

MARMON-HERRINGTON

MVG-1150 TRANSFER CASE

(RTC60)

REPAIR MANUAL



MARMON-HERRINGTON T-30 SERIES TRANSFER CASE

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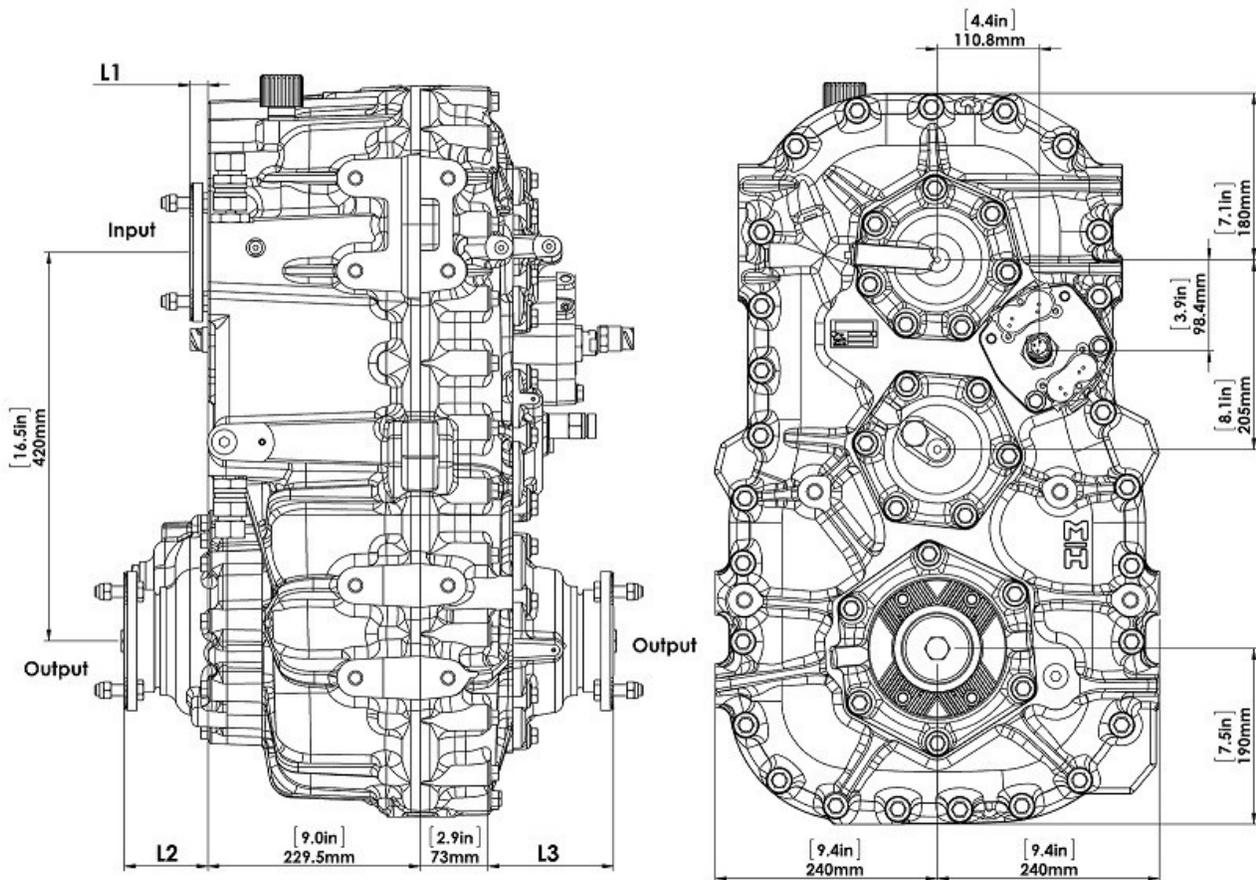


Attention!

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) for updates and additional information. Find detailed operation and preventative maintenance information in the General Operating Manual. T-30 Parts Manual also available.

MARMON-HERRINGTON T-30 TRANSFER CASE



INPUT TORQUE (FT LB)	INPUT SPEED MAX (RPM)	WEIGHT APPROX kg (W/O OIL OR PTO)	RATIO	
			HIGH	LOW
11,500	3,500	218	1:1.09	1:2.47

REPLACEMENT PARTS

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

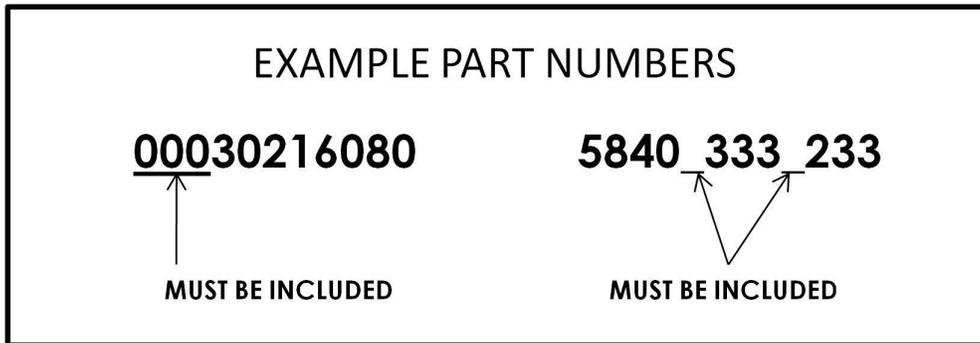
1. **FACTORY ORDER NUMBER.** Found on ID Plate affixed to Transfer Case Housing. This will be a six (6) digit number. (See illustration below)
2. Model of transfer case, i.e T-60, T-100
3. Give quantity and complete part number including **ALL CHARACTERS** (including zeros (0), dashes (-), underscores (_), 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

MARMON-HERRINGTON			
SALES ORDER	SXXXX XX	RATIO	
S/N		TYPE	
CUST P/N			

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

Except for the case of PD (Proportioning Differential) version transfer cases, 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, axle position, or PTO function 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).

