



## T60 Service Manual

Pro Gear's Harmon-Herrington T60 Service manual to assist in identifying the parts for your Harmon-Herrington transfer case unit.

If you need any assistance identifying the correct transfer case unit for your truck and equipment, contact your Harmon-Herrington replacement part specialists at Pro Gear and Transmission.

Pro Gear Transmission has same day shipping and 1000's of products in stock and ready to ship internationally for your next project.

For parts or service contact the Harmon-Herrington specialists at Pro Gear & Transmission, Inc.

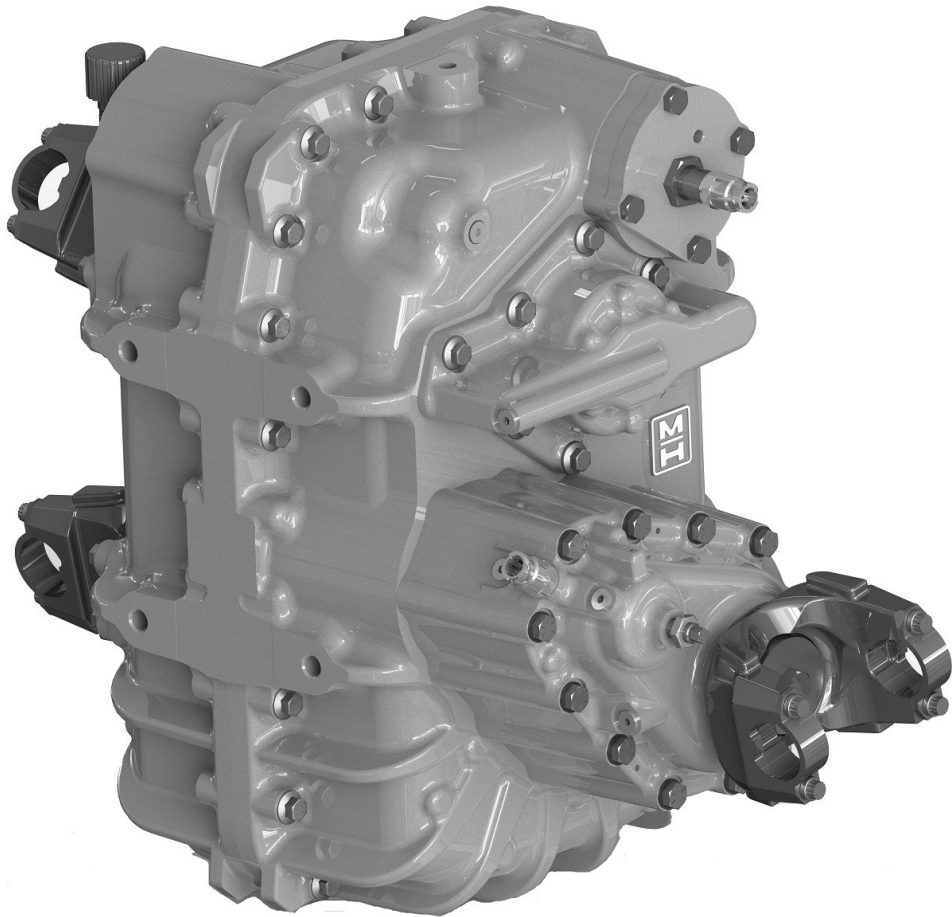
1 (877) 776-4600  
(407) 872-1901  
parts@eprogear.com

# MARMON-HERRINGTON

## T-60 TRANSFER CASE

( RTC-100 )

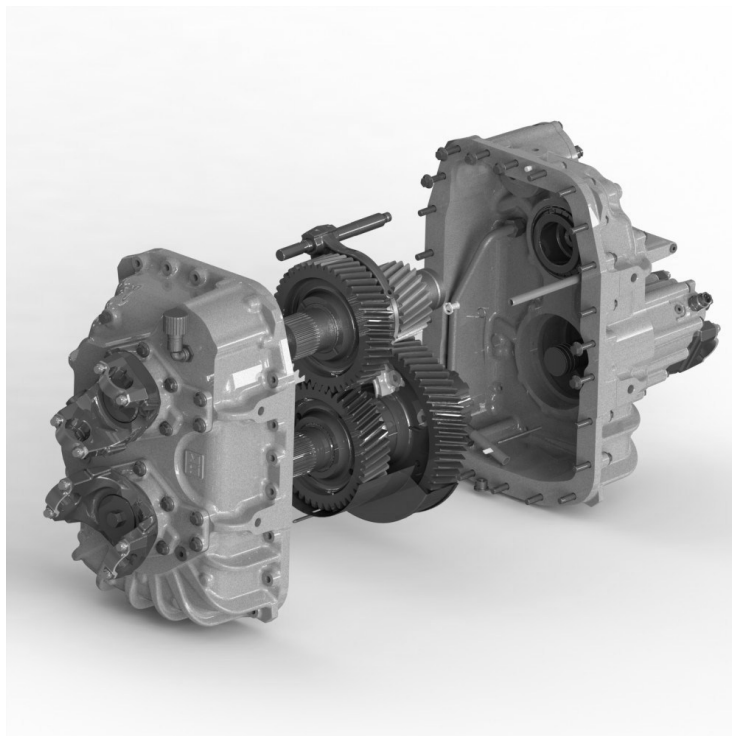
### REPAIR MANUAL



# MARMON-HERRINGTON T-60 SERIES TRANSFER CASE

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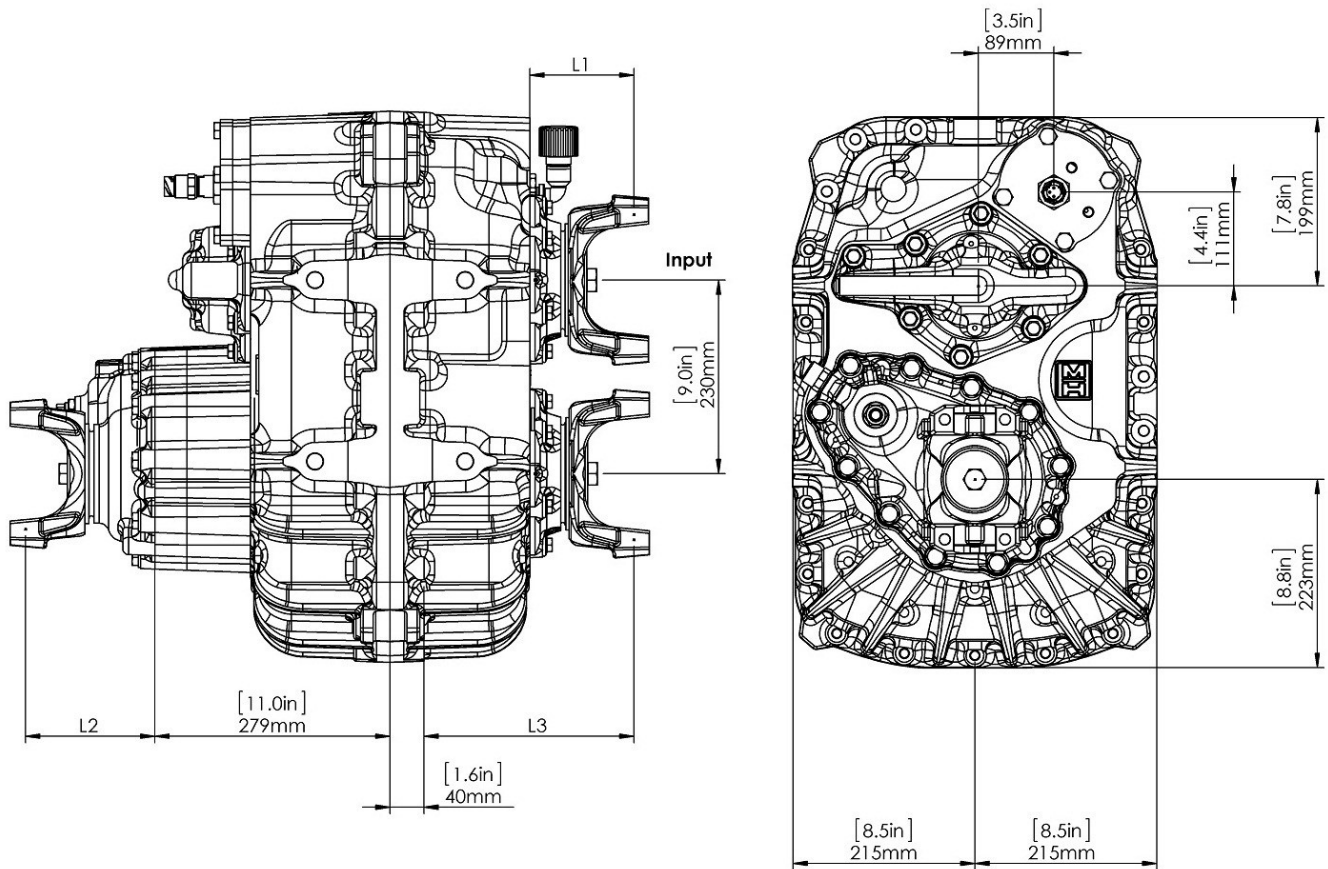


# Attention!

*This manual is intended for use by experienced technicians using safe procedures in a properly equipped shop environment. Safety precautions should always be followed, such as wearing eye protection, using appropriate tools and lifting devices. Marmon-Herrington is not responsible for damages or injury resulting from the service of these components.*

Remember to check our website ([marmon-herrington.com](http://marmon-herrington.com)) for updates and additional information. Find detailed operation and preventative maintenance information in the General Operating Manual. T-60 Parts Manual also available.

