

**MERITOR®**  
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## Service Parts Instructions

# Removing the External Oil Pump and Installing the Internal Oil Pump on Meritor MTC-4208 and MTC-4210 Series Transfer Cases for Power Take-Off (PTO) Usage

Kit 2831

Kit 2540

## Hazard Alert Messages

Read and observe all Warning and Caution hazard alert messages in this publication. They provide information that can help prevent serious personal injury, damage to components, or both.

## How to Obtain Additional Maintenance and Service Information

Refer to Maintenance Manual MM-0146, Transfer Cases MTC-4208, -4210 and -4213; Technical Bulletin TP-01137, Installing a Power Take-Off (PTO) Assembly Onto Meritor's MTC-4210 Transfer Case; and Technical Bulletin TP-0468, Connecting an Oil Cooler to MTC-4208, -4210 and -4213 Transfer Cases. To obtain these publications, visit Literature on Demand at [arvinmeritor.com](http://arvinmeritor.com).

## How to Obtain Tools, Kits and Supplies Specified in This Technical Bulletin

Call ArvinMeritor's Commercial Vehicle Aftermarket at 888-725-9355 to obtain Meritor tools and supplies.

## Kits Required

### Kit 2831 (Transfer Case Adaptor)

Part Number	Description	Quantity
A 3303G1047	Pump Assembly	1
2297-U-5273	Relief Valve	1
5X1327	Seal	1
2203-L-9242	Shim	3
2203-K-9241	Shim	3
A 2206U1347	Fitting and Tube Assembly	1
2206C1485	Male Connector	1
1250M1313	Plug	1
3297H1542	Input Shaft	1
1229P4800	Snap Ring	1
A 3226W1479	Input Cage	1
A1-1205-X-2728	Oil Seal Assembly	1
A 2206A1483	Tube Assembly	1
2206E1513	Fitting	2
HM813843K	Bearing Cone	1
MS-208045-1	Capscrew	6
1229-E-1669	Washer	6
2258-Z-1118	Spring	1

### Kit 2540 (Power Take-Off Kit)

Part Number	Description	Quantity
MDP10AF100	PTO Assembly	1
1229 E 1513	Flat Washer	8
S 2748 2	Capscrew	2
S-2710-2	Capscrew	6
1246T1190	Dowel	2

# Oil Pump Procedures

This publication provides instructions for replacing an external oil pump with an internal oil pump on Meritor MTC-4208 and MTC-4210 Series transfer cases. After you remove the external oil pump, you must install the internal oil pump before you return the vehicle to service or overheating and damage to the transfer case will result.

## Removal

### External Oil Pump

#### **⚠ WARNING**

To prevent serious eye injury, always wear safe eye protection when you perform vehicle maintenance or service.

Park the vehicle on a level surface. Block the wheels to prevent the vehicle from moving. Support the vehicle with safety stands. Do not work under a vehicle supported only by jacks. Jacks can slip and fall over. Serious personal injury and damage to components can result.

Take care when you use Loctite<sup>®</sup> adhesive to avoid serious personal injury. Read the manufacturer's instructions before using this product. Follow the instructions carefully to prevent irritation to the eyes and skin. If Loctite<sup>®</sup> adhesive material gets into your eyes, follow the manufacturer's emergency procedures. Have your eyes checked by a physician as soon as possible.

Use a brass or synthetic mallet for assembly and disassembly procedures. Do not hit steel parts with a steel hammer. Pieces of a part can break off. Serious personal injury and damage to components can result.

Observe all warnings and cautions provided by the press manufacturer to avoid damage to components and serious personal injury.

#### **⚠ CAUTION**

Meritor MTC-4208 and MTC-4210 Series transfer cases may operate with an oil temperature above 300° F (148° C). However, if the oil temperature reaches 350° F (177° C), stop the vehicle immediately. Check for the cause of overheating to prevent damage to components.

1. Wear safe eye protection.
2. Park the vehicle on a level surface. Block the wheels to prevent the vehicle from moving.
3. Place a suitable container under the drain plug to catch the fluid.

