

2021 TRANSMISSION

Automatic Transmission - 6L50 (MYB) - Repair Instructions - on Vehicle - Canyon, Colorado

REPAIR INSTRUCTIONS - ON VEHICLE

CONNECTOR RECONNECTION - AUTOMATIC TRANSMISSION

Special Tools

EL-35616 Terminal Test Probe Kit

For equivalent regional tools, refer to [Special Tools](#).

When the condition is not currently present, but is indicated in DTC history, the cause may be intermittent. An intermittent may also be the cause when there is a customer complaint, but the symptom cannot be duplicated. Refer to the Symptom Table of the system that is suspect of causing the condition before trying to locate an intermittent condition.

Most intermittent conditions are caused by faulty electrical connections or wiring. Inspect for the following items:

- Loose, corroded, or painted terminal stud/fastener
- Wiring broken inside the insulation
- Poor connection between the male and female terminal at a connector
- A terminal not seated all the way into the connector body
- Poor terminal to wire connection - Some conditions which fall under this description are poor crimps, poor solder joints, crimping over the wire insulation rather than the wire itself, and corrosion in the wire to terminal contact area, etc.
- Pierced or damaged insulation can allow moisture to enter the wiring causing corrosion. The conductor can corrode inside the insulation, with little visible evidence. Look for swollen and stiff sections of wire in the suspect circuits.
- Wiring which has been pinched, cut, or its insulation rubbed through may cause an intermittent open or short as the bare area touches other wiring or parts of the vehicle.
- Wiring that comes in contact with hot or exhaust components
- Refer to [Inducing Intermittent Fault Conditions](#) in order to duplicate the conditions required, in order to verify the customer concern.
- Refer to [Testing for Electrical Intermittents](#) for test procedures to detect intermittent open, high resistance, short to ground, and short to voltage conditions.
- Refer to [Scan Tool Snapshot Procedure](#) for advanced intermittent diagnosis and Vehicle Data Recorder operation.

Testing for Terminal Fretting

Some intermittent conditions can be caused by wire terminal fretting corrosion. Fretting corrosion is a build-up of insulating, oxidized wear debris that can form when there is a small motion between electrical contacts. The oxidized wear debris can pile up enough at the electrical contact spots that the electrical resistance across the connection increases. Movement between the contacting surfaces as small as 10 to 100 microns can cause fretting. To put this in perspective, a sheet of paper is about 100 microns thick, so fretting motion is small and hard to see. Vibration and thermal expansion/contraction are the main sources that create fretting motion. Since vehicles vibrate and can experience large temperature swings, they are a good source for fretting motion. Tin, copper, nickel, and iron surfaces are all susceptible to fretting corrosion. Fretting corrosion can be difficult to see but it looks like small, dark smudges on the terminals contact surface.

To correct a fretting condition disconnect the suspect connector and add dielectric grease / lubricant (Nyogel 760G or equivalent, meeting GM specification 12345579) to both sides of the connector terminals. Then

reconnect the connector and wipe away any excess lubricant. This will correct the additional terminal contact resistance due to the terminal fretting corrosion.

Testing for Proper Terminal Contact

It is important to test terminal contact at the component and any inline connectors before replacing a suspect component. Mating terminals must be inspected to ensure good terminal contact. A poor connection between the male and female terminal at a connector may be the result of contamination or deformation.

Contamination may be caused by the connector halves being improperly connected. A missing or damaged connector seal, damage to the connector itself, or exposing the terminals to moisture and dirt can also cause contamination. Contamination, usually in the underhood or underbody connectors, leads to terminal corrosion, causing an open circuit or intermittently open circuit.

Deformation is caused by probing the mating side of a connector terminal without the proper adapter. Always use the **EL-35616** kit when probing connectors. Other causes of terminal deformation are improperly joining the connector halves, or repeatedly separating and joining the connector halves. Deformation, usually to the female terminal contact tang, can result in poor terminal contact causing an open or intermittently open circuit.

Testing for Proper Terminal Contact in Bussed Electrical Centers

It is very important to use the correct test adapter when testing for proper terminal contact of fuses and relays in a bussed electrical center. Use the **EL-35616** kit to test for proper terminal contact. Failure to use the **EL-35616** kit can result in improper diagnosis of the bussed electrical center.

Follow the procedure below in order to test terminal contact:

1. Separate the connector halves.
2. Visually inspect the connector halves for contamination. Contamination may result in a white or green build-up within the connector body or between terminals. This causes high terminal resistance, intermittent contact, or an open circuit. An underhood or underbody connector that shows signs of contamination should be replaced in its entirety: terminals, seals, and connector body.
3. Using an equivalent male terminal/terminated lead, verify that the retention force is significantly different between a known good terminal and the suspect terminal. Replace the female terminal in question.

Flat Wire Connectors

There are no serviceable parts for flat wire connectors on the harness side or the component side.

Follow the procedure below in order to test terminal contact:

1. Remove the component in question.
2. Visually inspect each side of the connector for signs of contamination. Avoid touching either side of the connector as oil from your skin may be a source of contamination as well.
3. Visually inspect the terminal bearing surfaces of the flat wire circuits for splits, cracks, or other imperfections that could cause poor terminal contact. Visually inspect the component side connector to ensure that all of the terminals are uniform and free of damage or deformation.
4. Insert the appropriate adapter into the flat wire harness connector in order to test the circuit in question.

Control Module/Component Voltage and Grounds

Poor voltage or ground connections can cause widely varying symptoms.

- Test all control module voltage supply circuits. Many vehicles have multiple circuits supplying voltage to a control module. Other components in the system may have separate voltage supply circuits that may also need to be tested. Inspect connections at the module/component connectors, fuses, and any intermediate connections between the voltage source and the module/component. A test lamp or a DMM may indicate that voltage is present, but neither tests the ability of the circuit to carry sufficient current.

Operate the component to test the ability of the circuit to carry sufficient current. Refer to [Circuit Testing](#) , or [Power Distribution Wiring Schematics](#) .

- Test all control module ground and system ground circuits. The control module may have multiple ground circuits. Other components in the system may have separate grounds that may also need to be tested. Inspect grounds for clean and tight connections at the grounding point (screw or stud). Inspect the connections at the component and in splice packs, where applicable. Operate the component to test the ability of the circuit to carry sufficient current. Refer to [Circuit Testing](#) , or [Ground Distribution Wiring Schematics](#) .

Temperature Sensitivity

- An intermittent condition may occur when a component/connection reaches normal operating temperature. The condition may occur only when the component/connection is cold, or only when the component/connection is hot.
- Freeze Frame, Failure Records, Snapshot, or Vehicle Data Recorder data may help with this type of intermittent condition, where applicable.
- If the intermittent is related to heat, review the data for a relationship with the following:
 - High ambient temperatures
 - Underhood/engine generated heat
 - Circuit generated heat due to a poor connection, or high electrical load
 - Higher than normal load conditions, towing, etc.
- If the intermittent is related to cold, review the data for the following:
 - Low ambient temperatures - In extremely low temperatures, ice may form in a connection or component. Inspect for water intrusion.
 - The condition only occurs on a cold start.
 - The condition goes away when the vehicle warms up.
- Information from the customer may help to determine if the trouble follows a pattern that is temperature related.
- If temperature is suspected of causing an intermittent fault condition, attempt to duplicate the condition. Refer to [Inducing Intermittent Fault Conditions](#) in order to duplicate the conditions required.

Electromagnetic Interference and Electrical Noise

Some electrical components/circuits are sensitive to electromagnetic interference or other types of electrical noise. Inspect for the following conditions:

- A mis-routed harness that is too close to high voltage/high current devices such as secondary ignition components, motors, generator etc. - These components may induce electrical noise on a circuit that could interfere with normal circuit operation.
- Electrical system interference caused by a malfunctioning relay, or a control module driven solenoid or switch - These conditions can cause a sharp electrical surge. Normally, the condition will occur when the malfunctioning component is operating.
- Installation of non-factory or aftermarket add on accessories such as lights, 2-way radios, amplifiers, electric motors, remote starters, alarm systems, cell phones, etc. - These accessories may create interference in other circuits while operating and the interference would disappear when the accessory is not operating. Refer to [Checking Aftermarket Accessories](#) .
- Test for an open diode across the A/C compressor clutch and for other open diodes. Some relays may contain a clamping diode.
- The generator may be allowing AC noise into the electrical system.

Incorrect Control Module

- There are only a few situations where reprogramming a control module is appropriate:
 - A new service control module is installed.

- A control module from another vehicle is installed.
- Revised software/calibration files have been released for this vehicle.

NOTE: **DO NOT re-program the control module with the SAME software/calibration files that are already present in the control module. This is not an effective repair for any type of concern.**

- Verify that the control module contains the correct software/calibration. If incorrect programming is found, reprogram the control module with the most current software/calibration. Refer to [Control Module References](#) for replacement, setup, and programming.

TRANSMISSION CONTROL LEVER KNOB REPLACEMENT

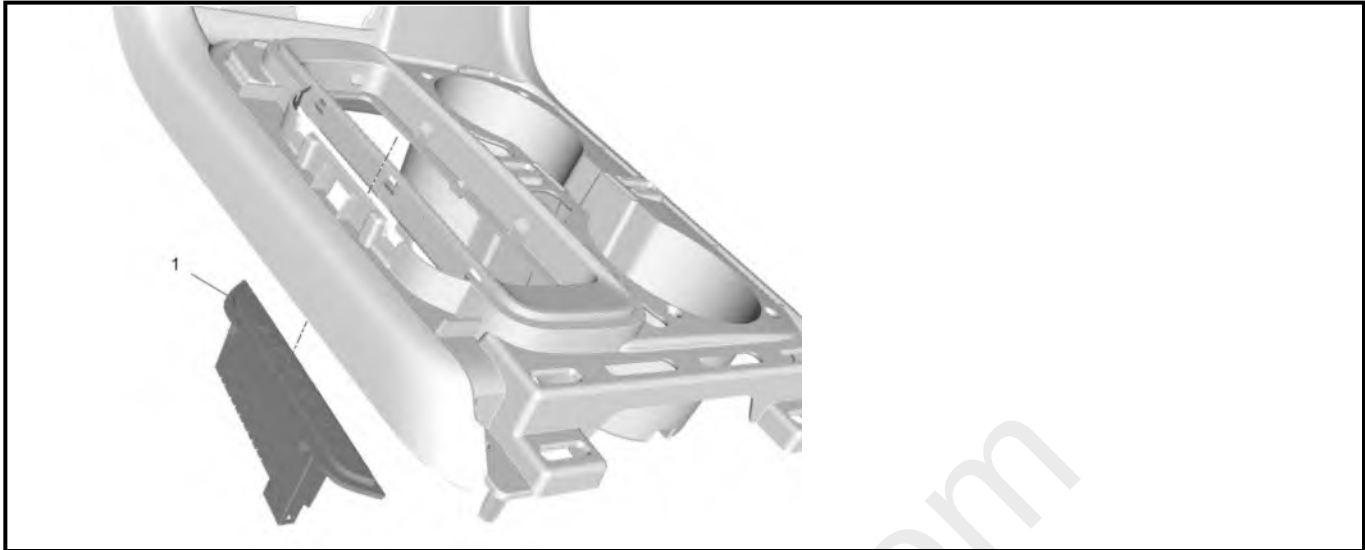


NOTE: Callouts in the following chart represent components shown in graphic above.

Callout	Component Name
1	Transmission Control Lever Knob Retainer (Qty: 6) Procedure Using a flat-bladed plastic trim tool, release the retaining clips securing the control lever boot.
2	Electrical connector
3	Transmission Control Lever Knob NOTE: • The control lever boot and knob are replaced as an assembly. • To remove the knob and boot assembly, pull upward and twist clockwise and counter-clockwise to release it from the

Callout	Component Name
	transmission control shaft.

AUTOMATIC TRANSMISSION CONTROL INDICATOR REPLACEMENT



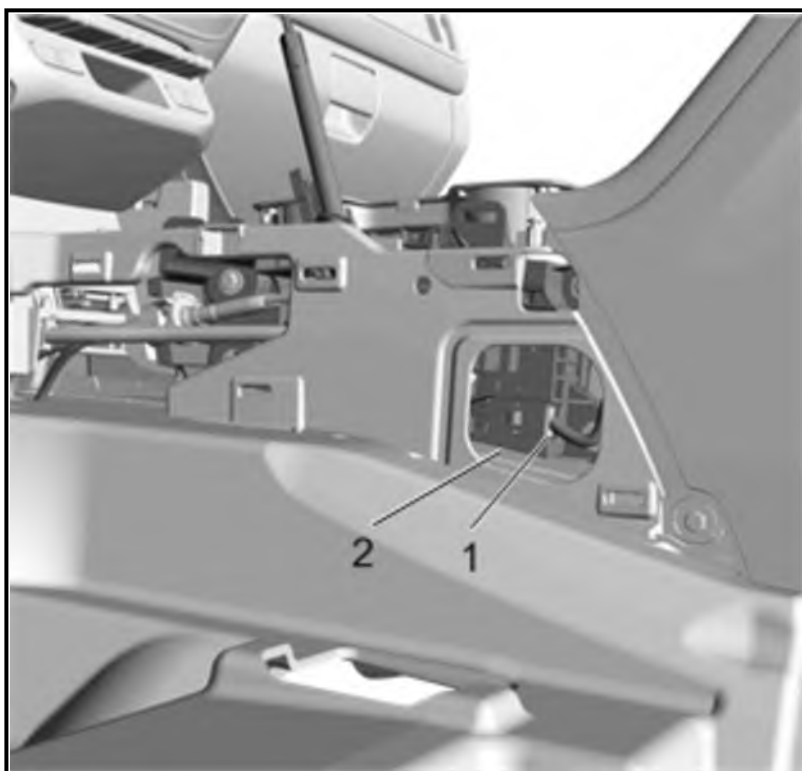
NOTE: Callouts in the following chart represent components shown in graphic above.

Callout	Component Name
Preliminary Procedure Remove the front floor console cup holder trim plate. Front Floor Console Cup Holder Opening Trim Plate Replacement (Manual Transmission) , or Front Floor Console Cup Holder Opening Trim Plate Replacement (Automatic Transmission) .	
1	Automatic Transmission Control Indicator Assembly Procedure Disconnect the electrical connector. Using a trim tool, release retaining tabs.

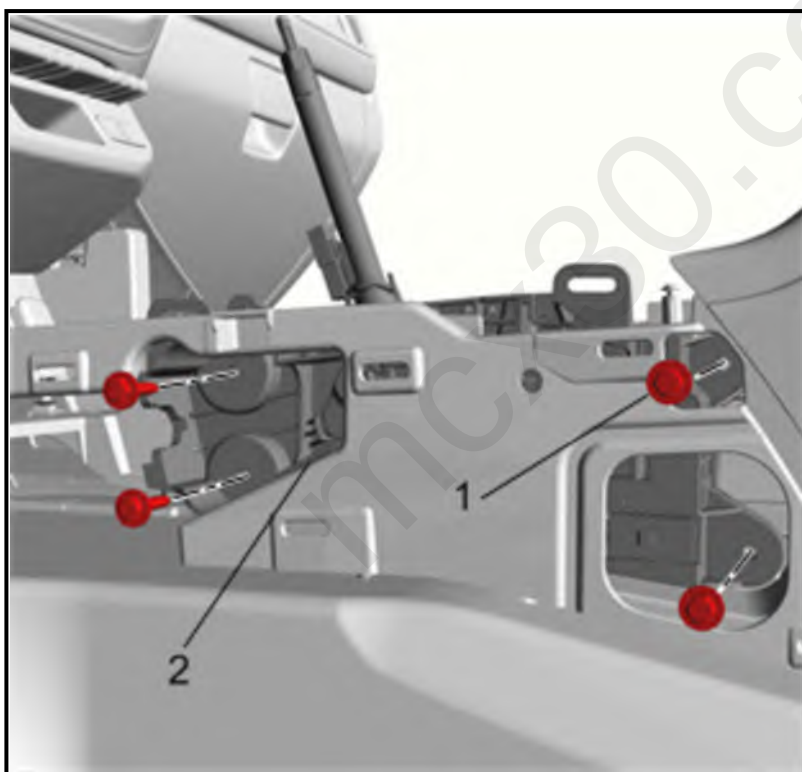
TRANSMISSION CONTROL REPLACEMENT

Removal Procedure

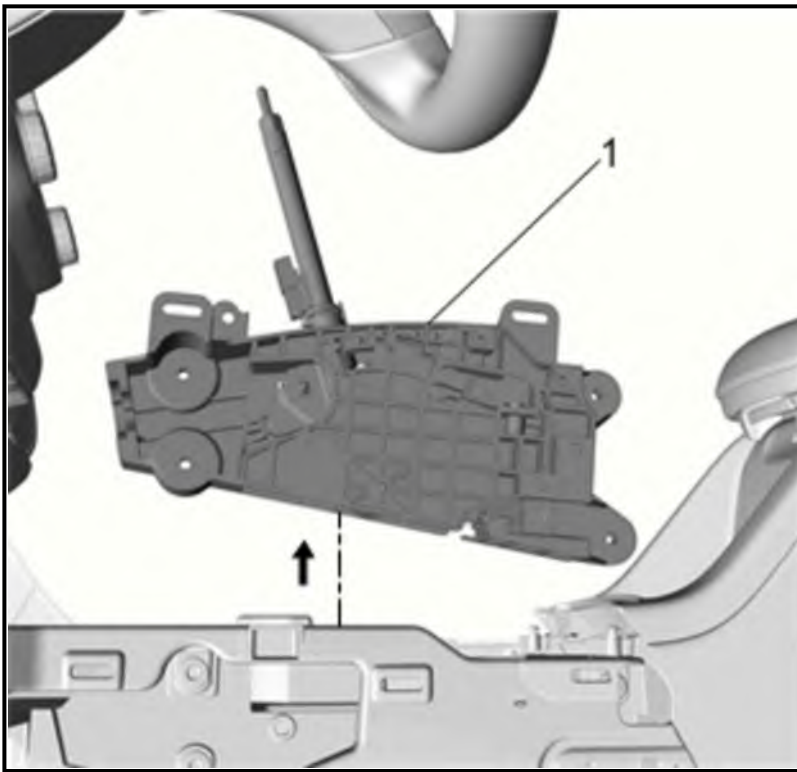
1. Set the park brake and chock the wheels.
2. Remove the front floor console cup holder opening trim plate (automatic transmission). [Front Floor Console Cup Holder Opening Trim Plate Replacement \(Manual Transmission\)](#) , or [Front Floor Console Cup Holder Opening Trim Plate Replacement \(Automatic Transmission\)](#).
3. Range Selector Lever Cable @ Automatic Transmission Control - Remove - [Range Selector Lever Cable Replacement](#)
4. Disconnect the electrical connector (1) from the rear of the transmission control (2).



5. Remove the four transmission shift control fasteners (1).

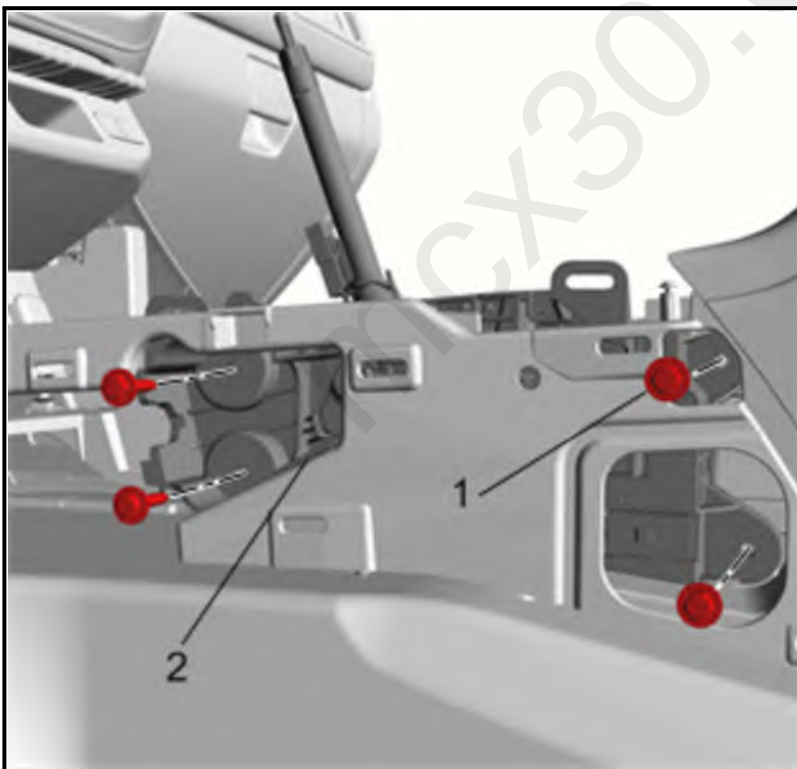


6. Remove the transmission shift control (1) from the console.



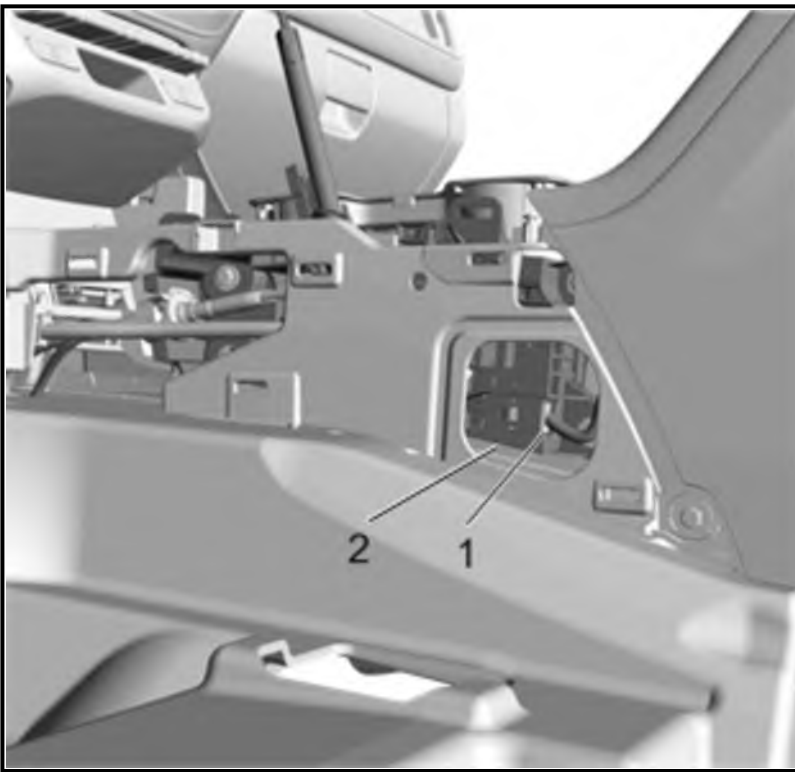
Installation Procedure

1. Position the transmission shift control into the floor console.
2. Install the transmission shift control fasteners (1) and tighten to 9 N.m (80 lb in)



CAUTION: Refer to [Fastener Caution](#) .

3. Connect the electrical connector (1) to the rear of the transmission control.



WARNING:

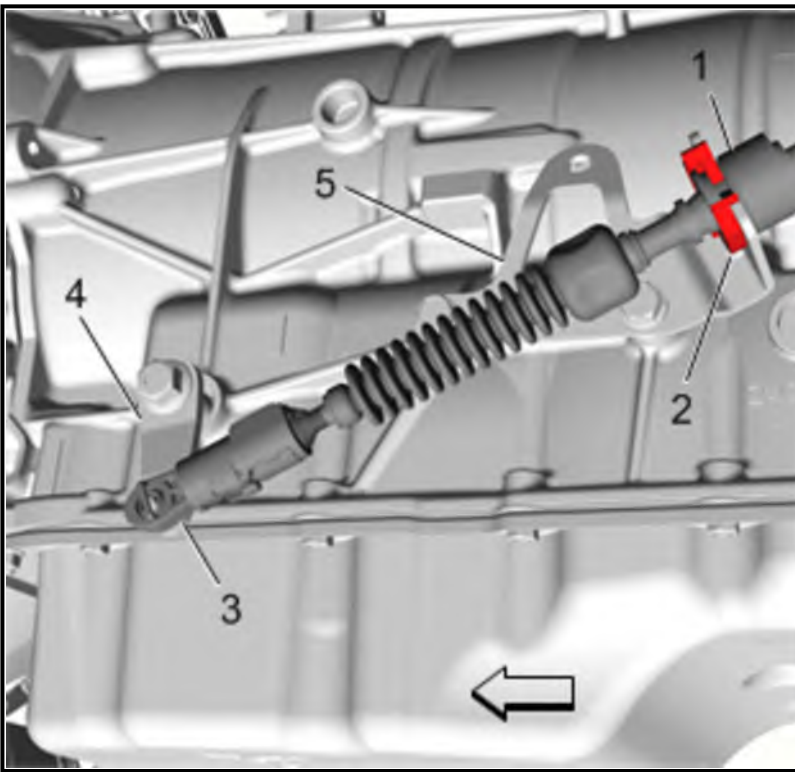
After installing the transmission range selector shift cable, pull up and push down on ALL connections to verify that the connections are fully seated and properly engaged. Failure to perform this task can result in the vehicle not being able to shift into PARK causing potential vehicle damage and bodily injury.

4. Range Selector Lever Cable @ Automatic Transmission Control - Install - [Range Selector Lever Cable Replacement](#)
5. Install the front floor console cup holder opening trim plate (automatic transmission). [Front Floor Console Cup Holder Opening Trim Plate Replacement \(Manual Transmission\)](#) , or [Front Floor Console Cup Holder Opening Trim Plate Replacement \(Automatic Transmission\)](#).
6. Adjust the automatic transmission range selector lever cable. [Range Selector Lever Cable Adjustment](#)

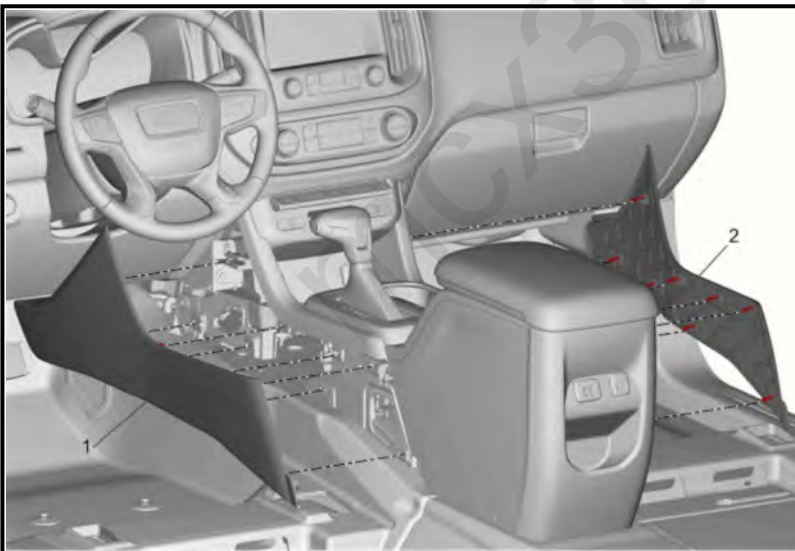
RANGE SELECTOR LEVER CABLE REPLACEMENT (FIRST DESIGN)

Removal Procedure

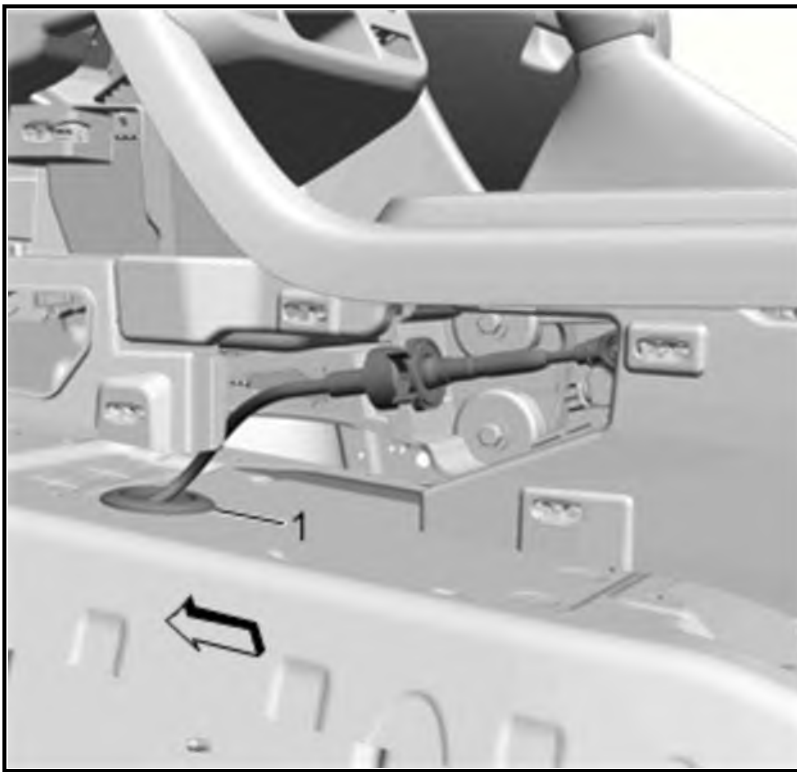
1. Raise and support the vehicle. [Lifting and Jacking the Vehicle](#)
2. Using a flat bladed tool, remove the automatic transmission range selector cable terminal (3).



3. Squeeze the locking retainer (2) in order to release the range selector lever cable (1).
4. Remove the automatic transmission range selector cable (1).
5. Lower the vehicle.
6. Using wheel chocks, block the tires.
7. Front Floor Console Extension Panel-Left Side (1) - Remove - [Front Floor Console Extension Panel Replacement](#)

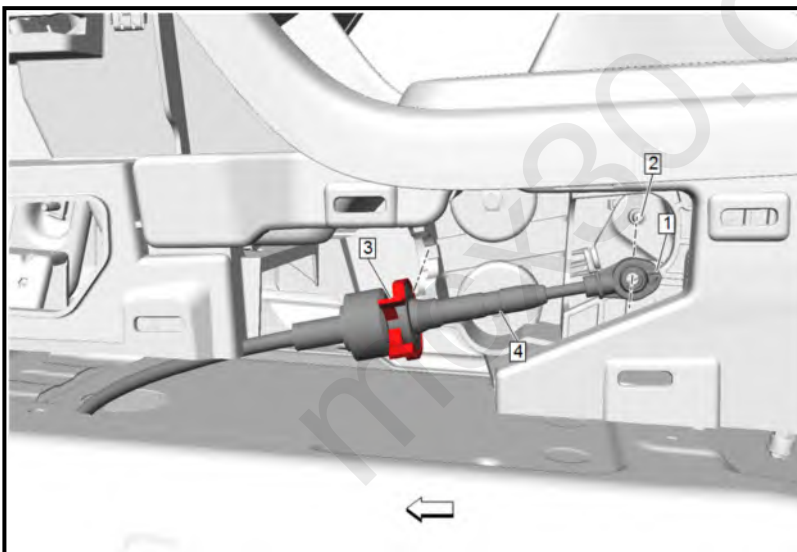


8. Using a flat bladed tool, release the range selector lever cable grommet (1) from the floor pan.



NOTE: Floor carpet not shown for clarity.

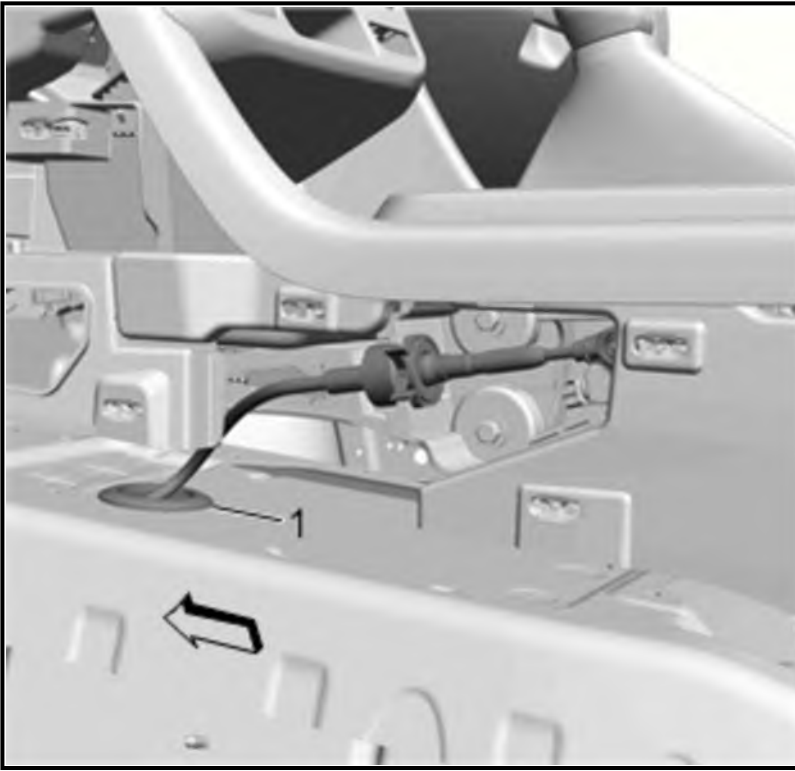
9. Disconnect the range selector lever cable end (1).



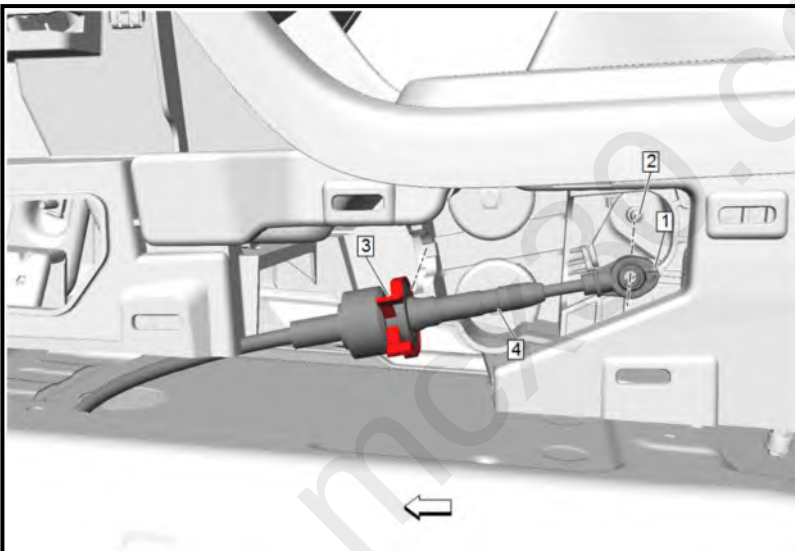
10. Squeeze the range selector lever cable retainer (3) and remove the range selector lever cable.
11. Remove the range selector lever cable (4).

Installation Procedure

1. Position the range selector lever cable through the floor pan.
2. Install the automatic transmission range selector cable grommet (1).



3. Connect the range selector lever cable end (1).



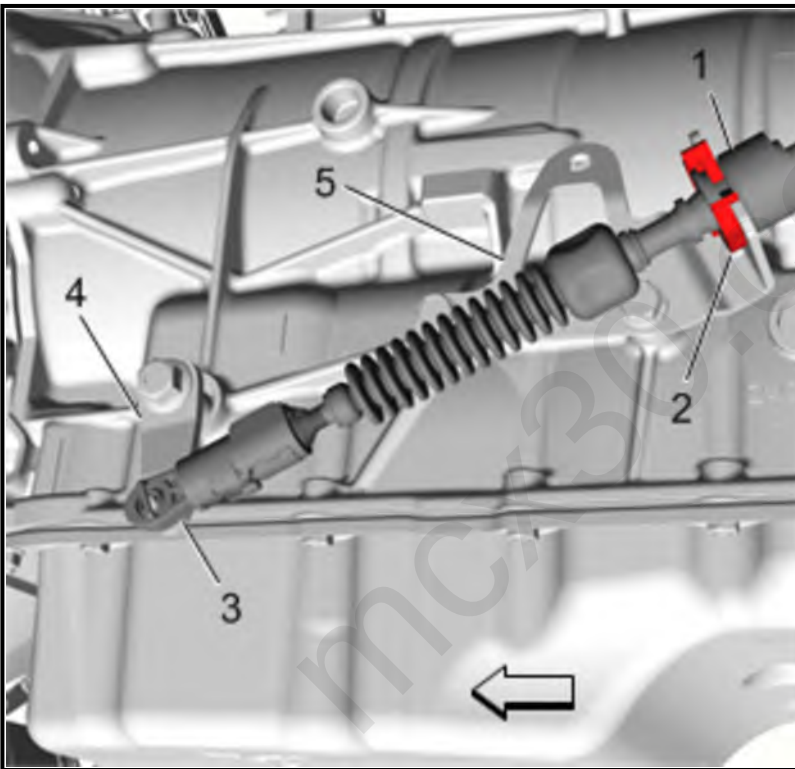
4. Squeeze the range selector lever cable retainer (3) and install the range selector lever cable (4).

5. Front Floor Console Extension Panel-Left Side (1) - Install - [Front Floor Console Extension Panel Replacement](#)



6. Raise the vehicle.

7. Properly route and position the automatic transmission range selector cable (1).



8. Install the automatic transmission range selector cable terminal (3).

9. Install the automatic transmission range selector cable retainer (2).

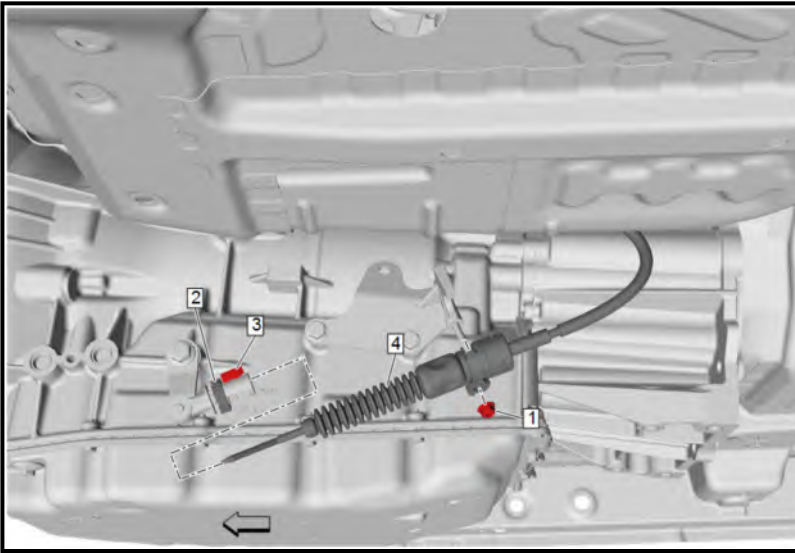
WARNING: After installing the transmission range selector shift cable, pull up and push down on ALL connections to verify that the connections are fully seated and properly engaged. Failure to perform this task can result in the vehicle not being able to shift into PARK causing potential vehicle damage and bodily injury.

10. Adjust the automatic transmission range selector cable. [Range Selector Lever Cable Adjustment](#)

RANGE SELECTOR LEVER CABLE REPLACEMENT (SECOND DESIGN)

Removal Procedure

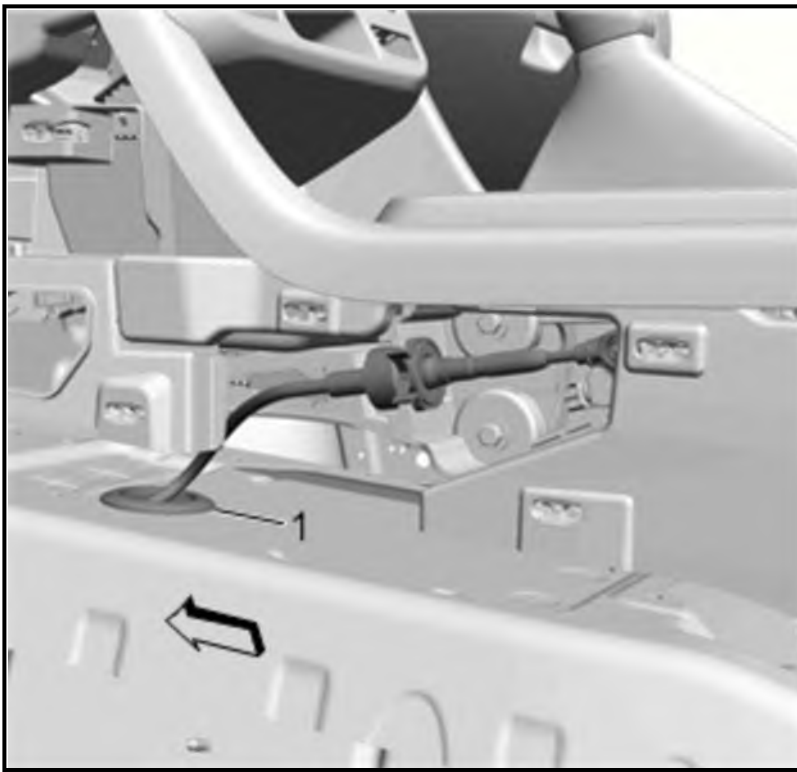
1. Raise and support the vehicle. [Lifting and Jacking the Vehicle](#)
2. Slide the locking ring (2) forward to access the cable retainer (3).



3. Using a flat bladed tool, raise the range selector lever cable retainer (3) on the automatic transmission range selector lever.
4. Remove the range selector lever cable bracket nut (1) from the range selector lever cable bracket.
5. Remove the range selector lever cable (4) from the range selector lever cable bracket.
6. Lower the vehicle.
7. Using wheel chocks, block the tires.
8. Front Floor Console Extension Panel-Left Side (1) - Remove - **Front Floor Console Extension Panel Replacement**

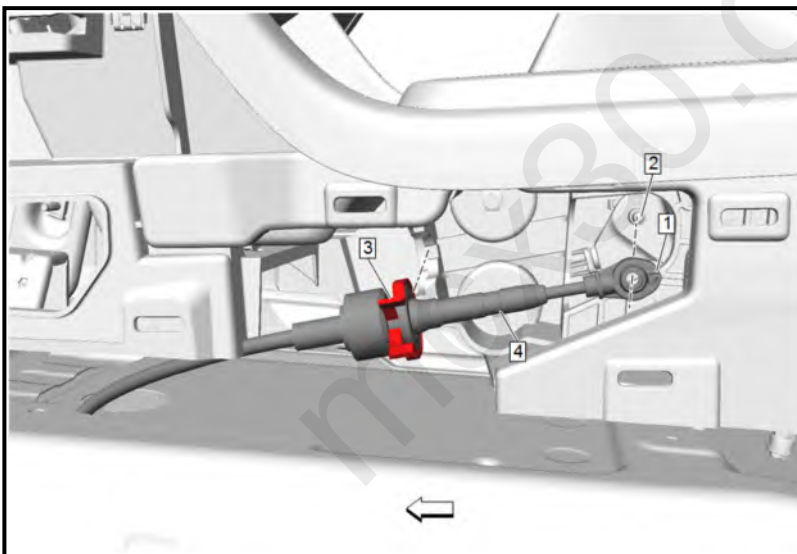


9. Using a flat bladed tool, release the range selector lever cable grommet (1) from the floor pan.



NOTE: Floor carpet not shown for clarity.