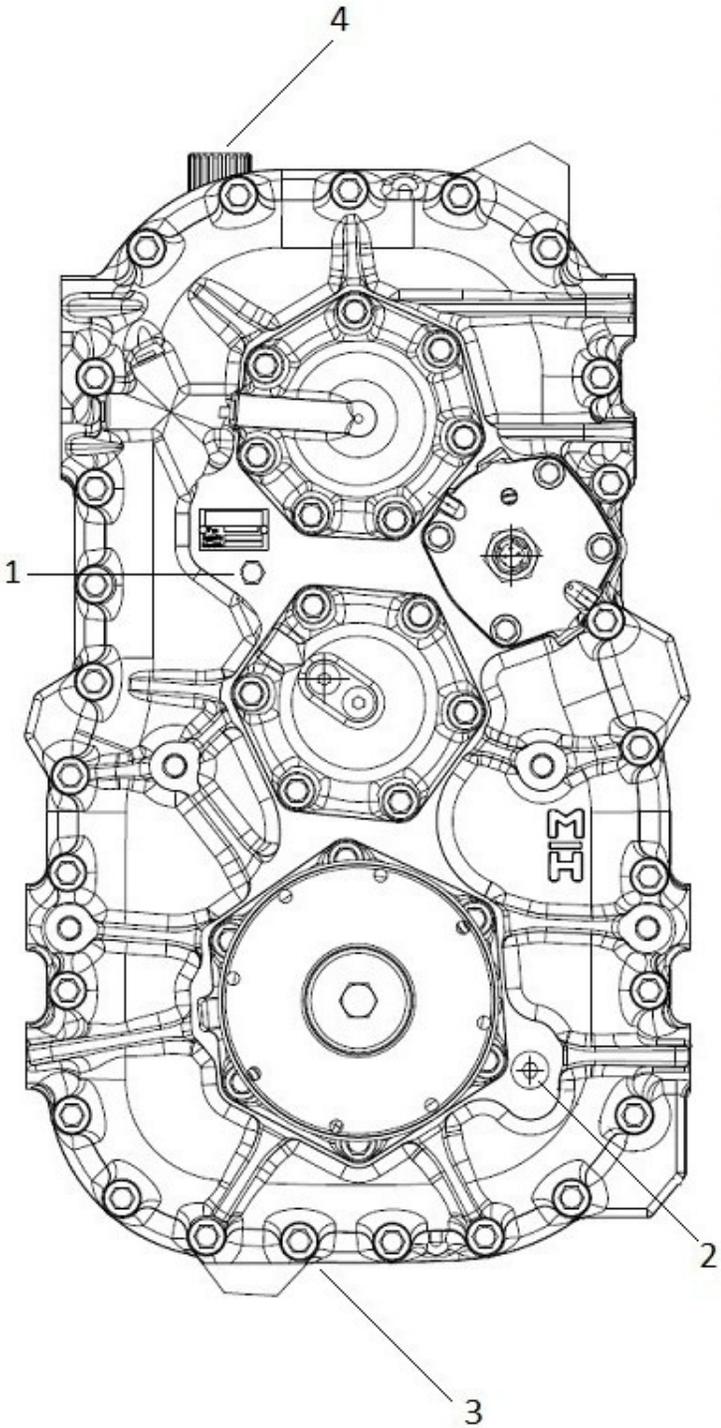
TORQUE

“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.



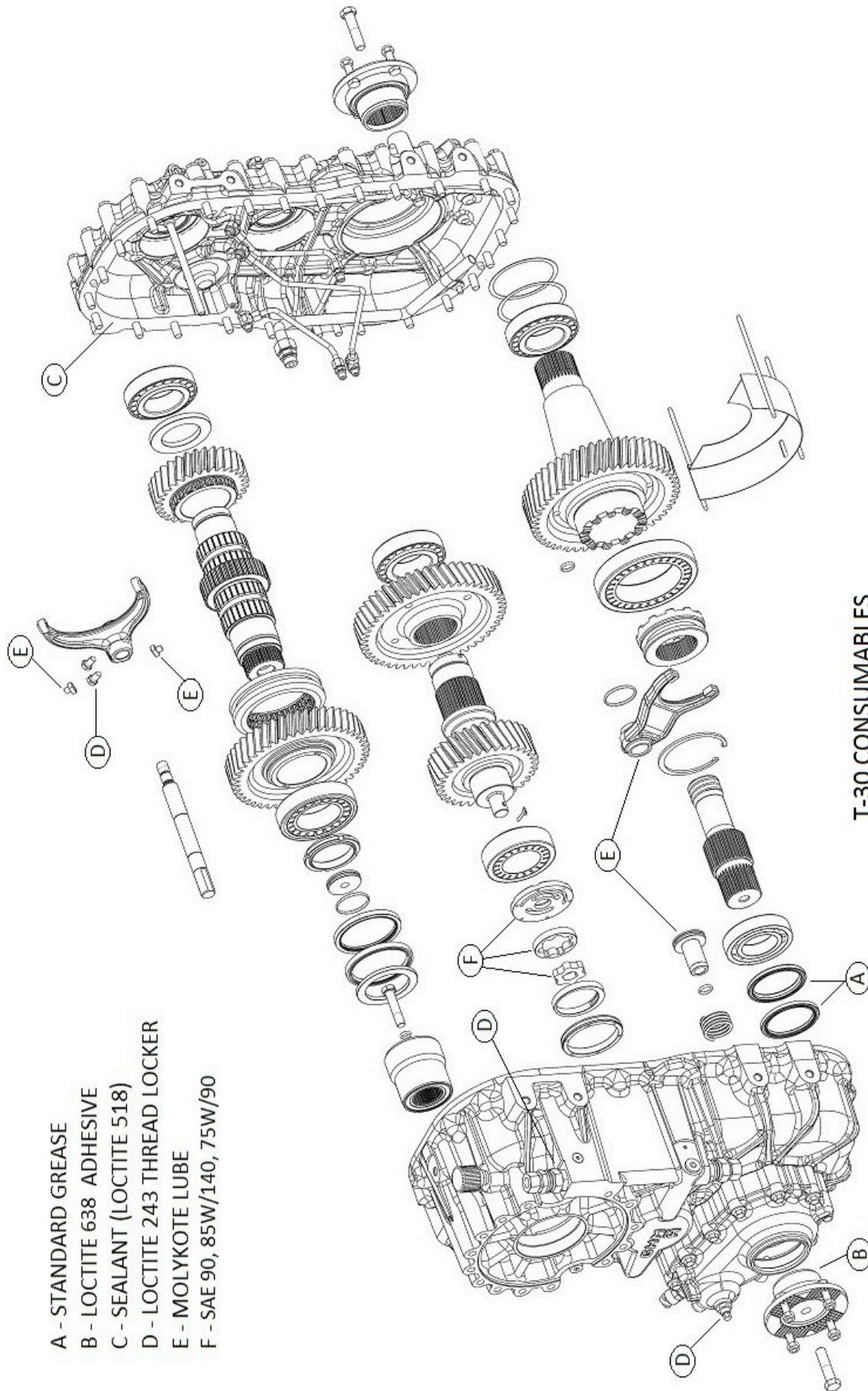
T-30 TRANSFER CASE

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

LUBE QTY: APPROX. 6.2L / 13.1 PINTS

- 1 - FILL PLUG
 - 2 - LEVEL PLUG
 - 3- DRAIN PLUG
 - 4 - VENT
- SAE 85W/140
 SAE 75W/90
 SAE 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-30 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 Shift Housing

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



Figure 3

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

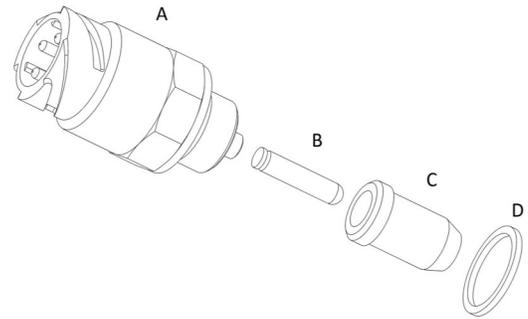


Figure 4

1.4.1 Remove FAE housing bolts.



Figure 5

1.4.2 Loosen shift fork adjuster to relieve tension on shift rod.



Figure 6

1.4.3 Remove FAE housing assembly.



Figure 7

T-Case (general)

1.5 Remove case bolts and bearing cover bolts.



Figure 8

HI / LO Shift Cylinder

- A - Cylinder
- B - Pistons
- C - O-rings
- D - Shims
- E - Retaining nut
- F - Rear cover

