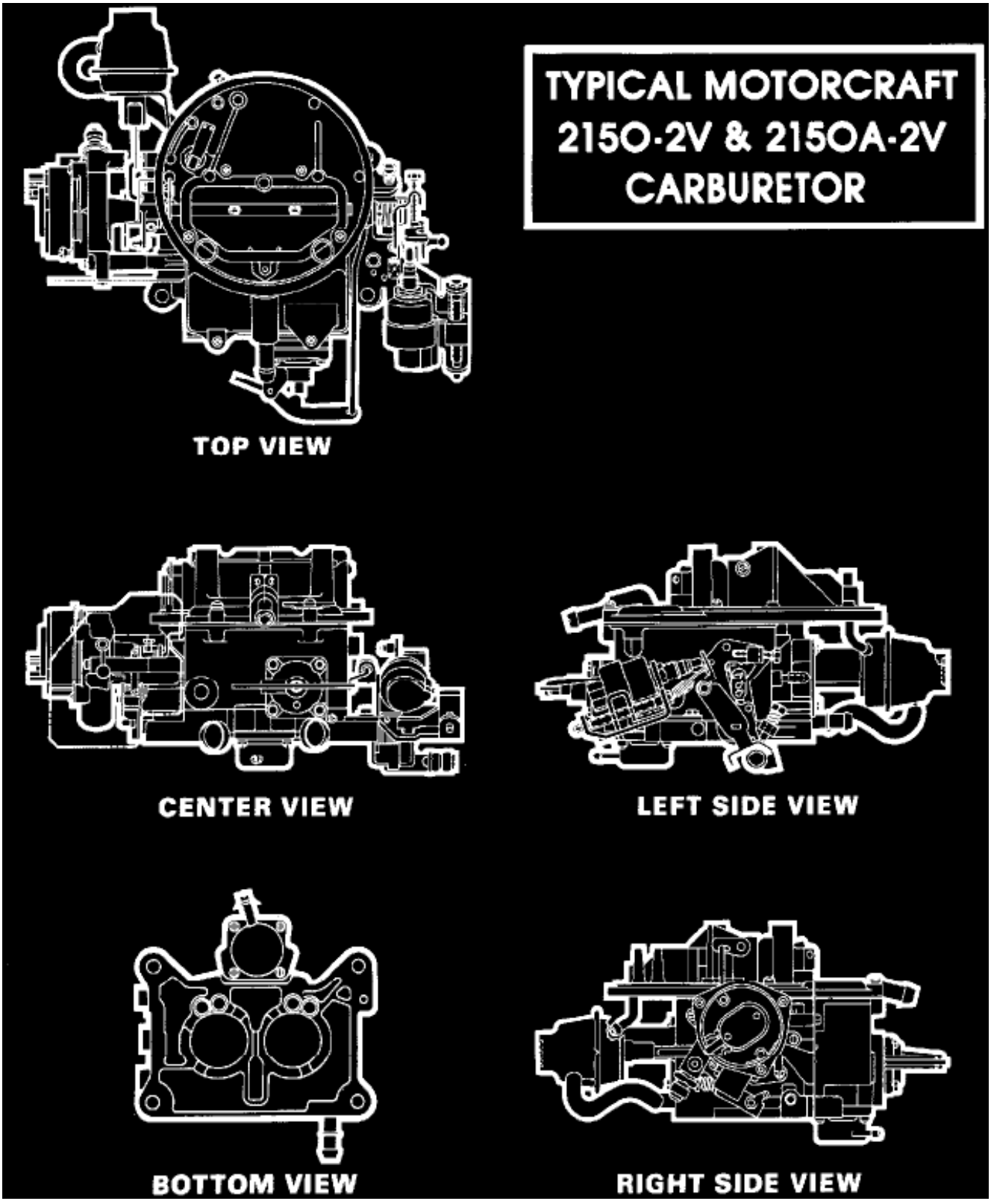
pressure is too low or too high install a new fuel pump.

Fuel Pump Pressure ..... 6.0-8.0 PSI

3. Reconnect fuel line at filter and install air cleaner.

		SLOW		FAST		
Engine	Year	Man. Trans.	Auto. Trans.	Man. Trans.	Auto. Trans.	Step of Cam
5.8L (351)	1982	750	600 D	1700	1650 P	2nd High
AC speed-up	1982	850	—			
w/decal ABF, ABJ	1982	—	550 D	—	2000 P	High
AC speed-up	1982	—	625 D			
Canada	1982	750	600 D	1700	1650 P	2nd High
shutdown idle	1982	850	—			
w/decal ABH	1982	—	550 D	—	2000 P	High
AC speed-up	1982	—	625 D			
5.8L (351) Windsor	1982	750	—	1700	—	2nd High
5.8L (351) Windsor	1982	—	550 D	—	2000 P	High
AC speed-up	1982	—	625 D			
5.8L (351)	1983	750	625 D	1700	2000 P	High
AC speed-up	1983	850	—			
shutdown idle w/decal	1983	—	575 D			
DEY, DFR	1983	600	—	1650	—	2nd High
California	1983	—	600 D	—	1650 P	2nd High

IDLE SPEED SPECIFICATIONS

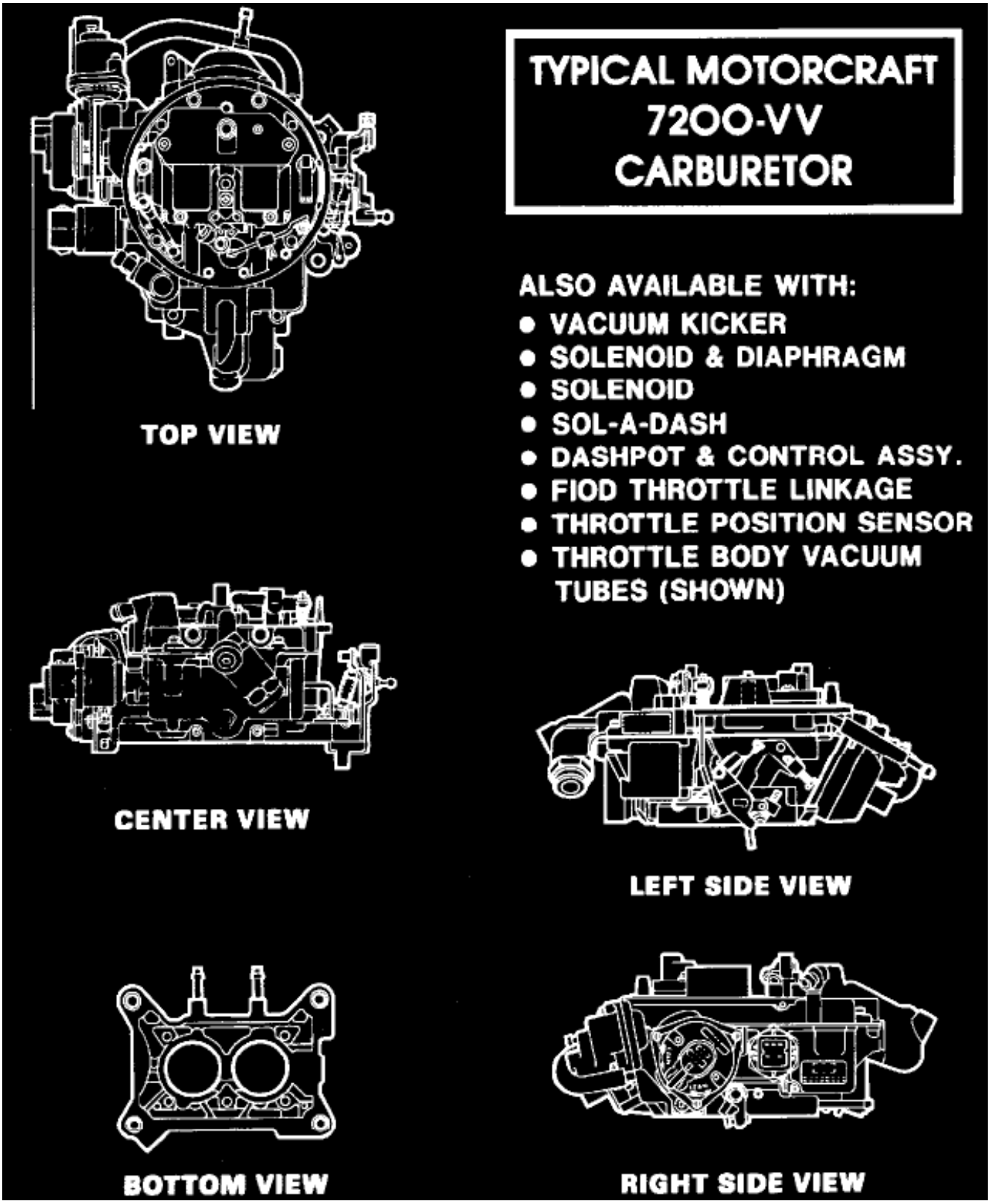


Idle Speed: Adjustments Curb Idle Speed

Identification

CARBURETOR IDENTIFICATION

2150-2V, 2150A-2V Carburetor

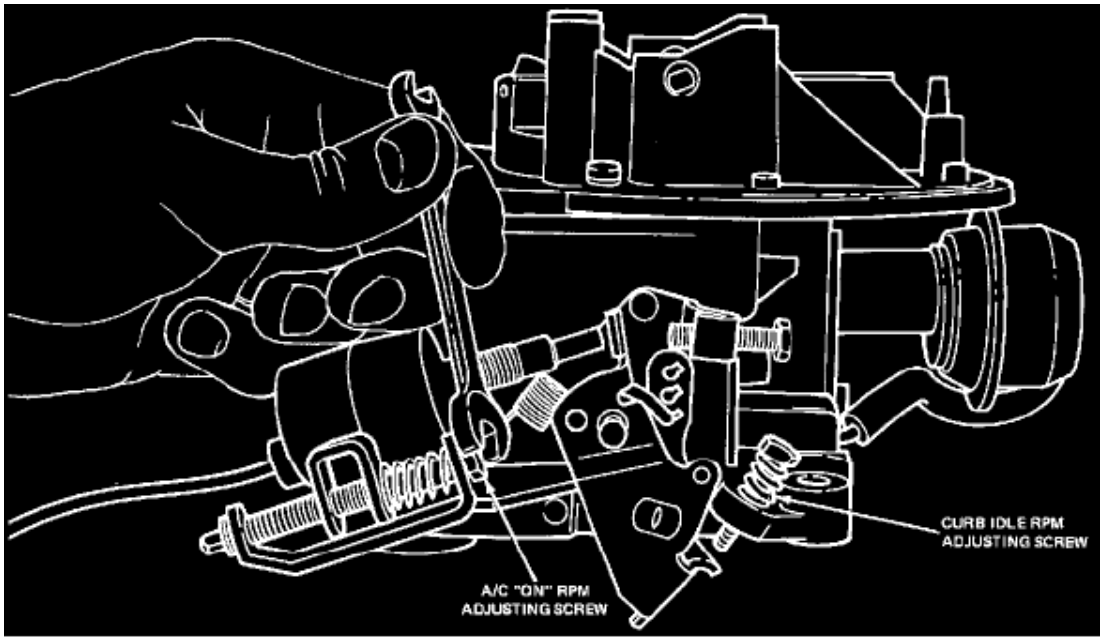


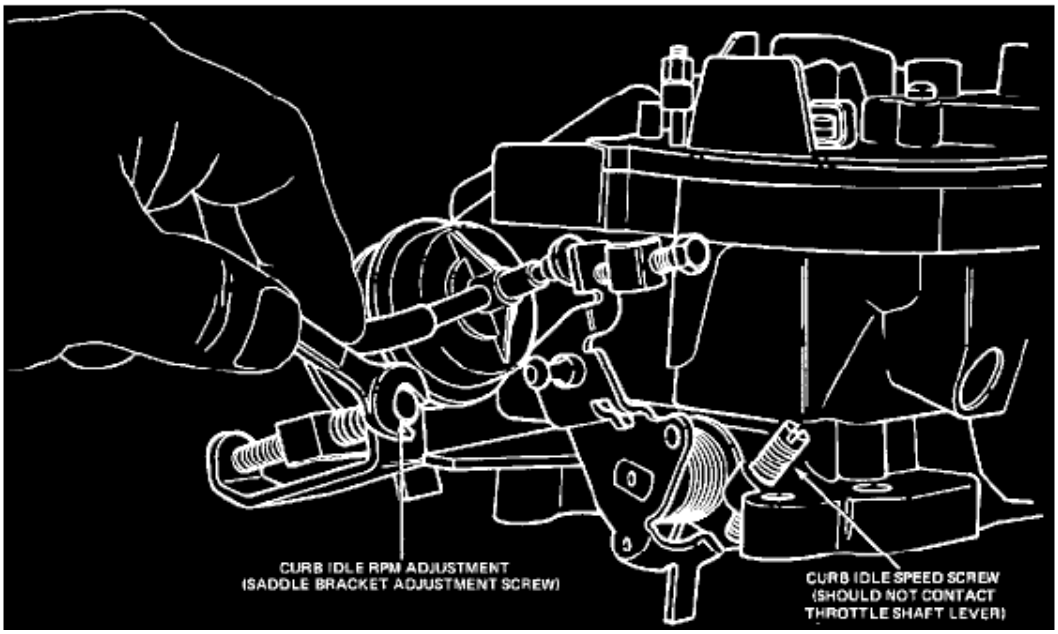
Variable Venturi, 7200-VV Carburetor

Type 2150-2V

CURB IDLE SPEED ADJUSTMENT

- Place the transmission in Neutral (manual) or Park (automatic).
- Bring engine to normal operating temperature (upper radiator hose hot).
- Place the transmission in the specified gear. See: Specifications


CURB IDLE RPM
ADJUSTING SCREW
A/C "ON" RPM
ADJUSTING SCREW


CURB IDLE RPM ADJUSTMENT
(SADDLE BRACKET ADJUSTMENT SCREW)
CURB IDLE SPEED SCREW
(SHOULD NOT CONTACT
THROTTLE SHAFT LEVER)

- Check curb idle rpm. Adjust to specification. See: Specifications

- Place the transmission in Neutral (manual) or Park (automatic). Rev the engine momentarily. Place the transmission in specified position, and recheck curb idle rpm. Readjust if required.

Type 7200-VV Carburetor

CURB IDLE SPEED ADJUSTMENT

- Place the transmission in Neutral (manual) or Park (automatic).

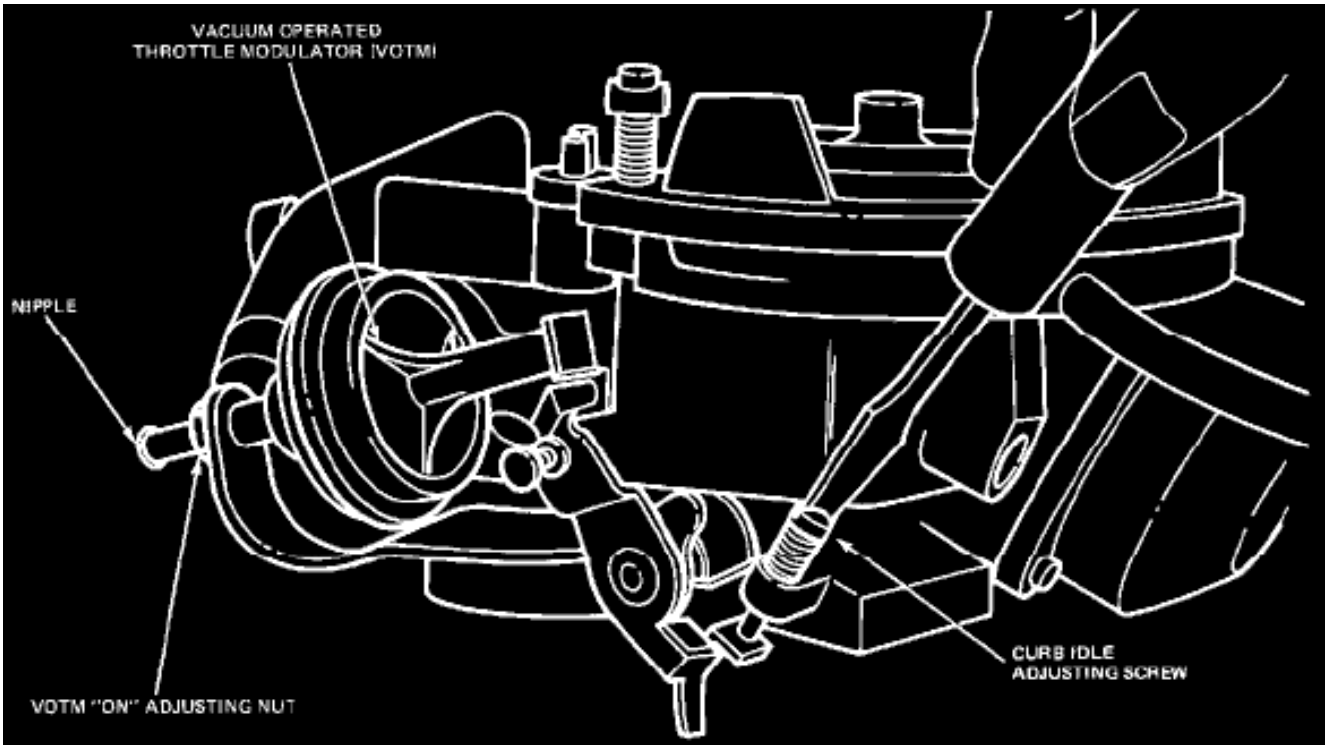
- Bring the engine to normal operating temperature.

- Disconnect purge hose on canister side of evaporator purge solenoid. Check to ensure that purge vacuum is present (solenoid has opened, will require a 3-5 minute wait after starting engine, followed by a short time at part throttle. Reconnect purge hose.

- Disconnect and plug the vacuum hose to the Vacuum Operated Throttle Modulator (VOTM) kicker.

- Place the transmission in specified position. See: Specifications

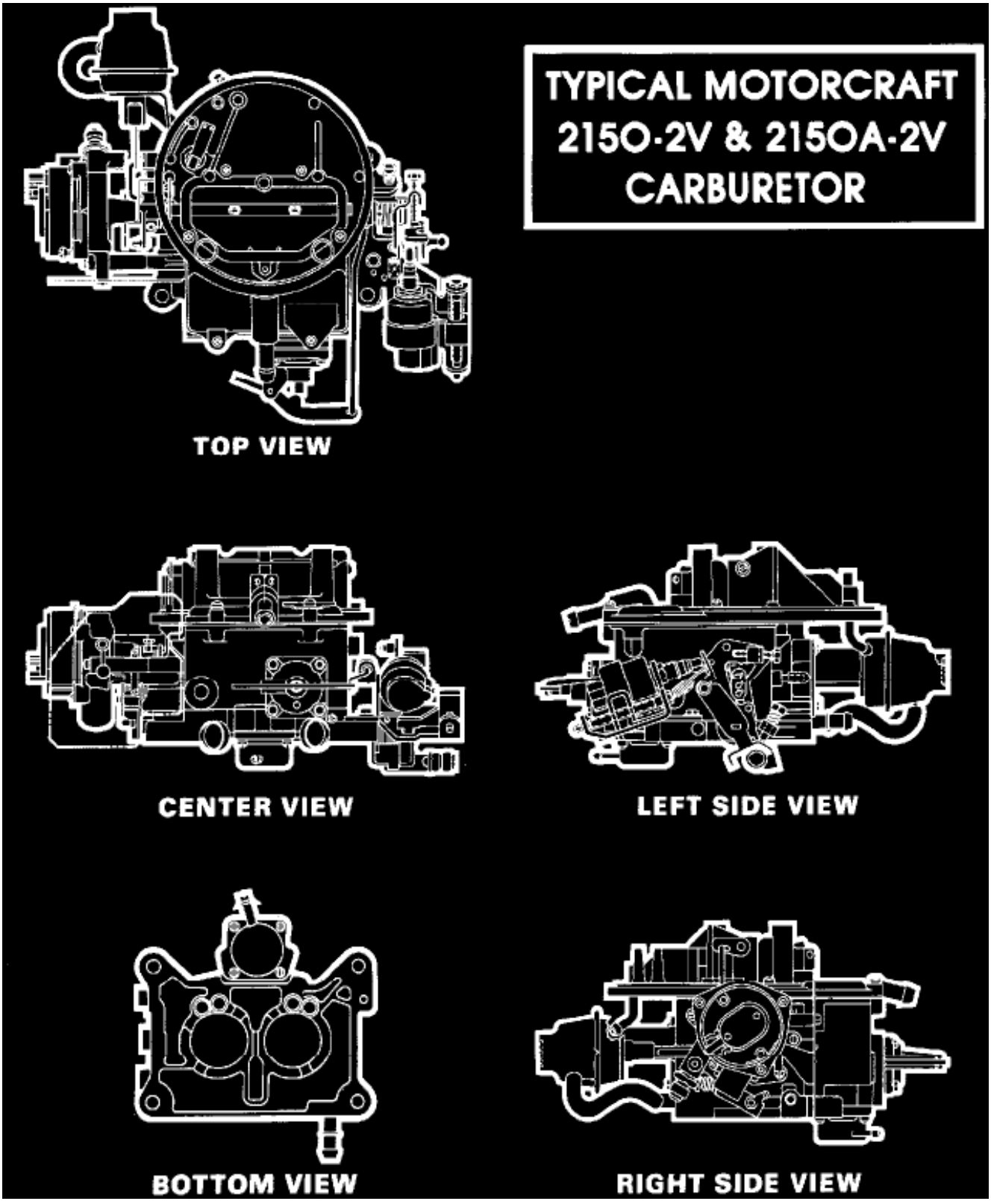
With Automatic Transmission



With Manual Transmission

- Check/adjust curb idle rpm. See: Specifications

- Place the transmission in Neutral or Park. Rev the engine momentarily. Place the transmission in specified position and recheck curb idle rpm. Readjust if required.

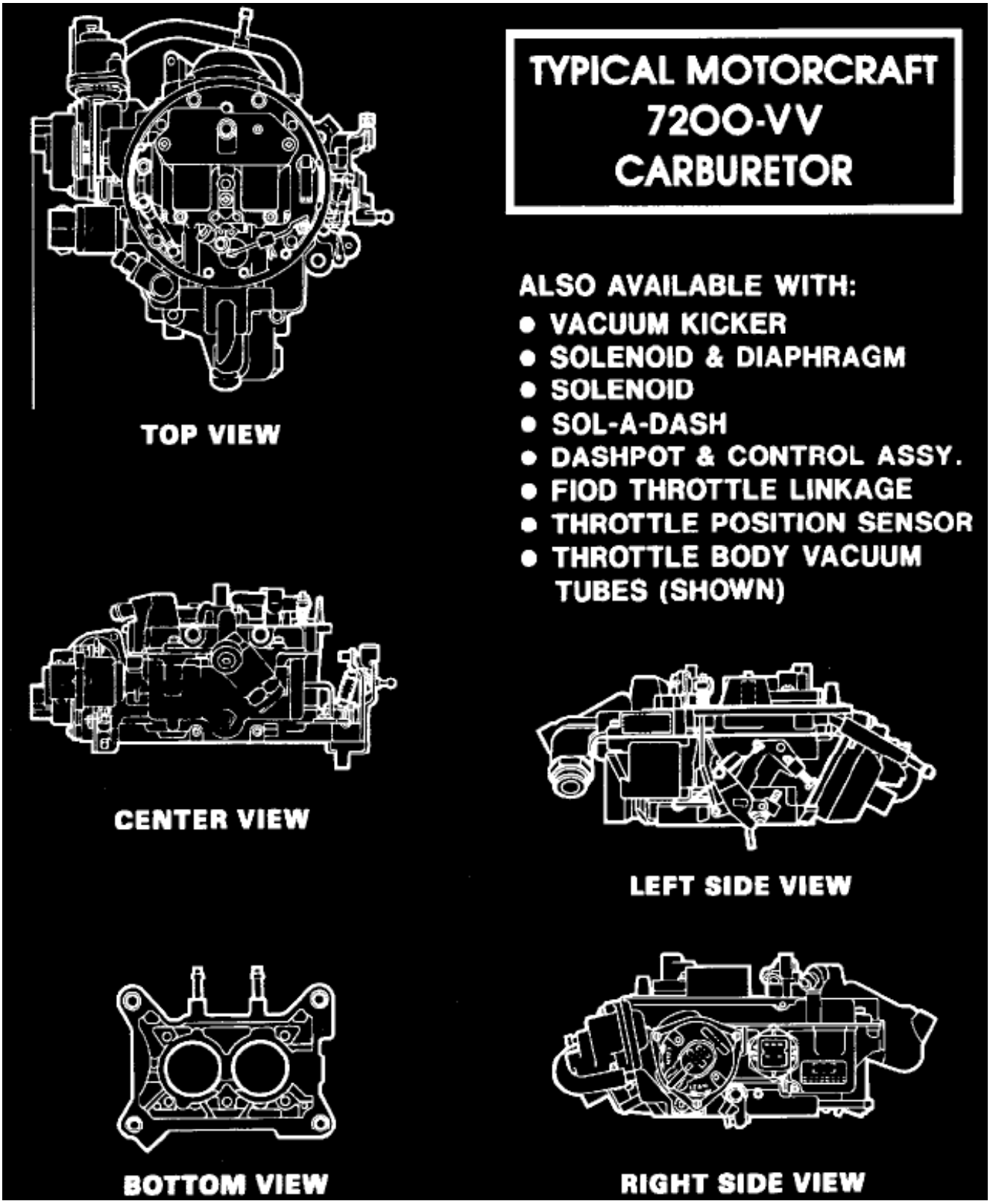


Idle Speed: Adjustments Fast Idle Speed

Identification

CARBURETOR IDENTIFICATION

2150-2V, 2150A-2V Carburetor

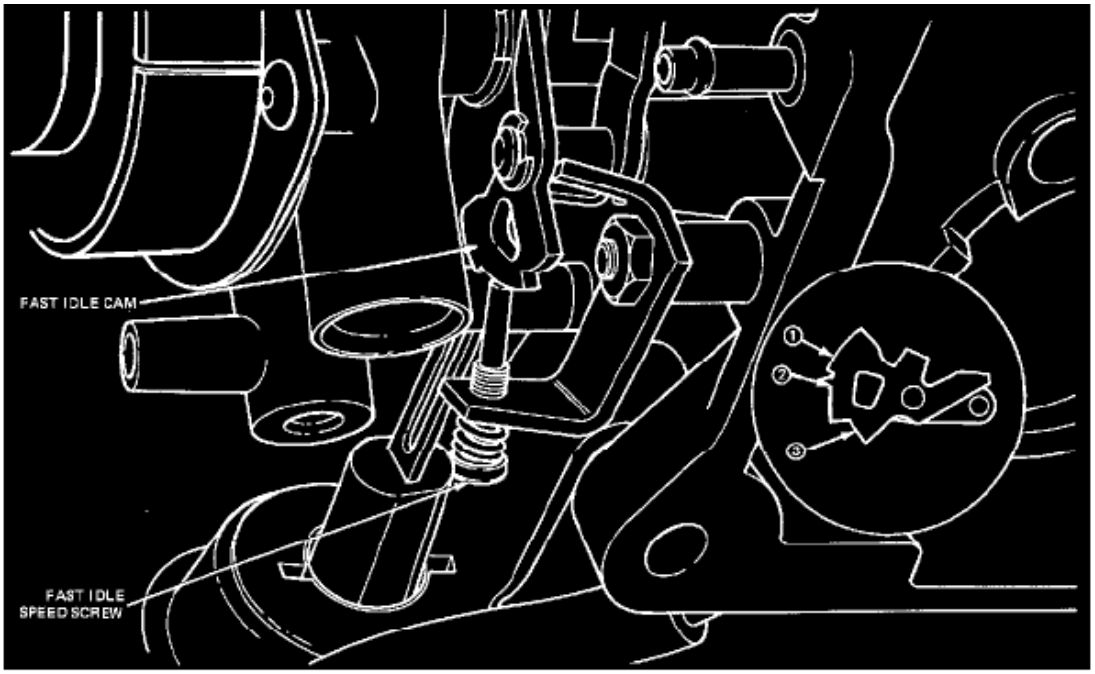


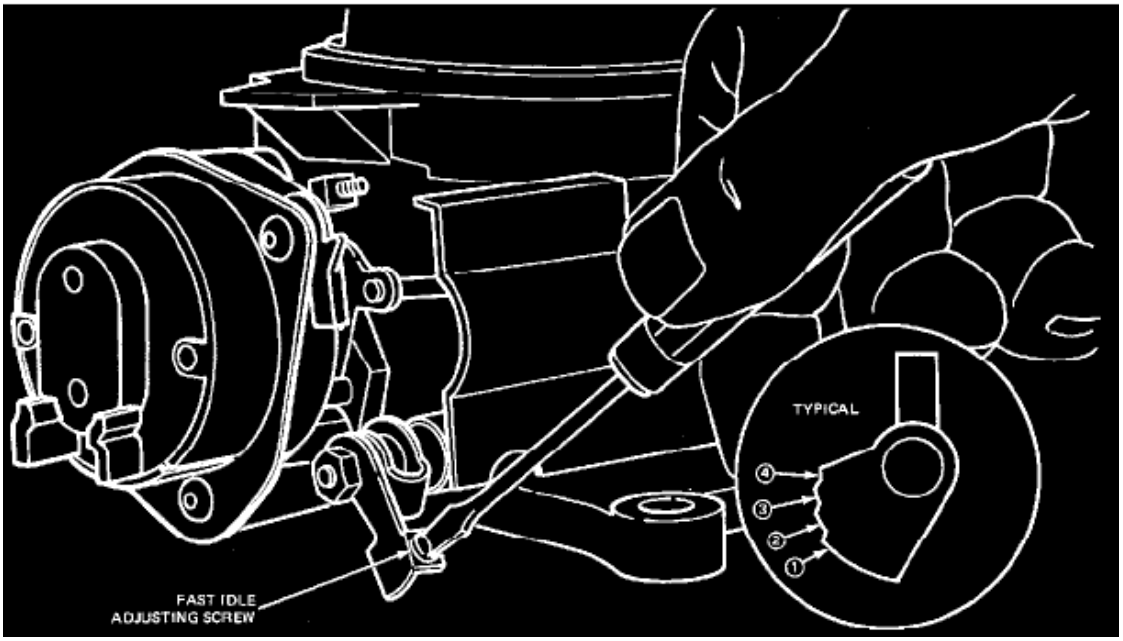
Variable Venturi, 7200-VV Carburetor

Type 2150-2V Carburetor

FAST IDLE SPEED ADJUSTMENT

- Place the transmission in Park (automatic) or Neutral (manual).
- Bring the engine to normal operating temperature.
- Disconnect the vacuum hose at the EGR valve and plug.


FAST IDLE CAM
FAST IDLE SPEED SCREW
1
2
3


TYPICAL
FAST IDLE ADJUSTING SCREW
4
3
2
1

- Place the fast idle adjustment mechanism on top step of fast idle cam. Check/adjust fast idle rpm to specification. See: Specifications

- Recheck for repeatability.

- Remove the plug from the EGR vacuum hose and reconnect.

Type 7200-VV Carburetor

FAST IDLE SPEED ADJUSTMENT

- Place the transmission in Neutral (manual) or Park (automatic).

- Bring the engine to normal operating temperature.

- Disconnect purge hose on canister side of evaporator purge solenoid. Check to ensure that purge vacuum is present (solenoid has opened, will require a 3-5 minute wait after starting engine, followed by a short time at part throttle. Reconnect purge hose.

-

Disconnect the vacuum hose at the EGR valve and plug.

- Place the fast idle adjustment mechanism on the second step of the fast idle cam.

- Check/adjust fast idle rpm to specification. Recheck for repeatability. See: Specifications

- Remove the plug from the EGR vacuum hose and reconnect.

Ford Bronco Workshop Manual (V8-351 5.8L VIN G 2-bbl (1982))
Ford Workshop Manuals > Powertrain Management > Fuel Delivery and Air Induction > Accelerator Pedal > Component Information > Technical Service Bulletins > Customer Interest for Accelerator Pedal: > 87538 > Mar > 87 > Engine - Lacks Power At Full Throttle

Accelerator Pedal: Customer Interest Engine - Lacks Power At Full Throttle

LACKS POWER - ACCELERATOR PEDAL HAS Article No.

LIMITED TRAVEL 87-5-38

LIGHT TRUCK 1980-87 F SERIES, BRONCO ISSUE:

Lack of power at wide open throttle may be caused by limited travel of the accelerator pedal. The current accelerator pedal may interfere with the floor carpet/mat when the driver demands wide open throttle.

ACTION: To correct this, install a new design accelerator pedal, E7TZ-9725-A, which provides 3/8 inch additional clearance for travel. Refer to the following service procedure.

1. Check to see if the accelerator pedal interferes with the floor carpet/mat at wide open throttle.

2. If so, install the new design accelerator pedal, E7TZ-9725-A. Refer to the appropriate Light Truck Shop Manual.

PART NUMBER PART NAME CLASS

E7TZ-9725-A Accelerator Pedal B

OTHER APPLICABLE ARTICLES: None WARRANTY STATUS: Reimbursable within the provisions of the Warranty and Policy Manual OPERATION: 9725A TIME:

0.3 Hr. DLR. CODING: Basic Part No. 9725 - Code: 16

Accelerator Pedal: All Technical Service Bulletins Engine - Lacks Power At Full Throttle

LACKS POWER - ACCELERATOR PEDAL HAS Article No.

LIMITED TRAVEL 87-5-38

LIGHT TRUCK 1980-87 F SERIES, BRONCO ISSUE:

Lack of power at wide open throttle may be caused by limited travel of the accelerator pedal. The current accelerator pedal may interfere with the floor carpet/mat when the driver demands wide open throttle.

ACTION: To correct this, install a new design accelerator pedal, E7TZ-9725-A, which provides 3/8 inch additional clearance for travel. Refer to the following service procedure.

1. Check to see if the accelerator pedal interferes with the floor carpet/mat at wide open throttle.

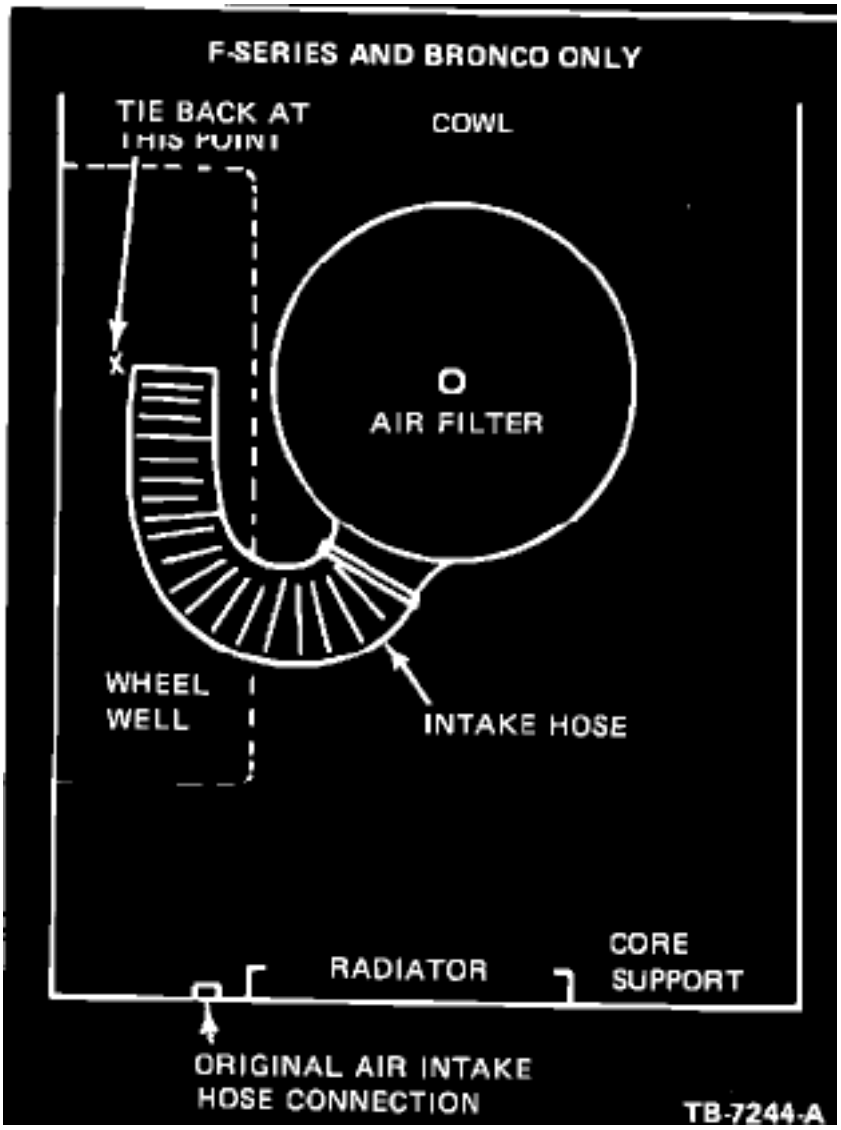
2. If so, install the new design accelerator pedal, E7TZ-9725-A. Refer to the appropriate Light Truck Shop Manual.

PART NUMBER PART NAME CLASS

E7TZ-9725-A Accelerator Pedal B

OTHER APPLICABLE ARTICLES: None WARRANTY STATUS: Reimbursable within the provisions of the Warranty and Policy Manual OPERATION: 9725A TIME:

0.3 Hr. DLR. CODING: Basic Part No. 9725 - Code: 16



Air Cleaner Housing: Technical Service Bulletins Air Cleaner - Sealing Procedure

Article No. 83-25-21-S

AIR CLEANER SEALING - 4.9L (1982-83 F-SERIES AND BRONCO ONLY) AND ALL UNITS WITH 5.0L, 5.8L OR 7.5L ENGINES. UNITS OPERATED IN DUSTY AND/OR OFF-ROAD CONDITIONS -

ARTICLE ALSO INCLUDES SEALING OF 7200VV CARBURETOR ON UNITS SO EQUIPPED

LIGHT TRUCKS 1980-83 E, F AND BRONCO

This is a re-write of TSB 83-25-21 (December 12, 1983). The air cleaner part numbers listed in the TSB are of insufficient detail and are therefore being deleted from the TSB.

Due to the variety of different air cleaners used, part numbers have not been included in this TSB. See your normal parts listing for these part numbers.

The subject vehicles operated in dusty/off-road conditions may experience an air cleaner sealing concern which could lead to engine oil consumption or, on 7200 VV carburetor equipped vehicles, a poor running condition. The following procedure should minimize these concerns.

1. Remove the air cleaner assembly from the engine and remove any loose debris from inside the tray. Replace the air cleaner assembly (9600) on all 1983 4.9L, 5.0L, 5.8L and, 7.5L equipped light trucks except the 1983 Econoline with the 4.9L engine.

Due to the variety of different air cleaners used, part numbers have not been included in this TSB. See your normal parts listings for these part numbers.

2. Wipe the sealing surfaces clean on the tray and cover and inspect for any dents or damage that would prevent a good seal. Replace any damaged components.

3. Inspect the air cleaner to carburetor gasket for proper installation. If the gasket appears crimped or damaged, replace it with a new sticky-back gasket. Prior to replacing the gasket, clean the carburetor flange. Install the new gasket sticky side down and press all the gasket down to assure a tight bond.

Gasket parts numbers: 4.9L - C8DZ-9654-A, 5.0L/5.8L/7.5L - D8ZZ-9654-A.

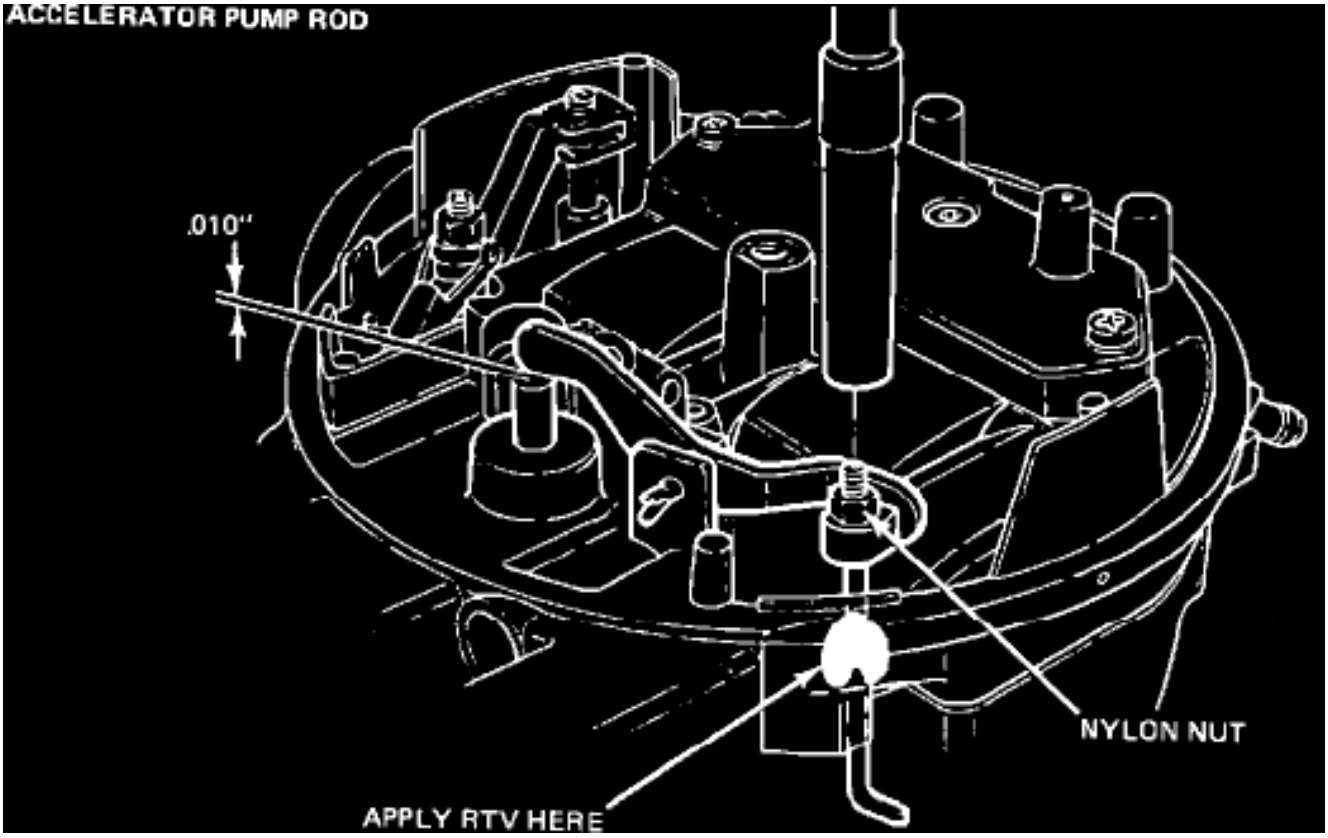
FIGURE 24

4. For F-Series and Bronco only, relocate the zip tube inlet. a) Detach the zip tube inlet from the radiator support. b) Move the inlet to the top rear of the wheel wellhousing per Figure 24. c) Secure the zip tube to the top of the housing with a nylon tie-down

strap. NOTE: At high temperatures, an octane ping may occur. If it persists, the zip tube must be reinstalled to the radiator support. 5.

Replace the PCV filter. For 4.9L, 5.0L-2V, 5.8L-2V and 7.5L-4V engines replace the PCV filter in the air cleaner with an in-line filter.

a. Remove and discard the crankcase breather cap to PCV filter hose (closure hose), PCV filter in the air cleaner, the adapter at the air cleaner and the adapter retaining clip.



b. Drill a 5/16" hole in the side wall of the air cleaner approximately 12" to the rear of the existing crankcase closure hole for 5.0L and 5.8L and approximately 6" to the rear on 7.5L. (The 4.9L does not need a new hole).

c. Install a 1/2" hose (E2AZ-6853-A) to the existing adaptor in the valve cover oil fill cap (2 pcs. 2-5/8" long for 4.9L, 18" long for 5.0L/5.8L, 12" long for 7.5L).

d. At a convenient location, cut the hose and install an in-line filter E2AZ-6A768-A for 5.0L, 5.8L and 7.5L. On the 4.9L, install the filter between the 2-5/8" long pieces installed in (c.).

NOTE: Install the filter with the wire mesh toward the oil fill cap. The mesh can be seen by looking into the end of the filter assembly.

e. Install an adapter E43Z-9E606-A in the air cleaner and attach using a retaining clip 383741-S. Center the adapter elbow in the new hole for 5.0L, 5.8L and 7.5L. Use the existing PCV filter (closure) pack hole for 4.9L.

f. Cut the PCV filter (closure) hose to proper length and attach to the adapter.

g. Plug the old hole in the tray with plug 377678-S for 5.0L, 5.8L and 7.5L only.

FIGURE 25

6. For 5.0L and 5.8L engines with a 7200 VV carburetor, clean and seal the carburetor to prevent dirt migration through the choke rod and accelerator pump rod holes (Refer to Figure 25).

a. Remove the carburetor from the vehicle.

b. Without disassembling the carburetor, thoroughly clean with Ford Automatic Choke Cleaner or equivalent, all of the choke linkage and accelerator pump linkage on the top and sides of the carburetor. Pay particular attention to the top and bottom of the upper body casting around the choke and accelerator pump rods. Allow cleaner to evaporate or blow dry with shop air.

c. Remove stepper motor, gasket, pintle and spring. Clean pintle and pintle cavity in main body casting thoroughly with Ford Automatic Choke Cleaner or equivalent. Do not re-install stepper motor at this time.

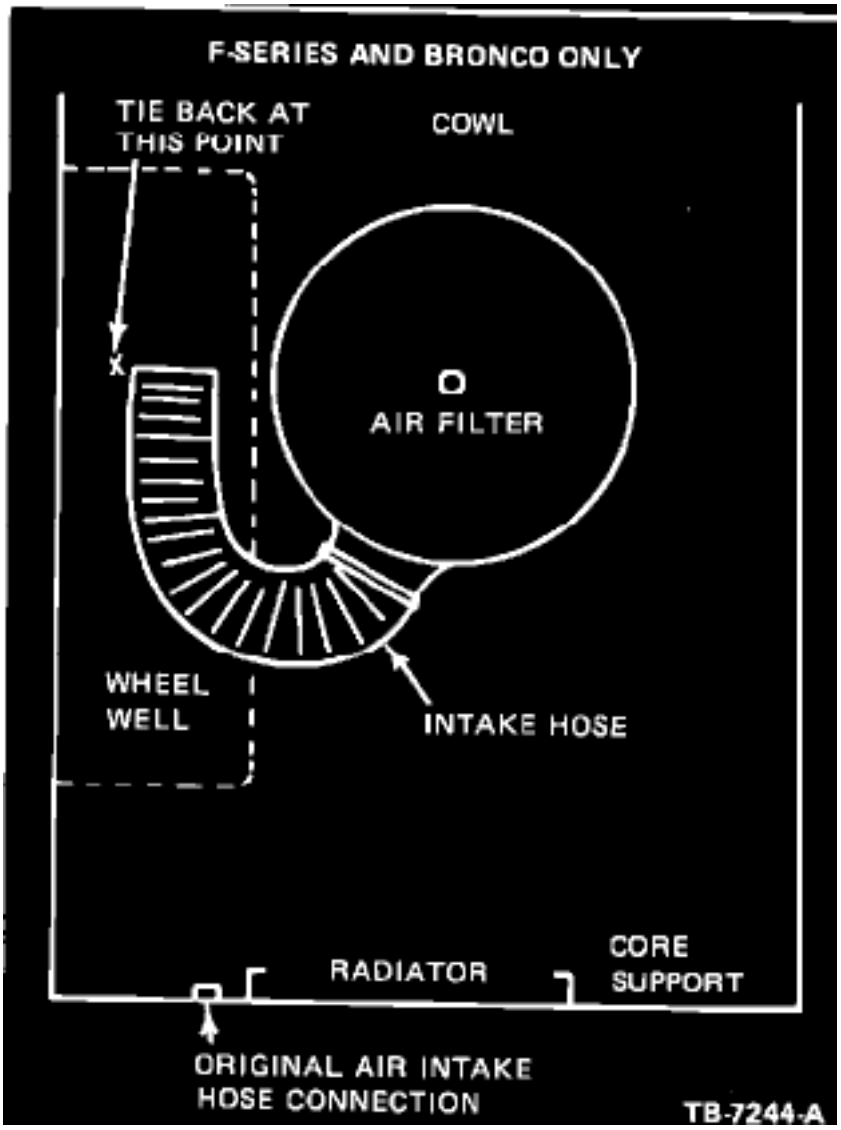


FIGURE 24

d. Hold throttle lever in the wide-open throttle position to raise the accelerator pump rod. With a toothpick, or other sharp tool, apply any commercially available silicone RTV (such as Dow Corning "Silastic") to the top side of the upper body casting around the accelerator pump rod (Figure 24). Fill the hole completely around the rods from the top side only and release the throttle lever.

e. With a rubber band, tie the throttle lever in closed-throttle position. Push fast idle cam to "off" position so that choke rod is fully raised. Fast idle cam should remain in "off" position.

f. With a toothpick, apply silicone RTV to bottom side of upper body casting around the choke shaft rod. Fill the hole completely around the rod from the bottom side only.

g. Install the spring, pintle, gasket, and stepper motor.

h. Allow carburetor to stand at room temperature for 24 hours without disturbing silicone RTV.

i. After 24-hour cure, remove rubber band from throttle lever, and open throttle to break (free) accelerator pump rod from silicone RTV. Bulk of RTV sealant should remain attached to upper body.

j. Manually exercise choke linkage to break (free) choke rod from silicone RTV. Bulk of RTV sealant should remain attached to upper body.

k. Re-install carburetor on vehicle.

7. Re-install and secure the air cleaner assembly as follows:

a. Set the air cleaner tray assembly on the carburetor and check that nothing is preventing the tray seating securely and completely sealing the flange.

b. Connect and secure the vacuum hoses.

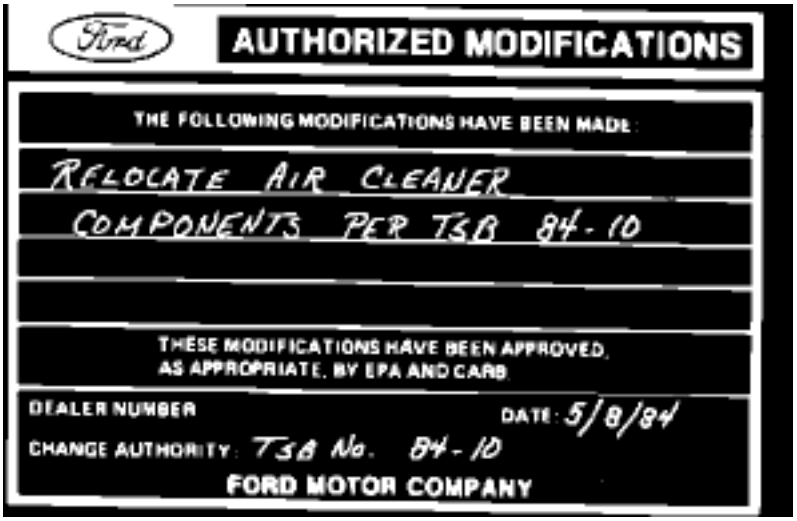
c. Install and seat a new heavy duty air cleaner element in the tray. Use E2TZ-9601-B (FA-732) for 4.9L and E0TZ-9601-A (FA-688) for 5.0L/5.8L. Use non-heavy duty element for 7.5L.

NOTE: Use of incorrect element will allow dirt to be ingested and will damage the engine.

d. Install the air cleaner cover and place the washer grommet rubber side down. Torque the wing nut hand tight (20 in.lbs.). Try to rotate the air cleaner assembly slightly. If it resists rotation, sealing to the carburetor is assured.

e. Connect the crankcase filter hose securely.

f. Install the heat riser tube. Connect the fresh air zip tube.



Obtain an Authorized Modifications decal and list the date, dealer number and summary of alterations performed. Select a prominent place adjacent to the Vehicle Emission Control Information decal suitable for installing the Authorized Modifications decal. Clean the area, install the decal and cover it with a clear plastic decal shield. PART NUMBER

PART NAME CLASS

E2AZ-6A768-A PCV Filter C

E2AZ-6853-A 1/2" PCV Hose C

E43Z-9E606-A Adapter C

E2TZ-9601-B Air Filter Element AM

E0TZ-9601-A Air Filter Element AM

C6TZ-9697-A Washer AM

D8ZZ-9654-A Gasket A

377678-S Plug BR

E3AZ-19562-A RTV Sealer A

390013-S36B Wing Nut S

C8DZ-9654-A Gasket AM

OTHER APPLICABLE ARTICLES: 83-25-21 WARRANTY STATUS: Reimbursable within the provisions of the Warranty and Policy Manual. OPERATION: SP9600C84 TIME:

6 cyl. - 0.5 Hr. 8 cyl. - 1.1 Hrs. DLR. CODING: Basic Part No. 9600 Code: 49

Accelerator Pump: Technical Service Bulletins Service Labor Time Standards Revision

REVISED SERVICE LABOR TIME STANDARDS Article No. 87-8-20

LIGHT TRUCK: 1981-84 F-100/350, ECONOLINE, BRONCO

ISSUE: Labor operations 9424A, (Intake manifold - remove and install or replace) and 9631A (Accelerator pump diaphragm or piston rod (carburetor) - replace) have been revised.

ACTION: The new labor allowances are as follows:

Operation 9424A Intake Manifold - Remove and Install or Replace

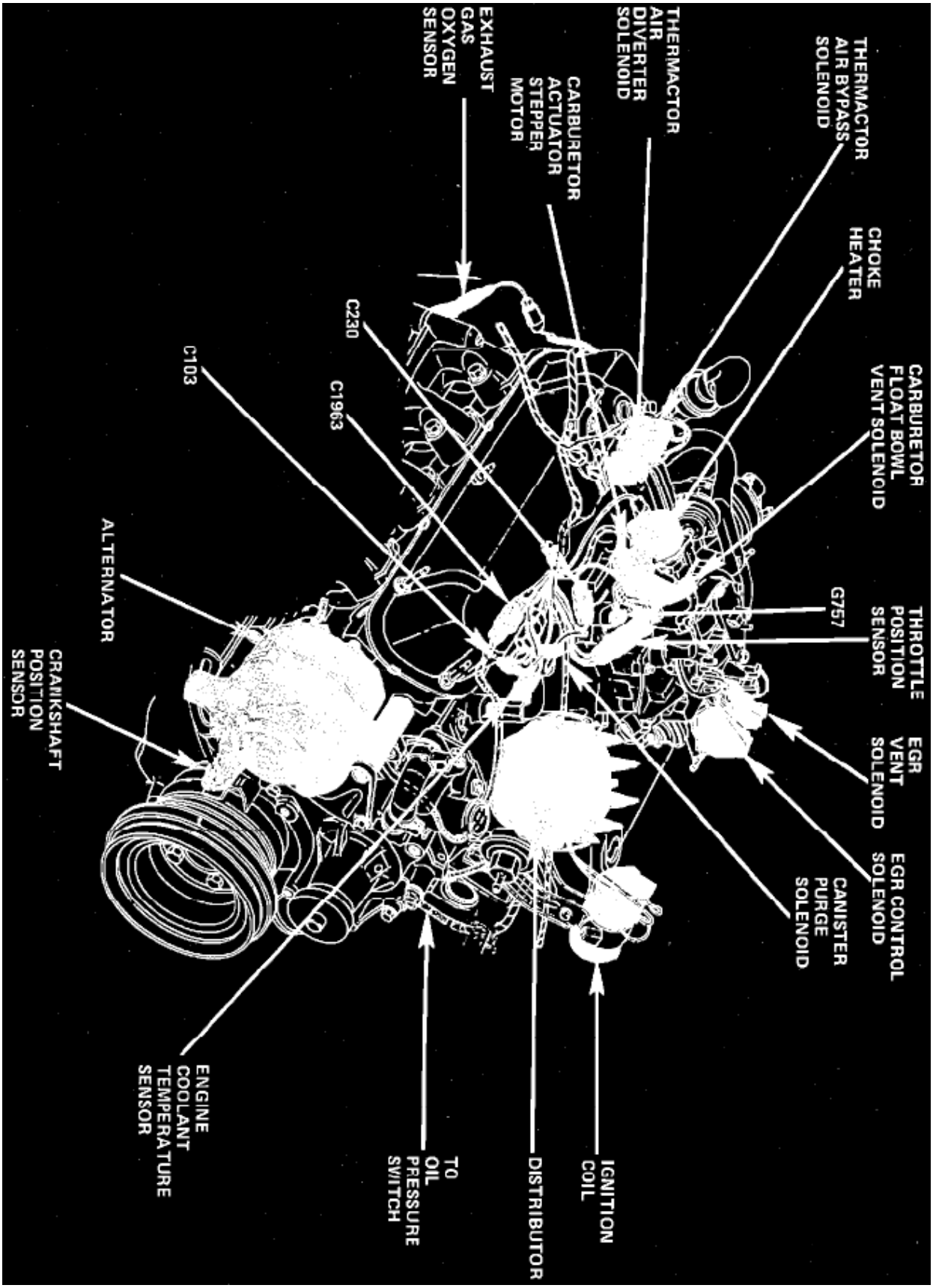
New allowance for 1981-84 Econoline (5.0L and 5.8L) . . . . . 3.2 Hrs.

Operation 9631A Accelerator Pump, Diaphragm or Piston Rod (Carburetor) - Replace

New allowance for all 8-cyl. engines (1984 only) . . . . . 1.3 Hrs.

OTHER APPLICABLE ARTICLES: None WARRANTY STATUS: "INFORMATION ONLY"

Ford Bronco Workshop Manual (V8-351 5.8L VIN G 2-bbl (1982))
Ford Workshop Manuals > Powertrain Management > Fuel Delivery and Air Induction > Carburetor > Bowl Vent Solenoid > Component Information > Locations

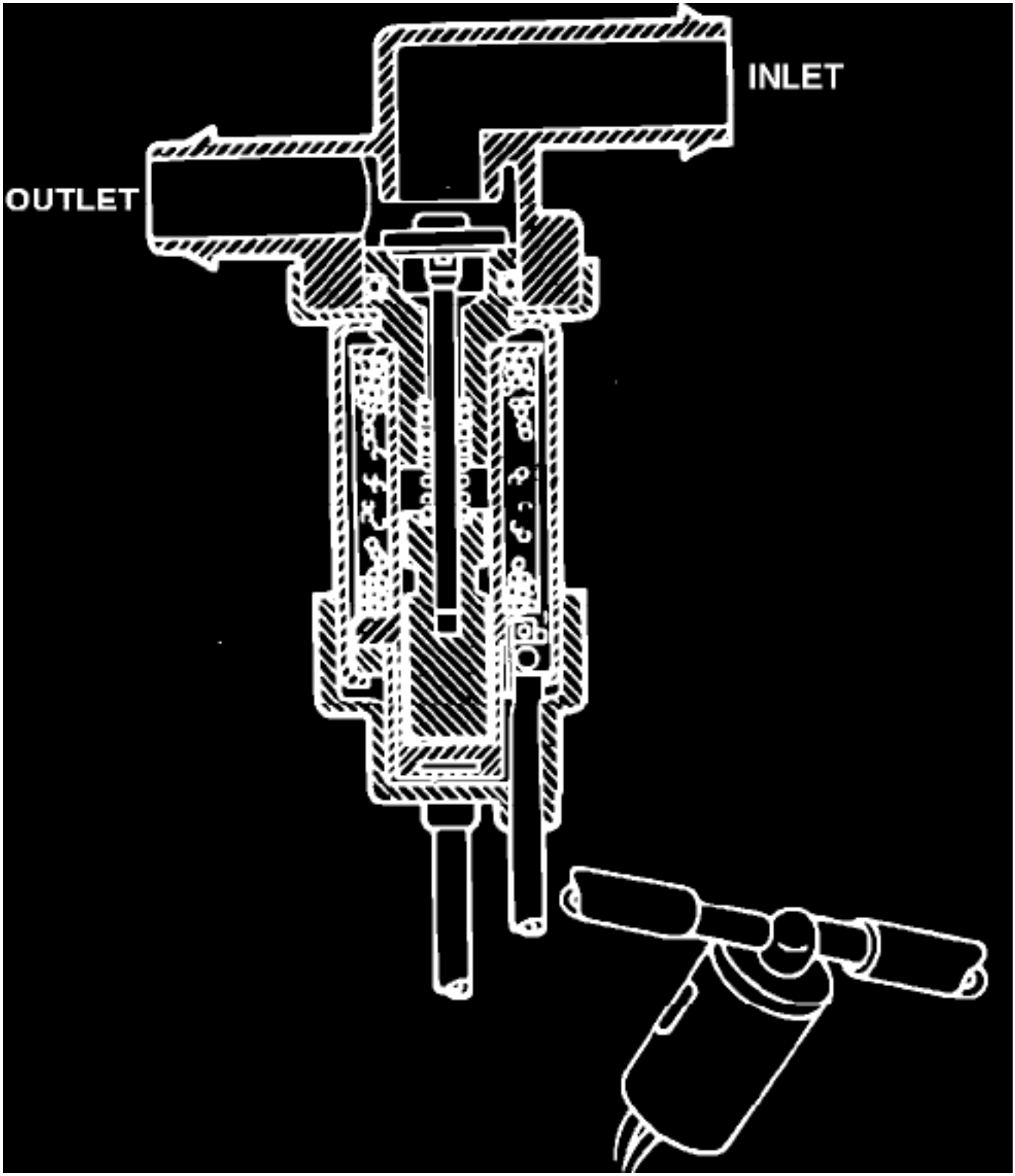


Bowl Vent Solenoid: Locations

Top RH Side Of Engine.

Mounted On Side Of Carburetor

Applicable to: 1982-83 V8-302/5.0L & V8-351/5.8L Engines w/EEC



Bowl Vent Solenoid: Description and Operation

Fig. 9 Carburetor fuel bowl solenoid vent valve

This valve, Fig. 9, used on some vehicles, is a normally open valve located in the fuel bowl vent line to the carbon canister. When the engine is running, the valve closes off the fuel bowl vent line. When the engine is shut off, the vent line returns to the normally open condition.

Bowl Vent Solenoid: Testing and Inspection

Apply 12 volts to valve. The valve should close, allowing no air to pass.

NOTE: If a lean fuel mixture is suspected of causing a problem, inspect either the solenoid vent valve or the fuel bowl vent valve for proper closing during engine operation. If the valve opens, allowing purged vacuum to affect fuel bowl balanced air pressure, the carburetor will give a leaner air/fuel mixture. On EEC equipped engines with a 7200 VV feedback carburetor (back-suction type only), the opposite (rich mixture) will result from an open or leaking valve.

CAUTION: The utmost care should be exercised when using a torch in the area of the fuel evaporation system as an open flame near these hoses may cause a fire and ultimate explosion.

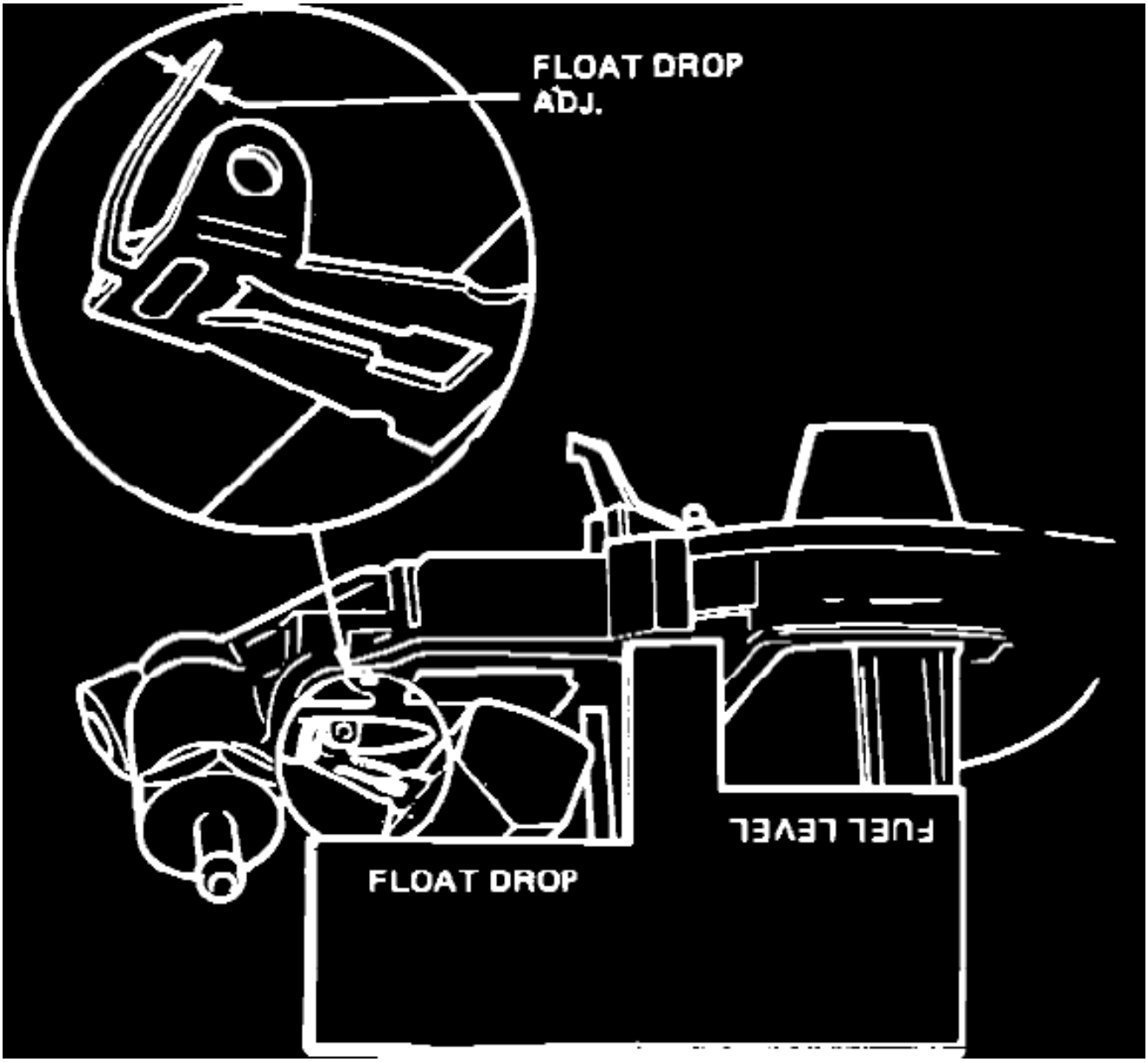
NOTE: Vapor line hoses used in these systems are made from a special rubber material. Bulk service hoses are available for service and will be marked "EVAP". Ordinary fuel hoses should not be used. They are subject to deterioration and may clog system.

CAUTION: Installation of a fill cap from a non-emission fuel tank will render the system inoperative, since the non-emission fill cap is vented and the system must be sealed to function properly. Also if a non-vented fill cap is installed on a conventional tank, the result will be a serious deformation or a total collapse of the fuel tank.

YEAR	CARB. MODEL (Code 9510)	FLOAT LEVEL (DRY)	FLOAT DROP	CONTROL VACUUM REGULATOR	VENTURI VALVE LIMITER	FAST IDLE CAM	CHOKE SETTING
1982	E1TE-ABA	1.040	1.460	.250	③	①	Index
	E1TE-AHA	1.040	1.460	.250	②	①	Index
	E1TE-YA	1.040	1.460	.250	③	①	Index
	E1TE-ZA	1.040	1.460	.250	②	①	Index
	E2TE-CAA, CBA	1.040	1.460	.250	③	①	Index
	E2TE-CCA, CDA	1.040	1.460	.250	②	①	Index

① .36 ON 2ND STOP.
② LIMITER ADJUSTING SCREW, .48-.52; LIMITER STOP SCREW, .99- 1.01.
③ LIMITER ADJUSTING SCREW, .39-.41; LIMITER STOP SCREW .99-1.01.

1981-82 7200 VV ADJUSTMENT SPECIFICATIONS



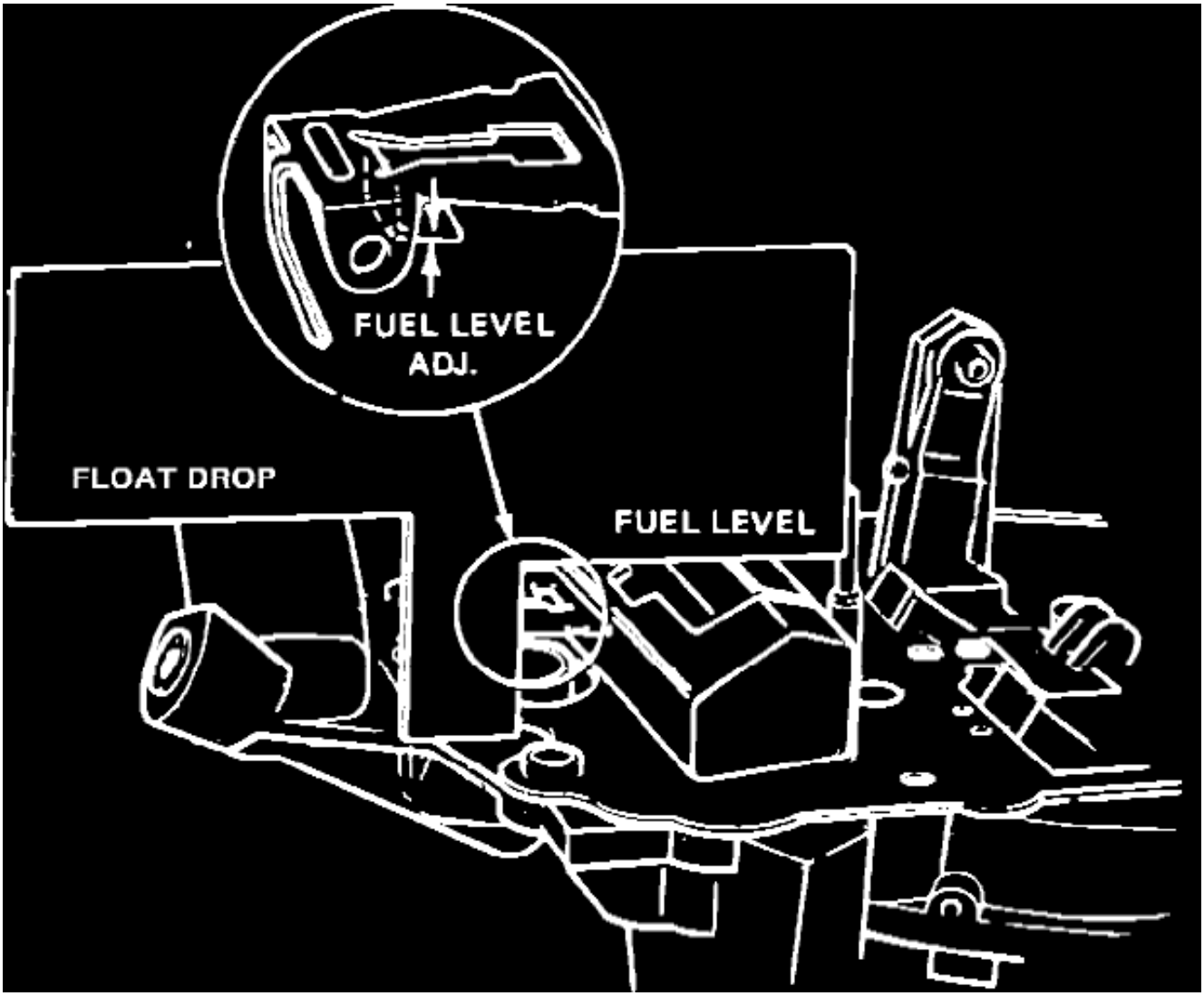
Carburetor Float: Adjustments Float Drop

Fig. 5 Float drop adjustment

1. Position upper body assembly in upright position, then place gauge, Fig. 5, against cast surface of upper body and measure vertical distance

between cast surface of upper body and bottom of float. Do not place gauge on gasket.

2. To adjust, bend stop tab on float lever away from hinge pin to increase setting and toward hinge pin to decrease setting. 3. Install upper body assembly.



Carburetor Float: Adjustments Fuel Level

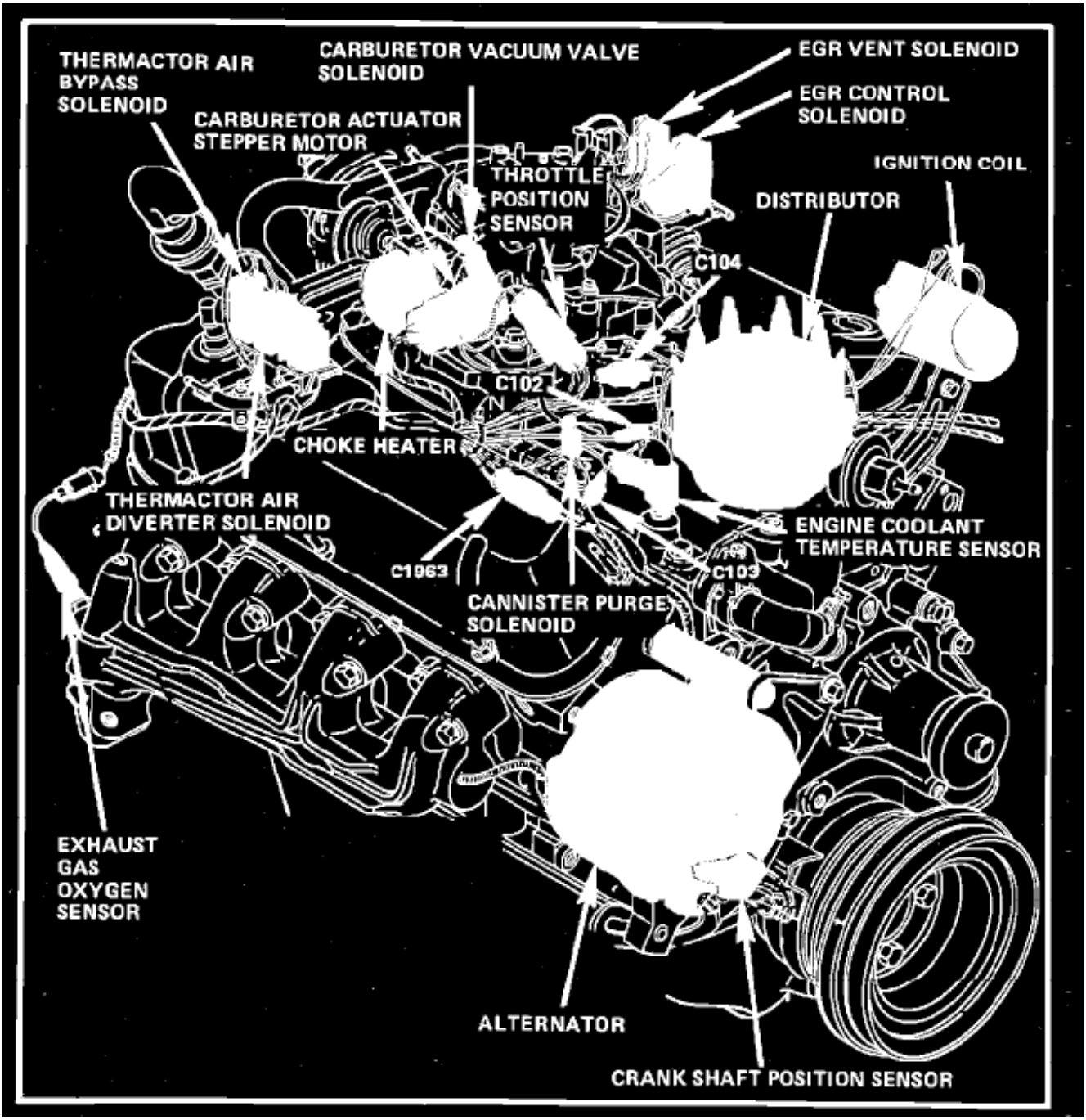
Fig. 4 Fuel level adjustment

1. Remove upper body assembly, then remove upper body gasket. Install new gasket prior to performing adjustment. 2. Invert upper body, then position fuel level gauge, Fig. 4, onto cast surface of upper body and measure vertical distance between cast surface of

upper body and bottom of float. Do not place gauge on gasket.

3. To adjust, bend float operating lever away from fuel inlet needle to decrease setting and toward needle to increase setting. Check and adjust float

drop. Float pontoon must be parallel with gasket.

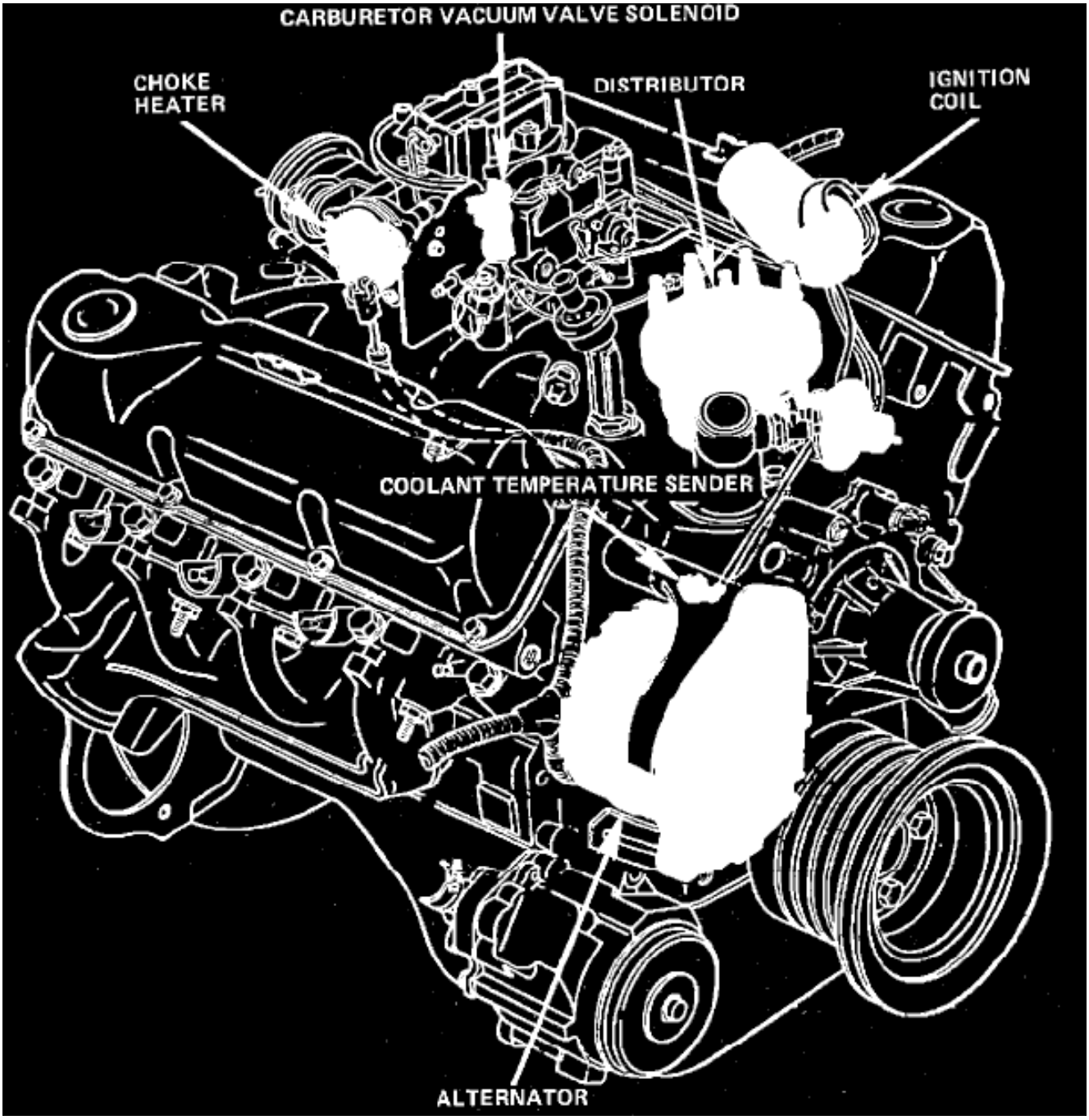


Carburetor Solenoid: Locations

RH Side Of Engine.

RH Front Of Carburetor

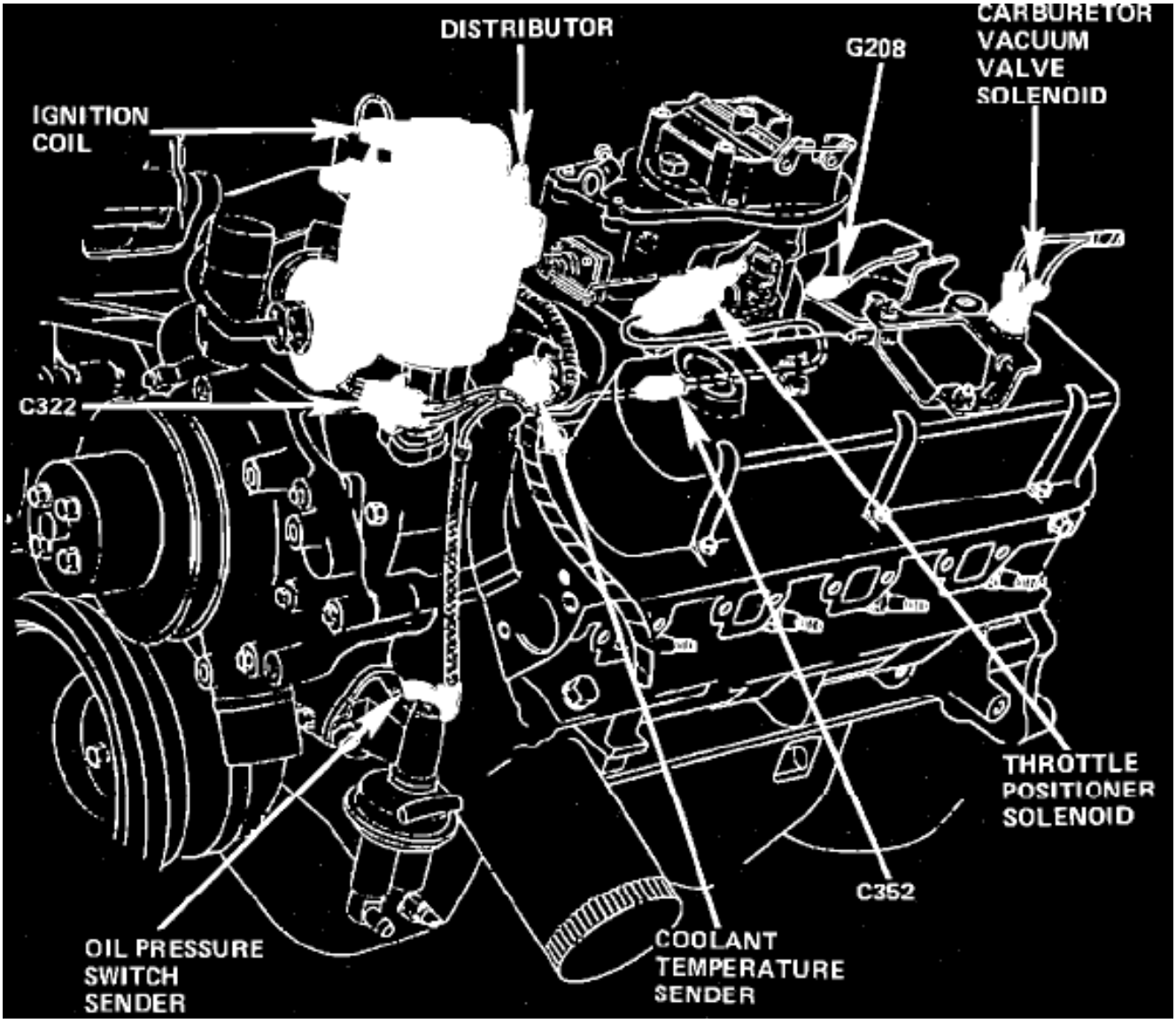
Applicable to: 1981 V8-302/5.0L & V8-351/5.8L Engines w/EEC



RH Side Of Engine.

RH Front Of Carburetor

Applicable to: 1981 V8-351M/5.8L & V8-400/6.6L Engines



LH Side Of Engine.

RH Front Of Carburetor

Applicable to: 1982-83 V8-255/4.2L & V8-302/5.0L Engines

Choke Housing: Technical Service Bulletins Electric Choke System - Testing Tool

Article No: 82-10-13 May 24, 1982

Subject: Rotunda Choke Cap Tester No. 90-0001

FORD All Vehicles With Single - And Two-stage Electric Chokes

LINCOLN-MERCURY All Vehicles With Single - And Two-stage Electric Chokes

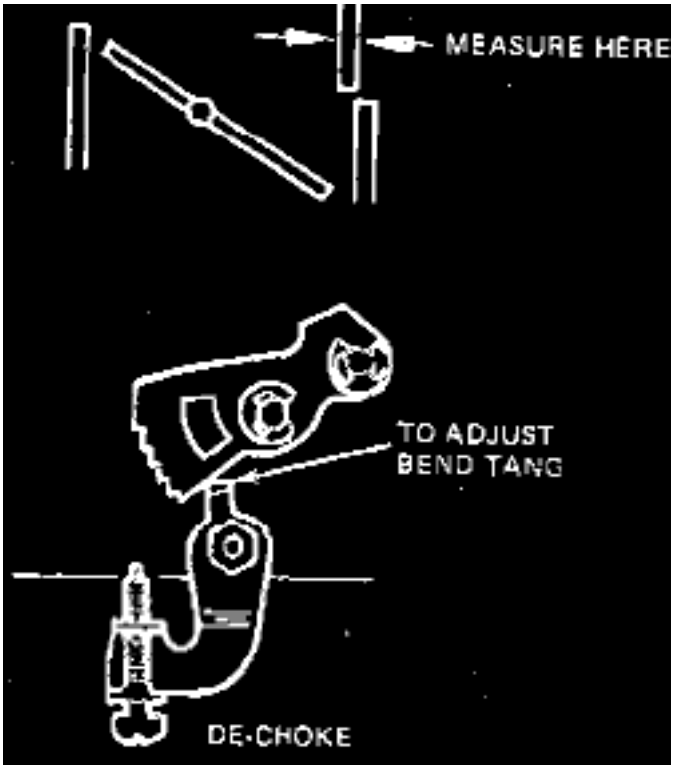
The tool was recently released to improve performance and reduce diagnosis time when servicing choke systems.

Testing time has been reduced to a few minutes with the all electric two-stage choke system. The temperature range of the tester is from -1 °F to 165 °F. For optimum tool performance, shop air with a line pressure of 90 PSI with 6-8 C.F.M. volume is required.

An adaptor is provided to service older model single-stage and hot-air-only systems. The unit is also recommended for testing other heat sensitive/actuated components and auto/temp control systems.

Refer to the Engine/Emission/Diagnosis Manual and the Manufacturers Instruction Manual (provided) for procedures and instructions.

Warranty Status: Information Only

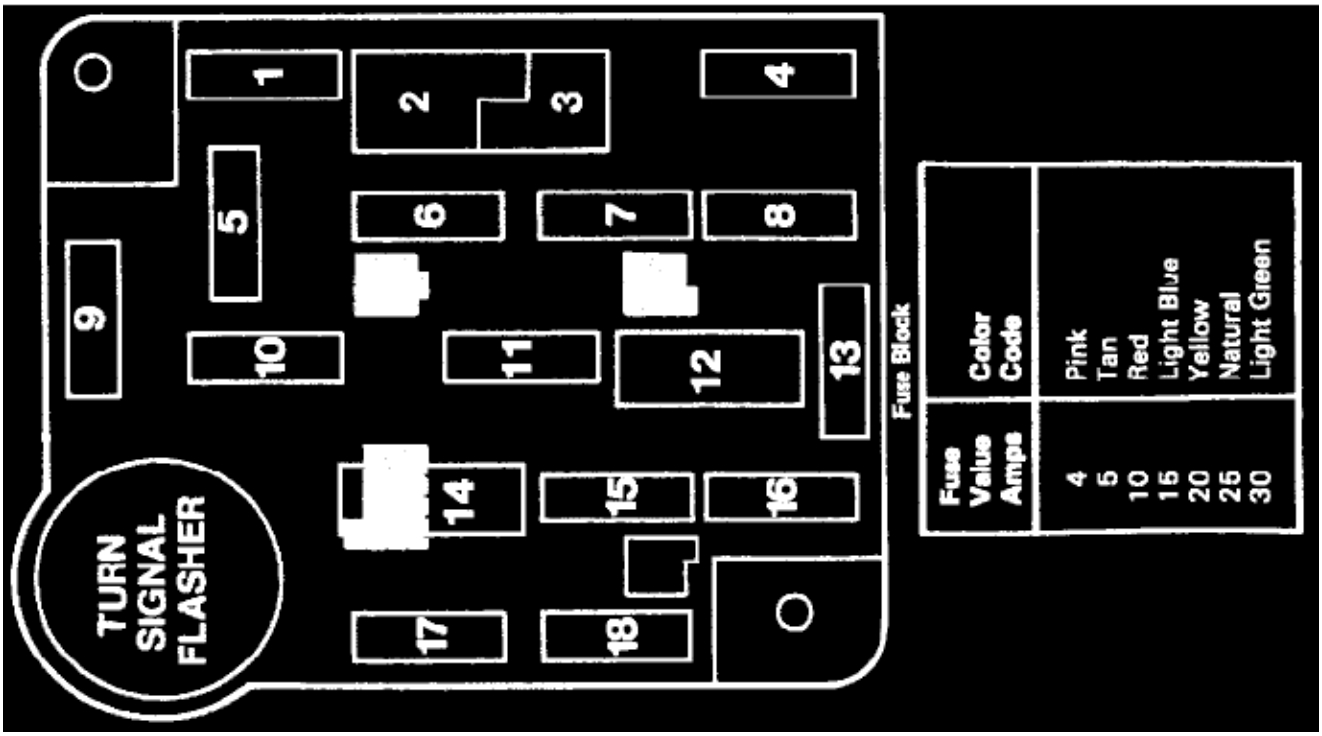


Choke Plate: Adjustments

Fig. 6 Dechoke clearance adjustment

1. Hold throttle in the wide open position and measure clearance between lower edge of choke plate and air horn wall using the specified size drill. 2. To adjust clearance, bend metal tang on fast idle speed lever attached to throttle shaft, Fig. 6. 3. Rotate throttle lever to ensure minimum throttle effort during dechoke tang engagement.

Fuse Position	Amps	Circuits Protected
1	20	Stop/Hazard Lights; Speed Control
2	--	(Not used)
3	--	(Not used)
4	15	Exterior Lights; Instrument Illumination
5	15	Turn Lights; Backup Lights
6	15	Speed Control; 4-Wheel Drive Indicator; Auxiliary Battery Control; Digital Clock; Auxiliary Heater; Feedback Carburetor Control
7	--	(Not used)
8	15	Courtesy, Dome, Cargo Lights; Warning Buzzer
9	30	Heater; A/C-Heater
10	--	(Not used)
11	15	Radio
12	25	Tailgate Power Window; Power Mirrors
13	30 c.b.	Power Door Locks
14	--	(Not used)
15	25	Tailgate Power Window
16	20 c.b.	Power Windows
17	10	Auxiliary Fuel Tank Selector
18	20	Horn; Cigar Lighter
	5	Instrument Illumination
	15	Seatbelt Buzzer; Warning Indicators; Carburetor Circuits; Tachometer; Choke Heater



Choke Relay: Locations

Fuse Block Description

Fuse Block

POWER DISTRIBUTION -

The alternator and battery are connected together at the starter relay hot terminal. Other circuits originate at the starter relay hot terminal and are protected by fuse links. Low power circuits are also protected by fuses.

- The ignition switch and light switch are powered at all times as are fuses 1, 4, 8, 10, and 16. The other fuses are powered through the ignition switch or the light switch.

Choke Thermostat/Heater: Technical Service Bulletins Alternator - Replacement Precautions

Article No. 85-12-24

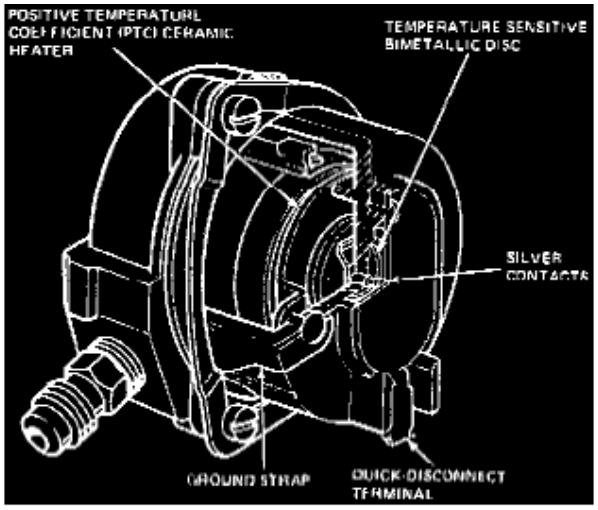
RICH MIXTURE - CHOKE DOES NOT OPEN - ELECTRIC CHOKE CONNECTION TO NON-OEM ALTERNATOR

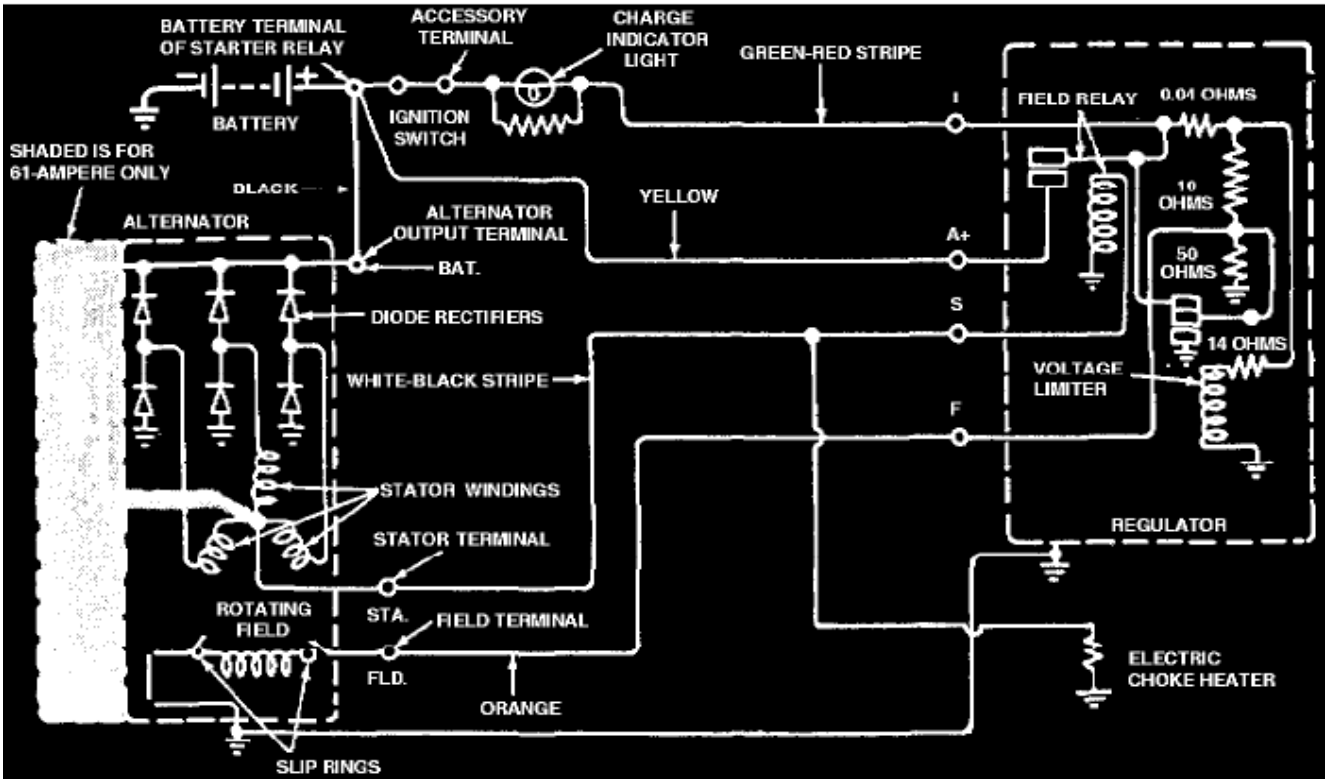
LIGHT TRUCK ALL SERIES

Replacement of the OEM alternator to accomodate higher current requirements of vehicle-mounted electrical equipment may adversely affect the operation of the electric choke on those vehicles so equipped. For this reason, it is important to examine the electrical system on a subject vehicle to determine if an electric choke is connected to the OEM alternator stator terminal. If there is such a connection, a similar connection must be provided on the replacement alternator.

Contact the manufacturer of the replacement alternator to determine the correct method of connecting to the alternator stator.

OTHER APPLICABLE ARTICLES: None WARRANTY STATUS: "INFORMATION ONLY"





Choke Thermostat/Heater: Description and Operation

Fir. 38 - Typical Electric Assist Choke Installation

Fig.39 - Electric Assist Choke Wiring Schematic

Purpose

Most 1973-82 models are equipped with an electric assist choke to reduce hydrocarbon (HC) and carbon monoxide (CO) emissions during starting and warm-up--choke on--period.

The electric assist choke is designed to give a more rapid choke opening at temperatures of about 60° to 65° F, or higher. It also provides a slower choke opening at temperatures below this point.

Operation

Current is constantly supplied to the ambient temperature switch. The system is grounded through a ground strap connected to the carburetor body. At temperatures below approximately 60 degrees, the switch opens and no current is supplied to the ceramic heater located within the thermostatic spring. Normal thermostatic spring choking action then occurs.

At temperatures above approximately 60-65 degrees, the temperature sensing switch closes and current is supplied to the ceramic heater. As the heater warms, it causes the thermostatic spring to pull the choke plates open within 1-1/2 minutes.

The electric assist choke system does not change any carburetor service procedures and cannot be adjusted.

If system is found out of calibration the heater control switch and/or choke unit must be replaced.

Construction

The electric choke system, Figs. 38 and 39, consists of a choke cap, thermostatic spring, a bimetal temperature sensing disc (switch), and a ceramic positive temperature coefficient (PTC) heater. The choke is powered from terminal or tap of the alternator.

Choke Thermostat/Heater: Testing and Inspection

Procedure

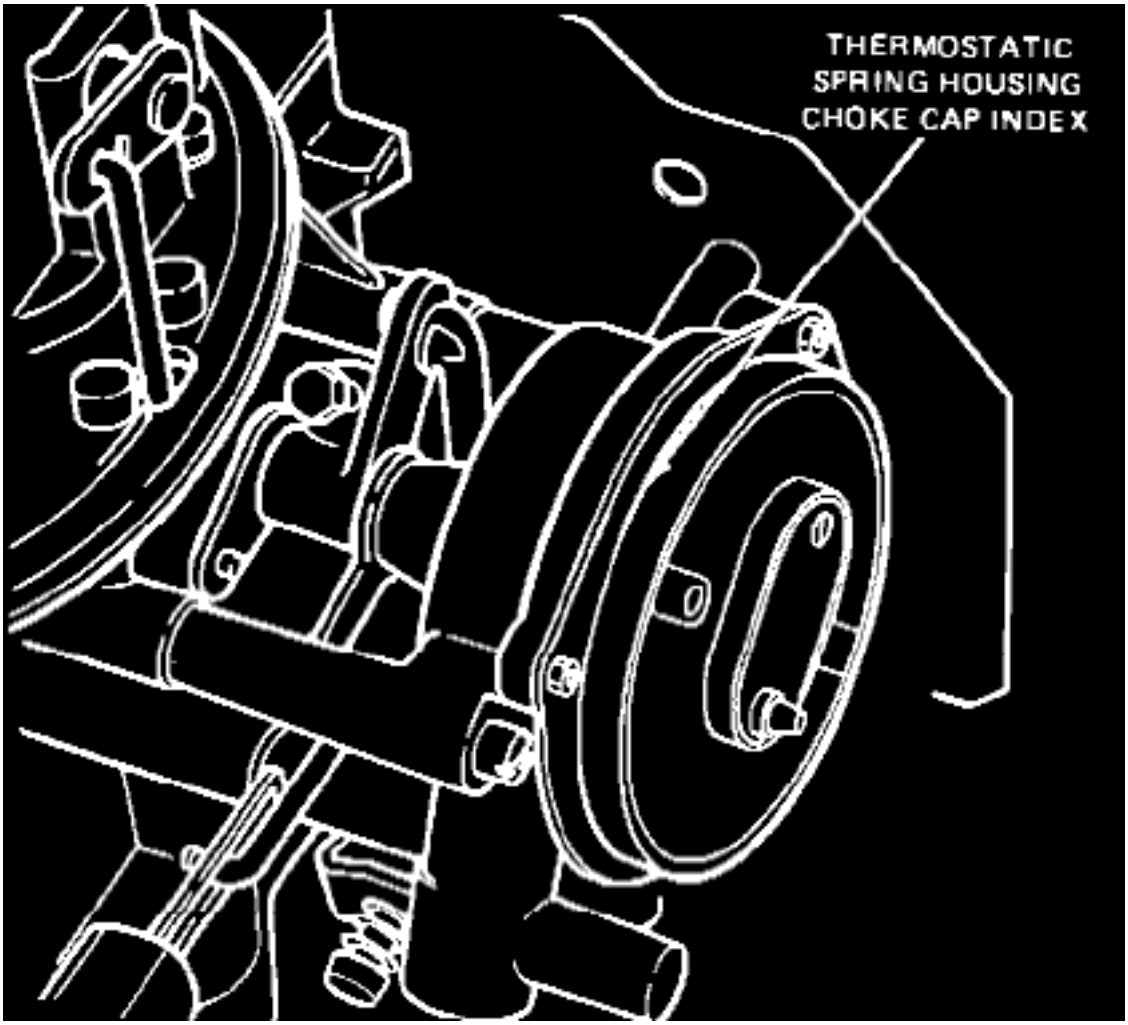
1. Disconnect stator lead at connector leading from choke cap and connect a test light in series with stator lead and ground.

2. With engine running, test light should glow.

3. If light does not glow, repair or replace either the alternator or choke wire.

4. With engine running at normal operating temperature, place test light in series with choke terminal and alternator lead. If light does not glow,

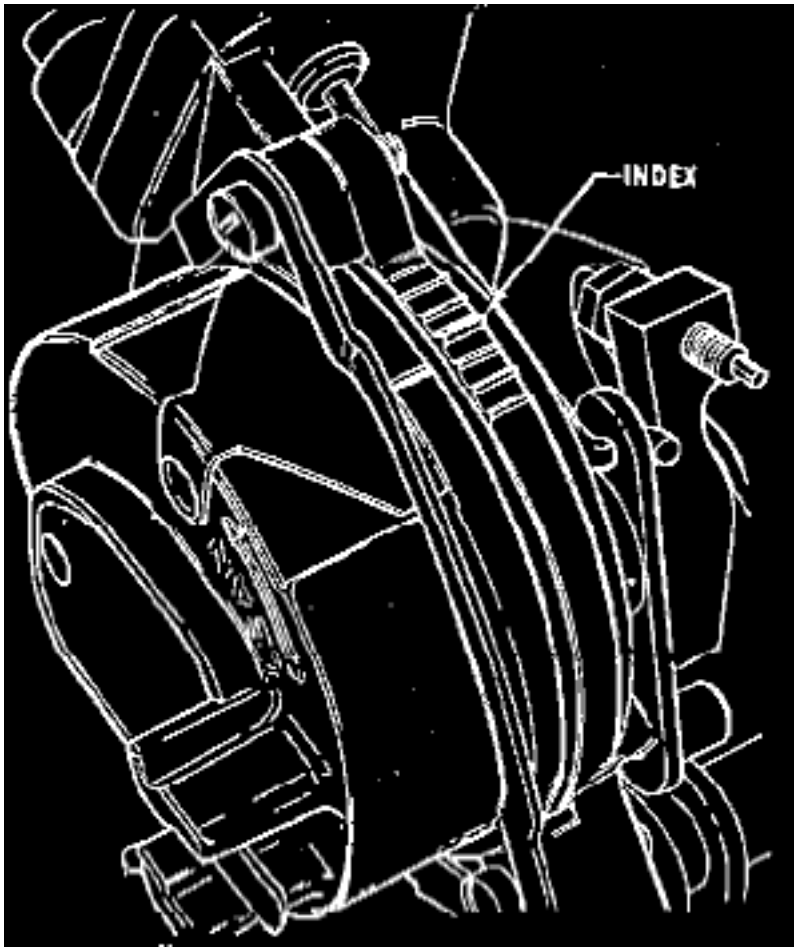
replace choke cap assembly.



Choke Thermostat/Heater: Adjustments Automatic Choke Valve Tension

Fig. 10 Automatic choke adjustment

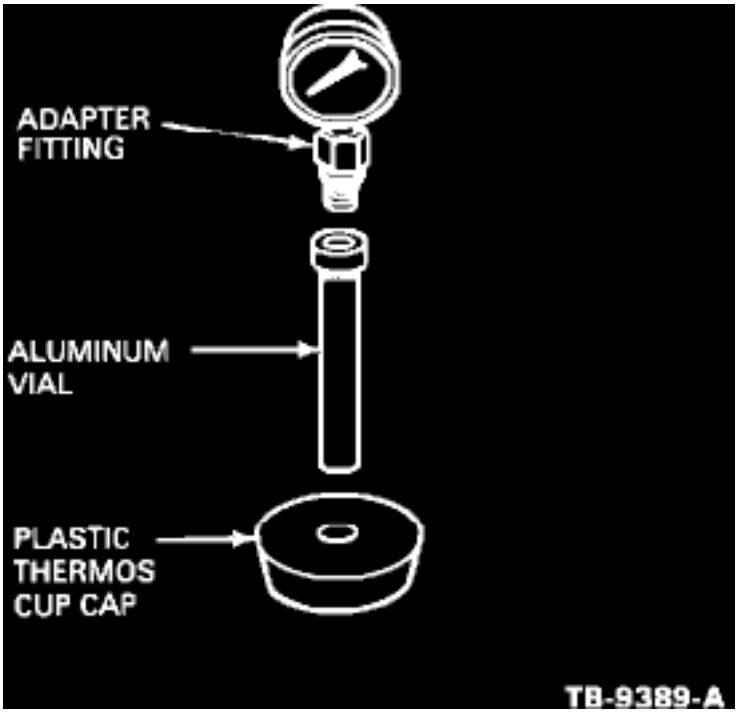
Turn thermostatic spring cover against spring tension until index mark on cover is aligned with mark specified in the Specifications Chart on choke housing, Fig. 10.



Choke Thermostat/Heater: Adjustments Choke Cap

Fig. 15 Choke cap adjustment

Fig. 15-With choke cap installed, rotate choke cap clockwise until notch on cap is aligned with specified notch on housing.



Fuel: Technical Service Bulletins Rotunda Gas Chek Kit - Requires Modification

Article No. FUEL SYSTEM - ROTUNDA "GAS-CHEK" KIT -

87-23-9 TOOL MODIFICATION

FORD: 1988 And Prior ALL CAR LINES

LINCOLN-MERCURY: 1988 And Prior ALL CAR LINES

LIGHT TRUCK: 1988 And Prior ALL LIGHT TRUCK LINES

ISSUE: The Rotunda "Gas-Chek Kit" (Tool Number 113-00002) that you may have purchased prior to October, 1987 requires modification. The necessary components and new operating instructions will be shipped to you at no charge. This tool modification will provide greater accuracy when performing high fuel vapor pressure testing of gasoline.

ACTION: To modify the Rotunda "Gas-Chek Kit", use the following service instructions.

NOTE: This modification MUST be done because it will seriously affect the volatility tests.

Figure 11

1. Remove adapter fitting attached to the 0-30 PSI gauge. CARE SHOULD BE TAKEN TO PREVENT DAMAGE TO GAUGE ASSEMBLY WHEN REMOVING FITTING. Throw away the adapter fitting, Figure 11.

2. Remove and throw away the aluminum vial, Figure 11.

3. Remove plastic thermos cup cap and throw away, Figure 11.

4. Remove the set of instructions from the lid of the Gas-Chek plastic storage box and throw them away.

NOTE: USE ONLY THE NEW instruction booklet that is furnished in the modification kit.

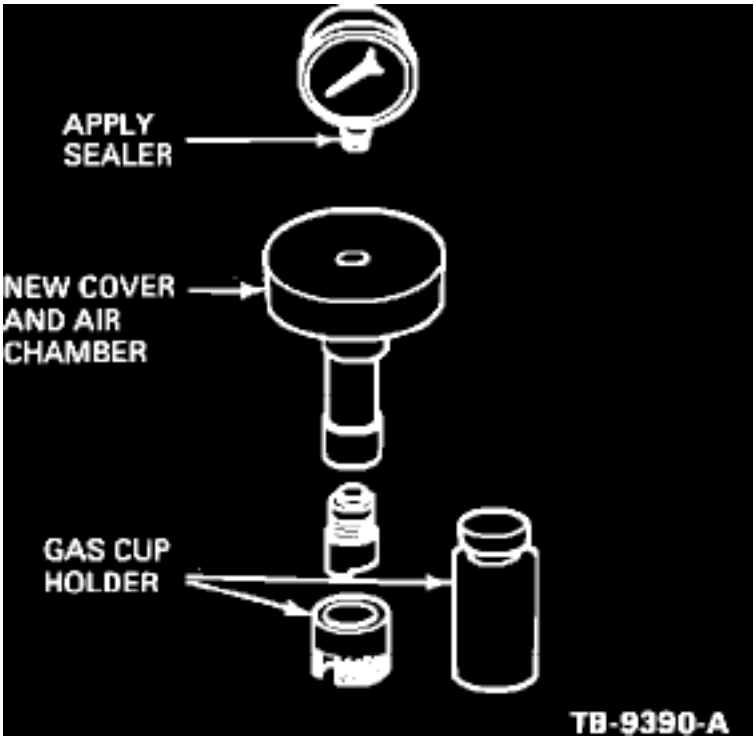


Figure 12

5. Using thread sealer or teflon tape on the threads of the PSI gauge, install gauge and tighten into new cover and air chamber, Figure

12. After installation is made, this assembly should not be disassembled.

6. Position small, plastic gasoline sample container and gas cup holder into gauge and vial cavity of die-cut, foam material for storage, Figure 12.

7. Care should be taken when storing unit to prevent damage which could then cause bad readings when checking gasoline vapor pressure.

OTHER APPLICABLE ARTICLES: None WARRANTY STATUS: "INFORMATION ONLY"

Fuel Filter: Technical Service Bulletins Fuel Filter - Replacement Information

Article No. 85-6-10

FUEL FILTER REPLACEMENT INFORMATION - ALL WITH FUEL FILTERS ATTACHED TO THE CARBURETOR AND/OR FUEL LINE WITH A RUBBER HOSE

FORD ALL 1985 AND PRIOR

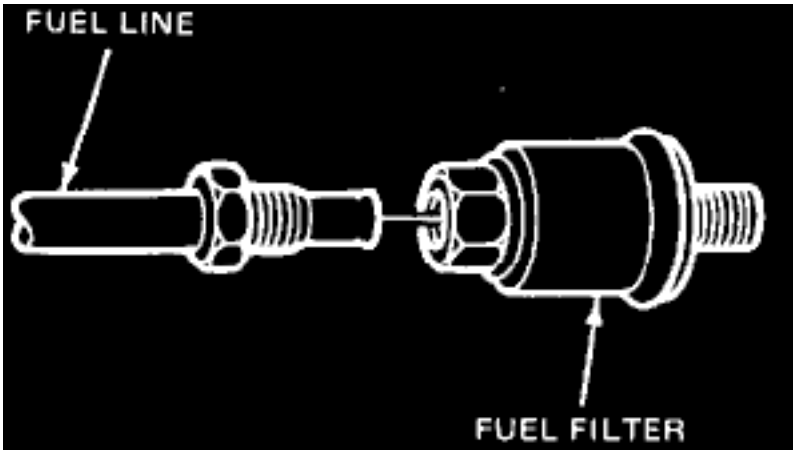
LINCOLN-MERCURY ALL 1985 AND PRIOR

LIGHT TRUCK ALL 1985 AND PRIOR

New fuel connector hoses and clamps should be used whenever a fuel filter is replaced.

Due to possible deterioration of hose materials which may result if a vehicle is fueled with gasoline containing excessive levels of methanol or ethanol, a new fuel hose and clamps should be installed when the fuel filter is changed. DO NOT REUSE OLD HOSES OR CLAMPS.

OTHER APPLICABLE ARTICLES: NONE WARRANTY STATUS: "INFORMATION ONLY"



Fuel Filter: Service and Repair Screw In Type

REMOVAL

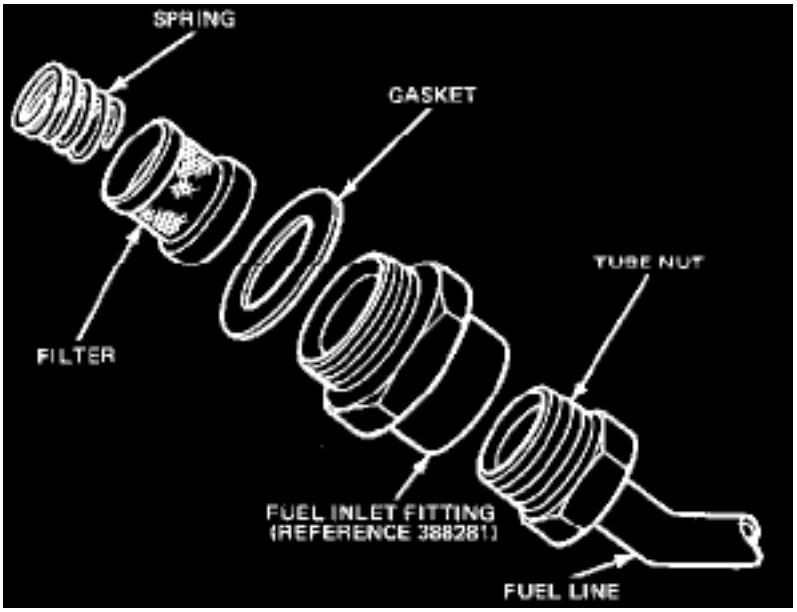
1. Remove the air cleaner assembly. 2. Loosen and remove the fuel tube from the filter. 3. Unscrew the filter from the carburetor.

INSTALLATION

1. Apply one drop of thread sealer to the external thread of a new filter. Thread the filter into the carburetor inlet port. 2. Tighten the filter to 9.0-11.0 Nm (80-100 in-lbs). 3. Apply ESE-M2C39-E or equivalent oil to the fuel supply tube nut and flare , and hand start the nut into the fuel filter inlet approximately two

threads.

4. Use an 11/16 inch wrench on the fuel filter to prevent the filter from rotating. Tighten the fuel filter to supply tube nut to 20-24 Nm (15-18 ft-lb). 5. Install air cleaner assembly. 6. Start the engine and check for fuel leaks.



Fuel Filter: Service and Repair Inlet Fitting Type

REMOVAL

- Remove the air cleaner.

- Hold the fuel filter inlet hex nut with a backup wrench and unscrew the fuel line tube nut from the fuel filter inlet.

WARNING: Use care to prevent combustion from fuel spillage.

- Unscrew the fuel inlet fitting.

-

Remove the gasket, filter and spring.

- Discard the gasket and filter.

INSTALLATION

- Install the spring, new filter and gasket.

- Hand start the fuel inlet fitting into the carburetor then, tighten to 10-24 Nm (90-125 lb-in).

- Apply oil, ESE-M2C39-E or equivalent to the fuel tube nut threads and tube flare.

- Hand start the fuel line tube nut into the fuel inlet fitting (approximately two threads).

- Use a backup wrench on the fuel inlet fitting while tightening the fuel line tube nut to 20-24 Nm (15-18 lb-ft).

- Start the engine and check for fuel leak.

- Install the air cleaner.

Fuel Hose Clamp: Technical Service Bulletins Fuel Filter - Replacement Information

Article No. 85-6-10

FUEL FILTER REPLACEMENT INFORMATION - ALL WITH FUEL FILTERS ATTACHED TO THE CARBURETOR AND/OR FUEL LINE WITH A RUBBER HOSE

FORD ALL 1985 AND PRIOR

LINCOLN-MERCURY ALL 1985 AND PRIOR

LIGHT TRUCK ALL 1985 AND PRIOR

New fuel connector hoses and clamps should be used whenever a fuel filter is replaced.

Due to possible deterioration of hose materials which may result if a vehicle is fueled with gasoline containing excessive levels of methanol or ethanol, a new fuel hose and clamps should be installed when the fuel filter is changed. DO NOT REUSE OLD HOSES OR CLAMPS.

OTHER APPLICABLE ARTICLES: NONE WARRANTY STATUS: "INFORMATION ONLY"

Fuel Pressure: Specifications

SPECIFICATIONS

Pressure ..... 6.0-8.0 PSI Volume ..... 1 pint in 20 seconds

NOTE: Measurements taken with engine idling.

Fuel Pressure: Testing and Inspection

PRESSURE TEST

1. Connect a suitable pressure gauge (0-15 PSI) to the carburetor end of the fuel line.

WARNING: Use care to prevent combustion of spilled fuel.

2. Start the engine (it should be able to run for over 30 seconds on the fuel in the carburetor bowl) and read the pressure after 10 seconds. If pump

pressure is too low or too high install a new fuel pump.

Fuel Pump Pressure ..... 6.0-8.0 PSI

3. Reconnect fuel line at filter and install air cleaner.

Fuel Gauge Sender: Locations Front Tank Fuel Gauge Sender

On Tank In Front Of Rear Axle

Fuel Gauge Sender: Locations Rear Tank Fuel Gauge Sender

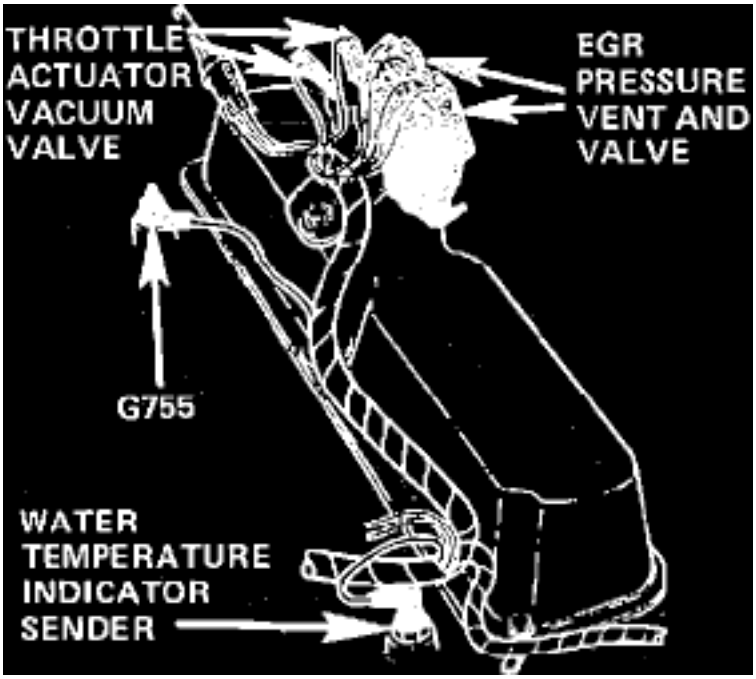
On Tank Behind Rear Axle

Fuel Tank Selector Switch: Locations

Center Of I/P

Fuel Tank Switching Valve: Locations

On LH Side Frame Member Behind Cab

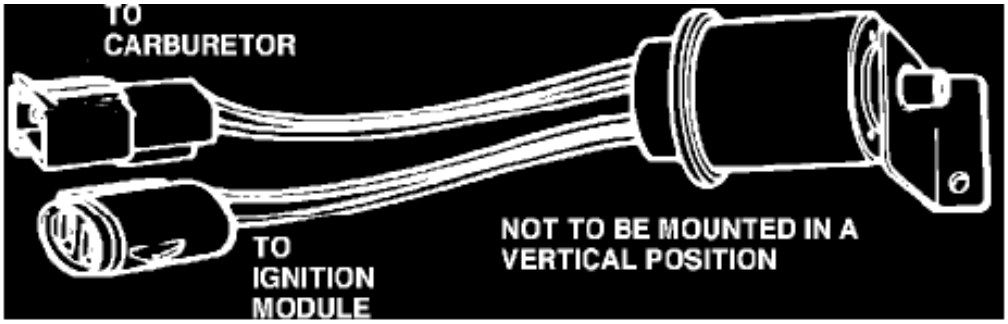


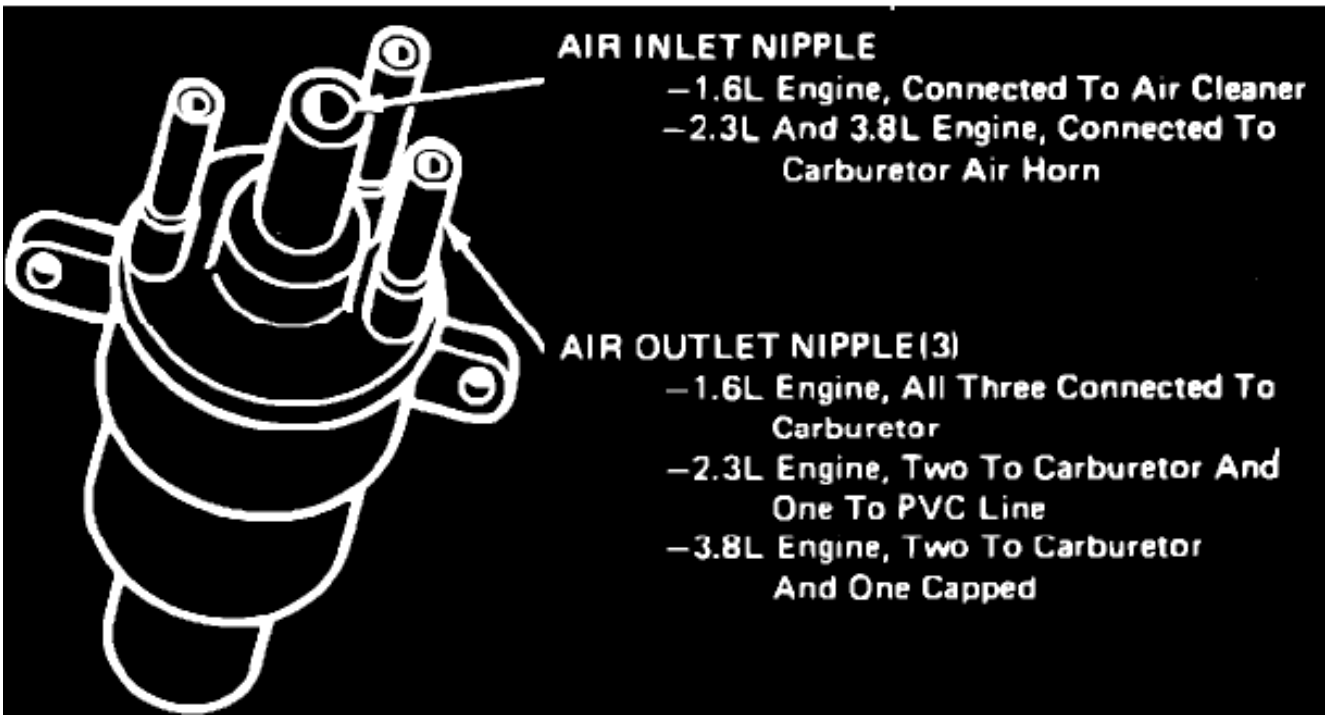
Idle Speed Vacuum Solenoid Valve: Locations

RH Side Of Engine.

On LH Valve Cover

Applicable to: 1982-83 V8-302/5.0L & V8-351/5.8L Engines w/EEC





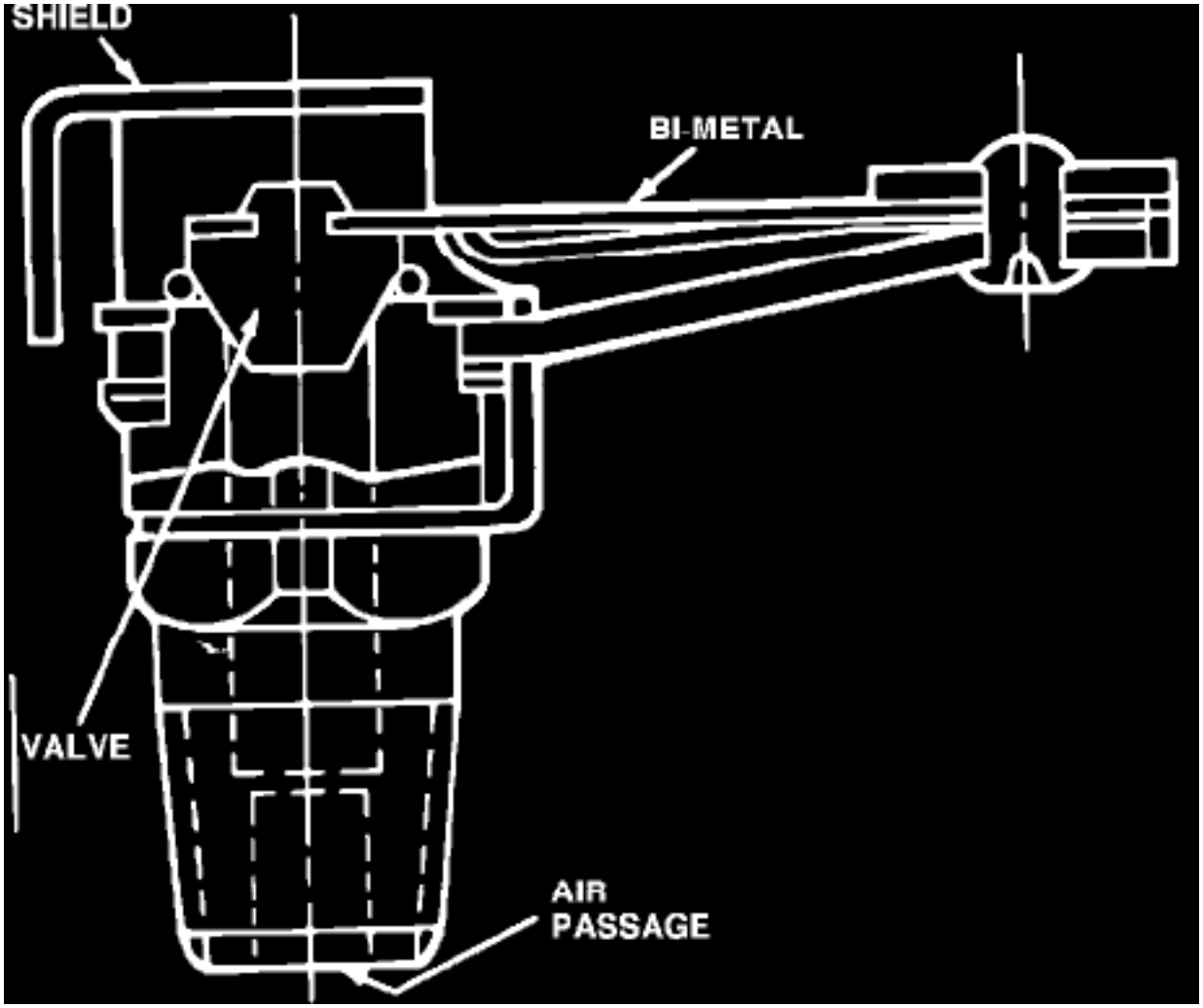
Idle/Altitude Compensator (Non Comp. Controlled): Description and Operation Altitude Compensator

Fig. 7 Electrical type altitude compensator

ELECTRICAL The electrical type altitude compensator, Fig. 7, used on some vehicles, is mounted on the ignition module. The compensator improves emissions and aids engine performance at altitudes above 4000 ft. by advancing the timing and leaning the air/fuel mixture.

Fig. 8 Mechanical type altitude compensator

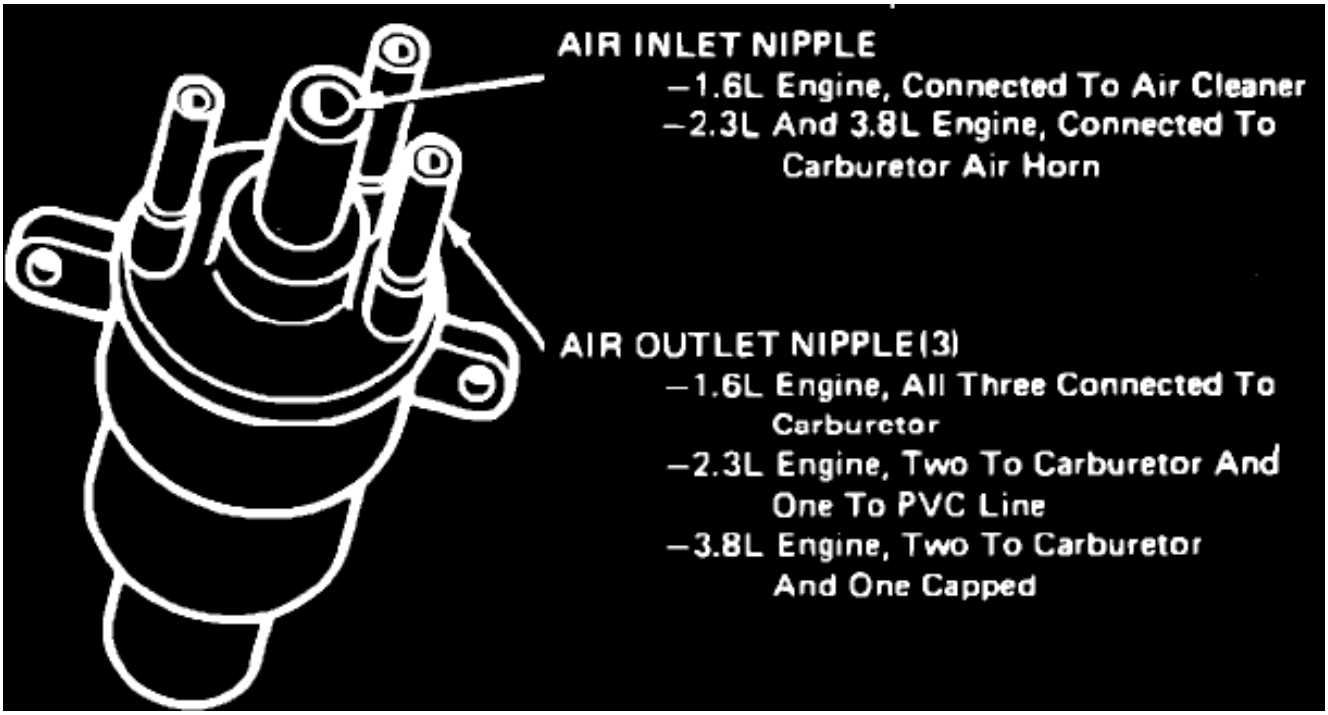
MECHANICAL The mechanical type altitude compensator, Fig. 8, is mounted on the bulkhead. The compensator leans the air/fuel mixture at altitudes above 3000 ft. by supplying additional filtered air to the carburetor.



Idle/Altitude Compensator (Non Comp. Controlled): Description and Operation Hot Idle Compensator

Fig. 17 Hot idle compensator

The hot idle compensator, Fig. 17, used on some vehicles, cools the engine during hot idle operation. The compensator may be integral with the carburetor or mounted separately. When open, the compensator bleeds air into the manifold, leaning out the air/fuel mixture at idle. This increased air intake causes an increase in engine idle speed, resulting in cooling of the engine. Temperature rise on the bi-metal sensor lifts the normally closed valve and opens the air passage. A valve that does not fully close will cause high idle speed and excessive exhaust emission.



Idle/Altitude Compensator (Non Comp. Controlled): Testing and Inspection

ELECTRICAL

1. Check and record engine timing.

2. Disconnect compensator from ignition module and connect suitable jumper wire across module connectors. Recheck engine timing.

3. At altitudes of 4000 ft. or lower, timing should be advanced 4° on V8-302 engine, or 6° on V8-351 engine.

4. At altitudes of 4000 ft. or higher on 6-300 engine, or 4600 ft. or more on V8-302 and V8-351 engines, there should be no change in timing.

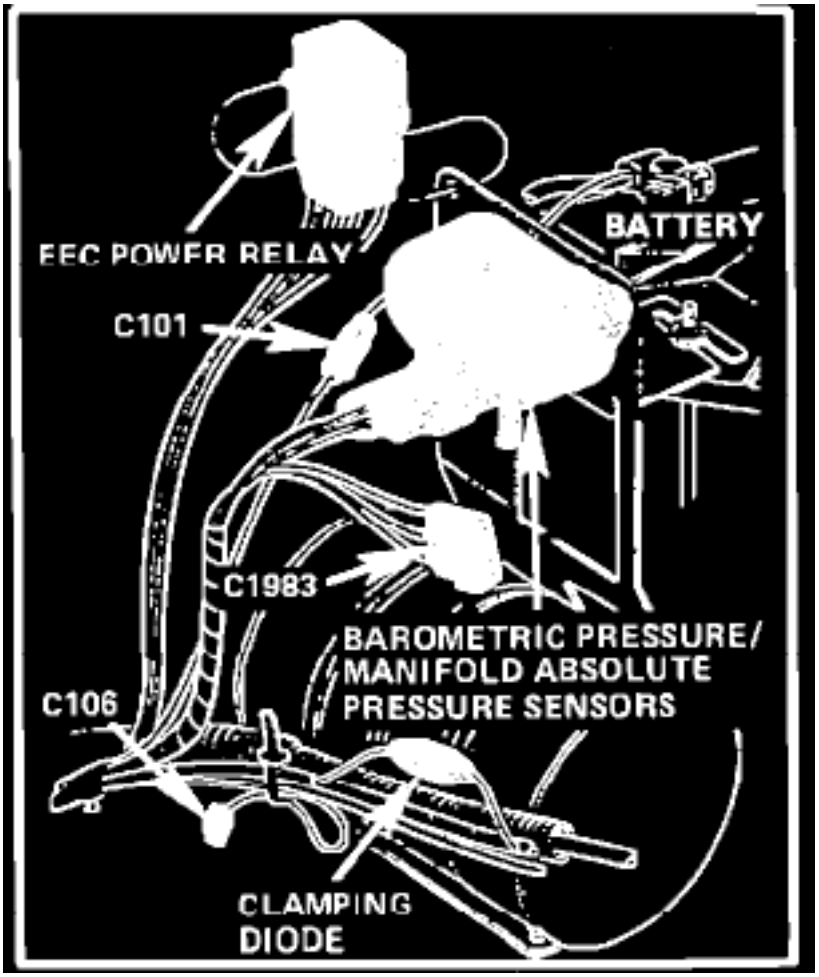
Fig. 8 Mechanical type altitude compensator

MECHANICAL

1. Connect a suitable vacuum gauge to air inlet nipple, Fig. 8, and check for vacuum with engine running.

2. On 4-140 engine, there should be no vacuum at altitudes of 2500 ft. or lower and vacuum should be present at altitudes of 3000 ft. or higher.

3. On V6-232 engines, there should be no vacuum at altitudes of 3500 ft. or lower and vacuum should be present at altitudes of 4000 ft. or higher.



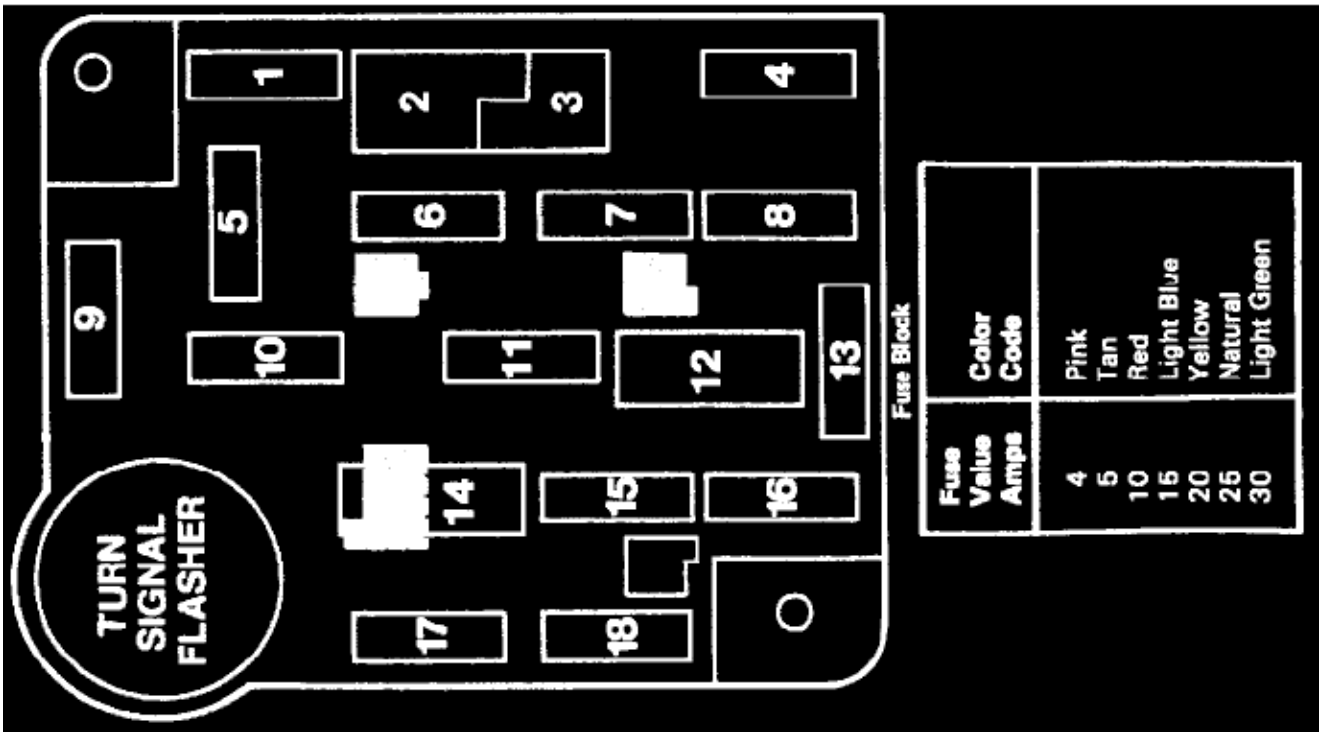
Main Relay (Computer/Fuel System): Locations

Forward Of RH Wheelwell At Battery.

RH Fender Apron

Applicable to: 1981-83

Fuse Position	Amps	Circuits Protected
1	20	Stop/Hazard Lights; Speed Control
2	--	(Not used)
3	--	(Not used)
4	15	Exterior Lights; Instrument Illumination
5	15	Turn Lights; Backup Lights
6	15	Speed Control; 4-Wheel Drive Indicator; Auxiliary Battery Control; Digital Clock; Auxiliary Heater; Feedback Carburetor Control
7	--	(Not used)
8	15	Courtesy, Dome, Cargo Lights; Warning Buzzer
9	30	Heater; A/C-Heater
10	--	(Not used)
11	15	Radio
12	25	Tailgate Power Window; Power Mirrors
13	30 c.b.	Power Door Locks
14	--	(Not used)
15	25	Tailgate Power Window
16	20 c.b.	Power Windows
17	10	Auxiliary Fuel Tank Selector
18	20	Horn; Cigar Lighter
	5	Instrument Illumination
	15	Seatbelt Buzzer; Warning Indicators; Carburetor Circuits; Tachometer; Choke Heater



Choke Relay: Locations

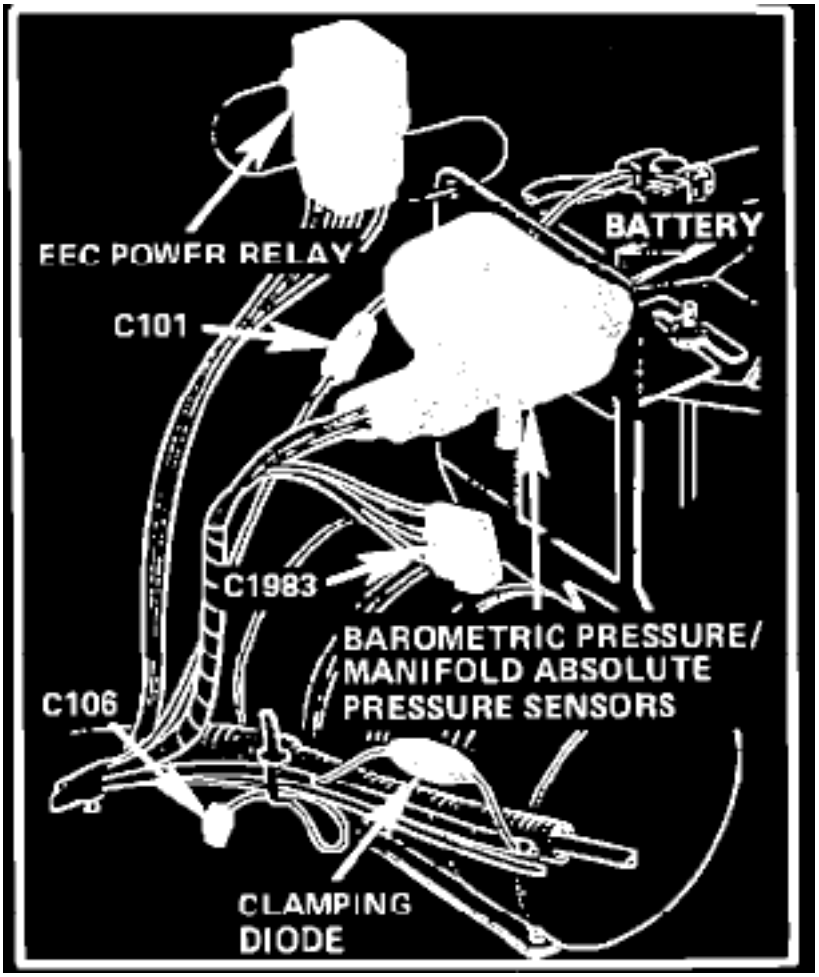
Fuse Block Description

Fuse Block

POWER DISTRIBUTION -

The alternator and battery are connected together at the starter relay hot terminal. Other circuits originate at the starter relay hot terminal and are protected by fuse links. Low power circuits are also protected by fuses.

- The ignition switch and light switch are powered at all times as are fuses 1, 4, 8, 10, and 16. The other fuses are powered through the ignition switch or the light switch.



Main Relay (Computer/Fuel System): Locations

Forward Of RH Wheelwell At Battery.

RH Fender Apron

Applicable to: 1981-83

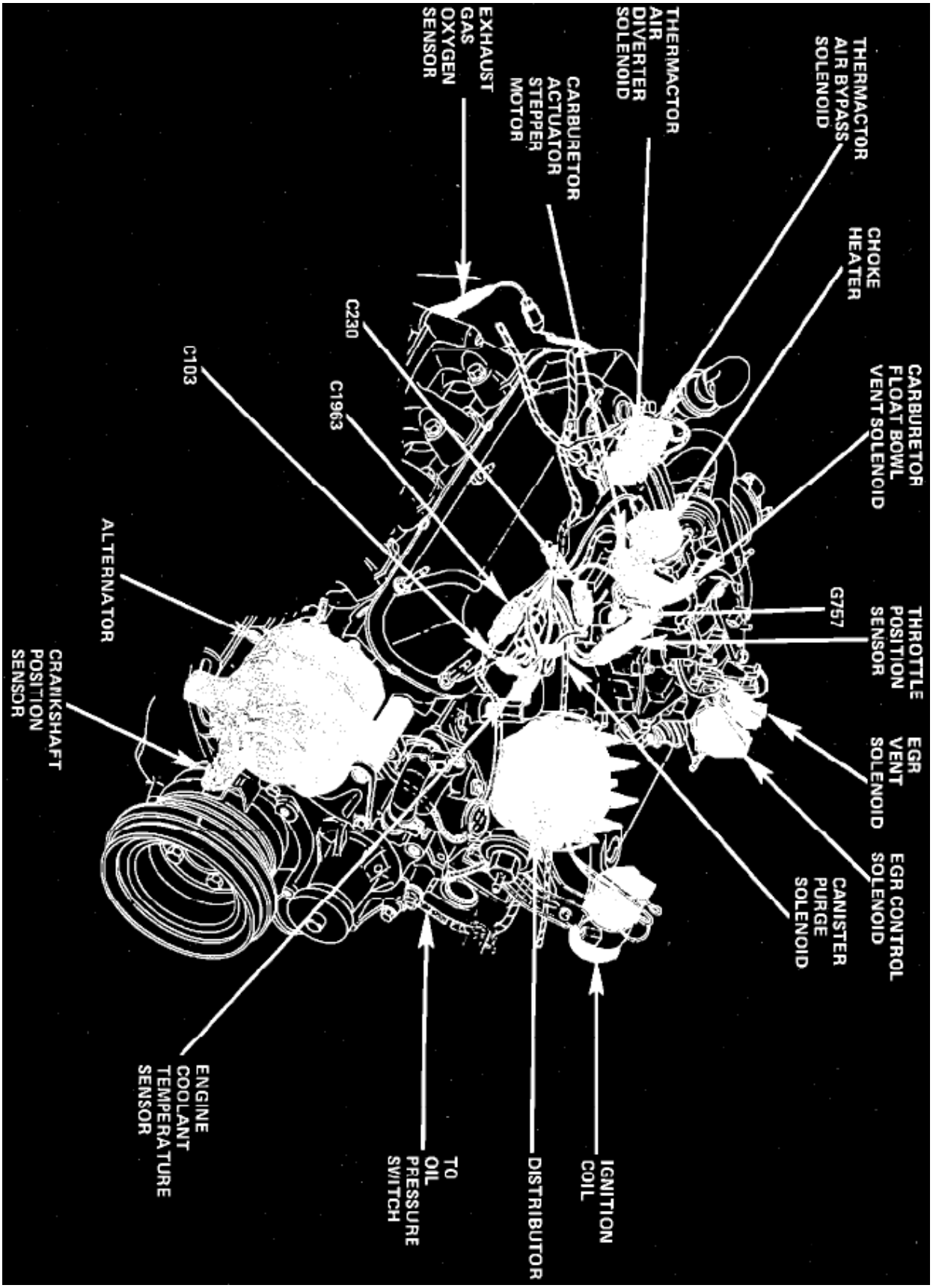
Fuel Tank Selector Switch: Locations

Center Of I/P

Engine	Year	TPS Voltage	
		Minimum	Maximum
All w/EEC III	1981	1.80-2.40	6.0 min.
All w/EEC III	1982-83	1.60-2.40	6.0 min.
All w/EEC IV	1984-88	0.90-1.00†	—
2.3L	1989-90	.34	4.84
2.9L	1989-90	.34	4.84
3.0L	1989-90	.34	4.84
4.0L	1990	.34	4.84
4.9L	1989-90	.20	4.84
5.0L	1989-90	.20	4.84
5.6L, 7.5L	1989-90	.20	4.84
w/4-speed AT	1989-90	.34	4.84

† Adjustable units only.

THROTTLE POSITION SENSOR SPECIFICATIONS

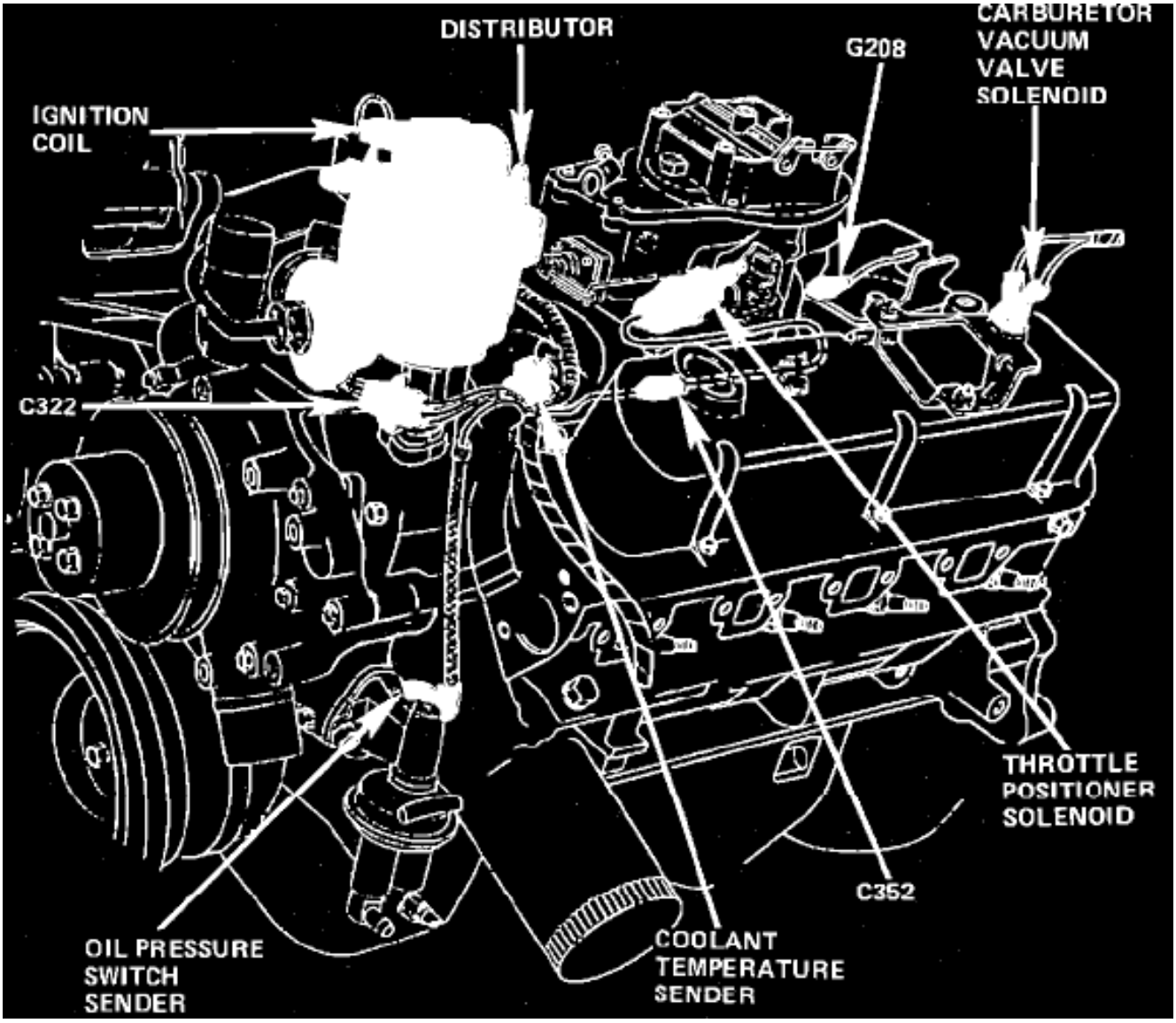

THERMACTOR AIR BYPASS SOLENOID
CHOKE HEATER
CARBURETOR FLOAT BOWL VENT SOLENOID
THERMACTOR AIR DIVERTER SOLENOID
CARBURETOR ACTUATOR STEPPER MOTOR
EXHAUST GAS OXYGEN SENSOR
C230
C1963
C103
G757
THROTTLE POSITION SENSOR
EGR VENT SOLENOID
EGR CONTROL SOLENOID
CANISTER PURGE SOLENOID
ALTERNATOR
CRANKSHAFT POSITION SENSOR
ENGINE COOLANT TEMPERATURE SENSOR
TO OIL PRESSURE SWITCH
DISTRIBUTOR
IGNITION COIL

Throttle Position Sensor: Locations

Top RH Side Of Engine.

RH Rear Of Carburetor

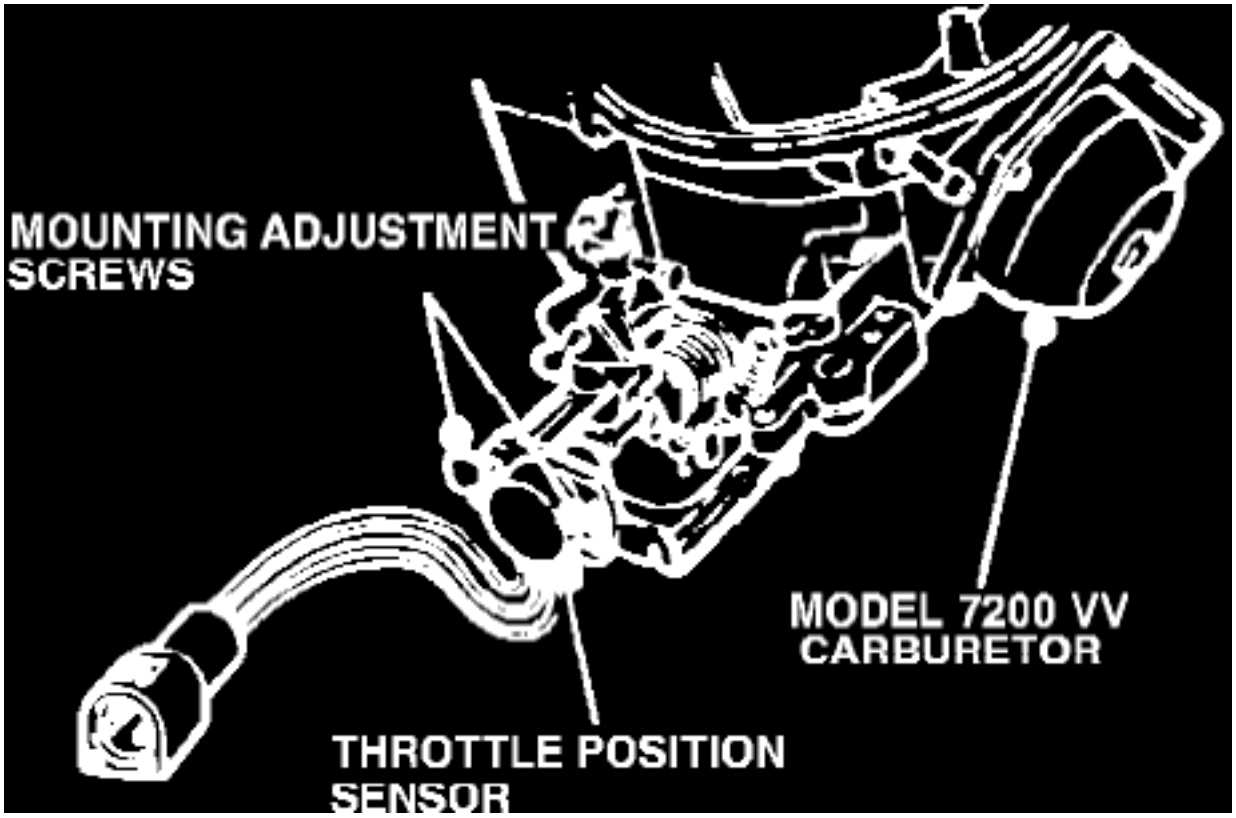
Applicable to: 1982-83 V8-302/5.0L & V8-351/5.8L Engines w/EEC



LH Side Of Engine.

RH Rear Of Carburetor

Applicable to: 1982-83 V8-255/4.2L & V8-302/5.0L Engines



Throttle Position Sensor: Description and Operation

Fig. 2 Throttle position sensor (typical)

This sensor, Fig. 2, is basically a rheostat switch attached to the carburetor throttle shaft and responds to throttle valve angle changes. The throttle angles are classified into three operating modes as follows:

a. Closed Throttle (Idle or Deceleration)

b. Part Throttle

c. Wide Open Throttle (Maximum Acceleration)

The ECA applies a reference voltage of about 9 volts to the sensor. The resultant sensor voltage supplied to the ECA, which is determined by the throttle position, is used by the ECA to determine the proper amount of spark advance, EGR flow, air/fuel ratio and thermactor air mode. The throttle position sensor mounting holes are slotted to permit adjustment. If the sensor is replaced, it must be correctly positioned or incorrect throttle information will be sent to the ECA. The adjustment requires use of special electronic test equipment.

Throttle Position Sensor: Adjustments

Engines with EEC III Turn ignition to RUN position and remove vacuum hose from throttle kicker, as equipped. With engine not running, compare voltage reading against specifications and adjust as needed.

Engines with EEC IV Connect positive probe of DVOM along terminal C (lower) of TPS and connect negative probe along terminal A (upper). Turn ignition on but do not start vehicle. Adjust TPS to specified value.

Ford Bronco Workshop Manual (V8-351 5.8L VIN G 2-bbl (1982))
Ford Workshop Manuals > Powertrain Management > Fuel Delivery and Air Induction > Throttle Cable/Linkage > Component Information > Technical Service Bulletins > Customer Interest for Throttle Cable/Linkage: > 83720 > Apr > 83 > Accelerator Linkage - Raspy/Sticky

Throttle Cable/Linkage: Customer Interest Accelerator Linkage - Raspy/Sticky

Article No. 83-7-20

ACCELERATOR LINKAGE - DIAGNOSTIC PROCEDURE

LIGHT TRUCKS 1980-83 LIGHT TRUCKS

Servicing of Cable-Type Acceleration Linkage

The following procedure will assist in diagnosing accelerator linkage concerns on 1980-83 light trucks.

If the accelerator pedal, when operated, is hard to push down or feels "raspy" or "sticky", perform the following:

1. First disconnect the accelerator cable from the carburetor (or injector pump) throttle lever ball stud. Also disconnect the cruise control from the accelerator cable if so equipped.

2. Then check the following items:

^ Be sure that the disconnected end of the cable or its spring does not come into contact with any of the surrounding parts.

^ Operate the pedal by foot.

^ If accelerator operation is smooth, the pedal assembly and cable are not the cause of the concern. Refer to the carburetor/injector pump diagnosis procedures in the appropriate shop manual for additional checks.

^ E, F, Bronco and Ranger with gas engine - See General Fuel System Service Section 24-01.

^ Ranger with Diesel Engine - See Ranger Shop Manual - 2.2L Diesel Engine Section 22-09 of the Engine Performance Diagnostic Guide.

^ F Series with the 6.9L Diesel Engine - See the 1983 Car/Truck Shop Manual - Engine Electronics Section 25-64.

^ If the concern persists (being sure disconnected end of cable has not come into contact with anything), check foot pedal assembly for free operation. If pedal operation is free, replace the cable.

If you have a high engine idle speed concern, check the following linkage systems:

1. First disconnect the accelerator cable from the carburetor (or injector pump) throttle lever ball stud. Also disconnect the cruise control from the accelerator cable if so equipped.

^ If the cable ball socket extends beyond the throttle lever ball stud, refer to the carburetor

diagnosis procedures in the appropriate shop manual for the correct adjustment procedure. ^

If the socket does not extend beyond the stud, check the foot pedal assembly for free operation. If the pedal operation is free, replace the cable.

NOTE: The accelerator cable should not be lubricated and it is not serviceable.

OTHER APPLICABLE ARTICLES: None WARRANTY STATUS: Reimbursable within the provisions of the Warranty and Policy Manual. OPERATION: M TIME:

"Actual Time" as defined in the Warranty and Policy Manual. DLR. CODING: Basic Part No. 9A758 Code: 41

Throttle Cable/Linkage: All Technical Service Bulletins Accelerator Linkage - Raspy/Sticky

Article No. 83-7-20

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^ Be sure that the disconnected end of the cable or its spring does not come into contact with any of the surrounding parts.

^ Operate the pedal by foot.

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^ Ranger with Diesel Engine - See Ranger Shop Manual - 2.2L Diesel Engine Section 22-09 of the Engine Performance Diagnostic Guide.

^ F Series with the 6.9L Diesel Engine - See the 1983 Car/Truck Shop Manual - Engine Electronics Section 25-64.

^ If the concern persists (being sure disconnected end of cable has not come into contact with anything), check foot pedal assembly for free operation. If pedal operation is free, replace the cable.

If you have a high engine idle speed concern, check the following linkage systems:

1. First disconnect the accelerator cable from the carburetor (or injector pump) throttle lever ball stud. Also disconnect the cruise control from the accelerator cable if so equipped.

^ If the cable ball socket extends beyond the throttle lever ball stud, refer to the carburetor

diagnosis procedures in the appropriate shop manual for the correct adjustment procedure. ^

If the socket does not extend beyond the stud, check the foot pedal assembly for free operation. If the pedal operation is free, replace the cable.

NOTE: The accelerator cable should not be lubricated and it is not serviceable.

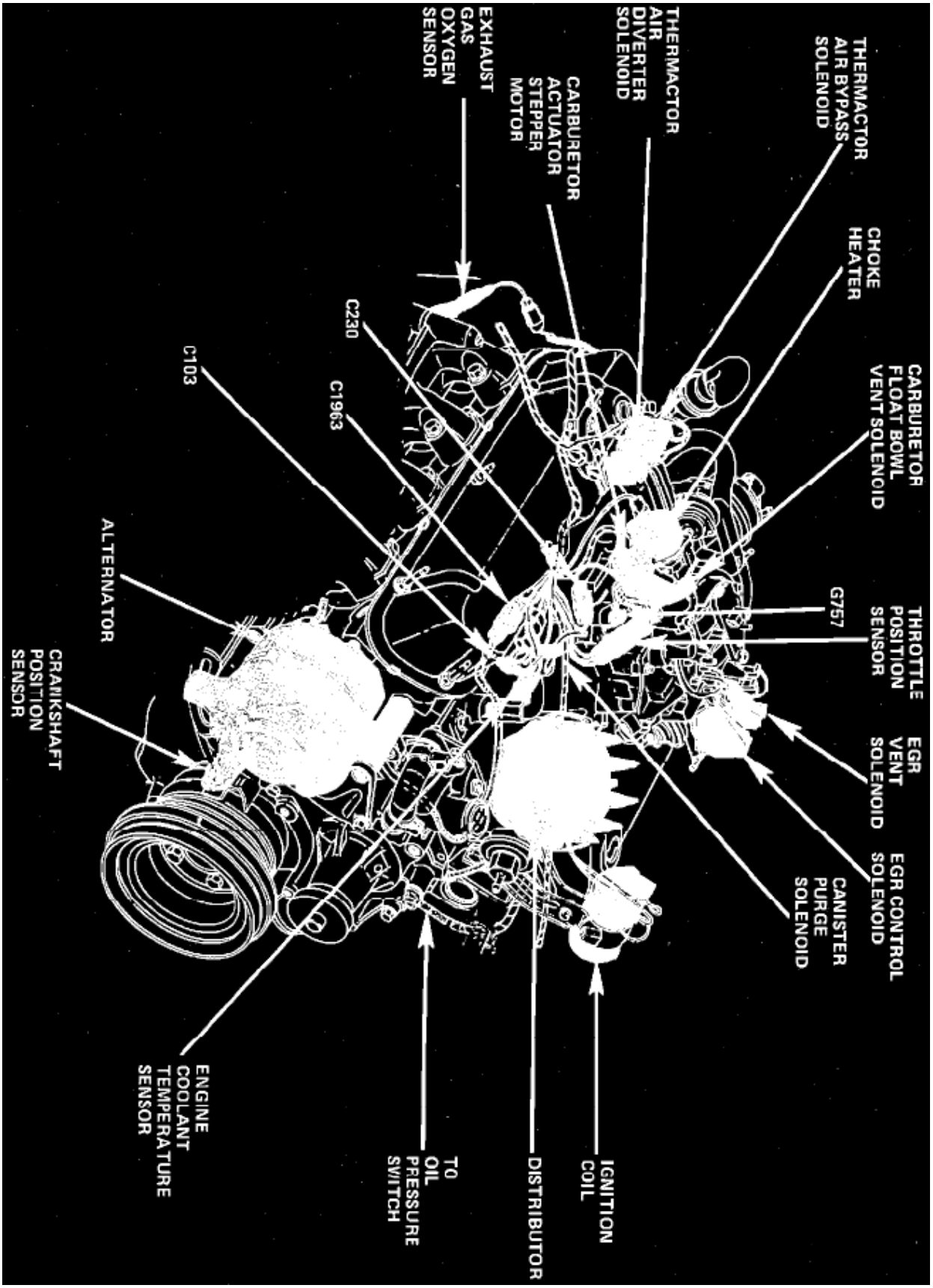
OTHER APPLICABLE ARTICLES: None WARRANTY STATUS: Reimbursable within the provisions of the Warranty and Policy Manual. OPERATION: M TIME:

"Actual Time" as defined in the Warranty and Policy Manual. DLR. CODING: Basic Part No. 9A758 Code: 41

Engine	Year	TPS Voltage	
		Minimum	Maximum
All w/EEC III	1981	1.80-2.40	6.0 min.
All w/EEC III	1982-83	1.60-2.40	6.0 min.
All w/EEC IV	1984-88	0.90-1.00†	—
2.3L	1989-90	.34	4.84
2.9L	1989-90	.34	4.84
3.0L	1989-90	.34	4.84
4.0L	1990	.34	4.84
4.9L	1989-90	.20	4.84
5.0L	1989-90	.20	4.84
5.6L, 7.5L	1989-90	.20	4.84
w/4-speed AT	1989-90	.34	4.84

† Adjustable units only.

THROTTLE POSITION SENSOR SPECIFICATIONS

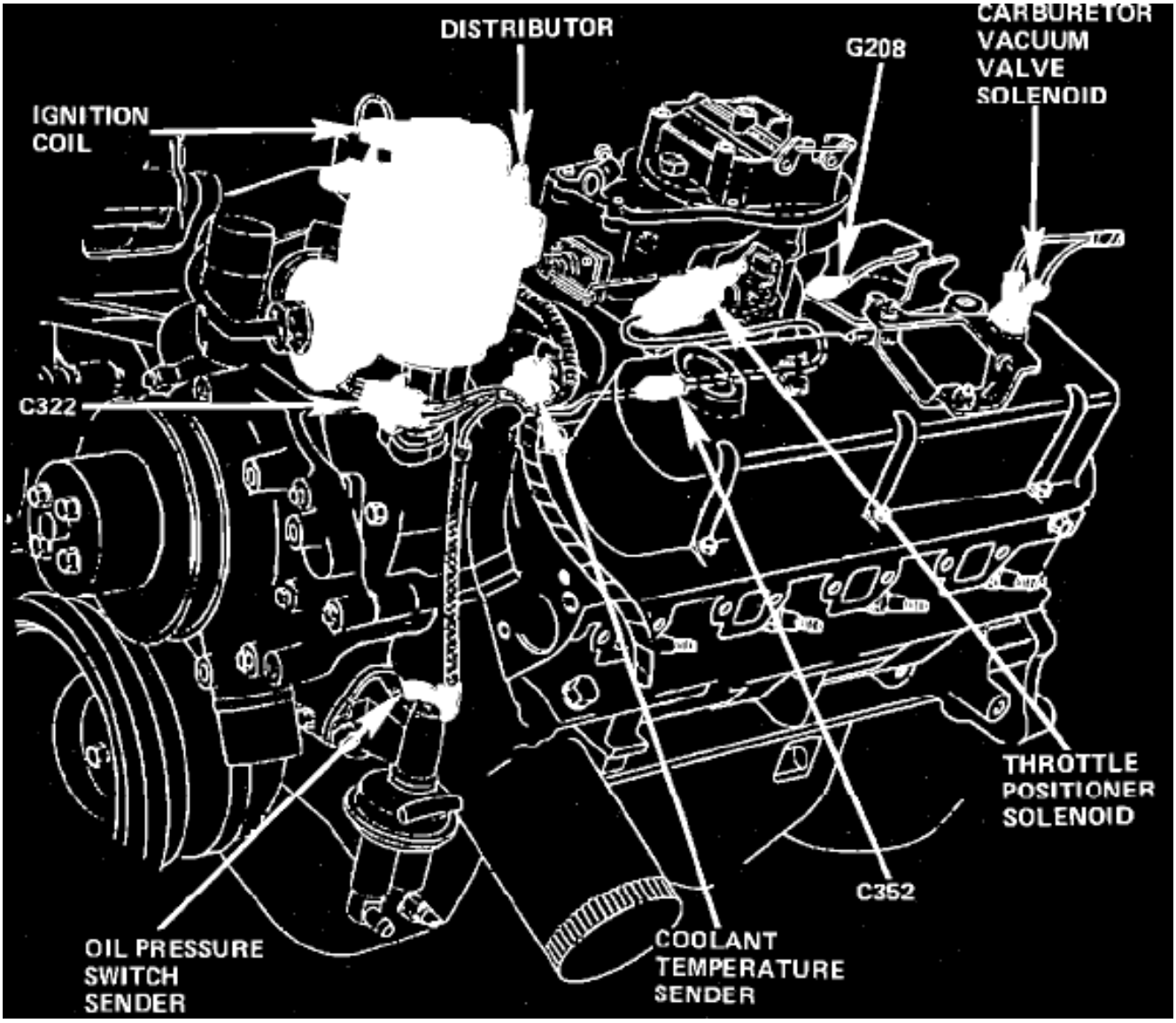

THERMACTOR AIR BYPASS SOLENOID
CHOKE HEATER
CARBURETOR FLOAT BOWL VENT SOLENOID
THERMACTOR AIR DIVERTER SOLENOID
CARBURETOR ACTUATOR STEPPER MOTOR
EXHAUST GAS OXYGEN SENSOR
C230
C1963
C103
G757
THROTTLE POSITION SENSOR
EGR VENT SOLENOID
EGR CONTROL SOLENOID
CANISTER PURGE SOLENOID
ALTERNATOR
CRANKSHAFT POSITION SENSOR
IGNITION COIL
DISTRIBUTOR
TO OIL PRESSURE SWITCH
ENGINE COOLANT TEMPERATURE SENSOR

Throttle Position Sensor: Locations

Top RH Side Of Engine.

RH Rear Of Carburetor

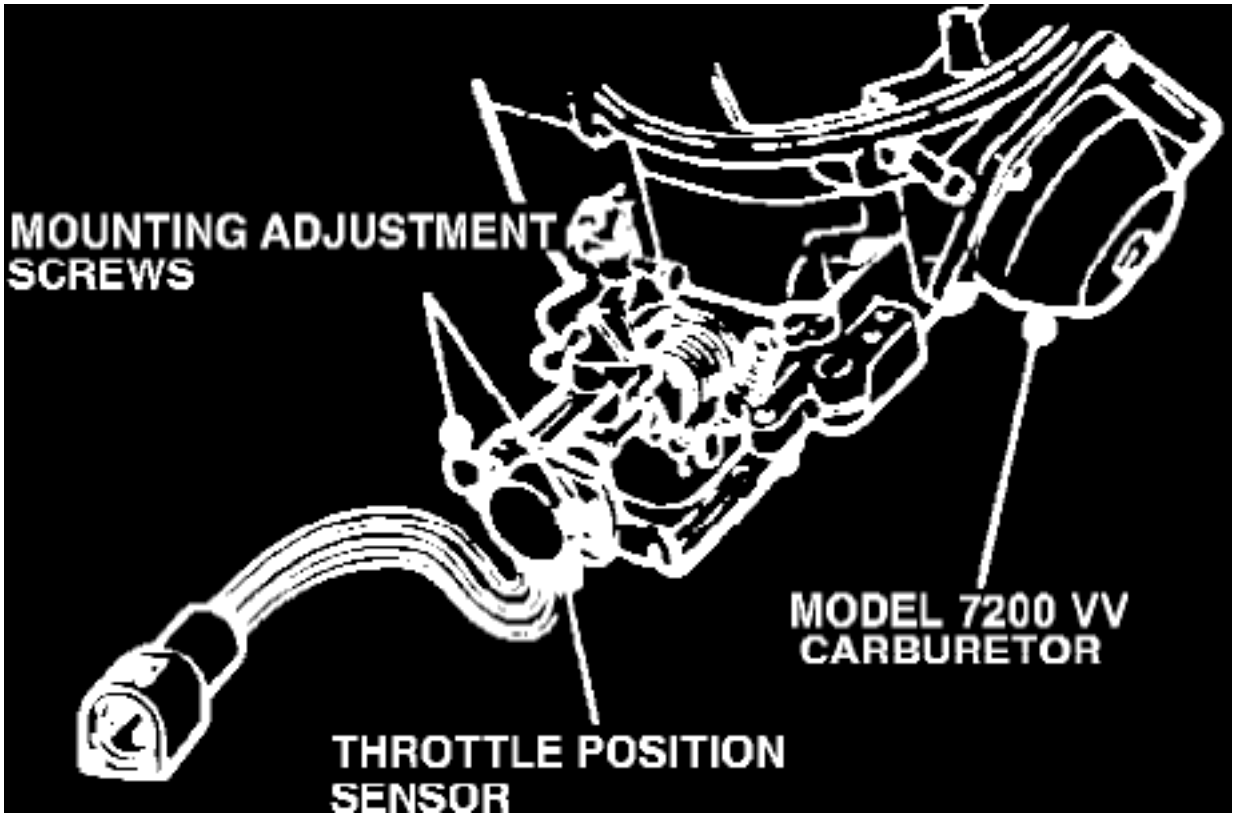
Applicable to: 1982-83 V8-302/5.0L & V8-351/5.8L Engines w/EEC



LH Side Of Engine.

RH Rear Of Carburetor

Applicable to: 1982-83 V8-255/4.2L & V8-302/5.0L Engines



Throttle Position Sensor: Description and Operation

Fig. 2 Throttle position sensor (typical)

This sensor, Fig. 2, is basically a rheostat switch attached to the carburetor throttle shaft and responds to throttle valve angle changes. The throttle angles are classified into three operating modes as follows:

a. Closed Throttle (Idle or Deceleration)

b. Part Throttle

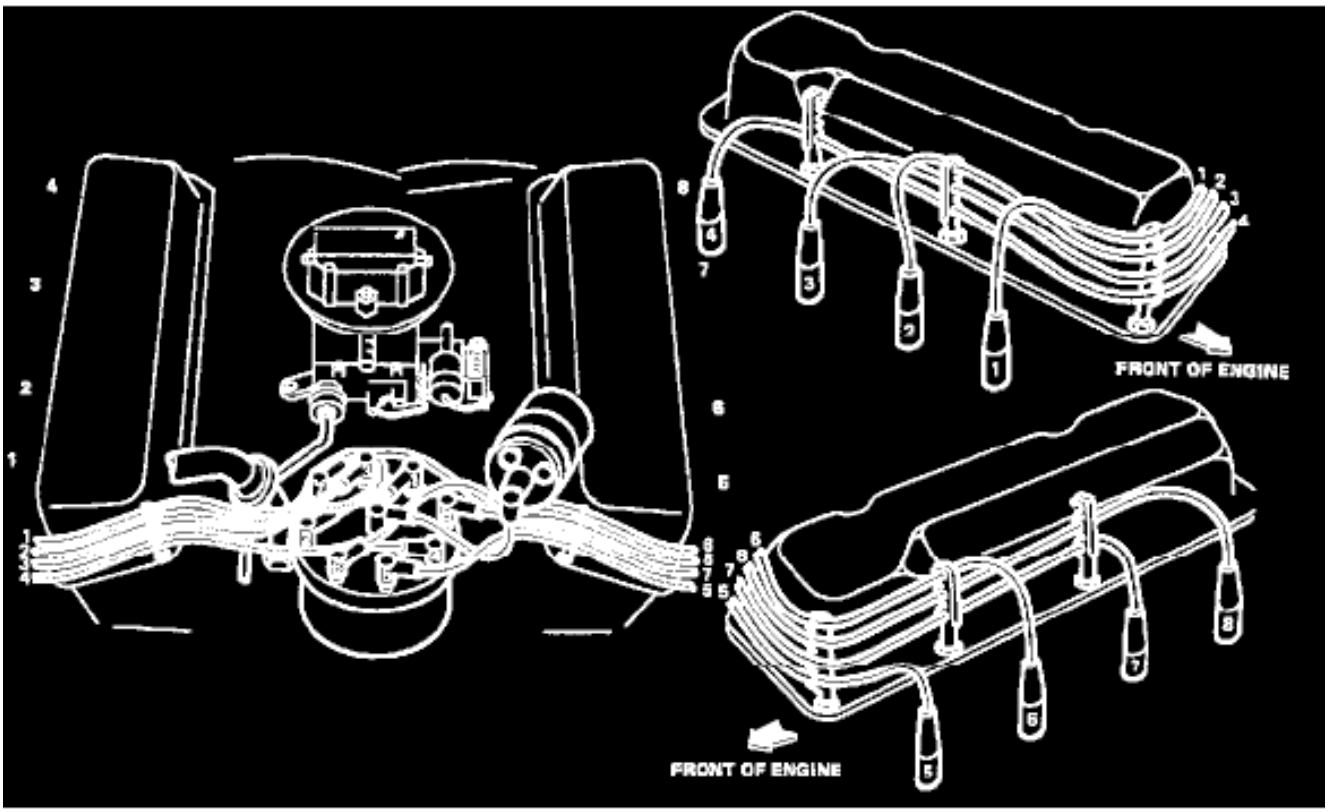
c. Wide Open Throttle (Maximum Acceleration)

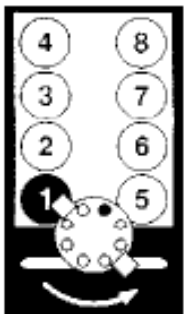
The ECA applies a reference voltage of about 9 volts to the sensor. The resultant sensor voltage supplied to the ECA, which is determined by the throttle position, is used by the ECA to determine the proper amount of spark advance, EGR flow, air/fuel ratio and thermactor air mode. The throttle position sensor mounting holes are slotted to permit adjustment. If the sensor is replaced, it must be correctly positioned or incorrect throttle information will be sent to the ECA. The adjustment requires use of special electronic test equipment.

Throttle Position Sensor: Adjustments

Engines with EEC III Turn ignition to RUN position and remove vacuum hose from throttle kicker, as equipped. With engine not running, compare voltage reading against specifications and adjust as needed.

Engines with EEC IV Connect positive probe of DVOM along terminal C (lower) of TPS and connect negative probe along terminal A (upper). Turn ignition on but do not start vehicle. Adjust TPS to specified value.

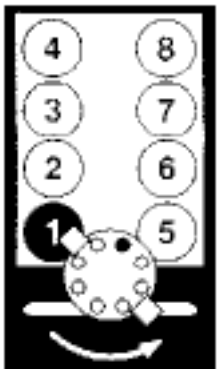




Firing Order: Specifications With EEC III

With EEC III The cylinders are numbered 1-4 on the Right side, starting with the front, and 5-8 on the left side, ending with the rear. Because of the unique dual level rotor used by the EEC-III Ignition system, the engine's firing order cannot be read off the top of

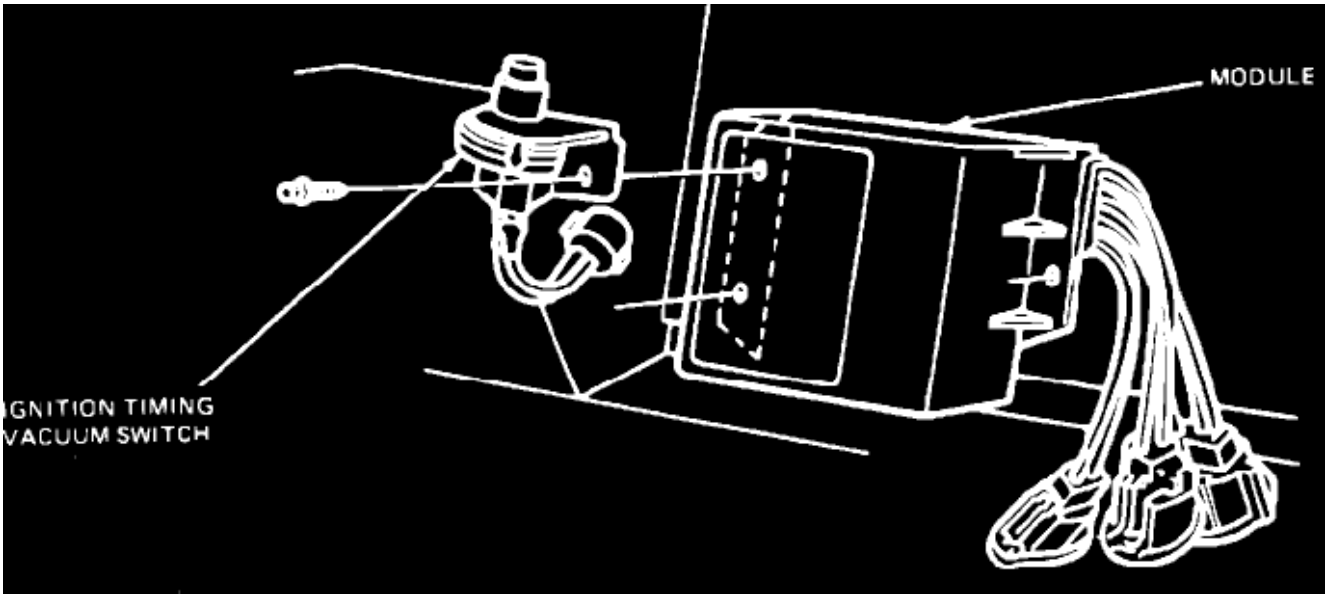
Firing Order 1-3-7-2-6-5-4-8



Firing Order: Specifications Without EEC III

Without EEC III

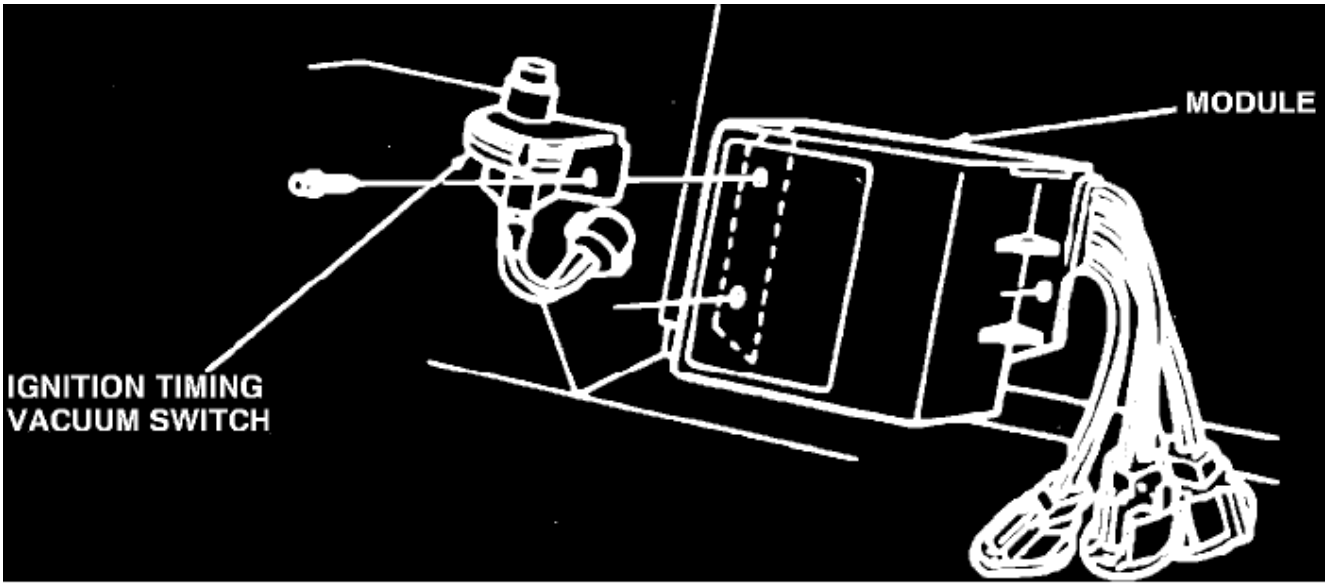
Firing Order 1-3-7-2-6-5-4-8



Ignition Timing Connector: Description and Operation

Fig. 20 Ignition Timing Vacuum Switch

Below vacuum setting, this switch, Fig. 20, used on some vehicles, is open and signals the ignition module to retard spark timing. The switch is closed above the vacuum setting and the ignition module is in the non-retard spark timing mode. Calibration resistors inside the switch control the amount of retard.



Part Number	Vacuum Setting ± 1.7 kPa (Inches Hg ± 0.5 In.)	Resistance Value (Ohms)
E1AE-12A265-BA	Less than 11.8 (3.5)	3,200 - 3,350
	Greater than 11.8 (3.5)	2,150 - 2,250
E1SE-12A265-BA	Less than 30 (9)	3,250 - 3,370
	Greater than 30 (9)	2,150 - 2,250
E1TE-12A265-CA	Less than 10 (3)	2,800 - 2,870
	Greater than 10 (3)	2,150 - 2,250
E25E-12A265-AA	Less than 13.5 (4)	2,800 - 2,870
	Greater than 13.5 (4)	2,150 - 2,250

Ignition Timing Connector: Testing and Inspection

Ignition Timing Vacuum Switch

Ignition Timing Vacuum Switch Test Chart

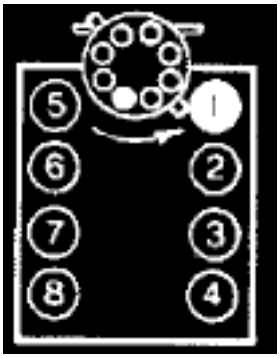
1. Disconnect switch from ignition module.

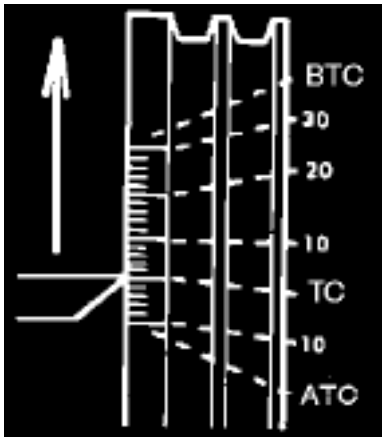
2. Connect suitable ohmmeter across switch terminals and compare resistance measured to ``less than'' values in the Ignition Timing vacuum Switch Test chart.

3. Apply vacuum to switch, using an outside vacuum source. Compare resistance now measured across switch terminals to ``greater than'' values in the Ignition Timing vacuum Switch Test chart.

4. Replace switch if resistance is not within specifications.


5
1
6
2
7
3
8
4


5
1
6
2
7
3
8
4


BTC
30
20
10
TC
10
ATC

Ignition Ballast Resistor: Description and Operation

The ballast resistor, (wire type), maintains a specific resistance between the positive (Batt.) terminal of the ignition coil connector and the wiring harness connector. It is not in operation during engine cranking enabling the coil to receive a hotter signal for starting. Once the engine is running, the resistor is used to protect the coil from voltage overload.

Ignition Ballast Resistor: Testing and Inspection

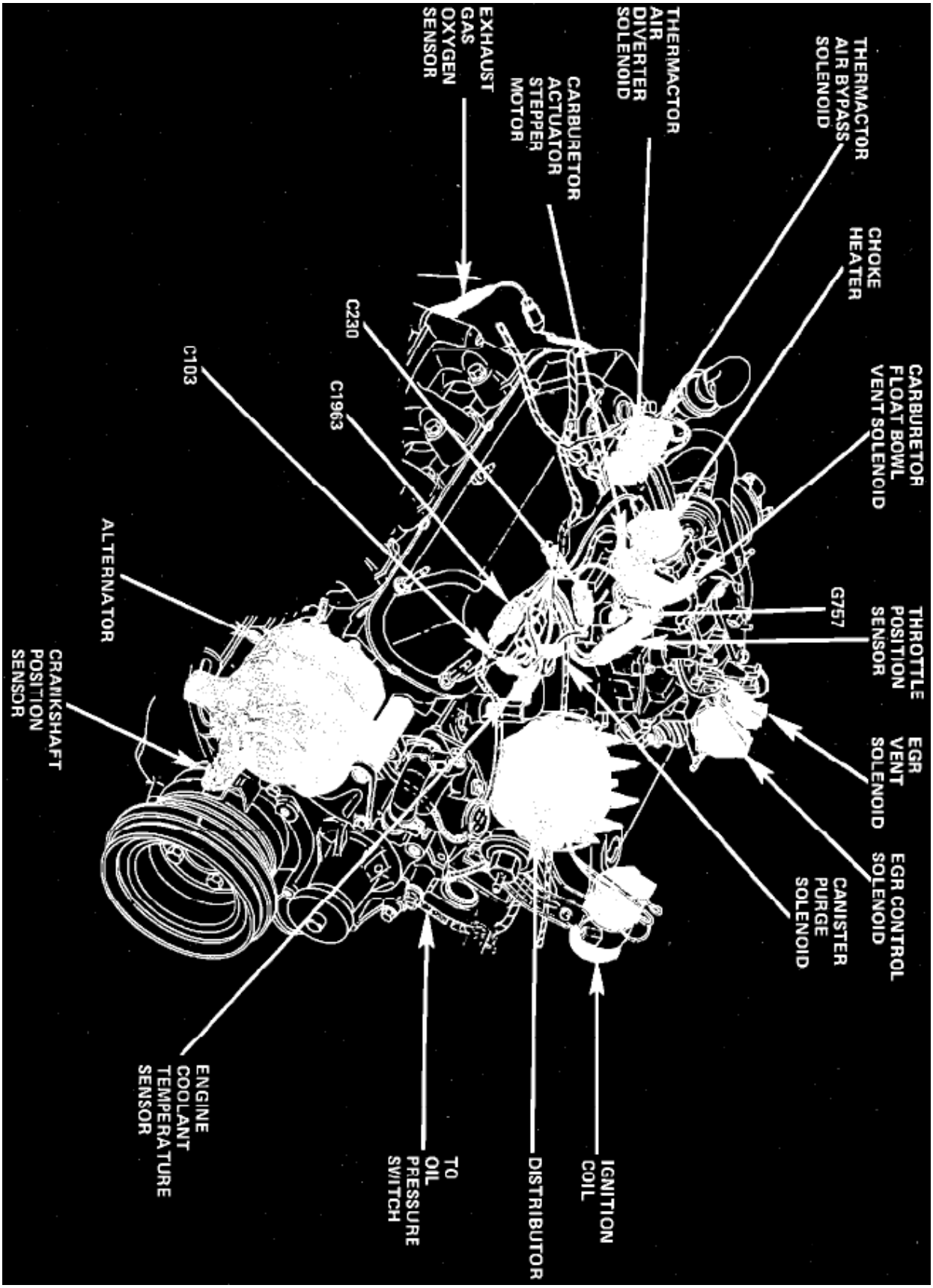
1. Disconnect module connector with red and white wires then, ignition coil connector.

2. Using a suitable ohmmeter, measure resistance between Batt. terminal of ignition coil connector and wiring harness connector wire that joins red wire in module connector.

3. If resistance is 0.8---1.6 ohms, ballast resistor is satisfactory. If resistance is less than 0.8 ohms or greater than 1.6 ohms, replace ballast resistor.

Engine	Year	Resistance (ohms)
All w/EEC III	1981-83	100-640

CRANKSHAFT SENSOR

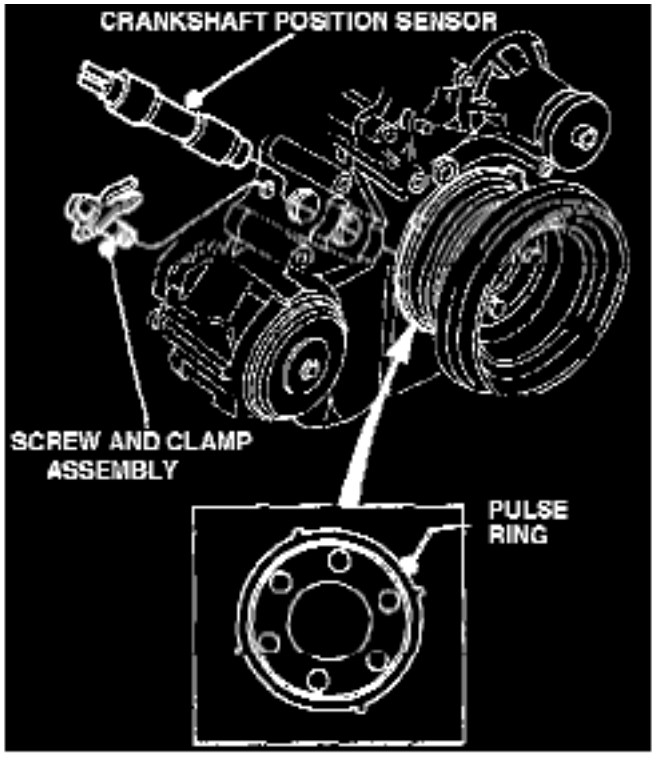

THERMACTOR AIR BYPASS SOLENOID
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EGR CONTROL SOLENOID
CANISTER PURGE SOLENOID
ALTERNATOR
CRANKSHAFT POSITION SENSOR
IGNITION COIL
DISTRIBUTOR
TO OIL PRESSURE SWITCH
ENGINE COOLANT TEMPERATURE SENSOR

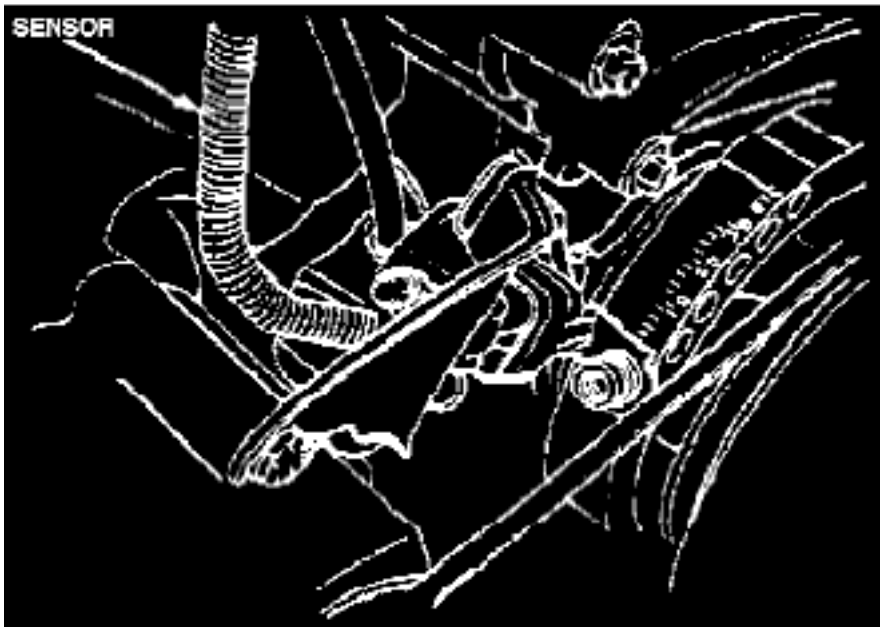
Crankshaft Position Sensor: Locations

Top RH Side Of Engine.

RH Front Of Engine

Applicable to: 1982-83 V8-302/5.0L & V8-351/5.8L Engines w/EEC





Crankshaft Position Sensor: Description and Operation

Fig.6 - Crankshaft Position Sensor

Fig.7 - Crankshaft Position Sensor

DESCRIPTION

The crankshaft vibration damper is fitted with a four-lobe "pulse ring" which provides the system with an accurate indication of when the pistons reach 10 BTDC. This indication is called the reference timing. Figs. 6 and 7.

The pulse ring is a powdered metal ring positioned on the crankshaft vibration damper during manufacture. It has four equally spaced lobes which represent crankshaft position when the pistons reach 10 BTDC.

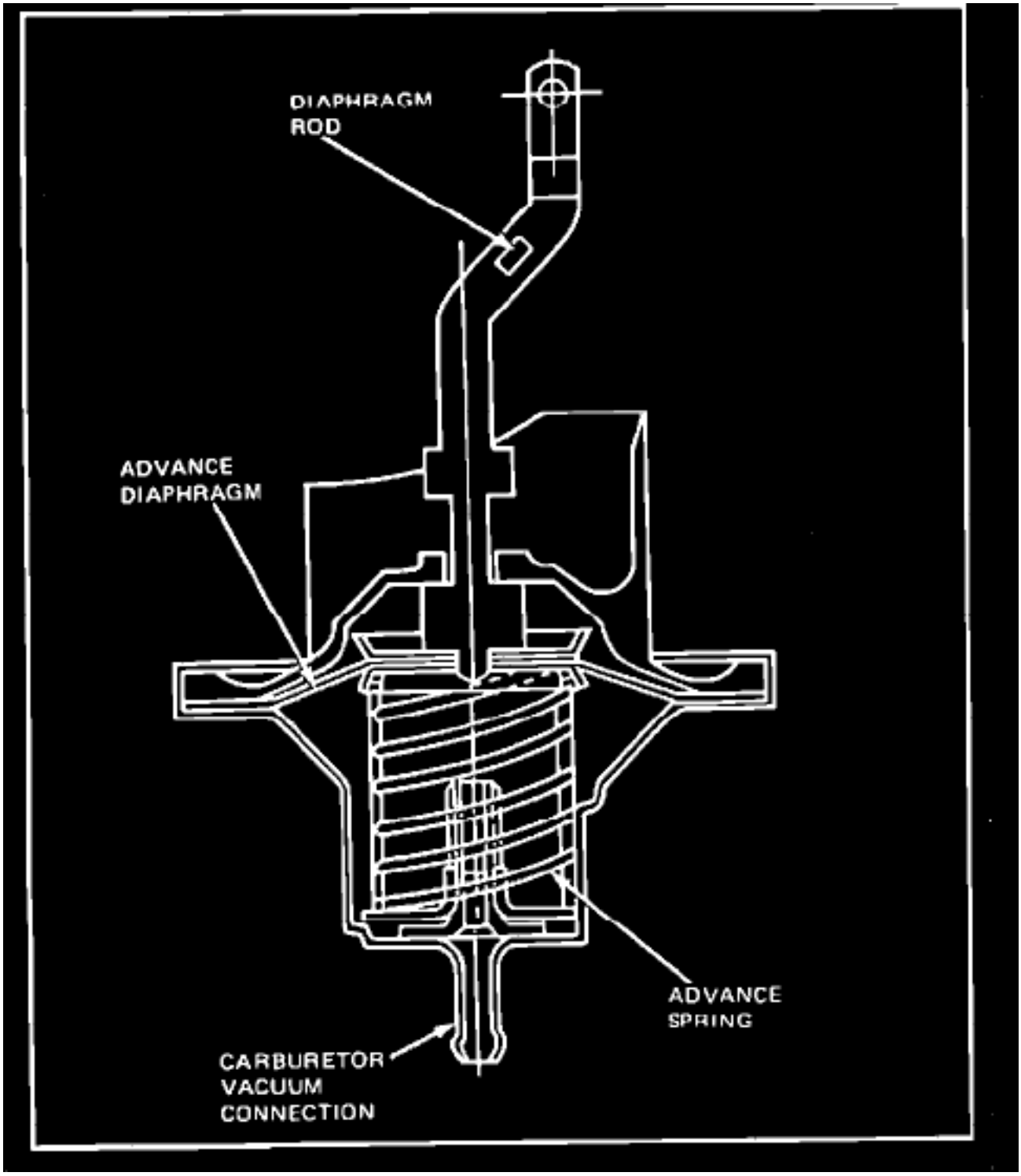
During operation, the lobes on the pulse ring pass by the tip of the CP sensor. The pulse ring interrupts the magnetic field at the tip of the sensor. When the field is interrupted, an output signal is generated and sent to the ECA.

As the crankshaft turns, the ECA evaluates the electrical impulses to determine the exact position of the crankshaft at any given time. By the frequency of the impulses, the ECA can determine the engine speed. With these two factors, the ECA will determine the appropriate ignition timing advance required for best engine operation.

Engine degrees at engine rpm, no load, in addition to basic timing setting.
Mechanical advance distributors only.

Engine	Trans-mission	Year	Distributor Number	Degrees @ 2500 RPM	
				Total	Centrifugal
351M	MT & AT	1981	D7TE-AHA	11.5-20.6	2.0-6.1
5.8L (351)M	MT & AT	1981	E0UE-CA	36.8-46.4	11.3-15.9
5.8L (351)M	MT & AT	1981	E1TE-EA	35.2-44.5	9.7-14.0
351 Windsor	MT & AT	1981-82	D7TE-ABA	9.4-19.5	0-5
351 Windsor	AT	1981-82	D7UE-JA	7.5-12.8	2.0-6.3
351 Windsor	MT	1981-83	D7UE-LA	14.5-23.7	5.0-9.2
5.8L (351)W	AT	1981	D1UE-EA	25.5-36.0	0-5.5
5.8L (351)W	AT	1981-82	D1UE-FA	27.4-37.7	1.9-7.2
5.8L (351)W	AT	1981-82	D1UE-GA	25.5-35.9	0-5.4
5.8L (351)W	MT	1982-83	E2TE-KA	12.7-22.1	7.2-11.6
5.8L (351)W	MT	1982-83	E2TE-SA	8.7-18.0	3.2-7.5
5.8L (351) 2V	MT & AT	1983-84	D7UE-LA	14.5-23.7	5.0-9.2
5.8L (351) 2V	MT & AT	1982-86	E2TE-UA	9.9-21.0	4.4-9.5
5.8L (351) 4V	AT	1984-86	E4TE-EA	27.8-37.0	10.3-14.5
5.8L (351) 4V	MT	1985-86	E5TE-NA	22.1-31.9	4.6-9.4
5.8L (351) 4V	AT	1985-86	E5TE-MA	20.7-30.5	3.2-8
5.8L (351) 4V	MT & AT	1985-87	E5TE-RA	23.0-32.5	9.5-14.0

DISTRIBUTOR TIMING ADVANCE

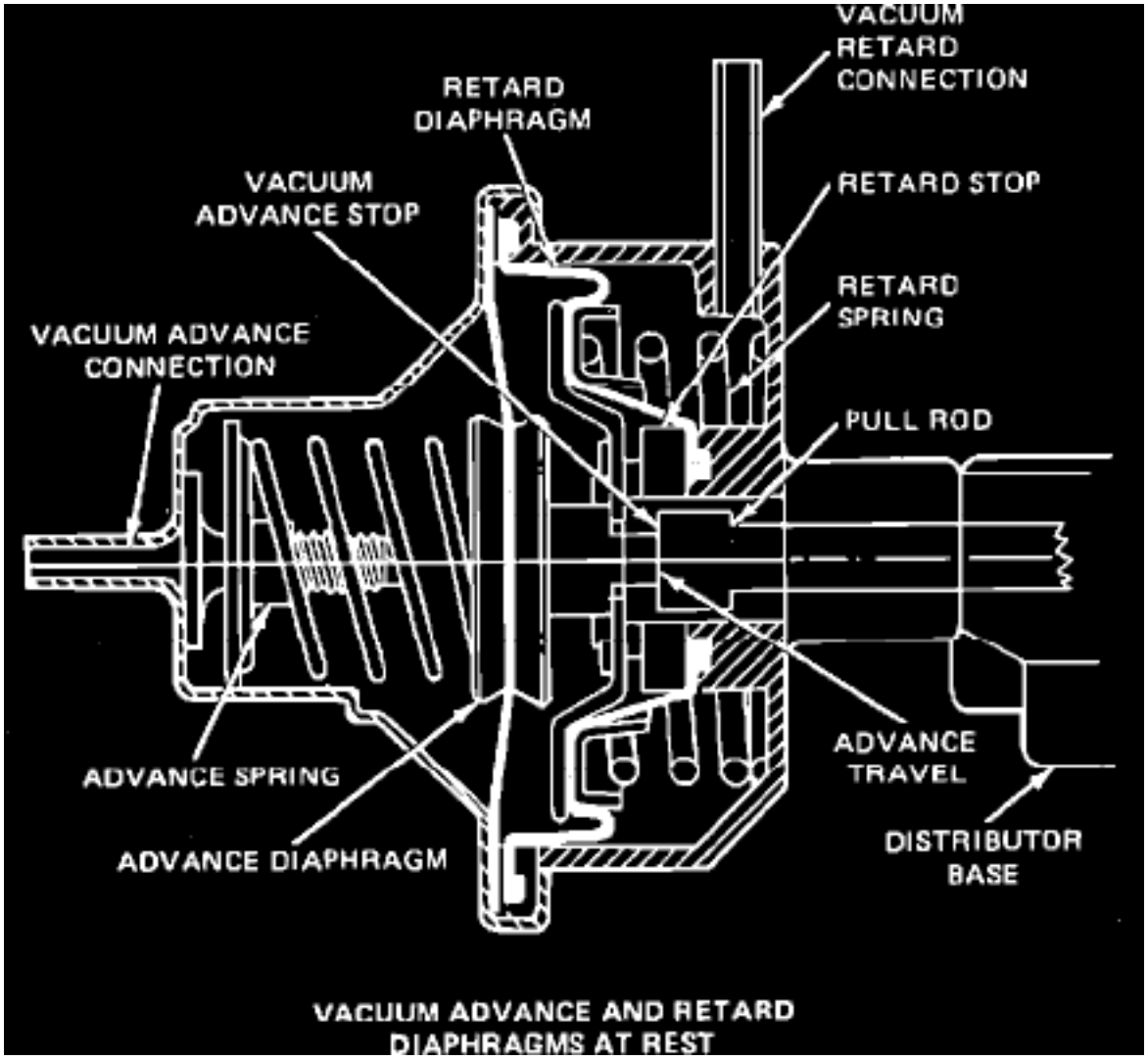


Distributor Advance Unit: Description and Operation Vacuum Spark Advance Mechanism

The vacuum spark control mechanism can provide spark advance if a single diaphragm assembly is used or spark advance and retard if a dual diaphragm assembly is used. The diaphragm assembly used depends on the engine calibration.

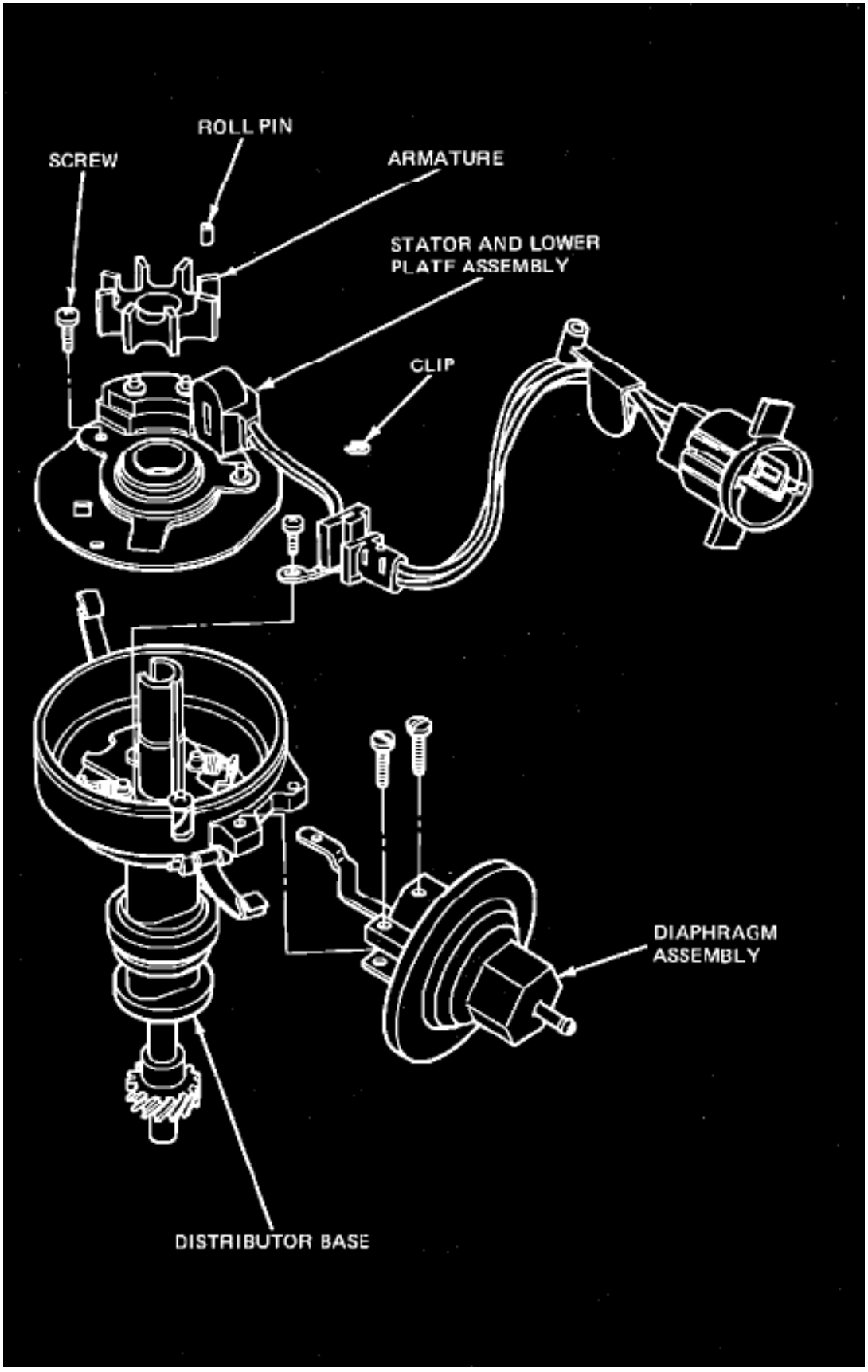
Single Diaphragm Assembly

SINGLE DIAPHRAGM ASSEMBLY The single diaphragm assembly, Fig. 11, also changes the armature to stator relationship to give spark advance. The stator assembly position is changed by means of vacuum being applied to the diaphragm assembly. Vacuum applied to the diaphragm assembly causes the diaphragm and attached diaphragm rod to move, compressing the advance spring, which controls the rate of advance. The movement of the diaphragm rod, which is attached to the stator assembly, makes the the stator assembly move with respect to the armature. This changes the initial armature to stator relationship set during initial timing, causing spark advance. The stator assembly is mounted on the lower plate assembly which with the diaphragm assembly, is attached to the distributor base.



Dual Diaphragm Assembly

DUAL DIAPHRAGM ASSEMBLY The dual diaphragm assembly, Fig. 12, obtains spark advance in the same manner as the single diaphragm assembly. In this case vacuum applied to the vacuum advance port causes the advance diaphragm and attached rod to move, otherwise the action is the same. Spark retard is done by applying vacuum to the vacuum retard port. This causes the retard diaphragm to move, compressing the retard spring, which controls the rate of spark retard. Compressing the retard spring allows the diaphragm rod stop to move due to the force applied by the advance spring pushing against it by means of the diaphragm rod. The result is the diaphragm rod moves causing the attached stator assembly to change position with respect to the armature. In this instance the direction of the stator assembly movement is opposite that occurring during vacuum advance, resulting in spark retard. NOTE: Any vacuum applied to the advance port overrides any spark retard caused by vacuum being applied to the retard port.


ROLL PIN
SCREW
ARMATURE
STATOR AND LOWER PLATF ASSEMBLY
CLIP
DIAPHRAGM ASSEMBLY
DISTRIBUTOR BASE

Distributor Advance Unit: Description and Operation Centrifugal Spark Advance Mechanism

Distributor - Exploded view

The centrifugal advance mechanism varies the relationship of the armature to the stator assembly. The armature is mounted to the sleeve and plate assembly which rotates in relation to the distributor shaft. The rotation is a result of the centrifugal weights moving in response to engine RPM. The movement of the weights change the initial relationship of the armature to the stator assembly by rotating the sleeve and plate assembly ahead of its static position on the distributor shaft Fig. 1. This produces spark advance. The rate of movement of the weights is controlled by calibrated springs.

Distributor Advance Unit: Service and Repair

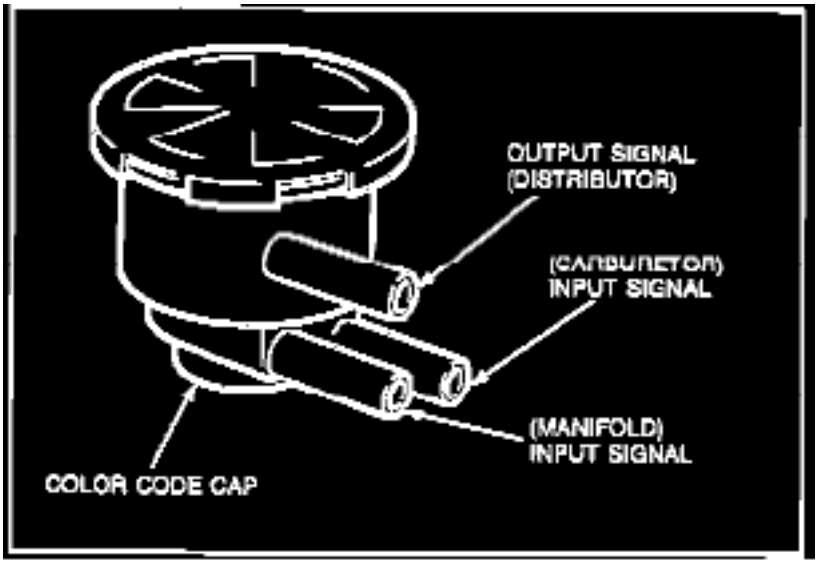
1. Remove distributor cap and rotor.

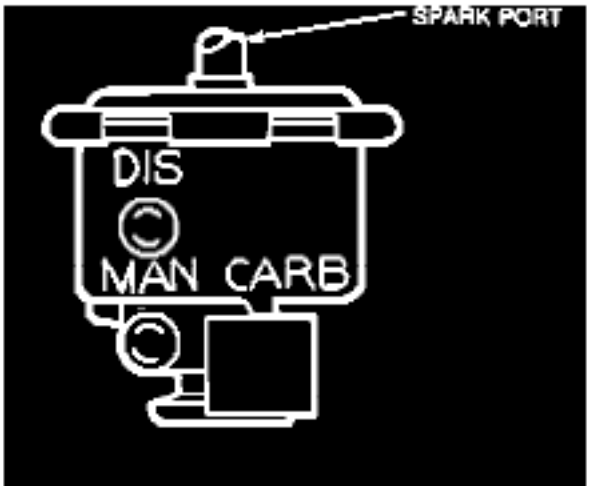
2. Disconnect vacuum lines, then remove snap ring that secures vacuum advance link to pickup assembly.

3. Remove vacuum advance attaching screws, then tilt unit downward to disconnect link.

4. Carefully remove unit from distributor.

5. Reverse procedure to install.





Distributor Vacuum Control: Description and Operation

3-Port Vacuum Regulator

Vacuum Regulator (3 & 4 Port)

Three port, Fig. 27, regulators and four port, Fig. 28, regulators are used to control the vacuum advance to the distributor. During engine idle conditions, the manifold vacuum signal is reduced to a constant output signal. Off idle, the output signal equals the spark port.

Distributor Vacuum Control: Testing and Inspection Distributor Modulator Valve Assembly

1. Turn ignition key to ``ON'' and check resistance at solenoid terminals.

2. If solenoid resistance is not 51---108 ohms, replace solenoid.

Distributor Vacuum Control: Testing and Inspection Vacuum Regulator

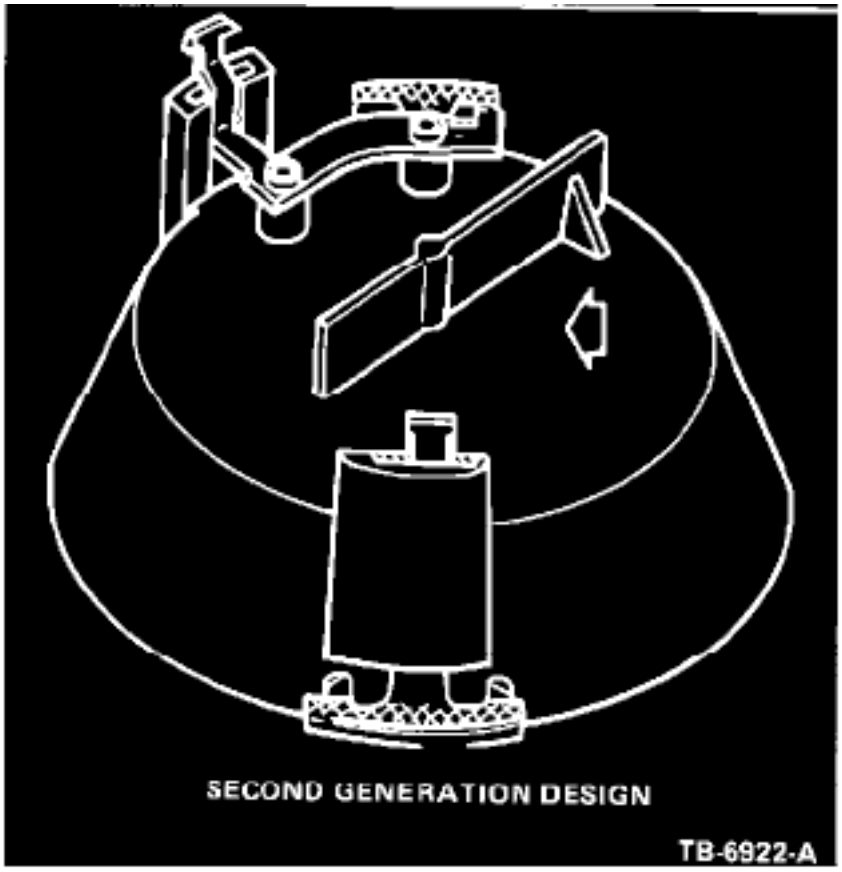
Procedure

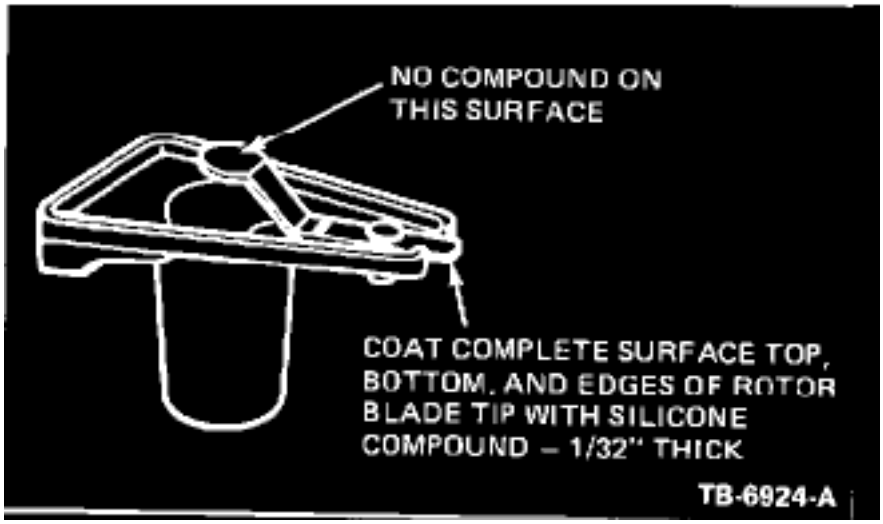
1. Disconnect vacuum line from distributor port and connect a vacuum gauge.

2. With engine at idle, the vacuum gauge reading should be within 1 inch Hg. vacuum of the calibration point. The calibration point of each valve can

be identified according to color code as follows: Black, 6 inches Hg.; green, 7 inches Hg.; red, 8 inches Hg.

3. Replace valve if not within specifications.





Ignition Rotor: Technical Service Bulletins Ignition Rotor - Alignment Procedure

Article No. 83-8-14

EEC III/DISTRIBUTOR - PROCEDURE FOR SETTING ROTOR ALIGNMENT 5.0L/5.8L EEC EQUIPPED LIGHT TRUCKS

LIGHT TRUCKS 1981/83 BRONCO, F-SERIES AND ECONOLINE

The following information and procedures are issued to clarify the proper setting of distributor rotor alignment on the subject vehicles. This reference publication supersedes all other printed material on subject.

FIGURE 12

FIGURE 13

For 1981 through 1983 model year vehicles, EEC distributors used on the EEC Systems had the "second generation" rotor (Figure 12). The 1983 model 5.0L EEC equipped Light Truck employs a conventional rotor (Figure 13). PROCEDURE FOR ROTOR ALIGNMENT:

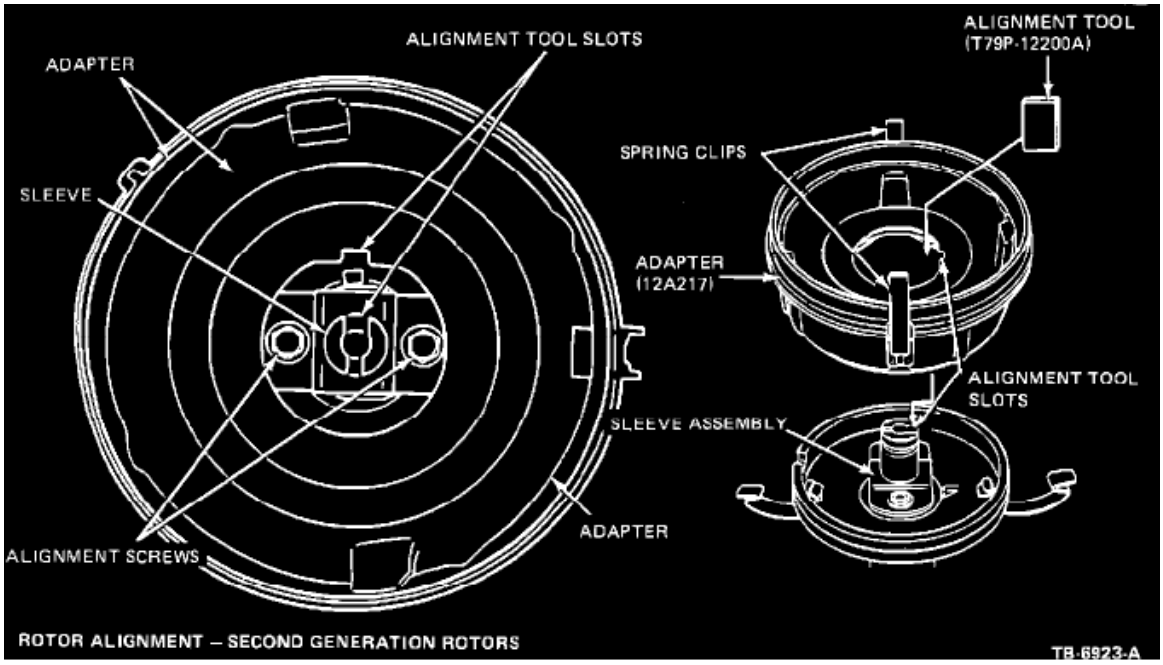
1. Remove the distributor cap and wires and position them to one side.

2. Remove the rotor.

3. To check rotor alignment:

a. Rotate the engine until the No. 1 piston is on the compression stroke. NOTE: Verification of being on the compression stroke is essential to correct rotor alignment. If the piston is on the exhaust stroke, the rotor can be misaligned by 180~.

b. Slowly rotate the engine until the alignment tool can be installed.


ALIGNMENT TOOL SLOTS
ALIGNMENT TOOL (T79P-12200A)
ADAPTER
SLEEVE
SPRING CLIPS
ADAPTER (12A217)
ALIGNMENT TOOL SLOTS
SLEEVE ASSEMBLY
ADAPTER
ALIGNMENT SCREWS
ROTOR ALIGNMENT – SECOND GENERATION ROTORS
TB-6923-A

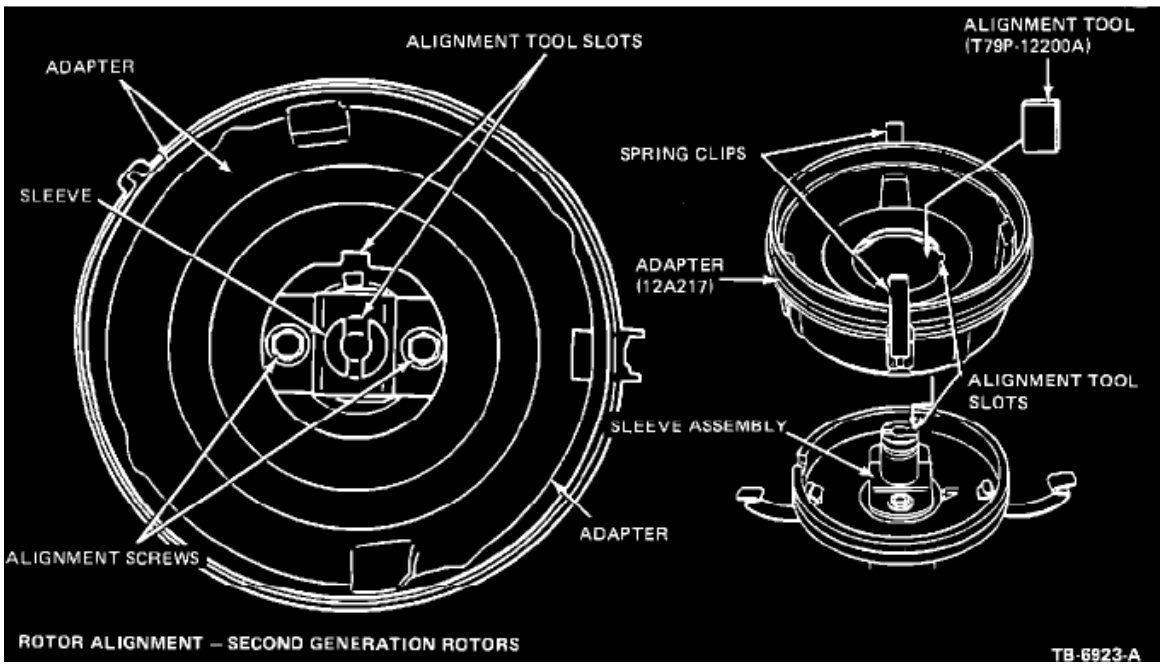

ALIGNMENT TOOL SLOTS
ALIGNMENT TOOL (T79P-12200A)
ADAPTER
SLEEVE
SPRING CLIPS
ADAPTER (12A217)
ALIGNMENT TOOL SLOTS
SLEEVE ASSEMBLY
ADAPTER
ALIGNMENT SCREWS
ROTOR ALIGNMENT – SECOND GENERATION ROTORS
TB-6923-A

FIGURE 14

c. The T79P-12200-A tool mounts between the slot on the sleeve and the slot (cut out) on the adapter (Figure 14).

d. Read the timing mark on the damper indicated by the timing pointer.

e. If the timing mark is specification, TDC +/- 4~, the rotor alignment is satisfactory. The alignment tool can be removed.

TO ADJUST ROTOR ALIGNMENT:

1. Remove the distributor cap by loosening the two spring clips holding the cap of the distributor adapter. Remove rotor.

2. Rotate engine until No. 1 piston is on the compression stroke. (See Step 3a above).

3. Slowly rotate the engine until the timing pointer is aligned with the specified timing mark. (TDC +/- 4~).

4. Loosen the two sleeve assembly adjustment screws and rotate the sleeve until the alignment tool T79P-

FIGURE 14

12200-A fits into the alignment slots on the sleeve and the adapter (Figure 14). 5.

Tighten the adjustment screw to 2.8-3.9 N-m (25-30 lb.in.). Remove alignment tool.

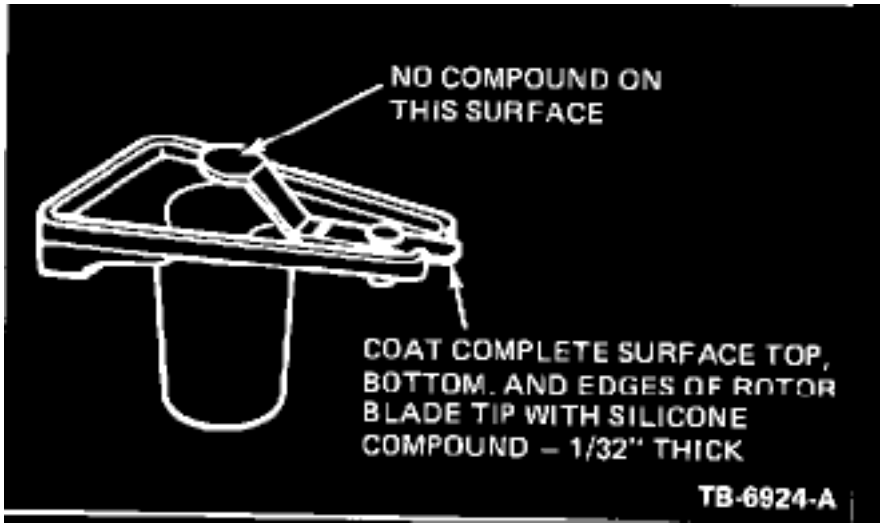


FIGURE 13

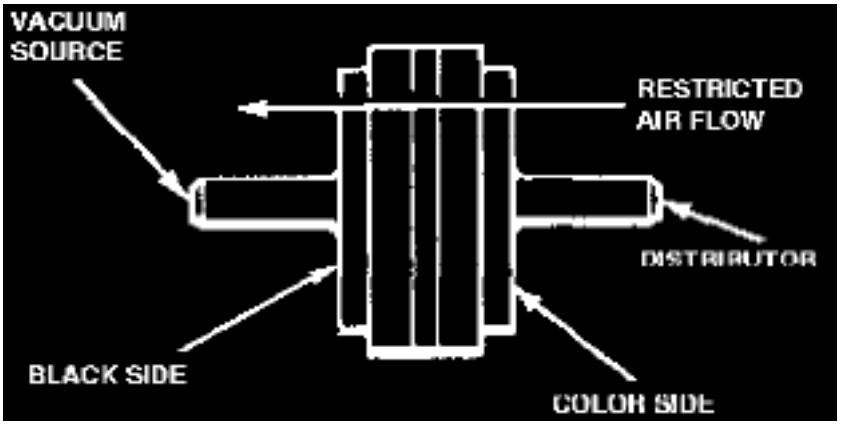
6. If the vehicle is a 1983 model equipped with a 5.0L engine, coat the rotor with silicone grease as shown in Figure 13.

7. Reinstall distributor cap and rotor making sure wires are firmly seated in the distributor cap terminal housings and on the spark plugs.

OTHER APPLICABLE ARTICLES: None WARRANTY STATUS: "INFORMATION ONLY"

Distributor Plate W/ Pick-up Sensor: Service and Repair

1. Remove distributor cap and rotor.
2. Remove vacuum advance unit and magnetic pickup assembly.
3. Remove attaching screws and lift base plate from distributor.
4. Reverse procedure to install.



Vacuum Spark Delay Valve: Description and Operation

Fig.25 - Spark Delay Valve

This unit is used in conjunction with some of the other Ford systems. Its purpose is to further reduce emissions by delaying the spark advance during rapid acceleration and by cutting off advance immediately upon deceleration. Fig. 25.

This plastic disc-shaped valve is installed in the carburetor vacuum line at the distributor advance diaphragm. It is a one way valve and will not operate if installed backwards. The black side of the valve must be toward the carburetor. This valve cannot be repaired.

NOTE: On all systems which employ the dual diaphragm distributor the line which has high vacuum at idle (normal operating temperature) is

connected to the secondary (retard) side of the distributor vacuum advance unit. This is the connection closest to the distributor cap.

Color	Number Value
White	5
Yellow	10
Blue	15
Green	20
Red	30

Year	Color	I.D. No.	Time in Seconds	
			Min.	Max.
1974–76	Black/Gray	1	1	4
	Black/Brown	2	2	5
	Black/White	5	4	12
	Black/Yellow	10	5.8	14
	Black/Blue	15	7	16
	Black/Green	20	9	20
	Black/Orange	30	13	24
	Black/Red	40	15	28
1977–82	Black/Gray	1	.6	1.6
	Black/Brown	2	1	3
	Black/White	5	2.7	9.3
	Black/Yellow	10	4.5	13.2
	Black/Blue	15	6.8	18.8
	Black/Green	20	8	26
	Black/Orange	30	11.6	38
	Black/Red	40	14	47.2
	White/Pink①	5	2.7	9.3
	White/Brown①	2	1	3
	White/Green①	20	8	26
	White/Yellow①	10	4.5	13.2
	White/Gray①	1	.6	1.6
	White/Blue①	20	8	26
	White/Red①	40	14	47.2

①—Retard Delay Valve Only

Vacuum Spark Delay Valve: Testing and Inspection

Fig.36 - SDV Valve Color Coding

Fig.37 - Spark Delay Valve (SDV) Specifications Chart

Refer to Figs. 36 & 37 for number value by color code.

NOTE: To perform the following procedure, an external vacuum source capable of maintaining a minimum constant 10 inches Hg. is required.

Mono Delay Valve

1. Set external vacuum source to 10 inches Hg. and connect black side of delay valve to vacuum source.

2. Connect a vacuum gauge with a 24 inch hose to colored side of delay valve.

3. Apply 10 inches Hg. vacuum and observe time in seconds for gauge to read 0-8 inches Hg. The minimum and maximum time for gauge to read 8

inches Hg. should be as shown in Fig. 37.

Dual Delay Valve

1. Set external vacuum source to 10 inches Hg. and connect vacuum gauge with a 24 inch hose to DIST nipple of delay valve.

2. Connect black side of delay valve and CARB nipple of delay valve to vacuum source.

NOTE: Avoid applying vacuum to CARB nipple while applying vacuum to black side of valve.

3. Apply 10 inches Hg. of vacuum and observe time in seconds for gauge to read from 0-8 inches Hg. The minimum and maximum time for gauge to

read 8 inches Hg. should be as shown in Fig. 37.

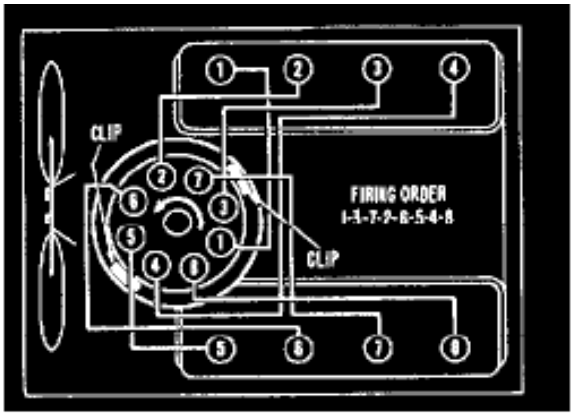
Retard Delay Valve

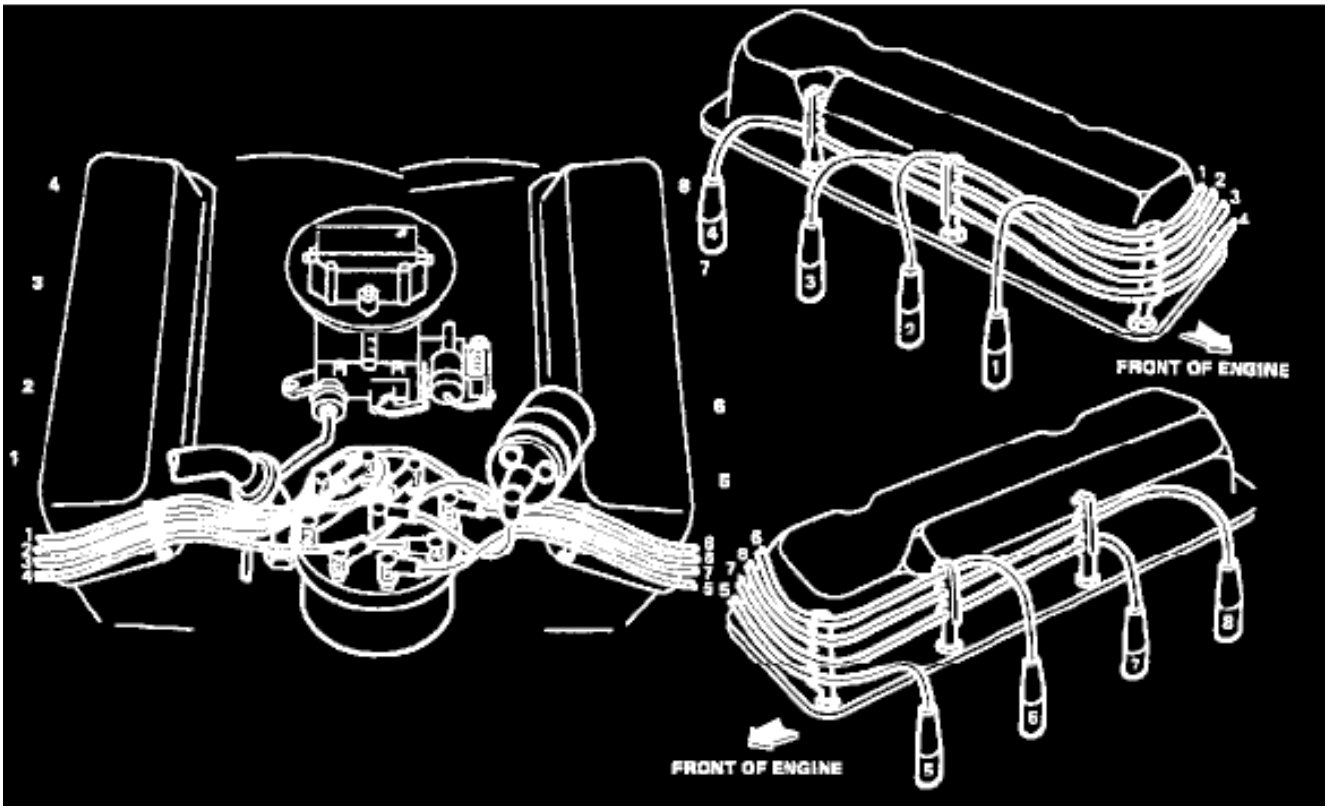
1. Set external vacuum source to 10 inches Hg. and connect colored side of delay valve to vacuum source.

2. Connect a vacuum gauge with a 24 inch hose to white side of delay valve.

3. Apply 10 inches Hg. of vacuum and observe time in seconds for gauge to read from 0-8 inches Hg. The minimum and maximum time for gauge to

read 8 inches Hg. should be as shown in Fig. 37.

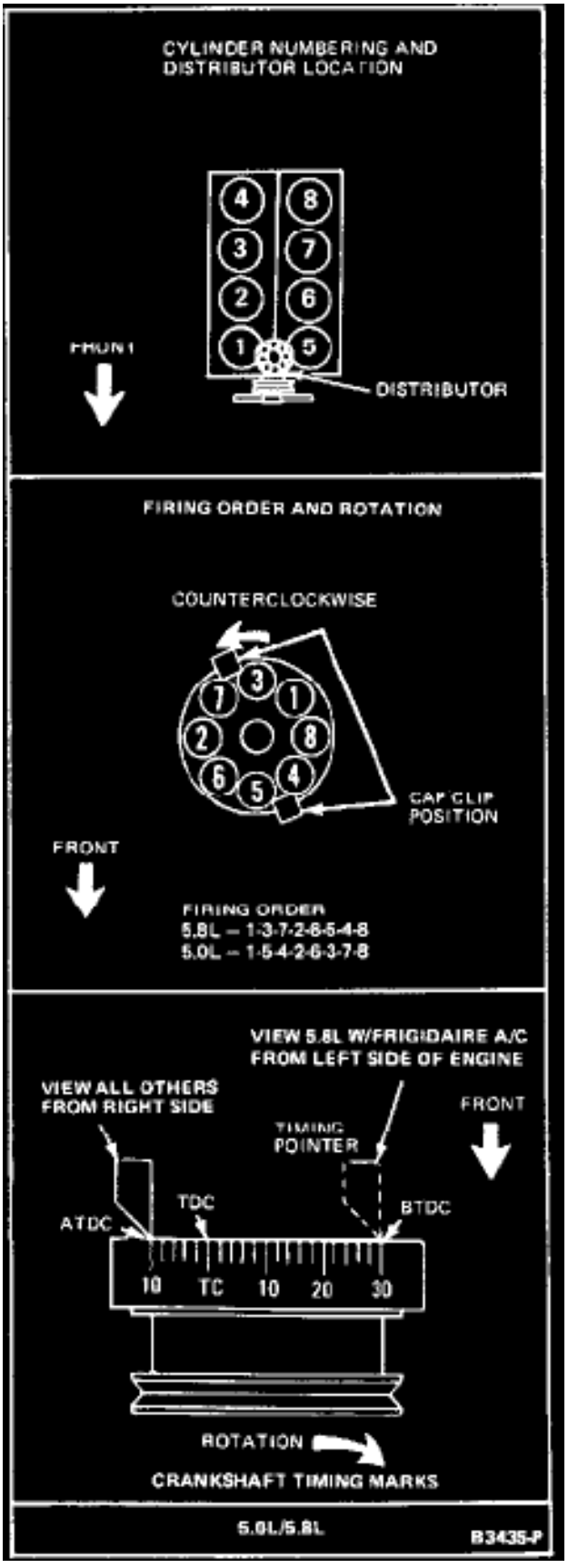




Ignition Cable: Diagrams

Spark Plug Wire Routing

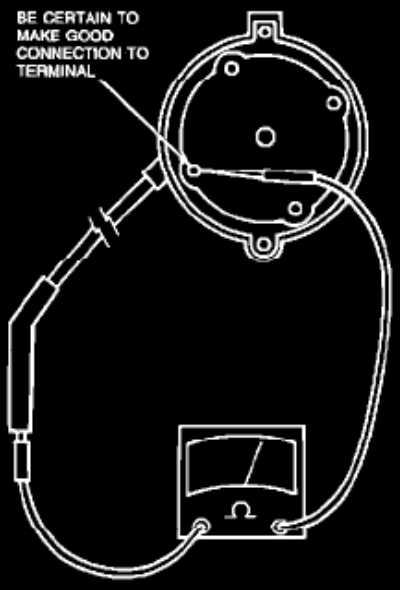
Ford F 250 5.8L Firing Order


CYLINDER NUMBERING AND DISTRIBUTOR LOCATION
4
8
3
7
2
6
1
5
FRONT
DISTRIBUTOR
FIRING ORDER AND ROTATION
COUNTERCLOCKWISE
7
3
1
2
8
6
5
4
CAP CLIP POSITION
FRONT
FIRING ORDER
5.8L – 1-3-7-2-6-5-4-8
5.0L – 1-5-4-2-6-3-7-8
VIEW 5.8L W/FRIGIDAIRE A/C FROM LEFT SIDE OF ENGINE
VIEW ALL OTHERS FROM RIGHT SIDE
FRONT
TIMING POINTER
TDC
ATDC
BTDC
10
TC
10
20
30
ROTATION
CRANKSHAFT TIMING MARKS
5.0L/5.8L
B3435-P

Spark Plug Wire Resistance

Test 3

TEST STEP	RESULT	ACTION TO TAKE
1. Remove distributor cap from distributor. 2. Check for spark plug wires firmly seated on cap. 3. Disconnect spark plug end of suspect wire(s). 4. Measure resistance from terminal in cap to spark plug terminal. 5. Reinstall distributor cap and connect spark plug wire to spark plug. **CAUTION** **Do not, under any circumstances, puncture a spark plug wire when measuring resistance. Measure only as instructed.** 6. **Was resistance less than 7,000 ohms per foot?**	Yes ▶	Spark plug wire resistance OK.
	No ▶	REPLACE spark plug wire(s).



Ignition Cable: Testing and Inspection

Spark Plug Wire Resistance

*** UPDATED BY TSB #85-9-33

Ignition Coil: Technical Service Bulletins Ignition - Coil Durability/Radio Frequency Interference

Article No. 84-22-8

IGNITION - COIL DURABILITY AND RADIO FREQUENCY INTERFERENCE

LIGHT TRUCKS 1985 AND PRIOR YEARS - ALL SERIES

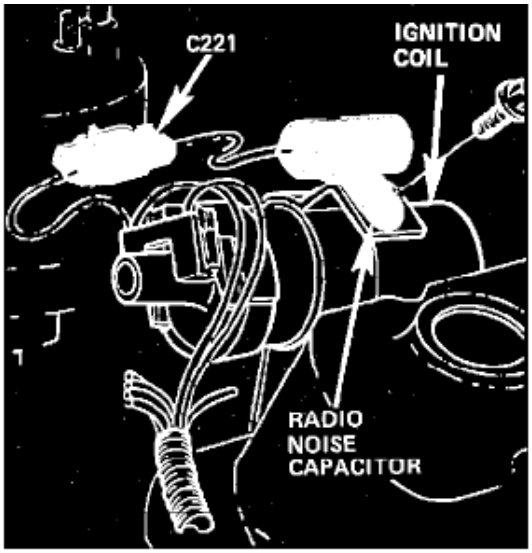
MEDIUM/HEAVY TRUCKS 1985 AND PRIOR YEARS - ALL SERIES

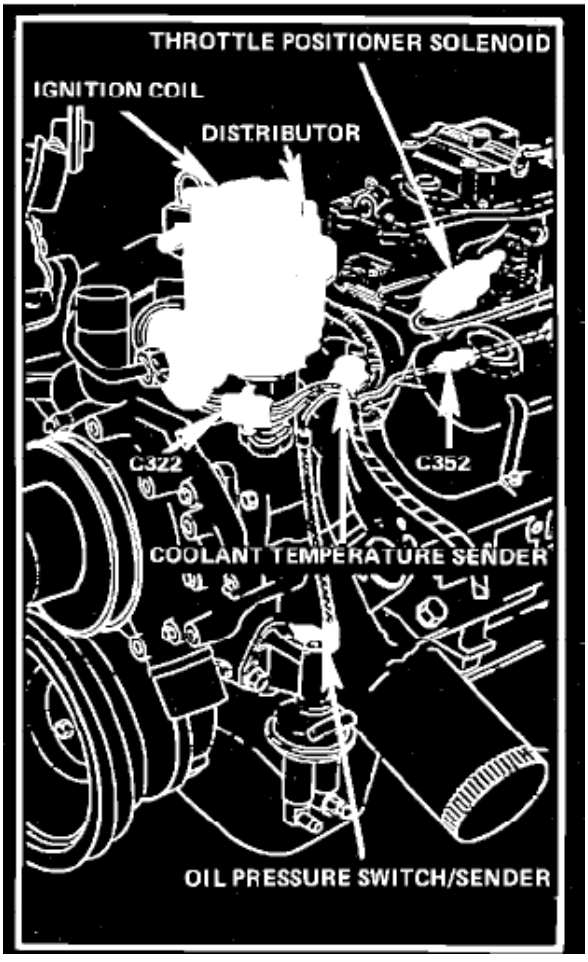
Relocation of the ignition coil to accomodate the installation of non-Ford engine-mounted equipment may effect the durability of the coil and/or cause a radio frequency interference condition. For these reasons movement of the ignition coil from its original location is not recommended.

OTHER APPLICABLE ARTICLES: None WARRANTY STATUS: "INFORMATION ONLY"

Ignition Coil: Specifications

Winding Resistance (ohms at 75 degrees F or 24 degrees C) 1981: Primary, 0-1; Secondary, 7700-9600. 1982-88 w/Dura-Spark; Primary, 0.8-1.6; Secondary, 7700-10,500. 1984-88 w/TFI (EEC IV): Primary, 0.3-1.0; Secondary, 8000-11,500.


C221
IGNITION COIL
RADIO NOISE CAPACITOR


THROTTLE POSITIONER SOLENOID
IGNITION COIL
DISTRIBUTOR
C322
C352
COOLANT TEMPERATURE SENDER
OIL PRESSURE SWITCH/SENDER

Ignition Coil: Locations

Top Front Of Engine.

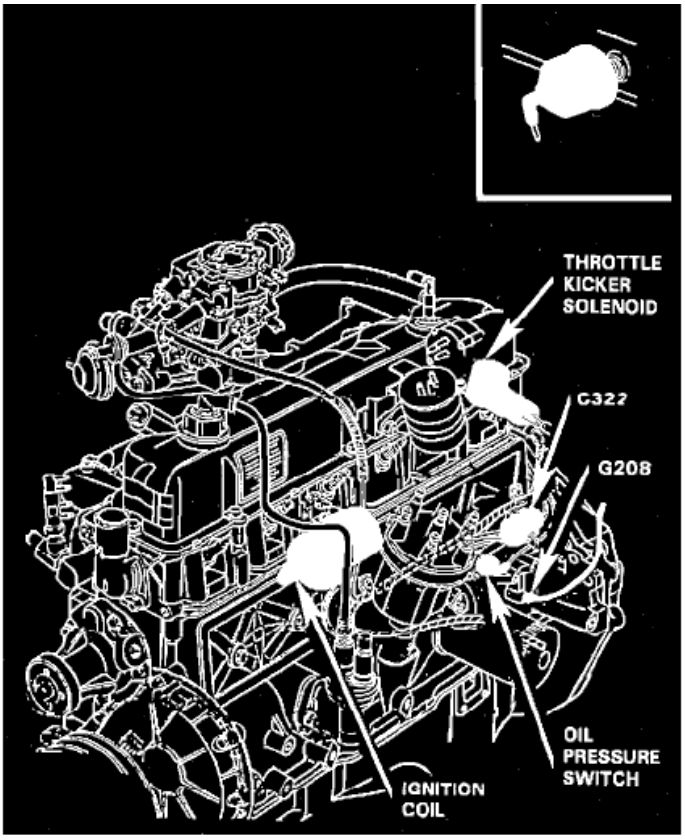
At Distributor

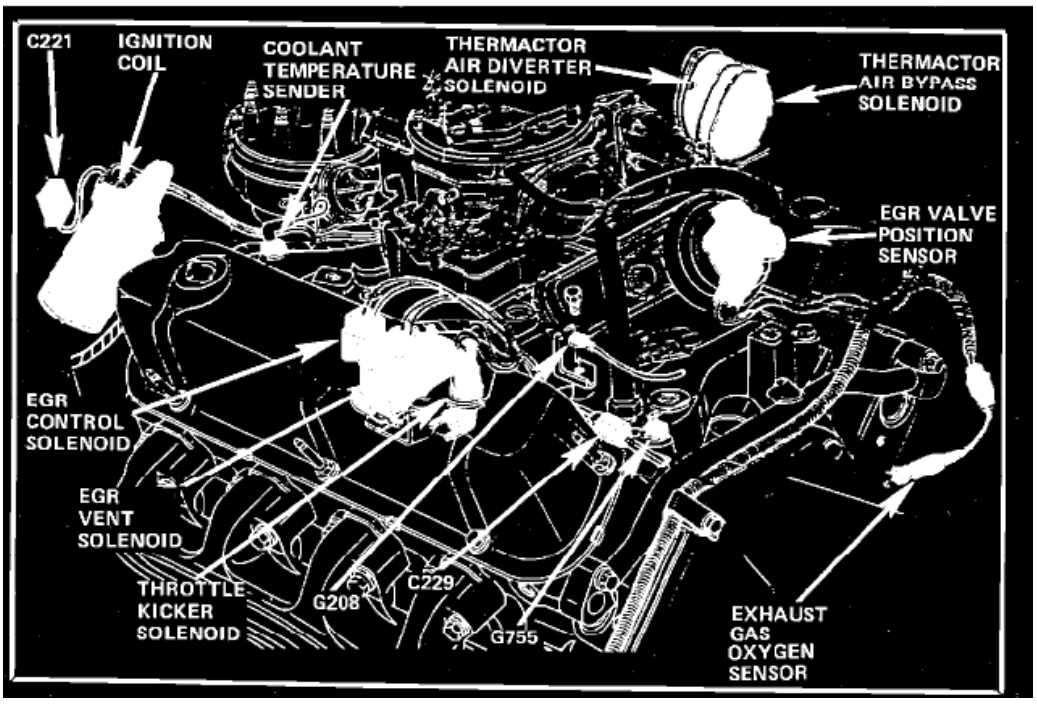
Applicable to: V8-351/5.8L Engine

LH Side Of Engine.

At Distributor

Applicable to: 1981 V8-302/5.0L & V8-351/5.8L Engines


THROTTLE KICKER SOLENOID
G327
G208
OIL PRESSURE SWITCH
IGNITION COIL

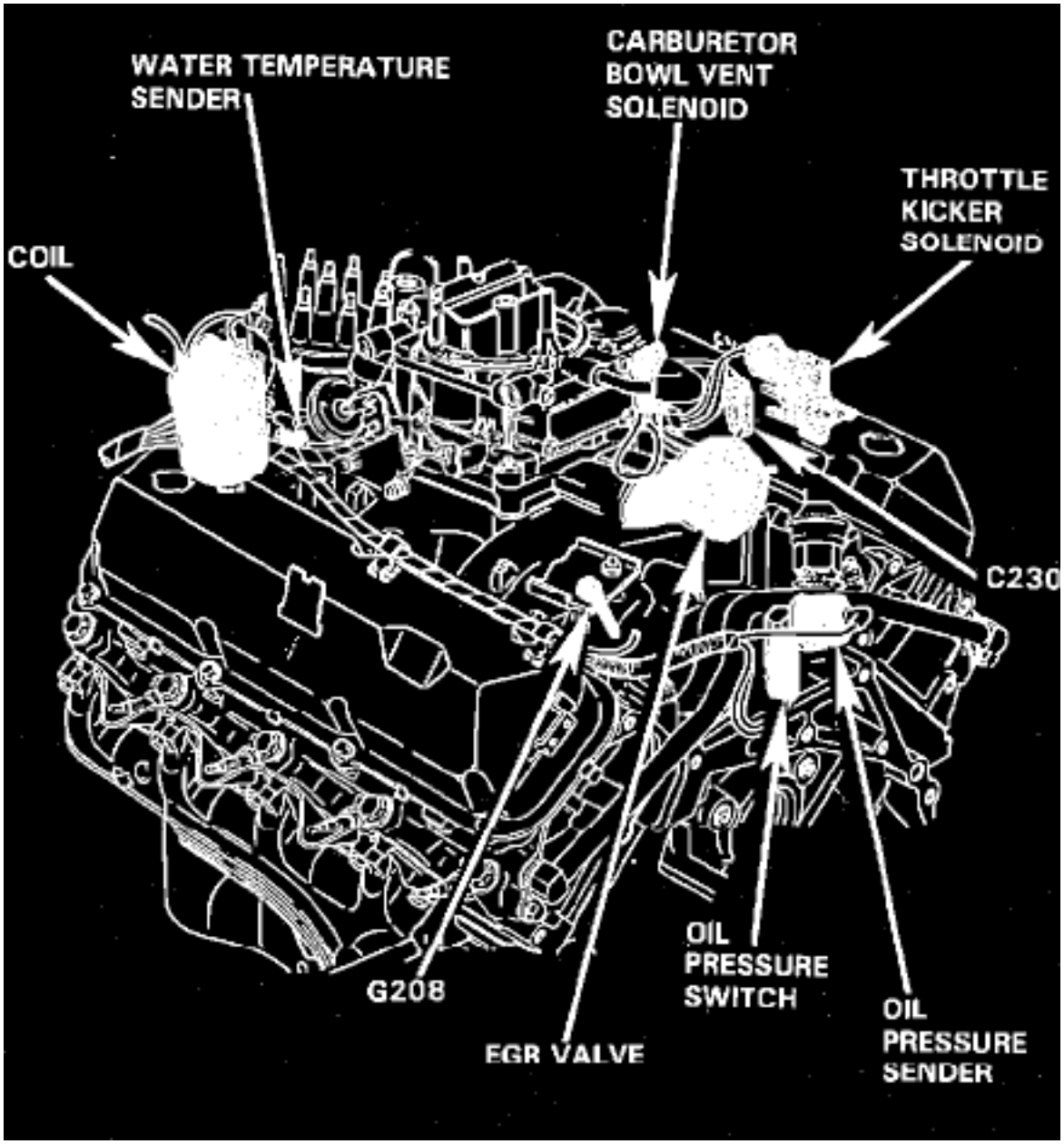

C221
IGNITION COIL
COOLANT TEMPERATURE SENDER
THERMACTOR AIR DIVERTER SOLENOID
THERMACTOR AIR BYPASS SOLENOID
EGR VALVE POSITION SENSOR
EGR CONTROL SOLENOID
EGR VENT SOLENOID
THROTTLE KICKER SOLENOID
G208
C229
G755
EXHAUST GAS OXYGEN SENSOR

LH Side Of Engine.

At Distributor

Applicable to: 1984-85 6-300/4.9L Engine (Over 8500 Lbs. GVW)

LH Side Of Engine.



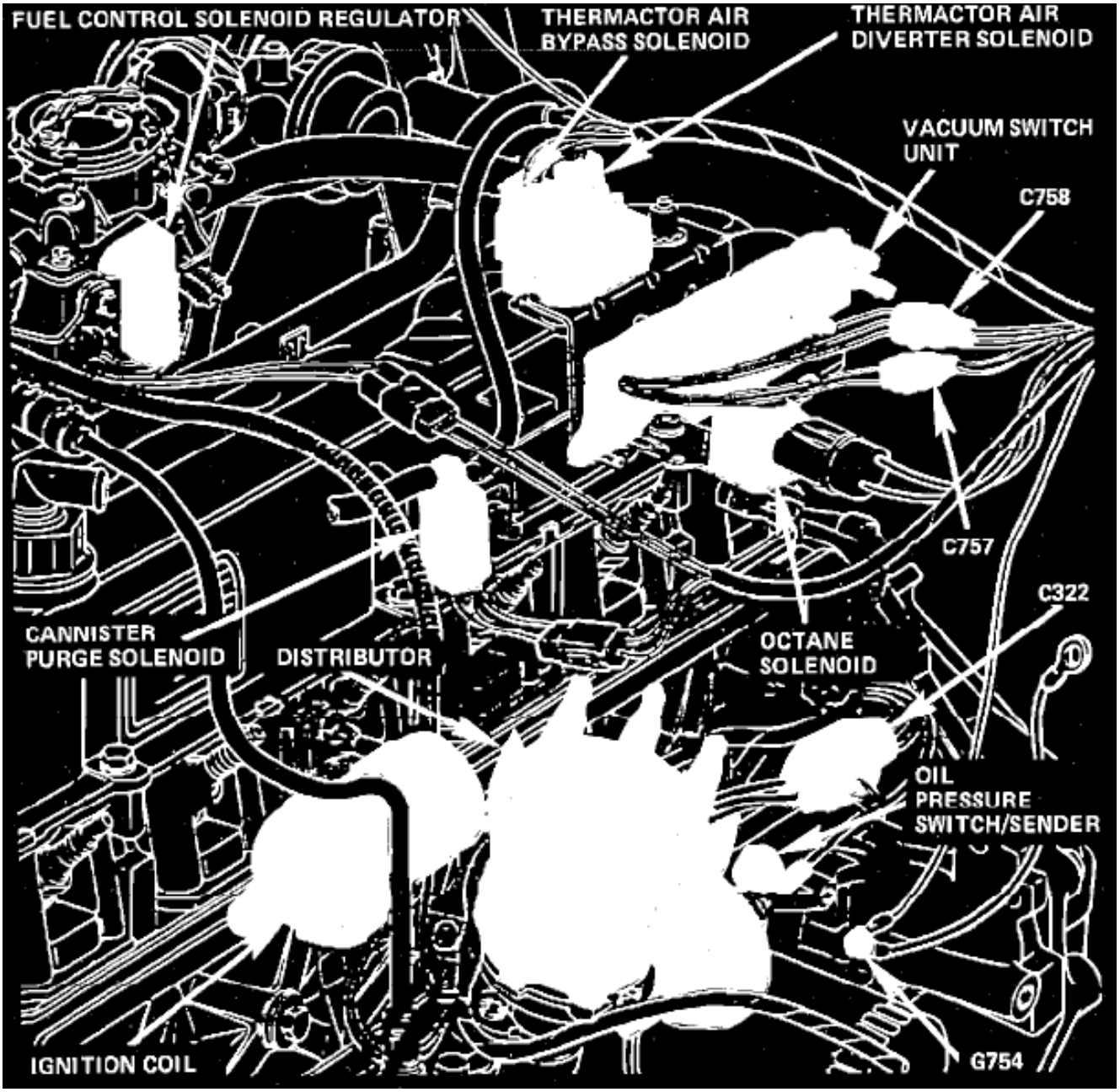
At Distributor

Applicable to: 1982-83 V8-302/5.0L & V8-351/5.8L Engines w/EEC

LH Side Of Engine.

At Distributor

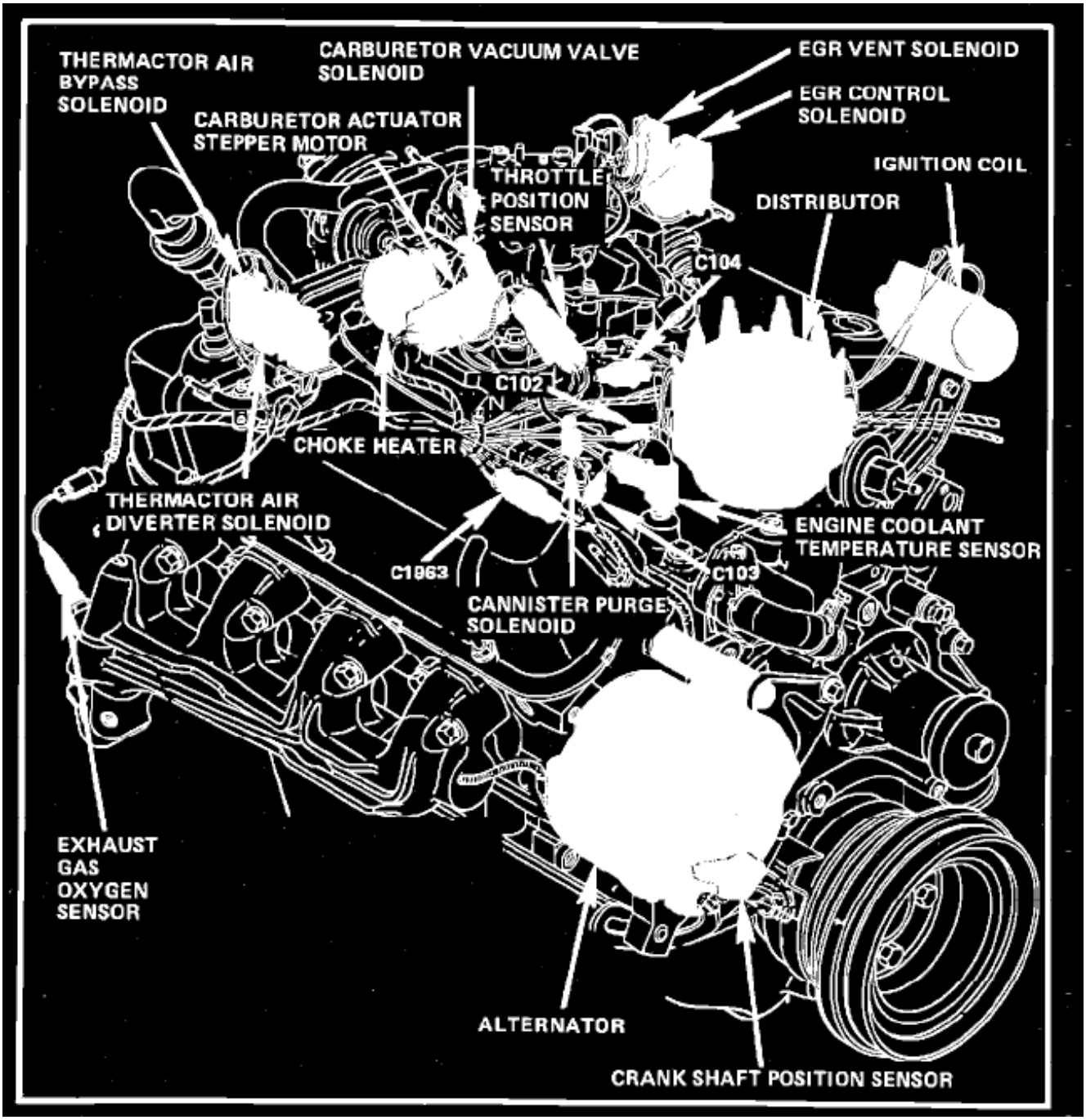
Applicable to: 1984-85 V8-460/7.5L Engine



LH Side Of Engine.

At Distributor

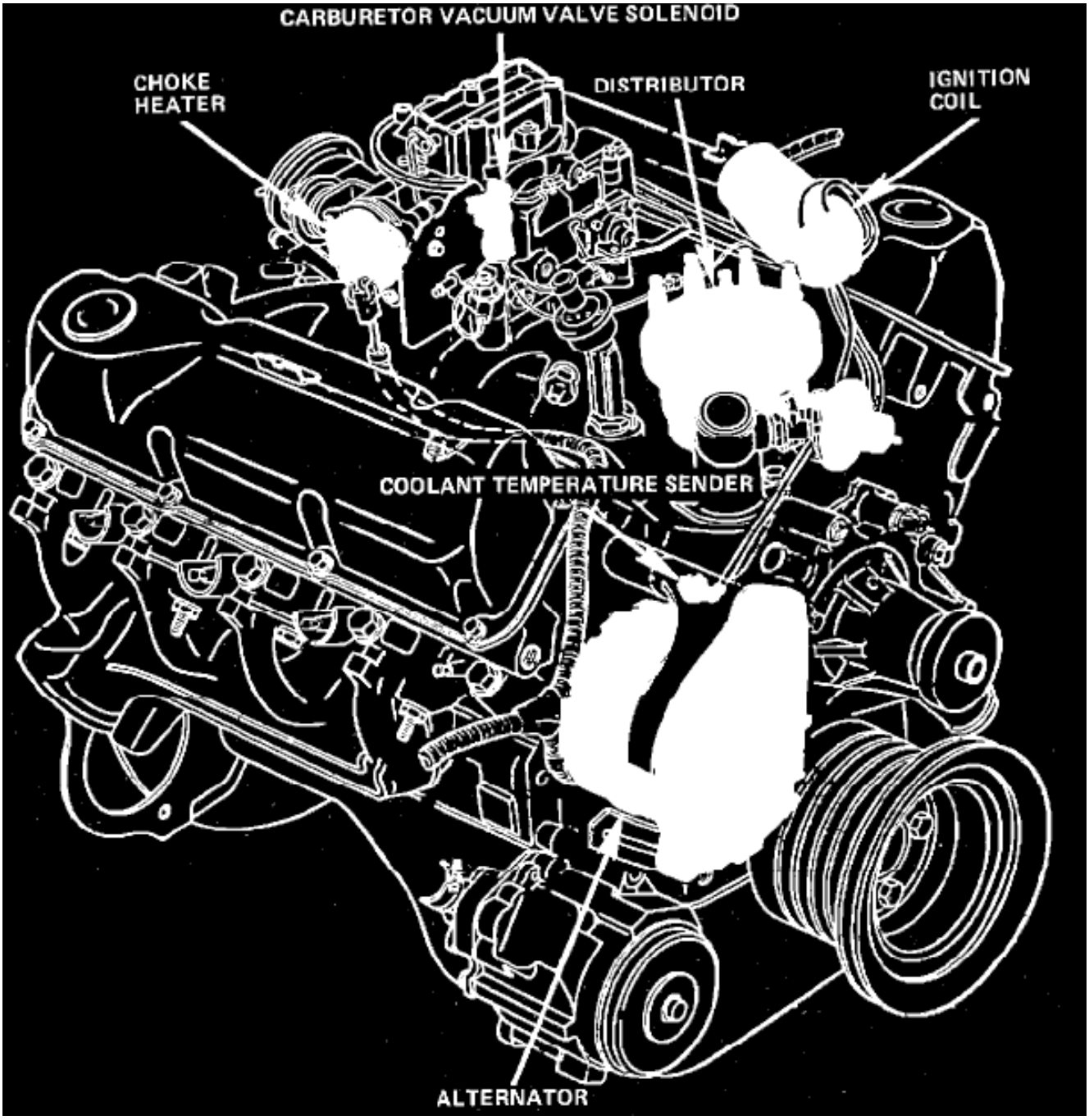
Applicable to: 1981 6-300/4.9L Engine w/MCU



RH Side Of Engine.

At Distributor

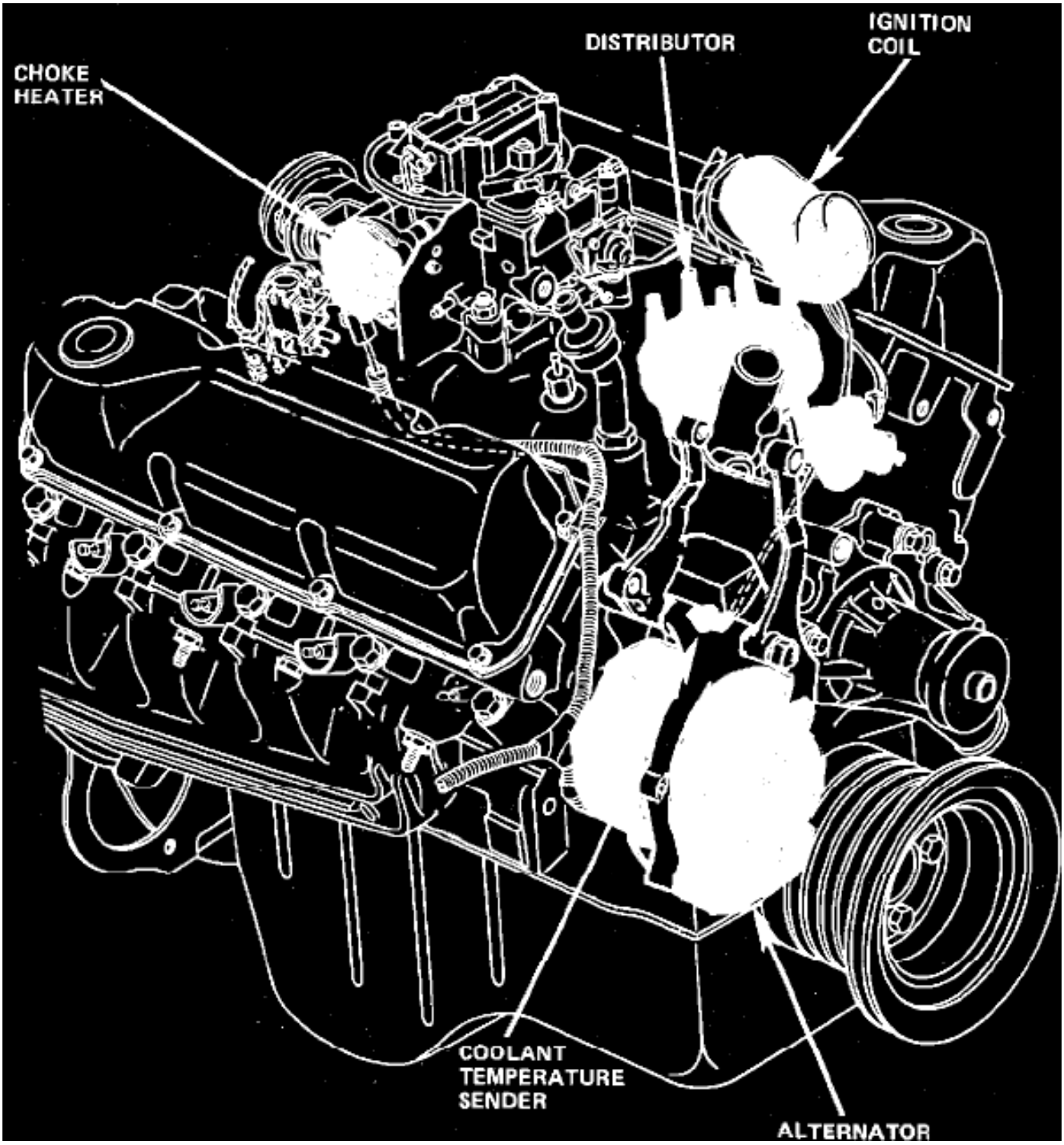
Applicable to: 1981 V8-302/5.0L & V8-351/5.8L Engines w/EEC



RH Side Of Engine.

At Distributor

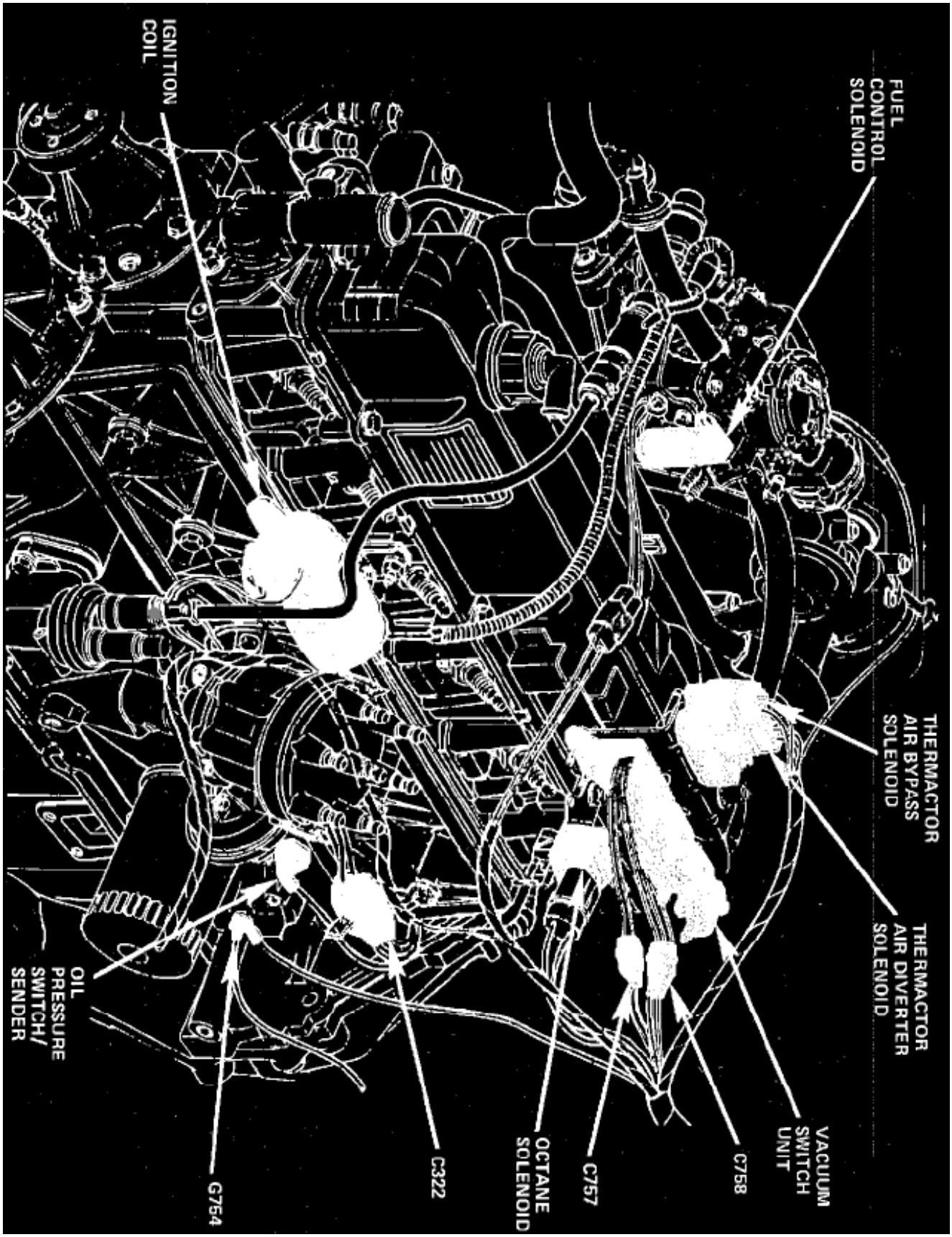
Applicable to: 1981 V8-351M/5.8L & V8-400/6.6L Engines



RH Side Of Engine.

At Distributor

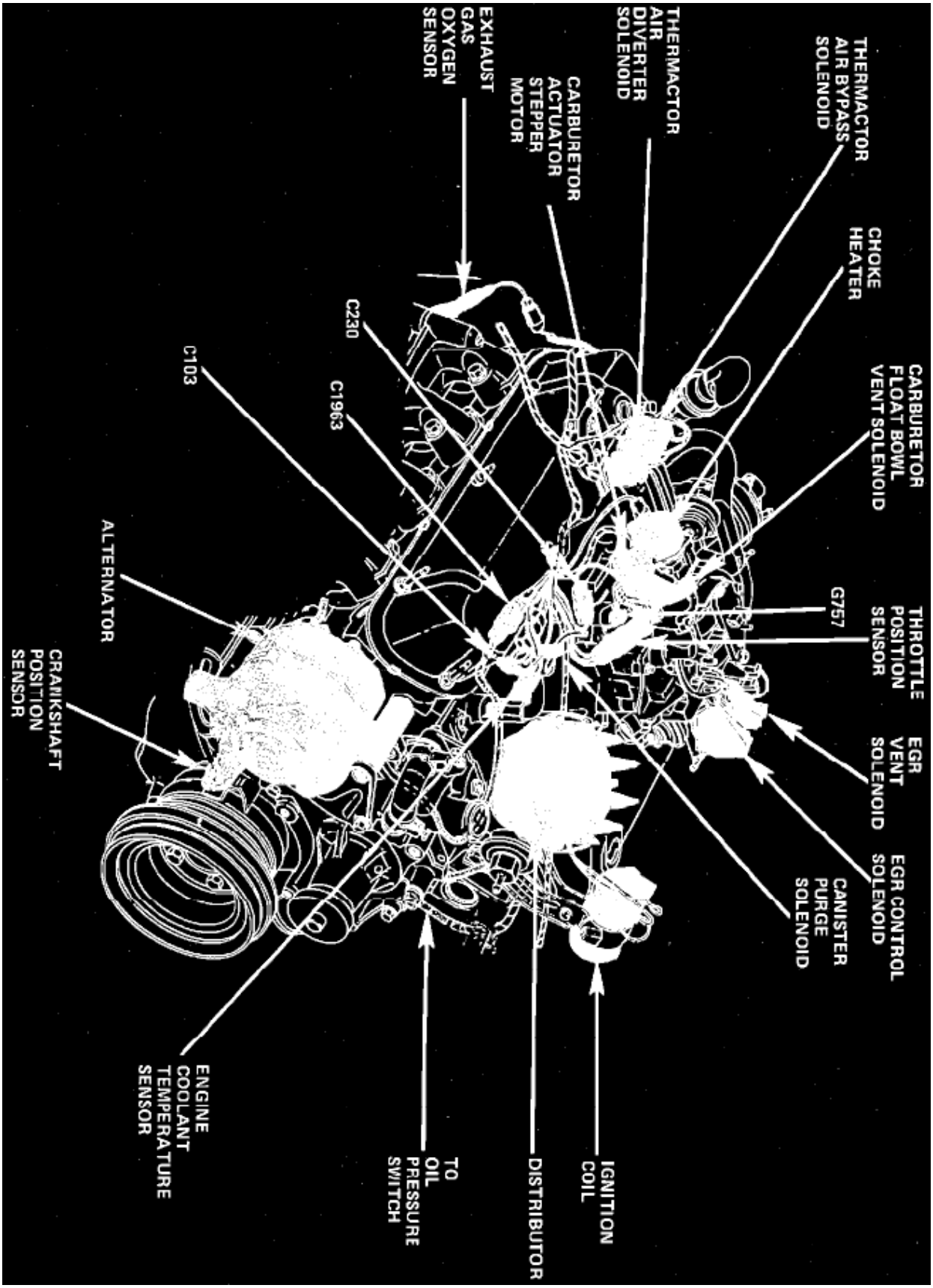
Applicable to: 1982 V8-351M/5.8L & V8-400/6.6L Engines


FUEL CONTROL SOLENOID
IGNITION COIL
THERMACTOR AIR BYPASS SOLENOID
THERMACTOR AIR DIVERTER SOLENOID
VACUUM SWITCH UNIT
C758
C757
OCTANE SOLENOID
C322
G754
OIL PRESSURE SWITCH/ SENDER

LH Side Of Engine.

At Distributor

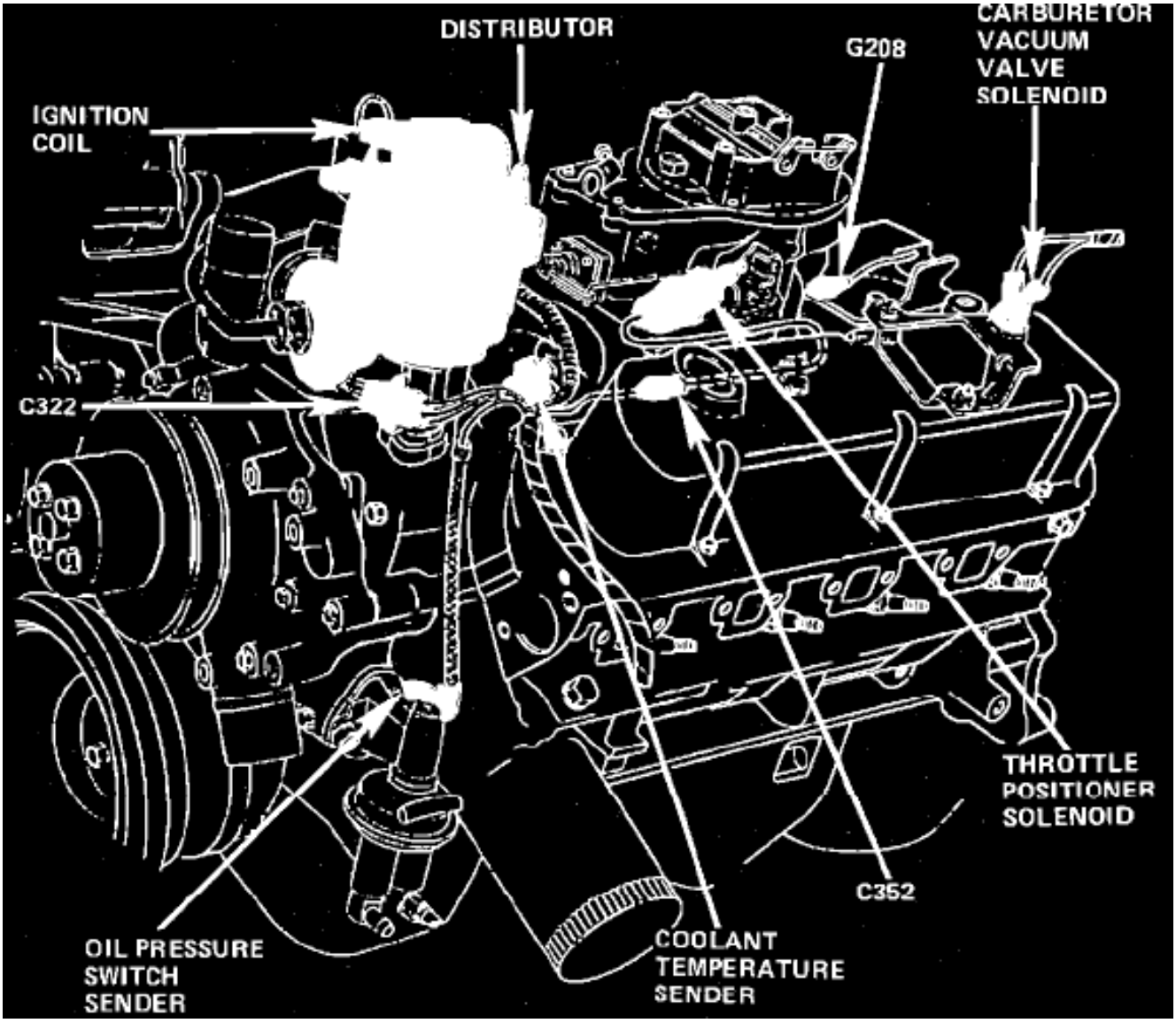
Applicable to: 1982-83 6-300/4.9L Engine w/MCU


THERMACTOR AIR BYPASS SOLENOID
CHOKE HEATER
CARBURETOR FLOAT BOWL VENT SOLENOID
THERMACTOR AIR DIVERTER SOLENOID
CARBURETOR ACTUATOR STEPPER MOTOR
EXHAUST GAS OXYGEN SENSOR
C230
C1963
C103
G757
THROTTLE POSITION SENSOR
EGR VENT SOLENOID
EGR CONTROL SOLENOID
CANISTER PURGE SOLENOID
ALTERNATOR
CRANKSHAFT POSITION SENSOR
ENGINE COOLANT TEMPERATURE SENSOR
TO OIL PRESSURE SWITCH
DISTRIBUTOR
IGNITION COIL

Top RH Side Of Engine.

At Distributor

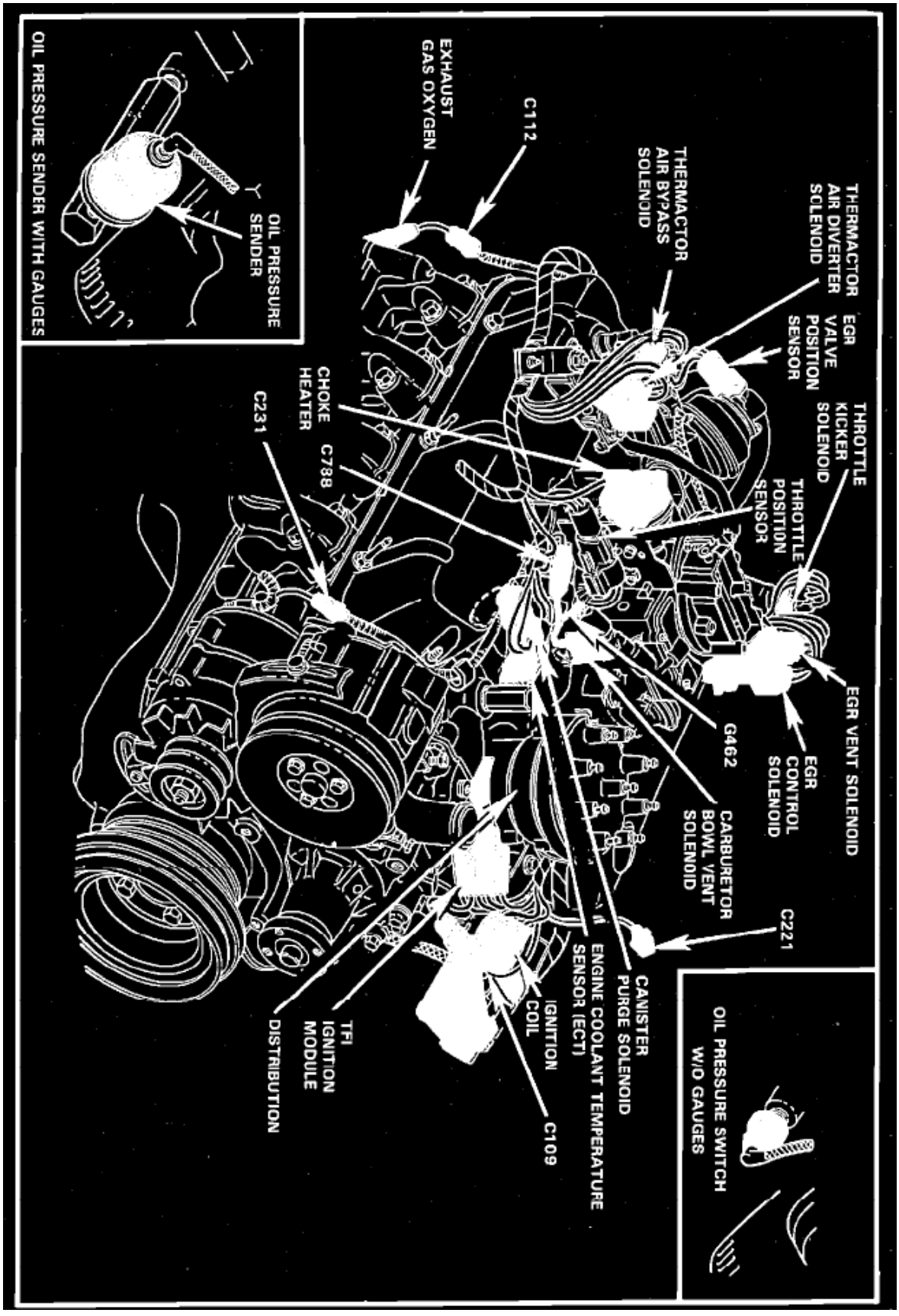
Applicable to: 1982-83 V8-302/5.0L & V8-351/5.8L Engines w/EEC



LH Side Of Engine.

