

Automatic Transmission - Allison

Specifications

Fastener Tightening Specifications

Application	Specification	
	Metric	English
Auxiliary Oil Cooler Top Support Bolts	30 N.m	22 lb ft
Auxiliary Oil Cooler Bottom Support to Radiator Support Bolts	30 N.m	22 lb ft
Auxiliary Oil Cooler Top Support to Radiator Support Bolts	30 N.m	22 lb ft
Flywheel to Flexplate Bolts	56 N.m	41 lb ft
Modulator Clip Bolt	20 N.m	15 lb ft
Modulator Cable to Support Bracket Bolts	9 N.m	80 lb ft
Modulator Cable Nut	12 N.m	106 lb in
Oil Cooler Line Engine Block Bracket Bolts	30 N.m	22 lb ft
Oil Cooler Line Nuts to Auxiliary Oil Cooler	30 N.m	22 lb ft
Oil Cooler Line Nuts to Radiator	30 N.m	22 lb ft
Oil Cooler Line Nuts to Transmission Connectors	25 N.m	18 lb ft
Oil Cooler Line Transmission Case Bracket Bolts	30 N.m	22 lb ft
Oil Level Indicator Tube to Engine Bracket Bolt	55 N.m	41 lb ft
Oil Level Indicator Tube to Transmission Nut	130 N.m	96 lb ft
Transmission to Engine Bolts	55 N.m	41 lb ft

Fluid Capacity Specifications

Application	Specification	
	Metric	English
Allison AT 545 Use DEXRON® III Automatic Transmission Oil.	14 LITER	14.8 quarts

Diagnostic Information and Procedures

Shift Speed Too High

Problem	Action
The governor valve is stuck.	Clean or replace the governor screen and/or the governor.
The modulation is delayed.	Adjust the modulator. Refer to <i>Transmission Modulator Cable Adjustment</i> .
The mechanical actuator cable is kinked, broken, or not properly adjusted.	Replace, adjust, or repair the cable.
The mechanical actuator is obstructed.	Replace the actuator.
The shift signal valve adjustment is too high.	Adjust the shift points.
The valves are sticking.	Replace or rebuild the control valve assembly.
The modulation is improper.	Inspect the modulator valve and the modulator body.

Shift Speed Too Low

Problem	Action
The governor spring is weak or missing.	Replace the governor.
The mechanical actuator is kinked, broken, or not properly adjusted.	Replace, adjust, or repair the cable.
The adjustment of the shift signal valve spring is too loose.	Tighten the spring adjusting ring to the specification.
The modulator valve is stuck open.	Check the spring adjustment.
The modulator valve is stuck open.	Replace the modulator. Refer to <i>Transmission Modulator Replacement</i> .

Low Main Pressure in All Ranges

Problem	Action
The oil level is low.	Add oil in order to acquire the proper oil level. Refer to <i>Transmission Oil Checking Procedure</i> .
The external filter is clogged.	Replace the external filter. Refer to <i>External Transmission Oil Filter Replacement</i> .
The seal ring on the intake tube is leaking or missing.	Install a new seal ring onto the top end of the intake tube.
The main pressure regulator valve spring is weak.	Replace the spring.
The control valve body is leaking.	Replace or rebuild the valve body assembly.
The valves of the trimmer relays and main pressure regulator are sticking.	Replace or rebuild the valve body assembly.
The input charging pump is worn or damaged.	Replace or rebuild the pump.
The priority valve is missing.	Replace the missing valve.

Low Main Pressure in First Gear

Possible Cause	Action
The first range circuit is leaking in the control valve body.	Replace or rebuild the control valve body.
The first clutch piston seals are leaking excessively.	1. Overhaul the transmission. 2. Replace the seals.

Intermittent Buzzing Noise

Problem	Action
The oil level is low.	Add oil in order to acquire the proper oil level. Refer to <i>Transmission Oil Checking Procedure</i> .
Air is leaking at the intake tube due to a damaged O-ring.	Replace the intake tube seal and filter.
The oil pan filter is clogged.	Replace the oil pan filter. Refer to <i>Transmission Oil Pan and Filter Replacement</i> .
The oil is aerated.	Make sure the oil level is correct. Refer to <i>Transmission Oil Checking Procedure</i> .
The external oil filter is damaged.	Replace the external oil filter. Refer to <i>External Transmission Oil Filter Replacement</i> .

Excessive Creep in First and Reverse Gears

Problem	Action
The engine idle speed is set too high.	Adjust the idle speed. Refer to Idle Speed Adjustment in Diesel Fuel Injection.
The shift cable is disconnected.	Connect the shift cable end. Refer to <i>Shift Cable Replacement</i> .

Low Lubrication Pressure

Problem	Action
The oil level is low.	Add oil in order to acquire the proper oil level. Refer to <i>Transmission Oil Checking Procedure</i> .
The engine idle speed is too low.	Refer to Idle Speed Adjustment.
The oil cooler lines are restricted or leaking.	1. Check the lines for kinks or leaks. 2. Reroute or replace the lines as necessary. Refer to <i>Transmission Oil Cooler Line Replacement</i> .
The transmission is excessively leaking oil internally.	Overhaul the transmission.

Fluid Leaking into Converter Housing

Problem	Action
The rear oil seal of the engine crankshaft is leaking.	Refer to Crankshaft Rear Oil Seal Replacement in Engine Mechanical.
The metal-cased, lip-type seal at the front of the input charging pump is leaking.	Replace the pump seal.
The seal around the outer diameter of the oil pump is leaking.	Replace the outer diameter pump seal.
The cranked weld in the torque converter assembly is leaking.	Repair or replace the converter assembly.
The torque converter pump hub at the seal area is worn.	Replace the torque converter pump hub.

Transmission Overheats in All Ranges

Problem	Action
The cooler lines are restricted.	1. Remove the restrictions. 2. Clean or replace the lines as necessary. Refer to <i>Transmission Oil Cooler Line Replacement</i>.
The torque converter has broken parts.	Repair or replace the converter assembly.
The oil is aerated.	Check the following parts: • The seal ring at the intake tube • The input charging pump
Internal leakage is slowing the oil cooling flow.	Overhaul the transmission.

High Stall Speed

Problem	Action
The oil level is low.	Add oil in order to attain the proper fluid level. Refer to <i>Transmission Oil Checking Procedure</i> .
The clutch pressure is low.	Test the pressure.
The forward clutch slips.	Rebuild the forward clutch.
The first clutch slips.	Rebuild the first clutch.
The fourth clutch (reverse) is slipping.	Rebuild the fourth clutch.

Low Stall Speed

Problem	Action
The engine is not performing efficiently, possibly because of plugged or restricted injectors or high altitude conditions.	Refer to Engine Controls.
The converter parts are broken.	Replace or rebuild the converter assembly.
The vehicle stalls at speeds of 50 percent of normal, which implies a freewheeling stator.	Replace or rebuild the converter assembly.

Rough Shifting

Problem	Action
The governor valve is stuck.	Clean or replace the governor screen and/or the governor.
The valve spring of the vacuum modulator is not properly adjusted, or the vacuum hose is kinked or leaking.	Check the spring adjustment.
The mechanical actuator cable is kinked, broken, or not properly adjusted.	Replace, adjust, or repair the cable.
The mechanical actuator is obstructed.	1. Check the actuator. 2. Replace the actuator if necessary.
The modulator is inoperative.	Replace the modulator. Refer to <i>Transmission Modulator Replacement</i> .
The trimmer valve is sticking, or has a broken spring.	Replace or rebuild the control valve body assembly.
The control valve is sticking.	Replace or rebuild the control valve body assembly.

Rough Shifting (cont'd)

Problem	Action
The modulator valve is sticking.	1. Clean the valve. 2. Check the vacuum modulator. 3. Adjust the spring.
The engine idle speed in neutral to drive is too fast.	Adjust the engine idle screw. Refer to <i>Idle Speed Adjustment in Engine Controls</i> .
The selector linkage is out of adjustment.	Adjust the shift cable. Refer to <i>Shift Cable Adjustment</i> .

Excessive Slip and Clutch Chatter Only One Range

Problem	Action
The clutch is slipping in one range.	1. Rebuild the specific clutch that is slipping. 2. Replace the piston seals.
Oil is leaking excessively at the piston seals in one range.	Overhaul the clutch and piston assembly.
Oil is leaking in the valve components of one range.	Replace or rebuild the control valve body assembly.
The trimmer valve is stuck open.	1. Replace or rebuild the control valve body assembly. 2. Check the trimmer valve for freedom of movement.
The priority valve is cycling.	Replace or rebuild the control valve body assembly.

Dirty Fluid

Problem	Action
The oil has not been changed at proper intervals.	1. Drain the oil. 2. Replace the oil filter. Refer to <i>Transmission Oil Pan and Filter Replacement</i>. 3. Replace the external oil filter. Refer to <i>External Transmission Oil Filter Replacement</i>. 4. Fill the transmission with new oil.
The heat of the oil is excessive.	Check the cooling system.
The clutch is inoperative.	Overhaul the transmission.
The filter or filter elements are damaged.	Replace the filter or elements. Refer to <i>External Transmission Oil Filter Replacement</i> .
The engine rear oil seal is faulty.	Replace the engine rear oil seal. Refer to <i>Engine Rear Oil Seal Replacement in Engine Mechanical</i> .

Output Shaft Seal Fluid Leak

Problem	Action
The seal at the output flange is missing or faulty.	Install a new seal in the rear of the transmission housing.
The flange is worn at the seal surface.	Replace the flange.

Slips in All Forward Ranges

Problem	Action
The oil level is low.	Add oil in order to obtain the proper oil level. Refer to <i>Transmission Oil Checking Procedure</i> .
The clutch main pressure is low.	Test the pressure.
The forward clutch is slipping.	1. Rebuild the forward clutch. 2. Replace the piston seals.
The seal rings on the front support hub are broken.	Replace the seal rings.

Slips in Fourth and Reverse Gear Only

Problem	Action
The fourth clutch is slipping.	1. Rebuild the clutch. 2. Replace the piston seals.
The trimmer valve is sticking.	1. Replace or rebuild the control valve body assembly. 2. Inspect the trimmer valve.
The seal rings on the center support assembly hub are broken.	Replace the seal rings.
The seal rings of the clutch piston are cut.	Replace the seal rings.
The check balls are not seating in the rotating clutch housings.	Inspect the check balls for contamination and proper operation.

Slips in Reverse and First Gear Only

Problem	Action
The first clutch is slipping.	1. Overhaul the clutch. 2. Replace the piston seals.
The piston seal rings are cut.	Replace the seal rings.
The clutch-apply oil feed tube is loose or leaking.	Reset or replace the feed tube.

Vehicle Moves Forward in Neutral

Problem	Action
The idle speed is incorrect.	Adjust the idle speed. Refer to <i>Idle Speed Adjustment in Engine Controls</i> .
The shift selector linkage is not in adjustment.	Adjust the shift cable. Refer to <i>Shift Cable Adjustment</i> .
The forward clutch has failed and is dragging.	Rebuild the forward clutch.