## MARMON-HERRINGTON T-60 TRANSFER CASE



INPUT TORQUE (FT LB)	INPUT SPEED MAX (RPM)	WEIGHT APPROX kg (W/O OIL OR PTO)	RATIO	
			HIGH	LOW
13,267	3,100	235	1:0.98	1:2.48



## REPLACEMENT PARTS

When ordering replacement parts for **MARMON-HERRINGTON TRANSFER CASES**, the following information should be given:

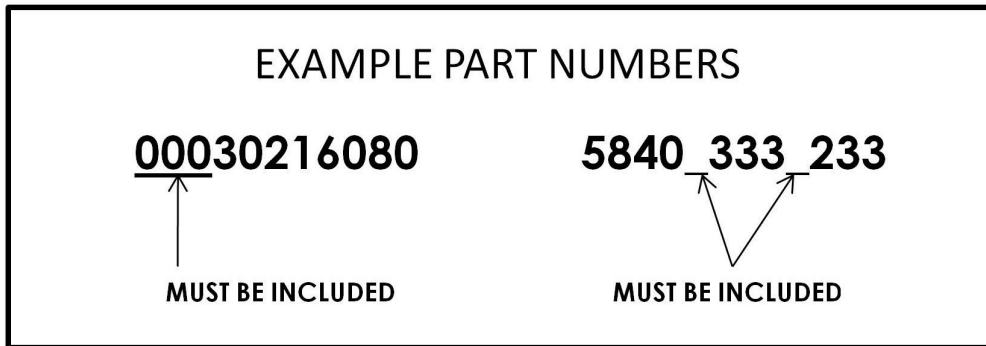
1. **FACTORY ORDER NUMBER.** Found on ID Plate affixed to Transfer Case Housing. This will be a six (6) digit number. (See illustration below)
2. Model of transfer case, i.e T-60, T-100
3. Give quantity and complete part number including **ALL CHARACTERS** (including zeros (0), dashes (-), underscores (\_), and spaces). **Note:** Drivelines, shift linkages, etc., can be found on the computer printout of Bill of Material, which is included in the Service Manual
4. Give complete billing and shipping address.

## WARRANTY CLAIM PROCEDURE

Before proceeding with repairs or ordering parts that you feel may be covered under warranty, you must first contact Marmon-Herrington Customer Service Department and obtain a Repair Authorization number.

Please be prepared to supply all of the following information:

- Factory Order Number**- This is located on an ID plate fixed to either the driver's door panel or the component (axle or transfer case) itself.
- Model and Serial Number** (required)- Again located on the ID plate fixed to either the driver's door panel or the component itself.
- Vehicle year, Make and Model**
- Vehicle Identification Number**
- Mileage**
- In Service Date**



The information necessary for replacement parts and/or warranty claim procedures will be found on the ID Plate



## GENERAL OPERATING INFORMATION

### TIRES AND GEAR RATIOS

Tires, wheels and axle gear ratios have been carefully selected to minimize torsional “wind-up” between front and rear axles. Please consult tire or gear specialist before installing components differing from original equipment.

### OPERATIONS

Marmon-Herrington equipped vehicles are intended for as-needed AWD (all-wheel-drive) operation in off-road conditions only. DO NOT operate in AWD mode on hard, dry surfaces.

### SHIFTING

Marmon-Herrington Axles and Transfer Cases are not fitted with any type of clutching device, and may only be shifted when the vehicle is at a complete stop. This applies to FAE (front axle engagement), high and low range, and locking differentials. The only exceptions are those vehicles equipped with Marmon-Herrington’s Safe-T-Shift system.

The transfer case relies on tooth alignment for internal gears to mesh, and it may be necessary to allow the vehicle to roll forward or backwards several inches to complete the shift. When selecting a shift function, operators must wait for the appropriate indicator to illuminate before accelerating to avoid costly internal damage.

### SHIFT PROCEDURE

1. With the vehicle at a complete stop, select the desired range or axle position desired.
2. Place the main transmission in gear.
3. Allow the vehicle to idle forward (or backwards) several inches until shift is completed, evidenced by the appropriate indicator light.
4. Accelerate normally. In case of a manual transmission, ease the clutch out in low gear, allowing the vehicle to “walk” until shift is complete (as per the appropriate dash indicator).

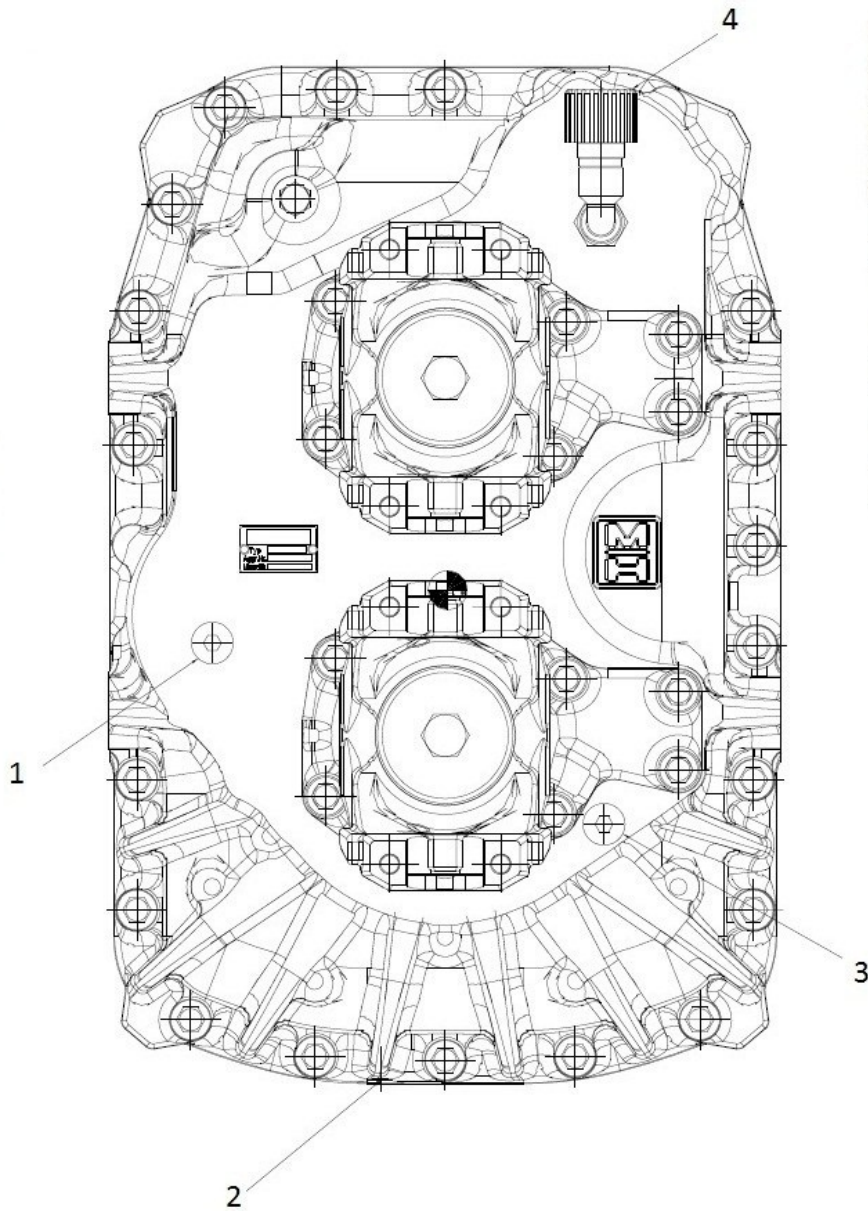
### TORQUE

“Torque Shock” or “Loading” is a damaging mode of failure that is easily avoidable. It generally occurs in situations when a vehicle is operating in an area of low traction at high RPM with the wheels spinning. When the tires make abrupt contact with a tractable surface, a violent shock-load is transmitted through the drive train. This can result in damage to axles, drive shafts, transfer cases and transmissions.

Simply engaging the front axle and operating in low range at lower speeds will allow the vehicle to proceed without imparting undue stress on the drive train.

### SUMMARY

Before retreating from the subject of shifting, it must be reemphasized that no transfer case, PTO, axle differential, or power divider should ever be shifted while the vehicle is in motion. The engagement of these components is intended for off-road use only, in poor traction conditions.



## T-60

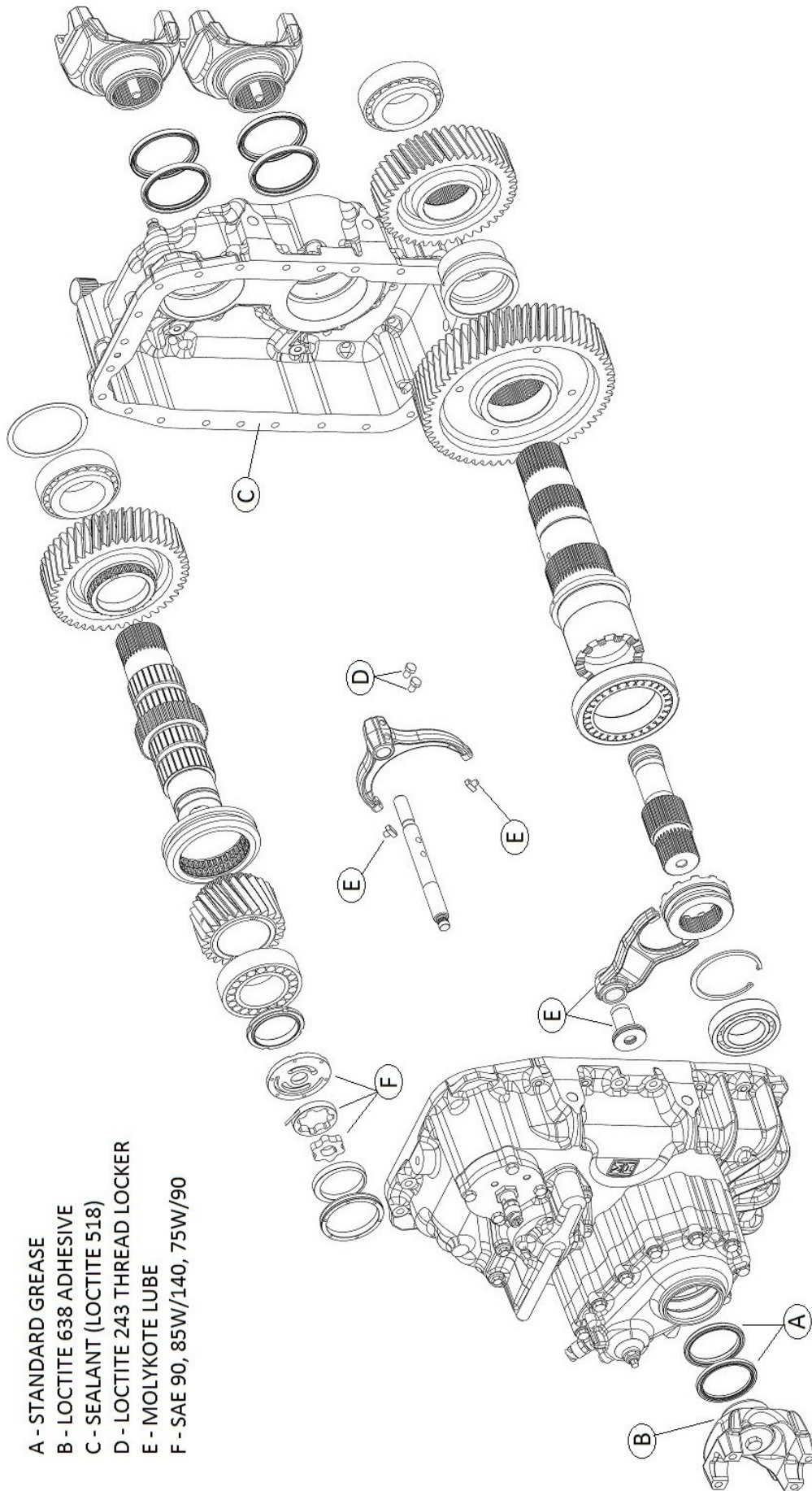
DRAIN OIL IN WARM CONDITIONS.  
 DRAIN LUBE THROUGH BOTTOM PLUG (2).  
 CLEAN MAGNETIC PLUG AND REPLACE.  
 ADD LUBE THROUGH FILL PLUG (1) UNTIL  
 LUBE JUST STARTS TO FLOW FROM PORT (3).  
 REPLACE PLUG.