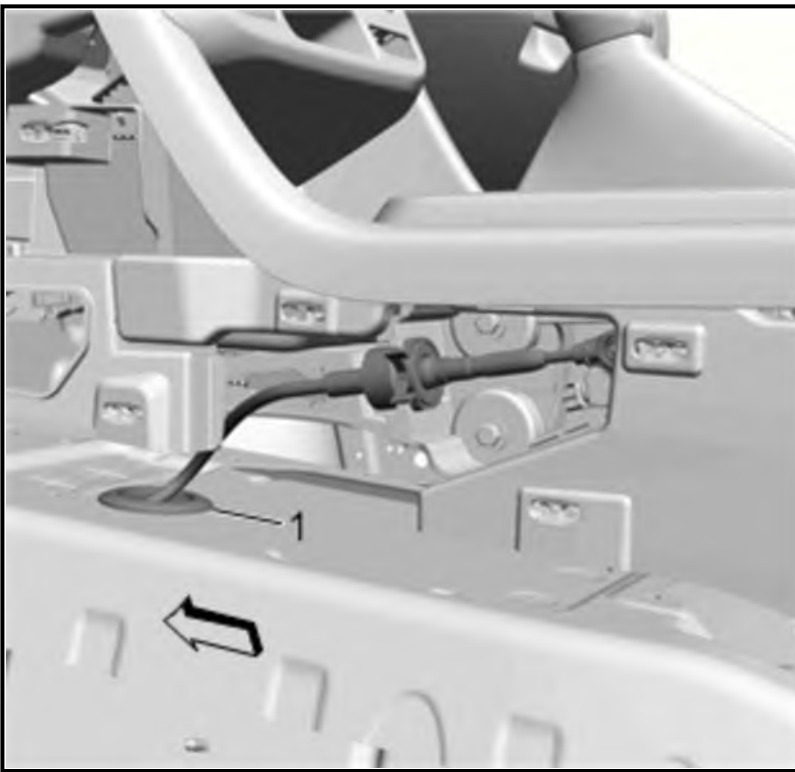
10. Disconnect the range selector lever cable end (1) from the transmission control pin (2).



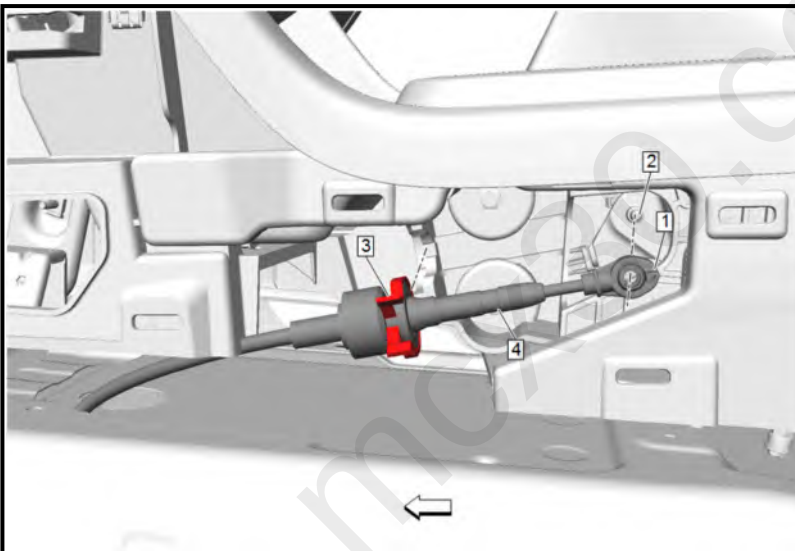
11. Squeeze the range selector lever cable retainer (3) and remove the range selector lever cable from the transmission control.
12. Remove the shift cable from the vehicle.

Installation Procedure

1. Position the shift cable through the floor pan.
2. Install the automatic transmission range selector cable grommet (1) to the floor pan.



3. Connect the range selector lever cable end (1) to the transmission control pin (2).



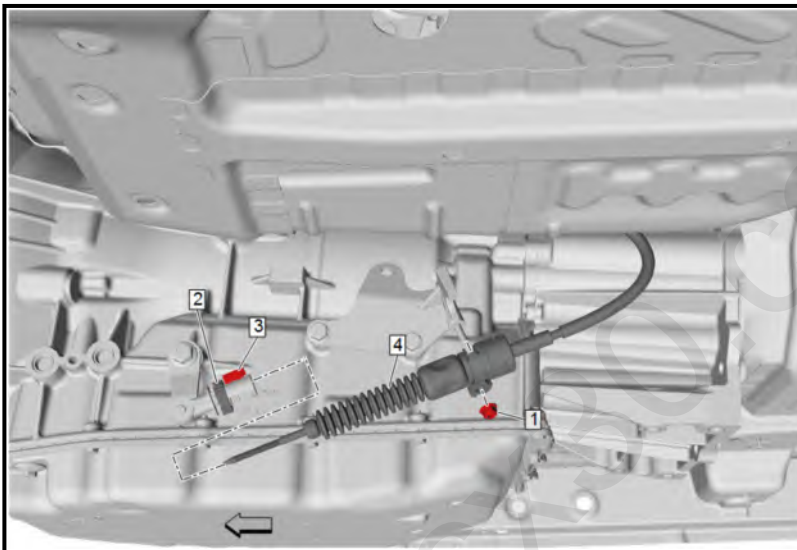
4. Squeeze the range selector lever cable retainer (3) and install the range selector lever cable to the transmission control.

5. Front Floor Console Extension Panel-Left Side (1) - Install - [**Front Floor Console Extension Panel Replacement**](#)



6. Raise the vehicle.

7. Insert the range selector lever cable (4) into the automatic transmission range selector lever.



8. Install the range selector lever cable (4) to the range selector lever cable bracket.

CAUTION: Refer to [Fastener Caution](#) .

9. Install the range selector lever cable bracket nut (1) and tighten to 9 N.m (80 lb in).

NOTE: Ensure the transmission control is in the Park position and the automatic transmission range selector lever is in the Park position.

10. Depress the range selector lever cable retainer (3) on the automatic transmission range selector lever.

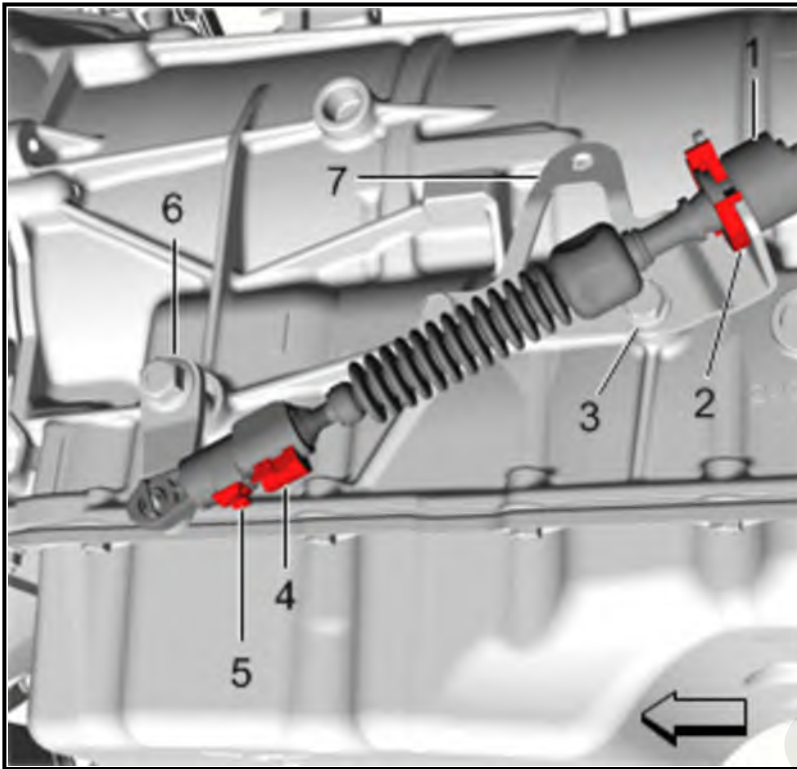
WARNING: After installing the transmission range selector shift cable, pull up and push down on ALL connections to verify that the connections are fully seated and properly engaged. Failure to perform this task can result in the vehicle not being able to shift into PARK causing potential vehicle damage and bodily injury.

11. Slide the locking ring (2) rearward to ensure the cable retainer (3) is fully seated.

12. Adjust the automatic transmission range selector cable. [Range Selector Lever Cable Adjustment](#)

RANGE SELECTOR LEVER CABLE ADJUSTMENT

1. Raise and support the vehicle. Refer to [Lifting and Jacking the Vehicle](#) .
2. Unlock the range selector lever cable adjustment clip (5).



3. Unlock the range selector lever cable adjustment retainer (4).
4. Ensure that the transmission manual shaft lever (6) is in the park (P) position.
5. Lower the vehicle.
6. Ensure that the transmission control is in the park (P) position.
7. Raise the vehicle.

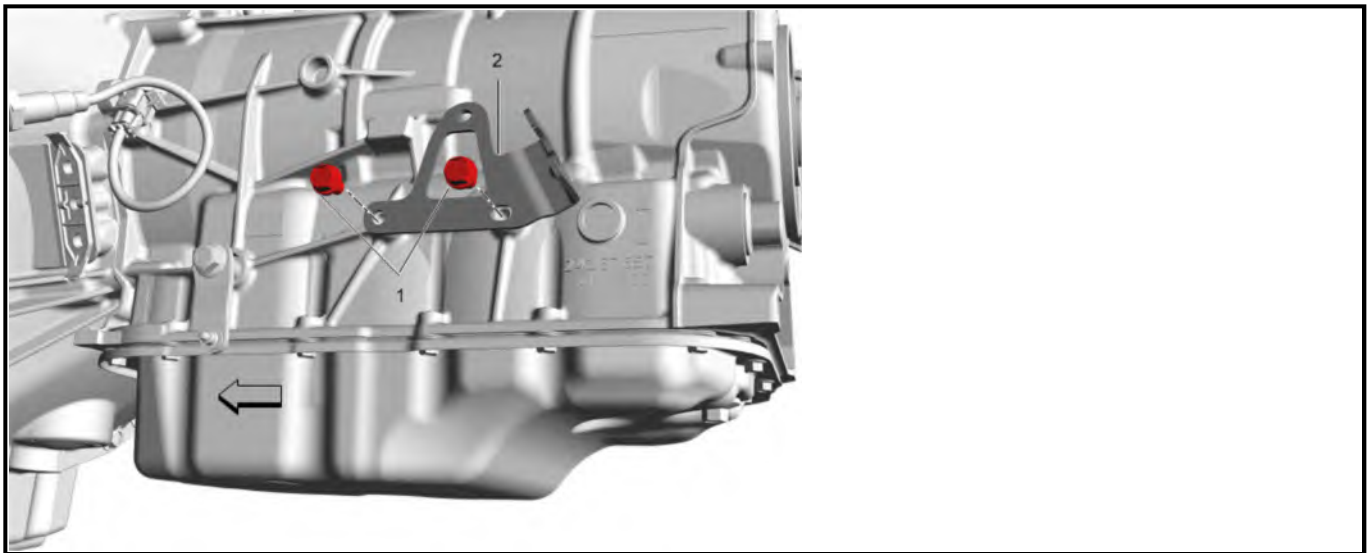
CAUTION: Refer to [Fastener Caution](#) .

8. Hold the selector lever (6) on transmission to eliminate any play.
9. Lock the range selector lever cable adjustment retainer (4).
10. Lock the range selector lever cable adjustment clip (5).
11. Inspect the operation of the starting system with the shift lever in each position. The engine should only crank when the lever is in the PARK or NEUTRAL position.
12. Check to ensure that all available shift controls operate properly.

WARNING: After installing the transmission range selector shift cable, ensure the shifter cannot be shifted out of the Park position unless the brake is applied. Failure to perform this task can result in the shifter moving out of the Park position unintentionally, causing potential vehicle damage and bodily injury.

13. Ensure the shifter cannot be shifted out of the Park position unless the brake is applied.

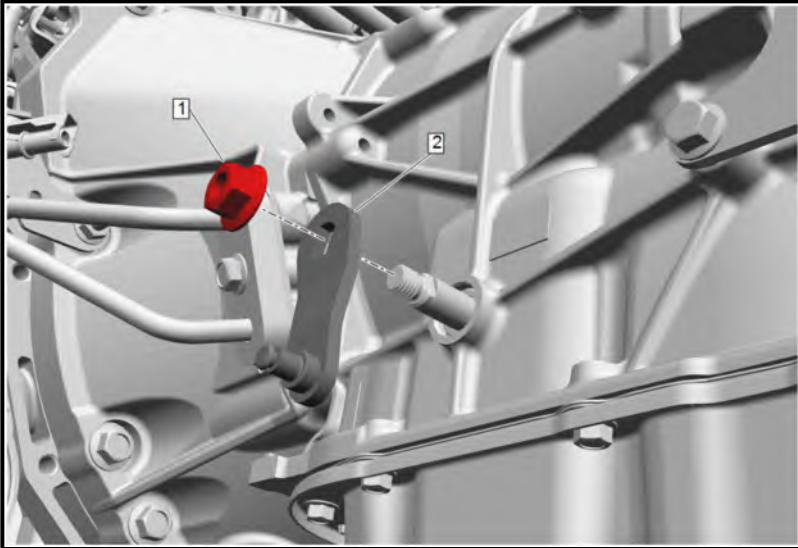
RANGE SELECTOR LEVER CABLE BRACKET REPLACEMENT



NOTE: Callouts in the following chart represent components shown in graphic above.

Callout	Component Name
Preliminary Procedures 1. Apply the park brake. 2. Shift the transmission into NEUTRAL. 3. <u>Lifting and Jacking the Vehicle</u> 4. Range Selector Lever Cable @ Transmission Range Selector Lever Cable Bracket - Disconnect - <u>Range Selector Lever Cable Replacement (First Design)</u>, or <u>Range Selector Lever Cable Replacement (Second Design)</u>.	
1	Transmission Range Selector Lever Cable Bracket Bolt [2x] CAUTION: Refer to <u>Fastener Caution</u> . Tighten 22 N.m (16 lb ft)
2	Transmission Range Selector Lever Cable Bracket

AUTOMATIC TRANSMISSION RANGE SELECTOR LEVER REPLACEMENT



NOTE: Callouts in the following chart represent components shown in graphic above.

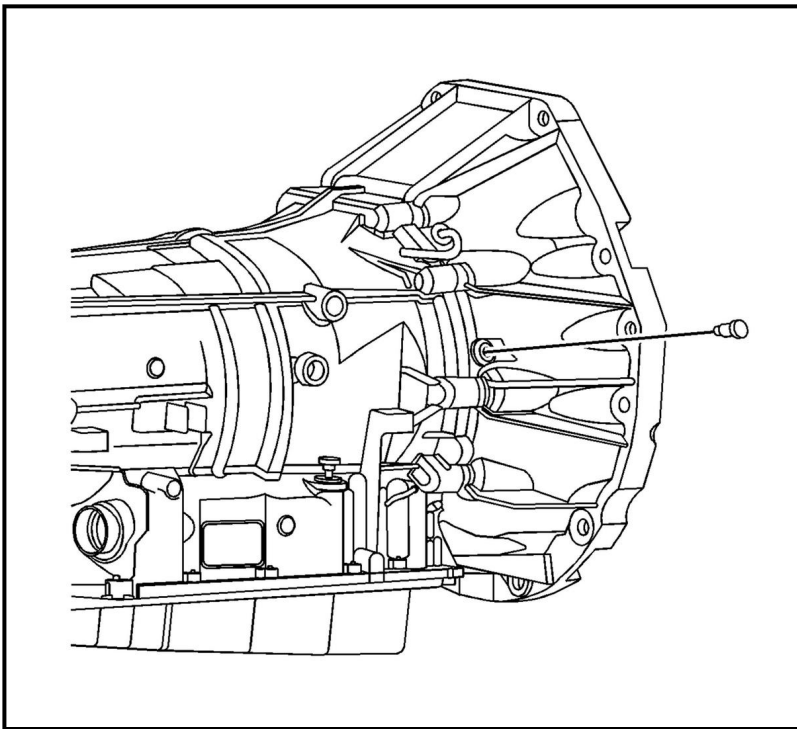
Callout	Component Name
Preliminary Procedures	
1. Apply the park brake. 2. Shift the transmission into neutral.	
WARNING: After installing the transmission range selector shift cable, pull up and push down on ALL connections to verify that the connections are fully seated and properly engaged. Failure to perform this task can result in the vehicle not being able to shift into PARK causing potential vehicle damage and bodily injury.	

Callout	Component Name
3. Range Selector Lever Cable @ Transmission - Disconnect - Range Selector Lever Cable Replacement	
1	Transmission Range Selector Cable Lever Nut WARNING: Hold the transmission range selector lever while removing or installing the lever retaining nut. Failure to hold the lever can cause damage to the transmission internal park system components which could allow the vehicle to roll when placed in the park position. CAUTION: Refer to Fastener Caution . Tighten 25 N.m (18 lb ft)
2	Transmission Range Selector Cable Lever

AUTOMATIC TRANSMISSION FLUID PRESSURE TEST HOLE PLUG REPLACEMENT

Removal Procedure

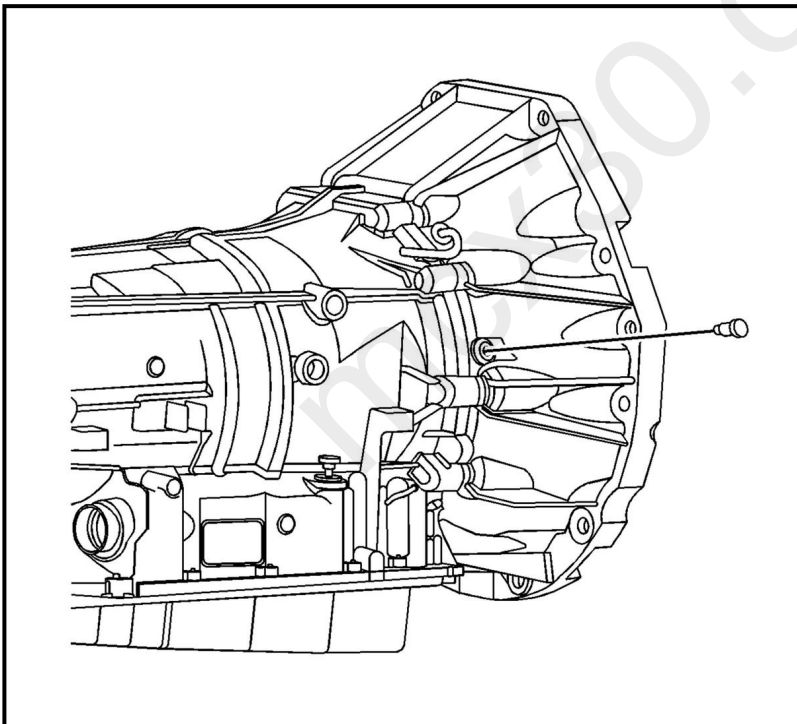
1. Raise and support the vehicle. Refer to [Lifting and Jacking the Vehicle](#) .
2. Clean the surrounding area of the oil pressure test plug.



3. Remove the oil pressure test plug.

Installation Procedure

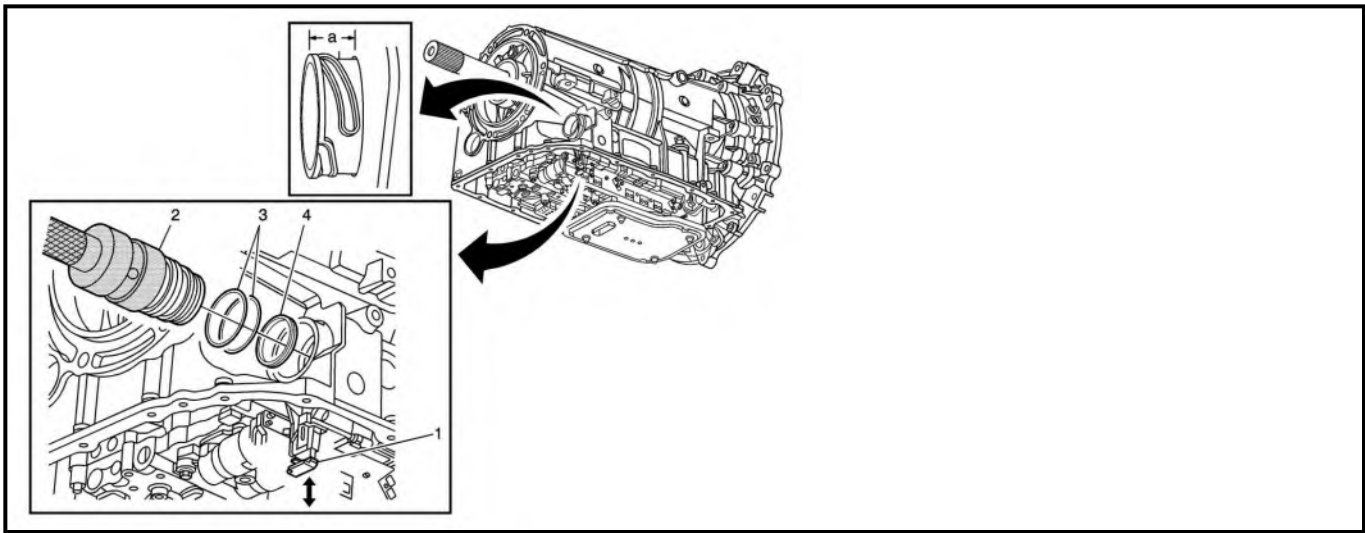
1. Install the oil pressure test plug and tighten to 11 N.m (97 lb in).



CAUTION: Refer to [Fastener Caution](#) .

2. Check the transmission fluid level (fill if necessary). Refer to [Transmission Fluid Level and Condition Check](#) .
3. Lower the vehicle.

AUTOMATIC TRANSMISSION ELECTRICAL CONNECTOR PASSAGE SLEEVE REPLACEMENT



NOTE: Callouts in the following chart represent components shown in graphic above.

Callout	Component Name
CAUTION: Orientate the alignment tab inside the passage sleeve with the slot in the electrical connector of the control solenoid valve assembly. Push the sleeve straight into the case bore and connector. Do NOT rotate the sleeve at any time. Ensure the sleeve is fully seated into the case. When the sleeve is properly installed, the distance from the case surface to the end of the sleeve should be 14 - 16 mm. Even though	

Callout	Component Name
the correct electrical connections may still be maintained, failure to ensure proper installation of the sleeve may result in a fluid leak around the sleeve lip seal and into the sleeve cavity.	
Preliminary Procedures 1. Raise and support the vehicle. Refer to Lifting and Jacking the Vehicle . 2. Remove the transmission oil pan. Refer to Automatic Transmission Fluid, Fluid Pan and/or Filter Replacement. 3. Disconnect the vehicle wire harness electrical connector from the transmission electrical connector passage sleeve.	
1	Electrical Connector Slide Lock TIP: Pull down on the slide lock to remove the sleeve. Push up on the slide lock after sleeve installation.
2	Electrical Connector Passage Sleeve • Use the DT 47715 electrical connector passage sleeve remover/installer and J 42183 driver handle to remove and install the electrical connector passage sleeve. • The distance (a) from the case surface to the end of the sleeve should be 14 - 16 mm. Special Tools • DT 47715 Electrical Connector Passage Sleeve Remover/Installer • J 42183 Driver Handle
3	O-Ring Seal (Qty: 2) TIP: Use a NEW O-ring seal.
4	Lip Seal TIP: Use a NEW lip seal.

AUTOMATIC TRANSMISSION FLUID, FLUID PAN AND/OR FILTER REPLACEMENT

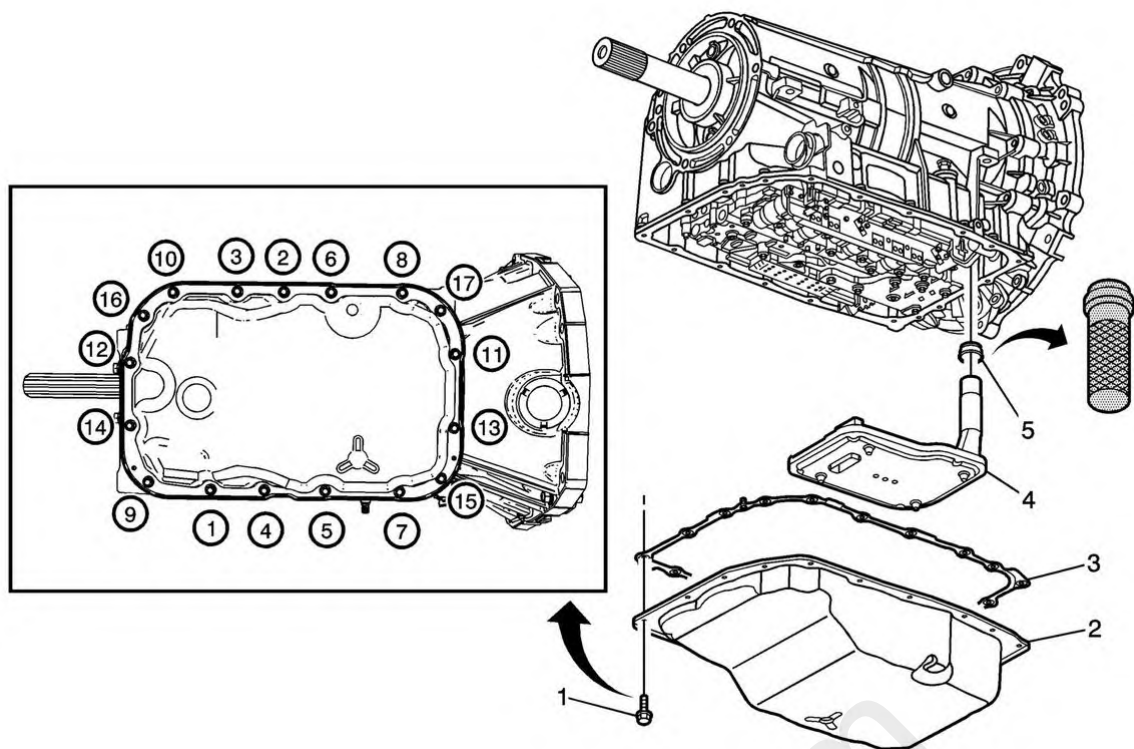


Fig. 1: Automatic Transmission Fluid, Fluid Pan And Filter Bolts Loosening Sequence

Courtesy of GENERAL MOTORS COMPANY

NOTE: Callouts in the following chart represent components shown in graphic above.

Callout	Component Name
CAUTION: Use Dexron® VI transmission fluid only. Failure to use the proper fluid may result in transmission internal damage.	
Preliminary Procedures 1. Raise and support the vehicle. Lifting and Jacking the Vehicle 2. Place a suitable drain pan under the transmission. 3. If equipped with LCV, remove the exhaust front pipe. Exhaust Pipe Replacement (LCV)	
1	Transmission Fluid Pan Bolt (Qty: 17) CAUTION: Refer to Fastener Caution . NOTE:

Callout	Component Name
	Tighten the bolts in the sequence shown. Tighten 9 N.m (80 lb in)
2	Transmission Fluid Pan Assembly Procedure 1. Fill the transmission with the proper fluid. <u>Transmission General Specifications</u> 2. Fill the transmission with the proper amount of transmission fluid. Refer to <u>Approximate Fluid Capacities</u> , or <u>Transmission Fluid Level and Condition Check</u> .
3	Transmission Fluid Pan Gasket NOTE: The fluid pan gasket is reusable. Inspect the gasket to determine if it may be reused.
4	NEW Fluid Filter Assembly NOTE: Pull the fluid filter assembly straight out. Do not bend or twist the filter neck.
5	NEW Fluid Filter Seal Assembly CAUTION: Do not damage the case sealing surface when removing the filter seal assembly. Procedure 1. Use a screwdriver or snap ring pliers to remove the filter seal. 2. Use the DT-47848 installer and the J-42183 handle to install the filter seal.

Callout	Component Name
	3. Lubricate the filter seal with transmission fluid before installing the filter. 4. Lower the vehicle. Special Tools • DT-47848 Seal Installer • J-42183 Driver Handle For equivalent regional tools, refer to Special Tools .

TRANSMISSION MOUNT INSPECTION

CAUTION: In order to avoid oil pan damage and possible engine failure, insert a block of wood that spans the width of the oil pan bottom between the oil pan and the jack support.

1. Raise the transmission/transaxle in order to remove the weight from the transmission/transaxle mount and create slight tension in the rubber.
2. Observe the transmission/transaxle mount while raising the transmission/transaxle. Replace the transmission/transaxle mount if the transmission/transaxle mount exhibits any of the following conditions:

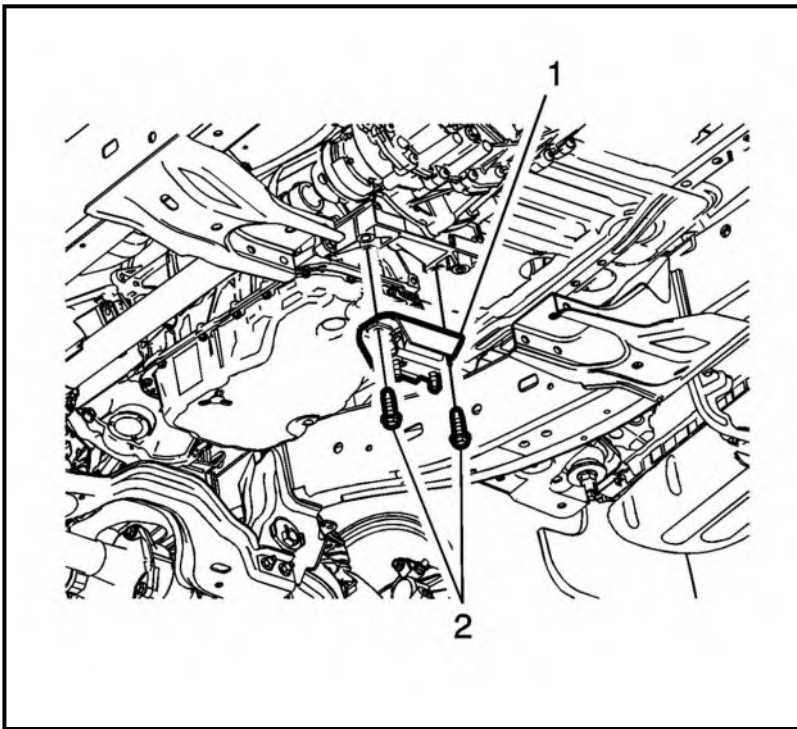
NOTE: Black paint on the rubber will crack with time, this does not constitute a failure.

- The hard rubber surface is covered with heat check cracks.
 - The rubber is separated from the metal plate of the transmission/transaxle mount.
 - The rubber is split through the center of the transmission/transaxle mount.
3. If there is movement between the metal plate of the transmission/transaxle mount and its attaching points, lower the transmission/transaxle on the transmission/transaxle mount. Tighten the bolts or nuts attaching the transmission/transaxle mount to the frame or transmission/transaxle mount bracket.

TRANSMISSION MOUNT REPLACEMENT (4WD)

Removal Procedure

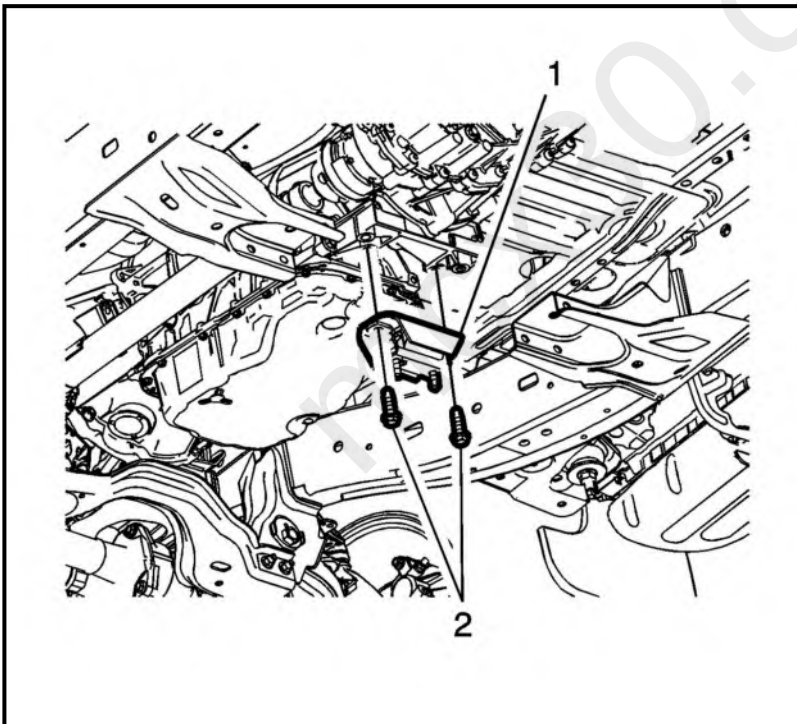
1. Remove the transmission support crossmember. Refer to [Transmission Support Crossmember Replacement \(4 Wheel Drive\)](#) .
2. Remove the transmission mount bolts (2).



3. Remove the transmission mount (1) from the vehicle.

Installation Procedure

1. Install the transmission mount (1) to the vehicle.



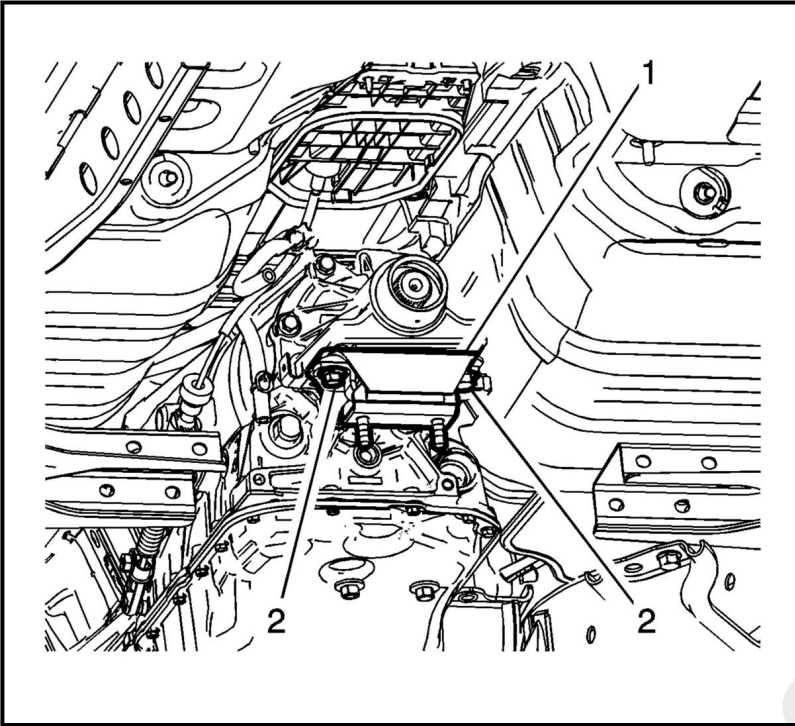
CAUTION: Refer to [Fastener Caution](#) .

2. Install the bolts (2) and tighten to 72 N.m (53 lb ft).
3. Install the transmission support crossmember. Refer to [Transmission Support Crossmember Replacement \(4 Wheel Drive\)](#) .

TRANSMISSION MOUNT REPLACEMENT (2WD)

Removal Procedure

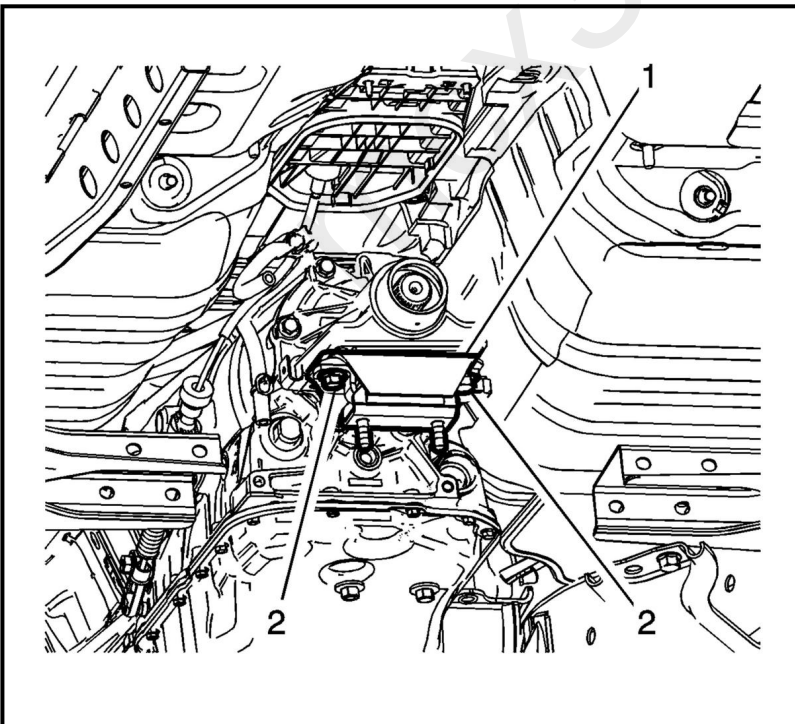
1. Remove the crossmember. Refer to [Transmission Support Crossmember Replacement \(2 Wheel Drive\)](#).
2. Remove the transmission mount bolts (2).



3. Remove the transmission mount (1) from the vehicle.

Installation Procedure

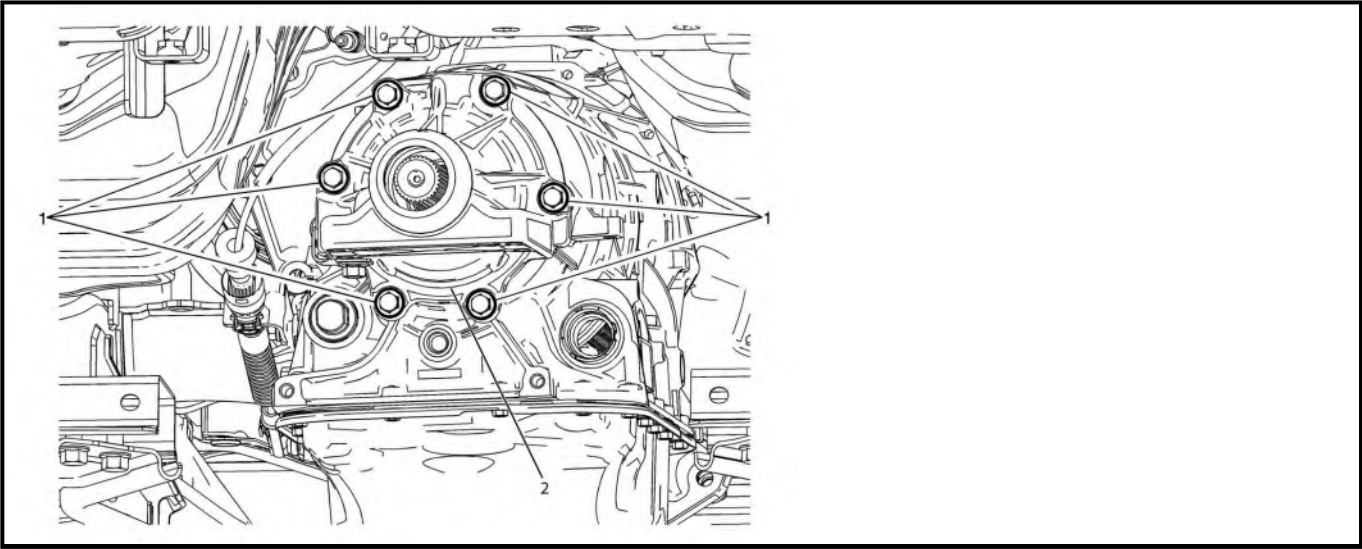
1. Install the transmission mount (1) to the vehicle.



CAUTION: Refer to [Fastener Caution](#).

2. Install the bolts (2) and tighten to 100 N.m (74 lb ft).
3. Install the crossmember. Refer to [Transmission Support Crossmember Replacement \(2 Wheel Drive\)](#).

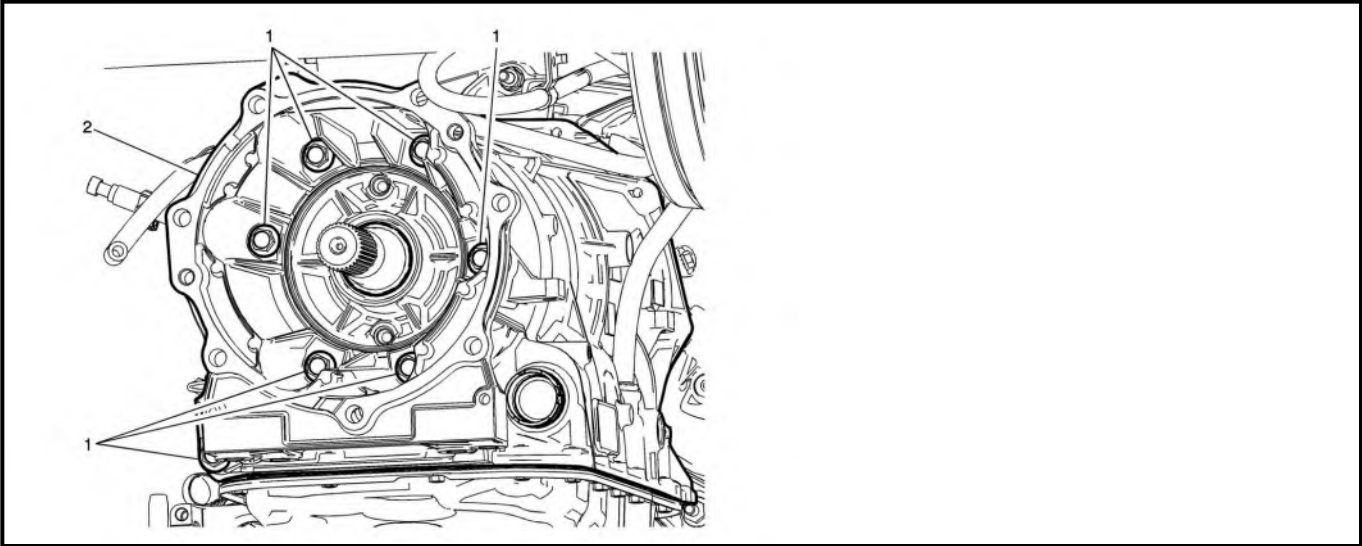
CASE EXTENSION AND GASKET REPLACEMENT (2WD)



NOTE: Callouts in the following chart represent components shown in graphic above.

