

SECTION 8E

WINDSHIELD WIPER/WASHER SYSTEM (PULSE)

NOTICE: Refer to Battery Disconnect Caution in Section 0A.

NOTICE: When fasteners are removed, always reinstall them at the same location from which they were removed. If a fastener needs to be replaced, use the correct part number fastener for that application. If the correct part number fastener is not available, a fastener of equal size and strength (or stronger) may be used. The correct torque value must be used when installing fasteners that require it. If the above conditions are not followed, parts or system damage could result.

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GENERAL DESCRIPTION

Figure 1

The windshield wiper/washer system consists of a permanent magnet depressed park wiper motor assembly, wiper linkage assemblies, wiper arm and blade assemblies, a washer pump mounted on a washer fluid reservoir and a wiper/washer switch assembly (Figure 1).

Pulse and timing functions, along with the demand wash function, are controlled by a printed circuit board in the wiper motor cover assembly. The wiper motor also is equipped with RFI (radio frequency interference) suppression.

Depressed park positioning is accomplished by an external drive mechanism on the wiper motor assembly.

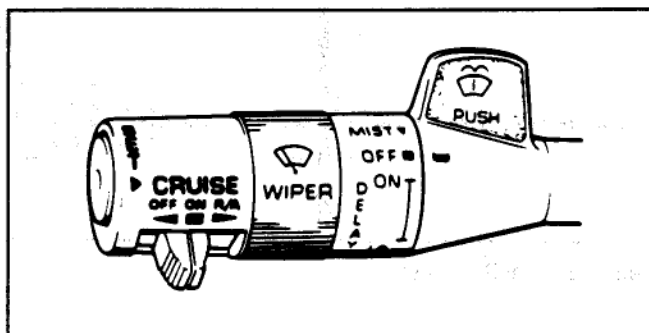


Figure 1 – Wiper/Washer Switch Assembly

CIRCUIT OPERATION

Figure 2

Wiper Operation

In addition to the features of a conventional (non-pulse) wiper system (mist, low and high speeds), the pulse type windshield wiper/washer system includes an operating mode in which the wipers make single sweeps with an adjustable time interval between sweeps. The time interval is controlled by a solid state timer in the wiper motor cover assembly. The duration of the delay interval is determined by the delay resistor in the wiper/washer switch assembly.

When the wiper switch is turned OFF, the wiper motor returns the wipers to end of sweep (inner wiper) position, the wiper motor reverses and activates its external depressed park mechanism to lower the wipers to park position.

Pulse Operation

With the wiper switch in DELAY (pulse), battery voltage is applied to the wiper motor connector at terminal "B" through CKT 143. Voltage also is applied to terminal "D" through CKT 113 and terminal "E" through CKT 112.

The length of delay time between sweeps is controlled by the variable pulse delay resistor. The delay is adjustable from 1 to 22 seconds, nominally.

8E-2 WINDSHIELD WIPER/WASHER SYSTEM

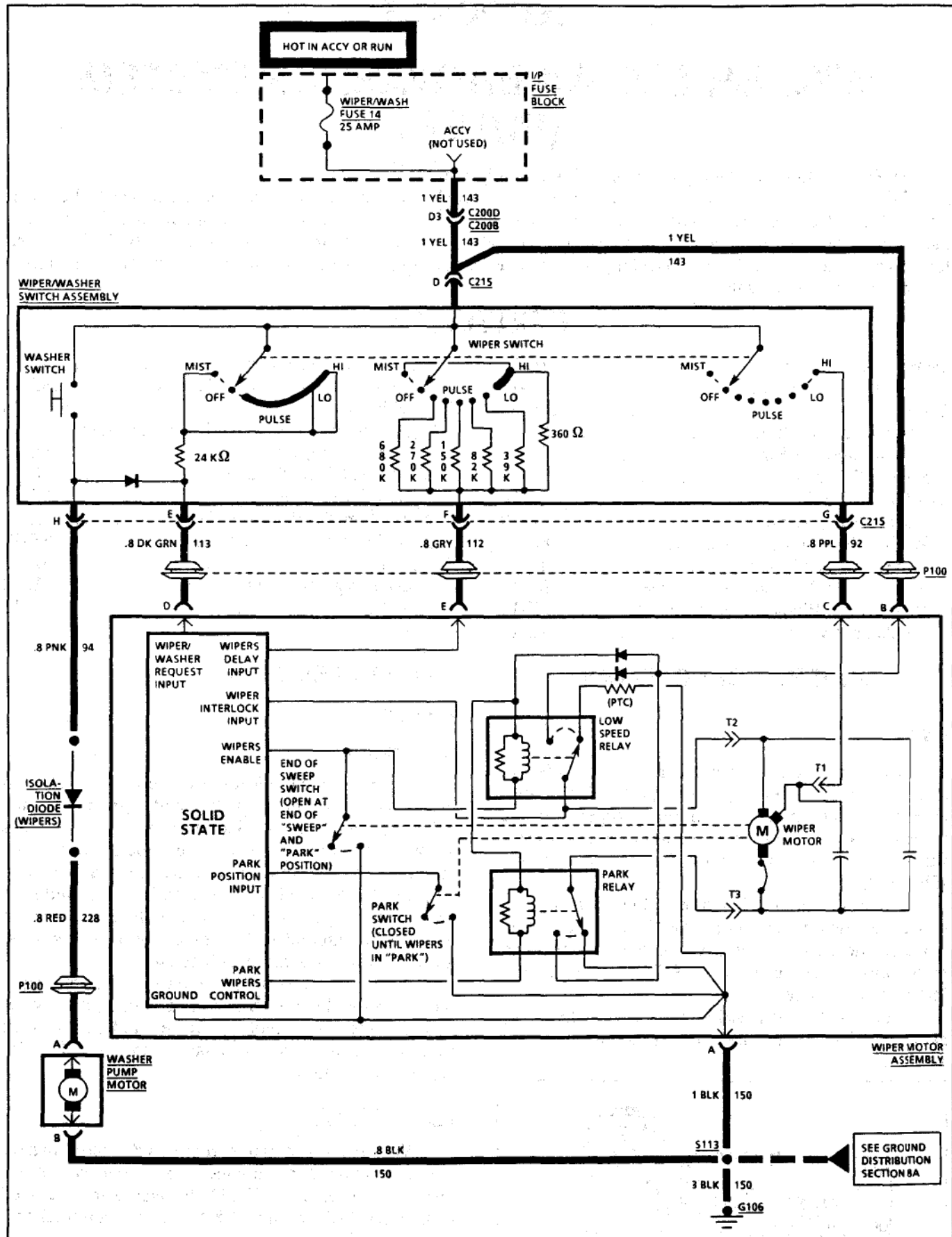


Figure 2 - Wiper/Washer System Electrical Schematic

Low Speed Operation

In the LO position of the wiper switch, battery voltage is applied to the wiper motor connector at terminal "B" through CKT 143 and terminal "E" through CKT 112, with voltage applied to terminal "D" through CKT 113.

The circuit board supplies power to the wiper motor, which runs continuously through the low speed relay.

High Speed Operation

In the HI position of the wiper switch, battery voltage is applied at terminals "B", "C" and "E" of the wiper motor assembly through CKTs 143, 92 and 112. Voltage also is applied to terminal "D" through CKT 113.

Park Position Operation

When turned OFF from any position, the wipers complete the last sweep and park. When the wiper switch is in OFF, the wiper motor assembly has battery voltage applied to terminal "B" only, from CKT 143. When the end of sweep switch opens, the control circuit reverses the wiper motor which activates the external depressed park mechanism. The wiper motor continues to run until the park switch opens.

Washer Operation

When the washer switch is turned to ON, battery voltage is applied to terminal "D" of the wiper motor assembly through CKT 113. The washer switch also applies voltage to terminal "A" which turns ON the washer pump through CKTs 94 and 228. The wiper motor has voltage applied through the low speed relay and operates at low speed for 2 to 4 wipes.

When the washer switch is held ON, the wiper motor circuit board will keep the washer pump ON only as long as the washer switch is held ON.

If the wipers had been in DELAY, LO or HI, they would return to that operation after the wash cycle. If in OFF, they then return to park position after 2 to 4 wipes.

Mist Operation

When the wiper switch is moved to MIST and released, the wipers make one sweep at low speed and return to park position. If the wiper switch is held in MIST, the wipers will continue to operate until the switch is released. The circuit operation is the same as that of low speed.

DIAGNOSIS

COMPONENT LOCATIONS

- Refer to Figure 4 for a list of component locations.

TROUBLESHOOTING HINTS

Figure 2

- Make the following checks before beginning System Diagnosis.
 1. Check fuse 14. If open, check for short to ground through CKT 143 and replace fuse.
 2. Check that all system connectors are mated firmly.
 3. If washer does not operate, check that:
 - Washer reservoir is filled.
 - Hoses are correctly attached.
 - Hoses are not cut, kinked or pinched.
 - Nozzles are not clogged.
 - Connector seal at washer pump is not damaged or missing.
 4. Check for binding or broken wiper arm linkage.
- Refer to System Diagnosis.

SYSTEM DIAGNOSIS

- Perform the System Check (Figure 5), then refer to the Symptom Table (Figure 6) for the appropriate diagnostic procedures.

