

Manual Transmission - Medium Duty

Specifications

Fastener Tightening Specifications

Application	Specification	
	Metric	English
Frame Rail Bracket Bolts and Nuts	22 N.m	16 lb ft
Oil Drain Plug	69 N.m	51 lb ft
Oil Fill Plug	69 N.m	51 lb ft
Set Screw	6 N.m	53 lb in
Shift and Select Cable Nuts	45 N.m	33 lb ft
Transmission and Cable Bracket Bolts	39 N.m	29 lb ft

Lubrication Specifications

Application	Specification	
	Metric	English
API GL5, SAE 90 Multipurpose Oil (Use SAE 80 in Canada)	6.5 liters	6.9 quarts

Diagnostic Information and Procedures

Manual Transmission Diagnosis

Inspect the clutch system and shifting controls for proper operation before you repair the transmission. Ensure that the problem is inside the transmission prior to removing the transmission.

Run the engine at a normal idle with the transmission in neutral and the clutch disengaged. Shift the transmission into reverse and check for a grinding noise. If a grinding noise is heard, check the clutch system and clutch controls for damage or wear. Refer to *Clutch Noisy* or *Clutch Noisy During Engagement*.

If shifting the transmission is restricted, check for dirt, wear, or damage to the shift cables, mounting brackets, and shift cable linkage. Check the shift cable for proper adjustment. Adjust the shift cables if required.

If the clutch system and transmission shifting controls are operational, perform the following diagnosis in order to help locate the transmission problem.

Transmission Jumps Out of Gear

Problem	Action
The shift linkage is improperly adjusted.	Adjust the shift linkage.
The shift fork pads or grooves in the sliding gear are worn excessively.	Overhaul the transmission.
The taper is worn on the clutch gear teeth.	Overhaul the transmission.
The transmission is out of alignment.	Align the transmission.
The shift rod poppet springs are broken.	Overhaul the transmission.
The shift rod poppet springs are worn.	Overhaul the transmission.
The shift rod is bent or out of line.	Overhaul the transmission.

Transmission Jumps Out of Gear (cont'd)

Problem	Action
The shift pad fork pads are not square with the shift rod bore.	Overhaul the transmission.
There is excessive end play in the drive gear, mainshaft, or countershaft.	Overhaul the transmission.
The thrust washers or faces are worn excessively or missing.	Overhaul the transmission.

Transmission Sticking in Gear

Problem	Action
The clutch linkage is improperly adjusted.	Adjust the clutch linkage.
The sliding clutch gears are tight on the sides.	Adjust the clutch system.
Chips are wedged between the spline of the shaft and the gears.	Overhaul the transmission.
There is a misaligned mainshaft of the countershaft.	Overhaul the transmission.

Noisy in the Gears

Problem	Action
The mainshaft rear bearing is worn.	Overhaul the transmission.
The rear bearing is rough, chipped, or tapered.	Overhaul the transmission.
The speedometer gears are worn.	Overhaul the transmission.
There is excessive end play of the mainshaft.	Overhaul the transmission.

Oil Leak Diagnosis

Problem	Action
The oil level is too high.	Adjust the oil level.
The lubricant in the transmission is incorrect.	Replace the transmission oil.
The bolts are loose or missing.	Tighten the loose bolts to the proper torque value. Refer to <i>Fastener Tightening Specifications</i> .
The bearing cap seals are worn.	Overhaul the transmission.
The transmission breather is plugged internally.	Overhaul the transmission.
The seal plugs are loose or missing.	Replace the seal plugs.
The gaskets are worn.	Overhaul the transmission.
There are cracks in the transmission case.	Overhaul the transmission.
The drain or filter plugs are loose.	Tighten the drain or filter plugs to the proper torque. Refer to <i>Fastener Tightening Specifications</i> .
The bearing caps are worn or plugged.	Clean or replace the bearing caps.

Noisy Bearings

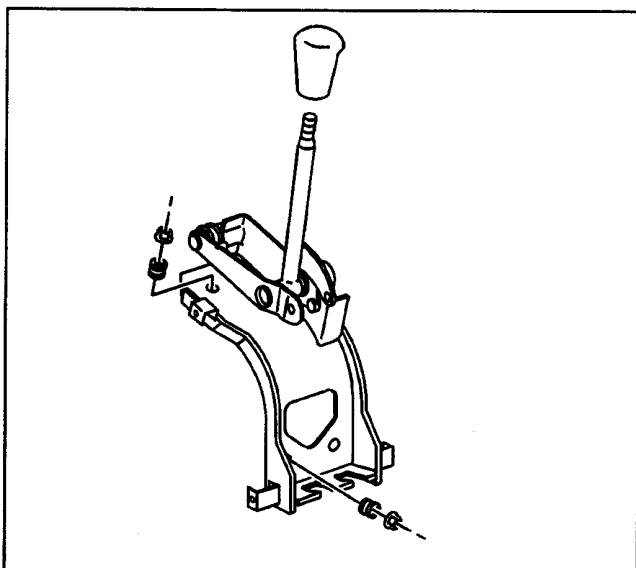
Problem	Action
There is dirt in the transmission oil.	Replace the transmission oil.
The lubricant is incorrect.	Replace the transmission oil.
The oil level is low.	Fill the transmission to the proper oil level.
The bearing retainer is worn or broken.	Overhaul the transmission.
Water or contaminants are in the transmission oil.	Replace the transmission oil.
The engine torque is too high for the transmission.	Adjust the engine torque.
The vehicle is overloaded.	Load the vehicle to the proper load limit.
There is excessive transmission vibration.	Overhaul the transmission.

