

SECTION 7A

AUTOMATIC TRANSMISSION ON-VEHICLE SERVICE

CAUTION: This vehicle is equipped with Supplemental Inflatable Restraint (SIR). Refer to **CAUTIONS** in Section 9J under "ON-VEHICLE SERVICE" and the SIR Component and Wiring Location view in Section 9J before performing service on or around SIR components or wiring. Failure to follow **CAUTIONS** could result in possible air bag deployment, personal injury, or otherwise unneeded SIR system repairs.

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. Fasteners that are not reused, and those requiring thread locking compound will be called out. 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.

NOTICE: The assembly of some components will require the use of an assembly lube. It is recommended that Transjel™ or petroleum jelly be used during assembly. Grease other than the recommended assembly lube will change transmission fluid characteristics and cause undesirable shift conditions and/or filter clogging.

CONTENTS

General Information	7A-2	Park/Neutral Position Switch Assembly	7A-12
Transmission Assembly Identification		Park/Neutral Position Switch Assembly	
Information	7A-2	Adjustment Using Old Switch	
Transmission Assembly Definitions	7A-2	Assembly	7A-12
Throttle Positions	7A-2	Park/Neutral Position Switch Assembly	
Shift Conditions	7A-2	Adjustment Using New Switch	
Noise Conditions	7A-3	Assembly	7A-13
Preliminary Checking Procedure	7A-3	Changing Transmission Fluid and Automatic	
Line Pressure Check ... Refer to Section 7A-15A		Transmission Oil Filter Assembly	7A-13
Noise and Vibration Analysis	7A-3	Automatic Transmission Oil Cooler Upper	
Transmission Fluid Checking and Filling		Pipe and Upper and Lower Hose	
Procedures	7A-3	Assemblies	7A-14
General Service Procedures	7A-4	Oil Cooler Flushing Procedure	7A-15
No Air Tool Recommendation	7A-4	Serviceable Components	7A-16
Parts Cleaning, Inspection and		Transmission Fluid Filler Tube Assembly	7A-16
Replacement	7A-4	Vehicle Speed Sensor (VSS)	7A-17
Flywheel Assembly/Torque Converter		Automatic Transmission Case Extension	7A-18
Clutch Vibration Test Procedure	7A-6	Accumulator Assembly	7A-18
Fluid Leak Diagnosis	7A-6	2-4 Band Servo Assembly	7A-19
Methods for Locating Leak	7A-6	Transmission Converter Cover	7A-20
Repairing the Leak	7A-6	Pressure Regulator Valve	7A-20
Possible Points of Fluid Leaks	7A-8	Control Valve Body and Pressure Switch	7A-21
Transmission Case Porosity Repair	7A-8	Control and Shift Solenoids	7A-22
Torque Converter Clutch Electrical Controls ..	7A-8	TCC Solenoid and Wiring Harness	
Torque Converter Clutch Diagnosis	7A-9	Replacement	7A-22
On-Vehicle Service	7A-9	Electrical Connector and Seal	7A-25
Automatic Transmission Range Selector		Case Extension Oil Seal Assembly	7A-25
Lever Cable Assembly	7A-9	Automatic Transmission Assembly Removal	
Automatic Transmission Control Assembly ..	7A-10	and Installation	7A-25
Automatic Transmission Park Lock		Specifications	7A-27
Cable Assembly	7A-10	Fastener Tightening Specifications	7A-27
Brake Transmission Shift Interlock		Special Tools	7A-28
System Diagnosis	Refer to Section 8A-138		
Automatic Transmission Control			
Lever Solenoid	7A-12		

GENERAL INFORMATION

TRANSMISSION ASSEMBLY IDENTIFICATION INFORMATION

Figures 1 and 2

The HYDRA-MATIC 4L60-E transmission has the identification information stamped into the case pan rail. The location of this information is shown in Figure 1. This information will assist in the servicing and determination of replacement parts when ordered through a GM parts catalog.

Additional transmission identification is provided on the "Service Parts Identification" label shown in Figure 2. This label contains information on the Regular Production Options (RPO) as well as standard and mandatory options. This label is affixed to the inside of each vehicle at the assembly plant. Refer to SECTION 0A for additional information.

TRANSMISSION ASSEMBLY DEFINITIONS

The following definitions are provided to establish a common language and assist the user in describing transmission assembly related conditions. Some of these terms or conditions are used in the transmission assembly diagnosis section of this service manual.

Throttle Positions

Minimum Throttle – least amount of throttle opening required for an upshift.

Light Throttle – approximately 1/4 of accelerator pedal travel.

Medium Throttle – approximately 1/2 of accelerator pedal travel.

Heavy Throttle – approximately 3/4 of accelerator pedal travel.

Wide Open Throttle (WOT) – full travel of accelerator pedal.

Full Throttle Detent Downshift – quick application of accelerator pedal to its full travel, forcing a downshift.

Zero Throttle Coastdown – full release of accelerator pedal while vehicle is in motion in drive range.

Engine Braking – condition where engine is used to slow vehicle by manually downshifting during zero throttle coastdown.

Shift Conditions

Bump – sudden and forceful application of clutch or band.

Chuggle – bucking or jerking condition that may be engine related. May be most noticeable when the torque converter clutch is engaged. Similar to the feel of towing a trailer.

Delayed – condition where shift is expected but does not occur for a period of time. Examples of this condition could be described as clutch or band engagement that does not occur as quickly as expected during part throttle or wide open throttle application of accelerator, or when manually downshifting to lower range. Also defined as "late" or "extended."

Double Bump – two sudden and forceful applications of clutch or band. Also defined as "double feel."

Early – condition where shift occurs before vehicle has reached proper speed and tends to labor engine after upshift.

End Bump – firmer feel at end of shift as compared to feel at start of shift. Also defined as "end feel" or "slip bump."

Firm – noticeable quick application of clutch or band that is considered normal with medium to heavy throttle shift. Should not be confused with "harsh" or "rough."

Flare – quick increase in engine RPM accompanied with momentary loss of torque. This most generally occurs during a shift. Also defined as "slipping."

Harsh – more noticeable application of clutch or band as compared to "firm." This condition is considered undesirable at any throttle position. Also defined as "rough."

Hunting – repeating quick series of upshifts and downshifts causing noticeable change in engine RPM. An example could be described as a 4-3-4 shift pattern. Also defined as "busyness."

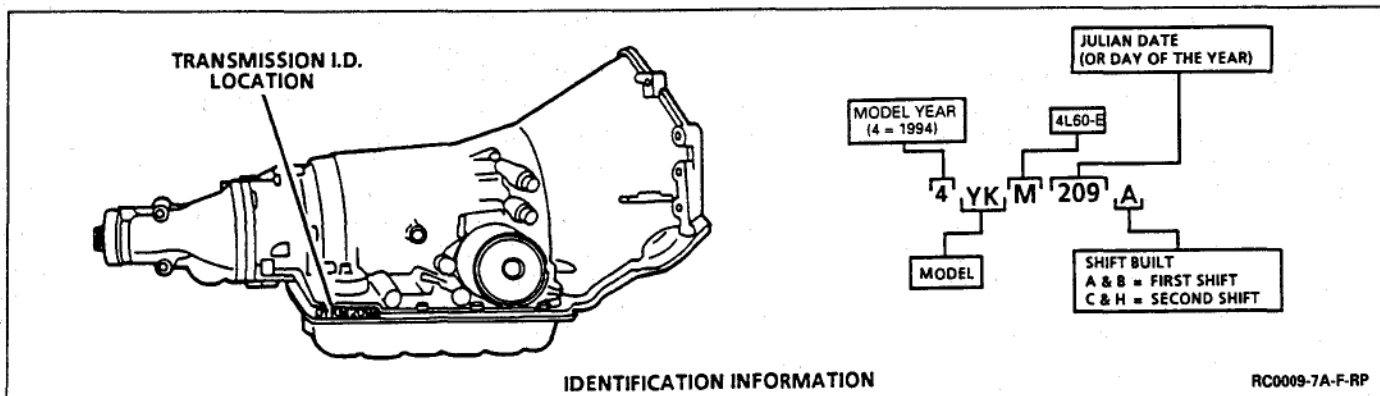


Figure 1 – Automatic Transmission Assembly Identification Information

M — INDICATES TRANSMISSION TYPE IN OPTION LIST. (SPECIFIC MODEL CODE IS FOUND ON THE TRANSMISSION NAMEPLATE) M30 — DESIGNATES HYDRA-MATIC 4L60-E		MX — DESIGNATES AUTOMATIC TRANSMISSION ASSEMBLY MX0 — DESIGNATES 4 SPEED	
SERVICE PARTS IDENTIFICATION		DO NOT REMOVE	
1 G 3 A R 4 7 Y X E 5 1 0 0 0 0 1 C90 C95 DF3 D3C D33 D 8 E Z E D FFL F40 GG1 GW9 G60 GU2 G89 JA1 JA4 K05 K22 K99 LT1 M30 MX0 NA5 NB1 NK1 NK2 N33 N67 GJW T87 UJ3 U23 U35 V08 V10 WC3 WG2 YT9 Y56 OIL 6SC 42B 421 420 42T 409 7SB 8WT 9WT 11A 90A			
PRINTED IN U.S.A.		PART NO. 14065987	
RC0001-7A-F-RP			

Figure 2 — Service Parts Identification Label

Initial Feel — distinct firmer feel at start of shift as compared to finish of shift.

Late — shift that occurs when engine is at higher than normal RPM for given amount of throttle.

Shudder — repeating jerking sensation similar to “chuggle” but more severe and rapid in nature. This condition may be most noticeable during certain ranges of vehicle speed. May also be used to define the condition after torque converter clutch engagement.

Slipping — noticeable increase in engine RPM without vehicle speed increase. Slip usually occurs during or after initial clutch or band engagement.

Soft — slow, almost unnoticeable clutch application with very little shift feel.

Surge — repeating engine related feeling of acceleration and deceleration that is less intense than “chuggle.”

Tie-Up — condition where two opposing clutches are attempting to apply at the same time causing the engine to labor with noticeable loss of engine RPM.

Noise Conditions

Gear Noise — whine, most noticeable in first gear and reverse that is related to vehicle speed. A gear noise condition may become less noticeable or go away after an upshift.

Pump Noise — high-pitched whine increasing in intensity with engine RPM. This condition may also be noticeable in “PARK” and “NEUTRAL” operating ranges with the vehicle stationary.

PRELIMINARY CHECKING PROCEDURE

Transmission assembly performance may be influenced by one or more of the following items. These items should be checked and corrected if necessary, before attempting transmission assembly diagnosis.

- High or low fluid level.
- Engine performance. Refer to SECTION 6 and SECTION 6E.

- Manual linkage adjustment.
- Internal fluid leaks. Refer to SECTION 7A-15A.
- Electrical system. Refer to SECTION 6D and SECTION 8A.
- Transmission assembly or other mechanical component. Refer to SECTION 7A-15A.

NOISE AND VIBRATION ANALYSIS

A noise or vibration noticeable when the vehicle is in motion, may not be caused by the transmission assembly.

If a noise or vibration is noticeable in “PARK” and “NEUTRAL” with engine at idle, but is less noticeable as RPM increases, the cause may be poor engine performance.



Inspect

- Tire and wheel assemblies for:
 - Uneven wear.
 - Imbalance.
 - Mixed sizes.
 - Mixed radial and bias ply. Refer to SECTION 3E.
- Suspension components for:
 - Alignment and wear.
 - Loose fasteners. Refer to SECTION 3C.
- Engine and transmission assembly mounts for:
 - Damage.
 - Loose bolts/screws.
- Transmission case mounting holes for:
 - Missing bolts/screws, nuts, studs.
 - Stripped threads.
 - Cracks.
- Flywheel assembly for:
 - Missing or loose bolts/screws.
 - Cracks.
 - Imbalance. Refer to SECTION 6A1.
- Torque converter clutch for:
 - Missing or loose bolts/screws or lugs.
 - Missing or loose balance weights.
 - Imbalance.

TRANSMISSION FLUID CHECKING AND FILLING PROCEDURES

Figure 3

Checking fluid level, color and condition at regular intervals will provide early diagnosis information about the transmission. This information may then be used to correct a condition that, if not detected early, could result in major transmission repair.

Refer to SECTION 0B for maintenance information and servicing intervals.

Important

- When new, automatic transmission fluid should be red. The red dye is added so the assembly plant can identify it as transmission fluid and distinguish it from engine oil or anti-freeze. The red dye, which is not an indicator of fluid quality, is not permanent. As the vehicle is driven the transmission fluid will begin to look darker. The color may eventually appear light brown.
- Wait at least 30 minutes before checking the transmission fluid level if you have been driving:
 - When outside temperatures are above 32°C (90°F).
 - At high speed for greater than 15 minutes.
 - In heavy traffic during hot weather.
 - While pulling a trailer.
- To get the right reading, the fluid should be at normal operating temperature, which is 80°C-93°C (180°F to 200°F).
- Hot check:
 - Get the vehicle warmed up by driving about 24 km (15 miles), when outside temperatures are above 10°C (50°F). If it's colder than 10°C (50°F), you may have to drive longer.
- Cold check:
 - A cold check can be made when the transmission temperature is between 24-29°C (75-85°F). Let the engine run at slow idle for 5 minutes if the outside temperature is 10°C (50°F) or more. If it's colder than 10°C (50°F), you may have to idle the engine longer.
- Fluid check procedure hot or cold:
 - A. Park the vehicle on a level surface.
 - B. Place the shift lever "PARK" with the parking brake applied.
 - C. With your foot on the brake pedal, move the shift lever through each gear range, pausing for about 3 seconds in each range. Then, position the shift lever in "PARK."
 - D. Let the engine idle for 3 minutes or more.
 - E. Then follow these steps to check the fluid level:
 - a. Pull out the dipstick and wipe it with a clean rag or paper towel.
 - b. Push it back in all the way, wait 3 seconds and then pull it back out again.
 - F. Check both sides of the dipstick, and read the lower level. The fluid level must be in the "COLD" area for a cold check or in the "HOT" area or cross-hatched area for a hot check.
 - G. If the fluid level is where it should be, push the dipstick back in all the way.

NOTICE: Do not overfill. Overfilling will cause foaming, loss of fluid and possible damage to the transmission.

H. If the fluid level is low, add only enough DEX-RON IIE to bring the fluid level up to the "COLD" area for a cold check or the "HOT" area for a hot check. It doesn't take much fluid, generally less than a pint. **DO NOT OVER-FILL.**

I. After adding fluid, recheck the fluid level as described above. When the correct fluid level is obtained, push the dipstick back in all the way.

- Fluid color.
 - Should be red when new.

GENERAL SERVICE PROCEDURES

NO AIR TOOL RECOMMENDATION

NOTICE: It is not recommended to use air powered tools to disassemble or assemble transmission assemblies. Improper bolt torques can contribute to transmission assembly repair conditions, and this information vital to diagnosis can only be detected when using hand tools.

