Service Bulletin

Bulletin No.: 21-NA-169
Date: April, 2022

TECHNICAL

Subject: **Diagnostic Tip for DTCs Set at a Low Mileage for 9T45/50/60 Automatic Transmissions**

Attention: **This bulletin only applies to vehicles with less than 19,000 km (12,000 miles) on the odometer.**

Brand:	Model:	Model Year:		VIN:		Engine:	Transmission: (9T45, 9T50 or 9T60 Automatic)
		from	to	from	to		
Buick	Encore GX	2020	2022	—	—	—	M3F
	Envision	2020	2022				M3T, M3H
	Regal	2020	2020				M3D, M3T
Cadillac	XT4	2020	2022				M3H
	XT5						M3G
	XT6						M3G
Chevrolet	Blazer	2020	2022				M3D, M3T
	Equinox	2020	2020				M3D
	Malibu	2020	2022				M3E
	Trailblazer	2021	2022				M3F
GMC	Acadia	2020	2022				M3H, M3G
	Terrain						M3H, M3U
Holden	Equinox	2020	2020				M3D

Involved Region or Country	North America, Middle East, Europe, Australia/New Zealand
Condition	The purpose of this bulletin is to aid the service technician in diagnosing 9T45/50/60 automatic transmissions with low mileage and DTCs current or history related to the control solenoids and valves. Follow the Service Procedure steps below to determine repair strategy.
Information	**Important:** For vehicles equipped with 9T65 transmissions (RPO M3V or M3W), do not follow this bulletin and refer to Service Bulletin # 20-NA-136. Please refer to these service publications for resolutions to customer comments prior to proceeding with this bulletin: ⇒ 18-NA-359: Information on Flashing D in PRNDL and/or Transmission Slip/ Flare on 1-2 Upshift with Zero to Very Light Throttle Input ⇒ 21-NA-038: Humming Noise Heard Coming From Front End of Vehicle When Driving at Highway Speeds (Blazer) ⇒ 19-NA-023: High Pitch Whine Noise Heard at 32-56 km/h (20-35 mph) in Any Gear Under Light to Moderate Acceleration (Equinox, Terrain) ⇒ 20-NA-165: Flutter or Boom Noise at 1200 RPM- Service Calibration (Trailblazer, Encore GX) ⇒ 21-NA-122: Vibration or Boom At 1300 RPM (Equinox, Terrain) ⇒ 21-NA-201: Information on DTC P0747 Setting at Engine Shut Down When Transmission is in Park/Neutral with No Hydraulic/Mechanical Transmission Concern ⇒ 21-NA-118: Vibration Type Noise Heard at Highway Speeds or with Engine Speed at 1,300-1,500 RPM (XT5, XT6, Blazer, Acadia)

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Service Procedure

Step One - DTCs

Check all Modules for DTCs. Records of all DTCs, Current or History, and Module Located In/On Repair Order.

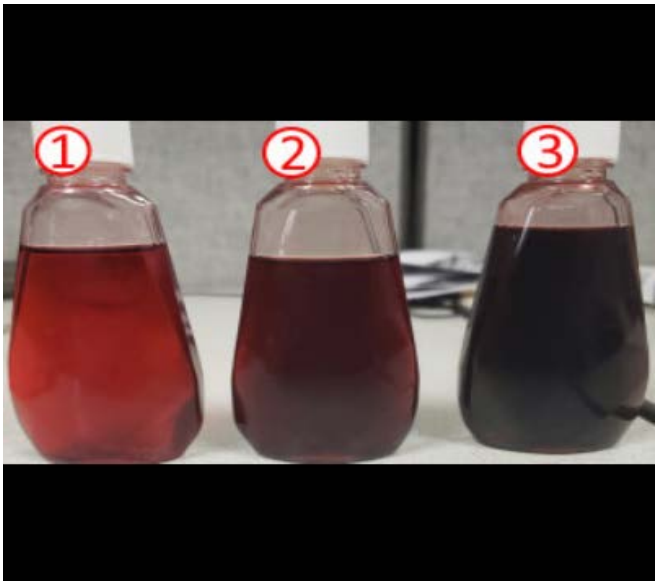
Step Two - Fluid Level and Condition Check

Note: Ensure the transmission has enough fluid in it to safely start the vehicle without damaging the transmission. With the vehicle off and the transmission fluid temperature at approximately 20–25°C (68–77°F), there must be at least enough fluid to drain out of the fluid level hole. This will ensure that there is enough fluid in the sump to fill the components once the vehicle is started.