Noisy in All Gears

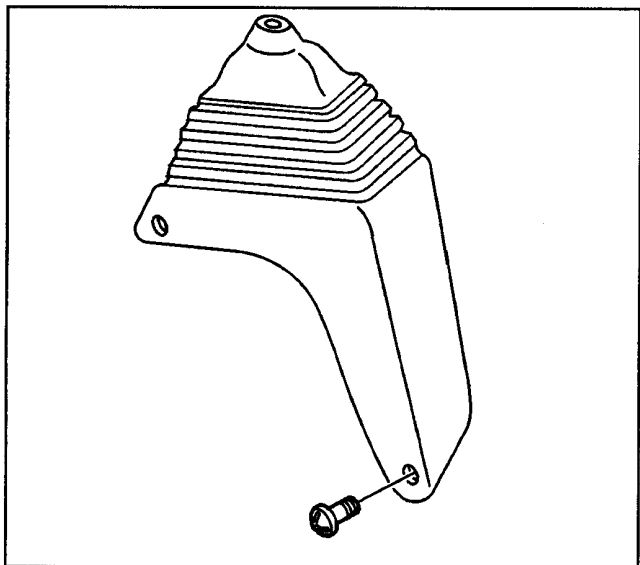
Problem	Action
The gears are chipped or cracked.	Overhaul the transmission.
Free running gears are seizing on the thrust face.	Overhaul the transmission.
There is lack of backlash between mating gears.	Overhaul the transmission.
The floating gears on the mainshaft have seized.	Overhaul the transmission.
There is a lack of transmission oil.	Fill the transmission to the proper oil level.

Noisy in Neutral with Engine Running

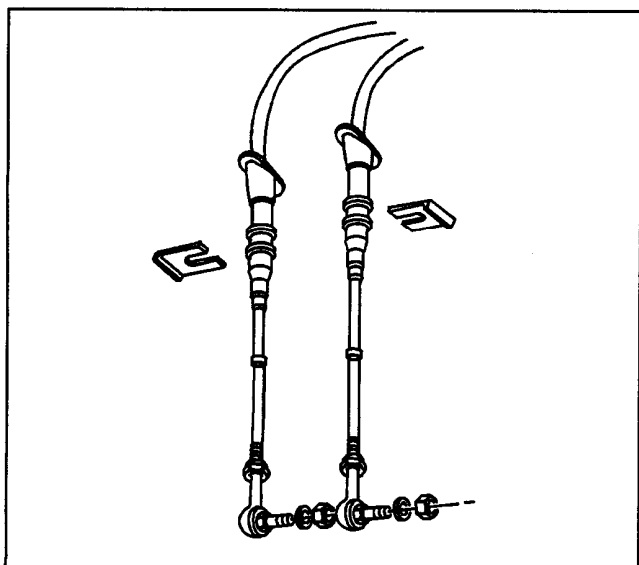
Problem	Action
The transmission is misaligned.	Align the transmission.
The flywheel pilot bearing is worn.	Replace the flywheel pilot bearing.
The countershaft bearing is worn.	Overhaul the transmission.
There is excessive end-play in the countershaft.	Overhaul the transmission.
There is excessive end-play in the idler gear.	Overhaul the transmission.
The reverse idler gear is worn.	Overhaul the transmission.
The countershaft is worn.	Overhaul the transmission.
The clutch linkage is adjusted incorrectly.	Overhaul the transmission.
The mainshaft pilot bearing is worn.	Overhaul the transmission.
The gear tooth contact surface is scuffed.	Overhaul the transmission.
There is a lack of transmission oil.	Fill the transmission to the proper oil level.
The transmission oil is the wrong grade.	Replace the transmission oil.



