2007 TRANSMISSION

Automatic Transmission - 6T70/6T75 - Outlook

SYMPTOMS - AUTOMATIC TRANSMISSION

IMPORTANT: Use the symptom tables only if the following conditions are met:

- **Refer to Diagnostic Starting Point - Vehicle .**
- **There are no DTCs set.**
- **The control modules can communicate via the serial data link.**
- **Review the system operation in order to familiarize yourself with the system functions. Refer to Transmission General Description and Transmission Component and System Description .**

VISUAL/PHYSICAL INSPECTION

Inspect the easily accessible or visible system components for obvious damage or conditions which could cause the symptom.

INTERMITTENT

Faulty electrical connections or wiring may be the cause of intermittent conditions. Refer to **Testing for Intermittent Conditions and Poor Connections** .

SYMPTOM LIST

Refer to a symptom diagnostic procedure from the following list in order to diagnose the symptom:

- Fluid Diagnosis
  - **Transmission Fluid Check**
  - **Fluid Pressure High or Low**
  - **Automatic Transmission Fluid Leaks**
  - **Fluid Leak Diagnosis**
- Noise and Vibration Diagnosis
  - **Whine/Growl Noise**

  - **Noise and Vibration Analysis**
  - **Torque Converter Diagnosis**
- Range Performance Diagnosis
  - **No Park**
  - **No Drive in All Ranges**
  - **No Reverse Gear**
- Shift Quality Feel Diagnosis
  - **Harsh Garage Shift**
  - **Harsh or Late First, Second, Third and Fourth Shift**
  - **Harsh First and Reverse Shift**
  - **Harsh or Late Second and Sixth Shift**
  - **Harsh or Late Third, Fifth and Reverse Shift**
  - **Harsh Fourth, Fifth and Sixth Shift**
- Shift Pattern
  - **No First and Reverse Gears**
  - **No First, Second, Third and Fourth Gear**
  - **No Second and Sixth Gear**
  - **No Fourth, Fifth and Sixth Gear**
  - **No Third, Fifth and Reverse Gear**
- Torque Converter Diagnosis
  - **Torque Converter Diagnosis**
  - **No Torque Converter Clutch Apply**
  - **No Torque Converter Clutch Release**
- Symptom Not Found or No Symptom Detected
  - **Transmission Fluid Check**
  - **Road Test**
  - **Line Pressure Check**

CONTROL SOLENOID VALVE AND TRANSMISSION CONTROL MODULE ASSEMBLY INSPECTION

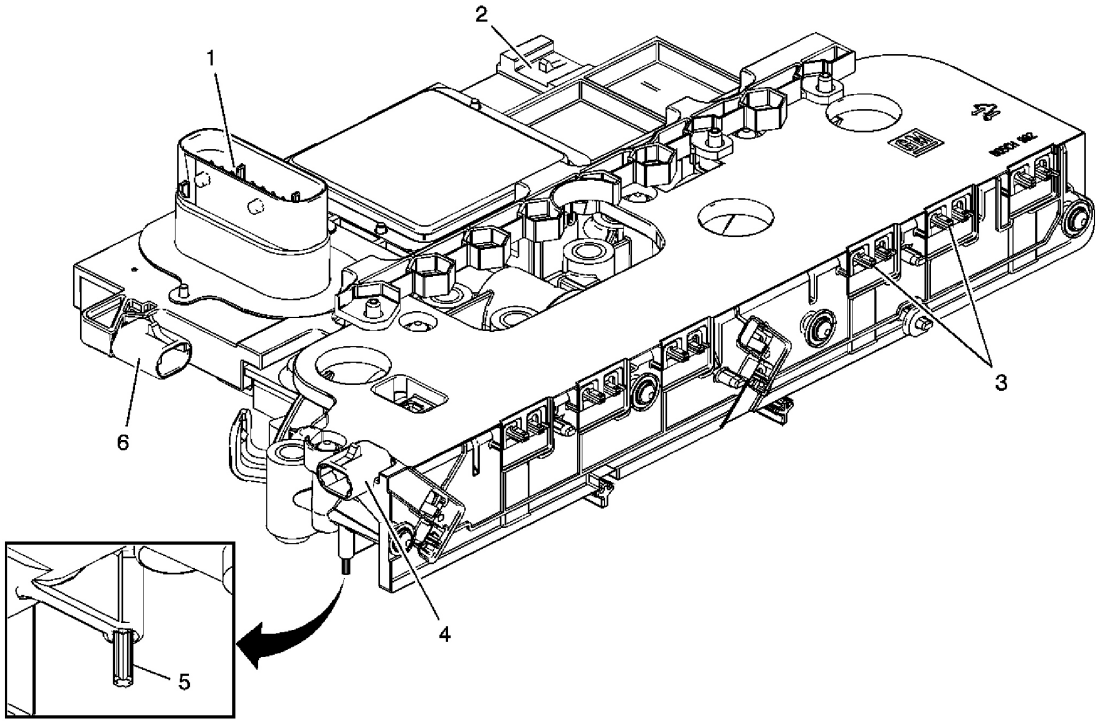

Fig. 1: Identifying Control Solenoid Valve & Transmission Control Module Assembly
Courtesy of GENERAL MOTORS CORP.

1. Inspect the control solenoid (w/body and TCM) valve assembly connectors and pins (1, 2, 4, 6) for the following conditions:
   - Damage
   - Bent pins
   - Debris
   - Broken retaining tab
   - Contamination
2. Ensure no metallic debris is inside the connectors near the terminal pins.
3. Inspect the control solenoid (w/body and TCM) valve assembly solenoid leads (3) for contamination or metallic debris.
4. Inspect the 4 control solenoid (w/body and TCM) valve assembly filter plate retaining tabs (5) for cracks and ensure proper tension when filter plate is attached.

CONTROL SOLENOID VALVE AND TRANSMISSION CONTROL MODULE ASSEMBLY INPUT SHAFT SPEED/OUTPUT SHAFT SPEED INPUT TEST

TOOLS REQUIRED

- **J 35616** GM-Approved Terminal Test Kit
- **J 38522** Variable Signal Generator

TEST PROCEDURE

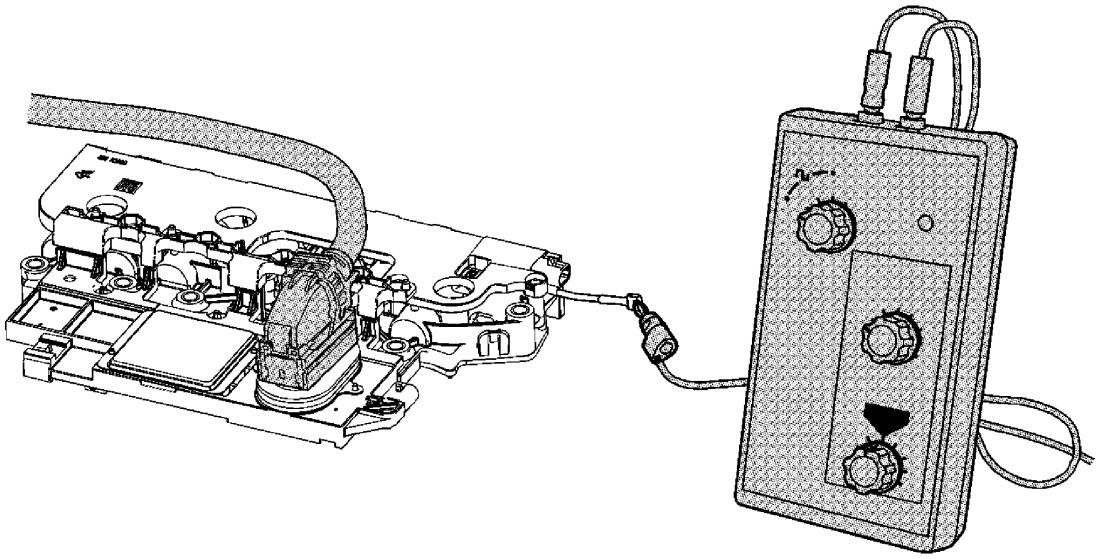

Fig. 2: Identifying Special Tools -- J 38522 And J 35616
Courtesy of GENERAL MOTORS CORP.

The purpose of this test is to provide a simulated input/output speed sensor (ISS/OSS) signal to the control solenoid (w/body and TCM) valve assembly ISS/OSS input circuits.

1. Disconnect the ISS/OSS wiring harness connector from the control solenoid (w/body and TCM) valve assembly.
2. Using the **J 35616** , connect the **J 38522** to the affected ISS or OSS signal circuit on the control solenoid (w/body and TCM) valve assembly.
    1. Set the **J 38522** Signal to 8 volts, the Frequency to 120 and the Percent Duty Cycle to 50.
    2. Ignition On, observe either the scan tool parameter ISS Signal or OSS Signal.
    3. The signal parameter should display between 100-400 RPM.

- If the signal display is not in this range, the control solenoid (w/body and TCM) valve assembly is not reading the input signal correctly and is faulty.

CONTROL SOLENOID VALVE AND TRANSMISSION CONTROL MODULE ASSEMBLY CLEANING

The control solenoid (w/body and TCM) valve assembly cleaning procedure is a specific software based routine, which resides in the TCM. This procedure is activated by the scan tool and is used to cycle the solenoids and valves in the control solenoid valve assembly in an attempt to dislodge debris and free up the valves after a performance diagnostic trouble code (DTC) has set. The transmission fluid is drained and refilled with new fluid and then the cleaning procedure is performed. When the cleaning procedure is completed, the DTC enable criteria is run again and retested to see if the DTC concern has been corrected.

1. Drain and refill the transmission fluid. Refer to **Transmission Fluid Replacement** .
2. Operate the transmission to achieve 70°-90°C (158°-194°F).
3. With a scan tool, select the Service Cleaning Procedure. Initiate the cleaning procedure.
4. When the cleaning procedure is completed, shut OFF the ignition for 30 seconds.

CONTROL SOLENOID VALVE AND TRANSMISSION CONTROL MODULE ASSEMBLY SOLENOID PERFORMANCE TEST

TOOLS REQUIRED

- **DT-47825** Control Solenoid Test Plate
- **DT-47825-20** Adapter Harness. See **Special Tools** .

TEST PROCEDURE

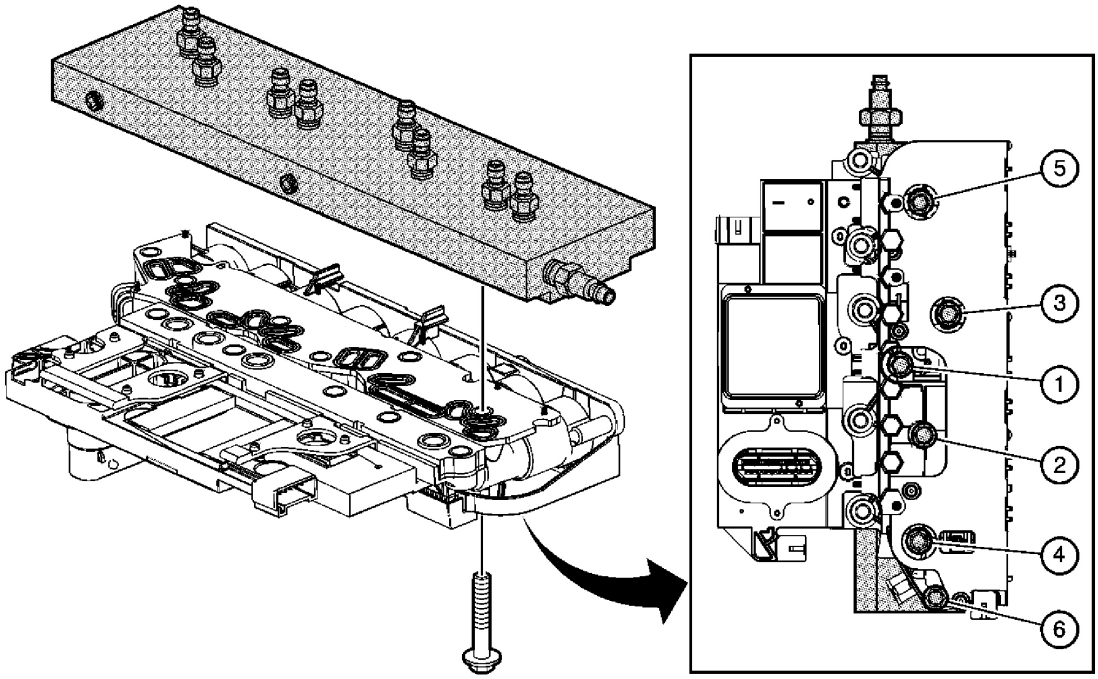

Fig. 3: Identifying Special Tool -- DT-47825-100
Courtesy of GENERAL MOTORS CORP.

The purpose of this procedure is to test the functionality of the control solenoid (w/body and TCM) valve assembly solenoids for a gross stuck open or stuck closed condition. **DT-47825** is bolted to the control solenoid (w/body and TCM) valve assembly on the valve body mounting surface. Pressurized air is passed into the aluminum test block, through the control solenoid (w/body and TCM) valve assembly solenoid passage and back to a pressure gage on the test block. The pressure gage indicates open if air pressure is passed through the solenoid or closed if the solenoid is unable to pass air through. A scan tool is used to command the solenoids ON and OFF. While watching the pressure gage, one can determine the valve functionality. The recommended shop air pressure for this test is 90-100 psi.

1. Remove the control solenoid (w/body and TCM) valve assembly from the transmission.
2. Bolt the **DT-47825** to the control solenoid (w/body and TCM) valve assembly on the valve body mounting surface. Use the bolts and washers supplied with the tool to attach the test block. Tighten the bolts to 5 N.m (44 lb in) using a center out alternating torque sequence.
3. Install the pressure gage to the affected solenoid air port. Reference component to air port table.
4. Connect the shop air pressure line to the **DT-47825** air psi inlet port.
5. Connect **DT-47825-20** to vehicle and control solenoid (w/body and TCM) valve assembly.

See **Special Tools** .