At Distributor

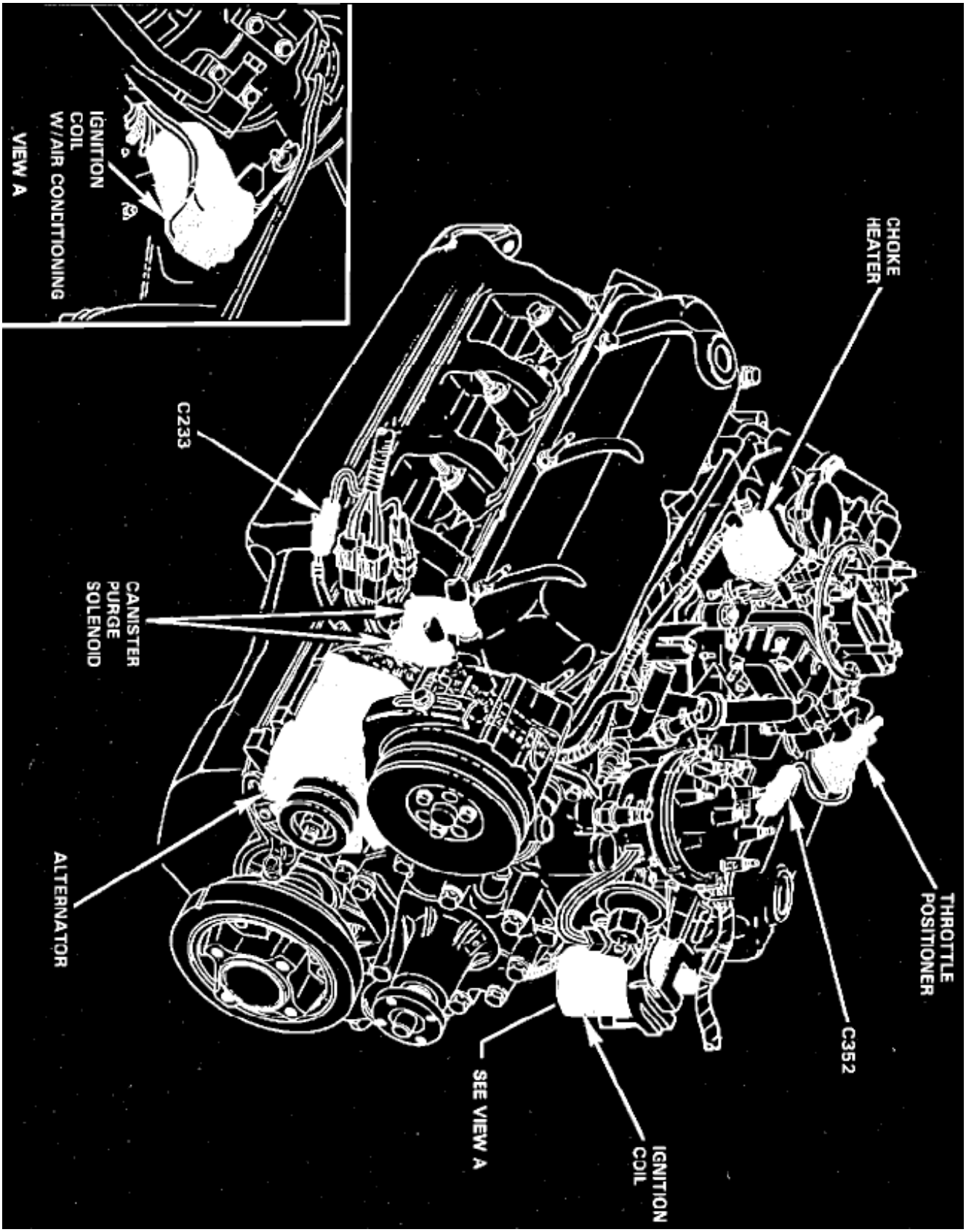
Applicable to: 1982-83 V8-255/4.2L & V8-302/5.0L Engines


THERMACTOR AIR DIVERTER SOLENOID
EGR VALVE POSITION SENSOR
THROTTLE KICKER SOLENOID
THERMACTOR AIR BYPASS SOLENOID
THROTTLE POSITION SENSOR
EXHAUST GAS OXYGEN
C112
CHOKE HEATER
C231
C188
EGR VENT SOLENOID
EGR CONTROL SOLENOID
G462
CARBURETOR BOWL VENT SOLENOID
C221
CANISTER PURGE SOLENOID
ENGINE COOLANT TEMPERATURE SENSOR (ECT)
IGNITION COIL
C109
TFI IGNITION MODULE
DISTRIBUTION
OIL PRESSURE SENDER
OIL PRESSURE SENDER WITH GAUGES
OIL PRESSURE SWITCH W/O GAUGES

RH Side Of Engine. 5.0 5.8

At Distributor

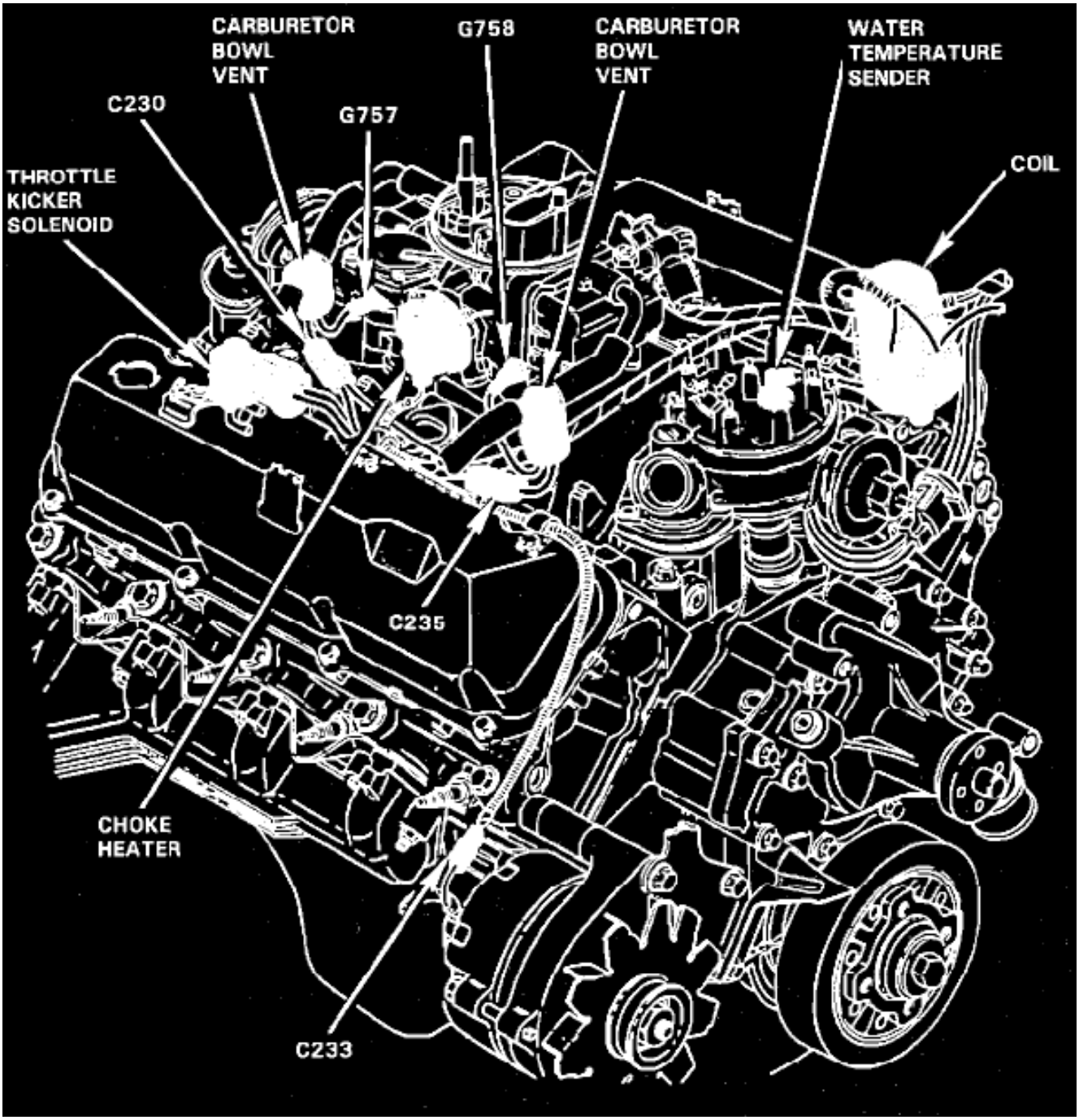
Applicable to: 1984-85 V8-351/5.8L & Carbureted V8-302/5.0L Engines w/EEC-IV (Under 8500 Lbs. GVW)


IGNITION COIL W/AIR CONDITIONING
VIEW A
CHOKE HEATER
C233
CANISTER PURGE SOLENOID
ALTERNATOR
SEE VIEW A
IGNITION COIL
C352
THROTTLE POSITIONER

RH Side Of Engine.

At Distributor

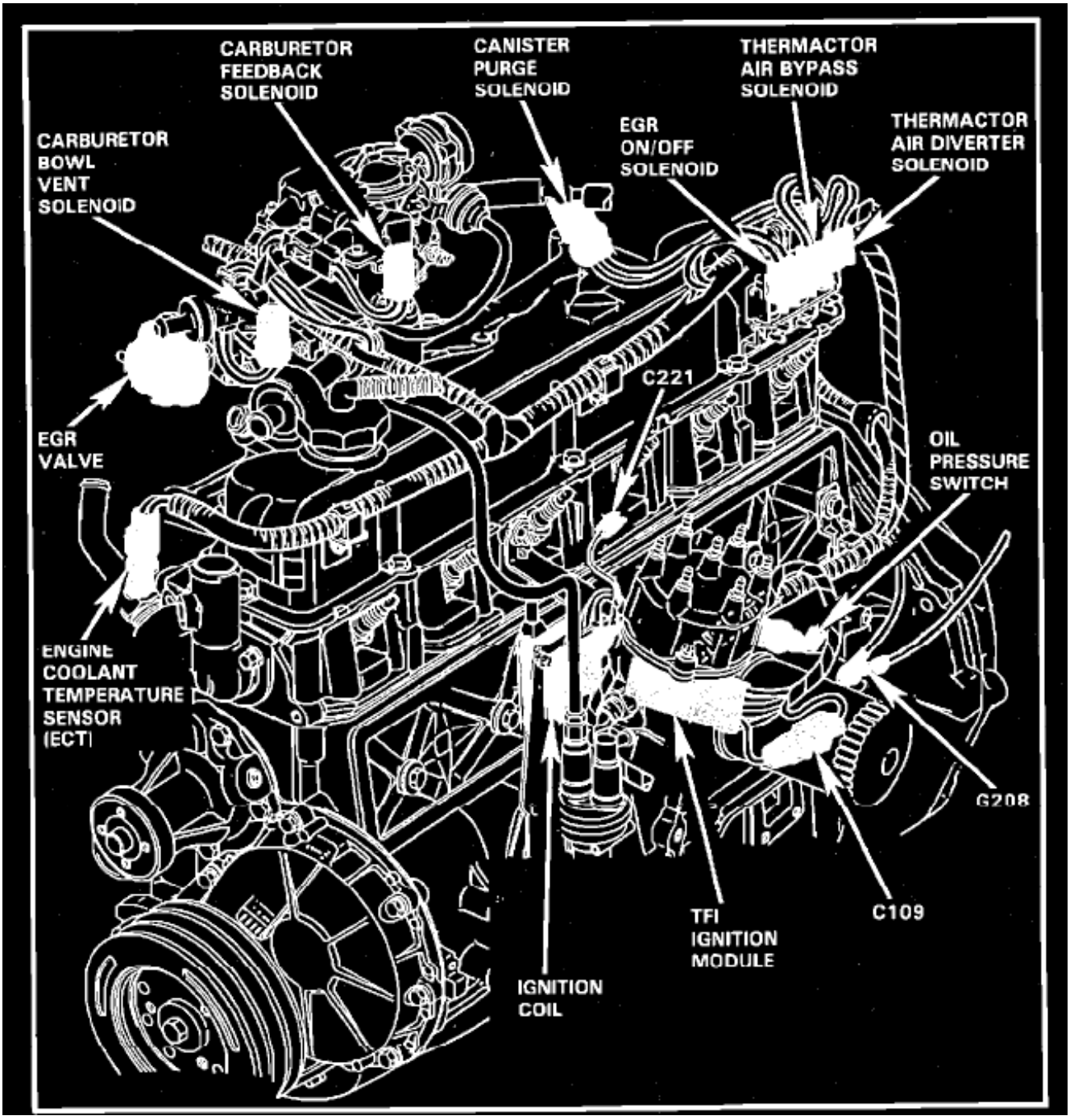
Applicable to: 1985 V8-351/5.8L Engine w/4 Barrel Carb. Except Calif.



RH Side Of Engine.

At Distributor

Applicable to: 1985 V8-460/7.5L Engine w/Manual Trans.



LH Side Of Engine.

At Distributor

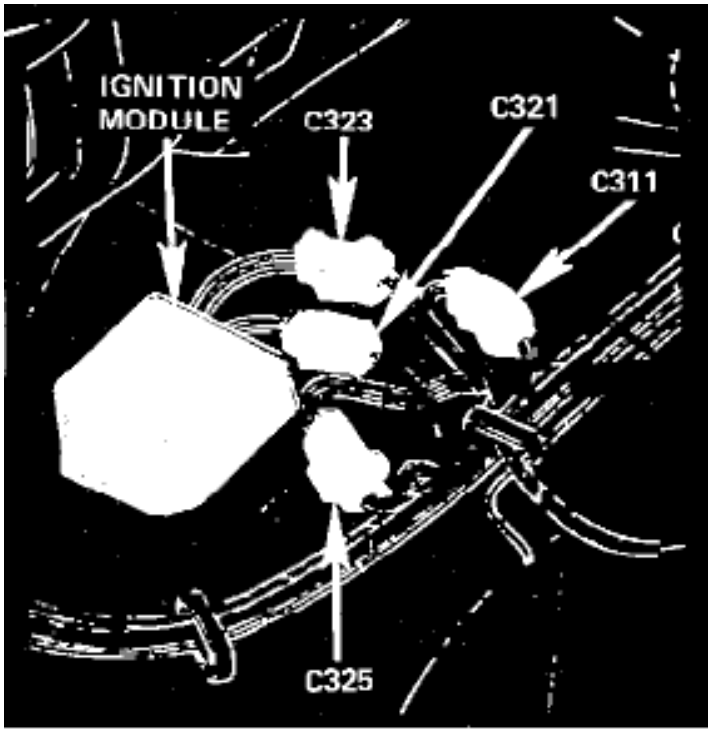
Applicable to: 1985 6-300/4.9L Engine w/EEC IV (Under 8500 Lbs. GVW)

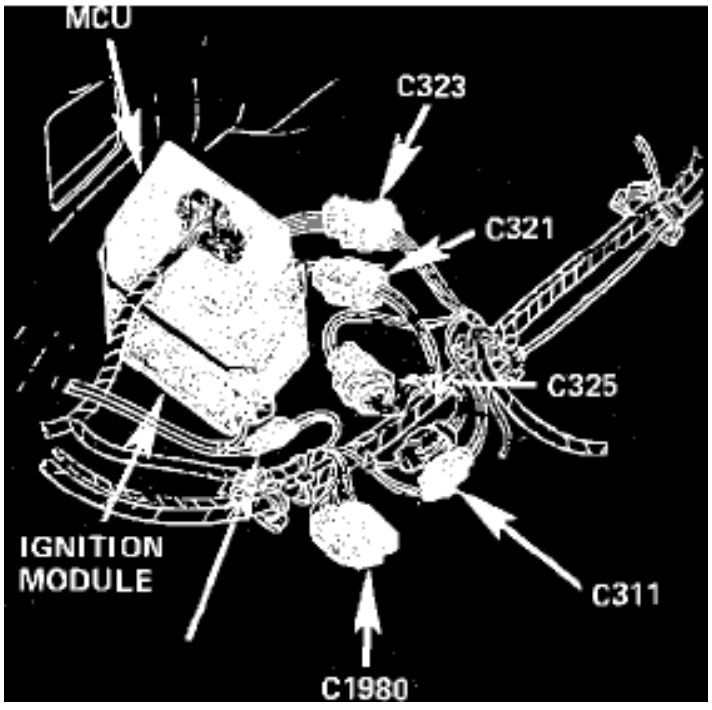
Ignition Coil: Testing and Inspection

1. Disconnect ignition coil electrical connector.

2. Using a suitable ohmmeter, measure resistance between coil Batt. terminal and Tach terminal.

3. If reading obtained is 0.8---1.6 ohms, coil is satisfactory. If not, replace coil.


IGNITION
MODULE
C323
C321
C311
C325


MCU
C323
C321
C325
IGNITION
MODULE
C311
C1980

Ignition Control Module: Locations

LH Inner Fender Well.

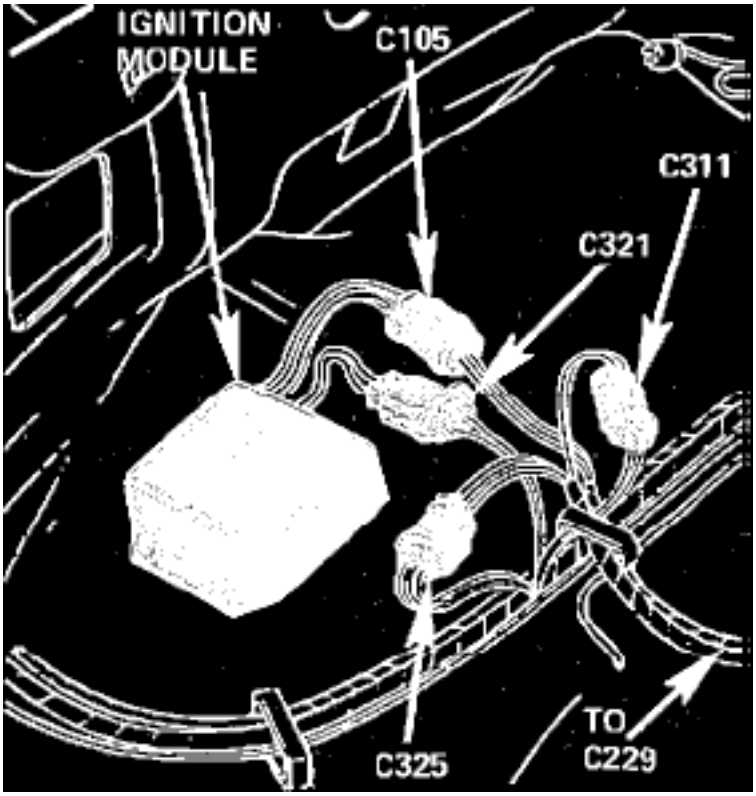
LH Inner Fender Well

Applicable to: 1981-83

LH Inner Fender Well.

LH Inner Fender Well

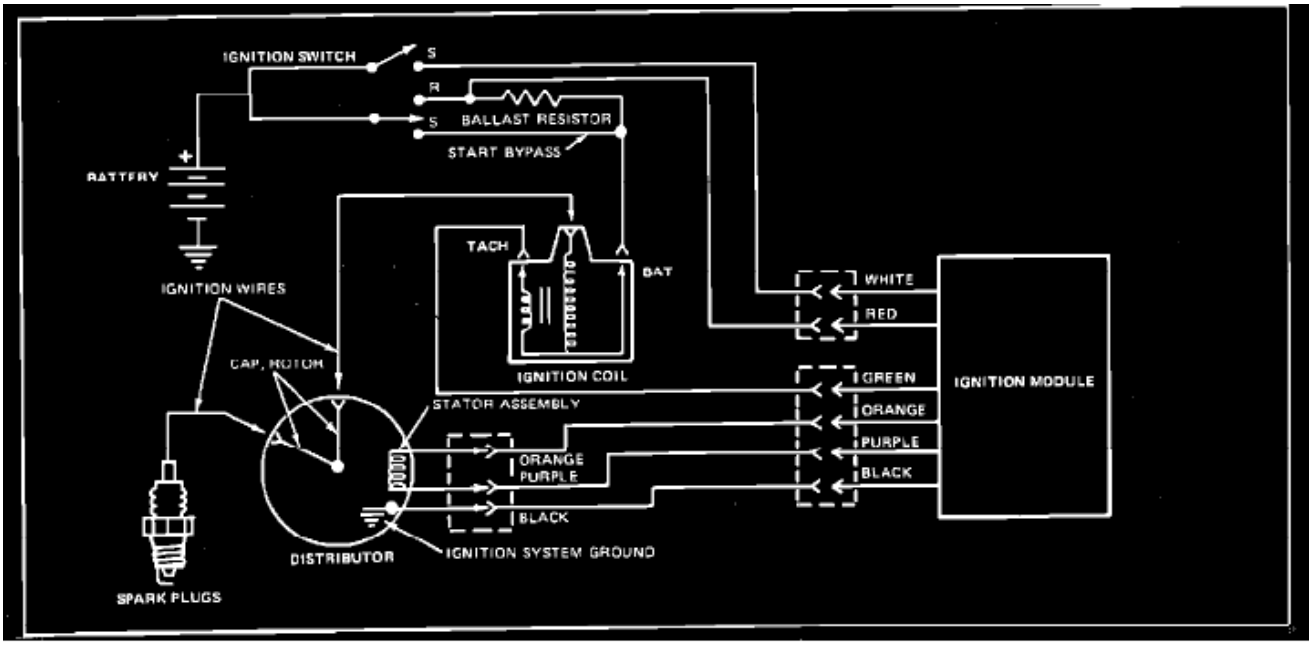
Applicable to: 1981-83 w/MCU

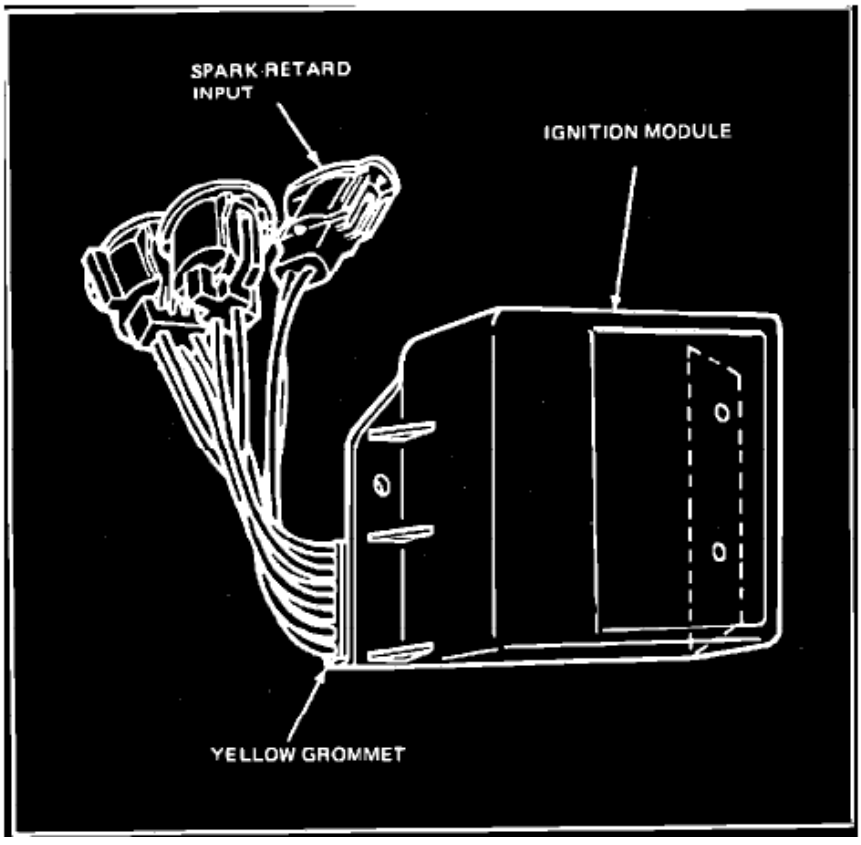


LH Inner Fender Well.

LH Inner Fender Well

Applicable to: 1981-83 w/EEC


IGNITION SWITCH
S
R
S
BALLAST RESISTOR
START BYPASS
BATTERY
+
IGNITION WIRES
TACH
BAT
IGNITION COIL
WHITE
RED
GREEN
ORANGE
PURPLE
BLACK
IGNITION MODULE
CAP, ROTOR
STATOR ASSEMBLY
ORANGE
PURPLE
BLACK
DISTRIBUTOR
IGNITION SYSTEM GROUND
SPARK PLUGS


SPARK RETARD INPUT
IGNITION MODULE
YELLOW GROMMET

Ignition Control Module: Description and Operation

Typical Ignition System

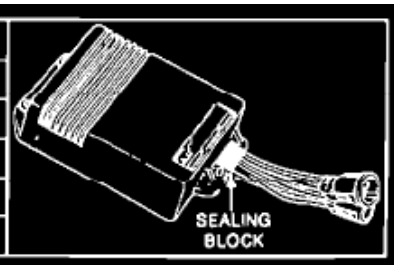
The Ignition Module shuts off the primary circuit each time it receives a pulse from the magnetic pick-up Fig. 9. A timing circuit in the ignition module turns the primary current back on after a short period of time. High voltage is created each time the magnetic field is built up and collapsed. The red ignition module wire provides operating voltage for the module's electronic components in the Run mode. The white module wire and start bypass provide increased voltage for the module and coil during Start mode.

Ignition Modules

Dura Spark II systems with UIM (Universal Ignition Module) Fig. 10 can respond to another control signal from either an Ignition Barometric Pressure Switch, Ignition Timing Vacuum Switch, or the Microprocessor Control Unit (MCU), depending on the engine calibration. Responding to this second signal, the UIM provides additional spark timing control for certain operating conditions by shutting off the ignition coil current flow at a different time than with just the distributor pick-up signal.

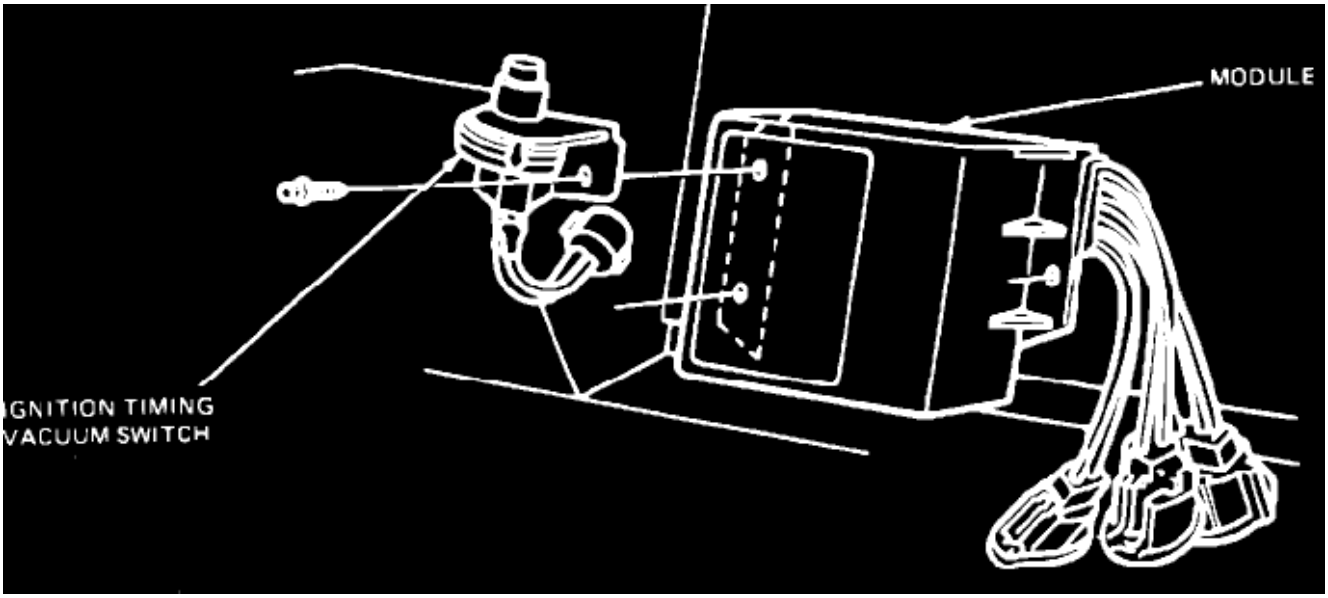
COLOR OF SEALING BLOCK*	TYPE OF IGNITION SYSTEM
Blue	Duraspark II
White	Duraspark II (Cranking Retard)
Yellow	Universal Ignition Module
Brown	Duraspark III (EEC-III System)
Blue (Module)	Thick-Film Ignition (TFI) Module

*Or Grommet.



Module Identification Chart

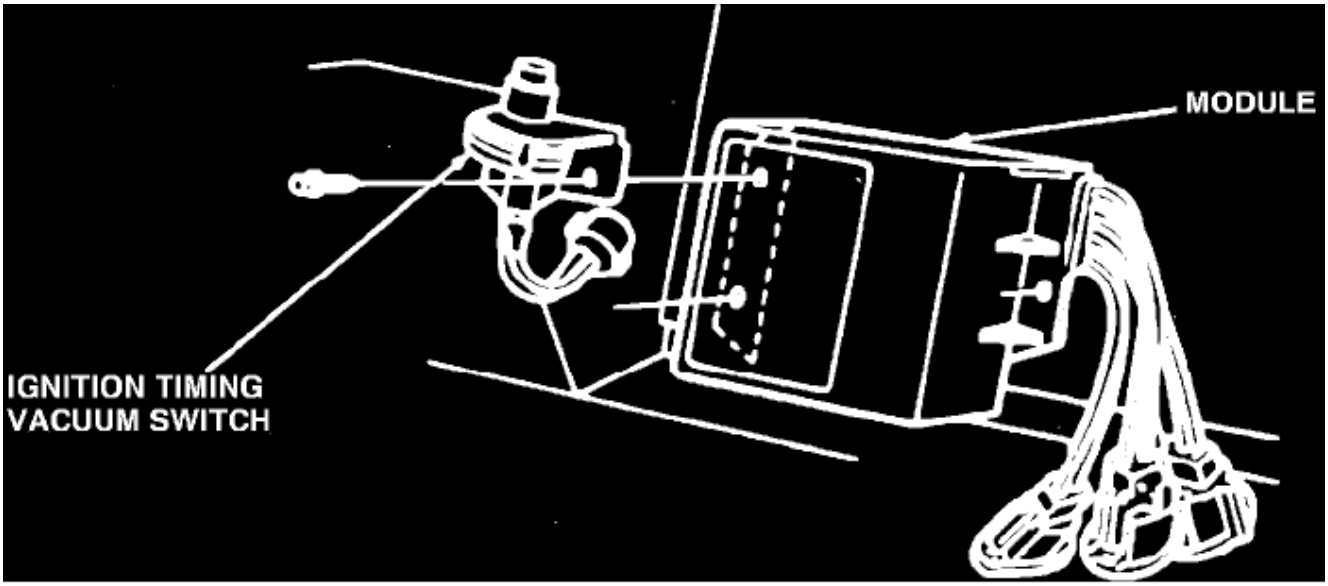
For proper ignition module identification refer to Fig. 1. The modules are not interchangeable, Dura Spark II has 6 wire connector while Dura Spark III has a 5 wire connector.



Ignition Timing Connector: Description and Operation

Fig. 20 Ignition Timing Vacuum Switch

Below vacuum setting, this switch, Fig. 20, used on some vehicles, is open and signals the ignition module to retard spark timing. The switch is closed above the vacuum setting and the ignition module is in the non-retard spark timing mode. Calibration resistors inside the switch control the amount of retard.



Part Number	Vacuum Setting ± 1.7 kPa (Inches Hg ± 0.5 In.)	Resistance Value (Ohms)
E1AE-12A265-BA	Less than 11.8 (3.5)	3,200 - 3,350
	Greater than 11.8 (3.5)	2,150 - 2,250
E1SE-12A265-BA	Less than 30 (9)	3,250 - 3,370
	Greater than 30 (9)	2,150 - 2,250
E1TE-12A265-CA	Less than 10 (3)	2,800 - 2,870
	Greater than 10 (3)	2,150 - 2,250
E25E-12A265-AA	Less than 13.5 (4)	2,800 - 2,870
	Greater than 13.5 (4)	2,150 - 2,250

Ignition Timing Connector: Testing and Inspection

Ignition Timing Vacuum Switch

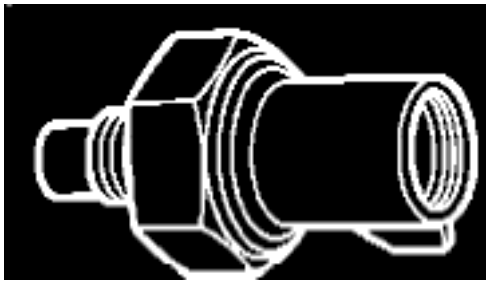
Ignition Timing Vacuum Switch Test Chart

1. Disconnect switch from ignition module.

2. Connect suitable ohmmeter across switch terminals and compare resistance measured to ``less than'' values in the Ignition Timing vacuum Switch Test chart.

3. Apply vacuum to switch, using an outside vacuum source. Compare resistance now measured across switch terminals to ``greater than'' values in the Ignition Timing vacuum Switch Test chart.

4. Replace switch if resistance is not within specifications.

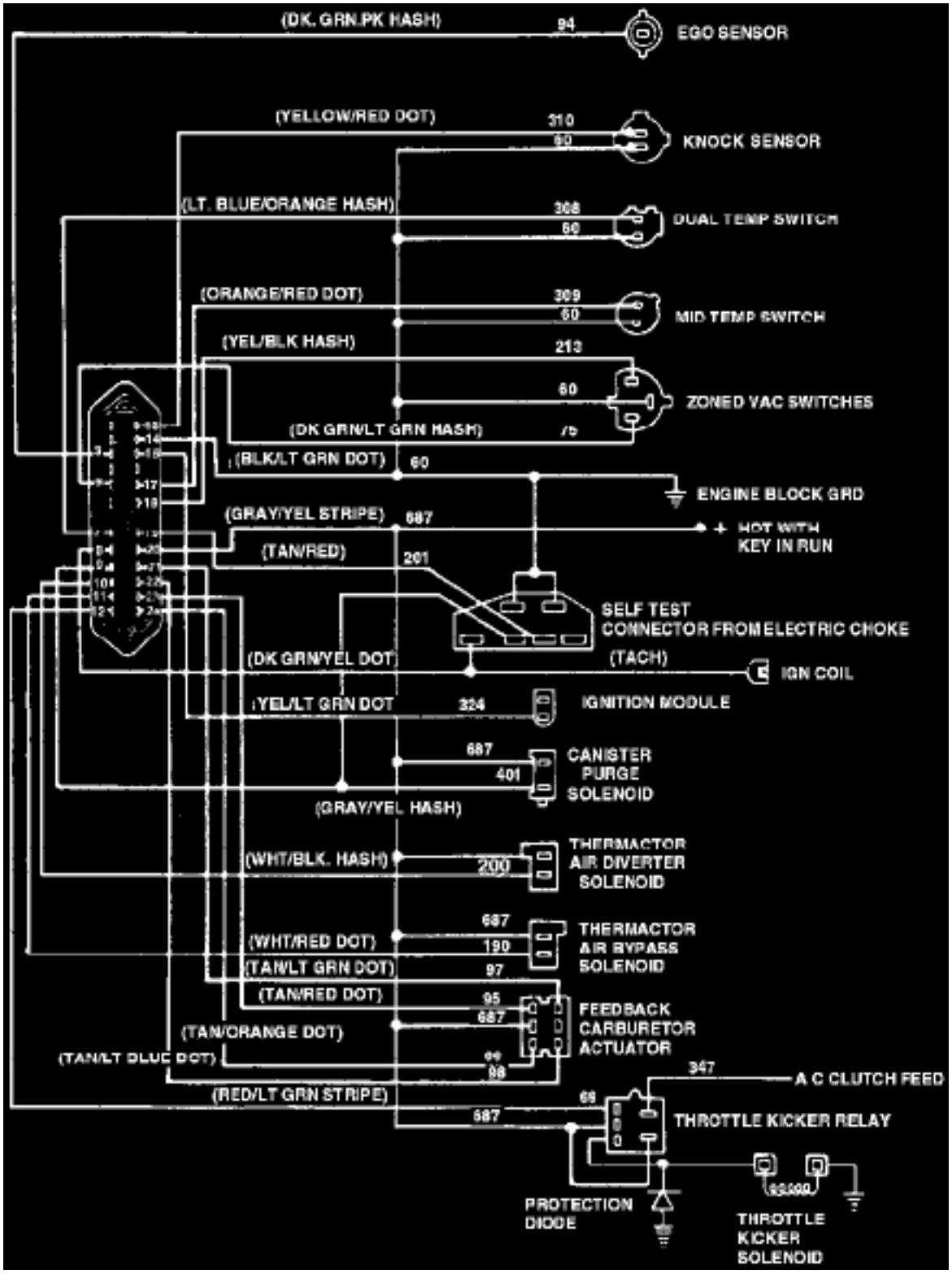


Knock Sensor: Description and Operation

Knock Sensor

The knock sensor, Fig. 11, is a piezo-electric accelerator accelerometer with the sensor designed to resonate at approximately the same frequency as the engine knock frequency.. The sensor uses the resonant frequency to mechanically amplify the engine knock frequency (5-6 KHz).

This method allows relatively large signals to be achieved without electrical amplification. The sensor has a thin circular piezoelectric ceramic disk which is bonded to a metal diaphragm. Electrical connections are made through a two-pin integral connector.



Knock Sensor: Testing and Inspection Component Testing

Fig.8 - MCU System Wiring Circuit

1. Make sure that the following three steps are properly conducted in order to simulate spark knock conditions and determine that spark detection

system is inoperative. If not, repeat test to verify problem. a. Make sure that engine is at normal operating temperature. Run engine at 2000 rpm for 2 minutes, then turn key off. Immediately restart engine

and allow to idle.

b. Observe voltmeter and vacuum gauge for initialization pulses after restarting the engine. The throttle kicker will also extend (increase engine

speed) and remain on throughout the test.

c. On vehicles with spark knock sensor, when initial pulses occur, immediately simulate spark knock by placing a 3/8 inch extension on manifold

near base of knock sensor. Tap end of extension with a small hammer for about 15 seconds.

2. Disconnect jumper wire from self-test trigger input circuit 201. 3. With ignition key off, disconnect vehicle harness from spark knock sensor. 4. Using a torque wrench and a 1 1/8 inch deep socket, make sure that spark sensor is torqued to 12-18 ft. lbs. If sensor is properly torqued, proceed

to next step. If not, torque to specifications.

5. Disconnect vehicle harness from MCU and spark sensor. Connect one lead of an ohmmeter to circuit 310 of vehicle harness and other lead to

engine block, Fig. 8. If resistance is 1000 ohms or more, proceed to next step. If resistance is less than 1000 ohms, repair short to ground in circuit 301.

6. With key off and knock sensor harness disconnected, check circuit 310 of vehicle harness for continuity. If resistance is 10 ohms or less, continue

to next step. If resistance is greater than 10 ohms, repair circuit 310.

7. Check circuit 60 of vehicle harness for continuity between knock sensor and MCU, Fig. 8. If resistance is 10 ohms or less, reconnect harness

connector to MCU and proceed to next step. If resistance is greater than 10 ohms, service circuit 60.

8. Reconnect jumper wire to circuits 201 and 60 of VIP connector, Fig. 8. 9. Connect a test lamp to positive terminal of battery, then disconnect knock sensor from vehicle harness.

10. Perform "Engine Running Functional Test" procedure. When the four initialization pulses occur, continuously tap circuit 310 of the vehicle

harness connector, which mates to the knock sensor connector, with the probe end for 5 seconds while observing voltmeter pulses. If a code 25 is

observed, replace MCU. If any other code is observed, replace spark knock sensor.

SPARK KNOCK, ONLY AT WIDE OPEN THROTTLE AND/OR POOR PERFORMANCE/MILEAGE

1. If engine has a spark knock sensor, disconnect it. 2. Make sure that ignition timing is within specifications. 3. With engine running at normal operating temperature, disconnect the two wire ignition module connector (yellow wire is circuit 324 and

black/white wire is circuit 69) from vehicle harness. Using a jumper wire, jump the wires together at the ignition module and note ignition timing. Remove jumper wire and note ignition timing. If timing retards 16-20 degrees, reconnect ignition module and proceed to next step. If timing does not retard 16-20 degrees, replace ignition module and repeat steps 1, 2 and 3.

4. With engine at normal operating temperature, set high cam on lowest step that will maintain engine speed greater than 1200 rpm. Note ignition

timing, then disconnect and plug vacuum hose from zone vacuum switch and again note timing. If timing retards more than 5 degrees, on engines with spark knock sensor, proceed to step 6, on all other engines MCU system is okay. If timing does not retard more than 5 degrees, proceed to next step.

5. With engine still at 1200 rpm, disconnect ignition module (connector with yellow and black/white wires). If timing retards, check circuit 324 for

short to ground. If circuit is okay, replace MCU unit and retest. If timing does not retard, check circuit 324 for open circuit. If circuit is okay, Replace MCU unit and retest.

6. On engines with spark knock sensor, reconnect sensor. Repeat Engine Running Functional Test, but do not simulate knock by taping sensor. If

service code 25 appears, MCU system is okay, testing is completed. If any other service code appears, replace knock sensor and retest.

Engine	Year	Resistance (ohms)	Air Gap (in./mm)
Ex. EEC	1981-88	400-1000*	.017 min./.43 min.

* With 250 watt heat lamp held 1½ inches from coil for 5 minutes.

DISTRIBUTOR PICKUP

Engine	Year	Resistance (ohms)	Air Gap (in./mm)
Ex. EEC	1981-88	400-1000*	.017 min./.43 min.
* With 250 watt heat lamp held 1 1/2 inches from coil for 5 minutes.			

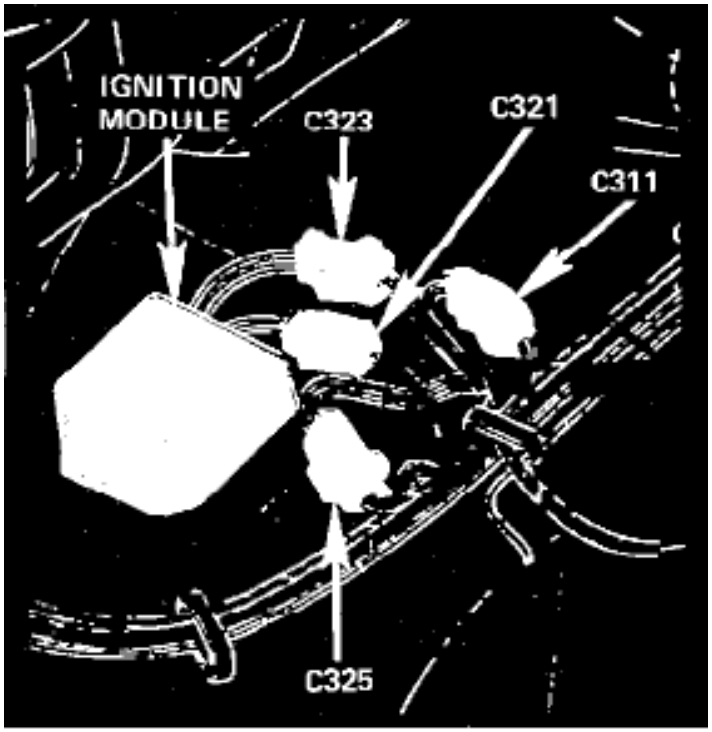
DISTRIBUTOR PICKUP

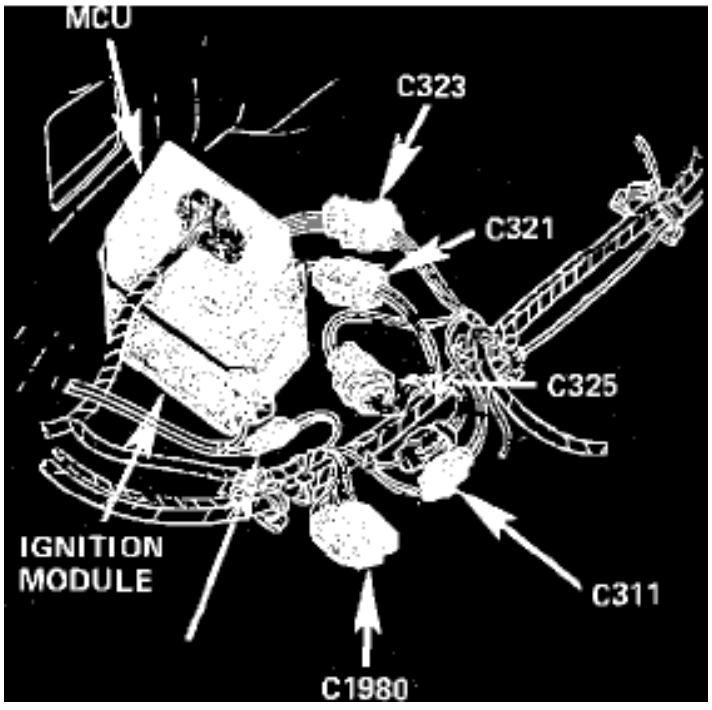
Pick-Up Coil: Testing and Inspection

Procedure

1. Disconnect distributor electrical connector. Inspect connections for dirt or corrosion. 2. Using a suitable ohmmeter, measure resistance across orange and purple wires in distributor connector. 3. If readings obtained are within 400---1000 ohms, circuit is satisfactory. If readings are less than 400 or more than 1000 ohms, replace stator

assembly.


IGNITION
MODULE
C323
C321
C311
C325


MCU
C323
C321
C325
IGNITION
MODULE
C311
C1980

Ignition Control Module: Locations

LH Inner Fender Well.

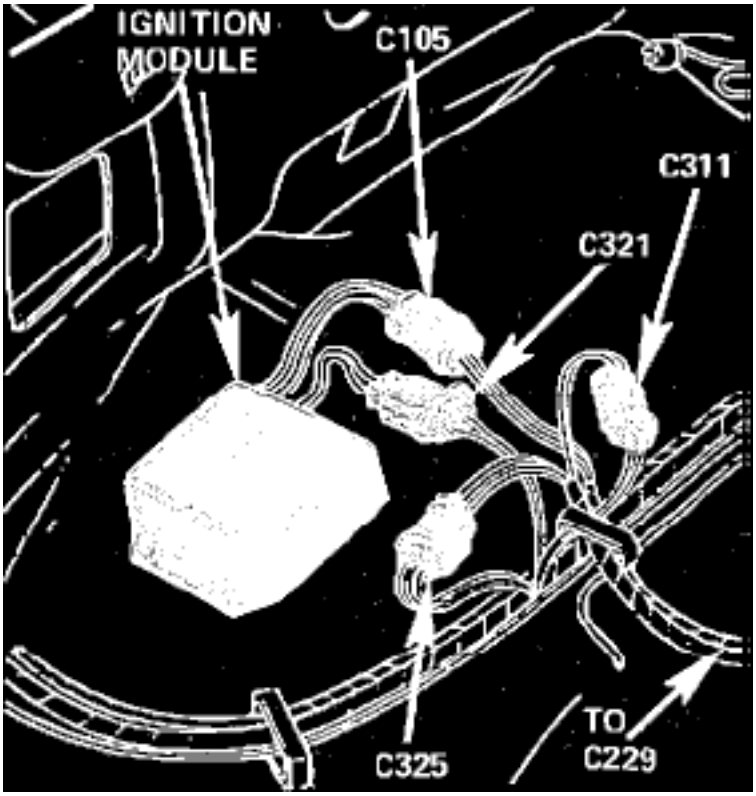
LH Inner Fender Well

Applicable to: 1981-83

LH Inner Fender Well.

LH Inner Fender Well

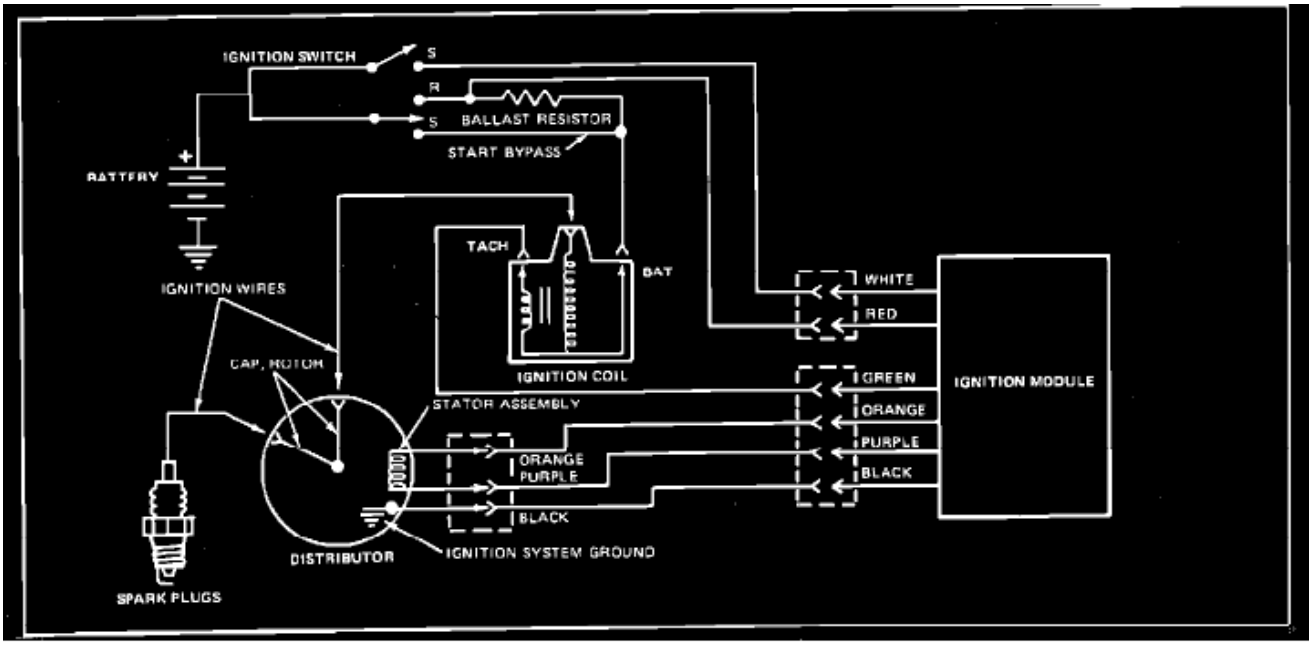
Applicable to: 1981-83 w/MCU

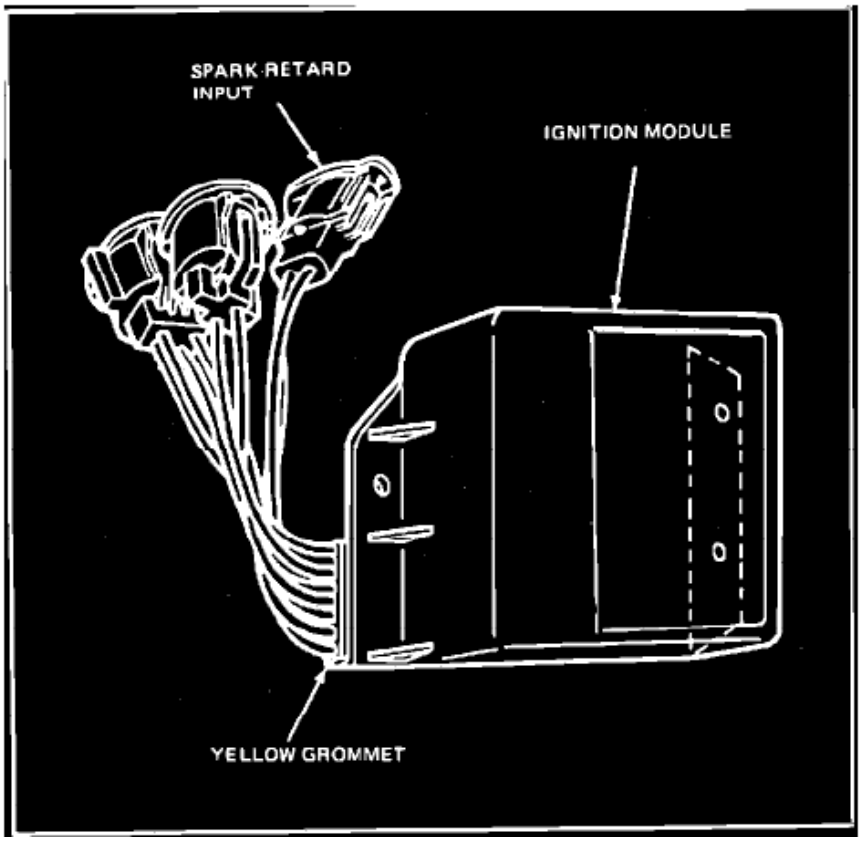


LH Inner Fender Well.

LH Inner Fender Well

Applicable to: 1981-83 w/EEC


IGNITION SWITCH
S
R
S
BALLAST RESISTOR
START BYPASS
BATTERY
+
IGNITION WIRES
TACH
BAT
IGNITION COIL
WHITE
RED
GREEN
ORANGE
PURPLE
BLACK
IGNITION MODULE
CAP, ROTOR
STATOR ASSEMBLY
ORANGE
PURPLE
BLACK
DISTRIBUTOR
IGNITION SYSTEM GROUND
SPARK PLUGS


SPARK RETARD INPUT
IGNITION MODULE
YELLOW GROMMET

Ignition Control Module: Description and Operation

Typical Ignition System

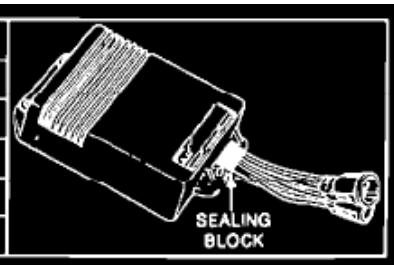
The Ignition Module shuts off the primary circuit each time it receives a pulse from the magnetic pick-up Fig. 9. A timing circuit in the ignition module turns the primary current back on after a short period of time. High voltage is created each time the magnetic field is built up and collapsed. The red ignition module wire provides operating voltage for the module's electronic components in the Run mode. The white module wire and start bypass provide increased voltage for the module and coil during Start mode.

Ignition Modules

Dura Spark II systems with UIM (Universal Ignition Module) Fig. 10 can respond to another control signal from either an Ignition Barometric Pressure Switch, Ignition Timing Vacuum Switch, or the Microprocessor Control Unit (MCU), depending on the engine calibration. Responding to this second signal, the UIM provides additional spark timing control for certain operating conditions by shutting off the ignition coil current flow at a different time than with just the distributor pick-up signal.

COLOR OF SEALING BLOCK*	TYPE OF IGNITION SYSTEM
Blue	Duraspark II
White	Duraspark II (Cranking Retard)
Yellow	Universal Ignition Module
Brown	Duraspark III (EEC-III System)
Blue (Module)	Thick-Film Ignition (TFI) Module

*Or Grommet.

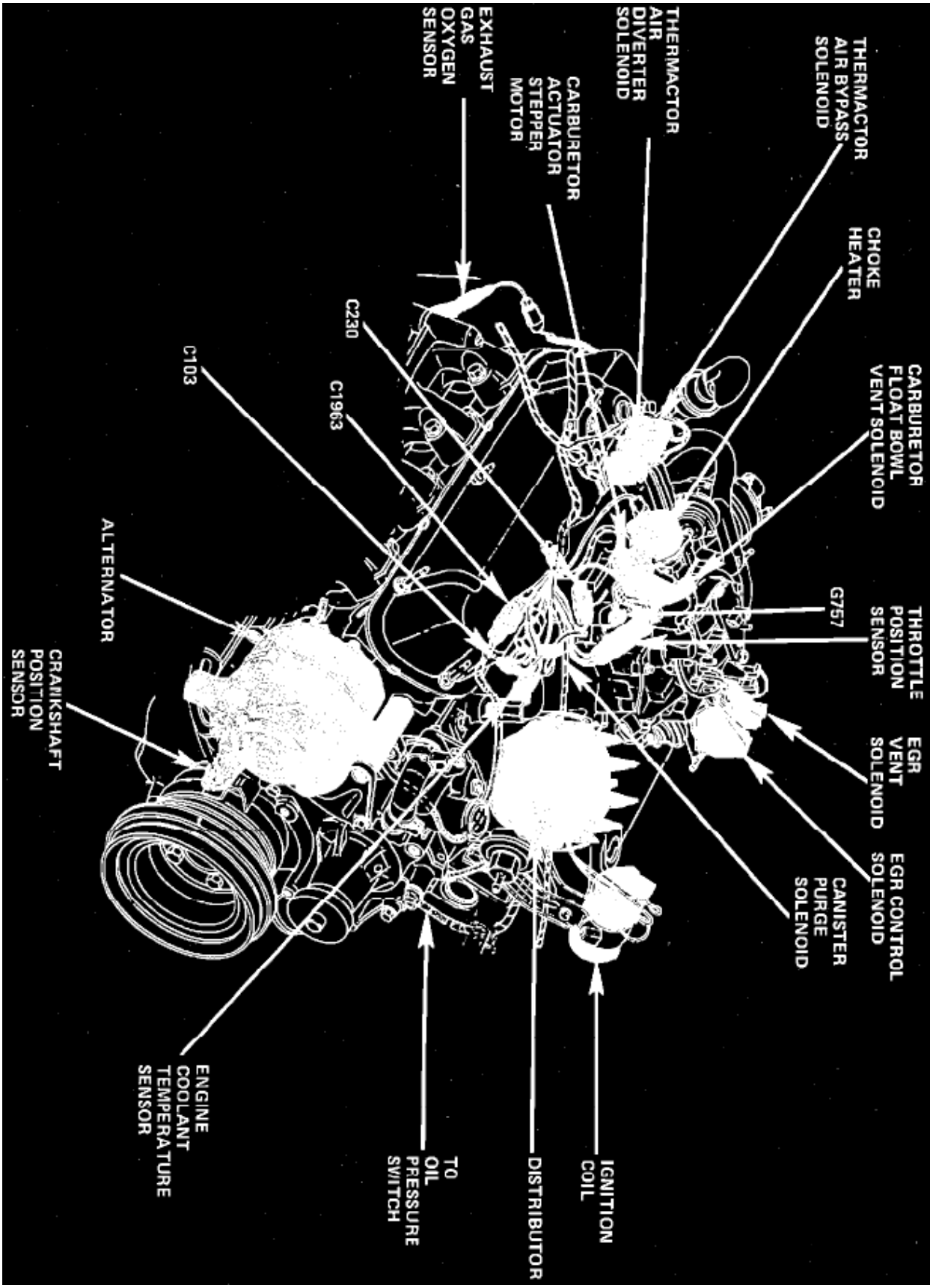


Module Identification Chart

For proper ignition module identification refer to Fig. 1. The modules are not interchangeable, Dura Spark II has 6 wire connector while Dura Spark III has a 5 wire connector.

Engine	Year	Resistance (ohms)
All w/EEC III	1981-83	100-640

CRANKSHAFT SENSOR

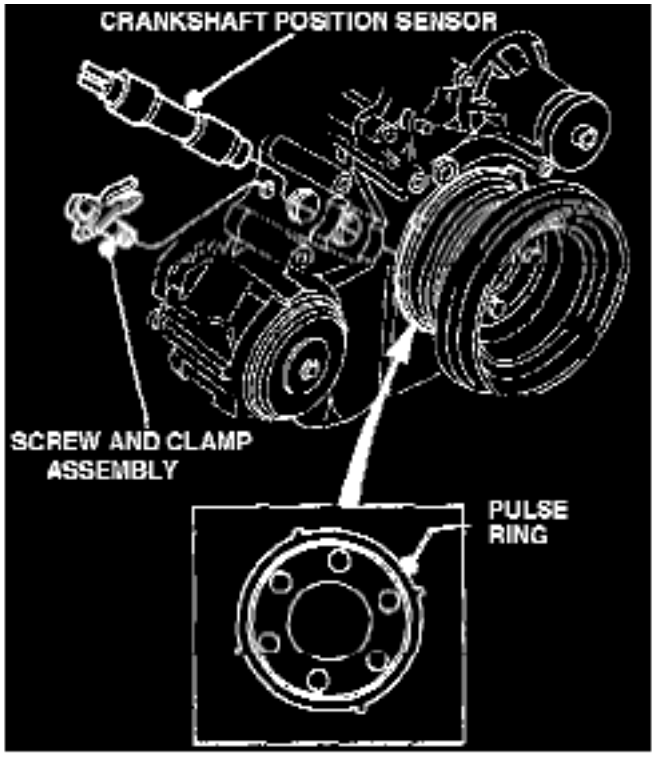

THERMACTOR AIR BYPASS SOLENOID
CHOKE HEATER
CARBURETOR FLOAT BOWL VENT SOLENOID
THERMACTOR AIR DIVERTER SOLENOID
CARBURETOR ACTUATOR STEPPER MOTOR
EXHAUST GAS OXYGEN SENSOR
C230
C1963
C103
G757
THROTTLE POSITION SENSOR
EGR VENT SOLENOID
EGR CONTROL SOLENOID
CANISTER PURGE SOLENOID
ALTERNATOR
CRANKSHAFT POSITION SENSOR
IGNITION COIL
DISTRIBUTOR
TO OIL PRESSURE SWITCH
ENGINE COOLANT TEMPERATURE SENSOR

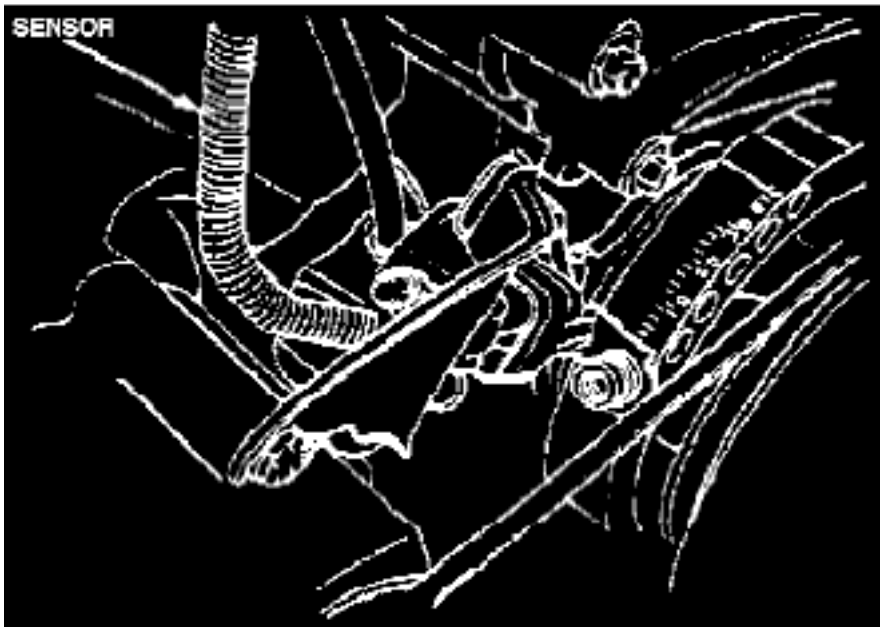
Crankshaft Position Sensor: Locations

Top RH Side Of Engine.

RH Front Of Engine

Applicable to: 1982-83 V8-302/5.0L & V8-351/5.8L Engines w/EEC





Crankshaft Position Sensor: Description and Operation

Fig.6 - Crankshaft Position Sensor

Fig.7 - Crankshaft Position Sensor

DESCRIPTION

The crankshaft vibration damper is fitted with a four-lobe "pulse ring" which provides the system with an accurate indication of when the pistons reach 10 BTDC. This indication is called the reference timing. Figs. 6 and 7.

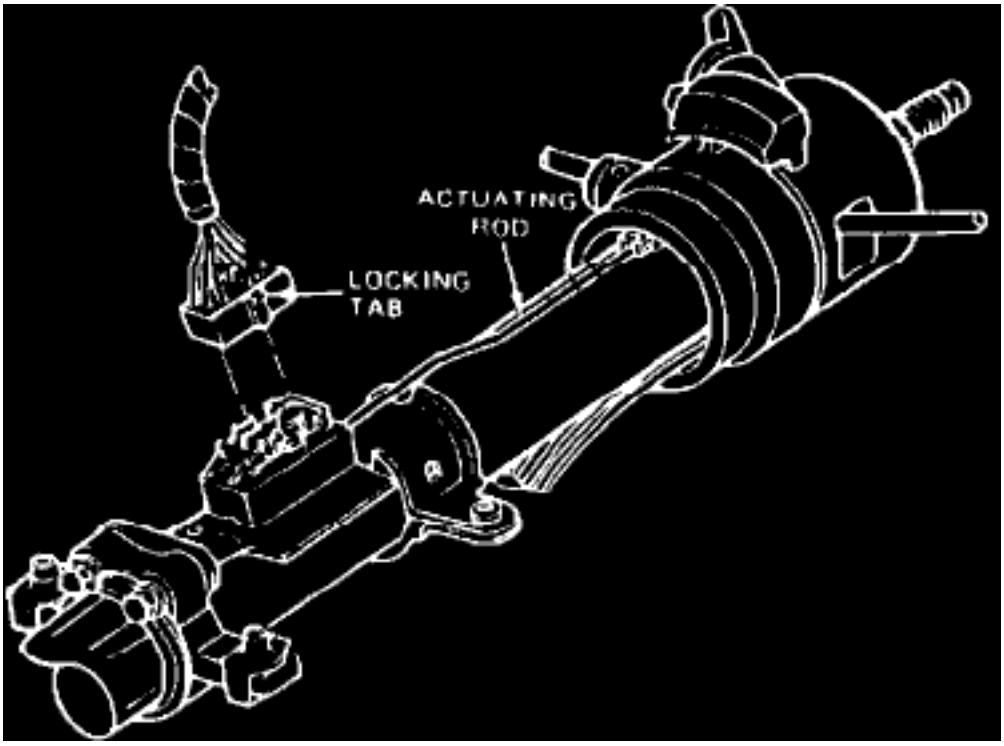
The pulse ring is a powdered metal ring positioned on the crankshaft vibration damper during manufacture. It has four equally spaced lobes which represent crankshaft position when the pistons reach 10 BTDC.

During operation, the lobes on the pulse ring pass by the tip of the CP sensor. The pulse ring interrupts the magnetic field at the tip of the sensor. When the field is interrupted, an output signal is generated and sent to the ECA.

As the crankshaft turns, the ECA evaluates the electrical impulses to determine the exact position of the crankshaft at any given time. By the frequency of the impulses, the ECA can determine the engine speed. With these two factors, the ECA will determine the appropriate ignition timing advance required for best engine operation.

Ignition Switch: Locations

Attached To Steering Column



Ignition Switch: Service and Repair

Fig. 3 Ignition switch replacement

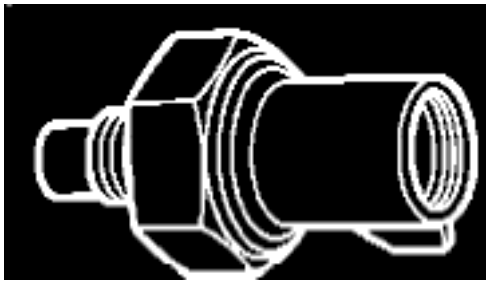
1. Disconnect battery ground cable.

2. Remove steering column shroud and lower the steering column.

3. Disconnect electrical connector from switch, then remove 2 switch attaching nuts.

4. Lift switch up to disengage actuator rod, then remove switch from vehicle, Fig. 3.

5. Reverse procedure to install.

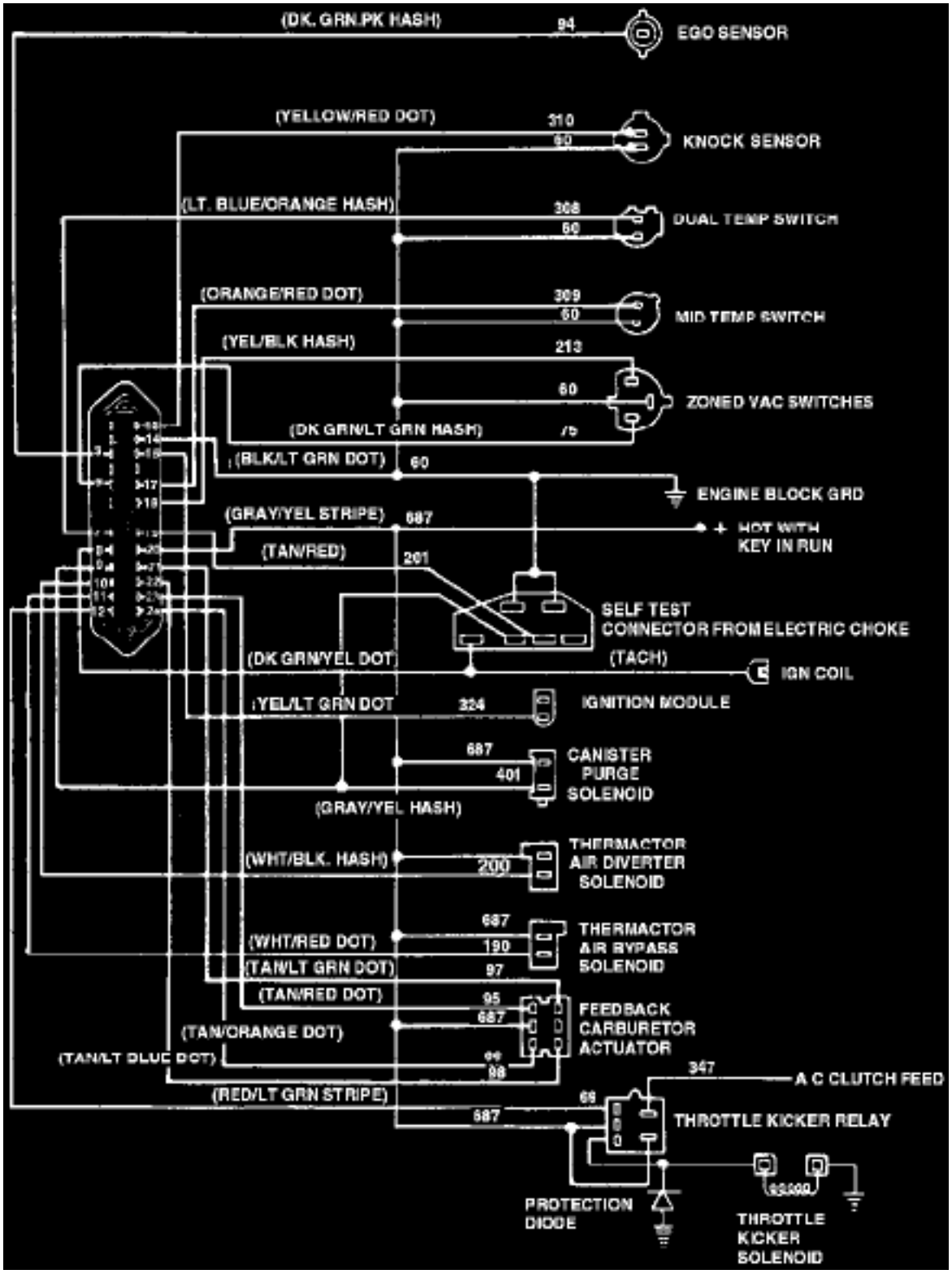


Knock Sensor: Description and Operation

Knock Sensor

The knock sensor, Fig. 11, is a piezo-electric accelerator accelerometer with the sensor designed to resonate at approximately the same frequency as the engine knock frequency.. The sensor uses the resonant frequency to mechanically amplify the engine knock frequency (5-6 KHz).

This method allows relatively large signals to be achieved without electrical amplification. The sensor has a thin circular piezoelectric ceramic disk which is bonded to a metal diaphragm. Electrical connections are made through a two-pin integral connector.



Knock Sensor: Testing and Inspection Component Testing

Fig.8 - MCU System Wiring Circuit

1. Make sure that the following three steps are properly conducted in order to simulate spark knock conditions and determine that spark detection

system is inoperative. If not, repeat test to verify problem. a. Make sure that engine is at normal operating temperature. Run engine at 2000 rpm for 2 minutes, then turn key off. Immediately restart engine

and allow to idle.

b. Observe voltmeter and vacuum gauge for initialization pulses after restarting the engine. The throttle kicker will also extend (increase engine

speed) and remain on throughout the test.

c. On vehicles with spark knock sensor, when initial pulses occur, immediately simulate spark knock by placing a 3/8 inch extension on manifold

near base of knock sensor. Tap end of extension with a small hammer for about 15 seconds.

2. Disconnect jumper wire from self-test trigger input circuit 201. 3. With ignition key off, disconnect vehicle harness from spark knock sensor. 4. Using a torque wrench and a 1 1/8 inch deep socket, make sure that spark sensor is torqued to 12-18 ft. lbs. If sensor is properly torqued, proceed

to next step. If not, torque to specifications.

5. Disconnect vehicle harness from MCU and spark sensor. Connect one lead of an ohmmeter to circuit 310 of vehicle harness and other lead to

engine block, Fig. 8. If resistance is 1000 ohms or more, proceed to next step. If resistance is less than 1000 ohms, repair short to ground in circuit 301.

6. With key off and knock sensor harness disconnected, check circuit 310 of vehicle harness for continuity. If resistance is 10 ohms or less, continue

to next step. If resistance is greater than 10 ohms, repair circuit 310.

7. Check circuit 60 of vehicle harness for continuity between knock sensor and MCU, Fig. 8. If resistance is 10 ohms or less, reconnect harness

connector to MCU and proceed to next step. If resistance is greater than 10 ohms, service circuit 60.

8. Reconnect jumper wire to circuits 201 and 60 of VIP connector, Fig. 8. 9. Connect a test lamp to positive terminal of battery, then disconnect knock sensor from vehicle harness.

10. Perform "Engine Running Functional Test" procedure. When the four initialization pulses occur, continuously tap circuit 310 of the vehicle

harness connector, which mates to the knock sensor connector, with the probe end for 5 seconds while observing voltmeter pulses. If a code 25 is

observed, replace MCU. If any other code is observed, replace spark knock sensor.

SPARK KNOCK, ONLY AT WIDE OPEN THROTTLE AND/OR POOR PERFORMANCE/MILEAGE

1. If engine has a spark knock sensor, disconnect it. 2. Make sure that ignition timing is within specifications. 3. With engine running at normal operating temperature, disconnect the two wire ignition module connector (yellow wire is circuit 324 and

black/white wire is circuit 69) from vehicle harness. Using a jumper wire, jump the wires together at the ignition module and note ignition timing. Remove jumper wire and note ignition timing. If timing retards 16-20 degrees, reconnect ignition module and proceed to next step. If timing does not retard 16-20 degrees, replace ignition module and repeat steps 1, 2 and 3.

4. With engine at normal operating temperature, set high cam on lowest step that will maintain engine speed greater than 1200 rpm. Note ignition

timing, then disconnect and plug vacuum hose from zone vacuum switch and again note timing. If timing retards more than 5 degrees, on engines with spark knock sensor, proceed to step 6, on all other engines MCU system is okay. If timing does not retard more than 5 degrees, proceed to next step.

5. With engine still at 1200 rpm, disconnect ignition module (connector with yellow and black/white wires). If timing retards, check circuit 324 for

short to ground. If circuit is okay, replace MCU unit and retest. If timing does not retard, check circuit 324 for open circuit. If circuit is okay, Replace MCU unit and retest.

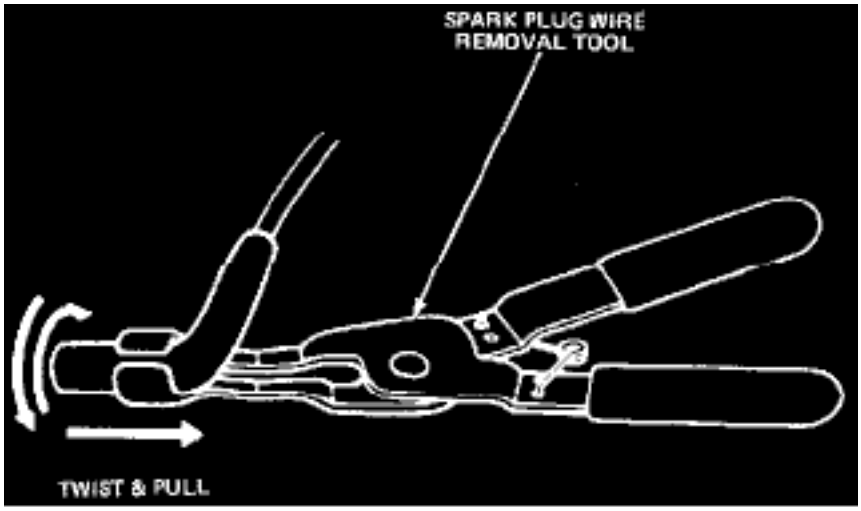
6. On engines with spark knock sensor, reconnect sensor. Repeat Engine Running Functional Test, but do not simulate knock by taping sensor. If

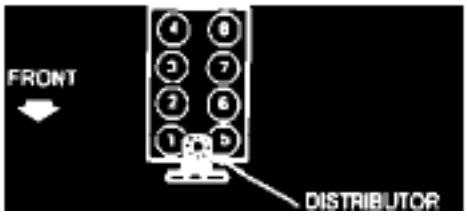
service code 25 appears, MCU system is okay, testing is completed. If any other service code appears, replace knock sensor and retest.

Spark Plug: Specifications

SPARK PLUGS

Gap ..... 0.044 in Torque ..... 14-20 Nm (10-15 ft-lbs)





Spark Plug: Service and Repair

REMOVAL

- Remove the wire from each spark plug by grasping the molded boot with tool T74P-6666-A or equivalent. Twist the boot until it loosens and then pull it off the spark plug. Do not pull on the wire, as the connection may become damaged.

- Any wire damaged must be replaced. Each original spark plug wire is numbered for the cylinder to which it is designated. If wires are not numbered, each wire should be numbered as to the plug from which it was removed.

- Clean the area around each spark plug port with compressed air.

- Using the proper size spark plug socket remove the spark plugs.

INSTALLATION

-

Check the gap on each new spark plug and set to specification. See: Specifications

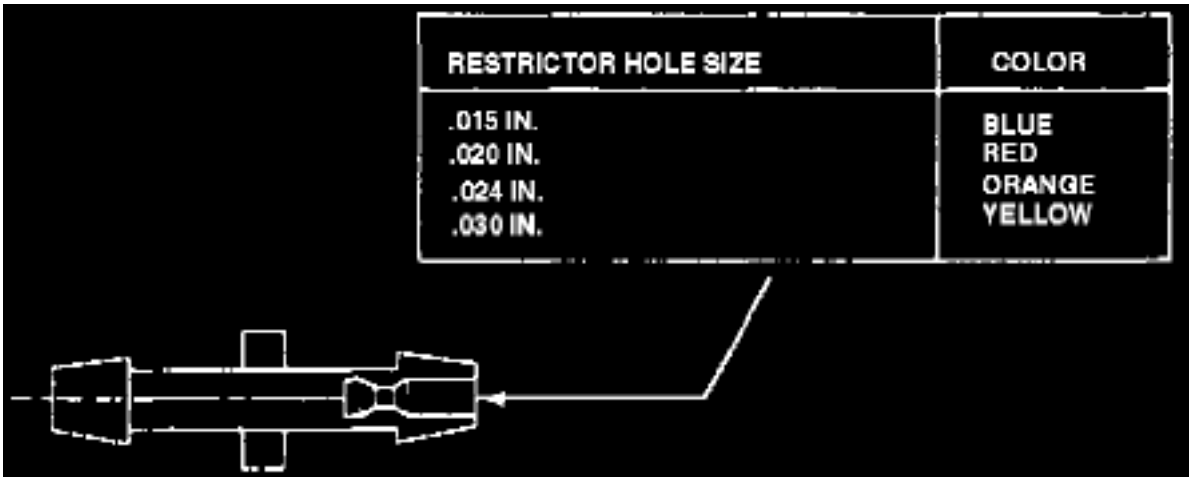
Cylinder Numbering And Distributor Location

- Install each spark plug and tighten to 14-20 Nm (10-15 ft-lbs).

- Coat the inside of each spark plug boot with silicone dielectric compound. Connect each spark plug wire to the plug from which it was removed. Be sure each wire is fully depressed on each plug and molded boot is firmly in place.

Thermal Vacuum Valve: Description and Operation

This system used on some vehicles, consists of an ambient temperature switch, a three-way vacuum valve, a latching relay and an external inline vacuum bleed. The three-way vacuum valve is used to select the carburetor vacuum source that is supplied to the distributor vacuum advance mechanism. The ambient temperature switch provides the switching circuit to determine which vacuum source will be selected as a function of outside air temperature. The latching relay, activated by temperature switch closing, remains energized regardless of temperature switch position which prevents system cycling due to minor ambient temperature changes. The inline vacuum bleed function is to purge the vacuum line in the CTAV system of any excessive gasoline vapors.



Vacuum Restrictor: Description and Operation

Fig.30 - Vacuum Restrictor

The orifice type flow restrictor, Fig. 30, is used on some systems to control the flow rate and or timing characteristics to the following systems:

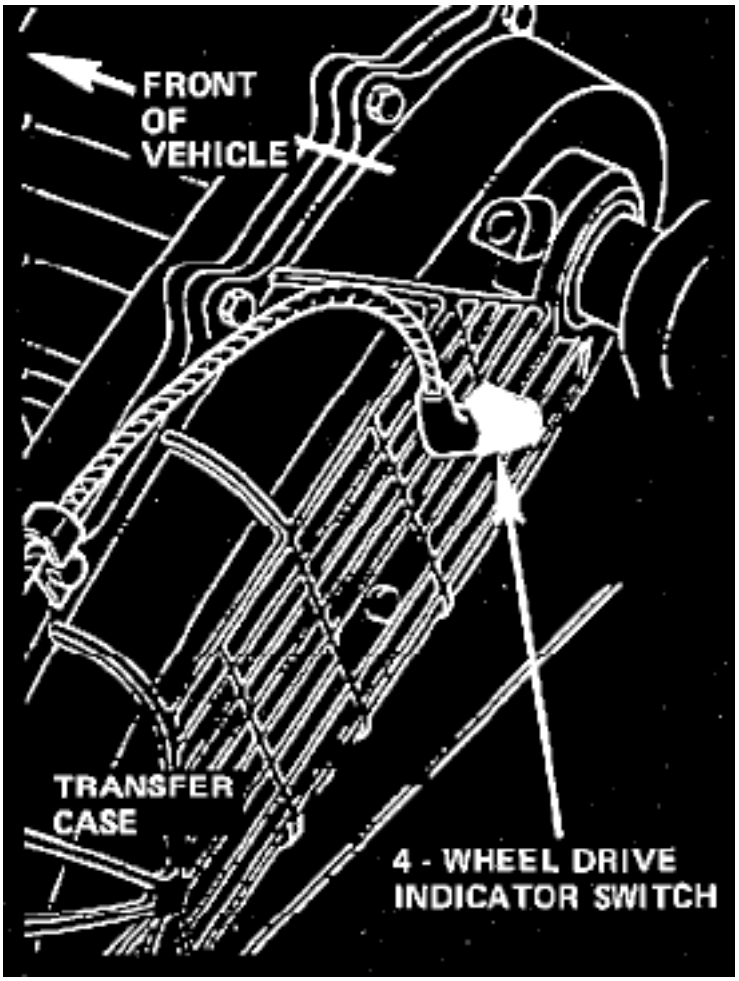
a. EGR valve timing (opening and closing).

b. Part throttle spark advance.

c. Purge system.

d. Thermactor system

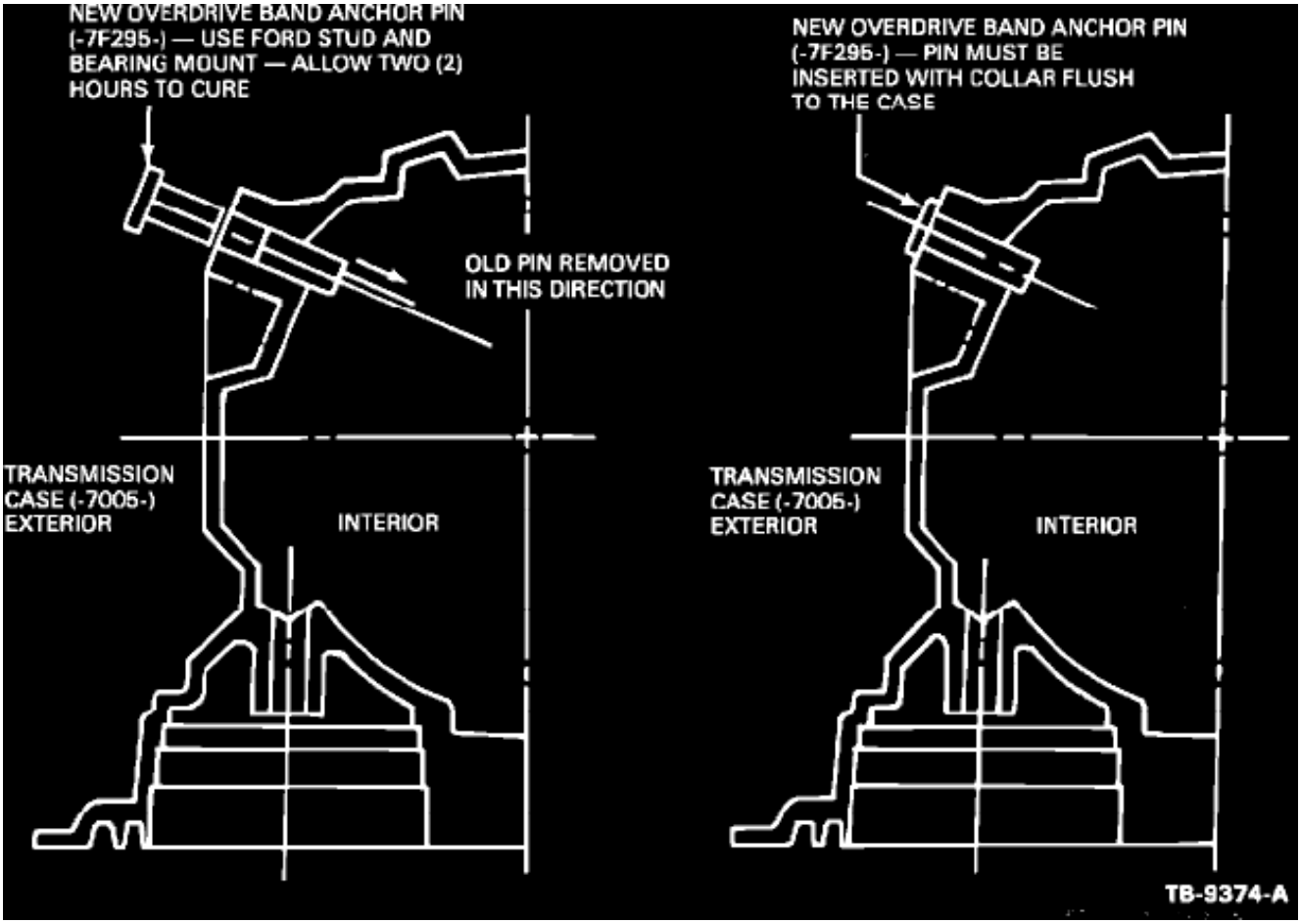
The flow rate through the restrictor is the same in both directions. If blocked, it should be replaced.



Four Wheel Drive Indicator Lamp: Locations

Rear Of Transfer Case

On Transfer Case



Band: Technical Service Bulletins A/T - AOD New Overdrive Band Anchor Pin

Article No. TRANSMISSION - AUTOMATIC OVERDRIVE

87-22-13 (AOD) - NEW OVERDRIVE BAND ANCHOR PIN - VEHICLES BUILT BEFORE 09/30/86

FORD: 1980-87 MUSTANG, THUNDERBIRD, FORD

LINCOLN-MERCURY: 1980-83 MARK VI 1980-87 COUGAR, MERCURY, CONTINENTAL, LINCOLN TOWN CAR

LIGHT TRUCK: 1980-87 E SERIES, F SERIES, BRONCO

ISSUE: A new overdrive band anchor pin, with a stepped diameter, is available for service. The old pin may have caused overdrive band wear or anchor pin leakage on vehicles built before 09/30/86.

NOTE: AOD transmissions built after 09/30/86 have the new design overdrive band anchor pin. This pin is NOT serviceable on transmissions built after 09/30/86. If replacement is required, a new transmission case must be installed.

Figure 10

ACTION: If service is required, use the appropriate Car or Light Truck Shop Manual, Section 17-20, for installation of the new overdrive band anchor pin, Figure 10.

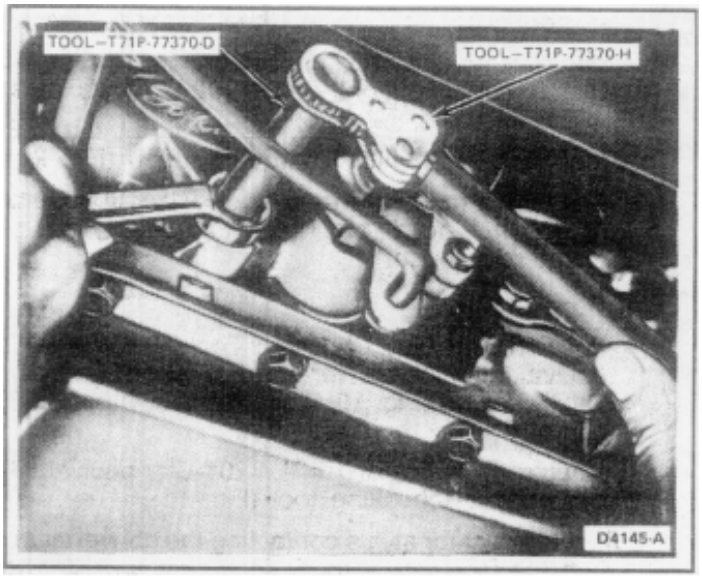
PART NUMBER PART NAME CLASS

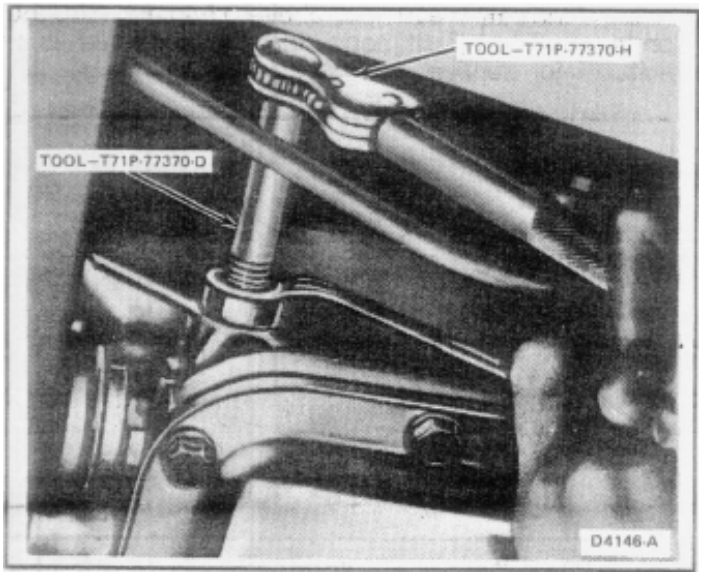
E2AZ-7F295-A Anchor Pin C

E0AZ-19554-BA Ford Stud and B

Bearing Mount

OTHER APPLICABLE ARTICLES: None WARRANTY STATUS: "INFORMATION ONLY"


TOOL–T71P-77370-D
TOOL–T71P-77370-H
D4145-A


TOOL–T71P-77370-H
TOOL–T71P-77370-D
D4146-A

Band: Adjustments C5 Transmission

Intermediate Band

Intermediate Band Adjustment

1. Clean all the dirt from the band adjusting screw area. Remove and discard the locknut

2. Install a new locknut on the adjustment screw.

3. Tighten the adjusting screw using Band Adjusting Ratchet T71 P-77370-H and Socket T71 P-77370-D or equivalent. Tool T71 P-77370-H or

equivalent, is a pre-set torque wrench which will click when the torque on the adjusting screw reaches 13.5 Nm (10 lb-ft).

4. Back off the adjusting screw exactly 4 1/4 turns.

5. Hold the adjusting screw from turning and tighten the locknut to 54 Nm (40 lb-ft).

Low/Reverse Band

Low Reverse Band Adjustment

1. Clean all the dirt from the band adjusting screw area. Remove and discard the locknut.

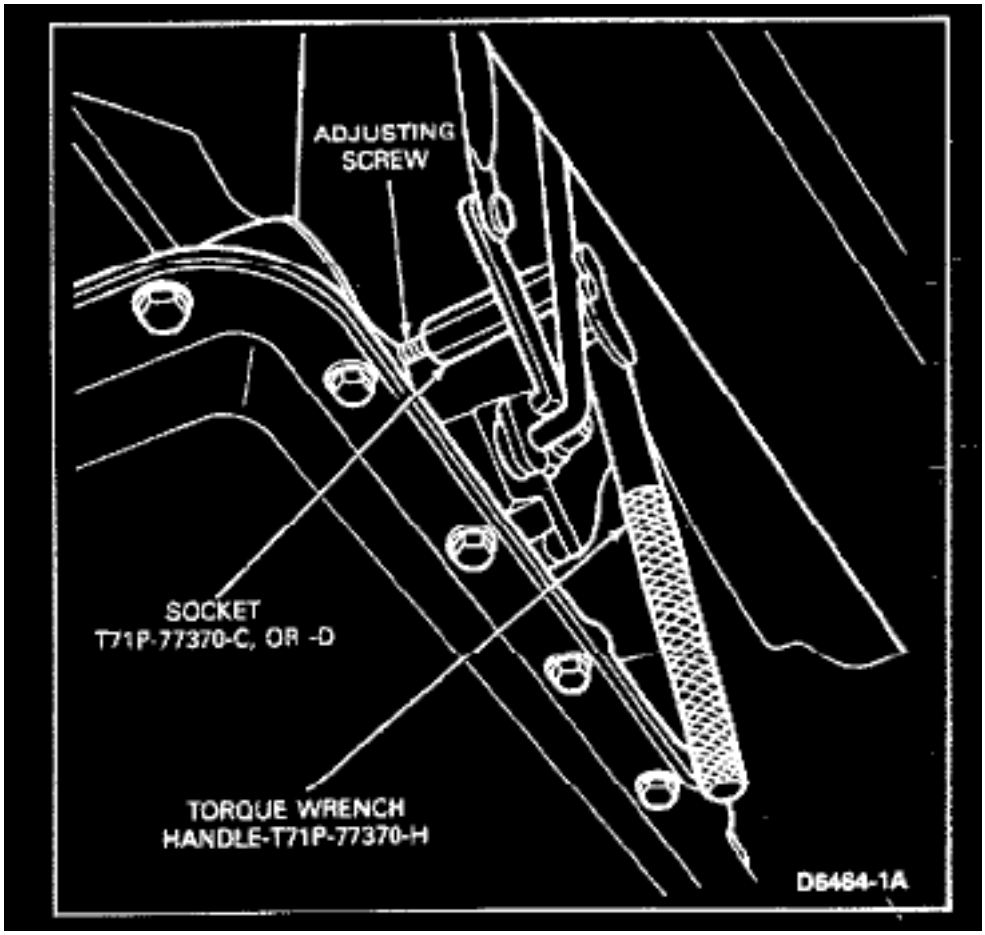
2. Install a new locknut on the adjusting screw.

3. Tighten the adjusting screw using Band Adjusting Ratchet T71 P-77370-H and Socket T71 P-77370-D or equivalent. Tool T71 P-77370-H or

equivalent, is a pre-set torque wrench which will click when the torque on the adjusting screw reaches 13.5 Nm (10 lb-ft).

4. Back off the adjusting screw exactly 3 turns.

5. Hold the adjusting screw from turning and tighten locknut to 54 Nm (40 lb-ft).



Band: Adjustments C6 Transmission

INTERMEDIATE BAND ADJUSTMENT

NOTE: When making the intermediate band adjustment, the locknut must be discarded and a new one installed each time the band is adjusted. Refer to service bulletins section for additional information on this procedure.

1. Clean dirt from the band adjusting screw. Remove and discard locknut. 2. Install a new locknut and tighten the adjusting screw to 14 Nm (10 ft lbs). 3. Back the screw off exactly 1.5 turns. 4. Hold the adjusting screw from turning and torque the locknut to 48-61 Nm(35-40 ft lbs).

Fluid - A/T: Customer Interest A/T - Synthetic Fluid Availability

Article No. 86-11-17

TRANSMISSION - AUTOMATIC - NEW SYNTHETIC DEXRON II ALL WEATHER AUTOMATIC TRANSMISSION FLUID

FORD 1986 and PRIOR ESCORT, EXP, FORD, LTD, THUNDERBIRD, MUSTANG, TEMPO; 1986 TAURUS

LINCOLN-MERCURY 1982-83 LN7; 1986 and PRIOR LYNX, MERCURY, MARQUIS, COUGAR, CAPRI, TOPAZ, LINCOLN, MARK, CONTINENTAL; 1986 SABLE

LIGHT TRUCK 1986 and PRIOR E, F SERIES, BRONCO, BRONCO II, RANGER

A new synthetic Dexron II automatic transmission fluid specification number ESR-M2C163-A2, part number E6AZ-19582-B is now available. This fluid will maintain a more constant viscosity through a wider range of temperatures.

In the event a vehicle will be operated in extremely cold temperatures for an extended period of time, remove all existing fluid from the transmission (using the procedure shown in the applicable 1986 Car or Light Truck Shop Manual) and replace with the new synthetic Dexron II fluid, E6AZ-19582-B. The synthetic fluid is year 'round fluid and will not require replacement for warmer weather.

CAUTION: DO NOT use synthetic Dexron II fluid in transmissions designed to use Type "F" fluid.

PART NUMBER PART NAME CLASS

E6AZ-19582-B Synthetic Dexron Oil V

Automatic Transmission Oil

OTHER APPLICABLE ARTICLES: None WARRANTY STATUS: "INFORMATION ONLY"

TSB 06-14-4

07/24/06

MERCON ATF IS BEING REPLACED BY MERCON V ATF AS A SERVICE FLUID.

FORD: 1980-1997 Crown Victoria 1981-1997 Mustang, Thunderbird 1981-2003 Escort 1986-1993 Festiva 1986-1997 Taurus 1989-1997 Probe 1994-1997 Aspire 1995-2000 Contour 1980-1996 Bronco 1981-2003 F-150 1981-2004 E-Series, F-Super Duty 1983-1996 Ranger 1986-1996 Aerostar 1991-1997 Explorer 1993-2004 F-53 Motorhome Chassis 1995-1998 Windstar 1997-2004 Expedition 2000-2005 Excursion 2001-2007 Escape 1987-2000 F-B-Series 2000-2007 F-650, F-750

LINCOLN: 1980-1997 Town Car 1981-1997 Continental 1993-1997 Mark VIII 1998-2004 Navigator 2002-2003 Blackwood

MERCURY: 1980-1997 Grand Marquis 1981-1997 Cougar 1986-1997 Sable 1987-1999 Tracer 1995-2000 Mystique 1999-2002 Cougar 1993-2002 Villager 1997 Mountaineer 2005-2007 Mariner

MERKUR: 1985-1989 XR4TI

This article supersedes TSB 01-15-7 to update the vehicle application chart.

ISSUE MERCON(R) Automatic Transmission Fluid is being replaced by MERCON(R) V as a service fluid.

ACTION Beginning immediately all automatic transmission / transaxle applications requiring MERCON(R) can now be serviced using MERCON(R) V or MERCON(R) Automatic Transmission Fluid or dual usage fluids labeled MERCON(R) / MERCON(R) V. After July 1, 2007, MERCON(R) Automatic Transmission Fluid will no longer be manufactured, therefore, availability of this fluid will only continue for however long it takes to deplete what remains in inventory.

SERVICE PROCEDURE

AUTOMATIC TRANSMISSION FLUID CHART

Specific service fluids (listed to the right) are called for depending on the type of transmission and the year the transmission was built. It is important to use the correct fluid, each fluid exhibits different properties and should be used only in the transmission for which they were designed. The vehicle owner or rebuilder should use the type of fluid printed in the owners guide or on the automatic transmission fluid level indicator. Refer to your scheduled maintenance guide to determine the correct service interval. Failure to use the recommended fluid may affect transmission performance and durability.

CAUTION:
DO NOT USE SUPPLEMENTAL TRANSMISSION FLUID ADDITIVES, TREATMENTS OR CLEANING AGENTS. The use of these materials may affect transmission operation and result in damage to internal transmission components.

CAUTION:
MERCON® SP, Motorcraft® Premium Automatic Transmission Fluid and Motorcraft® M5 ATFs are unique fluids and MUST be used in applications recommending that particular fluid. Use of any other fluid may cause reduced functionality or transmission damage.

CAUTION:
The functional characteristics of fluids for the CVT transmissions are very different than those of other ATFs. Use of a fluid other than Motorcraft® Continuously Variable Chain Type Transmission Fluid or one labeled as meeting MERCON® C may cause severe transmission damage.

FAILURE TO USE RECOMMENDED FLUID WILL AFFECT TRANSMISSION PERFORMANCE. REFER TO OWNERS MANUAL AND/OR FLUID LEVEL INDICATOR FOR PROPER FLUID TYPE.

V **MERCON® V**
- Part number XT-5-QM (Quarts) and XT-5-DM (55 Gallon Drum) Ford Specification is MERCON® V

NOTE: AUTOMATIC TRANSMISSIONS REQUIRING MERCON® V SHOULD ONLY BE SERVICED WITH MERCON® V, OR FLUID FROM A CONTAINER THAT IS SPECIFIED AS A DUAL USAGE FLUID: MERCON® /MERCON® V.

SP **MERCON® SP**
- Part number XT-6-QSP (Quarts) and XT-6-DSP (55 Gallon Drum) Ford Specification is MERCON® SP.

CVT **CONTINUOUSLY VARIABLE CHAIN TYPE**
- Part number XT-7-QCFT (Quarts)

P **PREMIUM AUTOMATIC TRANSMISSION FLUID**
- Part number XT-8-QAW.

M5 **MAZDA SPECIFIC FLUID**
- Part number XT-9-QMM5.

V M **MERCON® - Part number XT-2-QDX (Quarts) and XT-2-DDX (55 Gallon Drum) or, MERCON® V - Part number XT-5-QM (Quarts) and XT-5-DM (55 Gallon Drum)**

NOTE: AUTOMATIC TRANSMISSIONS REQUIRING MERCON® CAN NOW BE SERVICED WITH MERCON®, MERCON® V, OR, DUAL USAGE FLUIDS LABELED MERCON®/MERCON® V.

TB-8592-D

Figure 1

Service automatic transmissions requiring MERCON(R) with MERCON(R) V or MERCON(R) Automatic Transmission Fluid or dual usage fluids labeled MERCON(R) / MERCON(R) V

For proper fluid application on current and past model vehicles equipped with automatic transmissions I transaxles refer to the fluid usage chart. (Figure 1)

CAUTION

AUTOMATIC TRANSMISSIONS / TRANSAXLES THAT REQUIRE MERCON® V SHOULD STILL ONLY USE MERCON(R) V OR DUAL USAGE FLUID LABELED MERCON(R) / MERCON(R) V.

PART NUMBER	PART NAME
XT-2-QDX	MERCON® (Quart)
XT-2-DDX	MERCON® (55 Gal. Drum)
XT-5-QM	MERCON® V (Quart)
XT-5-DM	MERCON® V (55 Gal. Drum)

NOTE: The information in Technical Service Bulletins is intended for use by trained, professional technicians with the knowledge, tools, and equipment to do the job properly and safely. It informs these technicians of conditions that may occur on some vehicles, or provides information that could assist in proper vehicle service. The procedures should not be performed by "do-it-yourselfers". Do not assume that a condition described affects your car or truck. Contact a Ford, Lincoln, or Mercury dealership to determine whether the Bulletin applies to your vehicle.

CAUTION

MERCON(R) SP, MOTORCRAFT PREMIUM AUTOMATIC TRANSMISSION FLUID AND MOTORCRAFT M5 ATFS ARE UNIQUE FLUIDS AND MUST BE USED IN APPLICATIONS RECOMMENDING THAT PARTICULAR FLUID.

USE OF ANY OTHER FLUID MAY CAUSE REDUCED FUNCTIONALITY OR TRANSMISSION DAMAGE.

CAUTION

THE FUNCTIONAL CHARACTERISTICS OF FLUIDS FOR CVT TRANSMISSIONS ARE VERY DIFFERENT THAN THOSE OF OTHER AUTOMATIC TRANSMISSION FLUIDS (ATFS).

USE OF A FLUID OTHER THAN MOTORCRAFT CONTINUOUSLY VARIABLE CHAIN TYPE TRANSMISSION FLUID OR ONE LABELED AS MEETING MERCON(R) C WILL CAUSE FUNCTIONALITY CONCERNS AND INTERNAL TRANSMISSION DAMAGE.

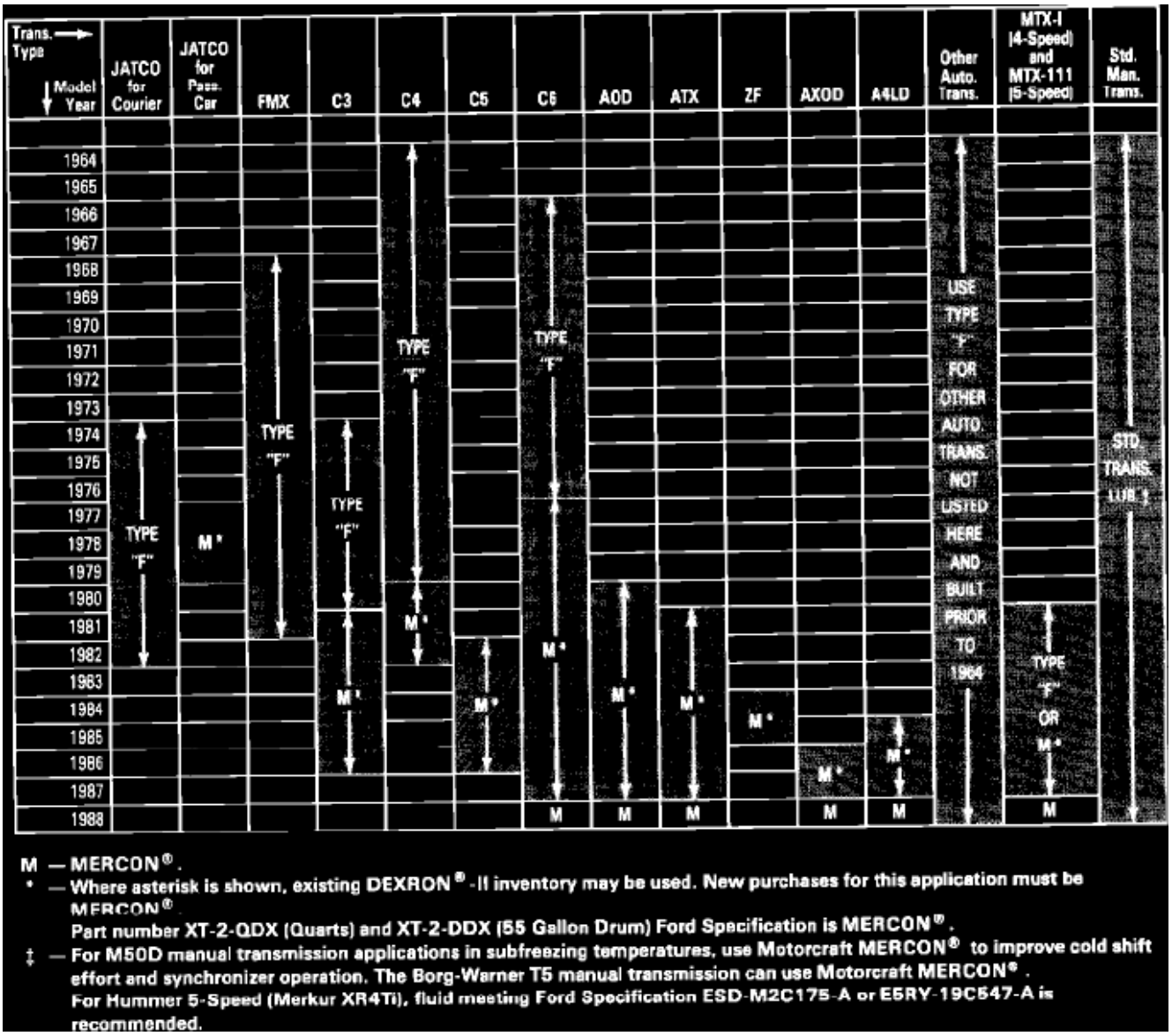
CAUTION

DO NOT USE AUTOMATIC TRANSMISSION FLUID SUPPLEMENTS, ADDITIVES, TREATMENTS OR CLEANING AGENTS.

Parts Block

WARRANTY STATUS: Information Only

Disclaimer



Fluid - A/T: All Technical Service Bulletins A/T, M/T - New `Mercon' Transmission Fluid

TRANSMISSION - AUTOMATIC/MANUAL - Article No.

NEW FLUID AND USAGE CHART 87-18-14

FORD: 1986 And Prior LTD 1988 And Prior ESCORT, TEMPO, MUSTANG, TAURUS, THUNDERBIRD, FORD

LINCOLN-MERCURY: 1986 And Prior CAPRI, MARQUIS 1987 And Prior LYNX 1988 And Prior TOPAZ, SABLE, COUGAR, MERCURY, MARK VII, CONTINENTAL, LINCOLN TOWN CAR

MERKUR: 1985-88 XR4Ti 1988 SCORPIO

LIGHT TRUCK: 1988 And Prior E SERIES, F SERIES, BRONCO, RANGER, BRONCO II, AEROSTAR

ISSUE: A new Transmission Fluid, MERCON (Ford Specification "MERCON") (XT-2- QDX, Quart), (XT-2-DDX, 55 Gallon Drum) is available for service. Use of the Motorcraft "MERCON" transmission fluid, where specified, will improve cold weather shift effort and synchronized operation.

ACTION: The chart on page 44 of this TSB gives transmission fluid applications for automatic transmissions and certain manual transmissions for Ford, Lincoln-Mercury, and Merkur vehicles.

NOTE: The use of MERCON is NOT RECOMMENDED for power steering systems. The manual transmission lubricant for the 1985 Merkur XR4Ti is a semi-synthetic oil. When adding oil to the transmission, use only E5RY-19C547-A (Ford Specification ESD-M2C175-A) or equivalent.

PART NUMBER PART NAME CLASS

XT-2-QDX MERCON - Quart V

XT-2-DDX MERCON - 55 Gallon V

Drum

E5RY-19C547-A Semi-Synthetic Oil B

OTHER APPLICABLE ARTICLES: 82-9-9 Supersedes 85-1-15, 85-6-7 WARRANTY STATUS: "INFORMATION ONLY"

Article No. 86-11-17

TRANSMISSION - AUTOMATIC - NEW SYNTHETIC DEXRON II ALL WEATHER AUTOMATIC TRANSMISSION FLUID

FORD 1986 and PRIOR ESCORT, EXP, FORD, LTD, THUNDERBIRD, MUSTANG, TEMPO; 1986 TAURUS

LINCOLN-MERCURY 1982-83 LN7; 1986 and PRIOR LYNX, MERCURY, MARQUIS, COUGAR, CAPRI, TOPAZ, LINCOLN, MARK, CONTINENTAL; 1986 SABLE

LIGHT TRUCK 1986 and PRIOR E, F SERIES, BRONCO, BRONCO II, RANGER

A new synthetic Dexron II automatic transmission fluid specification number ESR-M2C163-A2, part number E6AZ-19582-B is now available. This fluid will maintain a more constant viscosity through a wider range of temperatures.

In the event a vehicle will be operated in extremely cold temperatures for an extended period of time, remove all existing fluid from the transmission (using the procedure shown in the applicable 1986 Car or Light Truck Shop Manual) and replace with the new synthetic Dexron II fluid, E6AZ-19582-B. The synthetic fluid is year 'round fluid and will not require replacement for warmer weather.

CAUTION: DO NOT use synthetic Dexron II fluid in transmissions designed to use Type "F" fluid.

PART NUMBER PART NAME CLASS

E6AZ-19582-B Synthetic Dexron Oil V

Automatic Transmission Oil

OTHER APPLICABLE ARTICLES: None WARRANTY STATUS: "INFORMATION ONLY"

TSB 06-14-4

07/24/06

MERCON ATF IS BEING REPLACED BY MERCON V ATF AS A SERVICE FLUID.

FORD: 1980-1997 Crown Victoria 1981-1997 Mustang, Thunderbird 1981-2003 Escort 1986-1993 Festiva 1986-1997 Taurus 1989-1997 Probe 1994-1997 Aspire 1995-2000 Contour 1980-1996 Bronco 1981-2003 F-150 1981-2004 E-Series, F-Super Duty 1983-1996 Ranger 1986-1996 Aerostar 1991-1997 Explorer 1993-2004 F-53 Motorhome Chassis 1995-1998 Windstar 1997-2004 Expedition 2000-2005 Excursion 2001-2007 Escape 1987-2000 F-B-Series 2000-2007 F-650, F-750

LINCOLN: 1980-1997 Town Car 1981-1997 Continental 1993-1997 Mark VIII 1998-2004 Navigator 2002-2003 Blackwood

MERCURY: 1980-1997 Grand Marquis 1981-1997 Cougar 1986-1997 Sable 1987-1999 Tracer 1995-2000 Mystique 1999-2002 Cougar 1993-2002 Villager 1997 Mountaineer 2005-2007 Mariner

MERKUR: 1985-1989 XR4TI

This article supersedes TSB 01-15-7 to update the vehicle application chart.

ISSUE MERCON(R) Automatic Transmission Fluid is being replaced by MERCON(R) V as a service fluid.

ACTION Beginning immediately all automatic transmission / transaxle applications requiring MERCON(R) can now be serviced using MERCON(R) V or MERCON(R) Automatic Transmission Fluid or dual usage fluids labeled MERCON(R) / MERCON(R) V. After July 1, 2007, MERCON(R) Automatic Transmission Fluid will no longer be manufactured, therefore, availability of this fluid will only continue for however long it takes to deplete what remains in inventory.

SERVICE PROCEDURE

AUTOMATIC TRANSMISSION FLUID CHART

TRANSMISSIONS

TRANSAXLES

Specific service fluids (listed to the right) are called for depending on the type of transmission and the year the transmission was built. It is important to use the correct fluid, each fluid exhibits different properties and should be used only in the transmission for which they were designed. The vehicle owner or rebuilder should use the type of fluid printed in the owners guide or on the automatic transmission fluid level indicator. Refer to your scheduled maintenance guide to determine the correct service interval. Failure to use the recommended fluid may affect transmission performance and durability.

CAUTION:
DO NOT USE SUPPLEMENTAL TRANSMISSION FLUID ADDITIVES, TREATMENTS OR CLEANING AGENTS. The use of these materials may affect transmission operation and result in damage to internal transmission components.

CAUTION:
MERCON® SP, Motorcraft® Premium Automatic Transmission Fluid and Motorcraft® M5 ATFs are unique fluids and MUST be used in applications recommending that particular fluid. Use of any other fluid may cause reduced functionality or transmission damage.

CAUTION:
The functional characteristics of fluids for the CVT transmissions are very different than those of other ATF's. Use of a fluid other than Motorcraft® Continuously Variable Chain Type Transmission Fluid or one labeled as meeting MERCON® C may cause severe transmission damage.

FAILURE TO USE RECOMMENDED FLUID WILL AFFECT TRANSMISSION PERFORMANCE. REFER TO OWNERS MANUAL AND/OR FLUID LEVEL INDICATOR FOR PROPER FLUID TYPE.

V **MERCON® V**
- Part number XT-5-QM (Quarts) and XT-5-DM (55 Gallon Drum) Ford Specification is MERCON® V

NOTE: AUTOMATIC TRANSMISSIONS REQUIRING MERCON® V SHOULD ONLY BE SERVICED WITH MERCON® V, OR FLUID FROM A CONTAINER THAT IS SPECIFIED AS A DUAL USAGE FLUID: MERCON® /MERCON® V.

SP **MERCON® SP**
- Part number XT-6-QSP (Quarts) and XT-6-DSP (55 Gallon Drum) Ford Specification is MERCON® SP.

CVT **CONTINUOUSLY VARIABLE CHAIN TYPE**
- Part number XT-7-QCFT (Quarts)

P **PREMIUM AUTOMATIC TRANSMISSION FLUID**
- Part number XT-8-QAW.

M5 **MAZDA SPECIFIC FLUID**
- Part number XT-9-QMM5.

V M **MERCON® - Part number XT-2-QDX (Quarts) and XT-2-DDX (55 Gallon Drum) or, MERCON® V - Part number XT-5-QM (Quarts) and XT-5-DM (55 Gallon Drum)**

NOTE: AUTOMATIC TRANSMISSIONS REQUIRING MERCON® CAN NOW BE SERVICED WITH MERCON®, MERCON® V, OR, DUAL USAGE FLUIDS LABELED MERCON®/MERCON® V.

TB-8592-D

Figure 1

Service automatic transmissions requiring MERCON(R) with MERCON(R) V or MERCON(R) Automatic Transmission Fluid or dual usage fluids labeled MERCON(R) / MERCON(R) V

For proper fluid application on current and past model vehicles equipped with automatic transmissions I transaxles refer to the fluid usage chart. (Figure 1)

CAUTION

AUTOMATIC TRANSMISSIONS / TRANSAXLES THAT REQUIRE MERCON® V SHOULD STILL ONLY USE MERCON(R) V OR DUAL USAGE FLUID LABELED MERCON(R) / MERCON(R) V.

PART NUMBER	PART NAME
XT-2-QDX	MERCON® (Quart)
XT-2-DDX	MERCON® (55 Gal. Drum)
XT-5-QM	MERCON® V (Quart)
XT-5-DM	MERCON® V (55 Gal. Drum)

NOTE: The information in Technical Service Bulletins is intended for use by trained, professional technicians with the knowledge, tools, and equipment to do the job properly and safely. It informs these technicians of conditions that may occur on some vehicles, or provides information that could assist in proper vehicle service. The procedures should not be performed by "do-it-yourselfers". Do not assume that a condition described affects your car or truck. Contact a Ford, Lincoln, or Mercury dealership to determine whether the Bulletin applies to your vehicle.

CAUTION

MERCON(R) SP, MOTORCRAFT PREMIUM AUTOMATIC TRANSMISSION FLUID AND MOTORCRAFT M5 ATFS ARE UNIQUE FLUIDS AND MUST BE USED IN APPLICATIONS RECOMMENDING THAT PARTICULAR FLUID.

USE OF ANY OTHER FLUID MAY CAUSE REDUCED FUNCTIONALITY OR TRANSMISSION DAMAGE.

CAUTION

THE FUNCTIONAL CHARACTERISTICS OF FLUIDS FOR CVT TRANSMISSIONS ARE VERY DIFFERENT THAN THOSE OF OTHER AUTOMATIC TRANSMISSION FLUIDS (ATFS).

USE OF A FLUID OTHER THAN MOTORCRAFT CONTINUOUSLY VARIABLE CHAIN TYPE TRANSMISSION FLUID OR ONE LABELED AS MEETING MERCON(R) C WILL CAUSE FUNCTIONALITY CONCERNS AND INTERNAL TRANSMISSION DAMAGE.

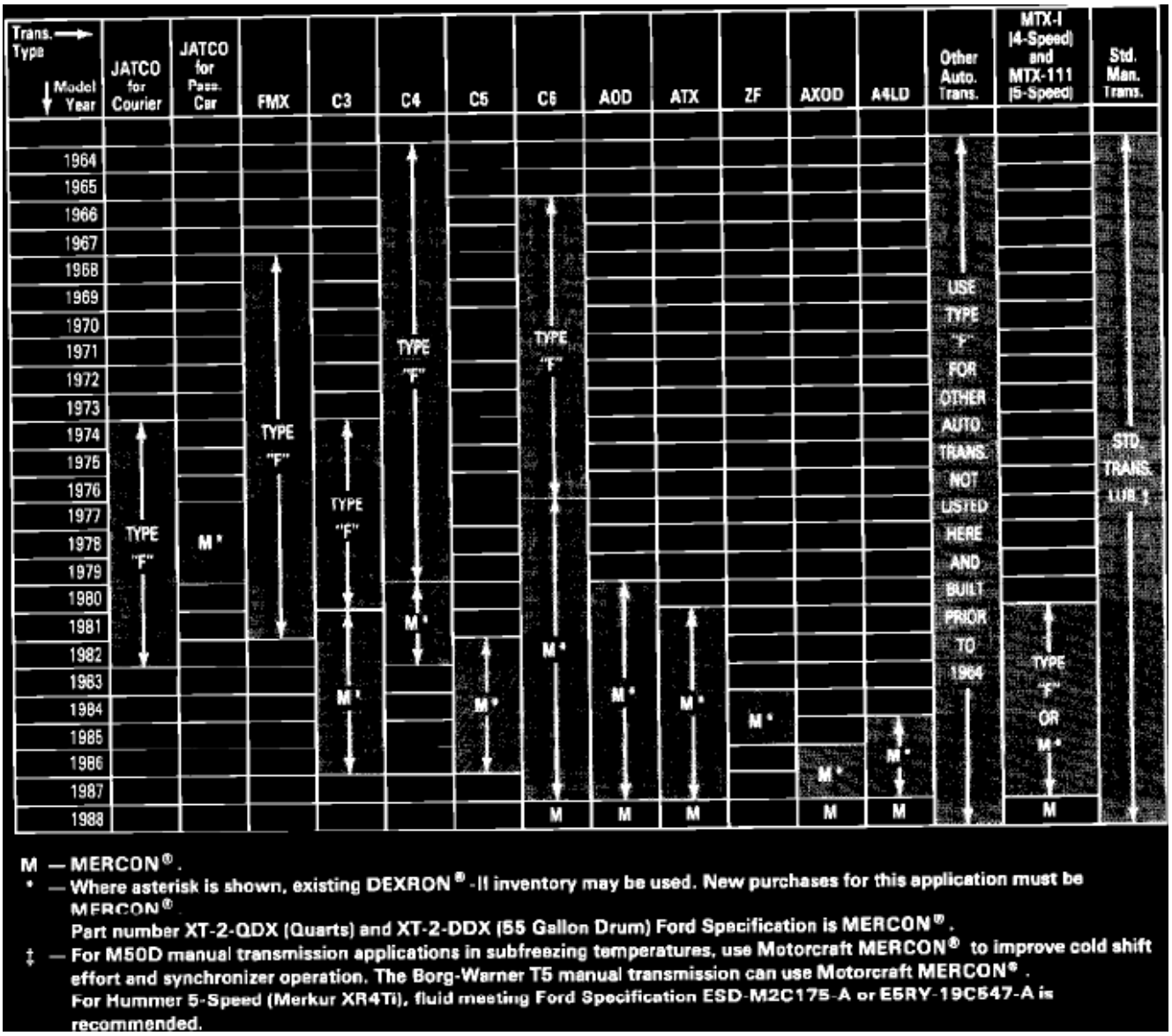
CAUTION

DO NOT USE AUTOMATIC TRANSMISSION FLUID SUPPLEMENTS, ADDITIVES, TREATMENTS OR CLEANING AGENTS.

Parts Block

WARRANTY STATUS: Information Only

Disclaimer



Fluid - A/T: All Technical Service Bulletins A/T, M/T - New `Mercon' Transmission Fluid

TRANSMISSION - AUTOMATIC/MANUAL - Article No.

NEW FLUID AND USAGE CHART 87-18-14

FORD: 1986 And Prior LTD 1988 And Prior ESCORT, TEMPO, MUSTANG, TAURUS, THUNDERBIRD, FORD

LINCOLN-MERCURY: 1986 And Prior CAPRI, MARQUIS 1987 And Prior LYNX 1988 And Prior TOPAZ, SABLE, COUGAR, MERCURY, MARK VII, CONTINENTAL, LINCOLN TOWN CAR

MERKUR: 1985-88 XR4Ti 1988 SCORPIO

LIGHT TRUCK: 1988 And Prior E SERIES, F SERIES, BRONCO, RANGER, BRONCO II, AEROSTAR

ISSUE: A new Transmission Fluid, MERCON (Ford Specification "MERCON") (XT-2- QDX, Quart), (XT-2-DDX, 55 Gallon Drum) is available for service. Use of the Motorcraft "MERCON" transmission fluid, where specified, will improve cold weather shift effort and synchronized operation.

ACTION: The chart on page 44 of this TSB gives transmission fluid applications for automatic transmissions and certain manual transmissions for Ford, Lincoln-Mercury, and Merkur vehicles.

NOTE: The use of MERCON is NOT RECOMMENDED for power steering systems. The manual transmission lubricant for the 1985 Merkur XR4Ti is a semi-synthetic oil. When adding oil to the transmission, use only E5RY-19C547-A (Ford Specification ESD-M2C175-A) or equivalent.

PART NUMBER PART NAME CLASS

XT-2-QDX MERCON - Quart V

XT-2-DDX MERCON - 55 Gallon V

Drum

E5RY-19C547-A Semi-Synthetic Oil B

OTHER APPLICABLE ARTICLES: 82-9-9 Supersedes 85-1-15, 85-6-7 WARRANTY STATUS: "INFORMATION ONLY"

Fluid - A/T: Specifications

Type MERCON(R) Automatic Transmission Fluid

CAPACITY, Initial Refill*: C-6 5.0 qt (US)

With the engine at operating temperature, shift

transmission through all gears. Check fluid level in PARK

and add fluid as needed

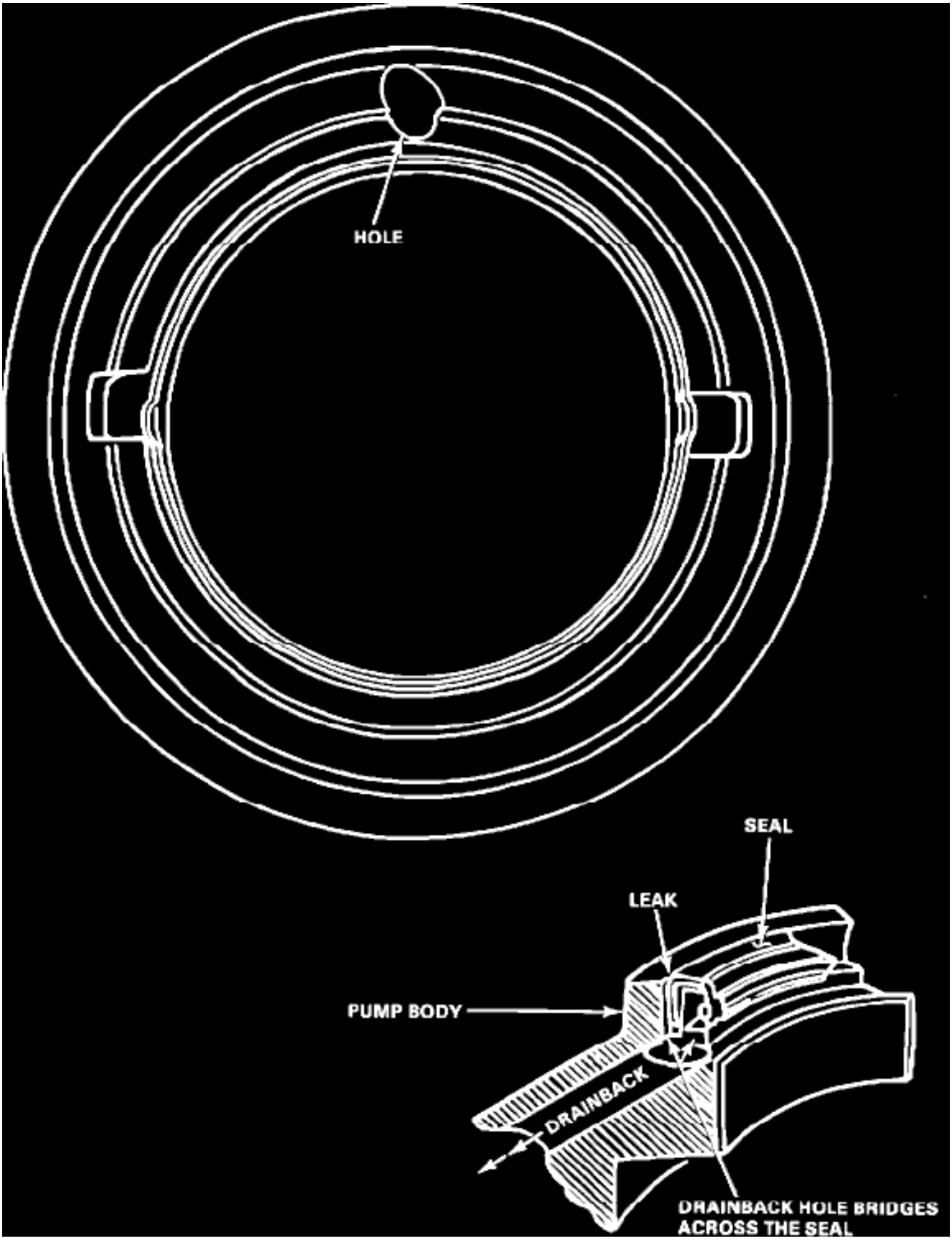
Others 3.0 qt (US)

Fluid - A/T: Specifications

Type MA(MERCON (R) Automatic Transmission Fluid)

CAPACITY, Total Fill: Tempo, Topaz 8.3 qt (US)

Others 9.8 qt (US)



Fluid Pump: Customer Interest A/T - AOD Fluid Leak

Article No. 85-24-7

LEAK - TRANSMISSION FLUID (AOD) - FRONT PUMP SEAL

FORD 1980-85 FORD, THUNDERBIRD, LTD, MUSTANG

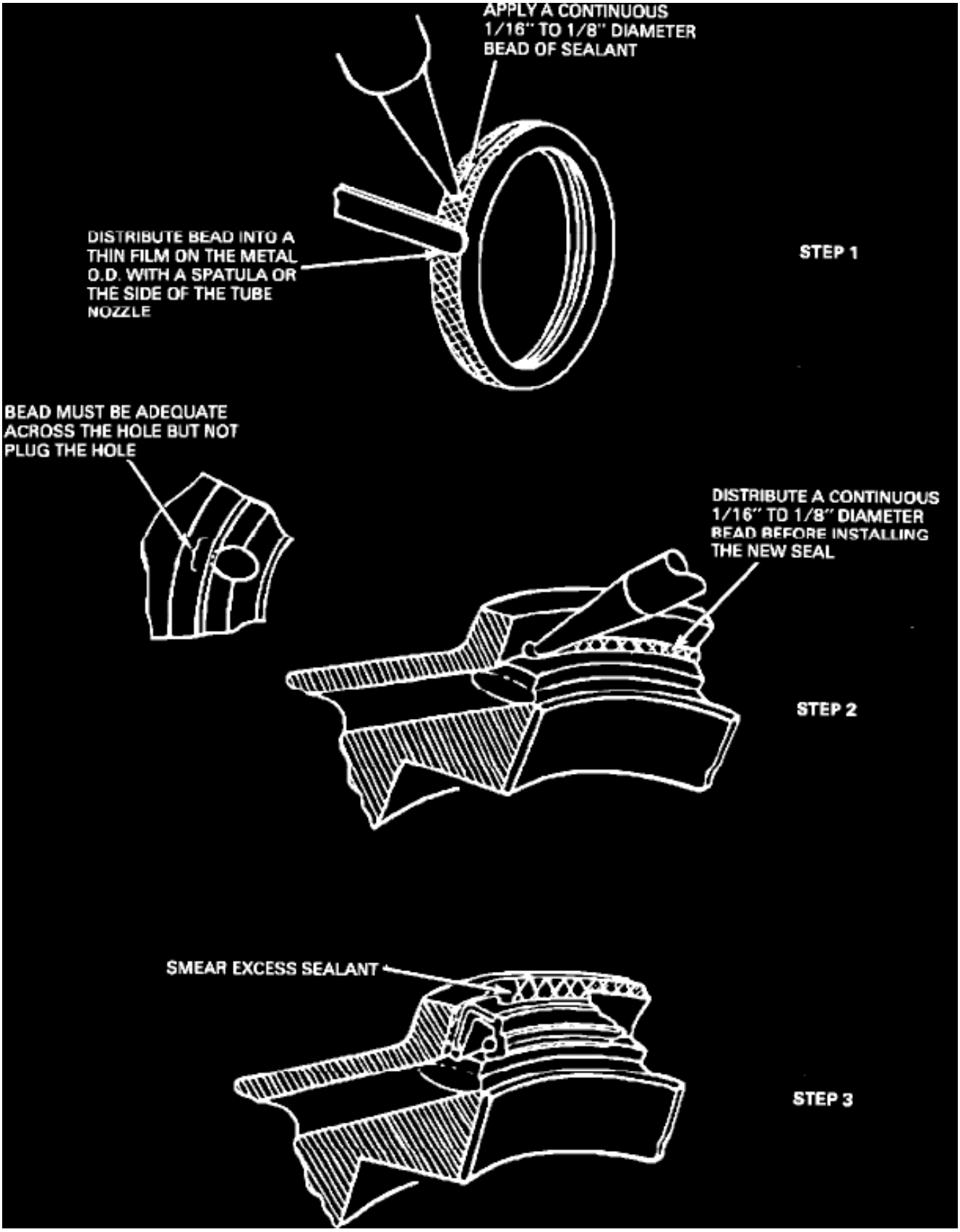
LINCOLN-MERCURY 1980-85 MERCURY, COUGAR, MARQUIS, CAPRI, LINCOLN, MARK, CONTINENTAL

LIGHT TRUCK 1982-85 E AND F SERIES, BRONCO

Figure 12 - Front Pump Seal

Transmission fluid leaks at the front pump seal in vehicles equipped with an AOD transmission built prior to October 1, 1985 may be caused by a variation in location of the fluid drainback hole at the pump allowing fluid to leak around the seal. If the drainback hole bridges across the outer edge of the pump seal, the seal may collapse in the hole causing a leak past the outside diameter of the seal (Figure 12).

1. Remove the front pump seal using procedures outlined in Section l7-20-34 of the 1985 Car Shop



Manual, Volume D.

2. Check the relationship of the drainback hole at the pump body to the sealing face of the seal (Figure 12). If the hole bridges the seal metal face, thoroughly clean and dry the pump body seal mating surface with spot remover (B7A-19521-A).

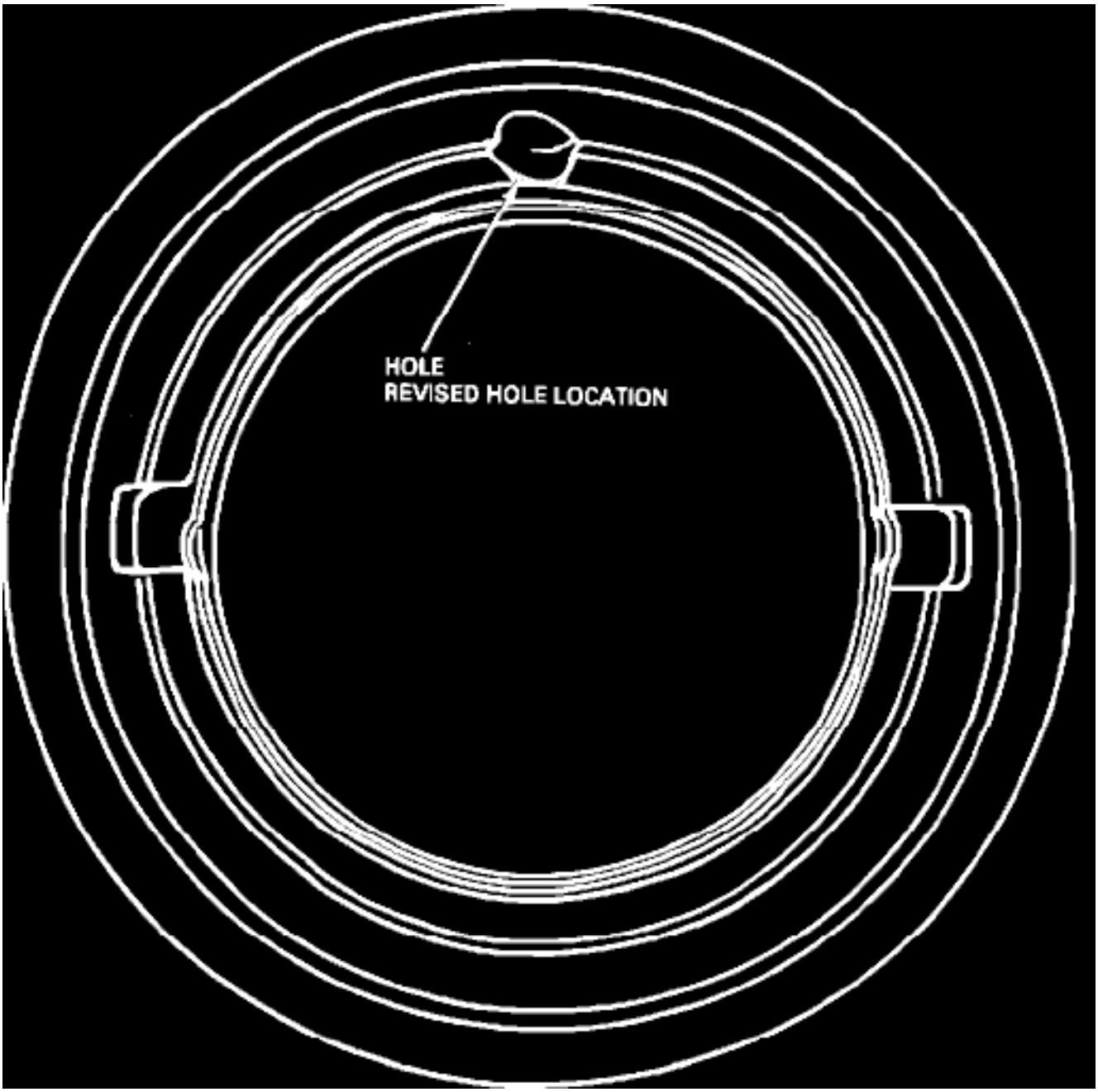
Figure 14 - Front Pump Seal - Outside Diameter Metal Surface

3. Obtain a new seal (C2AZ-7A248-A) and clean any oil that may be on the metal surface. Apply silicone sealant (E3AZ-19562-A) in a continuous 1/16" to 1/8" diameter bead to the outside diameter metal surface of the seal (Figure 14, Step 1). Distribute the bead of sealant into a thin film as shown.

NOTE: The silicone sealant is distributed in a cartridge tube. The nozzle should be cut to permit a flow of sealant 1/16" to 1/8" in diameter. Do not apply more than a 1/8" bead as the drainback hole could become plugged.

4. Apply a 1/16" to 1/8" diameter bead of sealant in the corner of the pocket of the pump body seal mating surface (Figure 14, Step 2).

NOTE: The bead must be adequate across the drainback hole but not plug the hole. If the hole is blocked, drainback behind the seal will not be provided and leakage could still occur.



5. Push seal in place and smear the excess sealant as shown in Figure 14, Step 3.

Figure 13 - Front Pump Seal/Revised Hole Location

Transmissions built after October 1, 1985 are equipped with a front pump that has a revised drainback hole located away from the seal edge mating surface (Figure 13). Depot stock has been replaced with pumps having the revised location drainback hole. PART NUMBER

PART NAME CLASS

B7A-19521-A Spot Remover A

C2AZ-7A248-A Pump Seal A

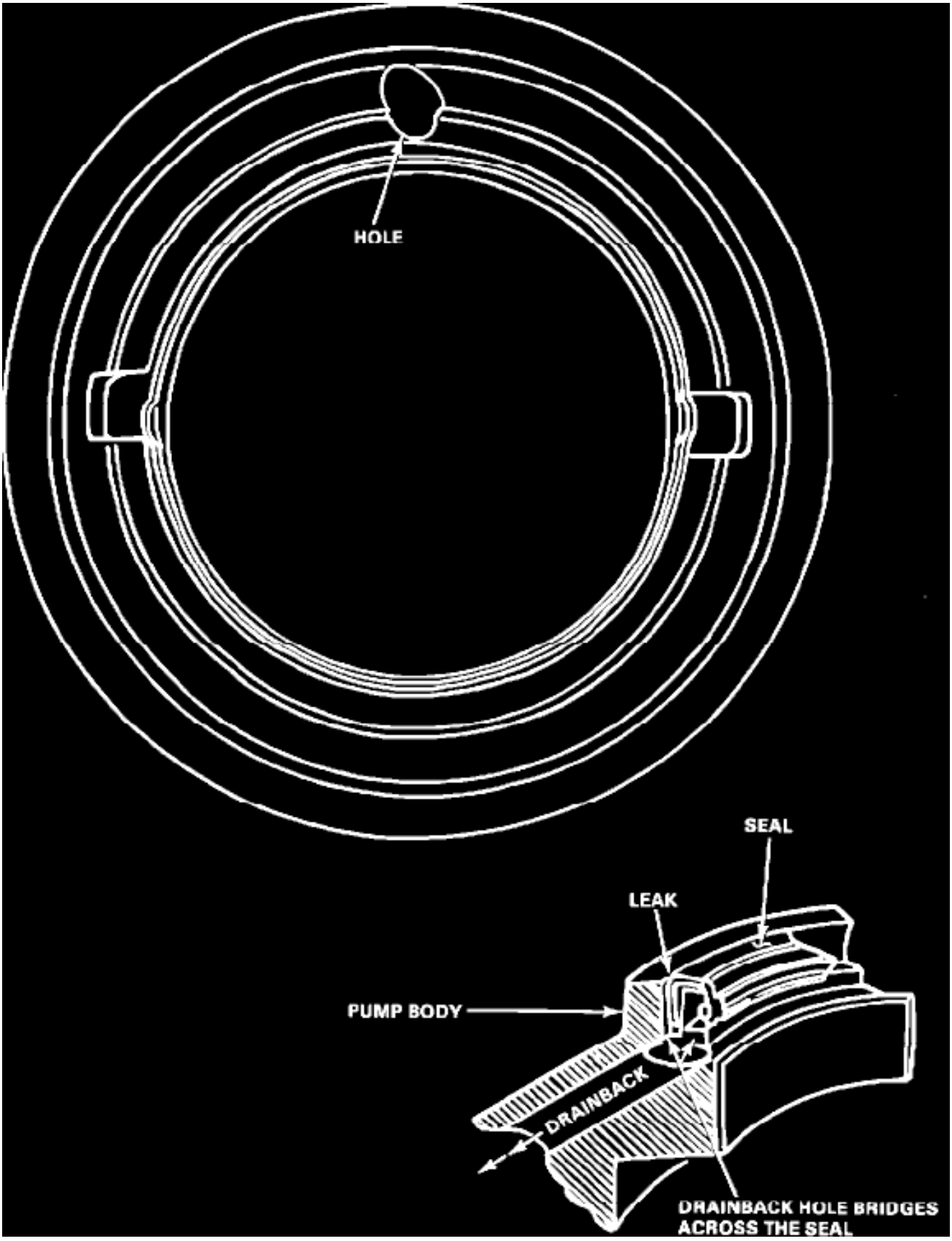
E3AZ-19562-A Silicone Sealant A

OTHER APPLICABLE ARTICLES: None WARRANTY STATUS: Reimbursable within the provisions of the Warranty and Policy Manual. OPERATION: SP7248A85 TIME:

3.4 Hrs. - Mustang/Capri, LTD/Marquis, Thunderbird/Cougar, Mark VII/Continental

2.8 Hrs. - Ford, Mercury, Lincoln 3.0 Hrs. - 4x2 F Series 4.9L/5.0L 2.7 Hrs. - 4x2 Econoline 4.9L/5.0L 4.3 Hrs. - 4x4 F Series and Bronco 5.0L OPERATION: SP7248B85 - Supplement extra time if equipped with skid plate under the transfer case TIME:

0.2 Hr. DLR. CODING: Basic Part No. 7A248 - Code: 77



Fluid Pump: All Technical Service Bulletins A/T - AOD Fluid Leak

Article No. 85-24-7

LEAK - TRANSMISSION FLUID (AOD) - FRONT PUMP SEAL

FORD 1980-85 FORD, THUNDERBIRD, LTD, MUSTANG

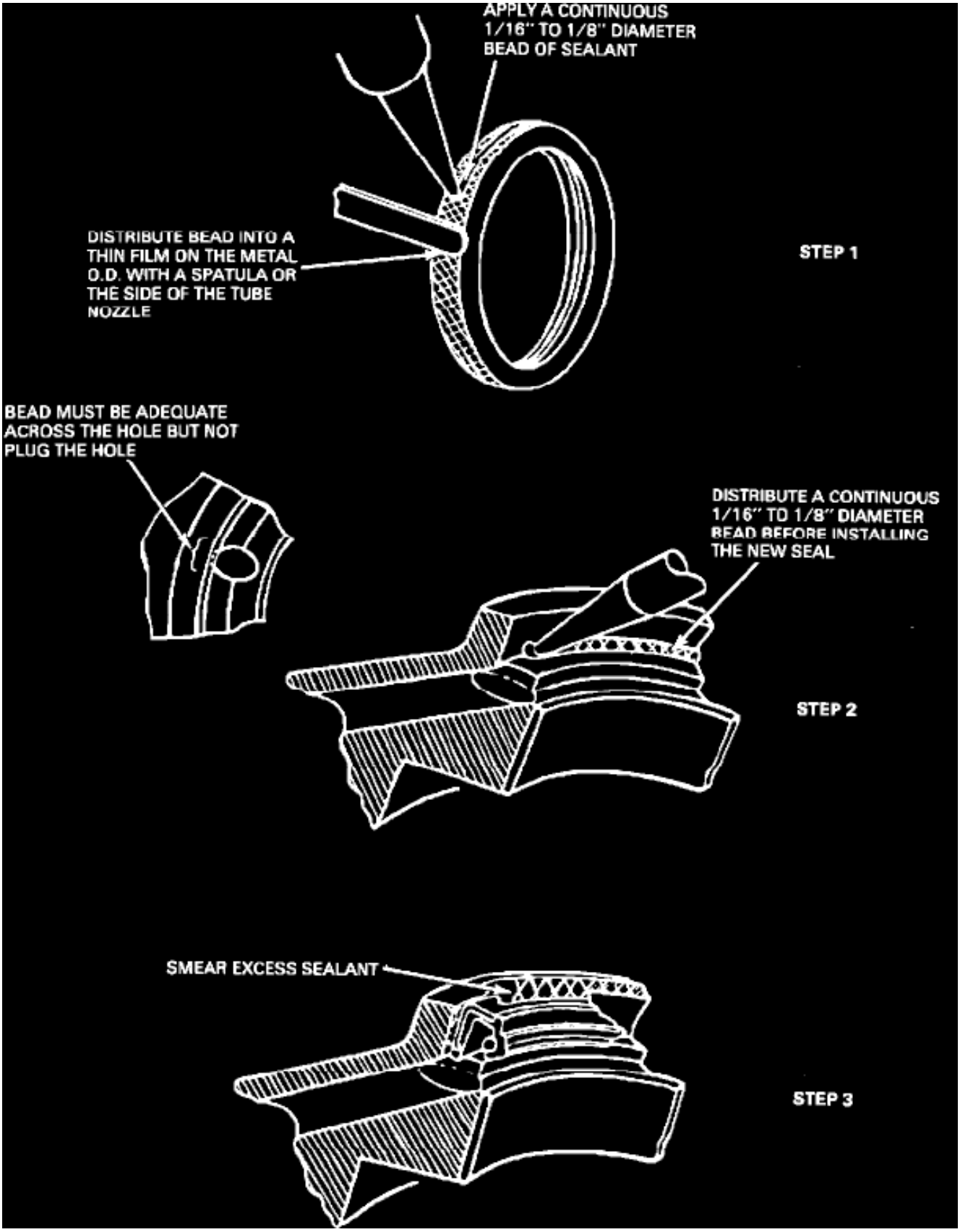
LINCOLN-MERCURY 1980-85 MERCURY, COUGAR, MARQUIS, CAPRI, LINCOLN, MARK, CONTINENTAL

LIGHT TRUCK 1982-85 E AND F SERIES, BRONCO

Figure 12 - Front Pump Seal

Transmission fluid leaks at the front pump seal in vehicles equipped with an AOD transmission built prior to October 1, 1985 may be caused by a variation in location of the fluid drainback hole at the pump allowing fluid to leak around the seal. If the drainback hole bridges across the outer edge of the pump seal, the seal may collapse in the hole causing a leak past the outside diameter of the seal (Figure 12).

1. Remove the front pump seal using procedures outlined in Section l7-20-34 of the 1985 Car Shop



Manual, Volume D.

2. Check the relationship of the drainback hole at the pump body to the sealing face of the seal (Figure 12). If the hole bridges the seal metal face, thoroughly clean and dry the pump body seal mating surface with spot remover (B7A-19521-A).

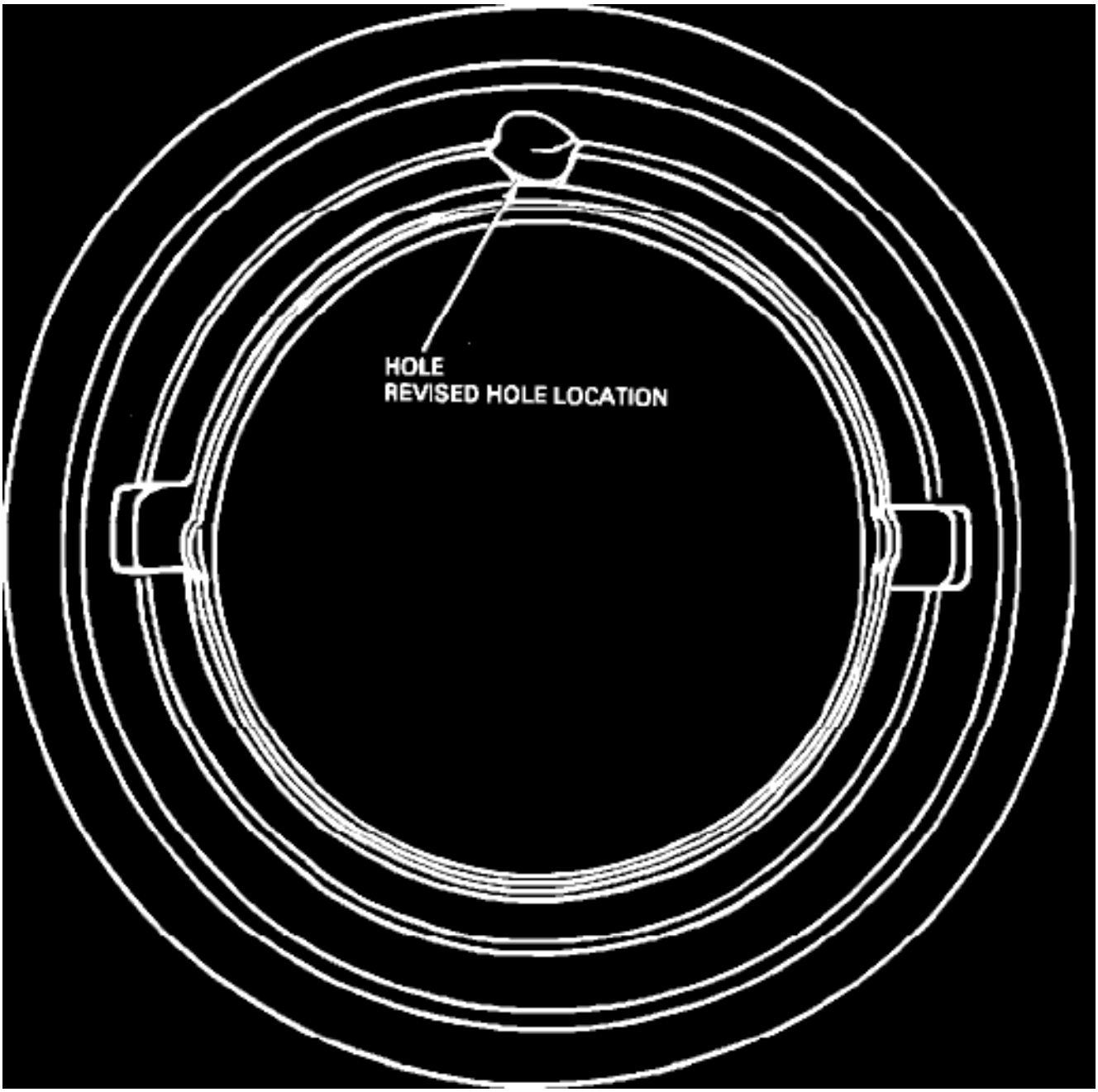
Figure 14 - Front Pump Seal - Outside Diameter Metal Surface

3. Obtain a new seal (C2AZ-7A248-A) and clean any oil that may be on the metal surface. Apply silicone sealant (E3AZ-19562-A) in a continuous 1/16" to 1/8" diameter bead to the outside diameter metal surface of the seal (Figure 14, Step 1). Distribute the bead of sealant into a thin film as shown.

NOTE: The silicone sealant is distributed in a cartridge tube. The nozzle should be cut to permit a flow of sealant 1/16" to 1/8" in diameter. Do not apply more than a 1/8" bead as the drainback hole could become plugged.

4. Apply a 1/16" to 1/8" diameter bead of sealant in the corner of the pocket of the pump body seal mating surface (Figure 14, Step 2).

NOTE: The bead must be adequate across the drainback hole but not plug the hole. If the hole is blocked, drainback behind the seal will not be provided and leakage could still occur.



5. Push seal in place and smear the excess sealant as shown in Figure 14, Step 3.

Figure 13 - Front Pump Seal/Revised Hole Location

Transmissions built after October 1, 1985 are equipped with a front pump that has a revised drainback hole located away from the seal edge mating surface (Figure 13). Depot stock has been replaced with pumps having the revised location drainback hole. PART NUMBER

PART NAME CLASS

B7A-19521-A Spot Remover A

C2AZ-7A248-A Pump Seal A

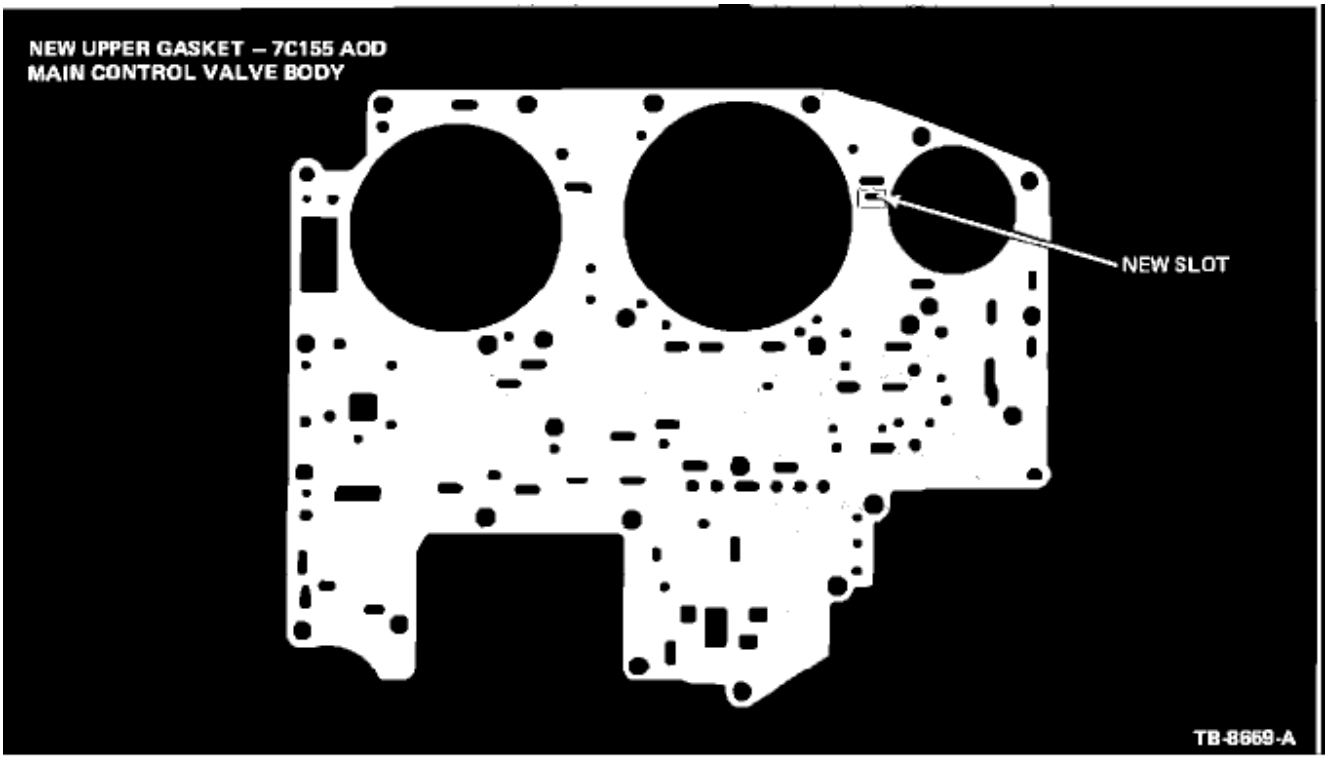
E3AZ-19562-A Silicone Sealant A

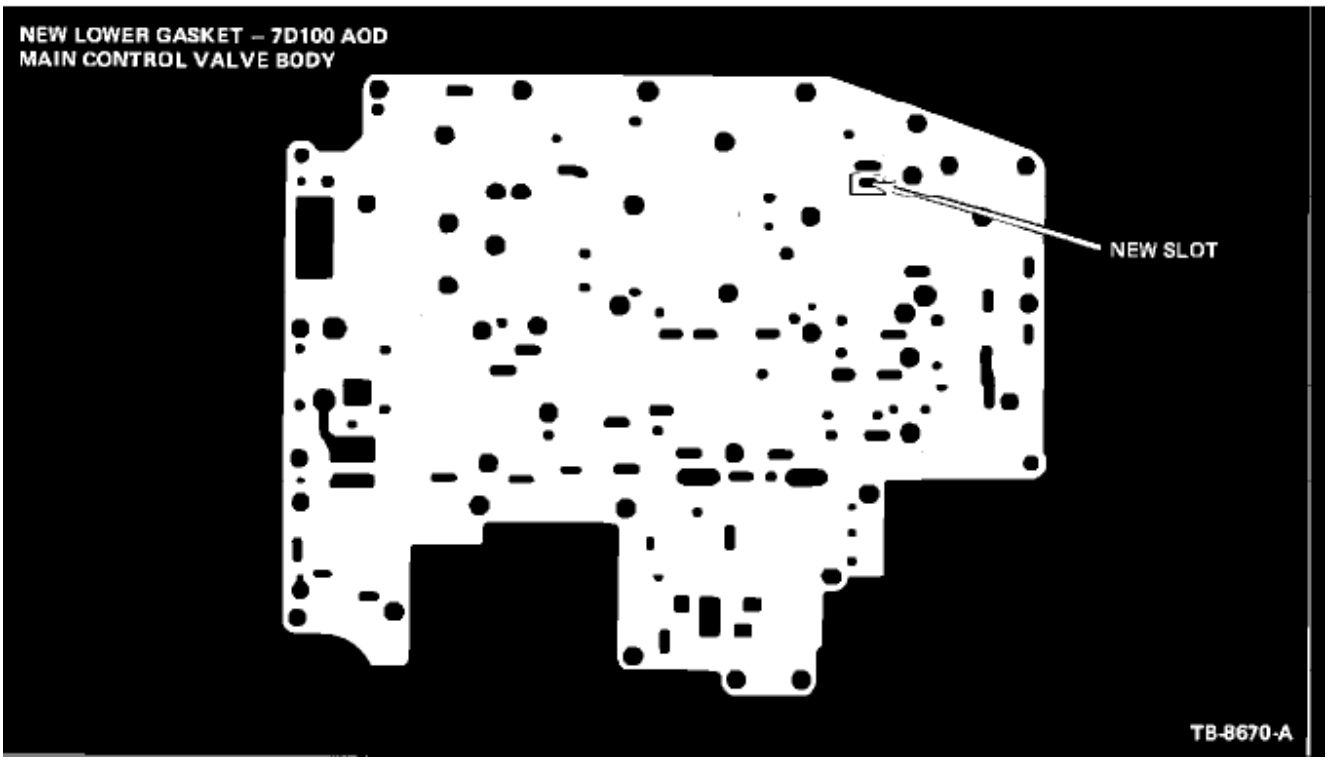
OTHER APPLICABLE ARTICLES: None WARRANTY STATUS: Reimbursable within the provisions of the Warranty and Policy Manual. OPERATION: SP7248A85 TIME:

3.4 Hrs. - Mustang/Capri, LTD/Marquis, Thunderbird/Cougar, Mark VII/Continental

2.8 Hrs. - Ford, Mercury, Lincoln 3.0 Hrs. - 4x2 F Series 4.9L/5.0L 2.7 Hrs. - 4x2 Econoline 4.9L/5.0L 4.3 Hrs. - 4x4 F Series and Bronco 5.0L OPERATION: SP7248B85 - Supplement extra time if equipped with skid plate under the transfer case TIME:

0.2 Hr. DLR. CODING: Basic Part No. 7A248 - Code: 77





Seals and Gaskets: Technical Service Bulletins A/T - AOD Main Control Valve Body Gasket

Article No. 86-13-17

TRANSMISSION - AUTOMATIC - AOD - MAIN CONTROL VALVE BODY GASKETS

FORD 1980-86 FORD, THUNDERBIRD, LTD, MUSTANG

LINCOLN-MERCURY 1980-83 MARK VI; 1980-86 MERCURY, COUGAR, MARQUIS, CAPRI, LINCOLN, CONTINENTAL; 1984-86 MARK VII

LIGHT TRUCK 1981-86 E SERIES, F SERIES, BRONCO

Figure 11

Figure 12

New upper and lower main control valve body gaskets have been released for service. The new gasket has an additional slot, which reduces the chance for contamination of the 3-4 shift valve (refer to Figures 11 and 12). The new gaskets can be used on all AOD main control valve bodies produced for the 1980-86 model years.

Old upper and lower main control valve body gaskets (EOAZ-7D100-B and EOAZ-7C155-A) may still be used on certain applications. To identify the correct application, the middle letter of the main control valve body's three-letter I.D. code is necessary. Refer to the following service usage chart for the correct gasket applications.

SERVICE USAGE CHART FOR AOD MAIN CONTROL VALVE BODY GASKETS

AOD Valve Body Old Gaskets New Gaskets

I.D. Codes EOAZ-7D100-B E6AZ-7D100-A

(Middle Letter) EOAZ-7C155-A E6AZ-7C155-A

A, B, C, D, E Acceptable

Acceptable

T, U, V, W, X, Y, Z

All other than above Must NOT Use Must Use

(For example: main controls with middle letter I.D. code F, G, H, . . . Q, R, S)

OTHER APPLICABLE ARTICLES: None WARRANTY STATUS: "INFORMATION ONLY"

GASKET APPLICATION CHART			
PART NUMBER	PART NAME	MODEL YR. USAGE	REMARKS
E9AZ-7D100-B	Main Control Gasket Kit	1980-1989	Kit contains three throttle valve springs and selection instructions.
F0AZ-7D100-A	Separator Plate Lower Gasket	1990	Only use on 1990 vehicles.
E9SZ-7C155-A	Main Control Upper Separator Gasket	1980-1990	Must be ordered individually.

Valve Body: Technical Service Bulletins A/T - AOD Separator Plate Gasket Changes

TRANSMISSION - AOD - MAIN CONTROL GASKET CHANGES AFFECTING USAGE OF SERVICE KITS Article No. 89-23-7 FORD:

1980-90 CROWN VICTORIA 1980-86 LTD 1980-90 THUNDERBIRD 1985-90 MUSTANG

LINCOLN-MERCURY: 1980-87 CONTINENTAL 1980-90 COUGAR, GRAND MARQUIS 1980-83 MARK VI 1980-90 TOWN CAR 1984-90 MARK VII 1985 CAPRI, MARQUIS

LIGHT TRUCK: 1981-90 BRONCO, ECONOLINE, F-150, F-250

ISSUE: The separator plate lower gasket from the current gasket service kit (7153) and overhaul service kit (7C391) cannot be used on any 1990 model vehicles.

ACTION: When servicing 1990 AOD transmissions the separator plate lower gasket found in the current kits must be thrown away and replaced with a new gasket (F0AZ-7D100-A). This new gasket can only be used on 1990 vehicles.

CAUTION: USE OF THE SEPARATOR PLATE LOWER GASKET CONTAINED IN THE CURRENT KITS ON 1990 VEHICLES COULD

CAUSE A REDUCTION IN THROTTLE VALVE PRESSURE. THIS CAN RESULT IN POSSIBLE TRANSMISSION FAILURES.

In the near future, gasket and overhaul kits will no longer contain any main control gaskets. Two main control lower separator plate gasket items will be available. Refer to the following gasket application chart for correct service part usage.

PART NUMBER PART NAME CLASS

E9AZ-7D100-B Main Control Gasket Kit B

FOAZ-7D100-A Separator Plate Lower Gasket B

E9SZ-7C155-A Main Control Upper Separator B

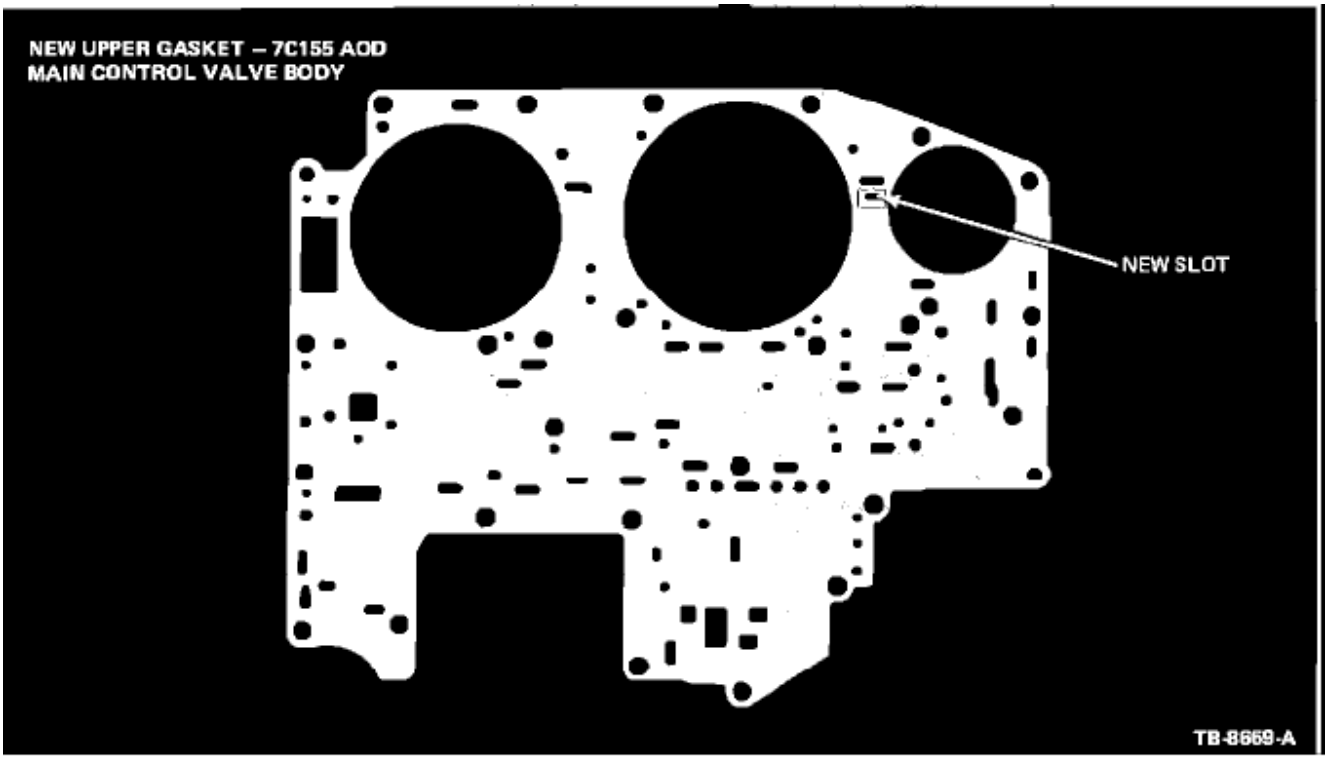
Plate Gasket

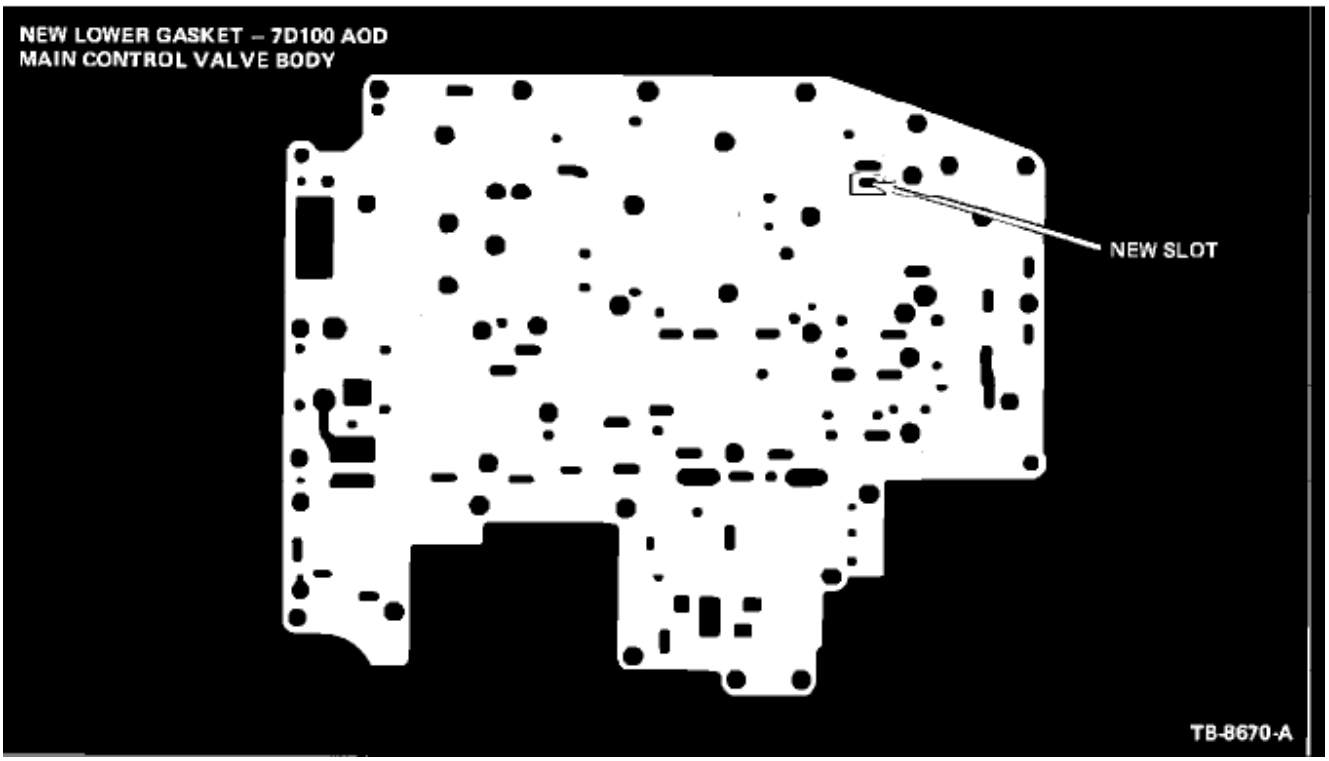
OTHER APPLICABLE ARTICLES: none

SUPERSEDES: 88-13-6

WARRANTY STATUS: INFORMATION ONLY

OASIS CODES: 5100, 5101, 5102, 5200, 5300, 5500, 5800





Valve Body: Technical Service Bulletins A/T - AOD Main Control Valve Body Gasket

Article No. 86-13-17

TRANSMISSION - AUTOMATIC - AOD - MAIN CONTROL VALVE BODY GASKETS

FORD 1980-86 FORD, THUNDERBIRD, LTD, MUSTANG

LINCOLN-MERCURY 1980-83 MARK VI; 1980-86 MERCURY, COUGAR, MARQUIS, CAPRI, LINCOLN, CONTINENTAL; 1984-86 MARK VII

LIGHT TRUCK 1981-86 E SERIES, F SERIES, BRONCO

Figure 11

Figure 12

New upper and lower main control valve body gaskets have been released for service. The new gasket has an additional slot, which reduces the chance for contamination of the 3-4 shift valve (refer to Figures 11 and 12). The new gaskets can be used on all AOD main control valve bodies produced for the 1980-86 model years.

Old upper and lower main control valve body gaskets (EOAZ-7D100-B and EOAZ-7C155-A) may still be used on certain applications. To identify the correct application, the middle letter of the main control valve body's three-letter I.D. code is necessary. Refer to the following service usage chart for the correct gasket applications.

SERVICE USAGE CHART FOR AOD MAIN CONTROL VALVE BODY GASKETS

AOD Valve Body Old Gaskets New Gaskets

I.D. Codes EOAZ-7D100-B E6AZ-7D100-A

(Middle Letter) EOAZ-7C155-A E6AZ-7C155-A

A, B, C, D, E Acceptable

Acceptable

T, U, V, W, X, Y, Z

All other than above Must NOT Use Must Use

(For example: main controls with middle letter I.D. code F, G, H, . . . Q, R, S)

OTHER APPLICABLE ARTICLES: None WARRANTY STATUS: "INFORMATION ONLY"

Valve Body: Technical Service Bulletins A/T - AOD Orifice Control Valve Plug Retainer

Article No. 85-14-7

TRANSMISSION - AUTOMATIC - AOD - ORIFICE CONTROL VALVE PLUG RETAINER CHANGE

FORD 1980-85 FORD, THUNDERBIRD, LTD, MUSTANG

LINCOLN-MERCURY 1980-85 MERCURY, COUGAR, MARQUIS, CAPRI, LINCOLN, MARK, CONTINENTAL

LIGHT TRUCK 1981-85 E & F SERIES - BRONCO

An improved plug retainer design is available for the orifice control valve bore plug in the AOD main control valve body assembly. A retainer plate (E5AZ-7E335-A) replaces the hairpin clip.

NOTE: Whenever the AOD main control valve body is disassembled for service, replace the hairpin clip with the retainer plate. For location of the orifice control valve bore, refer to the AOD main control assembly/disassembly section of the Car or Truck Shop Manual.

PART NUMBER PART NAME CLASS

E5AZ-7E335-A Retainer Plate R

OTHER APPLICABLE ARTICLES: NONE WARRANTY STATUS: "INFORMATION ONLY"

Clutch Pedal Assembly: Adjustments

NOTE: Clutch pedal total travel is not adjustable on these models.

1. Check clutch pedal free travel by measuring distance from clutch pedal pad to steering wheel rim, then depress clutch pedal until free travel is

diminished and take a second measurement. If the difference between the two measurements is less than 1/2 inch, the clutch linkage must be adjusted.

2. Loosen and back off the two jam nuts several turns, then adjust the first jam nut until a free travel measurement of 1 and 1/2 inches is obtained at

the clutch pedal.

3. While holding the second jam nut, tighten the first jam nut against the second one. 4. Recheck free pedal travel and readjust as necessary.

Clutch Switch: Locations

At Top Of Clutch Pedal

Clutch Switch: Testing and Inspection

Manual Transmission Vehicles Only This switch functions magnetically. Do not use magnetized tools near this switch.

1. If the switch is open when the clutch pedal is released, speed control will not operate. This must be corrected before making any other tests. Use only a multimeter of 5000 ohm/volt rating or higher when performing the clutch switch test.

2. Disconnect switch pigtail connector from speed control harness connector and connect an ohmmeter to the two switch connector terminals.

3. With clutch pedal in the fully released position, the resistance should be less than 5 ohms. With clutch pedal fully depressed, the circuit should be open.

4. If switch does not function as described, remove and replace switch.

Ford Bronco Workshop Manual (V8-351 5.8L VIN G 2-bbl (1982))
Ford Workshop Manuals > Transmission and Drivetrain > Clutch, M/T > Clutch Release Bearing, M/T > Component Information > Technical Service Bulletins > Customer Interest for Clutch Release Bearing: > 85214 > Jan > 85 > Clutch - Release Bearing Squeak/Scrape

Clutch Release Bearing: Customer Interest Clutch - Release Bearing Squeak/Scrape

Article No. 85-2-14

CLUTCH - RELEASE BEARING SQUEAK/SCRAPE

LIGHT TRUCKS 1982-83 E & F150-350, BRONCO

The concern is usually characterized by a squeal which occurs with the engine running and light pressure applied to the clutch pedal. The squeal stops when greater force is applied to the pedal, which occurs when disengaging the clutch. Under light pedal pressure, the release bearing load is insufficient to overcome the friction of the stationary bearing, and metal to metal squeal/scrape results between the bearing and the rotating pressure plate. Under greater axial loads, the bearing rotates with the pressure plate, and the squeal stops.

Major factors which tend to increase the tendency for a release bearing to squeal are as follows: 1.

Insufficient free play.

2. Lack of clutch housing concentricity and parallelism.

3. Out of plane pressure fingers.

The recommended respective diagnostic/service procedure for the above factors are as follows: 1.

Check clutch linkage free play per Section 16-03 of 1983 Light Truck Shop Manual.

2. Check clutch housing bore and face run out per Shop Manual procedure Section 16-01.

3. Check pressure plate finger heights per Shop Manual procedure Section 16-01.

Replace bearing if all of the above have been investigated and found acceptable. Customers also should be advised that light pedal pressure may result in squeal at the onset of clutch engagement with the free play type clutch linkage system.

OTHER APPLICABLE ARTICLES: None WARRANTY STATUS: Reimbursable within the provisions of the Warranty and Policy Manual. OPERATION: SP7003D83 TIME:

0.8 Hr. (Plus applicable standard times) DLR. CODING: Basic Part No. 7580 Code: 56

Ford Bronco Workshop Manual (V8-351 5.8L VIN G 2-bbl (1982))
Ford Workshop Manuals > Transmission and Drivetrain > Clutch, M/T > Clutch Release Bearing, M/T > Component Information > Technical Service Bulletins > All Technical Service Bulletins for Clutch Release Bearing: > 85214 > Jan > 85 > Clutch - Release Bearing Squeak/Scrape

Clutch Release Bearing: All Technical Service Bulletins Clutch - Release Bearing Squeak/Scrape

Article No. 85-2-14

CLUTCH - RELEASE BEARING SQUEAK/SCRAPE

LIGHT TRUCKS 1982-83 E & F150-350, BRONCO

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Replace bearing if all of the above have been investigated and found acceptable. Customers also should be advised that light pedal pressure may result in squeal at the onset of clutch engagement with the free play type clutch linkage system.

OTHER APPLICABLE ARTICLES: None WARRANTY STATUS: Reimbursable within the provisions of the Warranty and Policy Manual. OPERATION: SP7003D83 TIME:

0.8 Hr. (Plus applicable standard times) DLR. CODING: Basic Part No. 7580 Code: 56

Carrier Bearings: Testing and Inspection Bearing Cups

Check bearing cups for rings, spalling, galling or erratic wear patterns. The bearing cups must be solidly seated. Check by attempting to insert .0015 inch feeler gauge between cups and bottoms of bores.

Carrier Bearings: Testing and Inspection Cone & Roller Assemblies

When operated in the cups, the cone and roller assemblies must turn without any roughness. Examine roller ends for wear.

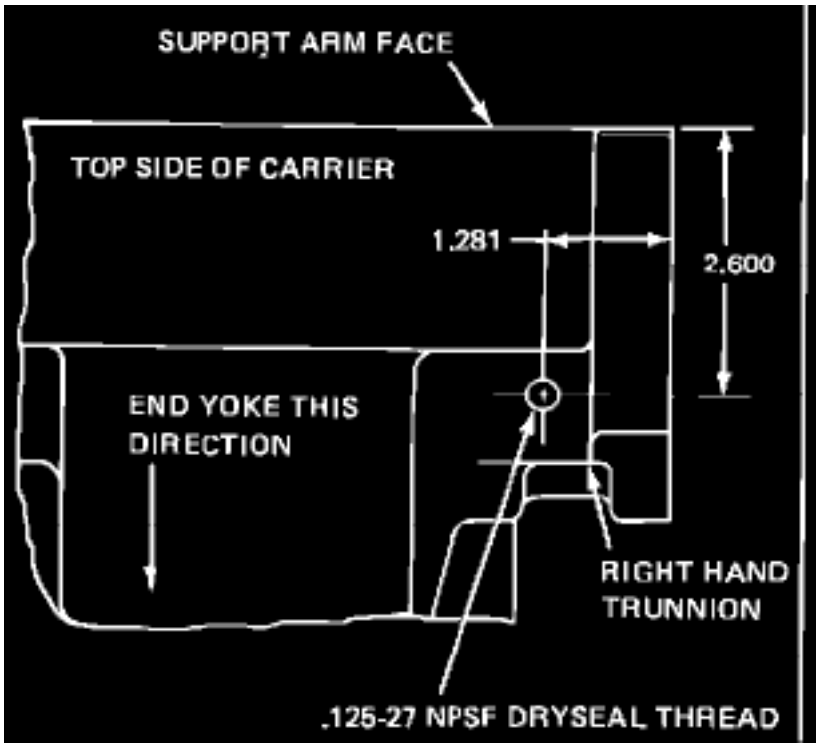
Carrier Bearings: Testing and Inspection Differential Bearing Adjusters

Test fit of bearing adjusters in their threads with bearing caps installed. Ensure that bearing caps are on sides that they were machined to fit. The faces of the adjusters that contact the bearing cups must be smooth and square. Examine threads in carrier if their fit is not proper and replace any adjuster with a damaged face or threads.

Carrier Side Gears: Testing and Inspection

Examine drive pinion and ring gear teeth for scoring or signs of excessive wear. Worn gears cannot be rebuilt to correct a noisy condition. Gear scoring and flaking are the result of excessive shock loading or the use of improper lubricant. Scored gears cannot be reused.

Examine teeth and thrust surfaces of differential gears. Wear on hub of differential side gears may cause a chucking noise known as chuckle, when the vehicle is operated at low speeds. Wear of splines, thrust surfaces or thrust washers may contribute to excessive drive line backlash.



Differential Case: Customer Interest Front Drive Axle - Leaks Lubricant From Vent

Article No. ^ AXLE - FRONT - LEAKS LUBRICANT FROM AXLE

87-12-18 VENT - DANA MODEL 44 IFS AND 50 IFS CARRIERS

^ LEAKS - LUBRICANT - FRONT AXLE VENT - DANA MODEL 44 IFS AND 50 IFS CARRIERS

LIGHT TRUCK: 1980-87 F SERIES, BRONCO

ISSUE: Lubricant leaking from the axle vent on Dana Model 44 IFS or 50 IFS front drive axle carriers may be caused by an obstructed or mislocated axle vent or vent hose.

ACTION: To correct this, check to make sure the axle vent and the vent hose is not blocked. If they are clear, modify and/or relocate the axle vent using the following service procedure.

1. Remove vent hose from axle vent.

2. Remove axle vent from carrier assembly.

3. Drill out the existing 1/16" axle vent hole in axle vent with a 1/8" drill.

4. Reassemble axle vent to carrier assembly. Reconnect rubber vent hose to axle vent.

NOTE: Make sure vent hose is not plugged.

5. Test drive vehicle. If lubricant leaks continue after performing Steps 1 through 4, relocate the axle vent as described in Part 11.

6. Remove carrier assembly from vehicle and support arm. Refer to the appropriate Light Truck Shop Manual.

7. Remove right hand axle shaft and differential case assembly from carrier. Remove right hand trunnion seal and right hand needle bearing assembly.

Figure 29 - Article 87-12-18

8. Drill an 11/32" (.343) diameter hole in right hand trunnion (passenger side) of carrier. Locate hole as shown in Figure 29.

9. Tap hole with a .125-27 NPSF Dryseal thread.

CAUTION: DURING DRILLING AND TAPPING OPERATION, CARE SHOULD BE USED TO MAKE SURE THAT ALL METAL CHIPS

ARE REMOVED FROM THE CARRIER AND THAT THEY DO NOT ENTER OTHER COMPONENTS, (e.g., bearings and oil seals).

10. Install a .125-27 NPSF pipe plug in old vent hole.

11. Reassemble differential case assembly into carrier. Assemble new axle shaft bearing and seal in carrier trunnion. Assemble remaining components

and install in vehicle.

12. Install axle vent into new hole that was drilled and tapped in the above steps. Reconnect rubber vent hose to axle vent.

NOTE: Make sure vent hose is not plugged.

13. Fill axle assembly with Hypoid Gear Lubricant (C6AZ-19580-E).

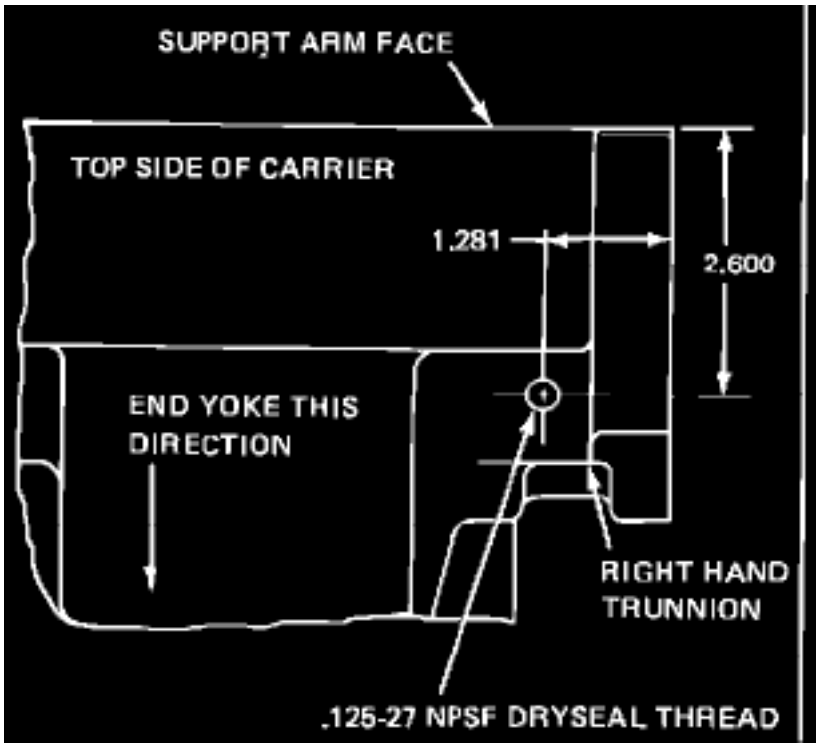
NOTE: Make sure vehicle is level. Do not overfill axle assembly. ONLY GL6 (C6AZ-19850-E) Lubricant should be, used. Use of lesser quality lubricants (i.e., GL4, GL5) may cause premature wear of the axle carrier. Limited slip carriers must have friction modifier added.

OTHER APPLICABLE ARTICLES: None

WARRANTY STATUS: Reimbursable within the provisions of the Warranty and Policy Manual

OPERATION: SP871218A - Steps 1-5 TIME: 0.6 Hr.

OPERATION: SP871218B - Steps 6-13 TIME: 2.8 Hrs. Use "M" time for auxiliary equipment such as snow plow frames. DLR. CODING: Basic Part No. 3010 - Code: 77



Differential Case: All Technical Service Bulletins Front Drive Axle - Leaks Lubricant From Vent

Article No. ^ AXLE - FRONT - LEAKS LUBRICANT FROM AXLE

87-12-18 VENT - DANA MODEL 44 IFS AND 50 IFS CARRIERS

^ LEAKS - LUBRICANT - FRONT AXLE VENT - DANA MODEL 44 IFS AND 50 IFS CARRIERS

LIGHT TRUCK: 1980-87 F SERIES, BRONCO

ISSUE: Lubricant leaking from the axle vent on Dana Model 44 IFS or 50 IFS front drive axle carriers may be caused by an obstructed or mislocated axle vent or vent hose.

ACTION: To correct this, check to make sure the axle vent and the vent hose is not blocked. If they are clear, modify and/or relocate the axle vent using the following service procedure.

1. Remove vent hose from axle vent.

2. Remove axle vent from carrier assembly.

3. Drill out the existing 1/16" axle vent hole in axle vent with a 1/8" drill.

4. Reassemble axle vent to carrier assembly. Reconnect rubber vent hose to axle vent.

NOTE: Make sure vent hose is not plugged.

5. Test drive vehicle. If lubricant leaks continue after performing Steps 1 through 4, relocate the axle vent as described in Part 11.

6. Remove carrier assembly from vehicle and support arm. Refer to the appropriate Light Truck Shop Manual.

7. Remove right hand axle shaft and differential case assembly from carrier. Remove right hand trunnion seal and right hand needle bearing assembly.

Figure 29 - Article 87-12-18

8. Drill an 11/32" (.343) diameter hole in right hand trunnion (passenger side) of carrier. Locate hole as shown in Figure 29.

9. Tap hole with a .125-27 NPSF Dryseal thread.

CAUTION: DURING DRILLING AND TAPPING OPERATION, CARE SHOULD BE USED TO MAKE SURE THAT ALL METAL CHIPS

ARE REMOVED FROM THE CARRIER AND THAT THEY DO NOT ENTER OTHER COMPONENTS, (e.g., bearings and oil seals).

10. Install a .125-27 NPSF pipe plug in old vent hole.

11. Reassemble differential case assembly into carrier. Assemble new axle shaft bearing and seal in carrier trunnion. Assemble remaining components

and install in vehicle.

12. Install axle vent into new hole that was drilled and tapped in the above steps. Reconnect rubber vent hose to axle vent.

NOTE: Make sure vent hose is not plugged.

13. Fill axle assembly with Hypoid Gear Lubricant (C6AZ-19580-E).

NOTE: Make sure vehicle is level. Do not overfill axle assembly. ONLY GL6 (C6AZ-19850-E) Lubricant should be, used. Use of lesser quality lubricants (i.e., GL4, GL5) may cause premature wear of the axle carrier. Limited slip carriers must have friction modifier added.

OTHER APPLICABLE ARTICLES: None

WARRANTY STATUS: Reimbursable within the provisions of the Warranty and Policy Manual

OPERATION: SP871218A - Steps 1-5 TIME: 0.6 Hr.

OPERATION: SP871218B - Steps 6-13 TIME: 2.8 Hrs. Use "M" time for auxiliary equipment such as snow plow frames. DLR. CODING: Basic Part No. 3010 - Code: 77

Differential Case: Testing and Inspection

Ensure that hubs where bearings mount are smooth. Check fit of differential gears in the counterbores. Carefully examine thrust washers, which may be damaged when bearings are removed. If differential bearing assemblies do not seat firmly on hubs, failure is certain. Ensure that mating surfaces of the two parts of case and the face of the ring gear attaching flange are smooth and free from nicks and burrs.

Differential Case: Adjustments

1. Attach ring gear to the differential case using new bolts. Torque bolts alternately and evenly to 50---60 ft. lbs. on except model 60 monobeam axle or 100-120 ft. lbs on model 60 monobeam axle.

2. Clean trunnions on the differential and install the master differential bearings on to differential case. Remove all burrs and nicks from hubs so master bearings rotate freely.

3. Place differential case into carrier (without pinion). The differential case should move freely in the carrier assembly. Position a suitable dial indicator against differential case flanges. Locate tip of the indicator on the flat surface of one ring gear bolt. Force the differential case toward the dial indicator as far as possible and zero dial indicator with force still applied. Dial indicator should have a minimum of .200 inch travel. Force differential case away from the dial indicator as far as it will go. Repeat this procedure until the same reading is obtained. Record dial indicator reading. This reading indicates the amount of shims needed behind the differential side bearings to take up total clearance between the differential bearing and case. This reading will be used during pinion and ring gear backlash adjustment.

4. Remove differential case from the carrier. Do not remove the master differential bearings at this time.

Differential Case: Service and Repair

For limited slip & locking differential assemblies, refer to ``Ford Drive Axle w/Integral Carrier'' section for assembly procedures. For adjustment procedures on these differentials, refer to step 9 in this procedure.

1. Install differential case in a vise, then apply suitable lubricant to side gear thrust washers and to hubs and thrust face of the new side gears.

2. Assemble both side gears and apply suitable lubricant to the spherical washers and pinion mate gears, then assemble pinion mate gears and washers.

3. Install both side gears and thrust washers, then the pinion mate gears and washers to hold side gears in position.

4. Rotate side gears until holes of washers and pinion gears line up with holes of the case. If gears cannot be rotated by hand, install one of the axle shafts into the side gear spline and use a pipe wrench to turn shaft.

5. Line up gear holes with those of the differential case using a suitable drift, then install pinion mate shaft. Ensure lock pin hole of shaft is lined up with lock pin hole of case.

6. Install lock pin, then peen metal of case over pin to lock in position. The semi-float shaft riding bearing design uses a locking pin that is

installed using a suitable wrench. Use a new lock pin and assemble finger tight. This prevents differential side gears and differential pinion mate gears from rotating in the case and dropping out when servicing the carrier section. A new lock pin should be installed after assembling the axle shafts.

7. Install ring gear to case, then the ring gear attaching screws. Torque ring gear attaching screws alternately to approximately 115 ft. lbs. on except model 30 axle or 45---60 ft. lbs on model 30 axle.

8. Install differential bearings onto case using suitable tool.

9. Install differential case assembly into carrier, less pinion, then mount suitable dial indicator on face of housing.

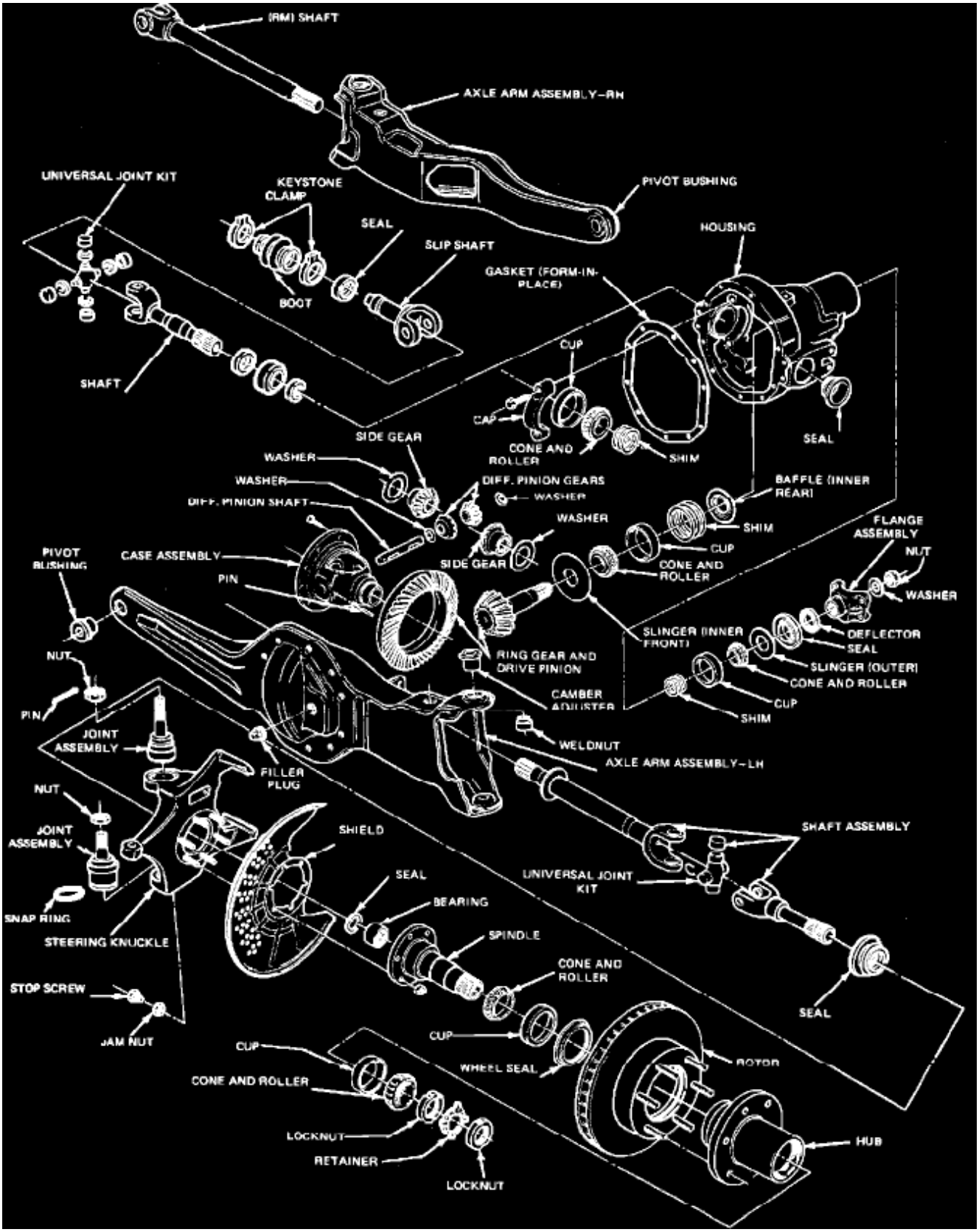
10. Locate tip of indicator on flat surface of one of the ring gear screw spot faces, then force differential assembly as far as possible in the direction towards the indicator. With force still applied, set indicator at zero.

11. Force differential assembly as far as it will go in the opposite direction. Repeat this step until the same reading is obtained, then record this reading.

This reading will be the total amount of shims required, less preload, and will be calculated later during assembly.

12. Remove indicator and differential assembly from housing. Do not remove bearings from differential case at this time.

Ford Bronco Workshop Manual (V8-351 5.8L VIN G 2-bbl (1982))
Ford Workshop Manuals > Transmission and Drivetrain > Differential Assembly > Differential Axle Housing > Component Information > Service and Repair > Front Axle Assembly Replace



Differential Axle Housing: Service and Repair Front Axle Assembly Replace

F-150 & BRONCO

1. Raise front of vehicle and support with safety stands under radius arm brackets.

2. On 1980 models, drain fluid from differential.

3. On all models, remove front tires and brake calipers. Position calipers aside, leaving brake lines attached. Do not allow weight of calipers to hang on brake lines.

4. On 1980 models, remove wheel hub and rotor assemblies, spindles, splash shields and axle shafts.

5. On all models, support axle arm assembly with a suitable jack and remove upper coil spring retainers. Carefully lower jack and remove coil springs, spring cushions and lower spring seats. The axle must be supported when removing springs and not be permitted to hang by brake hose. If length of brake hose is not sufficient to permit spring removal, it will be necessary to remove the disc brake caliper. Do not suspend caliper by brake hose, if removed.

Fig. 1 Four wheel drive front axle assembly. 1980---87 F-150 & Bronco (similar to other 1980---87 models exc. 1986---87 F-350 w/Dana 60 Monobeam axle)

6. Remove shock absorbers.

7. On 1980 models, remove upper and lower ball joint nuts and steering knuckle.

8. On all models, remove stud and spring seat from radius arm and axle arm, then the lower radius arm to axle arm attaching bolt.

9. Disconnect vent tube from left axle arm assembly on 1980 models, or from differential housing on 1981---87 models. Discard hose clamps. On 1981---87 models, remove vent fitting from differential housing and install a 1/8 inch pipe plug.

10. Remove right axle arm to crossmember pivot bolt.

11. On 1984---87 models, remove right axle shaft boot and discard boot clamps.

12. On all models, remove right drive axle assembly, and on 1981---87 models, slide axle shaft out of slip shaft.

13. Support differential housing with a suitable jack.

14. On 1980 models, remove differential retaining bolts.

15. On all models, remove left drive axle assembly attaching bolts and the axle assembly, Fig. 1.

16. Reverse procedure to install.

F-250---350 EXC. 1986---87 F-350 W/DANA 60 MONOBEAM AXLE

1. Raise and support front of vehicle.

2. On 1980 models, drain fluid from differential.

3. On all models, remove front tires and brake calipers. Position calipers aside, leaving brake lines attached. Do not allow weight of calipers to hang on brake lines.

4. On 1980 models, remove hub and rotor assemblies, spindles, splash shields and axle shafts.

5. On all models, support right axle assembly with a suitable jack and remove 2 U-bolts attaching shock absorber mounting plate and leaf spring to axle assembly.

6. On 1980 models, remove upper and lower ball joint nuts and steering knuckle.

7. On all models, disconnect vent tube, from left axle arm assembly on 1980 models, or from differential housing on 1981---87 models. On 1981---87 models, remove vent fitting from differential housing and install a 1/8 inch pipe plug.

8. Remove right axle assembly to crossmember pivot bolt and the axle assembly.

9. On 1984---87 models, remove right axle shaft boot and discard boot clamps.

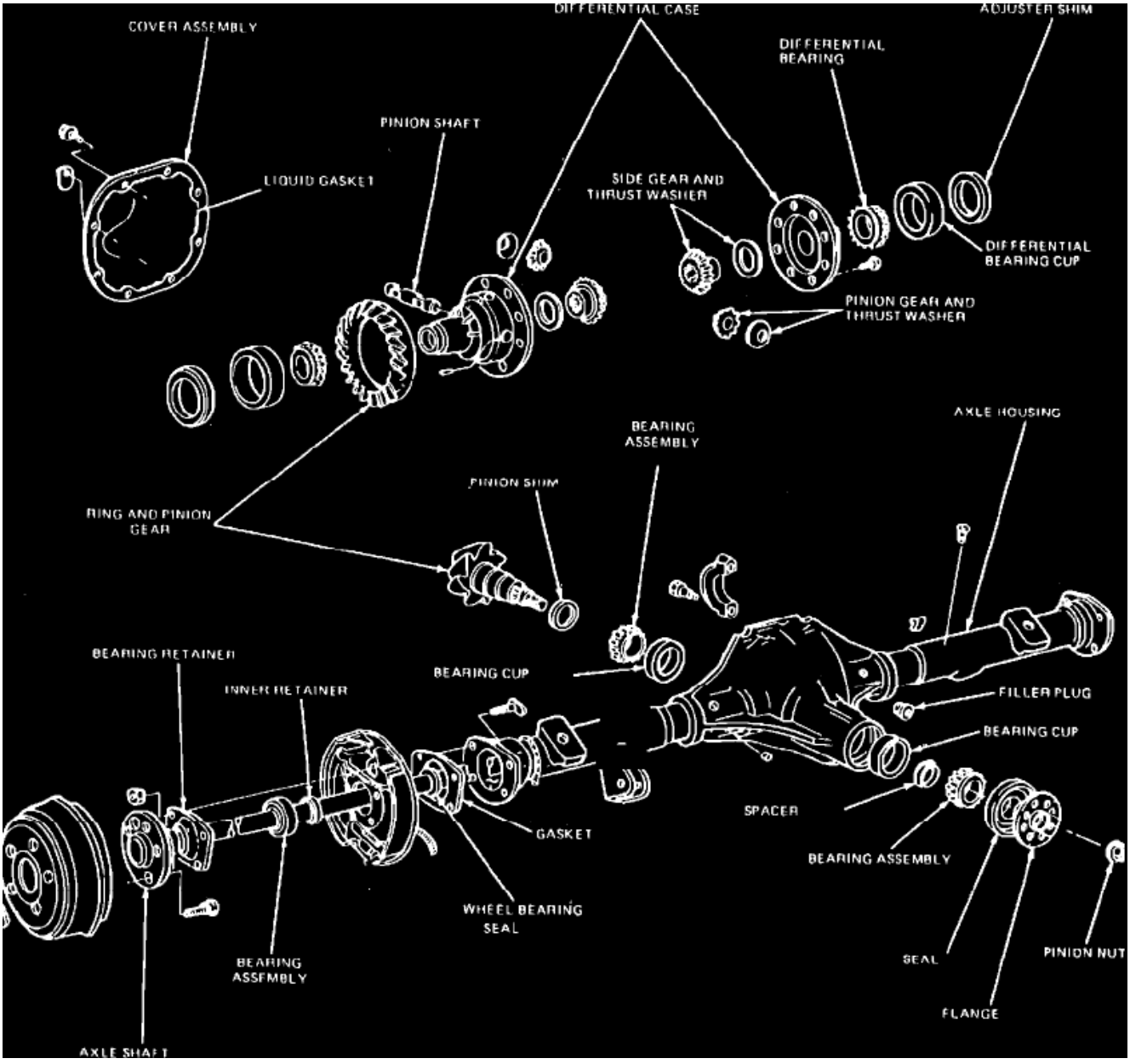
10. On 1981---87 models, slide axle shaft out of slip shaft.

11. On all models, support left axle arm assembly with a suitable jack and remove 2 U-bolts attaching shock absorber mounting plate and leaf spring to axle assembly.

12. On 1980 models, remove steering knuckle from left axle arm assembly.

13. On all models, support differential housing with a suitable jack, then remove left axle assembly to crossmember pivot bolt and the axle assembly.

14. Reverse procedure to install.



Differential Axle Housing: Service and Repair Rear Suspension

Dana/Spicer Integral - Rear Axle Assembly

1. Raise vehicle from floor and support with stand jacks under frame side rails.

2. Remove rear wheels.

3. Split rear universal joint.

4. Disconnect parking brake cable from equalizer rod and unfasten brake cable brackets from frame crossmember.

5. Disconnect hydraulic brake line connection at rear axle housing.

6. Loosen and move shock absorbers out of the way.

7. While supporting axle housing with hydraulic jack, remove spring clips and lower axle assembly to the floor.

8. Reverse the foregoing procedure to install the rear axle assembly, being sure to bleed the brake system when the installation is completed.

Axle Disassembly, Ford Integral Carrier


NUT

Fig. 1 Disassembled view of Ford 6 3/4 inch ring gear axle

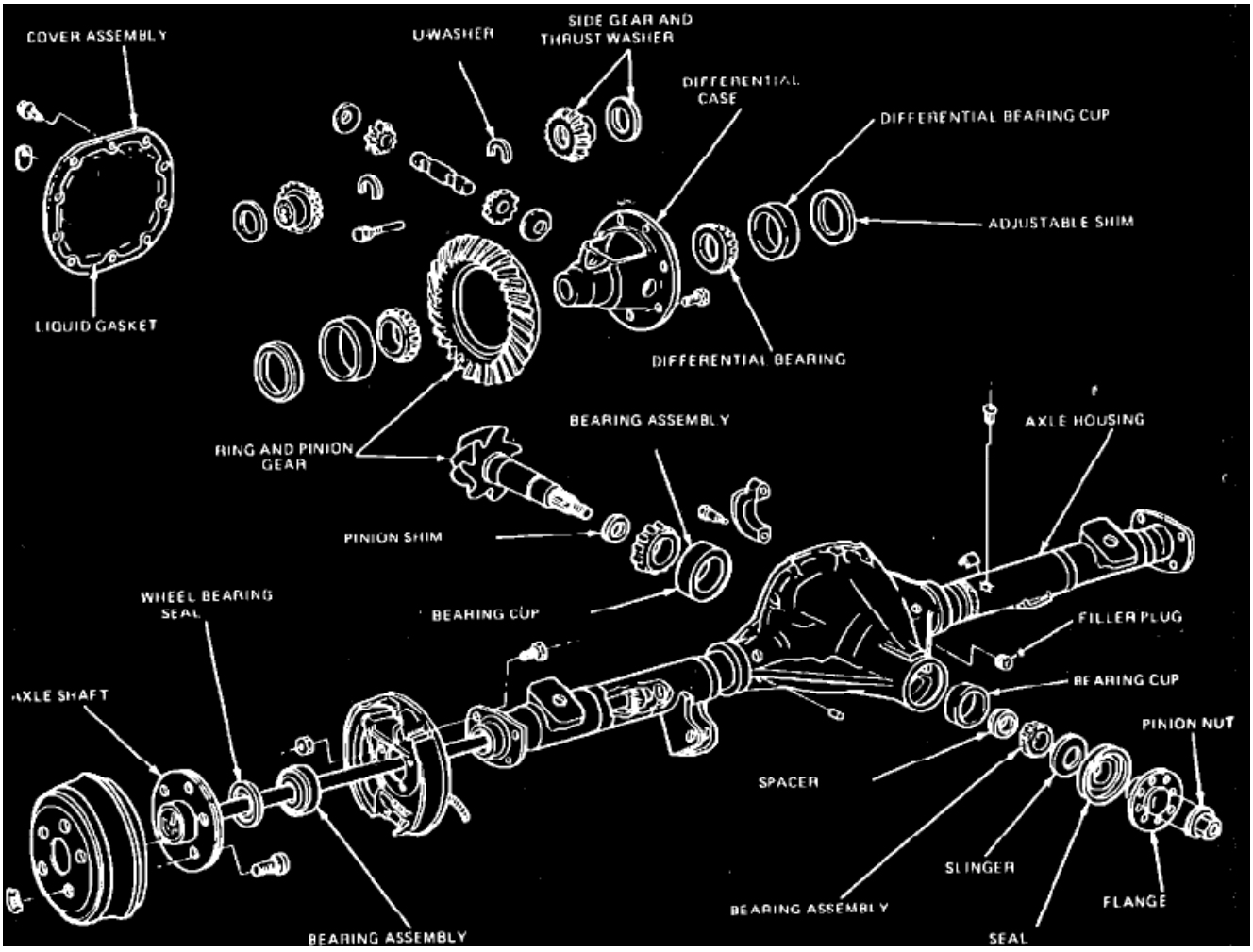
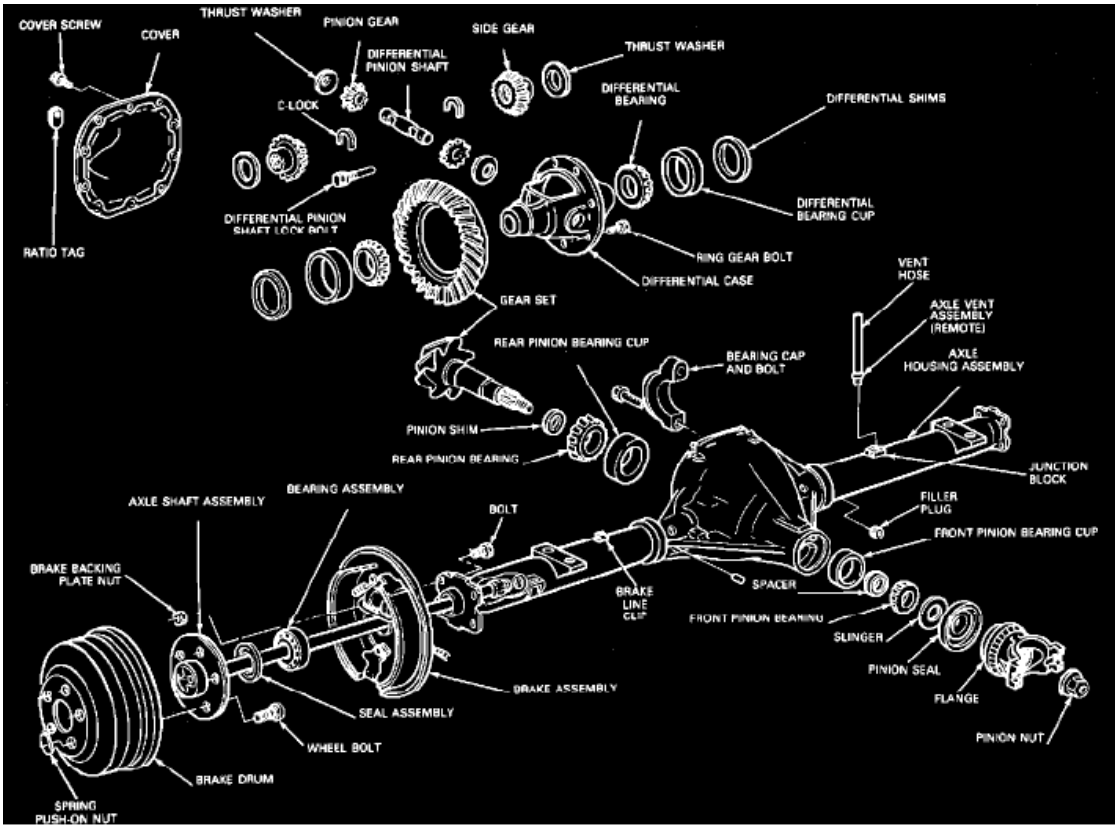


Fig. 2 Disassembled view of Ford 7 1/2 inch ring gear axle


COVER SCREW
COVER
THRUST WASHER
PINION GEAR
SIDE GEAR
THRUST WASHER
DIFFERENTIAL PINION SHAFT
C-LOCK
DIFFERENTIAL BEARING
DIFFERENTIAL SHIMS
DIFFERENTIAL PINION SHAFT LOCK BOLT
DIFFERENTIAL BEARING CUP
RATIO TAG
RING GEAR BOLT
DIFFERENTIAL CASE
VENT HOSE
AXLE VENT ASSEMBLY (REMOTE)
GEAR SET
REAR PINION BEARING CUP
BEARING CAP AND BOLT
AXLE HOUSING ASSEMBLY
PINION SHIM
REAR PINION BEARING
JUNCTION BLOCK
BEARING ASSEMBLY
AXLE SHAFT ASSEMBLY
BOLT
FILLER PLUG
FRONT PINION BEARING CUP
BRAKE BACKING PLATE NUT
SPACER
BRAKE LINE CLIP
FRONT PINION BEARING
SLINGER
PINION SEAL
BRAKE ASSEMBLY
FLANGE
SEAL ASSEMBLY
PINION NUT
WHEEL BOLT
BRAKE DRUM
SPRING PUSH-ON NUT

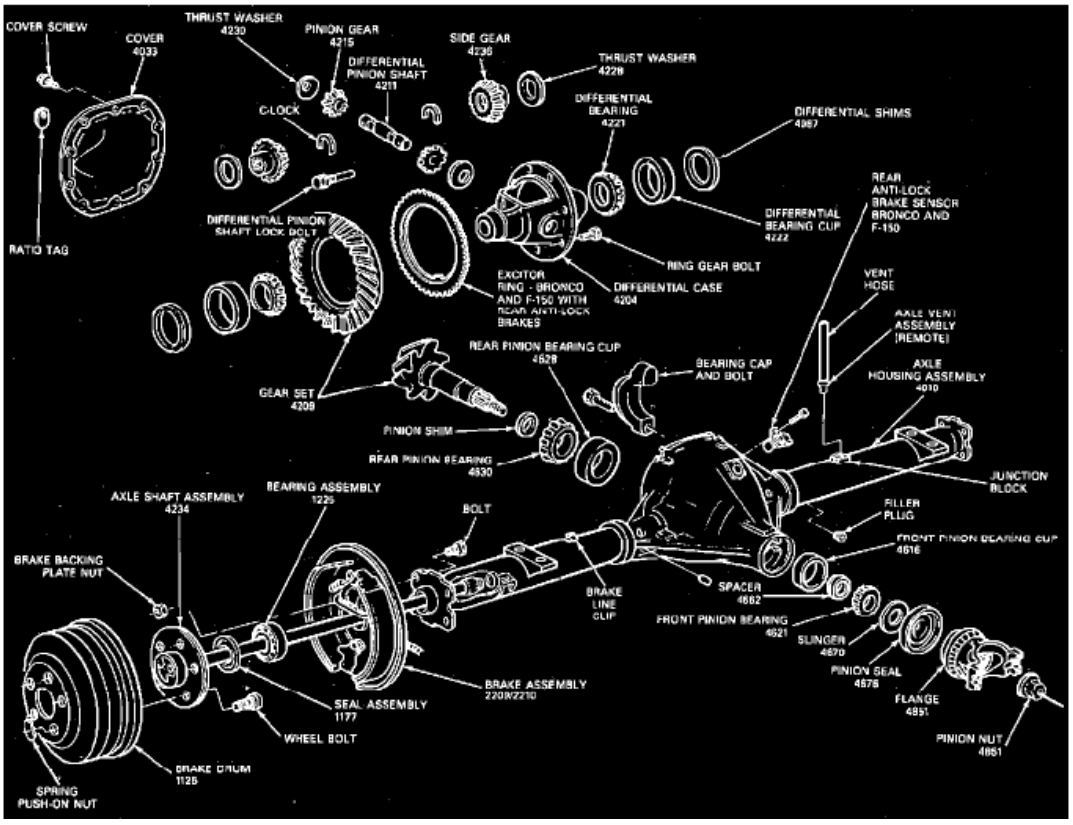

COVER SCREW
COVER 4033
THRUST WASHER 4230
PINION GEAR 4215
SIDE GEAR 4236
THRUST WASHER 4228
DIFFERENTIAL PINION SHAFT 4211
C-LOCK
DIFFERENTIAL BEARING 4221
DIFFERENTIAL SHIMS 4087
DIFFERENTIAL PINION SHAFT LOCK BOLT
DIFFERENTIAL BEARING CUP 4222
REAR ANTI-LOCK BRAKE SENSOR BRONCO AND F-150
RATIO TAG
RING GEAR BOLT
EXCITOR RING - BRONCO AND F-150 WITH REAR ANTI-LOCK BRAKES
DIFFERENTIAL CASE 4204
VENT HOSE
AXLE VENT ASSEMBLY (REMOTE)
REAR PINION BEARING CUP 4628
BEARING CAP AND BOLT
AXLE HOUSING ASSEMBLY 4010
GEAR SET 4209
PINION SHIM
REAR PINION BEARING 4630
JUNCTION BLOCK
BEARING ASSEMBLY 1225
AXLE SHAFT ASSEMBLY 4234
BOLT
FILLER PLUG
FRONT PINION BEARING CUP 4616
BRAKE BACKING PLATE NUT
SPACER 4662
BRAKE LINE CLIP
FRONT PINION BEARING 4621
SLINGER 4670
PINION SEAL 4678
BRAKE ASSEMBLY 2201/2210
FLANGE 4851
SEAL ASSEMBLY 1177
PINION NUT 4851
WHEEL BOLT
BRAKE DRUM 1126
SPRING PUSH-ON NUT

Fig. 3 Exploded view of 8.8 & 10.25 inch ring gear axles (except models w/anti-lock brakes). 8.8 inch ring gear axle shown, 10.25 inch ring gear axle similar

Fig. 4 Exploded view of 8.8 inch ring gear axles. Models w/anti-lock brakes

1. Remove axle cover, Figs. 1 through 4, then wipe lubricant from internal working parts and visually inspect parts for wear or damage.

2. Rotate gears to check for any roughness, which indicates damaged bearings or gears.

3. Check ring gear teeth for signs of scoring, abnormal wear, nicks or chips.

4. On models with 8.8 or 10.25 inch ring gear, proceed as follows:

a. Using dial indicator, check ring gear backlash and ring gear back face runout. Backlash should be .008---.015 inch and back face runout

should be under .004 inch.

b. Do not use contact pattern as a guide to check for noise. Check for proper gear set assembly using pinion depth gauge tool to determine

correct pinion shim required to ensure acceptable running condition.

5. On models with 6 3/4 or 7 1/2 inch ring gear, test ring gear runout as follows:

a. Install suitable dial indicator and zero indicator, then rotate ring gear and record reading. b. If reading exceeds .003 inch, check for improper torque of ring gear bolts or dirt between ring and case.

6. If reading still exceeds .003 inch after step 5b, diagnose ring gear runout as follows:

a. Remove ring gear. 1987 Bronco II models with anti-lock brakes use an exciter ring located on the ring gear assembly. Removal of the exciter

ring is not necessary when removing ring gear on this model.

b. On models with 6 3/4 inch ring gear, install left case on right and tap them together, then place differential cups on differential bearing cone

and roller.

c. On all models, place differential assembly in carrier casting. On models with 6 3/4 inch ring gear, two bolts and nuts must be installed to

hold case halves together.

d. Install .265 inch shim on left side as guide. e. Install left bearing cap and tighten bolts finger tight. f.

Install progressively larger shims on right side until largest shim selected can be assembled with a slight drag feel. Apply pressure toward left side to ensure that bearing cup is seated.

g. Install right side bearing cap and torque differential bearing cap bolts to 70---80 ft. lbs., then rotate assembly to ensure free rotation. h. Check runout of differential case flange with dial indicator. If runout is within .003 inch, install new ring and pinion gear. If runout exceeds

specifications, trouble is due to either a damaged case or worn bearings.

i. Remove differential case from carrier and the differential bearings from case.

j. Install new differential bearings on case hubs and install differential assembly in carrier less ring gear.

k. Check case runout. If runout is within .003 inch, use new bearings for reassembly. If runout is still excessive, case is damaged and must be

replaced.

7. Remove axle shafts.

8. Mark relationship of driveshaft end yoke and axle companion flange for proper assembly, then disconnect driveshaft at rear axle universal joint.

9. Install inch pound torque wrench on pinion nut and record torque required to maintain rotation of pinion through several turns.

10. Using suitable tools, hold companion flange and remove pinion nut.

11. Clean area around oil seal and place drain pan under seal.

12. Mark relationship of companion flange to pinion shaft for proper assembly, then, using suitable puller, remove companion flange.

13. Using suitable tool, remove pinion oil seal.

14. Mark one differential bearing cap to ensure proper positioning of caps during assembly. Do not interchange left and right bearing caps.

15. Loosen differential bearing cap bolts and bearing caps, noting direction of triangles on bearing caps for proper assembly.

16. Pry differential case, bearing cups and shims out until they are loose in bearing caps, then remove bearing caps and pry differential assembly from carrier. When using pry bar, place a wood block between pry bar and axle housing to protect casting face from damage.

17. Using suitable mallet, drive pinion out of front bearing cone and remove through rear of carrier casting.

18. Using suitable tools, remove pinion rear cone and roller bearing assembly, then, using micrometer, measure and record thickness of shim found under bearing cone.

19. Remove damaged pinion bearing cups from carrier by tapping alternately with brass drift on opposite sides of cups to prevent cups from cocking in casting.

Axle Housing, Replace, Ford Integral Carrier

1. Remove four backing plate nuts from each side of axle and wire backing plate aside.

2. Remove vent hose from vent and vent from brake junction block on rear axle housing.

3. Remove brake line from clips on axle housing and remove brake junction block. Do not open brake lines when removing junction box.

4. Support rear axle housing on suitable jack and remove U-bolt nuts and plates.

5. Disconnect lower bolts on shock absorber mounting bracket and remove housing from vehicle.

6. Reverse procedure to install. Torque U-bolt nuts to 75-100 ft. lbs. on 1983 F-100-350 & Bronco; 75-105 ft. lbs. on 1983 E-100-150 and 1984-87 E-250; 75-115 ft. lbs. on 1984-87 models exc. F-250 4 2 chassis cab and E series; 150-180 ft. lbs. on 1983 E-250 and 1983-87 E-350; and 150-210 ft. lbs. on 1983 and 1986-87 F-350 and 1984-87 F-250 4 2 chassis cab. Torque shock absorber lower bolts to 40-60 ft. lbs. on Econoline models, and 40-64 ft. lbs. on all other models. Torque backing brake attaching bolts to 20-40 ft. lbs. on F-100-150 models, and 50-70 ft. lbs. on

E-250 & F-250 models with 4050 lb. axle. No gaskets are required on brake backing plate.

Ford Removable Carrier

1. Raise and support vehicle.

2. Remove rear wheels and brake drums.

3. Remove rear wheel bearing retainer plate attaching nuts, then disconnect axle shafts from axle housing.

4. Mark driveshaft end yoke and U-joint flange for assembly reference, then disconnect driveshaft from flange. Mark position of cups to flange and remove driveshaft from transmission extension housing. Install a suitable seal installation tool into housing to prevent leakage.

5. Unfasten brake lines from retaining clips and disconnect vent tube, if equipped, from axle housing.

6. Remove brake backing plate assemblies from axle housing and wire aside.

7. Disconnect rear shock absorbers from lower mounts and position aside.

8. Lower axle slightly to reduce spring tension, then remove spring clips, U-bolt nuts and spring seat caps from each rear spring and lower axle assembly from vehicle.

9. On all models, reverse procedure to install.

DRIVETRAIN LUBRICANTS

	MANUAL TRANSMISSIONS										M/T RELATED		
	4 Spd. T18	4 Spd. NPG 435	M40D TOD	4 Spd. T19	5 Spd. TMA	5 Spd. MMC FM145	5 Spd. MMC FM146	5 Spd. R1 Mazda	5 Spd. R2 Mazda	5 Spd. ZF S5-42	Speedometer Driven Gear	Shift Lever Lower Ball End - MMC	Shift Lever Seal/Cap 435, T18, T19
1980	1	1	1								2		2
1981	1	1	1								2		2
1982	1	1	1								2		2
1983	1	1	1	1	5	1					3	2	2
1984	1	1	1	1	5	1					3	2	2
1985	1	1	1	1	5	1					3	2	2
1986	1	1	1	1	5	1					3	2	2
1987	1	1	1	1	5	1					3	2	2
1988	1						1	4	4	4	3	2	2
1989							1	4	4	4	3	2	2

LEGEND

Service Part	Description	Specification
1: D8DZ-19C547-A	Standard Transmission Lubricant	ESP M2C83C
2: C1AZ-19590-BA	Long Life Lubricant (Molybdenum Disulfide)	ESA M1CA75B
3: D0AZ-19584-AA D7AZ-19584-AA	Multi-Purpose Grease	ESR M1C159A ESB M1C93A ESB M1C106B
4: XT-2-QDX	Mercon	Mercon, Dexron II ESP-M2C166-H (Type H) ESP-M2C138-CJ (Type A)

Service Part	Description	Specification
5: E5RY-19C547-A	Merkur Synthentic Gear Oil (Dana Axles)	ESD M2C175A
6: C8AZ-19580-E	Additive Friction Modifier	ESW M2C105A
7: C8AZ-19B546-A	Disc Brake Caliper Slide Grease	EST M2C118A
8: D7AZ-19590-A		ESA M1C172A
9: E8TZ-19590-A	Grease	ESA M1C198A
10: E1TZ-19590-A	Automatic Hublock Grease	ESL M1C193 A

DRIVETRAIN LUBRICANTS

	FRONT DRIVE AXLES				TRANSFER CASE					HUBLOCKS			
	Gear Lubricants	Friction Modifier	Upper/Lower Brake Caliper Rails	Wheel and Spindle Bearings, U-Joints and Wheel End Oil Seals	BW 13-45	BW 13-50	BW 13-56	NPG 208	Shift Lever Ball End	R & B II Manual Hublock	R & B II Auto. Hublock	F & B Manual Hublock	F & B Auto. Hublock
1980	6	7	8	9	4	4	4	4	2	2	2	2	11
1981	6	7	8	9	4	4	4	4	2	2	2	2	11
1982	6	7	8	9	4	4	4	4	2	2	2	2	11
1983	6	7	8	9	4	4	4	4	2	2	2	2	11
1984	6	7	8	9	4	4	4	4	2	2	2	2	11
1985	6	7	8	9	4	4	4	4	2	2	2	2	11
1986	6	7	8	9	4	4	4	4	2	2	2	2	11
1987	6	7	8	9	4	4	4	4	2	2	2	2	11
1988	6	7	8	9	4	4	4	4	2	2	2	2	11
1989	6	7	8	9	4	4	4	4	2	2	2	2	11

LEGEND

Service Part	Description	Specification
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4: XT-2-QDX	Mercon	Mercon, Dexron II ESP-M2C166-H (Type H) ESP-M2C138-CJ (Type A)

Service Part	Description	Specification
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7: C8AZ-19B546-A	Disc Brake Caliper Slide Grease	EST M2C118A
8: D7AZ-19590-A		ESA M1C172A
9: E8TZ-19590-A	Grease	ESA M1C198A
10: E1TZ-19590-A	Automatic Hublock Grease	ESL M1C193 A

Article No. 89-8-16

^ DRIVETRAIN - LUBRICATION USAGE

^ TRANSMISSION - MANUAL - LUBRICATION USAGE

LIGHT TRUCK: 1980-89 BRONCO, ECONOLINE, F-150, F-250, F-350 1983-89 RANGER 1984-89 BRONCO II 1986-89 AEROSTAR

ISSUE: A quick reference manual transmission fluid usage chart and a quick reference drivetrain lubrication usage chart for light trucks has been put together to assist technicians in the event service is required.

FIGURE 1

FIGURE 2

ACTION: Refer to the transmission fluid application chart in Figure 1 for the correct fluid usage. Refer to the drivetrain lubrication application chart in Figure 2 for the correct lubricant usage.

PART NUMBER PART NAME CLASS

D8DZ-19C547-A Standard Transmission BG

Lubricant - 5 gallons C1AZ-19590-BA

Long Life Lubricant B

(molybdenum disulfide) - 14.5 ounces

DOAZ-19584-AA Multi-Purpose Grease - 4 ounce B

tube

D7AZ-19584-AA Multi-Purpose Grease - 15 B

ounce aerosol can

XT-2-QDX Transmission Fluid (Mercon) - V

quart can (pkg. of 12)

C6AZ-19580-E Gear Oil (Dana axle) - 1 gallon AG

C8AZ-19B546-A Additive Friction Modifier - 4 AM

ounce bottle

D7AZ-19590-A Disc Brake Caliper Slide AM

Grease - 4 ounce tube

E8TZ-19590-A Grease - 14.5 ounces B

E1TZ-19590-A Automatic Hublock Grease - 5 B

ounce tube

E5RY-19C547-A Merkur Synthetic Manual B

Transmission Fluid

OTHER APPLICABLE ARTICLES: None

WARRANTY STATUS: INFORMATION ONLY

OASIS CODES: 5970

Fluid - Differential: Technical Service Bulletins Front/Rear Drive Axles - Lubricant Drain/Fill Procedure

Article No. 83-3-23

FRONT AND REAR DRIVE AXLES - LUBRICANT DRAIN AND FILL PROCEDURE

LIGHT TRUCKS 1979-83 F100-350, BRONCO, E100-350, RANGER, BRONCO II

The following is the recommended procedure for draining axle lubricant from front and/or rear driving axles on all light truck models.

1. Drive the vehicle for 10-15 miles at highway speed to warm axle lubricant to operating temperature and minimum viscosity.

2. Raise the vehicle on a hoist and place a drain pan under the axle to be drained.

3. Wire brush the filler plug area of the axle housing cover or carrier assembly to prevent possible entry of dirt, rust, etc. into the axle assembly.

4. Remove the axle lubricant fill plug.

5. Using a suitable suction-type utility pump (manual or powered), drain the axle lubricant from the axle by inserting the pump suction hose through axle filler plug hole down into the lowest portion of the axle carrier housing removing all the lubricant.

6. Fill the axle housing with the specified amount and type of lubricant as shown on the following specification charts.

7. Install the filler plug and torque as shown on the following specification charts.

FRONT/REAR DRIVING AXLE SPECIFICATION CHARTS

I. Filler Rug Torque Chart

Axle Fill Plug Torque -

All Dana Front/Rear 20-30 Ft.Lbs.

- Ford Built Rear Axles 25-50 Ft.Lbs.

II. Axle Lubricant Capacities - Econoline

Approximate Capacity (1) U.S. Pints (2) Ford Standard and Traction-Lok

5.5 (3)

(E-100/150)

Dana Standard and Limited Slip 6.0 (4)

(E-250, Model 60/61-2)

Dana Standard and Limited Slip 6.5 (4)

(Model 70), Dual Rear Wheels

Ford Standard and Traction-Lok 5.5

(E-250 Van)

Dana Standard and Limited Slip 6.0 (4)

(Model 61-1) Single Rear Wheels

(1) Service refill capacities are determined by filling to the bottom of the filler hole.

(2) All Ford Conventional and Traction-Lok Rear Axles -

Use ESP-M2C154-A All Dana Conventional and Limited-Slip Rear Axles - Use ESW-M2C105-A

(3) Add 4 ounces of EST-M2C118-A (Friction Modifier C8AZ-19B546-A) for complete fill of Ford TractionLok axle.

(4) Add 4 ounces of EST-M2C118-A (Friction Modifier C8AZ-19B546-A) for complete refill of Dana Rear Limited-Slip Axle.

III. Axle Lubricant Capacities - Bronco Chart

Approximate Capacity (1) U.S. Pints Front Axle (5) Dana

3.8 (3)

Rear Axle (4) Ford 5.5 (2)

(1) Refill Capacity is determined by filling to the bottom of the filler hole.

(2) All Ford Conventional and Traction-Lok Rear Axles -

Use ESP-M2C154-A.

(3) All Dana Conventional and Limited-Slip Front Drive

Axles - Use ESW-M2C105-A.

(4) Add 4 ounces of EST-M2C118-A (Friction Modifier C8AZ-19B546-A) for complete fill of Ford TractionLok Axle (1979-1982).

(5) Add 2 ounces of EST-M2C118-A (Friction Modifier C8AZ-19B546-A) for complete refill of Dana Front Limited-Slip Axle.

IV. Axle Lubricant Capacities - F100 - F350 (4x2/4x4)

Approximate Capacity (1) U.S. Measure Axle Model (4)

Truck Type (Pints)

Ford 8.8" and 9" F100/150/250 5.5 (3)

Dana 44-IFS (Front Axle) F150/250 (4x4) 3.8

Dana 60 (Rear) F250 6.0

Dana 61-2 (Rear) F250 6.0

Dana 50-IFS (Front Axle) F250/350 (4x4) Heavy 4.1

Duty & Snow Plow

Dana 70 (Rear) F350 DRW Chassis Cab 6.5

Dana 70 HD (Rear) F350 DRW Regular Cab 7.4

Dana 61-1 (Rear F250/350 SRW 6.0

(1) Service refill capacities are determined by filling to the

bottom of the filler hole.

(2) Add EST-M2C118-A (Friction Modifier Part No. C8AZ-19B546-A) for complete refill of Dana LimitedSlip axles. Add 4 ounces for F250/350 Rear. For F150 & F250 4x4 add 2 ounces to front axle.

(3) Add 4 ounces of EST-M2C118-A (Friction Modifier C8AZ-19B546-A) for complete fill of Ford TractionLok Axle (1979-1982).

(4) All Ford Conventional and Traction-Lok Rear Axles -

Use ESP-M2C154-A. All Dana Conventional and Limited-Slip Front/Rear Axles - Use ESW-M2C105-A.

V. Axle Lubricant Capacities - Ranger 4x2/4x4, Bronco II

Approximate Capacities

U.S. Imperial

Measure Measure

(Pints) (Pints) Liters

Rear Ford 6-3/4 Ring Gear (1)(4) 3.0 2.5 1.4

Rear Ford 7.5 Ring Gear (2)(4) 5.0 (6) 4.2 2.4

Dana 28 Front Axle (4x4 Only)(3)(5) 1.0 (7) 0.83 0.45

Bronco II Ford 7.5 Ring Gear(2)(4) 5.5 (6) 4.6 2.6

(1) Fill to 3/8 in. +/- 1/8 in. (9.5 mm +/- 3 mm) below bottom of fill hole. Base GVW axle with 2.0L engine and 2.3L engine with automatic.

(2) Fill to 1/2 in. +/- 1/8 in. (12.7 mm t 3 mm) below bottom of fill hole. Optional GVW or 2.3L engine.

(3) Fill to 1/2 in. +/- 1/8 in. (12.7 mm + 3 mm) below bottom of fill hole.

(4) All Ford Conventional and Traction-Lok Rear Axles -

Use ESP-M2C154-A.

(5) All Dana Conventional and Limited-Slip Front Axles - Use ESW-M2C105-A.

(6) Add 4 ounces of EST-M2C118-A (Friction Modifier C8AZ-19B546-A) for complete fill of Ford TractionLok Axle.

(7) Add 1/2 ounce of EST-M2C118-A (Friction Modifier C8AZ-19B546-A) for complete refill of Dana Front Limited-Slip Axle.

PART NUMBER PART NAME CLASS

E0AZ-19580-A Lubricant-ESP-M2C154-A AM

C6AZ-19580-E Lubricant-ESW-M2C105-A AG

C8AZ-19B546-A Friction Modifier-EST-M2C118-A A

OTHER APPLICABLE ARTICLES: None WARRANTY STATUS: "INFORMATION ONLY"

Fluid - Differential: Capacity Specifications

TYPE: Standard 90 HP

Limited-Slip 90 HP*

CAPACITY, Refill: Front: All models 4.0 pt (US)

LIMITED-SLIP OR TRACTION-LOK IDENTIFICATION: Letter &

number on plate on door lock pillar

Rear: Dana 60 5.0 pt (US)

Dana 61 6.0 pt (US)

1982 70 HD 7.4 pt (US)

1981 Econoline w/Dana 70 7.0 pt (US)

Others 6.5 pt (US)

Fluid - Differential: Fluid Type Specifications

BL Self-adjusting Brake Lubricant

EC Ethylene Glycol Coolant

Mix 50/50 with water to at least -20°F (-29°C) protection

EP Extreme Pressure Gear Lubricant

Ford Part No. D8DZ-19C547-A

FA Automatic Transmission Fluid, Type F

GL-5 Gear Oil, API Service GL-5

HBH Hydraulic Brake Fluid, Extra

Heavy-Duty

HP Hypoid Gear Oil

Ford Part No. E0AZ-19580-A

HP* Hypoid Gear Oil for Limited-Slip

or Traction-Lok Differential

LM Lithium Grease, with Polyethylene

LS Steering Gear Lubricant

MA MERCONAutomatic Transmission

Fluid

MH Manifold Heat Valve Solvent

SG Motor Oil, API Service SG

Pinion Bearing: Testing and Inspection Bearing Cups

Check bearing cups for rings, galling or erratic wear patterns. The bearing cups must be solidly seated. Check by attempting to insert .0015 inch feeler gauge between cups and bottoms of bores.

Pinion Bearing: Testing and Inspection Companion Flange

Be sure that flat machined surfaces and the bearing cup sockets of the flange have not been damaged in removing driveshaft or in removing flange from axle. The edge of the flange that contacts the oil slinger or pinion front bearing must be smooth. Roughness aggravates backlash noises and causes wear on the slinger with a resultant loss in drive pinion bearing preload. The seal surface should be perfectly smooth or leakage will result.

Pinion Bearing: Testing and Inspection Cone & Roller Assemblies

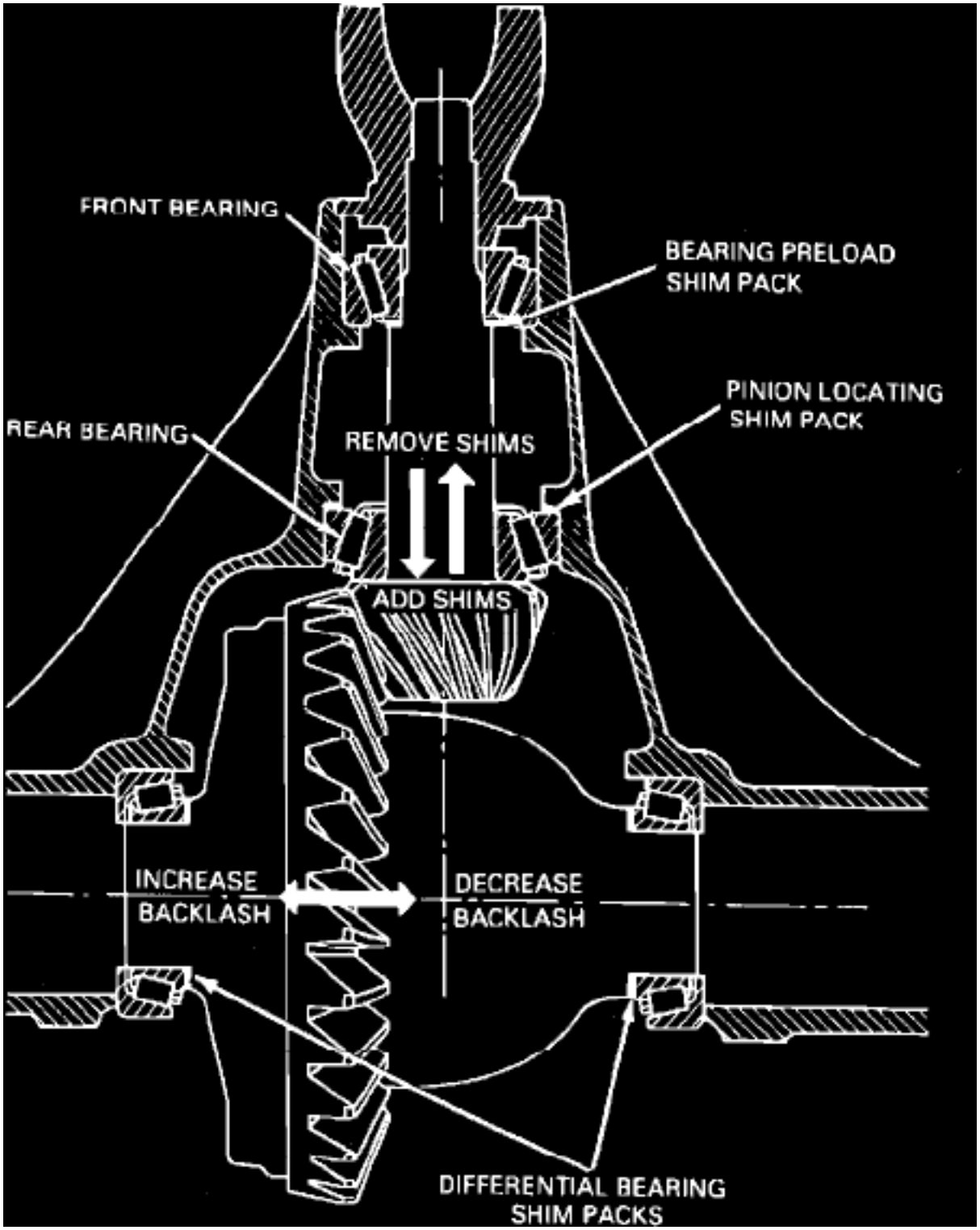
When operated in the cups, the cone and roller assemblies must turn without any roughness. Examine roller ends for wear.

Pinion Bearing: Testing and Inspection Differential Bearing Adjusters

Test fit of bearing adjusters in their threads with bearing caps installed. Ensure that bearing caps are on sides that they were machined to fit. The faces of the adjusters that contact the bearing cups must be smooth and square. Examine threads in carrier if their fit is not proper and replace any adjuster with a damaged face or threads.

Pinion Bearing: Testing and Inspection Pinion Retainer

Inspect visually for damage. Ensure that pinion bearing cups are seated. Ensure that there are no chips or burrs on mounting flange. Clean all lubricant passages. If pinion bearing cups were removed, examine bores in retainer carefully. Any nicks or burrs in these bores must be removed to permit proper seating of cups.



Pinion Bearing: Adjustments

Fig. 4 Shim replacement for preload adjustment

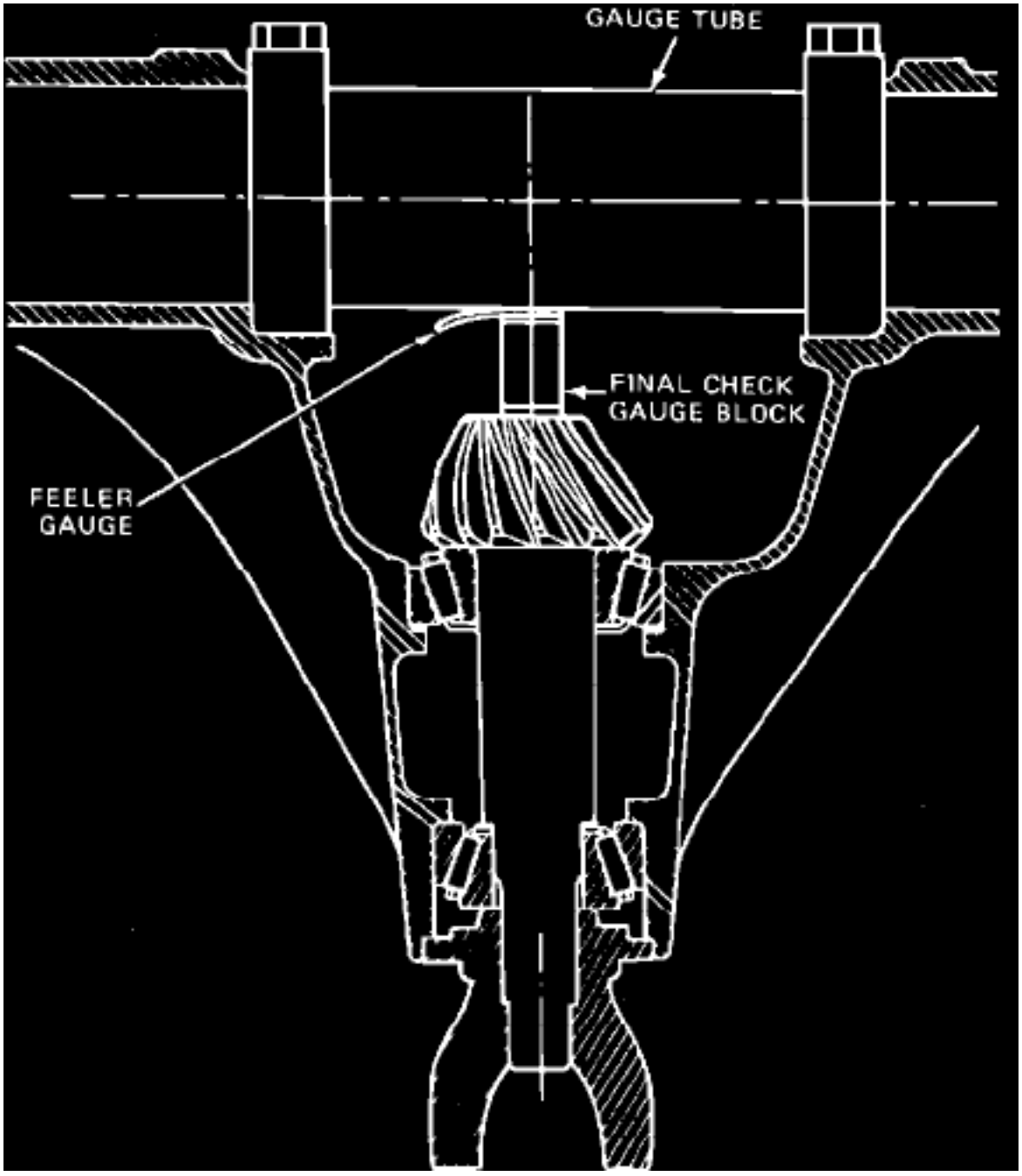


Fig. 5 Final pinion depth check

1. Install preload shims and slinger, if equipped, onto the pinion.

2. Install bearing cone assembly using suitable tool.

3. Install end yoke, washer and new pinion nut. Torque nut to approximately 250 ft. lbs. on except model 30 axle or 200---220 ft. lbs. on model 30 axle.

4. Rotate pinion using a suitable torque wrench. Rotating torque should be 20---40 inch lbs. To increase preload, remove shims from drive pinion. To decrease preload, add shims to pinion, Fig. 4.

5. Install suitable gauge tube in housing, then the bearing caps and cap attaching bolts, Fig. 5. Torque cap attaching bolts to 80---90 ft. lbs. on except model 30 axle or 35---50 ft. lbs. on model 30 axle.

6. Insert proper final check gauge block on top of pinion face under the gauge tube, Fig. 5. Place thumb on gauge block to ensure block is level.

7. Insert feeler gauge or shims between gauge tube and final check gauge block until slight drag is felt.

8. The reading in step 7 should be .020 inch added to the drive pinion etching, which could be plus (+) or minus (-) with a tolerance of .002 inch. If the distance must be increased, remove shims from beneath the inner pinion bearing cup. If the distance must be decreased, add shims beneath the inner pinion bearing cup.

9. With drive pinion at the correct depth, remove the yoke, nut and washer using a suitable tool.

10. Apply suitable lubricant to oil seal, then install drive pinion oil seal using a suitable installer. Ensure seal spring is properly installed after seal installation.

11. Install yoke using suitable tool, then the washer and nut. Torque nut to approximately 250 ft. lbs. on except model 30 axle or 200---220 ft. lbs. on model 30 axle.

Old Pinion Marking*	New Pinion Marking								
	.4	.3	.2	.1	0	+1	+2	+3	+4
+4	+0.008	+0.007	+0.006	+0.005	+0.004	+0.003	+0.002	+0.001	0
+3	+0.007	+0.006	+0.005	+0.004	+0.003	+0.002	+0.001	+0	-0.001
+2	+0.006	+0.005	+0.004	+0.003	+0.002	+0.001	0	-0.001	-0.002
+1	+0.005	+0.004	+0.003	+0.002	+0.001	0	-0.001	-0.002	-0.003
0	+0.004	+0.003	+0.002	+0.001	0	-0.001	-0.002	-0.003	-0.004
-1	+0.003	+0.002	+0.001	0	-0.001	-0.002	-0.003	-0.004	-0.005
-2	+0.002	+0.001	0	-0.001	-0.002	-0.003	-0.004	-0.005	-0.006
-3	+0.001	0	-0.001	-0.002	-0.003	-0.004	-0.005	-0.006	-0.007
-4	0	-0.001	-0.002	-0.003	-0.004	-0.005	-0.006	-0.007	-0.008

Pinion Bearing: Service and Repair Dana/Spicer, Front Drive

Bearing Cup & Drive Pinion Installation, FRONT DRIVE

1. Clean bore and if installed, remove the cup. Place oil baffle first and the required amount of shims in the inner pinion bearing bore and drive inner pinion bearing cup in place.

2. Place outer pinion cup into carrier and drive in place. Draw cups into the bore.

3. Lubricate ends of outer pinion bearings rollers. Install outer bearing cone into place on the outer bearing cup.

4. Install inner bearing cone and slinger onto pinion. Drive bearing on the pinion shaft until fully seated.

Drive Pinion Installation, DANA/SPICER, FRONT DRIVE

Fig. 7 Drive pinion adjusting shim thickness chart th gauge tool selection, model 44 & 50 axles

Two separate adjustments affect drive pinion and ring gear tooth contact. They are pinion depth (location) and backlash. The pinion locating shim pack is installed between the drive pinion inner bearing cup and carrier housing. This shim pack and inner oil slinger and oil baffle, if equipped, controls the position of the pinion. Adding shims moves the pinion toward the ring gear and removing shims moves the pinion away from the ring gear. Ring gears and pinions are supplied in matched sets with the standard or metric markings. On the button of each drive pinion is marked a plus (+), a minus (-) or a zero (0). These markings indicate the position for each gear set. The position is determined by the amount of shims between the inner pinion bearing cup and carrier bearing bore. For example, if a new pinion is marked ``positive'' (+) +3 (+8-metric) and an old pinion is marked ``0'', shims measuring (.003 inch) (.08 mm) must be removed between the drive pinion and inner bearing cup and retainer. If the old ring and pinion shim is used, measure the slinger and baffle and each shim separately and add each shim measurement to total the original measurement. If slinger and oil baffle is not used, install drive pinion with the original shim pack and check pinion location with a suitable depth gauge. If a new ring and pinion is being installed, note the plus (+) minus (-) or zero (0) marking on the bottom of the pinion assembly. Add or subtract shims, according to the chart to compensate for differences between the old and new pinion. A new ring gear and drive pinion is always installed as a matched set and never separately. Ensure that the same matching number appears on both the drive pinion and ring gear. Install the correct shim pack of the drive pinion and place the pinion into the carrier, then check pinion depth. Refer to Fig. 7 for shim adjustment for pinion replacement and to ``Bearing Cup & Drive Pinion Installation'' to complete procedure.

Drive Pinion Preload Check & Final Depth Check, FRONT DRIVE

1. Measure original preload shims and replace with new shims of equal size.

2. Install pinion into carrier.

3. Install new preload shims over pinion. Install outer pinion bearing cone and oil slinger. Assemble end yoke, washer, deflector and slinger onto pinion shaft and align assembly. Install a new pinion nut and torque to 200---220 ft. lbs. on except model 60 monobeam type axle or 240-300 ft. lbs. on model 60 monobeam axle.

4. Rotate pinion nut with an inch-pound torque wrench. Rotating torque should be 20---40 inch lbs. on except model 28 axle or 10 inch lbs. on model 28 axle. To increase preload, remove shims. To decrease preload, add shims.

5. Install bearing caps and torque to 80---90 ft. lbs. on except model 28 axle or 35---40 ft. lbs. on model 28 axle.

6. Install suitable final check gauge block onto top of the pinion button under the gauge tube. Place thumb on the gauge block to ensure block is level.

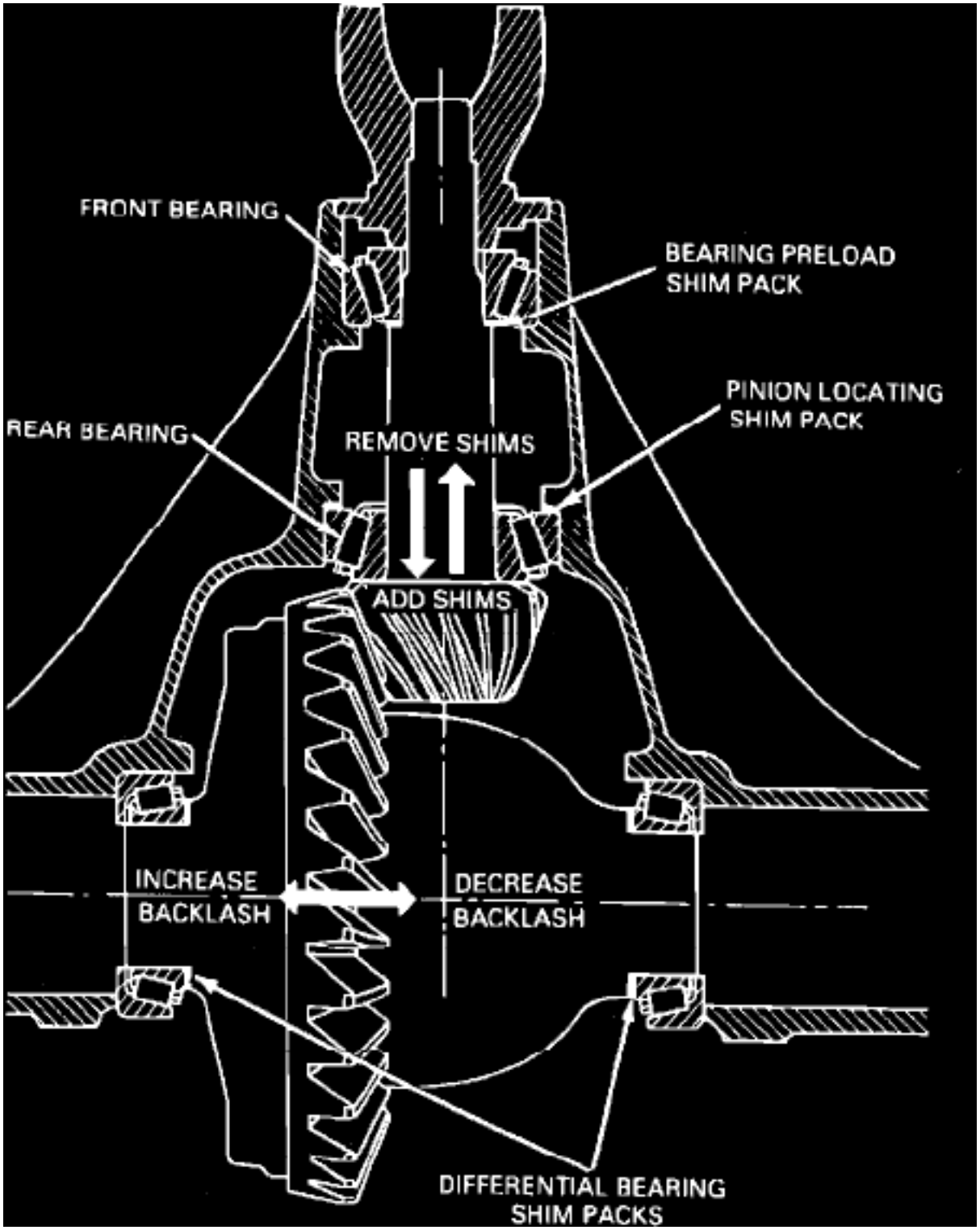
7. Insert feeler gauges between gauge tube and final check gauge block until a slight drag is felt.

8. On except model 28 axles, the reading should be .020 inch added to the drive pinion etching, which could be plus (+) or minus (-) with a tolerance of .002 inch. On model 28 axles (for example), if original pinion is etched (+) 4 (m + 10), and the new pinion is etched ``0'', then a new selective slinger is .004 inch thicker than the original selective oil slinger. If the original pinion is ``0'' and the new pinion is etched (+) 3 (m + 8), the new selective slinger should be .003 inch thinner than the original slinger.

9. With drive pinion at the correct depth, remove yoke, washer and nut.

10. Coat oil seal with suitable lubricant. Install drive pinion oil seal. After installation, ensure garter spring did not pop out. If garter spring pops out, remove and replace seal.

11. Install yoke. Install washer and nut. Tighten nut to 200---220 ft. lbs. on except model 60 monobeam axle or 240-300 ft. lbs on monobeam type axle.



Pinion Bearing: Service and Repair Dana/Spicer, Rear Axle

Pinion Bearing Cup Installation, DANA/SPICER, REAR AXLE

1. Place inner and outer bearing cups into carrier bore.

2. Install suitable inner bearing cup replacer tool on the inner bearing cup.

3. Install suitable outer bearing cup replacer tool on the outer bearing cup.

4. Install suitable threaded draw bar into the replacer tools, then tighten the draw bar to install cups into carrier bore.

Pinion Bearing Preload & Final Depth Check, REAR AXLE

Fig. 4 Shim replacement for preload adjustment

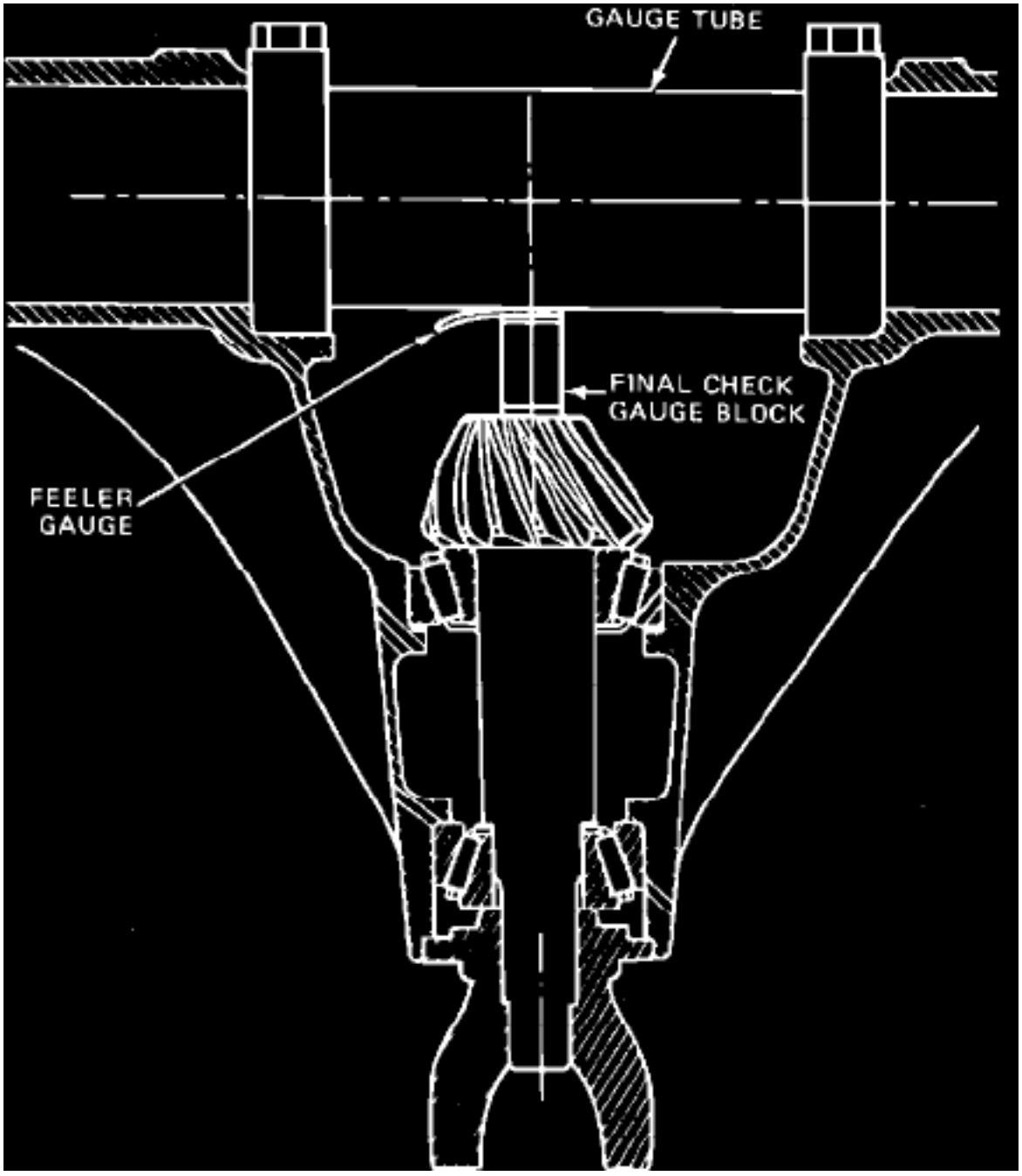


Fig. 5 Final pinion depth check

1. Install preload shims and slinger, if equipped, onto the pinion.

2. Install bearing cone assembly using suitable tool.

3. Install end yoke, washer and new pinion nut. Torque nut to approximately 250 ft. lbs. on except model 30 axle or 200---220 ft. lbs. on model 30 axle.

4. Rotate pinion using a suitable torque wrench. Rotating torque should be 20---40 inch lbs. To increase preload, remove shims from drive pinion. To decrease preload, add shims to pinion, Fig. 4.

5. Install suitable gauge tube in housing, then the bearing caps and cap attaching bolts, Fig. 5. Torque cap attaching bolts to 80---90 ft. lbs. on except model 30 axle or 35---50 ft. lbs. on model 30 axle.

6. Insert proper final check gauge block on top of pinion face under the gauge tube, Fig. 5. Place thumb on gauge block to ensure block is level.

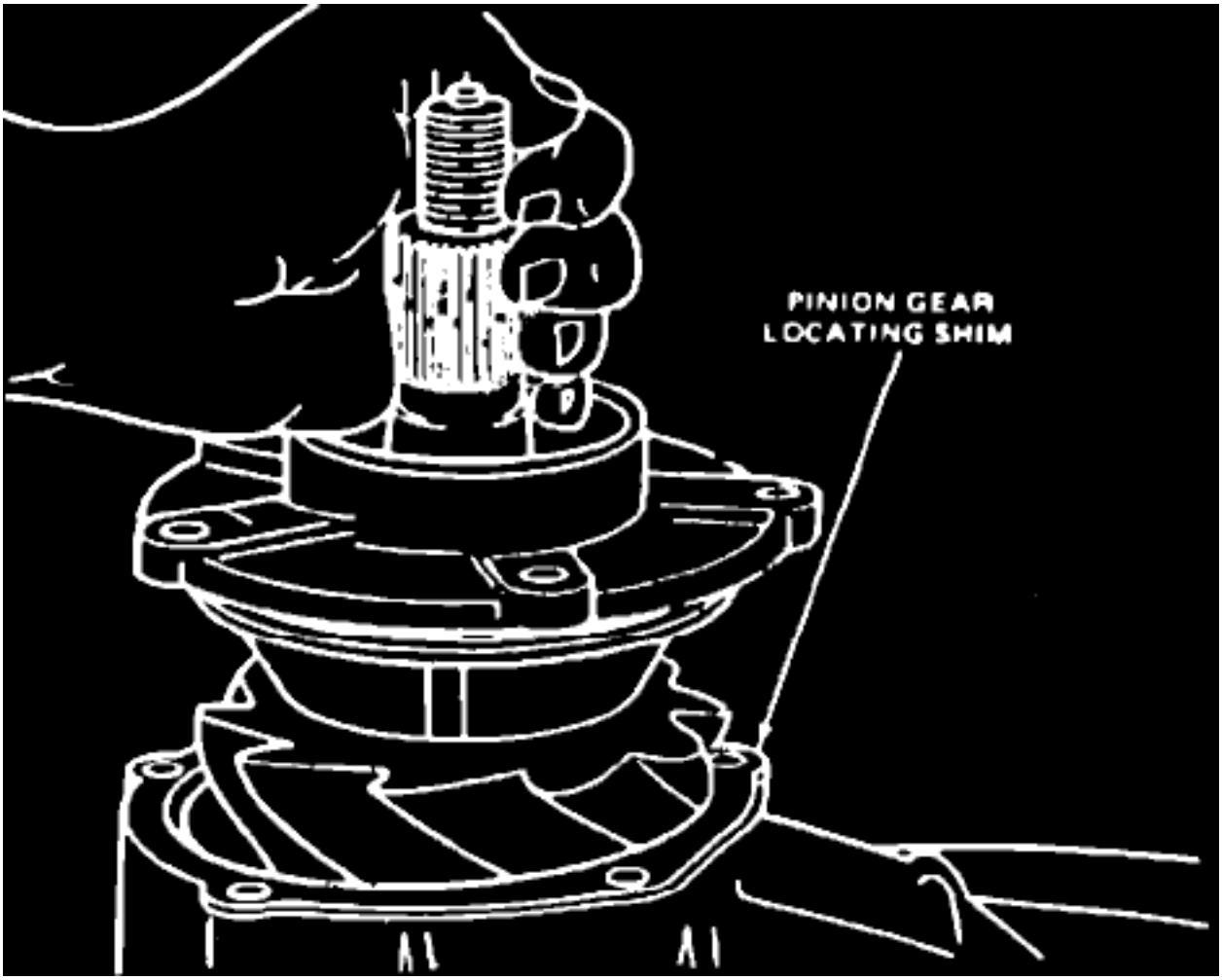
7. Insert feeler gauge or shims between gauge tube and final check gauge block until slight drag is felt.

8. The reading in step 7 should be .020 inch added to the drive pinion etching, which could be plus (+) or minus (-) with a tolerance of .002 inch. If the distance must be increased, remove shims from beneath the inner pinion bearing cup. If the distance must be decreased, add shims beneath the inner pinion bearing cup.

9. With drive pinion at the correct depth, remove the yoke, nut and washer using a suitable tool.

10. Apply suitable lubricant to oil seal, then install drive pinion oil seal using a suitable installer. Ensure seal spring is properly installed after seal installation.

11. Install yoke using suitable tool, then the washer and nut. Torque nut to approximately 250 ft. lbs. on except model 30 axle or 200---220 ft. lbs. on model 30 axle.



Pinion Bearing: Service and Repair Ford Removable

Backlash & Differential Bearing Preload Adjustment

1. Remove adjusting nut locks and loosen differential bearing cap bolts, then torque cap bolts to approximately 20 ft. lbs. Left adjusting nut is on ring gear side of carrier and right adjusting nut is on pinion side.

2. Loosen right nut until it is away from cup and tighten left nut until ring gear is just forced into position with zero backlash, then rotate pinion several revolutions to ensure that no binding is evident.

3. Check right nut to ensure that it is still loose, then install dial indicator.

4. Tighten right nut until it just contacts bearing cup, then set dial indicator to zero and apply pressure to bearings by tightening right nut until indicator reads .008---.012 inch.

5. Turn pinion gear several times in each direction to seat bearings in cups and ensure that no binding is evident, then torque bearing caps to 70---80 ft. lbs.

6. Measure backlash on several teeth around ring gear.

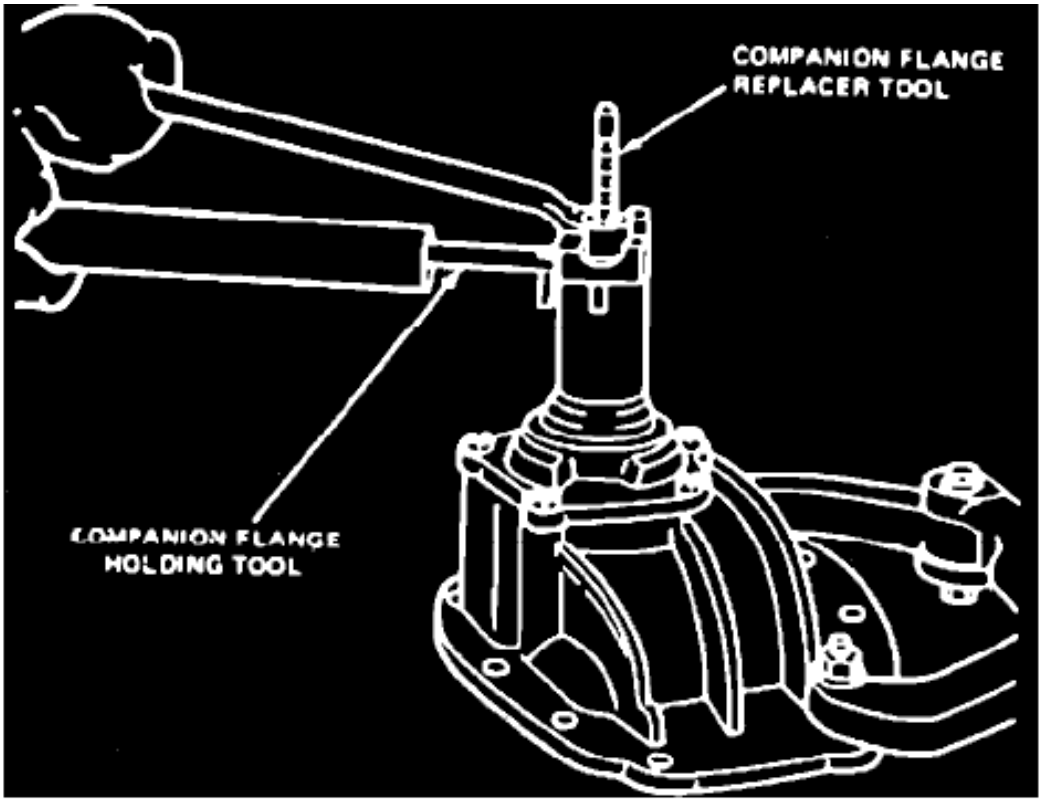
7. If backlash varies by more than .004 inch between any two teeth, loosen one adjusting nut and tighten opposite nut an equal amount to move ring gear away from or toward pinion. Tightening left nut moves ring gear into pinion to decrease backlash while tightening right nut moves ring gear away. When moving adjusting nuts, final movement should always be made in a tightening direction. Assuming left nut had to be loosened one notch, loosen nut two notches, then tighten one notch.

8. Ensure that case spread remains within specifications as previously described.

9. Perform teeth pattern check as described under ``General Axle Service.'' If backlash is correct and gross pattern error results, recheck pinion shim selection.

Drive Pinion & Bearing Retainer, FORD, REMOVABLE CARRIER,

Fig. 7 Installing Pinion And Retainer Assembly


COMPANION FLANGE
REPLACER TOOL
COMPANION FLANGE
HOLDING TOOL

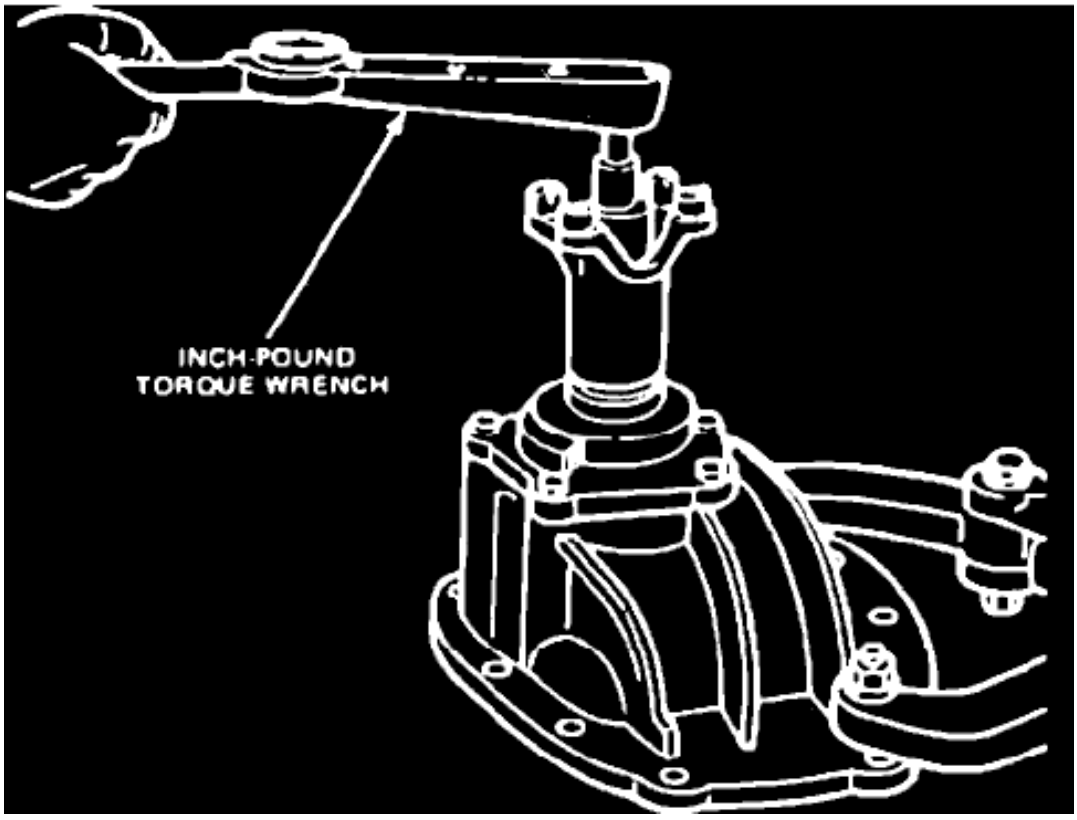

INCH-POUND
TORQUE WRENCH

Fig. 8 Installing Companion Flange

Fig. 9 Checking Pinion Bearing Preload

A new ring gear and drive pinion should always be installed as a matched set. Ensure that identifying numbers on ring gear and head of drive pinion are identical.

1. Using suitable tool, install pinion rear bearing cone on pinion shaft, then position new spacer on pinion shaft.

2. Place bearing retainer on drive pinion shaft and install front bearing cone and roller, then, using tool T57L-4621-B or equivalent, press bearing cone and roller into position, being careful not to crush collapsible spacer.

3. Lubricate O-ring with suitable lubricant, install into groove in pinion retainer, and snap into place. Then lubricate front and rear pinion bearings.

4. Position selected shim on carrier housing and install pinion and retainer assembly, being careful not to pinch O-ring, Fig. 7.

5. Install pinion retainer attaching bolts, torquing to 30---40 ft. lbs., then install oil slinger, if equipped.

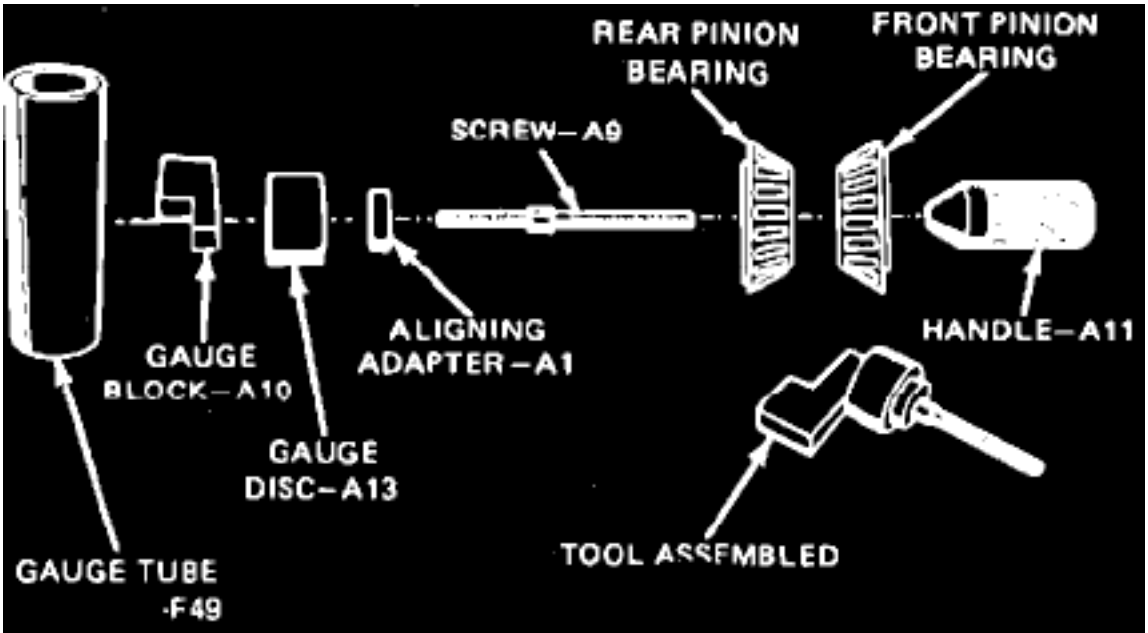
6. Using suitable tool, install new pinion oil seal in bearing retainer.

7. Install companion flange, Fig. 8.

8. Apply small amount of suitable lubricant to flange side of new pinion nut and start nut on drive pinion shaft.

9. Hold flange with suitable tool and tighten flange nut.

10. Check pinion bearing preload, Fig. 9. Correct preload is obtained when torque required to rotate pinion in retainer is 8---14 inch lbs. for original bearing or 16---29 inch lbs. for new bearing. If torque required to rotate pinion is less than specified, tighten pinion shaft nut a little at a time until proper preload is obtained. Do not over tighten nut. If excessive preload is obtained as a result of over tightening, replace collapsible bearing spacer. Do not back off pinion shaft nut to establish pinion bearing preload.



Dana Number	Description	Removable Carriers 9.0
A1	Aligning Adapter (33.02mm or 1.300 inch Outside Diameter)	X
A9	Screw	X
A10	Gauge Block (43.18mm or 1.700 inch Thick)	X
A11	Handle	X
A13	Gauge Disc (30.02mm or 1.189 inch Thick)	X
F49	Gauge Tube (73.45mm or 2.892 inch Outside Diameter)	X

Pinion Bearing Cups, Replace, FORD REMOVABLE CARRIER

Do not remove drive pinion bearing cups from the retainer unless cups are worn or damaged.

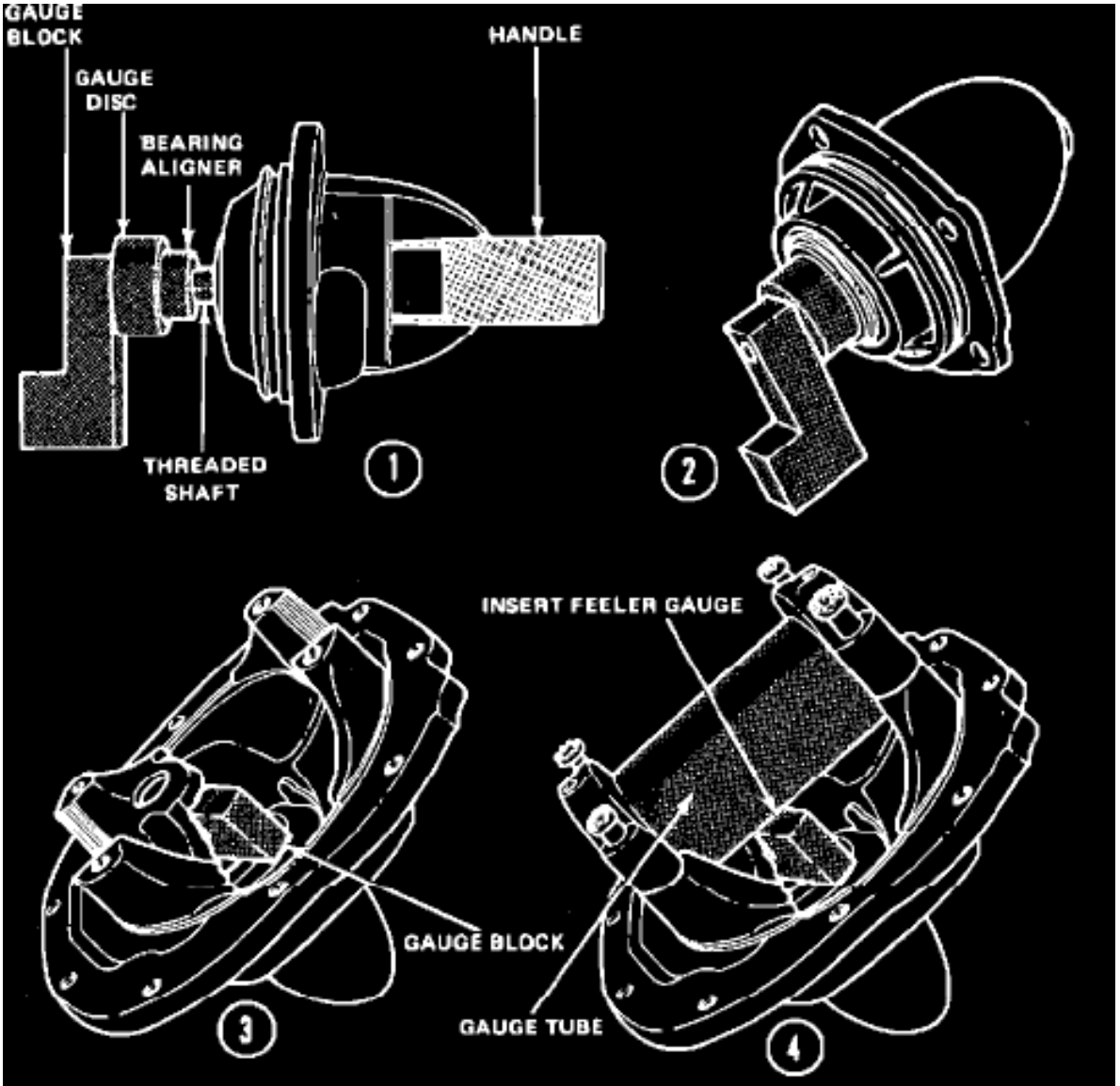
1. Using suitable puller, remove bearing cups.

2. Using tool T71P-4616-A or equivalent, install new bearing cups.

3. Check seating of cups by attempting to insert a .0015 inch feeler gauge between cup and bottom of bore. Cone and roller assemblies should be replaced whenever cups are replaced.

Selecting Correct Pinion Shim, FORD REMOVABLE CARRIER

Fig. 5 Removable carrier 9 inch ring gear axle pinion depth tool gauge



FEELER GAUGE READING	SHIM REQUIRED	FEELER GAUGE READING	SHIM REQUIRED	FEELER GAUGE READING	SHIM REQUIRED
.035	.005	.023	.017	.011	.029
.034	.006	.022	.018	.010	.030
.033	.007	.021	.019	.009	.031
.032	.008	.020	.020	.008	.032
.031	.009	.019	.021	.007	.033
.030	.010	.018	.022	.006	.034
.029	.011	.017	.023	.005	.035
.028	.012	.016	.024	.004	.036
.027	.013	.015	.025	.003	.037
.026	.014	.014	.026	.002	.038
.025	.015	.013	.027		
.024	.016	.012	.028		

Fig. 6 Using pinion depth gauge tool

When the ring gear and drive pinion or pinion bearings are replaced, the correct pinion shim thickness must be determined using tool T79P-4020-A or equivalent.

1. Select proper rear pinion bearing aligning adapter and gauge disc and slide these adapters over screw or threaded shaft, Fig. 5.

2. Install gauge block on threaded shaft and tighten securely, Fig. 6 (1).

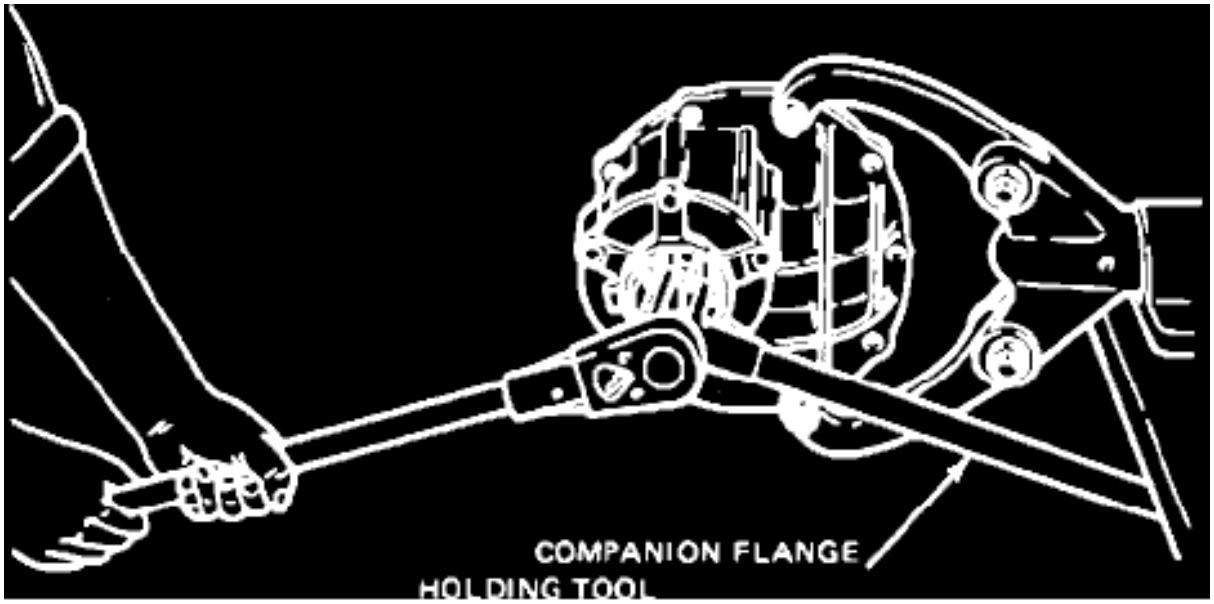
3. Place assembly and rear drive pinion bearing into pinion bearing retainer assembly, then install front pinion bearing and screw handle onto threaded shaft, tapered end into front pinion bearing, Fig. 6 (1) and (2). Flat end of handle has 3/8 inch hole cut in it so that an inch pound torque wrench may be used to obtain proper pinion bearing preload.

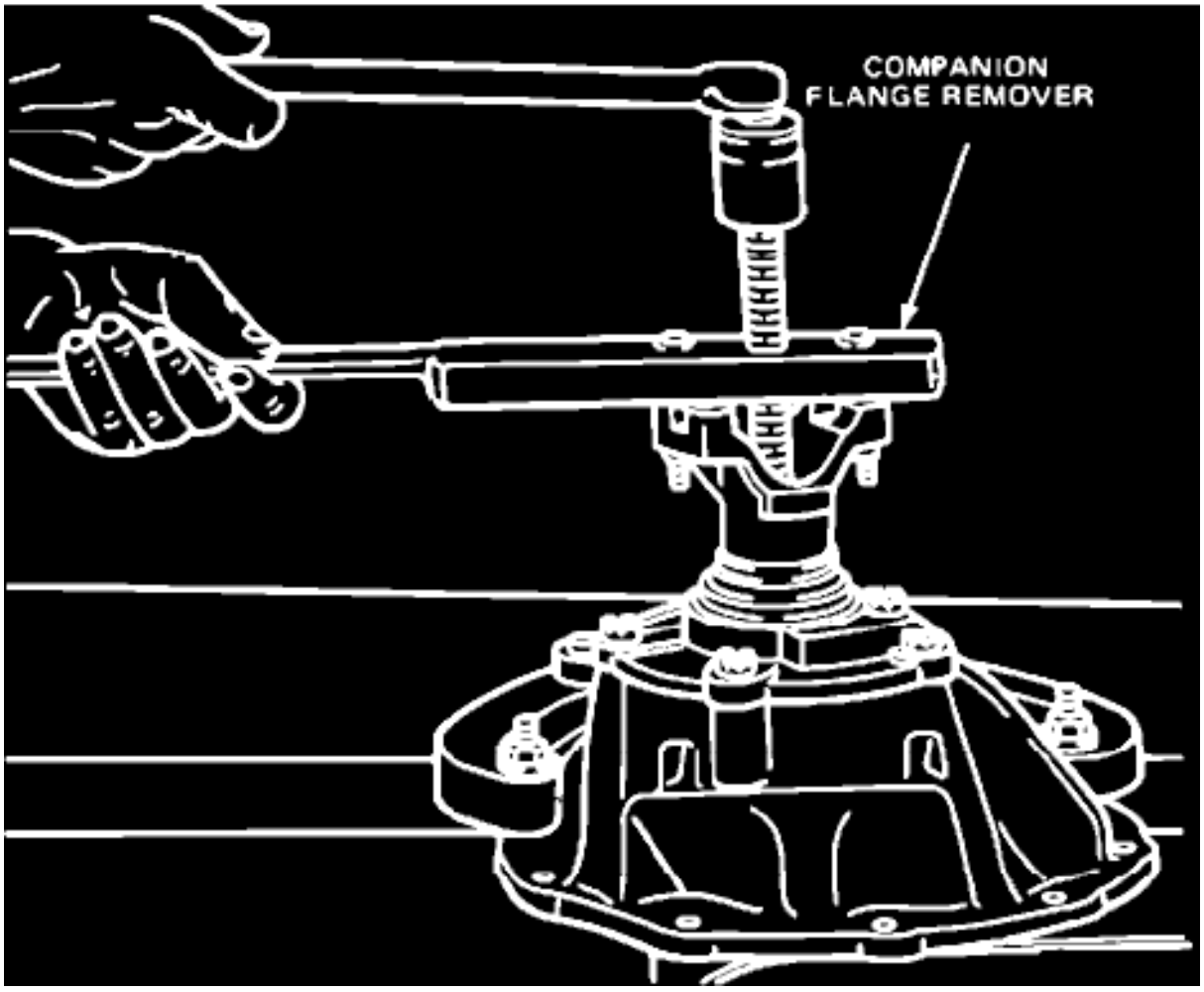
4. Install pinion bearing retainer assembly into carrier, less shim, torquing attaching bolts to 30---40 ft. lbs.