Vehicle Moves Backward in Neutral

Problem	Action
The shift cable is not in adjustment.	Adjust the shift cable. Refer to <i>Shift Cable Adjustment</i> .
The fourth clutch is inoperative and is dragging.	Rebuild the fourth clutch.
The shift cable is faulty or broken.	Repair or replace the shift cable. Refer to <i>Shift Cable Replacement</i> .
The main pressure is low.	Test the pressure.
The shift selector is not engage at the control valve.	Install or replace the parts that are involved. The parts are found inside the oil pan.
The oil level is low.	Fill to the proper oil level. Refer to <i>Transmission Oil Checking Procedure</i> .

Fluid Out of Fill Tube or Breather

Problem	Action
The oil level indicator is loose.	1. Tighten the cap. 2. Replace the cap as necessary.
The oil level is too high.	Drain the oil in order to acquire the proper oil level. Refer to <i>Transmission Oil Checking Procedure</i> .
The oil level is too low.	Add oil in order to acquire the proper oil level. Refer to <i>Transmission Oil Checking Procedure</i> .
The modulator is faulty.	Replace the modulator. Refer to <i>Transmission Modulator Replacement</i> .
The oil level indicator tube is plugged.	1. Check the fill tube for blockage. 2. Clean the tube as necessary.
The breather is clogged.	Clean or replace the breather.
The transmission oil contains water.	1. Drain the oil. 2. Replace the oil. Refer to <i>Transmission Oil Checking Procedure</i> .
The oil level indicator gasket is worn.	Replace the gasket or the oil level indicator. Refer to <i>Transmission Oil Level Indicator Tube Replacement</i> .
The oil level indicator is improperly marked.	Replace the oil level indicator. Refer to <i>Transmission Oil Level Indicator Tube Replacement</i> .

Oil Leak Diagnosis

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

General Method

1. Verify that the leak is transmission oil.
2. Thoroughly clean the suspected leak area.
3. Operate the vehicle for about 15 minutes or until normal operating temperatures are reached.
4. Park the vehicle over clean paper or cardboard.
5. Turn the ignition to the OFF position.
6. Look for oil spots on the paper.
7. Make the necessary repairs.

Powder Method

1. Thoroughly clean the suspected leak area with solvent.
2. Apply an aerosol type powder (foot powder) to the suspected leak area.
3. Operate the vehicle for about 15 minutes or until the normal operating temperatures are reached.
4. Turn the ignition to the OFF position.
5. Inspect the suspected leak area.
6. Trace the leak path through the powder in order to find the source.
7. Make the necessary repairs.

Dye and Black Light Method

1. Follow the manufacturer's recommendation for the amount of dye to be used.
2. Find the leak with a black light.
3. Make the necessary repairs.

Gasket and Seal Checks

Once the leak has been pinpointed and traced back to the source, determine the cause of the leak in order to repair the leak properly. If a gasket is replaced, but the sealing flange is bent, the new gasket will not repair the leak. Repair the bent flange before attempting to repair a leak. In order to prevent leakage, correct any of the following conditions.

- Check the gasket areas for the following conditions that may cause a leak:
 - The fluid level or pressure is too high
 - A plugged vent or drain-back holes
 - Improperly tightened fasteners or dirty/damaged threads
 - Warped flanges or warped sealing surfaces
 - Damaged or worn gaskets
 - Cracking or porosity of the component
 - Improper sealant used (where applicable)
- Check the seal areas for the following conditions that may cause a leak:
 - The oil level or pressure is too high
 - A plugged vent or drain-back hole
 - A damaged seal bore (scratched, burred, or nicked)
 - A damaged or worn seal
 - Improper installation
 - Cracks in the component
 - The manual or output shaft surface is scratched, nicked, or missing
 - A loose or worn bearing causing excess seal wear

Possible Points of Oil Leaks

Oil leaks may occur in the following areas:

- The transmission or the transmission oil pan
 - Attaching bolts are not tightened to the correct specification.
 - A gasket is improperly installed or damaged.
 - The oil pan or mounting face is not flat.
- The transmission case
 - The filler tube multi-lip threads are leaking.
 - The governor cover or O-ring is damaged or missing.
 - The filler tube bracket is misaligned.
 - The vehicle speed sensor seal is damaged.
 - The manual shaft seal is damaged.
 - The oil cooler connector fittings are loose or damaged.
 - The propeller shaft oil seal is worn or damaged.
 - The governor cover is leaking.
 - The line pressure pipe plug is loose.
 - The casting is porous.
- The converter end seal
 - The seal lip is cut.
Check the converter hub for damage.
 - The bushing is moved forward.
The bushing is damaged.
 - The garter spring is missing from the seal.
- The converter end
 - The converter leaks in the weld area.
 - The casting in the case of the pump is porous.
- The vent pipe or the fill tube
 - The transmission oil level is too high.
 - Water or coolant is in the oil.
The oil appears milky.
 - The case is porous.
 - The oil level indicator is incorrect.
 - The transmission vent is plugged.
 - The drain back holes are plugged.
 - The oil pump to case gasket, if equipped, is misaligned.

Repair Instructions

Parts Cleaning and Inspection

Service Precautions

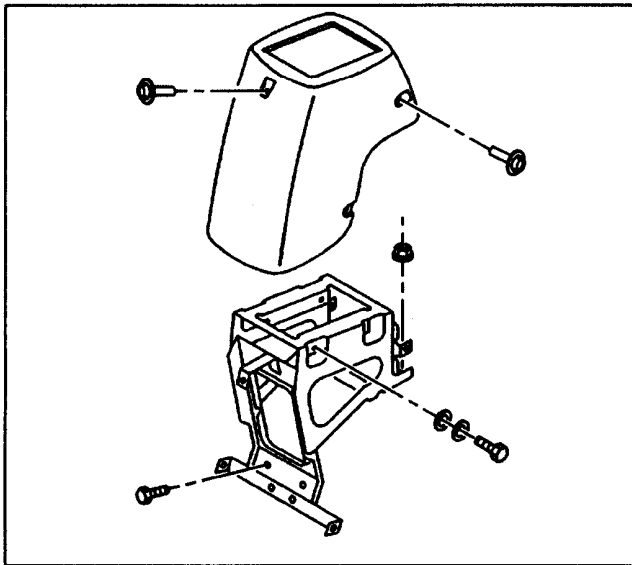
1. Use the following appropriate safety equipment:
 - Safety glasses
 - Safety shoes
 - Gloves
2. Keep the work area clean.
3. Keep the tools clean.
4. Clean the exterior of the transmission before removing any parts.
5. Do not use wipe cloths or rags.
6. Do not use solvents on rubber seals or plastic/Teflon® thrust washers.
7. Blow out all of the passages with compressed air.
8. Clean the small passages with a fine wire.
9. Handle the parts carefully in order to prevent damage.
10. Lubricate all of the internal parts with transmission oil during assembly.
11. When installing screws, bolts, or studs into aluminum, always dip the threads into transmission oil.
12. Always use a torque wrench for the proper torque.
13. Recondition damaged or stripped aluminum threads with thread inserts.
14. Replace all of the gaskets and O-ring seals. Do not use gasket cement or sealers.
15. Replace the plastic/Teflon® thrust washers.
16. Install the plastic/Teflon® thrust washers using the proper seal protector.

Inspection Procedure

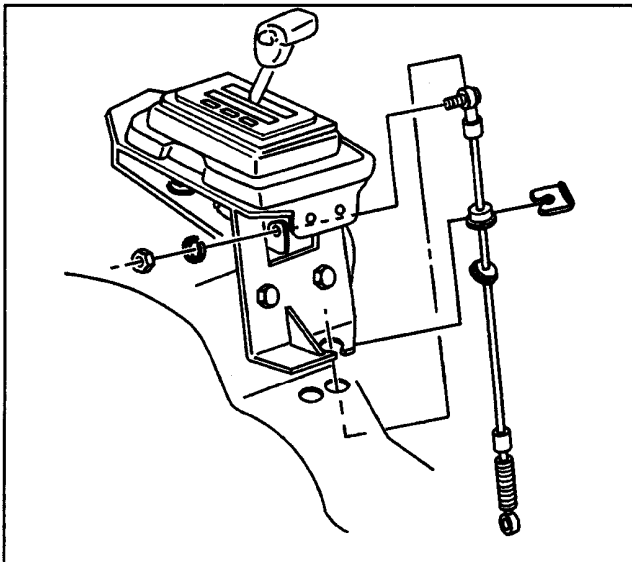
1. Inspect the manual linkage for wear at the pivoting points and bent or broken links and rods.
2. Inspect the following items for nicks, cuts, or damage:
 - The seals
 - The gasket
 - The O-rings
 - The mating surfaces
3. Check the mating surfaces for the following defects:
 - Nicks
 - Cuts
 - Damage
4. Inspect the snap rings for the following conditions:
 - Expansion or compression
 - Distortion
 - Nicks
 - Proper ring-to-groove fit
5. Inspect the bearings and thrust surfaces for the following conditions:
 - Wear
 - Scoring
 - Pitting

Transmission Oil Pan and Filter Replacement

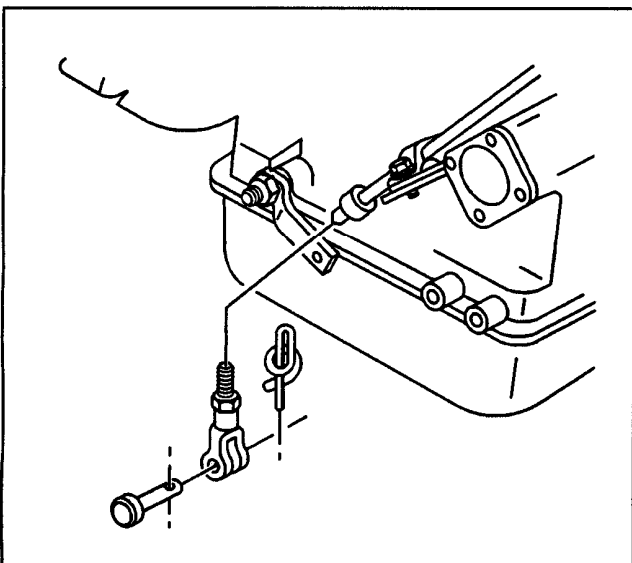
Refer to the Allison SA1241 Service Manual for the oil pan filter replacement.