4. Use a socket to remove the drain plug. Figure 1.

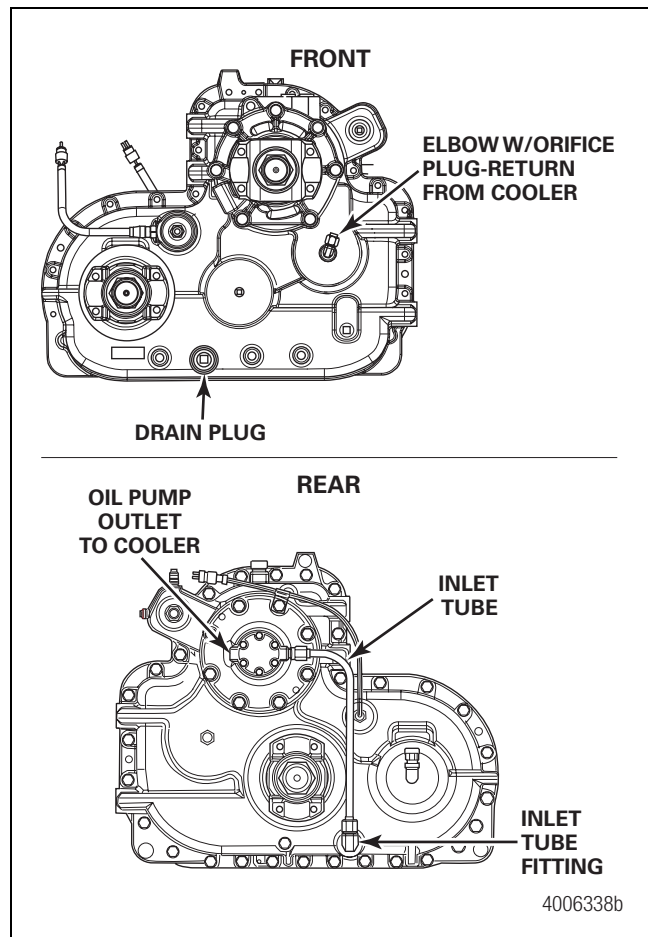


Figure 1

5. Drain the oil.
6. Disconnect the inlet oil line and original lube fittings. Some hardware may vary depending on the model. Lube suction may be on the front or back. Figure 1.
7. Remove the pump housing washers and bolts. Remove the pump housing and cover. Figure 2.

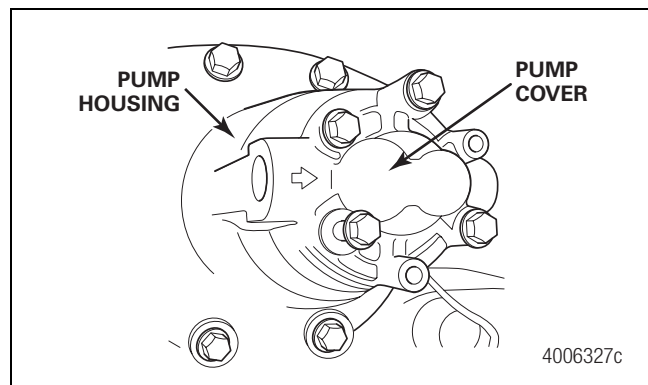


Figure 2

- Remove the pump and pump drive adaptor, if equipped. Figure 3.

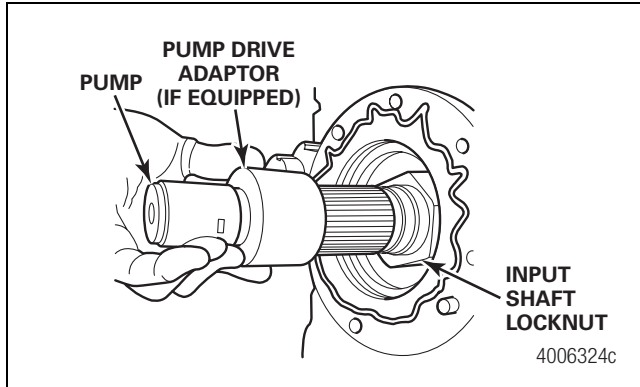


Figure 3

## Remove the Input Shaft Subassembly

- Use a yoke holder to secure the input yoke from rotating. Use a shallow socket to loosen the yoke locknut and washer. Figure 4.

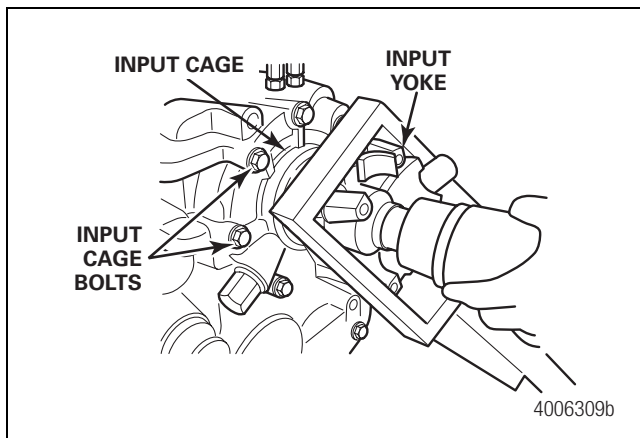


Figure 4

- With the yoke holder still in place, use a special deep well socket tool to remove the locknut on the rear of the input shaft. Refer to Maintenance Manual MM-0146 for tool specifications. Figure 3.
- Use a 3/4-inch socket to remove the input cage bolts and washers. Figure 4.