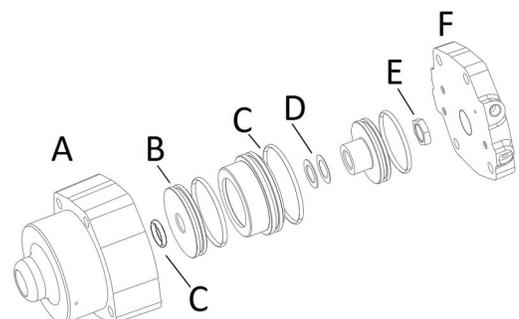


Figure 9

1.6 Remove shift cylinder mounting bolts.



Figure 10

1.6.1 Remove shift cylinder cover.



Figure 11

1.6.2 Remove retaining nut.



Figure 12

1.6.3 Blow air into this hole to release pistons.



Figure 13

1.6.4 Remove outer piston. Inspect 0-rings for wear.



Figure 14

1.6.5 Remove 0-ring at end of shaft, then use magnet to retrieve shims.

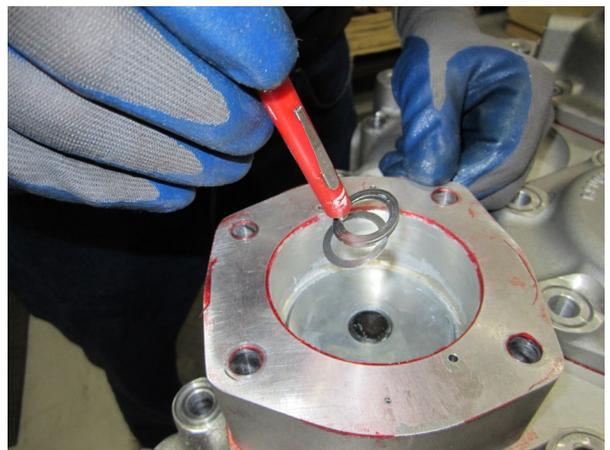


Figure 15

1.6.6 Blow air into hole again to remove inner piston.



Figure 16

1.6.7 Tap cylinder lightly with rubber mallet to break seal, then remove cylinder.



Figure 17

1.6.8 Remove O-ring from air passage.



Figure 18

Housing

1.7 Remove rear input bearing cover.



Figure 19

1.7.1 Retrieve shims and keep with cover.



Figure 20

1.7.2 Remove rear output bearing cover and intermediate shaft cover.

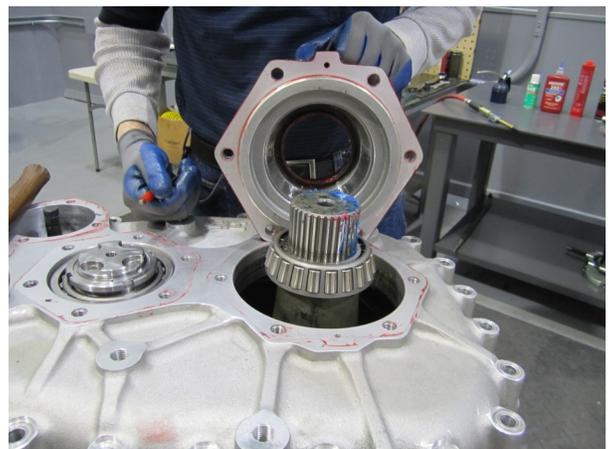


Figure 21

1.7.3 Use pry bar to break case seal.



Figure 22

Remove rear housing cover.



Figure 23

Gear-Set Removal

A - Input shaft

B - Intermediate shaft

C - Output shaft

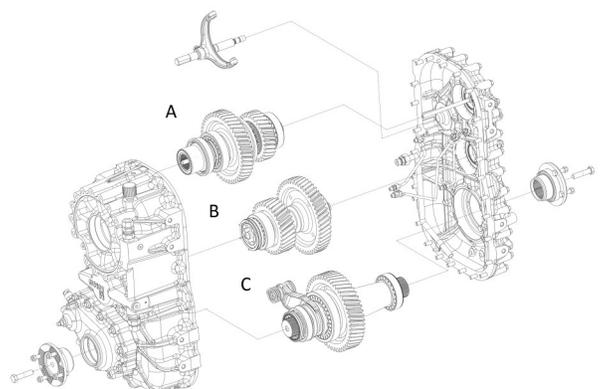


Figure 24

1.8 Lift out intermediate shaft.



Figure 25

1.8.1 Lift out rear output shaft and oil baffle.



Figure 26

1.8.2 Lift out input shaft as an assembly with shift fork assembly.



Figure 27

Housing (general)

- 1.9 Use appropriate puller to remove intermediate shaft bearing race.



Figure 28

- 1.9.1 Using a chisel, remove input shaft seal carrier.

Note: This is a sacrificial part, and cannot be re-used.



Figure 29

Input shaft seal carrier.



Figure 30

Oil Pump

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

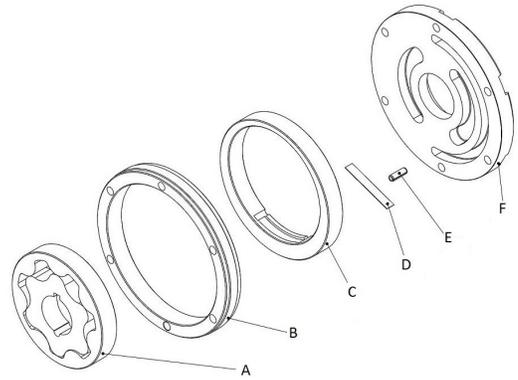


Figure 31

- 2.0 Remove retaining screws . Then remove pump cover, rotors, and shift ring.



Figure 32

Internals (general)

- 2.1 Remove air passage o-ring seal.



Figure 33

2.1.1 Remove internal oil lines.



Figure 34

2.1.2 Remove snap ring and pressure relief valve.



Figure 35

Front output housing.

2.2 Remove air passage o-rings.

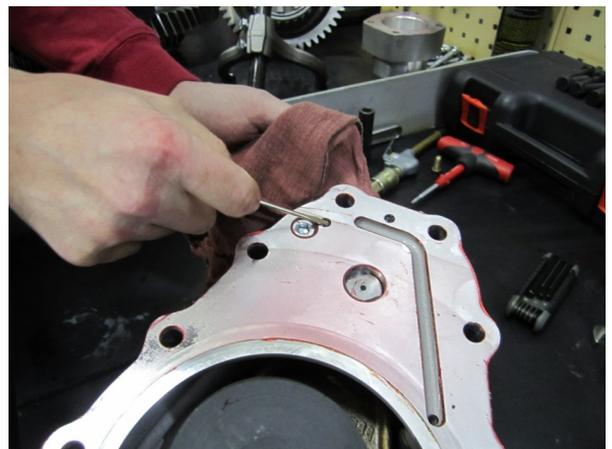


Figure 36

2.2.1 Remove housing bolts.



Figure 37

2.2.2 Separate housing halves.



Figure 38

2.2.3 Remove adjustment bolt and lock-nut.



Figure 39

2.2.4 Remove shift rod.



Figure 40

2.2.5 Use a brass drift to remove piston.



Figure 41

2.2.6 Remove large snap ring.



Figure 42

2.2.7 Press out front output shaft and bearing.



Figure 43

2.2.8 Press bearing from front output shaft.



Figure 44

Drive shafts.

2.3 Using appropriate puller, remove bearing from rear output shaft.



Figure 45

2.3.1 Using appropriate puller, remove bearings from intermediate shaft.



Figure 46

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

note: lock-nut may not be re-used.



Figure 47

2.3.3 Press drive gears, spacers, and bearings from input shaft.



Figure 48

2.3.4 Remove shift collar and HI/LO drive gears.

Note: Inspect engagement teeth of shift collar and drive gears.



Figure 49

Planetary Differential

The following pertains to models fitted with optional Planetary Differential.



