DANA SPICER®
Off-Highway Products

Service Manual

Powershift Transmission
T40000 Long Drop

TSM-0116
March 1998

TOWING OR PUSHING

Before towing the vehicle, be sure to lift the rear wheels off the ground or disconnect the driveline to avoid damage to the transmission during towing.

Note

IF THE TRANSMISSION HAS 4 WHEEL DRIVE, DISCONNECT BOTH FRONT AND REAR DRIVELINES. BECAUSE OF THE DESIGN OF THE HYDRAULIC SYSTEM, THE ENGINE CANNOT BE STARTED BY PUSHING OR TOWING.

FOREWORD

This manual has been prepared to provide the customer and the maintenance personnel with information and instructions on the maintenance and repair of the ***SPICER CLARK-HURTH*** product.

Extreme care has been exercised in the design, selection of materials, and manufacturing of these units.

The slight outlay in personal attention and cost required to provide regular and proper lubrication, inspection at stated intervals, and such adjustments as may be indicated will be reimbursed many times in low cost operation and trouble free service.

In order to become familiar with the various parts of the product, its principle of operation, troubleshooting, and adjustments, it is urged that the mechanic studies the instructions in this manual carefully and uses it as a reference when performing maintenance and repair operations.

Whenever repair or replacement of component parts is required, only ***SPICER CLARK-HURTH*** approved parts as listed in the applicable parts manual should be used. Use of “will-fit” or non-approved parts may endanger proper operation and performance of the equipment. ***SPICER CLARK-HURTH*** does not warrant repair or replacement parts, nor failures resulting from the use of parts which are not supplied by or approved by ***SPICER CLARK-HURTH***.

IMPORTANT

ALWAYS FURNISH THE DISTRIBUTOR WITH THE SERIAL AND MODEL NUMBER WHEN ORDERING PARTS.

Table of Contents

6. OPERATION OF THE TRANSMISSION

7. TROUBLESHOOTING GUIDE FOR THE T40000 TRANSMISSION

8. SECTIONAL VIEWS AND PARTS IDENTIFICATION

9. ASSEMBLY INSTRUCTIONS

10. DISASSEMBLY AND REASSEMBLY OF THE T40000 TRANSMISSION

11. OPTIONS

1. SAFETY PRECAUTIONS

To reduce the chance of personal injury and/or property damage, the following instruction must be carefully observed.

Proper service and repair are important to the safety of the service technician and the safe, reliable operation of the machine. If replacement parts are required the part must be replaced by a spare part which has the same part number or with a equivalent part. Do not use a spare part of lesser quality.

The service procedures recommended in this manual are effective methods for performing service and repair. Some of these procedures require the use of tools specifically designed for the purpose.

Accordingly, anyone who intends to use a spare part, service procedure or tool, which is not recommended by ***SPICER CLARK-HURTH***, must first determine that neither his safety nor the safe operation of the machine will be jeopardized by the spare part, service procedure or tool selected.

IMPORTANT

IT IS IMPORTANT TO NOTE THAT THIS MANUAL CONTAINS VARIOUS 'CAUTIONS' AND 'NOTICES' THAT MUST BE CAREFULLY OBSERVED IN ORDER TO REDUCE THE RISK OF PERSONAL INJURY DURING SERVICE OR REPAIR, OR THE POSSIBILITY THAT IMPROPER SERVICE OR REPAIR MAY DAMAGE THE UNIT OR RENDER IT UNSAFE. IT IS ALSO IMPORTANT TO UNDERSTAND THAT THESE 'CAUTIONS' AND 'NOTICES' ARE NOT EXHAUSTIVE, BECAUSE IT IS IMPOSSIBLE TO WARN ABOUT ALL THE POSSIBLE HAZARDOUS CONSEQUENCES THAT MIGHT RESULT FROM FAILURE TO FOLLOW THESE INSTRUCTIONS.

2. CLEANING, INSPECTION AND LEGEND SYMBOLS

2.1 CLEANING

Clean all parts thoroughly using solvent type cleaning fluid. It is recommended that parts be immersed in cleaning fluid and moved up and down slowly until all old lubricant and foreign material is dissolved and parts are thoroughly cleaned.

CAUTION

CARE SHOULD BE EXERCISED TO AVOID SKIN RASHES, FIRE HAZARDS, AND INHALATION OF VAPOURS WHEN USING SOLVENT TYPE CLEANERS.