LUBE QTY: APPROX. 19 PINTS

- 1 - FILL PLUG
  - 2 - DRAIN PLUG
  - 3 - LEVEL PLUG
  - 4 - VENT
- SAE 85W/140  
 SAE 75W/90

See General Operating Manual for recommended maintenance schedule as well as alternative weight and grade of approved lubricants.





- A - STANDARD GREASE
- B - LOCTITE 638 ADHESIVE
- C - SEALANT (LOCTITE 518)
- D - LOCTITE 243 THREAD LOCKER
- E - MOLYKOTE LUBE
- F - SAE 90, 85W/140, 75W/90

T-60 CONSUMABLES

# 1 - DISASSEMBLY

## T-Case (general)

1.1 Mount transfer case in appropriate stand.

1.2 Remove drain plug and drain lube.



Figure 1

1.3 Remove drive flanges

Note: It may be necessary to use threaded or hydraulic puller to remove flanges from shafts.

Note: Input flange and rear output flange bolts are M16X2.00X70, while front output flange bolt is M16X1.50X70. Keep bolts with correct flange to

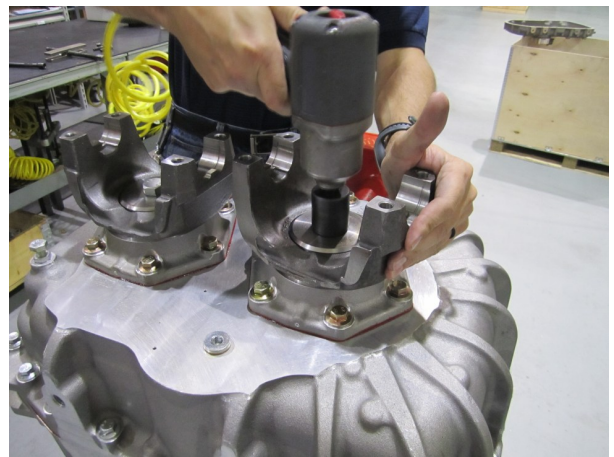


Figure 2

## FAE Housing.

- A - Seals
- B - Lock Nut
- C - FAE Housing
- D - Bearing
- E - Snap Ring
- F - Shift Collar
- G - Front Output Shaft
- H - Intermediate Plate
- I - Intermediate Plate (Long)
- J - Bolt
- K - Shift Rail
- L - Return Spring
- M - Shift Fork
- N - Piston
- O - O-Rings

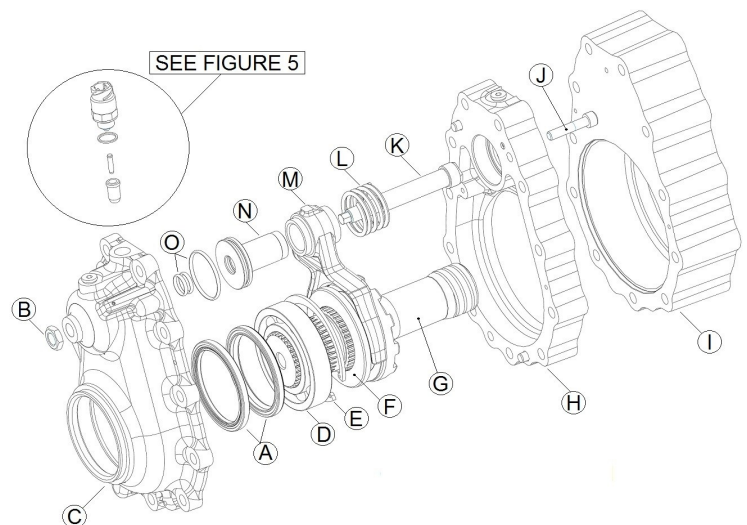


Figure 3

1.4 Remove Front Axle Engage ( FAE ) indicator switch, extension pin, snap ring, and shoulder. ( See figure 4 )

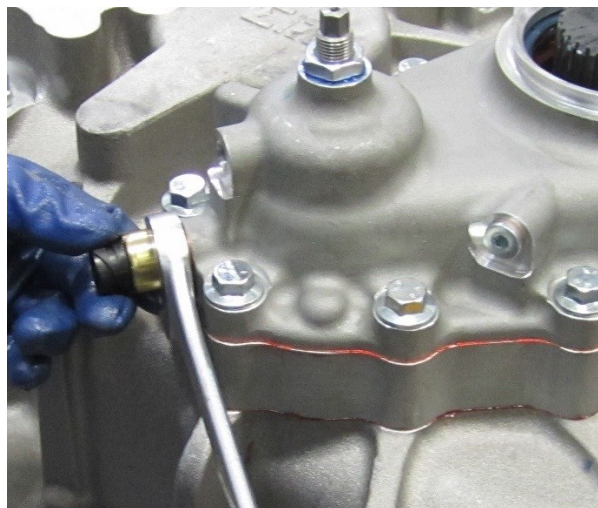


Figure 4

- A - Indicator switch
- B - Extension pin
- C - Guide shoulder
- D - Washer

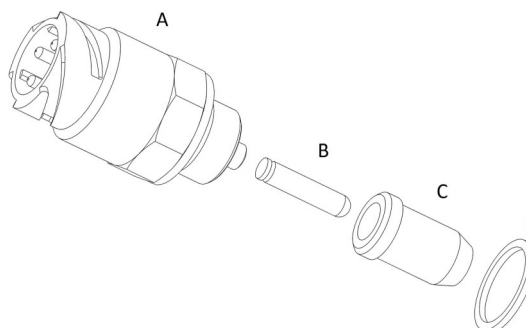


Figure 5

1.4.1 Remove FAE housing bolts.

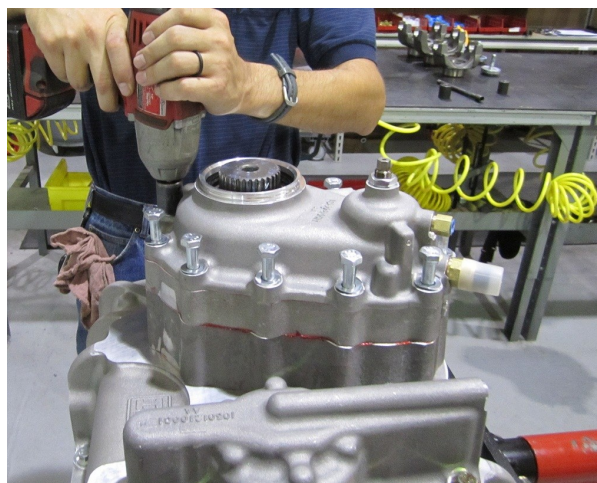


Figure 6



#### 1.4.2 Remove FAE housing assembly.

It may be necessary to tap the housing with a rubber mallet to break Loctite seal.

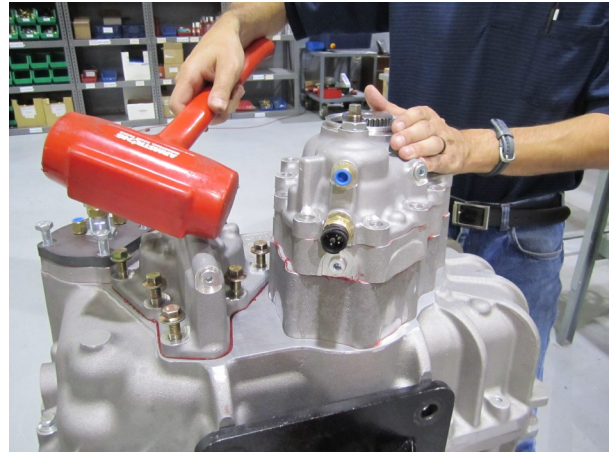


Figure 7

#### 1.4.3 First remove outer housing and intermediate plate, then the base plate as shown below.

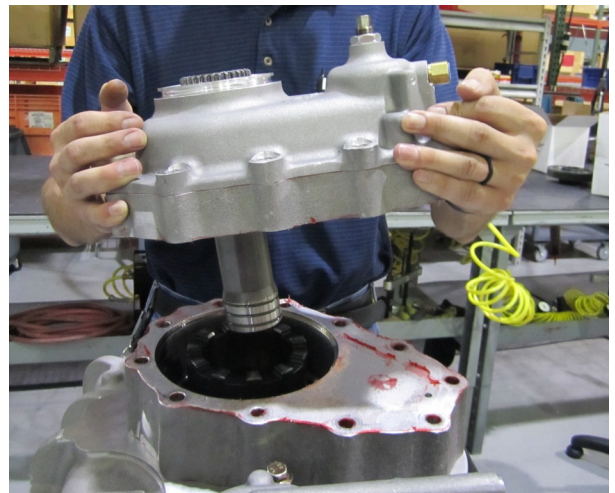


Figure 8

#### 1.4.4 Removing base plate.



Figure 9

## HI / LO Shift Cylinder

- A - O-Ring
- B - Cylinder
- C - O-Ring
- D - Piston
- E - Retaining nut
- F - Rear cover

Note: O-ring "A" fits into O-ring groove of cylinder bore.