### **CAUTION**

Use a pry bar and mallet to remove the input cage cover. Take care not to damage the shim pack. Damage to the transfer case will result.

- Use a pry bar and mallet to loosen the input cage cover. Figure 5.

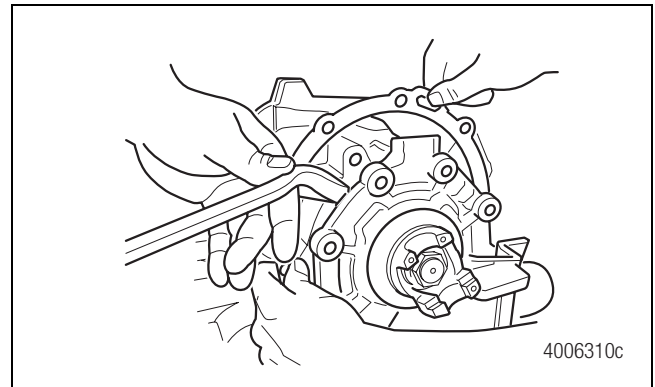


Figure 5

- Remove the shim pack. Figure 5.
- Remove the entire input shaft subassembly. Use a dead-blow hammer on the backside of the input shaft to loosen it further. Set up the shaft vertically on the workbench. Figure 6.

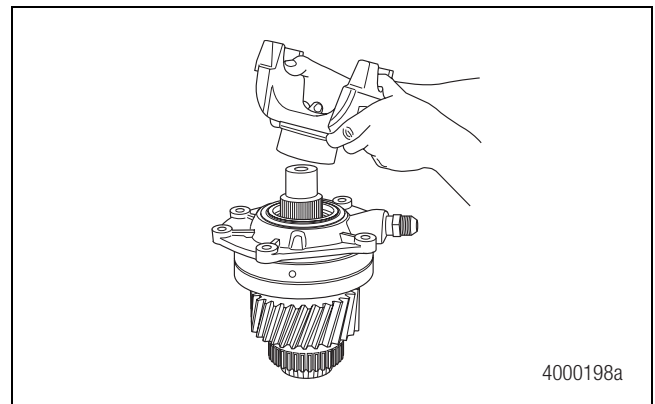


Figure 6

- Use a two-jaw puller to remove the yoke. Figure 6.
  - Remove the input cage.
  - Remove the low range gear retaining snap ring.
  - Remove the gear and save for later use.
- Discard the shaft assembly and input cage.

### **CAUTION**

After you remove the external oil pump, you must install the internal oil pump before you return the vehicle to service to prevent overheating and damage to the transfer case.

- After the external oil pump is removed, inspect the components and perform the assembly procedures provided in this bulletin. You must install the internal oil pump before you return the vehicle to service.

# Inspection

Refer to Maintenance Manual MM-0146 for inspection procedures.

# Assembly

## Prepare the Yoke

1. Inspect the seal sleeve and replace, if necessary. Use sleeve driver 2728T2 to install the seal sleeve onto the yoke. To obtain sleeve driver 2728T2, refer to the first page of this bulletin. Figure 7.