Callout	Component Name
Preliminary Procedures 1. Remove the propeller shaft. 2. Remove the transmission mount. Transmission Mount Replacement (2WD) .	
1	Extension Case Fastener (Qty: 6) CAUTION: Refer to Fastener Caution . Tighten 55 N.m (41 lb ft)
2	Extension Case

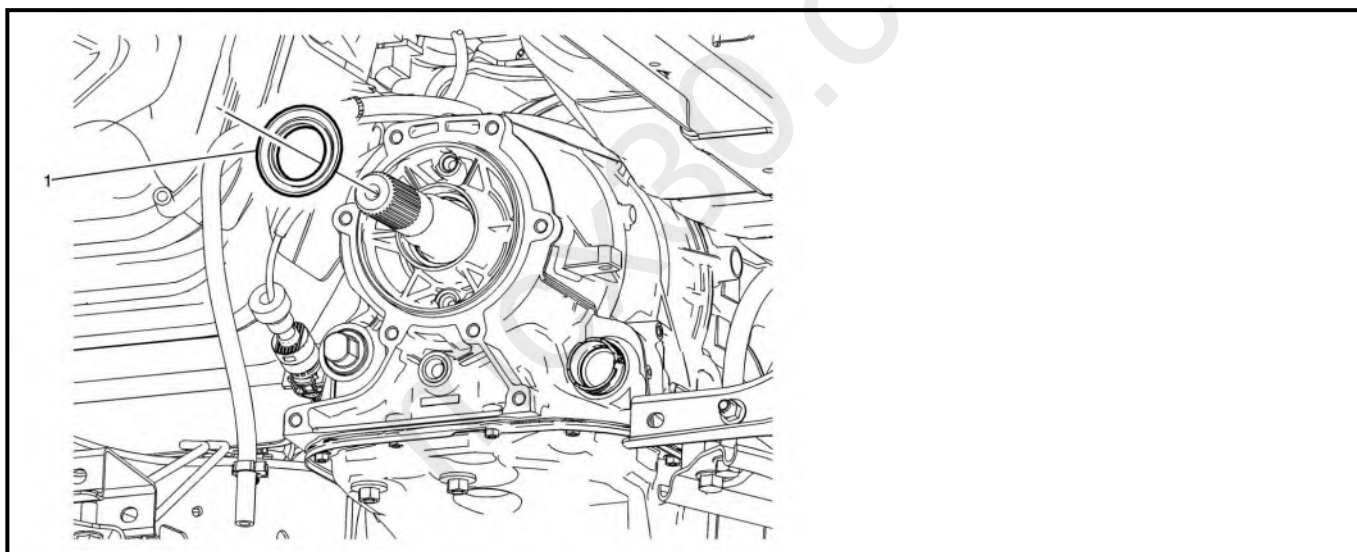
CASE EXTENSION AND GASKET REPLACEMENT (4WD)



NOTE: Callouts in the following chart represent components shown in graphic above.

Callout	Component Name
Preliminary Procedures 1. Remove the transfer case. Refer to Transfer Case Assembly Replacement (NQ7) . 2. Remove the transmission mount. Refer to Transmission Mount Replacement (4WD) . 3. Use a suitable transmission jack to support the transmission. 4. Use a flat adaptor on the transmission jack to support the transmission resting on the fluid pan.	
1	Extension Case Fasteners (Qty: 7) CAUTION: Refer to Fastener Caution . Tighten 55 N.m (41 lb ft)
2	Extension Case

TRANSMISSION OUTPUT SHAFT SEAL REPLACEMENT

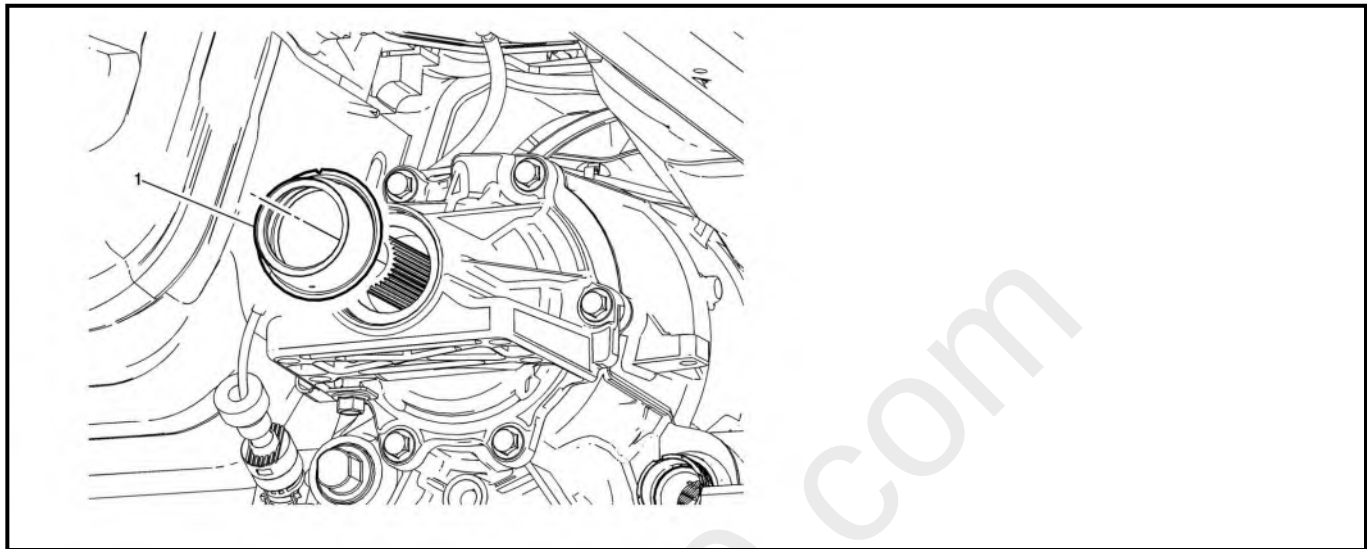


NOTE: Callouts in the following chart represent components shown in graphic above.

Callout	Component Name
Preliminary Procedure Remove the case extension. Refer to Case Extension and Gasket Replacement (2WD) , or Case Extension and Gasket Replacement (4WD) .	
1	Output Shaft Seal Procedure 1. Use the J-6125-B hammer and J-36825-A remover to remove the seal. Use care in order to avoid damaging the output shaft bushing. 2. Lubricate the seal with clean transmission fluid. 3. Use DT-50648 installer to install the seal.

Callout	Component Name
	Special Tools • DT-50648 Case Seal Installer • J-6125-B Slide Hammer with Adaptor • J-36825-A Output Shaft Oil Seal Remover For equivalent regional tools, refer to Special Tools .

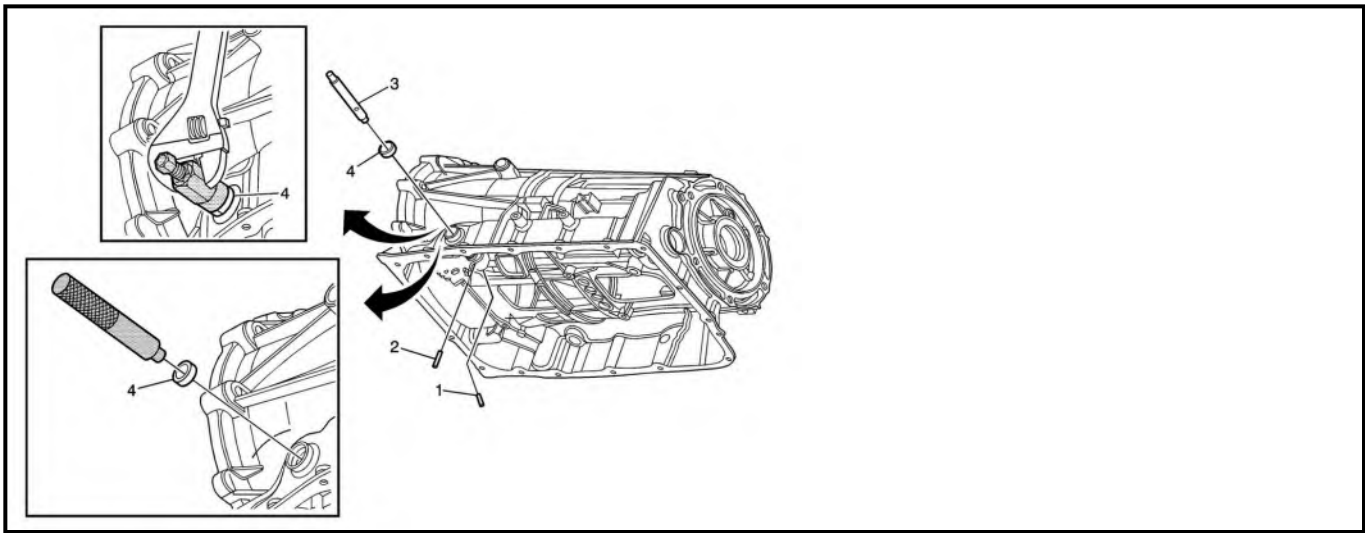
PROPELLER SHAFT FRONT SLIP YOKE OIL SEAL REPLACEMENT



NOTE: Callouts in the following chart represent components shown in graphic above.

Callout	Component Name
Preliminary Procedure Remove the rear propeller shaft. Refer to Propeller Shaft Replacement (With MYB) , or Propeller Shaft Replacement (M5T with 2WD) , or Propeller Shaft Replacement (M5T with 4WD) , or Propeller Shaft Replacement (With Bison) .	
1	Propeller Shaft Front Slip Yoke Oil Seal Special Tools • J-8092 Driver Handle (6L90) • J-38869 Output Shaft Seal Installer (6L80) • J-45000 Seal Remover For equivalent regional tools, refer to Special Tools .

MANUAL SHIFT SHAFT AND SEAL REPLACEMENT

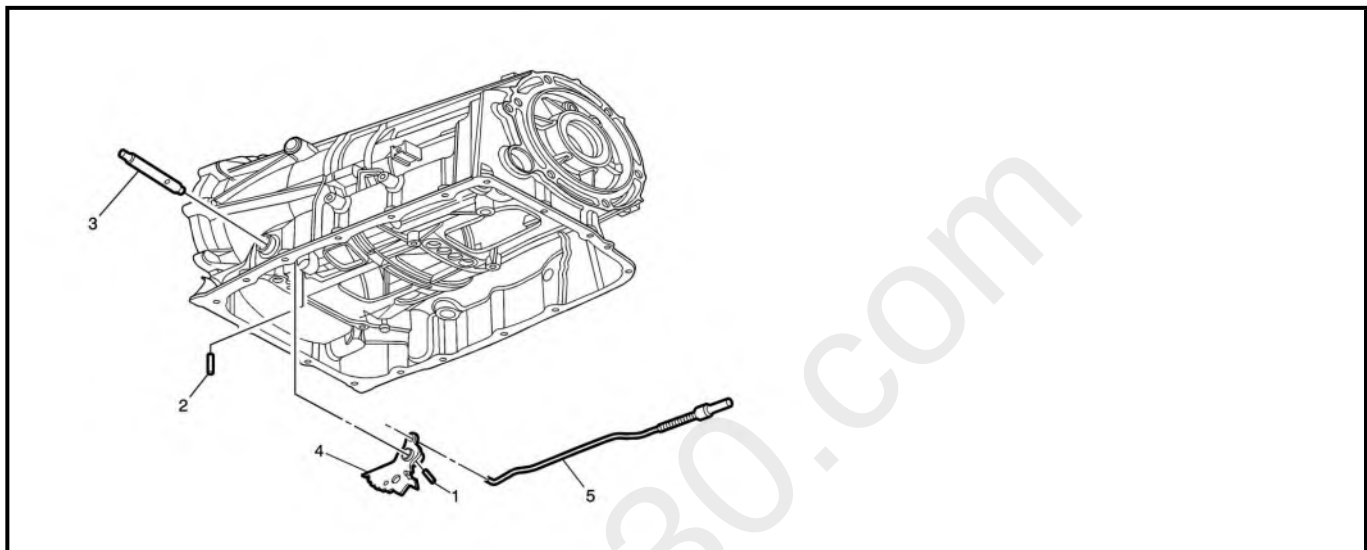


NOTE: Callouts in the following chart represent components shown in graphic above.

Callout	Component Name
Preliminary Procedures 1. Raise and support the vehicle. Refer to Lifting and Jacking the Vehicle . 2. If equipped with 4WD, remove the front axle propeller shaft. Refer to Front Axle Propeller Shaft Replacement (Without Bison) , or Front Axle Propeller Shaft Replacement (With Bison) . 3. Remove the transmission fluid pan. Refer to Automatic Transmission Fluid, Fluid Pan and/or Filter Replacement. 4. Remove the control valve body. Refer to Control Valve Lower Body and Upper Body Replacement.	
1	Manual Shift Shaft Pin Procedure 1. Discard the pin. Replace with NEW pin. 2. "Walk" the pin out using side cutters.
2	Manual Shift Detent Lever Hub Pin Procedure 1. Discard the pin. Replace with NEW pin. 2. "Walk" the pin out using side cutters.
3	Manual Shift Shaft NOTE: The manual shaft must be removed to replace the manual shaft seal.
4	Manual Shift Shaft Seal Procedure

Callout	Component Name
	1. Use the J 45201 cooler line seal remover to remove the seal from the transmission case. 2. Use the DT 47770 seal installer to install the seal into the transmission case. Special Tools • DT 47770 Seal Installer • J 45201 Cooler Line Seal Remover For equivalent regional tools, refer to Special Tools .

MANUAL SHIFT DETENT LEVER AND PARK PAWL ACTUATOR REPLACEMENT

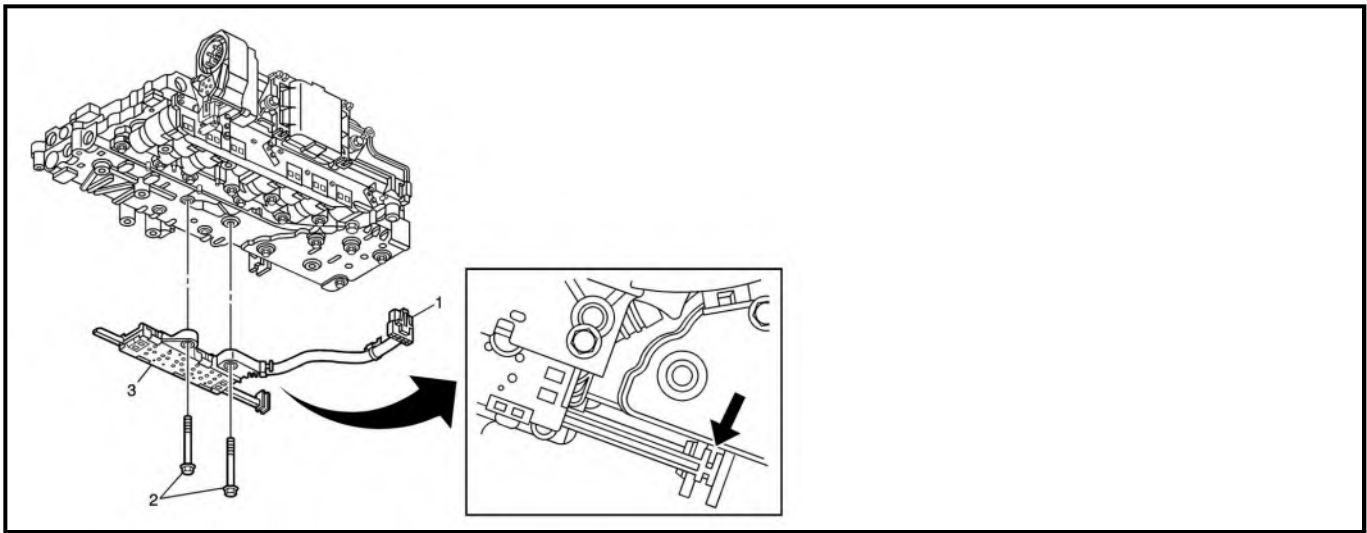


NOTE: Callouts in the following chart represent components shown in graphic above.

Callout	Component Name
Preliminary Procedures	
	1. Raise and support the vehicle. Refer to Lifting and Jacking the Vehicle . 2. If equipped with 4WD, remove the front axle propeller shaft. Refer to Front Axle Propeller Shaft Replacement (Without Bison) , or Front Axle Propeller Shaft Replacement (With Bison) . 3. Remove the transmission fluid pan. Refer to Automatic Transmission Fluid, Fluid Pan and/or Filter Replacement . 4. Remove the manual shift detent assembly roller. Refer to Control Valve Lower Body and Upper Body Replacement . 5. If removal of the park pawl actuator guide is necessary, remove the case extension. Refer to Case Extension and Gasket Replacement (2WD) , or Case Extension and Gasket Replacement (4WD) .
NOTE: Do not remove the park pawl or park pawl spring. The park pawl and park	

Callout	Component Name
pawl spring are not serviceable components.	
1	Manual Shaft Detent Lever Hub Pin NOTE: • Discard the pin. Replace with NEW pin. • "Walk" the pin out using side cutters.
2	Manual Shift Shaft Pin NOTE: • Discard the pin. Replace with NEW pin. • "Walk" the pin out using side cutters.
3	Manual Shift Shaft
4	Manual Shaft Detent Lever Assembly
5	Park Pawl Actuator Assembly

MANUAL SHIFT SHAFT POSITION SWITCH REPLACEMENT



NOTE: Callouts in the following chart represent components shown in graphic above.

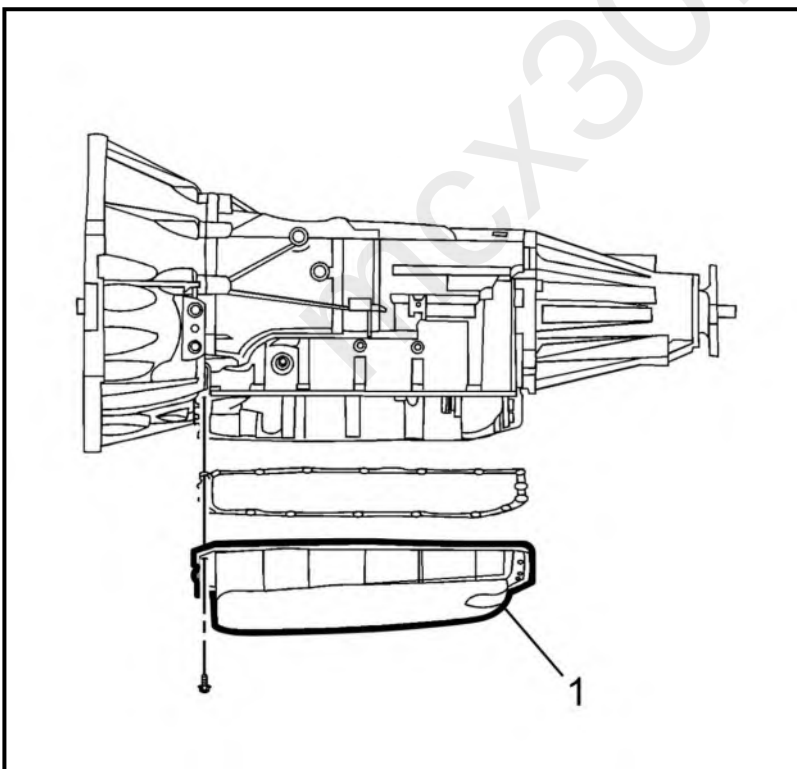
Callout	Component Name
Preliminary Procedures 1. Raise and support the vehicle. Refer to Lifting and Jacking the Vehicle . 2. Remove the transmission fluid pan and filter. Refer to Automatic Transmission Fluid, Fluid Pan and/or Filter Replacement.	
1	Manual Shift Shaft Position Switch Assembly Electrical Connector NOTE: • Release the connector lock before disconnecting. Engage the connector lock after connecting. • The wiring harness clip near the connector does not need to be replaced if broken or missing. The clip is used during manufacturing to keep the wire harness clear during an automated bolt installation process. If the clip is damaged,

Callout	Component Name
	simply remove and discard.
2	Manual Shift Shaft Position Switch Assembly Bolts CAUTION: Refer to <u>Fastener Caution</u> . Tighten 12 N.m (106 lb in)
3	Manual Shift Shaft Position Switch Assembly Procedure Align the switch activator slide with the manual valve link.

CONTROL SOLENOID VALVE AND TRANSMISSION CONTROL MODULE ASSEMBLY REPLACEMENT

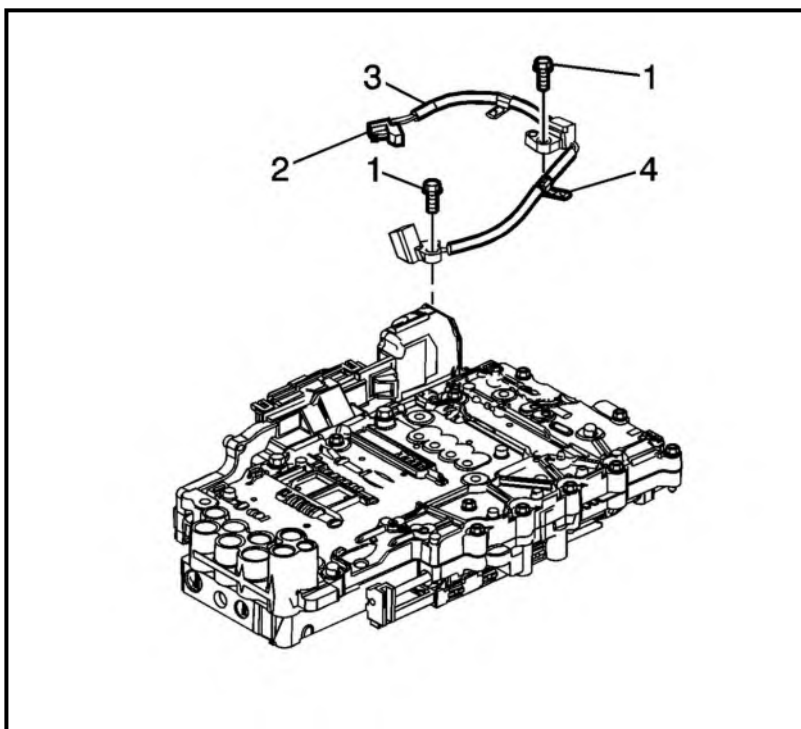
Removal Procedure

1. Remove the transmission oil pan and filter. Refer to [Automatic Transmission Fluid, Fluid Pan and/or Filter Replacement](#).
2. Remove the upper and lower control valve body assembly. Refer to [Control Valve Lower Body and Upper Body Replacement](#).



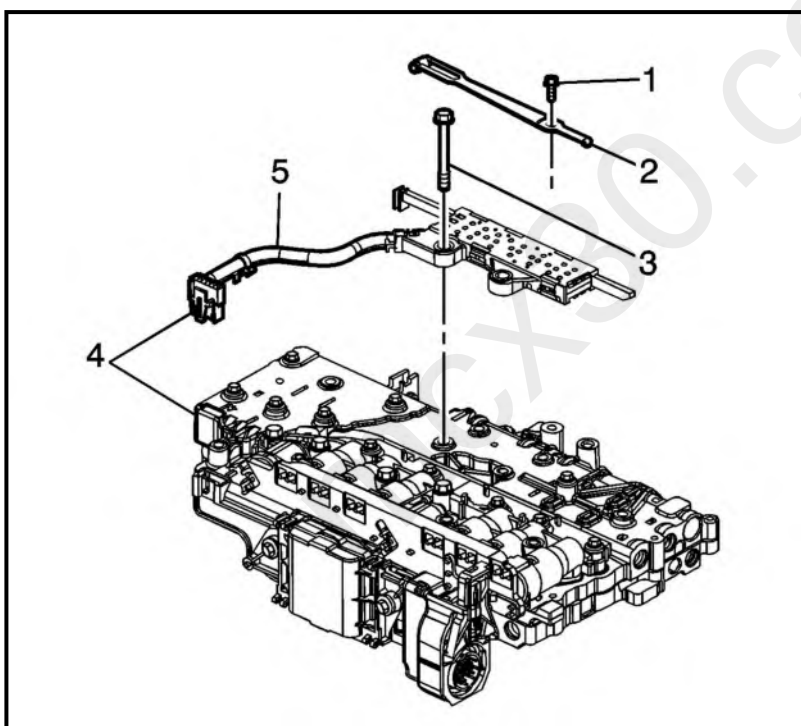
NOTE: The valve body must be removed from the transmission to replace the control solenoid valve and transmission control module assembly.

3. Remove the electrical connector passage sleeve. Refer to [Automatic Transmission Electrical Connector Passage Sleeve Replacement](#).
4. Disconnect the speed sensor electrical connector (2) from the control solenoid valve assembly.



5. Turn the control valve body assembly over.

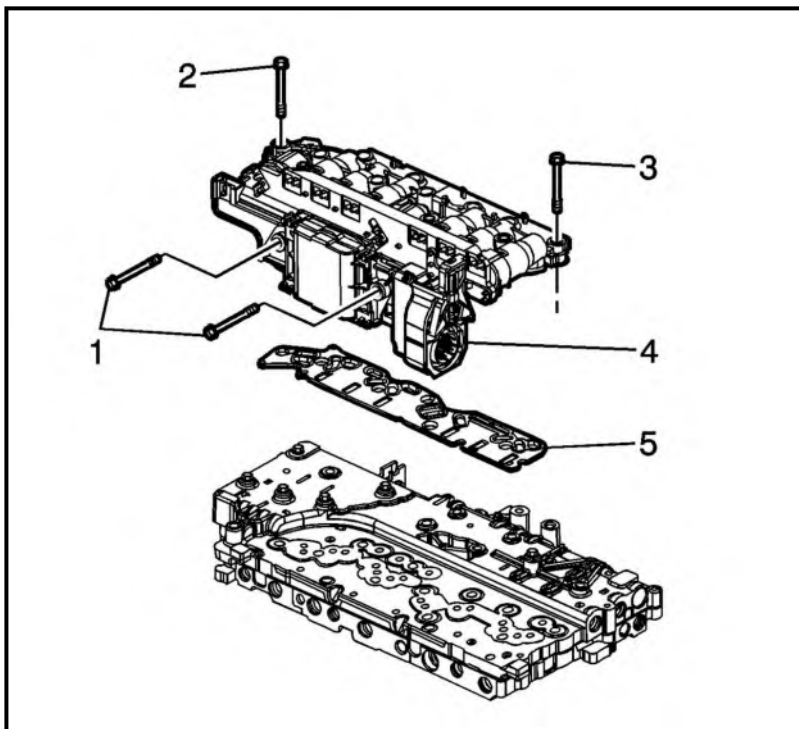
6. Disconnect the manual shift shaft position switch connector (4) from the control solenoid valve assembly.



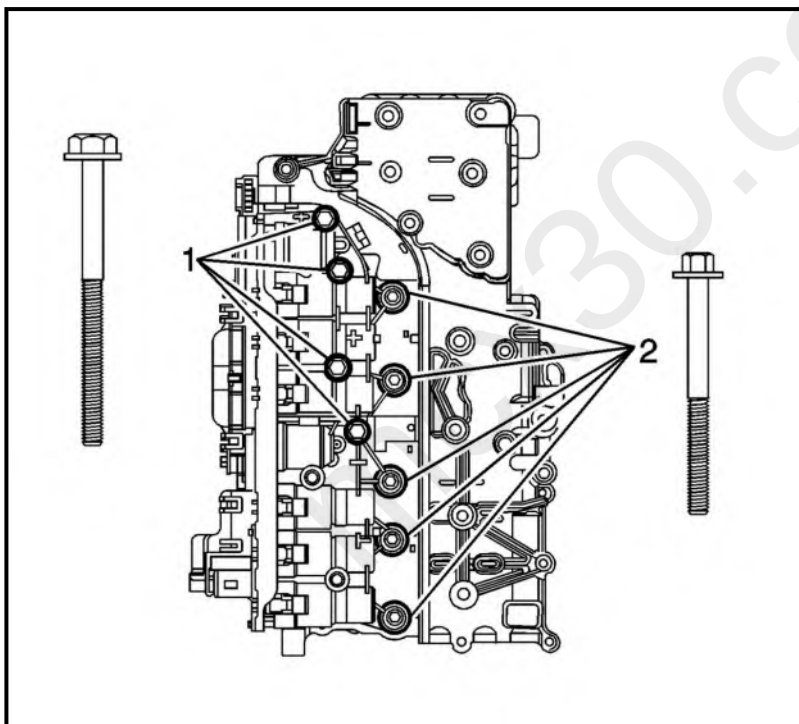
NOTE: Release the connector lock before disconnecting.

7. Remove the bolt (3) and remove the manual shift shaft position switch assembly.

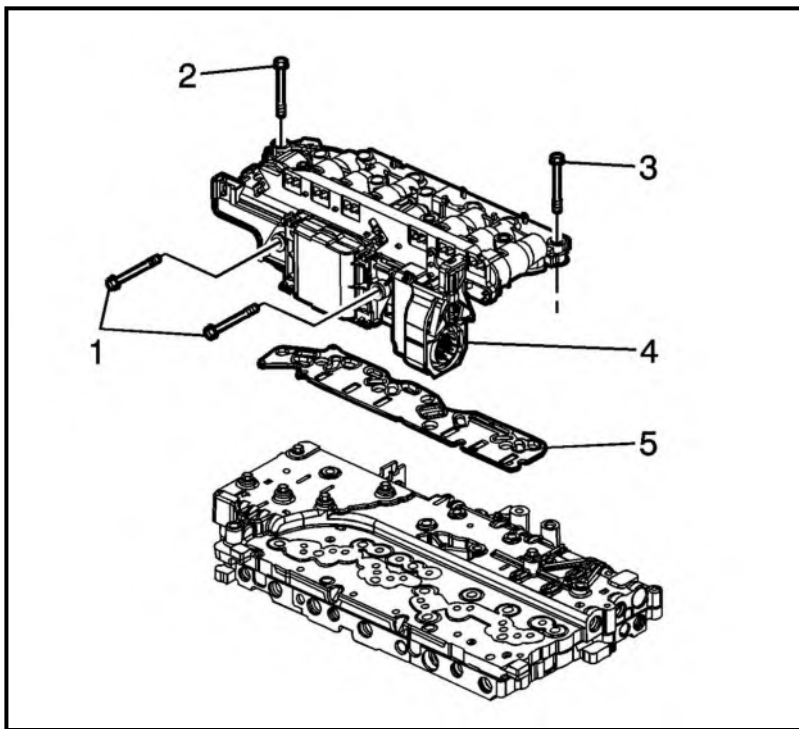
8. Remove the 2 bolts (1) from the "heat sink" side of the control solenoid valve assembly.



9. Remove the 5 bolts (2) and the 4 bolts (1) securing the control solenoid valve assembly to the control valve body assembly.



10. Remove the control valve body assembly.

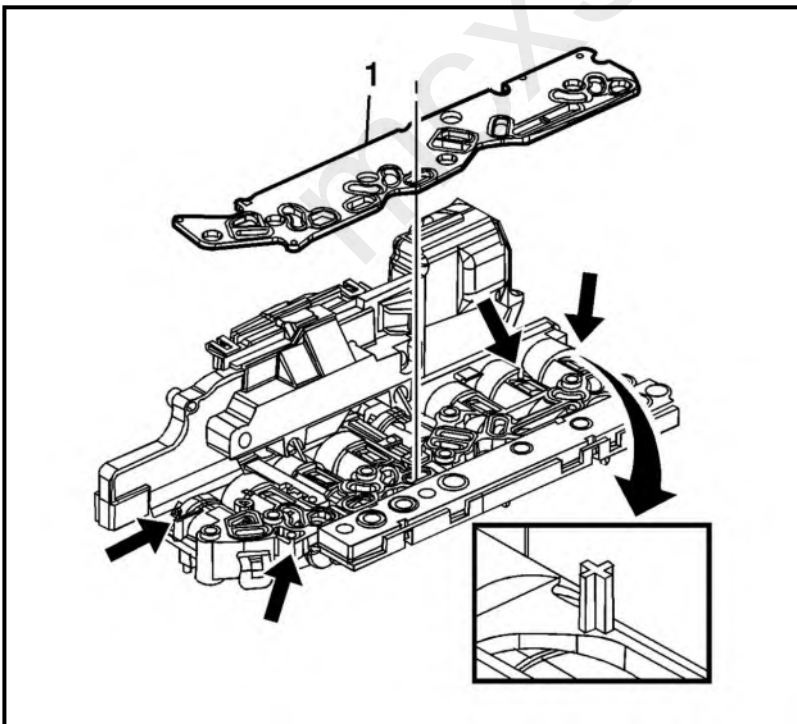


CAUTION: Use care when removing or installing the filter plate assembly. A broken or missing retaining tab may not adequately secure the filter plate to the control solenoid valve assembly, resulting in possible damage or contamination.

11. Carefully remove and discard the filter plate assembly (5).

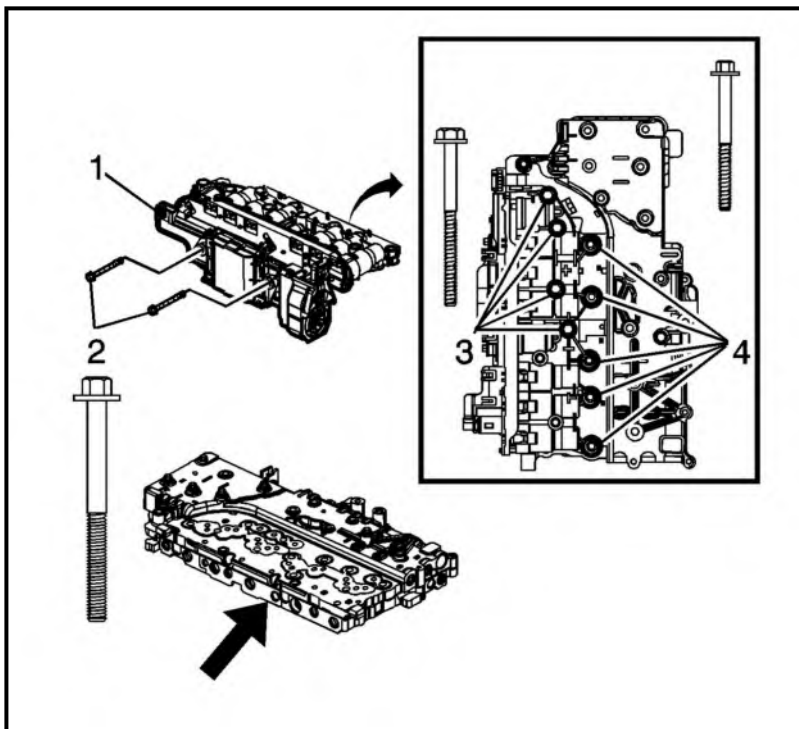
Installation Procedure

1. Install a NEW filter plate assembly (1).



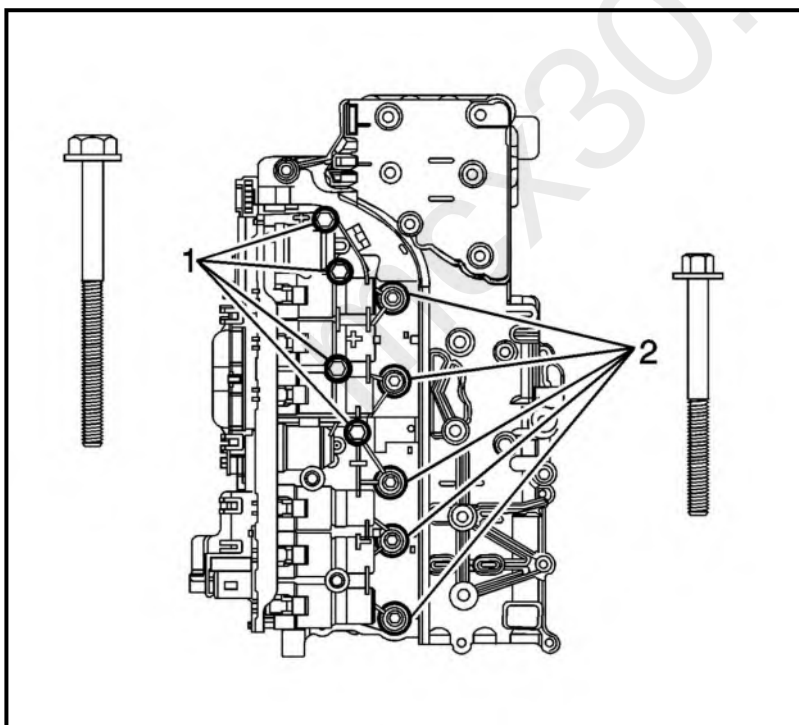
NOTE: Inspect the 4 filter plate retaining tabs on the control solenoid valve assembly. A broken or missing tab may not adequately secure the filter plate to the control solenoid valve assembly.

2. Align the control solenoid valve assembly (1) to the control valve lower body assembly.

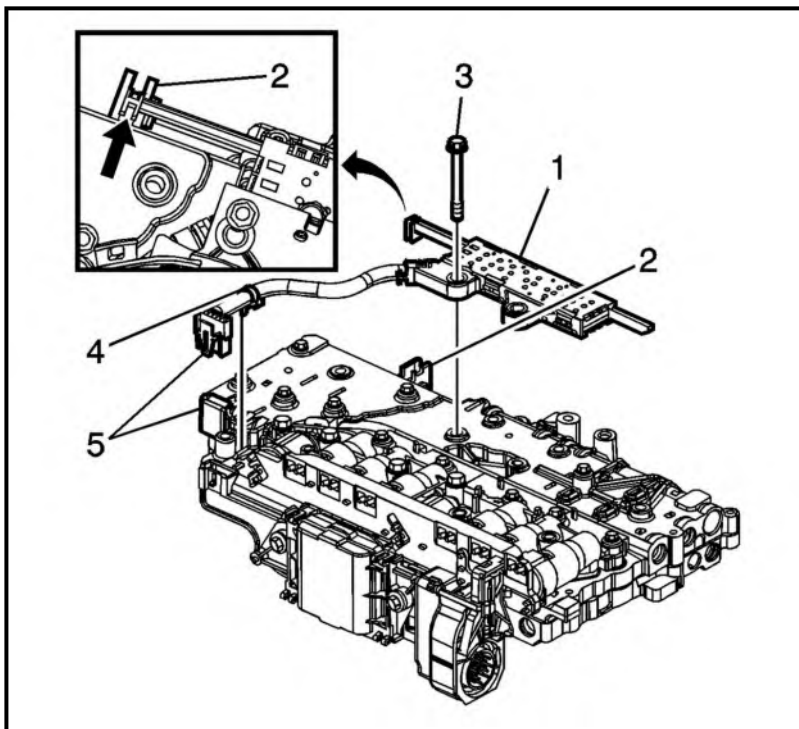


NOTE: Note the locator pin on the control valve lower body assembly.

3. Install the 2 bolts (2), through the "heat sink" side of the control solenoid valve assembly (1). Hand tighten only.
4. Install the 4 bolts (1) and 5 bolts (2) securing the control solenoid valve assembly to the control valve lower body assembly. Hand tighten only.



5. Install the manual shift shaft position switch assembly (1). Align the switch activator slide with the manual valve link. Secure with 1 bolt (3). Hand tighten only.



NOTE: The wiring harness clip (4) on the manual shift shaft position switch does not need to be replaced if damaged or missing. The clip functions only as a manufacturing assembly aid to keep the harness clear during an automated bolt installation process. If the clip is damaged, simply remove and discard.

6. Connect and lock the manual shift shaft position switch electrical connector (5) to the control solenoid valve assembly and attach the wiring harness clip (4).
7. Tighten all bolts in the sequence shown. The 2 "heat sink" bolts (17, 18) must be tightened last.

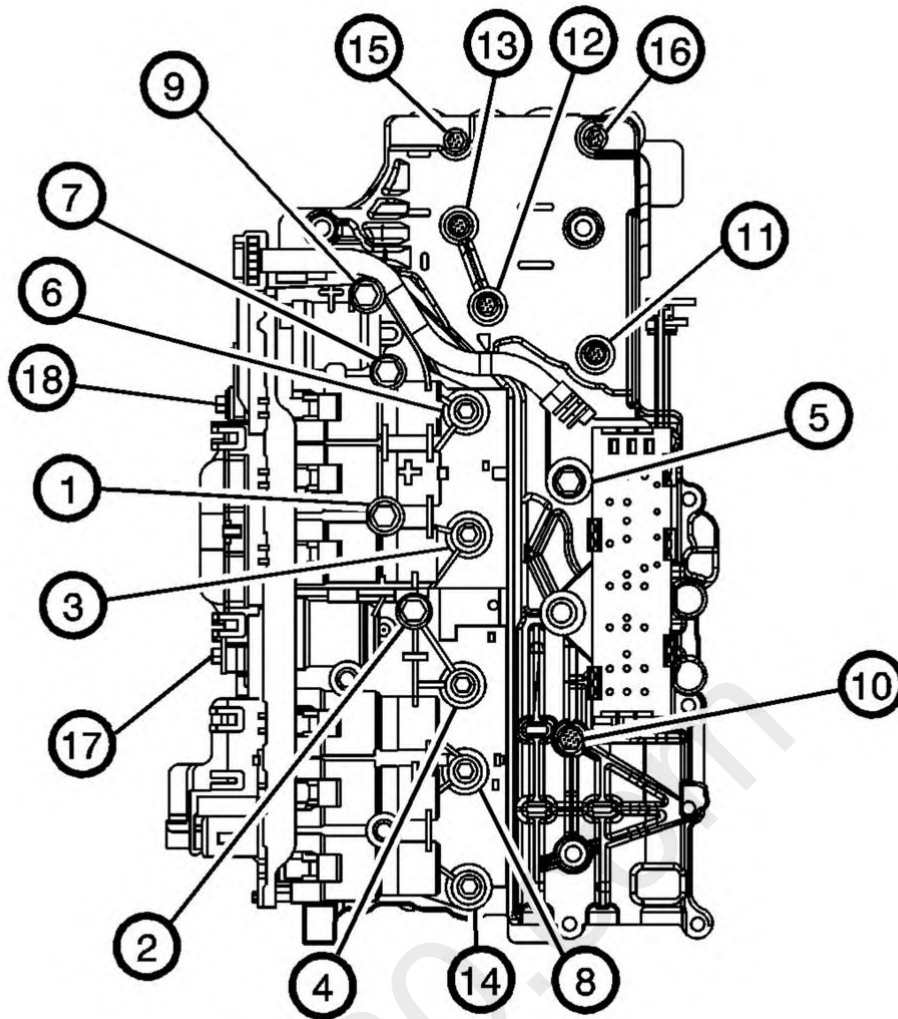


Fig. 2: Control Solenoid Valve Assembly Bolts Tightening Sequence

Courtesy of GENERAL MOTORS COMPANY

CAUTION: Bolt torque sequencing is critical to the proper function of the control solenoid valve assembly. Failure to follow the required sequencing may result in transmission malfunction.