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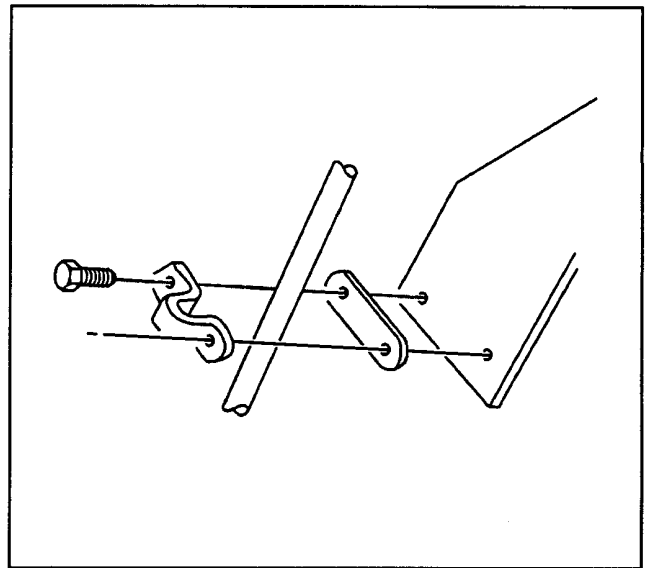
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Shift Cable Replacement

Removal Procedure

1. Remove the plugs and the screws securing the shift control housing to the shift control.
2. Remove the nut, the washer, and the clip securing the shift cable to the shift control.
3. Remove the cotter pin and the clevis pin securing the shift cable to the transmission shift lever.

4. Remove the two screws, the clamp, and the spacer securing the shift cable to the shift cable support bracket.
5. Note the positions of the shift cable frame rail clamps prior to removal.
6. Remove the screws and clamps securing the shift cable to the frame rail.
7. Remove the grommets securing the shift cable to the cab and the frame rail.

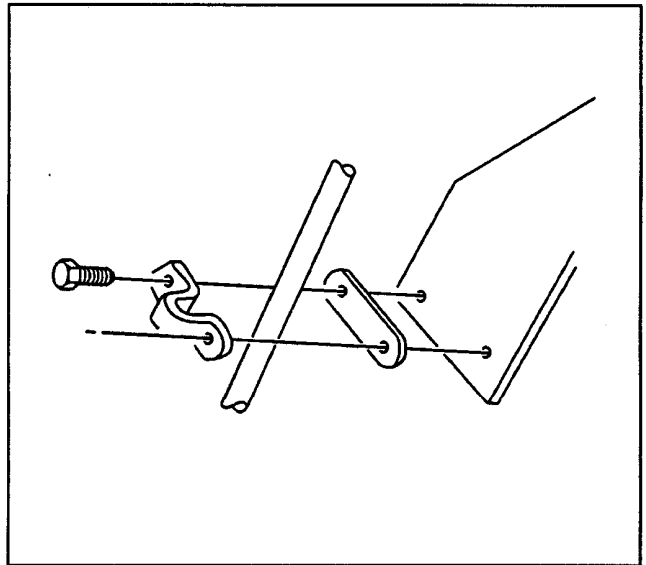


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Installation Procedure

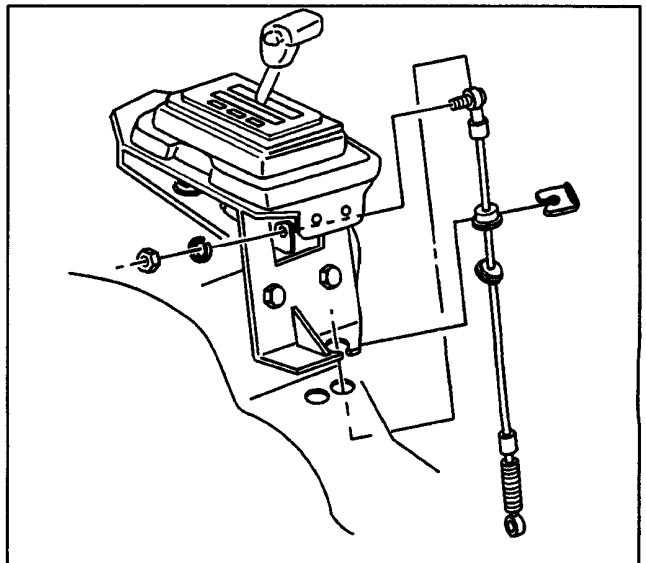
Notice: Ensure the shift control lever and the transmission shift lever are in the mechanical neutral position.

1. Install the screws and the clamps in order to secure the shift cable to the frame rail.
2. Install the two screws, the clamp, and the spacer in order to secure the shift cable to the shift cable support bracket.
3. Adjust the shift cable. Refer to *Shift Cable Adjustment*.

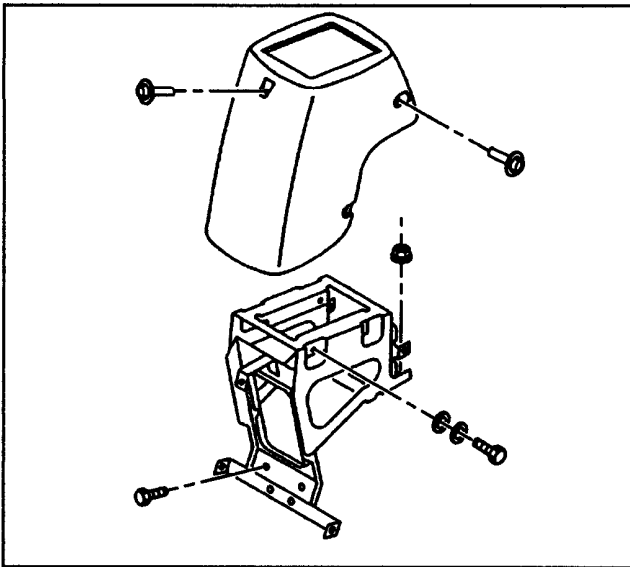


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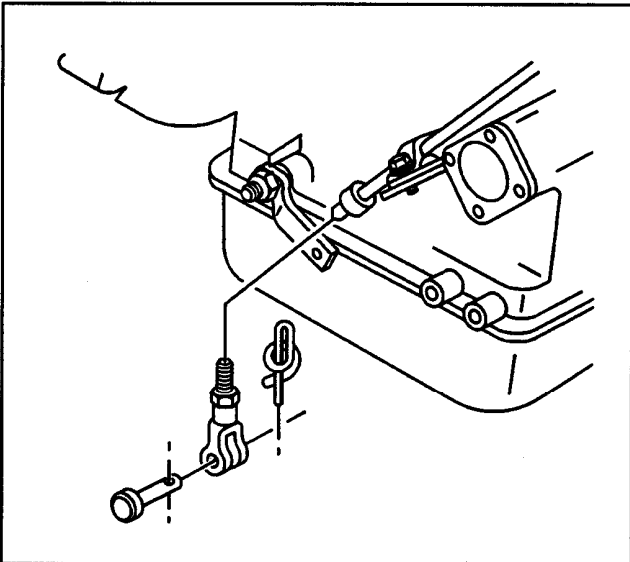
4. Install the nut, the washer, and the clip in order to secure the shift cable to the shift control.



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5. Install the plugs and screws in order to secure the shift control housing to the shift control.

Shift Cable Adjustment

Inspection Procedure

1. Turn the ignition OFF.
2. Block the wheels.
3. Shift the selector lever through each drive range while feeling for full engagement of the transmission.
 - 3.1. Make sure the shift control fully engages all the transmission detent positions in the transmission before the range selector hits a stop.
 - 3.2. Note the position of the selector lever after each shift.
 - 3.3. Make sure the transmission detent R (reverse) does not engage until the selector lever is completely out of the neutral notch.
4. If the selector lever is not properly located or operating, adjust the shift control cable.
 - If you cannot make a satisfactory adjustment, replace the shift cable. Refer to *Shift Cable Replacement*.
 - Before adjusting the shift cable, make sure that all the shift controls are not damaged and operate smoothly.
 - Have an assistant select the required range selector position while you listen for the full engagement of the gears at the transmission shift lever.

Adjustment Procedure

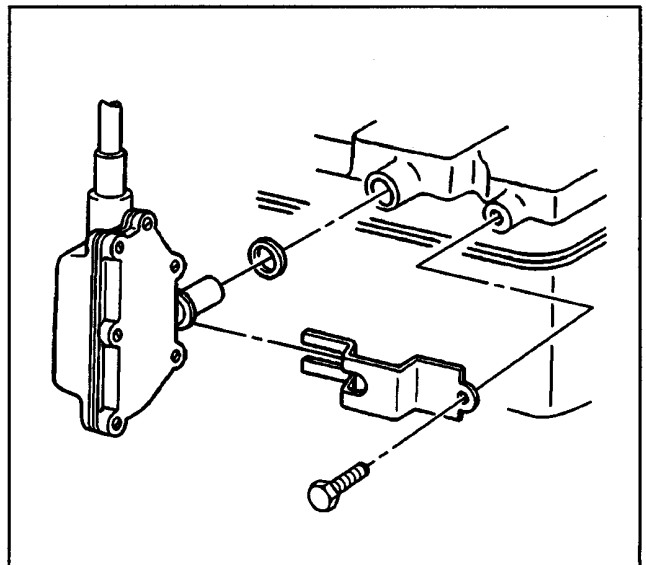
1. Place the range selector against the stop in the R (reverse) position.
2. Disconnect the clevis from the transmission shift lever.
3. Position the transmission shift lever into the mechanical reverse position.
4. Loosen the jam nut at the clevis.

5. Turn the clevis on the threaded cable core until the holes in the clevis align with the hole in transmission shift lever.
6. Install the clevis pin.
 - 6.1. Make sure that the clevis pin enters the holes freely.
 - 6.2. If the clevis pin does not enter the holes freely, adjust the clevis by turning the clevis one half turn in either direction.
- Important:** Do not spread the cotter pin.
7. Secure the clevis pin to the transmission shift lever with a new cotter pin.
8. Move the range selector lever in order to check for the detent engagement.
 - 8.1. Make sure the transmission detents fully engage just before the range selector lever hits the stops in the shift control lever.
 - 8.2. Check for the detent engagement in the N (neutral) position.
 - 8.3. Check for the detent engagement in the D (drive) position.
 - 8.4. Check for the detent engagement in the R (reverse) position.
 - 8.5. Check for the detent engagement in all the other range positions.
9. Spread the cotter pin.
10. Tighten the jam nut against the clevis pin.