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Repair Instructions

Shift Cable Replacement

Removal Procedure

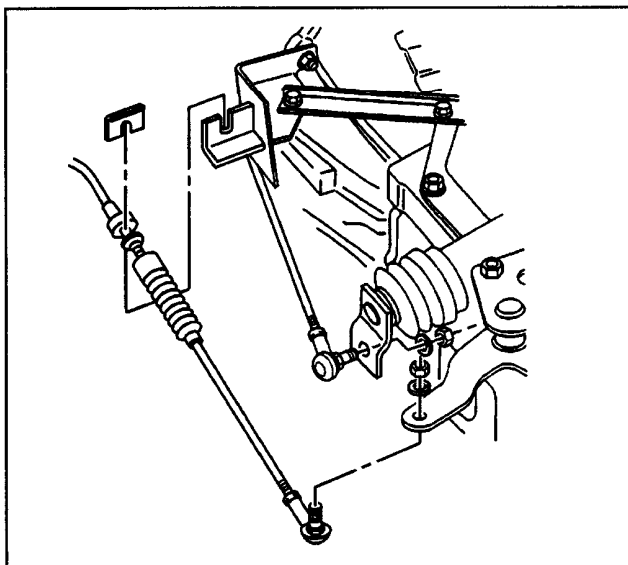
Important:

- Block all of the wheels on the vehicle prior to starting this procedure.
- Apply the park brake.
- Ensure that the shift control lever is in the Neutral position prior to removing the shift cables.

1. Remove the shift knob from the shift control lever.
2. Remove the four screws securing the shift boot to the shift control.
3. Remove the following fasteners securing the shift and select cables to the shift control:
 - The two nuts
 - The washers
 - The clips
4. Remove the two nuts and the washers securing the shift control to the panel.
5. Remove the shift and select cables from the panel.

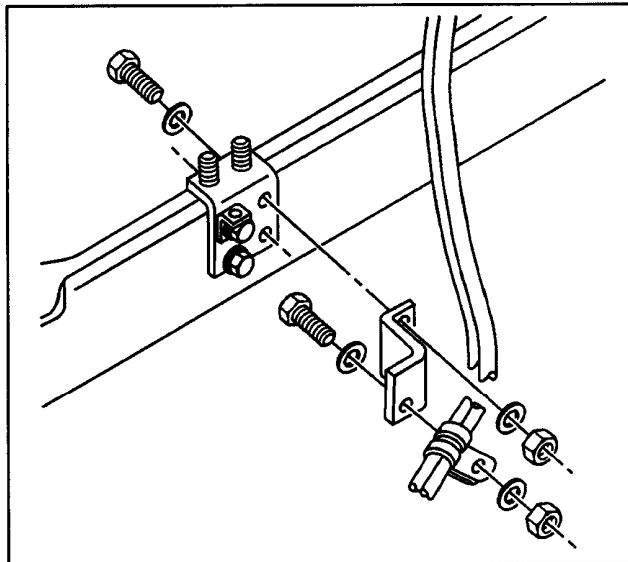
6. Remove the fasteners securing the shift and select cables to the transmission control lever and clutch control lever as follows:

- The two nuts
- The washers
- The clip



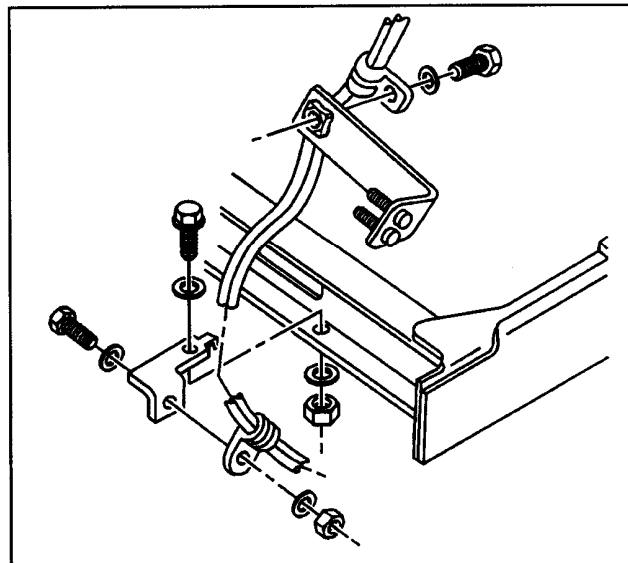
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7. Remove the bolts and the nuts that secure the shift and select cables to the frame rail brackets.

