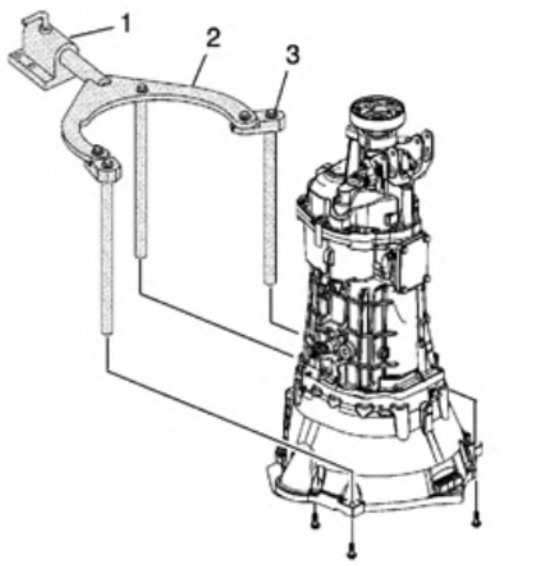
Transmission Disassemble

Special Tools

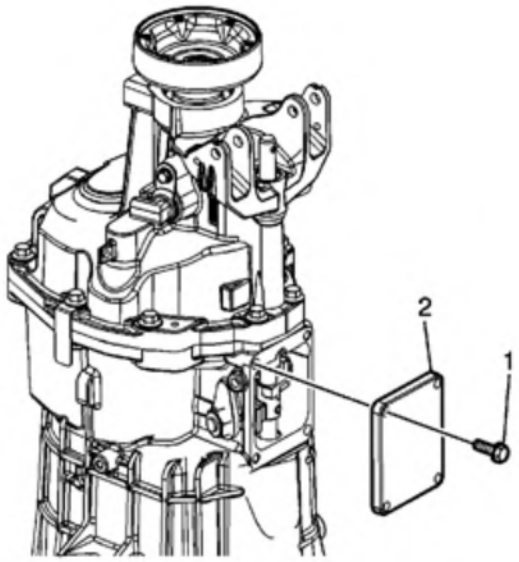
- *DT 47678* Transmission Holding Flange
- *DT 47678-10* Transmission Holding Flange Adapter
- *DT 49139* Hub Remover Tool
- *DT 49293* Gear Select/Skip Shift Solenoid Socket
- *J 6125-1B* Slider Hammer
- *J 8433* Universal Bridge Puller
- *J 08614-A* Pinion Flange Holder and Remover
- *J 08614-20* Forcing Screw
- *J 3289-20* Holding Fixture
- *J 22888-20A* Puller
- *J 23907* Slide Hammer
- *J 36017* Valve Seal Remover
- *J 39431* 5th/6th Driven Gear Puller
- *J 39431-3* 5th Gear Puller Adapter Bolts
- *J 44873-3* Mounting Bolts

For equivalent regional tools, refer to Special Tools.

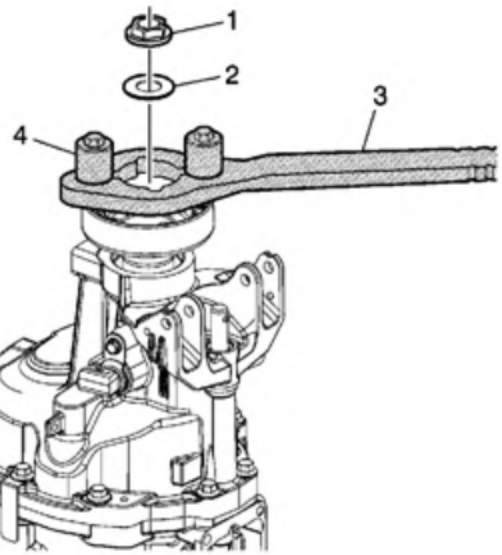
Extension Housing Removal



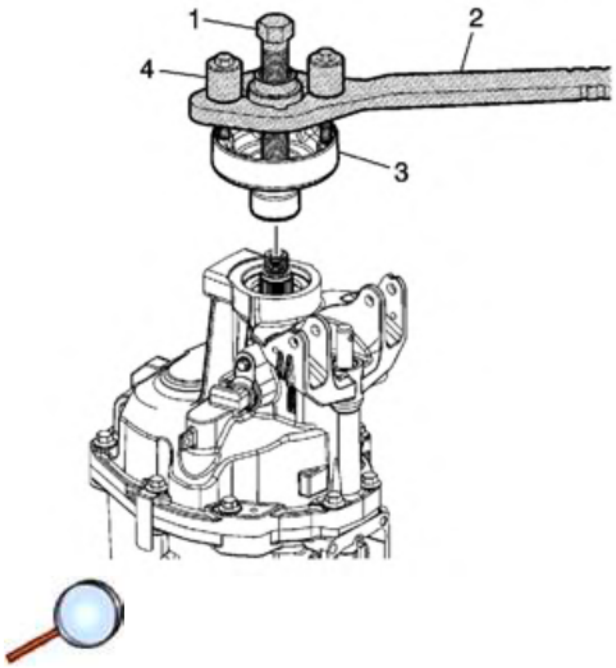
1. Install the *DT 47678* flange (2) and the *DT 47678-10* flange adapter (3).
2. Mount the transmission on a workbench using the *J 3289-20* holding fixture (1).
3. Rotate the transmission into a horizontal position.
4. Remove the transmission drain plug and drain the transmission fluid.
5. Shift the transmission into NEUTRAL (N).



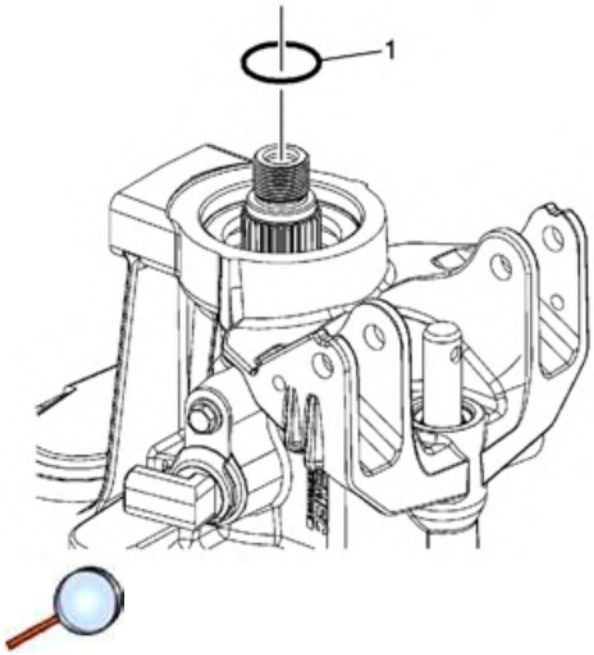
6. Remove the shifter cover plate bolts.
7. Remove the shifter cover plate.



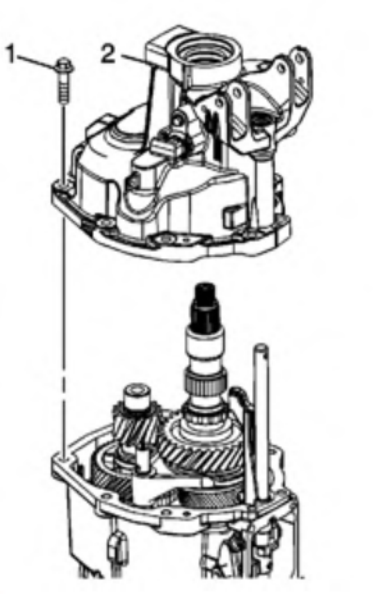
8. Install the *J 08614-A* holder (3) with the *J 08614-20* mounting bolts (4) to the propshaft transmission yoke.
9. Using a socket wrench, remove the propshaft transmission yoke nut (1).
10. Remove the propshaft transmission yoke washer (2).



11. Using *J 08614-A* holder (2), *J 08614-20* mounting bolts (4), and *J 08614-A* forcing screw (1), remove the propshaft transmission yoke (3).

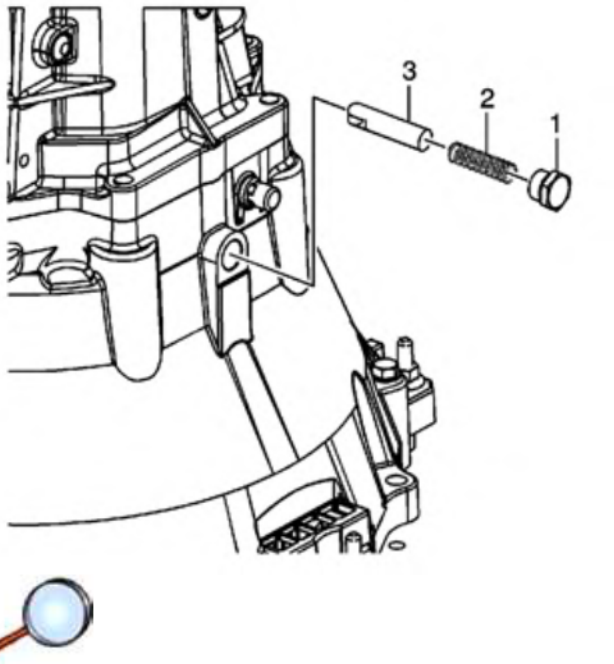


12. Remove the O-ring (1) from propshaft or propshaft transmission yoke.

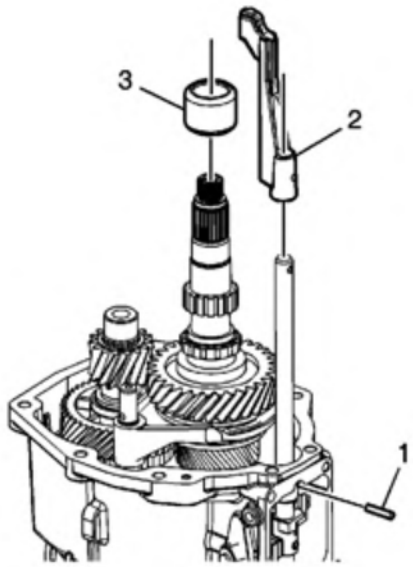


13. Remove the rear extension housing bolts and the rear extension housing.

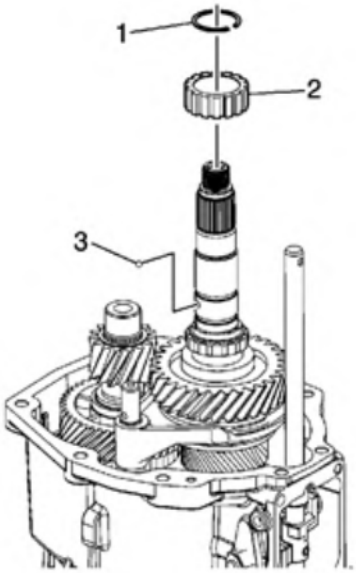
Reverse Speed Gear Removal



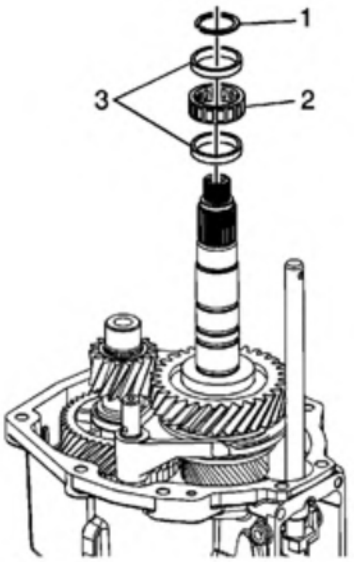
1. Remove the plug (1), spring (2), and shift detent roller (3).



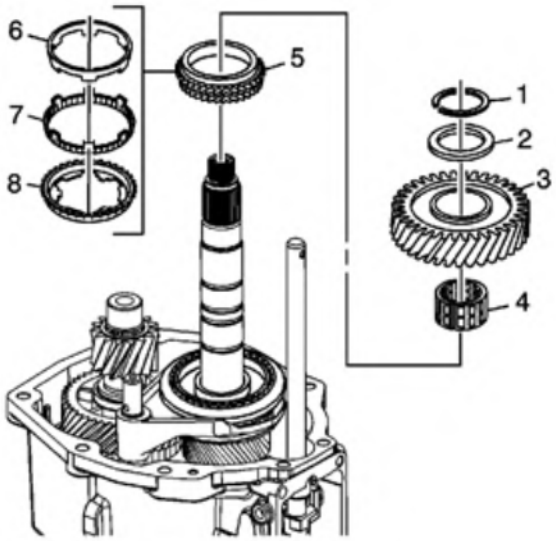
2. Remove the shift guide rollpin (1).
3. Remove the shift shaft extension (2).
4. Remove the extension housing main shaft bearing race (3).



5. Remove the following parts in order:
   - The snap ring (1)
   - The speed sensor rotor (2)
   - The locking ball (3)

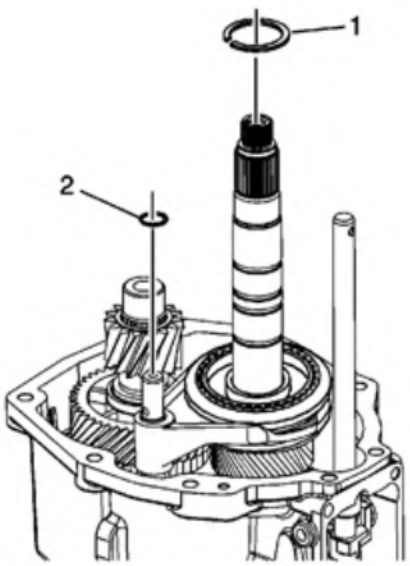


6. Remove the rear bearing retainer ring (1).
7. Remove the spacer (3).
8. Remove the mainshaft rear roller bearing (2).
9. Remove the spacer (3).

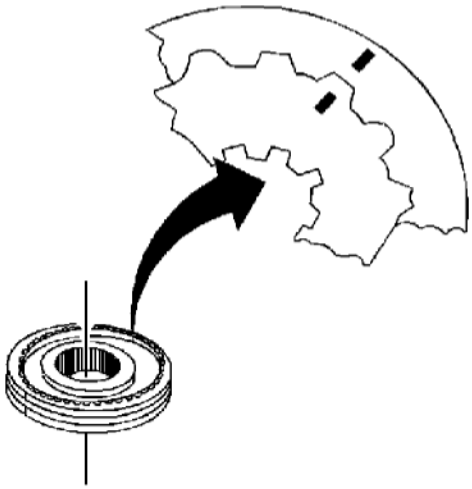


10. Remove the retainer ring (1).
11. Remove the reverse gear thrust washer (2).
12. Remove the reverse gear (3).
13. Remove the reverse gear caged needle bearing (4).
14. Remove the reverse gear blocking ring assembly (5), which includes the following components:
    - 14.1. Reverse drive gear inner cone (6)
    - 14.2. Reverse drive gear outer cone (7)
    - 14.3. Reverse gear blocking ring (8)

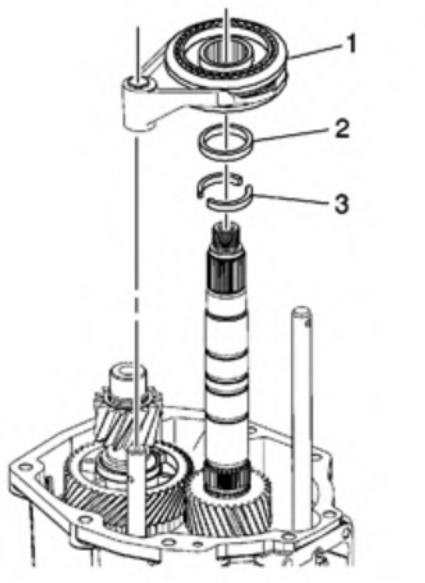
Reverse Shift Fork Removal



1. Remove the reverse synchronizer retainer ring.
2. Remove and discard the reverse shift fork retainer ring.

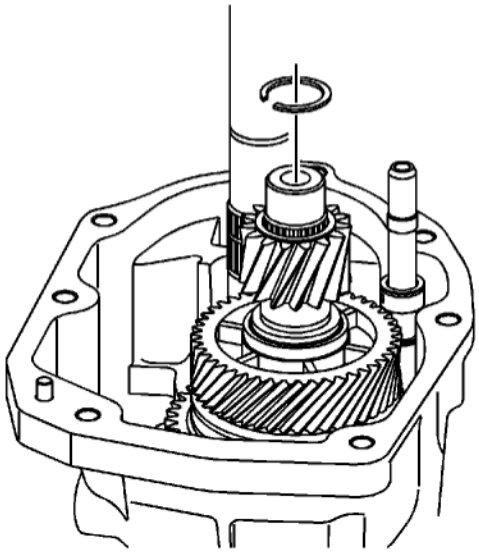


3. Scribe a mark on the synchronizer hub and on the sleeve. This will help you to reinstall the parts in the same position.

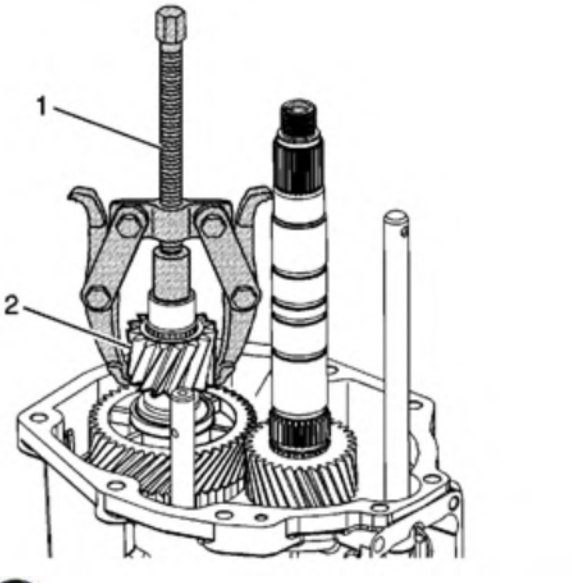


4. Remove the reverse synchronizer sleeve and shift fork (1) and inserts (2).
5. Pry to remove the reverse synchronizer hub (3).
6. Remove the locking ring (4).
7. Remove the two piece thrust washer (5).

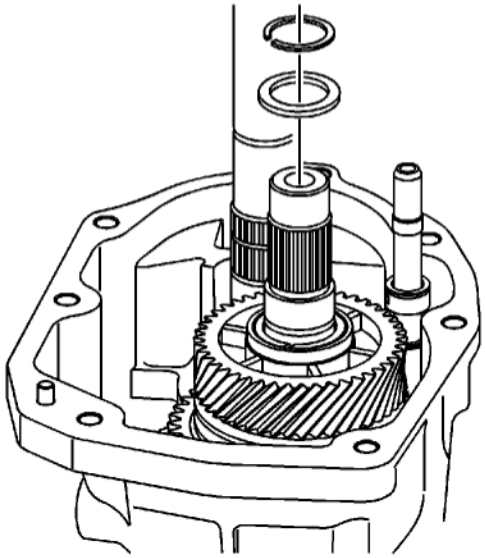
Countershaft Gear Removal



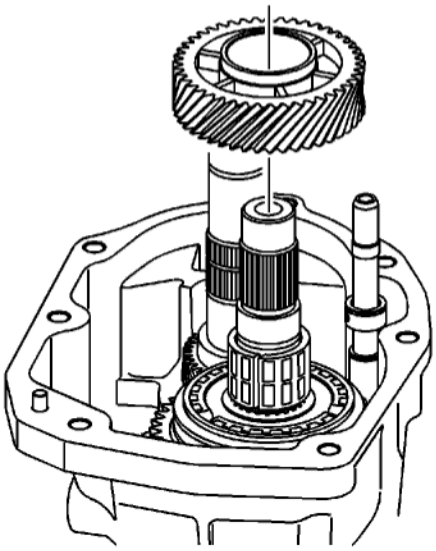
1. Remove the counter shaft retainer ring.



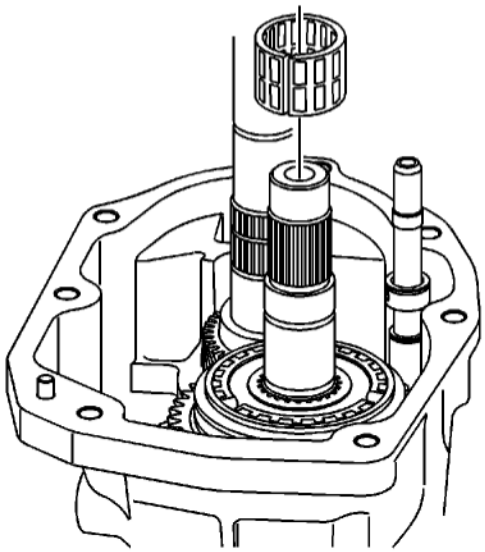
2. Remove the countershaft gear using *J 22888-20A* puller .



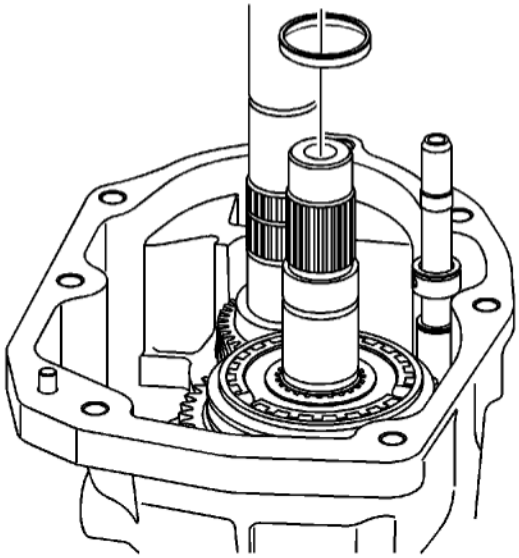
3. Remove the countershaft retainer and spacer.



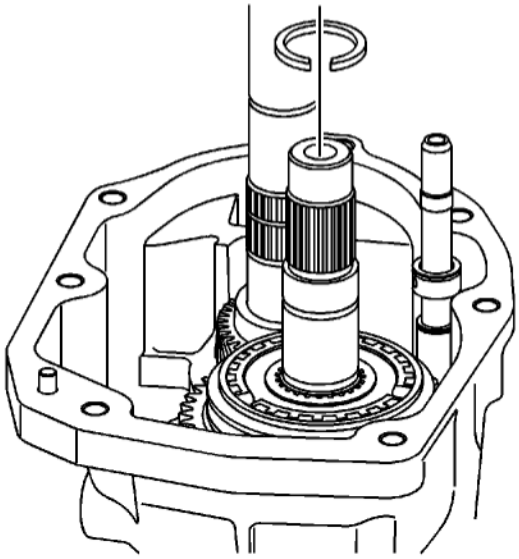
4. Remove the gear from the countershaft.



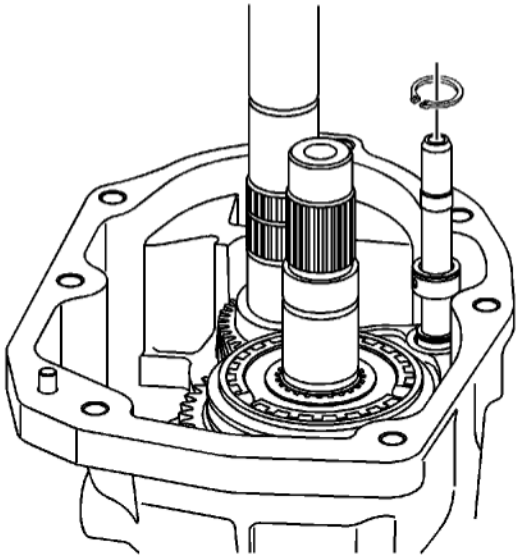
5. Remove the needle bearing from the countershaft.



6. Remove the spacer from the countershaft.

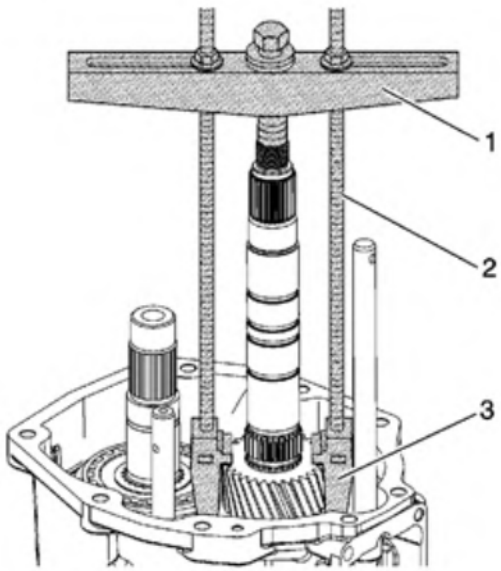


7. Remove the retainer clip from the countershaft.

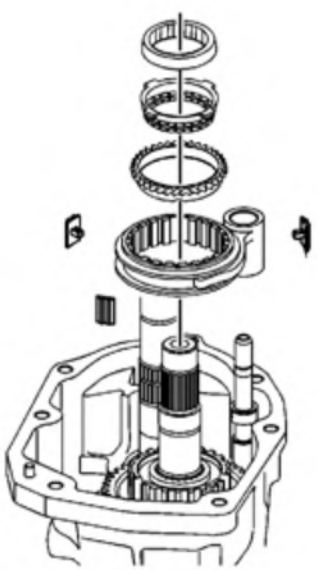


8. Remove the 5th/6th speed shift fork retainer ring.

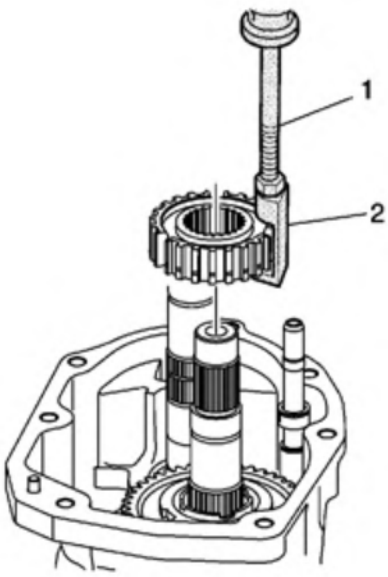
5th / 6th Speed Driven Gear Removal



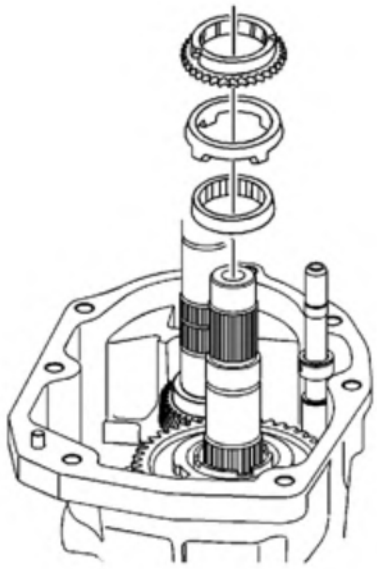
1. Using the *J 8433* puller (1), *J 39431* gear remover (3), and the *J 39431-3* adapter bolts (2), remove the 5th/6th speed driven gear.



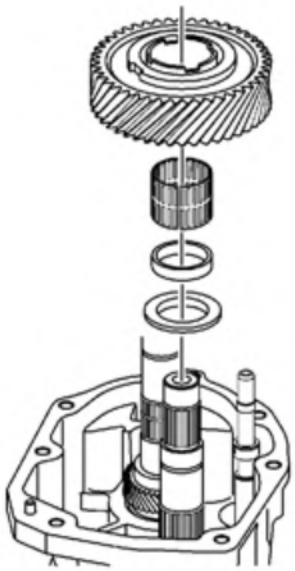
2. Remove the following components:
   2.1. The 5th/6th shift fork
   2.2. The synchronizer sleeve
   2.3. The synchronizer inserts
   2.4. The speed drive gear synchronizer blocking ring
   2.5. The speed drive gear friction cone
   2.6. The speed drive gear inner cone



3. Install the *DT 49139* remover (2) between the synchronizer hub assembly and synchronizer blocking ring.
4. Remove the synchronizer hub assembly with *J 6125-1B* slide hammer (1).

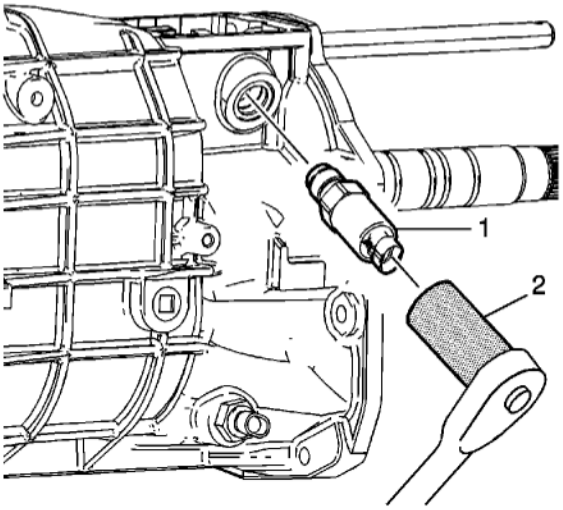


5. Remove the following components:
   5.1. The speed drive gear synchronizer blocking ring
   5.2. The speed drive gear friction cone
   5.3. The speed drive gear inner cone

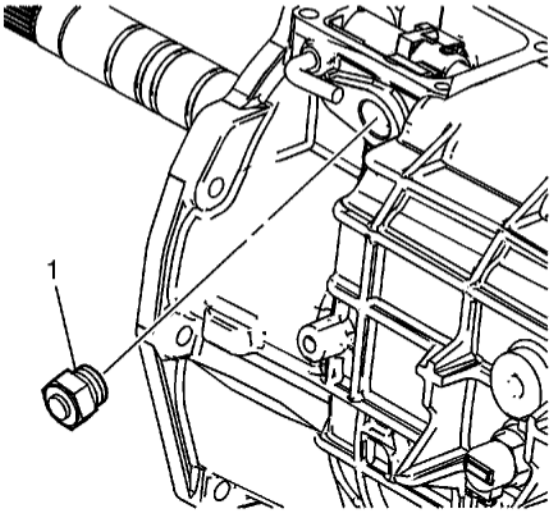


6. Remove the 6th driven gear, caged needle bearing, and 2 spacers.

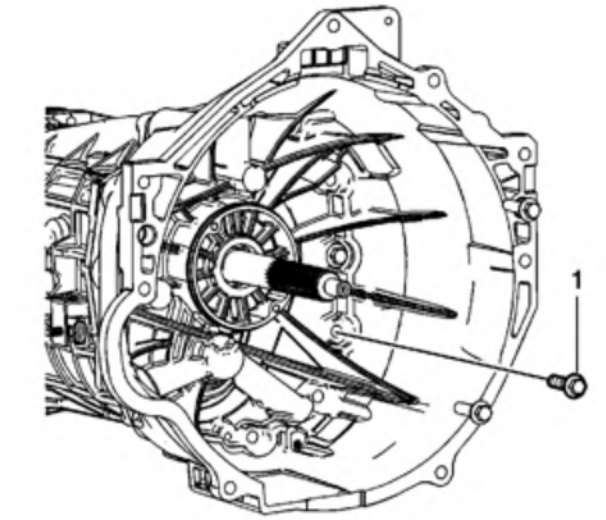
Transmission Case Removal



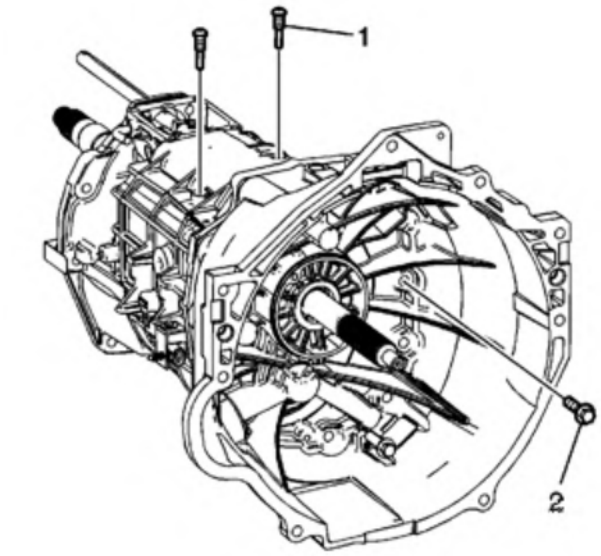
1. Remove the gear select/skip shift solenoid (1) using *DT 49293* socket (2).



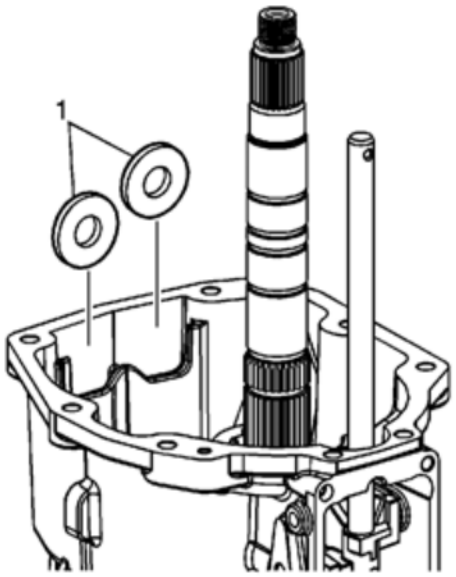
2. Remove the shift detent assembly (1).