1. Start the engine.
2. 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).
3. Allow the engine to idle 500–800 rpm for at least 3 minutes to allow any fluid foaming to dissipate and the fluid level to stabilize.
4. Release the brake pedal.
5. Keep the engine running and observe the transmission fluid temperature (TFT) using the Driver Information Center (DIC) or a scan tool.

Caution: The transmission fluid level must be checked when the transmission fluid temperature (TFT) is at 85–95°C (185–203°F). If the TFT is not at this temperature, operate the vehicle or allow the fluid to cool as required. Setting the fluid level with a TFT outside this temperature will result in either an under or over-filled transmission. TFT 95°C under-filled, TFT 85°C over-filled. An under-filled transmission will cause premature component wear or damage. An over-filled transmission will cause fluid to discharge out the vent tube, fluid foaming, or pump cavitation.

6. Raise the vehicle on a hoist. The vehicle must be level, with the engine running and the shift lever in the PARK range.
7. While the vehicle is idling, remove the oil level set plug (1). Allow any fluid to drain:
   - If the fluid is flowing as a steady stream, wait until the fluid begins to drip.
   - If no fluid comes out, add fluid until fluid drips out.
8. Record fluid level; overfilled, under-filled, correct on repair order and how much was needed to fill or came out:
   - If fluid is overfilled, set correct level and retest.
   - If fluid is under-filled, inspect for external leaks. Refer to *Fluid Leak Diagnosis* in SI.



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9. If fluid level is correct, then check condition of the fluid:
   - The fluid should be red or brown.
   - The fluid should be transparent so that objects or writing can be seen through it. Sample #1 is an example of acceptable fluid. Sample #2 is an example of very dark fluid. Sample #3 is an example of black fluid.
   - In addition to checking the fluid color and transparency, the fluid should be checked for an odor of burnt fluid. If the fluid is very dark, black, or has a burnt odor it would indicate clutch damage has occurred internally in the transmission and it would need to be removed from the vehicle and investigated.
   - Fluid that is cloudy or milky or appears to be contaminated with water indicates engine coolant or water contamination. Refer to the last version of Service Bulletin 08-07-30-035 for testing and, if confirmed, find the source of the coolant/water and repair. Then follow service manual instructions “engine coolant/water in transmission” to repair the transmission.
   - Inspect the fluid for excessive metal particles or other debris:
     – A small amount of “friction” material is a “normal” condition.
     – A small amount of “metal” from the manufacturing process is a “normal” condition. This is observed as fine silver streaks floating in the fluid.
     – If large pieces and/or metal pieces are noted in the fluid, or the fluid when rubbed between fingers feels gritty/sandy, it would indicate hardware damage has occurred internally in the transmission and it would need to be removed from the vehicle and investigated.
   - Inspect for external leaks. Refer to *Fluid Leak Diagnosis* in SI.
     – If fluid level and condition are OK, proceed to next step.

Step Three - Line Pressure Check

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

Note: You may need to remove or disconnect components in order to gain access to the transmission line pressure test hole plug.

1. Remove the line pressure test hole plug. Refer to *Automatic Transmission Fluid Pressure Test Hole Plug Replacement* in SI.
2. Install the *GE-21867* Pressure Gauge.
3. Start the engine.
4. Verify the Transmission Fluid Pressure = Greater than 345 kPa (50 psi).
   - If pressure is below 50 psi, record on the repair order and follow SI document for Fluid Pressure High or Low.
   - If above 50 psi, proceed to next step.
5. Turn the engine OFF.
6. Remove the *GE-21867* Pressure Gauge.
7. Install and tighten line pressure test hole plug. Refer to *Automatic Transmission Fluid Pressure Test Hole Plug Replacement* in SI.