5. Rotate gauge block so that it rests against pilot boss, Fig. 6 (3).

6. Using feeler gauge, measure distance between gauge block and gauge tube, Fig. 6 (4). Insert blade directly along gauge block top to ensure a correct reading. Fit should be a slight drag-type feeling.

7. Select proper shim according to feeler gauge reading, Fig. 6.


COMPANION FLANGE
HOLDING TOOL


COMPANION
FLANGE REMOVER

Pinion Bearing: Service and Repair Ford, Removable Carrier, Disassembly

Fig. 3 Removing Pinion Shaft Nut

Fig. 4 Removing Companion Flange

1. Remove drive pinion shaft nut, Fig. 3.

2. Remove companion flange from drive pinion shaft, Fig. 4.

3. Using suitable puller, remove pinion seal.

4. Remove the pinion, bearing, and retainer assembly from carrier housing. Extreme care must be taken not to damage mounting surfaces of retainer and carrier.

5. Place protective sleeve on pinion pilot bearing surface and press drive pinion shaft out of pinion retainer.

6. Using tool T71P-4621-B or equivalent, press pinion shaft out of pinion rear bearing cone.

7. Clean and inspect all parts as described in ``General Axle Service.''

Pinion Bearing: Service and Repair Pinion Bearing Cup Installation

1. Place inner and outer bearing cups into carrier bore.

2. Install suitable inner bearing cup replacer tool on the inner bearing cup.

3. Install suitable outer bearing cup replacer tool on the outer bearing cup.

4. Install suitable threaded draw bar into the replacer tools, then tighten the draw bar to install cups into carrier bore.

Pinion Gear: Technical Service Bulletins Rear Axle - Pinion Angle Adjustments

Article No. 85-5-28

REAR AXLE PINION ANGLE ADJUSTMENTS

LIGHT TRUCK 1976-85 E & F 100-350 AND BRONCO

Whenever the rear axle pinion angle requires adjustment to bring it into specification, the following tapered shims should be installed as outlined in the 1985 Light Truck Shop Manual, Section 14-31-2. Part Number

Part Number Angle Degree Application Class

C3TZ-5A313-A 2.5" Wide Shim 2 F-100/150 C

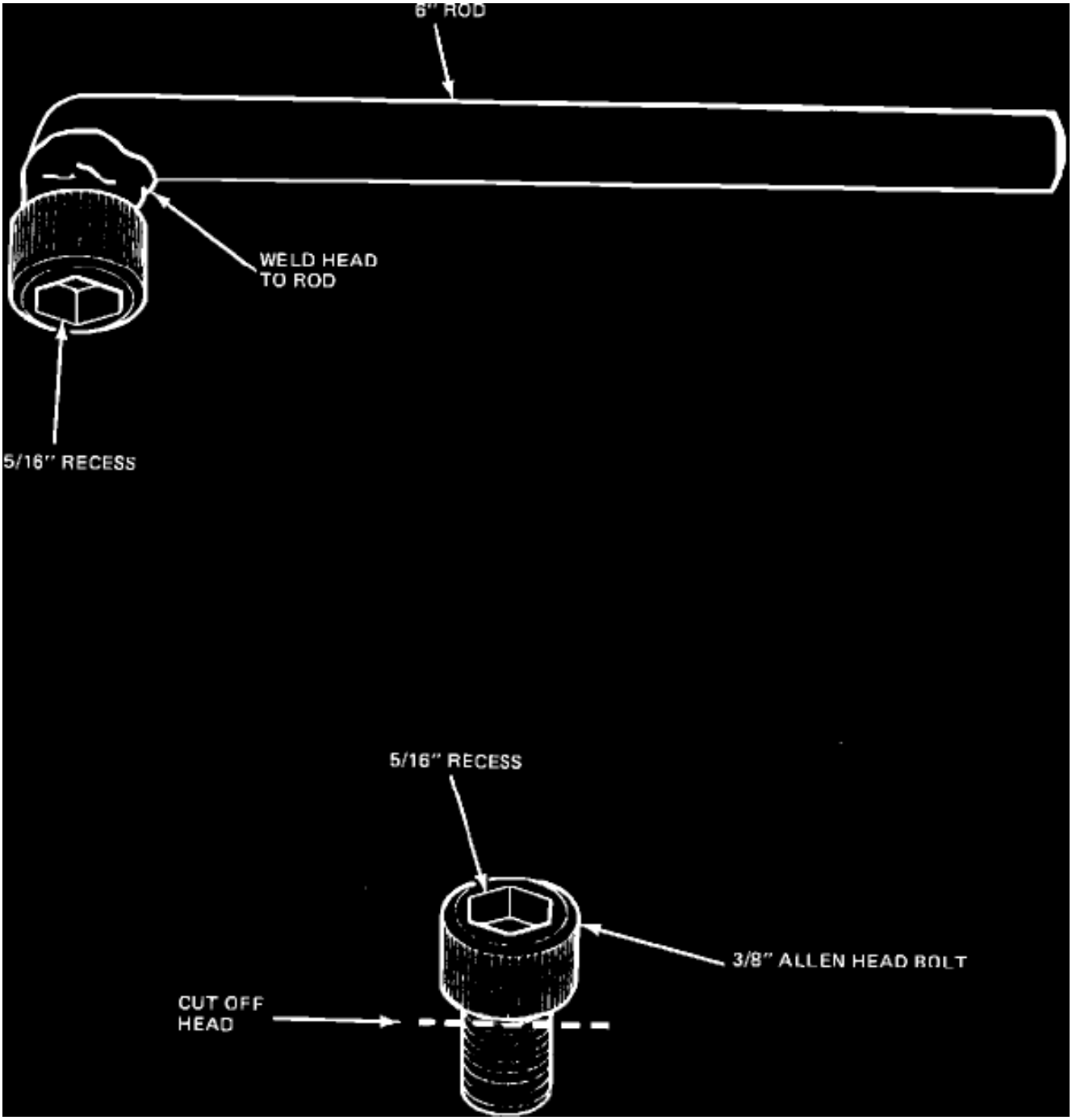
C3TZ-5A313-E (Ford Axles) 3 Bronco R

E100/150

C6TZ-5A313-B 3.0" Wide Shim 3 F-250/350 BM

(Dana Axles) E-250/350

WARRANTY STATUS: "INFORMATION ONLY"



Pinion Gear: Technical Service Bulletins Differential Pinion Bolt - Removal Aid

Article No. 84-6-15

AXLE - FORD-BUILT CAST CENTER AXLES - AID TO BOLT REMOVAL PROCEDURE FOR DIFFERENTIAL PINION SHAFT LOCK BOLT

FORD

1977-84 FORD CARLINES WITH 7.5", 8.5", 8.7", 8.8" REAR AXLES

LINCOLN-MERCURY 1977-84 LINCOLN-MERCURY CARLINES WITH 7.5", 8.5", 8.7", 8.8" REAR AXLES

LIGHT TRUCKS 1977-84 LIGHT TRUCKS WITH 7.5", 8.8" REAR AXLES

The subject bolt head may round off during removal with a conventional wrench or socket. To eliminate this condition, a socket type wrench may be made from a 3/8-inch Allen head bolt and a steel rod.

FIGURE 12

Cut the Allen head from the bolt and weld the head to the 6" rod. The rod will serve as a handle (Figure 12). In addition, the recess in the Allen head fits the 5/16-inch head in the differential pinion shaft lock bolt precisely.

OTHER APPLICABLE ARTICLES: None WARRANTY STATUS: "INFORMATION ONLY"

Pinion Gear: Testing and Inspection

Examine drive pinion and ring gear teeth for scoring or signs of excessive wear. Worn gears cannot be rebuilt to correct a noisy condition. Gear scoring and flaking are the result of excessive shock loading or the use of improper lubricant. Scored gears cannot be reused.

Examine teeth and thrust surfaces of differential gears. Wear on hub of differential side gears may cause a chucking noise known as chuckle, when the vehicle is operated at low speeds. Wear of splines, thrust surfaces or thrust washers may contribute to excessive drive line backlash.

Pinion Gear: Adjustments Depth Gauge Check

If any of the gauge surfaces become nicked, the high spots should be removed using an oil stone.

1. Install a new rear pinion bearing over a suitable aligning adapter, then position into the pinion bearing retainer assembly.

2. Place front of pinion bearing into the bearing cup, then assemble the handle onto the screw and hand tighten. The square drive in the handle of the tool is to be used for obtaining the proper pinion bearing preload. Set preload to 20---40 inch lbs.

3. Center suitable gauge tube into the differential bearing bore, then install the differential bearing caps.

4. Using a feeler gauge tool or shims, select the thickest shim that will enter between the gauge tube and gauge block. Insert feeler gauge directly along the gauge block to ensure a correct reading. If the service pinion gear is marked with a plus (+) reading, this amount should be subtracted from the thickness dimension obtained in step 4. If the service pinion gear is marked with a minus (-) reading, this amount should be added to the thickness dimension obtained in step 4.

5. Remove inner pinion bearing cup and install the correct number of shims in the carrier bore.

6. Install bearing cup and oil slinger, if equipped, on the pinion, then press on bearing using a suitable tool. If a baffle or slinger is used, replace with a new one during assembly.

Old Pinion Marking	New Pinion Marking								
	-4	-3	-2	-1	0	+1	+2	+3	+4
+4	+0.008	+0.007	+0.006	+0.005	+0.004	+0.003	+0.002	+0.001	0
+3	+0.007	+0.006	+0.005	+0.004	+0.003	+0.002	+0.001	0	-0.001
+2	+0.006	+0.005	+0.004	+0.003	+0.002	+0.001	0	-0.001	-0.002
+1	+0.005	+0.004	+0.003	+0.002	+0.001	0	-0.001	-0.002	-0.003
0	+0.004	+0.003	+0.002	+0.001	0	-0.001	-0.002	-0.003	-0.004
-1	+0.003	+0.002	+0.001	0	-0.001	-0.002	-0.003	-0.004	-0.005
-2	+0.002	+0.001	0	-0.001	-0.002	-0.003	-0.004	-0.005	-0.006
-3	+0.001	0	-0.001	-0.002	-0.003	-0.004	-0.005	-0.006	-0.007
-4	0	-0.001	-0.002	-0.003	-0.004	-0.005	-0.006	-0.007	-0.008

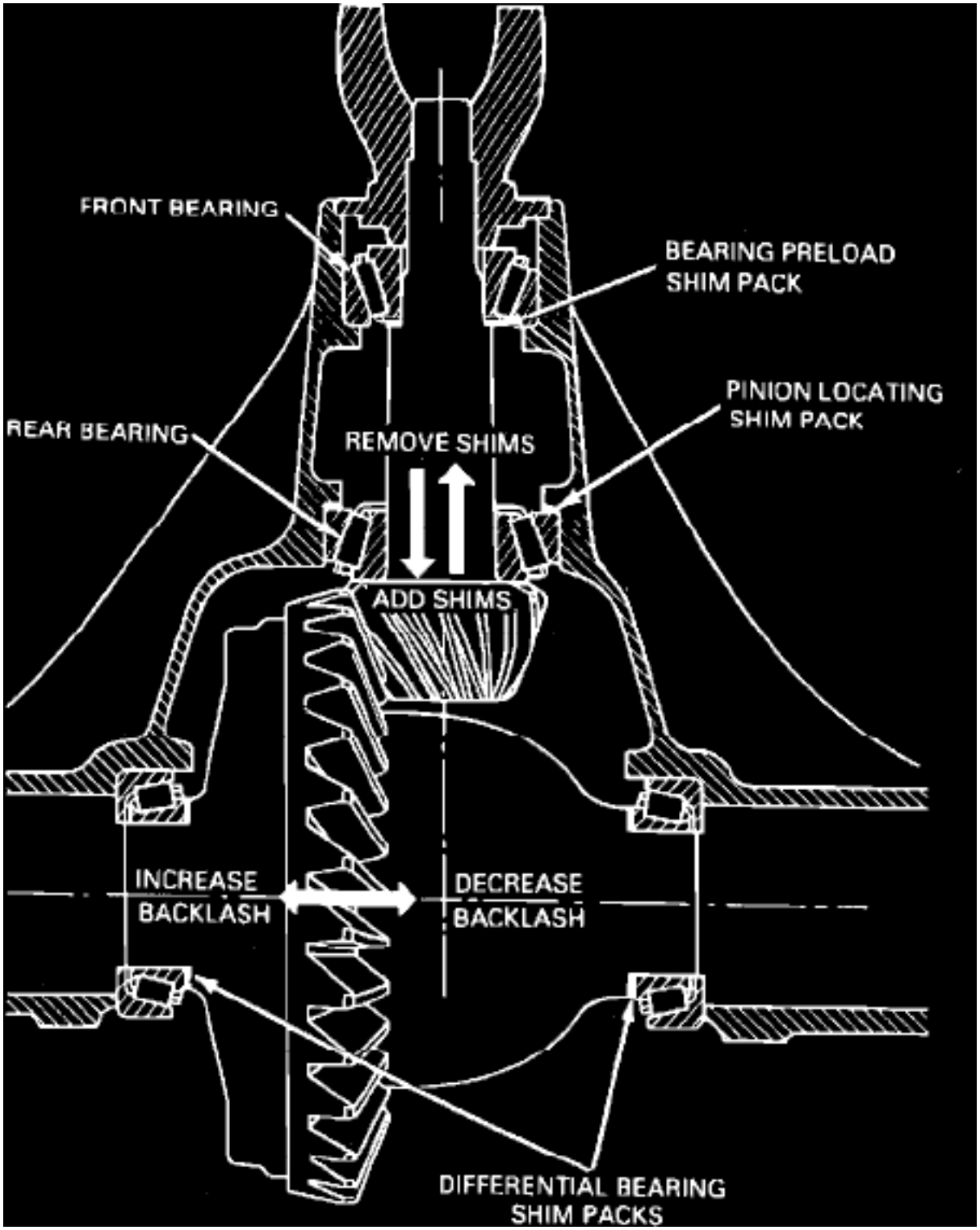
Pinion Gear: Adjustments Drive Pinion Depth of Mesh Setting

Fig. 3 Shim setting chart

Ring gears and pinions are supplied in matched sets only. Matched numbers on both the pinion and ring gear are etched for verification. On the face of each pinion there is etched either a plus or a minus number, or ``0,'' which indicates the best running position for each particular gear set. This dimension is controlled by shimming behind the inner pinion bearing cup. A pinion etched with a +3 would require .003 inch less shims that a pinion etched ``0.'' A pinion etched - 3 would require .003 inch more shims than a pinion etched ``0.'' If the etched figure is ``0'' the shim pack will remain the same. Refer to chart, Fig. 3. Shims are available in thicknesses of .003 inch, .005 inch, .010 inch and .030 inch.

If old ring and pinion set is to be reused, measure the old shim pack and build a new shim pack to the same dimension. If a baffle is used in the axle assembly, it is considered a part of the shim pack. Measure each shim separately with a micrometer and add together to get the total shim pack thickness from the original build up.

If a new gear set is being used, notice the (+) or (-) etching on both the new and old pinion and adjust thickness of new shim pack to compensate for the difference of these two figures. For example, if the old pinion reads +2 and the new pinion is - 2, add .004 inch shims to the original shim pack.



Pinion Gear: Adjustments Pinion Bearing Preload & Final Depth Check

Fig. 4 Shim replacement for preload adjustment

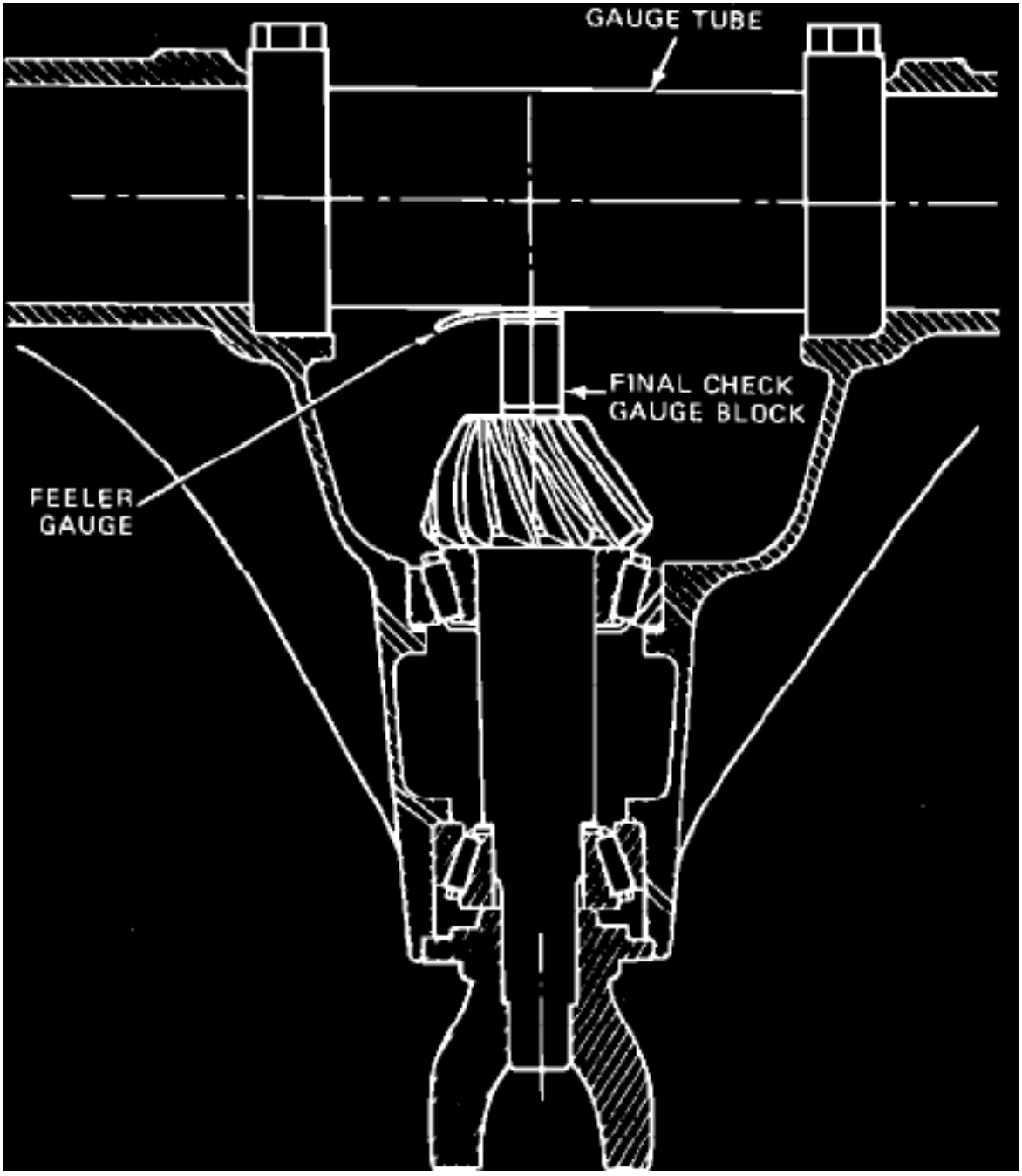


Fig. 5 Final pinion depth check

1. Install preload shims and slinger, if equipped, onto the pinion.

2. Install bearing cone assembly using suitable tool.

3. Install end yoke, washer and new pinion nut. Torque nut to approximately 250 ft. lbs. on except model 30 axle or 200---220 ft. lbs. on model 30 axle.

4. Rotate pinion using a suitable torque wrench. Rotating torque should be 20---40 inch lbs. To increase preload, remove shims from drive pinion. To decrease preload, add shims to pinion, Fig. 4.

5. Install suitable gauge tube in housing, then the bearing caps and cap attaching bolts, Fig. 5. Torque cap attaching bolts to 80---90 ft. lbs. on except model 30 axle or 35---50 ft. lbs. on model 30 axle.

6. Insert proper final check gauge block on top of pinion face under the gauge tube, Fig. 5. Place thumb on gauge block to ensure block is level.

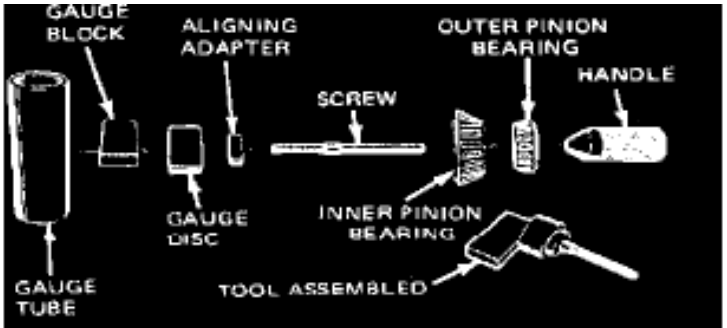
7. Insert feeler gauge or shims between gauge tube and final check gauge block until slight drag is felt.

8. The reading in step 7 should be .020 inch added to the drive pinion etching, which could be plus (+) or minus (-) with a tolerance of .002 inch. If the distance must be increased, remove shims from beneath the inner pinion bearing cup. If the distance must be decreased, add shims beneath the inner pinion bearing cup.

9. With drive pinion at the correct depth, remove the yoke, nut and washer using a suitable tool.

10. Apply suitable lubricant to oil seal, then install drive pinion oil seal using a suitable installer. Ensure seal spring is properly installed after seal installation.

11. Install yoke using suitable tool, then the washer and nut. Torque nut to approximately 250 ft. lbs. on except model 30 axle or 200---220 ft. lbs. on model 30 axle.



TOOL	TOOL NUMBER	AXLE MODEL 44	AXLE MODEL 50
Aligning Adapter	T75P-4020-A2	X	X
Gauge Disc	T80T-4020-F40		X
	D80T-4020-F44	X	
Gauge Block	T80T-4020-F42	X	X
Screw	T80T-4020-F43	X	X
Handle	T76P-4020-A11	X	X
Gauge Tube	T80T-4020-F41		X
	D80T-4020-F47	X	

Description	Number
Handle	T76P-4020-A11
Screw	T80T-4020-F43
Gauge Block	T80T-4020-F42
Aligning Adapter	T76P-4020-A3
Gauge Disc	T78P-4020-A15
Gauge Tube	D80T-4020-F48
Final Check Gauge Block	D81T-4020-F54

Tool	Number
Gauge Tube	T76P-4020-A7
Gauge Block	T76P-4020-A10
Gauge Disc	T83T-4020-F57
Aligning Adapter	T76P-4020-A1
Screw	T76P-4020-A9
Handle	T76P-4020-A11
Final Check Gauge Block	T83T-4020-F58

Pinion Gear: Service and Repair Dana/Spicer Front Axle

Bearing Cup & Drive Pinion Installation, Dana/Spicer, Front

1. Clean bore and if installed, remove the cup. Place oil baffle first and the required amount of shims in the inner pinion bearing bore and drive inner pinion bearing cup in place.

2. Place outer pinion cup into carrier and drive in place. Draw cups into the bore.

3. Lubricate ends of outer pinion bearings rollers. Install outer bearing cone into place on the outer bearing cup.

4. Install inner bearing cone and slinger onto pinion. Drive bearing on the pinion shaft until fully seated.

Depth Gauge Check, DANA/SPICER FRONT AXLE

Fig. 8 Depth gauge tool selection, model 44 & 50 axles

Fig. 9 Depth gauge tool selection, model 60 monobeam axles

Fig. 10 Depth gauge tool selection, model 28 model axles

1. Refer to Figs. 8, 9 and 10 for correct tool for particular axle assemblies. If any of the gauge surfaces become nicked, the high spots must be removed with a medium India oilstone to ensure no erroneous readings.

2. On except model 60 monobeam type axle, proceed as follows:

a. Install inner and outer pinion cups using suitable tools. Place a new rear pinion bearing over the proper aligning adapter and insert into pinion

bearing retainer assembly. Place front pinion bearing into the bearing cup in the carrier and assemble the handle onto the screw. Hand tighten.

Old Pinion Marking*	New Pinion Marking								
	.4	.3	.2	.1	0	+1	+2	+3	+4
+4	+0.008	+0.007	+0.006	+0.005	+0.004	+0.003	+0.002	+0.001	0
+3	+0.007	+0.006	+0.005	+0.004	+0.003	+0.002	+0.001	+0	-0.001
+2	+0.006	+0.005	+0.004	+0.003	+0.002	+0.001	0	-0.001	-0.002
+1	+0.005	+0.004	+0.003	+0.002	+0.001	0	-0.001	-0.002	-0.003
0	+0.004	+0.003	+0.002	+0.001	0	-0.001	-0.002	-0.003	-0.004
-1	+0.003	+0.002	+0.001	0	-0.001	-0.002	-0.003	-0.004	-0.005
-2	+0.002	+0.001	0	-0.001	-0.002	-0.003	-0.004	-0.005	-0.006
-3	+0.001	0	-0.001	-0.002	-0.003	-0.004	-0.005	-0.006	-0.007
-4	0	-0.001	-0.002	-0.003	-0.004	-0.005	-0.006	-0.007	-0.008

Note the 3/8 inch square drive in the handle to be used for obtaining the proper pinion bearing preload.

b. Center the proper gauge tube into the differential bearing bore. Install bearing caps. To preload the bearings, tighten handle to 20---40 inch

lbs.

c. Using a suitable feeler gauge tool or correct shims, select the thickest feeler shim that will enter between the gauge tube and gauge block.

Insert feeler gauge or shims directly along the gauge block to ensure a correct reading. The feeler gauge fit between the gauge tube and the gauge block should be a slight drag-type feeling.

d. After the correct shims or feeler gauge feel is obtained, check reading and this is the thickness of shims required, providing that upon

inspection of the service pinion gear, there are no markings. If the service pinion gear is marked with a plus (+) reading, this amount must be subtracted from the thickness dimension obtained previously.

e. If the service pinion gear is marked with a minus (-) reading, this amount must be added to the thickness dimension obtained previously. f.

Measure shims to verify the shim size. Place oil slinger, if equipped, onto pinion and press on the bearing. If a baffle and/or slinger is used, replace with a new one upon assembly and measure as part as the shim stack.

g. Continue to build the remaining components with proper pinion and differential bearing preload torques and ring gear backlash.

3. On model 60 monobeam type axles proceed as follows:

a. Place a new inner pinion bearing over the proper aligning adapter and insert into pinion bearing retainer assembly. Place outer pinion bearing

(new or used, if in satisfactory condition) into bearing cup and assemble tool handle onto the screw. Hand tighten assembly. Note the 3/8 inch square drive in the tool handle to be used for obtaining the proper pinion bearing preload. Torque to a 20-40 inch lb. preload.

b. Center proper gauge tube into the differential bearing bore. Install bearing caps and torque to 80-90 ft. lbs. c. Using a feeler gauge tool or shims, select the thickest feeler gauge or shim that will enter between the gauge tube and block assembly. Insert

the feeler gauge directly along the gauge block to ensure a correct reading. The feeler gauge should have a slight drag-type feel. Ensure shims or feeler gauge are free from dirt to ensure a correct reading.

d. After the correct feeler gauge feel has been obtained, check the reading. Reading obtained indicates the thickness of shims required

providing that, upon inspection of the service pinion gear, there are no markings. If the service pinion gear is marked with a (+) plus reading, this amount must be subtracted from the thickness dimension obtained in step c.

e. If the service pinion gear is marked with a (-) minus reading, this amount must be added to the thickness dimension obtained in step c. In

addition, you must use the exact same new inner pinion bearing that was used in the previous steps.

f. Remove inner pinion bearing cup and install the correct thickness of shims in the carrier bore. Install the bearing cup and oil slinger, if equipped, onto pinion and press on the bearing assembly with tool T53T-4621-C or equivalent. If a baffle or oil slinger is used, replace with a new one upon assembly and measure as part of the shim stack.

g. After following these procedures, continue to assemble the remaining components with proper pinion and differential bearing preload

torques and ring gear backlash.

Drive Pinion Installation, DANA/SPICER FRONT AXLE

Fig. 7 Drive pinion adjusting shim thickness chart th gauge tool selection, model 44 & 50 axles

Two separate adjustments affect drive pinion and ring gear tooth contact. They are pinion depth (location) and backlash. The pinion locating shim pack is installed between the drive pinion inner bearing cup and carrier housing. This shim pack and inner oil slinger and oil baffle, if equipped, controls the position of the pinion. Adding shims moves the pinion toward the ring gear and removing shims moves the pinion away from the ring gear. Ring gears and pinions are supplied in matched sets with the standard or metric markings. On the button of each drive pinion is marked a plus (+), a minus (-) or a zero (0). These markings indicate the position for each gear set. The position is determined by the amount of shims between the inner pinion bearing cup and carrier bearing bore. For example, if a new pinion is marked ``positive'' (+) +3 (+8-metric) and an old pinion is marked ``0'', shims measuring (.003 inch) (.08 mm) must be removed between the drive pinion and inner bearing cup and retainer. If the old ring and pinion shim is used, measure the slinger and baffle and each shim separately and add each shim measurement to total the original measurement. If slinger and oil baffle is not used, install drive pinion with the original shim pack and check pinion location with a suitable depth gauge. If a new ring and pinion is being installed, note the plus (+) minus (-) or zero (0) marking on the bottom of the pinion assembly. Add or subtract shims, according to the chart to compensate for differences between the old and new pinion. A new ring gear and drive pinion is always installed as a matched set and never separately. Ensure that the same matching number appears on both the drive pinion and ring gear. Install the correct shim pack of the drive pinion and place the pinion into the carrier, then check pinion depth. Refer to Fig. 7 for shim adjustment for pinion replacement and to ``Bearing Cup & Drive Pinion Installation'' to complete procedure.

Drive Pinion Preload Check & Final Depth Check Front Drive

1. Measure original preload shims and replace with new shims of equal size.

2. Install pinion into carrier.

3. Install new preload shims over pinion. Install outer pinion bearing cone and oil slinger. Assemble end yoke, washer, deflector and slinger onto pinion shaft and align assembly. Install a new pinion nut and torque to 200---220 ft. lbs. on except model 60 monobeam type axle or 240-300 ft. lbs. on model 60 monobeam axle.

4. Rotate pinion nut with an inch-pound torque wrench. Rotating torque should be 20---40 inch lbs. on except model 28 axle or 10 inch lbs. on model 28 axle. To increase preload, remove shims. To decrease preload, add shims.

5. Install bearing caps and torque to 80---90 ft. lbs. on except model 28 axle or 35---40 ft. lbs. on model 28 axle.

6. Install suitable final check gauge block onto top of the pinion button under the gauge tube. Place thumb on the gauge block to ensure block is level.

7. Insert feeler gauges between gauge tube and final check gauge block until a slight drag is felt.

8. On except model 28 axles, the reading should be .020 inch added to the drive pinion etching, which could be plus (+) or minus (-) with a tolerance of .002 inch. On model 28 axles (for example), if original pinion is etched (+) 4 (m + 10), and the new pinion is etched ``0'', then a new selective slinger is .004 inch thicker than the original selective oil slinger. If the original pinion is ``0'' and the new pinion is etched (+) 3 (m + 8), the new selective slinger should be .003 inch thinner than the original slinger.

9. With drive pinion at the correct depth, remove yoke, washer and nut.

10. Coat oil seal with suitable lubricant. Install drive pinion oil seal. After installation, ensure garter spring did not pop out. If garter spring pops out, remove and replace seal.

11. Install yoke. Install washer and nut. Tighten nut to 200---220 ft. lbs. on except model 60 monobeam axle or 240-300 ft. lbs on monobeam type axle.

Total Differential Case Endplay, Dana/Spicer, Front Drive

1. Attach ring gear to the differential case using new bolts. Torque bolts alternately and evenly to 50---60 ft. lbs. on except model 60 monobeam axle or 100-120 ft. lbs on model 60 monobeam axle.

2. Clean trunnions on the differential and install the master differential bearings on to differential case. Remove all burrs and nicks from hubs so master bearings rotate freely.

3. Place differential case into carrier (without pinion). The differential case should move freely in the carrier assembly. Position a suitable dial indicator against differential case flanges. Locate tip of the indicator on the flat surface of one ring gear bolt. Force the differential case toward the dial indicator as far as possible and zero dial indicator with force still applied. Dial indicator should have a minimum of .200 inch travel. Force differential case away from the dial indicator as far as it will go. Repeat this procedure until the same reading is obtained. Record dial indicator reading. This reading indicates the amount of shims needed behind the differential side bearings to take up total clearance between the differential bearing and case. This reading will be used during pinion and ring gear backlash adjustment.

4. Remove differential case from the carrier. Do not remove the master differential bearings at this time.

Old Pinion Marking	New Pinion Marking								
	-4	-3	-2	-1	0	+1	+2	+3	+4
+4	+0.008	+0.007	+0.006	+0.005	+0.004	+0.003	+0.002	+0.001	0
+3	+0.007	+0.006	+0.005	+0.004	+0.003	+0.002	+0.001	0	-0.001
+2	+0.006	+0.005	+0.004	+0.003	+0.002	+0.001	0	-0.001	-0.002
+1	+0.005	+0.004	+0.003	+0.002	+0.001	0	-0.001	-0.002	-0.003
0	+0.004	+0.003	+0.002	+0.001	0	-0.001	-0.002	-0.003	-0.004
-1	+0.003	+0.002	+0.001	0	-0.001	-0.002	-0.003	-0.004	-0.005
-2	+0.002	+0.001	0	-0.001	-0.002	-0.003	-0.004	-0.005	-0.006
-3	+0.001	0	-0.001	-0.002	-0.003	-0.004	-0.005	-0.006	-0.007
-4	0	-0.001	-0.002	-0.003	-0.004	-0.005	-0.006	-0.007	0.008

Pinion Gear: Service and Repair Dana/Spicer, Rear Axle

Depth Gauge Check, Dana/Spicer, Rear Axle

If any of the gauge surfaces become nicked, the high spots should be removed using an oil stone.

1. Install a new rear pinion bearing over a suitable aligning adapter, then position into the pinion bearing retainer assembly.

2. Place front of pinion bearing into the bearing cup, then assemble the handle onto the screw and hand tighten. The square drive in the handle of the tool is to be used for obtaining the proper pinion bearing preload. Set preload to 20---40 inch lbs.

3. Center suitable gauge tube into the differential bearing bore, then install the differential bearing caps.

4. Using a feeler gauge tool or shims, select the thickest shim that will enter between the gauge tube and gauge block. Insert feeler gauge directly along the gauge block to ensure a correct reading. If the service pinion gear is marked with a plus (+) reading, this amount should be subtracted from the thickness dimension obtained in step 4. If the service pinion gear is marked with a minus (-) reading, this amount should be added to the thickness dimension obtained in step 4.

5. Remove inner pinion bearing cup and install the correct number of shims in the carrier bore.

6. Install bearing cup and oil slinger, if equipped, on the pinion, then press on bearing using a suitable tool. If a baffle or slinger is used, replace with a new one during assembly.

Drive Pinion Depth of Mesh Setting, Dana/Spicer, Rear Axle

Fig. 3 Shim setting chart

Ring gears and pinions are supplied in matched sets only. Matched numbers on both the pinion and ring gear are etched for verification. On the face of each pinion there is etched either a plus or a minus number, or ``0,'' which indicates the best running position for each particular gear set. This dimension is controlled by shimming behind the inner pinion bearing cup. A pinion etched with a +3 would require .003 inch less shims that a pinion etched ``0.'' A pinion etched - 3 would require .003

inch more shims than a pinion etched ``0.'' If the etched figure is ``0'' the shim pack will remain the same. Refer to chart, Fig. 3. Shims are available in thicknesses of .003 inch, .005 inch, .010 inch and .030 inch.

If old ring and pinion set is to be reused, measure the old shim pack and build a new shim pack to the same dimension. If a baffle is used in the axle assembly, it is considered a part of the shim pack. Measure each shim separately with a micrometer and add together to get the total shim pack thickness from the original build up.

If a new gear set is being used, notice the (+) or (-) etching on both the new and old pinion and adjust thickness of new shim pack to compensate for the difference of these two figures. For example, if the old pinion reads +2 and the new pinion is - 2, add .004 inch shims to the original shim pack.

Pinion Bearing Preload & Final Depth Check, Rear Axle

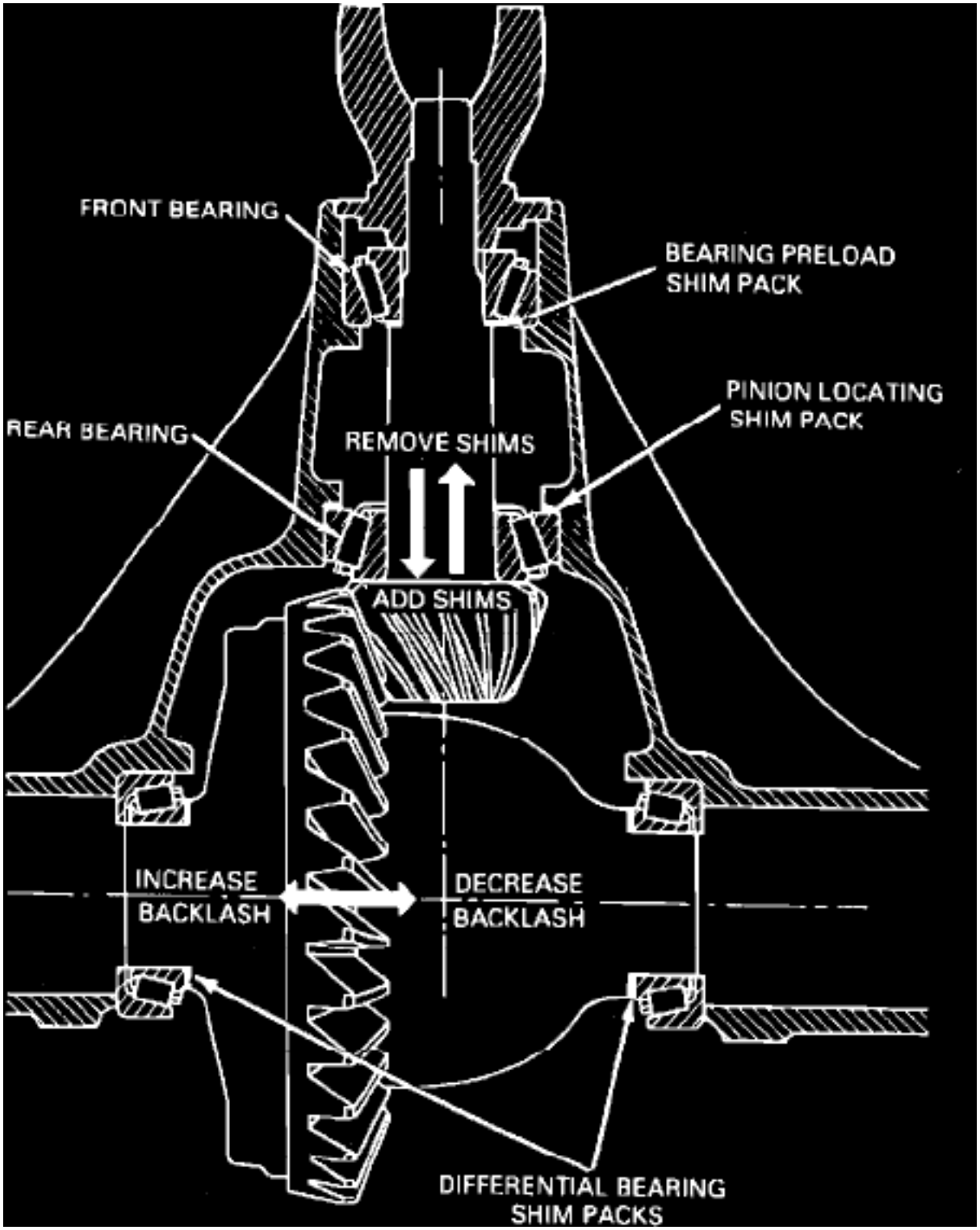


Fig. 4 Shim replacement for preload adjustment

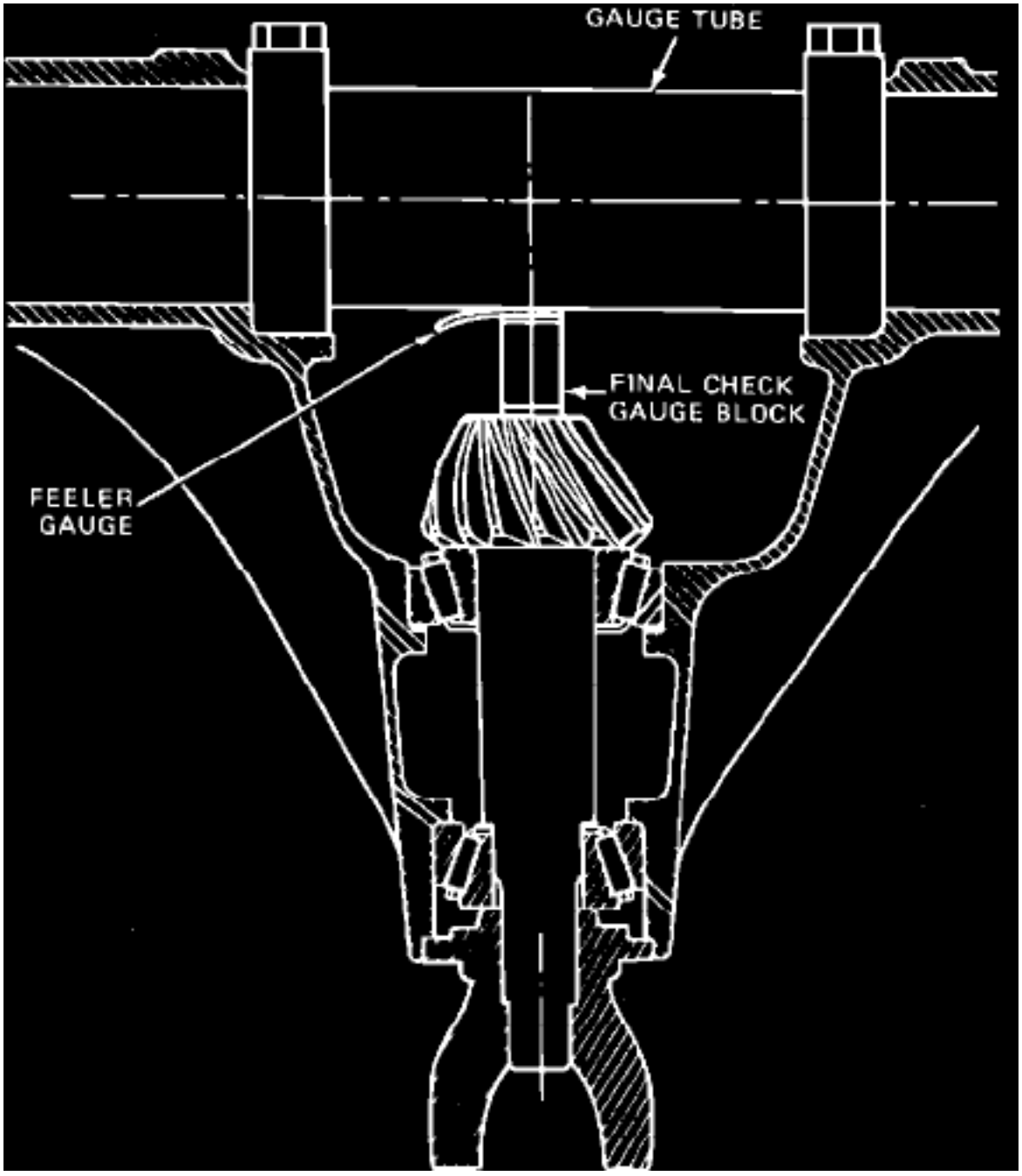


Fig. 5 Final pinion depth check

1. Install preload shims and slinger, if equipped, onto the pinion.

2. Install bearing cone assembly using suitable tool.

3. Install end yoke, washer and new pinion nut. Torque nut to approximately 250 ft. lbs. on except model 30 axle or 200---220 ft. lbs. on model 30 axle.

4. Rotate pinion using a suitable torque wrench. Rotating torque should be 20---40 inch lbs. To increase preload, remove shims from drive pinion. To decrease preload, add shims to pinion, Fig. 4.

5. Install suitable gauge tube in housing, then the bearing caps and cap attaching bolts, Fig. 5. Torque cap attaching bolts to 80---90 ft. lbs. on except model 30 axle or 35---50 ft. lbs. on model 30 axle.

6. Insert proper final check gauge block on top of pinion face under the gauge tube, Fig. 5. Place thumb on gauge block to ensure block is level.

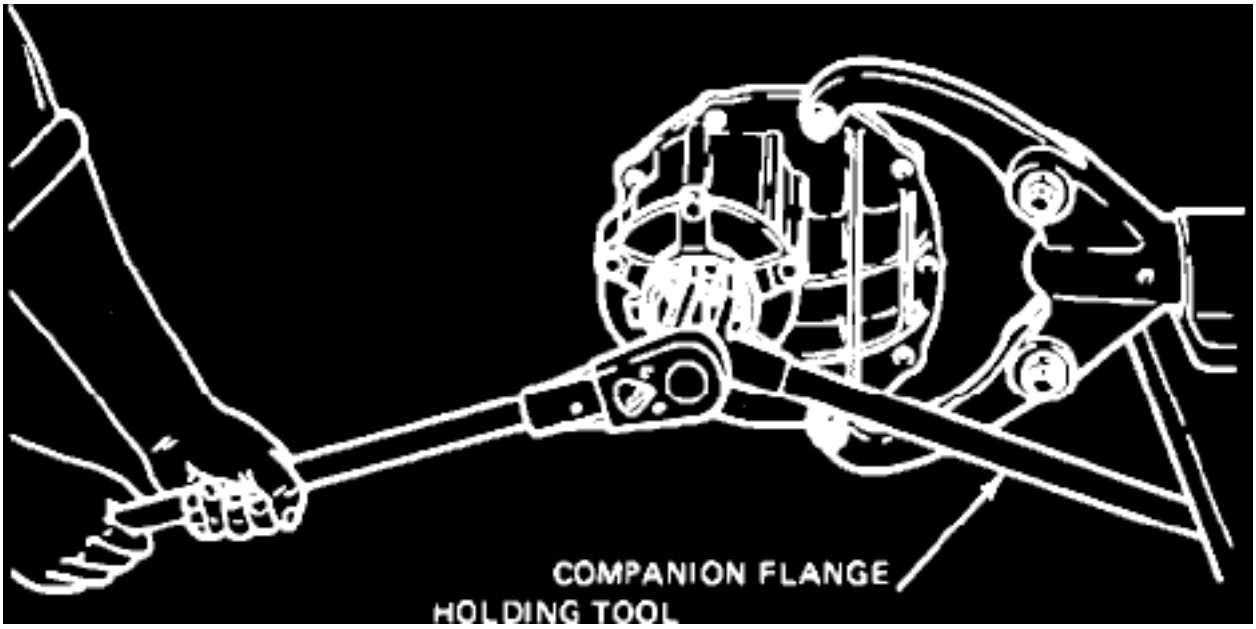
7. Insert feeler gauge or shims between gauge tube and final check gauge block until slight drag is felt.

8. The reading in step 7 should be .020 inch added to the drive pinion etching, which could be plus (+) or minus (-) with a tolerance of .002 inch. If the distance must be increased, remove shims from beneath the inner pinion bearing cup. If the distance must be decreased, add shims beneath the inner pinion bearing cup.

9. With drive pinion at the correct depth, remove the yoke, nut and washer using a suitable tool.

10. Apply suitable lubricant to oil seal, then install drive pinion oil seal using a suitable installer. Ensure seal spring is properly installed after seal installation.

11. Install yoke using suitable tool, then the washer and nut. Torque nut to approximately 250 ft. lbs. on except model 30 axle or 200---220 ft. lbs. on model 30 axle.



Pinion Gear: Service and Repair Ford Drive Axle W/ Removable Carrier

Backlash & Differential Bearing Preload Adjustment

1. Remove adjusting nut locks and loosen differential bearing cap bolts, then torque cap bolts to approximately 20 ft. lbs. Left adjusting nut is on ring gear side of carrier and right adjusting nut is on pinion side.

2. Loosen right nut until it is away from cup and tighten left nut until ring gear is just forced into position with zero backlash, then rotate pinion several revolutions to ensure that no binding is evident.

3. Check right nut to ensure that it is still loose, then install dial indicator.

4. Tighten right nut until it just contacts bearing cup, then set dial indicator to zero and apply pressure to bearings by tightening right nut until indicator reads .008---.012 inch.

5. Turn pinion gear several times in each direction to seat bearings in cups and ensure that no binding is evident, then torque bearing caps to 70---80 ft. lbs.

6. Measure backlash on several teeth around ring gear.

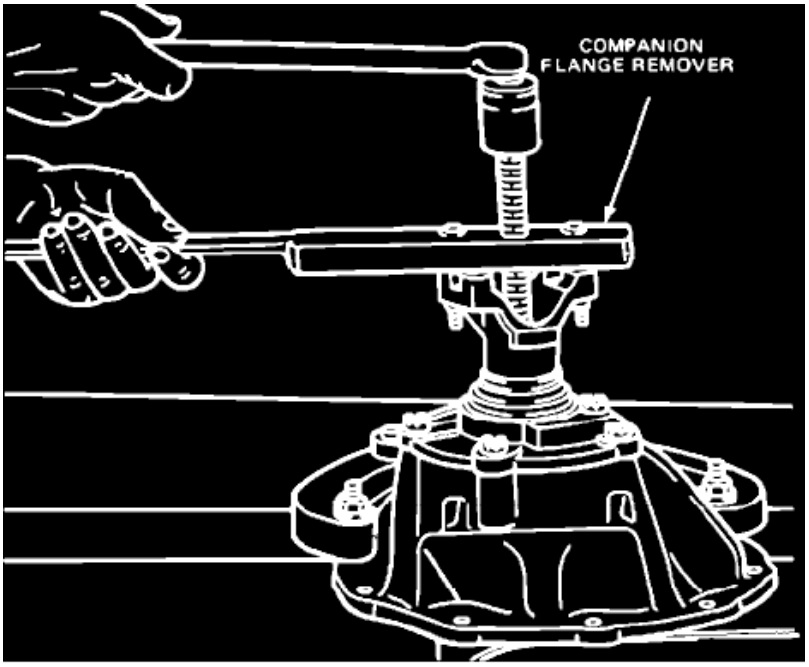
7. If backlash varies by more than .004 inch between any two teeth, loosen one adjusting nut and tighten opposite nut an equal amount to move ring gear away from or toward pinion. Tightening left nut moves ring gear into pinion to decrease backlash while tightening right nut moves ring gear away. When moving adjusting nuts, final movement should always be made in a tightening direction. Assuming left nut had to be loosened one notch, loosen nut two notches, then tighten one notch.

8. Ensure that case spread remains within specifications as previously described.

9. Perform teeth pattern check as described under ``General Axle Service.'' If backlash is correct and gross pattern error results, recheck pinion shim selection.

Drive Pinion & Bearing Retainer, Disassembly

Fig. 3 Removing Pinion Shaft Nut


COMPANION
FLANGE REMOVER

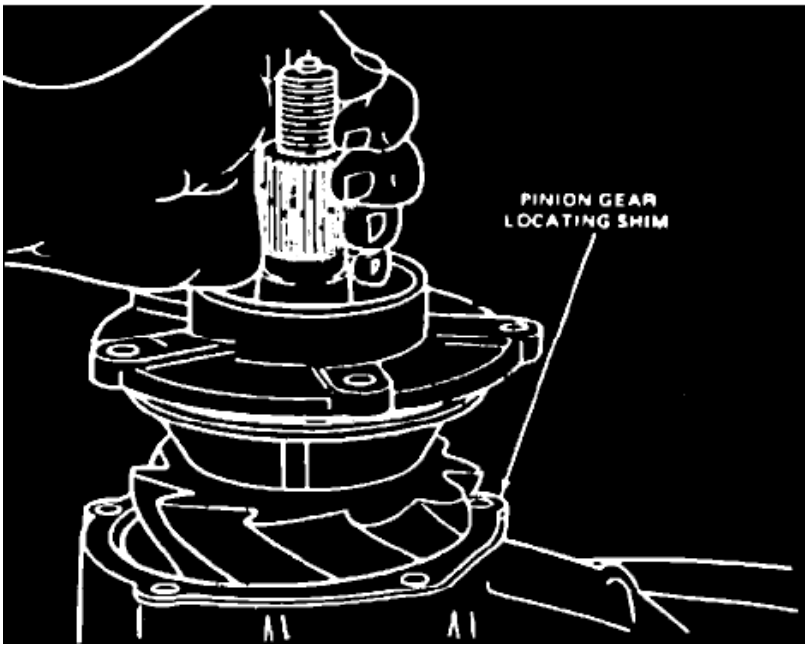

PINION GEAR
LOCATING SHIM

Fig. 4 Removing Companion Flange

1. Remove drive pinion shaft nut, Fig. 3.

2. Remove companion flange from drive pinion shaft, Fig. 4.

3. Using suitable puller, remove pinion seal.

4. Remove the pinion, bearing, and retainer assembly from carrier housing. Extreme care must be taken not to damage mounting surfaces of retainer and carrier.

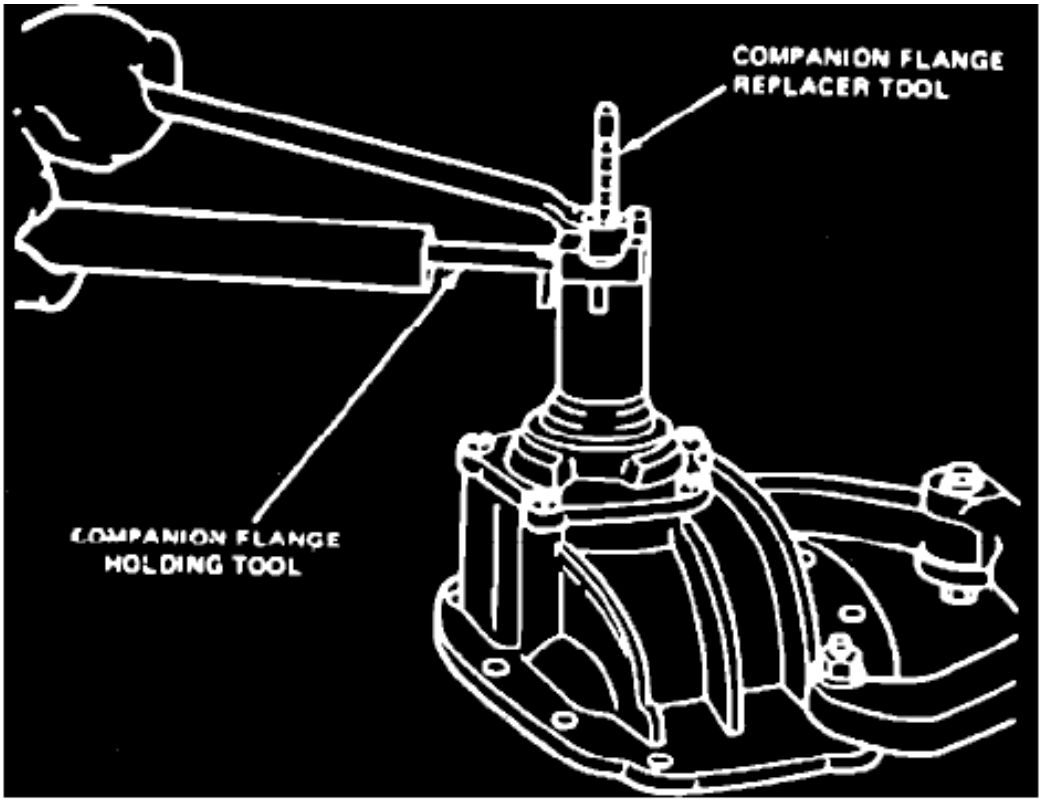
5. Place protective sleeve on pinion pilot bearing surface and press drive pinion shaft out of pinion retainer.

6. Using tool T71P-4621-B or equivalent, press pinion shaft out of pinion rear bearing cone.

7. Clean and inspect all parts as described in ``General Axle Service.''

Drive Pinion & Bearing Retainer, Ford, Removable Carrier,

Fig. 7 Installing Pinion And Retainer Assembly


COMPANION FLANGE
REPLACER TOOL
COMPANION FLANGE
HOLDING TOOL

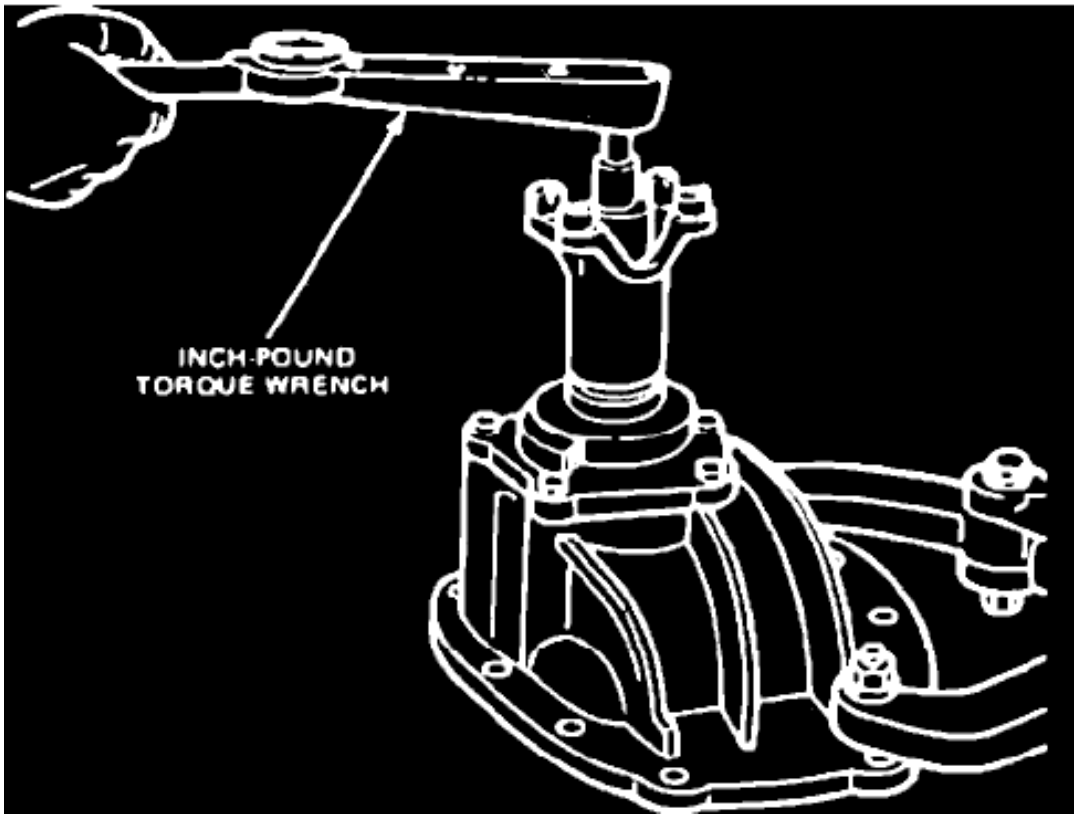

INCH-POUND
TORQUE WRENCH

Fig. 8 Installing Companion Flange

Fig. 9 Checking Pinion Bearing Preload

A new ring gear and drive pinion should always be installed as a matched set. Ensure that identifying numbers on ring gear and head of drive pinion are identical.

1. Using suitable tool, install pinion rear bearing cone on pinion shaft, then position new spacer on pinion shaft.

2. Place bearing retainer on drive pinion shaft and install front bearing cone and roller, then, using tool T57L-4621-B or equivalent, press bearing cone and roller into position, being careful not to crush collapsible spacer.

3. Lubricate O-ring with suitable lubricant, install into groove in pinion retainer, and snap into place. Then lubricate front and rear pinion bearings.

4. Position selected shim on carrier housing and install pinion and retainer assembly, being careful not to pinch O-ring, Fig. 7.

5. Install pinion retainer attaching bolts, torquing to 30---40 ft. lbs., then install oil slinger, if equipped.

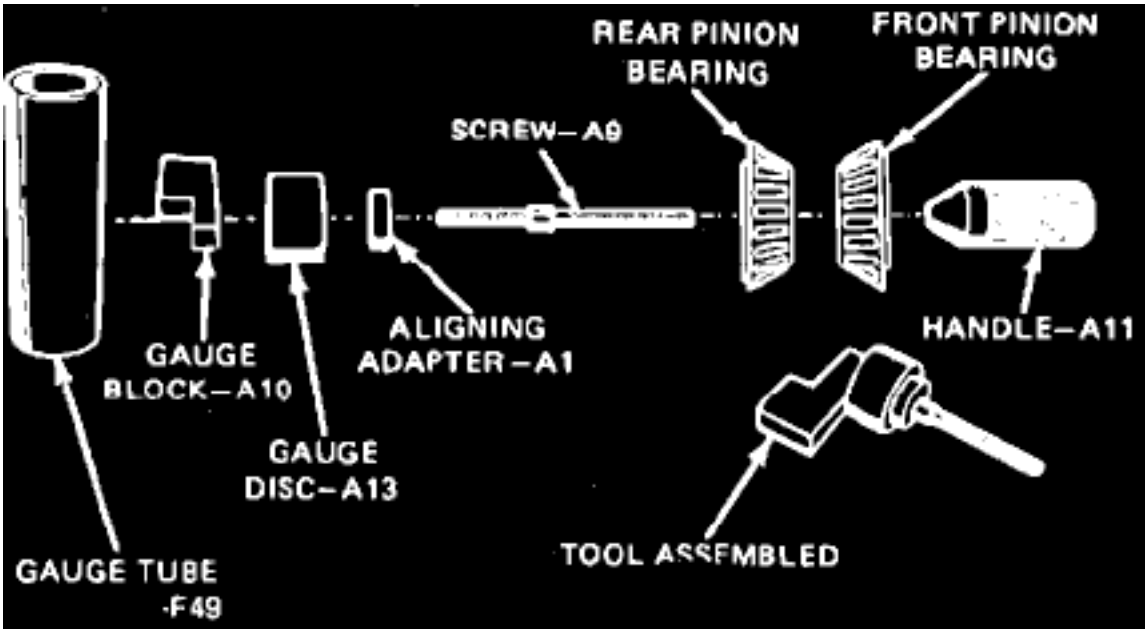
6. Using suitable tool, install new pinion oil seal in bearing retainer.

7. Install companion flange, Fig. 8.

8. Apply small amount of suitable lubricant to flange side of new pinion nut and start nut on drive pinion shaft.

9. Hold flange with suitable tool and tighten flange nut.

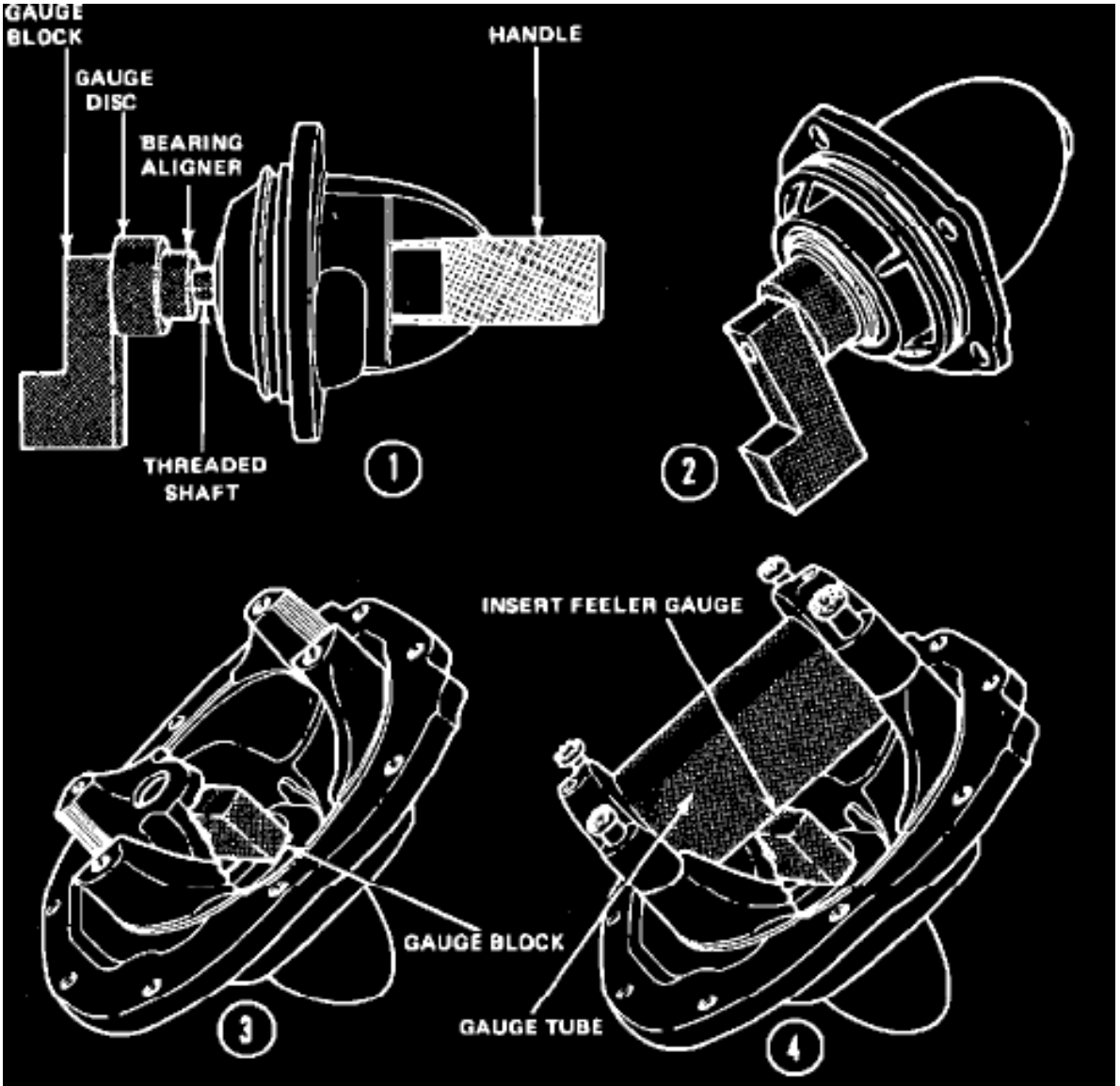
10. Check pinion bearing preload, Fig. 9. Correct preload is obtained when torque required to rotate pinion in retainer is 8---14 inch lbs. for original bearing or 16---29 inch lbs. for new bearing. If torque required to rotate pinion is less than specified, tighten pinion shaft nut a little at a time until proper preload is obtained. Do not over tighten nut. If excessive preload is obtained as a result of over tightening, replace collapsible bearing spacer. Do not back off pinion shaft nut to establish pinion bearing preload.



Dash Number	Description	Removable Carriers 9.0
A1	Aligning Adapter (33.02mm or 1.300 inch Outside Diameter)	X
A9	Screw	X
A10	Gauge Block (43.18mm or 1.700 inch Thick)	X
A11	Handle	X
A13	Gauge Disc (30.02mm or 1.189 inch Thick)	X
F49	Gauge Tube (73.45mm or 2.892 inch Outside Diameter)	X

Selecting Correct Pinion Shim, Ford Removable Carrier

Fig. 5 Removable carrier 9 inch ring gear axle pinion depth tool gauge



FEELER GAUGE READING	SHIM REQUIRED	FEELER GAUGE READING	SHIM REQUIRED	FEELER GAUGE READING	SHIM REQUIRED
.035	.005	.023	.017	.011	.029
.034	.006	.022	.018	.010	.030
.033	.007	.021	.019	.009	.031
.032	.008	.020	.020	.008	.032
.031	.009	.019	.021	.007	.033
.030	.010	.018	.022	.006	.034
.029	.011	.017	.023	.005	.035
.028	.012	.016	.024	.004	.036
.027	.013	.015	.025	.003	.037
.026	.014	.014	.026	.002	.038
.025	.015	.013	.027		
.024	.016	.012	.028		

Fig. 6 Using pinion depth gauge tool

When the ring gear and drive pinion or pinion bearings are replaced, the correct pinion shim thickness must be determined using tool T79P-4020-A or equivalent.

1. Select proper rear pinion bearing aligning adapter and gauge disc and slide these adapters over screw or threaded shaft, Fig. 5.

2. Install gauge block on threaded shaft and tighten securely, Fig. 6 (1).

3. Place assembly and rear drive pinion bearing into pinion bearing retainer assembly, then install front pinion bearing and screw handle onto threaded shaft, tapered end into front pinion bearing, Fig. 6 (1) and (2). Flat end of handle has 3/8 inch hole cut in it so that an inch pound torque wrench may be used to obtain proper pinion bearing preload.

4. Install pinion bearing retainer assembly into carrier, less shim, torquing attaching bolts to 30---40 ft. lbs.

5. Rotate gauge block so that it rests against pilot boss, Fig. 6 (3).

6. Using feeler gauge, measure distance between gauge block and gauge tube, Fig. 6 (4). Insert blade directly along gauge block top to ensure a correct reading. Fit should be a slight drag-type feeling.

7. Select proper shim according to feeler gauge reading, Fig. 6.

Ring Gear: Testing and Inspection Gears

Examine drive pinion and ring gear teeth for scoring or signs of excessive wear. Worn gears cannot be rebuilt to correct a noisy condition. Gear scoring and flaking are the result of excessive shock loading or the use of improper lubricant. Scored gears cannot be reused.

Examine teeth and thrust surfaces of differential gears. Wear on hub of differential side gears may cause a chucking noise known as chuckle, when the vehicle is operated at low speeds. Wear of splines, thrust surfaces or thrust washers may contribute to excessive drive line backlash.

Ring Gear: Testing and Inspection Runout

1987 models equipped with anti-lock brakes incorporate a multi-tooth exciter ring which is pressed on the differential case located behind the ring gear assembly. Do not remove exciter ring to measure ring gear runout. A space is provided between the exciter ring and ring gear to measure ring gear runout.

If ring gear runout during disassembly exceeded specifications, the condition may be caused by a warped gear, or distorted or damaged case or foreign matter trapped between differential case halves or under ring gears.

To determine cause of excessive runout, assemble differential case without ring gear, then check as described below.

Install case in differential carrier without ring gear attached. Install bearing caps and adjuster nuts and tighten cap bolts to specifications. Tighten adjuster nuts to center differential side bearing. Mount a dial indicator and check runout of case flange and ring gear pilot. If runout at either point is excessive, install a new differential case. If runout is within specification, the ring gear is out of specification. When performing this check on a locking differential case the four compression springs within the case should be temporarily removed. This will prevent a false runout reading due to distortion caused by the springs forcing the case apart.

Ring Gear: Adjustments Assembly of Differential Into Housing

Ring Gear & Pinion Backlash

1. Position differential assembly, with pinion installed, into housing. Ensure master bearings are still assembled in case.

2. Install dial indicator on carrier housing in same location as when spreading case.

3. Force ring gear into mesh with pinion, then set dial indicator to ``0'' while maintaining force on differential case.

4. Force ring gear away from pinion gear and note dial reading. Repeat sequence until same indicator reading is obtained. This measurement indicates amount of shims needed between differential case and bearings on the ring gear side.

5. Remove dial indicator and differential case from carrier, then the master bearings from differential case.

6. Place shims determined in step 4 on ring gear hub of differential case.

7. Install bearing cone on ring gear side of differential case, then drive bearing into place.

8. To determine thickness of shims required on hub of drive pinion side of differential case, subtract thickness of shims installed in step 6 from total differential case endplay as measured in ``Differential Case Assembly'' procedure. To this figure, add .015 inch.

9. Place shims determined in step 8 on hub of drive pinion side of differential case.

10. Install bearing cone on hub of drive pinion side of differential case.

11. Position suitable step plate on ring gear side bearing to protect bearing.

12. Place bearing on drive pinion side hub and drive it into position.

13. Install spreader tool and dial indicator as previously described. Do not spread case more than .015 inch.

14. Assemble differential bearing cups to bearing cones, then install differential assembly into carrier.

15. Tap differential assembly into position in carrier using a soft-faced hammer, then remove spreader tool from case.

16. Install bearing caps in proper position, then torque cap screws to 80---90 ft. lbs. on except model 30 axle or 35---50 ft. lbs on model 30 axle.

17. Measure ring gear and pinion backlash at three equidistant points using a dial indicator. Backlash must measure .004---.009 inch on except model 30 axle or .005---.009 inch on model 30 axle and cannot vary more than .003 inch on except model 30 axle or .002 inch on model 30 axle between points checked. Backlash may be brought within specifications by switching shims from one side of differential case to the other. Move ring gear closer to pinion to correct high backlash, or further away from pinion to correct low backlash.

18. On except model 30 axle having a cover plate without a flat mounting surface, install cover plate, using a new gasket, and torque attaching bolts alternately and evenly to 30---40 ft. lbs. On model 30 axle, torque cover attaching bolts to 15---25 ft. lbs.

19. On units having a cover plate with a flat mounting surface, install cover as follows:

a. Clean flat surface of cover plate and carrier mating surface. b. Apply suitable sealant to cover plate surface, ensuring bead of sealant is laid on inside of cover screw holes. c. Install two attaching bolts into cover at 2 o'clock and 8 o'clock positions. d. Position cover on carrier, then install remaining attaching bolts. e. Torque all attaching bolts alternately and evenly to 30---40 ft. lbs.

Ring Gear: Adjustments Backlash & Differential Bearing Preload Adjustment

FORD REMOVABLE CARRIER

1. Remove adjusting nut locks and loosen differential bearing cap bolts, then torque cap bolts to approximately 20 ft. lbs. Left adjusting nut is on ring gear side of carrier and right adjusting nut is on pinion side.

2. Loosen right nut until it is away from cup and tighten left nut until ring gear is just forced into position with zero backlash, then rotate pinion several revolutions to ensure that no binding is evident.

3. Check right nut to ensure that it is still loose, then install dial indicator.

4. Tighten right nut until it just contacts bearing cup, then set dial indicator to zero and apply pressure to bearings by tightening right nut until indicator reads .008---.012 inch.

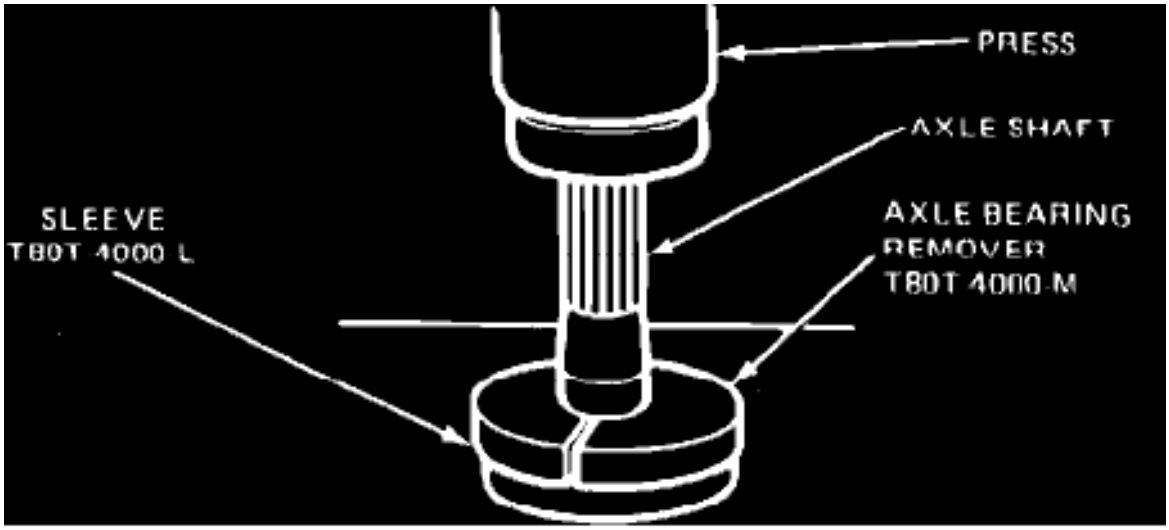
5. Turn pinion gear several times in each direction to seat bearings in cups and ensure that no binding is evident, then torque bearing caps to 70---80 ft. lbs.

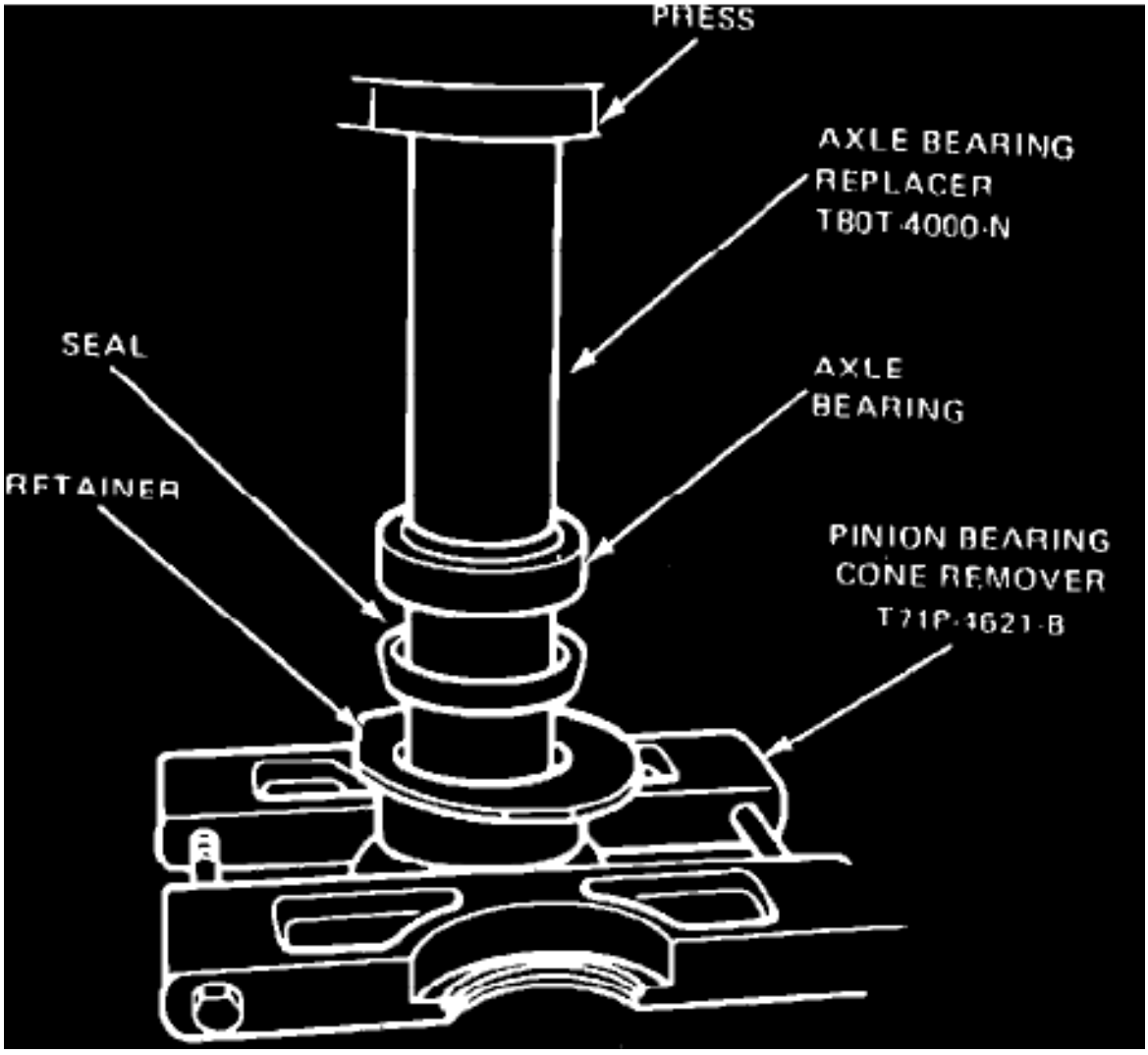
6. Measure backlash on several teeth around ring gear.

7. If backlash varies by more than .004 inch between any two teeth, loosen one adjusting nut and tighten opposite nut an equal amount to move ring gear away from or toward pinion. Tightening left nut moves ring gear into pinion to decrease backlash while tightening right nut moves ring gear away. When moving adjusting nuts, final movement should always be made in a tightening direction. Assuming left nut had to be loosened one notch, loosen nut two notches, then tighten one notch.

8. Ensure that case spread remains within specifications as previously described.

9. Perform teeth pattern check as described under ``General Axle Service.'' If backlash is correct and gross pattern error results, recheck pinion shim selection.


PRESS
AXLE SHAFT
SLEEVE
T80T 4000 L
AXLE BEARING
REMOVER
T80T 4000-M


PRESS
AXLE BEARING
REPLACER
T80T-4000-N
SEAL
AXLE
BEARING
RETAINER
PINION BEARING
CONE REMOVER
T71P-4621-B

Axle Bearing: Service and Repair Front

Fig. 2 Axle shaft bearing removal. 1980---82

Fig. 3 Axle shaft bearing installation. 1980---82

1980---82

1. Remove axle shaft as described under ``Axle Shaft, Replace.''

2. Remove 3 bearing retainer plate to carrier attaching bolts, then slide stud shaft and slip yoke out of housing.

3. Install axle shaft in a suitable vise and drill a 1/4 inch hole 3/4 through the bearing retainer.

4. Remove bearing retainer by breaking with a chisel positioned in drilled hole.

5. Press bearing from axle shaft, Fig. 2.

6. Remove seal and retainer plate from stub shaft. Discard seal.

7. Reverse procedure to install. Install bearing retainer and new seal onto shaft. Lubricate seal with wheel bearing grease. Install bearing onto axle with large radius on inner race facing yoke of axle. Press bearing, then inner bearing retainer until fully seated, Fig. 3. Push seal and outer retainer away from bearing and fill with grease. Wrap a piece of tape around the space, then pull retainer and seal against bearing. This will force grease into bearing. Repeat until grease is visible on small end of rollers.

Axle Bearing: Service and Repair Rear

Dana/Spicer Integral Housing Type

Full-Floating Axle

1. Set parking brake and loosen axle shaft bolts.

2. Raise and support rear of vehicle so that axle is parallel with floor.

3. Remove axle shaft bolts.

4. Remove axle shaft and discard gasket.

5. Pry out locking wedge with screwdriver.

6. Raise wheel until weight is removed from wheel bearing.

7. Remove wheel bearing adjustment nut.

8. Remove outer bearing cone and pull wheel assembly from axle.

9. Drive inner bearing cone and seal out of wheel hub with brass drift.

10. Inspect bearings and races and replace if worn or damaged. Drive races from wheel hub with brass drift.

11. Lubricate bearing cone and roller assemblies and place inner assemblies into wheel hub. Install new hub inner seal.

12. Wrap spindle threads with tape, then slide wheel assembly onto axle housing spindle and remove tape.

13. Install outer wheel bearing and start adjuster nut. Lower wheel to ground.

14. While rotating wheel, torque adjusting nut to 120-140 ft. lbs. Back off the nut to obtain 0.001---0.010 inch endplay (1/8-3/8 turn). If nut or locking wedge are damaged or do not allow for proper endplay they should be replaced.

15. Position locking wedge in key way slot, making sure it is not bottomed against the shoulder of adjusting nut.

16. Install axle shaft and new flange gasket, then install retaining bolts and torque locking bolts to 40---50 ft. lbs.

17. Adjust brakes.

18. Remove supports and lower vehicle.

Semi-Floating Axle

1. Raise and support vehicle.

2. Remove wheel and brake drum.

3. Remove cover plate and discard gasket.

4. Remove differential pinion shaft lock screw and the shaft.

5. Remove C-clip from button end of shaft by pushing inward on other end.

6. Pull shaft from axle tube. Do not rotate differential side gears.

7. Remove and discard oil seal from axle tube.

8. Pull bearing from axle tube.

9. Lubricate new bearing and install in axle tube.

10. Lubricate and install new oil seal.

11. Insert shaft into axle tube, making sure splines engage side gears, then install C-clip and pull shaft outward until the clip locks.

12. Install pinion mate shaft, aligning lock pin holes, and pinion gear side washers.

13. Install new lock screw and torque to 8 ft. lbs. on 1980---81 models, or 20---25 ft. lbs. on 1982---87 models.

14. Install cover plate and gasket. Torque bolts to 30---40 ft. lbs.

15. Install wheel and drum assembly.

16. Remove supports and lower vehicle.

Ford Integral Carrier Type Axle

1. Remove axle shaft as outlined in ``Axle Shaft, Replace''.

2. Insert tool T83T-1226-A for models with 8.8 inch ring gear, or tool T85T-1225-AH for models with 10.25 inch ring gear, and tool T50T-100-A into axle bore so tangs on tool engage bearing outer race. Remove bearing and seal as an assembly.

3. Install new bearing using tool T83T-1225-B on models with 8.8 inch ring gear, or tool T80T-4000-W on models with 10.25 inch ring gear, and new seal using tool T83T-1175-A on models with 8.8 inch ring gear, or tool T80T-4000-Y on models with 10.25 inch ring gear. Pack lips of seal with C1AZ-19590-B or equivalent.

4. Reinstall axle.

Ford Removable Carrier Type

Removal, Units w/Ball Bearing

1. Remove wheel assembly.

2. Remove brake drum from flange.

3. Working through hole provided in axle shaft flange, remove nuts that secure wheel bearing retainer.

4. Pull axle shaft out of housing. If bearing is a tight fit in axle housing, use a slide hammer type puller.

5. Remove brake backing plate and secure to frame rail.

6. If the axle shaft bearing is to be replaced, loosen the inner retainer by nicking it deeply with a chisel in several places. The bearing will then slide off easily.

7. Press bearing from axle shaft.

8. Inspect machined surface of axle shaft and housing for rough spots that would affect sealing action of the oil seal. Carefully remove any burrs or rough spots.

Installation

1. Press new bearing on shaft until it seats firmly against shoulder on shaft.

2. Press inner bearing retainer on shaft until it seats firmly against bearing.

3. If oil seal is to be replaced, use a hook-type tool to pull it out of housing. Wipe a small amount of oil resistant sealer on outer edge of seal before it is installed.

Removal, Units W/Roller Bearing

1. Remove wheel assembly.

2. Remove brake drum from flange.

3. Working through hole provided in axle flange, remove nuts securing wheel bearing retainer.

4. Pull axle shaft carefully from housing to prevent damage to outer seal rubber. Use a slide hammer type puller to remove tapered bearing cup from housing. Remove brake backing plate and secure to frame rail.

5. If the axle shaft bearing or seal is to be replaced, split the inner bearing retainer.

6. Press bearing from axle shaft.

7. Inspect machined surface of axle shaft and housing for rough spots that would affect sealing action of the oil seal. Carefully remove any burrs or rough spots.

8. Install outer retainer plate on axle shaft. Press lubricated seal and bearing onto shaft until firmly seated. Oil seal for rear drum brake equipped vehicles is different than that used on vehicles with rear disc brakes. Seals used with drum brakes have a gray metal colored outer rim, while seals used with disc brakes have a black or orange color.

9. Press new bearing retainer onto shaft until seated.

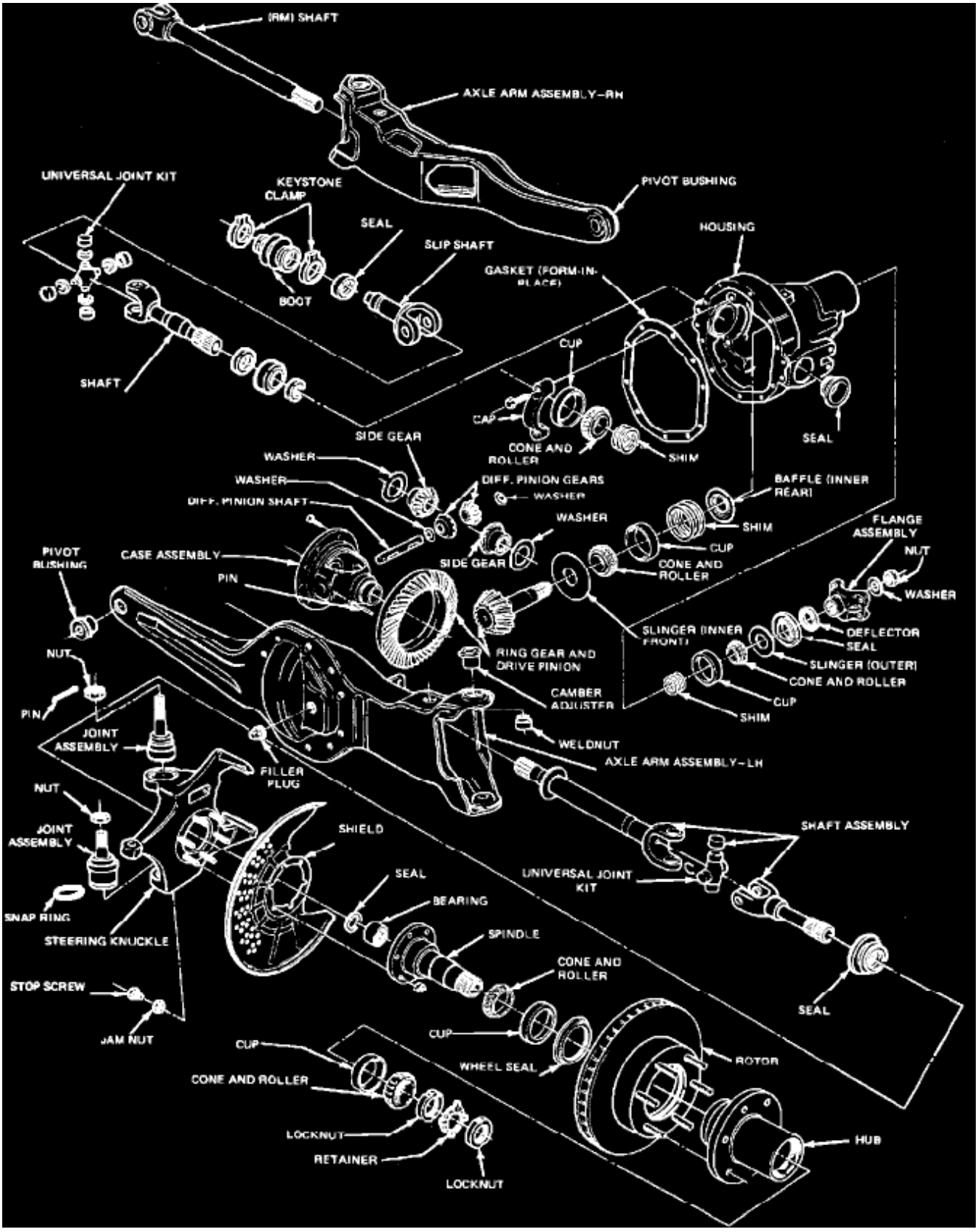
Installation

1. On 1980---84 models, place a new gasket on each side of brake carrier plate, and slide axle shaft into housing. On models with roller bearing, ensure outer seal is fully seated on bearing.

2. Start splines into differential side gear and push shaft in until bearing bottoms in housing.

3. Torque bearing retainer nuts to 20---40 ft. lbs.

Ford Bronco Workshop Manual (V8-351 5.8L VIN G 2-bbl (1982))
Ford Workshop Manuals > Transmission and Drivetrain > Drive Axles, Bearings and Joints > Axle Shaft Assembly > Axle Shaft > Component Information > Service and Repair > Axle Shaft, Conventional Fixed/Floating



Axle Shaft: Service and Repair Axle Shaft, Conventional Fixed/Floating

Front Drive Axle

Fig. 1 Four wheel drive front axle assembly. 1980---87 F-150 & Bronco (similar to other 1980---87 models exc. 1986---87 F-350 w/Dana 60 Monobeam axle)

EXC. 1986---87 F-350 W/DANA 60 MONOBEAM AXLE

1. Raise and support front of vehicle.

2. Remove front tire and brake caliper. Position caliper aside, leaving brake lines attached. Do not allow weight of caliper to hang on brake lines.

3. Remove spindle and brake splash shield, then the axle shaft, Fig. 1.

Dana/Spicer Integral Housing Type

Full-Floating Axle

1. Set parking brake and loosen axle shaft bolts.

2. Raise and support rear of vehicle so that axle is parallel with floor.

3. Remove axle shaft bolts.

4. Remove axle shaft and discard gasket.

5. Pry out locking wedge with screwdriver.

6. Raise wheel until weight is removed from wheel bearing.

7. Remove wheel bearing adjustment nut.

8. Remove outer bearing cone and pull wheel assembly from axle.

9. Drive inner bearing cone and seal out of wheel hub with brass drift.

10. Inspect bearings and races and replace if worn or damaged. Drive races from wheel hub with brass drift.

11. Lubricate bearing cone and roller assemblies and place inner assemblies into wheel hub. Install new hub inner seal.

12. Wrap spindle threads with tape, then slide wheel assembly onto axle housing spindle and remove tape.

13. Install outer wheel bearing and start adjuster nut. Lower wheel to ground.

14. While rotating wheel, torque adjusting nut to 120-140 ft. lbs. Back off the nut to obtain 0.001---0.010 inch endplay (1/8-3/8 turn). If nut or locking wedge are damaged or do not allow for proper endplay they should be replaced.

15. Position locking wedge in key way slot, making sure it is not bottomed against the shoulder of adjusting nut.

16. Install axle shaft and new flange gasket, then install retaining bolts and torque locking bolts to 40---50 ft. lbs.

17. Adjust brakes.

18. Remove supports and lower vehicle.

Semi-Floating Axle

1. Raise and support vehicle.

2. Remove wheel and brake drum.

3. Remove cover plate and discard gasket.

4. Remove differential pinion shaft lock screw and the shaft.

5. Remove C-clip from button end of shaft by pushing inward on other end.

6. Pull shaft from axle tube. Do not rotate differential side gears.

7. Remove and discard oil seal from axle tube.

8. Pull bearing from axle tube.

9. Lubricate new bearing and install in axle tube.

10. Lubricate and install new oil seal.

11. Insert shaft into axle tube, making sure splines engage side gears, then install C-clip and pull shaft outward until the clip locks.

12. Install pinion mate shaft, aligning lock pin holes, and pinion gear side washers.

13. Install new lock screw and torque to 8 ft. lbs. on 1980---81 models, or 20---25 ft. lbs. on 1982---87 models.

14. Install cover plate and gasket. Torque bolts to 30---40 ft. lbs.

15. Install wheel and drum assembly.

16. Remove supports and lower vehicle.

Ford Integral Carrier Type Axle

1. Raise and support vehicle, then remove rear wheel and brake drum.

2. Loosen rear housing cover screws and allow lubricant to drain, then remove cover.

3. Remove differential pinion shaft lock bolt and differential pinion shaft.

4. Move flanged end of axle shaft inward and remove C-lock from end of shaft.

5. Remove axle shaft from housing by pulling outward.

6. Reverse procedure to install. Apply Loctite EOAZ-19554-B to pinion shaft lock bolt threads, then torque lock bolt to 15-30 ft. lbs.

Ford Removable Carrier Type

Removal, Units w/Ball Bearing

1. Remove wheel assembly.

2. Remove brake drum from flange.

3. Working through hole provided in axle shaft flange, remove nuts that secure wheel bearing retainer.

4. Pull axle shaft out of housing. If bearing is a tight fit in axle housing, use a slide hammer type puller.

5. Remove brake backing plate and secure to frame rail.

6. If the axle shaft bearing is to be replaced, loosen the inner retainer by nicking it deeply with a chisel in several places. The bearing will then slide off easily.

7. Press bearing from axle shaft.

8. Inspect machined surface of axle shaft and housing for rough spots that would affect sealing action of the oil seal. Carefully remove any burrs or rough spots.

Installation

1. Press new bearing on shaft until it seats firmly against shoulder on shaft.

2. Press inner bearing retainer on shaft until it seats firmly against bearing.

3. If oil seal is to be replaced, use a hook-type tool to pull it out of housing. Wipe a small amount of oil resistant sealer on outer edge of seal before it

is installed.

Removal, Units W/Roller Bearing

1. Remove wheel assembly.

2. Remove brake drum from flange.

3. Working through hole provided in axle flange, remove nuts securing wheel bearing retainer.

4. Pull axle shaft carefully from housing to prevent damage to outer seal rubber. Use a slide hammer type puller to remove tapered bearing cup from housing. Remove brake backing plate and secure to frame rail.

5. If the axle shaft bearing or seal is to be replaced, split the inner bearing retainer.

6. Press bearing from axle shaft.

7. Inspect machined surface of axle shaft and housing for rough spots that would affect sealing action of the oil seal. Carefully remove any burrs or rough spots.

8. Install outer retainer plate on axle shaft. Press lubricated seal and bearing onto shaft until firmly seated. Oil seal for rear drum brake equipped vehicles is different than that used on vehicles with rear disc brakes. Seals used with drum brakes have a gray metal colored outer rim, while seals used with disc brakes have a black or orange color.

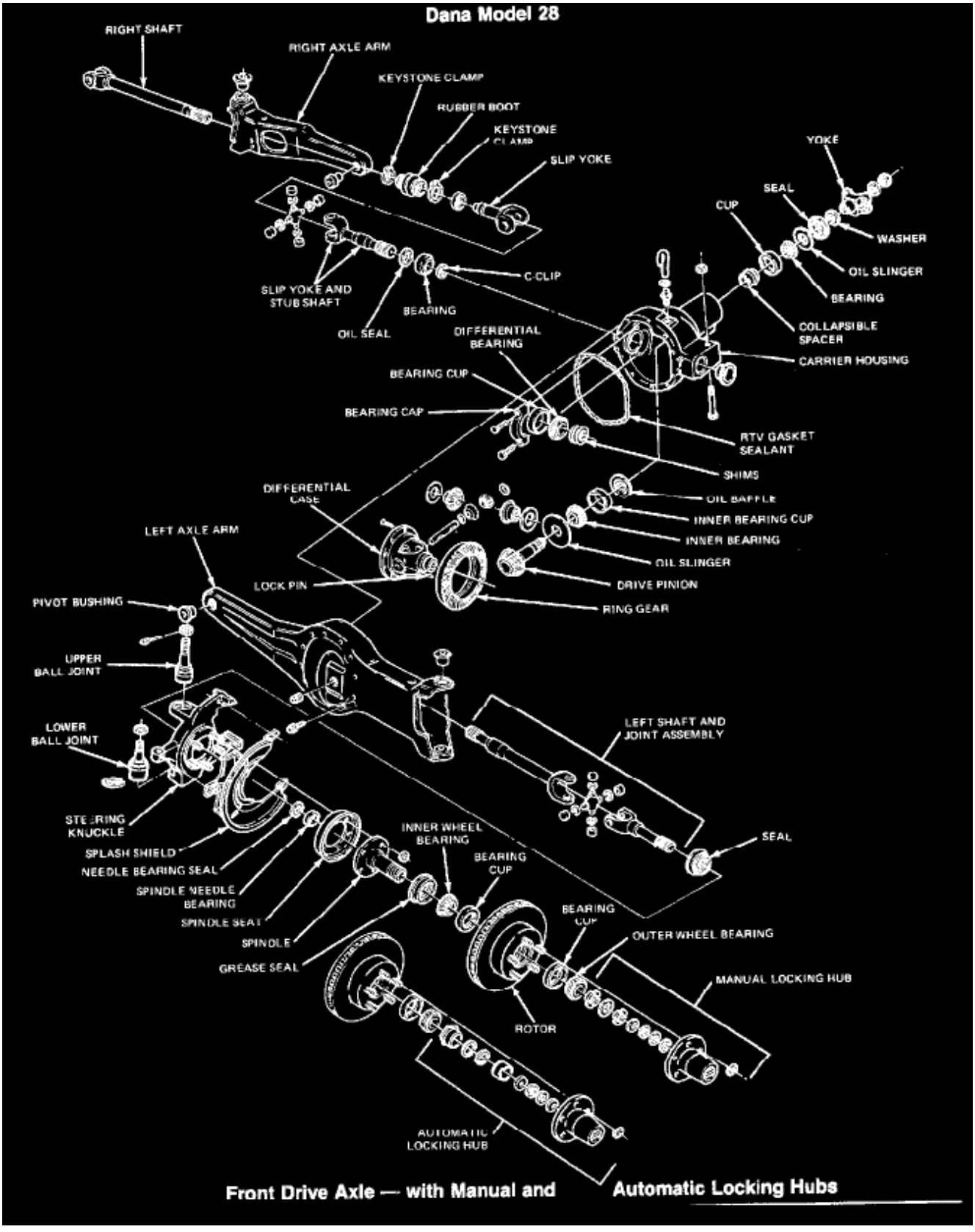
9. Press new bearing retainer onto shaft until seated.

Installation

1. On 1980---84 models, place a new gasket on each side of brake carrier plate, and slide axle shaft into housing. On models with roller bearing, ensure outer seal is fully seated on bearing.

2. Start splines into differential side gear and push shaft in until bearing bottoms in housing.

3. Torque bearing retainer nuts to 20---40 ft. lbs.


Dana Model 28
RIGHT SHAFT
RIGHT AXLE ARM
KEYSTONE CLAMP
RUBBER BOOT
KEYSTONE
SLIP YOKE
YOKE
SEAL
CUP
WASHER
OIL SLINGER
BEARING
COLLAPSIBLE SPACER
CARRIER HOUSING
C-CLIP
SLIP YOKE AND STUB SHAFT
BEARING
OIL SEAL
DIFFERENTIAL BEARING
BEARING CUP
BEARING CAP
RTV GASKET SEALANT
SHIMS
OIL BAFFLE
INNER BEARING CUP
INNER BEARING
OIL SLINGER
DRIVE PINION
RING GEAR
DIFFERENTIAL CASE
LOCK PIN
LEFT AXLE ARM
PIVOT BUSHING
UPPER BALL JOINT
LOWER BALL JOINT
LEFT SHAFT AND JOINT ASSEMBLY
STEERING KNUCKLE
SPLASH SHIELD
NEEDLE BEARING SEAL
SPINDLE NEEDLE BEARING
SPINDLE SEAT
SPINDLE
GREASE SEAL
INNER WHEEL BEARING
BEARING CUP
SEAL
BEARING CUP
OUTER WHEEL BEARING
MANUAL LOCKING HUB
ROTOR
AUTOMATIC LOCKING HUB
Front Drive Axle — with Manual and Automatic Locking Hubs

Axle Shaft: Service and Repair Front

Fig. 2.

REMOVAL AND INSTALLATION FRONT DRIVE AXLE

Removal

1 . Raise the vehicle on a hoist or jack and install safety stands under the radius arm brackets. Disconnect the driveshaft from the front axle yoke. 2. Remove the wheel and tire assembly. 3. Remove the disc brake calipers as described in Disc Brakes-Single Piston, Sliding Caliper. See: Brakes and Traction Control

NOTE: Do not let the caliper hang down on the weight of the brake lines. Support the caliper on a frame rail.

4. Remove the cotter pin and nut retaining the steering linkage to the spindle. Disconnect the linkage from the spindle. 5. Position a jack under the axle arm assembly and slightly compress the coil spring. Remove the nut which retains the lower portion of the spring

to the axle arm. Slowly lower the jack, and remove the coil spring, spacer, seat and stud.

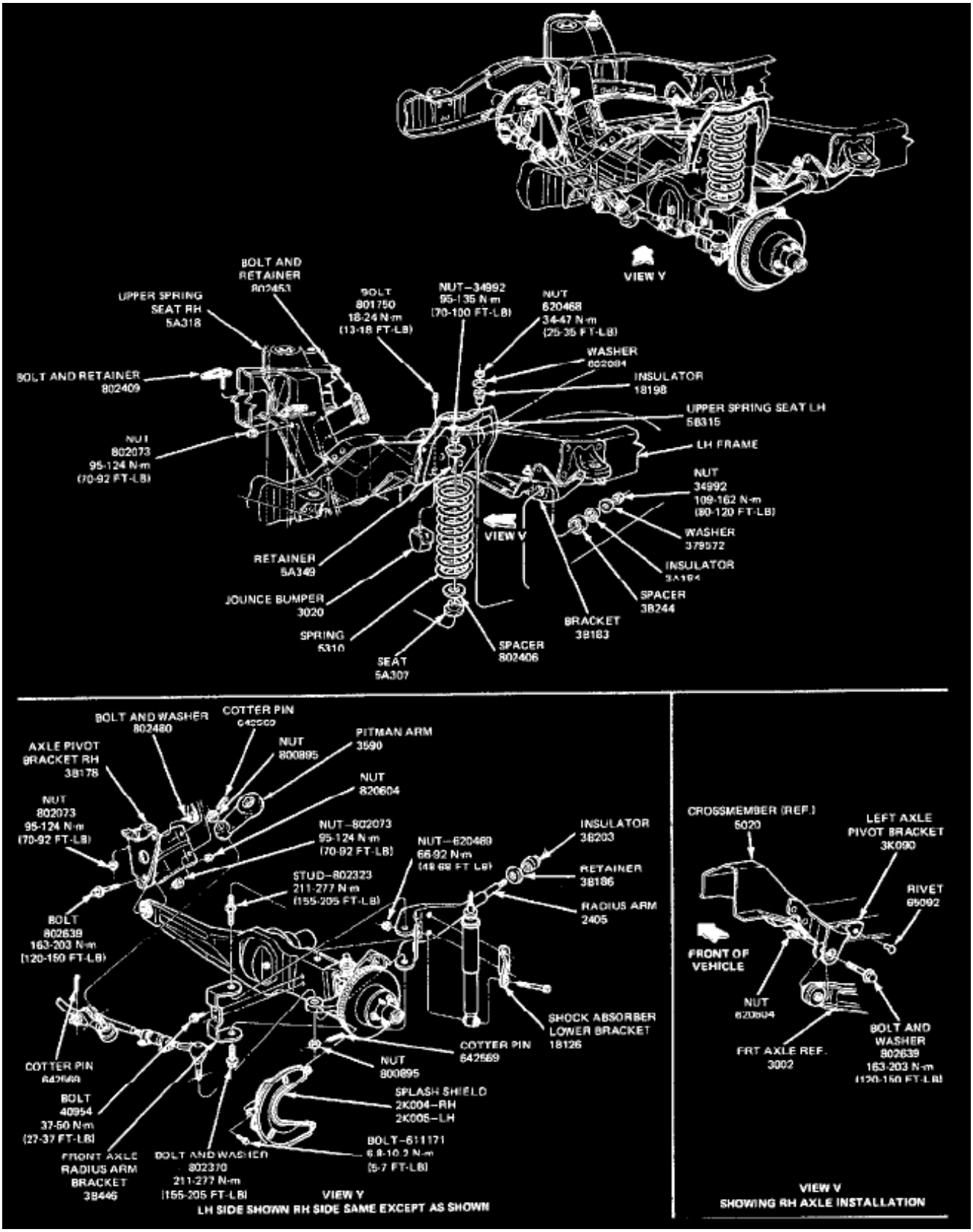
NOTE: The axle arm assembly must be sup- ported on the jack throughout spring removal and installation and must not be permitted to hang by the brake hose. If the length of the brake hose Is not sufficient to provide adequate clearance for the removal and installation of the spring, the caliper must be removed according to the procedures In Section, Disc Brake Single Piston Sliding Caliper. See: Brakes and Traction Control After removal, the caliper must be placed on the frame or otherwise supported to prevent suspending the caliper by the brake hose. These precautions must be taken to prevent serious damage to the tube portion of the caliper hose assembly.

6. Remove the bolt and nut and disconnect the shock absorber from the radius arm bracket. 7. Remove the stud and bolts that connect the radius arm bracket and radius arm to the axle arm. Rem move the bracket and radius arm. 8. Remove the pivot bolt securing the right handle axle arm assembly to the crossmember. Remove the keystone clamps securing the axle shaft

boot from the axle shaft slip yoke and axle shaft and slide the rubber boot over. Disconnect the right driveshaft from the slip yoke assembly. Lower the jack and remove the right axle arm assembly.

9. Position another jack under the differential housing. Remove the bolt that connects the left axle arm to the crossmember. Lower the jacks and

remove the left axle arm assembly.


VIEW V
BOLT AND RETAINER 802453
UPPER SPRING SEAT RH 5A318
BOLT 801750 18-24 N·m (13-18 FT-LB)
NUT—34992 95-135 N·m (70-100 FT-LB)
NUT 820468 34-47 N·m (25-35 FT-LB)
WASHER 802084
INSULATOR 18198
BOLT AND RETAINER 802409
UPPER SPRING SEAT LH 5B315
LH FRAME
NUT 802073 95-124 N·m (70-92 FT-LB)
NUT 34992 109-162 N·m (80-120 FT-LB)
WASHER 379572
INSULATOR 3A184
VIEW V
RETAINER 5A349
JOUNCE BUMPER 3020
SPACER 3B244
BRACKET 3B183
SPRING 5310
SPACER 802406
SEAT 5A307
BOLT AND WASHER 802480
COTTER PIN 642569
PITMAN ARM 3590
NUT 800895
AXLE PIVOT BRACKET RH 3B178
NUT 820604
NUT 802073 95-124 N·m (70-92 FT-LB)
NUT—802073 95-124 N·m (70-92 FT-LB)
NUT—620469 66-92 N·m (49-68 FT-LB)
INSULATOR 3B203
RETAINER 3B186
STUD—802323 211-277 N·m (155-205 FT-LB)
RADIUS ARM 2405
BOLT 802638 163-203 N·m (120-150 FT-LB)
SHOCK ABSORBER LOWER BRACKET 18126
COTTER PIN 642569
NUT 800895
COTTER PIN 642569
SPLASH SHIELD 2K004—RH 2K005—LH
BOLT 40954 37-50 N·m (27-37 FT-LB)
BOLT—611171 6.8-10.2 N·m (5-7 FT-LB)
FRONT AXLE RADIUS ARM BRACKET 3B446
BOLT AND WASHER 802370 211-277 N·m (155-205 FT-LB)
VIEW Y
LH SIDE SHOWN RH SIDE SAME EXCEPT AS SHOWN
CROSSMEMBER (REF.) 5020
LEFT AXLE PIVOT BRACKET 3K090
RIVET 65092
FRONT OF VEHICLE
NUT 820604
FRT AXLE REF. 3002
BOLT AND WASHER 802639 163-203 N·m (120-150 FT-LB)
VIEW V
SHOWING RH AXLE INSTALLATION

Installation

1. With the vehicle on a hoist or jacked up, position a jack under the left axle arm assembly. Raise the axle arm until the arm is in position in the

left pivot bracket. Install the nut and bolt and tighten to 163-203 N.m (1 20-150 ft-lbs).

NOTE: Do not remove the jack from under the differential housing at this time.

2. Place new keystone clamps for the axle shaft boot on the axle shaft assembly. Position the right axle arm on a jack and raise the right axle arm

so the right driveshaft slides onto the slip yoke stub shaft and the axle arm is in position in the right pivot bracket. Install the nut and bolt and tighten to 163-203 N.m (120-150 ft-lbs).

NOTE: Do not remove the jack from the right axle arm at this time.

3. Position the radius arm and front bracket on the axle arms. Install a new stud and nut on the top of the axle and radius arm assembly and

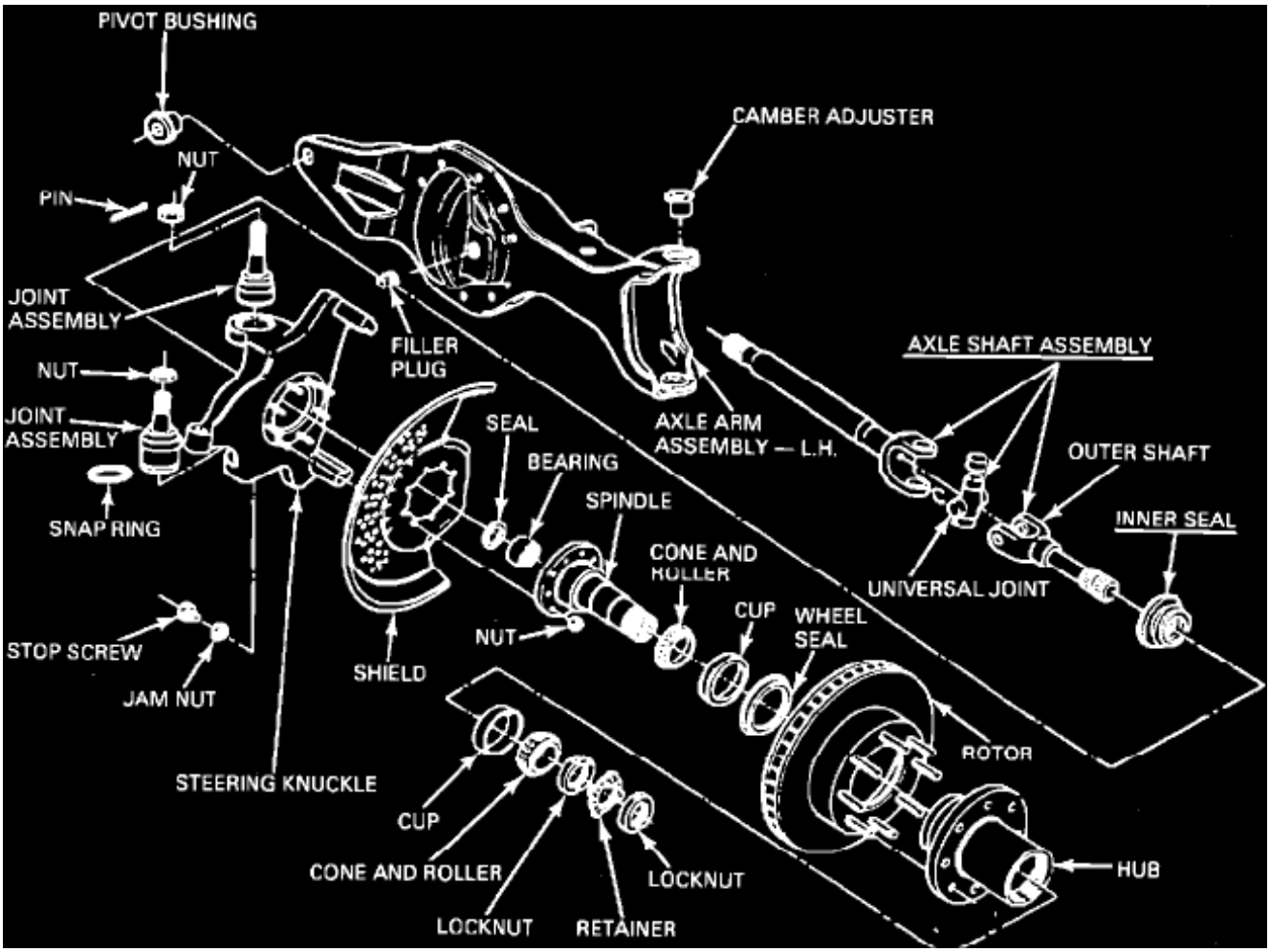
tighten to 217-298 N.m (160-220 ft-lbs). Install the bolts in the front of the bracket and tighten to 37-50 N.m (27-37 ft-lbs).

4. Install the seat, spacer retainer and coil spring on the stud and nut. Raise the jack to compress the coil spring. Install the nut and tighten to

95-135 N.m (70-1OO ft-lbs).

5. Connect the shock absorber to the axle arm assembly. Install nut and tighten to 57-97 N.m (42-72 ft-lbs). 6. Connect the tie rod ball joint to the spindle. Install nut and tighten to 68-101 N.m (50-75 ft-lbs). 7. Lower the jacks from the axle arms. 8. Install the disc brake caliper as described in Section Disc Brakes Single Piston, Sliding Caliper. See: Brakes and Traction Control 9. Install the wheel and tire assembly. Install lug nuts and tighten to 115-155 N.m (85-115 ft-lbs).

10. Connect the front output shaft to the front axle yoke. Install U-bolts and tighten nuts to 11-20 N.m (8-15 ft-lbs). 11. Remove the jacks and lower the vehicle.



Technical Service Bulletin # 851917 Date: 850926

Front Drive Axle - Spindle Seal Premature Wear

Article No. 85-19-17

AXLE - FRONT DRIVE - SPINDLE SEAL IMPROVEMENT

LIGHT TRUCK 1982-86 F150/250 (4x4), BRONCO

Operation on vehicles in off-road, severe environments may result in the one-piece design spindle seal and the spindle needle bearing seal allowing water and contaminants to get into the spindle needle bearings. This causes premature seal and bearing wear.

The following service action is suggested for installation of the previous style sealing system ("V" ring/"V" block seals and spacer/thrustwasher). This is similar to the sealing system on the model 501FS used on F350 4x4's.

Removal

1. Raise the front of the vehicle and install safety stands.

2. Remove the lug nuts and remove the front wheel and tire assembly.

3. Remove the caliper as described in Section 12-24, Disc Brakes - Light and Heavy Duty - Sliding Caliper of the 1986 Light Truck Shop Manual. Securely wire the caliper to the frame.

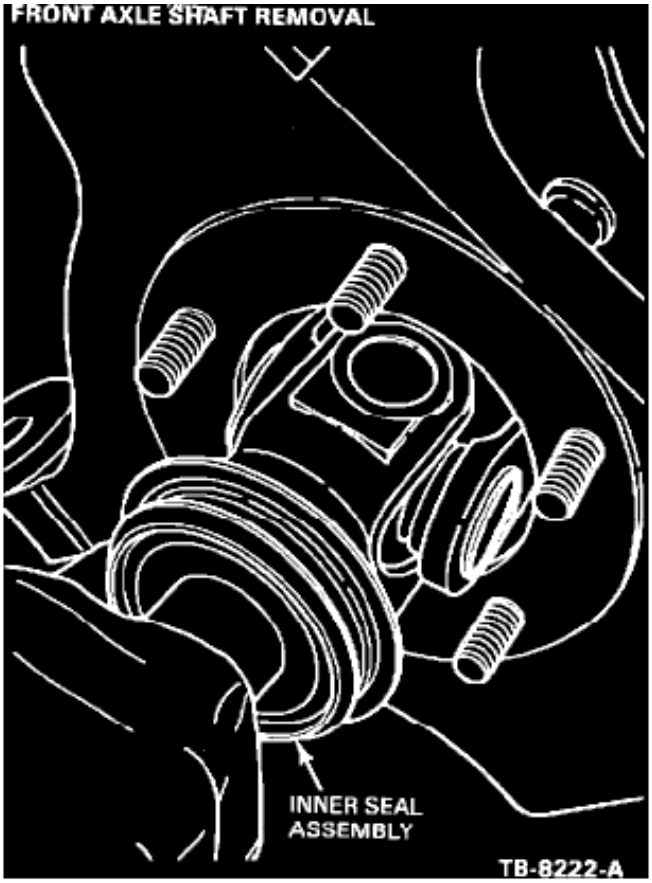
CAUTION:

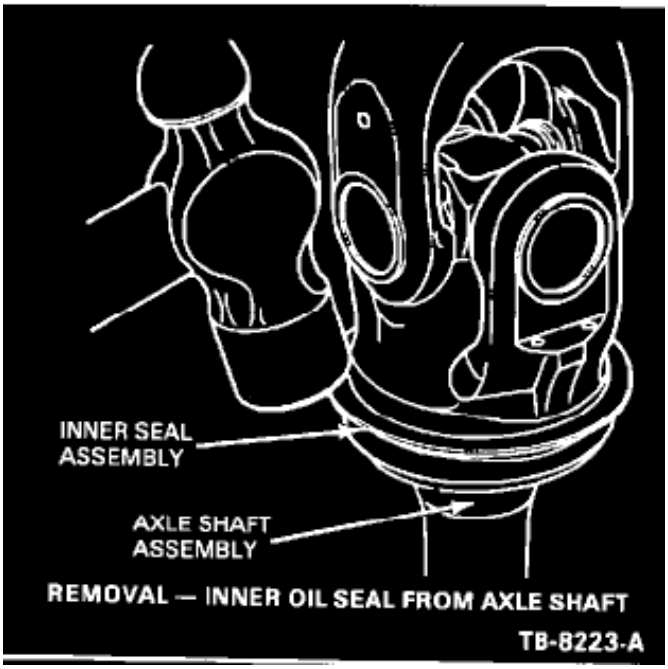
After removal, the caliper must be wired to the frame or otherwise supported to prevent suspending the caliper by the flexible hose. If securing the caliper is not practical, disconnect and plug the hose to the caliper. Upon caliper installation, bleed the brake system as described in Section 12- 01, General Hydraulic Brake Service in the 1985 Light Truck Shop Manual.

Figure 12 - DANA MODEL 44IFS FRONT DRIVING AXLE

4. Remove the six Allen-head capscrews retaining the manual locking hub cap to the hub body and remove the cap.

5. Remove the snap ring that retains the axle shaft in the hub body assembly.





6. Remove the lock ring seated in the groove of the wheel hub.

7. Remove the body assembly from the hub. If the body is difficult to remove, install two capscrews and pull the body assembly out of the hub.

8. Remove the outer locknut from the spindle with a Spanner Locknut Wrench, T83T-1197-B.

9. Remove the lockwasher from the spindle.

10. Remove the inner locknut from the spindle using a Spanner Locknut Wrench, T83T-1197-B.

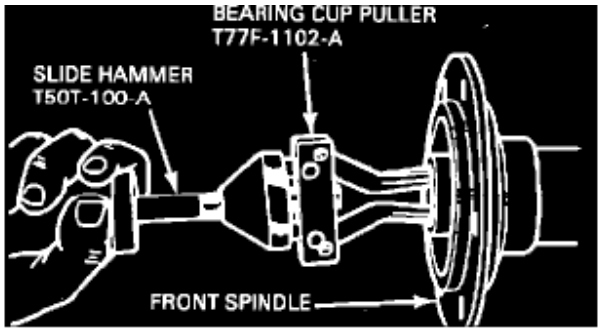
11. Remove the hub and rotor assembly and outer bearing from the spindle.

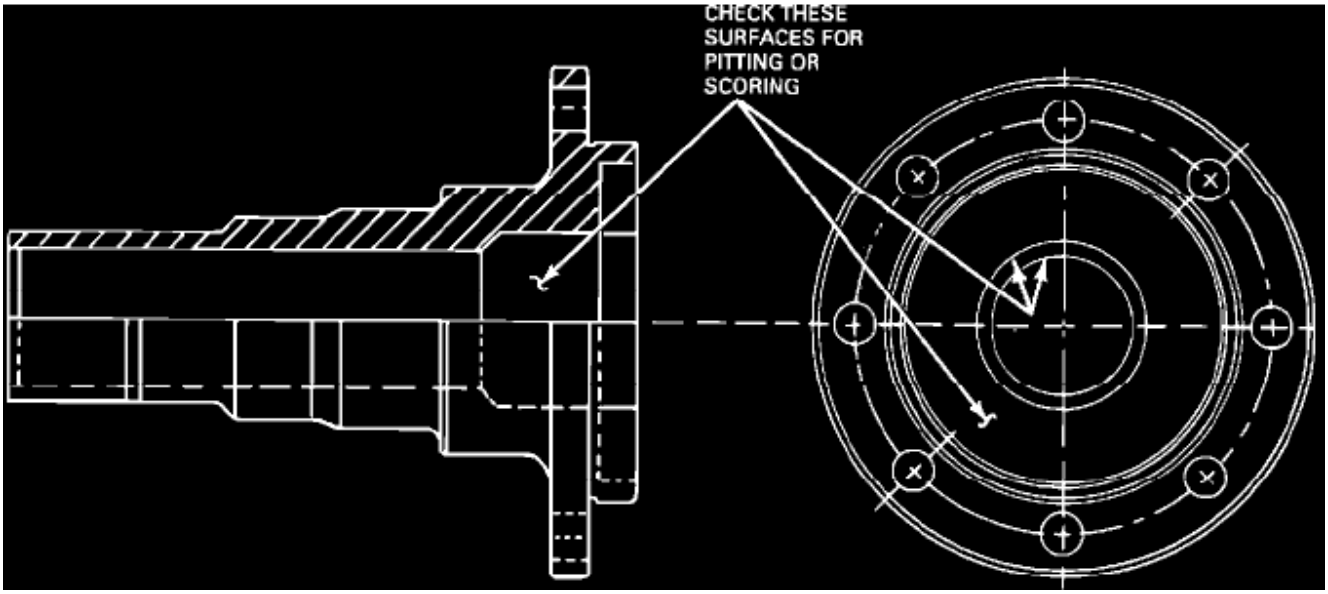
12. Remove the nuts retaining the spindle to the knuckle. Lightly tap the spindle with a rawhide hammer to remove it from the knuckle, 13. Remove the splash shield from the steering knuckle.

FIGURE 13

14. Remove slip yoke boot clamps on the R.H. axle shaft assembly. Pull the axle shaft out of the steering knuckle. Refer to Figure 13.

FIGURE 14





15. Remove the inner oil seal assembly from the axle shaft. Refer to Figure 14.

Figure 15 - REMOVAL - SPINDLE BEARING AND SEAL

Figure 20 - SPINDLE CHECKING AREAS FOR RUST/SCORING/PITTING

16. Remove the seal and needle bearing from the spindle as shown in Figure 15. Inspect the sealing surfaces of the spindle for severely corroded, pitted, worn or galled sealing surfaces. Replace spindle if damaged. Refer to Figure 20.

17. Inspect the outer shaft (3B387) of the axle shaft assembly for corroded, pitted, worn or galled surfaces in the inner oil seal and/or needle bearing areas. If damage to this area is evident, replace the outer shaft (3B387). Repair axle shaft as follows: Refer to Section 15-60 of the 1985 Light Truck Shop Manual.

a. Remove the snap rings that retain the bearings in the yokes of the axle shaft.

b. Position U-Joint Tool, T74P-4635-C, onto the axle shaft and press the bearing out of the yoke. If the bearing cannot be pressed completely out of the yoke, remove it with a vise grip or channel lock pliers. Mark the yoke and the shaft so that they will be reassembled in the same relative

position.

c. Reposition the tool to press on the spider in order to remove the bearing from the opposite side of the flange.

d. Remove the yoke from the spider of axle shaft.

e. Remove the bearings and spider from the other end of the axle shaft in the same manner.

Assembly (Refer to Section 15-60/Light Truck Shop Manual)

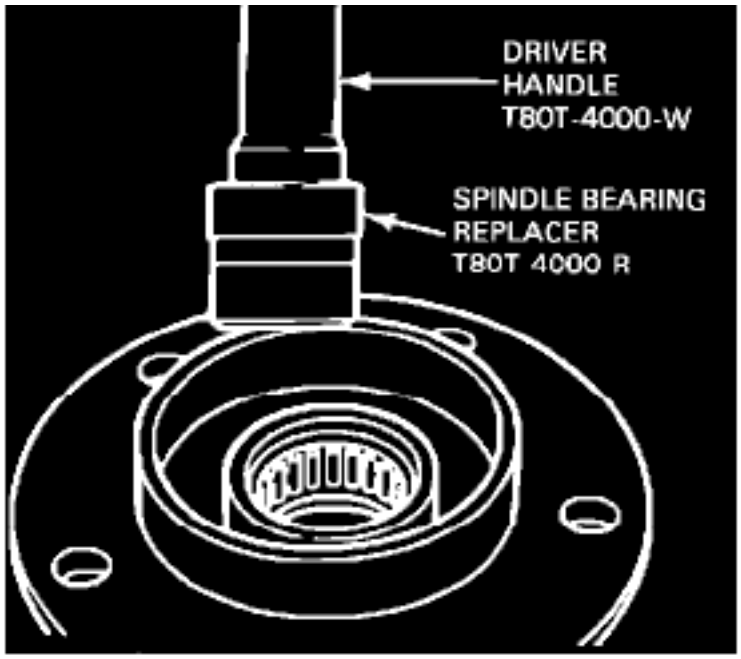
a. Start a new bearing into the axle shaft yoke.

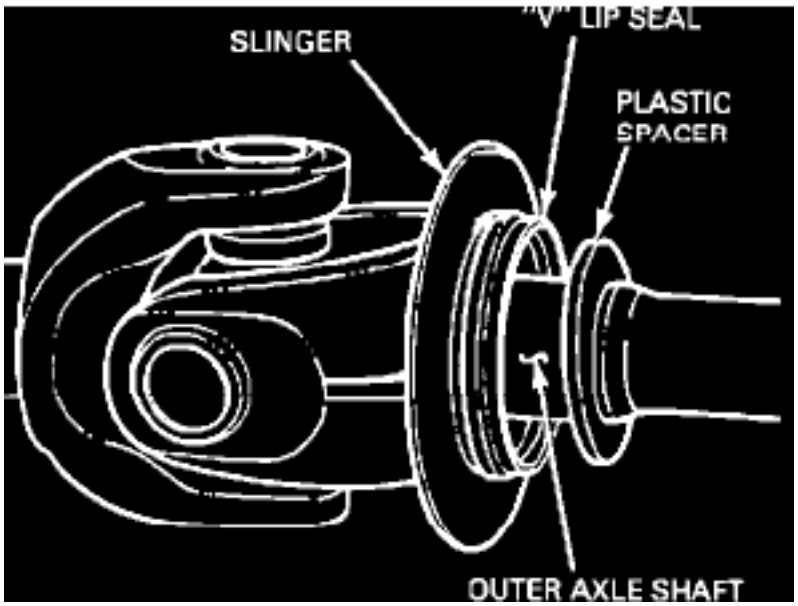
b. Position the spider in the axle shaft and press the bearing 6 mm (1/4") below the axle shaft surface using U-Joint Tool, T74P-4635-C.

c. Remove the tool and install a new snap ring.

d. Start a new bearing on the opposite side of the axle shaft.

e. Install the U-Joint Tool, T74P-4635-C, and press the bearing until the snap ring of the opposite bearing contacts the axle shaft.





f. Remove the tool and install a new snap ring.

g. Install the yoke on the spider in position marked during disassembly.

h. Install two new bearings and snap rings in the yoke and in the same manner as the axle shaft.

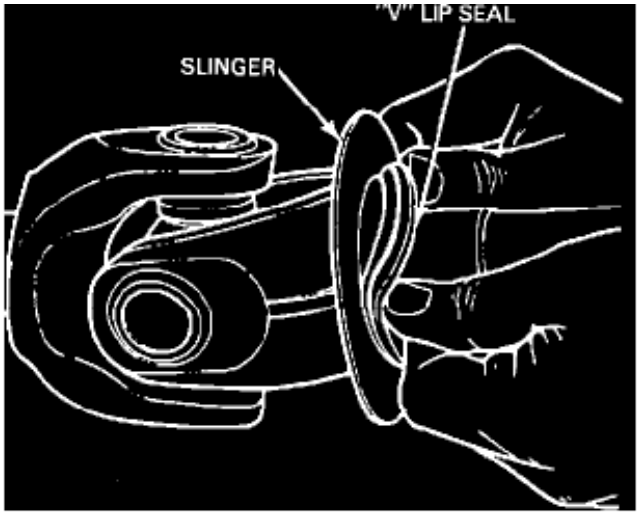
i. Check the U-Joint for freedom of movement. If a binding condition results, tap the ears of the axle shaft sharply to relieve the binding. DO NOT INSTALL AN AXLE SHAFT IF THE U-JOINT SHOWS SIGNS OF BINDING.

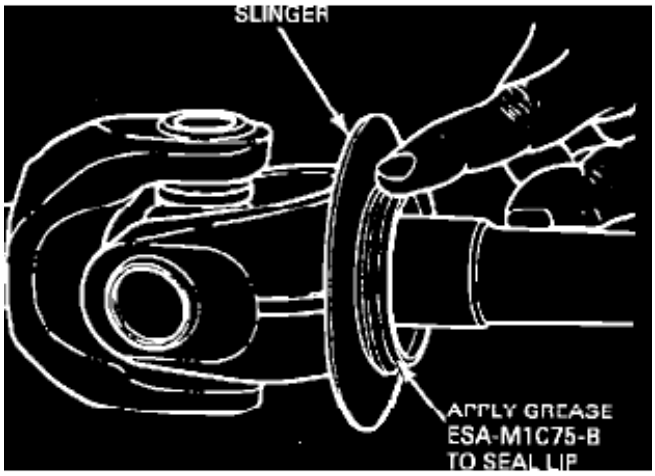
Installation

Figure 16 - SPINDLE BEARING INSTALLATION

1. Position a new needle bearing (3123) in the spindle bore of the spindle (3107). The writing on the bearing must face the rear of the spindle. Drive the bearing into the spindle with the Spindle Bearing Replacer, T80T-4000-R, and Driver Handle, T80T-400-W. Pack the bearing with Long Life Lubricant (C1AZ-19590-B) ESA-M1C75-B. Install the seal (1175) in the bore against the bearing with the open end of the "V" facing the rear of the spindle. Refer to Figure 16.

Figure 17 - SLINGER/SEAL/PLASTIC SPACER INSTALLATION





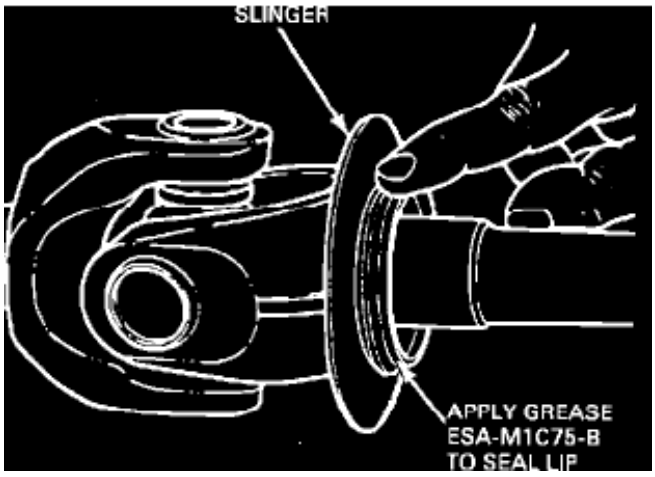


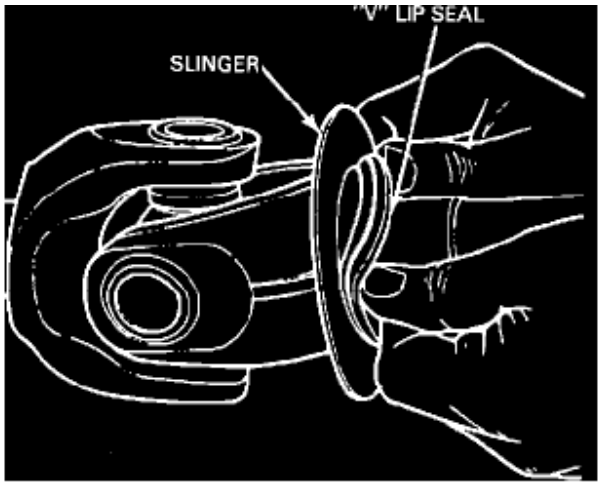
Figure 18 - "V" SEAL TO SLINGER INSTALLATION

Figure 19 - APPLY GREASE TO SEAL LIP

2. Press a new slinger on the axle shaft with an appropriate piece of press stock. Refer to Figures 17, 18 and 19.

Figure 19 - APPLY GREASE TO SEAL LIP

3. Install the rubber V-seal on the slinger and axle shaft. The lip of the seal should face towards the spindle. Refer to Figure 19.



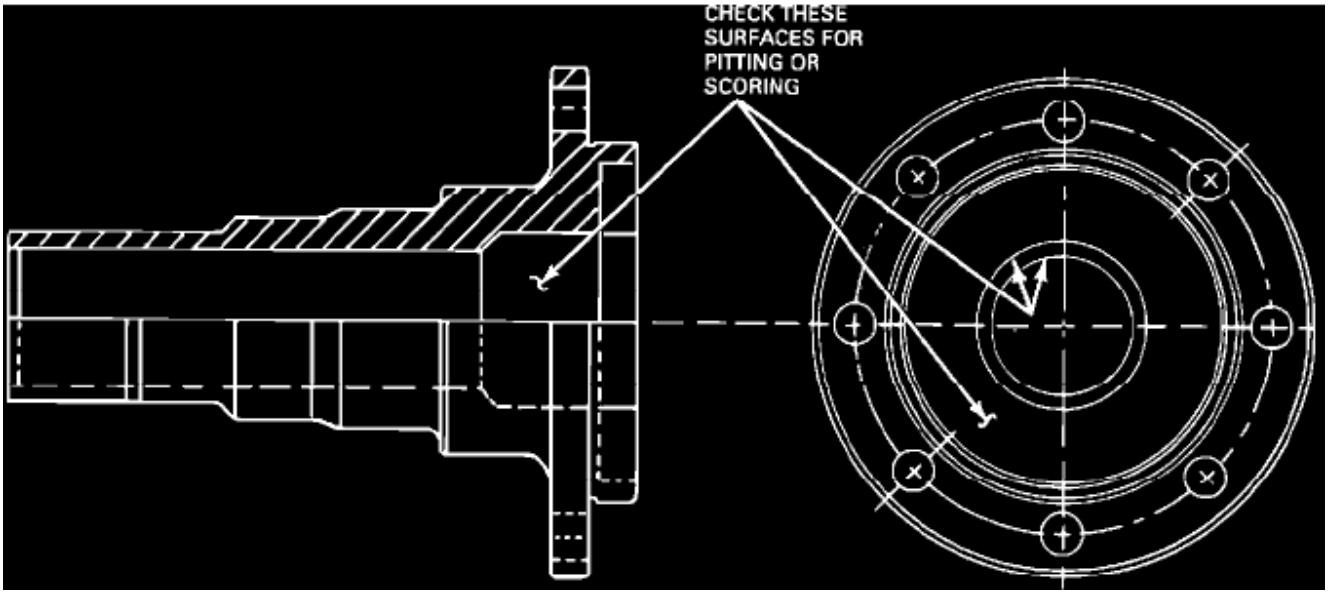


Figure 18 - "V" SEAL TO SLINGER INSTALLATION

4. Install the plastic spacer (3299) on the axle shaft. The chamferred side of the spacer should be inboard against the axle shaft. Refer to Figure 18.

Figure 20 - SPINDLE CHECKING AREAS FOR RUST/SCORING/PITTING

5. Pack the thrust face of the seal in the spindle bore and the V-seal on the axle shaft with Long Life Lubricant (C1AZ-19590-B) ESA-M1C75-B or equivalent. Refer to Figure 20.

6. Carefully guide the axle shaft through the knuckle and into the axle housing. Guide the R.H. axle shaft into the slip yoke. Install a new slip yoke boot clamp on R.H. side. Make sure the L.H. axle shaft splines are engaged in the differential side gear splines.

7. Install the splash shield on the steering knuckle.

8. Pack the caged needle bearing and seal area of the spindle with Long Life Lubricant (C1AZ-19590-B) ESA-M1C75-B or equivalent.

9. Place the spindle on the steering knuckle. Install and tighten the retaining nuts to 20-30 ft.lbs. torque.

10. Install the hub and rotor assembly on the spindle.

11. Install the inner locknut on the spindle and seat the bearing by tightening the locknut to 68 N-m (50 ft.lbs.) with Spanner Locknut Wrench, D85T- 1197-A.

12. While rotating the hub and rotor, back off the locknut 135-150 degrees.

13. Install the lockwasher so the key is positioned in the spindle groove. Rotate the inner locknut so the pin is aligned into the nearest lockwasher hole.

14. Install the outer locknut and retighten to 203 N-m (150 ft.lbs.) using Spanner Locknut Wrench, T83T-1197-B.

NOTE:

The final spindle end play should be 0.000-0.015 mm (0.000-0.006 inch).

15. Install the manual locking hub body assembly into the hub and rotor as outlined under Manual Locking Hub Removal/Installation.

16. Install the lock ring in the hub groove to retain the body in the hub.

17. Install the snap ring on the end of the axle shaft to retain the shaft to the body.

PART NUMBER PART NAME CLASS

D3TZ-3C132-A Slinger B

D6TZ-1175-A Seal A

D6TZ-1175-C Seal A

D6TZ-3299-A Spacer AM

C6TZ-3123-A Needle Bearing A

OTHER APPLICABLE ARTICLES: None WARRANTY STATUS: Reimbursable within the provisions of the Warranty and Policy Manual.

OPERATION: SP3076A85L TIME:

0.9 Hr. - Left hand side seals

OPERATION: SP3076A85R TIME:

0.9 Hr. - Right hand side seals

OPERATION: SP3076A85T TIME:

1.7 Hrs. - Both side seals

OPERATION: SP3220A85L TIME:

0.3 Hr. - Extra time to replace left outer shaft

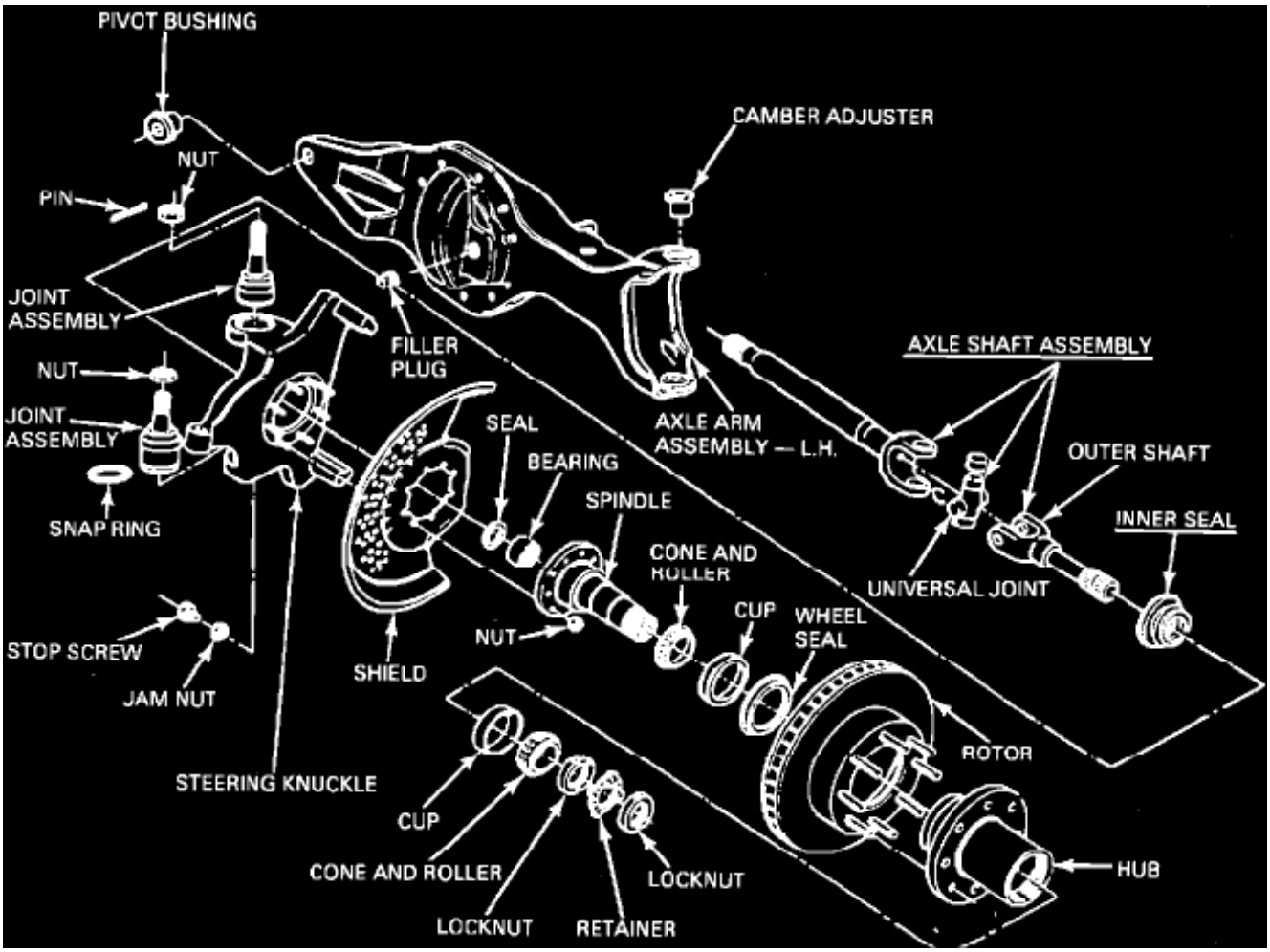
OPERATION: SP3220A85R TIME:

0.3 Hr. - Extra time to replace right outer shaft

OPERATION: SP3220A85T TIME:

0.5 Hr. - Extra time to replace both outer shafts

DLR. CODING: Basic Part No. 1175 - Code: 48



Technical Service Bulletin # 851917 Date: 850926

Front Drive Axle - Spindle Seal Premature Wear

Article No. 85-19-17

AXLE - FRONT DRIVE - SPINDLE SEAL IMPROVEMENT

LIGHT TRUCK 1982-86 F150/250 (4x4), BRONCO

Operation on vehicles in off-road, severe environments may result in the one-piece design spindle seal and the spindle needle bearing seal allowing water and contaminants to get into the spindle needle bearings. This causes premature seal and bearing wear.

The following service action is suggested for installation of the previous style sealing system ("V" ring/"V" block seals and spacer/thrustwasher). This is similar to the sealing system on the model 501FS used on F350 4x4's.

Removal

1. Raise the front of the vehicle and install safety stands.

2. Remove the lug nuts and remove the front wheel and tire assembly.

3. Remove the caliper as described in Section 12-24, Disc Brakes - Light and Heavy Duty - Sliding Caliper of the 1986 Light Truck Shop Manual. Securely wire the caliper to the frame.

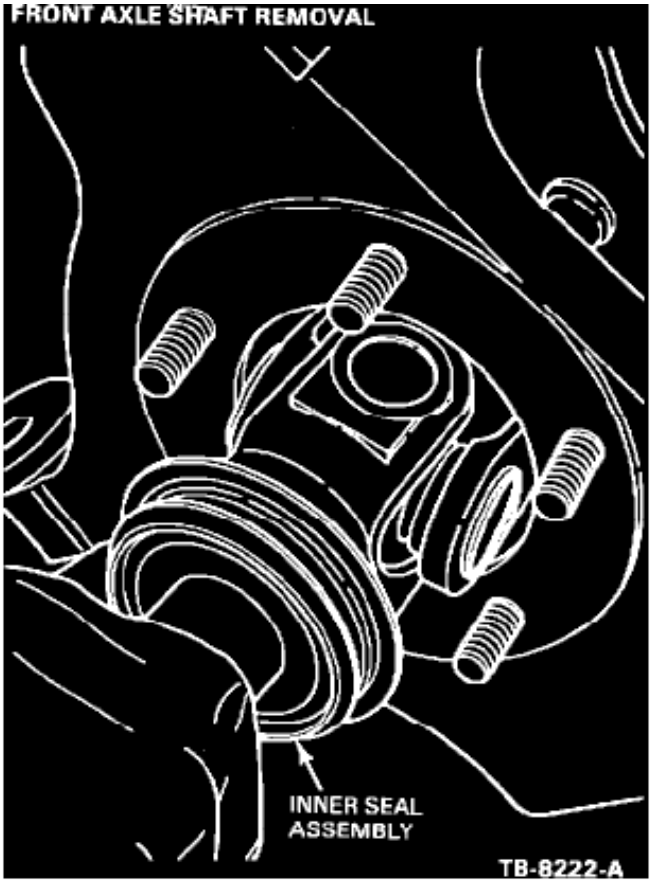
CAUTION:

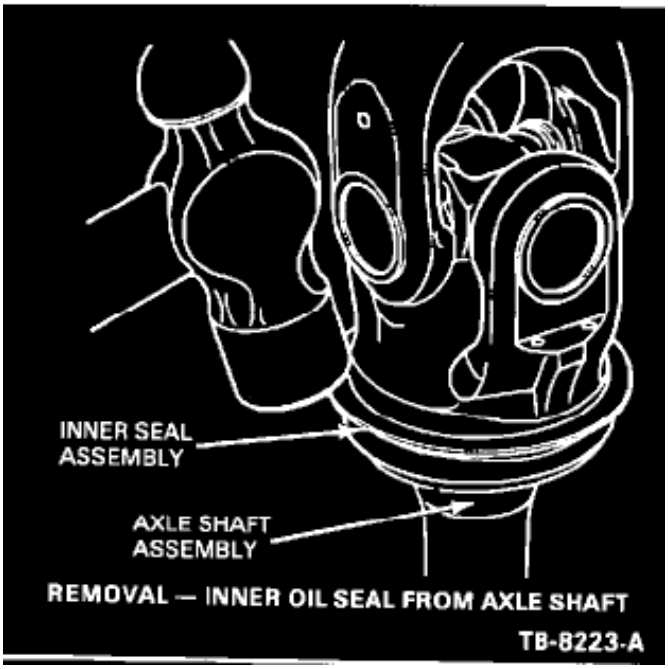
After removal, the caliper must be wired to the frame or otherwise supported to prevent suspending the caliper by the flexible hose. If securing the caliper is not practical, disconnect and plug the hose to the caliper. Upon caliper installation, bleed the brake system as described in Section 12- 01, General Hydraulic Brake Service in the 1985 Light Truck Shop Manual.

Figure 12 - DANA MODEL 44IFS FRONT DRIVING AXLE

4. Remove the six Allen-head capscrews retaining the manual locking hub cap to the hub body and remove the cap.

5. Remove the snap ring that retains the axle shaft in the hub body assembly.





6. Remove the lock ring seated in the groove of the wheel hub.

7. Remove the body assembly from the hub. If the body is difficult to remove, install two capscrews and pull the body assembly out of the hub.

8. Remove the outer locknut from the spindle with a Spanner Locknut Wrench, T83T-1197-B.

9. Remove the lockwasher from the spindle.

10. Remove the inner locknut from the spindle using a Spanner Locknut Wrench, T83T-1197-B.

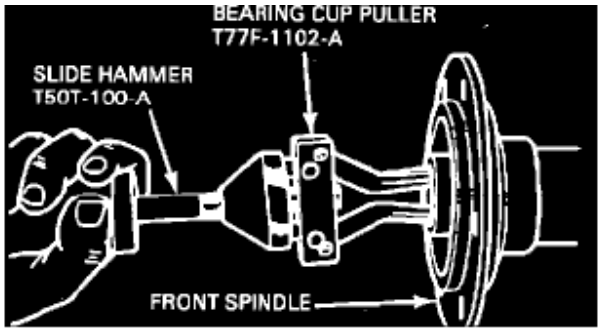
11. Remove the hub and rotor assembly and outer bearing from the spindle.

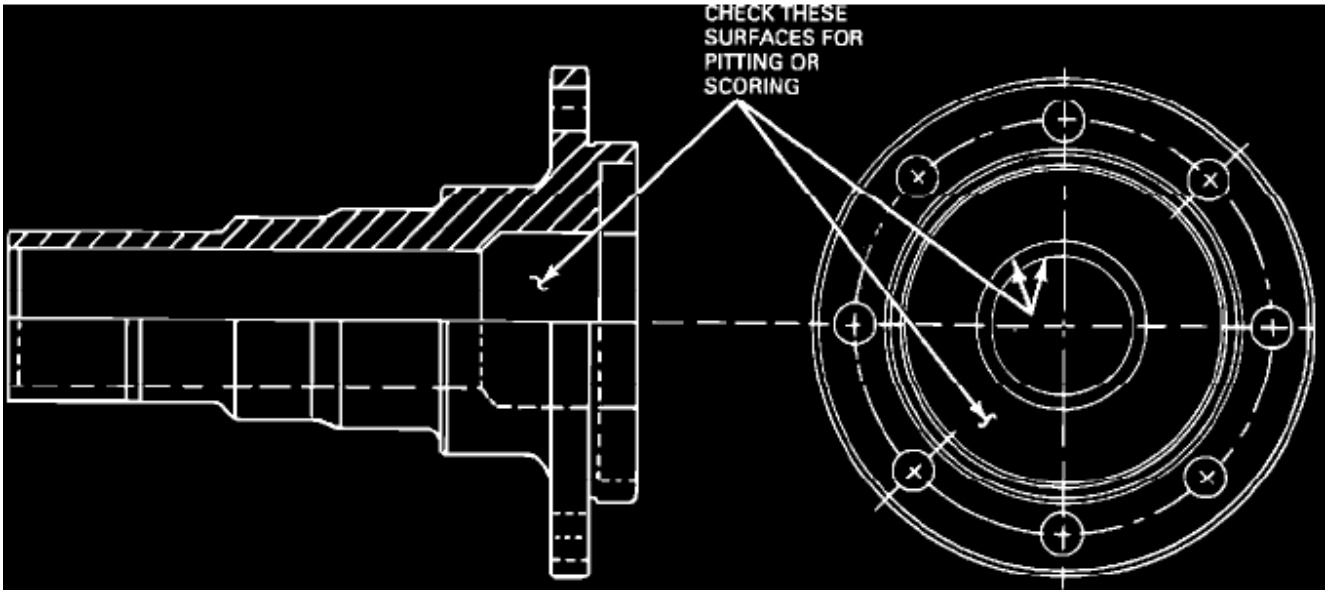
12. Remove the nuts retaining the spindle to the knuckle. Lightly tap the spindle with a rawhide hammer to remove it from the knuckle, 13. Remove the splash shield from the steering knuckle.

FIGURE 13

14. Remove slip yoke boot clamps on the R.H. axle shaft assembly. Pull the axle shaft out of the steering knuckle. Refer to Figure 13.

FIGURE 14





15. Remove the inner oil seal assembly from the axle shaft. Refer to Figure 14.

Figure 15 - REMOVAL - SPINDLE BEARING AND SEAL

Figure 20 - SPINDLE CHECKING AREAS FOR RUST/SCORING/PITTING

16. Remove the seal and needle bearing from the spindle as shown in Figure 15. Inspect the sealing surfaces of the spindle for severely corroded, pitted, worn or galled sealing surfaces. Replace spindle if damaged. Refer to Figure 20.

17. Inspect the outer shaft (3B387) of the axle shaft assembly for corroded, pitted, worn or galled surfaces in the inner oil seal and/or needle bearing areas. If damage to this area is evident, replace the outer shaft (3B387). Repair axle shaft as follows: Refer to Section 15-60 of the 1985 Light Truck Shop Manual.

a. Remove the snap rings that retain the bearings in the yokes of the axle shaft.

b. Position U-Joint Tool, T74P-4635-C, onto the axle shaft and press the bearing out of the yoke. If the bearing cannot be pressed completely out of the yoke, remove it with a vise grip or channel lock pliers. Mark the yoke and the shaft so that they will be reassembled in the same relative

position.

c. Reposition the tool to press on the spider in order to remove the bearing from the opposite side of the flange.

d. Remove the yoke from the spider of axle shaft.

e. Remove the bearings and spider from the other end of the axle shaft in the same manner.

Assembly (Refer to Section 15-60/Light Truck Shop Manual)

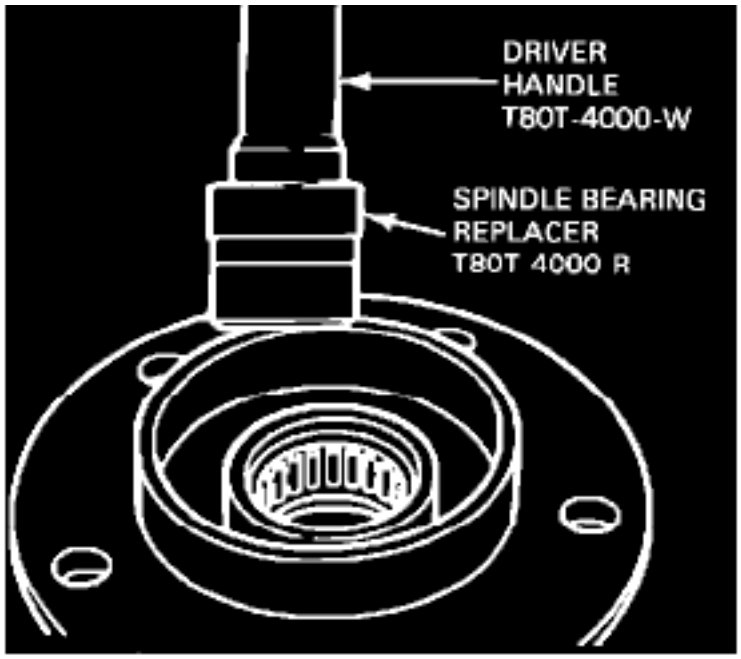
a. Start a new bearing into the axle shaft yoke.

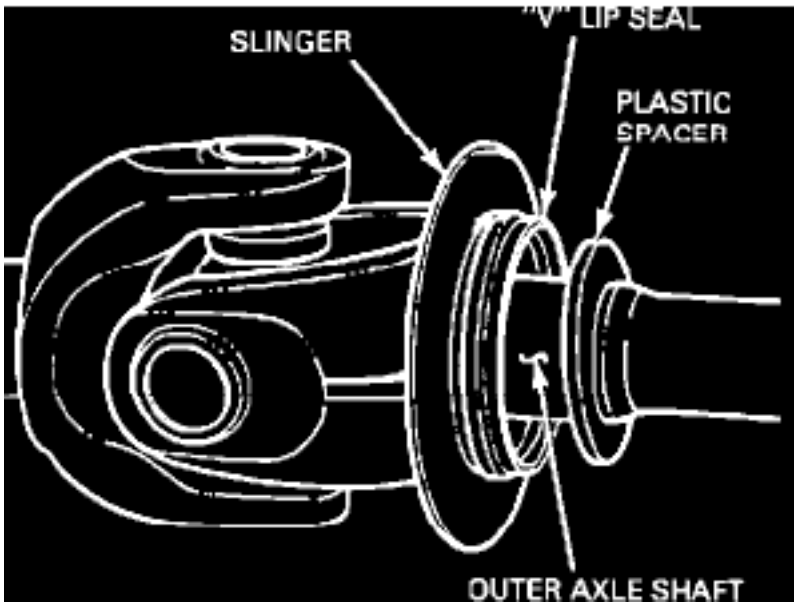
b. Position the spider in the axle shaft and press the bearing 6 mm (1/4") below the axle shaft surface using U-Joint Tool, T74P-4635-C.

c. Remove the tool and install a new snap ring.

d. Start a new bearing on the opposite side of the axle shaft.

e. Install the U-Joint Tool, T74P-4635-C, and press the bearing until the snap ring of the opposite bearing contacts the axle shaft.





f. Remove the tool and install a new snap ring.

g. Install the yoke on the spider in position marked during disassembly.

h. Install two new bearings and snap rings in the yoke and in the same manner as the axle shaft.

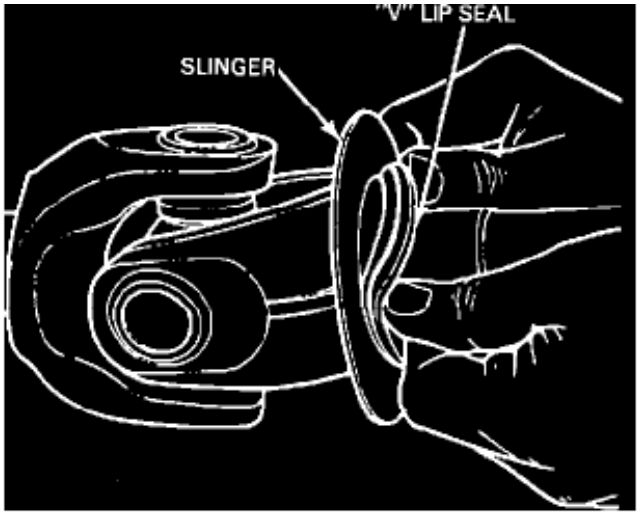
i. Check the U-Joint for freedom of movement. If a binding condition results, tap the ears of the axle shaft sharply to relieve the binding. DO NOT INSTALL AN AXLE SHAFT IF THE U-JOINT SHOWS SIGNS OF BINDING.

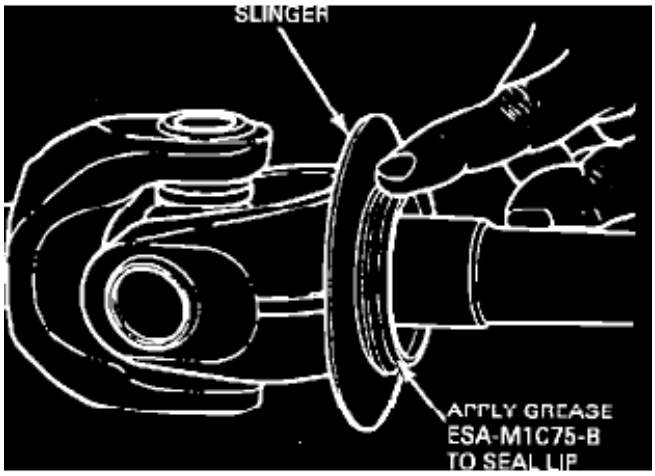
Installation

Figure 16 - SPINDLE BEARING INSTALLATION

1. Position a new needle bearing (3123) in the spindle bore of the spindle (3107). The writing on the bearing must face the rear of the spindle. Drive the bearing into the spindle with the Spindle Bearing Replacer, T80T-4000-R, and Driver Handle, T80T-400-W. Pack the bearing with Long Life Lubricant (C1AZ-19590-B) ESA-M1C75-B. Install the seal (1175) in the bore against the bearing with the open end of the "V" facing the rear of the spindle. Refer to Figure 16.

Figure 17 - SLINGER/SEAL/PLASTIC SPACER INSTALLATION





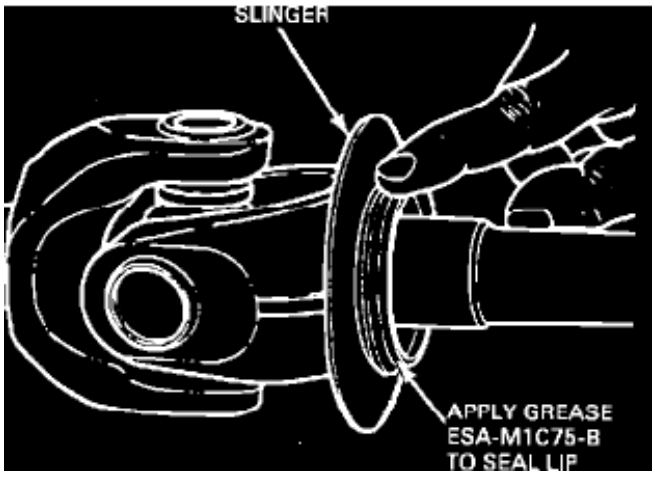


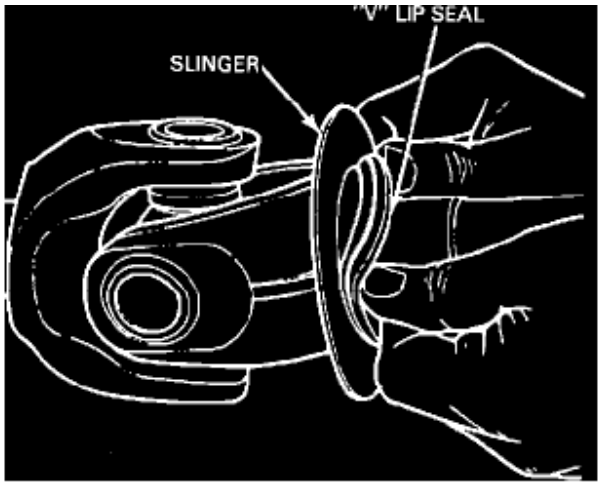
Figure 18 - "V" SEAL TO SLINGER INSTALLATION

Figure 19 - APPLY GREASE TO SEAL LIP

2. Press a new slinger on the axle shaft with an appropriate piece of press stock. Refer to Figures 17, 18 and 19.

Figure 19 - APPLY GREASE TO SEAL LIP

3. Install the rubber V-seal on the slinger and axle shaft. The lip of the seal should face towards the spindle. Refer to Figure 19.



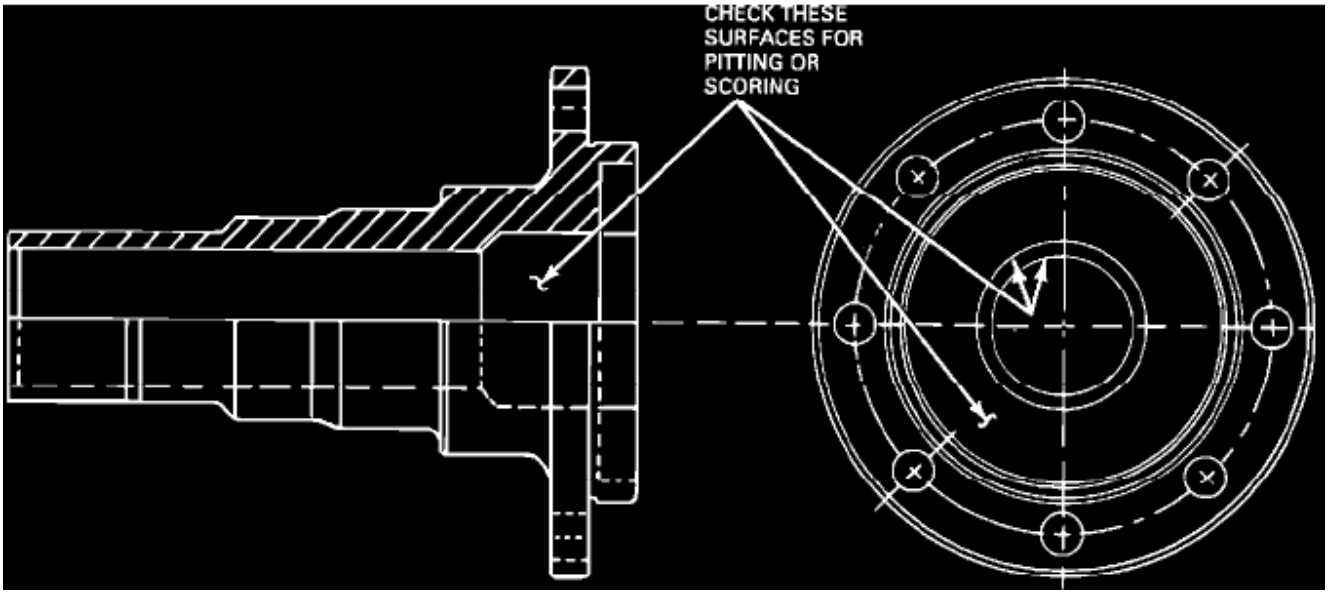


Figure 18 - "V" SEAL TO SLINGER INSTALLATION

4. Install the plastic spacer (3299) on the axle shaft. The chamferred side of the spacer should be inboard against the axle shaft. Refer to Figure 18.

Figure 20 - SPINDLE CHECKING AREAS FOR RUST/SCORING/PITTING

5. Pack the thrust face of the seal in the spindle bore and the V-seal on the axle shaft with Long Life Lubricant (C1AZ-19590-B) ESA-M1C75-B or equivalent. Refer to Figure 20.

6. Carefully guide the axle shaft through the knuckle and into the axle housing. Guide the R.H. axle shaft into the slip yoke. Install a new slip yoke boot clamp on R.H. side. Make sure the L.H. axle shaft splines are engaged in the differential side gear splines.

7. Install the splash shield on the steering knuckle.

8. Pack the caged needle bearing and seal area of the spindle with Long Life Lubricant (C1AZ-19590-B) ESA-M1C75-B or equivalent.

9. Place the spindle on the steering knuckle. Install and tighten the retaining nuts to 20-30 ft.lbs. torque.

10. Install the hub and rotor assembly on the spindle.

11. Install the inner locknut on the spindle and seat the bearing by tightening the locknut to 68 N-m (50 ft.lbs.) with Spanner Locknut Wrench, D85T- 1197-A.

12. While rotating the hub and rotor, back off the locknut 135-150 degrees.

13. Install the lockwasher so the key is positioned in the spindle groove. Rotate the inner locknut so the pin is aligned into the nearest lockwasher hole.

14. Install the outer locknut and retighten to 203 N-m (150 ft.lbs.) using Spanner Locknut Wrench, T83T-1197-B.

NOTE:

The final spindle end play should be 0.000-0.015 mm (0.000-0.006 inch).

15. Install the manual locking hub body assembly into the hub and rotor as outlined under Manual Locking Hub Removal/Installation.

16. Install the lock ring in the hub groove to retain the body in the hub.

17. Install the snap ring on the end of the axle shaft to retain the shaft to the body.

PART NUMBER PART NAME CLASS

D3TZ-3C132-A Slinger B

D6TZ-1175-A Seal A

D6TZ-1175-C Seal A

D6TZ-3299-A Spacer AM

C6TZ-3123-A Needle Bearing A

OTHER APPLICABLE ARTICLES: None WARRANTY STATUS: Reimbursable within the provisions of the Warranty and Policy Manual.

OPERATION: SP3076A85L TIME:

0.9 Hr. - Left hand side seals

OPERATION: SP3076A85R TIME:

0.9 Hr. - Right hand side seals

OPERATION: SP3076A85T TIME:

1.7 Hrs. - Both side seals

OPERATION: SP3220A85L TIME:

0.3 Hr. - Extra time to replace left outer shaft

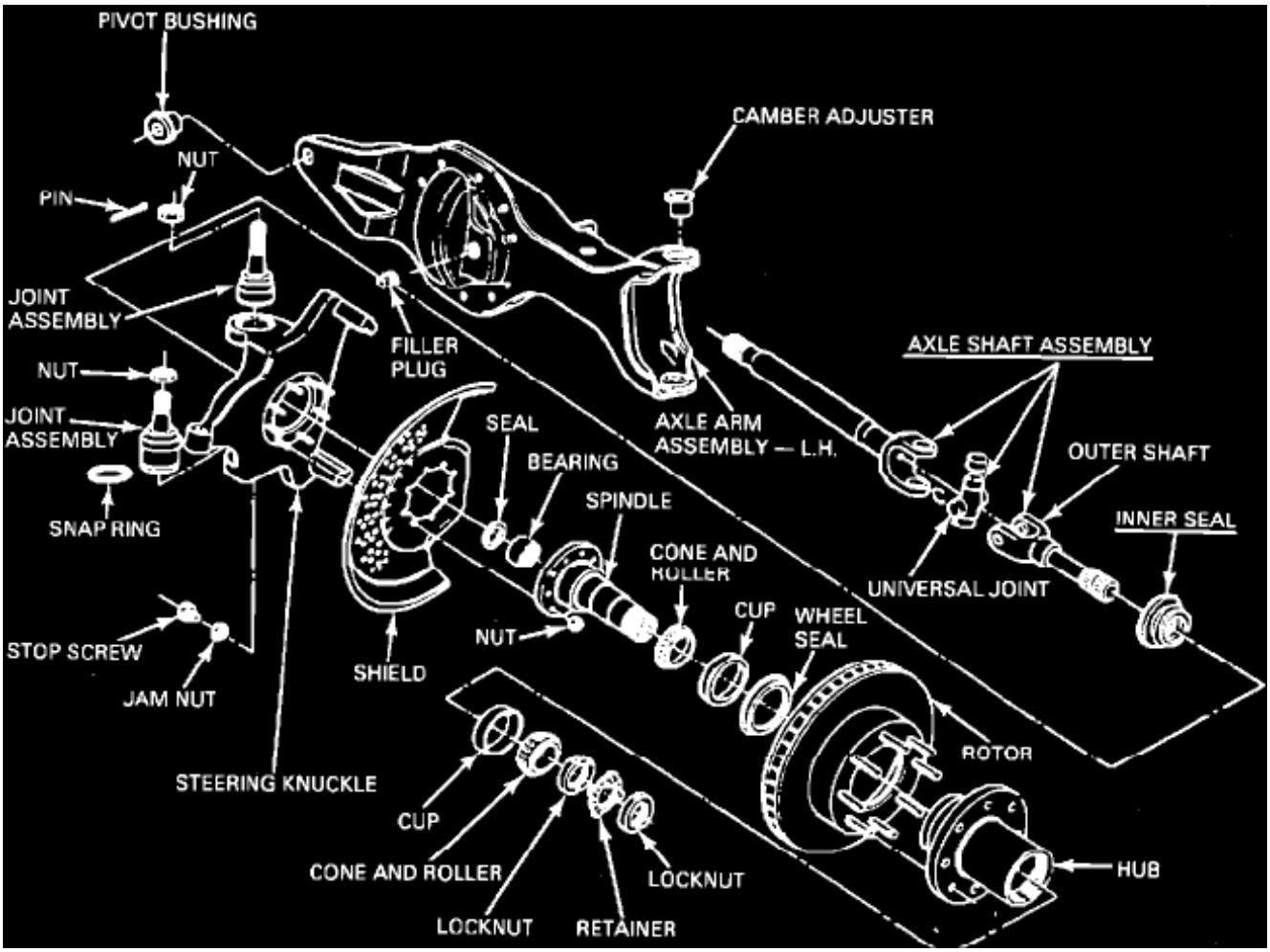
OPERATION: SP3220A85R TIME:

0.3 Hr. - Extra time to replace right outer shaft

OPERATION: SP3220A85T TIME:

0.5 Hr. - Extra time to replace both outer shafts

DLR. CODING: Basic Part No. 1175 - Code: 48



Technical Service Bulletin # 851917 Date: 850926

Front Drive Axle - Spindle Seal Premature Wear

Article No. 85-19-17

AXLE - FRONT DRIVE - SPINDLE SEAL IMPROVEMENT

LIGHT TRUCK 1982-86 F150/250 (4x4), BRONCO

Operation on vehicles in off-road, severe environments may result in the one-piece design spindle seal and the spindle needle bearing seal allowing water and contaminants to get into the spindle needle bearings. This causes premature seal and bearing wear.

The following service action is suggested for installation of the previous style sealing system ("V" ring/"V" block seals and spacer/thrustwasher). This is similar to the sealing system on the model 501FS used on F350 4x4's.

Removal

1. Raise the front of the vehicle and install safety stands.

2. Remove the lug nuts and remove the front wheel and tire assembly.

3. Remove the caliper as described in Section 12-24, Disc Brakes - Light and Heavy Duty - Sliding Caliper of the 1986 Light Truck Shop Manual. Securely wire the caliper to the frame.

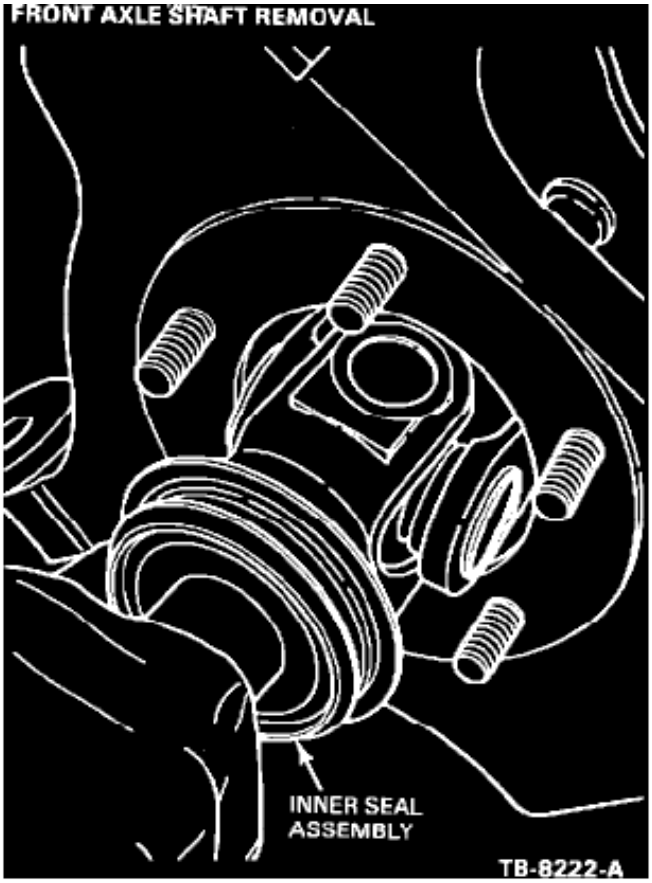
CAUTION:

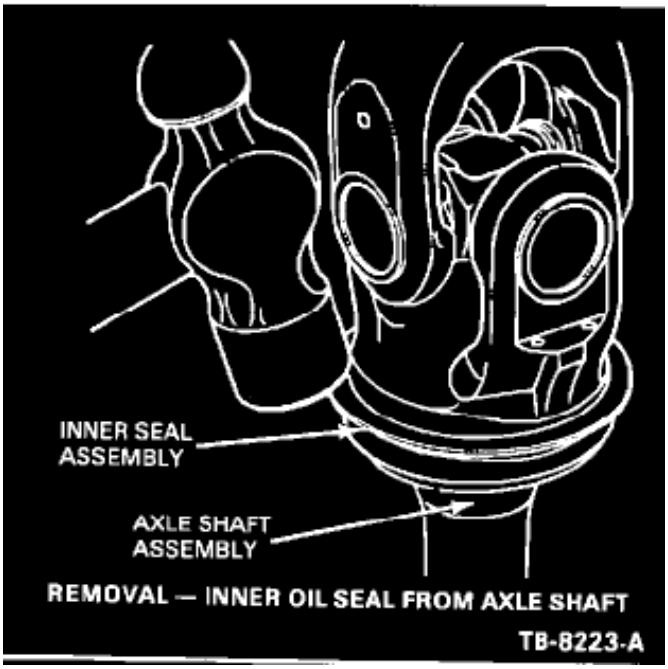
After removal, the caliper must be wired to the frame or otherwise supported to prevent suspending the caliper by the flexible hose. If securing the caliper is not practical, disconnect and plug the hose to the caliper. Upon caliper installation, bleed the brake system as described in Section 12- 01, General Hydraulic Brake Service in the 1985 Light Truck Shop Manual.

Figure 12 - DANA MODEL 44IFS FRONT DRIVING AXLE

4. Remove the six Allen-head capscrews retaining the manual locking hub cap to the hub body and remove the cap.

5. Remove the snap ring that retains the axle shaft in the hub body assembly.





6. Remove the lock ring seated in the groove of the wheel hub.

7. Remove the body assembly from the hub. If the body is difficult to remove, install two capscrews and pull the body assembly out of the hub.

8. Remove the outer locknut from the spindle with a Spanner Locknut Wrench, T83T-1197-B.

9. Remove the lockwasher from the spindle.

10. Remove the inner locknut from the spindle using a Spanner Locknut Wrench, T83T-1197-B.

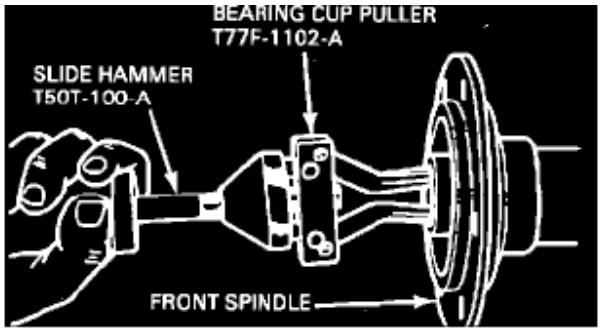
11. Remove the hub and rotor assembly and outer bearing from the spindle.

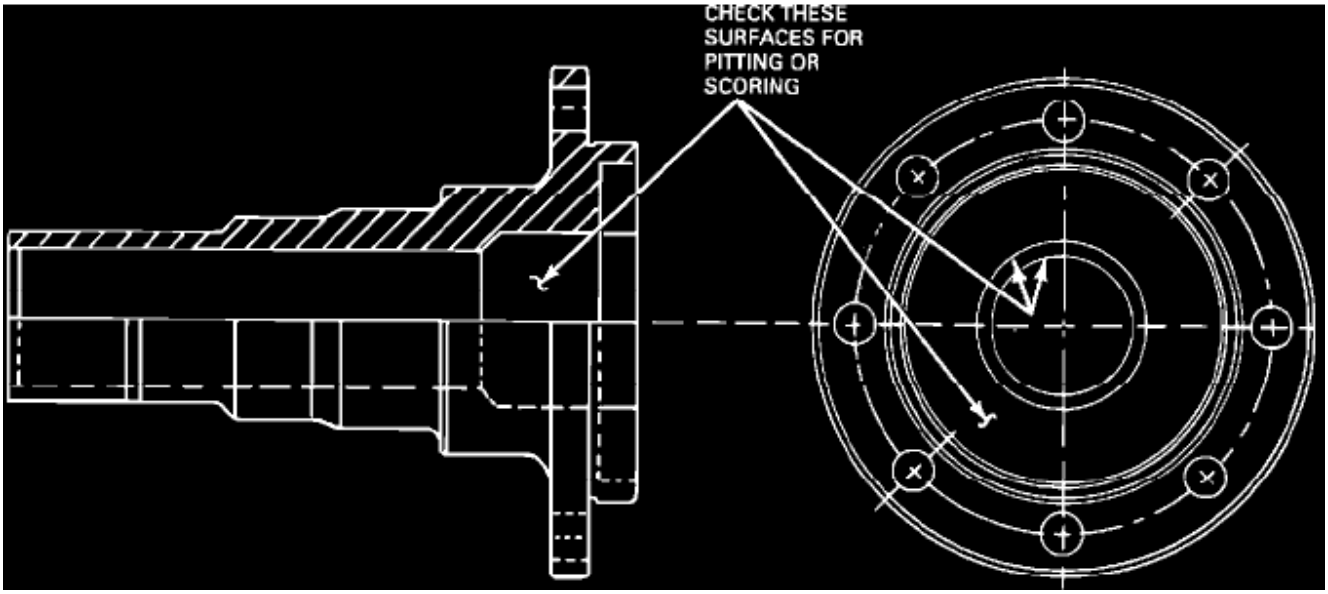
12. Remove the nuts retaining the spindle to the knuckle. Lightly tap the spindle with a rawhide hammer to remove it from the knuckle, 13. Remove the splash shield from the steering knuckle.

FIGURE 13

14. Remove slip yoke boot clamps on the R.H. axle shaft assembly. Pull the axle shaft out of the steering knuckle. Refer to Figure 13.

FIGURE 14





15. Remove the inner oil seal assembly from the axle shaft. Refer to Figure 14.

Figure 15 - REMOVAL - SPINDLE BEARING AND SEAL

Figure 20 - SPINDLE CHECKING AREAS FOR RUST/SCORING/PITTING

16. Remove the seal and needle bearing from the spindle as shown in Figure 15. Inspect the sealing surfaces of the spindle for severely corroded, pitted, worn or galled sealing surfaces. Replace spindle if damaged. Refer to Figure 20.

17. Inspect the outer shaft (3B387) of the axle shaft assembly for corroded, pitted, worn or galled surfaces in the inner oil seal and/or needle bearing areas. If damage to this area is evident, replace the outer shaft (3B387). Repair axle shaft as follows: Refer to Section 15-60 of the 1985 Light Truck Shop Manual.

a. Remove the snap rings that retain the bearings in the yokes of the axle shaft.

b. Position U-Joint Tool, T74P-4635-C, onto the axle shaft and press the bearing out of the yoke. If the bearing cannot be pressed completely out of the yoke, remove it with a vise grip or channel lock pliers. Mark the yoke and the shaft so that they will be reassembled in the same relative

position.

c. Reposition the tool to press on the spider in order to remove the bearing from the opposite side of the flange.

d. Remove the yoke from the spider of axle shaft.

e. Remove the bearings and spider from the other end of the axle shaft in the same manner.

Assembly (Refer to Section 15-60/Light Truck Shop Manual)

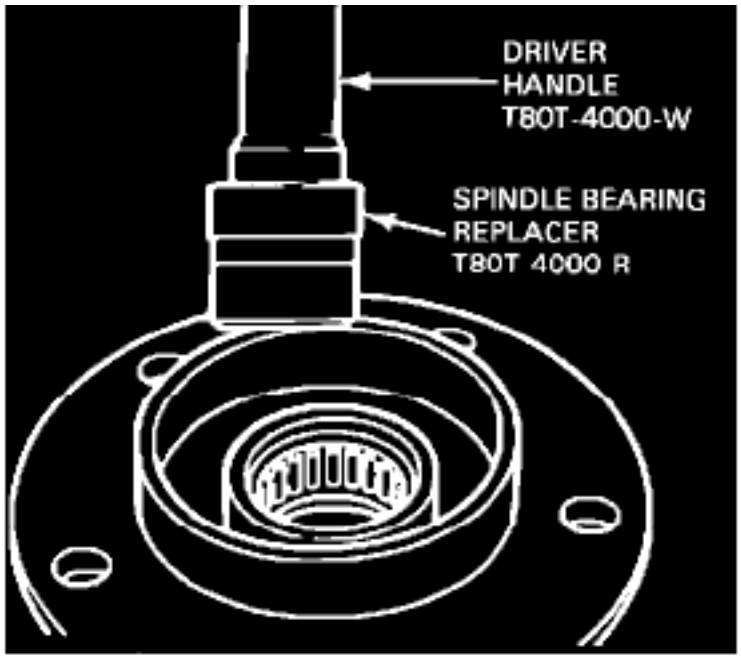
a. Start a new bearing into the axle shaft yoke.

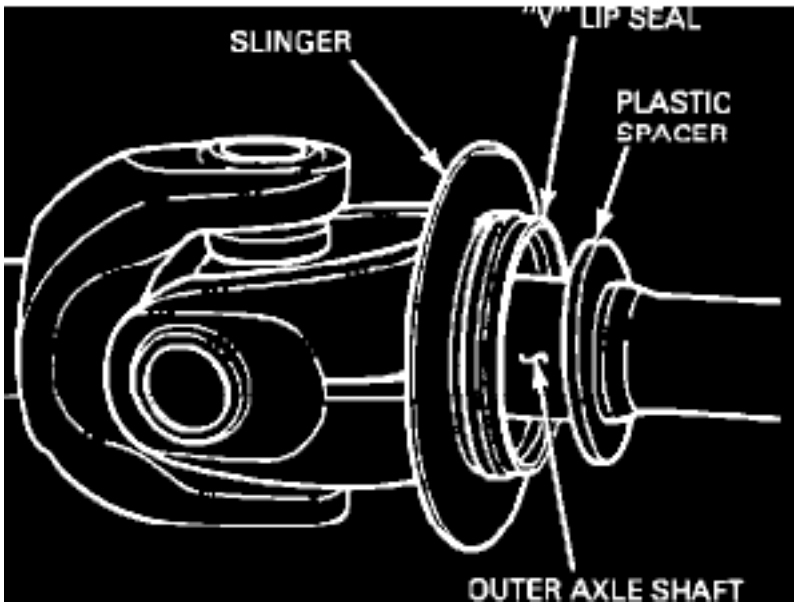
b. Position the spider in the axle shaft and press the bearing 6 mm (1/4") below the axle shaft surface using U-Joint Tool, T74P-4635-C.

c. Remove the tool and install a new snap ring.

d. Start a new bearing on the opposite side of the axle shaft.

e. Install the U-Joint Tool, T74P-4635-C, and press the bearing until the snap ring of the opposite bearing contacts the axle shaft.





f. Remove the tool and install a new snap ring.

g. Install the yoke on the spider in position marked during disassembly.

h. Install two new bearings and snap rings in the yoke and in the same manner as the axle shaft.

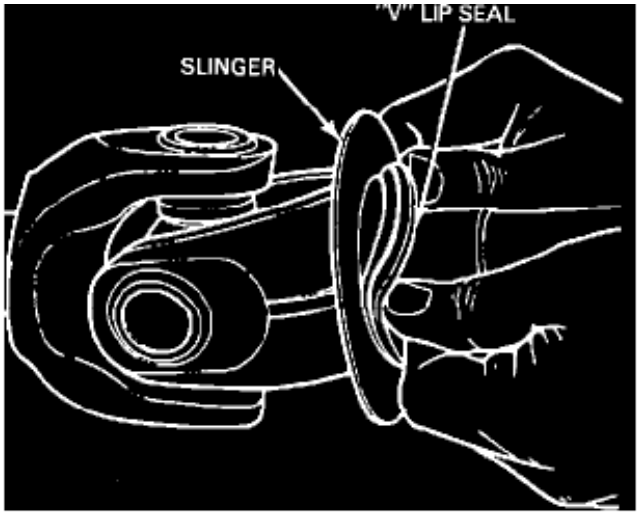
i. Check the U-Joint for freedom of movement. If a binding condition results, tap the ears of the axle shaft sharply to relieve the binding. DO NOT INSTALL AN AXLE SHAFT IF THE U-JOINT SHOWS SIGNS OF BINDING.

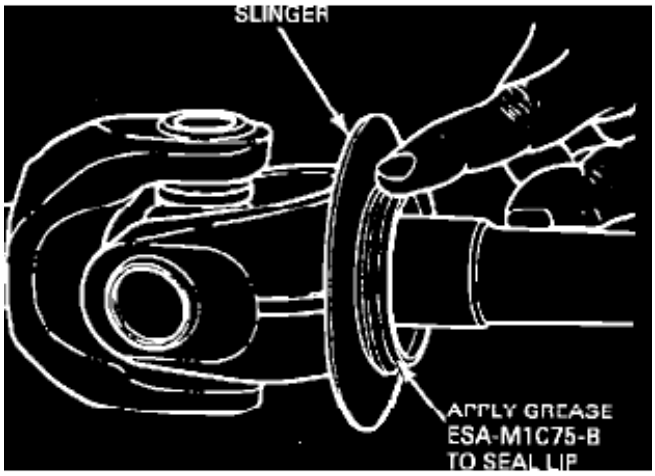
Installation

Figure 16 - SPINDLE BEARING INSTALLATION

1. Position a new needle bearing (3123) in the spindle bore of the spindle (3107). The writing on the bearing must face the rear of the spindle. Drive the bearing into the spindle with the Spindle Bearing Replacer, T80T-4000-R, and Driver Handle, T80T-400-W. Pack the bearing with Long Life Lubricant (C1AZ-19590-B) ESA-M1C75-B. Install the seal (1175) in the bore against the bearing with the open end of the "V" facing the rear of the spindle. Refer to Figure 16.

Figure 17 - SLINGER/SEAL/PLASTIC SPACER INSTALLATION





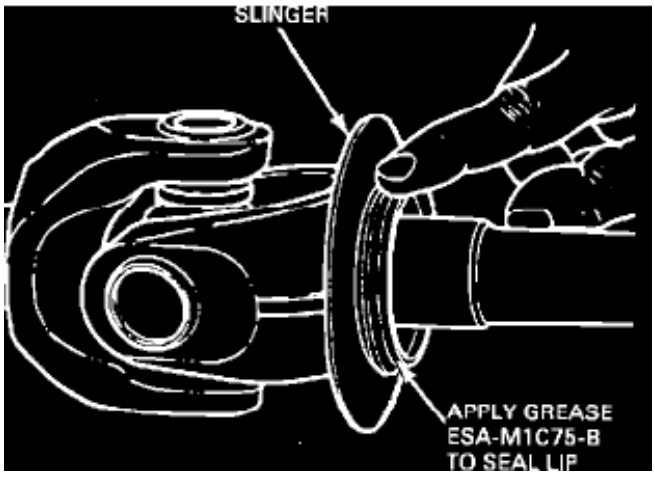


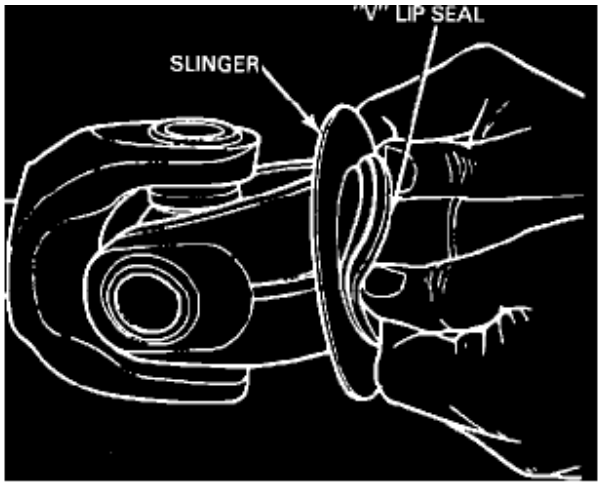
Figure 18 - "V" SEAL TO SLINGER INSTALLATION

Figure 19 - APPLY GREASE TO SEAL LIP

2. Press a new slinger on the axle shaft with an appropriate piece of press stock. Refer to Figures 17, 18 and 19.

Figure 19 - APPLY GREASE TO SEAL LIP

3. Install the rubber V-seal on the slinger and axle shaft. The lip of the seal should face towards the spindle. Refer to Figure 19.



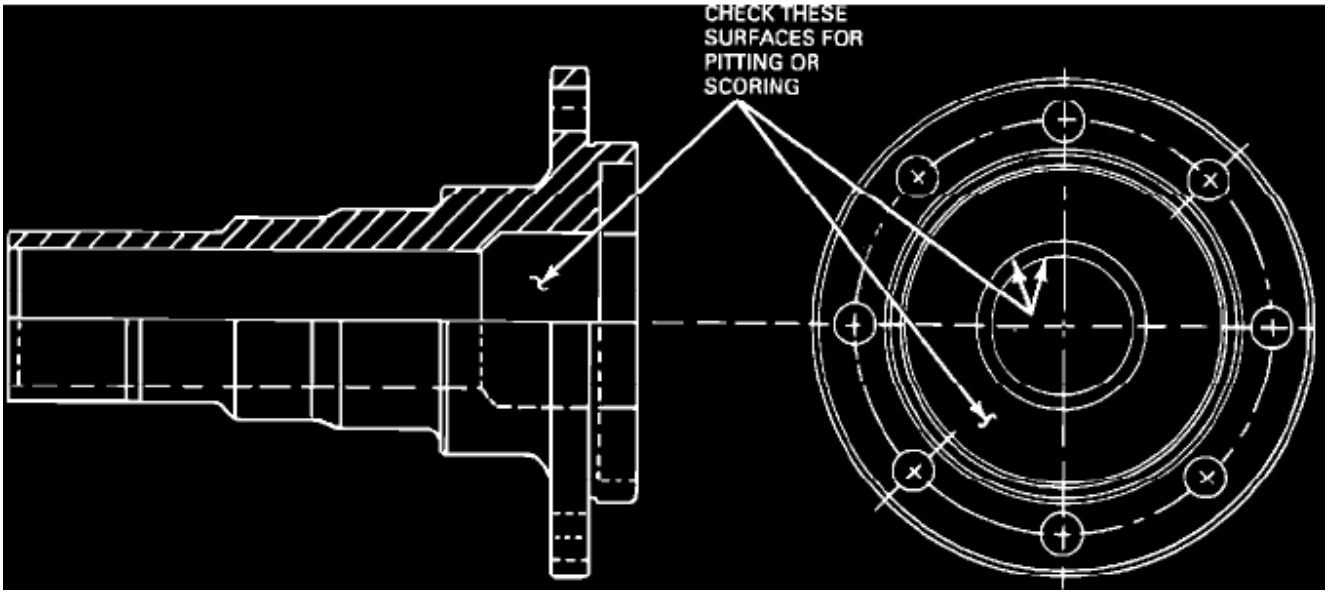


Figure 18 - "V" SEAL TO SLINGER INSTALLATION

4. Install the plastic spacer (3299) on the axle shaft. The chamferred side of the spacer should be inboard against the axle shaft. Refer to Figure 18.

Figure 20 - SPINDLE CHECKING AREAS FOR RUST/SCORING/PITTING

5. Pack the thrust face of the seal in the spindle bore and the V-seal on the axle shaft with Long Life Lubricant (C1AZ-19590-B) ESA-M1C75-B or equivalent. Refer to Figure 20.

6. Carefully guide the axle shaft through the knuckle and into the axle housing. Guide the R.H. axle shaft into the slip yoke. Install a new slip yoke boot clamp on R.H. side. Make sure the L.H. axle shaft splines are engaged in the differential side gear splines.

7. Install the splash shield on the steering knuckle.

8. Pack the caged needle bearing and seal area of the spindle with Long Life Lubricant (C1AZ-19590-B) ESA-M1C75-B or equivalent.

9. Place the spindle on the steering knuckle. Install and tighten the retaining nuts to 20-30 ft.lbs. torque.

10. Install the hub and rotor assembly on the spindle.

11. Install the inner locknut on the spindle and seat the bearing by tightening the locknut to 68 N-m (50 ft.lbs.) with Spanner Locknut Wrench, D85T- 1197-A.

12. While rotating the hub and rotor, back off the locknut 135-150 degrees.

13. Install the lockwasher so the key is positioned in the spindle groove. Rotate the inner locknut so the pin is aligned into the nearest lockwasher hole.

14. Install the outer locknut and retighten to 203 N-m (150 ft.lbs.) using Spanner Locknut Wrench, T83T-1197-B.

NOTE:

The final spindle end play should be 0.000-0.015 mm (0.000-0.006 inch).

15. Install the manual locking hub body assembly into the hub and rotor as outlined under Manual Locking Hub Removal/Installation.

16. Install the lock ring in the hub groove to retain the body in the hub.

17. Install the snap ring on the end of the axle shaft to retain the shaft to the body.

PART NUMBER PART NAME CLASS

D3TZ-3C132-A Slinger B

D6TZ-1175-A Seal A

D6TZ-1175-C Seal A

D6TZ-3299-A Spacer AM

C6TZ-3123-A Needle Bearing A

OTHER APPLICABLE ARTICLES: None WARRANTY STATUS: Reimbursable within the provisions of the Warranty and Policy Manual.

OPERATION: SP3076A85L TIME:

0.9 Hr. - Left hand side seals

OPERATION: SP3076A85R TIME:

0.9 Hr. - Right hand side seals

OPERATION: SP3076A85T TIME:

1.7 Hrs. - Both side seals

OPERATION: SP3220A85L TIME:

0.3 Hr. - Extra time to replace left outer shaft

OPERATION: SP3220A85R TIME:

0.3 Hr. - Extra time to replace right outer shaft

OPERATION: SP3220A85T TIME:

0.5 Hr. - Extra time to replace both outer shafts

DLR. CODING: Basic Part No. 1175 - Code: 48

Seals and Gaskets: Service and Repair

Removal, Units w/Ball Bearing

1. Remove wheel assembly.

2. Remove brake drum from flange.

3. Working through hole provided in axle shaft flange, remove nuts that secure wheel bearing retainer.

4. Pull axle shaft out of housing. If bearing is a tight fit in axle housing, use a slide hammer type puller.

5. Remove brake backing plate and secure to frame rail.

6. If the axle shaft bearing is to be replaced, loosen the inner retainer by nicking it deeply with a chisel in several places. The bearing will then slide off easily.

7. Press bearing from axle shaft.

8. Inspect machined surface of axle shaft and housing for rough spots that would affect sealing action of the oil seal. Carefully remove any burrs or rough spots.

Installation

1. Press new bearing on shaft until it seats firmly against shoulder on shaft.

2. Press inner bearing retainer on shaft until it seats firmly against bearing.

3. If oil seal is to be replaced, use a hook-type tool to pull it out of housing. Wipe a small amount of oil resistant sealer on outer edge of seal before it is installed.

Removal, Units W/Roller Bearing

1. Remove wheel assembly.

2. Remove brake drum from flange.

3. Working through hole provided in axle flange, remove nuts securing wheel bearing retainer.

4. Pull axle shaft carefully from housing to prevent damage to outer seal rubber. Use a slide hammer type puller to remove tapered bearing cup from housing. Remove brake backing plate and secure to frame rail.

5. If the axle shaft bearing or seal is to be replaced, split the inner bearing retainer.

6. Press bearing from axle shaft.

7. Inspect machined surface of axle shaft and housing for rough spots that would affect sealing action of the oil seal. Carefully remove any burrs or rough spots.

8. Install outer retainer plate on axle shaft. Press lubricated seal and bearing onto shaft until firmly seated. Oil seal for rear drum brake equipped vehicles is different than that used on vehicles with rear disc brakes. Seals used with drum brakes have a gray metal colored outer rim, while seals used with disc brakes have a black or orange color.

9. Press new bearing retainer onto shaft until seated.

Installation

1. On 1980---84 models, place a new gasket on each side of brake carrier plate, and slide axle shaft into housing. On models with roller bearing, ensure outer seal is fully seated on bearing.

2. Start splines into differential side gear and push shaft in until bearing bottoms in housing.

3. Torque bearing retainer nuts to 20---40 ft. lbs.

Wheel Bearing: Adjustments

4 WHEEL DRIVE MODELS

1980 F-350, 1980-82 F-250, 1980-85 F-150 & Bronco & 1984-85 F-250 Exc. w/Dana 501FS Axle

If vehicle is equipped with free running lock-out hubs, refer to ``Front Wheel Drive Section'' for removal and installation procedures. On 1985 Bronco and F-150-250 4 x 4 models built after June 30, 1985, a one piece spindle bearing locknut was used, requiring a revised procedure.

When removing manual hub, use spanner wrench PN P84-171-2 or equivalent. Insert spanner wrench tangs into four slots on nut assembly, apply inward pressure to unlock bearing nut locking splines and turn counterclockwise to loosen nut.

When installing, thread the new one piece locknut onto spindle with metal stamping inboard., ensuring I. D. key on metal stamping enters spindle keyway. Insert spanner wrench tangs into four slots on locknut assembly, apply inward pressure to unlock bearing nut locking splines and torque nut to 50-60 ft. lbs. to seat wheel bearings. Back off nut approximately 180 degrees, then torque to 15 ft. lbs.

New spindles have been released with a wider keyway. The one piece locknut can only be used with new spindles. Prior design level lock nuts will continue to be available for servicing of old spindles.

1. Raise vehicle and support with stands.

2. Remove hub assembly, then, using tool No. T59T-1197-B and a torque wrench, torque bearing inner adjusting nut to 50 ft. lbs. while rotating wheel back and forth to seat bearings.

3. Back out adjusting nut 1/4 turn on 1980 models, or 1/8 turn on 1981-85 models, and assemble lock tab and outer locknut.

4. Torque locknut to 50 ft. lbs. on 1980 models, or 150 ft. lbs. on 1981-85 models. Bend at least one tab into a slot on both the inner adjusting nut and outer locknut.

5. Final endplay of wheel when installed on spindle should be .001-.006 inch.

6. Install hub assembly.

Wheel Bearing: Service and Repair

4 WHEEL DRIVE MODELS

1. Raise and support front of vehicle and remove front wheels.

2. On models equipped with locking hubs, remove hubs as described in ``Front Wheel Drive Section''.

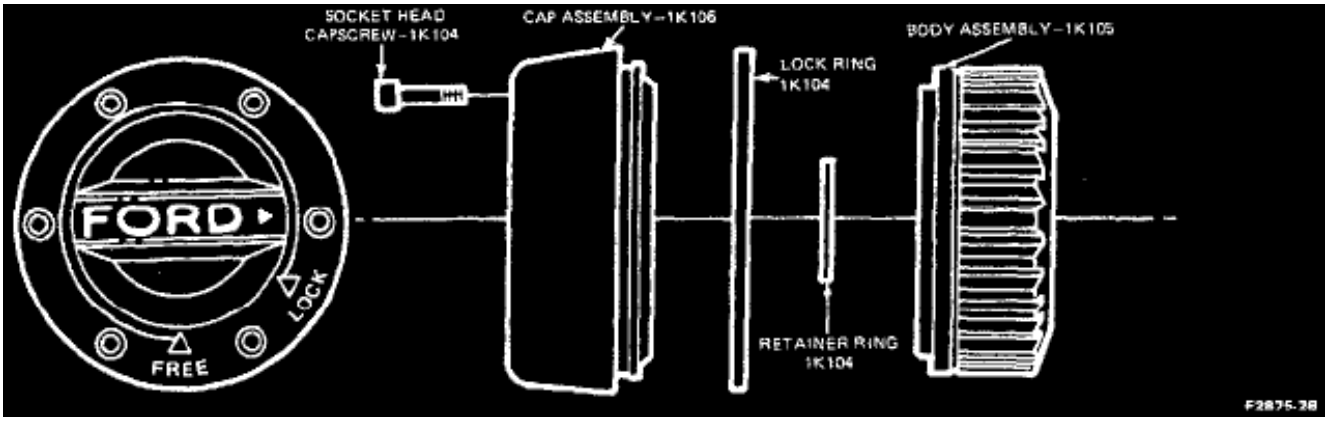
3. On 1980---81 models, remove front hub grease cap.

4. On 1980---81 models, remove driving hub snap ring, then the splined driving hub and pressure spring.

5. On all models, remove wheel bearing locknut, lock ring and adjusting nut, then the hub and disc assembly. The outer bearing and roller assembly will slide out when the hub is removed.

6. Remove inner bearing and grease seal from wheel hub using a suitable driving tool on 1980---81 models or a puller on 1982---87 models.

7. Reverse procedure to install. Adjust bearings as described under ``Wheel Bearings, Adjust''.



Wheel Hub (Locking): Service and Repair

Manual Locking Hub (Warner)

1980---87 F-150---350 & BRONCO W/MANUAL HUBS

Removal & Disassembly

1. Remove cap assembly capscrews and the cap assembly, Fig. 5.

2. Remove snap ring from end of axle shaft.

3. Remove lock ring from wheel hub groove.

4. Remove body assembly from wheel hub. If necessary, a puller may be used to remove body assembly.

Assembly & Installation

1. Install body assembly onto wheel hub, Fig. 5.

2. Install lock ring into hub groove, then the snap ring onto axle shaft.

3. Install cap assembly and torque capscrews to 35---50 inch lbs.

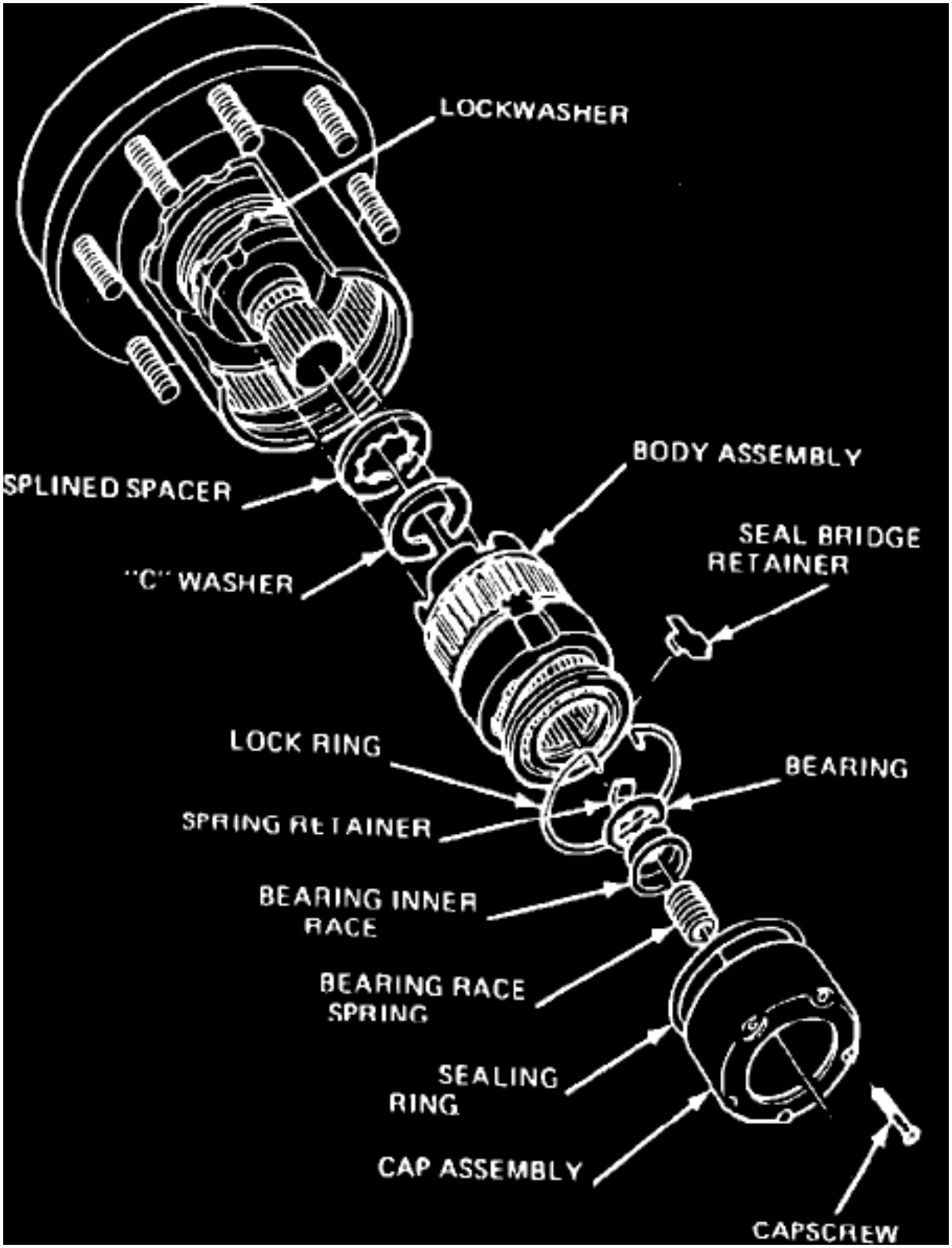


Fig. 6 Automatic front locking hub. 1980---87 F-150---350 & Bronco

1982-87 F-150-250 & BRONCO W/AUTOMATIC HUBS

Removal & Disassembly

1. Remove cap assembly capscrews and the cap assembly, Fig. 6. Avoid dropping ball bearing, bearing race and retainer when removing cap.

2. Remove rubber seal, then the seal bridge retainer from retainer ring space.

3. Remove retainer ring by closing ends with suitable pliers while pulling hub lock from wheel hub.

4. If wheel hub and spindle are to be removed, remove C-washer from stub shaft groove, splined spacer from shaft and the wheel bearing lock nuts and lock washer.

Assembly & Installation

1. Install wheel bearing locknut and lock washer. Torque locknut to 150 ft. lbs.

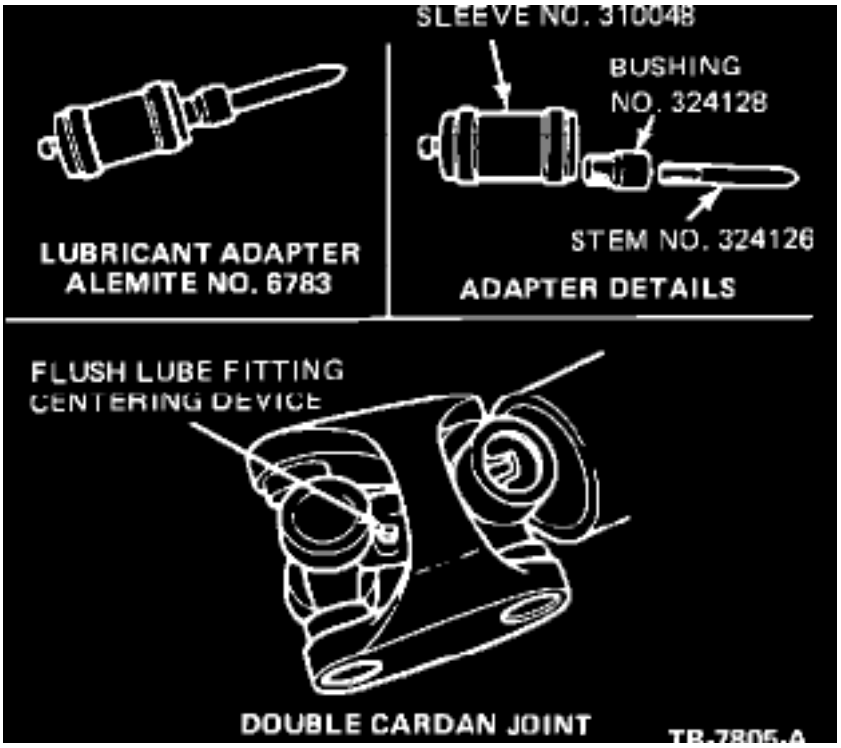
2. Install splined spacer and C-washer on axle shaft.

3. Install locking hub assembly into hub, ensuring large tangs are aligned with lock washer and splines align with hub and axle shaft splines, Fig. 6.

4. Install retainer ring by closing ends with suitable pliers while pushing locking hub assembly into wheel hub.

5. Install seal bridge retainer, narrow end first.

6. Install rubber seal, then the cap assembly. Torque cap screws alternately and evenly to 40---50 inch lbs.



Universal Joint: Technical Service Bulletins Driveshaft - Double Cardan U-Joint Lubrication

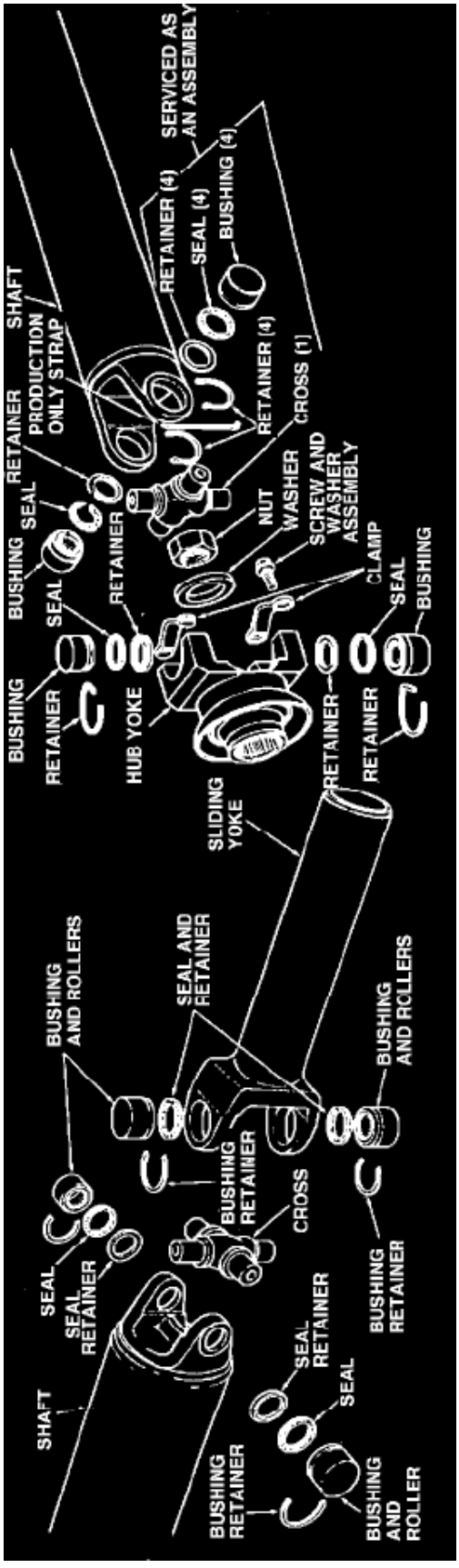
Article No. 85-3-13

DRIVESHAFT - DOUBLE CARDAN U-JOINT - WEAR-OUT/ LUBRICATION

LIGHT TRUCKS 1980-85 BRONCO, 1984-85 BRONCO II

Figure 6 - Universal Joint

The double Cardan universal joints require periodic lubrication, as stated in both the owner's and shop manuals. This item is often missed during routine maintenance and lack of lubrication will lead to shortened joint life. The fitting should be serviced using the lubrication adapter (Figure 6). This can be performed without removing the driveshaft. OTHER APPLICABLE ARTICLES: None WARRANTY STATUS: "INFORMATION ONLY"


SERVICED AS AN ASSEMBLY
SHAFT
RETAINER
PRODUCTION ONLY STRAP
BUSHING
SEAL
RETAINER
BUSHING
SEAL
RETAINER (4)
SEAL (4)
BUSHING (4)
RETAINER (4)
CROSS (1)
NUT
WASHER
SCREW AND WASHER ASSEMBLY
CLAMP
SEAL
BUSHING
BUSHING
RETAINER
HUB YOKE
RETAINER
RETAINER
SLIDING YOKE
BUSHING AND ROLLERS
SEAL AND RETAINER
BUSHING AND ROLLERS
BUSHING RETAINER
CROSS
SEAL
SEAL RETAINER
SHAFT
SEAL RETAINER
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BUSHING RETAINER
BUSHING RETAINER
BUSHING AND ROLLER

Universal Joint: Description and Operation

Fig. 3 Cross & roller type universal joints

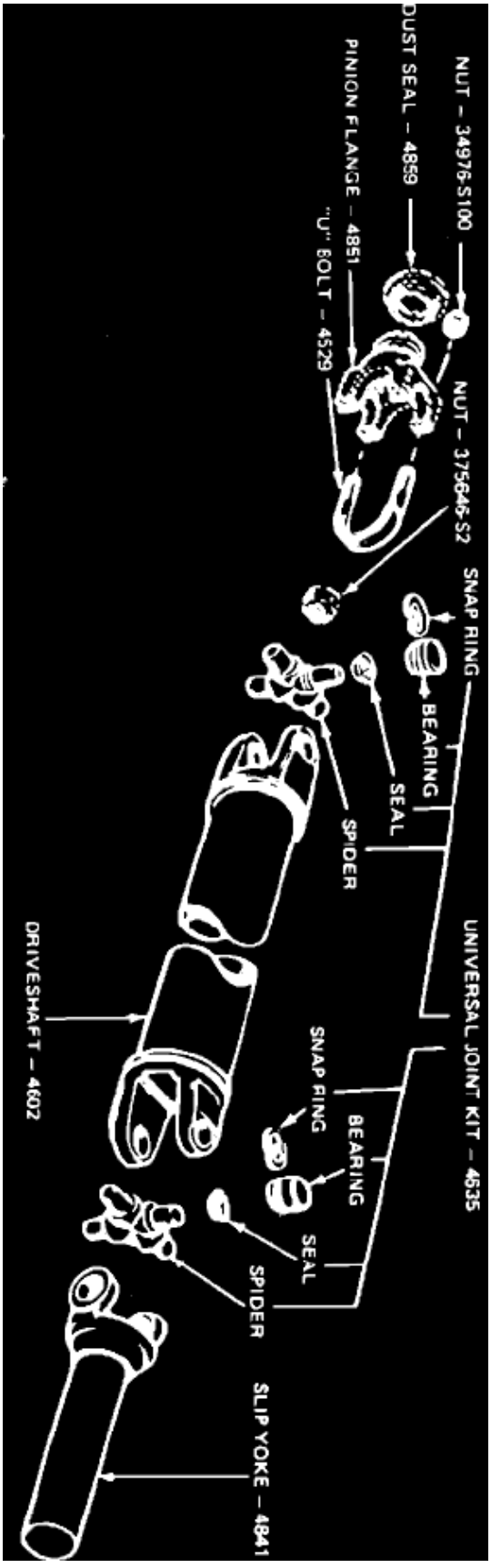
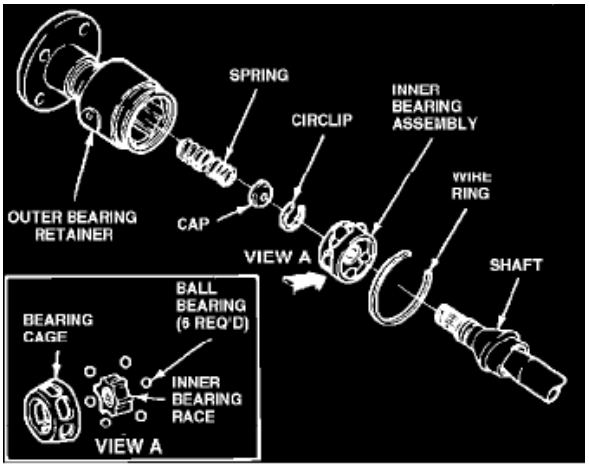
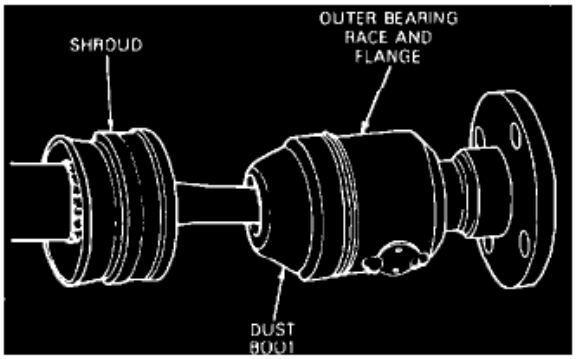
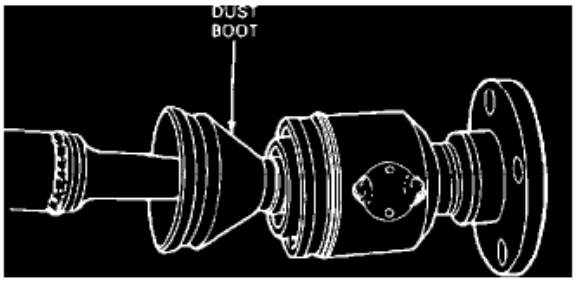

NUT – 34976-S100
DUST SEAL – 4859
PINION FLANGE – 4851
"U" BOLT – 4529
NUT – 375646-S2
SNAP RING
BEARING
SEAL
SPIDER
UNIVERSAL JOINT KIT – 4635
DRIVESHAFT – 4602
SNAP RING
BEARING
SEAL
SPIDER
SLIP YOKE – 4841

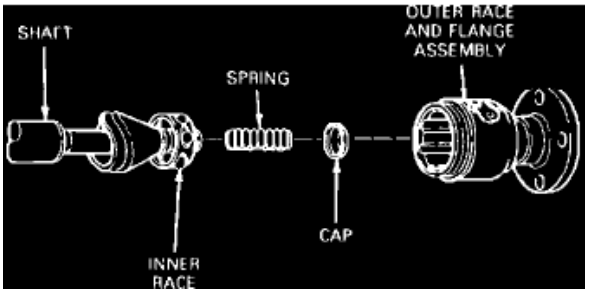
Fig. 4 Cross & roller type universal joints & propeller shaft

Figs. 3 and 4 illustrate typical examples of universal joints of this type. They all operate on the same principle and similar service and replacement procedures may be applied to all.


SPRING
CIRCLIP
INNER BEARING ASSEMBLY
WIRE RING
OUTER BEARING RETAINER
CAP
VIEW A
SHAFT
BALL BEARING (6 REQ'D)
BEARING CAGE
INNER BEARING RACE
VIEW A


SHROUD
OUTER BEARING RACE AND FLANGE
DUST BOOT


DUST BOOT


SHAFT
SPRING
OUTER RACE AND FLANGE ASSEMBLY
CAP
INNER RACE

Universal Joint: Service and Repair Constant Velocity Type

Fig. 10 Exploded view of CV (Constant Velocity) joint

The CV type joint, Fig. 10, incorporates an outer bearing retainer and flange, spring, cap, circlip, inner bearing assembly and a wire ring. The inner bearing assembly incorporates a bearing cage, six ball bearings and an inner race.

Fig. 11 Removing shroud

Fig. 12 Positioning dust boot

Fig. 13 Removing inner race from outer race

DISASSEMBLY

1. Remove clamp retaining shroud to outer bearing race and flange assembly.

2. Remove shroud taking care not to damage dust boot or outer bearing race and flange assembly,Fig. 11. It may be necessary to tap shroud using a plastic hammer.

3. Peel dust boot upward, Fig. 12, and away from outer bearing race and flange assembly.

4. Using a suitable screwdriver, remove wire ring that retains the inner race to outer race.

5. Remove inner race and shaft assembly from outer race and flange assembly, Fig. 13, then cap and spring from inside the outer retainer.

6. Using suitable snap ring pliers, remove circlip retaining the inner race assembly to shaft, then inner race assembly. Discard circlip.

7. If necessary, remove clamp retaining boot to shaft, then boot.

8. Using a suitable screwdriver, pry ball bearings from cage. Do not scratch or damage cage, race or ball bearings.

9. Rotate inner race to align it with cage windows, then remove inner race through wider end of cage.

CASSEMBLY

Individual components are not available for service. Therefore, if inspection determines component replacement, the entire CV joint must be replaced as an assembly.

1. Install inner bearing race in bearing cage with counter bore facing large end of cage.

2. Push race to top of cage, then rotate race until ball slots are aligned with windows. This will lock race to top of cage.

3. Install ball bearings.

4. If removed, install dust boot on shaft using a new clamp.

5. Install inner bearing assembly on shaft, then the circlip.

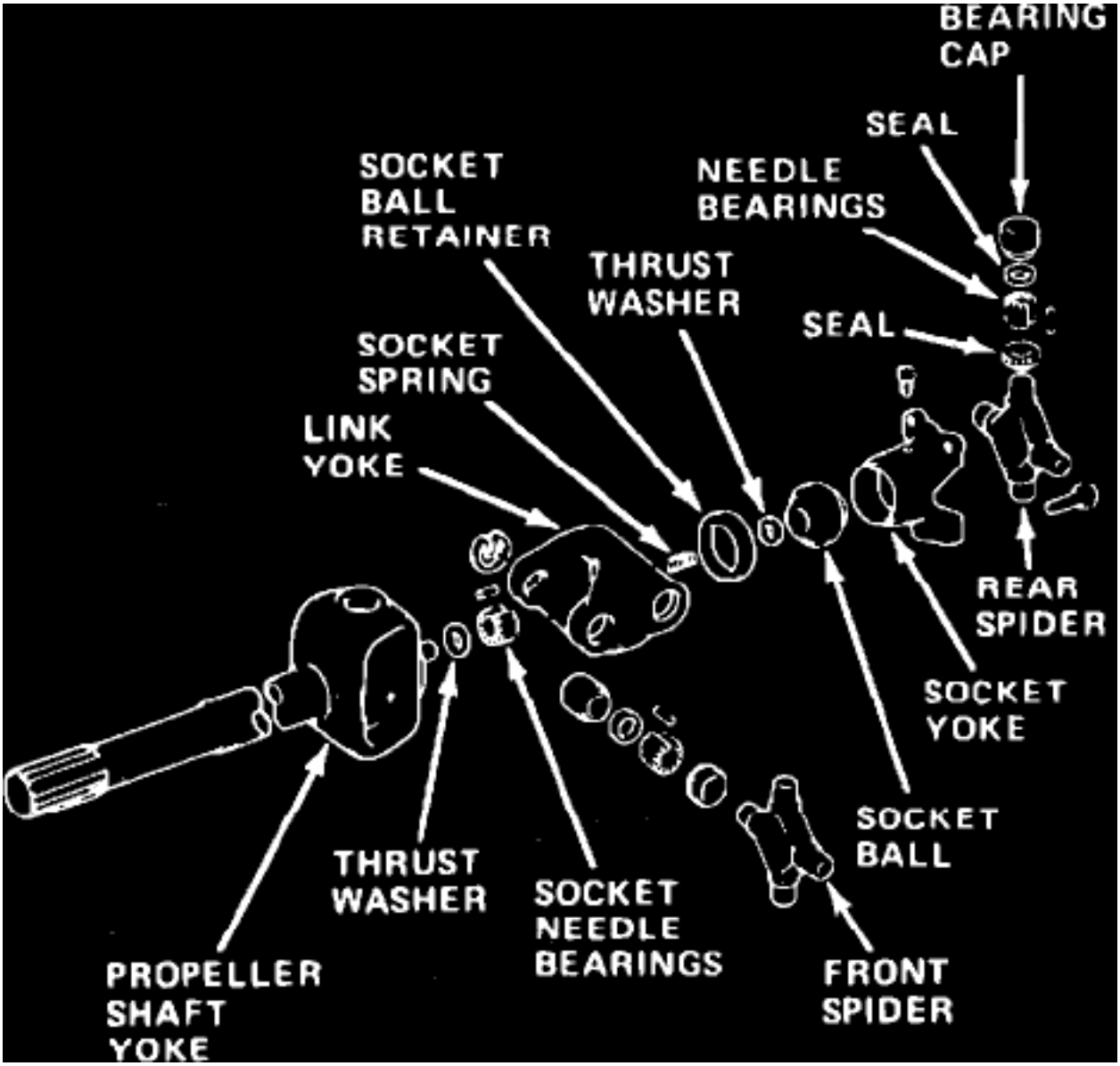
6. Install spring and cap in outer bearing retainer and flange, then fill outer bearing retainer with suitable grease.

7. Install inner race and shaft assembly in the outer bearing retainer and flange, then push inner race down and install wire ring.

8. Fill top of outer bearing retainer with suitable grease. Remove excess grease from external surfaces.

9. Pull dust boot over retainer until boot is seated in groove. Insert a suitable screwdriver blade between boot and outer bearing retainer to allow trapped air to escape from boot.

10. Install shroud over boot and retainer, then clamp in position.



Universal Joint: Service and Repair Disassembly and Assembly

Fig. 9 Double cardan universal joint exploded view

The double cardan type joint, Fig. 9, incorporates two universal joints, a centering socket yoke, and center yoke at one end of the shaft. A single universal joint is used at the other end.

DISASSEMBLY

1. Remove all bearing cap retainers.

2. Mark bearing caps, spiders, propeller shaft yoke, link yoke and socket yoke for assembly alignment reference, Fig. 9.

3. Remove bearing caps attaching from spider to propeller shaft yoke as follows:

a. Use a 5/8 inch socket to drive the bearing cap and a 11/16 inch socket to receive the opposite bearing cap as it is driven out. b. Place 5/8 inch socket on one bearing cap and 11/16 inch socket on opposite bearing. c. Position assembly in vise so vise jaws bear directly against sockets. d. Tighten vise to press first bearing cap out of link yoke. e. Loosen vise, reposition sockets and press opposite bearing cap out of link yoke.

4. Disengage propeller shaft yoke from link yoke.

5. Remove bearing caps attaching front spider to propeller shaft as described in step 3 above.

6. Remove front spider from yoke.

7. Remove bearing caps attaching rear spider to link yoke as outlined in step 3 above and remove spider and socket yoke from link yoke.

8. Clean all parts in solvent and wipe dry. Inspect assembly for damage or wear. If any component is worn or damaged, the entire assembly must be replaced.

ASSEMBLY

When assembling universal joint, make sure to align spiders and yokes according to marks made during disassembly.

1. Lubricate all bearings and contact surfaces with lithium base chassis grease.

2. Install bearing caps on yoke ends of rear spider and secure caps with tape, Fig. 9.

3. Assemble socket yoke and rear spider.

4. Position rear spider in link yoke and install bearing caps. Press caps into yoke using 5/8 inch socket until bearing cap retainer grooves are exposed.

5. Install rear spider-to-link yoke bearing cap retainers.

6. Position front spider in propeller shaft yoke and install bearing caps. Press caps into yoke using a 5/8 inch socket until bearing cap retainer grooves are exposed.

7. Install front spider-to-propeller shaft yoke bearing cap retainers.

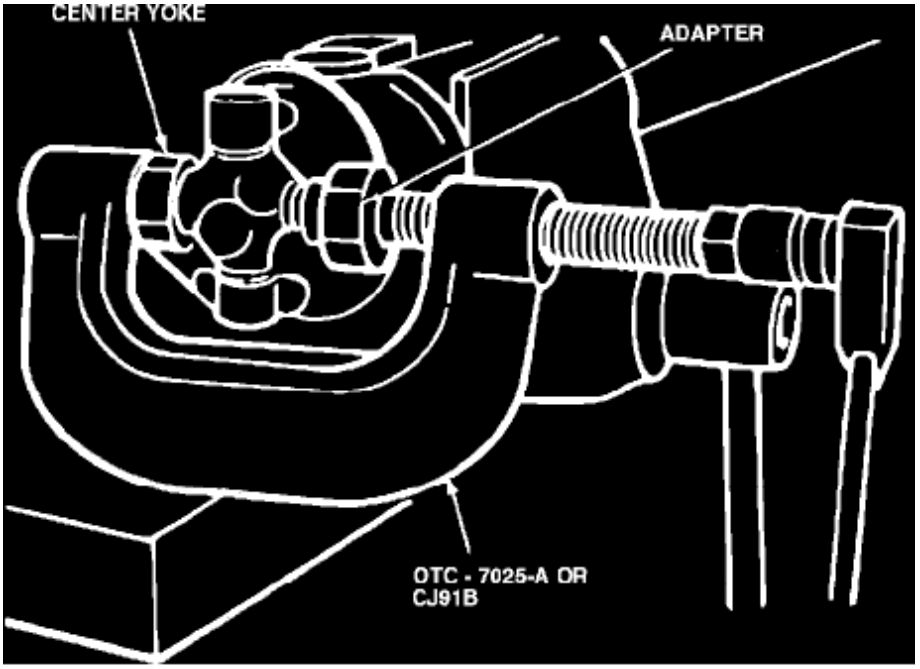
8. Install thrust washer and socket spring in ball socket bearing bore, if removed.

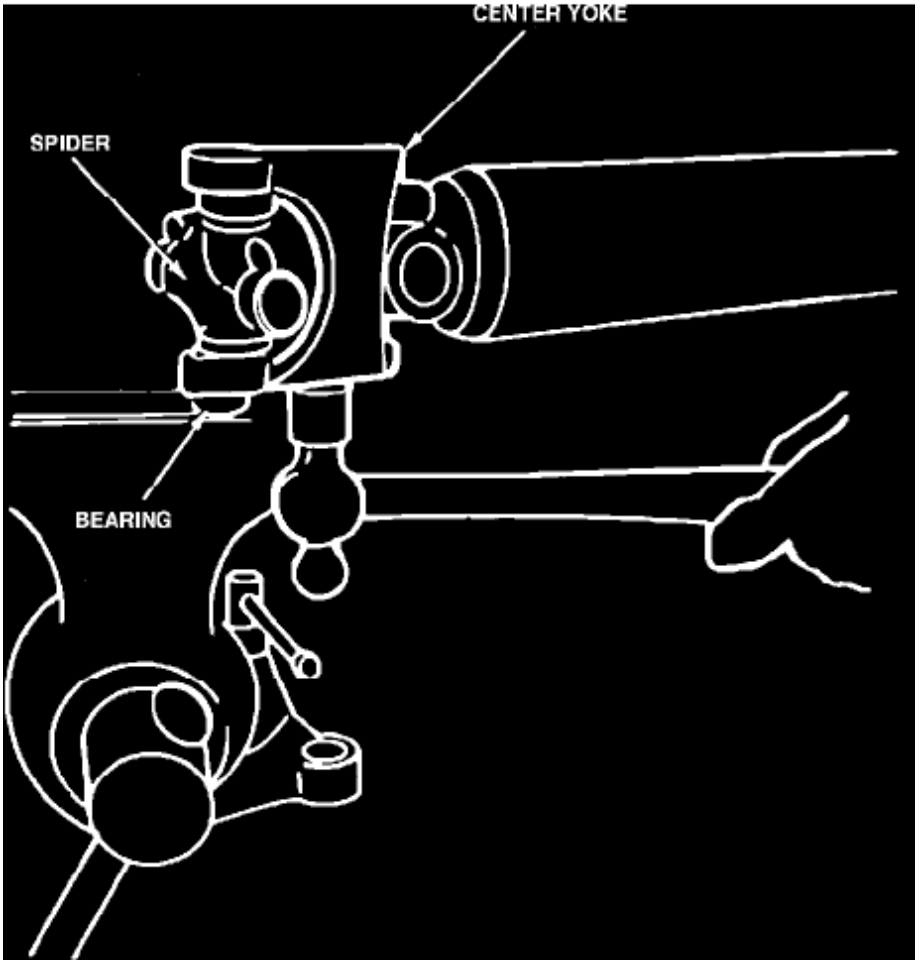
9. Install thrust washer on ball socket bearing boss (located on propeller shaft yoke), if removed.

10. Align ball socket bearing boss on propeller shaft yoke with ball socket bearing bore and insert boss into bore.

11. Align front spider with link yoke bearing cap bores and install bearing caps. Press caps into yoke using a 5/8 inch socket until bearing cap retainer grooves are exposed.

12. Install front spider-to-link yoke bearing cap retainers.


CENTER YOKE
ADAPTER
OTC - 7025-A OR
CJ91B


CENTER YOKE
SPIDER
BEARING

Universal Joint: Service and Repair Servicing Using Universal Joint Replacement Tool

Fig. 7 Removing bearing caps using tool & adapter

Fig. 8 Removing bearing cap by holding cap in vise & striking center yoke with hammer

Disassembly

1. Place driveshaft in a vise using care to avoid damaging it.

2. Remove bearing retaining snap rings. Some universal joints use injected nylon retainers in place of snap rings. During servicing, the snap rings supplied with the replacement universal joint assembly must be used.

3. Position tool on shaft and press bearing out of yoke, Fig. 7. If bearing cannot be pressed all the way out, remove it using vise grips or channel lock pliers or position driveshaft as shown and strike center yoke with hammer, Fig. 8. Mark yoke and shaft to make sure they will be reassembled in their same relative positions.

4. Reposition tool so that it presses on the spider in order to press other bearing from opposite side of flange.

5. If used, remove flange from spider.

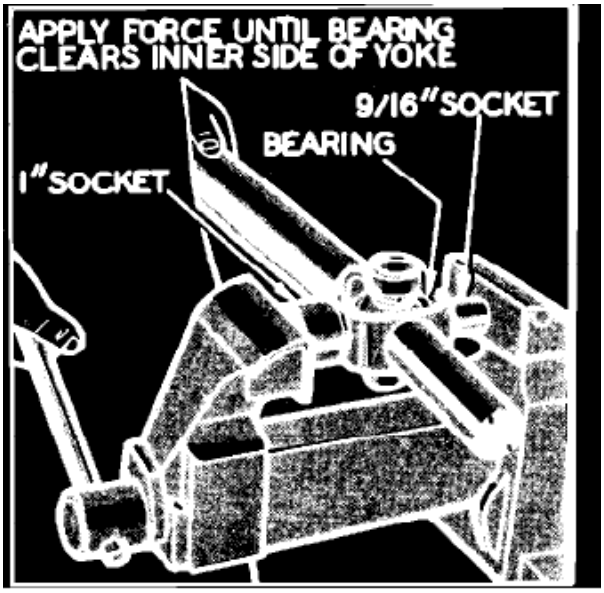
Assembly

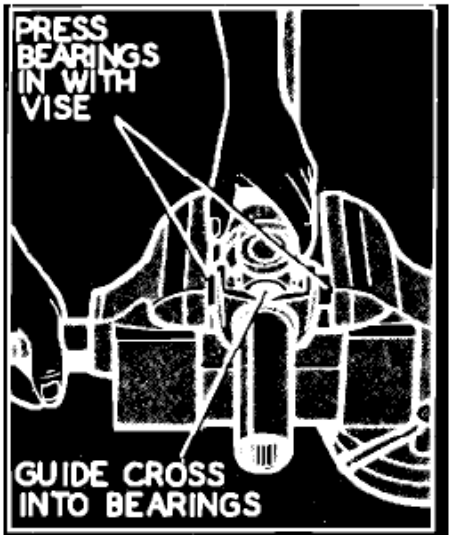
1. Start new bearing into yoke, then position spider into yoke and press bearing until it is 1/4 inch below surface.

2. Remove tool and install a new snap ring.

3. Start new bearing in opposite side of yoke, then install tool and press on bearing until opposite bearing contacts snap ring.

4. Remove tool and install remaining snap ring.


APPLY FORCE UNTIL BEARING CLEARS INNER SIDE OF YOKE
9/16" SOCKET
BEARING
1" SOCKET


PRESS BEARINGS IN WITH VISE
GUIDE CROSS INTO BEARINGS

Universal Joint: Service and Repair Servicing Without Universal Joint Replacement Tool

Fig. 5 Removing bearings from yoke using a small socket as a driver & large socket as a receiver

Disassembly

1. Remove snap rings (or retainer plates) that retain bearings in yoke and drive shaft.

2. Place U-joint in a vise.

3. Select a wrench socket with an outside diameter slightly smaller than the U-joint bearings. Select another wrench socket with an inside diameter slightly larger than the U-joint bearings.

4. Place the sockets at opposite bearings in the yoke so that the smaller socket becomes a bearing pusher and the larger socket becomes a bearing receiver when the vise jaws come together, Fig. 5. Close vise jaws until both bearings are free of yoke and remove bearings from the cross or spider.

5. If bearings will not come all the way out, close vise until bearing in receiver socket protrudes from yoke as much as possible without using excessive force. Then remove from vise and place that portion of bearing which protrudes from yoke between vise jaws. Tighten vise to hold bearing and drive yoke off with a soft hammer.

6. To remove opposite bearing from yoke, replace in vise with pusher socket on exposed cross journal with receiver socket over bearing cup. Then tighten vise jaws to press bearing back through yoke into receiving socket.

7. Remove yoke from drive shaft and again place protruding portion of bearing between vise jaws. Then tighten vise to hold bearing while driving yoke off bearing with soft hammer.

8. Turn spider or cross 1/4 turn and use the same procedure to press bearings out of drive shaft.

Fig. 6 Installing bearings into driveshaft yoke

Assembly

1. If old parts are to be reassembled, pack bearing cups with universal joint grease. Do not fill cups completely or use excessive amounts as

over-lubrication may damage seals during reassembly. Use new seals.

2. If new parts are being installed, check new bearings for adequate grease before assembling.

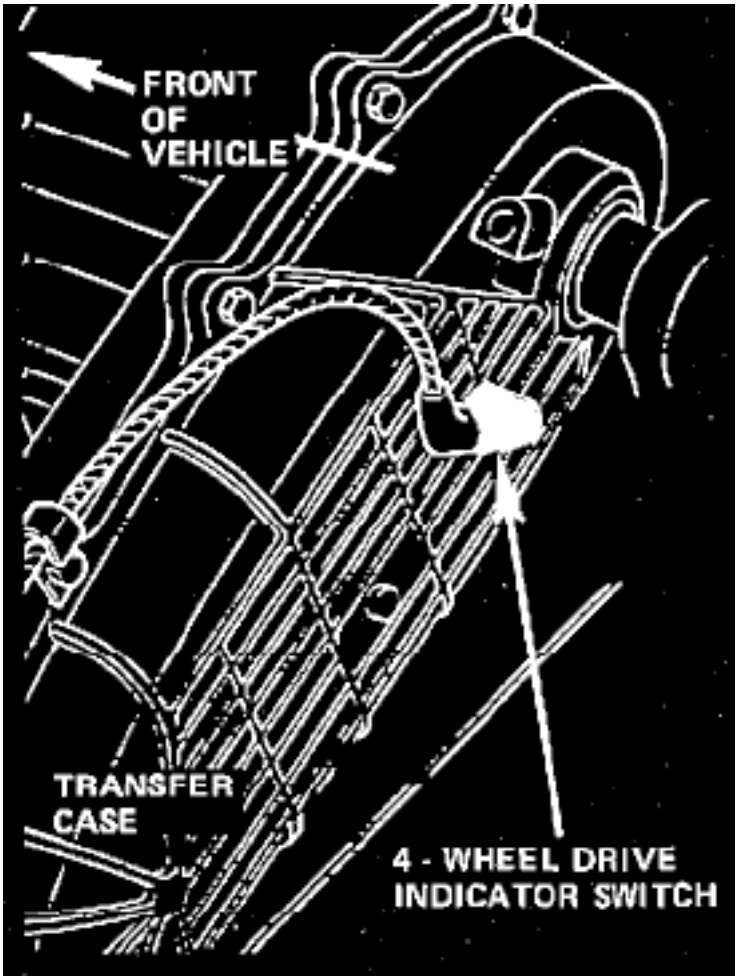
3. With the pusher (smaller) socket, press one bearing part way into drive shaft. Position spider into the partially installed bearing. Place second bearing into drive shaft. Fasten drive shaft in vise so that bearings are in contact with faces of vise jaws, Fig. 6. Some spiders are provided with locating lugs which must face toward drive shaft when installed.

4. Press bearings all the way into position and install snap rings or retainer plates.

5. Install bearings in yoke in same manner. When installation is completed, check U-joint for binding or roughness. If free movement is impeded, correct the condition before installation in vehicle.

Flywheel: Specifications

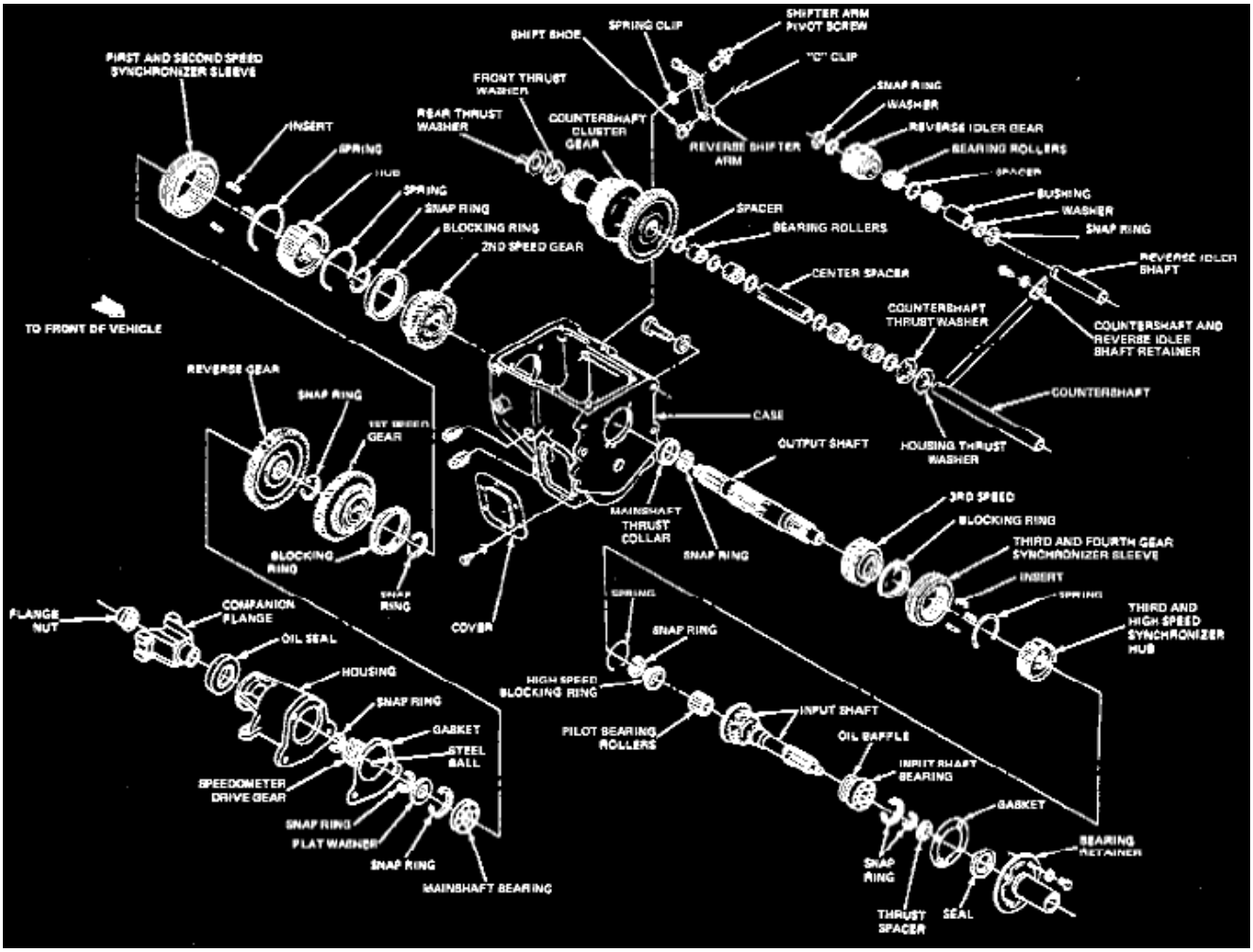
Flywheel To Crankshaft Bolts 75-85 ft.lb



Four Wheel Drive Indicator Lamp: Locations

Rear Of Transfer Case

On Transfer Case



Counter Gear: Service and Repair

DISASSEMBLE

Disassembled View Of Warner T-19B & T-19D 4-speed Manual Transmission

1. Remove dummy shaft and bearing rollers from countershaft gear. 2. Remove bearing spacers and center spacer from gear.

ASSEMBLE

1. Slide long bearing spacer into countershaft gear bore, then insert well greased dummy shaft into spacer. 2. Install one bearing spacer, then 22 pilot rollers in gear bore, While holding gear in a vertical position. 3. Install second spacer, then the remaining 22 rollers and spacer. 4. Apply suitable grease to face of large thrust washer, then hold washer against face of countershaft gear and invert assembly. Install rollers, spacers

and thrust washer in opposite end of gear.

DRIVETRAIN LUBRICANTS

	MANUAL TRANSMISSIONS										M/T RELATED		
	4 Spd. T18	4 Spd. NPG 435	M40D TOD	4 Spd. T19	5 Spd. TMA	5 Spd. MMC FM145	5 Spd. MMC FM146	5 Spd. R1 Mazda	5 Spd. R2 Mazda	5 Spd. ZF S5-42	Speedometer Driven Gear	Shift Lever Lower Ball End - MMC	Shift Lever Seal/Cap 435, T18, T19
1980	1	1	1								2		2
1981	1	1	1								2		2
1982	1	1	1								2		2
1983	1	1	1	1	5	1					3	2	2
1984	1	1	1	1	5	1					3	2	2
1985	1	1	1	1	5	1					3	2	2
1986	1	1	1	1	5	1					3	2	2
1987	1	1	1	1	5	1					3	2	2
1988	1						1	4	4	4	3	2	2
1989							1	4	4	4	3	2	2

LEGEND

Service Part	Description	Specification
1: D8DZ-19C547-A	Standard Transmission Lubricant	ESP M2C83C
2: C1AZ-19590-BA	Long Life Lubricant (Molybdenum Disulfide)	ESA M1CA75B
3: D0AZ-19584-AA D7AZ-19584-AA	Multi-Purpose Grease	ESR M1C159A ESB M1C93A ESB M1C106B
4: XT-2-QDX	Mercon	Mercon, Dexron II ESP-M2C166-H (Type H) ESP-M2C138-CJ (Type A)

Service Part	Description	Specification
5: E5RY-19C547-A	Merkur Synthentic Gear Oil (Dana Axles)	ESD M2C175A
6: C6AZ-19580-E	Additive Friction Modifier	ESW M2C105A
7: C8AZ-19B546-A	Disc Brake Caliper Slide Grease	EST M2C118A
8: D7AZ-19590-A		ESA M1C172A
9: E8TZ-19590-A	Grease	ESA M1C198A
10: E1TZ-19590-A	Automatic Hublock Grease	ESL M1C193 A

DRIVETRAIN LUBRICANTS

	FRONT DRIVE AXLES				TRANSFER CASE					HUBLOCKS			
	Gear Lubricants	Friction Modifier	Upper/Lower Brake Caliper Rails	Wheel and Spindle Bearings, U-Joints and Wheel End Oil Seals	BW 13-45	BW 13-50	BW 13-56	NPG 208	Shift Lever Ball End	R & B II Manual Hublock	R & B II Auto. Hublock	F & B Manual Hublock	F & B Auto. Hublock
1980	6	7	8	9	4	4	4	4	2	2	2	2	11
1981	6	7	8	9	4	4	4	4	2	2	2	2	11
1982	6	7	8	9	4	4	4	4	2	2	2	2	11
1983	6	7	8	9	4	4	4	4	2	2	2	2	11
1984	6	7	8	9	4	4	4	4	2	2	2	2	11
1985	6	7	8	9	4	4	4	4	2	2	2	2	11
1986	6	7	8	9	4	4	4	4	2	2	2	2	11
1987	6	7	8	9	4	4	4	4	2	2	2	2	11
1988	6	7	8	9	4	4	4	4	2	2	2	2	11
1989	6	7	8	9	4	4	4	4	2	2	2	2	11

LEGEND

Service Part	Description	Specification
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3: D0AZ-19584-AA D7AZ-19584-AA	Multi-Purpose Grease	ESR M1C159A ESB M1C93A ESB M1C106B
4: XT-2-QDX	Mercon	Mercon, Dexron II ESP-M2C166-H (Type H) ESP-M2C138-CJ (Type A)

Service Part	Description	Specification
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6: C6AZ-19580-E	Additive Friction Modifier	ESW M2C105A
7: C8AZ-19B546-A	Disc Brake Caliper Slide Grease	EST M2C118A
8: D7AZ-19590-A		ESA M1C172A
9: E8TZ-19590-A	Grease	ESA M1C198A
10: E1TZ-19590-A	Automatic Hublock Grease	ESL M1C193 A

Article No. 89-8-16

^ DRIVETRAIN - LUBRICATION USAGE

^ TRANSMISSION - MANUAL - LUBRICATION USAGE

LIGHT TRUCK: 1980-89 BRONCO, ECONOLINE, F-150, F-250, F-350 1983-89 RANGER 1984-89 BRONCO II 1986-89 AEROSTAR

ISSUE: A quick reference manual transmission fluid usage chart and a quick reference drivetrain lubrication usage chart for light trucks has been put together to assist technicians in the event service is required.

FIGURE 1

FIGURE 2

ACTION: Refer to the transmission fluid application chart in Figure 1 for the correct fluid usage. Refer to the drivetrain lubrication application chart in Figure 2 for the correct lubricant usage.

PART NUMBER PART NAME CLASS

D8DZ-19C547-A Standard Transmission BG

Lubricant - 5 gallons C1AZ-19590-BA

Long Life Lubricant B

(molybdenum disulfide) - 14.5 ounces

DOAZ-19584-AA Multi-Purpose Grease - 4 ounce B

tube

D7AZ-19584-AA Multi-Purpose Grease - 15 B

ounce aerosol can

XT-2-QDX Transmission Fluid (Mercon) - V

quart can (pkg. of 12)

C6AZ-19580-E Gear Oil (Dana axle) - 1 gallon AG

C8AZ-19B546-A Additive Friction Modifier - 4 AM

ounce bottle

D7AZ-19590-A Disc Brake Caliper Slide AM

Grease - 4 ounce tube

E8TZ-19590-A Grease - 14.5 ounces B

E1TZ-19590-A Automatic Hublock Grease - 5 B

ounce tube

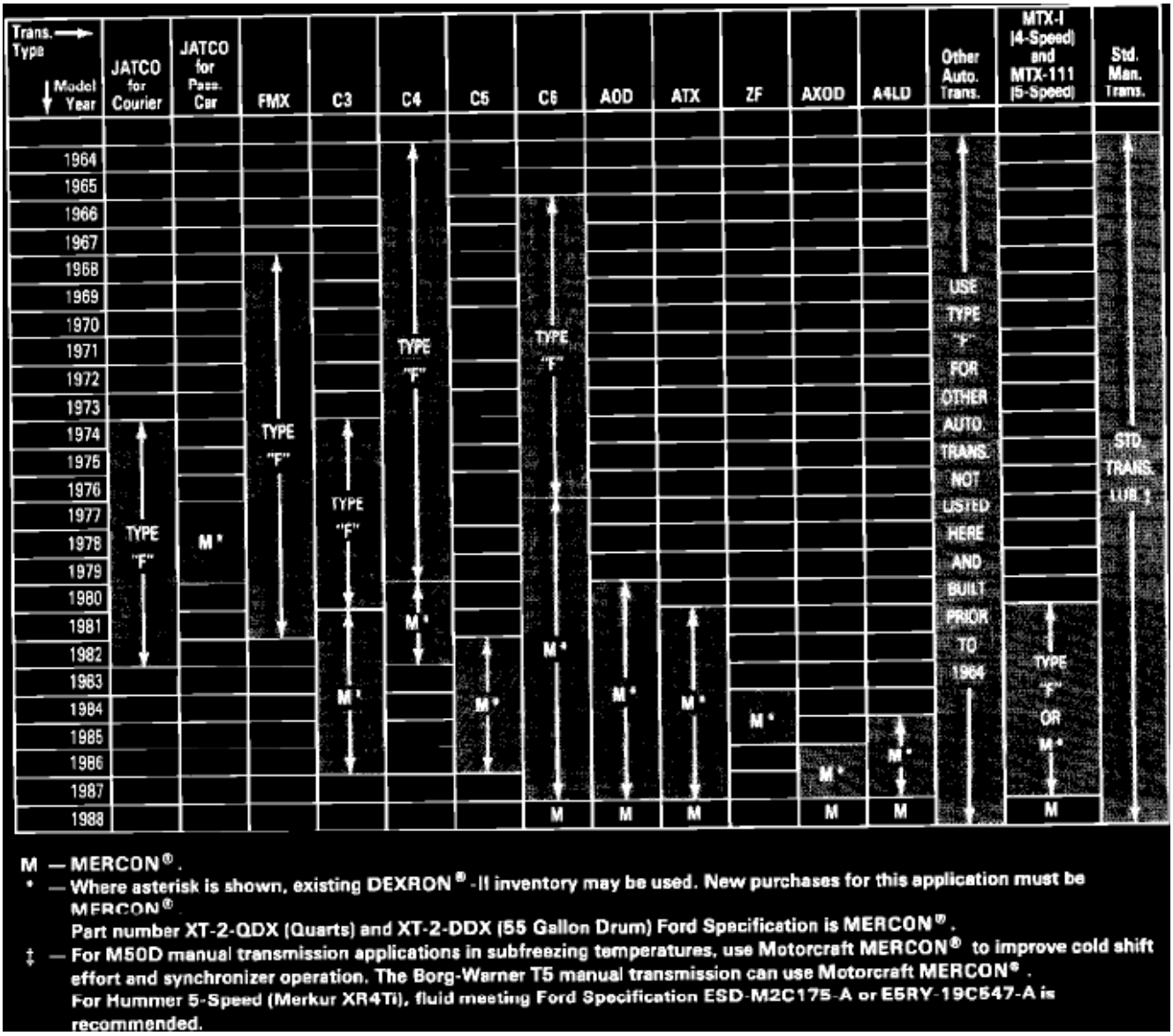
E5RY-19C547-A Merkur Synthetic Manual B

Transmission Fluid

OTHER APPLICABLE ARTICLES: None

WARRANTY STATUS: INFORMATION ONLY

OASIS CODES: 5970



Fluid - M/T: Technical Service Bulletins A/T, M/T - New `Mercon' Transmission Fluid

TRANSMISSION - AUTOMATIC/MANUAL - Article No.

NEW FLUID AND USAGE CHART 87-18-14

FORD: 1986 And Prior LTD 1988 And Prior ESCORT, TEMPO, MUSTANG, TAURUS, THUNDERBIRD, FORD

LINCOLN-MERCURY: 1986 And Prior CAPRI, MARQUIS 1987 And Prior LYNX 1988 And Prior TOPAZ, SABLE, COUGAR, MERCURY, MARK VII, CONTINENTAL, LINCOLN TOWN CAR

MERKUR: 1985-88 XR4Ti 1988 SCORPIO

LIGHT TRUCK: 1988 And Prior E SERIES, F SERIES, BRONCO, RANGER, BRONCO II, AEROSTAR

ISSUE: A new Transmission Fluid, MERCON (Ford Specification "MERCON") (XT-2- QDX, Quart), (XT-2-DDX, 55 Gallon Drum) is available for service. Use of the Motorcraft "MERCON" transmission fluid, where specified, will improve cold weather shift effort and synchronized operation.

ACTION: The chart on page 44 of this TSB gives transmission fluid applications for automatic transmissions and certain manual transmissions for Ford, Lincoln-Mercury, and Merkur vehicles.

NOTE: The use of MERCON is NOT RECOMMENDED for power steering systems. The manual transmission lubricant for the 1985 Merkur XR4Ti is a semi-synthetic oil. When adding oil to the transmission, use only E5RY-19C547-A (Ford Specification ESD-M2C175-A) or equivalent.

PART NUMBER PART NAME CLASS

XT-2-QDX MERCON - Quart V

XT-2-DDX MERCON - 55 Gallon V

Drum

E5RY-19C547-A Semi-Synthetic Oil B

OTHER APPLICABLE ARTICLES: 82-9-9 Supersedes 85-1-15, 85-6-7 WARRANTY STATUS: "INFORMATION ONLY"

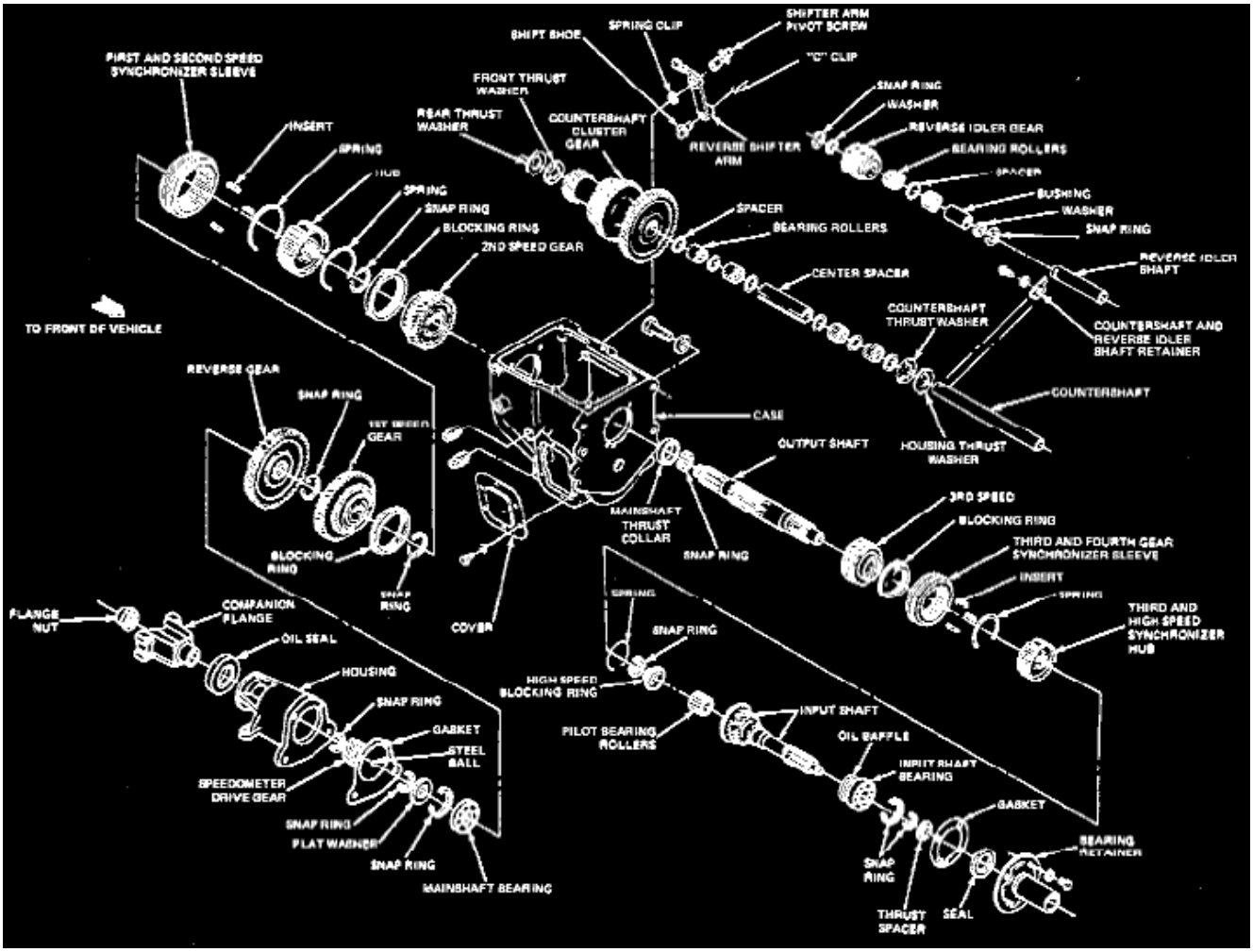
Fluid - M/T: Specifications

TYPE 80W EP

CAPACITY, Refill: 3-speed 3.5 pt (US)

4-speed ex. OD 7.0 pt (US)

W/OD 4.5 pt (US)



Synchronizer Ring: Service and Repair

DISASSEMBLE

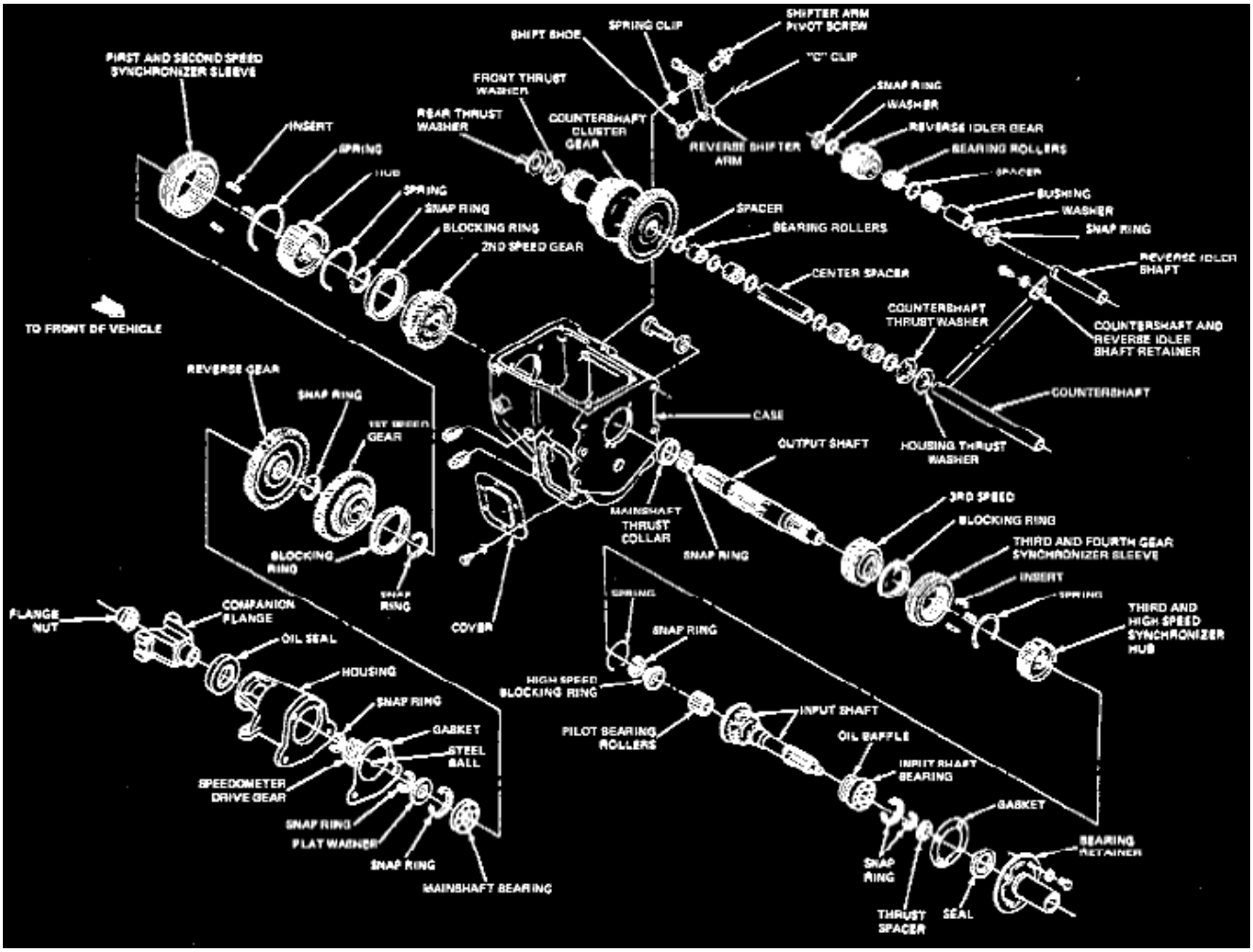
Disassembled View Of Warner T-19B & T-19D 4-speed Manual Transmission

1. Remove spring from each side of synchronizer assembly. 2. Remove 3 inserts from assembly, then slide hub out of sleeve.

ASSEMBLE

NOTE: The following procedure applies to the 1st-2nd synchronizer assembly. Assembly of the 3rd-4th synchronizer is identical except that the two grooves on the chamfered portion of the clutch sleeve can be assembled in either direction on the hub.

1. Install 1st-2nd clutch hub into sleeve, ensuring hub counterbore is on same side as sleeve chamfer. 2. Position 3 inserts into hub slots. 3. Hook end of spring under an insert, then position spring around hub and under each insert. 4. Invert assembly and hook end of second spring over opposite end of insert used for hooking first spring. 5. Position spring around hub and under each insert, in opposite direction of first spring.



Input Shaft: Service and Repair

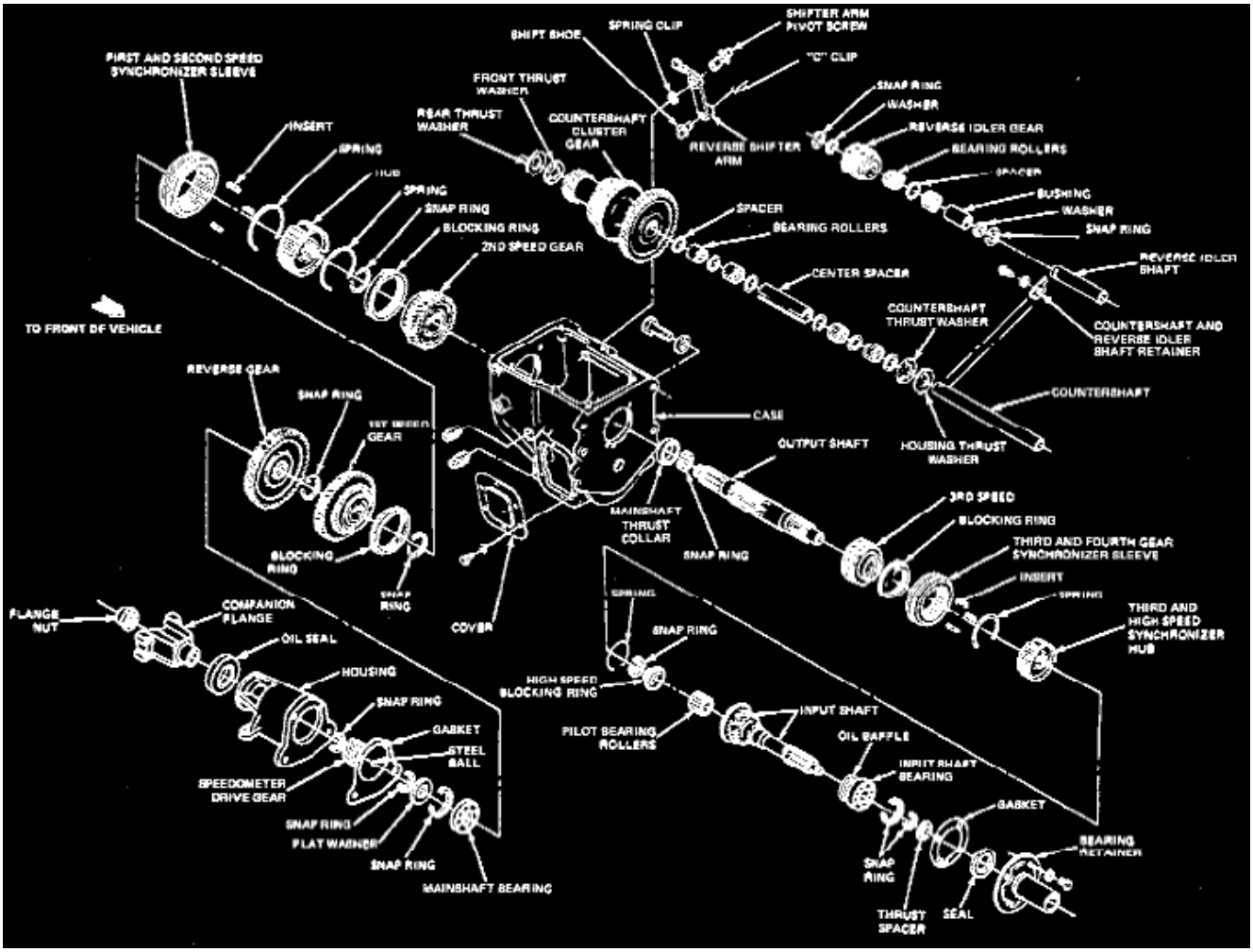
DISASSEMBLE

Disassembled View Of Warner T-19B & T-19D 4-speed Manual Transmission

1. Remove thrust spacer and pilot bearing rollers from gear bore. 2. Remove input shaft bearing using a suitable puller.

ASSEMBLE

1. Press bearing and oil baffle onto input shaft and against gear. 2. Apply suitable grease to gear bore and position 17 pilot rollers in bore. 3. Install thrust spacer in bore and hold in position with grease.



Output Shaft: Service and Repair

DISASSEMBLE

Disassembled View Of Warner T-19B & T-19D 4-speed Manual Transmission

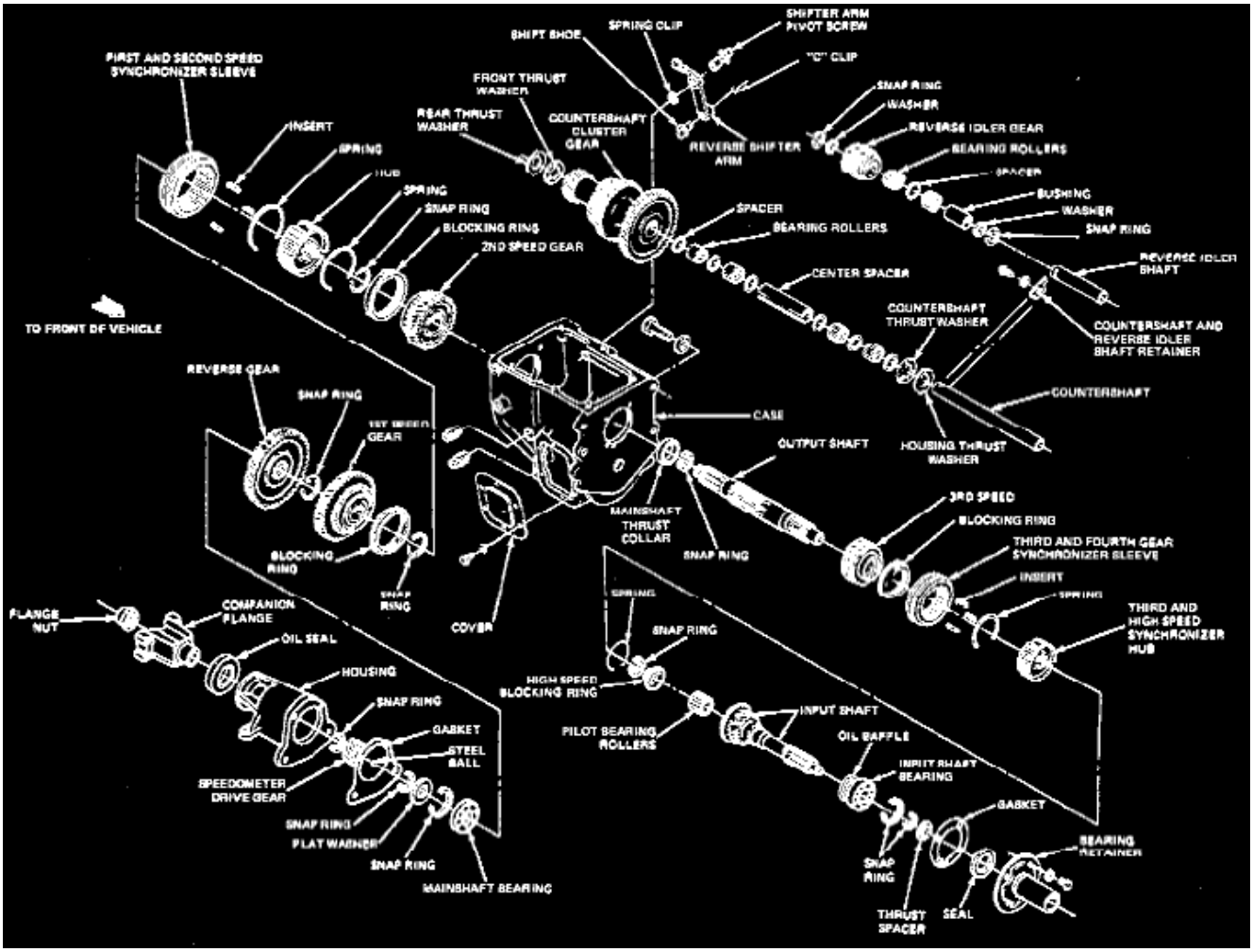
1. Remove snap ring, 3rd-4th synchronizer assembly, blocking ring and 3rd gear from output shaft. 2. Remove reverse gear from shaft using an arbor press or suitable puller. 3. Remove 1st gear snap ring, 1st gear and blocker ring from shaft. 4. Remove 1st-2nd synchronizer snap ring and the synchronizer assembly. 5. Remove 2nd gear snap ring, blocking ring and 2nd gear.

ASSEMBLE

1. Position output shaft vertically with front of shaft downward and slide 2nd gear onto shaft with gear cone toward rear. 2. Install snap ring on output shaft at rear of 2nd gear. 3. Position blocking ring in 1st-2nd synchronizer assembly next to side of hub with counterbore. Ensure ring slots align with insert. 4. Install 1st-2nd synchronizer assembly on shaft while holding blocking ring in place, and secure assembly with snap ring. 5. Install second blocking ring into synchronizer assembly, ensuring ring slots are aligned with inserts. 6. Install 1st gear and snap ring on shaft, ensuring coned portion of gear faces 1st-2nd synchronizer assembly. 7. Install output shaft in a suitable press, then press reverse gear and rear bearing cone onto shaft. 8. Remove output shaft from

press and install 3rd gear with cone toward front. 9. Position blocking ring in 3rd-4th synchronizer assembly on side with larger diameter hub. Ensure ring slots align with inserts.

10. Slide 3rd-4th synchronizer assembly onto shaft while holding blocking ring in position, then install thrust bearing against race. 11. Apply suitable grease to face of blocking ring, then install ring on shaft and into 3rd-4th synchronizer assembly.



Reverse Idler Gear: Service and Repair

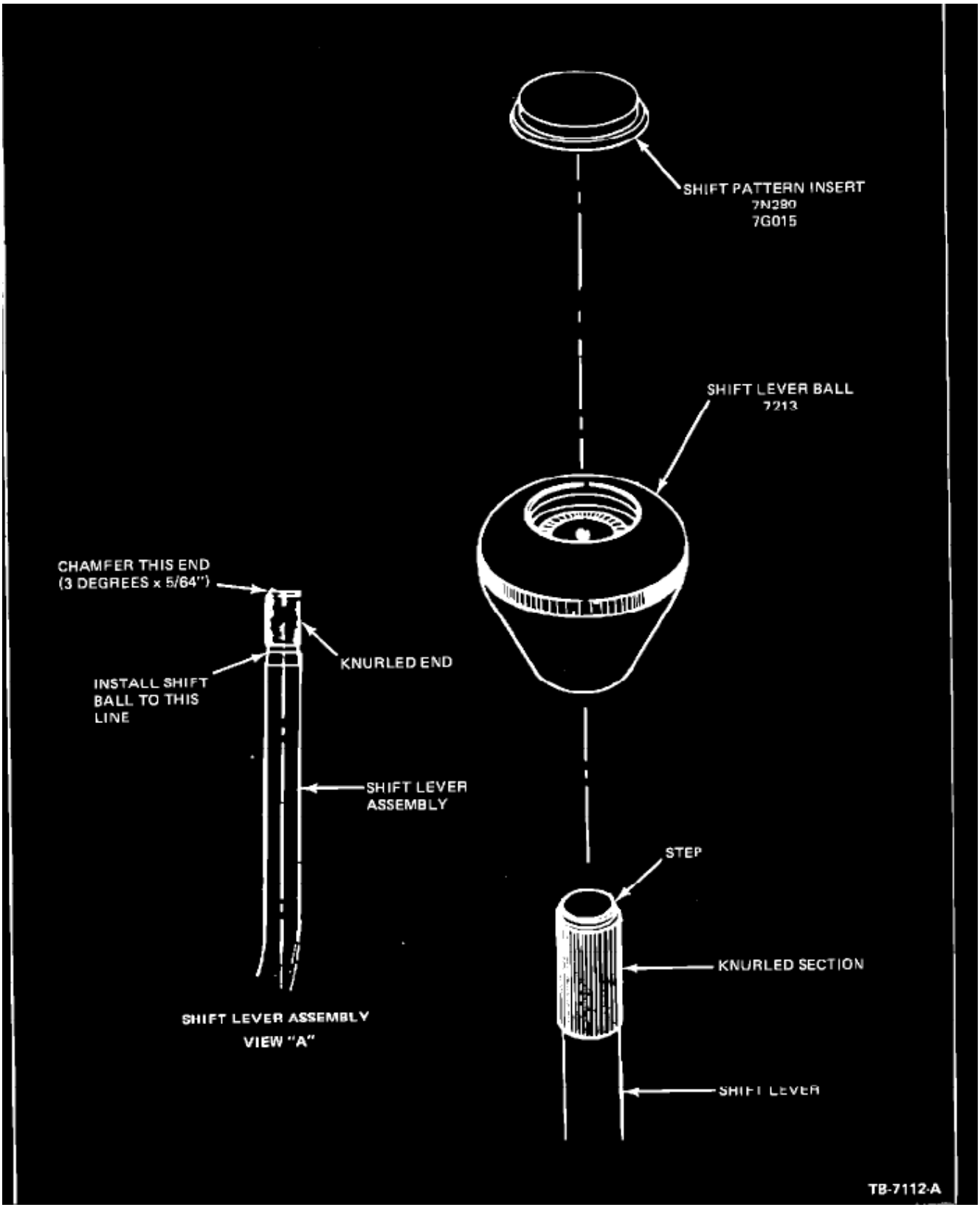
DISASSEMBLE

Disassembled View Of Warner T-19B & T-19D 4-speed Manual Transmission

1. Remove snap ring, idler gear bearing rollers and thrust washer from reverse idler gear. 2. Remove bearing spacer, bushing and remaining snap ring from gear.

ASSEMBLE

1. Install snap ring on one end of gear, then position gear vertically with snap ring at bottom. 2. Install thrust washer into gear on top of snap ring. 3. Apply suitable grease to outside of bushing, then install bushing on top of washer. 4. Install 37 rollers between bushing and gear bore. Install spacer on top of rollers, then insert remaining 37 rollers. 5. Install remaining thrust washer and snap ring.


SHIFT PATTERN INSERT
7N280
7G015
SHIFT LEVER BALL
7213
CHAMFER THIS END
(3 DEGREES x 5/64")
KNURLED END
INSTALL SHIFT
BALL TO THIS
LINE
SHIFT LEVER
ASSEMBLY
STEP
KNURLED SECTION
SHIFT LEVER
SHIFT LEVER ASSEMBLY
VIEW "A"
TB-7112-A

Shifter M/T: Customer Interest Shift Lever Knob - Pulls Off

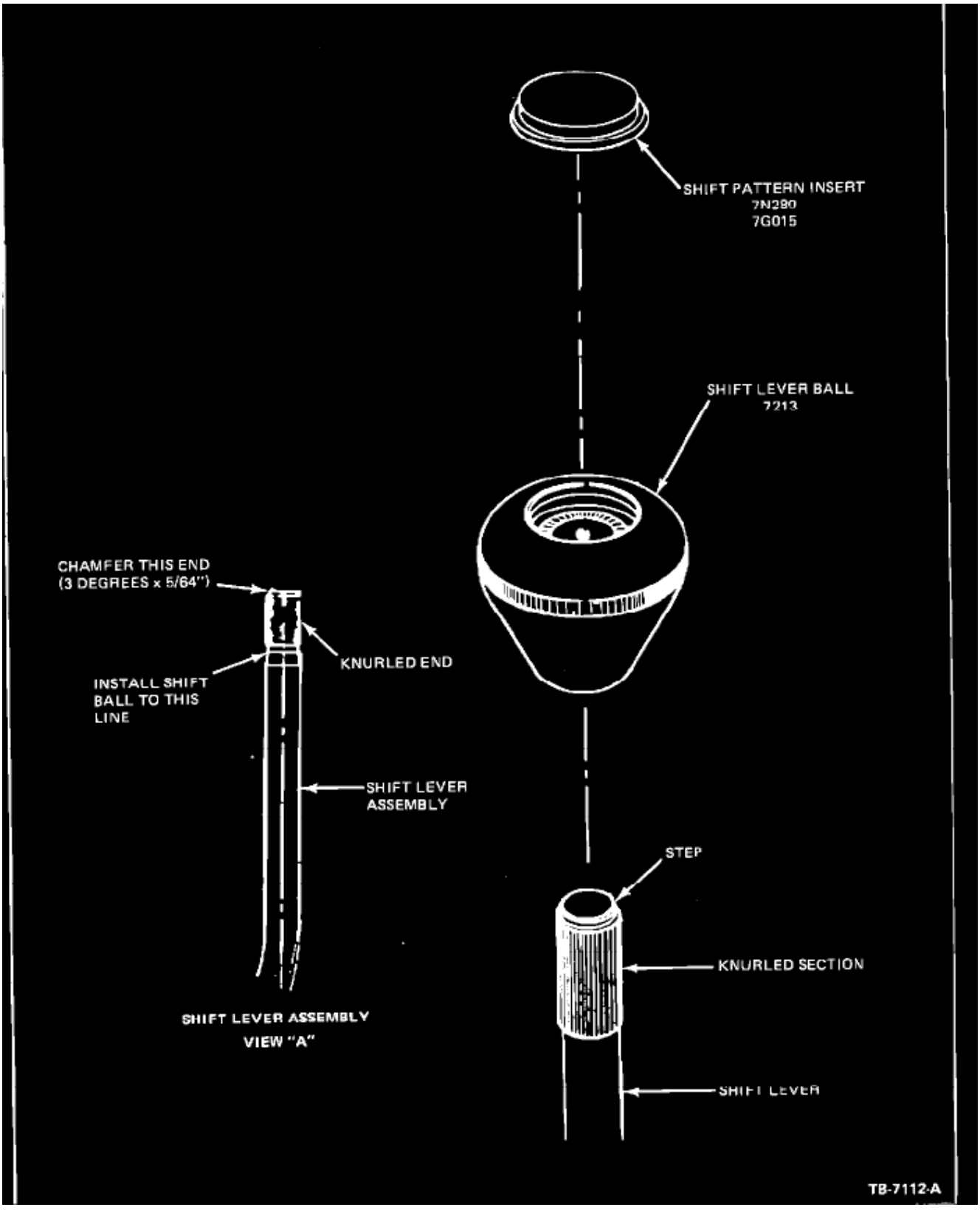
Article No. 83-19-17

TRANSMISSION/TRANSFER CASES - SHIFT KNOB - PULLS OFF FLOOR SHIFT LEVER

LIGHT TRUCKS 1982-84 ALL MODEL LIGHT TRUCKS

Figure 17

Shift lever knob "pull-off" may be due to knob damage during installation or lever knurling which is out of specification. The following procedure is to identify the cause and to service the condition (See Figure 17).


SHIFT PATTERN INSERT
7N280
7G015
SHIFT LEVER BALL
7213
CHAMFER THIS END
(3 DEGREES x 5/64")
KNURLED END
INSTALL SHIFT
BALL TO THIS
LINE
SHIFT LEVER
ASSEMBLY
STEP
KNURLED SECTION
SHIFT LEVER
SHIFT LEVER ASSEMBLY
VIEW "A"
TB-7112-A

1. Remove the shift ball from the shift lever assembly by removing the plastic shift pattern insert from the shift ball. Knock the ball off the lever with a block of wood and a hammer.

2. Inspect the lower cavity of the shift ball for broken or missing sections. Discard the ball if broken or missing pieces are noted. (Retain the plastic shift pattern insert).

3. On T-19 transmission inspect the knurled end of the

shift lever for undersize/oversize knurling by measuring the knurled diameter. The knurled diameter should be between 37/64" and 19/32" in diameter. 4.

If the diameter of the knurled section is less than the specified 37/64" minimum, then the shift lever should be replaced with a new one with good knurls. Also install a new shift ball with the new lever.

Figure 17

5. If the knurled diameter is within the specified diameter, replace the shift ball (7213) only, using the original shift lever and shift ball insert.

NOTE: Before installing the shift ball on the transmission shift lever and, using a machinist file or suitable hand grinder, file or grind a radius

or chamfer on the lever and the start of the knurls so as to remove the step from the top end of the lever and (Figure 17, View A) to aid installation.

6. Install the shift lever ball by warming the ball with a heat gun to 140~ - 180~ and tapping the ball onto the shift lever with a 7/16" socket and a rubber hammer or mallet. Tap the ball down to the beginn-

ing of the taper below the knurled section as shown in Figure 17, View A. Install the shift pattern insert. NOTE:

Tap the shift ball down on the shift lever to the beginning of the tapered shoulder (Figure 17, View A) below the knurled section of the shift lever assembly.