2.1.1 Bearings

Remove bearings from cleaning fluid and strike flat against a block of wood to dislodge solidified particles of lubricant. Immerse again in cleaning fluid to flush out particles. Repeat above operation until bearings are thoroughly clean. Dry bearings using moisture-free compressed air. Be careful to direct air stream across bearing to avoid spinning. Do not spin bearings when drying. Bearings may be rotated slowly by hand to facilitate drying process.

2.1.2 Housings

Clean interior and exterior of housings, bearing caps, etc…, thoroughly. Cast parts may be cleaned in hot solution tanks with mild alkali solutions providing these parts do not have ground or polished surfaces. Parts should remain in solution long enough to be thoroughly cleaned and heated. This will aid the evaporation of the cleaning solution and rinse water. Parts cleaned in solution tanks must be thoroughly rinsed with clean water to remove all traces of alkali. Cast parts may also be cleaned with steam cleaner.

CAUTION

CARE SHOULD BE EXERCISED TO AVOID INHALATION OF VAPOURS AND SKIN RASHES WHEN USING ALKALI CLEANERS.

All parts cleaned must be thoroughly dried immediately by using moisture-free compressed air or soft, lintless absorbent wiping rags free of abrasive materials such as metal fillings, contaminated oil, or lapping compound.

2.2 INSPECTION

The importance of careful and thorough inspection of all parts cannot be overstressed. Replacement of all parts showing indication of wear or stress will eliminate costly and avoidable failures at a later date.

2.2.1 Bearings

Carefully inspect all rollers: cages and cups for wear, chipping, or nicks to determine fitness of bearings for further use. Do not replace a bearing cone or cup individually without replacing the mating cup or cone at the same time. After inspection, dip bearings in Automatic Transmission Fluid and wrap in clean lintless cloth or paper to protect them until installed.

2.2.2 Oil Seals, Gaskets, Etc.

Replacement of spring load oil seals, “O”-rings, metal sealing rings, gaskets, and snap rings is more economical when unit is disassembled than premature overhaul to replace these parts at a future time. Further loss of lubricant through a worn seal may result in failure of other more expensive parts of the assembly. Sealing members should be handled carefully, particularly when being installed. Cutting, scratching, or curling under of lip of seal seriously impairs its efficiency. When assembling new metal type sealing rings, these should be lubricated with coat of chassis grease to stabilize rings in their grooves for ease of assembly of mating members. Lubricate all “O”-rings and seals with recommended type Automatic Transmission Fluid before assembly.

2.2.3 Gears and Shafts

If magna-flux process is available, use process to check parts. Examine teeth on all gears carefully for wear, pitting, chipping, nicks, cracks, or scores. If gear teeth show spots where case hardening is worn through or cracked, replace with new gear. Small nicks may be removed with suitable hone. Inspect shafts and quills to make certain they are not sprung, bent, or splines twisted, and that shafts are true.

2.2.4 Housing, Covers, etc.

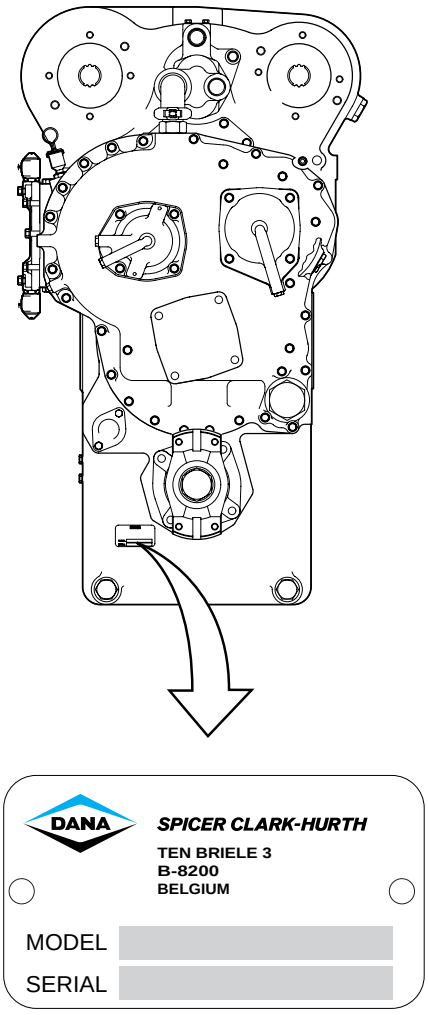
Inspect housings, covers and bearing caps to ensure that they are thoroughly clean and that mating surfaces, bearing bores, etc…, are free from nicks or burrs. Check all parts carefully for evidence of cracks or conditions which would cause subsequent oil leaks or failures.