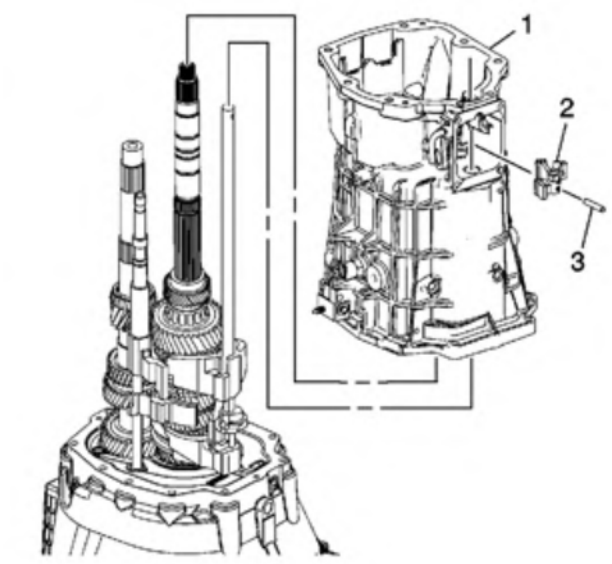
3. Remove 9 of the 11 clutch housing to transmission case bolts (1).
4. Rotate the transmission into the vertical position.



5. Remove the last 2 clutch housing to transmission case bolts (2).
6. Remove the shift lever guide bolts (1).

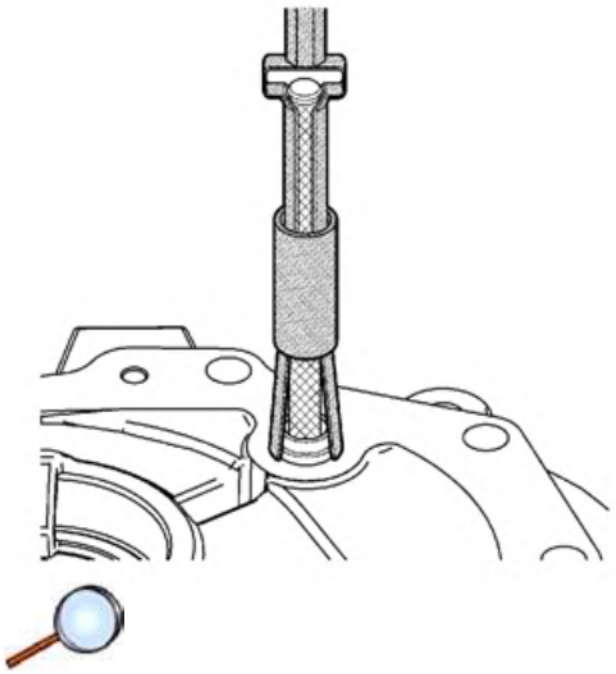


7. Remove the magnets (1) from the transmission case.



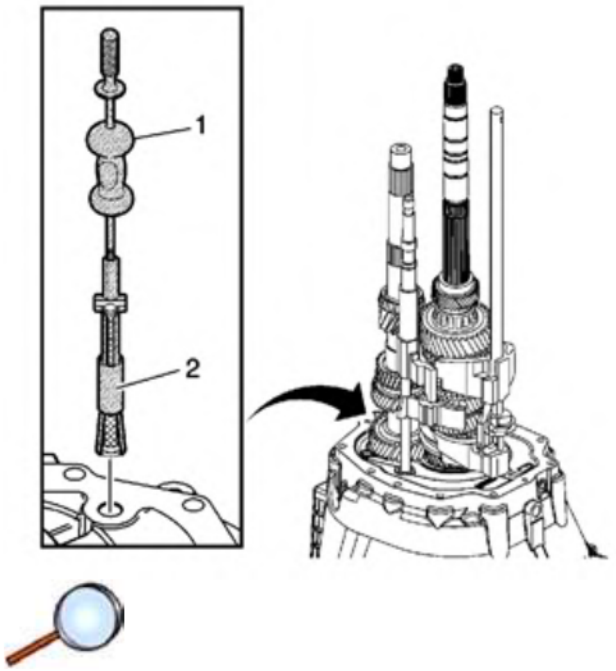
8. Remove the transmission case (1) and the select control lever assembly (2) together as follows:
   8.1. Remove the select control lever assembly pin.
   8.2. Slide the transmission case up and off of the gear clusters and the shift shaft components.
   8.3. Hold the select control lever assembly against the guide plate in order to prevent the release of the detent ball and the spring.
   8.4. Remove the select control lever assembly from the transmission case.

Oil Filter Removal



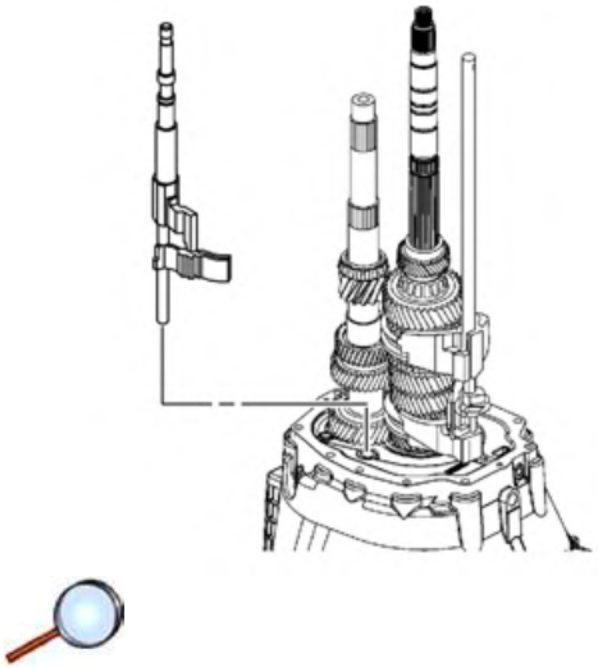
Note: Remove the oil filter before removing the shift shaft assemblies and gear clusters.

1. Attach *J 36017* tool over oil filter. Ensure that the tool grasps the oil filter where it contacts the adapter housing.
2. Slide the collar of *J 36017* tool down to secure the oil filter.

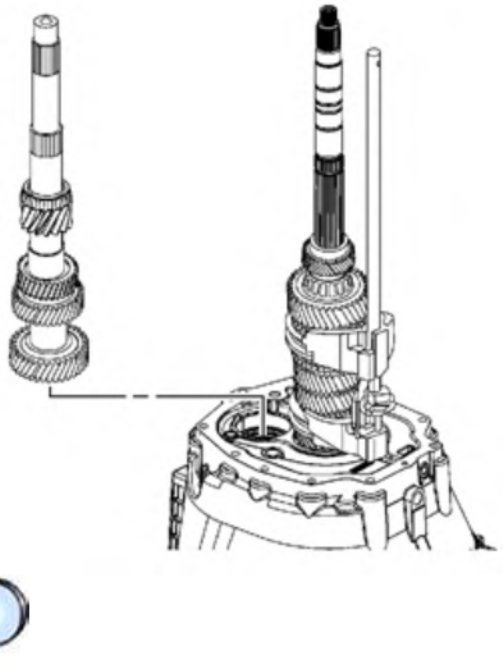


3. Using *J 23907* slide hammer (1) and *J 36017* remover (2), remove the oil filter.

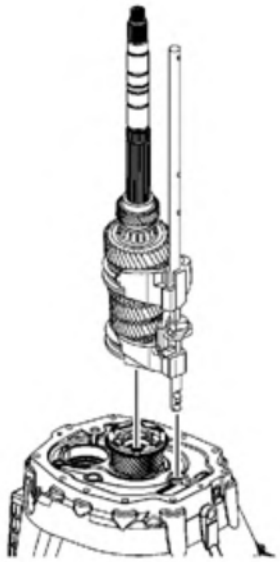
Shift Shaft Assemblies and Gear Cluster Removal



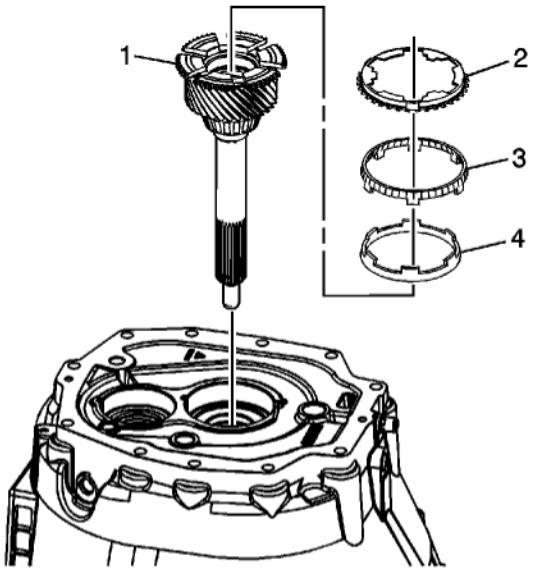
1. Rotate the 5th/6th and the reverse shift shaft levers off the shift interlock plate.
2. Remove the 5th/6th and the reverse shift shaft assembly.



3. Remove the countershaft. Lift up the mainshaft enough in order to remove the countershaft.



4. Remove the mainshaft and the shift shaft components as an assembly.
5. Remove the shift shaft assembly from the mainshaft.



6. Remove the 4th gear blocking ring assembly, which includes the following components:
   6.1. 4th speed drive gear blocking ring (2)
   6.2. 4th speed drive gear outer cone (3)
   6.3. 4th speed drive gear inner cone (4)
7. Remove the input shaft (1).

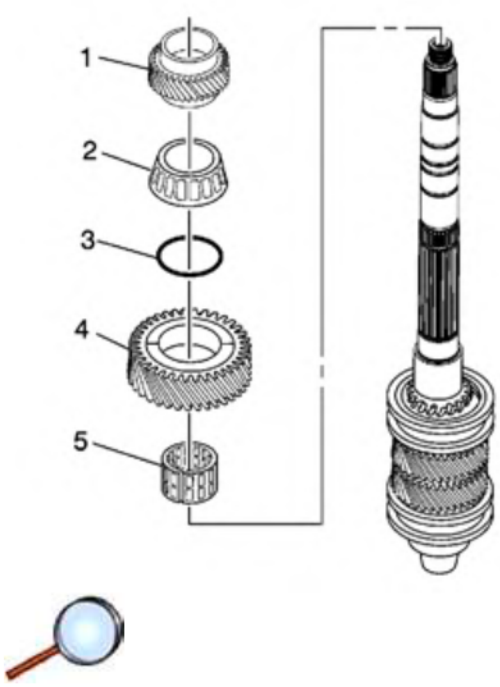
Main Shaft and Input Shaft Disassemble

Special Tools

- *J 22912-B* Rear Pinion and Axle Bearing Remover Split Plate
- *J 36513* Split Plate
- *J 39442* Press Adapter
- *J 39443* Split Plate
- *J 39473* Mainshaft Bearing Installer
- *J 39594* Bearing Race Remover
- *J 45124* Removal Bridge

For equivalent regional tools, refer to Special Tools.

Mainshaft

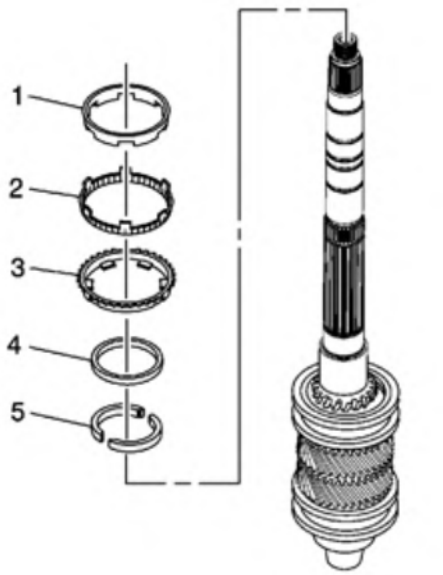


Note: Measure the 4th speed gear synchronizer wear gap before disassembling the mainshaft.

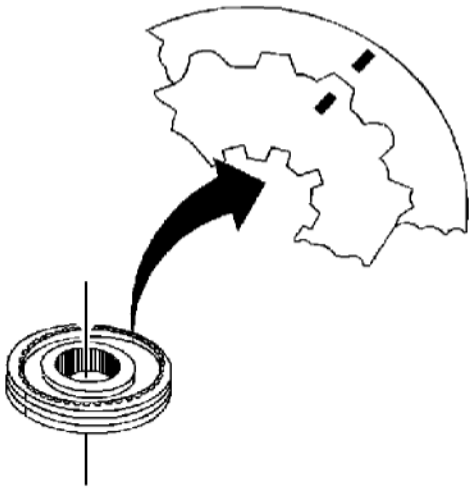
1. Install the input shaft in the clutch housing.
2. Install the mainshaft on the input shaft.
3. Using a feeler gage measure the gap between the 4th speed gear blocking ring and the 4th speed gear.
4. Replace the 4th speed gear friction cone and blocking ring when the gap is less than **1.27 mm (0.050 in)**.

Caution: Do not overtighten the J 36513 split plate past the gear teeth or damage to gear may occur.

5. Using the *J 36513* plate , close the split plate only enough to support the gear teeth, and the *J 39442* adapter , remove the following parts in order:
   5.1. If an O-ring is present on the mainshaft, remove and discard the O-ring (1). The O-ring was used for manufacturing purposes only.
   5.2. The 6th speed driven gear (2)
   5.3. The mainshaft large tapered bearing (3)
   5.4. The 1st speed gear (4)
   5.5. The 1st speed gear caged needle bearing (5)

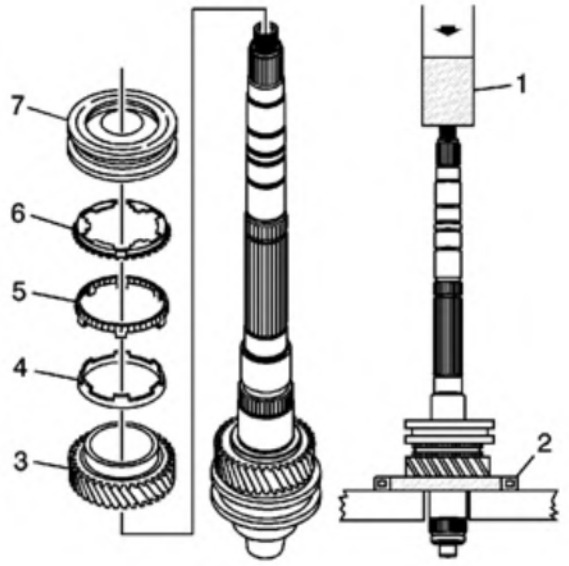


6. Remove the following parts in order:
   6.1. The 1st speed gear inner cone (1)
   6.2. The 1st speed gear outer cone (2)
   6.3. The 1st speed gear synchronizer blocking ring (3)
   6.4. The 1st speed gear locking ring (4)
   6.5. The 1st speed gear two piece washer (5)



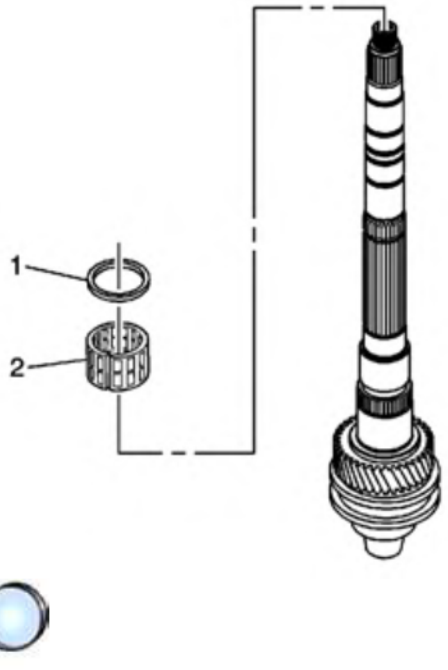
Note: The synchronizer hubs and sliding sleeves are a selected assembly. Keep these parts together as originally assembled.

7. Scribe a mark on the synchronizer hub and on the sleeve. This will help you to reinstall the parts in the same position.

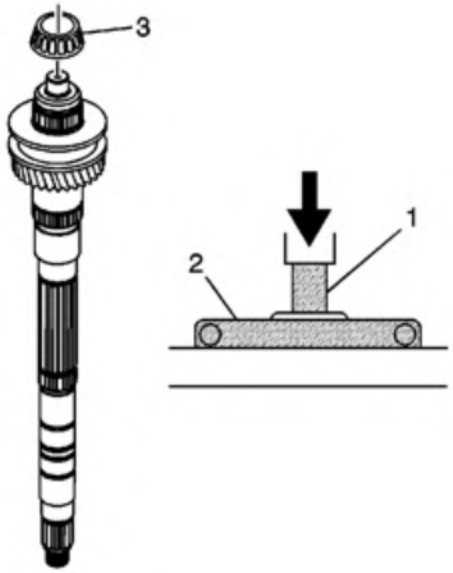


8. Use the *J 36513* plate (2) in an inverted position, *J 39442* adapter (1), and a hydraulic press to remove the following components:
   - The 2nd speed drive gear (3)
   - The 2nd speed gear inner cone (4) will press off with the 2nd speed gear
   - The 2nd speed gear outer cone (5)
   - The 2nd gear synchronizer blocking ring (6)

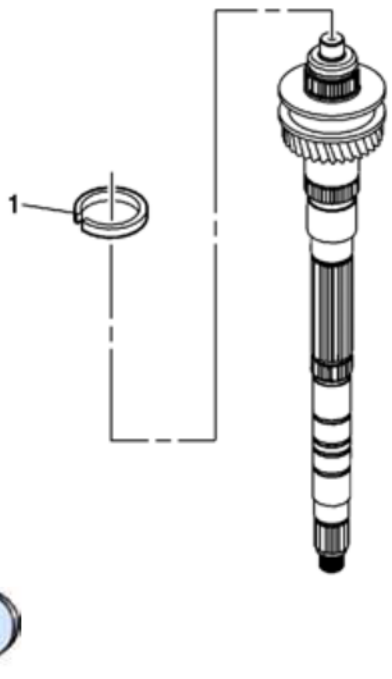
- 1st/2nd synchronizer hub (7)



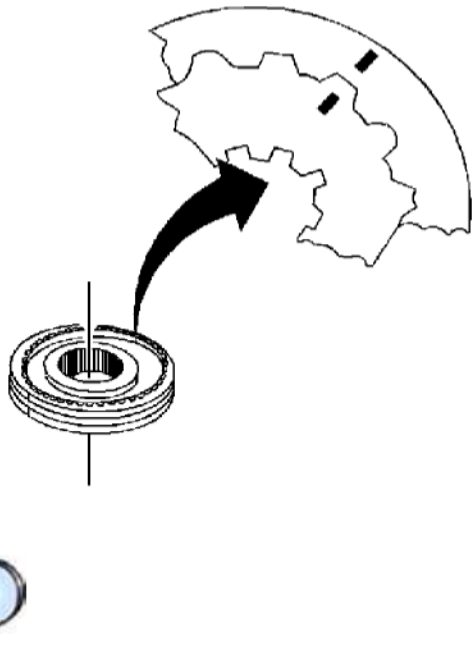
9. Remove the 2nd speed gear spacer and caged needle bearing.



10. Remove the mainshaft small tapered bearing (3). Use the *J 39442* adapter (1), the *J 39443* plate (2), and a hydraulic press.
11. Discard the small tapered bearing.

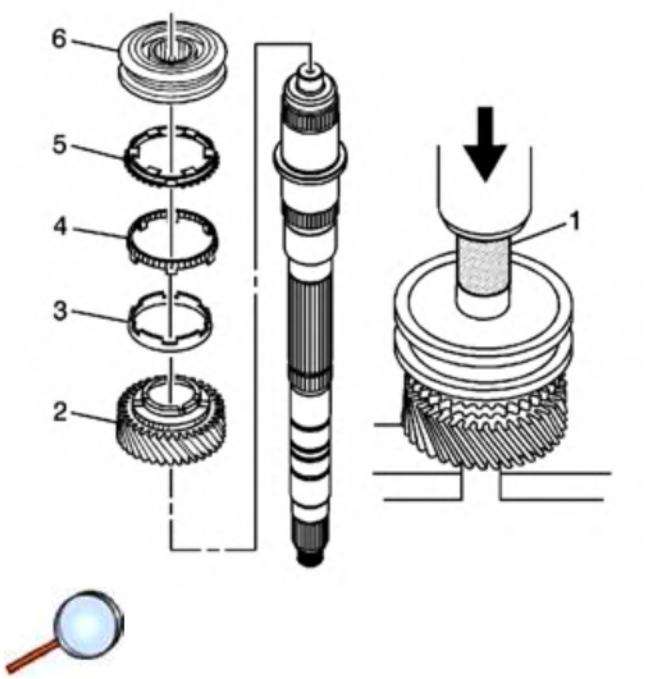


12. Remove the retainer (1).

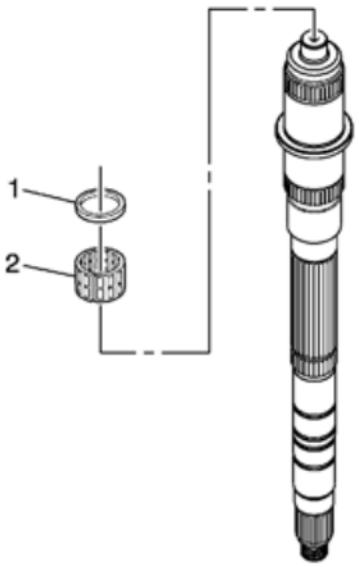


Note: The synchronizer hubs and sliding sleeves are a selected assembly. Keep these parts together as originally assembled.

13. Scribe a mark on the synchronizer hub and on the sleeve. This will help you to reinstall the parts in the same position.



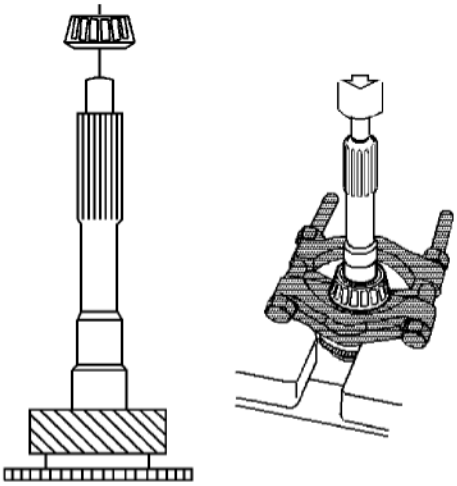
14. Use the *J 39473* installer (1), V-blocks, and a hydraulic press to remove the following components:
    - The 3rd/4th speed synchronizer assembly (6)
    - The 3rd speed gear blocking ring (5)
    - The 3rd speed gear outer cone (4)
    - The 3rd speed gear inner cone (3)
    - The 3rd speed gear (2)



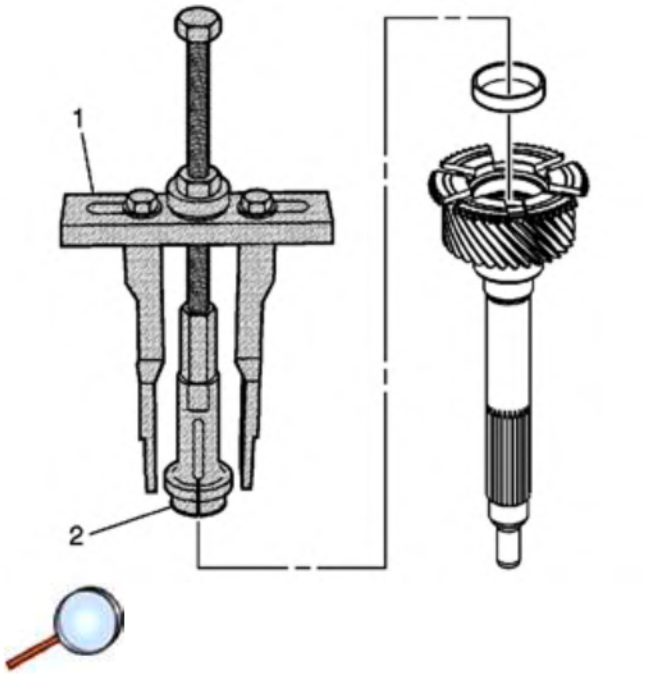
15. Remove the 3rd speed drive gear spacer.
16. Remove the 3rd speed gear caged needle bearing.

Input Shaft

Note: Do not replace the tapered bearing or the bearing race unless inspection shows that the bearing or the race are damaged.



1. Remove the tapered bearing from the input shaft, using the *J 22912-B* bearing remover and a hydraulic press.



2. Remove the bearing race from the input shaft, using the *J 45124* bridge (1) and the *J 39594* race remover (2).

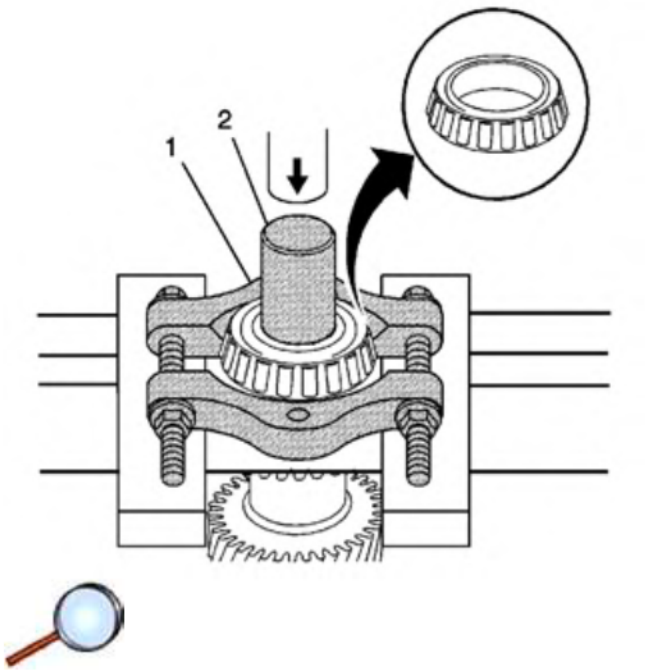
Counter Gear Shaft Disassemble

Special Tools

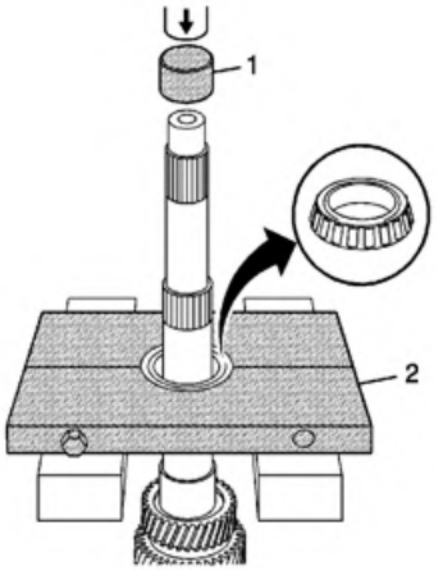
- *J 22912-B* Rear Pinion and Axle Bearing Remover
- *J 39473* Mainshaft Bearing Installer
- *J 39511* Split Plate
- *J 39547* Press Adapter

For equivalent regional tools, refer to Special Tools.

Note: Do not replace tapered bearings unless inspection shows bearing damage.



1. Remove the small tapered bearing, using the *J 22912-B* remover (1) with the *J 39473* installer (2) and a hydraulic press.
2. Discard the small tapered bearing.

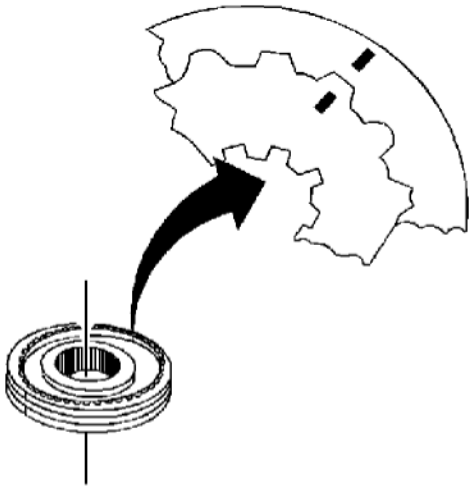


3. Remove the large tapered bearing, using the *J 39511* plate (2), the *J 39547* adapter (1) and a hydraulic press.
4. Discard the large tapered bearing.

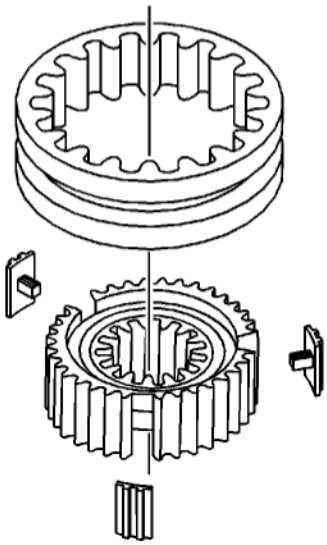
Synchronizers Disassemble

1st / 2nd, 3rd / 4th, 5th / 6th Synchronizers

Important: Synchronizer components are not interchangeable. Keep all the synchronizer components separate. The synchronizer hubs and the sliding sleeves are a selected assembly. Keep the hubs and the sliding sleeves together as originally assembled.

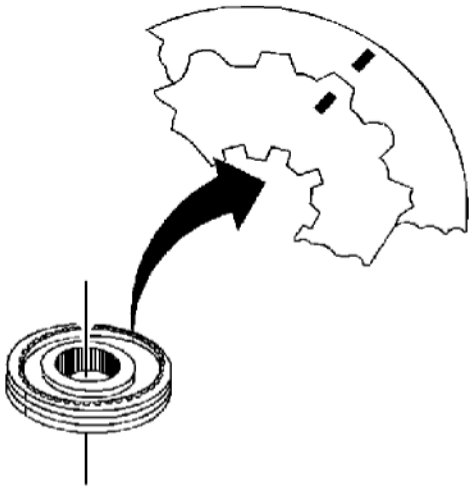


1. Scribe a mark on the synchronizer hub and on the sleeve. This will help you to reinstall the parts in the same position.

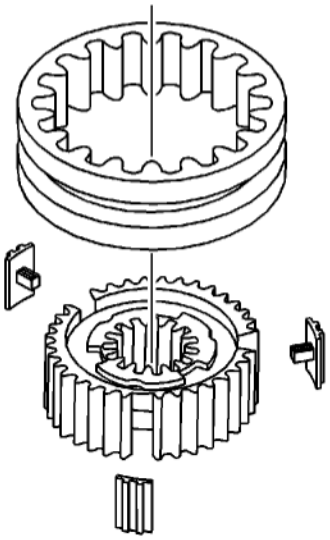


2. Remove the synchronizer inserts from the hub.

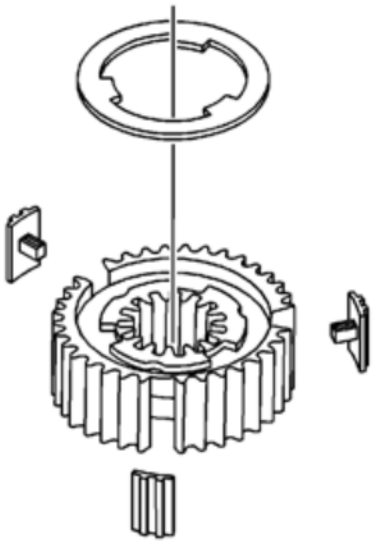
Reverse Synchronizer



1. Scribe a mark on the synchronizer hub and on the sleeve. This will help you to reinstall the parts in the same position.



2. Remove the synchronizer sleeve from the hub. Press against the inner hub.
3. Turn the hub over. The inserts will slide out from the hub.



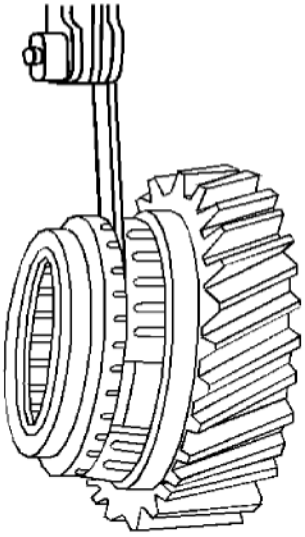


4. Using a small-blade screwdriver, remove the synchronizer key retainer, and discard.

Synchronizers Cleaning and Inspection

1. Clean all the synchronizer parts in a suitable solvent. Air dry all the synchronizer parts.
2. Inspect the synchronizer parts for the following conditions:
   - Burrs
   - Cracks
   - Chamfer for excessive wear
   - Free movement of the clutching sleeves on their hubs
   - Worn or damaged clutch teeth
   - Distorted springs
3. Replace synchronizer parts that are worn or damaged.

   Replace a burred or nicked part that cannot be reconditioned by hand. Use a soft stone or a crocus cloth.