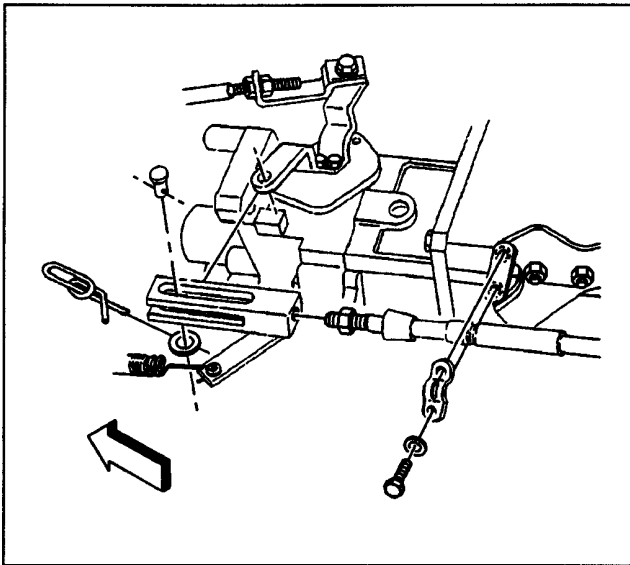
Transmission Modulator Replacement

Removal Procedure

1. Remove the bolt and clip securing the modulator and the O-ring to the transmission.

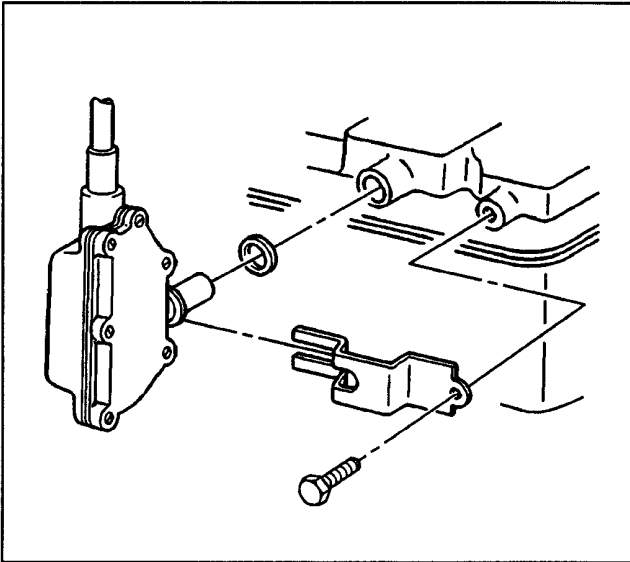


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2. Remove the two bolts and the washers securing the modulator cable to the support bracket.
3. Remove the cotter pin, the washer, and the clevis pin securing the clevis to the engine throttle lever.
4. Remove the clevis from the modulator cable.
5. Remove the modulator cable with the modulator from the vehicle.



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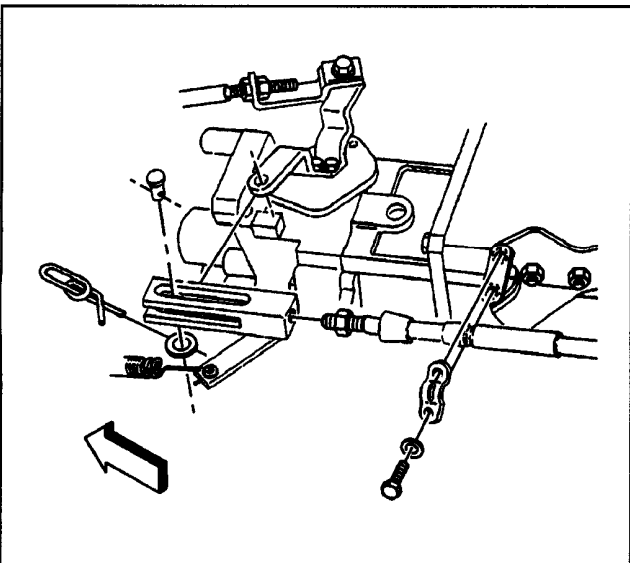
Installation Procedure

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

1. Install the bolt and the clip in order to secure the modulator and the O-ring to the transmission.

Tighten

Tighten the bolt to 20 N·m (15 lb ft).



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2. Install the two bolts and the washers in order to secure the modulator cable to the support bracket.

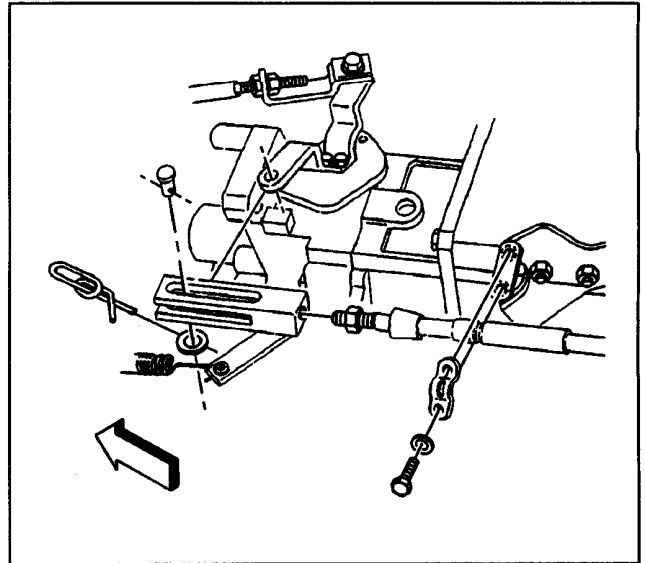
Tighten

Tighten the bolts to 9 N·m (80 lb in).

3. Adjust the modulator cable. Refer to *Transmission Modulator Cable Adjustment*.

Transmission Modulator Cable Adjustment**Removal Procedure**

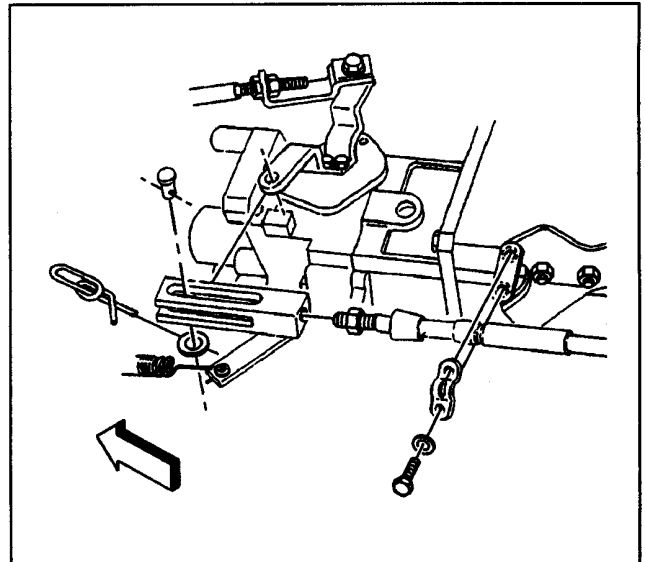
1. Remove the cotter pin, the clevis pin, and the washer securing the clevis to the throttle lever, if necessary.
2. Remove the clevis from the modulator cable, if necessary.



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Adjustment Procedure

1. Install the clevis to the modulator cable.
2. Install the threads of the modulator cable into the clevis to a 20 mm (0.8 in) thread engagement.
3. With the engine OFF, position the throttle lever to the wide open position.
4. Position the clevis over the throttle lever mounting hole.
5. Position the clevis pin through the clevis and the throttle lever.
 - 5.1. Make sure the distance between the clevis pin and the end of the clevis slot away from the cable is between 1–2 mm (0.04–0.08 in).
 - 5.2. If the clearance is not between 1–2 mm (0.04–0.08 in), thread the modulator cable into or out of the clevis in order to acquire the correct clearance.



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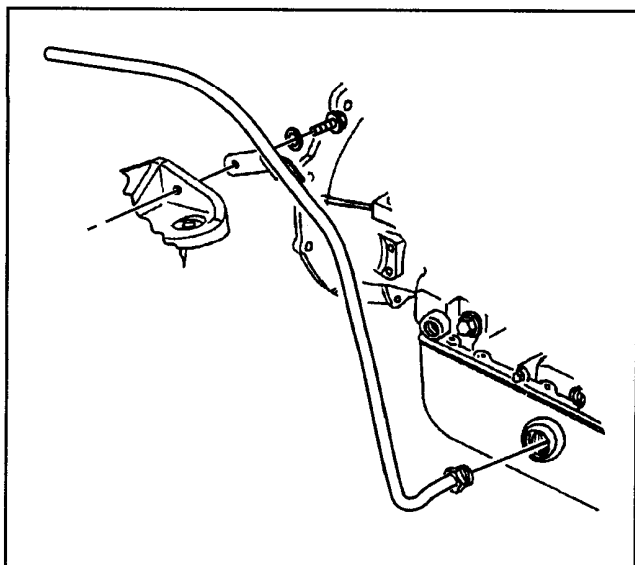
Notice: Refer to *Fastener Notice* in Cautions and Notices.

6. Secure the modulator cable nut to the clevis.

Tighten

Tighten the modulator cable nut to 12 N·m (106 lb in).

7. Secure the clevis pin to the clevis with the washer and the cotter pin.
8. Move the throttle lever from the wide open throttle position to the idle position three or four times.
9. Position the throttle lever in the wide open position.
10. Make sure that the clearance between the clevis pin and the end of the clevis slot away from the cable is between 1–2 mm (0.04–0.08 in).
11. Repeat the procedure, if necessary, in order to acquire the correct clearance.

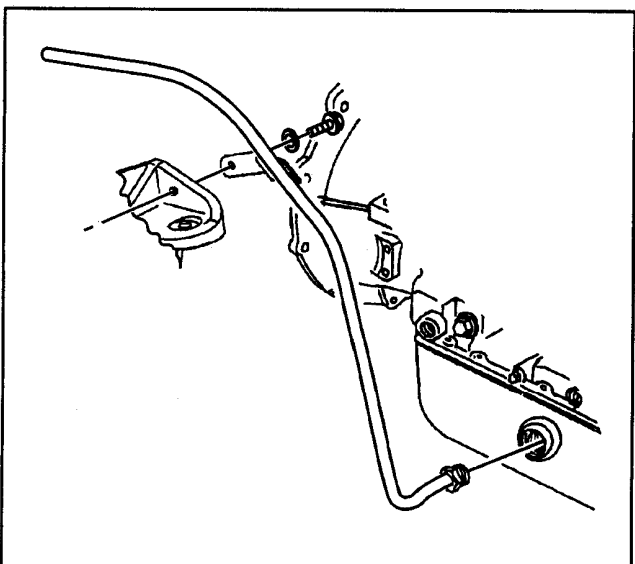


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Transmission Oil Level Indicator Tube Replacement

Removal Procedure

1. Remove the oil level indicator.
2. Remove the bolt and the washer securing the oil level indicator tube to the engine bracket.
3. Place a container under the transmission oil pan in order to catch the draining oil.
4. Remove the nut securing the oil level indicator tube to the transmission oil pan.