2.3 LEGEND SYMBOLS

	Smontaggio di sottogruppi Disassembly of assembly groups
	Montaggio di sottogruppi Reassemble to from assembly group
	Smontaggio di particollari ingombranti Remove obstruction parts
	Montaggio di particollari ingombranti Reinstall - remount parts which had obstructed disassembly
	Attenzione, indicazione importante Attention! important notice
	Controllare regolare p.e. coppie, misure, pressione etc. Check - adjust e.g. torque, dimensions, pressures etc.
	T = Attrezzature speciali P = Pagina T = Special tool P = Page
	Rispettare direzione di montaggio Note direction of installation
	Controllare esaminare controllo visuale Visual inspection
	Eventualimente riutilizzable (sostituire se necessario) Possibly still serviceable, renew if necessary

	Sostituire con ogni montaggio Renew at each reassembly
	Togliere - mettere la sicura Unlock - lock e.g. split pin, locking plate, etc.
	Mettere la sicura, incollare (mastice liquido) Lock - adhere (liquid sealant)
	Evitare danni ai materiali, danni ai pezzi Guard against material damage, damage to parts
	Marchiari prima dello smontaggio (per il montaggio) Mark before disassembly, observe marks when reasembl.
	Carricare riempire (olio - lubrificante) Filling - topping up - refilling e.g. oil, cooling water, etc.
	Scarricare olio, lubrificante Drain off oil, lubricant
	Tendere Tighten - clamp ; tightening a clamping device
	Insere pressione nel circuito idraulico Apply pressure into hydraulic circuit
	Pulire To clean

3. TECHNICAL SPECIFICATIONS



3.1 IDENTIFICATION OF THE UNIT

1. Model and type of the unit.
2. Serial number.

3.2 WEIGHT, DIMENSIONS, OIL CAPACITY

		MHR	HR
Weight (dry):	±850 kg (1870 lb.)		
Maximum length:		1141.4 mm (44.94”)	1026.1 mm (40.40”)
Maximum width:	Modulated:	740.3 mm (29.14”)	740.3 mm (29.14”)
	Standard:	693.8 mm (27.31”)	693.8 mm (27.31”)
Maximum height:		1186.2 mm (46.70”)	1186.2 mm (46.70”)

Oil capacity

±45 l (±12 US Gallon) without cooler and hydraulic lines.

Consult operator’s manual on applicable machine for system capacity.

3.3 TIGHTENING TORQUES

3.3.1 Torque specifications for lubricated or plated screw threads

GRADE 5 

NOM. SIZE	FINE THREAD LB - FT	FINE THREAD N - m	COARSE THREAD LB - FT	COARSE THREAD N - m
7500	223 - 245	302 - 332	200 - 220	271 - 298
6250	128 - 141	174 - 191	113 - 124	153 - 168
5625	91 - 100	123.4 - 135.5	82 - 90	111.2 - 122.0
5000	64 - 70	86.8 - 94.9	57 - 63	77.3 - 85.4
4375	41 - 45	55.6 - 61.0	37 - 41	50.2 - 55.5
3750	26 - 29	35.3 - 39.3	23 - 25	31.2 - 33.8
3125	16 - 20	21.7 - 27.1	12 - 16	16.3 - 21.6
2500	9 - 11	12.3 - 14.9	8 - 10	10.9 - 13.5

GRADE 8 

NOM. SIZE	FINE THREAD LB - FT	FINE THREAD N - m	COARSE THREAD LB - FT	COARSE THREAD N - m
7500	315 - 347	427 - 470	282 - 310	382 - 420
6250	180 - 198	244 - 268	159 - 175	216 - 237
5625	128 - 141	173.6 - 191.1	115 - 127	156.0 - 172.2
5000	90 - 99	122.1 - 134.2	80 - 88	108.5 - 119.3
4375	58 - 64	78.7 - 86.7	52 - 57	70.6 - 77.2
3750	37 - 41	50.2 - 55.5	33 - 36	44.8 - 48.8
3125	28 - 32	38.0 - 43.3	26 - 30	35.3 - 40.6
2500	11 - 13	15.0 - 17.6	9 - 11	12.3 - 14.9