PART NUMBER PART NAME CLASS

E2TZ-7213-B Shift Ball B

E2TZ-7210-D Shift Lever T-18 R

E3TZ-7210-N Shift Lever T-19 C

E2TZ-7210-C Shift Lever NPG435 B

E2TZ-7210-L Shift Lever SROD R

E2TZ-7210-E Shift Lever M4OD R

E3TZ-7210-A Shift Lever TK 4 spd. C

E4TZ-7210-C Shift Lever TK 5 spd.* C

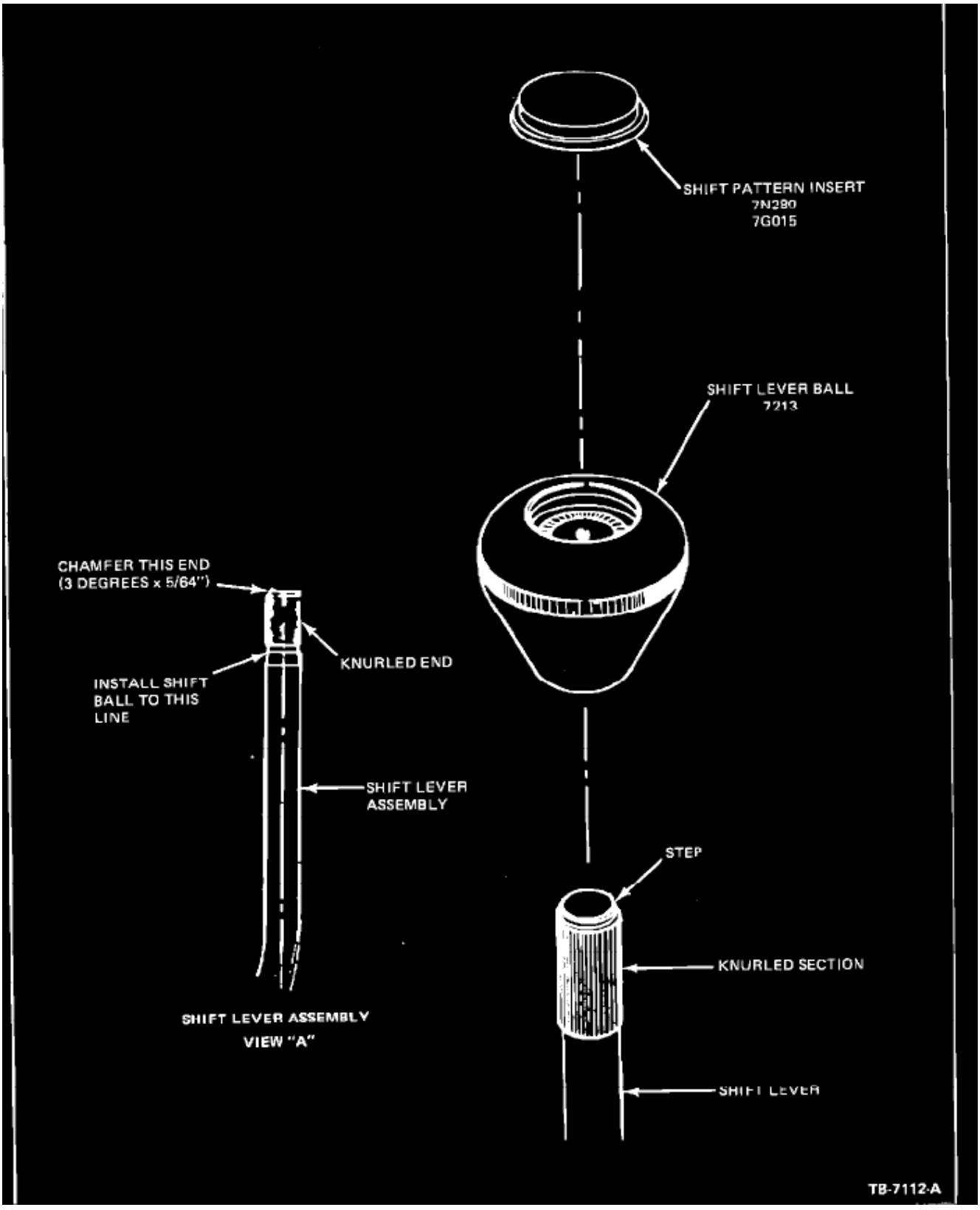
E2TZ-7210-B Shift Lever NP208/W1345 C

E3TZ-7210-K Shift Lever W-1350 C

* - Shift lever assembly includes shift tower.

OTHER APPLICABLE ARTICLES: 82-7-17 WARRANTY STATUS: Reimbursable within the provisions of the Warranty and Policy Manual. OPERATION/TIME: Refer to the Labor Time Standards Manual for applicable operation and time. DLR. CODING: Basic Part No. 7213 or 7210 Code:

01 or 16 as applicable.


SHIFT PATTERN INSERT
7N280
7G015
SHIFT LEVER BALL
7213
CHAMFER THIS END
(3 DEGREES x 5/64")
KNURLED END
INSTALL SHIFT
BALL TO THIS
LINE
SHIFT LEVER
ASSEMBLY
STEP
KNURLED SECTION
SHIFT LEVER
SHIFT LEVER ASSEMBLY
VIEW "A"
TB-7112-A

Shifter M/T: All Technical Service Bulletins Shift Lever Knob - Pulls Off

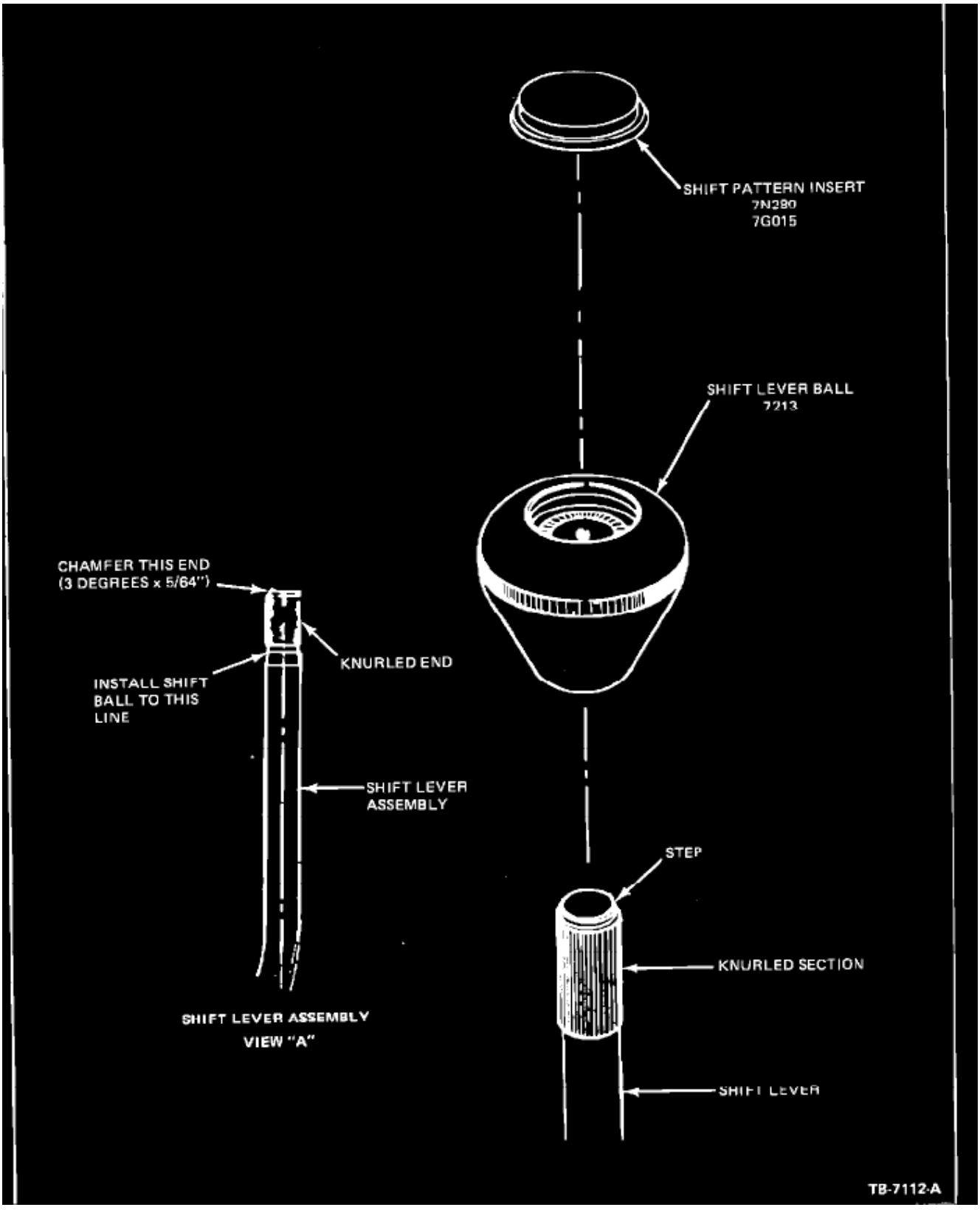
Article No. 83-19-17

TRANSMISSION/TRANSFER CASES - SHIFT KNOB - PULLS OFF FLOOR SHIFT LEVER

LIGHT TRUCKS 1982-84 ALL MODEL LIGHT TRUCKS

Figure 17

Shift lever knob "pull-off" may be due to knob damage during installation or lever knurling which is out of specification. The following procedure is to identify the cause and to service the condition (See Figure 17).


SHIFT PATTERN INSERT
7N280
7G015
SHIFT LEVER BALL
7213
CHAMFER THIS END
(3 DEGREES x 5/64")
KNURLED END
INSTALL SHIFT
BALL TO THIS
LINE
SHIFT LEVER
ASSEMBLY
STEP
KNURLED SECTION
SHIFT LEVER
SHIFT LEVER ASSEMBLY
VIEW "A"
TB-7112-A

1. Remove the shift ball from the shift lever assembly by removing the plastic shift pattern insert from the shift ball. Knock the ball off the lever with a block of wood and a hammer.

2. Inspect the lower cavity of the shift ball for broken or missing sections. Discard the ball if broken or missing pieces are noted. (Retain the plastic shift pattern insert).

3. On T-19 transmission inspect the knurled end of the

shift lever for undersize/oversize knurling by measuring the knurled diameter. The knurled diameter should be between 37/64" and 19/32" in diameter. 4.

If the diameter of the knurled section is less than the specified 37/64" minimum, then the shift lever should be replaced with a new one with good knurls. Also install a new shift ball with the new lever.

Figure 17

5. If the knurled diameter is within the specified diameter, replace the shift ball (7213) only, using the original shift lever and shift ball insert.

NOTE: Before installing the shift ball on the transmission shift lever and, using a machinist file or suitable hand grinder, file or grind a radius

or chamfer on the lever and the start of the knurls so as to remove the step from the top end of the lever and (Figure 17, View A) to aid installation.

6. Install the shift lever ball by warming the ball with a heat gun to 140~ - 180~ and tapping the ball onto the shift lever with a 7/16" socket and a rubber hammer or mallet. Tap the ball down to the beginn-

ing of the taper below the knurled section as shown in Figure 17, View A. Install the shift pattern insert. NOTE:

Tap the shift ball down on the shift lever to the beginning of the tapered shoulder (Figure 17, View A) below the knurled section of the shift lever assembly.

PART NUMBER PART NAME CLASS

E2TZ-7213-B Shift Ball B

E2TZ-7210-D Shift Lever T-18 R

E3TZ-7210-N Shift Lever T-19 C

E2TZ-7210-C Shift Lever NPG435 B

E2TZ-7210-L Shift Lever SROD R

E2TZ-7210-E Shift Lever M4OD R

E3TZ-7210-A Shift Lever TK 4 spd. C

E4TZ-7210-C Shift Lever TK 5 spd.* C

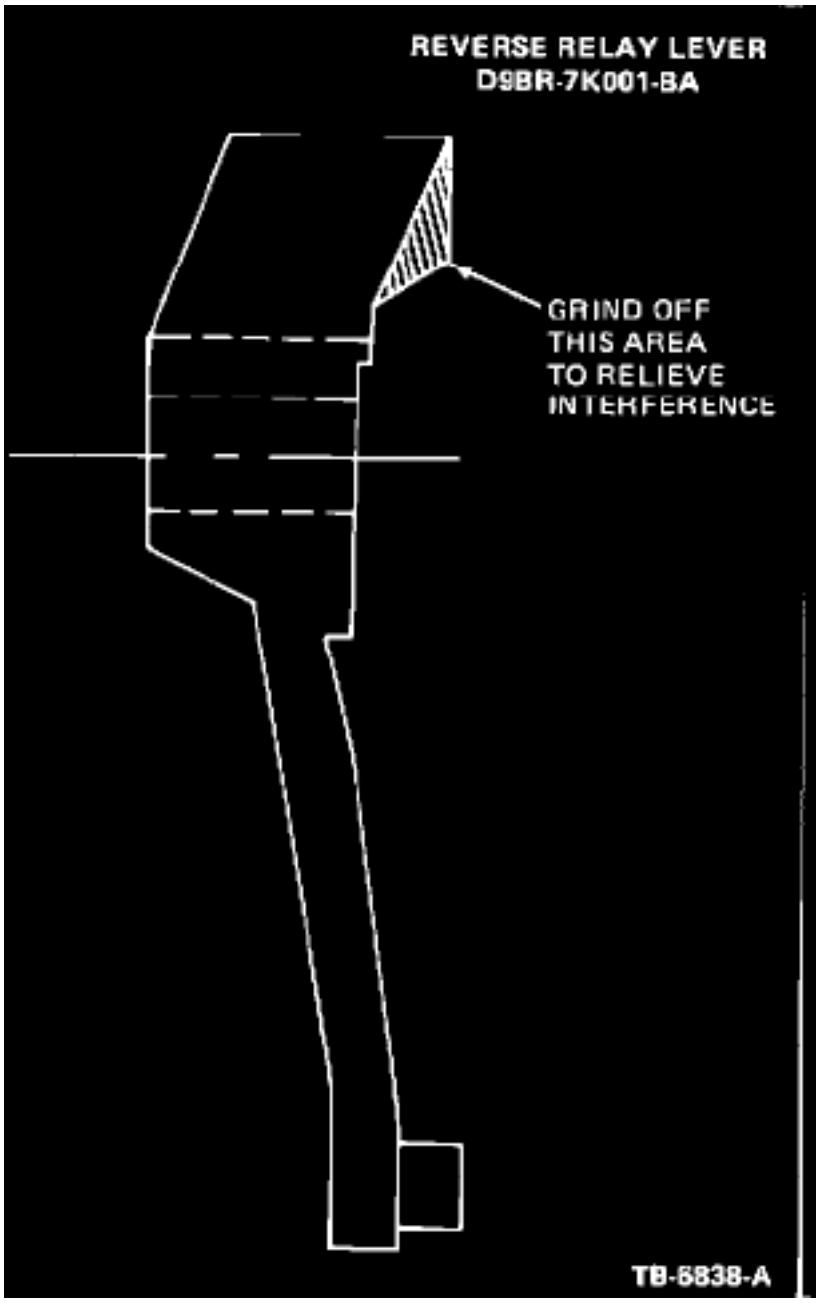
E2TZ-7210-B Shift Lever NP208/W1345 C

E3TZ-7210-K Shift Lever W-1350 C

* - Shift lever assembly includes shift tower.

OTHER APPLICABLE ARTICLES: 82-7-17 WARRANTY STATUS: Reimbursable within the provisions of the Warranty and Policy Manual. OPERATION/TIME: Refer to the Labor Time Standards Manual for applicable operation and time. DLR. CODING: Basic Part No. 7213 or 7210 Code:

01 or 16 as applicable.



Shift Linkage: Customer Interest M/T - Broken/Damaged Interlock Plates

Article No. 83-4-20

TRANSMISSION - MANUAL - SROD - INTERLOCK PLATE DAMAGED/BROKEN

LIGHT TRUCKS 1980-82 BRONCO & F-100/250

Damaged or broken interlock plates may be due to an interference condition between the reverse gearshift relay lever assembly and the gear selector interlock plate. The interference occurs while shifting into reverse gear.

Figure 9

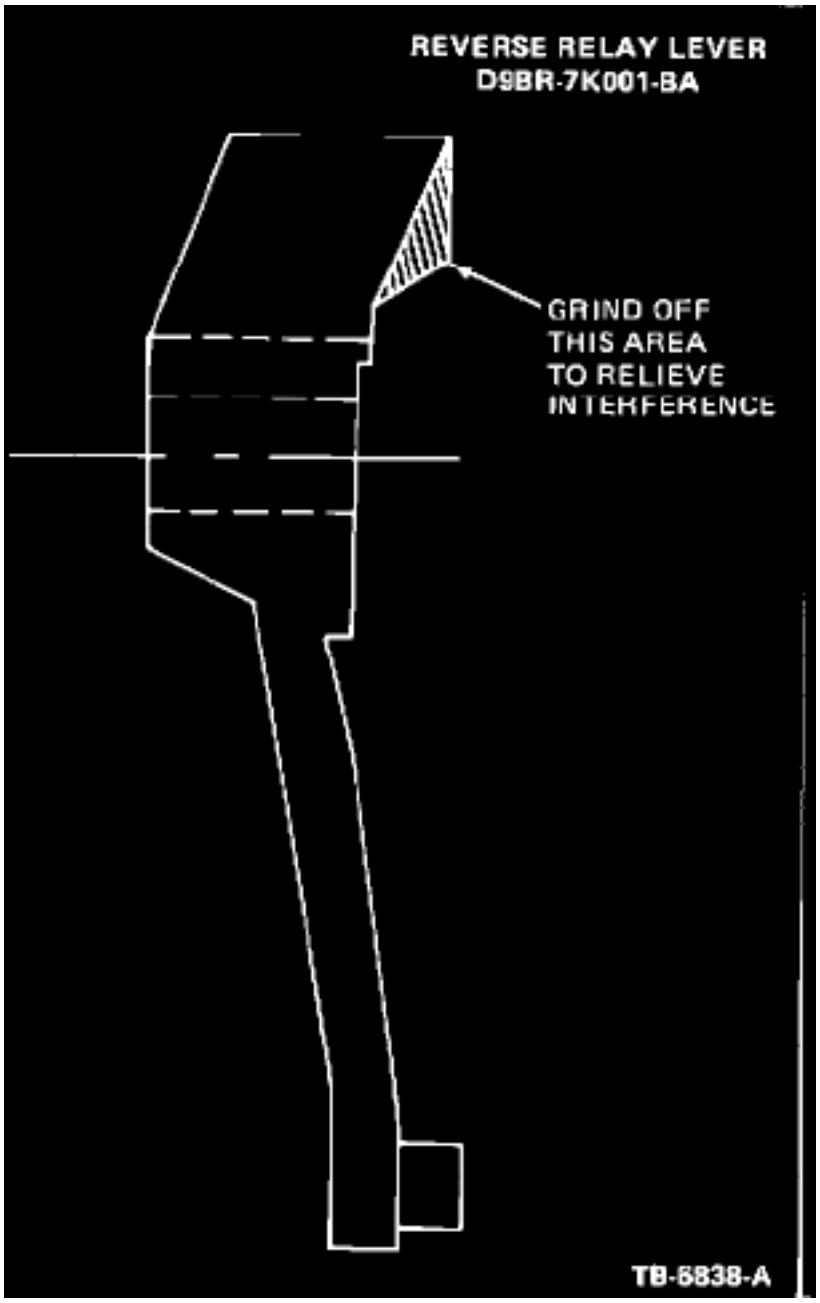
Remove the reverse gearshift relay lever assembly and the gear selector interlock plate. Replace the gear selector interlock plate with a new plate D9BZ-7K201-A and grind the reverse gearshift relay lever as shown in Figure 9. For teardown and build-up procedures, refer to appropriate Shop Manual, Chassis Volume, Section 16.

PART NUMBER PART NAME CLASS

D9BZ-7K201-A Interlock Plate B

OTHER APPLICABLE ARTICLES: None WARRANTY STATUS: Reimbursable within the provisions of the Warranty and Policy Manual. OPERATION: SP 7001-A-83 TIME:

2.8 Hrs. - 4x2 4.3 Hrs. - 4x4 DLR. CODING: Basic Part No. 7K201 Code: 16



Shift Linkage: All Technical Service Bulletins M/T - Broken/Damaged Interlock Plates

Article No. 83-4-20

TRANSMISSION - MANUAL - SROD - INTERLOCK PLATE DAMAGED/BROKEN

LIGHT TRUCKS 1980-82 BRONCO & F-100/250

Damaged or broken interlock plates may be due to an interference condition between the reverse gearshift relay lever assembly and the gear selector interlock plate. The interference occurs while shifting into reverse gear.

Figure 9

Remove the reverse gearshift relay lever assembly and the gear selector interlock plate. Replace the gear selector interlock plate with a new plate D9BZ-7K201-A and grind the reverse gearshift relay lever as shown in Figure 9. For teardown and build-up procedures, refer to appropriate Shop Manual, Chassis Volume, Section 16.

PART NUMBER PART NAME CLASS

D9BZ-7K201-A Interlock Plate B

OTHER APPLICABLE ARTICLES: None WARRANTY STATUS: Reimbursable within the provisions of the Warranty and Policy Manual. OPERATION: SP 7001-A-83 TIME:

2.8 Hrs. - 4x2 4.3 Hrs. - 4x4 DLR. CODING: Basic Part No. 7K201 Code: 16

DRIVETRAIN LUBRICANTS

	MANUAL TRANSMISSIONS										M/T RELATED		
	4 Spd. T18	4 Spd. NPG 435	M40D TOD	4 Spd. T19	5 Spd. TMA	5 Spd. MMC FM145	5 Spd. MMC FM146	5 Spd. R1 Mazda	5 Spd. R2 Mazda	5 Spd. ZF S5-42	Speedometer Driven Gear	Shift Lever Lower Ball End - MMC	Shift Lever Seal/Cap 435, T18, T19
1980	1	1	1								2		2
1981	1	1	1								2		2
1982	1	1	1								2		2
1983	1	1	1	1	5	1					3	2	2
1984	1	1	1	1	5	1					3	2	2
1985	1	1	1	1	5	1					3	2	2
1986	1	1	1	1	5	1					3	2	2
1987	1	1	1	1	5	1				4	3	2	2
1988	1						1	4	4	4	3	2	2
1989							1	4	4	4	3	2	2

LEGEND

Service Part	Description	Specification
1: D8DZ-19C547-A	Standard Transmission Lubricant	ESP M2C83C
2: C1AZ-19590-BA	Long Life Lubricant (Molybdenum Disulfide)	ESA M1CA75B
3: D0AZ-19584-AA D7AZ-19584-AA	Multi-Purpose Grease	ESR M1C159A ESB M1C93A ESB M1C106B
4: XT-2-QDX	Mercon	Mercon, Dexron II ESP-M2C166-H (Type H) ESP-M2C138-CJ (Type A)

Service Part	Description	Specification
5: E5RY-19C547-A	Merkur Synthentic Gear Oil (Dana Axles)	ESD M2C175A
6: C6AZ-19580-E	Additive Friction Modifier	ESW M2C105A
7: C8AZ-19B546-A	Disc Brake Caliper Slide Grease	EST M2C118A
8: D7AZ-19590-A		ESA M1C172A
9: E8TZ-19590-A	Grease	ESA M1C198A
10: E1TZ-19590-A	Automatic Hublock Grease	ESL M1C193 A

DRIVETRAIN LUBRICANTS

	FRONT DRIVE AXLES				TRANSFER CASE					HUBLOCKS			
	Gear Lubricants	Friction Modifier	Upper/Lower Brake Caliper Rails	Wheel and Spindle Bearings, U-Joints and Wheel End Oil Seals	BW 13-45	BW 13-50	BW 13-56	NPG 208	Shift Lever Ball End	R & B II Manual Hublock	R & B II Auto. Hublock	F & B Manual Hublock	F & B Auto. Hublock
1980	6	7	8	9	4	4	4	4	2	2	2	2	11
1981	6	7	8	9	4	4	4	4	2	2	2	2	11
1982	6	7	8	9	4	4	4	4	2	2	2	2	11
1983	6	7	8	9	4	4	4	4	2	2	2	2	11
1984	6	7	8	9	4	4	4	4	2	2	2	2	11
1985	6	7	8	9	4	4	4	4	2	2	2	2	11
1986	6	7	8	9	4	4	4	4	2	2	2	2	11
1987	6	7	8	9	4	4	4	4	2	2	2	2	11
1988	6	7	8	9	4	4	4	4	2	2	2	2	11
1989	6	7	8	9	4	4	4	4	2	2	2	2	11

LEGEND

Service Part	Description	Specification
1: D8DZ-19C547-A	Standard Transmission Lubricant	ESP M2C83C
2: C1AZ-19590-BA	Long Life Lubricant (Molybdenum Disulfide)	ESA M1CA75B
3: D0AZ-19584-AA D7AZ-19584-AA	Multi-Purpose Grease	ESR M1C159A ESB M1C93A ESB M1C106B
4: XT-2-QDX	Mercon	Mercon, Dexron II ESP-M2C166-H (Type H) ESP-M2C138-CJ (Type A)

Service Part	Description	Specification
5: E5RY-19C547-A	Merkur Synthentic Gear Oil (Dana Axles)	ESD M2C175A
6: C6AZ-19580-E	Additive Friction Modifier	ESW M2C105A
7: C8AZ-19B546-A	Disc Brake Caliper Slide Grease	EST M2C118A
8: D7AZ-19590-A		ESA M1C172A
9: E8TZ-19590-A	Grease	ESA M1C198A
10: E1TZ-19590-A	Automatic Hublock Grease	ESL M1C193 A

Article No. 89-8-16

^ DRIVETRAIN - LUBRICATION USAGE

^ TRANSMISSION - MANUAL - LUBRICATION USAGE

LIGHT TRUCK: 1980-89 BRONCO, ECONOLINE, F-150, F-250, F-350 1983-89 RANGER 1984-89 BRONCO II 1986-89 AEROSTAR

ISSUE: A quick reference manual transmission fluid usage chart and a quick reference drivetrain lubrication usage chart for light trucks has been put together to assist technicians in the event service is required.

FIGURE 1

FIGURE 2

ACTION: Refer to the transmission fluid application chart in Figure 1 for the correct fluid usage. Refer to the drivetrain lubrication application chart in Figure 2 for the correct lubricant usage.

PART NUMBER PART NAME CLASS

D8DZ-19C547-A Standard Transmission BG

Lubricant - 5 gallons C1AZ-19590-BA

Long Life Lubricant B

(molybdenum disulfide) - 14.5 ounces

DOAZ-19584-AA Multi-Purpose Grease - 4 ounce B

tube

D7AZ-19584-AA Multi-Purpose Grease - 15 B

ounce aerosol can

XT-2-QDX Transmission Fluid (Mercon) - V

quart can (pkg. of 12)

C6AZ-19580-E Gear Oil (Dana axle) - 1 gallon AG

C8AZ-19B546-A Additive Friction Modifier - 4 AM

ounce bottle

D7AZ-19590-A Disc Brake Caliper Slide AM

Grease - 4 ounce tube

E8TZ-19590-A Grease - 14.5 ounces B

E1TZ-19590-A Automatic Hublock Grease - 5 B

ounce tube

E5RY-19C547-A Merkur Synthetic Manual B

Transmission Fluid

OTHER APPLICABLE ARTICLES: None

WARRANTY STATUS: INFORMATION ONLY

OASIS CODES: 5970

Fluid - Transfer Case: Capacity Specifications

TYPE MERCON(R) Automatic Transmission Fluid

CAPACITY, Refill: NP208 7.0 pt (US)

Warner 1345 6.5 pt (US)

Warner 1350 Ranger 3.0 pt (US)

Fluid - Transfer Case: Fluid Type Specifications

BL Self-adjusting Brake Lubricant

EC Ethylene Glycol Coolant

Mix 50/50 with water to at least -20°F (-29°C) protection

EP Extreme Pressure Gear Lubricant

Ford Part No. D8DZ-19C547-A

FA Automatic Transmission Fluid, Type F

GL-5 Gear Oil, API Service GL-5

HBH Hydraulic Brake Fluid, Extra

Heavy-Duty

HP Hypoid Gear Oil

Ford Part No. E0AZ-19580-A

HP* Hypoid Gear Oil for Limited-Slip

or Traction-Lok Differential

LM Lithium Grease, with Polyethylene

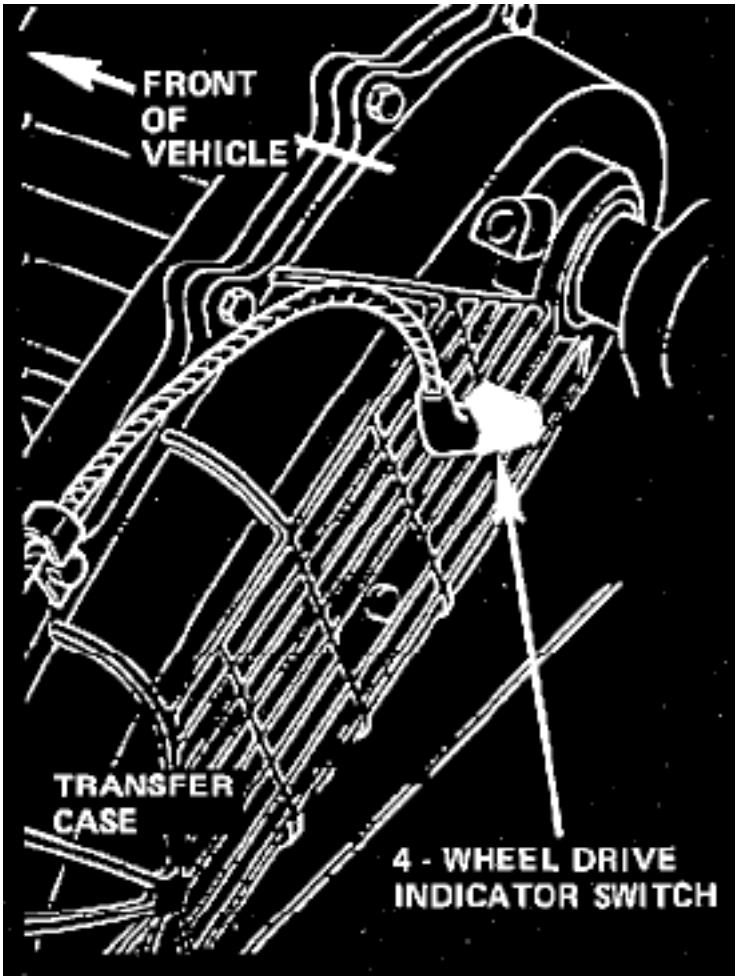
LS Steering Gear Lubricant

MA MERCONAutomatic Transmission

Fluid

MH Manifold Heat Valve Solvent

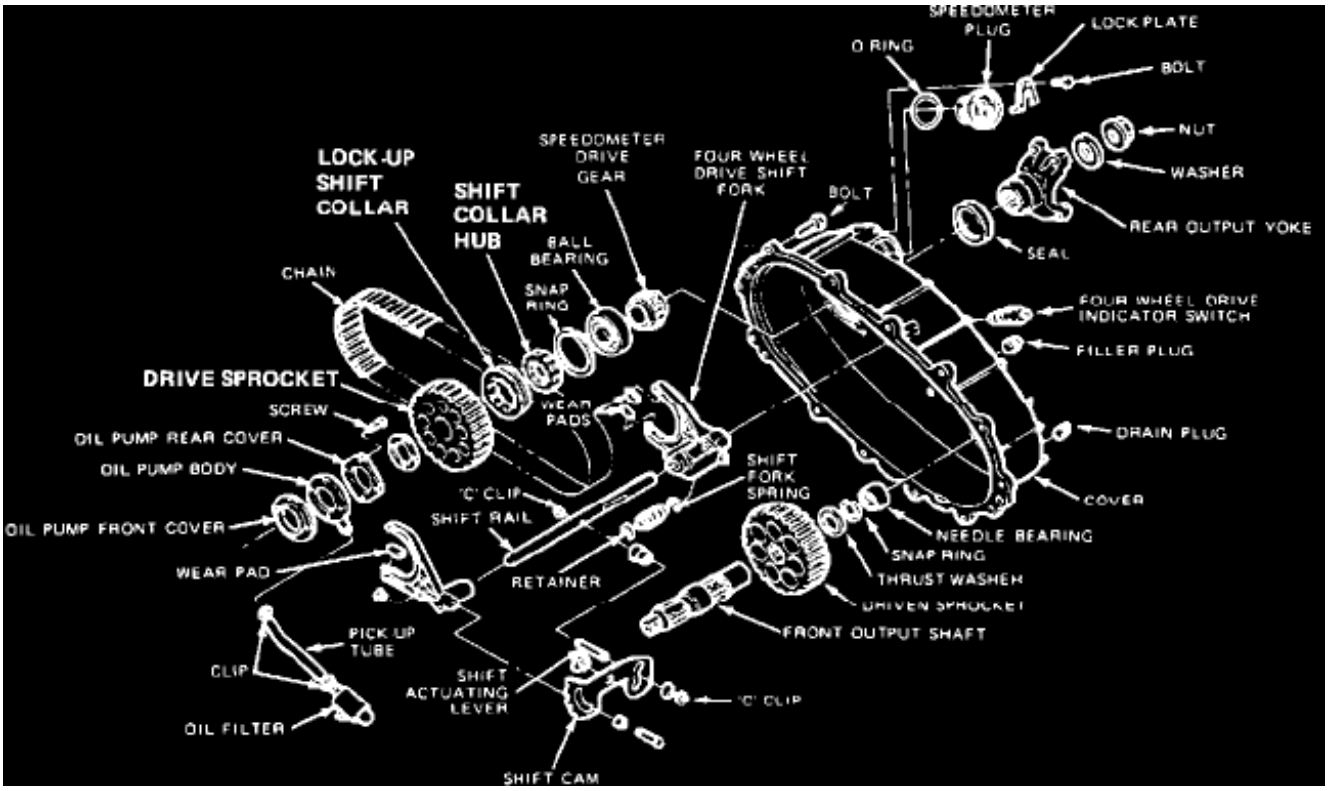
SG Motor Oil, API Service SG



Four Wheel Drive Indicator Lamp: Locations

Rear Of Transfer Case

On Transfer Case



Gear: Customer Interest Transfer Case - 4WD to 2WD Jump Out Condition

Article No. 85-15-14

TRANSFER CASE (BW 1345) 4W TO 2W DISENGAGEMENT

LIGHT TRUCK 1980-85 (Before 9/1/84) BRONCO, F150-350 (4x4)

Figure 13 - Transfer Case

F Series 4x4's and Broncos experiencing a 4W to 2W transfer case jump-out condition should be serviced by replacing the drive sprocket (see Figure 13) with an E2TZ-7177-C drive sprocket.(Refer to l985 Truck Shop Manual l6-86 ford disassembly/assembly instructions.) This new sprocket has a step lock cut into the spline teeth which will prevent future jump-out. Inspect the E0TZ-7106-A lock-up collar and E0TZ-7100-B shift collar hub and replace if the engaging face of the spline teeth is worn or damaged. PART NUMBER

PART NAME CLASS

E2TZ-7177-C Sprocket - Drive C

E0TZ-7106-A Collar - Lockup C

E0TZ-7100-B Hub - Collar RM

OTHER APPLICABLE ARTICLES: None WARRANTY STATUS: Reimbursable within the provisions of the Warranty and Policy Manual. OPERATION: SP7003B85 TIME:

3.8 Hrs. DLR. CODING: Basic Part No. T7177 - Code: 83

Gear: Customer Interest Transfer Case - NP208, Accelerated Wear

Article No. 83-3-24

TRANSFER CASE - NP208 - RANGE FORK AND NYLON ANNULUS HUB WEAR

LIGHT TRUCKS 1982-83 BRONCO, F150-250 (4x4)

New Process Gear Model 208 Transfer Cases on the above vehicles built after January 19, 1982 have a new range fork and annulus gear assembly design.

The annulus gear hub and web assembly (7B066) can be damaged when the transfer case is operated with low lube fluid levels or with a rough surface finish fork or thrust washer. This will result in transfer case shifting difficulties. The damaged nylon hub will appear to be melted or severely scored and must be replaced. The range fork (7289) and thrust washer (7D484) must also be replaced since surface finish damage or sharp edges created during the prior condition can cause accelerated wear of the new hub and web assembly and result in a repeat service. The transfer case should be refilled with 7 pints of new automatic transmission fluid lube (XT-2-QDX) and checked for any leaks. With the vehicle in a level position, the lube fluid must be up to fill plug opening.

PART NUMBER PART NAME CLASS

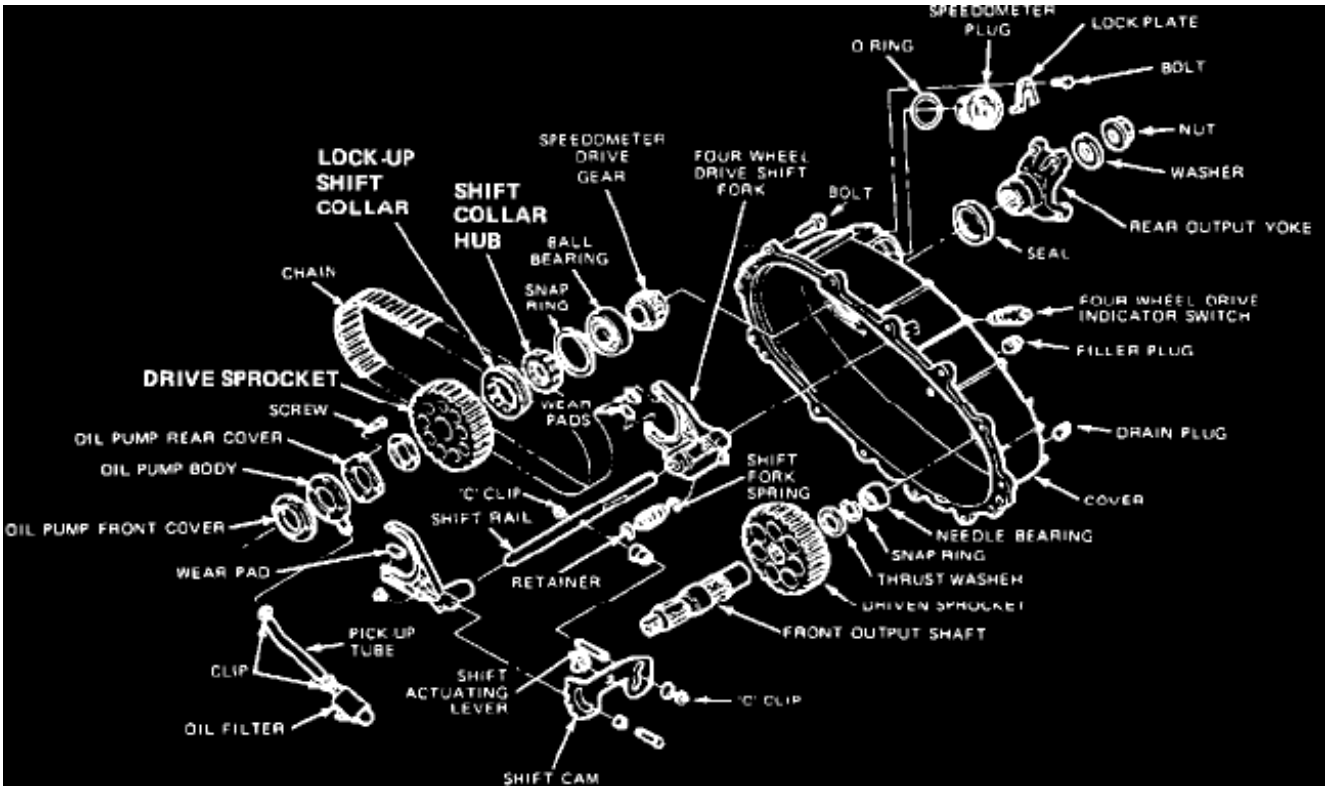
E2TZ-7B066-A Hub and Web B

E1TZ-7289-B Range Fork C

E1TZ-7D484-A Thrust Washer BM

XT-2-QDX Transmission Fluid-Dexron II V

OTHER APPLICABLE ARTICLES: None WARRANTY STATUS: Reimbursable within the provisions of the Warranty and Policy Manual. OPERATION/TIME: Refer to the Labor Time Standards Manual for applicable operation and time. DLR. CODING: Basic Part No. T7289 Code: 14



Gear: All Technical Service Bulletins Transfer Case - 4WD to 2WD Jump Out Condition

Article No. 85-15-14

TRANSFER CASE (BW 1345) 4W TO 2W DISENGAGEMENT

LIGHT TRUCK 1980-85 (Before 9/1/84) BRONCO, F150-350 (4x4)

Figure 13 - Transfer Case

F Series 4x4's and Broncos experiencing a 4W to 2W transfer case jump-out condition should be serviced by replacing the drive sprocket (see Figure 13) with an E2TZ-7177-C drive sprocket.(Refer to l985 Truck Shop Manual l6-86 ford disassembly/assembly instructions.) This new sprocket has a step lock cut into the spline teeth which will prevent future jump-out. Inspect the E0TZ-7106-A lock-up collar and E0TZ-7100-B shift collar hub and replace if the engaging face of the spline teeth is worn or damaged. PART NUMBER

PART NAME CLASS

E2TZ-7177-C Sprocket - Drive C

E0TZ-7106-A Collar - Lockup C

E0TZ-7100-B Hub - Collar RM

OTHER APPLICABLE ARTICLES: None WARRANTY STATUS: Reimbursable within the provisions of the Warranty and Policy Manual. OPERATION: SP7003B85 TIME:

3.8 Hrs. DLR. CODING: Basic Part No. T7177 - Code: 83

Article No. 83-3-24

TRANSFER CASE - NP208 - RANGE FORK AND NYLON ANNULUS HUB WEAR

LIGHT TRUCKS 1982-83 BRONCO, F150-250 (4x4)

New Process Gear Model 208 Transfer Cases on the above vehicles built after January 19, 1982 have a new range fork and annulus gear assembly design.

The annulus gear hub and web assembly (7B066) can be damaged when the transfer case is operated with low lube fluid levels or with a rough surface finish fork or thrust washer. This will result in transfer case shifting difficulties. The damaged nylon hub will appear to be melted or severely scored and must be replaced. The range fork (7289) and thrust washer (7D484) must also be replaced since surface finish damage or sharp edges created during the prior condition can cause accelerated wear of the new hub and web assembly and result in a repeat service. The transfer case should be refilled with 7 pints of new automatic transmission fluid lube (XT-2-QDX) and checked for any leaks. With the vehicle in a level position, the lube fluid must be up to fill plug opening.

PART NUMBER PART NAME CLASS

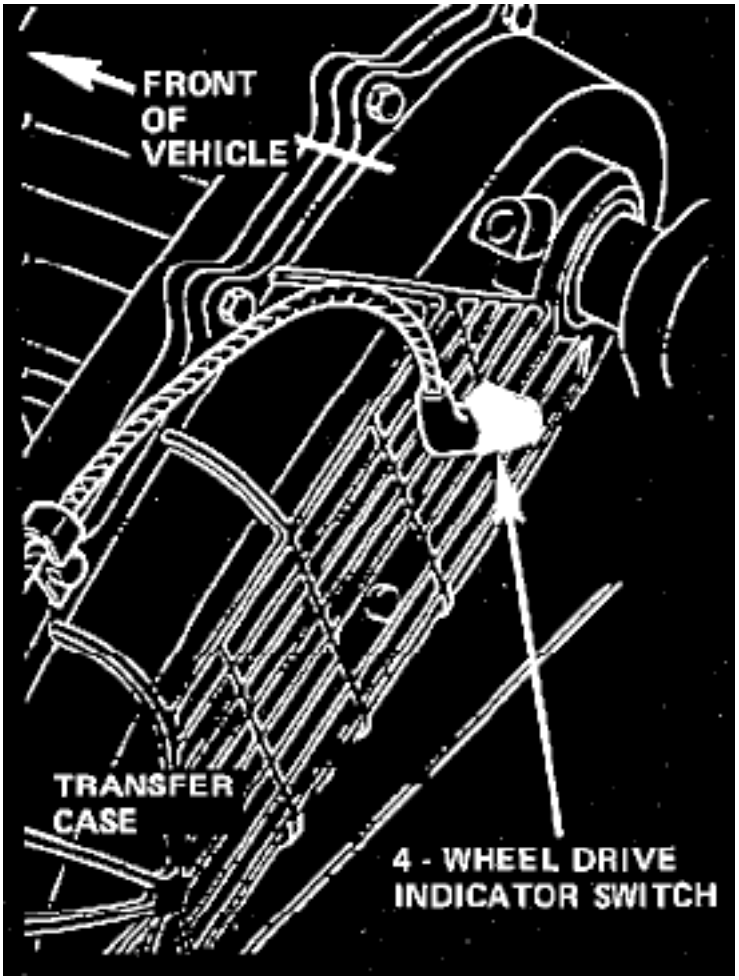
E2TZ-7B066-A Hub and Web B

E1TZ-7289-B Range Fork C

E1TZ-7D484-A Thrust Washer BM

XT-2-QDX Transmission Fluid-Dexron II V

OTHER APPLICABLE ARTICLES: None WARRANTY STATUS: Reimbursable within the provisions of the Warranty and Policy Manual. OPERATION/TIME: Refer to the Labor Time Standards Manual for applicable operation and time. DLR. CODING: Basic Part No. T7289 Code: 14



Four Wheel Drive Indicator Lamp: Locations

Rear Of Transfer Case

On Transfer Case

Main Shaft: Customer Interest Transfer Case - Ratcheting Noise

Article No. 83-21-14

TRANSFER CASE - NP208 - RATCHETING NOISE, INCOMPLETE DISENGAGEMENT - (4x4)

LIGHT TRUCKS 1980-84 F-150/250, BRONCO

Effective in production February 1, 1983, the New Process Gear 208 transfer case assembly incorporated a new mainshaft assembly featuring a positive stop to prevent 4-wheel drive disengagement. The overall width of the sliding clutch decreases from 1.262 to 1.080 inches to accomodate the positive stop.

Some transfer case assembled built after February 1, 1983 may have been assembled with the wide (1.262 inch) sliding clutch and with the new design mainshaft incorporating the "positive stop" design. This mismatching of parts results in either incomplete engagement or disengagement causing an interference or "ratcheting" condition. To eliminate objectionable "ratcheting" noise in the transfer case on any 1983 F-150/250 4x4, or Bronco vehicle built after February 1, 1983 or any previously serviced vehicles, the sliding clutch; mainshaft, sliding clutch, and modeshift spring service assembly kit, E3TZ-7061-L should be installed using all parts.

The part numbers listed below as "obsolete" are no longer released for service and should not be used due to potential of "mismatching" components. Each individual service kit is now replaced by one kit, Part No. E3TZ-7061-L, which includes a mainshaft, sliding mode clutch, and a modeshift spring.

PART NUMBER PART NAME CLASS

E3TZ-7061-L Mainshift Kit B

(shaft, sliding clutch, spring)

OBSOLETED PARTS

PART NUMBER

E0TZ-7100-D E3TZ-7100-G E3TZ-7100-H E1TZ-7061-B E1TZ-7061-D E3TZ-7061-J OTHER APPLICABLE ARTICLES: 82-18-10 WARRANTY STATUS: Reimbursable within the provisions of the Warranty and Policy Manual. OPERATION: M TIME:

"Actual Time" as defined in the Warranty and Policy Manual. DLR. CODING: Basic Part No. 7100 Code: 16

Main Shaft: All Technical Service Bulletins Transfer Case - Ratcheting Noise

Article No. 83-21-14

TRANSFER CASE - NP208 - RATCHETING NOISE, INCOMPLETE DISENGAGEMENT - (4x4)

LIGHT TRUCKS 1980-84 F-150/250, BRONCO

Effective in production February 1, 1983, the New Process Gear 208 transfer case assembly incorporated a new mainshaft assembly featuring a positive stop to prevent 4-wheel drive disengagement. The overall width of the sliding clutch decreases from 1.262 to 1.080 inches to accomodate the positive stop.

Some transfer case assembled built after February 1, 1983 may have been assembled with the wide (1.262 inch) sliding clutch and with the new design mainshaft incorporating the "positive stop" design. This mismatching of parts results in either incomplete engagement or disengagement causing an interference or "ratcheting" condition. To eliminate objectionable "ratcheting" noise in the transfer case on any 1983 F-150/250 4x4, or Bronco vehicle built after February 1, 1983 or any previously serviced vehicles, the sliding clutch; mainshaft, sliding clutch, and modeshift spring service assembly kit, E3TZ-7061-L should be installed using all parts.

The part numbers listed below as "obsolete" are no longer released for service and should not be used due to potential of "mismatching" components. Each individual service kit is now replaced by one kit, Part No. E3TZ-7061-L, which includes a mainshaft, sliding mode clutch, and a modeshift spring.

PART NUMBER PART NAME CLASS

E3TZ-7061-L Mainshift Kit B

(shaft, sliding clutch, spring)

OBSOLETED PARTS

PART NUMBER

E0TZ-7100-D E3TZ-7100-G E3TZ-7100-H E1TZ-7061-B E1TZ-7061-D E3TZ-7061-J OTHER APPLICABLE ARTICLES: 82-18-10 WARRANTY STATUS: Reimbursable within the provisions of the Warranty and Policy Manual. OPERATION: M TIME:

"Actual Time" as defined in the Warranty and Policy Manual. DLR. CODING: Basic Part No. 7100 Code: 16

Shift Fork: Customer Interest Transfer Case - NP208, Accelerated Wear

Article No. 83-3-24

TRANSFER CASE - NP208 - RANGE FORK AND NYLON ANNULUS HUB WEAR

LIGHT TRUCKS 1982-83 BRONCO, F150-250 (4x4)

New Process Gear Model 208 Transfer Cases on the above vehicles built after January 19, 1982 have a new range fork and annulus gear assembly design.

The annulus gear hub and web assembly (7B066) can be damaged when the transfer case is operated with low lube fluid levels or with a rough surface finish fork or thrust washer. This will result in transfer case shifting difficulties. The damaged nylon hub will appear to be melted or severely scored and must be replaced. The range fork (7289) and thrust washer (7D484) must also be replaced since surface finish damage or sharp edges created during the prior condition can cause accelerated wear of the new hub and web assembly and result in a repeat service. The transfer case should be refilled with 7 pints of new automatic transmission fluid lube (XT-2-QDX) and checked for any leaks. With the vehicle in a level position, the lube fluid must be up to fill plug opening.

PART NUMBER PART NAME CLASS

E2TZ-7B066-A Hub and Web B

E1TZ-7289-B Range Fork C

E1TZ-7D484-A Thrust Washer BM

XT-2-QDX Transmission Fluid-Dexron II V

OTHER APPLICABLE ARTICLES: None WARRANTY STATUS: Reimbursable within the provisions of the Warranty and Policy Manual. OPERATION/TIME: Refer to the Labor Time Standards Manual for applicable operation and time. DLR. CODING: Basic Part No. T7289 Code: 14

Shift Fork: All Technical Service Bulletins Transfer Case - NP208, Accelerated Wear

Article No. 83-3-24

TRANSFER CASE - NP208 - RANGE FORK AND NYLON ANNULUS HUB WEAR

LIGHT TRUCKS 1982-83 BRONCO, F150-250 (4x4)

New Process Gear Model 208 Transfer Cases on the above vehicles built after January 19, 1982 have a new range fork and annulus gear assembly design.

The annulus gear hub and web assembly (7B066) can be damaged when the transfer case is operated with low lube fluid levels or with a rough surface finish fork or thrust washer. This will result in transfer case shifting difficulties. The damaged nylon hub will appear to be melted or severely scored and must be replaced. The range fork (7289) and thrust washer (7D484) must also be replaced since surface finish damage or sharp edges created during the prior condition can cause accelerated wear of the new hub and web assembly and result in a repeat service. The transfer case should be refilled with 7 pints of new automatic transmission fluid lube (XT-2-QDX) and checked for any leaks. With the vehicle in a level position, the lube fluid must be up to fill plug opening.

PART NUMBER PART NAME CLASS

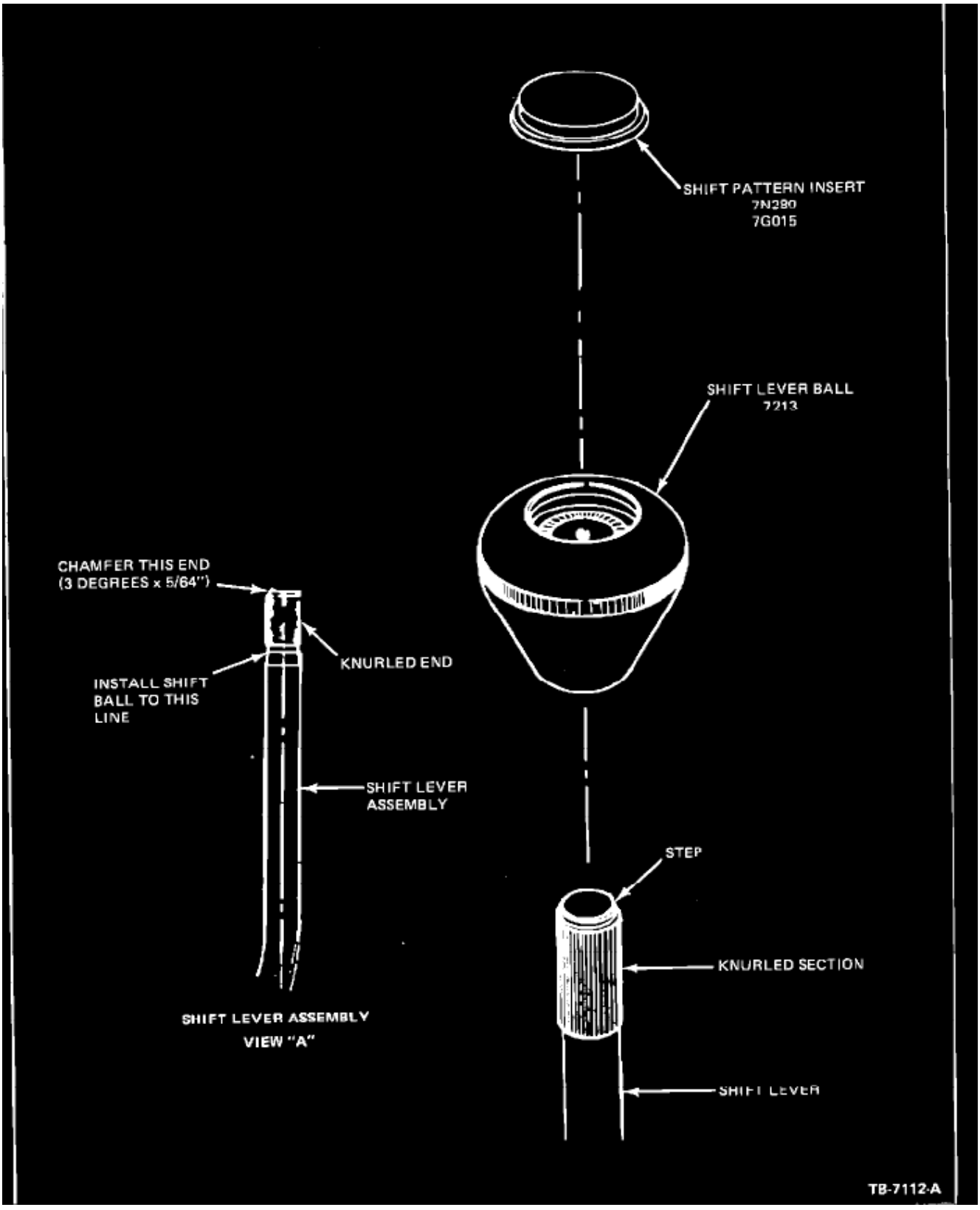
E2TZ-7B066-A Hub and Web B

E1TZ-7289-B Range Fork C

E1TZ-7D484-A Thrust Washer BM

XT-2-QDX Transmission Fluid-Dexron II V

OTHER APPLICABLE ARTICLES: None WARRANTY STATUS: Reimbursable within the provisions of the Warranty and Policy Manual. OPERATION/TIME: Refer to the Labor Time Standards Manual for applicable operation and time. DLR. CODING: Basic Part No. T7289 Code: 14


SHIFT PATTERN INSERT
7N280
7G015
SHIFT LEVER BALL
7213
CHAMFER THIS END
(3 DEGREES x 5/64")
KNURLED END
INSTALL SHIFT
BALL TO THIS
LINE
SHIFT LEVER
ASSEMBLY
SHIFT LEVER ASSEMBLY
VIEW "A"
STEP
KNURLED SECTION
SHIFT LEVER
TB-7112-A

Shifter Transfer Case: Customer Interest Shift Lever Knob - Pulls Off

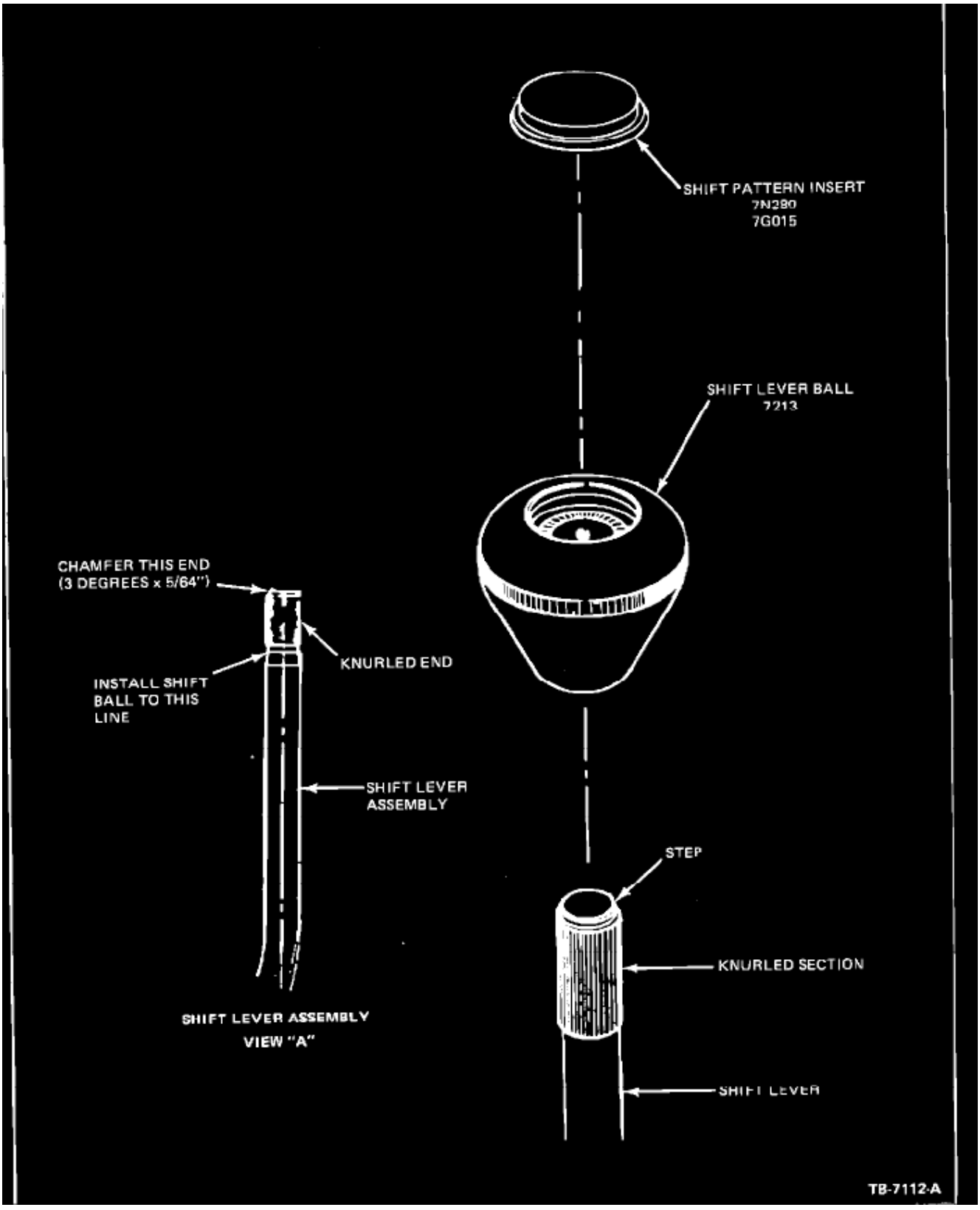
Article No. 83-19-17

TRANSMISSION/TRANSFER CASES - SHIFT KNOB - PULLS OFF FLOOR SHIFT LEVER

LIGHT TRUCKS 1982-84 ALL MODEL LIGHT TRUCKS

Figure 17

Shift lever knob "pull-off" may be due to knob damage during installation or lever knurling which is out of specification. The following procedure is to identify the cause and to service the condition (See Figure 17).


SHIFT PATTERN INSERT
7N280
7G015
SHIFT LEVER BALL
7213
CHAMFER THIS END
(3 DEGREES x 5/64")
KNURLED END
INSTALL SHIFT
BALL TO THIS
LINE
SHIFT LEVER
ASSEMBLY
STEP
KNURLED SECTION
SHIFT LEVER
SHIFT LEVER ASSEMBLY
VIEW "A"
TB-7112-A

1. Remove the shift ball from the shift lever assembly by removing the plastic shift pattern insert from the shift ball. Knock the ball off the lever with a block of wood and a hammer.

2. Inspect the lower cavity of the shift ball for broken or missing sections. Discard the ball if broken or missing pieces are noted. (Retain the plastic shift pattern insert).

3. On T-19 transmission inspect the knurled end of the

shift lever for undersize/oversize knurling by measuring the knurled diameter. The knurled diameter should be between 37/64" and 19/32" in diameter. 4.

If the diameter of the knurled section is less than the specified 37/64" minimum, then the shift lever should be replaced with a new one with good knurls. Also install a new shift ball with the new lever.

Figure 17

5. If the knurled diameter is within the specified diameter, replace the shift ball (7213) only, using the original shift lever and shift ball insert.

NOTE: Before installing the shift ball on the transmission shift lever and, using a machinist file or suitable hand grinder, file or grind a radius

or chamfer on the lever and the start of the knurls so as to remove the step from the top end of the lever and (Figure 17, View A) to aid installation.

6. Install the shift lever ball by warming the ball with a heat gun to 140~ - 180~ and tapping the ball onto the shift lever with a 7/16" socket and a rubber hammer or mallet. Tap the ball down to the beginn-

ing of the taper below the knurled section as shown in Figure 17, View A. Install the shift pattern insert. NOTE:

Tap the shift ball down on the shift lever to the beginning of the tapered shoulder (Figure 17, View A) below the knurled section of the shift lever assembly.

PART NUMBER PART NAME CLASS

E2TZ-7213-B Shift Ball B

E2TZ-7210-D Shift Lever T-18 R

E3TZ-7210-N Shift Lever T-19 C

E2TZ-7210-C Shift Lever NPG435 B

E2TZ-7210-L Shift Lever SROD R

E2TZ-7210-E Shift Lever M4OD R

E3TZ-7210-A Shift Lever TK 4 spd. C

E4TZ-7210-C Shift Lever TK 5 spd.* C

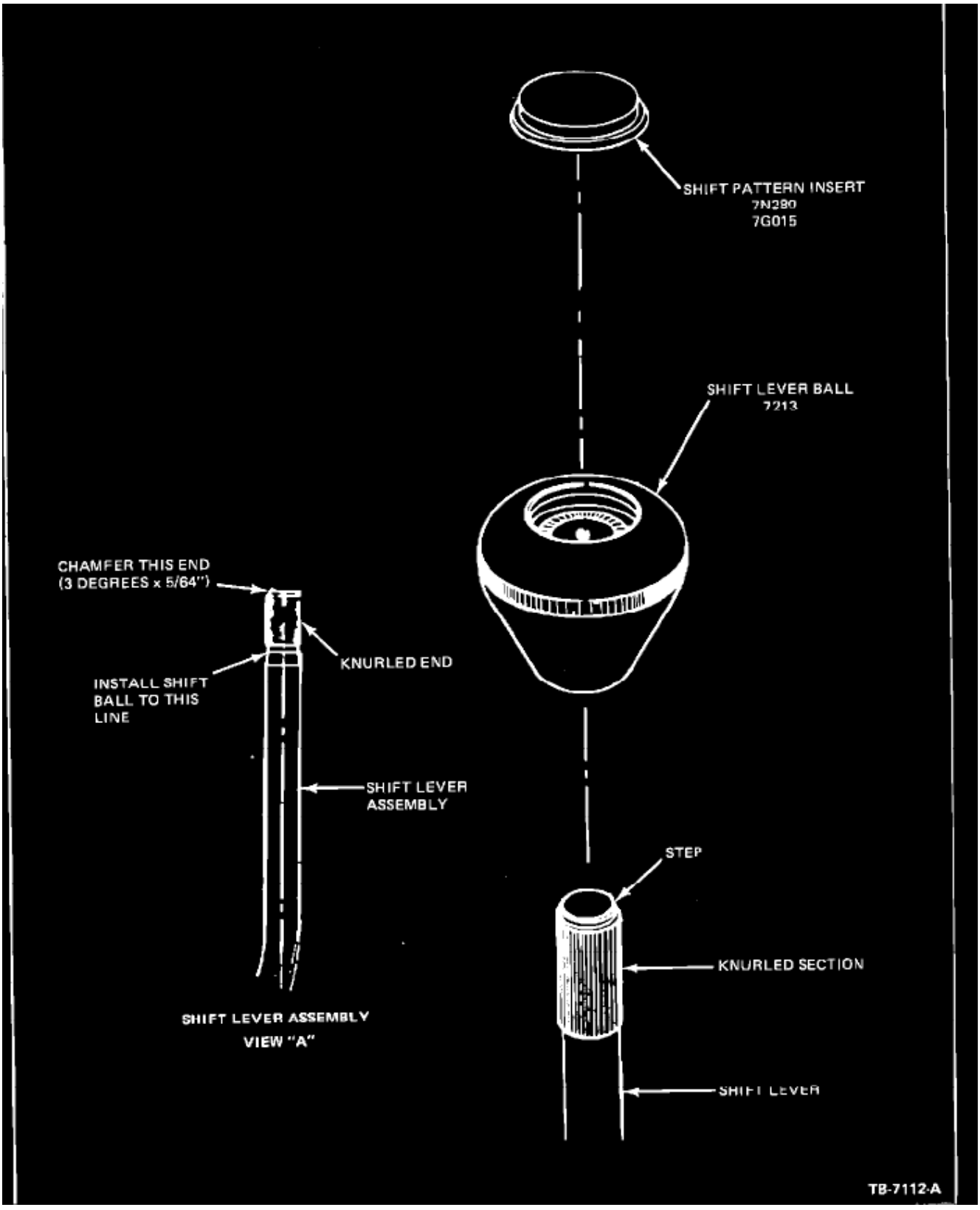
E2TZ-7210-B Shift Lever NP208/W1345 C

E3TZ-7210-K Shift Lever W-1350 C

* - Shift lever assembly includes shift tower.

OTHER APPLICABLE ARTICLES: 82-7-17 WARRANTY STATUS: Reimbursable within the provisions of the Warranty and Policy Manual. OPERATION/TIME: Refer to the Labor Time Standards Manual for applicable operation and time. DLR. CODING: Basic Part No. 7213 or 7210 Code:

01 or 16 as applicable.


SHIFT PATTERN INSERT
7N280
7G015
SHIFT LEVER BALL
7213
CHAMFER THIS END
(3 DEGREES x 5/64")
KNURLED END
INSTALL SHIFT
BALL TO THIS
LINE
SHIFT LEVER
ASSEMBLY
STEP
KNURLED SECTION
SHIFT LEVER
SHIFT LEVER ASSEMBLY
VIEW "A"
TB-7112-A

Shifter Transfer Case: All Technical Service Bulletins Shift Lever Knob - Pulls Off

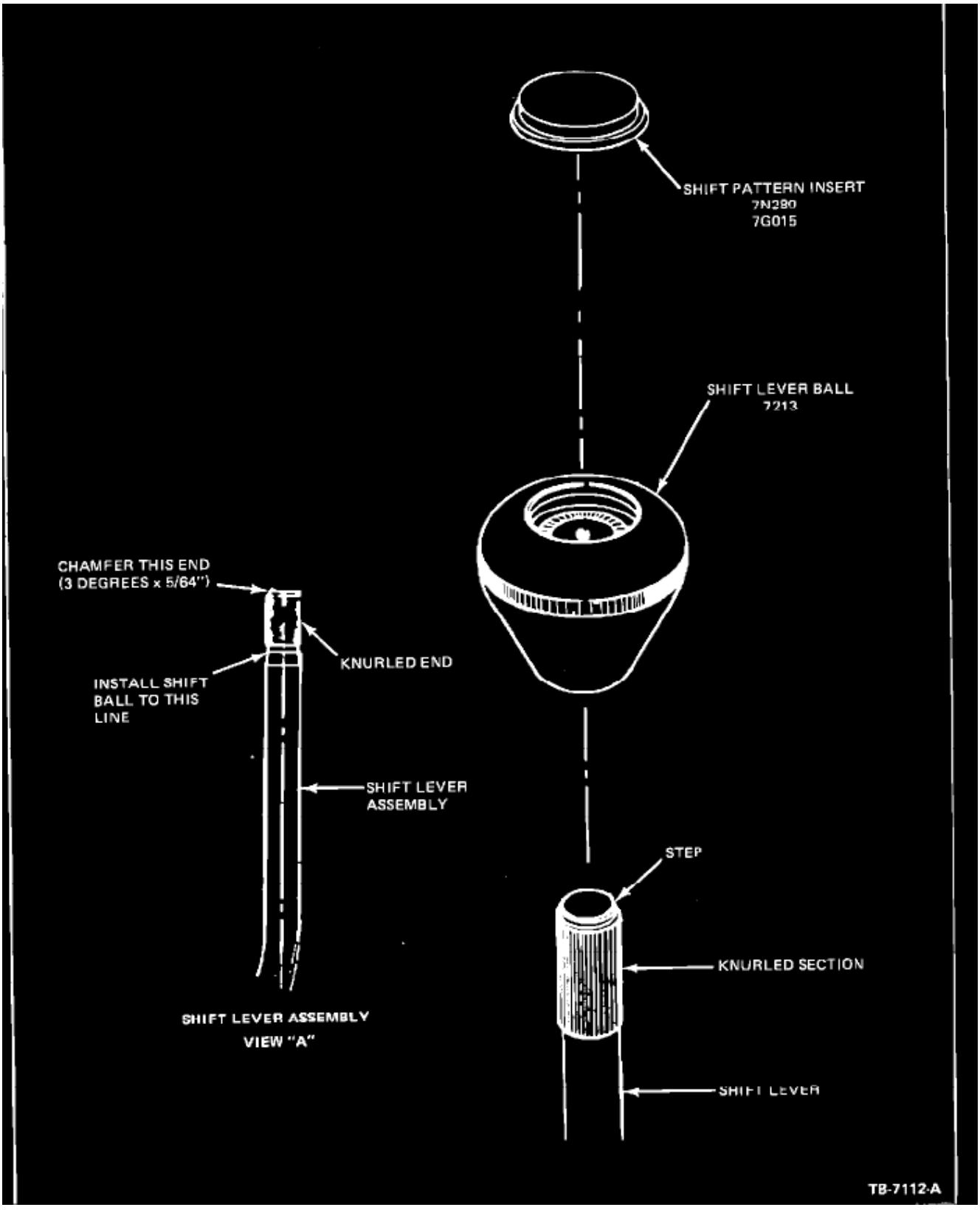
Article No. 83-19-17

TRANSMISSION/TRANSFER CASES - SHIFT KNOB - PULLS OFF FLOOR SHIFT LEVER

LIGHT TRUCKS 1982-84 ALL MODEL LIGHT TRUCKS

Figure 17

Shift lever knob "pull-off" may be due to knob damage during installation or lever knurling which is out of specification. The following procedure is to identify the cause and to service the condition (See Figure 17).


SHIFT PATTERN INSERT
7N280
7G015
SHIFT LEVER BALL
7213
CHAMFER THIS END
(3 DEGREES x 5/64")
KNURLED END
INSTALL SHIFT
BALL TO THIS
LINE
SHIFT LEVER
ASSEMBLY
STEP
KNURLED SECTION
SHIFT LEVER
SHIFT LEVER ASSEMBLY
VIEW "A"
TB-7112-A

1. Remove the shift ball from the shift lever assembly by removing the plastic shift pattern insert from the shift ball. Knock the ball off the lever with a block of wood and a hammer.

2. Inspect the lower cavity of the shift ball for broken or missing sections. Discard the ball if broken or missing pieces are noted. (Retain the plastic shift pattern insert).

3. On T-19 transmission inspect the knurled end of the

shift lever for undersize/oversize knurling by measuring the knurled diameter. The knurled diameter should be between 37/64" and 19/32" in diameter. 4.

If the diameter of the knurled section is less than the specified 37/64" minimum, then the shift lever should be replaced with a new one with good knurls. Also install a new shift ball with the new lever.

Figure 17

5. If the knurled diameter is within the specified diameter, replace the shift ball (7213) only, using the original shift lever and shift ball insert.

NOTE: Before installing the shift ball on the transmission shift lever and, using a machinist file or suitable hand grinder, file or grind a radius

or chamfer on the lever and the start of the knurls so as to remove the step from the top end of the lever and (Figure 17, View A) to aid installation.

6. Install the shift lever ball by warming the ball with a heat gun to 140~ - 180~ and tapping the ball onto the shift lever with a 7/16" socket and a rubber hammer or mallet. Tap the ball down to the beginn-

ing of the taper below the knurled section as shown in Figure 17, View A. Install the shift pattern insert. NOTE:

Tap the shift ball down on the shift lever to the beginning of the tapered shoulder (Figure 17, View A) below the knurled section of the shift lever assembly.

PART NUMBER PART NAME CLASS

E2TZ-7213-B Shift Ball B

E2TZ-7210-D Shift Lever T-18 R

E3TZ-7210-N Shift Lever T-19 C

E2TZ-7210-C Shift Lever NPG435 B

E2TZ-7210-L Shift Lever SROD R

E2TZ-7210-E Shift Lever M4OD R

E3TZ-7210-A Shift Lever TK 4 spd. C

E4TZ-7210-C Shift Lever TK 5 spd.* C

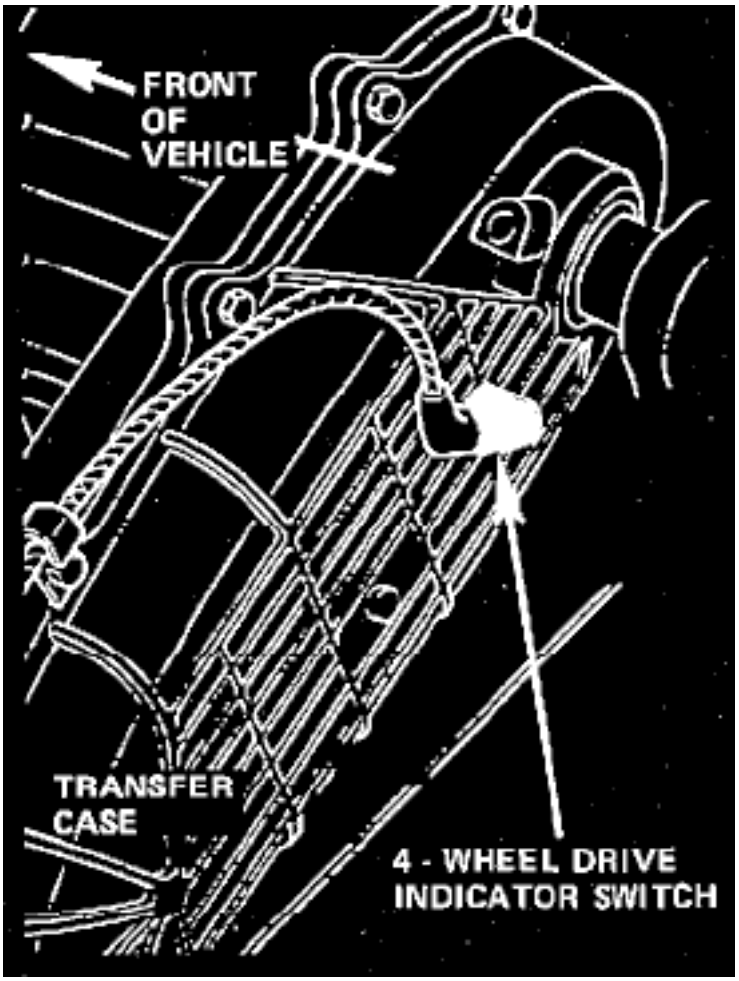
E2TZ-7210-B Shift Lever NP208/W1345 C

E3TZ-7210-K Shift Lever W-1350 C

* - Shift lever assembly includes shift tower.

OTHER APPLICABLE ARTICLES: 82-7-17 WARRANTY STATUS: Reimbursable within the provisions of the Warranty and Policy Manual. OPERATION/TIME: Refer to the Labor Time Standards Manual for applicable operation and time. DLR. CODING: Basic Part No. 7213 or 7210 Code:

01 or 16 as applicable.



Four Wheel Drive Indicator Lamp: Locations

Rear Of Transfer Case

On Transfer Case

Brake Bleeding: Service and Repair

Bleed primary and secondary hydraulic brake systems separately, bleeding longest line first on each system. Do not allow reservoir to run dry during bleeding operation. Never reuse fluid that has been drained from hydraulic system.

1. Loosen master cylinder to hydraulic line nuts and wrap shop cloths around tubing below fitting to absorb escaping brake fluid.

2. Depress brake pedal slowly by hand to floor of cab, forcing air trapped in master cylinder out at fitting.

3. Hold pedal down and tighten fittings, then release brake pedal. Releasing brake pedal before fittings are tightened will allow air to enter the master cylinder.

4. Repeat steps 1 through 3 until air ceases to escape at fittings and brake pedal is firm.

5. Bleed rear brakes as follows:

a. Pump pedal several times, then hold pedal down firmly. b. With pedal firmly depressed, open bleeder screw on one rear brake until pedal fades to floor, then close bleeder valve. c. Repeat procedure until a continuous flow of brake fluid is released from bleeder valve. d. Repeat steps 5a through 5c on other rear brake.

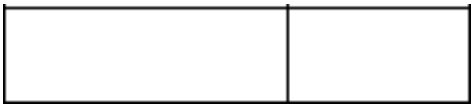
6. Bleed front brakes using same procedure as for rear brakes.

7. Fill master cylinder reservoirs to {1/4} inch from top of reservoirs.

8. Centralize the pressure differential control valve, if applicable, as follows:

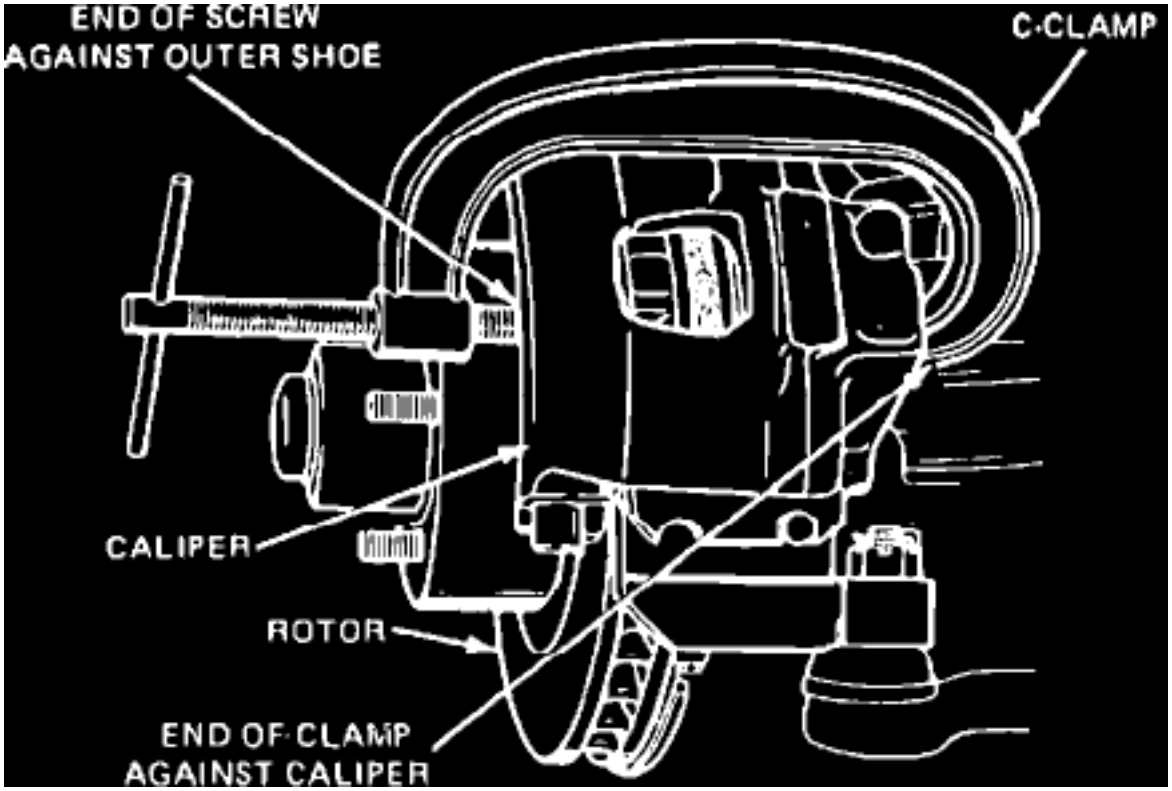
a. Turn ignition switch to ``ACC'' or ``On'' position. b. Push brake pedal down, allowing piston to center itself, turning off warning light. c. Turn ignition switch to ``OFF'' position.

9. Check brake operation and ensure pedal is firm, then road test vehicle.



Brake Caliper: Specifications

Bore Diameter 2.875 in



Brake Caliper: Service and Repair Caliper Removal

Fig. 1 Bottoming caliper piston in cylinder bore

1. Remove a portion of brake fluid from master cylinder disc brake reservoir.

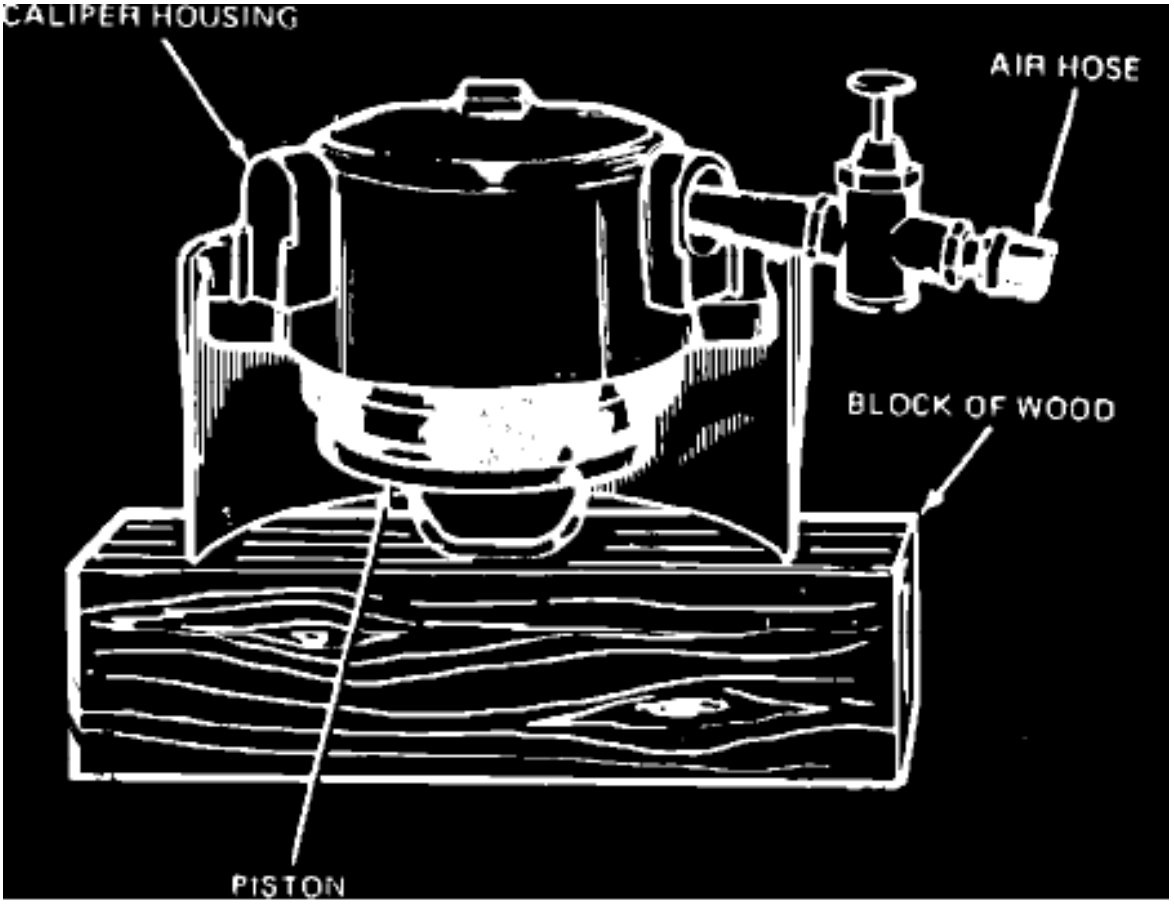
2. Raise and support vehicle and remove wheel and tire assembly.

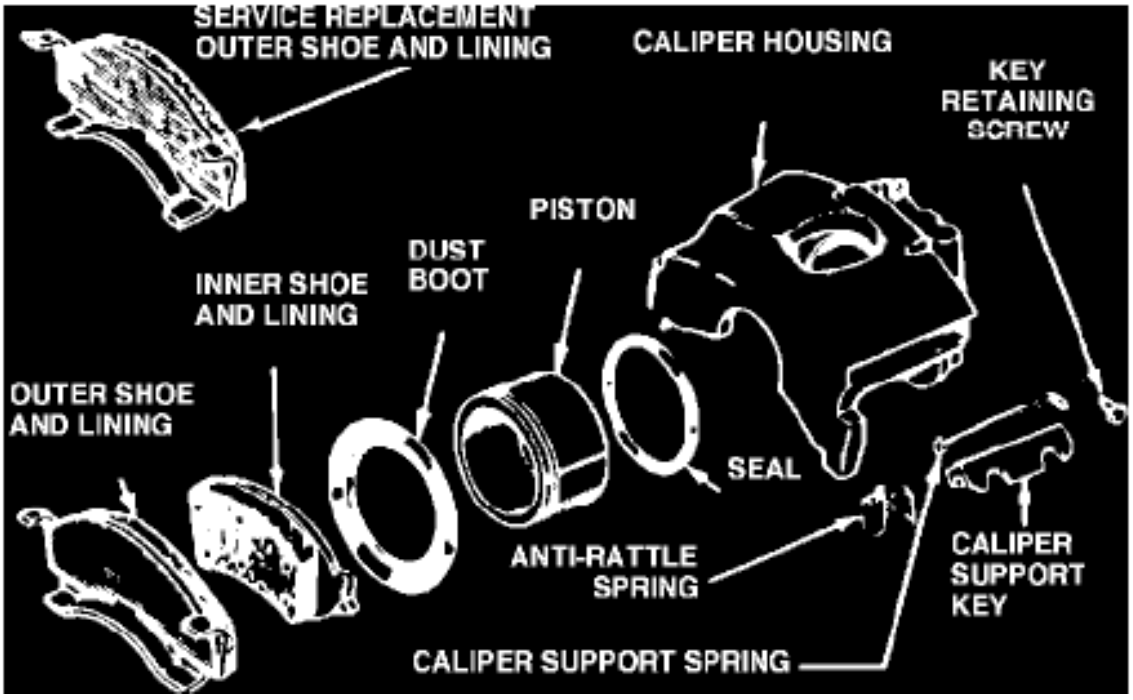
3. Install eight inch C-clamp on caliper, Fig. 1, and tighten clamp to bottom piston in cylinder bore, then remove clamp. Do not use screwdriver or other edged tool to pry piston from rotor.

4. Remove key retaining screw, then using hammer and drift, drive out caliper support key and spring.

5. Remove caliper by pushing it downward against spindle assembly and rotating upper end upward and out of spindle assembly.

6. Disconnect hydraulic line from caliper.


CALIPER HOUSING
AIR HOSE
BLOCK OF WOOD
PISTON


SERVICE REPLACEMENT OUTER SHOE AND LINING
CALIPER HOUSING
KEY RETAINING SCREW
PISTON
DUST BOOT
INNER SHOE AND LINING
OUTER SHOE AND LINING
SEAL
ANTI-RATTLE SPRING
CALIPER SUPPORT KEY
CALIPER SUPPORT SPRING

Brake Caliper: Service and Repair Disassembling Caliper

Fig. 2 Removing caliper piston

Fig. 3 Exploded view of disc brake caliper assembly

1. Remove plug from caliper inlet port and drain fluid from caliper housing.

2. Position caliper on block of wood, Fig. 2.

3. Slowly and carefully apply low pressure air to caliper inlet port until piston pops out.

4. If piston is jammed or cocked and will not pop out, release air pressure and tap sharply on end of piston with soft hammer or plastic or rubber mallet to straighten piston, then apply air pressure again to remove piston.

5. Remove boot from piston and seal from caliper cylinder bore, Fig. 3.

Brake Caliper: Service and Repair Assembling Caliper

1. Lubricate piston seal with clean brake fluid and position seal in groove in cylinder bore.

2. Coat outside of piston and both beads of dust boot with clean brake fluid, then insert piston through dust boot until boot is around closed end of piston.

3. Hold piston and dust boot directly above caliper cylinder bore and use fingers to work bead of dust boot into groove near top of cylinder bore.

4. One bead is seated in groove, press straight down on piston until piston bottoms in bore. Ensure piston is not cocked in bore.

Brake Caliper: Service and Repair Caliper Installation

1. Position caliper on spindle assembly by pivoting caliper around support upper mounting surface, being careful not to tear or cut boot as boot slips over inner shoe.

2. Using brake adjusting tool or screwdriver, hold upper machined surface of caliper against surface of support assembly and install new caliper support spring and new caliper support key.

3. Using suitable mallet, drive key and spring assembly into position, then install key retaining screw and torque to 14---20 ft. lbs.

4. Connect hydraulic line to caliper.

5. Install wheel and tire assembly and lower vehicle to ground, then fill master cylinder as necessary with suitable brake fluid.

6. Firmly depress brake pedal several times to seat linings on rotor.

7. Perform brake bleeding procedures.

Brake Pad: Customer Interest Front Disc Brakes - Squealing Noise

Article No. 86-8-13

BRAKES - FRONT DISC - SQUEAL

LIGHT TRUCK 1980-86 E100/350, F100/350, BRONCO

If the subject vehicles are experiencing a brake squeal concern, they should be serviced by installing insulator pads. Information in TSB 85-3-10 should not be used, this new service action supersedes the previous article with updated information.

The following procedures and precautions should be observed when servicing front brake squeal concerns.

^ Remove the caliper and clean the sliding surfaces with a wire brush. Apply a light coating of ESAM1C172-A(D7AZ-19590-A) lubricant to both surfaces. Be careful not to get lube on rotors or linings. Wipe any excess lube off after assembly. Visually inspect rotors for any obvious damage or scoring.

^ Check the front wheel bearing end play adjustment. Adjust the front wheel bearings using the procedures included in the Light Truck Shop Manual, Sections 11-10 and 11-12.

NOTE: The disc brake caliper and pads must be removed from the spindle prior to adjusting the front wheel bearings.

^ Clean lining and rotor surfaces. Remove any uneven glaze buildup on lining and rotor braking surfaces by sanding with medium to fine sandpaper or emery cloth. Uniform rotor sanding can be accomplished by holding the paper against the rotor braking surface while manually turning the rotor.

^ Remove any loose insulator material from the pad backing plates with sandpaper or an appropriate solvent.

This procedure applies only to the following models: 1980-86 E100/150, F100/150, Bronco, F250 4x2 under 6900 lbs. GVW (single piston calipers).

^ Install the service insulator (E1TZ-2B321-A) to the backing plate of the OUTBOARD pad and lining assembly (both L.H. and R.H. brake). Bond the insulator to the back side of the brake pad assembly with ESA-M1C140-A1 (D7AZ-19554-C) adhesive. Apply adhesive to the light color side of each insulator. Assure that insulator is centered on backing plate and that directions for applying adhesive are followed.

This procedure is for 1980-86 F250 4x2 over 6900 lbs. GVW, F250 4x4, F350, E250/350 (dual piston calipers).

^ Install the service insulator (E1TZ-2B321-B) to the back side of the INBOARD pad and lining assembly (both L.H. and R.H. brake). Bond the insulator to the backing plate and lining assembly using the previously listed procedure.

^ Install the service shim (E6TZ-2B321-A) to the back side of the outboard pad and lining assembly (both L.H. and R.H. brake) by clipping the shim over the straight edge of the backing plate. Be sure the shim is fully seated and centered on the straight edge of the backing plate.

NOTE: For dual piston caliper application only.

^ Reinstall caliper to the spindle assembly.

NOTE: DO NOT replace linings unless required for wear or additional concerns (Shop Manual, Section 12-24).

PART NUMBER PART NAME CLASS

E1TZ-2B321-A Insulator BM

E1TZ-2B321-B Insulator BM

E6TZ-2B321-A Shim B

D7AZ-19590-A Lubricant A

D7AZ-19554-C Adhesive AM

OTHER APPLICABLE ARTICLES: Supersedes 85-3-10 WARRANTY STATUS: Reimbursable within the provisions of the Warranty and Policy Manual. OPERATION: SP2321A86A - 1980-85 TIME:

1.1 Hrs.

OPERATION: SP2321A86B - 1986 TIME:

1.0 Hr. DLR. CODING: Basic Part No. 2001 - Code: 56

Brake Pad: Customer Interest Brakes (Rear) - Accelerated Wear

Articles No. 84-16-28

BRAKE, REAR - ACCELERATED WEAR - VEHICLES WITH 11" DIAMETER REAR BRAKES

LIGHT TRUCKS 1975-84 E & F-100/150 & BRONCO

This article supersedes TSB article 83-25-18, dated December 13, 1983, to include all 1975-84 E & F-100/150 & Bronco vehicles that have 11" diameter rear brakes.

Some E and F-100/150 and Bronco vehicles subjected to extreme duty cycles in urban delivery/service operations may experience accelerated rear brake wear. A service kit(E0UZ-2C178-A) has been released for these vehicles and should be installed in its entirety if the vehicle exhibits any of the following conditions:

^ Side to side imbalance in rear braking effectiveness.

^ Side to side imbalance in rear brake lining wear.

^ Excessive heat ("blued" shoes and/or drums).

The service kit consists of replacement front and rear brake linings, rear wheel cylinders and a proportioning valve. These parts must be installed per the appropriate shop manual installation procedure.

NOTE: If a misalignment between the drum braking surface and the shoe ledge guides of the brake backing plate is suspected, refer to TSB 82-24 for the appropriate service procedures before installing the service kit (E0UZ-2C178-A).

PART NUMBER PART NAME CLASS

E0UZ-2C178-A Brake Service Kit C

Front/Rear Services

OTHER APPLICABLE ARTICLES: 82-24-17 ARTICLE SUPERSEDED: 83-25-18 WARRANTY STATUS: Reimbursable within the provisions of the Warranty and Policy Manual. OPERATION: SP2178A83 TIME:

2.3 Hrs. DLR. CODING: Basic Part No. 2200 Code: 30

Brake Pad: All Technical Service Bulletins Front Disc Brakes - Squealing Noise

Article No. 86-8-13

BRAKES - FRONT DISC - SQUEAL

LIGHT TRUCK 1980-86 E100/350, F100/350, BRONCO

If the subject vehicles are experiencing a brake squeal concern, they should be serviced by installing insulator pads. Information in TSB 85-3-10 should not be used, this new service action supersedes the previous article with updated information.

The following procedures and precautions should be observed when servicing front brake squeal concerns.

^ Remove the caliper and clean the sliding surfaces with a wire brush. Apply a light coating of ESAM1C172-A(D7AZ-19590-A) lubricant to both surfaces. Be careful not to get lube on rotors or linings. Wipe any excess lube off after assembly. Visually inspect rotors for any obvious damage or scoring.

^ Check the front wheel bearing end play adjustment. Adjust the front wheel bearings using the procedures included in the Light Truck Shop Manual, Sections 11-10 and 11-12.

NOTE: The disc brake caliper and pads must be removed from the spindle prior to adjusting the front wheel bearings.

^ Clean lining and rotor surfaces. Remove any uneven glaze buildup on lining and rotor braking surfaces by sanding with medium to fine sandpaper or emery cloth. Uniform rotor sanding can be accomplished by holding the paper against the rotor braking surface while manually turning the rotor.

^ Remove any loose insulator material from the pad backing plates with sandpaper or an appropriate solvent.

This procedure applies only to the following models: 1980-86 E100/150, F100/150, Bronco, F250 4x2 under 6900 lbs. GVW (single piston calipers).

^ Install the service insulator (E1TZ-2B321-A) to the backing plate of the OUTBOARD pad and lining assembly (both L.H. and R.H. brake). Bond the insulator to the back side of the brake pad assembly with ESA-M1C140-A1 (D7AZ-19554-C) adhesive. Apply adhesive to the light color side of each insulator. Assure that insulator is centered on backing plate and that directions for applying adhesive are followed.

This procedure is for 1980-86 F250 4x2 over 6900 lbs. GVW, F250 4x4, F350, E250/350 (dual piston calipers).

^ Install the service insulator (E1TZ-2B321-B) to the back side of the INBOARD pad and lining assembly (both L.H. and R.H. brake). Bond the insulator to the backing plate and lining assembly using the previously listed procedure.

^ Install the service shim (E6TZ-2B321-A) to the back side of the outboard pad and lining assembly (both L.H. and R.H. brake) by clipping the shim over the straight edge of the backing plate. Be sure the shim is fully seated and centered on the straight edge of the backing plate.

NOTE: For dual piston caliper application only.

^ Reinstall caliper to the spindle assembly.

NOTE: DO NOT replace linings unless required for wear or additional concerns (Shop Manual, Section 12-24).

PART NUMBER PART NAME CLASS

E1TZ-2B321-A Insulator BM

E1TZ-2B321-B Insulator BM

E6TZ-2B321-A Shim B

D7AZ-19590-A Lubricant A

D7AZ-19554-C Adhesive AM

OTHER APPLICABLE ARTICLES: Supersedes 85-3-10 WARRANTY STATUS: Reimbursable within the provisions of the Warranty and Policy Manual. OPERATION: SP2321A86A - 1980-85 TIME:

1.1 Hrs.

OPERATION: SP2321A86B - 1986 TIME:

1.0 Hr. DLR. CODING: Basic Part No. 2001 - Code: 56

Ford Bronco Workshop Manual (V8-351 5.8L VIN G 2-bbl (1982))
Ford Workshop Manuals > Brakes and Traction Control > Disc Brake System > Brake Pad > Component Information > Technical Service Bulletins > All Technical Service Bulletins for Brake Pad: > 841628 > Jul > 84 > Brakes (Rear) - Accelerated Wear

Brake Pad: All Technical Service Bulletins Brakes (Rear) - Accelerated Wear

Articles No. 84-16-28

BRAKE, REAR - ACCELERATED WEAR - VEHICLES WITH 11" DIAMETER REAR BRAKES

LIGHT TRUCKS 1975-84 E & F-100/150 & BRONCO

This article supersedes TSB article 83-25-18, dated December 13, 1983, to include all 1975-84 E & F-100/150 & Bronco vehicles that have 11" diameter rear brakes.

Some E and F-100/150 and Bronco vehicles subjected to extreme duty cycles in urban delivery/service operations may experience accelerated rear brake wear. A service kit(E0UZ-2C178-A) has been released for these vehicles and should be installed in its entirety if the vehicle exhibits any of the following conditions:

^ Side to side imbalance in rear braking effectiveness.

^ Side to side imbalance in rear brake lining wear.

^ Excessive heat ("blued" shoes and/or drums).

The service kit consists of replacement front and rear brake linings, rear wheel cylinders and a proportioning valve. These parts must be installed per the appropriate shop manual installation procedure.

NOTE: If a misalignment between the drum braking surface and the shoe ledge guides of the brake backing plate is suspected, refer to TSB 82-24 for the appropriate service procedures before installing the service kit (E0UZ-2C178-A).

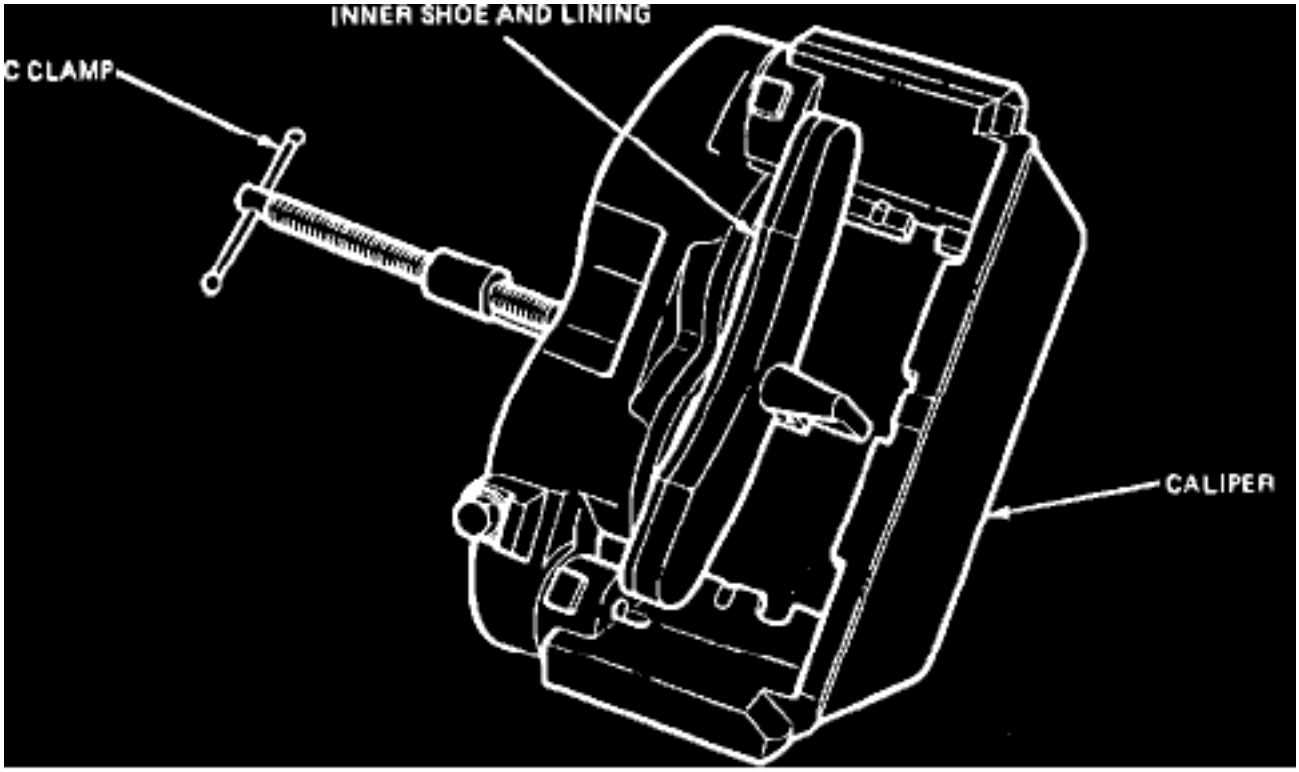
PART NUMBER PART NAME CLASS

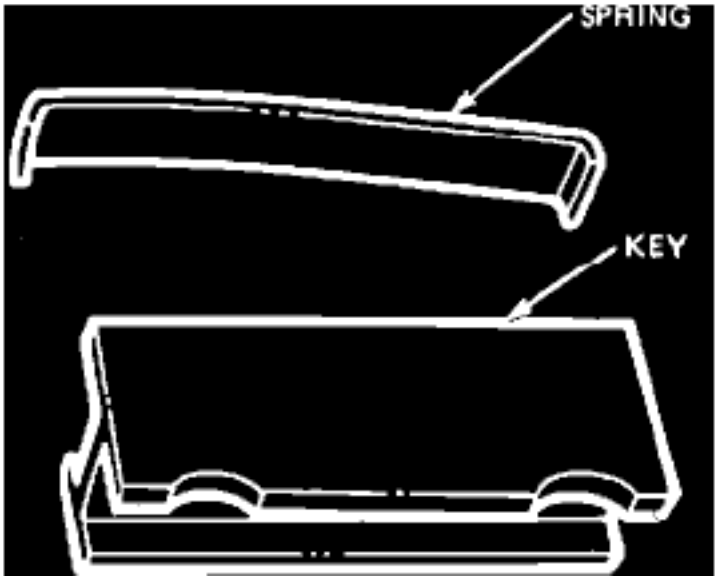
E0UZ-2C178-A Brake Service Kit C

Front/Rear Services

OTHER APPLICABLE ARTICLES: 82-24-17 ARTICLE SUPERSEDED: 83-25-18 WARRANTY STATUS: Reimbursable within the provisions of the Warranty and Policy Manual. OPERATION: SP2178A83 TIME:

2.3 Hrs. DLR. CODING: Basic Part No. 2200 Code: 30





Brake Pad: Service and Repair

REMOVAL

1. To avoid fluid overflow when pistons are pushed into caliper, remove some brake fluid from master cylinder.

2. Raise vehicle and remove wheel assembly.

3. Remove key retaining screw then, using a brass drift and hammer, drive out the key and spring.

4. Remove caliper and its support by rotating the key and spring end out and away from the rotor. Slide opposite end of caliper clear of the slide in the support and off the rotor. Place caliper on tie rod or axle. Do not allow the brake hose to support weight of caliper, as this can damage the hose.

5. Remove caliper brake shoe anti-rattle spring and inner and outer shoe and lining assemblies.

6. Clean and inspect caliper assembly. Thoroughly clean areas of caliper and support that contact during the sliding action of the caliper.

Fig. 3 Bottoming caliper pistons

Fig. 4 Caliper spring & key

INSTALLATION

1. Place used inner lining and shoe assembly over the pistons, then place a C-clamp on the caliper housing midway between the two pistons over the lining and shoe assembly, Fig. 3. Tighten the clamp until pistons are bottomed in caliper, then remove C-clamp and lining and shoe assembly.

2. Install the new inner and outer shoe and lining assemblies, and the anti-rattle spring.

3. Position caliper rail into the slide on the support and rotate the caliper onto rotor.

4. Position the key and spring, Fig. 4, then install the subassembly between the caliper and support. Note that the spring is between the key and caliper and that spring tangs overlap the ends of the key.

5. If necessary use a screwdriver to hold caliper against support assembly, then using a hammer, drive the key and spring into position aligning the correct notch with the existing hole in the support.

6. Install the key to support retaining screw and torque to 12---20 ft. lbs.

7. Install wheel assembly and lower vehicle. Check brake fluid level and add as necessary with heavy duty brake fluid.

8. Depress brake pedal several times to seat linings on rotor. Do not move vehicle until a firm brake pedal has been obtained.

Brake Rotor/Disc: Specifications

Front Nominal Thickness 1.185 in

Minimum Thickness 1.12 in

Thickness Variation (Parallelism)

Note: Integral hub & rotor, .0007 inch; separate hub & rotor, .0010 inch.

Run Out (TIR)

Note: Integral hub & rotor, .003 inch; separate hub & rotor, .005 inch.

Finish 15-80 micro-in

Brake Drum: Technical Service Bulletins Transmission/Transfer Case - Banging When Braking

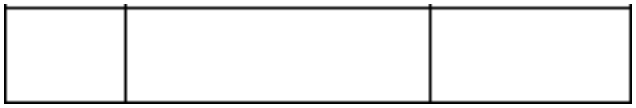
Article No. 83-7-26

NOISE - CLATTERING/BANGING OF TRANSMISSION/TRANSFER CASE DURING BRAKING

LIGHT TRUCKS 1981-83 F-150/350, BRONCO

Gear "banging" type noise during braking can be caused by rear wheel brake shudder "shaking" the transmission/transfer case even if it is not felt by the driver. The brake shudder may be caused by the rear wheels warping the brake drum. For F150 and Bronco with styled wheels, refer to TSB-82-10-15. For F250/350 with standard wheels, refer to TSB 83-7-19. Transmission or transfer case service actions should not be performed until confirming that brake shudder is not the causal factor.

OTHER APPLICABLE ARTICLES: 83-7-19; 82-10-15; 82-15-14 WARRANTY STATUS: "INFORMATION ONLY"



Brake Drum: Specifications

Rear Inside Diameter 11.031 in

Brake Drum: Service and Repair Installation

1. Assemble parking brake lever on secondary shoe and secure with spring washer and retaining clip.

2. Apply light coating of suitable lubricant at points where brake shoes contact backing plate.

3. Position brake shoes on backing plate, then install hold down spring pins, springs, and cups.

4. On rear brakes, install parking brake link, spring, and washer, then connect parking brake cable to parking brake lever.

5. Install anchor pin plate, if equipped, then place cable anchor over anchor pin with crimped side facing backing plate.

6. Install primary shoe to anchor spring.

7. Install cable guide on secondary shoe web with flanged holes fitted into hole in secondary shoe web, then thread cable around cable guide groove. Ensure that cable is positioned in groove and not between guide and shoe web.

8. Install secondary shoe to anchor spring. Ensure that all parts lay flat on anchor pin.

9. Remove clamp from wheel cylinder.

10. Apply suitable lubricant to threads and socket end of adjusting screw, turn adjusting screw into adjusting pivot nut to end of threads and back off {1/2} turn, then place adjusting socket on screw and install assembly between shoe ends with adjusting screw closer to secondary shoe. Socket end of each adjusting screw is stamped ``R'' or ``L'' to indicate use on right or left side of vehicle. Adjusting pivot nuts can be identified by number of lines machined around body of nut. Two lines indicate righthand nut and one line indicates lefthand nut.

11. Hook cable hook into hole in adjusting lever from outboard plate side.Adjusting levers are stamped ``R'' or ``L'' to indicate use on righthand or lefthand brake assembly.

12. Place hooked end of adjuster spring in large hole in primary shoe web and connect looped end of spring to adjuster lever hole.

13. Pull adjuster lever, cable, and automatic adjuster spring down toward rear to engage pivot hook in large hole in secondary shoe web, then ensure that adjusting mechanism works properly.

14. On vehicles with full-floating axles, install brake drums as follows:

a. Place brake drum on hub and install attaching screws, bolts, or bolts and nuts. b. Place hub and drum as an assembly on axle and start adjusting nut. c. Adjust wheel bearing nut and install wheel bearing lock washer and locknut. Refer to individual truck chapter for procedure. d. Install new gasket and the bolts and lock washers. e. Install wheel and tire assembly. f.

Adjust brakes. Refer to individual truck chapter for correct adjustment procedure.

15. On vehicles with semi-floating axles, install brake drums as follows:

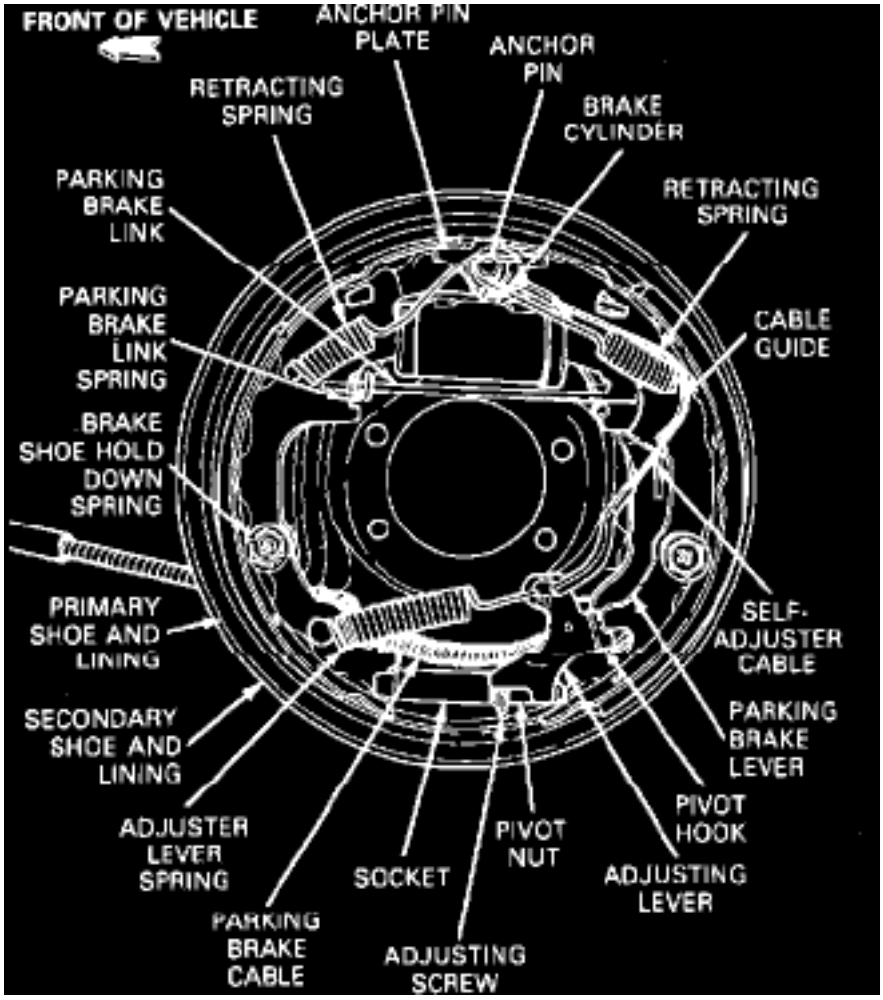
a. Adjust brakes. Refer to individual truck chapter for correct adjustment procedure. b. Install drum. c. Install brake drum retaining nuts and tighten securely. d. Install wheel on axle shaft flange studs against drum, and tighten retaining nuts.

16. If any hydraulic connections have been opened, perform system brake bleeding procedures.

17. Check master cylinder fluid lever, filling as necessary.

18. Check brake pedal for proper feel and return.

19. Lower vehicle and road test.



Brake Drum: Service and Repair Removal

Fig. 1 Drum brake assembly

1. Raise and support vehicle.

2. Remove hub cap, then the wheel and tire as an assembly.

3. On vehicles with full-floating axles, remove brake drum as follows:

a. Loosen rear brake shoe adjustment screw. b. Remove rear axle retaining bolts and lock washers, axle shaft, and gasket. c. Remove wheel bearing locknut, lock washer, and adjusting nut. d. Remove hub and drum from axle. e. Remove brake drum to hub retaining screws, bolts, or bolts and nuts, then remove brake drum from hub.

4. On vehicles with semi-floating axles, remove brake drum as follows:

a. Remove brake drum retaining nuts. b. Remove brake drum. If brake lining is dragging on brake drum, back off brake adjustment by rotating adjustment screw.

5. Install suitable clamp over ends of wheel cylinder.

6. Contract brake shoes as follows:

a. Disengage adjusting lever from adjusting screw by pulling backward on adjusting lever, Fig. 1. b. Move outboard side of adjusting screw upward and back off pivot nut as far as it will go.

7. Pull adjusting lever, cable, and automatic adjuster spring down and toward rear to unhook pivot hook from large hole in secondary shoe web. Do not pry pivot hook out of hole.

8. Remove automatic adjuster spring and adjusting lever.

9. Using suitable tool, remove secondary shoe to anchor spring, then the primary shoe to anchor spring.

10. Unhook cable anchor and remove anchor pin plate, if equipped.

11. Remove cable guide from secondary shoe.

12. Remove shoe hold-down springs, shoes, adjusting screw, pivot nut, and socket. Note color and position of each hold down spring for proper assembly.

13. On rear brakes, remove parking brake link and spring, then disconnect parking brake cable from parking brake lever.

14. Remove rear brake secondary shoe and disassemble parking brake lever from shoe by removing retaining clip and spring washer.

Brake Shoe: Customer Interest Brakes (Rear) - Accelerated Wear

Articles No. 84-16-28

BRAKE, REAR - ACCELERATED WEAR - VEHICLES WITH 11" DIAMETER REAR BRAKES

LIGHT TRUCKS 1975-84 E & F-100/150 & BRONCO

This article supersedes TSB article 83-25-18, dated December 13, 1983, to include all 1975-84 E & F-100/150 & Bronco vehicles that have 11" diameter rear brakes.

Some E and F-100/150 and Bronco vehicles subjected to extreme duty cycles in urban delivery/service operations may experience accelerated rear brake wear. A service kit(E0UZ-2C178-A) has been released for these vehicles and should be installed in its entirety if the vehicle exhibits any of the following conditions:

^ Side to side imbalance in rear braking effectiveness.

^ Side to side imbalance in rear brake lining wear.

^ Excessive heat ("blued" shoes and/or drums).

The service kit consists of replacement front and rear brake linings, rear wheel cylinders and a proportioning valve. These parts must be installed per the appropriate shop manual installation procedure.

NOTE: If a misalignment between the drum braking surface and the shoe ledge guides of the brake backing plate is suspected, refer to TSB 82-24 for the appropriate service procedures before installing the service kit (E0UZ-2C178-A).

PART NUMBER PART NAME CLASS

E0UZ-2C178-A Brake Service Kit C

Front/Rear Services

OTHER APPLICABLE ARTICLES: 82-24-17 ARTICLE SUPERSEDED: 83-25-18 WARRANTY STATUS: Reimbursable within the provisions of the Warranty and Policy Manual. OPERATION: SP2178A83 TIME:

2.3 Hrs. DLR. CODING: Basic Part No. 2200 Code: 30

Ford Bronco Workshop Manual (V8-351 5.8L VIN G 2-bbl (1982))
Ford Workshop Manuals > Brakes and Traction Control > Drum Brake System > Brake Shoe > Component Information > Technical Service Bulletins > All Technical Service Bulletins for Brake Shoe: > 841628 > Jul > 84 > Brakes (Rear) - Accelerated Wear

Brake Shoe: All Technical Service Bulletins Brakes (Rear) - Accelerated Wear

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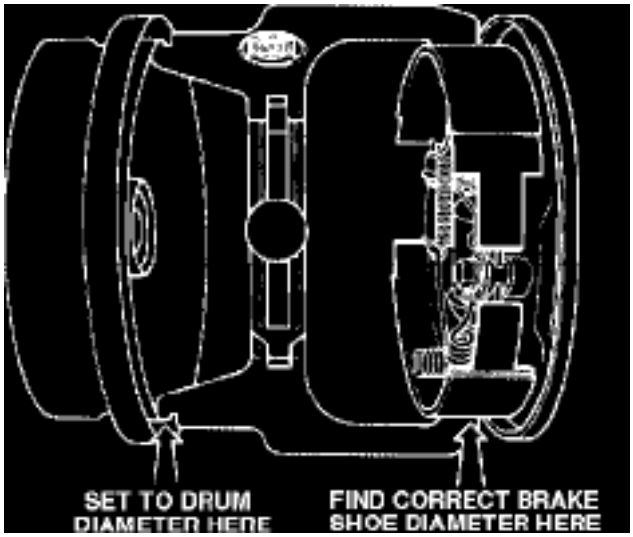
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Front/Rear Services

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2.3 Hrs. DLR. CODING: Basic Part No. 2200 Code: 30



Brake Shoe: Adjustments

Fig. 5 Service brake adjustment

The hydraulic drum brakes are self-adjusting and require a manual adjustment only after brake shoes have been relined or replaced. The adjustment is made as follows:

1. Determine inside diameter of brake drum using brake adjustment gauge, Fig. 5.

2. Reverse tool and adjust brake shoes to fit the gauge. Hold automatic adjusting lever out of engagement while rotating adjusting screw to avoid damaging screw slots.

Brake Shoe: Service and Repair Installation

1. Assemble parking brake lever on secondary shoe and secure with spring washer and retaining clip.

2. Apply light coating of suitable lubricant at points where brake shoes contact backing plate.

3. Position brake shoes on backing plate, then install hold down spring pins, springs, and cups.

4. On rear brakes, install parking brake link, spring, and washer, then connect parking brake cable to parking brake lever.

5. Install anchor pin plate, if equipped, then place cable anchor over anchor pin with crimped side facing backing plate.

6. Install primary shoe to anchor spring.

7. Install cable guide on secondary shoe web with flanged holes fitted into hole in secondary shoe web, then thread cable around cable guide groove. Ensure that cable is positioned in groove and not between guide and shoe web.

8. Install secondary shoe to anchor spring. Ensure that all parts lay flat on anchor pin.

9. Remove clamp from wheel cylinder.

10. Apply suitable lubricant to threads and socket end of adjusting screw, turn adjusting screw into adjusting pivot nut to end of threads and back off {1/2} turn, then place adjusting socket on screw and install assembly between shoe ends with adjusting screw closer to secondary shoe. Socket end of each adjusting screw is stamped ``R'' or ``L'' to indicate use on right or left side of vehicle. Adjusting pivot nuts can be identified by number of lines machined around body of nut. Two lines indicate righthand nut and one line indicates lefthand nut.

11. Hook cable hook into hole in adjusting lever from outboard plate side.Adjusting levers are stamped ``R'' or ``L'' to indicate use on righthand or lefthand brake assembly.

12. Place hooked end of adjuster spring in large hole in primary shoe web and connect looped end of spring to adjuster lever hole.

13. Pull adjuster lever, cable, and automatic adjuster spring down toward rear to engage pivot hook in large hole in secondary shoe web, then ensure that adjusting mechanism works properly.

14. On vehicles with full-floating axles, install brake drums as follows:

a. Place brake drum on hub and install attaching screws, bolts, or bolts and nuts. b. Place hub and drum as an assembly on axle and start adjusting nut. c. Adjust wheel bearing nut and install wheel bearing lock washer and locknut. Refer to individual truck chapter for procedure. d. Install new gasket and the bolts and lock washers. e. Install wheel and tire assembly. f.

Adjust brakes. Refer to individual truck chapter for correct adjustment procedure.

15. On vehicles with semi-floating axles, install brake drums as follows:

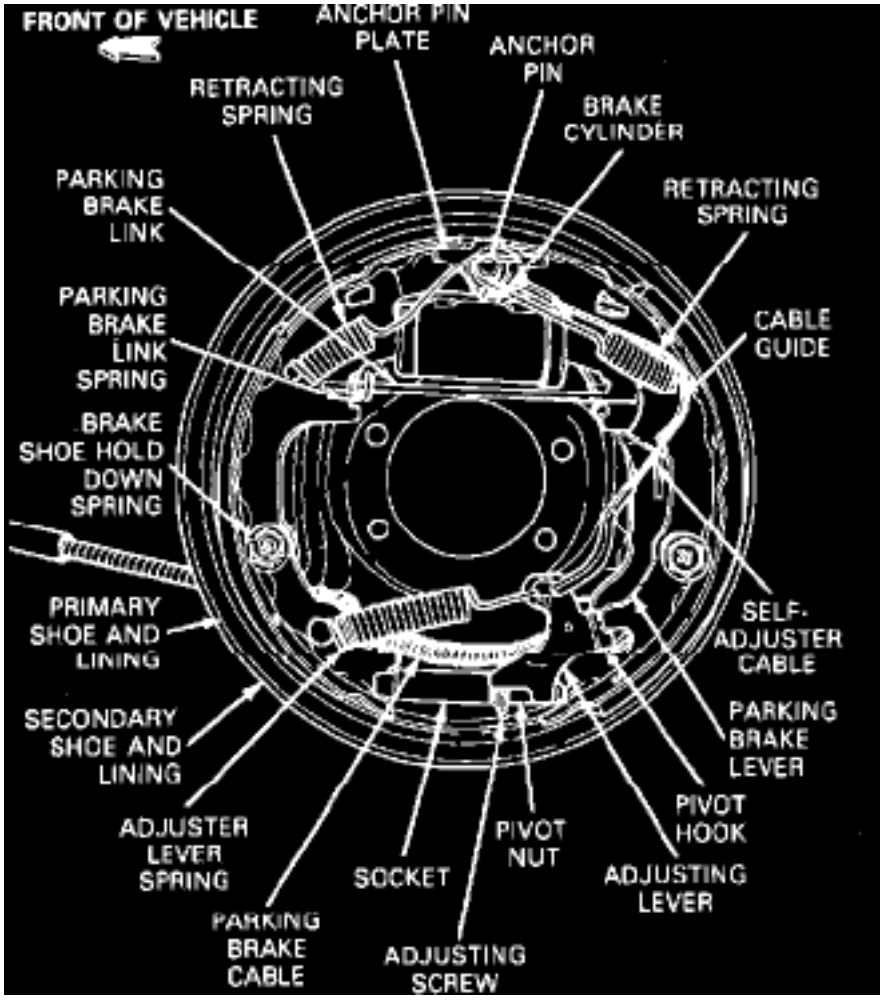
a. Adjust brakes. Refer to individual truck chapter for correct adjustment procedure. b. Install drum. c. Install brake drum retaining nuts and tighten securely. d. Install wheel on axle shaft flange studs against drum, and tighten retaining nuts.

16. If any hydraulic connections have been opened, perform system brake bleeding procedures.

17. Check master cylinder fluid lever, filling as necessary.

18. Check brake pedal for proper feel and return.

19. Lower vehicle and road test.



Brake Shoe: Service and Repair Removal

Fig. 1 Drum brake assembly

1. Raise and support vehicle.

2. Remove hub cap, then the wheel and tire as an assembly.

3. On vehicles with full-floating axles, remove brake drum as follows:

a. Loosen rear brake shoe adjustment screw. b. Remove rear axle retaining bolts and lock washers, axle shaft, and gasket. c. Remove wheel bearing locknut, lock washer, and adjusting nut. d. Remove hub and drum from axle. e. Remove brake drum to hub retaining screws, bolts, or bolts and nuts, then remove brake drum from hub.

4. On vehicles with semi-floating axles, remove brake drum as follows:

a. Remove brake drum retaining nuts. b. Remove brake drum. If brake lining is dragging on brake drum, back off brake adjustment by rotating adjustment screw.

5. Install suitable clamp over ends of wheel cylinder.

6. Contract brake shoes as follows:

a. Disengage adjusting lever from adjusting screw by pulling backward on adjusting lever, Fig. 1. b. Move outboard side of adjusting screw upward and back off pivot nut as far as it will go.

7. Pull adjusting lever, cable, and automatic adjuster spring down and toward rear to unhook pivot hook from large hole in secondary shoe web. Do not pry pivot hook out of hole.

8. Remove automatic adjuster spring and adjusting lever.

9. Using suitable tool, remove secondary shoe to anchor spring, then the primary shoe to anchor spring.

10. Unhook cable anchor and remove anchor pin plate, if equipped.

11. Remove cable guide from secondary shoe.

12. Remove shoe hold-down springs, shoes, adjusting screw, pivot nut, and socket. Note color and position of each hold down spring for proper assembly.

13. On rear brakes, remove parking brake link and spring, then disconnect parking brake cable from parking brake lever.

14. Remove rear brake secondary shoe and disassemble parking brake lever from shoe by removing retaining clip and spring washer.

Wheel Cylinder: Customer Interest Brakes (Rear) - Accelerated Wear

Articles No. 84-16-28

BRAKE, REAR - ACCELERATED WEAR - VEHICLES WITH 11" DIAMETER REAR BRAKES

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^ Side to side imbalance in rear brake lining wear.

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NOTE: If a misalignment between the drum braking surface and the shoe ledge guides of the brake backing plate is suspected, refer to TSB 82-24 for the appropriate service procedures before installing the service kit (E0UZ-2C178-A).

PART NUMBER PART NAME CLASS

E0UZ-2C178-A Brake Service Kit C

Front/Rear Services

OTHER APPLICABLE ARTICLES: 82-24-17 ARTICLE SUPERSEDED: 83-25-18 WARRANTY STATUS: Reimbursable within the provisions of the Warranty and Policy Manual. OPERATION: SP2178A83 TIME:

2.3 Hrs. DLR. CODING: Basic Part No. 2200 Code: 30

Wheel Cylinder: All Technical Service Bulletins Brakes (Rear) - Accelerated Wear

Articles No. 84-16-28

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2.3 Hrs. DLR. CODING: Basic Part No. 2200 Code: 30

Brake Bleeding: Service and Repair

Bleed primary and secondary hydraulic brake systems separately, bleeding longest line first on each system. Do not allow reservoir to run dry during bleeding operation. Never reuse fluid that has been drained from hydraulic system.

1. Loosen master cylinder to hydraulic line nuts and wrap shop cloths around tubing below fitting to absorb escaping brake fluid.

2. Depress brake pedal slowly by hand to floor of cab, forcing air trapped in master cylinder out at fitting.

3. Hold pedal down and tighten fittings, then release brake pedal. Releasing brake pedal before fittings are tightened will allow air to enter the master cylinder.

4. Repeat steps 1 through 3 until air ceases to escape at fittings and brake pedal is firm.

5. Bleed rear brakes as follows:

a. Pump pedal several times, then hold pedal down firmly. b. With pedal firmly depressed, open bleeder screw on one rear brake until pedal fades to floor, then close bleeder valve. c. Repeat procedure until a continuous flow of brake fluid is released from bleeder valve. d. Repeat steps 5a through 5c on other rear brake.

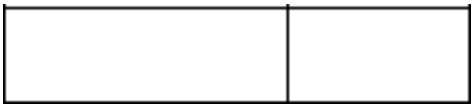
6. Bleed front brakes using same procedure as for rear brakes.

7. Fill master cylinder reservoirs to {1/4} inch from top of reservoirs.

8. Centralize the pressure differential control valve, if applicable, as follows:

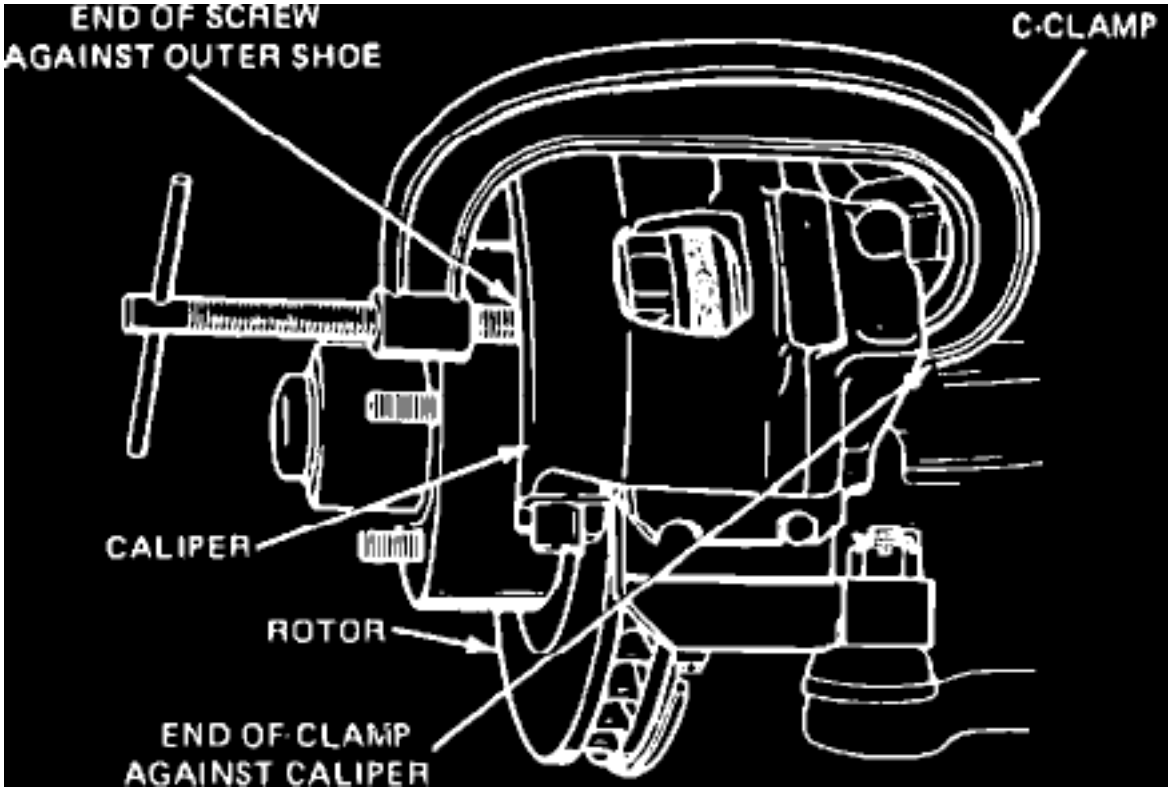
a. Turn ignition switch to ``ACC'' or ``On'' position. b. Push brake pedal down, allowing piston to center itself, turning off warning light. c. Turn ignition switch to ``OFF'' position.

9. Check brake operation and ensure pedal is firm, then road test vehicle.



Brake Caliper: Specifications

Bore Diameter 2.875 in



Brake Caliper: Service and Repair Caliper Removal

Fig. 1 Bottoming caliper piston in cylinder bore

1. Remove a portion of brake fluid from master cylinder disc brake reservoir.

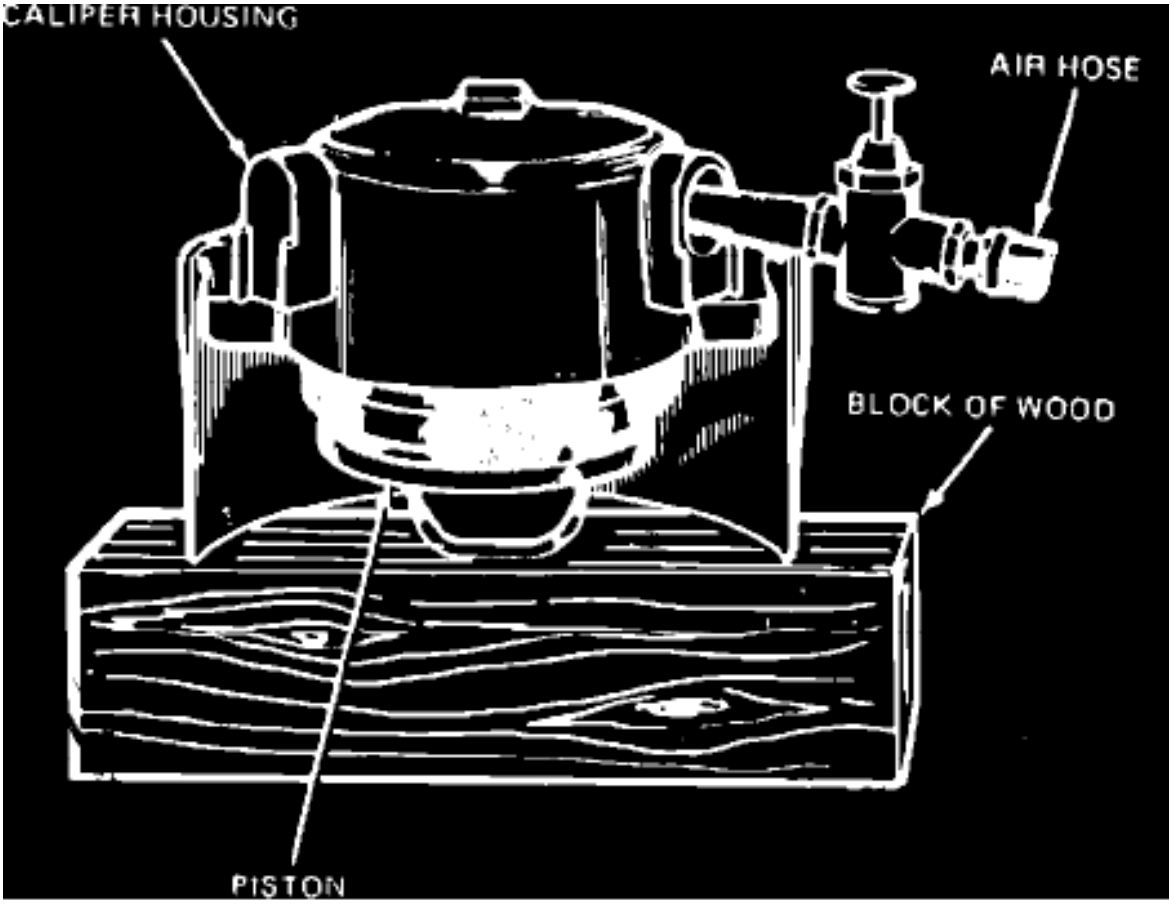
2. Raise and support vehicle and remove wheel and tire assembly.

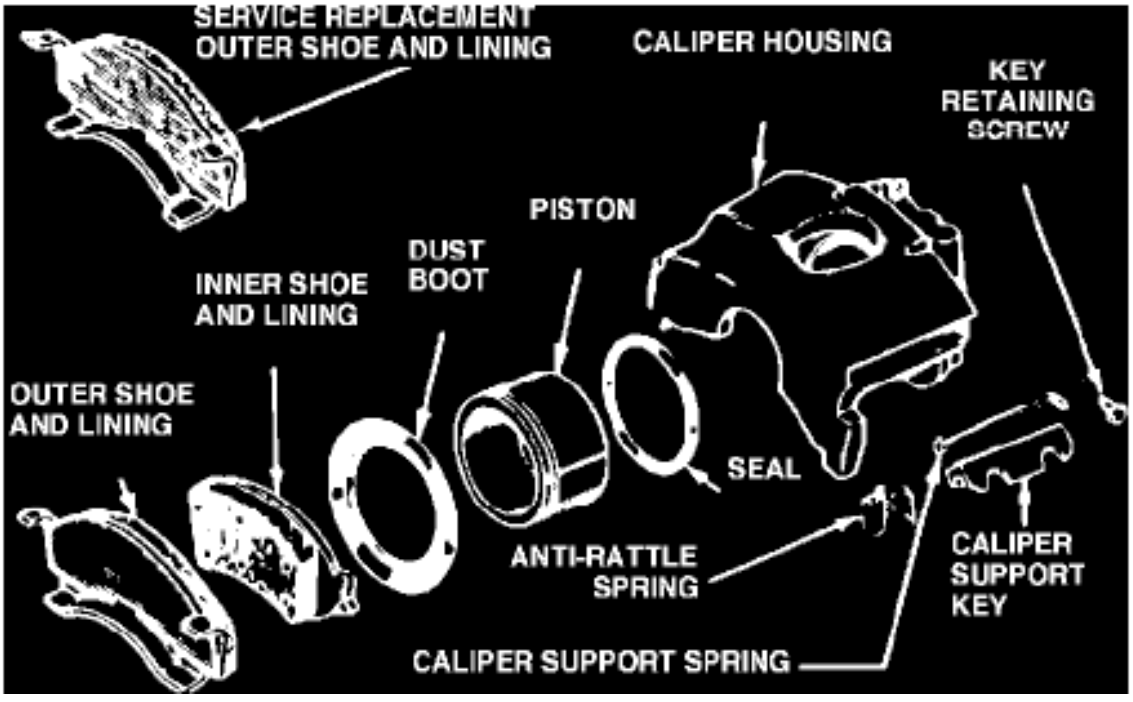
3. Install eight inch C-clamp on caliper, Fig. 1, and tighten clamp to bottom piston in cylinder bore, then remove clamp. Do not use screwdriver or other edged tool to pry piston from rotor.

4. Remove key retaining screw, then using hammer and drift, drive out caliper support key and spring.

5. Remove caliper by pushing it downward against spindle assembly and rotating upper end upward and out of spindle assembly.

6. Disconnect hydraulic line from caliper.


CALIPER HOUSING
AIR HOSE
BLOCK OF WOOD
PISTON


SERVICE REPLACEMENT OUTER SHOE AND LINING
CALIPER HOUSING
KEY RETAINING SCREW
PISTON
DUST BOOT
INNER SHOE AND LINING
OUTER SHOE AND LINING
SEAL
ANTI-RATTLE SPRING
CALIPER SUPPORT KEY
CALIPER SUPPORT SPRING

Brake Caliper: Service and Repair Disassembling Caliper

Fig. 2 Removing caliper piston

Fig. 3 Exploded view of disc brake caliper assembly

1. Remove plug from caliper inlet port and drain fluid from caliper housing.

2. Position caliper on block of wood, Fig. 2.

3. Slowly and carefully apply low pressure air to caliper inlet port until piston pops out.

4. If piston is jammed or cocked and will not pop out, release air pressure and tap sharply on end of piston with soft hammer or plastic or rubber mallet to straighten piston, then apply air pressure again to remove piston.

5. Remove boot from piston and seal from caliper cylinder bore, Fig. 3.

Brake Caliper: Service and Repair Assembling Caliper

1. Lubricate piston seal with clean brake fluid and position seal in groove in cylinder bore.

2. Coat outside of piston and both beads of dust boot with clean brake fluid, then insert piston through dust boot until boot is around closed end of piston.

3. Hold piston and dust boot directly above caliper cylinder bore and use fingers to work bead of dust boot into groove near top of cylinder bore.

4. One bead is seated in groove, press straight down on piston until piston bottoms in bore. Ensure piston is not cocked in bore.

Brake Caliper: Service and Repair Caliper Installation

1. Position caliper on spindle assembly by pivoting caliper around support upper mounting surface, being careful not to tear or cut boot as boot slips over inner shoe.

2. Using brake adjusting tool or screwdriver, hold upper machined surface of caliper against surface of support assembly and install new caliper support spring and new caliper support key.

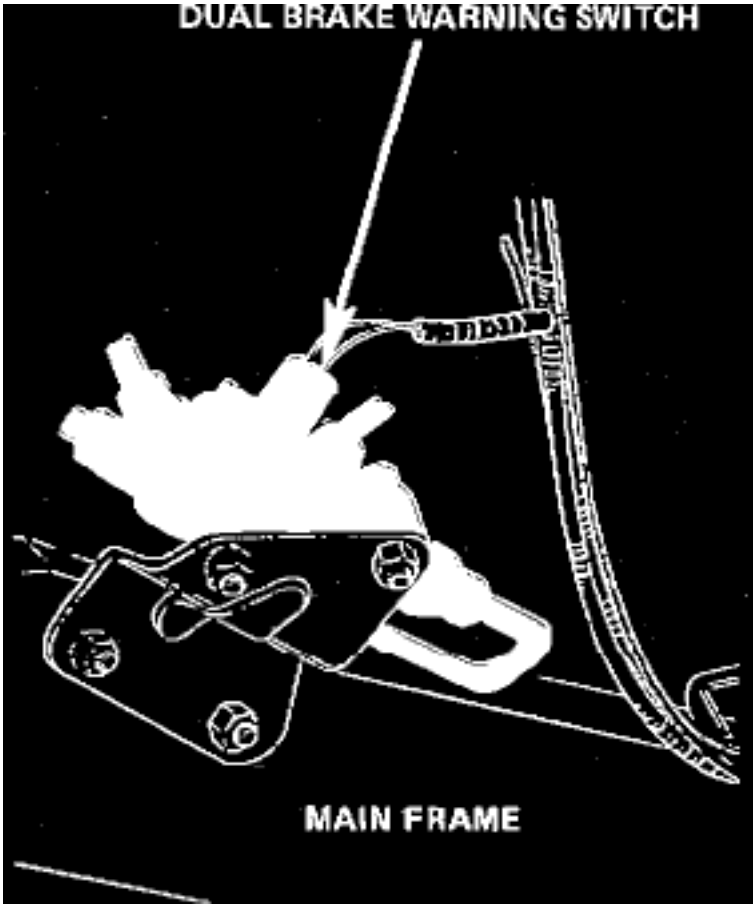
3. Using suitable mallet, drive key and spring assembly into position, then install key retaining screw and torque to 14---20 ft. lbs.

4. Connect hydraulic line to caliper.

5. Install wheel and tire assembly and lower vehicle to ground, then fill master cylinder as necessary with suitable brake fluid.

6. Firmly depress brake pedal several times to seat linings on rotor.

7. Perform brake bleeding procedures.



Brake Fluid Pressure Sensor/Switch: Locations

RH Frame Mainmember, Behind Cab.

Attached To LH Frame Member

Applicable to: 1981-83

Ford Bronco Workshop Manual (V8-351 5.8L VIN G 2-bbl (1982))
Ford Workshop Manuals > Brakes and Traction Control > Hydraulic System, Brakes > Brake Proportioning/Combination Valve > Component Information > Technical Service Bulletins > Customer Interest: > 841628 > Jul > 84 > Brakes (Rear) - Accelerated Wear

Brake Proportioning/Combination Valve: Customer Interest Brakes (Rear) - Accelerated Wear

Articles No. 84-16-28

BRAKE, REAR - ACCELERATED WEAR - VEHICLES WITH 11" DIAMETER REAR BRAKES

LIGHT TRUCKS 1975-84 E & F-100/150 & BRONCO

This article supersedes TSB article 83-25-18, dated December 13, 1983, to include all 1975-84 E & F-100/150 & Bronco vehicles that have 11" diameter rear brakes.

Some E and F-100/150 and Bronco vehicles subjected to extreme duty cycles in urban delivery/service operations may experience accelerated rear brake wear. A service kit(E0UZ-2C178-A) has been released for these vehicles and should be installed in its entirety if the vehicle exhibits any of the following conditions:

^ Side to side imbalance in rear braking effectiveness.

^ Side to side imbalance in rear brake lining wear.

^ Excessive heat ("blued" shoes and/or drums).

The service kit consists of replacement front and rear brake linings, rear wheel cylinders and a proportioning valve. These parts must be installed per the appropriate shop manual installation procedure.

NOTE: If a misalignment between the drum braking surface and the shoe ledge guides of the brake backing plate is suspected, refer to TSB 82-24 for the appropriate service procedures before installing the service kit (E0UZ-2C178-A).

PART NUMBER PART NAME CLASS

E0UZ-2C178-A Brake Service Kit C

Front/Rear Services

OTHER APPLICABLE ARTICLES: 82-24-17 ARTICLE SUPERSEDED: 83-25-18 WARRANTY STATUS: Reimbursable within the provisions of the Warranty and Policy Manual. OPERATION: SP2178A83 TIME:

2.3 Hrs. DLR. CODING: Basic Part No. 2200 Code: 30

Brake Proportioning/Combination Valve: All Technical Service Bulletins Brakes (Rear) - Accelerated Wear

Articles No. 84-16-28

BRAKE, REAR - ACCELERATED WEAR - VEHICLES WITH 11" DIAMETER REAR BRAKES

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^ Side to side imbalance in rear braking effectiveness.

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The service kit consists of replacement front and rear brake linings, rear wheel cylinders and a proportioning valve. These parts must be installed per the appropriate shop manual installation procedure.

NOTE: If a misalignment between the drum braking surface and the shoe ledge guides of the brake backing plate is suspected, refer to TSB 82-24 for the appropriate service procedures before installing the service kit (E0UZ-2C178-A).

PART NUMBER PART NAME CLASS

E0UZ-2C178-A Brake Service Kit C

Front/Rear Services

OTHER APPLICABLE ARTICLES: 82-24-17 ARTICLE SUPERSEDED: 83-25-18 WARRANTY STATUS: Reimbursable within the provisions of the Warranty and Policy Manual. OPERATION: SP2178A83 TIME:

2.3 Hrs. DLR. CODING: Basic Part No. 2200 Code: 30

TSB 06-14-4

07/24/06

MERCON ATF IS BEING REPLACED BY MERCON V ATF AS A SERVICE FLUID.

FORD: 1980-1997 Crown Victoria 1981-1997 Mustang, Thunderbird 1981-2003 Escort 1986-1993 Festiva 1986-1997 Taurus 1989-1997 Probe 1994-1997 Aspire 1995-2000 Contour 1980-1996 Bronco 1981-2003 F-150 1981-2004 E-Series, F-Super Duty 1983-1996 Ranger 1986-1996 Aerostar 1991-1997 Explorer 1993-2004 F-53 Motorhome Chassis 1995-1998 Windstar 1997-2004 Expedition 2000-2005 Excursion 2001-2007 Escape 1987-2000 F-B-Series 2000-2007 F-650, F-750

LINCOLN: 1980-1997 Town Car 1981-1997 Continental 1993-1997 Mark VIII 1998-2004 Navigator 2002-2003 Blackwood

MERCURY: 1980-1997 Grand Marquis 1981-1997 Cougar 1986-1997 Sable 1987-1999 Tracer 1995-2000 Mystique 1999-2002 Cougar 1993-2002 Villager 1997 Mountaineer 2005-2007 Mariner

MERKUR: 1985-1989 XR4TI

This article supersedes TSB 01-15-7 to update the vehicle application chart.

ISSUE MERCON(R) Automatic Transmission Fluid is being replaced by MERCON(R) V as a service fluid.

ACTION Beginning immediately all automatic transmission / transaxle applications requiring MERCON(R) can now be serviced using MERCON(R) V or MERCON(R) Automatic Transmission Fluid or dual usage fluids labeled MERCON(R) / MERCON(R) V. After July 1, 2007, MERCON(R) Automatic Transmission Fluid will no longer be manufactured, therefore, availability of this fluid will only continue for however long it takes to deplete what remains in inventory.

SERVICE PROCEDURE

AUTOMATIC TRANSMISSION FLUID CHART

TRANSMISSIONS

TRANSAXLES

TB-8592-D

Specific service fluids (listed to the right) are called for depending on the type of transmission and the year the transmission was built. It is important to use the correct fluid, each fluid exhibits different properties and should be used only in the transmission for which they were designed. The vehicle owner or rebuilder should use the type of fluid printed in the owners guide or on the automatic transmission fluid level indicator. Refer to your scheduled maintenance guide to determine the correct service interval. Failure to use the recommended fluid may affect transmission performance and durability.

CAUTION:
DO NOT USE SUPPLEMENTAL TRANSMISSION FLUID ADDITIVES, TREATMENTS OR CLEANING AGENTS. The use of these materials may affect transmission operation and result in damage to internal transmission components.

CAUTION:
MERCON® SP, Motorcraft® Premium Automatic Transmission Fluid and Motorcraft® M5 ATF's are unique fluids and MUST be used in applications recommending that particular fluid. Use of any other fluid may cause reduced functionality or transmission damage.

CAUTION:
The functional characteristics of fluids for the CVT transmissions are very different than those of other ATF's. Use of a fluid other than Motorcraft® Continuously Variable Chain Type Transmission Fluid or one labeled as meeting MERCON® C may cause severe transmission damage.

FAILURE TO USE RECOMMENDED FLUID WILL AFFECT TRANSMISSION PERFORMANCE. REFER TO OWNERS MANUAL AND/OR FLUID LEVEL INDICATOR FOR PROPER FLUID TYPE.

V **MERCON® V**
- Part number XT-5-QM (Quarts) and XT-5-DM (55 Gallon Drum) Ford Specification is MERCON® V

NOTE: AUTOMATIC TRANSMISSIONS REQUIRING MERCON® V SHOULD ONLY BE SERVICED WITH MERCON® V, OR FLUID FROM A CONTAINER THAT IS SPECIFIED AS A DUAL USAGE FLUID: MERCON® /MERCON® V.

SP **MERCON® SP**
- Part number XT-6-QSP (Quarts) and XT-6-DSP (55 Gallon Drum) Ford Specification is MERCON® SP.

CVT **CONTINUOUSLY VARIABLE CHAIN TYPE**
- Part number XT-7-QCFT (Quarts)

P **PREMIUM AUTOMATIC TRANSMISSION FLUID**
- Part number XT-8-QAW.

M5 **MAZDA SPECIFIC FLUID**
- Part number XT-9-QMM5.

V M **MERCON® - Part number XT-2-QDX (Quarts) and XT-2-DDX (55 Gallon Drum) or, MERCON® V - Part number XT-5-QM (Quarts) and XT-5-DM (55 Gallon Drum)**

NOTE: AUTOMATIC TRANSMISSIONS REQUIRING MERCON® CAN NOW BE SERVICED WITH MERCON®, MERCON® V, OR, DUAL USAGE FLUIDS LABELED MERCON®/MERCON® V.

Figure 1

Service automatic transmissions requiring MERCON(R) with MERCON(R) V or MERCON(R) Automatic Transmission Fluid or dual usage fluids labeled MERCON(R) / MERCON(R) V

For proper fluid application on current and past model vehicles equipped with automatic transmissions I transaxles refer to the fluid usage chart. (Figure 1)

CAUTION

AUTOMATIC TRANSMISSIONS / TRANSAXLES THAT REQUIRE MERCON® V SHOULD STILL ONLY USE MERCON(R) V OR DUAL USAGE FLUID LABELED MERCON(R) / MERCON(R) V.

PART NUMBER	PART NAME
XT-2-QDX	MERCON® (Quart)
XT-2-DDX	MERCON® (55 Gal. Drum)
XT-5-QM	MERCON® V (Quart)
XT-5-DM	MERCON® V (55 Gal. Drum)

NOTE: The information in Technical Service Bulletins is intended for use by trained, professional technicians with the knowledge, tools, and equipment to do the job properly and safely. It informs these technicians of conditions that may occur on some vehicles, or provides information that could assist in proper vehicle service. The procedures should not be performed by "do-it-yourselfers". Do not assume that a condition described affects your car or truck. Contact a Ford, Lincoln, or Mercury dealership to determine whether the Bulletin applies to your vehicle.

CAUTION

MERCON(R) SP, MOTORCRAFT PREMIUM AUTOMATIC TRANSMISSION FLUID AND MOTORCRAFT M5 ATFS ARE UNIQUE FLUIDS AND MUST BE USED IN APPLICATIONS RECOMMENDING THAT PARTICULAR FLUID.

USE OF ANY OTHER FLUID MAY CAUSE REDUCED FUNCTIONALITY OR TRANSMISSION DAMAGE.

CAUTION

THE FUNCTIONAL CHARACTERISTICS OF FLUIDS FOR CVT TRANSMISSIONS ARE VERY DIFFERENT THAN THOSE OF OTHER AUTOMATIC TRANSMISSION FLUIDS (ATFS).

USE OF A FLUID OTHER THAN MOTORCRAFT CONTINUOUSLY VARIABLE CHAIN TYPE TRANSMISSION FLUID OR ONE LABELED AS MEETING MERCON(R) C WILL CAUSE FUNCTIONALITY CONCERNS AND INTERNAL TRANSMISSION DAMAGE.

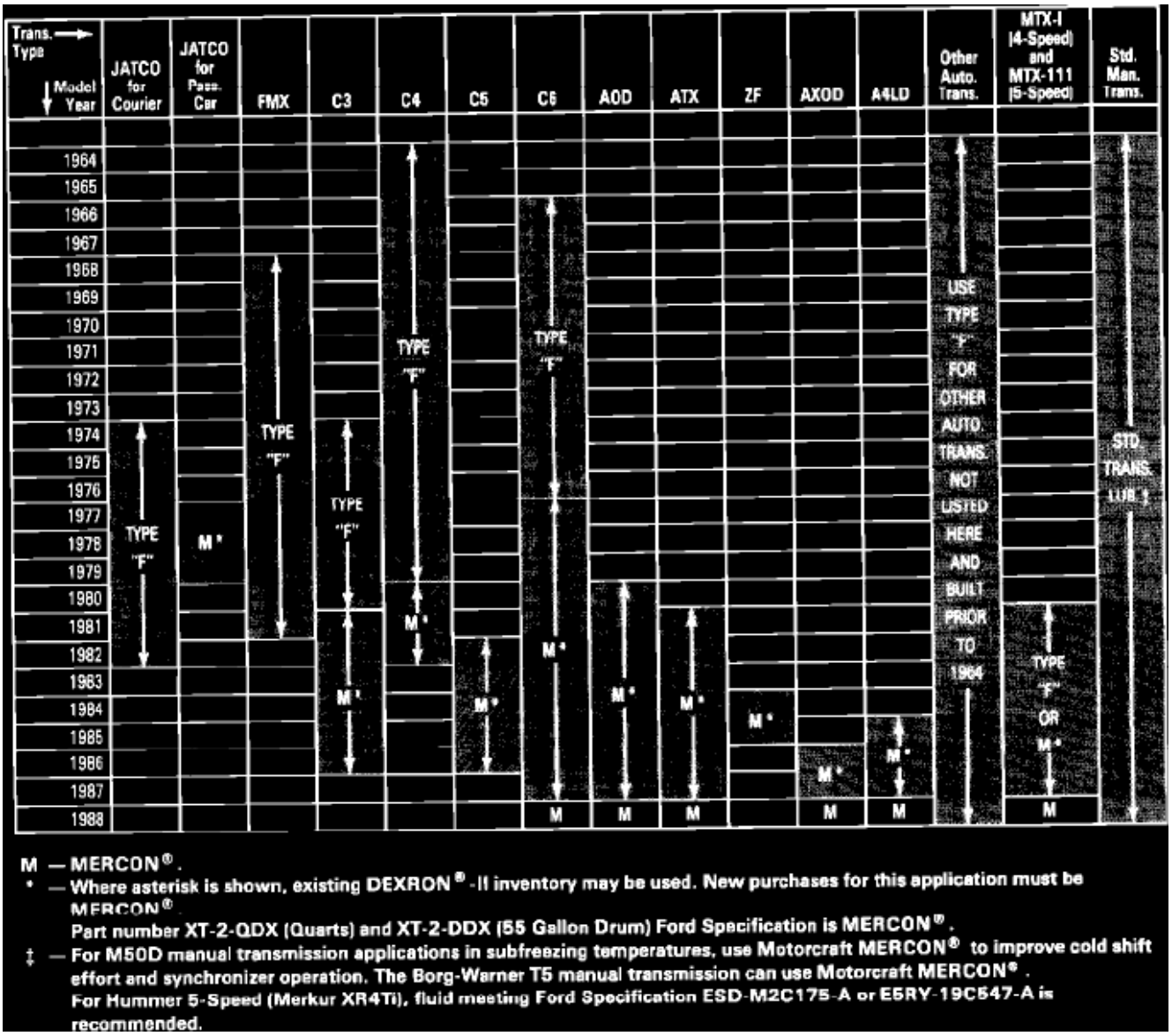
CAUTION

DO NOT USE AUTOMATIC TRANSMISSION FLUID SUPPLEMENTS, ADDITIVES, TREATMENTS OR CLEANING AGENTS.

Parts Block

WARRANTY STATUS: Information Only

Disclaimer



Fluid - A/T: All Technical Service Bulletins A/T, M/T - New `Mercon' Transmission Fluid

TRANSMISSION - AUTOMATIC/MANUAL - Article No.

NEW FLUID AND USAGE CHART 87-18-14

FORD: 1986 And Prior LTD 1988 And Prior ESCORT, TEMPO, MUSTANG, TAURUS, THUNDERBIRD, FORD

LINCOLN-MERCURY: 1986 And Prior CAPRI, MARQUIS 1987 And Prior LYNX 1988 And Prior TOPAZ, SABLE, COUGAR, MERCURY, MARK VII, CONTINENTAL, LINCOLN TOWN CAR

MERKUR: 1985-88 XR4Ti 1988 SCORPIO

LIGHT TRUCK: 1988 And Prior E SERIES, F SERIES, BRONCO, RANGER, BRONCO II, AEROSTAR

ISSUE: A new Transmission Fluid, MERCON (Ford Specification "MERCON") (XT-2- QDX, Quart), (XT-2-DDX, 55 Gallon Drum) is available for service. Use of the Motorcraft "MERCON" transmission fluid, where specified, will improve cold weather shift effort and synchronized operation.

ACTION: The chart on page 44 of this TSB gives transmission fluid applications for automatic transmissions and certain manual transmissions for Ford, Lincoln-Mercury, and Merkur vehicles.

NOTE: The use of MERCON is NOT RECOMMENDED for power steering systems. The manual transmission lubricant for the 1985 Merkur XR4Ti is a semi-synthetic oil. When adding oil to the transmission, use only E5RY-19C547-A (Ford Specification ESD-M2C175-A) or equivalent.

PART NUMBER PART NAME CLASS

XT-2-QDX MERCON - Quart V

XT-2-DDX MERCON - 55 Gallon V

Drum

E5RY-19C547-A Semi-Synthetic Oil B

OTHER APPLICABLE ARTICLES: 82-9-9 Supersedes 85-1-15, 85-6-7 WARRANTY STATUS: "INFORMATION ONLY"

Article No. 86-11-17

TRANSMISSION - AUTOMATIC - NEW SYNTHETIC DEXRON II ALL WEATHER AUTOMATIC TRANSMISSION FLUID

FORD 1986 and PRIOR ESCORT, EXP, FORD, LTD, THUNDERBIRD, MUSTANG, TEMPO; 1986 TAURUS

LINCOLN-MERCURY 1982-83 LN7; 1986 and PRIOR LYNX, MERCURY, MARQUIS, COUGAR, CAPRI, TOPAZ, LINCOLN, MARK, CONTINENTAL; 1986 SABLE

LIGHT TRUCK 1986 and PRIOR E, F SERIES, BRONCO, BRONCO II, RANGER

A new synthetic Dexron II automatic transmission fluid specification number ESR-M2C163-A2, part number E6AZ-19582-B is now available. This fluid will maintain a more constant viscosity through a wider range of temperatures.

In the event a vehicle will be operated in extremely cold temperatures for an extended period of time, remove all existing fluid from the transmission (using the procedure shown in the applicable 1986 Car or Light Truck Shop Manual) and replace with the new synthetic Dexron II fluid, E6AZ-19582-B. The synthetic fluid is year 'round fluid and will not require replacement for warmer weather.

CAUTION: DO NOT use synthetic Dexron II fluid in transmissions designed to use Type "F" fluid.

PART NUMBER PART NAME CLASS

E6AZ-19582-B Synthetic Dexron Oil V

Automatic Transmission Oil

OTHER APPLICABLE ARTICLES: None WARRANTY STATUS: "INFORMATION ONLY"

AUTOMATIC TRANSMISSION FLUID CHART

TRANSMISSIONS

TRANSAXLES

Specific service fluids (listed to the right) are called for depending on the type of transmission and the year the transmission was built. It is important to use the correct fluid, each fluid exhibits different properties and should be used only in the transmission for which they were designed. The vehicle owner or rebuilder should use the type of fluid printed in the owners guide or on the automatic transmission fluid level indicator. Refer to your scheduled maintenance guide to determine the correct service interval. Failure to use the recommended fluid may affect transmission performance and durability.

CAUTION:
DO NOT USE SUPPLEMENTAL TRANSMISSION FLUID ADDITIVES, TREATMENTS OR CLEANING AGENTS. The use of these materials may affect transmission operation and result in damage to internal transmission components.

CAUTION:
MERCON® SP, Motorcraft® Premium Automatic Transmission Fluid and Motorcraft® M5 ATFs are unique fluids and MUST be used in applications recommending that particular fluid. Use of any other fluid may cause reduced functionality or transmission damage.

CAUTION:
The functional characteristics of fluids for the CVT transmissions are very different than those of other ATF's. Use of a fluid other than Motorcraft® Continuously Variable Chain Type Transmission Fluid or one labeled as meeting MERCON® C may cause severe transmission damage.

FAILURE TO USE RECOMMENDED FLUID WILL AFFECT TRANSMISSION PERFORMANCE. REFER TO OWNERS MANUAL AND/OR FLUID LEVEL INDICATOR FOR PROPER FLUID TYPE.

V **MERCON® V**
- Part number XT-5-QM (Quarts) and XT-5-DM (55 Gallon Drum) Ford Specification is MERCON® V

NOTE: AUTOMATIC TRANSMISSIONS REQUIRING MERCON® V SHOULD ONLY BE SERVICED WITH MERCON® V, OR FLUID FROM A CONTAINER THAT IS SPECIFIED AS A DUAL USAGE FLUID: MERCON® /MERCON® V.

SP **MERCON® SP**
- Part number XT-6-QSP (Quarts) and XT-6-DSP (55 Gallon Drum) Ford Specification is MERCON® SP.

CVT **CONTINUOUSLY VARIABLE CHAIN TYPE**
- Part number XT-7-QCFT (Quarts)

P **PREMIUM AUTOMATIC TRANSMISSION FLUID**
- Part number XT-8-QAW.

M5 **MAZDA SPECIFIC FLUID**
- Part number XT-9-QMM5.

V M **MERCON® - Part number XT-2-QDX (Quarts) and XT-2-DDX (55 Gallon Drum) or, MERCON® V - Part number XT-5-QM (Quarts) and XT-5-DM (55 Gallon Drum)**

NOTE: AUTOMATIC TRANSMISSIONS REQUIRING MERCON® CAN NOW BE SERVICED WITH MERCON®, MERCON® V, CR, DUAL USAGE FLUIDS LABELED MERCON®/MERCON® V.

TB-8592-D

Figure 1

Service automatic transmissions requiring MERCON(R) with MERCON(R) V or MERCON(R) Automatic Transmission Fluid or dual usage fluids labeled MERCON(R) / MERCON(R) V

For proper fluid application on current and past model vehicles equipped with automatic transmissions I transaxles refer to the fluid usage chart. (Figure 1)

CAUTION

AUTOMATIC TRANSMISSIONS / TRANSAXLES THAT REQUIRE MERCON® V SHOULD STILL ONLY USE MERCON(R) V OR DUAL USAGE FLUID LABELED MERCON(R) / MERCON(R) V.

PART NUMBER	PART NAME
XT-2-QDX	MERCON® (Quart)
XT-2-DDX	MERCON® (55 Gal. Drum)
XT-5-QM	MERCON® V (Quart)
XT-5-DM	MERCON® V (55 Gal. Drum)

NOTE: The information in Technical Service Bulletins is intended for use by trained, professional technicians with the knowledge, tools, and equipment to do the job properly and safely. It informs these technicians of conditions that may occur on some vehicles, or provides information that could assist in proper vehicle service. The procedures should not be performed by "do-it-yourselfers". Do not assume that a condition described affects your car or truck. Contact a Ford, Lincoln, or Mercury dealership to determine whether the Bulletin applies to your vehicle.

CAUTION

MERCON(R) SP, MOTORCRAFT PREMIUM AUTOMATIC TRANSMISSION FLUID AND MOTORCRAFT M5 ATFS ARE UNIQUE FLUIDS AND MUST BE USED IN APPLICATIONS RECOMMENDING THAT PARTICULAR FLUID.

USE OF ANY OTHER FLUID MAY CAUSE REDUCED FUNCTIONALITY OR TRANSMISSION DAMAGE.

CAUTION

THE FUNCTIONAL CHARACTERISTICS OF FLUIDS FOR CVT TRANSMISSIONS ARE VERY DIFFERENT THAN THOSE OF OTHER AUTOMATIC TRANSMISSION FLUIDS (ATFS).

USE OF A FLUID OTHER THAN MOTORCRAFT CONTINUOUSLY VARIABLE CHAIN TYPE TRANSMISSION FLUID OR ONE LABELED AS MEETING MERCON(R) C WILL CAUSE FUNCTIONALITY CONCERNS AND INTERNAL TRANSMISSION DAMAGE.

CAUTION

DO NOT USE AUTOMATIC TRANSMISSION FLUID SUPPLEMENTS, ADDITIVES, TREATMENTS OR CLEANING AGENTS.

Parts Block

WARRANTY STATUS: Information Only

Disclaimer

XT-2-DDX MERCON - 55 Gallon V

Drum

E5RY-19C547-A Semi-Synthetic Oil B

OTHER APPLICABLE ARTICLES: 82-9-9 Supersedes 85-1-15, 85-6-7 WARRANTY STATUS: "INFORMATION ONLY"

Brake Proportioning/Combination Valve: Description and Operation

EXCEPT AEROSTAR, BRONCO II & 1983---87 RANGER These vehicles use a pressure differential valve, a metering valve (1980---84) and a proportioning valve which are combined in a single unit. These valves sense unbalanced pressure between front and rear brakes. Loss of pressure in either the primary or secondary brake system causes pressure differential valve to move off center and illuminate brake warning light. After system is replaced and brakes are bled, the valve centers itself, turning off warning light. The brake warning light switch is mounted on top of the valve body casting above the pressure differential valve tapered shoulder groove. When the valve is centered, spring loaded switch plunger fits into the tapered shoulder groove. The switch contacts are open, interrupting electrical continuity to the brake warning light on the instrument panel. The metering valve is located in the front end of the control valve housing between the front brake system inlet port and the right and left front brake outlet ports. This valve regulates hydraulic fluid pressure to the front disc brakes. The proportioning valve used on some models is located at the bottom of the housing between the rear brake system inlet and outlet ports. This valve regulates rear brake system hydraulic pressure. A plug and tube seat is pressed into the rear end of the central bore. A hole through the center of the plug and tube seal directs hydraulic fluid from the valve to the rear brake system outlet port.

Brake Master Cylinder: Technical Service Bulletins Brake Master Cylinder - Rebuilding Procedure

Article No. 83-19-14

BRAKE MASTER CYLINDERS - REBUILDING PROCEDURE

LIGHT TRUCKS 1981-84 ALL LIGHT TRUCKS

Rebuilding of brake master cylinders during the vehicle warranty period for the subject vehicles has been authorized. Service kits (Base Part Number 2004) are now available for all light truck series vehicles. The following procedure is recommended for rebuilding:

DISASSEMBLY

1. Clean the outside of the master cylinder and remove the filler cover and diaphragm. Drain and discard any brake fluid that remains in the cylinder.

2. Depress the primary piston and remove snap ring from retaining groove at the rear of the master cylinder bore.

3. Remove primary piston assembly from the master cylinder bore and inspect for seal damage or twisting. Record condition of piston assembly on service order and discard assembly.

4. Remove the secondary piston assembly by directing compressed air into the outlet port at the blind end of the bore while plugging the other outlet port. Inspect for seal damage or twisting. Record condition of piston assembly on service order and discard assembly.

5. Inspect the master cylinder bore for signs of etching, pitting, scoring or other damage.

a. If bore is damaged, discard and replace with new master cylinder assembly. Do not attempt to hone bore.

b. If bore is not damaged, rebuild master cylinder assembly using the proper service kit and the procedure outlined below.

ASSEMBLY

1. Clean the master cylinder body with clean isopropyl alcohol to remove any contamination.

2. Dip the service kit piston assemblies in clean brake fluid (ESA-M6C25-A) to lubricate seals.

3. Carefully insert the complete secondary piston assembly in the master cylinder bore.

4. Carefully insert the primary piston assembly in the master cylinder bore.

5. Depress the primary piston and install the snap ring in the cylinder bore groove.

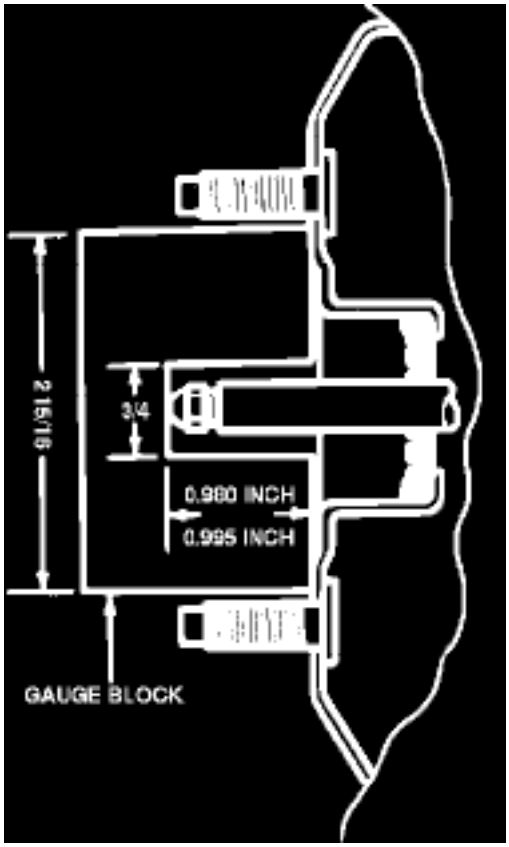
6. On manual brake vehicles, install the push rod retainer onto the push rod and install into the primary piston. Make sure the retainer is properly seated and holding the push rod securely.

7. Install the cover and gasket on the master cylinder assembly and secure into position with the retainer.

OTHER APPLICABLE ARTICLES: 80-21-14 WARRANTY STATUS: Reimbursable within the provisions of the Warranty and Policy Manual. OPERATION/TIME: Refer to the Labor Time Standards Manual for applicable operation and time. DLR. CODING: Basic Part No. 2004 Code: 53

Brake Master Cylinder: Description and Operation

This master cylinder contains a double hydraulic cylinder with one fluid reservoir on Aerostar models or two fluid reservoirs on other models as well as primary and secondary hydraulic pistons. The rear wheel brakes are connected to the secondary outlet port and are actuated by the secondary piston assembly. The front wheel brakes are connected to the primary outlet port(s), nearest the dash panel, and are actuated by the primary piston assembly.



Brake Master Cylinder: Adjustments

Fig. 1 Adjusting Piston Rod

To check adjustment of pushrod, fabricate a gauge and position it against the master cylinder mounting surface as shown in Fig. 1. Adjust pushrod screw by turning it until the end just touches inner edge of slot in the gauge.

Brake Master Cylinder: Service and Repair

LESS POWER BRAKES

1. Disconnect battery ground cable.

2. Disconnect stop lamp switch electrical connectors.

3. Remove retaining nut, shoulder bolt, spacers and bushing securing master cylinder pushrod to brake pedal.

4. Remove stop lamp switch from brake pedal.

5. Disconnect brake lines from master cylinder, then remove attaching screws or nuts and the master cylinder.

6. Remove boot from master cylinder push rod.

7. Reverse procedure to install.

POWER BRAKES

1. Depress brake pedal, with engine off, to release vacuum from power brake unit.

2. Disconnect brake lines from master cylinder.

3. Remove master cylinder-to-power brake unit attaching bolts, then lift master cylinder from mounting studs.

4. Reverse procedure to install.

Ford Bronco Workshop Manual (V8-351 5.8L VIN G 2-bbl (1982))
Ford Workshop Manuals > Brakes and Traction Control > Hydraulic System, Brakes > Wheel Cylinder > Component Information > Technical Service Bulletins > Customer Interest for Wheel Cylinder: > 841628 > Jul > 84 > Brakes (Rear) - Accelerated Wear

Wheel Cylinder: Customer Interest Brakes (Rear) - Accelerated Wear

Articles No. 84-16-28

BRAKE, REAR - ACCELERATED WEAR - VEHICLES WITH 11" DIAMETER REAR BRAKES

LIGHT TRUCKS 1975-84 E & F-100/150 & BRONCO

This article supersedes TSB article 83-25-18, dated December 13, 1983, to include all 1975-84 E & F-100/150 & Bronco vehicles that have 11" diameter rear brakes.

Some E and F-100/150 and Bronco vehicles subjected to extreme duty cycles in urban delivery/service operations may experience accelerated rear brake wear. A service kit(E0UZ-2C178-A) has been released for these vehicles and should be installed in its entirety if the vehicle exhibits any of the following conditions:

^ Side to side imbalance in rear braking effectiveness.

^ Side to side imbalance in rear brake lining wear.

^ Excessive heat ("blued" shoes and/or drums).

The service kit consists of replacement front and rear brake linings, rear wheel cylinders and a proportioning valve. These parts must be installed per the appropriate shop manual installation procedure.

NOTE: If a misalignment between the drum braking surface and the shoe ledge guides of the brake backing plate is suspected, refer to TSB 82-24 for the appropriate service procedures before installing the service kit (E0UZ-2C178-A).

PART NUMBER PART NAME CLASS

E0UZ-2C178-A Brake Service Kit C

Front/Rear Services

OTHER APPLICABLE ARTICLES: 82-24-17 ARTICLE SUPERSEDED: 83-25-18 WARRANTY STATUS: Reimbursable within the provisions of the Warranty and Policy Manual. OPERATION: SP2178A83 TIME:

2.3 Hrs. DLR. CODING: Basic Part No. 2200 Code: 30

Wheel Cylinder: All Technical Service Bulletins Brakes (Rear) - Accelerated Wear

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2.3 Hrs. DLR. CODING: Basic Part No. 2200 Code: 30

Parking Brake Cable: Technical Service Bulletins Parking Brake Cables - New Plastic Coated Design

Article No. 83-14-19

PARKING BRAKE CABLE - PLASTIC COATED - SERVICE RELEASE

LIGHT TRUCKS 1980-82 E, F & BRONCO

New plastic coated parking brake cables have been released to service 1980-82 E, F and Bronco vehicles. These new cables will result in improved resistance to corrosion and contamination and should be considered for vehicles. The rear cables are packaged in kit form and require both cables to be installed when replacing the prior level cables. The kit also contains other rear brake components that should be installed at that time.

New plastic coated front parking brake cables are also released for all 1980-82 F Series, Bronco, and Econoline vehicles. It is not always necessary to replace the front cables along with the rear cables; the vehicle must be inspected first to determine which cables require replacement.

REAR PARKING BRAKE KITS Model

Kit Number

F-100/150/Bronco 11" Rear Brake E0TZ-2A753-A

F-100 10" Rear Brake E0TZ-2A753-B

F-250/350 12" Rear Brake E0TZ-2A753-C

E-100/150 11" Rear Brake E0UZ-2A753-A

E-250/350 12" Rear Brake E0UZ-2A753-B

FRONT PARKING BRAKE CABLE

Model Wheel Base Part Number

F Series 117" E0TZ-2853-K

133" E0TZ-2853-L

138" E0TZ-2853-M

155" E0TZ-2853-N

161" E0TZ-2853-R

Bronco E0TZ-2853-S

Econoline 124" E0UZ-2853-A

138" E0UZ-2853-B

158" E0UZ-2853-C

176" E0UZ-2853-D

PART NUMBER PART NAME CLASS

E0TZ-2A753-A 11" Rear Parking Brake Kit C

F100/150/Bronco

E0TZ-2A753-B 10" Rear Parking Brake Kit C

F100

E0TZ-2A753-C 12" Rear Parking Brake Kit C

F250/350

E0UZ-2A753-A 11" Rear Parking Brake Kit C

E100/150

E0UZ-2A753-B 12" Rear Parking Brake Kit C

E250/350

E0TZ-2853-K Front Parking Brake Cable C

F Series 117"

E0TZ-2853-L Front Parking Brake Cable C

F Series 133"

E0TZ-2853-M Front Parking Brake Cable C

F Series 138"

E0TZ-2853-N Front Parking Brake Cable C

F Series 155"

E0TZ-2853-R Front Parking Brake Cable C

F Series 161"

E0TZ-2853-S Front Parking Brake Cable C

Bronco

E0UZ-2853-A Front Parking Brake Cable C

Econoline 124"

E0UZ-2853-B Front Parking Brake Cable C

Econoline 138"

E0UZ-2853-C Front Parking Brake Cable C

Econoline 158"

E0UZ-2853-D Front Parking Brake Cable C

Econoline 176"

OTHER APPLICABLE ARTICLES: None WARRANTY STATUS: "INFORMATION ONLY"

Parking Brake Control: Adjustments

EXC. 1985-87 E-350 W/ORSCHEIN PARKING BRAKE LEVER

1. Position parking brake pedal to fully released position, then tighten equalizer nut 6 full turns while preventing automatic adjuster from turning.

2. Depress parking brake pedal fully and measure cable tension. Cable tension should meet the following specifications: 1980 front cable with parking brake set in second notch, 120-160 lbs., and 1981-87 rear cable with parking brake fully applied, 350 lbs.

3. If cable tension is not within specifications, repeat step 3 and recheck.

4. Release parking brake and check for rear wheel drag. If brake drag is noted on 1983---87 E-250---350 & F-250---350 models and 1980---82 E-250---350 models after brake adjustment, remove rear drums and measure clearance between parking brake lever and cam plate. This clearance should be .015 inch with brakes fully released. If clearance is not .015 inch, repeat cable adjustment procedure.

Vacuum Brake Booster: Description and Operation

The single and tandem vacuum boosters are self contained vacuum hydraulic power braking units. These are vacuum suspended units that use vacuum and atmospheric pressure for their power. On gasoline engine vehicles, vacuum is supplied through a fitting in the intake manifold. On diesel engine vehicles, vacuum is supplied through a vacuum pump. The three basic elements of the booster are the vacuum power chamber, mechanically actuated booster check valve and a hydraulic dual master cylinder which supplies hydraulic pressure to the brake system. The vacuum power chamber consists of a front and rear shell, diaphragm, diaphragm plate, hydraulic pushrod and vacuum diaphragm return spring. The mechanically actuated booster check valve controls the degree of power brake application in accordance with foot pressure applied to the valve operating rod through the brake pedal linkage. This valve is integral with the vacuum power diaphragm.

Vacuum Brake Booster: Service and Repair

1. Disconnect battery ground cable.

2. Disconnect stop lamp switch electrical connectors.

3. Support underside of master cylinder, then remove power brake unit-to-master cylinder attaching nuts.

4. Remove vacuum hose between manifold and power brake unit, or power brake unit check valve. Remove check valve, if equipped.

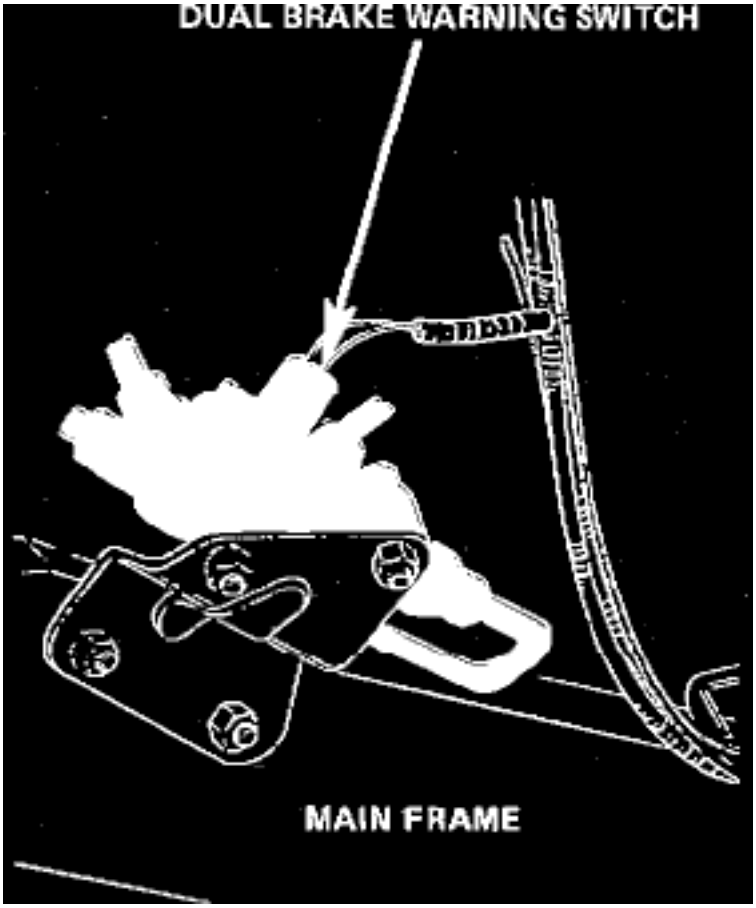
5. Separate power brake unit and master cylinder, leaving master cylinder supported far enough away to allow removal of power brake unit.

6. On models equipped with push rod mounted stop lamp switch, remove retaining pin, then slide switch, push rod, spacers and bushing off brake pedal pin.

7. On models equipped with brake pedal mounted stop lamp switch, remove attaching bolt, nut and plastic bushing, then disconnect power brake unit push rod from brake pedal.

8. Remove power brake unit attaching bolts and the power brake unit.

9. Reverse procedure to install.



Brake Fluid Pressure Sensor/Switch: Locations

RH Frame Mainmember, Behind Cab.

Attached To LH Frame Member

Applicable to: 1981-83

Clutch Switch: Locations

At Top Of Clutch Pedal

Clutch Switch: Testing and Inspection

Manual Transmission Vehicles Only This switch functions magnetically. Do not use magnetized tools near this switch.

1. If the switch is open when the clutch pedal is released, speed control will not operate. This must be corrected before making any other tests. Use only a multimeter of 5000 ohm/volt rating or higher when performing the clutch switch test.

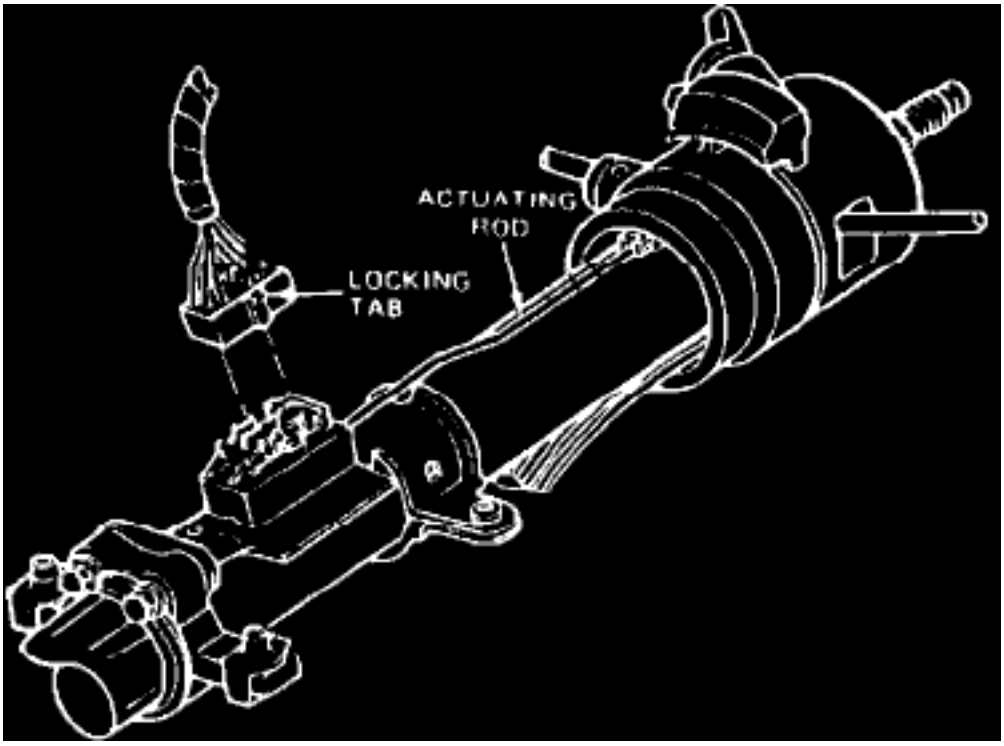
2. Disconnect switch pigtail connector from speed control harness connector and connect an ohmmeter to the two switch connector terminals.

3. With clutch pedal in the fully released position, the resistance should be less than 5 ohms. With clutch pedal fully depressed, the circuit should be open.

4. If switch does not function as described, remove and replace switch.

Ignition Switch: Locations

Attached To Steering Column



Ignition Switch: Service and Repair

Fig. 3 Ignition switch replacement

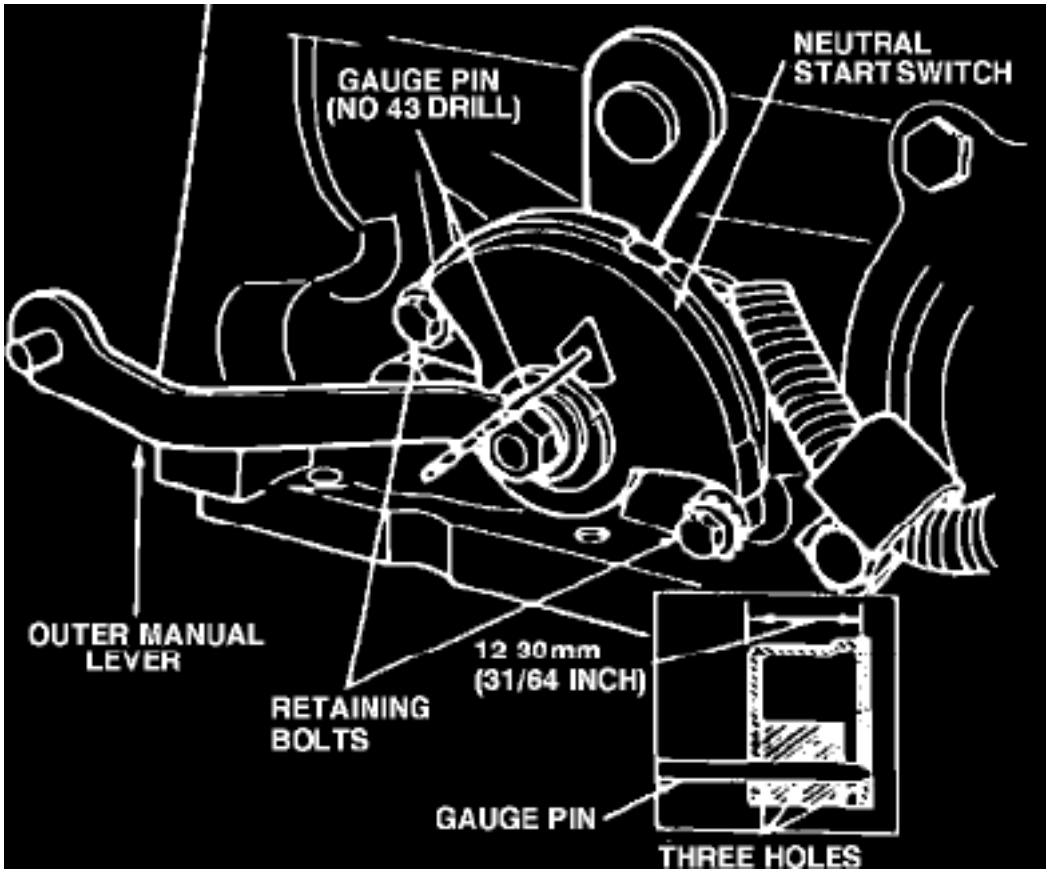
1. Disconnect battery ground cable.

2. Remove steering column shroud and lower the steering column.

3. Disconnect electrical connector from switch, then remove 2 switch attaching nuts.

4. Lift switch up to disengage actuator rod, then remove switch from vehicle, Fig. 3.

5. Reverse procedure to install.



Neutral Safety Switch: Service and Repair

Fig. 8 Neutral safety switch replacement. Exc. automatic overdrive transmission

EXC. AUTOMATIC OVERDRIVE TRANSMISSION

1. Disconnect battery ground cable.

2. Remove downshift linkage rod return spring from low-reverse servo cover.

3. Apply penetrating oil to outer lever attaching nut, then remove transmission downshift outer lever attaching nut and lever.

4. Remove neutral safety switch attaching bolts, then disconnect electrical connectors and remove switch from vehicle.

5. To install, position switch on transmission and secure with attaching bolts. Do not tighten bolts at this time.

6. Place transmission manual lever in neutral position, then insert a .091 inch gauge pin through gauge pin holes, Fig. 8.

7. Tighten switch attaching bolts, then remove gauge pin.

8. Install outer downshift lever and retaining nut.

9. Install downshift linkage rod return spring between lever and retaining clip on low-reverse servo cover.

10. Reconnect electrical connectors, then check operation of switch.

W/AUTOMATIC OVERDRIVE TRANSMISSION

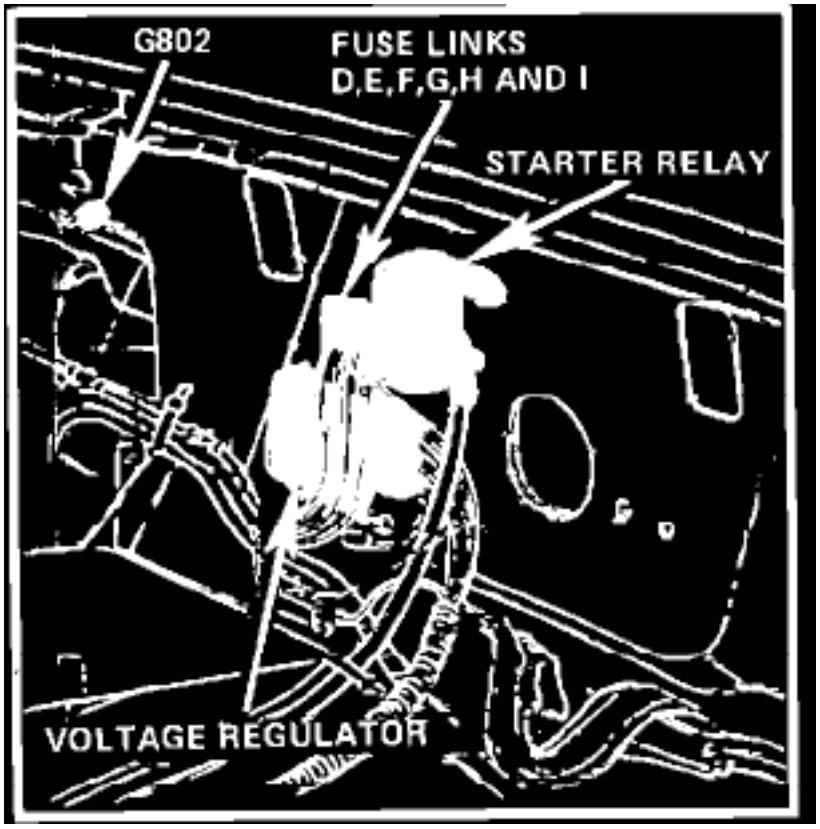
1. Disconnect battery ground cable.

2. Raise and support vehicle.

3. Disconnect electrical connector at neutral safety switch, lifting connector straight up.

4. Using suitable socket, remove neutral safety switch and O-ring seal.

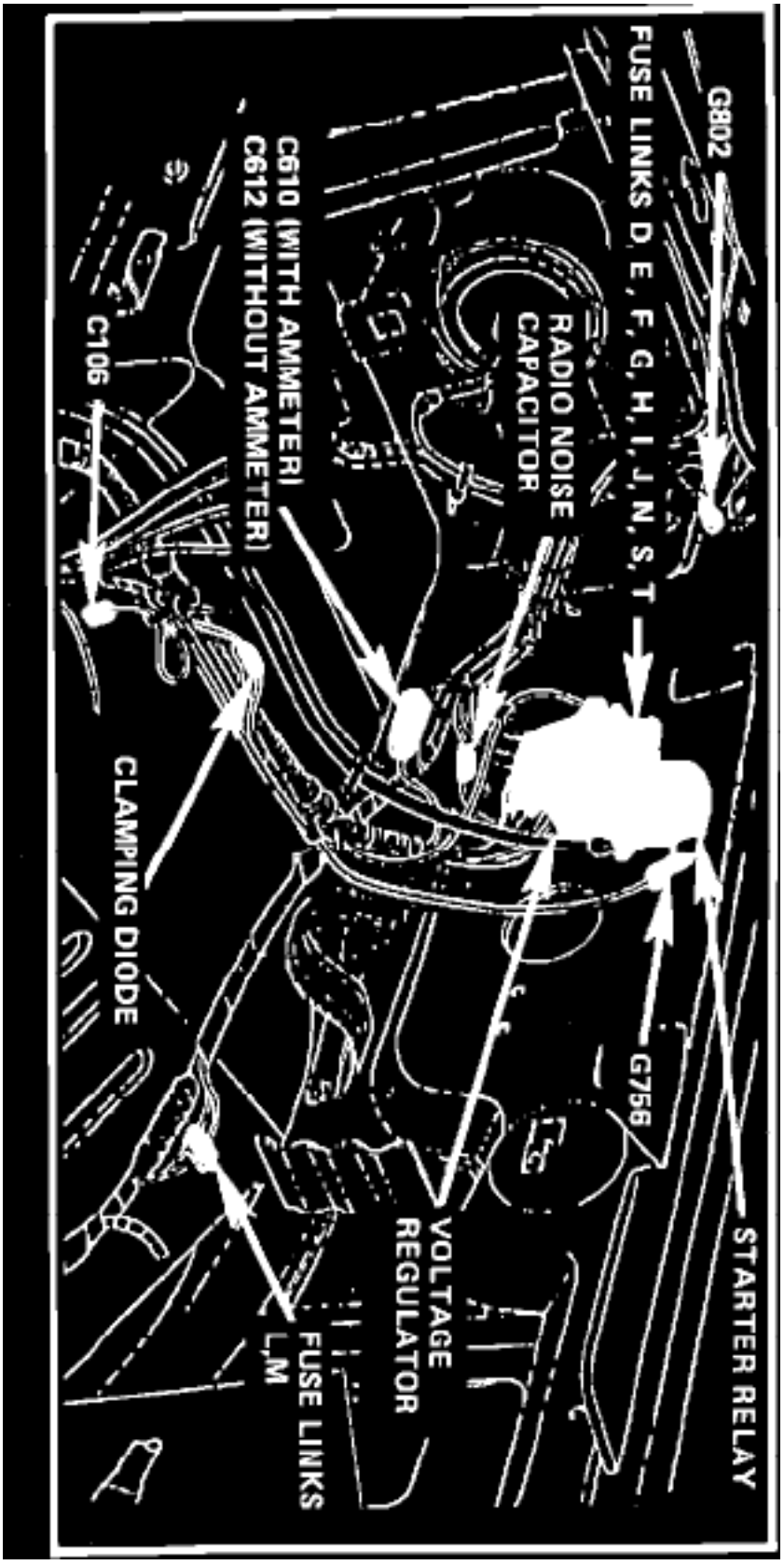
5. Reverse procedure to install, installing new O-ring seal.



Starter Relay: Locations All Engine

RH Front Fender Apron

On RH Fender Apron

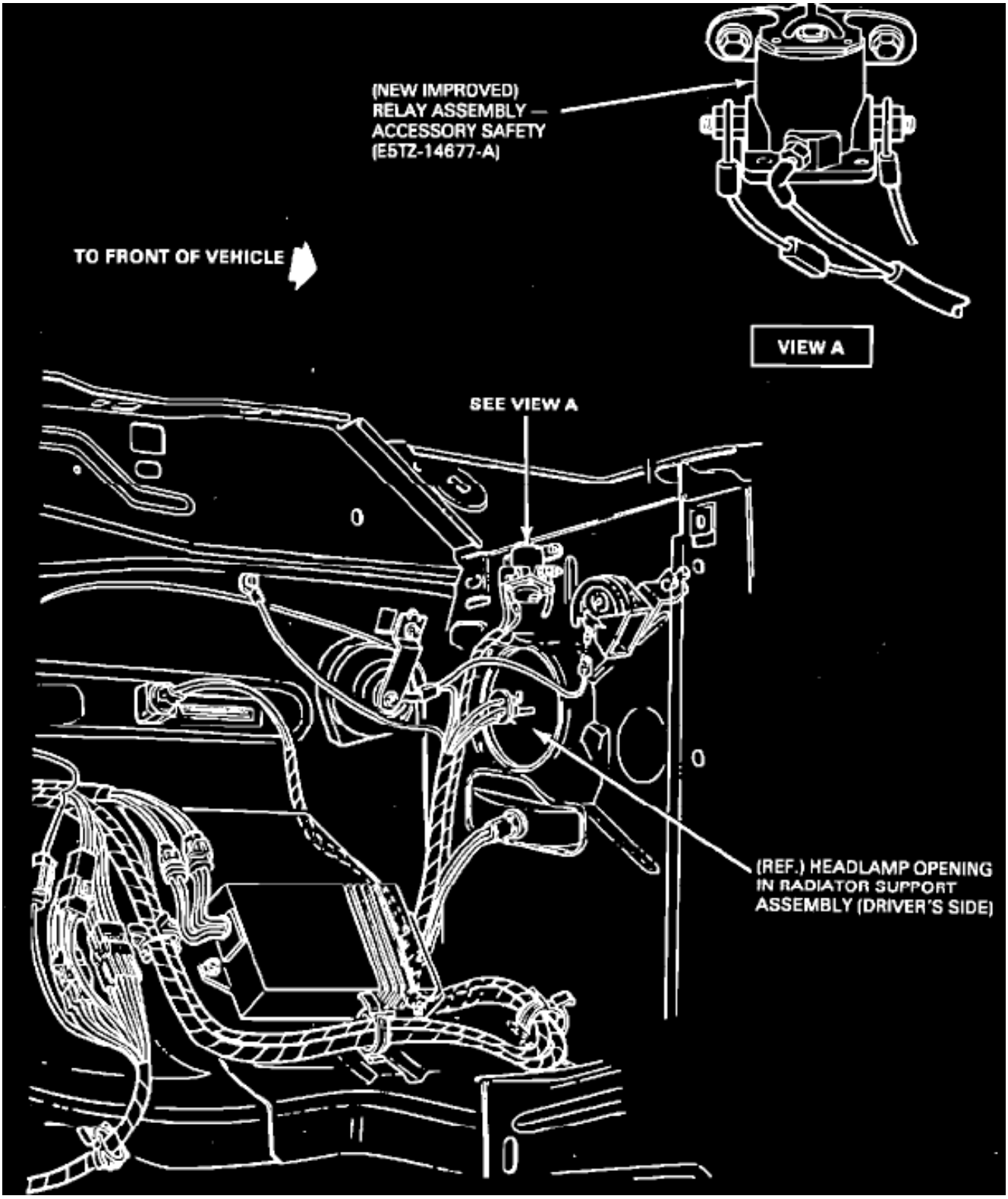

G802
FUSE LINKS D, E, F, G, H, I, J, N, S, T
RADIO NOISE CAPACITOR
C610 (WITH AMMETER)
C612 (WITHOUT AMMETER)
C106
CLAMPING DIODE
G756
STARTER RELAY
VOLTAGE REGULATOR
FUSE LINKS L,M

Starter Relay: Locations 1981-82 All & 1983-85 W/EEC

RH Front Fender Apron.

On RH Fender Apron

Applicable to: 1981-82 All & 1983-85 w/EEC



Battery: Technical Service Bulletins Auxiliary Battery Relay - Improved Design

Article No. 85-21-12

WIRING - AUXILIARY BATTERY RELAY-IMPROVED WEATHER RESISTANT DESIGN

LIGHT TRUCK 1973-86 E, F SERIES, BRONCO

Figure 14 - ECONOLINE LOCATION

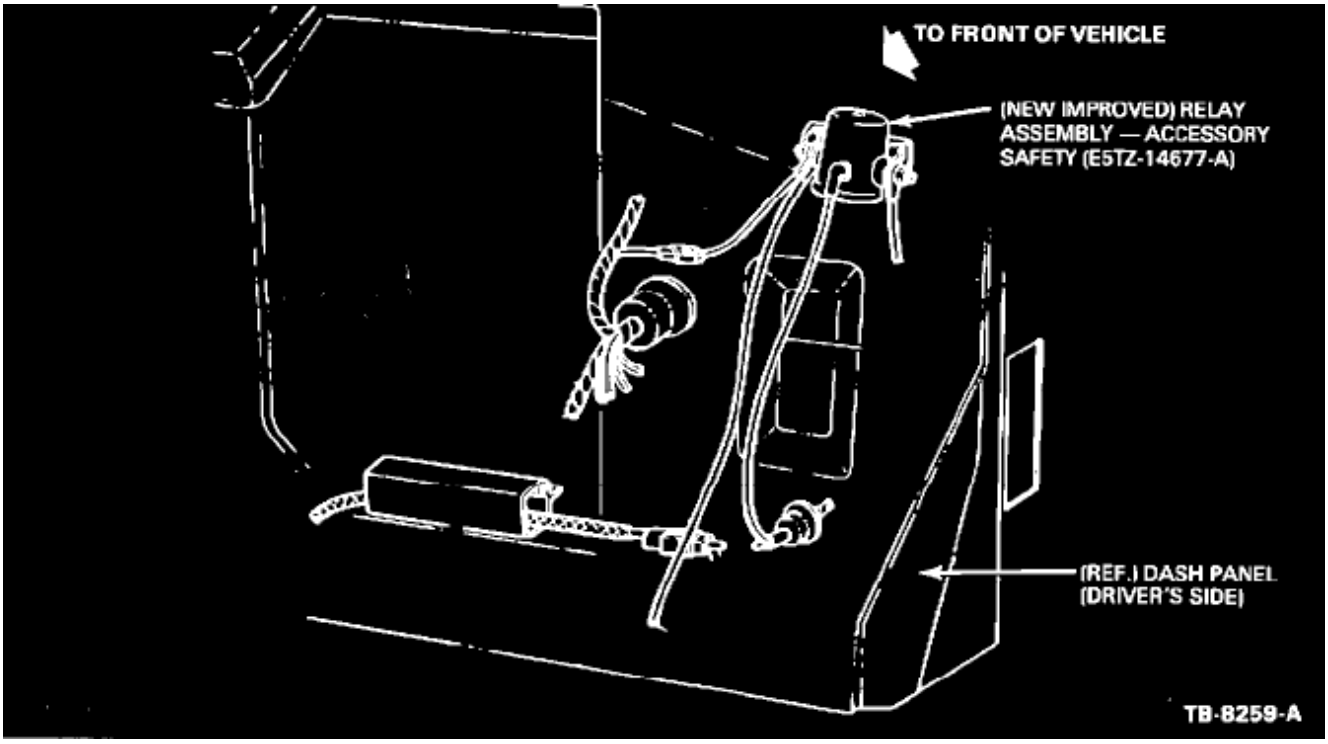


Figure 15 - F-150/350 TRUCK AND BRONCO LOCATION

An improved weather resistant auxiliary battery relay has been released for the subject vehicles equipped with an auxiliary battery. (See Figures 14 and 15)

The new relay (E5TZ-14677-A) is a direct replacement for the old relay, D3TZ-14377-B, which has been discontinued.

PART NUMBER PART NAME CLASS

E5TZ-14677-A Auxiliary Battery Relay A

OTHER APPLICABLE ARTICLES: None WARRANTY STATUS: "INFORMATION ONLY"

Battery: Specifications

BCI Group Number Cranking Performance

61 310 A

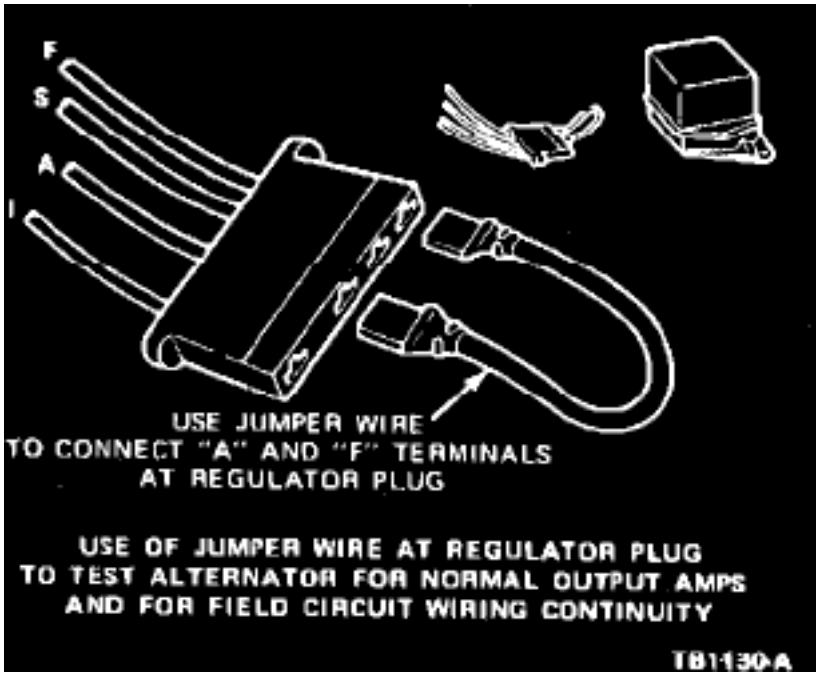
62 380 A

24F 500 A

24 535 A

Battery: Locations

LH Front Fender Well



Diode Trio: Testing and Inspection

Fig. 9 Regulator plug. Jumper wire connection

Test Procedure

1. Disconnect electric choke, if equipped.

2. Disconnect voltage regulator wiring connector.

3. Connect a jumper wire between the ``A'' and ``F'' terminals of the voltage regulator wiring connector, Fig. 9.

4. Connect voltmeter to battery clamps. Then, start and idle engine.

5. Observe and note voltmeter reading.

6. Move the voltmeter positive lead to the alternator ``S'' terminal and note voltage reading.

Test Results

1. If voltmeter reading is within {1/2} of battery voltage, the diodes are satisfactory.

2. If voltmeter reading is approximately 1.5 volts, the alternator has a shorted negative diode or a grounded stator winding.

3. If voltmeter reading is approximately 1.5 volts less than battery voltage, the alternator has a shorted positive diode.

4. If voltage reading is approximately 1 to 1.5 volts less than {1/2} battery voltage, the alternator has an open positive diode.

5. If voltage reading is 1 to 1.5 volts above {1/2} battery voltage, the alternator has an open negative diode.

6. Reconnect electric choke into circuit after tests are completed, if equipped.

Rectifier Diode / Bridge: Technical Service Bulletins Alternator - Rectifier Bench Test Procedure

Article No. 84-3-5

ALTERNATOR - RECTIFIER BENCH TEST PROCEDURE

FORD ALL

LINCOLN-MERCURY ALL

LIGHT TRUCKS ALL

MEDIUM/HEAVY TRUCKS ALL

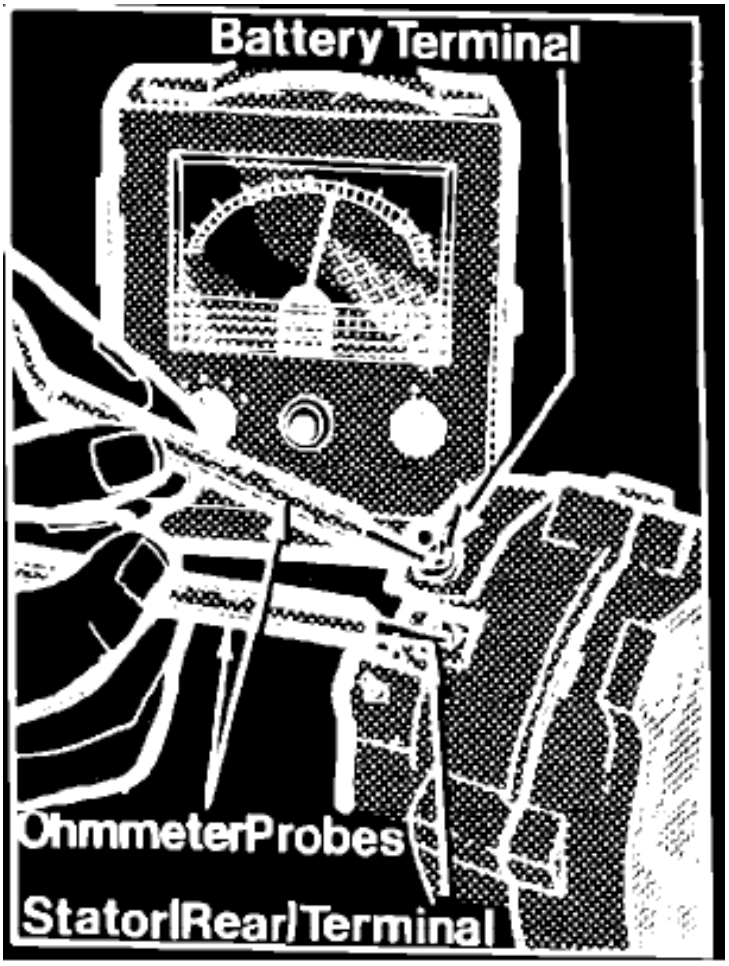
During a recent dealer survey, it was discovered that some technicians are using digital meters for alternator testing, despite specific instructions in the Shop Manual to the contrary. The digital meters cannot be used for checking rectifier assemblies or diodes in the alternator. This may explain a portion of non-defective rectifiers returned under warranty.

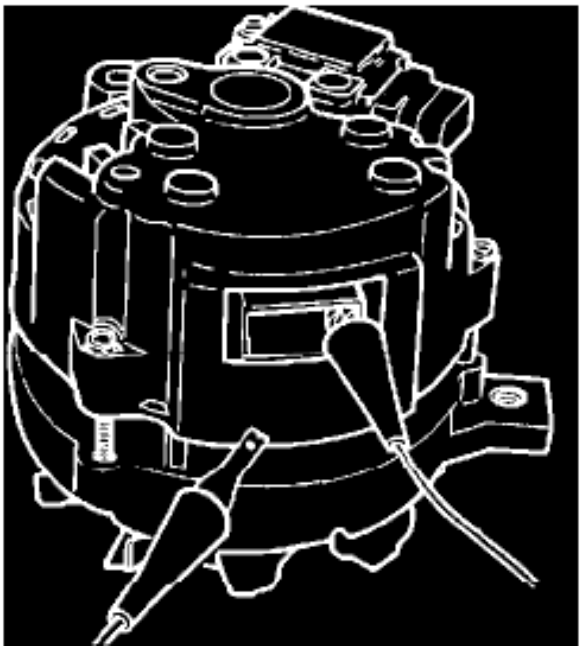
Alternator Rectifier Testing Information

The use of digital meters when bench testing an alternator rectifier assembly can cause misdiagnosis. It is recommended in the Shop Manual (Section 31) that a Rotunda Meter Model #059-00003, or equivalent, be used. Equivalent test meters must be of the "analog" type, not digital. A digital meter could only be used if it has a diode checking function. However, the readings should be compared with those of a new part to confirm the results.

If the rectifier is found to be okay, check for possible pinched or grounded wires to the inside of the housing. Then reassemble the alternator with the tested rectifier. The Shop Manual Charging System Diagnostic Procedure should be reviewed to confirm proper procedures were used. Remember to first check for proper drive belt tension and proper wire connections at the alternator and voltage regulator.

OTHER APPLICABLE ARTICLES: None WARRANTY STATUS: "INFORMATION ONLY"


Battery Terminal
Ohmmeter Probes
Stator Rear Terminal

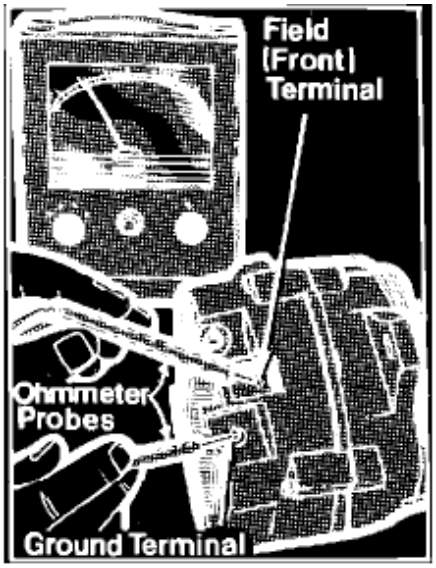


Rectifier Diode / Bridge: Testing and Inspection

Fig. 13 Testing diode trio

Fig. 14 Alternator w/integral regulator rectifier short or grounded & stator grounded test

RECTIFIER SHORT OR GROUNDED & STATOR GROUNDED TEST Using a suitable ohmmeter, connect one probe to the alternator BAT terminal, Figs. 13 and 14, and the other probe to the STA terminal (rear blade terminal). Then, reverse the ohmmeter probes and repeat the test. A reading of about 6.5 ohms should be obtained in one direction and no needle movement with the probes reversed. A reading in both directions indicates a bad positive diode, a grounded positive diode plate or a grounded BAT terminal. Perform the same test using the STA and GND (ground) terminals of the alternator. A reading in both directions indicates either a bad negative diode, a grounded stator winding, a grounded stator terminal, a grounded positive diode plate, or a grounded BAT terminal. Infinite readings (no needle movement) in all four probe positions in the preceding tests indicates an open STA terminal lead connection inside the alternator.


Field
(Front)
Terminal
Ohmmeter
Probes
Ground Terminal

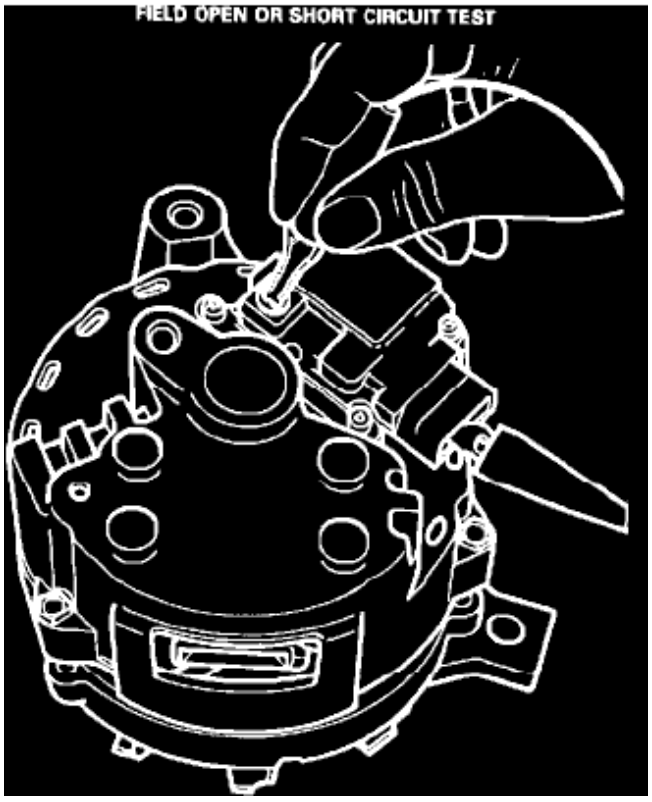

FIELD OPEN OR SHORT CIRCUIT TEST

Fig. 15 Testing rectifier bridge diodes

FIELD OPEN OR SHORT CIRCUIT TEST Exc. Alternators W/Integral Regulators Using a suitable ohmmeter, connect the alternator field terminal with one probe and the ground terminal with the other probe, Fig. 15. Then, spin the alternator pulley. The ohmmeter reading should be between 2.4 and 25 ohms on 1980 units, 2.4 and 100 ohms on all 1981-85 units and 1986-87 models less IAR system, and should fluctuate while the pulley is turning. An infinite reading (no meter movement) indicates an open brush lead, worn or stuck brushes, or a bad rotor assembly. An ohmmeter reading of less than 2.4 ohms indicates a grounded brush assembly, a grounded field terminal or a bad rotor.

Fig. 16 Alternator w/integral regulator field open or short circuit test

Alternators W/Integral Regulators

1. Using a suitable ohmmeter, connect regulator A blade terminal with one probe and the regulator ``F'' screw head with the other probe, Fig. 16.

2. Spin the alternator pulley and note meter reading, then reverse probes and repeat step 1. In one probe direction ohmmeter reading should be between 2.2 and 100 ohms and may fluctuate while pulley is turning. In the other direction, reading should fluctuate between 2.2 and approximately 9 ohms.

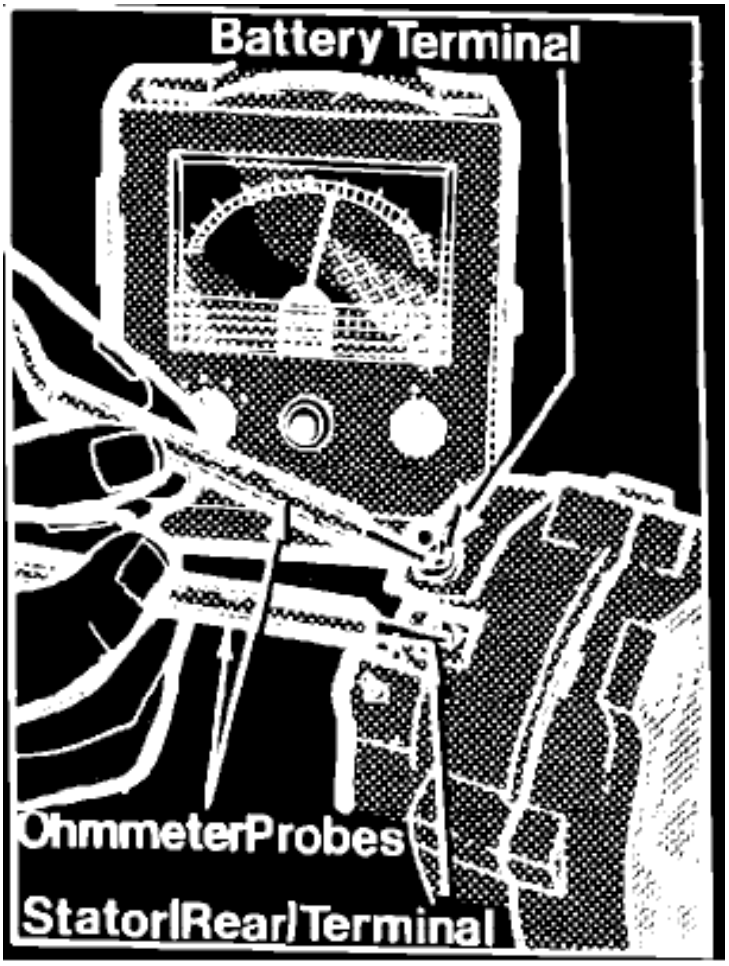
3. An infinite reading (no meter movement) in one direction and approximately 9 ohms in the other, indicates an open brush lead, worn or stuck brushes, defective rotor or a loose regulator to brush holder attaching screw.

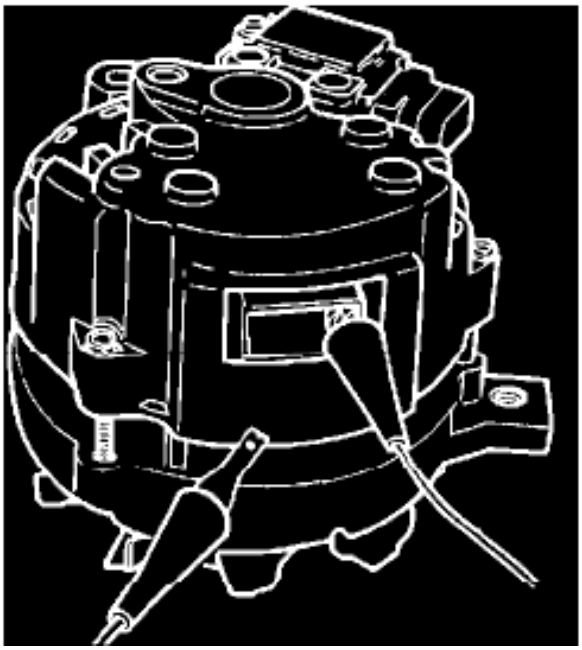
4. An ohmmeter reading less than 2.2 ohms in both directions indicates a shorted or defective regulator.

5. An ohmmeter reading significantly over 9 ohms in both directions indicates a defective regulator or loose ``F'' terminal screw.

6. Connect alternator rear housing with one ohmmeter probe and touch the other probe to the regulator ``F'' terminal. Reverse probes and repeat test. Ohmmeter reading should be infinite in one probe direction and approximately 9 ohms in the other.

7. If ohmmeter reads less than infinite at either point, a grounded brush lead, grounded rotor or defective regulator is indicated.


Battery Terminal
Ohmmeter Probes
Stator Rear Terminal

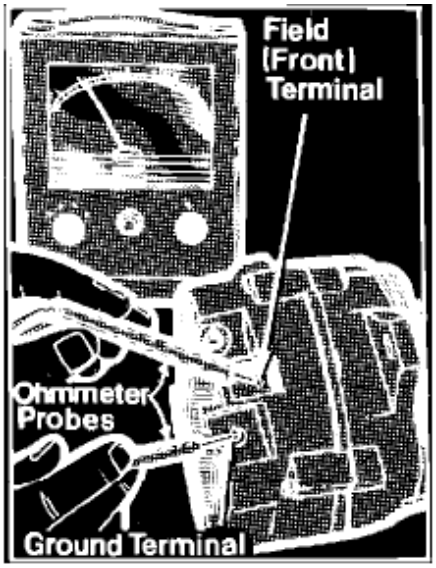


Stator: Testing and Inspection

Fig. 13 Testing diode trio

Fig. 14 Alternator w/integral regulator rectifier short or grounded & stator grounded test

RECTIFIER SHORT OR GROUNDED & STATOR GROUNDED TEST Using a suitable ohmmeter, connect one probe to the alternator BAT terminal, Figs. 13 and 14, and the other probe to the STA terminal (rear blade terminal). Then, reverse the ohmmeter probes and repeat the test. A reading of about 6.5 ohms should be obtained in one direction and no needle movement with the probes reversed. A reading in both directions indicates a bad positive diode, a grounded positive diode plate or a grounded BAT terminal. Perform the same test using the STA and GND (ground) terminals of the alternator. A reading in both directions indicates either a bad negative diode, a grounded stator winding, a grounded stator terminal, a grounded positive diode plate, or a grounded BAT terminal. Infinite readings (no needle movement) in all four probe positions in the preceding tests indicates an open STA terminal lead connection inside the alternator.


Field
(Front)
Terminal
Ohmmeter
Probes
Ground Terminal

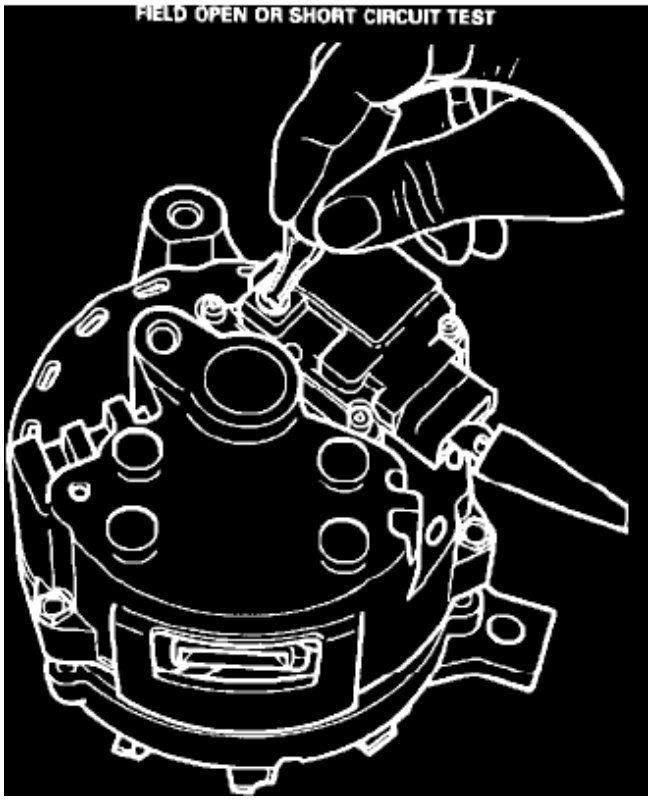

FIELD OPEN OR SHORT CIRCUIT TEST

Fig. 15 Testing rectifier bridge diodes

FIELD OPEN OR SHORT CIRCUIT TEST Exc. Alternators W/Integral Regulators Using a suitable ohmmeter, connect the alternator field terminal with one probe and the ground terminal with the other probe, Fig. 15. Then, spin the alternator pulley. The ohmmeter reading should be between 2.4 and 25 ohms on 1980 units, 2.4 and 100 ohms on all 1981-85 units and 1986-87 models less IAR system, and should fluctuate while the pulley is turning. An infinite reading (no meter movement) indicates an open brush lead, worn or stuck brushes, or a bad rotor assembly. An ohmmeter reading of less than 2.4 ohms indicates a grounded brush assembly, a grounded field terminal or a bad rotor.

Fig. 16 Alternator w/integral regulator field open or short circuit test

Alternators W/Integral Regulators

1. Using a suitable ohmmeter, connect regulator A blade terminal with one probe and the regulator ``F'' screw head with the other probe, Fig. 16.

2. Spin the alternator pulley and note meter reading, then reverse probes and repeat step 1. In one probe direction ohmmeter reading should be between 2.2 and 100 ohms and may fluctuate while pulley is turning. In the other direction, reading should fluctuate between 2.2 and approximately 9 ohms.

3. An infinite reading (no meter movement) in one direction and approximately 9 ohms in the other, indicates an open brush lead, worn or stuck brushes, defective rotor or a loose regulator to brush holder attaching screw.

4. An ohmmeter reading less than 2.2 ohms in both directions indicates a shorted or defective regulator.

5. An ohmmeter reading significantly over 9 ohms in both directions indicates a defective regulator or loose ``F'' terminal screw.

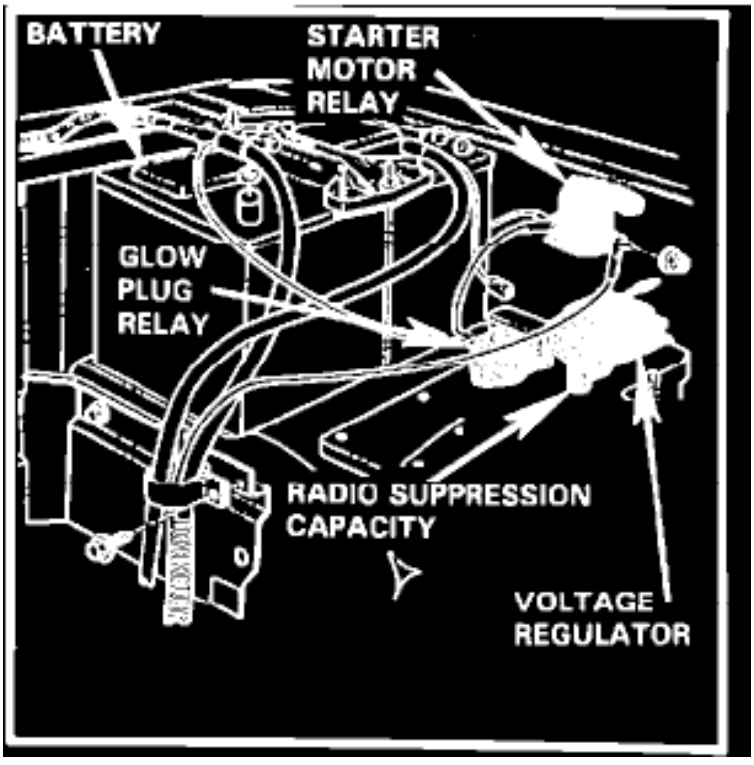
6. Connect alternator rear housing with one ohmmeter probe and touch the other probe to the regulator ``F'' terminal. Reverse probes and repeat test. Ohmmeter reading should be infinite in one probe direction and approximately 9 ohms in the other.

7. If ohmmeter reads less than infinite at either point, a grounded brush lead, grounded rotor or defective regulator is indicated.

Voltage Regulator: Specifications

Measure battery voltage and record figure. With engine operating off idle and all secondary electrical systems turned off, regulated voltage should be no greater than 2 volts above recorded figure. Turn on headlights and set heater blower to high. Regulated voltage off idle should be no less than 0.5 volts above recorded figure.


G802
FUSE LINKS
D,E,F,G,H AND I
STARTER RELAY
VOLTAGE REGULATOR


BATTERY
STARTER
MOTOR
RELAY
GLOW
PLUG
RELAY
RADIO SUPPRESSION
CAPACITY
VOLTAGE
REGULATOR

Voltage Regulator: Locations

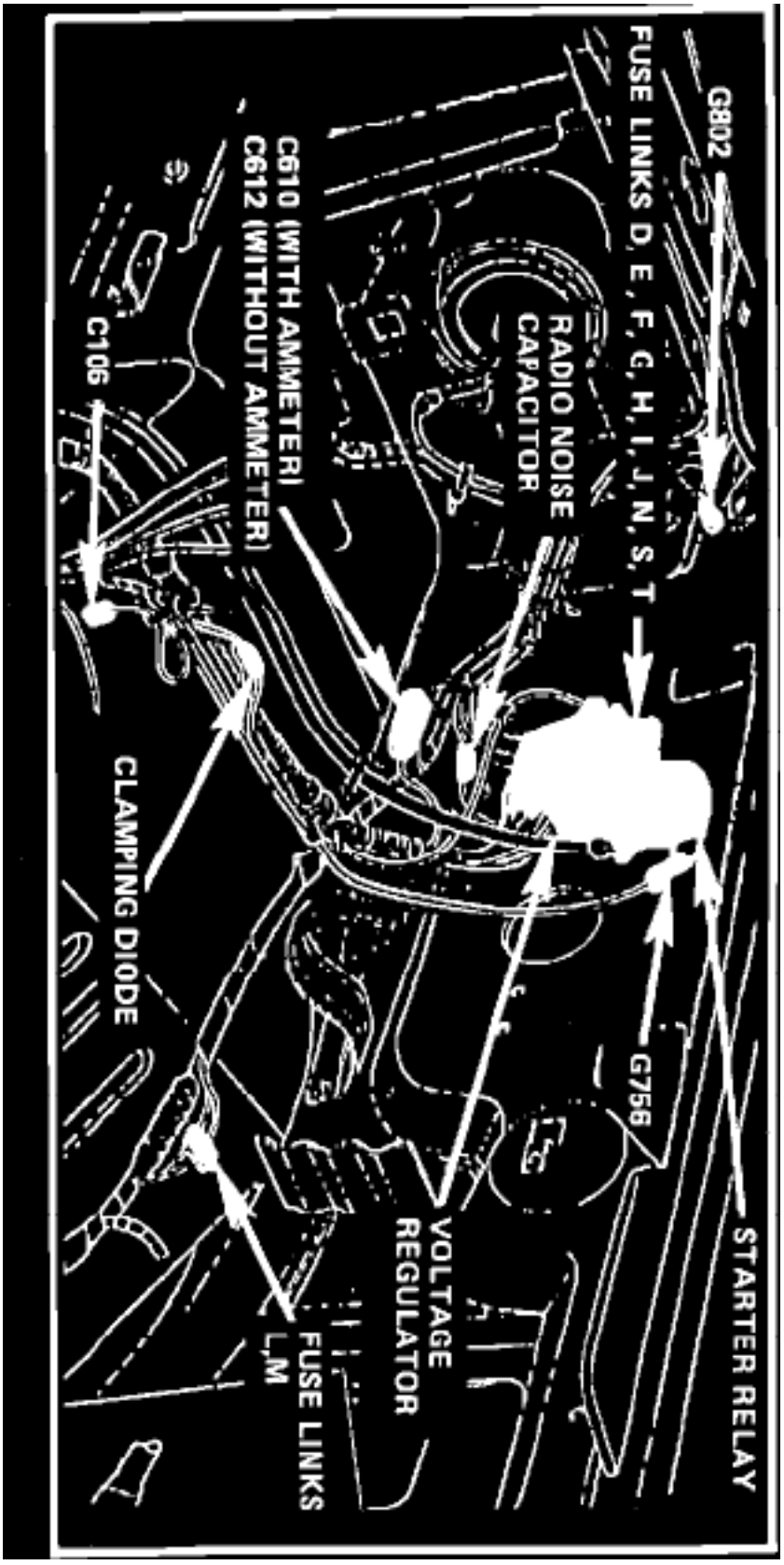
RH Front Fender Apron

Mounted On RH Fender Apron

RH Front Fender Well.

Mounted On RH Fender Apron

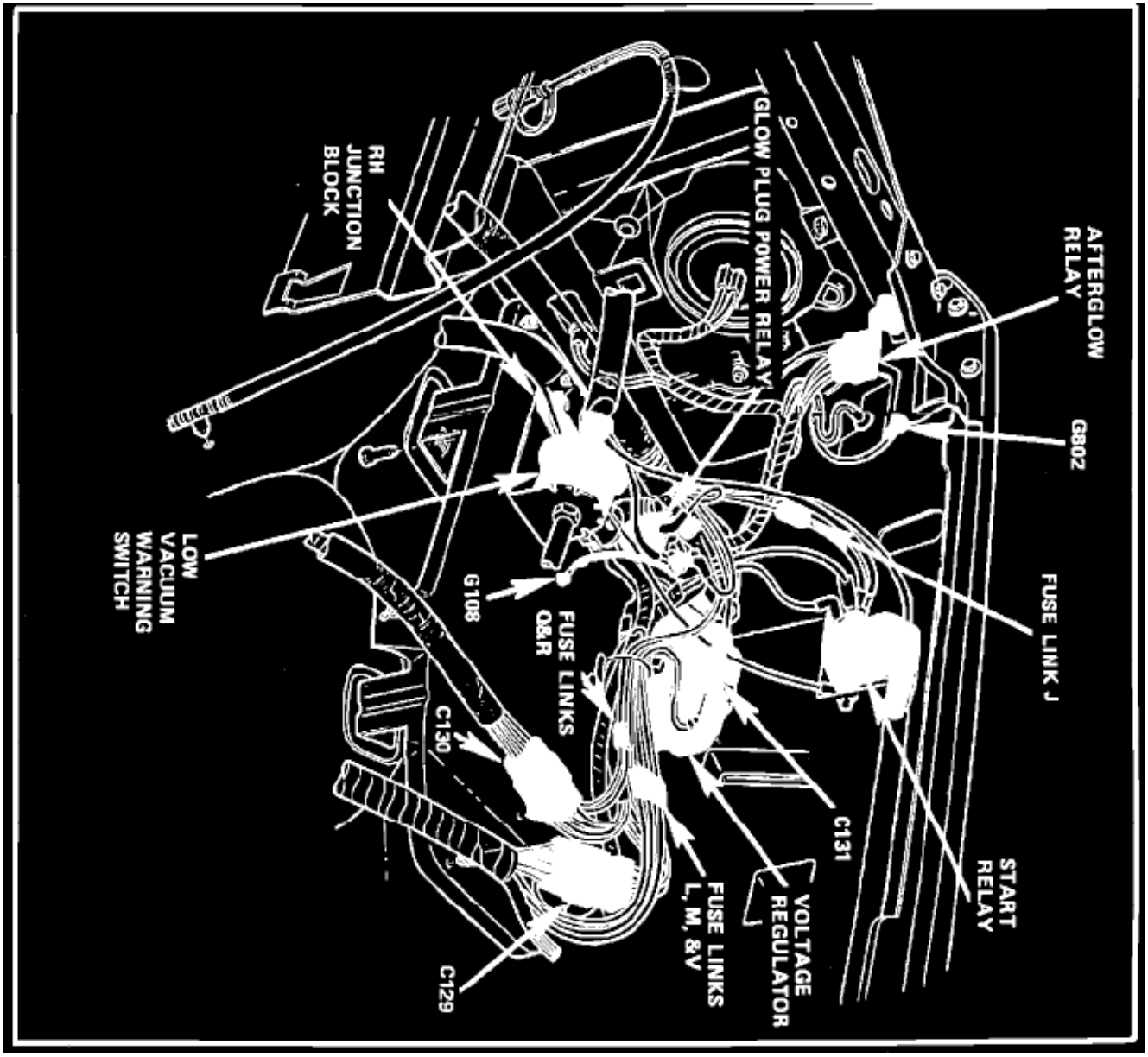
Applicable to: 1984-85 w/Diesel Engine


G802
FUSE LINKS D, E, F, G, H, I, J, N, S, T
RADIO NOISE CAPACITOR
C610 (WITH AMMETER)
C612 (WITHOUT AMMETER)
C106
CLAMPING DIODE
G756
STARTER RELAY
VOLTAGE REGULATOR
FUSE LINKS L,M

RH Front Fender Apron.

Mounted On RH Fender Apron

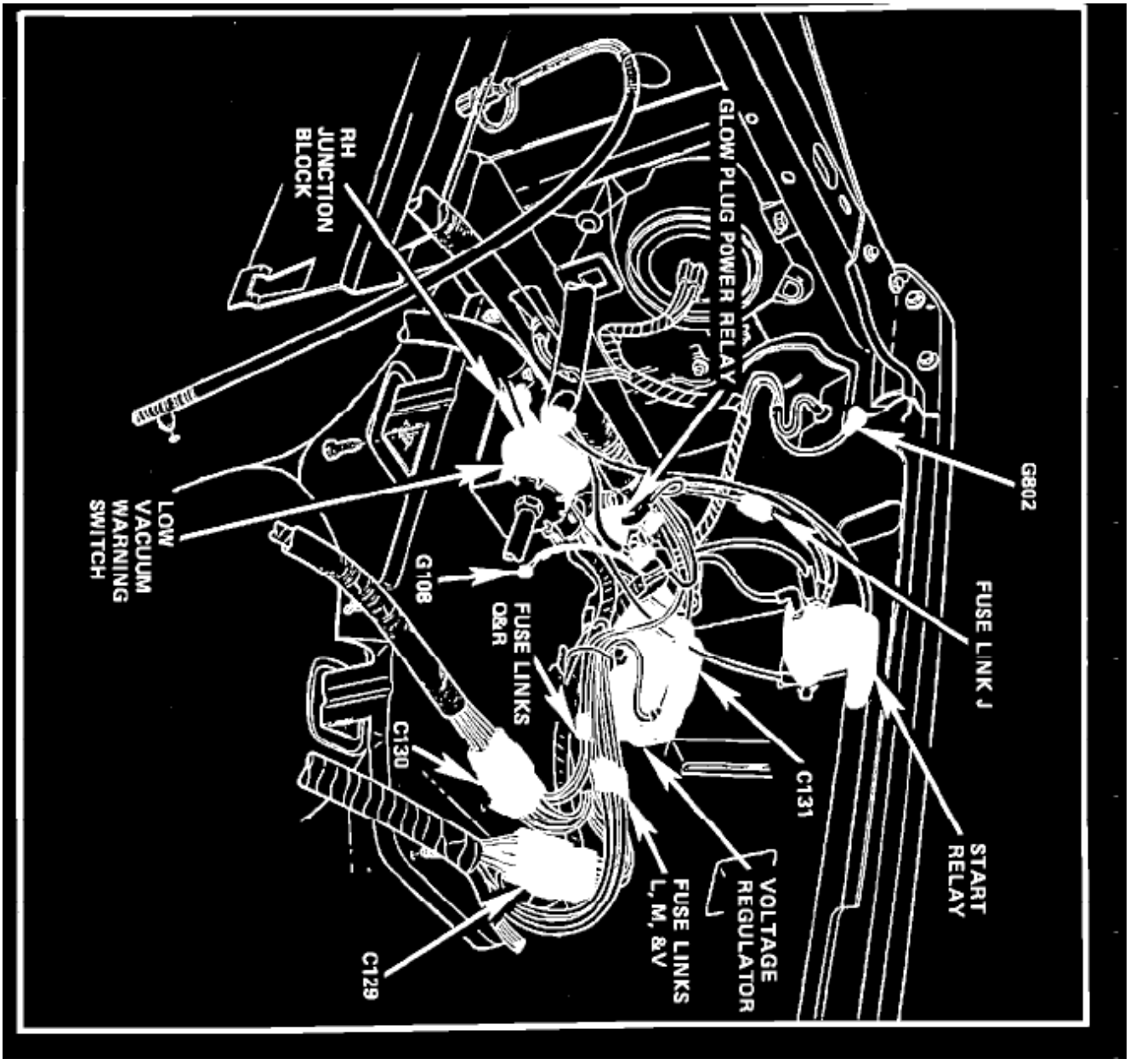
Applicable to: 1981-82 All & 1983-85 w/EEC



RH Fender Apron.

Mounted On RH Fender Apron

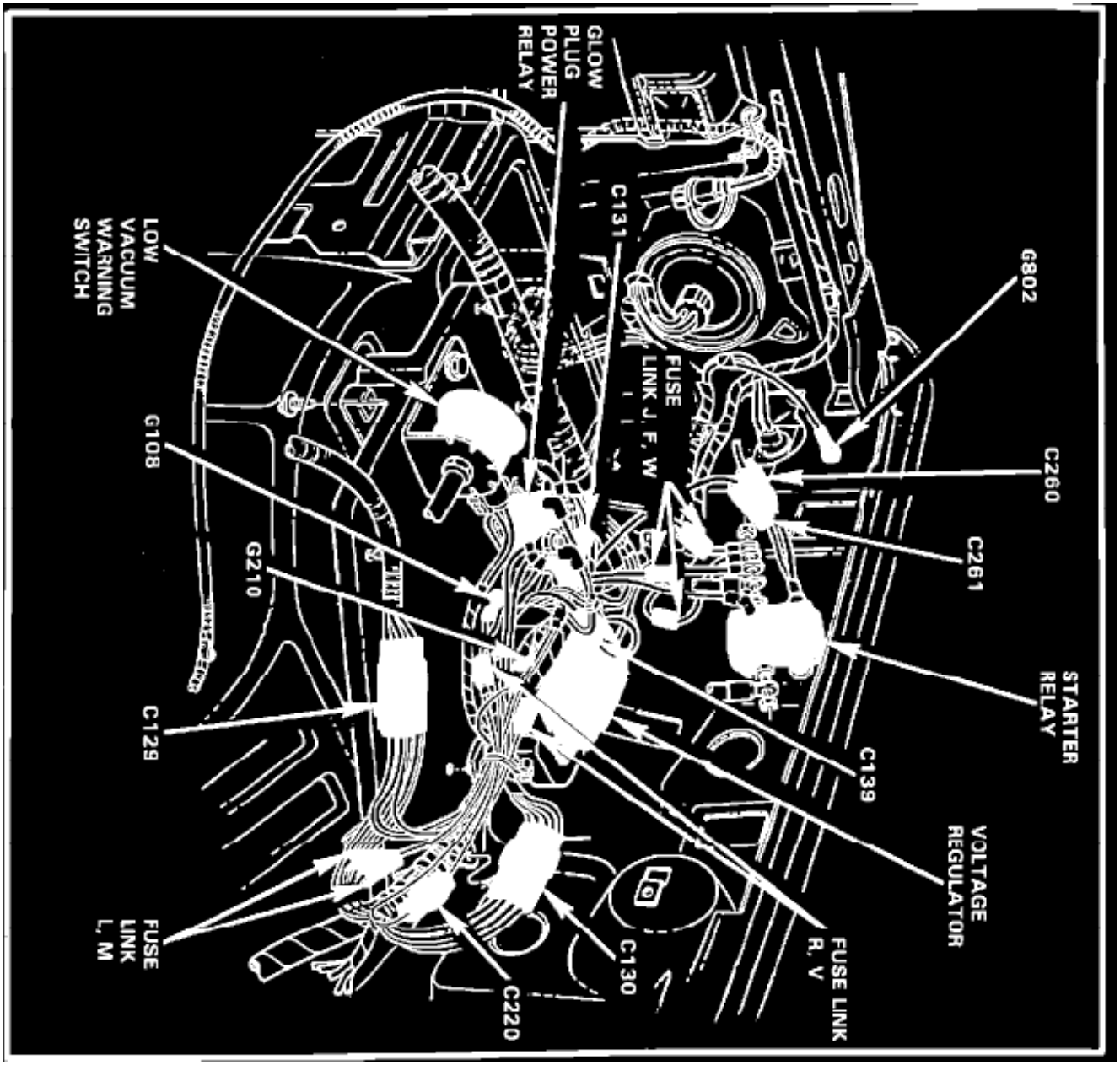
Applicable to: 1983 V8-420/6.9L Diesel Engine



RH Fender Apron.

Mounted On RH Fender Apron

Applicable to: 1984 V8-420/6.9L Diesel Engine



RH Fender Apron.

Mounted On RH Fender Apron

Applicable to: 1985 V8-420/6.9L Diesel Engine

Clutch Switch: Locations

At Top Of Clutch Pedal

Clutch Switch: Testing and Inspection

Manual Transmission Vehicles Only This switch functions magnetically. Do not use magnetized tools near this switch.

1. If the switch is open when the clutch pedal is released, speed control will not operate. This must be corrected before making any other tests. Use only a multimeter of 5000 ohm/volt rating or higher when performing the clutch switch test.

2. Disconnect switch pigtail connector from speed control harness connector and connect an ohmmeter to the two switch connector terminals.

3. With clutch pedal in the fully released position, the resistance should be less than 5 ohms. With clutch pedal fully depressed, the circuit should be open.

4. If switch does not function as described, remove and replace switch.

Ignition Ballast Resistor: Description and Operation

The ballast resistor, (wire type), maintains a specific resistance between the positive (Batt.) terminal of the ignition coil connector and the wiring harness connector. It is not in operation during engine cranking enabling the coil to receive a hotter signal for starting. Once the engine is running, the resistor is used to protect the coil from voltage overload.

Ignition Ballast Resistor: Testing and Inspection

1. Disconnect module connector with red and white wires then, ignition coil connector.

2. Using a suitable ohmmeter, measure resistance between Batt. terminal of ignition coil connector and wiring harness connector wire that joins red wire in module connector.

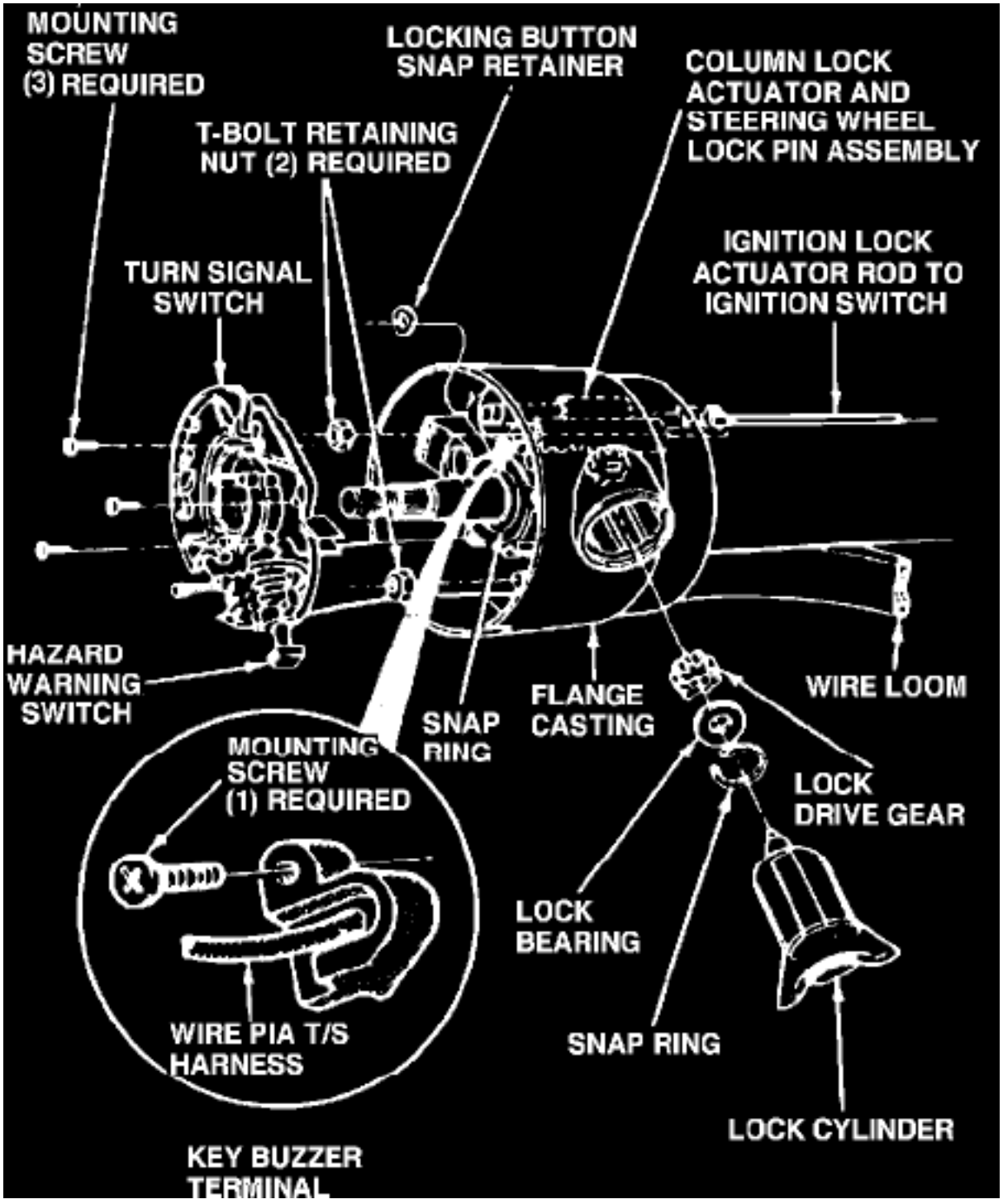
3. If resistance is 0.8---1.6 ohms, ballast resistor is satisfactory. If resistance is less than 0.8 ohms or greater than 1.6 ohms, replace ballast resistor.

Ignition Lock: Connector Views

For Connector Views, please refer to: Ignition Switch/Diagrams,

Ignition Lock: Electrical Diagrams

For Wiring Diagrams, please refer to: Starting System/Diagrams,



Ignition Lock: Service and Repair

Fig. 1 Ignition lock replacement. Fixed steering column

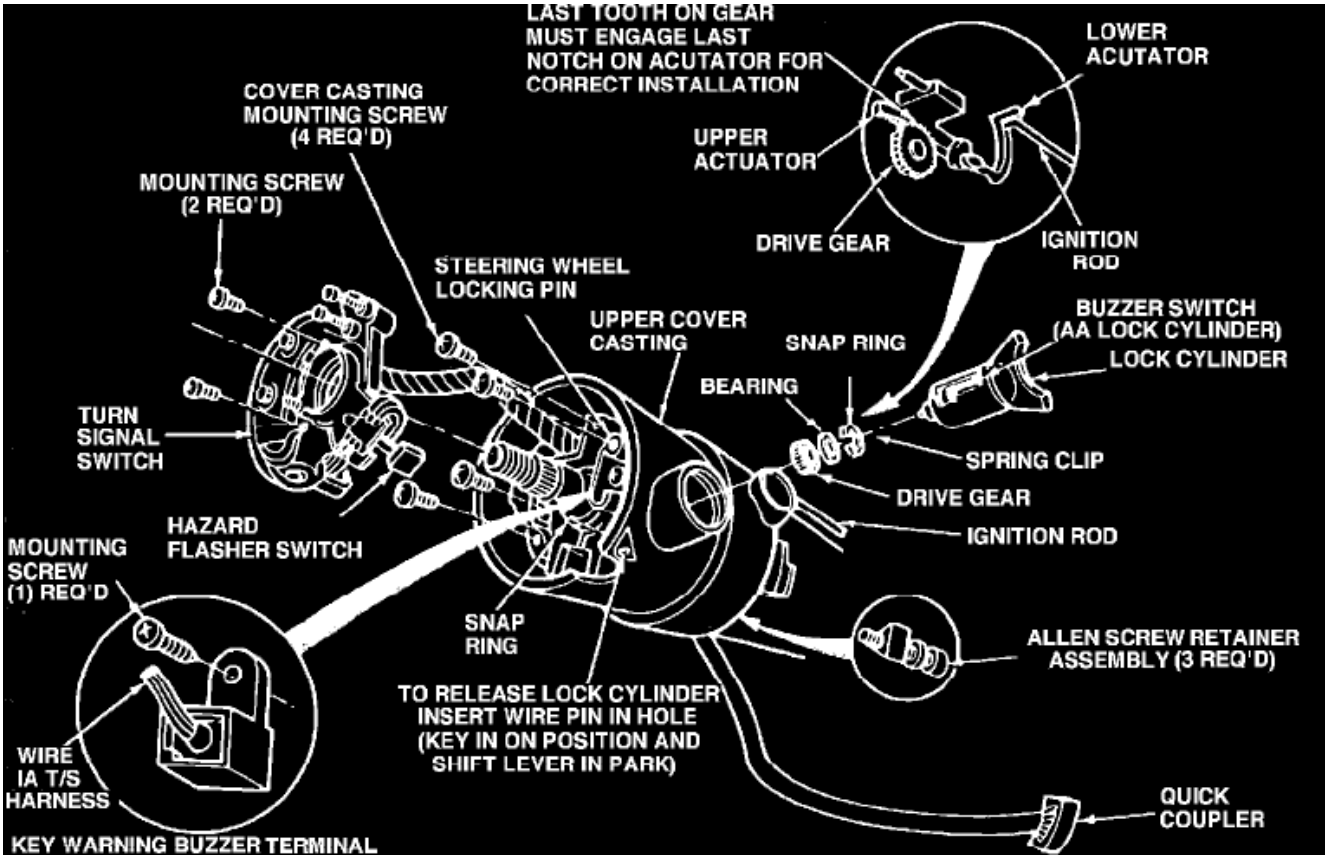


Fig. 2 Ignition lock replacement. Tilt steering column

1. Disconnect battery ground cable.

2. Remove steering wheel trim pad and steering wheel.

3. Shift transmission into Park on vehicles with automatic transmission, or into any gear on vehicles with manual transmission.

4. Insert a {1/8} inch diameter wire or small drift punch into retaining pin access slot and remove lock cylinder, Figs. 1 and 2, while depressing pin. The lock cylinder retaining pin is located adjacent to the hazard warning button on models with tilt steering column and inside the column near base of cylinder on models with fixed steering column.

5. To install, turn lock cylinder to On position and depress pin.

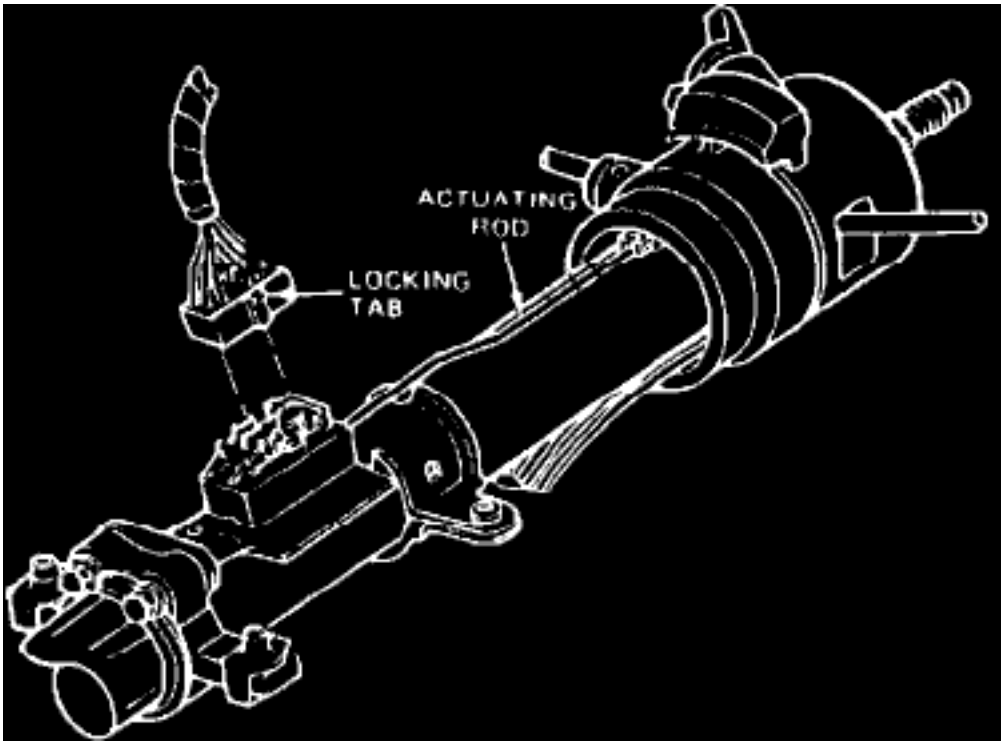
6. Install lock cylinder into housing. Turn ignition key to Off position after ensuring cylinder is fully seated and aligned into interlocking washer.

7. Turn the key to check for proper operation in all positions.

8. Install steering wheel and trim pad and reconnect battery ground cable.

Ignition Switch: Locations

Attached To Steering Column



Ignition Switch: Service and Repair

Fig. 3 Ignition switch replacement

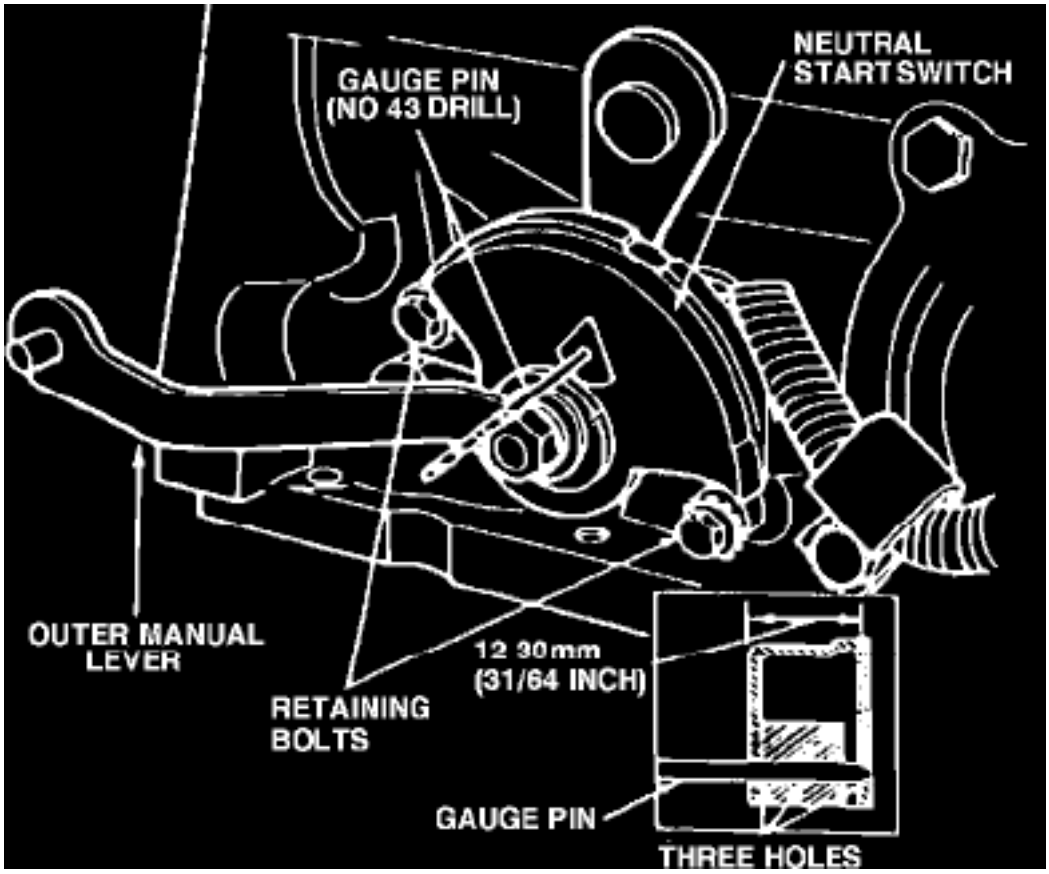
1. Disconnect battery ground cable.

2. Remove steering column shroud and lower the steering column.

3. Disconnect electrical connector from switch, then remove 2 switch attaching nuts.

4. Lift switch up to disengage actuator rod, then remove switch from vehicle, Fig. 3.

5. Reverse procedure to install.



Neutral Safety Switch: Service and Repair

Fig. 8 Neutral safety switch replacement. Exc. automatic overdrive transmission

EXC. AUTOMATIC OVERDRIVE TRANSMISSION

1. Disconnect battery ground cable.

2. Remove downshift linkage rod return spring from low-reverse servo cover.

3. Apply penetrating oil to outer lever attaching nut, then remove transmission downshift outer lever attaching nut and lever.

4. Remove neutral safety switch attaching bolts, then disconnect electrical connectors and remove switch from vehicle.

5. To install, position switch on transmission and secure with attaching bolts. Do not tighten bolts at this time.

6. Place transmission manual lever in neutral position, then insert a .091 inch gauge pin through gauge pin holes, Fig. 8.

7. Tighten switch attaching bolts, then remove gauge pin.

8. Install outer downshift lever and retaining nut.

9. Install downshift linkage rod return spring between lever and retaining clip on low-reverse servo cover.

10. Reconnect electrical connectors, then check operation of switch.

W/AUTOMATIC OVERDRIVE TRANSMISSION

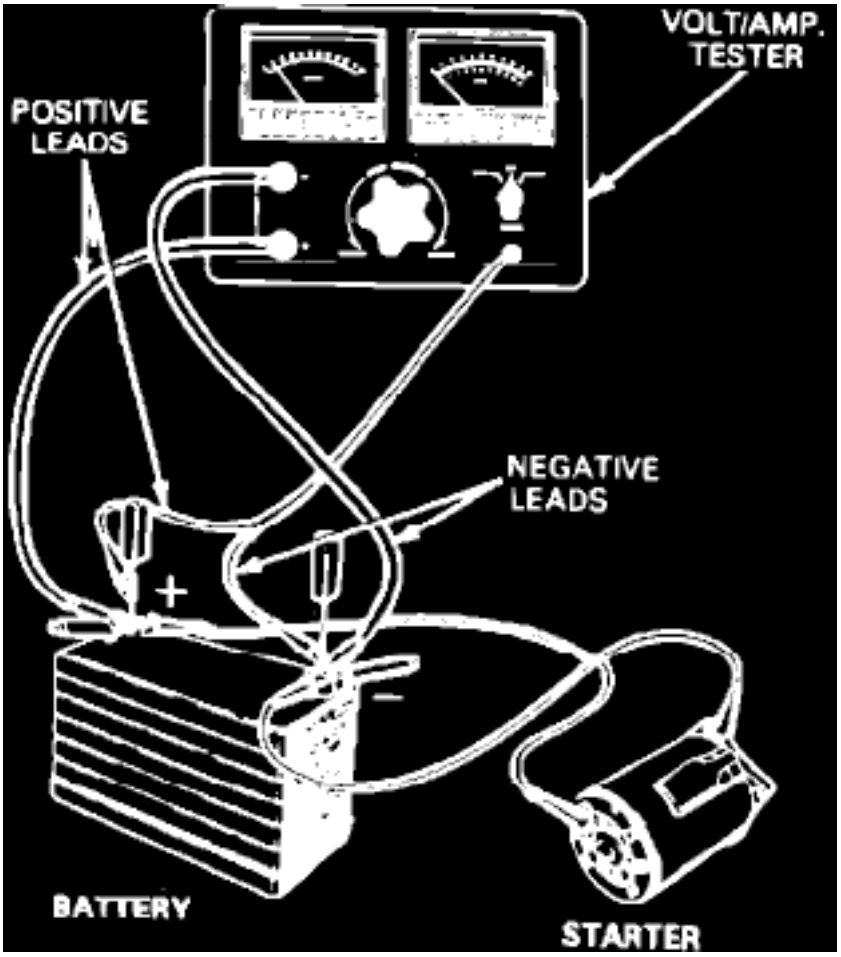
1. Disconnect battery ground cable.

2. Raise and support vehicle.

3. Disconnect electrical connector at neutral safety switch, lifting connector straight up.

4. Using suitable socket, remove neutral safety switch and O-ring seal.

5. Reverse procedure to install, installing new O-ring seal.



Starter Armature: Testing and Inspection Armature & Field Grounded Circuit Test

Fig. 4 Field grounded circuit test connections

1. Connect jumper lead to positive battery terminal.

2. Connect negative voltmeter lead to negative battery terminal.

3. Touch positive voltmeter lead to commutator and jumper wire to armature.

4. If voltmeter indicates voltage, armature windings are grounded.

5. Make connections as shown, Fig. 4. If voltmeter indicates voltage, field windings are grounded.

Starter Armature: Testing and Inspection Armature Open Circuit Test

An open circuit in the armature can sometimes be detected by examining commutator for signs of burning. A spot burned on the commutator is caused by an arc formed every time a commutator segment connected to the open circuit winding passes under a brush.

Technical Service Bulletin # 9211B1 Date: 920605

Starter Motor Brushes - Replacement Revision

Article No. 92-11B-1

06/05/92

^ SHOP MANUAL - 1982 THROUGH 1991 AS APPLICABLE - STARTER - POSITIVE ENGAGEMENT - STARTER MOTOR BRUSHES REPLACEMENT PROCEDURE FOR 4-INCH STARTERS REVISED/ADDED

^ SHOP MANUAL - 1990 AND 1991 AS APPLICABLE - STARTER - POSITIVE ENGAGEMENT - STARTER SIZE SPECFICATION REVISED

FORD: 1989 CROWN VICTORIA, ESCORT, TEMPO 1989-90 THUNDERBIRD 1989-91 MUSTANG, TAURUS

LINCOLN-MERCURY: 1989 CONTINENTAL, GRAND MARQUIS, MARK VII, TOPAZ, TOWN CAR 1989-90 COUGAR 1989-91 SABLE

LIGHT TRUCK: 1982-91 BRONCO, ECONOLINE, F-150-350 SERIES 1983-91 RANGER 1984-90 BRONCO II 1986-91 AEROSTAR 1988-91 F SUPER DUTY

ISSUE: The procedure for Starter Motor Brushes Replacement applicable to vehicles with 4-inch starters only is missing or incorrect in the "Starter-Positive Engagement" section of certain Shop Manuals. Additionally, the 1990 and 1991 Light Truck Shop Manuals incorrectly show a 3-inch starter in the Specifications Chart; the correct size is 4-inch. The following Shop Manuals are affected in the Sections indicated:

^ 1989 Domestic Car Lines: Section 28-02

^ 1990 Mustang, Taurus/Sable, Thunderbird/Cougar: Section 28-02

^ 1991 Mustang, Taurus/Sable: Section 28-02

^ 1986 through 1988 Aerostar: Section 11-02

^ 1989 Aerostar, Ranger, Bronco II: Section 03-06

^ 1990 and 1991 Aerostar, Ranger, Bronco II: Section 03-06A

^ 1983 Ranger/1984 Bronco II (Reprint), 1984 through 1988 Ranger/Bronco II, 1982 through 1990 Light Truck-Engine: Section 28-02

^ 1991 Light Truck-Engine: Section 03-06A

ACTION: Refer to Disassembly and Assembly in this TSB article for the additional information.

NOTE: THIS TSB ARTICLE INCLUDES REVISED PAGES FROM THE 1989, 1990 AND 1991 CAR SHOP MANUALS LISTED ABOVE, THE 1991 COMPACT TRUCK SHOP MANUAL AND THE 1990 AND 1991 LIGHT TRUCK SHOP MANUALS. ALTHOUGH NOT SHOWN, THE REVISIONS APPLY TO ALL LIGHT TRUCK AND COMPACT TRUCK MANUALS LISTED ABOVE.

NOTE: THE PROCEDURE IN THIS TSB ARTICLE APPLIES TO VEHICLES WITH 4-INCH STARTERS ONLY.

OTHER APPLICABLE ARTICLES: NONE WARRANTY STATUS: INFORMATION ONLY OASIS CODES:

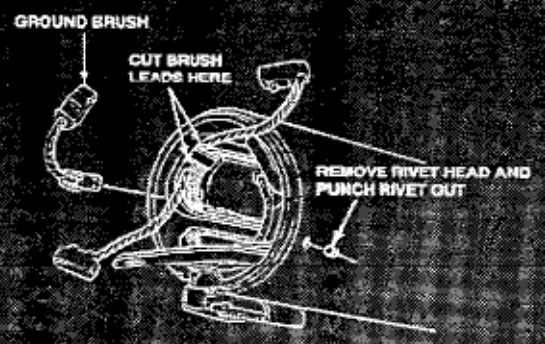
DISASSEMBLY AND ASSEMBLY (Continued)

Starter Drive Replacement

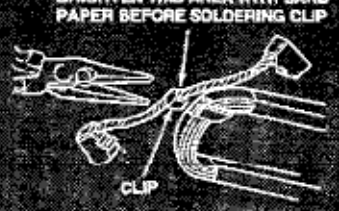
1. Remove plunger lever cover.
2. Remove pivot pin retaining starter drive plunger lever.
3. Loosen through bolts enough to allow removal of drive end housing, starter drive plunger lever and return spring.
4. Remove drive gear stop ring retainer and stop ring from groove in armature shaft, and remove drive gear assembly.
5. Apply a thin coating of Lubriplate 777 or equivalent on armature shaft splines. Install new drive gear assembly on armature shaft. Install a new stop ring.
6. Position starter gear plunger lever on starter frame. **Ensure that plunger lever properly engages starter drive assembly.**
7. Install a new stop ring retainer. Partially fill drive end housing bearing bore with grease (approximately one-quarter full). Position starter drive plunger lever return spring and drive end housing to starter frame. Tighten through bolts to 6-9 N·m (55-80 lb-in). Install pivot pin.
8. Position starter drive plunger lever cover on starter. Tighten retaining screw.

Starter Motor Brushes Replacement

1. Remove starter drive plunger lever cover.
2. Remove the two through bolts from the starter.
3. Remove the brush end plate.
4. Remove brush spring and pull brushes loose from brush holder.
5. Remove brush holder.
6. Remove the drive end housing and the plunger lever return spring.



7. Remove the starter drive plunger lever pivot pin and lever and remove the armature.
8. Ground brushes: Remove rivet head with file or chisel and remove rivet with 1/8" punch.
9. Cut the brush leads from the field coils as close to the field connection point as possible.
10. Clean and inspect the starter motor.
11. Position the new field brush lead on the field coil connection. Position and crimp the clip provided with the brushes to hold the brush lead to the connection. Solder the lead clip and connection together using rosin core solder. Use a 300 watt iron.



12. Rivet the ground brush leads to the frame with rivets provided in the brush kit.
13. Clean the commutator with 00 or 000 sandpaper.
14. Install the armature in the starter frame.
15. Install the starter drive gear plunger lever to the frame and starter drive assembly and install the pivot pin.
16. Install brush holder and insert brushes in holder and install brush springs.
17. Install the brush end plate.
18. Install the two through bolts to the starter frame.
19. Install starter drive plunger lever cover and tighten retainer screw.
20. Connect the starter to a battery and check operation.

Armature Replacement

1. Remove plunger lever cover.
2. Remove through bolts, pivot pin, drive end housing, drive plunger lever return spring and brush end plate.
3. Remove starter gear plunger lever. Remove brushes and lift out brush holder.
4. Remove armature. If starter drive gear assembly is being reused, remove stop ring retainer and stop ring from end of armature shaft. Remove drive gear assembly.
5. Place drive gear assembly on new armature with a new stop ring, thrust washer and retainer.

290000

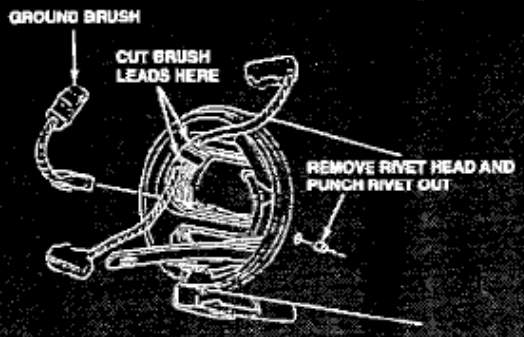
DISASSEMBLY AND ASSEMBLY (Continued)

Starter Drive Replacement

1. Remove cover screw, cover and through bolts.
2. Remove pivot pin retaining starter gear plunger lever and remove lever, starter drive end housing, armature and drive plunger return spring.
3. Remove the drive gear stop ring retainer and stop ring from the groove in the armature shaft and remove the drive gear assembly.
4. Apply a thin coating of Lubriplate 777 or equivalent, on the armature shaft splines. Install the new drive gear assembly on the armature shaft and install a new stop ring.
5. Position the starter gear plunger lever on the starter frame. **Ensure that the plunger lever properly engages the starter drive assembly.**
6. Install a new stop ring retainer and thrust washer. Partially fill the drive end housing bearing bore with grease (approximately one-quarter full). Position the starter drive plunger lever return spring and drive end housing to the starter frame, and then tighten the through bolts to 6-9 N·m (55-80 lb-in). Install pivot pin.
7. Position the starter drive plunger lever cover on the starter. Tighten the retaining screw.

Starter Motor Brushes Replacement

1. Remove starter drive plunger lever cover.
2. Remove the two through bolts from the starter.
3. Remove the brush end plate.
4. Remove brush spring and pull brushes loose from brush holder.
5. Remove brush holder.
6. Remove the drive end housing and the plunger lever return spring.



7. Remove the starter drive plunger lever pivot pin and lever and remove the armature.
8. Ground brushes: Remove rivet head with file or chisel and remove rivet with 1/8" punch.
9. Cut the brush leads from the field coils as close to the field connection point as possible.
10. Clean and inspect the starter motor.
11. Position the new field brush lead on the field coil connection. Position and crimp the clip provided with the brushes to hold the brush lead to the connection. Solder the lead clip and connection together using rosin core solder. Use a 300 watt iron.



12. Rivet the ground brush leads to the frame with rivets provided in the brush kit.
13. Clean the commutator with 00 or 000 sandpaper.
14. Install the armature in the starter frame.
15. Install the starter drive gear plunger lever to the frame and starter drive assembly and install the pivot pin.
16. Install brush holder and insert brushes in holder and install brush springs.
17. Install the brush end plate.
18. Install the two through bolts to the starter frame.
19. Install starter drive plunger lever cover and tighten retainer screw.
20. Connect the starter to a battery and check operation.

Armature Replacement

1. Remove cover screw, cover and through bolts.
2. Remove pivot pin retaining starter gear plunger lever and remove lever, starter drive end housing, armature, and drive plunger return spring.
3. Remove the armature. If the starter drive gear assembly is being reused, remove the stop ring retainer and stop ring from the end of the armature shaft, and remove the drive.
4. Place the drive gear assembly on the new armature with a new stop ring and retainer.
5. Install the armature in the starter frame.
6. Position the drive gear plunger lever to the frame and drive gear assembly.

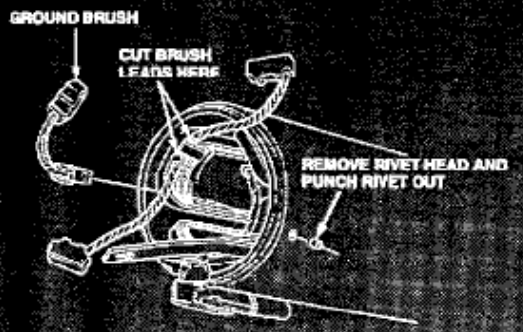
DISASSEMBLY AND ASSEMBLY (Continued)

Starter Drive Replacement

1. Remove cover screw, cover and through bolts.
2. Remove pivot pin retaining starter gear plunger lever and remove lever, starter drive end housing, armature and drive plunger return spring.
3. Remove the drive gear stop ring retainer and stop ring from the groove in the armature shaft and remove the drive gear assembly.
4. Apply a thin coating of Lubriplate 777 or equivalent, on the armature shaft splines. Install the new drive gear assembly on the armature shaft and install a new stop ring.
5. Position the starter gear plunger lever on the starter frame. **Ensure that the plunger lever properly engages the starter drive assembly.**
6. Install a new stop ring retainer and thrust washer. Partially fill the drive end housing bearing bore with grease (approximately one-quarter full). Position the starter drive plunger lever return spring and drive end housing to the starter frame, and then tighten the through bolts to 6-9 N·m (55-80 lb-in). Install pivot pin.
7. Position the starter drive plunger lever cover on the starter. Tighten the retaining screw.

Starter Motor Brushes Replacement

1. Remove starter drive plunger lever cover.
2. Remove the two through bolts from the starter.
3. Remove the brush end plate.
4. Remove brush spring and pull brushes loose from brush holder.
5. Remove brush holder.
6. Remove the drive end housing and the plunger lever return spring.



7. Remove the starter drive plunger lever pivot pin and lever and remove the armature.
8. Ground brushes. Remove rivet head with file or chisel and remove rivet with 1/8" punch.
9. Cut the brush leads from the field coils as close to the field connection point as possible.
10. Clean and inspect the starter motor.
11. Position the new field brush lead on the field coil connection. Position and crimp the clip provided with the brushes to hold the brush lead to the connection. Solder the lead clip and connection together using rosin core solder. Use a 300 watt iron.



12. Rivet the ground brush leads to the frame with rivets provided in the brush kit.
13. Clean the commutator with 00 or 000 sandpaper.
14. Install the armature in the starter frame.
15. Install the starter drive gear plunger lever to the frame and starter drive assembly and install the pivot pin.
16. Install brush holder and insert brushes in holder and install brush springs.
17. Install the brush end plate.
18. Install the two through bolts to the starter frame.
19. Install starter drive plunger lever cover and tighten retainer screw.
20. Connect the starter to a battery and check operation.

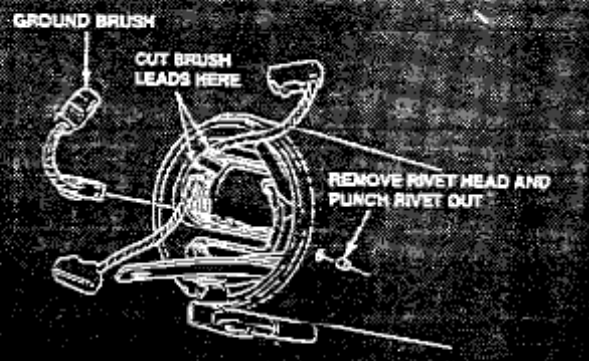
Armature Replacement

1. Remove cover screw, cover and through bolts.
2. Remove pivot pin retaining starter gear plunger lever and remove lever, starter drive end housing, armature, and drive plunger return spring.
3. Remove the armature. If the starter drive gear assembly is being reused, remove the stop ring retainer and stop ring from the end of the armature shaft, and remove the drive.
4. Place the drive gear assembly on the new armature with a new stop ring and retainer.
5. Install the armature in the starter frame.
6. Position the drive gear plunger lever to the frame and drive gear assembly.

DISASSEMBLY AND ASSEMBLY (Continued)

Starter Motor Brushes Replacement

1. Remove starter drive plunger lever cover.
2. Remove the two through bolts from the starter.
3. Remove the brush end plate.
4. Remove brush spring and pull brushes loose from brush holder.
5. Remove brush holder.
6. Remove the drive end housing and the plunger lever return spring.



7. Remove the starter drive plunger lever pivot pin and lever and remove the armature.
8. Ground brushes: Remove rivet head with file or chisel and remove rivet with 1/8" punch.
9. Cut the brush leads from the field coils as close to the field connection point as possible.
10. Clean and inspect the starter motor.
11. Position the new field brush lead on the field coil connection. Position and crimp the clip provided with the brushes to hold the brush lead to the connection. Solder the lead clip and connection together using rosin core solder. Use a 300 watt iron.



12. Rivet the ground brush leads to the frame with rivets provided in the brush kit.
13. Clean the commutator with 00 or 000 sandpaper.
14. Install the armature in the starter frame.
15. Install the starter drive gear plunger lever to the frame and starter drive assembly and install the pivot pin.
16. Install brush holder and insert brushes in holder and install brush springs.
17. Install the brush end plate.
18. Install the two through bolts to the starter frame.
19. Install starter drive plunger lever cover and tighten retainer screw.
20. Connect the starter to a battery and check operation.

Armature Replacement

1. Remove plunger lever cover.
2. Remove through bolts, pivot pin, drive end housing, drive plunger lever return spring and brush end plate.
3. Remove starter gear plunger lever. Remove brushes and lift out brush holder.
4. Remove armature. If starter drive gear assembly is being reused, remove stop ring retainer and stop ring from end of armature shaft. Remove drive gear assembly.
5. Place drive gear assembly on new armature with a new stop ring, thrust washer and retainer.
6. Install armature in starter frame.
7. Position drive gear plunger lever to frame and drive gear assembly.
8. Partially fill drive end housing bearing bore with grease (approximately one-quarter full). Position drive plunger lever return spring, and drive end housing to starter frame. Ensure stop ring retainer is seated properly in drive housing. Install pivot pin.
9. Install brush holder and insert brushes in holder. Install brush springs. Positive brush leads should be positioned in their respective slots to prevent grounding.
10. Install brush end plate. (Be certain end plate insulator is positioned properly on end plate).
11. Install two through bolts to starter frame. Tighten to 6-9 N·m (55-80 lb-in).
12. Install plunger lever cover and tighten retaining screw.
13. Check the starter no-load current draw. The starter no-load current draw specification is 80 amps.

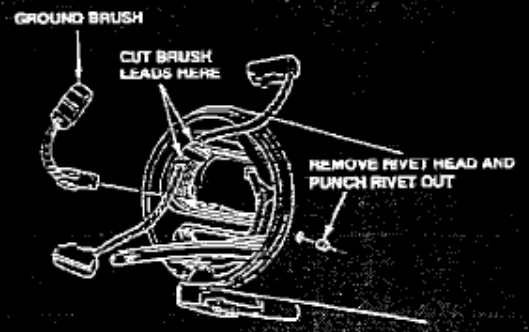
DISASSEMBLY AND ASSEMBLY (Continued)

Starter Drive Replacement

1. Remove cover screw, cover and through bolts.
2. Remove pivot pin retaining starter gear plunger lever and remove lever, starter drive end housing, armature and drive plunger return spring.
3. Remove the drive gear stop ring retainer and stop ring from the groove in the armature shaft and remove the drive gear assemby.
4. Apply a thin coating of Lubriplate 777 or equivalent, on the armature shaft splines. Install the new drive gear assembly on the armature shaft and install a new stop ring.
5. Position the starter gear plunger lever on the starter frame. **Ensure that the plunger lever properly engages the starter drive assembly.**
6. Install a new stop ring retainer and thrust washer. Partially fill the drive end housing bearing bore with grease (approximately one-quarter full). Position the starter drive plunger lever return spring and drive end housing to the starter frame, and then tighten the through bolts to 6-9 N·m (55-80 lb-in). Install pivot pin.
7. Position the starter drive plunger lever cover on the starter. Tighten the retaining screw.

Starter Motor Brushes Replacement

1. Remove starter drive plunger lever cover.
2. Remove the two through bolts from the starter.
3. Remove the brush end plate.
4. Remove brush spring and pull brushes loose from brush holder.
5. Remove brush holder.
6. Remove the drive end housing and the plunger lever return spring.



7. Remove the starter drive plunger lever pivot pin and lever and remove the armature.
8. Ground brushes: Remove rivet head with file or chisel and remove rivet with 1/8" punch.
9. Cut the brush leads from the field coils as close to the field connection point as possible.
10. Clean and inspect the starter motor.
11. Position the new field brush lead on the field coil connection. Position and crimp the clip provided with the brushes to hold the brush lead to the connection. Solder the lead clip and connection together using rosin core solder. Use a 300 watt iron.



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13. Clean the commutator with 00 or 000 sandpaper.
14. Install the armature in the starter frame.
15. Install the starter drive gear plunger lever to the frame and starter drive assembly and install the pivot pin.
16. Install brush holder and insert brushes in holder and install brush springs.
17. Install the brush end plate.
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20. Connect the starter to a battery and check operation.

Armature Replacement

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4. Place the drive gear assembly on the new armature with a new stop ring and retainer.
5. Install the armature in the starter frame.
6. Position the drive gear plunger lever to the frame and drive gear assembly.

DISASSEMBLY AND ASSEMBLY (Continued)

Armature Replacement (Continued)

7. Partially fill the drive end housing bearing bore with grease (approximately one-quarter full). Position the drive plunger lever return spring, and the drive end housing to the starter frame. Be sure that the stop ring retainer is seated properly in the drive housing. Install pivot pin.
8. Install brush holder and insert brushes in holder and install brush springs. Positive brush leads should be positioned in their respective slots to prevent grounding.
9. Install the brush end plate. (Be certain end plate insulator is positioned properly on end plate).
10. Install the two through bolts to the starter frame and tighten to 6-9 N·m (55-80 lb-in).
11. Install plunger lever cover and tighten retaining screw.
12. Check the starter no-load current draw. Starter no-load current draw specification is 80 amps.

SPECIFICATIONS

Starter

Positive Engagement Starter Motor								Starter Brushes				Torque Specifications					
Diameter		Current Draw Under Normal Load	Normal Engine Cranking Speed	Min. Stall Torque @ 5 Volts		Max. Load	No Load	Mfg. Length		Spring Tension		Through Bolt		Mounting Bolt		Cable Attaching Screw	
mm	Inches	Amps	RPM	N-m	Lb-Ft	Amps	Amps	mm	Inches	N	oz.	N-m	Lb-In	N-m	Lb-Ft	N-m	Lb-In
102	4	150-250	180-250	12.9	9.5	500	80	11.4	.45	22	80	6-9	55-80	20-27	15-20	8.0-12.4	70-110

Maximum Commutator runout is 0.12 mm (0.005 inch) Maximum starting circuit voltage drop (battery positive terminal to starter terminal) at normal engine temperature is 0.5 volt.

CJ2175-G

SPECIAL SERVICE TOOLS

Tool Number	Description
TOOL-4201-C	Dial Indicator
TOOL-10044-A	Starter Polescrew Wrench

CJ2259-D

ROTUNDA EQUIPMENT

Model	Description
078-00005	Starting and Charging Tester

CJ2672-B

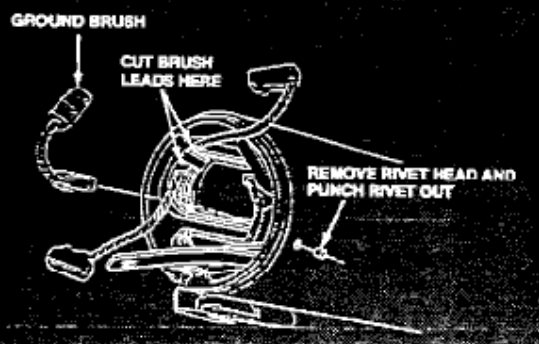
DISASSEMBLY AND ASSEMBLY (Continued)

Starter Drive Replacement

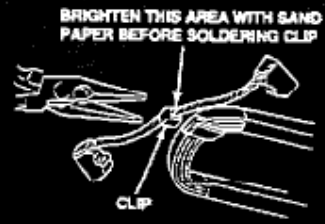
1. Remove cover screw, cover and through bolts.
2. Remove pivot pin retaining starter gear plunger lever and remove lever, starter drive end housing, armature and drive plunger return spring.
3. Remove the drive gear stop ring retainer and stop ring from the groove in the armature shaft and remove the drive gear assembly.
4. Apply a thin coating of Lubriplate 777 or equivalent, on the armature shaft splines. Install the new drive gear assembly on the armature shaft and install a new stop ring.
5. Position the starter gear plunger lever on the starter frame. **Ensure that the plunger lever properly engages the starter drive assembly.**
6. Install a new stop ring retainer and thrust washer. Partially fill the drive end housing bearing bore with grease (approximately one-quarter full). Position the starter drive plunger lever return spring and drive end housing to the starter frame, and then tighten the through bolts to 6-9 N·m (55-80 lb-in). Install pivot pin.
7. Position the starter drive plunger lever cover on the starter. Tighten the retaining screw.

Starter Motor Brushes Replacement

1. Remove starter drive plunger lever cover.
2. Remove the two through bolts from the starter.
3. Remove the brush end plate.
4. Remove brush spring and pull brushes loose from brush holder.
5. Remove brush holder.
6. Remove the drive end housing and the plunger lever return spring.