Step Four - Perform Road Test

Perform step 1-4 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 *Control Module References* for typical data values. Data that is questionable may indicate a concern.
5. Check the garage shifts:
   ⇒ Apply the brake pedal and ensure the parking brake is set.
   ⇒ Move the gear selector through the following ranges:
   - PARK to REVERSE
   - REVERSE to NEUTRAL
   - NEUTRAL to DRIVE
   - DRIVE to REVERSE
   - REVERSE to DRIVE

   ⇒ Pause 2 to 3 seconds in each gear position.
   ⇒ Verify the gear engagements are immediate (less than 2 seconds to complete if transmission fluid temperature is above *20°C (68°F)* and not harsh. Note that these shifts may be almost imperceptible in some applications. Using the scan tool to monitor Transmission ISS, achieving 0 rpm can be used to check delay in these cases.

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

- High engine idle speed – Compare engine idle speed to desired idle speed.
- A default condition caused by certain DTCs that result in maximum line pressure to prevent clutch slippage.
- Incomplete adapting or incorrect adapting – Repeat maneuver multiple times to see if shift quality improves. If it does not and no DTCs were set, then refer to SI document “Harsh Garage Shift”.

Note: 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.
- Cold transmission fluid temperature (TFT) – Use the scan tool to determine TFT.
- Selector linkage – Inspect and adjust as necessary.
- Incomplete adapting or incorrect adapting – Repeat maneuver multiple times to see if delay improves. If it does not and no DTCs were set, then refer to SI document “Harsh Garage Shift”.

6. Check Upshifts – 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 varying current to the appropriate PC solenoids to control oncoming and off going clutch pressures.
   ⇒ Monitor the following scan tool parameters:
   - Calc. Throttle Position
   - Vehicle Speed
   - Engine Speed
   - Transmission ISS
   - Transmission OSS
   - Command Gear
   - TCC PC Sol. Pressure Cmd.
   - TCC Slip Speed
   - TFP Switch 1
   - TFP Switch 2
   - TFP Switch 3
   - TFP Switch 4
   - 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
1. Place the gear selector in the DRIVE position.
2. Accelerate the vehicle using a steady throttle position between 15 and 20 percent. Hold the throttle steady.

3. 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 PC solenoid pressure command should change to “YES” for the oncoming clutch and the PC solenoid pressure command should change to “NO” for the off going clutch.
4. Note any harsh, soft or delayed shifts or slipping. Note any noise or vibration.
5. The torque converter clutch (TCC) feel may not be noticeable. In many applications the TCC will apply after the 1-2 shift and TCC events will not be easily detected using engine speed. Monitor TCC PC solenoid pressure command while driving and check TCC slip speed when the pressure command indicates that the TCC is commanded to apply.
6. When the TCC applies, slip speed should be controlled to below 100 RPM when the transmission is not shifting and the throttle is held steady. If the TCC slip exceeds this value for more than 6 seconds after the TCC PC Sol. Pressure Command indicates that the TCC is commanded on:
   - Check for DTCs.
   - Refer to *Torque Converter Diagnosis* in SI.

Note: This transmission is equipped with an electronically controlled capacity clutch (ECCC), which allows operation of the clutch without fully locking 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.