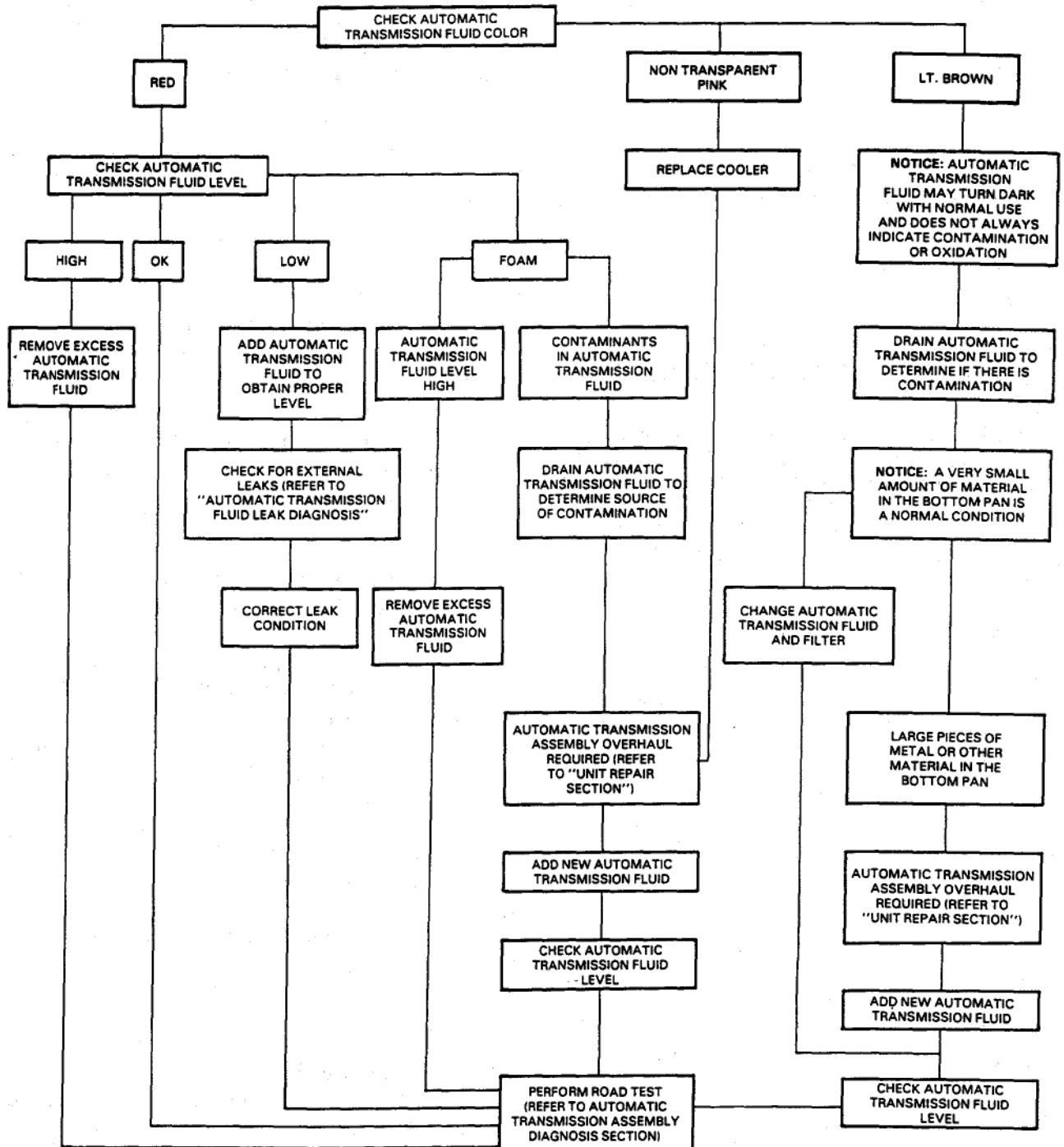
PARTS CLEANING, INSPECTION AND REPLACEMENT

- Use appropriate safety equipment such as:
 - Safety glasses.
 - Safety shoes.
 - Gloves.
 - Keep work areas and tools clean.
 - Clean transmission assembly exterior before removing parts.
 - Do not use wipe cloths or rags.
 - Do not use solvents on:
 - Rubber seals.
 - Plastic/Teflon® thrust washers or spacers.
 - Blow out all passages with compressed air.
 - Clean out small passages with fine wire.
 - Handle parts carefully to prevent damage.
- NOTICE:** The assembly of some components will require use of an assembly lube. It is recommended that J 36850 Transjel™, or equivalent, be used during assembly. Do not use any type of grease to retain parts during assembly of this unit. Lubricants other than the recommended assembly lube will change fluid characteristics and cause undesirable shift conditions and/or oil filter clogging.
- When installing bolts/screws or studs into aluminum, always dip the threads in Transjel™, or equivalent.
 - Recondition damaged or stripped aluminum threads with thread inserts.
 - Replace all gaskets and O-ring seals.
 - Do not use gasket cement or sealers.

HYDRA-MATIC 4L60-E



CHECK IN PARK, ENGINE IDLING, VEHICLE LEVEL.
TRANS HOT MUST BE IN CROSSHATCH.
DO NOT OVERFILL.
DEXRON®-IIIIE FLUID ONLY.



RC0008-7A-F-RP

Figure 3 – Checking Automatic Transmission Fluid Color, Level and Condition

- Replace Teflon® and rubber lip seals only when necessary and install using the appropriate seal installer.

**Inspect**

- Manual linkage for:
 - Bent or broken links and rods.
- All seals, gaskets, O-ring seals and mating surfaces for:
 - Nicks.
 - Cuts.
 - Damage.
- Snap rings for:
 - Expansion or compression.
 - Distortion.
 - Nicks.
 - Proper ring-to-groove fit.
- Bearings and thrust surfaces for:
 - Wear.
 - Scoring.
 - Pitting.

FLYWHEEL ASSEMBLY/TORQUE CONVERTER CLUTCH VIBRATION TEST PROCEDURE

NOTICE: Some engine/transmission assembly combinations cannot be balanced in this manner due to limited clearances between the torque converter clutch bolts/screws and the engine. Be sure bolts/screws do not bottom out in lug nuts or the transmission converter cover could be dented and cause internal damage.

**Remove or Disconnect**

1. Start engine.
2. With engine at idle speed and transmission assembly in "PARK" or "NEUTRAL," observe vibration.
3. Shut off engine.
4. Raise and suitably support vehicle. Refer to SECTION 0A.
5. Transmission converter cover bolts/screws.
6. Flywheel bolts/screws.
 - Discard flywheel bolts/screws.
7. Rotate torque converter clutch 120 degrees (1/3 turn).

**Install or Connect**

NOTICE: See "Notice" on page 7A-1 of this section.

1. Flywheel bolts/screws.
 - Hand start flywheel bolts/screws.
 - Use new flywheel bolts/screws with retaining compound removed from first three threads.

**Tighten**

- Flywheel bolts/screws to 63 N•m (46 lb. ft.).
2. Transmission converter cover bolts/screws.

**Tighten**

- Transmission converter cover bolts/screws to 10 N•m (89 lb. in.).
3. Lower vehicle.
 4. Start engine and check for vibration.
 - If vibration still exists repeat this procedure until best possible balance is obtained.

FLUID LEAK DIAGNOSIS

Figure 4

The cause of most external leaks generally can be located and repaired with the transmission assembly in the vehicle.

Methods for Locating Leak

General Method

1. Verify leak is transmission fluid.
2. Thoroughly clean suspected leak area.
3. Operate vehicle for about 24 km (15 miles) or until normal operating temperatures are reached.
4. Park vehicle over clean paper or cardboard.
5. Shut off engine and look for fluid spots on paper.
6. Make necessary repairs.

Powder Method

1. Thoroughly clean suspected leak area with solvent.
2. Apply aerosol type powder (foot powder) to suspected leak area.
3. Operate vehicle for about 24 km (15 miles) or until normal operating temperatures are reached.
4. Shut off engine.
5. Inspect suspected leak area and trace leak path through powder to find source.
6. Make necessary repairs.

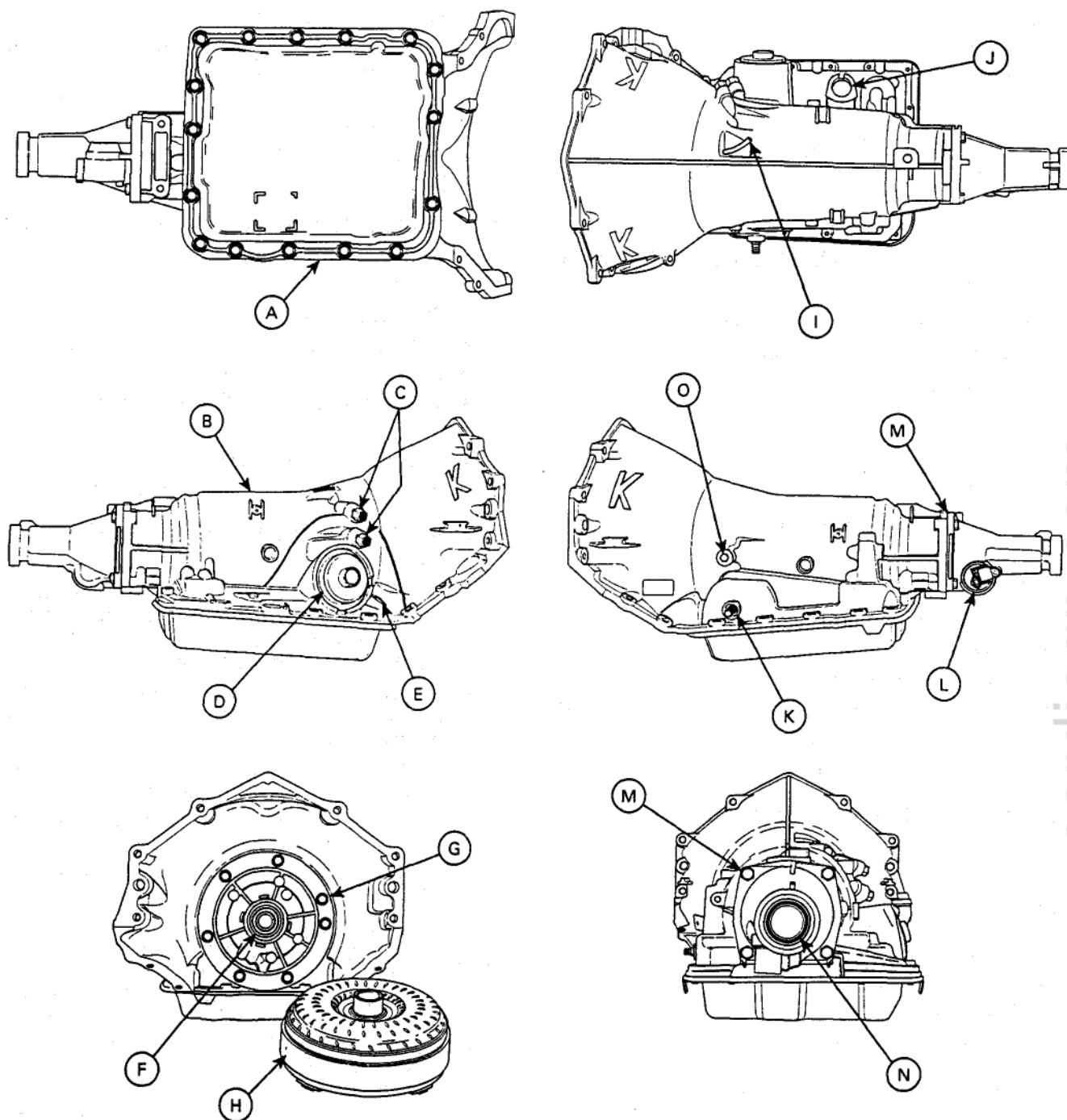
Dye and Black Light Method

A fluid dye and black light kit is available from various tool manufacturers.

1. Follow manufacturer's recommendations for amount of dye to use.
2. Detect leak with black light.
3. Make necessary repairs.

Repairing the Leak

Once the leak has been pinpointed and traced back to its source, the cause of the leak must be determined for it to be properly repaired. For example, if a gasket is replaced, but the sealing flange is bent, the new gasket will not repair the leak. The bent flange also must be repaired.



A BOTTOM PAN GASKET
B CASE
C COOLER CONNECTORS
D SERVO COVER SEAL
E OIL FILL TUBE SEAL

F OIL PUMP SEAL ASSEMBLY
G OIL PUMP TO CASE SEAL
H CONVERTER
I VENT
J ELECTRICAL CONNECTOR SEAL

K MANUAL SHAFT SEAL
L SPEED SENSOR SEAL
M EXTENSION TO CASE SEAL
N EXTENSION OIL SEAL ASSEMBLY
O LINE PRESSURE PLUG

Figure 4 – Automatic Transmission Fluid Leak Points

The following conditions may cause a leak. Before attempting to repair a leak, these conditions should be checked and corrected if necessary.

Gaskets

Inspect

- Fluid level/pressure too high.
- Plugged vent or drain-back holes.
- Improperly torqued fasteners, dirty or damaged threads.
- Warped flanges or sealing surface.
- Scratches, burrs or other damage to sealing surface.
- Damaged or worn gasket.
- Cracking or porosity of component.
- Improper sealant used, where applicable.
- Incorrect gasket.

Seals

Inspect

- Fluid level/pressure too high.
- Plugged vent or drain-back holes.
- Damaged seal bore.
- Damaged or worn seal.
- Improper installation.
- Cracks in component.
- Scratched, nicked or damaged, manual or output shaft surface.
- Loose or worn bearing causing excess seal wear.

Possible Points of Fluid Leaks

Oil Pan

Inspect

- Incorrectly tightened oil pan bolts/screws.
- Improperly installed or damaged oil pan gasket.
- Damaged oil pan.
- Incorrect oil pan gasket.

Oil Case Leak

Inspect

- Damaged or missing transmission filler tube seal.
- Mislocated filler tube bracket.
- Damaged vehicle speed sensor seal.
- Damaged manual shaft seal.
- Loose or damaged oil cooler connector fittings.
- Worn or damaged propeller shaft oil seal.
- Loose parking pawl shaft cup plug, if equipped.
- Loose line pressure pipe plug.
- Porous casting.

Leak at Torque Converter End

Inspect

- Torque converter seal damaged.
 - Torque converter seal lip cut. Check torque converter hub for damage.
 - Bushing moved forward and damaged.
 - Garter spring missing from seal.
- Torque converter leak in weld area.
- Porous casting of transmission case or oil pump.

Leak at Vent Pipe of Fluid Filler Tube Assembly

Inspect

- Over-filled system.
- Water or coolant in fluid. Fluid will appear milky.
- Transmission case porous.
- Incorrect fluid level indicator assembly.
- Plugged vent.
- Plugged drain-back holes.
- Mispositioned oil pump-to-case gasket, if equipped.

Transmission Case Porosity Repair

1. Clean leak area with solvent and air dry.

CAUTION: Epoxy cement may cause skin irritations and eye damage. Read and follow all information on container label as provided by manufacturer.

2. Mix sufficient amount of epoxy cement, GM P/N 1052533, or equivalent, following manufacturers' recommendations.
3. While transmission case is hot, apply epoxy cement with clean, dry soldering acid brush.
4. Allow epoxy cement to cure for three hours before starting engine.
5. Repeat fluid leak diagnosis procedures to determine if leak is fixed.

TORQUE CONVERTER CLUTCH ELECTRICAL CONTROLS

The torque converter clutch (TCC) system uses controls that are both internal and external to the transmission assembly. For internal control components of the TCC system, refer to SECTION 7A-15A for wiring diagrams and switch locations.

The external control components of the TCC system include:

Cruise Control Release Switch Assembly – To avoid stalling the engine when braking, the TCC is released any time the brake pedal assembly is applied.

Powertrain Control Module (PCM) – Receives input signals and grounds TCC solenoid to apply clutch when proper operating conditions are met.

Throttle Position Sensor – Sends throttle position information to PCM.

Manifold Absolute Pressure (MAP) Sensor – Sends engine vacuum (load) information to PCM.

Vehicle Speed Sensor (VSS) – Sends vehicle speed information to PCM.

Engine Coolant Temperature Sensor – Sends engine coolant temperature information to PCM.

TORQUE CONVERTER CLUTCH DIAGNOSIS

To properly diagnose the torque converter clutch (TCC) system, perform all electrical testing first and then hydraulic testing. Refer to SECTION 6E3 and SECTION 7A-15A for additional TCC information.

ON-VEHICLE SERVICE

AUTOMATIC TRANSMISSION RANGE SELECTOR LEVER CABLE ASSEMBLY

Figure 5

Remove or Disconnect

CAUTION: Refer to "Caution" under "Disconnecting the Battery Negative Cable Assembly" in SECTION 0A.

1. Battery negative cable assembly.
2. Raise and suitably support vehicle. Refer to SECTION 0A.
3. Cable assembly (806) from bracket (800).
4. Cable assembly (806) from lever assembly (809).
5. Lower vehicle.

6. Front floor console trim plate assembly. Refer to SECTION 8C.
7. Cable assembly (806) from control assembly (805).
8. Grommet on cable assembly (806) from base of control assembly (805), pulling cable assembly (806) through hole in front compartment floor pan assembly.

Install or Connect

NOTICE: See "Notice" on page 7A-1 of this section.

1. Grommet on cable assembly (806) to base of control assembly (805) by feeding cable assembly (806) through hole in front compartment floor pan assembly.
2. Cable assembly (806) to control assembly (805).
3. Front floor console trim plate assembly. Refer to SECTION 8C.
4. Place control assembly (805) in "NEUTRAL" position.