7. Remove the starter drive plunger lever pivot pin and lever and remove the armature.
8. Ground brushes: Remove rivet head with file or chisel and remove rivet with 1/8" punch.
9. Cut the brush leads from the field coils as close to the field connection point as possible.
10. Clean and inspect the starter motor.
11. Position the new field brush lead on the field coil connection. Position and crimp the clip provided with the brushes to hold the brush lead to the connection. Solder the lead clip and connection together using rosin core solder. Use a 300 watt iron.



12. Rivet the ground brush leads to the frame with rivets provided in the brush kit.
13. Clean the commutator with 00 or 000 sandpaper.
14. Install the armature in the starter frame.
15. Install the starter drive gear plunger lever to the frame and starter drive assembly and install the pivot pin.
16. Install brush holder and insert brushes in holder and install brush springs.
17. Install the brush end plate.
18. Install the two through bolts to the starter frame.
19. Install starter drive plunger lever cover and tighten retainer screw.
20. Connect the starter to a battery and check operation.

Armature Replacement

1. Remove cover screw, cover and through bolts.
2. Remove pivot pin retaining starter gear plunger lever and remove lever, starter drive end housing, armature, and drive plunger return spring.
3. Remove the armature. If the starter drive gear assembly is being reused, remove the stop ring retainer and stop ring from the end of the armature shaft, and remove the drive.
4. Place the drive gear assembly on the new armature with a new stop ring and retainer.
5. Install the armature in the starter frame.
6. Position the drive gear plunger lever to the frame and drive gear assembly.

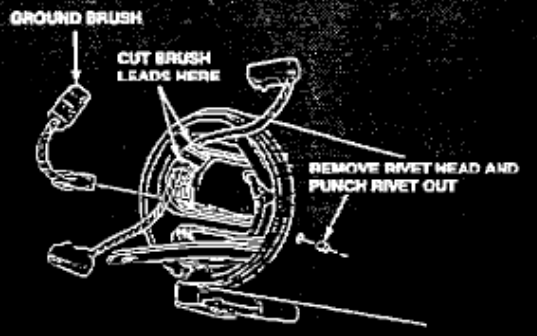
1989 TEMPO/TOPAZ, ESCORT

DISASSEMBLY AND ASSEMBLY (Continued)

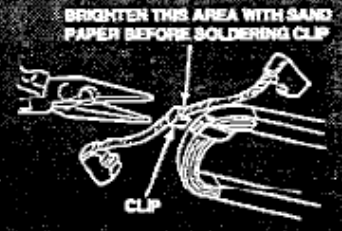
6. Position starter gear plunger lever on starter frame. **Ensure that plunger lever properly engages starter drive assembly.**
7. Install a new stop ring, retainer and thrust washer. Partially fill drive end housing bearing bore with grease (approximately 1/4 full). Position starter drive plunger lever return spring and drive end housing to starter frame. Tighten through bolts to 6-9 N·m (55-80 lb-in). Install pivot pin.
8. Position starter drive plunger lever cover on starter. Tighten retaining screw.

Starter Motor Brushes Replacement

1. Remove starter drive plunger lever cover.
2. Remove the two through bolts from the starter.
3. Remove the brush end plate.
4. Remove brush spring and pull brushes loose from brush holder.
5. Remove brush holder.
6. Remove the drive end housing and the plunger lever return spring.



7. Remove the starter drive plunger lever pivot pin and lever and remove the armature.
8. Ground brushes: Remove rivet head with file or chisel and remove rivet with 1/8" punch.
9. Cut the brush leads from the field coils as close to the field connection point as possible.
10. Clean and inspect the starter motor.
11. Position the new field brush lead on the field coil connection. Position and crimp the clip provided with the brushes to hold the brush lead to the connection. Solder the lead clip and connection together using rosin core solder. Use a 300 watt iron.



12. Rivet the ground brush leads to the frame with rivets provided in the brush kit.
13. Clean the commutator with 00 or 000 sandpaper.
14. Install the armature in the starter frame.
15. Install the starter drive gear plunger lever to the frame and starter drive assembly and install the pivot pin.
16. Install brush holder and insert brushes in holder and install brush springs.
17. Install the brush end plate.
18. Install the two through bolts to the starter frame.
19. Install starter drive plunger lever cover and tighten retainer screw.
20. Connect the starter to a battery and check operation.

Armature Replacement

1. Remove plunger lever cover.
2. Remove through bolts, pivot pin, drive end housing, drive plunger lever return spring and brush end plate.
3. Remove starter gear plunger lever. Remove brushes and lift out brush holder.
4. Remove armature. If starter drive gear assembly is being reused, remove stop ring retainer and stop ring from end of armature shaft. Remove drive gear assembly.
5. Place drive gear assembly on new armature with a new stop ring and retainer.
6. Install armature in starter frame.
7. Position drive gear plunger lever to frame and drive gear assembly.
8. Partially fill drive end housing bearing bore with grease (approximately 1/4 full). Position drive plunger lever return spring, and drive end housing to starter frame. Ensure stop ring retainer is seated properly in drive housing. Install pivot pin.
9. Install brush holder and insert brushes in holder. Install brush springs. Positive brush leads should be positioned in their respective slots to prevent grounding.
10. Install brush end plate. (Be certain end plate insulator is positioned properly on end plate).

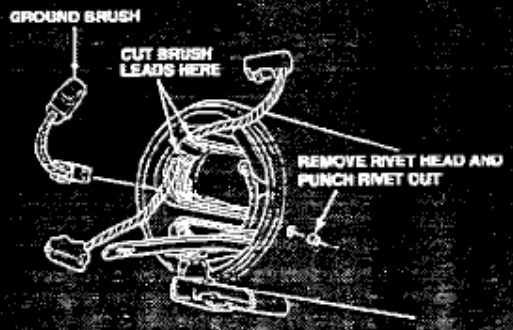
DISASSEMBLY AND ASSEMBLY (Continued)

Starter Drive Replacement

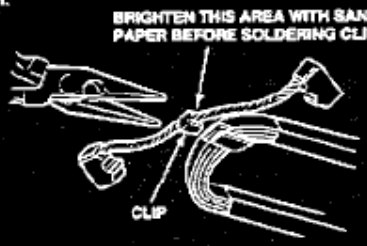
1. Remove cover screw, cover and through bolts.
2. Remove pivot pin retaining starter gear plunger lever and remove lever, starter drive end housing, armature and drive plunger return spring.
3. Remove the drive gear stop ring retainer and stop ring from the groove in the armature shaft and remove the drive gear assembly.
4. Apply a thin coating of Lubriplate 777 or equivalent, on the armature shaft splines. Install the new drive gear assembly on the armature shaft and install a new stop ring.
5. Position the starter gear plunger lever on the starter frame. Ensure that the plunger lever properly engages the starter drive assembly.
6. Install a new stop ring retainer and thrust washer. Partially fill the drive end housing bearing bore with grease (approximately one-quarter full). Position the starter drive plunger lever return spring and drive end housing to the starter frame, and then tighten the through bolts to 6-9 N·m (55-80 lb-in). Install pivot pin.
7. Position the starter drive plunger lever cover on the starter. Tighten the retaining screw.

Starter Motor Brushes Replacement

1. Remove starter drive plunger lever cover.
2. Remove the two through bolts from the starter.
3. Remove the brush end plate.
4. Remove brush spring and pull brushes loose from brush holder.
5. Remove brush holder.
6. Remove the drive end housing and the plunger lever return spring.



7. Remove the starter drive plunger lever pivot pin and lever and remove the armature.
8. Ground brushes. Remove rivet head with file or chisel and remove rivet with 1/8" punch.
9. Cut the brush leads from the field coils as close to the field connection point as possible.
10. Clean and inspect the starter motor.
11. Position the new field brush lead on the field coil connection. Position and crimp the clip provided with the brushes to hold the brush lead to the connection. Solder the lead clip and connection together using rosin core solder. Use a 300 watt iron.



12. Rivet the ground brush leads to the frame with rivets provided in the brush kit.
13. Clean the commutator with 00 or 000 sandpaper.
14. Install the armature in the starter frame.
15. Install the starter drive gear plunger lever to the frame and starter drive assembly and install the pivot pin.
16. Install brush holder and insert brushes in holder and install brush springs.
17. Install the brush end plate.
18. Install the two through bolts to the starter frame.
19. Install starter drive plunger lever cover and tighten retainer screw.
20. Connect the starter to a battery and check operation.

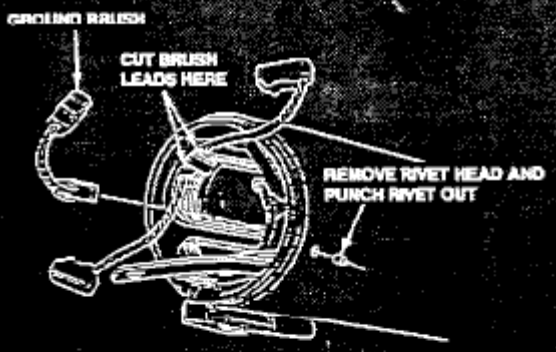
Armature Replacement

1. Remove cover screw, cover and through bolts.
2. Remove pivot pin retaining starter gear plunger lever and remove lever, starter drive end housing, armature, and drive plunger return spring.
3. Remove the armature. If the starter drive gear assembly is being reused, remove the stop ring retainer and stop ring from the end of the armature shaft, and remove the drive.
4. Place the drive gear assembly on the new armature with a new stop ring and retainer.
5. Install the armature in the starter frame.
6. Position the drive gear plunger lever to the frame and drive gear assembly.

DISASSEMBLY AND ASSEMBLY (Continued)

Starter Motor Brushes Replacement

1. Remove starter drive plunger lever cover.
2. Remove the two through bolts from the starter.
3. Remove the brush end plate.
4. Remove brush spring and pull brushes loose from brush holder.
5. Remove brush holder.
6. Remove the drive end housing and the plunger lever return spring.



7. Remove the starter drive plunger lever pivot pin and lever and remove the armature.
8. Ground brushes: Remove rivet head with file or chisel and remove rivet with 1/8" punch.
9. Cut the brush leads from the field coils as close to the field connection point as possible.
10. Clean and inspect the starter motor.
11. Position the new field brush lead on the field coil connection. Position and crimp the clip provided with the brushes to hold the brush lead to the connection. Solder the lead clip and connection together using rosin core solder. Use a 300 watt iron.



12. Rivet the ground brush leads to the frame with rivets provided in the brush kit.
13. Clean the commutator with 00 or 000 sandpaper.
14. Install the armature in the starter frame.
15. Install the starter drive gear plunger lever to the frame and starter drive assembly and install the pivot pin.
16. Install brush holder and insert brushes in holder and install brush springs.
17. Install the brush end plate.
18. Install the two through bolts to the starter frame.
19. Install starter drive plunger lever cover and tighten retainer screw.
20. Connect the starter to a battery and check operation.

Armature Replacement

1. Remove plunger lever cover.
2. Remove through bolts, pivot pin, drive end housing, drive plunger lever return spring and brush end plate.
3. Remove starter gear plunger lever. Remove brushes and lift out brush holder.
4. Remove armature. If starter drive gear assembly is being reused, remove stop ring retainer and stop ring from end of armature shaft. Remove drive gear assembly.
5. Place drive gear assembly on new armature with a new stop ring, thrust washer and retainer.
6. Install armature in starter frame.
7. Position drive gear plunger lever to frame and drive gear assembly.
8. Partially fill drive end housing bearing bore with grease (approximately one-quarter full). Position drive plunger lever return spring, and drive end housing to starter frame. Ensure stop ring retainer is seated properly in drive housing. Install pivot pin.
9. Install brush holder and insert brushes in holder. Install brush springs. Positive brush leads should be positioned in their respective slots to prevent grounding.
10. Install brush end plate. (Be certain end plate insulator is positioned properly on end plate).
11. Install two through bolts to starter frame. Tighten to 6-9 N·m (55-80 lb-in).
12. Install plunger lever cover and tighten retaining screw.
13. Check the starter no-load current draw. The starter no-load current draw specification is 80 amps.

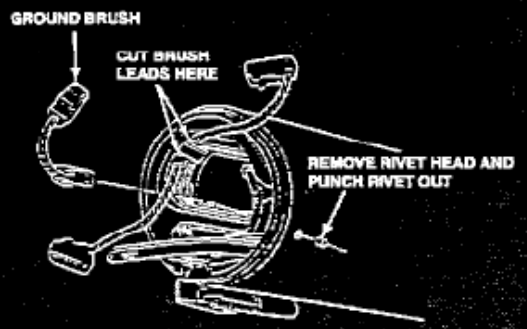
DISASSEMBLY AND ASSEMBLY (Continued)

Starter Drive Replacement

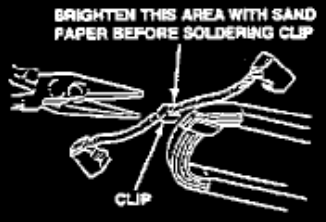
1. Remove cover screw, cover and through bolts.
2. Remove pivot pin retaining starter gear plunger lever and remove lever, starter drive end housing, armature and drive plunger return spring.
3. Remove the drive gear stop ring retainer and stop ring from the groove in the armature shaft and remove the drive gear assemby.
4. Apply a thin coating of Lubriplate 777 or equivalent, on the armature shaft splines. Install the new drive gear assembly on the armature shaft and install a new stop ring.
5. Position the starter gear plunger lever on the starter frame. **Ensure that the plunger lever properly engages the starter drive assembly.**
6. Install a new stop ring retainer and thrust washer. Partially fill the drive end housing bearing bore with grease (approximately one-quarter full). Position the starter drive plunger lever return spring and drive end housing to the starter frame, and then tighten the through bolts to 6-9 N·m (55-80 lb-in). Install pivot pin.
7. Position the starter drive plunger lever cover on the starter. Tighten the retaining screw.

Starter Motor Brushes Replacement

1. Remove starter drive plunger lever cover.
2. Remove the two through bolts from the starter.
3. Remove the brush end plate.
4. Remove brush spring and pull brushes loose from brush holder.
5. Remove brush holder.
6. Remove the drive end housing and the plunger lever return spring.



7. Remove the starter drive plunger lever pivot pin and lever and remove the armature.
8. Ground brushes: Remove rivet head with file or chisel and remove rivet with 1/8" punch.
9. Cut the brush leads from the field coils as close to the field connection point as possible.
10. Clean and inspect the starter motor.
11. Position the new field brush lead on the field coil connection. Position and crimp the clip provided with the brushes to hold the brush lead to the connection. Solder the lead clip and connection together using rosin core solder. Use a 300 watt iron.



12. Rivet the ground brush leads to the frame with rivets provided in the brush kit.
13. Clean the commutator with 00 or 000 sandpaper.
14. Install the armature in the starter frame.
15. Install the starter drive gear plunger lever to the frame and starter drive assembly and install the pivot pin.
16. Install brush holder and insert brushes in holder and install brush springs.
17. Install the brush end plate.
18. Install the two through bolts to the starter frame.
19. Install starter drive plunger lever cover and tighten retainer screw.
20. Connect the starter to a battery and check operation.

Armature Replacement

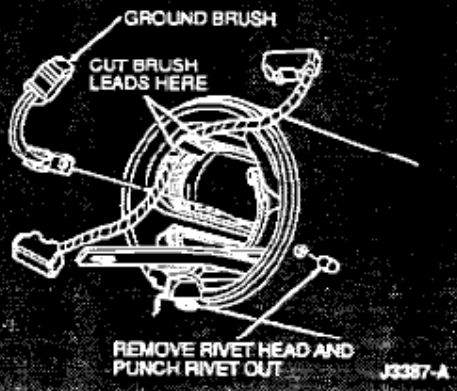
1. Remove cover screw, cover and through bolts.
2. Remove pivot pin retaining starter gear plunger lever and remove lever, starter drive end housing, armature, and drive plunger return spring.
3. Remove the armature. If the starter drive gear assembly is being reused, remove the stop ring retainer and stop ring from the end of the armature shaft, and remove the drive.
4. Place the drive gear assembly on the new armature with a new stop ring and retainer.
5. Install the armature in the starter frame.
6. Position the drive gear plunger lever to the frame and drive gear assembly.

DISASSEMBLY AND ASSEMBLY (Continued)

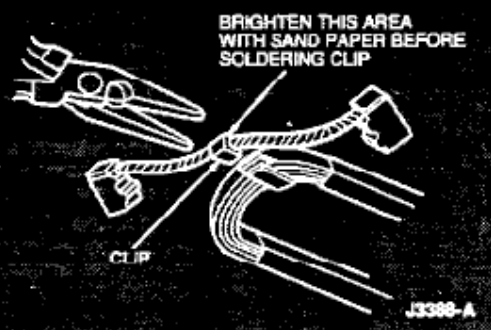
6. Install a new stop ring retainer and thrust washer. Partially fill the drive end housing bearing bore with grease (approximately one-quarter full). Position the starter drive plunger lever return spring and drive end housing to the starter frame, and then tighten the through bolts to 6-9 N·m (55-80 lb-in). Install pivot pin.
7. Position the starter drive plunger lever cover on the starter. Tighten the retaining screw.

Starter Motor Brushes Replacement

1. Remove starter drive plunger lever cover.
2. Remove two through bolts from starter.
3. Remove brush end plate.
4. Remove brush spring and pull brushes loose from brush holder.
5. Remove brush holder.
6. Remove drive end housing and plunger lever return spring.



7. Remove starter drive plunger lever pivot pin and lever and remove armature.
8. Ground brushes. Remove rivet head with file or chisel and remove rivet with 1/8 inch punch.
9. Cut brush leads from field coils as close to field connection point as possible.
10. Clean and inspect starter motor.
11. Position new field brush lead on field coil connection. Position and crimp clip provided with brushes to hold brush lead to connection. Solder lead clip and connection together using rosin core solder. Use a 300 watt iron.



12. Rivet ground brush leads to frame with rivets provided in brush kit.
13. Clean commutator with 00 or 000 sandpaper.
14. Install armature in starter frame.
15. Install starter drive gear plunger lever to frame and starter drive assembly and install pivot pin.
16. Install brush holder and insert brushes in holder and install brush springs.
17. Install brush end plate.
18. Install two through bolts to starter frame.
19. Install starter drive plunger lever cover and tighten retainer screw.
20. Connect starter to a battery to check operation.

Armature Replacement

1. Remove cover screw, cover and through bolts.
2. Remove pivot pin retaining starter gear plunger lever and remove lever, starter drive end housing, armature, and drive plunger return spring.
3. Remove the armature. If the starter drive gear assembly is being reused, remove the stop ring retainer and stop ring from the end of the armature shaft, and remove the drive.
4. Place the drive gear assembly on the new armature with a new stop ring and retainer.
5. Install the armature in the starter frame.
6. Position the drive gear plunger lever to the frame and drive gear assembly.
7. Partially fill the drive end housing bearing bore with grease (approximately one-quarter full). Position the drive plunger lever return spring, and the drive end housing to the starter frame. Be sure that the stop ring retainer is seated properly in the drive housing. Install pivot pin.
8. Install brush holder and insert brushes in holder and install brush springs. Positive brush leads should be positioned in their respective slots to prevent grounding.
9. Install the brush end plate. (Be certain end plate insulator is positioned properly on end plate).

DISASSEMBLY AND ASSEMBLY (Continued)

10. Install the two through bolts to the starter frame and tighten to 6-9 N·m (55-80 lb-in).
11. Install plunger lever cover and tighten retaining screw.
12. Check the starter no-load current draw. Starter no-load current draw specification is 80 amps.

SPECIFICATIONS

Starter

Positive Engagement Starter Motor								Starter Brushes				Torque Specifications					
Diameter		Current Draw Under Normal Load	Normal Engine Cranking Speed	Min. Stall Torque @ 5 Volts		Max. Load	No Load	Mfg. Length		Spring Tension		Through Bolt		Mounting Bolt		Cable Attaching Screw	
mm	Inches	Amps	RPM	N-m	Lb-Ft	Amps	Amps	mm	Inches	N	oz.	N-m	Lb-in	N-m	Lb-Ft	N-m	Lb-in
102	4	150-250	160-250	12.9	9.5	800	80 ± 10	11.4	.45	22	80	6-9	55-80	20-27	15-20	8.0-12.4	70-110

Maximum Commutator runout is 0.12 mm (0.005 inch). Maximum starting circuit voltage drop (battery positive terminal to starter terminal) at normal engine temperature is 0.5 volt. CJ2178-H

TORQUE SPECIFICATIONS

Description	N-m	Lb-Ft
Starter Retaining Bolts	21-27	15-20
Starter Cable-to-Motor Retaining Screw	8-12	70-110 (Lb-in)
Starter Through Bolts	6-9	55-80 (Lb-in)

ROTUNDA EQUIPMENT

Model	Description
078-00005	Starting and Charging Tester

SPECIAL SERVICE TOOLS

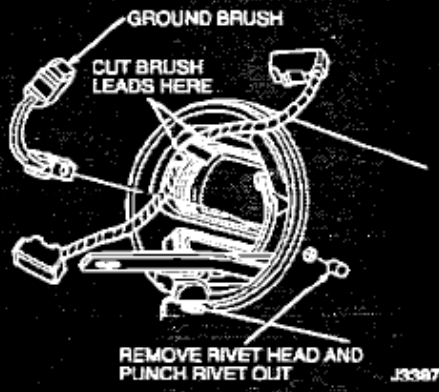
Tool Number	Description
TOOL-4201-C	Dial Indicator
TOOL-10044-A	Starter Polescrew Wrench

DISASSEMBLY AND ASSEMBLY (Continued)

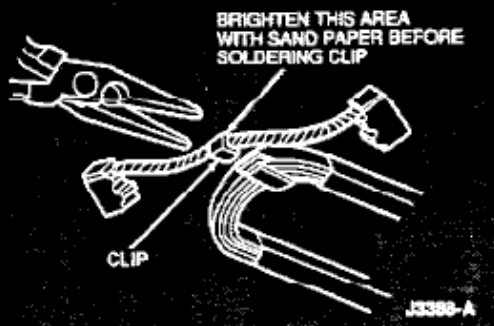
7. Install a new stop ring retainer and thrust washer. Partially fill drive end housing bearing bore with grease (approximately 1/4 full). Position starter drive plunger lever return spring and drive end housing to starter frame. Tighten through bolts to 6-9 N·m (55-80 lb-in). Install pivot pin.
8. Position starter drive plunger lever cover on starter. Tighten retaining screw.

Starter Motor Brushes Replacement

1. Remove starter drive plunger lever cover.
2. Remove two through bolts from starter.
3. Remove brush end plate.
4. Remove brush spring and pull brushes loose from brush holder.
5. Remove brush holder.
6. Remove drive end housing and plunger lever return spring.



7. Remove starter drive plunger lever pivot pin and lever and remove armature.
8. Ground brushes. Remove rivet head with file or chisel and remove rivet with 1/8 inch punch.
9. Cut brush leads from field coils as close to field connection point as possible.
10. Clean and inspect starter motor.
11. Position new field brush lead on field coil connection. Position and crimp clip provided with brushes to hold brush lead to connection. Solder lead clip and connection together using rosin core solder. Use a 300 watt iron.



12. Rivet ground brush leads to frame with rivets provided in brush kit.
13. Clean commutator with 00 or 000 sandpaper.
14. Install armature in starter frame.
15. Install starter drive gear plunger lever to frame and starter drive assembly and install pivot pin.
16. Install brush holder and insert brushes in holder and install brush springs.
17. Install brush end plate.
18. Install two through bolts to starter frame.
19. Install starter drive plunger lever cover and tighten retainer screw.
20. Connect starter to a battery to check operation.

Armature Replacement

1. Remove plunger lever cover.
2. Remove through bolts, pivot pin, drive end housing, drive plunger lever return spring and brush end plate.
3. Remove starter gear plunger lever. Remove brushes and lift out brush holder.
4. Remove armature. If starter drive gear assembly is being reused, remove stop ring retainer and stop ring from end of armature shaft. Remove drive gear assembly.
5. Place drive gear assembly on new armature with a new stop ring, thrust washer and retainer.
6. Install armature in starter frame.
7. Position drive gear plunger lever to frame and drive gear assembly.
8. Partially fill drive end housing bearing bore with grease (approximately 1/4 full). Position drive plunger lever return spring, and drive end housing to starter frame. Ensure stop ring retainer is seated properly in drive housing. Install pivot pin.
9. Install brush holder and insert brushes in holder. Install brush springs. Positive brush leads should be positioned in their respective slots to prevent grounding.

DISASSEMBLY AND ASSEMBLY (Continued)

10. Install brush end plate. (Be certain end plate insulator is positioned properly on end plate).
11. Install two through bolts to starter frame. Tighten to 6-9 N·m (55-80 lb-in).
12. Install plunger lever cover and tighten retaining screw.
13. Check the starter no-load current draw. The starter no-load current draw specification is 80 amps.

SPECIFICATIONS

Starter

Positive Engagement Starter Motor								Starter Brushes				Torque Specifications					
Diameter		Current Draw Under Normal Load	Normal Engine Cranking Speed	Min. Stall @ 5 Volts		Max. Load	No Load	Mfg. Length		Spring Tension		Through Bolt		Mounting Bolt		Cable Attaching Screw	
mm	in	Amps	RPM	N·m	Lb-Ft	Amps	Amps	mm	in	N	oz.	N·m	Lb-in	N·m	Lb-Ft	N·m	Lb-in
102	4	150-250	190-260	12.9	9.5	800	80 ± 10	11.4	.45	22	80	5.1-9.6	45-85	41-54	30-40	8.0-12.4	70-110

Maximum Commutator runout is 0.12 mm (0.005 inch). Maximum starting circuit voltage drop (battery positive terminal to starter terminal) at normal engine temperature is 0.5 volt.

CJ2258-D

TORQUE SPECIFICATIONS

Description	N·m	Lb-Ft
Starter Retaining Bolts	21-27	15-20
Starter Relay Retaining Nuts	5-10	45-89 (Lb-In)
Starter Through Bolts	6-9	55-80 (Lb-In)

ROTUNDA EQUIPMENT

Model	Description
078-00005	Starting and Charging Tester

SPECIAL SERVICE TOOLS

Tool Number	Description
TOOL-4201-C	Dial Indicator
TOOL-10044-A	Starter Polescrew Wrench

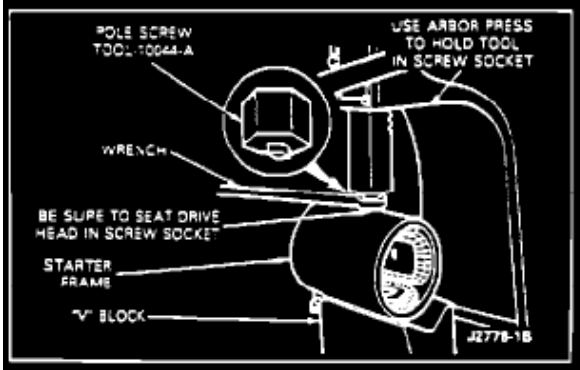


FIG. 9 Pole Shoe Screw Removal

9. Install brush end plate. Ensure end plate insulator is positioned properly on end plate.
10. Install two through bolts to starter frame. Tighten to 6.21-8.47 N·m (55-75 in-lb).
11. Secure starter in a vise. Connect starter to a battery to check its operation.

Starter Motor Brushes Replacement — 4-Inch Starter

1. Remove starter drive plunger lever cover.
2. Remove the two through bolts from the starter.
3. Remove the brush end plate.
4. Remove brush spring and pull brushes loose from brush holder.
5. Remove brush holder.
6. Remove the drive end housing and the plunger lever return spring.

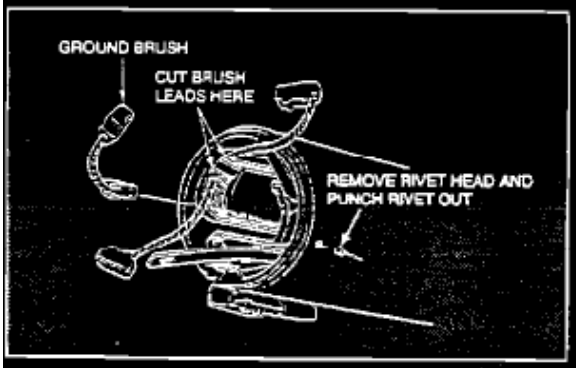


FIG. 10 Brush Removal

7. Remove the starter drive plunger lever pivot pin and lever and remove the armature.
8. Ground brushes: Remove rivet head with file or chisel and remove rivet with 1/8" punch.
9. Cut the brush leads from the field coils as close to the field connection point as possible.
10. Clean and inspect the starter motor.
11. Position the new field brush lead on the field coil connection. Position and crimp the clip provided with the brushes to hold the brush lead to the connection. Solder the lead clip and connection together using rosin core solder. Use a 300 watt iron.

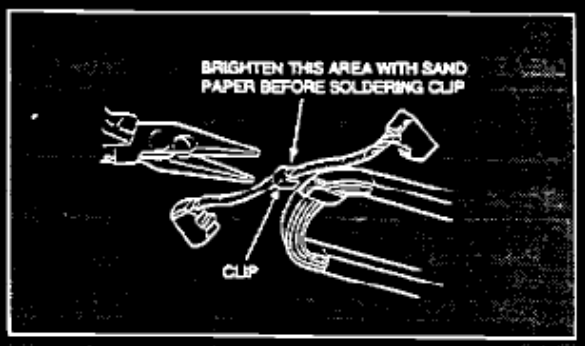


FIG. 11 Brush Installation

12. Rivet the ground brush leads to the frame with rivets provided in the brush kit.
13. Clean the commutator with 00 or 000 sandpaper.
14. Install the armature in the starter frame.
15. Install the starter drive gear plunger lever to the frame and starter drive assembly and install the pivot pin.
16. Install brush holder and insert brushes in holder and install brush springs.
17. Install the brush end plate.
18. Install the two through bolts to the starter frame.
19. Install starter drive plunger lever cover and tighten retainer screw.
20. Connect the starter to a battery and check operation.

Armature Replacement

1. Remove starter drive plunger lever cover retainer screw and remove cover.
2. Remove pivot pin retaining starter plunger lever.
3. Remove through bolts, drive end housing, plunger lever, drive plunger lever return spring, and brush end plate. Remove brushes and lift out brush holder.
4. Remove armature. If starter drive assembly is being reused, remove stop ring from end of armature shaft, and remove drive.

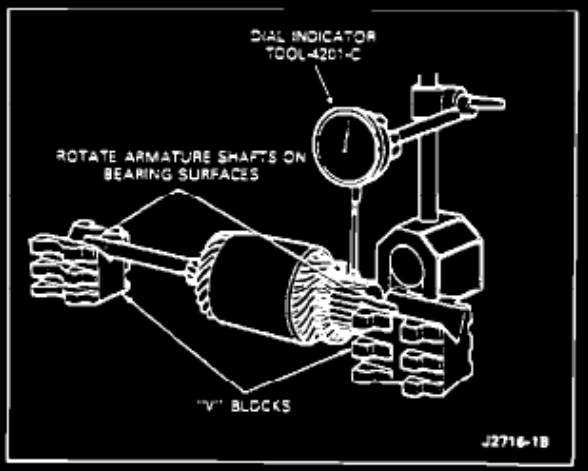


FIG. 12 Commutator Runout Check

SPECIFICATIONS

Starter Motor								Starter Brushes			
Motor Diameter		Current Draw Under Normal Load	Normal Engine Cranking Speed	Min. Stall Torque @ 5 Volts		Max. Load	No Load	Mfg. Length		Spring Tension	
mm	Inches	Amps	RPM	N-m	Lb-Ft	Amps	Amps	mm	Inches	N	oz.
102	4	130-220	100-230	14.7	11.0	800	70 ± 10	16.8	0.66	18	64

Maximum Commutator runout is 0.12mm (0.005 inch) Maximum starting circuit voltage drop (battery positive terminal to start terminal) at normal engine temperature is 0.5 volt.

SPECIAL SERVICE TOOLS

Tool No.	Description
TOOL-10044-A	Starter Pole Screw Wrench
TOOL-4201-C	Dial Indicator

CJ4735-2A

ROTUNDA EQUIPMENT

Model	Description
078-00005	Starting and Charging Tester

CJ3688-1B

DISASSEMBLY AND ASSEMBLY (Continued)

11. Position end plate to frame. Install and tighten through bolts to 6.21-8.47 N·m (55-75 in-lb). Do not pinch brush leads when installing end plate. Install pivot pin.
12. Position drive plunger lever cover and fasten to frame with cover screw.
13. Check starter no-load current draw.

Starter Drive Replacement

1. Remove starter plunger cover.
2. Remove pivot pin retaining starter plunger lever.
3. Loosen through bolts enough to allow removal of drive end housing and lever return spring. Remove lever.
4. Remove thrust washer, drive stop ring retainer and stop ring from end of armature shaft and remove drive assembly.
5. Apply a thin coating of Lubriplate 777 or equivalent on armature shaft splines. Install drive assembly on armature shaft and install a new stop ring.
6. Position starter gear plunger lever on the starter frame. **Ensure lever properly engages drive flange.**
7. Install a new stop ring retainer and thrust washer. Partially fill drive end housing bearing bore with Grease ESB-M1C63-A or equivalent (approximately 1/4 full). Position lever return spring and drive end housing to starter frame. Tighten through bolts to 6.21-8.47 N·m (55-75 in-lb). Install pivot pin.
8. Position starter drive plunger lever cover on starter. Tighten attaching screw.

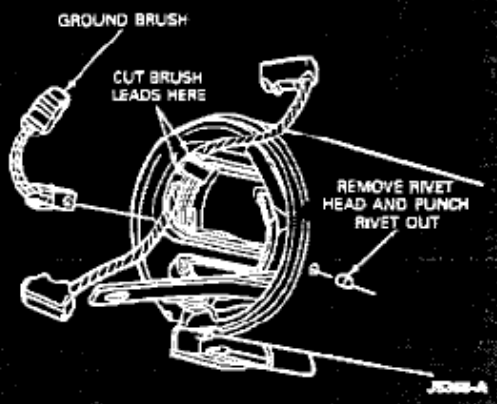
Brush Replacement

Replace starter brushes when they are worn to 6.35mm (1/4 inch). Always install a complete set of new brushes.

1. Remove the two through-bolts from starter frame.
2. Remove brush end plate, brush springs and brushes from holder.
3. Remove ground brush attaching screws or rivets from frame and remove brushes.
4. Cut insulated brush leads from field coils, as close to field connection point as possible.
5. Check plastic brush holder for cracks or broken mounting pads. Replace if necessary.
6. Position new insulated field brush lead on field coil connection. Position and crimp clip provided with brushes to hold brush lead to connection. Solder lead, clip, and connection together using a 300-watt iron and rosin core solder.
7. Install ground brush leads to frame with attaching screws or rivets.
8. Install brush holder and insert brushes in holder. Install brush springs. Positive brush leads should be positioned in their respective slots in brush holder to prevent potential grounding.
9. Install brush end plate. Ensure end plate insulator is positioned properly on end plate.
10. Install two through bolts to starter frame. Tighten to 6.21-8.47 N·m (55-75 in-lb).
11. Secure starter in a vise. Connect starter to a battery to check its operation.

Starter Motor Brushes Replacement

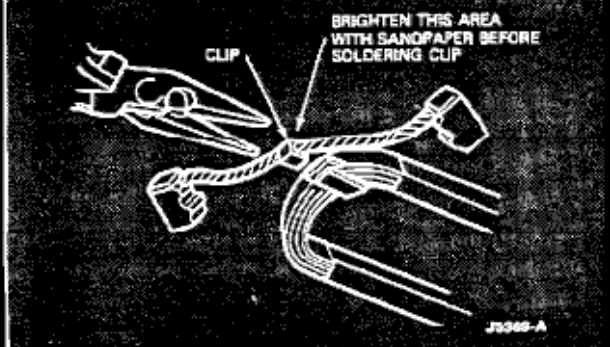
1. Remove starter drive plunger lever cover.
2. Remove the two through bolts from the starter.
3. Remove the brush end plate.
4. Remove brush spring and pull brushes loose from brush holder.
5. Remove brush holder.
6. Remove the drive end housing and the plunger lever return spring.
7. Remove the starter drive plunger lever pivot pin and lever and remove the armature.
8. Remove ground brush rivet head with the file or chisel and remove rivet with 1/8 inch punch.
9. Cut the brush leads from the field coils as close to the field connection point as possible.



10. Clean and inspect the starter motor.
11. Position the new field brush lead on the field coil connection. Position and crimp the clip provided with the brushes to hold the brush lead to the connection. Solder the lead clip and connection together using rosin core solder. Use a 300 watt iron.
12. Rivet the ground brush leads to the frame with rivets provided in the brush kit.
13. Clean the commutator with 00 or 000 sandpaper.
14. Install the armature in the starter frame.
15. Install the starter drive gear plunger lever to the frame and starter drive assembly and install the pivot pin.
16. Install brush holder and insert brushes in holder and install brush springs.
17. Install the brush end plate.

DISASSEMBLY AND ASSEMBLY (Continued)

18. Install the two through bolts to the starter frame.
19. Install starter drive plunger lever cover and tighten retainer screw.
20. Connect the starter to a battery to check operation.



Armature Replacement

1. Remove starter drive plunger lever cover retainer screw and remove cover.
2. Remove pivot pin retaining starter plunger lever.
3. Remove through bolts, drive end housing, plunger lever, drive plunger lever return spring, and brush end plate. Remove brushes and lift out brush holder.
4. Remove armature. If starter drive assembly is being reused, remove stop ring from end of armature shaft, and remove drive.
5. Place drive assembly on new armature with a new stop ring, retainer and thrust washer.
6. Install armature in starter frame.
7. Position drive plunger lever to frame and drive assembly. Ensure lever properly engages drive flange.
8. Partially fill drive end housing bearing bore with Grease ESB-M1C83-A or equivalent (approximately 1/4 full). Position drive lever return spring, and drive end housing to starter frame. Ensure stop ring retainer is seated properly in drive housing.
9. Install brush holder and insert brushes in holder. Install brush springs. Positive brush leads should be positioned in their respective slots to prevent grounding.
10. Install brush end plate. Ensure end plate insulator is positioned properly on end plate.
11. Install two through bolts to starter frame. Tighten to 6.21-6.47 N·m (55-75 in-lb). Install pivot pin.
12. Install starter drive plunger lever cover and tighten retaining screw.
13. Check starter no-load current draw with starter secure in vise during test.

SPECIFICATIONS

Refer to the following chart.

Starter Motor								Starter Brushes			
Motor Diameter		Current Draw Under Normal Load	Normal Engine Cranking Speed	Min. Stall Torque @ 5 Volts		Max. Load	No Load	Mfg. Length		Spring Tension	
mm	Inches	Amps	RPM	N·m	Lb-Ft	Amps	Amps	mm	Inches	N	oz.
101.60	4	130-220	100-230	14.7	11.0	600	70 ± 10	16.0	0.66	16	54

Maximum Commutator runout is 0.12mm (0.005 inch) Maximum starting circuit voltage drop (battery positive terminal to start terminal) at normal engine temperture is 0.5 volt.

SPECIAL SERVICE TOOLS

Tool No.	Description
TOOL-10044-A	Starter Pole Screw Wrench
TOOL 4201 C	Dial Indicator

CJ4735-B

ROTUNDA EQUIPMENT

Model	Description
078-00006	Starting and Charging Tester

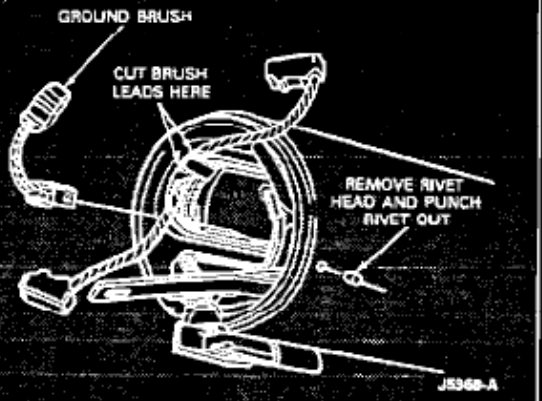
CJ3689-1B

DISASSEMBLY AND ASSEMBLY (Continued)

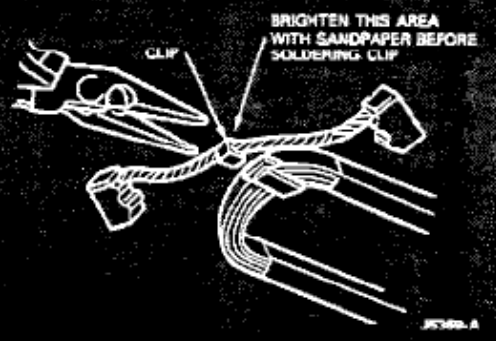
7. Install a new stop-ring retainer. Partially fill the drive end housing bearing bore with Multi-Purpose Grease D0AZ-19584-AA (ESR-M1C159-A or ESB-M1C93-A) or equivalent (approximately 1/4 full). Position the starter drive plunger lever return spring and drive end housing to the starter frame. Tighten the through bolts to 6.21-8.47 N·m (55-75 in-lb).
8. Position the starter drive plunger lever cover, with its gasket, on the starter. Tighten the attaching screw.

Starter Motor Brushes Replacement

1. Remove starter drive plunger lever cover.
2. Remove the two through bolts from the starter.
3. Remove the brush end plate.
4. Remove brush spring and pull brushes loose from brush holder.
5. Remove brush holder.
6. Remove the drive end housing and the plunger lever return spring.
7. Remove the starter drive plunger lever pivot pin and lever and remove the armature.
8. Remove ground brush rivet head with the file or chisel and remove rivet with 1/8 inch punch.
9. Cut the brush leads from the field coils as close to the field connection point as possible.



10. Clean and inspect the starter motor.
11. Position the new field brush lead on the field coil connection. Position and crimp the clip provided with the brushes to hold the brush lead to the connection. Solder the lead clip and connection together using rosin core solder. Use a 300 watt iron.
12. Rivet the ground brush leads to the frame with rivets provided in the brush kit.
13. Clean the commutator with 00 or 000 sandpaper.
14. Install the armature in the starter frame.
15. Install the starter drive gear plunger lever to the frame and starter drive assembly and install the pivot pin.
16. Install brush holder and insert brushes in holder and install brush springs.
17. Install the brush end plate.
18. Install the two through bolts to the starter frame.
19. Install starter drive plunger lever cover and tighten retainer screw.
20. Connect the starter to a battery to check operation.



Armature Replacement

1. Remove starter drive plunger lever cover and retaining screw.
2. Remove the through bolts, pivot pin, drive end housing, drive plunger lever return spring, and brush end plate.
3. Remove starter gear plunger lever. Remove brushes and lift out brush holder.
4. Remove the armature. If the starter drive gear assembly is being reused, remove the stop ring from the end of the armature shaft, and remove the drive gear assembly.
5. Place the drive gear assembly on the new armature with a new stop ring.
6. Install the armature in the starter frame.
7. Position the drive gear plunger lever to the frame and drive gear assembly.
8. Partially fill the drive end housing bearing bore with Multi-Purpose Grease D0AZ-19584-AA (ESR-M1C159-A or ESB-M1C93-A) or equivalent (approximately 1/4 full). Position the drive plunger lever return spring and the drive end housing to the starter frame. Ensure the stop ring retainer is seated properly in the drive housing.
9. Install brush holder. Insert brushes in holder and install brush springs. Positive brush leads should be positioned in their respective slots to prevent grounding.
10. Install the brush end plate (be certain end plate insulator is positioned properly on end plate).
11. Install the two through bolts to the starter frame. Tighten to 6.21-8.47 N·m (55-75 in-lb). Install pivot pin.
12. Install starter drive plunger lever cover and tighten retaining screw.

DISASSEMBLY AND ASSEMBLY (Continued)

13. Check the starter no-load current draw.

SPECIFICATIONS

Refer to the following chart.

POSITIVE ENGAGEMENT STARTER

Positive Engagement Starter Motor				Starter Brushes				
Dia. mm (Inches)	Current Draw Under Normal Load (Amps)	Normal Engine Cranking Speed (RPM)	Current Draw No. Load (Amps)	Mfg. Length mm (Inches)	Wear Limit mm (Inches)	Spring Tension kg (Ounces)	Through Bolt Torque N-m (In-Lbs)	Mounting Bolt Torque N-m (Ft-Lbs)
101.60 (4)	150-200	180-250	80	12.2 (0.50)	6.35 (0.25)	2.27 (80)	6.21-8.47 (55-75)	21.27 (15-20)

Maximum Commutator runout is 0.1270mm (0.005 inch). Maximum starting circuit voltage drop (battery positive terminal to starter terminal) at normal engine temperature is 0.5 volt.

SPECIAL SERVICE TOOLS

Tool Number	Description
TOOL 10044-A	Generator Pole Screw Wrench
TOOL 4201-C	Dial Indicator

CJ3169-2A

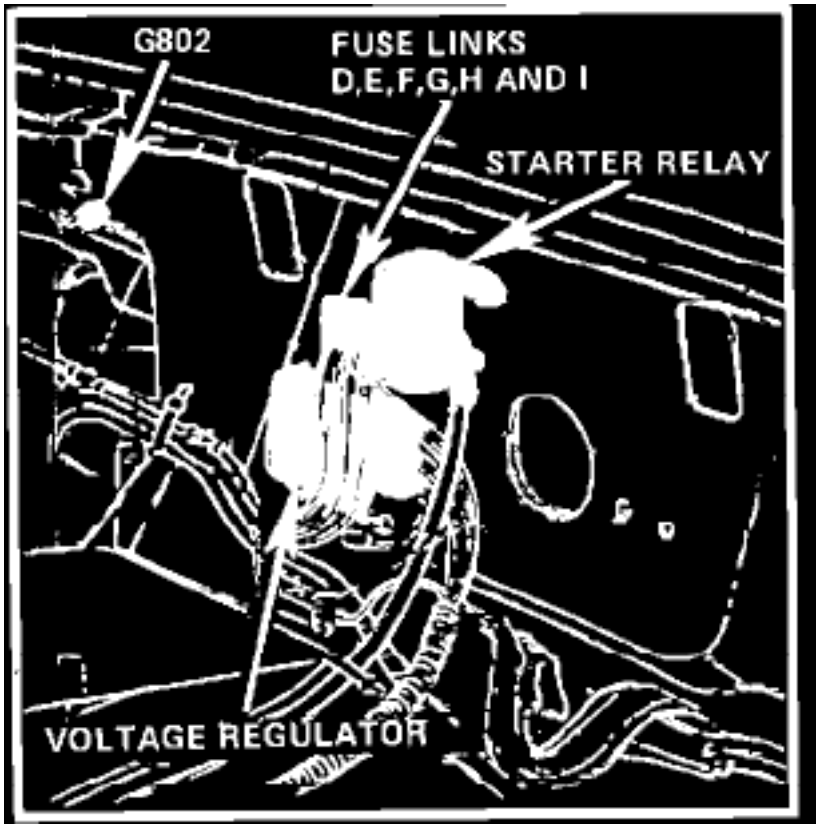
SPECIAL SERVICE TOOLS

Refer to the following chart.

ROTUNDA EQUIPMENT

Tool Number	Description
078-00005	Starting and Charging Tester

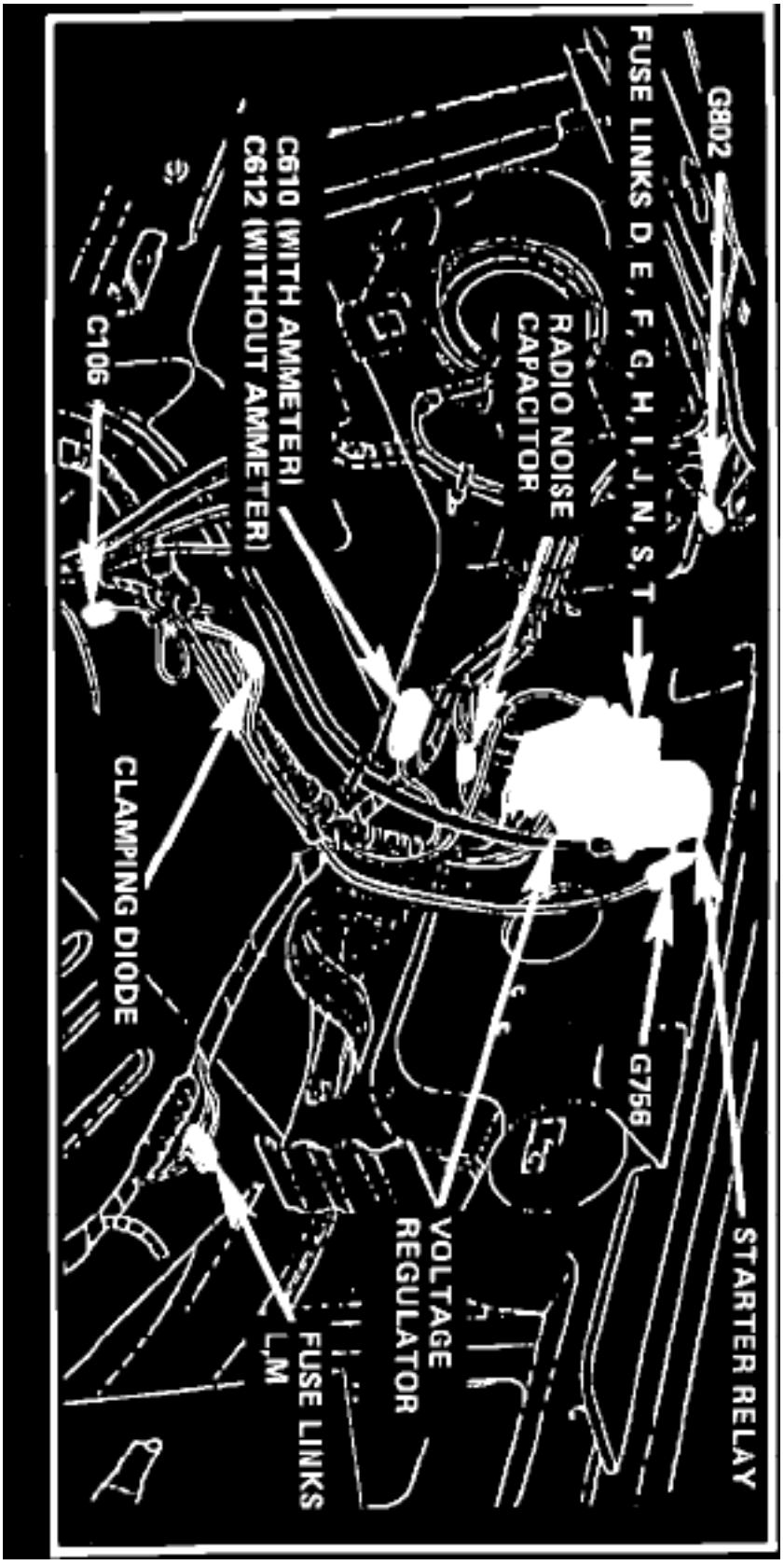
CJ3683-1A



Starter Relay: Locations All Engine

RH Front Fender Apron

On RH Fender Apron

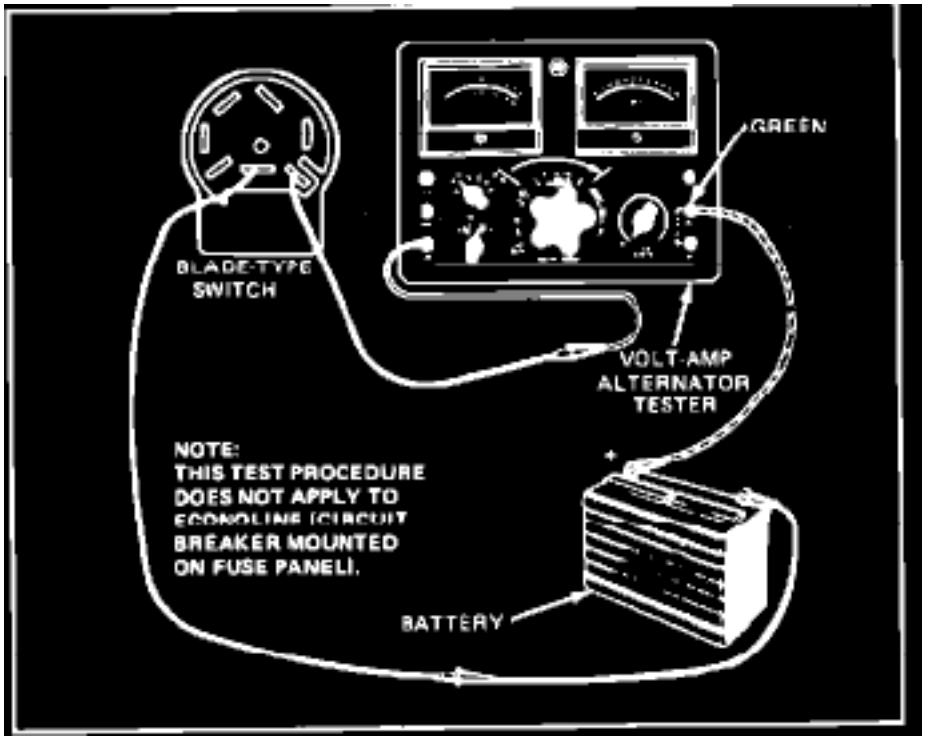

G802
FUSE LINKS D, E, F, G, H, I, J, N, S, T
RADIO NOISE CAPACITOR
C610 (WITH AMMETER)
C612 (WITHOUT AMMETER)
C106
CLAMPING DIODE
G756
STARTER RELAY
VOLTAGE REGULATOR
FUSE LINKS L,M

Starter Relay: Locations 1981-82 All & 1983-85 W/EEC

RH Front Fender Apron.

On RH Fender Apron

Applicable to: 1981-82 All & 1983-85 w/EEC



Circuit Breaker: Testing and Inspection

BRONCO & F-100---350 SERIES The circuit breaker is located in the wiper control switch on all rotary switches. For slide wiper control switches, the circuit breaker is located in the fuse panel. All pin terminal switches have a circuit breaker rating of 8 {1/4} amps. All blade terminal switches have a rating of 7 amps. Two separate tests are necessary to check for correct circuit breaker operation when circuit breaker is part of wiper switch.

Fig. 3 Testing circuit breaker. Bronco & F-100---350 Series

Test 1

1. Short tester leads together and adjust current draw until it equals circuit breaker rating.

2. Connect switch to tester, Fig. 3.

3. Leave switch connected to tester for 10 minutes, holding current reading on multimeter at rated current. If circuit breaker opens, replace wiper switch assembly.

Test 2

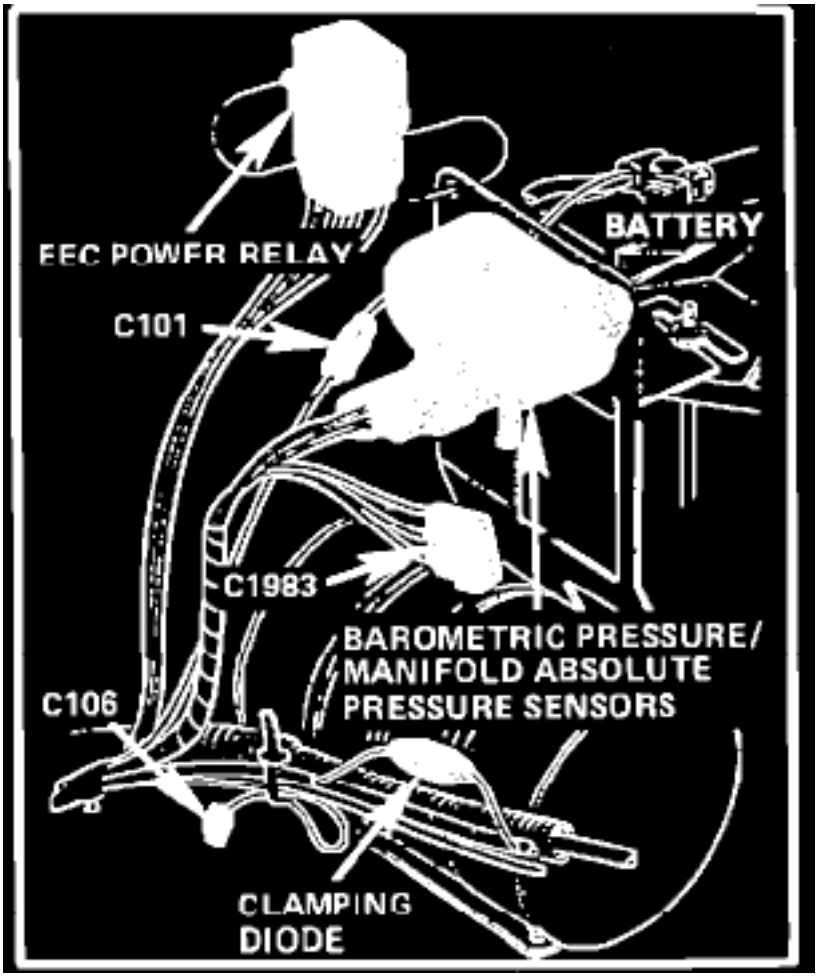
1. Short tester leads together and adjust current draw until it equals circuit breaker rating.

2. Connect switch to tester, Fig. 3.

3. Hold current reading on multimeter at twice the rated current of circuit breaker. If it takes more than 30 seconds for tester reading to drop to zero, replace wiper switch assembly.

Diode: Locations Inline Diode

Above LH Quarter Window

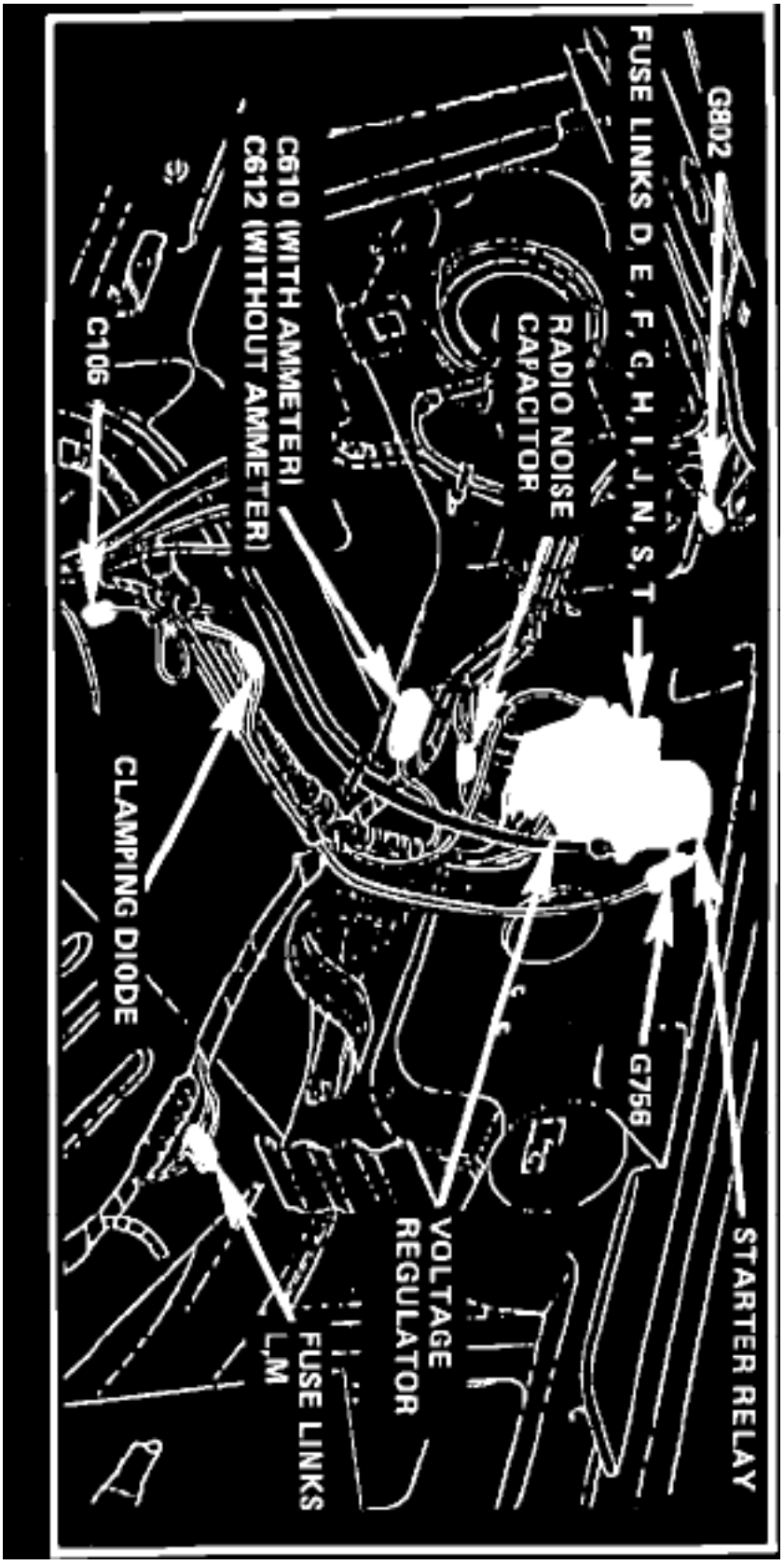


Diode: Locations Clamping Diode

Forward Of RH Wheelwell At Battery.

Front Of RH Fender Well

Applicable to: 1981-83


G802
FUSE LINKS D, E, F, G, H, I, J, N, S, T
RADIO NOISE CAPACITOR
C610 (WITH AMMETER)
C612 (WITHOUT AMMETER)
C106
CLAMPING DIODE
G756
STARTER RELAY
VOLTAGE REGULATOR
FUSE LINKS L,M

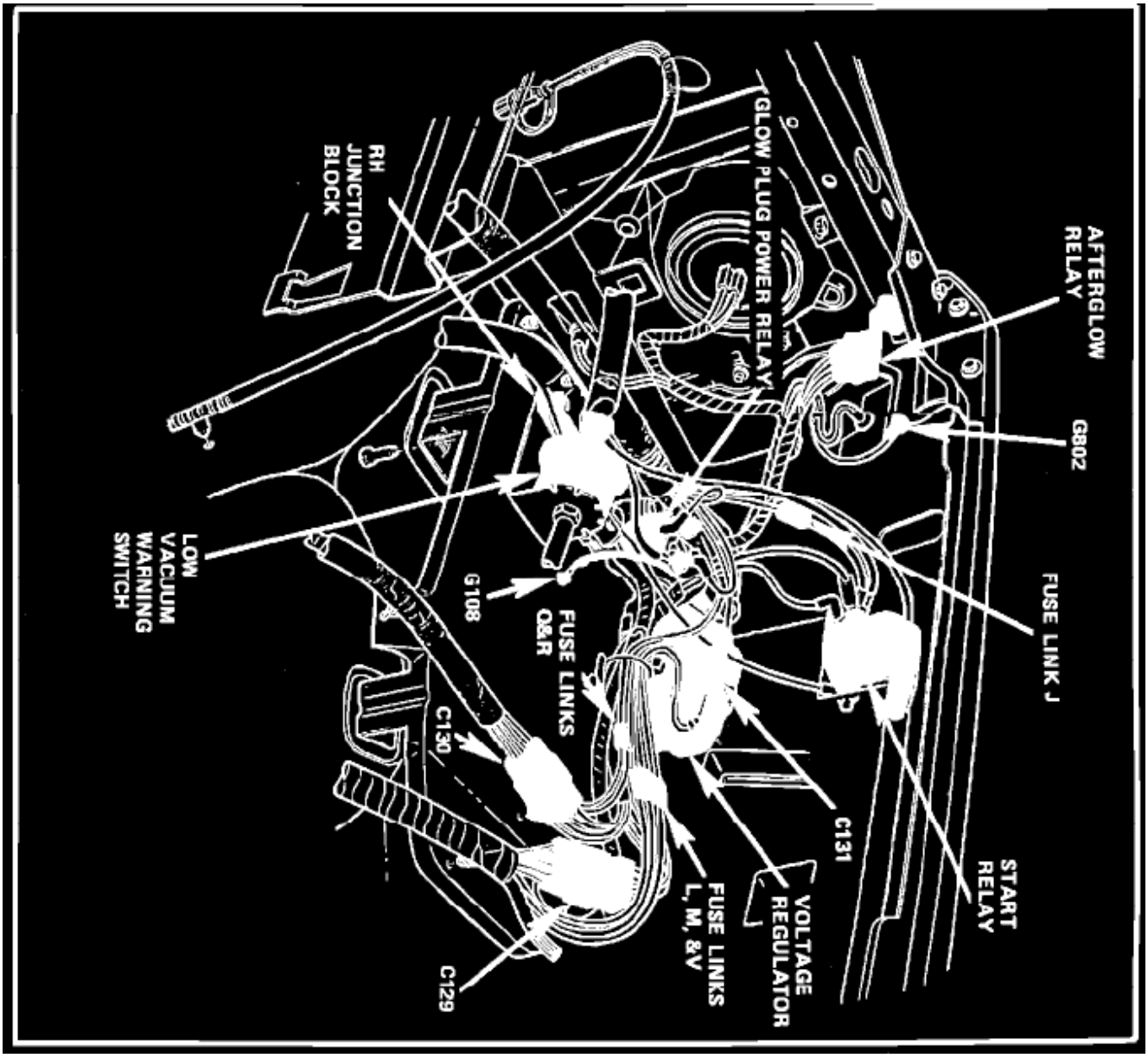
RH Front Fender Apron.

Front Of RH Fender Well

Applicable to: 1981-82 All & 1983-85 w/EEC

Fuse: Locations

On Harness Near Fuse Panel

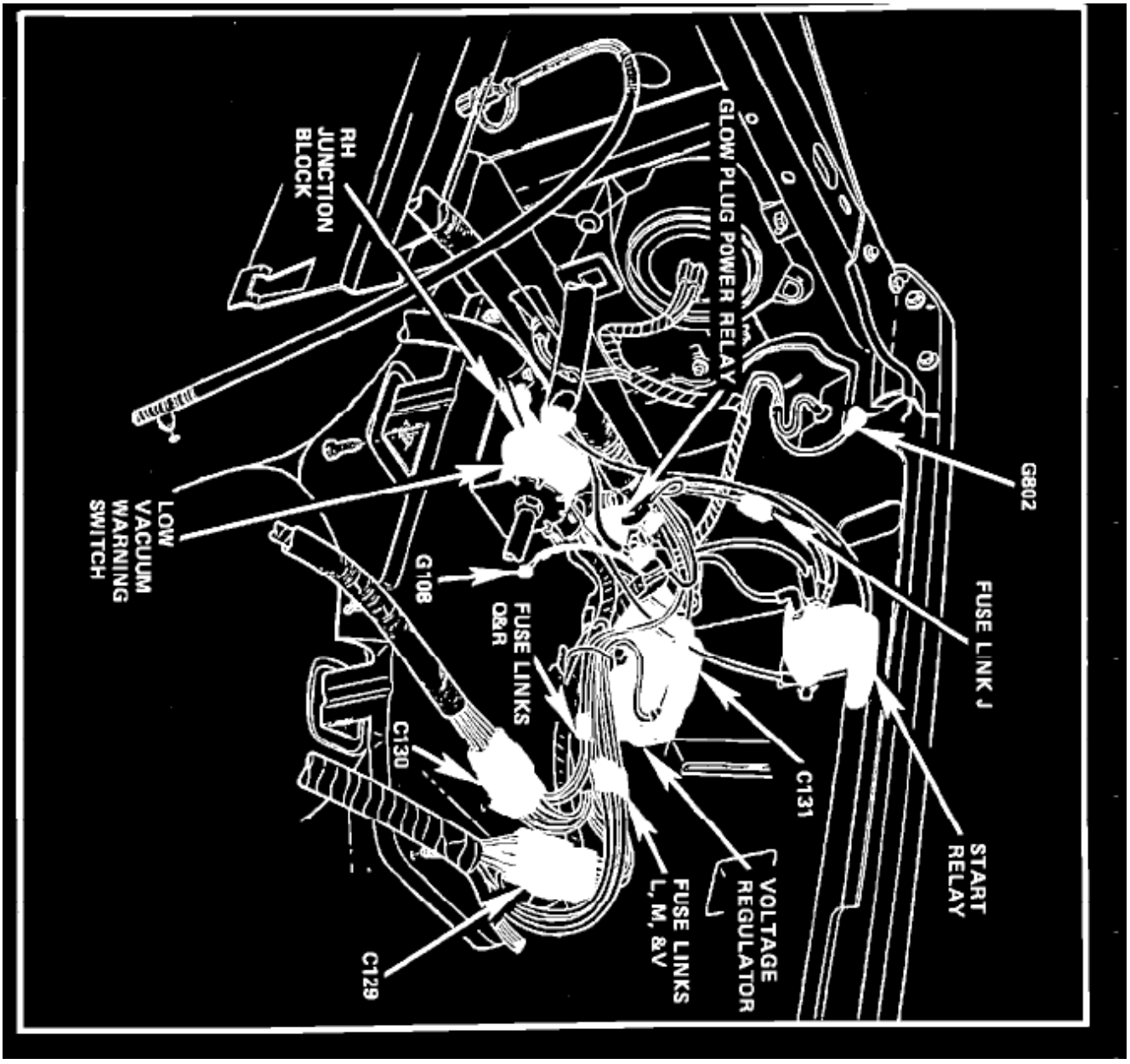


Fusible Link: Locations Fuse Link J

RH Fender Apron.

LH Front Fender Well

Applicable to: 1983 V8-420/6.9L Diesel Engine



RH Fender Apron.

LH Front Fender Well

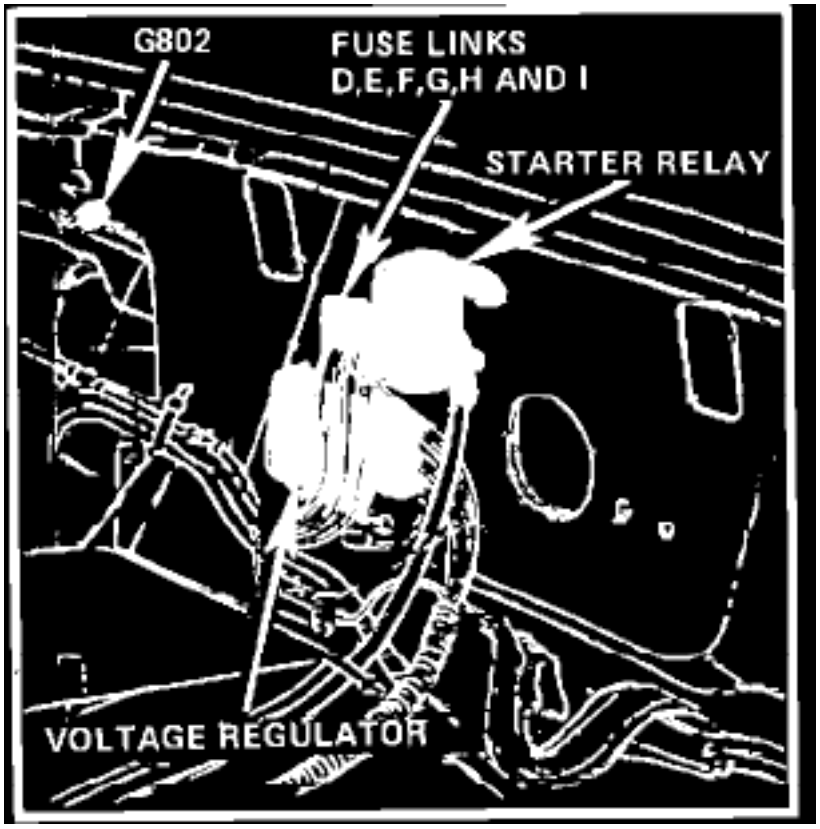
Applicable to: 1984 V8-420/6.9L Diesel Engine

Fusible Link: Locations Fuse Link P

LH Side Of Dash Panel

Fusible Link: Locations Fuse Links A, B, C & K

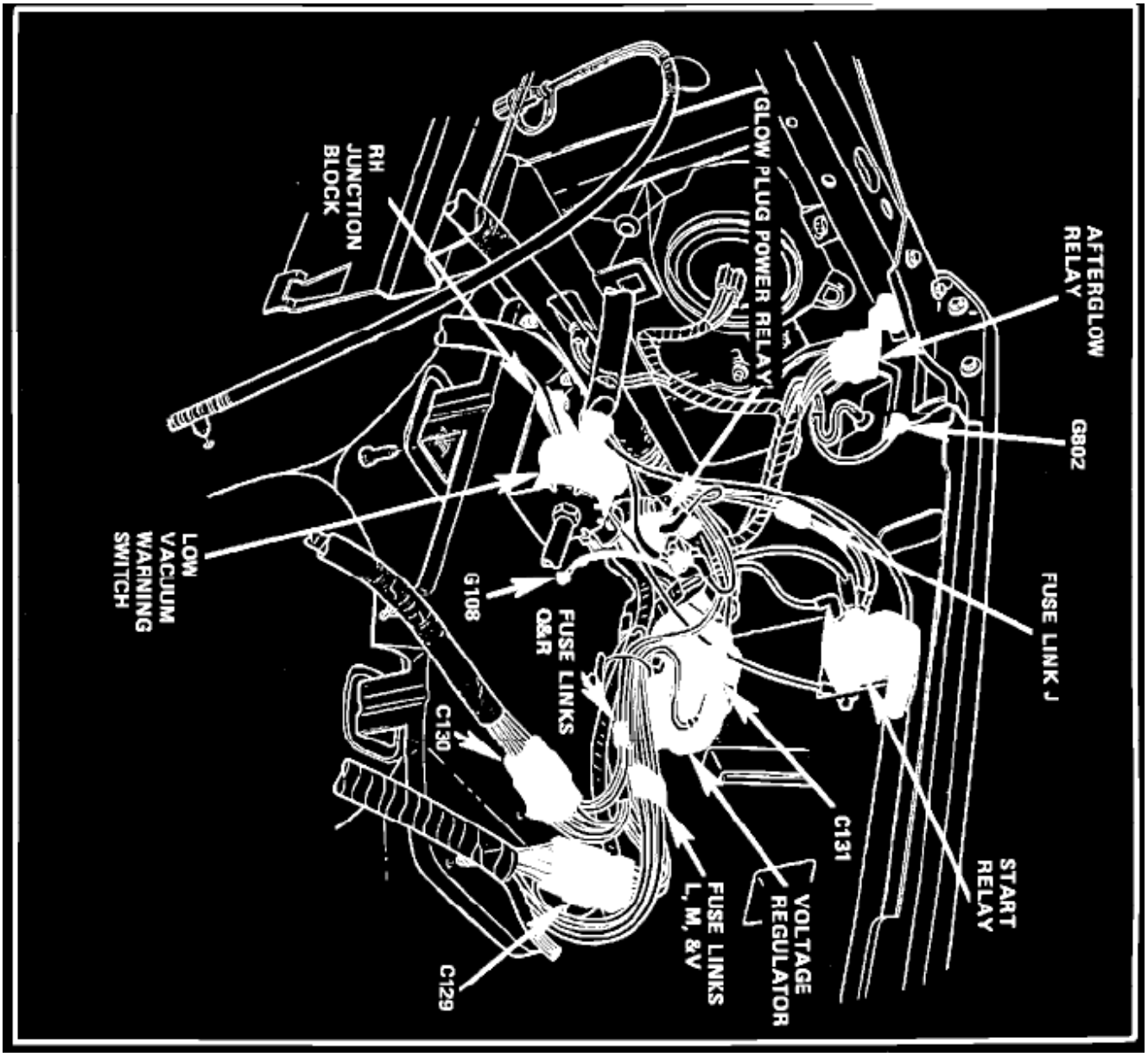
Near Junction Block Or Auxiliary Battery Relay



Fusible Link: Locations Fuse Links D, E, F, G, H & I

RH Front Fender Apron

At Starter Relay



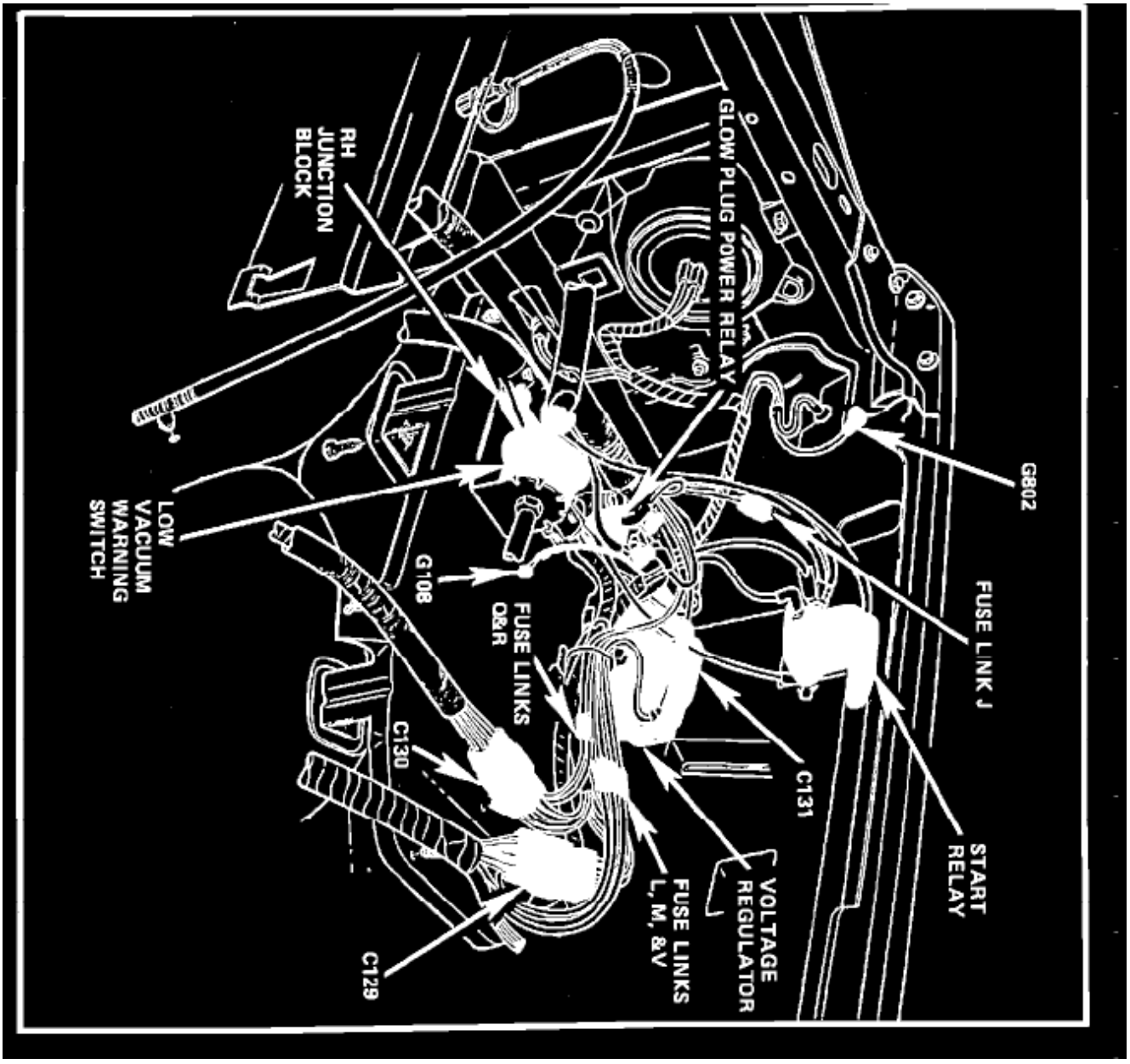
Fusible Link: Locations

Fuse Link J

RH Fender Apron.

LH Front Fender Well

Applicable to: 1983 V8-420/6.9L Diesel Engine



RH Fender Apron.

LH Front Fender Well

Applicable to: 1984 V8-420/6.9L Diesel Engine

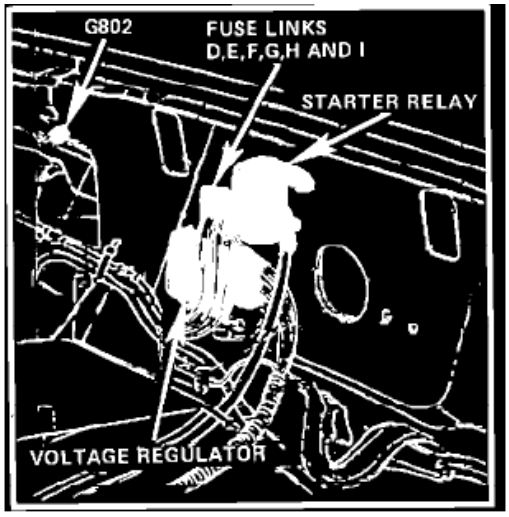
Fuse Link P

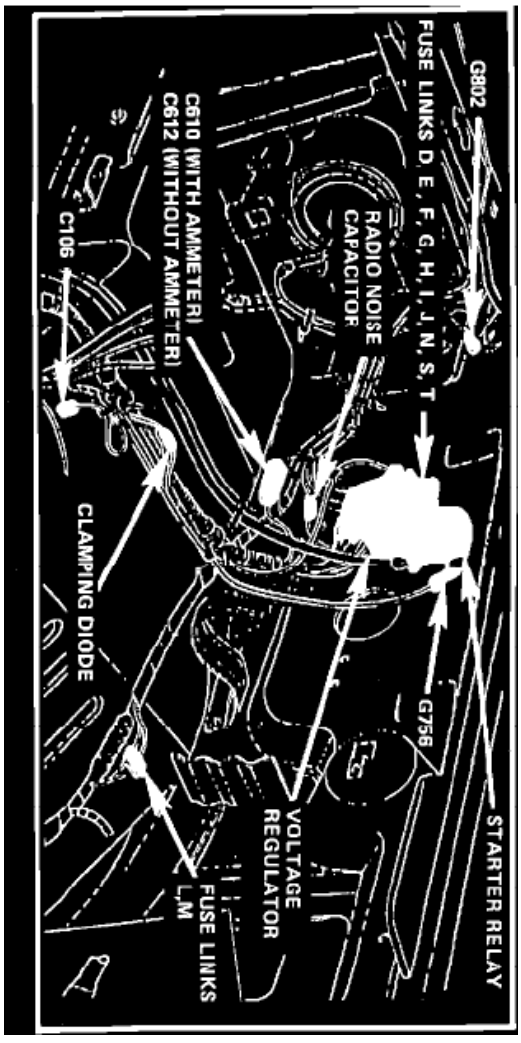
LH Side Of Dash Panel

Fuse Links A, B, C & K

Near Junction Block Or Auxiliary Battery Relay

Fuse Links D, E, F, G, H & I


G802
FUSE LINKS
D,E,F,G,H AND I
STARTER RELAY
VOLTAGE REGULATOR


G802
FUSE LINKS D, E, F, G, H, I, J, N, S, T
RADIO NOISE CAPACITOR
C610 (WITH AMMETER)
C612 (WITHOUT AMMETER)
C106
CLAMPING DIODE
G756
VOLTAGE REGULATOR
FUSE LINKS L,M
STARTER RELAY

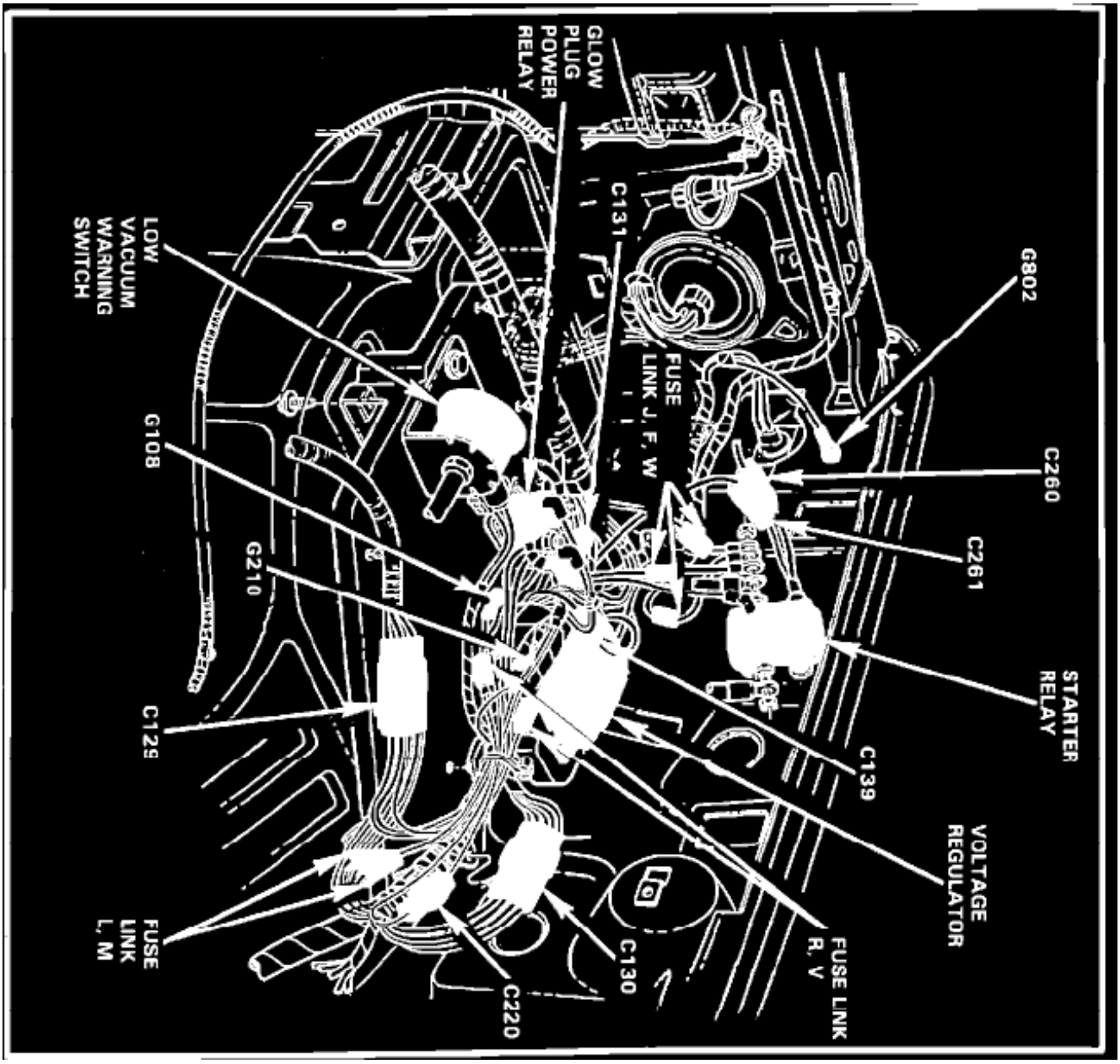
RH Front Fender Apron

At Starter Relay

Fuse Links D, E, F, G, H, I, J, N, S & T

RH Front Fender Apron.

At Starter Relay



Applicable to: 1981-82 All & 1983-85 w/EEC

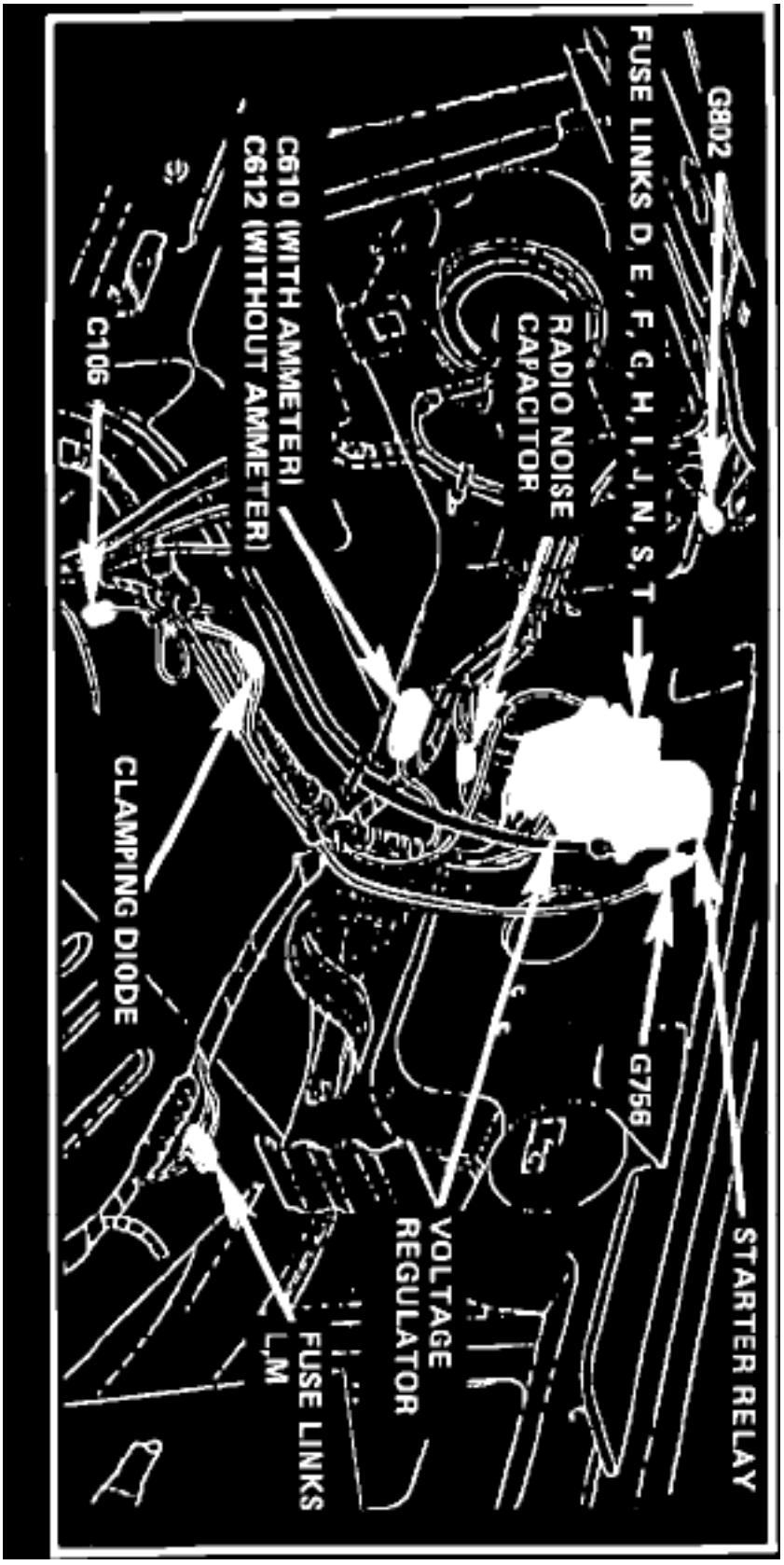
Fuse Links F, J & W

RH Fender Apron.

At Starter Relay

Applicable to: 1985 V8-420/6.9L Diesel Engine

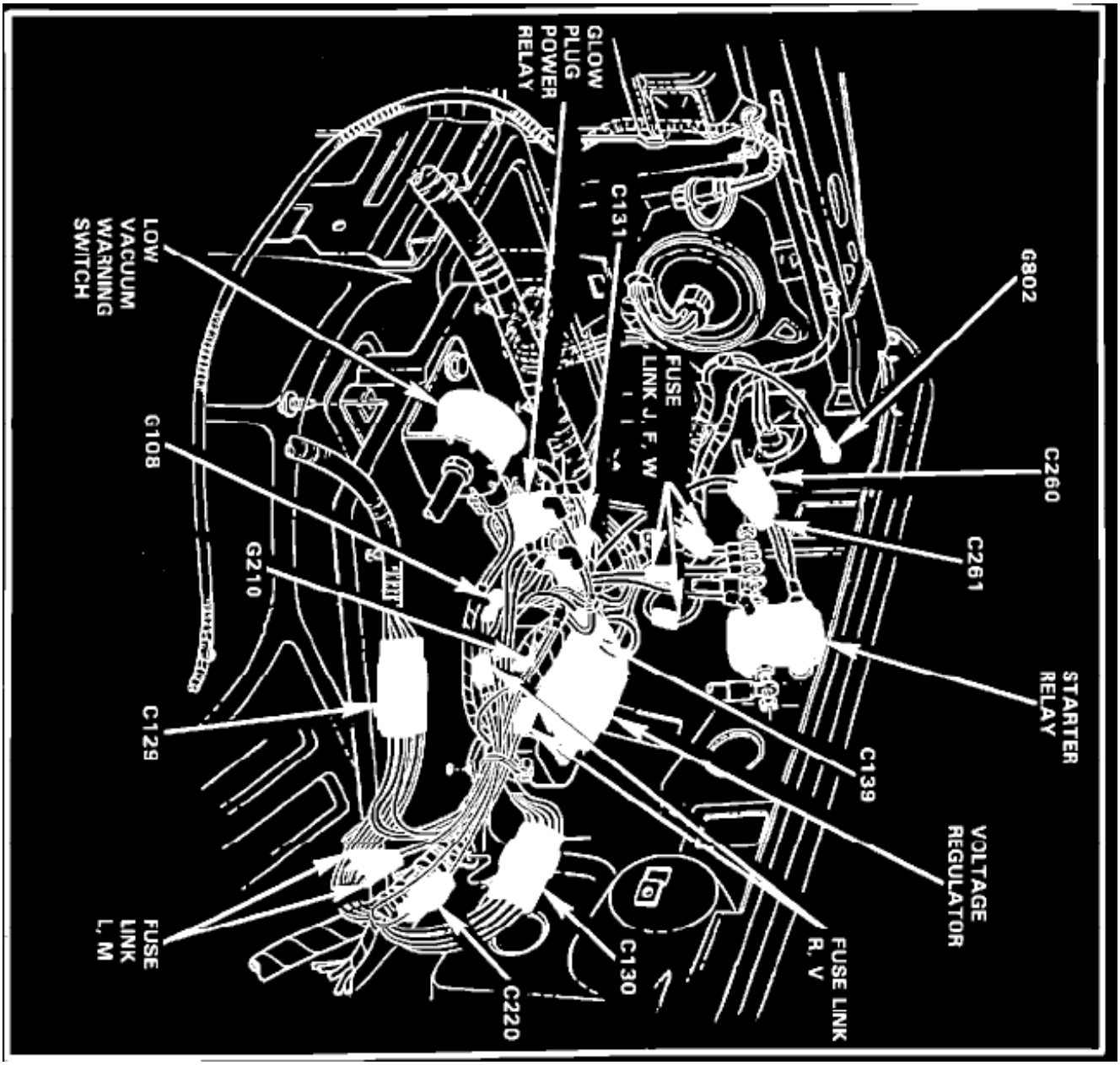
Fuse Links L & M


G802
FUSE LINKS D, E, F, G, H, I, J, N, S, T
RADIO NOISE CAPACITOR
C610 (WITH AMMETER)
C612 (WITHOUT AMMETER)
C106
CLAMPING DIODE
G756
STARTER RELAY
VOLTAGE REGULATOR
FUSE LINKS L,M

RH Front Fender Apron.

RH Fender Apron

Applicable to: 1981-82 All & 1983-85 w/EEC

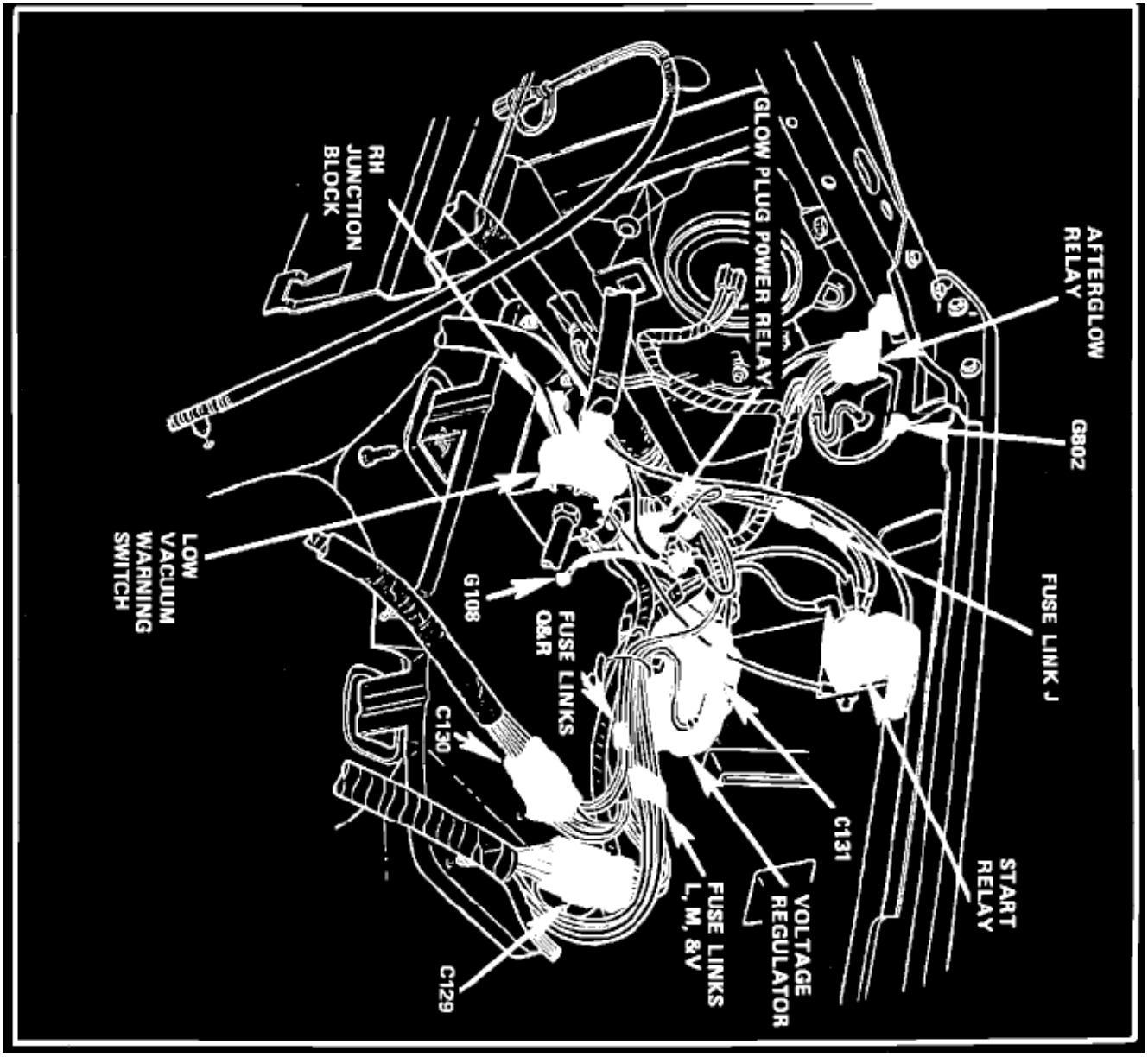


RH Fender Apron.

RH Fender Apron

Applicable to: 1985 V8-420/6.9L Diesel Engine

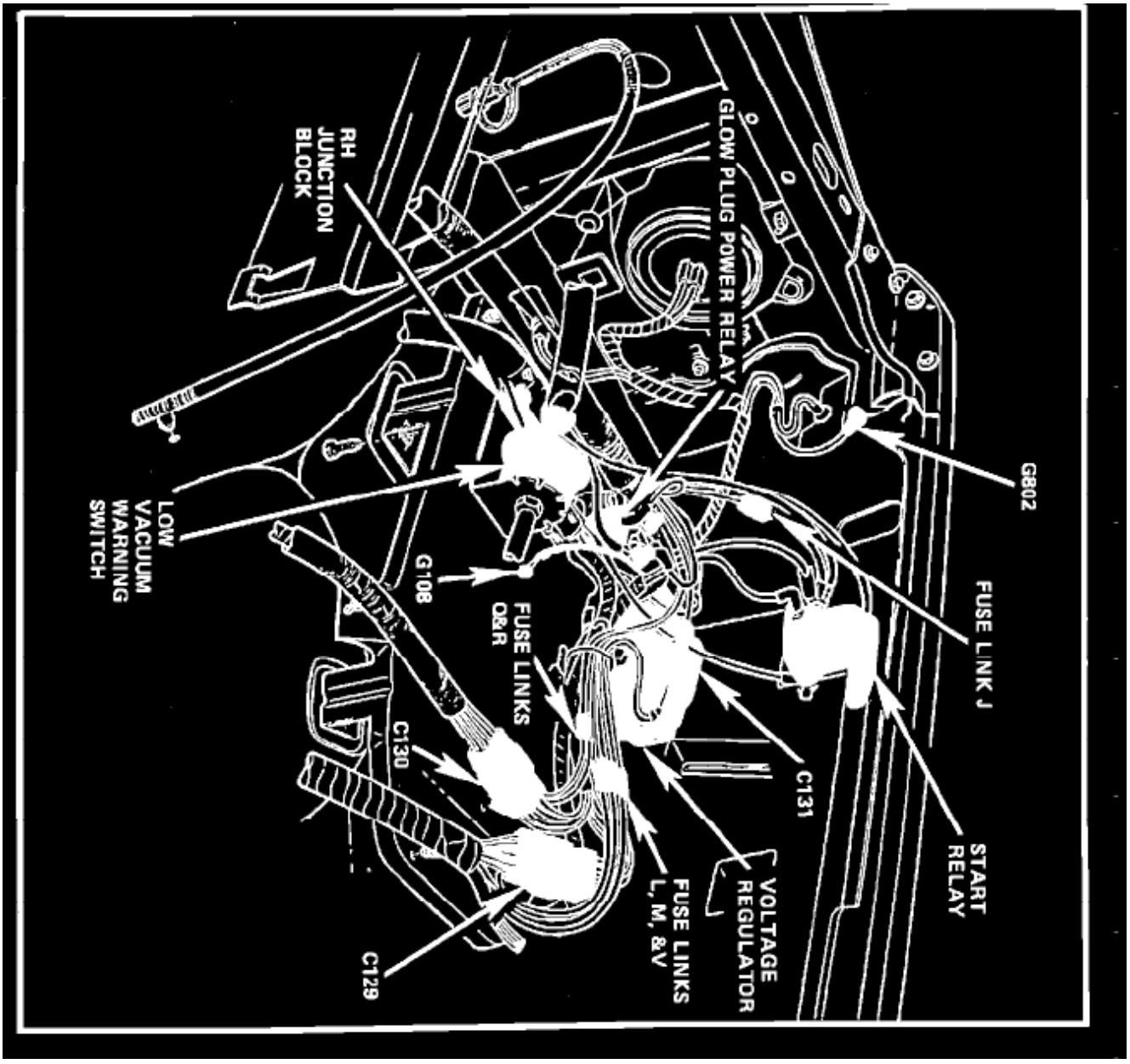
Fuse Links L, M & V



RH Fender Apron.

RH Fender Apron

Applicable to: 1983 V8-420/6.9L Diesel Engine



RH Fender Apron.

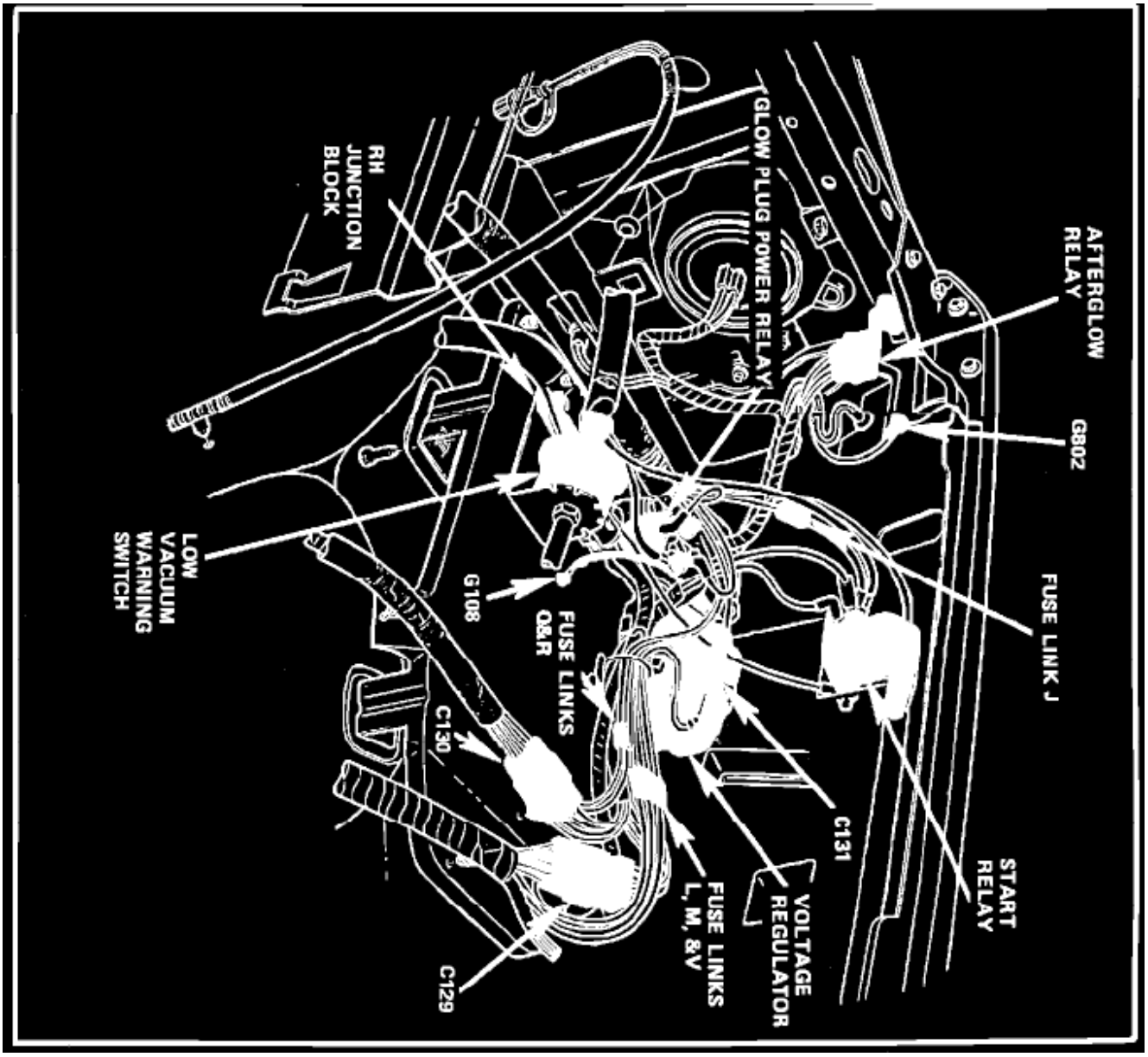
RH Fender Apron

Applicable to: 1984 V8-420/6.9L Diesel Engine

Fuse Links L, M, Q, R, V & W

RH Fender Apron

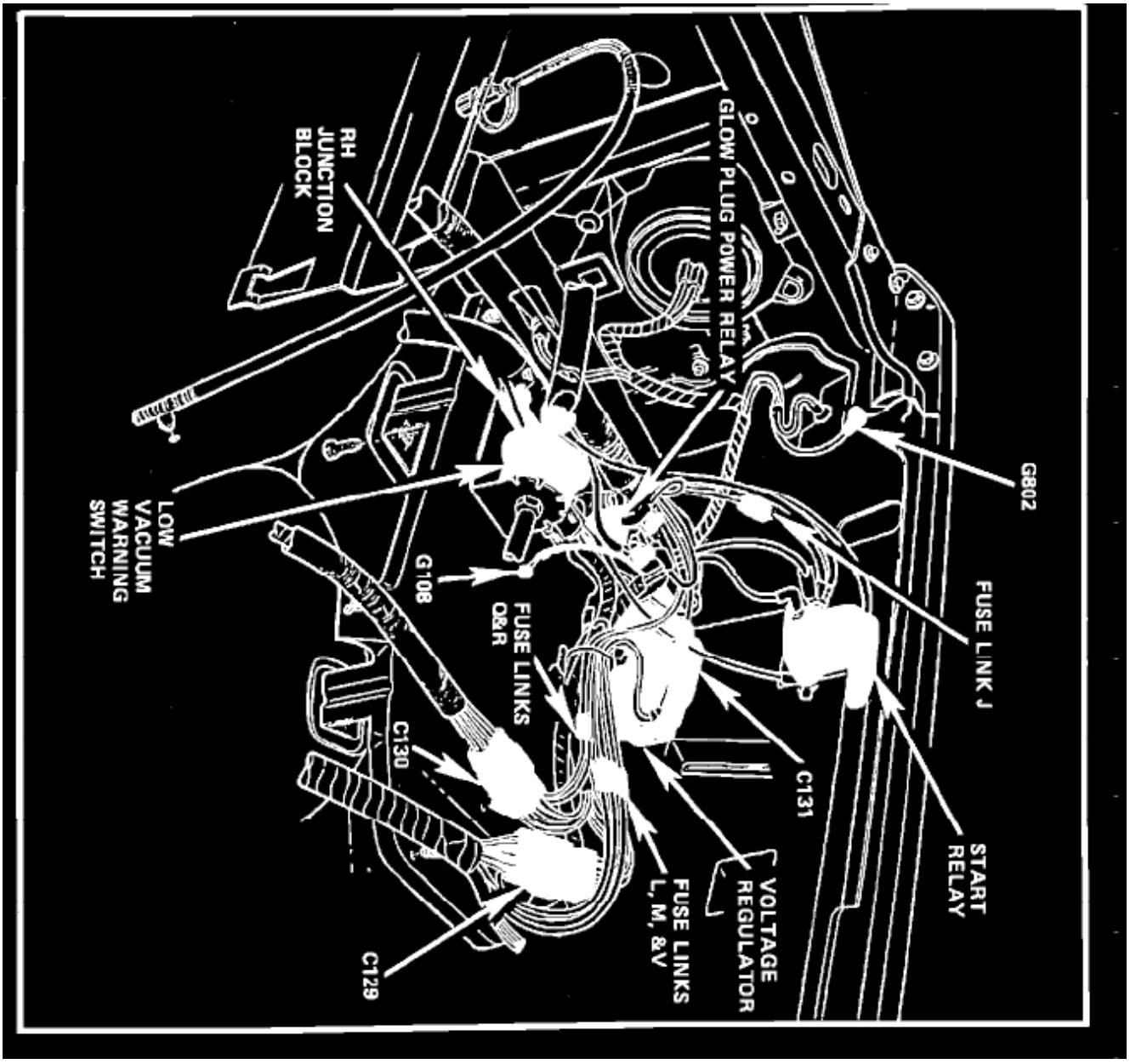
Fuse Links Q & R



RH Fender Apron.

RH Fender Apron

Applicable to: 1983 V8-420/6.9L Diesel Engine

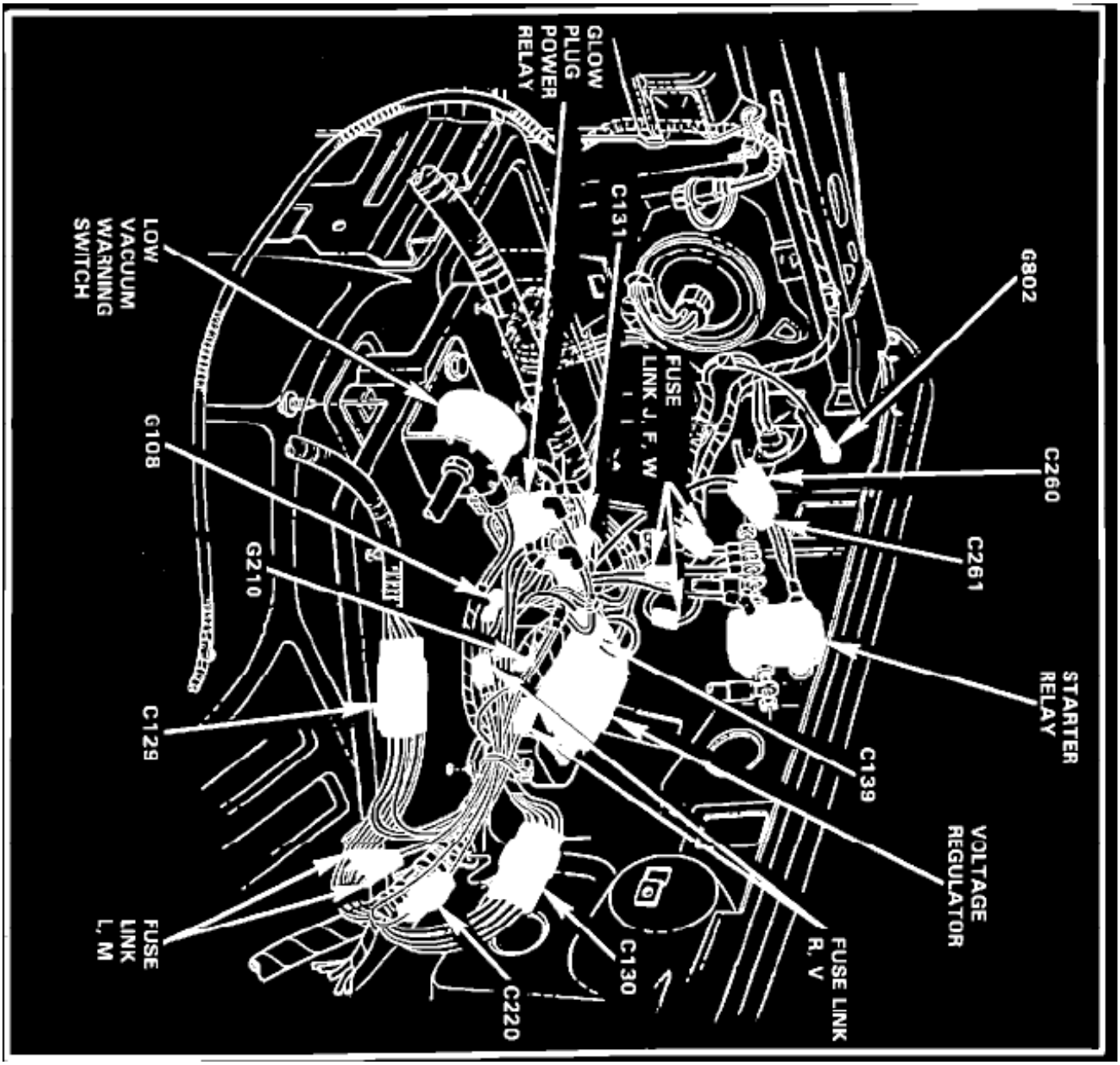


RH Fender Apron.

RH Fender Apron

Applicable to: 1984 V8-420/6.9L Diesel Engine

Fuse Links R & V



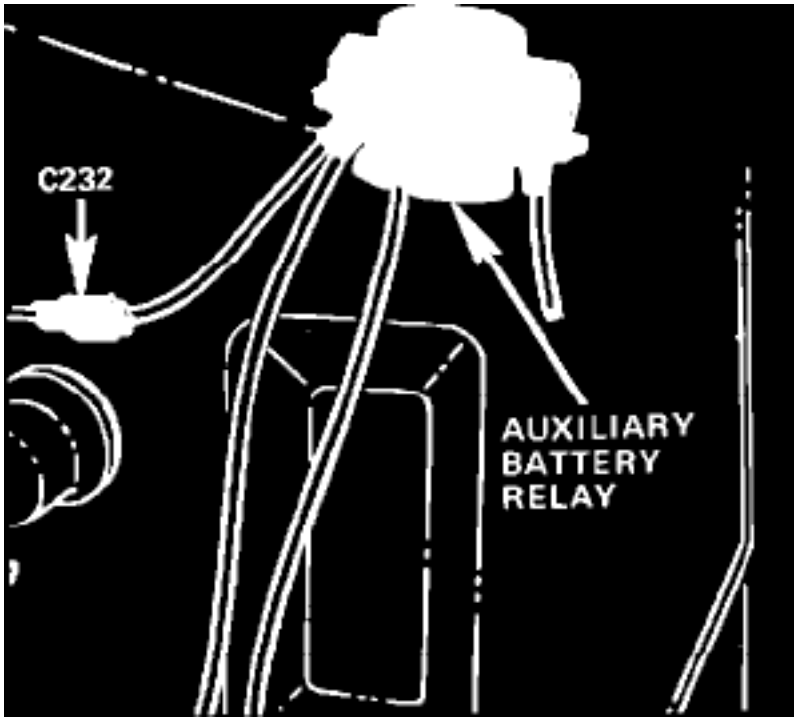
RH Fender Apron.

RH Fender Apron

Applicable to: 1985 V8-420/6.9L Diesel Engine

Multiple Junction Connector: Locations

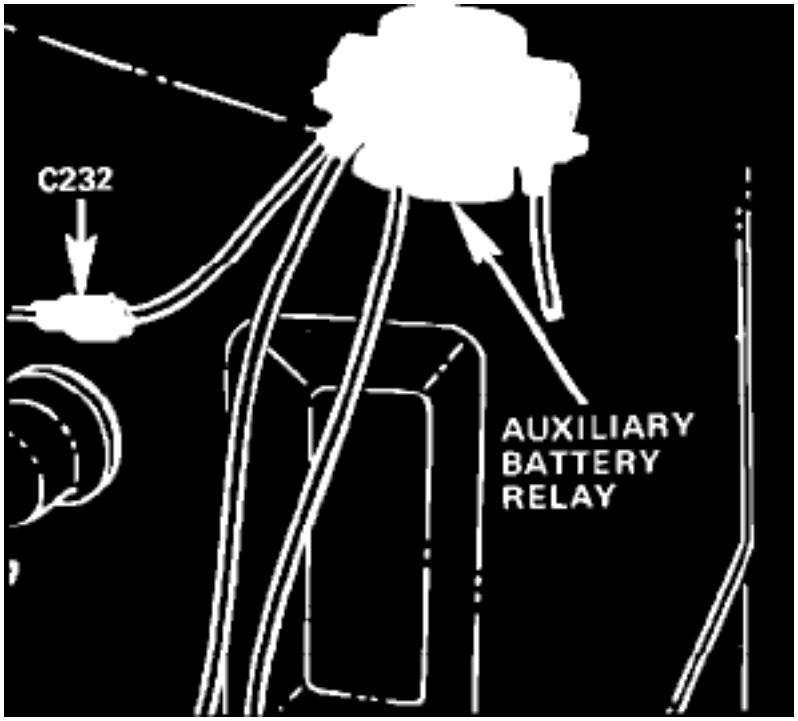
LH Dash Panel



Power Protection Relay: Locations

LH Side Of Dash Panel

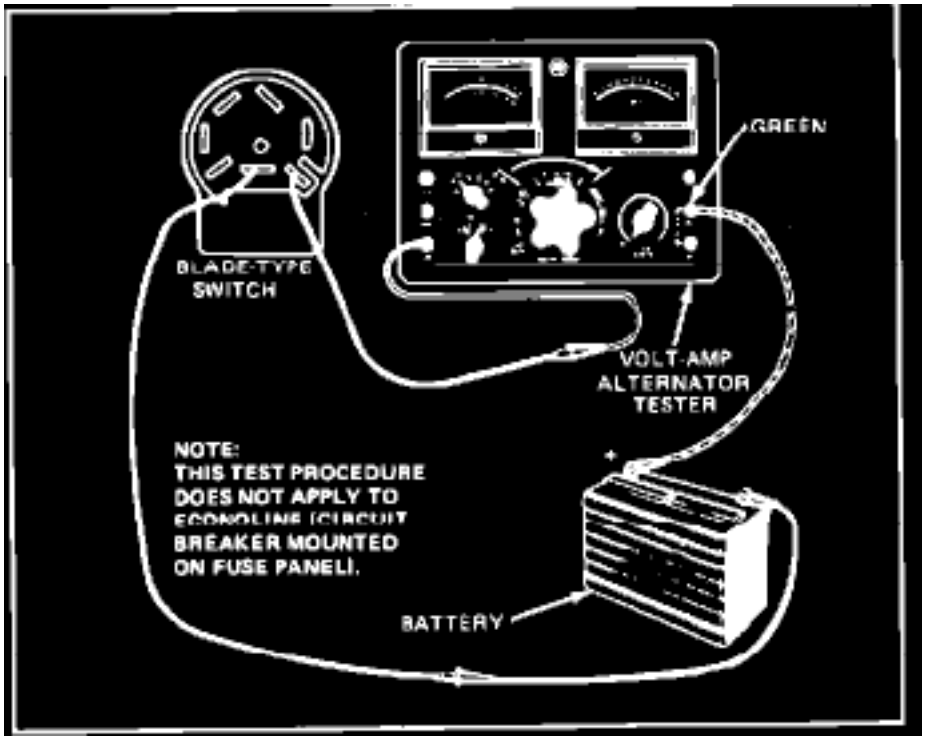
LH Side Of Dash Panel



Power Protection Relay: Locations

LH Side Of Dash Panel

LH Side Of Dash Panel



Circuit Breaker: Testing and Inspection

BRONCO & F-100---350 SERIES The circuit breaker is located in the wiper control switch on all rotary switches. For slide wiper control switches, the circuit breaker is located in the fuse panel. All pin terminal switches have a circuit breaker rating of 8 {1/4} amps. All blade terminal switches have a rating of 7 amps. Two separate tests are necessary to check for correct circuit breaker operation when circuit breaker is part of wiper switch.

Fig. 3 Testing circuit breaker. Bronco & F-100---350 Series

Test 1

1. Short tester leads together and adjust current draw until it equals circuit breaker rating.

2. Connect switch to tester, Fig. 3.

3. Leave switch connected to tester for 10 minutes, holding current reading on multimeter at rated current. If circuit breaker opens, replace wiper switch assembly.

Test 2

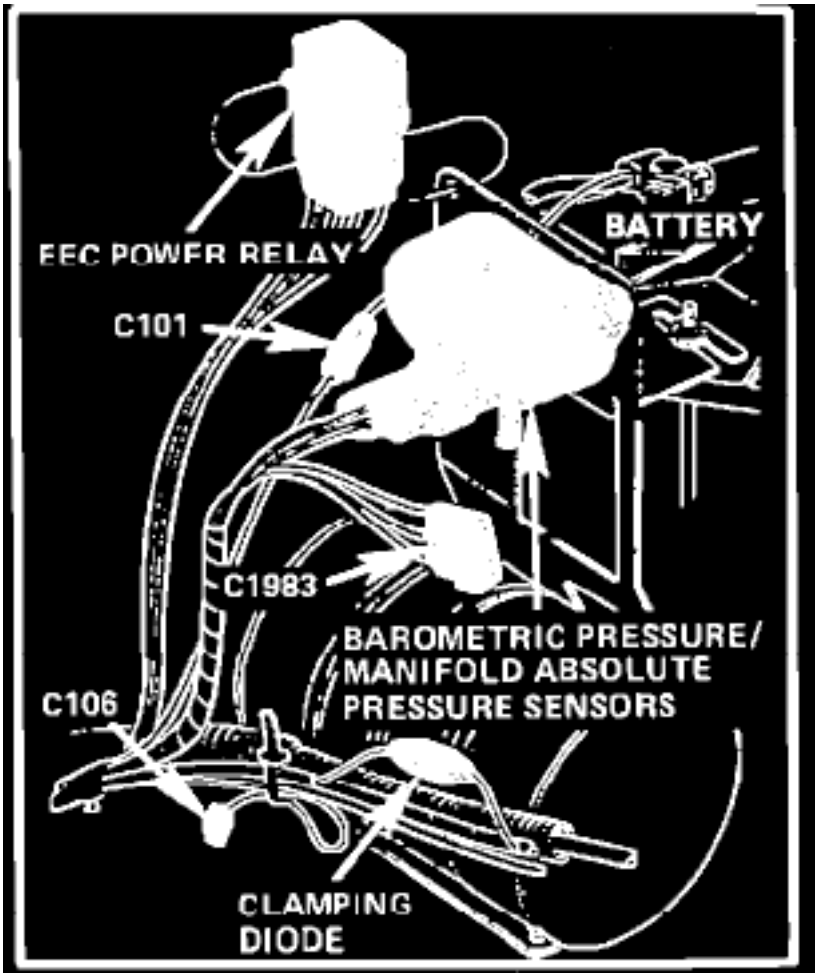
1. Short tester leads together and adjust current draw until it equals circuit breaker rating.

2. Connect switch to tester, Fig. 3.

3. Hold current reading on multimeter at twice the rated current of circuit breaker. If it takes more than 30 seconds for tester reading to drop to zero, replace wiper switch assembly.

Diode: Locations Inline Diode

Above LH Quarter Window

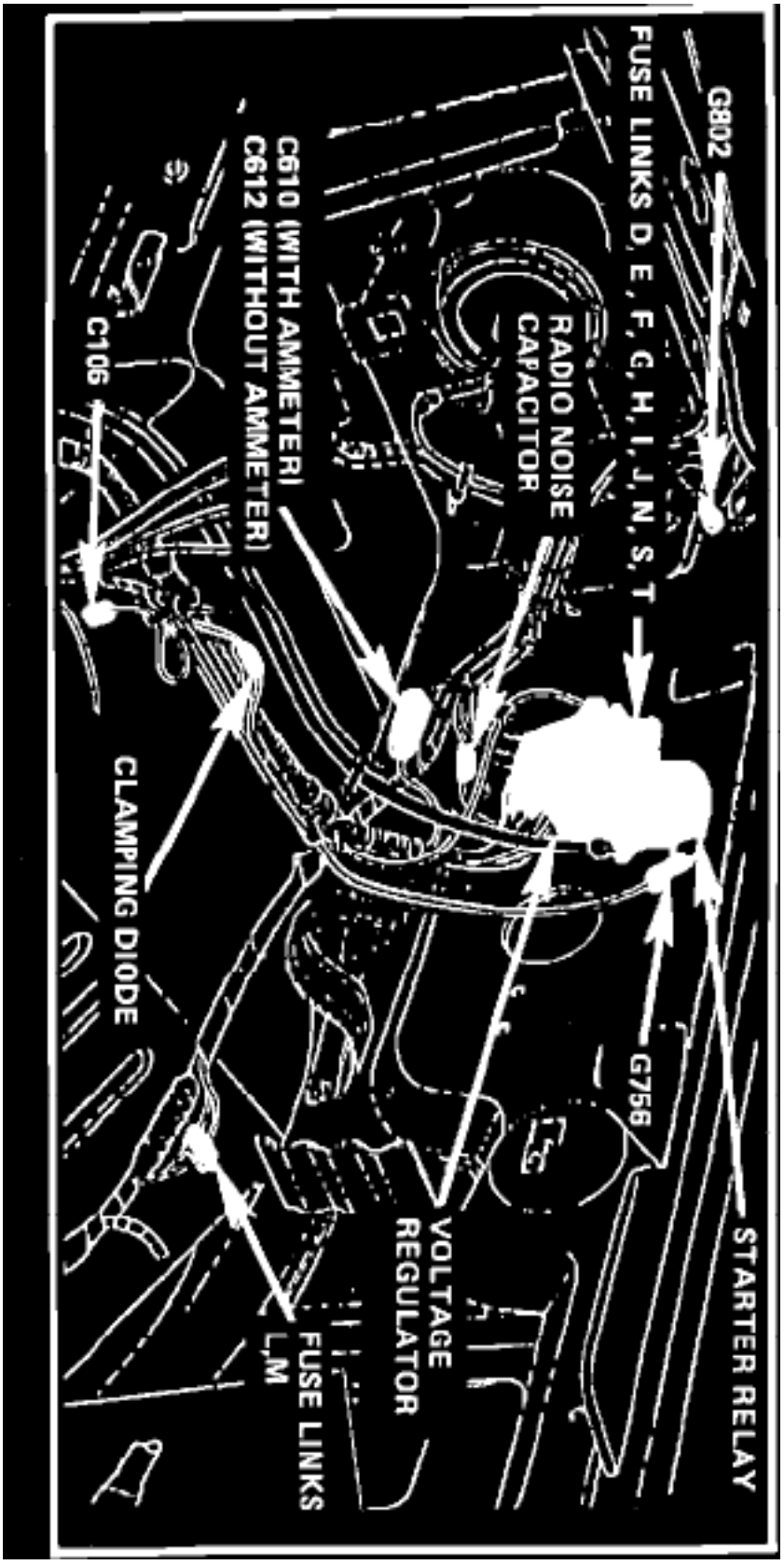


Diode: Locations Clamping Diode

Forward Of RH Wheelwell At Battery.

Front Of RH Fender Well

Applicable to: 1981-83


G802
FUSE LINKS D, E, F, G, H, I, J, N, S, T
RADIO NOISE CAPACITOR
C610 (WITH AMMETER)
C612 (WITHOUT AMMETER)
C106
CLAMPING DIODE
G756
STARTER RELAY
VOLTAGE REGULATOR
FUSE LINKS L,M

RH Front Fender Apron.

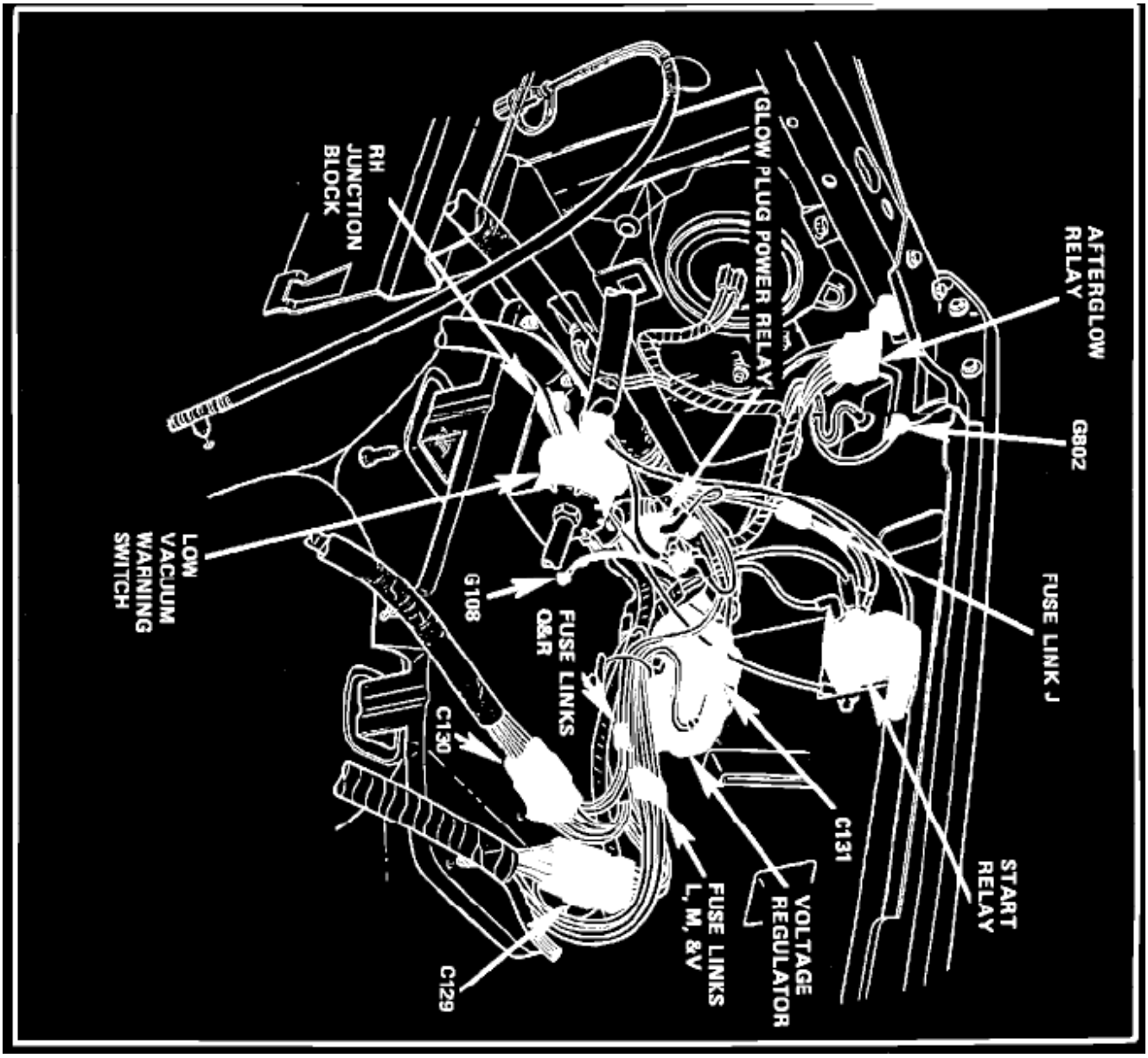
Front Of RH Fender Well

Applicable to: 1981-82 All & 1983-85 w/EEC

Fuse: Locations

On Harness Near Fuse Panel

Ford Bronco Workshop Manual (V8-351 5.8L VIN G 2-bbl (1982))
Ford Workshop Manuals > Power and Ground Distribution > Fusible Link > Component Information > Locations > Fuse Link J

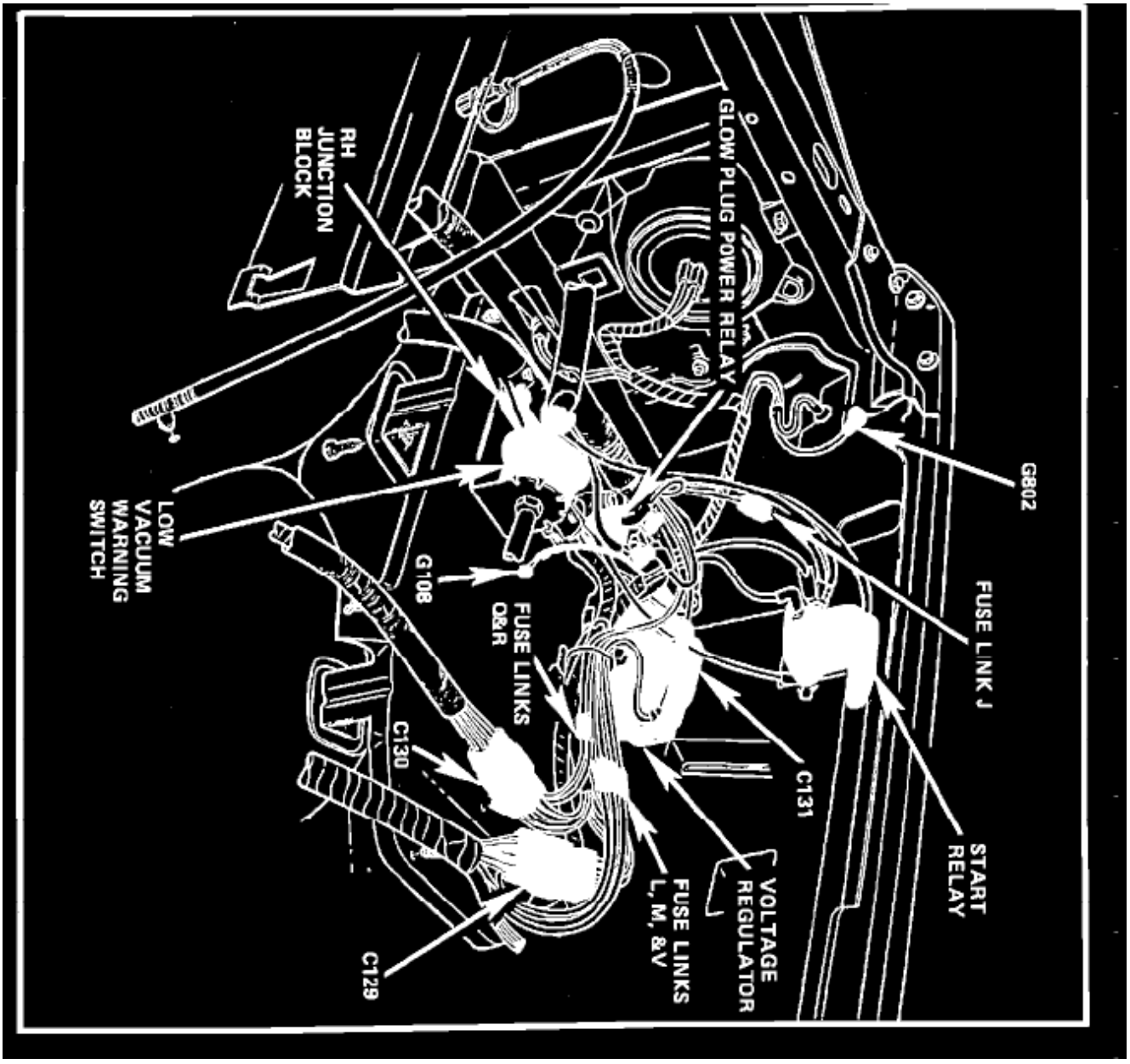


Fusible Link: Locations Fuse Link J

RH Fender Apron.

LH Front Fender Well

Applicable to: 1983 V8-420/6.9L Diesel Engine



RH Fender Apron.

LH Front Fender Well

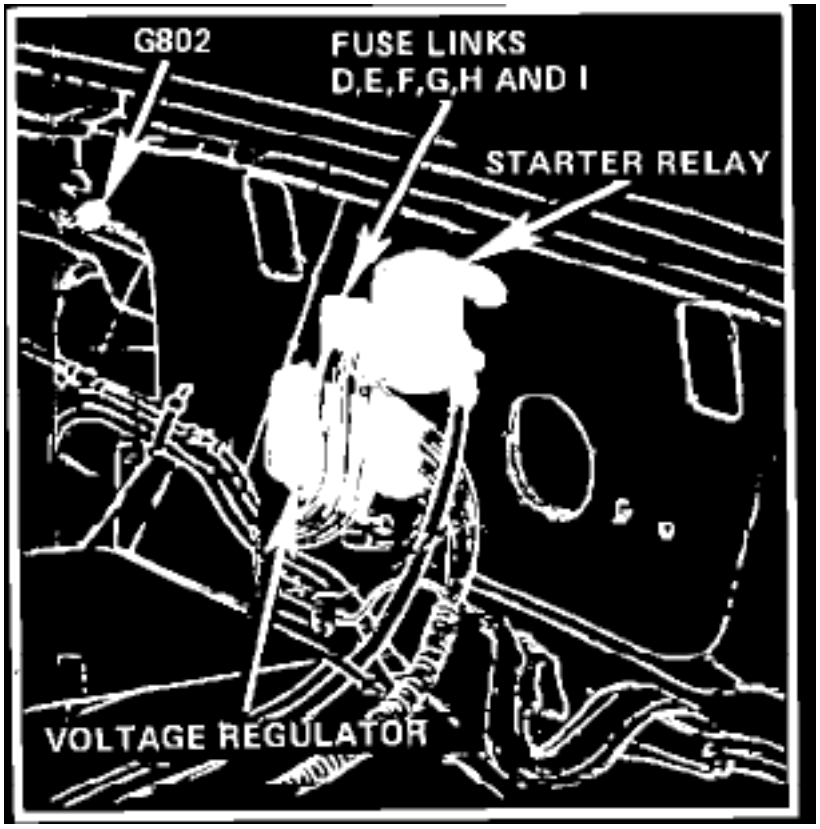
Applicable to: 1984 V8-420/6.9L Diesel Engine

Fusible Link: Locations Fuse Link P

LH Side Of Dash Panel

Fusible Link: Locations Fuse Links A, B, C & K

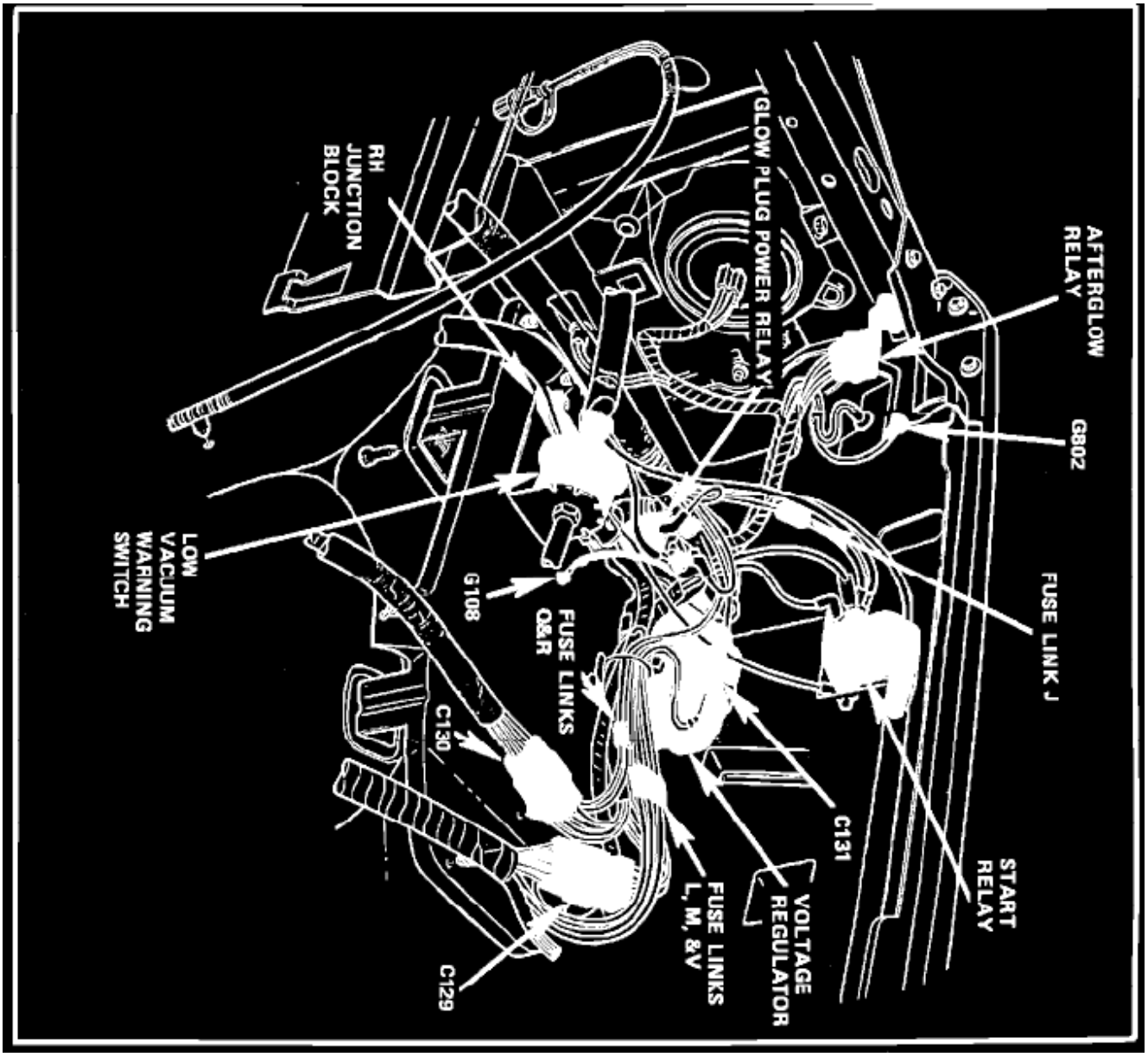
Near Junction Block Or Auxiliary Battery Relay



Fusible Link: Locations Fuse Links D, E, F, G, H & I

RH Front Fender Apron

At Starter Relay



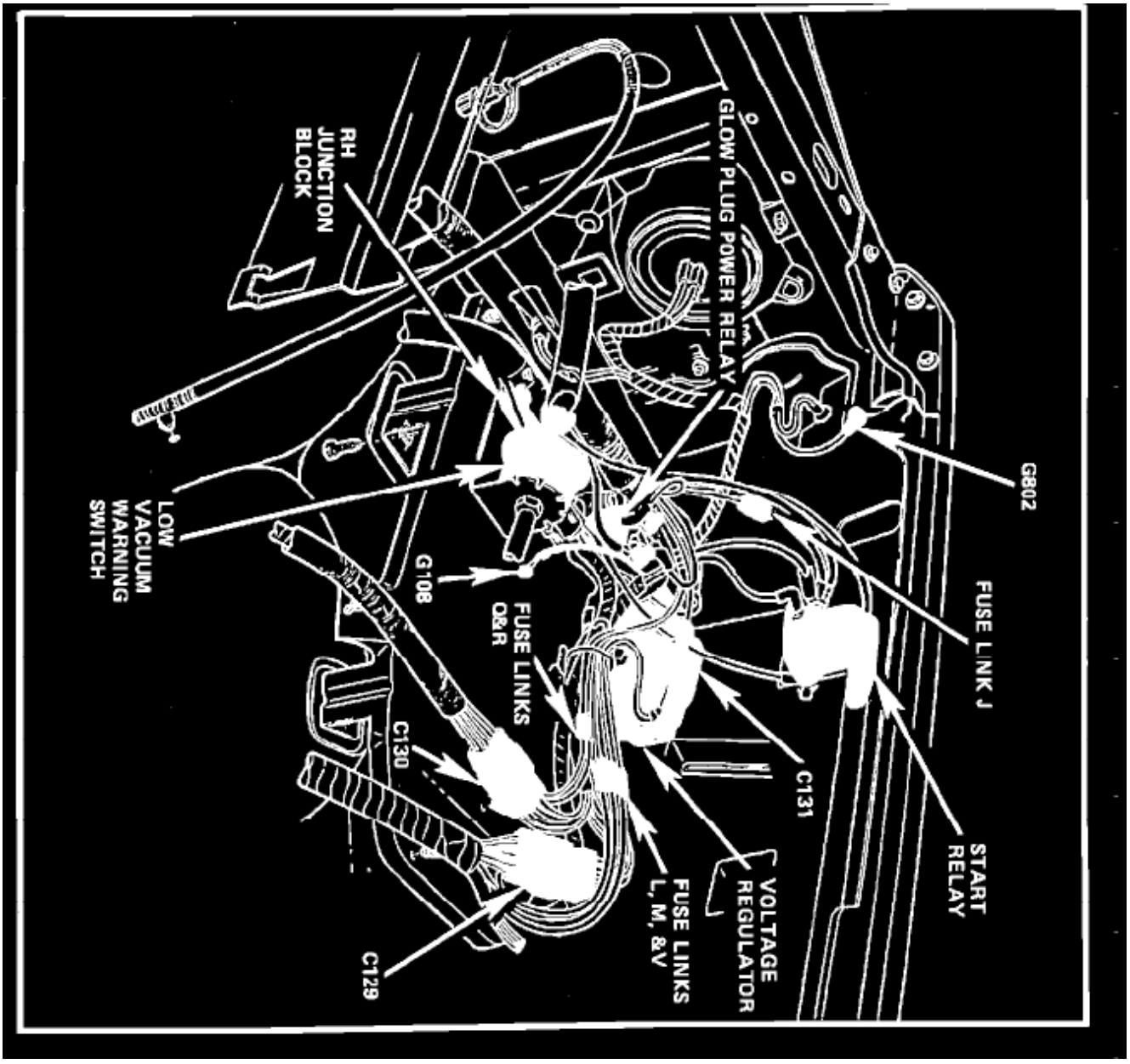
Fusible Link: Locations

Fuse Link J

RH Fender Apron.

LH Front Fender Well

Applicable to: 1983 V8-420/6.9L Diesel Engine



RH Fender Apron.

LH Front Fender Well

Applicable to: 1984 V8-420/6.9L Diesel Engine

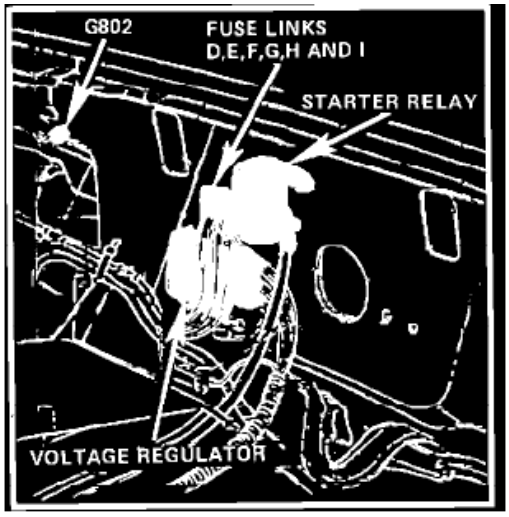
Fuse Link P

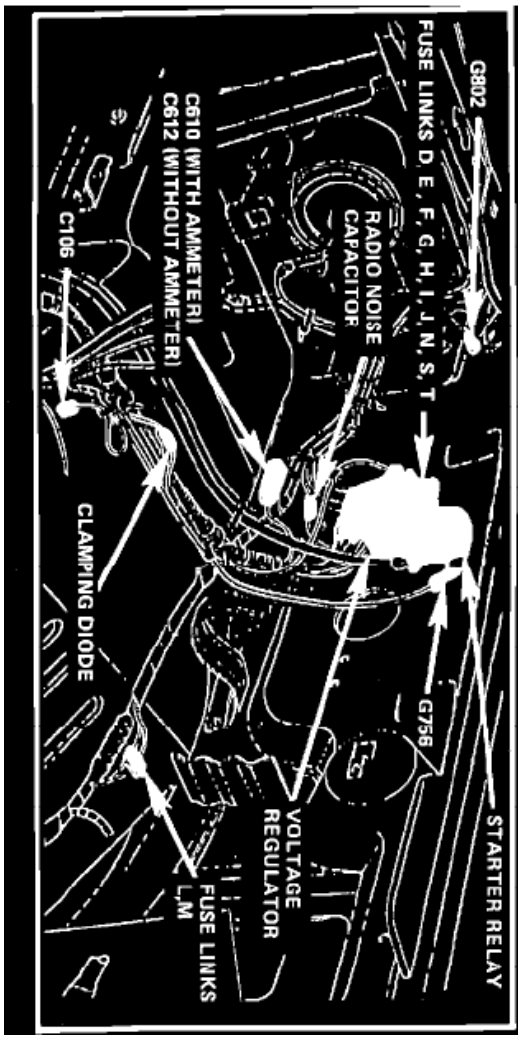
LH Side Of Dash Panel

Fuse Links A, B, C & K

Near Junction Block Or Auxiliary Battery Relay

Fuse Links D, E, F, G, H & I


G802
FUSE LINKS
D,E,F,G,H AND I
STARTER RELAY
VOLTAGE REGULATOR


G802
FUSE LINKS D, E, F, G, H, I, J, N, S, T
RADIO NOISE CAPACITOR
C610 (WITH AMMETER)
C612 (WITHOUT AMMETER)
C106
CLAMPING DIODE
G756
VOLTAGE REGULATOR
FUSE LINKS L,M
STARTER RELAY

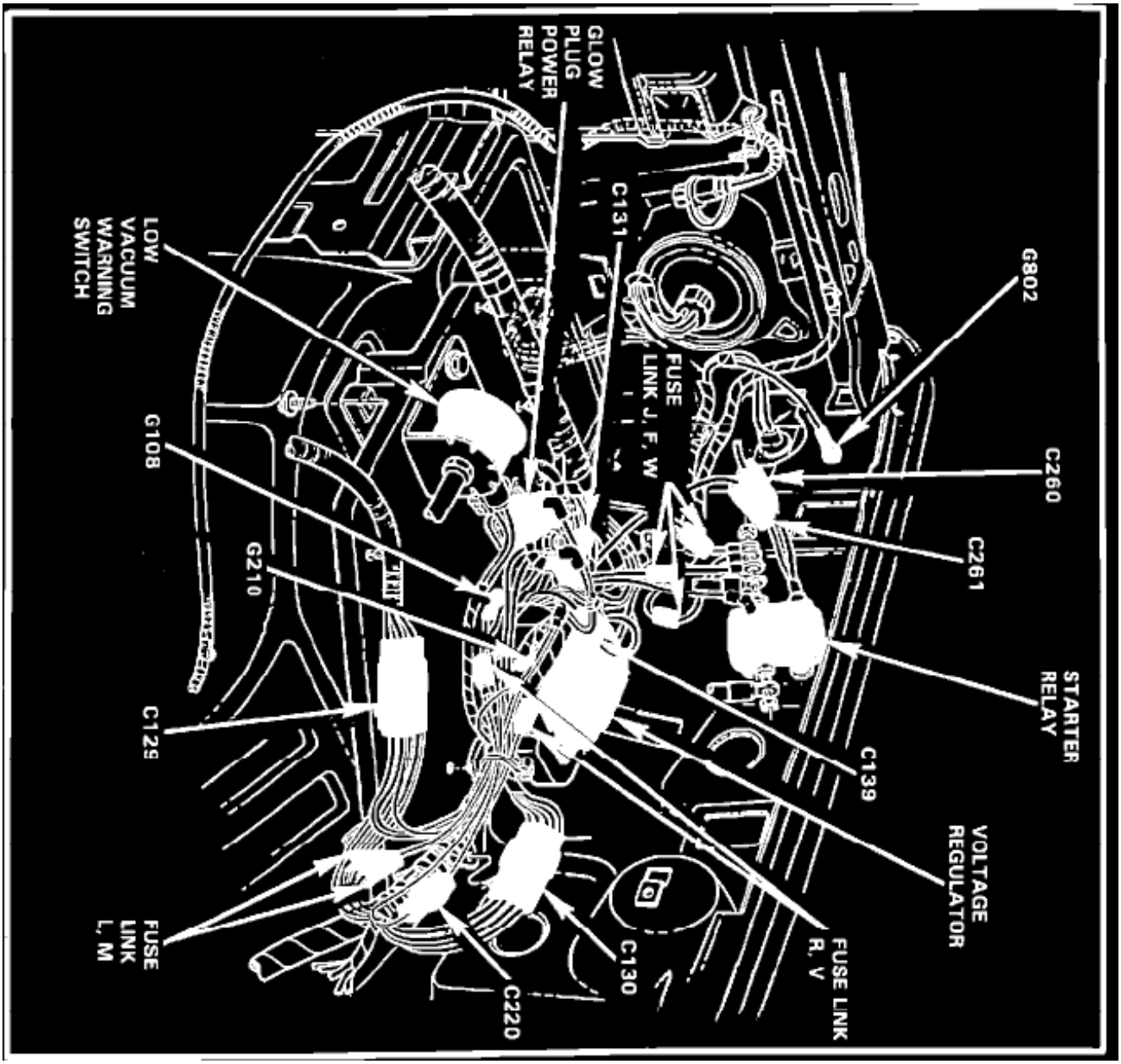
RH Front Fender Apron

At Starter Relay

Fuse Links D, E, F, G, H, I, J, N, S & T

RH Front Fender Apron.

At Starter Relay



Applicable to: 1981-82 All & 1983-85 w/EEC

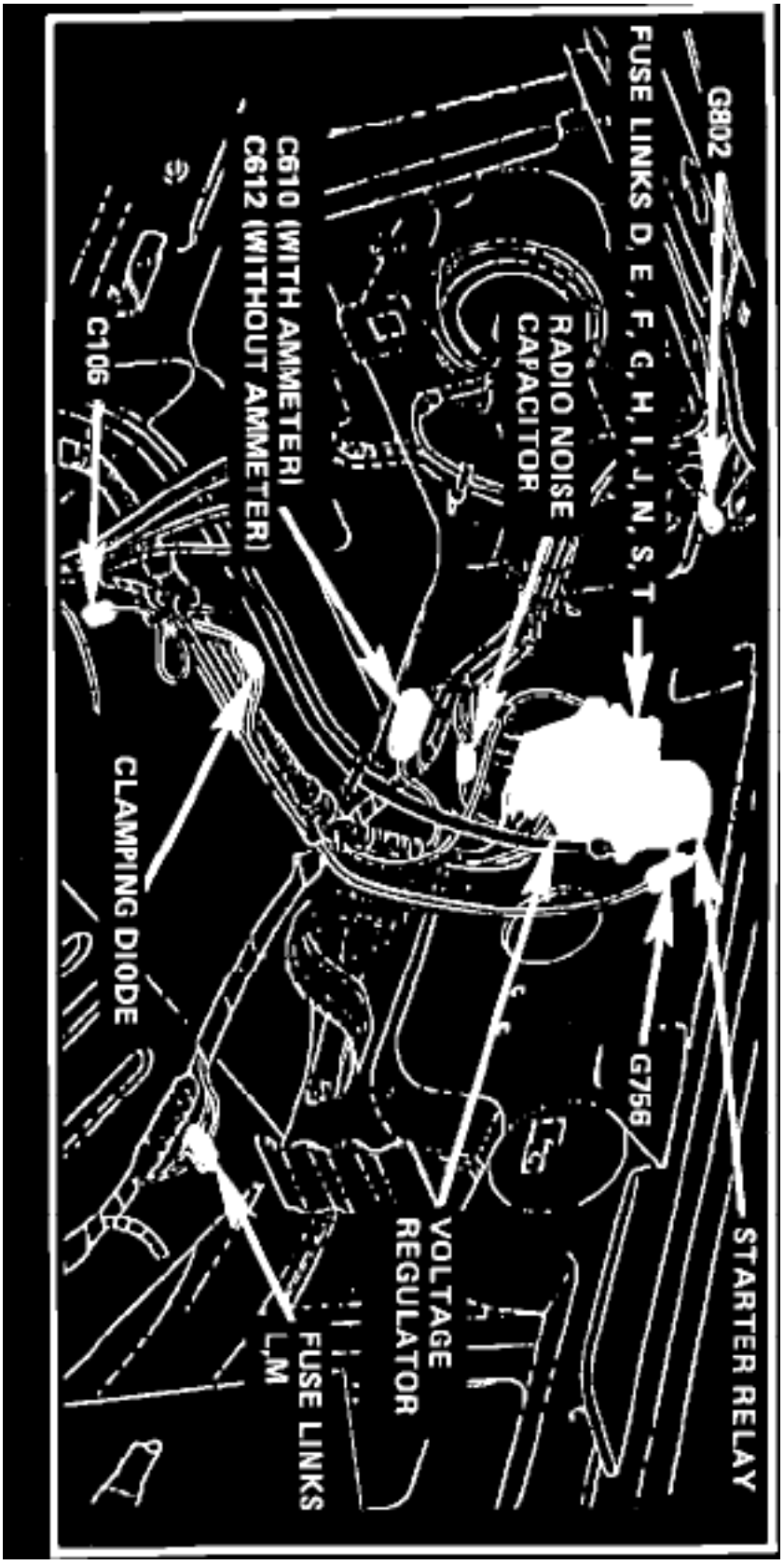
Fuse Links F, J & W

RH Fender Apron.

At Starter Relay

Applicable to: 1985 V8-420/6.9L Diesel Engine

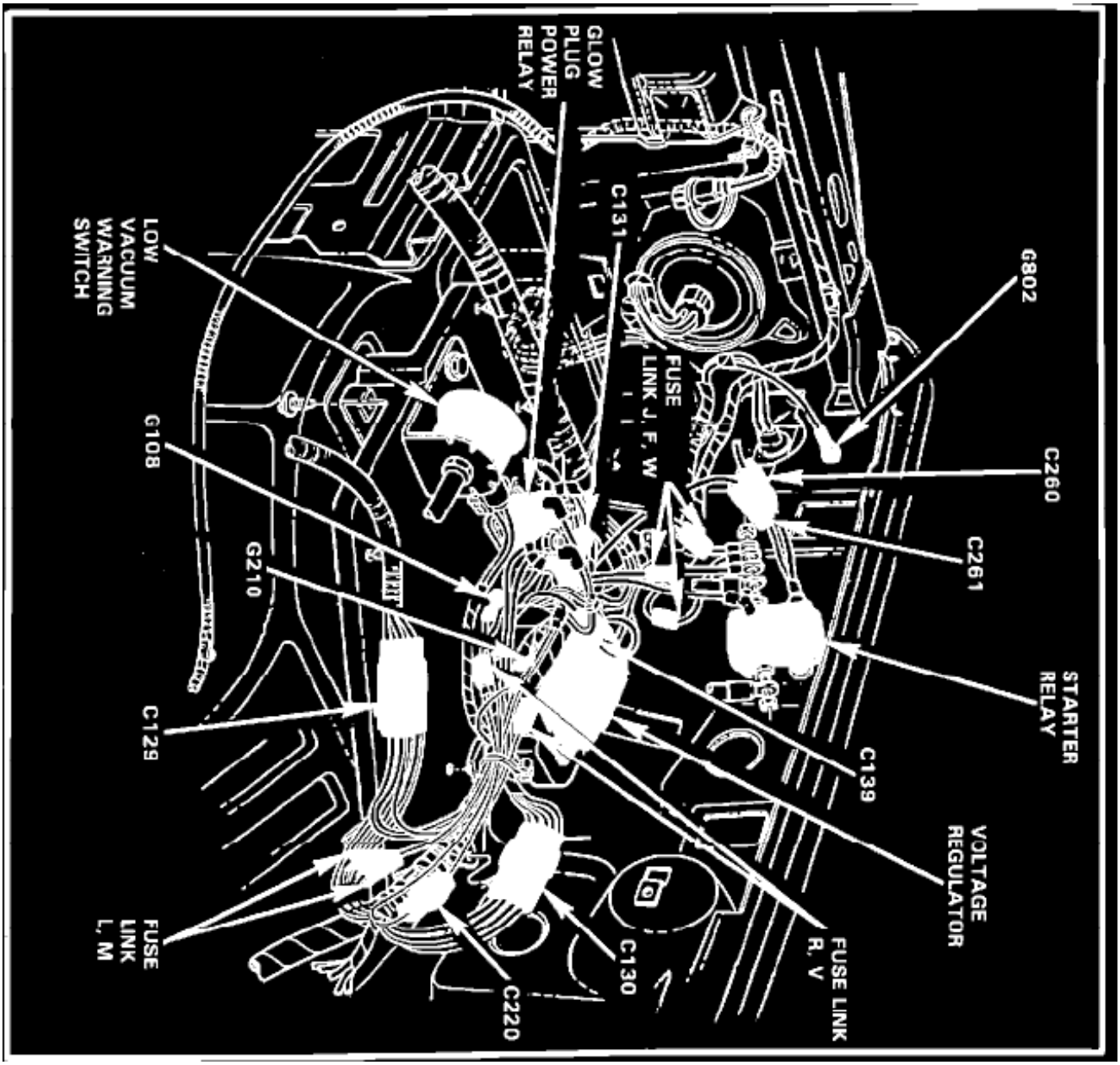
Fuse Links L & M


G802
FUSE LINKS D, E, F, G, H, I, J, N, S, T
RADIO NOISE CAPACITOR
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G756
STARTER RELAY
VOLTAGE REGULATOR
FUSE LINKS L,M

RH Front Fender Apron.

RH Fender Apron

Applicable to: 1981-82 All & 1983-85 w/EEC

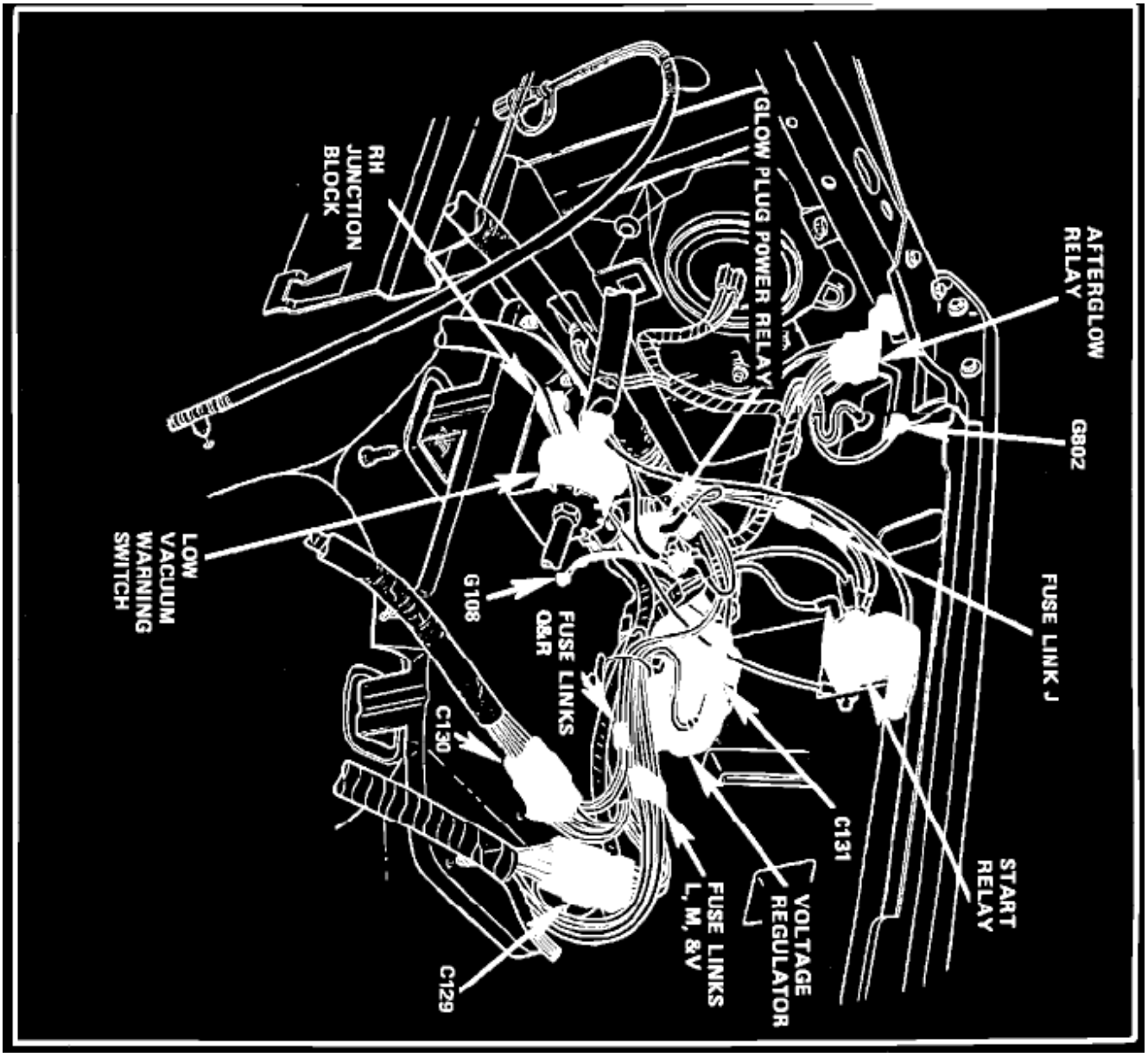


RH Fender Apron.

RH Fender Apron

Applicable to: 1985 V8-420/6.9L Diesel Engine

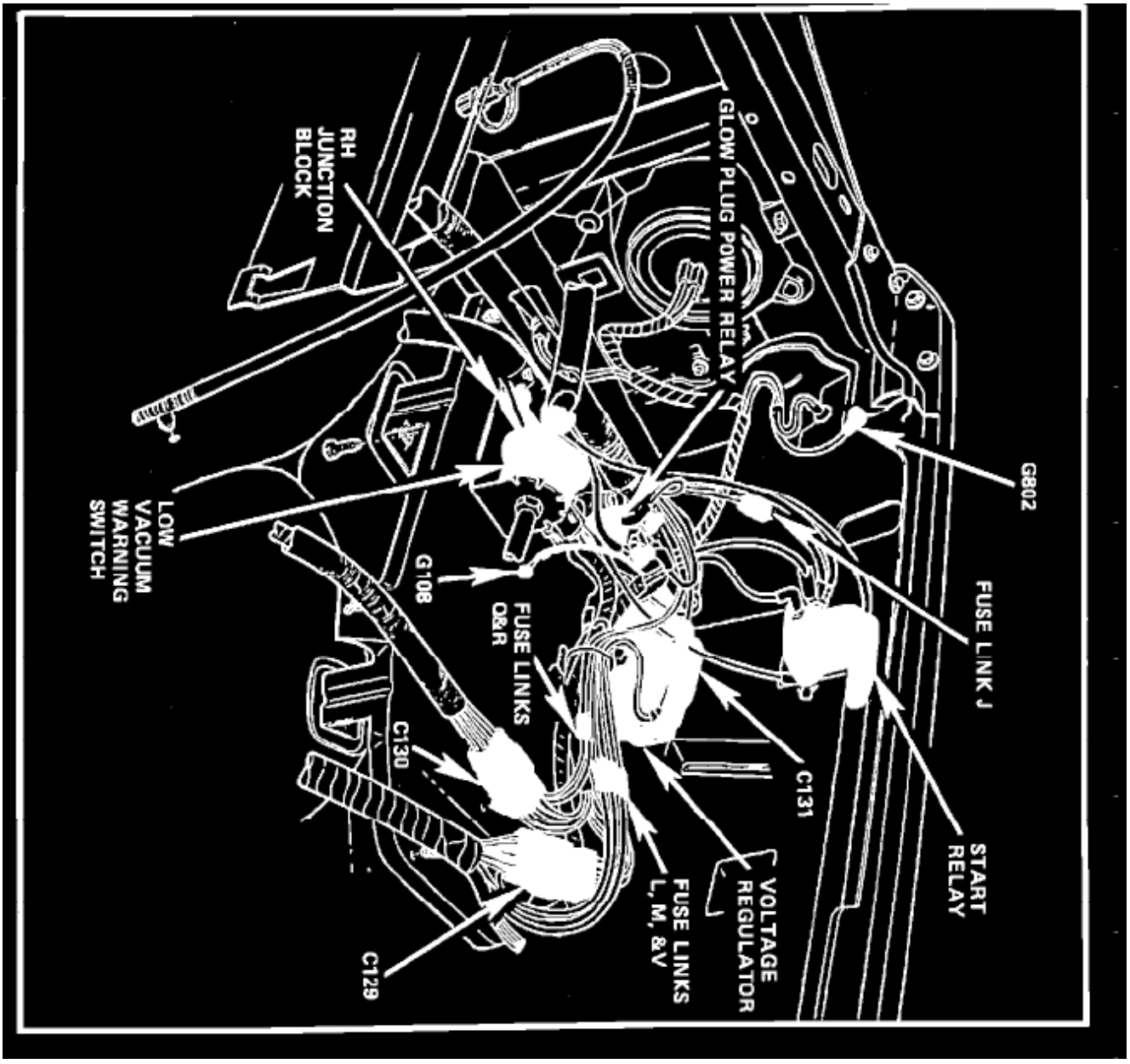
Fuse Links L, M & V



RH Fender Apron.

RH Fender Apron

Applicable to: 1983 V8-420/6.9L Diesel Engine



RH Fender Apron.

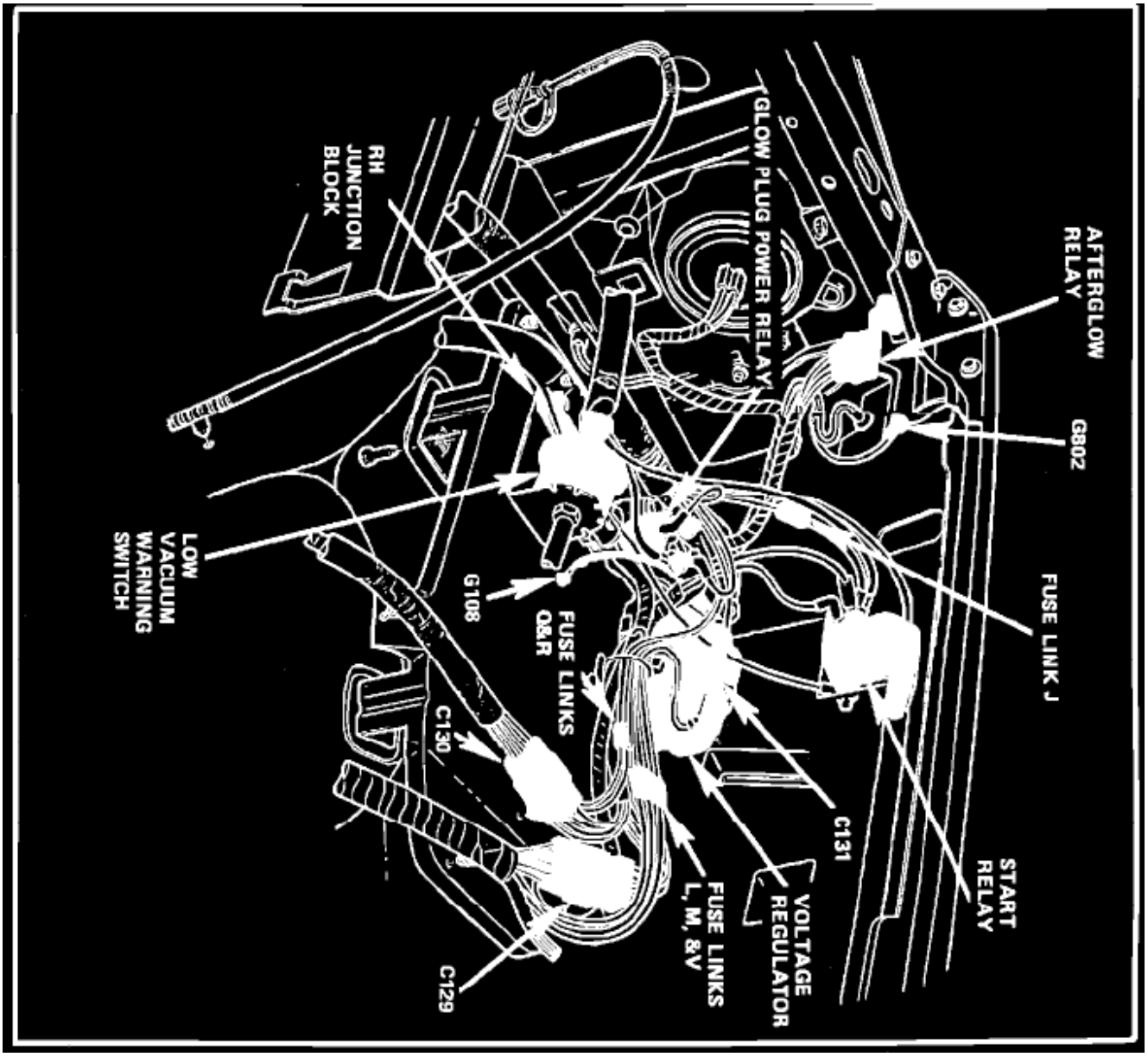
RH Fender Apron

Applicable to: 1984 V8-420/6.9L Diesel Engine

Fuse Links L, M, Q, R, V & W

RH Fender Apron

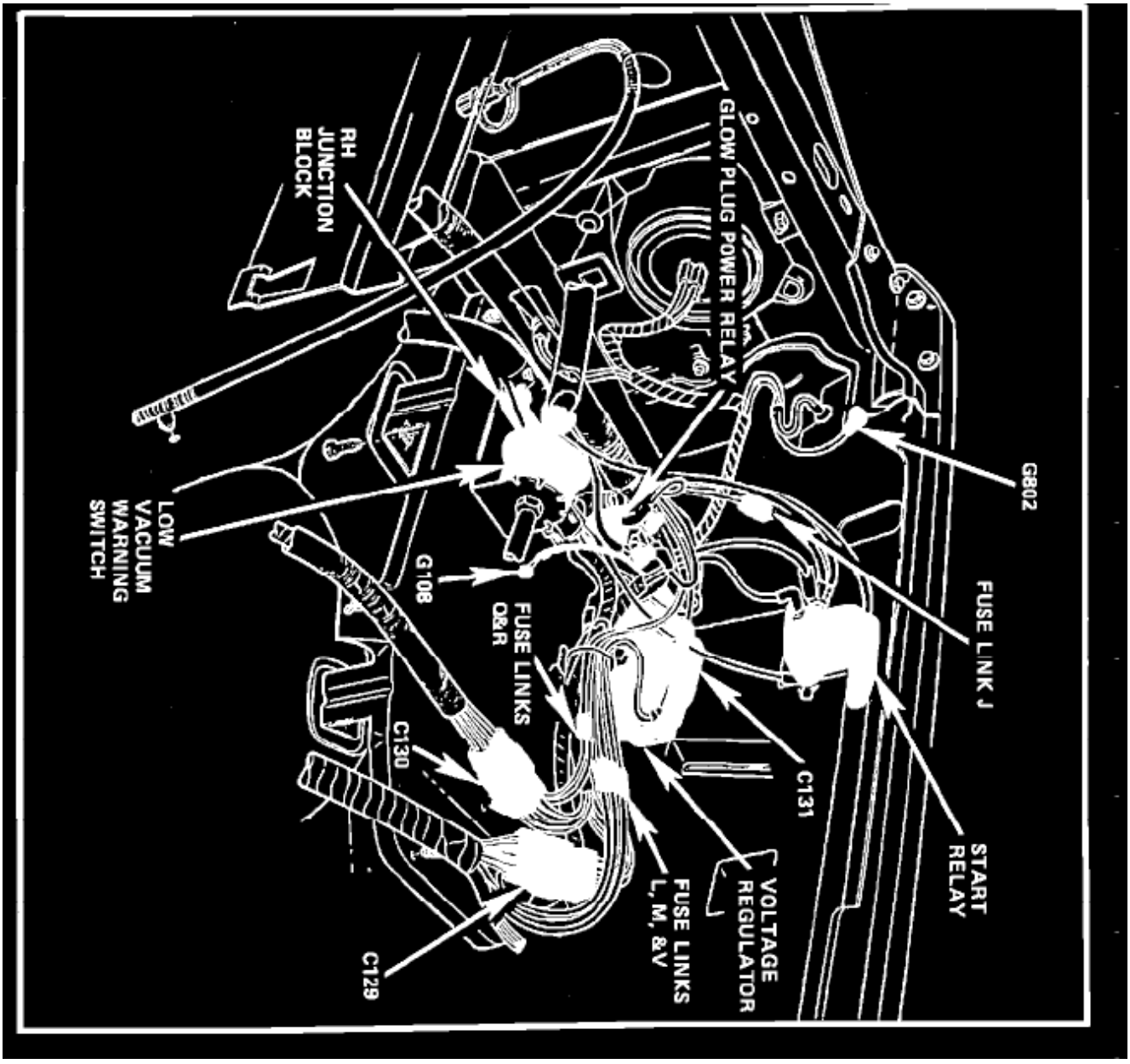
Fuse Links Q & R



RH Fender Apron.

RH Fender Apron

Applicable to: 1983 V8-420/6.9L Diesel Engine

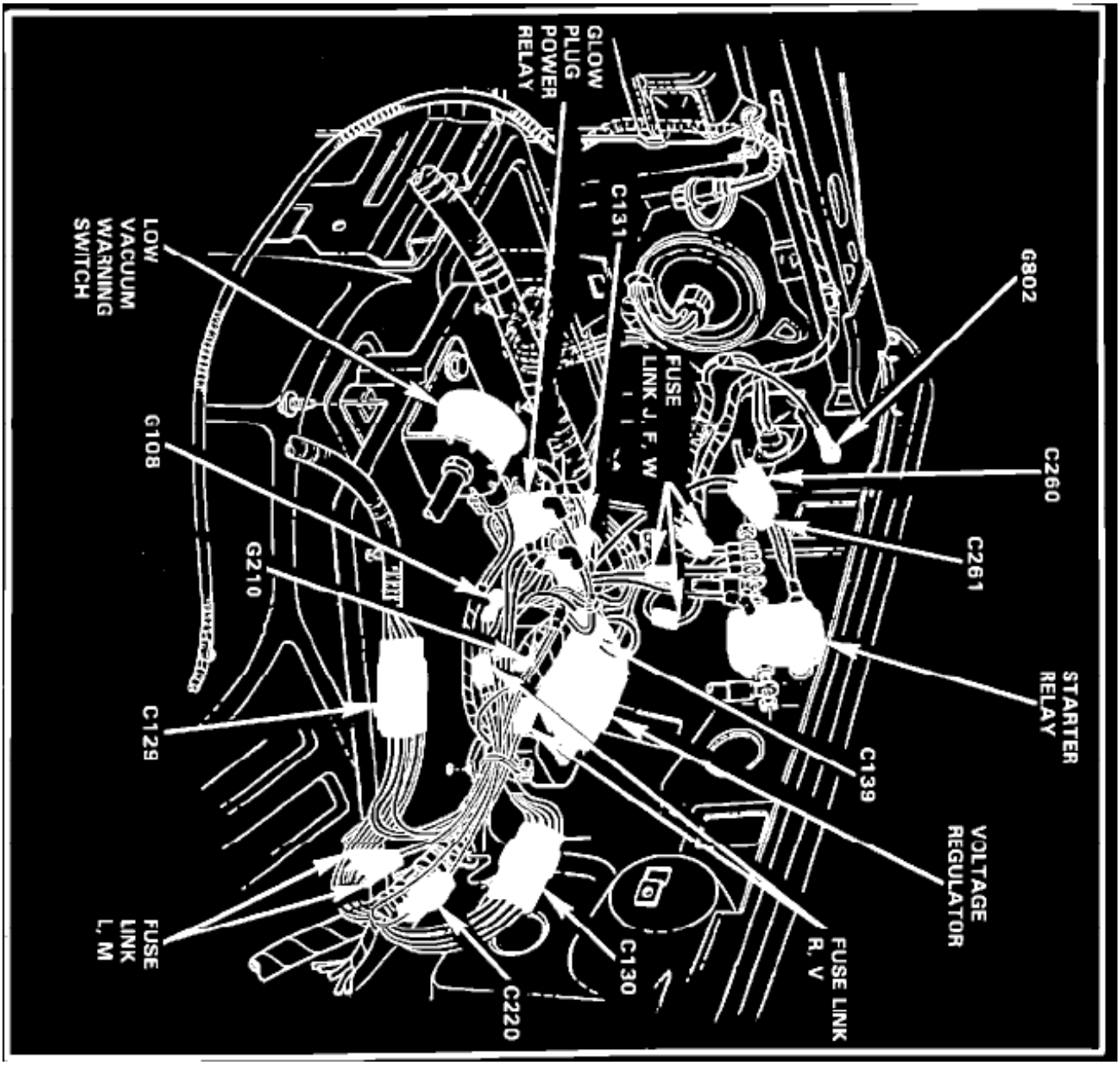


RH Fender Apron.

RH Fender Apron

Applicable to: 1984 V8-420/6.9L Diesel Engine

Fuse Links R & V



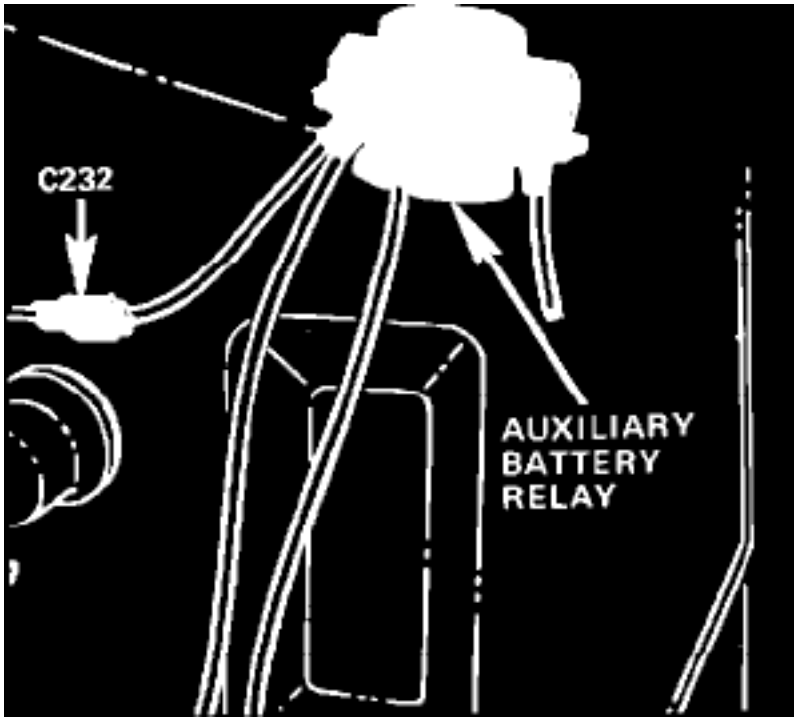
RH Fender Apron.

RH Fender Apron

Applicable to: 1985 V8-420/6.9L Diesel Engine

Multiple Junction Connector: Locations

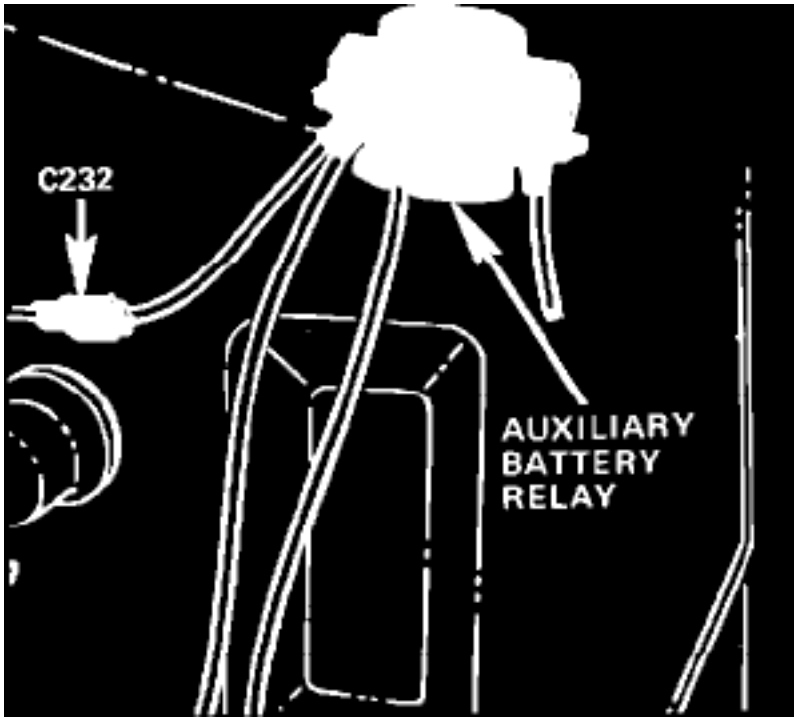
LH Dash Panel



Power Protection Relay: Locations

LH Side Of Dash Panel

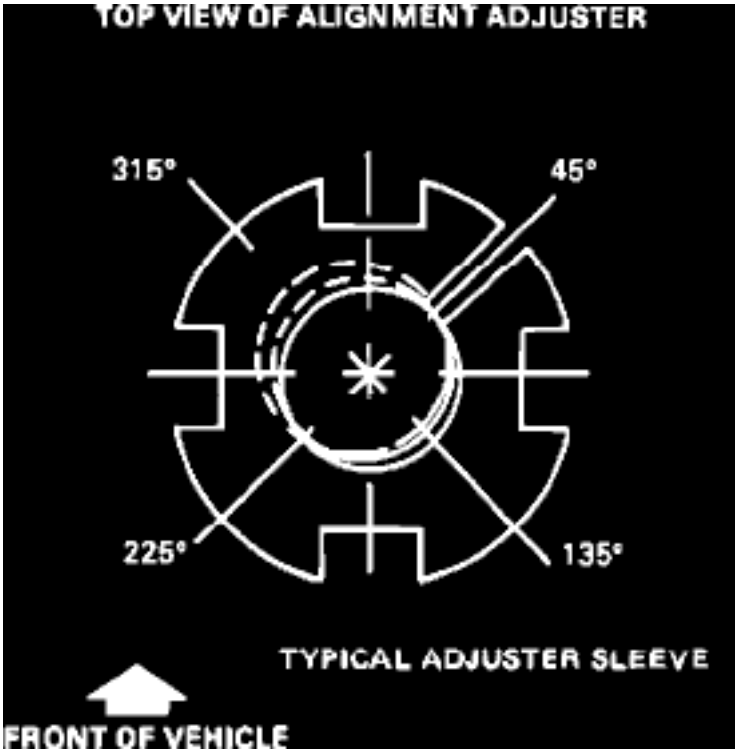
LH Side Of Dash Panel



Power Protection Relay: Locations

LH Side Of Dash Panel

LH Side Of Dash Panel



Alignment: Customer Interest Steering - Pull or Drift

Article No. 89-21-10

^ STEERING - PULL OR DRIFT - CASTER SPLIT - NEW

SERVICE ADJUSTERS - 4X4 MODELS

^ SUSPENSION - FRONT - NEW SERVICE CASTER ADJUSTERS - 4X4 MODELS

LIGHT TRUCK: 1980-89 BRONCO, F-150, F-250, F-350 1983-89 RANGER 1984-89 BRONCO II

Figure 1

This TSB article is being republished in its entirety to correct the service parts for the Caster Adjusters.

ISSUE: Two new alignment adjusters are now available for service. These new parts provide one degree of caster adjustment along with one degree of camber. Steering pull may be caused by caster split. The affected trucks are 4x4 Twin Traction Beam vehicles.

ACTION: Use the following procedure to determine the position of the service adjuster sleeve. Refer to the appropriate Light Truck Shop Manual, Section 14-21 for installation details.

The new alignment adjusters are similiar to the current camber adjusters. The one exception is the rotational position of the adjuster sleeve to obtain the desired adjustment.

ADJUSTER SLEEVE APPLICATION FOR RANGER BRONCO II, BRONCO, AND F-150

1. Measure and record the alignment readings.

2. Determine what alignment adjuster sleeves are on the truck.

NOTE: IF AFTERMARKET ADJUSTER SLEEVES HAVE BEEN INSTALLED, IT WILL BE NECESSARY TO FIND OUT WHAT CASTER AND CAMBER SLEEVES WERE USED.

If the adjuster sleeve is not marked or cannot be identified, install a 0 degree adjuster sleeve to use as a reference point.

3. Determine what adjuster sleeve change is required. Take your desired alignment (what you want to end up with) and compare it to the readings taken in Step 1 to determine the change.

4. Pick the adjuster sleeve that will get you the closest to the desired alignment.

5. Install and position the adjuster sleeve, Figure 1.

Refer to the appropriate Light Truck Shop Manual, Section 14-21 for service details. See the following caster adjuster sleeve chart and camber adjuster sleeve chart for the correct service parts.

CAMBER ADJUSTER SLEEVE APPLICATION CHART

SERVICE PART

APPLICATION VALUE NUMBER

F Series/Bronco - 0~ E0TZ-3B440-A

4x4

1/2~ E0TZ-3B440-B

1~ E0TZ-3B440-C

1-1/2~ E0TZ-3B440-D

Ranger/ Bronco II - 0~ E3TZ-3B440-A

4x4

1/2~ E3TZ-3B440-B

1~ E3TZ-3B440-C

1-1/2~ E3TZ-3B440-D

ADJUSTER ORIENTATION CHART

CAMBER CASTER CAMBER CASTER

POSITION LEFT LEFT RIGHT RIGHT

OF SLOT SIDE SIDE SIDE SIDE

45~ +1~ -1~ -1~ -1~

135~ -1~ -1~ + 1~ -1~

225~ -1~ +1~ +1~ +1~

315~ +1~ +1~ -1~ +1~

6. Recheck the alignment to make sure you arrived at the desired values.

CASTER WEDGE APPLICATION: F-250/350 4X4

The caster angle on the F-250 4x4 can be adjusted by inserting a wedge between the spring and the axle. Refer to the appropriate model year Light Truck Shop Manual, page 14-01-14 for installation details. See the following application chart for the correct service part.

CASTER WEDGE APPLICATION CHART

SERVICE PART

APPLICATION VALUE NUMBER

F-250/350 - 0~ E0TZ-5A313-A

4x4

1~ E0TZ-5A313-C

2~ E0TZ-5A313-B

NOTE: F-350 4X4 TWIN TRACTION BEAM - CASTER AND CASTER SPLITS ARE ADJUSTABLE USING WEDGES. F-350 4X4 MONOBEAM - CASTER SPLITS ARE NOT ADJUSTABLE. A CASTER CHANGE FOR BOTH WHEELS IS ACCOMPLISHED USING WEDGES.

PART NUMBER PART NAME CLASS

E9TZ-3B440-F Caster Adjuster - B

F-Series/Bronco

E9TZ-3B440-G Caster Adjuster - B

Ranger/Bronco II

E0TZ-3B440-A Camber Adjuster - AM

F-Series/Bronco

E0TZ-3B440-B Camber Adjuster - AM

F-Series/Bronco

E0TZ-3B440-C Camber Adjuster - AM

F-Series/Bronco

E0TZ-3B440-D Camber Adjuster - AM

F-Series/Bronco

E3TZ-3B440-A Camber Adjuster - BM

Ranger/Bronco II

E3TZ-3B440-B Camber Adjuster - AM

Ranger/Bronco II

E3TZ-3B440-C Camber Adjuster - AM

Ranger/Bronco II

E3TZ-3B440-D Camber Adjuster - AM

Ranger/Bronco II

E0TZ-5A313-A Caster Wedge C

E0TZ-5A313-B Caster Wedge BM

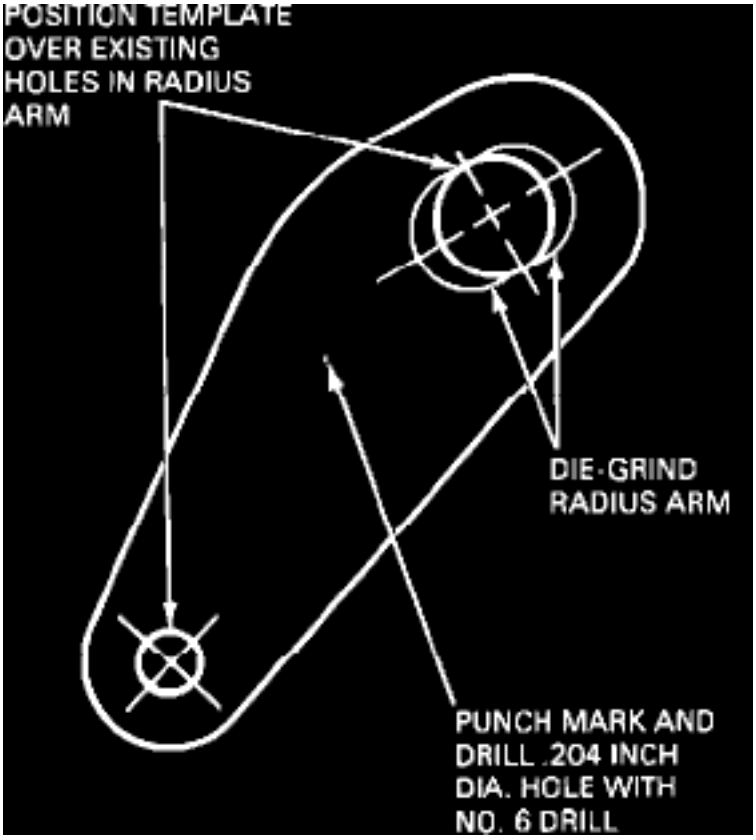
E0TZ-5A313-C Caster Wedge RM

OTHER APPLICABLE ARTICLES: 87-4-16 SUPERSEDES:

89-19-13, date 9/20 89

WARRANTY STATUS: INFORMATION ONLY OASIS CODES:

3100, 3200, 3300



Alignment: Customer Interest Steering - Pulling or Drifting

^ STEERING - PULL OR DRIFT - CASTER Article No.

ADJUSTMENT SERVICE KIT 87-4-16

^ SUSPENSION - FRONT - CASTER ADJUSTMENT SERVICE KIT

LIGHT TRUCK 1980-86 F-150 (4x4), BRONCO ISSUE:

A steering drift or pull may be caused by excessive front wheel side-to-side caster angle differences.

ACTION: If a front axle alignment check shows excessive (more than 3/4 degree split) side-to-side caster angle difference causing the vehicle to drift or pull, install a new caster adjustment kit (E0TZ-3K064-A) which allows the front axle side-to-side caster angles to be changed up to 2-1/2 degrees in 1/2 degree increments. New front axle to radius arm brackets must also be replaced when the caster kit is installed. Refer to the following service procedure for step-by-step instructions.

NOTE THE FOLLOWING INFORMATION BEFORE DOING WORK ON THE VEHICLE.

To correct caster side-to-side difference of up to 1- 1/2 degrees, install a caster adjuster plate on the radius arm that has the lower caster reading. Adjuster plates are identified R.H. and L.H.

To correct caster side-to-side difference more than 1-1/2 degrees, install the caster plate on both radius arms. Installing both plates will allow a caster split change of 2-1/2 degrees (+1-1/2 degrees

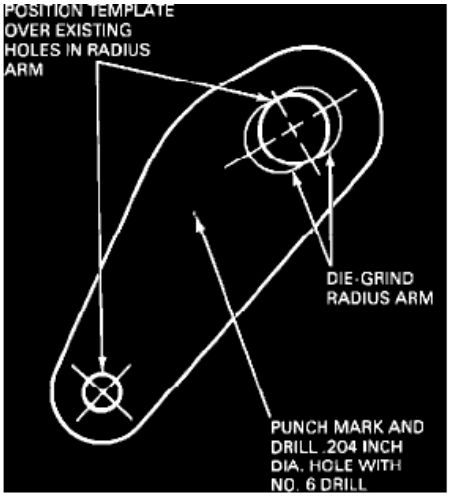
on the low caster side, -1 degree on the high caster side).

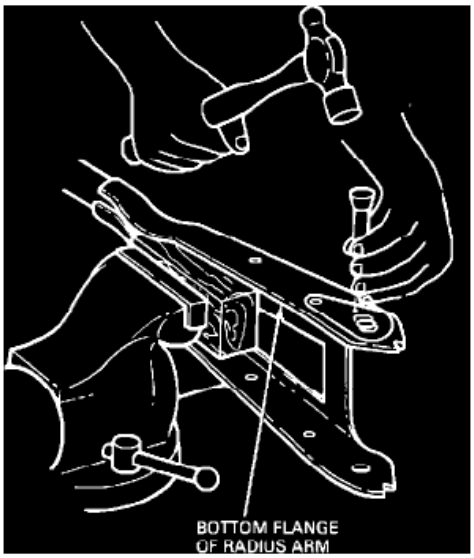
1. Remove radius arm from vehicle.

Figure 14 - Article 87-4-16

2. Locate the template, included in the kit, on the bottom flange of radius arm over the existing holes, as shown in Figure 14.

NOTE: Right arm adjustment is shown. One template is used to modify both right and left hand arms. When modifying right arm, position template with printed side down (printed side up for left arm).


POSITION TEMPLATE OVER EXISTING HOLES IN RADIUS ARM
DIE-GRIND RADIUS ARM
PUNCH MARK AND DRILL .204 INCH DIA. HOLE WITH NO. 6 DRILL


BOTTOM FLANGE OF RADIUS ARM

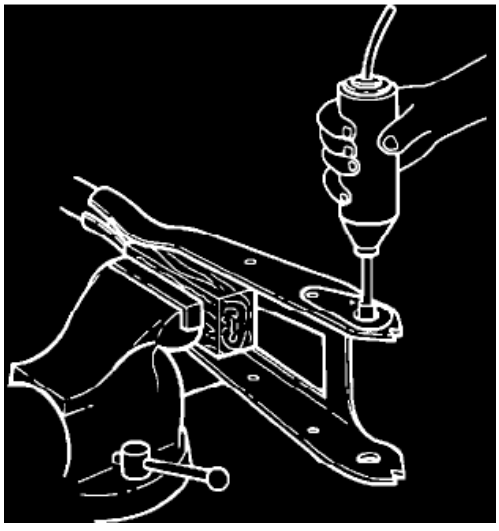
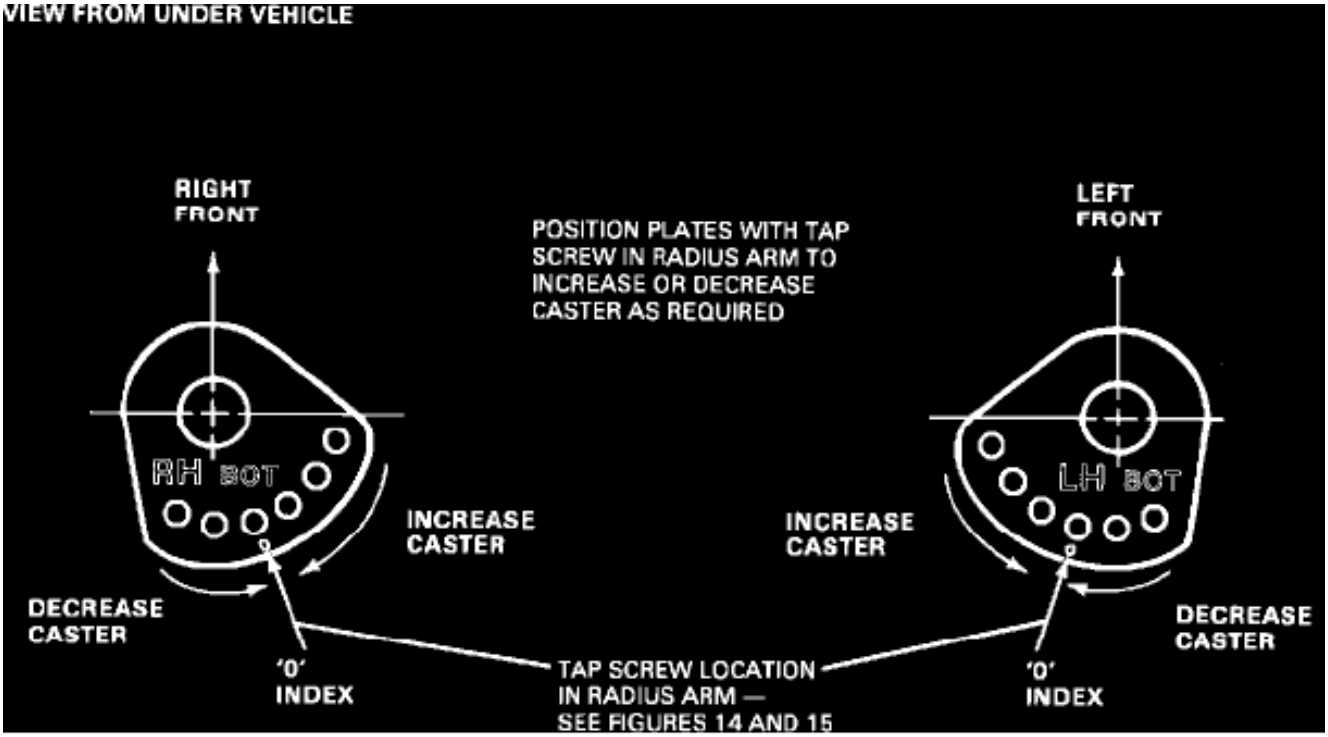


Figure 14 - Article 87-4-16

Figure 15 - Article 87-4-16



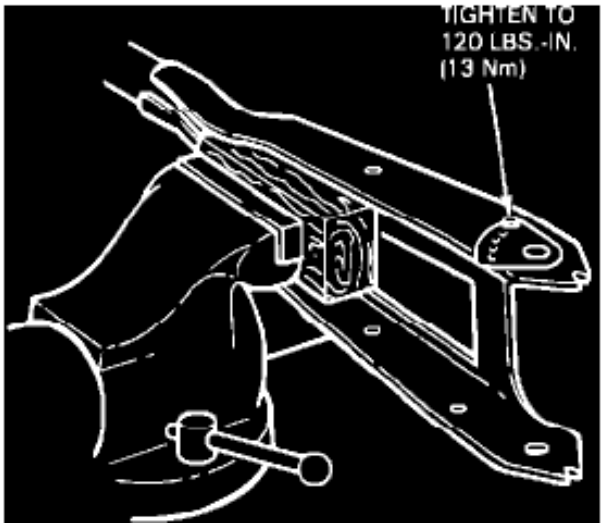


Figure 16 - Article 87-4-16

3. With template secure, punch mark radius arm at the small hole in the template, as shown in Figures 14 and 15. Mark radius arm, and diegrind a slot at the axle attaching hole the same size as the slot in the template, see Figure 16. De-burr the surface; avoid rounding the edges of the slot.

Figure 13 - Article 87-4-16

4. Use a No. 6 drill to make a .204 inch diameter through hole at the punch mark. Line up the caster adjuster plate on the radius arm to obtain the required change in caster, see Figure 13.

Figure 17 - Article 87-4-16

NOTE: Each hole changes caster approximately 1/2 degree + or - from the "0" index hole.

5. Install the tap screw to 120 in.lbs. (13 N-m) torque.

6. Reinstall radius arm with a new bracket (front axle to radius arm). The new bracket has a larger "jaw" spacing to fit over caster adjuster plate.

^ For non-quad shock vehicles, install bracket E7TZ-3B446-A.

^ For quad shock vehicles, install bracket E7TZ-18112-A, R.H. or E7TZ-18113-A, L.H.

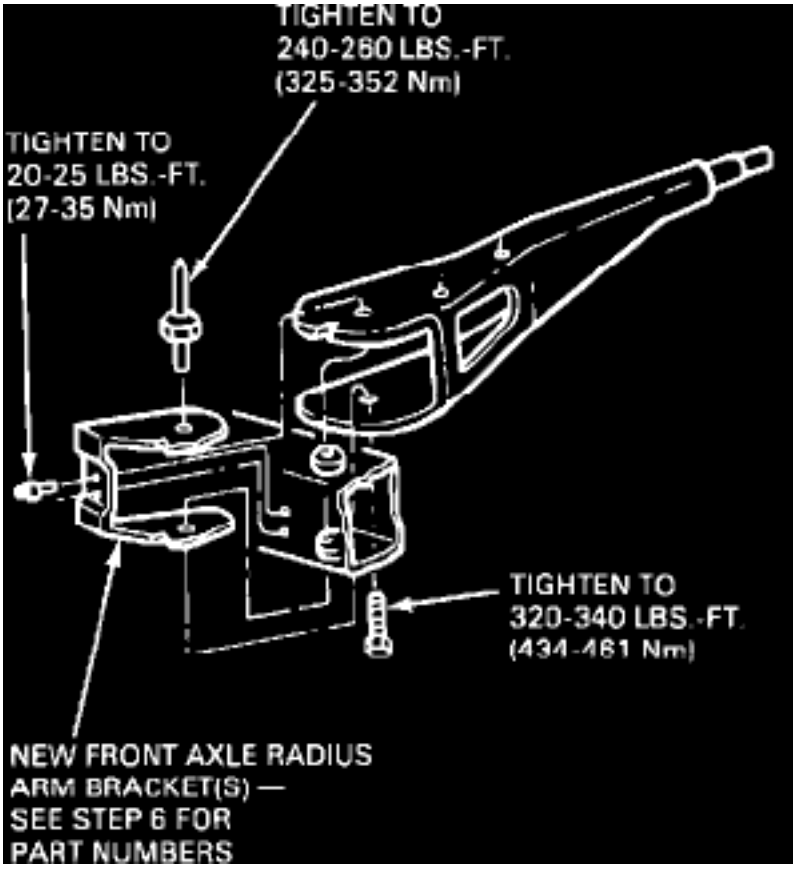


Figure 18 - Article 87-4-16

7. Tighten upper stud/bolt to 240-260 ft.lbs. (325-352 N-m) torque, Figure 18.

8. Tighten lower bolt to 320-340 ft.lbs. (434-461 N-m) torque, Figure 18.

9. Tighten front axle radius arm bracket bolts to 20-26 ft.lbs. (27-35 N-m) torque, Figure 18.

10. Arc weld caster adjuster plate to radius arm with a 1/4 inch-long bead along two sides of the plate.

11. Reset toe to specification. PART NUMBER

PART NAME CLASS

E0TZ-3K064-A Caster Kit CG

E7TZ-3B446-A Bracket - Radius Arm C

E7TZ-18112-A Bracket - Radius Arm CG

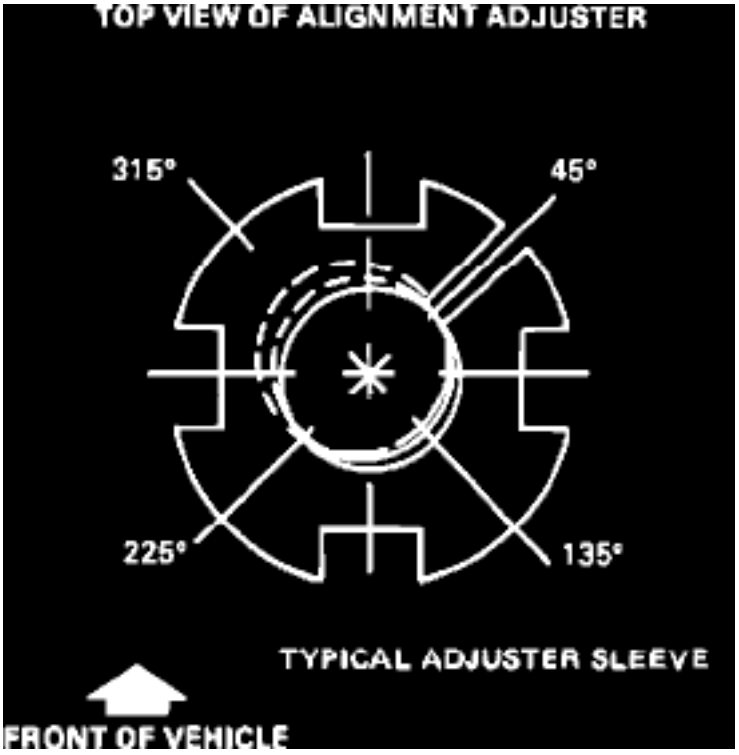
E7TZ-18113-A Bracket - Radius Arm CG

OTHER APPLICABLE ARTICLES: None WARRANTY STATUS: Reimbursable within the provisions of the Warranty and Policy Manual OPERATION: SP870416A - Caster kit one side TIME:

2.1 Hrs.

OPERATION: SP870416B - Caster kit both sides TIME:

3.5 Hrs. DLR. CODING: Basic Part No. FRONT - Code: 07



Alignment: All Technical Service Bulletins Steering - Pull or Drift

Article No. 89-21-10

^ STEERING - PULL OR DRIFT - CASTER SPLIT - NEW

SERVICE ADJUSTERS - 4X4 MODELS

^ SUSPENSION - FRONT - NEW SERVICE CASTER ADJUSTERS - 4X4 MODELS

LIGHT TRUCK: 1980-89 BRONCO, F-150, F-250, F-350 1983-89 RANGER 1984-89 BRONCO II

Figure 1

This TSB article is being republished in its entirety to correct the service parts for the Caster Adjusters.

ISSUE: Two new alignment adjusters are now available for service. These new parts provide one degree of caster adjustment along with one degree of camber. Steering pull may be caused by caster split. The affected trucks are 4x4 Twin Traction Beam vehicles.

ACTION: Use the following procedure to determine the position of the service adjuster sleeve. Refer to the appropriate Light Truck Shop Manual, Section 14-21 for installation details.

The new alignment adjusters are similiar to the current camber adjusters. The one exception is the rotational position of the adjuster sleeve to obtain the desired adjustment.

ADJUSTER SLEEVE APPLICATION FOR RANGER BRONCO II, BRONCO, AND F-150

1. Measure and record the alignment readings.

2. Determine what alignment adjuster sleeves are on the truck.

NOTE: IF AFTERMARKET ADJUSTER SLEEVES HAVE BEEN INSTALLED, IT WILL BE NECESSARY TO FIND OUT WHAT CASTER AND CAMBER SLEEVES WERE USED.

If the adjuster sleeve is not marked or cannot be identified, install a 0 degree adjuster sleeve to use as a reference point.

3. Determine what adjuster sleeve change is required. Take your desired alignment (what you want to end up with) and compare it to the readings taken in Step 1 to determine the change.

4. Pick the adjuster sleeve that will get you the closest to the desired alignment.

5. Install and position the adjuster sleeve, Figure 1.

Refer to the appropriate Light Truck Shop Manual, Section 14-21 for service details. See the following caster adjuster sleeve chart and camber adjuster sleeve chart for the correct service parts.

CAMBER ADJUSTER SLEEVE APPLICATION CHART

SERVICE PART

APPLICATION VALUE NUMBER

F Series/Bronco - 0~ E0TZ-3B440-A

4x4

1/2~ E0TZ-3B440-B

1~ E0TZ-3B440-C

1-1/2~ E0TZ-3B440-D

Ranger/ Bronco II - 0~ E3TZ-3B440-A

4x4

1/2~ E3TZ-3B440-B

1~ E3TZ-3B440-C

1-1/2~ E3TZ-3B440-D

ADJUSTER ORIENTATION CHART

CAMBER CASTER CAMBER CASTER

POSITION LEFT LEFT RIGHT RIGHT

OF SLOT SIDE SIDE SIDE SIDE

45~ +1~ -1~ -1~ -1~

135~ -1~ -1~ + 1~ -1~

225~ -1~ +1~ +1~ +1~

315~ +1~ +1~ -1~ +1~

6. Recheck the alignment to make sure you arrived at the desired values.

CASTER WEDGE APPLICATION: F-250/350 4X4

The caster angle on the F-250 4x4 can be adjusted by inserting a wedge between the spring and the axle. Refer to the appropriate model year Light Truck Shop Manual, page 14-01-14 for installation details. See the following application chart for the correct service part.

CASTER WEDGE APPLICATION CHART

SERVICE PART

APPLICATION VALUE NUMBER

F-250/350 - 0~ E0TZ-5A313-A

4x4

1~ E0TZ-5A313-C

2~ E0TZ-5A313-B

NOTE: F-350 4X4 TWIN TRACTION BEAM - CASTER AND CASTER SPLITS ARE ADJUSTABLE USING WEDGES. F-350 4X4 MONOBEAM - CASTER SPLITS ARE NOT ADJUSTABLE. A CASTER CHANGE FOR BOTH WHEELS IS ACCOMPLISHED USING WEDGES.

PART NUMBER PART NAME CLASS

E9TZ-3B440-F Caster Adjuster - B

F-Series/Bronco

E9TZ-3B440-G Caster Adjuster - B

Ranger/Bronco II

E0TZ-3B440-A Camber Adjuster - AM

F-Series/Bronco

E0TZ-3B440-B Camber Adjuster - AM

F-Series/Bronco

E0TZ-3B440-C Camber Adjuster - AM

F-Series/Bronco

E0TZ-3B440-D Camber Adjuster - AM

F-Series/Bronco

E3TZ-3B440-A Camber Adjuster - BM

Ranger/Bronco II

E3TZ-3B440-B Camber Adjuster - AM

Ranger/Bronco II

E3TZ-3B440-C Camber Adjuster - AM

Ranger/Bronco II

E3TZ-3B440-D Camber Adjuster - AM

Ranger/Bronco II

E0TZ-5A313-A Caster Wedge C

E0TZ-5A313-B Caster Wedge BM

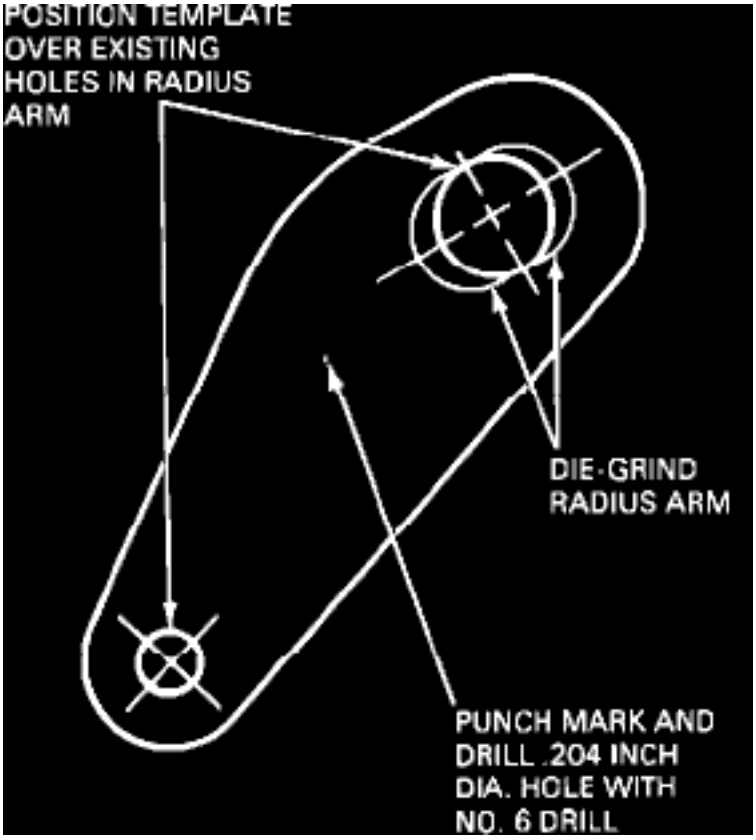
E0TZ-5A313-C Caster Wedge RM

OTHER APPLICABLE ARTICLES: 87-4-16 SUPERSEDES:

89-19-13, date 9/20 89

WARRANTY STATUS: INFORMATION ONLY OASIS CODES:

3100, 3200, 3300



Alignment: All Technical Service Bulletins Steering - Pulling or Drifting

^ STEERING - PULL OR DRIFT - CASTER Article No.

ADJUSTMENT SERVICE KIT 87-4-16

^ SUSPENSION - FRONT - CASTER ADJUSTMENT SERVICE KIT

LIGHT TRUCK 1980-86 F-150 (4x4), BRONCO ISSUE:

A steering drift or pull may be caused by excessive front wheel side-to-side caster angle differences.

ACTION: If a front axle alignment check shows excessive (more than 3/4 degree split) side-to-side caster angle difference causing the vehicle to drift or pull, install a new caster adjustment kit (E0TZ-3K064-A) which allows the front axle side-to-side caster angles to be changed up to 2-1/2 degrees in 1/2 degree increments. New front axle to radius arm brackets must also be replaced when the caster kit is installed. Refer to the following service procedure for step-by-step instructions.

NOTE THE FOLLOWING INFORMATION BEFORE DOING WORK ON THE VEHICLE.

To correct caster side-to-side difference of up to 1- 1/2 degrees, install a caster adjuster plate on the radius arm that has the lower caster reading. Adjuster plates are identified R.H. and L.H.

To correct caster side-to-side difference more than 1-1/2 degrees, install the caster plate on both radius arms. Installing both plates will allow a caster split change of 2-1/2 degrees (+1-1/2 degrees

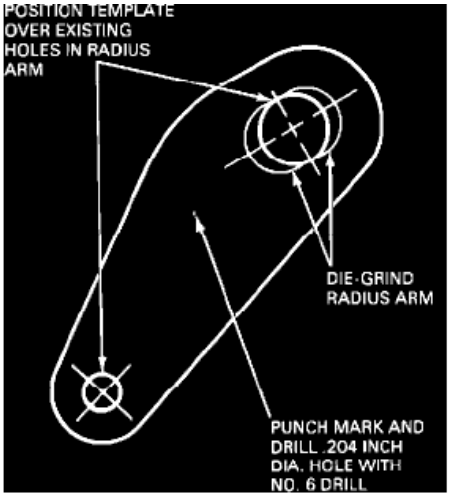
on the low caster side, -1 degree on the high caster side).

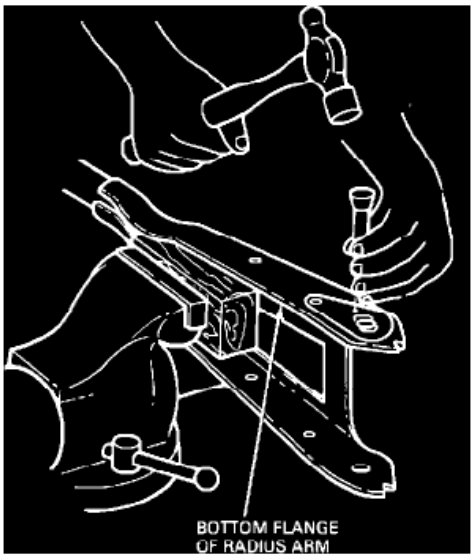
1. Remove radius arm from vehicle.

Figure 14 - Article 87-4-16

2. Locate the template, included in the kit, on the bottom flange of radius arm over the existing holes, as shown in Figure 14.

NOTE: Right arm adjustment is shown. One template is used to modify both right and left hand arms. When modifying right arm, position template with printed side down (printed side up for left arm).


POSITION TEMPLATE OVER EXISTING HOLES IN RADIUS ARM
DIE-GRIND RADIUS ARM
PUNCH MARK AND DRILL .204 INCH DIA. HOLE WITH NO. 6 DRILL


BOTTOM FLANGE OF RADIUS ARM

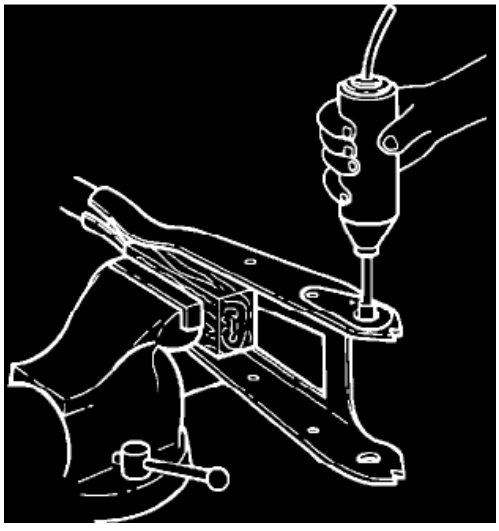
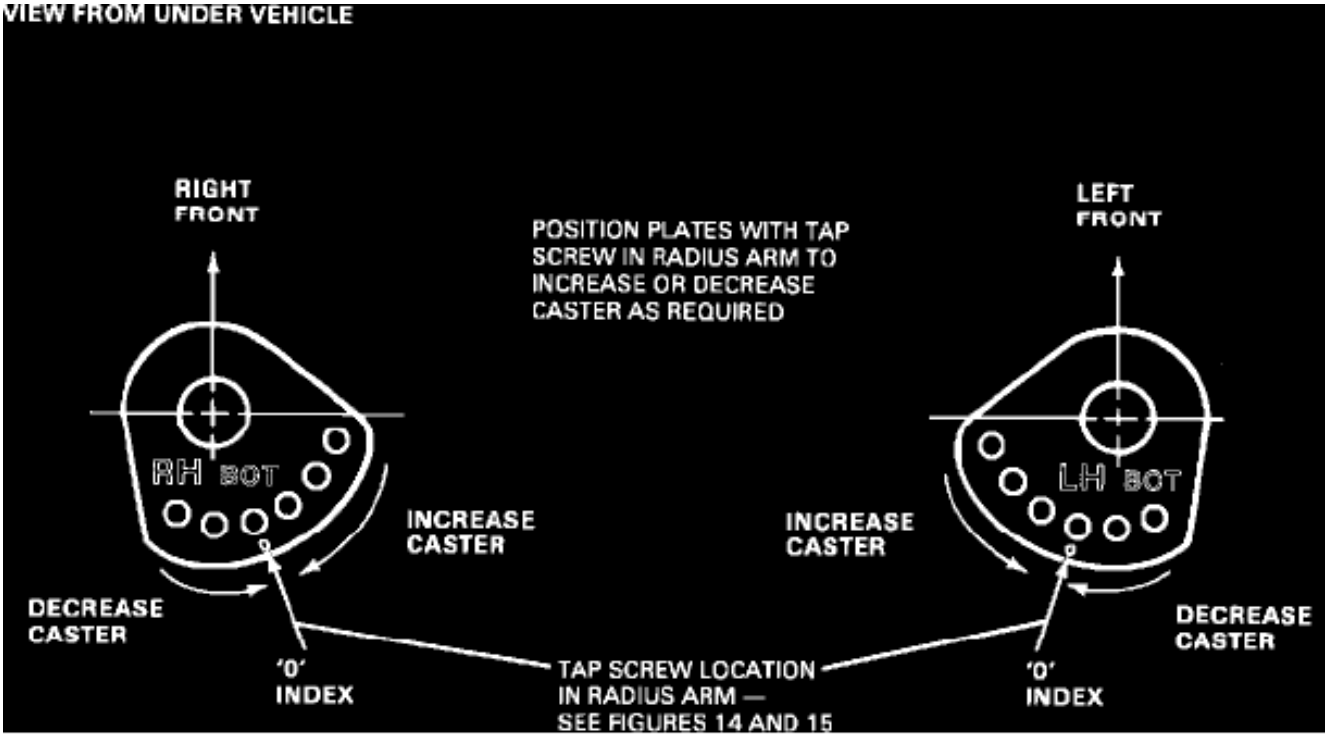


Figure 14 - Article 87-4-16

Figure 15 - Article 87-4-16



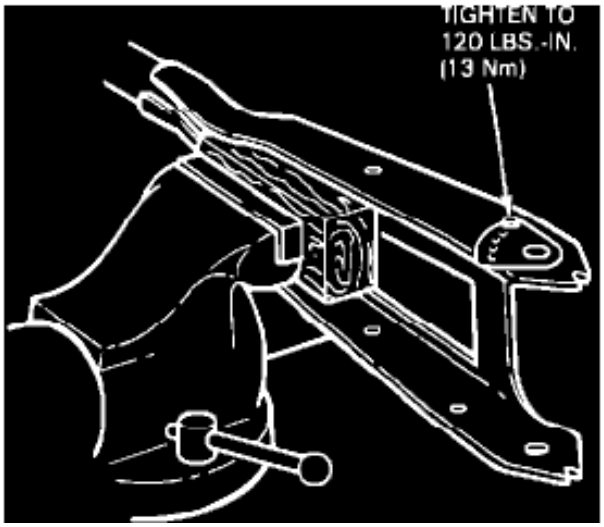


Figure 16 - Article 87-4-16

3. With template secure, punch mark radius arm at the small hole in the template, as shown in Figures 14 and 15. Mark radius arm, and diegrind a slot at the axle attaching hole the same size as the slot in the template, see Figure 16. De-burr the surface; avoid rounding the edges of the slot.

Figure 13 - Article 87-4-16

4. Use a No. 6 drill to make a .204 inch diameter through hole at the punch mark. Line up the caster adjuster plate on the radius arm to obtain the required change in caster, see Figure 13.

Figure 17 - Article 87-4-16

NOTE: Each hole changes caster approximately 1/2 degree + or - from the "0" index hole.

5. Install the tap screw to 120 in.lbs. (13 N-m) torque.

6. Reinstall radius arm with a new bracket (front axle to radius arm). The new bracket has a larger "jaw" spacing to fit over caster adjuster plate.

^ For non-quad shock vehicles, install bracket E7TZ-3B446-A.

^ For quad shock vehicles, install bracket E7TZ-18112-A, R.H. or E7TZ-18113-A, L.H.

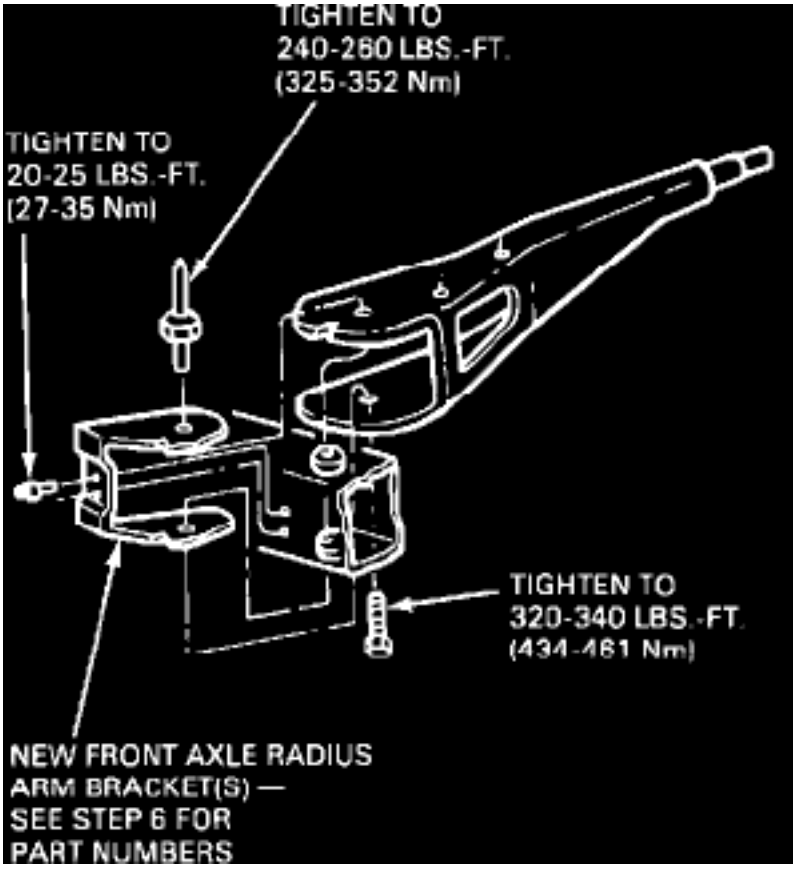


Figure 18 - Article 87-4-16

7. Tighten upper stud/bolt to 240-260 ft.lbs. (325-352 N-m) torque, Figure 18.

8. Tighten lower bolt to 320-340 ft.lbs. (434-461 N-m) torque, Figure 18.

9. Tighten front axle radius arm bracket bolts to 20-26 ft.lbs. (27-35 N-m) torque, Figure 18.

10. Arc weld caster adjuster plate to radius arm with a 1/4 inch-long bead along two sides of the plate.

11. Reset toe to specification. PART NUMBER

PART NAME CLASS

E0TZ-3K064-A Caster Kit CG

E7TZ-3B446-A Bracket - Radius Arm C

E7TZ-18112-A Bracket - Radius Arm CG

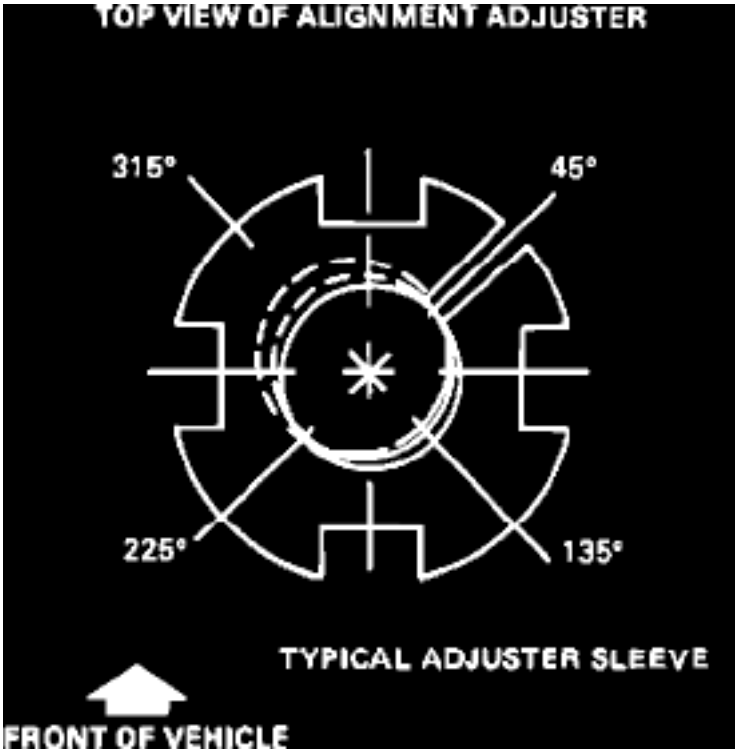
E7TZ-18113-A Bracket - Radius Arm CG

OTHER APPLICABLE ARTICLES: None WARRANTY STATUS: Reimbursable within the provisions of the Warranty and Policy Manual OPERATION: SP870416A - Caster kit one side TIME:

2.1 Hrs.

OPERATION: SP870416B - Caster kit both sides TIME:

3.5 Hrs. DLR. CODING: Basic Part No. FRONT - Code: 07



Alignment: By Symptom

Technical Service Bulletin # 892110 Date: 891018

Steering - Pull or Drift

Article No. 89-21-10

^ STEERING - PULL OR DRIFT - CASTER SPLIT - NEW

SERVICE ADJUSTERS - 4X4 MODELS

^ SUSPENSION - FRONT - NEW SERVICE CASTER ADJUSTERS - 4X4 MODELS

LIGHT TRUCK: 1980-89 BRONCO, F-150, F-250, F-350 1983-89 RANGER 1984-89 BRONCO II

Figure 1

This TSB article is being republished in its entirety to correct the service parts for the Caster Adjusters.

ISSUE: Two new alignment adjusters are now available for service. These new parts provide one degree of caster adjustment along with one degree of camber. Steering pull may be caused by caster split. The affected trucks are 4x4 Twin Traction Beam vehicles.

ACTION: Use the following procedure to determine the position of the service adjuster sleeve. Refer to the appropriate Light Truck Shop Manual, Section 14-21 for installation details.

The new alignment adjusters are similiar to the current camber adjusters. The one exception is the rotational position of the adjuster sleeve to obtain the desired adjustment.

ADJUSTER SLEEVE APPLICATION FOR RANGER BRONCO II, BRONCO, AND F-150

1. Measure and record the alignment readings.

2. Determine what alignment adjuster sleeves are on the truck.

NOTE: IF AFTERMARKET ADJUSTER SLEEVES HAVE BEEN INSTALLED, IT WILL BE NECESSARY TO FIND OUT WHAT CASTER AND CAMBER SLEEVES WERE USED.

If the adjuster sleeve is not marked or cannot be identified, install a 0 degree adjuster sleeve to use as a reference point.

3. Determine what adjuster sleeve change is required. Take your desired alignment (what you want to end up with) and compare it to the readings taken in Step 1 to determine the change.

4. Pick the adjuster sleeve that will get you the closest to the desired alignment.

5. Install and position the adjuster sleeve, Figure 1.

Refer to the appropriate Light Truck Shop Manual, Section 14-21 for service details. See the following caster adjuster sleeve chart and camber adjuster sleeve chart for the correct service parts.

CAMBER ADJUSTER SLEEVE APPLICATION CHART

SERVICE PART

APPLICATION VALUE NUMBER

F Series/Bronco - 0~ E0TZ-3B440-A

4x4

1/2~ E0TZ-3B440-B

1~ E0TZ-3B440-C

1-1/2~ E0TZ-3B440-D

Ranger/ Bronco II - 0~ E3TZ-3B440-A

4x4

1/2~ E3TZ-3B440-B

1~ E3TZ-3B440-C

1-1/2~ E3TZ-3B440-D

ADJUSTER ORIENTATION CHART

CAMBER CASTER CAMBER CASTER

POSITION LEFT LEFT RIGHT RIGHT

OF SLOT SIDE SIDE SIDE SIDE

45~ +1~ -1~ -1~ -1~

135~ -1~ -1~ + 1~ -1~

225~ -1~ +1~ +1~ +1~

315~ +1~ +1~ -1~ +1~

6. Recheck the alignment to make sure you arrived at the desired values.

CASTER WEDGE APPLICATION: F-250/350 4X4

The caster angle on the F-250 4x4 can be adjusted by inserting a wedge between the spring and the axle. Refer to the appropriate model year Light Truck Shop Manual, page 14-01-14 for installation details. See the following application chart for the correct service part.

CASTER WEDGE APPLICATION CHART

SERVICE PART

APPLICATION VALUE NUMBER

F-250/350 - 0~ E0TZ-5A313-A

4x4

1~ E0TZ-5A313-C

2~ E0TZ-5A313-B

NOTE: F-350 4X4 TWIN TRACTION BEAM - CASTER AND CASTER SPLITS ARE ADJUSTABLE USING WEDGES. F-350 4X4 MONOBEAM - CASTER SPLITS ARE NOT ADJUSTABLE. A CASTER CHANGE FOR BOTH WHEELS IS ACCOMPLISHED USING WEDGES.

PART NUMBER PART NAME CLASS

E9TZ-3B440-F Caster Adjuster - B

F-Series/Bronco

E9TZ-3B440-G Caster Adjuster - B

Ranger/Bronco II

E0TZ-3B440-A Camber Adjuster - AM

F-Series/Bronco

E0TZ-3B440-B Camber Adjuster - AM

F-Series/Bronco

E0TZ-3B440-C Camber Adjuster - AM

F-Series/Bronco

E0TZ-3B440-D Camber Adjuster - AM

F-Series/Bronco

E3TZ-3B440-A Camber Adjuster - BM

Ranger/Bronco II

E3TZ-3B440-B Camber Adjuster - AM

Ranger/Bronco II

E3TZ-3B440-C Camber Adjuster - AM

Ranger/Bronco II

E3TZ-3B440-D Camber Adjuster - AM

Ranger/Bronco II

E0TZ-5A313-A Caster Wedge C

E0TZ-5A313-B Caster Wedge BM

E0TZ-5A313-C Caster Wedge RM

OTHER APPLICABLE ARTICLES: 87-4-16 SUPERSEDES:

89-19-13, date 9/20 89

WARRANTY STATUS: INFORMATION ONLY OASIS CODES:

3100, 3200, 3300

Technical Service Bulletin # 87416 Date: 870225

Steering - Pulling or Drifting

^ STEERING - PULL OR DRIFT - CASTER Article No.

ADJUSTMENT SERVICE KIT 87-4-16

^ SUSPENSION - FRONT - CASTER ADJUSTMENT SERVICE KIT

LIGHT TRUCK 1980-86 F-150 (4x4), BRONCO ISSUE:

A steering drift or pull may be caused by excessive front wheel side-to-side caster angle differences.

ACTION: If a front axle alignment check shows excessive (more than 3/4 degree split) side-to-side caster angle difference causing the vehicle to drift or pull, install a new caster adjustment kit

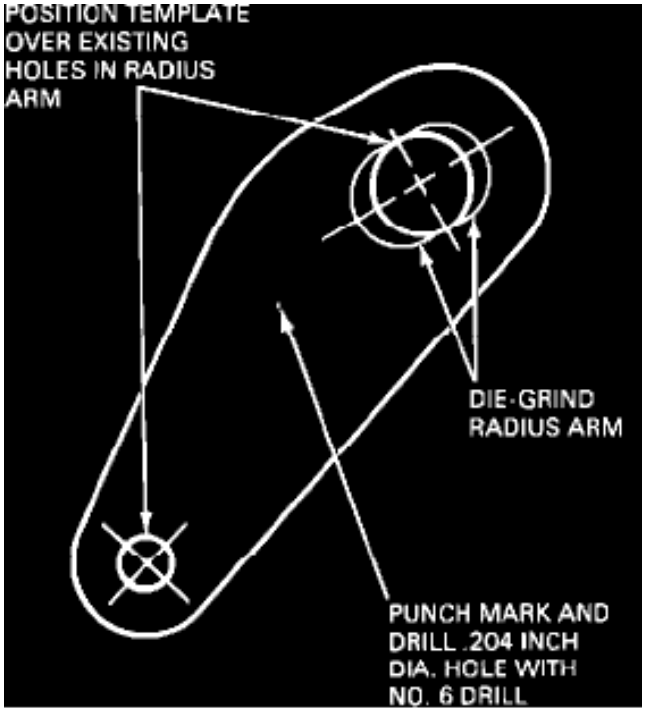
(E0TZ-3K064-A) which allows the front axle side-to-side caster angles to be changed up to 2-1/2 degrees in 1/2 degree increments. New front axle to radius arm brackets must also be replaced when the caster kit is installed. Refer to the following service procedure for step-by-step instructions.

NOTE THE FOLLOWING INFORMATION BEFORE DOING WORK ON THE VEHICLE.

To correct caster side-to-side difference of up to 1- 1/2 degrees, install a caster adjuster plate on the radius arm that has the lower caster reading. Adjuster plates are identified R.H. and L.H.

To correct caster side-to-side difference more than 1-1/2 degrees, install the caster plate on both radius arms. Installing both plates will allow a caster split change of 2-1/2 degrees (+1-1/2 degrees on the low caster side, -1 degree on the high caster side).

1. Remove radius arm from vehicle.


POSITION TEMPLATE OVER EXISTING HOLES IN RADIUS ARM
DIE-GRIND RADIUS ARM
PUNCH MARK AND DRILL .204 INCH DIA. HOLE WITH NO. 6 DRILL

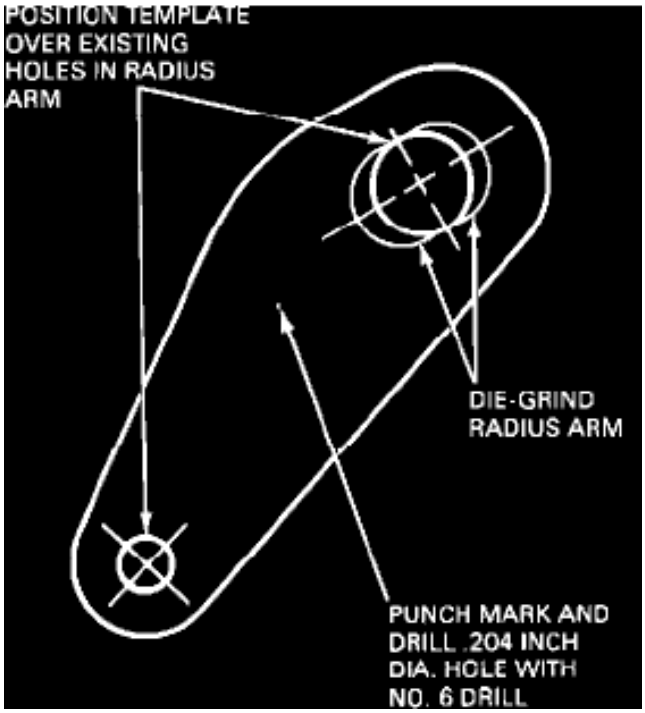
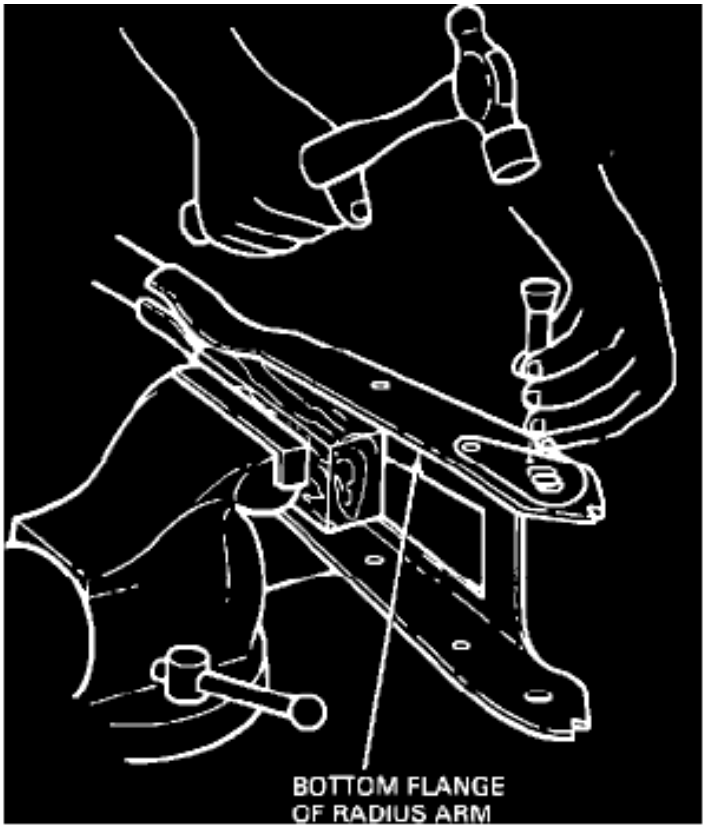

POSITION TEMPLATE OVER EXISTING HOLES IN RADIUS ARM
DIE-GRIND RADIUS ARM
PUNCH MARK AND DRILL .204 INCH DIA. HOLE WITH NO. 6 DRILL

Figure 14 - Article 87-4-16

2. Locate the template, included in the kit, on the bottom flange of radius arm over the existing holes, as shown in Figure 14.

NOTE: Right arm adjustment is shown. One template is used to modify both right and left hand arms. When modifying right arm, position template with printed side down (printed side up for left arm).

Figure 14 - Article 87-4-16


BOTTOM FLANGE
OF RADIUS ARM

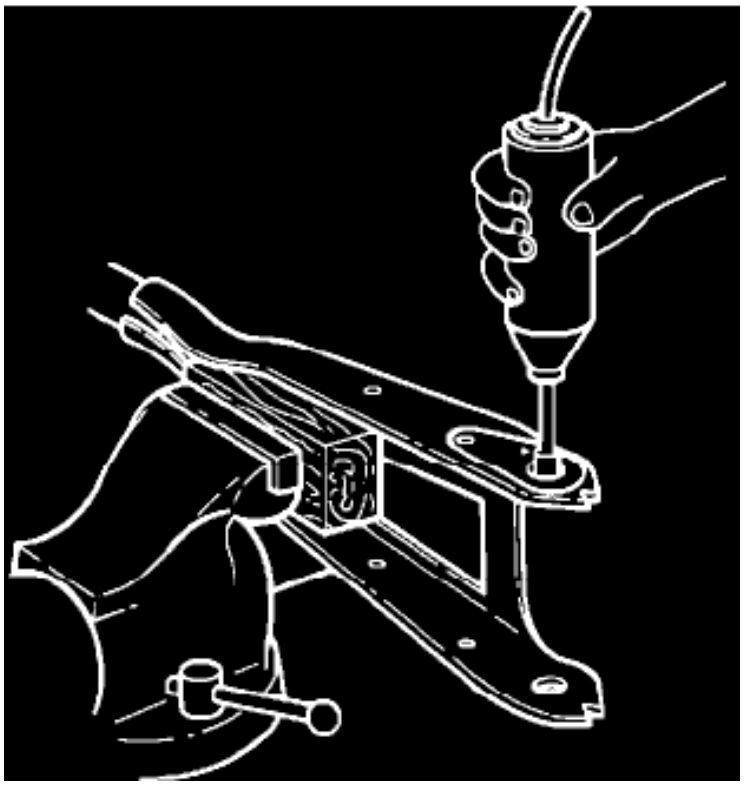
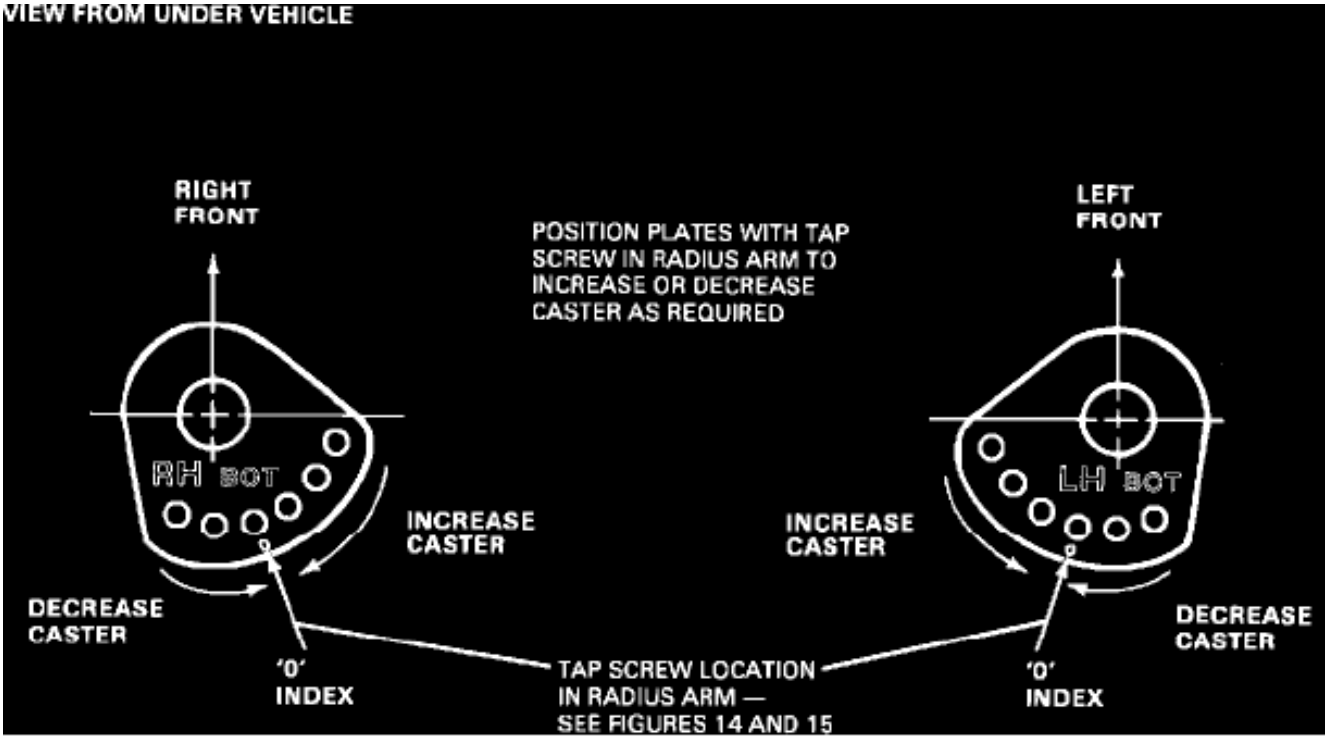


Figure 15 - Article 87-4-16

Figure 16 - Article 87-4-16

3. With template secure, punch mark radius arm at the small hole in the template, as shown in Figures 14 and 15. Mark radius arm, and diegrind a slot at the axle attaching hole the same size as the slot in the template, see Figure 16. De-burr the surface; avoid rounding the edges of the slot.



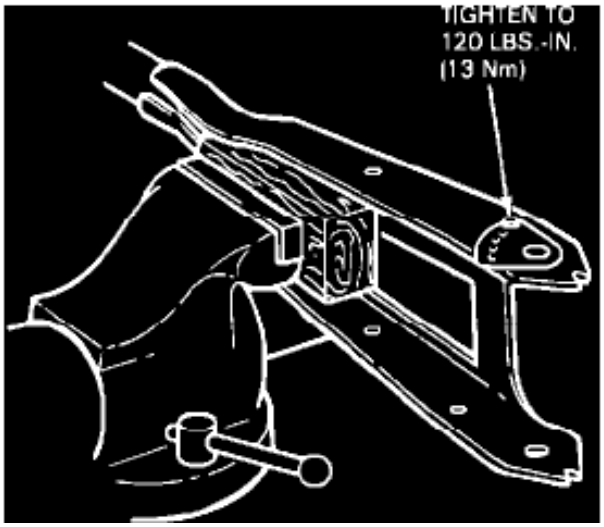


Figure 13 - Article 87-4-16

4. Use a No. 6 drill to make a .204 inch diameter through hole at the punch mark. Line up the caster adjuster plate on the radius arm to obtain the required change in caster, see Figure 13.

Figure 17 - Article 87-4-16

NOTE: Each hole changes caster approximately 1/2 degree + or - from the "0" index hole.

5. Install the tap screw to 120 in.lbs. (13 N-m) torque.

6. Reinstall radius arm with a new bracket (front axle to radius arm). The new bracket has a larger "jaw" spacing to fit over caster adjuster plate.

^ For non-quad shock vehicles, install bracket E7TZ-3B446-A.

^ For quad shock vehicles, install bracket E7TZ-18112-A, R.H. or E7TZ-18113-A, L.H.

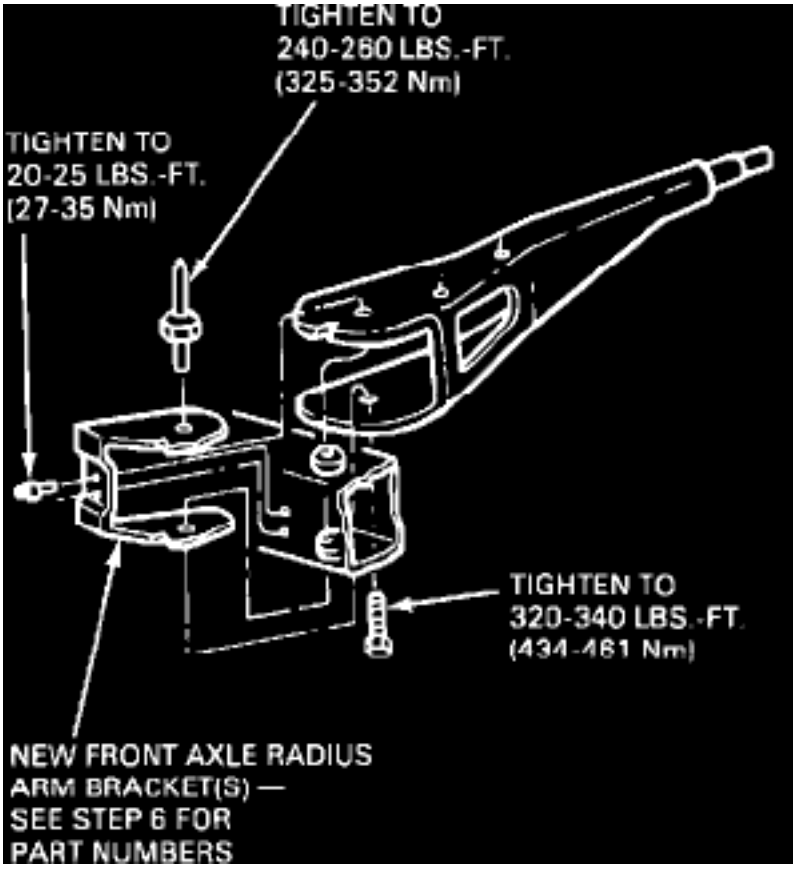


Figure 18 - Article 87-4-16

7. Tighten upper stud/bolt to 240-260 ft.lbs. (325-352 N-m) torque, Figure 18.

8. Tighten lower bolt to 320-340 ft.lbs. (434-461 N-m) torque, Figure 18.

9. Tighten front axle radius arm bracket bolts to 20-26 ft.lbs. (27-35 N-m) torque, Figure 18.

10. Arc weld caster adjuster plate to radius arm with a 1/4 inch-long bead along two sides of the plate.

11. Reset toe to specification. PART NUMBER

PART NAME CLASS

E0TZ-3K064-A Caster Kit CG

E7TZ-3B446-A Bracket - Radius Arm C

E7TZ-18112-A Bracket - Radius Arm CG

E7TZ-18113-A Bracket - Radius Arm CG

OTHER APPLICABLE ARTICLES: None WARRANTY STATUS: Reimbursable within the provisions of the Warranty and Policy Manual OPERATION: SP870416A - Caster kit one side TIME:

2.1 Hrs.

OPERATION: SP870416B - Caster kit both sides TIME:

3.5 Hrs. DLR. CODING: Basic Part No. FRONT - Code: 07

Technical Service Bulletin # 892110 Date: 891018

Steering - Pull or Drift

Article No. 89-21-10

^ STEERING - PULL OR DRIFT - CASTER SPLIT - NEW

SERVICE ADJUSTERS - 4X4 MODELS

^ SUSPENSION - FRONT - NEW SERVICE CASTER ADJUSTERS - 4X4 MODELS

LIGHT TRUCK: 1980-89 BRONCO, F-150, F-250, F-350 1983-89 RANGER 1984-89 BRONCO II

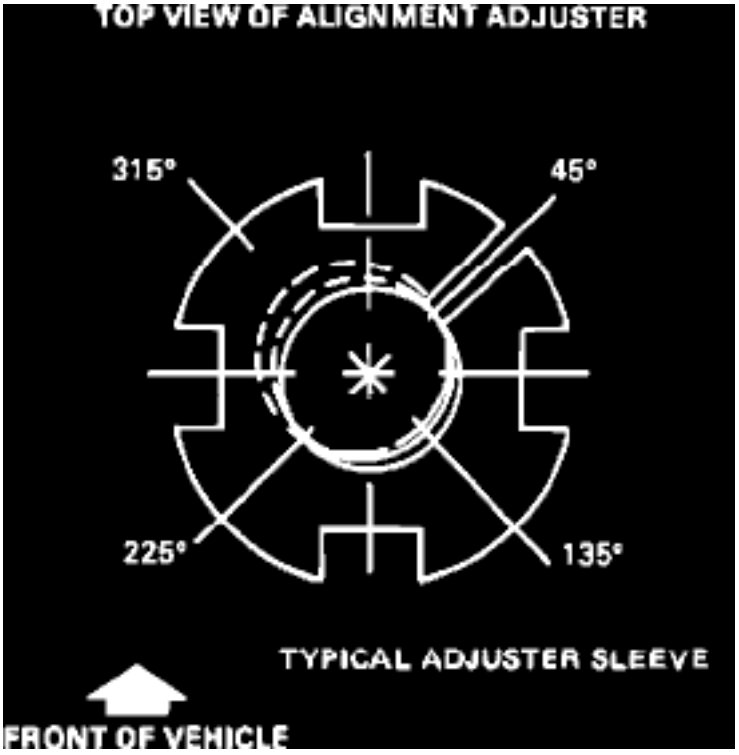


Figure 1

This TSB article is being republished in its entirety to correct the service parts for the Caster Adjusters.

ISSUE: Two new alignment adjusters are now available for service. These new parts provide one degree of caster adjustment along with one degree of camber. Steering pull may be caused by caster split. The affected trucks are 4x4 Twin Traction Beam vehicles.

ACTION: Use the following procedure to determine the position of the service adjuster sleeve. Refer to the appropriate Light Truck Shop Manual, Section 14-21 for installation details.

The new alignment adjusters are similiar to the current camber adjusters. The one exception is the rotational position of the adjuster sleeve to obtain the desired adjustment.

ADJUSTER SLEEVE APPLICATION FOR RANGER BRONCO II, BRONCO, AND F-150

1. Measure and record the alignment readings.

2. Determine what alignment adjuster sleeves are on the truck.

NOTE: IF AFTERMARKET ADJUSTER SLEEVES HAVE BEEN INSTALLED, IT WILL BE NECESSARY TO FIND OUT WHAT CASTER AND CAMBER SLEEVES WERE USED.

If the adjuster sleeve is not marked or cannot be identified, install a 0 degree adjuster sleeve to use as a reference point.

3. Determine what adjuster sleeve change is required. Take your desired alignment (what you want to end up with) and compare it to the readings taken in Step 1 to determine the change.

4. Pick the adjuster sleeve that will get you the closest to the desired alignment.

5. Install and position the adjuster sleeve, Figure 1.

Refer to the appropriate Light Truck Shop Manual, Section 14-21 for service details. See the following caster adjuster sleeve chart and camber adjuster sleeve chart for the correct service parts.

CAMBER ADJUSTER SLEEVE APPLICATION CHART

SERVICE PART

APPLICATION VALUE NUMBER

F Series/Bronco - 0~ E0TZ-3B440-A

4x4

1/2~ E0TZ-3B440-B

1~ E0TZ-3B440-C

1-1/2~ E0TZ-3B440-D

Ranger/ Bronco II - 0~ E3TZ-3B440-A

4x4

1/2~ E3TZ-3B440-B

1~ E3TZ-3B440-C

1-1/2~ E3TZ-3B440-D

ADJUSTER ORIENTATION CHART

CAMBER CASTER CAMBER CASTER

POSITION LEFT LEFT RIGHT RIGHT

OF SLOT SIDE SIDE SIDE SIDE

45~ +1~ -1~ -1~ -1~

135~ -1~ -1~ + 1~ -1~

225~ -1~ +1~ +1~ +1~

315~ +1~ +1~ -1~ +1~

6. Recheck the alignment to make sure you arrived at the desired values.

CASTER WEDGE APPLICATION: F-250/350 4X4

The caster angle on the F-250 4x4 can be adjusted by inserting a wedge between the spring and the axle. Refer to the appropriate model year Light Truck Shop Manual, page 14-01-14 for installation details. See the following application chart for the correct service part.

CASTER WEDGE APPLICATION CHART

SERVICE PART

APPLICATION VALUE NUMBER

F-250/350 - 0~ E0TZ-5A313-A

4x4

1~ E0TZ-5A313-C

2~ E0TZ-5A313-B

NOTE: F-350 4X4 TWIN TRACTION BEAM - CASTER AND CASTER SPLITS ARE ADJUSTABLE USING WEDGES. F-350 4X4 MONOBEAM - CASTER SPLITS ARE NOT ADJUSTABLE. A CASTER CHANGE FOR BOTH WHEELS IS ACCOMPLISHED USING WEDGES.

PART NUMBER PART NAME CLASS

E9TZ-3B440-F Caster Adjuster - B

F-Series/Bronco

E9TZ-3B440-G Caster Adjuster - B

Ranger/Bronco II

E0TZ-3B440-A Camber Adjuster - AM

F-Series/Bronco

E0TZ-3B440-B Camber Adjuster - AM

F-Series/Bronco

E0TZ-3B440-C Camber Adjuster - AM

F-Series/Bronco

E0TZ-3B440-D Camber Adjuster - AM

F-Series/Bronco

E3TZ-3B440-A Camber Adjuster - BM

Ranger/Bronco II

E3TZ-3B440-B Camber Adjuster - AM

Ranger/Bronco II

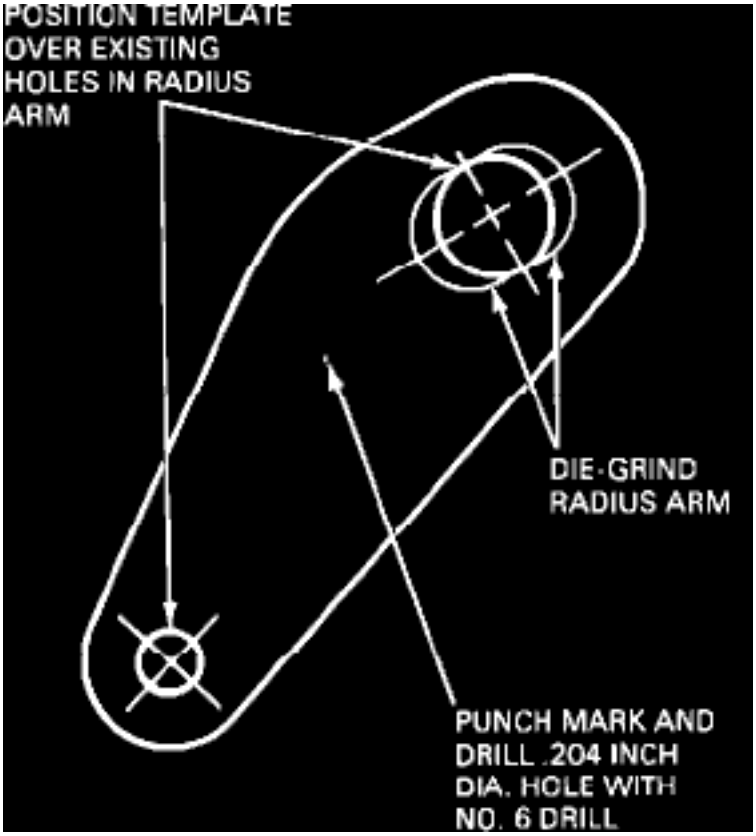
E3TZ-3B440-C Camber Adjuster - AM

Ranger/Bronco II

E3TZ-3B440-D Camber Adjuster - AM

Ranger/Bronco II

E0TZ-5A313-A Caster Wedge C



E0TZ-5A313-B Caster Wedge BM

E0TZ-5A313-C Caster Wedge RM

OTHER APPLICABLE ARTICLES: 87-4-16 SUPERSEDES:

89-19-13, date 9/20 89

WARRANTY STATUS: INFORMATION ONLY OASIS CODES:

3100, 3200, 3300

Technical Service Bulletin # 87416 Date: 870225

Steering - Pulling or Drifting

^ STEERING - PULL OR DRIFT - CASTER Article No.

ADJUSTMENT SERVICE KIT 87-4-16

^ SUSPENSION - FRONT - CASTER ADJUSTMENT SERVICE KIT

LIGHT TRUCK 1980-86 F-150 (4x4), BRONCO ISSUE:

A steering drift or pull may be caused by excessive front wheel side-to-side caster angle differences.

ACTION: If a front axle alignment check shows excessive (more than 3/4 degree split) side-to-side caster angle difference causing the vehicle to drift or pull, install a new caster adjustment kit (E0TZ-3K064-A) which allows the front axle side-to-side caster angles to be changed up to 2-1/2 degrees in 1/2 degree increments. New front axle to radius arm brackets must also be replaced when the caster kit is installed. Refer to the following service procedure for step-by-step instructions.

NOTE THE FOLLOWING INFORMATION BEFORE DOING WORK ON THE VEHICLE.

To correct caster side-to-side difference of up to 1- 1/2 degrees, install a caster adjuster plate on the radius arm that has the lower caster reading. Adjuster plates are identified R.H. and L.H.

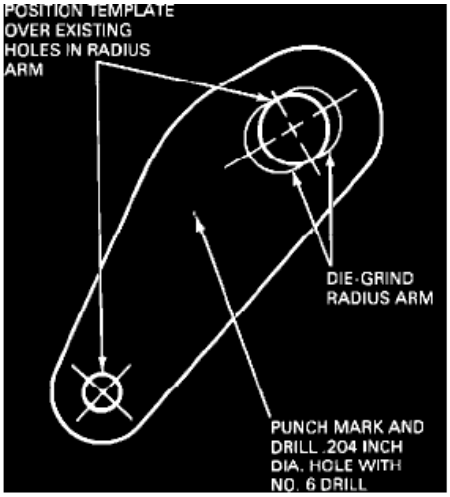
To correct caster side-to-side difference more than 1-1/2 degrees, install the caster plate on both radius arms. Installing both plates will allow a caster split change of 2-1/2 degrees (+1-1/2 degrees on the low caster side, -1 degree on the high caster side).

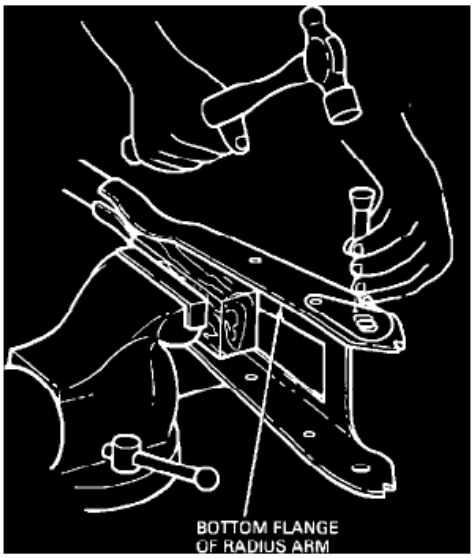
1. Remove radius arm from vehicle.

Figure 14 - Article 87-4-16

2. Locate the template, included in the kit, on the bottom flange of radius arm over the existing holes, as shown in Figure 14.

NOTE: Right arm adjustment is shown. One template is used to modify both right and left hand arms. When modifying right arm, position template with printed side down (printed side up for left arm).


POSITION TEMPLATE OVER EXISTING HOLES IN RADIUS ARM
DIE-GRIND RADIUS ARM
PUNCH MARK AND DRILL .204 INCH DIA. HOLE WITH NO. 6 DRILL


BOTTOM FLANGE OF RADIUS ARM

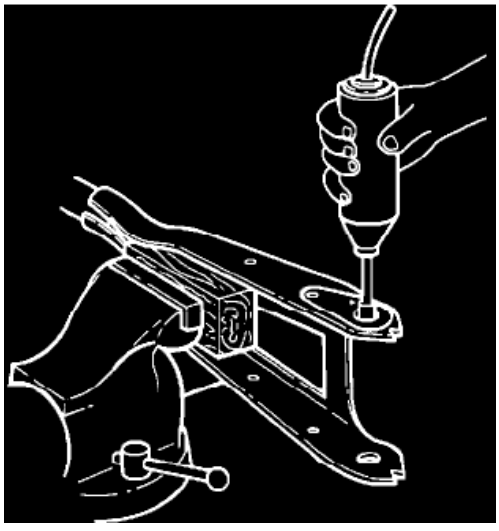
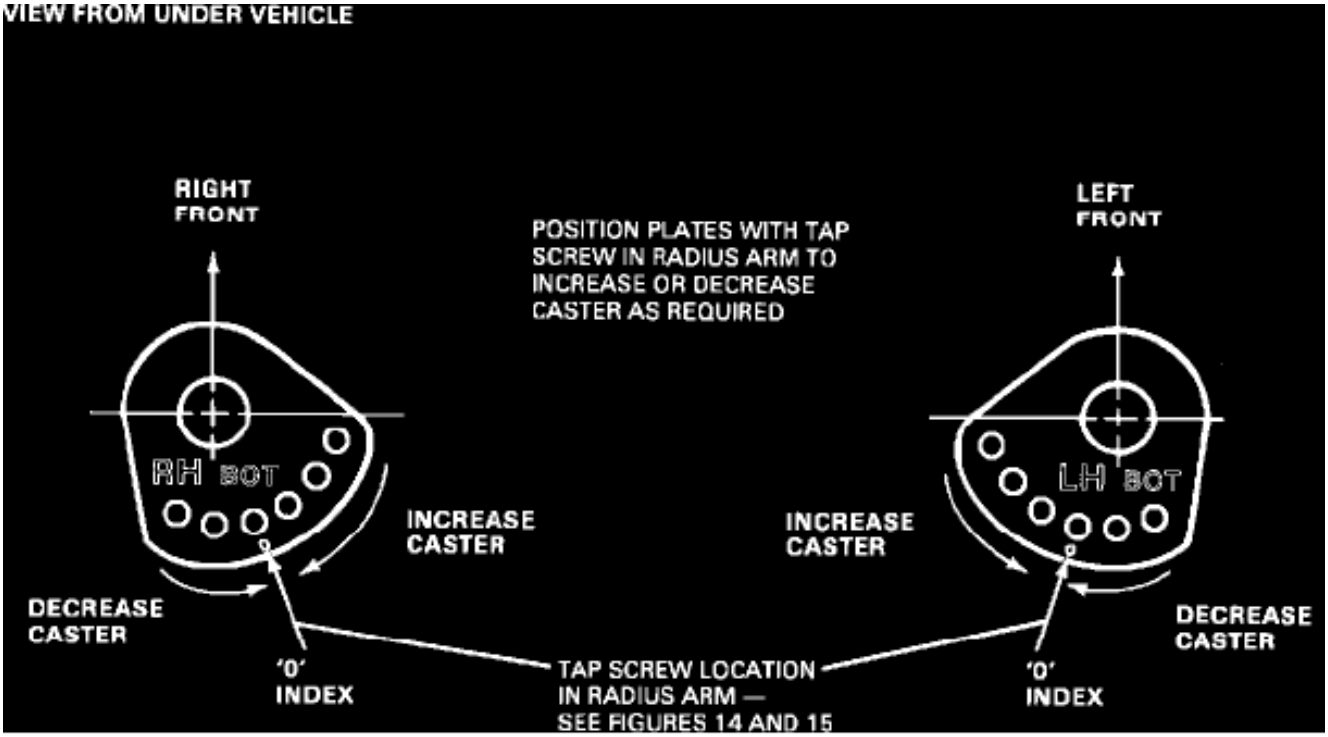


Figure 14 - Article 87-4-16

Figure 15 - Article 87-4-16



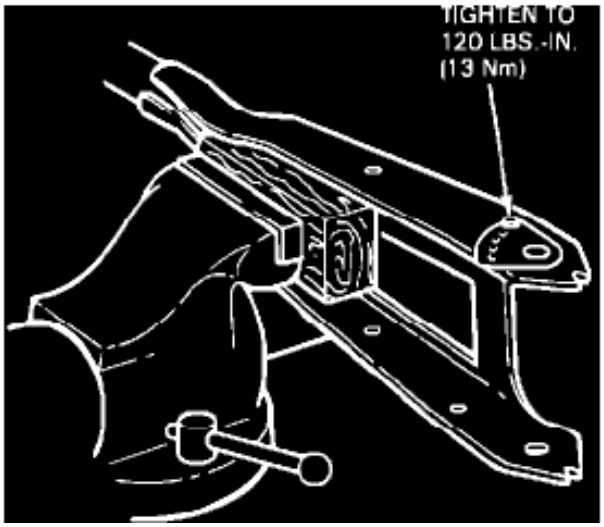


Figure 16 - Article 87-4-16

3. With template secure, punch mark radius arm at the small hole in the template, as shown in Figures 14 and 15. Mark radius arm, and diegrind a slot at the axle attaching hole the same size as the slot in the template, see Figure 16. De-burr the surface; avoid rounding the edges of the slot.

Figure 13 - Article 87-4-16

4. Use a No. 6 drill to make a .204 inch diameter through hole at the punch mark. Line up the caster adjuster plate on the radius arm to obtain the required change in caster, see Figure 13.

Figure 17 - Article 87-4-16

NOTE: Each hole changes caster approximately 1/2 degree + or - from the "0" index hole.

5. Install the tap screw to 120 in.lbs. (13 N-m) torque.

6. Reinstall radius arm with a new bracket (front axle to radius arm). The new bracket has a larger "jaw" spacing to fit over caster adjuster plate.

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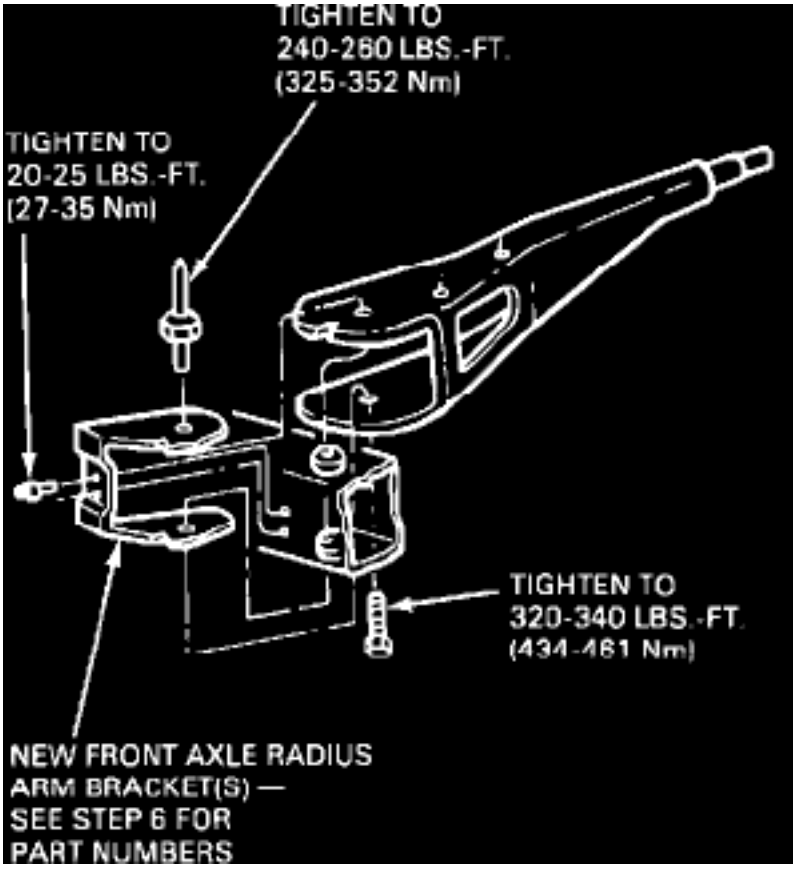


Figure 18 - Article 87-4-16

7. Tighten upper stud/bolt to 240-260 ft.lbs. (325-352 N-m) torque, Figure 18.

8. Tighten lower bolt to 320-340 ft.lbs. (434-461 N-m) torque, Figure 18.

9. Tighten front axle radius arm bracket bolts to 20-26 ft.lbs. (27-35 N-m) torque, Figure 18.

10. Arc weld caster adjuster plate to radius arm with a 1/4 inch-long bead along two sides of the plate.

11. Reset toe to specification. PART NUMBER

PART NAME CLASS

E0TZ-3K064-A Caster Kit CG

E7TZ-3B446-A Bracket - Radius Arm C

E7TZ-18112-A Bracket - Radius Arm CG

E7TZ-18113-A Bracket - Radius Arm CG

OTHER APPLICABLE ARTICLES: None WARRANTY STATUS: Reimbursable within the provisions of the Warranty and Policy Manual OPERATION: SP870416A - Caster kit one side TIME:

2.1 Hrs.

OPERATION: SP870416B - Caster kit both sides TIME:

3.5 Hrs. DLR. CODING: Basic Part No. FRONT - Code: 07

Alignment: Specifications

Camber Caster Toe

Ride Height 2.00-2.25 in --- --- 1/16 in

2.25-2.75 in --- --- 1/16 in

2.75-3.25 in -2 1/2 to -1/4 deg +6 to +9 deg 1/16 in

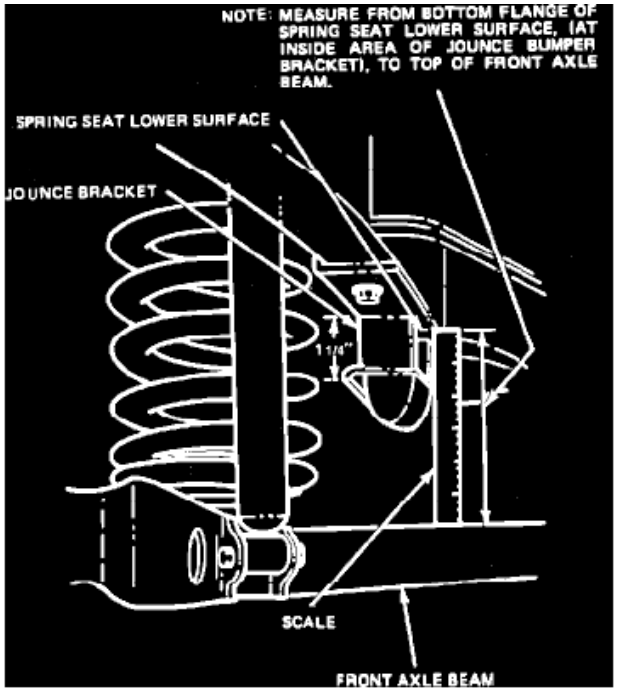
3.25-3.50 in -1 3/4 to +1/2 deg +5 to +8 deg 1/16 in

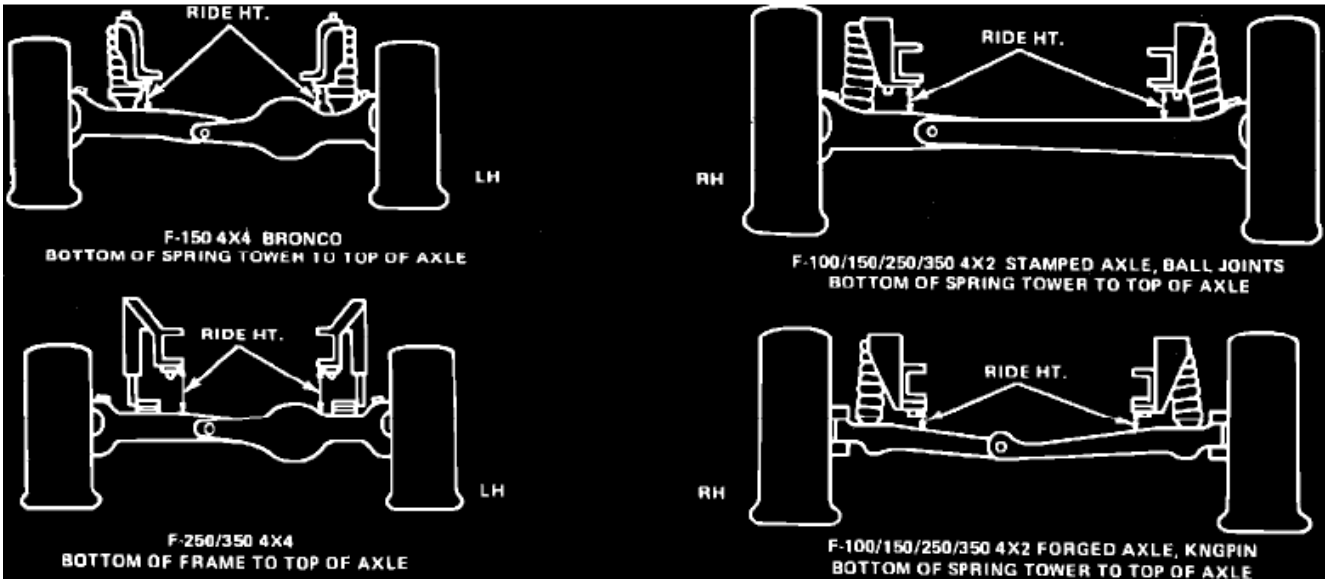
3.50-4.00 in -3/4 to +1 1/2 deg +4 to +7 deg 1/16 in

4.00-4.25 in 0 to +2 1/4 deg +3 to +6 deg 1/16 in

4.25-4.75 in +1 to +3 1/4 deg +2 to +5 deg 1/16 in

4.75-5.00 in +1 3/4 to +4 deg +1 to +4 deg 1/16 in





Alignment: Service and Repair

Fig. 1 Measuring Ride Height

Fig. 7 Measuring riding height. 1980---85 F-100---350 & Bronco

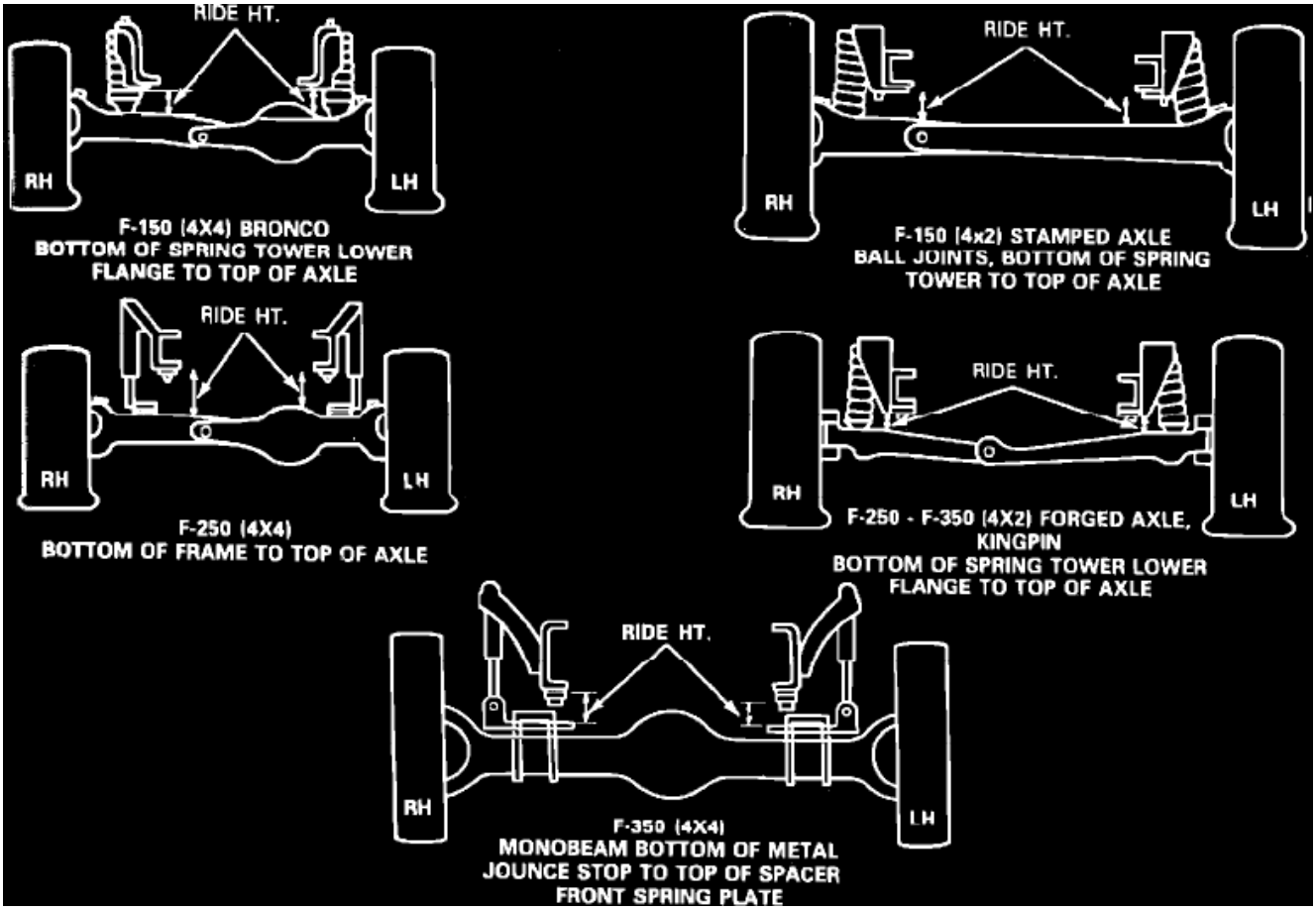
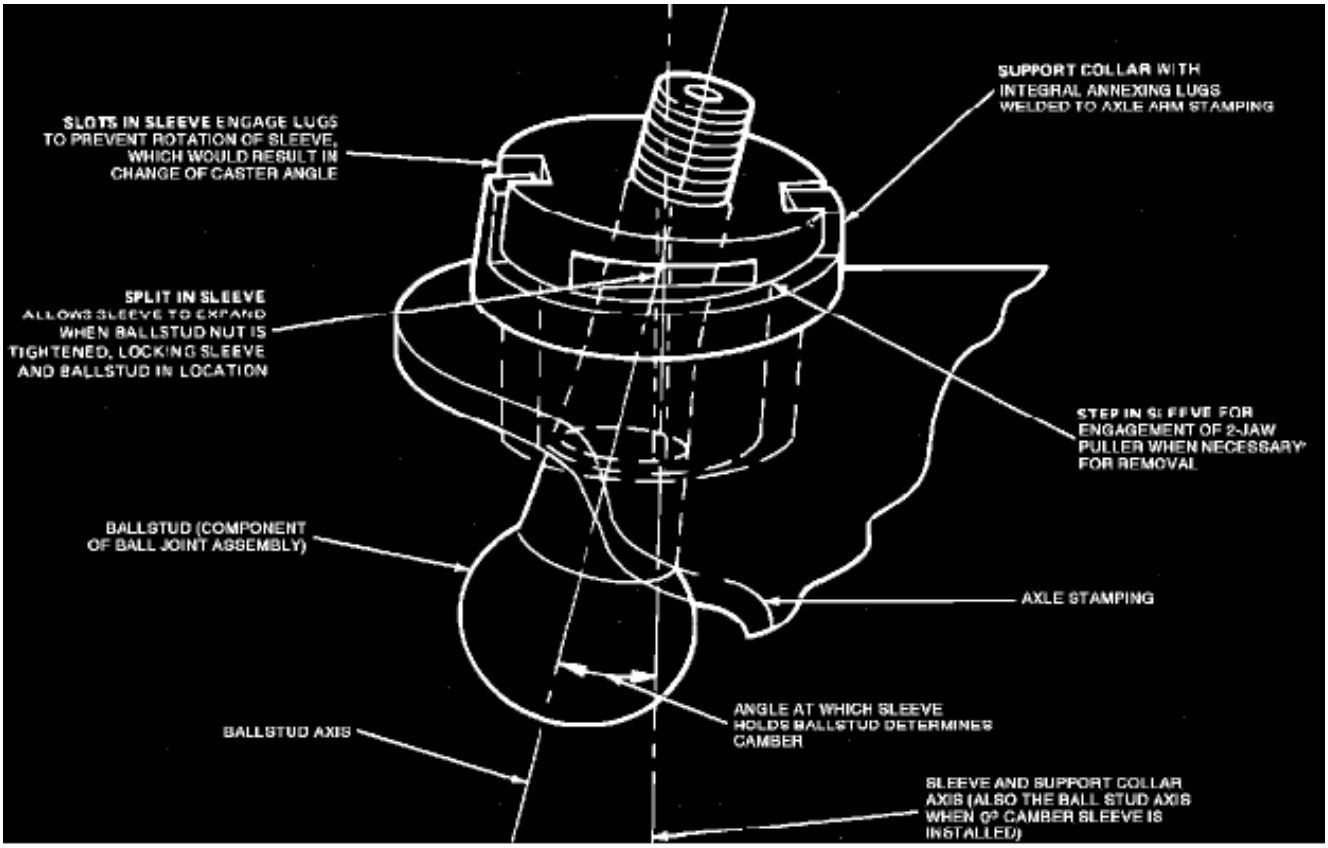


Fig. 8 Measuring Riding Height

Prior to checking caster and camber, ensure vehicle front ride height is within {1/8} inch side to side 1980-87 E-100-350. On 1980-87 F-100-350 models, the left side ride height should be within 0-{3/8} inch higher than the right side ride height. On 1980-87 F-150-350 (4x4) and Bronco, the front ride heights should be within {3/16} inch side to side. Refer to Figs. 6, 7 and 8. If the vehicle ride heights are not within specifications, redistribute load on loaded vehicles or slightly load empty vehicles on one side. If the ride heights cannot be brought within specifications, verify correct spring installation. The ride height variations stated, are for checking purposes only. The vehicle does not have to operate within these specifications. Check and correct as necessary all tire inflation pressures, then check front tires for the same size, ply rating and load range. Check front wheel bearings and adjust as necessary. If all the above checks have been made, check wheel alignment with suitable alignment equipment. Using the ride heights obtained earlier, compare caster and camber readings to those listed in the ``Wheel Alignment Specifications Chart''. If the caster and camber angles exceed the specifications, inspect front end for damaged suspension components. Replace as necessary. Alignment equipment indicates a true reading only when the vehicle's frame is horizontal. Therefore, if the frame is not level (due to tire, spring or load differences), the caster angle reading must be modified to compensate for the frame angles. If the front is higher than the rear, subtract the amount of angle from the reading. If the front is lower than the rear, add the angle. To check frame angle, use a spirit protractor, and take the frame angle measurement on the lower frame flange at the flat area immediately adjacent to the rear spring front hanger.

1980-85 4 X 2 MODELS EXC. 1982-85 F-100-350 W/BALL JOINTS

The camber and caster angles are designed into the front end and are not adjustable.