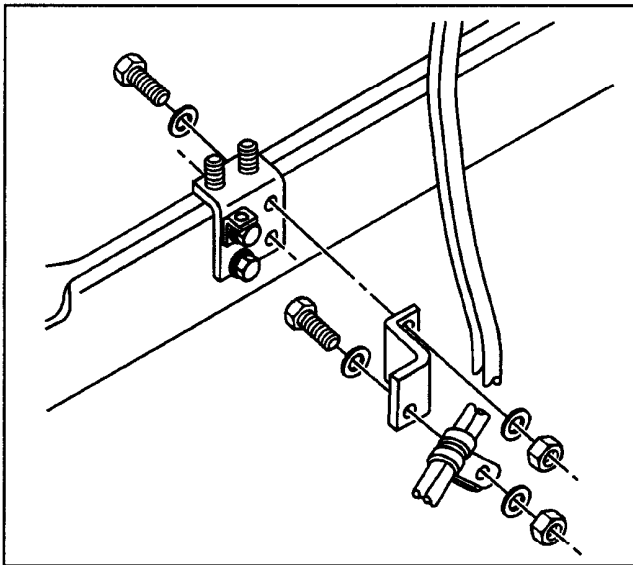


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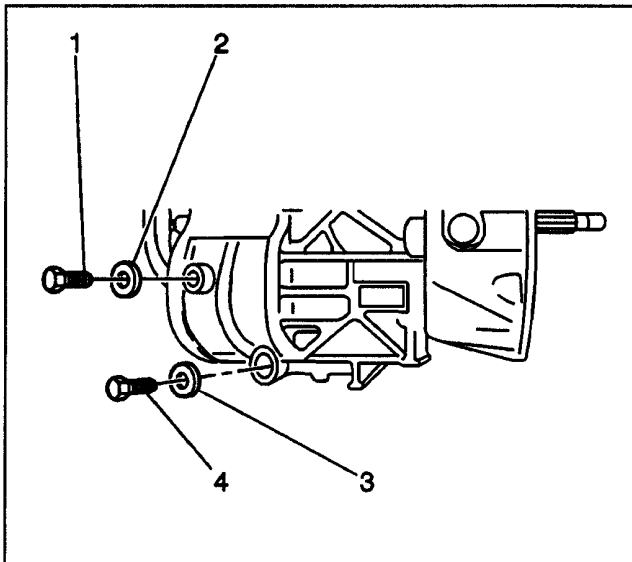
8. Remove the bolts and nuts securing the shift and select cables to the frame rail brackets. Note the routing of the shift and select cables.



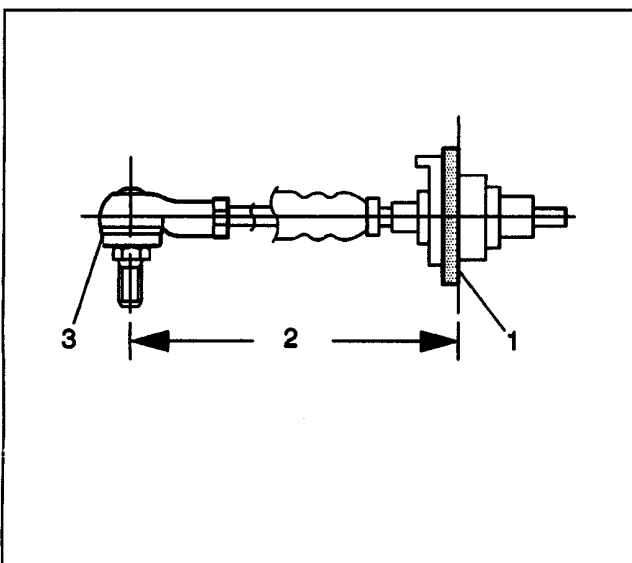
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Installation Procedure

1. Install the bolts and nuts securing the shift and select cables to the frame rail brackets.

Notice: Refer to *Fastener Notice* in Cautions and Notices.

2. Install the bolts and nuts securing the shift and select cables to the frame rail brackets.

Tighten

Tighten the frame rail bracket bolts and nuts to 22 N.m (16 lb ft).

3. Route the shift and select cables through the panels.

4. Install the two nuts and washers securing the shift control to the panel.

Tighten

Tighten the shift control panel nuts to 22 N.m (16 lb ft).

5. Install the following fasteners securing the shift and select cables to the shift control:

Tighten

Tighten the shift and select cable nuts to 45 N.m (33 lb ft).

- The two nuts
- The washers
- The clips

6. Install the four screws securing the shift boot to the shift control.

7. Install the shift knob to the shift control lever.

8. Adjust the shift and select control cables. Refer to *Shift Cable Adjustment*.

Shift Cable Adjustment

Important:

- The shift control cable attaches to the transmission control lever.
- The select control cable attaches to the select bell crank lever.

1. Remove the nut and washer securing the shift cable or the select control cable from the transmission control lever or the transmission select bell crank lever if applicable.
2. Ensure that the transmission select and shift levers are in the mechanical neutral position.
3. Turn the adjustment nut at the end (1) of the shift or select cable in order to obtain the proper rear side of bracket (3) to control lever distance.