Important

- Control assembly must remain in "NEUTRAL" position until cable assembly installation is completed.
5. Raise and suitably support vehicle. Refer to SECTION 0A.

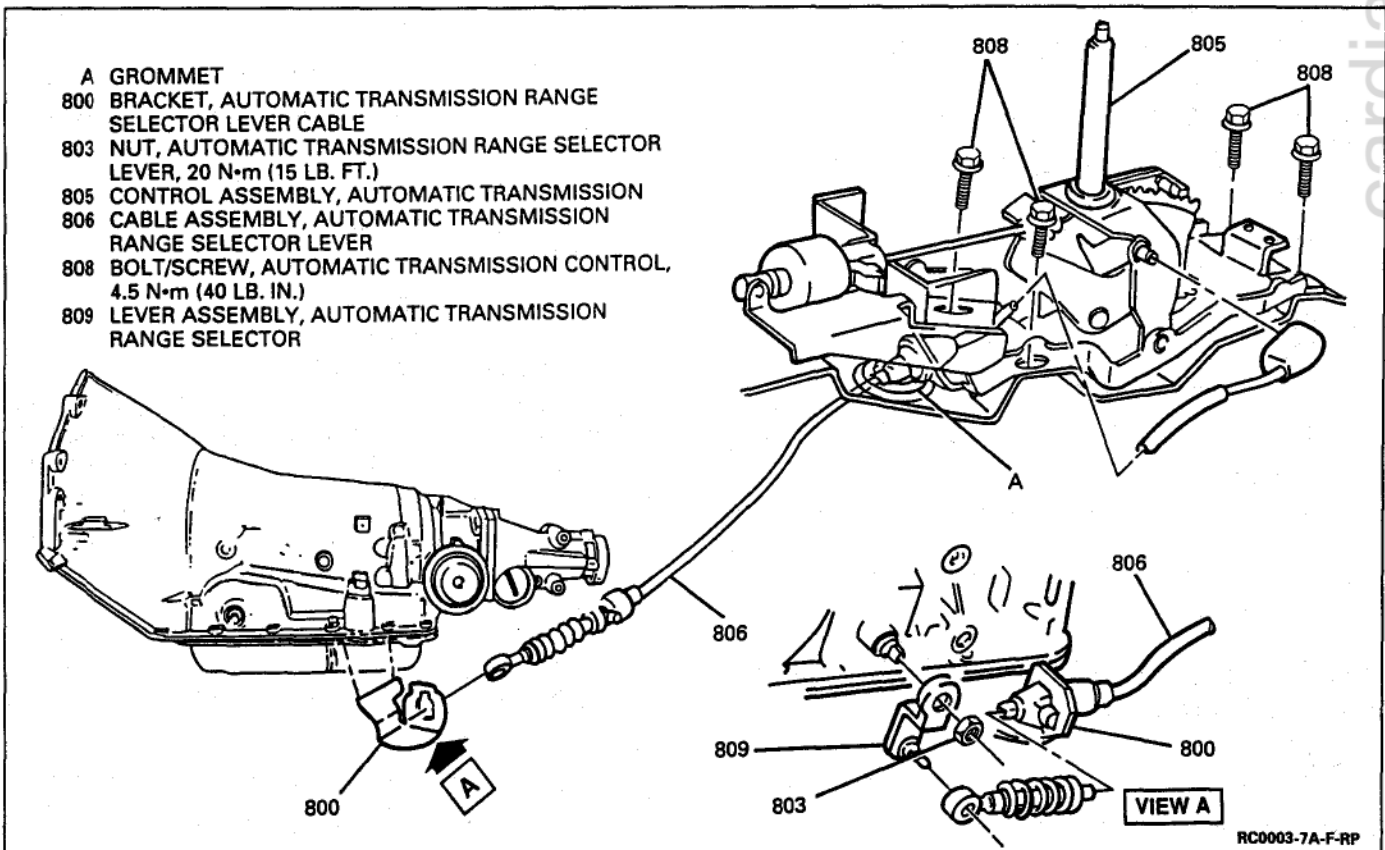


Figure 5 – Automatic Transmission Range Selector Lever Cable Assembly

6. Cable assembly (806) to bracket (800) with adjustment button unlocked.
7. Place lever assembly (809) in "NEUTRAL" position by rotating lever assembly counterclockwise from "PARK" through "REVERSE" and into "NEUTRAL."
8. Cable assembly (806) to lever assembly (809).
9. Lock adjustment button on cable assembly (806) to bracket (800) by turning counterclockwise.
10. Lower vehicle.
11. Battery negative cable assembly.

AUTOMATIC TRANSMISSION CONTROL ASSEMBLY

Figures 5 and 6

Remove or Disconnect

CAUTION: Refer to "Caution" under "Disconnecting the Battery Negative Cable Assembly" in SECTION 0A.

1. Battery negative cable assembly.
2. Automatic transmission range selector lever cable assembly. Refer to "Automatic Transmission Range Selector Lever Cable Assembly" in this section.
3. Park/neutral position switch assembly. Refer to "Park/Neutral Position Switch Assembly" in this section.
4. Bolts/screws (808).
5. Control assembly (805).

Install or Connect

NOTICE: See "Notice" on page 7A-1 of this section.

1. Control assembly (805).
2. Bolts/screws (808).

Tighten

- Bolts/screws (808) to 4.5 N•m (40 lb. in.).
3. Park/neutral position switch assembly. Refer to "Park/Neutral Position Switch Assembly" in this section.
 4. Automatic transmission range selector lever cable assembly. Refer to "Automatic Transmission Range Selector Lever Cable Assembly" in this section.
 5. Battery negative cable assembly.

AUTOMATIC TRANSMISSION PARK LOCK CABLE ASSEMBLY

Figure 7

Remove or Disconnect

CAUTION: Refer to "Caution" under "Disconnecting the Battery Negative Cable Assembly" in SECTION 0A.

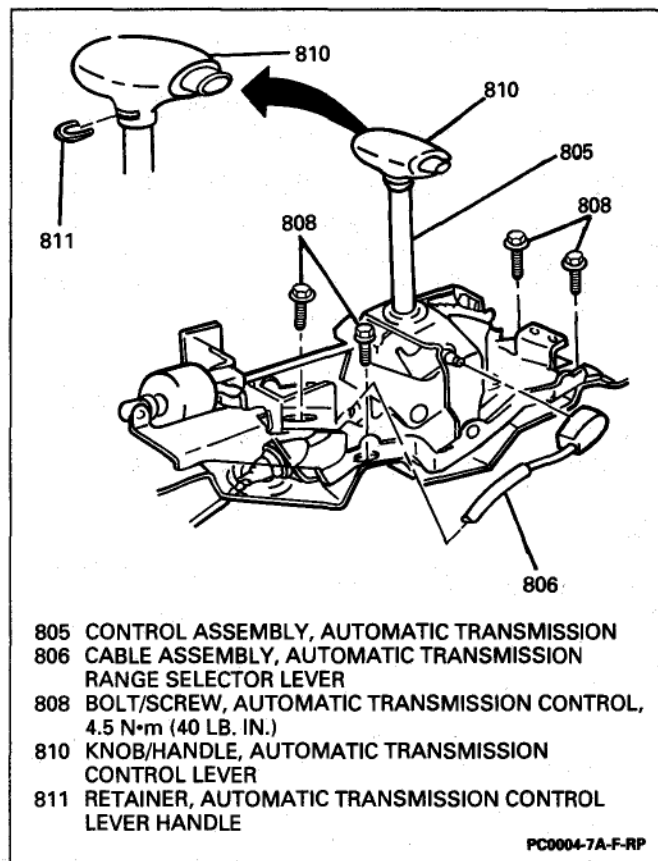


Figure 6 - Automatic Transmission Control Assembly (Typical)

1. Battery negative cable assembly.

CAUTION: Refer to "Caution" on page 7A-1 of this section.

2. Disable the SIR system. Refer to SECTION 9J.
3. Place automatic transmission control assembly in "PARK."
4. Turn ignition key to "RUN" position.
 - Do not proceed to next step with ignition key in any other position.
5. Left-hand instrument panel sound insulator assembly, instrument panel driver knee bolster assembly, and instrument panel driver knee bolster deflector. Refer to SECTION 8C.
6. Front floor console assembly. Refer to SECTION 8C.
7. Nut (814).
8. Clip (813).
9. Cable assembly (812) from bracket.
10. Move button (815) to "UP" position.
11. Unsnap cable terminal from park lock lever pin.
12. Lower steering column assembly. Refer to SECTION 3F.
13. Unsnap cable assembly (812) from steering column assembly (816).

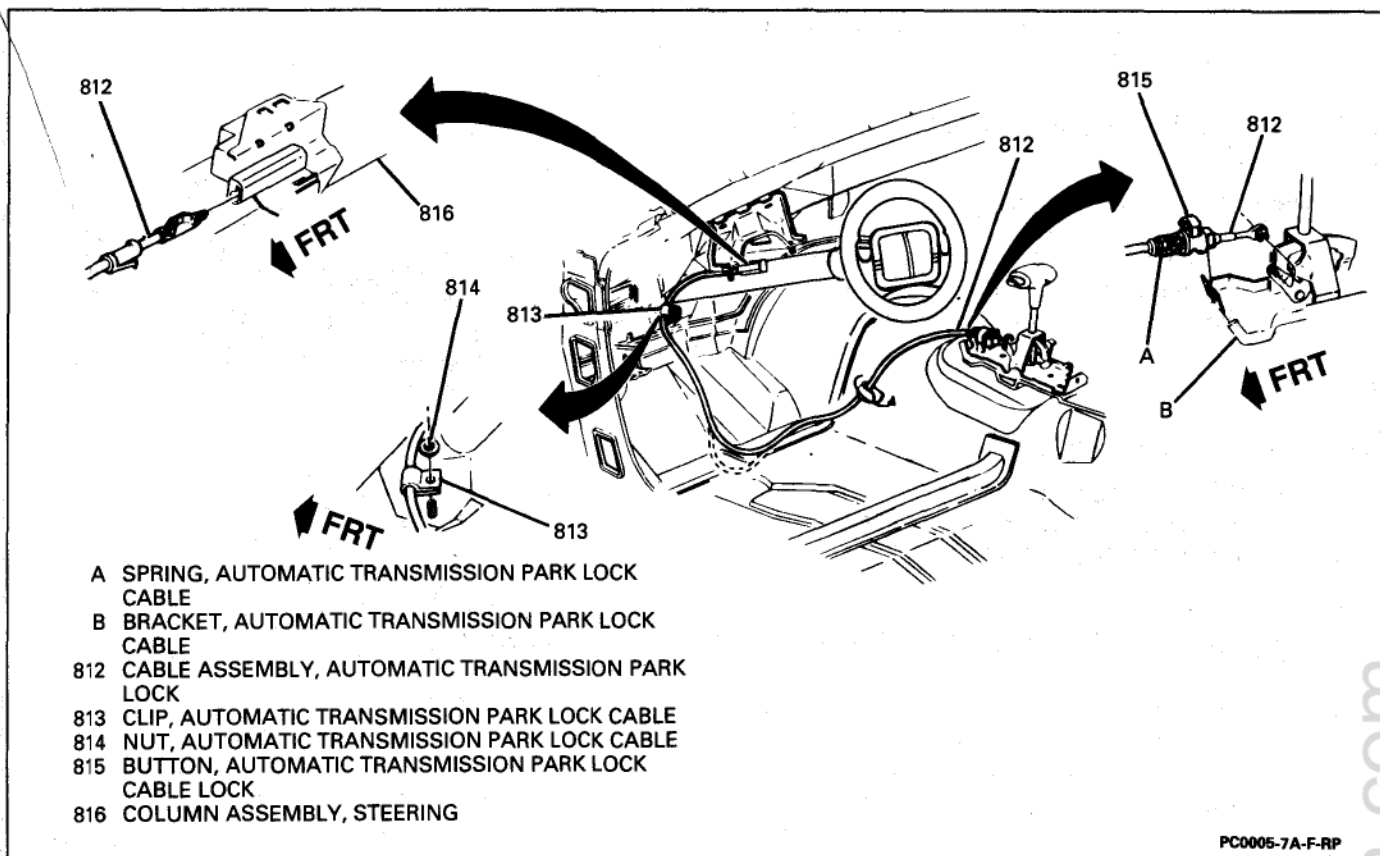


Figure 7 – Automatic Transmission Park Lock Cable Assembly (Typical)

Install or Connect

1. Make sure ignition key is in "RUN" position and automatic transmission control assembly is in "PARK."
 - Do not proceed to next step with ignition key in any other position.
2. Snap cable terminal to park lock lever pin.
3. Push cable connector forward to remove slack.
4. With no load applied to connector, press button (815) down.
5. Cable assembly (812) to bracket.
 - A. Push bracket housing against adjusting spring.
 - B. Drop cable assembly (812) through slot in bracket and seat housing to automatic transmission control assembly.
6. Push button (815) down.
7. Snap cable assembly (812) into steering column assembly (816).
8. Raise steering column assembly. Refer to SECTION 3F.
9. Clip (813).
10. Nut (814).
11. Front floor console assembly. Refer to SECTION 8C.
12. Left-hand instrument panel sound insulator assembly, instrument panel driver knee bolster assembly,

and instrument panel driver knee bolster deflector. Refer to SECTION 8C.

13. Turn ignition key to "OFF" position.
14. Battery negative cable assembly.
15. Enable the SIR system. Refer to SECTION 9J.

Inspect

- Functional operation.
 - A. With automatic transmission control assembly in "PARK" and the ignition key in "LOCK" position, make sure control assembly cannot be moved to different position. Ignition key should be removable from steering column assembly.
 - B. With ignition key in "RUN" and automatic transmission control assembly in "NEUTRAL," make sure key cannot be turned to "LOCK."
 - C. If above conditions are met, system is properly adjusted. Proceed to step E.
 - D. If above conditions are not met, put button (815) back to "UP" position, and readjust as above. Then push button (815) down and recheck operation.
 - E. If key cannot be removed in "PARK" position, move button (815) to "UP" position and move cable connector nose rearward until ignition key can be removed.
 - F. Snap button (815) down.

- G. Reinstall cable assembly (812) into clip (813) to ensure correct routing.

AUTOMATIC TRANSMISSION CONTROL LEVER SOLENOID

The automatic transmission control lever solenoid is part of the brake transmission shift interlock system (BTSI). The solenoid prevents the operator from shifting the automatic transmission control assembly out of "PARK" unless the brake pedal is depressed.

Figure 8

Remove or Disconnect

CAUTION: Refer to "Caution" under "Disconnecting the Battery Negative Cable Assembly" in section 0A.

1. Battery negative cable assembly.
2. Front floor console trim plate assembly. Refer to SECTION 8C.
3. Wiring harness electrical connector from automatic transmission control lever solenoid (804).
4. Automatic transmission control lever solenoid (804) by unsnapping retainers.

Install or Connect

1. Automatic transmission control lever solenoid (804) by snapping retainers into place.
2. Wiring harness electrical connector to automatic transmission control lever solenoid (804).
3. Front floor console trim plate assembly. Refer to SECTION 8C.
4. Battery negative cable assembly.

PARK/NEUTRAL POSITION SWITCH ASSEMBLY

The park/neutral position switch assembly prevents starter motor operation when the automatic transmission control assembly is in any gear by breaking the starter motor circuit. When the automatic transmission control assembly is in reverse (engine running), the park/neutral position switch completes the backup lamp circuit, lighting the backup lamps.

Figure 9

Remove or Disconnect

CAUTION: Refer to "Caution" under "Disconnecting the Battery Negative Cable Assembly" in SECTION 0A.

1. Battery negative cable assembly.
2. Front floor console assembly. Refer to SECTION 8C.
3. Bolts/screws (819).
4. Switch assembly (817).