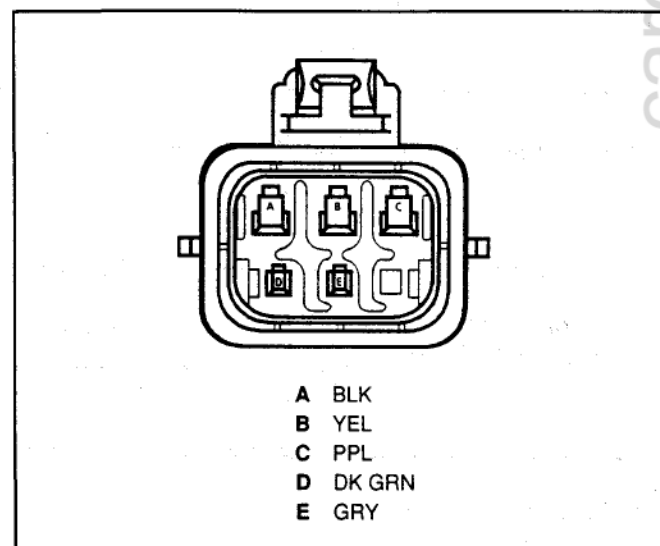


Figure 3 – Wiper Motor Wiring Harness Connector

8E-4 WINDSHIELD WIPER/WASHER SYSTEM

COMPONENT	LOCATION	SECTION 8A-201-PG	FIG.
I/P Fuse Block	LH side of I/P carrier, on the side	8	15
Isolation Diode (Wipers) ...	Approx. 20 cm (8 in.) from C215	35	64
Washer Pump	Front of vehicle, below engine hood latch	25	46
Wiper Motor Assembly	Rear of LH shock tower, mounted to dash panel below LH wiper mount	10	18
Wiper/Washer Switch Assembly	In left side of steering column, actuated by multi-function lever	3	5
C200B (18 cavities)	Part of forward lamp harness, between LH kick panel and steering column	25	49
C200D (48 cavities)	Part of I/P harness, between LH kick panel and steering column	25	49
C215 (11 cavities)	Near base of steering column	35	64
G106	Near top LH side of radiator, in top of T-bar	19	35
P100	Left side in dash panel, engine to passenger compartment	19	36
S113	Forward lamp harness, approx. 13 cm (5 in.) from electrical center breakout		

Figure 4 – Component Locations

SYSTEM CHECK

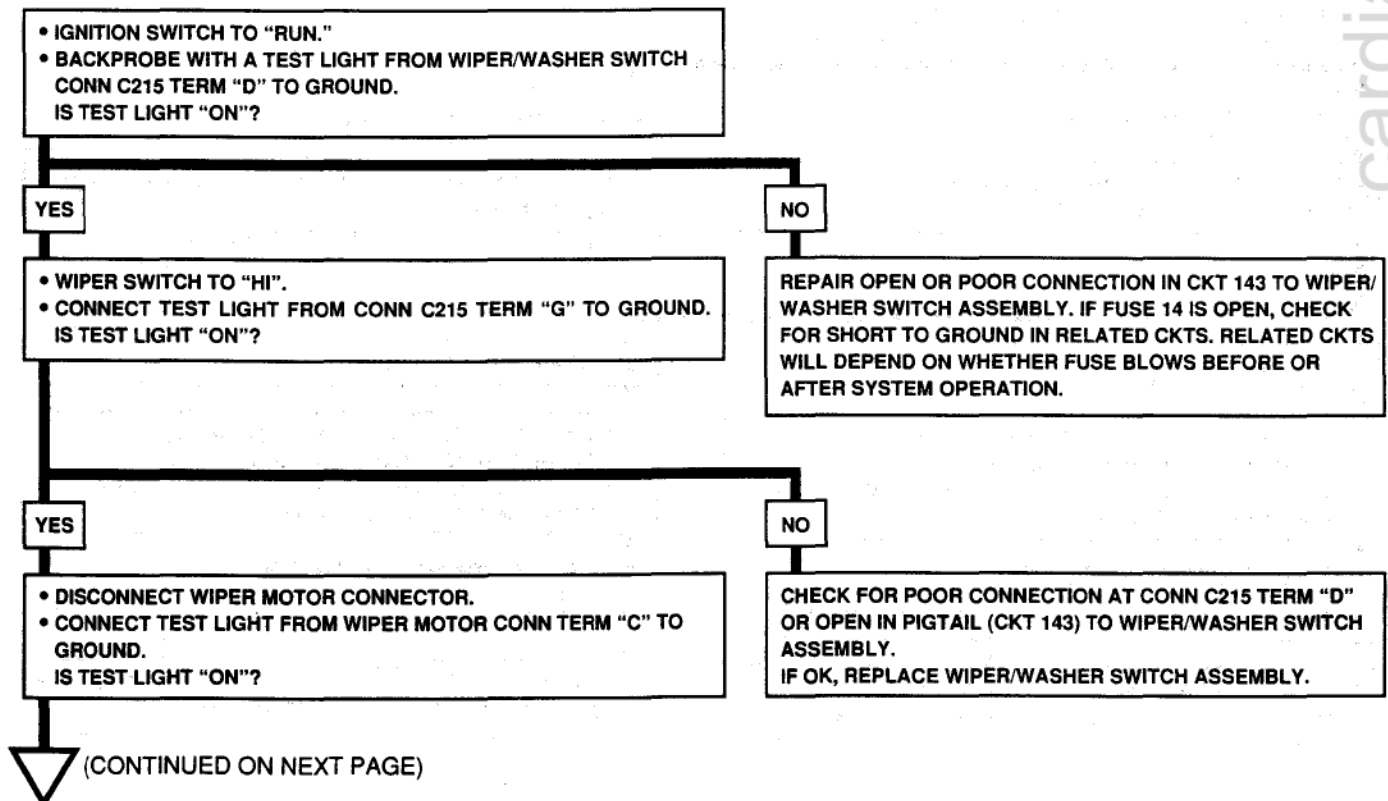
ACTION	NORMAL OPERATION
[1] • Turn ignition switch to RUN. • Press washer switch to ON.	Wipers operate at LO speed. Washer sprays windshield as long as washer switch is held in ON position. After releasing switch, washer stops and wipers return to park position after 2 to 4 sweeps.
[2] • Turn wiper switch to DELAY (pulse mode).	Wipers make one complete sweep, then pause for 1 to 22 seconds before making next sweep. The pause time is adjusted by turning the wiper switch through the delay range.
[3] • Wiper switch in DELAY. • Press washer switch ON.	Washer sprays windshield as long as washer switch is held ON. Wipers run at low speed while spraying and continue for 2 to 4 sweeps after washer switch is released. Wipers then return to pulse operation.
[4] • Turn wiper switch to LO.	Wipers run continuously at low speed.
[5] • Turn wiper switch to HI.	Wipers run continuously at faster speed.
[6] • Turn wiper switch to OFF.	Wipers return to park position at low speed.
[7] • Turn wiper switch to MIST, then release.	Wipers make one complete sweep, then return to park position.

Figure 5 – Wiper/Washer System Check

SYMPTOM	PROCEDURE	PAGE
Wipers do not operate in any mode.	Chart 1	8E-5
Wipers run when switch is "OFF."	Chart 2	8E-6
No low speed mode.	Replace wiper/washer switch assembly.	—
No high speed mode.	Chart 3	8E-7
Wipers operate only when switch is in HI position, but run at low speed.	Check for open or poor connection in CKT 143 between wiper/washer switch CONN C215 TERM "D" and wiper motor CONN TERM "B". If OK, replace wiper motor assembly.	—
Low speed, pulse delay and mist modes inoperative (high speed mode OK).	Chart 4	8E-7
Pulse delay operates incorrectly or not at all.	Chart 5	8E-8
Wipers stop randomly and do not park when switch is moved to "OFF."	Chart 6	8E-8
Wipers do not operate when washer switch is activated.	Chart 7	8E-9
Washer does not operate.	Chart 8	8E-9

Figure 6 – Symptom Table

CHART 1 WIPERS DO NOT OPERATE IN ANY MODE



8E-6 WINDSHIELD WIPER/WASHER SYSTEM

(CONTINUED FROM PREVIOUS PAGE)

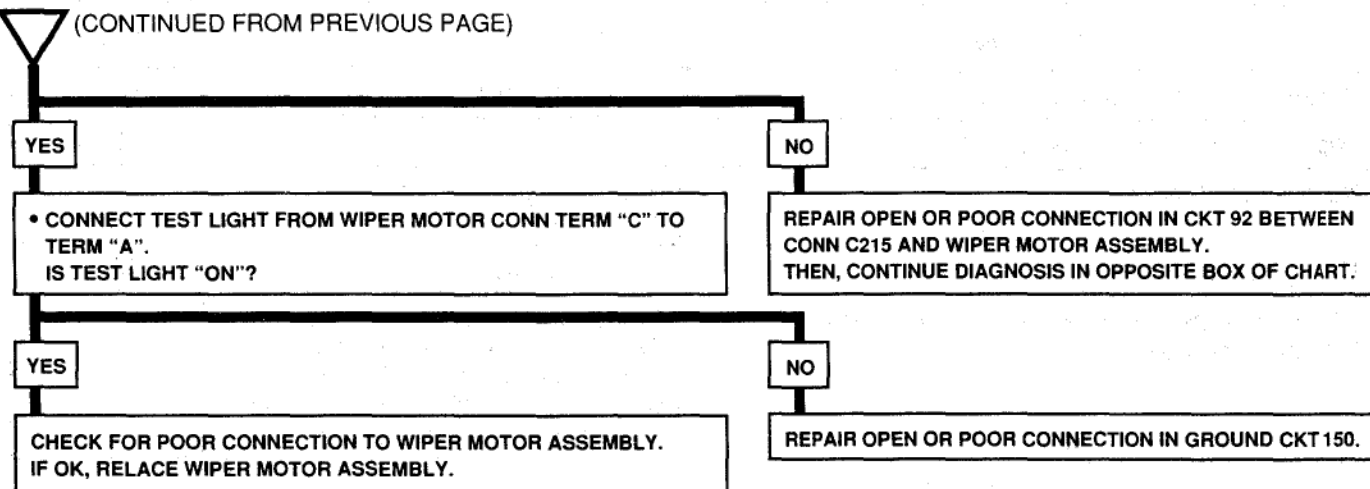


CHART 2
WIPERS RUN WHEN SWITCH IS "OFF"