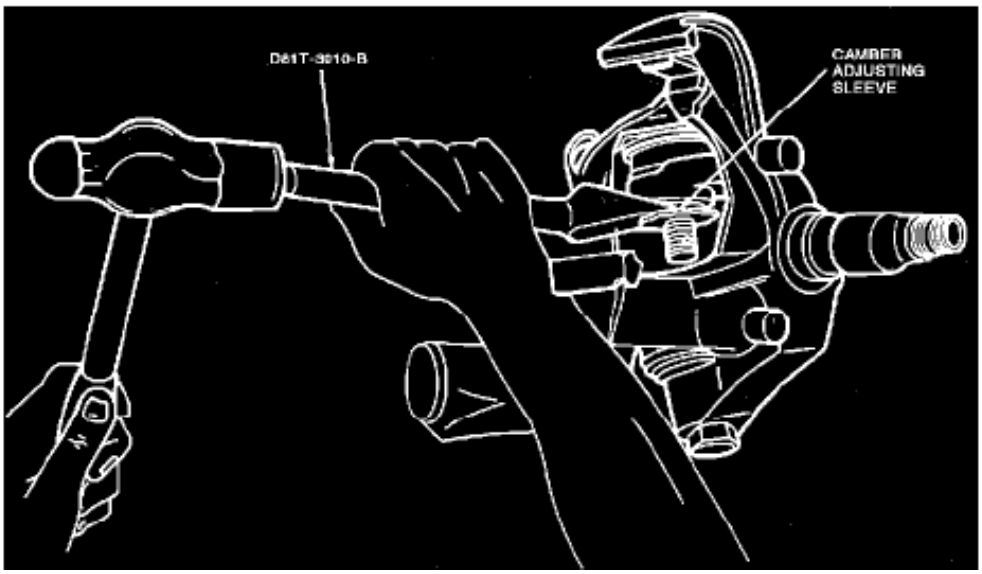


Fig. 3 Camber Adjustment

Fig. 4 Removing Caster/Camber Adjustment Sleeve

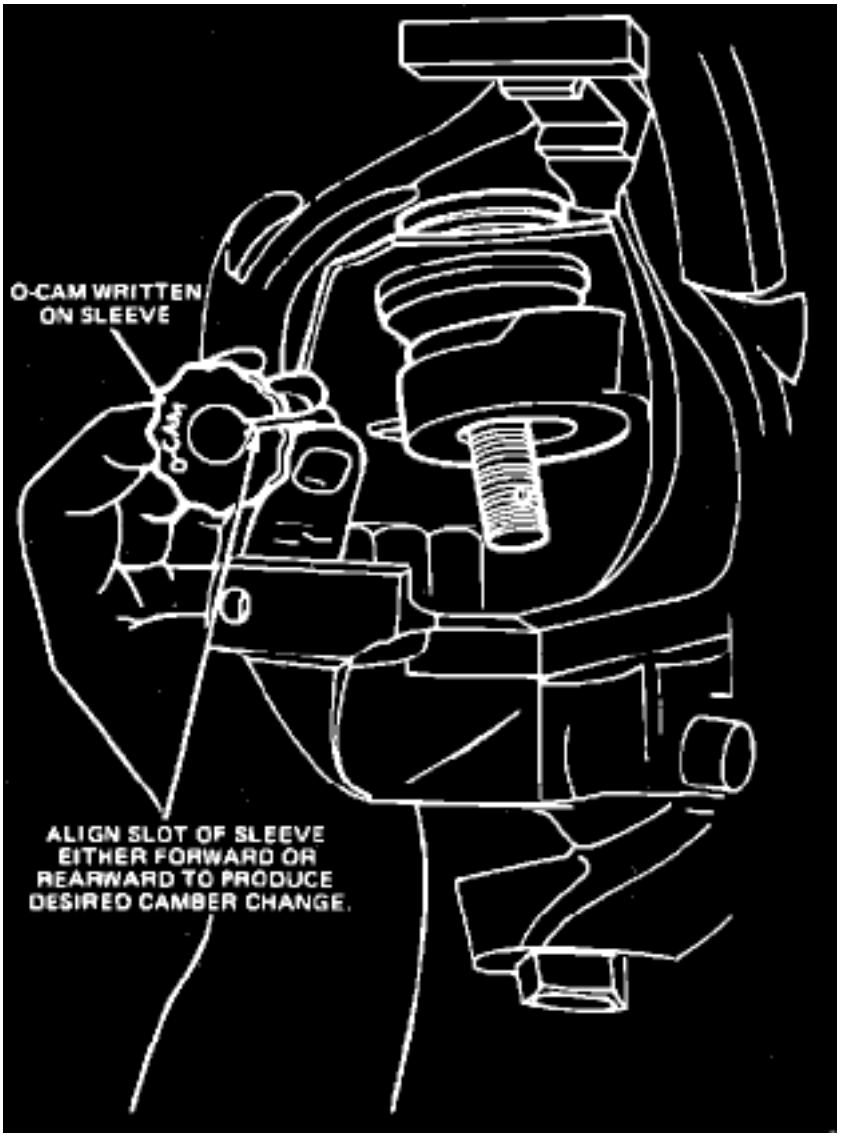


Fig. 5 Caster/Camber Adjustment

1980-87 F-150-350 4 X 4 & BRONCO, 1982-87 F-100-350 4 X 2 W/BALL JOINTS The caster angle on 1981-87 F-250-350 4 x 4 models with leaf spring front suspension can be adjusted by inserting a shim between the spring and axle. Shims are available in increments of 0°, 1° and 2°. The 0° shim is used to adjust side to side ride height when an angled shim is installed on the opposite side of the axle. On all other models, the caster angle is designed into the axle and is not adjustable. The camber angle may be adjusted by means of mounting sleeves placed on the upper ball joint, Figs. 9, 10 and 11. Four sleeves are available in {1/2}° camber increments to allow a 3° range of adjustment from - 1 {1/2}° to +1 {1/2}°.

TOE-IN, ADJUST Check the steering wheel spoke position when the front wheels are in the straight ahead position. If the spokes are not in the normal position, they can be adjusted while toe-in is being adjusted.

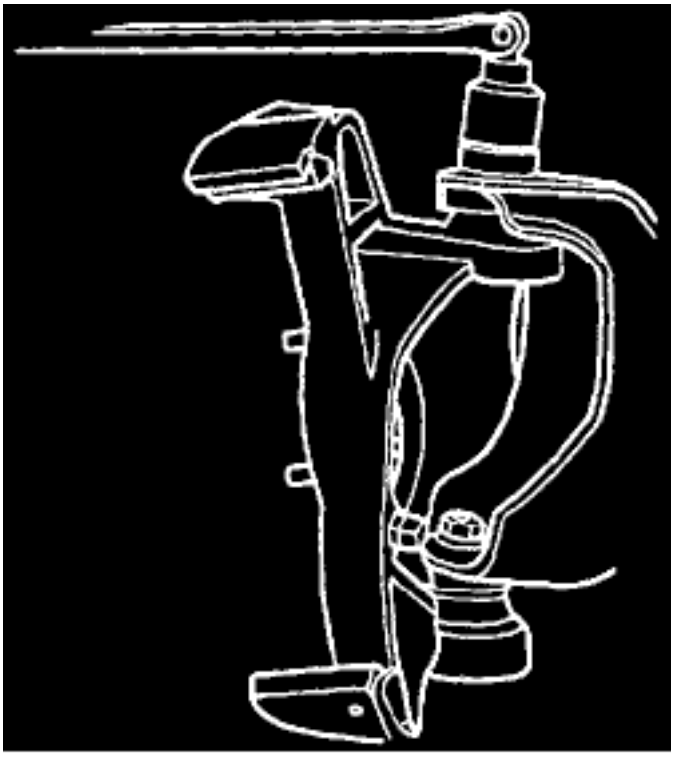
1. Loosen clamp bolts on each tie rod end sleeve.

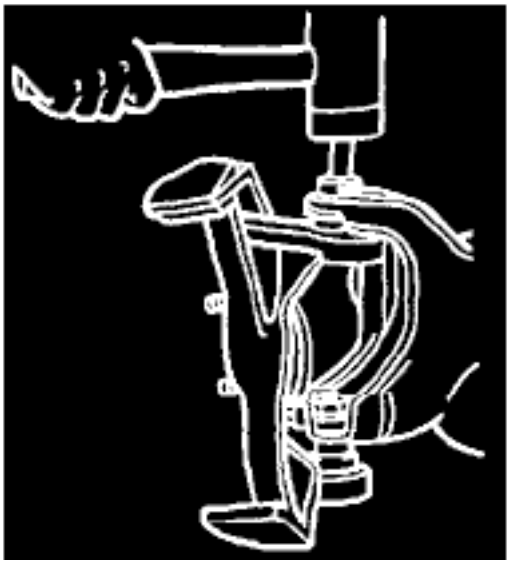
2. Adjust toe-in. If steering wheel spokes are in their normal position, lengthen or shorten both rods equally to obtain correct toe-in. If spokes are not in normal position, make necessary rod adjustments to obtain correct toe-in and steering wheel spoke alignment.

Front Steering Knuckle: Specifications

Lower Ball Joint ..... 90-110 ft-lbs Upper Ball Joint ..... 100 ft-lbs [1]

[1] 100 ft-lbs MINIMUM, advance the Upper Ball Joint nut to the next castellation, and install new cotter pin.





Front Steering Knuckle: Service and Repair

Ball Joint Service

Ball Joint Service

REMOVE

1. Remove brake rotor, axle shaft and spindle from steering knuckle. 2. Disconnect tie rod from steering arm. 3. Remove upper ball joint nut and loosen lower ball joint nut. Strike upper ball joint stud to loosen ball joints. 4. Remove lower ball joint nut and remove knuckle from yoke tube. 5. Remove camber adjuster bushing from tube and yoke assembly.

INSTALL

1. Install knuckle onto tube and yoke assembly, then install camber adjusting bushing with arrow pointing outward for positive camber or towards

center of vehicle for negative camber.

2. Install new lower ball joint nut and torque to Specifications. See: Specifications 3. Install new upper ball joint nut and torque to Specifications. See: Specifications 4. Advance upper ball joint nut to next castellation, and install new cotter pin. 5. Install brake rotor, axle shaft and spindle.

Power Steering Bleeding: Service and Repair

Four factors affect power operation of the steering system: fluid level and condition, drive belt tension, pump pressure and steering gear adjustment. These should always be checked before any major service operations are performed. Conditions such as, hard or loose steering, road shock or vibrations are not always due to steering gear or pump, but are often related instead to such factors as low tire pressure and front end alignment. These factors should be checked and corrected before any adjustment of the steering gear is made.

CHECKING FLUID LEVEL

1. Run engine to normal operating temperature, then shut it off. Remove reservoir filler cap and check oil level on dipstick. Level should be up to ``Full'' mark on dipstick.

2. If level is low, add power steering fluid to proper level on dipstick and replace filler cap. When adding less than one pint of fluid, it is permissible to use automatic transmission fluid. When adding larger quantities or when making a complete fluid change, it is recommended that special power steering fluid be used.

3. When checking fluid level after system has been serviced, air must be bled from the system as outlined under ``Bleeding System.''

BLEEDING SYSTEM

1. With wheels turned all the way to the left, add the recommended fluid to the ``Add'' mark on dipstick.

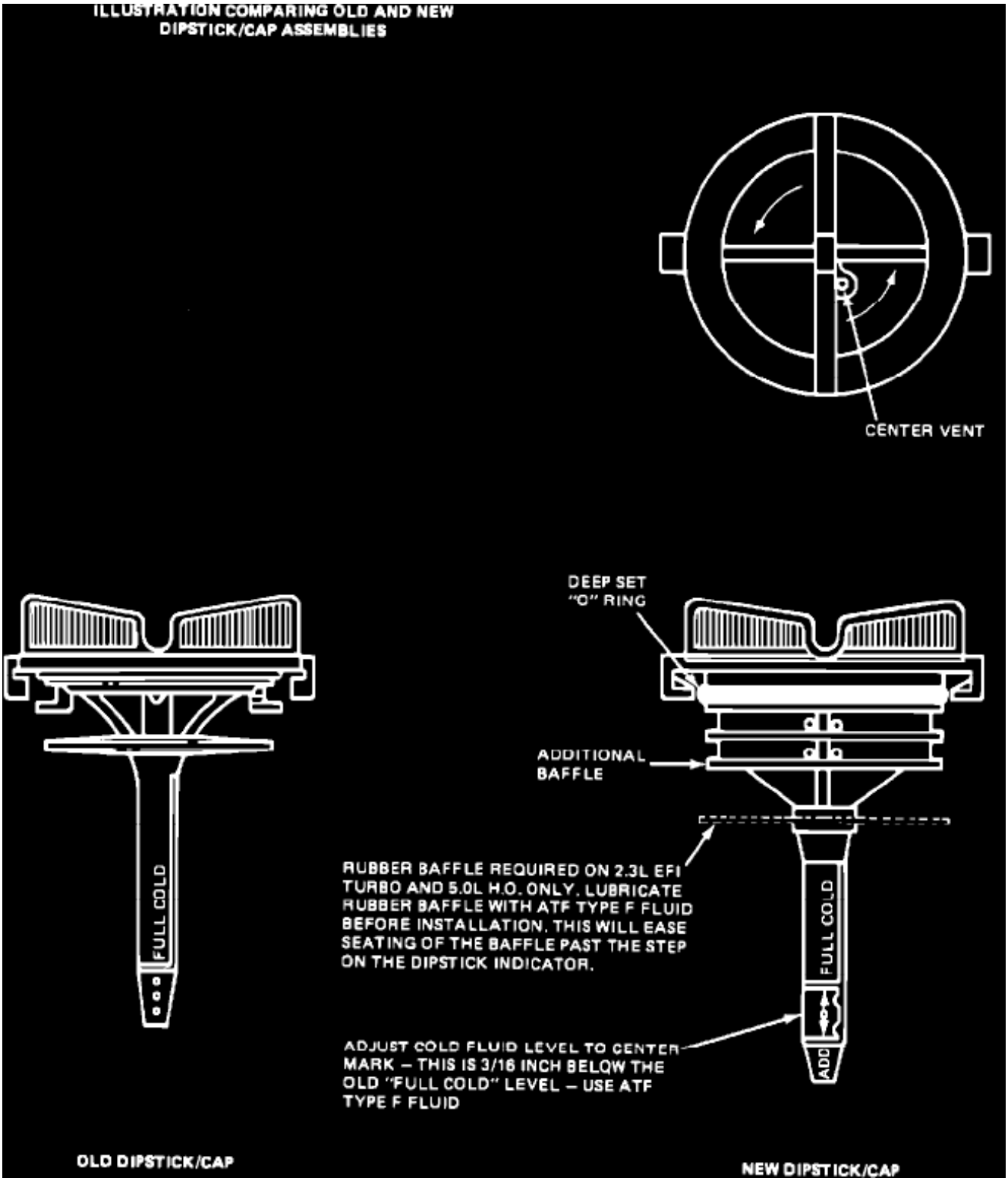
2. Start engine. While running at fast idle, recheck fluid level and, if necessary, add fluid to the ``Add'' mark on dipstick.

3. Bleed system by turning wheels from side to side without hitting stops. Maintain fluid level just above internal pump casting. Fluid with air in it will have a light tan appearance. This air must be eliminated from fluid before normal steering action can be obtained.

4. Return wheels to center position and continue to run engine for two or three minutes, then shut it off.

5. Road test vehicle to make sure steering functions normally and is free from noise.

6. Recheck fluid level, making sure level is at the ``Full'' mark.



Power Steering Fluid Reservoir: Customer Interest Power Steering Pump - Leakage At Dipstick Cap

Article No. 85-1-11-S

STEERING - POWER - CII PUMP LEAKAGE AT DIPSTICK CAP

FORD 1982-85 FORD, T-BIRD, GRANADA, MUSTANG, FAIRMONT, LTD

LINCOLN-MERCURY 1982-85 MERCURY, XR7, COUGAR, CAPRI, ZEPHYR, -MARQUIS, MARK, LINCOLN, CONTINENTAL

LIGHT TRUCKS 1982-85 F-SERIES, BRONCO II, RANGER, BRONCO

This TSB is being republished to provide current service part numbers for the dipstick cap and baffle.

Power steering pump leaks which appear to originate at the pressure fitting, return fitting, or at the reservoir to housing seal may actually be caused by fluid spilling past the dipstick/cap assembly. Overfill is the most common cause of spillage. Also, vehicles with high performance engines such as the 5.0L H.O. and the 2.3L EFI turbo are more susceptible to spillage. Other vehicles may spill fluid due to rough roads or severe handling conditions.

Figure 1 - Dipstick/Cap Assemblies

A new center vent dipstick (Figure 1) has been released to prevent spillage. It includes one additional baffle, a deep set "O" ring, and a 3/16" lower fluid level. For high performance vehicles with a 5.0L H.O. or 2.3L EFI turbo, a separate rubber baffle is added to the dipstick.

Before installing a new dipstick/cap assembly, make certain that spillage was not caused by an overfill condition.

1. Check return line at the pump for looseness and tighten clamp as necessary.

2. Check fluid level with new dipstick and adjust fluid level between "add" and "cold full" with fluid at room temperature.

3. If it is a high performance vehicle as noted above, install baffle on dipstick as illustrated in Figure 1.

NOTE: A gap between the filler neck and the cap is normal on reservoirs originally using the old dipstick. The deep set "O" ring compensates for this. PART NUMBER

PART NAME CLASS

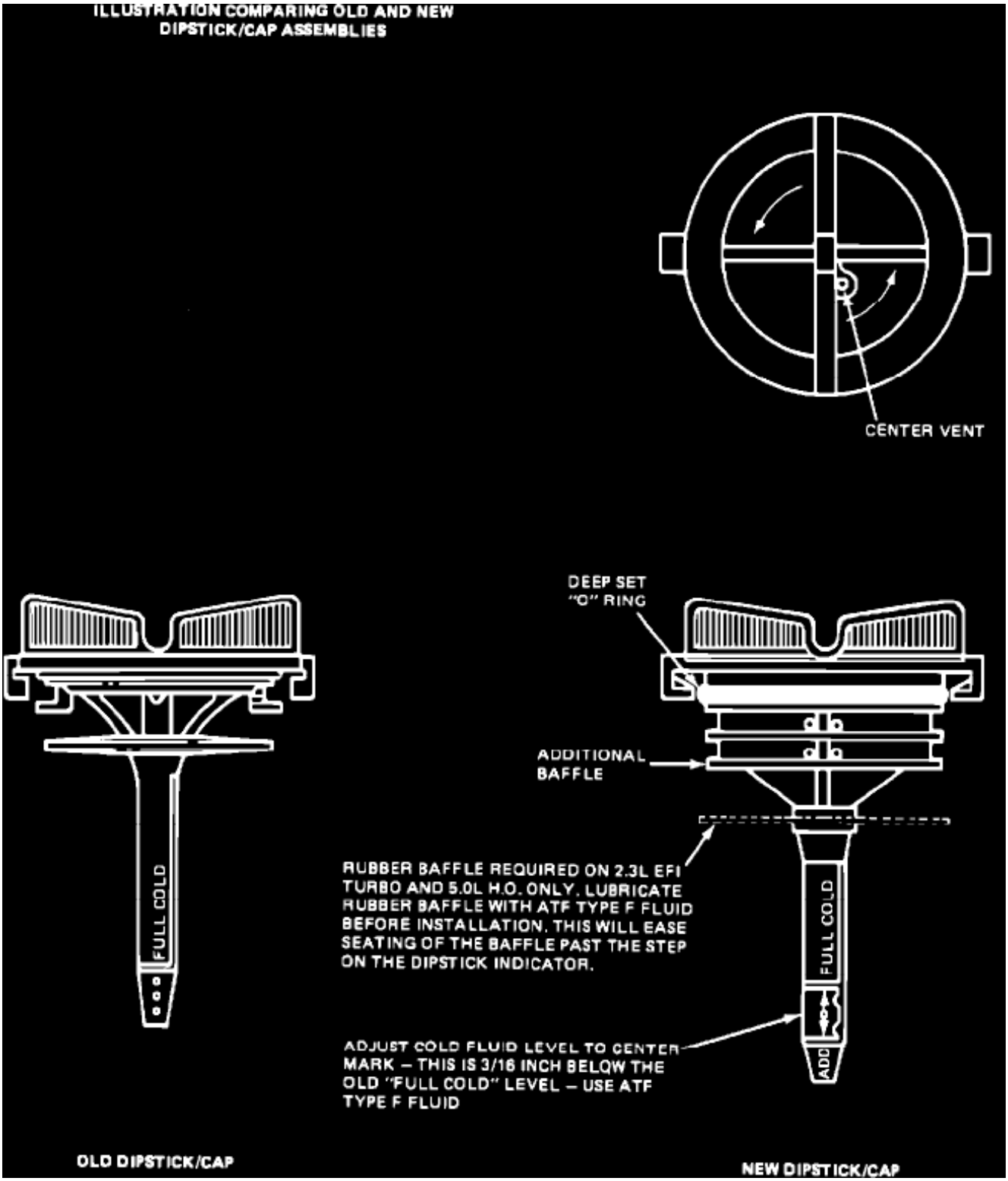
E5FZ-3A006-A Power Steering Pump A

Dipstick/Cap E5SZ-3E550-A

Rubber Baffle C

OTHER APPLICABLE ARTICLES: 85-1-11 ARTICLE SUPERSEDED: 85-1-11 WARRANTY STATUS: Reimbursable within the provisions of the Warranty and Policy Manual. OPERATION: SP3A674A84 TIME:

0.3 Hr. DLR. CODING: Basic Part No. 3A674 Code: 48



Power Steering Fluid Reservoir: All Technical Service Bulletins Power Steering Pump - Leakage At Dipstick Cap

Article No. 85-1-11-S

STEERING - POWER - CII PUMP LEAKAGE AT DIPSTICK CAP

FORD 1982-85 FORD, T-BIRD, GRANADA, MUSTANG, FAIRMONT, LTD

LINCOLN-MERCURY 1982-85 MERCURY, XR7, COUGAR, CAPRI, ZEPHYR, -MARQUIS, MARK, LINCOLN, CONTINENTAL

LIGHT TRUCKS 1982-85 F-SERIES, BRONCO II, RANGER, BRONCO

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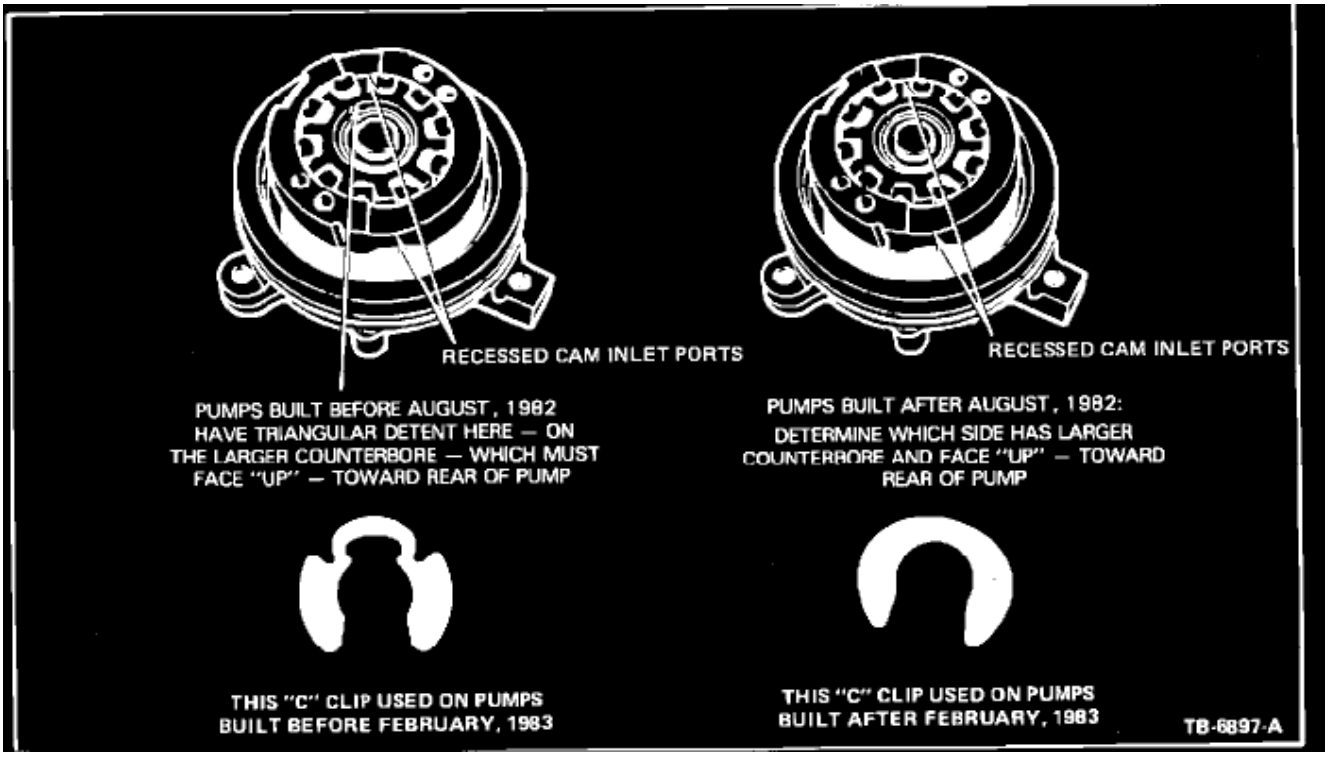
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0.3 Hr. DLR. CODING: Basic Part No. 3A674 Code: 48



Power Steering Pump: Technical Service Bulletins Power Steering pump - Rotor and `C' Clip Changes

Article No. 83-10-6

STEERING - POWER - PUMP - FORD -

ROTOR AND "C" CLIP CHANGES

FORD 1980 PINTO 1980-82 GRANADA, FORD 1980-83 MUSTANG, FAIRMONT, T-BIRD 1981-83 ESCORT 1982-83 EXP 1983 LTD, CROWN VICTORIA

LINCOLN-MERCURY 1980 BOBCAT, MONARCH, VERSAILLES 1980-82 MERCURY 1980-83 CAPRI, ZEPHYR, COUGAR, XR7, LINCOLN, MARK 1981-83 LYNX 1982-83 LN7, CONTINENTAL 1983 MARQUIS, GRAND MARQUIS

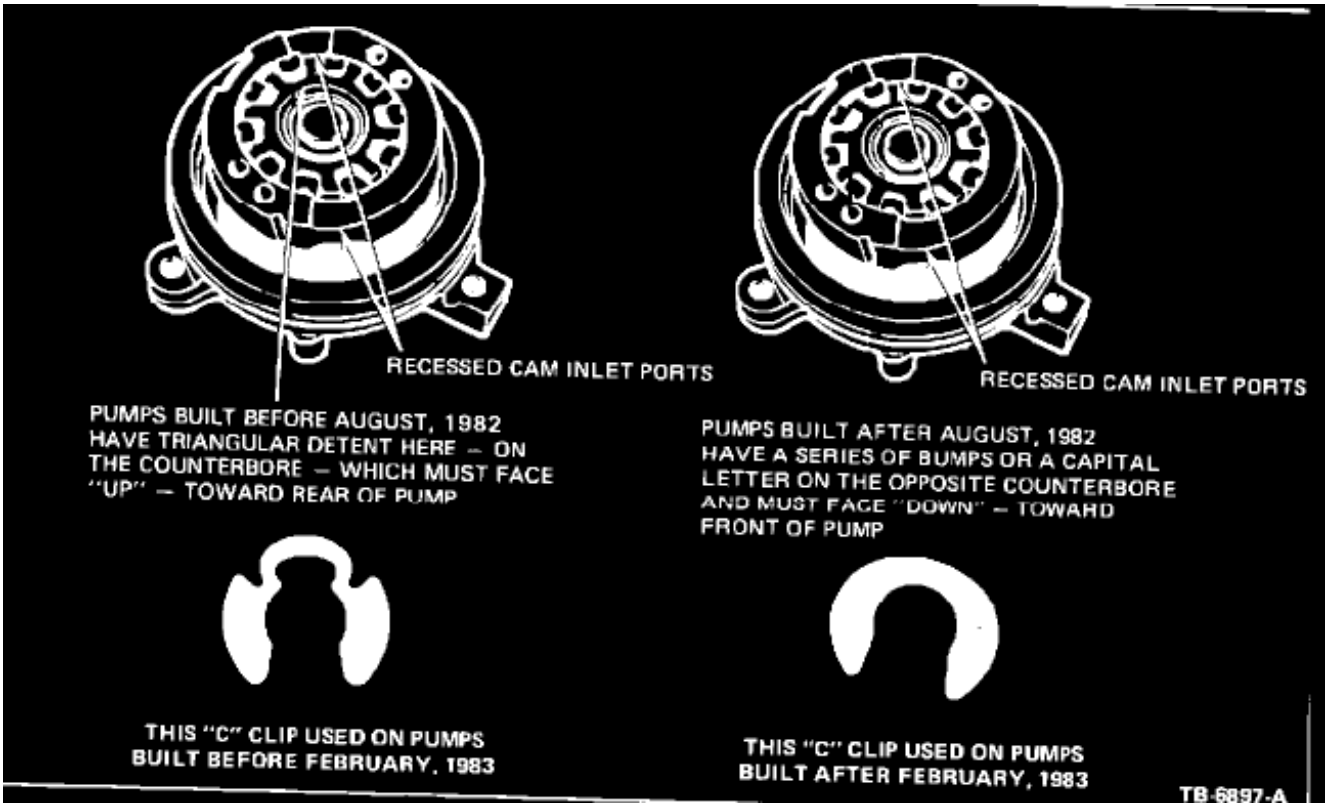
LIGHT TRUCKS 1980-83 F100, 150, 250, 350 1980-83 BRONCO 1983 RANGER The rotor identification mark for re-assembly and rotor retention "C" clip is changed.

Figure 8

CII pumps built since August 1982 no longer have rotors with the small triangular detent on the counterbore to indicate that this is the up side when reassembling (Figure 8). When servicing a pump built since that time it is necessary to determine which side has the larger counterbore and face that side up. It is important that the larger counterbore be up or the "C" clip will not install properly on the shaft. Then it would be necessary to remove the rotor from the cam, turn it over and re-install the slippers and springs.

Also, pumps built since February of 1983 have different rotor retention "C" clip (Figure 8). Either clip will fit on the shaft but the new clip is preferred. OTHER APPLICABLE ARTICLES: 83-6-7 WARRANTY STATUS: "INFORMATION ONLY"

SPECIAL INSTRUCTIONS: Face larger rotor counterbore up when re-assembling.



Power Steering Pump: Technical Service Bulletins Power Steering Pump - Changes

Article No. 83-6-7

STEERING - POWER - PUMP - ROTOR AND "C" CLIP CHANGES

FORD 1980 PINTO 1980-82 GRANADA, FORD 1980-83 MUSTANG, FAIRMONT, T-BIRD 1981-83 ESCORT 1982-83 EXP 1983 LTD, CROWN VICTORIA

LINCOLN-MERCURY 1980 BOBCAT, MONARCH, VERSAILLES 1980-82 MERCURY 1980-83 CAPRI, ZEPHYR, COUGAR, XR7, LINCOLN, MARK 1981-83 LYNX 1982-83 LN7, CONTINENTAL 1983 MARQUIS, GRAND MARQUIS

LIGHT TRUCKS 1980-83 F100, 150, 250, 350 1980-83 BRONCO 1983 RANGER

FIGURE 11

Since August, 1982, the small triangular detent on the rotor of CII power steering pumps has been eliminated. See Figure 11. This mark is used to identify the side of the rotor that must face up when re-assembling the pump. Pumps built since August have rotors with a series of bumps or a capital letter on the opposite side of the rotor. These marks must face down when reassembling the pump or the rotor shaft "C" clip will not install and the rotor will have to be pulled, turned and the springs and slippers re-installed. Dimensionally, these rotors are the same. However, for assembly purpose, it is important that when a rotor has a triangular detent, the mark be up and when it has any other identification, the mark must be down.

Also, pumps built since February, 1983, have a different rotor retention "C" clip (See Figure 11). Either clip will fit the rotor shaft, but the new clip is preferred. OTHER APPLICABLE ARTICLES:

None WARRANTY STATUS: "INFORMATION ONLY"

Power Steering Pump: Service and Repair Removal and Installation

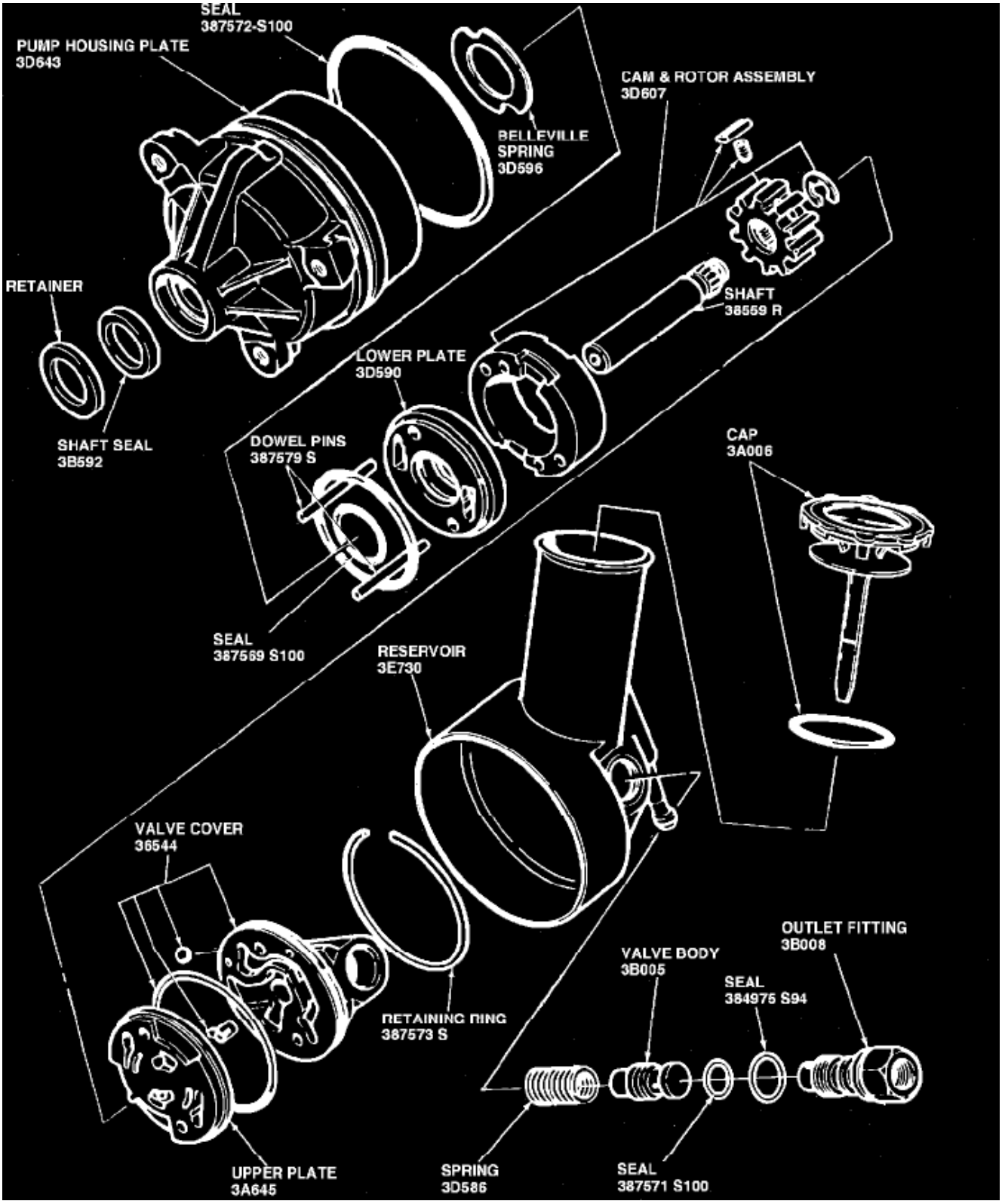
F-100---350 & BRONCO

1. Disconnect return hose from pump reservoir and drain steering pump fluid into a suitable container.

2. Remove pressure hose from pump.

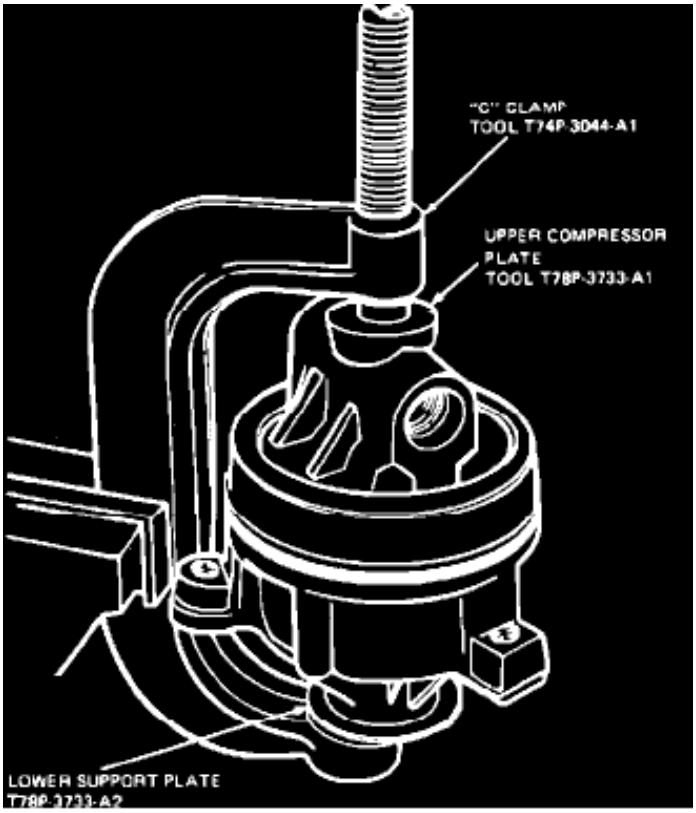
3. Remove pump drive belt, then unfasten pump and adjusting bracket from support bracket. Remove pump pulley, then the pump attaching bolts and pump.

4. Reverse procedure to install.



Power Steering Pump: Service and Repair Disassembly

Fig. 1 Exploded view of Ford Model CII power steering pump


"C" CLAMP
TOOL T74P-3044-A1
UPPER COMPRESSOR PLATE
TOOL T78P-3733-A1
LOWER SUPPORT PLATE
T78P-3733-A2

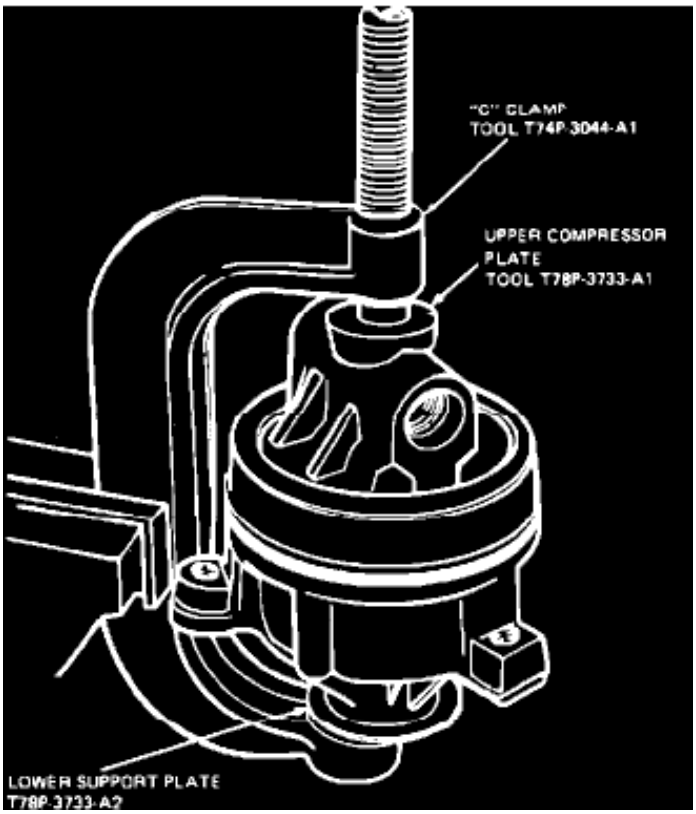

"C" CLAMP
TOOL T74P-3044-A1
UPPER COMPRESSOR PLATE
TOOL T78P-3733-A1
LOWER SUPPORT PLATE
T78P-3733-A2

Fig. 2 Positioning Pump In C-Clamp

Fig. 2 Positioning Pump In C-Clamp

1. Remove pulley from pump.

2. Remove outlet fitting, flow control valve and flow control valve spring from pump, then remove reservoir, Fig. 1.

3. Place a suitable C-clamp in a vise.

4. Position lower support plate T78P-3733-A2 over pump rotor shaft.

5. Install upper compressor plate T78P-3733-A1 into upper portion of C-clamp.

6. While holding compressor tool, place pump assembly into C-clamp with rotor shaft facing downward, Fig. 2.

7. Tighten C-clamp until a slight bottoming of valve cover is observed.

8. Through small hole located on side of pump housing, insert a suitable drift and push inward on valve cover snap ring. While pushing inward on snap ring, place a screwdriver under snap ring edge and remove ring from housing, Fig. 3.

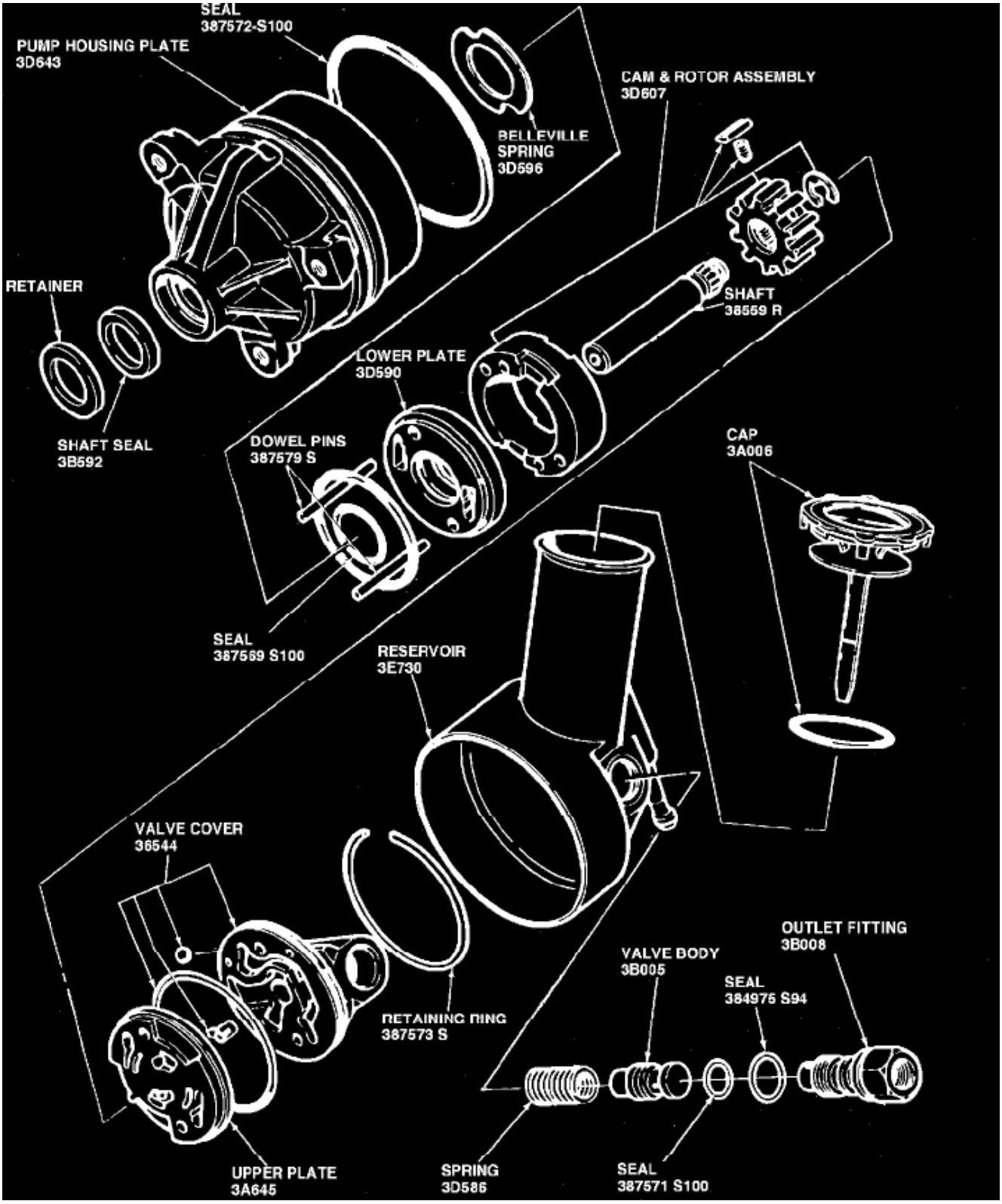
9. Loosen C-clamp and remove upper compressor plate T78P-3733-A2, then remove pump assembly.

10. Remove pump valve cover and O-ring.

11. Remove rotor shaft, upper plate, cam and rotor assembly and two dowel pins.

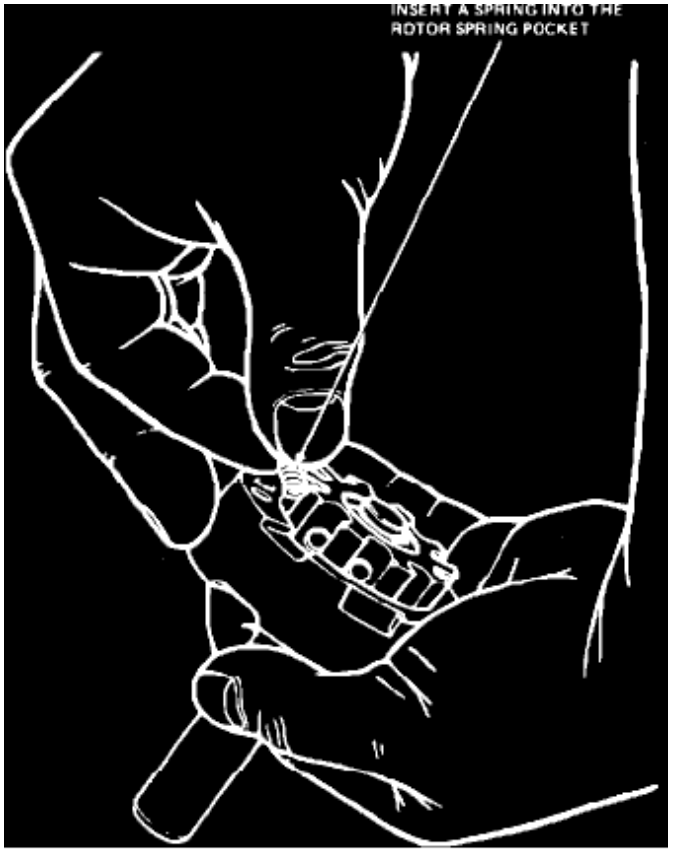
12. Remove lower plate and spring, by tapping housing on a flat surface.

13. Using a suitable screwdriver, remove rotor shaft seal.



Power Steering Pump: Service and Repair Assembly

Fig. 1 Exploded view of Ford Model CII power steering pump


INSERT A SPRING INTO THE
ROTOR SPRING POCKET


USE ONE OF THE SLIPPERS
TO COMPRESS THE SPRING
AND INSTALL THE SLIPPER

Fig. 4 Installing Slipper Springs

Fig. 5 Installing Slippers

1. Position rotor on rotor shaft splines with triangle detent on rotor counter bore facing upward.

2. Install snap ring into groove on end of rotor shaft, Fig. 1.

3. Position insert cam over rotor. Ensure recessed notch on insert cam is facing upward.

4. With rotor extended upward approximately half out of cam, insert spring into rotor picket, Fig. 4.

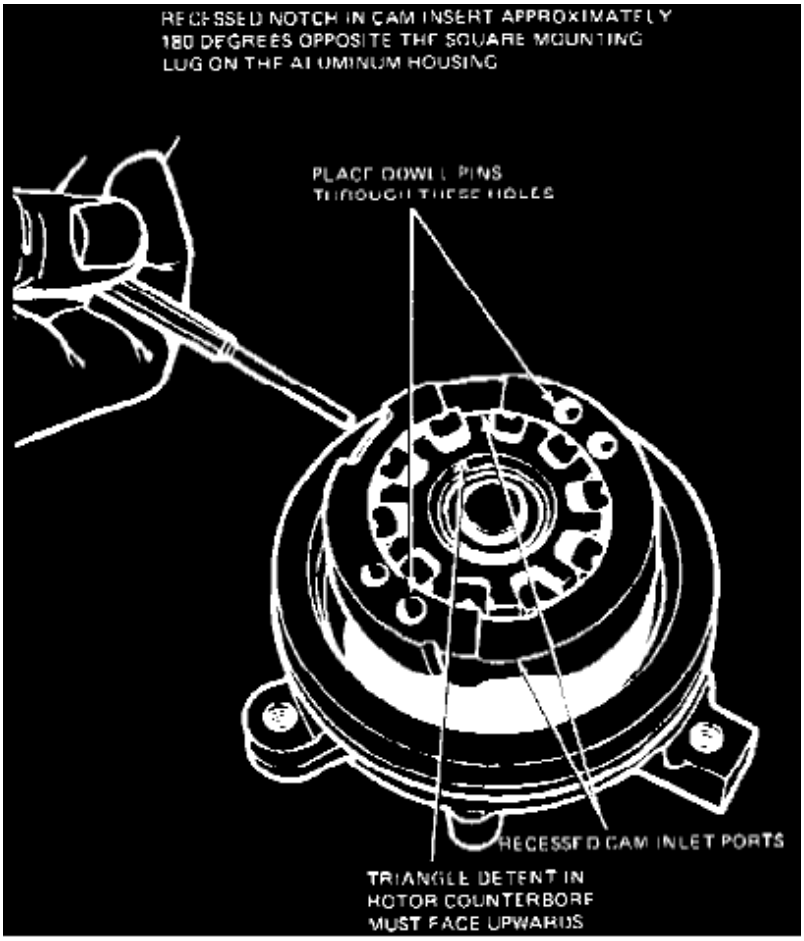
5. Use a slipper to compress spring, then install slipper with groove facing cam, Fig. 5.

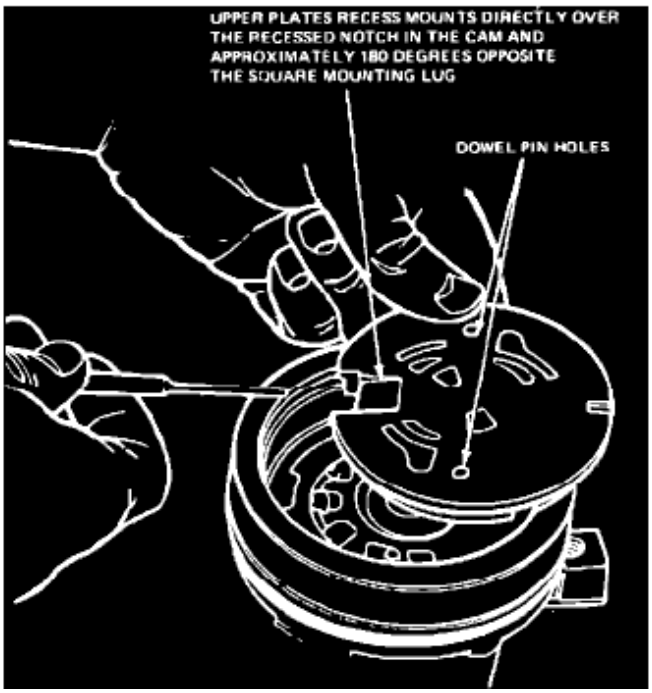
6. Perform steps 4 and 5 on slipper cavity beneath opposite inlet recess.

7. While holding cam stationary, index rotor left or right one space and install another spring and slipper until all ten rotor cavities have been filled. Ensure rotor springs and slippers remain in position while turning.

8. Apply Loctite No. 242 or 271 adhesive or equivalent to outside diameter of seal and Lockquick NF or T primer or equivalent to seal bore in housing. Install rotor shaft seal using tool No. T78P-3733-A3. Using a plastic mallet, drive seal into bore until properly seated.

9. Position pump plate on flat surface with pulley side facing downward.


RECESSED NOTCH IN CAM INSERT APPROXIMATELY
180 DEGREES OPPOSITE THE SQUARE MOUNTING
LUG ON THE ALUMINUM HOUSING
PLACE DOWEL PINS
THROUGH THESE HOLES
RECESSED CAM INLET PORTS
TRIANGLE DETENT IN
ROTOR COUNTERBORE
MUST FACE UPWARDS


UPPER PLATES RECESS MOUNTS DIRECTLY OVER
THE RECESSED NOTCH IN THE CAM AND
APPROXIMATELY 180 DEGREES OPPOSITE
THE SQUARE MOUNTING LUG
DOWEL PIN HOLES

10. Install two dowel pins and spring into housing. Spring must be inserted with dished surface facing upward.

11. Lubricate inner and outer O-ring seals with power steering fluid, then install seals on lower pressure plate.

12. Install lower pressure plate into housing and over dowel pin with O-ring seals facing toward front of pump. Position assembly on C-clamp. Place tool No. T78P-3733-A3 into rotor shaft hole and press on lower plate lightly until it bottoms in pump housing. This will seat the outer O-ring seal.

Upper Pressure Plate Installation

Fig. 8 Installing Valve Cover



Fig. 6 Assembling Cam, Slippers And Rotor

13. Install cam, rotor, rotor and slippers and rotor shaft assembly into pump housing over dowel pins. When installing assembly into pump housing,stepped holes must be used for dowel pins and notch in cam insert must be toward reservoir and approximately 180 degrees opposite square mounting lug on housing, Fig. 6.

14. Position upper pressure plate over dowel pins with recess directly over recessed notch on cam insert and approximately 180 degrees opposite square mounting lug, Fig. 7.

15. Lubricate O-ring seal with power steering fluid. Then, position O-ring on valve cover. Ensure plastic baffle is securely in position on valve cover. A coat of petroleum jelly may be used to hold baffle in position.

16. Insert valve cover over dowel pins. Ensure outlet fitting hole in valve cover is aligned with square mounting lug on housing, Fig. 8.

17. Place assembly in C-clamp and compress valve cover into pump housing until snap ring groove on housing is exposed.

18. Install valve cover snap ring in pump housing. Ensure snap ring ends are near access hole in pump housing.

19. Remove pump assembly from C-clamp.

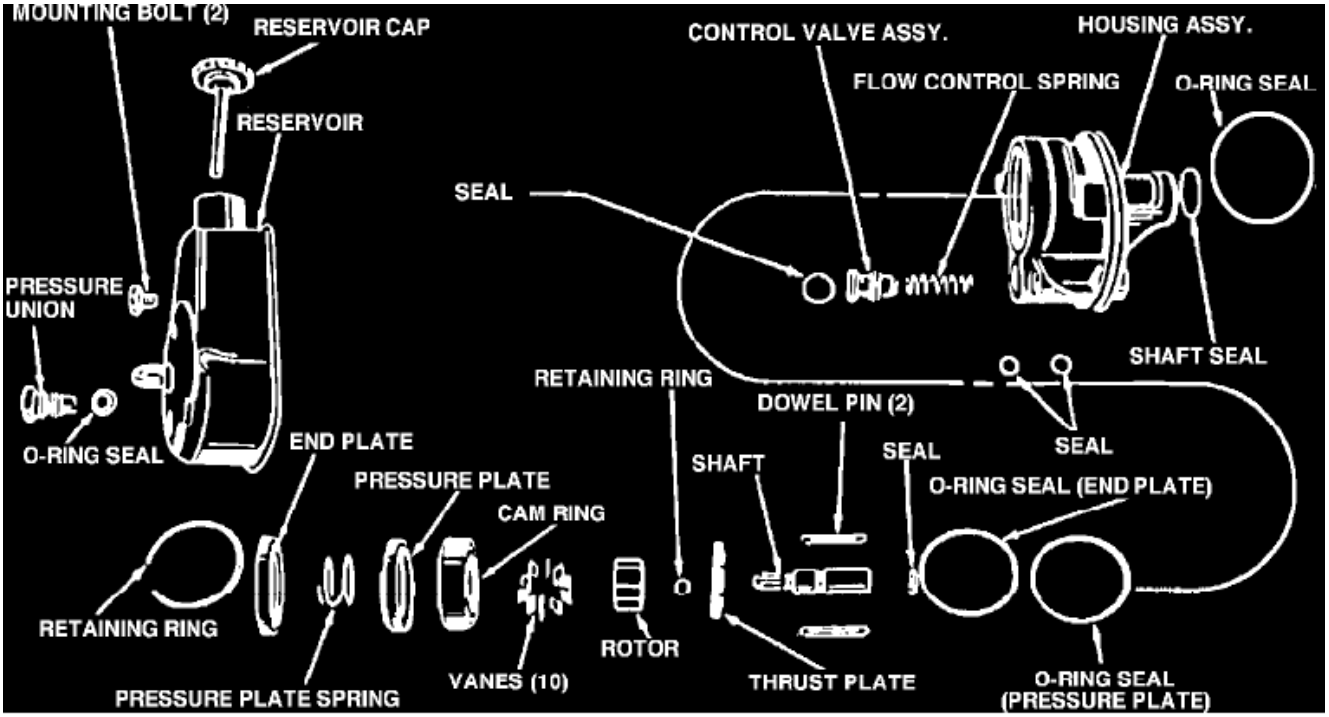
20. Lubricate O-ring seal with power steering fluid, then place seal on pump housing.

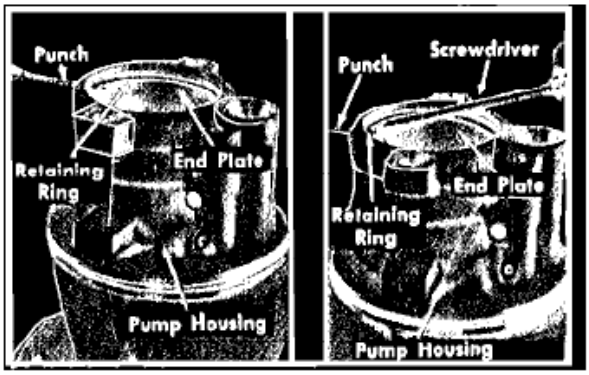
21. Install reservoir on pump housing.

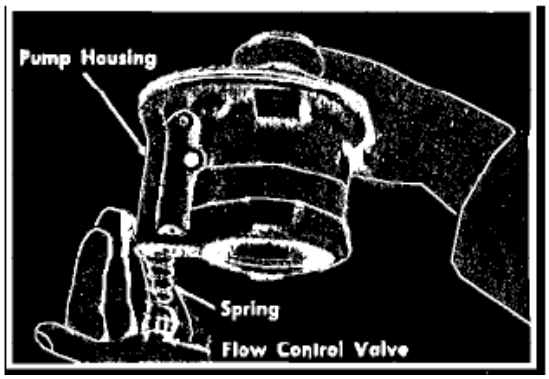
22. Install flow control valve and spring into valve cover.

23. Lubricate O-ring seals with power steering fluid, then place seals on outlet fitting.

24. Install outlet fitting on valve cover. Torque outlet fitting to 25---34 ft. lbs. Use care not to cock flow control valve when installing. Do not force valve forward otherwise damage to housing may result.







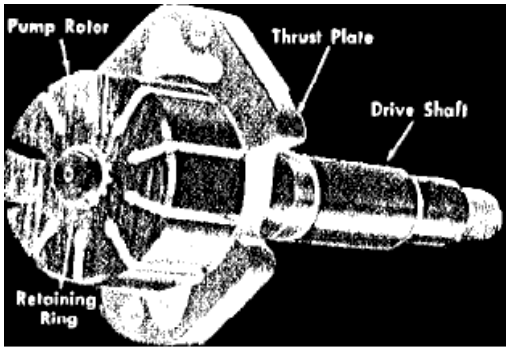
Power Steering Pump: Service and Repair Vane Type Pump W/ Integral Reservoir

Disassembly

Fig. 1 Vane type power steering pump w/integral reservoir disassembled (typical)

Fig. 2 Removing end plate retaining ring

Fig. 3 Removing flow control valve & spring


Pump Rotor
Thrust Plate
Drive Shaft
Retaining Ring

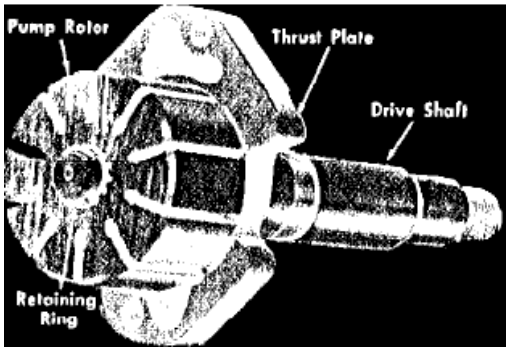

Pump Rotor
Thrust Plate
Drive Shaft
Retaining Ring

Fig. 4 Thrust plate & rotor installed on driveshaft

1. Referring to Fig. 1, carefully mount pump in vise with soft jaws and remove reservoir cap. When clamping pump in vise, do not exert excessive force on front hub as this may distort drive shaft bushing in housing.

2. Remove rear pump mounting stud and O-ring seal, pressure union and O-ring seal.

3. Remove reservoir, and second pressure union O-ring seal.

4. Using a small punch, depress end plate retaining ring enough to allow removal from groove. Use the {1/8} inch diameter hole in housing, Fig. 2. Then remove retaining ring with screwdriver.

5. Remove end plate which is spring loaded and usually sits above housing level. If end plate sticks, a slight rocking action should free it. If rocking action fails to free plate, use a magnet.

6. Remove two pressure springs from pump housing.

7. Remove flow control valve and spring by inverting housing. Do not disassemble flow control valve as it is serviced as a unit and pre-set at the factory, Fig. 3.

8. Remove drive shaft key from slot in shaft. Then with end of shaft pointed downward, press down until shaft is free.

9. Turn assembly over and remove drive shaft and rotary group.

10. Remove rotor retaining ring from groove in drive shaft. Remove rotor and thrust plate from shaft, Fig. 4.

11. Remove and discard O-ring seals from pump housing. Remove driveshaft oil seal only if inspection shows necessity for replacement.

Inspection

1. Clean all parts except the drive shaft oil seal in cleaning fluid. The seal will be damaged if immersed in cleaning fluid.

2. Check fit of vanes in slots of rotor for tightness or excessive looseness. Vanes must fit snugly but slide freely in slots in rotor. Tight fit of vanes in rotor can usually be corrected by thorough cleaning. Replace rotor if excessive looseness exists between rotor and vanes. Replace vanes if worn or scored.

3. Examine machined surfaces of pump ring for roughness or wear. Replace ring if roughness cannot be corrected with crocus cloth.

4. Inspect thrust plate, pressure plate and end plate for wear, scores or other damage.

5. Inspect pump housing for cracks or damage. Check housing for evidence of wear or scoring.

6. Check all springs for free length, distortion or collapsed coils.

7. Inspect located dowel pins for distortion.

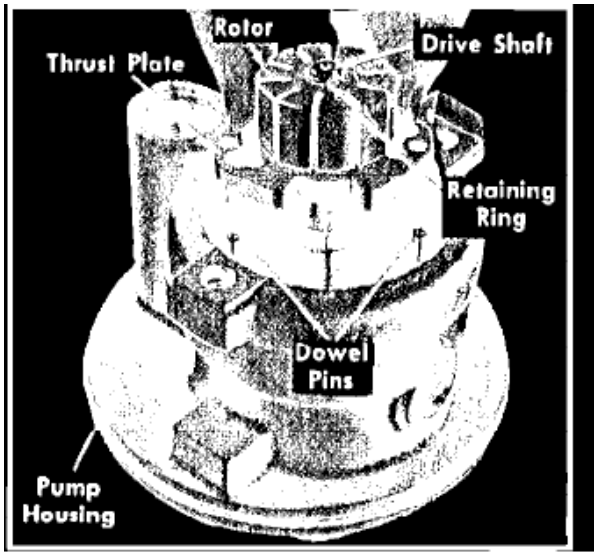
8. Examine outer diameter of flow control valve for scoring or roughness. Slight damage may be cleaned up with crocus cloth. Check valve assembly for freedom of movement in bore of pump housing.

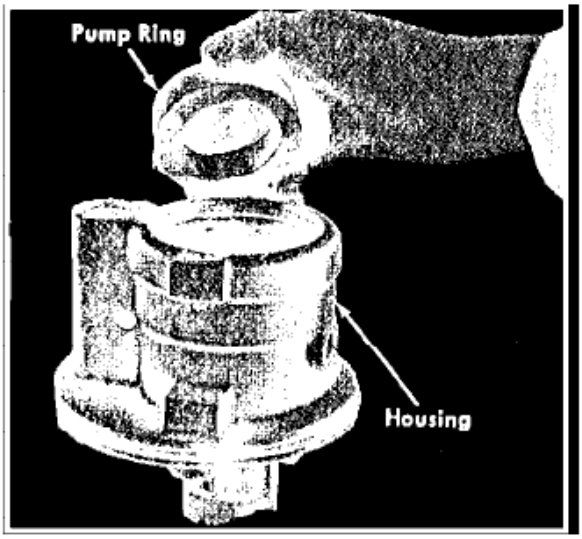
9. Check all oil passages in pump parts for obstruction. Use a piece of tag wire to clean out holes.

10. Check bushing in pump housing for wear or damage.

Assembly

Fig. 4 Thrust plate & rotor installed on driveshaft


Rotor
Drive Shaft
Thrust Plate
Retaining Ring
Dowel Pins
Pump Housing


Pump Ring
Housing

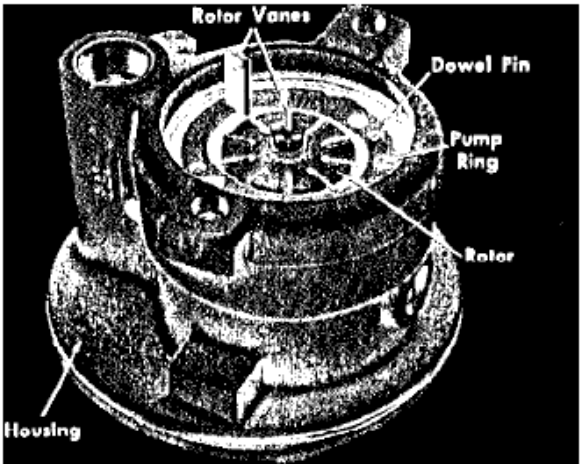

Rotor Vanes
Dowel Pin
Pump Ring
Rotor
Housing

Fig. 5 Installing driveshaft assembly

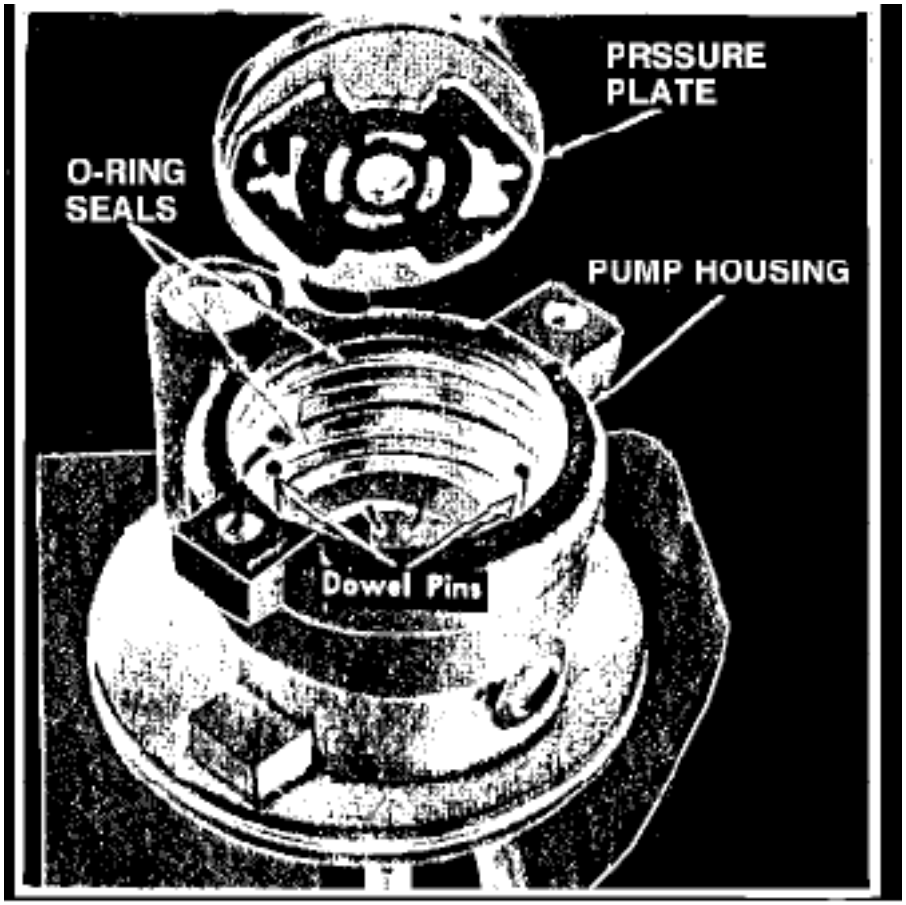
Fig. 6 Installing pump ring

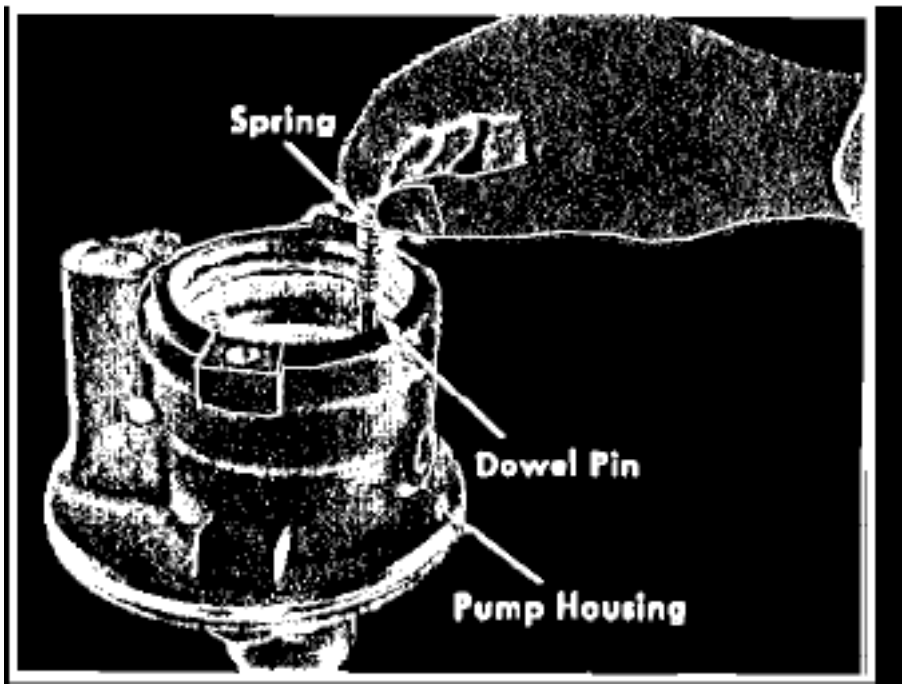
Fig. 7 Installing rotor vanes

1. Lubricate new O-ring seals with Vaseline and place in pump housing.

2. If drive shaft oil seal was removed during disassembly, lubricate new seal with Vaseline. Then install seal in pump body front hub, using a suitable seal driver.

3. Position thrust plate and rotor on drive shaft. Then install rotor retaining ring in groove of drive shaft, Fig. 4.


PRSSURE PLATE
O-RING SEALS
PUMP HOUSING
Dowel Pins


Spring
Dowel Pin
Pump Housing

4. Place pump housing on work bench as shown in Fig. 5 and install two pump ring dowel pins in bore of housing.

5. Install drive shaft in housing, making sure shaft seats properly.

6. Install pump ring in housing over two dowel pins with rotation arrow on ring to rear of pump housing, Fig. 6.Arrow on outer edge of pump ring points in direction of pump rotation (counterclockwise when viewed from rear of pump).

7. Install rotor vanes in slots of pump rotor, with radius edge of vanes toward outside of rotor, Fig. 7.

Fig. 8 Installing pressure plate

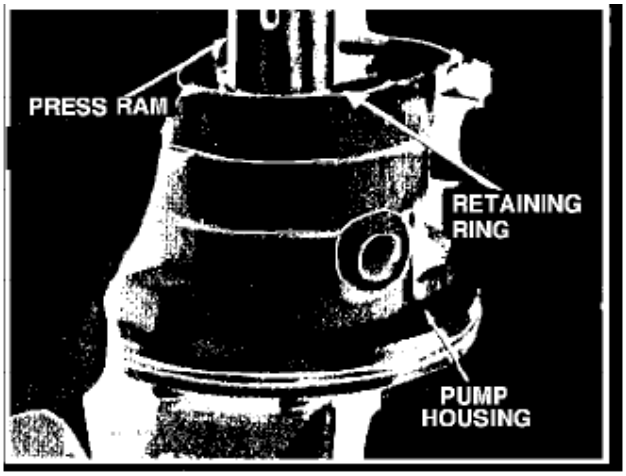
Fig. 9 Installing pressure plate springs

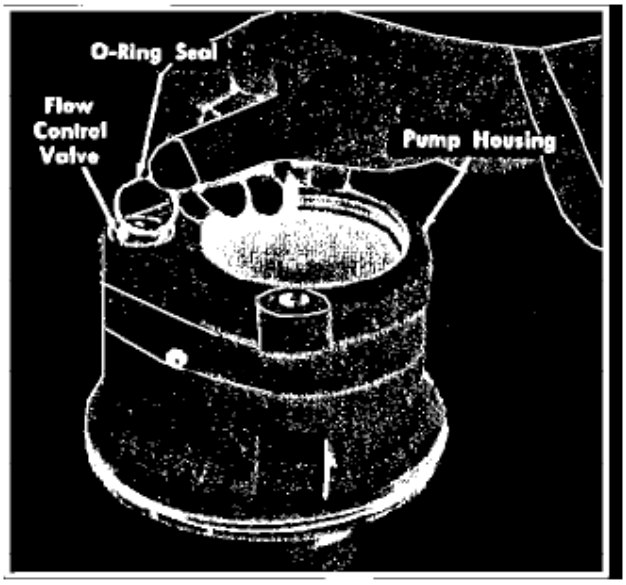
8. Position pump housing on two wood blocks and push parts down into place as shown in Fig. 8.

9. Lubricate outside diameter and chamfer of pressure plate with Vaseline to insure against damage to O-ring seals in housing. Then install pressure plate in housing over dowel pins.Ported face of pressure plate goes toward pump ring, Fig. 8.

10. Using a 2{3/4} inch diameter sleeve to apply pressure to outer edge of pressure plate only, press pressure plate into seat. Pressure plate will travel about {1/16} inch to seat. Do not press or hammer on center of pressure plate as to do so will cause permanent distortion resulting in pump failure.

11. Install two pressure plate springs, one over each dowel pin in pump housing, Fig. 9.


PRESS RAM
RETAINING RING
PUMP HOUSING


O-Ring Seal
Flow Control Valve
Pump Housing

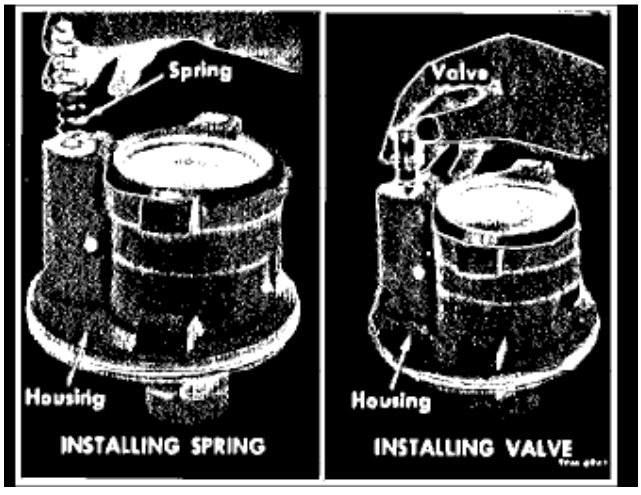

Spring
Housing
INSTALLING SPRING
Valve
Housing
INSTALLING VALVE

Fig. 10 Installing end plate & retaining ring

Fig. 11 Installing flow control valve & spring

Fig. 12 Installing pressure union O-ring seal

12. Lubricate outside diameter and chamfer of end plate with Vaseline to insure against damage to O-ring seal in housing. Then press end plate into housing. While holding end plate down in housing, install end plate retaining ring. Be sure end plate is completely and solidly seated in groove of housing, Fig. 10.

13. Remove assembly from press and place on work bench. Install flow control spring and valve in bore of housing. Make sure hex head screw goes into housing bore, Fig. 11.

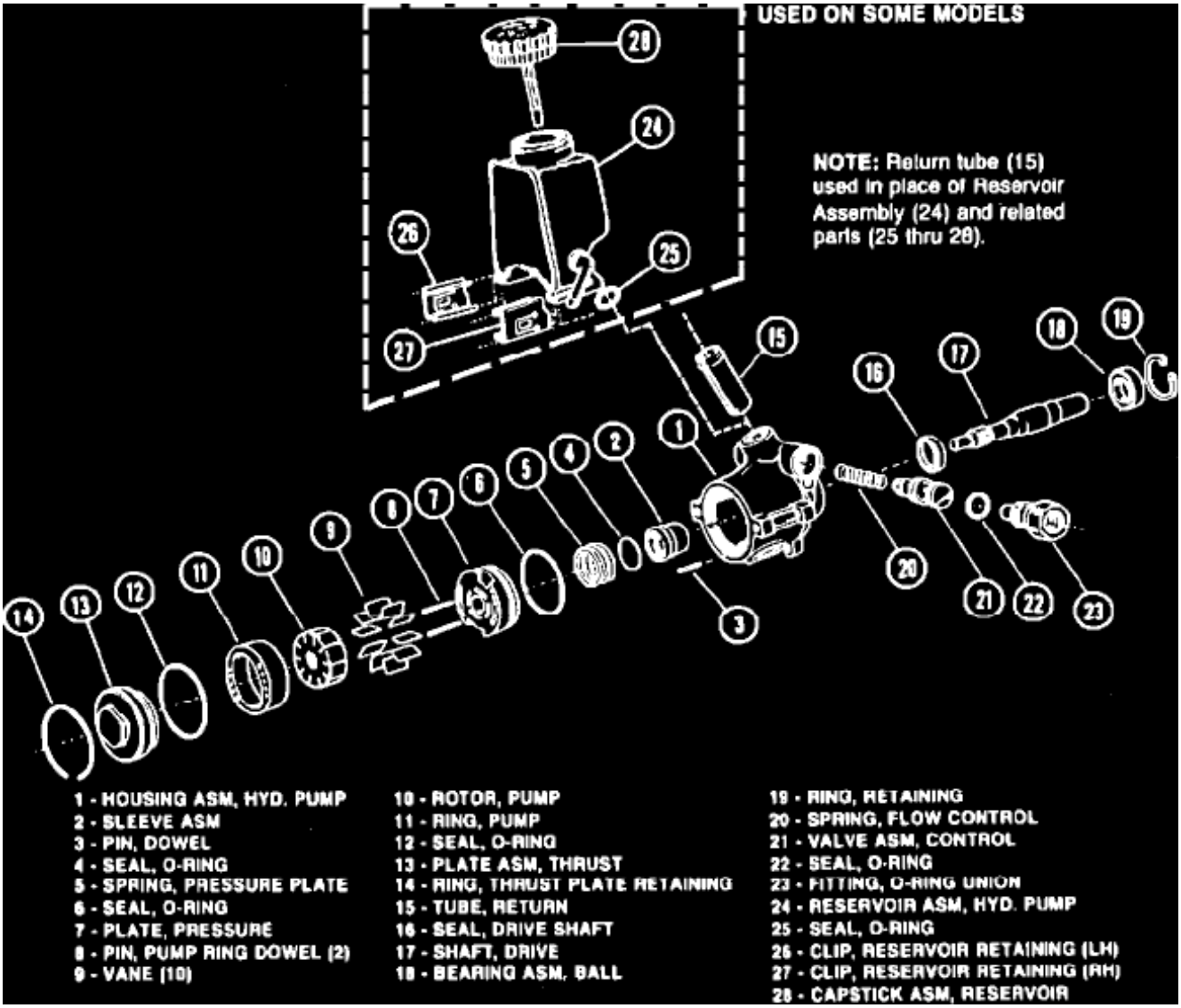
14. Position pressure union O-ring seal in bore of housing over flow control valve, Fig. 12.

15. Mount pump housing in vise with soft jaws and install reservoir.

16. Install pressure union and new O-ring seal in reservoir. Tighten union.

17. Install mounting stud and new O-ring seal in reservoir. Tighten stud.

18. Install drive shaft key in slot in shaft. Support shaft on opposite side while installing key. Install reservoir cap.



Power Steering Pump: Service and Repair Vane Type Pump, Less Integral Reservoir

Fig. 1 Vane type power steering pump, less integral reservoir disassembled

REMOVE AND INSTALL RETURN TUBE

REMOVE

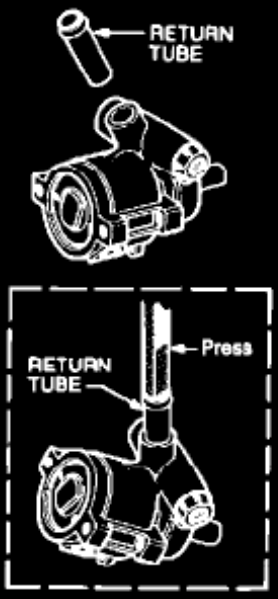
1. Plug return tube to prevent chips from entering pump.
2. Use tap, washers and nut to remove damaged return tube.

INSTALL

1. Using Loctite Solvent 75559 and Loctite 290 Adhesive, or equivalent, coat end of the new return tube.
2. Using a press, press tube into housing until bottomed.



Remove return tube



Install return tube

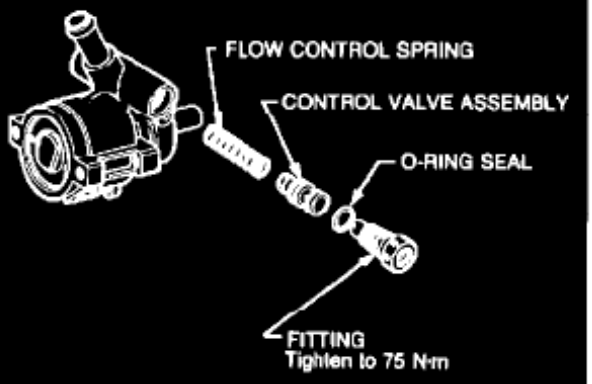
REMOVE AND INSTALL CONTROL VALVE ASSEMBLY

REMOVE

1. Remove parts as shown.

INSTALL

1. Install parts as shown.
2. Tighten to specifications.



REMOVE AND INSTALL DRIVE SHAFT AND OR BALL BEARING ASSEMBLY

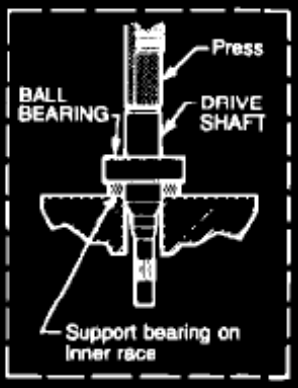
REMOVE

1. Remove retaining ring with suitable snap ring pliers.
2. Remove drive shaft and bearing assembly from housing.
3. Refer to inset for bearing removal.

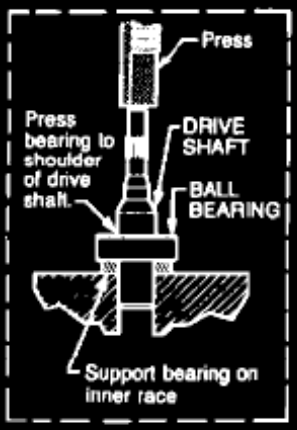
INSTALL

1. See inset for installation of bearing on drive shaft.
2. Slide assembly into housing while rotating drive shaft so shaft serrations engage with rotor.
3. Bottom bearing in housing.
4. Install retaining ring with beveled side outward.





Remove bearing



Install bearing



Install retaining ring

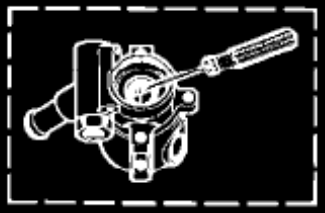
REMOVE AND INSTALL DRIVE SHAFT SEAL

REMOVE

1. Using a screwdriver, pry seal from housing.

INSTALL

1. Using suitable socket, press seal into housing until bottomed.



Seal removal

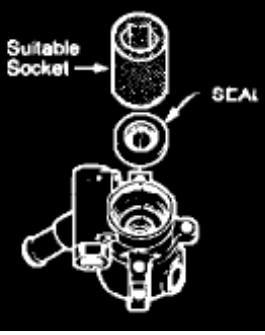
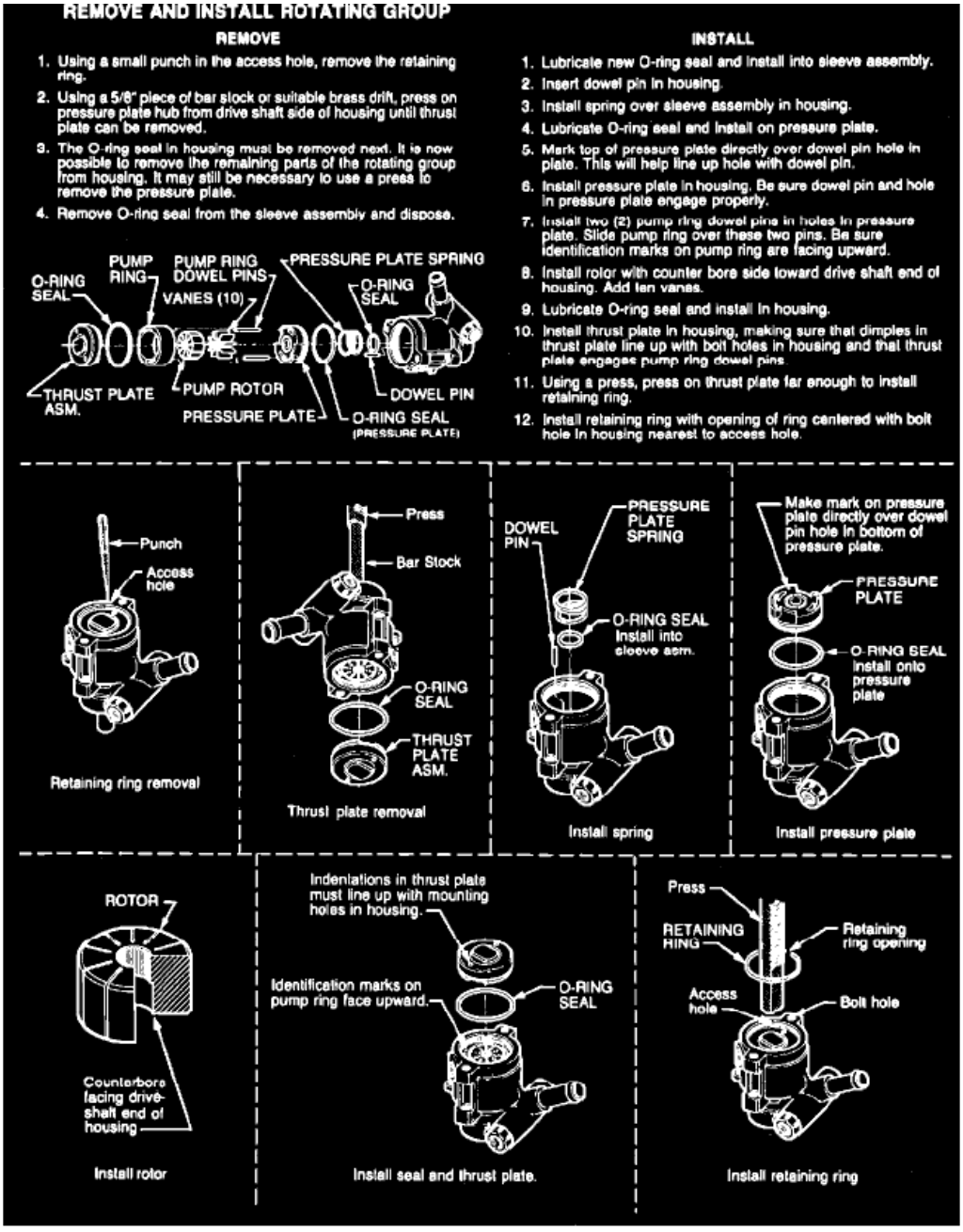


Fig. 2 Removal & installation of return tube, control valve, driveshaft, ball bearing assembly & driveshaft seal


REMOVE AND INSTALL ROTATING GROUP
REMOVE
1. Using a small punch in the access hole, remove the retaining ring.
2. Using a 5/8" piece of bar stock or suitable brass drift, press on pressure plate hub from drive shaft side of housing until thrust plate can be removed.
3. The O-ring seal in housing must be removed next. It is now possible to remove the remaining parts of the rotating group from housing. It may still be necessary to use a press to remove the pressure plate.
4. Remove O-ring seal from the sleeve assembly and dispose.
INSTALL
1. Lubricate new O-ring seal and install into sleeve assembly.
2. Insert dowel pin in housing.
3. Install spring over sleeve assembly in housing.
4. Lubricate O-ring seal and install on pressure plate.
5. Mark top of pressure plate directly over dowel pin hole in plate. This will help line up hole with dowel pin.
6. Install pressure plate in housing. Be sure dowel pin and hole in pressure plate engage properly.
7. Install two (2) pump ring dowel pins in holes in pressure plate. Slide pump ring over these two pins. Be sure identification marks on pump ring are facing upward.
8. Install rotor with counter bore side toward drive shaft end of housing. Add ten vanes.
9. Lubricate O-ring seal and install in housing.
10. Install thrust plate in housing, making sure that dimples in thrust plate line up with bolt holes in housing and that thrust plate engages pump ring dowel pins.
11. Using a press, press on thrust plate far enough to install retaining ring.
12. Install retaining ring with opening of ring centered with bolt hole in housing nearest to access hole.
O-RING SEAL
PUMP RING
PUMP RING DOWEL PINS
VANES (10)
PRESSURE PLATE SPRING
O-RING SEAL
THRUST PLATE ASM.
PUMP ROTOR
PRESSURE PLATE
DOWEL PIN
O-RING SEAL (PRESSURE PLATE)
Punch
Access hole
Retaining ring removal
Press
Bar Stock
O-RING SEAL
THRUST PLATE ASM.
Thrust plate removal
DOWEL PIN
PRESSURE PLATE SPRING
O-RING SEAL Install into sleeve asm.
Install spring
Make mark on pressure plate directly over dowel pin hole in bottom of pressure plate.
PRESSURE PLATE
O-RING SEAL Install onto pressure plate
Install pressure plate
ROTOR
Counterbore facing drive-shaft end of housing
Install rotor
Indentations in thrust plate must line up with mounting holes in housing.
Identification marks on pump ring face upward.
O-RING SEAL
Install seal and thrust plate.
Press
RETAINING RING
Retaining ring opening
Access hole
Bolt hole
Install retaining ring

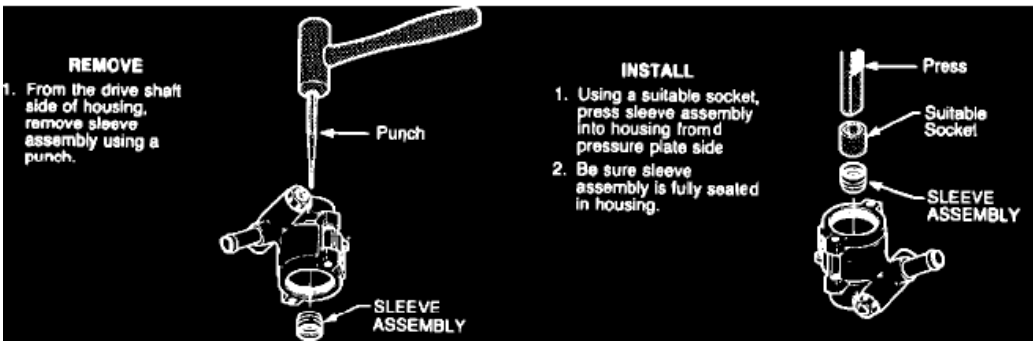

REMOVE
1. From the drive shaft side of housing, remove sleeve assembly using a punch.
Punch
SLEEVE ASSEMBLY
INSTALL
1. Using a suitable socket, press sleeve assembly into housing from d pressure plate side
2. Be sure sleeve assembly is fully seated in housing.
Press
Suitable Socket
SLEEVE ASSEMBLY

Fig. 3 Removal & installation of rotating group

Fig. 4 Removal & installation of sleeve assembly

Steering Column: Service Precautions

When the steering column is installed in the vehicle it is not susceptible to damage through ordinary use; however, when it is removed, care must be taken during handling. Such actions as a sharp blow on the end of the steering shaft or shift levers, leaning on the column assembly or dropping of the assembly could loosen or shear the plastic shear joints or rivets used to maintain column rigidity. Hammering, jolting or bumping on the steering shaft and gearshift tube must be avoided during all service operations. If the shear pins are broken, the controlled length of the telescoping design will be altered making these components unfit for further service. When removing the steering wheel, only a steering wheel puller designed for this purpose must be used. It is important that only the specified screws, bolts and nuts be used during the assembly procedure and torqued to specifications to insure proper breakaway action of the column under impact. Avoid using excessively long bolts or fasteners as they may prevent a portion of the steering column from collapsing. When replacing fasteners, replace with ones of the same part number or equivalent. When removing or installing the steering wheel, ignition switch, lock cylinder, turn signal switch, neutral start switch, back-up light switch or adjusting column shift manual transmission linkage refer to the appropriate vehicle chapter.

Steering Column: Description and Operation

ENERGY ABSORBING STEERING COLUMNS The energy absorbing function of the steering column allows the column to collapse at a controlled rate during a severe collision. The collapsing action reduces the possibility of the steering wheel being driven rearward towards the driver. If the driver is thrown forward into the steering wheel, the column can collapse even further at the same controlled rate, thereby reducing the force of impact. Several designs of steering column jackets are used. There is the slip-tube design which is held together with plastic inserts or rivets that shear upon impact and allow the column to collapse. And there is the slotted or corrugated mesh design and bellows type design which shorten in length during impact. The shift tube is a two piece design which is held together by injections of plastic that form the interconnecting inserts and shear pins. Under impact, there is a gradual paring away of the inserts by the knife-like edge in the adjoining tube section. The steering shaft is a two piece assembly. The upper piece is solid and has a double flattened lower end. The lower piece is hollow and formed to fit over the double flattened section of the upper piece. The purpose of the double flattened section is to provide continued steering action even though the shaft is completely collapsed. Upon impact, the shear pins break off and the shaft gradually telescopes against resistance provided by the plastic injections. The steering column mounting bracket prevents the column from being shifted towards the driver during impact. It uses two ``breakaway capsules'' that allow the mounting bracket to slip off its attaching points, allowing the steering column to compress or yield in a forward direction under a severe impact from the driver's end.

Steering Column: Service and Repair Removal and Installation

1980-87 BRONCO & F100-350 SERIES

Removal

1. Apply parking brake and disconnect battery ground cable.

2. Remove bolt and nut attaching intermediate shaft to steering column.

3. Disconnect shift linkage rod(s) from column.

4. Remove screws from underneath steering wheel, then lift horn switch assembly from steering wheel.

5. Disconnect horn switch wires by pulling spade terminal from blade connectors, then squeeze J-clip ground wire terminal and pull it out of hole in steering wheel.

6. Remove horn switch assembly, then the steering wheel retaining nut.

7. Using suitable puller, remove steering wheel from shaft. When servicing a tilt steering column, the steering wheel must be in the full ``UP''

position when removed.

8. Remove steering column floor opening cover plate screws.

9. Remove shroud by loosening screw at bottom, selecting position ``1'' on manual 3 speeds and automatics and spreading shroud open, and withdrawing out of instrument panel opening while pulling up and away from column.

10. On vehicles with automatic transmission, remove shift lever cable.

11. Remove instrument panel column opening cover.

12. Remove column support bracket to pedal support bracket attaching bolts.

13. Disconnect turn signal/hazard warning and ignition switch wiring harnesses.

14. Remove column from vehicle, then the column support bracket from column.

Installation

1. Attach steering column support bracket, ensuring that turn signal/hazard warning wiring is on outboard side of column, torquing nuts to 13-38 ft. lbs.

2. Hand start floor opening cover plate clamp bolt and press plate until clamp flats abut stops on column outer tube.

3. Load column into vehicle through opening in floor.

4. Connect turn signal/hazard warning and ignition switch wiring harnesses.

5. Raise column to pedal support bracket and hand start two bolts.

6. Fasten floor opening cover plate to floor, torquing screws to 6-10 ft. lbs.

7. Torque two support bracket bolts to 19-27 ft. lbs. and the cover plate clamp bolt to 8-18 ft. lbs.

8. On vehicles with automatic transmission, install and adjust shift lever cable.

9. Install instrument panel steering column opening cover.

10. Mount shroud by selecting position ``1'' on 3 speed manuals and automatics, spreading shroud around steering column and through opening in instrument panel. Post on interior will index shroud when properly positioned.

11. Torque screw at bottom of shroud to 10-15 inch lbs.

12. Attach shift linkage rod(s) to column.

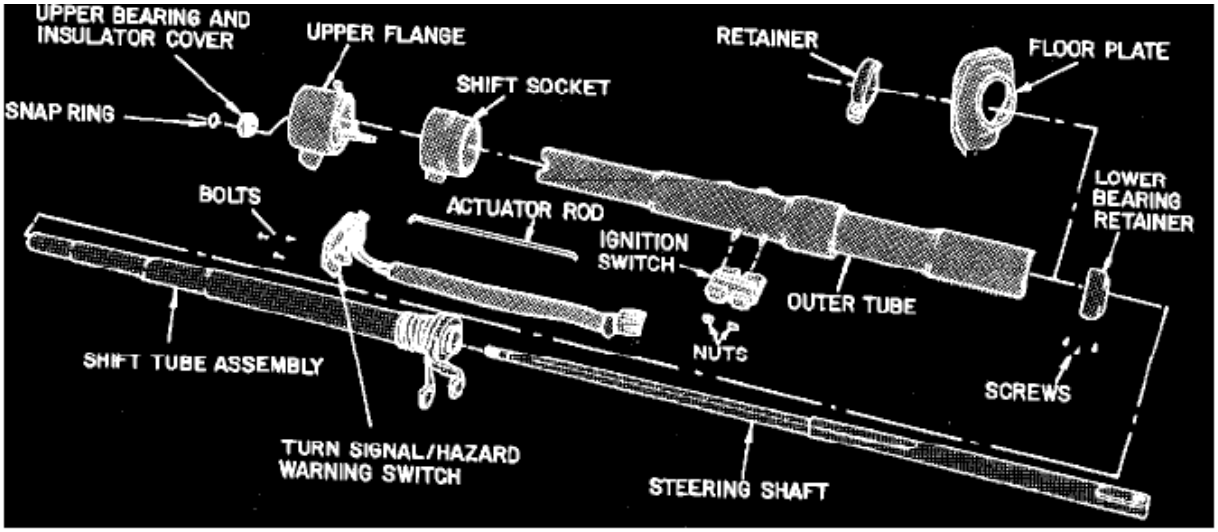
13. Connect intermediate shaft to steering column, torquing bolts to 45-59 ft. lbs. on 1980-85 models and 35-50 ft. lbs. on 1986-87 models

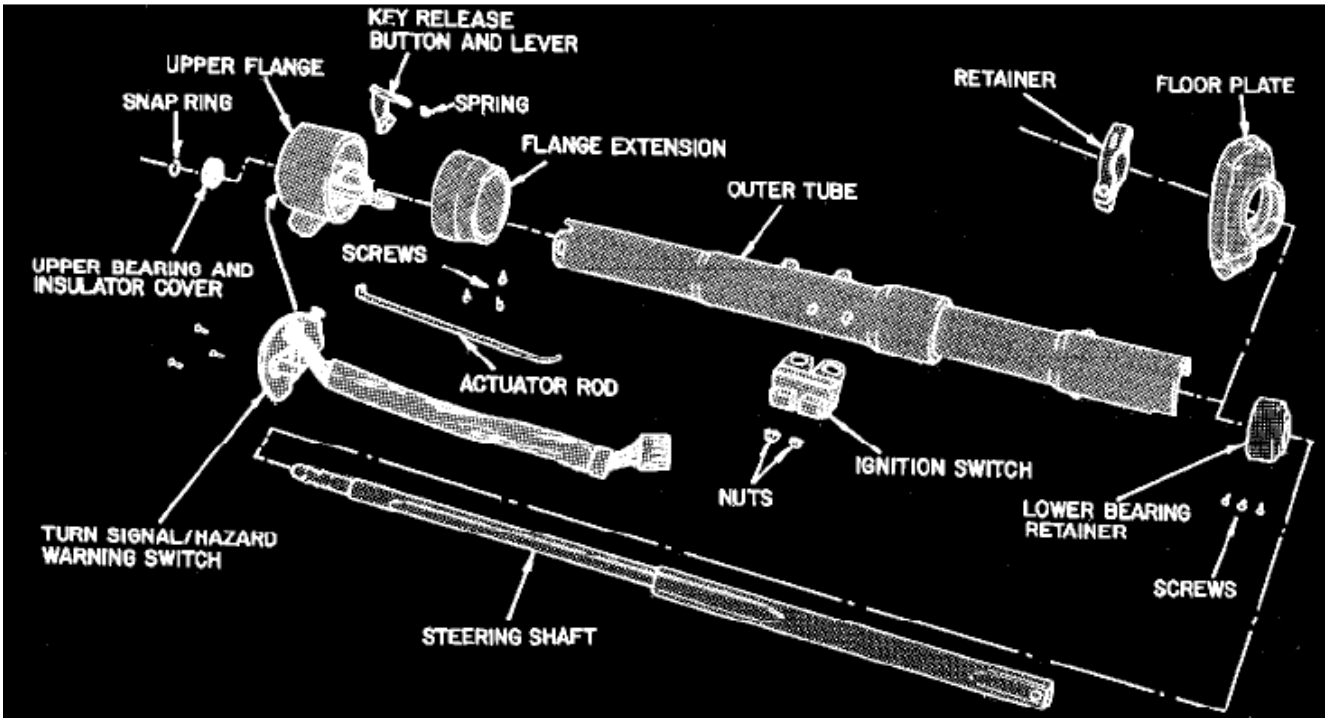
14. Position steering wheel into place with retaining nut, then torque nut to 30-40 ft. lbs.

15. Connect spade terminal of horn switch wire to blade connector and press J-clip ground terminal fully into threaded hole.

16. Center horn switch on steering wheel and install attaching screws.

17. Connect battery ground cable.





Steering Column: Service and Repair Disassembly

Non-Tilt Column

Fig. 1 Exploded view of non-tilt steering column. 1980---87 Bronco & F100-350 Series w/3 speed man. trans.

Fig. 2 Exploded view of non-tilt steering column. 1980---87 Bronco & F100-350 Series w/4 speed man. trans.

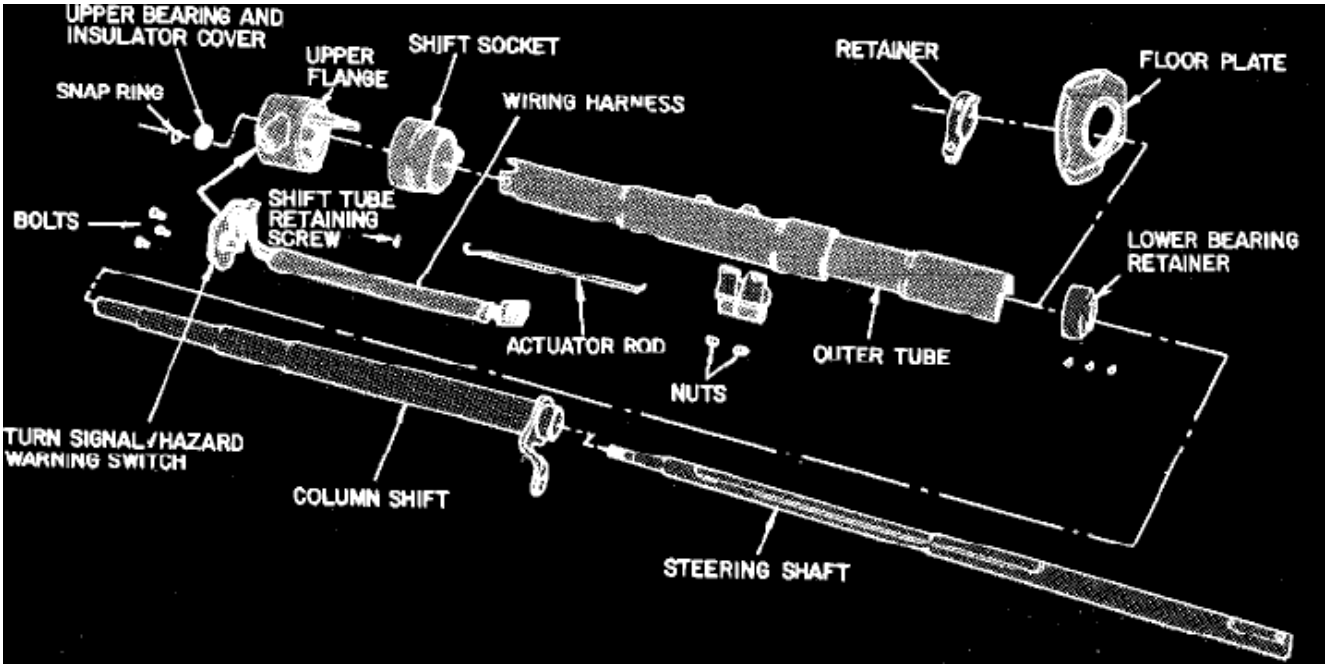


Fig. 3 Exploded view of non-tilt steering column. 1980---87 Bronco & F100-350 Series w/auto. trans.

1. Remove turn signal lever.

2. On vehicles equipped with 3 speed manual or automatic transmission, drive out pivot pin and remove hand shift lever.

3. Partially withdraw turn signal/hazard warning switch, and key warning buzzer terminal if equipped, from upper flange, Figs. 1, 2 and 3.

4. Remove snap ring from upper steering shaft.

5. Remove lower bearing retainer from bottom of steering column.

6. Using suitable tool, gently tap steering shaft out of bottom of steering column. Harsh impacts at either end of shaft may alter shaft in overall length, adversely affecting assembly.

7. On 1982 vehicles equipped with automatic transmission, remove shift tube retaining screw from bottom of shift socket.

8. On 1983-87 vehicles equipped with automatic transmission, drill out shift tube retaining rivet from bottom of shift socket.

9. On vehicles equipped with 3 speed manual or automatic transmission, withdraw shift tube assembly from bottom of column.

10. On all vehicles, clip ignition switch in lock position and remove ignition switch and actuator rod.

11. On E100-350 equipped with automatic transmission, remove PRNDL21 hood and lens assembly.

12. On all vehicles, loosen upper flange retaining nuts until only 1 or 2 threads remain engaged, then pinch nuts toward each other and withdraw upper flange from outer tube.

13. On vehicles equipped with 3 speed manual or automatic transmission, remove shift socket from outer tube.

14. On vehicles equipped with 4 speed manual transmission, remove flange extension from outer tube.

15. Remove upper bearing and insulator cover from upper flange by gently tapping from opposite side.

16. Remove flange retaining bolts and nuts.

17. On vehicles with manual transmission, remove snap ring from lock release lever assembly.

18. On vehicles equipped with manual transmission, remove lock release lever assembly through hole on front of flange and remove spring from assembly.

19. On vehicles equipped with automatic transmission, remove PRNDL21 insert from front of flange.

20. On all vehicles, place lock cylinder in ``Run'' position and remove retaining pin, then remove lock cylinder from flange.

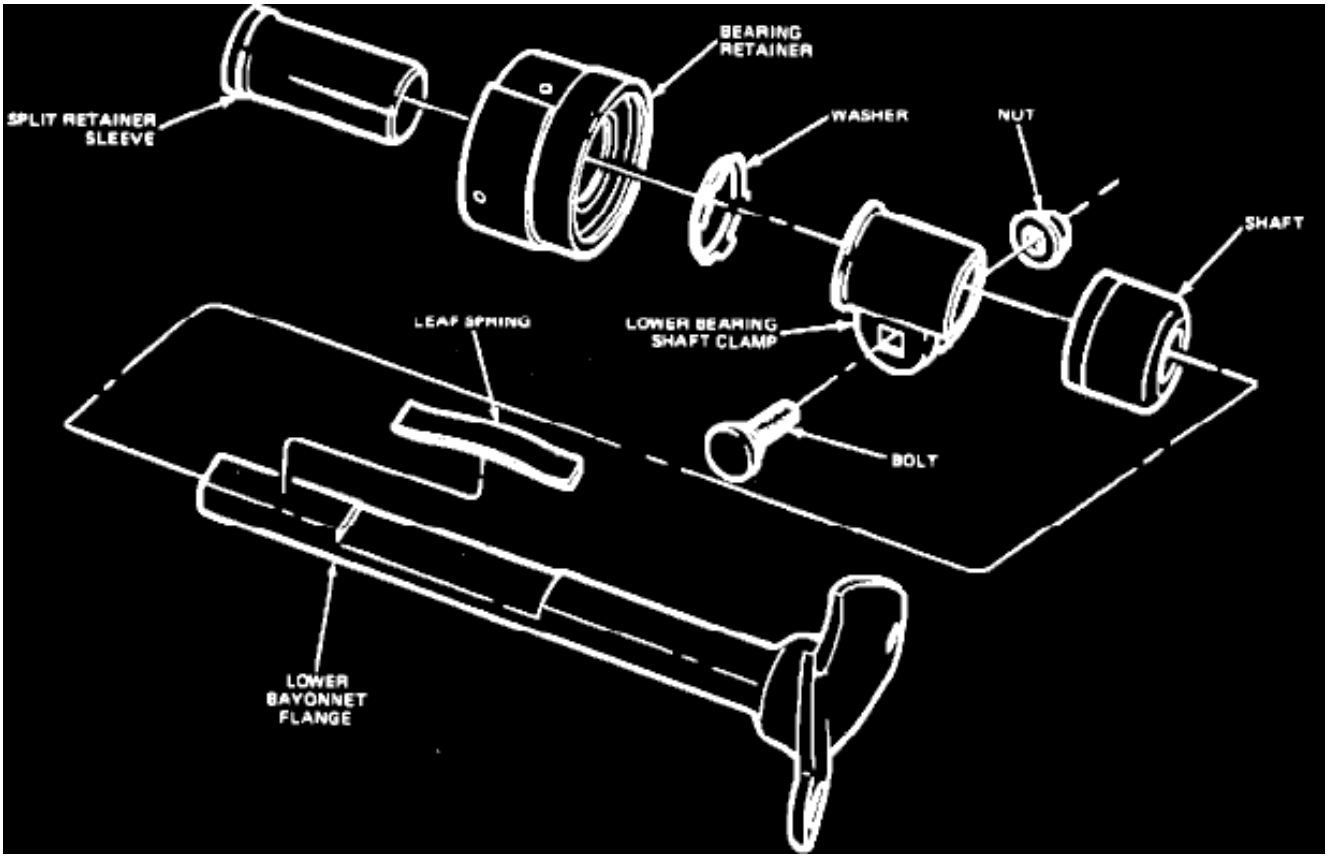


Fig. 11 Lower Bearing Retainer

21. Remove lock bearing snap ring, then the lock bearing.

22. Remove lock drive gear through lock cylinder opening, then the lock actuator assembly and lock actuator insert.

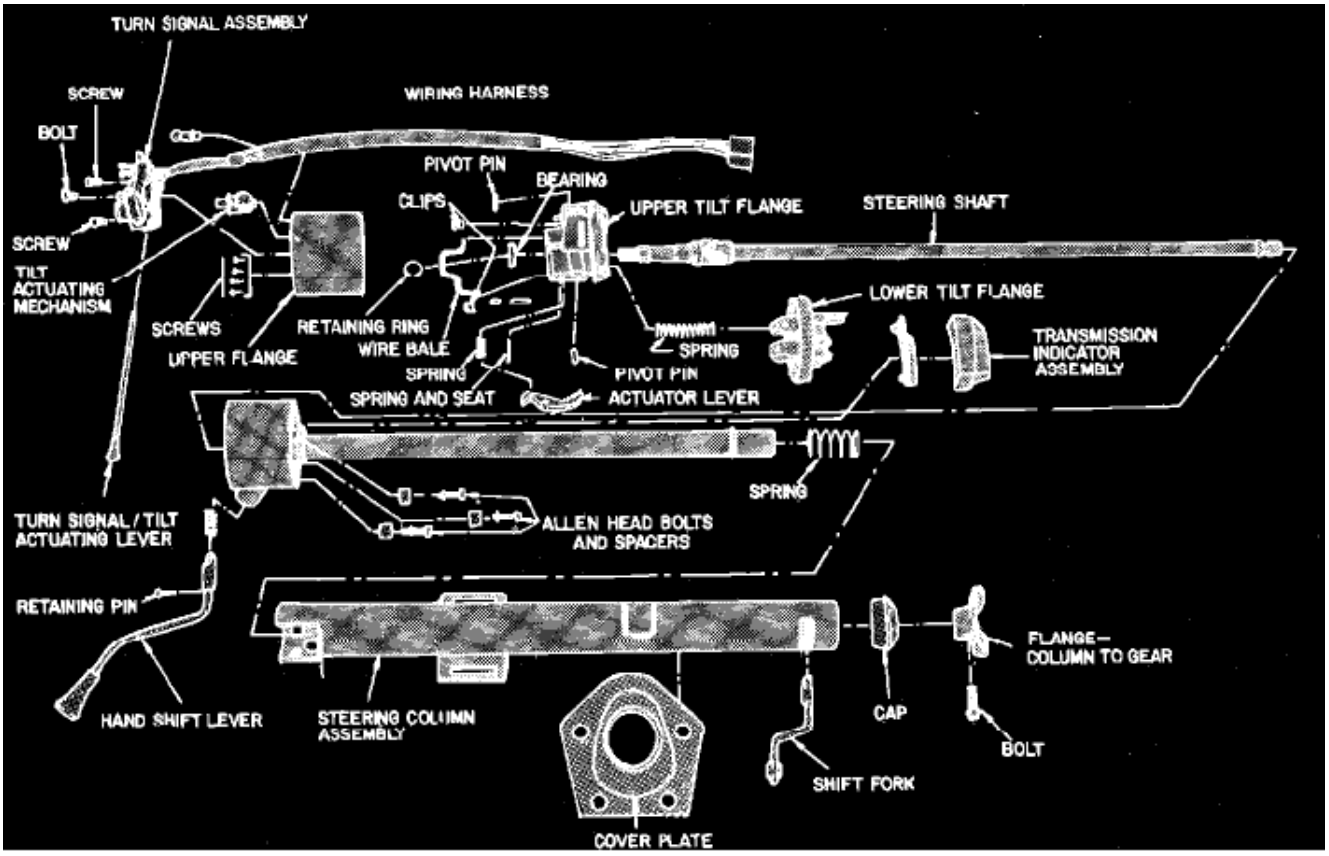
23. On E100-350, disassemble steering column lower bearing retainer subassembly as follows:

a. Remove steering column lower bayonet flange and leaf spring, Fig. 10. Do not loosen leaf spring. b. Remove lower bearing shaft clamp, bolt, and nut. c. Remove 3 screws and the lower bearing assembly. d. Remove split retainer sleeve from lower bearing retainer assembly.

24. On vehicles equipped with 3 speed manual transmission, disassemble shift tube subassembly as follows:

a. Hold shift tube above spring and push up and rotate lower shift arm until loading slot in arm aligns with lower key. b. Remove lower arm and lower spacer. c. Rotate upper shift arm until loading slot in arm aligns with lower key,then remove upper arm and upper spacer. d. Remove and discard shift arm grommets.

Tilt Column


TURN SIGNAL ASSEMBLY
SCREW
BOLT
WIRING HARNESS
PIVOT PIN
BEARING
CLIPS
UPPER TILT FLANGE
STEERING SHAFT
SCREW
TILT ACTUATING MECHANISM
SCREWS
UPPER FLANGE
RETAINING RING
WIRE BALE
SPRING
SPRING AND SEAT
PIVOT PIN
ACTUATOR LEVER
LOWER TILT FLANGE
SPRING
TRANSMISSION INDICATOR ASSEMBLY
SPRING
TURN SIGNAL / TILT ACTUATING LEVER
ALLEN HEAD BOLTS AND SPACERS
RETAINING PIN
FLANGE— COLUMN TO GEAR
HAND SHIFT LEVER
STEERING COLUMN ASSEMBLY
CAP
BOLT
SHIFT FORK
COVER PLATE

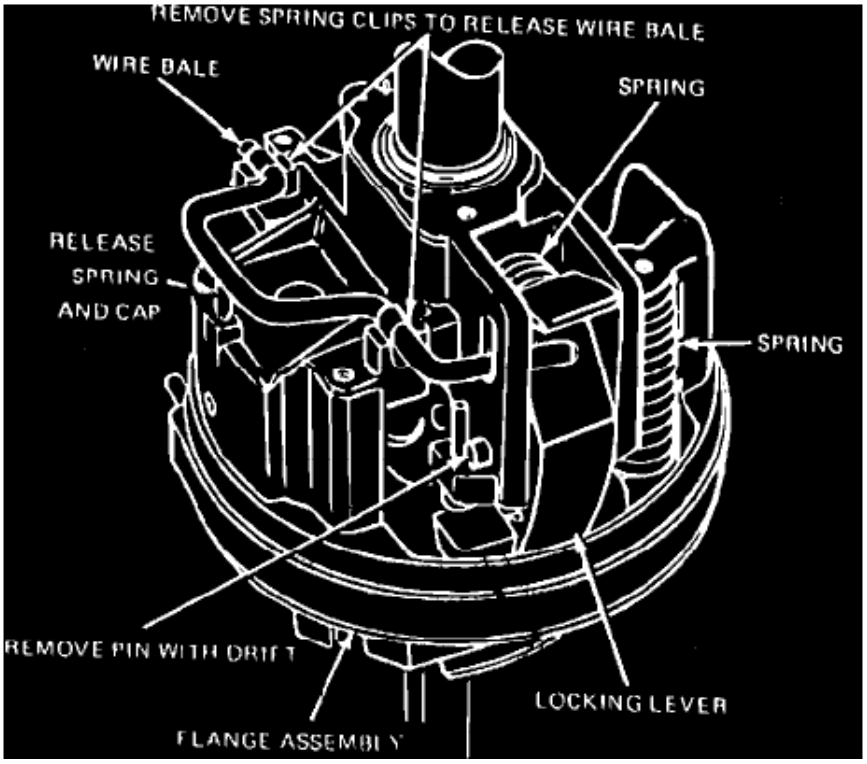

REMOVE SPRING CLIPS TO RELEASE WIRE BALE
WIRE BALE
SPRING
RELEASE SPRING AND CAP
SPRING
REMOVE PIN WITH DRIFT
LOCKING LEVER
FLANGE ASSEMBLY

Fig. 6 Exploded view of tilt steering column (typical). 1980---87 exc. Aerostar, Bronco II & 1983---87 Ranger

Fig. 7 Removing wire bale & tilt locking lever

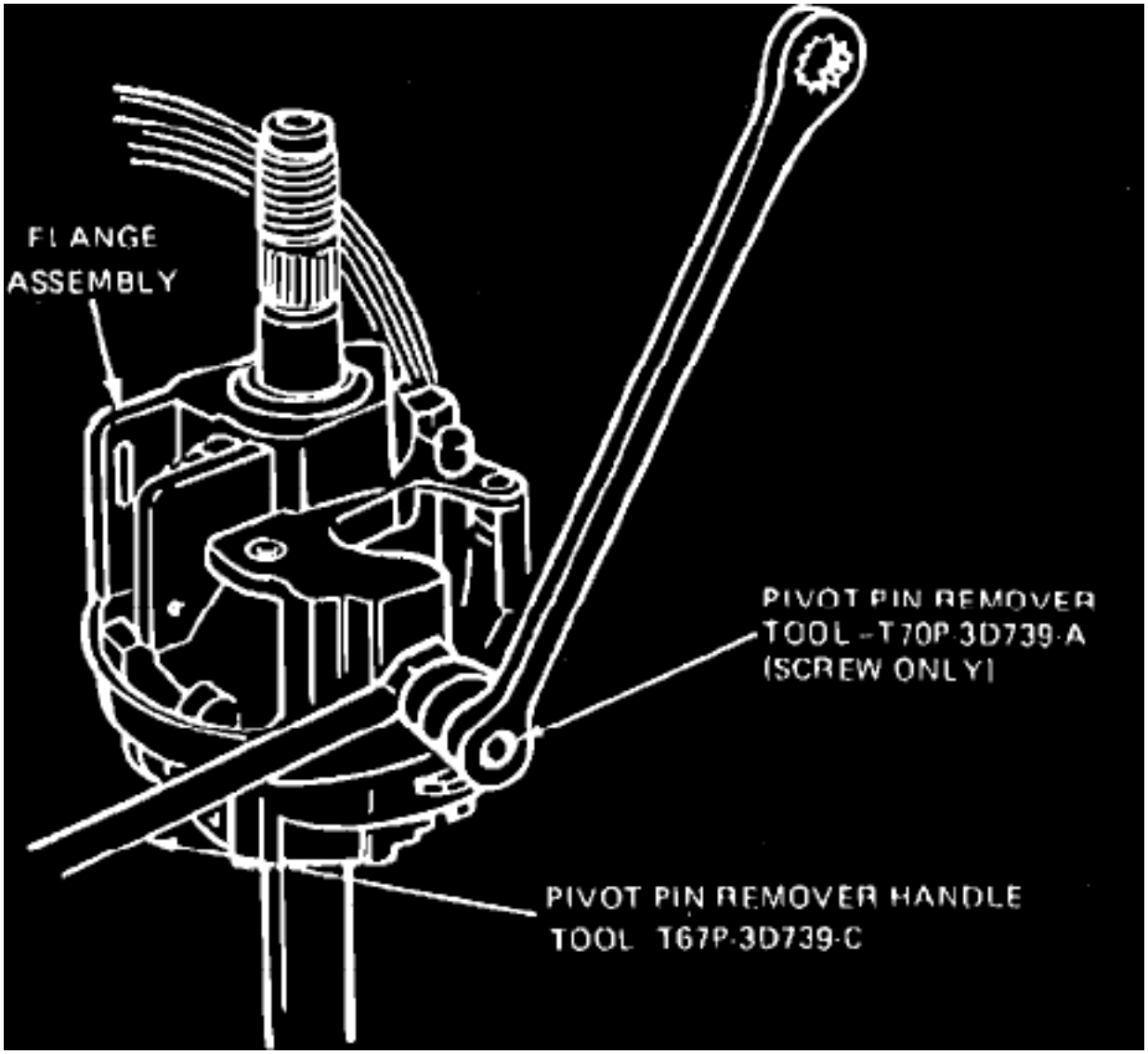


Fig. 8 Removing flange assembly pivot pins

1. Remove steering wheel and steering column, Fig. 6, from vehicle.

2. Remove turn signal actuator lever.

3. On models equipped with automatic transmission, drive out pivot pin and remove shift lever.

4. On 1980-S81 E100-S350 models, remove steering shaft lower flange and retaining clamp.

5. On all models, remove lower bearing retainer.

6. On models equipped with automatic transmission, remove shift tube retaining screw from bottom of shift socket, then slide shift tube out of bottom of column.

7. On all models, remove lock drive gear.

8. Remove turn signal switch attaching screws, then the wiring harness-to-steering column tube clips, if necessary.

9. Remove turn signal switch and harness from steering column.

10. Remove cover casting screws, then the casting from column.

11. Unhook and remove upper actuator from lower actuator.

12. Remove and discard lower flange-to-outer tube attaching screws.

13. Loosen ignition switch nut and washer assemblies and remove ignition rod from switch end.

14. Remove tilt mechanism, steering shaft and ignition actuation rod from steering column upper end.

15. On models equipped with automatic transmission, remove shift socket, then the shift lever indicator ring.

16. On models equipped with manual transmission, remove flange extension, then the key release lever mechanism from tilt mechanism.

17. On all models, remove spring clips holding wire bale, then the bale, Fig. 7.

18. Drive out pin holding locking lever, then remove the lever and spring.

19. Remove column upper shaft snap ring.

20. Remove two pivot pins from side of casting assembly, then separate upper and lower flange castings, Fig. 8. If pivot pins fit loosely in the lower flange, the pins must be discarded.

21. Position flange casting on suitable workbench with smaller bearing facing down.

22. Lightly tap on outer race of small bearing at each slot, using a small drift, and remove race and bearing.

23. Invert flange casting and repeat step 22 on large bearing.

Steering Column: Service and Repair Assembly

Non-Tilt Column

1. On vehicles equipped with 3 speed manual transmission, place bushing in socket retainer in outer tube.

2. On vehicles equipped with 3 speed manual transmission, place bushing on upper hub and wave washer on lower hub of shift socket.

3. On vehicles equipped with 3 speed manual or automatic transmission, install shift socket in outer tube.

4. On vehicles equipped with 4 speed manual transmission, install flange extension on outer tube.

5. Install lock actuator insert in rear of flange and torque screw to 15---25 inch lbs.

6. Insert lock actuator assembly through opening in front of flange until it bottoms against insert.

7. Install lock drive gear through lock cylinder opening so that last gear tooth aligns with last tooth on actuator assembly when actuator is fully rearward.

8. Install lock bearing, then the lock bearing snap ring.

9. Place lock cylinder in ``ON'' position and depress retaining pin, then insert lock cylinder into flange.

10. On vehicles equipped with automatic transmission, attach PRNDL21 insert to front of flange.

11. On vehicles equipped with manual transmission, position spring on lock release lever assembly and position lever assembly through hole in front of flange, then tighten spring until lever assembly drops into place.

12. On vehicles equipped with manual transmission, install snap ring on lock release lever assembly.

13. On all vehicles, install flange retaining bolts through holes in flange and hand start nuts 1 to 2 threads.

14. On vehicles equipped with automatic transmission, place wave washer in flange hub.

15. Install subassembled flange onto outer tube by pinching nuts toward each other and pressing flange in place, then torque nuts to 60---75 inch lbs.

16. On vehicles equipped with 3 speed manual transmission, assemble shift tube assembly as follows:

a. Install grommets in shift tube, small end facing up. b. Stack upper spacer, upper arm, lower spacer, and lower arm concentrically in order so that loading slots align. c. Press entire stack through common loading slot on shift tube, then rotate stack components individually until arms are aligned with their

keyways on shift key and spacers allow shift key to pass freely through operating slots.

17. On vehicles with 3 speed manual transmission, load shift tube assembly through lower opening of column.

18. On vehicles equipped with automatic transmission, install shift tube retaining rivet through bottom of shift socket.

19. On all vehicles, install steering shaft clip below knurl for upper bearing.

20. On Bronco and F100-350, ensure that shaft assembly length is 35.6 inches, adjusting as necessary by tapping gently in appropriate direction.

21. Load shaft through bottom of column, being careful not to collapse steering shaft on Bronco and F100-350.

22. Place cover insulator onto upper bearing and press onto knurl of steering shaft until snap ring groove is visible above bearing.

23. Install snap ring on steering shaft in groove above bearing.

24. Install turn signal/hazard warning switch, torquing screws to 15---25 inch lbs.

25. On E100-350, subassemble lower bearing retainer assembly as follows:

a. Install split retainer sleeve into lower bearing retainer assembly with sleeve shoulder against bearing. b. Loosely assemble clamp, bolt, and nut to lower bearing retainer assembly, ensuring that bolt aligns with round groove in split retainer sleeve. c. Push split retainer sleeve shoulder down and push clamp toward bearing, and torque clamp nut to 9-18 ft. lbs.

26. On Bronco and F100-350, install lower bearing retainer, ensuring that centerline of coupling shaft attachment hole extends .8 inch below lower face of retainer, and torque screws to 12-20 inch lbs.

27. On E100-350, install lower bearing retainer and telescope steering column lower bayonet shaft fully toward lower end of column.

28. Install ignition switch actuator rod.

29. Install ignition switch and hand start retaining nuts with lock cylinder in lock position.

30. Torque switch retaining nuts to 40-65 inch lbs. and remove clip.

31. Install hand shift lever and secure by driving in pivot pin.

32. Install turn signal switch lever, torquing screws to 30---45 inch lbs.

AEROSTAR, BRONCO II & 1983-87 RANGER

Tilt Column

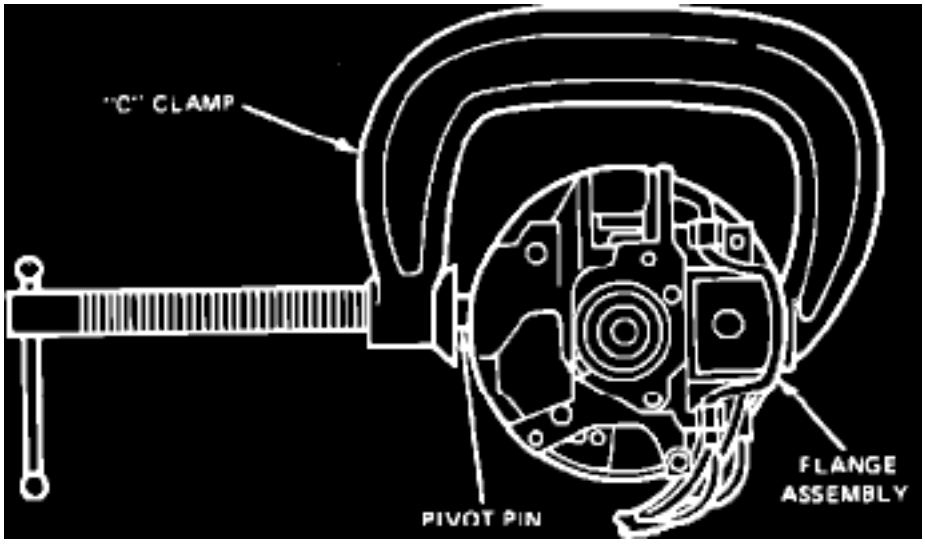


Fig. 6 Installing Flange Assembly Pivot Pins

1. Position flange casting on suitable work bench with large bearing seat facing up.

2. Place large upper bearing over seat with open side facing inward. Position a suitable socket on bearing outer race and lightly tap socket until bearing is seated. Use care to avoid contacting bearing inner race as damage will result.

3. Invert flange casting and repeat step 2 on small bearing.

4. Install lower actuator with ignition switch rod attached.

5. Install upper and lower flanges with pivot pins. Ensure column position spring is seated properly between upper and lower flange and wavy thrust washer is properly positioned between lower flange and socket.

6. Install column upper shaft snap ring.

7. Install locking lever, spring and lever pin.

8. Position wire bale on upper casting and install spring clips, Fig. 9.

9. On models equipped with automatic transmission, install shift lever indicator ring on tilt mechanism. Torque attaching screws to 10-20 inch lbs., then install shift socket.

10. On models equipped with manual transmission, attach key release mechanism to tilt mechanism, then install flange extension and torque attaching screws to 10-20 inch lbs.

11. On all models, install tilt mechanism. Feed steering shaft down center of column and ignition actuation rod through shift socket/flange extension along top of column outer tube.

12. Install flange retainer assemblies. Use new screws and torque to 50-68 inch lbs.

13. Install lower bearing retainer, then loosely attach ignition switch to outer tube.

14. Connect upper and lower actuators, then install column cover. Torque cover attaching screws to 40-50 inch lbs.

15. Position turn signal switch and wiring harness in steering column. Attach wiring harness to steering column tube clips, if necessary.

16. Install turn signal switch attaching screws and torque to 20-30 inch lbs.

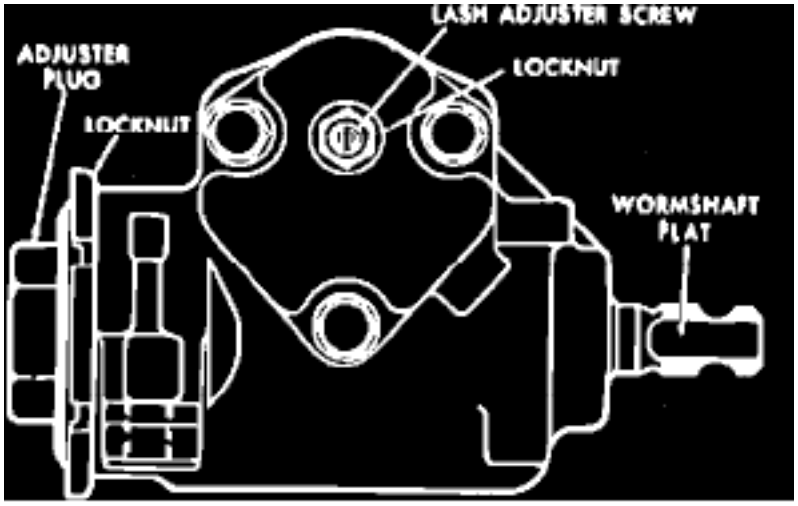
17. Install turn signal lever, then the lock drive gear.

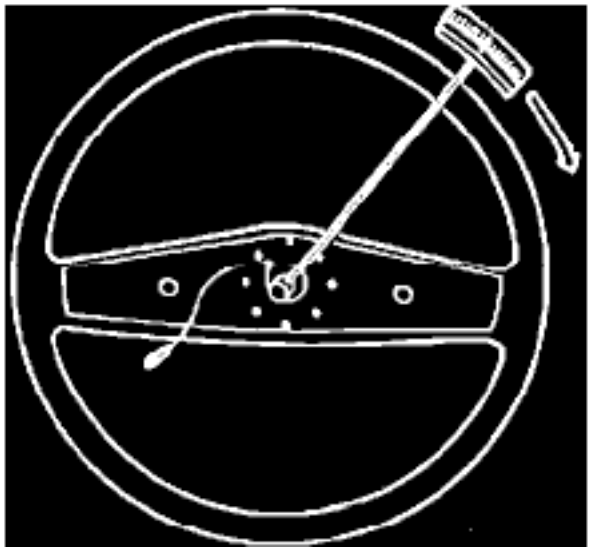
18. Install lock cylinder with key in ``On'' position. Ensure retaining pin is flush with cylinder.

19. On models equipped with automatic transmission, install shift lever and pivot pin.

20. On all models, install steering column.

1982-87 BRONCO, E100-350 & F100-350 SERIES, NON-TILT STEERING COLUMN





Sector Shaft: Adjustments

GEAR ADJUSTMENTS

There are two adjustments on the steering gear: worm bearing preload and pitman shaft overcenter preload.

Prior to adjusting the steering gear, all

outside loads must be removed.

Fig. 3 Steering gear adjustments

Fig. 4 Checking adjustment with an inch pound torque wrench

WORM BEARING PRELOAD, ADJUST

1. Disconnect battery ground cable, then raise and support vehicle.

2. Remove pitman arm nut, then mark relationship of pitman arm to pitman shaft to aid during reassembly.

3. Remove pitman arm using a suitable puller.

4. Loosen steering gear adjuster plug lock nut, then back off adjuster plug {1/4} turn, Fig. 3.

5. Remove horn pad or button to gain access to the steering wheel attaching nut.

6. Turn steering wheel gently in one direction to stop, then turn back {1/2} turn to position steering gear away from ``high point'' load position. Do

not turn wheel hard against steering stops with pitman arm disconnected as damage to the gear ball guides can result.

7. Position suitable inch pound torque wrench on steering wheel hub nut, Fig. 4, then while rotating steering wheel with inch pound wrench through a

90 degree arc, record and measure ``bearing drag.'' Do not use an inch pound wrench of more than 50 inch pound capacity.

8. Adjust worm bearing preload to specifications listed at end of section by turning adjuster plug while measuring turning torque at steering wheel hub with inch pound wrench.

Worm bearing preload specification is in excess of ``bearing drag'' determined in previous step.

9. Torque adjuster plug lock nut to 25 ft. lbs., then recheck preload. Rotate steering wheel from stop to stop. If steering gear feels ``lumpy'',

bearing damage is indicated. Gear should be disassembled and inspected as necessary.

PITMAN SHAFT OVERCENTER PRELOAD, ADJUST

1. Perform steps 1 through 9 of ``Worm Bearing Preload, Adjust'' procedure.

2. Turn steering wheel from one stop to the other while carefully counting the total turns required, then turn wheel back exactly halfway to position steering gear at ``high point.''

3. Loosen lash adjuster screw lock nut, Fig. 3, then turn adjuster screw clockwise to remove gear lash between ball nut and pinion shaft. Tighten lock

nut.

4. Check steering wheel turning torque with suitable inch pound wrench at steering wheel hub, Fig. 4, and compare to specifications listed at end of

section.

5. If measurement is not within specifications, loosen lock nut and readjust adjuster screw to obtain proper turning torque. Tighten lock nut and check turning torque through center of steering wheel travel.

If maximum turning torque exceeds specifications, turn adjuster screw

counterclockwise, then come up on adjustment by turning in a clockwise direction.

6. Assemble pitman arm to pitman shaft.

Axle Beam: Customer Interest Front Drive Axle - Damaged Left Arm

Article No. 83-6-21

AXLE - FRONT DRIVE - DAMAGED LEFT HAND ARM - 4x4 VEHICLES

LIGHT TRUCKS 1980-82 BRONCO, F150-350

Severe applications of 4x4 vehicles (e.g., snow plowing) can result in damage to the left axle arm between the spring seat and the carrier housing. Revising the two axle arm "Tab" to housing bolts from 3/8" to 1/2" will strengthen the arm and update the connection between the housing and the left axle arm to latest level.

When resolving a concern involving a damaged left axle arm between the spring seat and the carrier housing, the following procedure should be followed. In addition, if either the arm or the carrier is replaced, they should be reworked as described, to assure compatibility of the bolt holes.

- Inspect the left hand axle arm tab bolt holes. Ream 7/16" diameter (slotted) holes (2) to 9/16" diameter round holes if necessary.

- Inspect carrier housing. Ream the two axle arm to carrier housing attaching bolt holes, if the tapped holes are 3/8" diameter. Re-tap the holes (2) to 1/2" - 13 UNC-2B thread.

- Attach axle arm to carrier housing using part number 621032 - 1/2" diameter bolts supplied with axle arms. Torque the 1/2" bolts to 82-115 ft.lbs.

PART NUMBER PART NAME CLASS

E0TZ-3B403-G Axle Arm Kit - B

Bronco/F150 (4x4) 3550-3800#

E0TZ-3B403-H Axle Arm Kit - F250 C

(4x4) 3800#

E0TZ-3B403-J Axle Arm Kit - F250/350 C

(4x4) 4500#

E1TZ-3010-A Housing - Bronco/F150-250 C

(4x4) 3550-3800#

E1TZ-3010-B Housing - F250/350 C

(4x4) 4500#

OTHER APPLICABLE ARTICLES: None WARRANTY STATUS: Reimbursable within the provisions of the Warranty and Policy Manual. OPERATION: SP3403A83 TIME:

3.3 Hrs. DLR. CODING: Basic Part No. 3B403 Code: 01

Axle Beam: All Technical Service Bulletins Front Drive Axle - Damaged Left Arm

Article No. 83-6-21

AXLE - FRONT DRIVE - DAMAGED LEFT HAND ARM - 4x4 VEHICLES

LIGHT TRUCKS 1980-82 BRONCO, F150-350

Severe applications of 4x4 vehicles (e.g., snow plowing) can result in damage to the left axle arm between the spring seat and the carrier housing. Revising the two axle arm "Tab" to housing bolts from 3/8" to 1/2" will strengthen the arm and update the connection between the housing and the left axle arm to latest level.

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- Attach axle arm to carrier housing using part number 621032 - 1/2" diameter bolts supplied with axle arms. Torque the 1/2" bolts to 82-115 ft.lbs.

PART NUMBER PART NAME CLASS

E0TZ-3B403-G Axle Arm Kit - B

Bronco/F150 (4x4) 3550-3800#

E0TZ-3B403-H Axle Arm Kit - F250 C

(4x4) 3800#

E0TZ-3B403-J Axle Arm Kit - F250/350 C

(4x4) 4500#

E1TZ-3010-A Housing - Bronco/F150-250 C

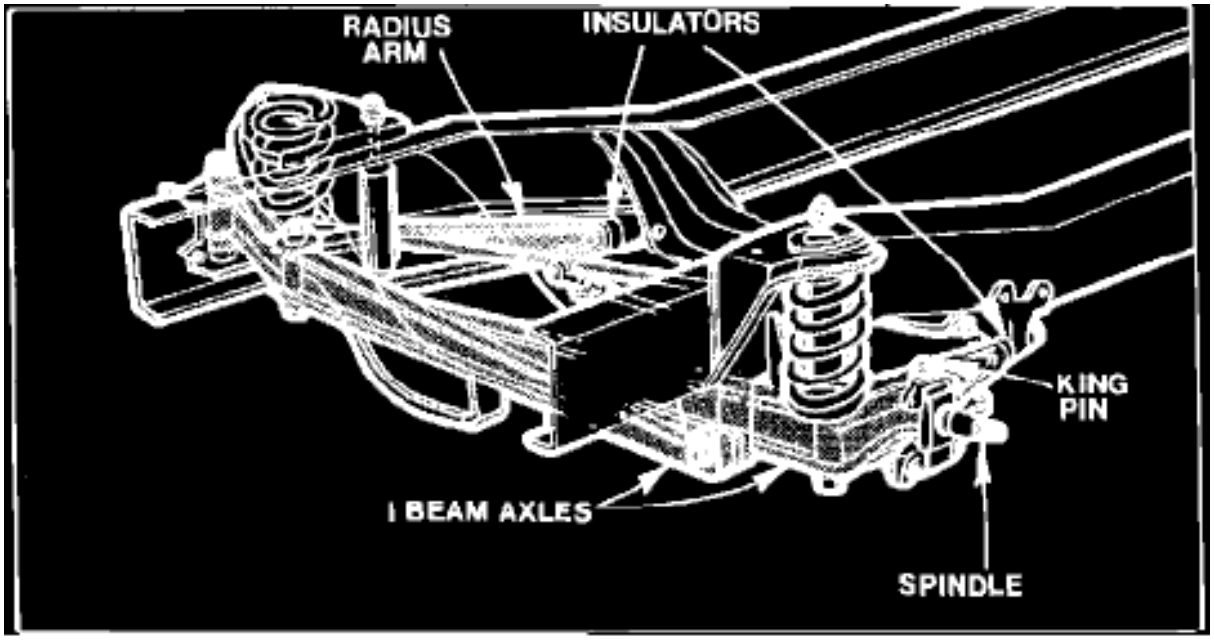
(4x4) 3550-3800#

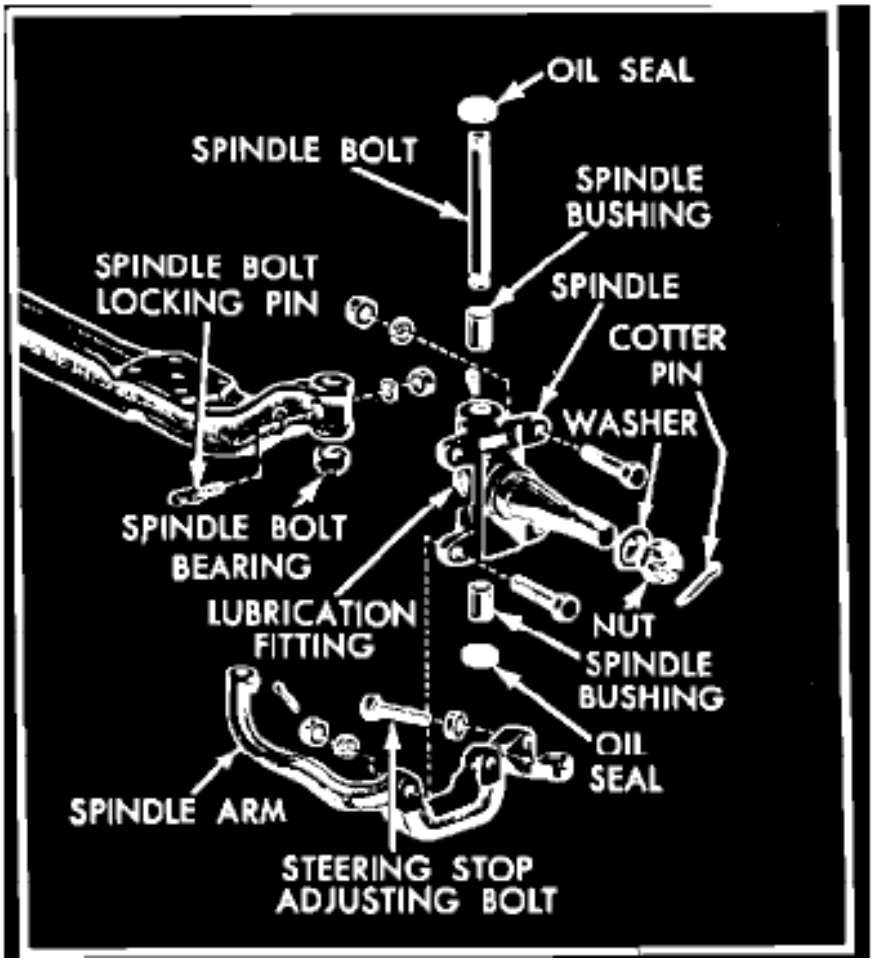
E1TZ-3010-B Housing - F250/350 C

(4x4) 4500#

OTHER APPLICABLE ARTICLES: None WARRANTY STATUS: Reimbursable within the provisions of the Warranty and Policy Manual. OPERATION: SP3403A83 TIME:

3.3 Hrs. DLR. CODING: Basic Part No. 3B403 Code: 01


RADIUS ARM
INSULATORS
KING PIN
I BEAM AXLES
SPINDLE


OIL SEAL
SPINDLE BOLT
SPINDLE BUSHING
SPINDLE BOLT LOCKING PIN
SPINDLE
COTTER PIN
WASHER
SPINDLE BOLT BEARING
LUBRICATION FITTING
NUT
SPINDLE BUSHING
OIL SEAL
SPINDLE ARM
STEERING STOP ADJUSTING BOLT

Axle Beam: Description and Operation

Fig. 1 Twin I-Beam front axle

Fig. 2 Spindle used with twin I Beam front axle. Typical

EXC. 4 WHEEL DRIVE MODELS

Twin I-Beam Axle As illustrated in Fig. 1 there are two I-beam axles, one for each front wheel. One end of each axle is attached to the spindle and a radius arm and the other end is attached to a frame bracket on the opposite side of the vehicle. Each spindle is held in place on the axle by ball joints or a spindle bolt which pivots in bushings pressed in the upper and lower ends of the spindle, Fig. 2. On models equipped with spindle bolts, a thrust bearing is installed between the lower end of the axle and the spindle to support the load on the axle. On all models, a spindle arm is installed on each spindle for attachment to the steering linkage.

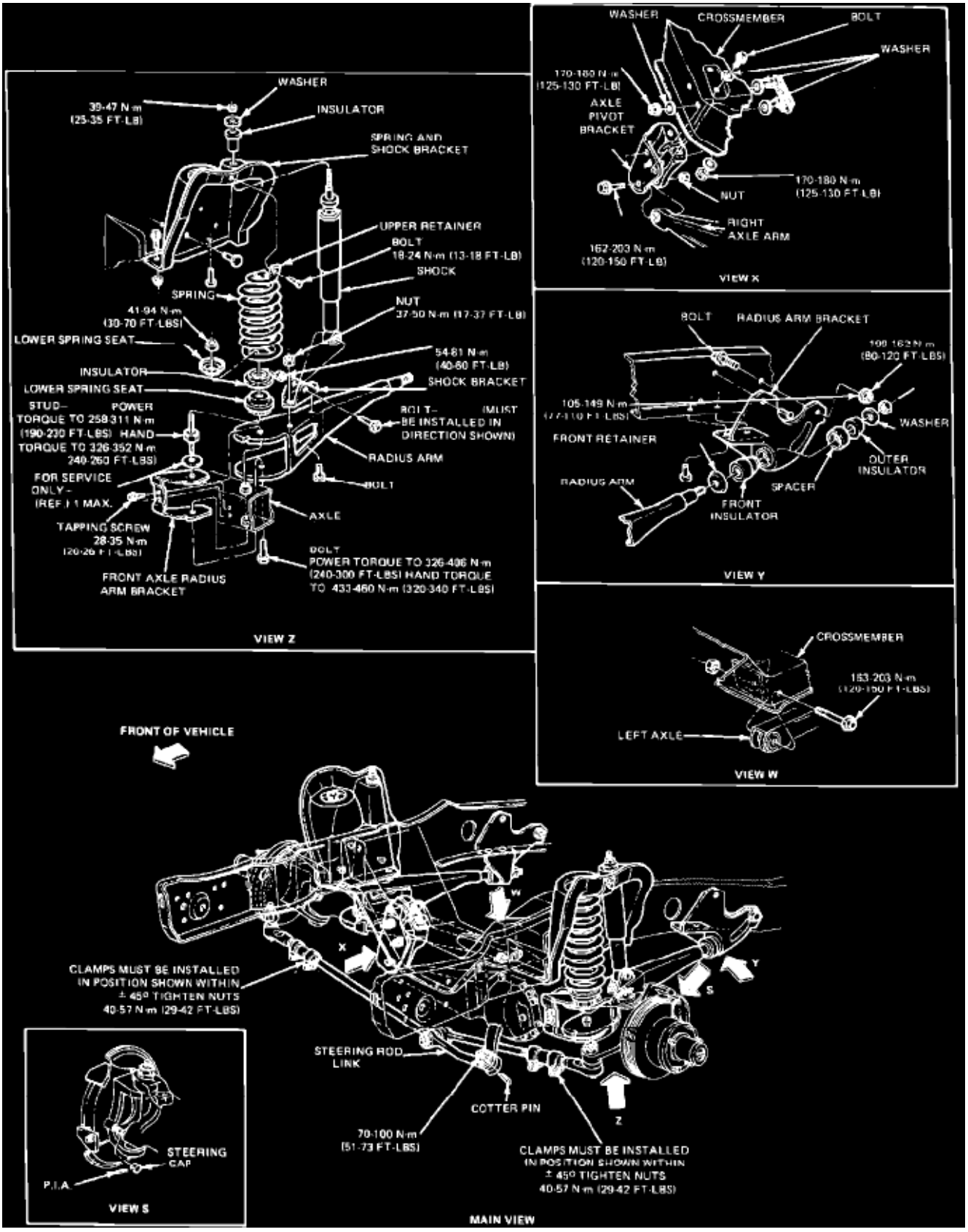

WASHER
39-47 N·m (25-35 FT-LB)
INSULATOR
SPRING AND SHOCK BRACKET
UPPER RETAINER
BOLT 18-24 N·m (13-18 FT-LB)
SHOCK
SPRING
NUT 37-50 N·m (27-37 FT-LB)
41-94 N·m (30-70 FT-LBS)
LOWER SPRING SEAT
54-81 N·m (40-60 FT-LB)
INSULATOR
LOWER SPRING SEAT
SHOCK BRACKET
STUD— POWER TORQUE TO 258-311 N·m (190-230 FT-LBS) HAND TORQUE TO 326-352 N·m 240-260 FT-LBS)
BOLT— (MUST BE INSTALLED IN DIRECTION SHOWN)
RADIUS ARM
FOR SERVICE ONLY - (REF.) 1 MAX.
BOLT
AXLE
TAPPING SCREW 28-35 N·m (20-26 FT-LBS)
BOLT POWER TORQUE TO 326-406 N·m (240-300 FT-LBS) HAND TORQUE TO 433-460 N·m (320-340 FT-LBS)
FRONT AXLE RADIUS ARM BRACKET
VIEW Z
WASHER
CROSSMEMBER
BOLT
WASHER
170-180 N·m (125-130 FT-LB)
AXLE PIVOT BRACKET
170-180 N·m (125-130 FT-LB)
NUT
RIGHT AXLE ARM
162-203 N·m (120-150 FT-LB)
VIEW X
BOLT
RADIUS ARM BRACKET
108-162 N·m (80-120 FT-LBS)
105-149 N·m (77-110 FT-LBS)
WASHER
FRONT RETAINER
OUTER INSULATOR
RADIUS ARM
SPACER
FRONT INSULATOR
VIEW Y
CROSSMEMBER
163-203 N·m (120-150 FT-LBS)
LEFT AXLE
VIEW W
FRONT OF VEHICLE
CLAMPS MUST BE INSTALLED IN POSITION SHOWN WITHIN ± 45° TIGHTEN NUTS 40-57 N·m (29-42 FT-LBS)
STEERING ROD LINK
COTTER PIN
70-100 N·m (51-73 FT-LBS)
CLAMPS MUST BE INSTALLED IN POSITION SHOWN WITHIN ± 45° TIGHTEN NUTS 40-57 N·m (29-42 FT-LBS)
MAIN VIEW
STEERING CAP
P.I.A.
VIEW S

Fig. 3 Independent front suspension. Bronco & F-150 Four Wheel Drive. 1981---87 shown (similar to 1980)

4 WHEEL DRIVE MODELS

Bronco & F-150 The independent front suspension on these vehicles is composed of a two piece front driving axle assembly, two coil springs and two radius arms, Fig. 3. The front driving axle consists of two independent yoke and tube assemblies. One end of yoke and tube assembly is anchored to the frame. The other end of each yoke and tube assembly is supported by the coil spring and radius arm.

APPLICATION CHART			
Model Year	Vehicle	Location	Part Number
1982-96	F-100-150 4X2	Lower	F6TZ-3050-AB
1987-96	F-250 4X2 (under 8500 GVW)	Lower	F6TZ-3050-FB
1987-97	F-250 4X2 (over 8500 GVW)	Lower	F6TZ-3050-FB
1987-97	F-350 4X2	Lower	F6TZ-3050-FB
1973-96	F-100-150/Bronco - 4X4	Lower	F6TZ-3050-CA
1980-94	F-250 4X4 (with 3800# axle)	Lower	F6TZ-3050-CA
1980-81	F-350 4X4 (with 3800# axle)	Lower	F6TZ-3050-CA
1980-96	F-250 4X4 (under 8500 GVW excluding 3800# axle)	Lower	F6TZ-3050-GA
1980-97	F-250 4X4 (over 8500 GVW excluding 3800# axle)	Lower	F6TZ-3050-GA
1980-85	F-350 4X4 (with 4500# axle)	Lower	F6TZ-3050-GA
1992-97	F-350 4X4	Lower	F6TZ-3050-HA
1987-96	F-150 4X2	Upper	F5UZ-3049-A
1987-96	F-250 (under 8500 GVW) 4X2	Upper	F5UZ-3049-A
1987-97	F-250 (over 8500 GVW) 4X2	Upper	F5UZ-3049-A
1987-97	F-350 4X2	Upper	F5UZ-3049-A
1980-96	F-100-150/Bronco 4X4	Upper	F6TZ-3049-AA
1980-96	F-250 4X4 (under 8500 GVW)	Upper	F6TZ-3049-AA
1980-97	F-250 4X4 (over 8500 GVW)	Upper	F6TZ-3049-AA
1980-85	F-350 4X4 (with 4500# axle)	Upper	F6TZ-3049-AA
1992-97	F-350 4X4 (with 4500# axle)	Upper	F6TZ-3049-AA

Ball Joint: Customer Interest Ball Joint - Clunk Noise From Front End

Article No. 96-23-15

11/04/96

^ SUSPENSION - EARLY BALL JOINT WEAR - "CLUNK" FROM FRONT END

^ NOISE - "CLUNKING" NOISE FROM BALL JOINTS - EARLY BALL JOINT WEAR

LIGHT TRUCK: 1973-83 F-100 1973-96 BRONCO 1980-96 F-150-350 SERIES

This TSB article is being republished in its entirety to include the latest level parts and to revise the model years.

ISSUE: A "clunking" noise may be heard from the upper and lower ball joints on some vehicles. This may be due to early wear of the joints caused by entry of water and contamination into the ball area.

ACTION: Replace the ball joints with a new integral seal design ball joint. Refer to the Application Chart for correct part usage. The new ball joint should reduce the possibility of moisture and contamination into the ball joint. Refer to the appropriate Service Manual for removal and installation procedures.

PART NUMBER PART NAME

F5UZ-3049-A Ball Joint

F6TZ-3049-AA Ball Joint

F6TZ-3050-AB Ball Joint

F6TZ-3050-CA Ball Joint

F6TZ-3050-FB Ball Joint

F6TZ-3050-GA Ball Joint

F6TZ-3050-HA Ball Joint

OTHER APPLICABLE ARTICLES: NONE

SUPERSEDES: 96-11-5

WARRANTY STATUS: Eligible Under The Provisions Of Bumper To Bumper Warranty Coverage

OPERATION DESCRIPTION TIME

962315AA Replace One (1) Lower 2.5 Hrs.

Ball Joint - 4X2

962315AB Replace Upper Or Both 3.5 Hrs.

Ball Joints On One Side And One (1) Lower Ball Joint On The Other Side - 4X2

962315AE Replace One (1) Lower 3.4 Hrs.

Ball Joint - Each Side - 4X2

962315ATA Replace One (1) Upper 2.7 Hrs.

Ball Joint Or Both Ball Joints On One Side - 4X2

962315AT Replace Both Ball Joints 3.7 Hrs.

On Both Sides - 4X2

962315BB Replace Both Ball Joints 4.5 Hrs.

On One Side And One (1) Lower Ball Joint On The Other Side - 4X4

962315BE Replace One (1) Lower 4.4 Hrs.

Ball Joint - Each Side - 4X4

962315BTA Replace One (1) Upper 3.2 Hrs.

Ball Joint Or Both Ball Joints On One Side - 4X4

962315BT Replace Upper Or Both 4.7 Hrs.

Ball Joints On Both Sides - 4X4

962315B Replace One (1) Lower 3.1 Hrs.

Ball Joint - 4X4

DEALER CODING

CONDITION

BASIC PART NO. CODE

3050 56

OASIS CODES: 303000, 304000, 702000, 702100

APPLICATION CHART			
Model Year	Vehicle	Location	Part Number
1982-96	F-100-150 4X2	Lower	F6TZ-3050-AB
1987-96	F-250 4X2 (under 8500 GVW)	Lower	F6TZ-3050-FB
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1987-97	F-350 4X2	Lower	F6TZ-3050-FB
1973-96	F-100-150/Bronco - 4X4	Lower	F6TZ-3050-CA
1980-94	F-250 4X4 (with 3800# axle)	Lower	F6TZ-3050-CA
1980-81	F-350 4X4 (with 3800# axle)	Lower	F6TZ-3050-CA
1980-96	F-250 4X4 (under 8500 GVW excluding 3800# axle)	Lower	F6TZ-3050-GA
1980-97	F-250 4X4 (over 8500 GVW excluding 3800# axle)	Lower	F6TZ-3050-GA
1980-85	F-350 4X4 (with 4500# axle)	Lower	F6TZ-3050-GA
1992-97	F-350 4X4	Lower	F6TZ-3050-HA
1987-96	F-150 4X2	Upper	F5UZ-3049-A
1987-96	F-250 (under 8500 GVW) 4X2	Upper	F5UZ-3049-A
1987-97	F-250 (over 8500 GVW) 4X2	Upper	F5UZ-3049-A
1987-97	F-350 4X2	Upper	F5UZ-3049-A
1980-96	F-100-150/Bronco 4X4	Upper	F6TZ-3049-AA
1980-96	F-250 4X4 (under 8500 GVW)	Upper	F6TZ-3049-AA
1980-97	F-250 4X4 (over 8500 GVW)	Upper	F6TZ-3049-AA
1980-85	F-350 4X4 (with 4500# axle)	Upper	F6TZ-3049-AA
1992-97	F-350 4X4 (with 4500# axle)	Upper	F6TZ-3049-AA

Ball Joint: All Technical Service Bulletins Ball Joint - Clunk Noise From Front End

Article No. 96-23-15

11/04/96

^ SUSPENSION - EARLY BALL JOINT WEAR - "CLUNK" FROM FRONT END

^ NOISE - "CLUNKING" NOISE FROM BALL JOINTS - EARLY BALL JOINT WEAR

LIGHT TRUCK: 1973-83 F-100 1973-96 BRONCO 1980-96 F-150-350 SERIES

This TSB article is being republished in its entirety to include the latest level parts and to revise the model years.

ISSUE: A "clunking" noise may be heard from the upper and lower ball joints on some vehicles. This may be due to early wear of the joints caused by entry of water and contamination into the ball area.

ACTION: Replace the ball joints with a new integral seal design ball joint. Refer to the Application Chart for correct part usage. The new ball joint should reduce the possibility of moisture and contamination into the ball joint. Refer to the appropriate Service Manual for removal and installation procedures.

PART NUMBER PART NAME

F5UZ-3049-A Ball Joint

F6TZ-3049-AA Ball Joint

F6TZ-3050-AB Ball Joint

F6TZ-3050-CA Ball Joint

F6TZ-3050-FB Ball Joint

F6TZ-3050-GA Ball Joint

F6TZ-3050-HA Ball Joint

OTHER APPLICABLE ARTICLES: NONE

SUPERSEDES: 96-11-5

WARRANTY STATUS: Eligible Under The Provisions Of Bumper To Bumper Warranty Coverage

OPERATION DESCRIPTION TIME

962315AA Replace One (1) Lower 2.5 Hrs.

Ball Joint - 4X2

962315AB Replace Upper Or Both 3.5 Hrs.

Ball Joints On One Side And One (1) Lower Ball Joint On The Other Side - 4X2

962315AE Replace One (1) Lower 3.4 Hrs.

Ball Joint - Each Side - 4X2

962315ATA Replace One (1) Upper 2.7 Hrs.

Ball Joint Or Both Ball Joints On One Side - 4X2

962315AT Replace Both Ball Joints 3.7 Hrs.

On Both Sides - 4X2

962315BB Replace Both Ball Joints 4.5 Hrs.

On One Side And One (1) Lower Ball Joint On The Other Side - 4X4

962315BE Replace One (1) Lower 4.4 Hrs.

Ball Joint - Each Side - 4X4

962315BTA Replace One (1) Upper 3.2 Hrs.

Ball Joint Or Both Ball Joints On One Side - 4X4

962315BT Replace Upper Or Both 4.7 Hrs.

Ball Joints On Both Sides - 4X4

962315B Replace One (1) Lower 3.1 Hrs.

Ball Joint - 4X4

DEALER CODING

CONDITION

BASIC PART NO. CODE

3050 56

OASIS CODES: 303000, 304000, 702000, 702100

Ball Joint: Specifications Ball Joint, Lower

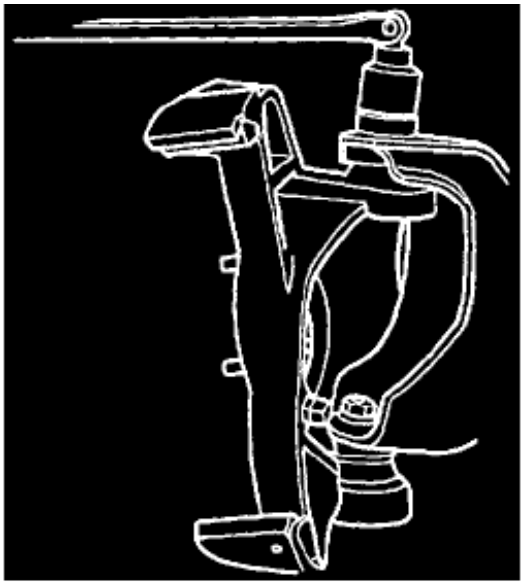
Lower Ball Joint ..... 90-110 ft-lbs Upper Ball Joint ..... 100 ft-lbs [1]

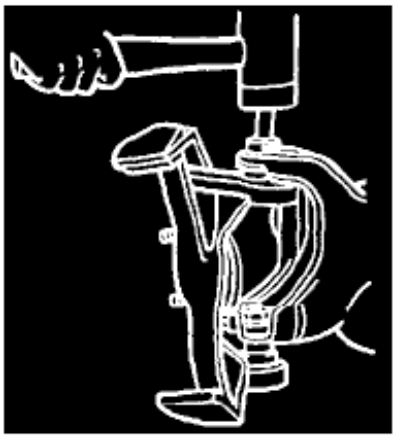
[1] 100 ft-lbs MINIMUM, advance the Upper Ball Joint nut to the next castellation, and install new cotter pin.

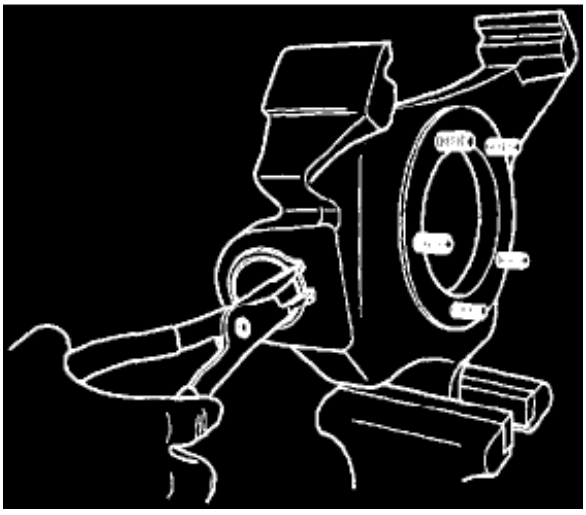
Ball Joint: Specifications Ball Joint, Upper

Lower Ball Joint ..... 90-110 ft-lbs Upper Ball Joint ..... 100 ft-lbs [1]

[1] 100 ft-lbs MINIMUM, advance the Upper Ball Joint nut to the next castellation, and install new cotter pin.







Ball Joint: Service and Repair Ball Joint, Lower

Ball Joint Service

Ball Joint Service

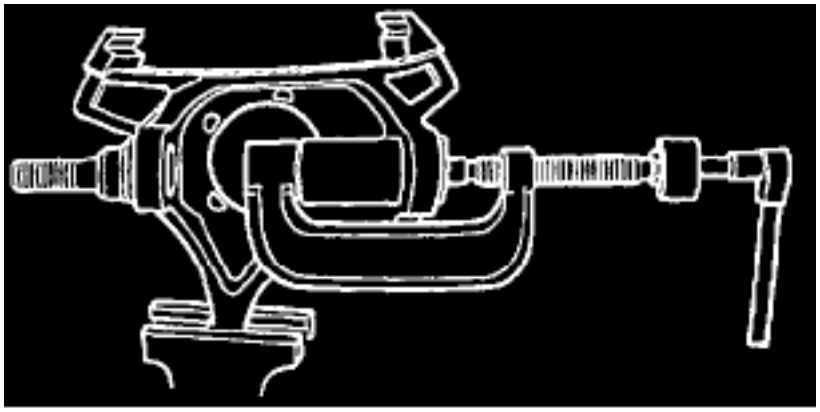
Ball Joint Service

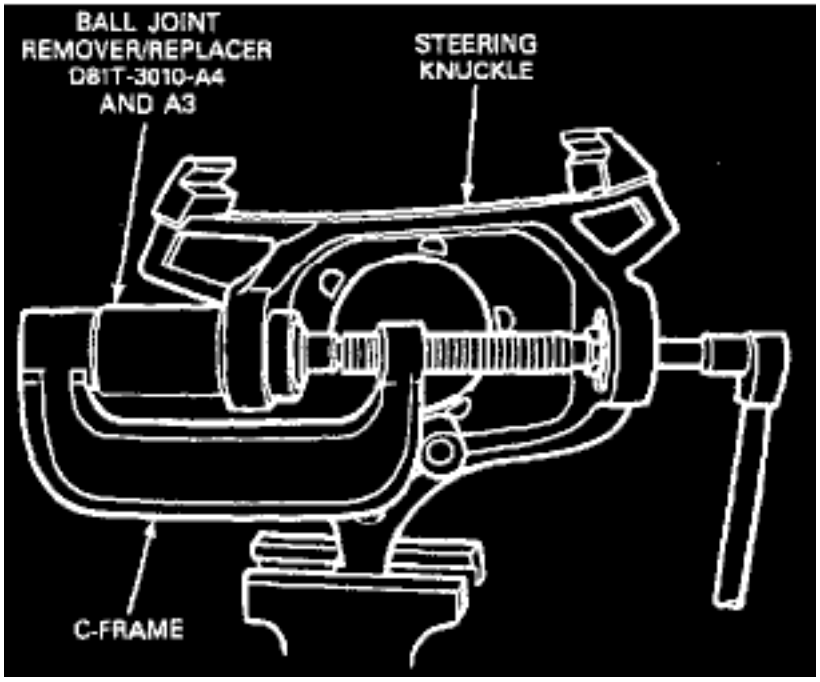
REMOVE

1. Remove brake rotor, axle shaft and spindle from steering knuckle. 2. Disconnect the steering arm from the knuckle. 3. Remove upper ball joint nut and loosen lower ball joint nut. Using a rawhide or heavy duty plastic hammer, hit sharply on the top stud to free the

knuckle from the tube yoke

4. Remove lower ball joint nut and remove knuckle from yoke tube. 5. Remove camber adjuster bushing from tube and yoke assembly. 6. Secure the knuckle in a vise. Remove the snap ring from the lower ball joint.





Ball Joint Service

Ball Joint Service

7. Assemble U-Joint Tool T74P-4635-C and Ball Joint Remover/Replacer T92T-3010-A over the lower ball joint. Turn the forcing screw to remove

the ball joint.

8. Assemble U-Joint Tool T74P-4635-C, Ball Joint Remover/Replacer D81T-3010-A4 and Ball Joint Remover/Replacer D8lT-3010-A3 or

equivalents over the upper ball joint. Turn the forcing screw clockwise to remove the upper ball joint.

INSTALL

NOTE: The upper ball joint must be installed first.

1. Position the upper ball joint along with U-Joint Tool T74P-4635-C, Receiver Cup D81T-3010-A5, Ball Joint Remover/Replacer tools

D81T-3010-A1, D81T-3010-A3 and D81T-3010-A4 or equivalents on the knuckle. Turn the forcing screw clockwise until the ball joint bottoms in the bore. Remove the tools.

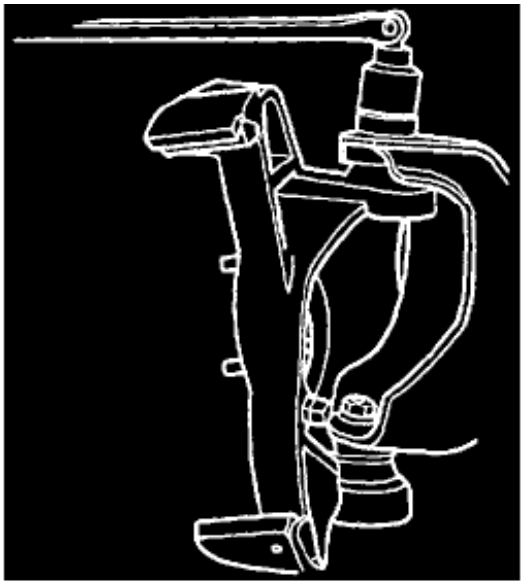
2. Position the lower ball joint and U-Joint Tool T74P-4635-C, Ball Joint Remover/Replacer T92T-3010-B and Ball Joint Remover/Replacer

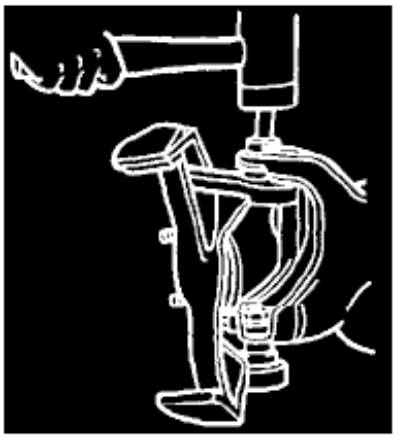
T92T-3010-A on the knuckle. Turn the forcing screw clockwise until the ball joint bottoms in the bore. Remove the tools.

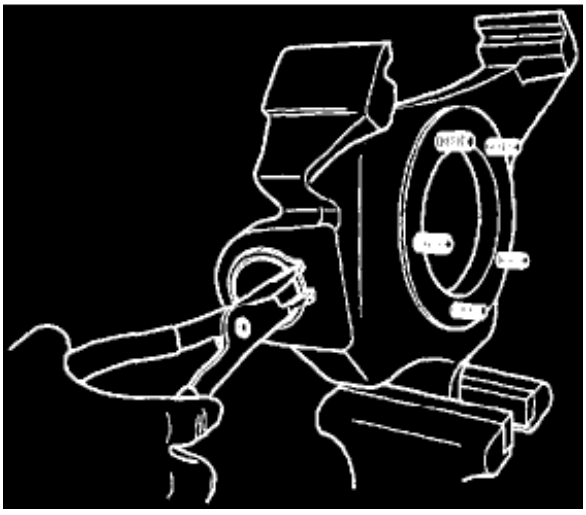
3. Install the snap ring on the lower ball joint. 4. Install knuckle onto tube and yoke assembly, then install camber adjusting bushing with arrow pointing outward for positive camber or towards

center of vehicle for negative camber.

5. Install new lower ball joint nut and torque to Specifications. See: Specifications/Ball Joint, Lower
6. Install new upper ball joint nut and torque to Specifications. See: Specifications/Ball Joint, Lower
7. Advance upper ball joint nut to next castellation, and install new cotter pin. 8. Install brake rotor, axle shaft and spindle.







Ball Joint: Service and Repair Ball Joint, Upper

Ball Joint Service

Ball Joint Service

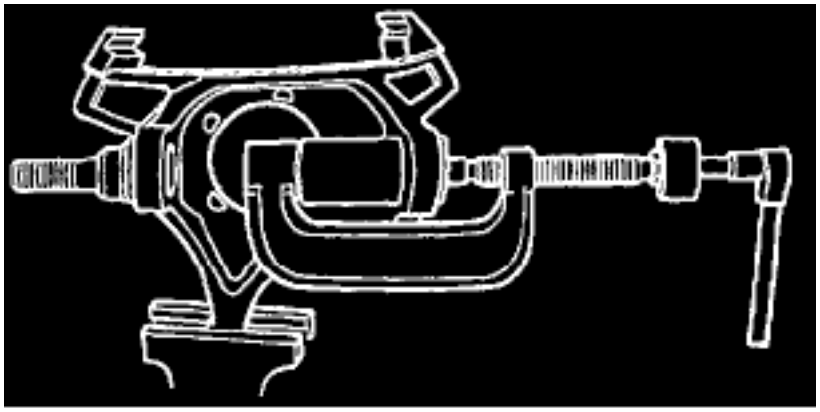
Ball Joint Service

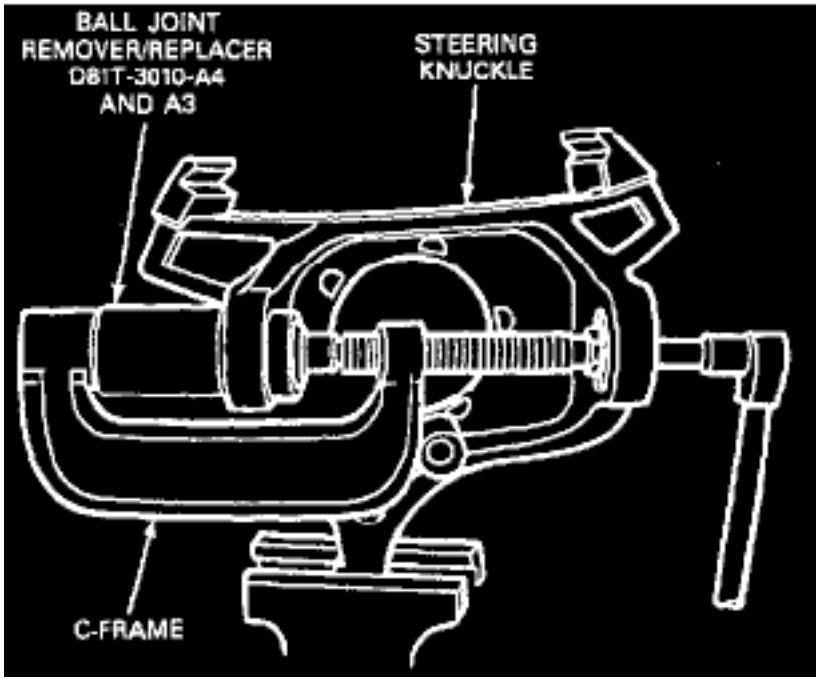
REMOVE

1. Remove brake rotor, axle shaft and spindle from steering knuckle. 2. Disconnect the steering arm from the knuckle. 3. Remove upper ball joint nut and loosen lower ball joint nut. Using a rawhide or heavy duty plastic hammer, hit sharply on the top stud to free the

knuckle from the tube yoke

4. Remove lower ball joint nut and remove knuckle from yoke tube. 5. Remove camber adjuster bushing from tube and yoke assembly. 6. Secure the knuckle in a vise. Remove the snap ring from the lower ball joint.





Ball Joint Service

Ball Joint Service

7. Assemble U-Joint Tool T74P-4635-C and Ball Joint Remover/Replacer T92T-3010-A over the lower ball joint. Turn the forcing screw to remove

the ball joint.

8. Assemble U-Joint Tool T74P-4635-C, Ball Joint Remover/Replacer D81T-3010-A4 and Ball Joint Remover/Replacer D8lT-3010-A3 or

equivalents over the upper ball joint. Turn the forcing screw clockwise to remove the upper ball joint.

INSTALL

NOTE: The upper ball joint must be installed first.

1. Position the upper ball joint along with U-Joint Tool T74P-4635-C, Receiver Cup D81T-3010-A5, Ball Joint Remover/Replacer tools

D81T-3010-A1, D81T-3010-A3 and D81T-3010-A4 or equivalents on the knuckle. Turn the forcing screw clockwise until the ball joint bottoms in the bore. Remove the tools.

2. Position the lower ball joint and U-Joint Tool T74P-4635-C, Ball Joint Remover/Replacer T92T-3010-B and Ball Joint Remover/Replacer

T92T-3010-A on the knuckle. Turn the forcing screw clockwise until the ball joint bottoms in the bore. Remove the tools.

3. Install the snap ring on the lower ball joint. 4. Install knuckle onto tube and yoke assembly, then install camber adjusting bushing with arrow pointing outward for positive camber or towards

center of vehicle for negative camber.

5. Install new lower ball joint nut and torque to Specifications. See: Specifications/Ball Joint, Upper
6. Install new upper ball joint nut and torque to Specifications. See: Specifications/Ball Joint, Upper
7. Advance upper ball joint nut to next castellation, and install new cotter pin. 8. Install brake rotor, axle shaft and spindle.

Cross-Member: Customer Interest Frame/Crossmember - Snapping/Popping Noise

Article No. 94-8-13

^ FRAME - # 1 CROSSMEMBER - RIVET REPLACEMENT

^ NOISE - "POPPING/CREAKING" SOUNDS - FRAME # 1 CROSSMEMBER

LIGHT TRUCK: 1980-94 BRONCO, F-150-350 SERIES 1988-94 F SUPER DUTY, F-47

This TSB article is being republished in its entirety to add certain 1992/94 model year vehicles, to revise the nut specified in the article and its torque specification, and to expand the diagnostic and repair procedures contained in the article.

ISSUE:

A "popping/creaking" sound may come from the area of the # 1 crossmember attachment to the left frame rail. This occurs because of a slip/stick motion at a loose rivet in the lower flange of the frame near the steering gear. The rivet could be either a standard cold head rivet in light duty applications or a "huck" rivet, which has the appearance of a large "pop" Civet.

ACTION:

Use the following diagnostic procedure to determine if the noise is originating in this rivet area. If so, replace the rivet with a nut, bolt and washer assembly. The revised parts increase the clamp load at the joint, minimizing the motion that causes the noise. Refer to the following procedure for service details.

SOURCES OF VARIOUS FRONT UNDERBODY NOISES:

Various front underbody noises may originate from several different sources. Several noises have been misdiagnosed as # 1 crossmember rivet "pop/creak" because the noise tends to propagate to the shock tower area and the shock tower area acts as an amplifier such that the noises all appear to be coming from that area. Other underbody areas that produce similar noises include:

^ loose or improperly seated shock tower rivets

^ loose or misaligned transmission crossmembers

^ loose radius arm brackets

^ loose axle pivot brackets

Other service bulletins have been published to address the proper repair of these concerns.

DESCRIPTION OF # 1 CROSSMEMBER NOISES:

"Pop/creak" - A metal-to-metal rubbing motion which slip/sticks when a twist is induced into the frame.

DIAGNOSTIC PROCEDURE:

1. INTERVIEW THE CUSTOMER:

a. Understand the customer's description of the noise and of the conditions under which it is heard.

b. Road test the vehicle with the customer to fully understand where, how and when the noise occurs.

2. DUPLICATE THE NOISE CONCERN:

a. Drive the vehicle around for at least 15 minutes to warm-up and stress the frame joints, so that any frame noise is more likely to be repeatable in the garage.

b. Test the following situations:

^ Can the noise be duplicated while stationary and on dry pavement by repeatedly turning the steering wheel from steering stop to steering stop?

^ Can the noise be repeated while on the hoist without the suspension loaded by repeatedly turning the steering wheel from steering stop to steering stop?

Typically, the twist in the frame can be induced by turning the steering wheel back and forth from steering stop to steering stop to duplicate the noise at the # 1 crossmember attachment. IF THE NOISE IS NOT DUPLICATED UNDER ONE OF THESE SITUATIONS, INVESTIGATE OTHER AREAS FOR THE NOISE BEFORE PROCEEDING TO REPAIR THE # 1 CROSSMEMBER RIVET.

3. INSPECT FRAME BOLTS FOR PROPER INSTALLATION TORQUE:

a. Inspect and tighten all front end components which bolt to the frame to confirm they are at the proper torque. This includes, but is not limited to:

^ Radius arm bracket bolts - 135 +/- 20 N-m (100 +/- 15 lb.ft.)

^ Axle pivot bracket bolts (torques vary by model - refer to the appropriate light truck Service Manual for proper torque specifications)

^ Bumper bracket bolts - (refer to the appropriate light truck Service Manual for proper torque specifications)

b. Inspect the transmission crossmember for proper alignment and bolt torques. If misaligned:

^ Loosen all transmission crossmember fasteners (including to the transmission).

^ Lift the transmission to remove any load on the crossmember.

^ Lift and reposition the transmission crossmember to be centered on the frame attachment holes.

^ Tighten all frame fasteners to the 63 +/- 9 N-m (46 +/- 7 lb.ft.).

^ Lower the transmission and tighten fasteners to 95 +/- 15 N-m (70 +/- 11 lb.ft.).

4. TEST DRIVE THE VEHICLE

Road test the vehicle again to duplicate the concern. If the noise is still present, continue.

5. INSPECT THE FRAME RIVETS

a. Repeat Step 2 to duplicate the noise in the garage.

b. Use a stethoscope or chassis ears to isolate the area of the chassis that the noise appears to be originating from. Areas to check include the shock tower rivets and all # 1 crossmember rivets.

6. SERVICE THE VEHICLE

a. If the noise appears to be from the lower left-front # 1 crossmember fastener, follow the procedure outlined below.

b. If the noise appears to be coming from another rivet (other than the lower left front # 1 crossmember rivet), refer to TSB 93-6-10 for the proper rivet repair procedure.

LOWER LEFT FRONT # 1 CROSSMEMBER RIVET REPLACEMENT:

NOTE:

THIS SERVICE PROCEDURE DOES NOT APPLY TO STEERING GEAR LINER REPLACEMENT. REFER TO TSB 90-11-10 FOR STEERING GEAR LINER REPAIR PROCEDURE.

1. Remove damaged or loose COLD HEAD RIVETS:

a. Drill a 1/8" (3.175 mm) hole through the rivet.

b. Redrill the same hole through the shank of the rivet with a 3/8" (9.525 mm) drill.

c. Remove the rivet head with an air chisel.

d. Drive out the rivet with a punch and hammer.

2. Remove damaged or loose "HUCK" RIVETS:

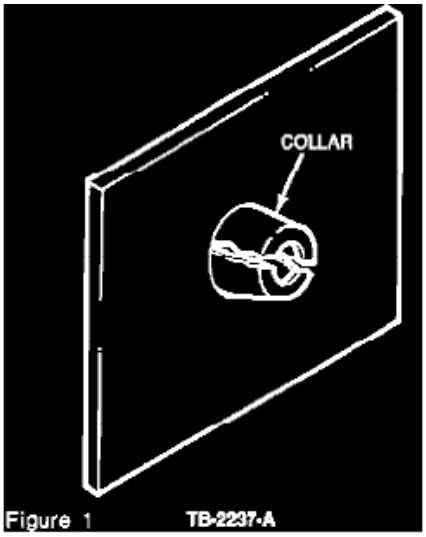
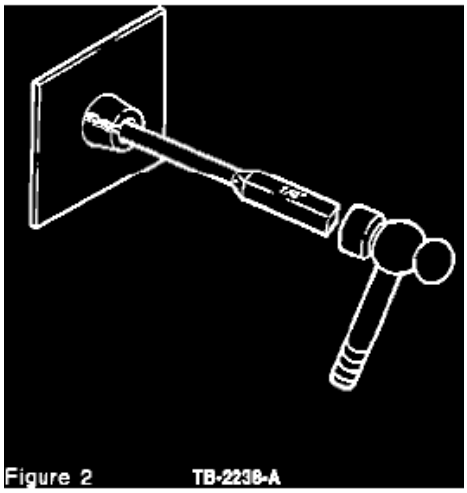
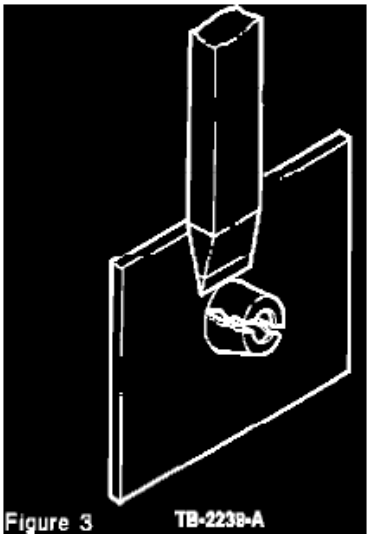


Figure 1 TB-2237-A

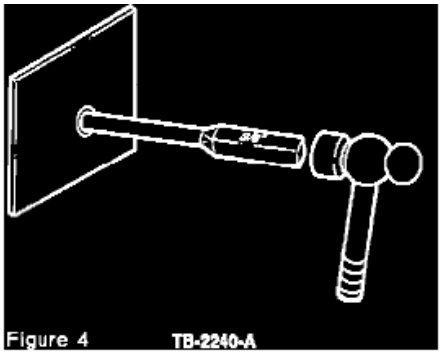

Figure 2 TB-2238-A

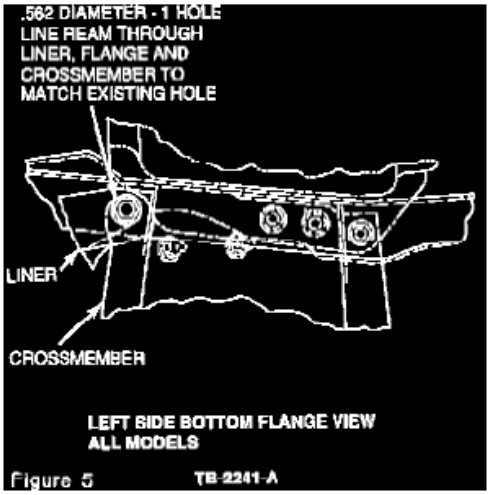

Figure 3 TB-2238-A

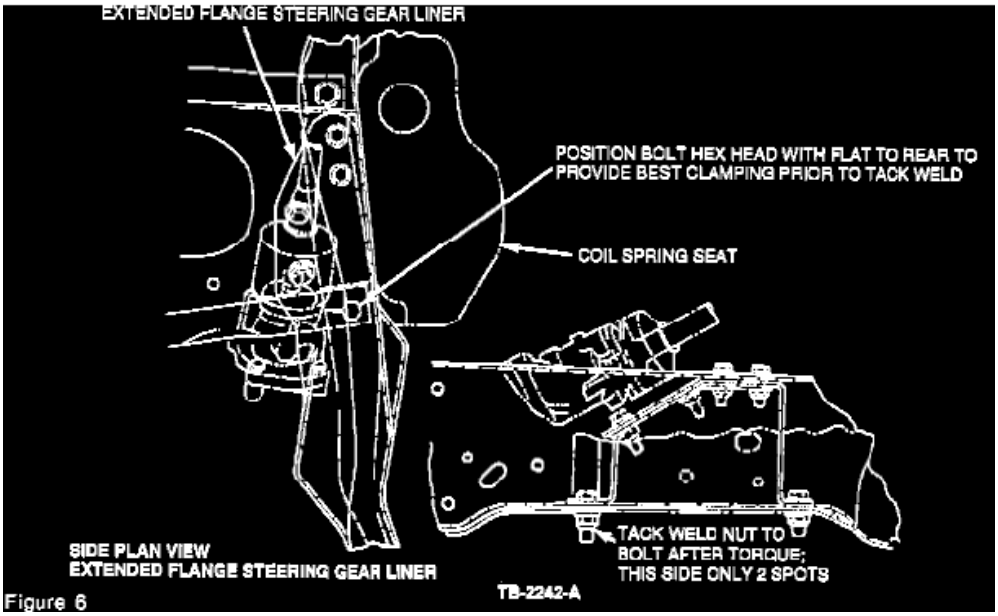
a. Use a flat chisel and hammer (or air chisel) to split the exposed collar of the huck fastener, Figure 1.

b. Knock the rivet pin out of the blind side with a 1/4" (6.35 mm) drift punch and hammer, Figure 2.

c. Cut the rivet's head off with a hammer and flat chisel, Figure 3.


Figure 4
TB-2240-A


.562 DIAMETER - 1 HOLE
LINE REAM THROUGH
LINER, FLANGE AND
CROSSMEMBER TO
MATCH EXISTING HOLE
LINER
CROSSMEMBER
LEFT SIDE BOTTOM FLANGE VIEW
ALL MODELS
Figure 5
TB-2241-A


EXTENDED FLANGE STEERING GEAR LINER
POSITION BOLT HEX HEAD WITH FLAT TO REAR TO PROVIDE BEST CLAMPING PRIOR TO TACK WELD
COIL SPRING SEAT
TACK WELD NUT TO BOLT AFTER TORQUE; THIS SIDE ONLY 2 SPOTS
SIDE PLAN VIEW
EXTENDED FLANGE STEERING GEAR LINER
TB-2242-A
Figure 6

d. Knock the sleeve out of the blind side with a 3/8" (9.525 mm) drift punch and hammer, Figure 4.

CAUTION:

REMOVAL OF THE FASTENER WITH A CUTTING TORCH IS NOT RECOMMENDED BECAUSE OF PROBABLE DAMAGE TO THE FRAME STRUCTURE.

3. Line ream the existing hole through the liner, frame flange and crossmember to 9/16" (14.228 mm), Figure 5.

4. Install a 9/16" Grade 8 nut (34990-S4), bolt (58698-S2) and washer (44880-S2), with nut/washer on the bottom, Figure 6.

a. Push the bolt into place using a brazing rod to hold the bolt.

PART NUMBER	PART NAME	CLASS
34990-S4	Nut 9/16 - 12 Hex (Pkg. 5)	RG
44880-S2	Washer 9/16 (Pkg. 12)	BG
58698-S2	Bolt 9/16-12 x 1.75" (Pkg. 4)	BG

b. Slide the bolt into the opening between the front face of the crossmember and frame liner.

c. Tighten the nut to 140 4-3 lb.ft. (190 4-4 N-m) and tack weld the nut to the bolt after tightening.

CAUTION:

DO NOT WELD THE NUT/WASHER TO THE FRAME.

OTHER APPLICABLE ARTICLES: 91-11-10

SUPERSEDES: 91-25-18

WARRANTY STATUS:

Eligible Under The Provisions Of Bumper To Bumper Warranty Coverage For 19 2-94 Models, Basic Warranty Coverage For All Other Models

OPERATION DESCRIPTION TIME

940813A Perform Diagnostics And 1.9 Hrs.

Replace Rivet

DEALER CODING

BASIC PART NO. CONDITION CODE

5005 56

OASIS CODES: 305000, 390000, 702000, 702100

Cross-Member: All Technical Service Bulletins Frame/Crossmember - Snapping/Popping Noise

Article No. 94-8-13

^ FRAME - # 1 CROSSMEMBER - RIVET REPLACEMENT

^ NOISE - "POPPING/CREAKING" SOUNDS - FRAME # 1 CROSSMEMBER

LIGHT TRUCK: 1980-94 BRONCO, F-150-350 SERIES 1988-94 F SUPER DUTY, F-47

This TSB article is being republished in its entirety to add certain 1992/94 model year vehicles, to revise the nut specified in the article and its torque specification, and to expand the diagnostic and repair procedures contained in the article.

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A "popping/creaking" sound may come from the area of the # 1 crossmember attachment to the left frame rail. This occurs because of a slip/stick motion at a loose rivet in the lower flange of the frame near the steering gear. The rivet could be either a standard cold head rivet in light duty applications or a "huck" rivet, which has the appearance of a large "pop" Civet.

ACTION:

Use the following diagnostic procedure to determine if the noise is originating in this rivet area. If so, replace the rivet with a nut, bolt and washer assembly. The revised parts increase the clamp load at the joint, minimizing the motion that causes the noise. Refer to the following procedure for service details.

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Various front underbody noises may originate from several different sources. Several noises have been misdiagnosed as # 1 crossmember rivet "pop/creak" because the noise tends to propagate to the shock tower area and the shock tower area acts as an amplifier such that the noises all appear to be coming from that area. Other underbody areas that produce similar noises include:

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^ loose radius arm brackets

^ loose axle pivot brackets

Other service bulletins have been published to address the proper repair of these concerns.

DESCRIPTION OF # 1 CROSSMEMBER NOISES:

"Pop/creak" - A metal-to-metal rubbing motion which slip/sticks when a twist is induced into the frame.

DIAGNOSTIC PROCEDURE:

1. INTERVIEW THE CUSTOMER:

a. Understand the customer's description of the noise and of the conditions under which it is heard.

b. Road test the vehicle with the customer to fully understand where, how and when the noise occurs.

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3. INSPECT FRAME BOLTS FOR PROPER INSTALLATION TORQUE:

a. Inspect and tighten all front end components which bolt to the frame to confirm they are at the proper torque. This includes, but is not limited to:

^ Radius arm bracket bolts - 135 +/- 20 N-m (100 +/- 15 lb.ft.)

^ Axle pivot bracket bolts (torques vary by model - refer to the appropriate light truck Service Manual for proper torque specifications)

^ Bumper bracket bolts - (refer to the appropriate light truck Service Manual for proper torque specifications)

b. Inspect the transmission crossmember for proper alignment and bolt torques. If misaligned:

^ Loosen all transmission crossmember fasteners (including to the transmission).

^ Lift the transmission to remove any load on the crossmember.

^ Lift and reposition the transmission crossmember to be centered on the frame attachment holes.

^ Tighten all frame fasteners to the 63 +/- 9 N-m (46 +/- 7 lb.ft.).

^ Lower the transmission and tighten fasteners to 95 +/- 15 N-m (70 +/- 11 lb.ft.).

4. TEST DRIVE THE VEHICLE

Road test the vehicle again to duplicate the concern. If the noise is still present, continue.

5. INSPECT THE FRAME RIVETS

a. Repeat Step 2 to duplicate the noise in the garage.

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LOWER LEFT FRONT # 1 CROSSMEMBER RIVET REPLACEMENT:

NOTE:

THIS SERVICE PROCEDURE DOES NOT APPLY TO STEERING GEAR LINER REPLACEMENT. REFER TO TSB 90-11-10 FOR STEERING GEAR LINER REPAIR PROCEDURE.

1. Remove damaged or loose COLD HEAD RIVETS:

a. Drill a 1/8" (3.175 mm) hole through the rivet.

b. Redrill the same hole through the shank of the rivet with a 3/8" (9.525 mm) drill.

c. Remove the rivet head with an air chisel.

d. Drive out the rivet with a punch and hammer.

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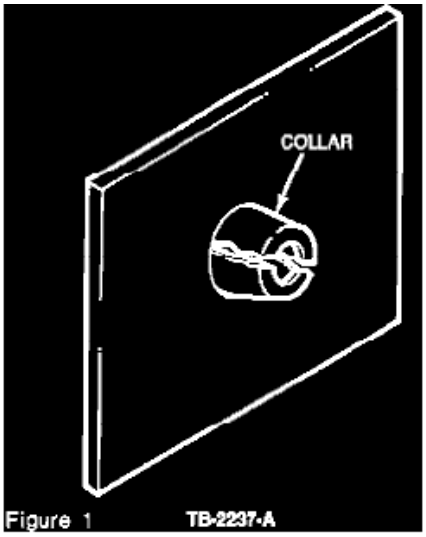
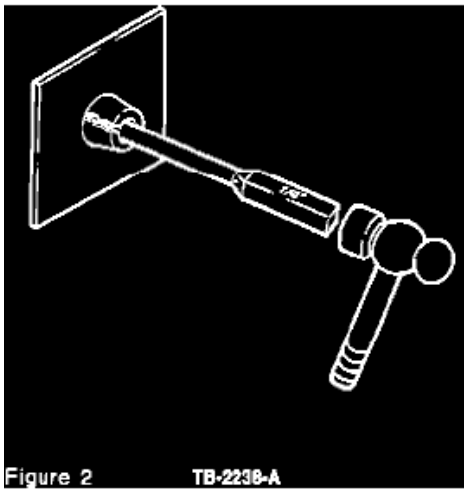
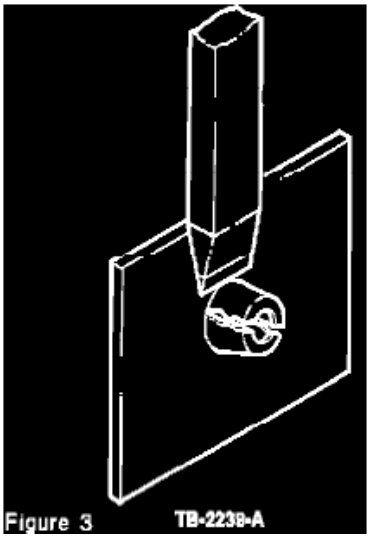


Figure 1 TB-2237-A

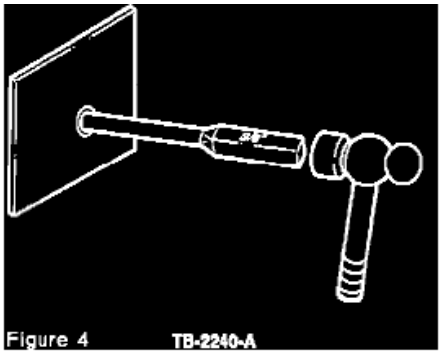

Figure 2 TB-2238-A

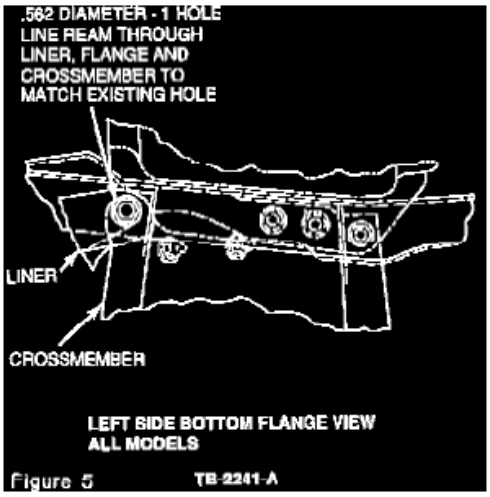

Figure 3 TB-2238-A

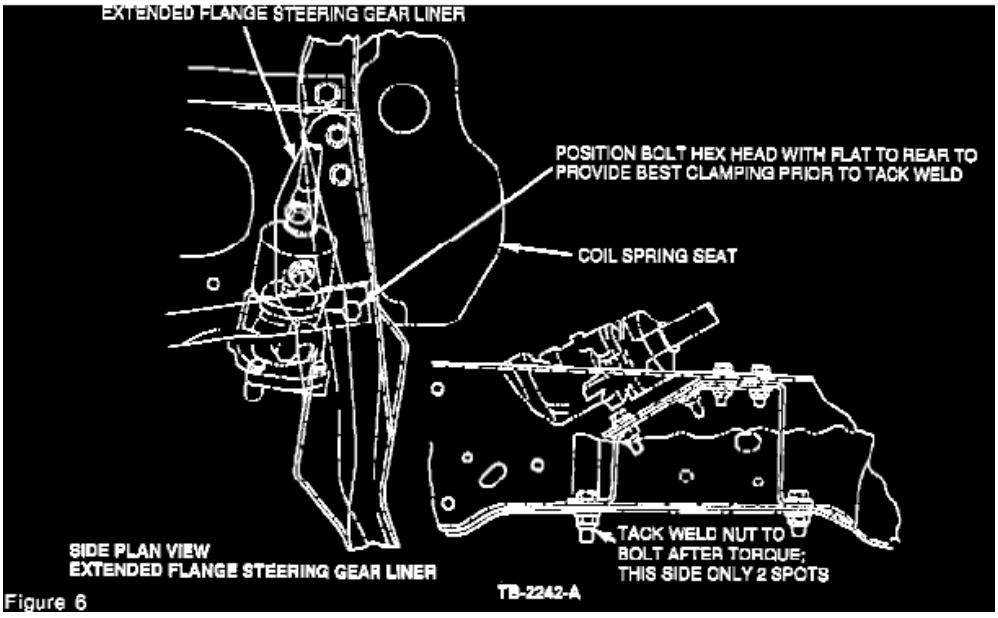
a. Use a flat chisel and hammer (or air chisel) to split the exposed collar of the huck fastener, Figure 1.

b. Knock the rivet pin out of the blind side with a 1/4" (6.35 mm) drift punch and hammer, Figure 2.

c. Cut the rivet's head off with a hammer and flat chisel, Figure 3.







d. Knock the sleeve out of the blind side with a 3/8" (9.525 mm) drift punch and hammer, Figure 4.

CAUTION:

REMOVAL OF THE FASTENER WITH A CUTTING TORCH IS NOT RECOMMENDED BECAUSE OF PROBABLE DAMAGE TO THE FRAME STRUCTURE.

3. Line ream the existing hole through the liner, frame flange and crossmember to 9/16" (14.228 mm), Figure 5.

4. Install a 9/16" Grade 8 nut (34990-S4), bolt (58698-S2) and washer (44880-S2), with nut/washer on the bottom, Figure 6.

a. Push the bolt into place using a brazing rod to hold the bolt.

PART NUMBER	PART NAME	CLASS
34990-S4	Nut 9/16 - 12 Hex (Pkg. 5)	RG
44880-S2	Washer 9/16 (Pkg. 12)	BG
58698-S2	Bolt 9/16-12 x 1.75" (Pkg. 4)	BG

b. Slide the bolt into the opening between the front face of the crossmember and frame liner.

c. Tighten the nut to 140 4-3 lb.ft. (190 4-4 N-m) and tack weld the nut to the bolt after tightening.

CAUTION:

DO NOT WELD THE NUT/WASHER TO THE FRAME.

OTHER APPLICABLE ARTICLES: 91-11-10

SUPERSEDES: 91-25-18

WARRANTY STATUS:

Eligible Under The Provisions Of Bumper To Bumper Warranty Coverage For 19 2-94 Models, Basic Warranty Coverage For All Other Models

OPERATION DESCRIPTION TIME

940813A Perform Diagnostics And 1.9 Hrs.

Replace Rivet

DEALER CODING

BASIC PART NO. CONDITION CODE

5005 56

OASIS CODES: 305000, 390000, 702000, 702100

Ford Bronco Workshop Manual (V8-351 5.8L VIN G 2-bbl (1982))
Ford Workshop Manuals > Steering and Suspension > Suspension > Cross-Member > Component Information > Technical Service Bulletins > All Technical Service Bulletins for Cross-Member: > 831818 > Sep > 83 > Suspension - #1 Crossmember Service Replacement

Cross-Member: All Technical Service Bulletins Suspension - #1 Crossmember Service Replacement

Artile No. 83-18-18

FRAME - #1 CROSSMEMBER - SERVICE REPLACEMENT

LIGHT TRUCKS 1980-83 F100-350, BRONCO; 1975-83 ECONOLINE

Number 1 crossmember kits are now available for usage where damaged crossmembers require complete replacement. The kits will service all vehicles except HD F-250/350 with 6.9L or 7.5L engines.

The kits include detailed installation instructions and necessary fasteners to assure a durable replacement.

In instances where the crossmember has minimal damage confined to areas surrounding the pivot brackets, complete replacement may not be required. In these cases, your District Zone Service Manager should be contacted regarding the potential usage of a reinforcing kit instead of complete replacement of the crossmember.

PART NUMBER PART NAME CLASS

D5UZ-5C139-A Kit - #1 Crossmember C

Econoline

E0TZ-5C139-A Kit - #1 Crossmember C

Bronco, F100-350 (Coil Springs) (except 6.9L, 7.5L engines)

E0TZ-5C139-B Kit - #1 Crossmember C

F-250/350 (4x4) (leaf springs) (except 6.9L, 7.5L engines)

OTHER APPLICABLE ARTICLES: None WARRANTY STATUS: "INFORMATION ONLY"

Cross-Member: All Technical Service Bulletins Suspension - #1 Crossmember Service Replacement

Artile No. 83-18-18

FRAME - #1 CROSSMEMBER - SERVICE REPLACEMENT

LIGHT TRUCKS 1980-83 F100-350, BRONCO; 1975-83 ECONOLINE

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Econoline

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Bronco, F100-350 (Coil Springs) (except 6.9L, 7.5L engines)

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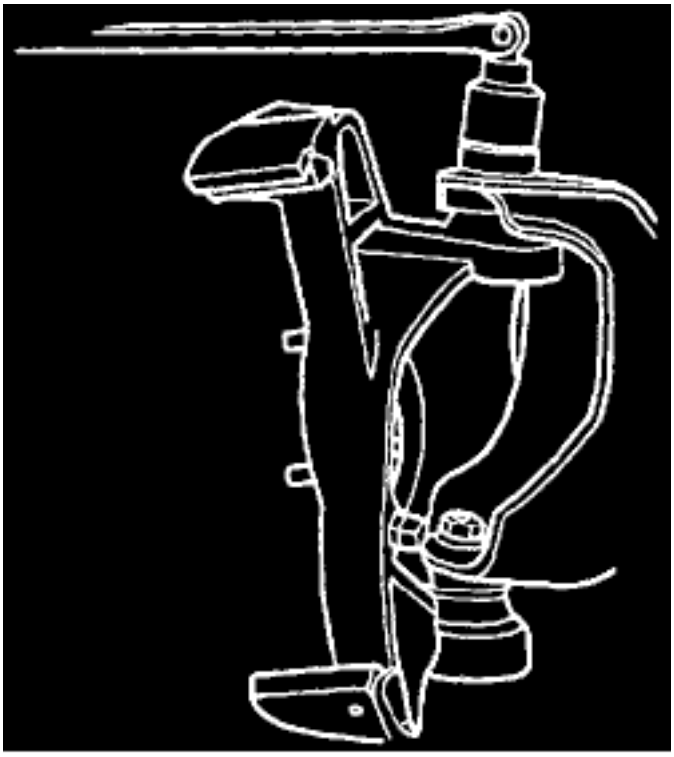
F-250/350 (4x4) (leaf springs) (except 6.9L, 7.5L engines)

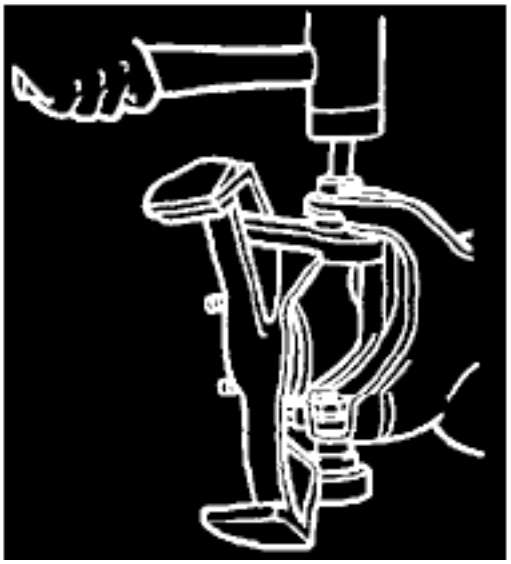
OTHER APPLICABLE ARTICLES: None WARRANTY STATUS: "INFORMATION ONLY"

Front Steering Knuckle: Specifications

Lower Ball Joint ..... 90-110 ft-lbs Upper Ball Joint ..... 100 ft-lbs [1]

[1] 100 ft-lbs MINIMUM, advance the Upper Ball Joint nut to the next castellation, and install new cotter pin.





Front Steering Knuckle: Service and Repair

Ball Joint Service

Ball Joint Service

REMOVE

1. Remove brake rotor, axle shaft and spindle from steering knuckle. 2. Disconnect tie rod from steering arm. 3. Remove upper ball joint nut and loosen lower ball joint nut. Strike upper ball joint stud to loosen ball joints. 4. Remove lower ball joint nut and remove knuckle from yoke tube. 5. Remove camber adjuster bushing from tube and yoke assembly.

INSTALL

1. Install knuckle onto tube and yoke assembly, then install camber adjusting bushing with arrow pointing outward for positive camber or towards

center of vehicle for negative camber.

2. Install new lower ball joint nut and torque to Specifications. See: Specifications 3. Install new upper ball joint nut and torque to Specifications. See: Specifications 4. Advance upper ball joint nut to next castellation, and install new cotter pin. 5. Install brake rotor, axle shaft and spindle.

PART NUMBER	PART NAME	CLASS
F2TZ-3B186-A	Radius Arm Bushing	B
F2TZ-3B203-A	Front Pivot Bushing, LH	B
F2TZ-3B203-B	Front Pivot Bushing, RH	B
E5TZ-3B244-A	Rear Bushing Spacer	AM
D9TZ-3B203-A	Rear Bushing	AM

Radius Arm Bushing: Customer Interest Steering - Pulls Left When Braking

Article No. 92-18-10

08/26/92

STEERING - LEFT DRIFT OR PULL DURING BRAKING - "RECESSION STEER" - F-SERIES 4X2 LIGHT DUTY AND F-150/BRONCO 4X4

LIGHT TRUCK: 1980-92 BRONCO, F-150 1989-92 F-250

ISSUE: The vehicle may drift or pull left during braking, with no torque in the steering wheel. This condition is known as "recession steer" and may be caused by the radius arm front pivot bushings.

ACTION: Confirm that "recession steer" exists and, if necessary, replace the left hand radius arm bushing with the flat front retainer and both front pivot bushings. Refer to the following procedure for service details.

NOTE: THIS PROCEDURE CAN ONLY BE USED IN CONJUNCTION WITH TSB 91-21-8 TO COMPLETELY RESOLVE THIS CONDITION.

IDENTIFY CONCERN

Confirm that "recession steer" exists and segregate it from possible brake pull.

^ "Recession steer" must be correctly identified and segregated from brake pull. "Recession steer" is identified by the vehicle drifting or pulling left during braking with no torque felt in the steering wheel.

^ With the right hand radius arm pivot bracket bolted on, as in current production, and no brake imbalance (correctly performing TSB 91-21-8 will assure this), the amount of left drift that could result from "recession steer", if corrective steering wheel input is not applied, during a moderate hard stop from 50 mph (80 km /h), is no more than 4 feet (1.2 m). The revised bushings are designed to correct this magnitude of "recession steer".

REMOVAL AND REPLACEMENT

Refer to the to the 1992 F-Series And Bronco Service Manual, Section 04-01A, for removal and replacement of the following components.

1. Replace the left hand (driver's side) radius arm bushing cupped front retainer with the flat front retainer (F2TZ-3B186-A).

2. Replace the left hand (driver's side) radius arm front pivot bushing with the new bushing (F2TZ-3B203-A). It is yellow in color with "LEFT HAND ONLY" molded in the front face.

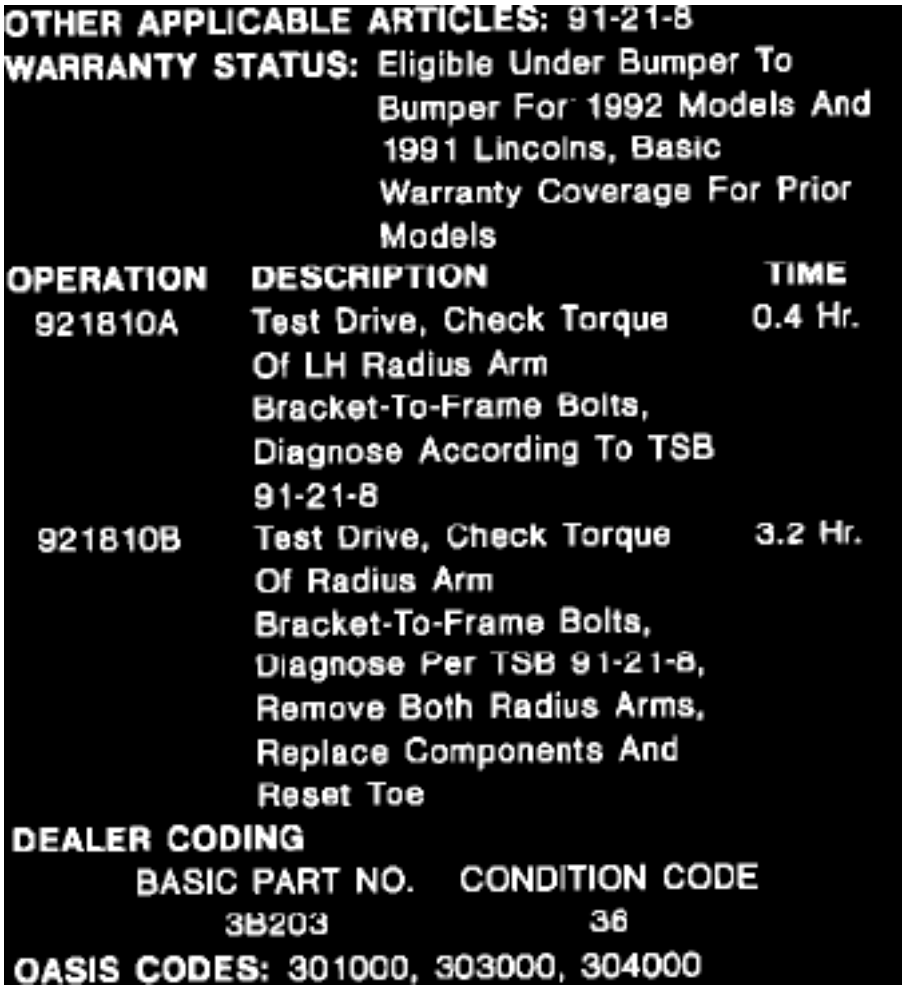
3. Replace the right hand (passenger side) radius arm front pivot bushing with a new bushing (F2TZ-3B203-B).

NOTE: REUSE THE ORIGINAL NYLON REAR BUSHING SPACER AND REAR BUSHING, UNLESS EXCESSIVE WEAR IS FOUND. REPLACE WITH (E5TZ-3B244-A) AND (D9TZ-3B203-A) RESPECTIVELY, IF REPLACEMENT IS NECESSARY. TIGHTEN BOTH THE LEFT HAND AND RIGHT HAND RADIUS ARM NUTS TO THE SPECIFIED 80-120 LB.FT. (109-163 N-m).

4. Set total toe to 1/32" (.794 mm) toe in.

PART NUMBER

NOTE: TIMES FOR TSB 91-21-8 DIAGNOSTICS WILL VARY DEPENDING ON WHAT IS FOUND. THEREFORE, DIAGNOSTIC TIME IS NOT INCLUDED. REFER TO TSB 91-21-8 FOR DIAGNOSTIC TIMES.



OTHER APPLICABLE ARTICLES: 91-21-8
WARRANTY STATUS: Eligible Under Bumper To Bumper For 1992 Models And 1991 Lincolns, Basic Warranty Coverage For Prior Models

OPERATION	DESCRIPTION	TIME
921810A	Test Drive, Check Torque Of LH Radius Arm Bracket-To-Frame Bolts, Diagnose According To TSB 91-21-8	0.4 Hr.
921810B	Test Drive, Check Torque Of Radius Arm Bracket-To-Frame Bolts, Diagnose Per TSB 91-21-8, Remove Both Radius Arms, Replace Components And Reset Toe	3.2 Hr.

DEALER CODING

BASIC PART NO.	CONDITION CODE
3B203	36

OASIS CODES: 301000, 303000, 304000

OPERATION DESCRIPTION

PART NUMBER	PART NAME	CLASS
F2TZ-3B186-A	Radius Arm Bushing	B
F2TZ-3B203-A	Front Pivot Bushing, LH	B
F2TZ-3B203-B	Front Pivot Bushing, RH	B
E5TZ-3B244-A	Rear Bushing Spacer	AM
D9TZ-3B203-A	Rear Bushing	AM

Radius Arm Bushing: All Technical Service Bulletins Steering - Pulls Left When Braking

Article No. 92-18-10

08/26/92

STEERING - LEFT DRIFT OR PULL DURING BRAKING - "RECESSION STEER" - F-SERIES 4X2 LIGHT DUTY AND F-150/BRONCO 4X4

LIGHT TRUCK: 1980-92 BRONCO, F-150 1989-92 F-250

ISSUE: The vehicle may drift or pull left during braking, with no torque in the steering wheel. This condition is known as "recession steer" and may be caused by the radius arm front pivot bushings.

ACTION: Confirm that "recession steer" exists and, if necessary, replace the left hand radius arm bushing with the flat front retainer and both front pivot bushings. Refer to the following procedure for service details.

NOTE: THIS PROCEDURE CAN ONLY BE USED IN CONJUNCTION WITH TSB 91-21-8 TO COMPLETELY RESOLVE THIS CONDITION.

IDENTIFY CONCERN

Confirm that "recession steer" exists and segregate it from possible brake pull.

^ "Recession steer" must be correctly identified and segregated from brake pull. "Recession steer" is identified by the vehicle drifting or pulling left during braking with no torque felt in the steering wheel.

^ With the right hand radius arm pivot bracket bolted on, as in current production, and no brake imbalance (correctly performing TSB 91-21-8 will assure this), the amount of left drift that could result from "recession steer", if corrective steering wheel input is not applied, during a moderate hard stop from 50 mph (80 km /h), is no more than 4 feet (1.2 m). The revised bushings are designed to correct this magnitude of "recession steer".

REMOVAL AND REPLACEMENT

Refer to the to the 1992 F-Series And Bronco Service Manual, Section 04-01A, for removal and replacement of the following components.

1. Replace the left hand (driver's side) radius arm bushing cupped front retainer with the flat front retainer (F2TZ-3B186-A).

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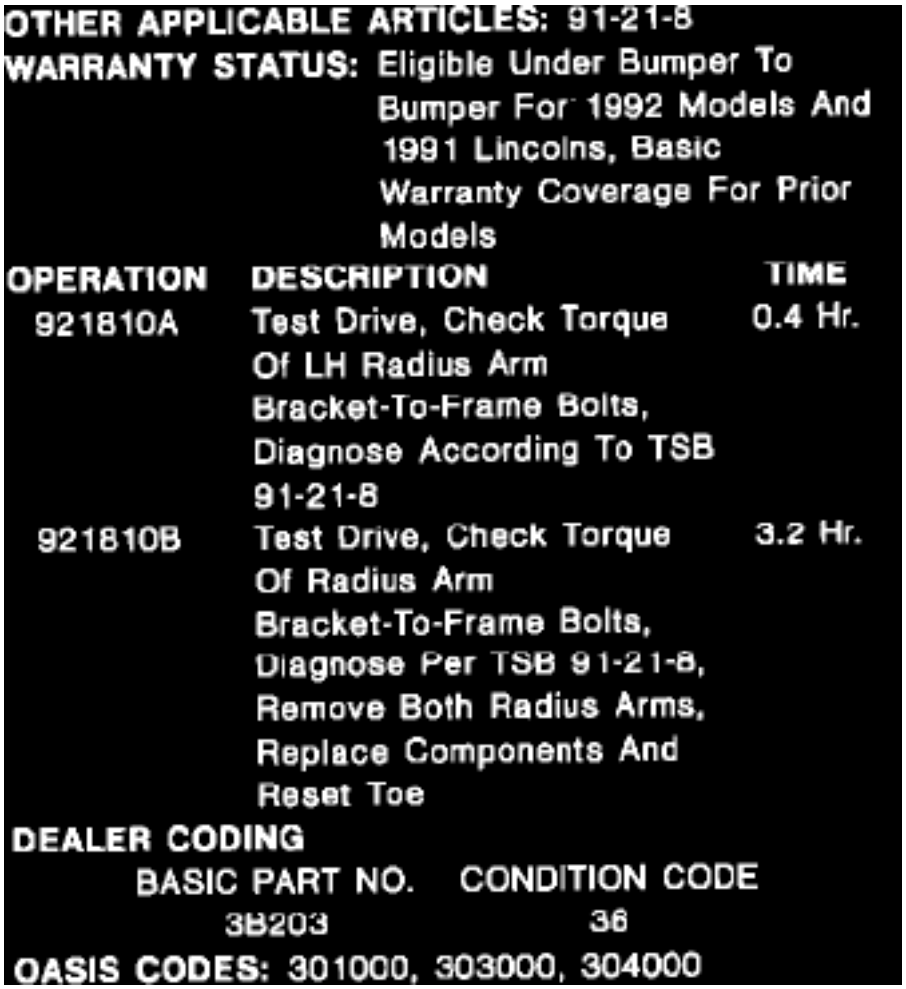
3. Replace the right hand (passenger side) radius arm front pivot bushing with a new bushing (F2TZ-3B203-B).

NOTE: REUSE THE ORIGINAL NYLON REAR BUSHING SPACER AND REAR BUSHING, UNLESS EXCESSIVE WEAR IS FOUND. REPLACE WITH (E5TZ-3B244-A) AND (D9TZ-3B203-A) RESPECTIVELY, IF REPLACEMENT IS NECESSARY. TIGHTEN BOTH THE LEFT HAND AND RIGHT HAND RADIUS ARM NUTS TO THE SPECIFIED 80-120 LB.FT. (109-163 N-m).

4. Set total toe to 1/32" (.794 mm) toe in.

PART NUMBER

NOTE: TIMES FOR TSB 91-21-8 DIAGNOSTICS WILL VARY DEPENDING ON WHAT IS FOUND. THEREFORE, DIAGNOSTIC TIME IS NOT INCLUDED. REFER TO TSB 91-21-8 FOR DIAGNOSTIC TIMES.



OTHER APPLICABLE ARTICLES: 91-21-8
WARRANTY STATUS: Eligible Under Bumper To Bumper For 1992 Models And 1991 Lincolns, Basic Warranty Coverage For Prior Models

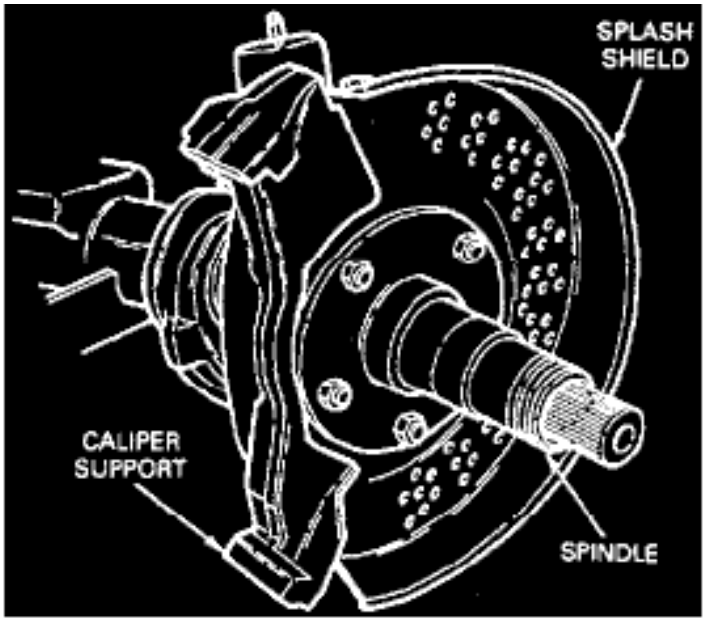
OPERATION	DESCRIPTION	TIME
921810A	Test Drive, Check Torque Of LH Radius Arm Bracket-To-Frame Bolts, Diagnose According To TSB 91-21-8	0.4 Hr.
921810B	Test Drive, Check Torque Of Radius Arm Bracket-To-Frame Bolts, Diagnose Per TSB 91-21-8, Remove Both Radius Arms, Replace Components And Reset Toe	3.2 Hr.

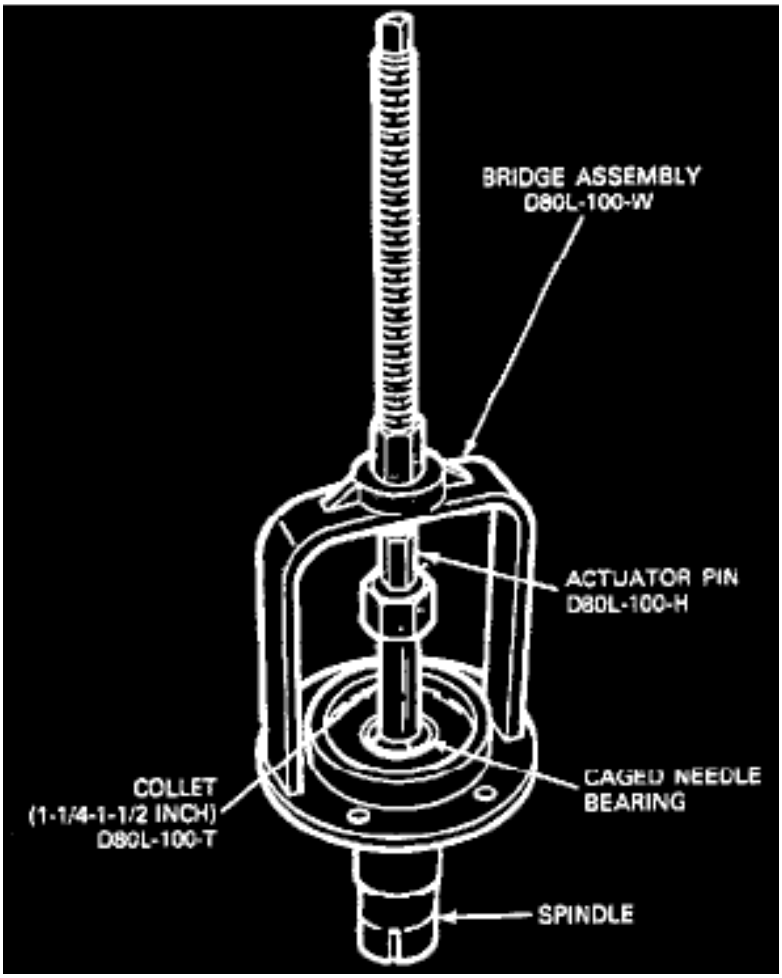
DEALER CODING

BASIC PART NO.	CONDITION CODE
3B203	36

OASIS CODES: 301000, 303000, 304000

OPERATION DESCRIPTION


SPLASH SHIELD
CALIPER SUPPORT
SPINDLE


BRIDGE ASSEMBLY D80L-100-W
ACTUATOR PIN D80L-100-H
CAGED NEEDLE BEARING
COLLET (1-1/4-1-1/2 INCH) D80L-100-T
SPINDLE

Spindle: Service and Repair

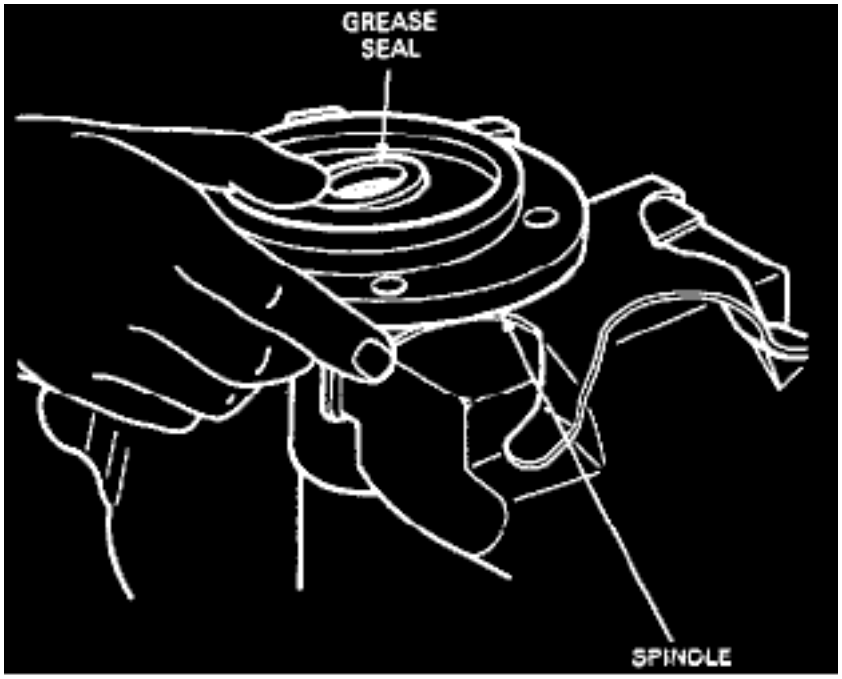
Axle Shaft Service

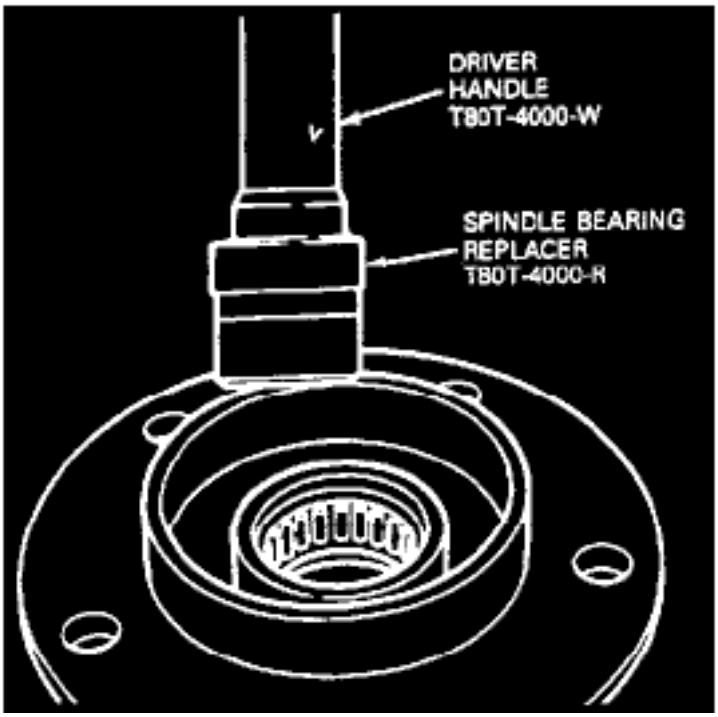
Axle Shaft Service

REMOVE

1. Wheel and Tire assembly 2. Remove the Caliper assembly and Brake Rotor. Refer to Disc Brake System. 3. Remove the nuts retaining the spindle to the knuckle. Lightly tap the spindle with a rawhide hammer to remove it from the knuckle. 4. If required, remove the caged needle bearing from the spindle. Remove the seal. Pull the bearing out of the spindle using Collet (1-1/2 to 1-3/4

inch), D80L-100-T, Actuator Pin, D80L-100-H and Bridge Assembly, D80L-100-W or equivalents.





Axle Shaft Service

Axle Shaft Service

INSTALL

1. If removed, position a new caged needle bearing in the spindle bore. The writing on the bearing must face the rear of the spindle, toward the

driving tool. Drive the bearing in the spindle with Spindle Bearing Replacer, T80T-4000-R and Driver Handle, T80T-4000-W or their equivalents. Pack the bearing with High Temperature (4x4) Front Axle and Wheel Bearing Grease, E8TZ- 19590-A (ESA-M1C198-A) or equivalent. Install the seal in the bore against the bearing.

2. Pack the thrust face of seal in the spindle bore and the V-seal on the axle shaft with High Temperature (4x4) Front Axle and Wheel Bearing

Grease E8TZ-19590-A (ESA-M1C198-A) or equivalent.

3. Place the spindle on the steering knuckle. Install the nuts and tighten to 68-81 Nm (50-60 ft lb). 4. Install the hub and rotor assembly on the spindle, inspecting the wheel bearings, and ensuring adequate lubrication with High Temperature (4x4)

Front Axle and Wheel Bearing Grease, E8TA-19590-A (ESA-M10198-A) or equivalent.

5. Install the inner locknut on the spindle and seat the bearing by tightening the locknut to 68 Nm (50 ft lb) with Spanner Locknut Wrench, D85T-1

197-A or equivalent.

6. Back off the inner locknut and retighten to 41-54 Nm (31-39 ft lb) while rotating the hub and rotor. 7. Back off the locknut 90 degrees. 8. Install the lockwasher so the key is positioned in the spindle groove. Tighten the inner locknut so the pin is aligned into the nearest hole in the

lockwasher.

9. Install the outer locknut and tighten to 217-278 Nm (160-205 ft lb) using Spanner locknut Wrench, D85T-1 197-A.

NOTE: The final wheel bearing end play should be 0.00-0. 15mm (0.000-0.004 inch). The maximum allowable torque to rotate the hub is 2.3 Nm (20 in lb).

10. Install the locking hub body assembly in the hub and rotor. 12. Install the lock ring in the hub groove to retain the hublock body in the hub. 13. Install the snap ring on the end of the axle shaft to retain the shaft to the body. 14. Position the cap assembly with new seal on the body. Install the six allen-head capscrews and tighten to 4.0-6.0 Nm (35-45 in lb).

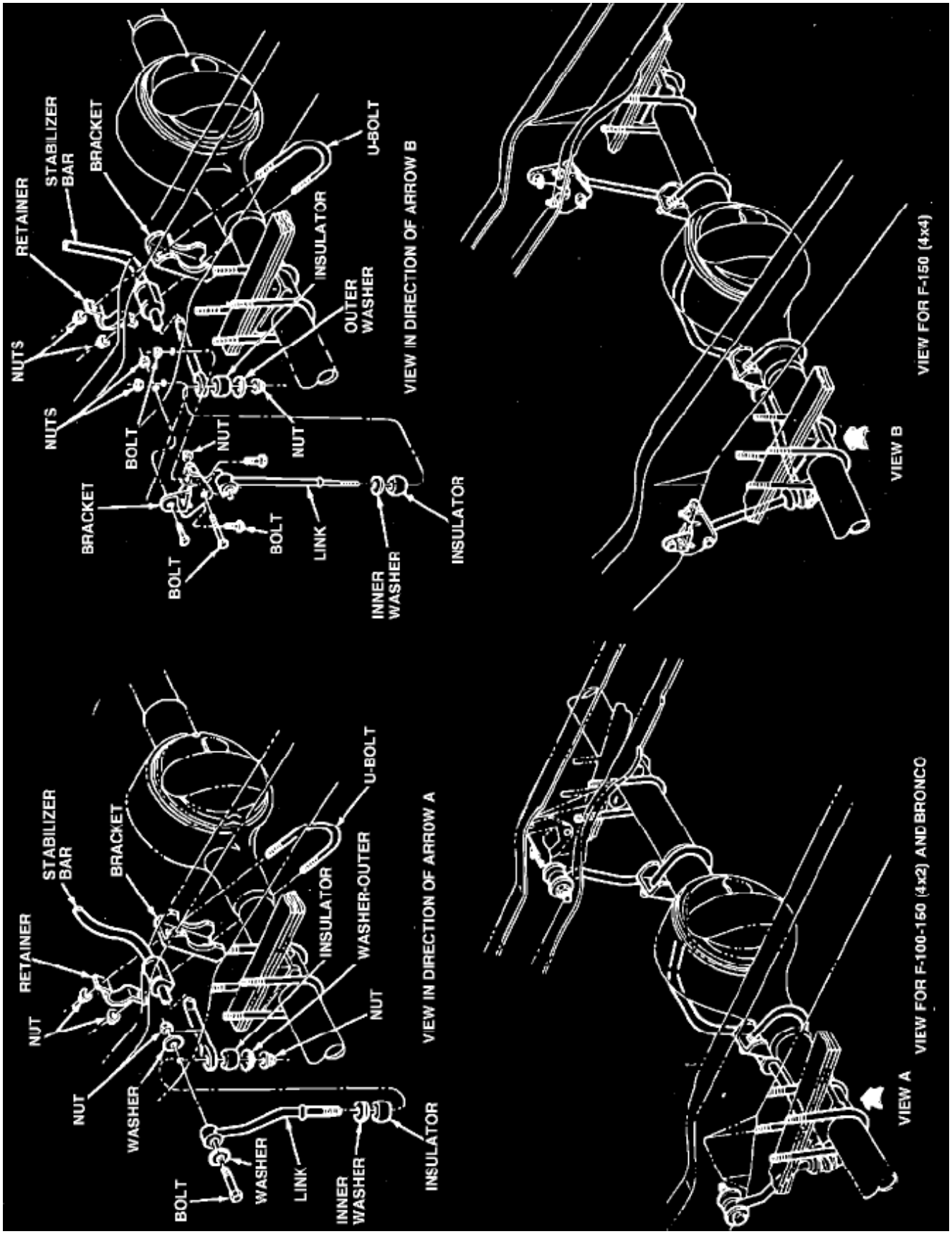
Stabilizer Bar: Service and Repair Front

1. Disconnect both ends of stabilizer bar from link assembly on I-beam bracket.

2. On 1986---87 F-350 models equipped with Dana 60 Monobeam axle, remove nuts, washers and bolts securing links to mounting brackets.

3. Remove stabilizer bar attaching bolts and the stabilizer bar. On 1980---87 F-150 4 4 and Bronco models, the coil spring must be removed to facilitate removal of the stabilizer bar mounting bracket.

4. Reverse procedure to install.


RETAINER
STABILIZER BAR
BRACKET
NUTS
U-BOLT
INSULATOR
OUTER WASHER
VIEW IN DIRECTION OF ARROW B
BRACKET
BOLT
NUT
BOLT
LINK
INNER WASHER
INSULATOR
VIEW B
VIEW FOR F-150 (4x4)
NUT
RETAINER
STABILIZER BAR
BRACKET
U-BOLT
WASHER-OUTER
INSULATOR
NUT
VIEW IN DIRECTION OF ARROW A
NUT
WASHER
BOLT
WASHER
LINK
INNER WASHER
INSULATOR
VIEW A
VIEW FOR F-100-150 (4x2) AND BRONCO

Stabilizer Bar: Service and Repair Rear

Fig. 6 Stabilizer bar replacement. 1981---87 F-100---150 & Bronco

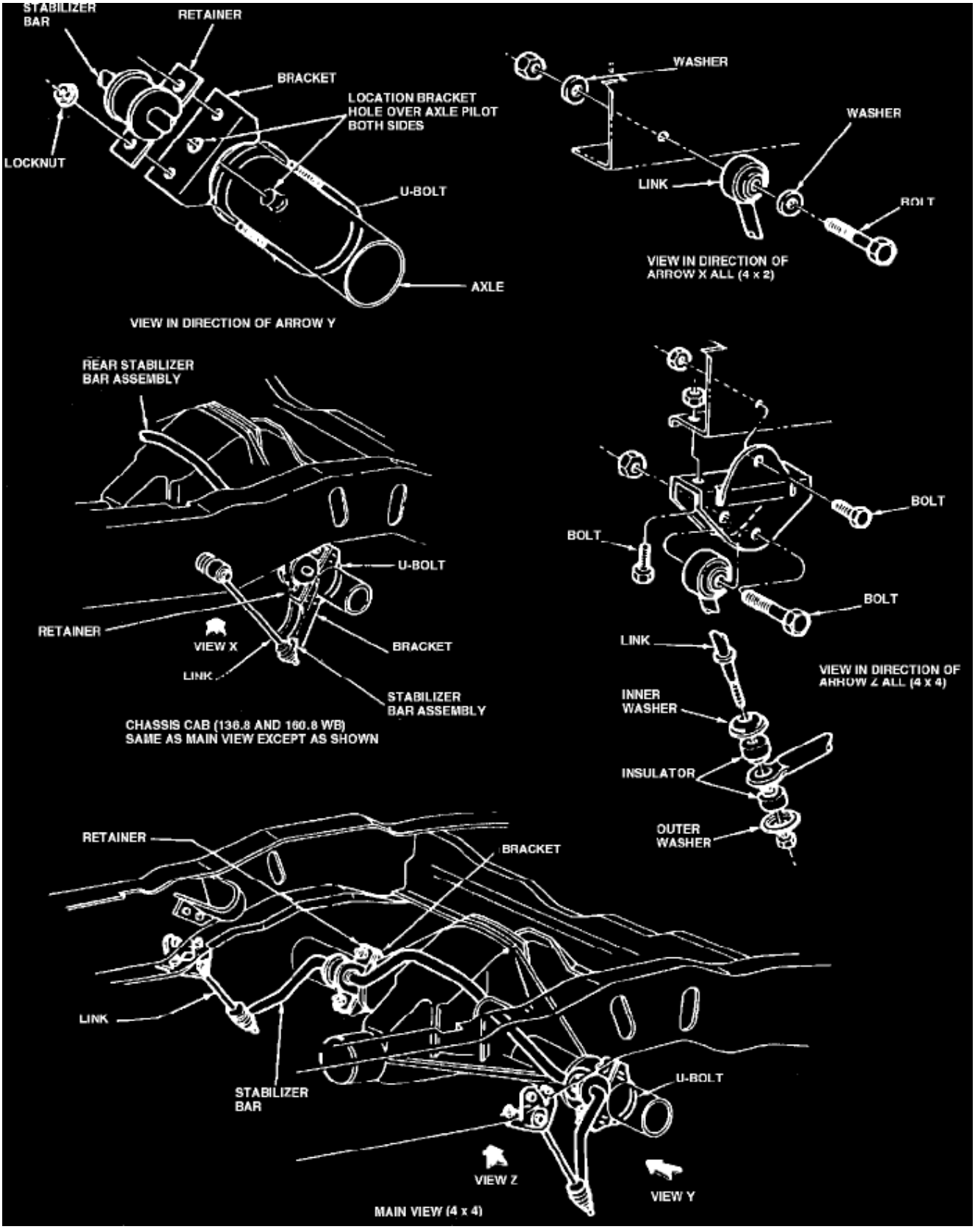

STABILIZER BAR
RETAINER
BRACKET
LOCATION BRACKET HOLE OVER AXLE PILOT BOTH SIDES
LOCKNUT
U-BOLT
AXLE
VIEW IN DIRECTION OF ARROW Y
WASHER
WASHER
LINK
BOLT
VIEW IN DIRECTION OF ARROW X ALL (4 x 2)
REAR STABILIZER BAR ASSEMBLY
U-BOLT
RETAINER
VIEW X
BRACKET
LINK
STABILIZER BAR ASSEMBLY
CHASSIS CAB (136.8 AND 160.8 WB) SAME AS MAIN VIEW EXCEPT AS SHOWN
BOLT
BOLT
BOLT
LINK
INNER WASHER
INSULATOR
OUTER WASHER
VIEW IN DIRECTION OF ARROW Z ALL (4 X 4)
RETAINER
BRACKET
LINK
STABILIZER BAR
U-BOLT
VIEW Z
VIEW Y
MAIN VIEW (4 x 4)

Fig. 7 Stabilizer bar replacement. 1981---87 F-250---350

1981---87 F-100---350 & BRONCO

1. Remove nut from lower end of stabilizer link, Figs. 6 and 7.

2. Remove outer washer and insulator, then disconnect stabilizer from link.

3. Remove inner insulators and washers.

4. Remove stabilizer link attaching nuts and bolts, then disconnect link from frame.

5. Remove U-bolt, bracket and retainer attaching nuts, then the stabilizer bar from vehicle.

6. Reverse procedure to install.

Subframe: Technical Service Bulletins Suspension - #1 Crossmember Service Replacement

Artile No. 83-18-18

FRAME - #1 CROSSMEMBER - SERVICE REPLACEMENT

LIGHT TRUCKS 1980-83 F100-350, BRONCO; 1975-83 ECONOLINE

Number 1 crossmember kits are now available for usage where damaged crossmembers require complete replacement. The kits will service all vehicles except HD F-250/350 with 6.9L or 7.5L engines.

The kits include detailed installation instructions and necessary fasteners to assure a durable replacement.

In instances where the crossmember has minimal damage confined to areas surrounding the pivot brackets, complete replacement may not be required. In these cases, your District Zone Service Manager should be contacted regarding the potential usage of a reinforcing kit instead of complete replacement of the crossmember.

PART NUMBER PART NAME CLASS

D5UZ-5C139-A Kit - #1 Crossmember C

Econoline

E0TZ-5C139-A Kit - #1 Crossmember C

Bronco, F100-350 (Coil Springs) (except 6.9L, 7.5L engines)

E0TZ-5C139-B Kit - #1 Crossmember C

F-250/350 (4x4) (leaf springs) (except 6.9L, 7.5L engines)

OTHER APPLICABLE ARTICLES: None WARRANTY STATUS: "INFORMATION ONLY"

Ford Bronco Workshop Manual (V8-351 5.8L VIN G 2-bbl (1982))
Ford Workshop Manuals > Steering and Suspension > Suspension > Suspension Spring (Coil / Leaf) > Component Information > Service and Repair > Rear

Suspension Spring (Coil / Leaf): Service and Repair Rear

F-100---350 & BRONCO

1. Raise and support rear of vehicle to a point where weight is relieved from rear springs and tires are still in contact with floor.

2. Remove spring U-bolts, and if equipped, the auxiliary spring and spacer.

3. Remove spring-to-bracket attaching nut and bolt from front of spring.

4. Remove upper and lower shackle attaching nuts and bolts from rear of spring, then lower spring and shackle assembly from vehicle.

5. Reverse procedure to install.

Suspension Spring (Coil / Leaf): Service and Repair Coil Spring

F-150 4 WHEEL DRIVE MODELS & BRONCO

1. Raise and support vehicle.

2. Remove shock absorber to lower bracket attaching bolt.

3. Remove spring lower retainer attaching nuts from inside coil spring.

4. Remove spring upper retainer attaching screw and the upper retainer.

5. Place jack stands under frame side rails and lower axle to relieve spring tension. The axle must be supported when replacing spring and not be permitted to hang by the brake hose. If the length of the brake hose is not sufficient to permit spring replacement, it will be necessary to remove the disc brake caliper. Do not suspend caliper by brake hose, if removed.

6. Remove spring and lower retainer.

7. Reverse procedure to install.

Ford Bronco Workshop Manual (V8-351 5.8L VIN G 2-bbl (1982))
Ford Workshop Manuals > Steering and Suspension > Suspension > Suspension Strut / Shock Absorber > Component Information > Service and Repair > Front Air Shock Absorber

Suspension Strut / Shock Absorber: Service and Repair Front Air Shock Absorber

1. Disconnect shock absorber from upper mounting.

2. Disconnect shock absorber from lower mounting, then compress shock and remove from vehicle.

3. Reverse procedure to install.

Suspension Strut / Shock Absorber: Service and Repair Rear

1. Raise and support rear of vehicle to a point where weight is relieved from rear springs and tires are still in contact with floor.

2. Remove lower attaching nut and bolt from shock absorber and swing lower end free of mounting bracket.

3. Remove upper attaching nut and the shock absorber.

4. Reverse procedure to install.

Wheel Bearing: Adjustments

4 WHEEL DRIVE MODELS

1980 F-350, 1980-82 F-250, 1980-85 F-150 & Bronco & 1984-85 F-250 Exc. w/Dana 501FS Axle

If vehicle is equipped with free running lock-out hubs, refer to ``Front Wheel Drive Section'' for removal and installation procedures. On 1985 Bronco and F-150-250 4 x 4 models built after June 30, 1985, a one piece spindle bearing locknut was used, requiring a revised procedure.

When removing manual hub, use spanner wrench PN P84-171-2 or equivalent. Insert spanner wrench tangs into four slots on nut assembly, apply inward pressure to unlock bearing nut locking splines and turn counterclockwise to loosen nut.

When installing, thread the new one piece locknut onto spindle with metal stamping inboard., ensuring I. D. key on metal stamping enters spindle keyway. Insert spanner wrench tangs into four slots on locknut assembly, apply inward pressure to unlock bearing nut locking splines and torque nut to 50-60 ft. lbs. to seat wheel bearings. Back off nut approximately 180 degrees, then torque to 15 ft. lbs.

New spindles have been released with a wider keyway. The one piece locknut can only be used with new spindles. Prior design level lock nuts will continue to be available for servicing of old spindles.

1. Raise vehicle and support with stands.

2. Remove hub assembly, then, using tool No. T59T-1197-B and a torque wrench, torque bearing inner adjusting nut to 50 ft. lbs. while rotating wheel back and forth to seat bearings.

3. Back out adjusting nut 1/4 turn on 1980 models, or 1/8 turn on 1981-85 models, and assemble lock tab and outer locknut.

4. Torque locknut to 50 ft. lbs. on 1980 models, or 150 ft. lbs. on 1981-85 models. Bend at least one tab into a slot on both the inner adjusting nut and outer locknut.

5. Final endplay of wheel when installed on spindle should be .001-.006 inch.

6. Install hub assembly.

Wheel Bearing: Service and Repair

4 WHEEL DRIVE MODELS

1. Raise and support front of vehicle and remove front wheels.

2. On models equipped with locking hubs, remove hubs as described in ``Front Wheel Drive Section''.

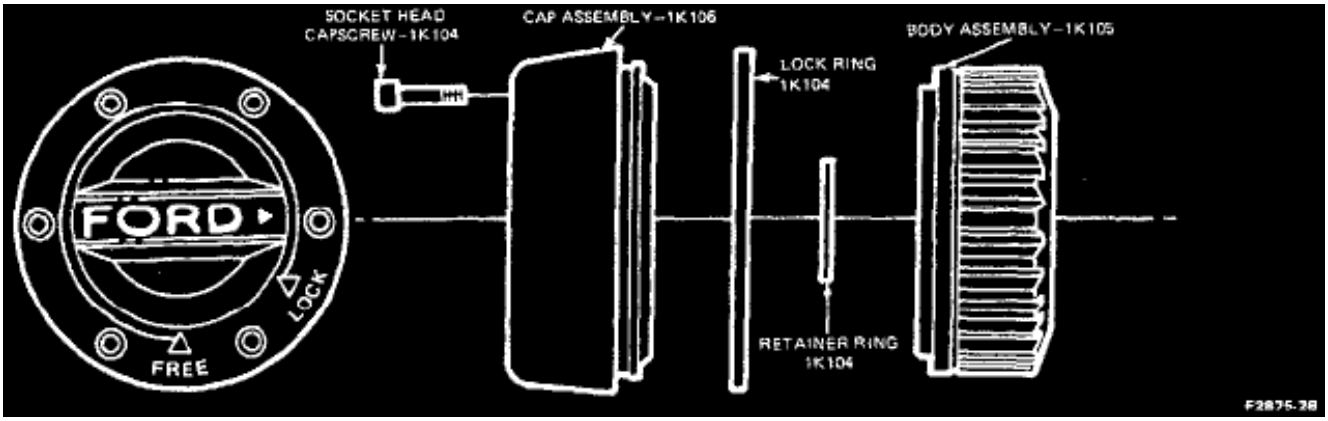
3. On 1980---81 models, remove front hub grease cap.

4. On 1980---81 models, remove driving hub snap ring, then the splined driving hub and pressure spring.

5. On all models, remove wheel bearing locknut, lock ring and adjusting nut, then the hub and disc assembly. The outer bearing and roller assembly will slide out when the hub is removed.

6. Remove inner bearing and grease seal from wheel hub using a suitable driving tool on 1980---81 models or a puller on 1982---87 models.

7. Reverse procedure to install. Adjust bearings as described under ``Wheel Bearings, Adjust''.



Wheel Hub (Locking): Service and Repair

Manual Locking Hub (Warner)

1980---87 F-150---350 & BRONCO W/MANUAL HUBS

Removal & Disassembly

1. Remove cap assembly capscrews and the cap assembly, Fig. 5.

2. Remove snap ring from end of axle shaft.

3. Remove lock ring from wheel hub groove.

4. Remove body assembly from wheel hub. If necessary, a puller may be used to remove body assembly.

Assembly & Installation

1. Install body assembly onto wheel hub, Fig. 5.

2. Install lock ring into hub groove, then the snap ring onto axle shaft.

3. Install cap assembly and torque capscrews to 35---50 inch lbs.

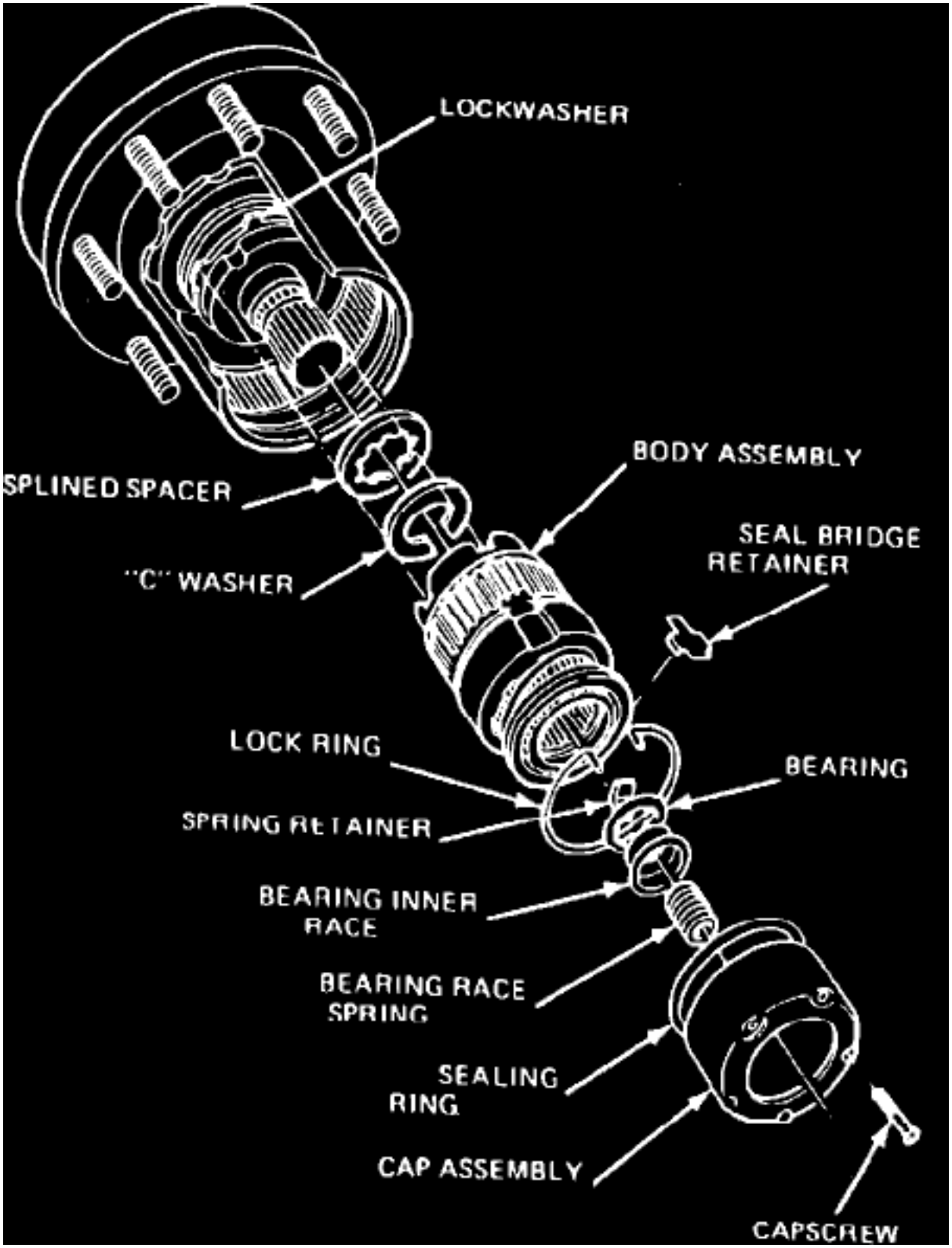


Fig. 6 Automatic front locking hub. 1980---87 F-150---350 & Bronco

1982-87 F-150-250 & BRONCO W/AUTOMATIC HUBS

Removal & Disassembly

1. Remove cap assembly capscrews and the cap assembly, Fig. 6. Avoid dropping ball bearing, bearing race and retainer when removing cap.

2. Remove rubber seal, then the seal bridge retainer from retainer ring space.

3. Remove retainer ring by closing ends with suitable pliers while pulling hub lock from wheel hub.

4. If wheel hub and spindle are to be removed, remove C-washer from stub shaft groove, splined spacer from shaft and the wheel bearing lock nuts and lock washer.

Assembly & Installation

1. Install wheel bearing locknut and lock washer. Torque locknut to 150 ft. lbs.

2. Install splined spacer and C-washer on axle shaft.

3. Install locking hub assembly into hub, ensuring large tangs are aligned with lock washer and splines align with hub and axle shaft splines, Fig. 6.

4. Install retainer ring by closing ends with suitable pliers while pushing locking hub assembly into wheel hub.

5. Install seal bridge retainer, narrow end first.

6. Install rubber seal, then the cap assembly. Torque cap screws alternately and evenly to 40---50 inch lbs.

Tires: Technical Service Bulletins Steering - Pull/Drift Diagnostic Procedures

Article No. 84-19-19

STEERING PULL/DRIFT/ROADABILITY - DIAGNOSTIC PROCEDURES

LIGHT TRUCKS 1980-84 F100-350, BRONCO, ECONOLINE

Section 19 of the 1983 and 1984 Light Truck Shop Manuals provides procedures to resolve most roadability concerns experienced to date. These procedures can be applied to any 1980 and later model light trucks.

When servicing 4 wheel drive vehicles with limited slip front axles, front tire circumference is the most probable cause if the pull is only present when the hubs are locked. Installing the two most evenly matched tires on the front axle should resolve the concern.

OTHER APPLICABLE ARTICLES: None WARRANTY STATUS: "INFORMATION ONLY"

Wheels: Technical Service Bulletins Transmission/Transfer Case - Banging When Braking

Article No. 83-7-26

NOISE - CLATTERING/BANGING OF TRANSMISSION/TRANSFER CASE DURING BRAKING

LIGHT TRUCKS 1981-83 F-150/350, BRONCO

Gear "banging" type noise during braking can be caused by rear wheel brake shudder "shaking" the transmission/transfer case even if it is not felt by the driver. The brake shudder may be caused by the rear wheels warping the brake drum. For F150 and Bronco with styled wheels, refer to TSB-82-10-15. For F250/350 with standard wheels, refer to TSB 83-7-19. Transmission or transfer case service actions should not be performed until confirming that brake shudder is not the causal factor.

OTHER APPLICABLE ARTICLES: 83-7-19; 82-10-15; 82-15-14 WARRANTY STATUS: "INFORMATION ONLY"

Wheel Bearing: Adjustments

4 WHEEL DRIVE MODELS

1980 F-350, 1980-82 F-250, 1980-85 F-150 & Bronco & 1984-85 F-250 Exc. w/Dana 501FS Axle

If vehicle is equipped with free running lock-out hubs, refer to ``Front Wheel Drive Section'' for removal and installation procedures. On 1985 Bronco and F-150-250 4 x 4 models built after June 30, 1985, a one piece spindle bearing locknut was used, requiring a revised procedure.

When removing manual hub, use spanner wrench PN P84-171-2 or equivalent. Insert spanner wrench tangs into four slots on nut assembly, apply inward pressure to unlock bearing nut locking splines and turn counterclockwise to loosen nut.

When installing, thread the new one piece locknut onto spindle with metal stamping inboard., ensuring I. D. key on metal stamping enters spindle keyway. Insert spanner wrench tangs into four slots on locknut assembly, apply inward pressure to unlock bearing nut locking splines and torque nut to 50-60 ft. lbs. to seat wheel bearings. Back off nut approximately 180 degrees, then torque to 15 ft. lbs.

New spindles have been released with a wider keyway. The one piece locknut can only be used with new spindles. Prior design level lock nuts will continue to be available for servicing of old spindles.

1. Raise vehicle and support with stands.

2. Remove hub assembly, then, using tool No. T59T-1197-B and a torque wrench, torque bearing inner adjusting nut to 50 ft. lbs. while rotating wheel back and forth to seat bearings.

3. Back out adjusting nut 1/4 turn on 1980 models, or 1/8 turn on 1981-85 models, and assemble lock tab and outer locknut.

4. Torque locknut to 50 ft. lbs. on 1980 models, or 150 ft. lbs. on 1981-85 models. Bend at least one tab into a slot on both the inner adjusting nut and outer locknut.

5. Final endplay of wheel when installed on spindle should be .001-.006 inch.

6. Install hub assembly.

Wheel Bearing: Service and Repair

4 WHEEL DRIVE MODELS

1. Raise and support front of vehicle and remove front wheels.

2. On models equipped with locking hubs, remove hubs as described in ``Front Wheel Drive Section''.

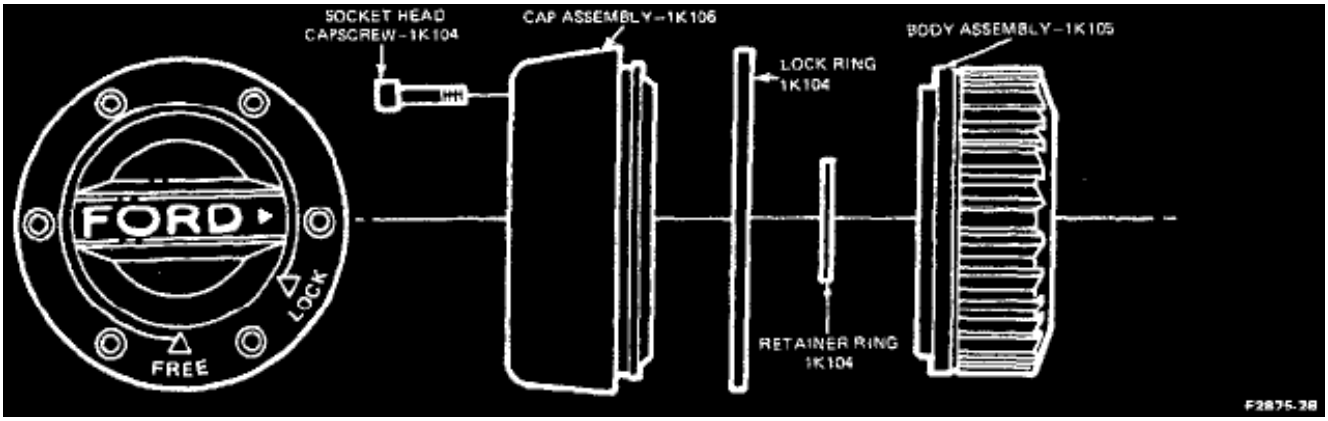
3. On 1980---81 models, remove front hub grease cap.

4. On 1980---81 models, remove driving hub snap ring, then the splined driving hub and pressure spring.

5. On all models, remove wheel bearing locknut, lock ring and adjusting nut, then the hub and disc assembly. The outer bearing and roller assembly will slide out when the hub is removed.

6. Remove inner bearing and grease seal from wheel hub using a suitable driving tool on 1980---81 models or a puller on 1982---87 models.

7. Reverse procedure to install. Adjust bearings as described under ``Wheel Bearings, Adjust''.



Wheel Hub (Locking): Service and Repair

Manual Locking Hub (Warner)

1980---87 F-150---350 & BRONCO W/MANUAL HUBS

Removal & Disassembly

1. Remove cap assembly capscrews and the cap assembly, Fig. 5.

2. Remove snap ring from end of axle shaft.

3. Remove lock ring from wheel hub groove.

4. Remove body assembly from wheel hub. If necessary, a puller may be used to remove body assembly.

Assembly & Installation

1. Install body assembly onto wheel hub, Fig. 5.

2. Install lock ring into hub groove, then the snap ring onto axle shaft.

3. Install cap assembly and torque capscrews to 35---50 inch lbs.

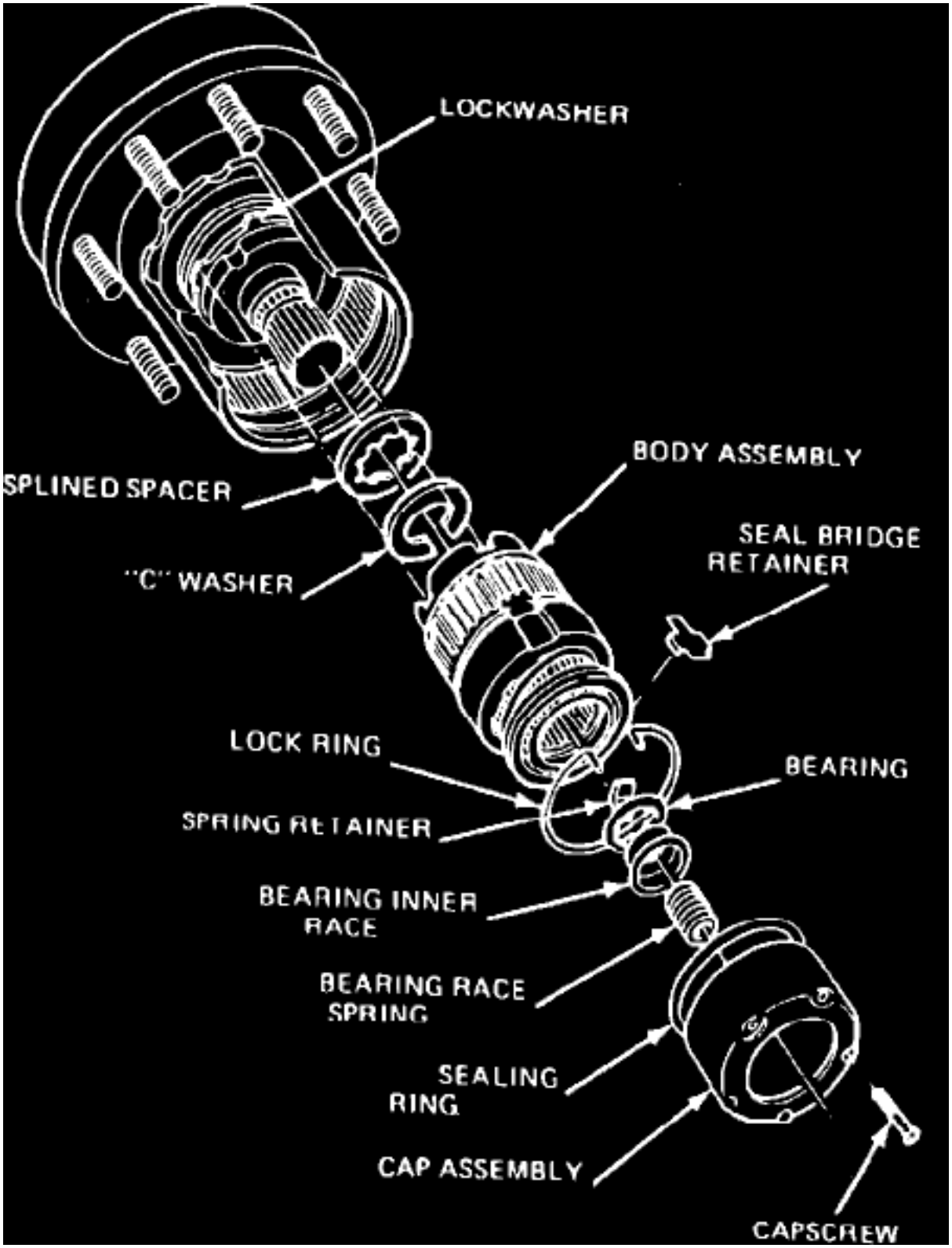


Fig. 6 Automatic front locking hub. 1980---87 F-150---350 & Bronco

1982-87 F-150-250 & BRONCO W/AUTOMATIC HUBS

Removal & Disassembly

1. Remove cap assembly capscrews and the cap assembly, Fig. 6. Avoid dropping ball bearing, bearing race and retainer when removing cap.

2. Remove rubber seal, then the seal bridge retainer from retainer ring space.

3. Remove retainer ring by closing ends with suitable pliers while pulling hub lock from wheel hub.

4. If wheel hub and spindle are to be removed, remove C-washer from stub shaft groove, splined spacer from shaft and the wheel bearing lock nuts and lock washer.

Assembly & Installation

1. Install wheel bearing locknut and lock washer. Torque locknut to 150 ft. lbs.

2. Install splined spacer and C-washer on axle shaft.

3. Install locking hub assembly into hub, ensuring large tangs are aligned with lock washer and splines align with hub and axle shaft splines, Fig. 6.

4. Install retainer ring by closing ends with suitable pliers while pushing locking hub assembly into wheel hub.

5. Install seal bridge retainer, narrow end first.

6. Install rubber seal, then the cap assembly. Torque cap screws alternately and evenly to 40---50 inch lbs.

Wheel Fastener: Technical Service Bulletins Lug Nuts - Proper Installation/Torqueing Procedure

Article No. 98-5A-4

^ BRAKES - PREVENTING BRAKE VIBRATION - SERVICE TIP

^ WHEELS - PROPER LUG TORQUE PROCEDURES - SERVICE TIP

FORD: 1972-97 THUNDERBIRD 1976-86 LTD 1976-97 MUSTANG 1981-97 CROWN VICTORIA 1982-88 EXP 1982-98 ESCORT 1984-94 TEMPO 1986-97 TAURUS 1988-93 FESTIVA 1989-97 PROBE 1994-97 ASPIRE 1995-98 CONTOUR

LINCOLN-MERCURY: 1979-83 MONARCH, ZEPHYR 1979-97 COUGAR 1980-83 MARK VI 1980-98 CONTINENTAL, TOWN CAR 1981-86 LYNX 1983-86 MARQUIS 1984-92 MARK VII 1984-94 TOPAZ 1986-97 SABLE 1987-89 TRACER 1987-97 GRAND MARQUIS 1991-94 CAPRI 1991-97 TRACER 1993-98 MARK VIII 1995-98 MYSTIQUE

LIGHT TRUCK: 1979-96 BRONCO 1979-97 ECONOLINE, F-150-350 SERIES 1984-90 BRONCO II 1984-97 RANGER 1986-97 AEROSTAR 1988-97 F SUPER DUTY 1991-97 EXPLORER 1993-97 VILLAGER 1995-98 WINDSTAR 1997 EXPEDITION 1998 NAVIGATOR

ISSUE: The use of air impact tools to tighten wheel lug nuts can lead to overtightened and/or unevenly tightened wheel lug nuts. Air impact tools typically used for wheel lug nut removal and installation can generate up to 475 N.m (350 lb-ft) of torque. Overtightened and/or unevenly torqued wheel lug nuts may cause:

^ Brake vibration

^ Distortion of the wheel hub

^ Distortion of the brake rotor

ACCUTORQ SOCKETS

VEHICLE	YEAR	SIZE	LB-FT TORQUE	TOOL COLOR
FORD				
Aspire	1994-97	21mm	80	Light Brown
Contour	1995-96	19mm-3/4"	100	Grey
Crown Victoria	1981-97	13/16"	100	Dark Brown
Escort ZX2	1998	21mm	80	Light Brown
Escort	1991-98	21mm	80	Light Brown
Escort	1982-90	19mm-3/4"	100	Grey
EXP	1982-88	19mm-3/4"	100	Grey
Festiva	1988-93	21mm	80	Light Brown
Granada	1975-82	13/16"	100	Dark Brown
LTD	1975-86	13/16"	100	Dark Brown
Mustang	1979-97	13/16"	100	Dark Brown
Probe	1989-97	21mm	80	Light Brown
Taurus	1986-97	19mm-3/4"	100	Grey
Tempo	1984-94	19mm-3/4"	100	Grey
Thunderbird	1967-97	19mm-3/4"	100	Grey
Thunderbird	1972-86	13/16"	100	Dark Brown
LINCOLN				
All Models	1980-98	13/16"	100	Dark Brown
MERCURY				
Capri	1991-94	21mm	80	Light Brown
Capri	1979-86	13/16"	100	Dark Brown
Cougar	1967-97	19mm-3/4"	100	Grey
Cougar	1979-86	13/16"	100	Dark Brown
Lynx	1981-86	19mm-3/4"	100	Grey
Marquis	1983-86	13/16"	100	Dark Brown
Mystique	1996-98	19mm-3/4"	100	Grey
Monarch, Zephyr	1979-83	13/16"	100	Dark Brown
Sable	1986-97	19mm-3/4"	100	Grey
Topaz	1984-94	19mm-3/4"	100	Grey
Tracer	1991-97	21mm	80	Light Brown
Tracer	1987-89	21mm	80	Light Brown
Grand Marquis	1987-97	19mm-3/4"	100	Grey
LIGHT TRUCK				
E-150/F-150	1975-97	13/16"	100	Dark Brown
E/F-250/350	1989-97	7/8"	140	Turquoise
E/F-250/350 (Dual Rears)	1994-97	7/8"	140	Turquoise
F-Super Duty	1998 97		140	N/A
Aerostar	1986-97	19mm-3/4"	100	Grey
Bronco	1979-96	13/16"	100	Dark Brown
Bronco II	1984-90	19mm-3/4"	100	Grey
Courier	1979-83	21mm	65	Black
Explorer	1991-97	13/16"	100	Dark Brown
Ranger	1984-97	19mm-3/4"	100	Grey
Windstar	1995-98	13/16"	100	Dark Brown
Villager	1993-97	21mm	80	Light Brown
Expedition	1997	19mm-3/4"	100	Grey
Navigator	1998	19mm-3/4"	100	Grey

TD-4106-B

Figure 1

^ Brake rotor runout

^ Damage to the wheel

^ Damage to the wheel nuts and studs

ACTION: All wheel lug nuts should only be tightened to specification using a torque wrench or by using the Rotunda ACCUTORO 164-R0314 or equivalent on a 1/2" drive air impact tool. The "ACCUTORO" lug nut sockets limit the torque of the air impact tool, preventing overtightening or uneven tightening of the wheel lug nuts. The torque limiting devices (regulators) on air impact tools will not reduce the output torque enough to prevent overtightening of the wheel lug nuts.

NOTE:

REFER TO THE APPROPRIATE SERVICE MANUAL OR THE CHART IN FIGURE 1 FOR THE CORRECT WHEEL LUG NUT TORQUE SPECIFICATION. THE CHART IN FIGURE 1 ALSO PROVIDES THE CORRECT "ACCUTORO" LUG NUT SOCKET TO USE.

The "ACCUTORO" socket is intended for lug nut installation, not removal. When using the "ACCUTORO" socket, the output torque of the air impact tool must be set to 217-339 N.m (160-250 lb-ft), usually this will be the lowest setting on the air impact tool.

The "ACCUTORO" lug nut sockets are available through Rotunda Equipment. The four-piece set (164-R0314) fits most Ford Motor Company cars and light trucks. The tool set consists of four (4) lug nut sockets and a storage case. The set can be ordered by calling Rotunda Equipment at 1-800-ROT-UNDA (768-8632).

CAUTION:

AIR IMPACT TOOLS SHOULD NOT BE USED TO TIGHTEN WHEEL LUG NUTS UNLESS THE "ACCUTORO" LUG NUT SOCKET OF THE CORRECT SPECIFICATION IS USED.

NOTE:

DO NOT USE AIR IMPACT TOOLS ON LOCKING WHEEL LUG NUTS. THEY ARE TO BE HAND-TORQUED ONLY.

OTHER APPLICABLE ARTICLES: NONE

SUPERSEDES: 97-17-6

WARRANTY STATUS: INFORMATION ONLY

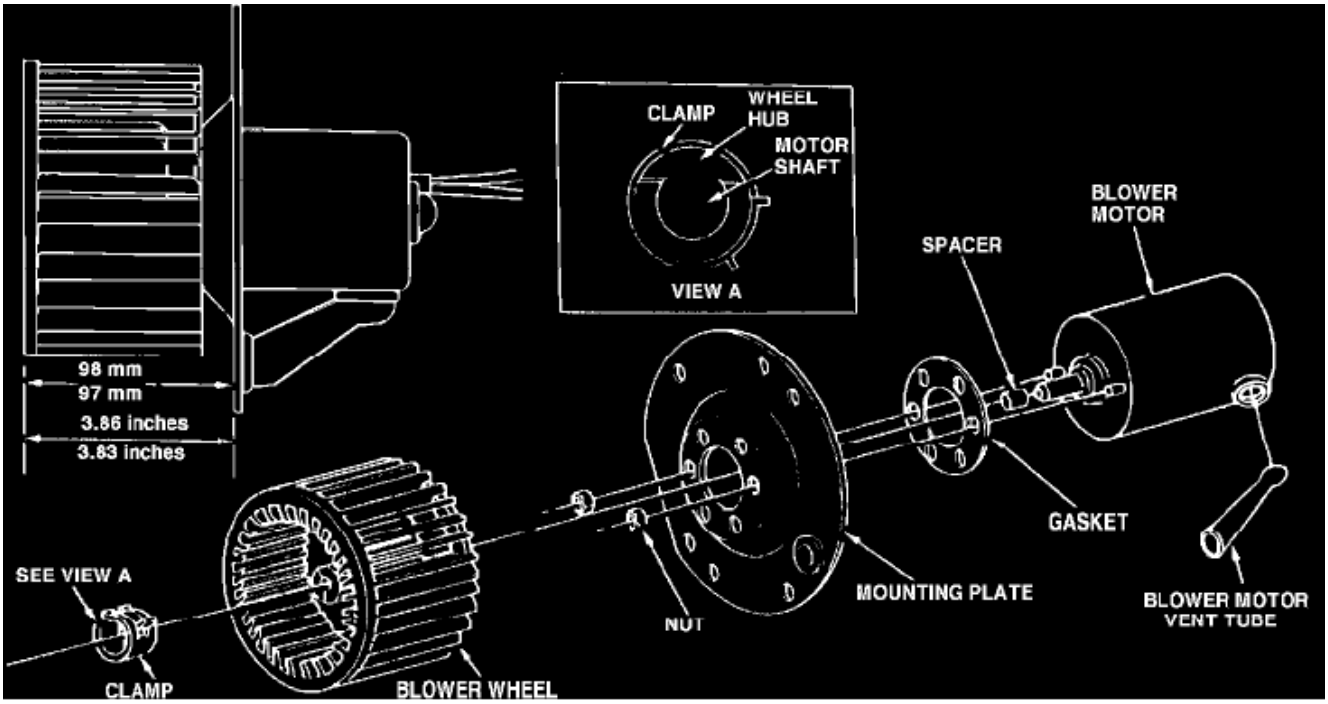
OASIS CODES: 301000, 303000, 306000

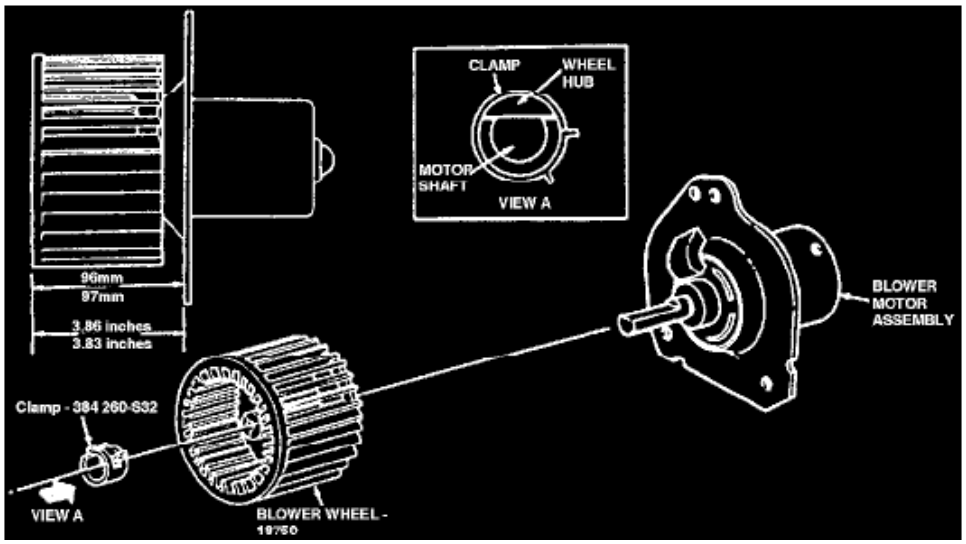
Blower Motor: Locations Auxiliary Blower Motor

On Rear RH Floor Pan

Blower Motor: Locations Blower Motor

RH Side Of Dash Panel

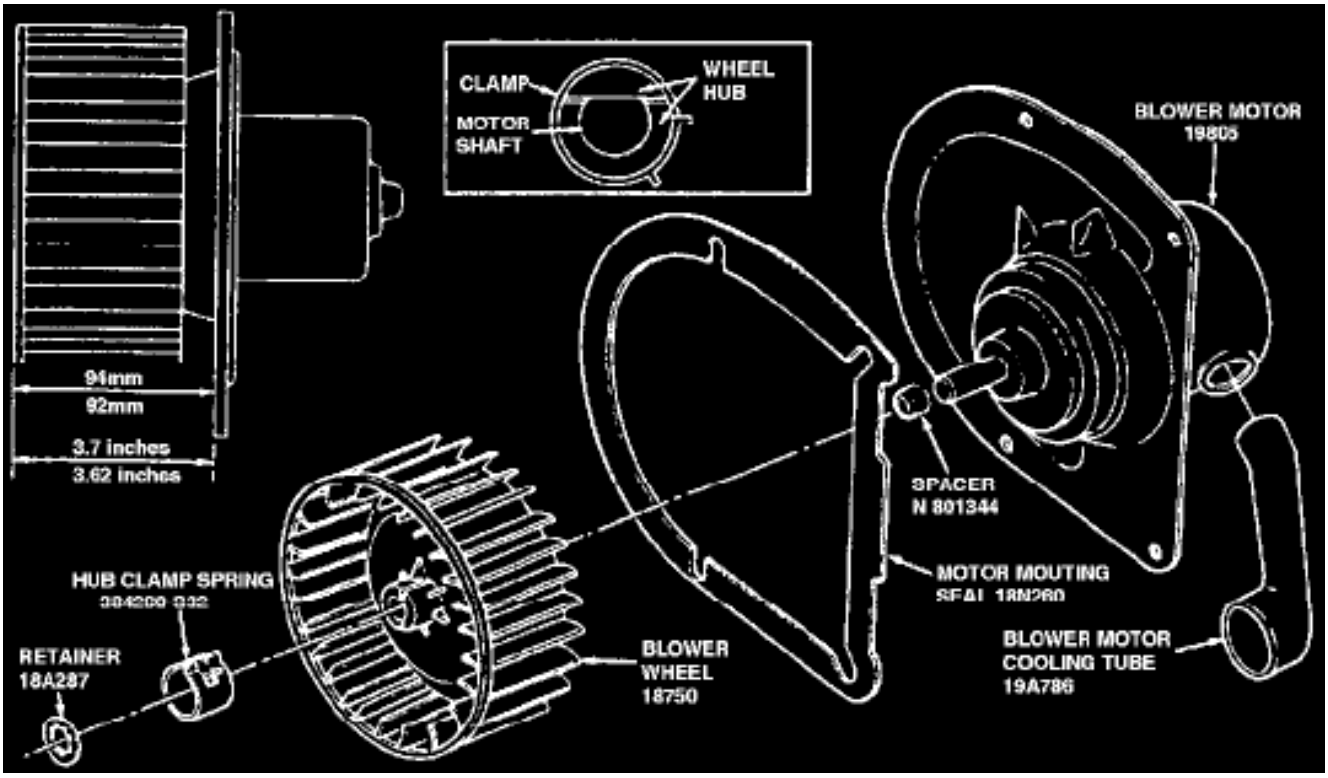




Blower Motor: Service and Repair

Fig. 17 Blower motor replacement. 1980---81 F-100---350 & Bronco less air conditioning

Blower Motor Replacement (Less A/C)



Blower Motor Replacement (With A/C)

F-100---350 & BRONCO

1. Disconnect battery ground cable.

2. Disconnect blower motor electrical connector, and on 1980---81 models less air conditioning, remove ground wire screw.

3. On models equipped with air conditioning, disconnect air cooling tube from blower motor.

4. On all models, remove blower motor attaching screws and the blower motor, Figs. 17, 18 and 19.

5. Reverse procedure to install.

Blower Motor Resistor: Locations Auxiliary Blower Motor Resistor

Near Blower Motor

Blower Motor Resistor: Locations Blower Motor Resistor

Next To Blower Motor

Blower Motor Switch: Locations Auxiliary Heater Switch

A/C COOLING FAN CONTROLLER

Under LH Side Of I/P

Blower Motor Switch: Locations Blower Control Switch

At Center Of I/P

Compressor Clutch: Technical Service Bulletins A/C - Warner Compressor Clutch Replacement

Article No. 85-4-3

AIR CONDITIONING - REPLACEMENT OF WARNER A/C COMPRESSOR CLUTCH ASSEMBLY

FORD 1980-84 ALL

LINCOLN-MERCURY 1980-84 ALL

LIGHT TRUCK 1980-84 ALL LIGHT TRUCKS

When existing stock of 1980-84 Warner Electric A/C compressor clutch hub and pulley parts is exhausted, it will be necessary to replace the entire clutch assembly, including the field coil, with current Ford manufactured clutch parts. Replacement of the Warner field coil is necessary because it is not compatible with the Ford clutch parts. The Warner field coil will continue to be available for replacement on Warner clutch assemblies.

NOTE: Never intermix clutch parts from different manufacturers. Refer to the Master Parts Catalog for part numbers and vehicle application.

OTHER APPLICABLE ARTICLES: NONE WARRANTY STATUS: "INFORMATION ONLY"

Control Assembly: Locations

Behind Center Of I/P

A/C Coupler O-ring: Technical Service Bulletins Air Conditioning - O Ring Removal Service Tip

Article No. 95-2-2

01/30/95

AIR CONDITIONING - O-RING REMOVAL FROM SPRING LOCK COUPLER - SERVICE TIP

FORD: 1981-95 MUSTANG 1982-83 FAIRMONT 1982-88 EXP 1982-95 CROWN VICTORIA, ESCORT, THUNDERBIRD 1983-86 LTD 1984-94 TEMPO 1986-95 TAURUS 1989-95 PROBE 1995 CONTOUR

LINCOLN-MERCURY: 1982-83 LN7, ZEPHYR 1982-87 LYNX 1982-95 CONTINENTAL, COUGAR, GRAND MARQUIS, TOWN CAR 1983-86 MARQUIS 1984-92 MARK VII 1984-94 TOPAZ 1986-95 SABLE 1991-95 TRACER 1993-94 CAPRI 1993-95 MARK VIII 1995 MYSTIQUE

LIGHT TRUCK: 1982-95 BRONCO, F SUPER DUTY, F-150-350 SERIES, RANGER 1983-90 BRONCO II 1986-95 AEROSTAR 1988-95 ECONOLINE 1991-95 EXPLORER 1995 WINDSTAR

This TSB is being republished in its entirety to include the latest level tools and procedures available.

ISSUE: Some technicians may use small screwdrivers to remove 0-rings from spring lock coupling fittings. This practice can and has resulted in scratches across the 0-ring grooves in the fittings. Loss of refrigerant charge in the system may result.