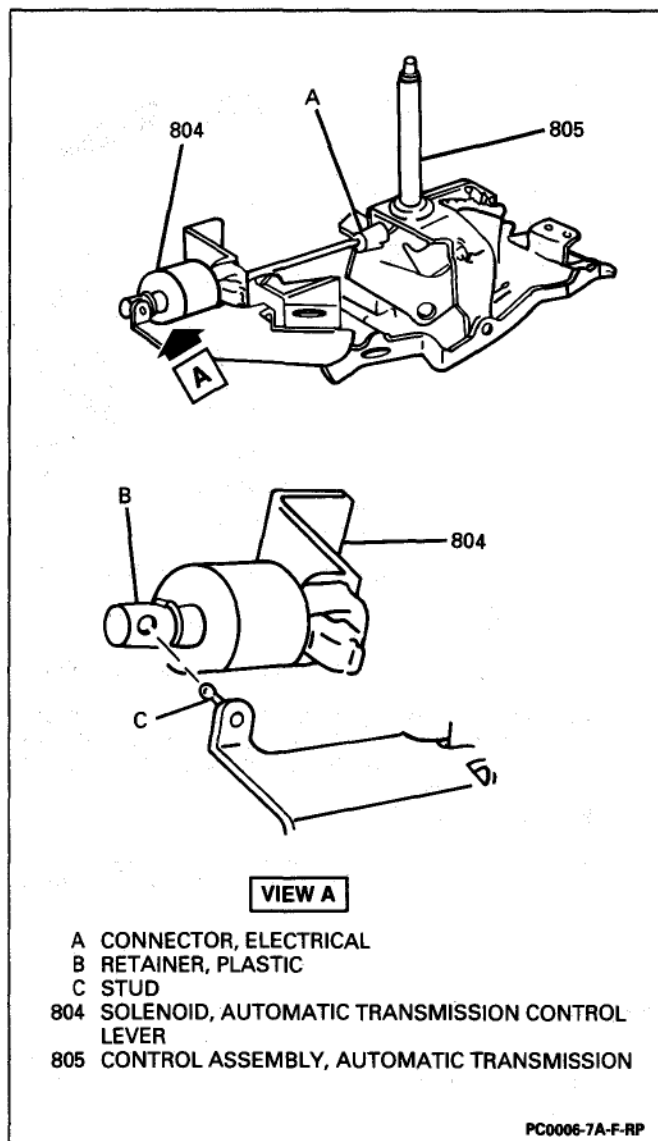


Figure 8 – Automatic Transmission Control Lever Solenoid (Typical)

Park/Neutral Position Switch Assembly Adjustment Using Old Switch Assembly

Install or Connect

NOTICE: See "Notice" on page 7A-1 of this section.

1. Place automatic transmission control assembly (805) in "NEUTRAL."
2. Tang (818) on switch assembly (817) into slot on automatic transmission control assembly (805).
3. Bolts/screws (819) to automatic transmission case, loosely.
4. Insert 2.34 mm (3/32-inch) gage pin into service adjustment hole, and rotate switch assembly (817) until gage pin drops to 15 mm (19/32-inch) depth.

Tighten

- Bolts/screws (819) to 2.2 N•m (19 lb. in.).

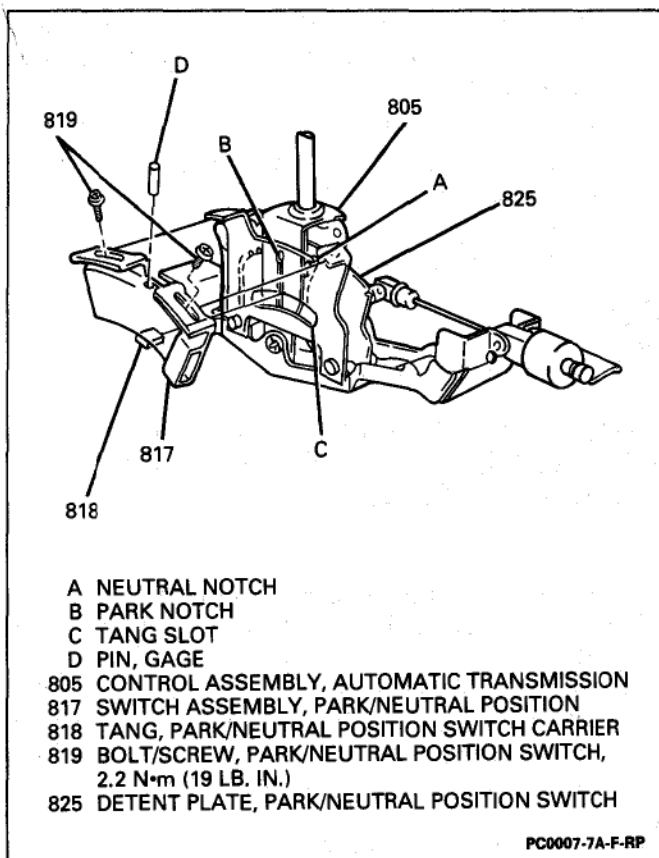


Figure 9 - Park/Neutral Position Switch Assembly

5. Front floor console assembly. Refer to SECTION 8C.
6. Battery negative cable assembly.

Important

- After park/neutral position switch assembly adjustment, verify engine will only start with ignition key in "PARK" or "NEUTRAL." If engine will start with ignition key in any other position, readjust park/neutral position switch assembly.

Park/Neutral Position Switch Assembly Adjustment Using New Switch Assembly

Install or Connect

1. Place automatic transmission control assembly (805) in "NEUTRAL."
2. Tang (818) on switch assembly (817) into slot on automatic transmission control assembly (805).
3. Bolts/screws (819) to automatic transmission case.

Tighten

- Bolts/screws (819) to 2.2 N•m (19 lb. in.).

Important

- If park/neutral position switch bolt/screw holes will not align with automatic transmission control assembly, verify automatic transmission

control assembly is in "NEUTRAL" position. Do not rotate park/neutral position switch assembly. If switch assembly has been rotated and the pin is broken, the switch assembly can be adjusted using the procedure under "Park/Neutral Position Switch Assembly Adjustment Using Old Switch Assembly" in this section.

4. Front floor console assembly. Refer to SECTION 8C.
5. Battery negative cable assembly.

CHANGING TRANSMISSION FLUID AND AUTOMATIC TRANSMISSION OIL FILTER ASSEMBLY

Figures 3, 10 and 11

Remove or Disconnect

1. Raise and suitably support vehicle. Refer to SECTION 0A.
2. Place drain pan under oil pan (73).
3. Bolts/screws (74) from front and sides only.
4. Loosen rear bolts/screws (74) approximately four turns.

NOTICE: When removing automatic transmission oil pan bolts/screws, use caution in order not to damage the automatic transmission case or automatic transmission oil pan sealing surfaces.

5. Lightly tap oil pan (73) with rubber mallet or pry to allow fluid to drain.

Inspect

- Fluid color and condition. Refer to Figure 3.
 - Filter. Open filter by prying the metal crimping away from the top of the filter (black) and pulling apart. The filter may contain evidence for root cause diagnosis.
 - Clutch material.
 - Bronze slivers indicating bushing wear.
 - Steel particles.
6. Remaining bolts/screws (74), oil pan (73) and gasket (72).
 7. Filter assembly (71) and seal (70).
 - Seal (70) may be stuck in automatic transmission case.

Clean

- Automatic transmission case and gasket surfaces with solvent, and air dry. All traces of gasket material must be removed.

Install or Connect

NOTICE: See "Notice" on page 7A-1 of this section.

1. Coat new seal (70) with small amount of Transjel™, or equivalent.
2. New seal (70) to filter assembly (71).

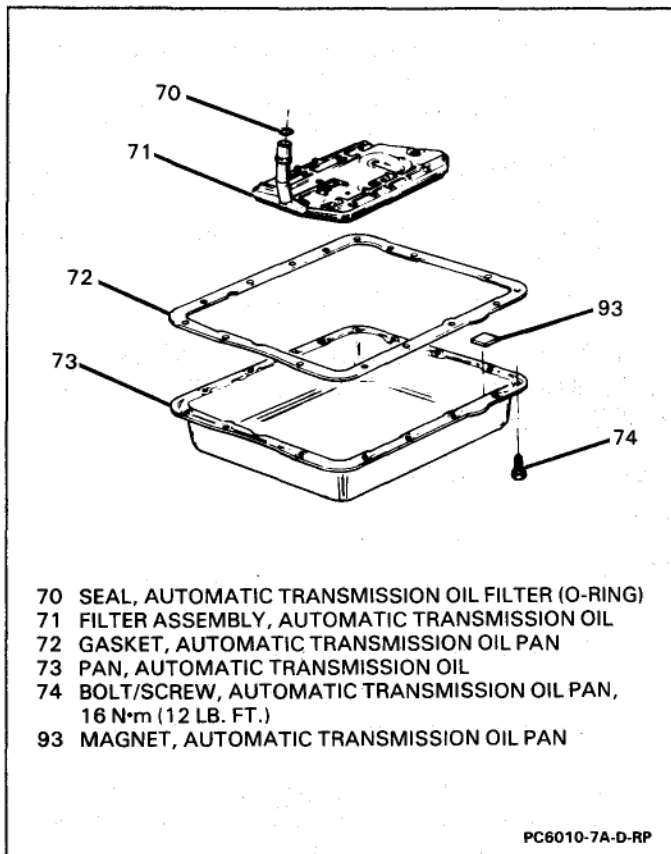


Figure 10 – Automatic Transmission Oil Pan and Automatic Transmission Oil Filter Assembly

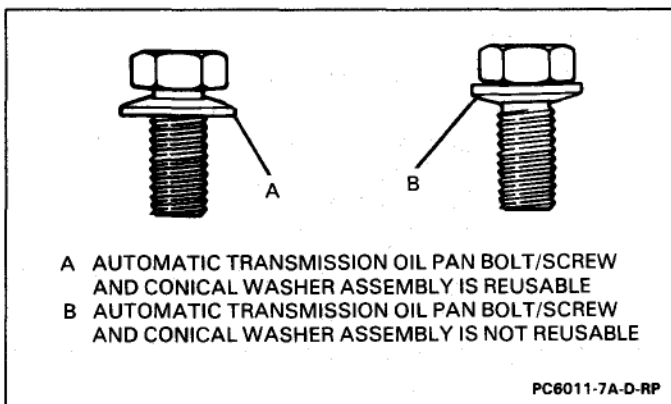


Figure 11 – Automatic Transmission Oil Pan Bolt/Screw and Conical Washer Assembly

3. Filter assembly (71) and seal (70) into automatic transmission case.
4. New gasket (72), oil pan (73) and bolts/screws (74).

NOTICE: Automatic transmission oil pan bolt/screw and washer assembly must not be reused if conical washer is reversed. Failure to replace the bolt/screw and washer may result in improper fastening of system components.

**Tighten**

- Bolts/screws (74) to 16 N•m (12 lb. ft.).
5. Lower vehicle.

NOTICE: Do not overfill. Overfilling will cause foaming, loss of fluid and possible damage to the transmission.

6. Fill automatic transmission fluid to proper level.
7. Check “COLD” fluid level reading for initial fill only. Refer to “Transmission Fluid Checking Procedures” in this section.

- Do not overfill.

**Inspect**

- Gasket (72) for leaks.

AUTOMATIC TRANSMISSION OIL COOLER UPPER PIPE AND UPPER AND LOWER HOSE ASSEMBLIES

Figure 12

If replacement of automatic transmission oil cooler pipe and hose assemblies is required, use only double-wrapped and brazed steel tubing meeting GM specification 123 M or equivalent. Tubing should be double flared.

NOTICE: Allow sufficient clearance to transmission oil cooler pipe and hose assemblies to prevent damage or wear which may cause fluid loss.

**Remove or Disconnect**

1. Fitting on radiator end of oil cooler upper hose assembly (860).
2. Fitting on radiator end of oil cooler lower hose assembly (857).
3. Raise and suitably support vehicle. Refer to SECTION 0A.
4. Propeller shaft assembly. Refer to SECTION 4A.
5. Rear axle torque arm assembly. Refer to SECTION 3D.
6. Catalytic converter hanger assembly. Refer to SECTION 6F.
7. Support automatic transmission assembly with a transmission stand.
8. Transmission support member assembly. Refer to SECTION 10-3.
9. Lower the transmission stand slightly, to allow access to oil cooler fittings at the transmission assembly.
10. Fitting on transmission assembly end of upper pipe assembly (856).
11. Fitting on transmission assembly end of lower hose assembly (857).
12. Upper pipe assembly (856) and lower hose assembly (857) from engine clip (858) and pipe clip (859).

**Install or Connect**

NOTICE: See “NOTICE” on page 7A-1 of this section.

1. Upper pipe assembly (856) and lower hose assembly (857) to engine clip (858) and pipe clip (859).

2. Fitting on transmission assembly end of lower hose assembly (857).

 Tighten

- Fitting on transmission assembly end of lower hose assembly (857) to 27 N•m (20 lb. ft.).

3. Fitting on transmission assembly end of upper pipe assembly (856).

 Tighten

- Fitting on transmission assembly end of upper pipe assembly (856) to 27 N•m (20 lb. ft.).

4. Raise the transmission assembly.
5. Transmission support member assembly. Refer to SECTION 10-3.
6. Remove transmission stand.
7. Catalytic converter hanger assembly. Refer to SECTION 6F.
8. Rear axle torque arm assembly. Refer to SECTION 3D.
9. Propeller shaft assembly. Refer to SECTION 4A.
10. Lower vehicle.
11. Fitting on radiator end of oil cooler lower hose assembly (857).

 Tighten

- Fitting on radiator end of oil cooler lower hose assembly (857) to 27 N•m (20 lb. ft.).

12. Fitting on radiator end of oil cooler upper hose assembly (860).

 Tighten

- Fitting on radiator end of oil cooler upper hose assembly (860) to 27 N•m (20 lb. ft.).

OIL COOLER FLUSHING PROCEDURE

Figure 12

Tools Required:

J 35944 "Transmission" Oil Cooler and Line Flusher

J 35944-20 Cooler Flushing Fluid

NOTICE: The automatic transmission oil cooler flushing procedure must be performed whenever a transmission assembly is removed for service to remove existing oil which may be contaminated and to prevent contamination of new oil. The flushing procedure must be performed before installation of the overhauled or replacement transmission assembly.

NOTICE: Flushing tool is designed for use with only J 35944-20 flushing fluid. Use of any other

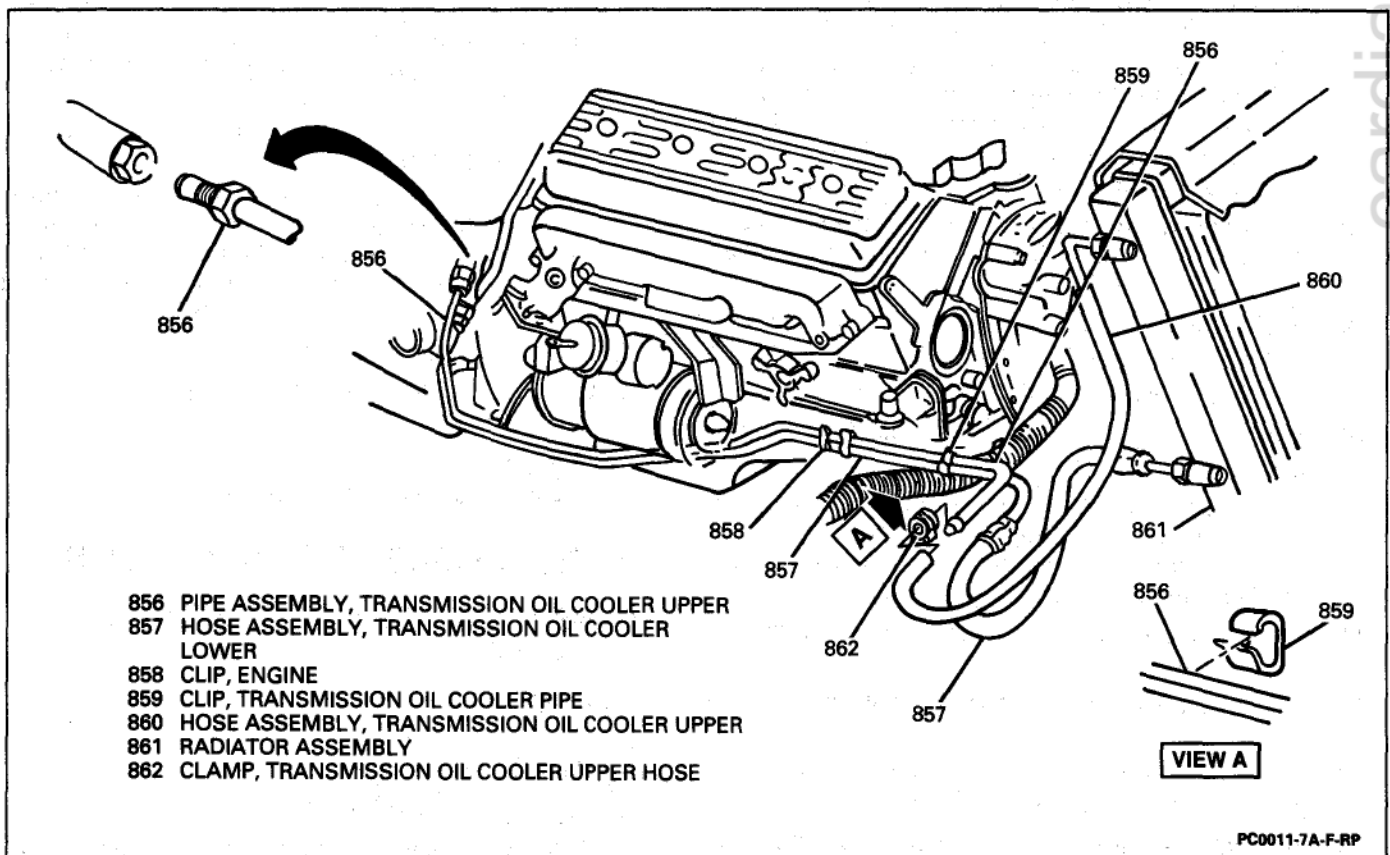


Figure 12 – Transmission Oil Cooler Pipe and Hose Assemblies

fluid can result in damage to the tool, automatic transmission oil cooler components or improper flushing of the cooler.