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Installation Procedure

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

1. Install the nut in order to secure the oil level indicator tube to the transmission oil pan.

Tighten

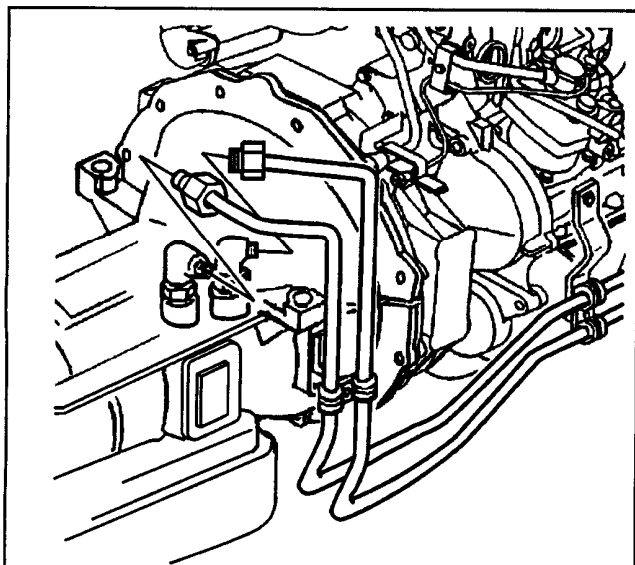
Tighten the nut to 130 N.m (96 lb ft).

2. Install the bolt and washer in order to secure the oil level indicator tube to the engine bracket.

Tighten

Tighten the bolt to 55 N.m (41 lb ft).

3. Install the oil level indicator.
4. Check the transmission oil level. Add oil as necessary. Refer to *Transmission Oil Checking Procedure*.



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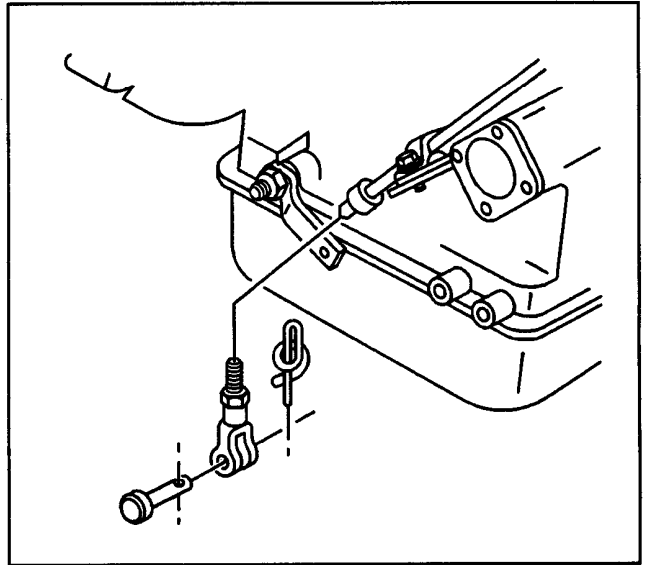
Transmission Replacement

Removal Procedure

Caution: Refer to *Battery Disconnect Caution* in Cautions and Notices.

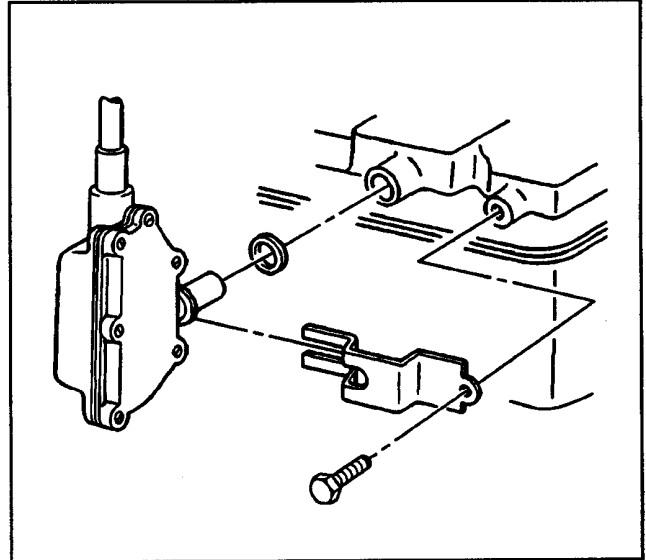
1. Disconnect the negative battery cable.
2. Raise the vehicle.
3. Disconnect the exhaust pipes. Refer to Exhaust Pipe Replacement in Engine Exhaust.
4. Remove the transmission oil level indicator tube. Refer to *Transmission Oil Level Indicator Tube Replacement*.
5. Drain the transmission oil.
6. Cover the transmission oil pan opening in order to prevent the entry of foreign material.
7. Disconnect the oil cooler lines from the transmission case. Refer to *Transmission Oil Cooler Line Replacement*.

8. Disconnect the shift cable from the transmission. Refer to *Shift Cable Replacement*.



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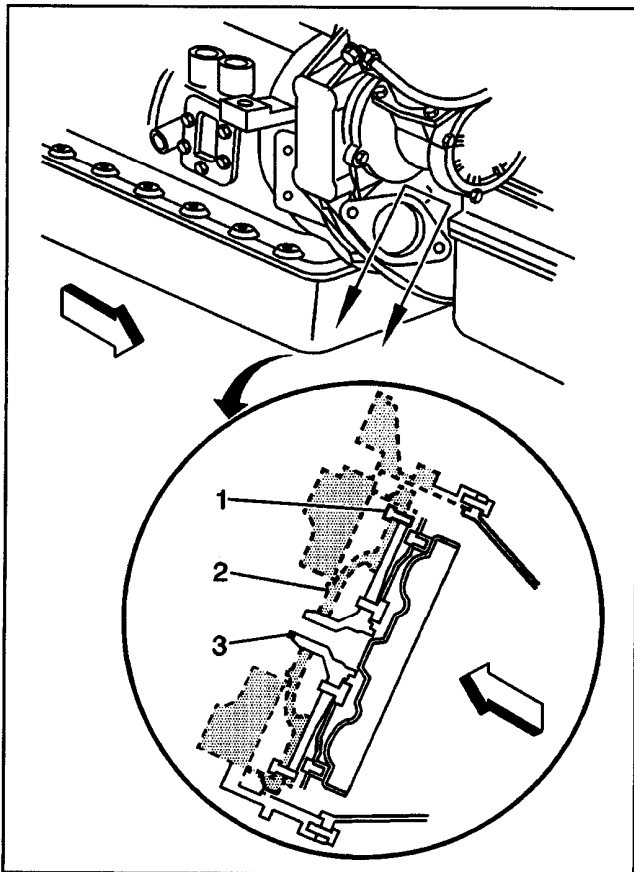
9. Remove the modulator from the transmission. Refer to *Transmission Modulator Replacement*.
10. Disconnect the wiring harness connectors from the transmission.
11. Remove the starter. Refer to *Starter Motor Replacement* in Engine Electrical.
12. Disconnect the propeller shaft from the transmission. Refer to the appropriate procedure:
- One-piece propeller shafts:
 - *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)*
13. Disconnect the park brake cable from the park brake. Refer to *Park Brake Cable Replacement* in Park Brake.



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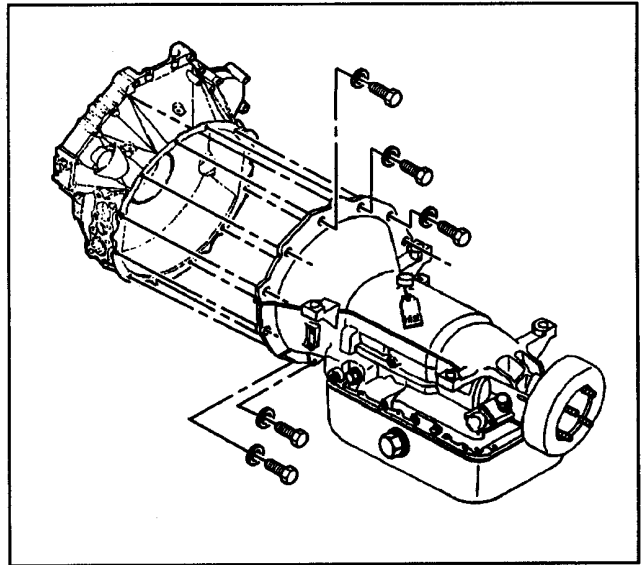
Notice: Carefully inspect the transmission and the surrounding areas to be sure no lines, hoses or wires will interfere with the transmission removal. In order to avoid damage to the transmission or the torque converter, support the transmission with a dolly jack. Do not let the torque converter fall.

14. Support the transmission with a transmission dolly that can hold a load of at least 349 kg (750 lb).
 - 14.1. Position the dolly so that the transmission oil pan will not support the weight of the transmission.
 - 14.2. Fasten a safety chain over the top of the transmission and on both sides of the dolly.
 - 14.3. Cushion the transmission in order to prevent cracks or tears to the transmission housing.
15. Remove the flywheel (2) from the flexplate (3).
 - 15.1. Remove the flywheel access cover.
 - 15.2. Using a pry bar, turn the flexplate (3) in order to align the flexplate to flywheel bolts (1) with the access hole.
 - 15.3. Remove the flexplate to flywheel bolts (1).
 - 15.4. Mark the flywheel (2) and flexplate alignment (3).



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16. Remove the transmission to engine bolts.
17. Move the transmission back from the engine.
18. Lower the transmission.
19. Remove the park brake from the transmission.
Refer to Park Brake.



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Installation Procedure

Notice: Carefully inspect the transmission and the surrounding area to be sure no lines, hoses or wires will interfere with the transmission installation. When raising and moving the transmission, do not let the torque converter slip off the shaft. The transmission or torque converter can be damaged.

Important: Do not install the transmission without installing the park brake.

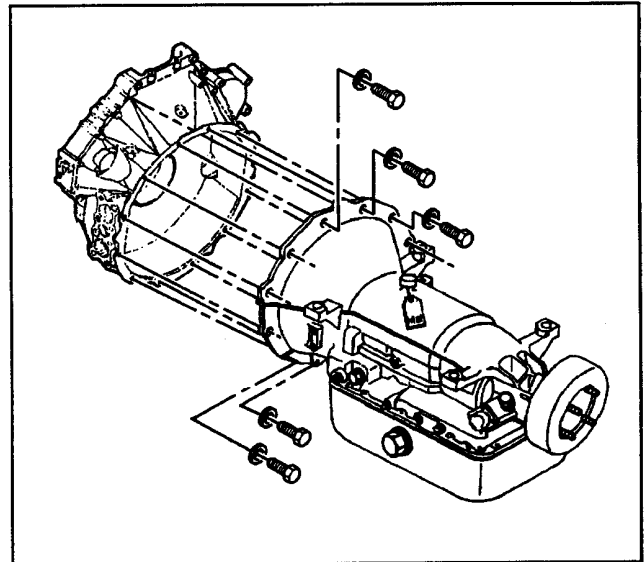
1. Install the park brake to the transmission. Refer to Park Brake Replacement in Park Brake.
2. Raise the vehicle.
3. Raise the transmission.
4. Move the transmission to the engine.
5. Install the transmission to engine.