4. Measure the gap between the vertical faces of the blocking ring teeth and the speed gear as follows:
   4.1. Assemble the correct blocking ring with the correct speed gear.
   4.2. The blocking ring must be fully seated on the gear.
   4.3. Use a feeler gauge to measure the forward gear gap.
   4.4. Use a feeler gauge to measure the reverse gear gap.

   Measure the gap without the wave washer in between the blocking ring and the reverse gear.

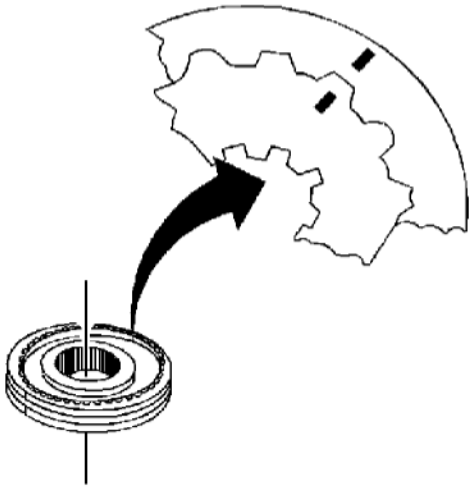
   The nominal gap is 1.27-2.16 mm (0.050-0.085 in) for the 1st and 2nd gear.

The nominal gap is 1.27-2.03 mm (0.050-0.080 in) for the 3rd, 4th, 5th and 6th gear.

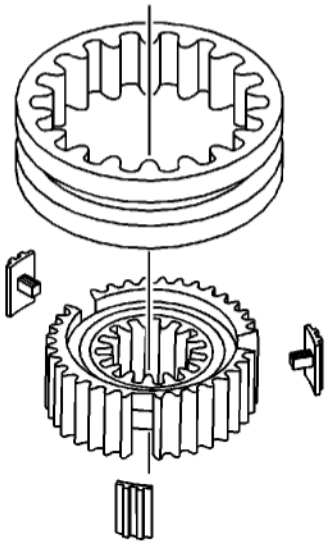
Replace the friction cones and blocker rings when the gap is significantly less than specified.

Synchronizers Assemble

1st / 2nd Synchronizer

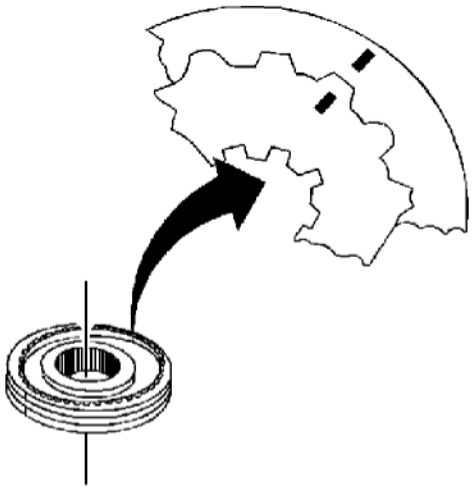


1. Check the synchronizer assembly scribe marks for correct positions.

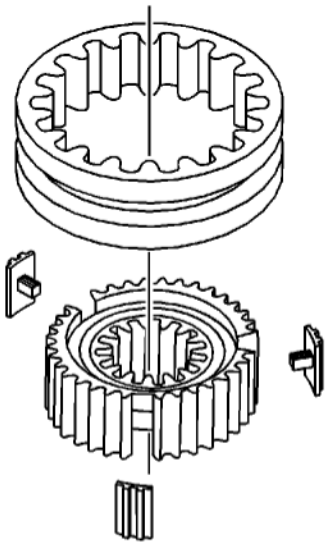


2. Install the synchronizer sleeve to the hub (align the insert openings in the hub with the cuts in the synchronizer sleeve).
3. Install the inserts with the slots facing the hub.

3rd / 4th, 5th / 6th Synchronizers

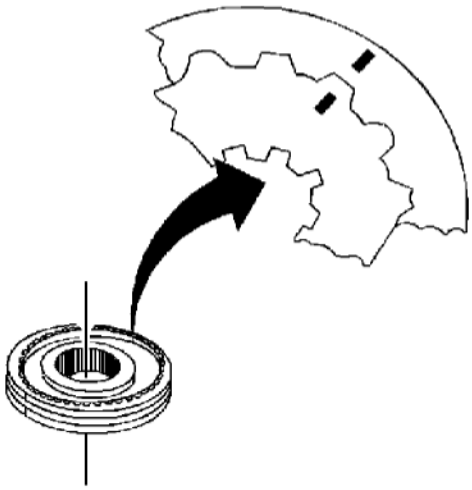


1. Check the synchronizer assembly scribe marks for correct positions.

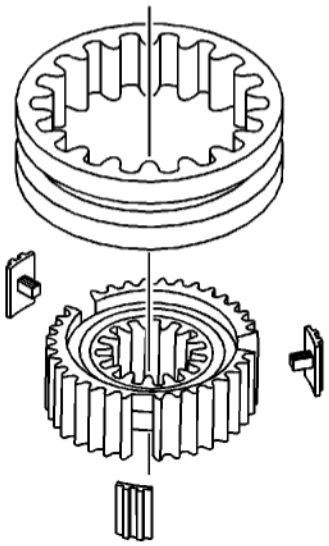


2. Install the synchronizer sleeve to the hub (align the insert openings in the hub with the cuts in the synchronizer sleeve).
3. Install the inserts with the slots facing the hub.

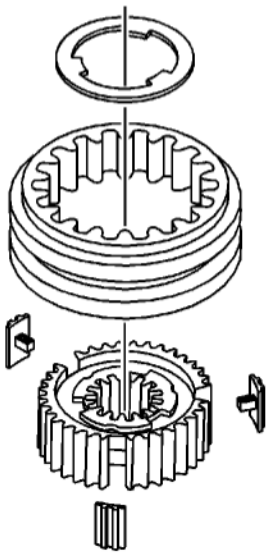
Reverse Synchronizer



1. Check the synchronizer assembly scribe marks for correct positions.



2. Install the synchronizer sleeve to the hub (align the insert openings in the hub with the cuts in the synchronizer sleeve).
3. Install the inserts with the slots facing the hub.



4. Install a new synchronizer insert retainer with the key retainer tangs over the synchronizer inserts.

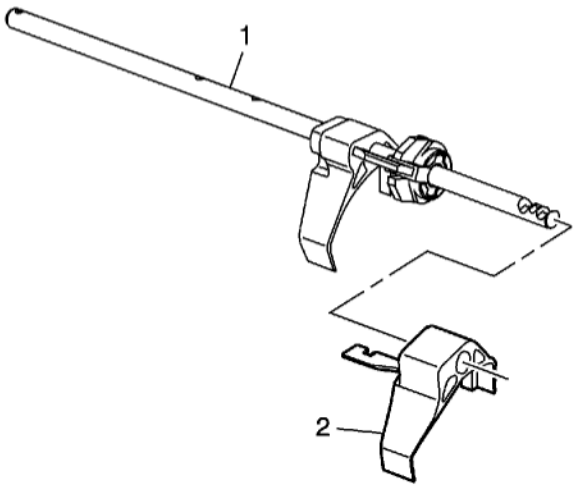
Shift Shaft and Fork Assemblies Disassemble

Special Tools

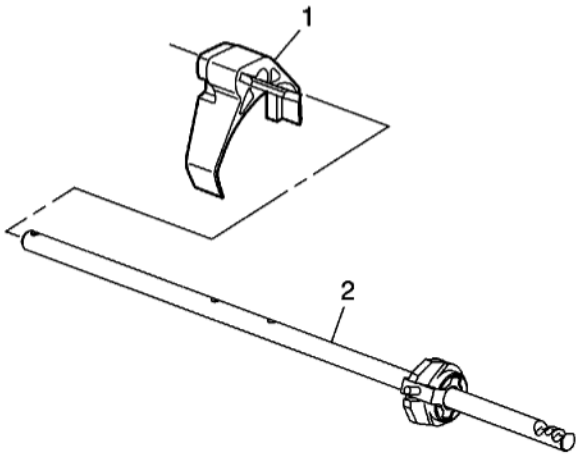
- *J 23907* Slide Hammer
- *J 39439-2* Bushing Remover

For equivalent regional tools, refer to Special Tools.

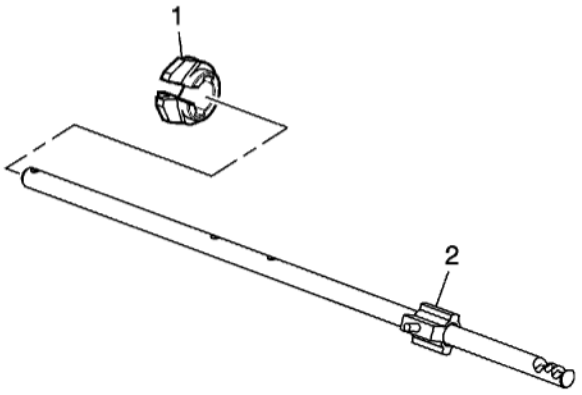
1st / 2nd, 3rd / 4th Shift Rail Assembly



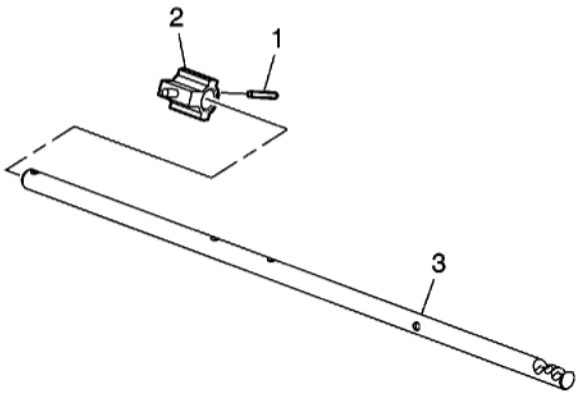
1. Remove the 1st/2nd shift fork (2) from the shift shaft (1).



2. Remove the 3rd/4th shift fork (1) from the shift shaft (2).



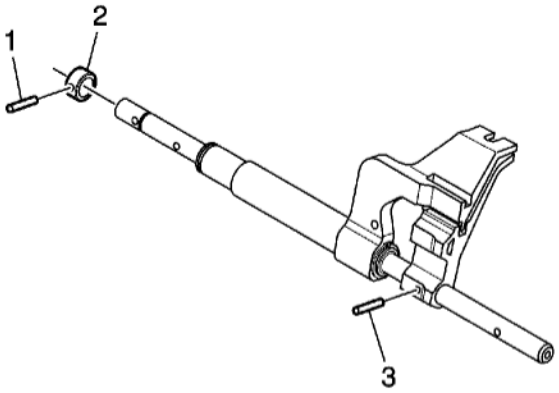
3. Remove the interlock plate (1) from the selector pin (2).





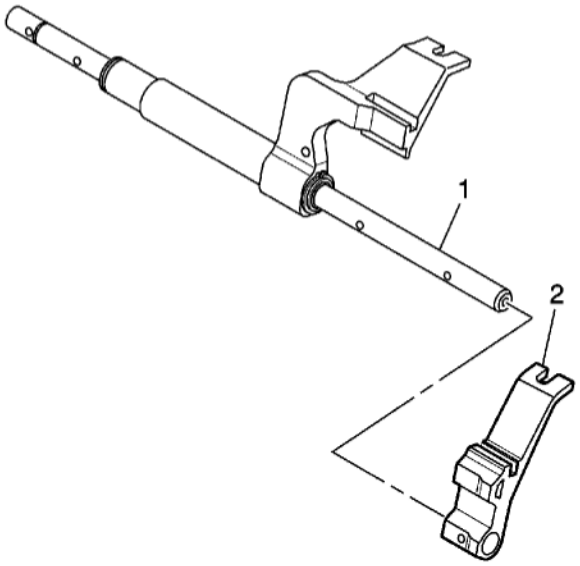
4. Remove the selector roll pin (1).
5. Remove the selector pin (2) from the shift shaft (3).

5th / 6th, Reverse Shift Rail Assembly

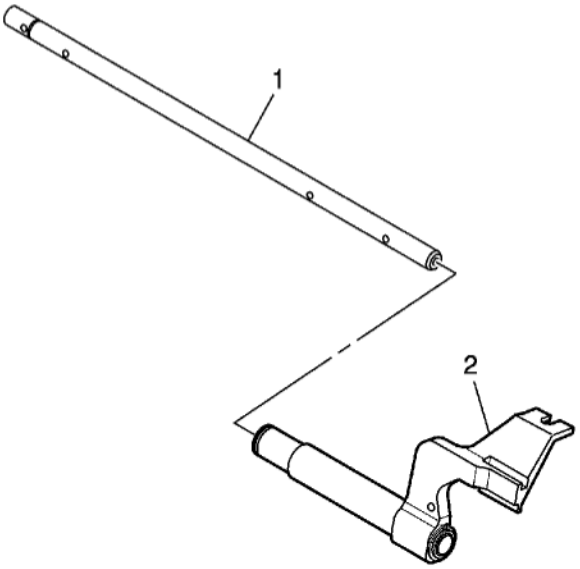




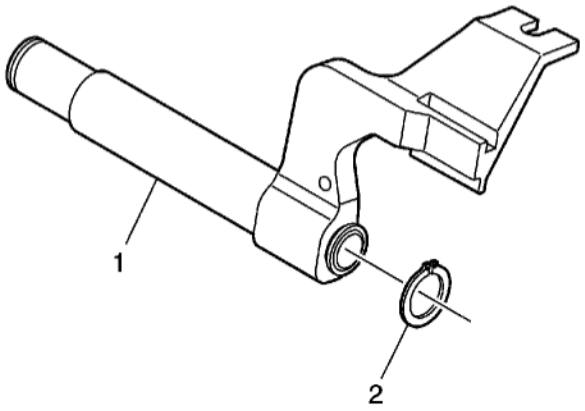
1. Remove the reverse shift collar pin (1).
2. Remove the reverse shift lever collar (2).
3. Remove the reverse shift lever pin (3).



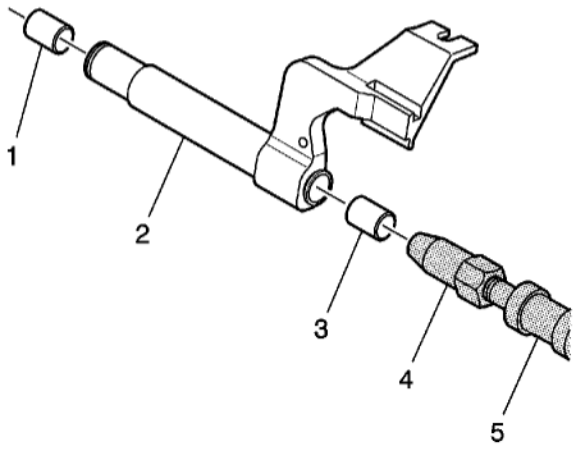
4. Remove the reverse shift lever (2) from the shift shaft (1).



5. Remove the 5th/6th shift lever (2) from the shift shaft (1).



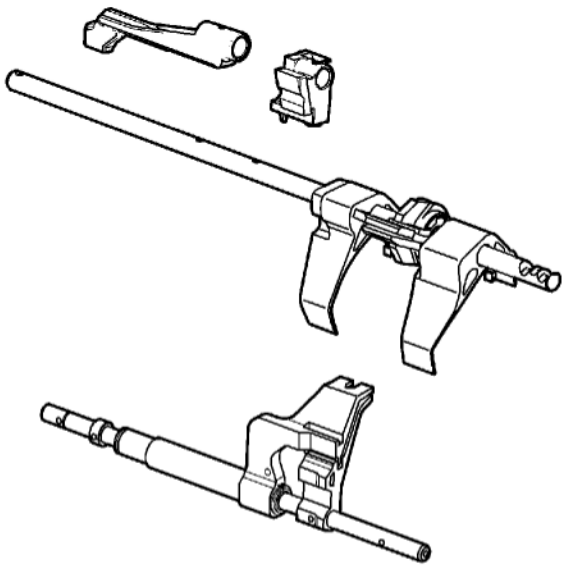
6. Remove the snap ring (2) from the 5th/6th shift lever (1).



Note: Do not replace the bushings unless inspection shows bushing damage.

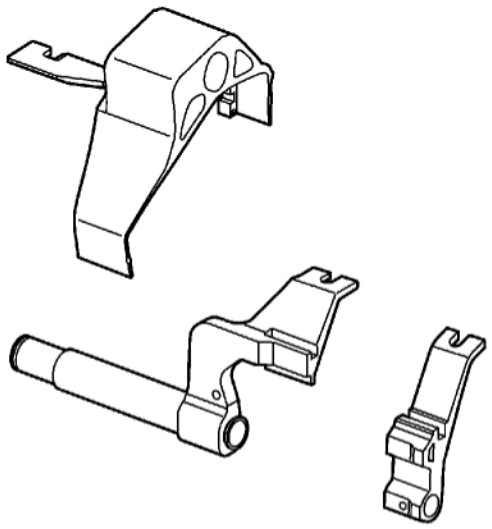
7. Remove the shift shaft bushings (1, 3) from the 5th/6th and reverse shift lever (2) using the *J 23907* slide hammer (5) and the *J 39439-2* remover (4).

Shift Shaft and Fork Assemblies Cleaning and Inspection



Warning: Wear safety glasses to avoid injury when using compressed air or any cleaning solvent. Bodily injury may occur if fumes are inhaled or if skin is exposed to chemicals.

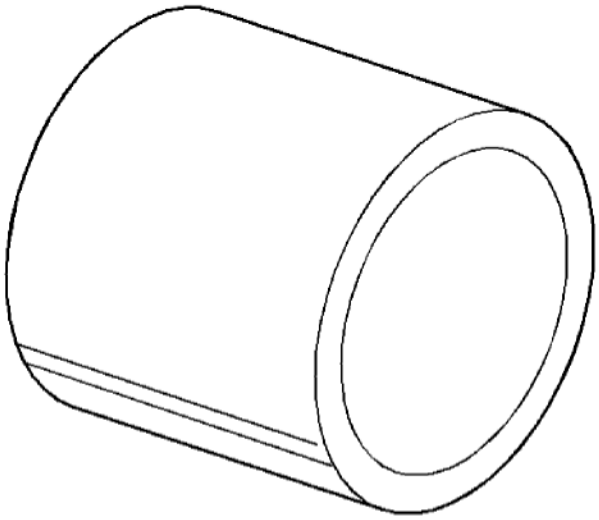
1. Clean the shift shaft and fork assembly parts with a suitable solvent. Air dry all the parts.



2. Inspect the shift forks, shift levers, and the shift links for excessive wear, fractures or

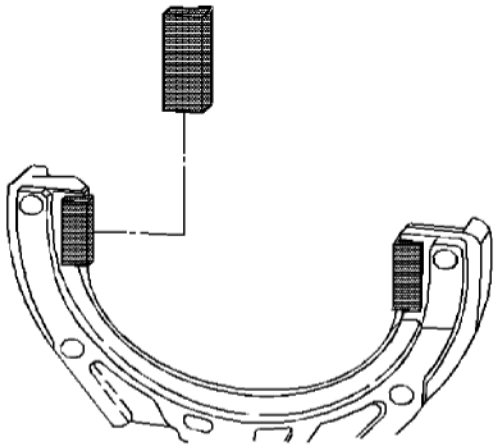
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distortion.





3. Inspect the shift shaft lever bushings for excessive wear.





4. Inspect the shift fork nylon inserts for wear.
5. Replace parts that are fractured, excessively worn, or distorted.
6. Replace an excessively worn or burred shift shaft.

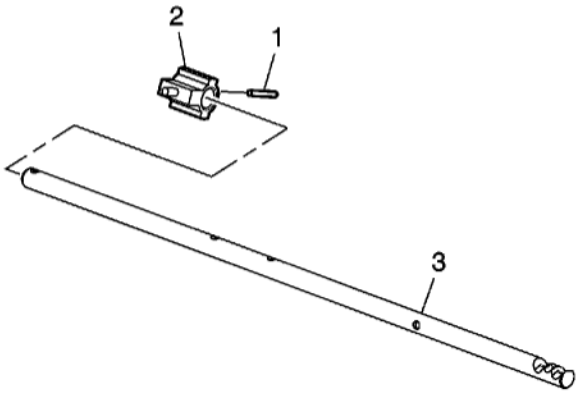
Shift Shaft and Fork Assemblies Assemble

Special Tools

- *J 36850* Transjel Lubricant
- *J 39437* Bushing Installer

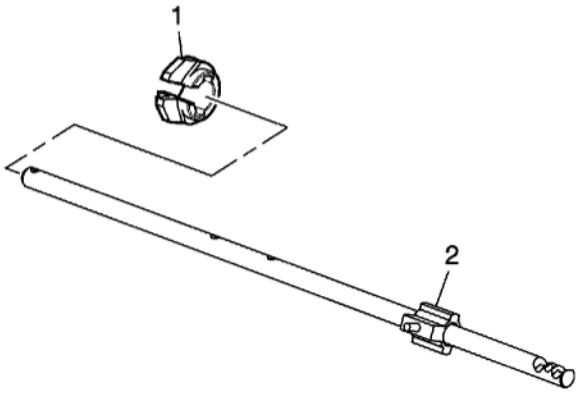
For equivalent regional tools, refer to Special Tools.

1st / 2nd, 3rd / 4th Shift Rail Assembly



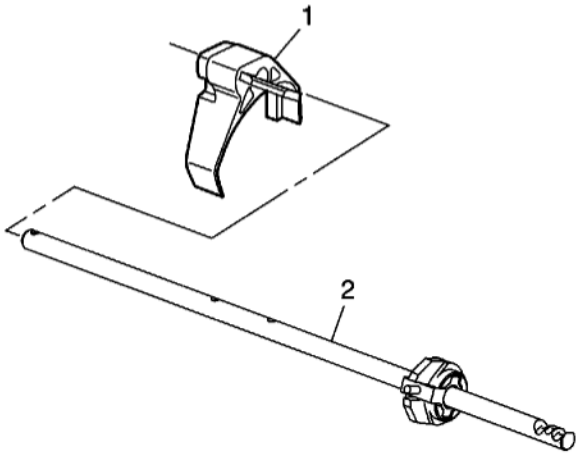


1. Install the selector pin (2) on the shift shaft (3).
2. Align the roll pin hole on the selector pin with the roll pin hole on the shift shaft.
3. Install the roll pin (1) through the selector pin (2) and the shift shaft (3).

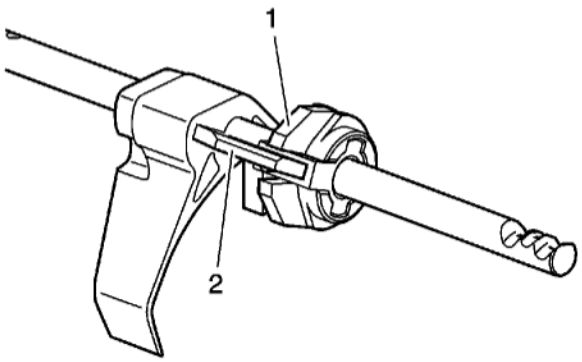


Note: The interlock plate fits loosely on the shift shaft and selector pin assembly. Use the *J 36850* transjel lubricant to hold the neutral return cam pin in place.

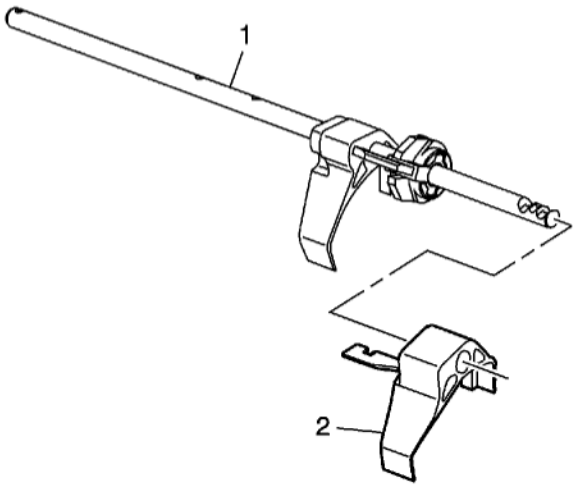
4. Install the interlock plate (1) on the selector pin (2).



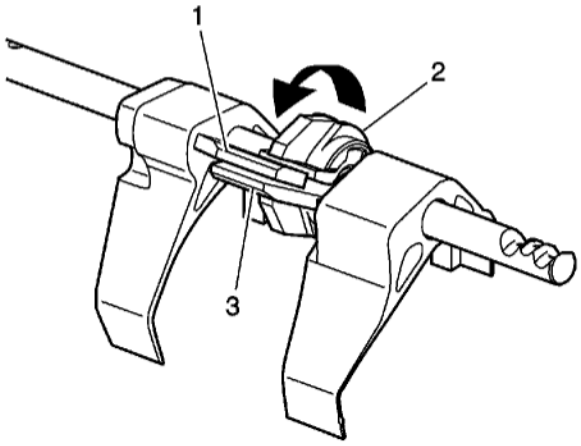
5. Install the 3rd/4th shift fork (1) on the shift shaft (2).



6. Align the notch on the shift link (2) with the shift interlock plate (1).

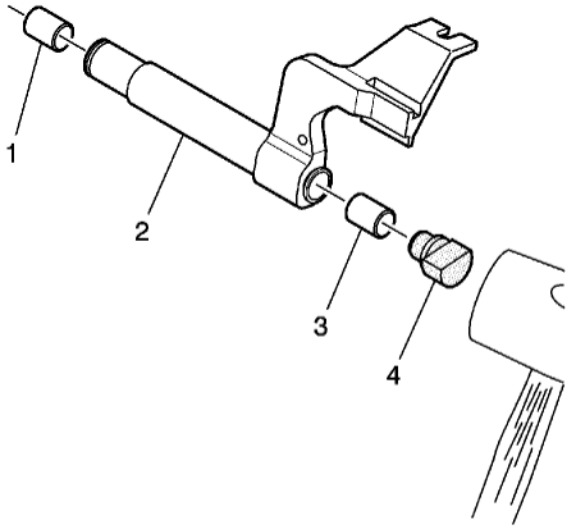


7. Install the 1st/2nd shift fork (2) on the shift shaft (1).

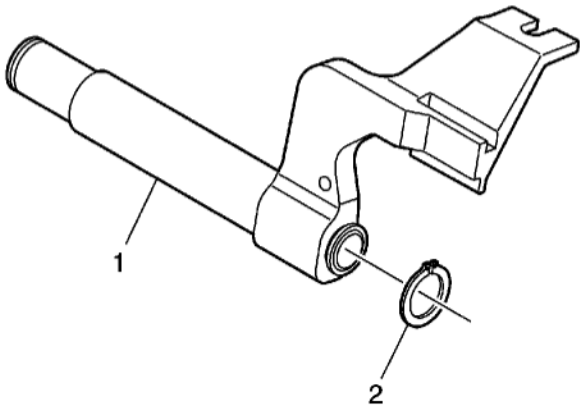


8. Install the 1st/2nd shift shaft link (3) beneath the 3rd/4th shift shaft link (1) on the interlock plate and the selector roll pin assembly (2).

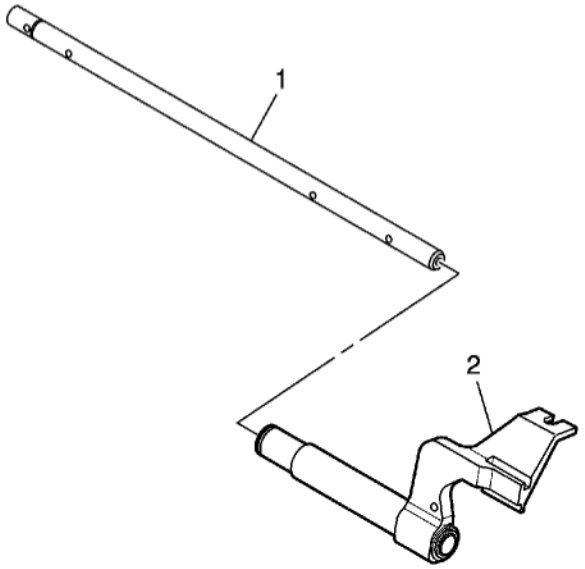
5th / 6th, Reverse Shift Rail Assembly



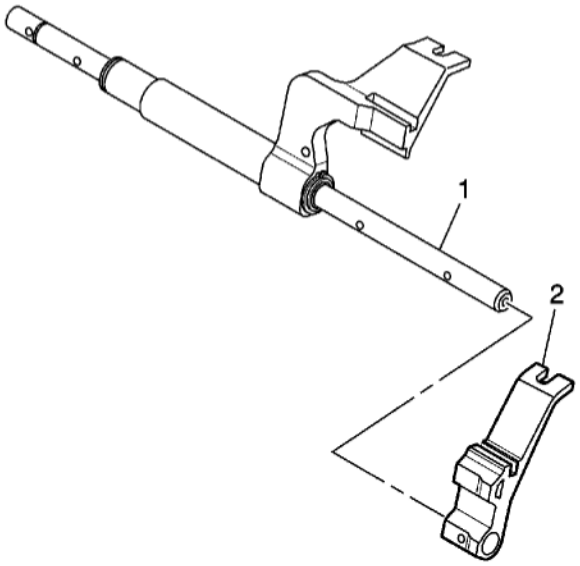
1. Install the 5th/6th shift shaft lever bushings (1) and (3) in the 5th/6th shift lever (2) using the *J 39437* bushing installer (4) and a hammer.



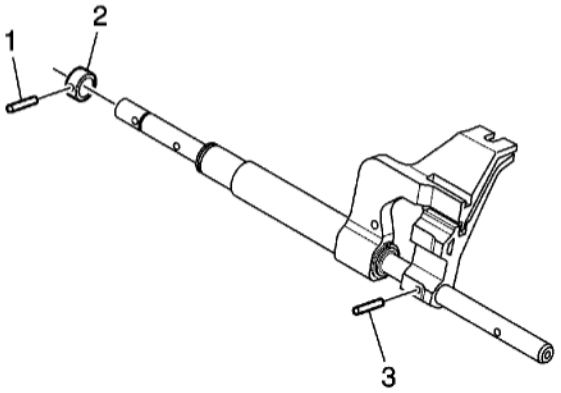
2. Install the retainer ring (2) on the 5th/6th shift lever (1).



3. Install the 5th/6th shift lever (2) on the shift shaft (1).



4. Install the reverse shift lever (2) on the shift shaft (1).



5. Install the reverse lever roll pin (3).
6. Install the reverse collar (2).
7. Install the reverse collar roll pin (1).

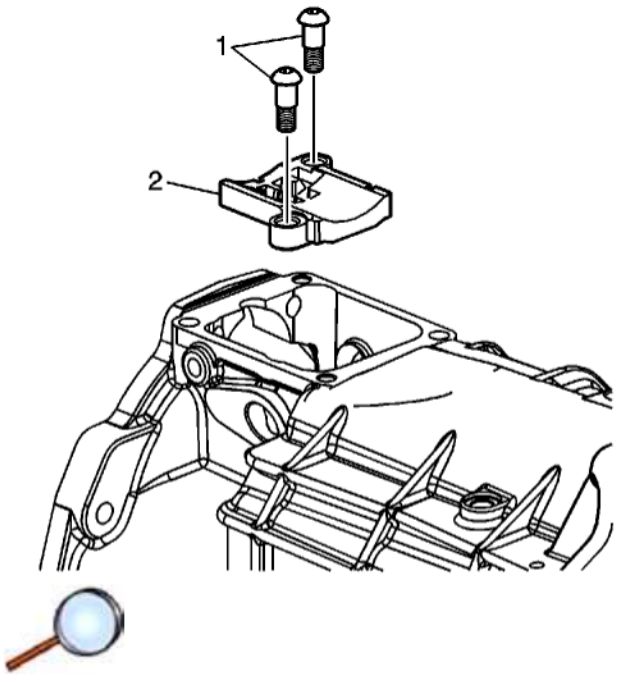
Transmission Case and Clutch Housing Disassemble

Special Tools

- *DT 49216* Bushing Remover
- *J 8092* Drive Handle
- *J 36190* Driver Handle
- *J 39439-2* Bushing Remover
- *J 39790-A* Mainshaft Bearing Race Remover
- *J 44384* Shift Fork Bearing Installer
- *J 45124* Removal Bridge

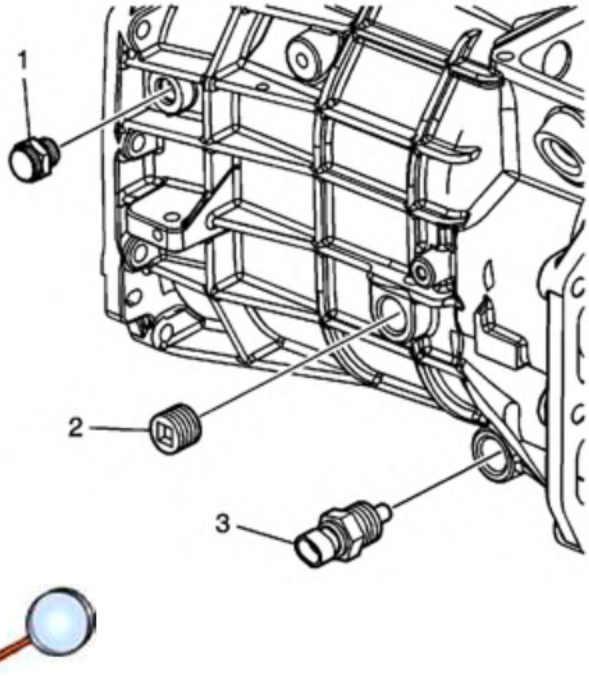
For equivalent regional tools, refer to Special Tools.