1. Remove fill cap on J 35944 and fill with 0.6 liters (20 to 21 ounces) of J 35944-20.

- Do not overfill tool.
- Follow manufacturer's suggested procedures for handling fluid.

2. Replace cap on J 35944 and pressurize to 550 to 700 kPa (80 to 100 psi).

NOTICE: Shop air supply must be equipped with a water/oil filter and pressure should not exceed 825 kPa (120 psi). Failure to use a water/oil filter can allow residual moisture to cause corrosion of components. Excessive air pressure can cause damage to components.

3. Install J 35944 to undercarriage of vehicle with hook provided, and attach hose from flushing tool to upper pipe assembly (856) attaching to **top** fitting at transmission assembly end of oil cooler.
4. Install discharge hose to lower hose assembly (857) attaching to **bottom** fitting at transmission assembly end of oil cooler. Clip opposite end of discharge hose to oil drain container.
5. With water valve on tool in "OFF" position, attach water supply to J 35944.
6. Turn water supply on at faucet.
7. Flush transmission fluid by opening water valve on tool to "ON" position for about 10 seconds.
 - If water does not flow through cooler (system is completely plugged), do not complete flushing procedure. Turn water off immediately and inspect oil cooler and pipes for restriction. Replace cooler and/or pipes as required.
8. Turn water valve on tool to "OFF" position and clip discharge hose to 5-gallon pail. Cover pail with shop cloth to prevent splash.
9. Turn water valve on tool to "ON" position and depress trigger to mix flushing fluid into water flow.
 - Use bale clip to hold trigger down.
10. Flush oil cooler with water and fluid for two minutes.
 - Every 15 to 20 seconds during flushing procedure, attach air supply to air valve on J 35944 and leave in place for 3 to 5 seconds to create surging action for complete cleaning.
11. Release trigger and turn water valve on tool to "OFF" position.
12. Disconnect discharge hose from lower hose assembly (857).
13. Install hose from J 35944 to lower hose assembly (857) attaching to **bottom** fitting of oil cooler.
14. Connect discharge hose to upper pipe assembly (856) attaching to **top** fitting of oil cooler.
 - Reversing hoses creates back-flush.
15. Repeat steps 9 and 10.

16. Release trigger and allow water only to rinse the oil cooler for one minute.
17. Turn water valve on tool to "OFF" position and turn water supply off at faucet.
18. Attach air supply to air valve on J 35944 and dry system out with dry compressed air for at least two minutes. Be sure no moisture can be seen leaving hose.
19. Remove J 35944 and discharge hose from oil cooler/hoses.
20. Connect oil cooler feed hose to automatic transmission assembly.
 - Feed hose is lower hose assembly (857) attached to **bottom** connection at transmission end of system.
21. Attach discharge hose to oil cooler return pipe.
 - Return pipe is upper pipe assembly (856) attached to **top** connection at transmission end of system.
22. Attach opposite end of discharge hose to oil drain container.
23. Fill automatic transmission assembly with fluid.
24. Start engine and run for 30 seconds to remove any residual moisture from cooler.



Inspect

- A. Fluid flow through cooler feed lines during 30 second running period. Minimum of 1.8 liters (2 quarts) of fluid should flow during this time.
- B. If fluid flow is insufficient, check flow by disconnecting feed line at cooler and observe flow with engine running at idle.
 - Insufficient Flow: Inspect transmission for causes.
 - Sufficient Flow: Inspect cooler pipes, hoses and fittings and repeat cooler flushing procedure. If the flow through cooler is still insufficient after second flushing procedure, replace cooler.
25. Disconnect discharge hose.
26. Connect oil cooler return pipe to fitting.



Adjust

- Transmission fluid level.

SERVICEABLE COMPONENTS

TRANSMISSION FLUID FILLER TUBE ASSEMBLY

Figure 13



Remove or Disconnect

1. Indicator assembly (837).
2. Raise and suitably support vehicle. Refer to SECTION 0A.
3. Bolt/screw (835) retaining tube assembly (836) to transmission assembly (838).

4. Loosen tube assembly (836) from transmission assembly (838).
5. Place drain pan under transmission assembly (838).
6. Lower vehicle.
7. Tube assembly (836) and seal (901) from vehicle by pulling out from top.

Install or Connect

NOTICE: See "Notice" on page 7A-1 of this section.

1. Seal (901) and tube assembly (836) through top of vehicle.
2. Raise and suitably support vehicle. Refer to SECTION 0A.
3. Insert seal (901) into automatic transmission case hole.
4. Tube assembly (836) to transmission assembly (838).
5. Bolt/screw (835) attaching tube assembly (836) to transmission assembly (838).

Tighten

- Bolt/screw (835) to 95 N•m (70 lb. ft.) on 3.4L L32 engines.
 - Bolt/screw (835) to 47 N•m (35 lb. ft.) on 5.7L LT1 engines.
6. Lower vehicle.
 7. Indicator assembly (837).

Vehicle Speed Sensor (VSS)

Figure 14

Remove or Disconnect

1. Raise and suitably support vehicle. Refer to SECTION 0A.
2. Speed sensor electrical connector.
3. Speed sensor bolt (100).
4. Speed sensor (99) and O-ring seal (42).
 - Use suitable container to catch transmission fluid.

Install or Connect

NOTICE: See "Notice on page 7A-1 of this section.

1. Speed sensor (99) with new O-ring seal (42).
2. Speed sensor bolt (100).

Tighten

- Speed sensor bolt (100) to 11 N•m (97 lb. in.).
3. Speed sensor electrical connector.
 4. Lower vehicle.

NOTICE: Do not overfill. Overfilling will cause foaming, loss of fluid and possible damage to the transmission.

- Refill with transmission fluid as required.

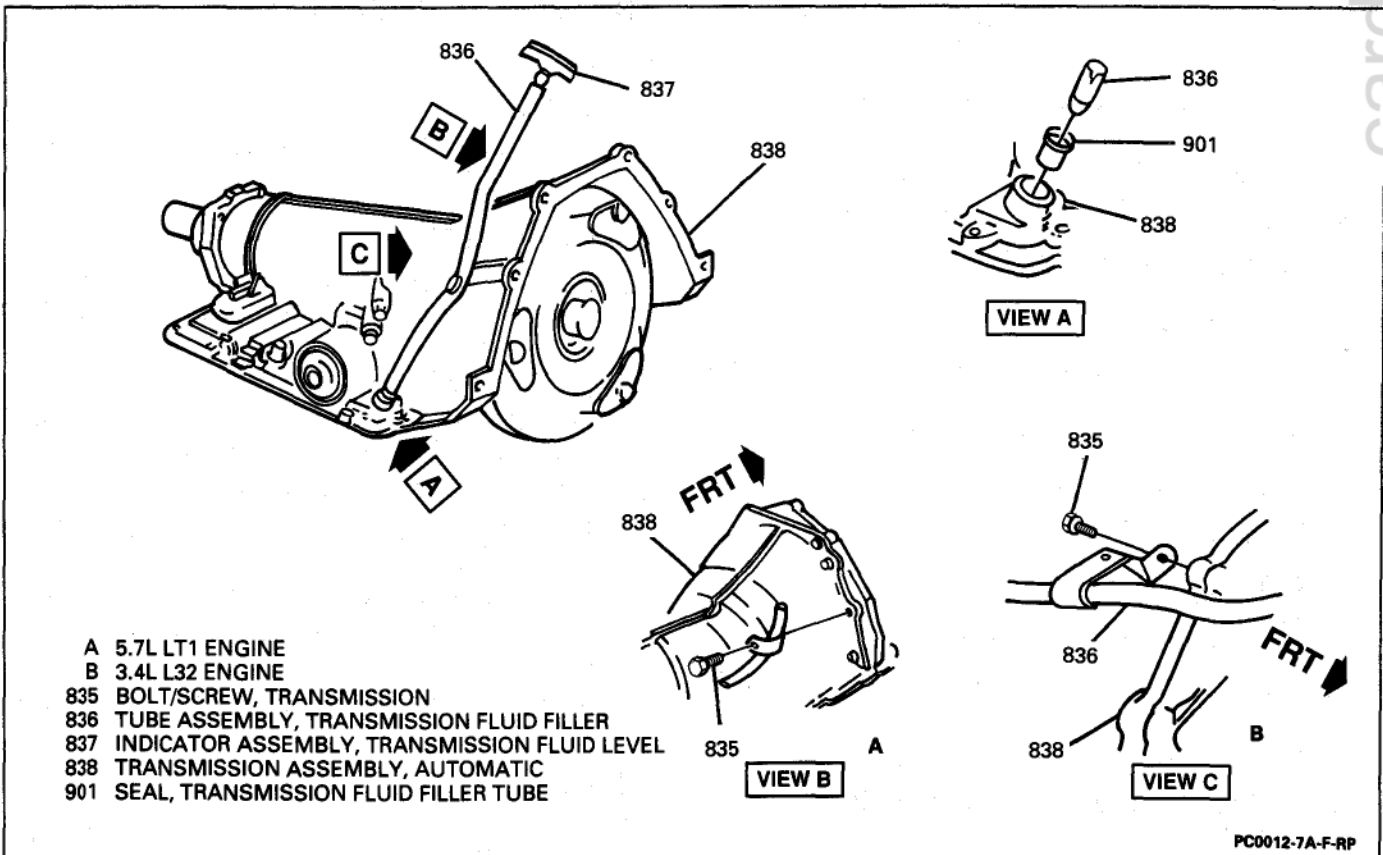


Figure 13 – Transmission Fluid Filler Tube and Transmission Fluid Level Indicator Assemblies

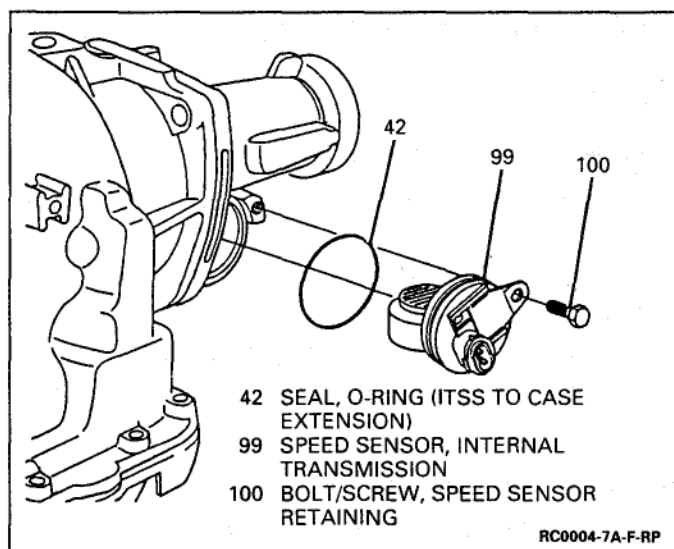


Figure 14 - Vehicle Speed Sensor

AUTOMATIC TRANSMISSION CASE EXTENSION

Figure 15

Remove or Disconnect

1. Raise and suitably support vehicle. Refer to SECTION 0A.
2. Propeller shaft assembly. Refer to SECTION 4A.
3. Rear axle torque arm assembly. Refer to SECTION 3D.
4. Catalytic converter hanger assembly. Refer to SECTION 6F.
5. Bolts/screws (37).
6. Extension (36), with seal (35). Discard seal (35).
7. Sleeve (690) and seal (691), if necessary.

Install or Connect

NOTICE: See "Notice" on page 7A-1 of this section.

1. Sleeve (690) and seal (691), if removed.
2. New seal (35) and extension (36).
3. Bolts/screws (37).

Tighten

- Bolts/screws (37) to 35 N•m (26 lb. ft.).
4. Rear axle torque arm assembly. Refer to SECTION 3D.
 5. Propeller shaft assembly. Refer to SECTION 4A.
 6. Catalytic converter hanger assembly. Refer to SECTION 6F.
 7. Lower vehicle.

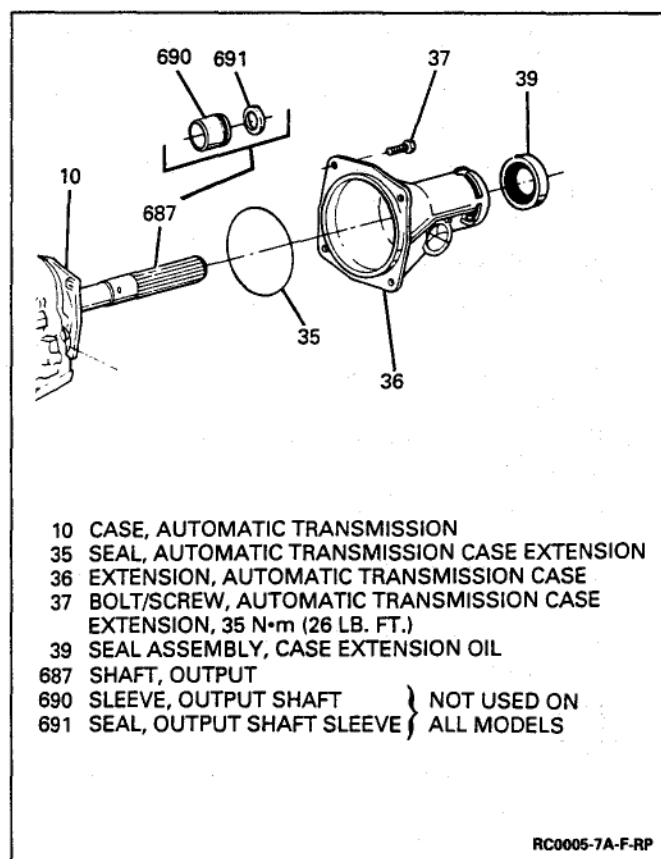


Figure 15 - Speedometer Drive Gear and Automatic Transmission Case Extension

ACCUMULATOR ASSEMBLY

Figure 16

Tool Required:

J 25025-B Pump and Valve Body Alignment Pin Set

Remove or Disconnect

1. Oil pan. Refer to "Changing Transmission Fluid and Automatic Transmission Oil Filter Assembly" in this section.
2. Oil filter and filter seal.
3. Control valve body. Refer to "Control Valve Body and Pressure Switch" in this section.
4. Accumulator cover bolts/screws (935).
5. 1-2 accumulator cover (934), piston (933) and spring (932).
6. Bolts/screws (936) and spacer plate support (931).
7. Spacer plate (929) and spacer plate gaskets (928 and 930).
8. 3-4 accumulator spring (927), piston (926) and pin (925).

Inspect

- Accumulator assembly. Refer to SECTION 7A-14B.