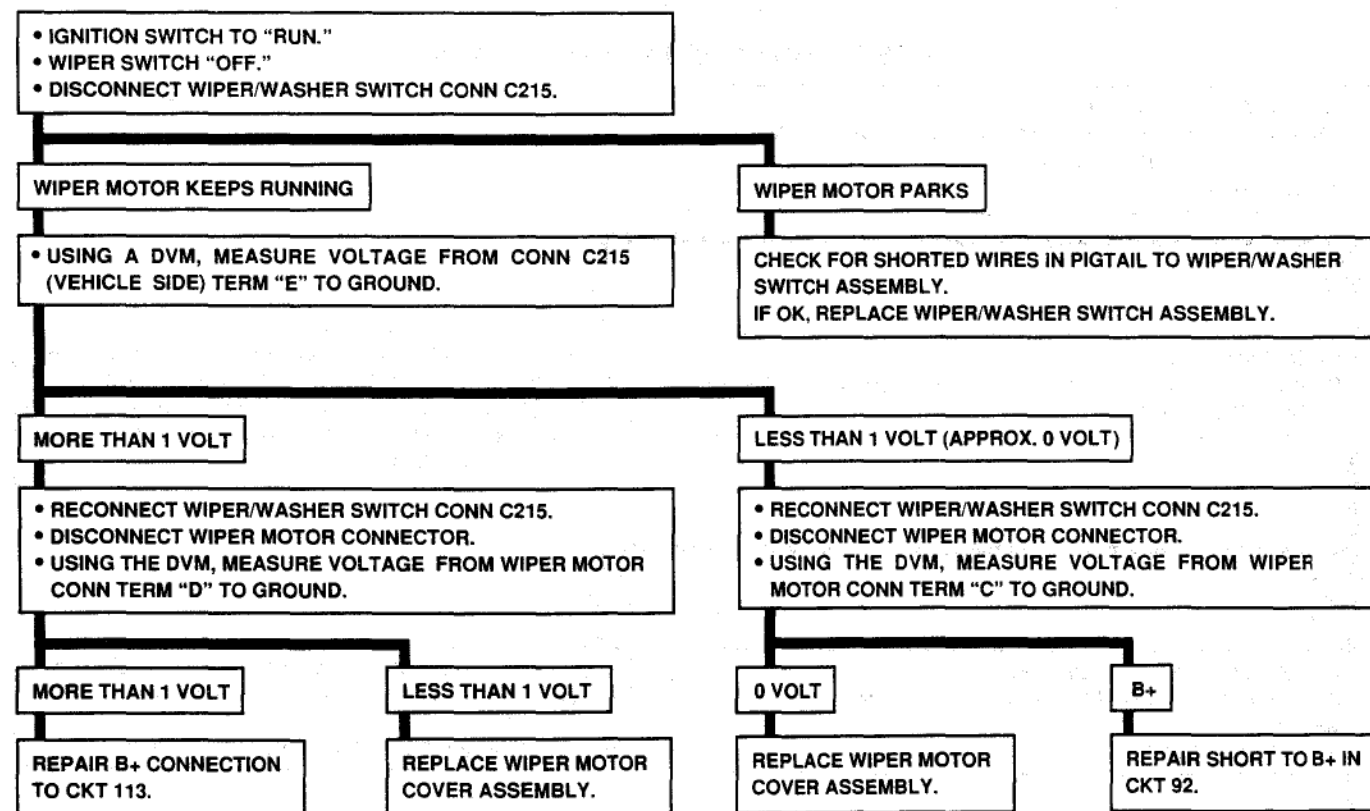


CHART 3
NO HIGH SPEED MODE

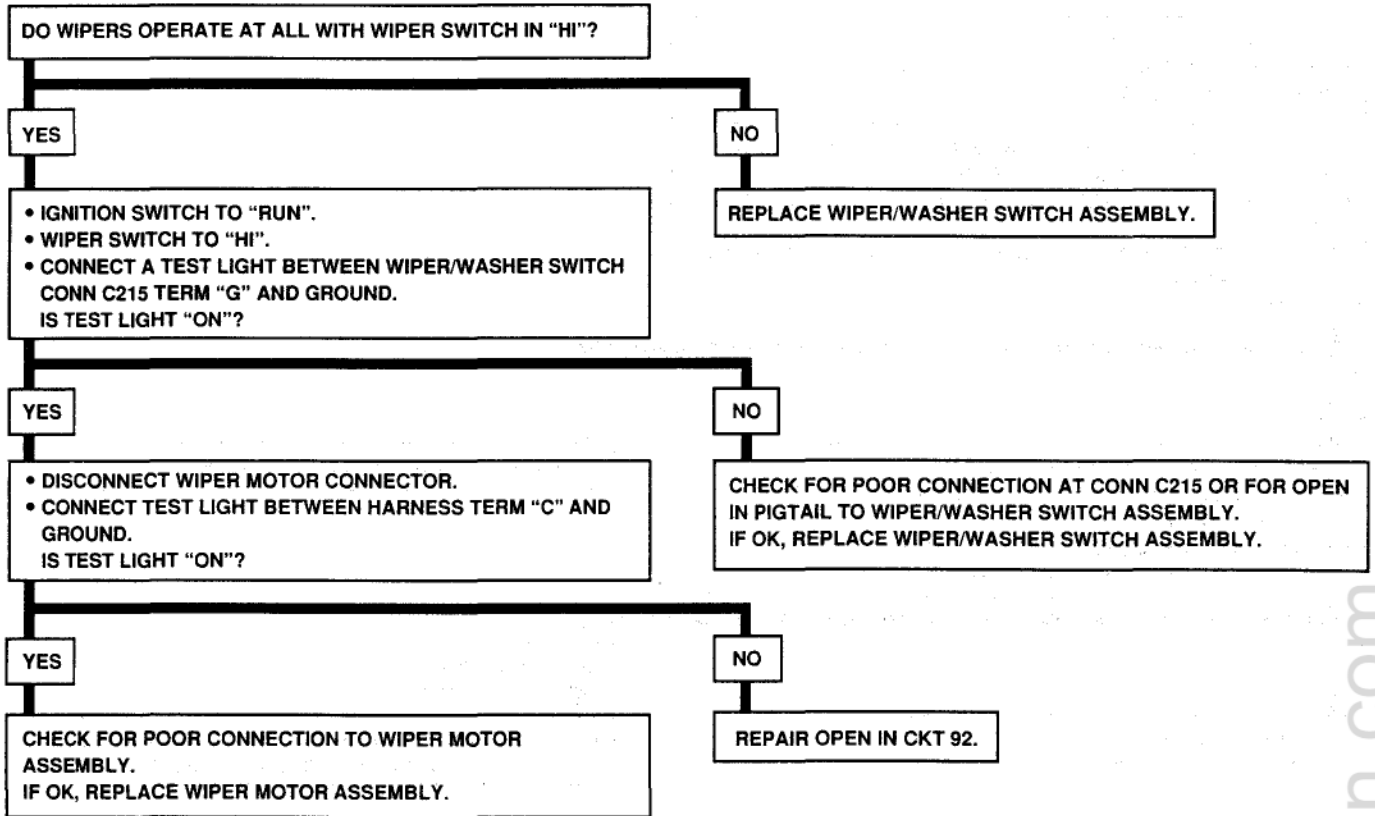


CHART 4
LOW SPEED, PULSE DELAY AND MIST MODES INOPERATIVE
(HIGH SPEED MODE OK)