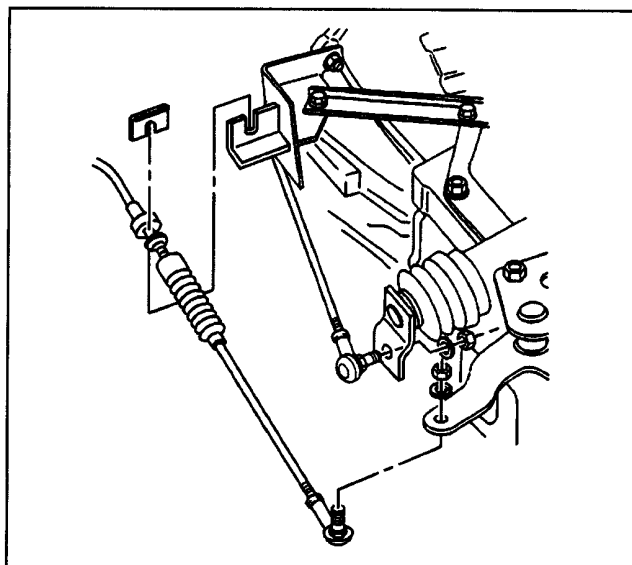
Notice: Refer to *Fastener Notice* in Cautions and Notices.

4. Install the nuts, the washers, and the clip securing the shift and/or select cable(s) to the transmission control lever and/or the select bell crank lever.

Tighten

Tighten the shift and select cable nuts to 45 N.m 33 lb ft).

5. Start the engine and check for proper shift operation.

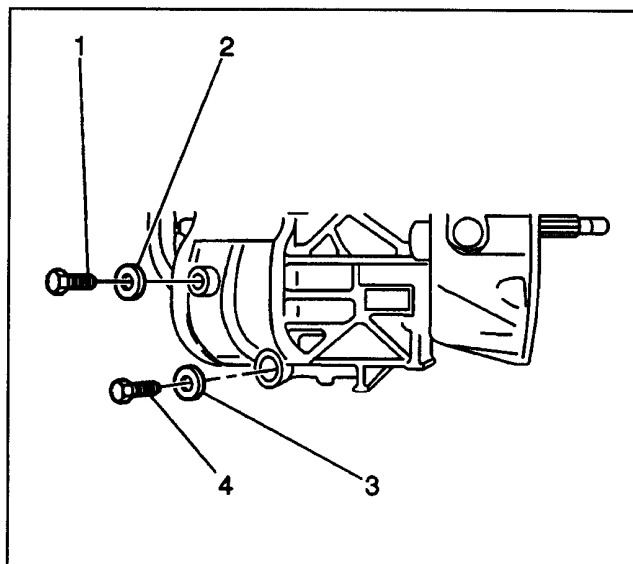


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Transmission Oil Change Procedure

Removal Procedure

1. Clean the area around the drain and fill plugs.
2. Remove the oil fill plug (1) and the seal (2) from the transmission case. Discard the seal.
3. Position a container under the oil drain hole to catch the transmission oil.
4. Remove the oil drain plug (3) and the seal (4) from the transmission case. Discard the seal.



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Installation Procedure

Notice: Refer to *Fastener Notice* in Cautions and Notices.

1. Install the oil drain plug (3) and a new seal (4) into the transmission case.

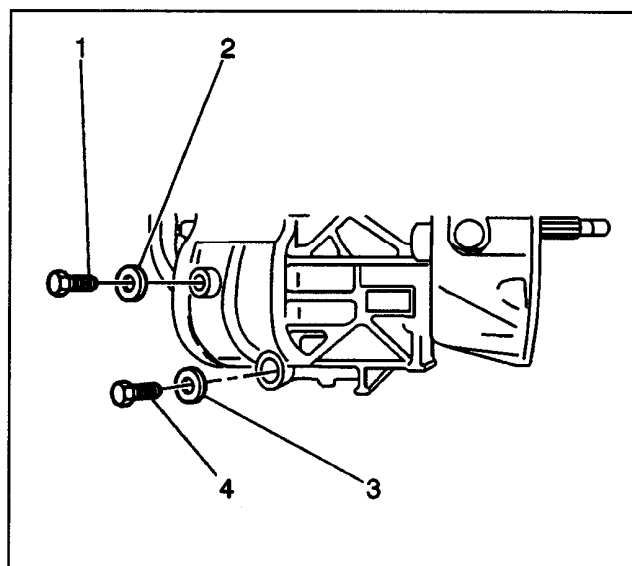
Tighten

Tighten the oil drain plug to 69 N.m (51 lb ft).

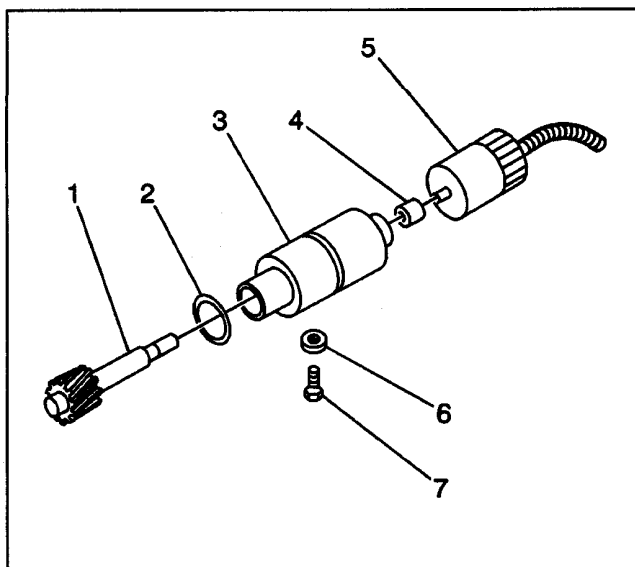
2. Fill the transmission to the level of the oil fill plug hole with transmission oil. Refer to *Lubrication Specifications*.
3. Install the oil fill plug (1) and a new seal (2) to the transmission case.