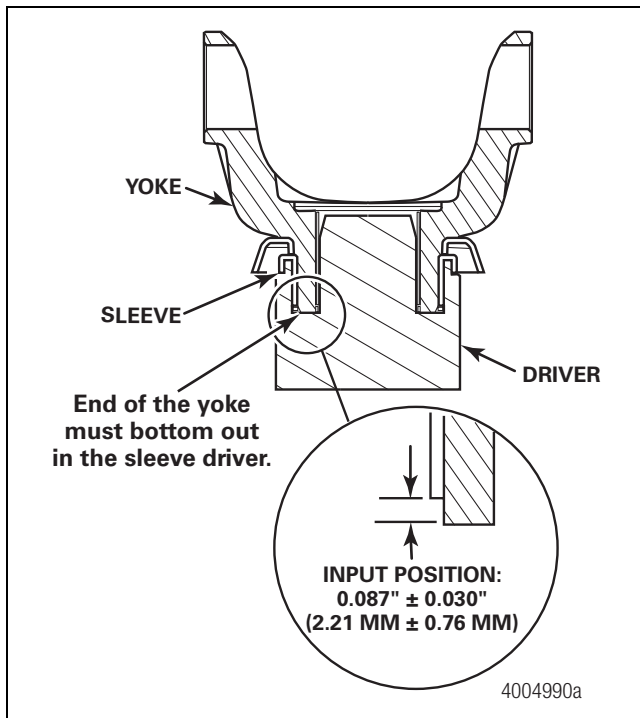


Figure 7

2. Apply a light coat of axle oil to the yoke seal journal. Position the sleeve into the transfer case input yoke sleeve driver. Do not touch the greased areas of the sleeve. The sleeve must be kept clean prior to assembly into the seal.
3. Use an arbor press and the correct driver to install the sleeve into the yoke. Verify that the sleeve is fully-seated in the yoke.
4. The yoke must be fully-pressed into the sleeve driver until the end of the yoke bottoms out in the sleeve driver. This will correctly position the sleeve onto the yoke. When correctly seated, the forward-rear input sleeve is positioned 0.087-inch  $\pm$  0.030-inch (2.21 mm  $\pm$  0.75 mm) from the end of the yoke. Figure 7.
  - **If you don't have a press:** Position the yoke on a five-inch (127 mm) spacer on a workbench. Use a dead-blow hammer and the correct driver to install the sleeve into the yoke.

## CAUTION

Hold the sleeve and seal only on the outer diameter. Do not touch the greased inner diameter of the seal and the greased area of the sleeve. This can contaminate the seal and cause a leak between the shaft and the seal. Damage to components can result.

5. Use seal driver 2728T1 to install the seal into the input cage. Figure 8.

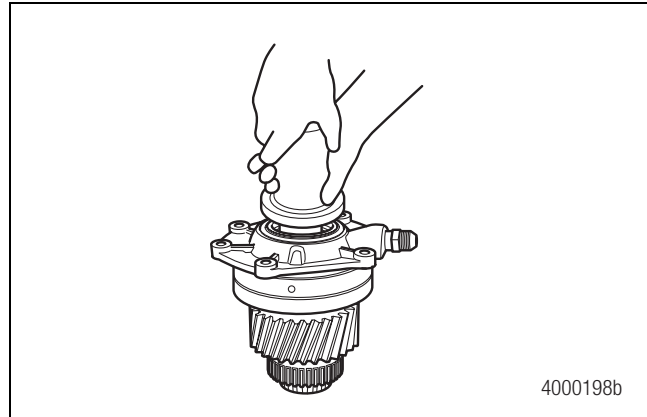


Figure 8

6. Install the transfer case input seal. Hold the sleeve and seal only on the outer diameter. Position the seal into the seal driver and align it with the transfer case input bearing cage. Do not touch the lips in the inner diameter of the seal.
7. Use a dead-blow hammer and the correct driver to install the seal into the bearing cage.
8. Use a feeler gauge to check the seal gap. The seal is correctly installed if the gap is less than 0.005-inch (0.127 mm) around the circumference of the seal flange. Figure 9.
  - **If the gap is greater than 0.005-inch (0.127 mm):** Repeat Step 7 until the gap is less than 0.005-inch (0.127 mm).

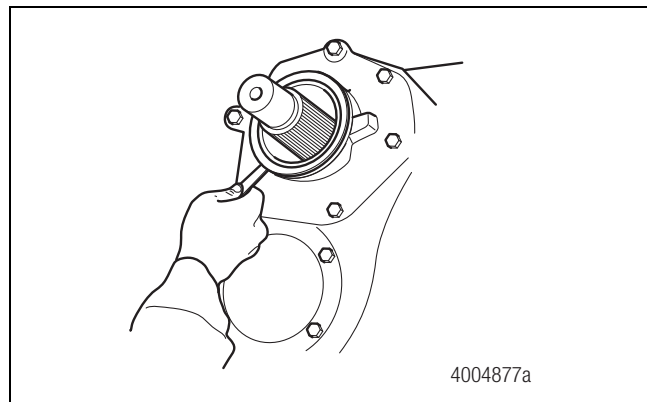



Figure 9

# Installation

## Internal Oil Pump

1. Install an elbow to the inlet port on the input cage. Note the orientation of the elbow. Use Loctite® 592 PST® thread sealant on the NPT threads. Tighten it to 35 lb-ft (47 N•m). Figure 10. 