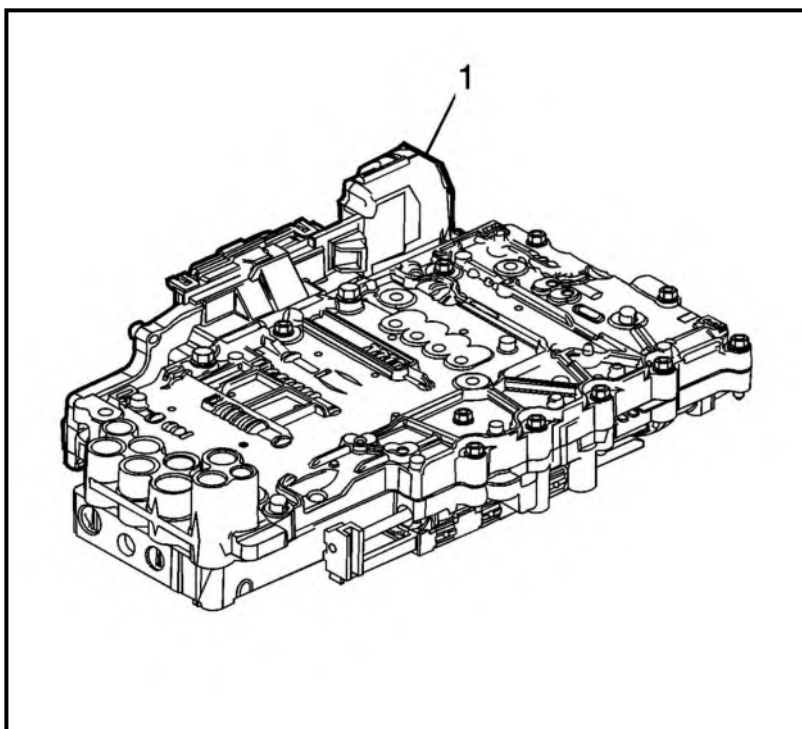
CAUTION: Refer to [Fastener Caution](#) .

NOTE: When following the tightening sequence, skip over bolts 10, 11, 12, 13 and 15. These bolts are not removed for this procedure.

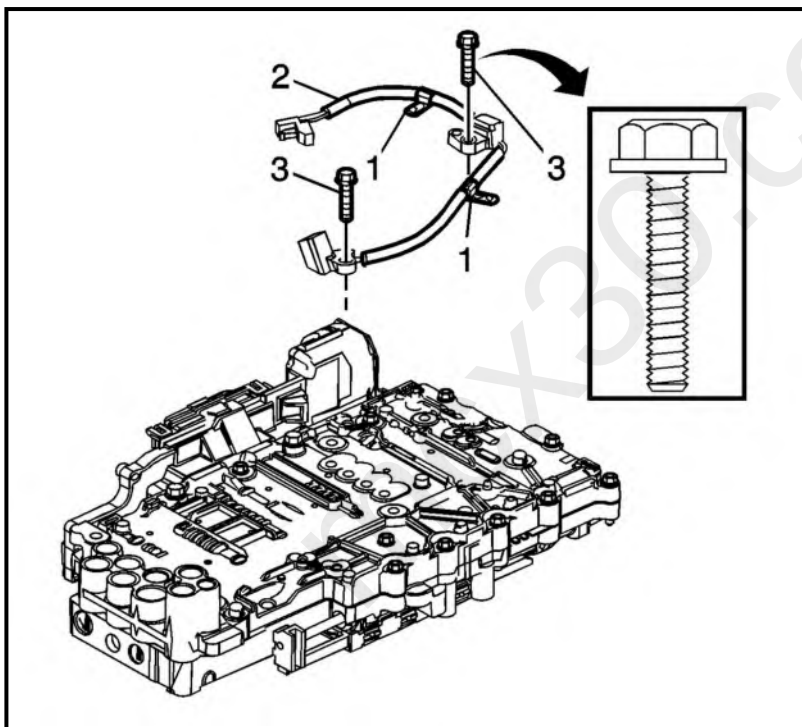
Tighten bolts to 8 N.m (71 lb in).

8. Turn the control valve body assembly over.

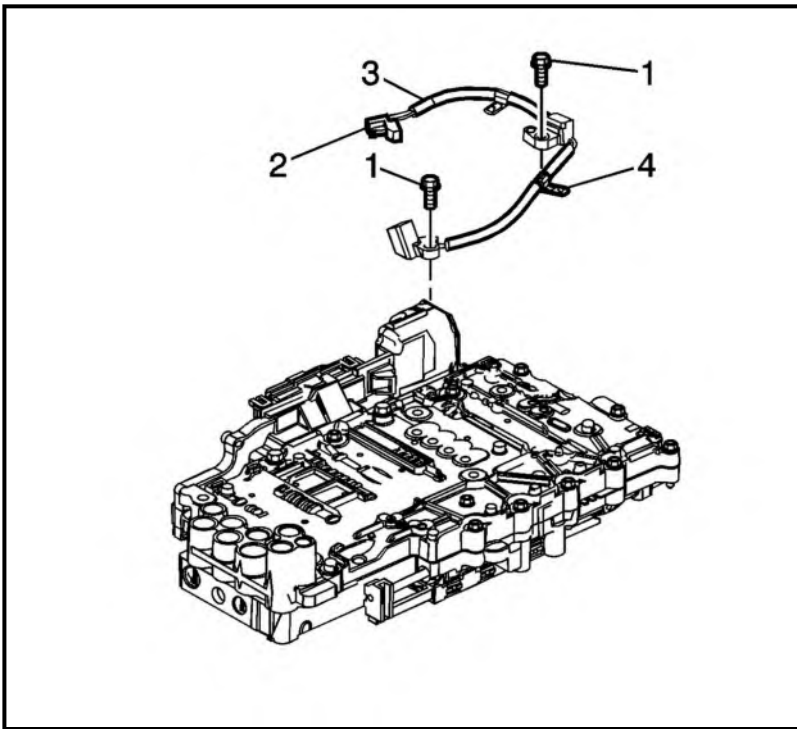
9. Inspect the contact area between the "heat sink" area of the control solenoid valve assembly (1) and the valve body. There should be no visible gap. If a gap exists, loosen all 18 bolts and retighten in the sequence shown.



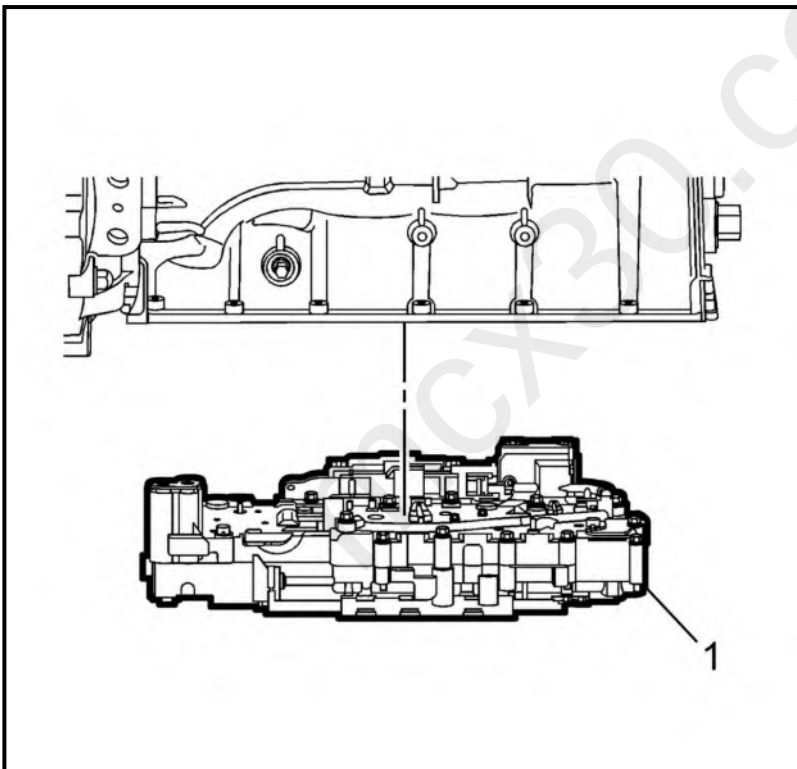
10. Inspect the 2 input and output speed sensor wiring harness clips (1) for damage. Replace if damaged.



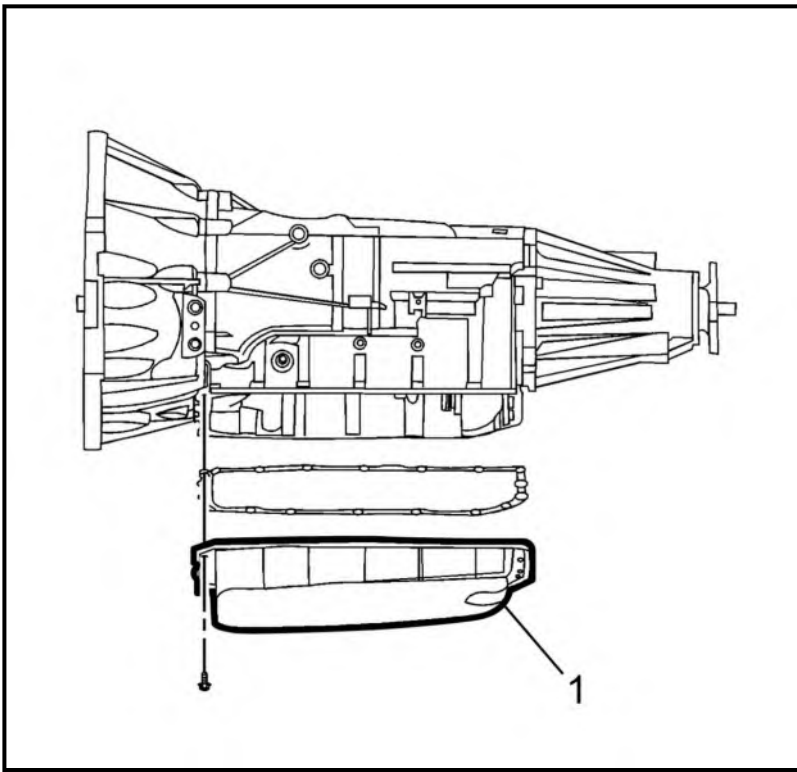
11. Connect the speed sensor electrical connector (2) to the control solenoid valve assembly.



12. Install the upper and lower control valve body assembly. Refer to [Control Valve Lower Body and Upper Body Replacement](#).



13. Install the electrical connector passage sleeve. Refer to [Automatic Transmission Electrical Connector Passage Sleeve Replacement](#).
14. Install the transmission oil pan and filter. Refer to [Automatic Transmission Fluid, Fluid Pan and/or Filter Replacement](#).



15. If a NEW TCM has been installed into the vehicle, the NEW module needs to be reprogrammed. Refer to [Service Programming System \(SPS\)](#) .

NOTE:

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 valve assembly replacement
- TCM software/calibration update
- Any service in response to a shift quality concern

16. Perform the Reset Transmission Adapts. Refer to [Reset Transmission Adapts](#) .

CONTROL VALVE LOWER BODY AND UPPER BODY REPLACEMENT

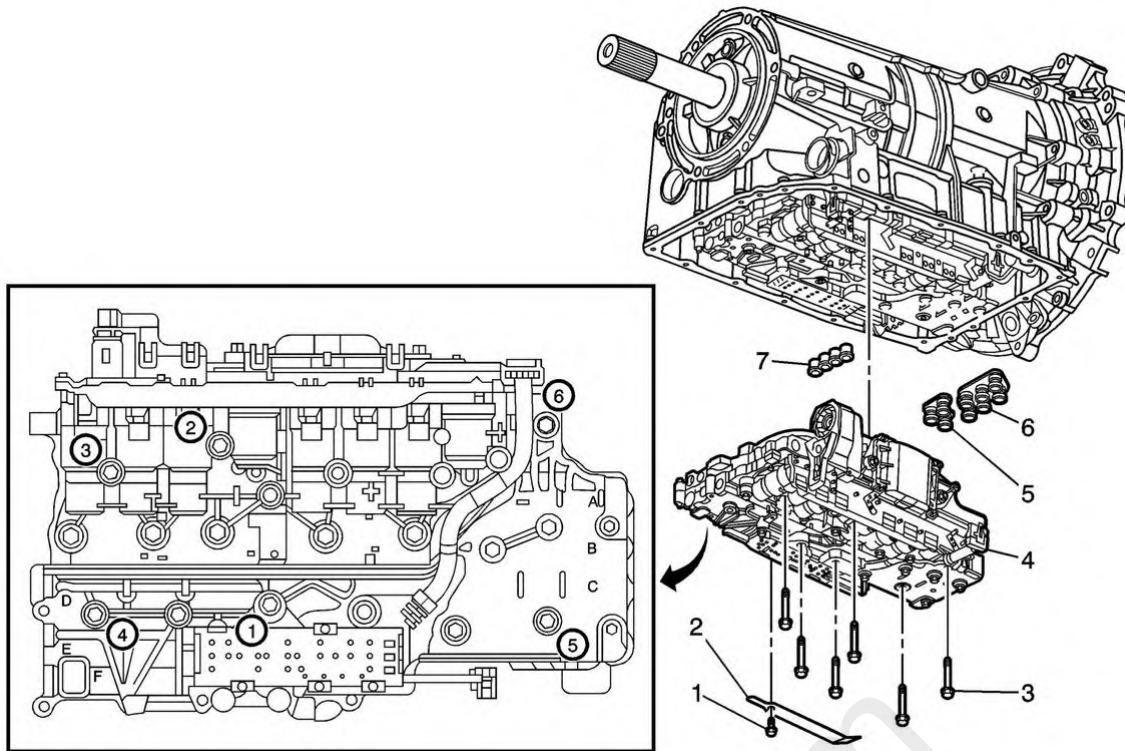


Fig. 3: Control Valve Lower Body And Upper Body Bolts Loosening Sequence

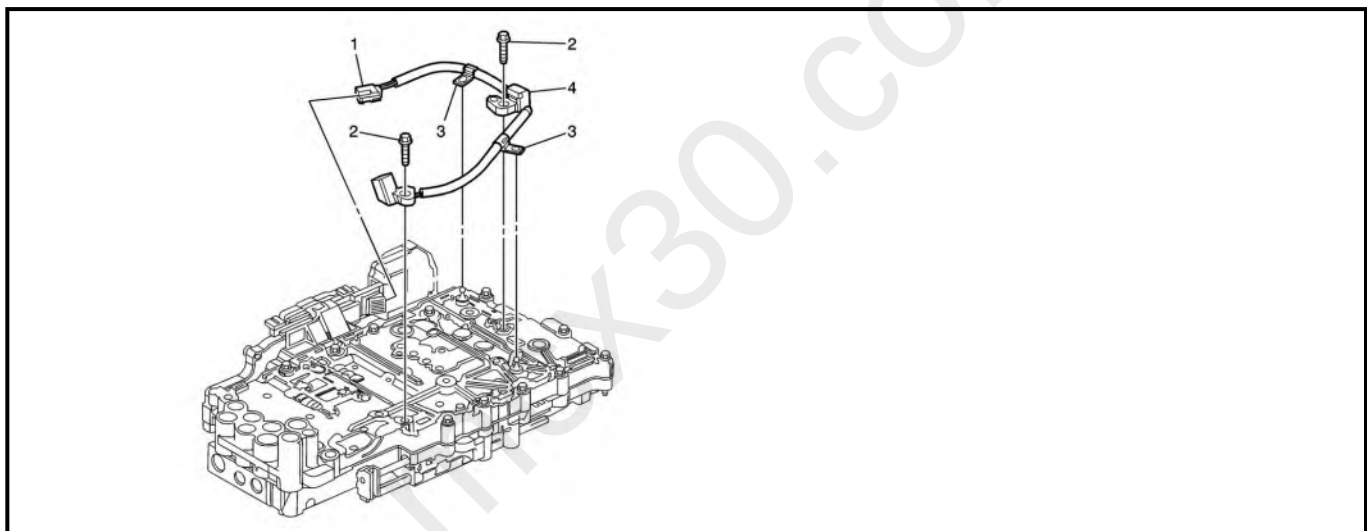
Courtesy of GENERAL MOTORS COMPANY

NOTE: Callouts in the following chart represent components shown in graphic above.

Callout	Component Name
Preliminary Procedures Remove the transmission electrical connector. Refer to Automatic Transmission Electrical Connector Passage Sleeve Replacement .	
1	Manual Shaft Detent Bolt CAUTION: Refer to Fastener Caution . Tighten 12 N.m (106 lb in)
2	Manual Shaft Detent Assembly
3	Control Valve Assembly Bolt (Qty: 6) Procedure - Do not remove all the bolts in the control valve body assembly. Remove only the bolts indicated. - Tighten in specified sequence. Tighten 8 N.m (71 lb in) Special Tools DT-48285 Valve Body Torx Plus Socket For equivalent regional tools, refer to Special Tools .

Callout	Component Name
4	Control Valve Assembly
5	Fluid Pump Seal Procedure Discard seal and replace with new.
6	Fluid Pump Seal Procedure Discard seal and replace with new.
7	Center Support Fluid Passage Seal Procedure 1. Discard seal and replace with new. 2. It is recommended that transmission adaptive pressure (TAP) information be reset. Transmission performance may be affected as new TAP values are learned. Refer to Reset Transmission Adapts . 3. If replacing the control valve body assembly, remove the Control Solenoid Valve and Transmission Control Module Assembly Replacement, and the Manual Shift Shaft Position Switch Replacement.

INPUT AND OUTPUT SPEED SENSOR REPLACEMENT



NOTE: Callouts in the following chart represent components shown in graphic above.

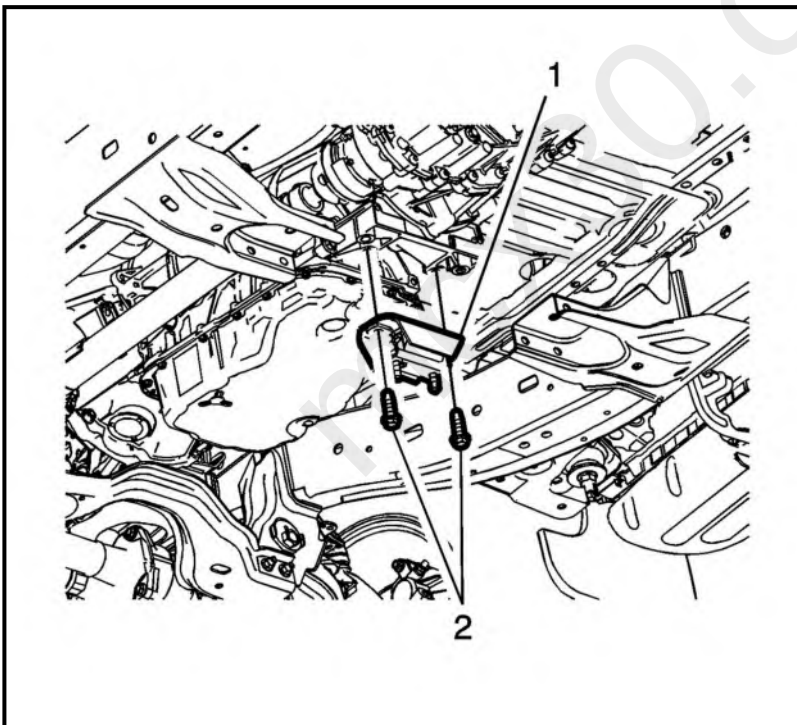
Callout	Component Name
Preliminary Procedures	
1. Raise and support the vehicle. Refer to Lifting and Jacking the Vehicle . 2. Remove the transmission fluid pan and filter. Refer to Automatic Transmission Fluid, Fluid Pan and/or Filter Replacement. 3. Remove the upper and lower valve body assembly. Refer to Control Valve Lower Body and Upper Body Replacement.	
1	Speed Sensor Electrical Connector
2	Input and Output Speed Sensor Assembly Bolts (Qty: 2) CAUTION: Refer to Fastener

Callout	Component Name
	Caution . Tighten 12 N.m (106 lb in)
3	Input and Output Speed Sensor Assembly Clips (Qty: 2) TIP: Inspect the wiring harness clips for damage replace if necessary.
4	Input and Output Speed Sensor Assembly

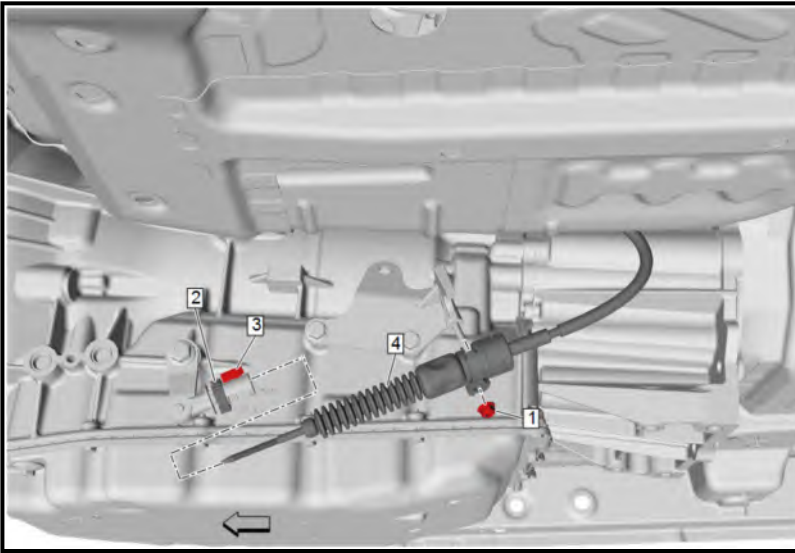
TRANSMISSION REPLACEMENT (LCV ENGINE WITH 4WD)

Removal Procedure

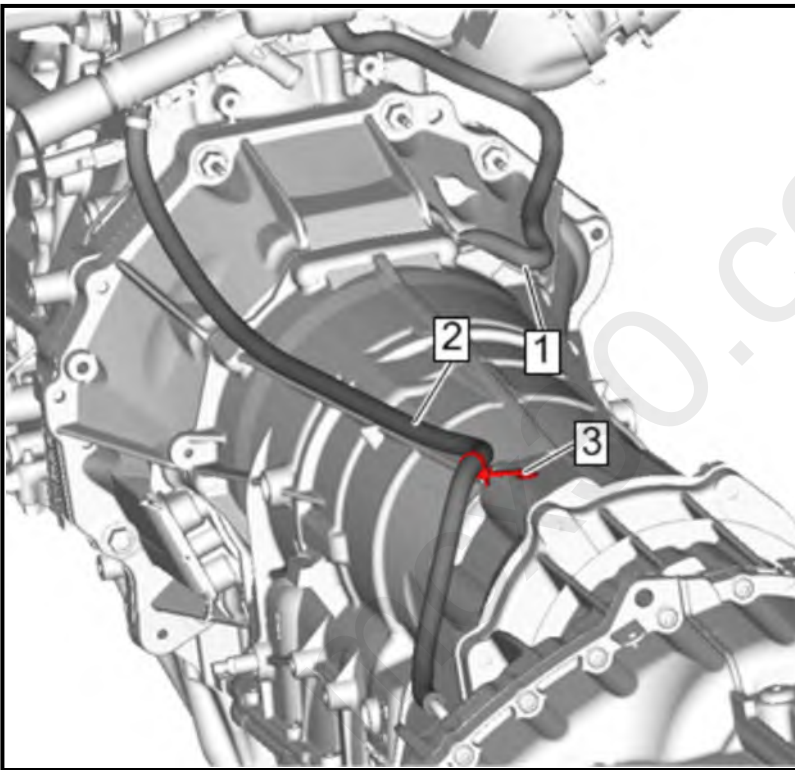
1. Disconnect the negative battery cable. [Battery Negative Cable Disconnection and Connection](#)
2. Remove the starter motor. [Starter Replacement \(LCV\)](#)
3. Mark the position of the flywheel to the torque converter.
4. Remove the three flywheel to torque converter bolts.
5. Remove the transfer case. [Transfer Case Assembly Replacement \(NQ7\)](#)
6. Support the transmission with a transmission jack.
7. Remove the transmission crossmember. [Transmission Support Crossmember Replacement \(4 Wheel Drive\)](#)
8. Remove the transmission mount (1). [Transmission Mount Replacement \(4WD\)](#)



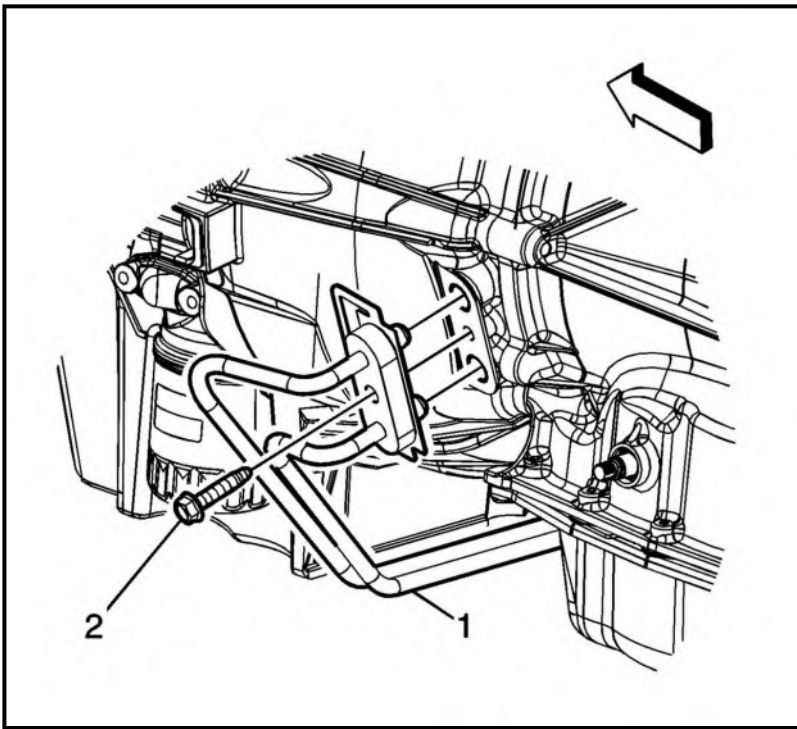
9. Remove the range selector lever cable (4) from the transmission. [Range Selector Lever Cable Replacement \(First Design\)](#), or [Range Selector Lever Cable Replacement \(Second Design\)](#).



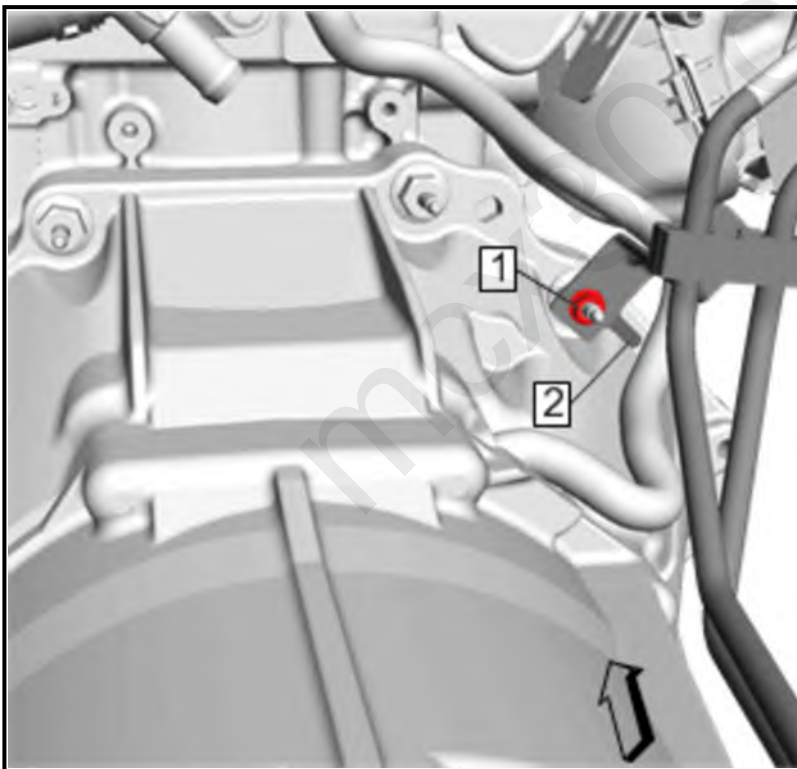
10. Disconnect the transmission vent hoses (1, 2) from the transmission and transfer case and position out of the way.



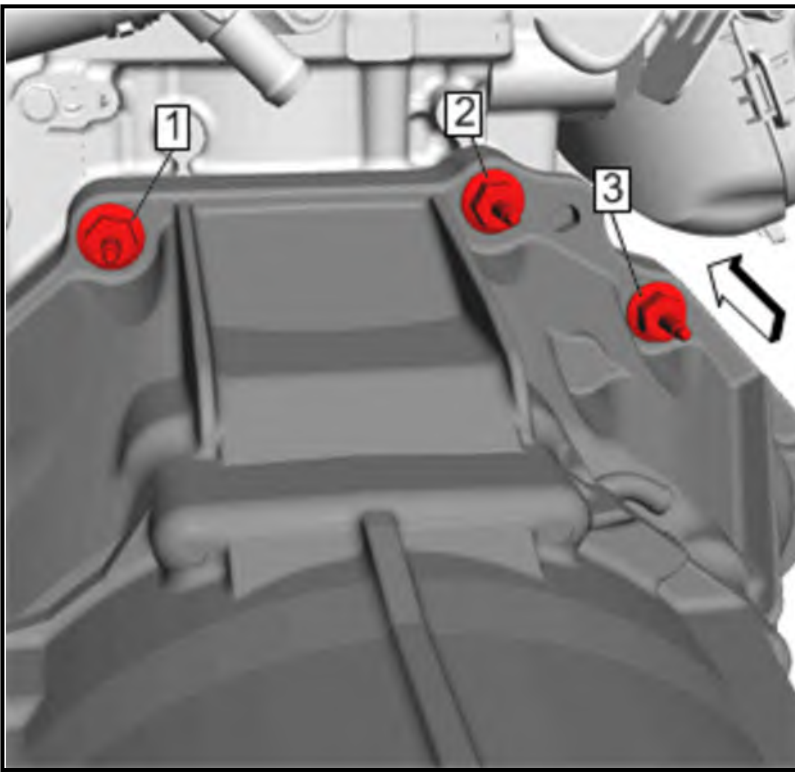
11. Disconnect the retainer (3) from the transmission.
12. Disconnect the transmission electrical connector from the transmission.
13. Remove the wire harness from the transmission.
14. Disconnect the transmission oil cooler lines (1) from the transmission. [Transmission Fluid Cooler Inlet and Outlet Pipe Replacement \(LCV\)](#)



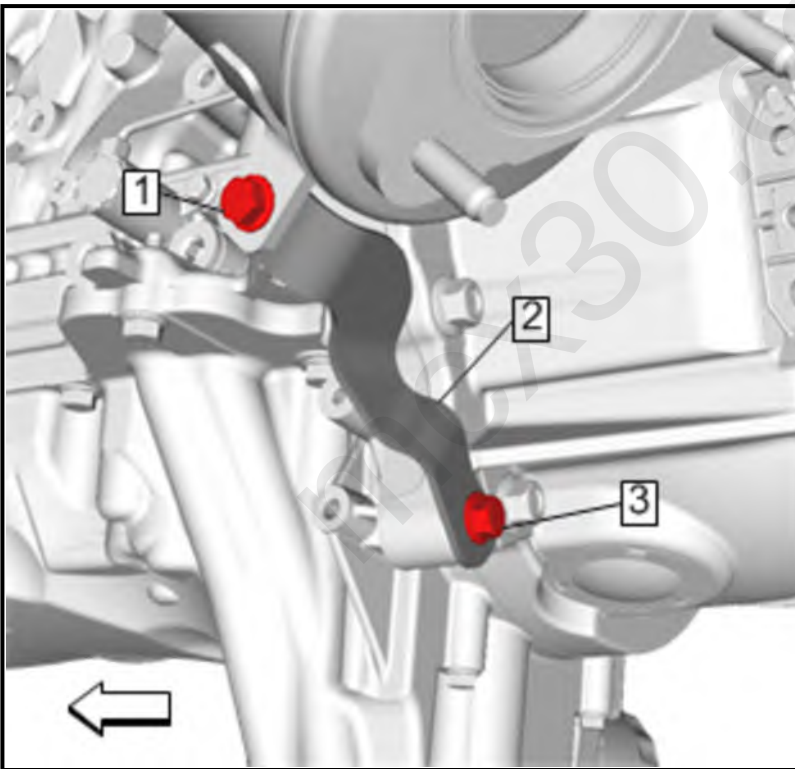
15. Plug the transmission oil cooler line connections in the transmission case.
16. Lower the transmission to gain access to the top and sides of the transmission.
17. Remove the nut (1), then position the bracket (2) out of the way.



18. Remove the 3 upper fasteners (1, 2, 3) securing the transmission to the engine.

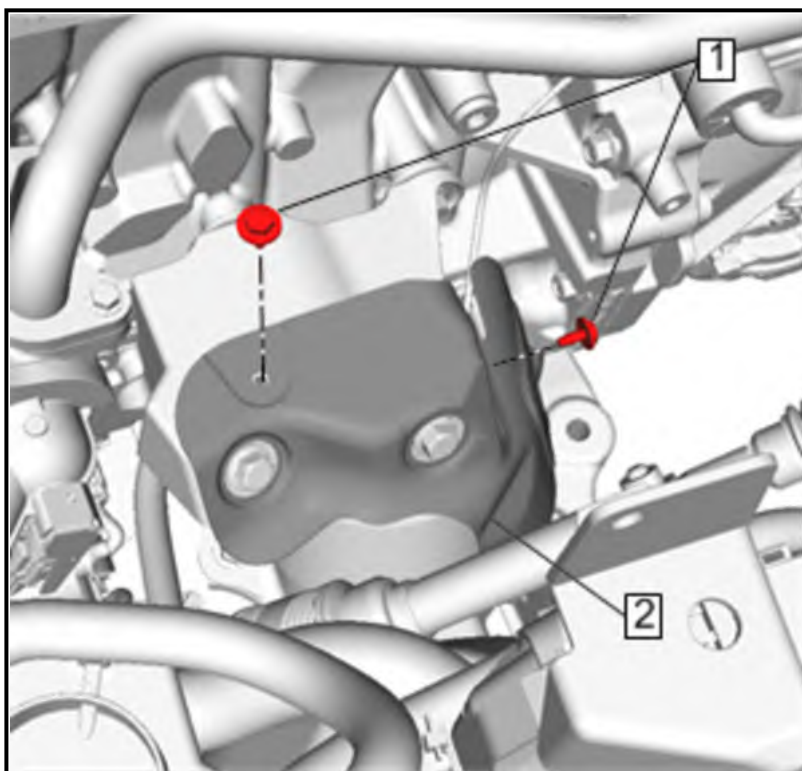


19. Remove the catalytic converter bracket (2).

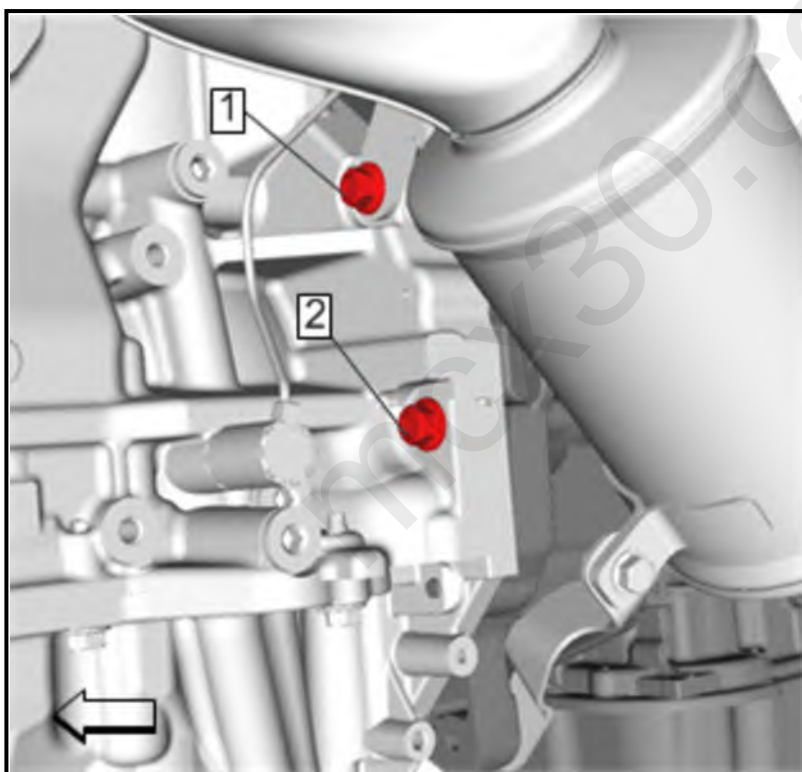


20. Catalytic Converter - Remove - [Catalytic Converter Replacement \(LCV\)](#).

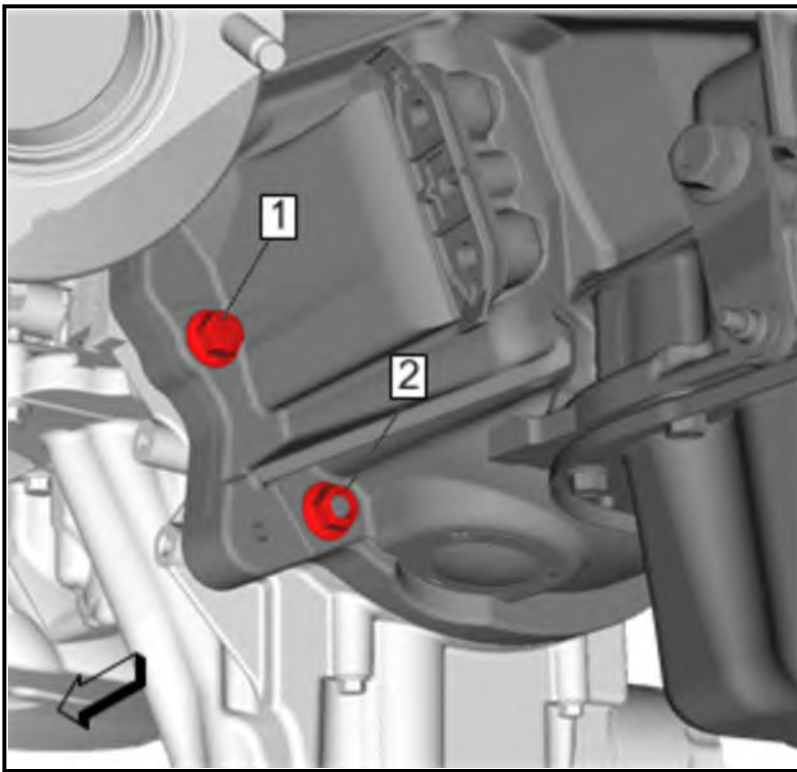
21. Remove the engine mount heat shield bolts (1), then remove the heat shield (2).



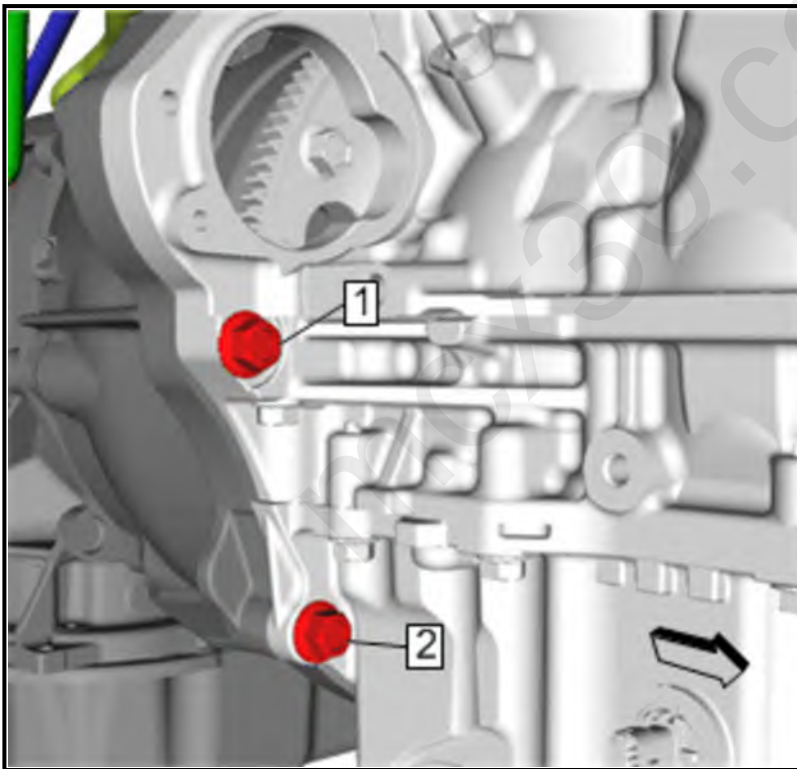
22. Remove the 2 left side fasteners (1, 2) securing the transmission to the engine.



23. Remove the 2 left lower fasteners (1, 2) securing the transmission to the engine.



24. Remove the 2 right side fasteners (1, 2) securing the transmission to the engine.



NOTE: Ensure that the torque converter stays seated in the transmission when pulling the transmission out.

25. Pull the transmission straight back.
26. Remove the transmission from the vehicle.
27. Transfer components as necessary.
28. Inspect the transmission fluid cooler, hoses, and pipes for leaks or damage. Replace as necessary.

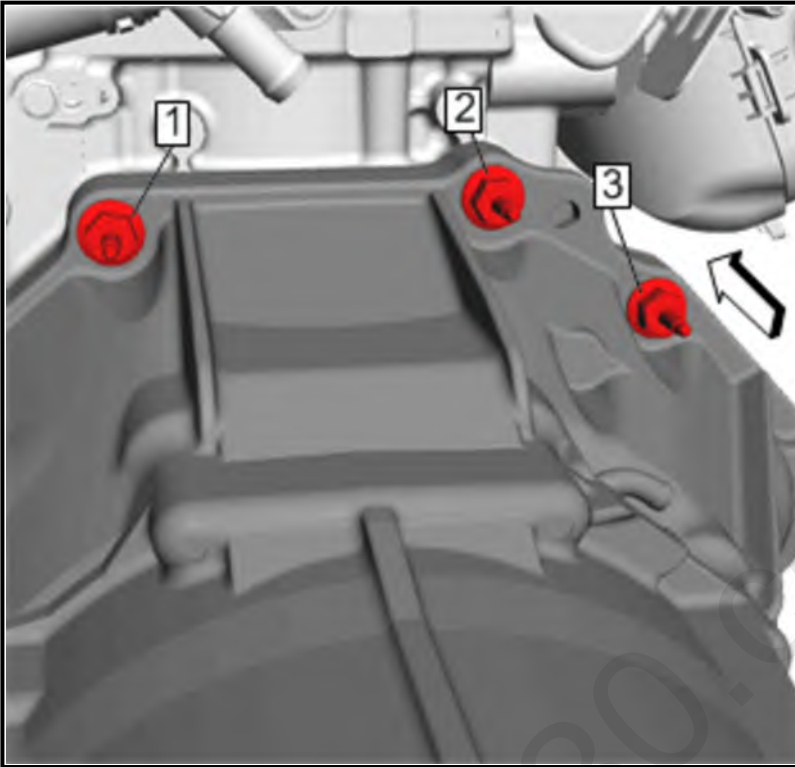
Installation Procedure

1. Support the transmission with a transmission jack.

2. Raise the transmission into place.
3. Slide the transmission straight onto the locating pins while lining up the marks on the flywheel and the torque converter.