Figure 50

2.4 Remove bolts securing differential housing and lift off differential shaft.



Figure 51

2.4.1 Remove large snap ring.



Figure 52

2.4.2 Lift off drive shaft.



Figure 53

2.4.3 Lift off planetary ring gear.



Figure 54

2.4.4 Remove socket head bolts from planet housing.



Figure 55

2.4.5 Remove snap ring from snout shaft if replacing inner bearing race.



Figure 56

2.4.6 Use pry bars to lift planetary out of case.

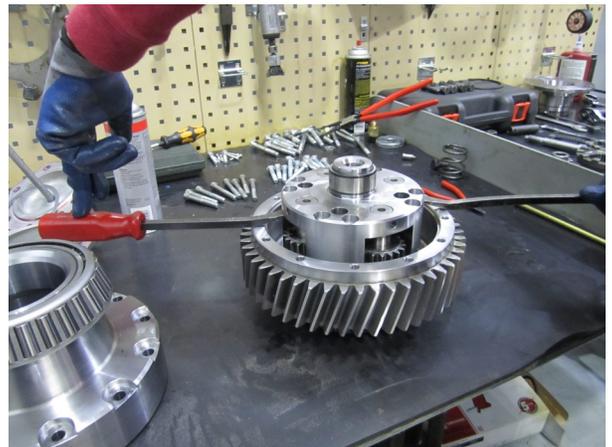


Figure 57

Planet gears with shaft housing removed.



Figure 58

Planet gears, bearings and spacers.



Figure 59

Planetary gear shafts are held in place with a spring and set pin. (see figures 61, 62)



Figure 60

Set pin and spring load into inner bore hole.



Figure 58

2.4.7 During assembly, hold pin against spring while inserting gear shaft. Align set hole with pin, and lock into place.

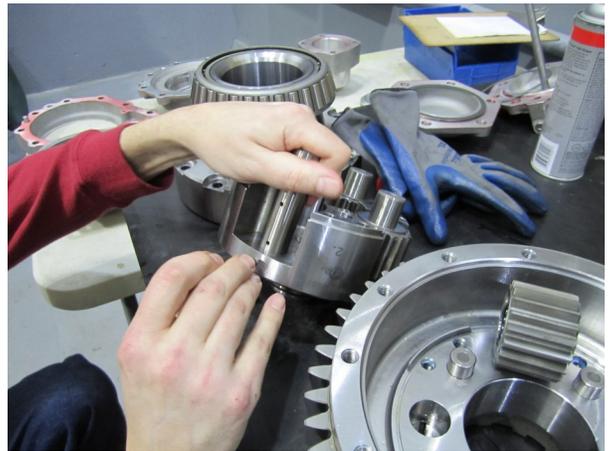


Figure 59

2.4.8 Inspect inner drive shaft bearings for wear.



Figure 60

Planetary Assembly

2.4.9 Assembly of planetary is reverse order of disassembly.

Note: Use Loctite 243 on case half bolts and torque to 57-70 Nm

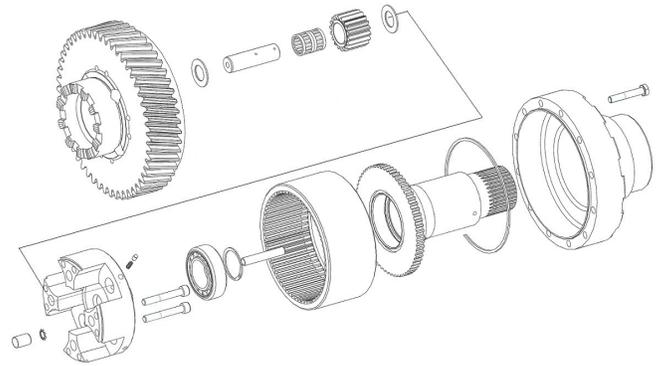


Figure 61

Transfer Case Assembly

2.5 Reassemble shaft groups.

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

Input shaft assembly.

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

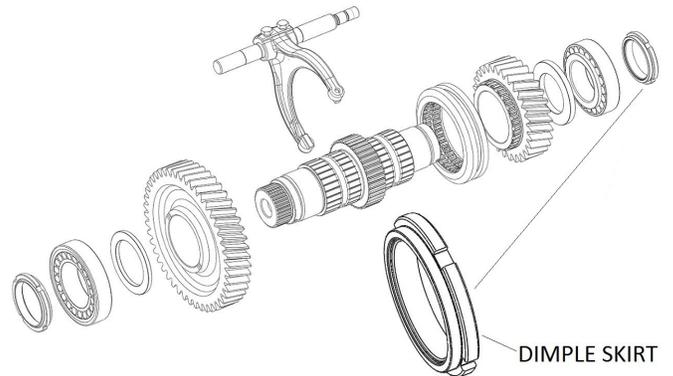


Figure 62

2.5.1 Note that the Input Shaft has a small bushing installed at the rear. The top oiling spray tube fits through this bushing (figure 64).

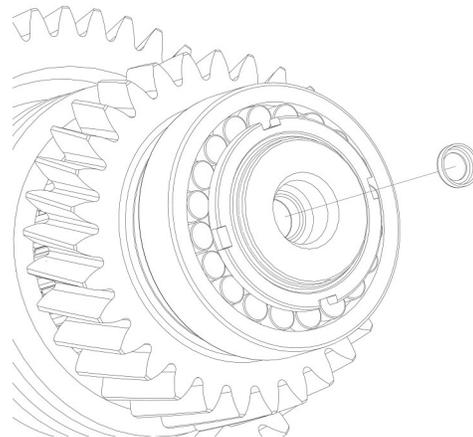


Figure 63

2.5.2 Input shaft - Gently drive bushing into bore until completely seated.



Figure 64

2.5.3 Intermediate shaft assembly. Heat bearings to 200F. Freeze gear shaft and install bearings.

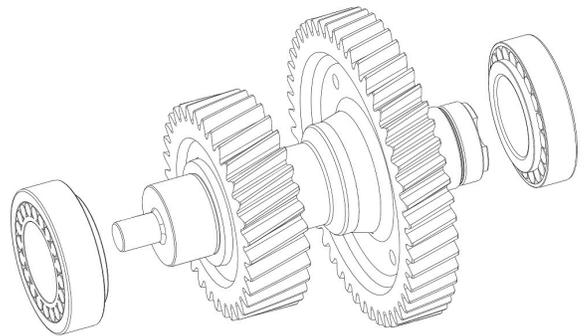


Figure 65

2.5.4 Output shaft assembly (non PD version) .

Heat bearings to 200F, freeze shaft, then install bearings.

Note: See PD (proportioning differential) section if applicable.

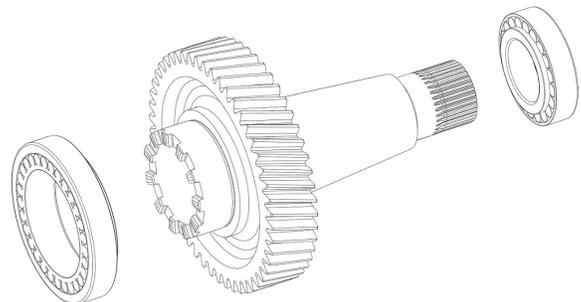


Figure 66

Lubrication System

2.6 Install internal lube lines and air passage o-rings.

Torque compression nuts to 54-66 Nm.



Figure 67

2.6.1 Install pressure relief valve.



Figure 68

2.6.2 Install lube spray pipe at 20 degree angle to case edge. Torque nut to 60 Nm.



Figure 69

2.6.3 Install oil pump rotors, shift ring and center plate. Hold flat spring in slot on shift ring while inserting center plate. (see figure 31)

Note: Install shift ring “ dull side ” UP.

Note: Coat assembly with lube before installing pump cover!



Figure 70

2.6.4 Be sure to align shift ring roll pin with large slot in pump cover.



Figure 71

2.6.5 Coat socket head screws with Loctite 243 and torque to 5.5 Nm.



Figure 72

2.6.6 Freeze shaft bearing races and install.



Figure 73

Installing Drive Shafts.

The process of measuring and adjusting shaft bearing preload is identical for all three 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 0.15mm. Add shims as necessary to obtain this value.

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.

Input and output shaft may be measured at the same time. Intermediate shaft preload must be performed with input and output shafts removed.