3.3.2 Elastic stop nut torque

THREAD SIZE	LB - FT	N - m
1" - 20	150 - 200	203.4 - 271.1
$1^1/_4$" - 18	200 - 250	271.2 - 338.9
$1^1/_2$" - 18	300 - 350	406.8 - 474.5
$1^3/_4$" - 18	400 - 450	542.4 - 610.1

3.3.3 “O”-ring ports plug torque

THREAD SIZE	LB - FT	N - m
3/8 - 20	5 - 8	7 - 11
7/16 - 20	7 - 10	9 - 14
9/16 - 18	12 - 15	16 - 20
3/4 - 16	20 - 25	27 - 34
$1^{5}/_{16}$ - 12	65 - 75	88 - 102
$1^{7}/_{8}$ - 12	75 - 85	102 - 115

3.3.4 Pipe plug torque

THREAD SIZE	LB - FT	N - m
1/4 - 18	15 - 20	20 - 27
1/2 - 14	30 - 35	41 - 47
3/4 - 10	40 - 45	54 - 61

3.3.5 Suction screen torque

13 - 20 Nm (10 to 15 ft. lbs.)

3.3.6 Solenoid and solenoid cartridge torque

Solenoid nut: 5 - 7 Nm (4 - 5 ft. lbs.)

Solenoid cartridge: 22 - 27 Nm (16 - 20 ft. lbs.)

3.4 PRESSURE AND TEMPERATURE SPECIFICATIONS

- Normal operating temperature 70 - 120 °C (158 - 248 F) measured at temperature check port converter out (port 71 - **).
- Maximum allowed transmission temperature 120 °C (248 F).
- Transmission regulator pressure (*) - (neutral) - port 31 (**).
  - At 600 RPM min. 16.5 bar (240 PSI) minimum.
  - At 2000 RPM: 20.7 bar (300 PSI) maximum.

- Pump flow (*)
  - At 2000 RPM in neutral: 143.8 l/min. minimum (38 GPM).

- Clutch pressures (*)
  - 1st clutch: port 41 (**).
  - 2nd clutch: not available.
  - 3rd clutch: port 43 (**).
  - 4th clutch: port 44 (**).
  - Forward clutch: port 45 (**).
  - Reverse clutch: not available (**).

  At 2000 RPM :
  - 16.5 - 20.7 bar (240 - 300 PSI) clutch activated.
  - 0 - 0.2 bar (0 - 3 PSI) clutch released.

- Filter bypass valve set at 1.7 - 2 bar (*) (25 - 30 PSI).
- Lube pressure (*) (port 34) - 0.7 - 1.4 bar (10 - 20 PSI) at 108 l/min. (28.5 GPM) pump flow (±1500 RPM).
- Safety valve: cracking pressure (*) 8.9 - 11.7 bar (130 - 170 PSI), measured at port 36 with convertor out shut off.
- Converter out pressure (*) (port 11) 1.7 bar min. (25 PSI) at 2000 RPM and max. 4.8 bar (70 PSI) at no load governed speed.

(*) All pressures and flows to be measured with oil temperature of 82 - 93 °C (180 - 200 F)

(**) Refer to section 7 “Troubleshooting” for check port identification.

3.5 ELECTRICAL SPECIFICATIONS

- Solenoid (forward, reverse, 1st, 2nd and 3rd).

  Coil resistance:

  - 12V: 9.79 Ω (20 °C - 68 F).
  - 24V: 39.90 Ω (20 °C - 68 F).

- Speed sensor:

  - Type: inductive sensor.
  - Sensing distance: 0 - 0.6 mm (0 - 0.024”).
  - Coil resistance: 1050 Ω (± 100 Ω).

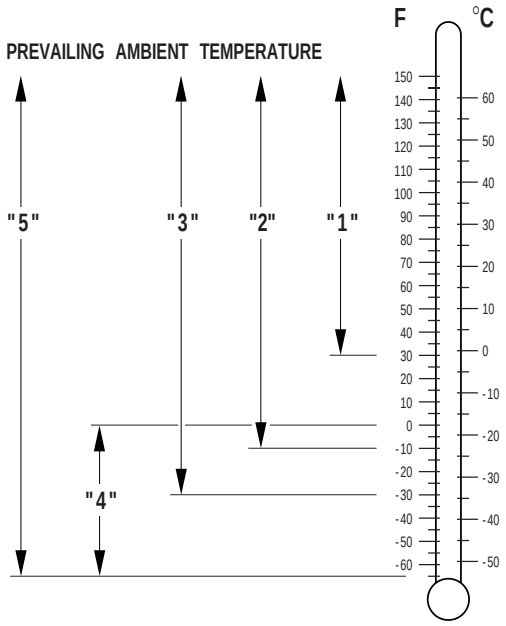
3.6 HYDRAULIC COOLER AND FILTER LINE SPECIFICATIONS