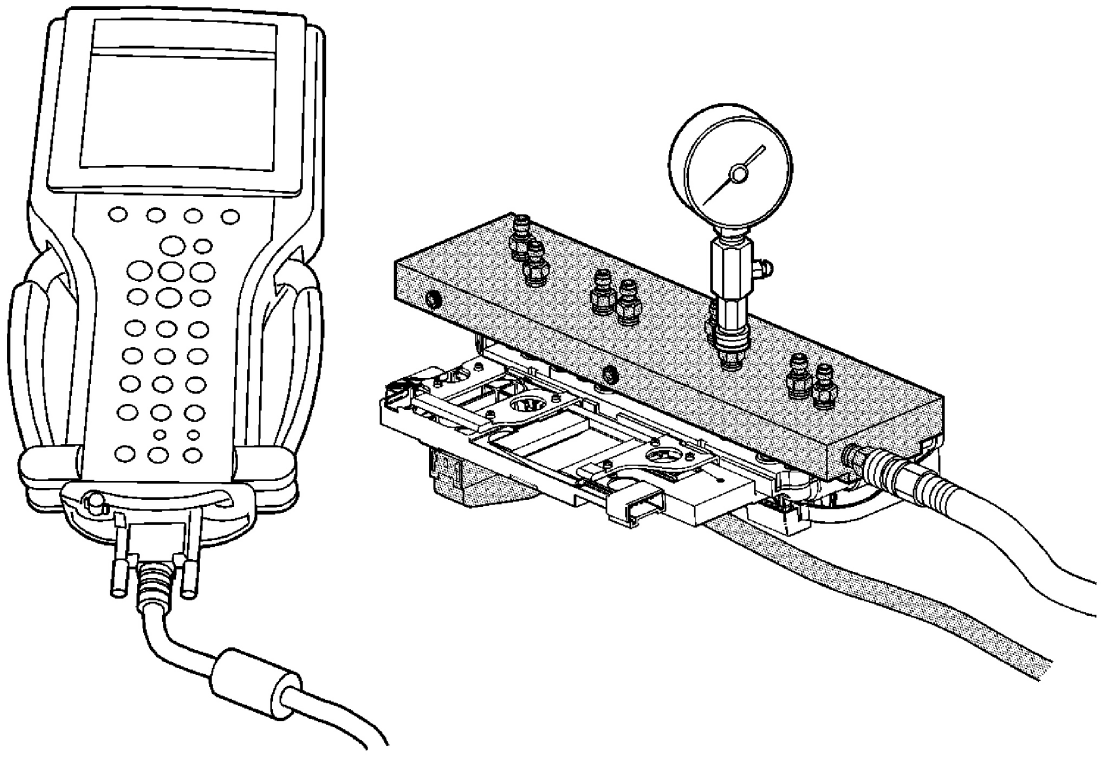

Fig. 4: Identifying Special Tool -- DT-47825-20
Courtesy of GENERAL MOTORS CORP.

6. Ignition ON, with a scan tool command the solenoid in question On and Off. Watch the air pressure gage and look for the change in pressure as you command the valve On and Off. The valve should allow air pressure to flow through the valve port to the gage with a result of pressure reading on the gage. If the valve is stuck closed, no pressure change will occur. Command the solenoid valve On and Off several times to determine the state of the solenoid valve in question. Release the air pressure in the gage between pressurization tests.

Control Solenoid (w/Body and TCM) Valve Assembly Solenoid Performance Test Block to Component Identification

COMPONENT	PORT ON TEST BLOCK	Key On, Engine Off (KOEO) Normal State
PC Solenoid 1	A	Regulated PSI flow to gauge
PC Solenoid 2	C	No PSI flow to gauge
PC Solenoid 3	G	Full PSI flow to gauge
PC Solenoid 4	B	No PSI flow to gauge

PC Solenoid 5	F	No PSI flow to gauge
Shift Solenoid 1	H	Full PSI flow to gauge
Shift Solenoid 2	D	No PSI flow to gauge
TCC PC Solenoid	E	No PSI flow to gauge

IMPORTANT: With the key on engine off (KOEO), the TCM will normally cycle some of the transmission solenoids On and Off to facilitate keeping the ports and solenoids clean and free of debris. This dither function is a normal activity and will cause the valves to cycle open and closed quickly when the TCM is powered up. This can cause the psi gage to flicker high and low as the valves open and close. This may cause some air to exit the ports where the psi gage is not connected as those solenoids cycle on and off.

Drain the TCM of excess transmission fluid before attaching to test block and use caution when attaching air to test block air inlet.

SERVICE FAST LEARN ADAPTS

Service Fast Learn Adapts is a procedure for 6 speed automatic transmissions in which a series of tests are run to allow the transmission control module (TCM) to learn individual clutch characteristics. Once the clutch data is learned, Service Fast Learn Adapts translates it into the adaptive data cells, which the TCM uses for clutch control during shifts. The scan tool provides initiation of the Service Fast Learn Adapts procedure. This procedure is to be used following transmission repair.

The Service Fast Learn Adapts procedure must be performed when one of the following repairs have been made to the vehicle. Failure to perform the procedure after one of the following repairs may result in poor transmission performance, as well as transmission DTCs being set:

- Transmission internal service/overhaul
- Valve body repair or replacement
- Control solenoid (w/body and TCM) valve assembly replacement
- TCM software/calibration update
- Any service in response to a shift quality concern

IMPORTANT: Ensure the following conditions are met before performing the Service Fast Learn Adapts procedure:

- **Drive wheels are blocked**
- **Parking brake is applied**
- **Service brake is applied**
- **Zero percent throttle and no external engine RPM control**
- **Transmission fluid temperature (TFT) is between 70-100°C (158-212°F)**
- **Transmission gear selector has been cycled from Park to Reverse 3 times in order to purge air from the reverse clutches.**

1. Use the scan tool to navigate to Service Fast Learn Adapts by selecting the following commands:
   1. F3: Special Function
   2. F1: Transmission Output Controls
   3. Service Fast Learn Adapts

IMPORTANT: If at any time during the procedure, required conditions are not met, Service Fast Learn Adapts may abort and the process may need to be started again from the beginning.

2. Use the scan tool to perform the Service Fast Learn Adapts procedure.

IMPORTANT: There are 3 stages required to successfully complete the Service Fast Learn Adapts procedure:

1. **PARK test setup**
2. **DRIVE mode**
3. **REVERSE mode**

These stages are automatically initiated and controlled by the scan tool. As the procedure is being performed, the scan tool data display will provide operator instructions. Follow the scan tool instructions as required. The following are brief descriptions of each of the 3 different stages.

PARK TEST SETUP

While the transmission is in PARK, Service Fast Learn Adapts will prepare for test cycles. The test preparation will include the diagnostic criteria checks, safety checks, vehicle status checks and then will perform internal transmission test preparation functions such as clutch air purging. The scan tool will instruct the operator to select park and apply the brake only.

DRIVE MODE

CAUTION: Block the wheels before selecting DRIVE. While in DRIVE, if the Scan Tool loses communication or becomes disconnected, the vehicle could move forward. Failure to block the wheels could result in personal injury or property damage.

Once the PARK setup has completed, the scan tool instructs the driver to select DRIVE. Once DRIVE is selected, the TCM engages the individual clutches to learn the clutch volume, full feed fill thresholds and pressure offsets. The TCM will only cycle through this test once. Running the Service Fast Learn Adapts procedure multiple times will give the same results and is not necessary.

REVERSE MODE

CAUTION: Block the wheels before selecting REVERSE. While in REVERSE, if the Scan Tool loses communication or becomes disconnected, the vehicle could move backward. Failure to block the wheels could result in personal injury or property damage.

Next, the scan tool instructs the driver to select REVERSE. The TCM engages the individual clutches to learn the clutch volume, full feed fill thresholds and pressure offsets. The TCM will only cycle through this test one time. Running the Service Fast Learn Adapts procedure multiple times will give the same results.

IMPORTANT: When the Service Fast Learn Adapts procedure is completed, the transmission will remain in a neutral state.

3. Once the procedure is complete, shut OFF the engine and power down the TCM. You will lose communication to the scan tool.

4. Restart the engine. This will complete the Service Fast Learn Adapts procedure.

TROUBLESHOOTING

If the Service Fast Learn Adapts will not run and the above stated conditions have been met, ensure the following:

- TFT is between 70-100°C (158-212°F).
- Brakes and brake switch are functioning properly.
- No active DTCs.
- Closed throttle and engine RPM increases above 1500 RPM while in Park Test Setup or at entrance of the test modes.
- Park/Neutral position switch is properly adjusted and functioning.
- Line pressure control is able to provide 1000 kPa and is within specifications.
- Vehicle is not moving or vibrating excessively.
- Clutches are properly assembled.

TRANSMISSION FLUID CHECK

This procedure checks both the transmission fluid level, as well as the condition of the fluid itself.

NOTE: Use Dexron VI transmission fluid only. Failure to use the proper fluid may result in transmission internal damage.

IMPORTANT: Ensure the transmission has enough fluid in it to safely start the vehicle without damaging the transmission. With the vehicle off there must be at least enough fluid to wet the end of the dipstick bullet. This will ensure that there is enough fluid in the sump to fill the components once the vehicle is started.

LEVEL CHECKING PROCEDURE

1. Park the vehicle on a level surface, apply the parking brake and place the shift lever in PARK (P).
2. Start the engine.
3. Depress the brake pedal and move the shift lever through each gear range, pausing for about 3 seconds in each range. Then move the shift lever back to PARK (P).
4. Allow the engine to idle 500-800 RPM for at least 1 minute. Release the brake pedal.
5. Keep the engine running and observe the transmission fluid temperature (TFT) using the Driver Information Center or a scan tool.

6. **Tip:** If the fluid temperature is below the specified range, perform the following procedure to raise the fluid temperature to the specified range.

   If the TFT reading is not within the required temperature ranges, allow the vehicle to cool or operate the vehicle until the appropriate TFT is reached.

   Drive the vehicle in second gear until the fluid temperature is within the specified range.

   IMPORTANT: Check the transmission fluid level when the TFT is between 180°F and 200°F (82°C and 93°C). The fluid level ri ses as fluid temperature increases, so it is important to ensure the transmission fluid temperature is within range.

7. Remove the dipstick and wipe it with a clean rag or paper towel.
8. Inspect the fluid color. The fluid should be red or dark brown.
   - If the fluid color is very dark or black and has a burnt odor, inspect the fluid for excessive metal particles or other debris. A small amount of "friction" material is a "normal" condition. If large pieces and/or metal particles are noted in the fluid, flush the oil cooler and cooler lines and overhaul the transmission. If there are no signs of transmission internal damage noted, replace the fluid, repair the oil cooler and flush the cooler lines.
   - Fluid that is cloudy or milky or appears to be contaminated with water indicates engine coolant or water contamination. Refer to **Engine Coolant/Water in Transmission**.
9. Install the dipstick and tighten. Wait three seconds and then remove it again.

   IMPORTANT: Always check the fluid level at least twice. Consistent readings are important to maintaining proper fluid level. If inconsistent readings are noted, inspect the transmission vent assembly to ensure it is clean and unclogged.

10. Check both sides of the dipstick and read the lower level.

    Tip: It is not necessary to get the fluid level all the way up to the MAX mark. Anywhere within the crosshatch band is acceptable.

11. Install and remove the dipstick again to verify the reading.
12. If the fluid level is not within the crosshatch band and the transmission temperature is between 180°F and 200°F (82°C and 93°C), add or drain fluid as necessary to bring the

level into the crosshatch band. If the fluid level is low, add only enough fluid to bring the level into the crosshatch band.

Tip: Do not add more than one pint (0.5L) at a time without rechecking the level. Once the oil is on the dipstick bullet, it will not take much more fluid to raise the fluid level into the crosshatch band. Do not overfill. Also, if the fluid level is low, inspect the transmission for leaks. Refer to **Fluid Leak Diagnosis**.

13. If the fluid level is in the acceptable range, install the dipstick.
14. If the fluid was changed, reset the transmission oil life monitor if applicable.

FLUID CONDITION INSPECTION

- Inspect the fluid color. The fluid should be red in color. The fluid may also turn brown form normal use and does not always indicate contamination.

IMPORTANT: Fluid that is very dark or black and has a burnt odor usually indicates contamination or overheating.

- If the fluid color is very dark or black and has a burnt odor, inspect the fluid for excessive metal particles or other debris which may indicate transmission damage. Refer to **Road Test** to verify transmission operation. Change the transmission fluid if no other conditions are found.
- Fluid that is cloudy or milky or appears to be contaminated with water indicates engine coolant or water contamination. Refer to **Engine Coolant/Water in Transmission**.