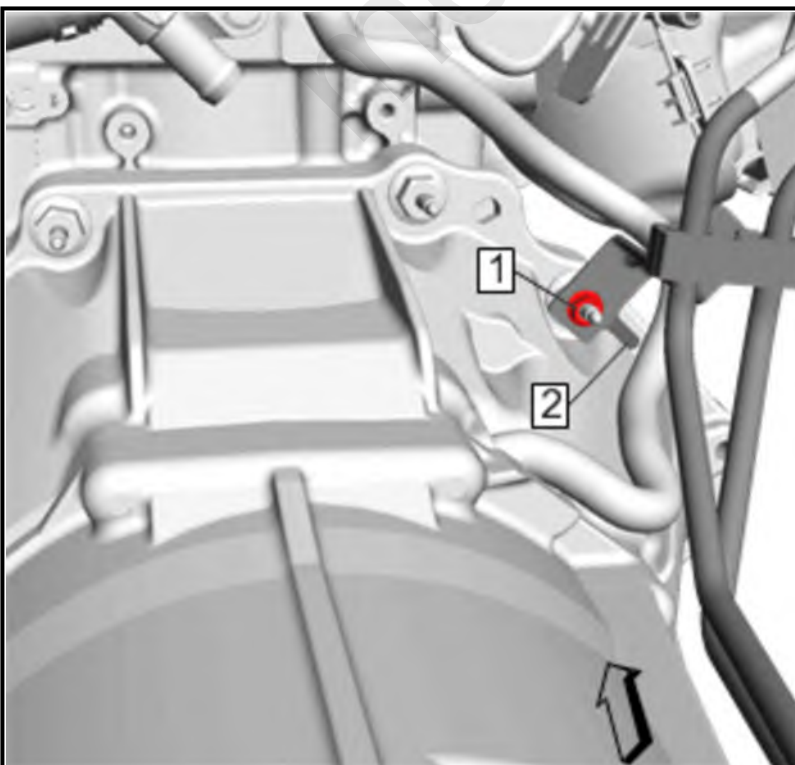
The torque converter must rotate freely by hand.

4. Install the 3 upper fasteners (1, 2, 3) securing the transmission to the engine and tighten to 50 N.m (37 lb ft).

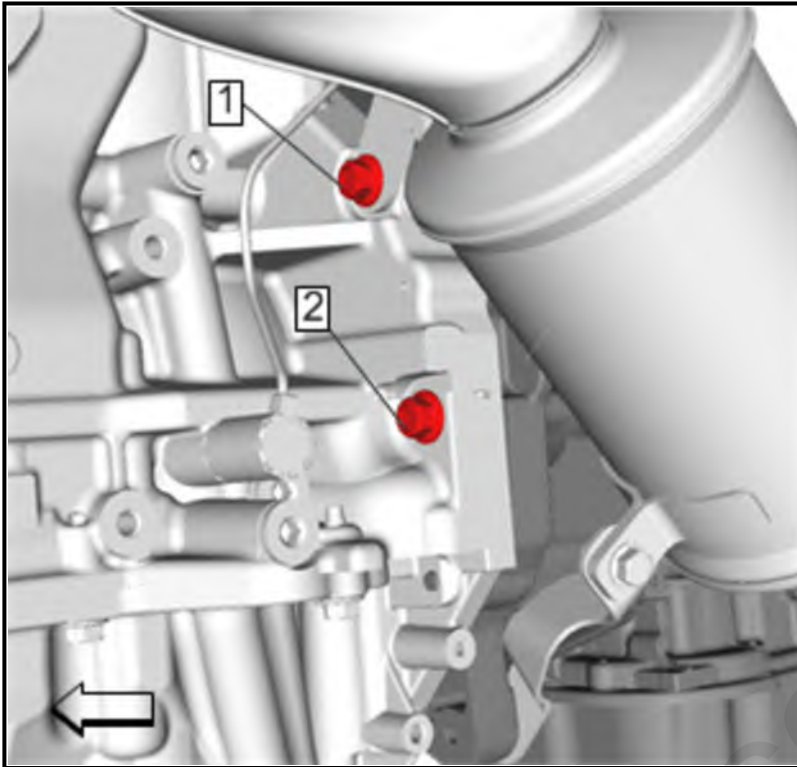


CAUTION: Refer to [Fastener Caution](#) .

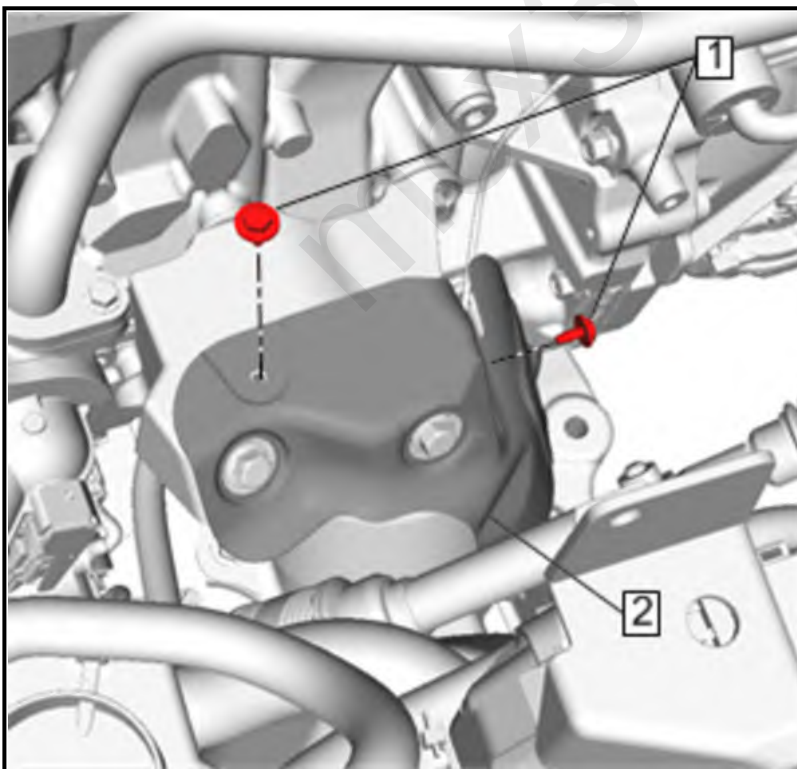
5. Position the bracket (2) to the transmission.



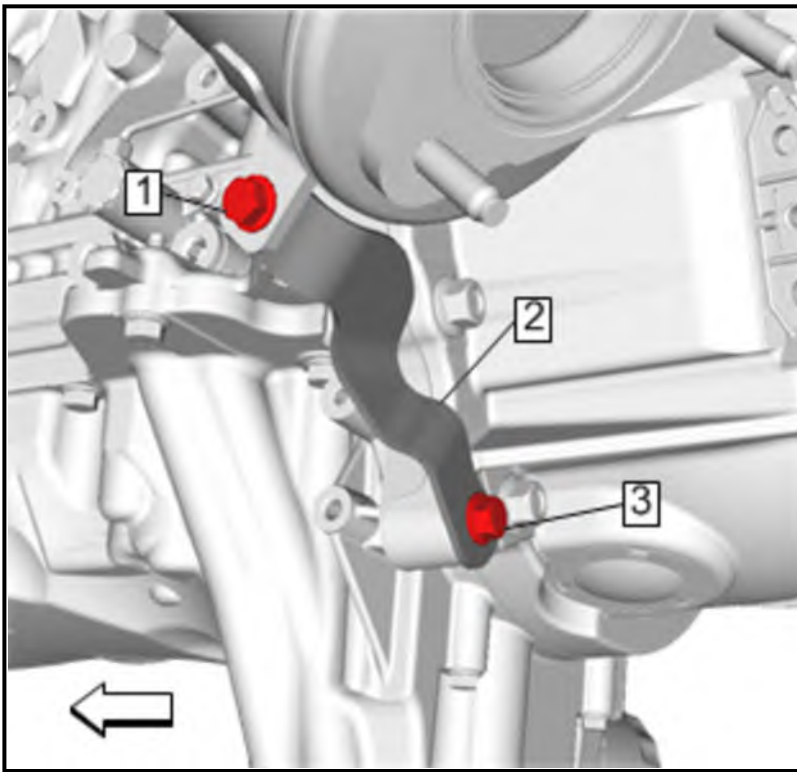
6. Install the fastener (1) and tighten to 22 N.m (16 lb ft).
7. Install the 2 left side fasteners (1, 2) securing the transmission to the engine and tighten to 50 N.m (37 lb ft).



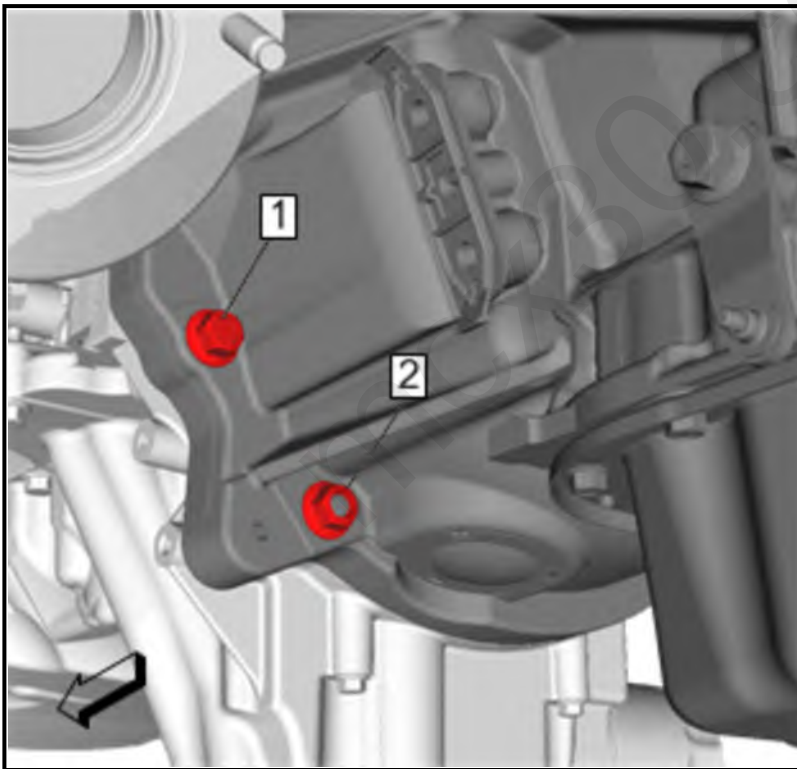
8. Catalytic Converter - Install - [Catalytic Converter Replacement \(LCV\)](#).
9. Install the engine mount heat shield (2), then install the engine mount heat shield bolts (1). [Engine Mount Replacement - Left Side](#)



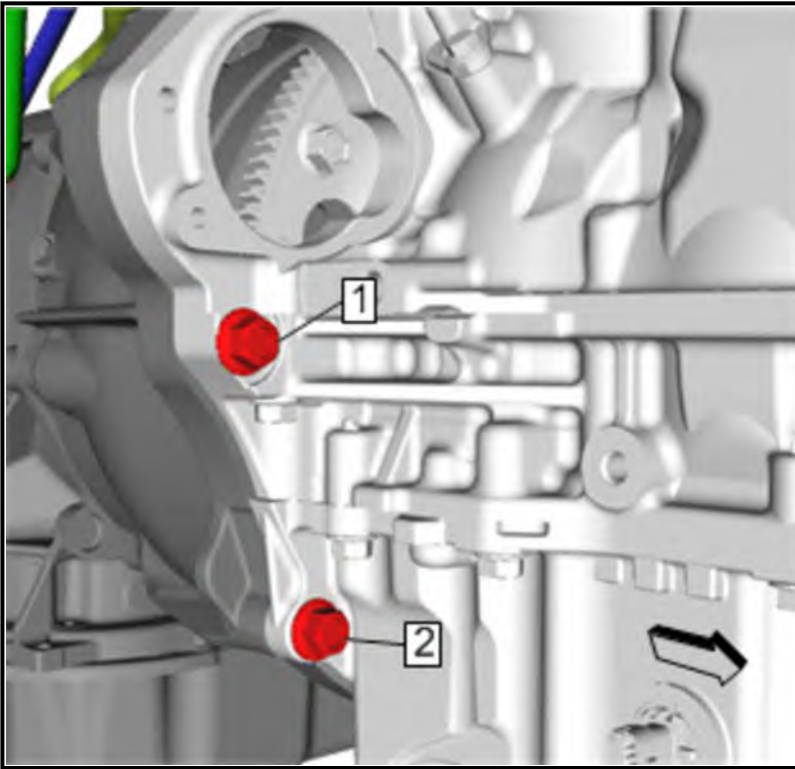
10. Install the catalytic converter bracket (2) and tighten the nut to 22 N.m (16 lb ft).



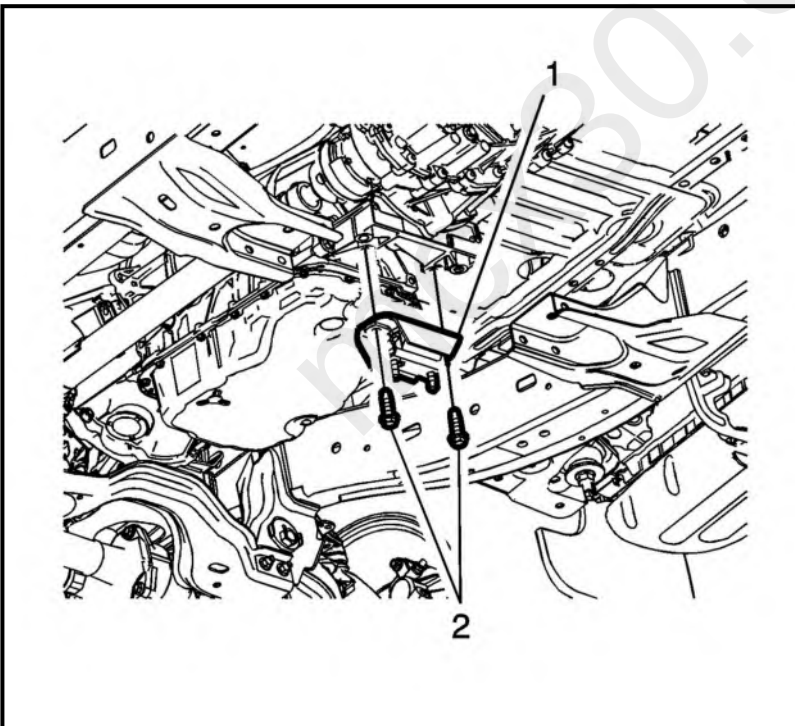
11. Install the 2 left lower fasteners (1, 2) securing the transmission to the engine and tighten to 50 N.m (37 lb ft).



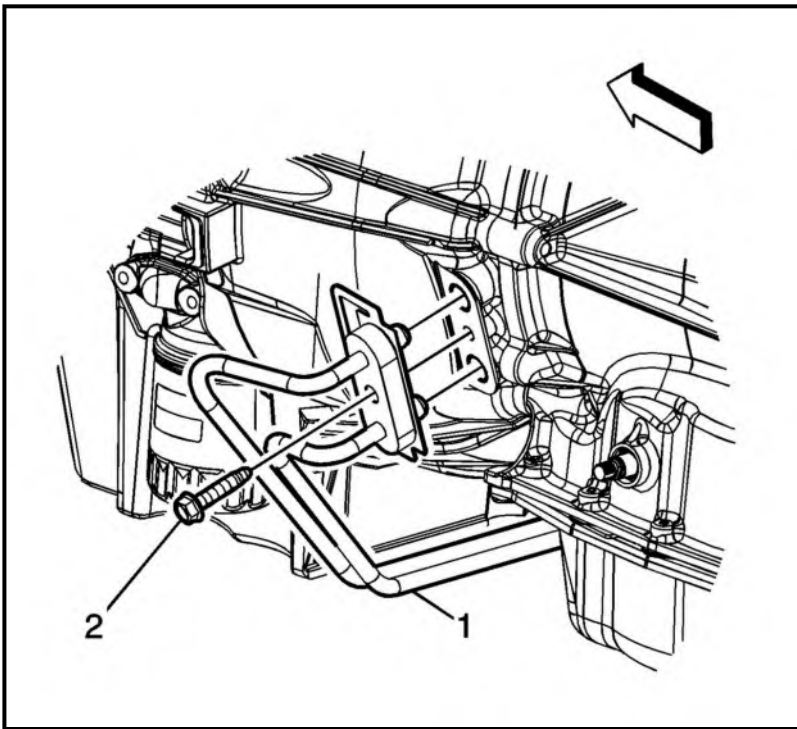
12. Install the 2 right side fasteners (1, 2) securing the transmission to the engine and tighten to 50 N.m (37 lb ft).



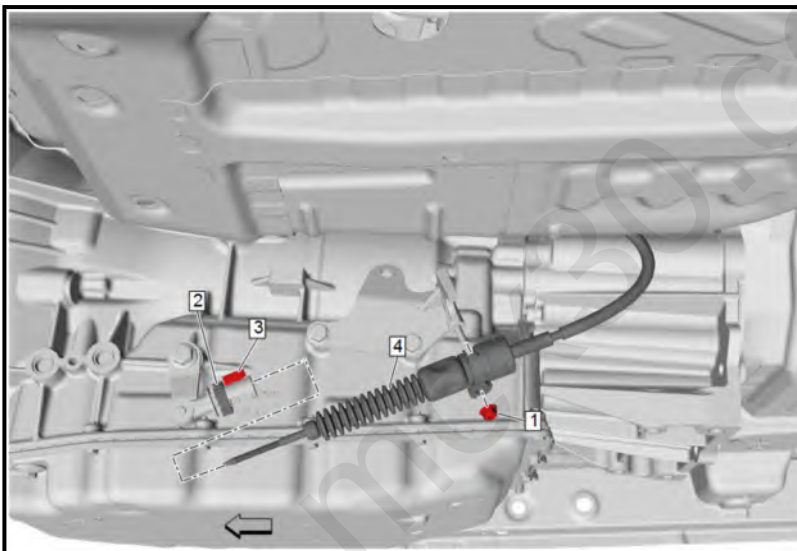
13. If reusing the torque converter bolts, clean the bolt threads and apply LOCTITE 242, or equivalent, to the threads prior to installation.
14. Install the flywheel to torque converter bolts and tighten to 63 N.m (46 lb ft).
15. Install the transmission mount (1). [Transmission Mount Replacement \(4WD\)](#)



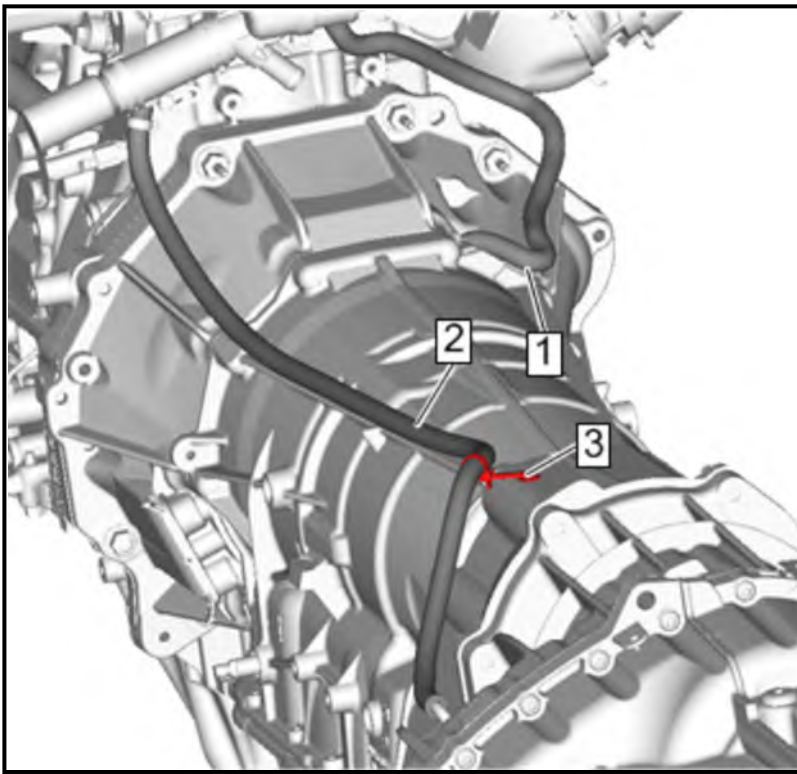
16. Install the transmission crossmember. [Transmission Support Crossmember Replacement \(4 Wheel Drive\)](#)
17. Install the starter motor. [Starter Replacement \(LCV\)](#)
18. Connect the transmission oil cooler lines (1) to the transmission. [Transmission Fluid Cooler Inlet and Outlet Pipe Replacement \(LCV\)](#)



19. Install the range selector lever cable (1) to the transmission. [Range Selector Lever Cable Replacement \(First Design\)](#), or [Range Selector Lever Cable Replacement \(Second Design\)](#).



20. Install the wire harness to the transmission.
 21. Connect the transmission electrical connector to the transmission.
 22. Connect the transmission vent hoses (1, 2) to the transmission and transfer case.



23. Connect the retainer (3) to the transmission.
24. Remove the transmission jack.
25. Install the transfer case. [Transfer Case Assembly Replacement \(NQ7\)](#)
26. Lower the vehicle.
27. Connect the negative battery cable. [Battery Negative Cable Disconnection and Connection](#) .
28. Fill the transmission to the proper level. [Transmission Fluid Level and Condition Check](#) .
29. If a NEW TCM has been installed into the vehicle, the NEW module needs to be reprogrammed. [Service Programming System \(SPS\)](#) .

NOTE:

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:

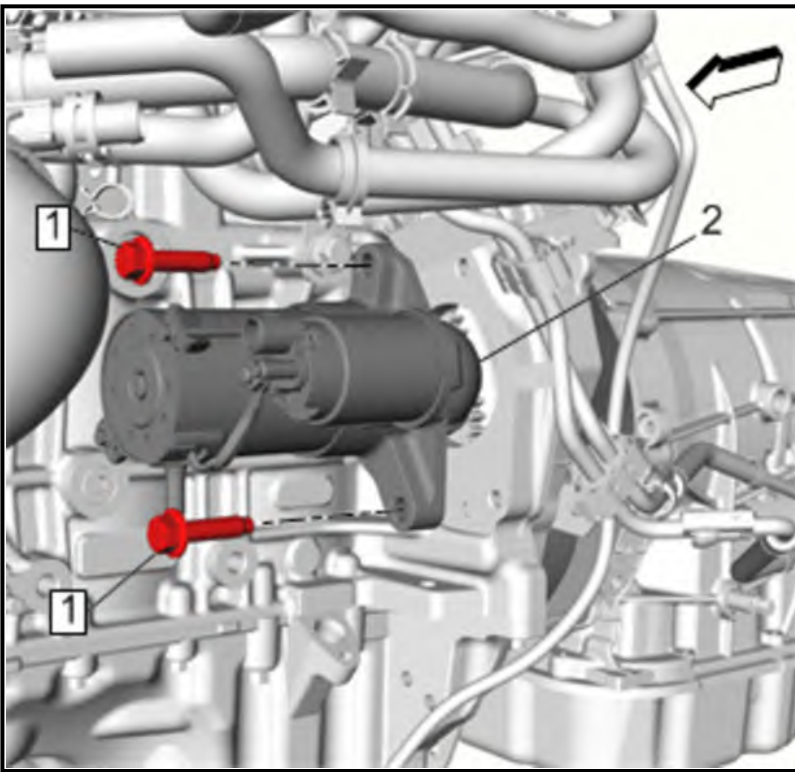
- Transmission internal service/overhaul
- Valve body repair or replacement
- Control solenoid valve assembly replacement
- TCM software/calibration update
- Any service in response to a shift quality concern

30. Perform the Reset Transmission Adapts. [Reset Transmission Adapts](#)

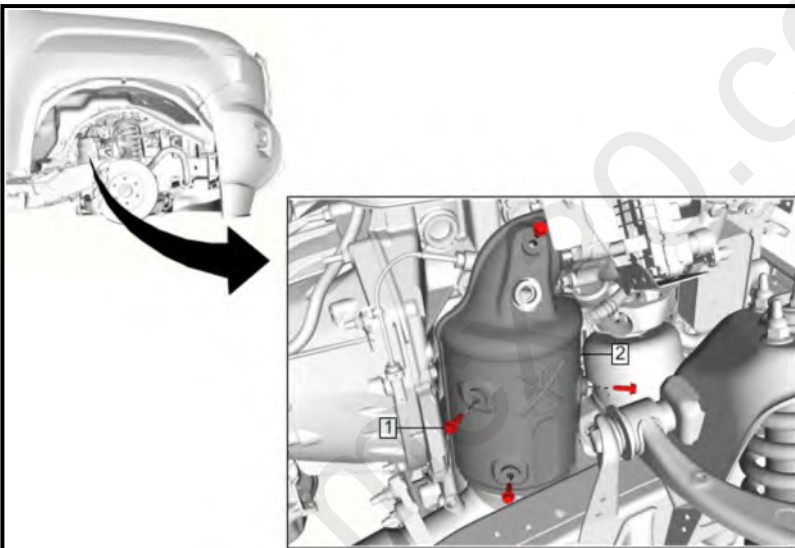
TRANSMISSION REPLACEMENT (LWN DIESEL WITH 4WD)

Removal Procedure

1. Disconnect the negative battery cable. [Battery Negative Cable Disconnection and Connection](#) .
2. Remove the front passenger side wheelhouse liner. [Front Wheelhouse Liner Replacement \(Without ZR2\)](#) , or [Front Wheelhouse Liner Replacement \(With ZR2\)](#) , or [Front Wheelhouse Liner Replacement \(Bison\)](#)
3. Remove the starter (2). [Starter Replacement \(LWN\)](#)



4. Remove the catalytic converter heat shield (2). [Catalytic Converter Heat Shield Replacement \(LWN\)](#)



5. Remove the flywheel inspection cover.

6. Mark the position of the flywheel to the torque converter.

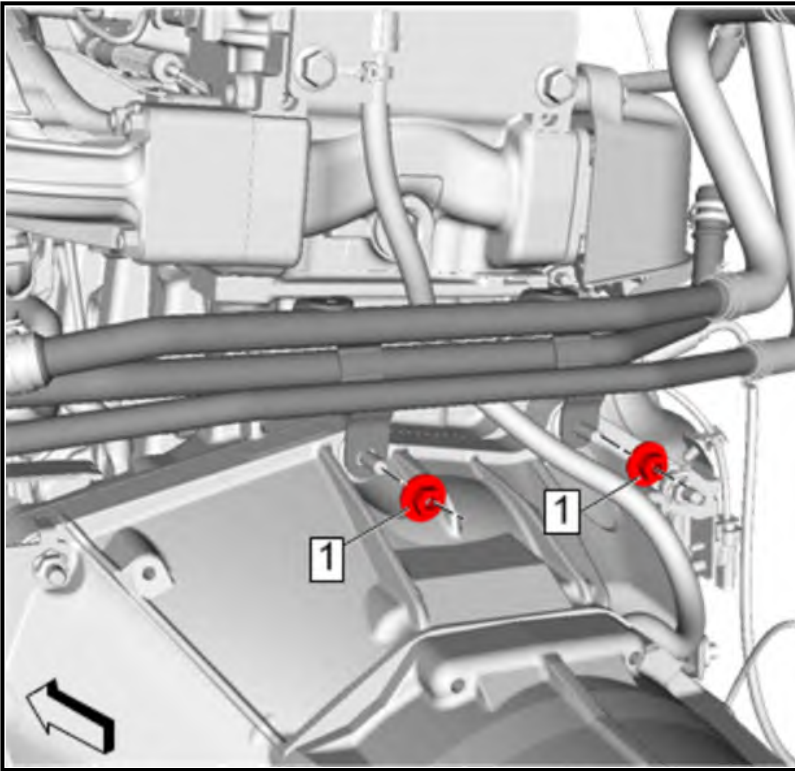
7. Rotate the engine through the inspection cover opening using an appropriate tool.

8. Remove the six flywheel to torque converter bolts.

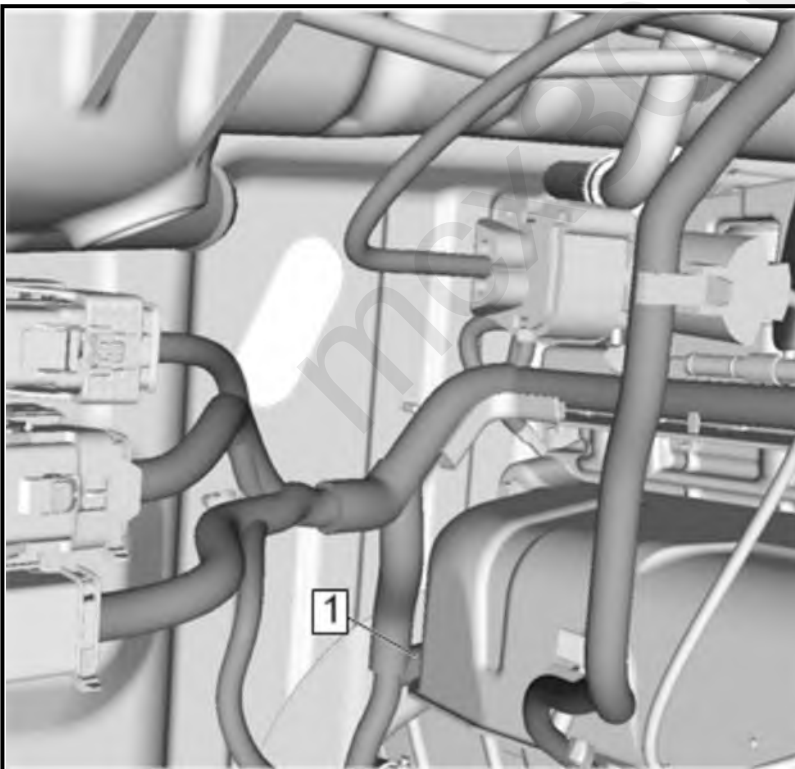
9. Remove the transfer case. [Transfer Case Assembly Replacement \(NQ6\)](#)

10. Lower rear of transmission to access the radiator surge tank outlet pipe nuts.

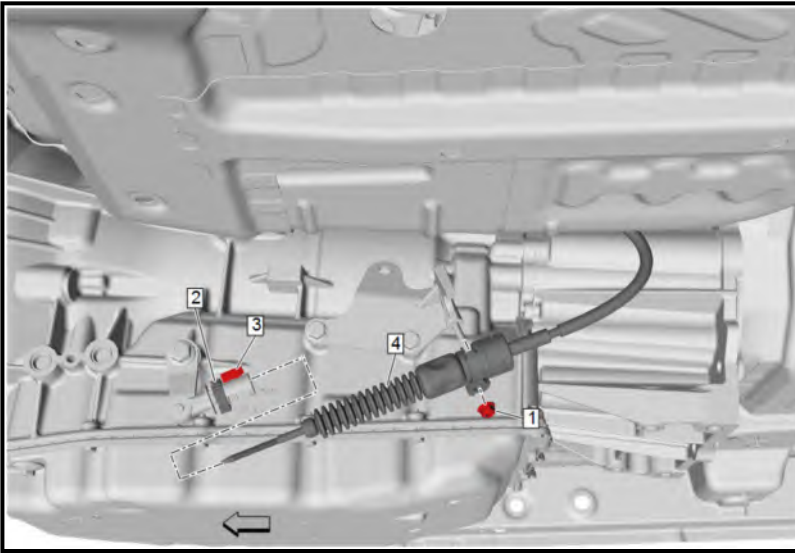
11. Remove the radiator surge tank outlet pipe nuts (1).



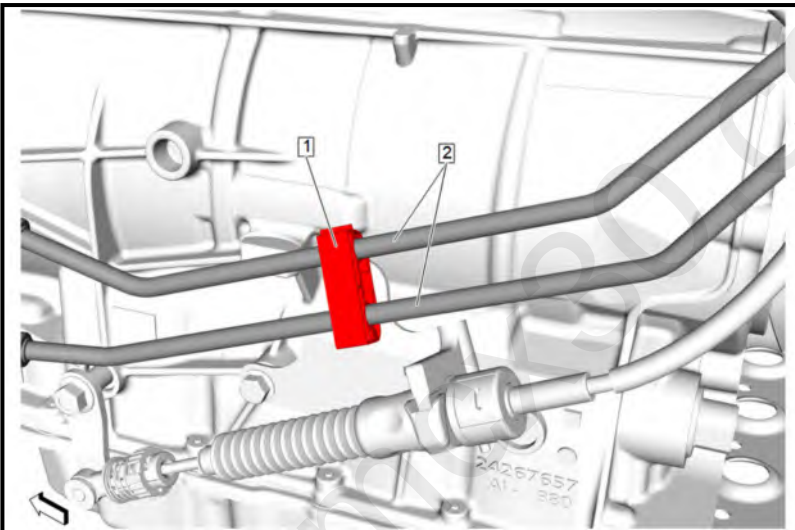
12. Raise rear of transmission and install transmission cross member to support transmission.
13. Lower the vehicle.
14. From passenger side of vehicle, reposition wiring harness outboard away from radiator surge tank pipe assembly.



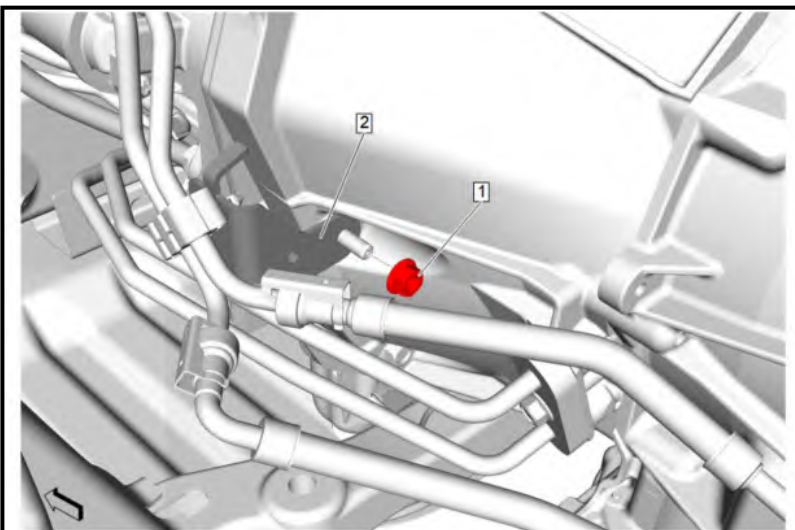
15. Rotate radiator surge tank outlet pipe assembly to remove from transmission studs.
16. Pull the surge tank pipe assembly towards driver side until pipe brackets are out of the way of the Studs and support the assembly.
17. Using a suitable jack, support the transmission and remove transmission cross member.
18. Remove the range selector lever cable (4) from the transmission. [Range Selector Lever Cable Replacement \(First Design\)](#), or [Range Selector Lever Cable Replacement \(Second Design\)](#).



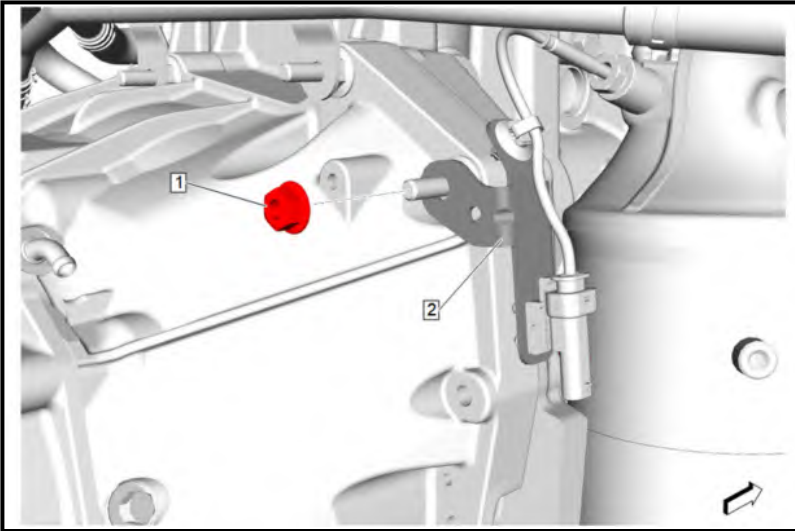
19. Disconnect the transmission vent hose from the transmission.
20. Disconnect the transfer case vent hose from the transmission and position aside.
21. Disconnect the transmission electrical connector from the transmission.
22. Remove the wire harness from the transmission.
23. Remove the retainer (1) from the transmission.



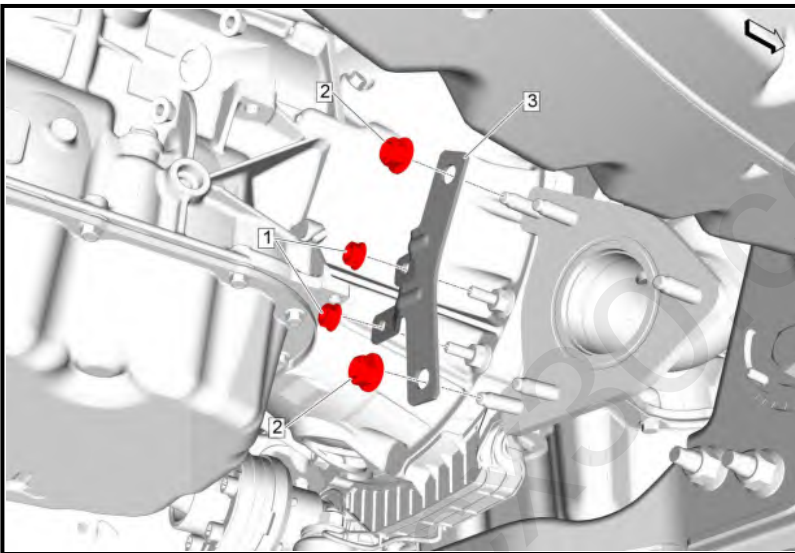
24. Reposition the fuel lines (2).
25. Remove the fuel injection fuel feed and return hose clip nut (1) and reposition bracket (2).



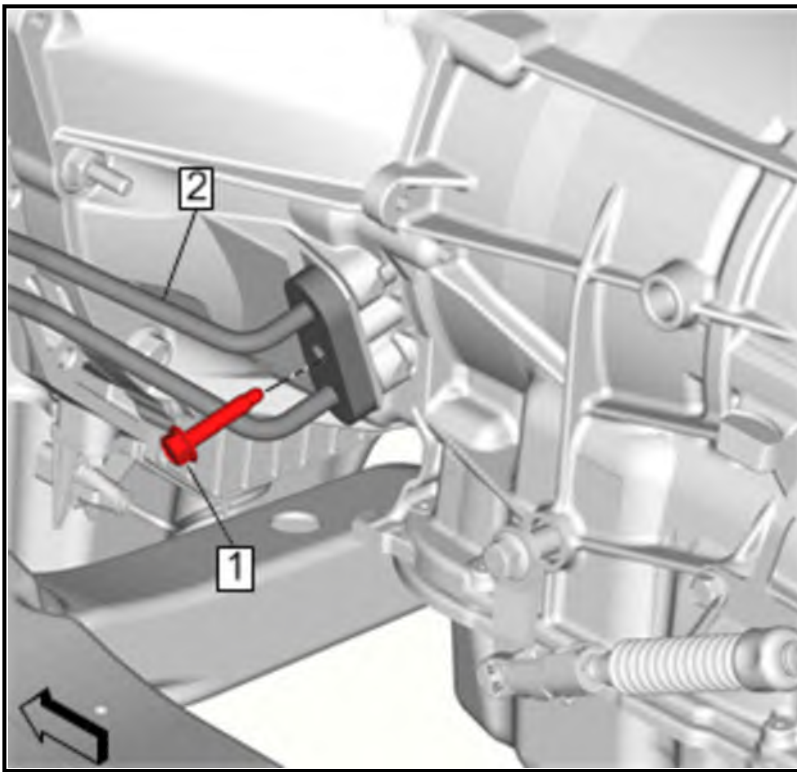
26. Remove the exhaust temperature sensor bracket nut (1) and reposition bracket (2).



27. Catalytic Converter Brace Bracket (3) - Remove - [Catalytic Converter Replacement \(LWN\)](#)

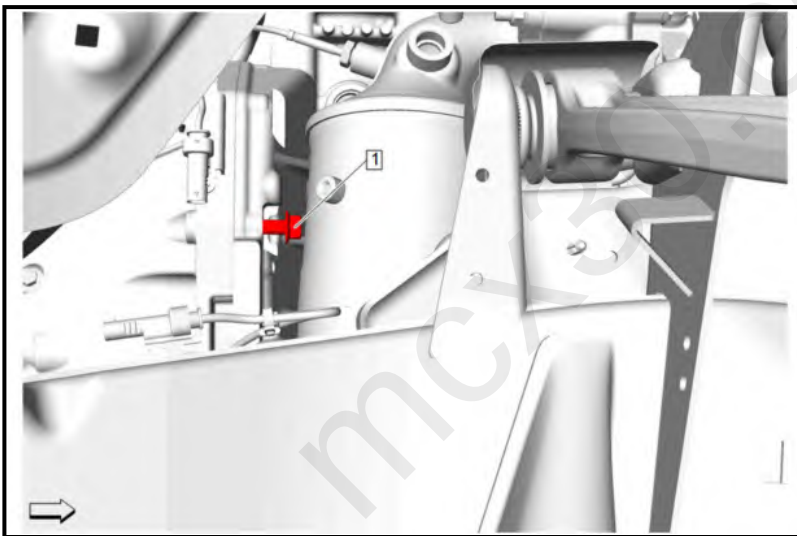


28. Disconnect the transmission oil cooler lines (2) from the transmission. [Transmission Fluid Cooler Inlet and Outlet Pipe Replacement \(LWN\)](#)



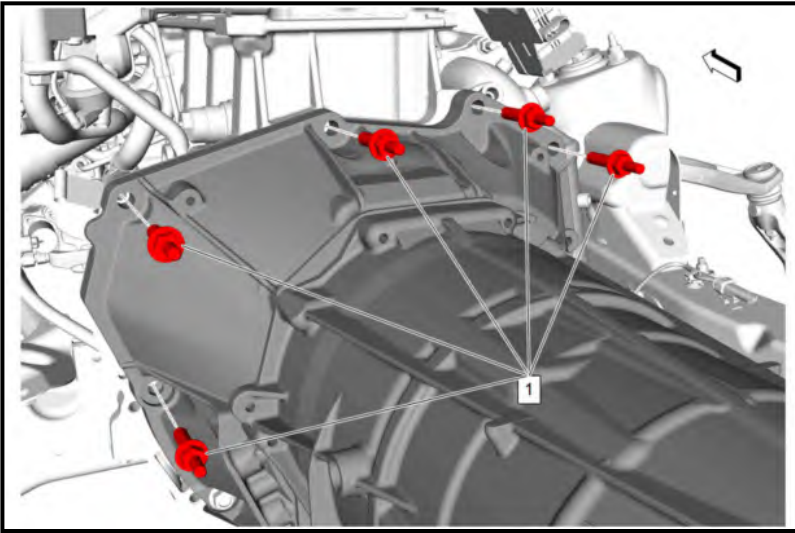
29. Plug the transmission oil cooler line connections in the transmission case.