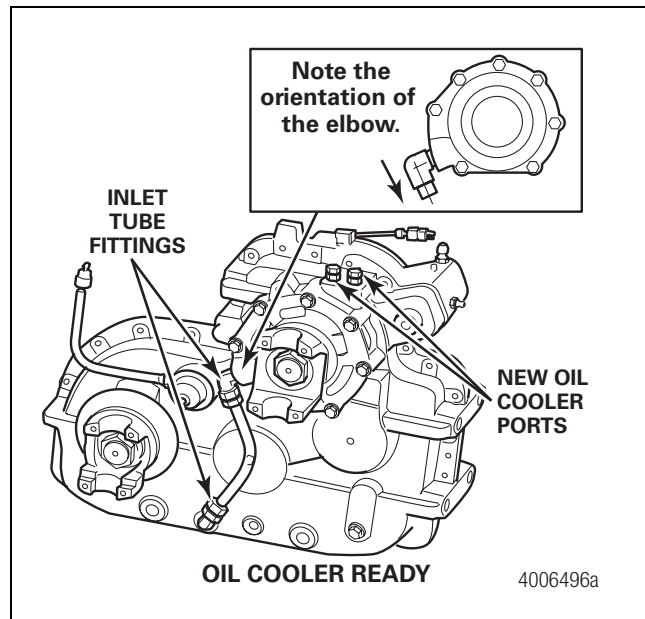


Figure 10

2. Place the large O-ring around the groove on the bearing cage and lubricate with grease. Figure 11.

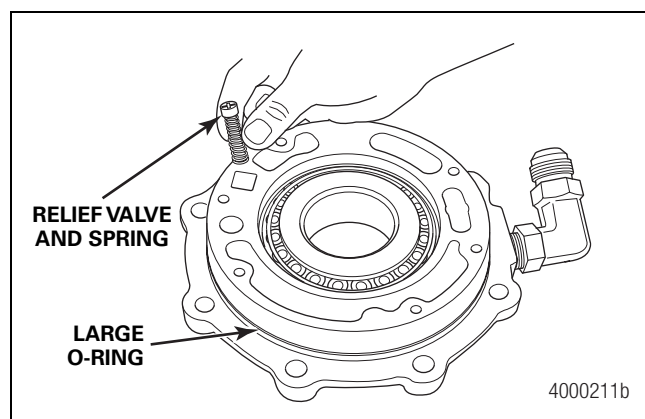


Figure 11

3. Pack grease into the pump oil inlet port before assembling the oil pump to the input bearing cage. Figure 12.

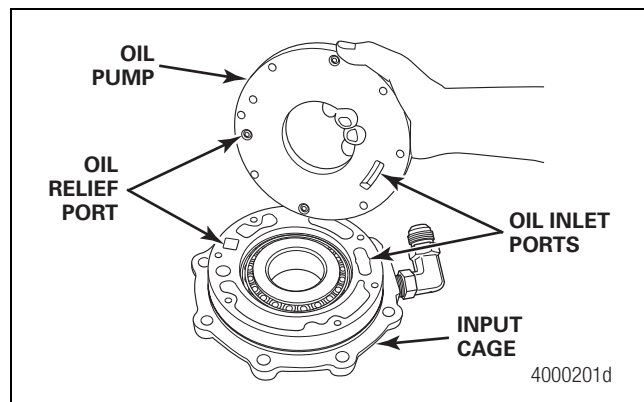




Figure 12

4. Place the bearing cone on the race in the bearing cage.
5. Insert the relief valve and spring into the relief port of the input bearing cage. Install the large diameter end of the spring down. Figure 11. Align the oil pump inlet with the oil inlet port of the input bearing cage. Figure 12.
6. Install the six pump-to-inlet bearing cage capscrews and washers. Apply Loctite® 277 sealant to the capscrews. Tighten the capscrews to 22-28 lb-ft (30-38 N•m). 
7. Set aside the input cage/pump assembly.
8. Install the supplied restrictor plug in the end of the input shaft. Tighten it to a minimum of 15 lb-ft (20 N•m). Ensure the restrictor plug is the correct plug supplied from the kit with an 0.090-inch (2.29 mm) orifice. Figure 13. 

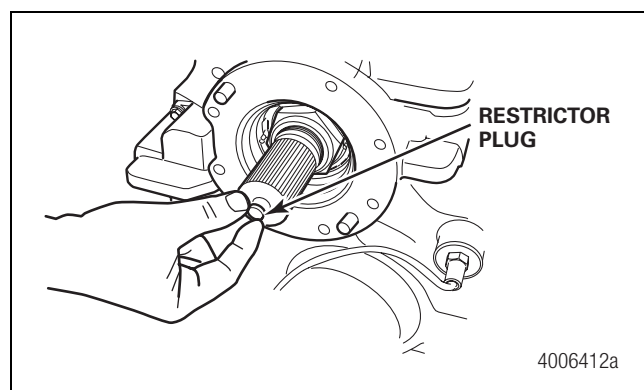


Figure 13

9. Install the original low range gear with synthetic prelude 50 on the journal.
10. Install a new snap ring.
11. Set up the shaft vertically on the workbench.
12. Inspect the sealing rings on the pump assembly. Ensure that the rings are in place and slide freely.

- Lubricate the sealing rings on the inside diameter of the pump and the shaft journal adjacent to the pump splines. Figure 14.