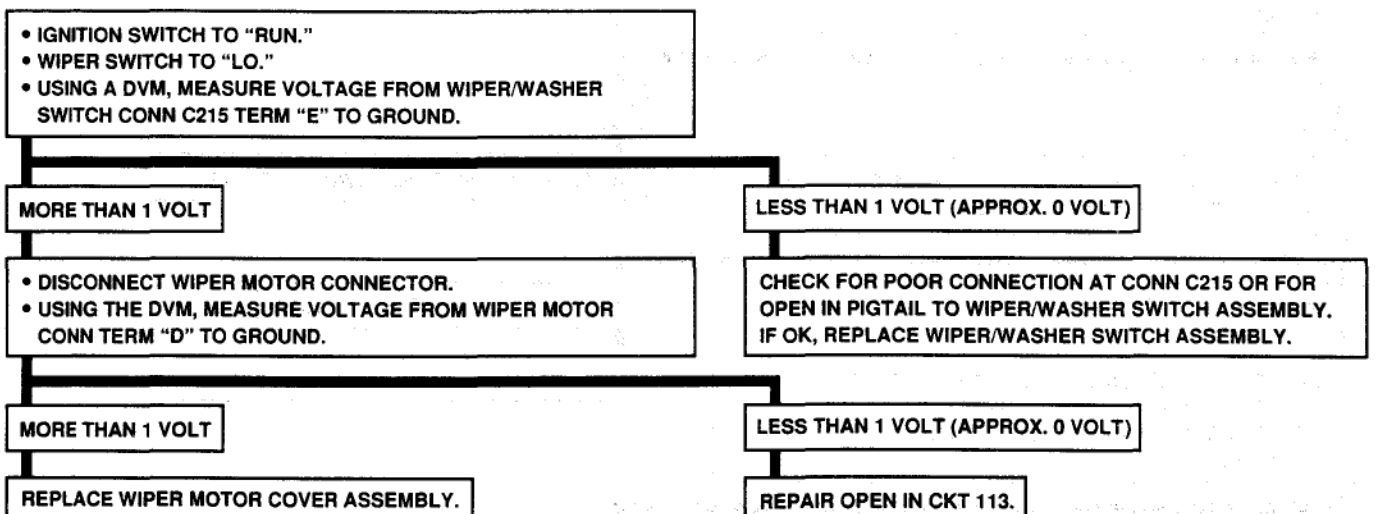


CHART 5
PULSE DELAY OPERATES INCORRECTLY OR NOT AT ALL

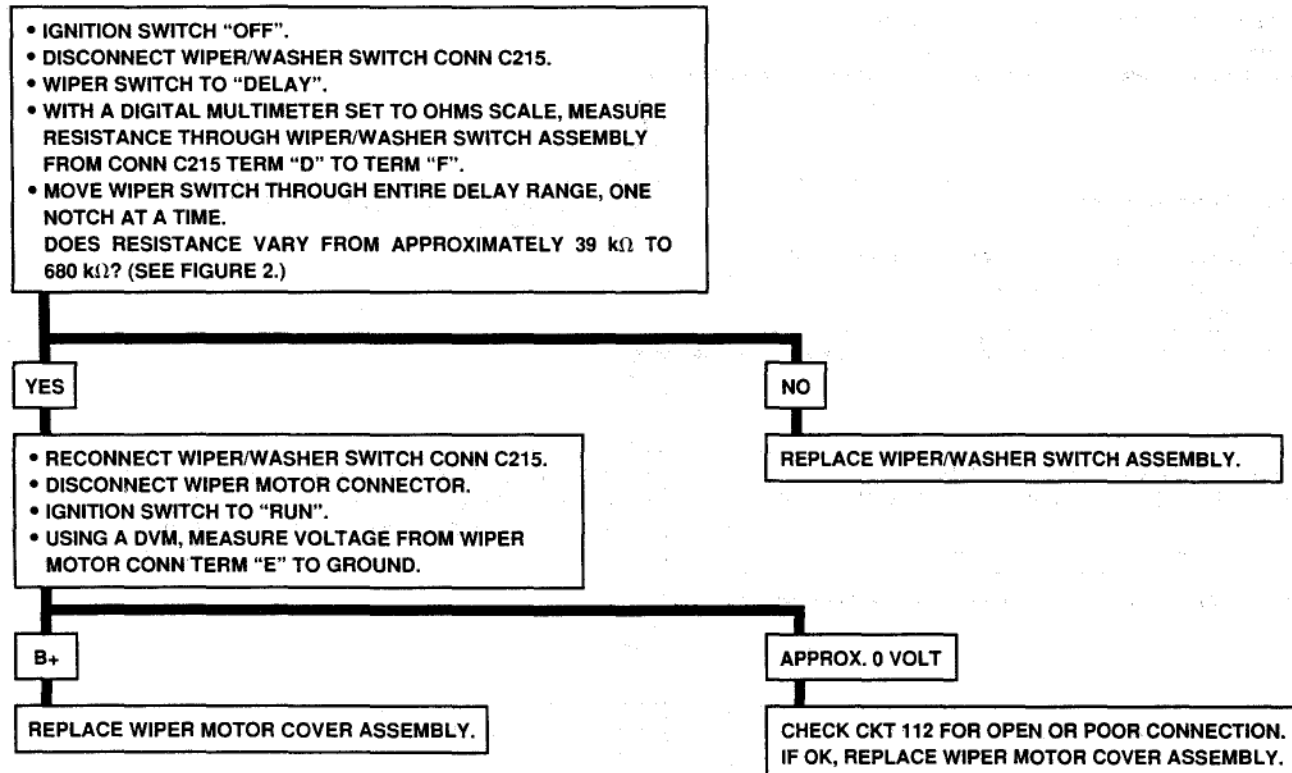


CHART 6
WIPERS STOP RANDOMLY AND DO NOT PARK WHEN SWITCH IS MOVED TO "OFF"

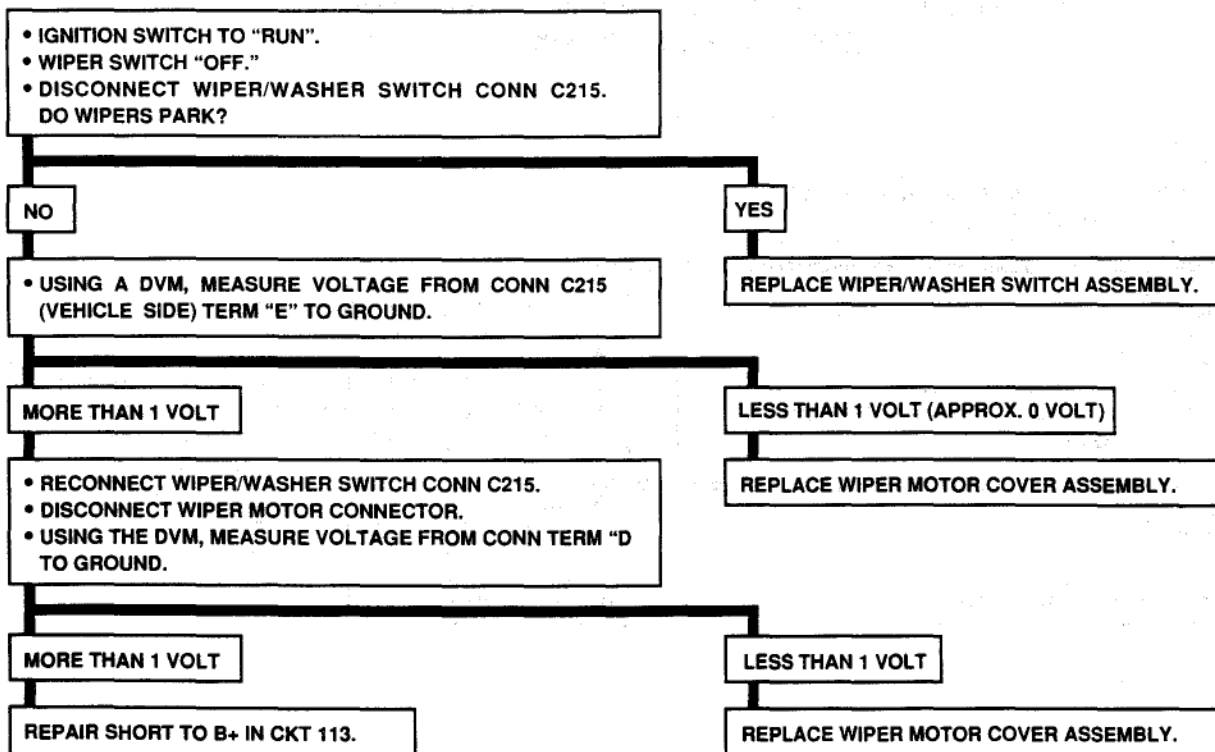


CHART 7

WIPERS DO NOT OPERATE WHEN WASHER SWITCH IS ACTIVATED

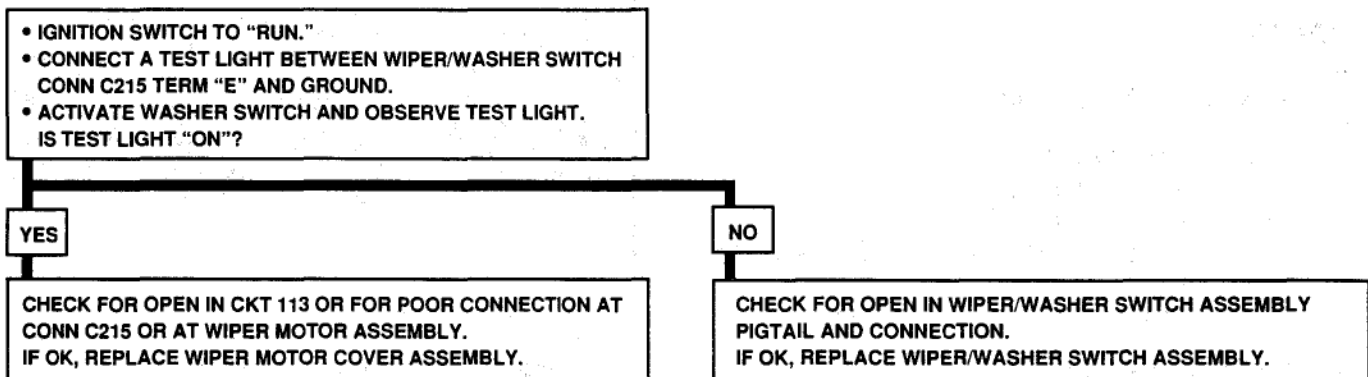
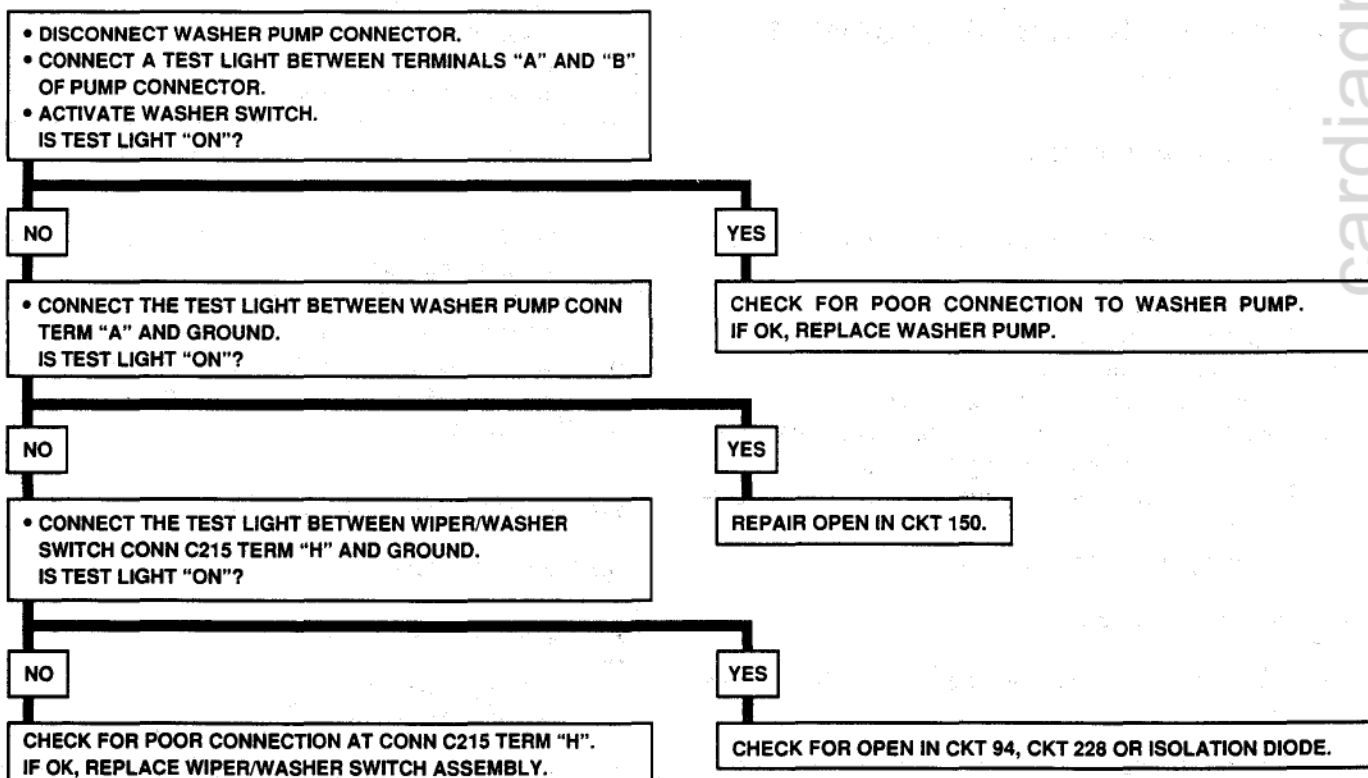


CHART 8

WASHER DOES NOT OPERATE



ON-VEHICLE SERVICE

WASHER PUMP REPLACEMENT

Figure 8

Remove or Disconnect

1. Negative battery cable.
2. Electrical connector (3).
3. Place drain pan under vehicle.
4. Washer pump (4) from reservoir (2) using suitable pliers.
5. Washer hose assembly (5) from pump.