30. Transmission Bolt (1) - Loosen

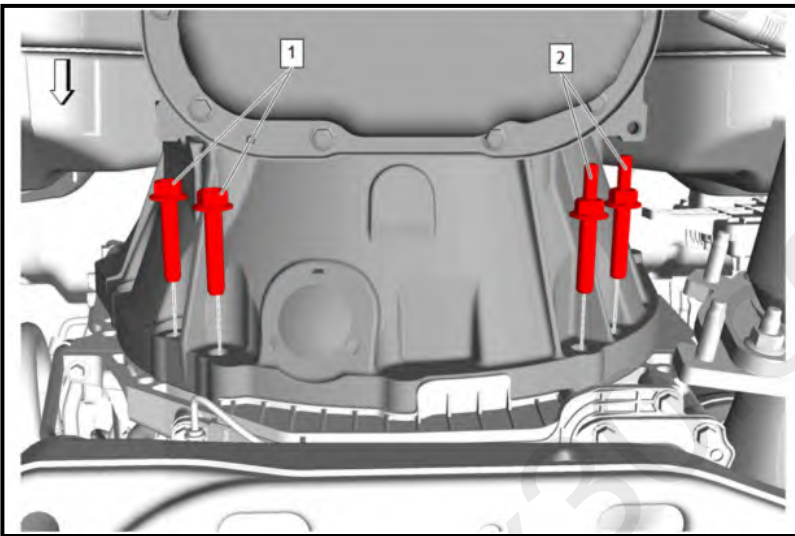


NOTE: Transmission bolt stays in engine.

31. Transmission Stud (1) - Remove [5x]

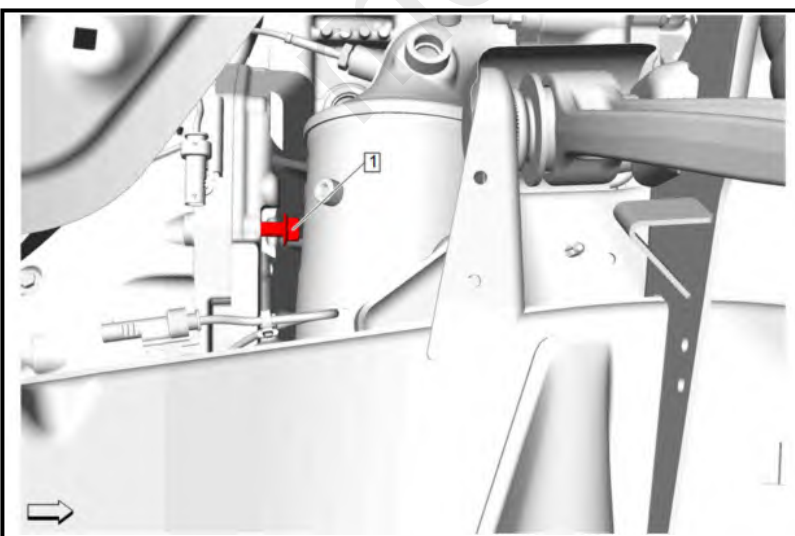


32. Transmission Bolt (1) - Remove [2x]



33. Transmission Stud (2) - Remove [2x]

34. Pull the transmission straight back while removing transmission bolt (1) from transmission.



NOTE:

- Ensure that the torque converter stays seated in the transmission when pulling the transmission out.
- Transmission bolt stays in engine.

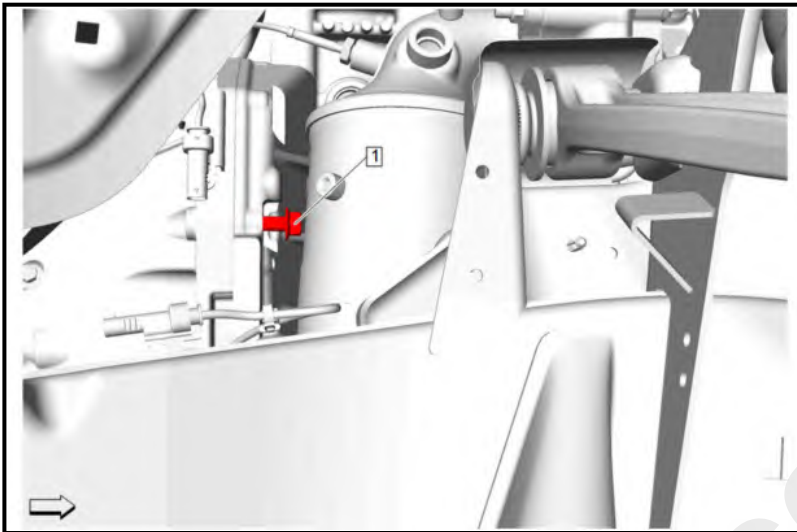
35. Remove the transmission from the vehicle.

36. Transfer components as necessary.

37. Inspect the transmission fluid cooler, hoses, and pipes for leaks or damage. Replace as necessary.

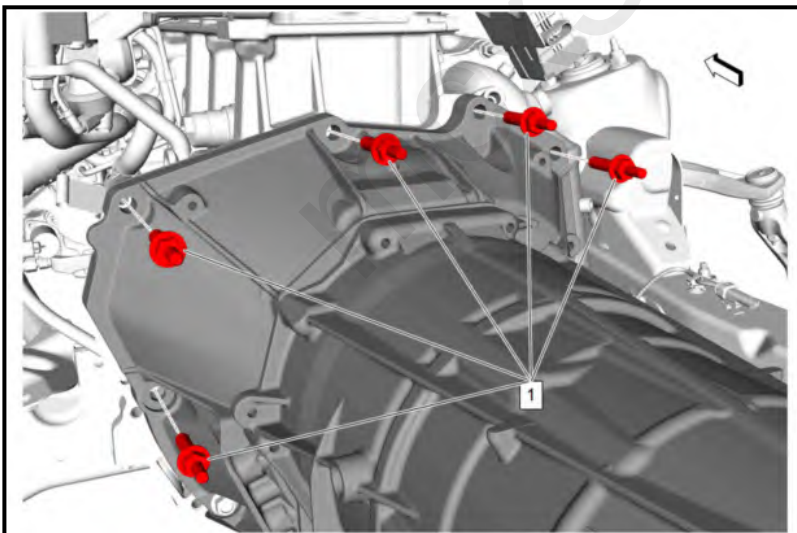
Installation Procedure

1. Support the transmission with a transmission jack.
2. Raise the transmission into place.
3. Slide the transmission straight onto the locating pins while lining up the marks on the flywheel and the torque converter.



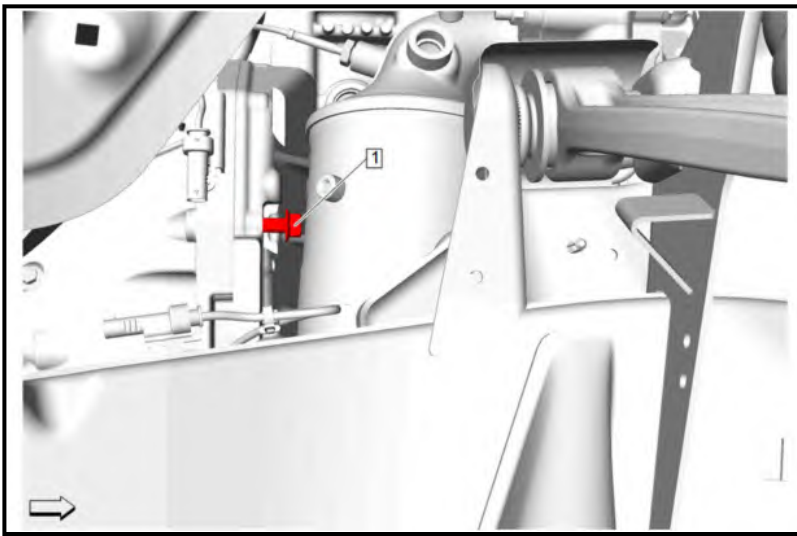
NOTE: The torque converter must rotate freely by hand.

4. Engage threads of the transmission bolt (1) and hand tighten.
5. Transmission Stud (1) - Install and tighten [5x] 50 N.m (37 lb ft)



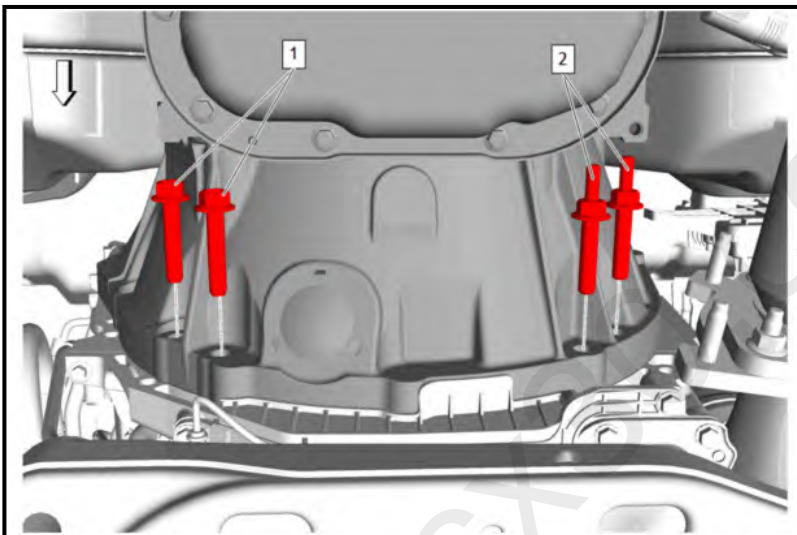
CAUTION: Fastener Caution .

6. Transmission Bolt (1) - Tighten 50 N.m (37 lb ft)



NOTE: Transmission bolt stays in engine.

7. Transmission Stud (2) - Install and tighten [2x] 50 N.m (37 lb ft)



8. Transmission Bolt (1) - Install and tighten [2x] 50 N.m (37 lb ft)

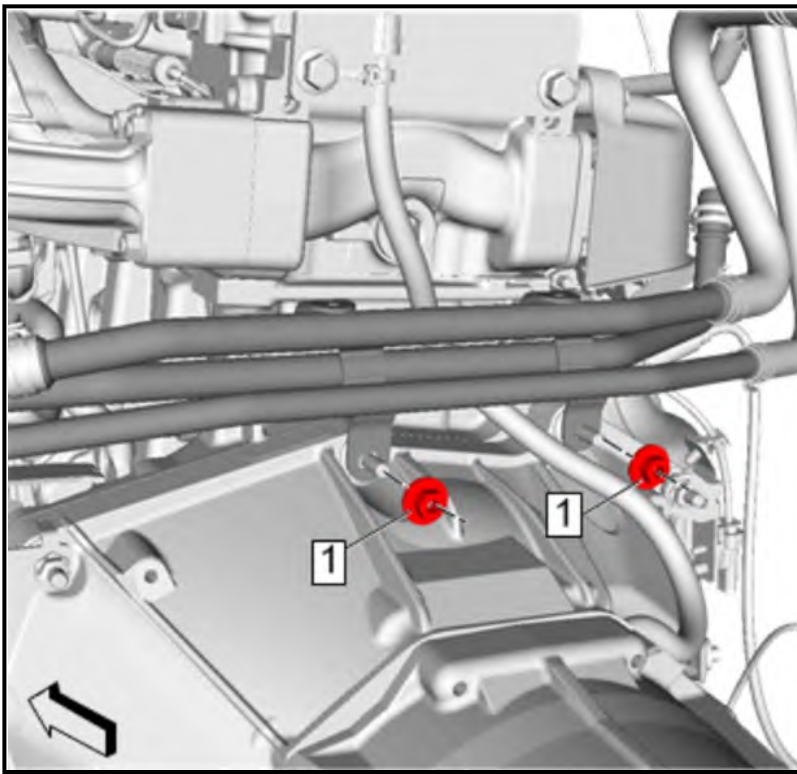
9. If reusing the torque converter bolts, clean the bolt threads and apply thread locker or an equivalent, to the threads prior to installation. [Adhesives, Fluids, Lubricants, and Sealers](#)

10. Install the flywheel to torque converter bolts and tighten to 63 N.m (46 lb ft).

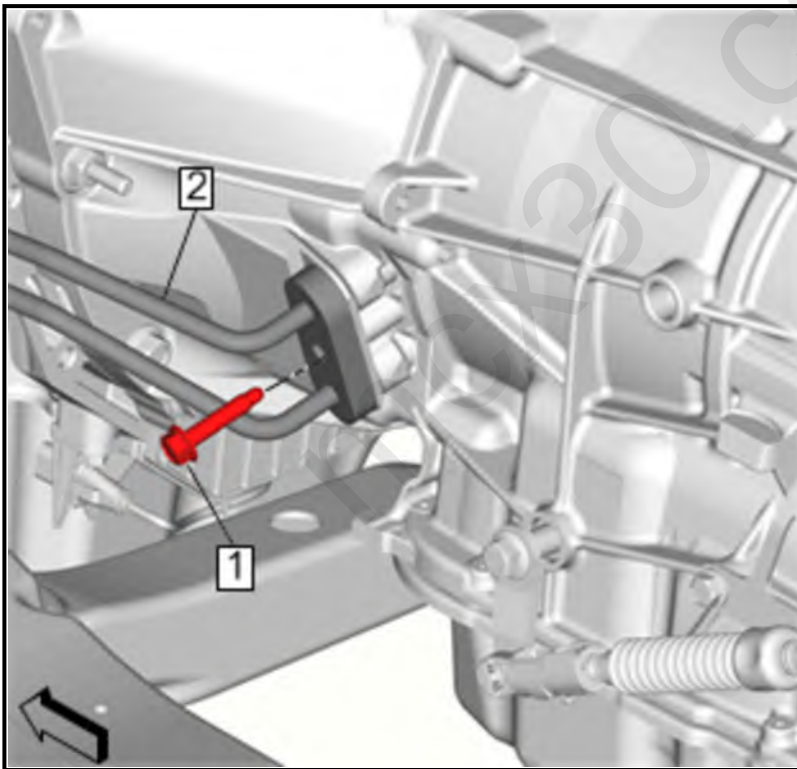
11. Install the flywheel inspection cover.

12. Install radiator surge tank pipe assembly support and position back onto the studs.

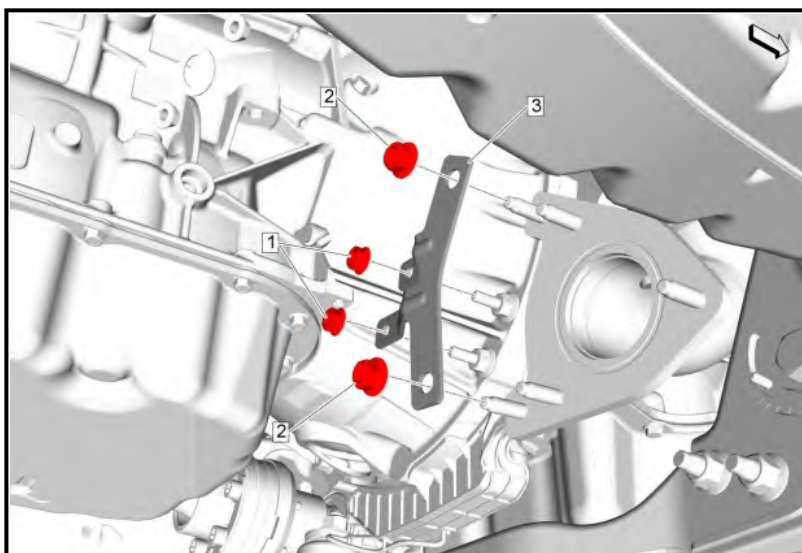
13. Lower rear of transmission and install radiator surge tank pipe nuts and tighten to 22 N.m (16 lb ft).



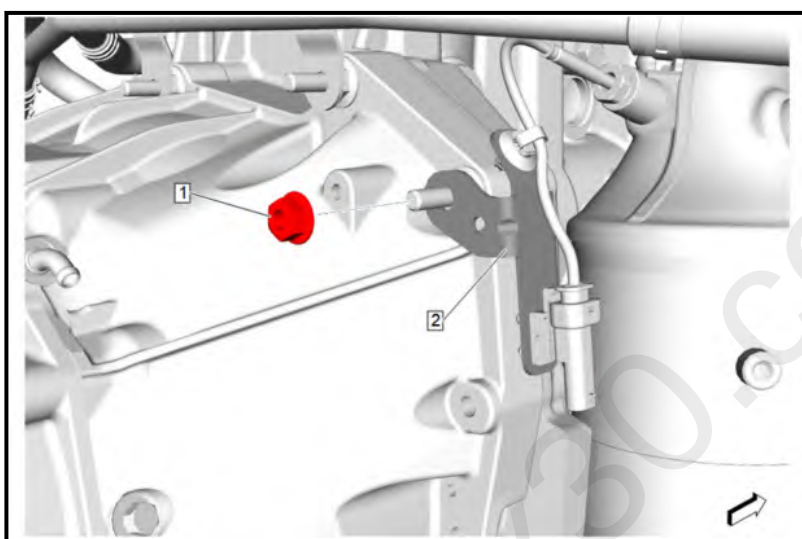
14. Connect the transmission oil cooler lines (2) to the transmission. [Transmission Fluid Cooler Inlet and Outlet Pipe Replacement \(LWN\)](#)



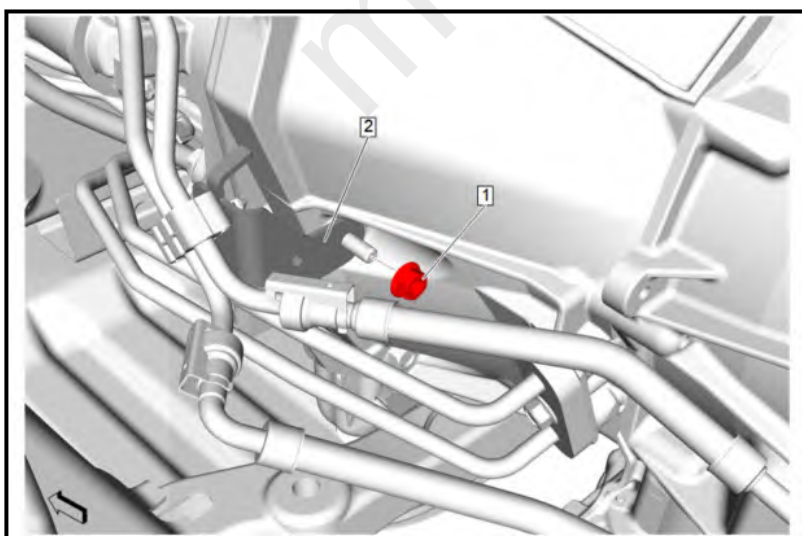
15. Catalytic Converter Brace Bracket (3) - Install - [Catalytic Converter Replacement \(LWN\)](#)



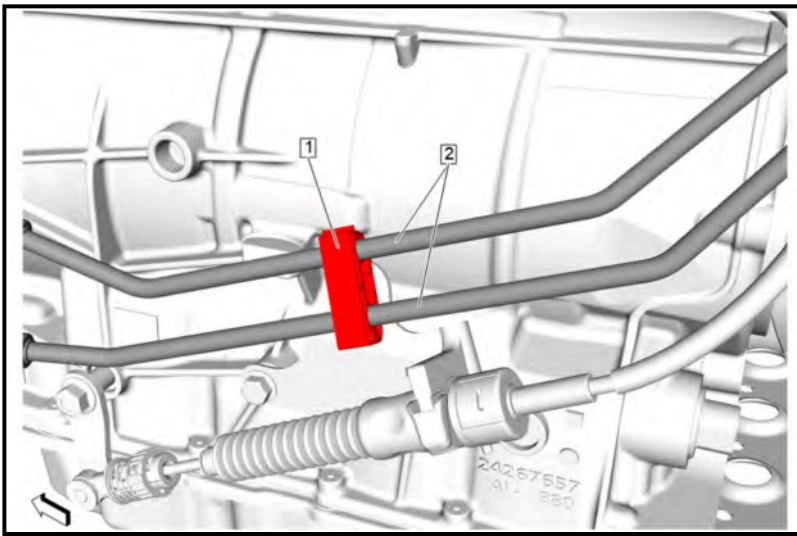
16. Install the exhaust temperature sensor bracket (2) and bracket nut (1) and tighten to 22 N.m (16 lb ft).



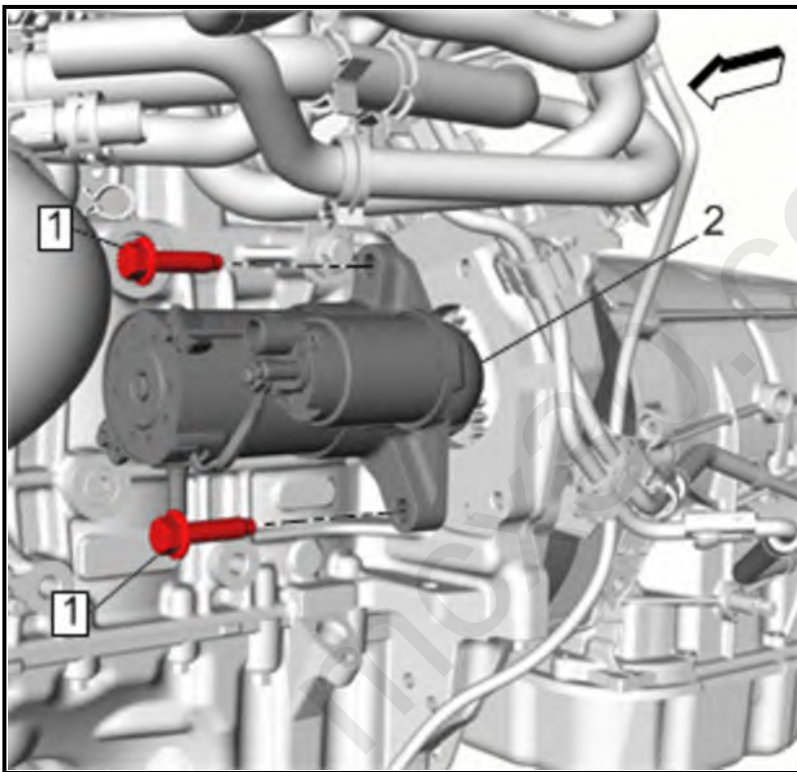
17. Install the fuel injection fuel feed and return hose clip bracket (2) and bracket nut (1) and tighten to 22 N.m (16 lb ft).



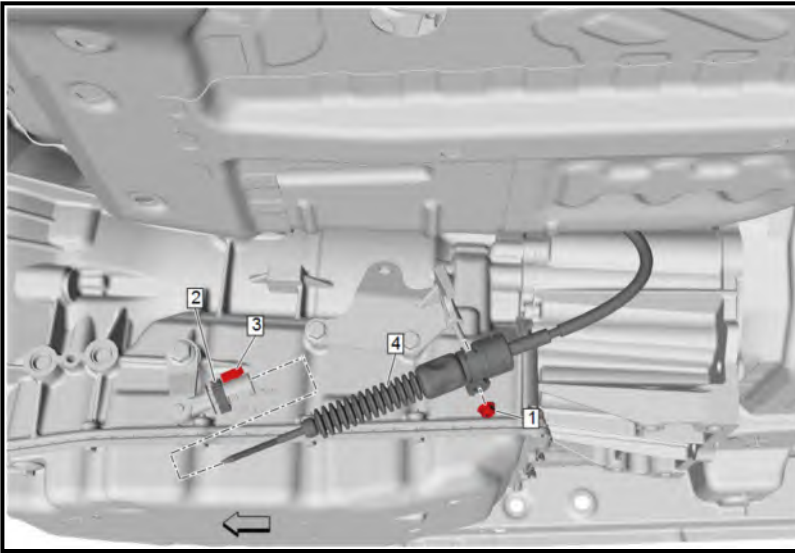
18. Install the fuel lines (2).



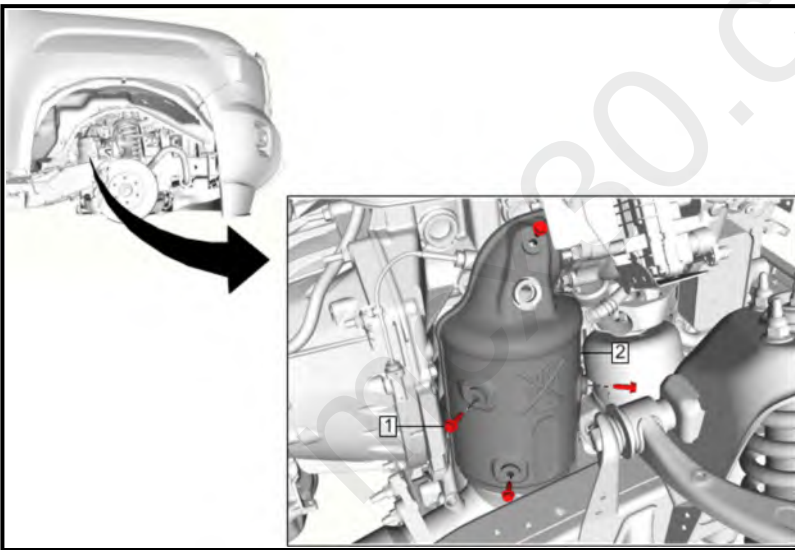
19. Install the retainer (1) to the transmission.
20. Install the starter (2). [Starter Replacement \(LWN\)](#)



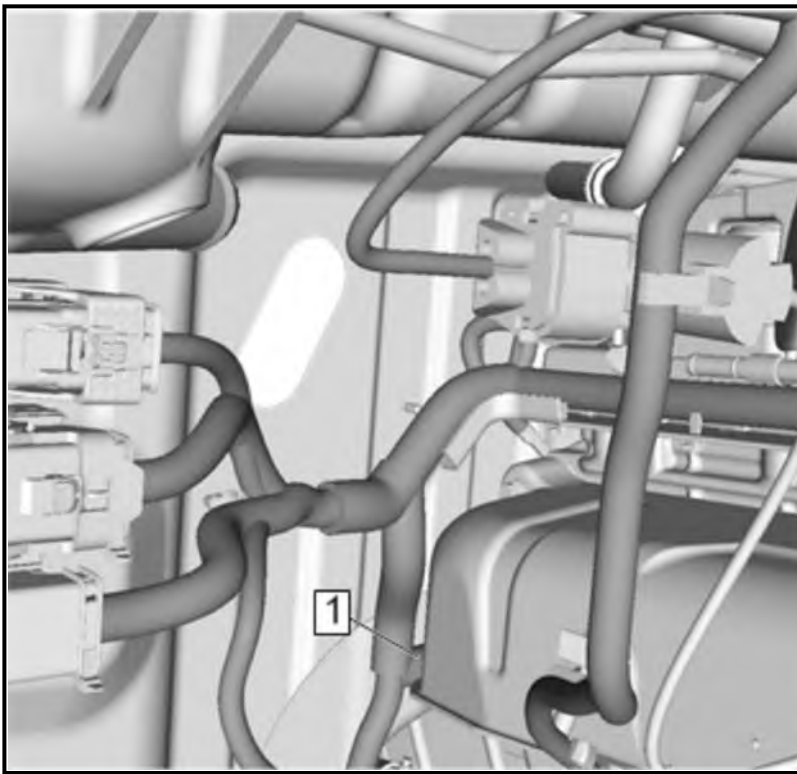
21. Install the front passenger side wheelhouse liner. [Front Wheelhouse Liner Replacement \(Without ZR2\)](#), or [Front Wheelhouse Liner Replacement \(With ZR2\)](#), or [Front Wheelhouse Liner Replacement \(Bison\)](#)
22. Install the range selector cable (4) to the transmission. [Range Selector Lever Cable Replacement \(First Design\)](#), or [Range Selector Lever Cable Replacement \(Second Design\)](#)



23. Install the wire harness to the transmission.
24. Connect the transmission electrical connector to the transmission.
25. Connect the transmission vent hose to the transmission.
26. Connect the transfer case vent hose to the transmission.
27. Remove the transmission jack.
28. Install the transfer case. [Transfer Case Assembly Replacement \(NQ6\)](#)
29. Install the catalytic converter heat shield (2). [Catalytic Converter Heat Shield Replacement \(LWN\)](#)



30. Lower the vehicle.
31. From passenger side of vehicle, reposition wiring harness outboard to the surge tank pipe assembly.



32. Connect the negative battery cable. [Battery Negative Cable Disconnection and Connection](#)
33. Fill the transmission to the proper level. [Transmission Fluid Level and Condition Check](#) .
34. If a NEW TCM has been installed into the vehicle, the NEW module needs to be reprogrammed. [Service Programming System \(SPS\)](#)

NOTE:

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 valve assembly replacement
- TCM software/calibration update
- Any service in response to a shift quality concern

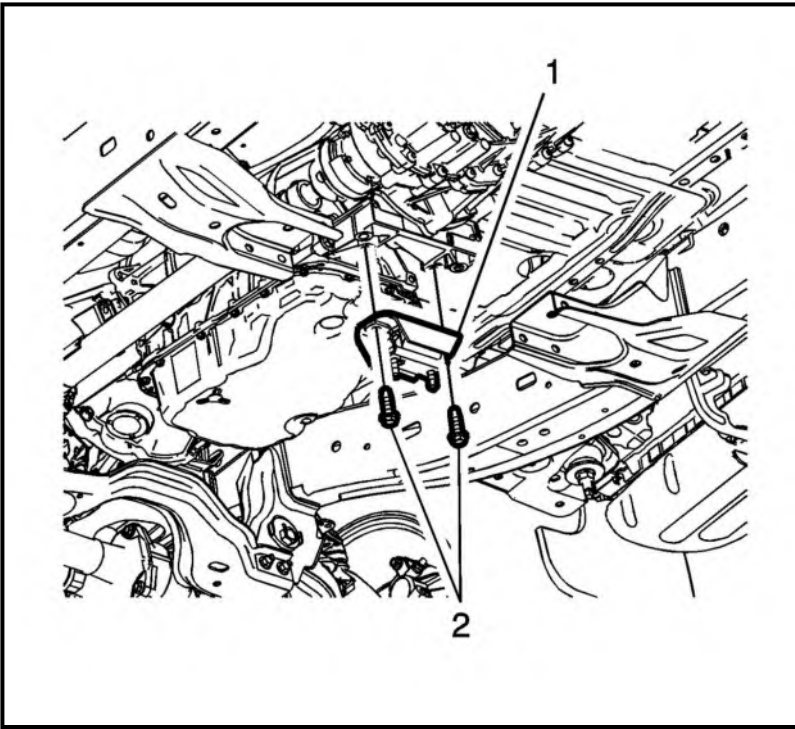
35. Perform the Reset Transmission Adapts. [Reset Transmission Adapts](#) .

TRANSMISSION REPLACEMENT (LCV ENGINE WITH 2WD)

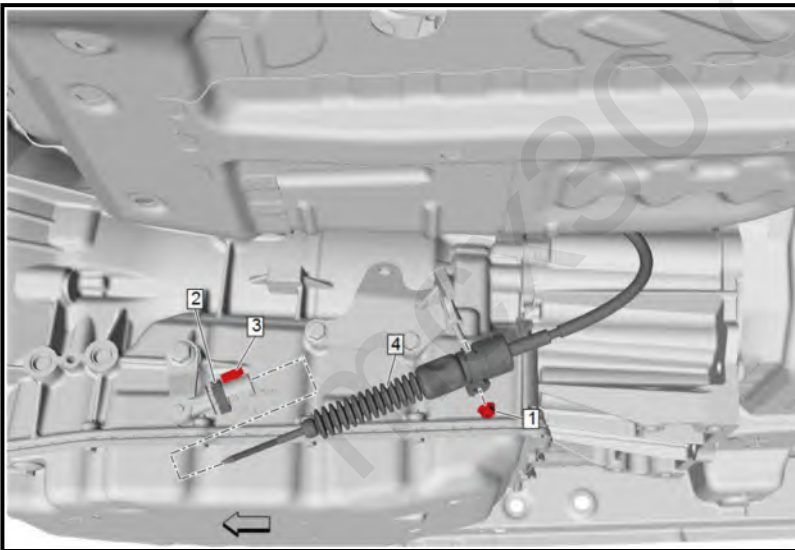
Removal Procedure

1. Disconnect the negative battery cable. [Battery Negative Cable Disconnection and Connection](#)
2. Remove the starter motor. [Starter Replacement \(LCV\)](#).
3. Remove the exhaust pipe. [Exhaust Pipe Replacement \(LCV\)](#).
4. Mark the position of the flywheel to the torque converter.
5. Remove the three flywheel to torque converter bolts.
6. Remove the rear propeller shaft. [Propeller Shaft Replacement \(With MYB\)](#) , or [Propeller Shaft Replacement \(M5T with 2WD\)](#) , or [Propeller Shaft Replacement \(With Bison\)](#).
7. Support the transmission with a transmission jack.
8. Remove the transmission crossmember. [Transmission Support Crossmember Replacement \(2 Wheel Drive\)](#).

9. Remove the transmission mount (1). [Transmission Mount Replacement \(2WD\)](#)



10. Remove the range selector cable (4) from the transmission. [Range Selector Lever Cable Replacement \(First Design\)](#), or [Range Selector Lever Cable Replacement \(Second Design\)](#)

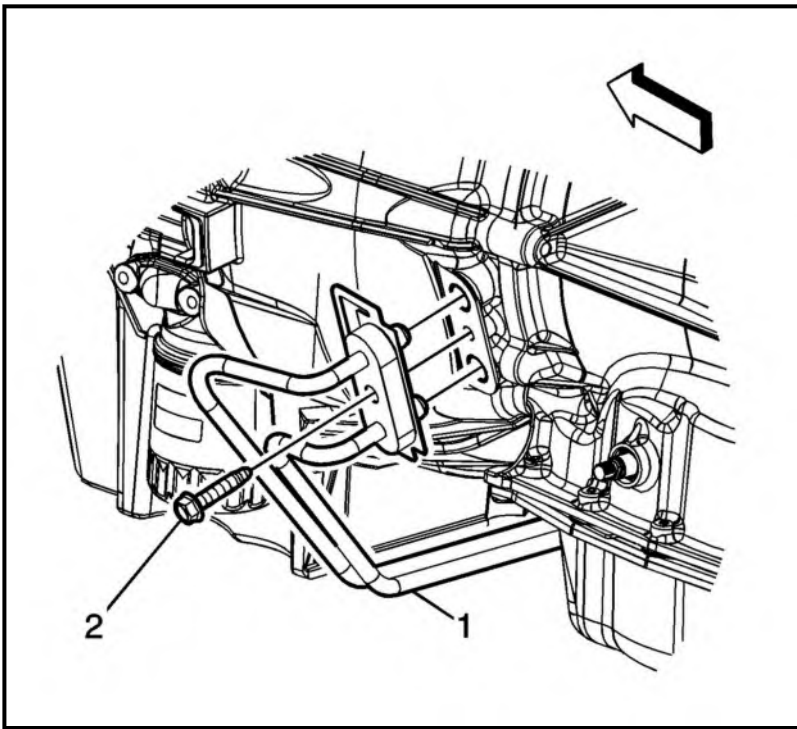


11. Disconnect the transmission vent hose from the transmission.

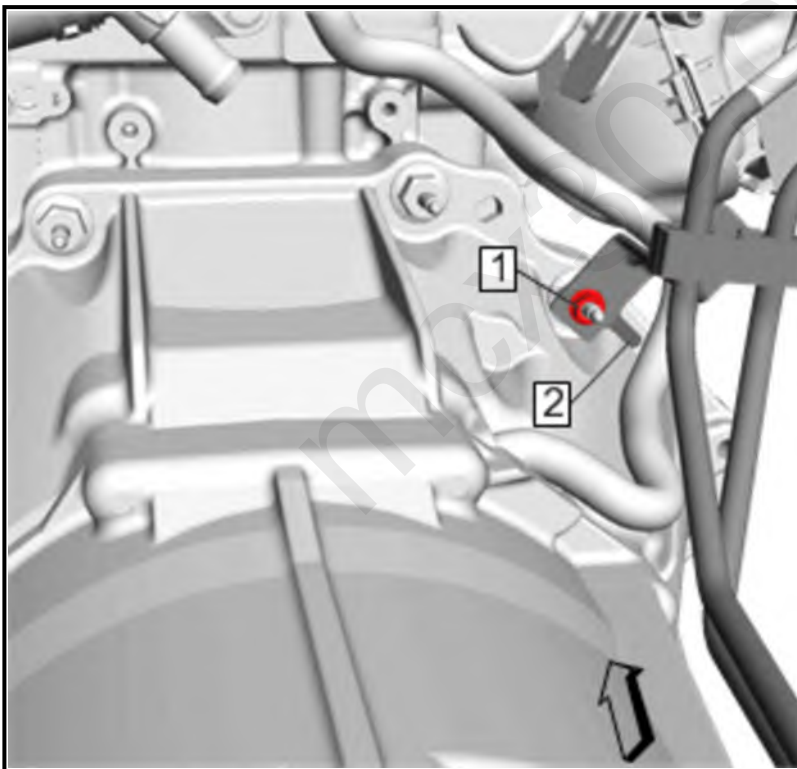
12. Disconnect the transmission electrical connector from the transmission.

13. Remove the wire harness from the transmission.

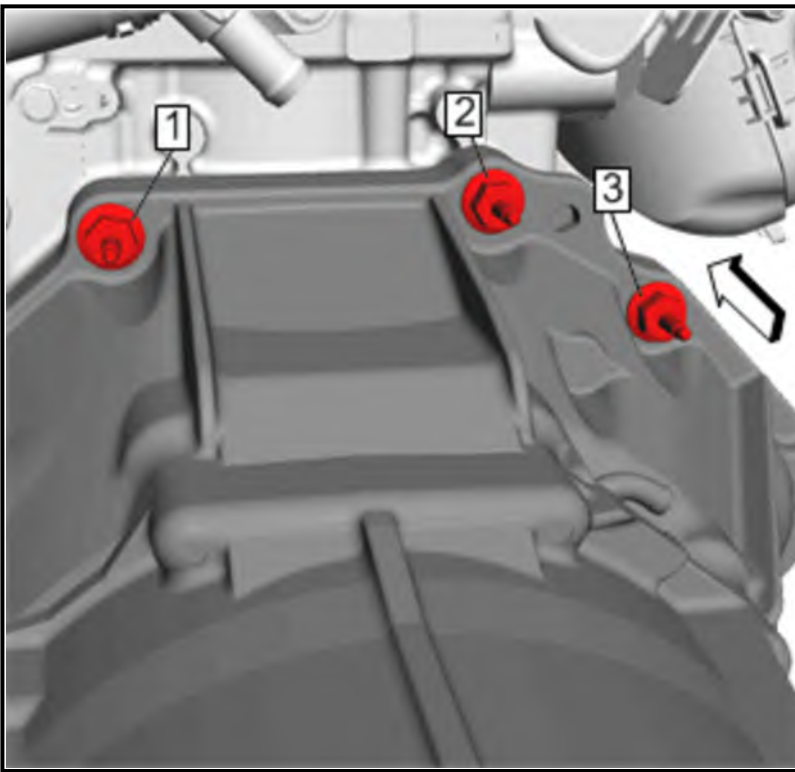
14. Disconnect the transmission oil cooler lines (1) from the transmission. [Transmission Fluid Cooler Inlet and Outlet Pipe Replacement \(LCV\)](#)



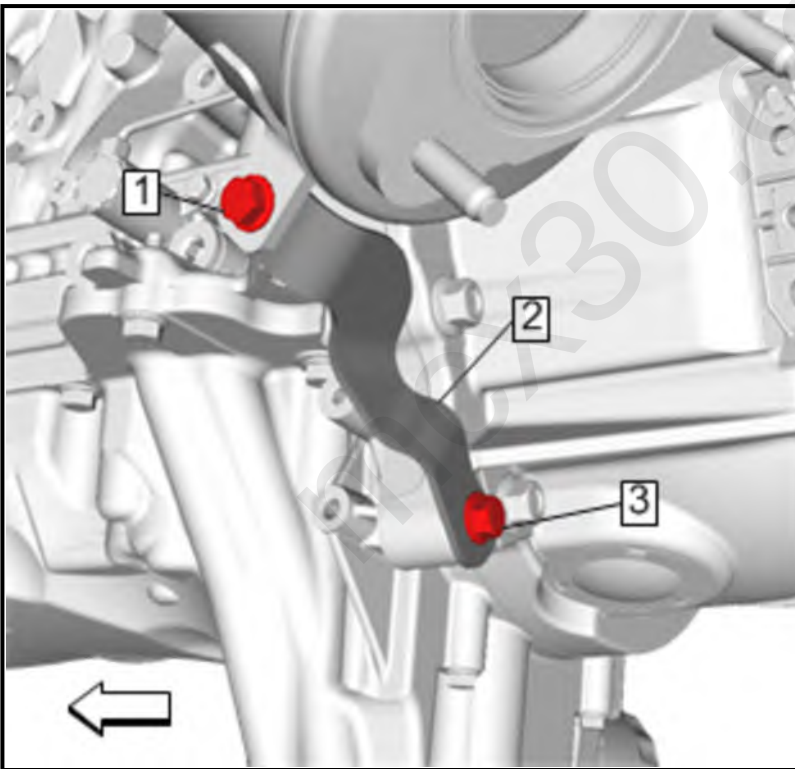
15. Plug the transmission oil cooler line connections in the transmission case.
16. Lower the transmission to gain access to the top and sides of the transmission.
17. Remove the nut (1), then position the bracket (2) out of the way.