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

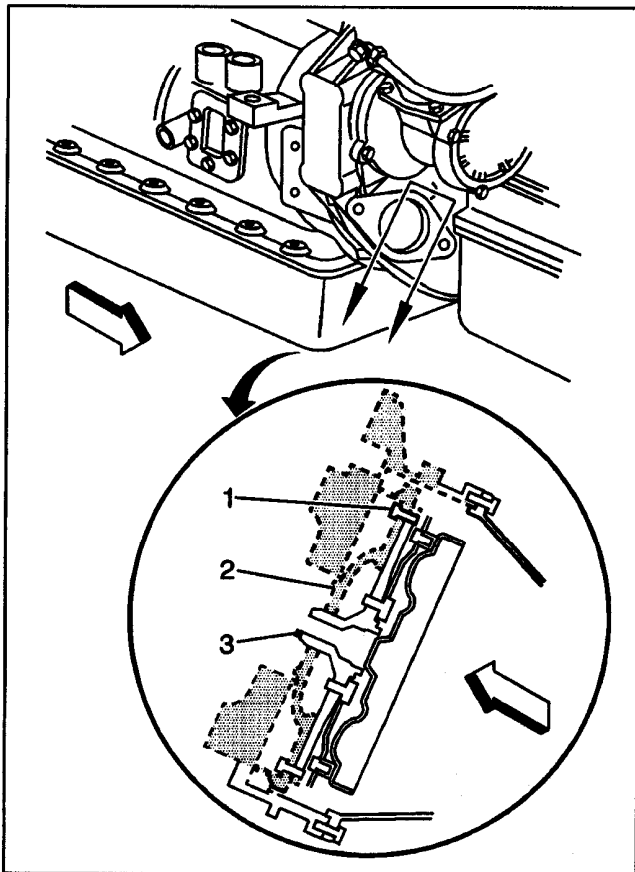
6. Install the transmission to engine bolts.

Tighten

Tighten the bolts to 55 N.m (41 lb ft).



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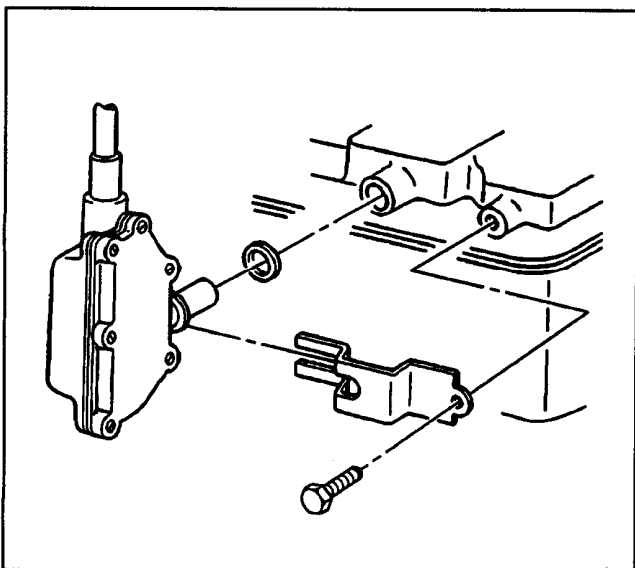
205282

7. Install the flywheel (2) to the flexplate (3).
 - 7.1. Using the alignment marks, align the flywheel (2) and the flexplate (3).
 - 7.2. Using a pry bar, turn the flexplate (3) in order to align the holes for the flexplate to flywheel bolts with the access hole.
 - 7.3. Install the flexplate to flywheel bolts (1) through the access hole.

Tighten

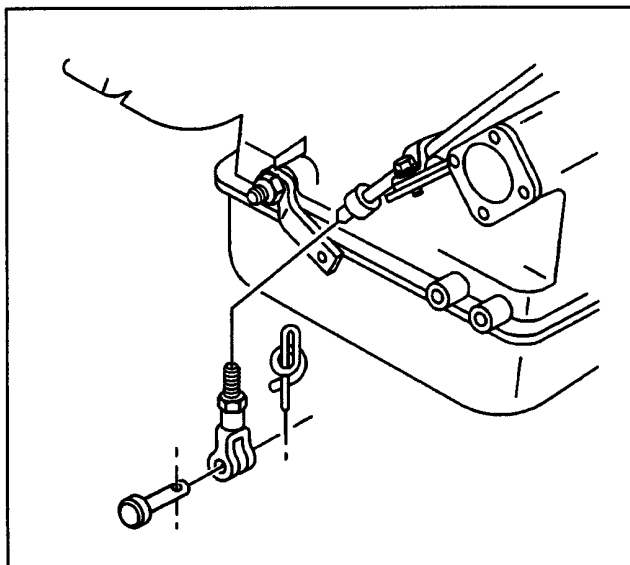
Tighten the bolts to 56 N.m (41 lb ft).

8. Install the flywheel housing access cover.
9. Connect the park brake cable. Refer to Park Brake Cable Replacement in Park Brake.
10. Connect the propeller shaft to the transmission. Refer to the appropriate procedure:
 - One-piece propeller shafts:
 - 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. Install the starter. Refer to Starter Motor Replacement in Engine Electrical.
12. Connect the wiring harness connectors to the transmission.
13. Install the modulator to the transmission. Refer to Transmission Modulator Replacement.



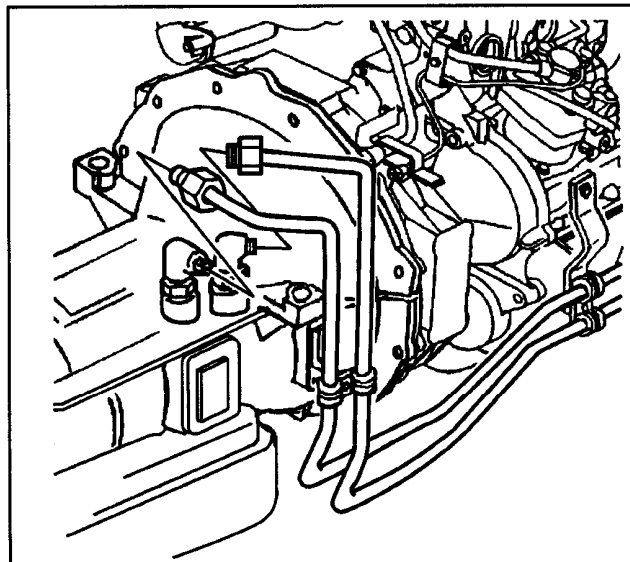
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14. Connect the shift cable to the transmission.
Refer to *Shift Cable Replacement*.



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15. Connect the oil cooler lines to the transmission case. Refer to *Transmission Oil Cooler Line Replacement*.
16. Install the transmission oil level indicator tube. Refer to *Transmission Oil Level Indicator Tube Replacement*.
17. Connect the exhaust pipes. Refer to *Exhaust Pipe Replacement in Engine Exhaust*.
18. Connect the negative battery cable.
19. Check the transmission oil. Add transmission oil, if necessary. Refer to *Transmission Oil Checking Procedure*.



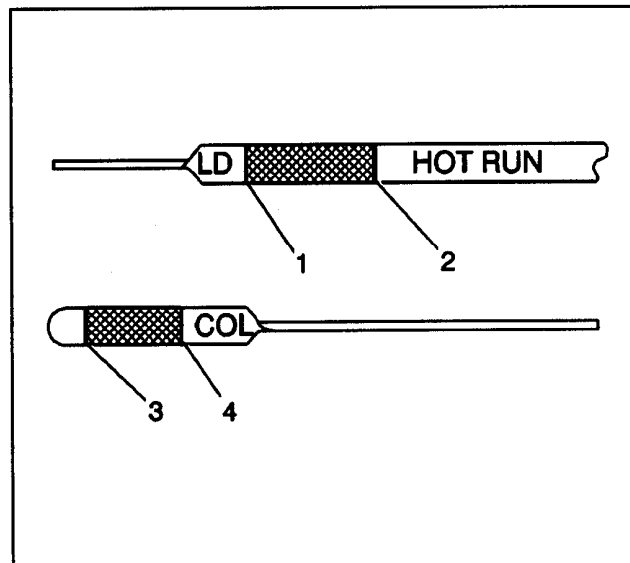
205259

Transmission Oil Checking Procedure

1. Start the engine.
2. Shift the transmission through all the ranges in order to fill the clutch cavities and oil passages.
3. Shift the transmission to neutral.
4. Idle the engine for at least 1 minute at 1,000–1,200 RPM in order to clear the system of air.
5. Make sure the parking brake is applied.

Notice: When adding oil or checking the oil level, dirt or foreign material must not be allowed to enter the fill tube. Before removing the oil level indicator, clean around the end of the fill tube. Contaminated transmission oil will cause rapid wear and early failure of internal parts.

6. Check the oil while the vehicle is on level ground.



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Cold Oil Check

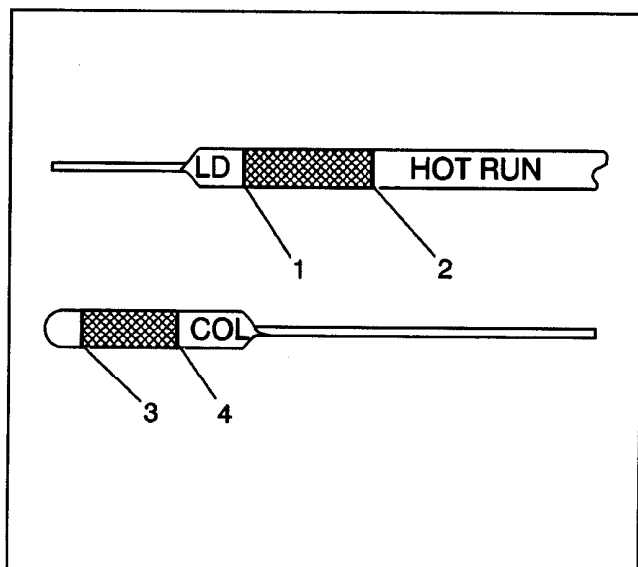
1. Idle the engine.
2. Make sure the oil temperature is at 16–49 °C (60–120 °F).
3. Remove the oil level indicator from the oil filler tube.
4. Check the oil level.
 - If the oil level registers between the COLD ADD (4) and the COLD FULL (3) bands, the transmission may be safely operated.

Important: Do not overfill the transmission with oil. Refer to *Transmission Oil Checking Procedure*.

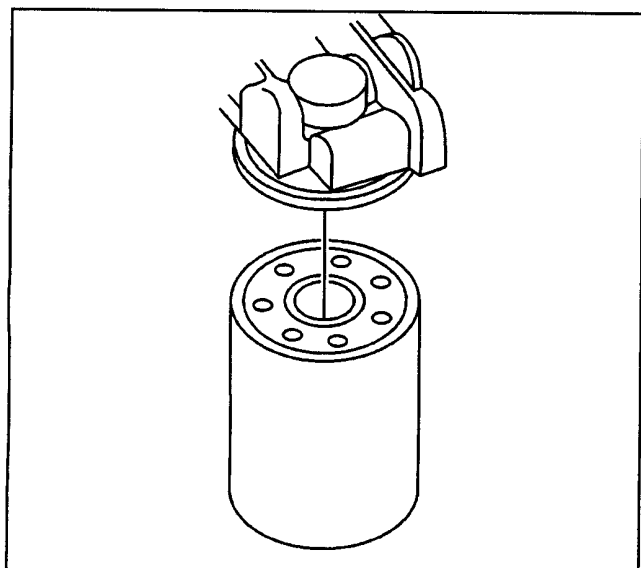
- If the level registers at or below the COLD ADD (4) band, add oil in order to bring the oil level to the COLD FULL (3) band. Refer to Adjusting The Oil Level.
5. Make a hot oil check after the transmission reaches the operating temperature.