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

2.7 Install input and output shafts. Then install case half with 10 bolts torque to 72-88Nm.

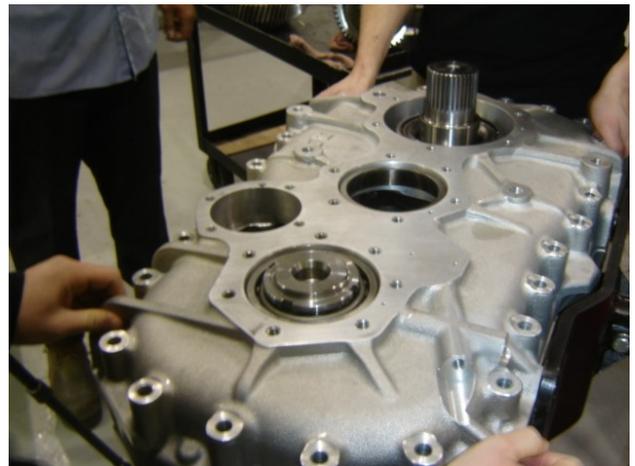


Figure 74

2.7.1 Measure height of bearing cover locating shoulder.

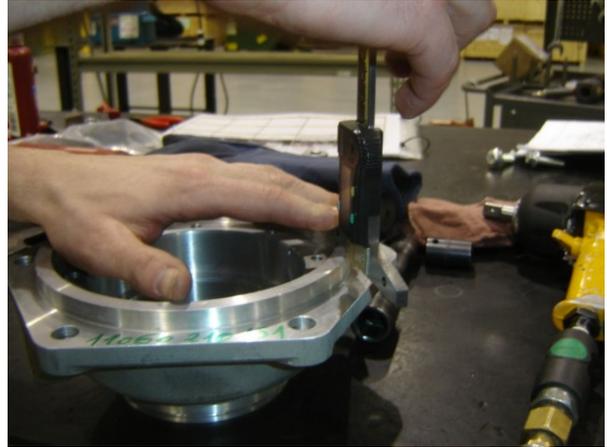


Figure 75

2.7.2 Measure depth of bearing race top from case surface, and subtract this value from measurement in step 2.7.1, and add 0.15mm.



Figure 76

2.7.3 Add shims to equal the value determined in step 2.7.2.



Figure 77

2.7.4 Bolt bearing cover in place.



Figure 78

2.7.5 Check rotational torque. Add or remove shims as needed to achieve 4-7 Nm.

Note: Install shaft seals into bearing covers after rotational torque adjustment is completed.

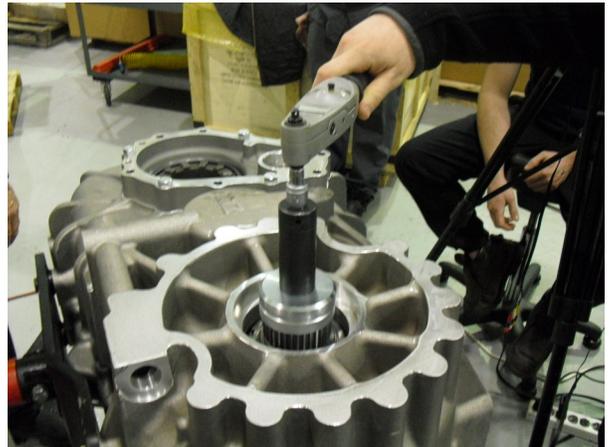


Figure 79

Note: Front axle intermediate housing serves as the front output bearing cover, and must be installed when completing the measurement process.

In the case of a PD (proportioning differential), the PD assembly is measured in the same fashion as a non-PD output shaft.

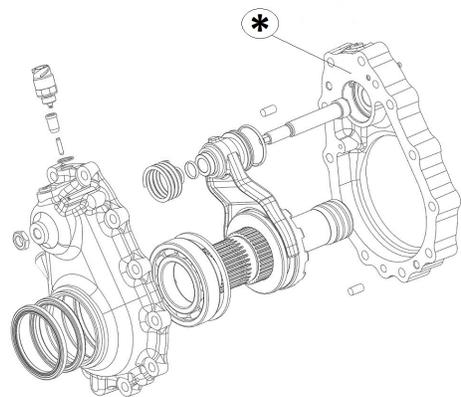


Figure 80

2.8.0 Drive Shaft Installation

Install fork onto shift rail and torque bolts to 42-50 Nm.

Apply lube to slider and install into fork.

Install inner o-ring on shift rail.

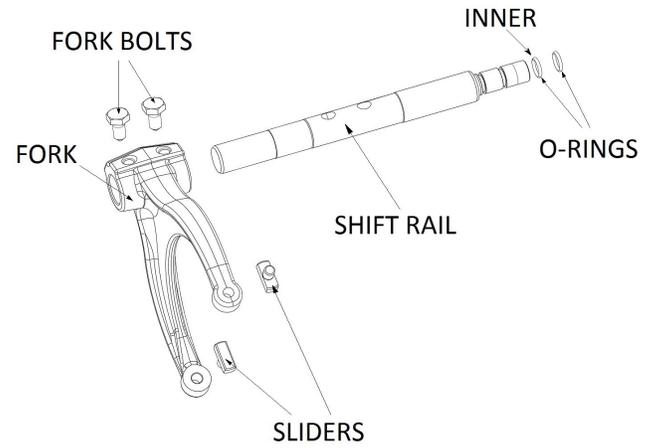


Figure 81

2.8.1 Install input shaft and shift fork as an assembly.



Figure 82

2.8.2 Install output shaft and oil deflector. Ensure that baffle locating pins are fully seated in their bores.



Figure 83

2.8.3 Insert oil pump drive key into slot of intermediate shaft. Ensure that it is fully seated in slot.

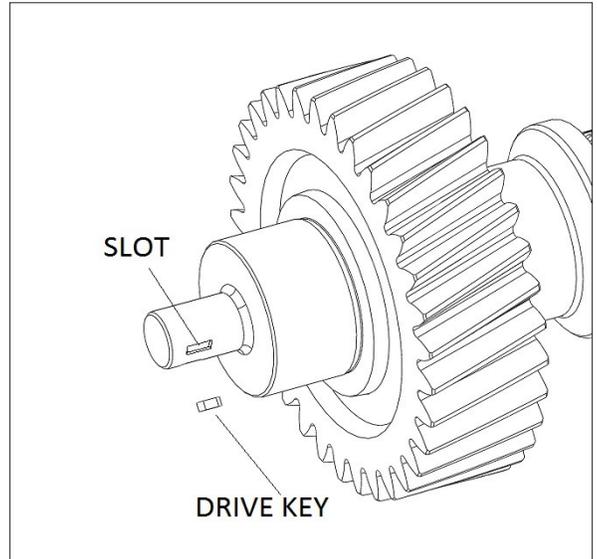


Figure 84

2.8.4 Align drive key in intermediate shaft with slot in oil pump rotor, and lower shaft into place.

Note: pump rotor has two key slots: radiused and square backed. Drive key will fit squared backed hole only!

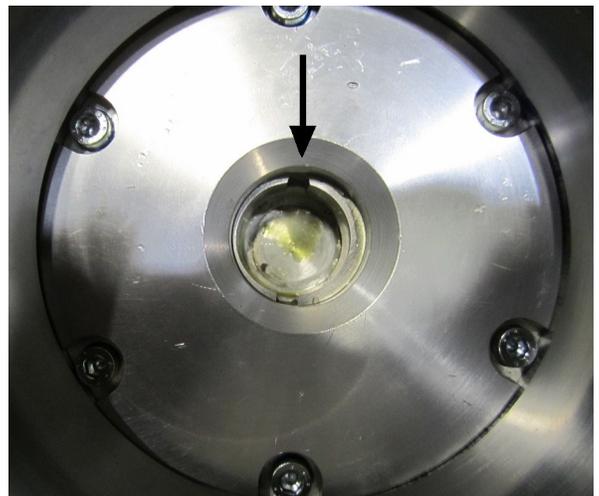


Figure 85

Lowering intermediate shaft into place. Ensure that oil pump drive key engages slot in pump rotor!