Install or Connect

1. Washer hose assembly (5).
2. Washer pump (4) in washer reservoir (2) using pliers.

Important

- Make sure washer pump is pushed all the way into washer reservoir seal.

3. Electrical connector (3).
4. Refill washer reservoir.
5. Negative battery cable.

WASHER RESERVOIR REPLACEMENT

Figures 7 and 8

Remove or Disconnect

1. Washer fluid.
2. Two scrivenets (1, Figure 7) from top of washer reservoir (2).
3. Drive vehicle onto rack.
4. Negative battery cable.
5. Raise vehicle on rack.
6. Splash guard and mounting screws.
7. Two scrivenets (1) from bottom of washer reservoir.
8. Washer reservoir and pump (4, Figure 8).
9. Electrical connector (3) and washer hose assembly (5).
10. Washer pump from reservoir.

Install or Connect

NOTICE: See "Notice" on page 8E-1 of this section.

1. Washer pump (4, Figure 8) in washer reservoir (2).

Important

- Make sure washer pump is pushed all the way into washer reservoir seal.

2. Washer hose assembly (5) and electrical connector (3).

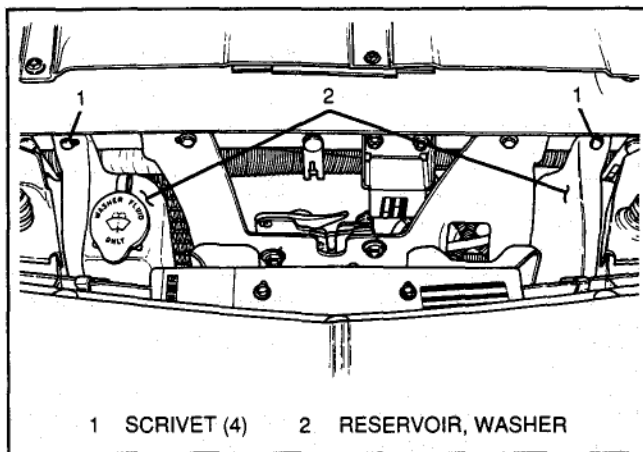


Figure 7 – Washer Reservoir (Top Front View)

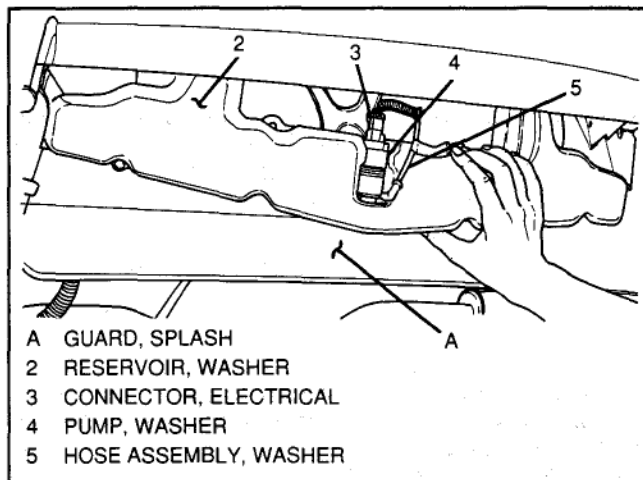


Figure 8 – Washer Reservoir Removal

3. Washer reservoir with 2 scrivenets (1, Figure 7) at bottom of reservoir.
4. Splash guard with mounting screws.
5. Lower vehicle on rack.
6. Negative battery cable, then drive vehicle off rack.
7. Two scrivenets (1) at top of washer reservoir.
8. Washer fluid.

WIPER ARM REPLACEMENT

Figures 9 through 11

Remove or Disconnect

Tool Required:

J 39637 Wiper Arm Puller

1. Operate wipers at lowest DELAY setting, then shut off wipers at inner wipe (end of sweep) position. At tip of blade assembly, mark windshield to aid at installation. See Figure 11 for wipe pattern and inner wipe positions.
2. Raise hood (Chevrolet only).
3. Lift wiper arm nut cover and remove nut (7, Figure 9).

**Important**

- Do not grasp plastic spoiler of wiper arm.
4. Wiper arm (6, Figure 10) from linkage drive shaft using J 39637.
 5. Wiper blade assembly, if required. See "Wiper Blade Assembly Replacement."

**Install or Connect**

NOTICE: See "Notice" on page 8E-1 of this section.

1. Wiper blade assembly, if removed. See "Wiper Blade Assembly Replacement."
2. Wiper arm (6) on linkage drive shaft, with tip of blade assembly aligned with mark made at removal.

**Important**

- If wipers could not be stopped at inner wipe position for wiper arm removal, position blade tip(s) according to dimensions given in Figure 11.
3. Nut (7, Figure 9) on linkage drive shaft.

**Important**

- It may be necessary to allow for some movement of a wiper arm when its nut is being tightened. If wiper arm moves away from desired alignment mark, loosen nut (7) and reposition wiper arm.

**Tighten**

- Nut (7) to 32 N•m (24 lb. ft.) while holding wiper arm.
4. Close nut cover.
 5. Close hood (Chevrolet only).

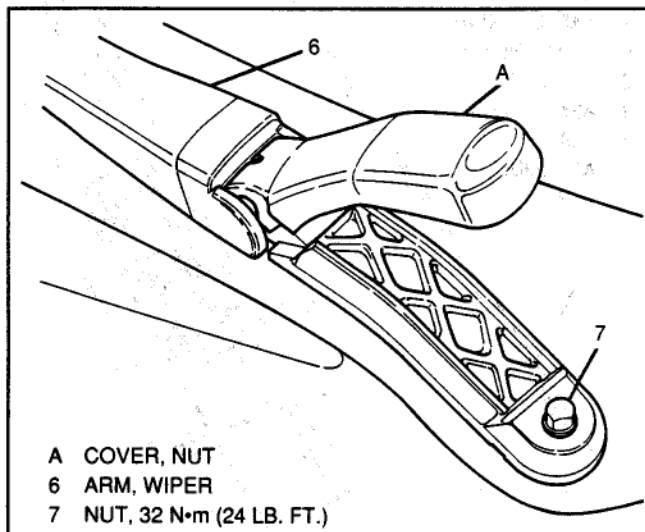


Figure 9 – Wiper Arm Nut Removal

**Inspect**

- Run wipers and check for proper wipe pattern (Figure 11).
- Shut off wipers and check for correct park position.

WIPER BLADE ASSEMBLY REPLACEMENT

Figures 12 and 13

**Remove or Disconnect****Important**

- Do not grasp plastic spoiler of wiper arm.
1. If wiper arms have not been removed, lift wiper arm (6, Figure 12) until it locks into service-up position.

**Important**

- Use care when removing or installing a blade assembly (8). Inadvertent bumping can cause the wiper arm to toggle back and strike the windshield.
2. Press down on locking tab of blade pivot, then pull blade assembly downward to disengage it from hook of wiper arm.

**Install or Connect**

1. Position pivot of blade assembly (8, Figure 13) in hook of wiper arm (6), then pull blade assembly upward until locking tab of blade pivot engages slot in arm hook.
2. Carefully lower wiper arm and blade assembly onto windshield.