Hot Oil Check

1. Idle the engine.
 2. Make sure the oil sump temperature is at 38–49 °C (100–120 °F).
 3. Remove the oil level indicator from the oil filler tube.
 4. Check the oil level.
 - If the oil level registers between the HOT ADD (1) and the HOT FULL (2) bands, the transmission may be safely operated.
- Important:** Do not overfill the transmission with oil. Refer to *Fluid Capacity Specifications*.
- If the level registers at or below the HOT ADD (1) band, add oil in order to bring the oil level to the HOT FULL (2) band. Refer to Adjusting The Oil Level.



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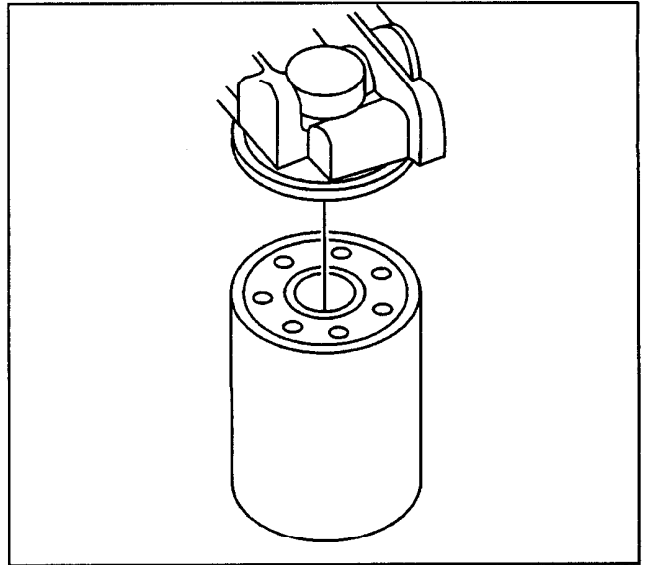
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External Transmission Oil Filter Replacement**Removal Procedure**

1. Locate the external oil filter connected in-line of the transmission oil cooler. The filter is mounted on the right frame rail.
2. Place a container under the oil filter in order to catch any draining oil.
3. Remove the filter from the oil filter cover.

Installation Procedure

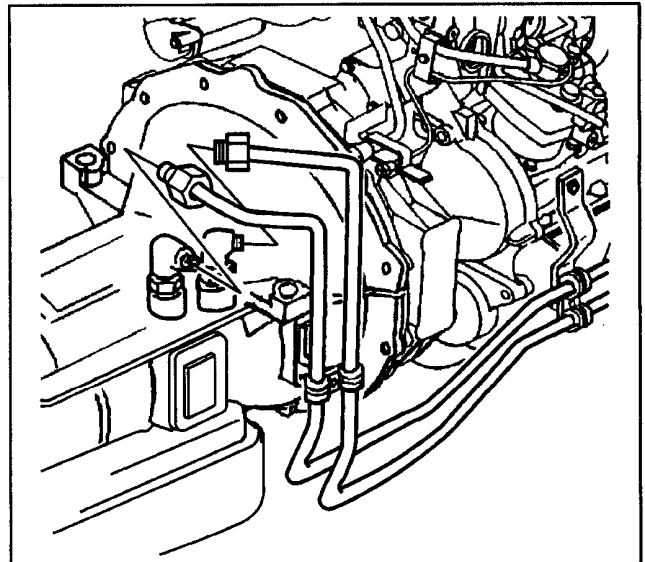
1. Apply a light coat of transmission oil to the filter seal.
2. Install the filter to the oil filter cover.
3. Hand tighten the filter to the oil filter cover.



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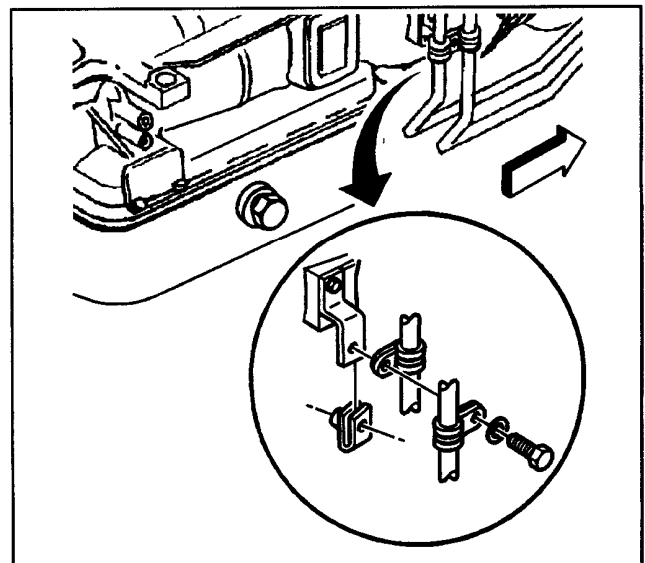
Transmission Oil Cooler Line Replacement**Removal Procedure**

1. Remove the two nuts securing the two oil cooler lines to the transmission oil cooler line connectors.

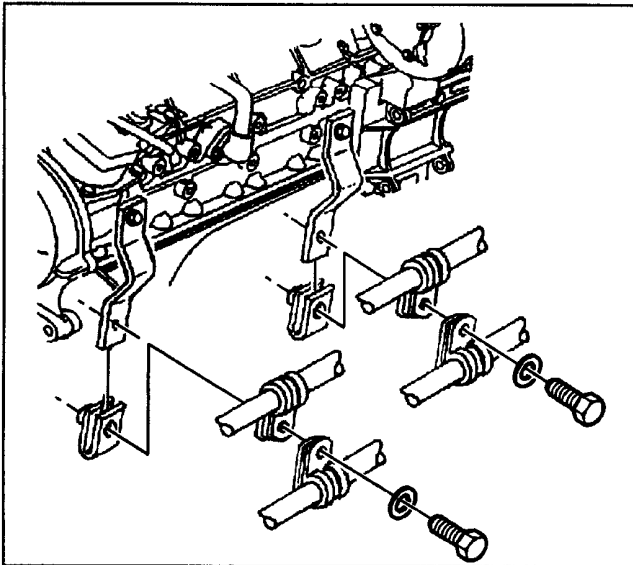


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2. Remove the bolt, the washer, and the nut securing the oil cooler line to the transmission case bracket.

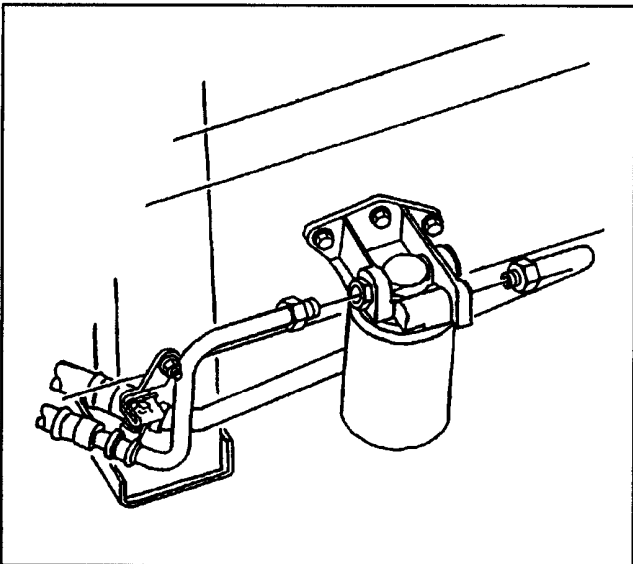


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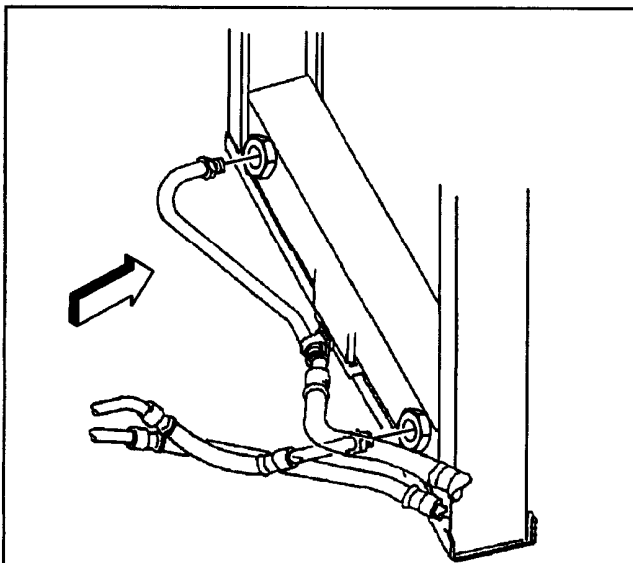
205265

3. Remove the two bolts, the washers, and the nuts securing the oil cooler lines to the engine block bracket.



205270

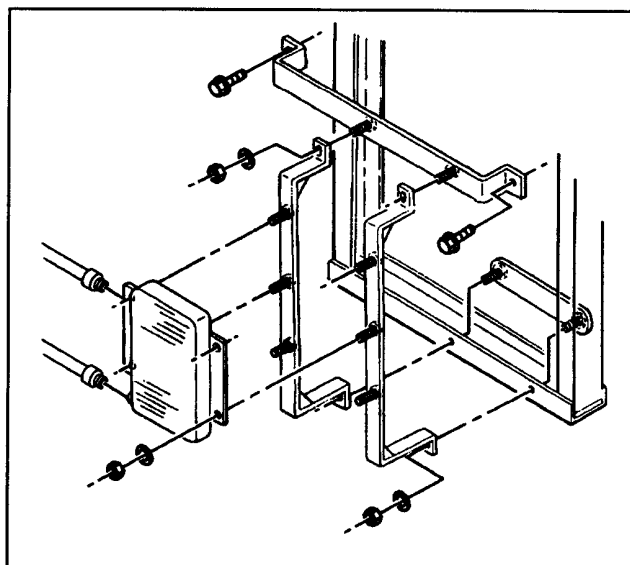
4. Remove the two nuts securing the two oil cooler lines to the transmission oil filter.



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5. Disconnect the two oil cooler lines from the radiator.