LINE PRESSURE CHECK

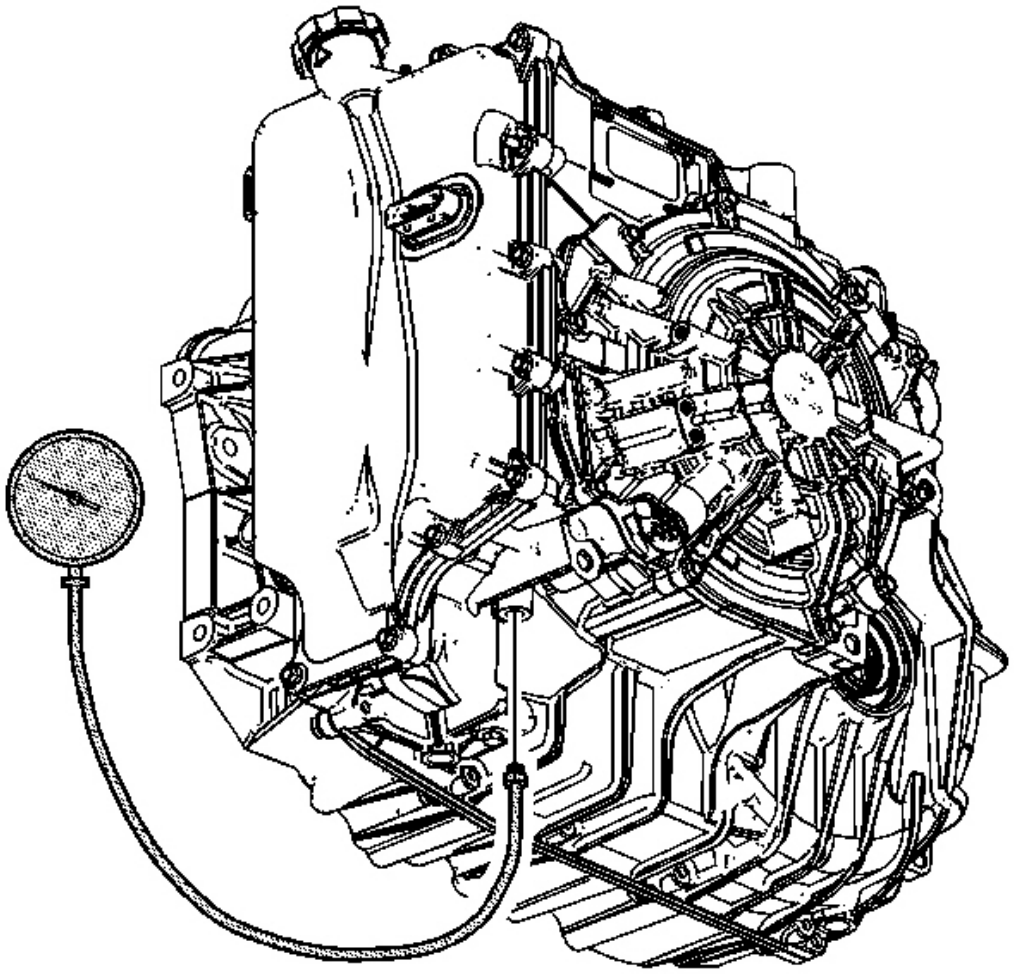

Fig. 5: Identifying Special Tool -- J 21867
Courtesy of GENERAL MOTORS CORP.

TOOLS REQUIRED

J 21867 Pressure Gage

TEST PROCEDURE

CAUTION: Keep the brakes applied at all times in order to prevent unexpected vehicle motion. Personal injury may result if

the vehicle moves unexpectedly.

1. Install a scan tool.
2. Start the engine.
3. Inspect the transmission for the proper fluid level. Refer to **Transmission Fluid Check**.
4. Use the scan tool to inspect for any active or stored diagnostic trouble codes.
5. Inspect the manual linkage at the transmission for proper function.
6. Turn the engine OFF.
7. Remove the line pressure test hole plug.
8. Install the **J 21867** .
9. Access the Scan Tool Transmission Output Controls for the Line PC Solenoid.
10. Start the engine.

IMPORTANT: In order to achieve accurate line pressure readings, the following procedure must be performed at least 3 times in order to gather uniform pressure readings.
The scan tool is only able to control the line PC solenoid in PARK and NEUTRAL with engine speeds below 1500 RPM. This protects the clutches from extreme high or low line pressures.

11. Use the scan tool to increase and decrease the Line PC Solenoid in increments of approximately 100 kPa (15 psi). The scan tool commands the increment values automatically.
12. Allow the pressure to stabilize between increments.
13. Compare the pressure readings on the scan tool to those indicated on the **J 21867** .
14. If the pressure readings vary greatly, refer to **Fluid Pressure High or Low**.
15. Turn the engine OFF.
16. Remove the **J 21867** .

NOTE: Refer to Fastener Notice .

17. Install the line pressure test hole plug.

Tighten: Tighten the pressure plug to 12 N.m (106 lb in).

ROAD TEST

IMPORTANT: The Road Test Procedure should be performed only as part of the Symptom Diagnosis. Refer to Symptoms - Automatic Transmission.

The following test provides a method of evaluating the condition of the automatic transmission. The test is structured so that most driving conditions would be achieved. The test is divided into the following parts:

- Electrical Function Check
- Upshift Control and Torque Converter Clutch (TCC) Apply
- Part Throttle Downshifts
- Manual Downshifts
- Coasting Downshifts
- Manual Gear Range Selection
  - REVERSE
  - Driver Shift Control

IMPORTANT: Complete the test in the sequence given. Incomplete testing cannot guarantee an accurate evaluation.

Before the road test, ensure the following:

- The engine is performing properly.
- Transmission fluid level is correct. Refer to **Transmission Fluid Check**.
- Tire pressure is correct.

During the road test:

- Perform the test only when traffic conditions permit.
- Operate the vehicle in a controlled, safe manner.
- Observe all traffic regulations.
- View the scan tool data while conducting this test.

Take along qualified help in order to operate the vehicle safely.

- Observe any unusual sounds or smells.

After the road test, check the following:

- Inspect for proper transmission fluid level. Refer to **Transmission Fluid Check**.
- Inspect for any diagnostic trouble codes (DTCs) that may have set during the testing. Refer to the applicable DTC.
- Monitor the scan tool data for any abnormal readings or data.
- Inspect for fluid leaks. Refer to **Fluid Leak Diagnosis**.

ELECTRICAL FUNCTION CHECK

Perform this procedure first in order to ensure the electronic transmission components are functioning properly. If these components are not checked, a simple electrical condition could be misdiagnosed.

1. Connect the scan tool.
2. Ensure the gear selector is in PARK and set the parking brake.
3. Start the engine.
4. Verify that the following scan tool data can be obtained and is functioning properly.

   Refer to **Scan Tool Data List** for typical data values. Data that is questionable may indicate a concern.

   - Engine Speed
   - Transmission ISS
   - Transmission OSS
   - Vehicle Speed
   - IMS
   - Commanded Gear
   - Gear Ratio
   - Line PC Sol. Pressure Cmd.
   - TCC Brake Switch
   - ECT, Engine Data List
   - Trans. Fluid Temp.
   - TCM Temperature

- Calc. Throttle Position
- Ignition Voltage
- TFP Switch 1
- TFP Switch 3
- TFP Switch 4
- TFP Switch 5
- PC Sol. 2 Pressure Cmd.
- PC Sol. 3 Pressure Cmd.
- PC Sol. 4 Pressure Cmd.
- PC Sol. 5 Pressure Cmd.
- Shift Solenoid 1
- Shift Solenoid 2
- TCC PC Sol. Duty Cycle
- TCC Slip Speed

5. Monitor the TCC Brake Switch parameter while applying and releasing the brake pedal. The scan tool should display:
   - Open when the brake pedal is applied.
   - Closed when the brake pedal is released.
6. Check the garage shifts.
   1. Apply the brake pedal and ensure the parking brake is set.
   2. Move the gear selector through the following ranges:
      1. PARK to REVERSE
      2. REVERSE to NEUTRAL
      3. NEUTRAL to DRIVE
   3. Pause 2 to 3 seconds in each gear position.
   4. Verify the gear engagements are immediate and not harsh.

IMPORTANT: Harsh engagement may be caused by any of the following conditions:

- **High engine idle speed-Compare engine idle speed to desired idle speed.**
- **Commanded low pressure control (PC) solenoid current-Investigate PC Sol. Pressure Cmd. kPa (psi) for all**

solenoids. High pressure will cause harsh shifts.

- **A default condition caused by certain DTCs that result in maximum line pressure to prevent clutch slippage.**

IMPORTANT: Soft or delayed engagement may be caused by any of the following conditions:

- **Low idle speed-Compare engine idle speed to desired idle speed.**
- **Low fluid level**
- **Commanded high PC solenoid current-Investigate PC Sol. Pressure Cmd. kPa (psi) for all solenoids. Low pressure will cause soft or delayed shifts.**
- **Cold transmission fluid temperature (TFT)-Use the scan tool to determine TFT.**
- **Selector linkage-Inspect and adjust as necessary.**

7. Monitor transmission range on the scan tool, engine data list.
    1. Apply the brake pedal and ensure the parking brake is set.
    2. Move the gear selector through all ranges.
    3. Pause 2 to 3 seconds in each range.
    4. Return gear selector to PARK.
    5. Verify that all selector positions match the scan tool display.
8. Check throttle position input.
    1. Apply the brake pedal and ensure the parking brake is set.
    2. Ensure the gear selector is in PARK.
    3. Monitor the scan tool Calc. Throttle Position while increasing and decreasing engine speed with the throttle pedal. The scan tool Calc. Throttle Position percentage should increase and decrease with engine speed.

If any of the above checks do not perform properly, record the result for reference after completion of the road test.

UPSHIFT CONTROL AND TORQUE CONVERTER CLUTCH (TCC) APPLY

The TCM calculates the upshift points based primarily on 2 inputs: throttle position and vehicle speed. When the TCM determines that conditions are met for a shift to occur, the TCM

commands the shift by closing or opening the ground circuit for the appropriate solenoid.

Perform the following steps:

1. Refer to **Shift Speed** table in this section and choose a throttle position of 12.5 percent or 25 percent. All throttle positions shown should be tested to cover the normal driving range.
2. Monitor the following scan tool parameters:
    - Calc. Throttle Position
    - Vehicle Speed
    - Engine Speed
    - Transmission ISS
    - Transmission OSS
    - Commanded Gear
    - TCC PC Sol. Pressure Cmd.
    - TCC Pressure Actual
    - TCC Slip Speed
    - TFP Switch 1
    - TFP Switch 3
    - TFP Switch 4
    - TFP Switch 5
    - PC Sol. 2 Pressure Cmd.
    - PC Sol. 3 Pressure Cmd.
    - PC Sol. 4 Pressure Cmd.
    - PC Sol. 5 Pressure Cmd.
    - Shift Solenoid 1 and 2
3. Place the gear selector in the DRIVE position.
4. Accelerate the vehicle using the chosen throttle position. Hold the throttle steady.
5. As the transmission upshifts, there should be a noticeable shift feel or engine speed change within 1 to 2 seconds of the commanded gear change. The TCC feel may not be noticeable. Look for 100-300 RPM engine speed change.
6. Compare the shift speeds to the Shift Speed table. Refer to **Shift Speed** . Shift speeds may vary slightly due to TFT or other operating variables, including hydraulic delays in responding to electronic controls.
    - Note any harsh, soft or delayed shifts or slipping.

- Note any noise or vibration.

IMPORTANT: This transmission is equipped with an Electronically Controlled Capacity Clutch (ECCC), which does not allow the clutch to fully lock to the torque converter cover. The clutch maintains a small amount of slippage, approximately 20 RPM, in 2nd, 3rd, 4th, 5th and 6th gears, depending on the vehicle application. ECCC was developed to reduce the possibility of noise, vibration or chuggle caused by TCC apply. Full lockup is available at highway speeds on some applications.

IMPORTANT: The TCC will not engage until the engine is in closed loop operation and the vehicle speed is as shown in the Shift Speed table. Refer to Shift Speed . The vehicle must be in a near-cruise condition, not accelerating or coasting and on a level road surface.

7. Monitor TCC PC solenoid current while driving and make sure the current rises when the TCC is commanded to apply.
   - When the TCC applies there should be a noticeable drop in engine speed and a drop in slip speed to below 100 RPM. If the TCC apply can not be detected:
     - Check for DTCs.
     - Refer to **Torque Converter Diagnosis**.
   - Apply and release the brake pedal. The TCC will release on most applications.

PART THROTTLE DOWNSHIFT

1. Place the gear selector in the DRIVE position.
2. Accelerate the vehicle to 64-88 km/h (40-55 mph) in 6th gear.
3. Quickly increase throttle angle to between 25-30 percent.
4. Verify the following:
   - The TCC releases.
   - The transmission downshifts immediately.

MANUAL DOWNSHIFTS

Manual downshift testing is not required for vehicles equipped with Driver Shift Control (DSC).

The TCM and shift solenoids will automatically override DSC downshifts to protect the transmission from damage.

Coasting Downshifts

1. Place the gear selector in the DRIVE position.
2. Accelerate the vehicle to 6th gear with the TCC applied.
3. Release the throttle and apply the brakes
4. Verify the following:
   - The TCC releases (on most applications).
   - Downshifts occur as commanded.

REVERSE

Perform the following test using a 10-15 percent throttle position.

1. With the vehicle stopped, move the gear selector to REVERSE.
2. Slowly accelerate the vehicle.
3. Verify that there is no noticeable slip, noise or vibration.

DRIVER SHIFT CONTROL (DSC)/ELECTRONIC RANGE SELECTION (ERS) (SATURN ONLY)

Refer to the owner's manual for specific instructions on DSC. The TCM will upshift automatically when maximum engine speed is achieved and will protect from any downshift which may cause excessive engine RPMs.

TORQUE CONVERTER DIAGNOSIS

TORQUE CONVERTER STATOR

The torque converter stator roller clutch can have 2 different malfunctions.

- The stator assembly freewheels in both directions.
- The stator assembly remains locked up in both directions.

POOR ACCELERATION AT LOW SPEED - STATOR ROLLER CLUTCH FREEWHEELS AT ALL TIMES

If the stator is freewheeling at all times, the vehicle tends to have poor acceleration from a standstill and at speeds below 48-55 km/h (30-34 mph). At speeds above 48-55 km/h (30-34

mph), the vehicle may act normally.

For poor acceleration at low speeds, you should first determine that the exhaust system is not blocked and the transmission is in First gear when starting out. If the engine freely accelerates to high RPM in NEUTRAL, you can assume that the engine and the exhaust system are normal. Check for poor performance in DRIVE and REVERSE to help determine if the stator is freewheeling at all times.

POOR ACCELERATION AT HIGH SPEED - STATOR ROLLER CLUTCH IS LOCKED UP AT ALL ALL TIMES

If the stator is locked up at all times, performance is normal when accelerating from a standstill. Engine RPM and vehicle speed are limited or restricted at speeds above 48-55 km/h (30-34 mph). Visual examination of the converter may reveal a blue color from overheating.

TORQUE CONVERTER STATOR NOISE

IMPORTANT: Do not confuse this noise with pump whine noise, which is usually noticeable in all gear ranges. Pump whine will vary with line pressure.