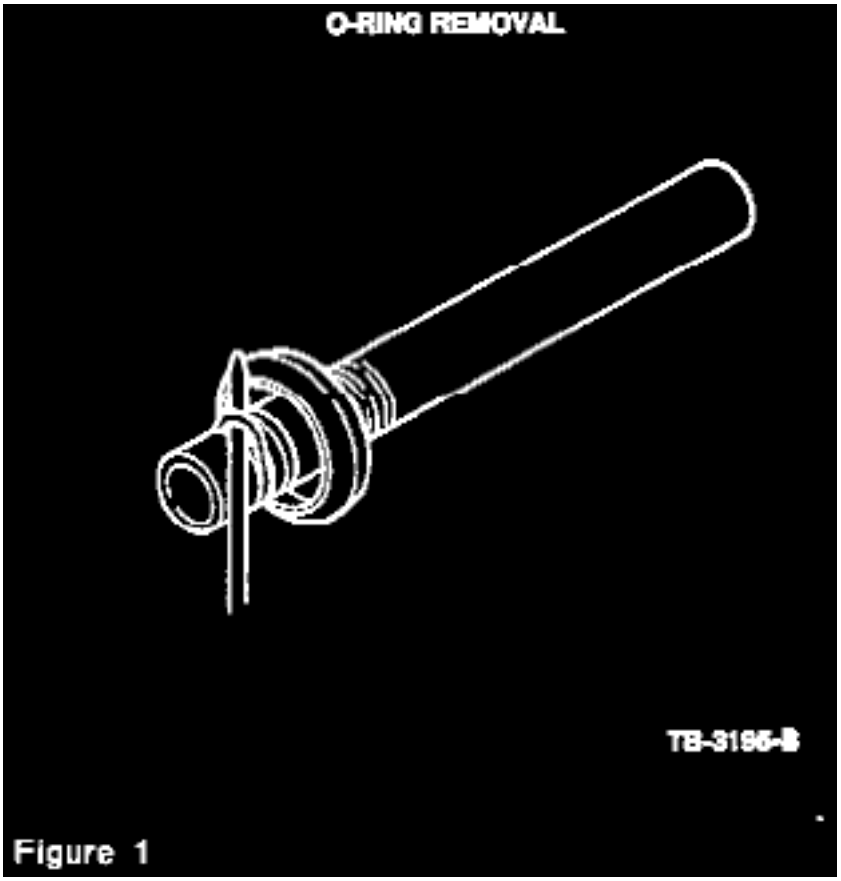


Figure 1

ACTION: It is recommended that a plastic toothpick, or equivalent tool, be used to remove 0-rings. Refer to Figure 1. Do not use the metal O-Ring Tool (T71P-19703-C). Only plastic O-Ring Tool (F5VH-17B017-AA) is approved for O-ring removal.

OTHER APPLICABLE ARTICLES: 91-22-5, 93-6-5 SUPERSEDES: 93-15-5 WARRANTY STATUS: INFORMATION ONLY OASIS CODES: 208000, 208999

PART NUMBER	PART NAME	CLASS
391396-S100	O-ring, 3/8"	BS
391397-S100	O-ring, 1/2"	BS
391304-S100	O-ring, 5/8"	BS
391305-S100	O-ring, 3/4"	BS
F2AZ-19D690-B	O-ring Service Kit (Contains 8 pieces each of above O-ring sizes)	B
F73Z-19577-A	YN-9 Compressor Oil	B

A/C Coupler O-ring: Technical Service Bulletins A/C Coupling - Cleaning Procedures

Article No. 93-6-5

03/17/93

^ AIR CONDITIONING - AVAILABILITY OF NEW GREEN O-RING SERVICE KIT TO PROVIDE IMPROVED SEALING AND DURABILITY

^ AIR CONDITIONING - SPRING LOCK COUPLING REFRIGERANT FITTINGS - CLEANING PROCEDURE

FORD: 1981-91 MUSTANG 1982-88 EXP 1982-91 CROWN VICTORIA, ESCORT, THUNDERBIRD

1983-86 LTD 1984-91 TEMPO 1986-91 TAURUS

LINCOLN-MERCURY: 1981-86 CAPRI 1982-83 MARK VI 1982-87 LYNX 1982-91 CONTINENTAL, COUGAR, GRAND MARQUIS, TOWN CAR 1983-86 MARQUIS 1984-91 MARK VII, TOPAZ 1986-91 SABLE 1991 TRACER

LIGHT TRUCK: 1982-91 BRONCO, F-150-350 SERIES 1983-90 BRONCO II 1983-91 RANGER 1986-91 AEROSTAR 1988-91 ECONOLINE 1991 EXPLORER

ISSUE: A procedure has been developed for cleaning Spring Lock Coupling (SLC) refrigerant fittings during air conditioning system repairs. This procedure and replacement of black O-rings with the improved green O-rings will reduce the potential of refrigerant leaks.

ACTION:

When servicing the air conditioning system on the subject vehicles, or if a refrigerant leak is suspected at any of the SLC connections, disconnect all SLC connections and replace all black O-rings with new green O-rings which are made of an improved material. Use the following service procedure to clean the coupling before installing new green O-rings. Refer to the Parts Block in this article for correct parts usage.

CLEANING PROCEDURE

1. Remove all refrigerant from the vehicle A/C system using an U.L. approved Refrigerant/Recovery device prior to disconnecting the refrigerant couplings. Refer to the appropriate model year Service Manual for a detailed A/C discharging procedure.

2. Disconnect the SLC coupling.

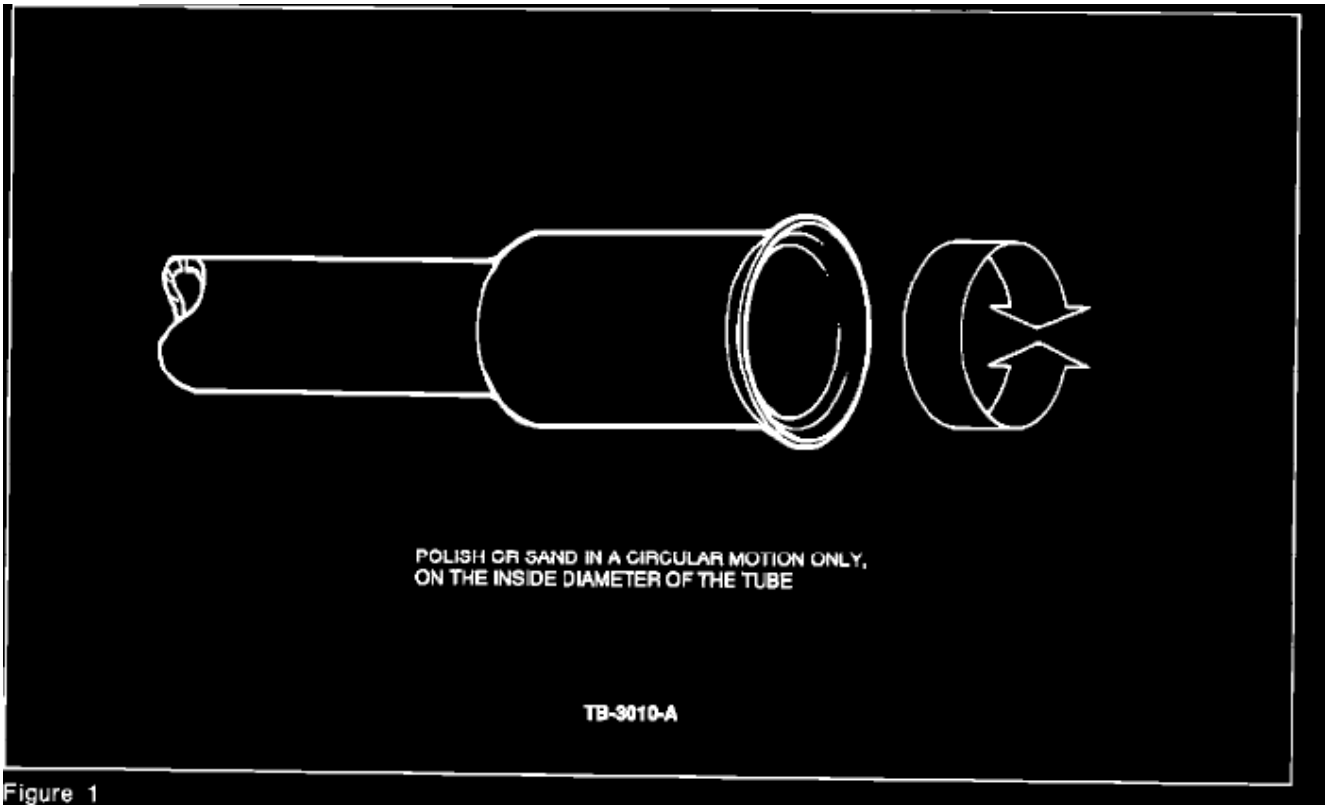


Figure 1

3. Remove the black O-rings. Be careful not to scratch the O-ring grooves.

CAUTION: A SCRATCH CAN CAUSE FUTURE REFRIGERANT LEAKS.

4. Remove any surface residue from the inside of the female SLC and the grooves of the male SLC by polishing with 400 grit emery cloth or equivalent. Polish the female surface by using a twisting motion, Figure 1, so that any scratches made will not cross the O-ring sealing surface.

5. Perform additional polishing of the surface using 600 grit emery cloth or equivalent.

6. Remove all residue from polishing operations from both fittings by wiping with a lint-free rag.

7. Install new green O-rings. If the O-rings are not prelubricated, lube with YN-9 A/C compressor oil (F73Z-19577-A) before installing them.

8. Lubricate the inside of the female portion of the SLC with YN-9 compressor oil (F73Z-19577-A) and apply additional oil to the O-rings.

9. Reconnect the fitting.

10. Recharge the A/C system. Refer to the appropriate model year Service Manual for specific detailed instructions.

OTHER APPLICABLE ARTICLES: 91-22-5

WARRANTY STATUS: INFORMATION ONLY

OASIS CODES: 208000, 208999

PART NUMBER	PART NAME	CLASS
391396-S100	O-ring, 3/8"	BS
391397-S100	O-ring, 1/2"	BS
391304-S100	O-ring, 5/8"	BS
391305-S100	O-ring, 3/4"	BS
F2AZ-19D690-B	O-ring Service Kit (Contains 8 pieces each of above O-ring sizes)	B
F73Z-19577-A	YN-9 Compressor Oil	B

A/C Coupler Spring: Technical Service Bulletins A/C Coupling - Cleaning Procedures

Article No. 93-6-5

03/17/93

^ AIR CONDITIONING - AVAILABILITY OF NEW GREEN O-RING SERVICE KIT TO PROVIDE IMPROVED SEALING AND DURABILITY

^ AIR CONDITIONING - SPRING LOCK COUPLING REFRIGERANT FITTINGS - CLEANING PROCEDURE

FORD: 1981-91 MUSTANG 1982-88 EXP 1982-91 CROWN VICTORIA, ESCORT, THUNDERBIRD

1983-86 LTD 1984-91 TEMPO 1986-91 TAURUS

LINCOLN-MERCURY: 1981-86 CAPRI 1982-83 MARK VI 1982-87 LYNX 1982-91 CONTINENTAL, COUGAR, GRAND MARQUIS, TOWN CAR 1983-86 MARQUIS 1984-91 MARK VII, TOPAZ 1986-91 SABLE 1991 TRACER

LIGHT TRUCK: 1982-91 BRONCO, F-150-350 SERIES 1983-90 BRONCO II 1983-91 RANGER 1986-91 AEROSTAR 1988-91 ECONOLINE 1991 EXPLORER

ISSUE: A procedure has been developed for cleaning Spring Lock Coupling (SLC) refrigerant fittings during air conditioning system repairs. This procedure and replacement of black O-rings with the improved green O-rings will reduce the potential of refrigerant leaks.

ACTION:

When servicing the air conditioning system on the subject vehicles, or if a refrigerant leak is suspected at any of the SLC connections, disconnect all SLC connections and replace all black O-rings with new green O-rings which are made of an improved material. Use the following service procedure to clean the coupling before installing new green O-rings. Refer to the Parts Block in this article for correct parts usage.

CLEANING PROCEDURE

1. Remove all refrigerant from the vehicle A/C system using an U.L. approved Refrigerant/Recovery device prior to disconnecting the refrigerant couplings. Refer to the appropriate model year Service Manual for a detailed A/C discharging procedure.

2. Disconnect the SLC coupling.

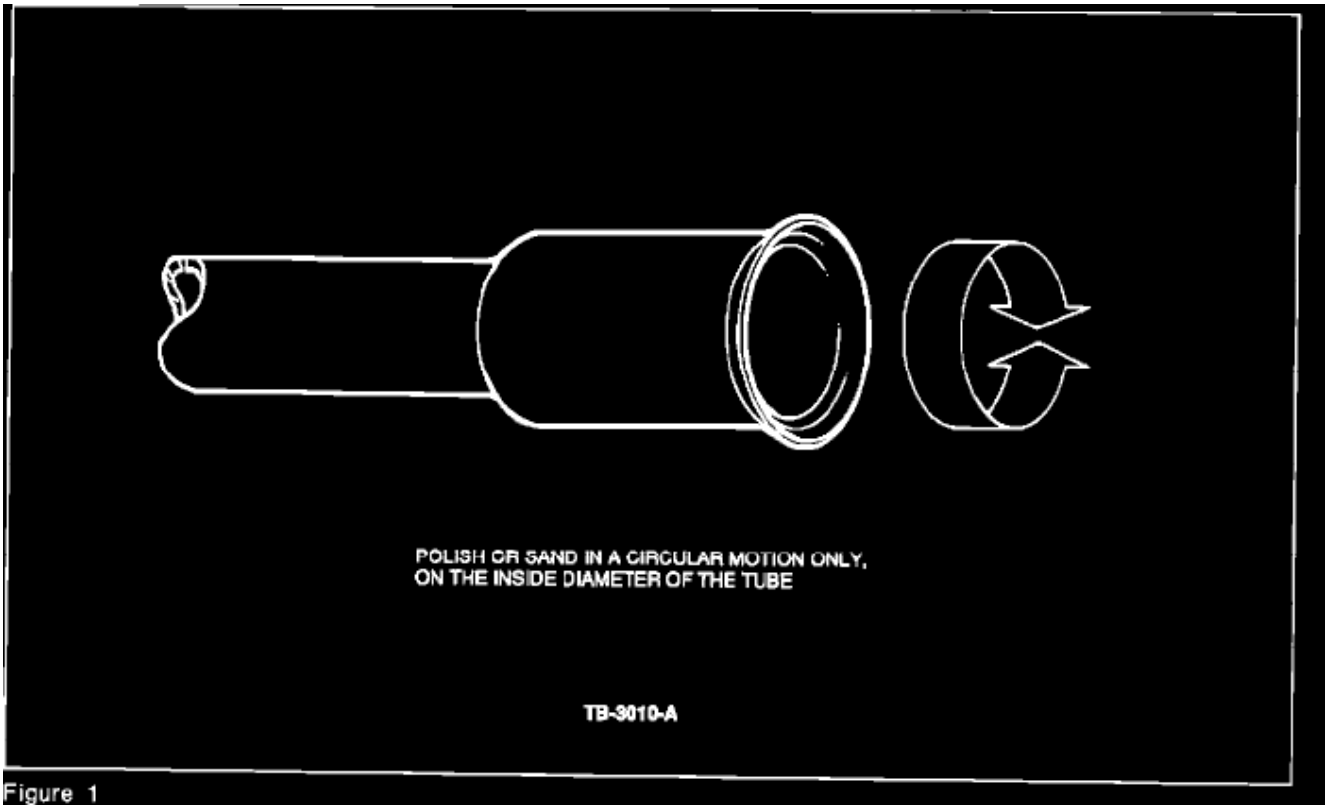


Figure 1

3. Remove the black O-rings. Be careful not to scratch the O-ring grooves.

CAUTION: A SCRATCH CAN CAUSE FUTURE REFRIGERANT LEAKS.

4. Remove any surface residue from the inside of the female SLC and the grooves of the male SLC by polishing with 400 grit emery cloth or equivalent. Polish the female surface by using a twisting motion, Figure 1, so that any scratches made will not cross the O-ring sealing surface.

5. Perform additional polishing of the surface using 600 grit emery cloth or equivalent.

6. Remove all residue from polishing operations from both fittings by wiping with a lint-free rag.

7. Install new green O-rings. If the O-rings are not prelubricated, lube with YN-9 A/C compressor oil (F73Z-19577-A) before installing them.

8. Lubricate the inside of the female portion of the SLC with YN-9 compressor oil (F73Z-19577-A) and apply additional oil to the O-rings.

9. Reconnect the fitting.

10. Recharge the A/C system. Refer to the appropriate model year Service Manual for specific detailed instructions.

OTHER APPLICABLE ARTICLES: 91-22-5

WARRANTY STATUS: INFORMATION ONLY

OASIS CODES: 208000, 208999

Evaporator Case: Technical Service Bulletins A/C - Condensate Reduction

Article No. 83-24-20

AIR CONDITIONING - CONDENSATE DRIPS INTO PASSENGER COMPARTMENT

LIGHT TRUCKS 1980-83 F SERIES & BRONCO

To avoid dripping condensate into the passenger compartment from the A/C registers and other locations in the passenger compartment, set the A/C function selector lever to Maximum A/C and reduce the blower speed to low or med/low as soon as comfort will allow. This procedure decreases the condensate on the evaporator core and reduces the tendency to blow moisture into the passenger compartment.

OTHER APPLICABLE ARTICLES: None WARRANTY STATUS: "INFORMATION ONLY"

Evaporator Core: Technical Service Bulletins A/C - Condensate Reduction

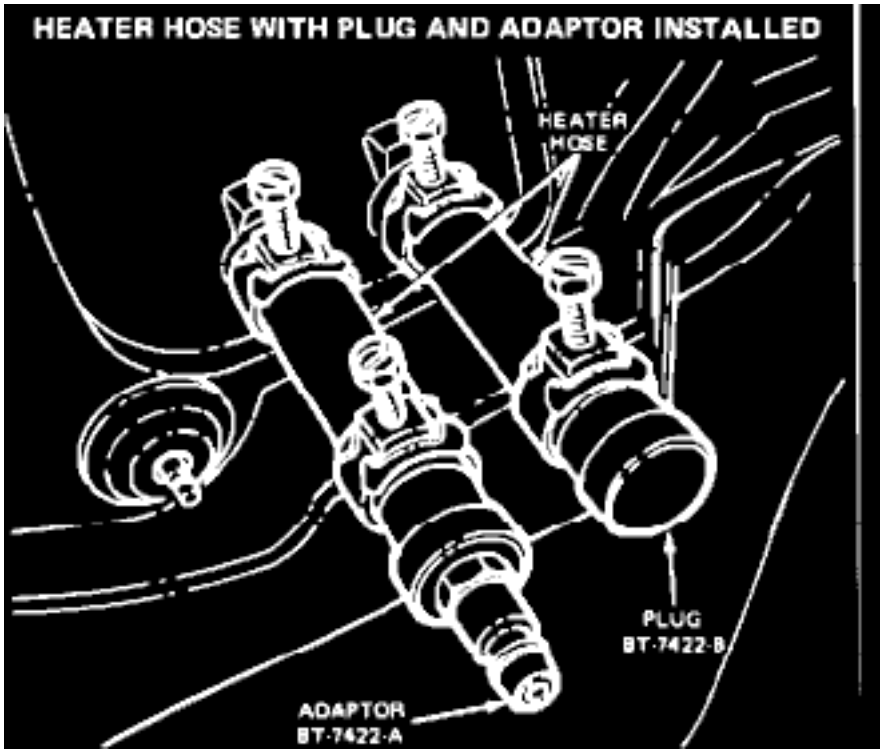
Article No. 83-24-20

AIR CONDITIONING - CONDENSATE DRIPS INTO PASSENGER COMPARTMENT

LIGHT TRUCKS 1980-83 F SERIES & BRONCO

To avoid dripping condensate into the passenger compartment from the A/C registers and other locations in the passenger compartment, set the A/C function selector lever to Maximum A/C and reduce the blower speed to low or med/low as soon as comfort will allow. This procedure decreases the condensate on the evaporator core and reduces the tendency to blow moisture into the passenger compartment.

OTHER APPLICABLE ARTICLES: None WARRANTY STATUS: "INFORMATION ONLY"



Heater Core: Technical Service Bulletins Heater Core - Leakage Diagnostic Tips

Article No. 85-8-2

HEATER CORE - LEAK - DIAGNOSTIC TIPS

FORD ALL

LINCOLN-MERCURY ALL

LIGHT TRUCK ALL

Good heater cores are being returned through the parts return system coded as leaking. Complaints of leaking may be caused by an inadequate seal between the heater hose and the heater core tubes allowing coolant to follow the tube to the heater core, leak into the passenger compartment and appear as a leaking heater core.

When diagnosing a suspect heater core leak, inspect the hose to heater core tube attachment to assure the connection is not leaking. If a leaking connection is found, correct the leak. If the connection appears not to be leaking, leak test the heater core before removing it from the vehicle using the following procedure:

HEATER CORE LEAK TEST

Pressure Test 1.

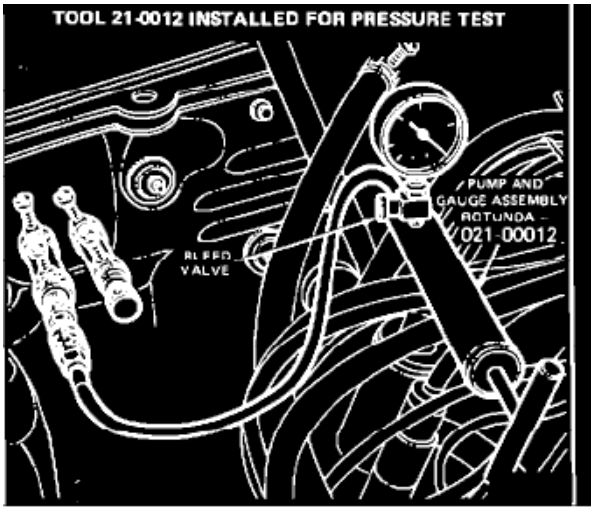
Drain the coolant from the cooling system.

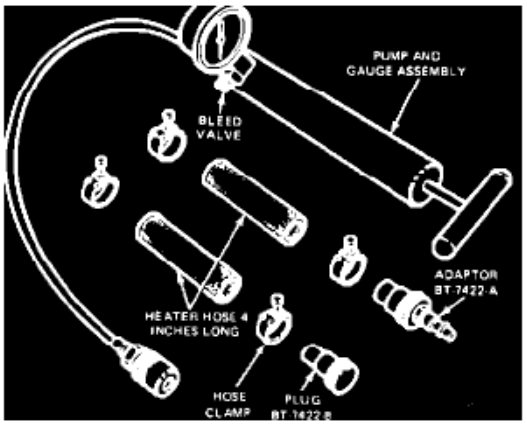
2. Disconnect the heater hoses from the heater core tubes.

3. Install a short piece of heater hose (approximately 4 inches long) on each heater core tube.

Figure 1

4. Fill the heater core and hoses with water and install plug BT-7422-B and adapter BT-7422-A from Rotunda model 021-00012 or equivalent in the hose ends (Figure 1). Secure the hoses, plug and adapter with hose clamps.


TOOL 21-0012 INSTALLED FOR PRESSURE TEST
PUMP AND GAUGE ASSEMBLY ROTUNDA 021-00012
BLEED VALVE


PUMP AND GAUGE ASSEMBLY
BLEED VALVE
ADAPTOR BT-7422-A
HEATER HOSE 4 INCHES LONG
HOSE CLAMP
PLUG BT-7422-B

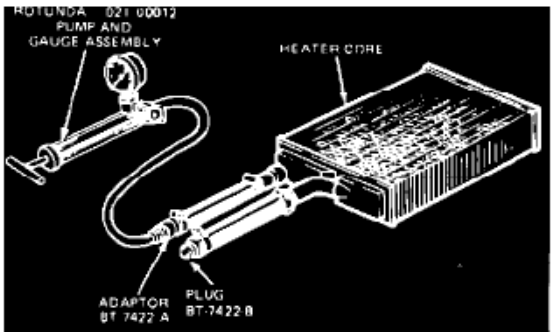

ROTUNDA 021-00012 PUMP AND GAUGE ASSEMBLY
HEATER CORE
ADAPTOR BT-7422-A
PLUG BT-7422-B

Figure 2

Figure 3 - TOOL 021-00012 WITH HEATER HOSE AND CLAMPS

5. Attach the pump and gauge assembly Rotunda model 021-00012 or equivalent to the adapter (Figure 2). Close the bleed valve at the base of the gauge and pump 30 psi of air pressure into the heater core (Figure 3).

6. Observe the pressure gauge for a minimum of three minutes. The pressure should not drop.

7. If the pressure does not drop, no leaks are indicated.

8. If the pressure drops, check the hose connections to the core tubes for leaks. If the hoses do not leak, remove the heater core from the vehicle and perform the bench test.

Bench Test 1.

Drain all coolant from the heater core.

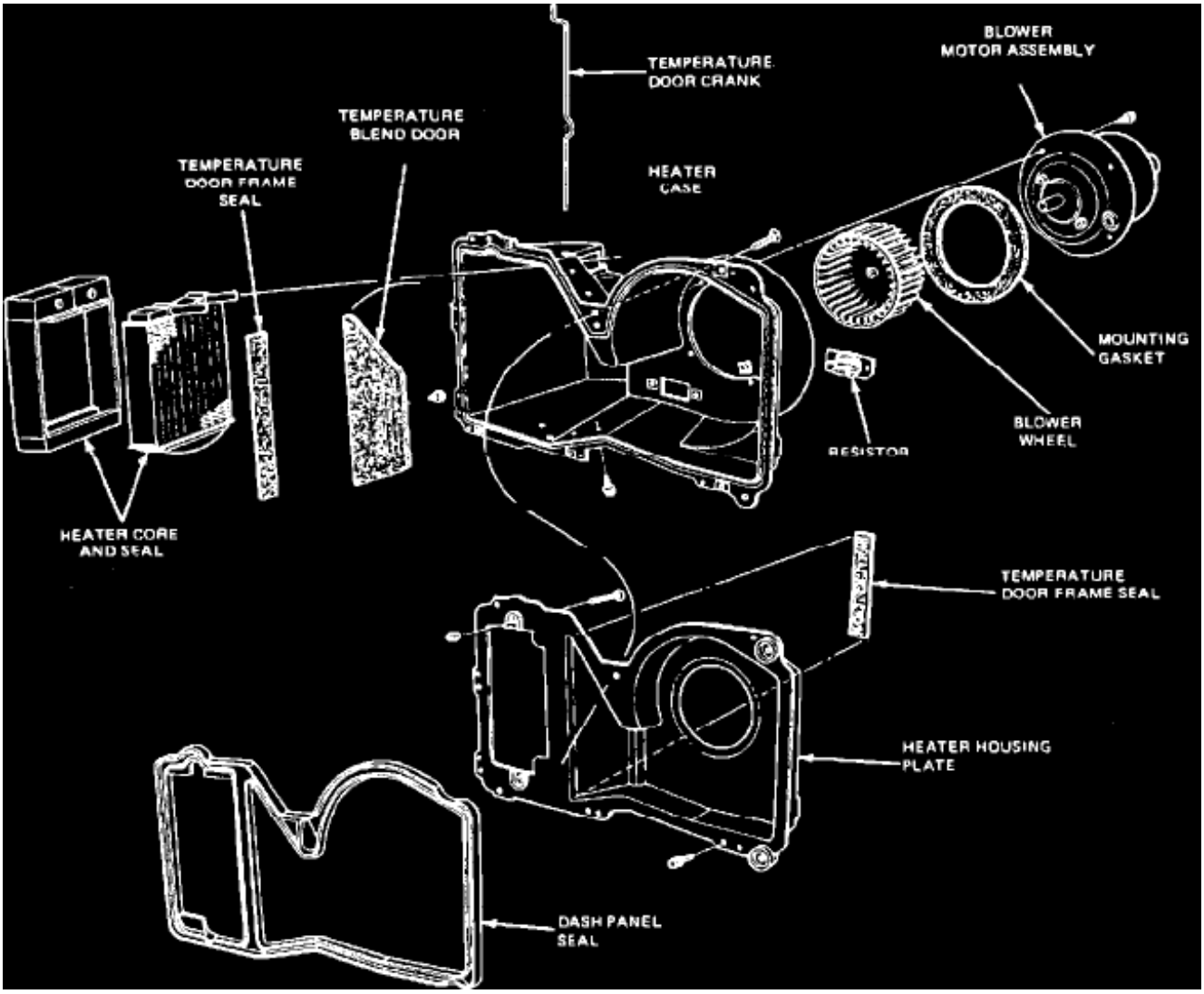
Figure 4 - HEATER CORE BENCH TEST

2. Connect the 4-inch test hoses with plug and adapter to the core tubes. Then connect the air pump and gauge assembly to the adapter (Figure 4).

3. Apply 30 psi of air pressure to the heater core with Rotunda model 021-00012 or equivalent, and submerge the core in water.

4. If a leak is observed, service or replace the heater core as necessary.

OTHER APPLICABLE ARTICLES: NONE WARRANTY STATUS: "INFORMATION ONLY"



Heater Core: Service and Repair

Fig. 13 Heater core replacement. F-100---350 & Bronco less air conditioning

F-100---350 & BRONCO Less Air Conditioning

1. Disconnect battery ground cable.

2. Disconnect cable from temperature blend door and the mounting bracket from top of heater assembly.

3. Disconnect blower motor and resistor electrical connectors.

4. Disconnect and plug hoses from heater core.

5. Working under instrument panel, remove 2 nuts on 1980---81 models, or 3 nuts on 1982---87 models, attaching left side of heater assembly and right side of plenum to dash.

6. On 1980---81 models, remove screw attaching top center of heater assembly to dash.

7. On all models, remove 2 screws attaching right side of heater assembly to dash, then lift heater assembly out of vehicle.

8. Remove heater housing plate attaching screws, nut and bolt and the plate.

9. On 1980---82 models, remove 3 heater core frame attaching screws and the frame.

10. On all models, slide heater core and seal out of heater assembly, Fig. 13.

11. Reverse procedure to install.

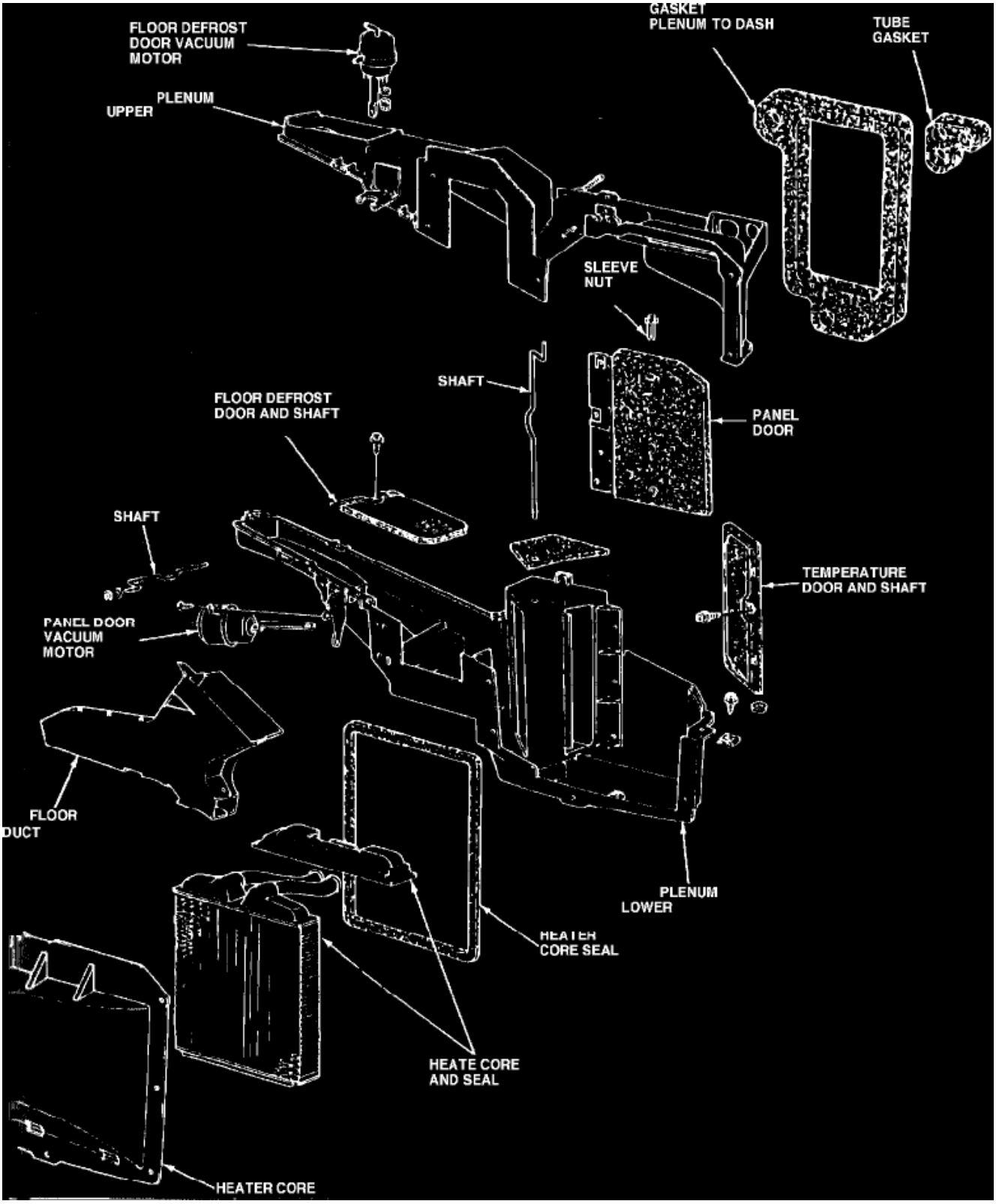


Fig. 14 Heater core replacement. F-100---350 & Bronco w/air conditioning

W/Air Conditioning

1. Disconnect battery ground cable.
2. Disconnect and plug hoses from heater core.
3. Remove glove compartment liner.
4. Remove 8 heater core cover attaching screws and the cover.
5. Remove heater core from plenum, Fig. 14.
6. Reverse procedure to install.

Technical Service Bulletin # 98-12-5 Date: 980622

A/C - Filtering Refrigerant After Compressor Replacement

Article No. 98-12-5

06/22/98

AIR CONDITIONING - FILTERING REFRIGERANT

AFTER A/C COMPRESSOR REPLACEMENT - SERVICE TIPS

FORD: 1980-98 CROWN VICTORIA 1981-98 ESCORT 1982-83 FAIRMONT 1982-88 EXP 1982-97 THUNDERBIRD 1982-98 MUSTANG 1983-86 LTD 1984-94 TEMPO 1986-98 TAURUS 1988-93 FESTIVA 1989-97 PROBE 1994-98 ASPIRE 1995-98 CONTOUR

LINCOLN-MERCURY: 1980-98 GRAND MARQUIS, TOWN CAR 1982-83 ZEPHYR 1982-86 CAPRI 1982-87 LN7 1982-97 COUGAR 1982-98 CONTINENTAL 1983-86 MARQUIS 1984-92 MARK VII 1984-94 TOPAZ 1986-98 SABLE 1991-94 CAPRI 1991-98 TRACER 1993-98 MARK VIII 1995-98-MYSTIQUE 1999 COUGAR

LIGHT TRUCK: 1980-96 BRONCO 1980-97 F SUPER DUTY 1980-98 ECONOLINE, F-150, F-150, F-350 1983-98 RANGER 1984-90 BRONCO II 1986-97 AEROSTAR 1988-97 F-47 1991-98 EXPLORER 1993-98 VILLAGER 1995-98 WINDSTAR 1997-98 EXPEDITION, MOUNTAINEER 1999 SUPER DUTY F SERIES

This TSB article is being republished in its entirety to revise the Service Procedure and to update the model years.

ISSUE Vehicles that have and inoperative A/C compressor, due to internal causes, MUST have the refrigerant system cleaned to remove any debris or contaminants that may be present to prevent damage to the replacement compressor.

ACTION

Install a Service Filter Kit in the refrigerant system prior to installing the replacement compressor. Refer to the following Service Procedure for details.

OTHER APPLICABLE ARTICLES: NONE

SUPERSEDES: 96-15-5

WARRANTY STATUS: Eligible Under The Provisions Of Bumper To Bumper Warranty Coverage For 1992-99 Models And 1991 Lincolns, Basic Warranty Coverage For All Other Models And Major Component Warranty Coverage For All Other Lincoins

OPERATION DESCRIPTION TIME

981205A Kit Installation 1.2 Hrs.

981205B Extra Time For Refrigerant 0.4 Hr.

(R-12) Recovery

DEALER CODING

CONDITION

BASIC PART NO. CODE

19703 49

OASIS CODES: 208000, 208999

Service Procedure

THIS PROCEDURE IS OPTIONAL IF THE SYSTEM IS FLUSHED USING THE ROTUNDA A/C FLUSHER.

CAUTION

THIS FILTERING PROCEDURE MAY BE USED FOR EITHER R-12 OR R-134a REFRIGERANT SYSTEMS. BECAUSE THE TWO (2) SYSTEMS USE DIFFERENT REFRIGERANT OILS AND BECAUSE THE COMPRESSOR COULD BE DAMAGED IF THE WRONG OIL IS USED, SYSTEM IDENTIFICATION IS VERY IMPORTANT. BE SURE SYSTEM IS CORRECTLY IDENTIFIED BEFORE STARTING THE FILTERING PROCEDURE.

Each Service Filter Kit includes the following items:

^ One (1) Pancake Filter (to be installed in the liquid line between the condenser and the orifice tube)

^ One (1) Instruction Sheet

NOTE

ON 1993-94 RANGER/EXPLORER VEHICLES, TECHNICIANS MAY EXPERIENCE DIFFICULTY WHEN CONNECTING THE PANCAKE FILTER HOSE FITTINGS TO THE EVAPORATOR INLET WITH THE ORIFICE TUBE INSTALLED. REMOVE THE OFFICE TUBE AND RUN THE SYSTEM FOR 1 HOUR AS DESCRIBED IN THE FILTERING PROCEDURE. REINSTALL THE ORIFICE TUBE AFTER FILTERING IS COMPLETE.

CAUTION

FOLLOW ALL REFRIGERANT SYSTEM SAFETY AND SERVICE PRECAUTIONS OUTLINED IN THE APPROPRIATE SERVICE OR WORKSHOP MANUAL.

1. Before removing any refrigerant system components, recover the refrigerant from the system following the recycling methods outlined In the appropriate Service/Workshop Manual.

2. Remove the suction accumulator/drier assembly and drain the oil into a calibrated container.

3. Install a new suction accumulator/drier and add new refrigerant oil to replace the old oil. The quantity of the new oil to be added is the amount to match that drained from the old accumulator plus 60 mL (2 oz). Refer to the Dealer Master Parts Catalog for the correct suction accumulator/drier part number.

CAUTION

REMEMBER TO USE MOTORCRAFT YN-9-A REFRIGERANT COMPRESSOR OIL WITH R-12 SYSTEMS AND MOTORCRAFT YN-12-C REFRIGERANT COMPRESSOR OIL WITH R-134a SYSTEMS. FAILURE TO USE THE CORRECT REFRIGERANT OIL MAY RESULT IN DAMAGE TO SYSTEM COMPONENTS.

4. Install a new orifice tube. Refer to the Dealer Master Parts Catalog for the correct orifice tube part number. If the orifice tube in the vehicle is located in the liquid line between the condenser and the evaporator, replace the liquid line assembly.

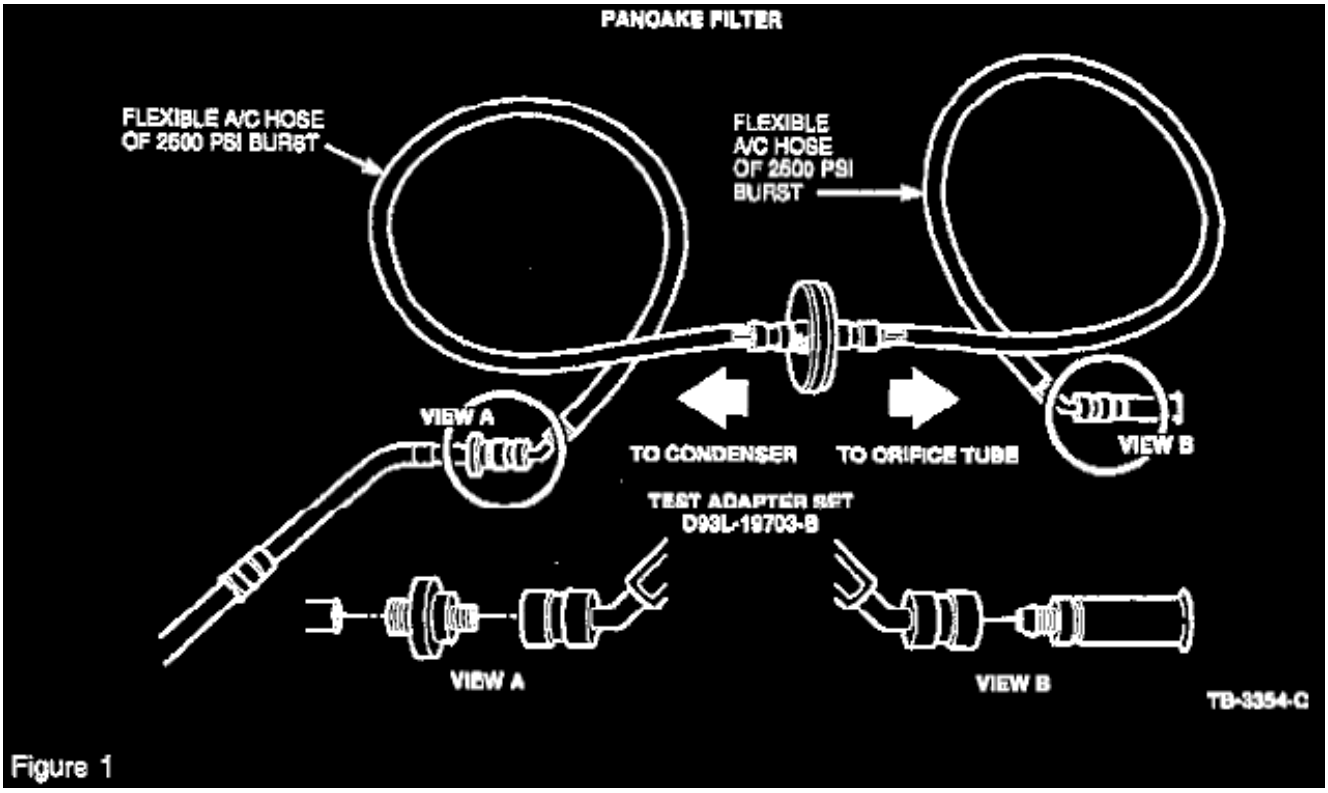


Figure 1

5. Install pancake filter in the liquid line between the condenser and the orifice tube, Figure 1.

a. Be sure orifice inlet is toward the condenser.

b. Connections can be made using Test Adapter Set D93L-19703-B, or equivalent, and flexible refrigerant hose of 2500 psi burst rating. Individual fittings are also available.

6. Remove the old compressor following Service/Workshop Manual procedures. Drain the oil into a calibrated container.

7. Drain the oil from the replacement compressor into a clean calibrated container.

NOTE:

IT WILL BE NECESSARY TO TRANSFER THE MAGNET CLUTCH FROM THE OLD COMPRESSOR TO THE REPLACEMENT COMPRESSOR. FOLLOW SERVICE/WORKSHOP MANUAL PROCEDURES.

8. A new FX-15 service compressor contains 207 mL (7 oz.) of R-12 refrigerant oil. A new FS-10 service compressor does not contain any oil and can be used with an R-12 or an R-134a system.

CAUTION

REMEMBER TO USE YN-9-A (MINERAL) OIL WITH R-12 SYSTEMS AND YN-12-C (PAG) OIL WITH R-134a SYSTEMS. FAILURE TO USE THE CORRECT REFRIGERANT OIL MAY RESULT IN DAMAGE TO SYSTEM COMPONENTS.

^ If the amount of oil drained from the removed compressor is between 90 and 148 mL (3-5 oz), pour the same amount of clean refrigerant oil into the new compressor.

^ If the amount of oil drained from the old compressor is greater than 90 mL (3 oz), pour 90 mL (3 oz) of clean refrigerant oil into the new compressor.

9. Install the new compressor following Service/Workshop Manual procedures. Make sure all mounting bolts are tightened properly. Check the tension of the compressor drive belt. Adjust if necessary.

10. Evacuate, charge and leak test the system, following Service/Workshop Manual procedures.

11. Check all refrigerant system hoses, lines and the position of the newly-installed filters to make sure they do not interfere with other engine compartment components. If necessary, use tie straps to make adjustments.

12. Set the A/C control on Max A/C, high blower and temperature control at full cold.

a. Start engine and let idle briefly.

b. Be sure A/C system is operating properly.

13. Gradually bring the engine up to 1200 rpm by running it at lower rpms for short periods (first at 800 rpm, then at 1000 rpm). Set the engine at 1200 rpm and run it for an hour with the A/C system operating.

14. Stop the engine.

NOTE:

IT WILL BE NECESSARY TO RECOVER THE SYSTEM REFRIGERANT CHARGE BEFORE PROCEEDING.

15. Allow the engine to cool sufficiently to remove the fittings, flexible hoses and pancake filter from the liquid line.

16. Discard the filter. It can be used one (1) tie only.

17. Reconnect the liquid line back into the system.

18. Evacuate, charge and leak test the system. Make any necessary adjustments.

19. Check the operation of the system in all models.

PART NUMBER PART NAME

F8VZ-19E773-AA Filter Kit

F73Z-19577-AA Refrigerant Oil - Motorcraft YN-9-A (For R-12 Refrigerant Systems Only)

F7AZ-19589-DA Refrigerant Oil - Motorcraft YN-12-C (PAG-Type Oil For R-134a Refrigerant Systems Only)

NOTE

THE TOTAL REPAIR TIME IS FOR INSTALLING SERVICE FILTER KIT PER INSTRUCTIONS THIS INCLUDES INSTALLATION OF AND DISCARD OF FILTER. REFER TO SERVICE LABOR TIME STANDARDS MANUALS IF ADDITIONAL LABOR OPERATIONS ARE REQUIRED.

Refrigerant: Technical Service Bulletins Air Conditioning - Use of Correct Fluorescent Tracer Dye

Article No. 93-20-6

09/29/93

AIR CONDITIONING - USE OF CORRECT FLUORESCENT TRACER DYE - SERVICE TIP

FORD: 1980-93 CROWN VICTORIA 1981-93 ESCORT 1982-83 FAIRMONT 1982-88 EXP 1982-93 MUSTANG, THUNDERBIRD 1983-86 LTD 1984-93 TEMPO 1986-93 TAURUS 1988-93 FESTIVA 1989-93 PROBE

LINCOLN-MERCURY: 1980-93 GRAND MARQUIS, TOWN CAR 1981-87 LYNX 1982-83 LN7, ZEPHYR 1982-86 CAPRI 1982-93 CONTINENTAL, COUGAR 1983-86 MARQUIS 1984-92 MARK VII 1984-93 TOPAZ 1986-93 SABLE 1991-93 CAPRI, TRACER

LIGHT TRUCK: 1980-93 BRONCO, ECONOLINE, F-150-350 SERIES 1983-93 RANGER 1984-90 BRONCO II 1986-93 AEROSTAR 1988-93 F-47 1991-93 EXPLORER 1993 VILLAGER

ISSUE: Use of untested, unapproved fluorescent tracer dyes for A/C system leak checking may damage the air conditioning system. Some of these materials may not be compatible with Ford A/C systems.

ACTION: When leak-checking an R-12 A/C system with a "black light", use only Rotunda-supplied Part No. 112-R0027, Fluoro-Lite brand dye. No other dyes have been approved by Ford Motor Company.

NOTE: 112-R0027 DYE IS NOT COMPATIBLE WITH R-134a REFRIGERANT.

OTHER APPLICABLE ARTICLES: NONE WARRANTY STATUS: INFORMATION ONLY OASIS CODES: 208999

Refrigerant: Technical Service Bulletins R-12 Refrigerant - Substitutes

Article No. 94-14-3

07/13/94

Air Conditioning - Use Of R-12 Refrigerant Substitutes - Service Tip

FORD: 1980-93 CROWN VICTORIA 1981-93 ESCORT 1982-83 FAIRMONT 1982-88 EXP 1982-93 MUSTANG, THUNDERBIRD 1983-86 LTD 1984-93 TEMPO 1986-93 TAURUS 1988-93 FESTIVA 1989-93 PROBE

LINCOLN-MERCURY: 1980-93 GRAND MARQUIS, TOWN CAR 1981-87 LYNX 1982-83 LN7, ZEPHYR 1982-86 CAPRI 1982-93 CONTINENTAL, COUGAR 1983-86 MARQUIS 1984-92 MARK VII 1984-93 TOPAZ 1986-93 SABLE 1991-93 CAPRI, TRACER

MERKUR: 1986-89 SCORPIO, XR4TI

LIGHT TRUCK: 1980-93 BRONCO, ECONOLINE, F-150-350 SERIES 1983-93 RANGER 1984-90 BRONCO II 1986-93 AEROSTAR 1988-93 F-47 1991-93 EXPLORER 1992-94 F-53 1993 VILLAGER

MEDIUM/HEAVY TRUCK: 1954-90 C SERIES 1970-94 L SERIES 1979-90 CL-9000, CL-CLT-9000 SERIES 1980-94 F SERIES 1986-94 CARGO SERIES

This TSB is being republished in its entirety to include Heavy Truck models.

ISSUE:

A number of manufacturers are producing refrigerant products which are described as being direct replacements for refrigerant R-12. The use of any unauthorized substitute refrigerant may severely damage the A/C system components.

ACTION:

If service is required, use only NEW or RECYCLED refrigerant R-12.

Ford Motor Company has not tested or approved any R-12 refrigerant substitute at this time. R-134a is approved only for systems which specify R-134a,

and is not compatible with R-12 systems.

R-22 likewise, is not compatible with R-12 systems.

CAUTION:

USING ANY UNAUTHORIZED SUBSTITUTE REFRIGERANT FOR R-12 MAY RESULT IN SEVERE DAMAGE TO THE A/C SYSTEM COMPONENTS.

OTHER APPLICABLE ARTICLES: 91-9-7

SUPERSEDES: 93-23-11

WARRANTY STATUS: INFORMATION ONLY

OASIS CODES: 208000, 208999, 290000

Refrigerant: Technical Service Bulletins A/C - R12 Refrigerant Substitutes Service Tip

Article No. 96-17-10

08/12/96

AIR CONDITIONING - USE OF R-12 REFRIGERANT SUBSTITUTES - SERVICE TIP

FORD: 1980-93 CROWN VICTORIA 1981-93 ESCORT 1982-83 FAIRMONT 1982-88 EXP 1982-93 MUSTANG, THUNDERBIRD 1983-86 LTD 1984-94 TEMPO 1986-93 TAURUS 1988-93 FESTIVA 1989-93 PROBE

LINCOLN-MERCURY: 1980-93 GRAND MARQUIS, TOWN CAR 1981-87 LYNX 1982-83 LN7, ZEPHYR 1982-86 CAPRI 1982-93 COUGAR 1982-94 CONTINENTAL 1983-86 MARQUIS 1984-92 MARK VII 1984-94 TOPAZ 1986-93 SABLE 1991-93 CAPRI, TRACER

MERKUR: 1985-89 XR4TI 1988-90 SCORPIO

LIGHT TRUCK: 1980-93 BRONCO, ECONOLINE, F SUPER DUTY, F-150-350 SERIES 1983-93 RANGER 1984-90 BRONCO II 1986-93 AEROSTAR 1988-93 F-47 1991-93 EXPLORER 1993 VILLAGER

MEDIUM/HEAVY TRUCK: 1985-94 CARGO SERIES, F & B SERIES, L SERIES

This TSB article is being republished in its entirety to list Environmental Protection Agency (EPA) reviewed NC substitutes for R-12 refrigerant.

ISSUE: A number of manufacturers are producing refrigerant products which are described as being direct replacements for refrigerant R-12.

ACTION: If service is required, use only new or of known quality recycled refrigerant R-12. Ford Motor Company has approved R-134a as the only refrigerant substitute for R-12.

CAUTION:

USING ANY UNAUTHORIZED SUBSTITUTE REFRIGERANT FOR R-12 MAY RESULT IN SEVERE DAMAGE TO THE A/C SYSTEM COMPONENTS.

INFORMATION FROM THE EPA

				Components Percentage							
Brand Name (1)	Ford Approved	Status (2)	Date	HCFC 22	HCFC 124	HCFC 142b	HFC 134a	HFC 152a	Propane (R-290)	Butane (R-600)	Iso-butane (R-600a)
HFC-134a	Yes	ASU	3/18/94				100%				
R-401C	No	ASU	3/18/94	33%	52%			15%			
FRIGC FR-12	No	ASU	6/13/95		39%		59%			2%	
Freezone (3)	No	ASU	5/22/96			19%	70%				
R-406A / GHG / McCool (4)	No	P	5/22/96	55%		41%					4%
GHG-X4 / Autofrost / Chill-It (4)	No	P	5/22/96	51%	28.5%	16.5%					4%
Hot Shot / Kar Kool (4)	No	P	5/22/96	50%	39%	9.5%					1.5%
GHG-HP (4)	No	P	5/22/96	65%		31%					4%
FREEZ-12	No	Under Review				20%	80%				

(1) R-401A (made by DuPont), R-401B (DuPont), R-409A (Elf Atochem), Care 30 (Calor Gas), Adak-29/Adak-12 (TACIP International) and ES-12R (Interveet) have not been submitted for review in motor vehicle air conditioning, and it is therefore illegal to use them in such systems.

(2) See article for details on legality of use according to Status:
- ASU = acceptable subject to fittings, labeling, and no drop-in use conditions
- P = proposed acceptable subject to use conditions; open to public comment so decision is not final
- UNA = unacceptable; illegal for use as CFC-12 substitutes in motor vehicle air conditioners

(3) Freezone contains 2% of a lubricant

(4) Additional use condition: MUST BE USED WITH BARRIER HOSES

This information has been taken from EPA documents to address Ford specific applications and recommendations. Further EPA information on ozone-depleting substances and regulations regarding its handling can be found on the Internet at World Wide Web site: http://www.epa.gov/ozone/

In 1994, EPA established the Significant New Alternatives Policy (SNAP) program to review alternatives to ozone-depleting substances like R-12. EPA examines new substitutes for their ozone depleting, global warming, flammability, and toxicity characteristics. The SNAP process does not test these substitutes for A/C system compatibility, reliability, durability, or performance.

Under the SNAP rule, each new refrigerant must be used in accordance with the following conditions:

1. Unique Fittings - Each new refrigerant must be used with a unique set of fittings to prevent the accidental mixing of different refrigerants.

2. Unique Equipment - Each refrigerant must have dedicated recovery/recycling equipment for that refrigerant.

3. Labels - Whether a vehicle is originally designed to use a new refrigerant or is retrofitted, the technician must apply a detailed label giving specific information about the alternative. This label covers up information about the old refrigerant and provides valuable details on the alternative and how it was used. The technician is required to fill in their name, company performing the retrofit, address and the date retrofitted.

4. Remove Original Refrigerant - The original R-12 must be removed from the system prior to charging with the new refrigerant. This will guarantee that the largest amount of clean R-12 is available for use in vehicles that still need it.

				Reason Unacceptable
Brand Name (1)	Ford Approved	Status (2)	Date	HCFC 22, HCFC 124, HCFC 142b, HFC 134a, HFC 152a, Propane (R-290), Butane (R-600), Iso-butane (R-600a)
Ikon-12	No	ASU	5/22/96	Composition claimed as confidential business information
OZ-12	No	UNA	3/18/94	Flammable blend of hydrocarbons; insufficient data to demonstrate safety
R-176	No	UNA	3/18/94	Contains CFC-12, which is inappropriate in a CFC-12 substitute
HC-12a	No	UNA	6/13/95	Flammable blend of hydrocarbons; insufficient data to demonstrate safety
R-405A	No	UNA	6/13/95	Contains a perfluorocarbon, which has extremely high global warming potential and lifetime

(1) R-401A (made by DuPont), R-401B (DuPont), R-409A (Elf Atochem), Care 30 (Calor Gas), Adak-29/Adak-12 (TACIP International) and ES-12H (Intervest) have not been submitted for review in motor vehicle air conditioning, and it is therefore illegal to use them in such systems.

(2) See article for details on legality of use according to Status:

- ASU = acceptable subject to fittings, labeling, and no drop-in use conditions
- P = proposed acceptable subject to use conditions; open to public comment so decision is not final
- UNA = unacceptable; illegal for use as CFC-12 substitutes in motor vehicle air conditioners

(3) Freezone contains 2% of a lubricant

(4) Additional use condition; MUST BE USED WITH BARRIER HOSES

A summary of the refrigerants reviewed under EPA's SNAP program for use in motor vehicle air conditioning systems is in the table.

OTHER APPLICABLE ARTICLES: 91-9-7, 96-15-7

SUPERSEDES: 93-23-11

WARRANTY STATUS: INFORMATION ONLY

OASIS CODES: 208000, 208999, 290000

Refrigerant: Capacity Specifications

A/C Refrigerant Capacity ..... 54 oz

Refrigerant: Fluid Type Specifications

Type	Refrigerant 12 (R-12) Ford Part Number
	D4AZ-19B519-A

Technical Service Bulletin # 98-12-5 Date: 980622

A/C - Filtering Refrigerant After Compressor Replacement

Article No. 98-12-5

06/22/98

AIR CONDITIONING - FILTERING REFRIGERANT

AFTER A/C COMPRESSOR REPLACEMENT - SERVICE TIPS

FORD: 1980-98 CROWN VICTORIA 1981-98 ESCORT 1982-83 FAIRMONT 1982-88 EXP 1982-97 THUNDERBIRD 1982-98 MUSTANG 1983-86 LTD 1984-94 TEMPO 1986-98 TAURUS 1988-93 FESTIVA 1989-97 PROBE 1994-98 ASPIRE 1995-98 CONTOUR

LINCOLN-MERCURY: 1980-98 GRAND MARQUIS, TOWN CAR 1982-83 ZEPHYR 1982-86 CAPRI 1982-87 LN7 1982-97 COUGAR 1982-98 CONTINENTAL 1983-86 MARQUIS 1984-92 MARK VII 1984-94 TOPAZ 1986-98 SABLE 1991-94 CAPRI 1991-98 TRACER 1993-98 MARK VIII 1995-98-MYSTIQUE 1999 COUGAR

LIGHT TRUCK: 1980-96 BRONCO 1980-97 F SUPER DUTY 1980-98 ECONOLINE, F-150, F-150, F-350 1983-98 RANGER 1984-90 BRONCO II 1986-97 AEROSTAR 1988-97 F-47 1991-98 EXPLORER 1993-98 VILLAGER 1995-98 WINDSTAR 1997-98 EXPEDITION, MOUNTAINEER 1999 SUPER DUTY F SERIES

This TSB article is being republished in its entirety to revise the Service Procedure and to update the model years.

ISSUE Vehicles that have and inoperative A/C compressor, due to internal causes, MUST have the refrigerant system cleaned to remove any debris or contaminants that may be present to prevent damage to the replacement compressor.

ACTION

Install a Service Filter Kit in the refrigerant system prior to installing the replacement compressor. Refer to the following Service Procedure for details.

OTHER APPLICABLE ARTICLES: NONE

SUPERSEDES: 96-15-5

WARRANTY STATUS: Eligible Under The Provisions Of Bumper To Bumper Warranty Coverage For 1992-99 Models And 1991 Lincolns, Basic Warranty Coverage For All Other Models And Major Component Warranty Coverage For All Other Lincoins

OPERATION DESCRIPTION TIME

981205A Kit Installation 1.2 Hrs.

981205B Extra Time For Refrigerant 0.4 Hr.

(R-12) Recovery

DEALER CODING

CONDITION

BASIC PART NO. CODE

19703 49

OASIS CODES: 208000, 208999

Service Procedure

THIS PROCEDURE IS OPTIONAL IF THE SYSTEM IS FLUSHED USING THE ROTUNDA A/C FLUSHER.

CAUTION

THIS FILTERING PROCEDURE MAY BE USED FOR EITHER R-12 OR R-134a REFRIGERANT SYSTEMS. BECAUSE THE TWO (2) SYSTEMS USE DIFFERENT REFRIGERANT OILS AND BECAUSE THE COMPRESSOR COULD BE DAMAGED IF THE WRONG OIL IS USED, SYSTEM IDENTIFICATION IS VERY IMPORTANT. BE SURE SYSTEM IS CORRECTLY IDENTIFIED BEFORE STARTING THE FILTERING PROCEDURE.

Each Service Filter Kit includes the following items:

^ One (1) Pancake Filter (to be installed in the liquid line between the condenser and the orifice tube)

^ One (1) Instruction Sheet

NOTE

ON 1993-94 RANGER/EXPLORER VEHICLES, TECHNICIANS MAY EXPERIENCE DIFFICULTY WHEN CONNECTING THE PANCAKE FILTER HOSE FITTINGS TO THE EVAPORATOR INLET WITH THE ORIFICE TUBE INSTALLED. REMOVE THE OFFICE TUBE AND RUN THE SYSTEM FOR 1 HOUR AS DESCRIBED IN THE FILTERING PROCEDURE. REINSTALL THE ORIFICE TUBE AFTER FILTERING IS COMPLETE.

CAUTION

FOLLOW ALL REFRIGERANT SYSTEM SAFETY AND SERVICE PRECAUTIONS OUTLINED IN THE APPROPRIATE SERVICE OR WORKSHOP MANUAL.

1. Before removing any refrigerant system components, recover the refrigerant from the system following the recycling methods outlined In the appropriate Service/Workshop Manual.

2. Remove the suction accumulator/drier assembly and drain the oil into a calibrated container.

3. Install a new suction accumulator/drier and add new refrigerant oil to replace the old oil. The quantity of the new oil to be added is the amount to match that drained from the old accumulator plus 60 mL (2 oz). Refer to the Dealer Master Parts Catalog for the correct suction accumulator/drier part number.

CAUTION

REMEMBER TO USE MOTORCRAFT YN-9-A REFRIGERANT COMPRESSOR OIL WITH R-12 SYSTEMS AND MOTORCRAFT YN-12-C REFRIGERANT COMPRESSOR OIL WITH R-134a SYSTEMS. FAILURE TO USE THE CORRECT REFRIGERANT OIL MAY RESULT IN DAMAGE TO SYSTEM COMPONENTS.

4. Install a new orifice tube. Refer to the Dealer Master Parts Catalog for the correct orifice tube part number. If the orifice tube in the vehicle is located in the liquid line between the condenser and the evaporator, replace the liquid line assembly.

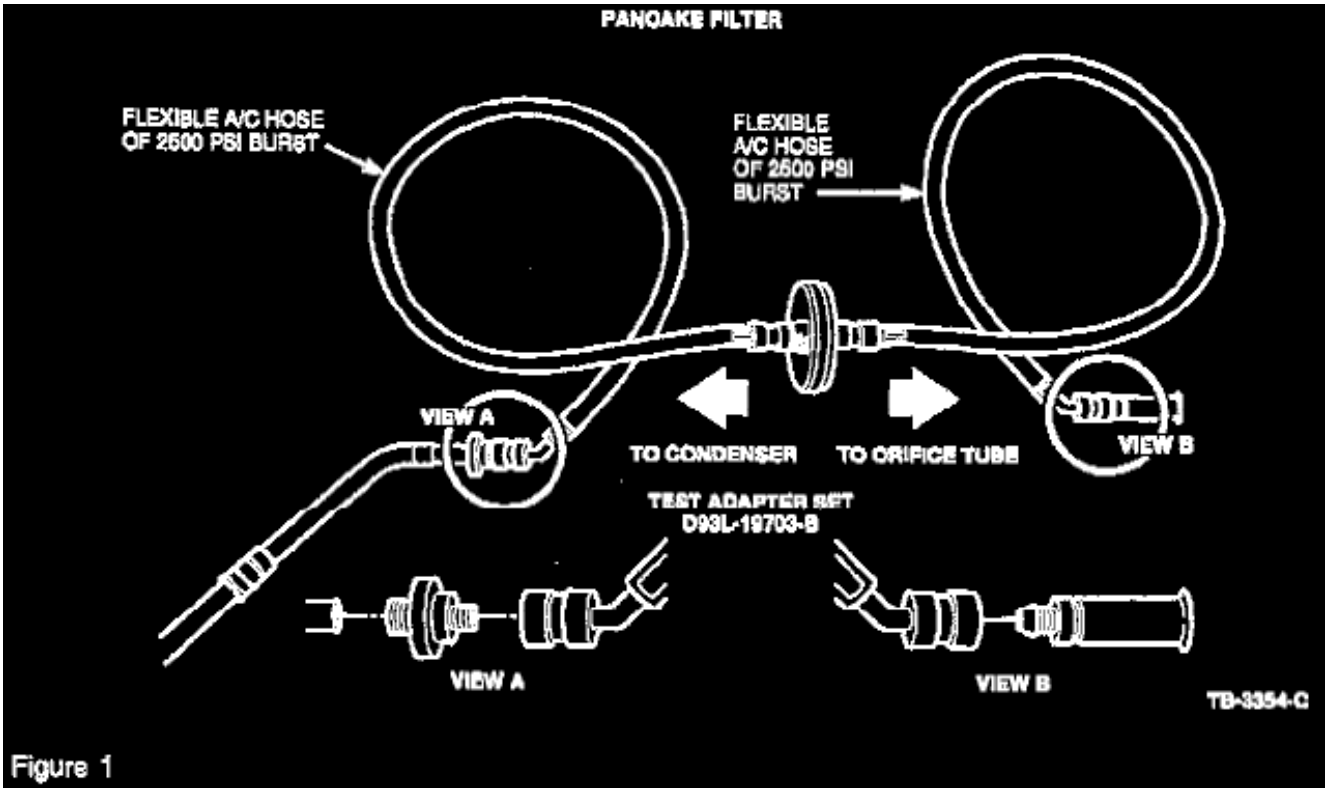


Figure 1

5. Install pancake filter in the liquid line between the condenser and the orifice tube, Figure 1.

a. Be sure orifice inlet is toward the condenser.

b. Connections can be made using Test Adapter Set D93L-19703-B, or equivalent, and flexible refrigerant hose of 2500 psi burst rating. Individual fittings are also available.

6. Remove the old compressor following Service/Workshop Manual procedures. Drain the oil into a calibrated container.

7. Drain the oil from the replacement compressor into a clean calibrated container.

NOTE:

IT WILL BE NECESSARY TO TRANSFER THE MAGNET CLUTCH FROM THE OLD COMPRESSOR TO THE REPLACEMENT COMPRESSOR. FOLLOW SERVICE/WORKSHOP MANUAL PROCEDURES.

8. A new FX-15 service compressor contains 207 mL (7 oz.) of R-12 refrigerant oil. A new FS-10 service compressor does not contain any oil and can be used with an R-12 or an R-134a system.

CAUTION

REMEMBER TO USE YN-9-A (MINERAL) OIL WITH R-12 SYSTEMS AND YN-12-C (PAG) OIL WITH R-134a SYSTEMS. FAILURE TO USE THE CORRECT REFRIGERANT OIL MAY RESULT IN DAMAGE TO SYSTEM COMPONENTS.

^ If the amount of oil drained from the removed compressor is between 90 and 148 mL (3-5 oz), pour the same amount of clean refrigerant oil into the new compressor.

^ If the amount of oil drained from the old compressor is greater than 90 mL (3 oz), pour 90 mL (3 oz) of clean refrigerant oil into the new compressor.

9. Install the new compressor following Service/Workshop Manual procedures. Make sure all mounting bolts are tightened properly. Check the tension of the compressor drive belt. Adjust if necessary.

10. Evacuate, charge and leak test the system, following Service/Workshop Manual procedures.

11. Check all refrigerant system hoses, lines and the position of the newly-installed filters to make sure they do not interfere with other engine compartment components. If necessary, use tie straps to make adjustments.

12. Set the A/C control on Max A/C, high blower and temperature control at full cold.

a. Start engine and let idle briefly.

b. Be sure A/C system is operating properly.

13. Gradually bring the engine up to 1200 rpm by running it at lower rpms for short periods (first at 800 rpm, then at 1000 rpm). Set the engine at 1200 rpm and run it for an hour with the A/C system operating.

14. Stop the engine.

NOTE:

IT WILL BE NECESSARY TO RECOVER THE SYSTEM REFRIGERANT CHARGE BEFORE PROCEEDING.

15. Allow the engine to cool sufficiently to remove the fittings, flexible hoses and pancake filter from the liquid line.

16. Discard the filter. It can be used one (1) tie only.

17. Reconnect the liquid line back into the system.

18. Evacuate, charge and leak test the system. Make any necessary adjustments.

19. Check the operation of the system in all models.

PART NUMBER PART NAME

F8VZ-19E773-AA Filter Kit

F73Z-19577-AA Refrigerant Oil - Motorcraft YN-9-A (For R-12 Refrigerant Systems Only)

F7AZ-19589-DA Refrigerant Oil - Motorcraft YN-12-C (PAG-Type Oil For R-134a Refrigerant Systems Only)

NOTE

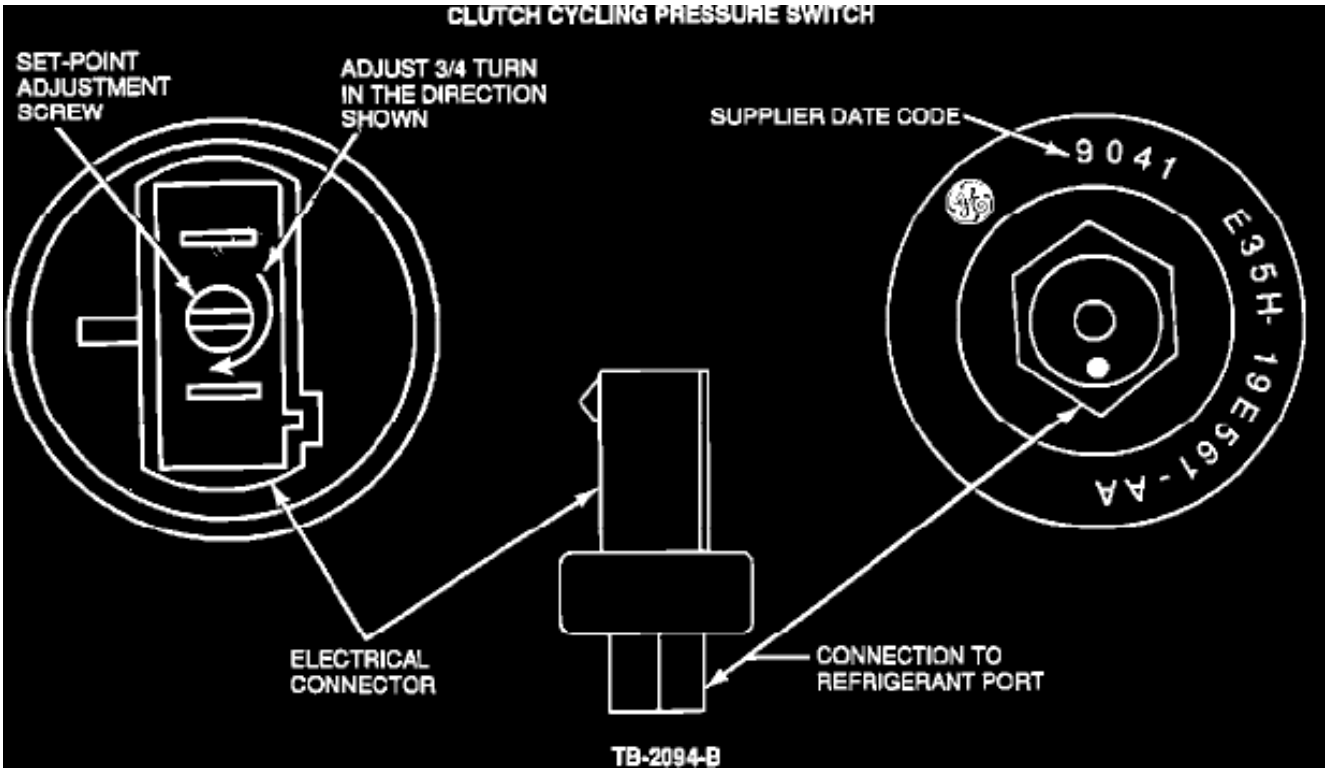
THE TOTAL REPAIR TIME IS FOR INSTALLING SERVICE FILTER KIT PER INSTRUCTIONS THIS INCLUDES INSTALLATION OF AND DISCARD OF FILTER. REFER TO SERVICE LABOR TIME STANDARDS MANUALS IF ADDITIONAL LABOR OPERATIONS ARE REQUIRED.

Refrigerant Oil: Capacity Specifications

Refrigerant Oil ..... 10 OZ

Refrigerant Oil: Fluid Type Specifications

Compressor ..... 500 viscosity (C9AZ-19557-B or Motorcraft VN-2 or equivalent)



Refrigerant Pressure Sensor / Switch: Customer Interest A/C System - Chemical/Refrigerator Type Odor

Article No. 91-15-5

07/24/91

AIR CONDITIONING - "REFRIGERATOR TYPE SMELL" OR "CHEMICAL TYPE ODOR" A/C SYSTEM - VEHICLES BUILT BEFORE 10/15/90

FORD: 1980-91 CROWN VICTORIA 1981-91 ESCORT 1982-83 FAIRMONT 1982-88 EXP 1982-91 MUSTANG, THUNDERBIRD 1983-86 LTD 1984-91 TEMPO 1986-91 TAURUS 1989-91 PROBE

LINCOLN-MERCURY: 1980-91 GRAND MARQUIS, MARK VII, TOWN CAR 1981-87 LYNX 1982-83

LN7, ZEPHYR

1982-86 CAPRI 1982-91 CONTINENTAL, COUGAR 1983-86 MARQUIS 1984-91 TOPAZ 1986-91 SABLE

LIGHT TRUCK: 1980-91 BRONCO, F-150-350 SERIES 1982-91 RANGER 1983-90 BRONCO II 1986-91 AEROSTAR 1988-91 ECONOLINE, F SUPER DUTY, F-47 1991 EXPLORER

This TSB article is being republished in its entirety to include Labor Standards for the Taurus, Sable and Probe vehicle models.

ISSUE: A "refrigerator type smell" or "chemical type" odor may come from some A/C systems. As the calibration of the clutch cycling pressure switch drifts downward, the evaporator core temperature may drop too low. This results in a "refrigerator type smell" or "chemical type" odor as the system cycles on and off.

Figure 1

ACTION: Install a new recalibrated clutch cycling pressure switch or adjust the existing/non-recalibrated clutch cycling pressure switch. The recalibrated switch can be identified by a specific supplier date code stamped near the fitting end of the switch, Figure 1.

^ Recalibrated switches built in the 1990 calendar year begin with the supplier date code 9041 and run through 9052.

^ Recalibrated switches built in the 1991 calendar year start with the supplier date code 9101 and run through 9152.

ADJUSTMENT PROCEDURE

Adjust the existing/non-recalibrated A/C cycling pressure switch by using the following service procedure.

1. Disconnect the body wiring harness.

2. Turn the set screw located between the two electrical terminals 3/4 turn clockwise (looking into the electrical connection) Figure 1.

3. Reconnect the body wiring harness.

PART NUMBER PART NAME CLASS

E35Y-19E561-A A/C Cycling Pressure Switch AM

OTHER APPLICABLE ARTICLES: NONE SUPERSEDES:

91-11-8

WARRANTY STATUS: Eligible Under Basic Warranty Coverage OPERATION DESCRIPTION

TIME

911505A Install A/C Cycling 0.3 Hr.

Pressure Switch - Town Car, Escort, Lynx, EXP And LN7.

911505B Install A/C Cycling 0.4 Hr.

Pressure Switch - Tempo/ Topaz, Taurus/Sable, Probe.

911505C Install A/C Cycling 0.5 Hr.

Pressure Switch - Crown Victoria, Grand Marquis, Mark VII, Continental, Thunderbird, Cougar, Fairmont, Zephyr, Mustang, Capri, LTD And Marquis.

911505D Install A/C Cycling 0.4 Hr.

Pressure Switch - All Light Trucks.

911505E Adjust A/C Cycling Switch - 0.2 Hr.

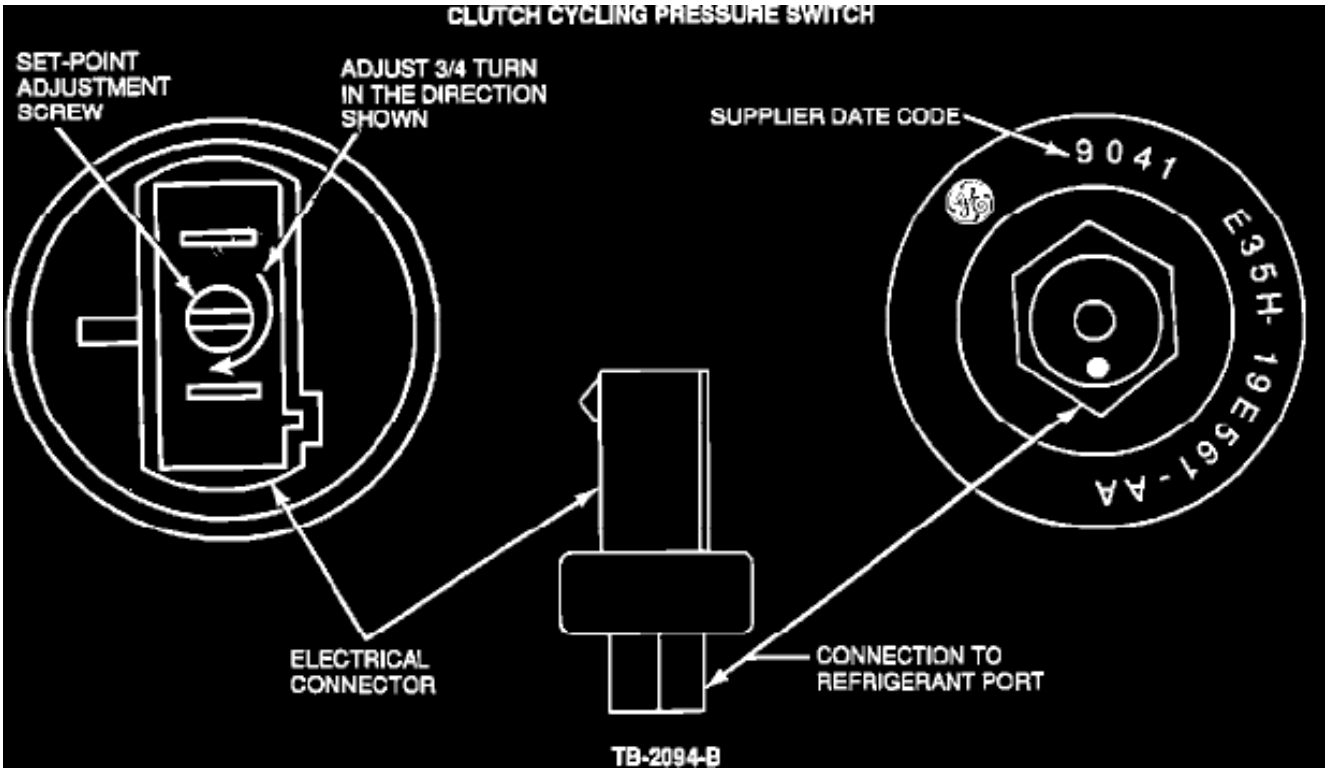
All

DEALER CODING

BASIC PART NO. CONDITION CODE

19E661 53

OASIS CODES: 208000, 208999



Refrigerant Pressure Sensor / Switch: All Technical Service Bulletins A/C System - Chemical/Refrigerator Type Odor

Article No. 91-15-5

07/24/91

AIR CONDITIONING - "REFRIGERATOR TYPE SMELL" OR "CHEMICAL TYPE ODOR" A/C SYSTEM - VEHICLES BUILT BEFORE 10/15/90

FORD: 1980-91 CROWN VICTORIA 1981-91 ESCORT 1982-83 FAIRMONT 1982-88 EXP 1982-91 MUSTANG, THUNDERBIRD 1983-86 LTD 1984-91 TEMPO 1986-91 TAURUS 1989-91 PROBE

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ADJUSTMENT PROCEDURE

Adjust the existing/non-recalibrated A/C cycling pressure switch by using the following service procedure.

1. Disconnect the body wiring harness.

2. Turn the set screw located between the two electrical terminals 3/4 turn clockwise (looking into the electrical connection) Figure 1.

3. Reconnect the body wiring harness.

PART NUMBER PART NAME CLASS

E35Y-19E561-A A/C Cycling Pressure Switch AM

OTHER APPLICABLE ARTICLES: NONE SUPERSEDES:

91-11-8

WARRANTY STATUS: Eligible Under Basic Warranty Coverage OPERATION DESCRIPTION

TIME

911505A Install A/C Cycling 0.3 Hr.

Pressure Switch - Town Car, Escort, Lynx, EXP And LN7.

911505B Install A/C Cycling 0.4 Hr.

Pressure Switch - Tempo/ Topaz, Taurus/Sable, Probe.

911505C Install A/C Cycling 0.5 Hr.

Pressure Switch - Crown Victoria, Grand Marquis, Mark VII, Continental, Thunderbird, Cougar, Fairmont, Zephyr, Mustang, Capri, LTD And Marquis.

911505D Install A/C Cycling 0.4 Hr.

Pressure Switch - All Light Trucks.

911505E Adjust A/C Cycling Switch - 0.2 Hr.

All

DEALER CODING

BASIC PART NO. CONDITION CODE

19E661 53

OASIS CODES: 208000, 208999

Refrigerant Pressure Sensor / Switch: All Technical Service Bulletins A/C - Pressure Cycling Switch Diagnostic Procedure

AIR CONDITIONING-CLUTCH PRESSURE CYCLING SWITCH DIAGNOSTIC PROCEDURE Article No. 89-14-10 FORD: 1980-89 CROWN VICTORIA 1981-89 ESCORT 1982-88 EXP 1982-89 MUSTANG, THUNDERBIRD 1983-86 LTD 1984-89 TEMPO

1986-89 TAURUS

LINCOLN-MERCURY: 1980-89 GRAND MARQUIS, MARK VI, MARK VII, TOWN CAR 1981-87 LYNX 1982-86 CAPRI 1982-89 CONTINENTAL, COUGAR 1983-86 MARQUIS 1984-89 TOPAZ 1986-89 SABLE

LIGHT TRUCK: 1980-89 BRONCO, F SERIES 1983-89 RANGER 1984-89 BRONCO II 1986-89 AEROSTAR 1988-89 ECONOLINE ISSUE:

Poor air conditioning cooling caused by low or no refrigerant charge often results in unnecessary replacement of the clutch cycling pressure switch. The switch is designed to work on system pressure. It closes at about 46 psi and opens at about 24.5 psi. It has a normal cycle (on and off) rate of 2 to 5 cycles per minute.

ACTION: If an inoperative or fast cycling pressure switch is found, use the following diagnostic charts before replacing the pressure switch.

DIAGNOSTIC PROCEDURE:

1. Connect a manifold gauge set to the service ports and check the system pressures. They should be above the closing pressure of the switch (46 psi).

2. If the A/C system pressures are above 46 psi and the clutch will not engage, proceed as follows:

^ Check the pressure switch harness connector and harness wires for a continuous open condition.

^ Check for an intermittent open or a poor connection between the connector and the pressure switch terminals.

a. If the harness connector and wires are OK, by-pass the pressure switch by jumping the two terminals of the connector. If the clutch still does not engage, THE PRESSURE SWITCH IS NOT DEFECTIVE. Refer to the respective EVTM for the clutch circuit schematic and circuit diagnosis. Repair as necessary.

3. Check the ambient temperature. If the ambient temperature is below 48~ F (9~ C), the system pressure will not be high enough to close the pressure switch (46 psi).

4. If the system does not contain refrigerant, the pressure will not be high enough to close the switch for compressor operation. Leak test, repair, evacuate and charge the system.

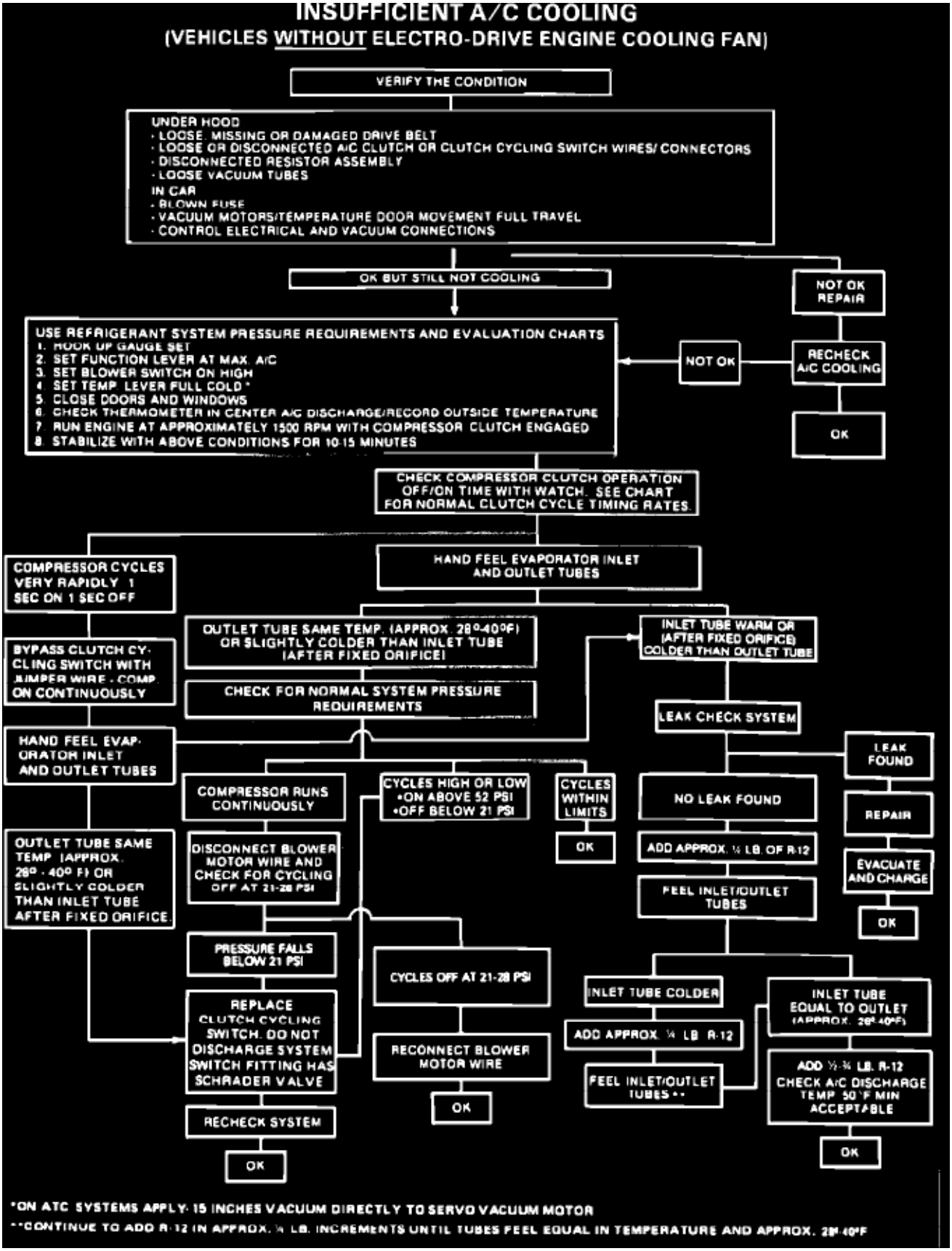

INSUFFICIENT A/C COOLING
(VEHICLES WITHOUT ELECTRO-DRIVE ENGINE COOLING FAN)
VERIFY THE CONDITION
UNDER HOOD
· LOOSE, MISSING OR DAMAGED DRIVE BELT
· LOOSE OR DISCONNECTED A/C CLUTCH OR CLUTCH CYCLING SWITCH WIRES/ CONNECTORS
· DISCONNECTED RESISTOR ASSEMBLY
· LOOSE VACUUM TUBES
IN CAR
· BLOWN FUSE
· VACUUM MOTORS/TEMPERATURE DOOR MOVEMENT FULL TRAVEL
· CONTROL ELECTRICAL AND VACUUM CONNECTIONS
OK BUT STILL NOT COOLING
NOT OK REPAIR
USE REFRIGERANT SYSTEM PRESSURE REQUIREMENTS AND EVALUATION CHARTS
1. HOOK UP GAUGE SET
2. SET FUNCTION LEVER AT MAX. A/C
3. SET BLOWER SWITCH ON HIGH
4. SET TEMP LEVER FULL COLD *
5. CLOSE DOORS AND WINDOWS
6. CHECK THERMOMETER IN CENTER A/C DISCHARGE/RECORD OUTSIDE TEMPERATURE
7. RUN ENGINE AT APPROXIMATELY 1500 RPM WITH COMPRESSOR CLUTCH ENGAGED
8. STABILIZE WITH ABOVE CONDITIONS FOR 10-15 MINUTES
NOT OK
RECHECK A/C COOLING
OK
CHECK COMPRESSOR CLUTCH OPERATION OFF/ON TIME WITH WATCH. SEE CHART FOR NORMAL CLUTCH CYCLE TIMING RATES.
COMPRESSOR CYCLES VERY RAPIDLY 1 SEC ON 1 SEC OFF
HAND FEEL EVAPORATOR INLET AND OUTLET TUBES
BYPASS CLUTCH CYCLING SWITCH WITH JUMPER WIRE - COMP. ON CONTINUOUSLY
OUTLET TUBE SAME TEMP. (APPROX. 28°-40°F) OR SLIGHTLY COLDER THAN INLET TUBE (AFTER FIXED ORIFICE)
INLET TUBE WARM OR (AFTER FIXED ORIFICE) COLDER THAN OUTLET TUBE
CHECK FOR NORMAL SYSTEM PRESSURE REQUIREMENTS
LEAK CHECK SYSTEM
HAND FEEL EVAPORATOR INLET AND OUTLET TUBES
LEAK FOUND
COMPRESSOR RUNS CONTINUOUSLY
CYCLES HIGH OR LOW
•ON ABOVE 52 PSI
•OFF BELOW 21 PSI
CYCLES WITHIN LIMITS
NO LEAK FOUND
REPAIR
OUTLET TUBE SAME TEMP (APPROX. 28° - 40° F) OR SLIGHTLY COLDER THAN INLET TUBE AFTER FIXED ORIFICE.
DISCONNECT BLOWER MOTOR WIRE AND CHECK FOR CYCLING OFF AT 21-28 PSI
OK
ADD APPROX. ¼ LB. OF R-12
EVACUATE AND CHARGE
FEEL INLET/OUTLET TUBES
OK
PRESSURE FALLS BELOW 21 PSI
CYCLES OFF AT 21-28 PSI
INLET TUBE COLDER
INLET TUBE EQUAL TO OUTLET (APPROX. 28°-40°F)
REPLACE CLUTCH CYCLING SWITCH. DO NOT DISCHARGE SYSTEM SWITCH FITTING HAS SCHRADER VALVE
RECONNECT BLOWER MOTOR WIRE
ADD APPROX. ¼ LB. R-12
ADD ½-¾ LB. R-12
FEEL INLET/OUTLET TUBES **
CHECK A/C DISCHARGE TEMP 50°F MIN ACCEPTABLE
OK
OK
RECHECK SYSTEM
OK
*ON ATC SYSTEMS APPLY 15 INCHES VACUUM DIRECTLY TO SERVO VACUUM MOTOR
**CONTINUE TO ADD R-12 IN APPROX. ¼ LB. INCREMENTS UNTIL TUBES FEEL EQUAL IN TEMPERATURE AND APPROX. 28°-40°F

Figure 1

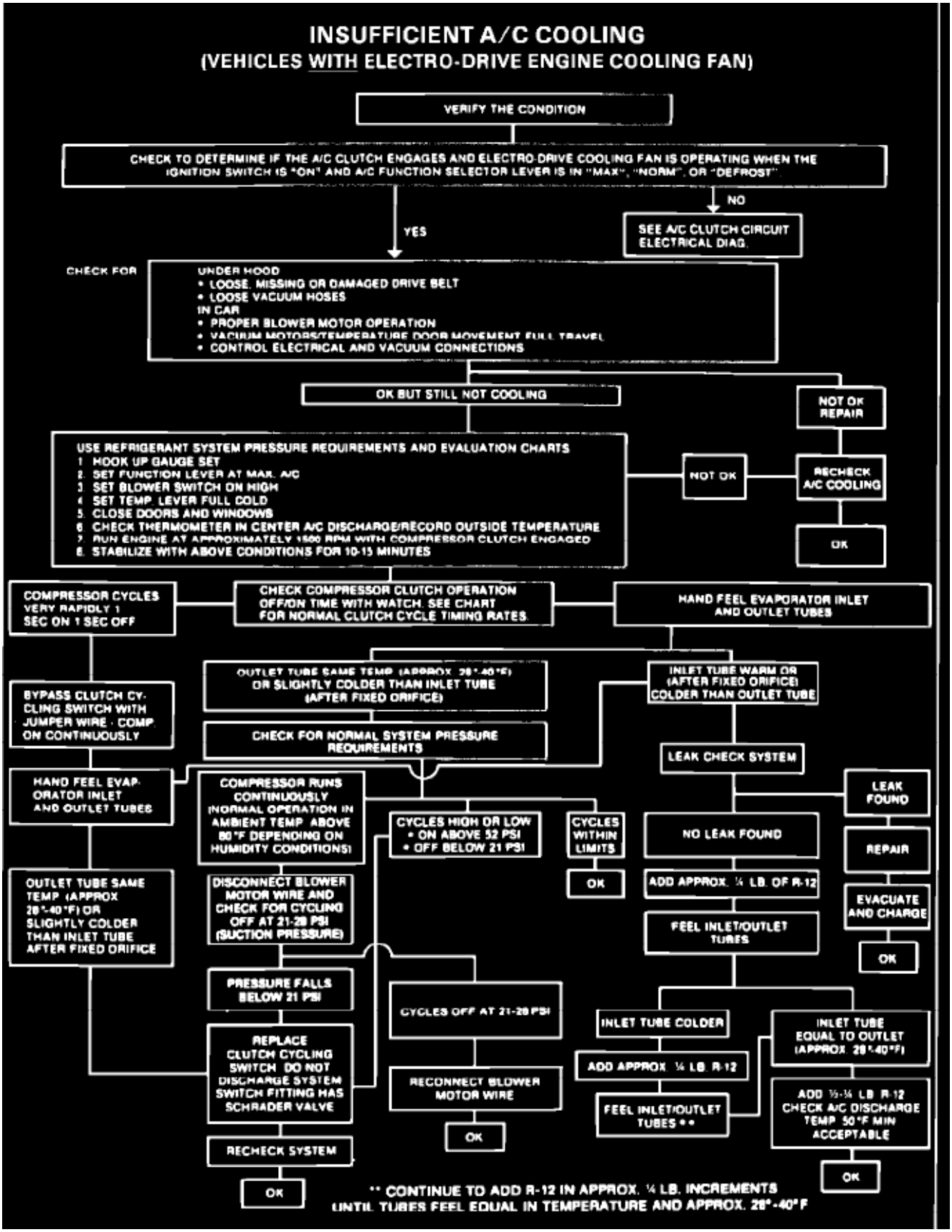

INSUFFICIENT A/C COOLING
(VEHICLES WITH ELECTRO-DRIVE ENGINE COOLING FAN)
VERIFY THE CONDITION
CHECK TO DETERMINE IF THE A/C CLUTCH ENGAGES AND ELECTRO-DRIVE COOLING FAN IS OPERATING WHEN THE IGNITION SWITCH IS "ON" AND A/C FUNCTION SELECTOR LEVER IS IN "MAX", "NORM", OR "DEFROST"
NO
SEE A/C CLUTCH CIRCUIT ELECTRICAL DIAG.
YES
CHECK FOR
UNDER HOOD
• LOOSE, MISSING OR DAMAGED DRIVE BELT
• LOOSE VACUUM HOSES
IN CAR
• PROPER BLOWER MOTOR OPERATION
• VACUUM MOTORS/TEMPERATURE DOOR MOVEMENT FULL TRAVEL
• CONTROL ELECTRICAL AND VACUUM CONNECTIONS
OK BUT STILL NOT COOLING
NOT OK REPAIR
USE REFRIGERANT SYSTEM PRESSURE REQUIREMENTS AND EVALUATION CHARTS
1. HOOK UP GAUGE SET
2. SET FUNCTION LEVER AT MAX. A/C
3. SET BLOWER SWITCH ON HIGH
4. SET TEMP. LEVER FULL COLD
5. CLOSE DOORS AND WINDOWS
6. CHECK THERMOMETER IN CENTER A/C DISCHARGE/RECORD OUTSIDE TEMPERATURE
7. RUN ENGINE AT APPROXIMATELY 1500 RPM WITH COMPRESSOR CLUTCH ENGAGED
8. STABILIZE WITH ABOVE CONDITIONS FOR 10-15 MINUTES
NOT OK
RECHECK A/C COOLING
OK
COMPRESSOR CYCLES VERY RAPIDLY 1 SEC ON 1 SEC OFF
CHECK COMPRESSOR CLUTCH OPERATION OFF/ON TIME WITH WATCH. SEE CHART FOR NORMAL CLUTCH CYCLE TIMING RATES.
HAND FEEL EVAPORATOR INLET AND OUTLET TUBES
BYPASS CLUTCH CYCLING SWITCH WITH JUMPER WIRE - COMP. ON CONTINUOUSLY
OUTLET TUBE SAME TEMP (APPROX. 28°-40°F) OR SLIGHTLY COLDER THAN INLET TUBE (AFTER FIXED ORIFICE)
CHECK FOR NORMAL SYSTEM PRESSURE REQUIREMENTS
INLET TUBE WARM OR (AFTER FIXED ORIFICE) COLDER THAN OUTLET TUBE
LEAK CHECK SYSTEM
HAND FEEL EVAPORATOR INLET AND OUTLET TUBES
COMPRESSOR RUNS CONTINUOUSLY (NORMAL OPERATION IN AMBIENT TEMP. ABOVE 80°F DEPENDING ON HUMIDITY CONDITIONS)
CYCLES HIGH OR LOW • ON ABOVE 52 PSI • OFF BELOW 21 PSI
CYCLES WITHIN LIMITS
OK
NO LEAK FOUND
ADD APPROX. ¼ LB. OF R-12
FEEL INLET/OUTLET TUBES
LEAK FOUND
REPAIR
EVACUATE AND CHARGE
OK
OUTLET TUBE SAME TEMP (APPROX 28°-40°F) OR SLIGHTLY COLDER THAN INLET TUBE AFTER FIXED ORIFICE
DISCONNECT BLOWER MOTOR WIRE AND CHECK FOR CYCLING OFF AT 21-28 PSI (SUCTION PRESSURE)
PRESSURE FALLS BELOW 21 PSI
REPLACE CLUTCH CYCLING SWITCH. DO NOT DISCHARGE SYSTEM. SWITCH FITTING HAS SCHRADER VALVE
RECHECK SYSTEM
OK
CYCLES OFF AT 21-28 PSI
RECONNECT BLOWER MOTOR WIRE
OK
INLET TUBE COLDER
ADD APPROX. ¼ LB. R-12
FEEL INLET/OUTLET TUBES **
INLET TUBE EQUAL TO OUTLET (APPROX. 28°-40°F)
ADD ½-¾ LB. R-12 CHECK A/C DISCHARGE TEMP. 50°F MIN. ACCEPTABLE
OK
** CONTINUE TO ADD R-12 IN APPROX. ¼ LB. INCREMENTS UNTIL TUBES FEEL EQUAL IN TEMPERATURE AND APPROX. 28°-40°F

Figure 2

5. If the pressures are above 46 psi and the clutch cycle rate is faster than the normal rate of 2 to 5 cycles per minute, the system is probably low on refrigerant. Check that the system contains the correct refrigerant charge by following the correct diagnostic chart (Figures 1 or 2).

WARRANTY STATUS: INFORMATION ONLY OASIS CODES:

2600, 2610

Refrigerant Pressure Sensor / Switch: All Technical Service Bulletins A/C - Pressure Cycling Switch Diagnostic Procedure

AIR CONDITIONING-CLUTCH PRESSURE CYCLING SWITCH DIAGNOSTIC PROCEDURE Article No. 89-14-10 FORD: 1980-89 CROWN VICTORIA 1981-89 ESCORT 1982-88 EXP 1982-89 MUSTANG, THUNDERBIRD 1983-86 LTD 1984-89 TEMPO

1986-89 TAURUS

LINCOLN-MERCURY: 1980-89 GRAND MARQUIS, MARK VI, MARK VII, TOWN CAR 1981-87 LYNX 1982-86 CAPRI 1982-89 CONTINENTAL, COUGAR 1983-86 MARQUIS 1984-89 TOPAZ 1986-89 SABLE

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3. Check the ambient temperature. If the ambient temperature is below 48~ F (9~ C), the system pressure will not be high enough to close the pressure switch (46 psi).

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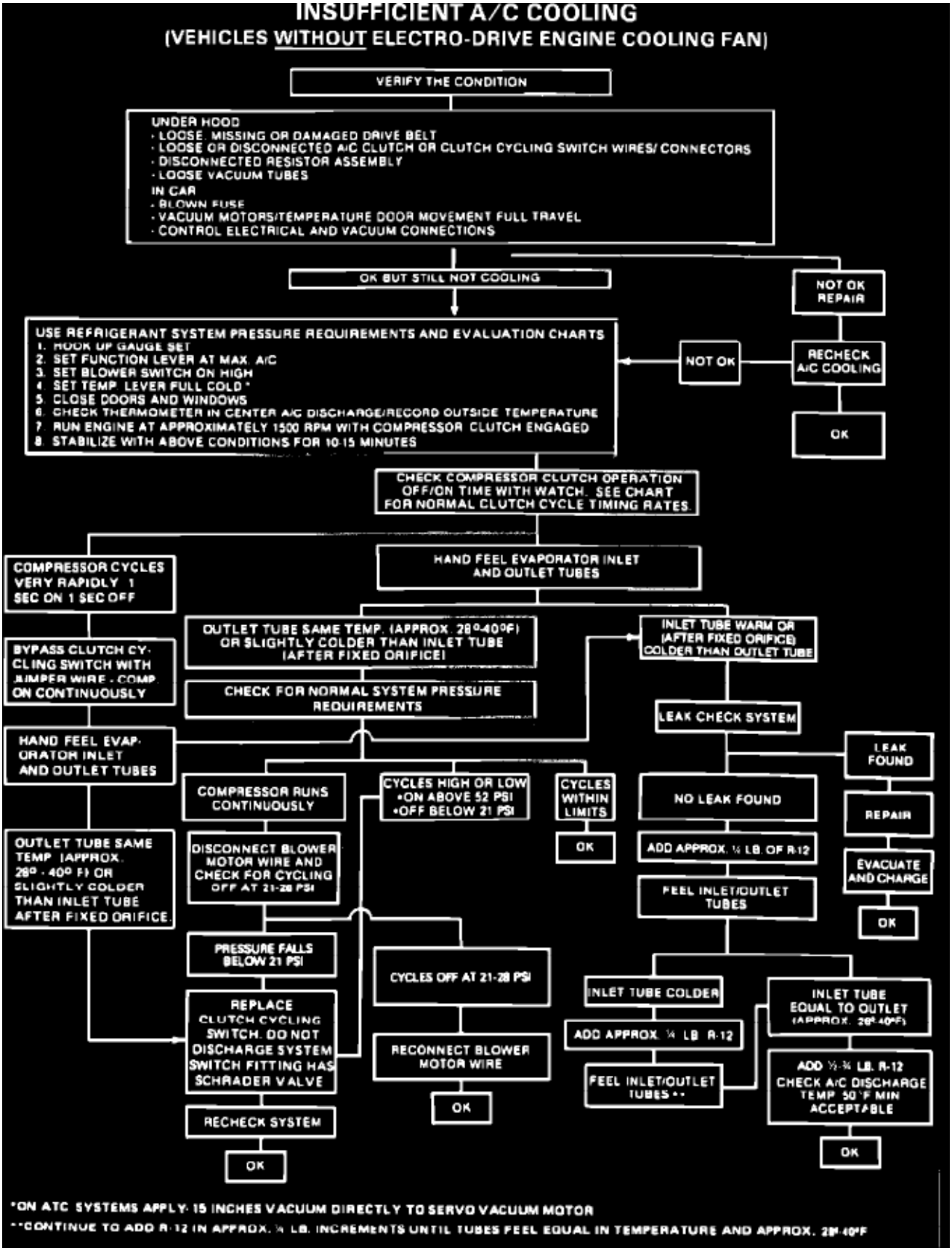

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(VEHICLES WITHOUT ELECTRO-DRIVE ENGINE COOLING FAN)
VERIFY THE CONDITION
UNDER HOOD
· LOOSE, MISSING OR DAMAGED DRIVE BELT
· LOOSE OR DISCONNECTED A/C CLUTCH OR CLUTCH CYCLING SWITCH WIRES/ CONNECTORS
· DISCONNECTED RESISTOR ASSEMBLY
· LOOSE VACUUM TUBES
IN CAR
· BLOWN FUSE
· VACUUM MOTORS/TEMPERATURE DOOR MOVEMENT FULL TRAVEL
· CONTROL ELECTRICAL AND VACUUM CONNECTIONS
OK BUT STILL NOT COOLING
NOT OK REPAIR
USE REFRIGERANT SYSTEM PRESSURE REQUIREMENTS AND EVALUATION CHARTS
1. HOOK UP GAUGE SET
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3. SET BLOWER SWITCH ON HIGH
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6. CHECK THERMOMETER IN CENTER A/C DISCHARGE/RECORD OUTSIDE TEMPERATURE
7. RUN ENGINE AT APPROXIMATELY 1500 RPM WITH COMPRESSOR CLUTCH ENGAGED
8. STABILIZE WITH ABOVE CONDITIONS FOR 10-15 MINUTES
NOT OK
RECHECK A/C COOLING
OK
CHECK COMPRESSOR CLUTCH OPERATION OFF/ON TIME WITH WATCH. SEE CHART FOR NORMAL CLUTCH CYCLE TIMING RATES.
COMPRESSOR CYCLES VERY RAPIDLY 1 SEC ON 1 SEC OFF
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OUTLET TUBE SAME TEMP. (APPROX. 28°-40°F) OR SLIGHTLY COLDER THAN INLET TUBE (AFTER FIXED ORIFICE)
INLET TUBE WARM OR (AFTER FIXED ORIFICE) COLDER THAN OUTLET TUBE
CHECK FOR NORMAL SYSTEM PRESSURE REQUIREMENTS
LEAK CHECK SYSTEM
HAND FEEL EVAPORATOR INLET AND OUTLET TUBES
LEAK FOUND
COMPRESSOR RUNS CONTINUOUSLY
CYCLES HIGH OR LOW
•ON ABOVE 52 PSI
•OFF BELOW 21 PSI
CYCLES WITHIN LIMITS
NO LEAK FOUND
REPAIR
OUTLET TUBE SAME TEMP (APPROX. 28° - 40° F) OR SLIGHTLY COLDER THAN INLET TUBE AFTER FIXED ORIFICE.
DISCONNECT BLOWER MOTOR WIRE AND CHECK FOR CYCLING OFF AT 21-28 PSI
OK
ADD APPROX. ¼ LB. OF R-12
EVACUATE AND CHARGE
FEEL INLET/OUTLET TUBES
OK
PRESSURE FALLS BELOW 21 PSI
CYCLES OFF AT 21-28 PSI
INLET TUBE COLDER
INLET TUBE EQUAL TO OUTLET (APPROX. 28°-40°F)
REPLACE CLUTCH CYCLING SWITCH. DO NOT DISCHARGE SYSTEM SWITCH FITTING HAS SCHRADER VALVE
RECONNECT BLOWER MOTOR WIRE
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FEEL INLET/OUTLET TUBES **
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OK
OK
RECHECK SYSTEM
OK
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**CONTINUE TO ADD R-12 IN APPROX. ¼ LB. INCREMENTS UNTIL TUBES FEEL EQUAL IN TEMPERATURE AND APPROX. 28°-40°F

Figure 1

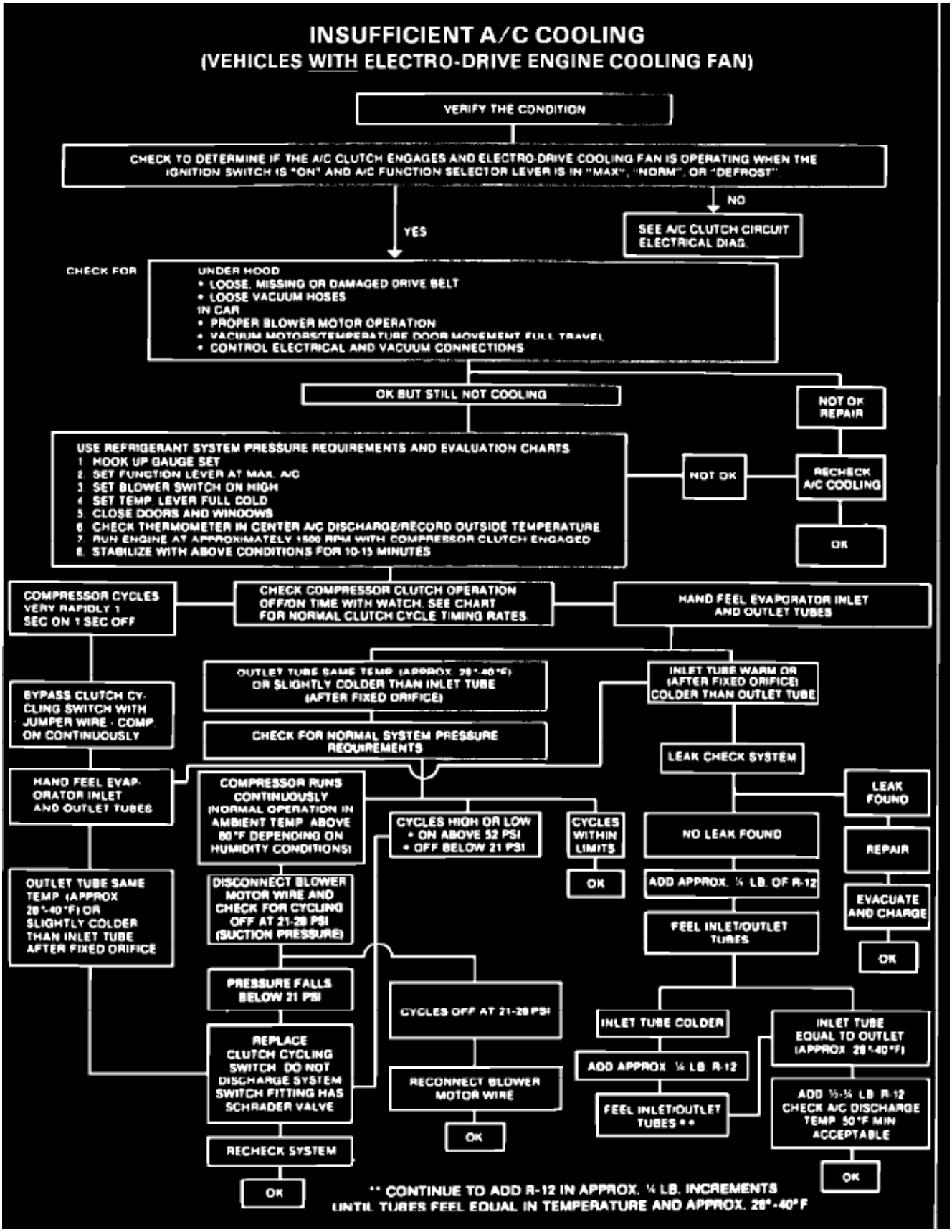

INSUFFICIENT A/C COOLING
(VEHICLES WITH ELECTRO-DRIVE ENGINE COOLING FAN)
VERIFY THE CONDITION
CHECK TO DETERMINE IF THE A/C CLUTCH ENGAGES AND ELECTRO-DRIVE COOLING FAN IS OPERATING WHEN THE IGNITION SWITCH IS "ON" AND A/C FUNCTION SELECTOR LEVER IS IN "MAX", "NORM", OR "DEFROST"
NO
SEE A/C CLUTCH CIRCUIT ELECTRICAL DIAG.
YES
CHECK FOR
UNDER HOOD
• LOOSE, MISSING OR DAMAGED DRIVE BELT
• LOOSE VACUUM HOSES
IN CAR
• PROPER BLOWER MOTOR OPERATION
• VACUUM MOTORS/TEMPERATURE DOOR MOVEMENT FULL TRAVEL
• CONTROL ELECTRICAL AND VACUUM CONNECTIONS
OK BUT STILL NOT COOLING
NOT OK REPAIR
USE REFRIGERANT SYSTEM PRESSURE REQUIREMENTS AND EVALUATION CHARTS
1. HOOK UP GAUGE SET
2. SET FUNCTION LEVER AT MAX. A/C
3. SET BLOWER SWITCH ON HIGH
4. SET TEMP. LEVER FULL COLD
5. CLOSE DOORS AND WINDOWS
6. CHECK THERMOMETER IN CENTER A/C DISCHARGE/RECORD OUTSIDE TEMPERATURE
7. RUN ENGINE AT APPROXIMATELY 1500 RPM WITH COMPRESSOR CLUTCH ENGAGED
8. STABILIZE WITH ABOVE CONDITIONS FOR 10-15 MINUTES
NOT OK
RECHECK A/C COOLING
OK
COMPRESSOR CYCLES VERY RAPIDLY 1 SEC ON 1 SEC OFF
CHECK COMPRESSOR CLUTCH OPERATION OFF/ON TIME WITH WATCH. SEE CHART FOR NORMAL CLUTCH CYCLE TIMING RATES.
HAND FEEL EVAPORATOR INLET AND OUTLET TUBES
BYPASS CLUTCH CYCLING SWITCH WITH JUMPER WIRE - COMP. ON CONTINUOUSLY
OUTLET TUBE SAME TEMP (APPROX. 28°-40°F) OR SLIGHTLY COLDER THAN INLET TUBE (AFTER FIXED ORIFICE)
CHECK FOR NORMAL SYSTEM PRESSURE REQUIREMENTS
INLET TUBE WARM OR (AFTER FIXED ORIFICE) COLDER THAN OUTLET TUBE
LEAK CHECK SYSTEM
HAND FEEL EVAPORATOR INLET AND OUTLET TUBES
COMPRESSOR RUNS CONTINUOUSLY (NORMAL OPERATION IN AMBIENT TEMP. ABOVE 80°F DEPENDING ON HUMIDITY CONDITIONS)
CYCLES HIGH OR LOW • ON ABOVE 52 PSI • OFF BELOW 21 PSI
CYCLES WITHIN LIMITS
OK
NO LEAK FOUND
ADD APPROX. ¼ LB. OF R-12
FEEL INLET/OUTLET TUBES
LEAK FOUND
REPAIR
EVACUATE AND CHARGE
OK
OUTLET TUBE SAME TEMP (APPROX 28°-40°F) OR SLIGHTLY COLDER THAN INLET TUBE AFTER FIXED ORIFICE
DISCONNECT BLOWER MOTOR WIRE AND CHECK FOR CYCLING OFF AT 21-28 PSI (SUCTION PRESSURE)
PRESSURE FALLS BELOW 21 PSI
REPLACE CLUTCH CYCLING SWITCH. DO NOT DISCHARGE SYSTEM. SWITCH FITTING HAS SCHRADER VALVE
RECHECK SYSTEM
OK
CYCLES OFF AT 21-28 PSI
RECONNECT BLOWER MOTOR WIRE
OK
INLET TUBE COLDER
ADD APPROX. ¼ LB. R-12
FEEL INLET/OUTLET TUBES **
INLET TUBE EQUAL TO OUTLET (APPROX. 28°-40°F)
ADD ½-¾ LB. R-12 CHECK A/C DISCHARGE TEMP. 50°F MIN. ACCEPTABLE
OK
** CONTINUE TO ADD R-12 IN APPROX. ¼ LB. INCREMENTS UNTIL TUBES FEEL EQUAL IN TEMPERATURE AND APPROX. 28°-40°F

Figure 2

5. If the pressures are above 46 psi and the clutch cycle rate is faster than the normal rate of 2 to 5 cycles per minute, the system is probably low on refrigerant. Check that the system contains the correct refrigerant charge by following the correct diagnostic chart (Figures 1 or 2).

WARRANTY STATUS: INFORMATION ONLY OASIS CODES:

2600, 2610

Refrigerant Pressure Sensor / Switch: Locations

RH Side Of Dash Panel On Accumulator

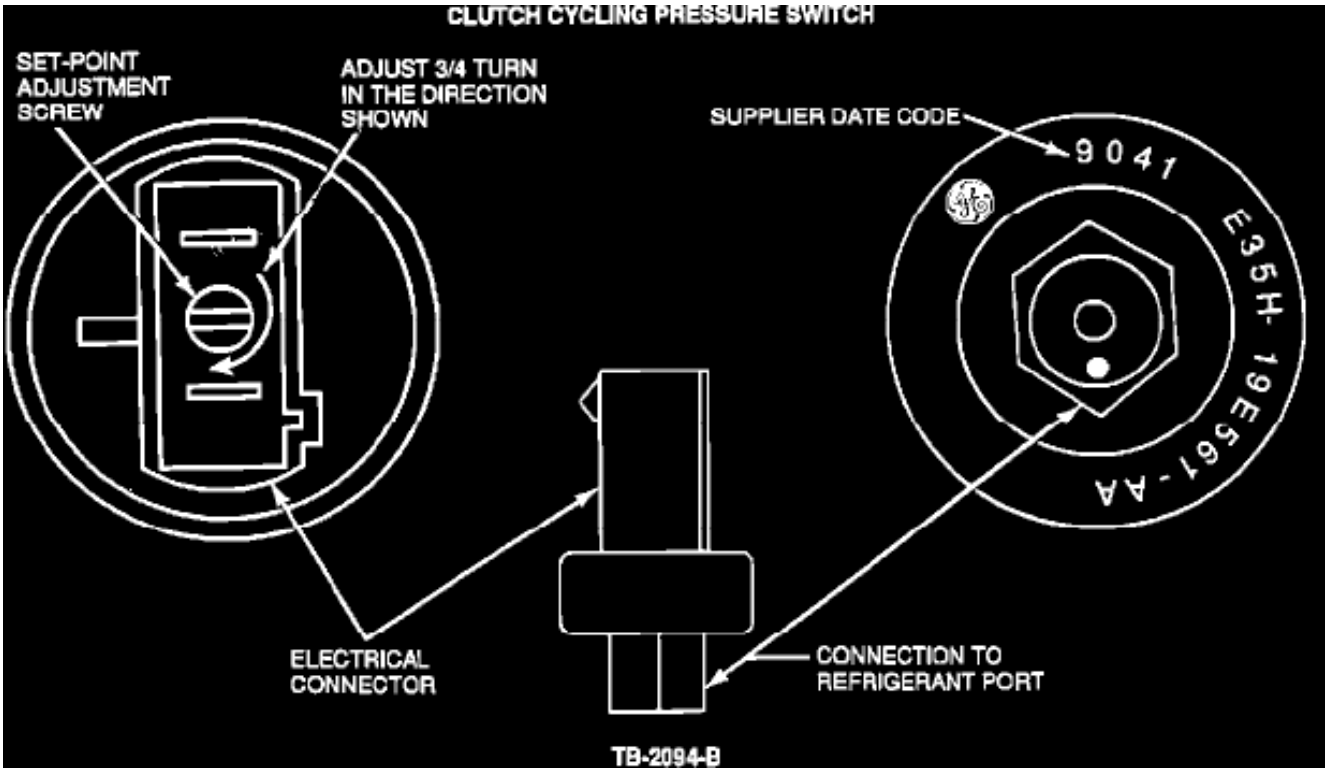
Blower Motor Switch: Locations Auxiliary Heater Switch

A/C COOLING FAN CONTROLLER

Under LH Side Of I/P

Blower Motor Switch: Locations Blower Control Switch

At Center Of I/P



Refrigerant Pressure Sensor / Switch: Customer Interest A/C System - Chemical/Refrigerator Type Odor

Article No. 91-15-5

07/24/91

AIR CONDITIONING - "REFRIGERATOR TYPE SMELL" OR "CHEMICAL TYPE ODOR" A/C SYSTEM - VEHICLES BUILT BEFORE 10/15/90

FORD: 1980-91 CROWN VICTORIA 1981-91 ESCORT 1982-83 FAIRMONT 1982-88 EXP 1982-91 MUSTANG, THUNDERBIRD 1983-86 LTD 1984-91 TEMPO 1986-91 TAURUS 1989-91 PROBE

LINCOLN-MERCURY: 1980-91 GRAND MARQUIS, MARK VII, TOWN CAR 1981-87 LYNX 1982-83

LN7, ZEPHYR

1982-86 CAPRI 1982-91 CONTINENTAL, COUGAR 1983-86 MARQUIS 1984-91 TOPAZ 1986-91 SABLE

LIGHT TRUCK: 1980-91 BRONCO, F-150-350 SERIES 1982-91 RANGER 1983-90 BRONCO II 1986-91 AEROSTAR 1988-91 ECONOLINE, F SUPER DUTY, F-47 1991 EXPLORER

This TSB article is being republished in its entirety to include Labor Standards for the Taurus, Sable and Probe vehicle models.

ISSUE: A "refrigerator type smell" or "chemical type" odor may come from some A/C systems. As the calibration of the clutch cycling pressure switch drifts downward, the evaporator core temperature may drop too low. This results in a "refrigerator type smell" or "chemical type" odor as the system cycles on and off.

Figure 1

ACTION: Install a new recalibrated clutch cycling pressure switch or adjust the existing/non-recalibrated clutch cycling pressure switch. The recalibrated switch can be identified by a specific supplier date code stamped near the fitting end of the switch, Figure 1.

^ Recalibrated switches built in the 1990 calendar year begin with the supplier date code 9041 and run through 9052.

^ Recalibrated switches built in the 1991 calendar year start with the supplier date code 9101 and run through 9152.

ADJUSTMENT PROCEDURE

Adjust the existing/non-recalibrated A/C cycling pressure switch by using the following service procedure.

1. Disconnect the body wiring harness.

2. Turn the set screw located between the two electrical terminals 3/4 turn clockwise (looking into the electrical connection) Figure 1.

3. Reconnect the body wiring harness.

PART NUMBER PART NAME CLASS

E35Y-19E561-A A/C Cycling Pressure Switch AM

OTHER APPLICABLE ARTICLES: NONE SUPERSEDES:

91-11-8

WARRANTY STATUS: Eligible Under Basic Warranty Coverage OPERATION DESCRIPTION

TIME

911505A Install A/C Cycling 0.3 Hr.

Pressure Switch - Town Car, Escort, Lynx, EXP And LN7.

911505B Install A/C Cycling 0.4 Hr.

Pressure Switch - Tempo/ Topaz, Taurus/Sable, Probe.

911505C Install A/C Cycling 0.5 Hr.

Pressure Switch - Crown Victoria, Grand Marquis, Mark VII, Continental, Thunderbird, Cougar, Fairmont, Zephyr, Mustang, Capri, LTD And Marquis.

911505D Install A/C Cycling 0.4 Hr.

Pressure Switch - All Light Trucks.

911505E Adjust A/C Cycling Switch - 0.2 Hr.

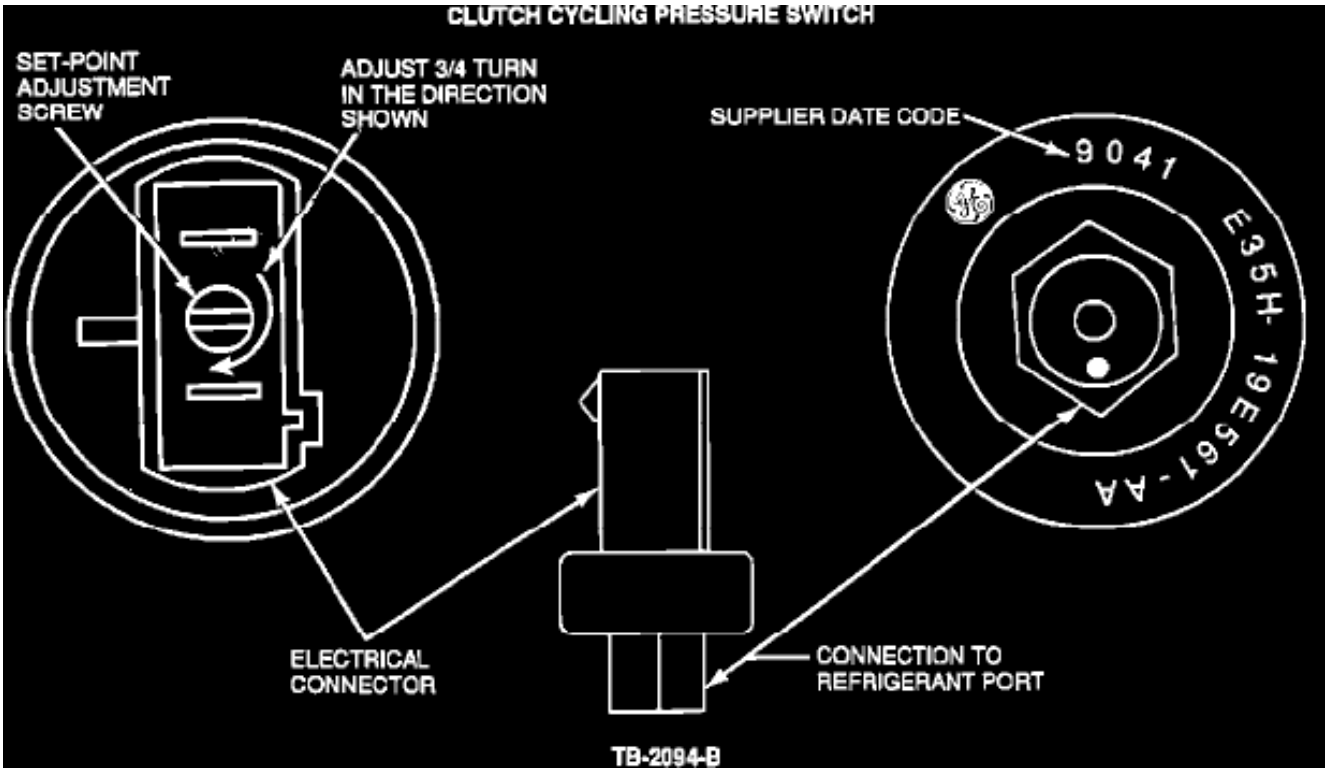
All

DEALER CODING

BASIC PART NO. CONDITION CODE

19E661 53

OASIS CODES: 208000, 208999



Refrigerant Pressure Sensor / Switch: All Technical Service Bulletins A/C System - Chemical/Refrigerator Type Odor

Article No. 91-15-5

07/24/91

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LN7, ZEPHYR

1982-86 CAPRI 1982-91 CONTINENTAL, COUGAR 1983-86 MARQUIS 1984-91 TOPAZ 1986-91 SABLE

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Adjust the existing/non-recalibrated A/C cycling pressure switch by using the following service procedure.

1. Disconnect the body wiring harness.

2. Turn the set screw located between the two electrical terminals 3/4 turn clockwise (looking into the electrical connection) Figure 1.

3. Reconnect the body wiring harness.

PART NUMBER PART NAME CLASS

E35Y-19E561-A A/C Cycling Pressure Switch AM

OTHER APPLICABLE ARTICLES: NONE SUPERSEDES:

91-11-8

WARRANTY STATUS: Eligible Under Basic Warranty Coverage OPERATION DESCRIPTION

TIME

911505A Install A/C Cycling 0.3 Hr.

Pressure Switch - Town Car, Escort, Lynx, EXP And LN7.

911505B Install A/C Cycling 0.4 Hr.

Pressure Switch - Tempo/ Topaz, Taurus/Sable, Probe.

911505C Install A/C Cycling 0.5 Hr.

Pressure Switch - Crown Victoria, Grand Marquis, Mark VII, Continental, Thunderbird, Cougar, Fairmont, Zephyr, Mustang, Capri, LTD And Marquis.

911505D Install A/C Cycling 0.4 Hr.

Pressure Switch - All Light Trucks.

911505E Adjust A/C Cycling Switch - 0.2 Hr.

All

DEALER CODING

BASIC PART NO. CONDITION CODE

19E661 53

OASIS CODES: 208000, 208999

Refrigerant Pressure Sensor / Switch: All Technical Service Bulletins A/C - Pressure Cycling Switch Diagnostic Procedure

AIR CONDITIONING-CLUTCH PRESSURE CYCLING SWITCH DIAGNOSTIC PROCEDURE Article No. 89-14-10 FORD: 1980-89 CROWN VICTORIA 1981-89 ESCORT 1982-88 EXP 1982-89 MUSTANG, THUNDERBIRD 1983-86 LTD 1984-89 TEMPO

1986-89 TAURUS

LINCOLN-MERCURY: 1980-89 GRAND MARQUIS, MARK VI, MARK VII, TOWN CAR 1981-87 LYNX 1982-86 CAPRI 1982-89 CONTINENTAL, COUGAR 1983-86 MARQUIS 1984-89 TOPAZ 1986-89 SABLE

LIGHT TRUCK: 1980-89 BRONCO, F SERIES 1983-89 RANGER 1984-89 BRONCO II 1986-89 AEROSTAR 1988-89 ECONOLINE ISSUE:

Poor air conditioning cooling caused by low or no refrigerant charge often results in unnecessary replacement of the clutch cycling pressure switch. The switch is designed to work on system pressure. It closes at about 46 psi and opens at about 24.5 psi. It has a normal cycle (on and off) rate of 2 to 5 cycles per minute.

ACTION: If an inoperative or fast cycling pressure switch is found, use the following diagnostic charts before replacing the pressure switch.

DIAGNOSTIC PROCEDURE:

1. Connect a manifold gauge set to the service ports and check the system pressures. They should be above the closing pressure of the switch (46 psi).

2. If the A/C system pressures are above 46 psi and the clutch will not engage, proceed as follows:

^ Check the pressure switch harness connector and harness wires for a continuous open condition.

^ Check for an intermittent open or a poor connection between the connector and the pressure switch terminals.

a. If the harness connector and wires are OK, by-pass the pressure switch by jumping the two terminals of the connector. If the clutch still does not engage, THE PRESSURE SWITCH IS NOT DEFECTIVE. Refer to the respective EVTM for the clutch circuit schematic and circuit diagnosis. Repair as necessary.

3. Check the ambient temperature. If the ambient temperature is below 48~ F (9~ C), the system pressure will not be high enough to close the pressure switch (46 psi).

4. If the system does not contain refrigerant, the pressure will not be high enough to close the switch for compressor operation. Leak test, repair, evacuate and charge the system.

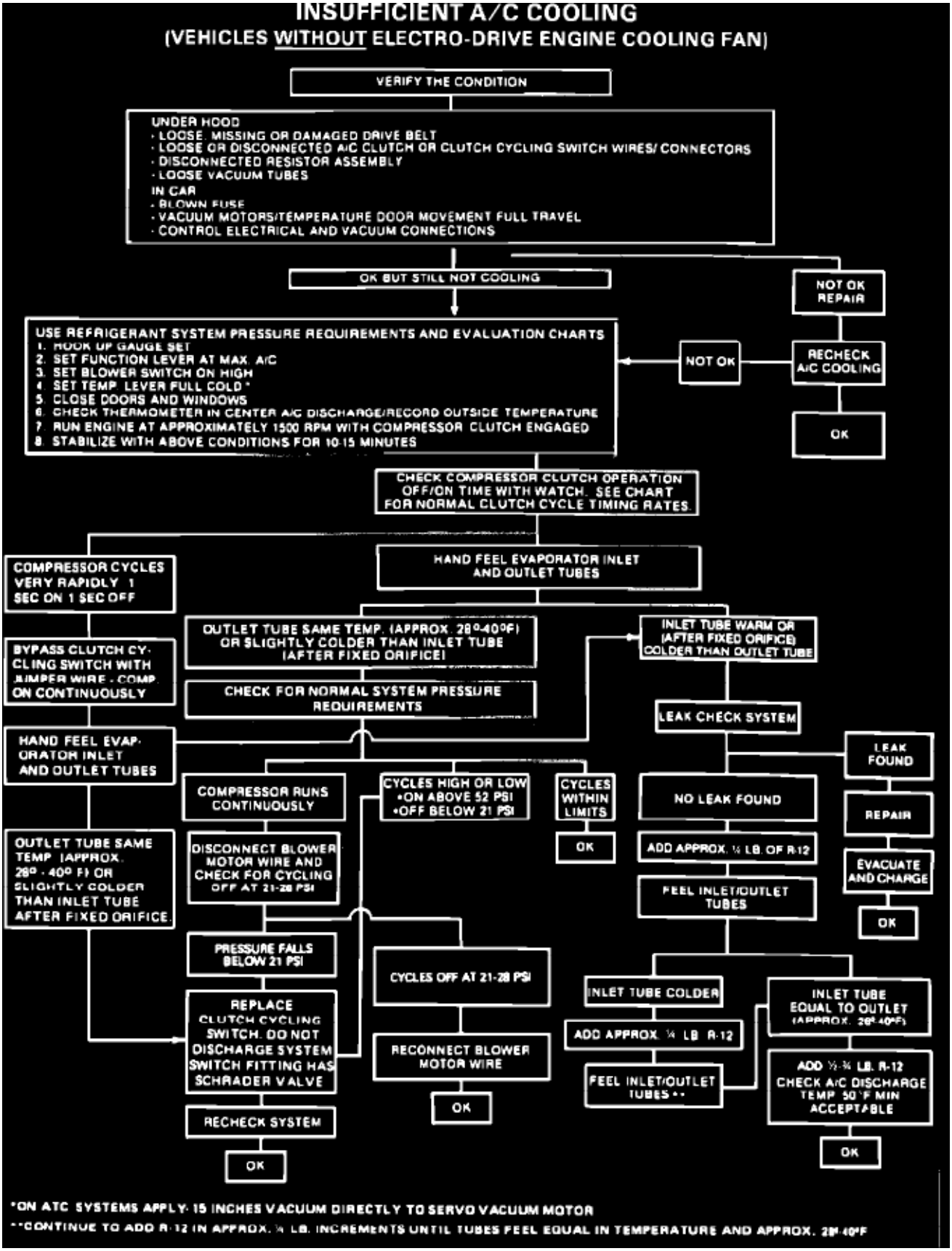

INSUFFICIENT A/C COOLING
(VEHICLES WITHOUT ELECTRO-DRIVE ENGINE COOLING FAN)
VERIFY THE CONDITION
UNDER HOOD
· LOOSE, MISSING OR DAMAGED DRIVE BELT
· LOOSE OR DISCONNECTED A/C CLUTCH OR CLUTCH CYCLING SWITCH WIRES/ CONNECTORS
· DISCONNECTED RESISTOR ASSEMBLY
· LOOSE VACUUM TUBES
IN CAR
· BLOWN FUSE
· VACUUM MOTORS/TEMPERATURE DOOR MOVEMENT FULL TRAVEL
· CONTROL ELECTRICAL AND VACUUM CONNECTIONS
OK BUT STILL NOT COOLING
NOT OK REPAIR
USE REFRIGERANT SYSTEM PRESSURE REQUIREMENTS AND EVALUATION CHARTS
1. HOOK UP GAUGE SET
2. SET FUNCTION LEVER AT MAX. A/C
3. SET BLOWER SWITCH ON HIGH
4. SET TEMP LEVER FULL COLD *
5. CLOSE DOORS AND WINDOWS
6. CHECK THERMOMETER IN CENTER A/C DISCHARGE/RECORD OUTSIDE TEMPERATURE
7. RUN ENGINE AT APPROXIMATELY 1500 RPM WITH COMPRESSOR CLUTCH ENGAGED
8. STABILIZE WITH ABOVE CONDITIONS FOR 10-15 MINUTES
NOT OK
RECHECK A/C COOLING
OK
CHECK COMPRESSOR CLUTCH OPERATION OFF/ON TIME WITH WATCH. SEE CHART FOR NORMAL CLUTCH CYCLE TIMING RATES.
COMPRESSOR CYCLES VERY RAPIDLY 1 SEC ON 1 SEC OFF
HAND FEEL EVAPORATOR INLET AND OUTLET TUBES
BYPASS CLUTCH CYCLING SWITCH WITH JUMPER WIRE - COMP. ON CONTINUOUSLY
OUTLET TUBE SAME TEMP. (APPROX. 28°-40°F) OR SLIGHTLY COLDER THAN INLET TUBE (AFTER FIXED ORIFICE)
INLET TUBE WARM OR (AFTER FIXED ORIFICE) COLDER THAN OUTLET TUBE
CHECK FOR NORMAL SYSTEM PRESSURE REQUIREMENTS
LEAK CHECK SYSTEM
HAND FEEL EVAPORATOR INLET AND OUTLET TUBES
LEAK FOUND
COMPRESSOR RUNS CONTINUOUSLY
CYCLES HIGH OR LOW
•ON ABOVE 52 PSI
•OFF BELOW 21 PSI
CYCLES WITHIN LIMITS
NO LEAK FOUND
REPAIR
OUTLET TUBE SAME TEMP (APPROX. 28° - 40° F) OR SLIGHTLY COLDER THAN INLET TUBE AFTER FIXED ORIFICE.
DISCONNECT BLOWER MOTOR WIRE AND CHECK FOR CYCLING OFF AT 21-28 PSI
OK
ADD APPROX. ¼ LB. OF R-12
EVACUATE AND CHARGE
FEEL INLET/OUTLET TUBES
OK
PRESSURE FALLS BELOW 21 PSI
CYCLES OFF AT 21-28 PSI
INLET TUBE COLDER
INLET TUBE EQUAL TO OUTLET (APPROX. 28°-40°F)
REPLACE CLUTCH CYCLING SWITCH. DO NOT DISCHARGE SYSTEM SWITCH FITTING HAS SCHRADER VALVE
RECONNECT BLOWER MOTOR WIRE
ADD APPROX. ¼ LB. R-12
ADD ½-¾ LB. R-12
FEEL INLET/OUTLET TUBES **
CHECK A/C DISCHARGE TEMP 50°F MIN ACCEPTABLE
OK
OK
RECHECK SYSTEM
OK
*ON ATC SYSTEMS APPLY 15 INCHES VACUUM DIRECTLY TO SERVO VACUUM MOTOR
**CONTINUE TO ADD R-12 IN APPROX. ¼ LB. INCREMENTS UNTIL TUBES FEEL EQUAL IN TEMPERATURE AND APPROX. 28°-40°F

Figure 1

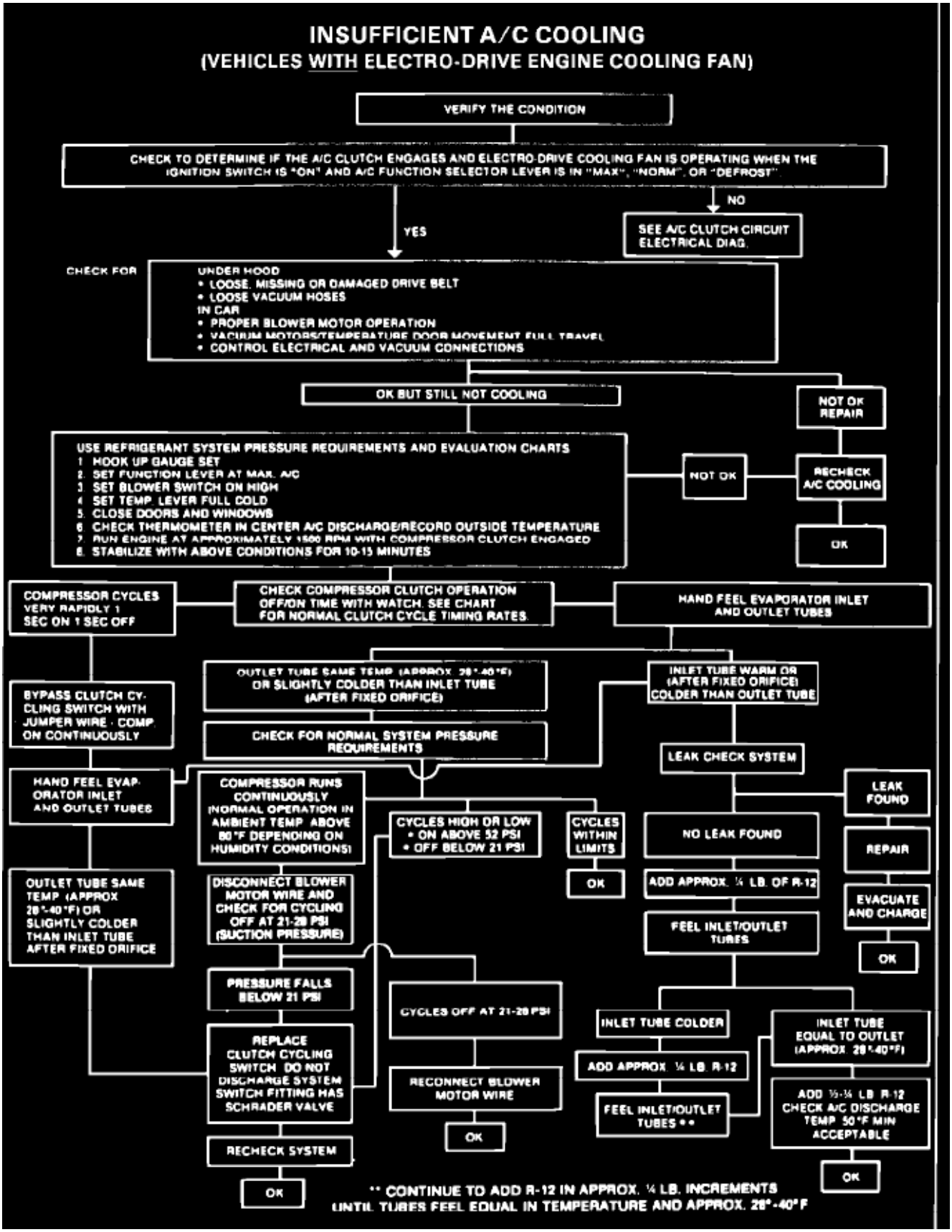

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VERIFY THE CONDITION
CHECK TO DETERMINE IF THE A/C CLUTCH ENGAGES AND ELECTRO-DRIVE COOLING FAN IS OPERATING WHEN THE IGNITION SWITCH IS "ON" AND A/C FUNCTION SELECTOR LEVER IS IN "MAX", "NORM", OR "DEFROST"
NO
SEE A/C CLUTCH CIRCUIT ELECTRICAL DIAG.
YES
CHECK FOR
UNDER HOOD
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5. CLOSE DOORS AND WINDOWS
6. CHECK THERMOMETER IN CENTER A/C DISCHARGE/RECORD OUTSIDE TEMPERATURE
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8. STABILIZE WITH ABOVE CONDITIONS FOR 10-15 MINUTES
NOT OK
RECHECK A/C COOLING
OK
COMPRESSOR CYCLES VERY RAPIDLY 1 SEC ON 1 SEC OFF
CHECK COMPRESSOR CLUTCH OPERATION OFF/ON TIME WITH WATCH. SEE CHART FOR NORMAL CLUTCH CYCLE TIMING RATES.
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CHECK FOR NORMAL SYSTEM PRESSURE REQUIREMENTS
INLET TUBE WARM OR (AFTER FIXED ORIFICE) COLDER THAN OUTLET TUBE
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OK
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DISCONNECT BLOWER MOTOR WIRE AND CHECK FOR CYCLING OFF AT 21-28 PSI (SUCTION PRESSURE)
PRESSURE FALLS BELOW 21 PSI
REPLACE CLUTCH CYCLING SWITCH. DO NOT DISCHARGE SYSTEM. SWITCH FITTING HAS SCHRADER VALVE
RECHECK SYSTEM
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INLET TUBE COLDER
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ADD ½-¾ LB. R-12 CHECK A/C DISCHARGE TEMP. 50°F MIN. ACCEPTABLE
OK
** CONTINUE TO ADD R-12 IN APPROX. ¼ LB. INCREMENTS UNTIL TUBES FEEL EQUAL IN TEMPERATURE AND APPROX. 28°-40°F

Figure 2

5. If the pressures are above 46 psi and the clutch cycle rate is faster than the normal rate of 2 to 5 cycles per minute, the system is probably low on refrigerant. Check that the system contains the correct refrigerant charge by following the correct diagnostic chart (Figures 1 or 2).

WARRANTY STATUS: INFORMATION ONLY OASIS CODES:

2600, 2610

Refrigerant Pressure Sensor / Switch: All Technical Service Bulletins A/C - Pressure Cycling Switch Diagnostic Procedure

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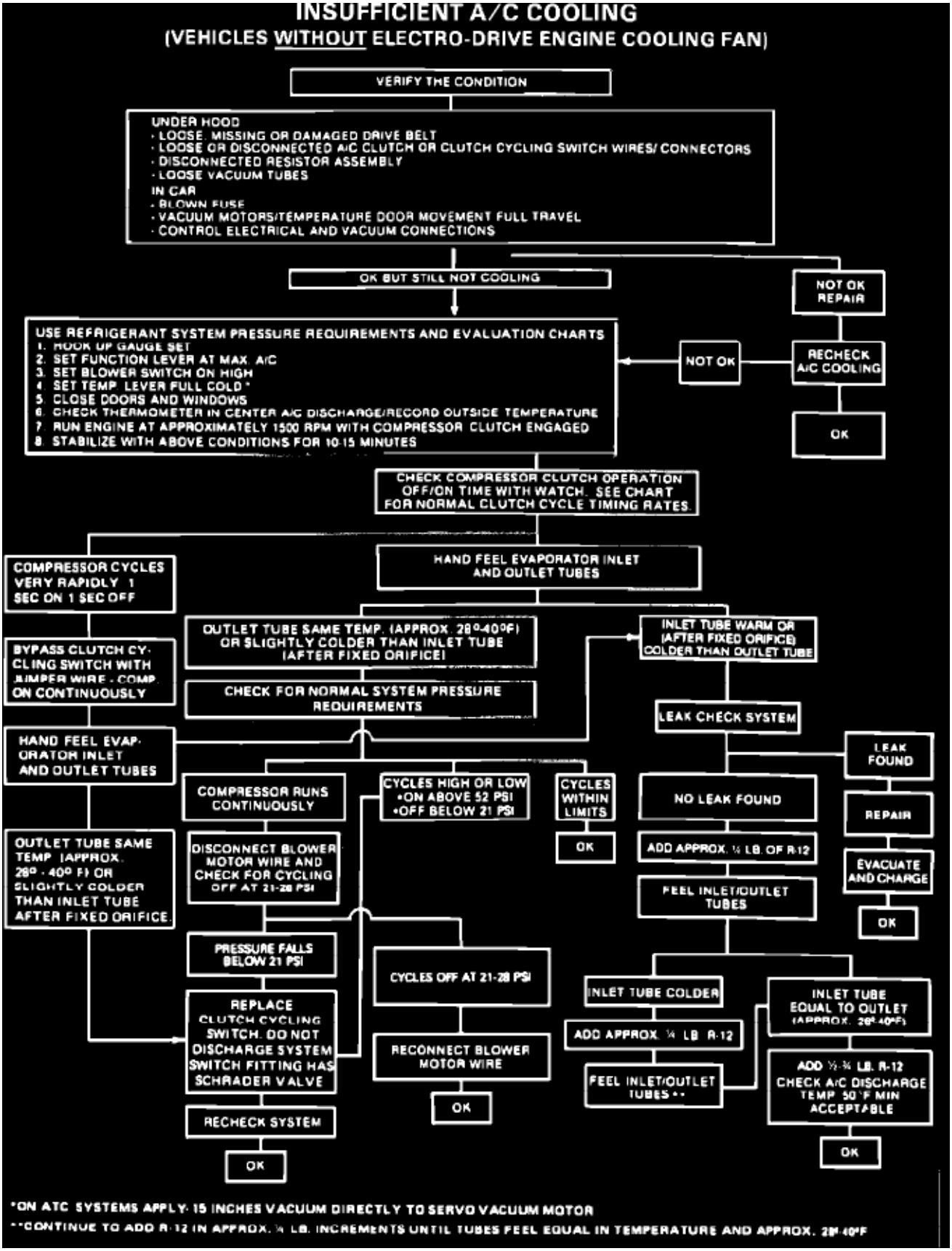

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· DISCONNECTED RESISTOR ASSEMBLY
· LOOSE VACUUM TUBES
IN CAR
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7. RUN ENGINE AT APPROXIMATELY 1500 RPM WITH COMPRESSOR CLUTCH ENGAGED
8. STABILIZE WITH ABOVE CONDITIONS FOR 10-15 MINUTES
NOT OK
RECHECK A/C COOLING
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OK
*ON ATC SYSTEMS APPLY 15 INCHES VACUUM DIRECTLY TO SERVO VACUUM MOTOR
**CONTINUE TO ADD R-12 IN APPROX. ¼ LB. INCREMENTS UNTIL TUBES FEEL EQUAL IN TEMPERATURE AND APPROX. 28°-40°F

Figure 1

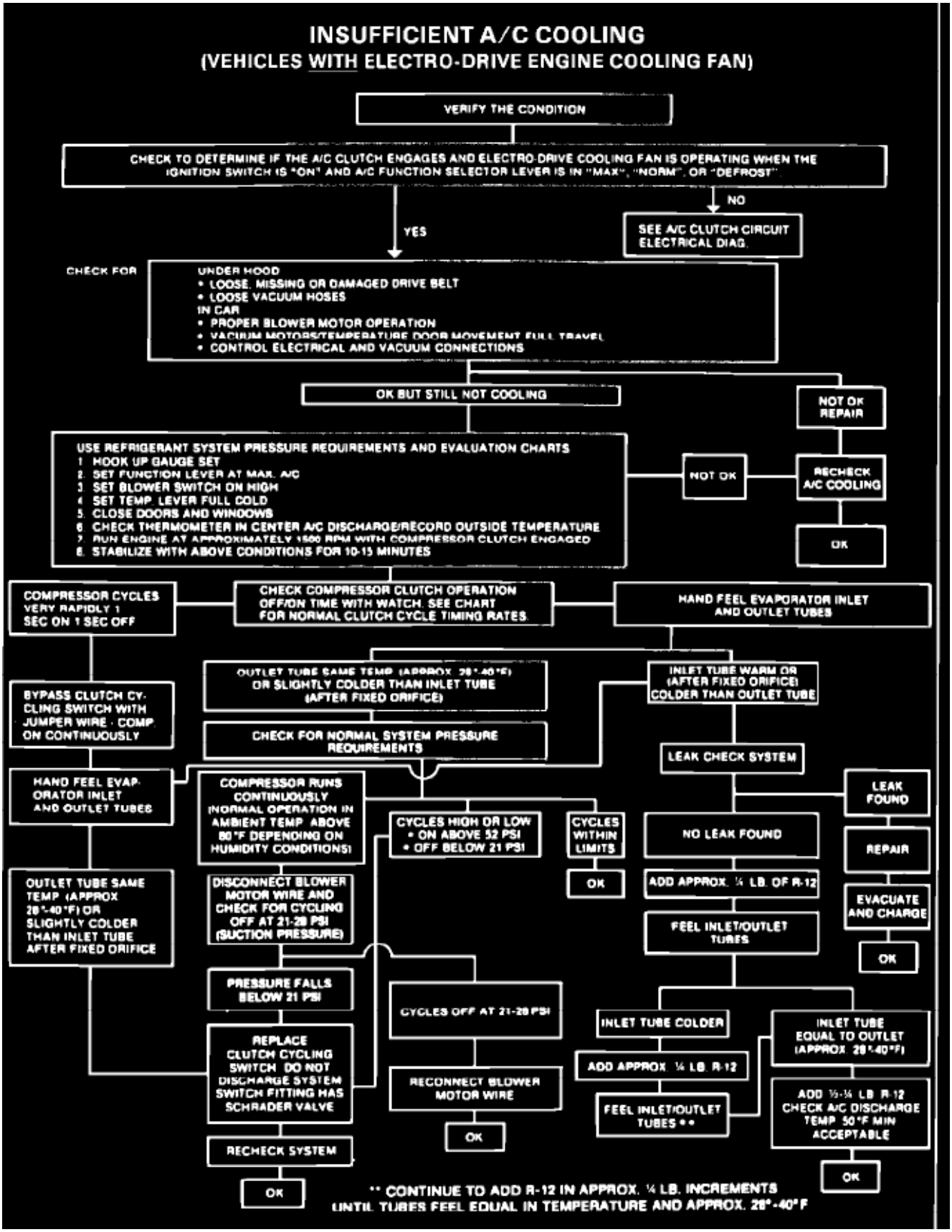

INSUFFICIENT A/C COOLING
(VEHICLES WITH ELECTRO-DRIVE ENGINE COOLING FAN)
VERIFY THE CONDITION
CHECK TO DETERMINE IF THE A/C CLUTCH ENGAGES AND ELECTRO-DRIVE COOLING FAN IS OPERATING WHEN THE IGNITION SWITCH IS "ON" AND A/C FUNCTION SELECTOR LEVER IS IN "MAX", "NORM", OR "DEFROST"
NO
SEE A/C CLUTCH CIRCUIT ELECTRICAL DIAG.
YES
CHECK FOR
UNDER HOOD
• LOOSE, MISSING OR DAMAGED DRIVE BELT
• LOOSE VACUUM HOSES
IN CAR
• PROPER BLOWER MOTOR OPERATION
• VACUUM MOTORS/TEMPERATURE DOOR MOVEMENT FULL TRAVEL
• CONTROL ELECTRICAL AND VACUUM CONNECTIONS
OK BUT STILL NOT COOLING
NOT OK REPAIR
USE REFRIGERANT SYSTEM PRESSURE REQUIREMENTS AND EVALUATION CHARTS
1. HOOK UP GAUGE SET
2. SET FUNCTION LEVER AT MAX. A/C
3. SET BLOWER SWITCH ON HIGH
4. SET TEMP. LEVER FULL COLD
5. CLOSE DOORS AND WINDOWS
6. CHECK THERMOMETER IN CENTER A/C DISCHARGE/RECORD OUTSIDE TEMPERATURE
7. RUN ENGINE AT APPROXIMATELY 1500 RPM WITH COMPRESSOR CLUTCH ENGAGED
8. STABILIZE WITH ABOVE CONDITIONS FOR 10-15 MINUTES
NOT OK
RECHECK A/C COOLING
OK
COMPRESSOR CYCLES VERY RAPIDLY 1 SEC ON 1 SEC OFF
CHECK COMPRESSOR CLUTCH OPERATION OFF/ON TIME WITH WATCH. SEE CHART FOR NORMAL CLUTCH CYCLE TIMING RATES.
HAND FEEL EVAPORATOR INLET AND OUTLET TUBES
BYPASS CLUTCH CYCLING SWITCH WITH JUMPER WIRE - COMP. ON CONTINUOUSLY
OUTLET TUBE SAME TEMP (APPROX. 28°-40°F) OR SLIGHTLY COLDER THAN INLET TUBE (AFTER FIXED ORIFICE)
CHECK FOR NORMAL SYSTEM PRESSURE REQUIREMENTS
INLET TUBE WARM OR (AFTER FIXED ORIFICE) COLDER THAN OUTLET TUBE
LEAK CHECK SYSTEM
HAND FEEL EVAPORATOR INLET AND OUTLET TUBES
COMPRESSOR RUNS CONTINUOUSLY (NORMAL OPERATION IN AMBIENT TEMP. ABOVE 80°F DEPENDING ON HUMIDITY CONDITIONS)
CYCLES HIGH OR LOW • ON ABOVE 52 PSI • OFF BELOW 21 PSI
CYCLES WITHIN LIMITS
OK
NO LEAK FOUND
ADD APPROX. ¼ LB. OF R-12
FEEL INLET/OUTLET TUBES
LEAK FOUND
REPAIR
EVACUATE AND CHARGE
OK
OUTLET TUBE SAME TEMP (APPROX 28°-40°F) OR SLIGHTLY COLDER THAN INLET TUBE AFTER FIXED ORIFICE
DISCONNECT BLOWER MOTOR WIRE AND CHECK FOR CYCLING OFF AT 21-28 PSI (SUCTION PRESSURE)
PRESSURE FALLS BELOW 21 PSI
REPLACE CLUTCH CYCLING SWITCH. DO NOT DISCHARGE SYSTEM. SWITCH FITTING HAS SCHRADER VALVE
RECHECK SYSTEM
OK
CYCLES OFF AT 21-28 PSI
RECONNECT BLOWER MOTOR WIRE
OK
INLET TUBE COLDER
ADD APPROX. ¼ LB. R-12
FEEL INLET/OUTLET TUBES **
INLET TUBE EQUAL TO OUTLET (APPROX. 28°-40°F)
ADD ½-¾ LB. R-12 CHECK A/C DISCHARGE TEMP. 50°F MIN. ACCEPTABLE
OK
** CONTINUE TO ADD R-12 IN APPROX. ¼ LB. INCREMENTS UNTIL TUBES FEEL EQUAL IN TEMPERATURE AND APPROX. 28°-40°F

Figure 2

5. If the pressures are above 46 psi and the clutch cycle rate is faster than the normal rate of 2 to 5 cycles per minute, the system is probably low on refrigerant. Check that the system contains the correct refrigerant charge by following the correct diagnostic chart (Figures 1 or 2).

WARRANTY STATUS: INFORMATION ONLY OASIS CODES:

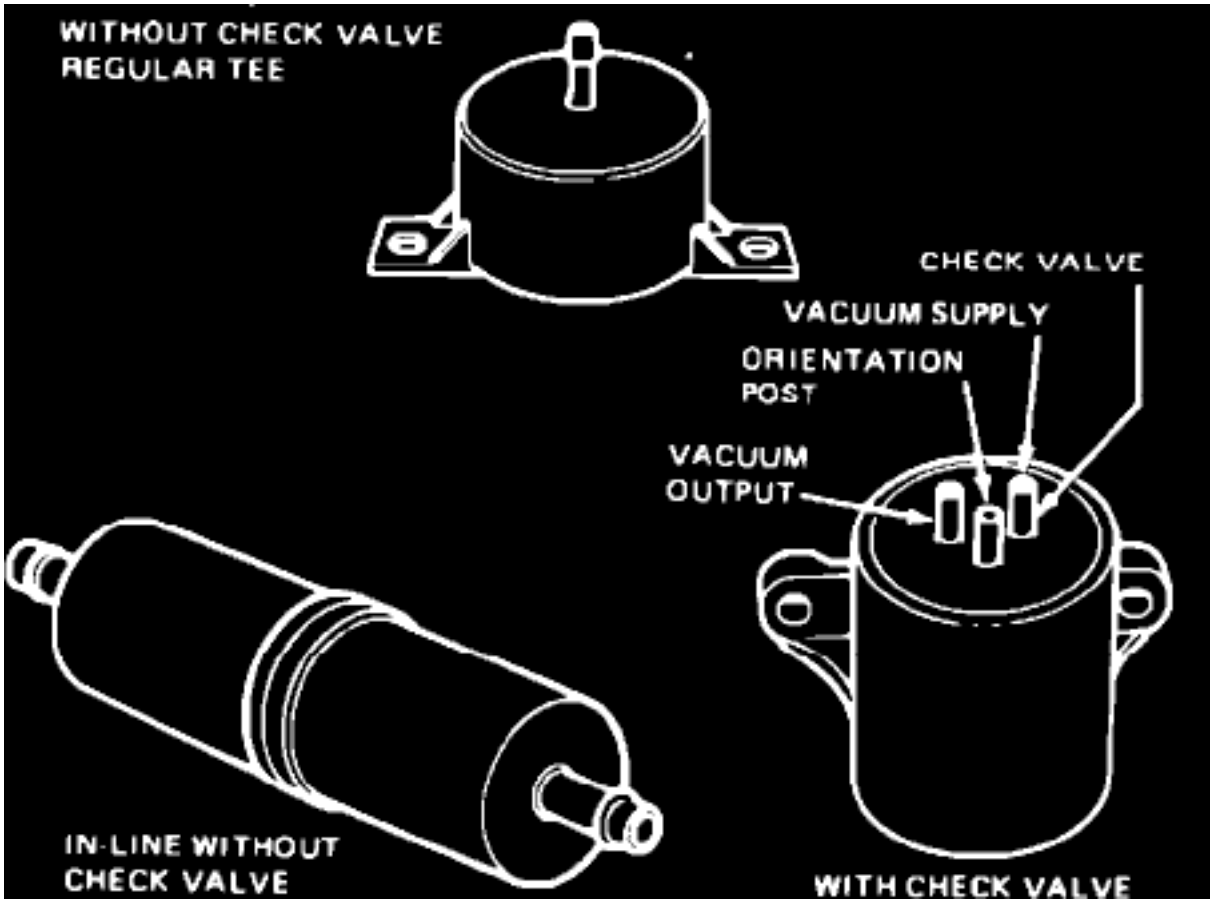
2600, 2610

Refrigerant Pressure Sensor / Switch: Locations

RH Side Of Dash Panel On Accumulator

Vacuum Harness HVAC: Description and Operation

Engine vacuum systems a pre-assembled harness which features colored nylon vacuum lines. The color is a visual aid both in production and in service. The emission decal on the engine provides a colored schematic of the vacuum hookup which corresponds with the pre-assembled harness. Vacuum hose harnesses consist of nylon hoses a .150 inch outer diameter and a .090 inch inner diameter bonded to nylon or rubber connectors. Occasionally a rubber hose may be connected to the harness. The nylon connectors have rubber inserts to provide a seal between the nylon connector and the component connection.



Vacuum Reservoir HVAC: Description and Operation

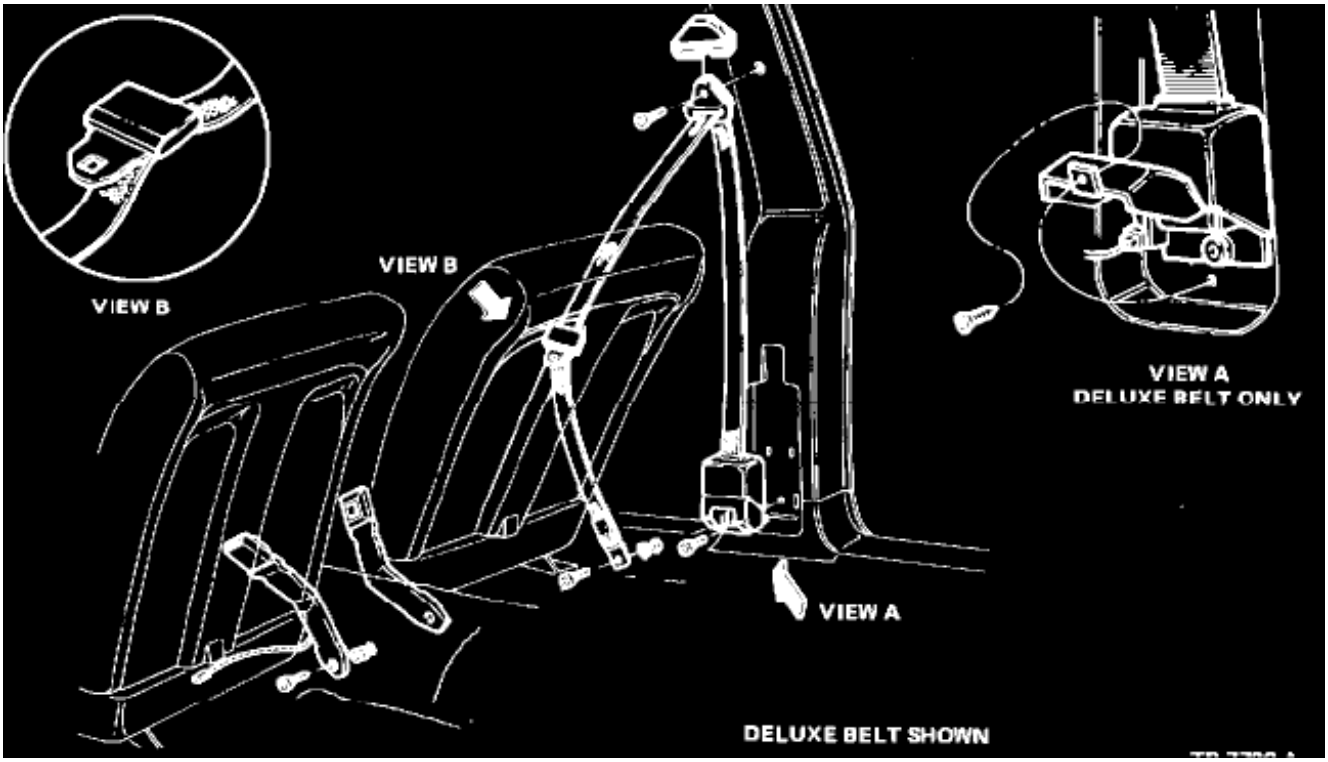
Fig. 37 Vacuum reservoirs

The vacuum reservoir, Fig. 37, used on some vehicles, acts as an accumulator and prevents sudden drops or rapid fluctuations in a vacuum signal during acceleration. If vacuum in the reservoir leaks more than 1/2 inch Hg in 1 minute, the reservoir is defective and must be replaced.

Vacuum Solenoid Valve HVAC: Locations

AUXILIARY HEATER VACUUM SOLENOID VALVE

Forward Of Blower Motor



Technical Service Bulletin # 8524 Date: 850124

Seat/Shoulder Belts - General Service Information

Article No. 85-2-4 SEAT/SHOULDER BELTS - GENERAL SERVICE INFORMATION

FORD ALL - 1974-85

LINCOLN-MERCURY ALL - 1974-85

LIGHT TRUCKS ALL - 1974-85

MEDIUM/HEAVY TRUCKS ALL - 1974-85

The States of New York, New Jersey and Illinois recently enacted a mandatory seat belt usage law. With these laws and impending similar belt usage legislation in other states, dealers can expect customer inquiries regarding seat belts. The following information is being published in an effort to refamiliarize dealership service personnel with seat and shoulder belt systems utilized over the past several model years. Previous Service Recall and TSB articles pertaining to seat belt usage and servicing are also included.

Section 1 -Identification of Seat Belt System Types For Model Years 1974-1985

There are three distinct types of seat belt systems. Two of the systems are three-point anchoring systems. One three-point system has dual retractors; one retractor for the lap and one for the shoulder belt. The other three-point system is the continuous loop single retractor system for the lap and shoulder belts. The third system is a two-point system that contains a lap belt only which is used for rear seat and front center passenger restraint.

Continuous Loop Three-Point System The continuous loop system has a moveable tongue on the front outboard lap/shoulder belt and only one retractor.

Dual Retractor Three-Point System

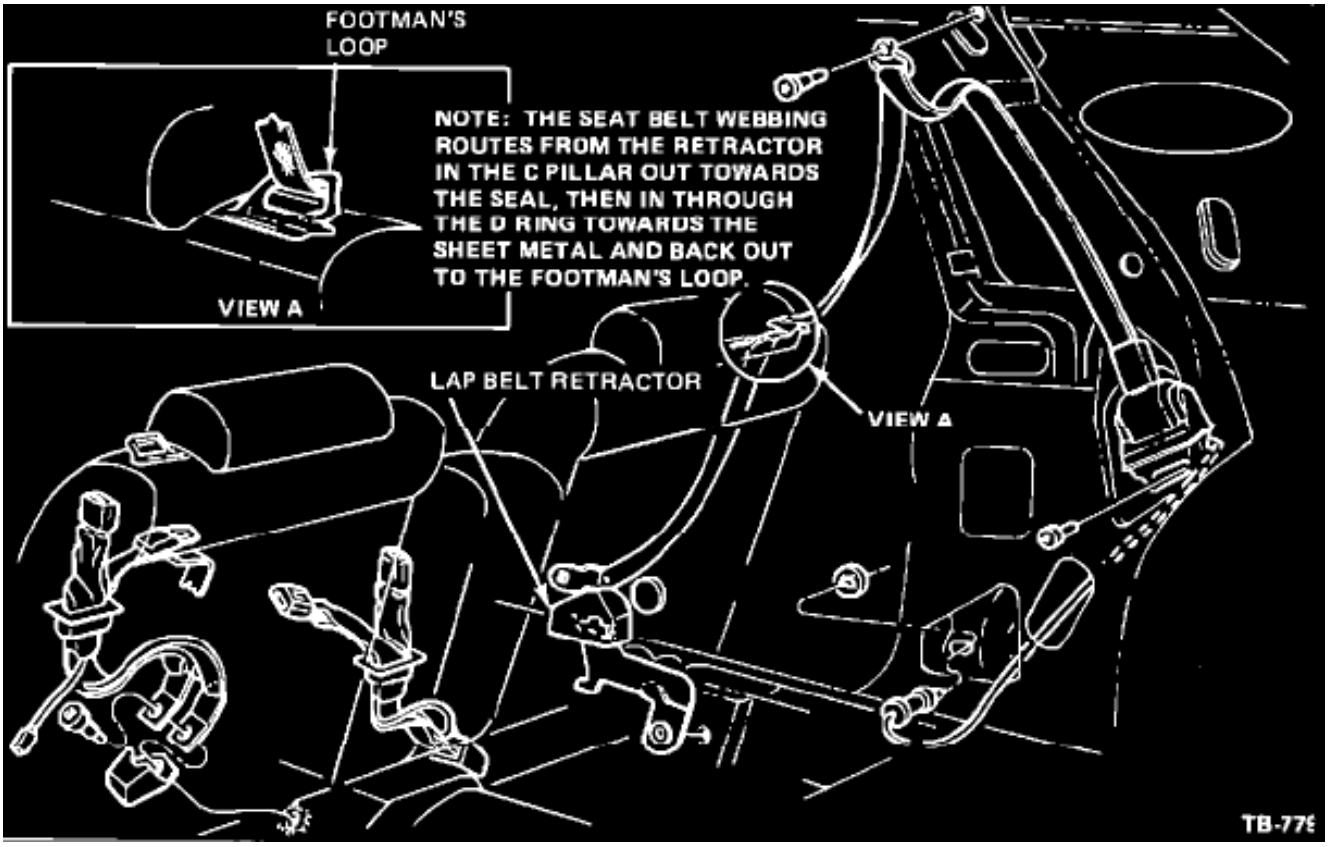
The dual retractor system has a fixed tongue on the front outboard lap/shoulder belt. (Note that on the Econoline for 1982-85 model years, the two retractors are on one frame attached to the seat pedestal.)

Front Center/Rear Seat Two-Point System A 2-point system provides a lap belt only and applies to the front seat center position and all rear seat positions. Rear outboard belts are equipped with retractors, while front and rear center belts are not.

A.Continuous Loop Three-Point Shoulder/Lap Belt - System With Moveable Tongue and One Retractor - 1976 to Present Cars and Ligh

Figure 5

The continuous loop three-point system (Figure 5) is used for front outboard passengers. The outboard lap/shoulder belt uses a common moveable tongue. To fasten the seat belt, the tongue is inserted into the inboard buckle. The webbing of the lap belt is anchored to the side of the body without a



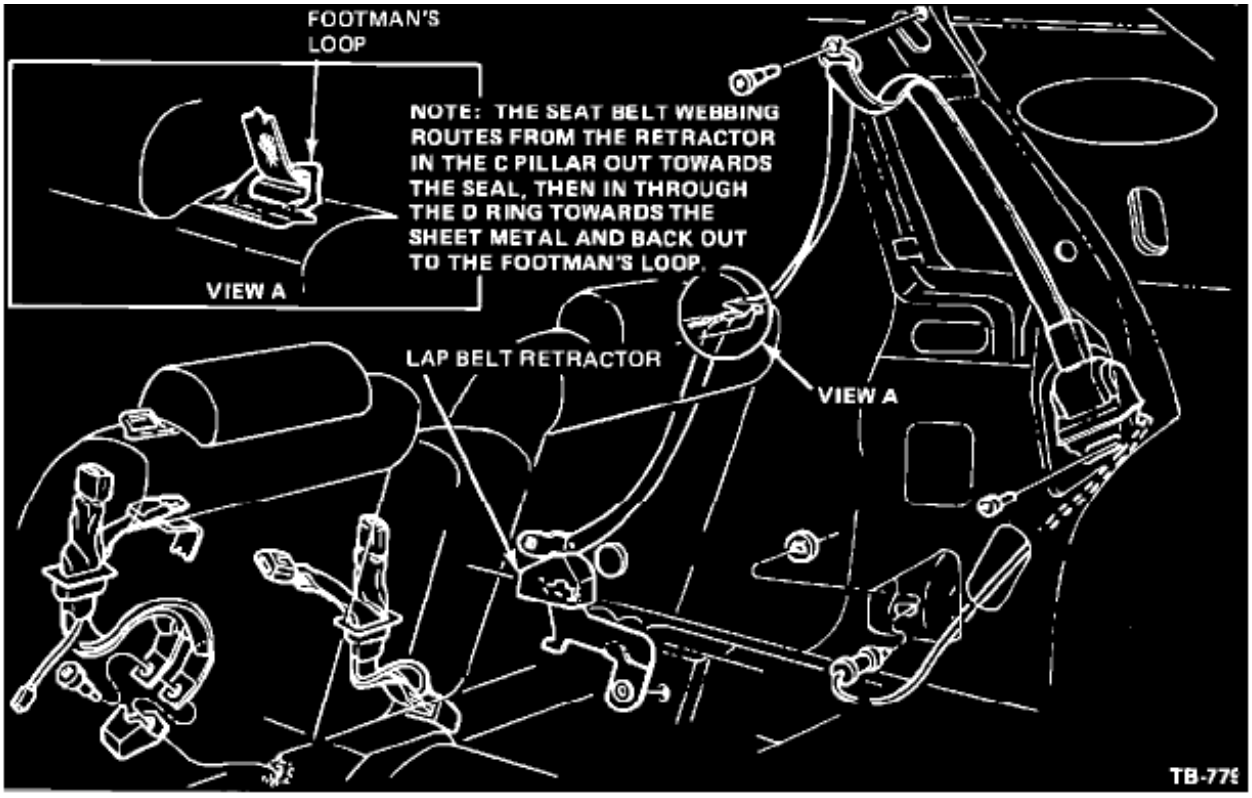
retractor. The shoulder harness webbing has the other end fixed in a retractor, which is located on the "B" pillar post or in the quarter panel. The shoulder harness retractor is designed to let the webbing freely move in or out, except during sufficient vehicle deceleration, when it is automatically locked by a mechanically actuated inertia sensor. The inboard (buckle) portion of the seat belt assembly passes between the seat cushion and seat back on bench seat installations, and directly to a fixed anchorage on the floor. On bucket seat installations, it is routed along the side of the seat and is fastened to a slide bar. The slide bar is connected to the seat track, the seat, and the floor pan. On LTD/Marquis and Thunderbird/Cougar, the buckle end passes between the seat and the consolette and is connected to the seat track.

Attaching the tongue to the buckle secures the occupant with both lower and upper restraints. This attachment of the tongue and buckle can be accomplished by a single continuous movement. This system may also include a tension eliminator that is designed to release automatically when the respective front door is opened. As the seatbelt is unbuckled, the tongue end of the belt should be hand-guided back to the retractor to prevent the belt tongue from striking occupants or objects nearby during retraction.

B.Dual Retractor Three-Point Shoulder/Lap System - 1974 to 1983 Cars and Light Trucks and 1974 to 1985 Econolines and Club Wago

Figure 4

The dual retractor three-point system is used for front outboard occupants (Figure 4). The lap belt portion and shoulder harness are joined at the tongue. To secure the belt, the tongue is inserted into the buckle of the inboard belt portion.



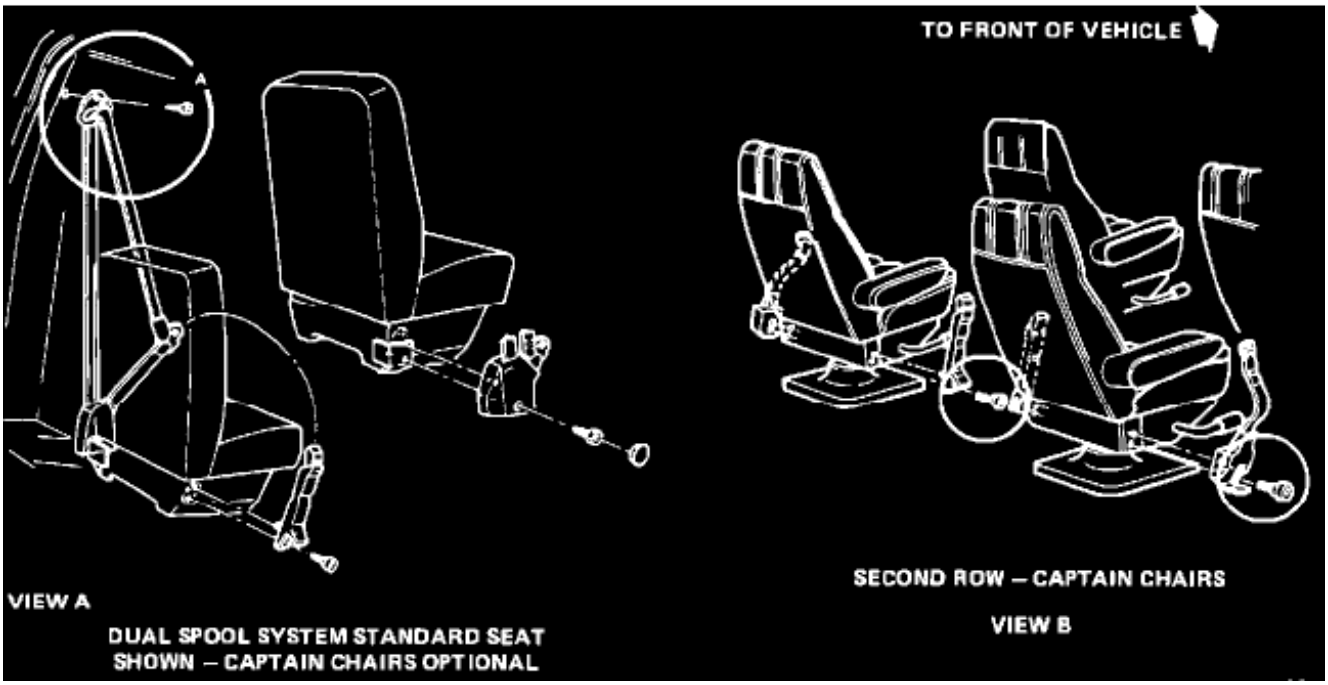
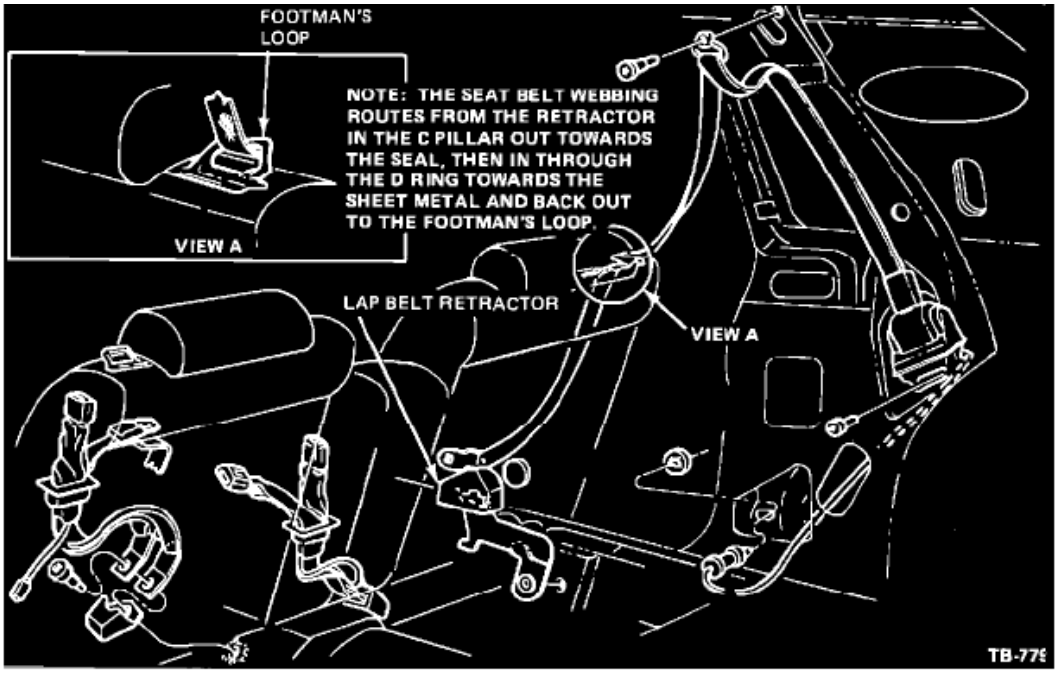


Figure 4

Figure 6

Except for the 1983-85 Econoline and Club Wagon, the webbing for the outboard lap belt extends from the belt retractor located on the rocker panel that automatically locks when the belt is being worn. This locking feature prevents the belt from being pulled out further, but allows the belt to retract, thus maintaining a snug fit around the user for increased safety. This lap belt retractor is located on or in the rocker panel (depending on car line and model - Figure 4) or on the seat pedestal for 1983-85 Econoline and Club Wagon (Figure 6).


FOOTMAN'S LOOP
NOTE: THE SEAT BELT WEBBING ROUTES FROM THE RETRACTOR IN THE C PILLAR OUT TOWARDS THE SEAL, THEN IN THROUGH THE D RING TOWARDS THE SHEET METAL AND BACK OUT TO THE FOOTMAN'S LOOP.
VIEW A
LAP BELT RETRACTOR
VIEW A
TB-77

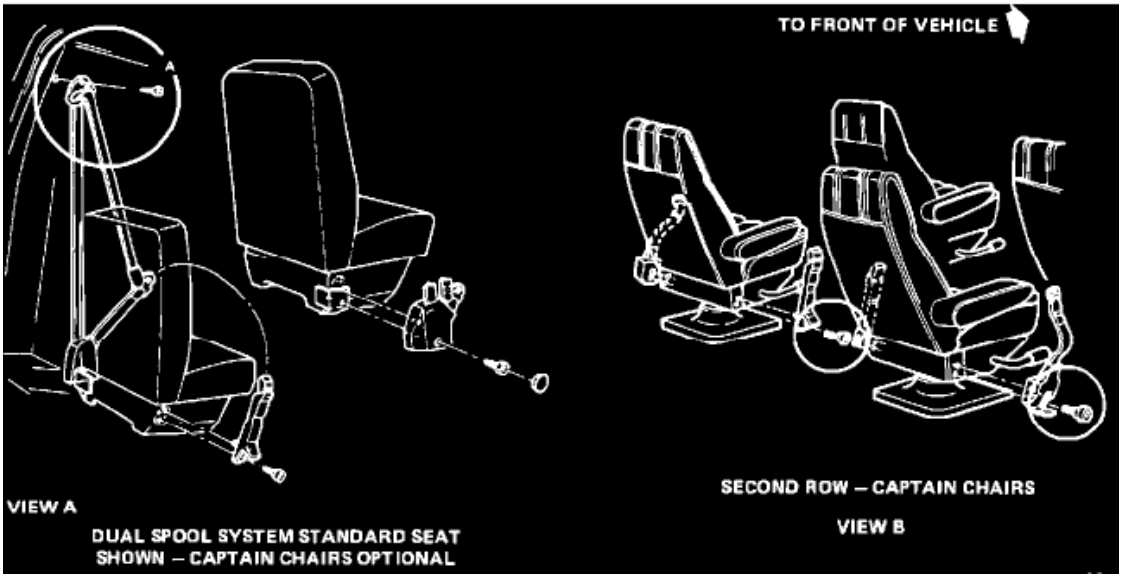

TO FRONT OF VEHICLE
VIEW A
DUAL SPOOL SYSTEM STANDARD SEAT SHOWN – CAPTAIN CHAIRS OPTIONAL
SECOND ROW – CAPTAIN CHAIRS
VIEW B

Figure 4

The shoulder harness webbing has one end fixed in a retractor (Figure 4) which is located in or on the rocker panel, or in the "B" pillar post (depending on car/truck line and model). The Mustang/Capri shoulder harness retractor is located in the quarter panel. From the retractor, the webbing then passes through a guide above and behind the occupant's shoulder which directs the webbing at the proper downward angle over the occupant's shoulder and chest, and attaches the tongue to the inboard belt buckle. The shoulder harness retractor is designed to let the webbing move freely in or out at all times, except during vehicle deceleration, when the retractor is automatically locked by a mechanically actuated retractor inertia sensor. The inboard belt buckle passes through the seat cushion on a bench seat or around the side of the cushion on a bucket seat to a fixed anchorage on the floor or seat pedestal for Econolines. Attaching (locking together) the tongue and buckle secures the occupant with both lower and upper restraints. This attachment of the tongue and buckle can be accomplished by a single continuous movement.

C.Two-Point System - Center Front/Rear and Rear Seat Lap Belts

Those vehicles designed to accommodate a center rear seat occupant have a center lap belt without a retractor. The belt should be adjusted by the tongue to fit snugly and as low as possible around the hips.

Figure 6

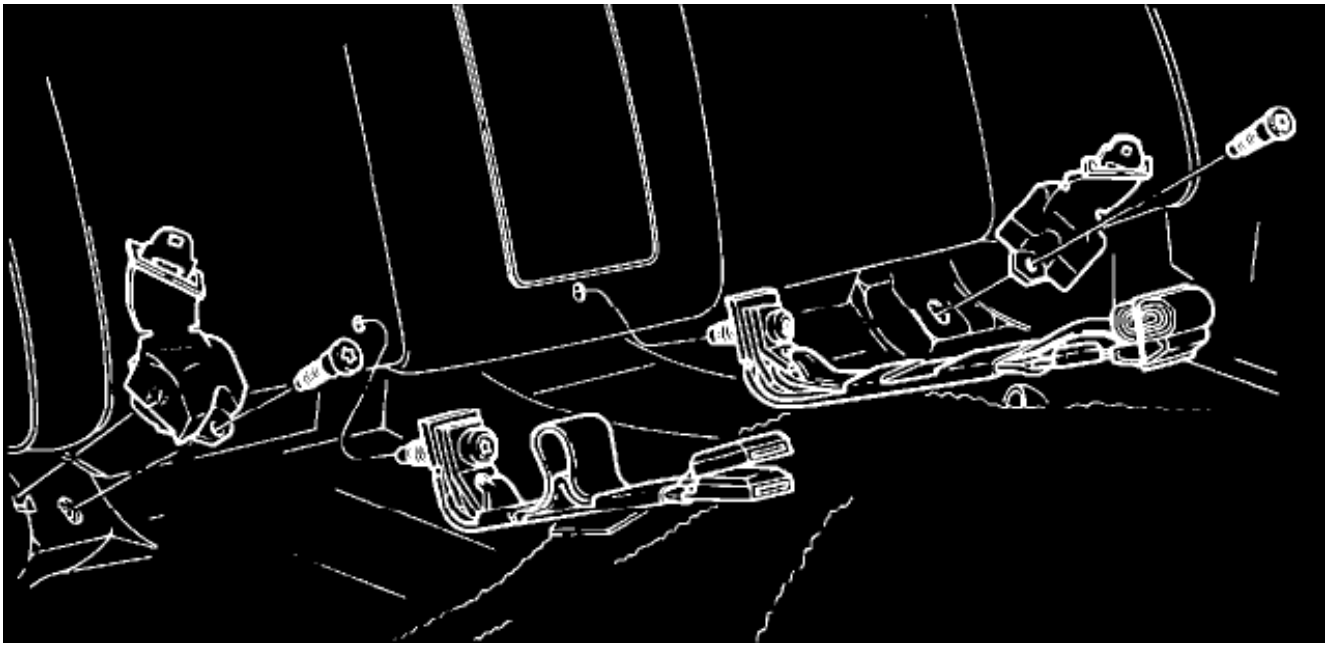


Figure 7

In passenger cars and light trucks, the rear seat two-point lap belt system for outboard passengers has the retractor located in the quarter panel or attached to the floor under the seat (Figure 7). On Econoline, Club Wagon, Bronco and Bronco II vehicles, the rear seat retractors are attached to the seat frame or the floor. The buckle portions of the seat belt are all attached to the floor on passenger cars, and either to the floor or seat frame on Broncos and Econolines. Most rear seat lap belt retractor assemblies are equipped with a sleeve to prevent the tongue from being lost between the seat cushion and seat back. The buckle ends pass between the seat cushion and seat back. On passenger cars, the locking together of the tongue and buckle can be made by a single continuous movement. On Bronco and Econoline vehicles, the outboard buckle ends pass around the outside of the rear seat (Figure 6, View B).

Section 3-Functional Test Procedure For Shoulder Harness

Shoulder Harness Functional Test Procedure for Three-Point Systems (Both Dual Retractor and Continuous Loop Systems)

Driver should buckle up and proceed to a test area appropriate for making sudden stops. If the RH passenger seat

belt must be tested, a passenger should be buckled into the RH seat. The passenger belt may be tested utilizing a driver only, providing the driver has the ability to grasp the RH shoulder belt and extend it approximately (660 mm) 26 inches with no compromise to safe driving. This method applies to the (8 km/h) 5 mph test only.

NOTE: The RH shoulder belt should not be extended during testing. This avoids the possibility of a false lock-up that is caused by a fully extended belt.

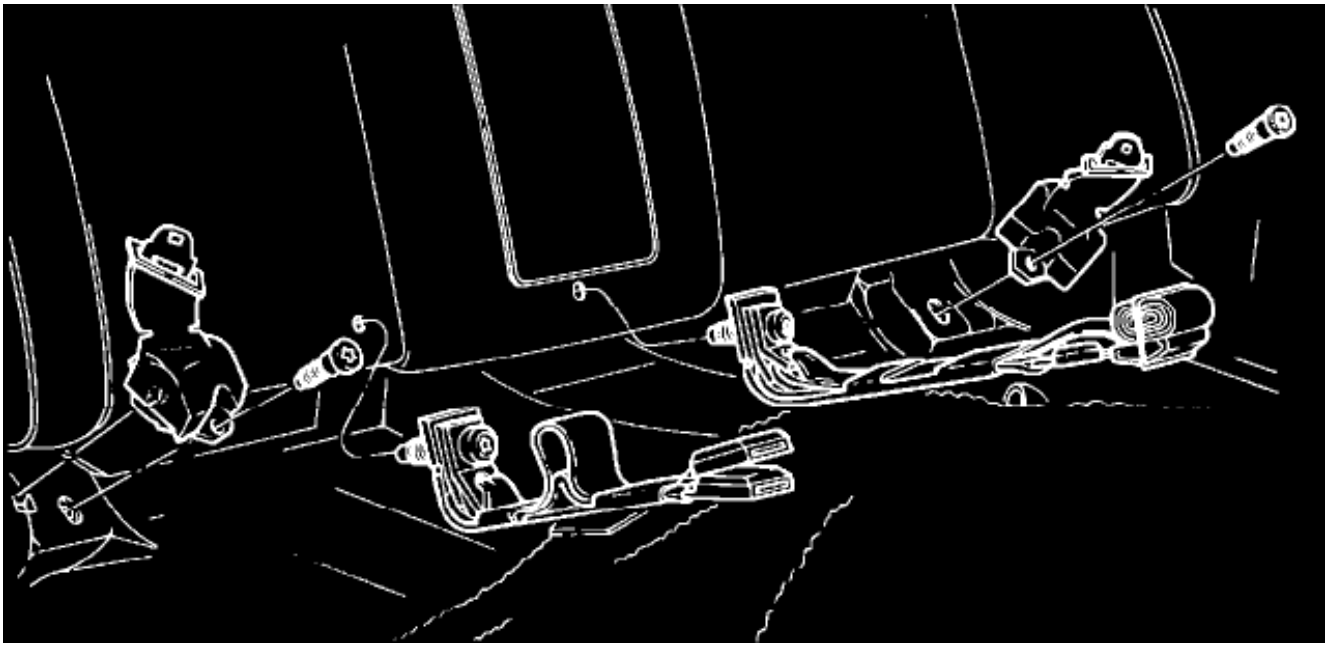
After reaching an area to safely perform sudden stops, the driver should attain a speed of approximately (8 km/h) 5 mph. The driver should inform the passenger (if any), that he is preparing to make a brake application. At this time, both driver and passenger should prepare to lean slightly forward at the moment the brake application is made.

The driver should make a moderately hard brake application (approximately l6 ft./sec.) without tire skid. The brake application should be on dry concrete or equivalent hard road surface (never on a wet or gravel road). The driver and passenger should lean forward slightly into the shoulder harness; at this instant, the belt retractor should lock-up without webbing payout.

If there is a retractor lock-up on both driver and passenger shoulder straps, the seat belt assemblies are functioning properly. Should either or both retractors fail to lock-up at the (8 km/h) 5 mph speed, the test should be repeated at a constant (24 km/h) 15 mph. (This test must be performed with a RH passenger if the RH belt is to be tested.)

If either or both shoulder belt assemblies do not lock-up at the (24 km/h) 15 mph test, the vehicle is to be returned for removal and replacement of the seat belt assembly, then retest.

WARNING: WHEN REPLACING A SEAT BELT ASSEMBLY, BE SURE TO INSTALL A COMPLETE NEW ASSEMBLY (BUCKLE PORTION AND TONGUE PORTION TOGETHER) AS RECEIVED FROM FORD MOTOR COMPANY. DO NOT REPLACE ONE PART OF A SEAT BELT ASSEMBLY WITHOUT INSTALLING THE ENTIRE SEAT BELT ASSEMBLY. THIS WILL ASSURE THAT THE BUCKLE PORTION IS MANUFACTURED BY THE SAME MANUFACTURER AS THE TONGUE PORTION AND IS COMPATIBLE WITH IT. ALSO BE SURE THAT THE BELTS INSTALLED ARE INTENDED SPECIFICALLY FOR THE VEHICLE IN WHICH THEY ARE BEING INSTALLED.



Section 4-Functional Test Procedure For Lap Belts and Retractor

Webbing Cannot Be Fully Extracted From Lap Belt Retractor - 2-Door and 4-Door (Front Outboard - Except Versailles)

1. Pull webbing from the shoulder harness retractor, allowing the lap belt to retract fully into the retractor. Pull webbing from the lap belt retractor, allow it to retract fully.

2. If OK, buckle up while sitting in seat. Repeat five times to ensure proper operation. If not OK, inspect for webbing twists in the seat belt assembly and remove the twists, if possible, without dismantling the retractor assembly. Otherwise, replace the seat belt assembly and repeat the buckle-up procedure five times.

REMEMBER, A COMPLETE SEAT BELT ASSEMBLY MUST ALWAYS BE INSTALLED AS NOTED IN THE WARNING STATEMENT IN SECTIONS 3 AND 7 OF THIS ARTICLE!

Lap Belt Retractor Does Not Lock - Dual Retractor 2-Door and 4-Door Models - Front Outboard Seat (Except Versailles)

1. Withdraw a minimum of 18 inches (460mm) of webbing from the lap belt retractor and check for lock-up. Retractor must lock-up after 18 inches (460mm) of webbing withdrawal and return of 2 inches (50mm) into retractor and pull out.

2. If the retractor does not lock, replace the entire seat belt assembly and retest.

REMEMBER, A COMPLETE SEAT BELT ASSEMBLY MUST ALWAYS BE INSTALLED AS NOTED IN THE WARNING STATEMENT IN SECTIONS 3 AND 7 OF THIS ARTICLE!

Lap Belt Retractor Does Not Lock - Dual Retractor 2-Door and 4-Door Models - Front Outboard Seat (Versailles Only)

1. Fasten the seat belt. Pull on the lap belt webbing - the retractor should be locked if OK. Unbuckle, allow the lap belt retractor to fully retract.

2. Repeat Step 1 five (5) times to ensure proper operation.

3. If not OK, replace the seat belt assembly for that seating position and retest.

REMEMBER, A COMPLETE SEAT BELT ASSEMBLY MUST ALWAYS BE INSTALLED AS NOTED IN THE WARNING STATEMENT IN SECTIONS 3 AND 7 OF THIS ARTICLE!

NOTE: There are two ways to stop the retractor from "free wheeling". One way is to "buckle up" and the retractor will lock immediately. The second way is to pull approximately 12" of webbing from the lap belt retractor, wait approximately 15 seconds, and a thermal timer will deactivate the "free wheeling" feature.

Webbing Cannot Be Fully Extracted From Lap Belt Retractor

1. If the webbing cannot be pulled from the lap belt retractor, it may be twisted and jammed in a partially extended position. If the twist can be removed without retractor disassembly, allow the webbing to fully retract and then withdraw a minimum of 18 inches (460mm) of webbing from the retractor, return 2 inches (50mm) and check for lock-up. If OK, allow to retract fully and buckle up while sitting in the seat. Repeat five times to ensure proper operation. Verify that belt webbing can be extended far enough to expose the manufacturer's certification label.

2. If not OK, replace the seat belt assembly and repeat appropriate portions of Step 1, above.

REMEMBER, A COMPLETE SEAT BELT ASSEMBLY MUST ALWAYS BE INSTALLED AS NOTED IN THE WARNING STATEMENT IN SECTIONS 3 AND 7 OF THIS ARTICLE!

Figure 7

Seats - Rear - Lap Belt Retractor Does Not Lock - 2-Point System (Figure 7)

1. Withdraw a minimum of 18 inches (460mm) of webbing from lap belt retractor and check for lock-up. Retractor must lock-up after 18 inches (460mm) of webbing withdrawn and return of 2 inches (50mm) into retractor and pull out.

If OK, allow it to retract fully and buckle up while sitting in the seat. Repeat five times to ensure proper operation.

2. If not OK, replace seat belt assembly and repeat Step 1.

REMEMBER, A COMPLETE SEAT BELT ASSEMBLY MUST ALWAYS BE INSTALLED AS NOTED IN THE WARNING STATEMENT IN SECTIONS 3 AND 7 OF THIS ARTICLE!

3. If the retractor of a new seat belt assembly has been bolted into a damaged or distorted mounting area, the new retractor could be warped and may not function. If this is the case, service the sheet metal in the area of the retractor mounting and install a new belt assembly.

REMEMBER, A COMPLETE SEAT BELT ASSEMBLY MUST ALWAYS BE INSTALLED AS NOTED IN THE WARNING STATEMENT IN SECTIONS 3 AND 7 OF THIS ARTICLE!

Buckle Does Not Latch - All Belts

If the tongue will not latch into the buckle securely, a coin or other foreign object may be interfering with proper buckle operation. Remove the object, if possible, and recheck for secure latching. If not OK, replace the belt assembly.

REMEMBER, A COMPLETE SEAT BELT ASSEMBLY MUST ALWAYS BE INSTALLED AS NOTED IN THE WARNING STATEMENT IN SECTIONS 3 AND 7 OF THIS ARTICLE!

Section 5-Seat Belt Procedure After an Accident

NOTE: ALL SEAT BELT ASSEMBLIES INCLUDING RETRACTORS AND ATTACHING HARDWARE SHOULD BE INSPECTED AFTER ANY COLLISION. FORD RECOMMENDS THAT ALL SEAT BELT ASSEMBLIES IN USE DURING A COLLISION BE REPLACED UNLESS THE COLLISION WAS MINOR AND THE BELTS SHOW NO DAMAGE AND CONTINUE TO OPERATE PROPERLY. SEAT BELT ASSEMBLIES NOT IN USE DURING A COLLISION SHOULD ALSO BE INSPECTED AND REPLACED IF EITHER DAMAGE OR IMPROPER OPERATION IS NOTED.

Before installing the new seat belt assembly, the seat belt attaching areas must be inspected for damage and distortion, and if the attaching points are damaged or distorted, the sheet metal must be reworked back to its original shape and structural integrity.

Install the new seat belt assembly in matched sets using the appropriate instructions; then functionally test as described previously in this article.

Section 6-Cleaning Belt Webbing

Clean the belt webbing with any mild soap solution recommended for cleaning upholstery or carpets; follow instructions provided with the soap. Do not bleach or re-dye the webbing because it may weaken the belt webbing.

Section 7-Service Parts

The Ford Motor Company stocks replacement parts for all passenger car safety belt systems for which there is nominal demand without regard to the age of vehicle. Beyond this, in the interest of ensuring that the full protection of safety belts is available for all Ford owners, the Company will undertake to provide parts to service the belt system for any Company vehicle if it was originally

equipped with safety belts.

Seat belt and shoulder assembly part numbers for specific applications can be identified by referring to Body Section 611 of the parts catalog. In general, these assemblies are available with black webbing only once the vehicle is beyond two years out of production. Part orders should be placed through the normal PDC system.

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QUICK REFERENCE PARTS LISTING FOR SEAT BELTS, COMFORT CLIPS, AND EXTENDERS

Extenders offer eight inches of additional length and can be used in all seating positions. It is necessary to ensure that the manufacturer of the extender being installed is the same as that identified on the seat belt assembly. Part numbers for comfort clips used in the 3-point system, seat belts, extenders are shown below.

Quick Reference Part Listing

Book Microfiche

Section Page Plate Row Column

Car Seat Belt Extenders

1973-1979 611 2 F4 10 01

and Seat Belts 1973-1979 611 2 M4 9 56

1980- 611 1 F3 23 47

1980- 611 1 M3 23 47

Truck Seat Belt Extenders

1973-1979 600 3 LT2 20 48

and Seat Belts 1980- 600 4 LT2 11 04

All Vehicles Comfort Clips

1973-1979 600 8 F4 9 63

Section 8-Service Recalls Involving Seat Belts

Recall # Letter Dated Year Car Line Concern

H1B 11/17/1971 1972 Pinto, T-Bird, Light Truck Seat belt or shoulder belt bolt fracture

C-2H 7/10/1972 1972 Mark IV Belt retractor won't lock up

H-2H 7/10/1972 1972 Thunderbird Belt retractor won't lock up

C-3E 7/31/1972 1972 Montego Belt retractor won't lock up

H-3E 7/31/1972 1972 Torino Belt retractor won't lock up

H-3F 7/31/1972 71-72 F-Series Lt. & Med. Incorrect length shoulder belt - no adjustment

H-9D 6/1973 1973 Ford, Pinto, Lt. Truck Seat belt bolt fracture

118 3/20/1974 1974 Torino Retractor remains unlocked

130 8/26/1974 1975 Mercury Mixed part assys. - no seat belt latching

152 2/14/1975 1972 Maverick, Comet Need longer belts

189 4/26/1976 1976 W-Series Belt too short

214 12/4/1976 76-77 Granada, Monarch Shoulder belt weld nut replacement

253 2/22/1978 72-78 L8OO/900, L8000/9000 Belt too short

282 3/30/1978 1978 Pinto, Bobcat, Mustang II Retractor won't lock up

289 8/29/1978 1978 T-Bird, Cougar, LTD II, Ford Retractor won't lock up

298 9/20/1978 1978 F-Series Weld nut replacement

313 10/25/1978 1979 Econolines Possible cut belt by the seat

1536 11/1/1978 1979 Versailles Retractor solenoid drawing constant

current, discharging battery

458 3/30/1983 81-82 Escort, Lynx Wagon Shoulder belt anchorage reinforcement

477 12/12/1983 1984 Escort/Lynx (3 dr.), Tempo/ D-ring bolt replacement

Topaz (2 dr.), Mustang/Capri, T-Bird/Cougar, LTD/Marquis, Mark VII, Continental, Ford/ Mercury, Lincoln, Ranger, Bronco II, Bronco 477-S

2/23/1984 1984 Bronco, Bronco II, Ranger D-ring covers

489 8/8/1984 81-84 Escort/Lynx, Tempo/Topaz Belt protective spacers

Section 9-TSB's Involving Seat Belts

TSB # Title Other Information

198 Unauthorized Service Replace belt assembly

81-2-6 Securing Tot Guard Seat belt extender

81-5-3 Seat Belt Discoloration (Red) Truck, Escort/Lynx 1981

81-7-23 Seat Belt Becomes Tight While Driving Seat belt replacement

83-18-15 Seat Belt Rattles Against Trim Seat belt replacement

84-4-4 D-Ring Bind - Restricts Extraction of Belt Addition of spacer

84-11-1 D-Ring Cover Bind - Belt Free Swing D-ring cover replacement

41-50-8 See following page

OTHER APPLICABLE ARTICLES: None WARRANTY STATUS: "INFORMATION ONLY"

Seat Belt Buckle Switch: Locations

In Driver's Seat Belt Buckle

Seat Belt Latch: Technical Service Bulletins Safety Belt - Tongue Cover Now Available

SAFETY BELT - TONGUE COVER SERVICE PART

AVAILABILITY

Article No. 88-25-2

FORD: 1974-88 ALL

LINCOLN-MERCURY: 1974-88 ALL

LIGHT-TRUCK: 1974-88 ALL

MEDIUM/HEAVY: 1974-88

ISSUE: The safety belt tongue cover is now available for service. It is no longer necessary to replace the entire safety belt assembly in the event a buckle and tongue cover requires service.

ACTION: No corrective action is required. Refer to the following application chart for the correct service part number.

NOTE: THE SAFETY BELT TONGUE COVERS ARE SERVICED IN A NEUTRAL COLOR AND MUST BE PAINTED TO MATCH.

SAFETY BELT TONGUE COVER APPLICATION CHART MODEL YEAR

VEHICLE SERVICE PART NO.

1986-88 Taurus/Sable E7DZ-54612A64-A

1974-88 All Other Vehicles E7FZ-61612A64-A

PART NUMBER PART NAME CLASS

E7DZ-54612A64-A Safety Belt Tongue Cover Package of 4

BM

E7FZ-61612A64-A Safety Belt Tongue Cover Package of 4

B

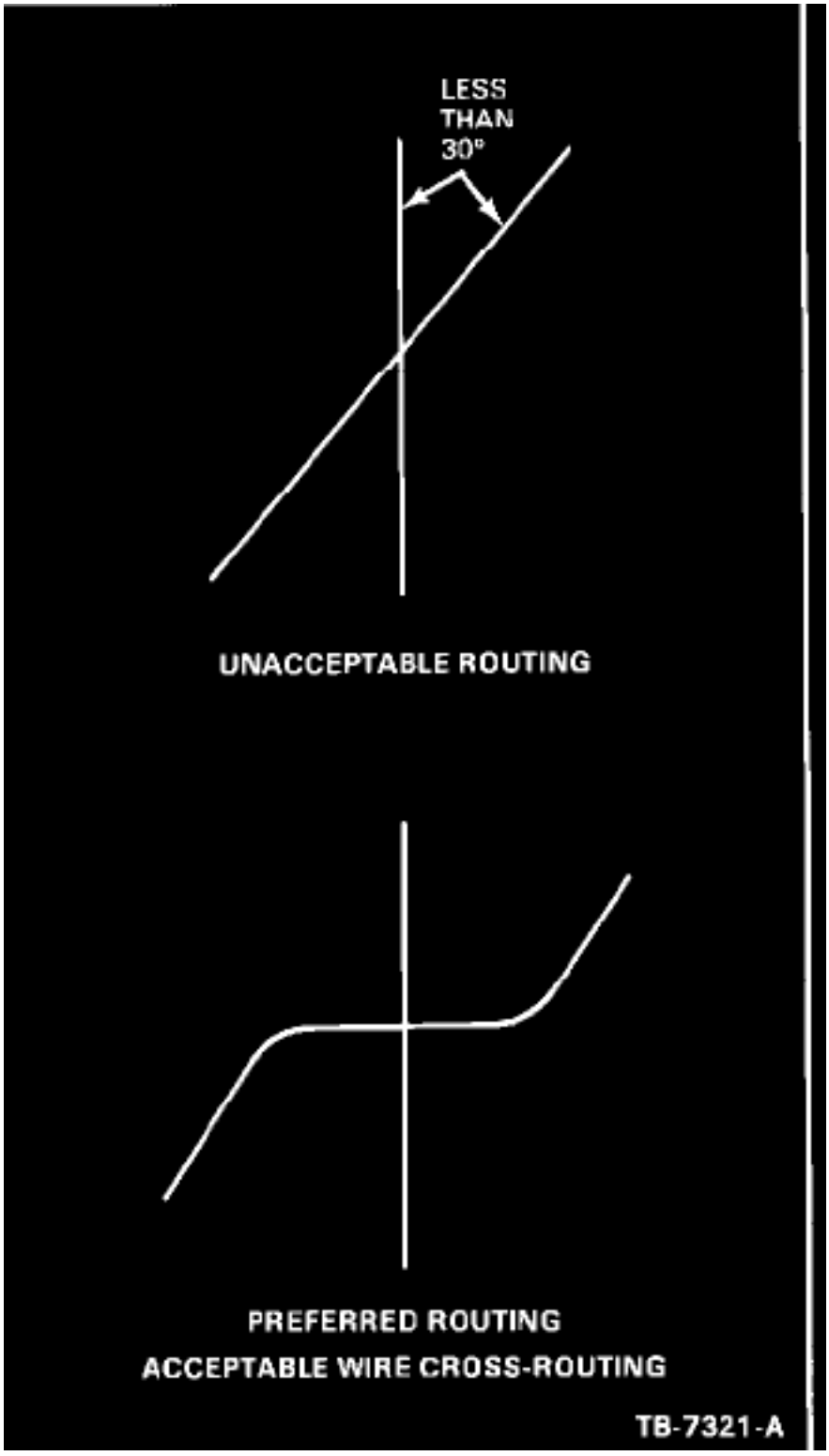
OTHER APPLICABLE ARTICLES: None WARRANTY STATUS:

"INFORMATION ONLY"

OASIS CODES: 1050, 1051, 1800

Seat Belt Buckle Switch: Locations

In Driver's Seat Belt Buckle



Antitheft and Alarm Systems: Technical Service Bulletins Antitheft Devices - Installation Precautions

Article No. 86-3-9

ANTI-THEFT DEVICES (AFTER MARKET) - INSTALLATION/ OPERATING PRECAUTIONS ON VEHICLES EQUIPPED WITH ELECTRONIC ENGINE CONTROLS (EEC)

FORD 1978-86 ALL

LINCOLN-MERCURY 1978-86 ALL

LIGHT TRUCK 1981-86 ALL

NOTE: This article is being republished in its entirety to include 1986 models.

Installation of "AfterMarket" anti-theft devices such as fuel shutoff and ignition defeating devices may cause no starts, hard starting, stalls, or damage to vehicle components on Ford vehicles equipped with electronic engine controls. Possible damage caused by these devices can result from the following situations:

1. Fuel shutoff devices - Attempting to start the vehicle without disarming this device may cause the fuel injectors to run dry and overheat, which will lead to failure of the injectors.

2. Ignition defeating devices which ground the ignition/tachometer lead - Attempting to start the vehicle without disarming may result in ignition coil failure.

Figure 13

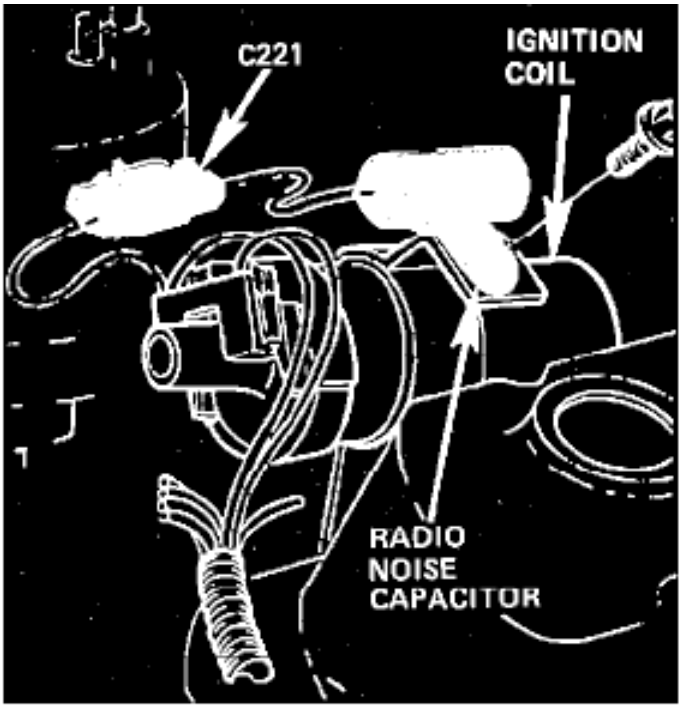
In addition, care must be taken when routing underhood after market wiring (see Figure 13 for proper precautions), in order to avoid electromagnetic interference with electronic engine controls. The following precautions must be observed:

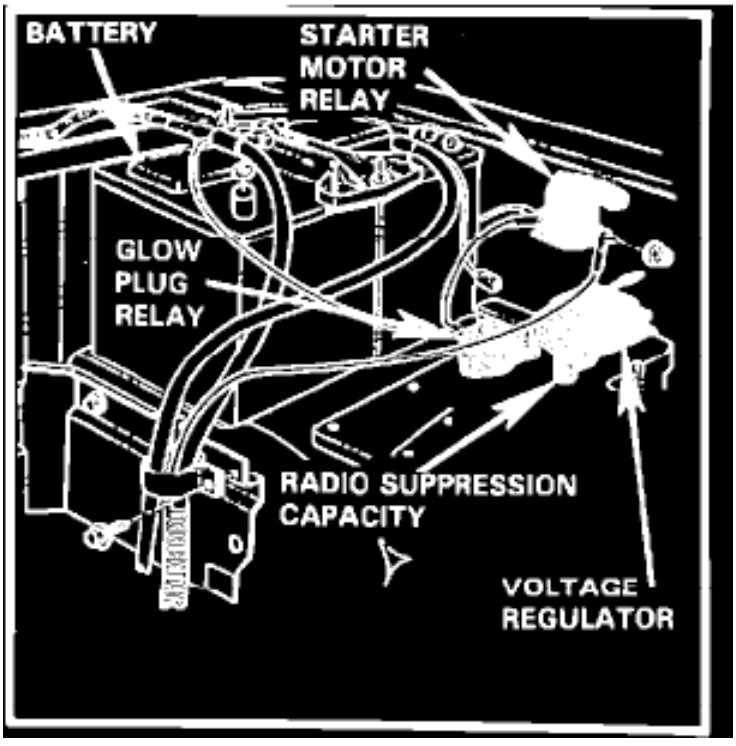
1. Ignition tach signal wiring must not be randomly routed through the engine compartment.

2. Add-on wiring must not run parallel to secondary (plug) ignition wires.

3. EEC wiring harness (12A581) must not be altered or cut or rerouted.

Failure to observe these warnings may result in damage to vehicle components or drive deterioration. OTHER APPLICABLE ARTICLES: Supersedes 85-7-8 WARRANTY STATUS: "INFORMATION ONLY"


C221
IGNITION COIL
RADIO NOISE CAPACITOR


BATTERY
STARTER MOTOR RELAY
GLOW PLUG RELAY
RADIO SUPPRESSION CAPACITY
VOLTAGE REGULATOR

Radio/Stereo Noise Filter: Locations

Top Front Of Engine.

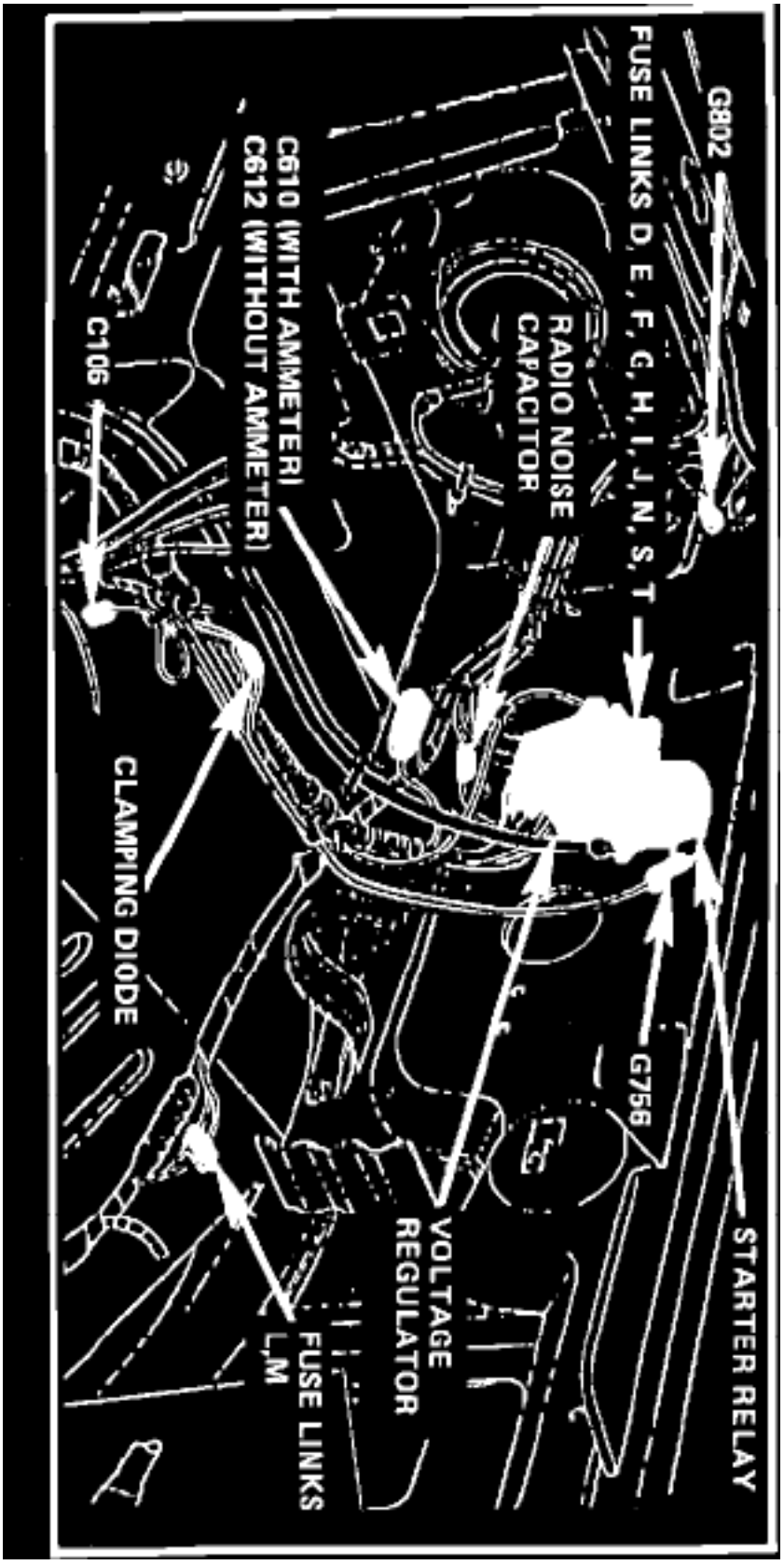
Attached To Voltage Regulator

Applicable to: V8-351/5.8L Engine

RH Front Fender Well.

Attached To Voltage Regulator

Applicable to: 1984-85 w/Diesel Engine


G802
FUSE LINKS D, E, F, G, H, I, J, N, S, T
RADIO NOISE CAPACITOR
C610 (WITH AMMETER)
C612 (WITHOUT AMMETER)
C106
CLAMPING DIODE
G756
STARTER RELAY
VOLTAGE REGULATOR
FUSE LINKS L,M

RH Front Fender Apron.

Attached To Voltage Regulator

Applicable to: 1981-82 All & 1983-85 w/EEC

Trailer Lighting Module: Locations

Attached To Brake Pedal

Trailer Lighting Relay: Locations

On Dash Panel Below Junction Block

Cross-Member: Customer Interest Frame/Crossmember - Snapping/Popping Noise

Article No. 94-8-13

^ FRAME - # 1 CROSSMEMBER - RIVET REPLACEMENT

^ NOISE - "POPPING/CREAKING" SOUNDS - FRAME # 1 CROSSMEMBER

LIGHT TRUCK: 1980-94 BRONCO, F-150-350 SERIES 1988-94 F SUPER DUTY, F-47

This TSB article is being republished in its entirety to add certain 1992/94 model year vehicles, to revise the nut specified in the article and its torque specification, and to expand the diagnostic and repair procedures contained in the article.

ISSUE:

A "popping/creaking" sound may come from the area of the # 1 crossmember attachment to the left frame rail. This occurs because of a slip/stick motion at a loose rivet in the lower flange of the frame near the steering gear. The rivet could be either a standard cold head rivet in light duty applications or a "huck" rivet, which has the appearance of a large "pop" Civet.

ACTION:

Use the following diagnostic procedure to determine if the noise is originating in this rivet area. If so, replace the rivet with a nut, bolt and washer assembly. The revised parts increase the clamp load at the joint, minimizing the motion that causes the noise. Refer to the following procedure for service details.

SOURCES OF VARIOUS FRONT UNDERBODY NOISES:

Various front underbody noises may originate from several different sources. Several noises have been misdiagnosed as # 1 crossmember rivet "pop/creak" because the noise tends to propagate to the shock tower area and the shock tower area acts as an amplifier such that the noises all appear to be coming from that area. Other underbody areas that produce similar noises include:

^ loose or improperly seated shock tower rivets

^ loose or misaligned transmission crossmembers

^ loose radius arm brackets

^ loose axle pivot brackets

Other service bulletins have been published to address the proper repair of these concerns.

DESCRIPTION OF # 1 CROSSMEMBER NOISES:

"Pop/creak" - A metal-to-metal rubbing motion which slip/sticks when a twist is induced into the frame.

DIAGNOSTIC PROCEDURE:

1. INTERVIEW THE CUSTOMER:

a. Understand the customer's description of the noise and of the conditions under which it is heard.

b. Road test the vehicle with the customer to fully understand where, how and when the noise occurs.

2. DUPLICATE THE NOISE CONCERN:

a. Drive the vehicle around for at least 15 minutes to warm-up and stress the frame joints, so that any frame noise is more likely to be repeatable in the garage.

b. Test the following situations:

^ Can the noise be duplicated while stationary and on dry pavement by repeatedly turning the steering wheel from steering stop to steering stop?

^ Can the noise be repeated while on the hoist without the suspension loaded by repeatedly turning the steering wheel from steering stop to steering stop?

Typically, the twist in the frame can be induced by turning the steering wheel back and forth from steering stop to steering stop to duplicate the noise at the # 1 crossmember attachment. IF THE NOISE IS NOT DUPLICATED UNDER ONE OF THESE SITUATIONS, INVESTIGATE OTHER AREAS FOR THE NOISE BEFORE PROCEEDING TO REPAIR THE # 1 CROSSMEMBER RIVET.

3. INSPECT FRAME BOLTS FOR PROPER INSTALLATION TORQUE:

a. Inspect and tighten all front end components which bolt to the frame to confirm they are at the proper torque. This includes, but is not limited to:

^ Radius arm bracket bolts - 135 +/- 20 N-m (100 +/- 15 lb.ft.)

^ Axle pivot bracket bolts (torques vary by model - refer to the appropriate light truck Service Manual for proper torque specifications)

^ Bumper bracket bolts - (refer to the appropriate light truck Service Manual for proper torque specifications)

b. Inspect the transmission crossmember for proper alignment and bolt torques. If misaligned:

^ Loosen all transmission crossmember fasteners (including to the transmission).

^ Lift the transmission to remove any load on the crossmember.

^ Lift and reposition the transmission crossmember to be centered on the frame attachment holes.

^ Tighten all frame fasteners to the 63 +/- 9 N-m (46 +/- 7 lb.ft.).

^ Lower the transmission and tighten fasteners to 95 +/- 15 N-m (70 +/- 11 lb.ft.).

4. TEST DRIVE THE VEHICLE

Road test the vehicle again to duplicate the concern. If the noise is still present, continue.

5. INSPECT THE FRAME RIVETS

a. Repeat Step 2 to duplicate the noise in the garage.

b. Use a stethoscope or chassis ears to isolate the area of the chassis that the noise appears to be originating from. Areas to check include the shock tower rivets and all # 1 crossmember rivets.

6. SERVICE THE VEHICLE

a. If the noise appears to be from the lower left-front # 1 crossmember fastener, follow the procedure outlined below.

b. If the noise appears to be coming from another rivet (other than the lower left front # 1 crossmember rivet), refer to TSB 93-6-10 for the proper rivet repair procedure.

LOWER LEFT FRONT # 1 CROSSMEMBER RIVET REPLACEMENT:

NOTE:

THIS SERVICE PROCEDURE DOES NOT APPLY TO STEERING GEAR LINER REPLACEMENT. REFER TO TSB 90-11-10 FOR STEERING GEAR LINER REPAIR PROCEDURE.

1. Remove damaged or loose COLD HEAD RIVETS:

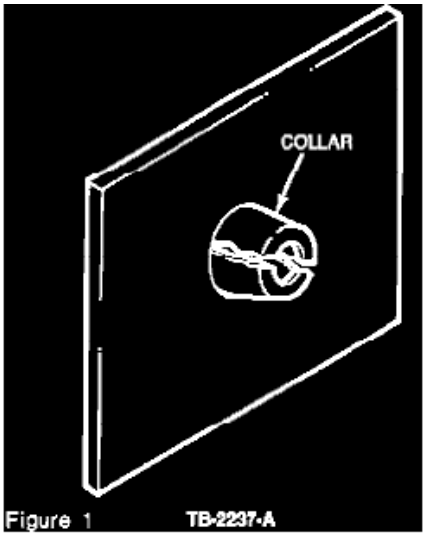
a. Drill a 1/8" (3.175 mm) hole through the rivet.

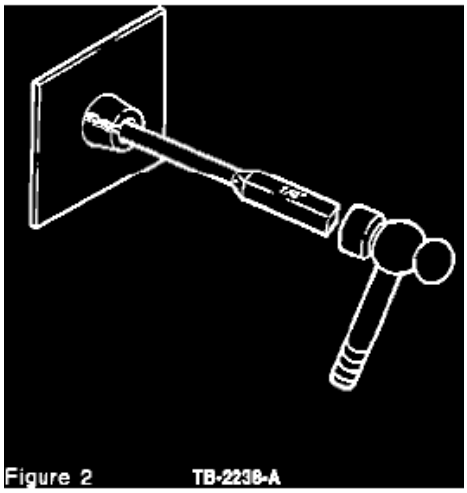
b. Redrill the same hole through the shank of the rivet with a 3/8" (9.525 mm) drill.

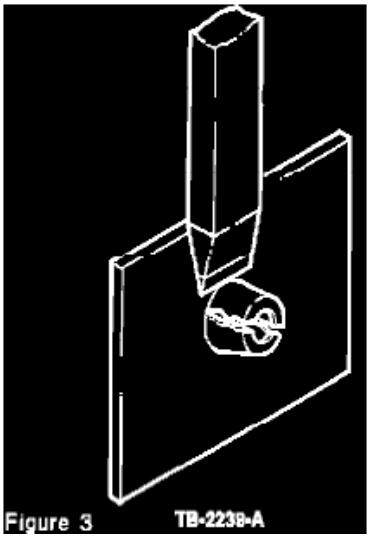
c. Remove the rivet head with an air chisel.

d. Drive out the rivet with a punch and hammer.

2. Remove damaged or loose "HUCK" RIVETS:


COLLAR
Figure 1
TB-2237-A

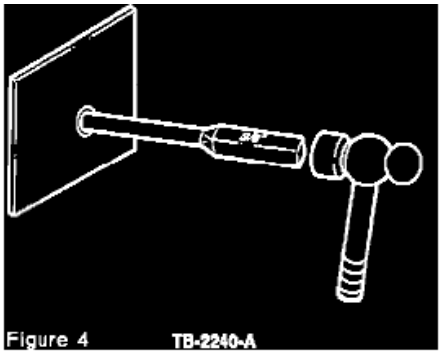

Figure 2
TB-2238-A

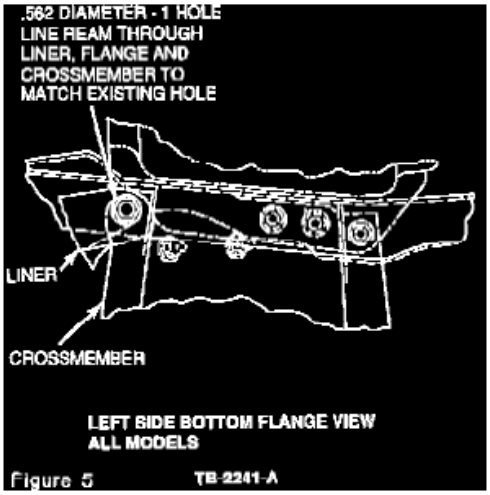

Figure 3
TB-2238-A

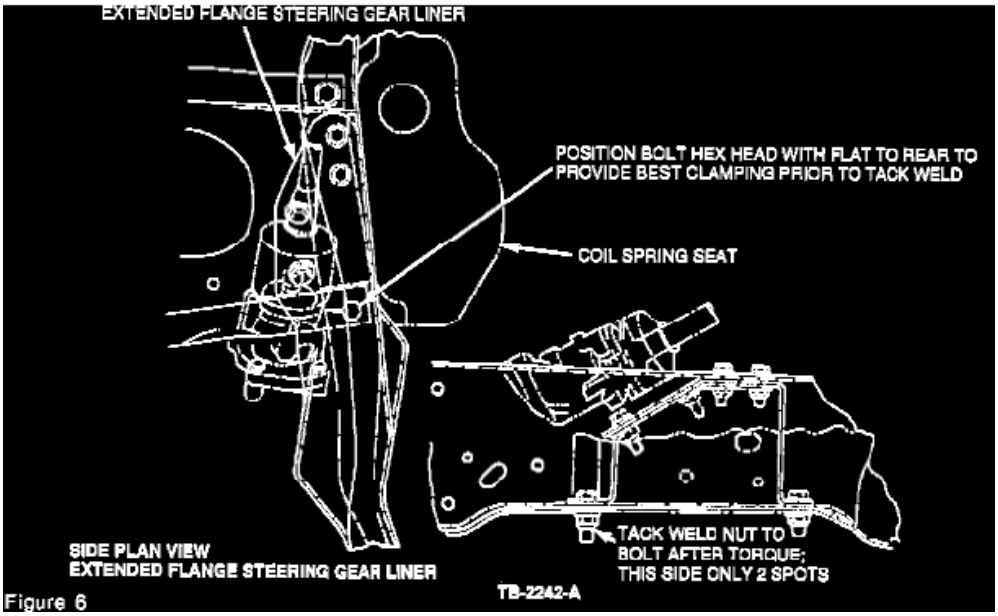
a. Use a flat chisel and hammer (or air chisel) to split the exposed collar of the huck fastener, Figure 1.

b. Knock the rivet pin out of the blind side with a 1/4" (6.35 mm) drift punch and hammer, Figure 2.

c. Cut the rivet's head off with a hammer and flat chisel, Figure 3.


Figure 4
TB-2240-A


.562 DIAMETER - 1 HOLE
LINE REAM THROUGH
LINER, FLANGE AND
CROSSMEMBER TO
MATCH EXISTING HOLE
LINER
CROSSMEMBER
LEFT SIDE BOTTOM FLANGE VIEW
ALL MODELS
Figure 5
TB-2241-A


EXTENDED FLANGE STEERING GEAR LINER
POSITION BOLT HEX HEAD WITH FLAT TO REAR TO PROVIDE BEST CLAMPING PRIOR TO TACK WELD
COIL SPRING SEAT
TACK WELD NUT TO BOLT AFTER TORQUE; THIS SIDE ONLY 2 SPOTS
SIDE PLAN VIEW
EXTENDED FLANGE STEERING GEAR LINER
TB-2242-A
Figure 6

d. Knock the sleeve out of the blind side with a 3/8" (9.525 mm) drift punch and hammer, Figure 4.

CAUTION:

REMOVAL OF THE FASTENER WITH A CUTTING TORCH IS NOT RECOMMENDED BECAUSE OF PROBABLE DAMAGE TO THE FRAME STRUCTURE.

3. Line ream the existing hole through the liner, frame flange and crossmember to 9/16" (14.228 mm), Figure 5.

4. Install a 9/16" Grade 8 nut (34990-S4), bolt (58698-S2) and washer (44880-S2), with nut/washer on the bottom, Figure 6.

a. Push the bolt into place using a brazing rod to hold the bolt.

PART NUMBER	PART NAME	CLASS
34990-S4	Nut 9/16 - 12 Hex (Pkg. 5)	RG
44880-S2	Washer 9/16 (Pkg. 12)	BG
58698-S2	Bolt 9/16-12 x 1.75" (Pkg. 4)	BG

b. Slide the bolt into the opening between the front face of the crossmember and frame liner.

c. Tighten the nut to 140 4-3 lb.ft. (190 4-4 N-m) and tack weld the nut to the bolt after tightening.

CAUTION:

DO NOT WELD THE NUT/WASHER TO THE FRAME.

OTHER APPLICABLE ARTICLES: 91-11-10

SUPERSEDES: 91-25-18

WARRANTY STATUS:

Eligible Under The Provisions Of Bumper To Bumper Warranty Coverage For 19 2-94 Models, Basic Warranty Coverage For All Other Models

OPERATION DESCRIPTION TIME

940813A Perform Diagnostics And 1.9 Hrs.

Replace Rivet

DEALER CODING

BASIC PART NO. CONDITION CODE

5005 56

OASIS CODES: 305000, 390000, 702000, 702100

Cross-Member: All Technical Service Bulletins Frame/Crossmember - Snapping/Popping Noise

Article No. 94-8-13

^ FRAME - # 1 CROSSMEMBER - RIVET REPLACEMENT

^ NOISE - "POPPING/CREAKING" SOUNDS - FRAME # 1 CROSSMEMBER

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^ Axle pivot bracket bolts (torques vary by model - refer to the appropriate light truck Service Manual for proper torque specifications)

^ Bumper bracket bolts - (refer to the appropriate light truck Service Manual for proper torque specifications)

b. Inspect the transmission crossmember for proper alignment and bolt torques. If misaligned:

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^ Lift the transmission to remove any load on the crossmember.

^ Lift and reposition the transmission crossmember to be centered on the frame attachment holes.

^ Tighten all frame fasteners to the 63 +/- 9 N-m (46 +/- 7 lb.ft.).

^ Lower the transmission and tighten fasteners to 95 +/- 15 N-m (70 +/- 11 lb.ft.).

4. TEST DRIVE THE VEHICLE

Road test the vehicle again to duplicate the concern. If the noise is still present, continue.

5. INSPECT THE FRAME RIVETS

a. Repeat Step 2 to duplicate the noise in the garage.

b. Use a stethoscope or chassis ears to isolate the area of the chassis that the noise appears to be originating from. Areas to check include the shock tower rivets and all # 1 crossmember rivets.

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LOWER LEFT FRONT # 1 CROSSMEMBER RIVET REPLACEMENT:

NOTE:

THIS SERVICE PROCEDURE DOES NOT APPLY TO STEERING GEAR LINER REPLACEMENT. REFER TO TSB 90-11-10 FOR STEERING GEAR LINER REPAIR PROCEDURE.

1. Remove damaged or loose COLD HEAD RIVETS:

a. Drill a 1/8" (3.175 mm) hole through the rivet.

b. Redrill the same hole through the shank of the rivet with a 3/8" (9.525 mm) drill.

c. Remove the rivet head with an air chisel.

d. Drive out the rivet with a punch and hammer.

2. Remove damaged or loose "HUCK" RIVETS:

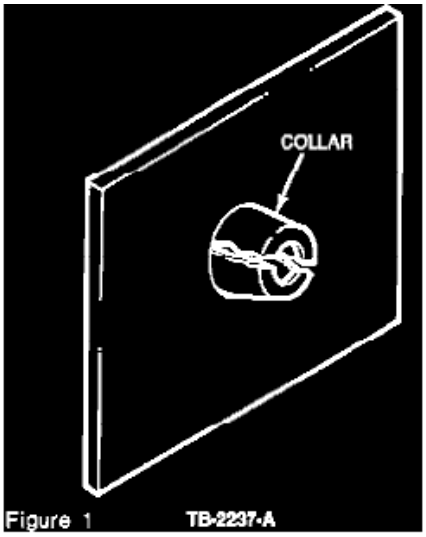
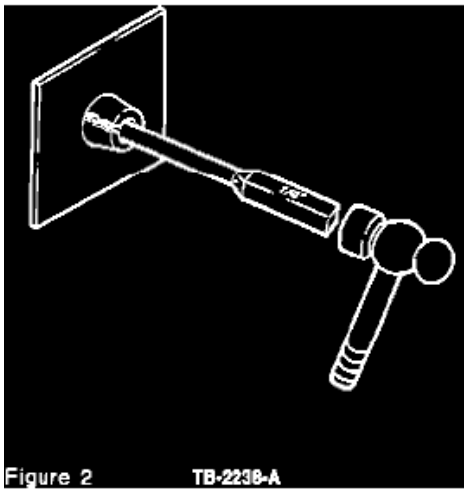
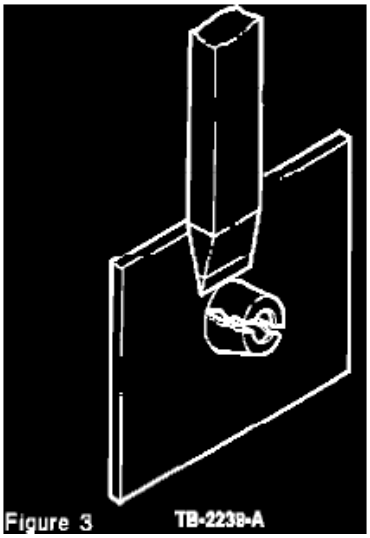


Figure 1 TB-2237-A

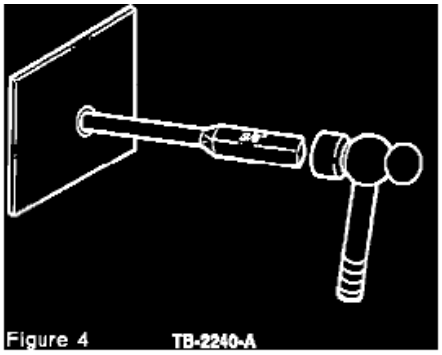

Figure 2 TB-2238-A

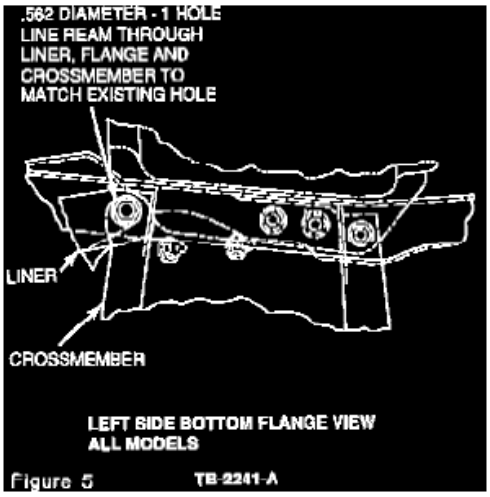

Figure 3 TB-2238-A

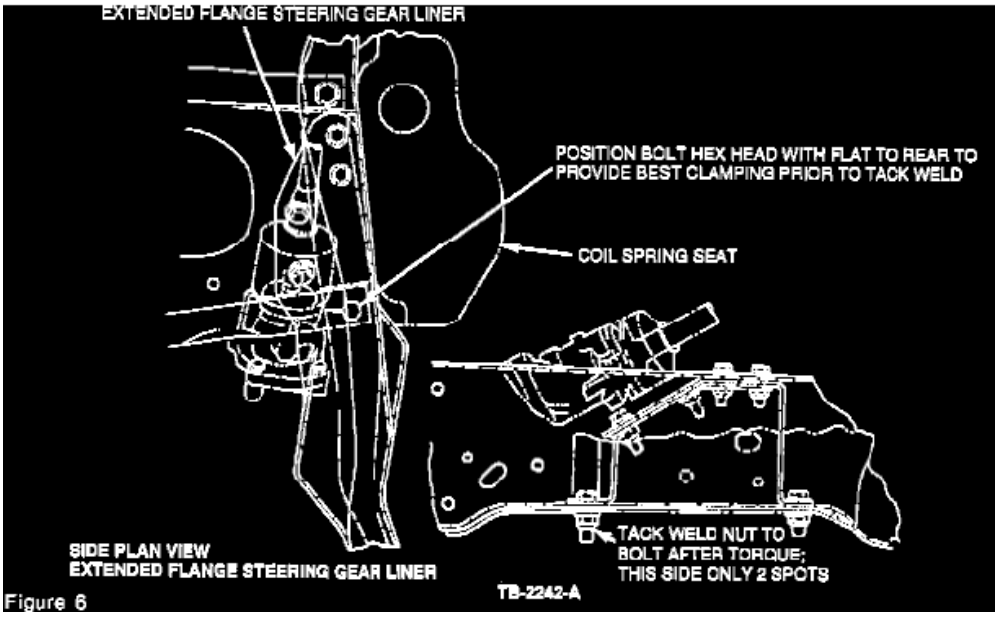
a. Use a flat chisel and hammer (or air chisel) to split the exposed collar of the huck fastener, Figure 1.

b. Knock the rivet pin out of the blind side with a 1/4" (6.35 mm) drift punch and hammer, Figure 2.

c. Cut the rivet's head off with a hammer and flat chisel, Figure 3.







d. Knock the sleeve out of the blind side with a 3/8" (9.525 mm) drift punch and hammer, Figure 4.

CAUTION:

REMOVAL OF THE FASTENER WITH A CUTTING TORCH IS NOT RECOMMENDED BECAUSE OF PROBABLE DAMAGE TO THE FRAME STRUCTURE.

3. Line ream the existing hole through the liner, frame flange and crossmember to 9/16" (14.228 mm), Figure 5.

4. Install a 9/16" Grade 8 nut (34990-S4), bolt (58698-S2) and washer (44880-S2), with nut/washer on the bottom, Figure 6.

a. Push the bolt into place using a brazing rod to hold the bolt.

PART NUMBER	PART NAME	CLASS
34990-S4	Nut 9/16 - 12 Hex (Pkg. 5)	RG
44880-S2	Washer 9/16 (Pkg. 12)	BG
58698-S2	Bolt 9/16-12 x 1.75" (Pkg. 4)	BG

b. Slide the bolt into the opening between the front face of the crossmember and frame liner.

c. Tighten the nut to 140 4-3 lb.ft. (190 4-4 N-m) and tack weld the nut to the bolt after tightening.

CAUTION:

DO NOT WELD THE NUT/WASHER TO THE FRAME.

OTHER APPLICABLE ARTICLES: 91-11-10

SUPERSEDES: 91-25-18

WARRANTY STATUS:

Eligible Under The Provisions Of Bumper To Bumper Warranty Coverage For 19 2-94 Models, Basic Warranty Coverage For All Other Models

OPERATION DESCRIPTION TIME

940813A Perform Diagnostics And 1.9 Hrs.

Replace Rivet

DEALER CODING

BASIC PART NO. CONDITION CODE

5005 56

OASIS CODES: 305000, 390000, 702000, 702100

Ford Bronco Workshop Manual (V8-351 5.8L VIN G 2-bbl (1982))
Ford Workshop Manuals > Body and Frame > Frame > Cross-Member > Component Information > Technical Service Bulletins > All Technical Service Bulletins for Cross-Member: > 831818 > Sep > 83 > Suspension - #1 Crossmember Service Replacement

Cross-Member: All Technical Service Bulletins Suspension - #1 Crossmember Service Replacement

Artile No. 83-18-18

FRAME - #1 CROSSMEMBER - SERVICE REPLACEMENT

LIGHT TRUCKS 1980-83 F100-350, BRONCO; 1975-83 ECONOLINE

Number 1 crossmember kits are now available for usage where damaged crossmembers require complete replacement. The kits will service all vehicles except HD F-250/350 with 6.9L or 7.5L engines.

The kits include detailed installation instructions and necessary fasteners to assure a durable replacement.

In instances where the crossmember has minimal damage confined to areas surrounding the pivot brackets, complete replacement may not be required. In these cases, your District Zone Service Manager should be contacted regarding the potential usage of a reinforcing kit instead of complete replacement of the crossmember.

PART NUMBER PART NAME CLASS

D5UZ-5C139-A Kit - #1 Crossmember C

Econoline

E0TZ-5C139-A Kit - #1 Crossmember C

Bronco, F100-350 (Coil Springs) (except 6.9L, 7.5L engines)

E0TZ-5C139-B Kit - #1 Crossmember C

F-250/350 (4x4) (leaf springs) (except 6.9L, 7.5L engines)

OTHER APPLICABLE ARTICLES: None WARRANTY STATUS: "INFORMATION ONLY"

Ford Bronco Workshop Manual (V8-351 5.8L VIN G 2-bbl (1982))
Ford Workshop Manuals > Body and Frame > Frame > Cross-Member > Component Information > Technical Service Bulletins > All Other Service Bulletins for Cross-Member: > 831818 > Sep > 83 > Suspension - #1 Crossmember Service Replacement

Cross-Member: All Technical Service Bulletins Suspension - #1 Crossmember Service Replacement

Artile No. 83-18-18

FRAME - #1 CROSSMEMBER - SERVICE REPLACEMENT

LIGHT TRUCKS 1980-83 F100-350, BRONCO; 1975-83 ECONOLINE

Number 1 crossmember kits are now available for usage where damaged crossmembers require complete replacement. The kits will service all vehicles except HD F-250/350 with 6.9L or 7.5L engines.

The kits include detailed installation instructions and necessary fasteners to assure a durable replacement.

In instances where the crossmember has minimal damage confined to areas surrounding the pivot brackets, complete replacement may not be required. In these cases, your District Zone Service Manager should be contacted regarding the potential usage of a reinforcing kit instead of complete replacement of the crossmember.

PART NUMBER PART NAME CLASS

D5UZ-5C139-A Kit - #1 Crossmember C

Econoline

E0TZ-5C139-A Kit - #1 Crossmember C

Bronco, F100-350 (Coil Springs) (except 6.9L, 7.5L engines)

E0TZ-5C139-B Kit - #1 Crossmember C

F-250/350 (4x4) (leaf springs) (except 6.9L, 7.5L engines)

OTHER APPLICABLE ARTICLES: None WARRANTY STATUS: "INFORMATION ONLY"

Subframe: Technical Service Bulletins Suspension - #1 Crossmember Service Replacement

Artile No. 83-18-18

FRAME - #1 CROSSMEMBER - SERVICE REPLACEMENT

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F-250/350 (4x4) (leaf springs) (except 6.9L, 7.5L engines)

OTHER APPLICABLE ARTICLES: None WARRANTY STATUS: "INFORMATION ONLY"

Power Door Lock Actuator: Locations

In Respective Doors

Power Door Lock Switch: Locations

In Respective Doors

Power Mirror Motor: Locations

In Respective Doors

Power Mirror Switch: Locations

In LH Door

Paint: Technical Service Bulletins Paint - Iron Particle Removal

Article No. 95-6-1

03/27/95

^ PAINT - IRON PARTICLE REMOVAL - INDUSTRIAL FALLOUT - ACID RAIN NEUTRALIZATION

^ PAINT - ROUGH TEXTURE/FERROUS METAL CONTAMINATION - ACID RAIN DISCOLORATION OR ETCHING

FORD: 1980 and after CROWN VICTORIA, ESCORT, MUSTANG, THUNDERBIRD 1982-88 EXP 1984-94 TEMPO 1986 and after TAURUS 1988-93 FESTIVA 1989 and after PROBE 1994-95 ASPIRE 1995 CONTOUR

LINCOLN-MERCURY: 1980 and after CONTINENTAL, COUGAR, GRAND MARQUIS, TOWN CAR 1981-87 LYNX 1984-92 MARK VII 1984-94 TOPAZ 1986 and after SABLE 1987-89 TRACER 1991-94 CAPRI 1991 and after TRACER 1993 and after MARK VIII 1995 MYSTIQUE

MERKUR: 1985-89 XR4TI 1988-89 SCORPIO

LIGHT TRUCK: 1980 and after F-150-350 SERIES 1981 and after ECONOLINE 1982 and after BRONCO 1983 and after RANGER 1984-90 BRONCO II 1986 and after AEROSTAR 1988 and after F SUPER DUTY 1991 and after EXPLORER 1993 and after VILLAGER 1995 and after WINDSTAR

MEDIUM/HEAVY TRUCK: 1980-91 C SERIES, CL-CLT-9000 SERIES 1980 and after F & B SERIES, L SERIES 1986 and after CARGO SERIES

ISSUE: Ferrous metal particles (hot iron dust) are generated by manufacturing facilities, rail shipments, combustion engines, jet engines, body shops, etc. These particles mechanically/magnetically bond to vehicles' painted surfaces. Moisture and temperature combine with the particles to create a chemical reaction. The reaction causes the particles to corrode and enter into the physical paint film.

ACTION: To remove these particles/contaminants, USE ONLY the following procedure. The procedure must be performed before any buffing, polishing, color sanding or refinishing is attempted. The materials in this procedure are alkaline, acidic and neutral. They must be used in the specified order.

CAUTION:

ANY CHANGES TO THIS PROCEDURE WILL CAUSE AN INCOMPLETE OR UNSATISFACTORY REPAIR AND MAY RESULT IN

POSSIBLE DAMAGE TO THE PAINTED SURFACES AND TRIM.

WARNING:

THE TECHNICIAN MUST WEAR PROTECTIVE CLOTHING AND EYE PROTECTION TO PREVENT SKIN IRRITATION.

CAUTION:

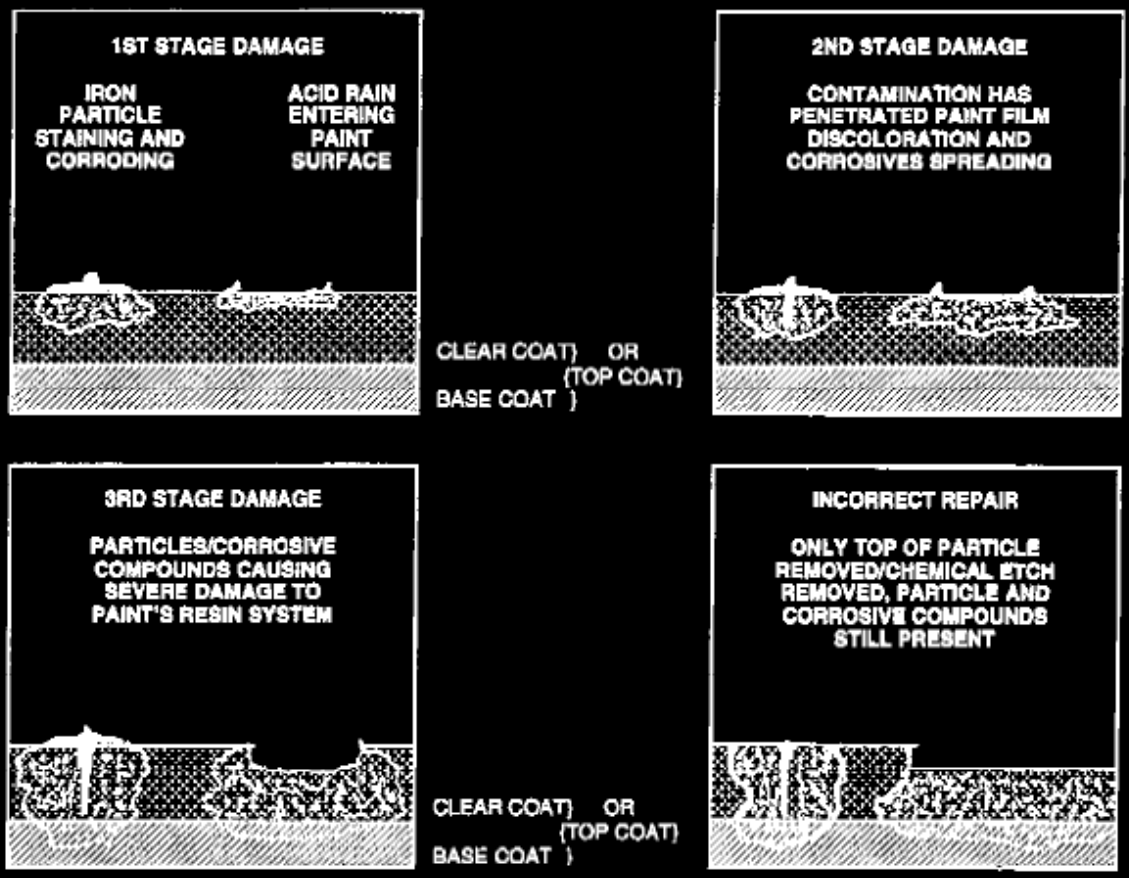
THE USE OF ANY OTHER PRODUCT OR PROCEDURE MAY CAUSE DAMAGE TO ALUMINUM, FLEXIBLE PAINTED SURFACES OR OTHER PAINTED SURFACES. FOLLOW DIRECTIONS EXACTLY AND RINSE THOROUGHLY AFTER EACH STEP.

NOTE:

THIS DECONTAMINATION PROCEDURE IS DESIGNED TO REMOVE SURFACE CONTAMINANTS FROM THE PAINT ON VEHICLES THAT HAVE BEEN CONTAMINATED UP TO 120 DAYS. VEHICLES WHICH HAVE EXPERIENCED THE CONDITION LONGER THAN THIS PERIOD MAY REQUIRE AN ADDITIONAL TREATMENT TO REMOVE FERROUS METAL CONTAMINANTS.

IDENTIFICATION

INDUSTRIAL FALLOUT (IFO) is a general term used to identify Rail Dust, Brake Dust, Ferrous Metal, Alkaline/Crystalline Deposits, Water Spots, Acid Rain, and other types of Environmental Contamination.



Studies conducted have shown the use of Oxalic Acid ferrous metal removers actually contribute to further damage of the paint's resin system, creating long term damage, which may not be evident for months. Additionally, Oxalic Acid products may damage soft exterior trim, aluminum trim and soften the paint.

The use of "clay" type products does not remove the entire ferrous particle or environmental contamination. Clay removes only the top of the particle and stain generated by the contamination, leaving the particle imbedded and the corrosive chemical compounds generated by the contamination in the paint system.

The particles and/or chemical compounds are still present and they continue to generate damage. Color sanding, buffing or compounding the paint film to remove ferrous metal, industrial fallout or acid rain damage may not remove the entire cause of the damage (they treat only the symptom and not the cause). The chemical compounds are still in the paint system and will continue to damage the paint. Color sanding and buffing may result in excessive removal of clear coat film. Removal of OEM clear coat in excess of 0.03 mil may contribute to premature clear coat failure and is not recommended.

THE DECONTAMINATION PROCEDURE DIRECTED IN THIS BULLETIN MUST BE PERFORMED BEFORE ANY BUFFING, POLISHING, COLOR SANDING OR REFINISHING IS ATTEMPTED.

TB-4187-A

Figure 1

For ease of identifying, the Radio Shack Model 63-851, 30X, lighted, magnifier is recommended.

1. Ferrous Metal

^ Light colored vehicles: Small rust orange dots with black in center of stain.

^ Dark colored vehicles: Small white or silver dots with a "rainbow hue" around the particle. The surface will also feel rough to the touch.

2. Industrial Fallout

^ The surface feels rough to the touch and may exhibit crystalline deposits.

^ Usually ferrous metal is present, as well as water spots.

MANUFACTURERS			
PROCEDURE	FINISH KARE (818)-443-8983, CUSTOMER SERVICE	3M (800)-364-3577	MEGUIAR'S (800)-347-5700, CUSTOMER SERVICE
Decontamination	#1119, #883, #11830	None	None
Coarse Compounds	#340 Compound, FK-7503G Pad	Imperial Micro-Finishing Compound	#4 Heavy, #1 Medium, #2 Light
Light	#338 Compound, FK-7503G Pad	Finesse-It II Finishing Compound	#4 Heavy, #1 Medium, #2 Light
Polish	#330, FK-8110G Pad, FK-2500G Pad	Perfect-It Foam Polishing Pad Glaze	#9
Protectant	#218 Or #2180	Imperial Hand Glaze	#9 Or #7
Color Sanding Lubricant	#780 Sand Lube	None	None

3. Acid Rain

^ Surface will exhibit irregular discolored spotting.

^ Dark colored vehicles will show cloudy or greying spots where the acids have started to etch away the paint.

NOTE:

IN EXTREME CASES ETCHING OF THE SURFACE WILL BE VISIBLE OR FELT.

DECONTAMINATION

Use Finish Kare Inc. products 1119/883/11850 to decontaminate the paint surface. Follow the manufacturer's recommended procedures.

NOTE:

FORD DOES NOT RECOMMEND THE USE OF OXALIC ACIDS OR OTHER "FALLOUT REMOVERS".

1. Rinse off dust and debris with cold water. Be sure to start at the bottom and work up.

2. Prepare product "1119" by mixing one (1) part "1119" with four (4) parts cold water.

3. Use clean wash mitt and apply mixture to entire car, starting at the bottom and working up to the top surface. Keep car wet with the solution for 5 to 10 minutes. Do not allow product to dry on the car, and do not allow it to streak down the sides. Rewipe with mitt if necessary to avoid streaks.

4. Rinse car with cold water.

5. Dry the flat surfaces of the vehicle hood, roof and deck lid.

6. Apply product "883" directly to the contaminated surfaces using a clean dry sponge, wash mitt, or soft truck brush ("883" is ready to use from the bottle, with no mixing involved). Keep the areas wet with the "883" for 5 to 7 minutes. Do not allow to dry on the car. Wipe down to the body line on the sides.

7. Prepare product "118SC" by mixing 1 oz (0.03 L) with 1 gal (3.785 L) of water.

8. Shampoo the vehicle with "118SC" shampoo mixture using a clean wash mitt and then rinse with cold water.

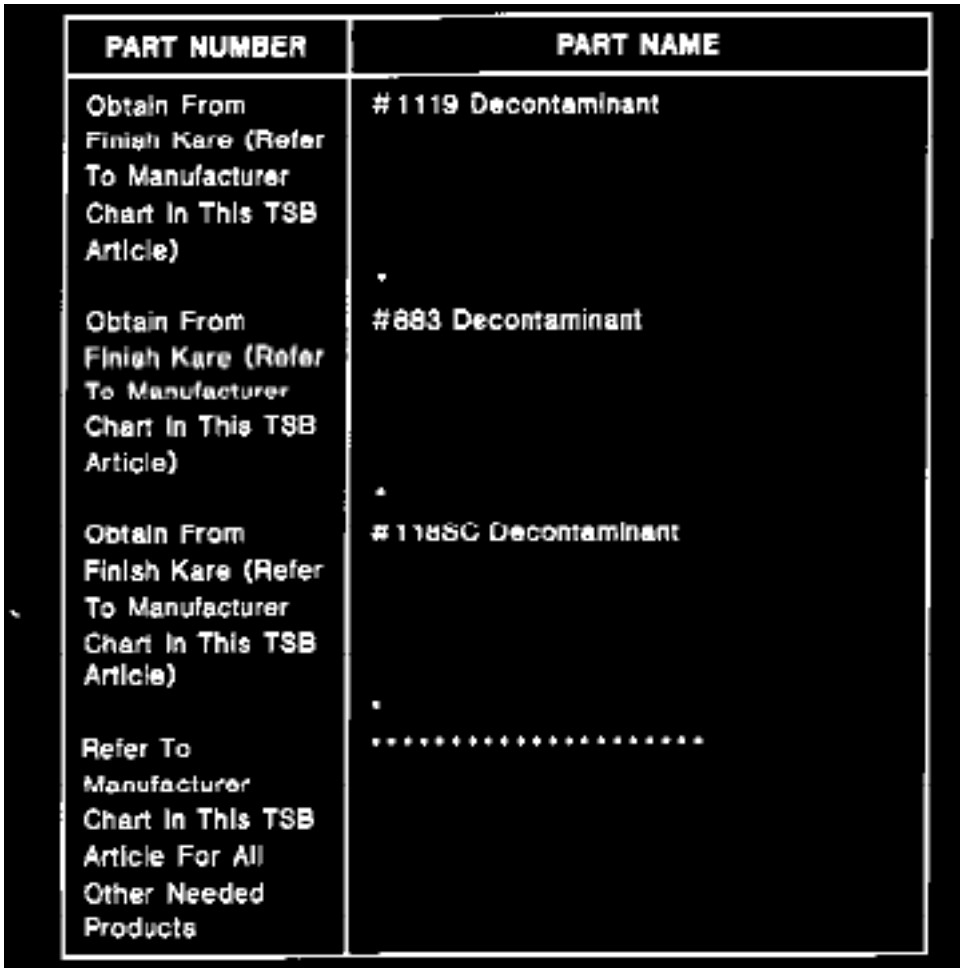
NOTE:

DO NOT USE "1185C" MITT WITH "1119" OR "883" SOLUTIONS. USE SEPARATE MITTS AND ALWAYS KEEP THEM SEPARATE.

9. Inspect paint surface to see if rust particles have been removed. If rust particles have been on the vehicle for a long time, it may be necessary to repeat each of the above steps.

NOTE:

THE NEUTRALIZER CONCENTRATE IS A HEAVY DUTY SHAMPOO AND CAN BE USED IN AN AUTOMATIC CAR WASH SYSTEM.



PART NUMBER	PART NAME
Obtain From Finish Kare (Refer To Manufacturer Chart In This TSB Article)	#1119 Decontaminant
Obtain From Finish Kare (Refer To Manufacturer Chart In This TSB Article)	#883 Decontaminant
Obtain From Finish Kare (Refer To Manufacturer Chart In This TSB Article)	#1188C Decontaminant
Refer To Manufacturer Chart In This TSB Article For All Other Needed Products	**********

CORRECTION OF SURFACE FOLLOWING DECONTAMINATION:

1. Visually inspect surface for evidence of removal of ferrous metal particles, crystalline deposits and water spots. Acid rain discoloring or etching will require either buffing, color sanding or refinishing if etching is visible.

2. Use the buffing products from only one (1) manufacturer. Do not intermix products.

3. Always follow the manufacturer's product sequence. Use appropriate pads with each product as recommended by the manufacturer.

NOTE:

DO NOT REMOVE MORE THAN 0.3 OF A MIL OF PAINT MATERIAL, OR REPAINTING WILL BE REQUIRED.

4. Use a dual action sander (D/A Sander) with a velcro-mount backing plate and appropriate foam pad for final polishing swirl removal.

5. Use an alcohol and water mixture (1:4 ratio) to clean buffed areas to verify removal of scratches and swirls before application of final protective glaze.

NOTE:

FREQUENT WASHING OF VEHICLES IS IMPORTANT. CONTAMINANTS SETTLE ONTO THE VEHICLE EVERY DAY. USE CLEAN WATER (DEIONIZED, REVERSE OSMOSIS, ETC.) TWICE WEEKLY TO REMOVE HEAVY DUST, AND PARTICULATES. THE USE OF A NEUTRAL pH CAR WASH SOAP EVERY TWO (2) WEEKS IS RECOMMENDED TO NEUTRALIZE VEHICLE CONTAMINATION.

Parts Block

NOTE:

DEALERS SHOULD USE PROGRAM CODE R-23 AND CONDITION CODES C5 AND C6. REFER TO W & P MANUAL, SECTION 5-1, PAGE 3.

OTHER APPLICABLE ARTICLES: 91-18-1, 92-6-4 WARRANTY STATUS: Eligible Under The Provisions Of 12 Month/12,000 Mile Basic Warranty Coverage

OPERATION DESCRIPTION TIME

950601A Decontaminate And Surface 0.6 Hr.

Correction - Aspire

950601B Decontaminate And Surface 0.6 Hr.

Correction - Escort/Tracer

950601C Decontaminate And Surface 0.6 Hr.

Correction - Probe

950601D Decontaminate And Surface 0.6 Hr.

Correction - Contour/Mystique

950601E Decontaminate And Surface 0.6 Hr.

Correction - Mustang

950601F Decontaminate And Surface 0.7 Hr.

Correction - Taurus/Sable

950601G Decontaminate And Surface 0.7 Hr.

Correction - Thunderbird/Cougar

950601H Decontaminate And Surface 0.7 Hr.

Correction - Crown Victoria/Grand Marquis

950601I Decontaminate And Surface 0.7 Hr.

Correction - Mark VIII

950601J Decontaminate And Surface 0.7 Hr.

Correction - Continental

950601K Decontaminate And Surface 0.6 Hr.

Correction - Capri

950601L Decontaminate And Surface 0.8 Hr.

Correction - Town Car

950601M Decontaminate And Surface 0.7 Hr.

Correction - Villager

950601N Decontaminate And Surface 0.6 Hr.

Correction - Windstar

9506010 Decontaminate And Surface 0.7 Hr.

Correction - Aerostar

950601P Decontaminate And Surface 0.6 Hr.

Correction - Bronco

9506010 Decontaminate And Surface 1.1 Hrs.

Correction - Econoline

950601R Decontaminate And Surface 0.9 Hr.

Correction - F-Series

950601S Decontaminate And Surface 0.6 Hr.

Correction - Explorer

950601T Decontaminate And Surface 0.7 Hr.

Correction - Ranger

950601U Decontaminate And Surface 0.5 Hr.

Correction - F-Super Duty

950601V Decontaminate And Surface 0.7 Hr.

Correction - F/B-Series

950601W Decontaminate And Surface 0.7 Hr.

Correction - L-Series

950601X Decontaminate And Surface 0.5 Hr.

Correction - Cargo

950601Y Decontaminate And Surface 0.6 Hr.

Correction - Tempo/Topaz

DEALER CODING

BASIC PART NO. CONDITION CODE

ENTRE C5 OR C6

OASIS CODES: 106000

Paint: Technical Service Bulletins Paint - Preparation Procedure And MSDS Information

Article No. 94-23-4

11/14/94

PAINT - PRIMED SHEET METAL - PREP PROCEDURE AND MSDS INFORMATION

FORD: 1980 and after CROWN VICTORIA, ESCORT, MUSTANG, THUNDERBIRD 1982-88 EXP 1984 and after TEMPO 1986 and after TAURUS 1988-93 FESTIVA 1989 and after PROBE

LINCOLN-MERCURY: 1980 and after CONTINENTAL, COUGAR, GRAND MARQUIS, TOWN CAR 1981-87 LYNX 1984-92 MARK VII 1984 and after TOPAZ 1986 and after SABLE 1987-89 TRACER 1991-94 CAPRI 1993 and after MARK VIII

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LIGHT TRUCK: 1980 and after F-150-350 SERIES 1981 and after ECONOLINE 1982 and after BRONCO 1983 and after RANGER 1984-90 BRONCO II 1986 and after AEROSTAR 1988 and after F SUPER DUTY 1991 and after EXPLORER 1993 and after VILLAGER 1995 WINDSTAR

MEDIUM/HEAVY TRUCK: 1980-91 C SERIES, CL-CLT-9000 SERIES 1980 and after F & B SERIES, L SERIES 1986 and after CARGO SERIES

ISSUE: This procedure is being published to advise all body and paint technicians about proper procedures for preparation of sheet metal parts coated with electrodeposition primer (E-Coat).

ACTION: When prepping a replacement body panel for installation, it is mandatory to leave the E-Coat intact. DO NOT SAND OFF THE E-COAT.

Improper preparation with excessive sanding of the E-Coat to bare metal will jeopardize the sheet metal warranty and overall customer satisfaction. In particular, the E-Coat is necessary to protect the parts from rust. Light scuff sanding using a Scotch Brite pad or wet 320 grit sand paper is recommended for minor flaws. If a minor flaw exists, wet sand or scuff out the flaw and prime the repair area. Again, do not remove all of the E-Coat from the panel.

CAS: 7439-92-1 ★★★★★★ **LEAD** ★★★★★★ **CHEMICAL FACT SHEET**

Chemical Names (Synonyms): Lead.

Inorganic Compound Names: Lead carbonate (CAS 598-63-0)
Lead chloride (CAS 7758-95-4)
Lead monoxide (CAS 1317-36-8)
Lead sulfide (CAS 1314-87-0)
and others.

Trade Names: C.I. Pigment Metal 4, C.I. 77575, Lead flake, Whole lead, Litharge, and others.

Uses: Tank linings, piping and other chemical reaction equipment; petroleum refining, manufacture of gasoline additives; pigments for paint; storage batteries, solder and fusible alloys; radiation shielding; and others.

PHYSICAL INFORMATION

Appearance: Bluish white to silvery gray solid (lead metal).

Odor: None.

Minimum Detectable by Odor: Unknown.

Behavior in Water: Insoluble.

Evaporation: Unknown.

HEALTH HAZARD INFORMATION

OSHA Standard: Average 8 hour exposure – 0.05 mg/m³ (lead).

Note: Current OSHA regulations require that if an individual has a blood-lead level greater than or equal to .060 mg lead per 100 ml blood, he must be removed from all exposures to lead and cannot return to an exposed environment until the blood level falls to .040 mg lead per 100 ml blood or less.

NIOSH Recommended Limit: Average 10 hour day/40 hour week exposure – .01 mg/m³ (lead).

ACGIH Recommended Limit: Average 8 hour exposure – 0.15 mg/m³ (lead).

Short Term Exposure:

Note: Lead is a cumulative poison. Increasing amounts build up in the body and eventually a point is reached where symptoms and disability may occur. Lead dust carried home on contaminated clothing can cause symptoms in other family members. Standards only protect for inhalation exposure. Extra precautions should be taken if skin exposure also occurs.

Inhalation: The effects of exposure to fumes and dusts of inorganic lead may not develop quickly. Symptoms may include decreased physical fitness, fatigue, sleep disturbance, headache, aching bones and muscles, constipation, abdominal pains, and decreased appetite. These effects are reversible and complete recovery is possible. Inhalation of large amounts of lead may lead to seizures, coma, and death.

TB-3995-A

Figure 1

CAS: 7439-92-1 ★★★★★★ LEAD ★★★★★★ CHEMICAL FACT SHEET

HEALTH HAZARD INFORMATION (CONT'D.)

Skin: May cause irritation.

Eyes: May cause irritation.

Ingestion: See effects listed for inhalation. Ingestion of large amounts of lead may lead to seizures, coma, and death.

Long Term Exposure:

Lead can accumulate in the body over a period of time. Therefore, long term exposures to lower levels can result in a build up of lead in the body and more severe symptoms. These may include anemia, pale skin, a blue line at the gum margin, decreased handgrip strength, abdominal pain, severe constipation, nausea, vomiting, and paralysis of the wrist joint. Prolonged exposure may also result in kidney damage. If the nervous system is affected, usually due to very high exposures, the resulting effects include severe headache, convulsions, coma, delirium, and death. In non-fatal cases, recovery is slow and not always complete. Alcohol ingestion and physical exertion may bring on symptoms. Continuous exposure can result in decreased fertility. Lead exposure of either parent before pregnancy can increase the chances of miscarriage or birth defects. Exposure of the mother during pregnancy can cause birth defects.

EMERGENCY AND FIRST AID INSTRUCTIONS

Inhalation: Move victim to fresh air. Give artificial respiration, as needed. Get medical attention immediately.

Skin: Wash area with plenty of soap and water. Remove any contaminated clothing immediately.

Eyes: Rinse eyes with plenty of water for 15 minutes. Seek medical attention, if necessary.

Ingestion: If victim is conscious, give water. Seek medical attention.

Note to Physician: Whole blood lead levels, circulating plasma/erythrocyte lead concentration ratio, urine ALA, and erythrocyte protoporphyrin fluorescent microscopy may all be useful in monitoring or assessing lead exposure. Chelating agents such as edetate disodium calcium and penicillamine are generally useful in the therapy of acute lead intoxication.

PROTECTIVE MEASURES

Storage and Handling: Store in an area away from heat and keep separate from potassium.

Engineering Controls: Adequate ventilation, sinks, showers and eyewash stations should be provided.

Protective Clothing: Full body work clothing should be worn including bump caps or hard hats, rubber gloves, and eye protection. Employees should routinely wash their skin thoroughly and change clothing at the end of each work shift.

TB-3996-A

Figure 2

CAS: 7439-92-1 ★★★★★★ LEAD ★★★★★★ CHEMICAL FACT SHEET

PROTECTIVE MEASURES (CONT'D.)

Protective Equipment: For levels up to 0.5 mg/m³, use any dust and mist respirator, except single-use.

For up to 1 mg/m³, use any dust and mist respirator, except single-use or quarter mask, or any fume respirator or high efficiency particulate filter respirator.

For up to 5 mg/m³, use a high efficiency particulate filter respirator with a full facepiece.

For up to 100 mg/m³, use a powered air-purifying respirator with a high efficiency particulate filter or a Type C supplied-air respirator operated in pressure-demand or other positive-pressure or continuous-flow mode.

For up to 200 mg/m³, use a Type C supplied-air respirator with full facepiece operated in pressure-demand or other positive-pressure mode, or with a full facepiece, helmet or hood operated in continuous-flow mode.

For levels greater than 200 mg/m³, escape, or entry into unknown concentrations, use a self-contained breathing apparatus with full facepiece operated in pressure-demand or other positive-pressure mode or a combination respirator which includes a Type C supplied-air respirator with a full facepiece operated in pressure-demand or other positive-pressure or continuous-flow mode and an auxiliary self-contained breathing apparatus operated in pressure-demand or other positive-pressure mode.

Other Precautions: No eating, drinking, or smoking in areas where the dusts or fumes of lead or its compounds are present.

FIRE AND EXPLOSION INFORMATION

General: Not combustible. If exposed to fire, may release toxic fumes of sulfur and lead oxides.

Explosive Limits: Unknown.

Extinguisher: Use extinguisher appropriate to burning material. When fighting fire, wear a self-contained breathing apparatus with full facepiece and operated in positive-pressure mode.

REACTIVITY INFORMATION

Conditions to Avoid: Excessive heat.

Materials to Avoid: Reacts violently with potassium.

SOURCE: Chemical Fact Sheet as prepared by the Bureau of Toxic Substance Assessment, New York State Department of Health; modified by the Toxicology Department, Ford Motor Company.

TB-3997-A

Figure 3

WARNING:

LEAD CONTAMINATION POTENTIAL: THE ELECTRODEPOSITION PRIMER USED BY FORD MOTOR COMPANY OVER BASE METAL ON SERVICE REPLACEMENT PARTS OR COMPLETED VEHICLES CONTAINS SMALL AMOUNTS OF LEAD FOR CORROSION PROTECTION OF STEEL. EXCESSIVE DUSTS GENERATED BY UNNECESSARY AND IMPROPER SANDING MAY CONTAIN AIRBORNE LEAD CONTAMINATION IN EXCESS OF OSHA STANDARDS. INFORMATION REGARDING THE HAZARDS OF LEAD CAN BE FOUND IN THE CHEMICAL FACT SHEETS IN THE FIGURES IN THIS ARTICLE.

NOTE:

READ ALL INFORMATION IN THIS TECHNICAL SERVICE BULLETIN CAREFULLY AND FORWARD TO ALL EMPLOYEES PERFORMING PAINT PREPPING OPERATIONS. DEALERS SHOULD CONTACT LEGAL COUNSEL AND/OR LOCAL OSHA

AUTHORITIES FOR DIRECTION REGARDING OSHA LEAD STANDARD REQUIREMENTS.

If a replacement body panel contains more than a minor flaw in the E-coat, it should be returned. Contact your Customer Service representative for instructions.

If more extensive sanding, other than that described above, is necessary, (e.g., refinishing original vehicle sheet metal) follow the procedures outlined below:

ALTERNATIVE SANDING PROCEDURES WHEN EXTENSIVE SANDING IS REQUIRED

The following procedures for sheet metal preparation by sanding or media blasting are based on tests conducted by Ford Motor Company in accordance with requirements set forth in the Federal OSHA Inorganic Lead Standard 29 CFR 1910.1025.

SANDING PROCEDURE

1. Each technician performing the sanding operation MUST wear an approved respirator with high efficiency particulate filter (HEPA).

2. Technicians should use dual action sander with vacuum collection.

3. The vacuum equipment MUST be equipped with a HEPA filter on the air exhaust. Dealers are cautioned not to exhaust vacuum air into the atmosphere. Operators are cautioned to follow the manufacturer's guidelines for maintenance and the replacement of filters.

MEDIA BLASTING PROCEDURE

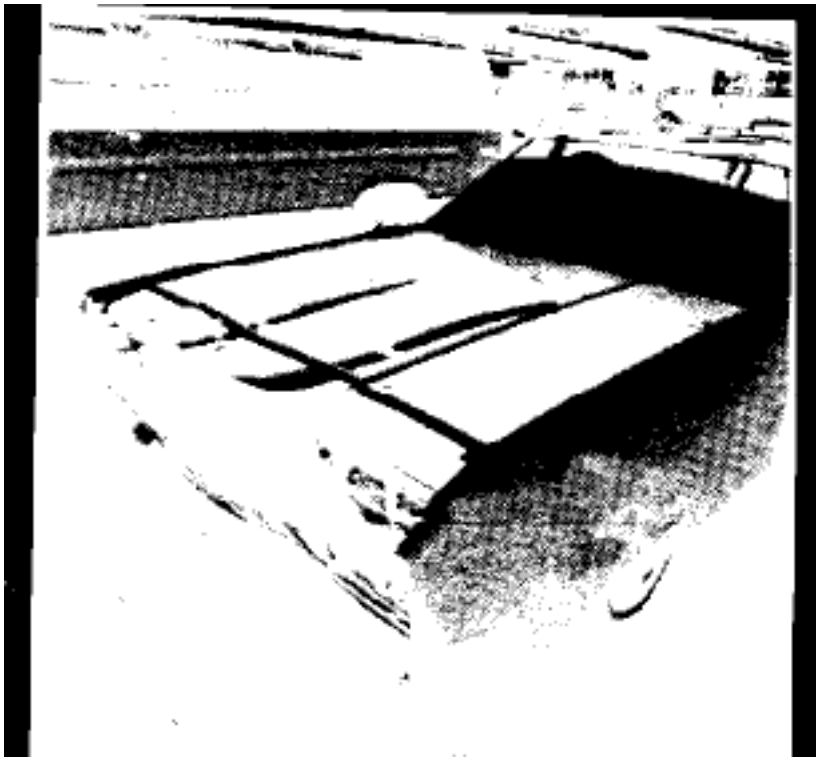
1. Testing has shown that plastic media blasting meets OSHA lead standard requirements and is efficient when the manufacturer's published procedures are followed.

2. The operator must wear an air supplied hood using compressed air free from carbon monoxide, oil, water, and other contamination when performing this operation. Specifics of the media blasting procedure for whole body paint removal have been previously published.

NOTE:

PLEASE READ THE CHEMICAL FACT SHEETS IN THE FIGURES.

OTHER APPLICABLE ARTICLES: NONE WARRANTY STATUS: INFORMATION ONLY OASIS CODES: 106000



Paint: Technical Service Bulletins Paint - Cosmetic Surface Service Procedures

Article No. 84-3-3

PAINT - COSMETIC SURFACE SERVICE PROCEDURES

FORD ALL CAR LINES - ALL MODEL YEARS

LINCOLN-MERCURY ALL CAR LINES - ALL MODEL YEARS

LIGHT TRUCKS ALL SERIES - ALL MODEL YEARS

The cosmetic paint surface service procedures outlined below are reprinted from Article Number 82-3-3 dated February 18, 1982. Many of these procedures and techniques described have been incorporated along with several other helpful procedures in a video tape which is now available. This video tape describes paint and soft facia service procedures developed by Ford Motor Company Assembly plants to correct minor concerns. After seeing the video tape and with practice, a technician or body shop employee should be able to do the following:

^ Remove most minor dings and dents (without filling and repainting), by using special metal massaging service tools.

^ Remove hood and deck depressions without filling and repainting.

^ Remove trapped dirt particles and still preserve the original paint finish.

^ Service minor scratches that do not cut through into the prime or metal.

^ Service orange peel without repainting.

^ Service sags and runs without repainting.

^ Remove surface stains with a heat gun.

^ Make soft facia services on many punctures and tears in plastic parts without replacement.

^ Service damaged abrasion resistant coating.

^ Properly paint over E-coating.

The video tape is titled, "Cosmetic Paint and Surface Repairs" and is available in 3/4 inch Umatic UMC, Order Number 4651-025; or 1/2 inch VHS, Order Number 4651-025.

For ordering information refer to the Ford Service Training Aids Catalog or write to:

Ford Service Publications Post Office Box 07150 Detroit, Michigan 48207

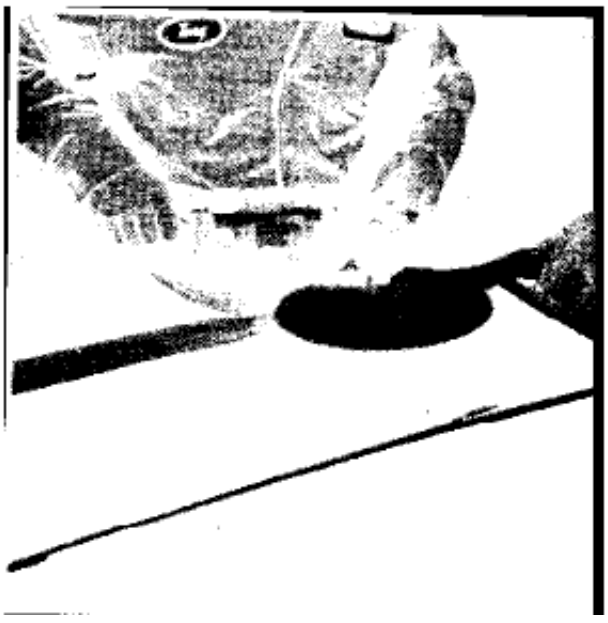
Exterior paint surface damage or imperfections of a nature where the prime coat does not show can, in most instances, be restored without repainting. The restoration of gloss and luster after the condition has been removed is made possible by new and improved service materials and procedures. The following procedure is applicable to surface conditions such as dirt particles, orange peel, runs, sags, industrial fallout stains, swirl marks, light scratches and other minor imperfections. Usually, these conditions are localized and it is not necessary to restore the entire panel. However, in a case such as dirt particles or scratches in several localized areas, it is recommended that the entire panel be restored to maintain a uniform appearance.

FIGURE 5

Preparation

Before starting the service, the affected surface must be clean and dry. Mask off adjacent panels, mouldings, stripes and character lines as required (Figure 5). Where applicable, eye protection, face mask and a belt buckle cover should be worn.





Service Procedure

The basic concept of the procedure is to remove the defect condition, and then restore the finish to an acceptable appearance. As a general guideline, remember that sanding marks are removed with rubbing compound and the swirl marks evident after buffing are removed by polishing. As an example, light scratches or small dirt particles can be removed with a power buffer and medium buffing compound followed by polishing. Deeper scratches, heavy dirt particles or orange peel must be wet sanded, buffed with compound to remove the sanding marks and then polished to remove the swirl marks from the buffing operation.

It is suggested with initial service attempts, that technicians develop a learning cycle by picking a small service area and first try polishing, then buffing and finally wet sanding to remove the condition. When you have determined which method is appropriate, proceed with the remaining area to be serviced and then restore the finish as required. The following outlines the complete procedure and required materials.

FIGURE 6

Polishing

For removal of very minor scratches, swirl marks and/or to restore luster to a dull finish.

Apply a small amount of 3M Final Glaze to the affected panel (Figure 6) and using a suitable electric or air powered polish/buffing wheel (2000 max. rpm) and a 3M Superbuff 2 + 2 Pad, polish the affected area until all swirl marks are gone and desired luster is obtained. When polishing, keep the pad flat against the surface. Do not bear down, the weight of the buffer is sufficient. Add Final Glaze sparingly as needed. Compound

For removal of light scratches, small dirt particles, minor grind marks and sanding marks.

FIGURE 7



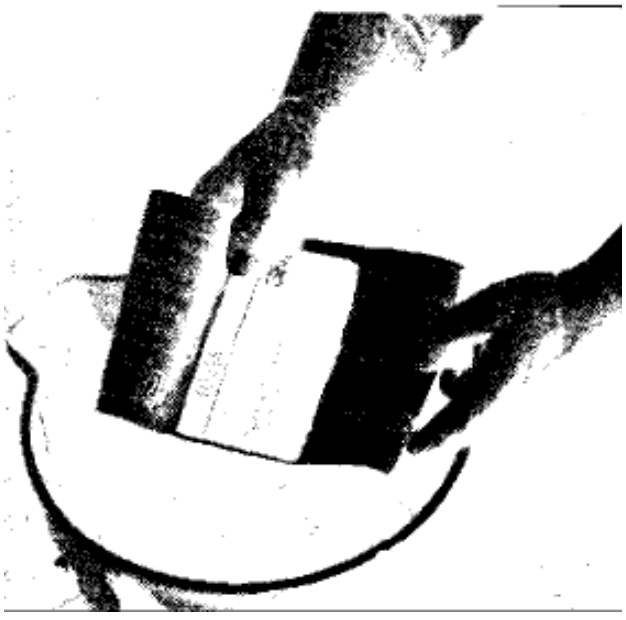


FIGURE 8

Apply 3M Superduty Rubbing Compound (medium) to the panel and using a clean 2 + 2 pad on the wheel (as noted above) spread the compound evenly and buff the surface until the condition is removed; or in the case of a sanded area, the sanding marks are gone and the luster is restored to an acceptable level for polishing (Figure 7 and Figure 8). When buffing, keep the wheel flat to the surface using light to moderate pressure and long even strokes. Periodically check the finish and add compound as required. When buffing is complete, polish the panel as described above.
Sanding

For removal of severe conditions such as heavy dirt particles, deep scratches and orange peel. This wet sanding procedure utilizes 3M Ultra Fine Imperial Wetordry Color Sanding Paper to facilitate removal of surface damage. The Ultra Fine paper cuts quickly leaving a uniform finish that requires a minimum of buffing to restore the luster.

FIGURE 9

1. Soak the 3M Imperial Wetordry Paper and a 3M Imperial Wetordry Sponge Pad thoroughly in clean water and wrap the paper around the pad as shown in Figure 9.

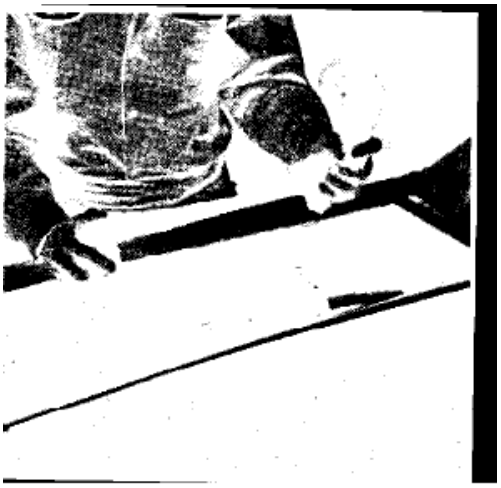






FIGURE 10

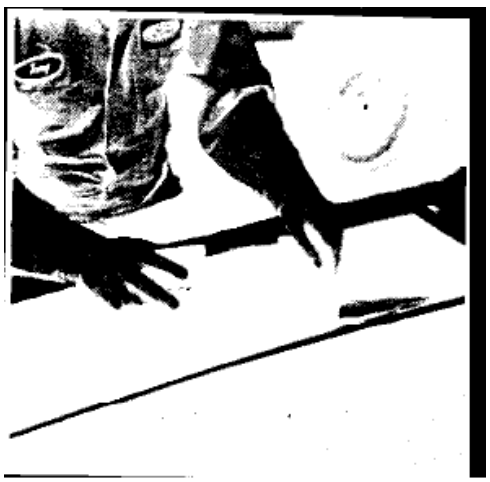
2. Using a clean sponge, wet the area to be sanded. It is essential that the paper be kept wet as sanding proceeds (Figure 10).

FIGURE 11

3. Wet sand the affected area with light even pressure on the pad with back and forth strokes (not circular). Do a small area at a time (Figure 11).

FIGURE 12

4. Frequently dip the pad and paper in water to wash off sanding residue (Figure 12).



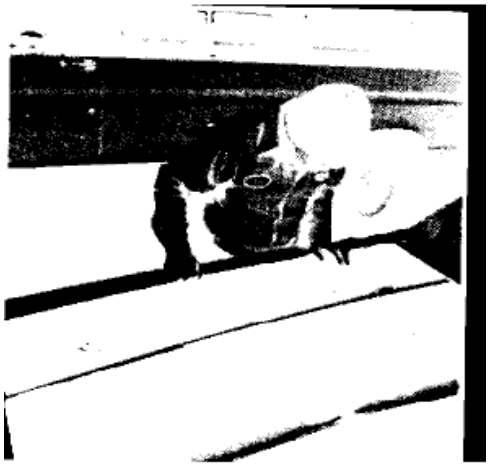




FIGURE 13

5. Frequently flood or squeegee off the affected surface to check depth of cut and to see if the defect is removed. The amount of paint surface that is being sanded can be judged as the area dulls (Figure 13).

FIGURE 14

6. Water wash the affected area to determine if all surface defects have been removed. Note the uniform dull appearance of an evenly sanded panel (Figure 14). If the surface is not uniform, lightly resand the area.

FIGURE 15

7. Wash and squeegee off the panel and check to assure that all defects are removed and sanding is complete. Then proceed with the buffing and polish procedures to restore the luster to the finish.

8. Figure 15 shows a hood panel which has been sanded, buffed and polished on one section to illustrate the effectiveness of the procedure.

Runs and Sags

The service of runs and sags in nonmetallic paint is covered in the previously released training publication "The Wet Look." This procedure, which consists of shaving the run or sag flush with a commercial single edge razor blade, sanding with a hard block and then compounding, can now be improved by finishing the service with Final Glaze. It is recommended that minor sags and runs be wet sanded with 600 grit paper. If it is necessary to shave them off with a razor blade, first dull the corners with sandpaper to avoid scratching the adjacent panel finish.