Guide Plate Removal

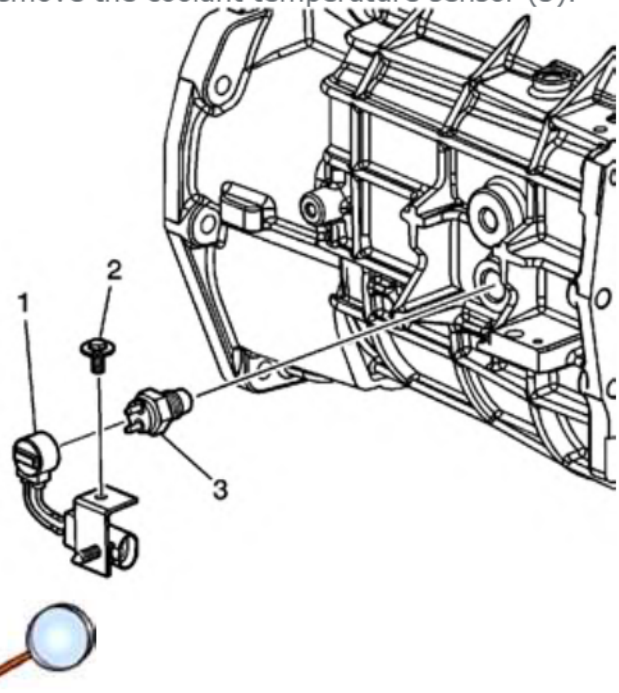


1. Remove the detent guide plate attaching bolts.
2. Remove the detent guide plate.

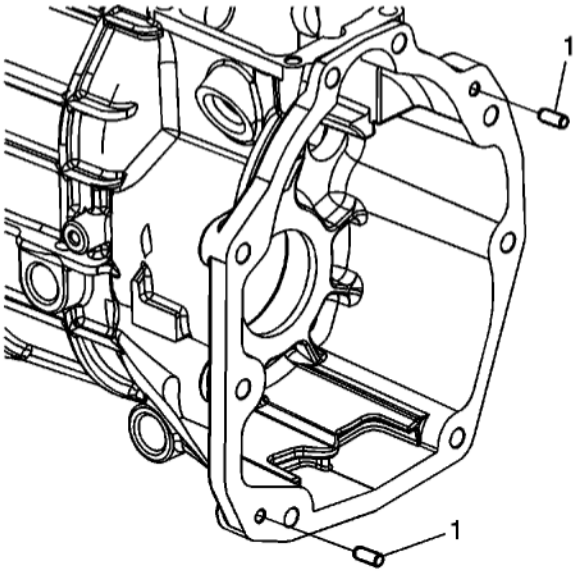
Transmission Case



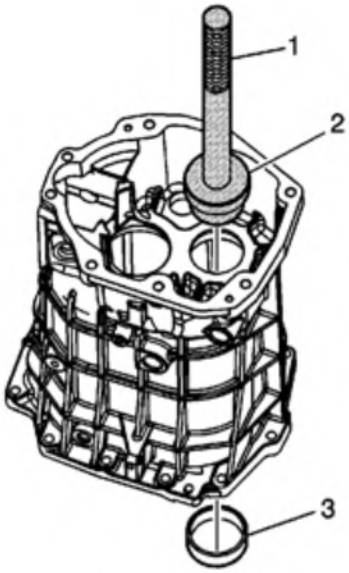
1. Remove the cooler line return fitting (1).
2. Remove the transmission case fill plug (2).
3. Remove the coolant temperature sensor (3).



4. Remove the backup lamp switch connector harness bolt (2).
5. Remove the backup lamp switch connector harness (1).
6. Remove the backup lamp switch (3).

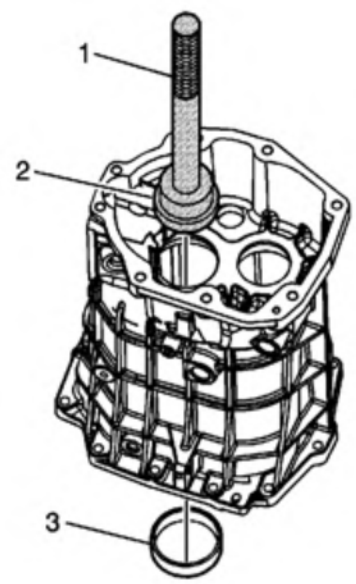


7. Remove the dowel pins (1).



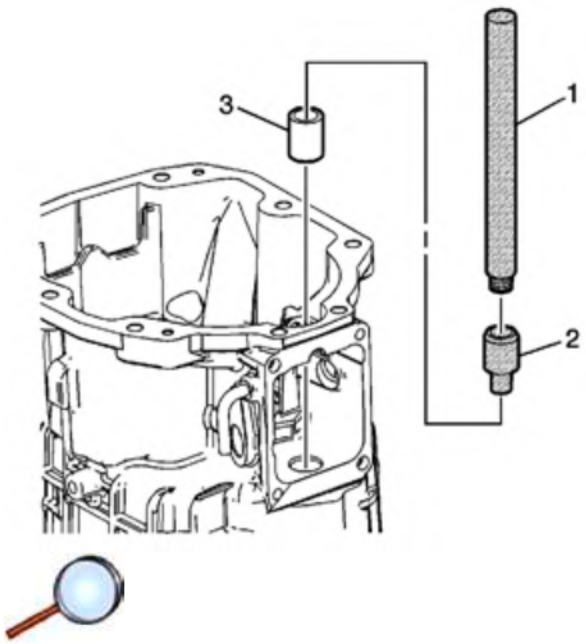
Note: Do not replace the bearing race unless inspection shows bearing race damage.

8. Remove the countershaft bearing race (3), using the *J 8092* drive handle (1) and the *J 39790-A* race remover (2).



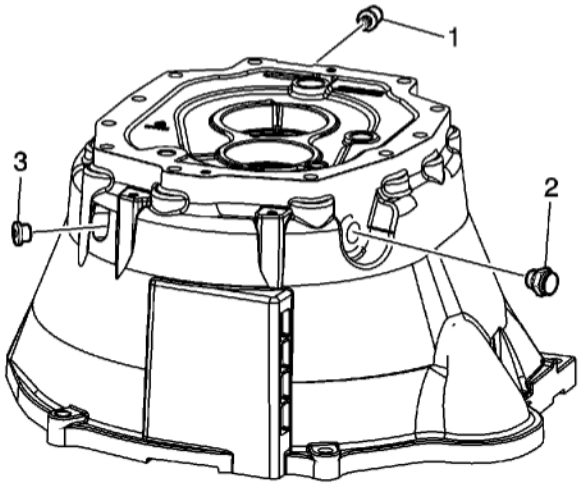
Note: Do not replace the bearing race unless inspection shows bearing race damage.

9. Remove the mainshaft bearing race (3), using the *J 8092* drive handle (1) and the *J 39790-A* race remover (2).

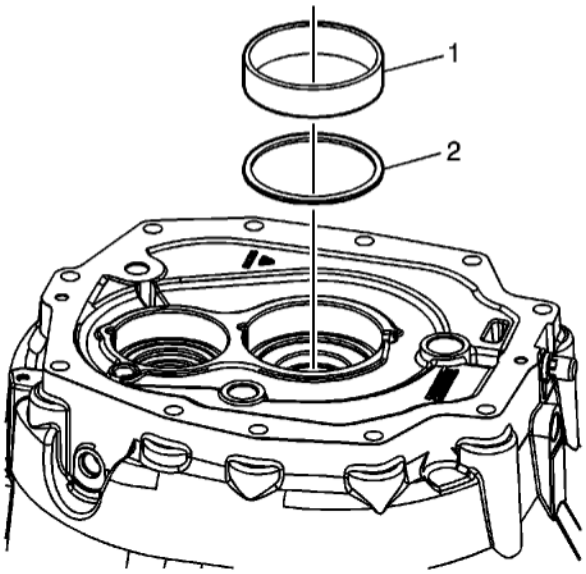


10. Remove the Ist/2nd and the 3rd/4th shift shaft bearing (3), using the *J 36190* driver handle (1) and the *J 44384* remover (2).

Clutch Housing

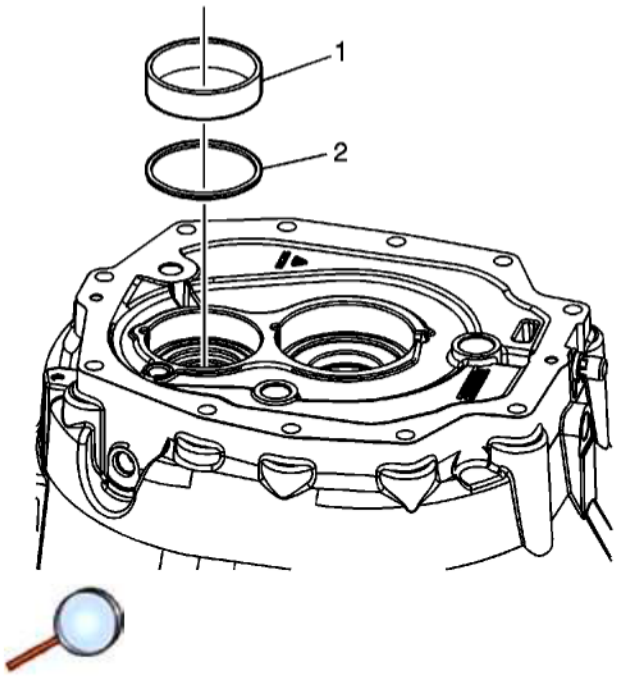


1. Remove the vent assembly (1).
2. Remove the pump outlet cooler fitting with o-ring (2).
3. Remove the transmission fluid pump outlet pipe fitting (3).

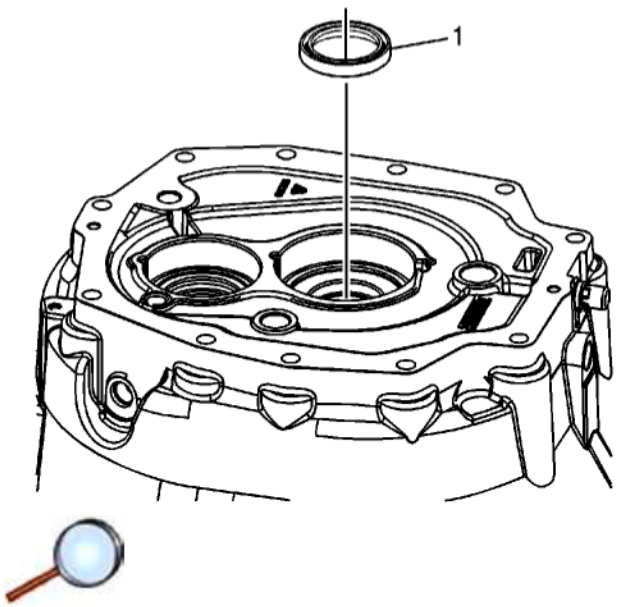


Note: There may be one or more shims.

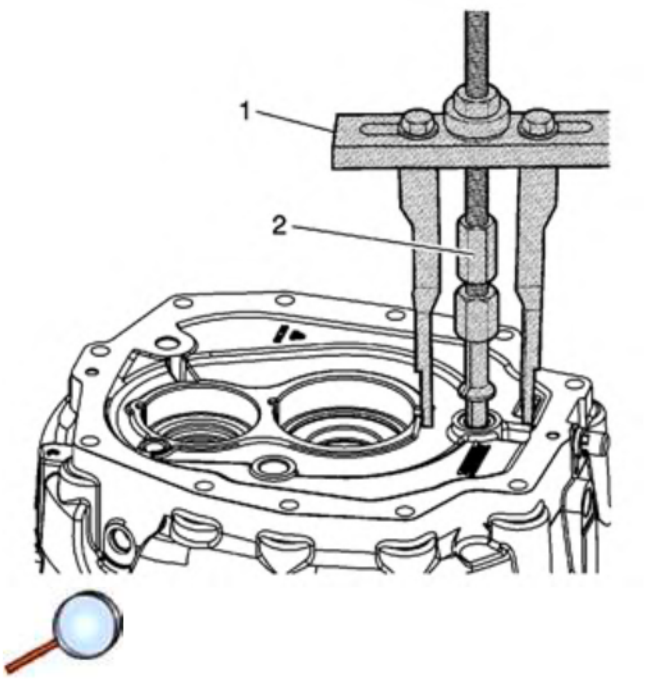
4. Remove the input shaft bearing race (1) and one or more shims (2).



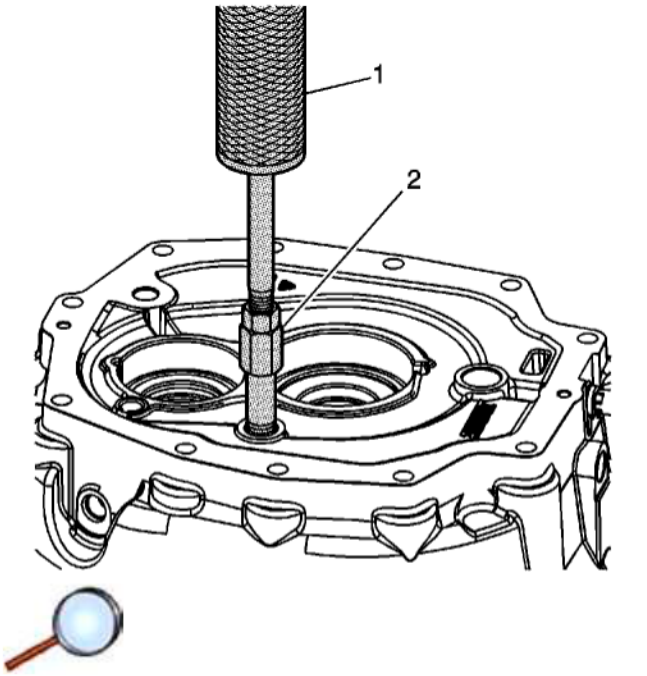
5. Remove the countershaft bearing race (1) and one or more the shims (2).



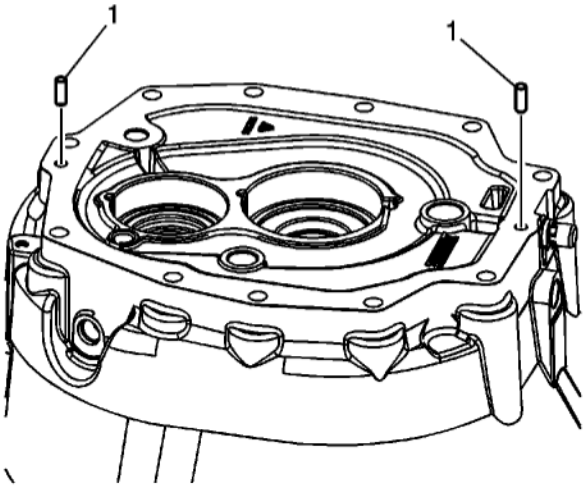
6. Remove and discard the input shaft seal (1).



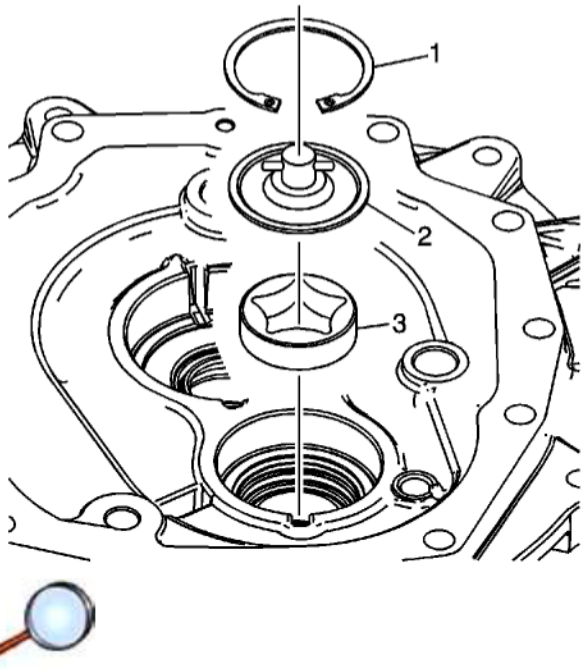
7. Remove the 1st/2nd shift shaft bearing, using the *J 45124* removal bridge (1) with the *DT 49216* bushing remover (2) and a wrench.



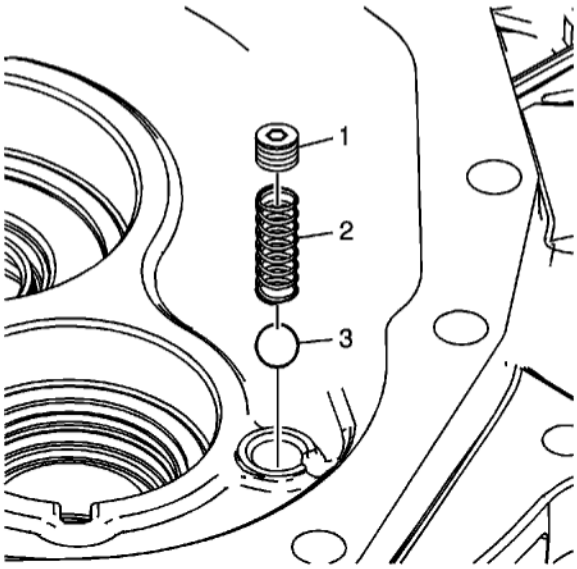
8. Remove the 3rd/4th shift shaft bushing, using the *J 23907-1* slide hammer (1) with the *J 39439-2* bushing remover (2).



9. Remove the dowel pins (1).



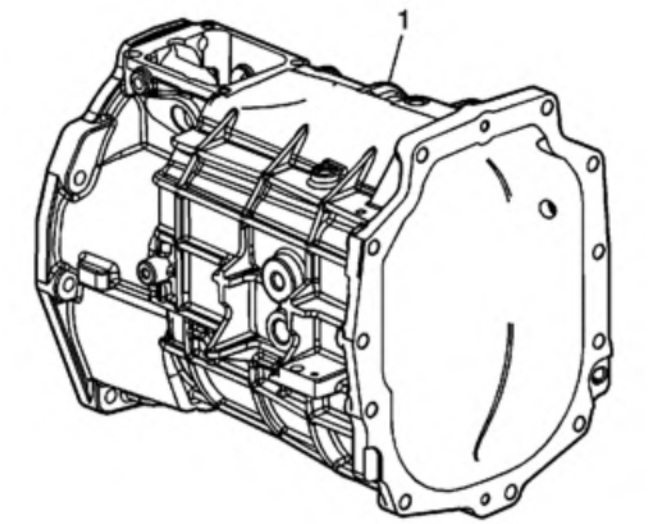
10. Remove the retainer ring (1).
11. Remove the oil pump cover assembly (2).
12. Remove the oil pump (3).



13. Remove the transmission fluid pump spring retaining plug (1).
14. Remove the transmission fluid pump spring (2).
15. Remove the transmission fluid pump check ball (3).

Transmission Case and Clutch Housing Cleaning and Inspection

Transmission Case



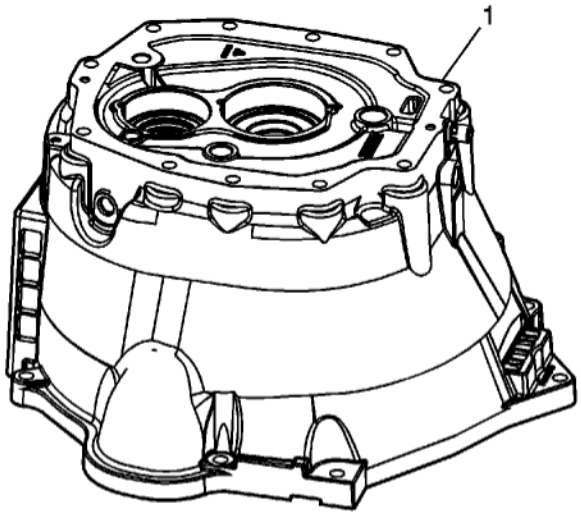


Warning: Wear safety glasses to avoid injury when using compressed air or any cleaning solvent. Bodily injury may occur if fumes are inhaled or if skin is exposed to chemicals.

1. Clean the transmission case in a suitable solvent. Air dry the transmission case.
2. Clean all sealant material from retainer bolt threads.
3. Inspect the transmission case for the following conditions:
   - Cracks
   - Scratches
   - Damaged threads
   - Burrs
   - Nicked mounting surfaces
   - Damaged sealing surfaces
   - Damaged front or rear bearing bores
4. Inspect the machined mating surfaces for flatness with a straight edge.
5. Inspect the bearing races and bores for wear, scratches or grooves.
6. Inspect the bushing for excessive wear.
7. Use a fine mill file to dress minor scratches or burrs.
8. If scratches, or grooves or scoring cannot be removed by hand with a soft stone or crocus cloth, replace the component.
9. Clean up damaged threads with the correct size tap.
10. Replace a cracked ho

11. Replace worn bushings.

Clutch Housing Assembly





Warning: Wear safety glasses to avoid injury when using compressed air or any cleaning solvent. Bodily injury may occur if fumes are inhaled or if skin is exposed to chemicals.

1. Clean the clutch housing parts with a suitable solvent. Air dry all the parts.
2. Inspect the clutch housing parts for the following conditions:
   - Cracks

     Replace the clutch housing part if cracks are found.
   - Scratches
   - Burrs
   - Nicked mounting surfaces
   - Damaged sealing surfaces
   - Damaged front or rear bearing bores
3. Inspect the machined mating surfaces for flatness. Check the mating surfaces with a straight edge.
4. Inspect the bearing races and bores for wear, scratches or grooves.
5. Inspect the bushing for excessive wear. Replace worn bushings.
6. Use a fine mill file to dress minor scratches or burrs.
7. If scratches, or grooves or scoring cannot be removed by hand with a soft stone or crocus cloth, replace the component.

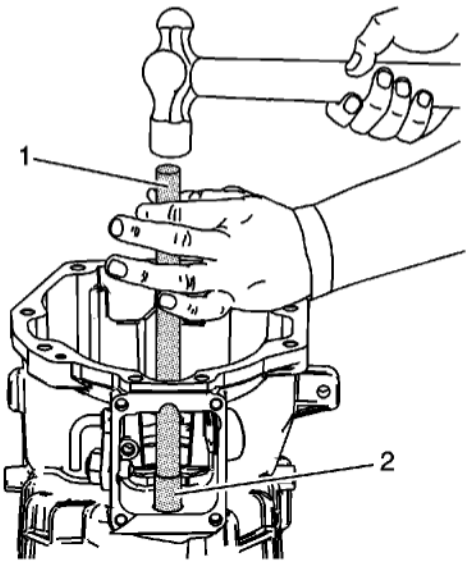
Transmission Case and Clutch Housing Assemble

Special Tools

- *J 8092* Universal Driver Handle
- *J 23907-1* Slide Hammer
- *J 36017* Valve Seal Remover
- *J 36190* Universal Driver Handle
- *J 39433* Input Shaft Seal Installer
- *J 39435* Bearing Race Installer
- *J 39439-3* Bushing Installer
- *J 39439-1* Shift Rail Bushing Removal/Installer
- *J 39442* Mainshaft and Countershaft Press Adapter
- *J 42464* Shift Shaft Seal Installer
- *J 42496* Inner Shift Rail Inner Seal Installer
- *J 44384* Bearing Installer

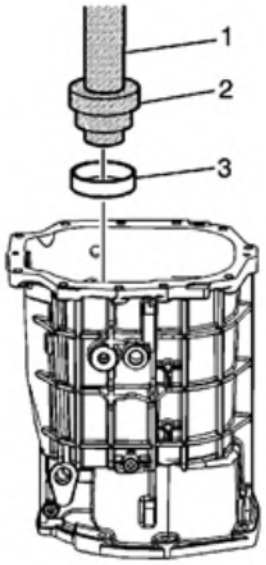
For equivalent regional tools, refer to Special Tools.

Transmission Case

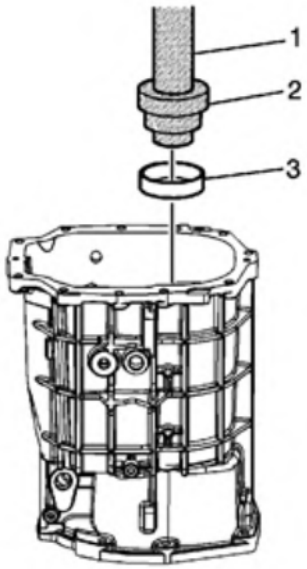


Note: The end of the bearing that has numbers stamped on it must face the *J 44384* bearing installer , so that the lled.

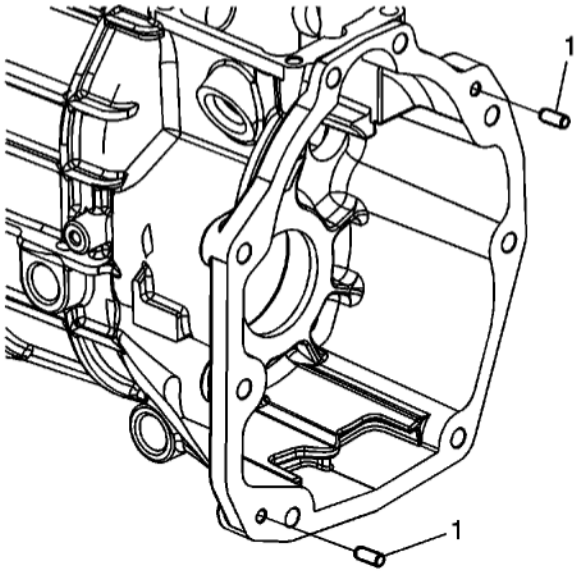
1. Install the 1st/2nd and the 3rd/4th shift shaft bearing. Use the *J 36190* driver handle (1) and the *J 44384* bearing installer (2).



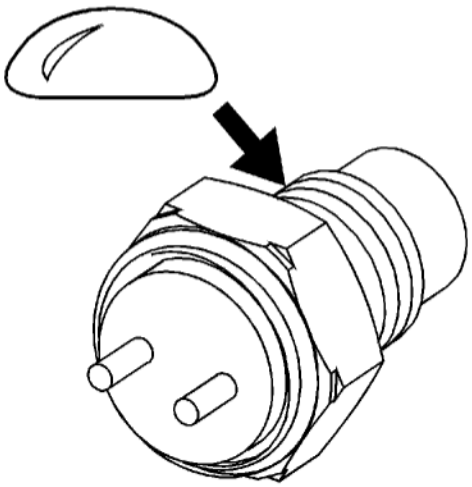
2. Install the mainshaft bearing race (3), using the *J 8092* driver handle (1) and the *J 39435* installer (2).



3. Install the countershaft bearing race (3), using the *J 8092* driver handle (1) and the *J 39435* installer (2).

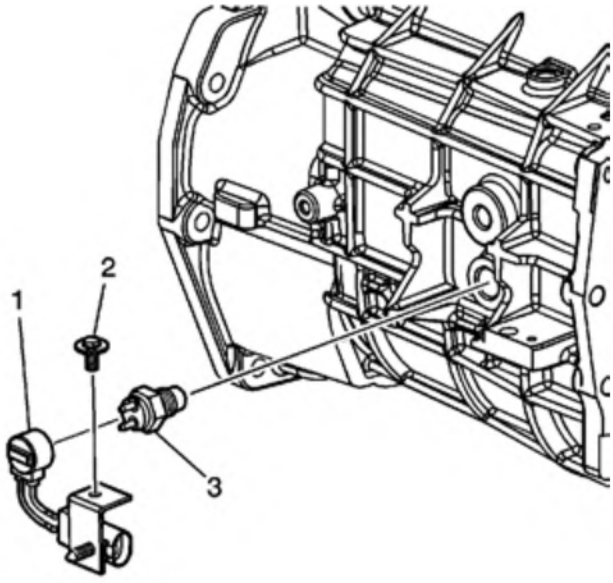


4. Install the dowel pins (1).

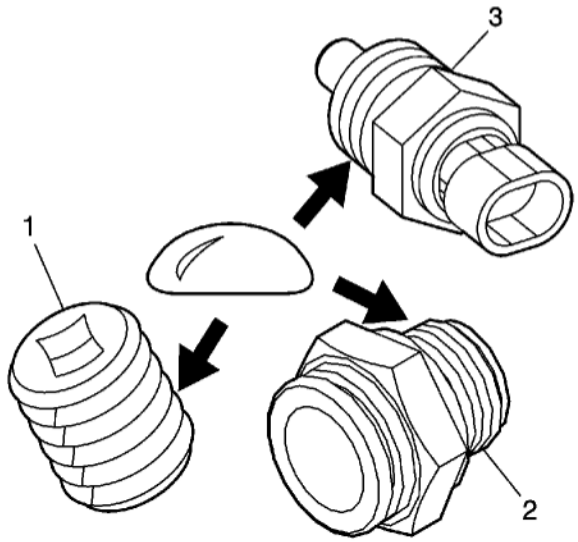


5. Apply sealant GM P/N 12346004 (Canadian P/N 10953480) or equivalent to the threads of the backup lamp switch.

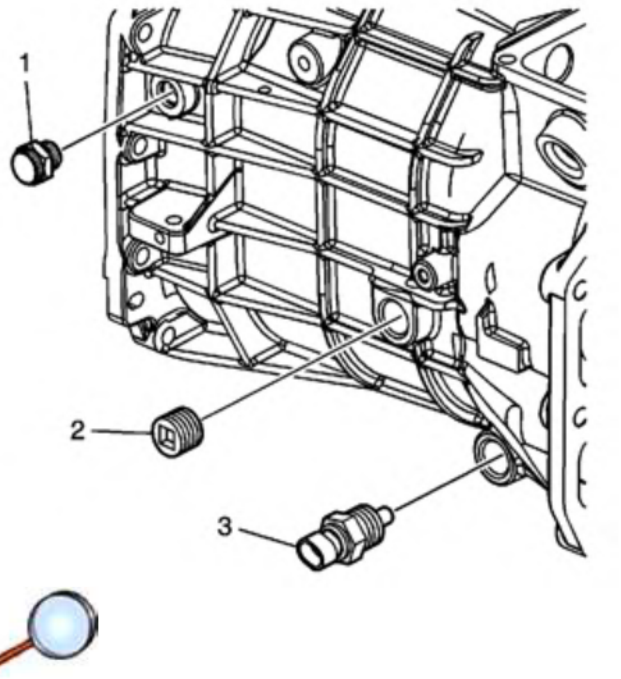
Caution: Refer to Fastener Caution in the Preface section.



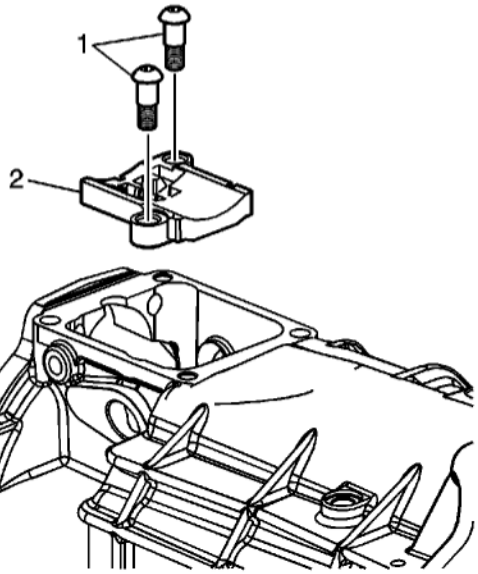
6. Install the backup lamp switch (3) and tighten to **27 N·m (20 lb ft)**.
7. Connect the backup lamp switch connector harness (1) to the backup lamp switch.
8. Install the backup switch bracket and bolt with washer (2). Tighten the bracket bolt to **9 N·m (80 lb in)**.



9. Apply sealant GM P/N 12346004 (Canadian P/N 10953480) or equivalent to the threads of the transmission case fill plug (1), the temperature sensor (3) and the cooler line return fitting (2).



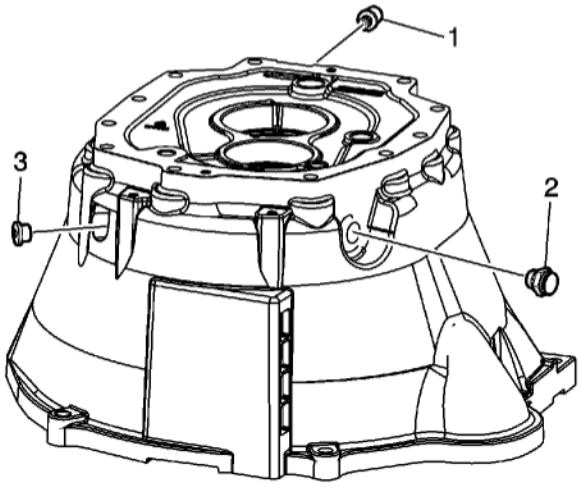
10. Install the transmission case cooler line return fitting (1) and tighten to **18 N·m (13 lb ft)**.
11. Install the transmission case fill plug (2) and tighten to **27 N·m (20 lb ft)**.
12. Install the coolant temperature sensor (3) and tighten to **39 N·m (29 lb ft)**.