Torque converter whine is noticed when the vehicle is stopped and the transmission is in DRIVE or REVERSE. This noise will increase as you increase the engine RPM. The noise will stop when the vehicle is moving or when you apply the torque converter clutch, because both halves of the converter are turning at the same speed.

Perform a stall test to verify that the noise is actually coming from the torque converter:

1. Place your foot on the brake.
2. Put the gear selector in DRIVE.

NOTE: You may damage the transmission if you depress the accelerator for more than 6 seconds.

3. Depress the accelerator to approximately 1,200 RPM for no more than six seconds.

A torque converter noise will increase under this load.

TORQUE CONVERTER CLUTCH

The torque converter clutch (TCC) is applied by fluid pressure, which is controlled by a TCC

pressure control (PC) solenoid. This solenoid is part of the control solenoid valve assembly, which is located inside the automatic transmission assembly. The solenoid is controlled through a combination of computer controlled switches and sensors.

TORQUE CONVERTER CLUTCH SHUDDER

The key to diagnosing torque converter clutch (TCC) shudder is to note when it happens and under what conditions. TCC shudder should only occur during the apply or the release of the converter clutch. Shudder should never occur after the TCC plate is fully applied.

IF SHUDDER OCCURS DURING TCC APPLY OR RELEASE

If the shudder occurs while the TCC is applying, the problem can be within the transmission or the torque converter. Something is causing one of the following conditions to occur:

- The clutch is not engaging completely.
- The clutch is not releasing completely.
- The clutch is releasing and applying rapidly and continuously.

One of the following conditions may be causing the TCC Shudder to occur:

- Leaking turbine shaft/TCC seals
- A restricted release orifice
- A distorted clutch or housing surface due to long converter to flywheel bolts
- Defective friction material on the TCC plate

IF SHUDDER OCCURS AFTER TCC HAS APPLIED

IMPORTANT: Some transmissions are equipped with an electronically controlled capacity clutch (ECCC), which does not allow the clutch to fully lock to the torque converter cover. The clutch maintains a small amount of slippage, approximately 20 RPM, in 2nd, 3rd, 4th, 5th and 6th gears, depending on the vehicle application. ECCC was developed to reduce the possibility of noise, vibration or chuggle caused by TCC apply. Full lockup is only available at highway speeds on some applications.

If shudder occurs after the TCC has applied, most of the time there is nothing wrong with the transmission.

The TCC is not likely to slip after the TCC has been applied. Engine problems may go unnoticed under light throttle and load, but they become noticeable after the TCC apply when going up a hill or accelerating. This is due to the mechanical coupling between the engine and the transmission.

IMPORTANT: The TCC will not engage until the engine is in closed loop operation and the vehicle must be in a near-cruise condition, not accelerating or coasting and on a level road surface.

Once TCC is applied, there is no torque converter (fluid coupling) assistance. Engine or driveline vibrations could be unnoticeable before TCC engagement. Refer to **Symptoms - Engine Controls** in order to avoid misdiagnosis of TCC shudder and the unnecessary disassembly of a transmission or the unnecessary replacement of a torque converter.

TORQUE CONVERTER VIBRATION TEST

IMPORTANT: The Noise and Vibration Analysis procedure should be performed prior to performing this test.

Perform the Torque Converter Vibration Test.

ISOLATING VIBRATION

IMPORTANT: Some engine/transmission combinations cannot be balanced in this manner due to restricted access or limited clearances between the torque converter bolts and the engine.

To isolate and correct a flywheel or torque converter vibration, separate the torque converter from the flywheel to determine if vibration is in the engine or transmission.

1. With the engine at idle speed and the transmission in PARK or NEUTRAL, observe the vibration.
2. Turn the engine OFF.
3. Raise and suitably support the vehicle. Refer to **Lifting and Jacking the Vehicle** .
4. Remove the torque converter access cover and the bolts (if equipped).
5. Mark the relationship of the torque converter to the flywheel.
6. Remove the bolts attaching the converter to the flywheel.
7. Slide the torque converter away from the flywheel.

8. Rotate the flywheel and torque converter to inspect for defects or missing balance weights.
9. Lower the vehicle.
10. With the engine at idle speed and the transmission in PARK or NEUTRAL, observe the vibration.
11. Turn the engine OFF.
12. If the vibration remains, the vibration is most likely caused by the engine.

NOTE: Refer to Fastener Notice .

13. Install the converter to flywheel bolts.

    Tighten: Tighten to 60 N.m (44 lb ft).

NOTE: When installing the torque converter to the flywheel, make sure to use specific bolts. DO NOT use longer bolts. Using longer bolts will result in deformation of the torque converter cover and cause internal damage.

14. If the vibration is gone or changed, perform the Indexing Torque Converter procedure.

INDEXING TORQUE CONVERTER

To determine and correct a torque converter vibration, the following procedure may have to be performed several times to achieve the best possible torque converter to flywheel balance.

1. Raise and suitably support the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Rotate the torque converter one bolt position from the original marked position.
3. Align the torque converter hub (2) in the engine crankshaft (3) and install the torque converter to flywheel bolts.

   Tighten: Tighten to 60 N.m (44 lb ft).

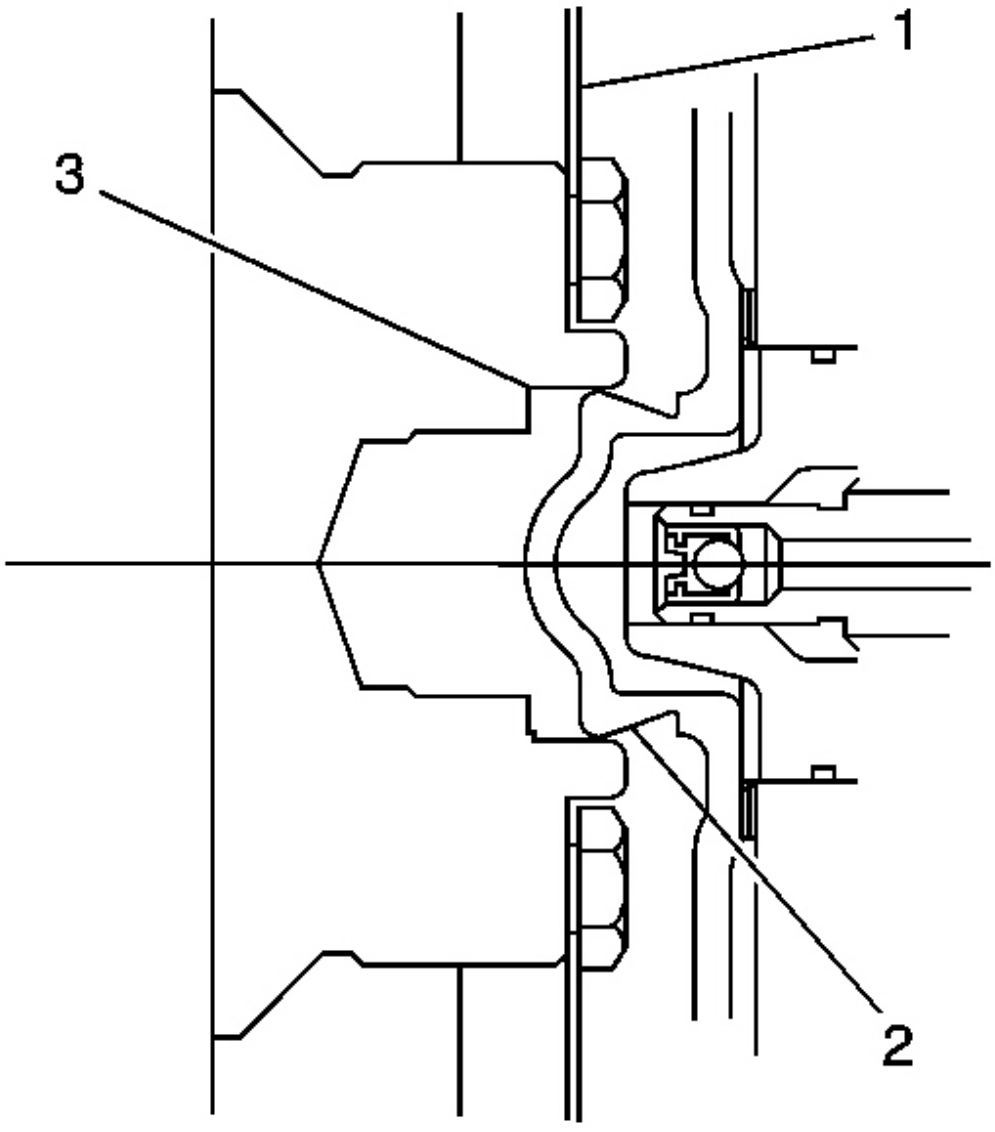

Fig. 6: View Of Torque Converter Hub In Engine Crankshaft
Courtesy of GENERAL MOTORS CORP.

4. Lower the vehicle.
5. With the engine at idle speed and the transmission in PARK or NEUTRAL, observe the vibration.

- Repeat this procedure until the best possible balance is obtained.
- If the vibration does not improve after rotating the torque converter 360 degrees, replace the torque converter assembly.

6. Install the torque converter access cover and bolts (if equipped).

Tighten: Tighten to 12 N.m (9 lb ft).

Torque Converter Replacement Guide

DO NOT replace the Torque Converter if the following symptoms are found.	
Condition	**Action**
• Transmission Fluid Oxidized/Discolored • No metal debris • Clutch fiber material	Do not replace the torque converter. Refer to **Transmission Fluid Check**.
Transmission Fluid Contaminated with Metal Particles	**IMPORTANT:** **Do not replace the torque converter for clutch system or gearset component damage. Fine metallic debris or clutch plate material that is suspended in the fluid will not cause damage to the internal torque converter components nor any internal transmission components.**
Harsh Gear Shifts-TCC Not Applied	Do not replace the torque converter. Refer to **Symptoms - Automatic Transmission**.
Noise-Whine	• Refer to **Symptoms - Automatic Transmission**. • Do not replace the torque converter if noise is present in Neutral/Park. Refer to **Symptoms - Engine Mechanical** .
Vibration-Out of Balance	Refer to Torque Converter Vibration Test in this procedure.
No Drive/Slips in Drive-TCC Not Applied	Do not replace the torque converter until completing all engine and transmission diagnostics.
Idle Surge/Rough Idle	Do not replace the torque converter. Refer to **Symptoms - Engine Controls**
	Do not replace the torque converter.

TCC Apply/Release Shudder	Refer to Torque Converter Clutch Shudder in this procedure.
TCC Chuggle	Do not replace the torque converter. Refer to **Symptoms - Engine Controls** .
DTC P0741-TCC Stuck OFF/High Slip-Intermittent Only	Do not replace the torque converter. Refer to **DTC P0741 or P0742** diagnostic table.
DTC P0741-TCC Stuck OFF/High Slip	Do not replace the torque converter. Refer to **DTC P0741 or P0742** diagnostic table.
DTC P0742-TCC Stuck ON	Do not replace the torque converter. Refer to **DTC P0741 or P0742** diagnostic table.
DTC P1887-TCC Release Switch	Do not replace the torque converter.
Transmission Fluid Contaminated with Sludge/Metal Particles as a result of: • Engine Coolant/Oil • Pump damage • Drive sprocket support damage • Turbine/stator shaft damage • No damage found in transmission	Replace the torque converter. Refer to **Torque Converter Removal** .
Poor Acceleration above 48 km/h (30 mph) - Good Launch	Do not replace the torque converter until completing all engine and transmission diagnostics. • Refer to Torque Converter Stator in this procedure. • Refer to **Symptoms - Engine Controls** .
Poor Launch - Good Acceleration above 48 km/h (30 mph)	Do not replace the torque converter until completing all engine and transmission diagnostics. • Refer to Torque Converter Stator in this procedure. • Refer to **Symptoms - Engine**

	Controls .
Stripped Converter Bolt Holes	Replace the torque converter.
Torque Converter Pilot Damaged	Replace the torque converter.
Torque Converter Hub surface is damaged - scored, raised/transferred metal.	Replace the torque converter.
Torque Converter Ballooning	Replace the torque converter.
External Leaks in the weld areas - hub, lug or closure weld.	Replace the torque converter.
Broken/Cracked Flywheel	Replace the torque converter.
Torque Converter Discolored/Overheated	Replace the torque converter.

CLUTCH PLATE DIAGNOSIS

COMPOSITION PLATES

Dry the plates and inspect the plates for the following conditions:

- Pitting
- Flaking
- Delamination-splitting or separation of bonded clutch material
- Wear
- Glazing
- Cracking
- Charring
- Chips or metal particles embedded in the lining

Replace a composition plate which shows any of these conditions.

STEEL PLATES

Wipe the plates dry and check the plates for heat discoloration. If the surfaces are smooth, even if color smear is indicated, you can reuse the plate. If the plate is discolored with heat spots or if the surface is scuffed, replace the plate.

CAUSES OF BURNED CLUTCH PLATES

The following conditions can result in a burned clutch plate:

- Incorrect usage of clutch or apply plates
- Engine coolant or water in the transmission fluid
- A cracked clutch piston
- Damaged or missing seals
- Low line pressure
- Valve body conditions
  - The valve body face is not flat.
  - Porosity in between channels.
  - The valve train retainers are improperly installed.
  - The checkballs are misplaced.
- The Teflon® seal rings are worn or damaged.

ENGINE COOLANT/WATER IN TRANSMISSION

NOTE: The antifreeze or water will deteriorate the seals, gaskets and the glue that bonds the clutch material to the pressure plate. Both conditions may cause damage to the transmission.

If antifreeze or water has entered the transmission, perform the following:

1. Disassemble the transmission.
2. Replace all of the rubber type seals. The coolant will attack the seal material which will cause leakage.
3. Replace the composition-faced clutch plate assemblies. The facing material may separate from the steel center portion.
4. Replace all of the nylon parts - washers.
5. Replace the torque converter.
6. Thoroughly clean and rebuild the transmission, using new gaskets and oil filter.
7. Flush the cooler lines after the transmission cooler has been properly repaired or replaced.
8. Inspect the rubber hose portion of the oil cooler lines for damage, if applicable. Refer to **Transmission Fluid Cooler Flushing and Flow Test**.