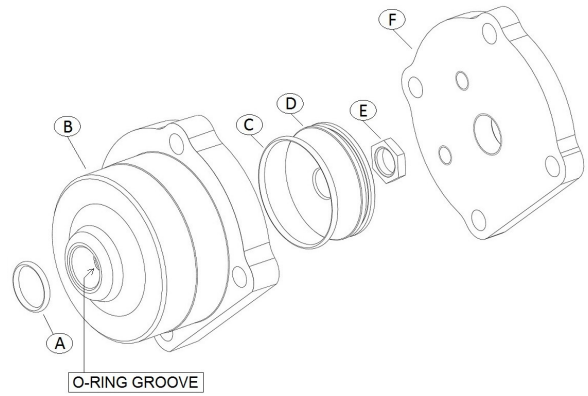


Figure 10

### 1.5 Remove HI/LO shift cylinder cover

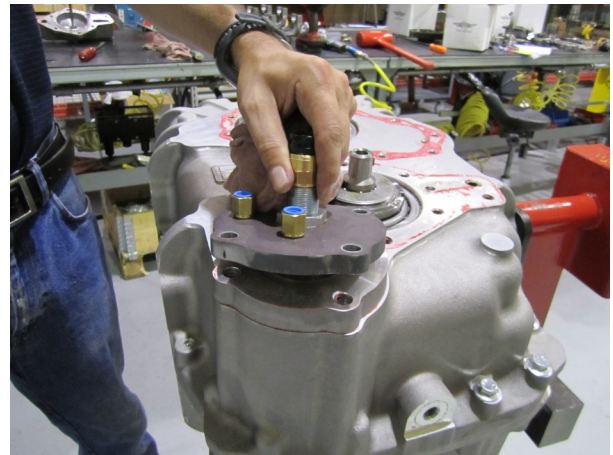


Figure 11

### View of shift rail retaining nut.



Figure 12

1.5 Remove retaining nut.

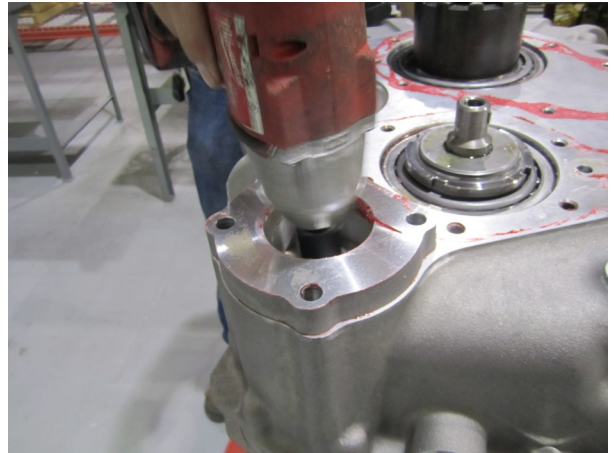


Figure 13

1.5.1 Blow air into air port to release piston.

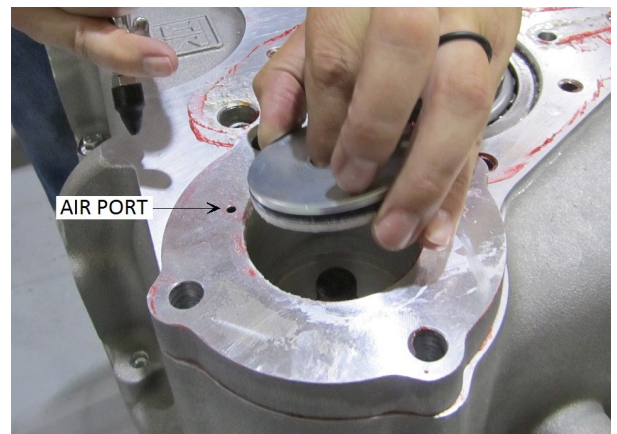


Figure 14

1.5.2 Remove piston. Inspect 0-rings for wear.

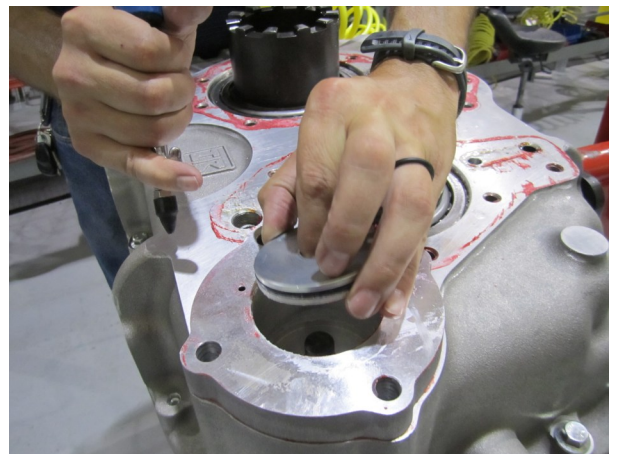


Figure 15



1.5.3 Remove air cylinder.



Figure 16

1.5.4 Inspect O-Ring on end of shift rail.

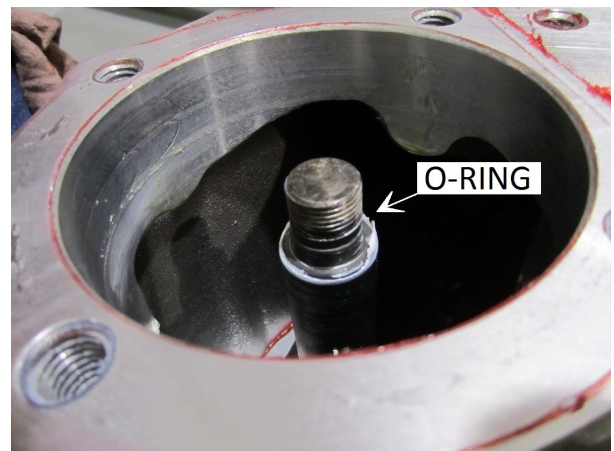


Figure 17

1.5.5 Inspect O-Ring inside shift fork bore of cylinder.

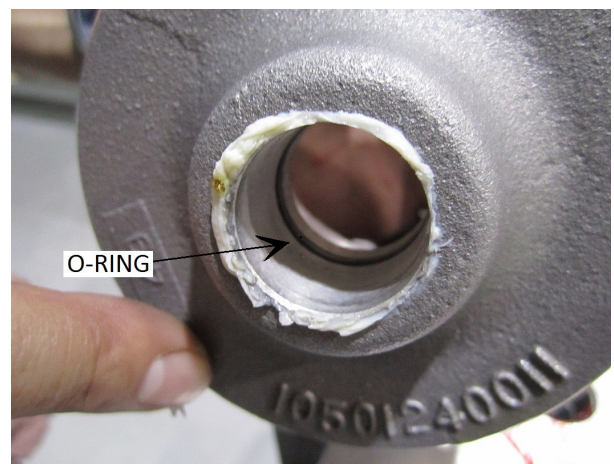


Figure 18

## Housing

### 1.6 Remove oil pump.



Figure 19

### 1.6.1 Remove bearing covers. It may be necessary tap cover with rubber mallet to break seal.



Figure 20

### 1.6.2 Retrieve shims.



Figure 21

1.6.3 Remove case bolts and use pry bar to loosen rear case half.



Figure 22

1.6.4 Remove rear case half.



Figure 23

## Gear-Set Removal

A - Input shaft

B - Output shaft

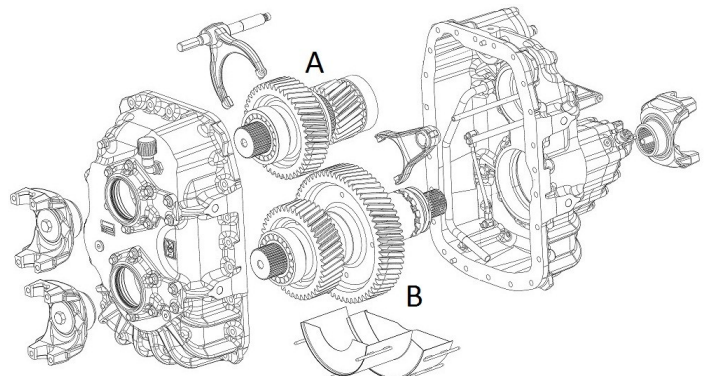


Figure 24



View of drive shafts with rear cover removed.