PART NUMBER PART NAME CLASS

05528 3M Imperial Wetordry Sponge Pad

02021 3M Imperial Wetordry Color

Sanding Paper

05955 3M Superduty Rubbing

Compound

05957 3M Superduty Paste Compound

(if preferred)

05701 3M Superbuff 2 + 2 Pad

05710 3M Superbuff Adaptor (if req'd)

05988 3M Final Glaze

02024 3M Wetordry Tri-M-ite Paper 600 Grit

05519 3M Sanding Block

7" Polisher/Buffer Air or Electric Razor Blade - Industrial Single Edge

OTHER APPLICABLE ARTICLES: 82-3-3 WARRANTY STATUS: Reimbursable within the provisions of the Warranty and Policy Manual. OPERATION: SPP6282 TIME:

One Panel 0.4 Hr. - Each additional 0.2 Hr. MATERIAL ALLOWANCE: $.75 per panel DLR. CODING: Basic Part No. As applicable

Paint: Technical Service Bulletins Paint - Cosmetic Damage From Airborn Materials

PAINT COSMETIC DAMAGE FROM AIRBORN MATERIALS Article No. 89-13-3 FORD:

1989 and prior ALL FORD LINES

LINCOLN-MERCURY: 1989 and prior ALL LINCOLN-MERCURY LINES

LIGHT TRUCK: 1989 and prior ALL LIGHT TRUCK LINES

ISSUE: Paint may be damaged from various sources of airborn materials. The two different types are:

^ Inorganic

^ Organic

Sometimes it is hard to identify the type of paint damage and know how to remove it. This TSB article gives detailed information and descriptions of both types of airborn materials. It also outlines the service procedures for treating them.

ACTION: If service is required, identify the source of damage involved by referring to the following information. Use the following recommended service procedure to correct concerns.

INORGANIC AIRBORN MATERIAL

The effects of inorganic airborn materials can be seen as:

^ Dark blotches in the paint where the pigment in the paint surface has been attacked

^ Irregular spots that are cracked or etched around the edges and dull in the centers.

^ Small orange colored spots caused by iron particles may appear on the paint surface.

Generally, materials that attack a paint film are either acidic or alkaline in nature.

Sulfuric and nitric acids, in general, cause extreme damage to automative paint finishes. Even very small concentrations of the same materials can cause chemical spotting damage. Due to evaporation and condensation, these acids can create severe etching "spots" that may eventually crack or lift the paint film after some time in service.

Although some automotive finishes are more resistant than others, none are completely immune to these chemicals. The most resistant paints used today are the urethanes because their resin system is least likely to react with chemicals. Air dry coatings are more susceptible to attack only when they are fresh. The longer the paint dries the more resistant it becomes.

CHEMICAL SPOTTING DAMAGE OF AUTOMOTIVE FINISHES CHART		
PAINT COLOR	**APPEARANCE**	**CAUSED BY**
Yellow	White spot	Hydrochloric or Muriatic acid
	Dark brown spot (yellow)	Nitric acid
	Red spot with film degradation	Sodium hydroxide (caustic)*
	Spot blistering	Acetic acid
Non-metallic medium depth blue	Whitening	Nitric acid
	Whitening with film degradation	Sodium hydroxide (caustic)*
	Spot blistering	Acetic acid
White	Pink	Nitric acid
	Pink coloration with film degradation	Sodium hydroxide (caustic)*
	Spot blistering	Acetic acid
	Yellowing, non-acrylic lacquer only	Ammonium hydroxide
Medium depth blue	Slight light blue spot	Hydrocholoric acid
	Dark blue spot	Nitric acid
	Deep purple spot with film degradation	Sodium hydroxide (caustic)*
	Spot blistering	Acetic acid
Pale blue metallics	Slight darkening	Hydrocloric acid
	Slight yellowing	Ammonium hydroxide
	Severe darkening	Nitric acid
	Severe darkening with film degradation	Sodium hydroxide (caustic)*
	Spot blistering	Acetic acid
Silver metallics	Light spot	Hydrocloric acid
	Light spot (enamel turns yellow)	Ammonium hydroxide
	Yellowing	Nitric acid
	Dark, film degradation	Sodium hydroxide (caustic)*

ACIDS/ALKALIS AND pH CHART	
pH SCALE VALUE	**EXAMPLES**
2.0 - very strong acids	Hydrochloric, Nitric, Sulfuric,Phosphoric, Hydrofluoric and some Wire Wheel Cleaners
3.0 - strong acids	Citric, Chromic, Sulfonic, and Human Gastric juices
4.0 - acidic	Oxalic, Gluconic, Tartaric Fallout Remover
5.0 - slightly acidic	Lactic, Uric, Acid Rain
6.0 - very slightly acidic	Carbonic
7.0 - Neutral	Blood, most Body Fluids, Distilled Water
8.0 - very slightly alkaline	Urine, Wash concentrate
9.0 - slightly alkaline	Baking Soda
10.0 - alkaline	Soda Ash, Carb-Kleen
11.0 - strong alkaline	Lye, Potash, Tire Cleaner

Metallic colors are more intolerant to chemicals because aluminum flake is fairly reactive with either an acid or alkali. The following chart contains the most common acid materials found on automotive finishes. The chart shows a color, the corresponding damage appearance and also the chemical causal agent. It is not applicable for Basecoat/Clearcoat finishes.

* "Caustic" refers to any alkaline substance that may be "harsh" or "corrosive" depending on strength or concentration.

The following "pH" chart show the relationship between acidic and alkaline chemicals and their corresponding pH values. This chart is provided for informational reference only. ORGANIC AIRBORN MATERIALS

Organic damage is generally easier to identify. Organic damage is mostly due to tree sap, bird and insect droppings, dead insects (Figure 8) and pollen. Tree sap is easily identified by clear raised drops that may be hard or sticky. Bee or bug dropping spots may appear brownish or yellow in color, about an eighth to a quarter inch in diameter. Dead and decomposing insect bodies are readily visible to the eye. Pollen deposits are small yellow clusters. Each of these items is potentially damaging to any currently available paint system. Other noticeable traits of organic damage are spots that are raised (swelling) micro-crazing (cracked) and pitting, due to pollen eating into the paint film. The active ingredients in most organic contaminants are tannic and formic acids . These acids are found in berries and bodily fluids of insects and birds.

Investigations completed at dealerships show that the bright lot lights tend to attract insects. The use of "soft lights" for display and storage lot illumination will help reduce damage resulting from decomposing bugs and droppings by decreasing the number of bugs attracted to these lights. Organic damage is accelerated by heat. During very hot weather conditions, it is important to wash vehicles more often.

ORGANIC AND INORGANIC REPAIR PROCEDURES FOR MILD DAMAGE

Iron dust particles may imbed themselves into the paint film. On some light colored vehicles after some weathering, tiny dots of rust start to appear. They

feel rough to the touch and are difficult to remove. The best way to remove these particles is by treating the finish with an oxalic acid-detergent-water wash. Use the following procedure to perform this service repair.

NOTE: OXALIC ACID WASH IS ALSO PRE-PACKAGED IN VARIOUS STRENGTHS UNDER VARIOUS BRAND NAMES, IF YOU CHOOSE NOT TO MIX YOUR OWN BATCHES.

1. Wash and degrease the vehicle first, using Ford Multi Purpose Cleaner (B8A-19523-B) or equivalent, and a suitable wax and grease remover. If this does not remove all of the iron particles, proceed with the oxalic acid wash.

2. Prepare a quantity of oxalic acid-detergent-water solution as follows:

a. Dissolve 6-8 ounces of Oxalic Acid (powder) in one gallon of warm water.

b. Add 1-2 tablespoons full of non-alkaline detergent such as Ford Multi Purpose Cleaner.

3. Apply this solution liberally to all affected surfaces of the vehicle with a large sponge. Keep the surface wet until the technician can no longer feel any surface roughness with bare or gloved fingertips.

NOTE: IF THIS IS NOT DONE THOROUGHLY, STAINING MAY REDEVELOP IF IRON PARTICLES ARE LEFT BEHIND.

4. Rinse the area with clean water.

CAUTION: FAILURE TO THOROUGHLY RINSE THIS SURFACE COULD RESULT IN CORROSION OF ANODIZED ALUMINUM OR

STAINLESS STEEL PARTS WITH PROLONGED CONTACT.

5. If the iron particles are not totally removed after 2 washings, use one or both of the procedures listed for minor chemical contamination.

NOTE: THE USE OF POLISHING (WITH WAX), SANDING WITH MICRO FINE SANDPAPER (1500 GRIT OR GREATER) OR BUFFING WITH VERY LIGHT COMPOUND SHOULD ONLY BE DONE AS A LAST RESORT.

CHEMICAL CONTAMINATION

Chemical contamination, either acid or alkali, can cause off-color spots and crack the paint film. In the presence of moisture (dew), sulfur contamination will change the color (light/dark) of the paint pigments. (This does not apply to Basecoat/Clearcoat)

Since this contamination affects the pigments, lacquers and enamels show no difference in resistance. Production thermal drying and air drying finishes are likely to be spotted.

Minor chemical contamination can be removed by using the following step by step procedure.

1. Wash the vehicle first by using Ford Multi Purpose Cleaner (B8A-19523-B) or equivalent to remove the exterior foreign materials.

2. If the spotting is extensive and on the horizontal surfaces, then machine polish.

3. Apply a light grit polishing compound to the affected surface by using a soft brush. The compound should be applied to a small area at a time so that it can be buffed out while still wet to get maximum cutting efficiency.

4. Polish off the spots using a buffer operating at 1700-1800 rpm. Confine polishing to the spotted areas. Repeat as necessary until all spots have been removed.

5. Remove spots on curved surfaces, near edges, and next to mouldings or ornaments by hand polishing as follows:

a. Apply some polishing compound to a cotton cloth. (Do not use a synthetic cloth.)

b. Rub vigorously until the spots are no longer visible.

c. Clean off excess polishing compound by using a clean cloth and compressed air.

6. Buff out the polishing marks and bring up the gloss by using a buffer equipped with a clean, dry lambs wool pad.

NOTE: IF POLISHING DOES NOT SUFFICIENTLY REMOVE DAMAGE, THE VEHICLE CAN BE WET SANDED USING 1500 GRIT SANDPAPER AND THE FOLLOWING PROCEDURE

Wet Sanding Procedure

1. Clean the exterior surface of the vehicle with Ford Multi Purpose cleaner or an equivalent to remove all contamination.

2. Apply 1500 grit sandpaper to a rubber padded sanding block to sand the paint surface.

3. Use a squirt bottle filled with water to lubricate the 1500 grit sandpaper as you begin to sand only the damaged areas. Water is an abrasive as well as a lubricant in this step.

NOTE: IF THE DAMAGE HAS GONE DEEPLY INTO THE PAINT FILM AND IT WILL NOT POLISH OR SAND OUT, THEN REFINISHING IS REQUIRED.

ORGANIC MATERIAL REPAIR PROCEDURE FOR MILD DAMAGE

Minor organic damage can be removed by using the following step by step procedure.

1. Wash and degrease the vehicle thoroughly by using Ford Multi Purpose Cleaner (B8A-19523-B) or equivalent and a wax and grease remover to remove all organics.

2. Inspect the vehicle horizontal surfaces. If spotting or paint film swelling is extensive, use a buffer to repair.

3. Apply a light grit polishing compound to the affected areas by using a soft brush. The compound should be applied to a small area at a time so that it can be buffed out while still wet to get maximum efficiency.

4. Polish off the spots or swelling marks using a buffer that operates between 1700-1800 rpm. Polishing should be confined to the affected areas only. Repeat as necessary until all spots or marks are removed.

5. Remove spots on curved surfaces, near edges, and next to mouldings or ornaments by hand polishing as follows:

a. Apply some polishing compound to a cotton cloth. (Do not use a synthetic cloth.)

b. Rub vigorously until the spots are no longer visible.

c. Clean off excess polishing compound by using a clean cloth and compressed air.

6. Buff out the polishing marks and bring up the gloss by using a buffer equipped with a clean, dry lambs wool pad.

NOTE: IF POLISHING DOES NOT SUFFICIENTLY REMOVE DAMAGE, THE VEHICLE CAN BE WET SANDED USING 1500 GRIT SANDPAPER AND THE FOLLOWING PROCEDURE.

Wet Sanding Procedure

1. Clean the exterior surface of the vehicle with Ford Multi Purpose cleaner or an equivalent to remove all organics.

2. Apply 1500 grit sandpaper to a rubber padded sanding block to sand the paint surface.

3. Use a squirt bottle filled with water to lubricate the 1500 grit sandpaper as you begin to sand only the damaged areas. Water is an abrasive as well as a lubricant in this step.

NOTE: IF THE DAMAGE HAS GONE DEEPLY INTO THE PAINT FILM AND IT WILL NOT POLISH OUT, THEN REFINISHING IS REQUIRED.

PAINT RECONDITIONING PROCEDURES FOR SEVERE DAMAGE

Acrylic enamel single stage or base/clear paint systems should be painted by using the following procedure.

1. .Wash the vehicle with Ford Multi Purpose Cleaner or equivalent to remove all organic materials.

2. Wash the areas to be painted with wax and grease remover.

3. Prepare the area as follows:

a. Neutralize the affected areas with baking soda (sodium bicarbonate) and water.

b. Rinse the surface off with plain water.

c. Wash the panel with a mild soapy detergent.

d. Dry the panel completely.

NOTE: IF THE DAMAGE IS THROUGH THE TOP COAT FINISH AND INTO THE PRIMERS, THE PANEL MUST BE SANDED DOWN TO BARE METAL OR PLASTIC AND THEN REFINISHED.

4. Apply a self-etching primer for metal surfaces only.

NOTE: A FLEX ADDITIVE MAY BE NECESSARY WHEN WORKING WITH FLEXIBLE PLASTICS

Then proceed as follows:

a. Let dry per instructions.

b. Apply a two component urethane primer surfacer.

c. Sand the surface with 400 grit sandpaper to get to proper finish.

d. Finish sanding with 600 grit sandpaper.

5. Solvent wash panel with wax and grease remover. Then, tack wipe it.

6. Apply base coat or top coat material per applicable paint system.

NOTE: THE USE OF ACRYLIC URETHANE ENAMEL IS HIGHLY RECOMMENDED FOR THIS TYPE OF REPAIR.

7. Apply clear acrylic urethane if you are using a base/clear paint system.

WAYS TO MINIMIZE EFFECTS OF AIRBORN MATERIAL DAMAGE

During the past year, Ford Motor Company and major paint suppliers have participated in a survey to analyze the effects of airborn materials. This survey was conducted on foreign and domestic vehicles. It resulted in the following interesting conclusions.

1. Keeping the vehicles clean, washing frequently with de-ionized water and drying by hand or mechanical means will help minimize the effects of inorganic and organic materials.

2. Spray washing without rubbing will not totally remove all residue on the surface of the vehicle. Damage could possibly occur over a longer period of time.

3. Care should be taken to not allow any painted vehicle surface to become wet in direct sunlight. (A sprinkler system can cause damage if the vehicles are not dried.) Possible alkaline water or mineral deposit may be the cause.

4. The use of "Soft Lights" for lighting around storage lots and showing areas will minimize the attraction of insects and the possibility of organic damage.

5. Ford Motor Company is piloting a program for a transit/storage coating to be applied on the horizontal surfaces of all vehicles. These coatings have shown good protection to the paint surface. They are clear in color and should be left on the vehicles until they are sold.

6. We are testing many "permanent paint sealants" used by dealers. Until all testing is completed, we cannot give any recommendations for what products to use. Testing has shown that a sealant that allows water to bead up on the vehicle does not help to dissipate the materials on the paint surface. Sheeting of water on the vehicle is highly desirable.

OTHER APPLICABLE ARTICLES: None WARRANTY STATUS: INFORMATION ONLY OASIS CODES:

1100

Seat Back: Customer Interest Passenger Seat Back - Rattling Noise

Article No. 83-6-19

NOISE - RATTLE - FRONT SEAT - UNOCCUPIED PASSENGER BENCH SEAT BACK - BRONCO AND SUPERCAB

LIGHT TRUCKS 1978-83 F SERIES AND BRONCO

A rattle emanating from the passenger front seat back can be serviced by replacing the seat back latch striker with one having a plastisol coating (1978-83 model units). For 1978-82 model units - in addition to the plastisol coated seat back latch striker, it will be necessary to replace the front seat cushion scuff plate with a rubber bumper per the attached servicing procedure and illustrations.

1. Obtain the following parts:

D8TZ-1362638-A Striker-Front Requirements

Seat Back Latch (1978-83 units 1 per vehicle

built through 11-14-82)

C8AZ-6260310-A Bumper - .23 x 1.50 x 1.00 oblong (1978-82

1 per vehicle

units)

2. Remove the bolts retaining the seat belts to the floor pan.

3. Remove the seat and track assembly from the vehicle as outlined in Section 41 of the appropriate Truck Shop Manual.

4. Remove the passenger seat back from the seat cushion. Refer to Section 41-25 of the appropriate Truck Shop Manual.

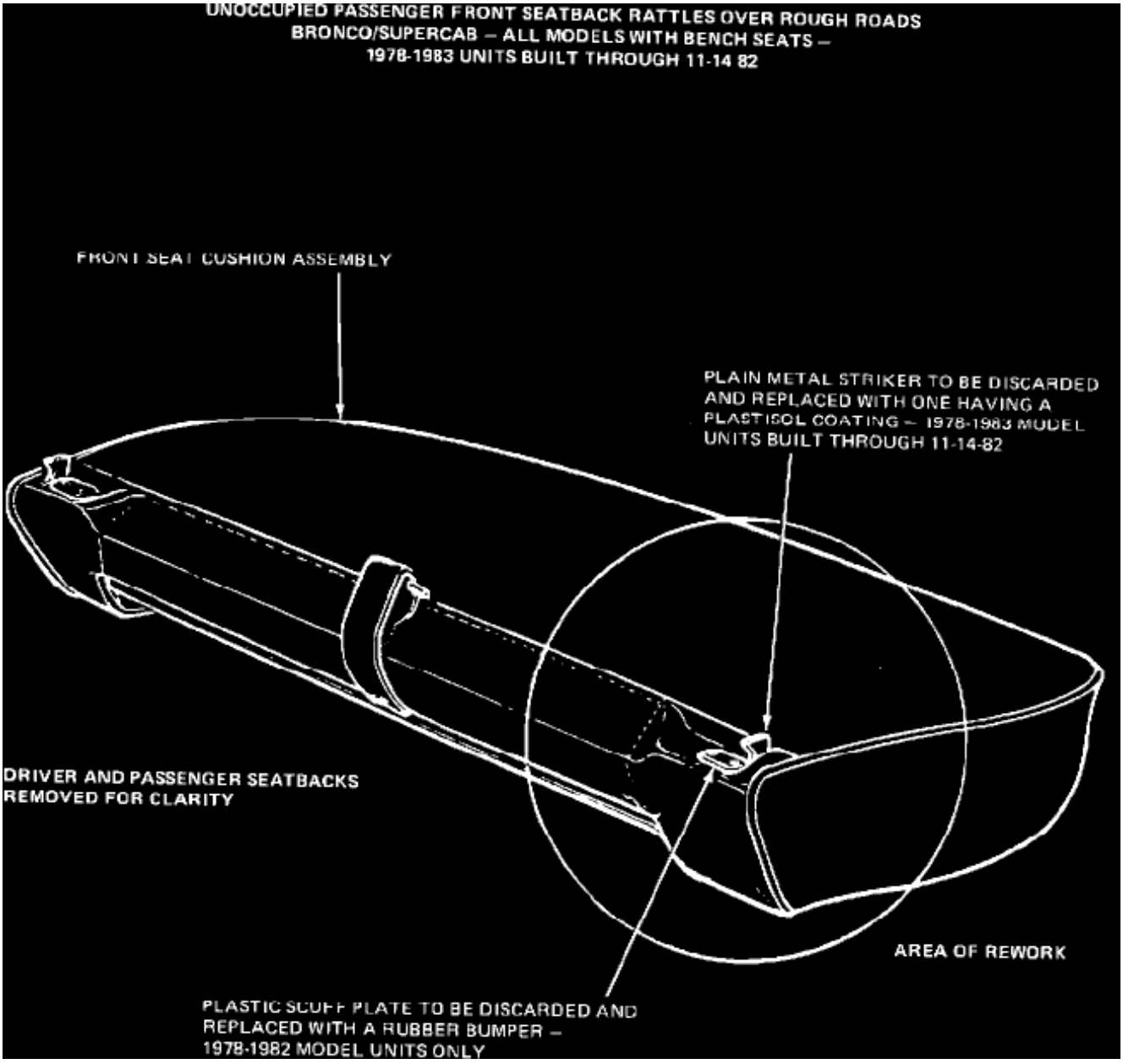

UNOCCUPIED PASSENGER FRONT SEATBACK RATTLES OVER ROUGH ROADS
BRONCO/SUPERCAB – ALL MODELS WITH BENCH SEATS –
1978-1983 UNITS BUILT THROUGH 11-14 82
FRONT SEAT CUSHION ASSEMBLY
PLAIN METAL STRIKER TO BE DISCARDED AND REPLACED WITH ONE HAVING A PLASTISOL COATING – 1978-1983 MODEL UNITS BUILT THROUGH 11-14-82
DRIVER AND PASSENGER SEATBACKS REMOVED FOR CLARITY
AREA OF REWORK
PLASTIC SCUFF PLATE TO BE DISCARDED AND REPLACED WITH A RUBBER BUMPER – 1978-1982 MODEL UNITS ONLY

FIGURE 20

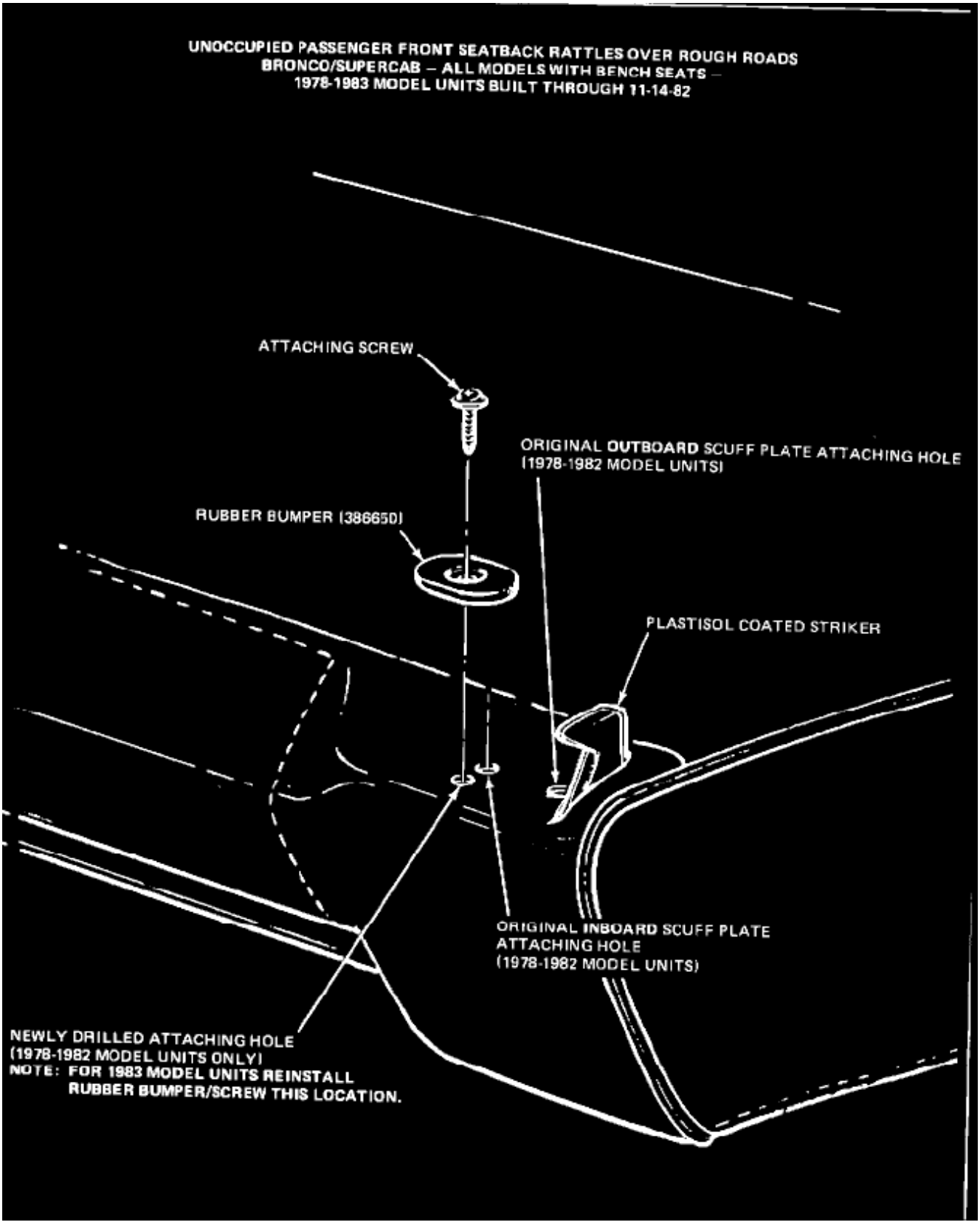

UNOCCUPIED PASSENGER FRONT SEATBACK RATTLES OVER ROUGH ROADS
BRONCO/SUPERCAB – ALL MODELS WITH BENCH SEATS –
1978-1983 MODEL UNITS BUILT THROUGH 11-14-82
ATTACHING SCREW
ORIGINAL OUTBOARD SCUFF PLATE ATTACHING HOLE
(1978-1982 MODEL UNITS)
RUBBER BUMPER (386650)
PLASTISOL COATED STRIKER
ORIGINAL INBOARD SCUFF PLATE
ATTACHING HOLE
(1978-1982 MODEL UNITS)
NEWLY DRILLED ATTACHING HOLE
(1978-1982 MODEL UNITS ONLY)
NOTE: FOR 1983 MODEL UNITS REINSTALL
RUBBER BUMPER/SCREW THIS LOCATION.

FIGURE 22

5. On the passenger side of the seat cushion, remove the scuff plate (1978-82) or rubber bumper (1983 only), For 1978-82 units, discard the scuff plate and one (1) attaching screw (Figure 20). For 1983 units, retain the rubber bumper and attaching screw (Figure 22).

6. On the passenger side of the seat cushion, disengage the trim cover as required to gain access to the two (2) screws, securing the seat back latch striker to the seat cushion frame (Figure 22). Then, remove and discard the striker.

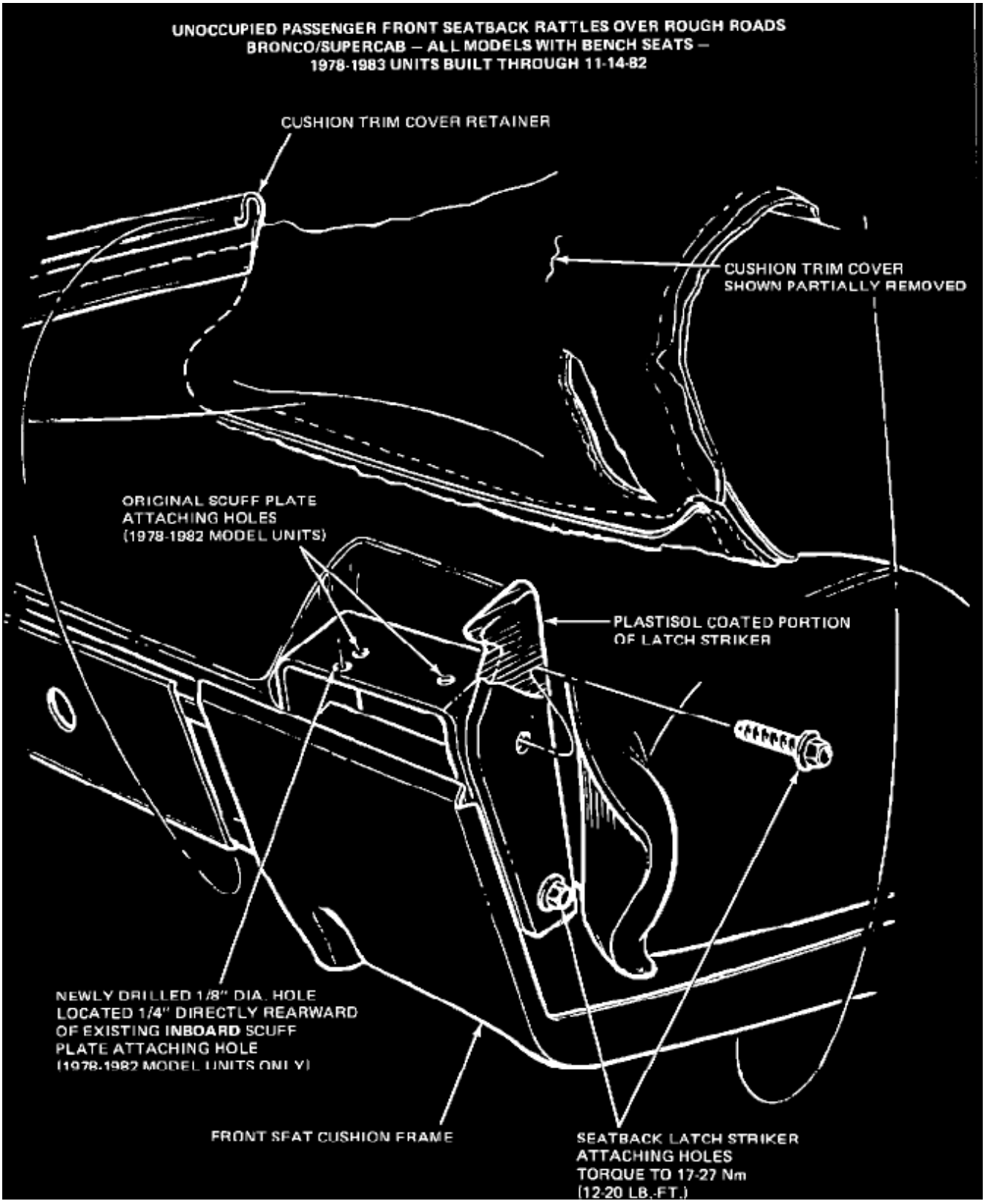

UNOCCUPIED PASSENGER FRONT SEATBACK RATTLES OVER ROUGH ROADS
BRONCO/SUPERCAB — ALL MODELS WITH BENCH SEATS —
1978-1983 UNITS BUILT THROUGH 11-14-82
CUSHION TRIM COVER RETAINER
CUSHION TRIM COVER SHOWN PARTIALLY REMOVED
ORIGINAL SCUFF PLATE ATTACHING HOLES (1978-1982 MODEL UNITS)
PLASTISOL COATED PORTION OF LATCH STRIKER
NEWLY DRILLED 1/8" DIA. HOLE LOCATED 1/4" DIRECTLY REARWARD OF EXISTING INBOARD SCUFF PLATE ATTACHING HOLE (1978-1982 MODEL UNITS ONLY)
FRONT SEAT CUSHION FRAME
SEATBACK LATCH STRIKER ATTACHING HOLES TORQUE TO 17-27 Nm (12-20 LB.-FT.)

FIGURE 21

7. Install the plastisol coated seat back latch striker procured in Step #1. (Figure 21). Torque the attaching screws to 17-27 N-m (12-20 lbs.ft.).

8. With the seat cushion in the upright position, measure 1/4" directly rearward from the center of

the existing inboard scuff plate attaching hole and drill a 1/8" diameter hole in the frame as shown in Figure 21. (1978-82 units only).

9. Install the seat cushion trim cover. (Refer to Section 41-60 of the appropriate Truck Shop Manual).

10. Using an awl, locate through the trim cover the newly drilled hole in the seat cushion frame, then install the rubber bumper (1978-82 units only). For 1983 units, install the rubber bumper in its original location (Figure 22).

11. Install the seat back to the seat cushion as outline in Section 41-25 of the appropriate Truck Shop Manual.

12. Install the seat and track assembly in the vehicle as outlined in Section 41-01 of the appropriate Truck Shop Manual. Torque the seat track to floor pan, attaching screws to 25-44 N-m (18-32 lbs.ft.).

13. Install the seat belt assemblies as outlined in Section 41-50 of the appropriate Truck Shop Manual, Torque the seat belt to floor pan, attaching bolts to 30-43 N-m (22-32 lbs.ft.).

14. Check the seat tracks and seat latch for proper operation

NOTE: Adjust the seat back latch cable as required to obtain a .10 max gap between the seat back latch pawl and the striker. Refer to Section 41-25 of the appropriate Truck Shop Manual.

PART NUMBER PART NAME CLASS

D8TZ-1362638-A Striker - Front Seat Back Latch C

C8AZ-6260310-A Bumper - .23" x 1.5" x 1.0" C

OTHER APPLICABLE ARTICLES: None

WARRANTY STATUS: Reimbursable within the provisions of the Warranty and Policy Manual .
OPERATION: M TIME: "Actual Time" as defined in the Warranty and Policy Manual. DLR.
CODING: Basic Part No. 7060012 Code: 56

Seat Back: All Technical Service Bulletins Passenger Seat Back - Rattling Noise

Article No. 83-6-19

NOISE - RATTLE - FRONT SEAT - UNOCCUPIED PASSENGER BENCH SEAT BACK - BRONCO AND SUPERCAB

LIGHT TRUCKS 1978-83 F SERIES AND BRONCO

A rattle emanating from the passenger front seat back can be serviced by replacing the seat back latch striker with one having a plastisol coating (1978-83 model units). For 1978-82 model units - in addition to the plastisol coated seat back latch striker, it will be necessary to replace the front seat cushion scuff plate with a rubber bumper per the attached servicing procedure and illustrations.

1. Obtain the following parts:

D8TZ-1362638-A Striker-Front Requirements

Seat Back Latch (1978-83 units 1 per vehicle

built through 11-14-82)

C8AZ-6260310-A Bumper - .23 x 1.50 x 1.00 oblong (1978-82

1 per vehicle

units)

2. Remove the bolts retaining the seat belts to the floor pan.

3. Remove the seat and track assembly from the vehicle as outlined in Section 41 of the appropriate Truck Shop Manual.

4. Remove the passenger seat back from the seat cushion. Refer to Section 41-25 of the appropriate Truck Shop Manual.

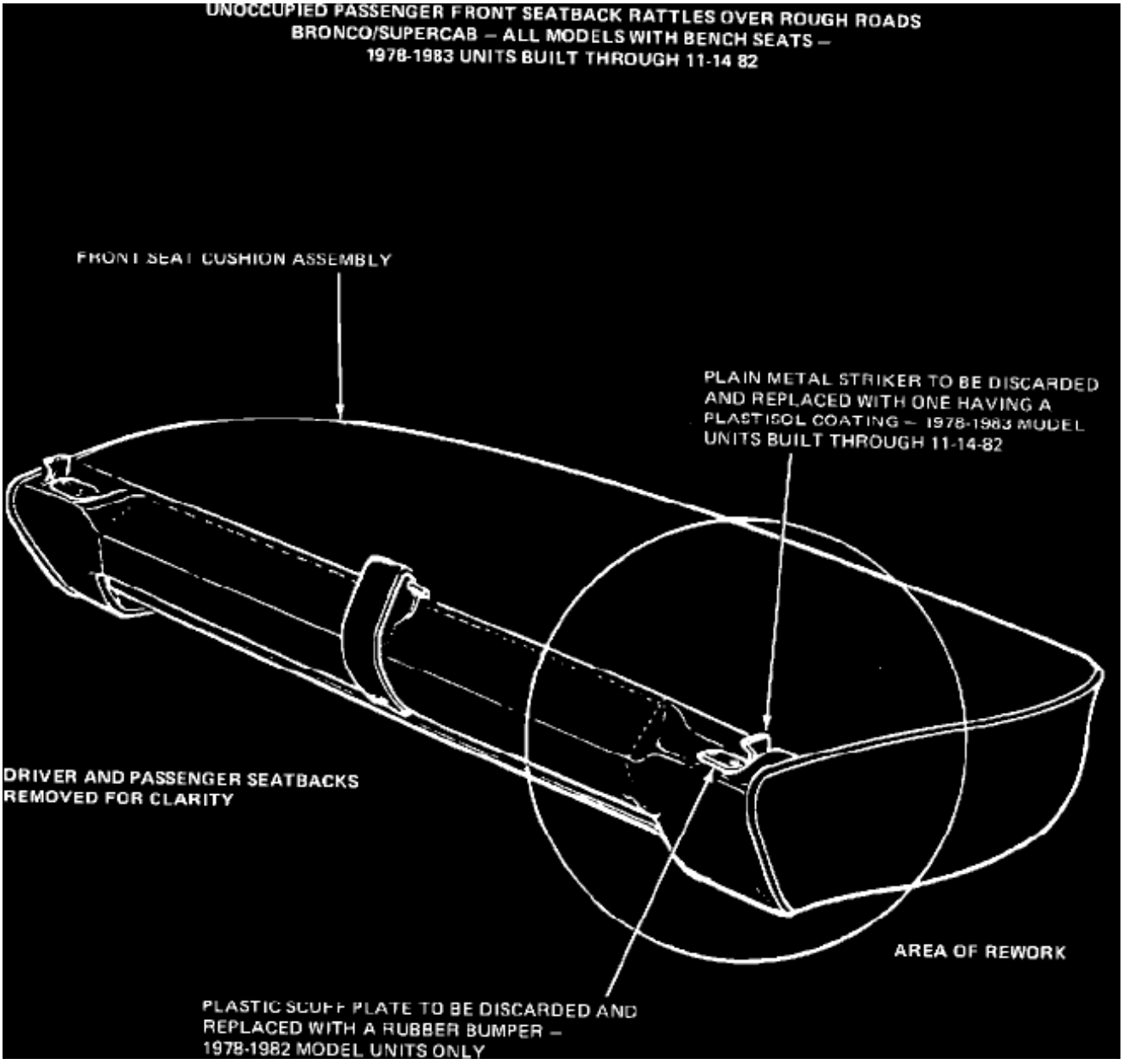

UNOCCUPIED PASSENGER FRONT SEATBACK RATTLES OVER ROUGH ROADS
BRONCO/SUPERCAB – ALL MODELS WITH BENCH SEATS –
1978-1983 UNITS BUILT THROUGH 11-14 82
FRONT SEAT CUSHION ASSEMBLY
PLAIN METAL STRIKER TO BE DISCARDED AND REPLACED WITH ONE HAVING A PLASTISOL COATING – 1978-1983 MODEL UNITS BUILT THROUGH 11-14-82
DRIVER AND PASSENGER SEATBACKS REMOVED FOR CLARITY
AREA OF REWORK
PLASTIC SCUFF PLATE TO BE DISCARDED AND REPLACED WITH A RUBBER BUMPER – 1978-1982 MODEL UNITS ONLY

FIGURE 20

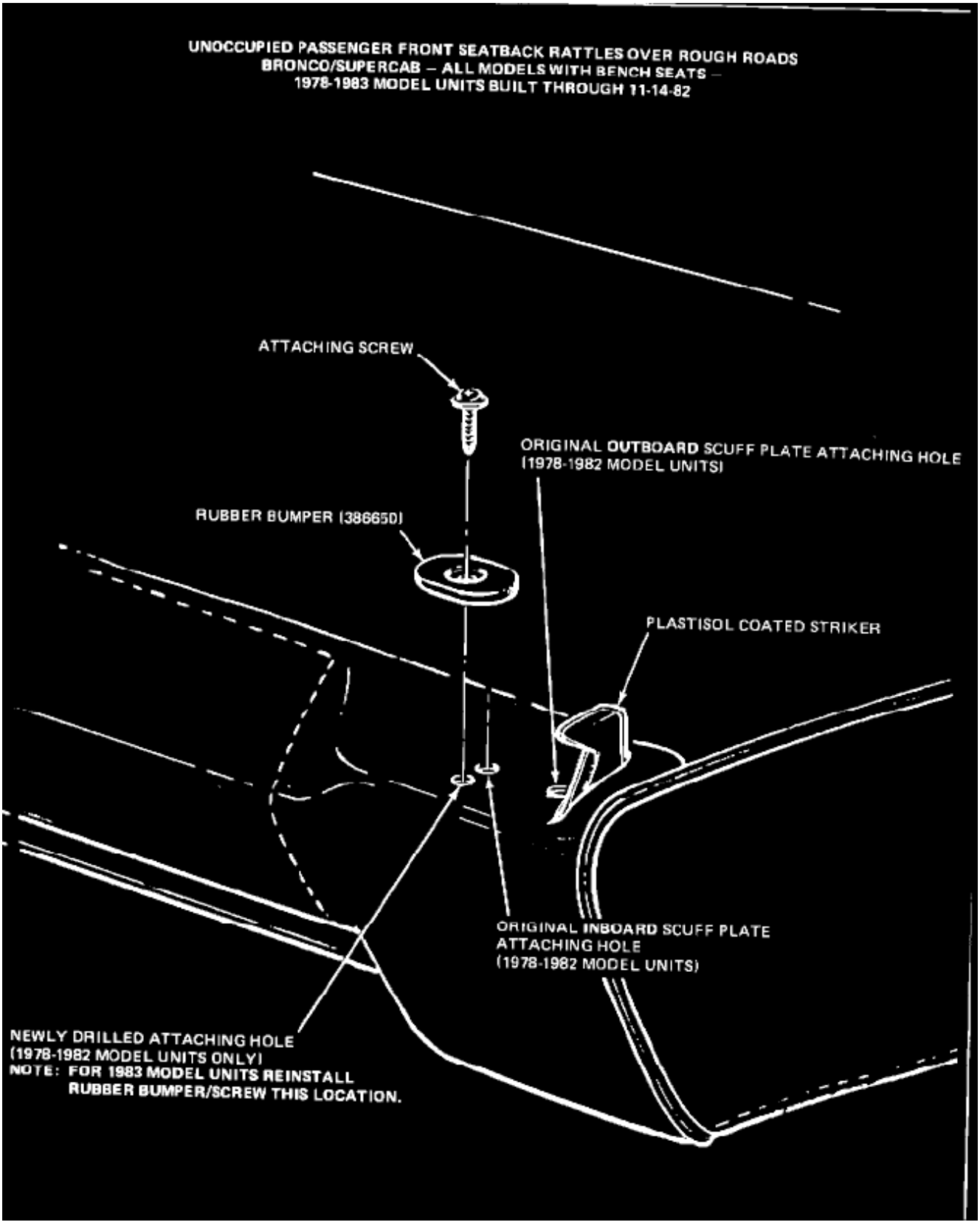

UNOCCUPIED PASSENGER FRONT SEATBACK RATTLES OVER ROUGH ROADS
BRONCO/SUPERCAB – ALL MODELS WITH BENCH SEATS –
1978-1983 MODEL UNITS BUILT THROUGH 11-14-82
ATTACHING SCREW
ORIGINAL OUTBOARD SCUFF PLATE ATTACHING HOLE
(1978-1982 MODEL UNITS)
RUBBER BUMPER (386650)
PLASTISOL COATED STRIKER
ORIGINAL INBOARD SCUFF PLATE
ATTACHING HOLE
(1978-1982 MODEL UNITS)
NEWLY DRILLED ATTACHING HOLE
(1978-1982 MODEL UNITS ONLY)
NOTE: FOR 1983 MODEL UNITS REINSTALL
RUBBER BUMPER/SCREW THIS LOCATION.

FIGURE 22

5. On the passenger side of the seat cushion, remove the scuff plate (1978-82) or rubber bumper (1983 only), For 1978-82 units, discard the scuff plate and one (1) attaching screw (Figure 20). For 1983 units, retain the rubber bumper and attaching screw (Figure 22).

6. On the passenger side of the seat cushion, disengage the trim cover as required to gain access to the two (2) screws, securing the seat back latch striker to the seat cushion frame (Figure 22). Then, remove and discard the striker.

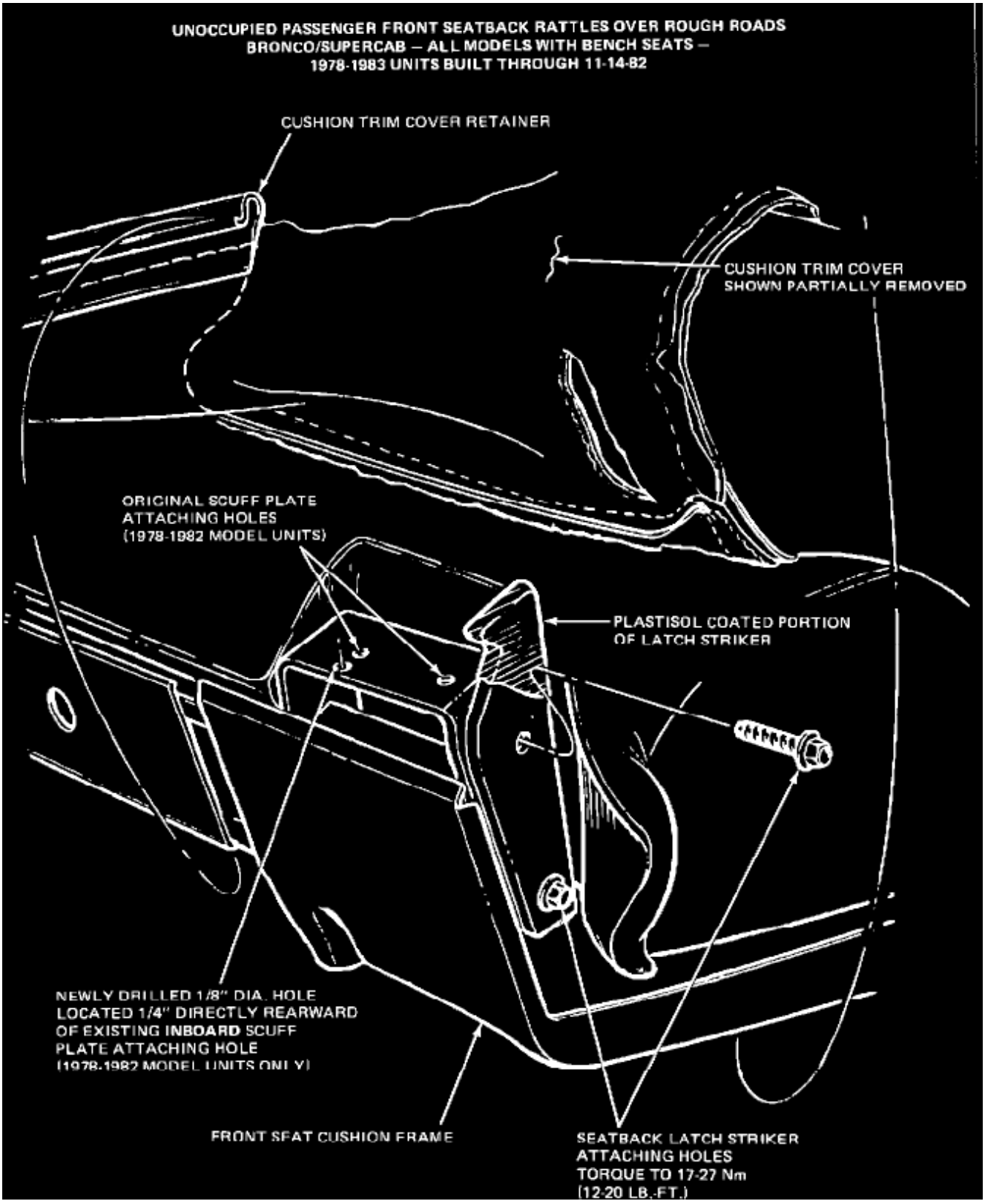

UNOCCUPIED PASSENGER FRONT SEATBACK RATTLES OVER ROUGH ROADS
BRONCO/SUPERCAB — ALL MODELS WITH BENCH SEATS —
1978-1983 UNITS BUILT THROUGH 11-14-82
CUSHION TRIM COVER RETAINER
CUSHION TRIM COVER SHOWN PARTIALLY REMOVED
ORIGINAL SCUFF PLATE ATTACHING HOLES (1978-1982 MODEL UNITS)
PLASTISOL COATED PORTION OF LATCH STRIKER
NEWLY DRILLED 1/8" DIA. HOLE LOCATED 1/4" DIRECTLY REARWARD OF EXISTING INBOARD SCUFF PLATE ATTACHING HOLE (1978-1982 MODEL UNITS ONLY)
FRONT SEAT CUSHION FRAME
SEATBACK LATCH STRIKER ATTACHING HOLES TORQUE TO 17-27 Nm (12-20 LB.-FT.)

FIGURE 21

7. Install the plastisol coated seat back latch striker procured in Step #1. (Figure 21). Torque the attaching screws to 17-27 N-m (12-20 lbs.ft.).

8. With the seat cushion in the upright position, measure 1/4" directly rearward from the center of

the existing inboard scuff plate attaching hole and drill a 1/8" diameter hole in the frame as shown in Figure 21. (1978-82 units only).

9. Install the seat cushion trim cover. (Refer to Section 41-60 of the appropriate Truck Shop Manual).

10. Using an awl, locate through the trim cover the newly drilled hole in the seat cushion frame, then install the rubber bumper (1978-82 units only). For 1983 units, install the rubber bumper in its original location (Figure 22).

11. Install the seat back to the seat cushion as outline in Section 41-25 of the appropriate Truck Shop Manual.

12. Install the seat and track assembly in the vehicle as outlined in Section 41-01 of the appropriate Truck Shop Manual. Torque the seat track to floor pan, attaching screws to 25-44 N-m (18-32 lbs.ft.).

13. Install the seat belt assemblies as outlined in Section 41-50 of the appropriate Truck Shop Manual, Torque the seat belt to floor pan, attaching bolts to 30-43 N-m (22-32 lbs.ft.).

14. Check the seat tracks and seat latch for proper operation

NOTE: Adjust the seat back latch cable as required to obtain a .10 max gap between the seat back latch pawl and the striker. Refer to Section 41-25 of the appropriate Truck Shop Manual.

PART NUMBER PART NAME CLASS

D8TZ-1362638-A Striker - Front Seat Back Latch C

C8AZ-6260310-A Bumper - .23" x 1.5" x 1.0" C

OTHER APPLICABLE ARTICLES: None

WARRANTY STATUS: Reimbursable within the provisions of the Warranty and Policy Manual .
OPERATION: M TIME: "Actual Time" as defined in the Warranty and Policy Manual. DLR.
CODING: Basic Part No. 7060012 Code: 56

Power Door Lock Switch: Locations

In Respective Doors

Power Mirror Switch: Locations

In LH Door

Brake Switch (Cruise Control): Testing and Inspection

Perform this test only when brake application will not disconnect the speed control system.

1. Check operation of stop lamps by applying approximately 6 lbs. of pressure to brake pedal. If more than 6 lbs. is required, check brake pedal actuation and stop lamp switch.

2. If stop lamps do not function properly, check bulbs, circuit fuse or stop lamp switch.

3. If stop lamps function properly, check for battery voltage at 6 way connector using black wire w/green stripe on 1980 models, 1981-83 E-100-350 and 1984-87 E-150-350 series, or white wire w/pink stripe on 1981-82 F-100-350 and Bronco series, or white wire w/purple stripe on 1983 F-100-350, Bronco and Ranger, 1984-87 F-150-350, Ranger, 1984-87 Bronco II and 1986-87 Aerostar.

4. Depress brake pedal until stop lamps are illuminated. Check voltage at red wire w/black stripe on 1980 models, 1981-83 E-100-350 and 1984-87 E-150-350 models, or the light green wire on 1981-83 F-100-350 and Bronco, 1984-87 F-150-350 and Bronco, 1983-87 Ranger, 1984-87 Bronco II and 1986-87 Aerostar. The difference between the two voltage readings must not exceed 1.5 volts. If voltage is greater, a high resistance exists in the circuit and must be found and corrected.

Clutch Switch: Service and Repair

1. Remove bracket mounting screw(s).
2. Disconnect electrical connector and remove switch and bracket assembly.
3. Remove switch from bracket.
4. Reverse procedure to install.

Cruise Control Module: Locations

Behind I/P At RH Side Of Steering Column

Cruise Control Module: Testing and Inspection

Use only a multi-meter of 5000 ohm/volt rating or higher when performing amplifier test.

``On'' Circuit Test

1. Turn ignition ``On.''

2. Connect a voltmeter between light blue wire w/black hash and ground on models exc. 1983-87 Ranger, 1984-87 Bronco II and 1986-87 Aerostar or white wire w/purple stripe and ground on 1983-87 Ranger, 1984-87 Bronco II and 1986-87 Aerostar.

3. Battery voltage should be indicated when ``On'' switch on steering column is depressed and held. If battery voltage is not indicated, check horn relay and perform control switch test.

4. Release ``On'' button. Voltmeter should indicate 7.8 volts indicating ``On'' circuit is engaged. If voltage does not remain, check amplifier ground, fuses or circuit breakers or replace amplifier with known good amplifier and repeat test.

5. Replace as necessary.

``Off'' Circuit Test

1. Turn ignition ``On.''

2. Connect a voltmeter between light blue wire w/black hash and ground.

3. Depress ``Off'' button. Voltage should drop to zero indicating ``On'' circuit is de-energized.

4. If voltage does not drop to zero, perform ``Control Switch Test.''

``Set-Accelerate'' Circuit Test

1. Turn ignition ``On.''

2. Connect a voltmeter between light blue wire w/black hash and ground.

3. Depress ``On'' switch, then hold ``Set-Accel'' button on steering wheel. Voltmeter should indicate 4.5 volts. Rotate steering wheel back and forth and check for voltmeter fluctuations. If reading varies more than .5 volts, perform ``Control Switch Test.''

``Coast'' Circuit Test

1. Turn ignition ``On.''

2. Connect a voltmeter between light blue wire w/black hash and ground.

3. Depress ``On'' switch, then depress and hold ``Coast'' button on steering wheel. Voltmeter should indicate 1.5 volts. Rotate steering wheel back and forth and check for voltage fluctuations. If reading varies more than .5 volts, perform ``Control Switch Test.''

``Resume'' Circuit Test

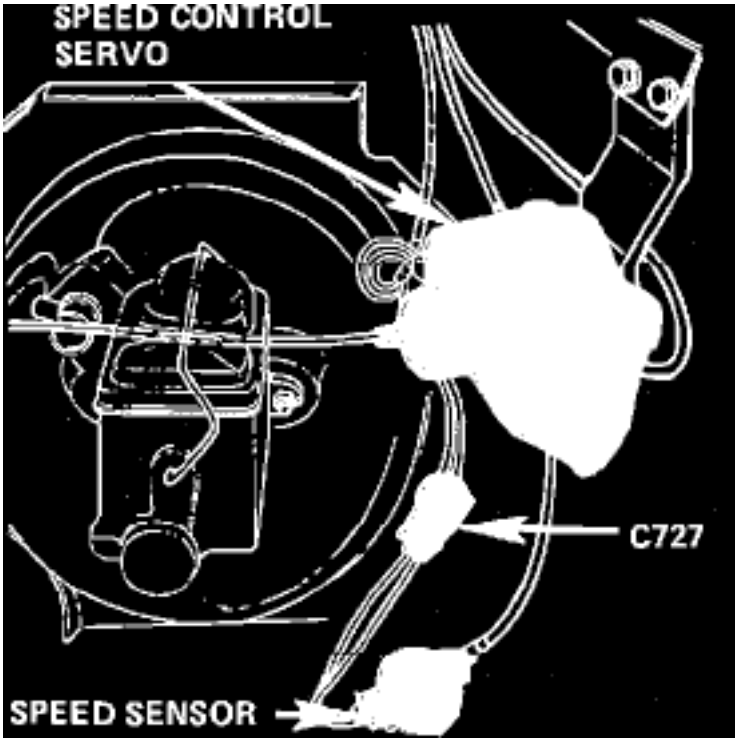
1. Turn ignition ``On.''

2. Connect a voltmeter between light blue wire w/black hash and ground.

3. Depress and hold ``Resume'' button. Voltmeter should indicate 6.5 volts.

If all circuits are functioning properly, perform ``Servo Assembly

Test" using a known good amplifier. Do not replace amplifier before performing servo test.



Cruise Control Servo: Locations

LH Side Of Dash Panel.

On LH Inner Fender Well

Applicable to: V8 Engine

Cruise Control Servo: Testing and Inspection

1981-83 F-100-350 & Bronco, 1984-87 F-150-350 & Bronco 1982-83 E-100-350 & 1984-87 E-150-350 Series

1. Disconnect ball chain from carburetor (if equipped), then the electrical connector at the amplifier.

2. Connect an ohmmeter between orange wire w/yellow hash and gray wire w/black hash at connector. A resistance of 40 to 125 ohms should be obtained.

3. Connect an ohmmeter between orange wire w/yellow hash and white wire w/pink hash. A resistance of 60 to 90 ohms should be obtained.

4. If equipped, connect ball chain to carburetor.

5. Start engine and ensure servo vacuum from engine exceeds 2.5 inches of Hg, then disconnect servo from amplifier.

6. Connect orange wire w/yellow hash of servo to battery positive terminal and white wire w/pink hash to ground, then momentarily touch gray wire w/black hash to ground. Servo throttle actuator should pull in and engine RPM should increase. Throttle should hold in position or slowly release chain tension.

7. Remove white wire w/pink hash and check for immediate release of chain tension from servo.

8. Replace servo if servo fails to function as described. Amplifier may need replacement if orange wire w/yellow hash is shorted to either white-pink hash lead or gray-black hash lead.

Cruise Control Servo: Service and Repair

Exc. 1986-87 Aerostar

1. Raise hood, then disconnect wiring harness connector at servo assembly. On some models, it may be necessary to disconnect servo assembly at the amplifier under the dash and carefully pull harness and connector through dash panel opening.

2. Disconnect ball chain at carburetor or adjuster from accelerator cable (as equipped), then remove vacuum hose from servo assembly.

3. Remove servo assembly retaining pins and nuts, then the servo assembly from mounting bracket.

4. Reverse procedure to install.

Cruise Control Servo Cable: Service and Repair

1. Remove servo assembly, then discard cable.
2. Attach new actuator cable to servo assembly.
3. Install servo assembly.

Cruise Control Switch: Locations

In Steering Wheel Hub Assembly

Cruise Control Switch: Testing and Inspection

1980-87 Models Exc. 1983-87 Ranger, 1984-87 Bronco II & 1986 Aerostar Disconnect 6 way connector from control switch at the amplifier, then perform the following checks:

1. Connect a voltmeter between light blue-black hash lead and ground, then depress the ``On'' button and check for battery voltage.

2. Turn ignition ``Off,'' then connect an ohmmeter between light blue-black hash lead and ground.

3. Rotate steering wheel throughout its full range while making the following checks:

a. Depress ``Off'' button and check for a reading of 0-1 ohm. b. Depress ``Set'' button and check for a reading of 646-714 ohms. c. Depress and hold ``Coast'' switch and check for a reading of 114-126 ohms. d. On models with ``Resume,'' depress and hold ``Resume'' switch and check for a reading of approximately 2200 ohms.

4. If resistance values are not as specified, inspect wiring, slip rings, turn signal copper brushes, speed control switch and steering column for proper ground. Check for proper ground by connecting an ohmmeter between upper steering column flange and a suitable ground. Resistance should be less then 1/2 ohm. Rotate steering wheel throughout its full range and ensure flexible coupling has a resistance of less than 1 ohm.

Cruise Control Switch: Service and Repair

1. Remove steering wheel pad attaching screws from behind steering wheel.

2. While pulling pad away from steering wheel, disconnect horn and speed control wire connectors and remove pad.

3. Remove retaining nuts securing the speed control switches and trim plate retainer to the steering wheel pad.

4. Disconnect wiring connector on rear of steering wheel pad assembly, then remove switch and trim retainer assembly.

5. Remove speed control switches by snapping out of plastic retainer.

6. To remove the ground brush, remove steering wheel for access.

7. Snap the ground brush assembly out of the turn signal switch.

8. Reverse procedure to install.

Cruise Control Module: Locations

Behind I/P At RH Side Of Steering Column

Cruise Control Module: Testing and Inspection

Use only a multi-meter of 5000 ohm/volt rating or higher when performing amplifier test.

``On'' Circuit Test

1. Turn ignition ``On.''

2. Connect a voltmeter between light blue wire w/black hash and ground on models exc. 1983-87 Ranger, 1984-87 Bronco II and 1986-87 Aerostar or white wire w/purple stripe and ground on 1983-87 Ranger, 1984-87 Bronco II and 1986-87 Aerostar.

3. Battery voltage should be indicated when ``On'' switch on steering column is depressed and held. If battery voltage is not indicated, check horn relay and perform control switch test.

4. Release ``On'' button. Voltmeter should indicate 7.8 volts indicating ``On'' circuit is engaged. If voltage does not remain, check amplifier ground, fuses or circuit breakers or replace amplifier with known good amplifier and repeat test.

5. Replace as necessary.

``Off'' Circuit Test

1. Turn ignition ``On.''

2. Connect a voltmeter between light blue wire w/black hash and ground.

3. Depress ``Off'' button. Voltage should drop to zero indicating ``On'' circuit is de-energized.

4. If voltage does not drop to zero, perform ``Control Switch Test.''

``Set-Accelerate'' Circuit Test

1. Turn ignition ``On.''

2. Connect a voltmeter between light blue wire w/black hash and ground.

3. Depress ``On'' switch, then hold ``Set-Accel'' button on steering wheel. Voltmeter should indicate 4.5 volts. Rotate steering wheel back and forth and check for voltmeter fluctuations. If reading varies more than .5 volts, perform ``Control Switch Test.''

``Coast'' Circuit Test

1. Turn ignition ``On.''

2. Connect a voltmeter between light blue wire w/black hash and ground.

3. Depress ``On'' switch, then depress and hold ``Coast'' button on steering wheel. Voltmeter should indicate 1.5 volts. Rotate steering wheel back and forth and check for voltage fluctuations. If reading varies more than .5 volts, perform ``Control Switch Test.''

``Resume'' Circuit Test

1. Turn ignition ``On.''

2. Connect a voltmeter between light blue wire w/black hash and ground.

3. Depress and hold ``Resume'' button. Voltmeter should indicate 6.5 volts.

If all circuits are functioning properly, perform ``Servo Assembly

Test" using a known good amplifier. Do not replace amplifier before performing servo test.

Brake Switch (Cruise Control): Testing and Inspection

Perform this test only when brake application will not disconnect the speed control system.

1. Check operation of stop lamps by applying approximately 6 lbs. of pressure to brake pedal. If more than 6 lbs. is required, check brake pedal actuation and stop lamp switch.

2. If stop lamps do not function properly, check bulbs, circuit fuse or stop lamp switch.

3. If stop lamps function properly, check for battery voltage at 6 way connector using black wire w/green stripe on 1980 models, 1981-83 E-100-350 and 1984-87 E-150-350 series, or white wire w/pink stripe on 1981-82 F-100-350 and Bronco series, or white wire w/purple stripe on 1983 F-100-350, Bronco and Ranger, 1984-87 F-150-350, Ranger, 1984-87 Bronco II and 1986-87 Aerostar.

4. Depress brake pedal until stop lamps are illuminated. Check voltage at red wire w/black stripe on 1980 models, 1981-83 E-100-350 and 1984-87 E-150-350 models, or the light green wire on 1981-83 F-100-350 and Bronco, 1984-87 F-150-350 and Bronco, 1983-87 Ranger, 1984-87 Bronco II and 1986-87 Aerostar. The difference between the two voltage readings must not exceed 1.5 volts. If voltage is greater, a high resistance exists in the circuit and must be found and corrected.

Clutch Switch: Service and Repair

1. Remove bracket mounting screw(s).
2. Disconnect electrical connector and remove switch and bracket assembly.
3. Remove switch from bracket.
4. Reverse procedure to install.

Cruise Control Switch: Locations

In Steering Wheel Hub Assembly

Cruise Control Switch: Testing and Inspection

1980-87 Models Exc. 1983-87 Ranger, 1984-87 Bronco II & 1986 Aerostar Disconnect 6 way connector from control switch at the amplifier, then perform the following checks:

1. Connect a voltmeter between light blue-black hash lead and ground, then depress the ``On'' button and check for battery voltage.

2. Turn ignition ``Off,'' then connect an ohmmeter between light blue-black hash lead and ground.

3. Rotate steering wheel throughout its full range while making the following checks:

a. Depress ``Off'' button and check for a reading of 0-1 ohm. b. Depress ``Set'' button and check for a reading of 646-714 ohms. c. Depress and hold ``Coast'' switch and check for a reading of 114-126 ohms. d. On models with ``Resume,'' depress and hold ``Resume'' switch and check for a reading of approximately 2200 ohms.

4. If resistance values are not as specified, inspect wiring, slip rings, turn signal copper brushes, speed control switch and steering column for proper ground. Check for proper ground by connecting an ohmmeter between upper steering column flange and a suitable ground. Resistance should be less then 1/2 ohm. Rotate steering wheel throughout its full range and ensure flexible coupling has a resistance of less than 1 ohm.

Cruise Control Switch: Service and Repair

1. Remove steering wheel pad attaching screws from behind steering wheel.

2. While pulling pad away from steering wheel, disconnect horn and speed control wire connectors and remove pad.

3. Remove retaining nuts securing the speed control switches and trim plate retainer to the steering wheel pad.

4. Disconnect wiring connector on rear of steering wheel pad assembly, then remove switch and trim retainer assembly.

5. Remove speed control switches by snapping out of plastic retainer.

6. To remove the ground brush, remove steering wheel for access.

7. Snap the ground brush assembly out of the turn signal switch.

8. Reverse procedure to install.

Vehicle Speed Sensor/Transducer - Cruise Control: Testing and Inspection

1980-87 Models Exc. 1983-87 Ranger, 1984-87 Bronco II & 1986-87 Aerostar

1. Disconnect 6 way connector from amplifier assembly, then connect an ohmmeter between dark green wire w/white stripe and black wire on 1980 E-100-350, 1981-83 F-100-350 models and Bronco, and 1984-87 F-150-350 and Bronco, or green and black wire on 1980 F-100-350 and 1981-83 E-100-350 models and 1984-87 E-150-350 at the speed sensor end. A reading of 40 ohms should be obtained. A reading of 0 ohms indicates a shorted coil and an infinity reading indicates an open coil.

2. Replace sensor if a correct reading has not been obtained.

Vacuum Vent Valve: Testing and Inspection

1. Disconnect vacuum hose from the servo that leads to the dump valve.

2. Connect a hand vacuum pump to the hose, and draw vacuum. If vacuum cannot be obtained, the hose or dump valve is leaking, and should be replaced.

3. Step on brake pedal. The vacuum should be released. If not, adjust or replace the dump valve.

2.5 inches of Hg is minimum vacuum for normal

servo operation. The vacuum source is a hose attached to a 5/16 inch engine vacuum fitting port on all except 6.9 diesel. On the 6.9 diesel, the vacuum source is the vacuum reservoir ``Vac'' port.

Vacuum Vent Valve: Service and Repair

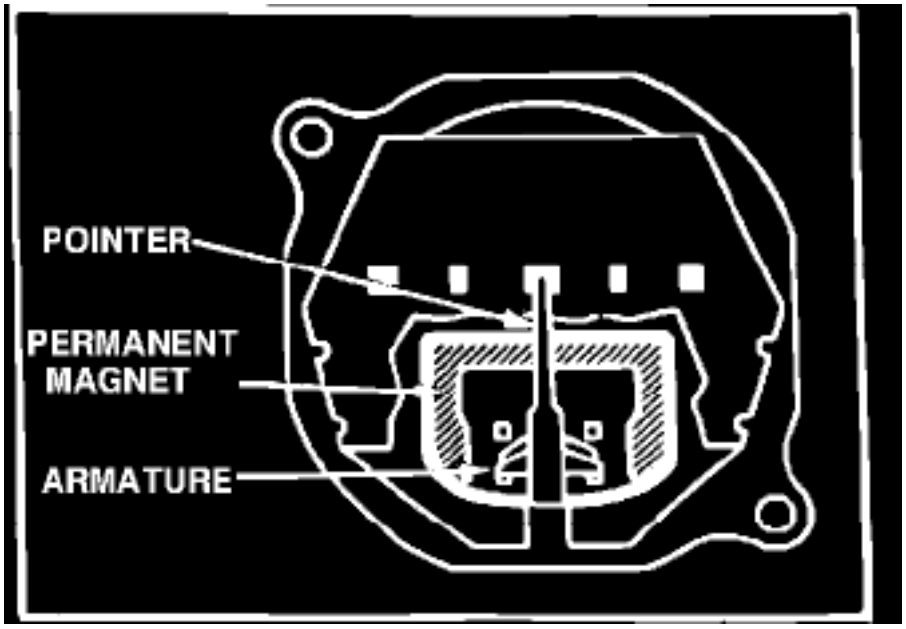
1. Remove vacuum hose from valve and remove bracket mounting screw.
2. Remove valve and bracket assembly.
3. Remove valve from the bracket.
4. Reverse procedure to install.

Vehicle Speed Sensor/Transducer - Cruise Control: Testing and Inspection

1980-87 Models Exc. 1983-87 Ranger, 1984-87 Bronco II & 1986-87 Aerostar

1. Disconnect 6 way connector from amplifier assembly, then connect an ohmmeter between dark green wire w/white stripe and black wire on 1980 E-100-350, 1981-83 F-100-350 models and Bronco, and 1984-87 F-150-350 and Bronco, or green and black wire on 1980 F-100-350 and 1981-83 E-100-350 models and 1984-87 E-150-350 at the speed sensor end. A reading of 40 ohms should be obtained. A reading of 0 ohms indicates a shorted coil and an infinity reading indicates an open coil.

2. Replace sensor if a correct reading has not been obtained.



Ammeter Gauge: Testing and Inspection

The ammeter is an instrument used to indicate current flow into and out of the battery. When electrical accessories in the vehicle draw more current than the alternator can supply, current flows from the battery and the ammeter indicates a discharge (-) condition. When electrical loads of the vehicle are less than alternator output, current is available to charge the battery, and the ammeter indicates a charge (+) condition. If battery is fully charged, the voltage regulator reduces alternator output to meet only immediate vehicle electrical loads. When this happens, ammeter reads zero.

Fig. 1 Conventional type ammeter

CONVENTIONAL AMMETER

A conventional ammeter must be connected between the battery and alternator in order to indicate current flow. This type ammeter, Fig. 1, consists of a frame to which a permanent magnet is attached. The frame also supports an armature and pointer assembly. Current in this system flows from the alternator through the ammeter, then to the battery or from the battery through the ammeter into the vehicle electrical system, depending on vehicle operating conditions. When no current flows through the ammeter, the magnet holds the pointer armature so that the pointer stands at the center of the dial. When current passes in either direction through the ammeter, the resulting magnetic field attracts the armature away from the effect of the permanent magnet, thus giving a reading proportional to the strength of the current flowing.

Troubleshooting When the ammeter apparently fails to register correctly, there may be trouble in the wiring which connects the ammeter to the alternator and battery or in the alternator or battery itself. To check the connections, first tighten the two terminal posts on the back of the ammeter. Then, following each wire from the ammeter, tighten all connections on the ignition switch, battery and alternator. Chafed, burned or broken insulation can be found by following each ammeter wire from end to end. All wires with chafed, burned or broken insulation should be repaired or replaced. After this is done, and all connections are tightened, connect the battery cable and turn on the ignition switch. The needle should point slightly to the discharge (-) side. Start the engine and run slightly above idling speed. The needle should move slowly to the charge side (+). If the pointer does not move as indicated, the ammeter is out of order and should be replaced.

SHUNT TYPE AMMETER The shunt type ammeter is actually a specifically calibrated voltmeter. It is connected to read voltage drop across a resistance wire (shunt) between the battery and alternator. The shunt is located either in the vehicle wiring or within the ammeter itself. When voltage is higher at the alternator end of the shunt, the meter indicates a charge (+) condition. When voltage is higher at the battery end of the shunt, the meter indicates a discharge (-) condition. When voltage is equal at both ends of the shunt, the meter reads zero. Troubleshooting Ammeter accuracy can be determined by comparing reading with an ammeter of known accuracy.

1. With engine stopped and ignition switch in RUN position, switch on headlamps and heater fan. Meter should indicate a discharge (-) condition.

2. If ammeter pointer does not move, check ammeter terminals for proper connection and check for open circuit in wiring harness. If connections and wiring harness are satisfactory, ammeter is defective.

3. If ammeter indicates a charge (+) condition, wiring harness connections are reversed at ammeter.

Audible Warning Device: Locations Lamps-On Warning Buzzer

Behind RH Side Of I/P

Audible Warning Device: Locations Seat Belt Warning Buzzer/Chime

Rear RH Side Of I/P

Clock: Locations

In Top Center Of I/P

Clock: Testing and Inspection

Regulation of electric clocks is accomplished automatically by resetting the time. If the clock is running fast, the action of turning the hands back to correct the time will automatically cause the clock to run slightly slower. If the clock is running slow, the action of turning the hands forward to correct the time will automatically cause the clock to run slightly faster (10 to 15 seconds daily). A lockout feature prevents the clock regulator mechanism from being reset more than once per wind cycle, regardless of the number of times the time is reset. After the clock rewinds, if the time is then reset, automatic regulation will take place. If a clock varies over 10 minutes per day, it will never adjust properly and must be repaired or replaced.

WINDING CLOCK WHEN CONNECTING BATTERY OR CLOCK WIRING The clock requires special attention when reconnecting a battery that has been disconnected for any reason, a clock that has been disconnected, or when replacing a blown clock fuse. It is very important that the initial wind be fully made. The procedure is as follows:

1. Make sure that all other instruments and lights are turned off.

2. Connect positive cable to battery.

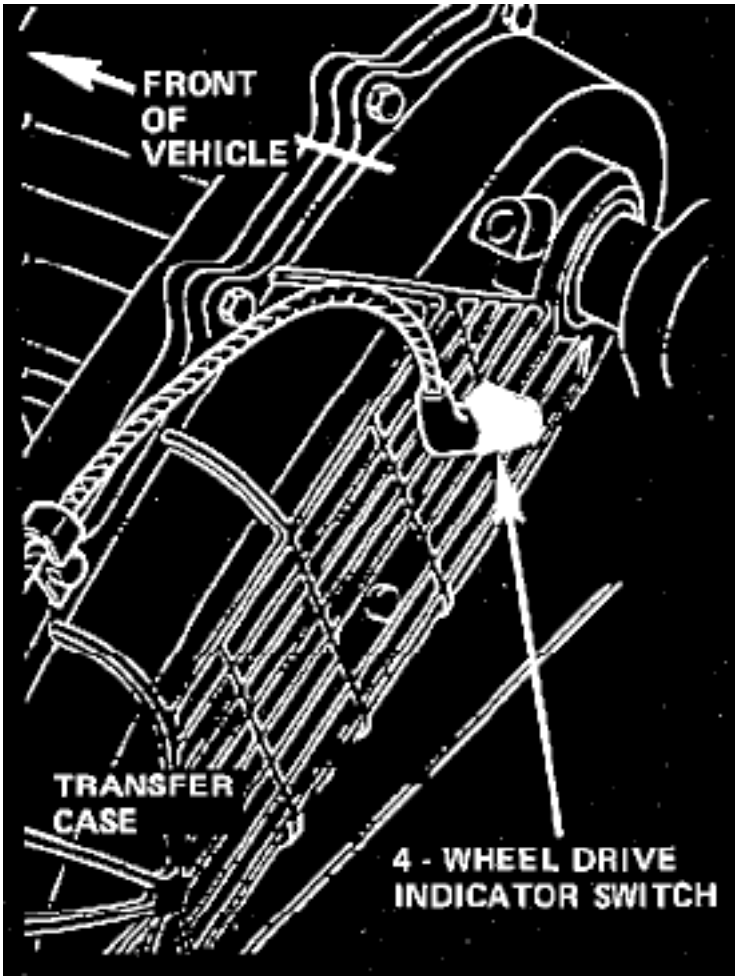
3. Before connecting the negative cable, press the terminal to its post on the battery. Immediately afterward, strike the terminal against the battery post to see if there is a spark. If there is a spark, allow the clock to run down until it stops ticking, and repeat as above until there is no spark. Then immediately make the permanent connection before the clock can again run down. The clock will run down in approximately two minutes.

4. Reset clock after all connections have been made. The foregoing procedure should also be followed when reconnecting the clock after it has been disconnected, or if it has stopped because of a blown fuse. Be sure to disconnect battery before installing a new fuse.

TROUBLESHOOTING If clock does not run, check for blown ``clock'' fuse. If fuse is blown, check for short in wiring. If fuse is not blown, check for open circuit. With an electric clock, the most frequent cause of clock fuse blowing is voltage at the clock which will prevent a complete wind and allow clock contacts to remain closed. This may be caused by any of the following: discharged battery, corrosion on contact surface of battery terminals, loose connections at battery terminals, at junction block, at fuse clips, or at terminal connection of clock. Therefore, if in reconnecting battery or clock it is noted that the clock is not ticking, always check for blown fuse, or examine the circuits at the points indicated above to determine and correct the cause.

Door Switch: Locations

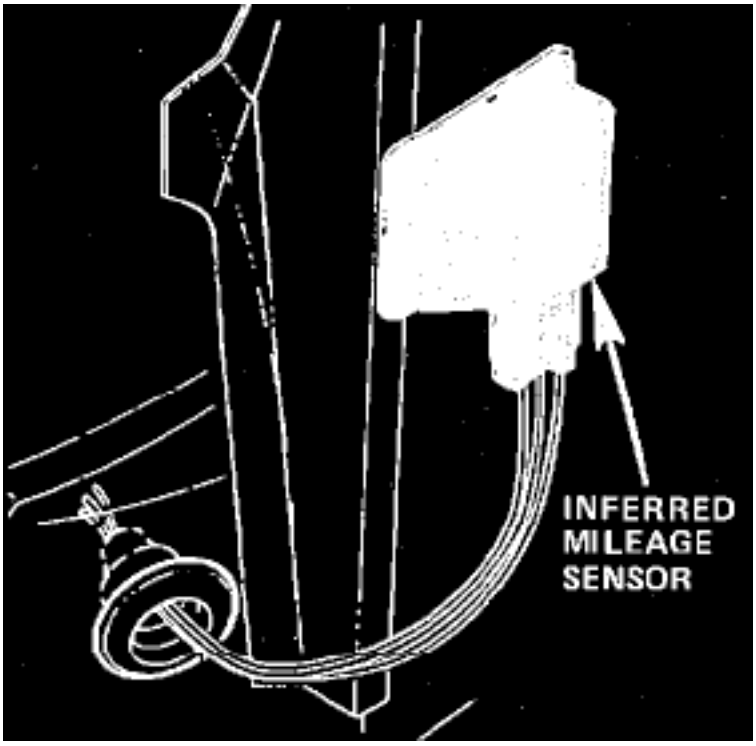
LH Lower Cowl, Near Fuse Block



Four Wheel Drive Indicator Lamp: Locations

Rear Of Transfer Case

On Transfer Case



Fuel Distance/Mileage Module: Locations

Under LH Side Of I/P.

Under RH Side Of I/P

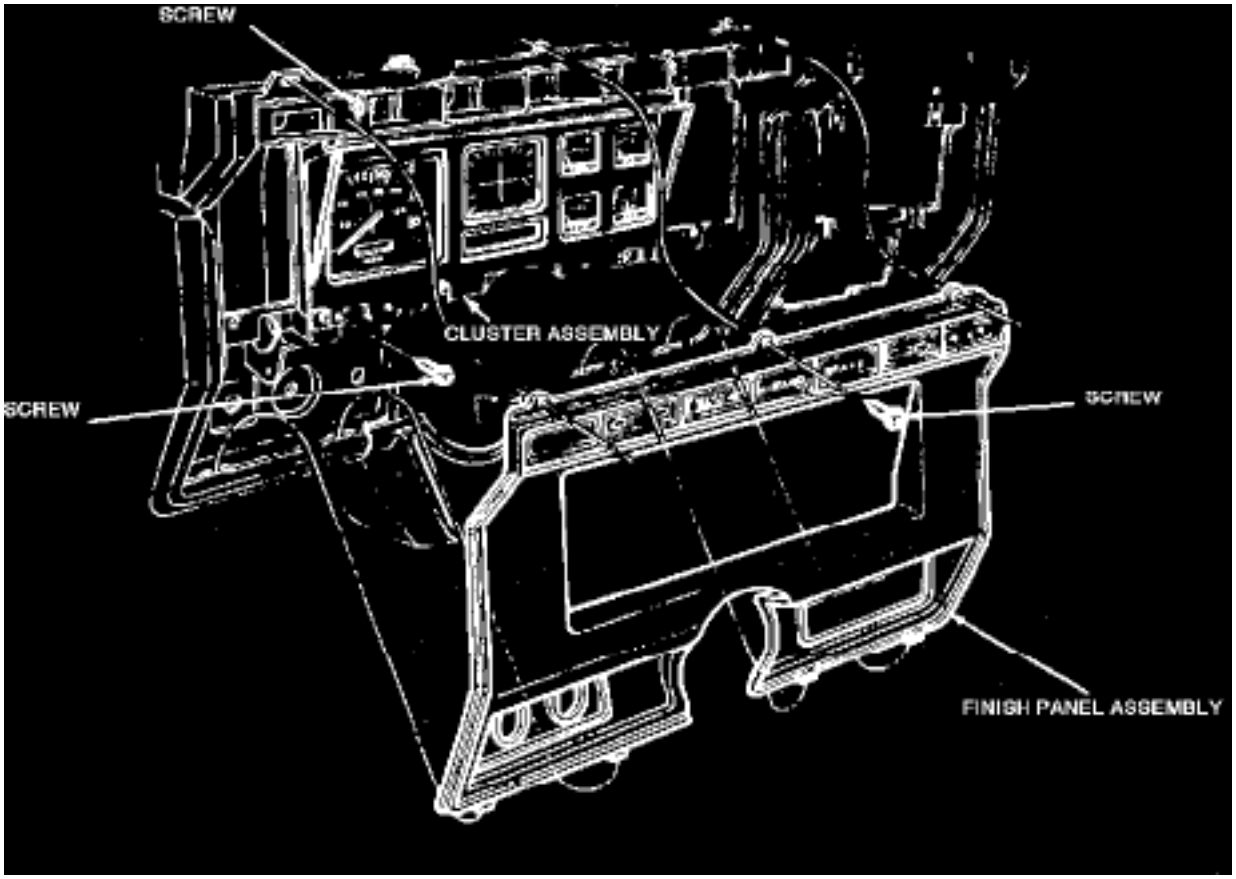
Applicable to: 1981-83

Fuel Gauge Sender: Locations Front Tank Fuel Gauge Sender

On Tank In Front Of Rear Axle

Fuel Gauge Sender: Locations Rear Tank Fuel Gauge Sender

On Tank Behind Rear Axle



Instrument Cluster / Carrier: Service and Repair

Fig. 10 Instrument Cluster

F-100---350 & BRONCO

1. Disconnect battery ground cable.

2. Remove wiper/washer knob, and on equipped 1980 models, the fuel gauge switch knob. Use a suitable hook tool to release each knob lock tab.

3. Remove light switch knob, windshield wiper switch knob and fog light switch knob, if equipped.

4. Remove steering column shroud, using care not to damage transmission selector indicator cables on models equipped with automatic transmission.

5. On models equipped with automatic transmission, release shift lever indicator cable retaining clip(s), then remove cable loop from retainer pin. Remove cable bracket attaching screw and slide bracket out of slot in tube.

6. On all models, remove cluster finish panel and the 4 cluster attaching screws, Fig. 10.

7. Pull cluster back from panel and disconnect speedometer cable, printed circuit electrical connector and 4 x 4 indicator light electrical connector, if equipped.

8. Remove cluster from vehicle, Fig. 10.

9. Reverse procedure to install.

Odometer: Technical Service Bulletins Speedometer/Odometer - Inaccurate Readings

SPEEDOMETER - MECHANICAL/ELECTRONIC - INACCURATE SPEED READINGS AND ODOMETER READINGS

Article No. 89-2-7

FORD: 1989 AND PRIOR ALL CAR LINES

LINCOLN-MERCURY: 1989 AND PRIOR ALL CAR LINES

LIGHT TRUCK: 1989 AND PRIOR ALL TRUCK LINES

ISSUE: The accuracy of speedometer/odometer readings may be influenced by several vehicle components or systems. The information in this TSB article is intended to assist technicians in speedometer/odometer concern diagnosis.

ACTION: Use the following supplemental information below to assist in speedometer/odometer diagnostics.

OPERATION

A mechanical analog speedometer displays vehicle speed and the odometer displays total distance traveled. The speedometer/odometer assembly is cable driven by either a transmission or a transaxle. All speedometer/odometer assemblies, except for police vehicles are the same with respect to the speed accuracy tolerance used during calibration. The odometer gear ratio is fixed so that all are identical and have no error in the speedometer head.

Electronic digital operation is similar. It could use a drive cable or a speed sensor to drive the speedometer/odometer. An electronic signal is sent from a speed sensor to the digital speedometer/ odometer assembly. The speed sensor is driven by a transmission or a transaxle, similar to a cable.

Several areas of concern that may affect speedometer/ odometer readings are tires, axle gear ratio and speedometer/odometer drive and driven gears.

TIRES

Improper tire rolling radius and inflation pressure, temperature and size may contribute to inaccurate system readings. System accuracy testing should be performed after the tires are set at the correct pressure as shown on the safety compliance certification label. The tires should be warmed for a short period. Best results are obtained on smooth, dry pavement while driving at a constant speed within the posted speed limit.

AXLE/TRANSAXLE RATIO

The gear ratio of the rear axle or the final drive ratio of the transaxle must be known to select or check if the proper speedometer/odometer drive and driven gears are present. Various gear ratios are available, but usually are not a concern when dealing with speedometer/odometer concerns unless the gear ratio has been changed.

WARNING: NEVER CORRECT SPEEDOMETER READINGS BY CHANGING GEARS UNLESS THE ODOMETER IS ALSO OFF. DRIVE/DRIVEN GEARS

The speedometer/odometer drive gear is located inside the transmission, transaxle or transfer case and is not easily accessed for change. The driven gear rotates the speedometer cable. Rear wheel drive vehicles have several driven gears with various numbers of teeth available to correct input to the speedometer/odometer head. Front wheel drive vehicles generally do not offer different gears for correction.

GENERAL DESCRIPTION

The maximum allowable odometer system accuracy error is +/- 3.75% of the actual distance traveled. Ford Motor vehicles are well within those limits.

The speed indication is biased high, except on police vehicles with certified calibration speedometers/ odometers. As a general rule, the indicated speed is equal to or greater than the actual speed. This is intended to protect the consumer against violating speed laws. Most customer concerns are related to speedometers reading too high at true speeds between 50 MPH and 65 MPH (80 - 105 Km/h). At that speed range, the worst case errors may indicate a speed that is 10% greater than true speed.

The speedometer head is an instrument which processes information sent to it by the rotating speedometer cable. If the system components send the

wrong number of revolution per mile to the speedometer head, an inaccurate speed reading and amount of distanced traveled will be displayed. Since there is no error in the fixed gear ratio of the speedometer head odometer, start by checking the accuracy of the odometer even if the customer concern indicates a speed accuracy problem. Odometer accuracy can be checked by using roads established at mile increments or a known local course. If roads with mile markers are used, a five mile stretch is recommended to allow for inaccuracies. If an error is greater than 3.75%, a change to the transmission drive/driven gear selection, tire size, or tire inflation may need attention. The odometer should be checked again to verify any corrective action. If the indicated speed error exceeds 10% between 50 MPH and 60 MPH (80 - 105 Km/h), replace the speedometer/odometer assembly. Vehicles with transfer cases that have fluctuating readings may be due to slippage of drive gears, parts not splined or loose yoke nuts.

If the vehicle has speed control, the speed accuracy can be checked using the verified odometer vs. time. The formula is as follows:

3600 divided by TIME (seconds to cover one mile) = TRUE MPH (Km/h) EXAMPLES:

60 MPH (96 Km/h) requires 60 seconds to cover one mile

55 MPH (88 Km/h) requires 65 and 3/4 seconds to cover one mile

50 MPH (80 Km/h) requires 72 seconds to cover one mile

ARTICLE SUPERSEDED: 84-14-6, date 7/3/84

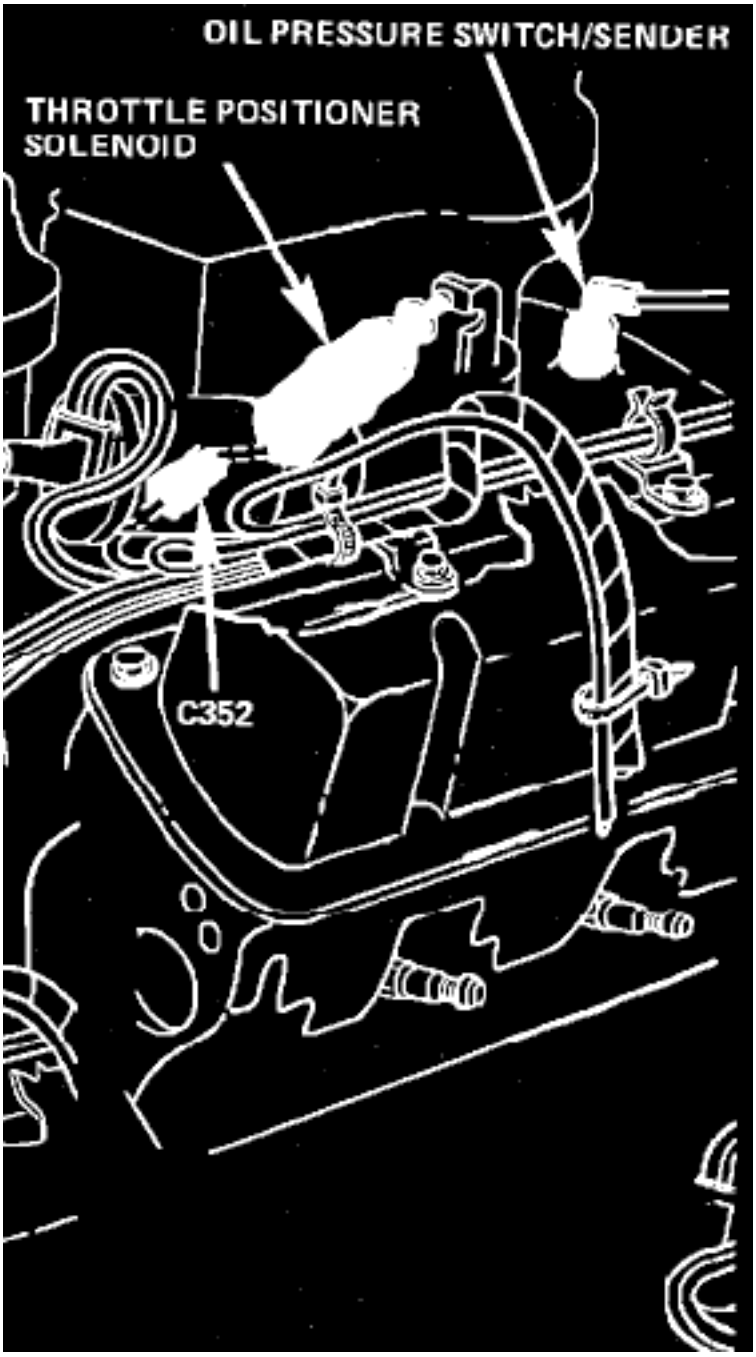
WARRANTY STATUS: "INFORMATION ONLY"

OASIS CODES: 2300, 2310, 2400, 2500

Oil Pressure Gauge: Testing and Inspection

This oil pressure indicating system incorporates an instrument voltage regulator, electrical oil pressure gauge and a sending unit which are connected in series. The sending unit consists of a diaphragm, contact and a variable resistor. As oil pressure increases or decreases, the diaphragm actuated the contact on the variable resistor, in turn controlling current flow to the gauge. When oil pressure is low, the resistance of the variable resistor is high, restricting current flow to the gauge, in turn indicating low oil pressure. As oil pressure increases, the resistance of the variable resistor is lowered, permitting an increased current flow to the gauge, resulting in an increased gauge reading.

TROUBLESHOOTING A special tester is required to diagnose this type gauge. Follow instructions included with the tester.

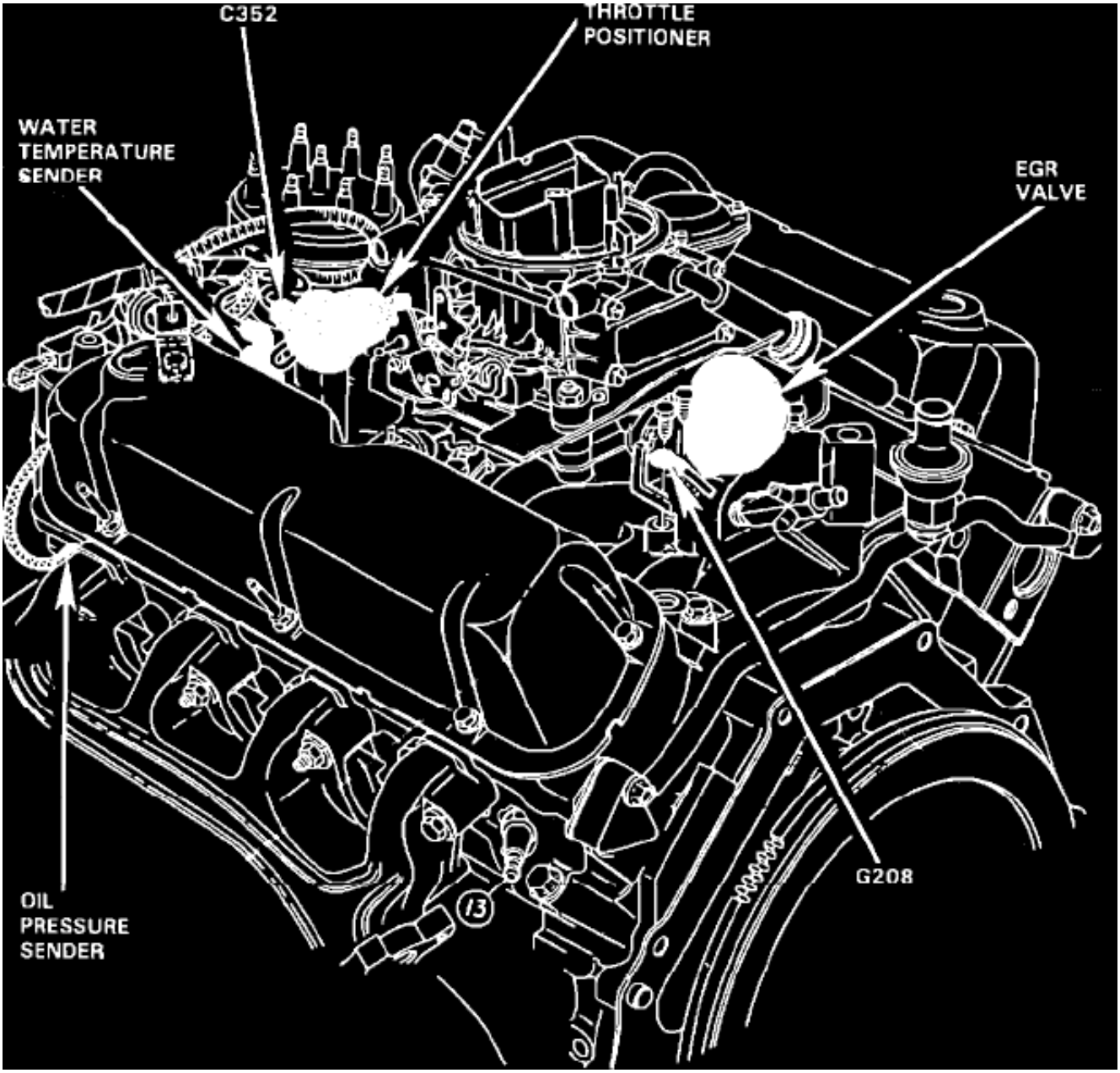


Oil Pressure Sender: Locations

LH Side Of Engine.

Rear Top Of Engine Block

Applicable to: 1981-82 V8-351M/5.8L & V8-400/6.6L Engines



LH Side Of Engine.

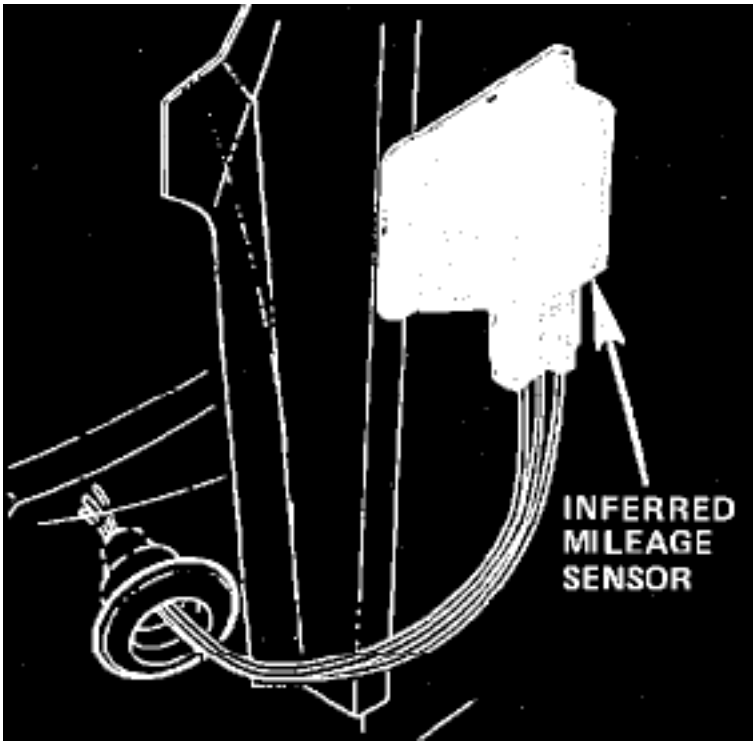
Rear Top Of Engine Block

Applicable to: 1985 V8-351/5.8L Engine w/4 Barrel Carb. Except Calif.

Oil Pressure Warning Lamp/Indicator: Testing and Inspection

Many trucks utilize a warning light on the instrument panel in place of the conventional dash indicating gauge to warn the driver when the oil pressure is dangerously low. The warning light is wired in series with the ignition switch and the engine unit--which is an oil pressure switch. The oil pressure switch contains a diaphragm and a set of contacts. When the ignition switch is turned on, the warning light circuit is energized and the circuit is completed through the closed contacts in the pressure switch. When the engine is started, build-up of oil pressure compresses the diaphragm, opening the contacts, thereby breaking the circuit and putting out the light.

TROUBLESHOOTING The oil pressure warning light should go on when the ignition is turned on. If it does not light, disconnect the wire from the engine unit and ground the wire to the frame or cylinder block. Then if the warning light still does not go on with the ignition switch on, replace the bulb. If the warning light goes on when the wire is grounded to the frame or cylinder block, the engine unit should be checked for being loose or poorly grounded. If the unit is found to be tight and properly grounded, it should be removed and a new one installed. (The presence of sealing compound on the threads of the engine unit will cause a poor ground). If the warning light remains lit when it normally should be out, replace the engine unit before proceeding further to determine the cause for a low pressure indication. The warning light will sometimes light up or flicker when the engine is idling, even though the oil pressure is adequate. However, the light should go out when the engine speed is increased.



Fuel Distance/Mileage Module: Locations

Under LH Side Of I/P.

Under RH Side Of I/P

Applicable to: 1981-83

Door Switch: Locations

LH Lower Cowl, Near Fuse Block

Fuel Gauge Sender: Locations Front Tank Fuel Gauge Sender

On Tank In Front Of Rear Axle

Fuel Gauge Sender: Locations Rear Tank Fuel Gauge Sender

On Tank Behind Rear Axle

Speedometer Cable: Testing and Inspection

The following material covers only that service on speedometers which is feasible to perform. Repairs on the units themselves are not included as they require special tools and extreme care when making repairs and adjustments that only an experienced speedometer mechanic should attempt. The speedometer has two main parts, the speedometer head and the speedometer drive cable. When the speedometer fails to indicate speed or mileage, the cable or cable housing is probably broken. On vehicles are equipped with speed control, there is a speed sensor attached to the transmission. This is used to sense the revolutions of cable assembly and to regulate speed control.

SPEEDOMETER CABLE Most cables are broken due to lack of lubrication, or a sharp bend or kink in the housing. A cable might break because of the speedometer head mechanism binds. In such cases, the speedometer head should be repaired or replaced before a new cable or housing is installed. A ``jumpy'' pointer condition, together with a scraping noise, is due, in most instances, to a dry or kinked speedometer cable. The kinked cable rubs on the housing and winds up, slowing down the pointer. The cable then unwinds and the pointer ``jumps.'' To check for kinks, remove the cable, lay it on a flat surface and twist one end with the fingers. If it turns over smoothly the cable is not kinked. But if part of the cable flops over as it is twisted, the cable is kinked and should be replaced.

LUBRICATION The speedometer cable should be lubricated with special cable lubricant. Fill the ferrule on the upper end of the housing with the cable lubricant. Insert the cable in the housing, starting at the upper end. Turn the cable around carefully while feeding it into the housing. Repeat filling the ferrule except for the last six inches of cable. Too much lubricant at this point may cause the lubricant to work into the speedometer head.

INSTALLING CABLE During installation, if the cable sticks when inserted in the housing and will not go through, the housing is damaged inside or kinked. Be sure to check the housing from one end to the other. Straighten any sharp bends by relocating clamps or elbows. Replace housing if it is badly kinked or broken. Position the cable and housing so that they lead into the head as straight as possible. Check the new cable for kinks before installing it. Use wide, sweeping, gradual curves where the cable comes out of the transmission and connects to the head so the cable will not be damaged during installation. Arrange the housing so it does not lean against the engine because heat from the engine may dry out the lubricant. If inspection indicates that the cable and housing are in good condition, yet pointer action is erratic, check the speedometer head for possible binding. The speedometer drive pinion should also be checked. If the pinion is dry or its teeth are stripped, the speedometer may not register properly.

Speedometer Head: Technical Service Bulletins Speedometer/Odometer - Inaccurate Readings

SPEEDOMETER - MECHANICAL/ELECTRONIC - INACCURATE SPEED READINGS AND ODOMETER READINGS

Article No. 89-2-7

FORD: 1989 AND PRIOR ALL CAR LINES

LINCOLN-MERCURY: 1989 AND PRIOR ALL CAR LINES

LIGHT TRUCK: 1989 AND PRIOR ALL TRUCK LINES

ISSUE: The accuracy of speedometer/odometer readings may be influenced by several vehicle components or systems. The information in this TSB article is intended to assist technicians in speedometer/odometer concern diagnosis.

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OPERATION

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Electronic digital operation is similar. It could use a drive cable or a speed sensor to drive the speedometer/odometer. An electronic signal is sent from a speed sensor to the digital speedometer/ odometer assembly. The speed sensor is driven by a transmission or a transaxle, similar to a cable.

Several areas of concern that may affect speedometer/ odometer readings are tires, axle gear ratio and speedometer/odometer drive and driven gears.

TIRES

Improper tire rolling radius and inflation pressure, temperature and size may contribute to inaccurate system readings. System accuracy testing should be performed after the tires are set at the correct pressure as shown on the safety compliance certification label. The tires should be warmed for a short period. Best results are obtained on smooth, dry pavement while driving at a constant speed within the posted speed limit.

AXLE/TRANSAXLE RATIO

The gear ratio of the rear axle or the final drive ratio of the transaxle must be known to select or check if the proper speedometer/odometer drive and driven gears are present. Various gear ratios are available, but usually are not a concern when dealing with speedometer/odometer concerns unless the gear ratio has been changed.

WARNING: NEVER CORRECT SPEEDOMETER READINGS BY CHANGING GEARS UNLESS THE ODOMETER IS ALSO OFF. DRIVE/DRIVEN GEARS

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GENERAL DESCRIPTION

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50 MPH (80 Km/h) requires 72 seconds to cover one mile

ARTICLE SUPERSEDED: 84-14-6, date 7/3/84

WARRANTY STATUS: "INFORMATION ONLY"

OASIS CODES: 2300, 2310, 2400, 2500

Temperature Gauge: Testing and Inspection Dash Gauge Test

Gauge failures are often caused by defective wiring or grounds. The first step in locating trouble should be a thorough inspection of all wiring, terminals and printed circuits. If wiring is secured by clamps, check to see whether the insulation has been severed, thereby grounding the wire. In the case of a fuel gauge installation, rust may cause failure by corrosion at the ground connection of the tank unit. The Constant Voltage Regulator (CVR) type indicator is a bimetal-resistance type system consisting of an Instrument Voltage Regulator (IVR), an indicator gauge, and a variable resistance sending unit. Current to the system is applied to the gauge terminals by the IVR, which maintains an average-pulsating value of 5 volts. The indicator gauge consists of a pointer which is attached to a wire-wound bimetal strip. Current passing through the coil heats the bimetal strip, causing the pointer to move. As more current passes through the coil, heat increases, moving the pointer farther. The circuit is completed through a sending unit which contains a variable resistor. When resistance is high, less current is allowed to pass through the gauge, and the pointer moves very little. As resistance decreases due to changing conditions in system being monitored, more current passes through gauge coil, causing pointer to move farther. Do not apply battery voltage to system or ground output terminals of IVR, as damage to system components or wiring circuits may result.

DASH GAUGE TEST

1. Disconnect battery ground cable and remove gauge from vehicle.

2. Connect ohmmeter between gauge terminals and read coil winding resistance.

3. An upward movement of ohmmeter needle from 10 ohms to 14 ohms is normal, as test current of ohmmeter causes a temperature rise in gauge coil windings.

4. If ohmmeter reads below 10 ohms or above 14 ohms, gauge is defective.

Temperature Gauge: Testing and Inspection Electrical Temperature Gauges

This temperature indicating system consists of a sending unit, located on the cylinder head, electrical temperature gauge and an instrument voltage regulator. As engine temperature increases or decreases, the resistance of the sending unit changes, in turn controlling current flow to the gauge. When engine temperature is low, the resistance of the sending unit is high, restricting current flow to the gauge, in turn indicating low engine temperature. As engine temperature increases, the resistance of the ending unit decreases, permitting an increased current flow to the gauge, resulting in an increased temperature reading.

TROUBLESHOOTING A special tester is required to diagnose this type gauge. Follow instructions included with the tester.

Temperature Sensor (Gauge): Technical Service Bulletins Temperature Gauge - Reads Low/Erratic

Article No. 95-13-2

07/03/95

^ GAUGE - TEMPERATURE-READS IN LOW RANGE - ERRATIC READINGS

^ SERVICE PARTS - RETURN OF OBSOLETE TEMPERATURE SENDERS

FORD: 1981-94 ESCORT 1981-95 MUSTANG, THUNDERBIRD 1983-95 CROWN VICTORIA 1984-94 TEMPO 1986-95 TAURUS

LINCOLN-MERCURY: 1981-92 TOWN CAR 1981-95 COUGAR 1983-95 GRAND MARQUIS 1984-92 MARK VII 1984-94 TOPAZ 1986-95 SABLE 1987-89 TRACER 1991-94 TRACER 1993-95 MARK VIII

LIGHT TRUCK: 1982-95 BRONCO 1983-95 RANGER 1986-94 AEROSTAR 1990-95 F-150-350 SERIES 1991-95 EXPLORER 1992-95 ECONOLINE 1995 WINDSTAR

ISSUE: Temperature Sender F1SZ-10884-A with a build date code prior to 2774 (277th day of 1994) should be purged from your inventory and returned to your facing PDC. These parts are being made obsolete because of an incorrect crimp during assembly. Installing these parts on a vehicle could result in early loss of temperature sender function.

ACTION: Remove and return the suspect parts from your dealership's inventory. The obsolete parts should be withdrawn from your inventory and returned to your facing PDC within 30 days of this TSB.

NOTE:

USE TSB ARTICLE 93-24-8 FOR DIAGNOSIS PROCEDURE IN DETERMINING IF LOW GAUGE READINGS COULD BE ASSOCIATED WITH A TEMPERATURE SENDER CONCERN.

1. Perform 100% sort of all stock on hand.

2. Suspect stock has a build date code prior to 2774. Usable stock will have a build date code of 2774 or later.

NOTE:

DATE CODES ARE LOCATED ON THE SIDE OF THE SENDER HEX.

3. Usable stock can be returned to your inventory and released for normal sales.

4. Return suspect part (F1SZ-10884-A) to your facing PDC using the least expensive transportation.

5. If claim is processed electronically via DOES II, use return code "GB"; otherwise, complete a separate paper claim form FPS-340 using return code "J".

6. In the Remarks Section, write "Returned per TSB 95-13-2".

LIMITS

^ The returns must be received within 30 days from the date of this TSB.

^ Returns are restricted to the subject parts.

^ The parts returned must have been purchased from FCSD in accordance with Policy and Procedure Bulletin 4000.

CREDIT

Credit for parts and prepaid freight costs will be issued.

Replacement stock is available for ordering

PART NUMBER PART NAME

F1SZ-10884-A Temperature Sender

OTHER APPLICABLE ARTICLES: 93-24-8

WARRANTY STATUS: INFORMATION ONLY

OASIS CODES: 203000, 203200, 204000, 204200, 402000

Temperature Warning Lamp/Indicator: Testing and Inspection

A bimetal temperature switch located in the cylinder head control the operation of a temperature indicator light with a red lens. If the engine cooling system is not functioning properly and coolant temperature exceeds a predetermined value, the warning light will illuminate.

TROUBLESHOOTING If the red light is not lit when the engine is being cranked, check for a burned out bulb, an open in the light circuit, or a defective ignition switch. If the red light is lit when the engine is running, check the wiring between light and switch for a ground, defective temperature switch, or overheated cooling system. As a test circuit to check whether the red bulb is functioning properly, a wire which is connected to the ground terminal of the ignition switch is tapped into its circuit. When the ignition is in the ``Start'' (engine cranking) position, the ground terminal is grounded inside the switch and the red bulb will be lit. When the engine is started and the ignition switch is in the ``On'' position, the test circuit is opened and the bulb is then controlled by the temperature switch.

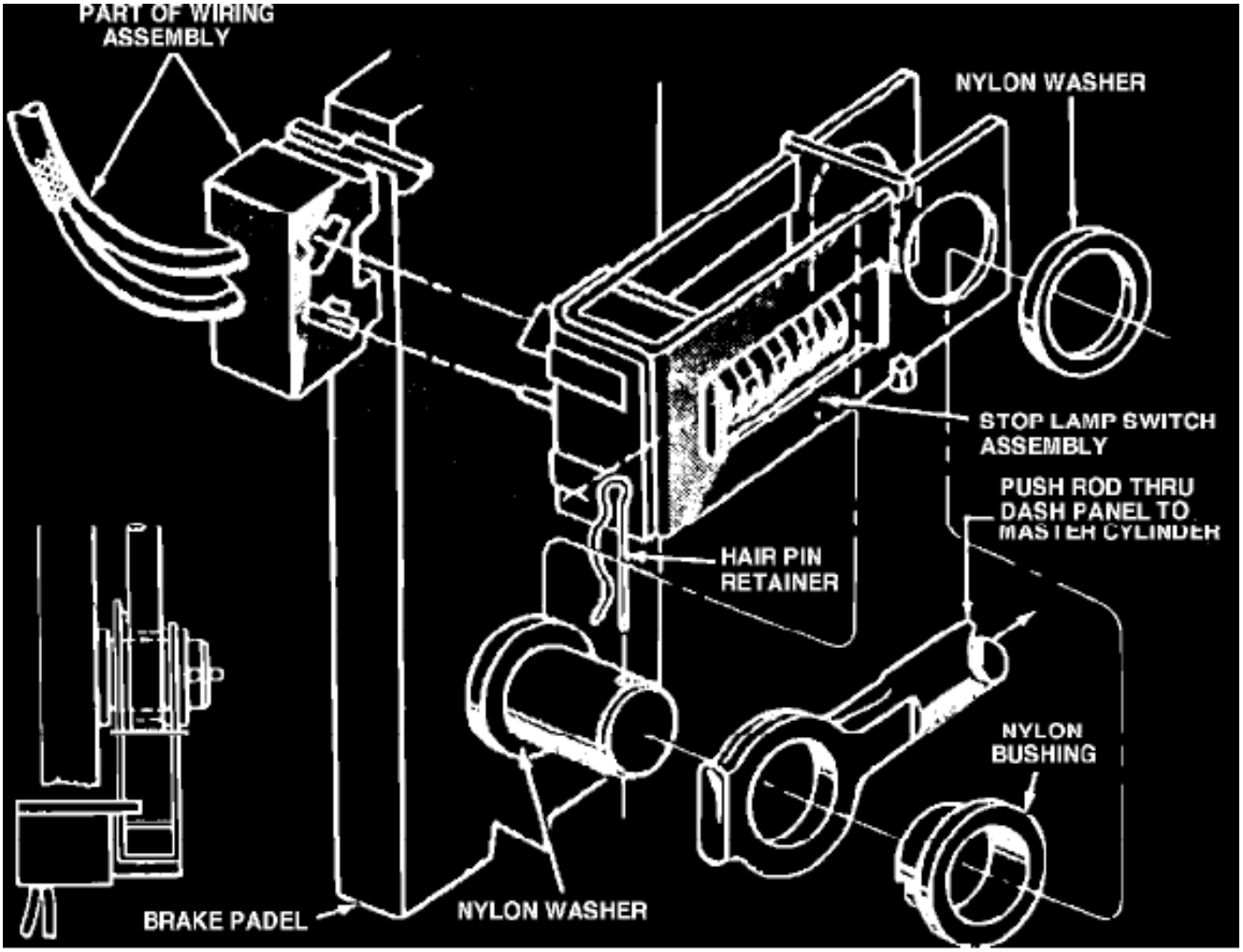
Volt Meter Gauge: Testing and Inspection

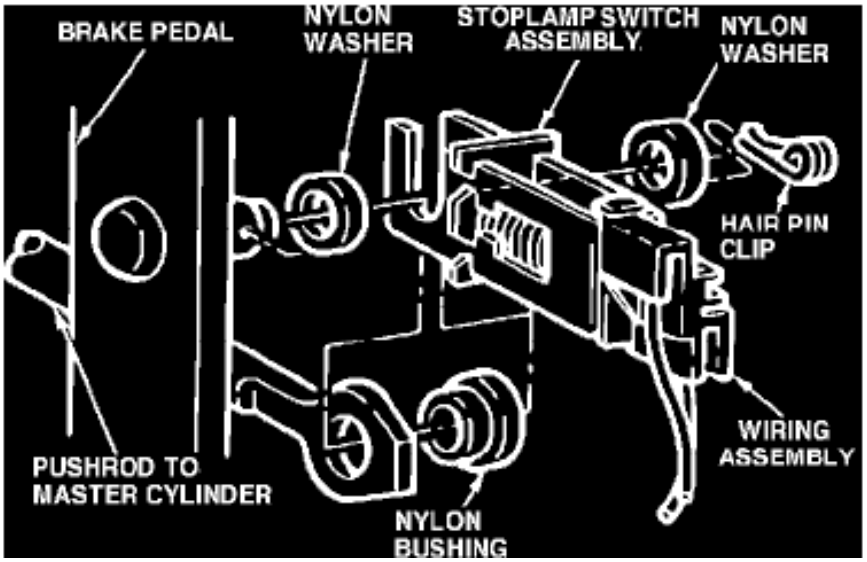
The voltmeter is a gauge which measures the electrical flow from the battery to indicate whether the battery output is within tolerances. The voltmeter reading can range from 13.5---14.0 volts under normal operating conditions. If an undercharge or overcharge condition is indicated for an extended period, the battery and charging system should be checked.

TROUBLESHOOTING To check voltmeter, turn key and headlights on with engine off. Pointer should move to 12.5 volts. If no needle movement is observed, check connections from battery to circuit breaker. If connections are tight and meter shows no movement, check wire continuity. If wire continuity is satisfactory, the meter is inoperative and must be replaced.

Brake Light Switch: Locations

At Top Of Brake Pedal


PART OF WIRING ASSEMBLY
NYLON WASHER
STOP LAMP SWITCH ASSEMBLY
PUSH ROD THRU DASH PANEL TO MASTER CYLINDER
HAIR PIN RETAINER
NYLON BUSHING
BRAKE PADEL
NYLON WASHER


BRAKE PEDAL
NYLON WASHER
STOPLAMP SWITCH ASSEMBLY
NYLON WASHER
HAIR PIN CLIP
WIRING ASSEMBLY
PUSHROD TO MASTER CYLINDER
NYLON BUSHING

Brake Light Switch: Service and Repair

Fig. 6 Stop light switch replacement. Exc. 1980---83 E-100 w/manual brakes.

Fig. 7 Stop light switch replacement. 1980---83 E-100 w/manual brakes

1. Disconnect battery ground cable.

2. Disconnect electrical connector from switch, Figs. 6 and 7.

3. Remove hairpin retainer, then slide stop light switch, pushrod, nylon washers and bushings away from pedal and remove the switch from vehicle.

4. Reverse procedure to install. Ensure stop light switch wires are of sufficient length to allow full travel of the brake pedal.

Clearance Lamp: Locations

On Dash Panel Below Junction Block

Door Switch: Locations

LH Lower Cowl, Near Fuse Block

Fog/Driving Lamp Relay: Locations

Behind LH Side Of I/P

Fog/Driving Lamp Switch: Locations

Behind LH Side Of I/P

Headlamp Dimmer Switch: Locations

On Floor Pan, LH Side Of Cab

Headlamp Switch: Technical Service Bulletins Headlamp Light Switch - Schematic Revision

Article No. 91-11B-35

06/14/91

^ ELECTRICAL/VACUUM TROUBLESHOOTING MANUAL - 1981 - PAGES 40 AND 41 - EXTERIOR LIGHTS CONNECTIONS TO LIGHT SWITCH REVISED

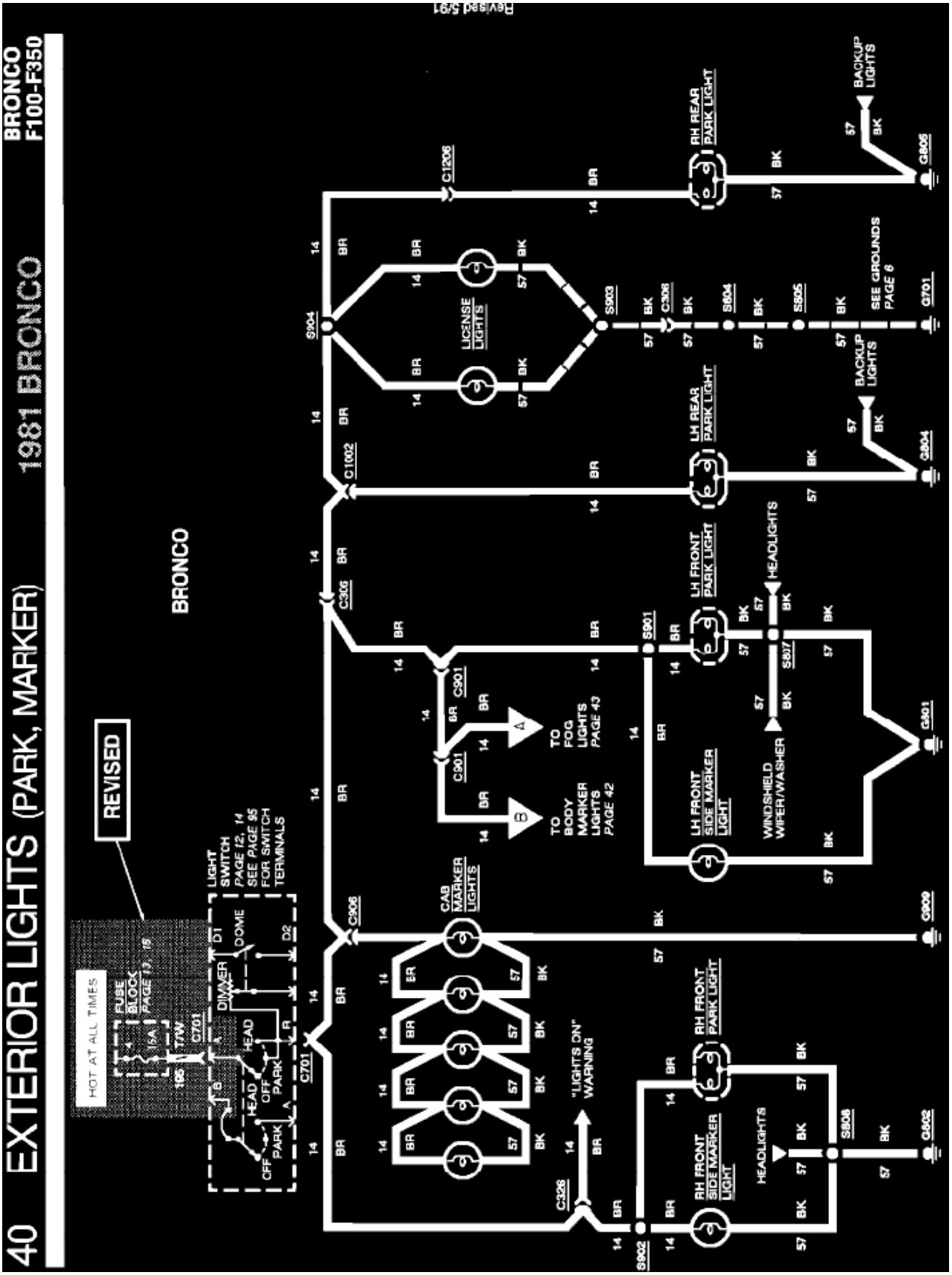
^ ELECTRICAL/VACUUM TROUBLESHOOTING MANUAL - 1982 - PAGE 40 - EXTERIOR LIGHTS CONNECTIONS TO LIGHT SWITCH REVISED

^ ELECTRICAL/VACUUM TROUBLESHOOTING MANUAL - 1984 - PAGE 34 - EXTERIOR LIGHTS CONNECTIONS TO LIGHT SWITCH REVISED

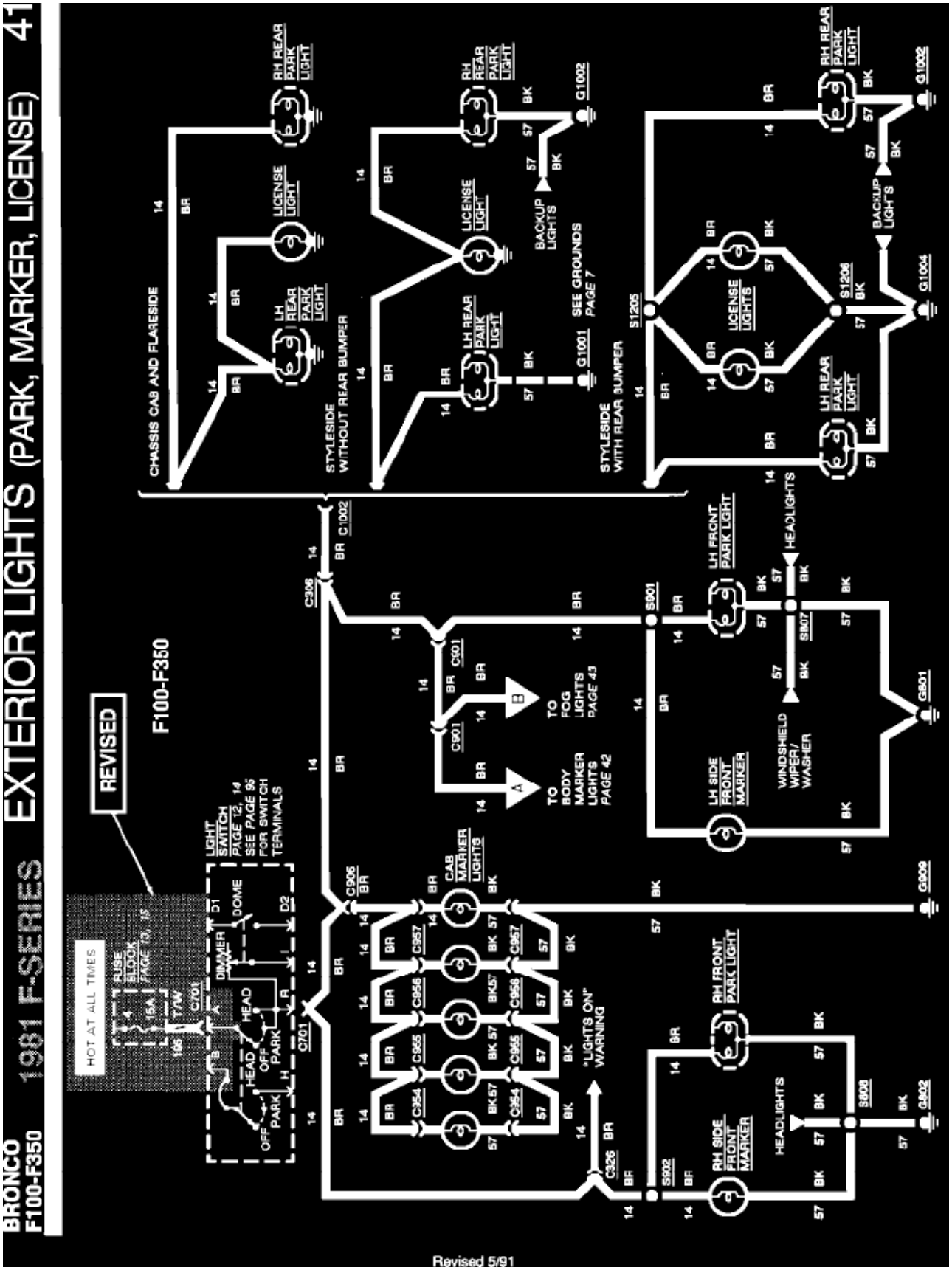
^ ELECTRICAL/VACUUM TROUBLESHOOTING MANUAL - 1985 - PAGE 34 - EXTERIOR LIGHTS CONNECTIONS TO LIGHT SWITCH REVISED

LIGHT TRUCK: 1981 F-150-350 SERIES 1981-82 BRONCO 1984-85 ECONOLINE

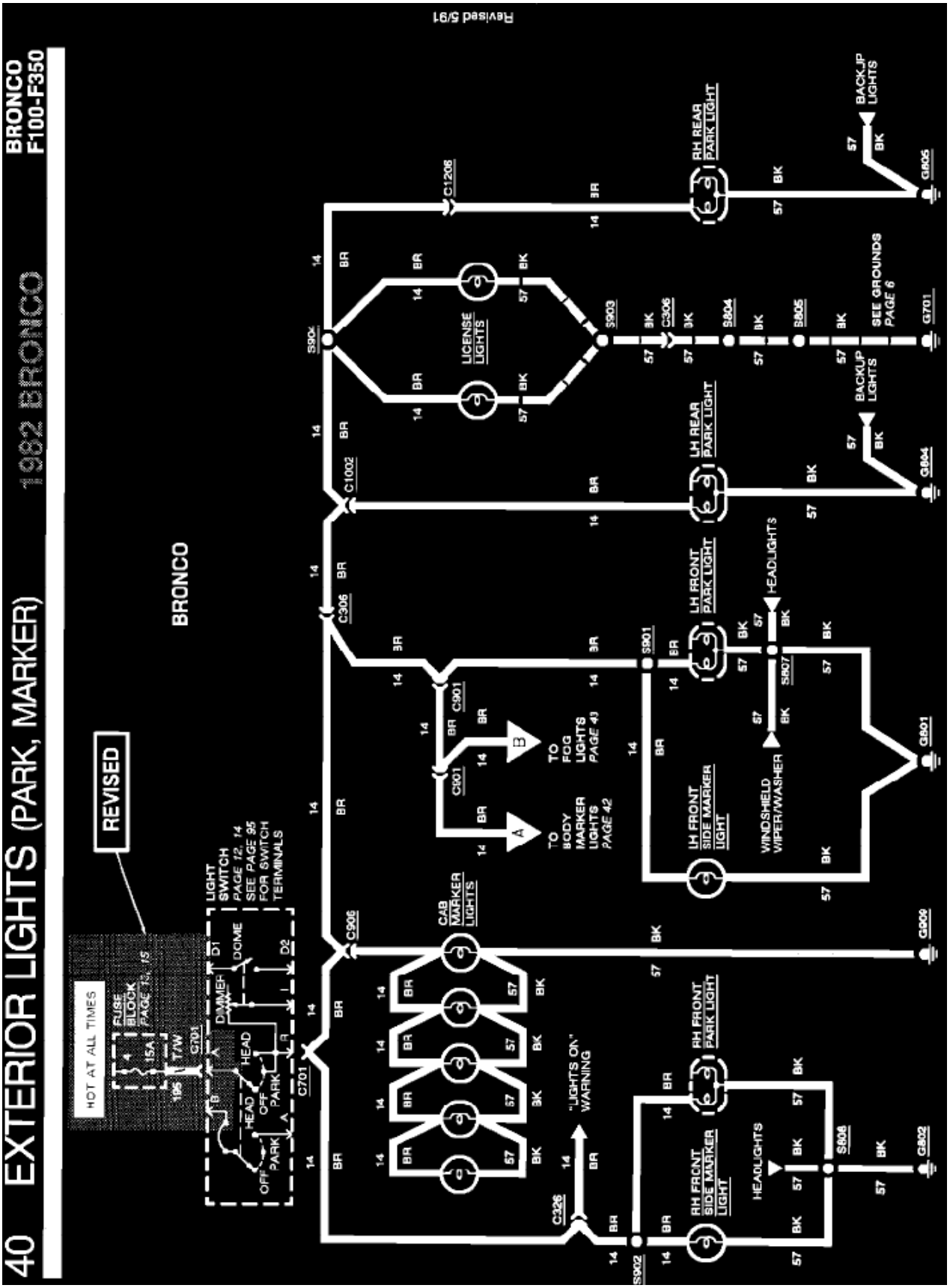
ISSUE: The connections of Exterior Lights (Marker, Park, License) to the Light Switch are inaccurately shown in the schematics of the following Electrical/Vacuum Troubleshooting Manuals:

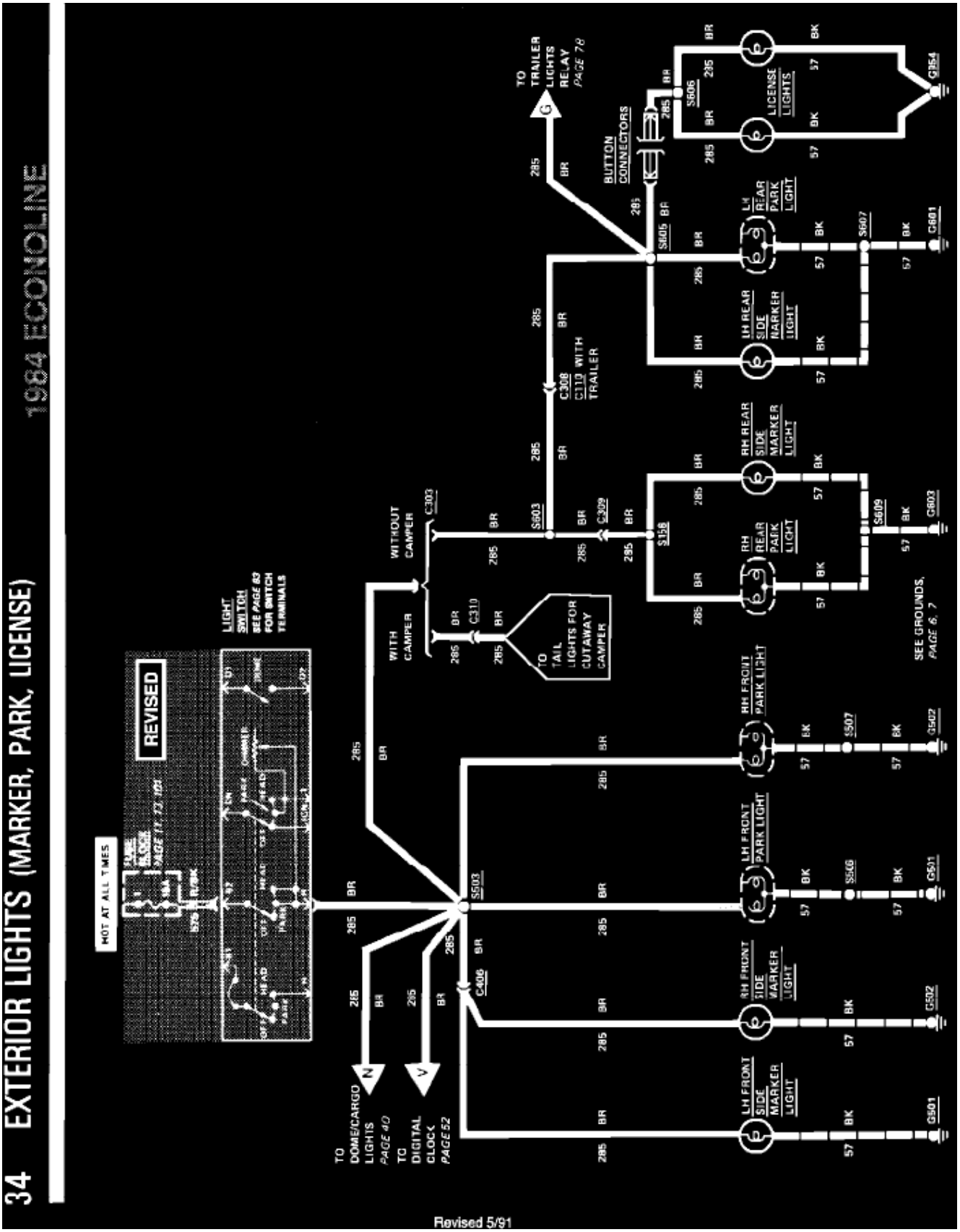

40 EXTERIOR LIGHTS (PARK, MARKER)
1981 BRONCO
BRONCO F100-F350
BRONCO
REVISED
HOT AT ALL TIMES
FUSE BLOCK PAGE 13, 15
15A
T/W
195
C701
DIMMER
DOME
HEAD
OFF
PARK
LIGHT SWITCH PAGE 12, 14 SEE PAGE 95 FOR SWITCH TERMINALS
CAB MARKER LIGHTS
"LIGHTS ON" WARNING
TO BODY MARKER LIGHTS PAGE 42
TO FOG LIGHTS PAGE 43
LICENSE LIGHTS
RH FRONT SIDE MARKER LIGHT
RH FRONT PARK LIGHT
LH FRONT SIDE MARKER LIGHT
LH FRONT PARK LIGHT
LH REAR PARK LIGHT
RH REAR PARK LIGHT
HEADLIGHTS
WINDSHIELD WIPER/WASHER
BACKUP LIGHTS
SEE GROUNDS PAGE 6
G902
G904
G901
G909
G804
G701
G805
S902
S904
S903
S808
S901
S817
S804
S805
C306
C1002
C1206
C326
C308
C901

Ford Bronco Workshop Manual (V8-351 5.8L VIN G 2-bbl (1982))
Ford Workshop Manuals > Lighting and Horns > Headlamp > Headlamp Switch > Component Information > Technical Service Bulletins > Headlamp Light Switch - Schematic Revision > Page 3487

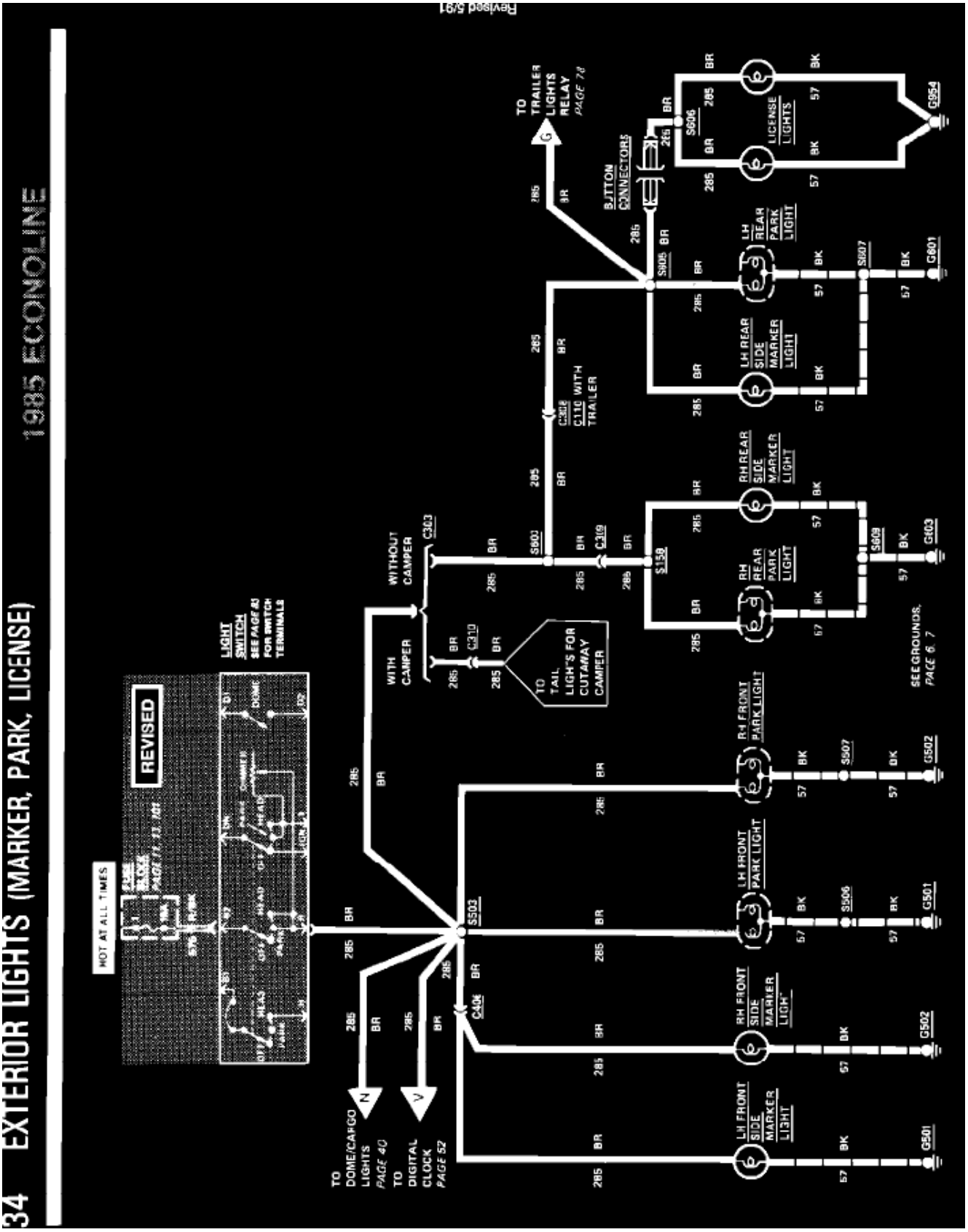


^ 1981 Bronco/F-Series Pages 40 and 41


40 EXTERIOR LIGHTS (PARK, MARKER)
1982 BRONCO
BRONCO F100-F350
Revised 5/91
REVISED
BRONCO
HOT AT ALL TIMES
FUSE BLOCK PAGE 13, 15
15A
T/W
C701
195
LIGHT SWITCH PAGE 12, 14
SEE PAGE 95 FOR SWITCH TERMINALS
DIMMER
DOME
HEAD
OFF
PARK
D1
D2
CAB MARKER LIGHTS
C906
C901
TO BODY MARKER LIGHTS PAGE 42
TO FOG LIGHTS PAGE 43
"LIGHTS ON" WARNING
C326
S902
RH FRONT SIDE MARKER LIGHT
RH FRONT PARK LIGHT
HEADLIGHTS
S808
G802
S901
LH FRONT SIDE MARKER LIGHT
LH FRONT PARK LIGHT
WINDSHIELD WIPER/WASHER
S807
G801
C306
C1002
LH REAR PARK LIGHT
BACKUP LIGHTS
S804
G804
S805
SEE GROUNDS PAGE 6
G701
S903
LICENSE LIGHTS
C306
C1206
RH REAR PARK LIGHT
BACKUP LIGHTS
G805


34 EXTERIOR LIGHTS (MARKER, PARK, LICENSE)
1984 ECONOLINE
REVISED
HOT AT ALL TIMES
LIGHT SWITCH
SEE PAGE 83 FOR SWITCH TERMINALS
WITH CAMPER
WITHOUT CAMPER
TO TAIL LIGHTS FOR CUTAWAY CAMPER
TO TRAILER LIGHTS RELAY PAGE 78
BUTTON CONNECTORS
LH FRONT SIDE MARKER LIGHT
RH FRONT SIDE MARKER LIGHT
LH FRONT PARK LIGHT
RH FRONT PARK LIGHT
LH REAR SIDE MARKER LIGHT
RH REAR SIDE MARKER LIGHT
LH REAR PARK LIGHT
RH REAR PARK LIGHT
LICENSE LIGHTS
TO DOME/CARGO LIGHTS PAGE 40
TO DIGITAL CLOCK PAGE 52
SEE GROUNDS, PAGE 6, 7
Revised 5/91

Ford Bronco Workshop Manual (V8-351 5.8L VIN G 2-bbl (1982))
Ford Workshop Manuals > Lighting and Horns > Headlamp > Headlamp Switch > Component Information > Technical Service Bulletins > Headlamp Light Switch - Schematic Revision > Page 3490



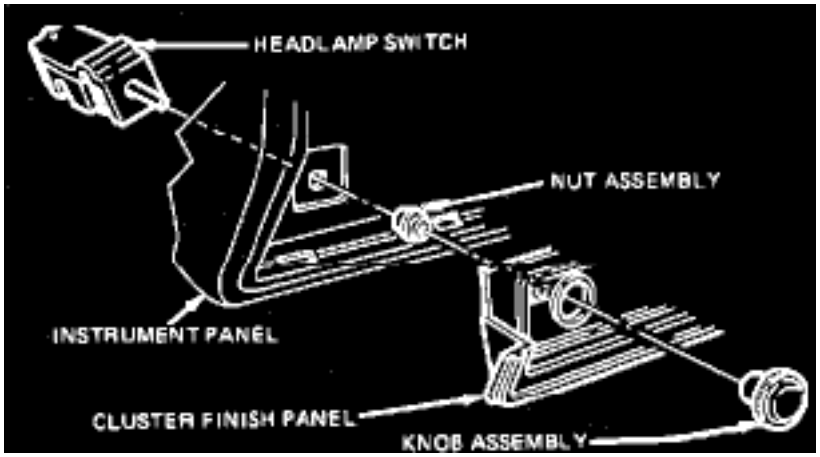
^ 1985 Econoline Page 34

ACTION: Refer to the pages in this TSB article for the revised schematics.

OTHER APPLICABLE ARTICLES: NONE

WARRANTY STATUS: INFORMATION ONLY

OASIS CODES: 290000



Headlamp Switch: Service and Repair

Fig. 6 Light Switch

F-100---350 & BRONCO

1. Disconnect battery ground cable.

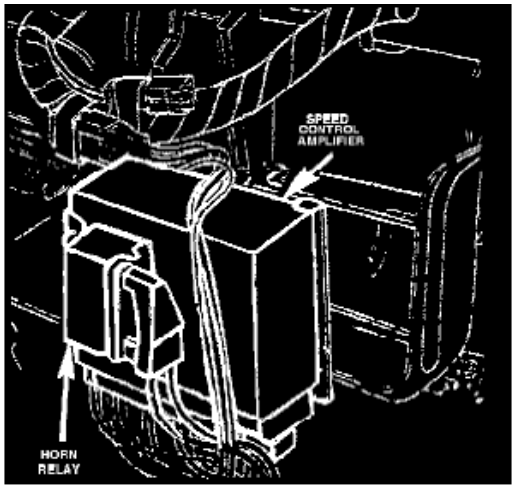
2. Remove knobs from headlight switch, windshield wiper switch and fog light switch (if equipped). Use a suitable hook tool to release each knob lock tab.

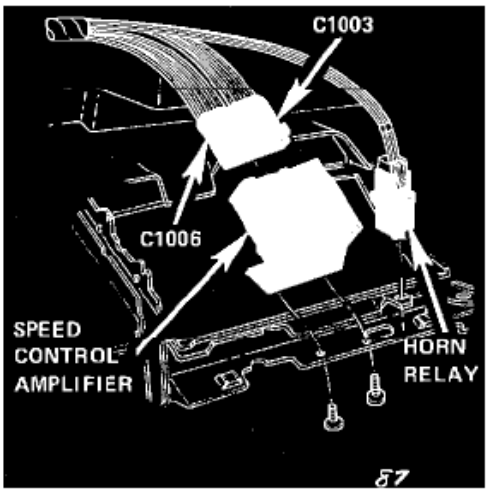
3. Remove steering column shroud, then the cluster finish panel assembly, Fig. 5.

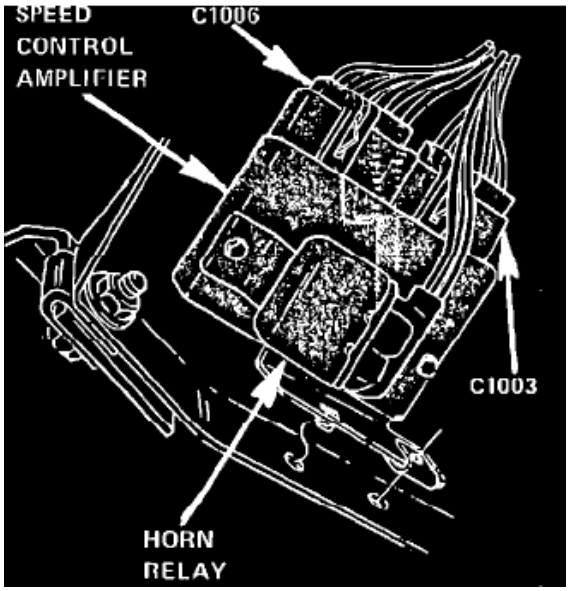
4. Remove switch attaching nut, Fig. 5.

5. Disconnect electrical connector from switch and remove switch from vehicle.

6. Reverse procedure to install.


SPEED
CONTROL
AMPLIFIER
HORN
RELAY


C1003
C1006
SPEED
CONTROL
AMPLIFIER
HORN
RELAY

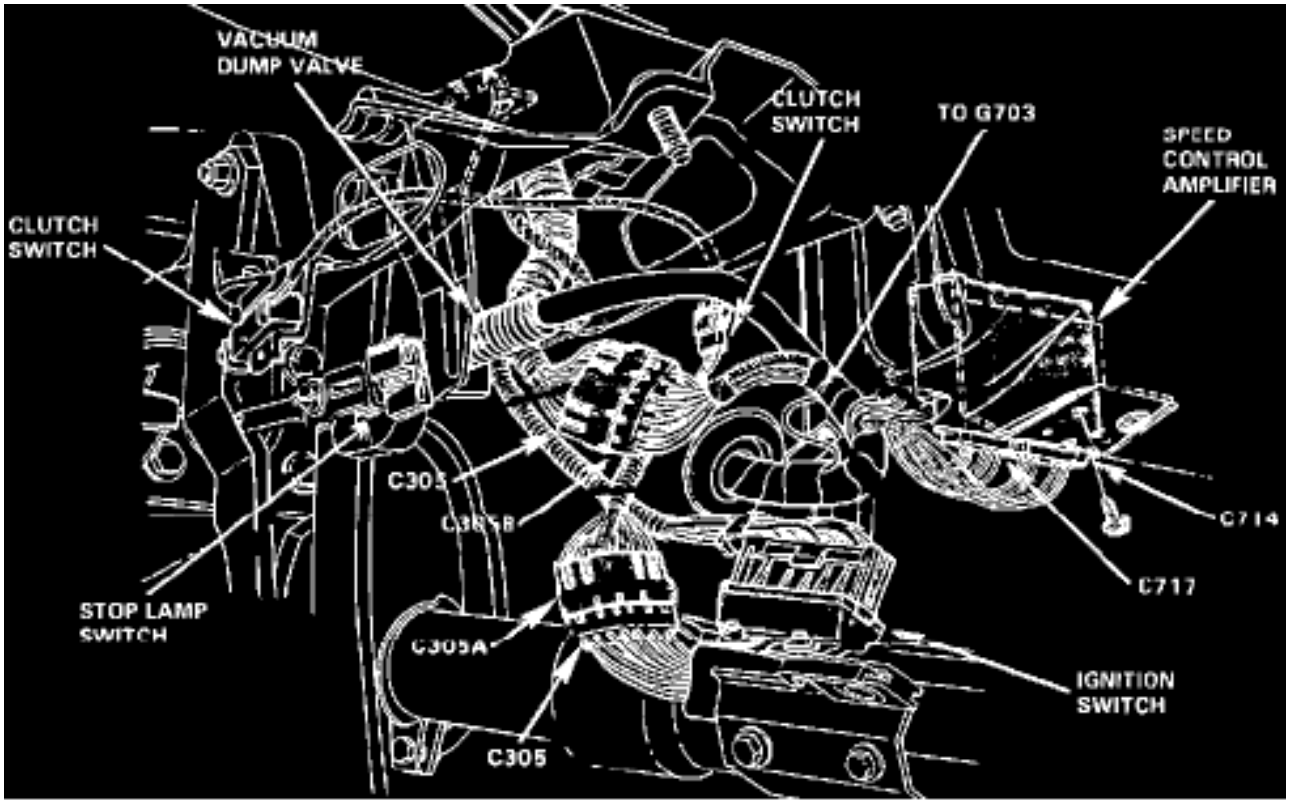

SPEED
CONTROL
AMPLIFIER
C1006
C1003
HORN
RELAY

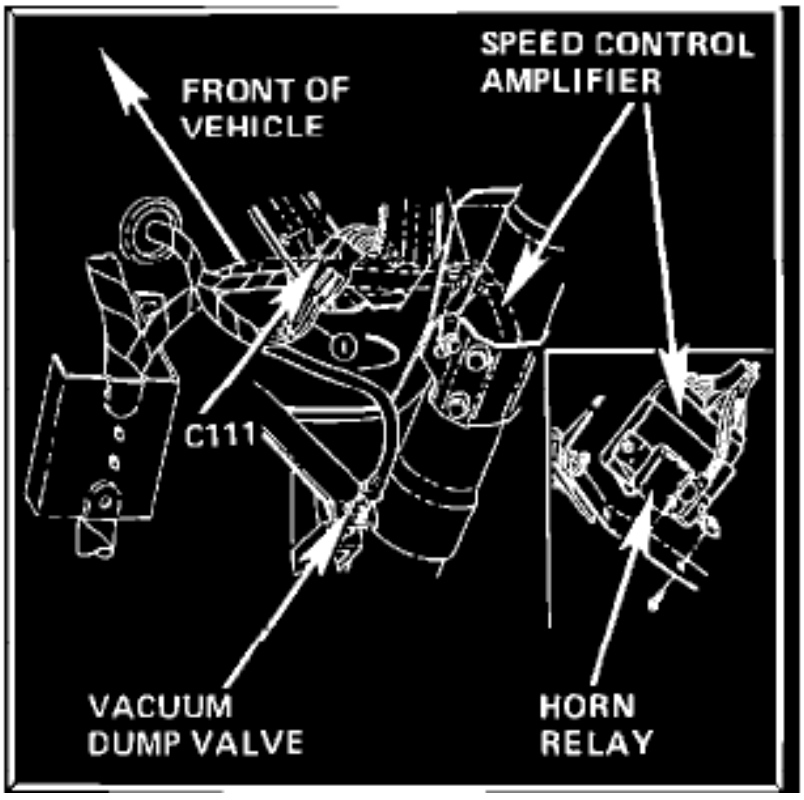
Horn Relay: Locations

Horn Relay Location

Under LH Side Of I/P.

Under LH Side Of I/P, With Speed Control


VACUUM
DUMP VALVE
CLUTCH
SWITCH
TO G703
SPEED
CONTROL
AMPLIFIER
CLUTCH
SWITCH
C305
C714
C717
STOP LAMP
SWITCH
C305A
IGNITION
SWITCH
C305

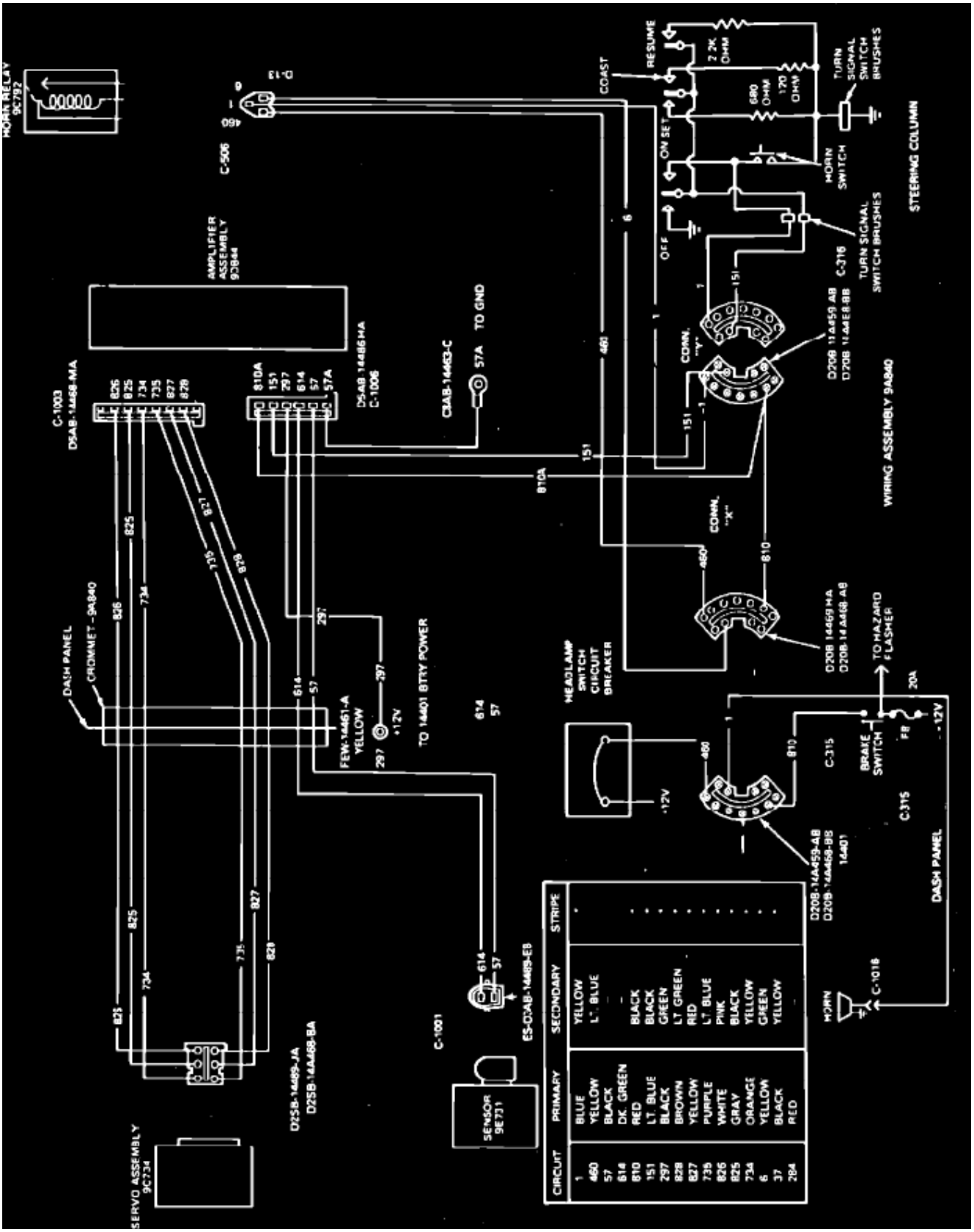

SPEED CONTROL
AMPLIFIER
FRONT OF
VEHICLE
C111
VACUUM
DUMP VALVE
HORN
RELAY

Underneath LH Side Of I/P

Below LH Side Of I/P

Horn Relay With Speed Control

Bronco F-150 thru F-350, E-150 thru E-350 and Super F Series The horn relay is use on vehicles equipped with speed control and is located under the left side of the instrument panel, left of the steering column and is mounted on the outboard attaching screw of the speed control amplifier module.


HORN RELAY 9C792
AMPLIFIER ASSEMBLY 9D844
C-1003 D5AB-14486-MA
D5AB-14486-MA C-1006
CRUISE CONTROL SERVO ASSEMBLY 9C734
SENSOR 9E731
C-1001
D25B-14489-JA D25B-14A488-BA
ES-D3AB-14489-EB
DASH PANEL
CRUISE CONTROL - 9A840
FEN-14461-A YELLOW
TO 14401 BTTY POWER
HEADLAMP SWITCH CIRCUIT BREAKER
C-506
D-13
COAST
RESUME
ON SET
OFF
2.2K OHM
680 OHM
170 OHM
TURN SIGNAL SWITCH BRUSHES
HORN SWITCH
STEERING COLUMN
TURN SIGNAL SWITCH BRUSHES
C-316
CONN. "Y"
CONN. "X"
D208 14459 AB D208 14A468 BB
D208 14469 HA D208 14A468 AB
WIRING ASSEMBLY 9A840
TO HAZARD FLASHER
BRAKE SWITCH
C-315
F8
20A
-12V
TO GND
57A
810A
151
297
614
57
825
826
827
828
734
735
820
460
810
1
6
CIRCUIT | PRIMARY | SECONDARY STRIPE
1 BLUE YELLOW
460 YELLOW BLACK
57 BLACK DK. GREEN
614 DK. GREEN RED
810 RED LT. BLUE
151 LT. BLUE BLACK
297 BLACK BROWN
828 BROWN YELLOW
827 YELLOW PURPLE
735 PURPLE WHITE
826 WHITE GRAY
825 GRAY ORANGE
734 ORANGE YELLOW
6 YELLOW BLACK
37 BLACK RED
284 RED YELLOW
YELLOW L. BLUE
BLACK BLACK
GREEN LT. GREEN
RED LT. BLUE
PINK BLACK
YELLOW GREEN
GREEN YELLOW
D208-14A459-AB D208-14A468-BB 14401
HORN C-1018
DASH PANEL

Horn Relay: Testing and Inspection

Fig. 3 Speed control wiring diagram. 1981---83 E-100-350 & 1984-87 E-150-350

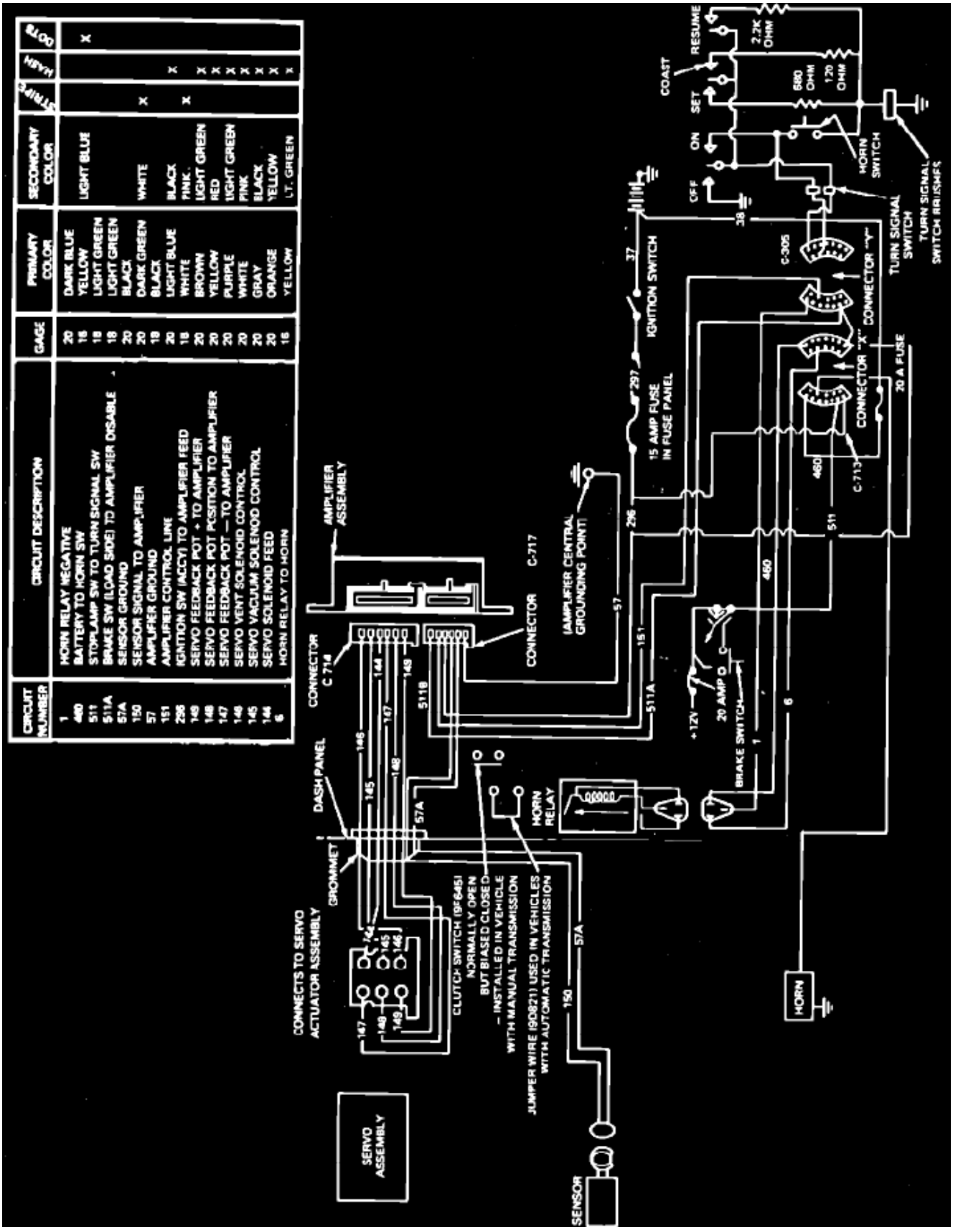

CIRCUIT NUMBER
CIRCUIT DESCRIPTION
GAGE
PRIMARY COLOR
SECONDARY COLOR
TURN
HAZ
STOP
1 HORN RELAY NEGATIVE 20 DARK BLUE
460 BATTERY TO HORN SW 18 YELLOW
511 STOPLAMP SW TO TURN SIGNAL SW 18 LIGHT GREEN
511A BRAKE SW (LOAD SIDE) TO AMPLIFIER DISABLE 18 LIGHT GREEN LIGHT BLUE X
57A SENSOR GROUND 20 BLACK
150 SENSOR SIGNAL TO AMPLIFIER 20 DARK GREEN WHITE X
57 AMPLIFIER GROUND 18 BLACK
151 AMPLIFIER CONTROL LINE 20 LIGHT BLUE BLACK X
296 IGNITION SW (ACCY) TO AMPLIFIER FEED 18 WHITE PINK X X
149 SERVO FEEDBACK POT + TO AMPLIFIER 20 BROWN LIGHT GREEN X X
148 SERVO FEEDBACK POT POSITION TO AMPLIFIER 20 YELLOW RED X X
147 SERVO FEEDBACK POT — TO AMPLIFIER 20 PURPLE LIGHT GREEN X X
146 SERVO VENT SOLENOID CONTROL 20 WHITE PINK X X
145 SERVO VACUUM SOLENOID CONTROL 20 GRAY BLACK X X
144 SERVO SOLENOID FEED 20 ORANGE YELLOW X X
6 HORN RELAY TO HORN 16 YELLOW LT. GREEN X
AMPLIFIER ASSEMBLY
CONNECTOR C 714
CONNECTOR C-717
AMPLIFIER CENTRAL GROUNDING POINT
15 AMP FUSE IN FUSE PANEL
IGNITION SWITCH
DASH PANEL
GROMMET
CONNECTS TO SERVO ACTUATOR ASSEMBLY
SERVO ASSEMBLY
CLUTCH SWITCH (SF6451) NORMALLY OPEN BUT BIASED CLOSED — INSTALLED IN VEHICLE WITH MANUAL TRANSMISSION
JUMPER WIRE (19D921) USED IN VEHICLES WITH AUTOMATIC TRANSMISSION
HORN RELAY
+12V
20 AMP
BRAKE SWITCH
SENSOR
HORN
COAST
RESUME
SET
ON
OFF
2.2K OHM
680 OHM
120 OHM
HORN SWITCH
TURN SIGNAL SWITCH
TURN SIGNAL SWITCH ASSEMBLY
CONNECTOR "Y"
CONNECTOR "X"
20 A FUSE
C-305
C-713

Fig. 4 Speed control wiring diagram. 1981 F-100-350 & Bronco

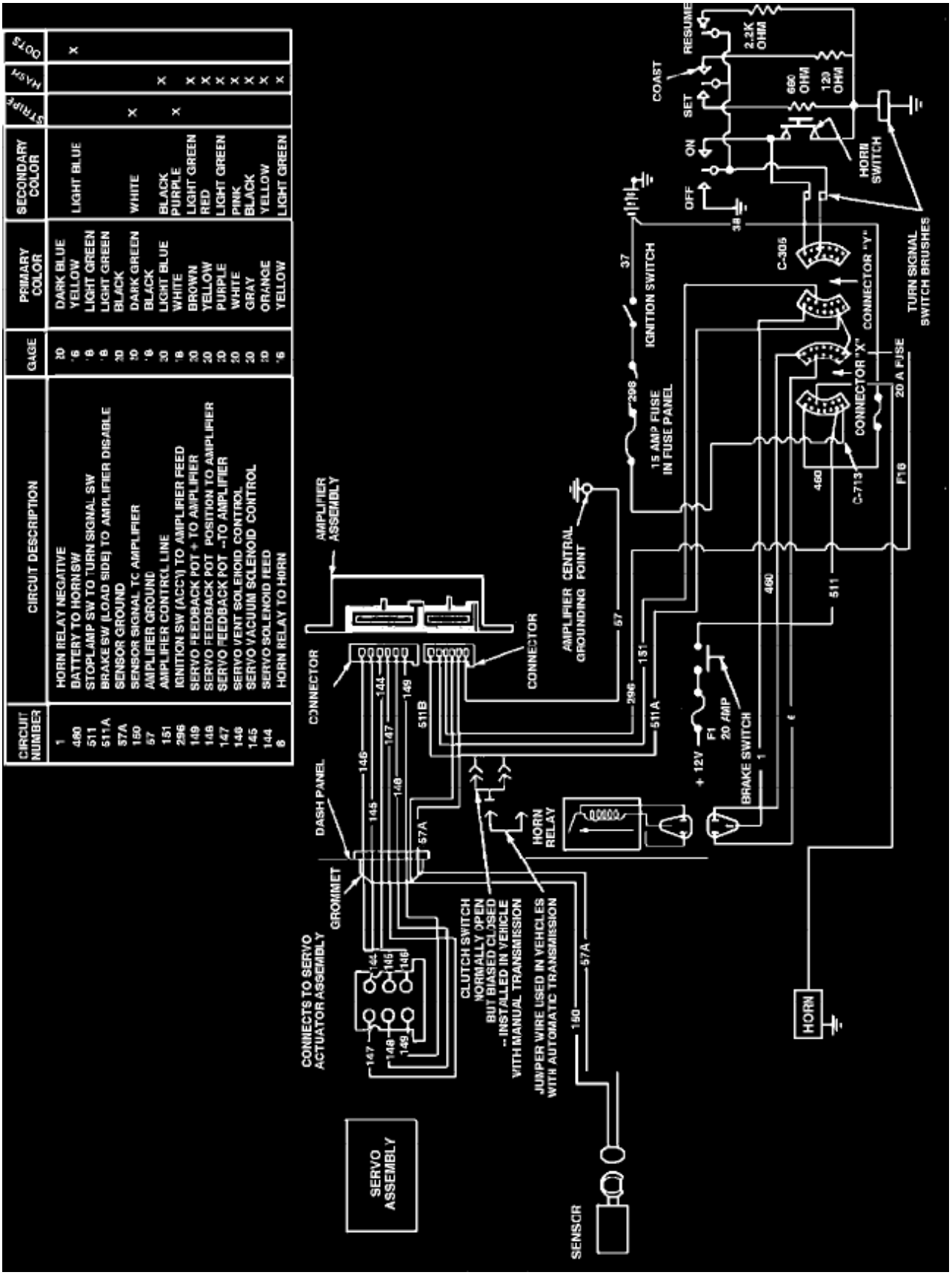

CIRCUIT NUMBER
CIRCUIT DESCRIPTION
GAGE
PRIMARY COLOR
SECONDARY COLOR
STRIPE
HASH
DOTS
1 HORN RELAY NEGATIVE 20 DARK BLUE
480 BATTERY TO HORN SW 16 YELLOW
511 STOPLAMP SW TO TURN SIGNAL SW 18 LIGHT GREEN LIGHT BLUE X
511A BRAKE SW (LOAD SIDE) TO AMPLIFIER DISABLE 18 LIGHT GREEN
57A SENSOR GROUND 20 BLACK
150 SENSOR SIGNAL TC AMPLIFIER 20 DARK GREEN WHITE X
57 AMPLIFIER GROUND 18 BLACK X
151 AMPLIFIER CONTROL LINE 20 LIGHT BLUE BLACK X
296 IGNITION SW (ACC'I) TO AMPLIFIER FEED 18 WHITE PURPLE X
149 SERVO FEEDBACK POT + TO AMPLIFIER 20 BROWN LIGHT GREEN X X
148 SERVO FEEDBACK POT POSITION TO AMPLIFIER 20 YELLOW RED X X
147 SERVO FEEDBACK POT --TO AMPLIFIER 20 PURPLE LIGHT GREEN X X
146 SERVO VENT SOLENOID CONTROL 20 WHITE PINK X X
145 SERVO VACUUM SOLENOID CONTROL 20 GRAY BLACK X X
144 SERVO SOLENOID FEED 20 ORANGE YELLOW X X
6 HORN RELAY TO HORN 16 YELLOW LIGHT GREEN X
AMPLIFIER ASSEMBLY
CONNECTOR
CONNECTOR
DASH PANEL
GROMMET
CONNECTS TO SERVO ACTUATOR ASSEMBLY
SERVO ASSEMBLY
SENSOR
CLUTCH SWITCH NORMALLY OPEN BUT BIASED CLOSED -- INSTALLED IN VEHICLE WITH MANUAL TRANSMISSION
JUMPER WIRE USED IN VEHICLES WITH AUTOMATIC TRANSMISSION
HORN RELAY
AMPLIFIER CENTRAL GROUNDING POINT
+ 12V
F1 20 AMP
BRAKE SWITCH
15 AMP FUSE IN FUSE PANEL
IGNITION SWITCH
OFF
ON
SET
RESUME
COAST
2.2K OHM
680 OHM
120 OHM
HORN SWITCH
TURN SIGNAL SWITCH BRUSHES
C-305
CONNECTOR "Y"
CONNECTOR "X"
C-713
20 A FUSE
F16
HORN
460
511
57
57A
150
151
296
298
511A
511B
144
145
146
147
148
149

Fig. 5 Speed control wiring diagram. 1982---83 F-100-350, 1984---87 F-150-350 & 1982---87 Bronco

1981-87 Models Exc. 1983-87 Ranger, 1984-87 Bronco II & 1986-87 Aerostar

1. Locate horn relay wire connector marked X and Y, Figs. 3, 4 and 5.

2. Using connector X, locate wire 460, then using a suitable voltmeter, check for battery voltage at male side of connector.

3. Using connector Y, locate wire 1, then using a suitable voltmeter, check for battery voltage at female side of connector. Depress horn, voltmeter should read zero and horn should sound. If battery voltage remains, circuit is open. Connectors should remain connected during testing.

4. Check horn relay by momentarily grounding circuit 1 to chassis. This bypasses horn switch and horn should sound. If horn does not sound, check for battery voltage at connector X wire 6 during relay operation. If voltage is present at circuit 6 during relay operation, an open circuit is indicated between horn and connector X.

5. If relay does not operate with battery voltage present at circuit 460 and circuit 1 is grounded, replace relay.

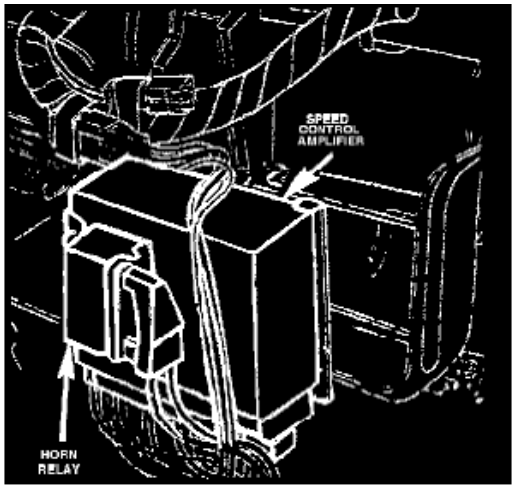
Horn Switch: Locations

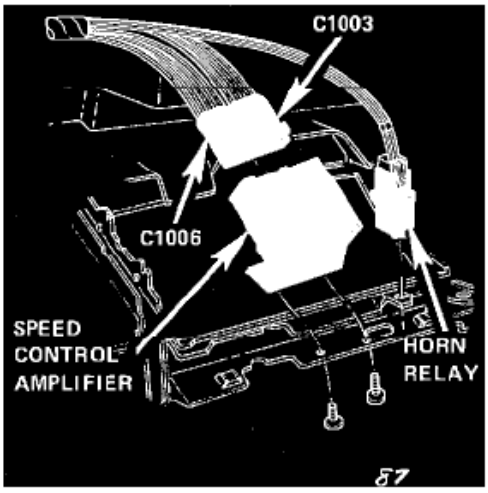
In Steering Wheel Hub Assembly

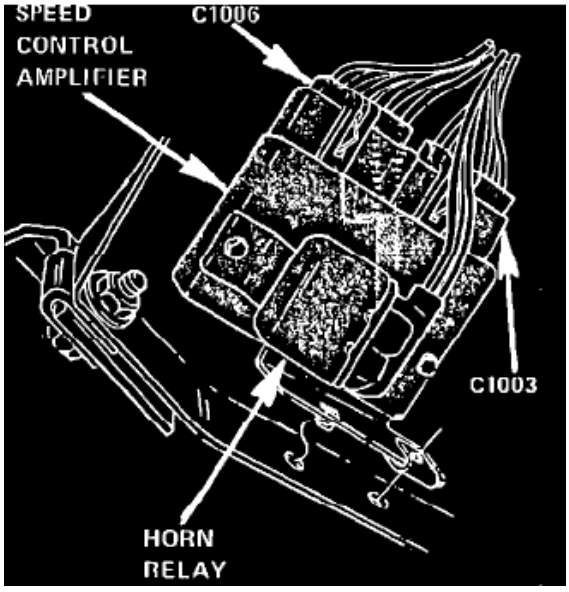
Fog/Driving Lamp Relay: Locations

Behind LH Side Of I/P

Ford Bronco Workshop Manual (V8-351 5.8L VIN G 2-bbl (1982))
Ford Workshop Manuals > Lighting and Horns > Relays and Modules - Lighting and Horns > Horn Relay > Component Information > Locations





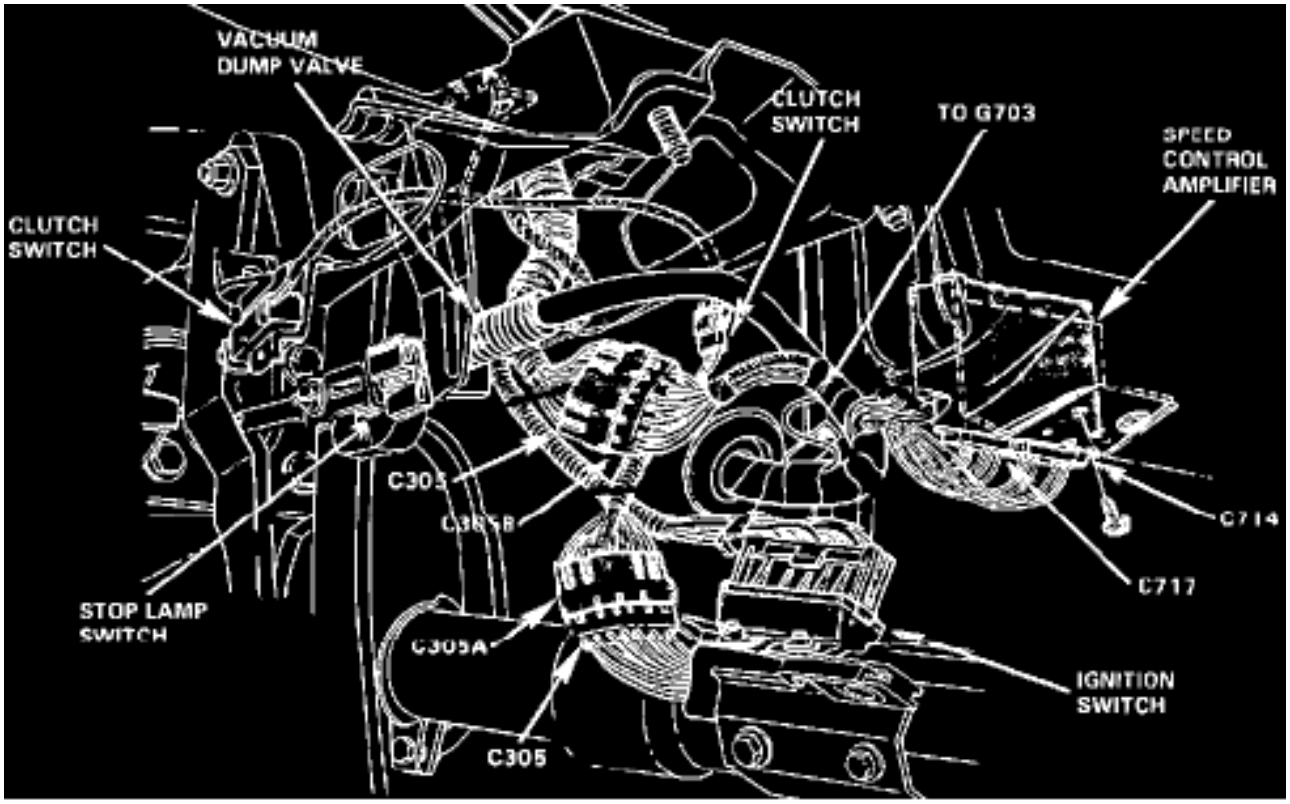


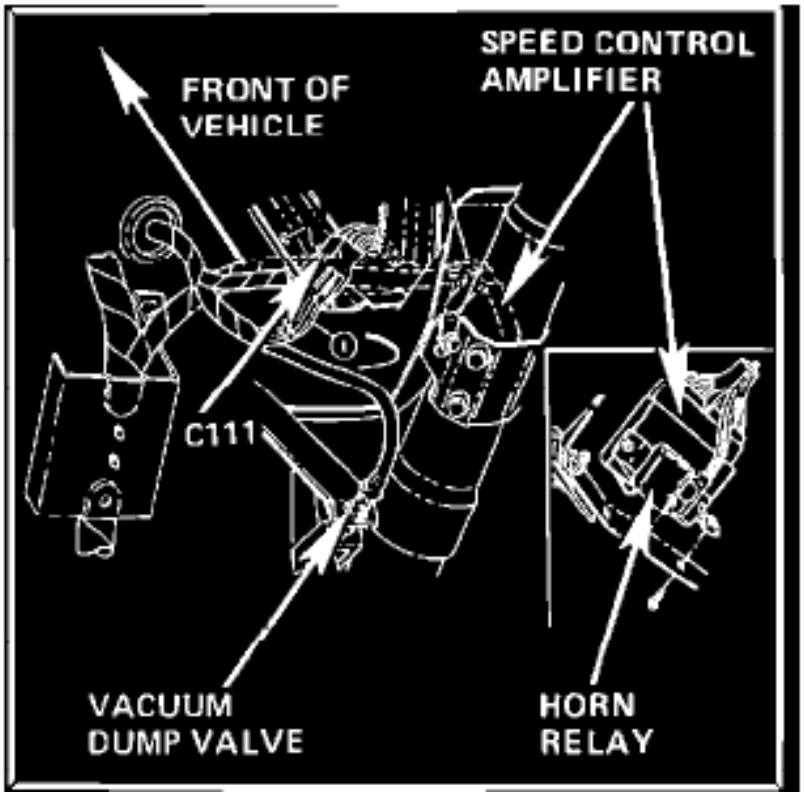
Horn Relay: Locations

Horn Relay Location

Under LH Side Of I/P.

Under LH Side Of I/P, With Speed Control


VACUUM DUMP VALVE
CLUTCH SWITCH
TO G703
SPEED CONTROL AMPLIFIER
CLUTCH SWITCH
C305
C714
C717
STOP LAMP SWITCH
C305A
IGNITION SWITCH
C305

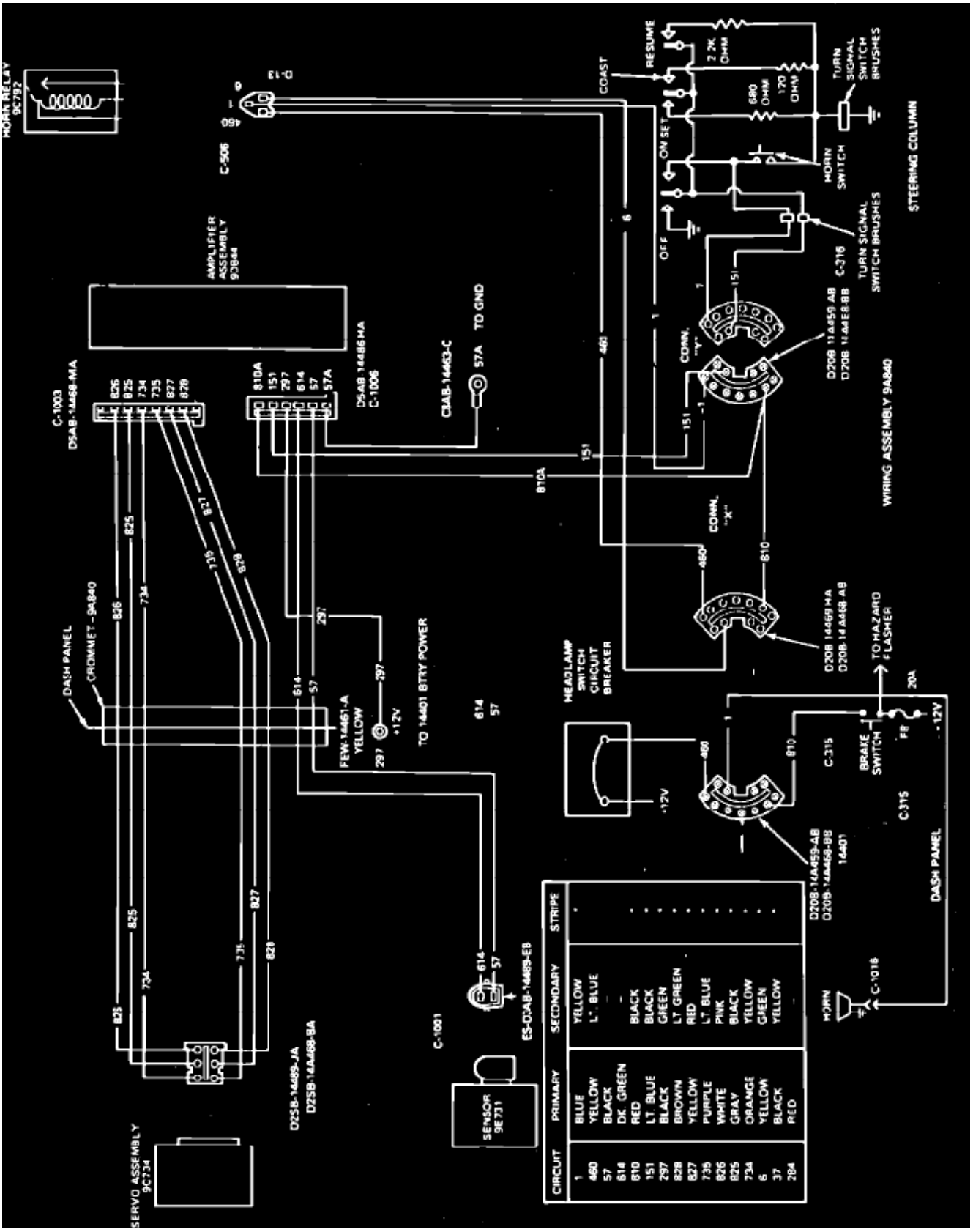

SPEED CONTROL AMPLIFIER
FRONT OF VEHICLE
C111
VACUUM DUMP VALVE
HORN RELAY

Underneath LH Side Of I/P

Below LH Side Of I/P

Horn Relay With Speed Control

Bronco F-150 thru F-350, E-150 thru E-350 and Super F Series The horn relay is use on vehicles equipped with speed control and is located under the left side of the instrument panel, left of the steering column and is mounted on the outboard attaching screw of the speed control amplifier module.


HORN RELAY 9C792
C-506
AMPLIFIER ASSEMBLY 9B844
C-1003 D5AB-14486-MA
D5AB-14486-MA C-1006
D5AB-14463-C
57A TO GND
DASH PANEL
CRIMMET-9A840
FEW-14461-A YELLOW
TO 14401 BTTY POWER
HEADLAMP SWITCH CIRCUIT BREAKER
COAST
RESUME
ON SET
OFF
2.2K OHM
680 OHM
120 OHM
TURN SIGNAL SWITCH BRUSHES
HORN SWITCH
STEERING COLUMN
C-316
TURN SIGNAL SWITCH BRUSHES
CONN. "Y"
CONN. "X"
D2DB-14459-AB
D2DB-14468-BB
WIRING ASSEMBLY 9A840
D2DB-14469-HA
D2DB-14468-AB
TO HAZARD FLASHER
BRAKE SWITCH
C-315
D2DB-14459-AB
D2DB-14468-BB
14401
DASH PANEL
HORN
C-1018
SENSOR 9E731
ES-DAB-14489-EB
C-1001
D2SB-14489-JA
D2SB-14A468-BA
SERVO ASSEMBLY 9C734
CIRCUIT | PRIMARY | SECONDARY | STRIPE
1 | BLUE | YELLOW | -
460 | YELLOW | L. BLUE | -
57 | BLACK | - | -
614 | DK. GREEN | BLACK | -
810 | RED | BLACK | -
151 | LT. BLUE | GREEN | -
297 | BLACK | LT. GREEN | -
828 | BROWN | RED | -
827 | YELLOW | LT. BLUE | -
739 | PURPLE | PINK | -
826 | WHITE | BLACK | -
825 | GRAY | YELLOW | -
734 | ORANGE | GREEN | -
6 | YELLOW | YELLOW | -
37 | BLACK | - | -
284 | RED | - | -

Horn Relay: Testing and Inspection

Fig. 3 Speed control wiring diagram. 1981---83 E-100-350 & 1984-87 E-150-350

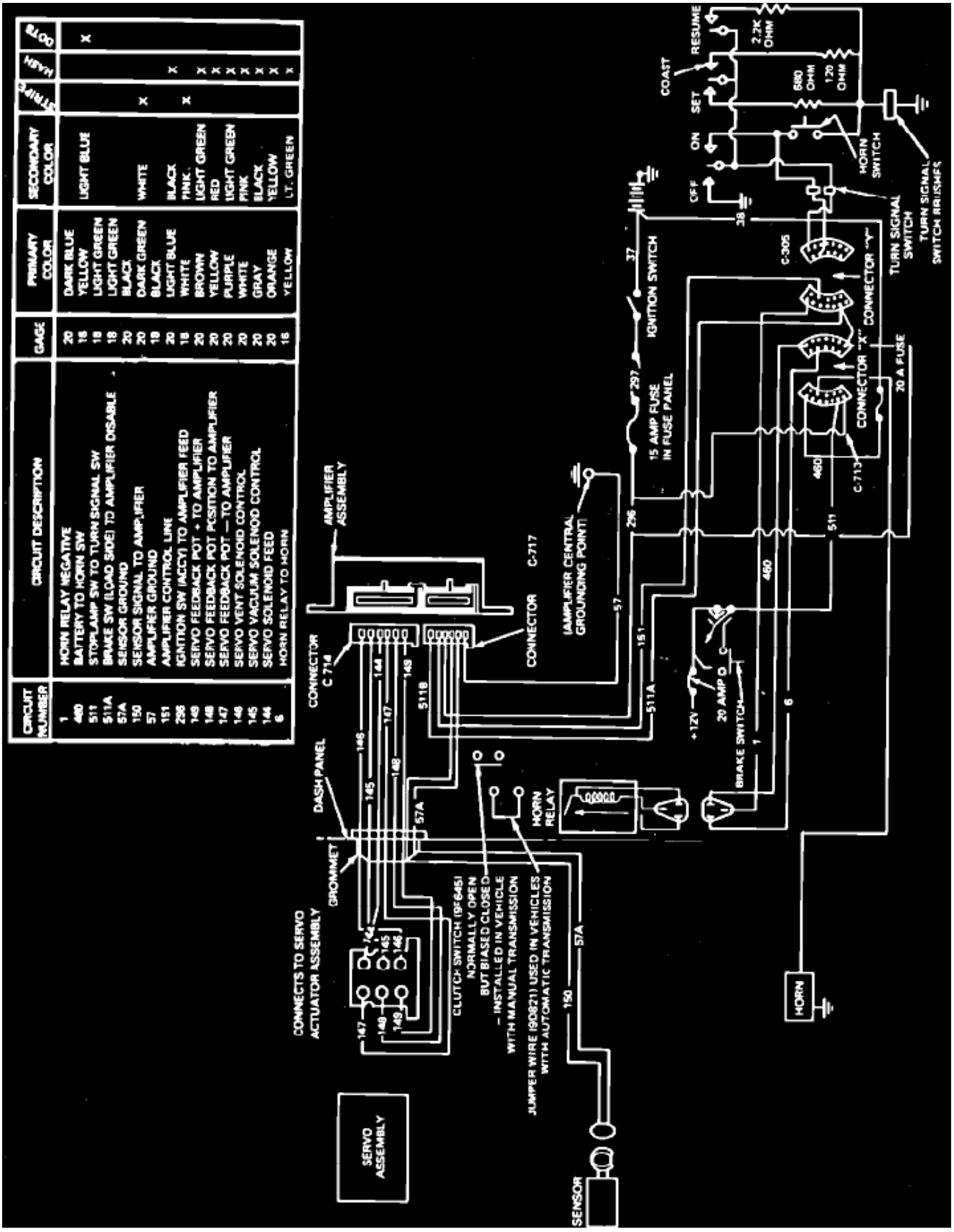

CIRCUIT NUMBER
CIRCUIT DESCRIPTION
GAGE
PRIMARY COLOR
SECONDARY COLOR
TURN
FLASH
STOP
1 HORN RELAY NEGATIVE 20 DARK BLUE
460 BATTERY TO HORN SW 18 YELLOW
511 STOPLAMP SW TO TURN SIGNAL SW 18 LIGHT GREEN LIGHT BLUE X
511A BRAKE SW (LOAD SIDE) TO AMPLIFIER DISABLE 18 LIGHT GREEN
57A SENSOR GROUND 20 BLACK
150 SENSOR SIGNAL TO AMPLIFIER 20 DARK GREEN WHITE X
57 AMPLIFIER GROUND 18 BLACK
151 AMPLIFIER CONTROL LINE 20 LIGHT BLUE BLACK X X
298 IGNITION SW (ACCY) TO AMPLIFIER FEED 18 WHITE PINK. X X
149 SERVO FEEDBACK POT + TO AMPLIFIER 20 BROWN LIGHT GREEN X X
148 SERVO FEEDBACK POT POSITION TO AMPLIFIER 20 YELLOW RED X X
147 SERVO FEEDBACK POT — TO AMPLIFIER 20 PURPLE LIGHT GREEN X X
146 SERVO VENT SOLENOID CONTROL 20 WHITE PINK X X
145 SERVO VACUUM SOLENOID CONTROL 20 GRAY BLACK X X
144 SERVO SOLENOID FEED 20 ORANGE YELLOW X X
6 HORN RELAY TO HORN 16 YELLOW LT. GREEN X
AMPLIFIER ASSEMBLY
CONNECTOR C-714
CONNECTOR C-717
(AMPLIFIER CENTRAL GROUNDING POINT)
DASH PANEL
GROMMET
CONNECTS TO SERVO ACTUATOR ASSEMBLY
SERVO ASSEMBLY
CLUTCH SWITCH (SF6451 NORMALLY OPEN BUT BIASED CLOSED – INSTALLED IN VEHICLE WITH MANUAL TRANSMISSION
JUMPER WIRE (90821) USED IN VEHICLES WITH AUTOMATIC TRANSMISSION
SENSOR
HORN RELAY
15 AMP FUSE IN FUSE PANEL
IGNITION SWITCH
+12V
20 AMP
BRAKE SWITCH
HORN
C-305
CONNECTOR "Y"
CONNECTOR "X"
C-713
20 A FUSE
TURN SIGNAL SWITCH
TURN SIGNAL SWITCH RR/SM/FS
HORN SWITCH
COAST
RESUME
SET
ON
OFF
2.2K OHM
680 OHM
120 OHM

Fig. 4 Speed control wiring diagram. 1981 F-100-350 & Bronco

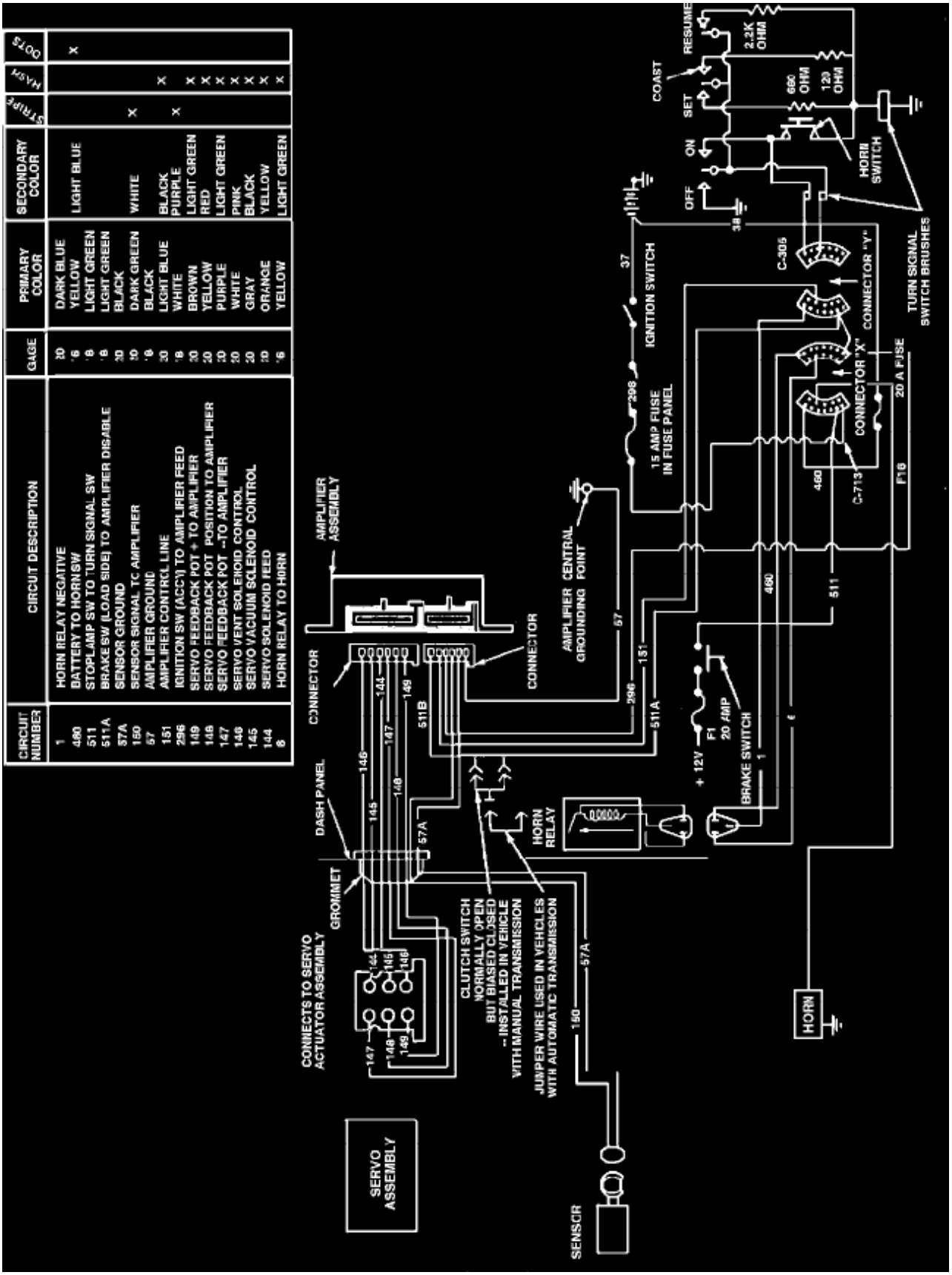

CIRCUIT NUMBER
CIRCUIT DESCRIPTION
GAGE
PRIMARY COLOR
SECONDARY COLOR
STRIPE
HASH
DOTS
1 HORN RELAY NEGATIVE 20 DARK BLUE
480 BATTERY TO HORN SW 18 YELLOW LIGHT BLUE X
511 STOPLAMP SW TO TURN SIGNAL SW 18 LIGHT GREEN
511A BRAKE SW (LOAD SIDE) TO AMPLIFIER DISABLE 18 LIGHT GREEN
57A SENSOR GROUND 20 BLACK
150 SENSOR SIGNAL TO AMPLIFIER 20 DARK GREEN WHITE X
57 AMPLIFIER GROUND 18 BLACK X
151 AMPLIFIER CONTROL LINE 20 LIGHT BLUE BLACK X
296 IGNITION SW (ACC#) TO AMPLIFIER FEED 18 WHITE PURPLE X
149 SERVO FEEDBACK POT + TO AMPLIFIER 20 BROWN LIGHT GREEN X X
148 SERVO FEEDBACK POT POSITION TO AMPLIFIER 20 YELLOW RED X X
147 SERVO FEEDBACK POT -TO AMPLIFIER 20 PURPLE LIGHT GREEN X X
146 SERVO VENT SOLENOID CONTROL 20 WHITE PINK X X
145 SERVO VACUUM SOLENOID CONTROL 20 GRAY BLACK X X
144 SERVO SOLENOID FEED 20 ORANGE YELLOW X X
8 HORN RELAY TO HORN 18 YELLOW LIGHT GREEN X
AMPLIFIER ASSEMBLY
CONNECTOR
DASH PANEL
GROMMET
CONNECTS TO SERVO ACTUATOR ASSEMBLY
SERVO ASSEMBLY
SENSOR
CLUTCH SWITCH NORMALLY OPEN BUT BIASED CLOSED -- INSTALLED IN VEHICLE WITH MANUAL TRANSMISSION
JUMPER WIRE USED IN VEHICLES WITH AUTOMATIC TRANSMISSION
HORN RELAY
AMPLIFIER CENTRAL GROUNDING POINT
+ 12V
F1 20 AMP
BRAKE SWITCH
15 AMP FUSE IN FUSE PANEL
IGNITION SWITCH
COAST
RESUME
SET
ON
OFF
2.2K OHM
680 OHM
120 OHM
HORN SWITCH
TURN SIGNAL SWITCH BRUSHES
C-305
CONNECTOR "Y"
CONNECTOR "X"
C-713
20 A FUSE
F18
HORN

Fig. 5 Speed control wiring diagram. 1982---83 F-100-350, 1984---87 F-150-350 & 1982---87 Bronco

1981-87 Models Exc. 1983-87 Ranger, 1984-87 Bronco II & 1986-87 Aerostar

1. Locate horn relay wire connector marked X and Y, Figs. 3, 4 and 5.

2. Using connector X, locate wire 460, then using a suitable voltmeter, check for battery voltage at male side of connector.

3. Using connector Y, locate wire 1, then using a suitable voltmeter, check for battery voltage at female side of connector. Depress horn, voltmeter should read zero and horn should sound. If battery voltage remains, circuit is open. Connectors should remain connected during testing.

4. Check horn relay by momentarily grounding circuit 1 to chassis. This bypasses horn switch and horn should sound. If horn does not sound, check for battery voltage at connector X wire 6 during relay operation. If voltage is present at circuit 6 during relay operation, an open circuit is indicated between horn and connector X.

5. If relay does not operate with battery voltage present at circuit 460 and circuit 1 is grounded, replace relay.

Trailer Lighting Relay: Locations

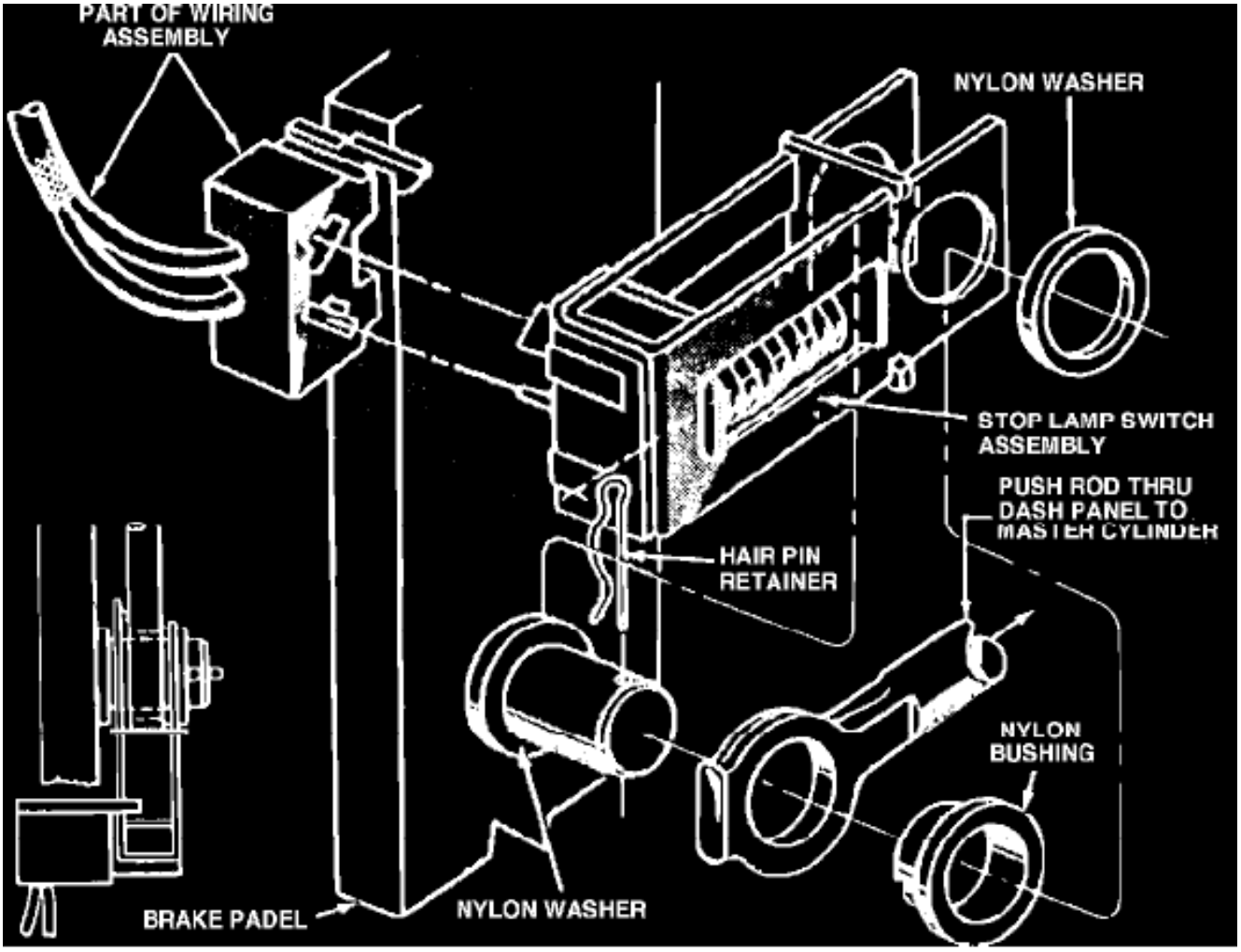
On Dash Panel Below Junction Block

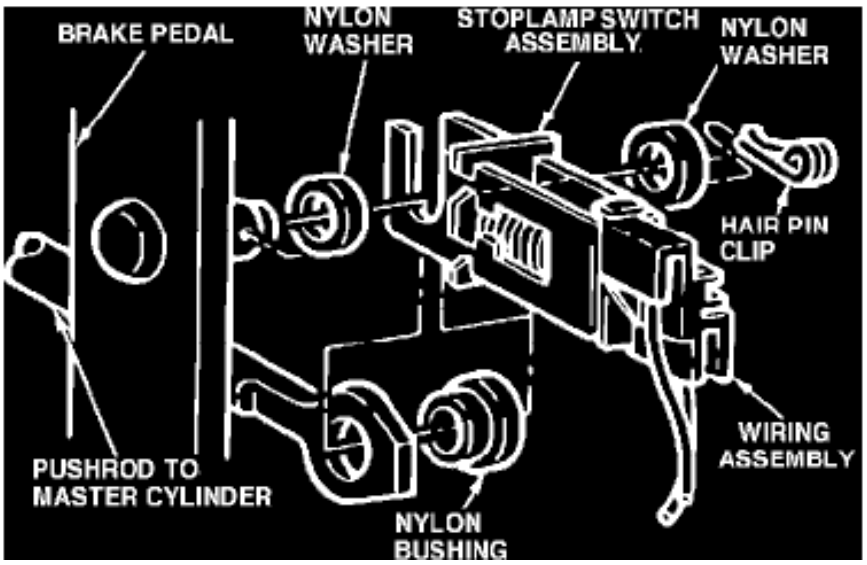
Trailer Lighting Module: Locations

Attached To Brake Pedal

Brake Light Switch: Locations

At Top Of Brake Pedal


PART OF WIRING ASSEMBLY
NYLON WASHER
STOP LAMP SWITCH ASSEMBLY
PUSH ROD THRU DASH PANEL TO MASTER CYLINDER
HAIR PIN RETAINER
NYLON BUSHING
BRAKE PADEL
NYLON WASHER


BRAKE PEDAL
NYLON WASHER
STOPLAMP SWITCH ASSEMBLY
NYLON WASHER
HAIR PIN CLIP
WIRING ASSEMBLY
PUSHROD TO MASTER CYLINDER
NYLON BUSHING

Brake Light Switch: Service and Repair

Fig. 6 Stop light switch replacement. Exc. 1980---83 E-100 w/manual brakes.

Fig. 7 Stop light switch replacement. 1980---83 E-100 w/manual brakes

1. Disconnect battery ground cable.

2. Disconnect electrical connector from switch, Figs. 6 and 7.

3. Remove hairpin retainer, then slide stop light switch, pushrod, nylon washers and bushings away from pedal and remove the switch from vehicle.

4. Reverse procedure to install. Ensure stop light switch wires are of sufficient length to allow full travel of the brake pedal.

Door Switch: Locations

LH Lower Cowl, Near Fuse Block

Fog/Driving Lamp Switch: Locations

Behind LH Side Of I/P

Headlamp Dimmer Switch: Locations

On Floor Pan, LH Side Of Cab

Headlamp Switch: Technical Service Bulletins Headlamp Light Switch - Schematic Revision

Article No. 91-11B-35

06/14/91

^ ELECTRICAL/VACUUM TROUBLESHOOTING MANUAL - 1981 - PAGES 40 AND 41 - EXTERIOR LIGHTS CONNECTIONS TO LIGHT SWITCH REVISED

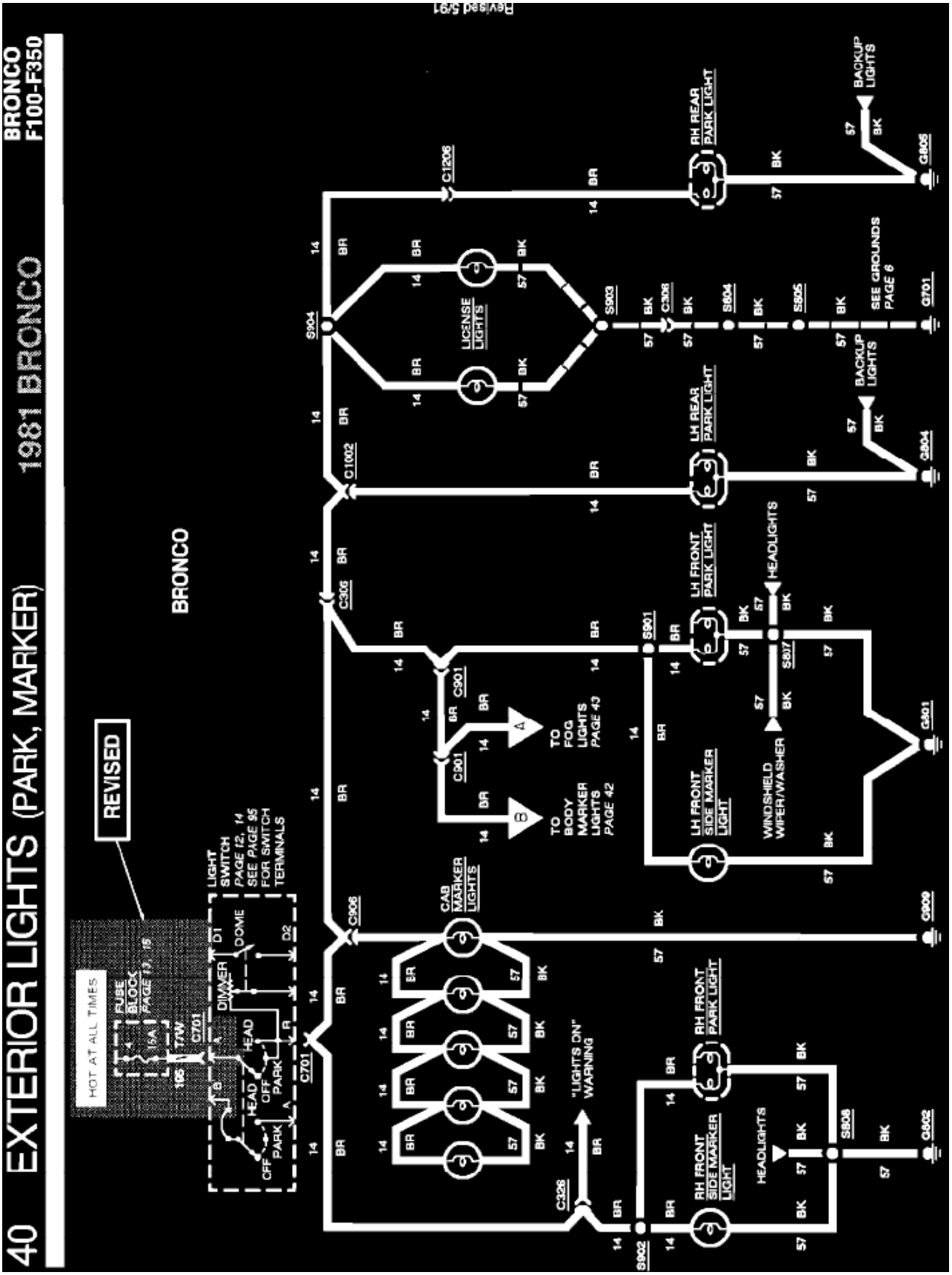
^ ELECTRICAL/VACUUM TROUBLESHOOTING MANUAL - 1982 - PAGE 40 - EXTERIOR LIGHTS CONNECTIONS TO LIGHT SWITCH REVISED

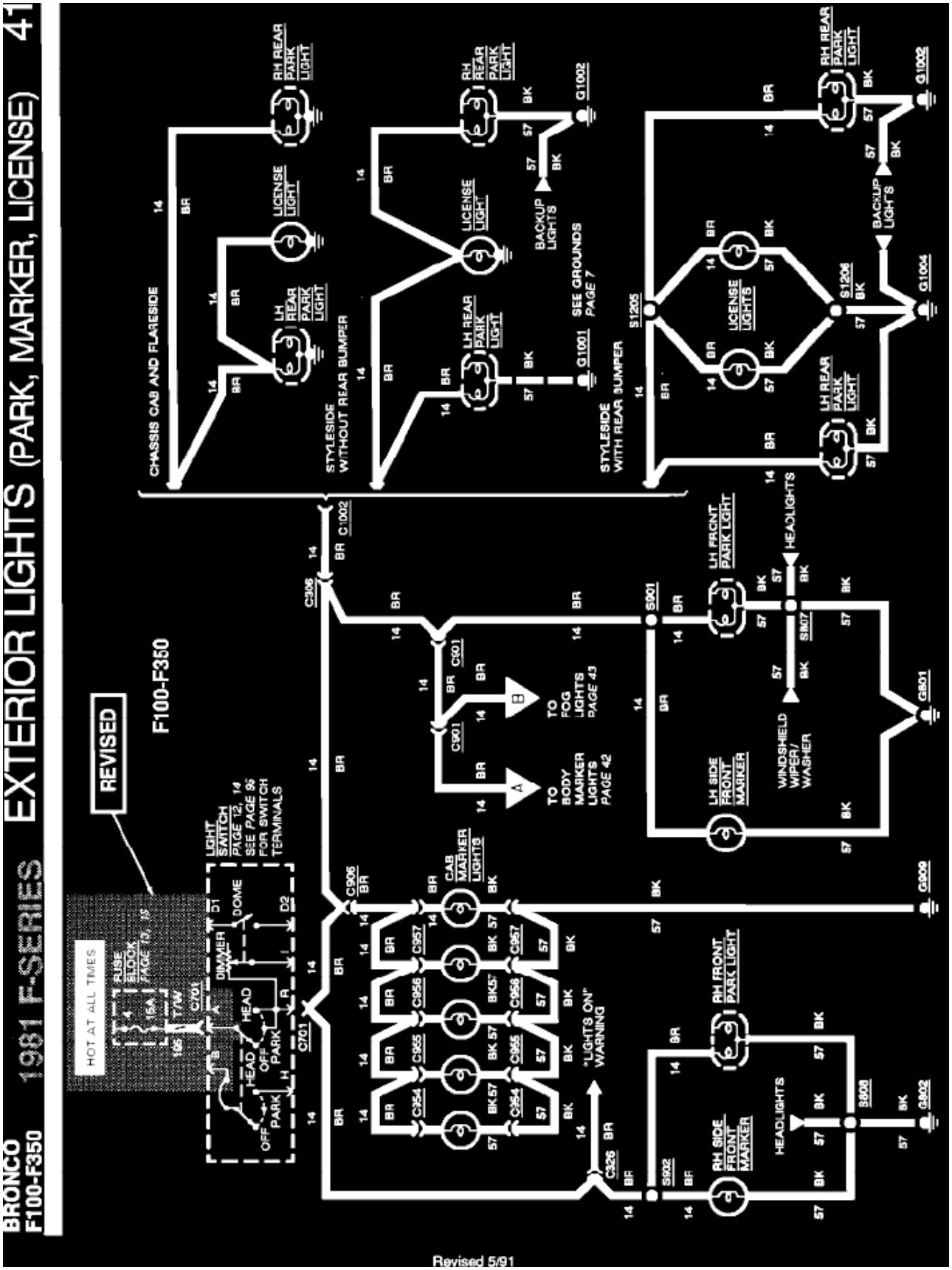
^ ELECTRICAL/VACUUM TROUBLESHOOTING MANUAL - 1984 - PAGE 34 - EXTERIOR LIGHTS CONNECTIONS TO LIGHT SWITCH REVISED

^ ELECTRICAL/VACUUM TROUBLESHOOTING MANUAL - 1985 - PAGE 34 - EXTERIOR LIGHTS CONNECTIONS TO LIGHT SWITCH REVISED

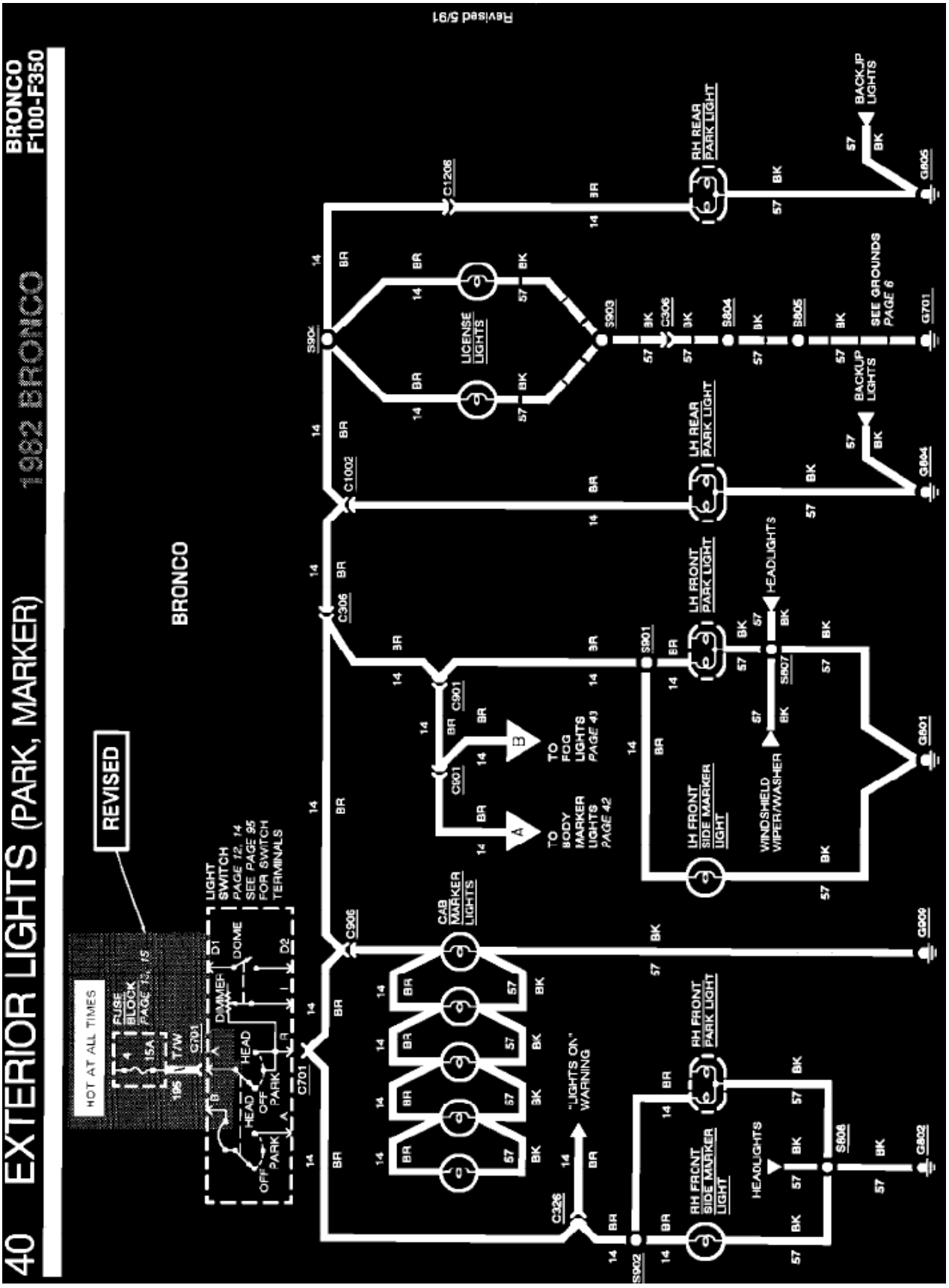
LIGHT TRUCK: 1981 F-150-350 SERIES 1981-82 BRONCO 1984-85 ECONOLINE

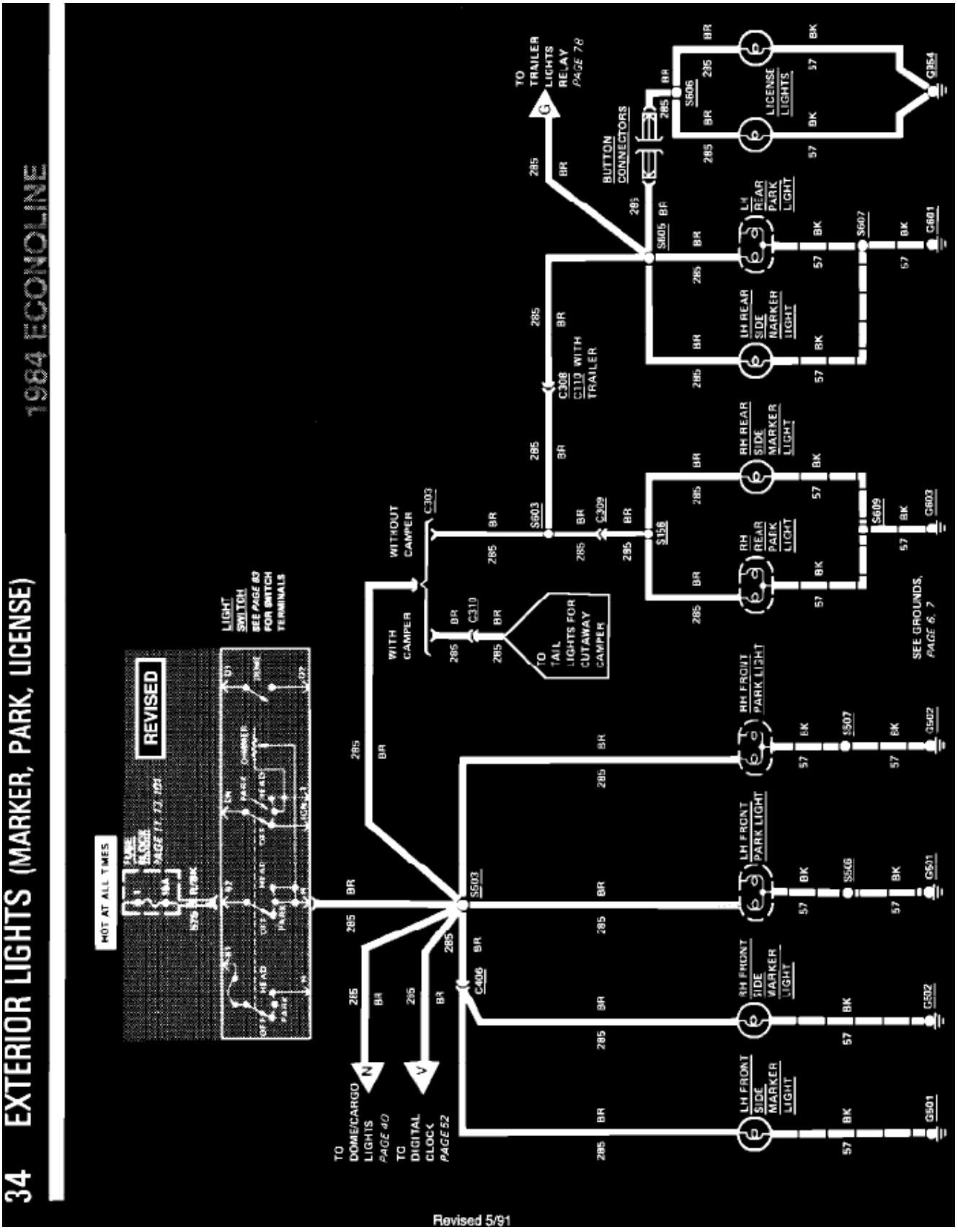
ISSUE: The connections of Exterior Lights (Marker, Park, License) to the Light Switch are inaccurately shown in the schematics of the following Electrical/Vacuum Troubleshooting Manuals:

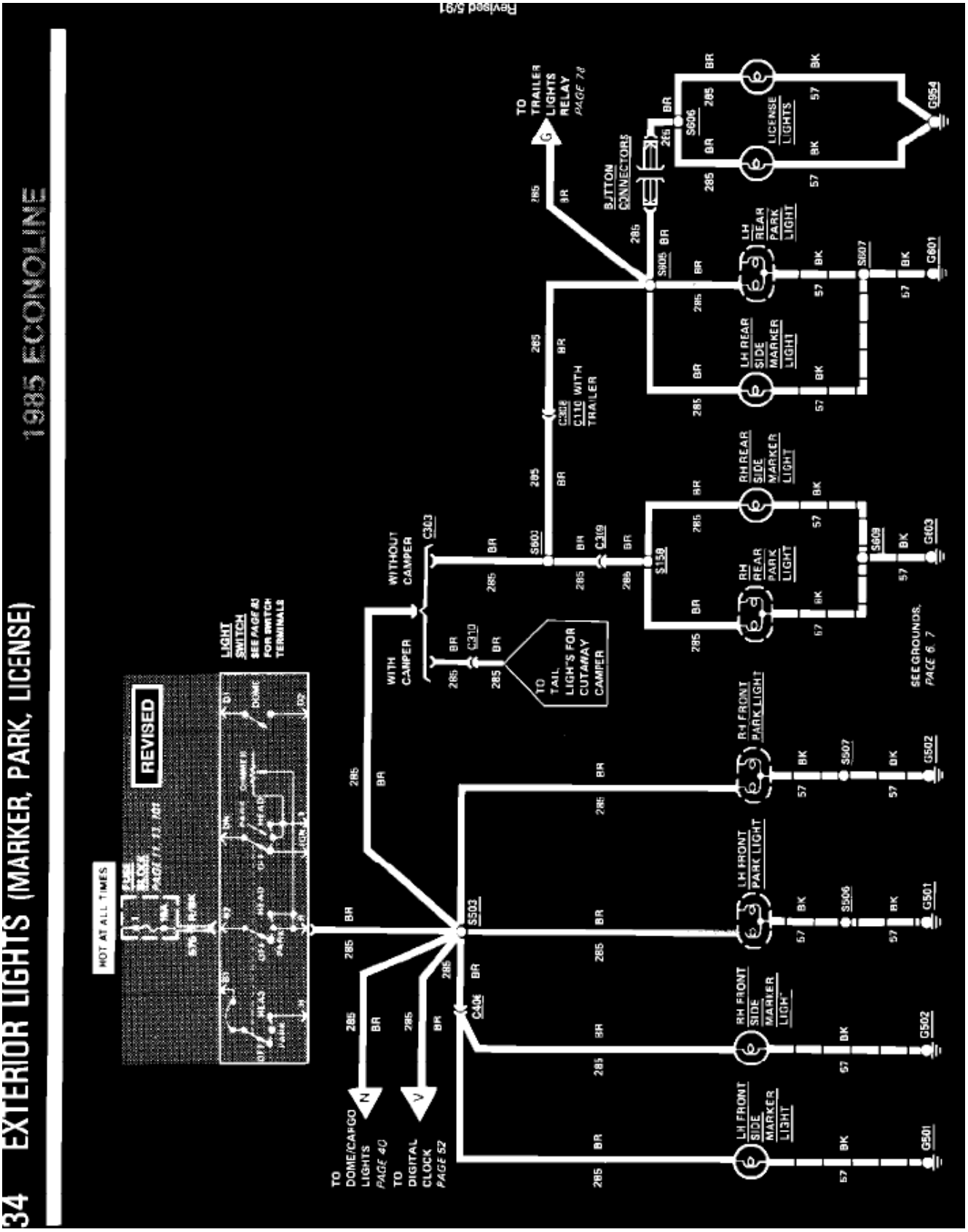

40 EXTERIOR LIGHTS (PARK, MARKER)
1981 BRONCO
BRONCO F100-F350
REVISED
BRONCO
HOT AT ALL TIMES
FUSE BLOCK PAGE 13, 15
15A
T7V
195
C701
DIMMER
DOME
HEAD
OFF
PARK
LIGHT SWITCH PAGE 12, 14 SEE PAGE 95 FOR SWITCH TERMINALS
D1
D2
C906
CAB MARKER LIGHTS
"LIGHTS ON" WARNING
C326
C305
C1002
C1206
C901
TO BODY MARKER LIGHTS PAGE 42
TO FOG LIGHTS PAGE 43
S904
S903
S902
S901
S808
S807
S804
S805
C308
LICENSE LIGHTS
RH FRONT SIDE MARKER LIGHT
RH FRONT PARK LIGHT
LH FRONT SIDE MARKER LIGHT
LH FRONT PARK LIGHT
LH REAR PARK LIGHT
RH REAR PARK LIGHT
HEADLIGHTS
WINDSHIELD WIPER/WASHER
BACKUP LIGHTS
SEE GROUNDS PAGE 6
G902
G909
G901
G904
G701
G905
BR
BK
14
57


BRONCO
F100-F350
1981 F-SERIES EXTERIOR LIGHTS (PARK, MARKER, LICENSE) 41
REVISED
F100-F350
HOT AT ALL TIMES
FUSE BLOCK
LIGHT SWITCH
DIMMER
DOME
HEAD
OFF
PARK
CHASSIS CAB AND FLARESIDE
STYLESIDE WITHOUT REAR BUMPER
STYLESIDE WITH REAR BUMPER
LH REAR PARK LIGHT
RH REAR PARK LIGHT
LICENSE LIGHT
LICENSE LIGHTS
BACKUP LIGHTS
SEE GROUNDS PAGE 7
CAB MARKER LIGHTS
TO BODY MARKER LIGHTS PAGE 42
TO FOG LIGHTS PAGE 43
LH FRONT PARK LIGHT
RH FRONT PARK LIGHT
LH SIDE FRONT MARKER
RH SIDE FRONT MARKER
HEADLIGHTS
WINDSHIELD WIPER/ WASHER
"LIGHTS ON" WARNING
Revised 5/91

^ 1981 Bronco/F-Series Pages 40 and 41


40 EXTERIOR LIGHTS (PARK, MARKER)
1982 BRONCO
BRONCO F100-F350
Revised 5/91
REVISED
BRONCO
HOT AT ALL TIMES
FUSE BLOCK PAGE 13, 15
15A
T/W
C701
195
DIMMER
DOME
HEAD
OFF
PARK
LIGHT SWITCH PAGE 12, 14 SEE PAGE 95 FOR SWITCH TERMINALS
D1
D2
C906
CAB MARKER LIGHTS
C901
TO BODY MARKER LIGHTS PAGE 42
TO FOG LIGHTS PAGE 43
C326
"LIGHTS ON" WARNING
S902
RH FRONT SIDE MARKER LIGHT
RH FRONT PARK LIGHT
HEADLIGHTS
S806
G802
G906
C306
C1002
S901
LH FRONT SIDE MARKER LIGHT
LH FRONT PARK LIGHT
HEADLIGHTS
S807
WINDSHIELD WIPER/WASHER
G801
S902
LICENSE LIGHTS
S903
C1206
LH REAR PARK LIGHT
RH REAR PARK LIGHT
BACKUP LIGHTS
S804
S805
G804
SEE GROUNDS PAGE 6
G701
BACKUP LIGHTS
G805


34 EXTERIOR LIGHTS (MARKER, PARK, LICENSE)
1984 ECONOLINE
REVISED
HOT AT ALL TIMES
LIGHT SWITCH
SEE PAGE 83 FOR SWITCH TERMINALS
WITHOUT CAMPER
WITH CAMPER
TO TRAILER LIGHTS RELAY PAGE 78
BUTTON CONNECTORS
C308
C310 WITH TRAILER
TO TAIL LIGHTS FOR CUTAWAY CAMPER
TO DOME/CARGO LIGHTS PAGE 40
TO DIGITAL CLOCK PAGE 52
LH FRONT SIDE MARKER LIGHT
RH FRONT SIDE MARKER LIGHT
LH FRONT PARK LIGHT
RH FRONT PARK LIGHT
LH REAR SIDE MARKER LIGHT
RH REAR SIDE MARKER LIGHT
LH REAR PARK LIGHT
RH REAR PARK LIGHT
LICENSE LIGHTS
SEE GROUNDS, PAGE 6, 7
Revised 5/91


34 EXTERIOR LIGHTS (MARKER, PARK, LICENSE)
1985 ECONOLINE
Revised 5/91
REVISED
HOT AT ALL TIMES
LIGHT SWITCH
SEE PAGE 40 FOR SWITCH TERMINALS
TO DOME/CARGO LIGHTS PAGE 40
TO DIGITAL CLOCK PAGE 52
WITH CAMPER
WITHOUT CAMPER
TO TAIL LIGHTS FOR CUTAWAY CAMPER
C110 WITH TRAILER
TO TRAILER LIGHTS RELAY PAGE 74
SPLICE CONNECTIONS
LH FRONT SIDE MARKER LIGHT
RH FRONT SIDE MARKER LIGHT
LH FRONT PARK LIGHT
RH FRONT PARK LIGHT
LH REAR SIDE MARKER LIGHT
RH REAR SIDE MARKER LIGHT
LH REAR PARK LIGHT
RH REAR PARK LIGHT
LICENSE LIGHTS
SEE GROUNDS, PAGE 6 7

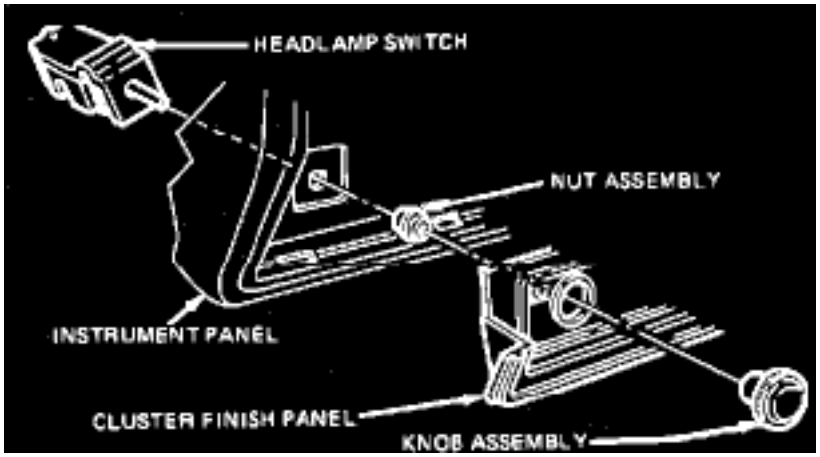
^ 1985 Econoline Page 34

ACTION: Refer to the pages in this TSB article for the revised schematics.

OTHER APPLICABLE ARTICLES: NONE

WARRANTY STATUS: INFORMATION ONLY

OASIS CODES: 290000



Headlamp Switch: Service and Repair

Fig. 6 Light Switch

F-100---350 & BRONCO

1. Disconnect battery ground cable.

2. Remove knobs from headlight switch, windshield wiper switch and fog light switch (if equipped). Use a suitable hook tool to release each knob lock tab.

3. Remove steering column shroud, then the cluster finish panel assembly, Fig. 5.

4. Remove switch attaching nut, Fig. 5.

5. Disconnect electrical connector from switch and remove switch from vehicle.

6. Reverse procedure to install.

Ford Bronco Workshop Manual (V8-351 5.8L VIN G 2-bbl (1982))
Ford Workshop Manuals > Lighting and Horns > Sensors and Switches - Lighting and Horns > Horn Switch > Component Information > Locations

Horn Switch: Locations

In Steering Wheel Hub Assembly

Turn Signal Switch: Locations

In Steering Column

Turn Signal Switch: Service and Repair

1. Disconnect battery ground cable.

2. Remove horn switch, then the steering wheel.

3. Remove turn signal switch lever by unscrewing from steering column.

4. On 1981---87 F-100---350 and Bronco models, remove lower steering column shroud.

5. On 1981---87 E-100---350 models, remove upper and lower steering column shrouds.

6. On all models, disconnect electrical connector from turn signal switch and remove switch attaching screws.

7. On all models with tilt column and 1980 E-100---350, F-100---350 and Bronco with fixed column, remove wires and terminals from steering column electrical connector, after noting color code and location of each connector. Remove plastic cover sleeve, if equipped, from wiring harness, then lift switch assembly out through top of column. On 1981---87 E-100---350 models equipped with tilt column and automatic transmission, disconnect transmission selector indicator light electrical connector from turn signal switch harness prior to removing the switch.

8. On all models with fixed column, except 1980 E-100---350, F-100---350 and Bronco, remove switch assembly by lifting out of column while guiding connector plug through opening in shift socket. On 1981---87 E-100---350 models equipped with fixed column and automatic transmission, remove transmission selector indicator light assembly with turn signal switch.

9. Reverse procedure to install.

Trailer Lighting Relay: Locations

On Dash Panel Below Junction Block

Trailer Lighting Module: Locations

Attached To Brake Pedal

Turn Signal Flasher: Locations

Front Of Fuse Block

Turn Signal Switch: Locations

In Steering Column

Turn Signal Switch: Service and Repair

1. Disconnect battery ground cable.

2. Remove horn switch, then the steering wheel.

3. Remove turn signal switch lever by unscrewing from steering column.

4. On 1981---87 F-100---350 and Bronco models, remove lower steering column shroud.

5. On 1981---87 E-100---350 models, remove upper and lower steering column shrouds.

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8. On all models with fixed column, except 1980 E-100---350, F-100---350 and Bronco, remove switch assembly by lifting out of column while guiding connector plug through opening in shift socket. On 1981---87 E-100---350 models equipped with fixed column and automatic transmission, remove transmission selector indicator light assembly with turn signal switch.

9. Reverse procedure to install.

Heated Glass Element Relay: Locations

Under LH Corner Of I/P

Heated Glass Element Relay: Locations

Under LH Corner Of I/P

Power Window Safety Switch: Locations

At Center Of Tailgate

Power Window Switch: Locations Master Power Window Switch

In LH Door

Power Window Switch: Locations RH Window Control

In RH Door

Power Window Switch: Locations Tailgate Power Window Regulator Switch

LH Side Of Tailgate

Power Window Motor: Locations Power Window Motor

In Respective Doors

Power Window Motor: Locations Tailgate Power Window Motor

In Center Of Tailgate

Power Window Safety Switch: Locations

At Center Of Tailgate

Power Window Switch: Locations Master Power Window Switch

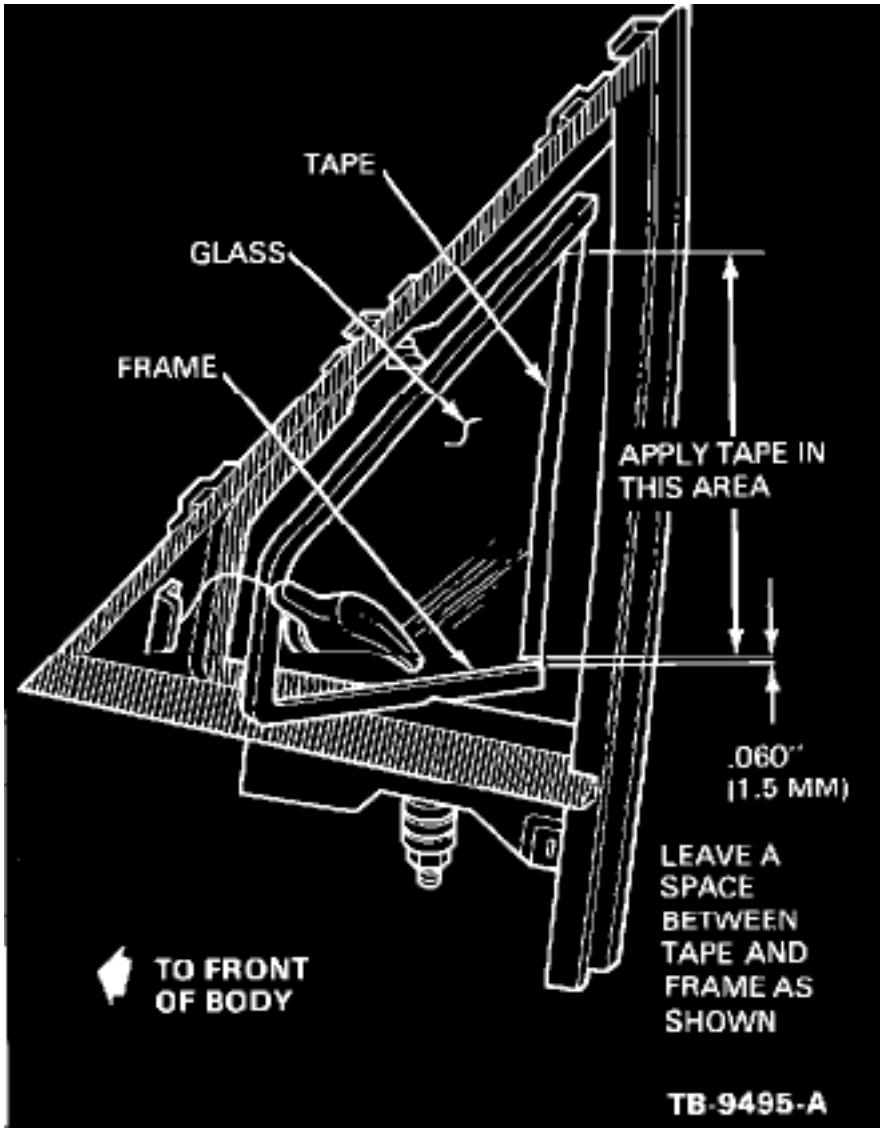
In LH Door

Power Window Switch: Locations RH Window Control

In RH Door

Power Window Switch: Locations Tailgate Power Window Regulator Switch

LH Side Of Tailgate



Window Glass: Customer Interest Manual Vent Windows - Difficult to Open

GLASS - MANUAL VENT WINDOWS HARD TO OPEN

Article No. 88-5-2

FORD: 1980-88 CROWN VICTORIA 1981-86 THUNDERBIRD 1981-87 ESCORT 1984-86 LTD

LINCOLN-MERCURY: 1980-88 GRAND MARQUIS

1981-86 LYNX, COUGAR 1984-86 MARQUIS

LIGHT TRUCK: 1980-88 E-SERIES, F-SERIES, BRONCO 1983-88 RANGER 1984-88 BRONCO II 1986-88 AEROSTAR

ISSUE: Hard to open pivoting type vent windows may be caused by the glass sticking to the weatherstrip on the division bar. The weatherstrip is often pulled out of the division bar when this

condition is present.

FIGURE 1

ACTION: To correct this, apply a strip of clear pressure sensitive tape on the inside vertical edge of the vent window glass, Figure 1.

PART NUMBER PART NAME CLASS

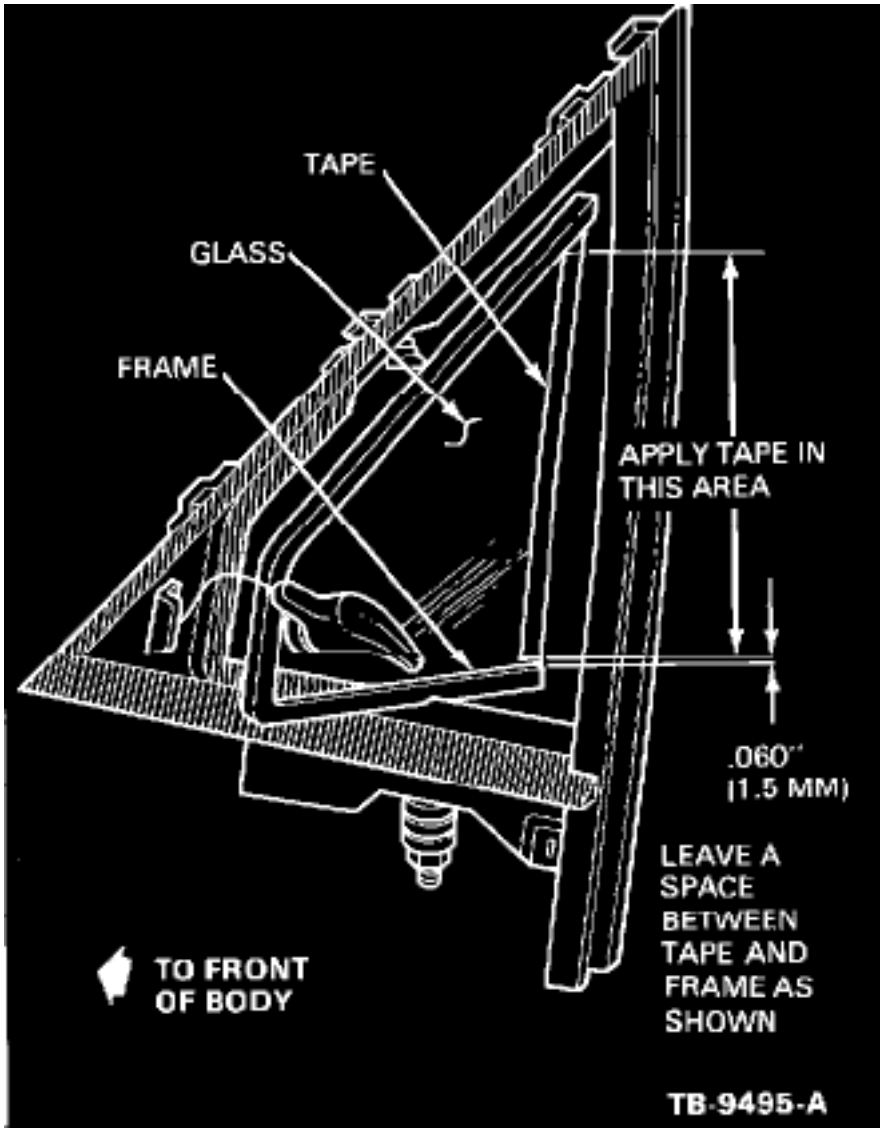
E8AZ-19627-A Clear Pressure Sensitive B

Tape

OTHER APPLICABLE ARTICLES: None WARRANTY STATUS: Eligible Under Basic Warranty Coverage OPERATION: 880502A - Both vent windows TIME:

0.3 Hr. DLR. CODING: Basic Part No. 7021402 Code:

41



Window Glass: All Technical Service Bulletins Manual Vent Windows - Difficult to Open

GLASS - MANUAL VENT WINDOWS HARD TO OPEN

Article No. 88-5-2

FORD: 1980-88 CROWN VICTORIA 1981-86 THUNDERBIRD 1981-87 ESCORT 1984-86 LTD

LINCOLN-MERCURY: 1980-88 GRAND MARQUIS

1981-86 LYNX, COUGAR 1984-86 MARQUIS

LIGHT TRUCK: 1980-88 E-SERIES, F-SERIES, BRONCO 1983-88 RANGER 1984-88 BRONCO II 1986-88 AEROSTAR

ISSUE: Hard to open pivoting type vent windows may be caused by the glass sticking to the weatherstrip on the division bar. The weatherstrip is often pulled out of the division bar when this

condition is present.

FIGURE 1

ACTION: To correct this, apply a strip of clear pressure sensitive tape on the inside vertical edge of the vent window glass, Figure 1.

PART NUMBER PART NAME CLASS

E8AZ-19627-A Clear Pressure Sensitive B

Tape

OTHER APPLICABLE ARTICLES: None WARRANTY STATUS: Eligible Under Basic Warranty Coverage OPERATION: 880502A - Both vent windows TIME:

0.3 Hr. DLR. CODING: Basic Part No. 7021402 Code:

41

Washer Fluid Level Switch: All Technical Service Bulletins Wiper/Washer - Low Fluid Warning Light Stays On

Article No. 84-21-9

WIPER/WASHER - LOW FLUID WARNING LIGHT STAYS ON

FORD ALL MODEL YEARS AND ALL CAR LINES WITH LOW FLUID WARNING LIGHT

LINCOLN-MERCURY ALL MODEL YEARS AND ALL CAR LINES WITH LOW FLUID WARNING LIGHT

LIGHT TRUCKS ALL MODEL YEARS AND ALL LINES WITH LOW FLUID WARNING LIGHT

On some vehicles equipped with low fluid warning light, the light may stay on even when the washer reservoir is full. This is caused by using washer fluid concentrate (C9AZ-19550-A/B) that has not been mixed with water according to the instructions. The undiluted washer solution is absorbed by the float resulting in the float sinking.

When filling the washer reservoir with washer fluid concentrate (C9AZ-19550-A/B), the instructions on the can must be followed. Mixing the concentrated washer fluid with water will stop the float from sinking.

OTHER APPLICABLE ARTICLES: None WARRANTY STATUS: "INFORMATION ONLY"

Windshield: Recalls Recall 93E039000: Incorrect Glass Markings

THE WINDSHIELDS DO NOT MEET THE MARKING REQUIREMENTS OF FMVSS NO. 205, "GLAZING MATERIALS." THE WINDSHIELDS ARE NOT IDENTIFIED AS TO THE TYPE OF GLASS USED. HOWEVER, THE WINDSHIELDS COMPLY FULLY WITH THE PERFORMANCE REQUIREMENTS OF FMVSS NO. 205. SEE NOTE BELOW.

SYSTEM: VISUAL SYSTEMS; GLASS; WINDSHIELD.

VEHICLE DESCRIPTION: AFTERMARKET WINDSHIELDS FOR LIGHT DUTY TRUCKS.

NOTE: THE MANUFACTURER'S PETITION WHICH REQUESTED THAT NHTSA DETERMINE THIS FMVSS NON-COMPLIANCE DOES NOT CREATE AN UNREASONABLE RISK TO MOTOR VEHICLE SAFETY HAS BEEN GRANTED. THEREFORE, THE MANUFACTURER IS NOT OBLIGATED TO CONDUCT AN OWNER NOTIFICATION AND REMEDY CAMPAIGN.

1980 FORD TRUCK BRONCO 1980 FORD TRUCK F SUPER DUTY 1980 FORD TRUCK F150 1980 FORD TRUCK F250 1980 FORD TRUCK F350 1980 FORD TRUCK F600 1980 FORD TRUCK F700 1980 FORD TRUCK F800 1981 FORD TRUCK BRONCO 1981 FORD TRUCK F SUPER DUTY 1981 FORD TRUCK F150 1981 FORD TRUCK F250 1981 FORD TRUCK F350 1981 FORD TRUCK F600 1981 FORD TRUCK F700 1981 FORD TRUCK F800 1982 FORD TRUCK BRONCO 1982 FORD TRUCK F SUPER DUTY 1982 FORD TRUCK F150 1982 FORD TRUCK F250 1982 FORD TRUCK F350 1982 FORD TRUCK F600 1982 FORD TRUCK F700 1982 FORD TRUCK F800 1983 FORD TRUCK BRONCO 1983 FORD TRUCK F SUPER DUTY 1983 FORD TRUCK F150 1983 FORD TRUCK F250 1983 FORD TRUCK F350 1983 FORD TRUCK F600 1983 FORD TRUCK F700 1983 FORD TRUCK F800 1984 FORD TRUCK BRONCO 1984 FORD TRUCK F SUPER DUTY 1984 FORD TRUCK F150 1984 FORD TRUCK F250 1984 FORD TRUCK F350 1984 FORD TRUCK F600 1984 FORD TRUCK F700 1984 FORD TRUCK F800 1985 FORD TRUCK BRONCO 1985 FORD TRUCK F SUPER DUTY 1985 FORD TRUCK F150 1985 FORD TRUCK F250 1985 FORD TRUCK F350 1985 FORD TRUCK F600 1985 FORD TRUCK F700 1985 FORD TRUCK F800 1986 FORD TRUCK BRONCO 1986 FORD TRUCK F SUPER DUTY

1986 FORD TRUCK F150 1986 FORD TRUCK F250 1986 FORD TRUCK F350 1986 FORD TRUCK F600 1986 FORD TRUCK F700 1986 FORD TRUCK F800 1987 FORD TRUCK BRONCO 1987 FORD TRUCK F SUPER DUTY 1987 FORD TRUCK F150 1987 FORD TRUCK F250 1987 FORD TRUCK F350 1987 FORD TRUCK F600 1987 FORD TRUCK F700 1987 FORD TRUCK F800 1988 FORD TRUCK BRONCO 1988 FORD TRUCK F SUPER DUTY 1988 FORD TRUCK F150 1988 FORD TRUCK F250 1988 FORD TRUCK F350 1988 FORD TRUCK F600 1988 FORD TRUCK F700 1988 FORD TRUCK F800 1989 FORD TRUCK BRONCO 1989 FORD TRUCK F SUPER DUTY 1989 FORD TRUCK F150 1989 FORD TRUCK F250 1989 FORD TRUCK F350 1989 FORD TRUCK F600 1989 FORD TRUCK F700 1989 FORD TRUCK F800 1990 FORD TRUCK BRONCO 1990 FORD TRUCK F SUPER DUTY 1990 FORD TRUCK F150 1990 FORD TRUCK F250 1990 FORD TRUCK F350 1990 FORD TRUCK F600 1990 FORD TRUCK F700 1990 FORD TRUCK F800 1991 FORD TRUCK BRONCO 1991 FORD TRUCK F SUPER DUTY 1991 FORD TRUCK F150 1991 FORD TRUCK F250 1991 FORD TRUCK F350 1991 FORD TRUCK F600 1991 FORD TRUCK F700 1991 FORD TRUCK F800 1992 FORD TRUCK BRONCO 1992 FORD TRUCK F SUPER DUTY 1992 FORD TRUCK F150 1992 FORD TRUCK F250 1992 FORD TRUCK F350 1992 FORD TRUCK F600 1992 FORD TRUCK F700 1992 FORD TRUCK F800 1993 FORD TRUCK BRONCO 1993 FORD TRUCK F SUPER DUTY 1993 FORD TRUCK F150 1993 FORD TRUCK F250 1993 FORD TRUCK F350 1993 FORD TRUCK F600 1993 FORD TRUCK F700 1993 FORD TRUCK F800 1994 FORD TRUCK BRONCO 1994 FORD TRUCK F SUPER DUTY 1994 FORD TRUCK F150 1994 FORD TRUCK F250

1994 FORD TRUCK F350 1994 FORD TRUCK F600 1994 FORD TRUCK F700 1994 FORD TRUCK F800

Windshield: All Technical Service Bulletins Recall 93E039000: Incorrect Glass Markings

THE WINDSHIELDS DO NOT MEET THE MARKING REQUIREMENTS OF FMVSS NO. 205, "GLAZING MATERIALS." THE WINDSHIELDS ARE NOT IDENTIFIED AS TO THE TYPE OF GLASS USED. HOWEVER, THE WINDSHIELDS COMPLY FULLY WITH THE PERFORMANCE REQUIREMENTS OF FMVSS NO. 205. SEE NOTE BELOW.

SYSTEM: VISUAL SYSTEMS; GLASS; WINDSHIELD.

VEHICLE DESCRIPTION: AFTERMARKET WINDSHIELDS FOR LIGHT DUTY TRUCKS.

NOTE: THE MANUFACTURER'S PETITION WHICH REQUESTED THAT NHTSA DETERMINE THIS FMVSS NON-COMPLIANCE DOES NOT CREATE AN UNREASONABLE RISK TO MOTOR VEHICLE SAFETY HAS BEEN GRANTED. THEREFORE, THE MANUFACTURER IS NOT OBLIGATED TO CONDUCT AN OWNER NOTIFICATION AND REMEDY CAMPAIGN.

1980 FORD TRUCK BRONCO 1980 FORD TRUCK F SUPER DUTY 1980 FORD TRUCK F150 1980 FORD TRUCK F250 1980 FORD TRUCK F350 1980 FORD TRUCK F600 1980 FORD TRUCK F700 1980 FORD TRUCK F800 1981 FORD TRUCK BRONCO 1981 FORD TRUCK F SUPER DUTY 1981 FORD TRUCK F150 1981 FORD TRUCK F250 1981 FORD TRUCK F350 1981 FORD TRUCK F600 1981 FORD TRUCK F700 1981 FORD TRUCK F800 1982 FORD TRUCK BRONCO 1982 FORD TRUCK F SUPER DUTY 1982 FORD TRUCK F150 1982 FORD TRUCK F250 1982 FORD TRUCK F350 1982 FORD TRUCK F600 1982 FORD TRUCK F700 1982 FORD TRUCK F800 1983 FORD TRUCK BRONCO 1983 FORD TRUCK F SUPER DUTY 1983 FORD TRUCK F150 1983 FORD TRUCK F250 1983 FORD TRUCK F350 1983 FORD TRUCK F600 1983 FORD TRUCK F700 1983 FORD TRUCK F800 1984 FORD TRUCK BRONCO 1984 FORD TRUCK F SUPER DUTY 1984 FORD TRUCK F150 1984 FORD TRUCK F250 1984 FORD TRUCK F350 1984 FORD TRUCK F600 1984 FORD TRUCK F700 1984 FORD TRUCK F800 1985 FORD TRUCK BRONCO 1985 FORD TRUCK F SUPER DUTY 1985 FORD TRUCK F150 1985 FORD TRUCK F250 1985 FORD TRUCK F350 1985 FORD TRUCK F600 1985 FORD TRUCK F700 1985 FORD TRUCK F800 1986 FORD TRUCK BRONCO 1986 FORD TRUCK F SUPER DUTY

1986 FORD TRUCK F150 1986 FORD TRUCK F250 1986 FORD TRUCK F350 1986 FORD TRUCK F600 1986 FORD TRUCK F700 1986 FORD TRUCK F800 1987 FORD TRUCK BRONCO 1987 FORD TRUCK F SUPER DUTY 1987 FORD TRUCK F150 1987 FORD TRUCK F250 1987 FORD TRUCK F350 1987 FORD TRUCK F600 1987 FORD TRUCK F700 1987 FORD TRUCK F800 1988 FORD TRUCK BRONCO 1988 FORD TRUCK F SUPER DUTY 1988 FORD TRUCK F150 1988 FORD TRUCK F250 1988 FORD TRUCK F350 1988 FORD TRUCK F600 1988 FORD TRUCK F700 1988 FORD TRUCK F800 1989 FORD TRUCK BRONCO 1989 FORD TRUCK F SUPER DUTY 1989 FORD TRUCK F150 1989 FORD TRUCK F250 1989 FORD TRUCK F350 1989 FORD TRUCK F600 1989 FORD TRUCK F700 1989 FORD TRUCK F800 1990 FORD TRUCK BRONCO 1990 FORD TRUCK F SUPER DUTY 1990 FORD TRUCK F150 1990 FORD TRUCK F250 1990 FORD TRUCK F350 1990 FORD TRUCK F600 1990 FORD TRUCK F700 1990 FORD TRUCK F800 1991 FORD TRUCK BRONCO 1991 FORD TRUCK F SUPER DUTY 1991 FORD TRUCK F150 1991 FORD TRUCK F250 1991 FORD TRUCK F350 1991 FORD TRUCK F600 1991 FORD TRUCK F700 1991 FORD TRUCK F800 1992 FORD TRUCK BRONCO 1992 FORD TRUCK F SUPER DUTY 1992 FORD TRUCK F150 1992 FORD TRUCK F250 1992 FORD TRUCK F350 1992 FORD TRUCK F600 1992 FORD TRUCK F700 1992 FORD TRUCK F800 1993 FORD TRUCK BRONCO 1993 FORD TRUCK F SUPER DUTY 1993 FORD TRUCK F150 1993 FORD TRUCK F250 1993 FORD TRUCK F350 1993 FORD TRUCK F600 1993 FORD TRUCK F700 1993 FORD TRUCK F800 1994 FORD TRUCK BRONCO 1994 FORD TRUCK F SUPER DUTY 1994 FORD TRUCK F150 1994 FORD TRUCK F250

1994 FORD TRUCK F350 1994 FORD TRUCK F600 1994 FORD TRUCK F700 1994 FORD TRUCK F800

Washer Fluid Level Switch: All Technical Service Bulletins Wiper/Washer - Low Fluid Warning Light Stays On

Article No. 84-21-9

WIPER/WASHER - LOW FLUID WARNING LIGHT STAYS ON

FORD ALL MODEL YEARS AND ALL CAR LINES WITH LOW FLUID WARNING LIGHT

LINCOLN-MERCURY ALL MODEL YEARS AND ALL CAR LINES WITH LOW FLUID WARNING LIGHT

LIGHT TRUCKS ALL MODEL YEARS AND ALL LINES WITH LOW FLUID WARNING LIGHT

On some vehicles equipped with low fluid warning light, the light may stay on even when the washer reservoir is full. This is caused by using washer fluid concentrate (C9AZ-19550-A/B) that has not been mixed with water according to the instructions. The undiluted washer solution is absorbed by the float resulting in the float sinking.

When filling the washer reservoir with washer fluid concentrate (C9AZ-19550-A/B), the instructions on the can must be followed. Mixing the concentrated washer fluid with water will stop the float from sinking.

OTHER APPLICABLE ARTICLES: None WARRANTY STATUS: "INFORMATION ONLY"

Wiper Control Module: Locations

LH Side Of I/P

Ford Bronco Workshop Manual (V8-351 5.8L VIN G 2-bbl (1982))
Ford Workshop Manuals > Wiper and Washer Systems > Sensors and Switches - Wiper and Washer Systems > Washer Fluid Level Switch > Component Information > Technical Service Bulletins > Customer Interest for Washer Fluid Level Switch: > 84219 > Oct > 84 > Wiper/Washer - Low Fluid Warning Light Stays On

Washer Fluid Level Switch: Customer Interest Wiper/Washer - Low Fluid Warning Light Stays On

Article No. 84-21-9

WIPER/WASHER - LOW FLUID WARNING LIGHT STAYS ON

FORD ALL MODEL YEARS AND ALL CAR LINES WITH LOW FLUID WARNING LIGHT

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LIGHT TRUCKS ALL MODEL YEARS AND ALL LINES WITH LOW FLUID WARNING LIGHT

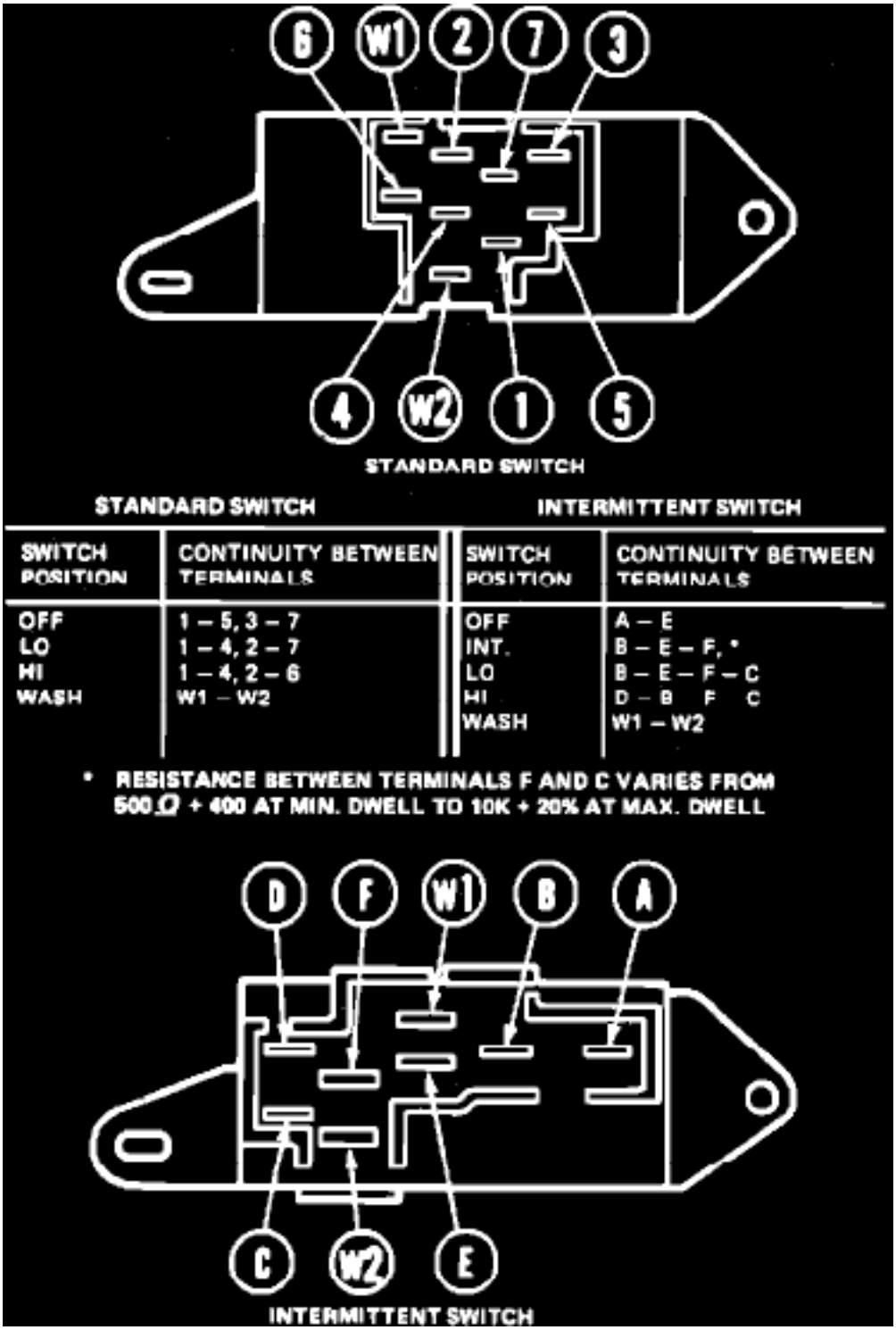
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OTHER APPLICABLE ARTICLES: None WARRANTY STATUS: "INFORMATION ONLY"

Wiper Switch: Locations

LH Side Of I/P

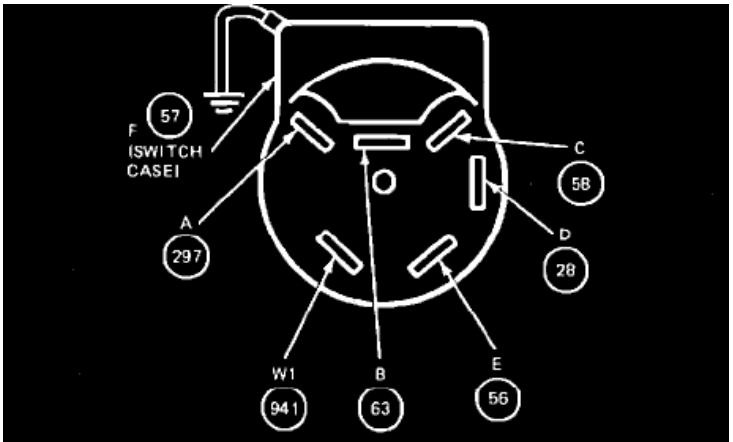


STANDARD SWITCH		INTERMITTENT SWITCH	
SWITCH POSITION	CONTINUITY BETWEEN TERMINALS	SWITCH POSITION	CONTINUITY BETWEEN TERMINALS
OFF	1 – 5, 3 – 7	OFF	A – E
LO	1 – 4, 2 – 7	INT.	B – E – F, *
HI	1 – 4, 2 – 6	LO	B – E – F – C
WASH	W1 – W2	HI	D – B F C
		WASH	W1 – W2

* RESISTANCE BETWEEN TERMINALS F AND C VARIES FROM 500 Ω + 400 AT MIN. DWELL TO 10K + 20% AT MAX. DWELL

Wiper Switch: Testing and Inspection

Fig. 4 Wiper Switch Continuity Test

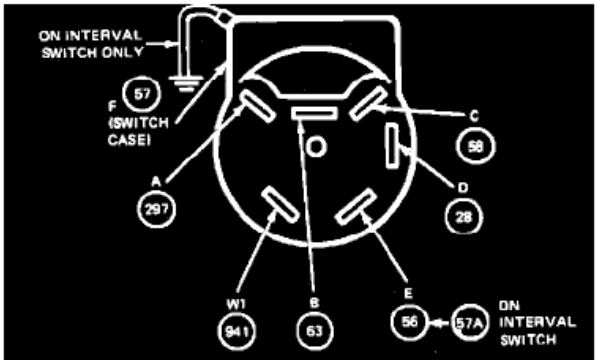


INTERMITTENT SWITCH

SWITCH POSITION	CONTINUITY BETWEEN TERMINALS
OFF (PARK)	A – B
	D – E
LOW	A – B
	D – E – F
HIGH	D – E – F
	A – B – C
INTERMITTENT	A-B, E-F
	VARIABLE RESISTANCE BETWEEN D – E 200-1000 OHMS MAX. 5600 – 8400 ohms
WASH	A-B-W1

2-SPEED SWITCH

SWITCH POSITION	CONTINUITY BETWEEN TERMINALS
OFF (PARK)	C – D
	A – B
LOW	A – B – C
HIGH	A – B – E
WASH	A-B-W1



INTERVAL SWITCH

SWITCH POSITION	CONTINUITY BETWEEN TERMINALS
OFF (PARK)	A – B
	D – E
LOW	A – B
	D – E – F
HIGH	D – E – F
	A – B – C
INTERVAL	A-B, E-F
	VARIABLE RESISTANCE BETWEEN D – E 200-1000 OHMS MAX. 5600 – 8400 ohms
WASH	A-B-W1

2-SPEED SWITCH

SWITCH POSITION	CONTINUITY BETWEEN TERMINALS
OFF (PARK)	C – D
	A – B
LOW	A – B – C
HIGH	A – B – E
WASH	A-B-W1

Fig. 5 Testing wiper switch continuity. 1980 Bronco & F-100---350

Fig. 5 Wiper Switch Continuity Test

1. Check continuity between switch terminals, Figs. 4 through 6.

2. To detect marginal operation of switch, rotate or slide switch control knob while each reading is being taken.

3. If switch does not show continuity or if poor continuity exists at any switch position, replace switch.

Wiper Switch: Service and Repair

F-100---350 & BRONCO

1. Disconnect battery ground cable.

2. Remove wiper switch knob, bezel nut and bezel.

3. Pull switch down from under instrument panel, then disconnect electrical connector and remove switch from vehicle.

4. Reverse procedure to install.

Ford Bronco Workshop Manual (V8-351 5.8L VIN G 2-bbl (1982))
Ford Workshop Manuals > Wiper and Washer Systems > Washer Fluid Level Switch > Component Information > Technical Service Bulletins > Customer Interest for Washer Fluid Level Switch: > 84219 > Oct > 84 > Wiper/Washer - Low Fluid Warning Light Stays On

Washer Fluid Level Switch: Customer Interest Wiper/Washer - Low Fluid Warning Light Stays On

Article No. 84-21-9

WIPER/WASHER - LOW FLUID WARNING LIGHT STAYS ON

FORD ALL MODEL YEARS AND ALL CAR LINES WITH LOW FLUID WARNING LIGHT

LINCOLN-MERCURY ALL MODEL YEARS AND ALL CAR LINES WITH LOW FLUID WARNING LIGHT

LIGHT TRUCKS ALL MODEL YEARS AND ALL LINES WITH LOW FLUID WARNING LIGHT

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When filling the washer reservoir with washer fluid concentrate (C9AZ-19550-A/B), the instructions on the can must be followed. Mixing the concentrated washer fluid with water will stop the float from sinking.

OTHER APPLICABLE ARTICLES: None WARRANTY STATUS: "INFORMATION ONLY"

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FORD ALL MODEL YEARS AND ALL CAR LINES WITH LOW FLUID WARNING LIGHT

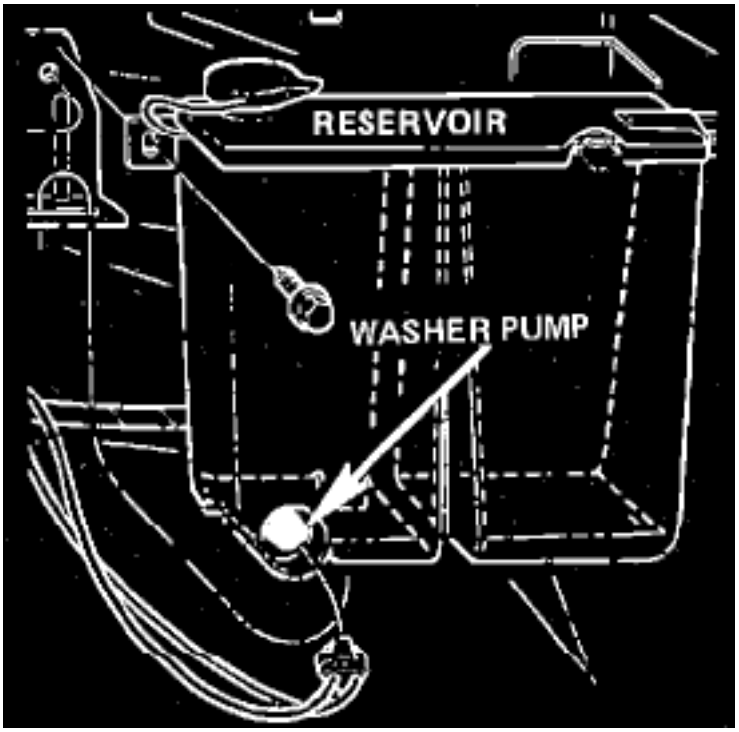
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OTHER APPLICABLE ARTICLES: None WARRANTY STATUS: "INFORMATION ONLY"



Windshield Washer Motor: Locations

LH Front Of Engine Compartment

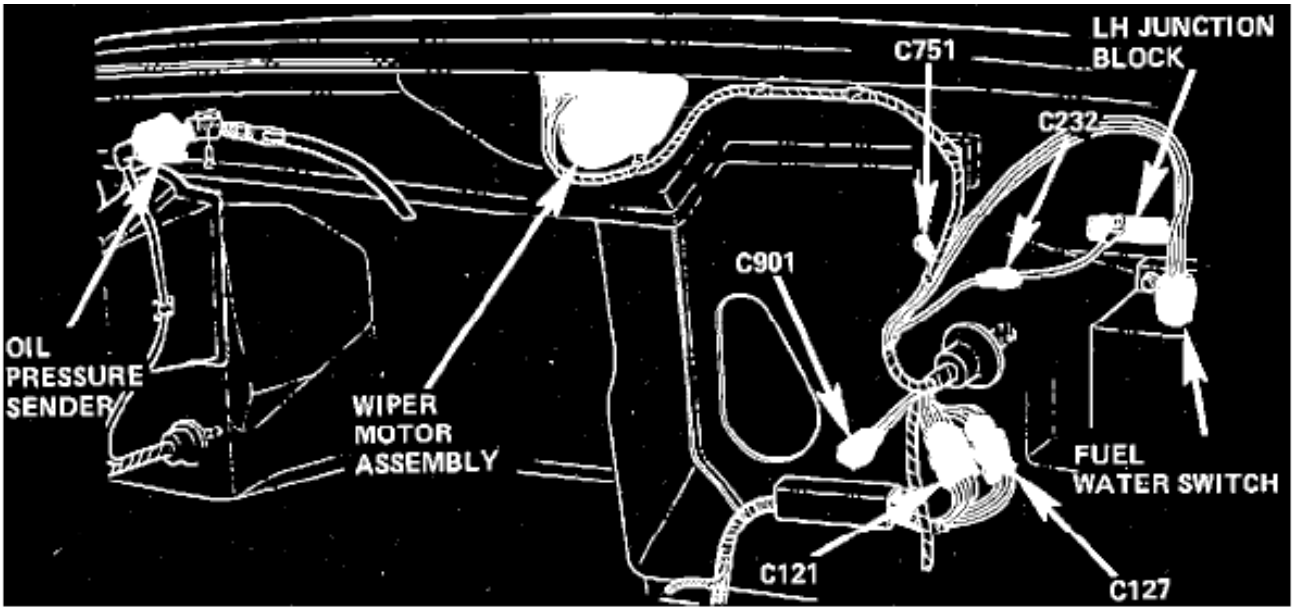
In Washer Reservoir

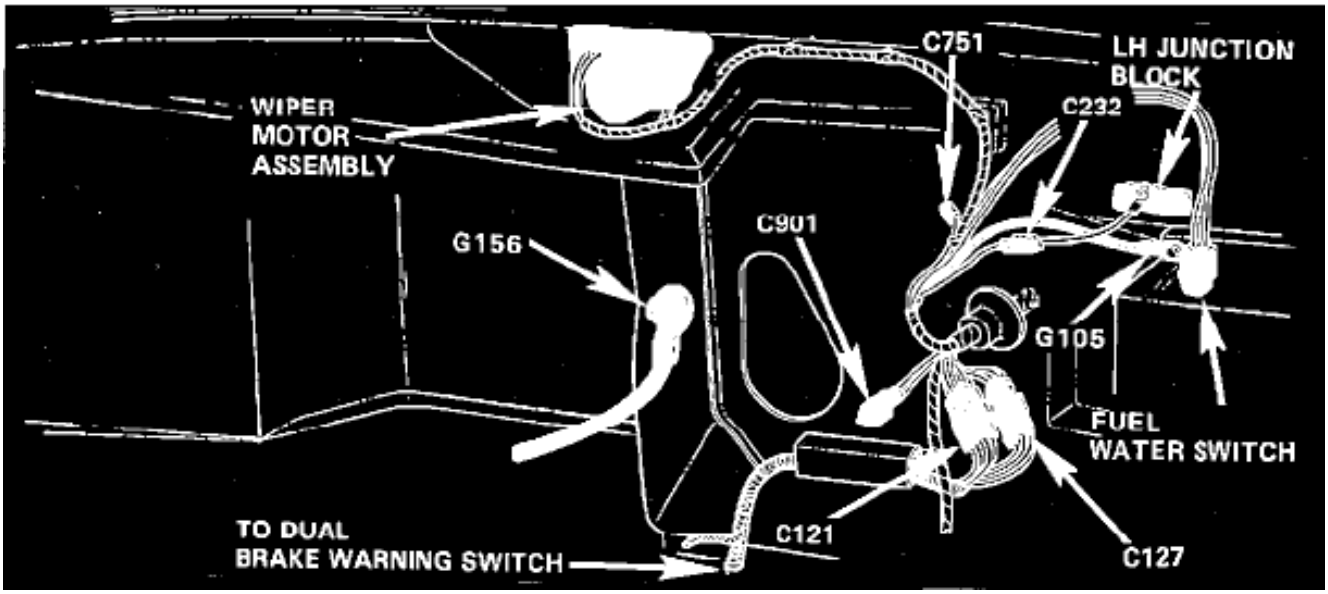
Wiper Control Module: Locations

LH Side Of I/P

Wiper Gear Box: Service and Repair

1. Disconnect battery ground cable.
2. Remove both wiper arm and blade assemblies.
3. Remove cowl grille attaching screws and raise the grille slightly.
4. Disconnect windshield washer fluid hose, then remove cowl grille.
5. Remove clip securing right and left linkage and the retaining clip from wiper motor arm.
6. Remove 3 pivot body-to-cowl panel attaching screws, then the arm and pivot shaft assembly.
7. Reverse procedure to install.





Wiper Motor: Locations

Center Of Dash Panel.

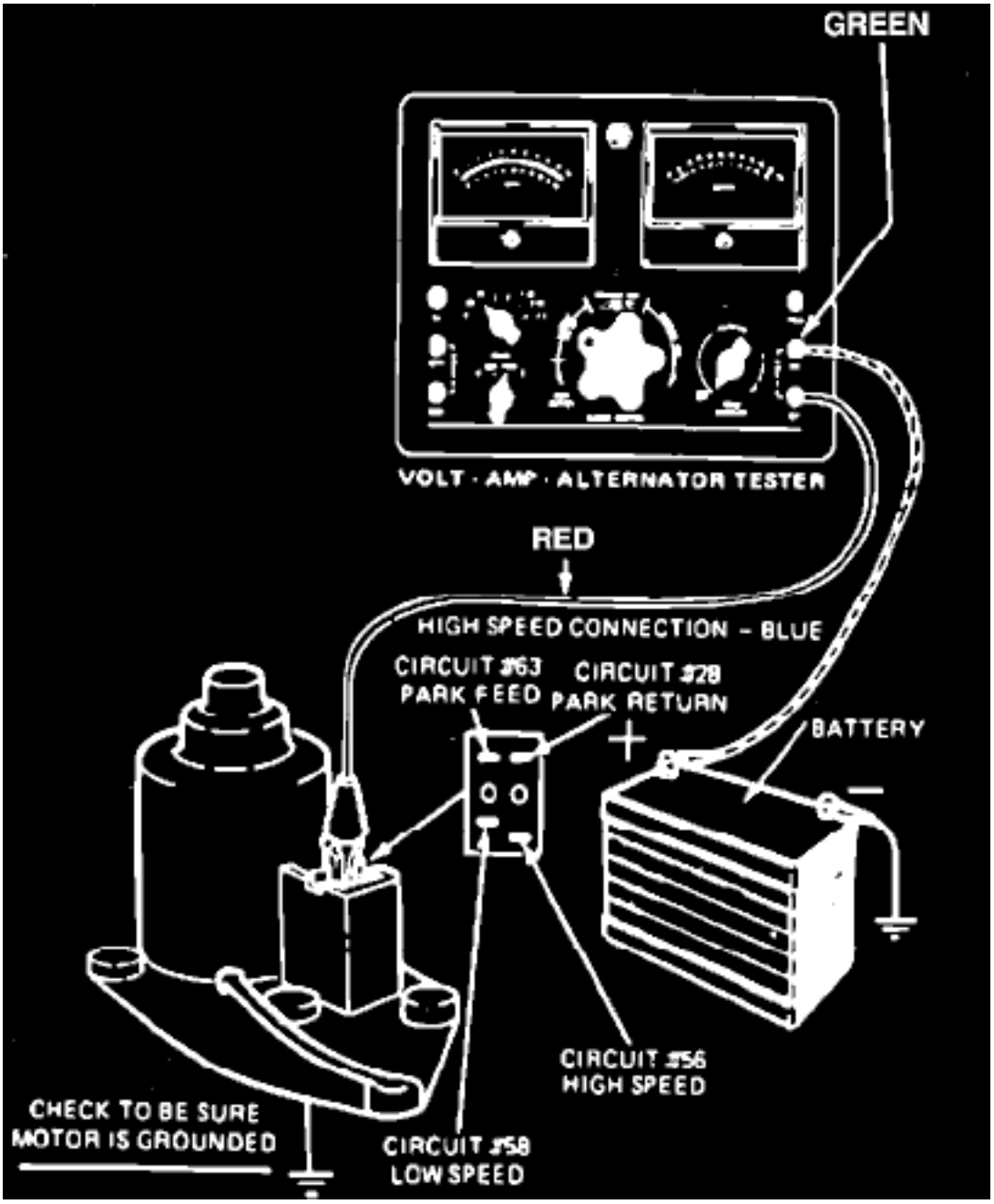
Attached To Center Of Dash Panel

Applicable to: 1983 w/Diesel Engine

Center Of Dash Panel.

Attached To Center Of Dash Panel

Applicable to: 1984-85 w/Diesel Engine



Wiper Motor: Testing and Inspection

Fig. 1 Testing wiper motor current draw. 1980---87 Bronco & F-100---350 Series

Bronco & F100---350

1. Disconnect wiper motor linkage and electrical connector.

2. Connect multimeter to wiper motor, Fig. 1, connecting positive lead of tester first to low speed connection, then to high speed connections at connector plug. Current draw should not exceed 3 amps.

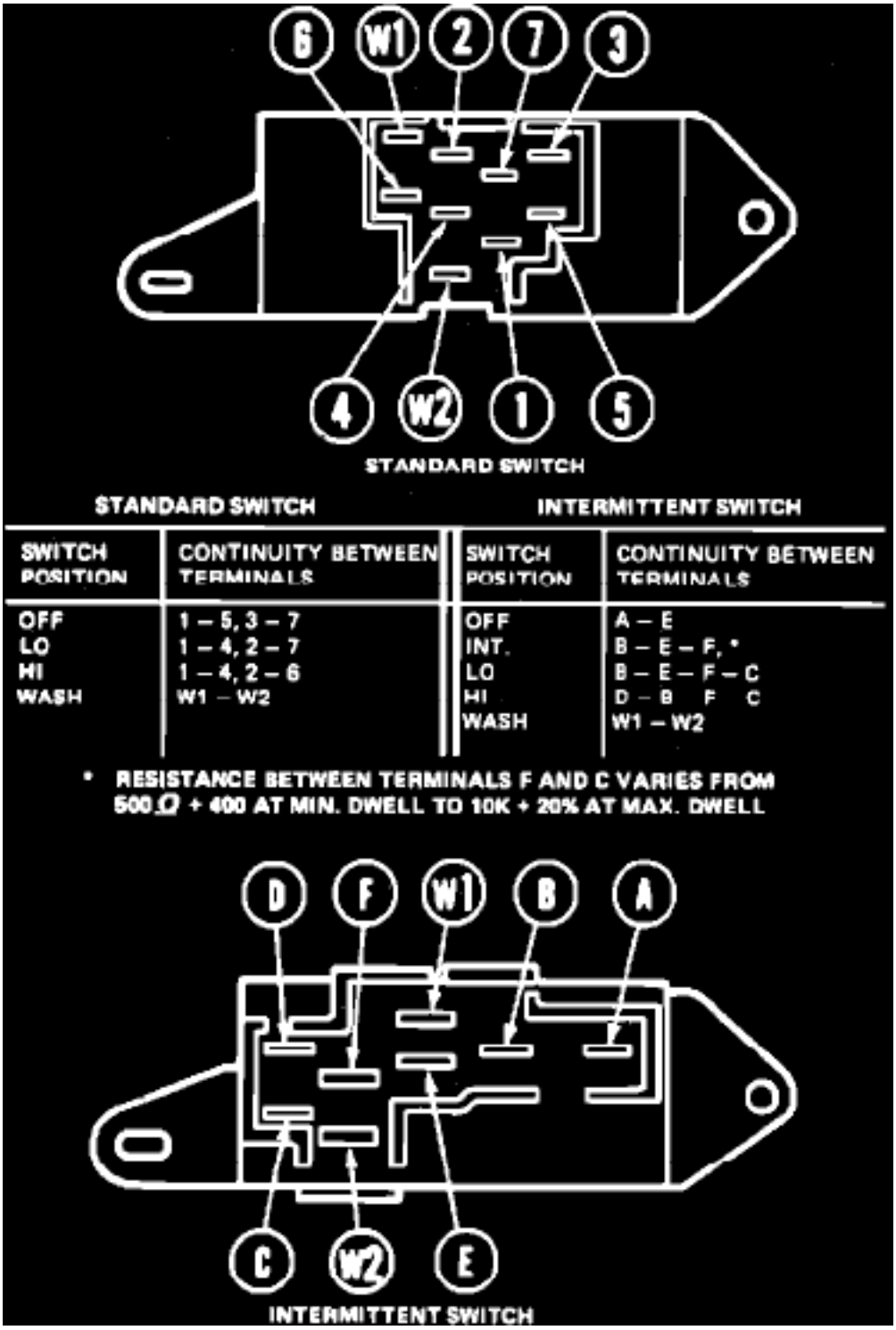
Wiper Motor: Service and Repair

F-100---350 & BRONCO

1. Disconnect battery ground cable.
2. Remove both wiper arm and blade assemblies.
3. Remove cowl grille attaching screws and raise the grille slightly.
4. Disconnect washer nozzle hose, then remove cowl grille assembly.
5. Remove wiper linkage clip from motor output arm.
6. Disconnect wiper motor electrical connector.
7. Remove wiper motor attaching screws and the wiper motor.
8. Reverse procedure to install.

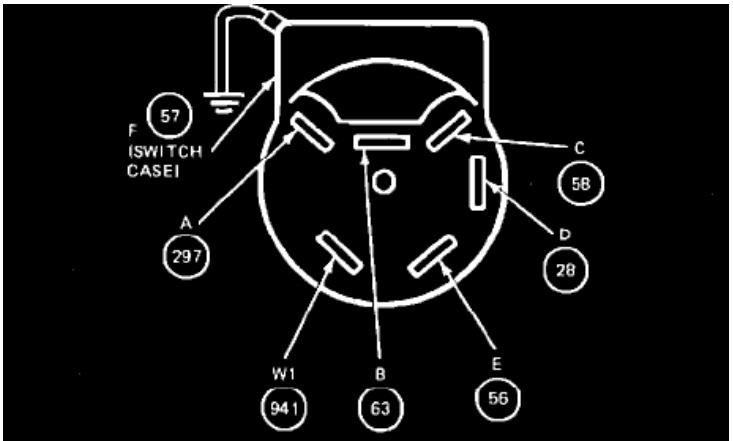
Wiper Switch: Locations

LH Side Of I/P



Wiper Switch: Testing and Inspection

Fig. 4 Wiper Switch Continuity Test

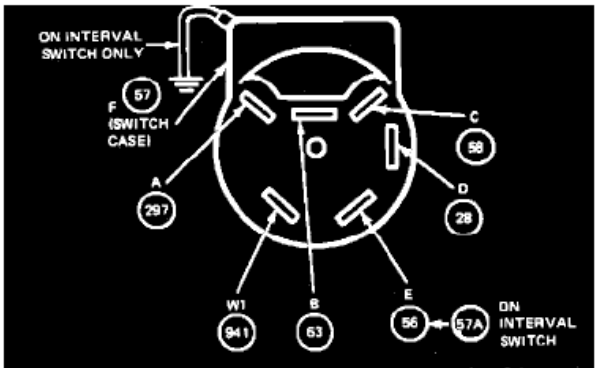


INTERMITTENT SWITCH

SWITCH POSITION	CONTINUITY BETWEEN TERMINALS
OFF (PARK)	A – B D – E
LOW	A – B D – E – F
HIGH	D – E – F A – B – C
INTERMITTENT	A-B, E-F VARIABLE RESISTANCE BETWEEN D – E 200-1000 OHMS MAX. 5600 – 8400 ohms
WASH	A-B-W1

2-SPEED SWITCH

SWITCH POSITION	CONTINUITY BETWEEN TERMINALS
OFF (PARK)	C – D A – B
LOW	A – B – C
HIGH	A – B – E
WASH	A-B-W1



INTERVAL SWITCH

SWITCH POSITION	CONTINUITY BETWEEN TERMINALS
OFF (PARK)	A – B D – E
LOW	A – B D – E – F
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