FLUID LEAK DIAGNOSIS

GENERAL METHOD

1. Verify that the leak is transmission fluid.
2. Thoroughly clean the suspected leak area.
3. Operate the vehicle for 24 km (15 mi) or until normal operating temperatures are reached.
4. Park the vehicle over clean paper or cardboard.
5. Shut OFF the engine.
6. Look for fluid spots on the paper.
7. Make the necessary repairs.

POWDER METHOD

1. Thoroughly clean the suspected leak area with solvent.
2. Apply an aerosol type leak tracing powder to the suspected leak area.
3. Operate the vehicle for 24 km (15 mi) or until normal operating temperatures are reached.
4. Shut OFF the engine.
5. Inspect the suspected leak area.
6. Trace the leak path through the powder in order to find the source of the leak.
7. Make the necessary repairs.

DYE AND BLACK LIGHT METHOD

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

1. Follow the manufacturer's instructions in order to determine the amount of dye to use.
2. Operate the vehicle for 24 km (15 mi) or until normal operating temperatures are reached.
3. Detect the leak with the black light.
4. Make the necessary repairs.

FIND THE CAUSE OF THE LEAK

Pinpoint the leak and trace the leak back to the source. You must determine the cause of the leak in order to repair the leak properly. For example, if you replace a gasket, but the sealing flange is bent, the new gasket will not repair the leak. You must also repair the bent flange. Before you attempt to repair a leak, check for the following conditions and make repairs as necessary:

Gaskets

- Fluid level/pressure is too high

- Plugged vent or drain-back holes
- Improperly tightened fasteners
- Dirty or damaged threads
- Warped flanges or sealing surface
- Scratches, burrs or other damage to the sealing surface
- Damaged or worn gasket
- Cracking or porosity of the component
- Improper sealant used, where applicable
- Incorrect gasket

Seals

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

POSSIBLE POINTS OF FLUID LEAKS

Transmission Case Cover and/or Valve Body Cover

- Incorrectly tightened bolts
- Improperly installed or damaged gasket/seal
- Damaged mounting face
- Incorrect gasket seal

Case Leak

- Damaged input speed sensor seal
- Damaged manual shaft seal
- Loose or damaged oil cooler lines/seals
- Worn or damaged axle shaft oil seal

- Loose line pressure pipe plug or fluid level pipe plug
- Porous casting
- Warped torque converter housing
- Damaged converter housing to case seal

Leak at the Torque Converter End

- Converter leak in the weld area
- Converter seal lip cut. Check the converter hub for damage
- Converter seal bushing moved forward and damaged
- Converter seal garter spring missing from the seal
- Porous casting of the torque converter housing

Leak at the Vent

- Overfilled system
- Water or coolant in the fluid; The fluid will appear milky
- Transmission case porous
- Incorrect fluid level indicator causing an overfilled system
- Plugged vent

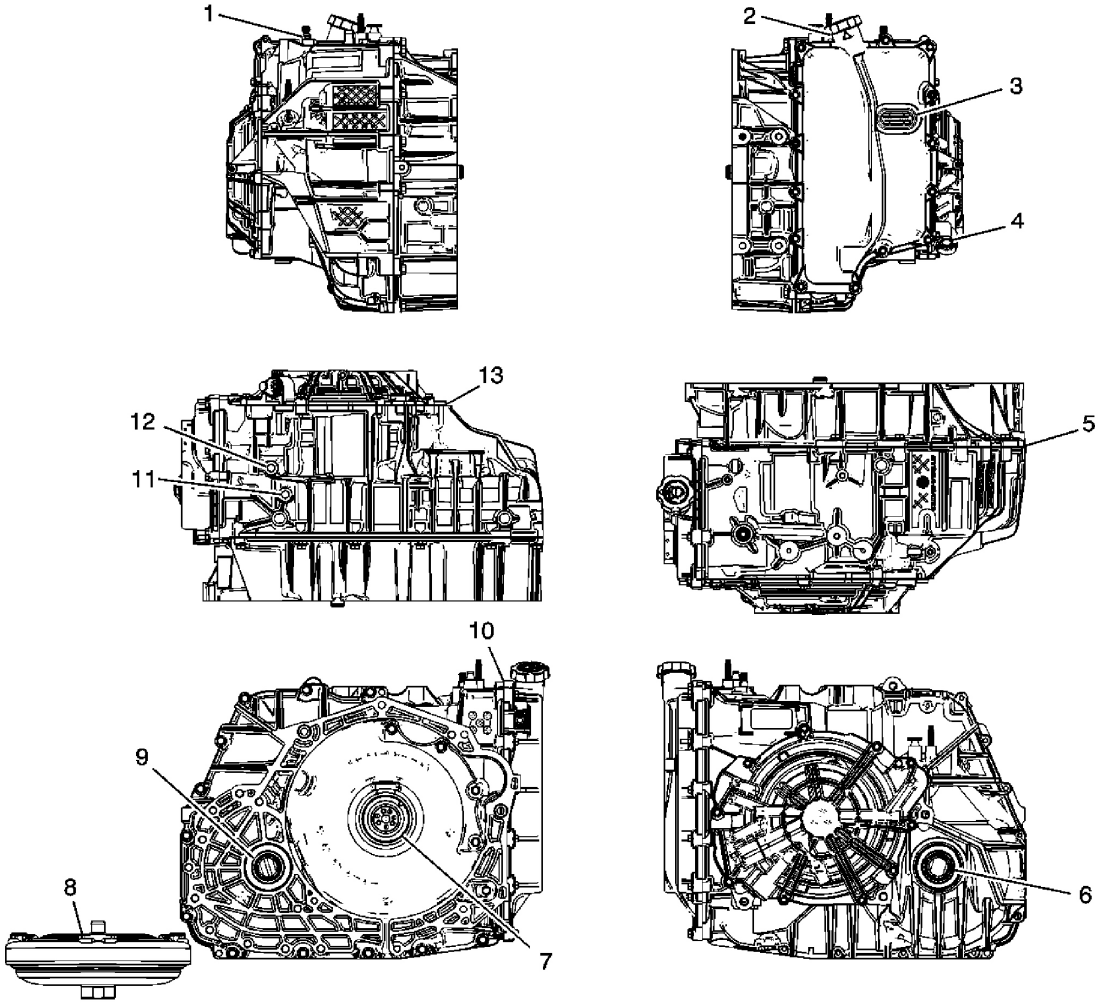

Fig. 7: Identifying Leak Inspection Points
Courtesy of GENERAL MOTORS CORP.

Callouts For Fig. 7

Callout	Component Name
1	Manual Shift Shaft Seal
2	Automatic Transmission Vent
3	Control Valve Body Cover Wiring Connector Hole Seal
4	Input Speed Sensor Seal
5	Converter Housing to Case Joint
6	Front Wheel Drive Shaft Oil Seal Assembly - Case
7	Torque Converter Fluid Seal Assembly
8	Torque Converter Assembly

9	Front Wheel Drive Shaft Oil Seal Assembly - Torque Converter Housing
10	Control Valve Body Cover Assembly Gasket
11	Fluid Level Hole Plug
12	Fluid Pressure Hole Plug
13	Case Cover Gasket

CASE POROSITY REPAIR

Some external leaks are caused by case porosity in non-pressurized areas.

1. Thoroughly clean the area to be repaired with a cleaning solvent. Air dry the area.

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

2. Using instructions from the manufacturer, mix a sufficient amount of an epoxy to make the repair.
3. Apply the epoxy. A clean, dry soldering acid brush can be used to clean the area and also to apply the epoxy cement. Make certain that the area to be repaired is fully covered.
4. Allow the epoxy cement to cure for three hours before assembling the components.
5. Repeat the fluid leak diagnosis procedures.

TRANSMISSION FLUID COOLER FLUSHING AND FLOW TEST

GM studies indicate that plugged or restricted transaxle oil coolers and line cause insufficient transaxle lubrication and elevated operating temperatures which can lead to premature transaxle wear-out. Many repeat repair cases could have been prevented by following published procedures for transaxle oil cooler flushing and flow checking. This procedure includes flow checking and flushing the auxiliary transaxle oil cooler, if equipped.

IMPORTANT: Use the SA9165T or equivalent to flush the transaxle oil cooler and the oil cooler line whenever the transaxle is removed for the following repairs:

- **Torque converter**
- **Oil pump**
- **Transaxle overhaul complete**

- **Transaxle assembly replacement**

Use the appropriate transaxle fluid when performing a transaxle repair. Only GM Goodwrench DEXRON®VI automatic transaxle fluid should be used when doing a repair on a six (6) speed GM transaxle.

Time allowance for performing the cooler flow checking and flushing procedure has been included in the appropriate labor time guide operations since the 1987 model year. The service procedure steps for oil cooler flushing are as follows:

COOLER FLOW CHECK AND FLUSHING STEPS

1. Tools Required
2. Preparation
3. Back Flush
4. Forward Flush
5. Flow Check
6. Clean-up

TOOLS REQUIRED

- **DT-48312** Transmission Cooler Flushing Adapter. See **Special Tools** .
- **J 35944-22** Cooler Flushing Fluid. See **Special Tools** .
- **SA9165T** Oil Cooler Line Flusher. See **Special Tools** .
- Measuring Cup
- Funnel
- Water supply - hot water recommended
- Water hose, at least 16 mm (5/8 in) ID
- Shop air supply with water/oil filters, regulator and pressure gage
- Air chuck with clip, if available
- Oil drain container
- Pail with lid - 19 L (5 gallon)
- Eye protection
- Rubber gloves

PREPARATION

1. During the installation of the repaired or replacement transaxle, do not connect the oil cooler lines.

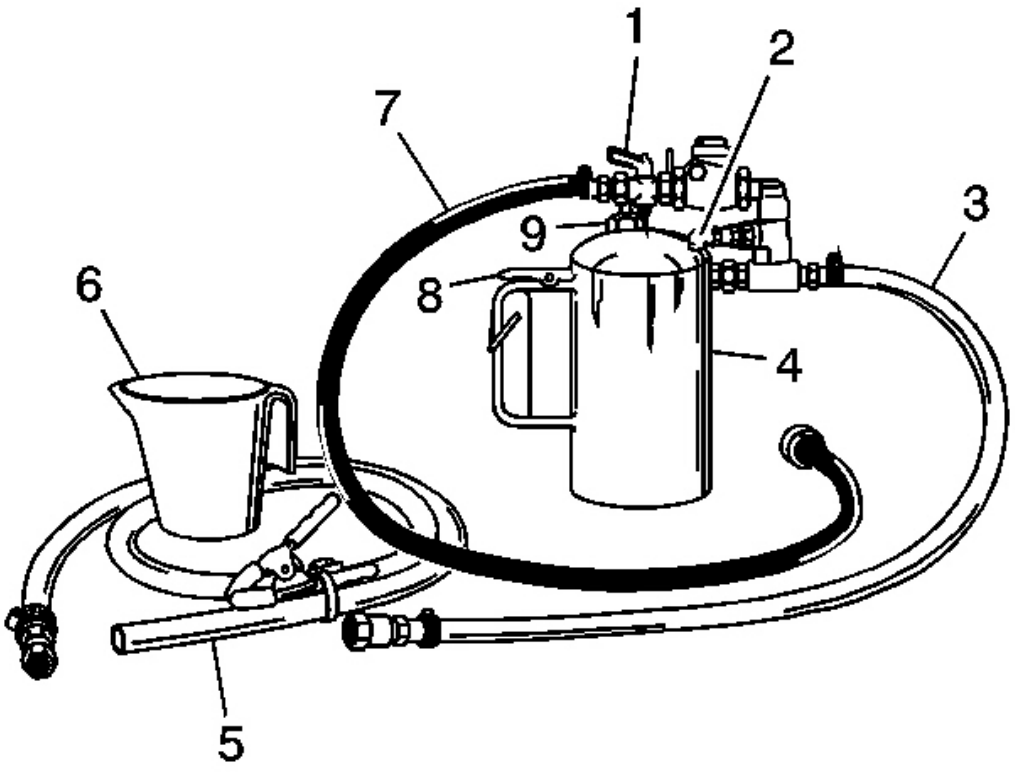

Fig. 8: Identifying Flusher Tank & Components
Courtesy of GENERAL MOTORS CORP.

NOTE: Do not use solutions that contain alcohol or glycol. Use of solutions that contain alcohol or glycol may damage the oil cooler line flusher, oil cooler components and/or transmission components.

IMPORTANT: The J 35944-22 is environmentally safe, yet powerful enough to cut through transaxle fluid to dislodge any contaminants from the cooler. See Special Tools . The safety precautions on the label, regarding potential skin and eye irritations

associated with prolonged exposure, are typical precautions that apply to many similar cleaning solutions. It should be noted that according to GM, use of other non-approved fluids for cooler flushing can have an adverse reaction to the seals inside the transaxle.

2. Remove the fill cap (9) on the **SA9165T** and fill the flusher tank (4) with 0.6 L (20-21 oz.) of **J 35944-22** , using the measuring cup (6). See **Special Tools** . Do not overfill.
3. Install the fill cap (9) on the **SA9165T** and pressurize the flusher tank (4) to 550-700 kPa (80-100 psi), using the shop air supply at the tank air valve (2). See **Special Tools** .
4. With the water supply valve (1) on the **SA9165T** in the OFF position, connect the water supply hose from the **SA9165T** to the water supply at the faucet. See **Special Tools** .
5. Turn ON the water supply at the faucet.