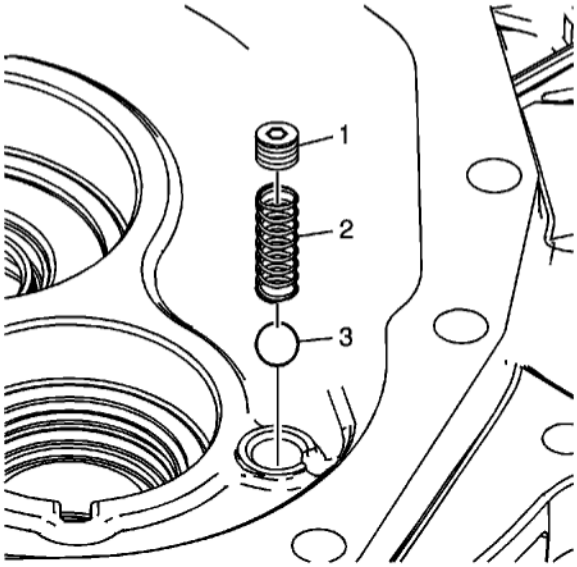
Caution: The H-pattern on the guide plate must face the extension housing. If the guide plate is installed incorrectly, then damage will occur.

13. Install the guide plate (2) and the guide plate bolts (1) and tighten to **22 N·m (16 lb ft)**.

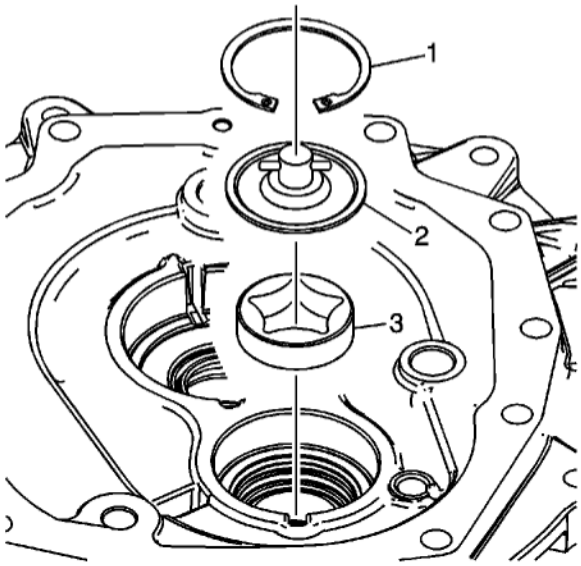
Clutch Housing Assembly



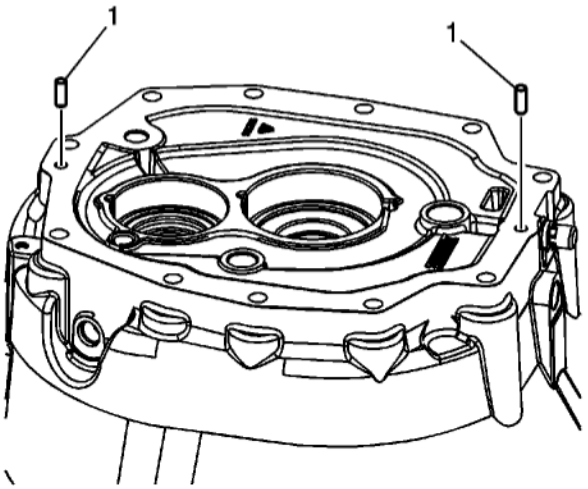
1. Install the transmission fluid pump outlet pipe fitting (3) and tighten to **27 N·m (20 lb ft)**.
2. Install the pump outlet cooler fitting (2), and tighten to **18 N·m (13 lb ft)**.
3. Install the vent assembly (1).



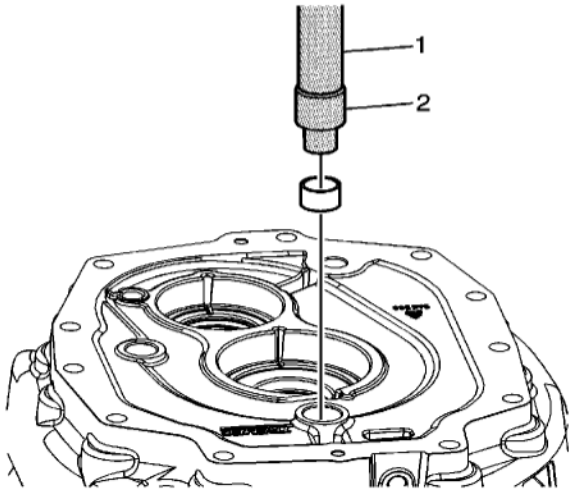
4. Install the transmission fluid pump check ball (3).
5. Install the transmission fluid pump spring (2).
6. Install the transmission fluid pump spring retaining plug (1). Tighten the plug to **27 N·m (20 lb ft)**.



7. Install the oil pump (3).
8. Install the oil pump cover assembly (2).
9. Install the retainer ring (1).

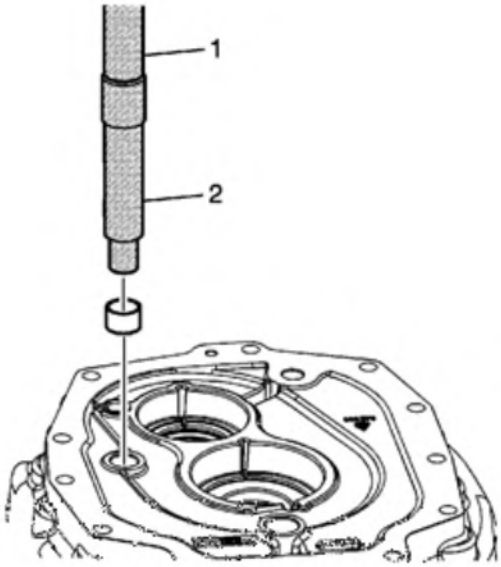


10. Install the dowel pins (1).

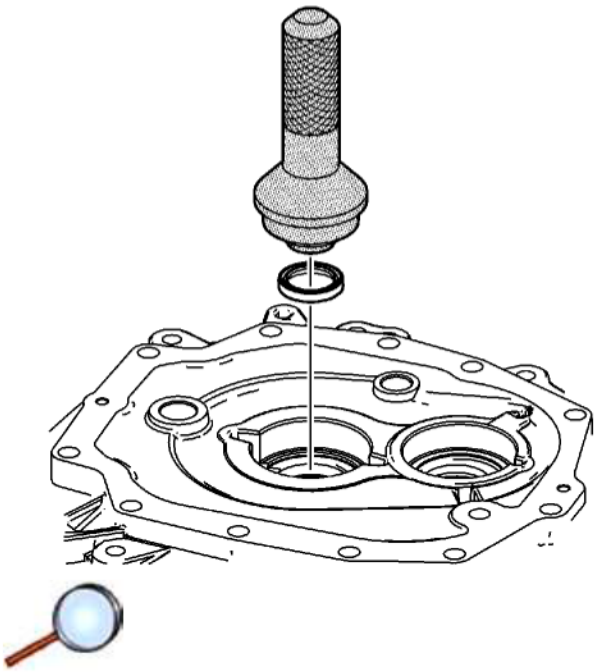


Caution: If the 1st/2nd speed shift shaft bearing is installed incorrectly it will interfere with the inner shift rail seal causing a leak.

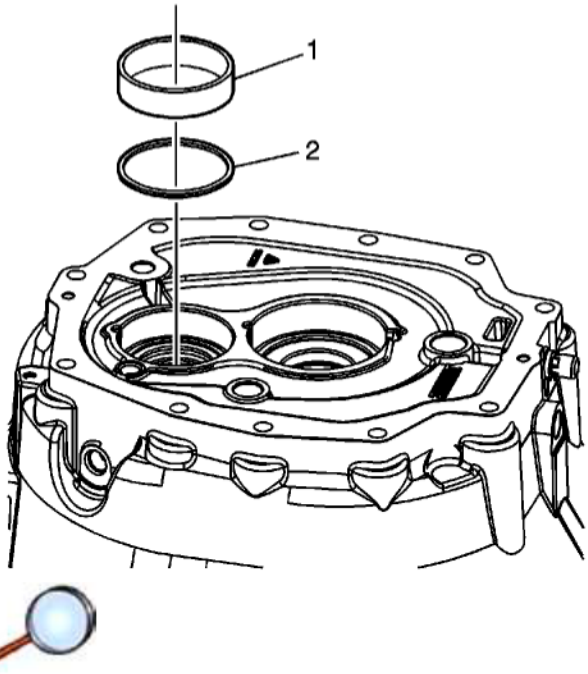
11. Install the 1st/2nd speed shift shaft bearing flush with the clutch housing, using the *J 36190* driver handle (1) with the *J 44384* bearing installer (2).



12. Install the 3rd/4th speed shift shaft bushing flush with the clutch housing, using the *J 36190* driver handle (1) with the *J 39439-1* bushing removal/installer (2).

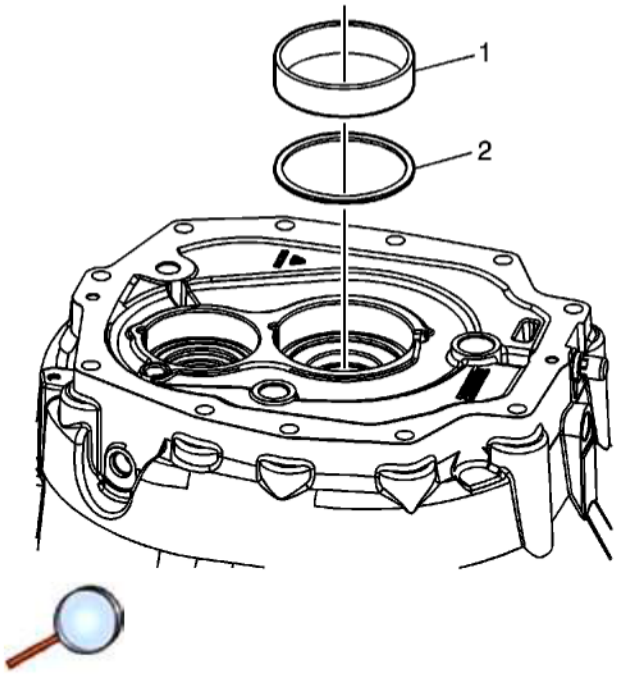


13. Install the input shaft seal, using the *J 39433* input installer .



Note: One or more shims may be used.

14. Install one or more countershaft bearing shims (2) and the bearing race (1). Refer to Input Shaft, Mainshaft and Countershaft in Shimming Procedures.



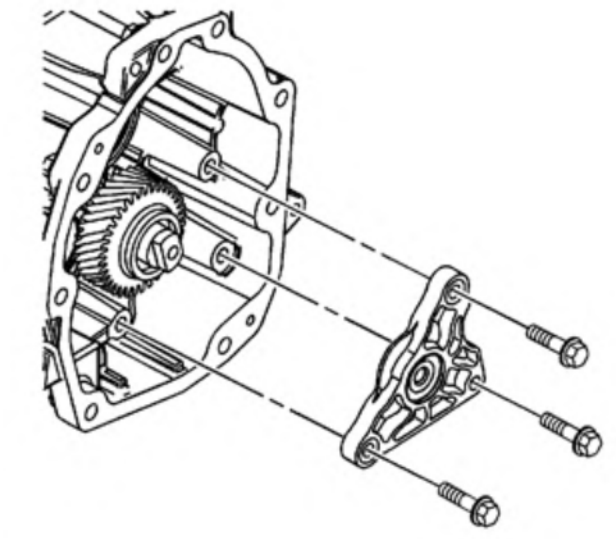
15. Install one or more input shaft bearing shims 2) and the bearing race (1). Refer to Input Shaft, Mainshaft and Countershaft in Shimming Procedures.

Extension Disassemble

Special Tools

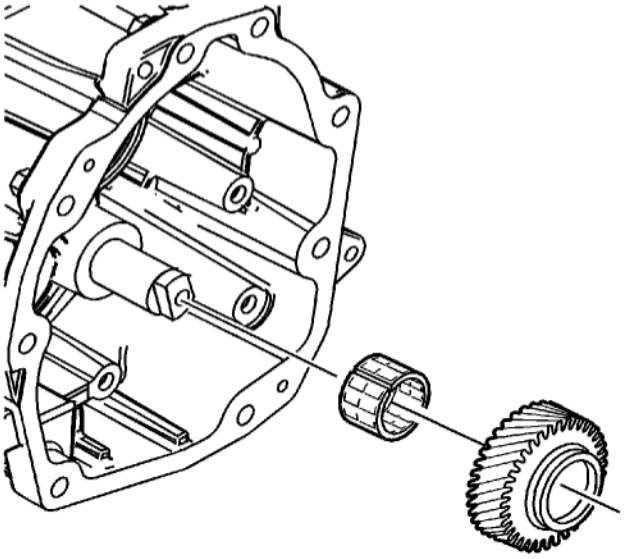
- *DT 49216* Shift Rail Bearing Remover
- *J 23907* Slide Hammer with Bearing Adapter
- *J 26941* Bearing Race Remover
- *J 29369-2* Bushing and Bearing Remover - 2-3 in
- *J 36190* Universal Driver Handle
- *J 39431* Fifth/Sixth Driven Gear Puller
- *J 39439-1* Bushing Installer
- *J 39439-2* Shift Rail Bushing Remover
- *J 39439-3* Bushing Installer
- *J 45124* Removal Bridge
- *J 45124-9* Puller Leg

For equivalent regional tools, refer to Special Tools.

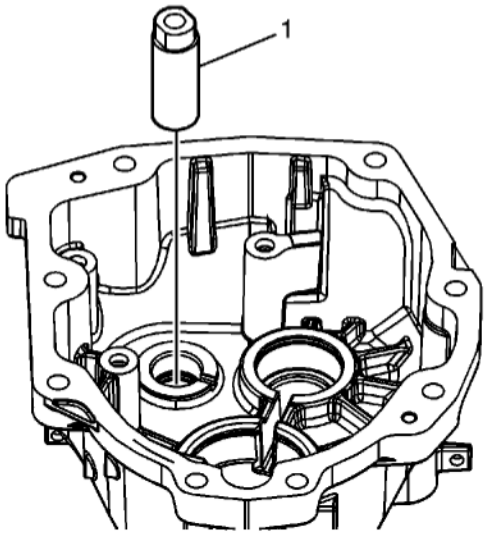




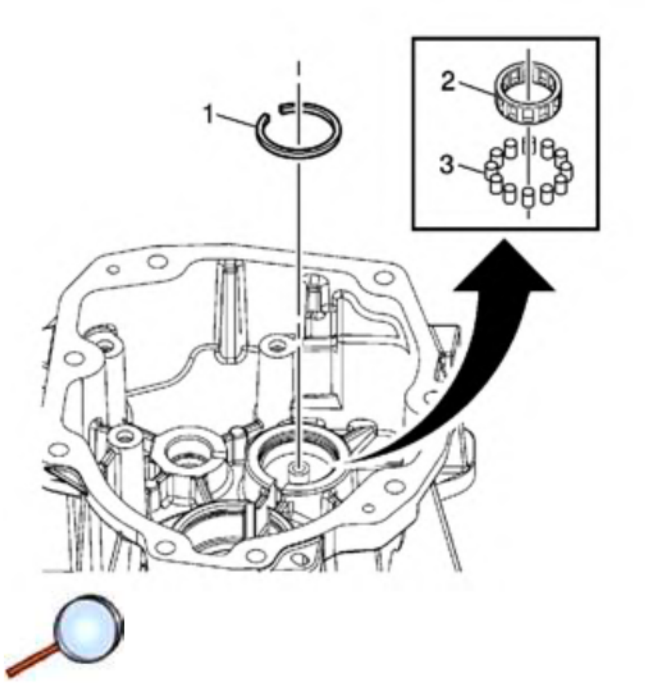
1. Remove the reverse idler shaft bracket bolts and bracket.



2. Remove the reverse idler gear and the roller bearing.



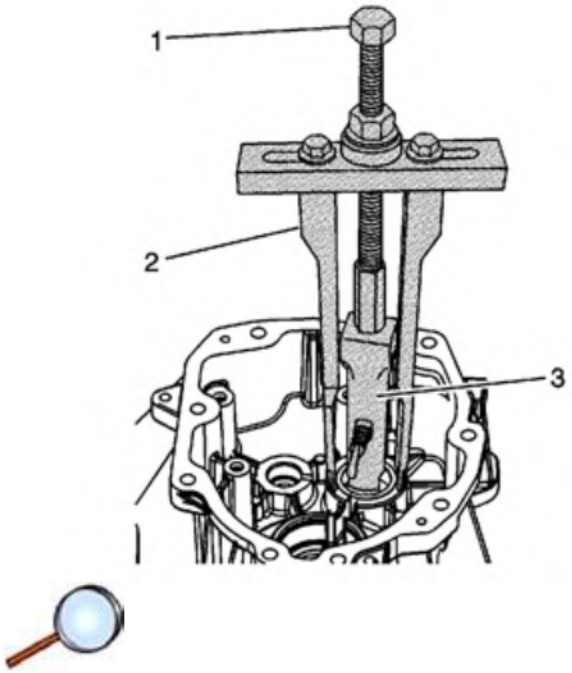
3. Remove the reverse idler gear shaft (1).



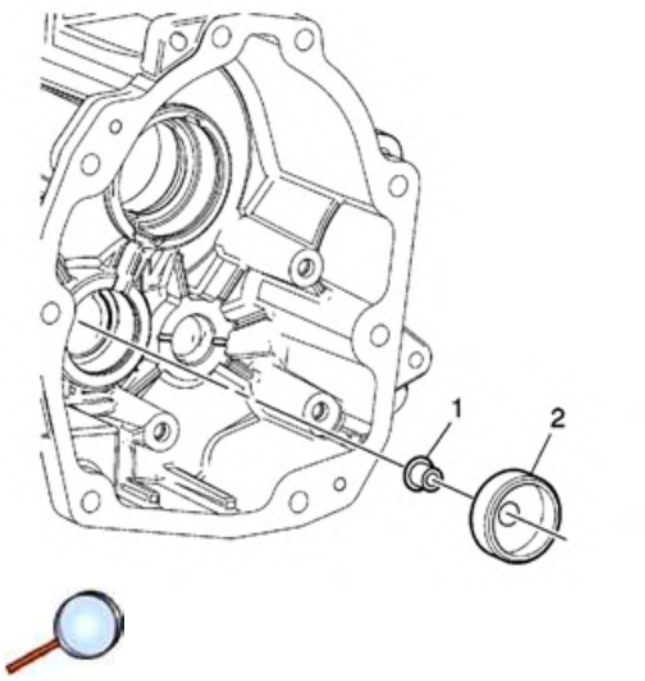
4. Remove the countershaft rear bearing retainer (1).

Note: The plastic roller bearing cage (2) and bearings are part of the countershaft bearing assembly. Always use a new countershaft bearing assembly.

5. Cut away the plastic roller bearing cage (2) from the countershaft bearing assembly.
6. Remove the bearings (3). Discard the cage and bearings.

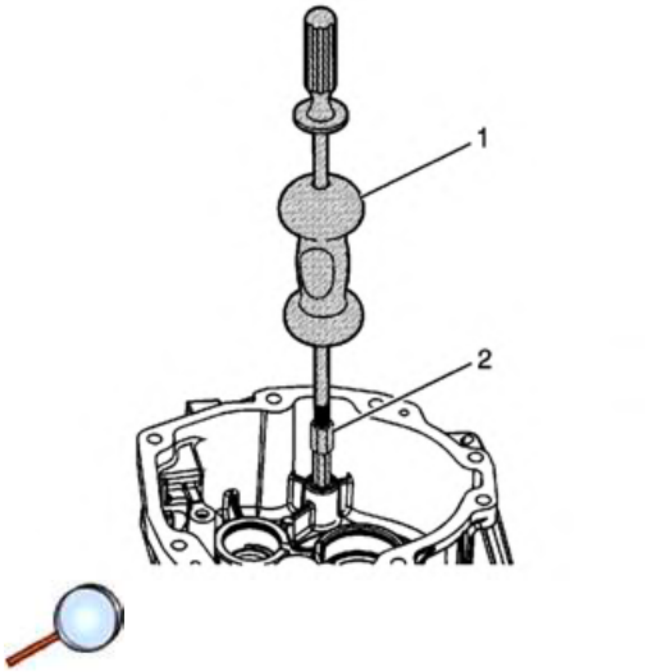


7. Install *J 45124-1* removal bridge (1), *J 45124-9* puller leg (2), and *J 29369-2* remover (3) in the race from the countershaft bearing assembly in the extension housing.
8. Remove the race.

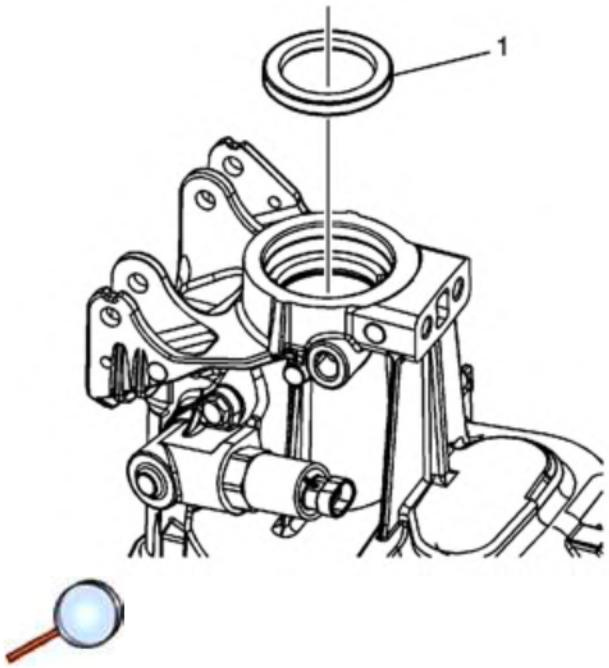


Note: The bearing race is part of the countershaft bearing assembly. Always use a new countershaft bearing assembly.

9. Remove the oil funnel from the bearing race. Discard the bearing race.

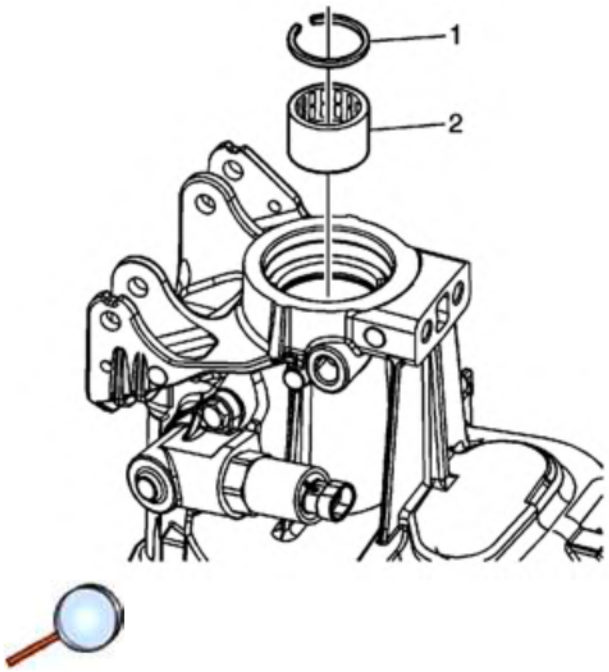


10. Using *J 39439-2* remover (2) and *J 23907* slide hammer (1), remove the bushing.

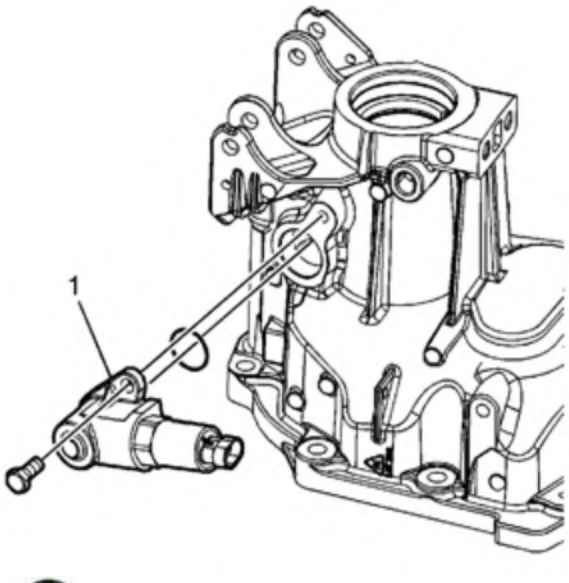


11. Remove the output shaft seal.

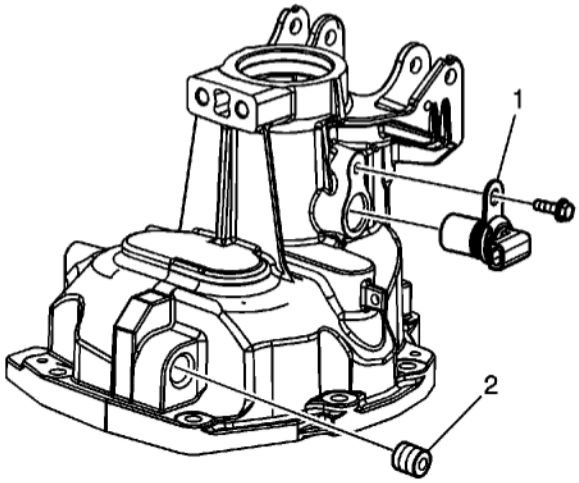
    Pry out the seal with a suitable tool.



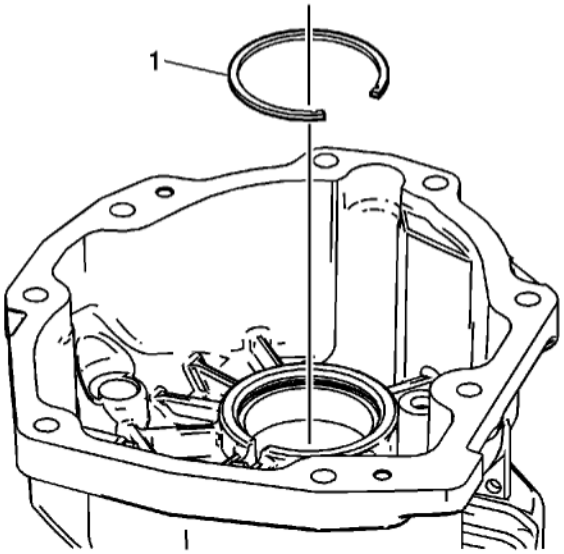
12. Remove the snap ring (1) and the roller bearing (2).



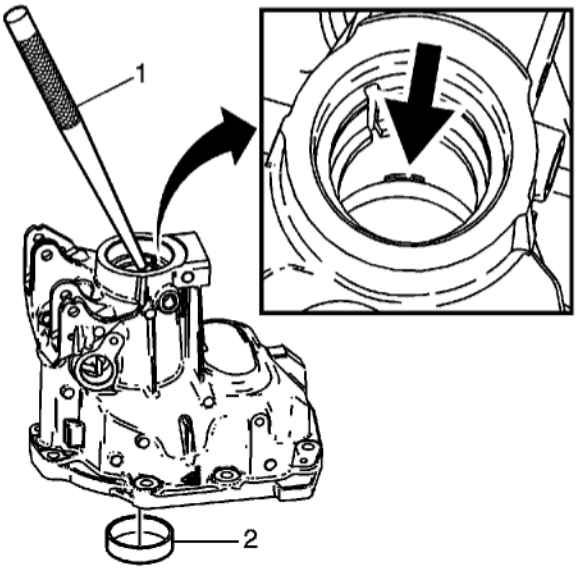
13. Remove the mounting bolt, the reverse lockout assembly (1) and the O-ring.



14. Remove the bolt and the vehicle speed sensor (1).
15. Remove the plug (2).

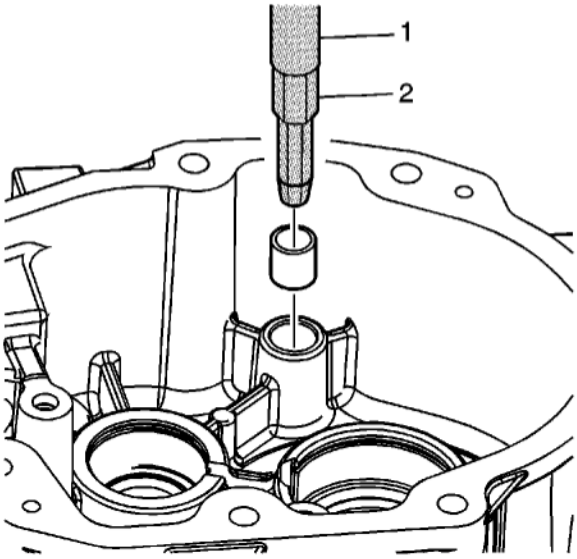


16. Remove the mainshaft bearing race retainer ring.

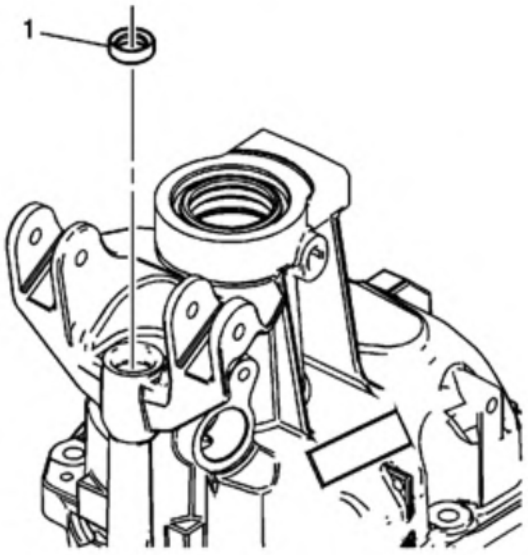


Note: Do not replace the bearing race unless inspection shows bearing race damage.

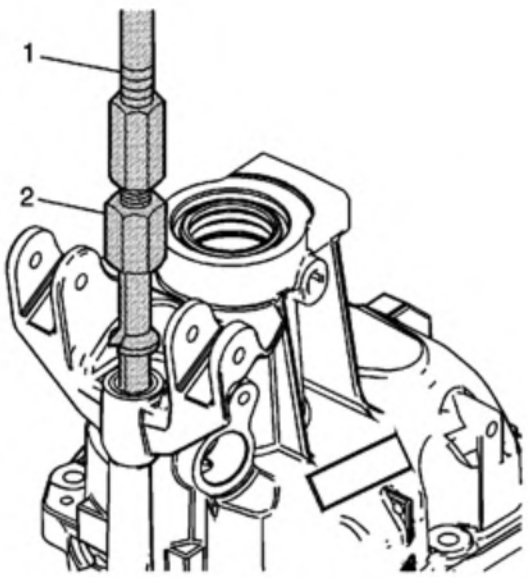
17. Place the extension housing on a flat work surface. Locate the oil clearance gap between the housing and the main shaft bearing race.
18. Insert a brass drift through the mainshaft opening of the extension housing, into the oil clearance gap. Using a mallet, tap down on the drift to remove the mainshaft bearing race.



19. Remove the reverse rail bushing using the *J 36190* handle (1) and *J 39439-2* installer (2).



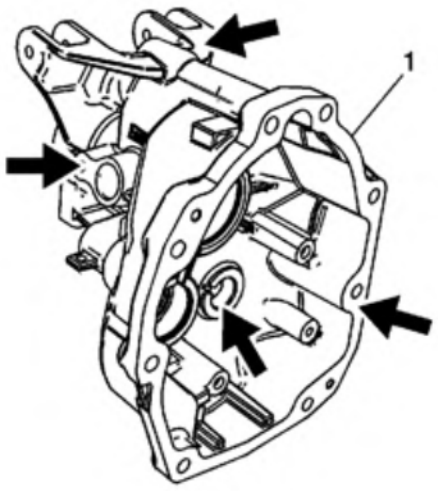
20. Remove the rear housing shift rail seal.



21. Remove the shift rail bearing using the *J 23907* slide hammer (1) and *DT 49216* remover (2).

Extension Cleaning and Inspection

Warning: Refer to Safety Glasses and Compressed Air Warning in the Preface section.