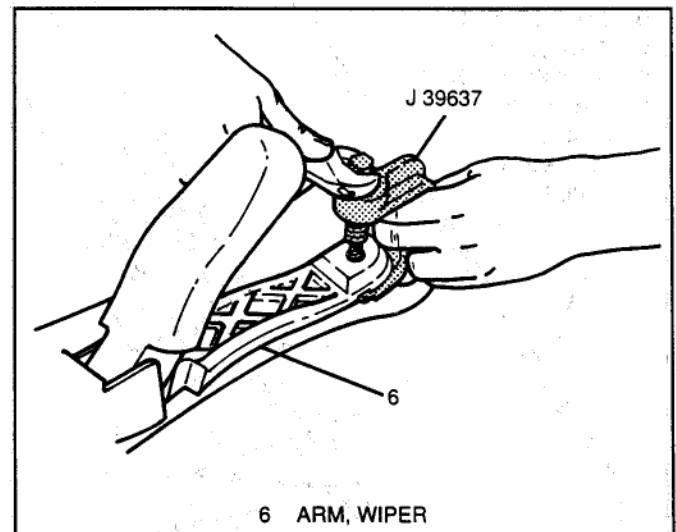


Figure 10 – Wiper Arm Removal

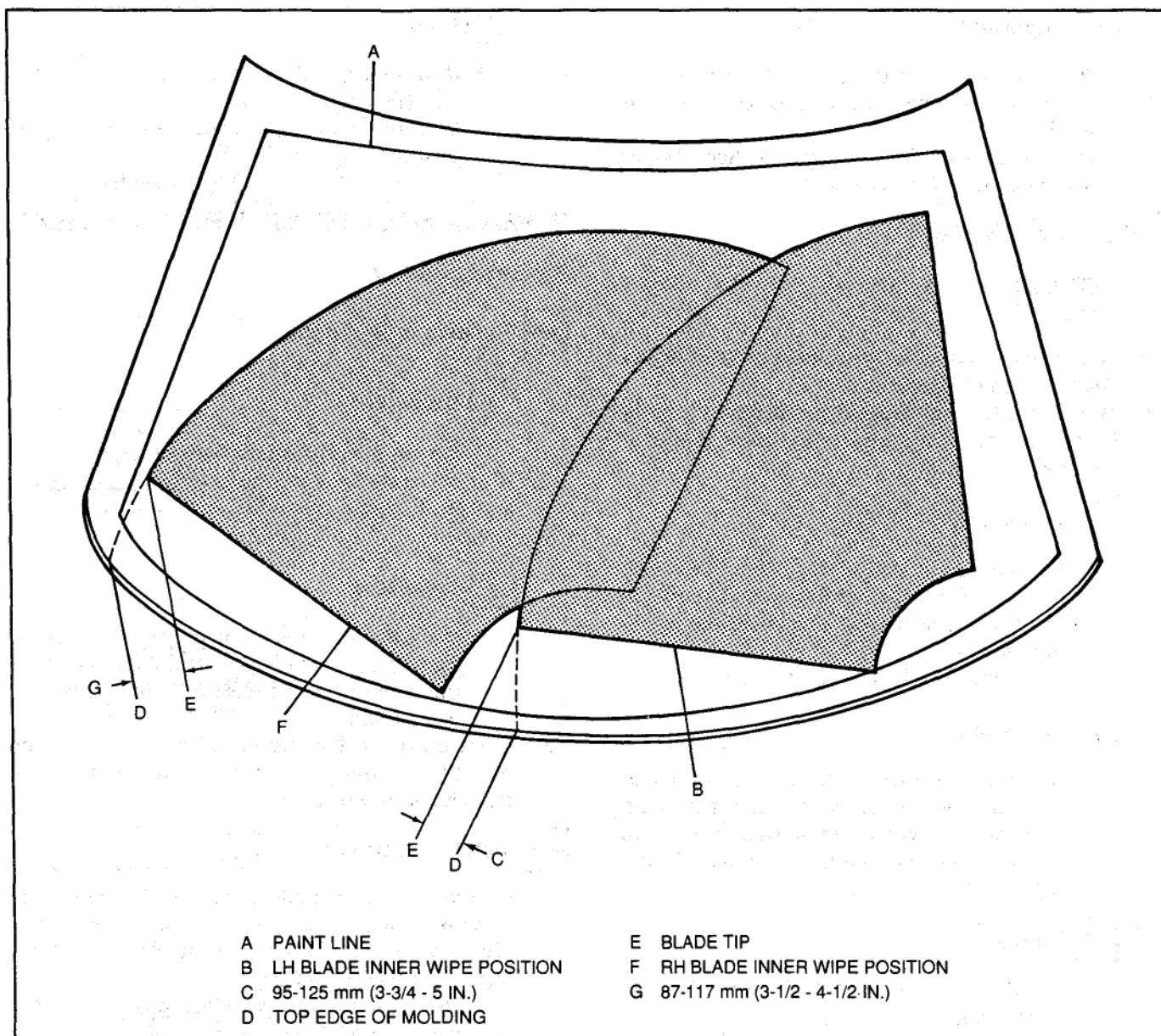


Figure 11 – Wipe Pattern and Inner Wipe Positions

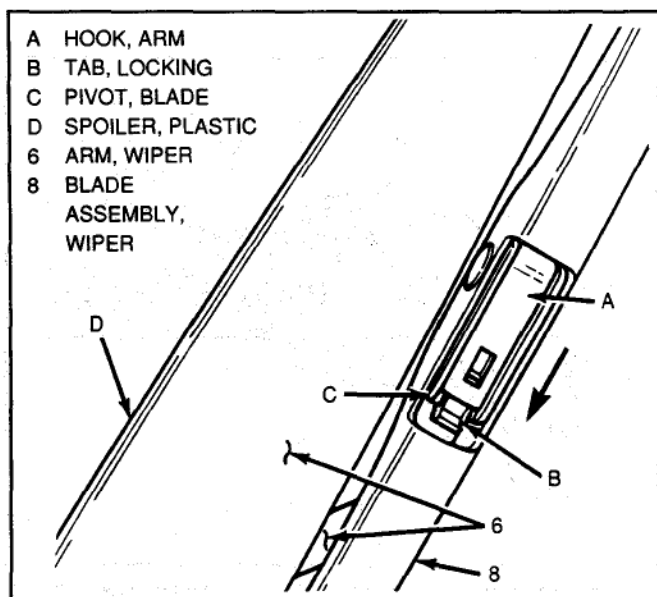


Figure 12 – Wiper Blade Assembly Removal

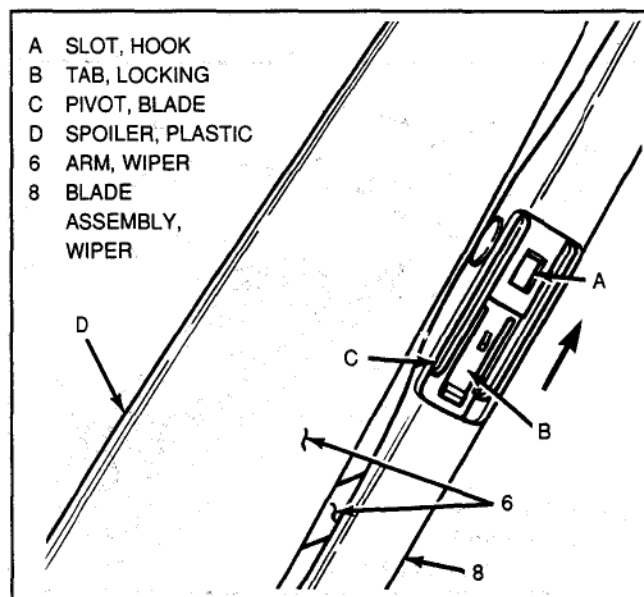


Figure 13 – Wiper Blade Assembly Installation

WIPER BLADE ELEMENT REPLACEMENT

Figures 14 and 15

Remove or Disconnect

1. Wiper blade assembly from wiper arm. See "Wiper Blade Assembly Replacement."
2. Blade element (9, Figure 14) has two notches at one end which are engaged by the bottom claw set of blade assembly. At notched end, pull blade element from blade assembly.

Install or Connect

NOTICE: The heel end of the wiper blade assembly is the end nearest to the base of the wiper arm.

Important

- Replacement blade elements have three plastic caps which retain the two metal flexor strips. Do not remove these caps before the element is installed.
1. At heel end of blade assembly, slide blade element (9, Figure 15), notched end last, into blade claw sets. The plastic retainer caps will be forced off as element is fully inserted.
 2. Be certain that the two element notches are engaged by last claw set and that all other claws are properly engaged in slots of element on both sides.
 3. Wiper blade assembly on wiper arm. See "Wiper Blade Assembly Replacement."

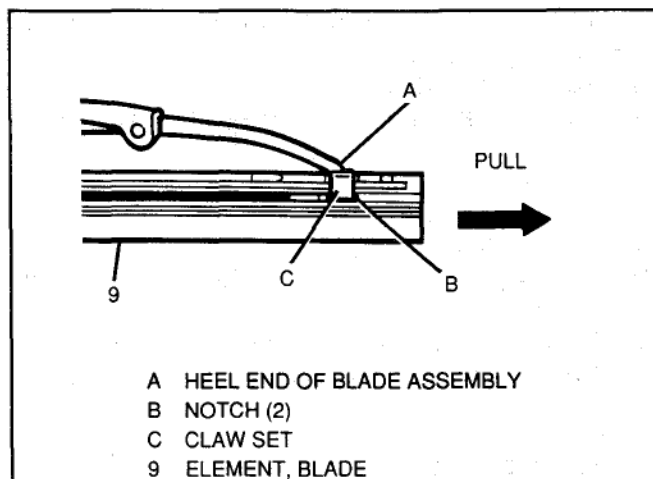


Figure 14 – Wiper Blade Element Removal

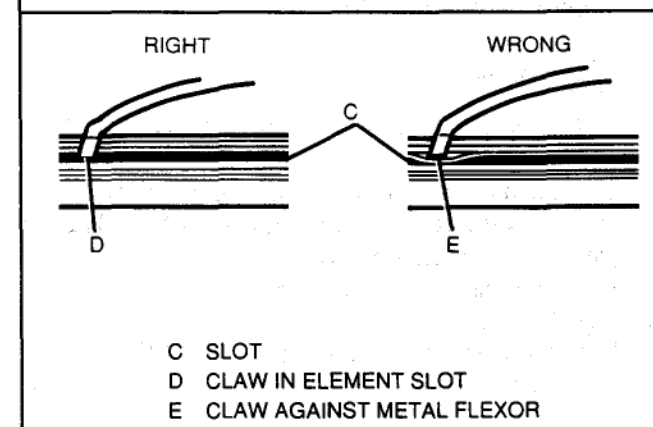
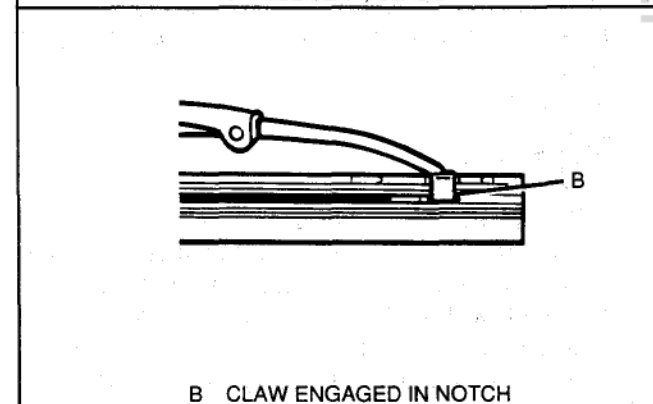
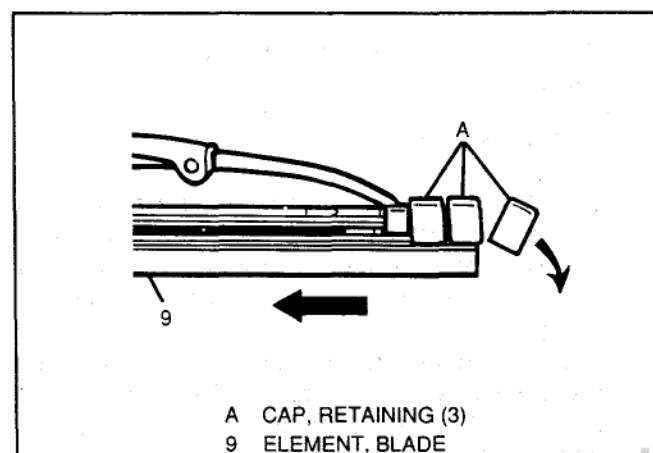


Figure 15 – Wiper Blade Element Installation

WINDSHIELD WASHER

Figures 11 and 16

A correctly operating windshield wiper/washer system has a spray pattern that cleans 75% of the wipe pattern (Figure 11) within ten wiper cycles.

If a washer nozzle (10, Figure 16) becomes plugged, apply air pressure. If a nozzle remains plugged, the nozzle must be replaced.

WIPER MOTOR ASSEMBLY REPLACEMENT

Figures 16 through 19

Remove or Disconnect

Tool Required:

J 39232 Wiper Linkage Separator

1. Wiper arm and blade assemblies. See "Wiper Arm Replacement."
2. Negative battery cable.
3. LH cowl panel and hood seal.
4. Washer hose assembly (11, Figure 16) from LH cowl panel.