Tighten

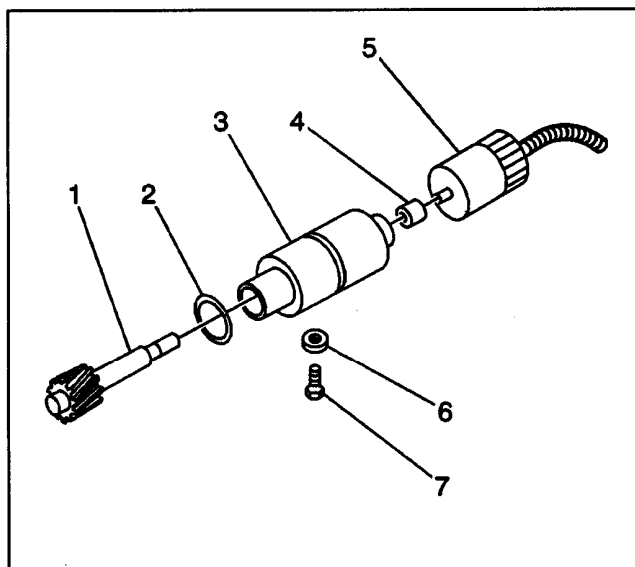
Tighten the oil fill plug to 69 N.m (51 lb ft).



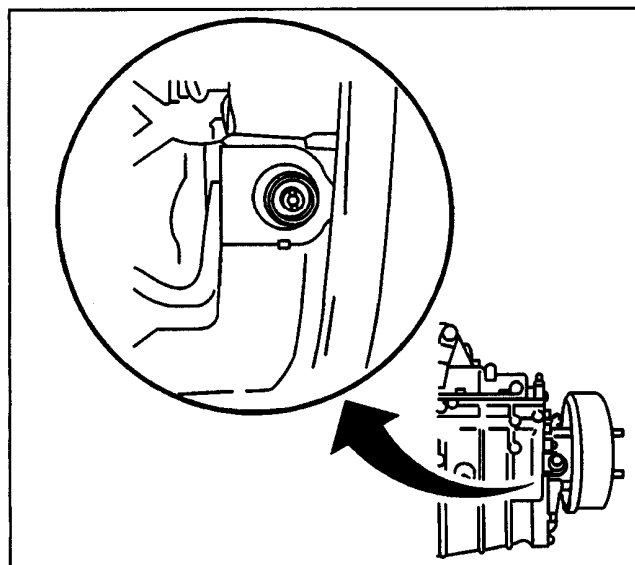
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Speedometer Driven Gear Replacement

Removal Procedure

Tools Required

J 35833 Speedometer Driven Gear Bushing Remover

1. Remove the speed sensor (5) and speed sensor seal (4) from the speedometer driven gear bushing.
Discard the speed sensor seal.
2. Remove the bushing set screw (7) and washer (6) from the speedometer driven gear bushing (3).
3. Use the *J 35833* in order to remove the speedometer driven gear bushing (3) from the transmission case.
4. Remove the speedometer driven gear seal from the transmission case.
Discard the speedometer driven gear seal (2).
5. Remove the speedometer driven gear (1) from the transmission.

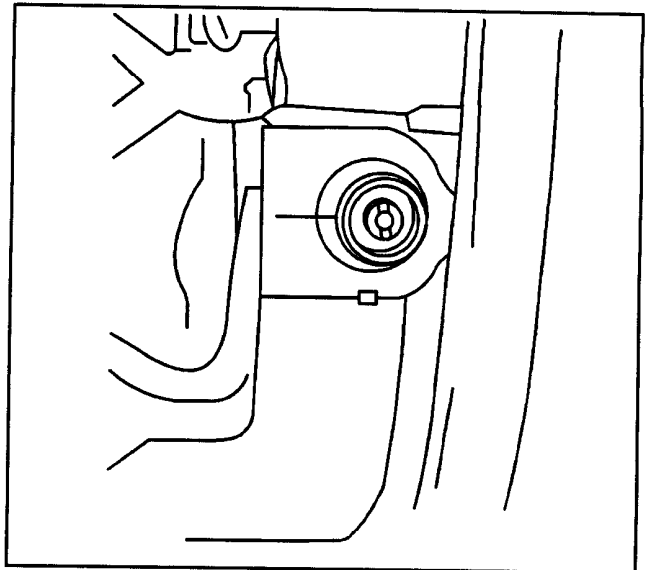
Installation Procedure

1. Install the speedometer driven gear (1) to the transmission.
2. Install a new speedometer driven gear seal (2) to the transmission case.
3. Install the speedometer driven gear bushing (3) to the transmission case.
4. Install the bushing set screw (7) and the washer (6) to the speedometer driven gear bushing.
5. Install the speed sensor (5) and a new speed sensor seal (4) to the speedometer driven gear bushing.