- Minimum 32 mm (1.25”) internal diameter for lines and fittings.
- Suitable for operation from ambient to 120 °C (248 F) continuous operating temperature.
- Must withstand 20 bar (290 PSI) continuous pressure and with 40 bar (580 PSI) intermittent surges.
- Conform SAE J1019 and SAE J517, 100RI.

4. MAINTENANCE

4.1 OIL SPECIFICATION

4.1.1 Recommended lubricants



Temperature range "1"

1. C-4 grade 30.
2. C-3 grade 30.
3. MIL-L-2104C - grade 30.

Temperature range "2"

1. MIL-L-2104C - grade 10.
2. MIL-L-2104D - grade 10.
3. C-4 grade 10.
4. C-3 grade 10.

Temperature range "3"

1. C-3 * DEXRON-II D.
2. C-4 * DEXRON-II D.

* DEXRON is a registered trademark of the General Motors Corporation.

Caution

DEXRON II D IS NOT COMPATIBLE WITH GRAPHITE CLUTCH PLATE MATERIAL UNLESS IT MEETS THE APPROVED C3/C4 SPECIFICATIONS.

Temperature range "4"

1. MIL-L-46167 A.

Temperature range "5"

1. CONOCO high performance synthetic motor oil (Spec. No. 6718).

Note

TEMPERATURE RANGES "2" AND "3" MAY BE USED TO LOWER AMBIENT TEMPERATURES WHEN SUMP PREHEATERS ARE USED. TEMPERATURE RANGE "4" SHOULD BE USED ONLY IN AMBIENT TEMPERATURE RANGE SHOWN.

PREFERRED OIL VISCOSITY:

SELECT HIGHEST OIL VISCOSITY COMPATIBLE WITH PREVAILING AMBIENT TEMPERATURES AND OIL APPLICATION CHART.

ANY DEVIATION FROM THE ACCOMPANYING ILLUSTRATION MUST HAVE WRITTEN APPROVAL OF THE APPLICATION DEPARTMENT OF THE ***SPICER CLARK-HURTH*** ENGINEERING AND MARKETING DEPARTMENT.

4.2 MAINTENANCE INTERVALS

4.2.1 Daily

Check oil level daily with engine running at idle (600 RPM) and oil at 82 - 93 °C (180 - 200 F).

Maintain oil level at full mark.

4.2.2 Normal drain period

Normal drain period and oil filter element change are for average environment and duty cycle condition.

Severe or sustained high operating temperature or very dusty atmospheric conditions will cause accelerated deterioration and contamination.

For extreme conditions judgement must be used to determine the required change intervals.

Every 500 hours

Change oil filter element.

Every 1000 hours

Drain and refill system as follows (Drain with oil at 65 - 93 °C (150 - 200 F)):

1. Drain transmission and remove sump screen. Clean screen thoroughly and replace, using new gaskets.
2. Remove and discard filter elements. Install new elements.
3. Refill transmission to LOW mark.
4. Run engine at 500 - 600 RPM to prime convertor and lines.
5. Recheck level with engine running at 500 - 600 RPM and add oil to bring level to LOW mark.
   When oil temperature is hot 82.2 - 93.3 °C (180- 200 F) make final oil level check.
   Bring oil level to full mark.

Note

IT IS RECOMMENDED THAT OIL FILTER BE CHANGED AFTER 100 HOURS OF OPERATION ON NEW, REBUILT OR REPAIRED UNIT.

4.3 SERVICING MACHINE AFTER COMPONENTS OVERHAUL

The transmission, torque converter, and its allied hydraulic system are important links in the driveline between the engine and the wheels. The proper operation of either unit depends greatly on the condition and operation of the other. Therefore, whenever repair or overhaul of one unit is performed, the balance of the system must be considered before the job can be considered complete.