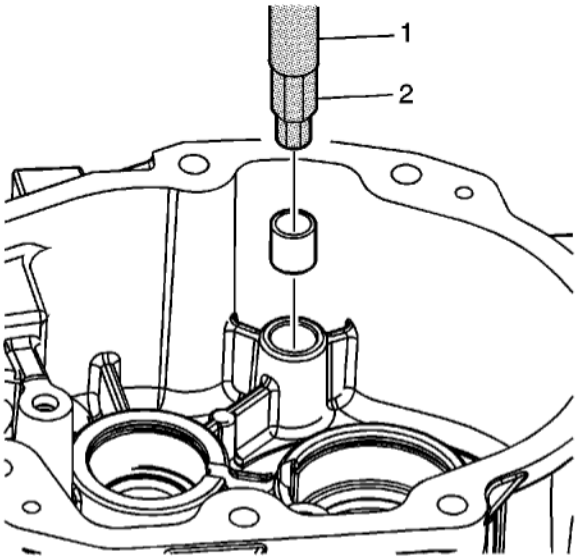
1. Clean the rear extension housing in a suitable solvent. Air dry the housing.
2. Inspect the extension housing for the following:
   - Cracks
   - Scratches
   - Damaged threads
   - Burrs
   - Nicked mounting surfaces
   - Damaged sealing surfaces
   - Damaged front or rear bearing bores
3. Replace a cracked housing.
4. Clean up damaged threads with the correct size thread tap.
5. Inspect the machined mating surfaces for flatness. Check the mating surfaces with a straight edge.
6. Use a fine mill file to dress minor scratches or burrs.

Extension Assemble

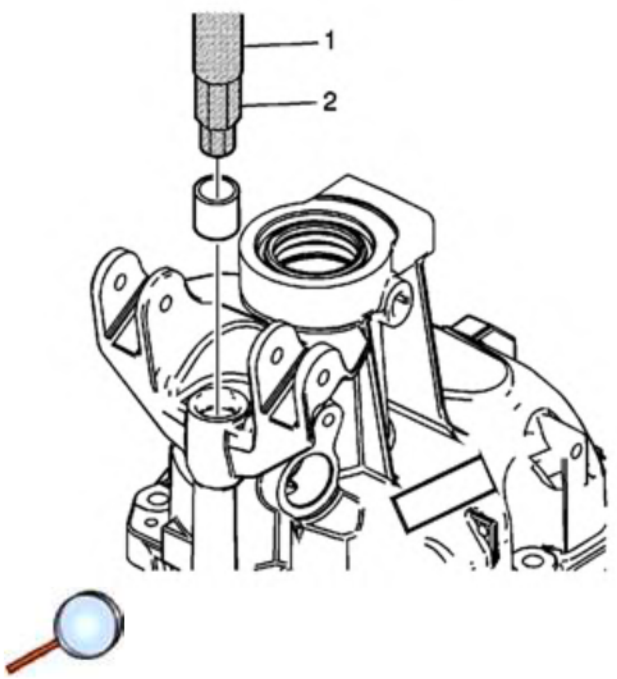
Special Tools

- *DT 48074* Input and Output Shaft Seal Installer
- *DT 48802* Bearing Installer
- *J 8092* Drive Handle
- *J 21426* Outer Output Shaft Seal Installer
- *J 36190* Universal Driver Handle
- *J 39437* Bushing Installer
- *J 39439-3* Rear Case Bushing Installer
- *J 39546* Bearing Race Installer
- *J 44384* Shifter Fork Bearing Installer

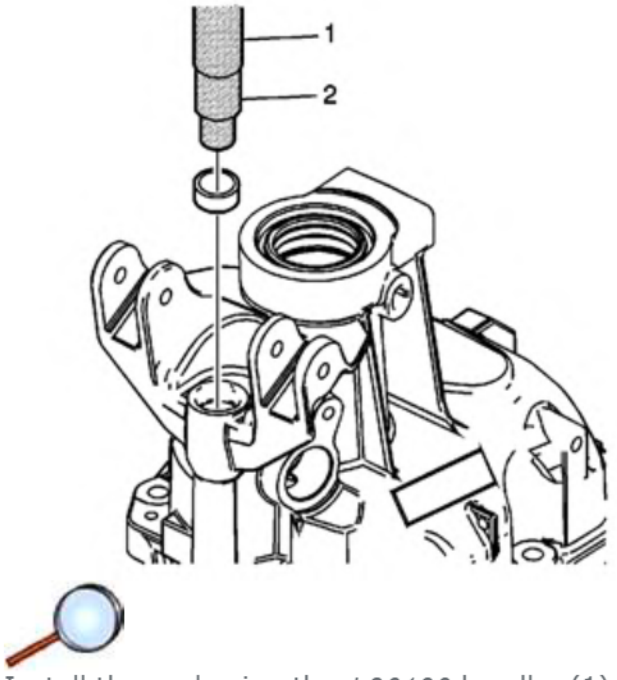
For equivalent regional tools, refer to Special Tools.



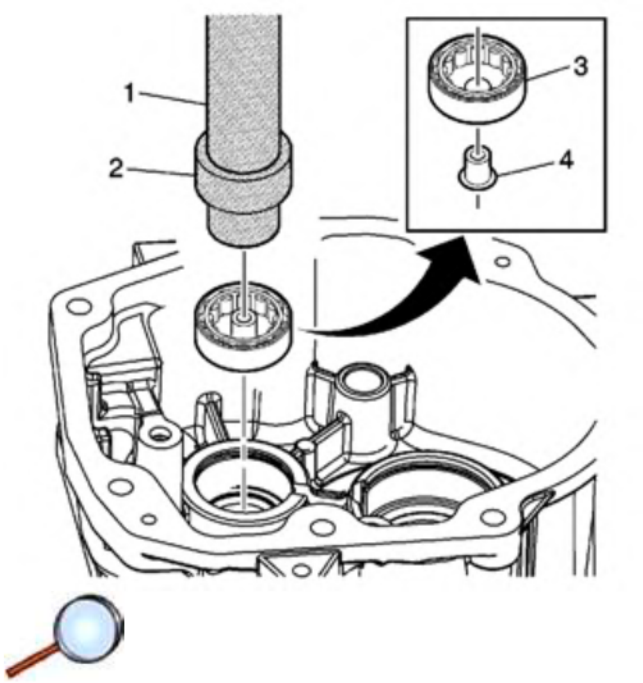
1. Using *J 36190* handle (1) and *J 39439-3* installer (2), install the reverse rail bushing.



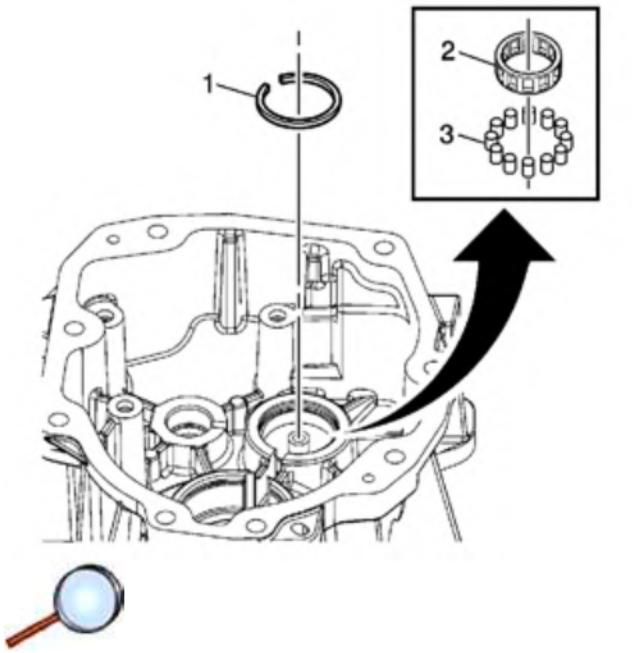
2. Install the shift rail bearing using the *J 36190* handle (1) and the *J 44384* installer (2).



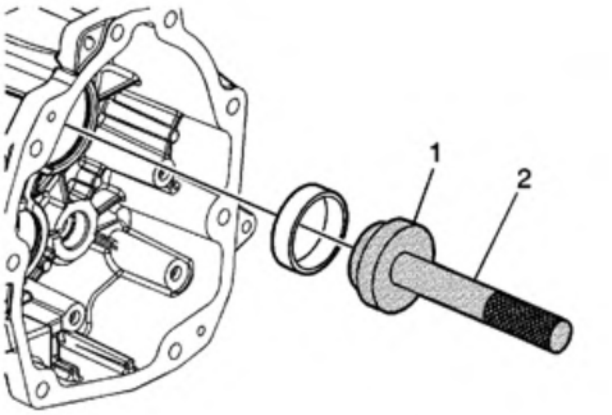
3. Install the seal using the *J 36190* handle (1) and *J 44384* installer (2).



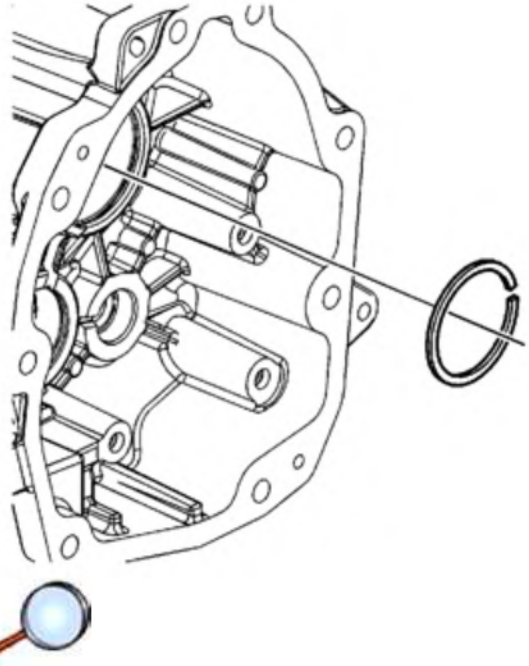
4. Snap the oil funnel into a NEW extension housing countershaft bearing assembly.
5. Using the *J 36190* handle (1) and *DT 48802* installer (2), install the countershaft bearing.



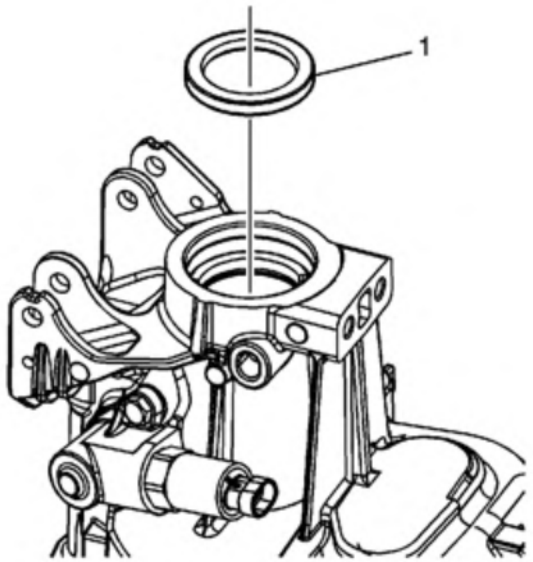
6. Install the countershaft rear bearing retainer.



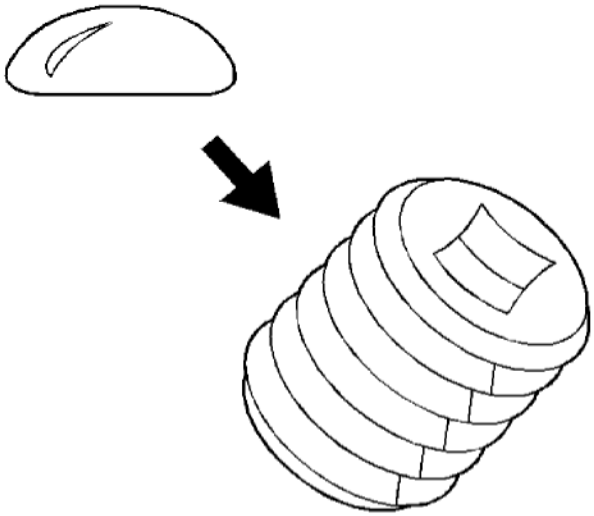
7. Install the mainshaft bearing race, using the *J 39546* installer (1) and the *J 8092* drive handle (2).



8. Install the mainshaft bearing race retainer ring.

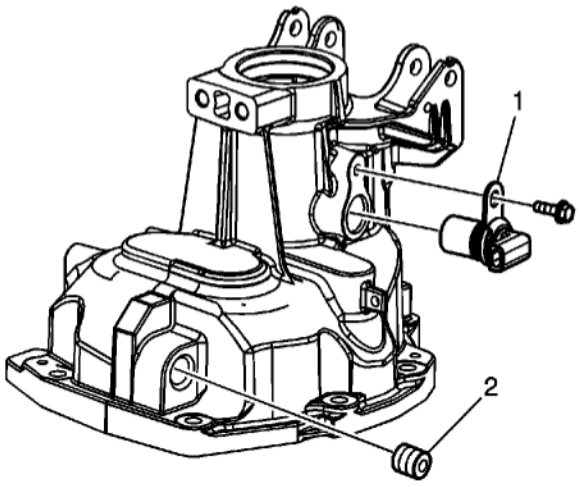


9. Install the NEW output shaft seal using the *J 8092* drive handle and the *DT 48074* input/output Shaft installer .

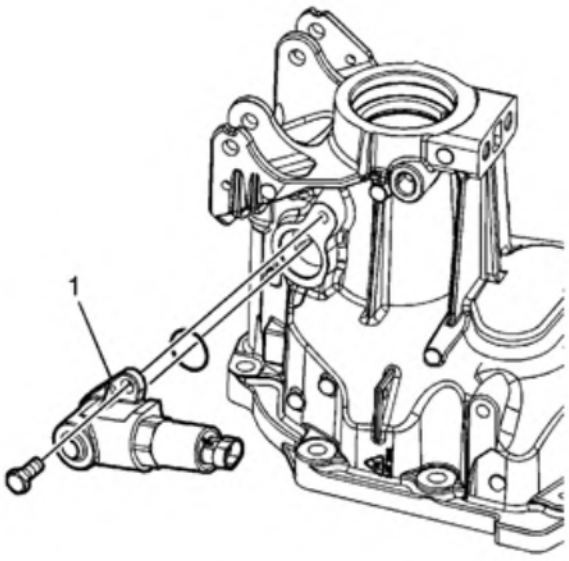


10. Apply sealer GM P/N 12346004 (Canadian P/N 10953480) or equivalent to the transmission case drain plug.

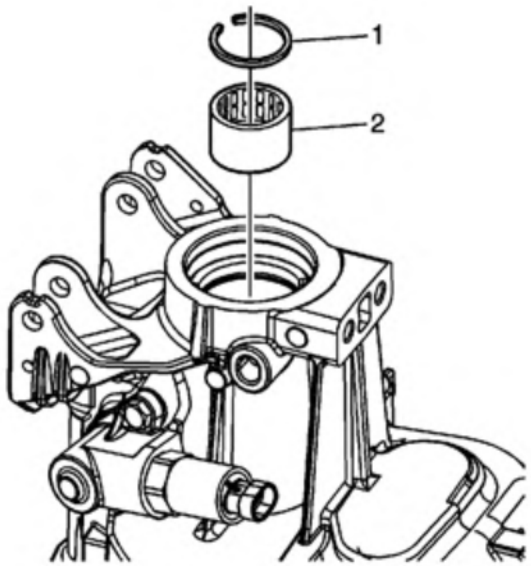
Caution: Refer to Fastener Caution in the Preface section.



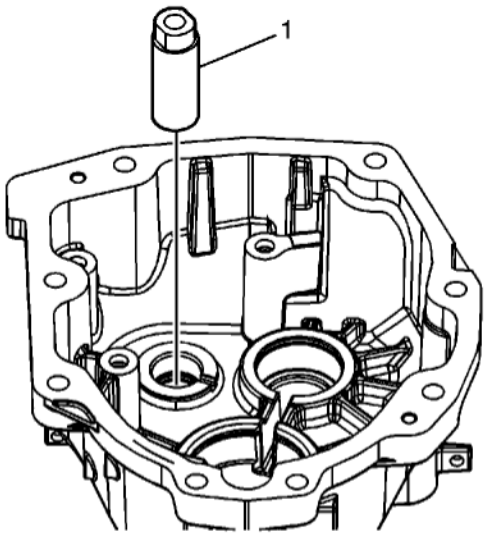
11. Install the transmission case drain plug (2) and tighten to **27 N·m (20 lb ft)**.
12. Install the vehicle speed sensor (1).
13. Install the vehicle speed sensor bolt and tighten to **11 N·m (96 lb in)**.



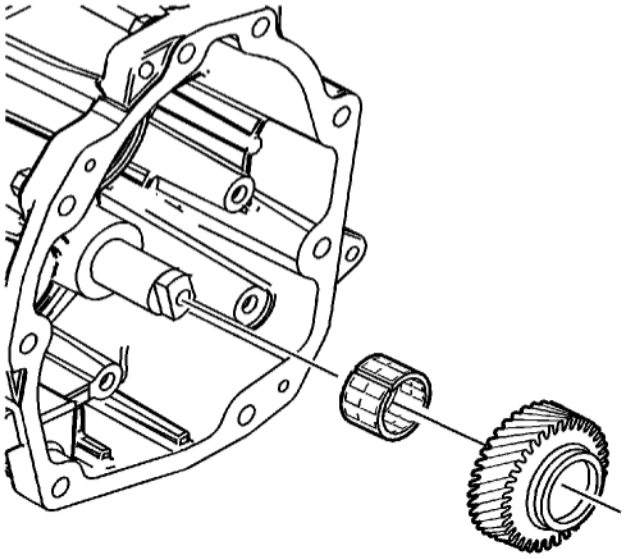
14. Install a NEW O-ring onto the reverse lockout assembly.
15. Install the reverse lockout assembly into the extension housing.
16. Install the reverse lockout assembly bolt and tighten to **18 N·m (13 lb ft)**.



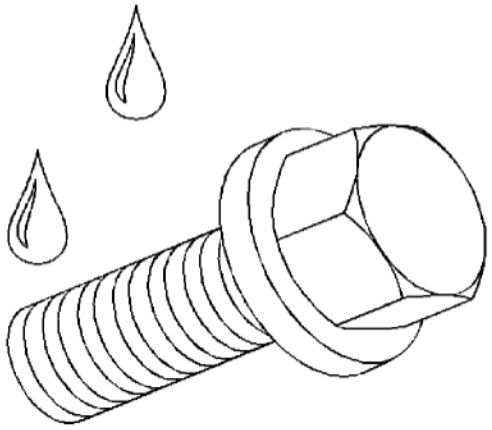
17. Install the roller bearing (2).
18. Install the snap ring (1).



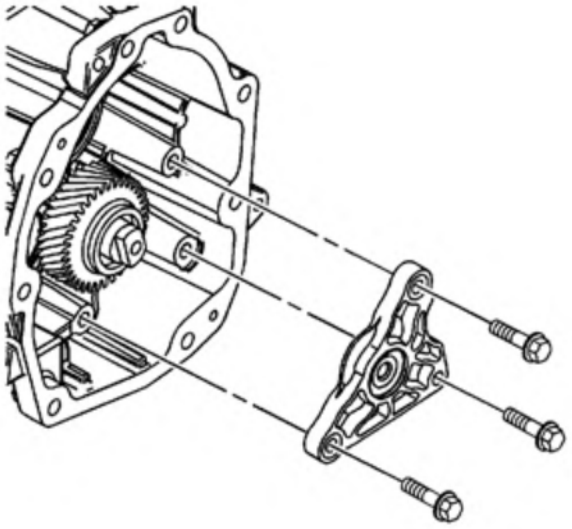
19. Install the reverse idler gear shaft (1).



20. Install the roller bearing and reverse idler gear.

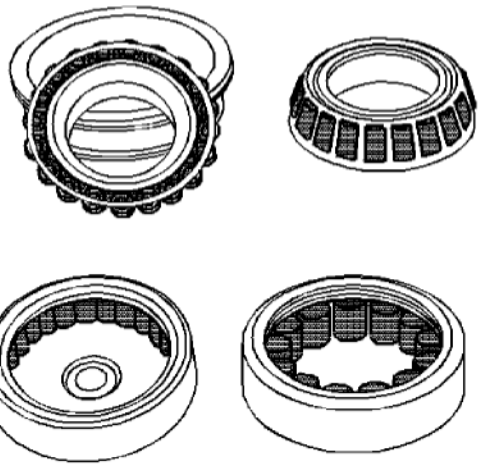


21. Apply GM P/N 12345382, (Canadian P/N 10953489) or equivalent to the reverse idler shaft bracket bolt threads.



22. Install the reverse idler shaft bracket and bolts. Tighten the bolts to **25 N·m (18 lb ft)**.

Bearings and Spacers Cleaning and Inspection

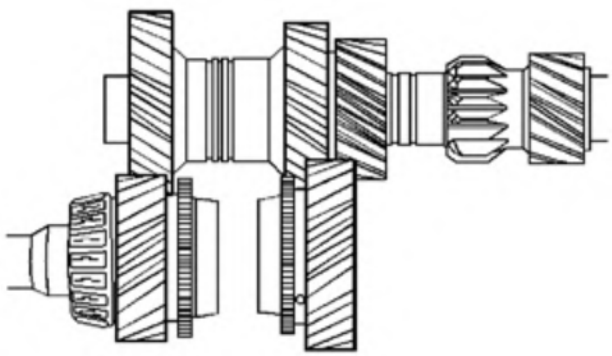


Warning: Wear safety glasses to avoid injury when using compressed air or any cleaning solvent. Bodily injury may occur if fumes are inhaled or if skin is exposed to chemicals.

Caution: Do not allow the bearings to spin. Turn them slowly by hand. Spinning the bearings may damage the race and the rollers.

1. Clean all the bearing parts in a suitable solvent. Air dry all the parts.
2. Lubricate the bearings. Refer to Lubrication Specifications for the proper transmission lubricant.
3. Inspect the bearings and journals for roughness and unusual wear or damage.
4. Inspect the mainshaft bearing journals for wear.
5. Inspect the mainshaft speed gear bearings for wear.
6. Inspect the main drive gear pilot bearing rollers for wear.
7. Replace parts which show signs of excessive wear.
8. Do not file surfaces which have been hardened and precision ground.
9. Replace worn or damaged bearings.
10. Replace mated bearing parts when only one part is damaged.

Gears Cleaning and Inspection



Warning: Wear safety glasses to avoid injury when using compressed air or any cleaning solvent. Bodily injury may occur if fumes are inhaled or if skin is exposed to chemicals.

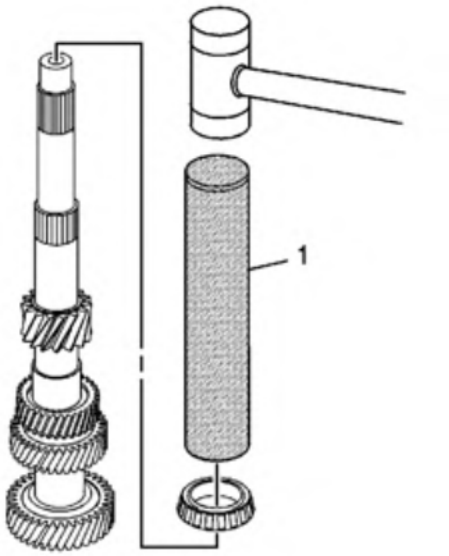
1. Clean all the parts in a suitable solvent. Air dry all the parts.
2. Inspect the gear tooth surfaces on all the gear sets for the following conditions:
   - Cracks
   - Pitting
   - Nicks
   - Chipped gear teeth
   - High spots -- small shiny spots on the gear teeth mating surfaces
3. Inspect for damaged splines on the input shaft, mainshaft, and the countershaft extension.
4. Remove nicks and burrs with a soft stone or a crocus cloth.
5. Replace a burred or nicked part that cannot be reconditioned by hand.
6. Replace gears and gear assemblies that are worn or damaged.

Counter Gear Shaft Assemble

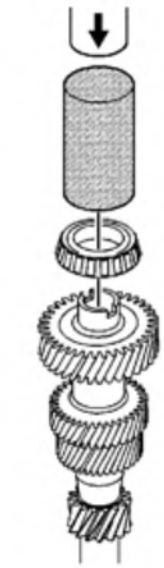
Special Tools

J 38205-1 Press Tube

For equivalent regional tools, refer to Special Tools.



1. Install a NEW large tapered bearing, using the *J 38205-1* press tube and a rubber mallet.



2. Install a NEW small tapered bearing, using the *J 38205-1* press tube and a hydraulic press.

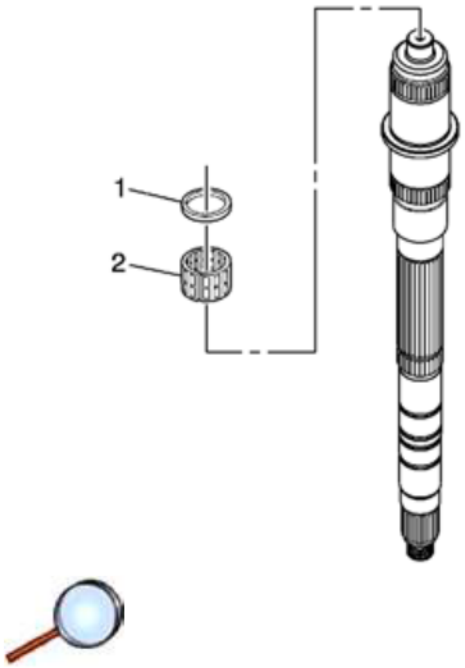
Main Shaft and Input Shaft Assemble

Special Tools

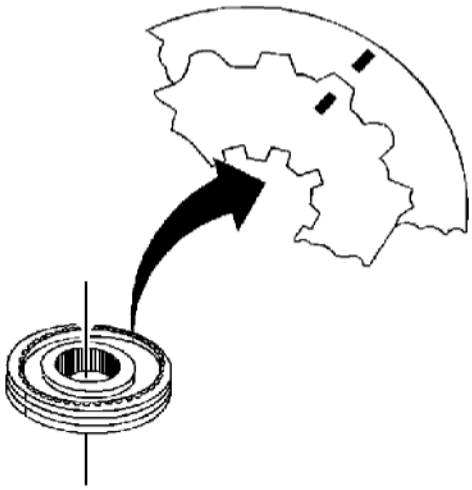
- *J 28537-17* Bearing Race Installer
- *J 36183* Press Tube
- *J 36184* Press Tube Adapter
- *J 39371* 1st/2nd Synchronizer Installer
- *J 39441* 5th/6th Driven Gear Installer
- *J 39441-10* Installer Adapter
- *J 39441-20* 5th Gear Installer Adapter
- *J 39473* Mainshaft Bearing Installers .
- *J 44735* Installation Tube

For equivalent regional tools, refer to Special Tools

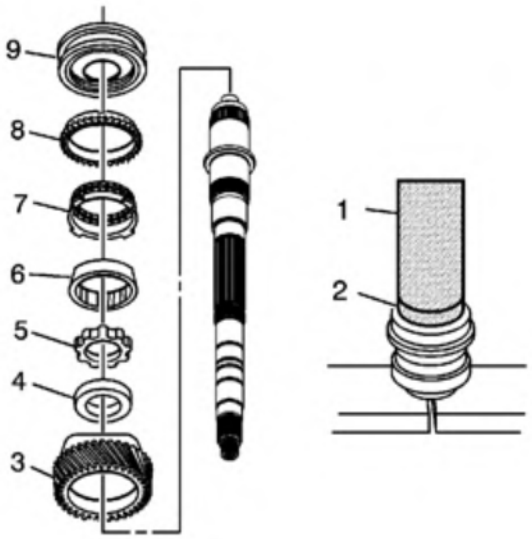
Mainshaft



1. Install the 3rd speed gear caged needle bearing and the spacer.
2. Install the 3rd speed drive gear spacer.

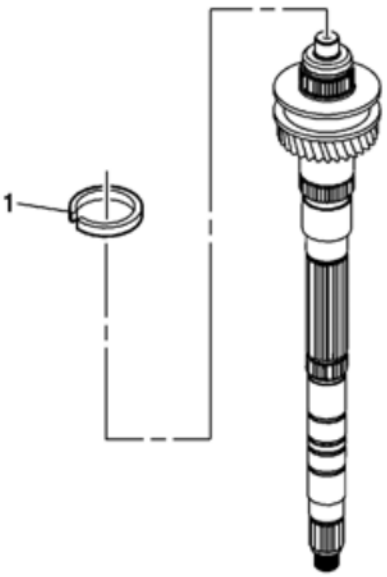


3. Check the 3rd/4th speed gear synchronizer assembly scribe marks for correct positions.

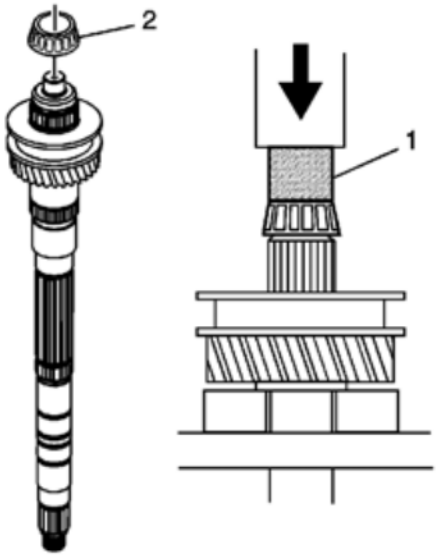


4. Install the 3rd/4th synchronizer assembly as follows:
   4.1. Start the press operation.
   4.2. STOP pressing before the keys engage the blocking ring slots.
   4.3. Lift and rotate the 3rd speed gear in order to engage the keys with the blocking ring.
   4.4. Continue pressing until the synchronizer is seated.
5. Install the following parts in order:
   5.1. The 3rd speed gear (3)
   5.2. The spacer (4)
   5.3. The thrust washer (5)
   5.4. The 3rd speed gear inner cone (6)

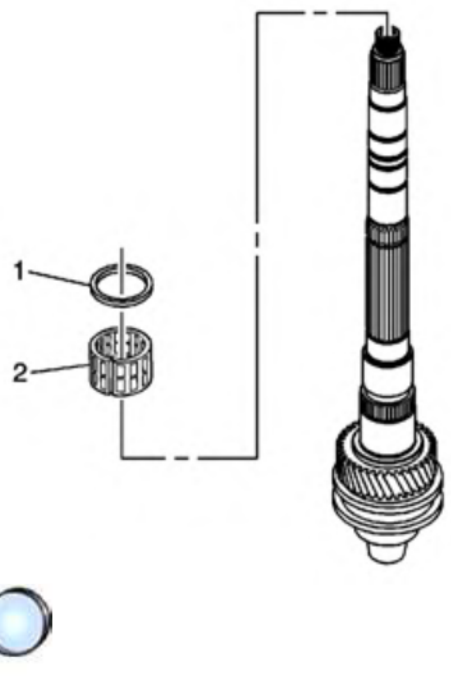
5.5. The 3rd speed gear friction cone (7)
5.6. The 3rd speed gear blocking ring (8)
5.7. The 3rd/4th speed gear synchronizer assembly (9). The groove on the sleeve faces the 3rd speed gear.



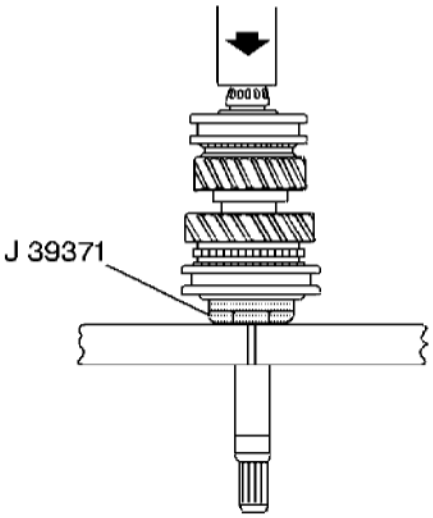
6. Install the 3rd/4th synchronizer retainer ring (1).



7. Install a new mainshaft small tapered bearing (2), using the *J 39473* installers (1), V-blocks, and a hydraulic press.