Figure 86

2.9.0 Case Housing

Apply Loctite 518 sealant to mating surface.



Figure 87

2.9.1 Install air passage o-rings per application requirements.

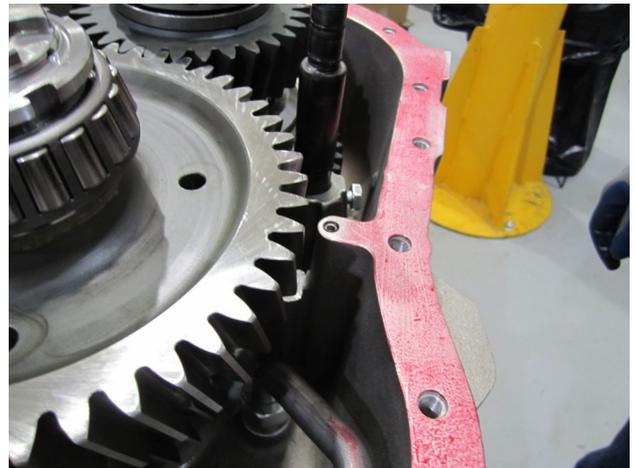


Figure 88

2.9.2 Install rear case half.



Figure 89

2.9.3 Treat bolt threads with Loctite 243 and torque to 72-88 Nm.



Figure 90

2.9.4 Apply Loctite 518 sealant to mating surfaces of bearing covers.



Figure 91

2.9.5 Install bearing covers. Treat bolt threads with Loctite 243 and torque to 46 Nm.

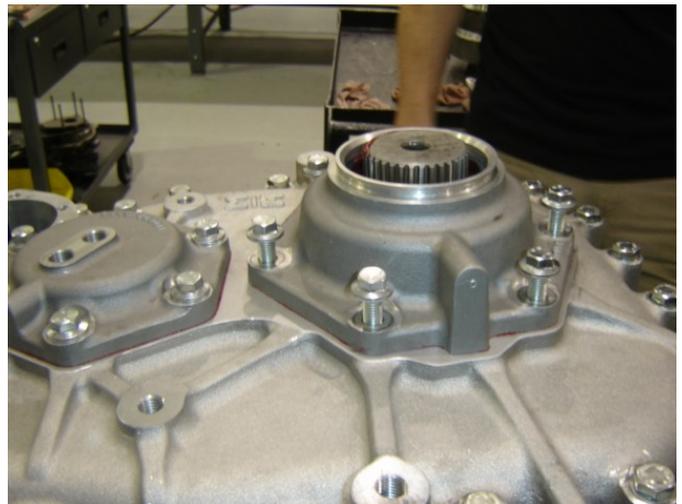


Figure 92

3.0.0 HI / LO Range Shift Mechanism

Install air passage O-ring and coat mating surface of shift cylinder with Loctite 518.

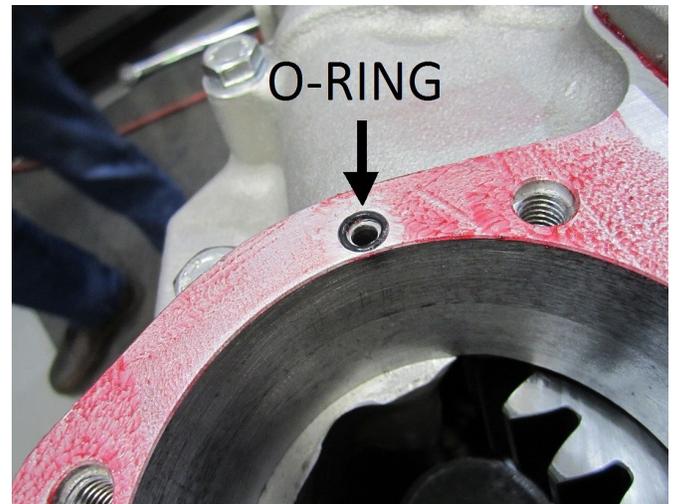


Figure 93

3.0.1 Inspect shift rail O-Ring in cylinder bore.

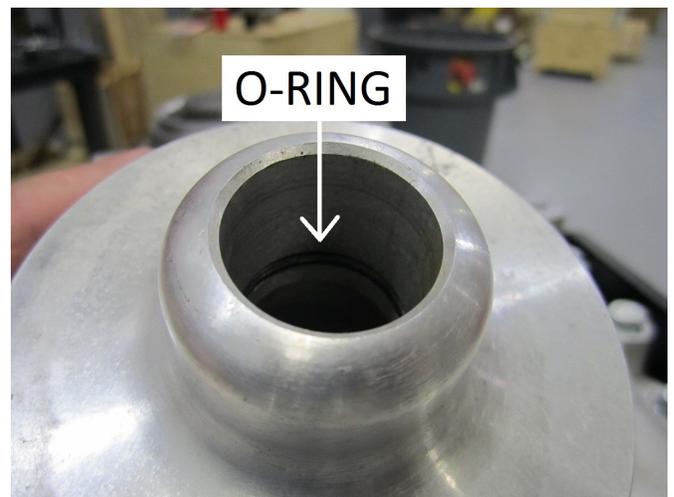


Figure 94

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



Figure 95

3.0.3 Install flat piston (low range) and o-ring. Press piston inward by hand to engage high range. It may be necessary to rotate input shaft to align engagement teeth.

With piston and shaft pushed fully forward into high range, measure distance from top of piston to upper deck of cylinder. This is measurement "A".

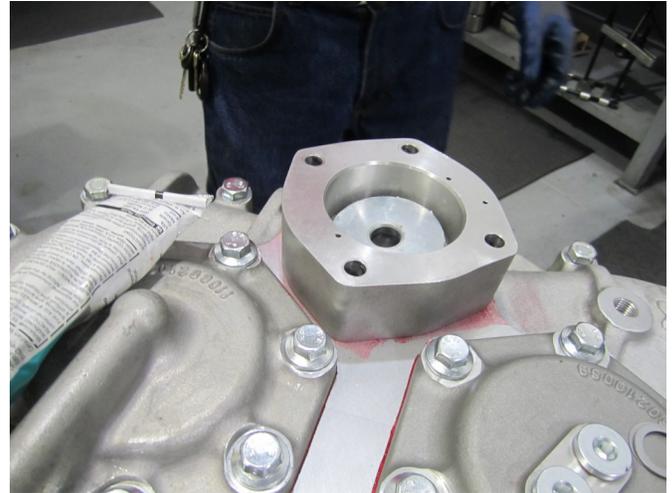


Figure 96

The T-30 features 3-position (High, Low, Neutral) Range Shifting. The Neutral position of pistons are adjusted first, followed by High and Low.

Note: Neutral adjustment is set by manually moving shift rail between high and low range. Air is then used to set high and low adjustments.

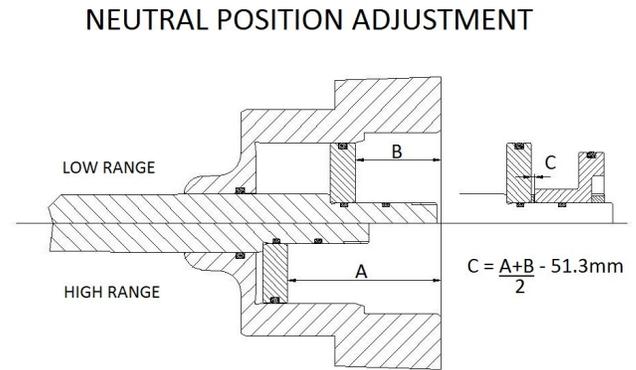


Figure 97

3.0.4 Remove adjustment screw and lock-nut. Insert drift pin into hole and push shift rail forward to engage low range gear.