BACK FLUSH

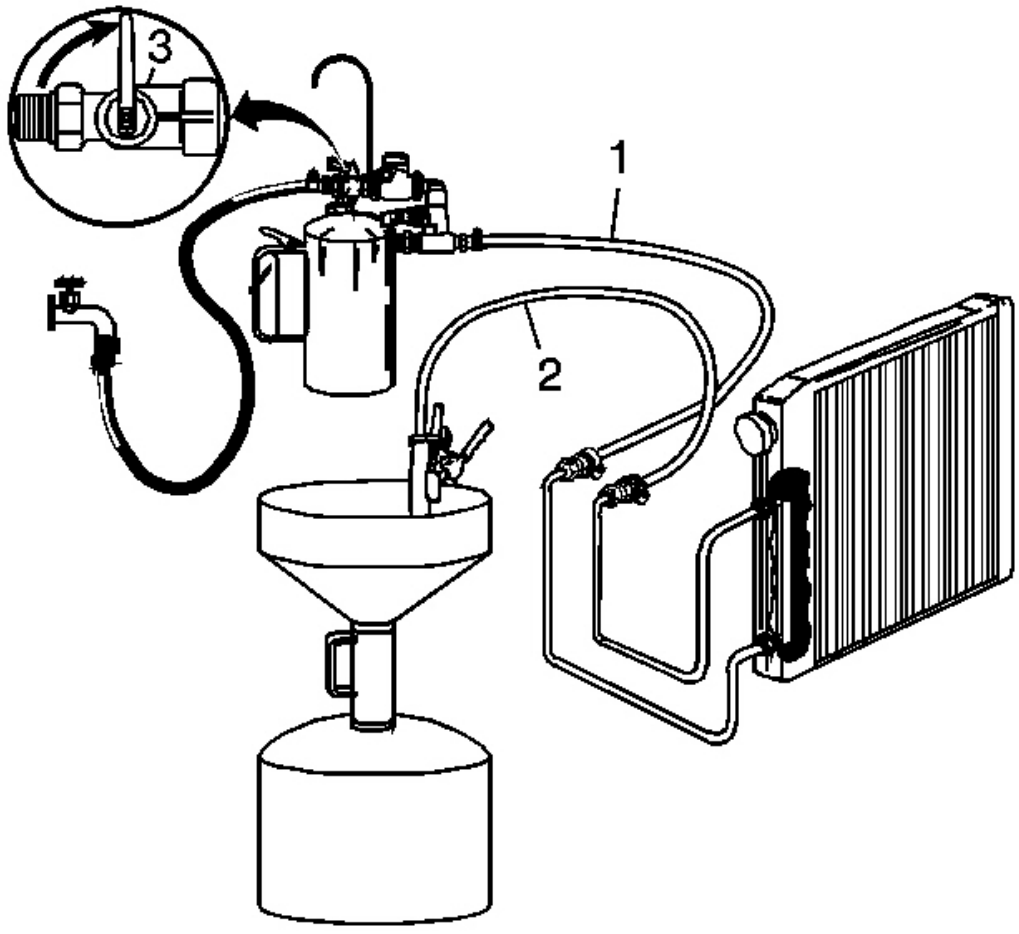

Fig. 9: View Of Oil Cooler Line Flusher
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: Inspect the transaxle oil cooler lines for kinks or damage. Repair as necessary.

1. Connect the **SA9165T** to the oil cooler feed line. See **Special Tools** . Use the **DT-48312** . See **Special Tools** .
2. Clip the discharge hose (2) onto the oil drain container.
3. Attach the **SA9165T** to the undercarriage of the vehicle with the hook provided and connect the flushing system feed supply hose (1) from the **SA9165T** to the oil cooler return

line. See **Special Tools** . Use the **DT-48312** .

4. Turn the **SA9165T** water supply valve (3) to the ON position and allow water to flow through the oil cooler and lines for 10 seconds to remove any remaining transaxle fluid. If water does not flow through the oil cooler and lines, the cause of the blockage must be diagnosed and the plugged component must be repaired or replaced. Continue with the cooler flushing and flow check procedure once the blockage is corrected.
5. Turn the **SA9165T** water supply valve (3) to the OFF position and clip the discharge hose onto a 19 liter (5 gallon) pail with a lid, to avoid splashback. See **Special Tools** .

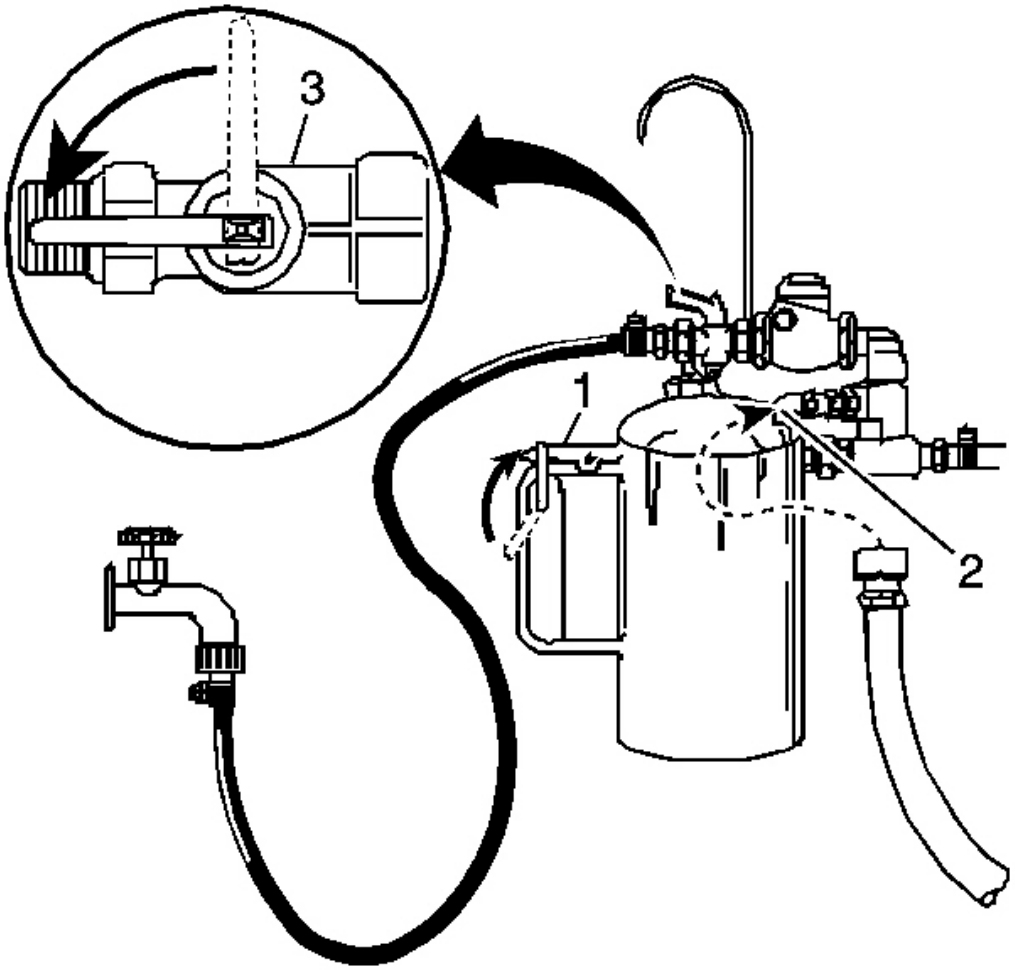

Fig. 10: Identifying J 35944-A Water Supply Valve ON/OFF Positions
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: Flushing for approximately 2 minutes in each cooler line direction will result in a total of about 8-10 gallons of waste fluid. This mixture of water and flushing fluid is to be captured in a bucket or similar container.

6. Turn the **SA9165T** water supply valve (3) to the ON position and depress the trigger (1) to mix cooler flushing solution into the water flow. See **Special Tools** . Use the clip provided on the handle to hold the trigger (1) down. The discharge will foam vigorously when the solution is introduced into the water stream.
7. Flush the oil cooler and lines with water and solution for 2 minutes. During this flush, attach the shop air supply 550-700 kPa (80-100 psi) to the flushing system feed air valve (2) located on the **SA9165T** , for 3-5 seconds at the end of every 15-20 second interval to create a surging action. See **Special Tools** .
8. Release the trigger (1) and turn the **SA9165T** water supply valve (3) to the OFF position. See **Special Tools** .

FORWARD FLUSH

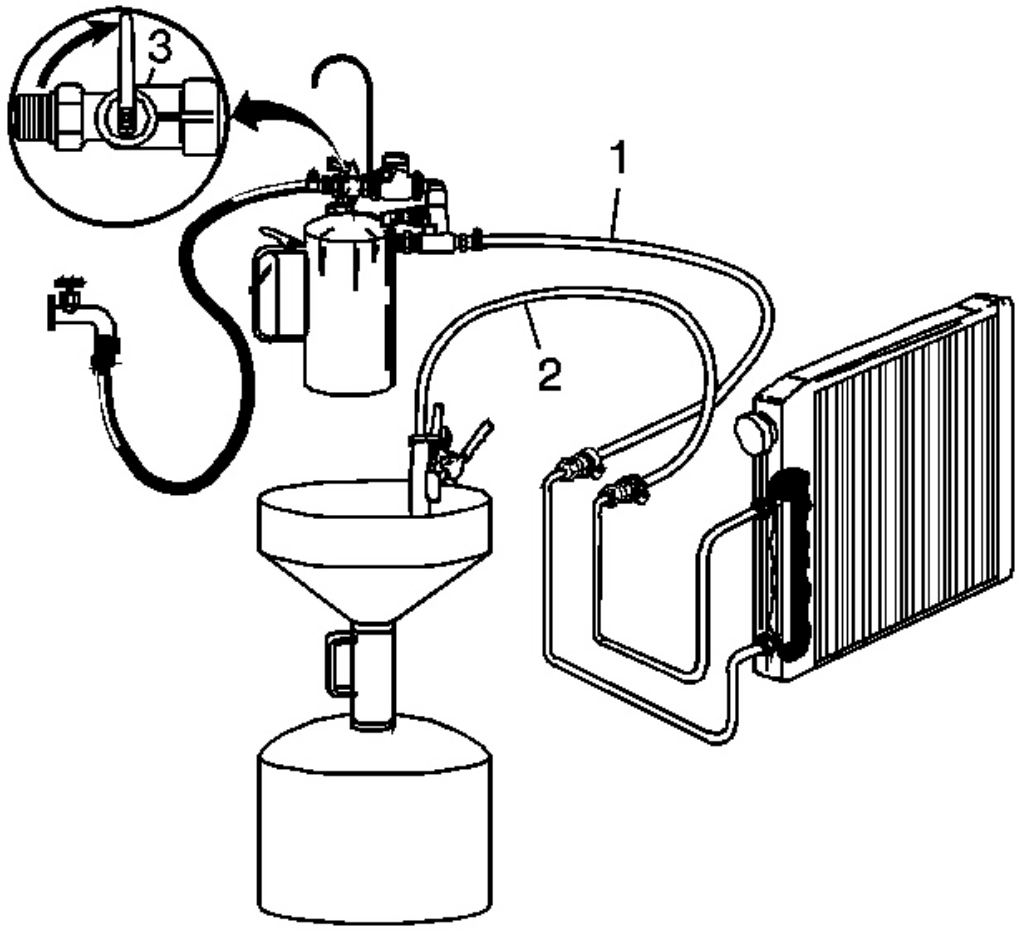

Fig. 11: View Of Oil Cooler Line Flusher
Courtesy of GENERAL MOTORS CORP.

1. Disconnect both hoses (1 and 2) from the oil cooler lines and connect them to the opposite oil cooler line. This will allow the oil cooler and lines to be flushed in the normal flow direction.
2. Repeat Step 6 and 7 of the Back Flush.

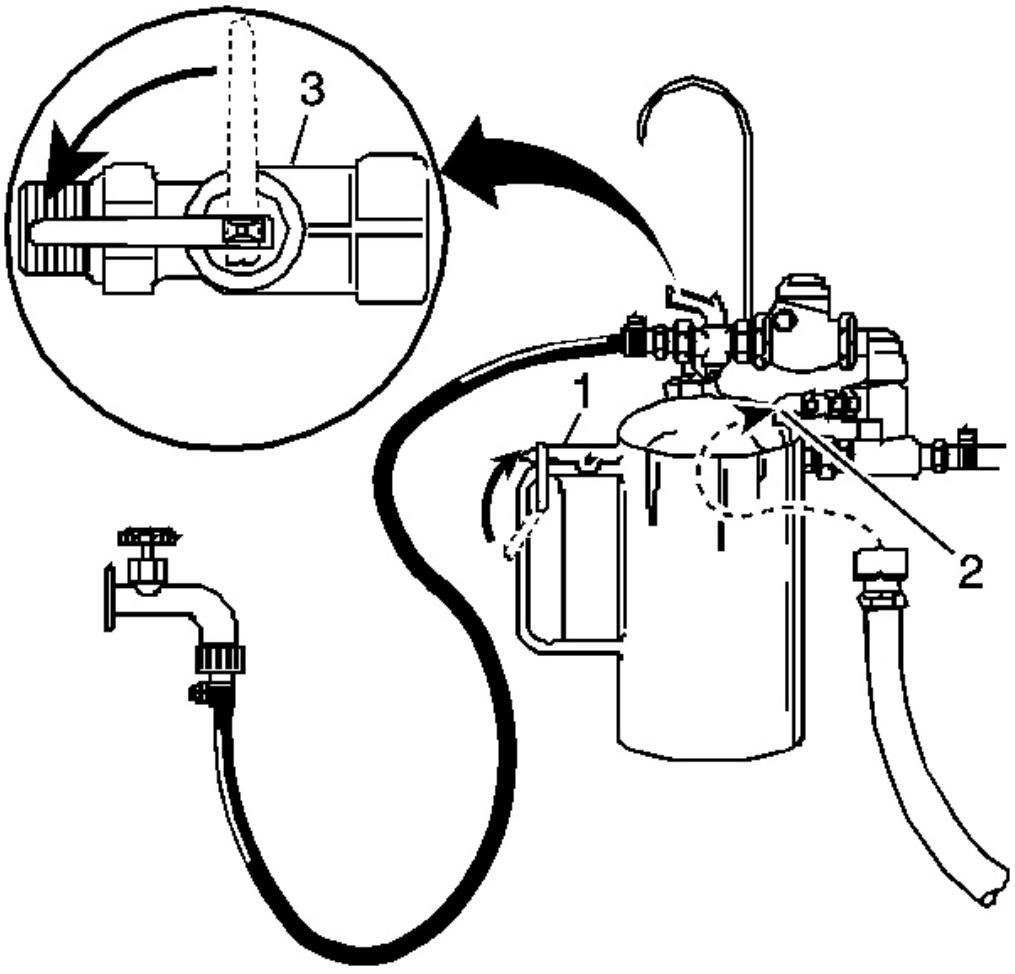

Fig. 12: Identifying J 35944-A Water Supply Valve ON/OFF Positions
Courtesy of GENERAL MOTORS CORP.