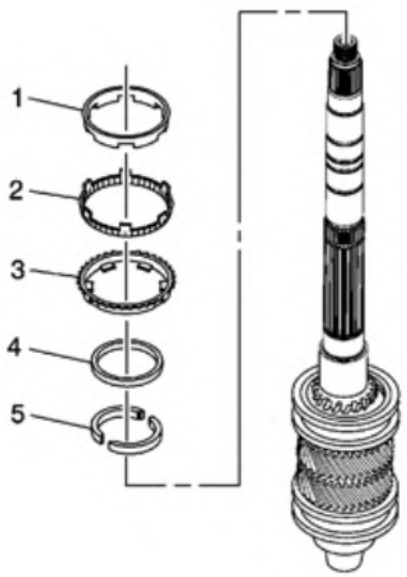


8. Install the 2nd speed gear caged needle bearing (2) and bearing spacer (1).

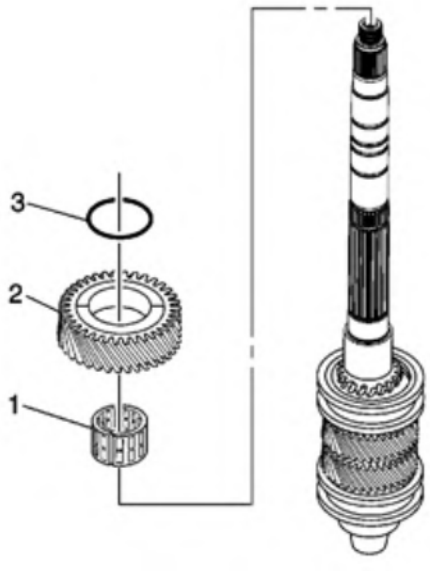


9. Do the following when installing the 1st/2nd synchronizer assembly:
   9.1. Start the press operation.
   9.2. Stop pressing before the keys engage the blocking ring slots.
   9.3. Lift and rotate the 2nd speed gear in order to engage the keys with the blocking ring.
   9.4. Continue pressing until the synchronizer is seated.
10. Install the following parts in order using the *J 39371* 1st/2nd installer and a hydraulic press:
   10.1. The 2nd speed gear
   10.2. The 2nd speed gear inner cone
   10.3. The 2nd speed gear friction cone
   10.4. The 2nd speed gear blocking ring

10.5. The 1st/2nd synchronizer assembly (The ID groove on the sleeve faces the 1st speed gear.)

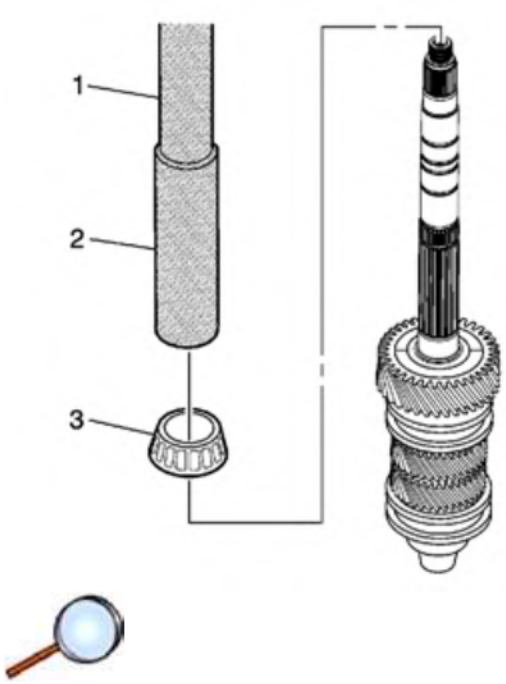


11. Install the following parts in order:
    11.1. The 1st speed gear two piece washer (5)
    11.2. The 1st speed gear locking ring (4)
    11.3. The 1st speed gear synchronizer blocking ring (3)
    11.4. The 1st speed gear outer cone (2)
    11.5. The 1st speed gear inner cone (1)

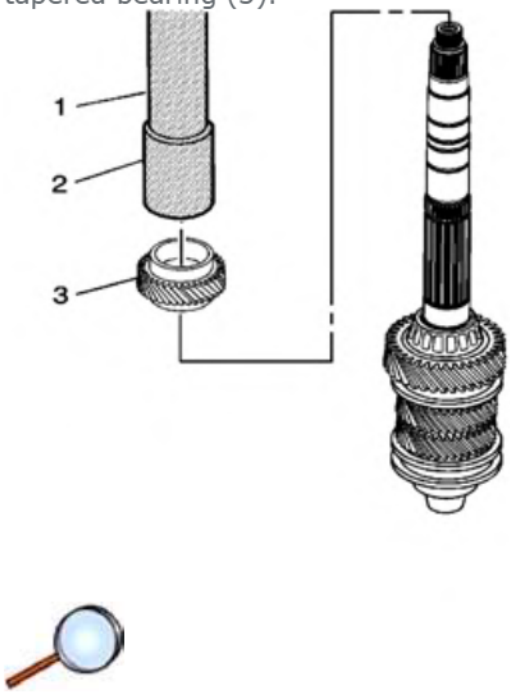


12. Install the following parts in order:

12.1. The 1st speed gear caged needle bearing (1)
12.2. The 1st speed gear (2)
12.3. The mainshaft inner seal O-ring (3)

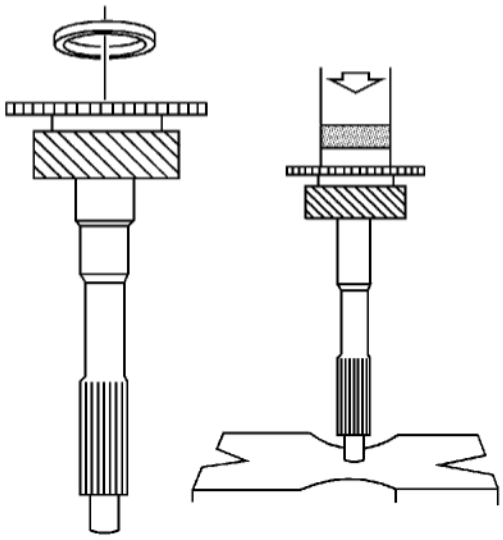


13. Using *J 39441* installer (1), *J 39441-20* adapter (2), and a press, install the mainshaft large tapered bearing (3).

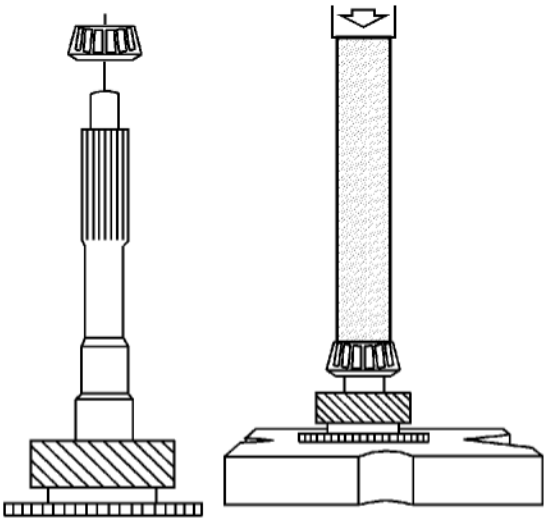


14. Using the *J 39441* gear installer (1) and the *J 39441-10* adapter (2), install the 6th speed driven gear (3).

Input Shaft



1. Install a new bearing race on the input shaft, using the *J 28537-17* installer and a hydraulic press.



2. Install a new tapered bearing on the input shaft. Use the *J 44735* tube and a hydraulic press.

Transmission Assemble

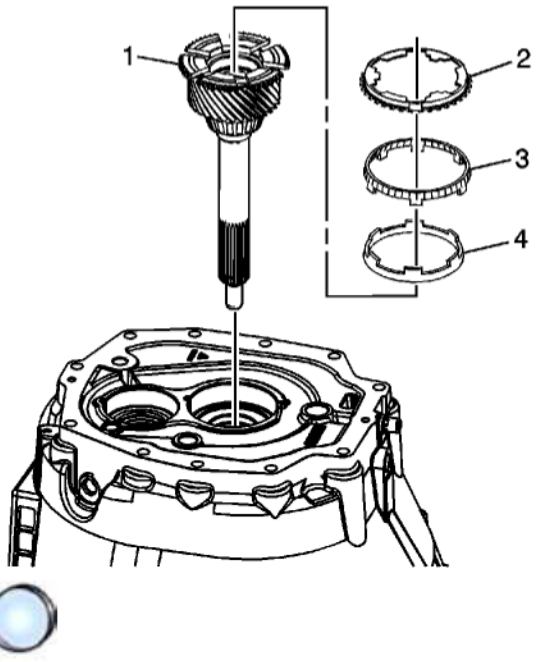
Special Tools

- *DT 47678* Transmission Holding Flange
- *DT 47678-10* Transmission Holding Flange Adapter
- *DT 49293* Gear Select/Skip Shift Solenoid Socket
- *J 08614A* Pinion Flange Holder and Remover
- *J 3289-20* Holding Fixture
- *J 36017* Valve Seal Remover
- *J 36850* Transjel® Lubricant Assembly Lube
- *J 38205-1* Press Tube
- *J 39441-20* Fifth Gear Installer Adapter
- *J 39441-30* 5th/6th Driven Gear Installer
- *J 39442* Mainshaft and Countershaft Press Adapter
- *J 44395* Transmission Holding Fixture

For equivalent regional tools, refer to Special Tools.

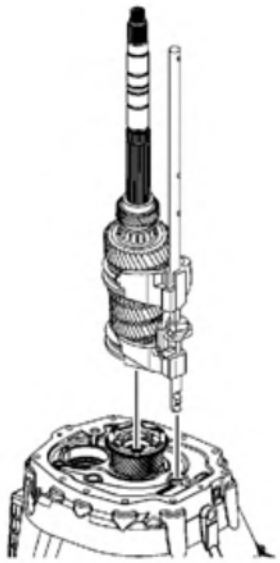
Shift Shaft Assemblies and Gear Clusters Installation

1. Lubricate all components as assembly progresses, using *J 36850* transjel® lubricant .



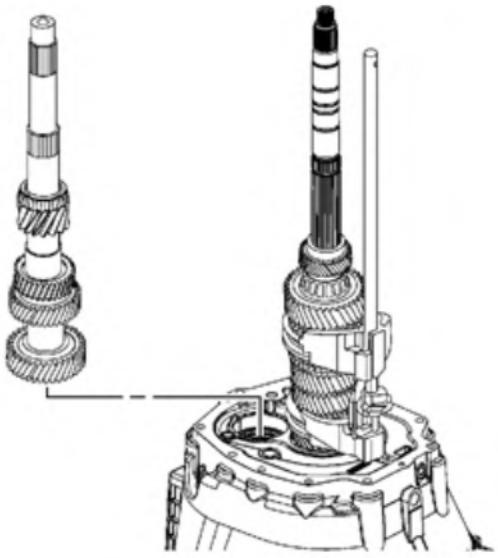
2. Install the input shaft (1) in the clutch housing.
3. Install the 4th gear blocking assembly:
   3.1. Install the 4th speed drive gear inner cone (4).
   3.2. Install the 4th speed drive gear outer cone (3).

3.3. Install the 4th speed drive gear blocking ring (2).



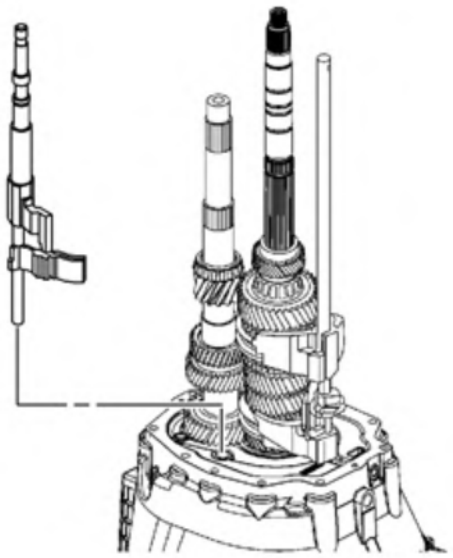
Note: In order for the shift forks to properly line up with the synchronizers, the shift shaft assembly must be assembled correctly. Refer to Shift Shaft and Fork Assemblies Assemble.

4. Assemble the shift shaft to the mainshaft.
5. Install the mainshaft and the shift shaft assembly into the clutch housing.



6. Install the countershaft assembly using the following sequence:
   6.1. Lift up the mainshaft assembly enough in order to install the countershaft assembly.
   6.2. Install the countershaft assembly.
   6.3. Lift the mainshaft assembly enough in order to rotate the input shaft to engage the

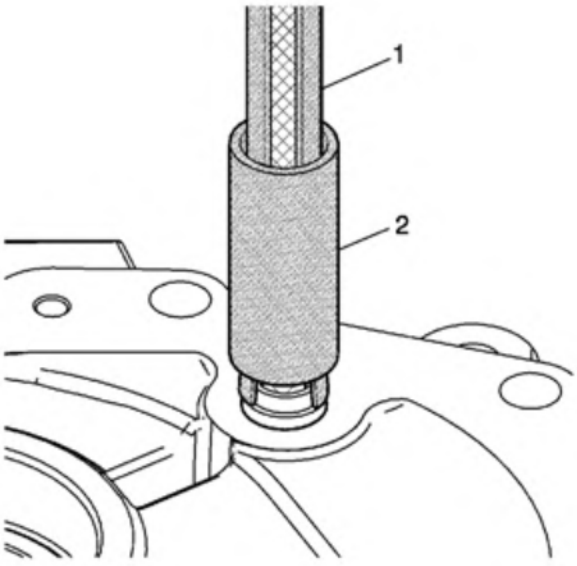
synchronizer keys with 4th gear blocking ring.



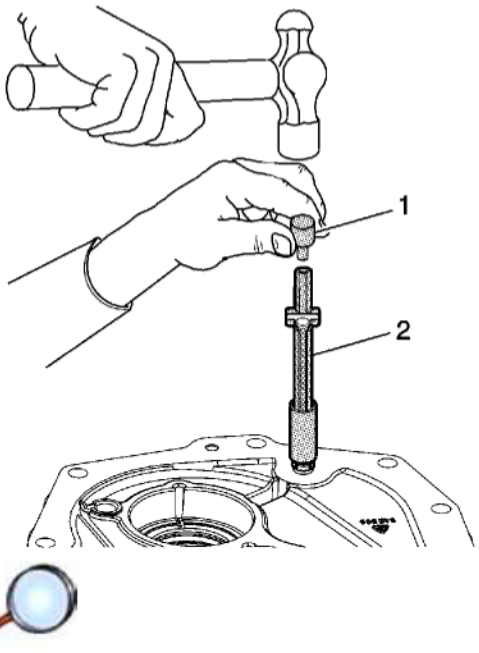
7. Install the 5th/6th and the reverse shift shaft.

   Align the slots of the shift shaft levers with the interlock plate.

Oil Filter Installation

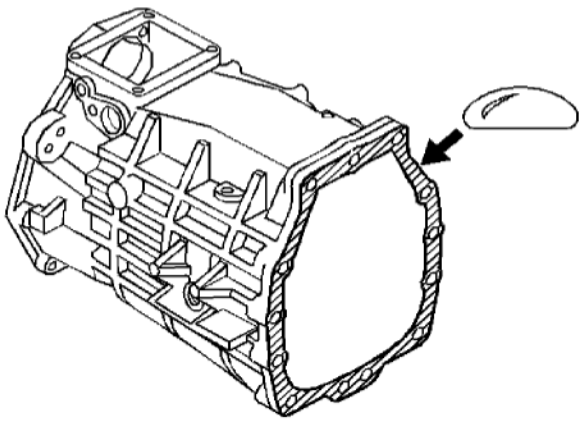


1. Attach the *J 36017* remover (1) within the groove at the base of the oil filter assembly. Slide the collar (2) of the tool down to grasp the oil filter assembly.



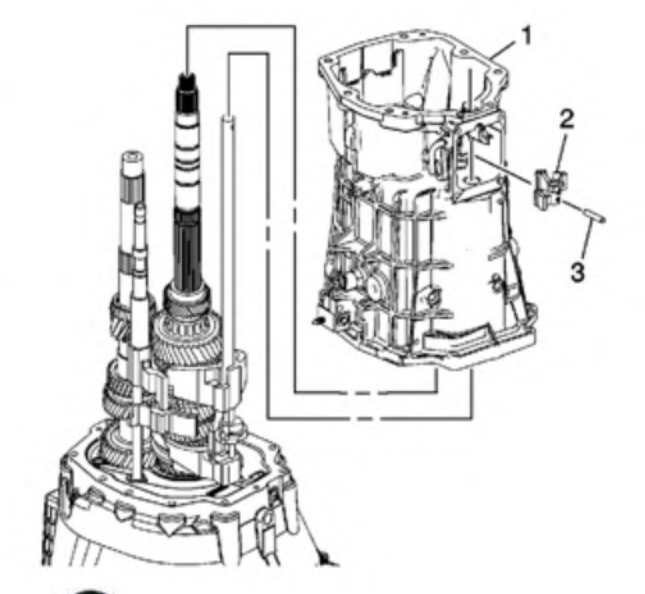
2. Place the oil filter assembly with *J 36017* remover (2) attached onto the clutch housing.
3. Using the *J 39442* adapter (1), tap the oil filter assembly into place with a hammer. Remove the *J 36017* remover .

Transmission Case Installation

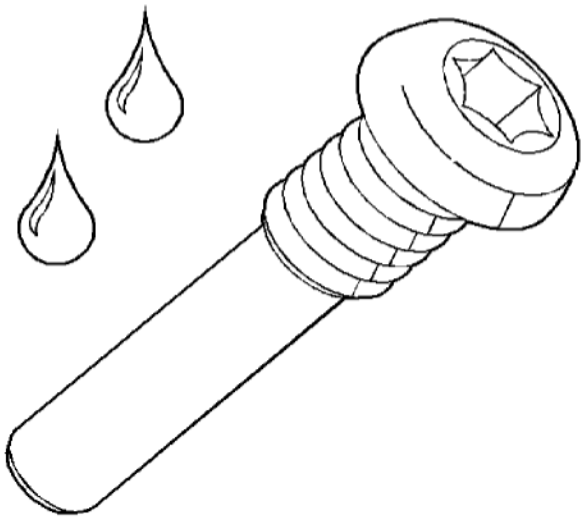


Note: Lubricate all components as the assembly progresses. Use *J 36850* transjel® lubricant or the equivalent.

1. Apply sealant GM P/N 12345739, (Canadian P/N 10953472) or equivalent to the transmission case to adapter plate mating surface.

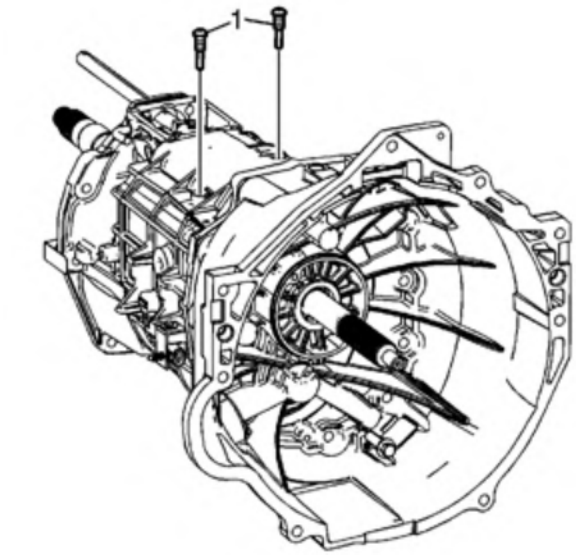


2. Do the following in order to install the transmission case and the select control lever assembly:
   2.1. Shift the transmission into NEUTRAL in order to keep the 3rd/4th shift shaft from engaging.
   2.2. Install the select control lever assembly (2), through the transmission case opening, while sliding the transmission case (1) onto the gear clusters and the shift rail components.
   2.3. Install the select control lever assembly pin (3).



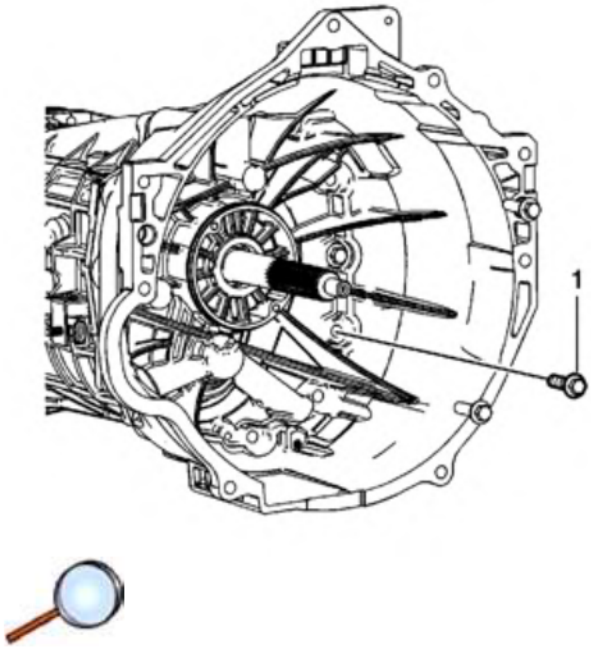
3. Apply threadlock GM P/N 12346004, (Canadian P/N 10953480) or equivalent to the threads of the shift lever guide bolts.

Caution: Refer to Fastener Caution in the Preface section.

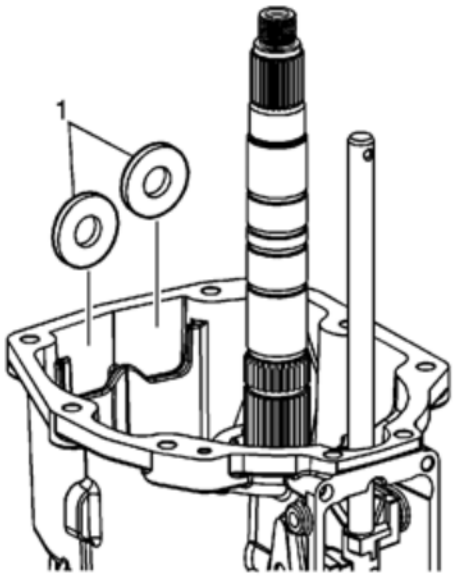


Note: In order to align the shift interlock plate slot with the shift lever guide bolt holes, pull up on the 5th/6th and reverse shift rail assembly while installing the shift lever guide bolts.

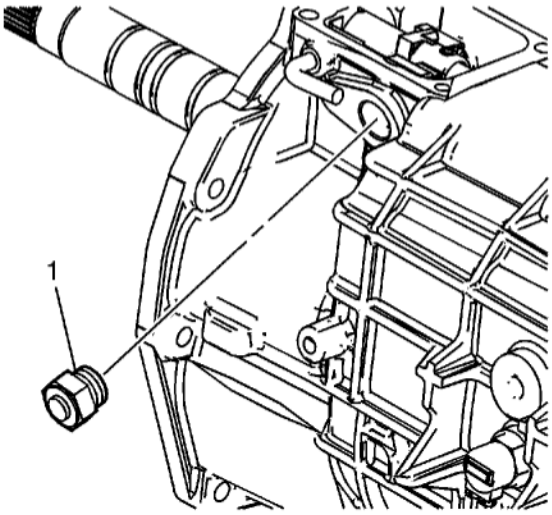
4. Install the shift lever guide bolts while pulling up on 5th/6th and reverse shift rail assembly. Tighten the bolts to **27 N·m (20 lb ft)**.



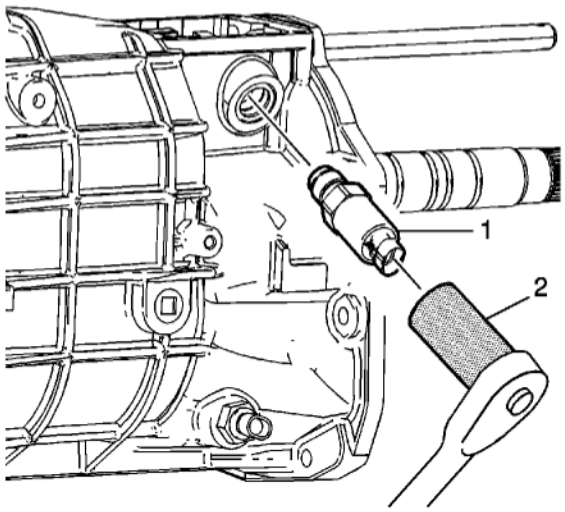
5. Install the clutch housing to transmission case bolts and tighten to **48 N·m (36 lb ft)**.



6. Install the magnets into the transmission case.

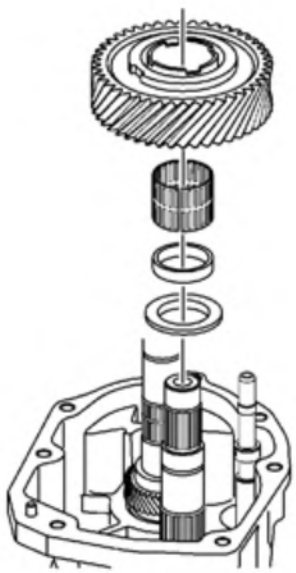


7. Install the shift detent assembly and tighten to **40 N·m (30 lb ft)**.

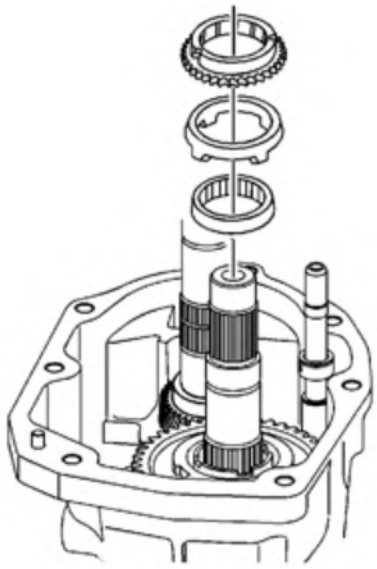


8. Using *DT 49293* socket , install the gear select/skip shift solenoid and tighten to **40 N·m (30 lb ft)**.

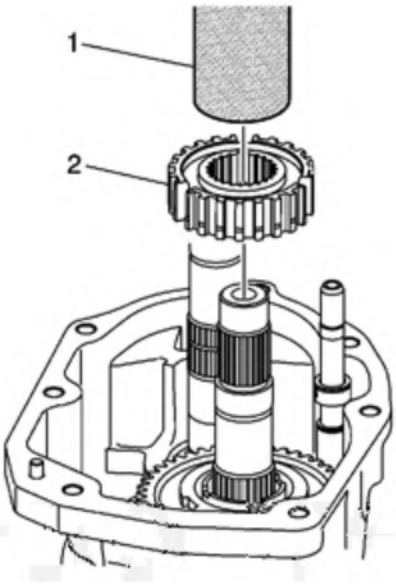
5th / 6th Speed Driven Gear Installation



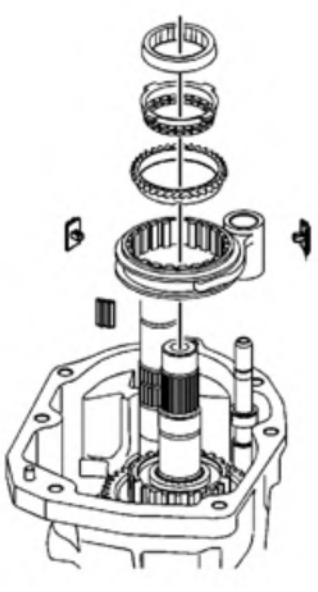
1. Install two spacers, caged needle bearing, and 6th driven gear.



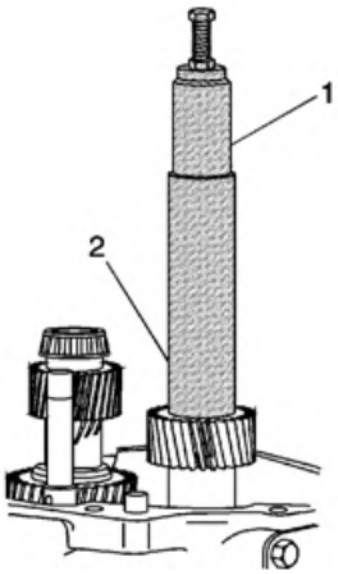
2. Install the speed drive gear inner cone, speed drive gear friction cone, and synchronizer blocking ring.



3. Install the synchronizer hub assembly (2) using *J 38205-1* tube (1).

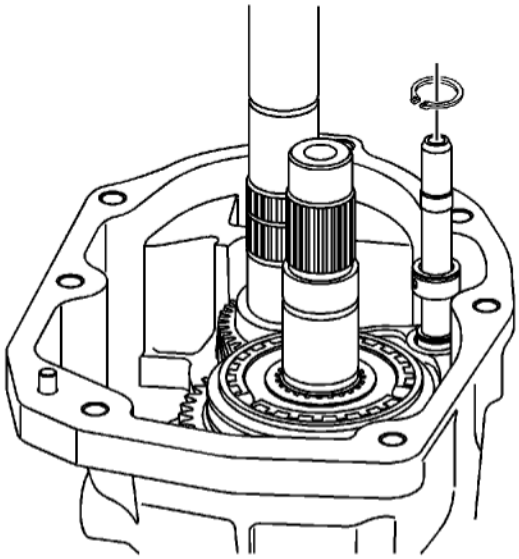


4. Install the following components:
   - drive gear inner cone
   - drive gear friction cone
   - synchronizer blocking ring
   - synchronizer inserts
   - synchronizer sleeve
   - 5th/6th shift fork

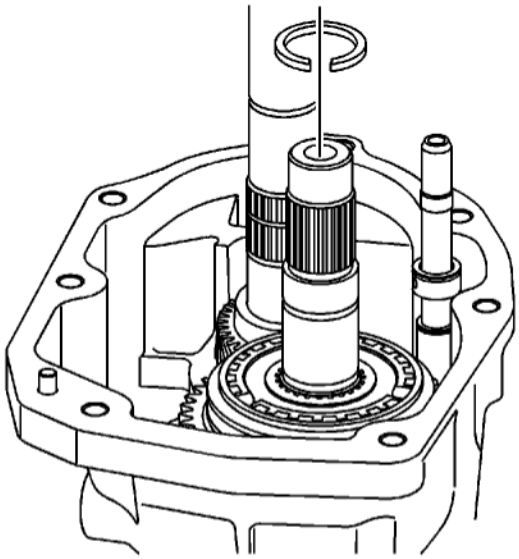


5. Install the 5th/6th speed driven gear using the *J 39441-30* installer (2) and *J 39441-20* adapter (1). The smaller outside diameter (OD) of the gear faces down.

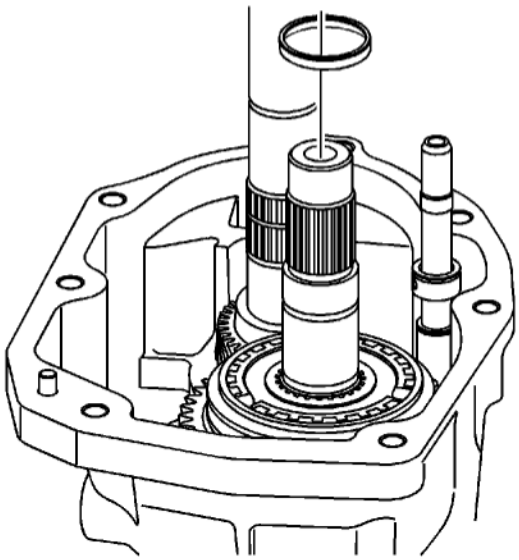
Reverse Shift Fork Installation



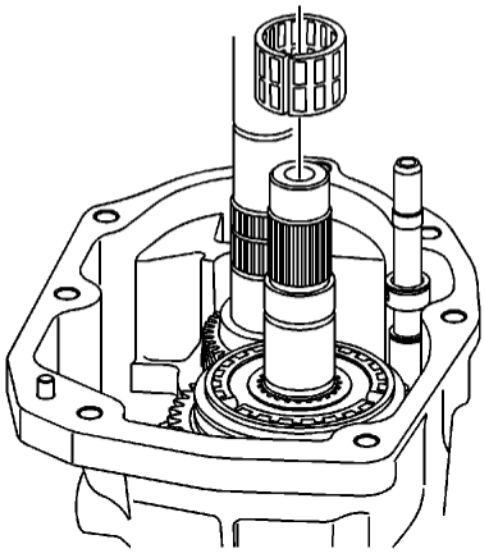
1. Install the 5th/6th speed shift fork retainer ring.



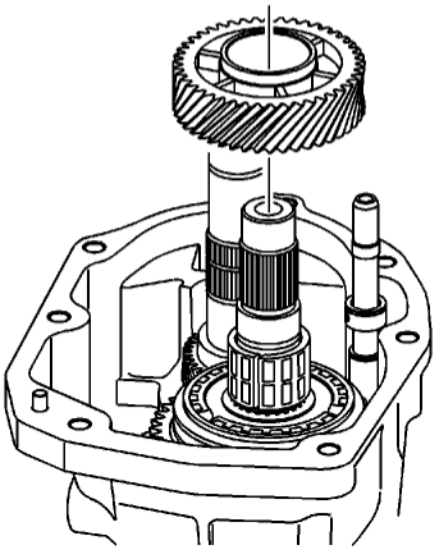
2. Install the retainer clip to the countershaft.



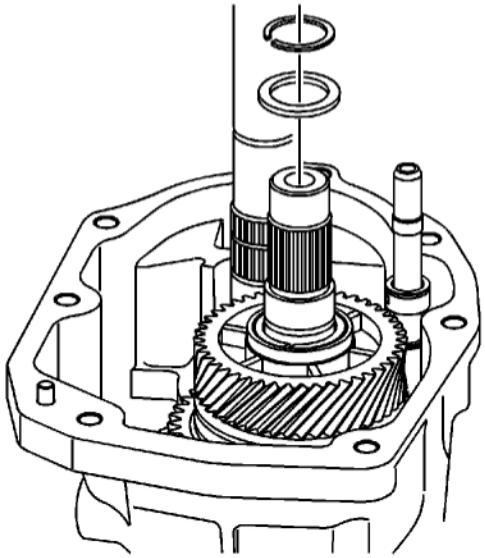
3. Install the spacer to the countershaft.