Speedometer Driven Gear Backlash Adjustment

1. Remove the speedometer driven gear from the transmission. Refer to *Speedometer Driven Gear Replacement*.
2. Position the speedometer driven gear and the speedometer driven gear bushing into the transmission case rear cover.
3. Rotate the bushing in the direction toward the front of the vehicle until there is no backlash between the speedometer driven gear and the transmission drive gear.

4. Mark the bushing and transmission case rear cover.

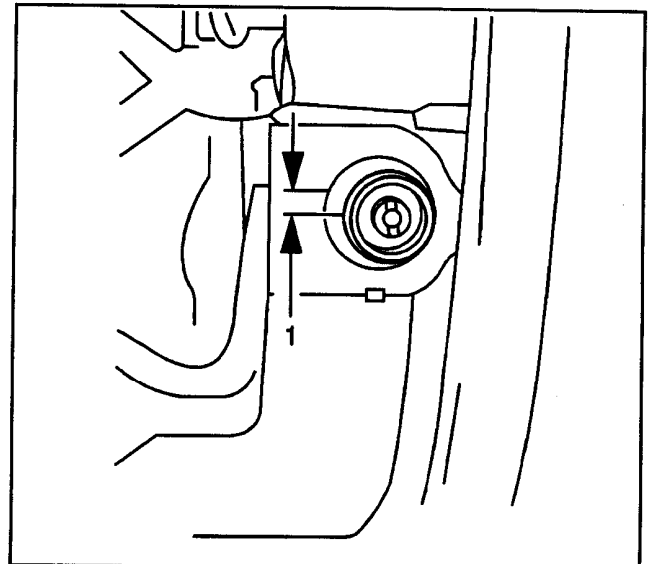


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5. Rotate the bushing in the reverse direction (1) by the measurement shown in the Reverse Direction Distance Table.

Notice: The backlash between the gears will be in the specified range 0.1-0.3 mm (0.138-0.157 in) after performing this procedure.

6. Using a marker pin, mark a set screw hole boring position on the bushing through the rear case set screw mounting hole.
 7. Remove the bushing and speedometer driven gear from the transmission rear case.
 8. Drill a set screw access hole into the bushing. Drill one 4.5 mm (0.177 in) hole 3.5—4.0 mm (0.138—0.157 in) depth into the bushing.
 9. Install the following components into the transmission rear case:
 - The speedometer driven gear
 - The speedometer driven gear seal
 - The speedometer driven gear bushing
 10. Align the access hole in the bushing with the set screw hole.
- Notice:** Refer to *Fastener Notice* in Cautions and Notices.



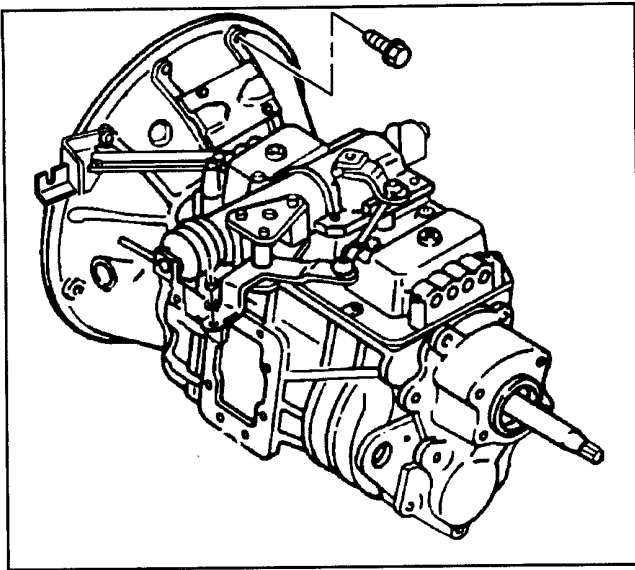
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11. Install the set screw and washer.

Tighten

Tighten the set screw to 6 N·m (53 lb in).