18. Remove the 3 upper fasteners (1, 2, 3) securing the transmission to the engine.

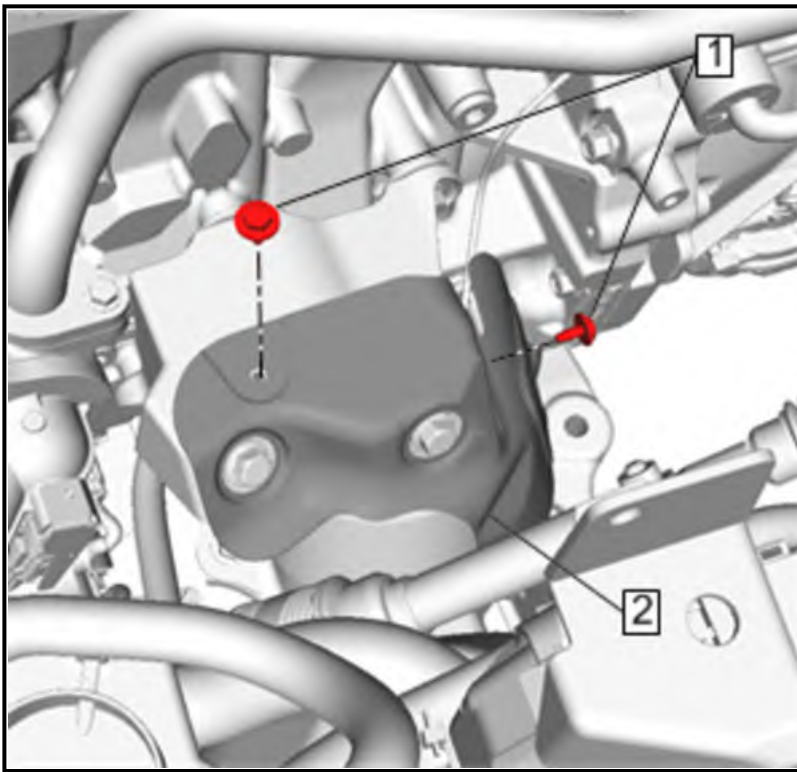


19. Remove the catalytic converter bracket (2).

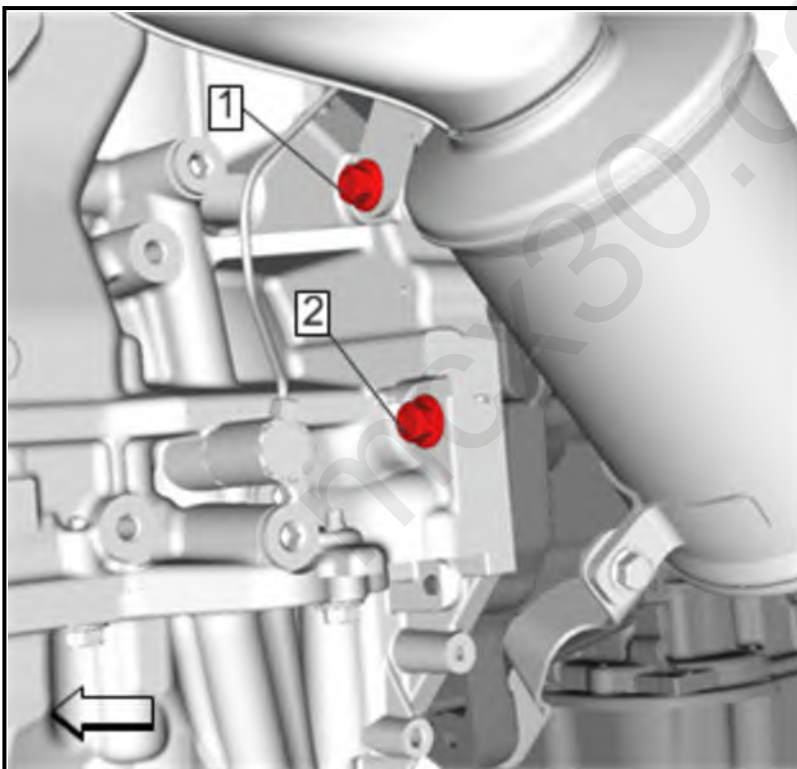


20. Catalytic Converter - Remove - [Catalytic Converter Replacement \(LCV\)](#).

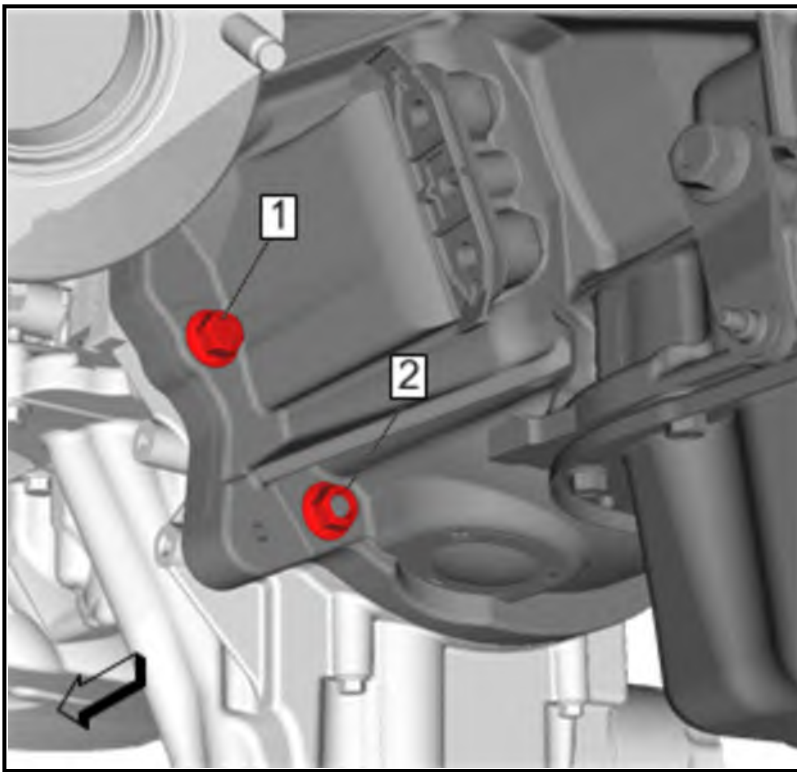
21. Remove the engine mount heat shield bolts (1), then remove the heat shield (2).



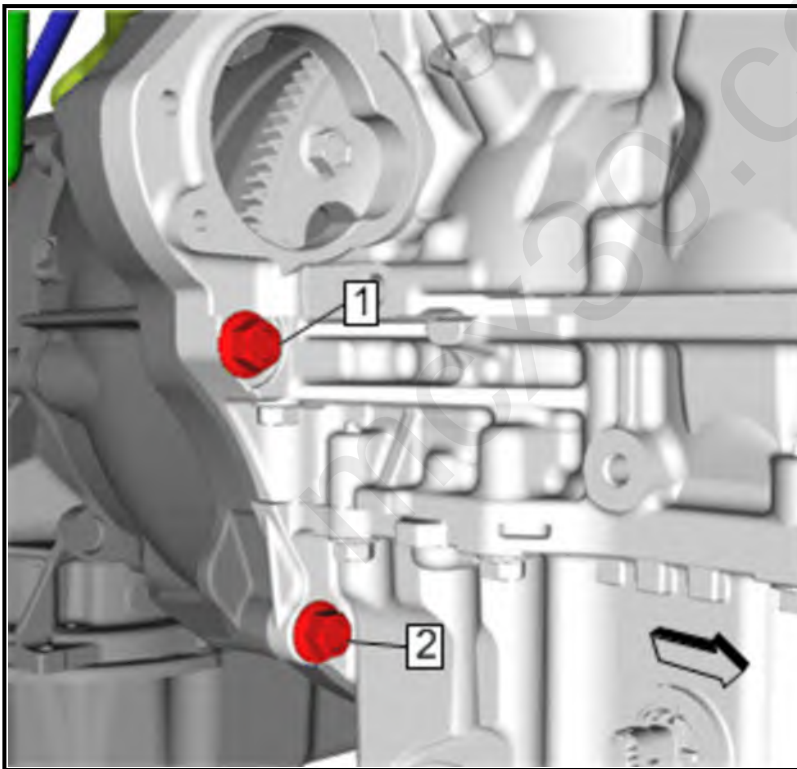
22. Remove the 2 left side fasteners (1, 2) securing the transmission to the engine.



23. Remove the 2 left lower fasteners (1, 2) securing the transmission to the engine.



24. Remove the 2 right side fasteners (1, 2) securing the transmission to the engine.



NOTE: Ensure that the torque converter stays seated in the transmission when pulling the transmission out.

25. Pull the transmission straight back.
26. Remove the transmission from the vehicle.
27. Transfer components as necessary.
28. Inspect the transmission fluid cooler, hoses, and pipes for leaks or damage. Replace as necessary.

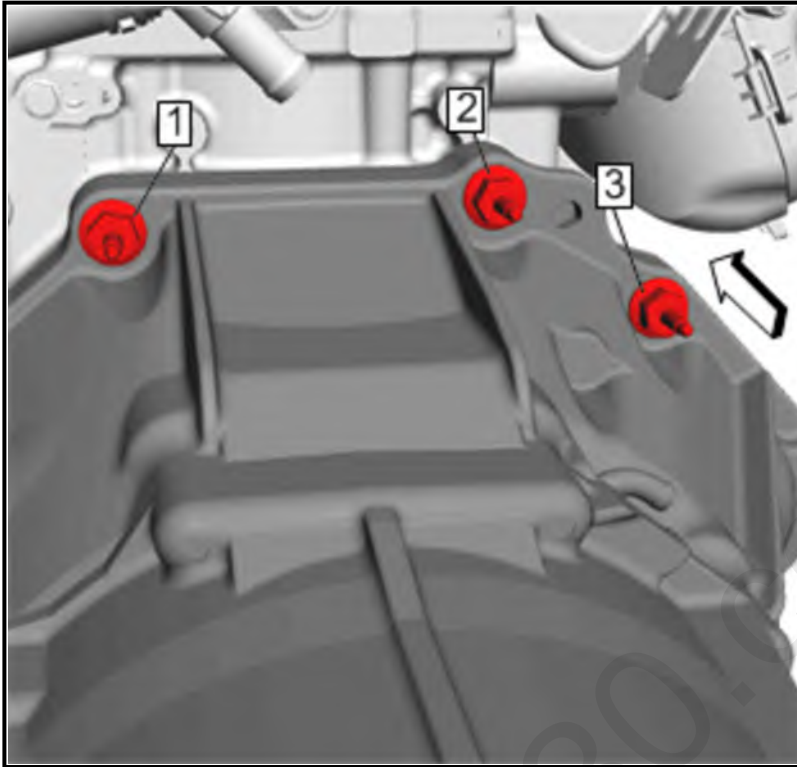
Installation Procedure

1. Support the transmission with a transmission jack.

2. Raise the transmission into place.
3. Slide the transmission straight onto the locating pins while lining up the marks on the flywheel and the torque converter.

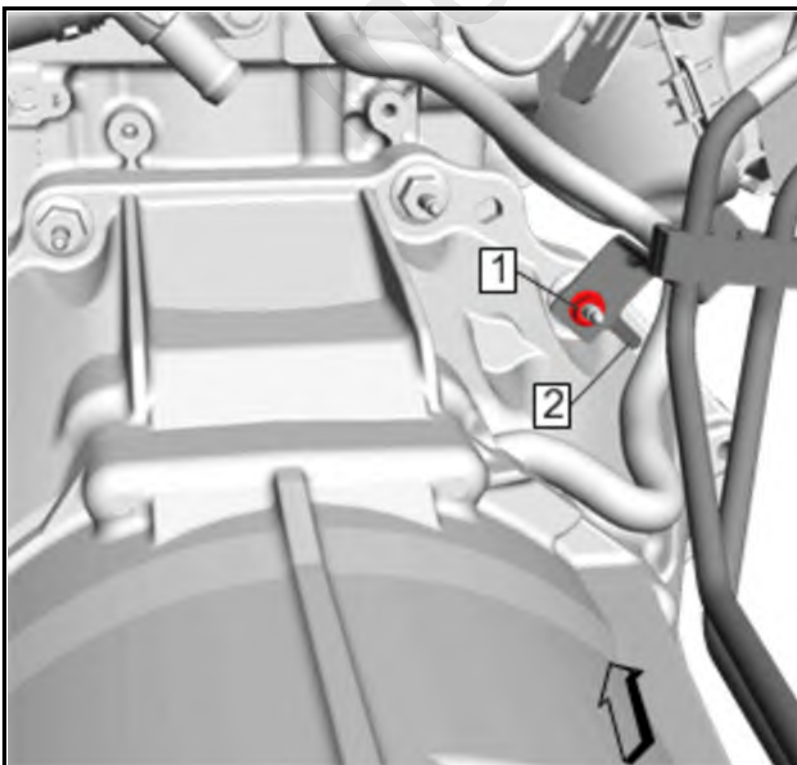
The torque converter must rotate freely by hand.

4. Install the 3 upper fasteners (1, 2, 3) securing the transmission to the engine and tighten to 50 N.m (37 lb ft).

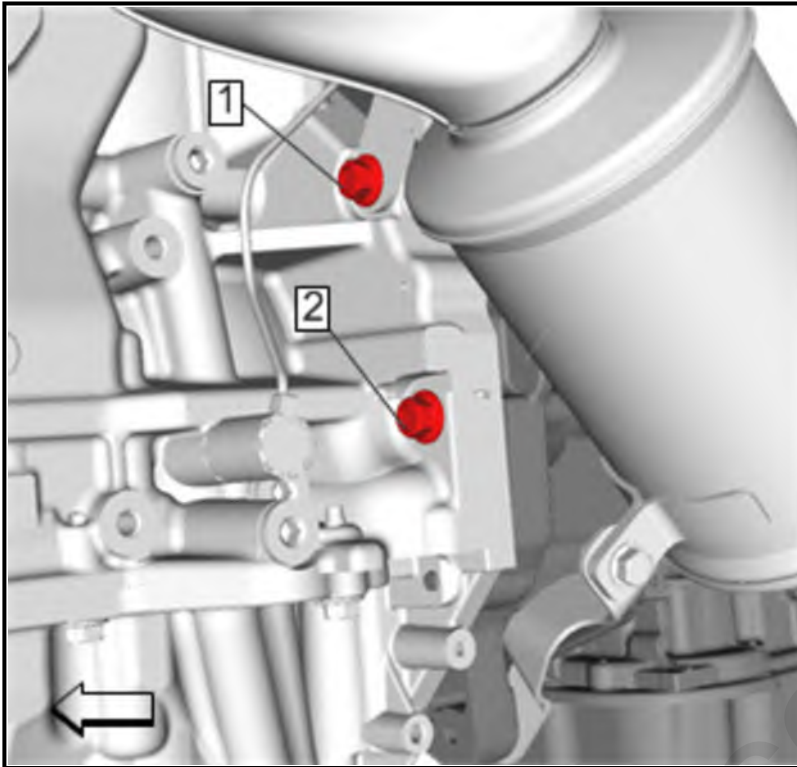


CAUTION: Refer to [Fastener Caution](#) .

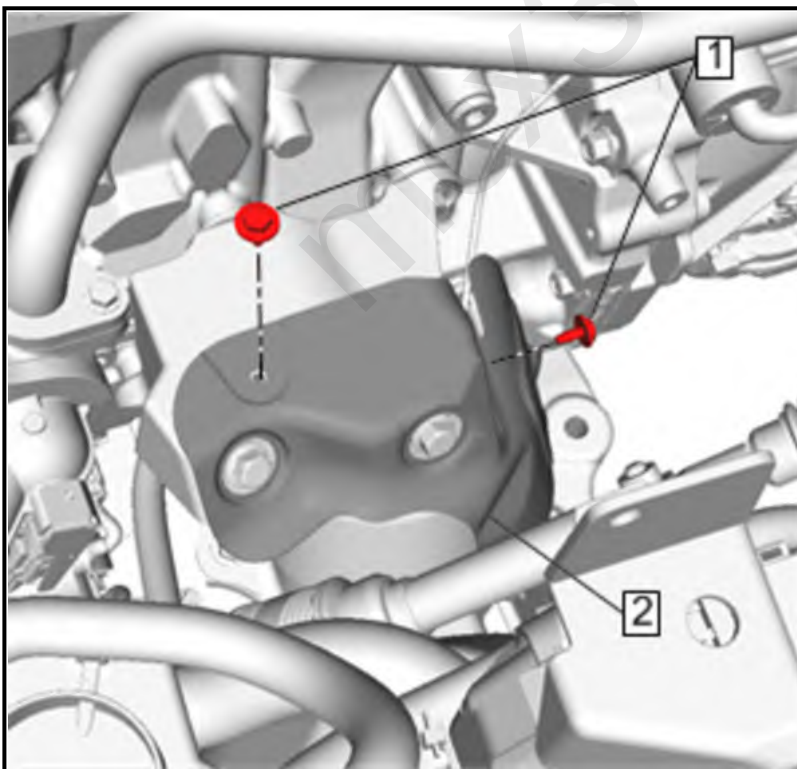
5. Position the bracket (2) to the transmission.



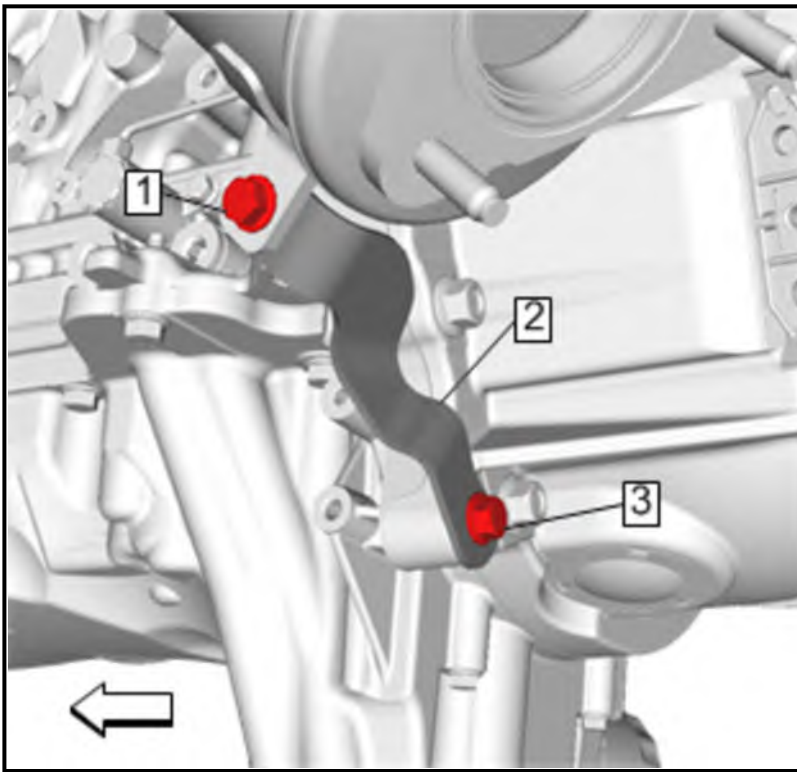
6. Install the fastener (1) and tighten to 22 N.m (16 lb ft).
7. Install the 2 left side fasteners (1, 2) securing the transmission to the engine and tighten to 50 N.m (37 lb ft).



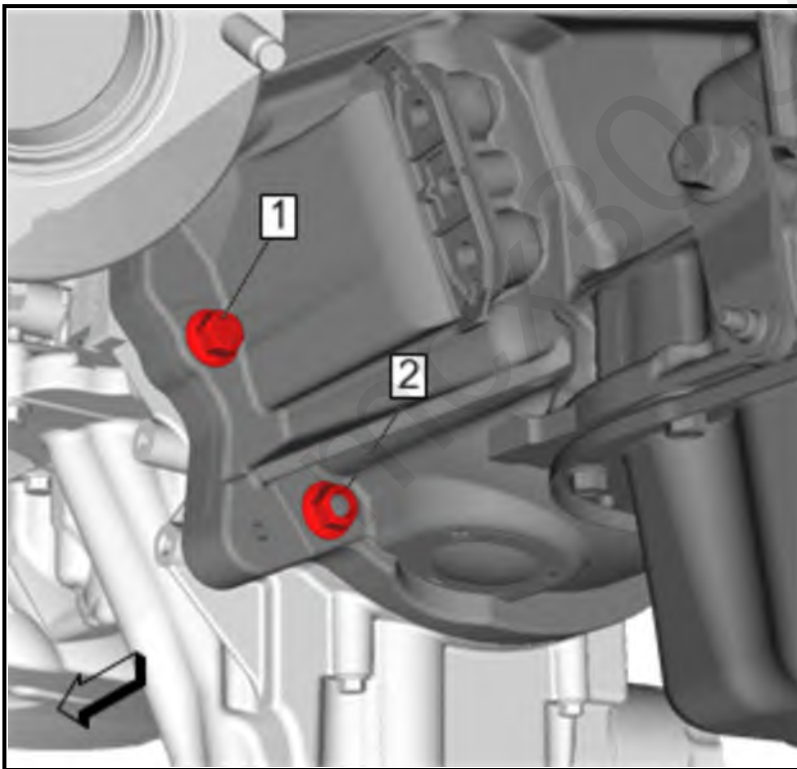
8. Catalytic Converter - Install - [Catalytic Converter Replacement \(LCV\)](#).
9. Install the engine mount heat shield (2), then install the engine mount heat shield bolts (1). [Engine Mount Replacement - Left Side](#)



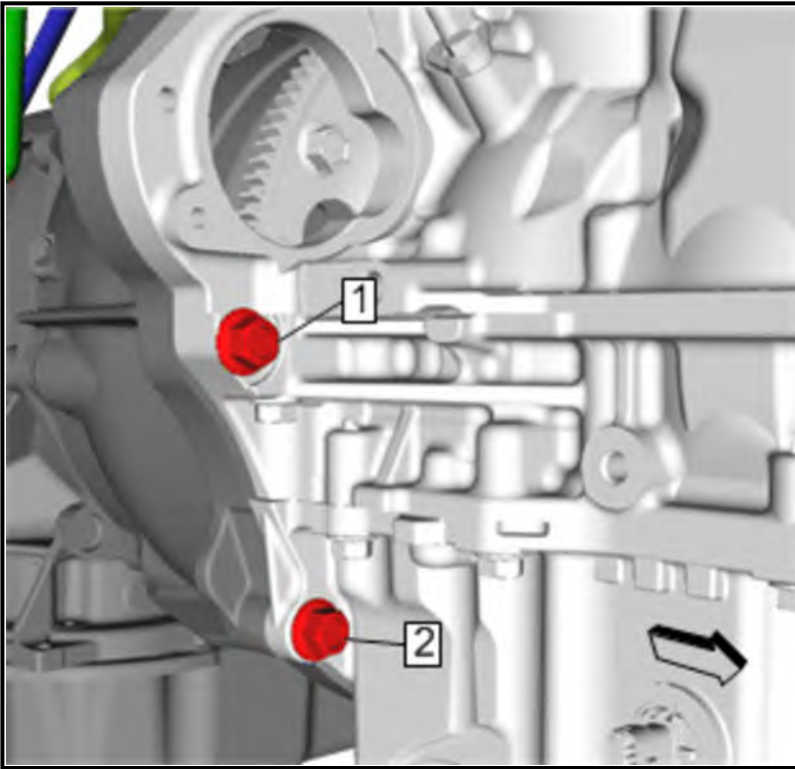
10. Install the catalytic converter bracket (2) and tighten the nut to 22 N.m (16 lb ft).



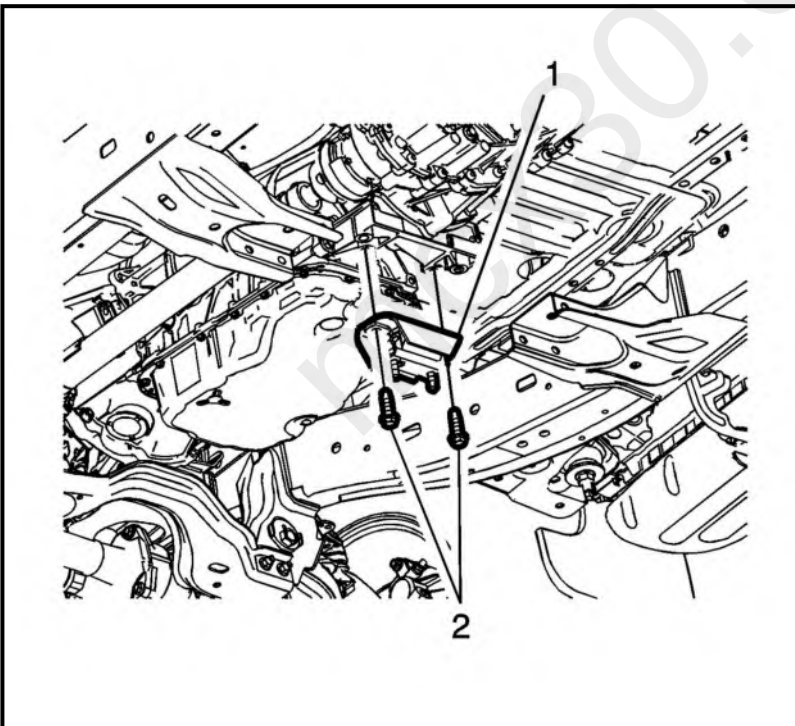
11. Install the 2 left lower fasteners (1, 2) securing the transmission to the engine and tighten to 50 N.m (37 lb ft).



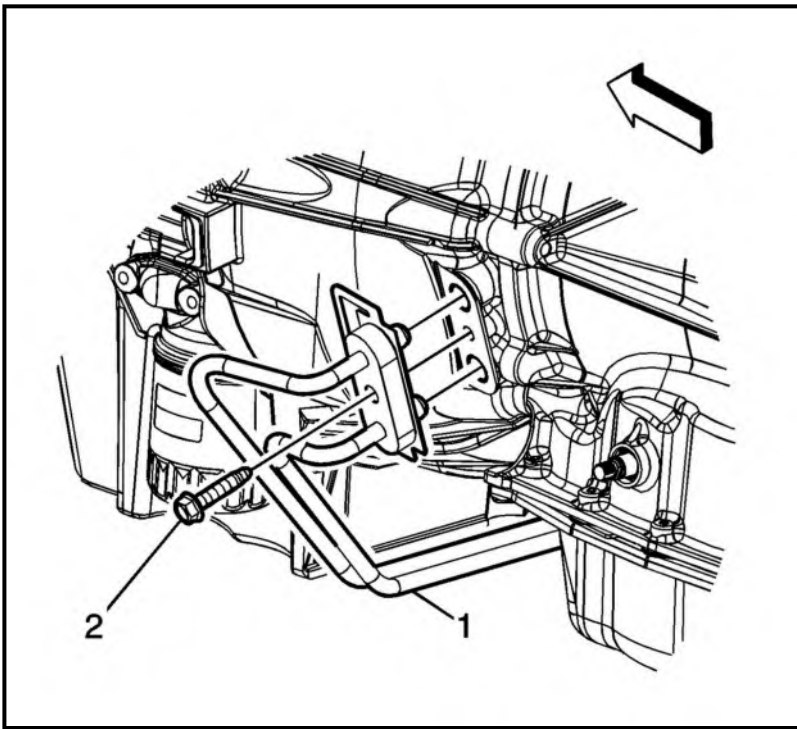
12. Install the 2 right side fasteners (1, 2) securing the transmission to the engine and tighten to 50 N.m (37 lb ft).



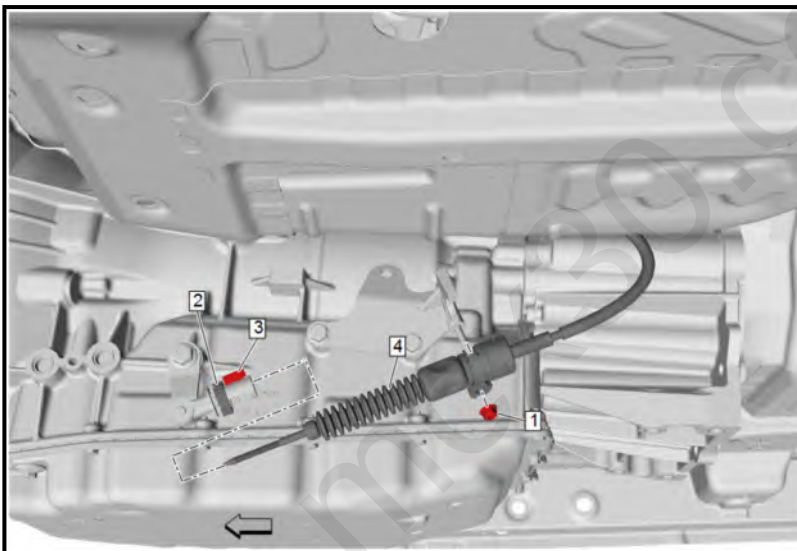
13. If reusing the torque converter bolts, clean the bolt threads and apply LOCTITE 242, or equivalent, to the threads prior to installation.
14. Install the flywheel to torque converter bolts and tighten to 63 N.m (46 lb ft).
15. Install the transmission mount (1). [Transmission Mount Replacement \(2WD\)](#)



16. Install the transmission crossmember. [Transmission Support Crossmember Replacement \(2 Wheel Drive\)](#)
17. Install the starter motor. [Starter Replacement \(LCV\)](#)
18. Connect the transmission oil cooler lines (1) to the transmission. [Transmission Fluid Cooler Inlet and Outlet Pipe Replacement \(LCV\)](#)



19. Install the range selector cable (4) to the transmission. [Range Selector Lever Cable Replacement \(First Design\)](#), or [Range Selector Lever Cable Replacement \(Second Design\)](#).



20. Install the wire harness to the transmission.
21. Connect the transmission electrical connector to the transmission.
22. Connect the transmission vent hose to the transmission.
23. Remove the transmission jack.
24. Install the rear propeller shaft. [Propeller Shaft Replacement \(With MYB\)](#) , or [Propeller Shaft Replacement \(M5T with 2WD\)](#) , or [Propeller Shaft Replacement \(With Bison\)](#).
25. Install the exhaust pipe. [Exhaust Pipe Replacement \(LCV\)](#).
26. Lower the vehicle.
27. Connect the negative battery cable. [Battery Negative Cable Disconnection and Connection](#) .
28. Fill the transmission to the proper level. [Transmission Fluid Level and Condition Check](#) .
29. If a NEW TCM has been installed into the vehicle, the NEW module needs to be reprogrammed. [Service Programming System \(SPS\)](#) .

NOTE: 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:

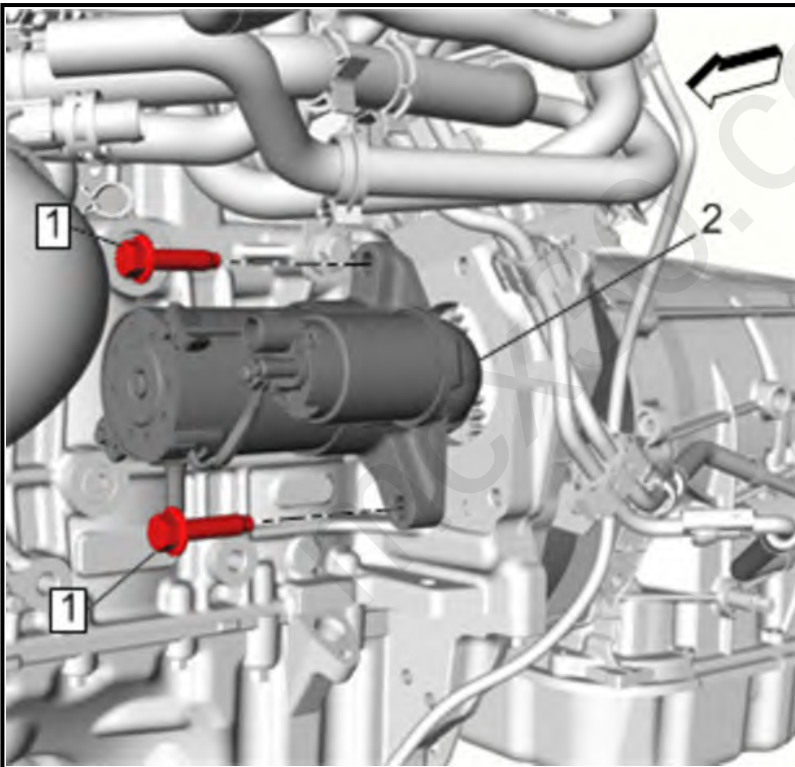
- Transmission internal service/overhaul
- Valve body repair or replacement
- Control solenoid valve assembly replacement
- TCM software/calibration update
- Any service in response to a shift quality concern

30. Perform the Reset Transmission Adapts. [Reset Transmission Adapts](#)

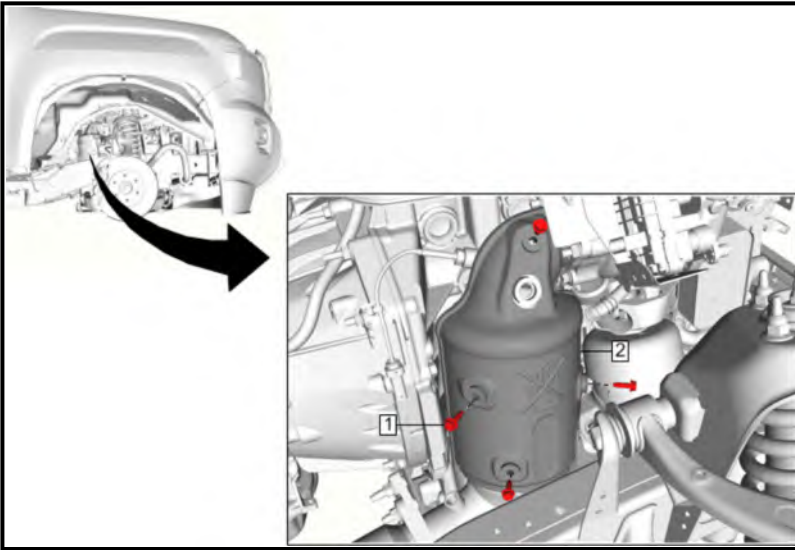
TRANSMISSION REPLACEMENT (LWN DIESEL WITH 2WD)

Removal Procedure

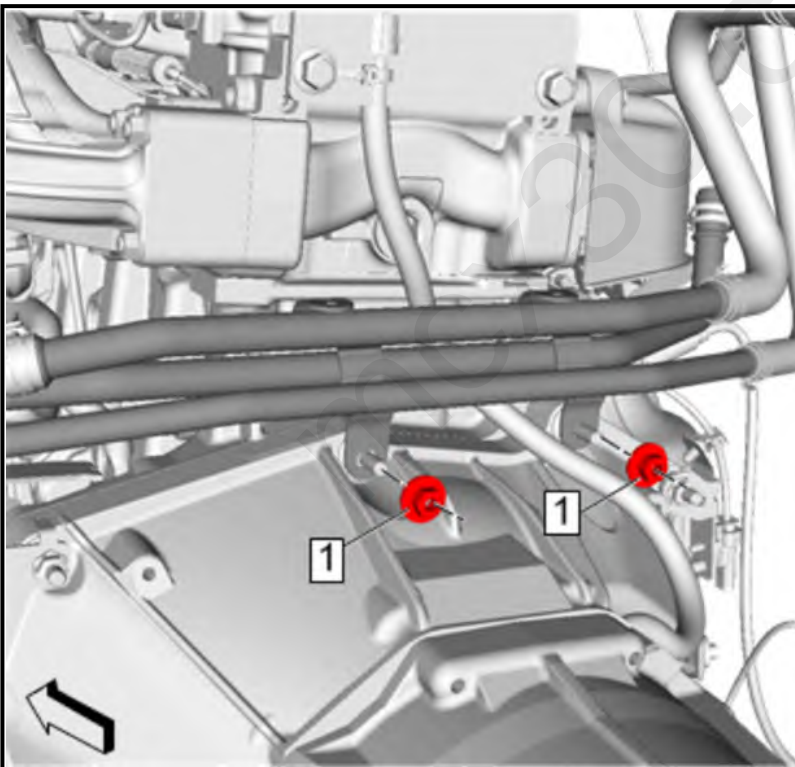
1. Disconnect the negative battery cable. [Battery Negative Cable Disconnection and Connection](#) .
2. Remove the front passenger side wheelhouse liner. [Front Wheelhouse Liner Replacement \(Without ZR2\)](#) , or [Front Wheelhouse Liner Replacement \(With ZR2\)](#) , or [Front Wheelhouse Liner Replacement \(Bison\)](#).
3. Remove the starter (2). [Starter Replacement \(LWN\)](#).



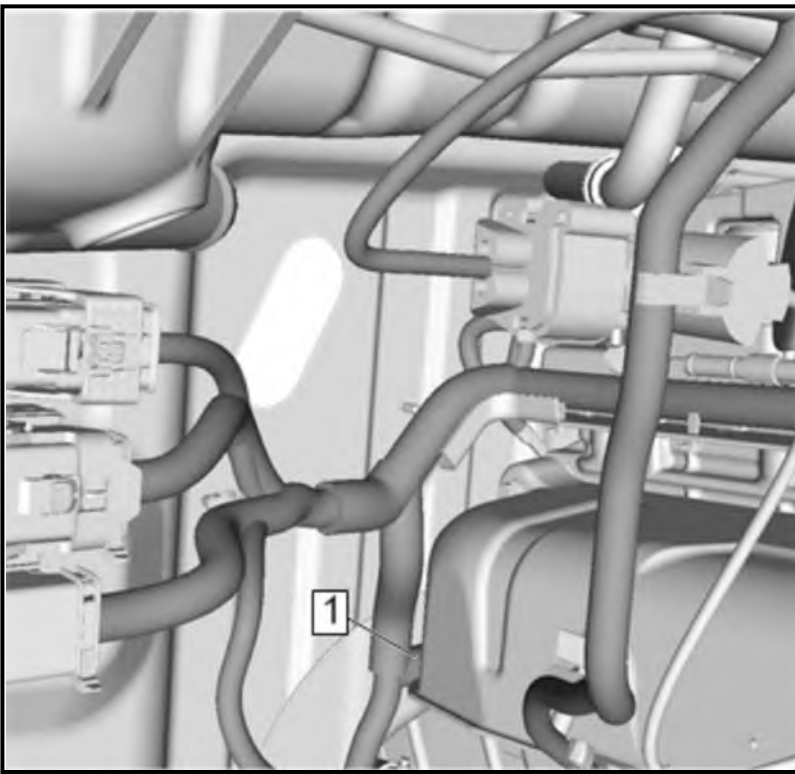
4. Remove the catalytic converter heat shield (2). [Catalytic Converter Heat Shield Replacement \(LWN\)](#).



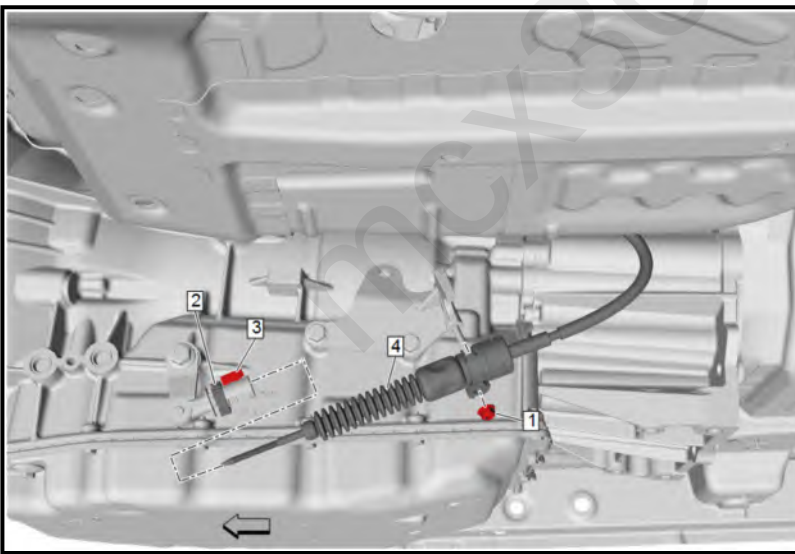
5. Remove the flywheel inspection cover.
6. Mark the position of the flywheel to the torque converter.
7. Rotate the engine through the inspection cover opening using an appropriate tool.
8. Remove the six flywheel to torque converter bolts.
9. Remove the propeller shaft. **Propeller Shaft Replacement (With MYB)**
10. Lower rear of transmission to access the radiator surge tank outlet pipe nuts.
11. Remove the radiator surge tank outlet pipe nuts (1).



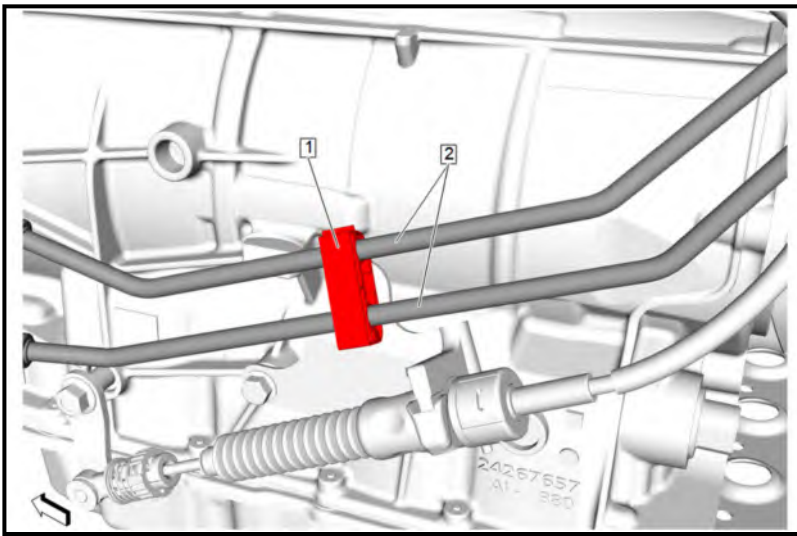
12. Raise rear of transmission and install transmission cross member to support transmission.
13. Lower the vehicle.
14. From passenger side of vehicle, reposition wiring harness outboard away from radiator surge tank pipe assembly.



15. Rotate radiator surge tank outlet pipe assembly to remove from transmission studs.
16. Pull the surge tank pipe assembly towards driver side until pipe brackets are out of the way of the Studs and support the assembly.
17. Using a suitable jack, support the transmission and remove transmission cross member.
18. Remove the range selector lever cable (4) from the transmission. [Range Selector Lever Cable Replacement \(First Design\)](#), or [Range Selector Lever Cable Replacement \(Second Design\)](#).