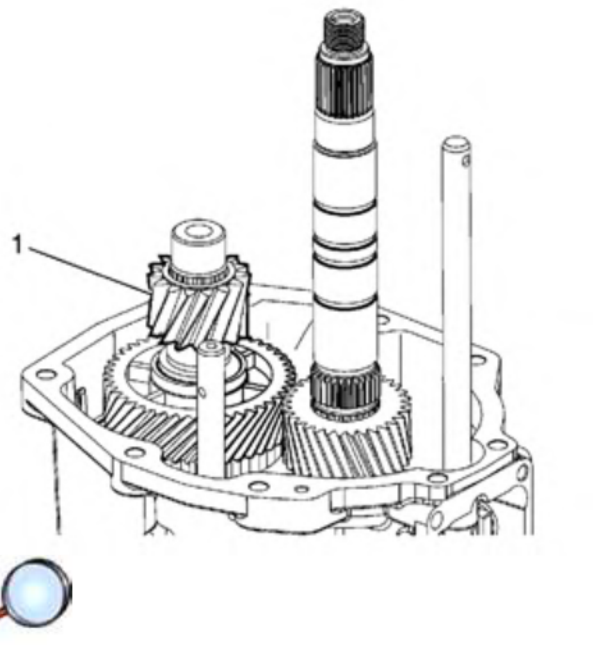
4. Install the needle bearing to the countershaft.



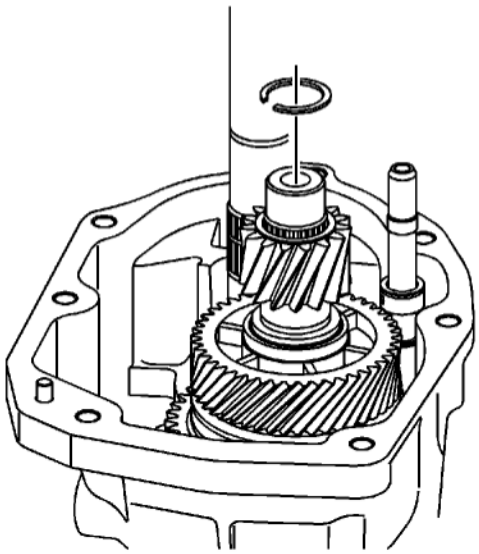
5. Install the gear to the countershaft.



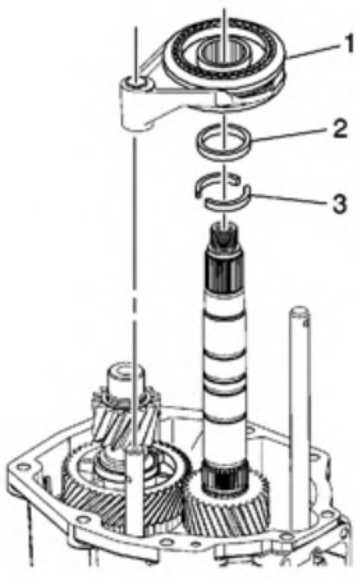
6. Install the countershaft retainer and spacer.



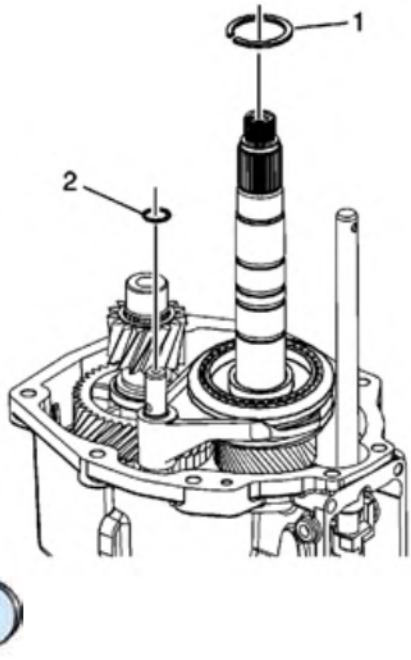
7. Install the countershaft gear.



8. Install the countershaft retainer ring.

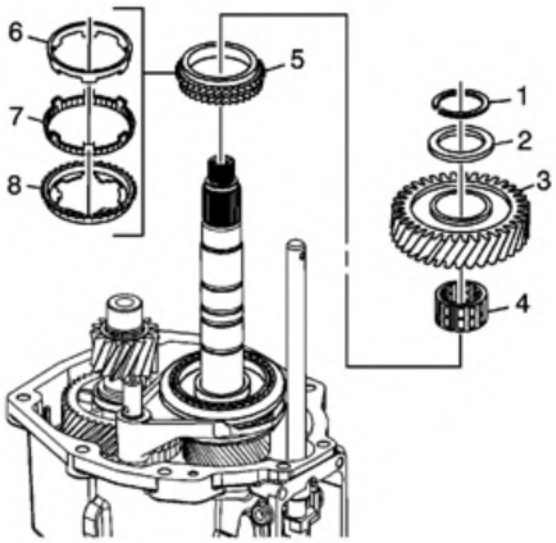


9. Install the two piece thrust washer.
10. Install the locking ring.
11. Install the reverse shift fork and the synchronizer.

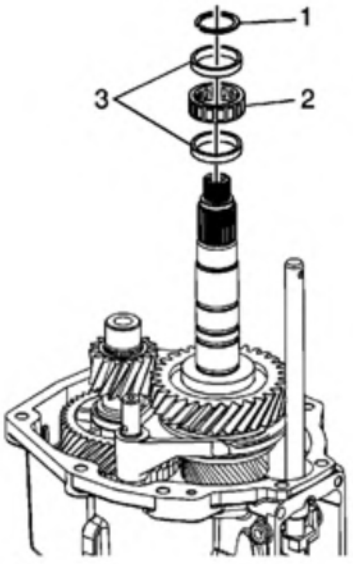


12. Install a NEW shift fork retainer ring.
13. Install the reverse synchronizer retainer ring.

Reverse Speed Gear Installation

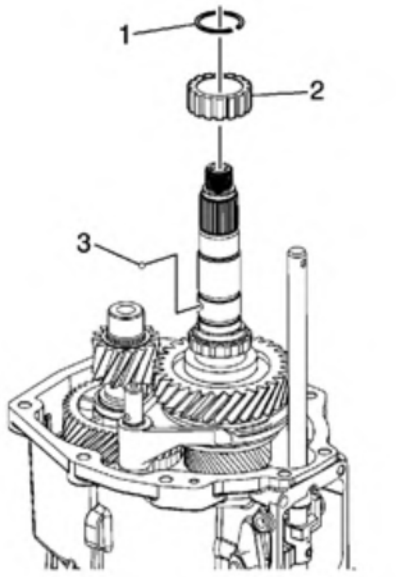


1. Install the following parts in order:
   1.1. The reverse gear blocking ring assembly (5), including the following components:
      - Reverse gear inner ring (6)
      - Reverse gear outer ring (7)
      - Reverse gear blocking ring (8)
   1.2. The caged needle bearing (4)
   1.3. The reverse speed gear (3)
   1.4. The thrust washer (2)
   1.5. The retainer ring (1)

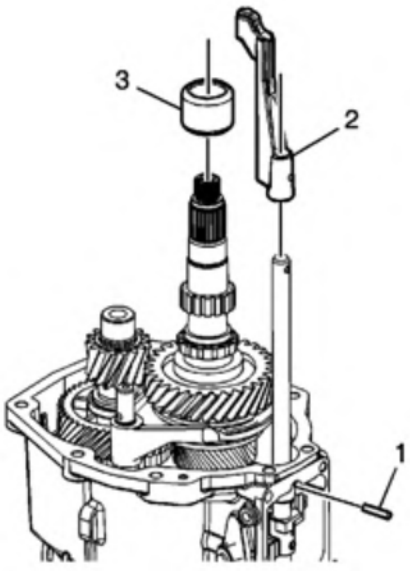


2. Install the following parts in order:

2.1. The spacer
2.2. The roller bearing
2.3. The spacer
2.4. The roller bearing retainer ring

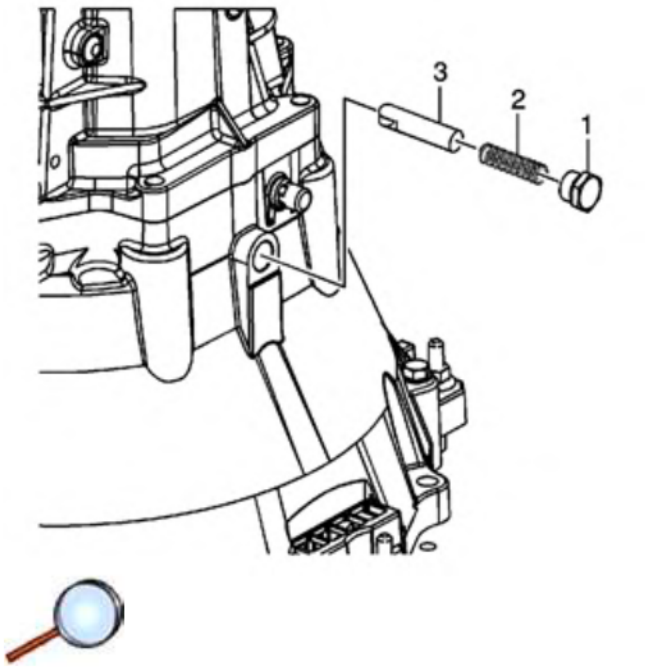


3. Install the following parts in order:
   - The locking ball
   - The speed sensor rotor
   - The snap ring



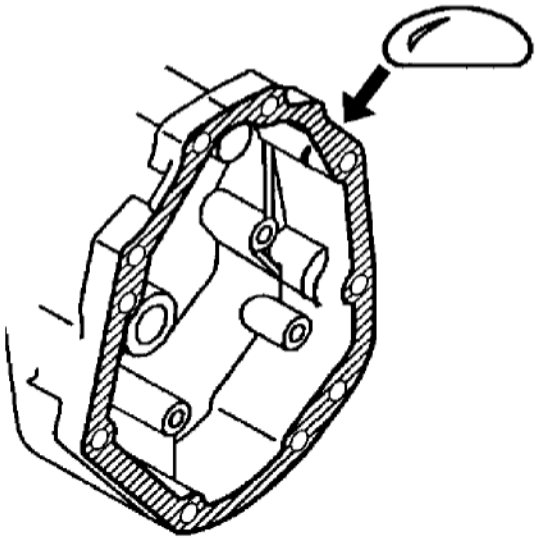
4. Install the extension housing main shaft bearing race.

5. Install the shift shaft extension.
6. Install NEW shift guide roll pin.

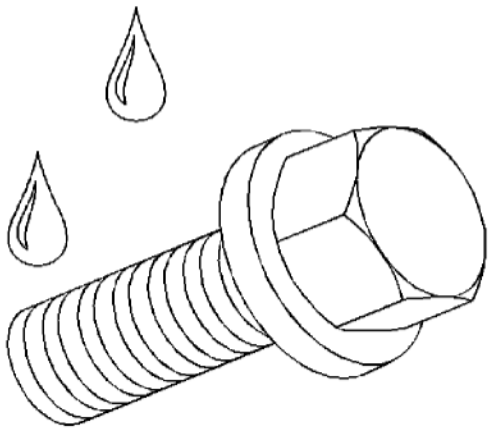


7. Lift up on the shift shaft extension while installing the shift detent roller, spring and plug. Tighten the plug to **24 N·m (18 lb in)**.

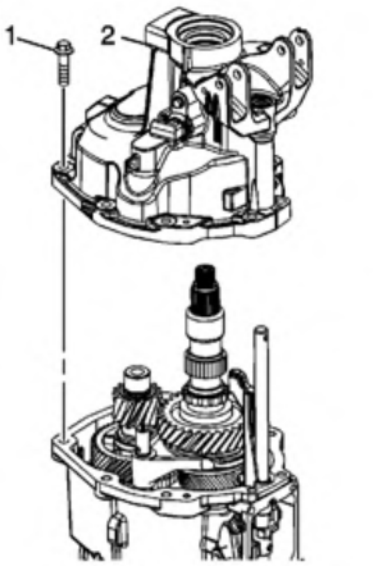
Extension Housing Assembly Installation



1. Apply sealant GM P/N 12345739, (Canadian P/N 10953472) or equivalent to the extension housing to the transmission case mating surface.

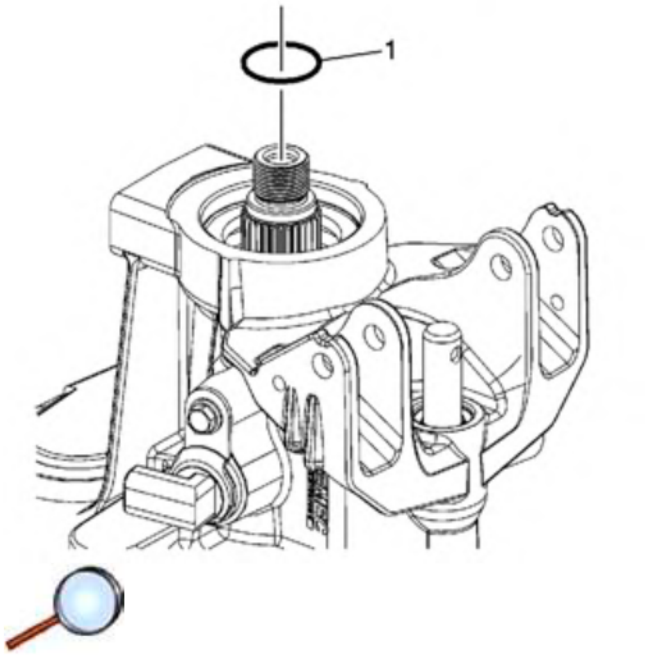


2. Apply thread sealer GM P/N 12346004, (Canadian P/N 10953480) or equivalent to the top 2 extension housing bolts.

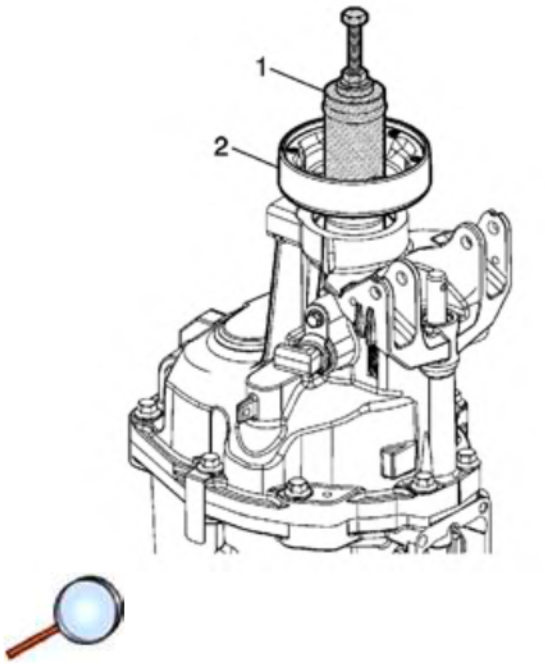


Note: Align the 5th/6th shift shaft to the extension housing bore in order to install the extension housing.

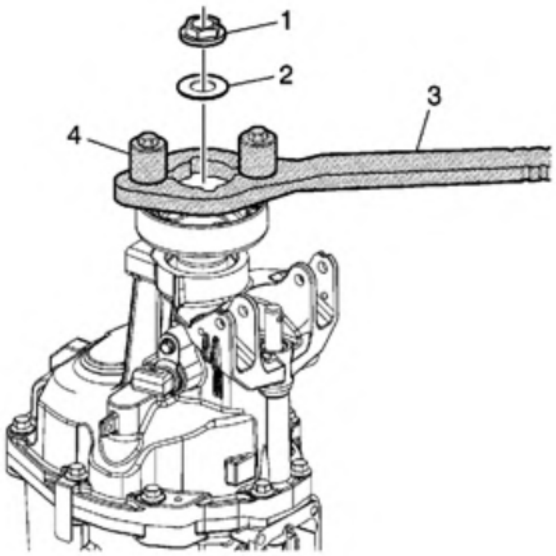
3. Install the extension housing.
4. Install the extension housing bolts and tighten to **48 N·m (36 lb ft)**.



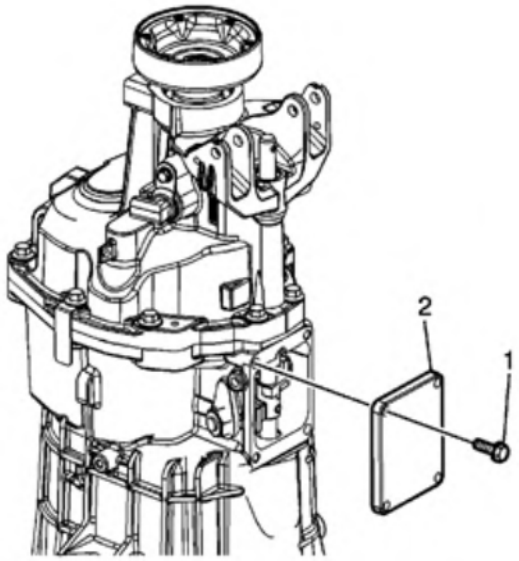
5. Install the propshaft O-ring (1).



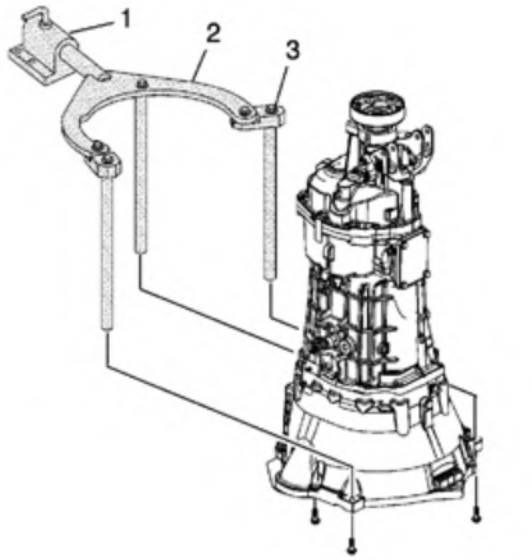
6. Install the propshaft transmission yoke (2). Install *J 39441-30* installer (1) onto the transmission yoke. Turn the bolt to install the transmission yoke into the mainshaft.



7. Install the propshaft washer (2) and nut (1).
8. Use the *J 08614A* holder (3) and *J 08614-20* bolts (4) to hold the propshaft transmission yoke. Tighten the nut (1) to **136 N·m (100 lb ft)**



9. Install the shifter cover plate.
10. Install the shifter cover plate bolts and tighten to **20 N·m (15 lb ft)**.



11. Remove the *DT 47678* flange (2) and *DT 47678-10* adapter .
12. Remove the *DT 47678* flange and *DT 47678-10* adapter from *J 3289-20* fixture (1).

Shimming Procedures

Special Tools

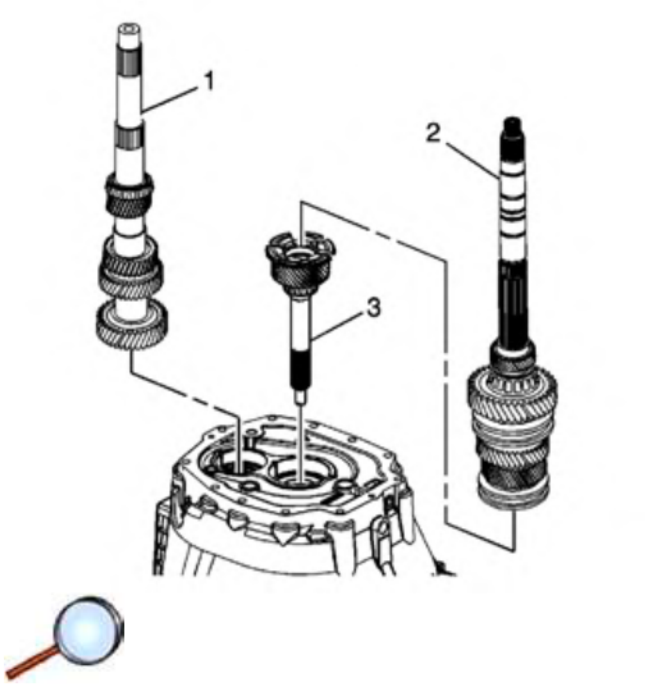
J 8001 Dial Indicator Set

For equivalent regional tools, refer to Special Tools.

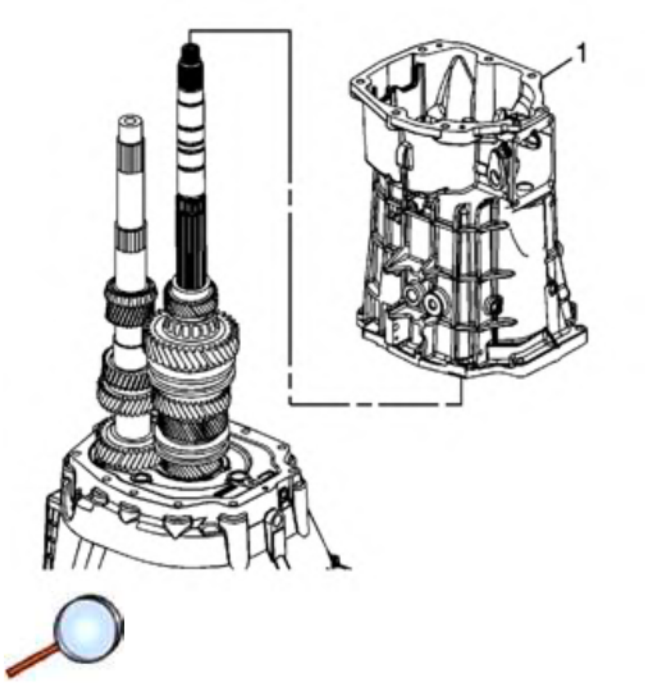
Note: The shimming procedure is required to be performed during service only when the following parts are replaced:

- The input shaft
- The counter shaft
- The main shaft
- The adapter plate
- The main housing
- The extension housing

Input Shaft, Mainshaft, and Countershaft

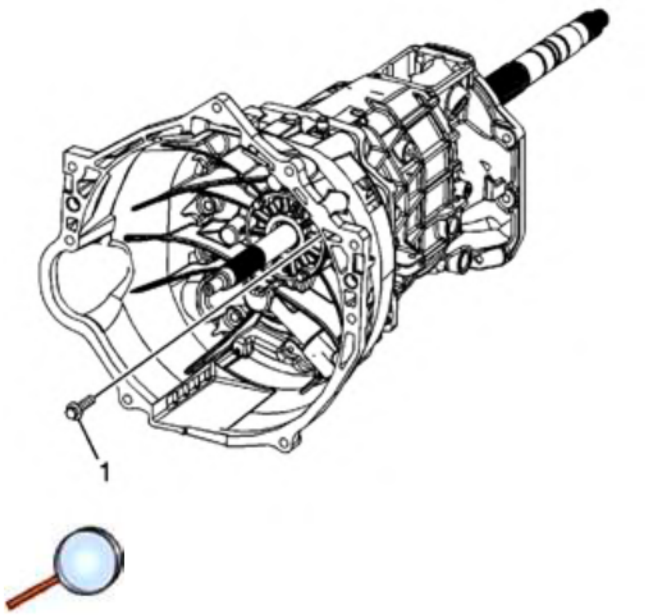


1. Rotate the clutch housing to the vertical position.
2. Install the following assemblies in order:
   2.1. The input shaft (3)
   2.2. Align the 4th speed gear blocking ring to the input shaft.
   2.3. The mainshaft assembly (2)
   2.4. The countershaft (1), lifting up the mainshaft enough to install the countershaft.

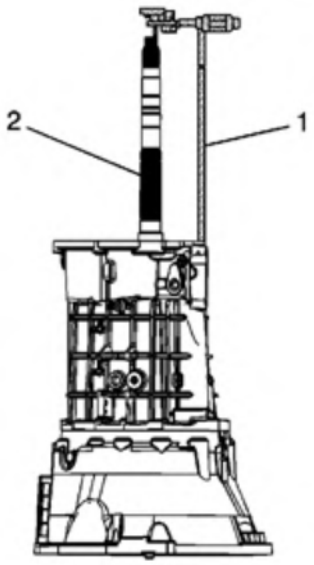


3. Install the transmission case (1).

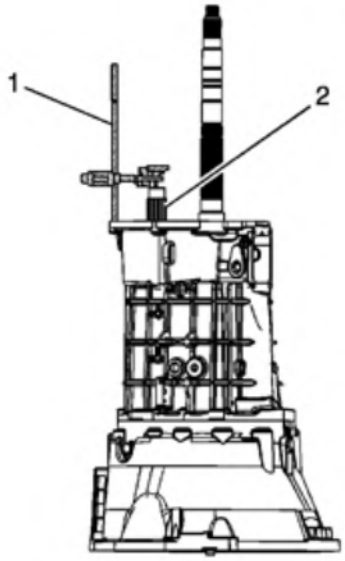
Caution: Refer to Fastener Caution in the Preface section.



4. Install the clutch housing to transmission case bolts and tighten to **36 N·m (27 lb ft)**.

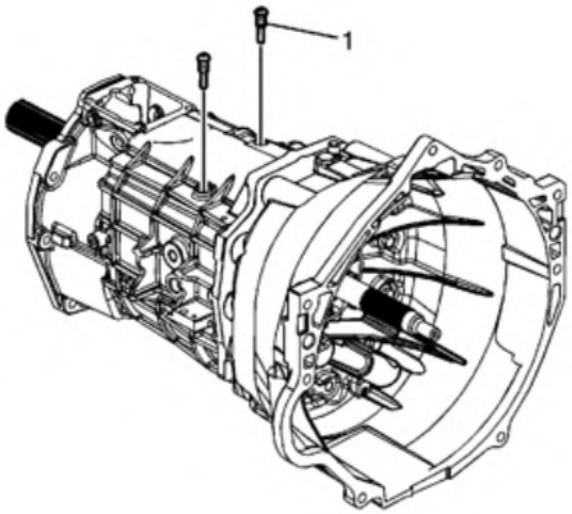


5. Measure the input shaft/mainshaft end play using the following procedure:
   5.1. Place the tip of the *J 8001* indicator set (1) on the end of the mainshaft.
   5.2. Move the main shaft up and down.
   5.3. Record the measurement.
6. Select a shim to achieve 0.0127-0.0889 mm (0.00049-0.00349 in) preload.
7. Remove the *J 8001* indicator set .



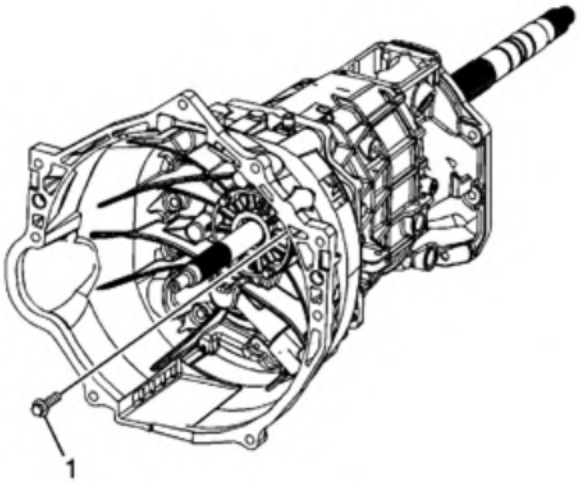
8. Measure the countershaft end play using the following procedure:
   8.1. Place the tip of the *J 8001* indicator set (1) on the end of the countershaft.
   8.2. Move the countershaft up and down.
   8.3. Record the measurement.
9. Select a shim to achieve 0.0127-0.0889 mm (0.00049-0.00349 in) preload.

10. Remove the *J 8001* indicator set .



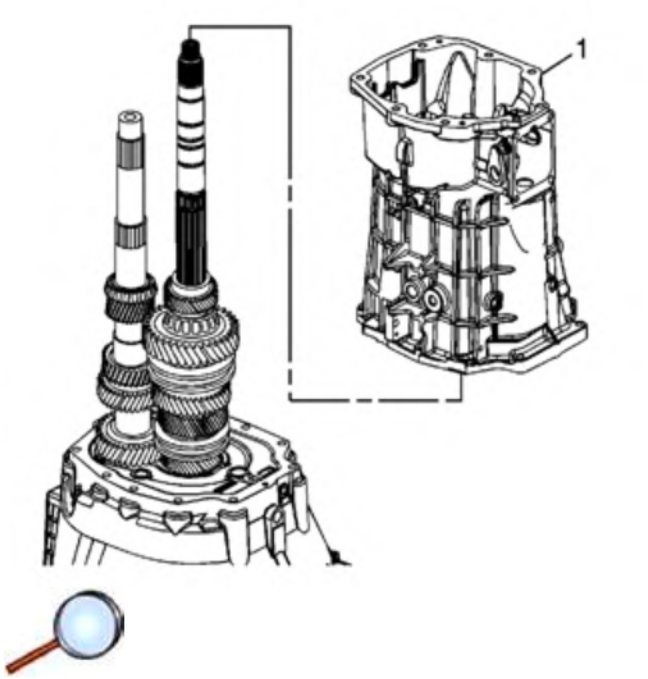


11. Remove the shift lever guide bolts.

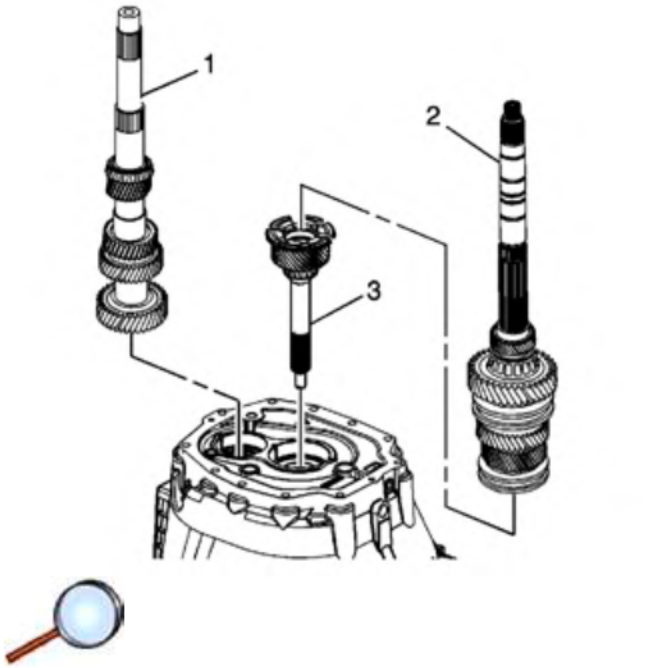




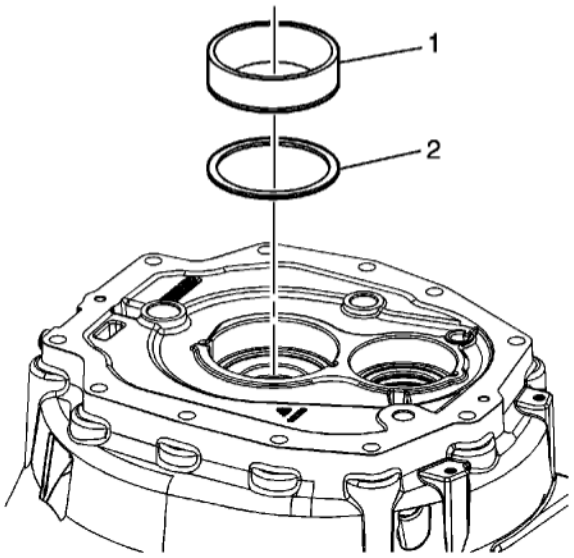
12. Remove the clutch housing to the transmission case bolts.



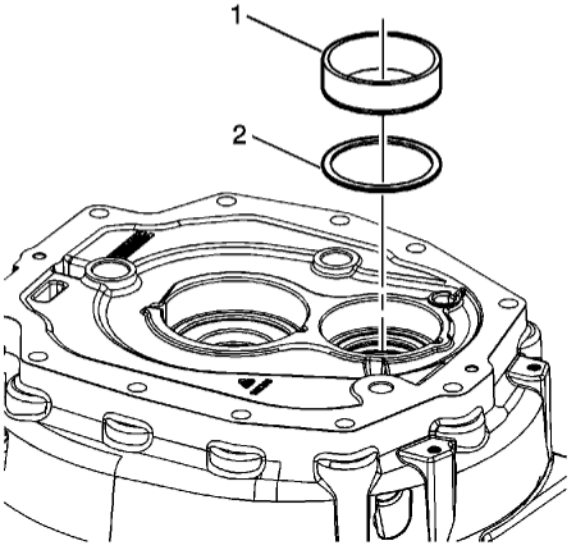
13. Remove the transmission case.



14. Remove the following parts in order:
    14.1. The countershaft (1), lifting up the mainshaft (2) enough to remove the countershaft.
    14.2. The mainshaft assembly (2)
    14.3. The input shaft (3)



15. Remove the input shaft bearing race (1).
16. Remove the input shaft bearing shim (1) and discard.
17. Install the new input shaft bearing shim, and the original bearing race.



18. Remove the countershaft bearing race (1).
19. Remove the countershaft bearing shim (2) and discard.
20. Install the new input shaft bearing shim, and the original bearing race.