12. Install a new speed sensor seal and seal sensor.



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Transmission Replacement

Removal Procedure

1. Block all of the vehicle wheels.
2. Remove the transmission oil from the transmission. Refer to *Transmission Oil Change Procedure*.
3. Remove the propeller shaft. Refer to the following procedures:
 - *One-Piece Propeller Shaft Replacement (Full Yoke/229)*
 - *One-Piece Propeller Shaft Replacement (Full Yoke/305)*
 - *One-Piece Propeller Shaft Replacement (Half Yoke/229)*
 - *One-Piece Propeller Shaft Replacement (Half Yoke/305)*
 - *One-Piece Propeller Shaft Replacement (Outboard Slip/229)*
 - *One-Piece Propeller Shaft Replacement (Outboard Slip/305)*
 - *Two-Piece Propeller Shaft Replacement (Inboard Slip Joint and Flange)*
 - *Three-Piece Propeller Shaft Replacement (Center Bearing, Full Yoke)*
4. Remove the clutch slave cylinder. Refer to *Clutch in Transmission*.
5. Remove the power take off drive shaft, if installed.
6. Remove the parking brake cable and bracket. Refer to *Parking Brake Cable Replacement*.
7. Remove the shift and select cable at the transmission. Refer to *Shift Cable Replacement*.
8. Remove the wiring harness connectors and the wiring harness.
9. Remove the speed sensor and seal from the speedometer driven gear bushing.

Important:

- Support the transmission with a cradle type jack prior to removing the transmission mounting bolts.
 - If a cradle type jack is not used, chain the transmission to the jack that you use.
 - Pull the transmission straight back on the clutch splines in order to avoid damage to the clutch system.
 - Do not let the transmission hang on the clutch splines when removing the transmission from the engine.
10. Remove the bolts that secure the transmission and cable brackets to the engine.

Installation Procedure**Important:**

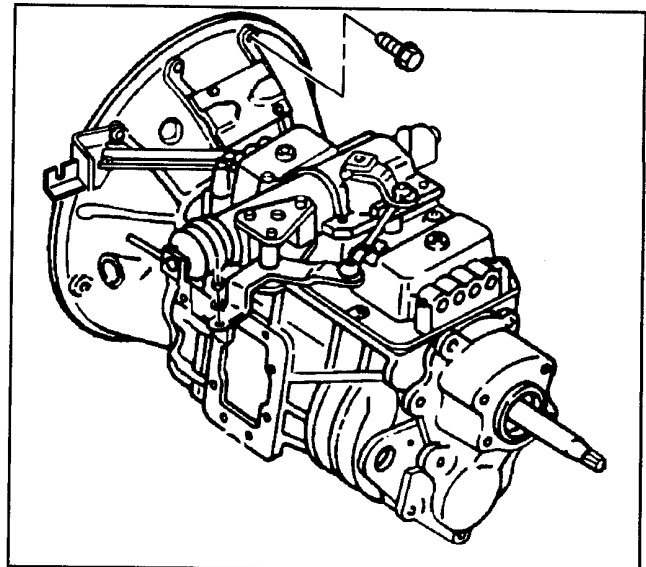
- Support the transmission with a cradle type jack prior to lifting the transmission.
- Do not let the transmission hang on the clutch splines when removing the transmission from the engine.

1. Align the transmission with the engine.
2. Align the direct gear shaft splines with the clutch hub splines.
3. Install the bolts that secure the transmission and the cable brackets to the engine.

Tighten

Tighten the transmission and cable bracket bolts to 39 N.m (29 lb ft).

4. Install the speed sensor and seal to the speedometer driven gear bushing.
5. Install the wiring harness connectors and the wiring harness.
6. Install the shift and select cable at the transmission. Refer to *Shift Cable Replacement*.
7. Install the parking brake cable and bracket. Refer to *Parking Brake Cable Replacement* in *Parking Brake*.
8. Install the power take off drive shaft, if necessary.
9. Install the clutch slave cylinder. Refer to *Clutch in Transmission*.
10. Install the propeller shaft. Refer to the following procedures:
 - *One-Piece Propeller Shaft Replacement (Full Yoke/229)*
 - *One-Piece Propeller Shaft Replacement (Full Yoke/305)*
 - *One-Piece Propeller Shaft Replacement (Half Yoke/229)*
 - *One-Piece Propeller Shaft Replacement (Half Yoke/305)*
 - *One-Piece Propeller Shaft Replacement (Outboard Slip/229)*
 - *One-Piece Propeller Shaft Replacement (Outboard Slip/305)*
 - *Two-Piece Propeller Shaft Replacement (Inboard Slip Joint and Flange)*
 - *Three-Piece Propeller Shaft Replacement (Center Bearing, Full Yoke)*
11. Fill the transmission with transmission oil. Refer to *Transmission Oil Change Procedure*.
12. Start the engine and check for the transmission operation.



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Description and Operation**Transmission Description and Operation**

The six speed (MLD6Q) transmission has a constant mesh first and reverse gear. The remaining gears are synchronized. Shifting is done with a remote shift controlm connected to two cables that operate a shift quadrant mounted on the top of the transmission. The transmission is equipped with a drive that can be connected to a power takeoff system.

Overhaul Information

For the overhaul of the MLD6Q manual transmissions, refer to Manual Transmission Overhaul.