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5. Electrical connector from wiper motor assembly (17, Figure 17).
6. Screw (14) and nut (20).
7. Socket of RH linkage assembly (13) from ball of LH linkage assembly (15) using J 39232 (see Figure 18).
8. LH linkage assembly.
9. Screw (19, Figure 17).
10. Pull wiper motor assembly free from slots of bracket (16).
11. Socket of RH linkage assembly from crank arm ball of wiper motor assembly using J 39232 (see Figure 18).

Install or Connect

Tool Required:

J 39529 Wiper Linkage Installer

NOTICE: See "Notice" on page 8E-1 of this section.

Important

- When installing wiper motor assembly, make certain that the crank arm is in inner wipe position as shown in Figure 17. The crank arm drive pin must be engaged in the cam pocket.
1. Press socket of RH linkage assembly (13) into engagement with crank arm ball of wiper motor assembly (17) using J 39529 (see Figure 19).
 2. Wiper motor assembly (17, Figure 17) with two locator pads (18) pressed fully into slots of bracket (16).
 3. Screw (19).

Tighten

- Screw (19) to 10 N•m (7.5 lb. ft.).
4. LH linkage assembly (15) without attaching parts.
 5. Press socket of RH linkage assembly into engagement with ball of LH linkage assembly using J 39529 (see Figure 19).
 6. Attach LH linkage assembly with screw (14, Figure 17) and nut (20).

Tighten

- Screw (14) and nut (20) to 10 N•m (7.5 lb. ft.).
7. Electrical connector to wiper motor assembly.
 8. Washer hose assembly (11, Figure 16) to LH cowl panel and washer nozzle (10).
 9. LH cowl panel and hood seal.
 10. Negative battery cable.
 11. Wiper arm and blade assemblies. See "Wiper Arm Replacement."

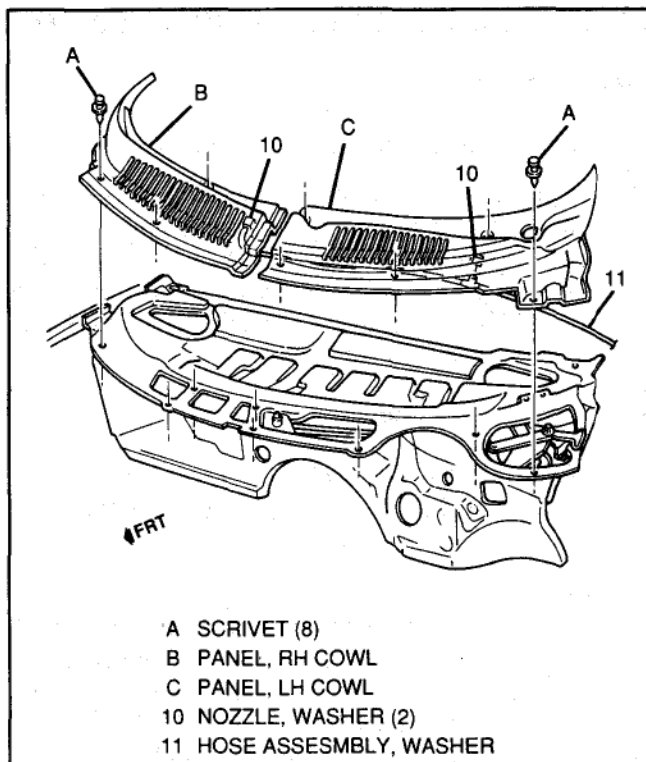


Figure 16 – Cowl Panels and Washer Components

WIPER LINKAGE ASSEMBLY REPLACEMENT

Figures 16 through 19

Remove or Disconnect

Tool Required:

J 39232 Wiper Linkage Separator

1. Wiper arm and blade assemblies. See "Wiper Arm Replacement."
2. LH cowl panel and hood seal.
3. Washer hose assembly (11, Figure 16) from LH cowl panel.
4. Screw (14, Figure 17) and nut (20).
5. Socket of RH linkage assembly (13) from ball of LH linkage assembly (15) using J 39232 (see Figure 18).
6. LH linkage assembly.
7. Three screws (12, Figure 17).
8. Socket of RH linkage assembly from crank arm ball of wiper motor assembly (17) using J 39232 (see Figure 18).
9. RH linkage assembly from slotted plenum access hole.

Install or Connect

Tool Required:

J 39529 Wiper Linkage Installer

NOTICE: See "Notice" on page 8E-1 of this section.

OFF-VEHICLE SERVICE

WIPER MOTOR COVER ASSEMBLY REPLACEMENT

Figures 20 and 21

 Remove or Disconnect

1. Three screws (21, Figure 20) using Torx screwdriver.
2. Cover assembly (22).

 Install or Connect

NOTICE: See "Notice" on page 8E-1 of this section.

1. Cover assembly (22, Figure 20).

 Important

- Before installing the cover assembly, make certain that the inner wipe cam is positioned as shown in Figure 21.
2. Three screws (21, Figure 20).

1. RH linkage assembly (13, Figure 17) through slotted plenum access hole.
 2. Three screws (12) finger tight.
 3. Align RH linkage assembly.
 4. Press socket of RH linkage assembly into engagement with crank arm ball of wiper motor assembly (17) using J 39529 (see Figure 19).
 5. LH linkage assembly (15, Figure 17) without attaching parts.
 6. Press socket of RH linkage assembly into engagement with ball of LH linkage assembly using J 39529 (see Figure 19).
 7. Screw (14, Figure 17) and nut (20).
-  **Tighten**
- Screw (14), nut (20) and three screws (12) to 10 N•m (7.5 lb. ft.).
8. Washer hose assembly to LH cowl panel and washer nozzle (10).
 9. LH cowl panel and hood seal.
 10. Wiper arm and blade assemblies. See "Wiper Arm Replacement."

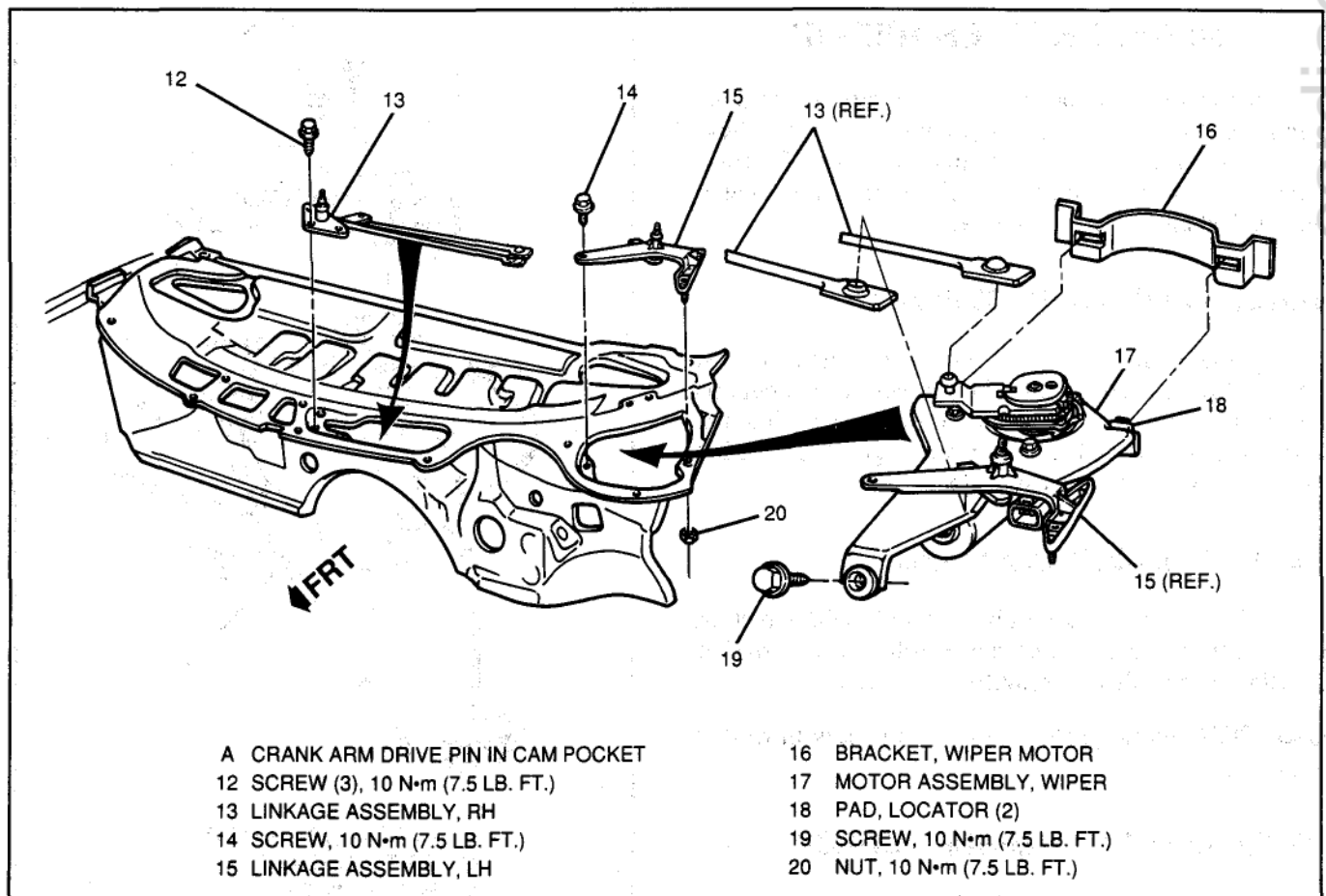


Figure 17 - Linkage and Wiper Motor Assemblies

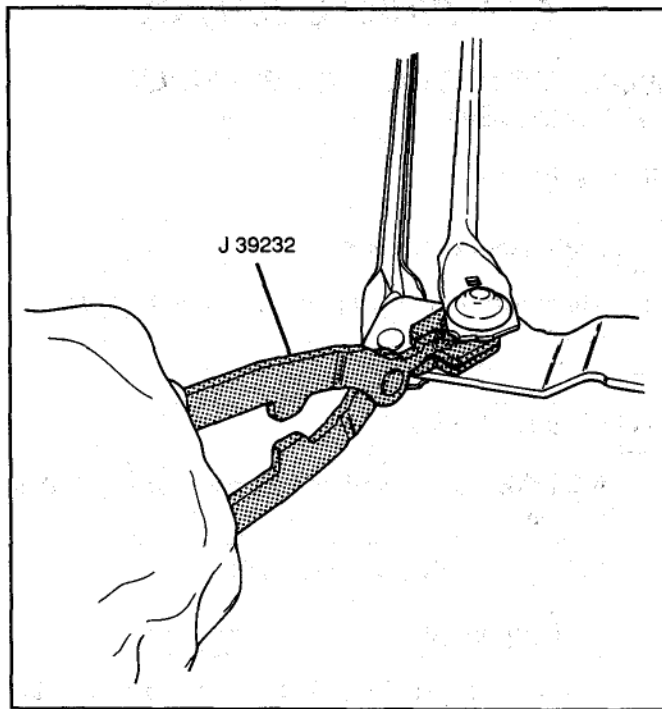


Figure 18 - J 39232 Wiper Linkage Separator (Typical Usage)