3. Release the trigger (1) of the **SA9165T** and allow water only to rinse the oil cooler and lines for 1 minute. See **Special Tools** .
4. Turn the **SA9165T** water supply valve (3) to the OFF position and turn OFF the water supply at the faucet. See **Special Tools** .
5. Attach the shop air supply to the flushing system feed air valve (2) on the **SA9165T** and blow out the water from the oil cooler and lines. See **Special Tools** . Continue, until no water comes out of the discharge hose.

FLOW TEST

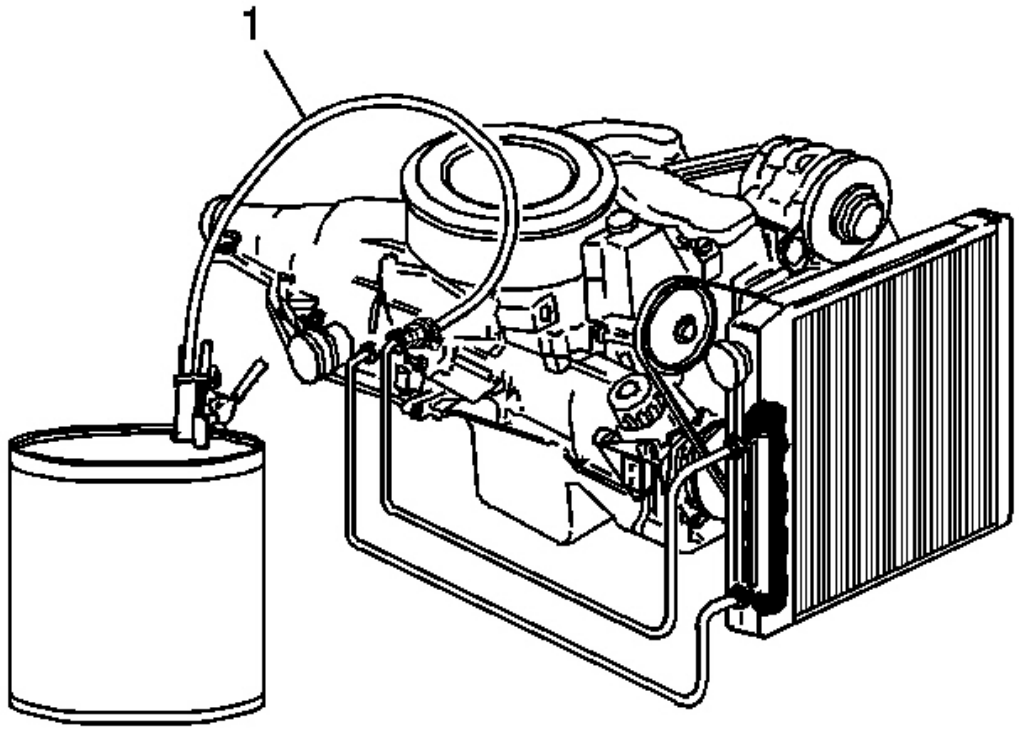

Fig. 13: View Of Flow Test Procedure & Special Tools
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: The Flow Test must be performed after the flush to ensure that all flushing solution and water is removed from the oil cooling system. Corrosion of the oil cooler will occur if water and flushing solution remain in the oil cooling system.

1. Disconnect the hose from the oil cooler line. Connect the oil cooler feed line to the transaxle for normal flow.
2. Clip the discharge hose (1) to an empty oil container.
3. Confirm the transaxle is filled with automatic transaxle fluid. Refer to **Fluid Capacity Specifications** for the correct automatic transaxle fluid capacity.
4. Start the engine with the transaxle in PARK range and run for 30 seconds after fluid begins

to flow from the discharge hose (1). A minimum of 1.9 L (2 quarts) must be discharged during this 30 second run time.

5. If the fluid flow meets or exceeds 1.9 L (2 quarts) in 30 seconds, connect the oil cooler return line to the transaxle.
6. If fluid flow is less than 1.9 L (2 qt) in 30 seconds, perform the following diagnosis:
    1. Disconnect the **SA9165T** discharge hose (1) from the oil cooler return line. See **Special Tools** .
    2. Disconnect the oil cooler feed line at the radiator.
    3. Connect the **SA9165T** discharge hose (1) to the oil cooler feed line, radiator end. See **Special Tools** .
    4. Clip the discharge hose (1) onto the oil drain container.
    5. Start the engine with the transaxle in PARK range and run for 30 seconds after fluid begins to flow from the discharge hose (1). A minimum of 1.9 L (2 qt) must be discharged during this 30 second run time.
7. If the amount of transaxle fluid flow remains less than 1.9 L (2 qt) in 30 seconds, inspect the oil cooler feed line for restrictions or damage. If no condition is found with the feed pipe, inspect the transaxle.

CLEAN-UP

1. Disconnect the water supply hose from the **SA9165T** and bleed any remaining air pressure from the flusher tank. See **Special Tools** .
2. Remove the fill cap from the **SA9165T** and return any unused flushing solution to its container. See **Special Tools** . Rinse the **SA9165T** with water. Do not store the **SA9165T** with flushing solution in it.
3. After every third use, clean the **SA9165T** as described in the instructions included with the tool.
4. Dispose of any waste water/solution and transaxle fluid in accordance with local regulations.

NOISE AND VIBRATION ANALYSIS

A noise or vibration that is noticeable when the vehicle is in motion MAY NOT be the result of the transmission. Refer to the General Information **Diagnostic Starting Point - Vibration Diagnosis and Correction** procedure.

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

- Vibration may also be caused by a small amount of water inside the converter.
- Inspect the engine and transmission mounts for damage and loose bolts.
- Inspect the transmission case mounting holes for the following conditions:
  - Missing bolts, nuts and studs
  - Stripped threads
  - Cracks
- Inspect the flywheel for the following conditions:
  - Missing or loose bolts
  - Cracks
  - Imbalance
- Inspect the torque converter for the following conditions:
  - Missing or loose bolts or lugs
  - Missing or loose balance weights
  - Imbalance caused by heat distortion or fluid contamination
- If the noise or vibration is noticeable in PARK and NEUTRAL with the engine at idle, but is more noticeable as RPM increases, the vibration may be an engine imbalance or a transmission imbalance. Refer to **Torque Converter Diagnosis**.

WHINE/GROWL NOISE

Whine/Growl Noise

Checks	Causes
Front Differential Drive Pinion Gear Assembly (23)	• Inspect for proper Taper Roller Bearing Pre-load • Inspect for loose or worn transfer Driven Gear
Differential Assembly (486)	• Inspect for proper Taper Roller Bearing Pre-load • Inspect for worn or damaged Side Gear Thrust Washer (492) or Pinion Gear Thrust Washer (488) • Inspect for loose or worn Side Gear Axle Splines
Input Carrier Assembly (470)	• Inspect for worn or damaged Pinion Gear Thrust Washers and Bushings • Inspect for worn or damaged Pinion Gears, Pins or Needle Bearings • Inspect for loose Hub and Ring Gear
	• Inspect for worn or damaged Pinion Gear Thrust

Output Carrier Assembly (474)	Washers and Bushings • Inspect for worn or damaged Pinion Gears, Pins or Needle Bearings • Inspect for loose Hub and Ring Gear
Reaction Carrier Assembly (467)	• Inspect for worn or damaged Pinion Gear Thrust Washers and Bushings • Inspect for worn or damaged Pinion Gears, Pins or Needle Bearings • Inspect for loose hub and Ring Gear
Fluid Pump Assembly (203)	• Inspect for proper fluid level • Inspect for loose or worn Drive Link Assembly (218) • Inspect for worn Driven Sprocket Thrust Washer (214) or Drive Sprocket Thrust Washers (219, 220) • Inspect for leaking Transfer Drive Gear Support Seal (213), Pump Fluid Outlet Seal Assembly (57) or Filter Seal (202) • Inspect for worn or damaged Fluid Pump Shaft Splines
3-5-Reverse Clutch Assembly	• Inspect for inadequate Clutch Plate Clearance • Inspect for loose or worn Clutch Plate Splines (423-425) • Inspect for loose or worn Clutch Spring Retainer (427) • Inspect for loose Speed Sensor Reluctor Wheel (416) or Retainer (415)
4-5-6 Clutch Assembly	• Inspect for inadequate Clutch Plate Clearance • Inspect for loose or worn Clutch Plate Splines (449, 440) • Inspect for loose or worn Clutch Spring Retainer (442) • Inspect for loose or worn 3-5-Reverse/4-5-6 Clutch Housing Bushing
	• Inspect for inadequate Clutch Plate Clearance • Inspect for loose or worn Clutch Plate Splines (456-

1-2-3-4 Clutch Assembly	458) • Inspect for loose or worn Clutch Spring Retainer (459)
Low and Reverse Clutch Assembly (OWC) (455)	• Inspect for loose or worn Splines (455) • Inspect for loose or worn Retainer (454)
Low and Reverse Clutch	• Inspect for inadequate Clutch Plate Clearance • Inspect for loose or worn Clutch Plate Splines (449-452) • Inspect for loose or worn Clutch Spring Retainer (410)
2-6 Clutch Assembly	• Inspect for inadequate Clutch Plate Clearance • Inspect for loose or worn Clutch Plate Splines (445-447) • Inspect for loose or worn Clutch Spring Retainer (407)
Case Assembly (51)	• Inspect for loose or broken Transaxle Mount Bolts • Inspect for loose Torque Converter and Differential Housing Bolts (26) • Inspect for loose or broken Fluid Trough Bolts (56)

AUTOMATIC TRANSMISSION FLUID LEAKS

Automatic Transmission Fluid Leaks

Checks	Causes
Torque Converter (27)	Inspect for damage.
Case Assembly (21)	• Inspect for porosity or damage on the sealing surfaces • Inspect for loose Oil Cooler Line Bolts or damaged Oil Cooler Line Seals • Inspect for damaged Manual Shift Shaft Seal (58) • Inspect for damaged or worn Axle Seal (61) or Axle Seal Slinger on the axle shafts • Inspect for loose Pressure Test Plug (62) and Fluid Level Plug (63)
	• Inspect for damaged Torque Converter Housing

Torque Converter Housing Assembly (221)	Assembly (25) • Inspect for porosity or damage on the sealing surfaces • Inspect for damaged Torque Converter Housing Seal (22) • Inspect for damaged or worn Torque Converter Fluid Seal (225) • Inspect for loose Torque Converter and Differential Housing Bolts (26) • Inspect for damaged or worn Axle Seal (226) or Axle Seal Slingers on the axle shafts
Case Cover assembly (34)	• Inspect for porosity or damage on the sealing surface • Inspect for damaged Case Cover Gasket (33) • Inspect for loose Case Cover Assembly Bolts (35) • Inspect for loose Input Speed Sensor (ISS) Bolt (401) • Inspect for damaged Input Speed Sensor (ISS) Seal (402) • Inspect for loose, damaged or leaking Case Cover Assembly bore plugs
Valve Body Cover Assembly (1)	• Inspect for damaged or warped Valve Body Cover Assembly (1) • Inspect for damaged Valve Body Cover Gasket (5) • Inspect for loose Valve Body Cover Bolts (7) and Valve Body Cover Studs (6) • Inspect for damaged or improperly installed Wire Connector Hole Seal (10) • Inspect for damaged or worn Fluid Level Indicator Seal • Inspect for plugged vent holes in the Fluid Level Indicator (2)

NO PARK

No Park

Checks	Causes

Front Differential Drive Pinion (w/Transfer Gear) Gear Assembly (481)	• Inspect for broken or stripped Park Gear splines • Inspect for broken or worn Park Gear
Front Differential Carrier Assembly (486)	Inspect for damaged, broken or loose Front Differential Ring Gear
Output Carrier Transfer Drive Gear Hub Assembly (477)	• Inspect for worn, stripped or broken splines • Inspect for disengaged hub to Transfer Drive Gear
Reaction Carrier Assembly (467)	• Inspect for worn, stripped or broken splines • Inspect for disengaged to the Output Sun Gear (475)
Case Assembly (507)	• Inspect for broken or damaged Case • Inspect for loose or stripped Park Pawl Actuator Bracket Bolts (500) • Inspect for broken or bent Park Pawl Actuator Bracket (501) • Inspect for broken or missing Park Pawl Actuator Guide Pin (505) or Manual Shaft Pin (510) • Inspect for broken, loose or misaligned Park Pawl Guide (506) • Inspect for binding or broken Park Pawl (503) or Actuator Assembly (509)
Manual Shift Detent Lever Assembly (511)	Inspect for broken or disengaged Manual Valve Link Pin

HARSH GARAGE SHIFT

Harsh Garage Shift

Checks	Causes
Input Carrier Assembly (470)	Inspect for worn or stripped Ring Gear Splines
Case Assembly (51)	• Inspect for damaged or fatigued 1-2-3-4 Clutch Wave Plate (458) and Low & Reverse Clutch Wave Plate (450) • Inspect for stripped or worn splines on 1-2-3-4 Clutch Plate (456) • Inspect for improperly positioned or plugged Low Reverse Piston (408) air bleed