Figure 25

1.7 Lift out input shaft as assembly with shift fork and shift rail using eye-bolt (M16-1.5).



Figure 26

1.7.1 Remove oil pickup tube.

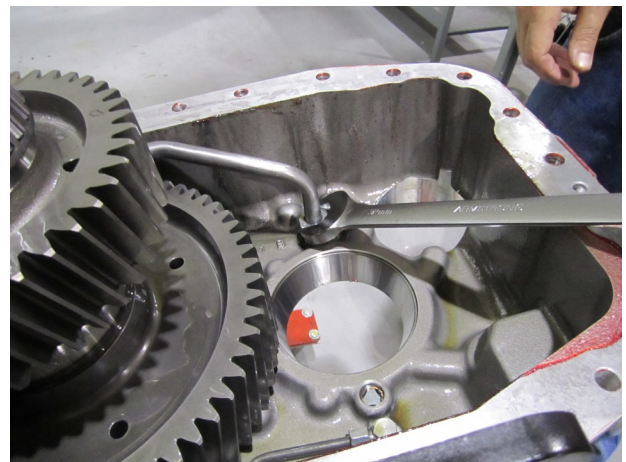


Figure 27



1.7.2 Lift out output shaft with oil deflector.

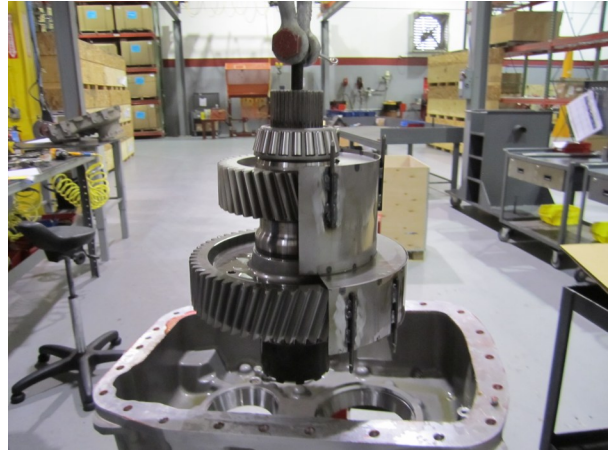


Figure 28

## Housing (general)

1.8 Remove snap ring and pressure relief valve.

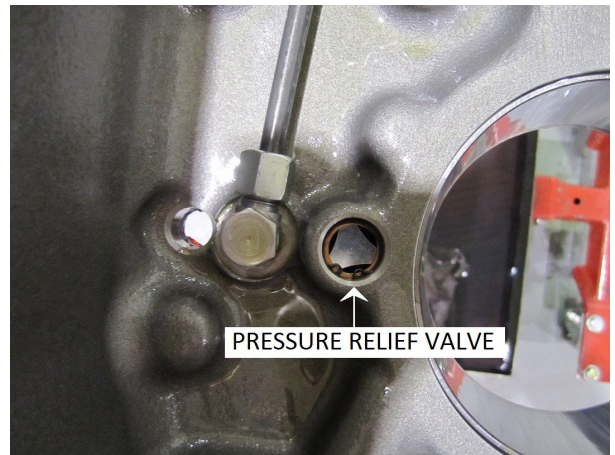


Figure 29

1.8.1 Use appropriate puller to remove bearing races.

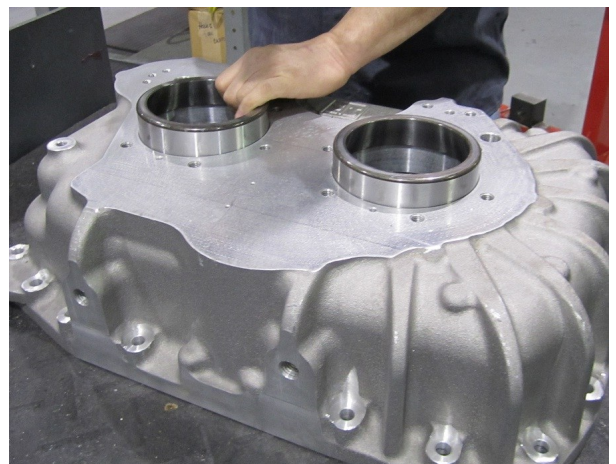


Figure 30

## R&R Drive shafts.

1.9 Grind out dimple-lock on input shaft nut and remove nut.

Note: Lock-nut may not be reused.



Figure 31

1.9.1 Press input shaft bearing from input shaft.



Figure 32

1.9.2 Remove drive gear and shift collar, then press rear shaft bearing from input shaft.



Figure 33

1.9.3 Press bearings from output shaft.



Figure 34

## Oil Pump

- A - Internal and external rotors
- B - Shift ring
- C - Center plate
- D - Flat spring
- E - Roll pin
- F - Large slot
- G - Pump cover

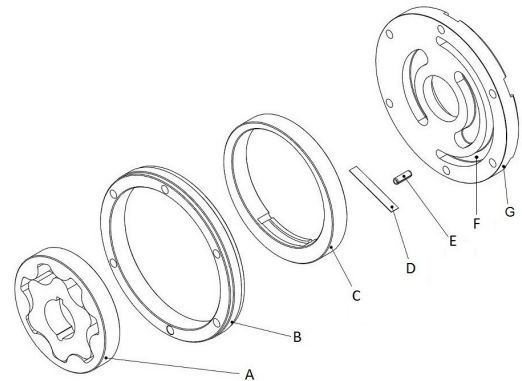


Figure 35

2.0 Remove retaining screws.



Figure 36



2.0.1 Remove pump cover.



Figure 37

2.0.2 Remove rotors and shift ring. Take care to contain flat spring when separating internal rotor from shift ring.

Inspect parts and replace as necessary.



Figure 38

### Front output housing.

2.1 Remove air passage o-rings.

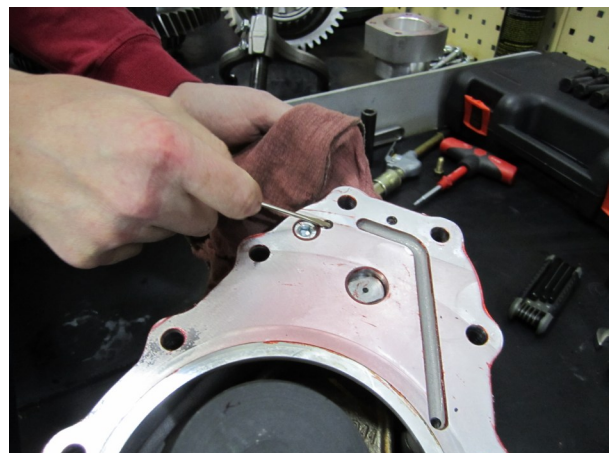


Figure 39

2.1.1 Remove housing bolts.

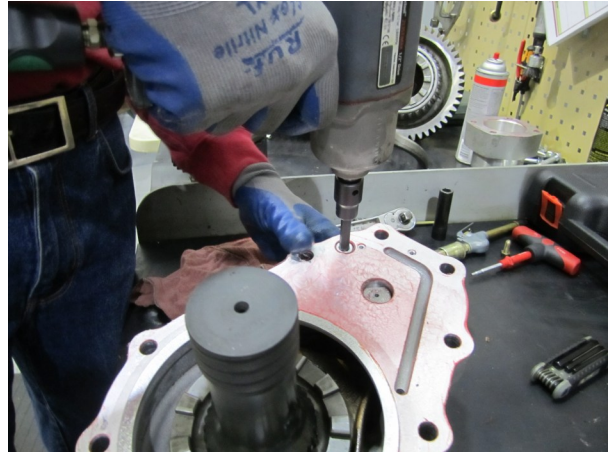


Figure 40

2.1.2 Separate housing halves.



Figure 41

2.1.3 Remove adjustment bolt and lock-nut.

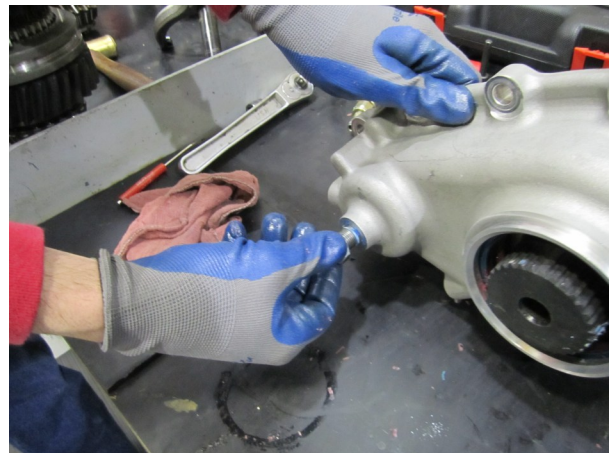


Figure 42

2.1.4 Remove shift rod.



Figure 43

2.1.5 Use a brass drift to remove piston.



Figure 44

2.1.6 Remove large snap ring.

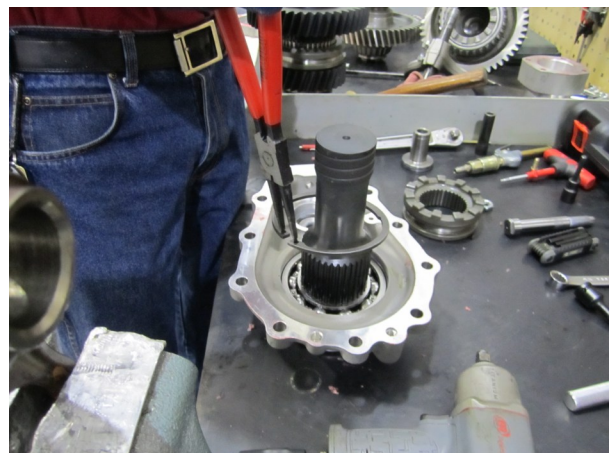


Figure 45



2.1.7 Press out front output shaft and bearing.



Figure 46

2.1.8 Press bearing from front output shaft.



Figure 47

## Transfer Case - Assembly

2.2 Reassemble shaft groups.

Freeze shafts to aid bearing installation. Heat bearings to 200F degrees.

Input shaft: Lube gear seats on shaft, and slip gears and shift collar into place. Install bearings onto shaft. Torque shaft nut to 420-480 Nm, then peen dimple-skirt at locating hole in shaft.

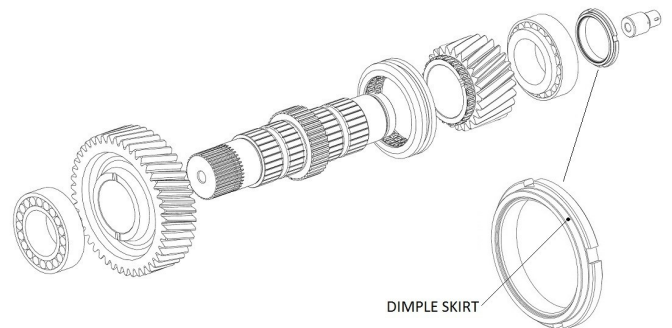


Figure 48

2.2.1 Heat bearings to 95C and install on output shaft.

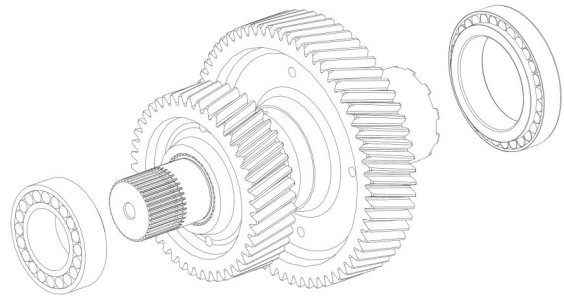


Figure 49

### Installing Drive Shafts.

The process of measuring and adjusting shaft bearing preload is identical for both input and output shafts. With the shaft staged in its race, install the rear case half with 10 bolts tightened to 72-88Nm. Measure the height of the locating shoulder on the bearing cap. Then measure the depth from case surface to top of bearing race. Subtract height from depth and add 0.10mm. Add shims as necessary to obtain this value.