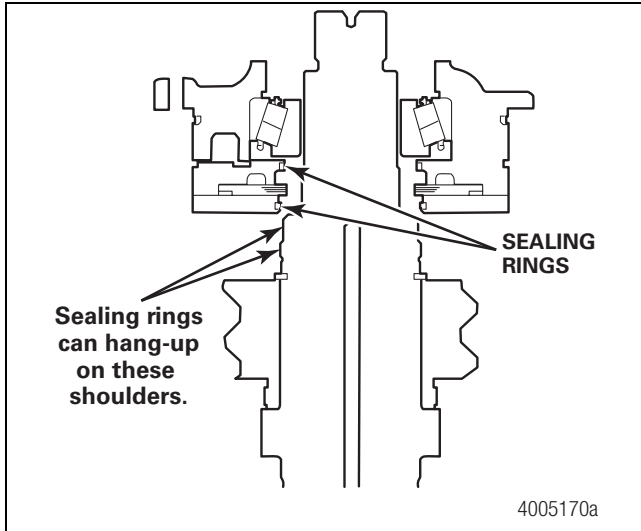


Figure 14

**CAUTION**

When you assemble the input shaft to the pump, carefully align the input shaft to the pump opening, then slowly install the input shaft into the opening. If the input shaft is not correctly aligned to the pump opening during assembly, the input shaft can hang up on the pump sealing rings, which will damage the rings.

- Place the oil pump and input bearing cage assembly over the input shaft. The drive teeth on the inner pump rotor must engage the teeth on the input shaft. Do not use force to engage the splines. If a sealing ring is broken, remove and replace the pump.
- Install the input yoke, washer and locknut. Use a press, if available, to seat the bearing cage on the shaft.
- Install the input shaft subassembly into the transfer case.
- Install the shim pack and the input cage cover. Figure 15.

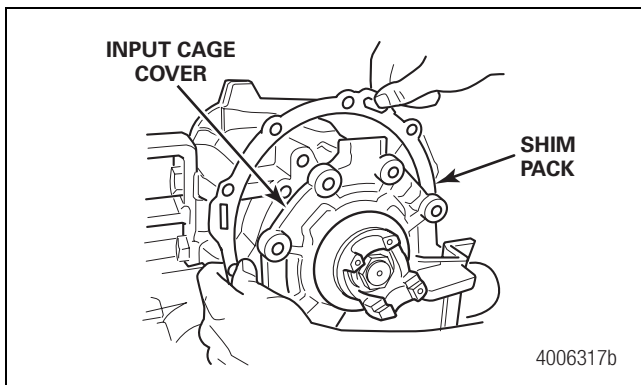


Figure 15

- Install the input cage cover washers and bolts and tighten.
- Check input shaft end play, which must be 0.002-0.006-inch (0.05-0.015 mm).
  - If end play is not within specification:** Add or remove shims to adjust end play to 0.002-0.006-inch (0.05-0.015 mm) to prevent damage to the transfer case. Refer to Maintenance Manual MM-0146 for the adjustment procedures.
- Tighten the input cage bolts in a cross pattern to 85-115 lb-ft (115-156 N•m). Figure 16.

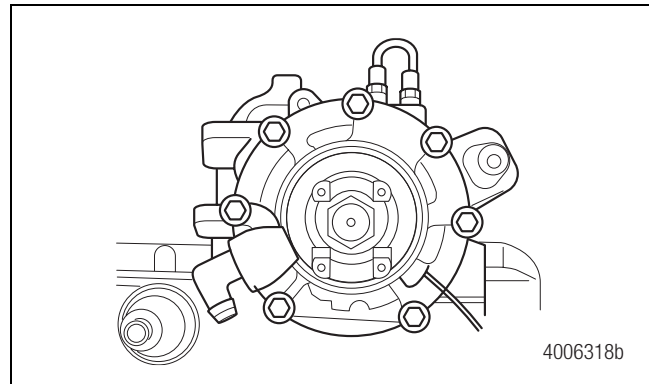


Figure 16

- Tighten the front and rear input shaft locknuts to 700-900 lb-ft (949-1220 N•m).
- Ensure that the restrictor plug is present in the end of the input shaft. The orifice must be clear of Loctite® sealant or any debris. Figure 17.