	• Inspect for correct fluid level

NO DRIVE IN ALL RANGES

No Drive in All Ranges

Checks	Causes
Case Assembly (51)	• Inspect for cracked or broken Case (51) • Inspect for stripped or sheared splines • Inspect for missing Lube Orifice Plug • Inspect for binding Manual Shift Detent Lever Assembly (511) • Inspect for missing Manual Shift Shaft Pin (510) • Inspect for interference or binding Park Pawl Actuator Assembly (509) • Inspect for disengaged or broken 1-2-3-4 Clutch Piston Spring Retainer (459)
Torque Converter	• Inspect for stripped or sheared splines on Turbine Shaft • Inspect for missing bolts from Torque Converter to Flywheel
35R/456 Housing Assembly	• Inspect for damaged or broken Input Shaft Thrust Bearing Assembly (32) • Inspect for stripped, sheared or loose splines on the Input Shaft to the 3-5 Reverse/4-5-6 Clutch Housing (422)
Oil Pump Assembly	• Inspect for fluid leaks/improper fluid level • Inspect for disengaged, worn, binding or failed Drive Sprocket (216), Driven Sprocket (215) or Drive Link (217) • Inspect for leaking Fluid Outlet Seal Assembly (57) • Inspect for damaged or worn Drive (219, 220) and Driven Sprocket Thrust Washers (214) • Inspect for loose or missing Oil Pump Bolts (204) • Inspect for stripped or sheared splines on the Oil Pump Shaft or Driven Sprocket (215)

	• Inspect for damaged, clogged or improperly installed Oil Filter Assembly (201) • Inspect for damaged or leaking Oil Filter Neck Seal (202)
Low & Reverse Clutch Assembly (455)	Inspect for stripped or sheared splines to the Reaction Carrier (467)
Input Carrier Assembly (470)	• Inspect for stripped or sheared splines to ring gear • Inspect for improperly installed carrier pinion gear pins

NO FIRST AND REVERSE GEARS

No First and Reverse Gears

Checks	Causes
Low and Reverse Clutch Assembly (455)	• Inspect for disengaged or broken Low and Reverse Clutch Retainer (454) • Inspect for stripped or sheared splines on Low and Reverse Clutch (455)
Low and Reverse Clutch	• Inspect for stripped or sheared splines on Low and Reverse Clutch Plates (449-453) • Inspect for damaged, deformed or improper surface finish on the Low and Reverse Clutch Plates (449-453)
Case Cover Assembly (403)	• Inspect for disengaged or broken Low and Reverse Clutch Piston Spring Retainer (410) • Inspect for worn, damaged or debonding Low and Reverse Clutch Piston Seals (408) • Inspect for broken or deformed Low and Reverse Clutch Piston (408) • Inspect for improperly position or too large bleed hole in Low and Reverse Piston (408) • Inspect for porosity or improper finish on the Case Cover

NO FIRST, SECOND, THIRD AND FOURTH GEAR

No First, Second, Third and Fourth Gear

Checks	Causes
1-2-3-4 Clutch Assembly	• Inspect for damaged or worn 1-2-3-4 clutch plates (456-458). • Inspect for damaged or broken 1-2-3-4 clutch piston (461) and piston seals damaged, worn or delaminating • Inspect for broken or binding 1-2-3-4 clutch piston return spring (460) • Inspect for broken or disengaged 1-2-3-4 clutch piston return spring retainer (459)
Output Sun Gear Assembly (457)	Inspect for stripped or sheared splines on the Output Sun Gear shell
Reaction Carrier Assembly (467)	• Inspect for stripped or sheared splines on the Input Ring Gear • Inspect for disengaged or broken Input Ring Gear Retainer
Output Carrier Assembly (474)	• Low/Reverse Clutch Assembly (OWC) (455) splines sheared or broken • Inspect for disengaged or broken Reaction Ring Gear Retainer

NO SECOND AND SIXTH GEAR

No Second and Sixth Gear

Checks	Causes
2-6 Clutch Assembly	• Inspect for damaged or worn 2-6 Clutch Plates (445-447) • Inspect for damaged, worn, broken, improper surface finish or sheared splines on the 2-6 clutch backing plate (448) • Inspect for damaged or broken 2-6 clutch piston (405) and piston seals damaged, worn or delaminating • Inspect for broken or binding 2-6 clutch piston return spring (406)

	• Inspect for broken or disengaged 2-6 Clutch Piston Return Spring Retainer (407)
Reaction Carrier Assembly (467)	• Inspect for stripped or sheared splines on the Input Ring Gear • Inspect for disengaged or broken Input Ring Gear Retainer

HARSH OR LATE FIRST, SECOND, THIRD AND FOURTH SHIFT

Harsh or Late First, Second, Third and Fourth Shift

Checks	Causes
1-2-3-4 Clutch Assembly	• Inspect for damaged or broken 1-2-3-4 Clutch Piston (461) and piston seals damaged, worn or leaking • Inspect for fatigued or binding 1-2-3-4 Clutch Piston Return Spring (460) • Inspect for improper surface finish on 1-2-3-4 Clutch Plates (456-458)
Case Cover Assembly (403)	Inspect for leaking or loose fitting blow off valve

HARSH FIRST AND REVERSE SHIFT

Harsh First and Reverse Shift

Checks	Causes
Case Cover Assembly (403)	Inspect for plugged or improperly positioned Low & Reverse Piston (408) air bleed
Low and Reverse Clutch	Inspect for improper surface finish on Low & Reverse Clutch Plates (449-453)

NO THIRD, FIFTH AND REVERSE GEAR

No Third, Fifth and Reverse Gear

Checks	Causes
3-5-Reverse Clutch Assembly	• Inspect for damaged, worn or stripped splines on 3-5-Reverse Clutch Plates (423-426), Backing Plate (426) • Inspect for sheared or stripped splines on 3-5-Rev/4-

	5-6 Housing to Turbine Shaft (422) • Inspect for damage, improper surface finish, porosity, deformed or unbalanced 3-5-Rev/4-5-6 Housing (422) • Inspect for damaged, worn, loose or seized hub bushing in the 3-5-Rev/4-5-6 Housing • Inspect for broken, porous or improper surface finish or plugged oil passages of the 3-5-Rev/4-5-6 Housing (422) • Inspect for failure of the Input Shaft Thrust Bearing (32) • Inspect for disengaged or broken 3-5-Reverse Clutch Backing Plate Retainer (427) • Inspect for damaged, worn or leaking 3-5-Reverse Clutch Piston Seals (419-421) • Inspect for damaged or broken 3-5-Rev/4-5-6 Clutch Housing (422) • Inspect for warped, damaged, improper surface finish or debonding 3-5-Reverse Clutch Piston (417) • Inspect for broken or fatigued 3-5-Reverse Clutch Spring (418) • Inspect for disengaged or broken Speed Sensor Reluctor Retainer (415) • Inspect for broken Speed Sensor Reluctor Wheel (416) • Inspect for seized Input Shaft Thrust Bearing (32)
Reaction Carrier (467)	• Inspect for broken or disengaged Input Internal Gear Retainer • Inspect for stripped or sheared splines on the Input Internal Gear
Output Carrier (474)	Inspect for stripped or sheared splines for the Reaction Internal Ring Gear
4-5-6 Clutch Assembly	• Inspect for plugged or missing 4-5-6 Piston Dam Oil Feed hole • Inspect for leaking 4-5-6 Piston Dam

HARSH OR LATE SECOND AND SIXTH SHIFT

Harsh or Late Second and Sixth Shift

Checks	Causes
2-6 Clutch Assembly	• Inspect for worn or improper surface finish on the 2-6 Clutch Plates (446, 447) and Backing Plate (448) • Inspect for fatigued 2-6 Clutch Piston Cushion Spring (445)
Case Cover Assembly (403)	• Inspect for damaged or broken 2-6 Clutch Piston (405) and piston seals damaged, worn or delaminating • Inspect for fatigued 2-6 Clutch Piston Return Spring (406)

NO FOURTH, FIFTH AND SIXTH GEAR

No Fourth, Fifth and Sixth Gear

Checks	Causes
4-5-6 Clutch Assembly	• Inspect for damaged or broken 4-5-6 Clutch Piston (433) and Piston Seals (430-432) • Inspect for broken or disengaged 4-5-6 Backing Plate Retainer (442) • Inspect for damaged or broken 4-5-6 Clutch Dam Piston (435) and piston seals damaged, worn or delaminating • Inspect for broken or disengaged 4-5-6 Clutch Dam Retainer (436) • Inspect for sheared or stripped splines on the Reaction Carrier Hub (438) • Inspect for sheared or stripped splines on 3-5-Rev/4-5-6 Housing to Turbine Shaft (422) • Inspect for loose, worn or damaged 3-5-Rev/4-5-6 Housing Bushing • Inspect for broken, porous or improper surface finish or plugged oil passages of the 3-5-Rev/4-5-6 Housing (422)

	• Inspect for failure of the Input Shaft Thrust Bearing (32)

HARSH OR LATE THIRD, FIFTH AND REVERSE SHIFT

Harsh or Late Third, Fifth and Reverse Shift

Checks	Causes
3-5-Reverse Clutch Assembly	• Inspect for improper surface finish on 3-5-Reverse Clutch Plates (423-426), Backing Plate (426) • Inspect for plugged or restricted oil passages and air bleed of the 3-5-Rev/4-5-6 Housing (422) • Inspect for damaged, worn or leaking 3-5-Reverse Clutch Piston Seals (419-421) • Inspect for warped 3-5-Rev/4-5-6 Clutch Housing (422) • Inspect for fatigued 3-5-Reverse Clutch Waved Plate (423)

HARSH FOURTH, FIFTH AND SIXTH SHIFT

Harsh Fourth, Fifth and Sixth Shift

Checks	Causes
4-5-6 Clutch Assembly	• Inspect for leaking 4-5-6 Clutch Piston (433) and Piston Seals (430-432) • Inspect for plugged or restricted 4-5-6 Piston Dam air bleed • Inspect for fatigued 4-5-6 Clutch Piston Spring (434) • Inspect for leaking 4-5-6 Clutch Dam Seals (435) • Inspect for improper surface finish on 4-5-6 Clutch Plates (439-441) • Inspect for porous, improper surface finish, seal groove damage or plugged or restricted oil passages of the 3-5-Rev/4-5-6 Housing (422)

NO TORQUE CONVERTER CLUTCH APPLY

No Torque Converter Clutch Apply

Checks	Causes
Torque Converter Assembly (27)	• Inspect for damaged Torque Converter Clutch Seal (inside converter assembly) • Diagnose Torque Converter Assembly for possible internal damage
Upper Valve Body Assembly (349)	Inspect for worn, damaged or sticking TCC Regulator Apply (330) and TCC Regulator Apply Shuttle (331) Valves
Transfer Drive Gear Support Assembly (208)	Inspect for worn or damaged Transfer Drive Gear Support Seal (213)
Torque Converter Housing Assembly (221)	Inspect for worn or damaged Torque Converter Fluid Seal Assembly (225)

NO TORQUE CONVERTER CLUTCH RELEASE

No Torque Converter Clutch Release

Checks	Causes
Torque Converter Assembly (27)	Diagnose Torque Converter Assembly for possible internal damage
Upper Valve Body Assembly (349)	Inspect for worn, damaged or sticking TCC Regulator Apply (330) and TCC Regulator Apply Shuttle (331) Valves

HARSH TORQUE CONVERTER CLUTCH APPLY OR INOPERATIVE OR NO ELECTRONICALLY CONTROLLED CAPACITY CLUTCH CONTROL

Harsh Torque Converter Clutch Apply or Inoperative or No Electronically Controlled Capacity Clutch Control

Checks	Causes
Torque Converter Assembly (27)	Inspect for leaking or damaged Torque Converter Clutch Hub Seal
Drive Gear Support Assembly (208)	Inspect for leaking Drive Gear Support Seal (213)

NO REVERSE GEAR

No Reverse Gear

Checks	Causes
3-5-Reverse Clutch Assembly	• Inspect for damaged, worn or stripped splines on 3-5-Reverse Clutch Plates (423-426), Backing Plate (426) • Inspect for sheared or stripped splines on 3-5-Rev/4-5-6 Housing to Turbine Shaft (422) • Inspect for damage, improper surface finish, porosity, deformed or unbalanced 3-5-Rev/4-5-6 Housing (422) • Inspect for damaged, worn, loose or seized hub bushing in the 3-5-Rev/4-5-6 Housing • Inspect for broken, porous or improper surface finish or plugged oil passages of the 3-5-Rev/4-5-6 Housing (422) • Inspect for failure of the Input Shaft Thrust Bearing (32) • Inspect for disengaged or broken 3-5-Reverse Clutch Backing Plate Retainer (427) • Inspect for damaged, worn or leaking 3-5-Reverse Clutch Piston Seals (419-421) • Inspect for damaged or broken 3-5-Rev/4-5-6 Clutch Housing (422) • Inspect for warped, damaged, improper surface finish or debonding 3-5-Reverse Clutch Piston (417) • Inspect for broken or fatigued 3-5-Reverse Clutch Spring (418) • Inspect for disengaged or broken Speed Sensor Reluctor Retainer (415) • Inspect for broken Speed Sensor Reluctor Wheel (416) • Inspect for seized Input Shaft Thrust Bearing (32)

FLUID PRESSURE HIGH OR LOW

Fluid Pressure High or Low

Checks	Causes

Fluid Pump Assembly (203)	• Inspect for loose Fluid Pump Bolts (204) • Inspect for leaking or damaged Fluid Pump Outlet Seals (57) and Oil Filter Seal (202) • Inspect for improperly installed or damaged Oil Filter (201) • Inspect for sticking Line Pressure Blow Off Valve
Front Differential Drive Gear Support Assembly (208)	• Inspect for leaking or damaged Drive Gear Support Torque Converter Seal Assembly (206) or Fluid Passage Tube Gasket (212) • Inspect for leaking or damaged Drive Gear Support Fluid Passage Tube Assembly (209)
Upper Valve Body Assembly (312)	• Inspect for leaking or damaged Upper Valve Body Assembly (309) Gasket • Inspect for worn, sticking or damaged Pressure Regulator Valve (337) or Pressure Regulator Valve Spring (338)
Lower Valve Body Assembly (313)	Inspect for leaking or damaged Lower Valve Body Assembly (313) Gasket
Control Valve (w/Body & TCM) Valve Assembly (15)	Inspect for leaking or damaged Filter Plate Assembly Seals (16)
Case Assembly (51)	Inspect for missing Lube Oil Circuit Orifice or Baffle (229)