With shift rail pushed fully aft into low range, re-measure distance from top of piston to upper deck of cylinder. This measurement "B".

Add measurements A and B and divide by 2. Subtract 51.3 mm, and add shims (as shown in fig. 99) equaling this value (measurement C).



Figure 98

3.0.5 Add shims per measuring procedure in 3.0.4.



Figure 99

3.0.6 Install 2nd o-ring onto outer groove of shift rail.



Figure 100

3.0.7 Install high range and neutral pistons. Inspect o-rings and replace as necessary.



Figure 101

3.0.8 Apply Loctite 243 to threads and install shift rail end nut.



Figure 102

3.0.9 Torque end nut to 100 Nm.



Figure 103

3.1.0 Apply Loctite 518 to cylinder mating surface and install cylinder end cover. Torque cover bolts to 46 Nm.

Install applicable position sensor.



Figure 104

3.1.1 Refer to Fig. 105 for the following adjustments.

Remove lock-nut and adjustment bolt. Apply air (REGULATED 15 PSI ONLY!) to high range port. Rotate input shaft to ensure full mesh of engagement teeth.

Re-install adjustment bolt, but tighten only until making contact with end of shift rail. Turn additional 1/2 turn, then secure lock nut.

Replace indicator switch and extension pin.

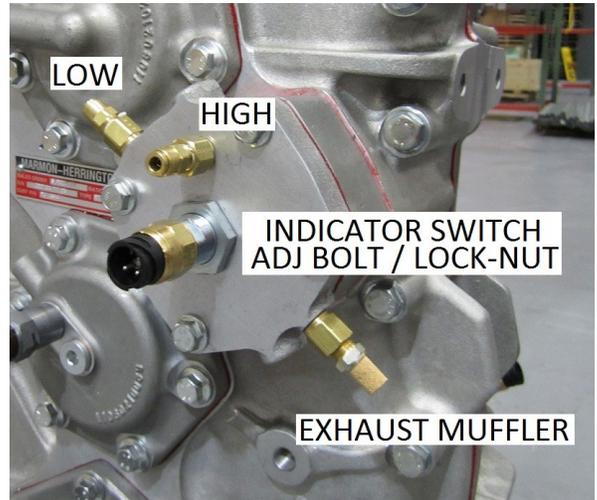


Figure 105

3.1.2 Loosen low range adjustment screw and lock nut. Apply air (REGULATED 15 PSI) to low range port on shift cylinder. It may be necessary to rotate input shaft to fully mesh engagement teeth.

Turn adjustment screw until it contacts end of shift rail. Turn additional 1/2 turn, then secure lock-nut.

Note: Indicator switch must be installed during adjustment procedures to prevent air leakage.

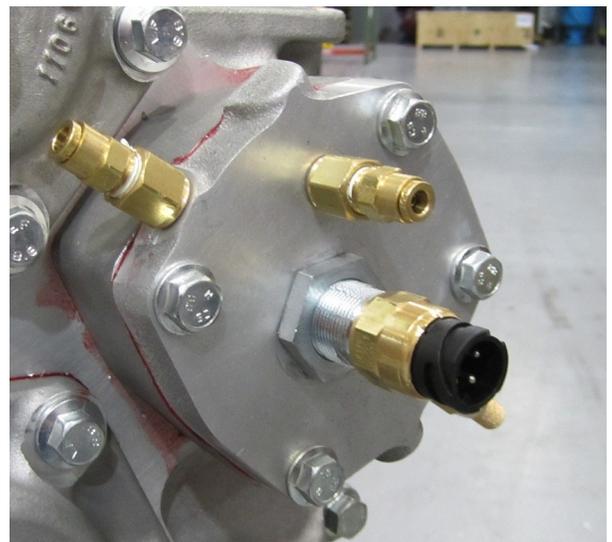


Figure 106

3.1.3 Test both high and low shifting. If input shaft will not turn, adjustment is too tight. If “ratcheting” can be felt, adjustment is too loose.

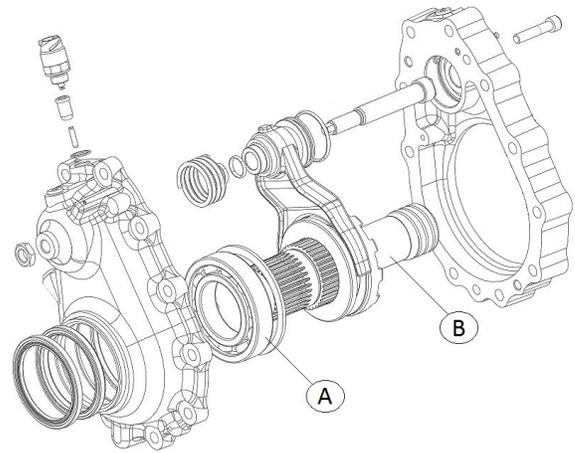
Note: Indicator switch must be installed during adjustment procedures to prevent air leakage.

Greater than 15 PSI applied during testing, will result in erroneous adjustment.



4.0 Front Axle Engage (FAE) Mechanism

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



FRONT AXLE ENGAGE SYSTEM

Figure 108

4.0.1 Freeze shaft and bearing assembly and install into outer FAE housing.



Figure 109

4.0.2 Install snap ring, ensuring that snap ring ends are positioned at relief channel as shown in figure 110.

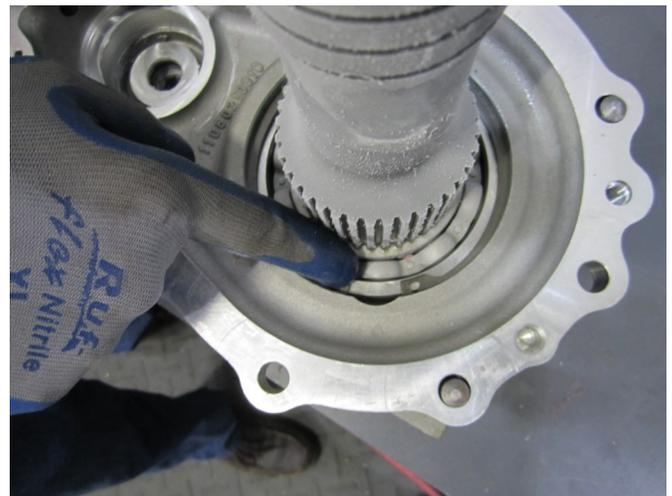


Figure 110

4.0.3 Install inner and outer o-rings on FAE piston.

Note: coat all pistons and o-rings with moly-type assembly lubricant.