6. Disconnect the two oil cooler lines from the auxiliary oil cooler.
7. Remove the oil cooler lines from the vehicle.



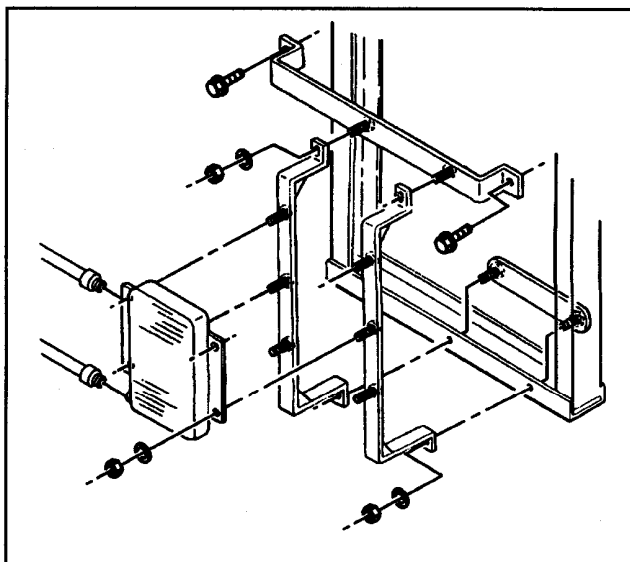
205278

Installation Procedure

1. Install the oil cooler lines to the vehicle.
Notice: Refer to *Fastener Notice* in Cautions and Notices.
2. Connect the two oil cooler lines to the auxiliary oil cooler.

Tighten

Tighten the oil cooler lines to 30 N.m (22 lb ft).

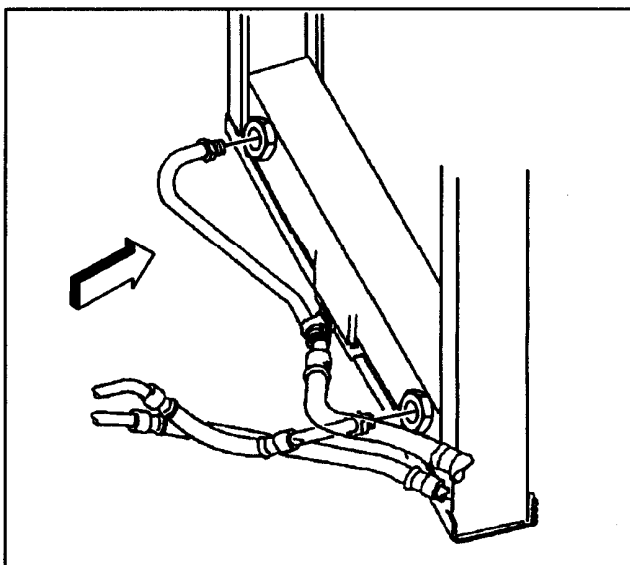


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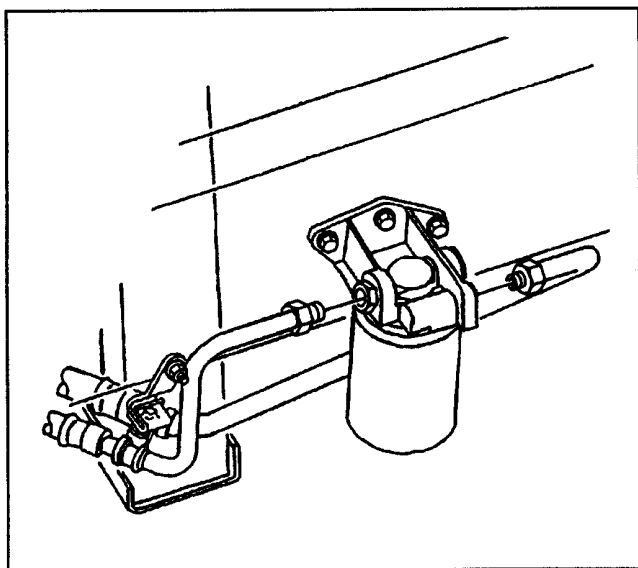
3. Install the two oil cooler lines to the radiator.

Tighten

Tighten the oil cooler lines to 30 N.m (22 lb ft).



205273

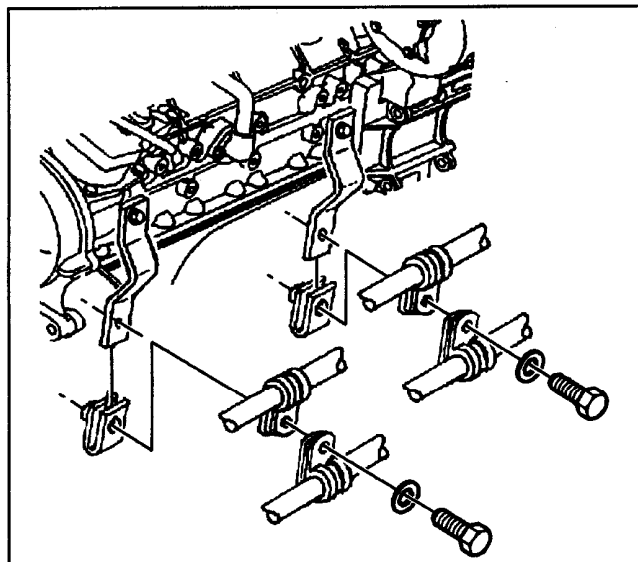


205270

4. Install the two nuts in order to secure the two oil cooler lines to the transmission oil filter.

Tighten

Tighten the nuts to 30 N.m (22 lb ft).

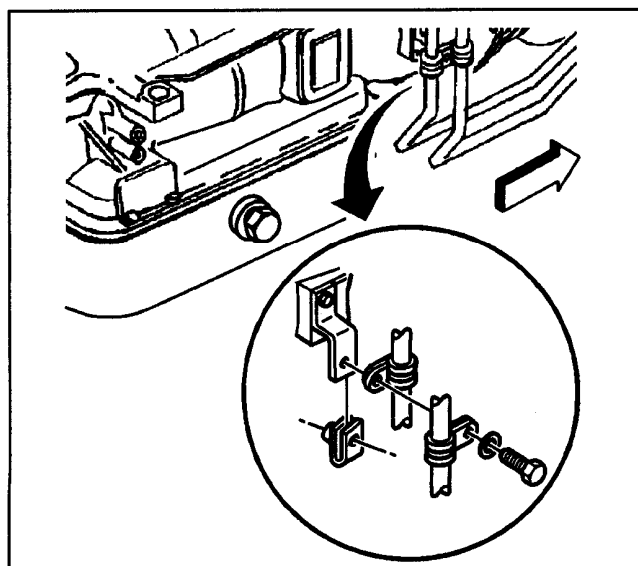


205265

5. Install the two bolts, the washers, and the nuts in order to secure the oil cooler lines to the engine block bracket.

Tighten

Tighten the nuts to 30 N.m (22 lb ft).



205262

6. Install the bolt, the washer, and the nut in order to secure the oil cooler line to the transmission case bracket.

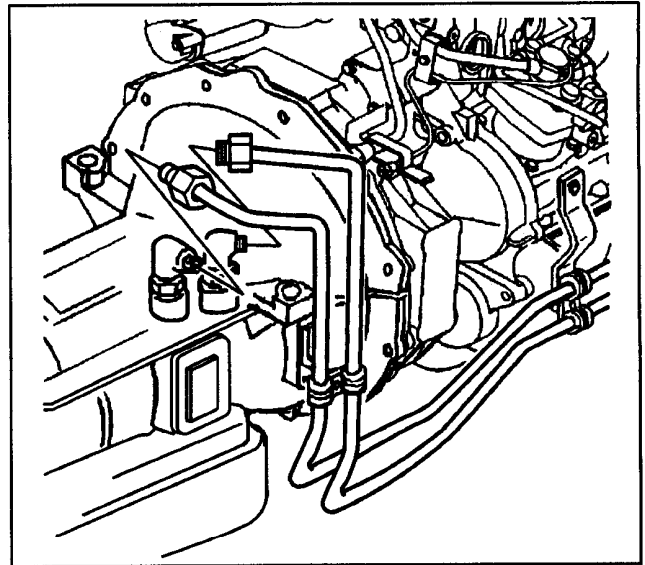
Tighten

Tighten the bolt to 30 N.m (22 lb ft).

7. Install the two nuts in order to secure the two cooler lines to the transmission oil cooler line connectors.

Tighten

Tighten the nuts to 25 N·m (18 lb ft).



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Flushing the Transmission Oil Cooler and Lines

Flush the oil cooler lines following a breakdown of the transmission in order to eliminate contaminated oil. This helps prevent trouble after repairs of the transmission.

1. Disconnect the oil cooler lines at the transmission case.
2. If an auxiliary filter has been installed, disconnect the oil cooler return line at the auxiliary filter instead of the transmission.
Notice: Do not exceed 689 kPa (100 psi) air pressure or damage may result to the oil cooler.
3. Back flush the oil cooler and lines using clean mineral spirits and compressed air.
4. Flush all remaining mineral spirits from the oil cooler and lines using compressed air.
5. Flush the oil cooler lines again with transmission oil.
 - 5.1. Test the oil cooler for free flow of oil.
 - 5.2. If the flow of oil is restricted, replace the tank and cooler assembly.
 - 5.3. If debris from the oil cooler circuit persists, install a new auxiliary filter in the oil return line between the oil cooler and the transmission.

Description and Operation

Transmission Description and Operation

The Allison AT 545 automatic transmission includes a hydraulic torque converter, a planetary gear train, and a hydraulic control system. The control system automatically changes gears. The control system provides pressure in order to apply the clutches. With the transmission in the drive range, the torque converter multiplies the engine torque in order to start the movement of the vehicle. The converter also acts as a hydraulic cushion between the engine and the transmission. The clutches and the gear sets provide multiple speeds forward and one speed reverse.

Automatic up shifting and down shifting depends on the vehicle load, the speed, and the foot pressure on the accelerator. When the pedal is fully depressed, the automatic up shifting occurs near the governed engine speed. A partially depressed accelerator pedal causes up shifts to occur at a lower engine speed.

The automatic transmission shift control consists of three components: a range selector mounted in the cab, a shift control lever which is part of the transmission, and an adjustable cable that connects the range selector and the shift control lever.

This section details the service procedures for supporting vehicles for the Allison Automatic Transmission AT 545. Allison Transmission also provides a publication for the testing, servicing, overhaul, and troubleshooting diagnosis of the AT 545 transmission. The name of the publication is the Allison AT 500 and AT 1500 Series Transmission Service Manual SA 1241.

Obtain a copy of the Allison AT 500 and AT 1500 Series Transmission Service Manual SA 1241 from any local Allison distributor or dealer. Order the Service Manual SA 1241 and Allison automatically sends the latest printing of that service manual.

Contact the local Allison distributor for additional information and guidance on overhaul procedures and services.

Overhaul Information

For the overhaul and the internal parts inspection of the AT 545 automatic transmissions, refer to the Allison AT 500 and AT 1500 Series Service Manual SA 1241 and the Allison AT 545 Inspection Analysis Technicians Guide SA 1948.