After the overhauled or repaired transmission has been installed in the machine, the oil cooler, and connecting hydraulic system must be thoroughly cleaned. This can be accomplished in several manners and a degree of judgement must be exercised as to the method employed.

The following are considered the minimum steps to be taken:

1. Drain entire system thoroughly.
2. Disconnect and clean all hydraulic lines. Where feasible hydraulic lines should be removed from machine for cleaning.
3. Replace oil filter elements cleaning out filter cases thoroughly.
4. The oil cooler must be thoroughly cleaned. The cooler should be “back flushed” with oil and compressed air until all foreign material has been removed. Flushing in direction of normal oil flow will not adequately clean the cooler. If necessary, cooler assembly should be removed from machine for cleaning, using oil, compressed air, and steam cleaner for that purpose.

IMPORTANT

DO NOT USE FLUSHING COMPOUNDS FOR CLEANING PURPOSES.

5. On remote mounted torque convertors remove drain plug from torque convertor and inspect interior of convertor housing, gears, etc…. If presence of considerable foreign material is noted, it will be necessary that the convertor be removed, disassembled and cleaned thoroughly. It is realised this entails extra labor, however such labor is a minor cost compared to the cost of difficulties which can result from presence of such foreign material in the system.
6. Reassemble all components and use only type oil (See chapter 4.1.1 “Recommended lubricants”). Fill the transmission through filler opening until fluid comes up to LOW mark on transmission dipstick.

Note

IF THE DIPSTICK IS NOT ACCESSIBLE OIL LEVEL CHECK PLUGS ARE PROVIDED.

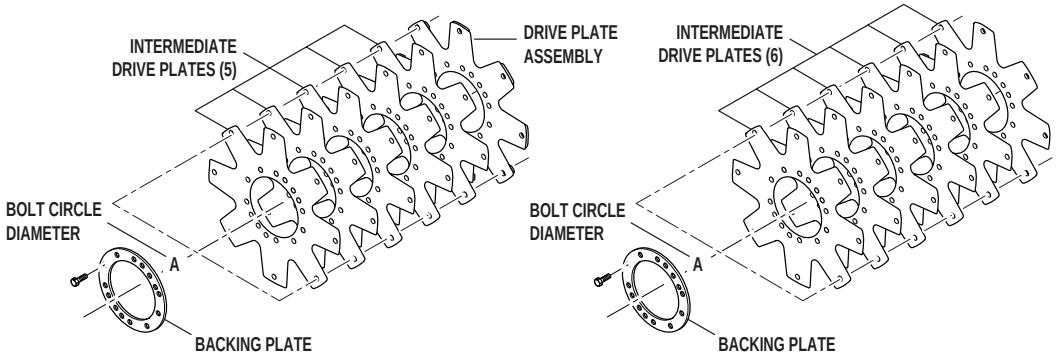
- Remove LOWER check plug, fill until oil runs from LOWER oil hole. Replace filler and level plug.
- Run engine two minutes at 500 - 600 RPM to prime torque convertor and hydraulic lines.
- Recheck level of fluid in transmission with engine running at idle (500 - 600 RPM).
- Add quantity necessary to bring fluid level to LOW mark on dipstick or runs freely from LOWER oil level check plug hole.
- Install oil level plug of dipstick.
- Recheck with hot oil 82.2 - 93.3 °C (180 - 200 F).
- Bring oil level to FULL mark on dipstick or runs freely from UPPER oil level plug.

7. Recheck all drain plugs, lines, connections, etc…., for leaks and tighten where necessary.

5. INSTALLATION DETAILS

5.1 CONVERTER DRIVE COUPLING

Measure the “A” dimension (bolt circle diameter) and order drive plate kit listed below.



“A” Dimension (Bolt circle diameter)

- 15.00” (381.000 mm) diameter
  Kit No. 802587 - 10 mm.
- 16.00” (406.400 mm) diameter
  Kit No. 802558 - 10 mm.
- 16.00” (406.400 mm) diameter
  Kit No. 802590 - 7/16 - 20 mm.
- 16.875” (428.625 mm) diameter
  ** Kit No. 802609 - 7/16 - 20.
- 17.00” (431.800 mm) diameter
  Kit No. 802593 - 10 mm.
- 17.00” (431.800 mm) diameter
  Kit No. 802562 - 7/16 - 20 mm.