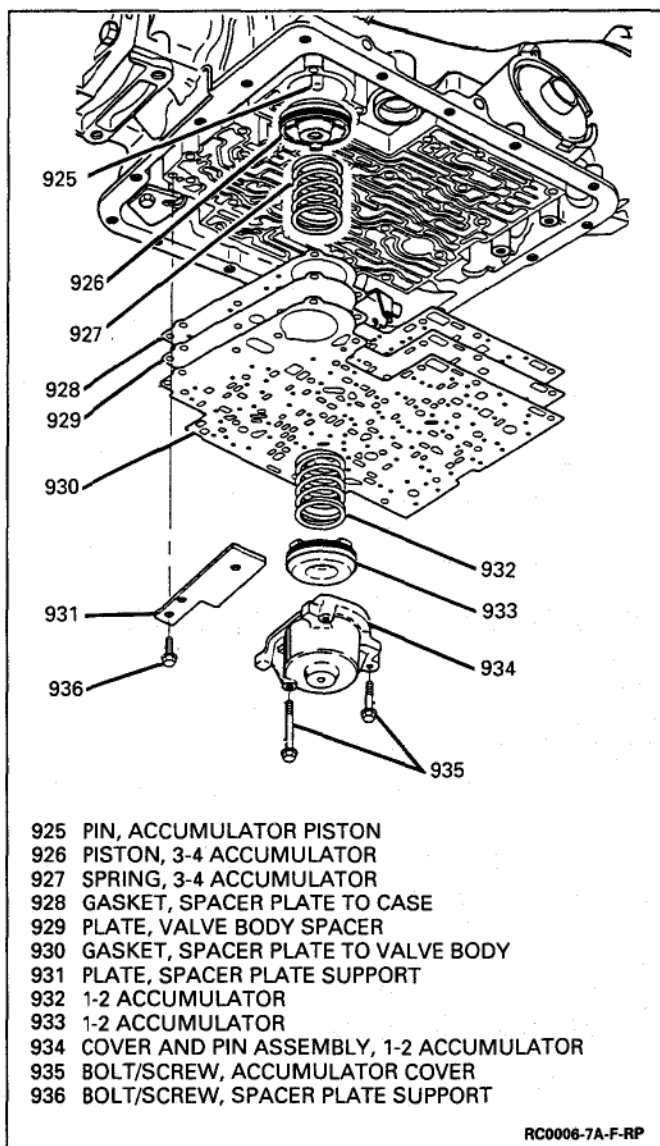


Figure 16 – Accumulator Assembly

Install or Connect

- 3-4 accumulator pin (925) into transmission case.
- 3-4 accumulator piston (926) onto pin (925).
 - Piston legs must face valve body.
- 3-4 accumulator piston spring (927).
- J 25025-B to transmission case.
- Case gasket and valve body gasket to spacer plate.
 - Case gasket is identified by a "C."
 - Valve body gasket is identified by a "V."
 - Use J 36850 to retain gaskets to spacer plate.
- Spacer plate (929) and gaskets (928 and 930) to transmission case.
- Spacer plate support (931) and bolts/screws (936).

Tighten

- Spacer plate support bolts/screws (936) to 11 N•m (97 lb. in.).

- 1-2 accumulator piston (933) to accumulator cover (934).
 - Piston legs must face toward case when installed.
- 1-2 accumulator spring (932) onto piston (933).
- 1-2 accumulator cover (934) and bolts/screws (935).

Tighten

- Bolts/screws (935) to 11 N•m (97 lb. in.).
- Remove J 25025-B.
 - Control valve body. Refer to "Control Valve Body and Pressure Switch" in this section.
 - Oil filter and filter seal.
 - Oil pan. Refer to "Changing Transmission Fluid and Automatic Transmission Oil Filter Assembly" in this section.

2-4 BAND SERVO ASSEMBLY

Figures 17 and 18

Remove or Disconnect

Tool Required:

J 29714-A Servo Cover Depressor

- Raise and suitably support vehicle. Refer to SECTION 0A.
- Exhaust crossover pipe assembly and catalytic converter hanger assembly. Refer to SECTION 6F.
- Propeller shaft assembly. Refer to SECTION 4A.
- Rear axle torque arm assembly. Refer to SECTION 3D.
- Support automatic transmission assembly with transmission stand.
- Transmission support. Refer to SECTION 10-3.
- Catalytic converter heat shield. Refer to SECTION 6F.
- Lower automatic transmission assembly.
- Two automatic transmission oil pan bolts/screws from below servo cover (15).
- Install J 29714-A on automatic transmission oil pan rail.
- Reinstall automatic transmission oil pan bolts/screws.
- Depress servo cover (15) and remove retaining ring (13).
- J 29714-A.
- Servo cover (15).
 - If unable to remove by hand, use slip joint pliers.
 - O-ring seal may remain in automatic transmission case.
- 2-4 band servo assembly (16).

Inspect

- 2-4 band servo assembly. Refer to SECTION 7A-15B for disassembly and inspection procedures.

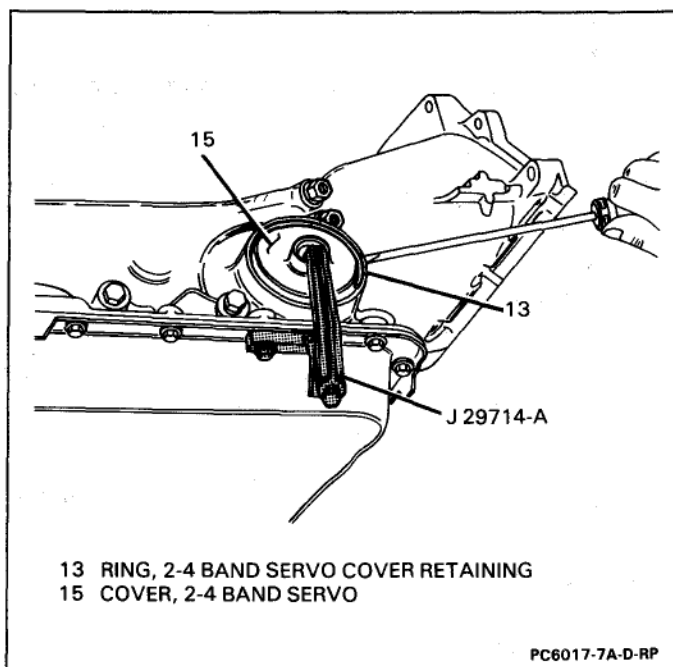


Figure 17 – 2-4 Band Servo Cover

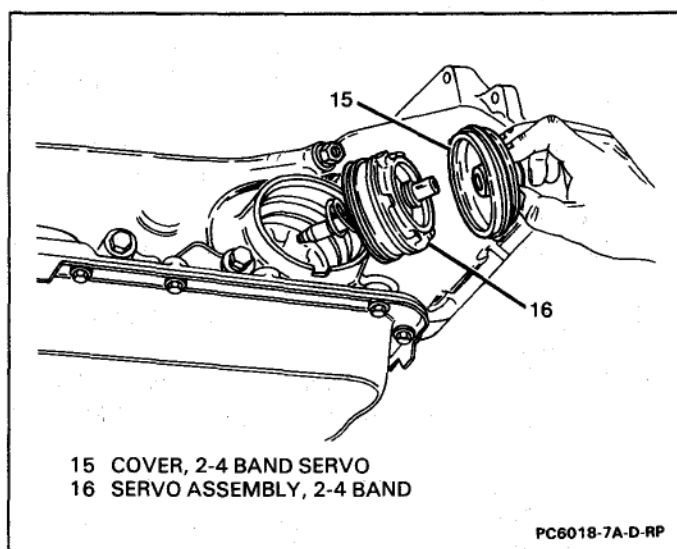


Figure 18 – 2-4 Band Servo Assembly

Install or Connect

NOTICE: See "Notice" on page 7A-1 of this section.

1. 2-4 band servo assembly (16).
2. Servo cover (15).
 - Replace O-ring seal on servo cover (15).
3. Install J 29714-A on automatic transmission oil pan rail.
4. Depress servo cover (15).
5. Retaining ring (13).
6. Remove J 29714-A.

Tighten

- Automatic transmission oil pan bolts/screws to 16 N•m (12 lb. ft.).
7. Raise automatic transmission assembly.
 8. Catalytic converter heat shield. Refer to SECTION 6F.
 9. Transmission support. Refer to SECTION 10-3.
 10. Remove tool supporting automatic transmission assembly.
 11. Rear axle torque arm assembly. Refer to SECTION 3D.
 12. Propeller shaft assembly. Refer to SECTION 4A.
 13. Exhaust crossover pipe assembly and catalytic converter hanger assembly. Refer to SECTION 6F.
 14. Lower vehicle.

TRANSMISSION CONVERTER COVER

Figure 19

Remove or Disconnect

1. Raise and suitably support vehicle. Refer to SECTION OA.
2. Converter cover bolts/screws (840).
3. Converter cover (839) from automatic transmission assembly (838).

Install or Connect

NOTICE: See "Notice" on page 7A-1 of this section.

1. Converter cover (839) to automatic transmission assembly (838).
2. Converter cover bolts/screws (840).

Tighten

- Transmission converter cover bolts/screws (840) to 10 N•m (89 lb. in.).
3. Lower vehicle.

PRESSURE REGULATOR VALVE

Figure 20

Remove or Disconnect

1. Automatic transmission oil pan. Refer to "Changing Transmission Fluid and Automatic Transmission Oil Filter Assembly" in this section.
2. Compress TV (throttle valve) boost valve bushing and related components (223 through 218) with small screwdriver.
3. Retainer ring (224).
4. Slowly release spring pressure.
5. Regulator valve (218).
6. Spring (219).

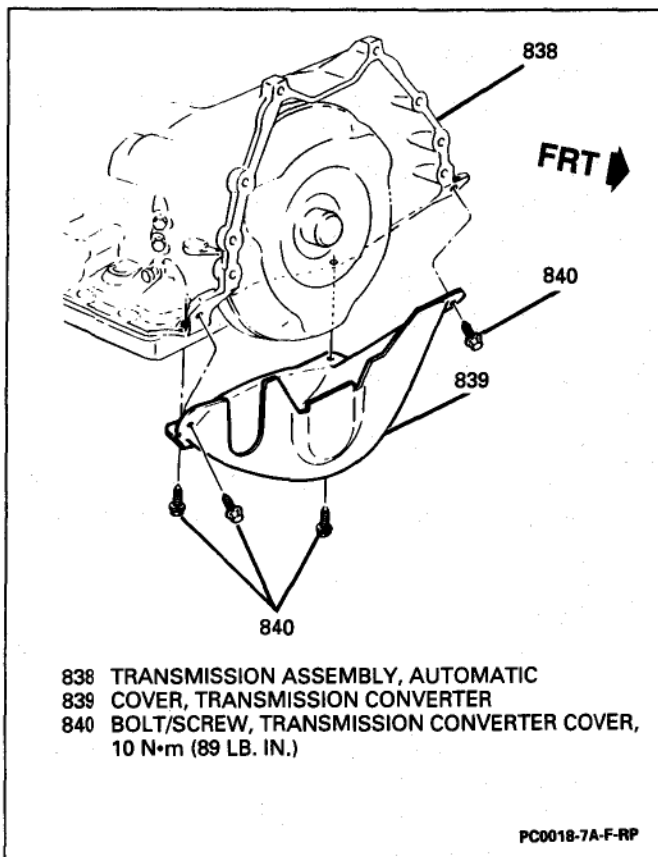


Figure 19 – Transmission Converter Cover

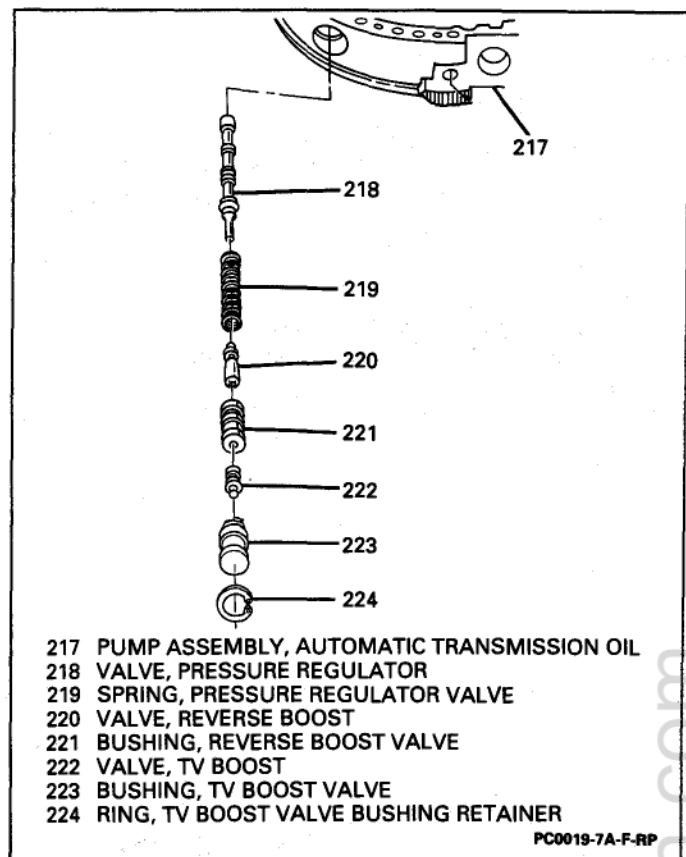


Figure 20 – Pressure Regulator Valve Assembly

7. Reverse boost valve (220) and bushing (221).
8. TV boost valve (222) and bushing (223).

Inspect

- Pressure regulator valve assembly. Refer to SECTION 7A-15B for disassembly and inspection procedures.

Install or Connect

1. Regulator valve (218) into pump cover bore.
2. Spring (219).
3. Reverse boost valve (220) into bushing (221).
 - Small end first. Retain with Transjel™, or equivalent.
4. Bushing (221) with reverse boost valve (220) into pump cover bore.
5. TV boost valve (222) into bushing (223).
 - Insert long land of TV boost valve (222) into largest hole of bushing (223). Retain with Transjel™, or equivalent.
6. Bushing (223) with TV boost valve (222) into pump cover bore.
7. Compress TV boost valve bushing and related components (223 through 218).
8. Retainer ring (224).
9. Automatic transmission oil pan. Refer to "Changing Transmission Fluid and Automatic Transmission Oil Filter Assembly" in this section.

CONTROL VALVE BODY AND PRESSURE SWITCH

Figures 10, 21, 22 and 24

Remove or Disconnect

1. Oil pan. Refer to "Changing Transmission Fluid and Automatic Transmission Oil Filter Assembly" in this section.
2. Oil filter and filter seal.
3. Electrical connectors from control valve body components.
4. Torque converter clutch (TCC) solenoid bolts/screws and solenoid assembly with O-ring seal.
5. Wiring harness bolts/screws and lay wiring harness aside.
6. Bolts/screws (942) and pressure switch assembly (941).
7. Bolt/screw (939) and manual detent spring assembly (938).
8. Remaining control valve body bolts/screws.
9. Manual valve link (705).
10. Control valve body (937).

Inspect

- Control valve body (937). Refer to SECTION 7A-14B for cleaning, inspection and repair of the control valve body.

Install or Connect

NOTICE: Install all valve body bolts/screws then torque in a spiral pattern starting from the center (see Figure 22). If bolts/screws are torqued at random, valve bores may be distorted and inhibit valve operation.

1. Control valve body (937) and manual valve link (705) to transmission case (10).
2. Control valve body bolts/screws.
3. Manual detent spring assembly (938) and bolt/screw (939).
4. Pressure switch assembly (941) and bolts/screws (942).
5. Wiring harness and wiring harness bolts/screws.
6. TCC solenoid, O-ring seal and bolts/screws.
7. Electrical connectors.