The above measurements may be completed with input and output shafts at the same time however, the rotational torque measurements must be completed individually, i.e.: input shaft measured with output shaft removed, output Shaft measured with input shaft removed.

Rotational torque measurement procedure: Secure bearing cover and torque bolts to proper value. Use Torque-O-Meter to determine rolling torque. Add or subtract shims to obtain 4-7 Nm rotational torque.

Note: Install shaft seals into bearing covers after rotational torque adjustments are completed.

### Rotational Torque Measurement and Shimming.

2.3 Freeze bearing races and drive into housing.



Figure 50

2.3.1 Front axle intermediate housing serves as front output bearing carrier. Install without sealant using

Use temporary bolts ( 12mm X 85mm ) to secure FAE intermediate housing during measurement procedure.



Figure 51

2.3.2 Install oil pump using 4 bolts without thread locker.



Figure 52

2.3.3 Install output shaft without oil deflector.



Figure 53



2.3.4 Install rear case half. Torque bolts to 72-88 Nm. Without thread locker.



Figure 54

2.3.5 Use brass drift to seat bearings.



Figure 55

2.3.6 Measure depth from deck of housing to top of Bearing race.



Figure 56

2.3.7 Measure height of lip on bearing cover and Subtract this value from measurement in step 2.3.6, and add 0.10mm.



Figure 57

2.3.8 Add shims to equal the value determined in Step 2.3.7.



Figure 58

2.3.9 Bolt bearing cover in place. Torque bolts to 46 Nm without thread locker.

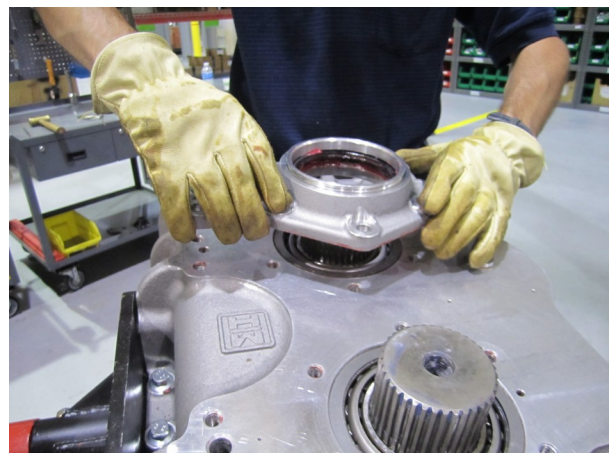


Figure 59

2.3.9a Check rotational torque. Using Torque-O-Meter, check rotational torque value. Add or remove shims to achieve 4-7 Nm.

Remove output shaft and rear case half. Install Input shaft and rear case half, and repeat rotational torque adjustment procedures. Install shaft seals in bearing covers.

Note: These procedures performed using drive flange bolt threaded into shaft.

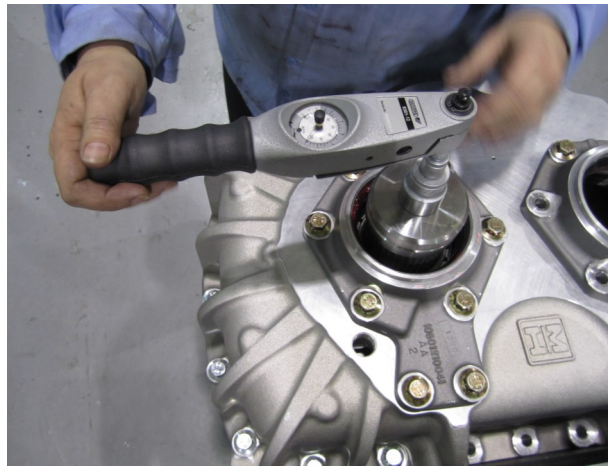


Figure 60

2.4. Remove rear housing and input shaft. Install output shaft with oil deflector. Take care to Ensure that deflector pins line up with locating holes in case.



Figure 61

2.4.1 Install oil pickup tube, treating threads with Loctite 243, and torqueing compression fitting to 63-78 Nm. Torque lower tube clamp bolt to 18-22 Mn.

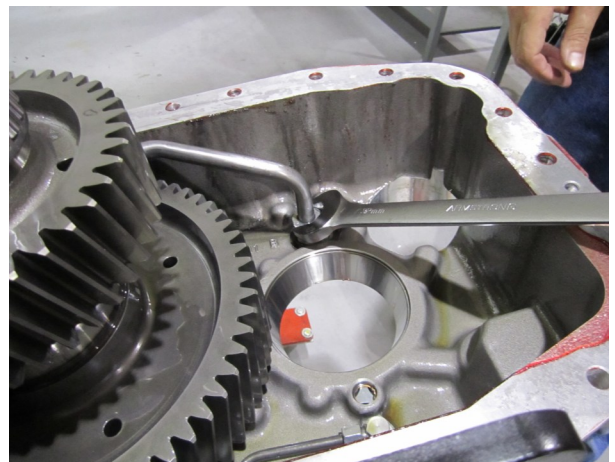


Figure 62



2.4.2 Install pressure relief valve assembly. Ensure fully seated snap ring



Figure 63

## HI/LO Shift Mechanism

2.5 Assemble HI/LO shift fork. Apply Loctite 243 to fork bolts and torque to 42-50 Nm. Apply lube to sliders and fit into fork.

Install o-rings on shift rail, and coat with Molykote lube.

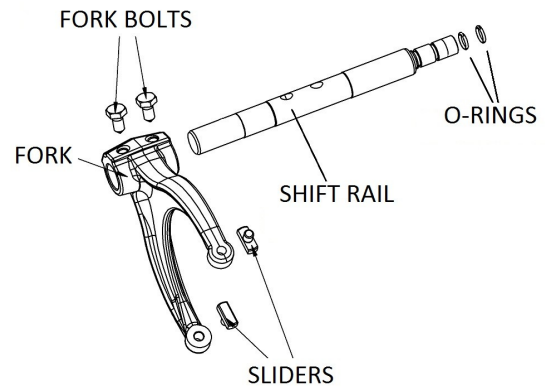


Figure 64

2.5.1 Inspect o-ring in shift cylinder. Coat with Molykote lube.

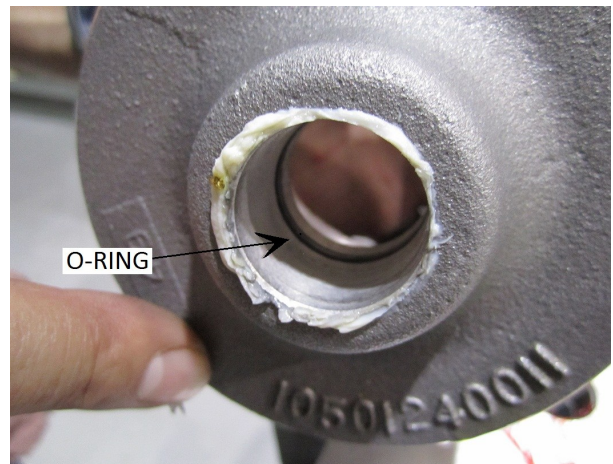


Figure 65

2.5.2 Install shift cylinder. Use plastic dead-blow hammer to tap into place if necessary.



Figure 66

## Case Housing

2.6 Install input shaft and fork as an assembly.



Figure 67

2.6.1 Scrape old sealant from mating surface.

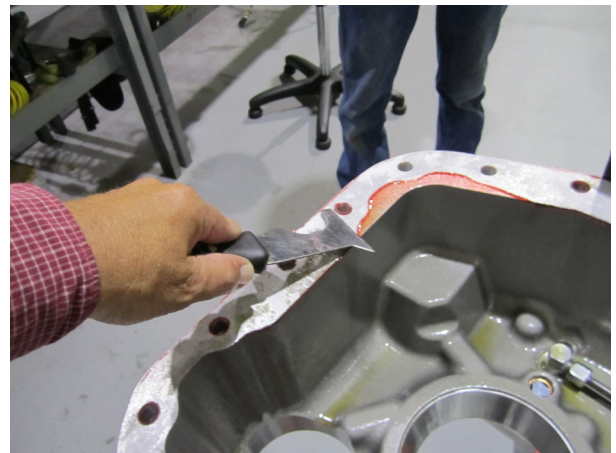


Figure 68

2.6.2 Coat case mating surface with Loctite 518.

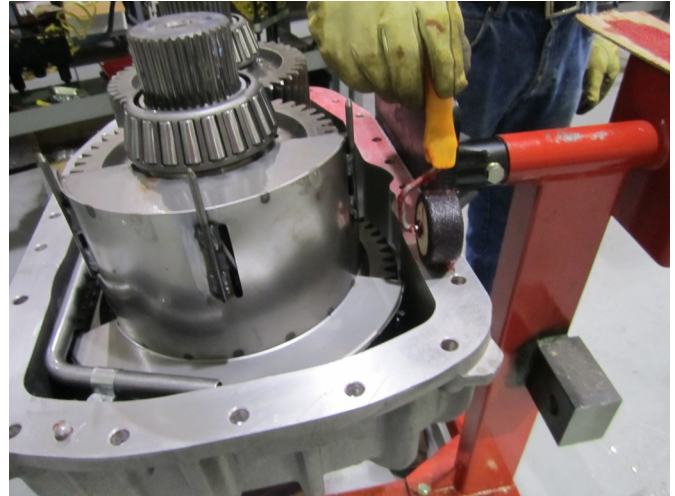


Figure 69

2.6.3 Install rear case half ensuring alignment of oil deflector locating pins.

Torque case bolts to 77-88 Nm.

Coat mating surfaces of bearing covers with Loctite 518, and install. Apply Loctite 243 to bolts and torque to 46 Nm.



Figure 70

## Oil Pump

2.7 Refer to figure 35. Assemble inner and outer rotors with flat spring. Coat all parts with gear oil and insert into shift ring and center plate.