Each kit will include the following parts:

- 5 Intermediate drive plates.
- 1 Drive plate assembly.
- 1 Backing plate.
- 14 Drive plate mounting cap screws.
- 1 Instruction sheet
- ** 1 pc. Drive plate mounting spacer is included in Kit No. 802609.

“A” Dimension (Bolt circle diameter)

- 16.00” (406.400 mm) diameter
  Kit No. 802594 W/O nuts.

Each kit will include the following parts:

- 6 Intermediate drive plates.
- 1 Backing plate.
- 14 Drive plate mounting cap screws.
- 1 Instruction sheet.

Note

ASSEMBLY OF FLEXPLATES MUST BE COMPLETED WITHIN A 15 MINUTE PERIOD FROM START OF SCREW INSTALLATION.
IF THE SCREW IS REMOVED FOR ANY REASON IT MUST BE REPLACED. THE ADHESIVE LEFT IN THE TAPPED HOLES MUST BE REMOVED WITH THE PROPER TAP AND CLEANED WITH SOLVENT.
DRY THE HOLE THOROUGHLY AND USE A NEW SCREW FOR REINSTALLATION.

Position drive plate and weld nut assembly on impeller with weld nuts toward converter.
Align intermediate drive plates and backing plate with holes in impeller cover.

Note

TWO DIMPLES 180° APART IN BACKING PLATE, HOLLOW SIDE TOWARD THE CONVERTER.
INSTALL CAP SCREWS. TIGHTEN CAP SCREWS TORQUE 70.4 - 77.1 N.M. (52 - 57 FT. LBS.).

5.2 TRANSMISSION TO ENGINE INSTALLATION PROCEDURE

1. Remove all burrs from flywheel mounting face and nose pilot bore. Clean drive plate surface with solvent.
2. Check engine flywheel & housing for conformance to standard SAE No. 1 per SAE J927 and J1033 tolerance specifications for pilot bore size, pilot bore runout and mounting face flatness. Measure and record engine crankshaft end play.
3. Install two 88,90 mm (3.50) long transmission to flywheel housing guide studs in the engine flywheel housing as shown. Rotate the engine flywheel to align a drive plate mounting screw hole with the flywheel housing access hole.
4. Install a 101,60 mm (4.00) long drive plate locating stud in a drive plate nut. Align the locating stud in the drive plate with the flywheel drive plate mounting screw hole positioned in step No. 3.
5. Locate transmission on flywheel housing.

   Aligning drive plate to flywheel and transmission to flywheel housing. Install transmission to flywheel housing screws. Tighten screws to specified torque. Remove transmission to engine guide studs. Install remaining screws and tighten to specified torque.
6. Remove drive plate locating stud.
7. Install drive plate attaching screw. Snug screw but **do not tighten**. Some engine flywheel housings have a hole located on the flywheel housing circumference in line with the drive plate screw access hole. A screwdriver or pry bar used to hold the drive plate against the flywheel will facilitate installation of the drive plate screws. Rotate the engine flywheel and install the remaining seven (7) flywheel to drive plate attaching screws. Snug screws but do not tighten. After all eight (8) screws are installed. Tighten each cap screw to the following torque 78 - 86 N.m. (58- 64 ft. lbs.) for a 7/16 cap screw and 65 - 75 N.m. (48 - 55 ft. lbs.) for an M10 cap screw. This will require rotating the engine flywheel until the full amount of eight (8) screws have been tightened.
8. Measure engine crankshaft end play after transmission has been completely installed on engine flywheel. This value must be within 0,025 mm (0.001) of the end play recorded in step No. 2.