7. Part Throttle Step-in Downshifts:
   ⇒ Place the gear selector in the DRIVE position.
   ⇒ Accelerate the vehicle at light throttle (5-10 percent) until 3rd gear is just achieved.
   ⇒ Quickly increase throttle angle until commanded gear indicates that a downshift to 2nd gear is commanded.
   ⇒ Verify that the transmission downshifts within 2 seconds of the throttle movement
   ⇒ Repeat steps 2 to 4 at higher speed to achieve 4th gear and then step in to command a 4th gear to 3rd gear downshift.
   ⇒ Repeat steps 2 to 4 at higher speed to achieve 5th gear and then step in to command a 5th to 4th gear downshift.
   ⇒ Repeat steps 2 to 4 at higher speed to achieve 6th gear and then step in to command a 6th gear to 5th gear downshift.
   ⇒ Note any harsh, soft or delayed shifts or slipping. Note any noise or vibration.
8. Coasting Downshifts:
   ⇒ Place the gear selector in the DRIVE position.
   ⇒ Accelerate the vehicle to 6th gear with the TCC applied.
   ⇒ Release the throttle and apply the brakes.
   ⇒ Verify that the downshifts occur as commanded by monitoring gear ratio, which should change after commanded gear changes.
   ⇒ Note any harsh, soft or delayed shifts or slipping. Note any noise or vibration.
9. Reverse:
   ⇒ With the vehicle stopped, move the gear selector to REVERSE.
   ⇒ Slowly accelerate the vehicle to a 10-15 percent throttle position.
   ⇒ Verify that there is no noticeable slip, noise or vibration.
10. Road Test Results:
   ⇒ Diagnostic TIP: If completion of the above tests are inconclusive to isolate if the transmission shifting concern(s) are internal transmission or input/command, can use the control function feature in GDS2 to command all shifts. If when using GDS2 to command shifts and transmission shifts into each range commanded, the concern is generally an input/command concern, and not an internal transmission concern. If ranges are not completed when using GDS2 to command, then generally the concern is an internal transmission concern and not an input/command concern.
   ⇒ If noise or vibration concern is noted, follow *Noise and Vibration Analysis* in SI using Chassis Ears and PICO scope in diagnosis.
   ⇒ If upshifts and downshifts are harsh, soft, delayed, or slip, follow SI diagnosis for condition.

Step Five - DTC

If any of the following DTCs are current or reset during the road test, record on the repair order and follow the instructions below for that DTC.

- P0796 Transmission Control Solenoid Valve 3 Stuck Off
- P0797 Transmission Control Solenoid Valve 3 Stuck On
- P2723 Transmission Control Solenoid Valve 5 Stuck Off
- P2724 Transmission Control Solenoid Valve 5 Stuck On

If any of the above first group of DTCs are current or reset on the road test, the transmission must be removed from the vehicle and inspected for damage to the clutch plates. If hot spots or other evidence of a slipping clutch, then follow SI procedure for replacement of the affected clutch plates and replace **both** the solenoid body and valve body.

- P0746 Transmission Control Solenoid Valve 1 Stuck Off
- P0747 Transmission Control Solenoid Valve 1 Stuck On
- P2731 Transmission Control Solenoid Valve 6 Performance

- P2732 Transmission Control Solenoid Valve 6 Stuck Off
- P2733 Transmission Control Solenoid Valve 6 Stuck On
- P2820 Transmission Control Solenoid Valve 9 Stuck Off
- P2821 Transmission Control Solenoid Valve 9 Stuck On
- P18AA Transmission Range Control Valve 1 Position Switch Circuit Stuck On
- P18AB Transmission Range Control Valve 1 Position Switch Circuit Stuck Off
- P18AC Transmission Range Control Valve 2 Position Switch Circuit Stuck On
- P18AD Transmission Range Control Valve 2 Position Switch Circuit Stuck Off
- P18AE Transmission Range Control Enable Valve Stuck Off

If any of the above second group of DTCs are current or reset on the road test and the transmission fluid is red, translucent, and doesn't have a burnt odor, then **only** replace both the solenoid body and valve body. If the transmission fluid is very dark or black, not translucent, and has a burnt odor, then in addition to replacing the solenoid body and valve body, the transmission should be removed from the vehicle and inspected for damage to the clutch plates, if found follow SI procedure to replace them.

- P0741 Torque Converter Clutch (TCC) System Stuck Off
- P0776 Transmission Control Solenoid Valve 2 Stuck Off
- P0777 Transmission Control Solenoid Valve 2 Stuck On
- P2817 Transmission Control Solenoid Valve 8 Stuck Off
- P2818 Transmission Control Solenoid Valve 8 Stuck On

If any of the above third group of DTCs are current or reset on the road test and the transmission fluid is red, translucent, and doesn't have a burnt odor, then **only** replace the solenoid body. If the transmission fluid is very dark or black, not translucent, and has a burnt odor, then in addition to replacing the solenoid body, the transmission should be removed from the vehicle and inspected for damage to the clutch plates, if found follow SI procedure to replace them.