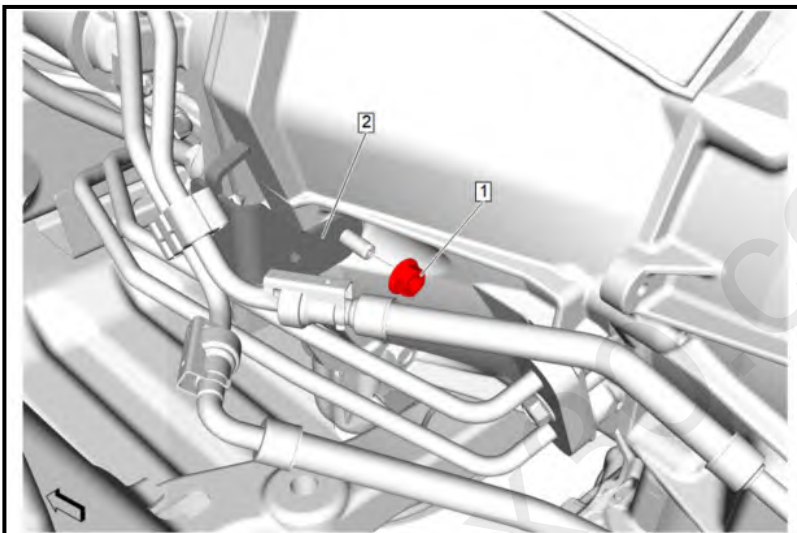


19. Disconnect the transmission vent hose from the transmission.
20. Disconnect the transmission electrical connector from the transmission.
21. Remove the wire harness from the transmission.
22. Remove the retainer (1) from the transmission.

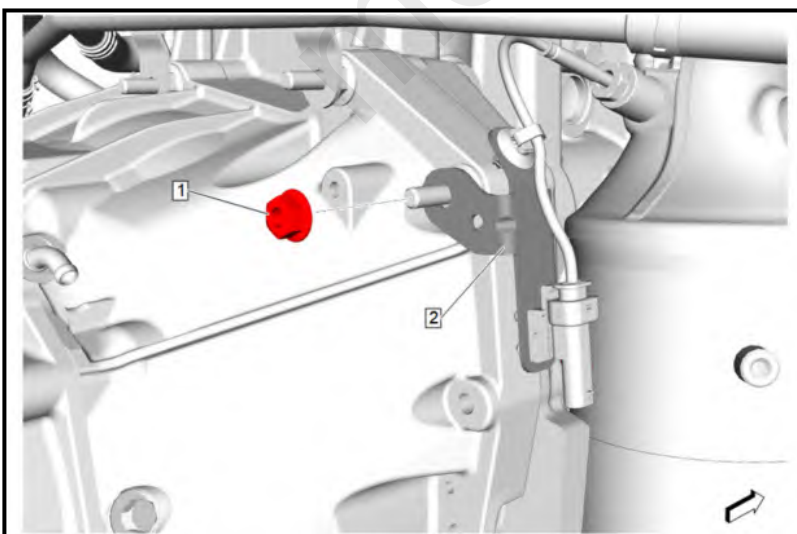


23. Reposition the fuel lines (2).

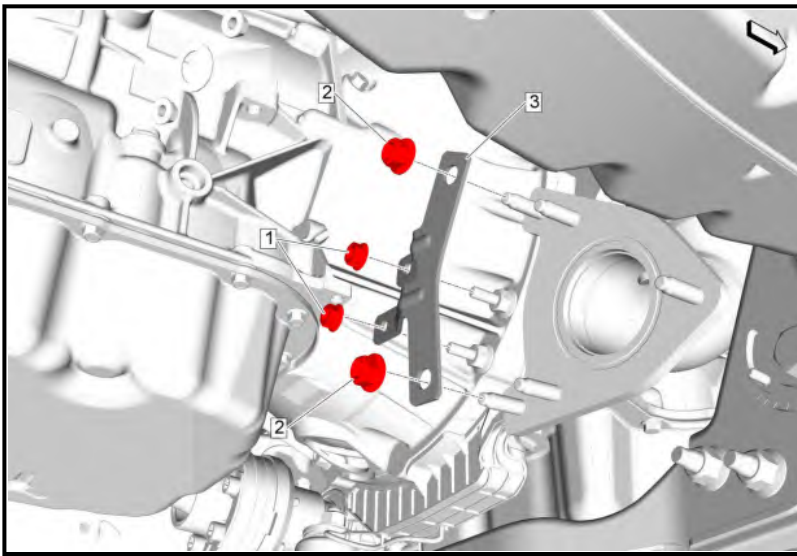
24. Remove the fuel injection fuel feed and return hose clip nut (1) and reposition bracket (2).



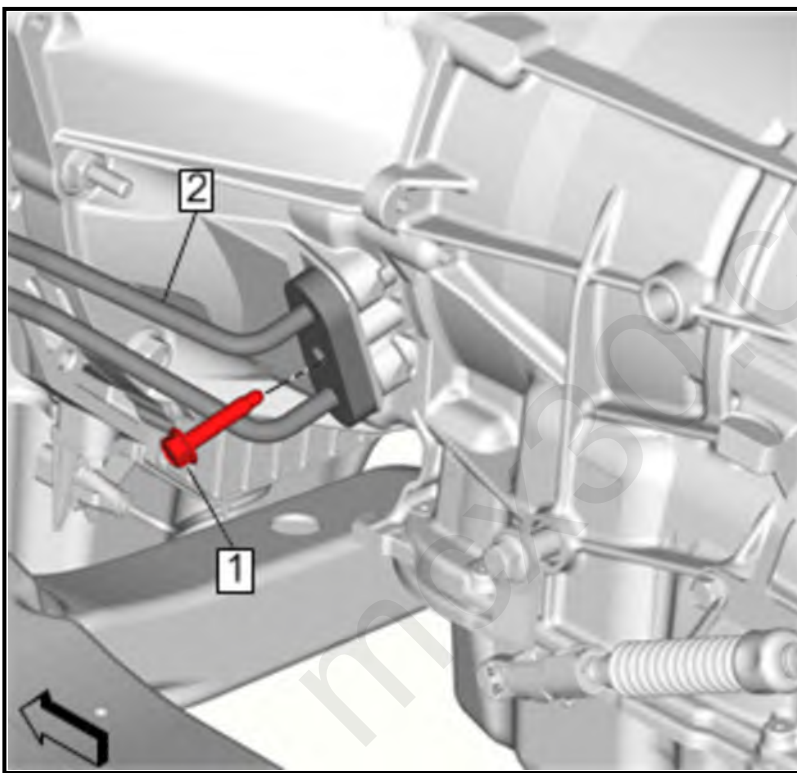
25. Remove the exhaust temperature sensor bracket nut (1) and reposition bracket (2).



26. Catalytic Converter Brace Bracket (3) - Remove - [Catalytic Converter Replacement \(LWN\)](#).

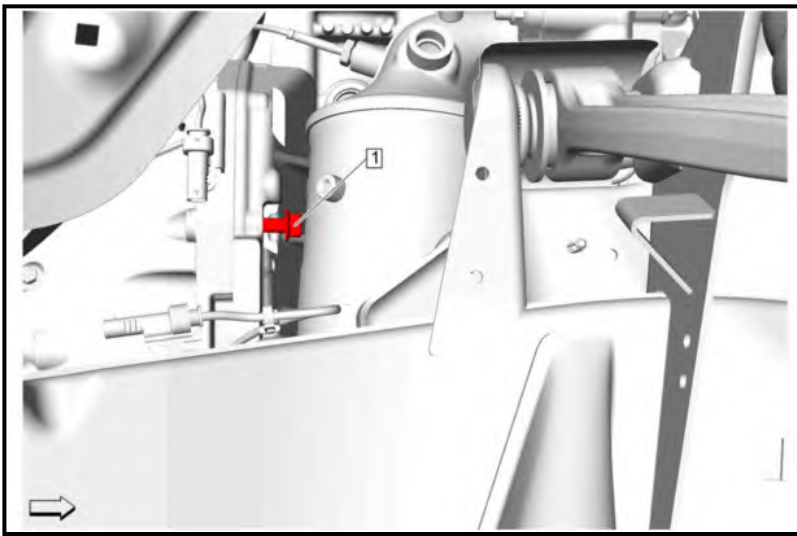


27. Disconnect the transmission oil cooler lines (2) from the transmission. [Transmission Fluid Cooler Inlet and Outlet Pipe Replacement \(LWN\)](#)



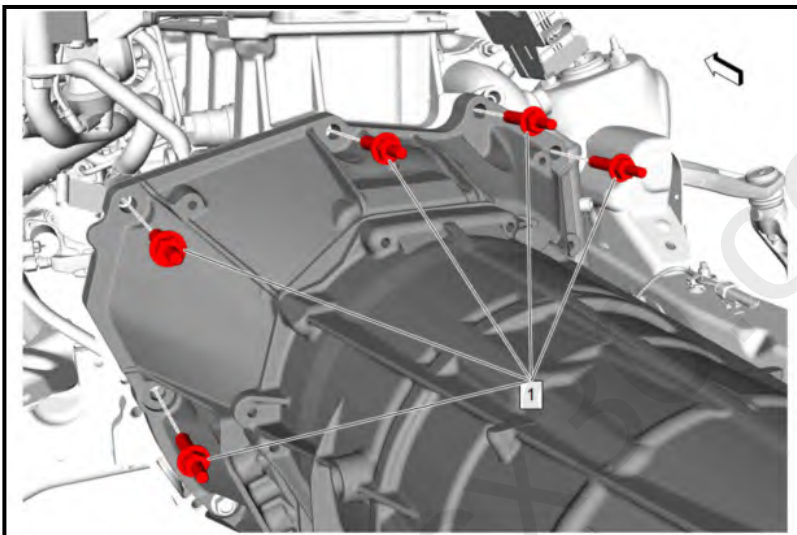
28. Plug the transmission oil cooler line connections in the transmission case.

29. Transmission Bolt (1) - Loosen

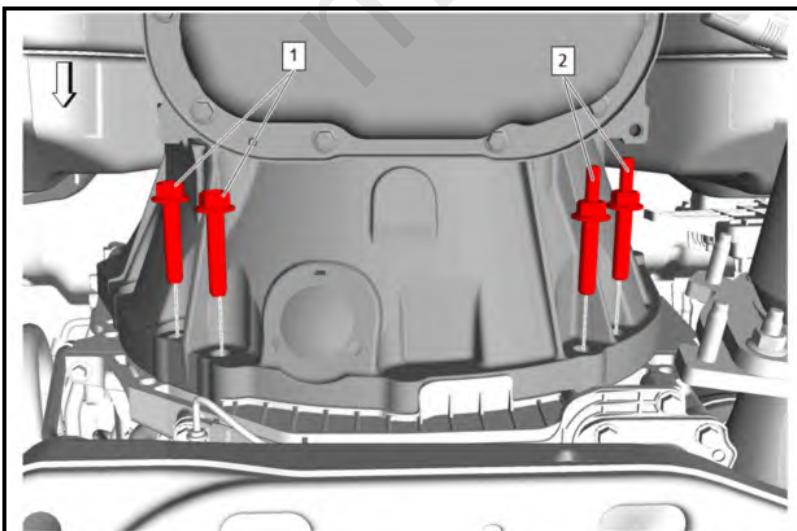


NOTE: Transmission bolt stays in engine.

30. Transmission Stud (1) - Remove [5x]

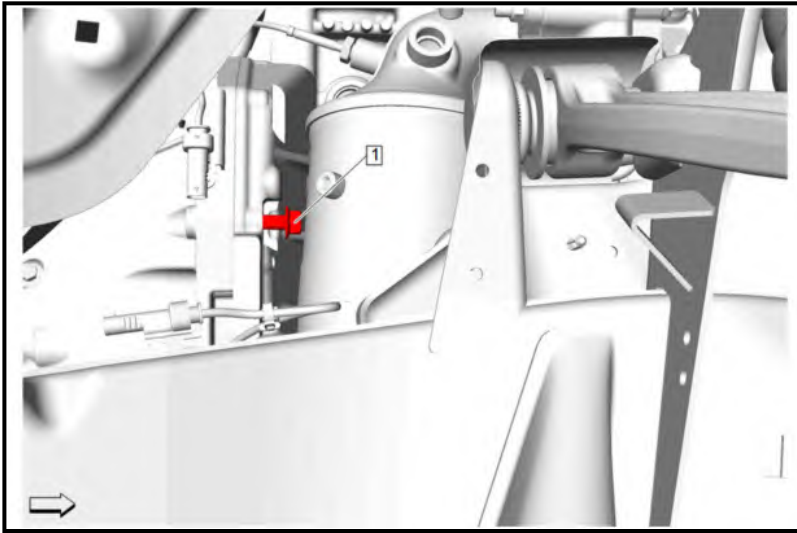


31. Transmission Bolt (1) - Remove [2x]



32. Transmission Stud (2) - Remove [2x]

33. Pull the transmission straight back while removing transmission bolt (1) from transmission.



NOTE:

- Ensure that the torque converter stays seated in the transmission when pulling the transmission out.
- Transmission bolt stays in engine.

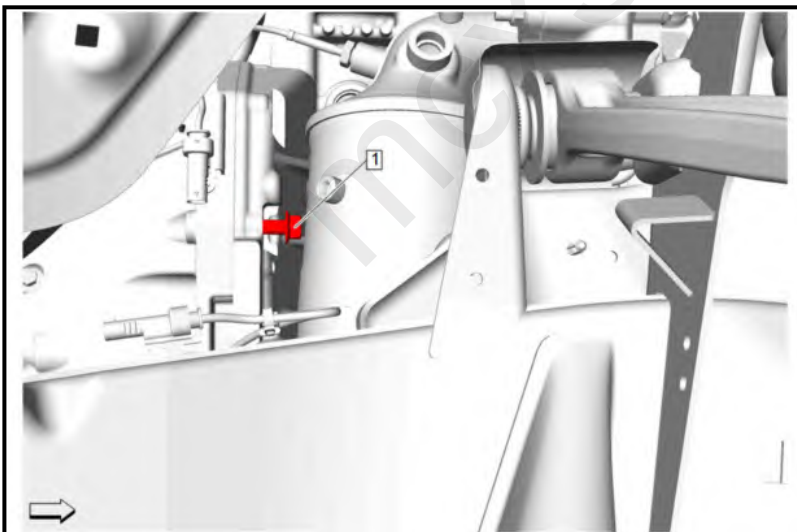
34. Remove the transmission from the vehicle.

35. Transfer components as necessary.

36. Inspect the transmission fluid cooler, hoses, and pipes for leaks or damage. Replace as necessary.

Installation Procedure

1. Support the transmission with a transmission jack.
2. Raise the transmission into place.
3. Slide the transmission straight onto the locating pins while lining up the marks on the flywheel and the torque converter.

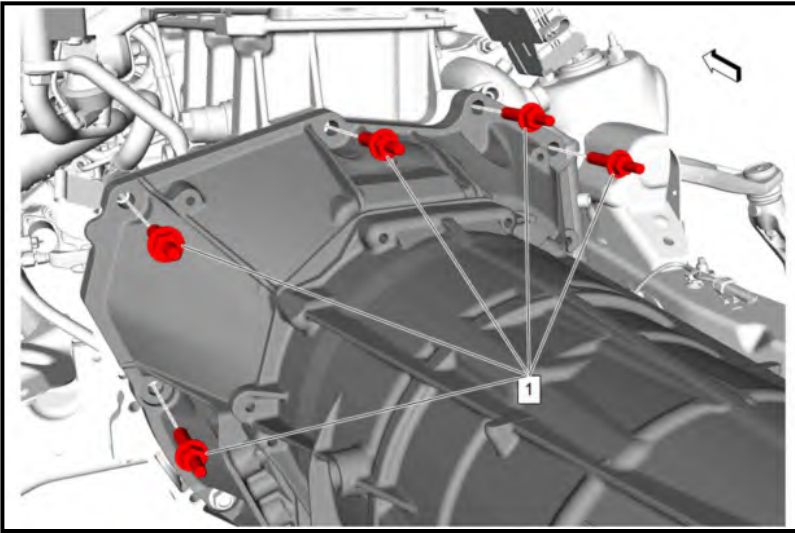


NOTE:

The torque converter must rotate freely by hand.

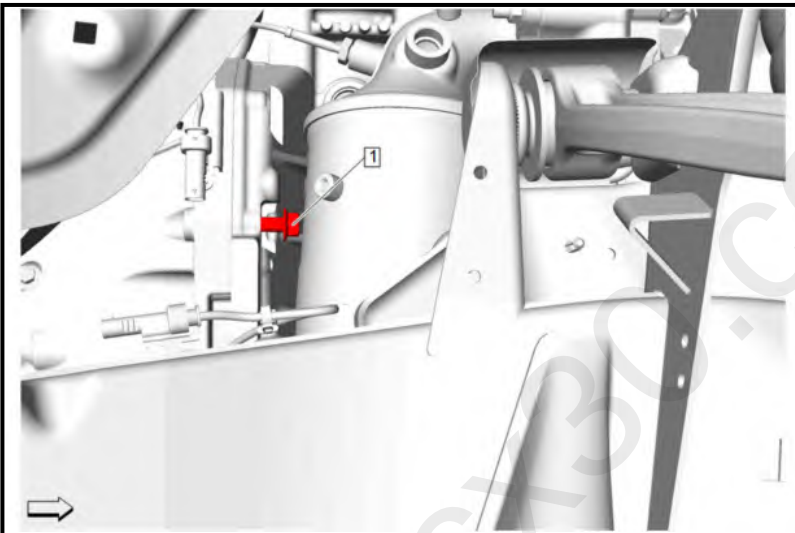
4. Engage threads of the transmission bolt (1) and hand tighten.

5. Transmission Stud (1) - Install and tighten [5x] 50 N.m (37 lb ft)



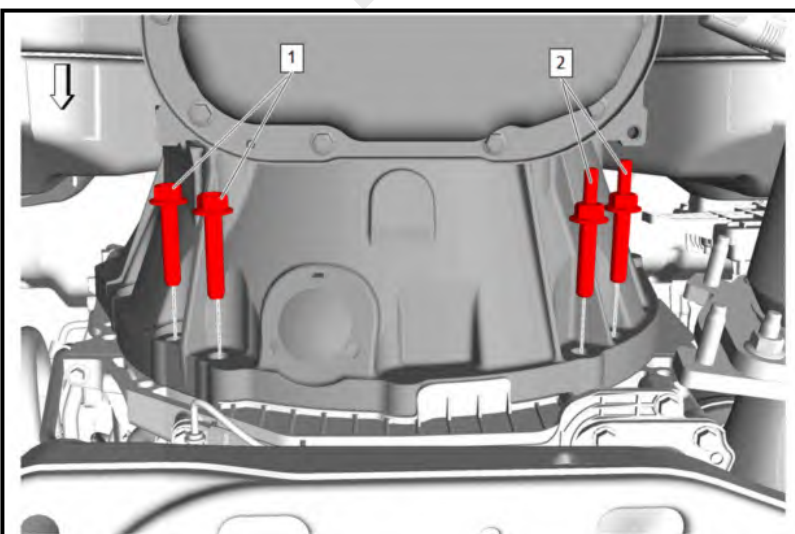
CAUTION: Fastener Caution .

6. Transmission Bolt (1) - Tighten 50 N.m (37 lb ft)



NOTE: Transmission bolt stays in engine.

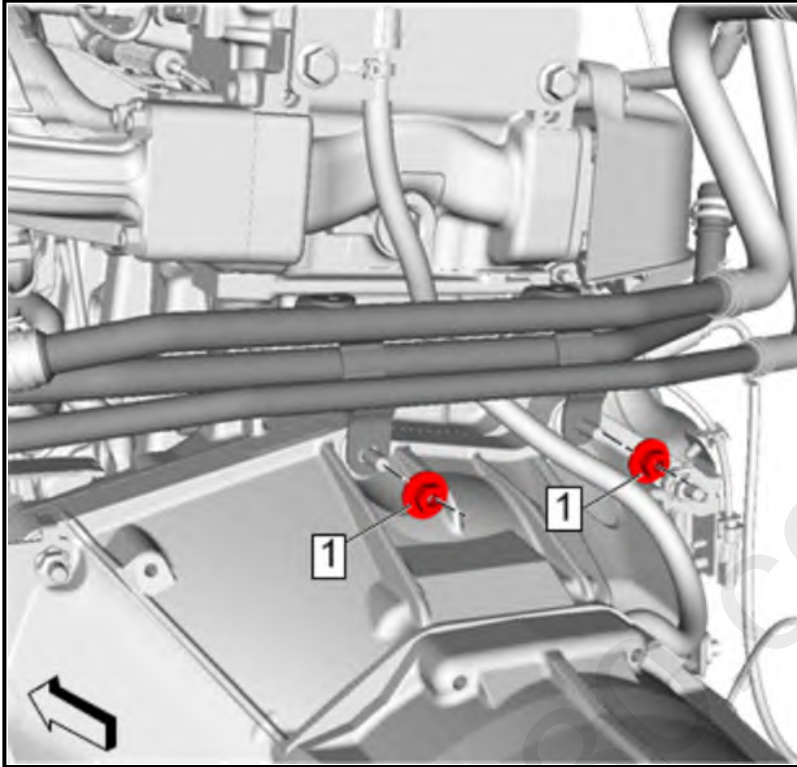
7. Transmission Stud (2) - Install and tighten [2x] 50 N.m (37 lb ft)



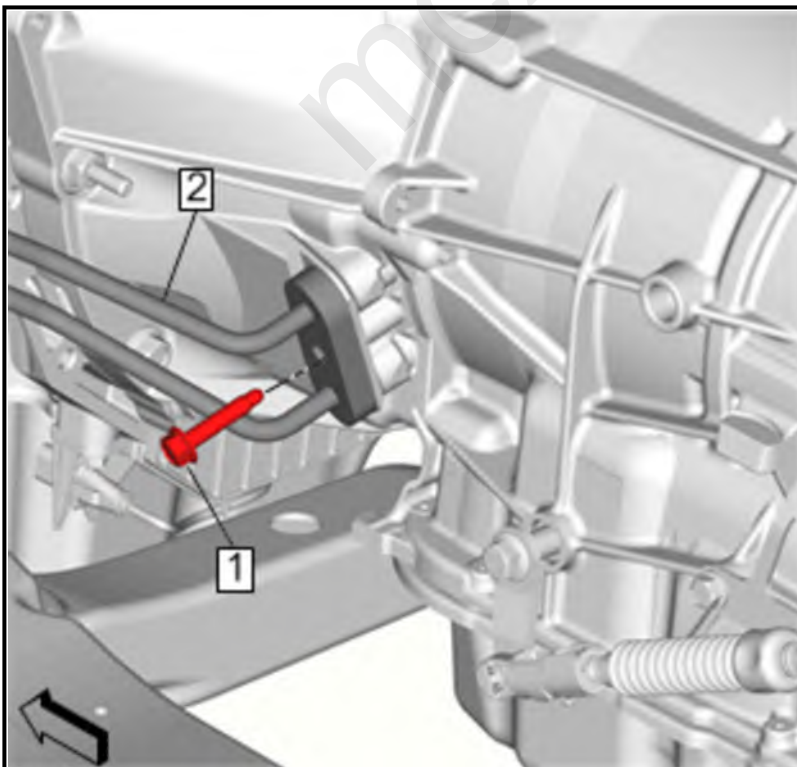
8. Transmission Bolt (1) - Install and tighten [2x] 50 N.m (37 lb ft)

9. If reusing the torque converter bolts, clean the bolt threads and apply thread locker or an equivalent, to the threads prior to installation. Adhesives, Fluids, Lubricants, and Sealers

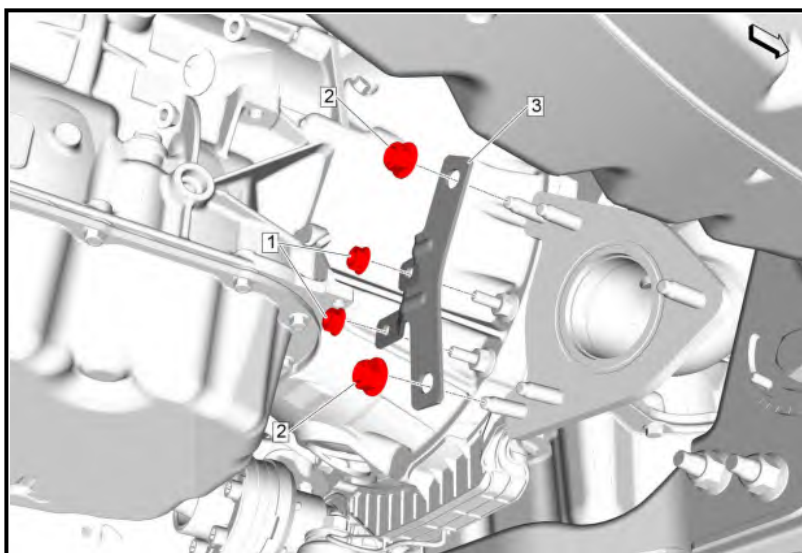
10. Install the flywheel to torque converter bolts and tighten to 63 N.m (46 lb ft).
11. Install the flywheel inspection cover.
12. Support transmission and install transmission cross member.
13. Install radiator surge tank pipe assembly support and position back onto the studs.
14. Install the driver side wheel liner. [Front Wheelhouse Liner Replacement \(Without ZR2\)](#) , or [Front Wheelhouse Liner Replacement \(With ZR2\)](#) , or [Front Wheelhouse Liner Replacement \(Bison\)](#).
15. Lower rear of transmission and install radiator surge tank pipe nuts and tighten to 22 N.m (16 lb ft).



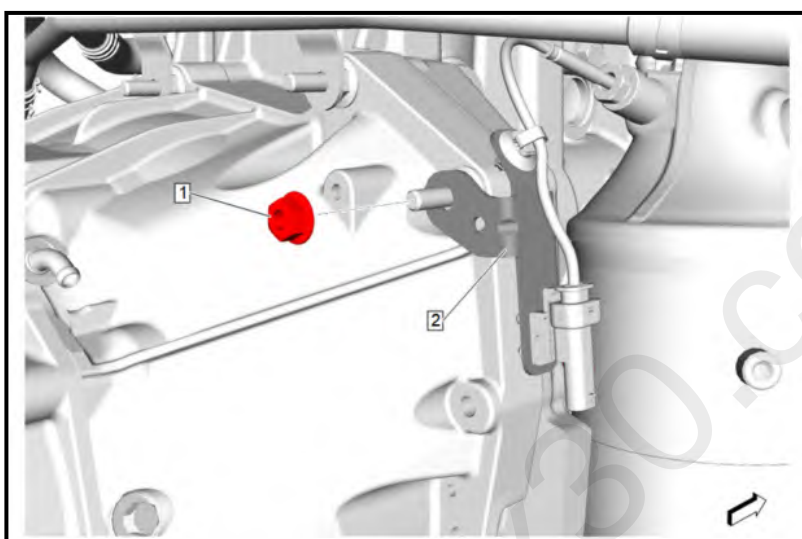
16. Connect the transmission oil cooler lines (2) to the transmission. [Transmission Fluid Cooler Inlet and Outlet Pipe Replacement \(LWN\)](#).



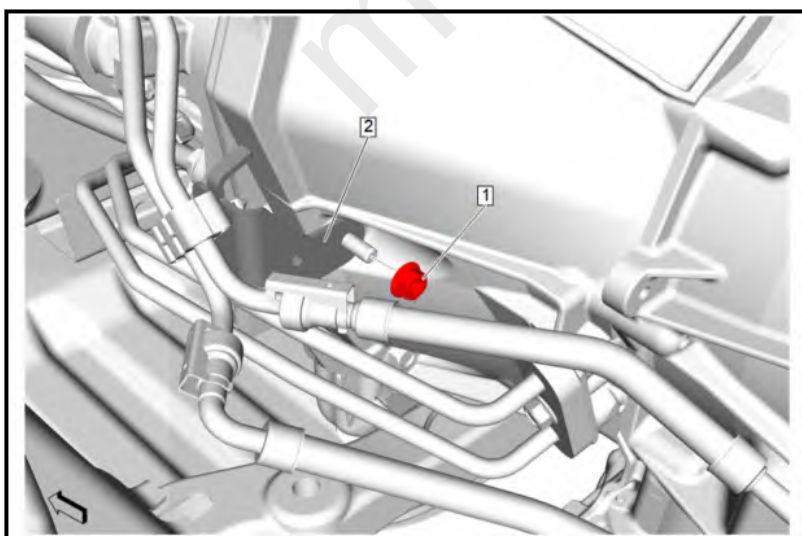
17. Catalytic Converter Brace Bracket (3) - Install - [Catalytic Converter Replacement \(LWN\)](#).



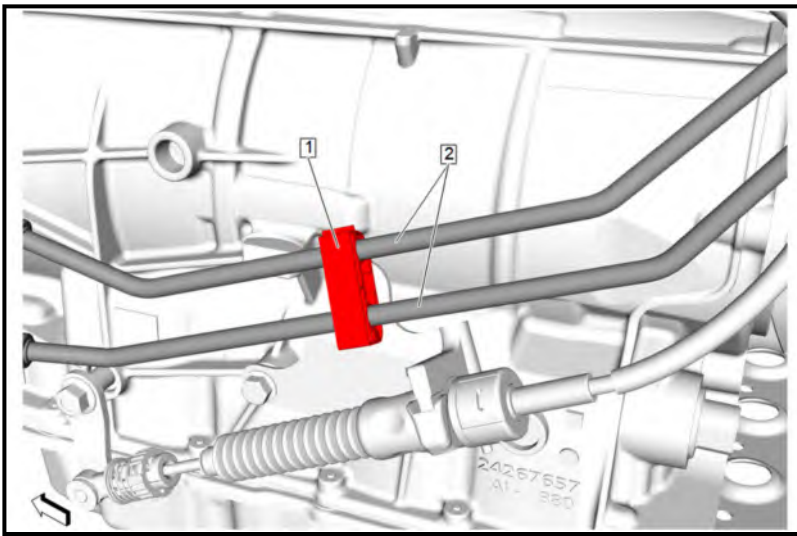
18. Install the exhaust temperature sensor bracket (2) and bracket nut (1) and tighten to 22 N.m (16 lb ft).



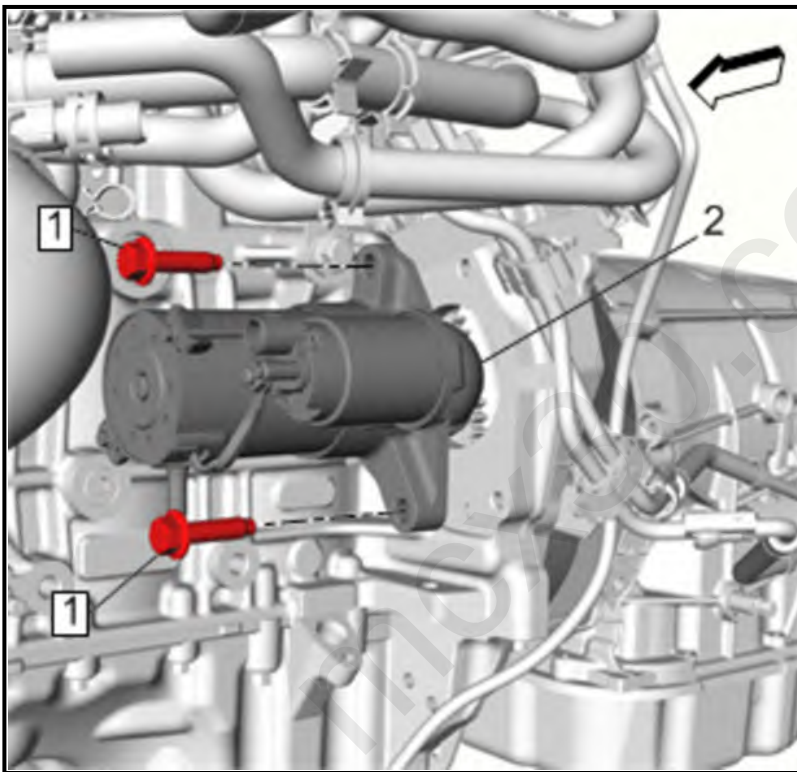
19. Install the fuel injection fuel feed and return hose clip bracket (2) and bracket nut (1) and tighten to 22 N.m (16 lb ft).



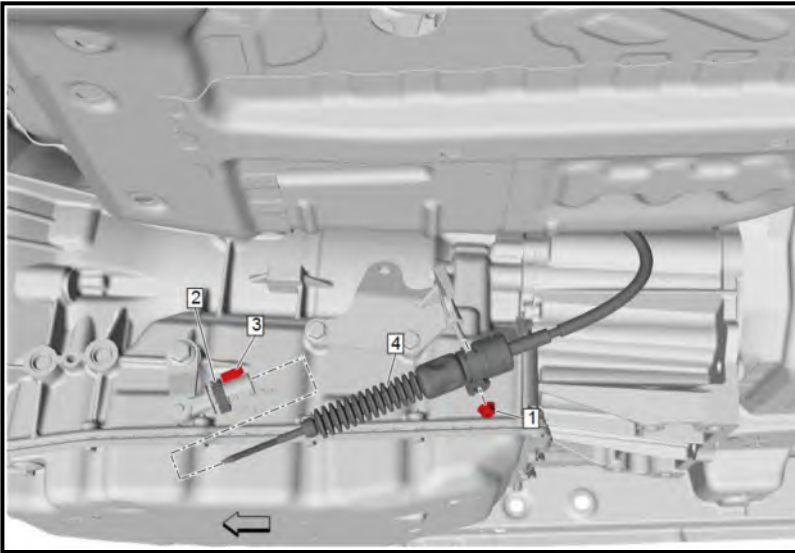
20. Install the fuel lines (2).



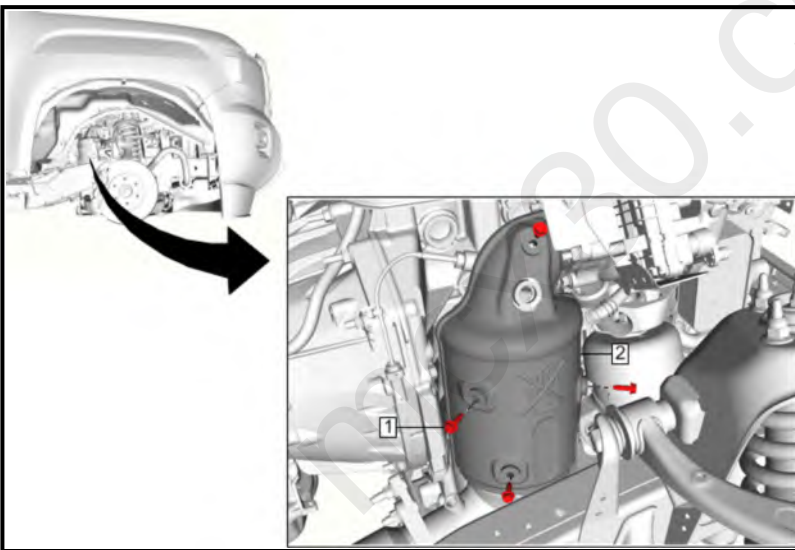
21. Install the retainer (1) to the transmission.
22. Install the starter (2). [Starter Replacement \(LWN\)](#)



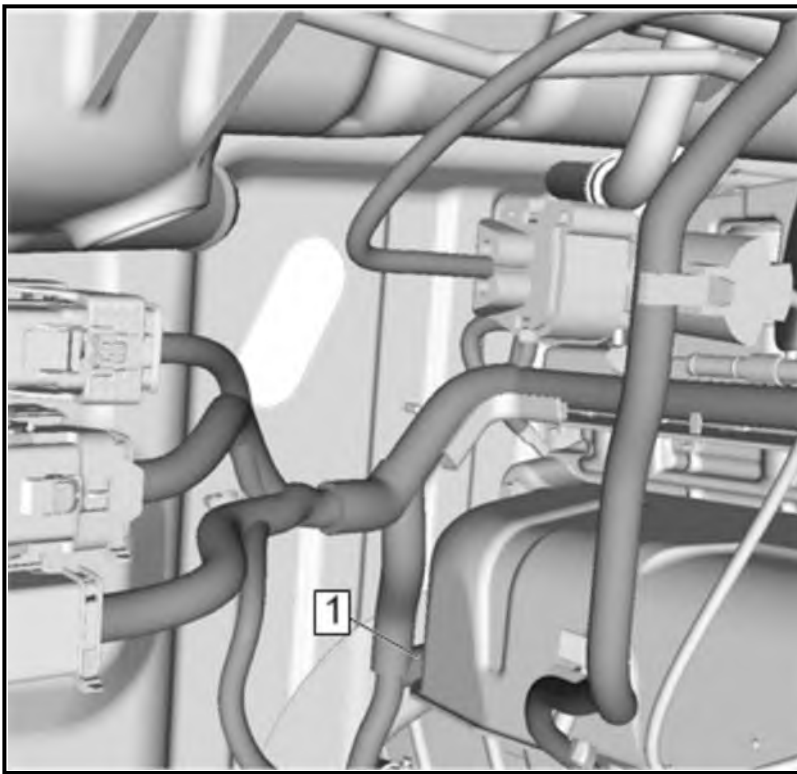
23. Install the front passenger side wheelhouse liner. [Front Wheelhouse Liner Replacement \(Without ZR2\)](#), or [Front Wheelhouse Liner Replacement \(With ZR2\)](#), or [Front Wheelhouse Liner Replacement \(Bison\)](#)
24. Install the nuts retaining the upper and lower fuel line brackets to the transmission studs.
25. Install the range selector lever cable (4) to the transmission. [Range Selector Lever Cable Replacement \(First Design\)](#), or [Range Selector Lever Cable Replacement \(Second Design\)](#)



26. Install the wire harness to the transmission.
27. Connect the transmission electrical connector to the transmission.
28. Connect the transmission vent hose to the transmission.
29. Remove the transmission jack.
30. Install the propeller shaft. [Propeller Shaft Replacement \(With MYB\)](#) , or [Propeller Shaft Replacement \(M5T with 2WD\)](#) , or [Propeller Shaft Replacement \(With Bison\)](#).
31. Install the catalytic converter heat shield (2). [Catalytic Converter Heat Shield Replacement \(LWN\)](#).



32. Lower the vehicle.
33. From passenger side of vehicle, reposition wiring harness outboard to the surge tank pipe assembly.



34. Connect the negative battery cable. [Battery Negative Cable Disconnection and Connection](#)
35. Fill the transmission to the proper level. [Transmission Fluid Level and Condition Check](#) .
36. If a NEW TCM has been installed into the vehicle, the NEW module needs to be reprogrammed. [Service Programming System \(SPS\)](#)

NOTE:

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 valve assembly replacement
- TCM software/calibration update
- Any service in response to a shift quality concern

37. Perform the Reset Transmission Adapts. [Reset Transmission Adapts](#) .

TORQUE CONVERTER REPLACEMENT

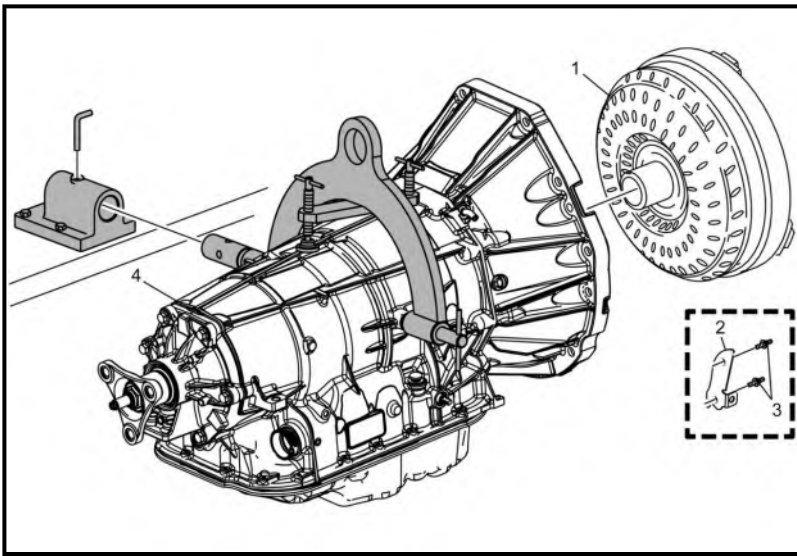
Special Tool

DT-21366 Converter Holding Strap

Equivalent regional tools: [Special Tools](#)

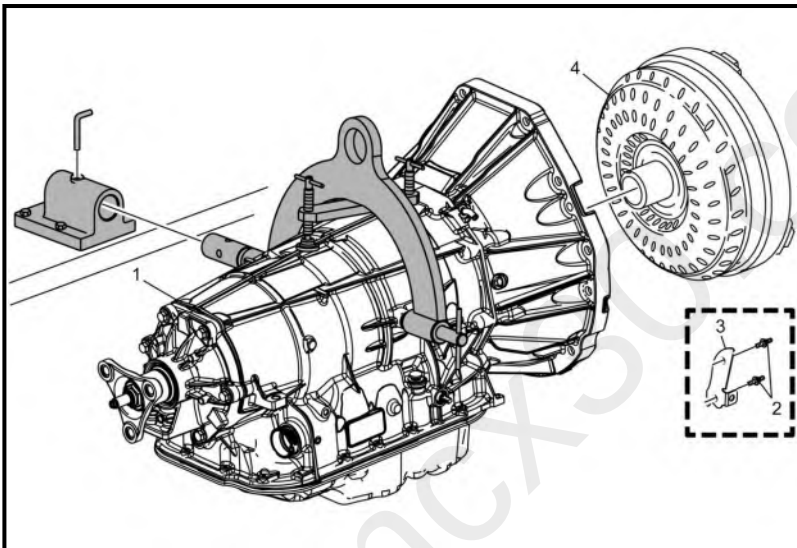
Removal Procedure

1. Transmission - Remove - [Transmission Replacement \(LCV Engine with 4WD\)](#), or [Transmission Replacement \(LWN Diesel with 4WD\)](#), or [Transmission Replacement \(LCV Engine with 2WD\)](#), or [Transmission Replacement \(LWN Diesel with 2WD\)](#)
2. Torque Converter (1) - Remove - [Torque Converter Removal and Holding Fixture Installation \(6L50\)](#)



Installation Procedure

1. Lubricate the torque converter pump hub outer diameter and the torque converter seal with clean transmission fluid. [Adhesives, Fluids, Lubricants, and Sealers](#)



NOTE: Use care not to damage the torque converter seal during torque converter installation.

2. To install, slowly turn and apply light pressure to the torque converter (4) to engage the turbine shaft splines, the stator shaft splines and the engagement area on the converter hub with the oil pump drive.
3. Transmission Converter Cover - Model Dependent (3) - Install

NOTE: Refer to the procedure link for torque specification.

4. Transmission Cover Stud - Model Dependent (2) - Install and tighten [2x] - [Torque Converter Installation and Holding Fixture Removal \(6L50\)](#)

WARNING: The torque converter must be held to the torque converter housing by a retaining device such as shipping brackets. Without the retaining device, the torque converter may slide forward, disengaging the oil pump, or may fall completely out of the transmission causing personal injury and/or property damage.

5. Install the **DT-21366** converter holding strap (1) to the transmission.

6. Transmission (1) - Install - **Transmission Replacement (LCV Engine with 4WD)**, or **Transmission Replacement (LWN Diesel with 4WD)**, or **Transmission Replacement (LCV Engine with 2WD)**, or **Transmission Replacement (LWN Diesel with 2WD)**.
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