# MARMON-HERRINGTON T-60 SERIES TRANSFER CASE

## TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technical Specifications</td>
<td>3</td>
</tr>
<tr>
<td>Parts and Warranty Procedures</td>
<td>4</td>
</tr>
<tr>
<td>Operational Information</td>
<td>5</td>
</tr>
<tr>
<td>Lube Filling and Checking</td>
<td>6</td>
</tr>
<tr>
<td>Consumables</td>
<td>7</td>
</tr>
<tr>
<td>Disassembly</td>
<td>8</td>
</tr>
<tr>
<td>Gear Set Removal</td>
<td>15</td>
</tr>
<tr>
<td>Assembly</td>
<td>23</td>
</tr>
<tr>
<td>HI / LO / Neutral Shifting Adjustment</td>
<td>41</td>
</tr>
<tr>
<td>Front Axle Engagement (FAE) System</td>
<td>42</td>
</tr>
</tbody>
</table>
**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-60 Parts Manual also available.

### MARMON-HERRINGTON T-60 TRANSFER CASE

<table>
<thead>
<tr>
<th>INPUT TORQUE (FT LB)</th>
<th>INPUT SPEED MAX (RPM)</th>
<th>WEIGHT APPROX (W/O OIL OR PTO)</th>
<th>RATIO</th>
</tr>
</thead>
<tbody>
<tr>
<td>13,267</td>
<td>3,100</td>
<td>235</td>
<td>1:0.98 1:2.48</td>
</tr>
</tbody>
</table>
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 Marm-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**

EXAMPLE PART NUMBERS

```
00030216080  5840 333 233
MUST BE INCLUDED  MUST BE INCLUDED
```

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 shockload 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.
1 - DISASSEMBLY

T-Case (general)

1.1 Mount transfer case in appropriate stand.
1.2 Remove drain plug and drain lube.

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

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

1.4.1 Remove FAE housing bolts.

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

Figure 4

Figure 5

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.

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

1.4.4 Removing base plate.
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.

1.5 Remove HI/LO shift cylinder cover

View of shift rail retaining nut.
1.5 Remove retaining nut.

1.5.1 Blow air into air port to release piston.

1.5.2 Remove piston. Inspect 0-rings for wear.
1.5.3 Remove air cylinder.

1.5.4 Inspect O-Ring on end of shift rail.

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

1.6 Remove oil pump.

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

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

1.6.4 Remove rear case half.

**Gear-Set Removal**

A - Input shaft

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

1.7.1 Remove oil pickup tube.
1.7.2 Lift out output shaft with oil deflector.

Housing (general)

1.8 Remove snap ring and pressure relief valve.

1.8.1 Use appropriate puller to remove bearing races.
R&R Drive shafts.

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

Note: Lock-nut may not be reused.

1.9.1 Press input shaft bearing from input shaft.

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

**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

2.0 Remove retaining screws.
2.0.1 Remove pump cover.

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.

**Front output housing.**

2.1 Remove air passage o-rings.
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.

2.1.5 Use a brass drift to remove piston.

2.1.6 Remove large snap ring.
2.1.7 Press out front output shaft and bearing.

2.1.8 Press bearing from front output shaft.

Transfer Case - Assembly

2.2 Reassemble shaft groups.

Freeze shafts to aid bearing installation. Heat bearings to 200°F 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.
2.2.1 Heat bearings to 95C and install on output shaft.

![Figure 49](image-url)

**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](image-url)
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.

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

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

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.

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

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.

2.5.1 Inspect o-ring in shift cylinder. Coat with Molykote lube.
2.5.2 Install shift cylinder. Use plastic dead-blow hammer to tap into place if necessary.

Case Housing

2.6 Install input shaft and fork as an assembly.

2.6.1 Scrape old sealant from mating surface.
2.6.2 Coat case mating surface with Loctite 518.

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.

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.
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](image1)

2.7.2 Coat mating surface with Loctite 518.

![Figure 73](image2)

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](image3)
Oil pipe (arrow) flush with housing.

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

2.7.4 Align oil pump drive slot with drive key, and install pump as seen in next step.
2.7.5 Torque oil pump bolts to 78-88 Nm.

Front Axle Engage (FAE) Mechanism

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

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

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

Note: apply Molykote to piston extension.

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.
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.

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

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

2.9.2 Install o-rings in ait passages on back of FAE housing.
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 0-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.

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

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

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

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

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.

3.1.2 Install breather fitting and lock-nut using Loctite 243. Torque lock-nut to 90-110 Nm.
3.1 Heat output flanges to 82C and install. Apply Loctite 243 to bolts and torque to 240-297 Nm.

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