Figure 71



2.7.1 Install oil pump cover ensuring that roll pin in shift ring is aligned with large slot in cover. See figure 35.



Figure 72

2.7.2 Coat mating surface with Loctite 518.

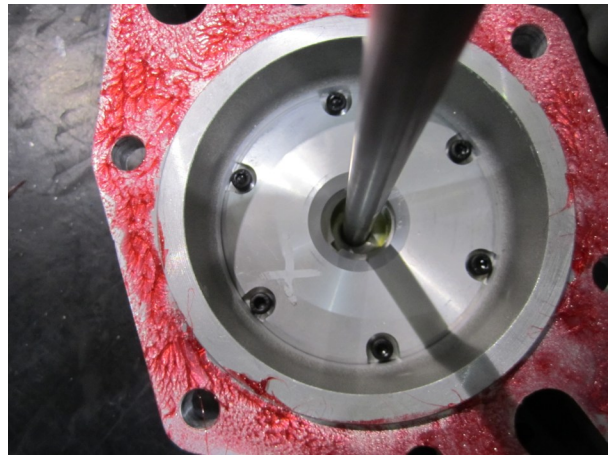


Figure 73

2.7.3 Apply Molykote to oil pipe and push into bore in oil pump mounting boss until flush as seen in Figure 75.

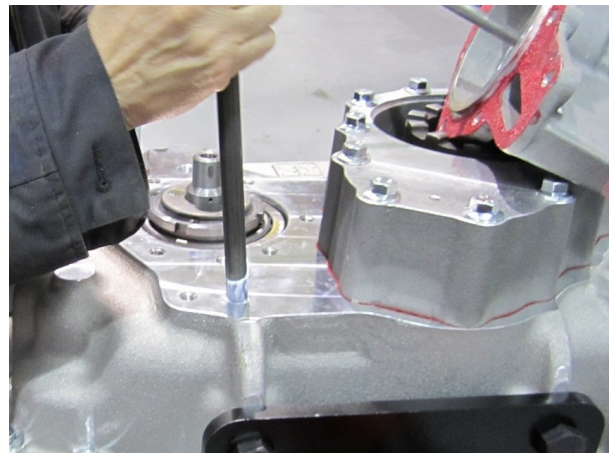


Figure 74

Oil pipe (arrow) flush with housing.

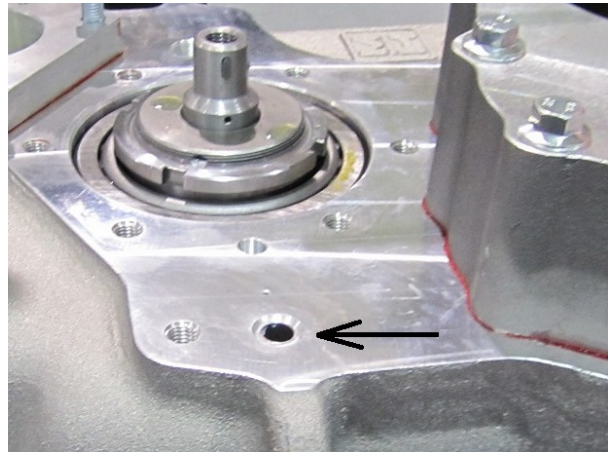


Figure 75

Note position of oil pump drive key on input shaft before installing oil pump.

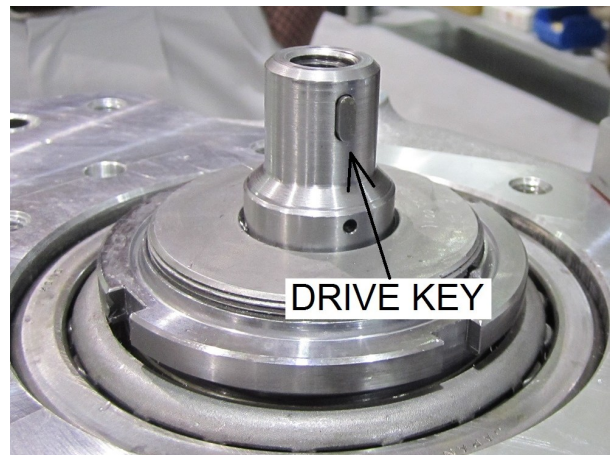


Figure 76

2.7.4 Align oil pump drive slot with drive key, and install pump as seen in next step.

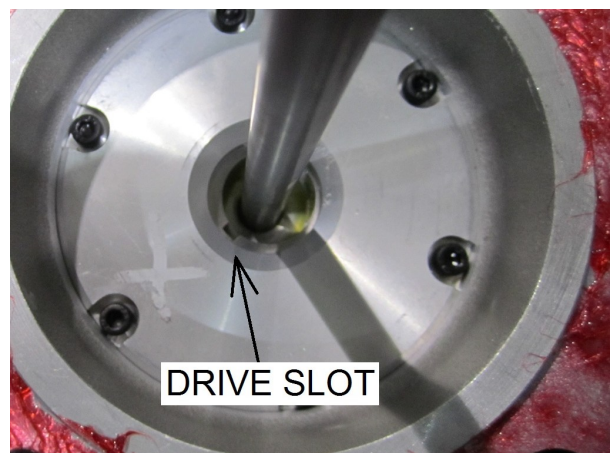


Figure 77

2.7.5 Torque oil pump bolts to 78-88 Nm.



Figure 78

### Front Axle Engage (FAE) Mechanism

2.8 Heat bearing A to 100C and install onto FAE shaft B.

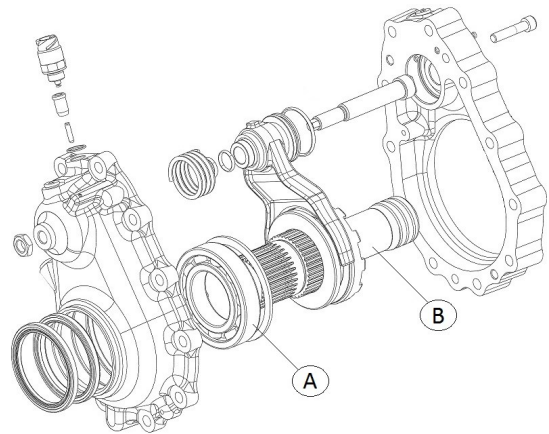


Figure 79

2.8.1 Freeze shaft and bearing assembly to -77C and install into FAE housing.



Figure 80



2.8.2 Install snap-ring, ensuring that snap-ring ends are positioned at relief channel as shown in figure 81.

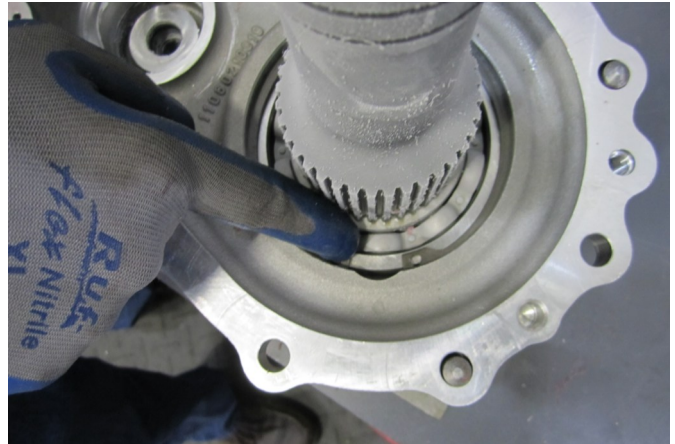


Figure 81

2.8.3 Install inner and outer o-rings onto FAE piston.

Note: coat all pistons and O-rings with Molykote lubricant.

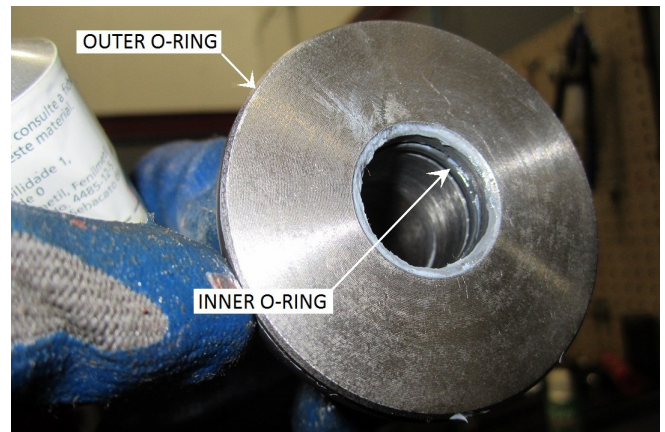


Figure 82

2.8.4 Install o-ring into FAE housing piston bore and coat with Molykote lubricant.

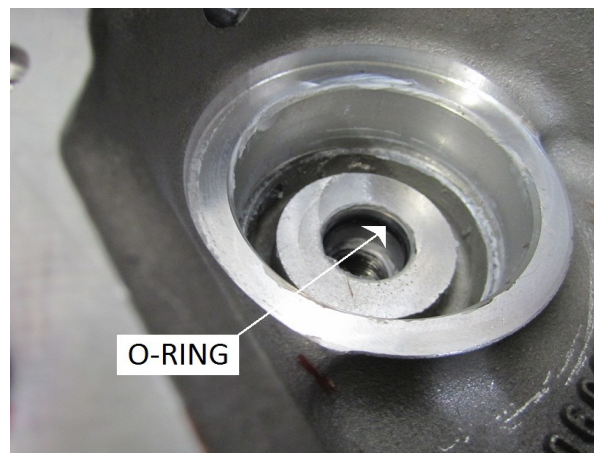


Figure 83

2.8.5 Install piston into FAE housing.



Figure 84

2.8.6 Install fork and shift collar onto FAE output shaft while guiding fork over piston extension.

Note: apply Molykote to piston extension.