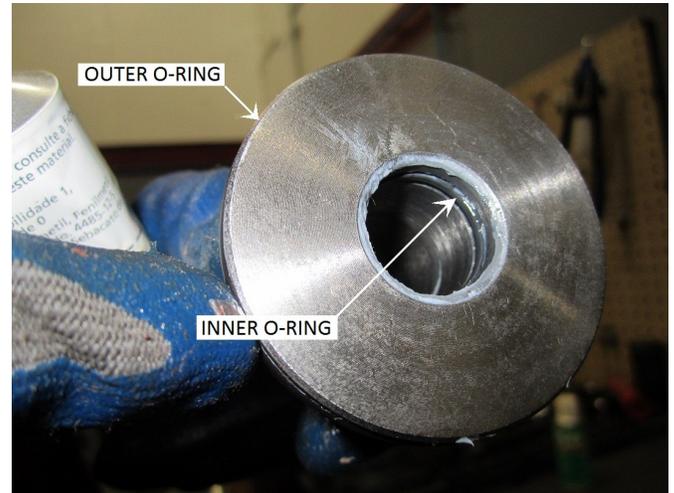


Figure 111

4.0.4 Install o-ring into FAE housing piston bore.

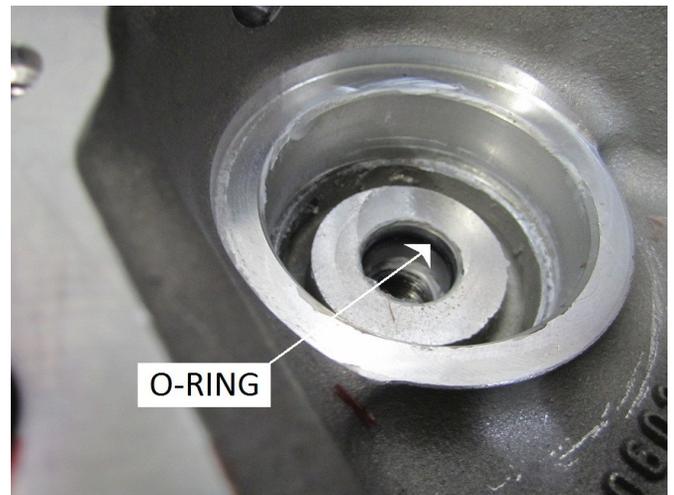


Figure 112

4.0.5 Install piston into FAE housing.



Figure 113

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

Note: apply assembly lube to piston extension.

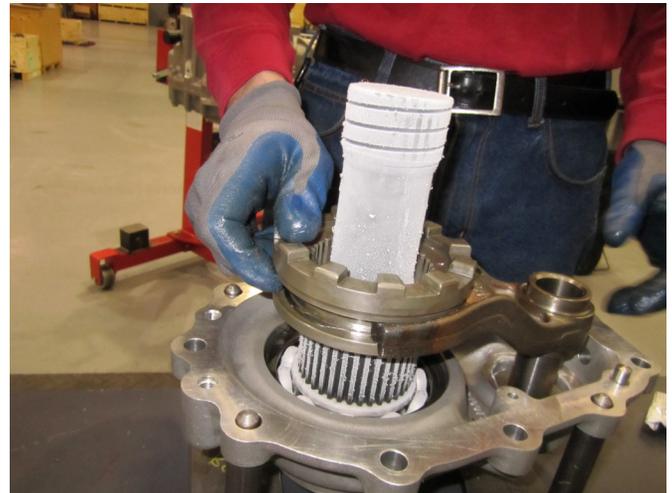


Figure 114

4.0.7 Install FAE shift rail through fork and piston. Rotate until approximately 15/16 " - 1 " of thread is exposed on outer portion as shown in figure 116.



Figure 115

15/16 " to 1 " of exposed thread.



Figure 116

4.0.8 While maintaining the 15/16 " - 1 " of exposed thread on the shift rail, ensure that inside end of rail is flush, or just below housing deck to prevent binding.

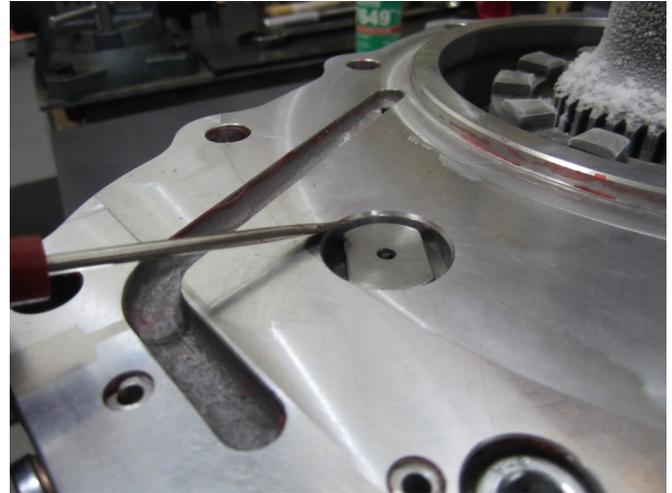


Figure 117

4.0.9 Install o-ring into air passage on FAE outer cover.

Apply coat of Loctite 518 to mating surface.



Figure 118

4.1.0 Position FAE return spring.



Figure 119

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



Figure 120

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

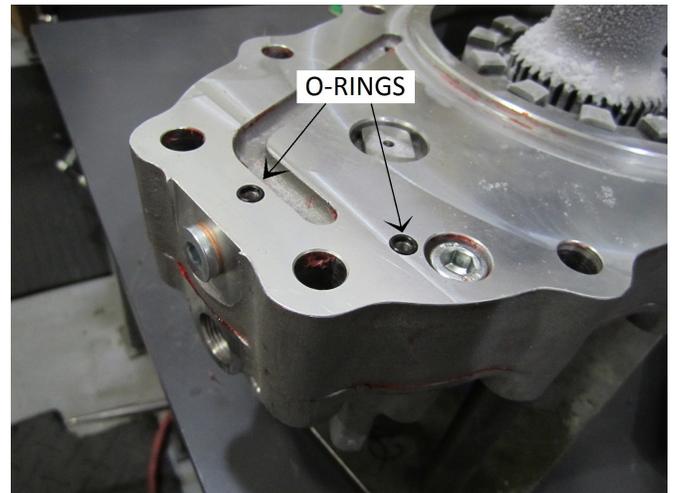


Figure 121

4.1.3 Apply gear lube to output shaft bore. Coat mating surface of housing with Loctite 518.



Figure 122

4.1.4 Install FAE housing and torque bolts to 80 Nm.



Figure 123

4.1.5 FAE Shift Adjustment.

Loosen lock nut and adjustment bolt. Apply 120 PSI to air port. Rotate output flange to ensure full engagement. Screw in adjustment bolt until contact with shift rail is felt. Back bolt 1/2 turn. Apply Loctite 243 to lock nut and tighten to 100 Nm.

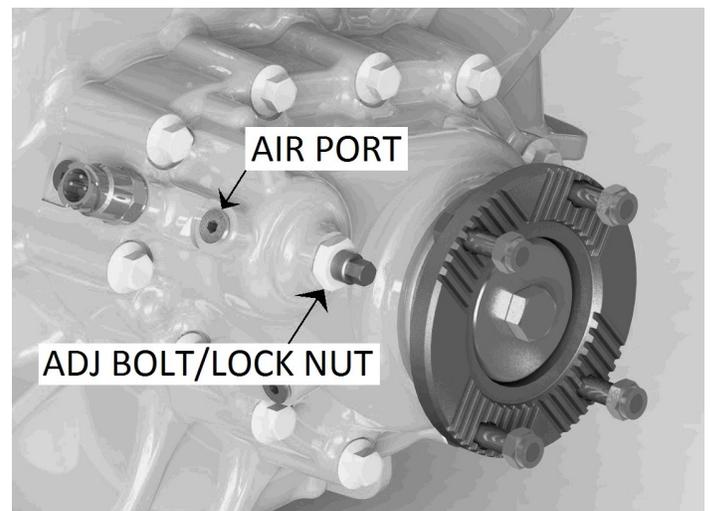


Figure 124

4.1.6 Install drive flanges.

Heat flanges to 200C and install flange. Treat bolt with Loctite 243, and torque to 600 Nm.

Note: Remember that input and rear output bolt thread pitch is M16X2.00X70. Front output bolt is M16X1.50X70. Installation of incorrect bolts may cause damage drive shafts!



Figure 125