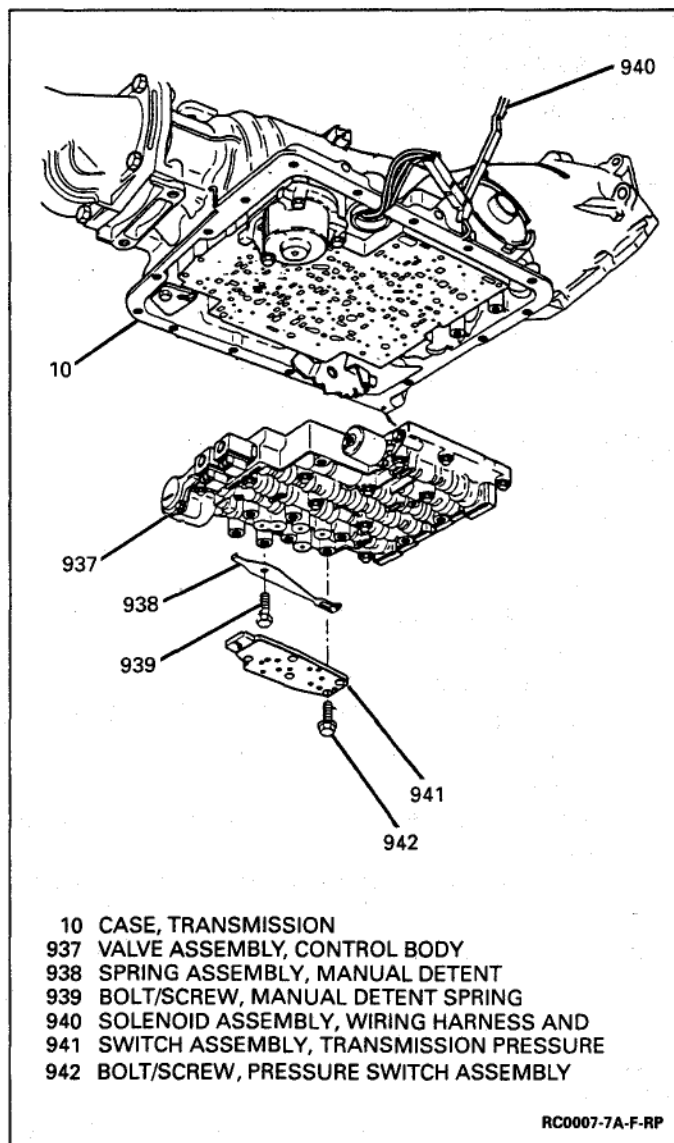


Figure 21 – Control Valve and Pressure Switch Assembly

Tighten

- All bolts/screws in the pattern shown in Figure 22 to 11 N•m (97 lb. in.).
8. Oil filter and filter seal.
 9. Oil pan. Refer to “Changing Transmission Fluid and Automatic Transmission Oil Filter Assembly” in this section.

CONTROL AND SHIFT SOLENOIDS

Figures 10, 16 and 23

Remove or Disconnect

1. Oil pan. Refer to “Changing Transmission Fluid and Automatic Transmission Oil Filter Assembly” in this section.
2. Oil filter and filter seal.
3. Accumulator cover bolts/screws (935).
4. 1-2 accumulator cover, piston and spring (934, 933 and 932).
5. Component electrical connectors.
6. Pressure control solenoid retainer bolt/screw, retainer and solenoid.
7. Shift solenoid retainers and shift solenoids.
8. 3-2 control solenoid retainer and control solenoid.

Install or Connect

1. 3-2 control solenoid and retainer.
2. Shift solenoids and retainers.
3. Pressure control solenoid, retainer and retainer bolt/screw.
 - Position pressure control solenoid with the electrical tabs facing outboard.
4. Component electrical connectors.
5. 1-2 accumulator piston to the accumulator cover.
 - Piston legs must face toward the case when installed.
6. 1-2 accumulator spring onto piston (932 and 933).
7. 1-2 accumulator cover (934) and accumulator cover-bolts/screws (935).

Tighten

- Bolts/screws (935) to 11 N•m (97 lb. in.).
8. Oil filter and filter seal.
 9. Oil pan. Refer to “Changing Transmission Fluid and Automatic Transmission Oil Filter Assembly” in this section.

TCC SOLENOID AND WIRING HARNESS REPLACEMENT

Figures 16 and 23

Tool Required:

J 28458 Power Piston Seal Protector and Diaphragm Retainer Installer

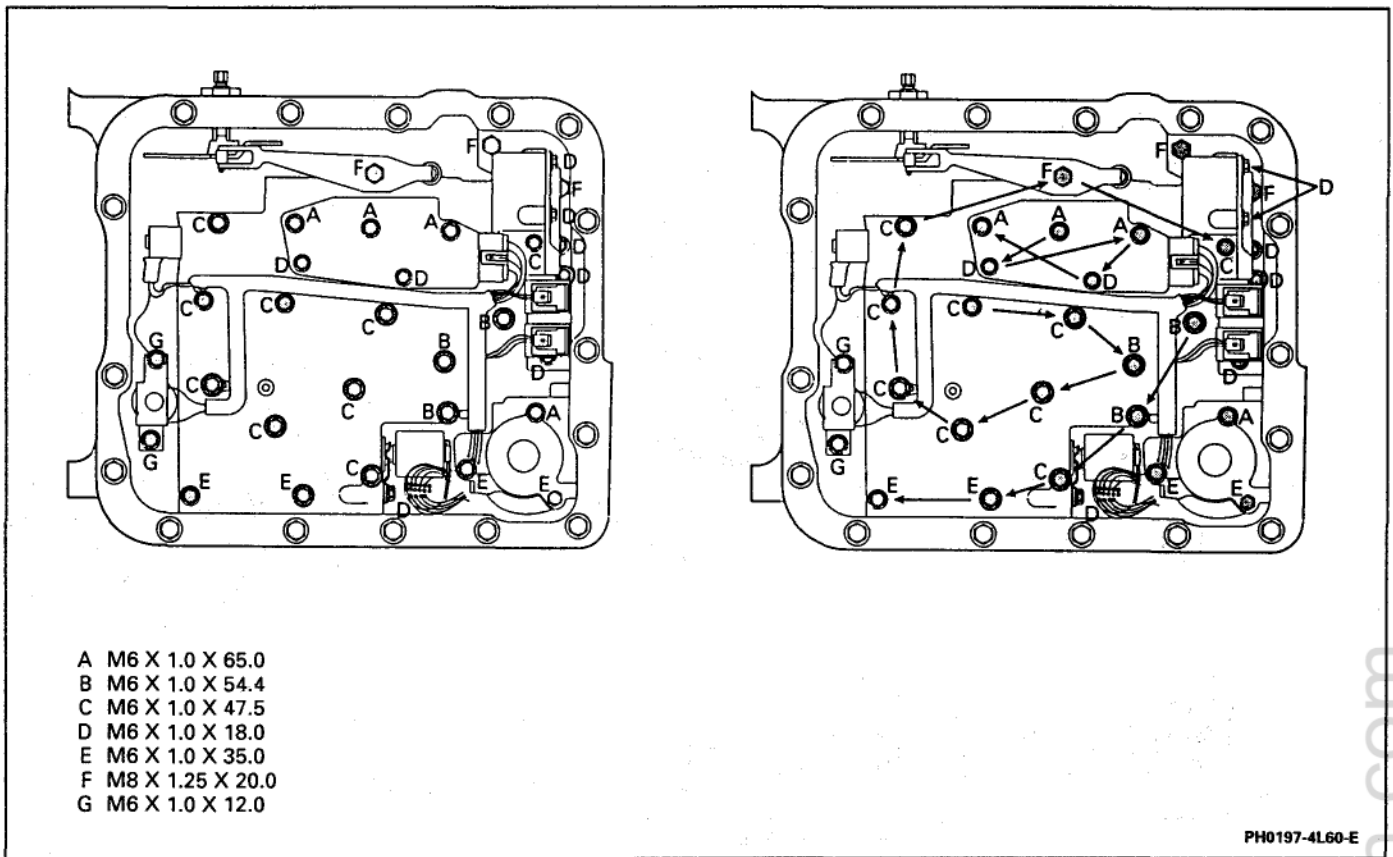


Figure 22 – Valve Body Bolts/Screws and Tightening Pattern

↔ Remove or Disconnect

1. Exhaust system. Refer to SECTION 6F.
2. Oil pan. Refer to "Changing Transmission Fluid and Automatic Transmission Oil Filter Assembly" in this section.
3. Oil filter and seal.
4. External wiring harness connector from transmission pass-through connector.
 - Squeeze fore and aft flats on connector to release locking tabs and pull connector.
5. Accumulator cover bolts/screws (935).
6. 1-2 accumulator cover, piston and spring (934, 933 and 932).
7. Component electrical connectors.
8. Pressure control solenoid retainer bolt/screw, retainer and solenoid.
9. TCC solenoid bolts/screws.
10. Pass-through electrical connector from transmission case.
 - Use small end of J 28458 over top of connector and twist to release four tabs while at the same time pulling harness connector from the transmission case.
11. TCC solenoid with wiring harness from transmission case.

→ Install or Connect

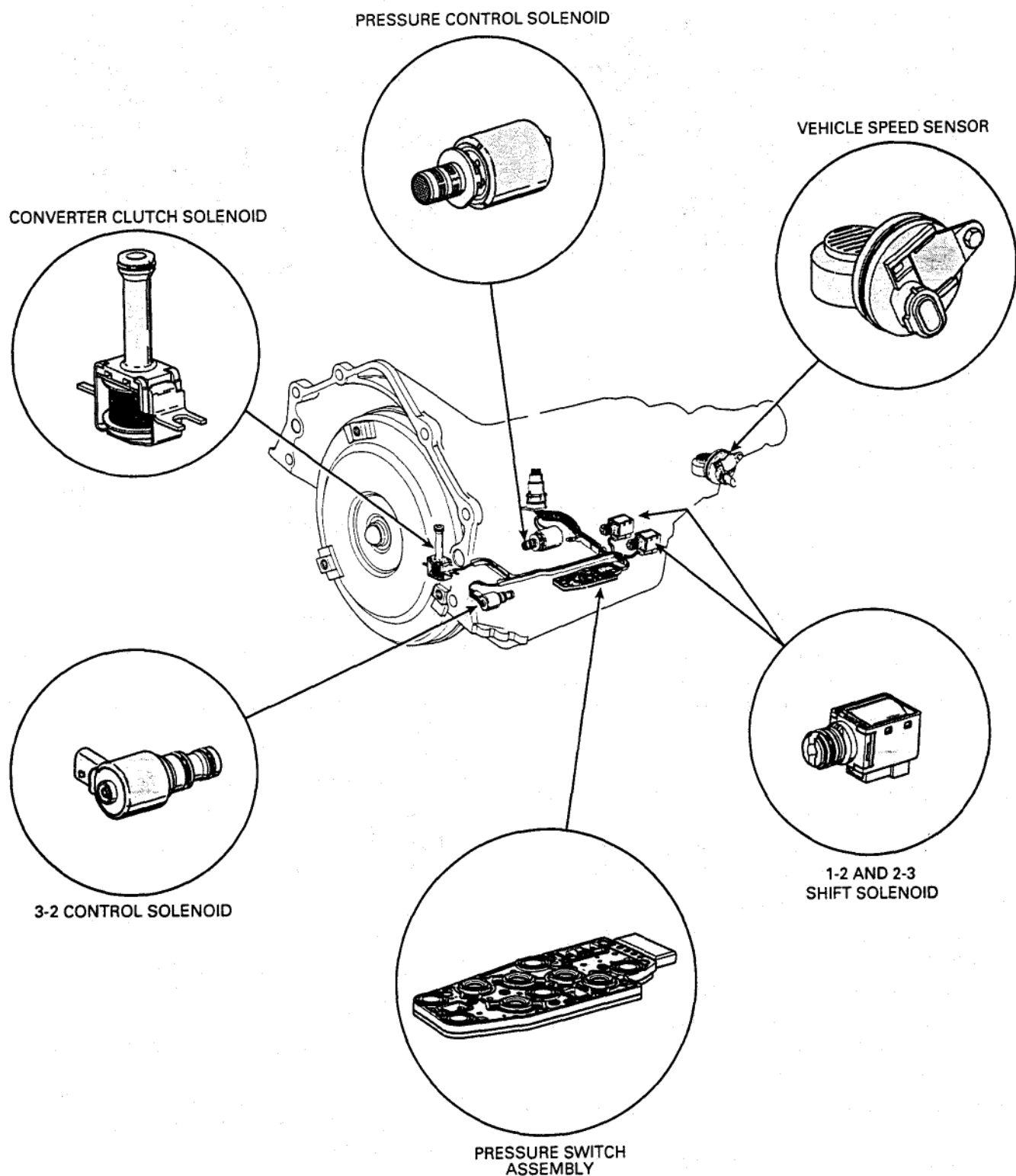
1. TCC solenoid with wiring harness to transmission case.
2. Pass-through electrical connector to transmission case.
3. TCC solenoid bolts/screws.
4. Pressure control solenoid, retainer and bolt/screw.

⌚ Tighten

- TCC solenoid bolts/screws to 11 N•m (97 lb. in.).
 - Pressure control solenoid bolt/screw to 11 N•m (97 lb. in.).
5. Component electrical connectors.
 6. 1-2 accumulator piston (933) to 1-2 accumulator cover (934).
 - Piston legs must face toward the case when installed.
 7. 1-2 accumulator spring onto piston (932)/(933).
 8. 1-2 accumulator cover (934) and accumulator cover bolts/screws (935).

⌚ Tighten

- Bolts/screws to 11 N•m (97 lb. in.).
9. Wiring harness connector to transmission pass-through connector.



RC1016-7A-Y-RP

Figure 23 – Electronic Component Location Views

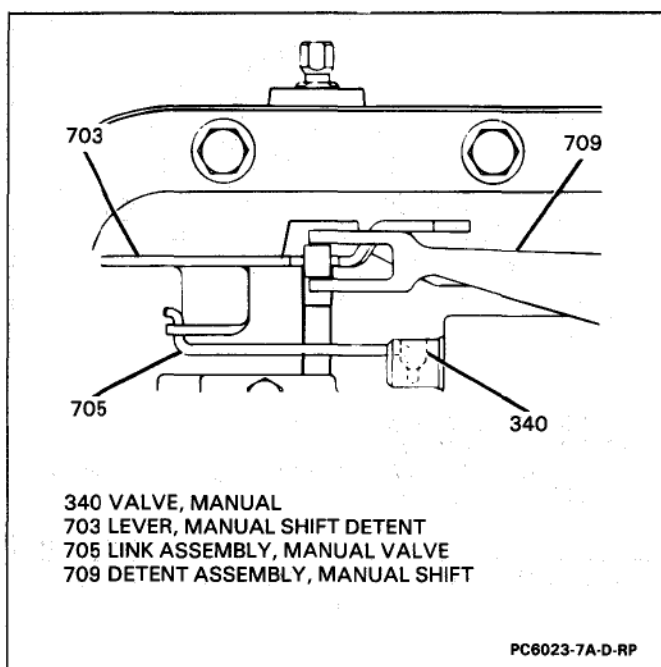


Figure 24 - Manual Shift Detent Assembly

10. Oil filter and seal.
11. Oil pan. Refer to "Changing Transmission Fluid and Automatic Transmission Oil Filter Assembly" in this section.
12. Exhaust system. Refer to SECTION 6F.

ELECTRICAL CONNECTOR AND SEAL

Figure 23

Remove or Disconnect

1. Oil pan and automatic transmission oil filter assembly. Refer to "Changing Transmission Fluid and Automatic Transmission Oil Filter Assembly" in this section.
2. Internal and external electrical wires from electrical connections.
3. Electrical connector and seal from automatic transmission assembly.
4. Seal from electrical connector.
 - Discard old seal.

Inspect

- Automatic transmission sealing surface for damage or corrosion.

Install or Connect

1. New seal to electrical connector.
2. Electrical connector and new seal to automatic transmission assembly.
3. Internal and external electrical wires to electrical connectors.
4. Oil pan and automatic transmission oil filter assembly. Refer to "Changing Transmission Fluid and

Automatic Transmission Oil Filter Assembly" in this section.

CASE EXTENSION OIL SEAL ASSEMBLY

Figure 15

Tool Required:

J 21426 Case Extension Oil Seal Installer

Remove or Disconnect

1. Propeller shaft assembly. Refer to SECTION 4A.
2. Oil seal assembly (39) with screwdriver.

Install or Connect

1. Oil seal assembly (39). Tap into place with J 21426.
2. Propeller shaft assembly. Refer to SECTION 4A.

NOTICE: Do not overfill. Overfilling will cause foaming, loss of fluid and possible damage to the transmission.

Adjust

- Automatic transmission fluid level.

AUTOMATIC TRANSMISSION ASSEMBLY REMOVAL AND INSTALLATION

Figures 19 and 25 through 28

A pressure test should be performed before automatic transmission assembly removal to aid in diagnosis.