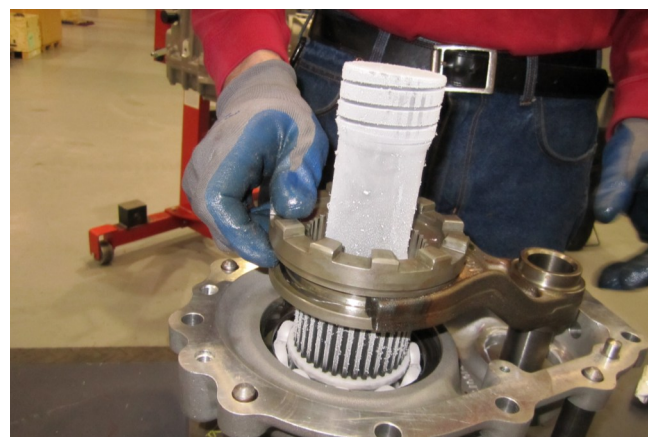


Figure 85

2.8.7 Install FAE shift rail through fork and piston. Rotate until approximately 15/16" to 1" of thread is exposed on outer portion as shown in figure 86.



Figure 86

15/16 to 1 " of exposed thread.



Figure 87

2.8.8 While maintaining 15/16 " to 1 " of exposed thread, ensure that inside end of rail flush, or just below housing deck to prevent binding.

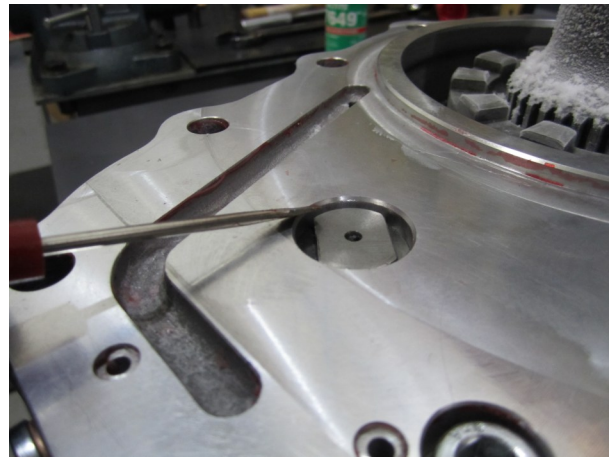


Figure 88

2.8.9 Install o-ring into air passage on FAE outer cover. Apply Loctite 518 to mating surface.



Figure 89



2.9 Position FAE return spring.



Figure 88

2.9.1 Mate inner and outer FAE housing halves and secure with two socket-head bolts. Tighten gradually to 46 Nm.



Figure 89

2.9.2 Install o-rings in air passages on back of FAE housing.

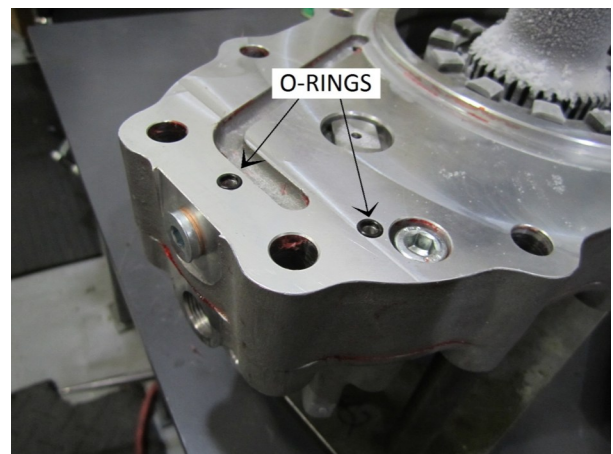


Figure 90

2.9.3 Apply gear oil to output shaft bore. Coat mating surfaces with Loctite 518 sealant.



Figure 91

2.9.4 Remove temporary bolts and install FAE housing. Torque permanent bolts to 80 Nm.



Figure 92

## HI / LO Shift Cylinder

3.0 Install O-ring on piston.



Figure 93

3.0.1 Lubricate piston with Molykote, then insert into piston over shift rail. Treat shift rail threads with Loctite 243. Install retaining nut and torque to 90-110 Nm.

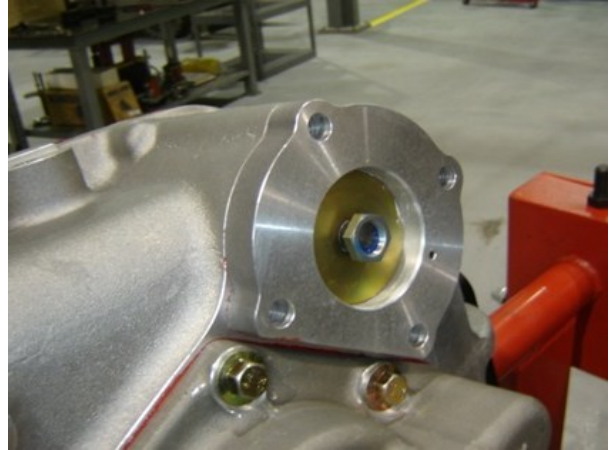


Figure 94

3.0.2 Coat mating surface of cylinder cover with Loctite 518 and install, torquing bolts to 72-88 Nm.



Figure 95

3.0.3 Thread lock-nut onto LO range adjustment screw and install into cylinder cap.



Figure 96



3.0.4 Apply air to LO port, and rotate input shaft to allow engagement teeth to fully mesh. Turn adjustment screw in until it contacts shift rail. Turn screw additional 3/4 turn, and torque lock-nut to 90-110 Nm.

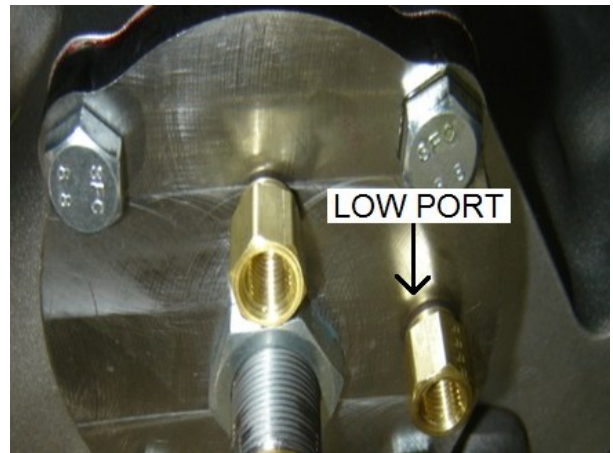


Figure 97

3.0.5 Install indicator switch and torque to 33-44 Nm.



Figure 98

3.0.6 Install HI range adjustment screw and lock-nut as described in 3.0.3. Thread screw in approx. .25 ”.



Figure 99

3.0.7 Apply air to HI port and rotate input shaft to ensure full engagement. Rotate adjustment screw inward until it makes contact with shift rail.

Turn screw in 1 additional turn, then tighten lock-nut to 75-91 Nm.

Install indicator switch and extension pin.

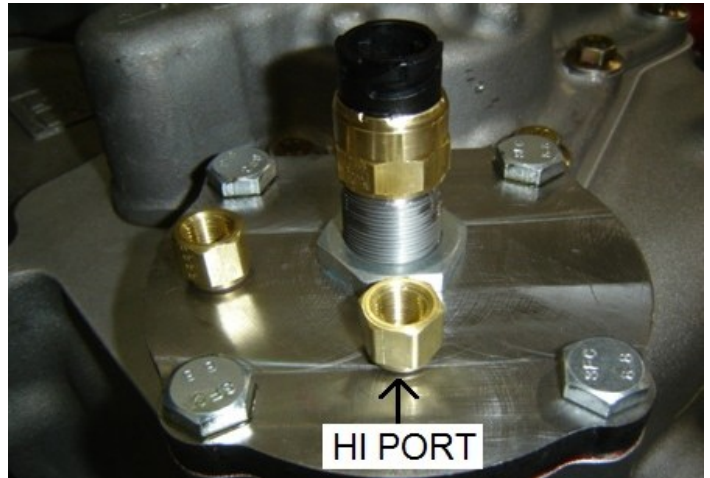


Figure 100

3.0.8 Apply air to the FAE port. Rotate flange to ensure full engagement. Turn control rod in until drag is felt. Then back rod out 1/2 turn.

Treat threads with Loctite 243 and torque lock-nut to 190-230 Nm.

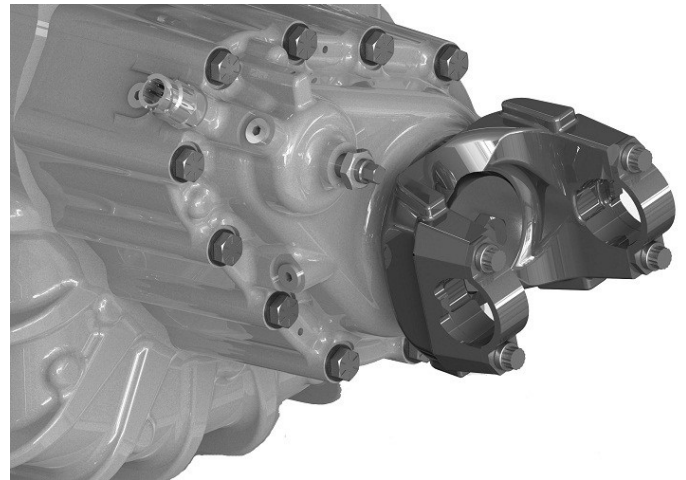


Figure 101

3.1.2 Install breather fitting and lock-nut using Loctite 243. Torque lock-nut to 90-110 Nm.



Figure 102

3.1 Heat output flanges to 82C and install. Apply Loctite 243 to bolts and torque to 240-297 Nm.

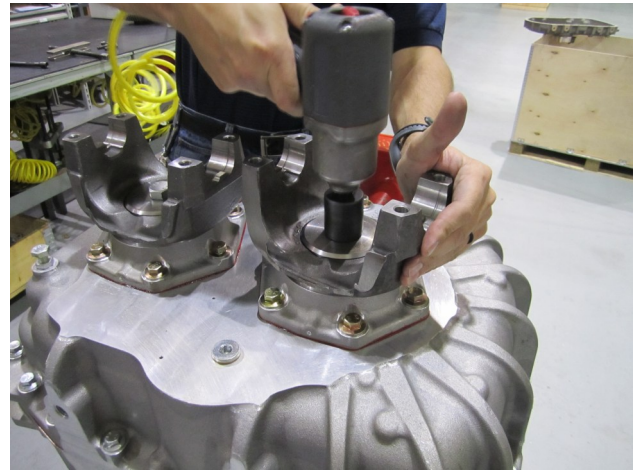


Figure 103

3.1.1 Heat front output flange to 82C and install. Apply Loctite 243 to bolt and torque to 175-215 Nm.



Figure 104