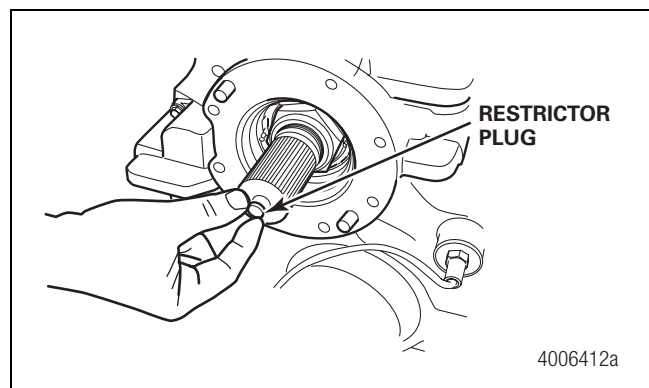
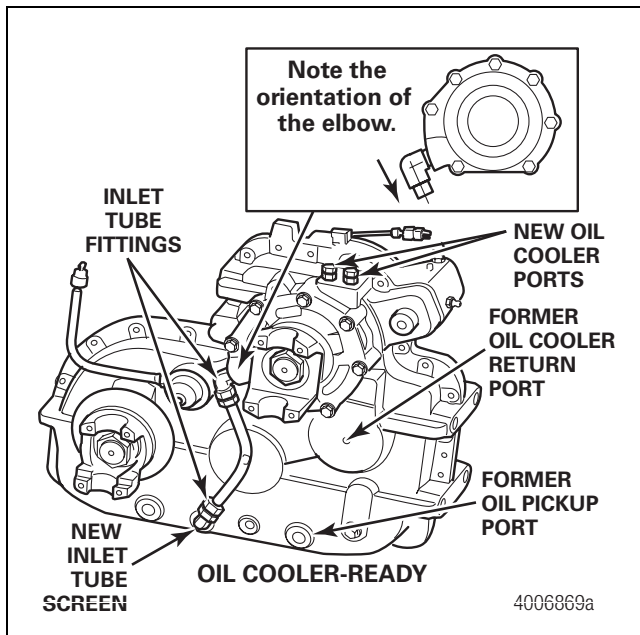


Figure 17

## Install the Required Plugs and Fittings

- Use a 3/8-inch plug to seal the former oil cooler return port. Use Loctite® 592 PST® thread sealant. Tighten it to 20 lb-ft (27 N•m). Figure 18.



**Figure 18**

2. Use a 3/4-inch plug to seal the former oil pick-up port. Use Loctite® 592 PST® thread sealant. Tighten it to 35 lb-ft (47 N•m).
3. Install the new inlet tube/screen assembly at the former drain plug location. Tighten it to a minimum of 35 lb-ft (47 N•m).
4. Install the inlet tube. Tighten it the fittings to a minimum of 25 lb-ft (34 N•m).
5. Remove the two 1/2-inch NPT plugs from the top of the housing. Replace them with straight connectors. Use Loctite® 592 PST® thread sealant on the connectors. Tighten them to 25 lb-ft (34 N•m).
6. Connect the oil cooler lines to these ports. Tighten them to a minimum of 20 lb-ft (27 N•m). Refer to TP-0468 for cooler placement and connection guidelines.
7. Refer to Maintenance Manual MM-0146 or Technical Bulletin TP-01137 for procedures on how to connect the PTO and yoke.

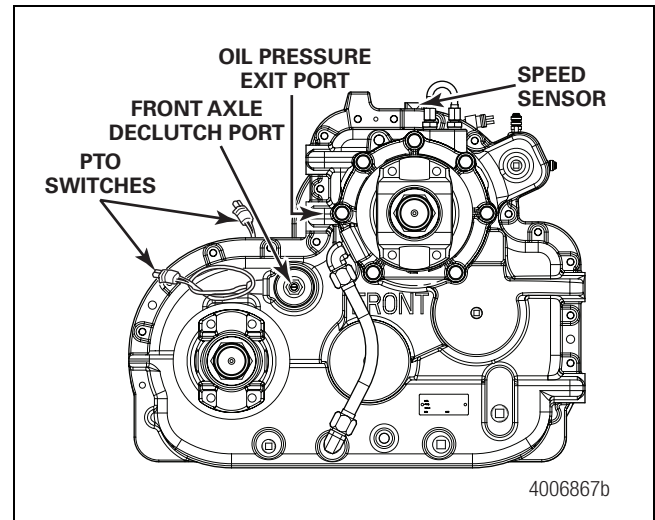
## Leakdown Test

1. Remove the housing breather. Install the regulated pressure line to the breather port (3/8" -NPT). With air regulated to 10 psi (0.7 bar) maximum, apply air pressure to the housing.
2. Shut off the air pressure and check for leaks.
  - **If no leaks are present:** This procedure is complete.
  - **If leaks are present:** Find the fitting that leaks. Proceed to the correct section in this technical bulletin that applies and repeat only those steps.