NOTICE: Transmission oil cooler flushing must be performed when an automatic transmission assembly is removed for service. The flushing procedure should be performed after the installation of the overhauled or replacement assembly. Failure to flush the system may cause damage to the system and its components.

Remove or Disconnect

Tool Required:

J 21426 Output Shaft Sleeve and Case Extension Oil Seal Installer

CAUTION: Refer to "Caution" under "Disconnecting the Battery Negative Cable Assembly" in SECTION 0A.

1. Battery negative cable assembly.
2. Raise and suitably support vehicle. Refer to SECTION 0A.
3. Mark position of propeller shaft assembly to pinion yoke.
4. Propeller shaft assembly. Refer to SECTION 4A.
5. Support transmission assembly (838).
6. Washer (853) and nut (852) from support (850) and transmission assembly (838).
7. Bolts/screws (854) from support (850) and rail assembly (846).
8. Support (850) from transmission assembly (838) and rail assembly (846).
9. Rear axle torque arm. Refer to SECTION 3D.

10. Catalytic converter hanger assembly. Refer to SECTION 6F.
11. Bolts/screws (840) from cover (839).
12. Cover (839) from transmission assembly (838).
13. Bolts/screws (842) from converter assembly (1).
14. Flywheel assembly (841) from converter assembly (1).
15. Move catalytic converter heat shield as necessary. Refer to SECTION 6F.
16. Automatic transmission range selector lever cable assembly. Refer to "Automatic Transmission Range Selector Lever Cable Assembly" in this section.
17. Transmission oil cooler pipe assemblies from transmission oil cooler pipe clips.
18. Electrical connectors at transmission assembly (838).
19. Bolts/screws (843 or 845).
20. Transmission fluid level indicator assembly.
21. Separate transmission assembly (838) from engine block.
22. Transmission oil cooler lines.
23. Lower transmission assembly (838) from vehicle.

Install or Connect

NOTICE: See "Notice" on page 7A-1 of this section.

1. Raise transmission assembly (838) into vehicle.
2. Transmission oil cooler lines.
3. Align transmission assembly (838) to engine block.
4. Transmission fluid level indicator assembly.
5. Bolts/screws (843 or 845).

Tighten

- Bolts/screws (843) to 47 N•m (35 lb. ft.).
 - Bolts/screws (845) to 95 N•m (70 lb. ft.).
6. Electrical connectors to transmission assembly (838).
 7. Transmission oil cooler pipe and hose assemblies to transmission oil cooler pipe clips.
 8. Automatic transmission range selector lever cable assembly. Refer to "Automatic Transmission Range Selector Lever Cable Assembly" in this section.
 9. Reposition catalytic converter heat shield. Refer to SECTION 6F.
 10. Flywheel assembly (841) to converter assembly (1).
 11. Bolts/screws (842) to converter assembly (1).

Tighten

- Bolts/screws (842) to 63 N•m (46 lb. ft.).
12. Converter cover (839) to transmission assembly (838).
 13. Bolts/screws (840) to cover (839).

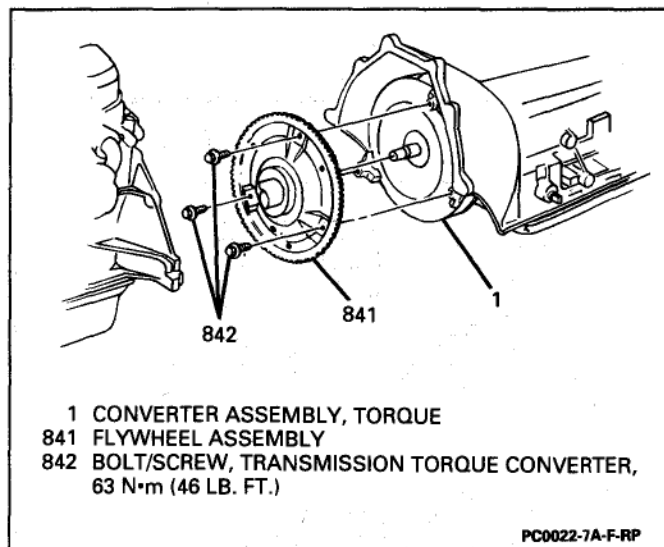


Figure 25 – Torque Converter Assembly-to-Flywheel Assembly

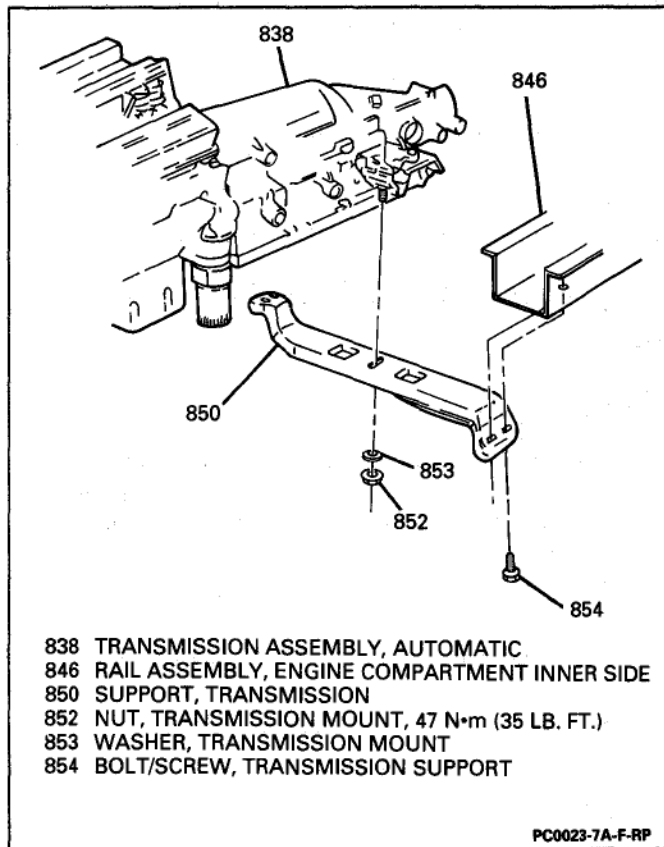


Figure 26 – Automatic Transmission Assembly Mounting

Tighten

- Bolts/screws (840) to 10 N•m (89 lb. in.).
14. Catalytic converter hanger assembly. Refer to SECTION 6F.
 15. Rear axle torque arm. Refer to SECTION 3D.
 16. Support (850) to transmission assembly (838) and rail assembly (846).

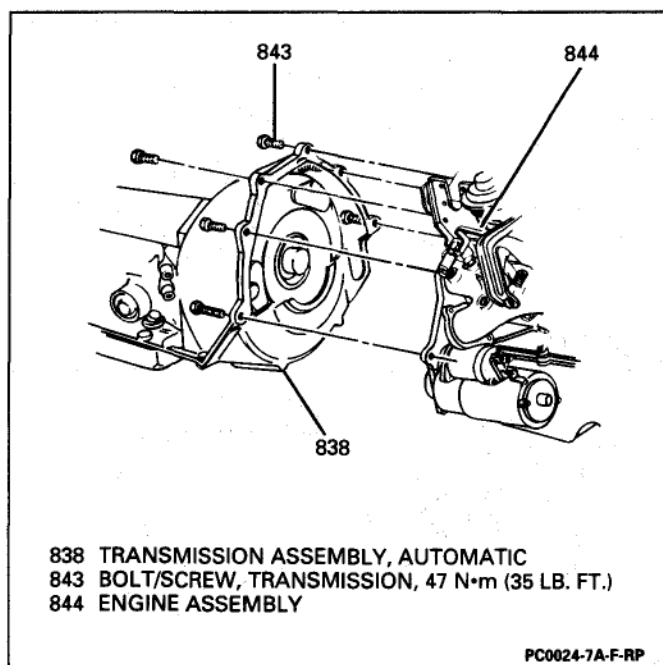


Figure 27 – Automatic Transmission Assembly-to-Engine Assembly (5.7 LT1 Engine)

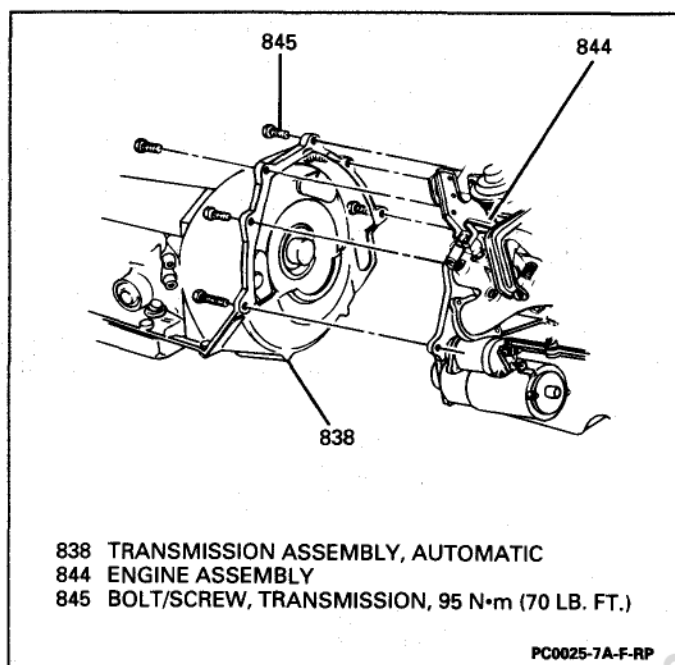


Figure 28 – Automatic Transmission Assembly-to-Engine Assembly (3.4L L32 Engine)

17. Bolts/screws (854) to support (850) and rail assembly (846).
18. Washer (853) and nut (852) to support (850) and transmission assembly (838).



Tighten

- Nut (852) to 47 N•m (35 lb. ft.).
19. Remove support from transmission assembly (838).
 20. Propeller shaft assembly, using marks made during removal. Refer to SECTION 4A.
 21. Lower vehicle.
 22. Battery negative cable assembly.



Clean

NOTICE: Transmission oil cooler flushing must be performed when a transmission assembly is

removed for service. The flushing procedure should be performed after the installation of the overhauled or replacement assembly. Failure to flush the system may cause damage to the system and its components.

- Transmission oil cooler and oil cooler pipe and hose assemblies. Refer to "Oil Cooler Flushing Procedure" in this section.



Adjust

- Automatic transmission shift control lever cable assembly. Refer to "Automatic Transmission Range Selector Lever Cable Assembly" in this section.

NOTICE: Do not overfill. Overfilling will cause foaming, loss of fluid and possible damage to the transmission.

- Transmission fluid level.

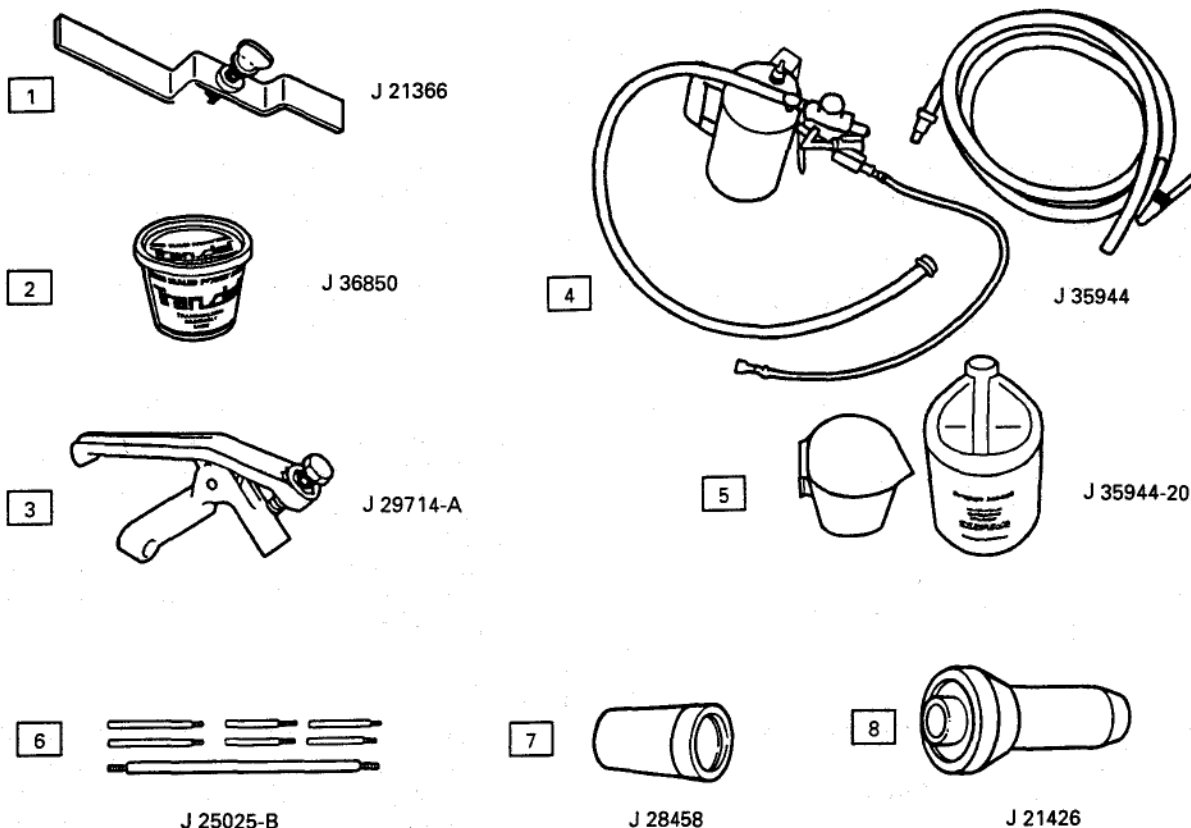
SPECIFICATIONS

FASTENER TIGHTENING SPECIFICATIONS

Accumulator Cover Bolt/Screw	11 N•m (97 lb. in.)
Automatic Transmission Case Extension Bolt/Screw	35 N•m (26 lb. ft.)
Automatic Transmission Control Bolt/Screw	4.5 N•m (40 lb. in.)
Automatic Transmission Oil Cooler Pipe and Hose Assembly Fittings	27 N•m (20 lb. ft.)
Automatic Transmission Oil Pan Bolt/Screw	16 N•m (12 lb. ft.)
Automatic Transmission Range Selector Lever Cable Bracket Bolt/Screw	24 N•m (18 lb. ft.)
Automatic Transmission Range Selector Lever Nut	20 N•m (15 lb. ft.)
Control Valve Body Bolt/Screw	11 N•m (97 lb. in.)
Flywheel Bolt/Screw	63 N•m (46 lb. ft.)
Manual Shift Detent Bolt/Screw	22 N•m (16 lb. ft.)
Park/Neutral Position Switch Bolt/Screw	2.2 N•m (19 lb. in.)
Pressure Control Solenoid Retainer Bolt/Screw	11 N•m (97 lb. in.)
Spacer Plate Support Bolt/Screw	11 N•m (97 lb. in.)

Special Hex Washer Head Bolt (M6X1X16)	11 N•m (97 lb. in.)
TCC Solenoid Valve Bolt/Screw	11 N•m (97 lb. in.)
Transmission Bolt/Screw (3.4L L32 Engine)	95 N•m (70 lb. ft.)
Transmission Bolt/Screw (5.7L LT1 Engine)	47 N•m (35 lb. ft.)
Transmission Converter Cover Bolt/Screw	10 N•m (89 lb. in.)
Transmission Mount Nut	47 N•m (35 lb. ft.)
Transmission Torque Converter Bolt/Screw	63 N•m (46 lb. ft.)
Vehicle Speed Sensor Bolt/Screw	11 N•m (97 lb. in.)
Vehicle Speed Sensor Retaining Bolt/Screw	10 N•m (89 lb. in.)

SPECIAL TOOLS



- | | |
|--|---|
| 1 CONVERTER HOLDING STRAP | 6 VALVE BODY ALIGNMENT PIN SET |
| 2 TRANSMISSION ASSEMBLY LUBRICANT (TRANSJEL®) | 7 POWER PISTON SEAL PROTECTOR AND DIAPHRAGM RETAINER INSTALLER |
| 3 SERVO COVER DEPRESSOR | 8 CASE EXTENSION OIL SEAL INSTALLER |
| 4 OIL COOLER AND LINE FLUSHER | |
| 5 COOLER FLUSHING FLUID (1 GALLON) | |

RC1024-7A-Y-RP