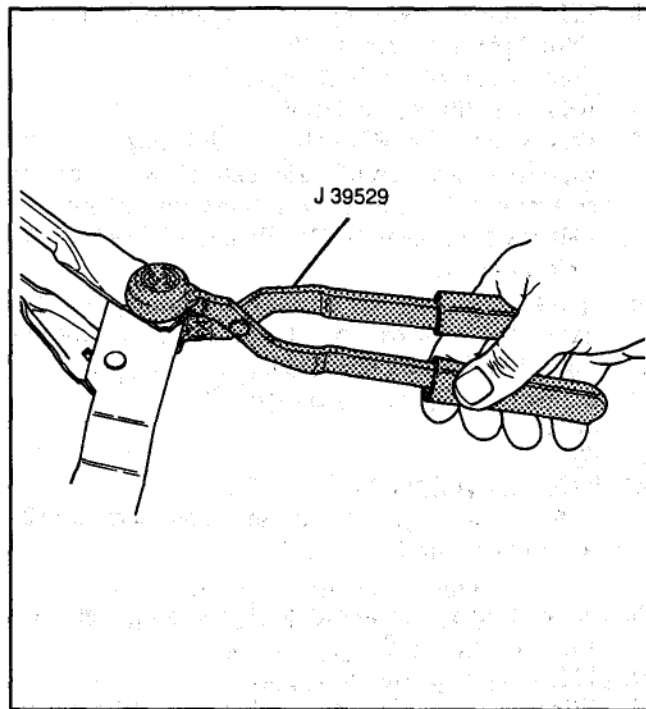


Figure 19 - J 39529 Wiper Linkage Installer (Typical Usage)



Tighten

- Screws (21) to 2 N·m (18 lb. in.).

WIPER CHATTER REPAIR

Some vehicles may exhibit a condition where the windshield wipers chatter and/or wipe unevenly. Several items may contribute to this condition. To completely repair this condition **ALL** items listed should be checked and repaired as necessary.

WINDSHIELD GLASS CLEANING

Clean windshield with windshield cleaner, GM PN 1050011 or equivalent. The cleaner used should be one which will not harm paint finish or scratch glass. The glass is clean when water no longer "beads", but "sheets" across entire glass surface.

BLADE ELEMENT CLEANING

Lift each blade assembly off windshield and clean element with a cloth saturated in full strength washer solution. Rinse blade assemblies with water.

CAUTION: Avoid prolonged skin contact with washer solution.

WIPER ARM TIP PRESSURE CHECK

1. Run wipers at lowest DELAY setting, then shut wipers off at inner wiper (end of sweep) position.

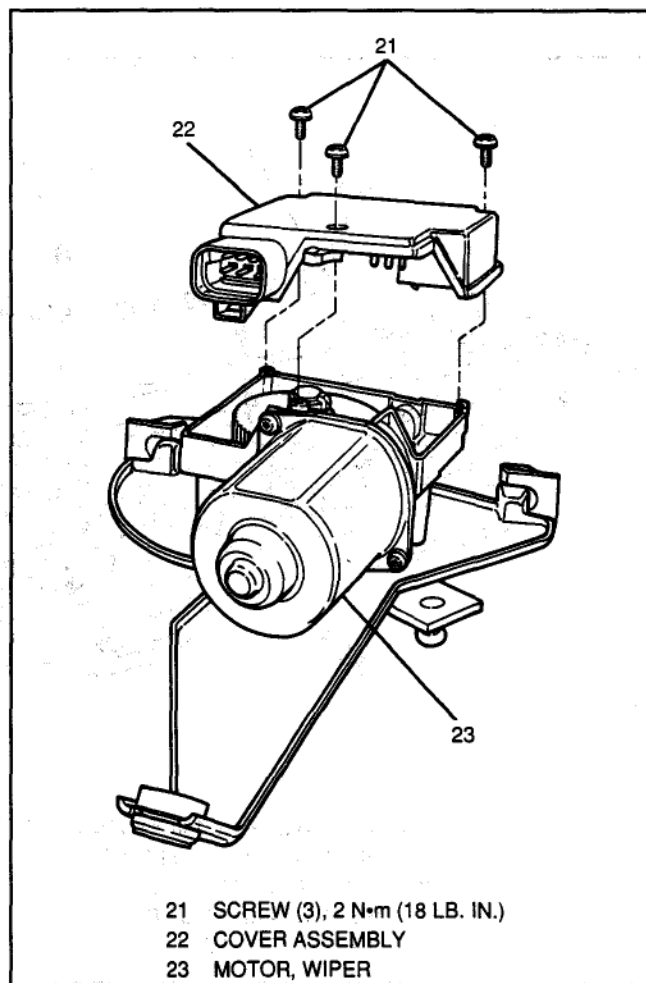


Figure 20 - Wiper Motor Cover Assembly Replacement

2. Remove blade assemblies from wiper arms, providing protection for windshield surface.
3. Attach a scale to wiper arm hook and measure the force required to lift wiper arm perpendicular to windshield to normal working height (height with blade assembly attached).
4. If the force required is not within the specifications given below, the wiper arm should be replaced.

Tip Pressure — RH Wiper Arm — 9-11 N
 (32.5-39.5 oz.)
 LH Wiper Arm — 10-12 N
 (36.0-43.0 oz.)

BLADE ELEMENT SET CHECK

Figure 22

Remove wiper blade assemblies from wiper arms. Look down the length of the blade element. The rubber element which contacts the glass must be on the center line of the blade assembly ± 15 degrees. Replace the element if necessary.

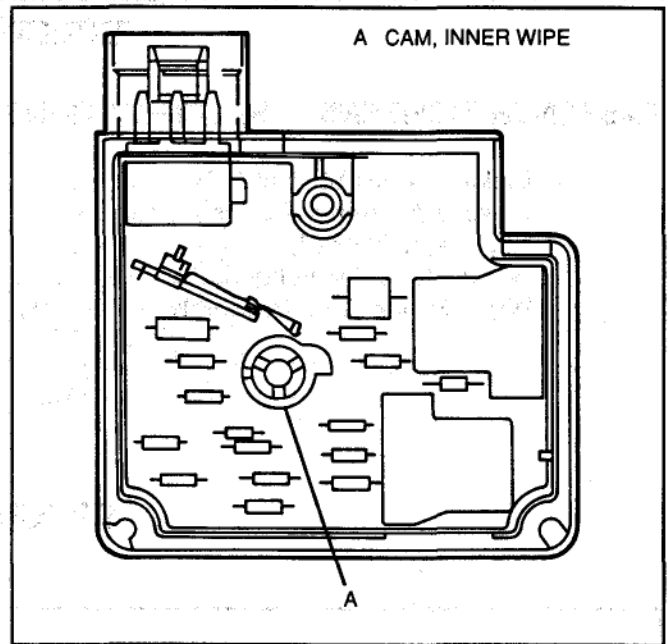


Figure 21 — Inner Wipe Cam Position for Cover Assembly Installation

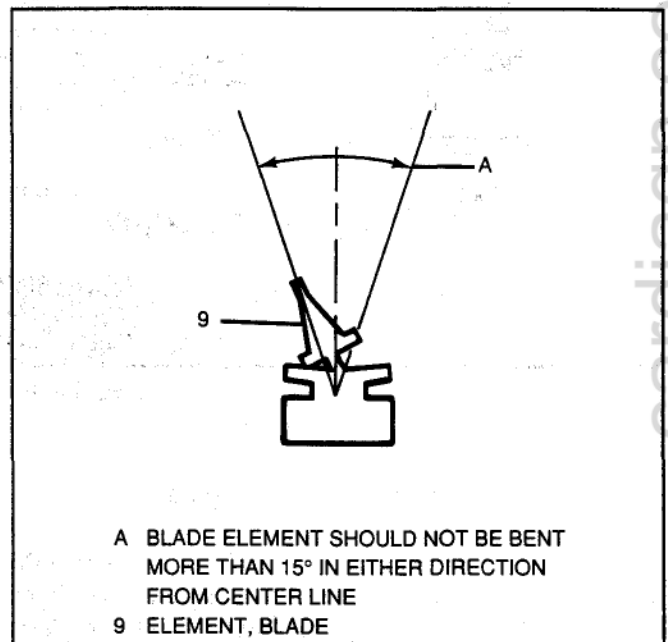


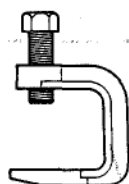
Figure 22 — Blade Element Set Check

SPECIFICATIONS

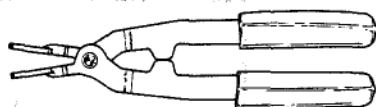
FASTENER TIGHTENING SPECIFICATIONS

Linkage Assembly Nut (20)	10 N•m (7.5 lb. ft.)
Linkage Assembly Screws (12 and 14)	10 N•m (7.5 lb. ft.)
Wiper Arm Nuts (7)	32 N•m (24 lb. ft.)
Wiper Motor Assembly Screw (19)	10 N•m (7.5 lb. ft.)
Wiper Motor Cover Assembly Screws (21)	2 N•m (18 lb. in.)

SPECIAL TOOLS



J 39637



J 39232



J 39529

1. WIPER ARM PULLER
2. WIPER LINKAGE SEPARATOR
3. WIPER LINKAGE INSTALLER

SECTION 9

ACCESSORIES

CONTENTS

Audio Systems	Section 9A
Cruise Control	Section 9B
Theft Deterrent Systems	Section 9D
Engine Coolant Heater	Section 9E
Supplemental Inflatable Restraint (SIR) System	Section 9J
Remote Keyless Entry	Section 9K