3. Once the leakdown test is completed, remove the air line and reinstall the breather.

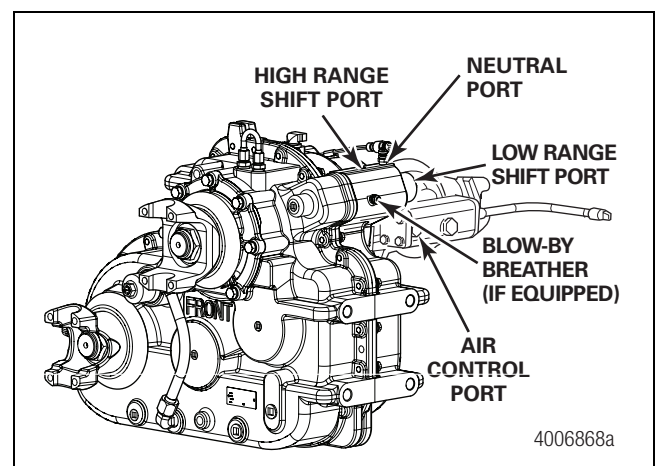
## Transfer Case Shifting Check

1. Apply 60 psi (4.14 bar) or greater of air pressure to the front axle declutch. Figure 19.



**Figure 19**

2. Turn the input shaft by hand to verify that the front output turns at same rate as the rear output.
3. Remove the air pressure.
4. Apply 60 psi (4.14 bar) or greater of air pressure to the high-range shaft air port. Figure 20.



**Figure 20**

5. Turn the input shaft by hand to verify that the rear output turns at the same rate as the input.
6. Remove the air pressure.

7. Apply 60 psi (4.14 bar) or greater of air pressure to the low-range shaft cylinder air port. Figure 20.
8. Turn the input shaft by hand to verify that the rear output turns at approximately half the rate as the input.
9. Remove the air pressure.
10. For transfer cases equipped with PTO, apply 60 psi (4.14 bar) or greater of air pressure to the neutral shift location. Figure 20.
11. Turn the input shaft by hand to verify that the rear output does not turn at all. Have someone hold the output shafts to prevent them from turning while spinning the input.
12. Remove the air pressure.

## Oil Fill Procedure

### CAUTION

Meritor does not approve petroleum-based and multi-viscosity oil. Do not install API GL-5 oils, which contain extreme-pressure (EP) additives. These additives can form sludge at normal operating temperatures. Damage to components can result. Use only SAE Grade 50W synthetic oil in the transfer case.

When servicing the transfer case, add the specified lubricant until the oil level is even with the fill hole. Do not overfill the transfer case, which can cause the transfer case to overheat. Damage to components can result.

1. The transfer case and oil lines may be hot. With the vehicle on a level surface, fill the transfer case to the fill hole with SAE grade synthetic 50W gear oil (Meritor specification O-81).

### CAUTION

You should run the pump pressure test at the same time or damage to the transfer case can occur.

2. Drive the vehicle one to five miles above 30 mph to prime and purge the oil cooler system.
3. Return the vehicle to the garage and park on a level surface.
4. Allow the system to stand for at least 10 minutes. Ensure that any oil foam is gone.
5. Check the system for leaks at all fitting connections and transfer case oil ports.
6. Check the oil fill level in the transfer case. The level should be below the fill hole following the priming run.
7. Refill the transfer case to the bottom of the fill hole.

## Pump Pressure Test

1. Remove the plug and install a fitting into the transfer case oil pressure exit port to monitor pump pressure. The pressure hose should be long enough to route the gauge to a position where it can be viewed in the cab of the vehicle. Figure 19.
2. Perform an oil pump pressure diagnostic test by road testing the system up to five miles (8.05 km) before you check oil pump pressure.
  - A positive pressure greater than 20 psi (1.38 bar) indicates the pump and oil cooler system are primed.
  - A constant pressure above 55 psi (3.79 bar) can indicate an issue exists with an oil line connection, such as a kink or an incorrect connection.

## Transfer Case Oil Specifications

<u>Oil Description<sup>1,2</sup></u>	<u>Meritor Specification</u>	<u>A.P.I. Specification</u>	<u>Military Specification</u>	<u>SAE Grade</u>	<u>Outside Temperature</u>
Full Synthetic Oil <sup>3,4</sup>	O-81	—	—	50W	Above -40° F (-40° C)

<sup>1</sup> Do not mix or switch oil types. Use the same oil that initially filled the transfer case.

<sup>2</sup> Do not use multi-viscosity oils.

<sup>3</sup> Meritor-approved full synthetic oil for manual Meritor transmissions is also approved for Meritor transfer cases. Use synthetic oil only if the transfer case was initially filled with synthetic oil.

<sup>4</sup> Do not use multi-viscosity (i.e., 80/90W) A.P.I. GL-5 gear oil, axle lube in transfer cases.

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