- P2714 Transmission Control Solenoid Valve 4 Stuck Off
- P2715 Transmission Control Solenoid Valve 4 Stuck On
- P187D Transmission Park Valve Stuck On
- P187E Transmission Park Valve Stuck Off

If any of the above fourth group of DTCs are current or reset on the road test and the transmission fluid is red, translucent, and doesn't have a burnt odor, then **only** replace the valve body. If the transmission fluid is very dark or black, not translucent, and has a burnt odor, then in addition to replacing the valve body, the transmission should be removed from the vehicle and inspected for damage to the clutch plates. If found, follow SI procedure to replace them.

- P18A8 Transmission Park Control Solenoid Actuator Stuck Off
- P18E7 Transmission Park Valve Position Sensor 1 Performance
- P18E8 Transmission Park Valve Position Sensor 2 Performance
- P27EC Transmission Range Control Valve 1 Position Switch Performance
- P27F0 Transmission Range Control Valve 2 Position Switch Performance

Note: If P18A8 is set, then also replace the Park Inhibit Solenoid Actuator along with the solenoid body and valve body.

If any of the above fifth group of DTCs are current or reset on the road test and the transmission fluid is red, translucent, and doesn't have a burnt odor, then check vehicle battery health and state of charge per SI instructions, also check battery, TCM, and Transmission ground for voltage loss. If battery and grounds do not show problem and DTC is current, then replace both the solenoid body and valve body. If the transmission fluid is very dark or black, not translucent, and has a burnt odor, then in addition to replacing the solenoid body and valve body, the transmission should be removed from the vehicle and inspected for damage to the clutch plates. If damage is found, follow SI procedure to replace the clutch plates.

If there are no current DTCs or they were/are only in history and are not able to be reproduced, perform the *Transmission Service Fast Learn Procedure* in SI and if no DTCs reset, return the vehicle to the customer.

Symptoms other than listed above should be diagnosed using SI procedures and repaired as necessary.

Parts Information

No parts are required for this repair.

Warranty Information

For vehicles repaired under the Emission coverage, use the following labor operation. Reference the Applicable Warranties section of Investigate Vehicle History (IVH) for coverage information.

Labor Operation	Description	Labor Time
8486018*	Perform Fluid Level Check and Evaluate Condition, Oil Pressure Checks and Service Fast Learn	1.5 hrs
8463690**	Control Valve Body Replacement	Use Published Labor Operation Time
8463700	Control Valve Solenoid Body Replacement	

*This is a unique Labor Operation for bulletin use only. This operation is only used if no other transmission components are replaced. Can only be used if the vehicle is below 19, 000 km (12,000 miles) on the odometer.

**If valve body and solenoid body are replaced at the same time, use this Labor Operation.

Note: If transmission is removed from vehicle and internally inspected for clutch or hardware failure, use the appropriate valve body or solenoid body Labor Operation for the DTC and include the clutch or hardware inspection and repair time as straight time to the labor operation.

Version	4
Modified	Released July 20, 2021 Revised September 28, 2021 – Added the 2022 Model Year, updated information under both Notes in step 5 under Step Four - Perform Road Test and updated information under Step 5 - DTC. Revised November 29, 2021 – Added Holden Equinox model, Europe, Australia/New Zealand to Involved Region or Country section and updated the service publication reference in last arrow under Information. Revised April 08, 2022 - Replaced PIP5697B with 21-NA-201 and PIT5778A with 21-NA-122 in the Information section.

GM bulletins are intended for use by professional technicians, NOT a "do-it-yourselfer". They are written to inform these technicians of conditions that may occur on some vehicles, or to provide information that could assist in the proper service of a vehicle. Properly trained technicians have the equipment, tools, safety instructions, and know-how to do a job properly and safely. If a condition is described, DO NOT assume that the bulletin applies to your vehicle, or that your vehicle will have that condition. See your GM dealer for information on whether your vehicle may benefit from the information.

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