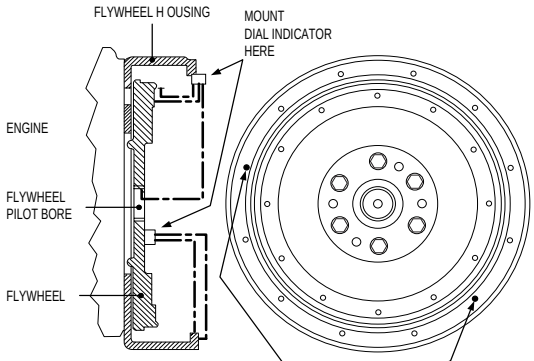


FIG. 1

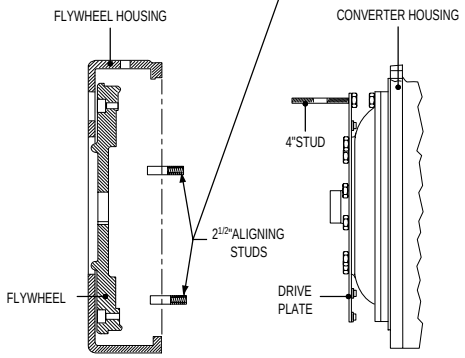


FIG. 2

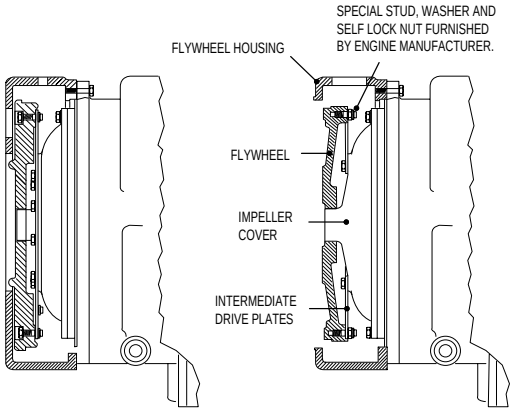


FIG. 3 FIG.4

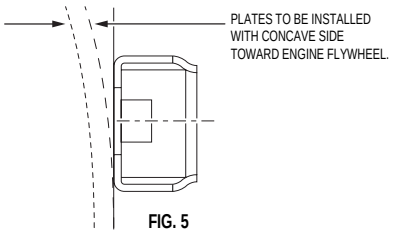
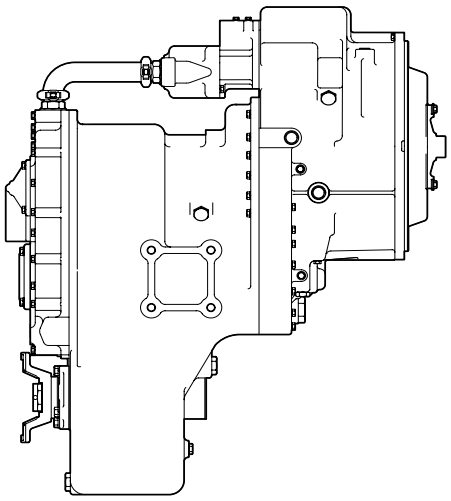
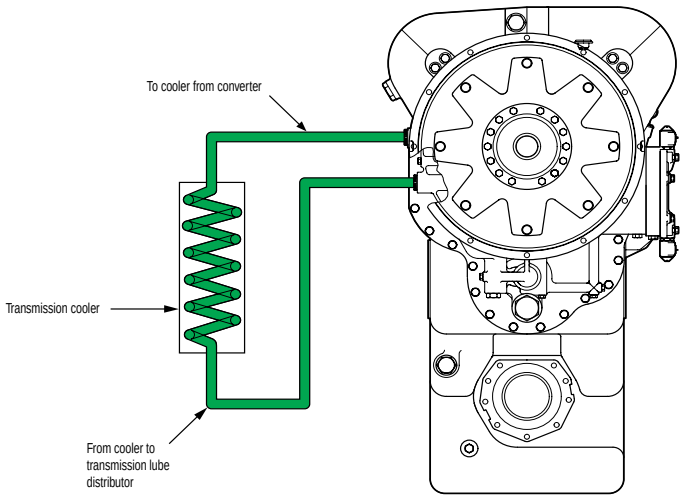


FIG. 5

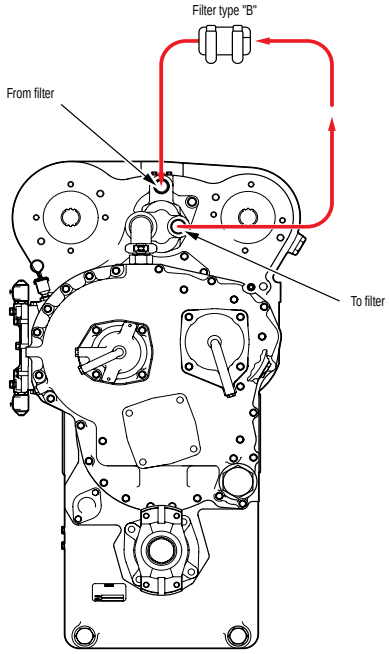
5.3 EXTERNAL PLUMBING



RIGHT SIDE VIEW



FRONT VIEW



REAR SIDE VIEW

5.3.1 Cooler lines specifications

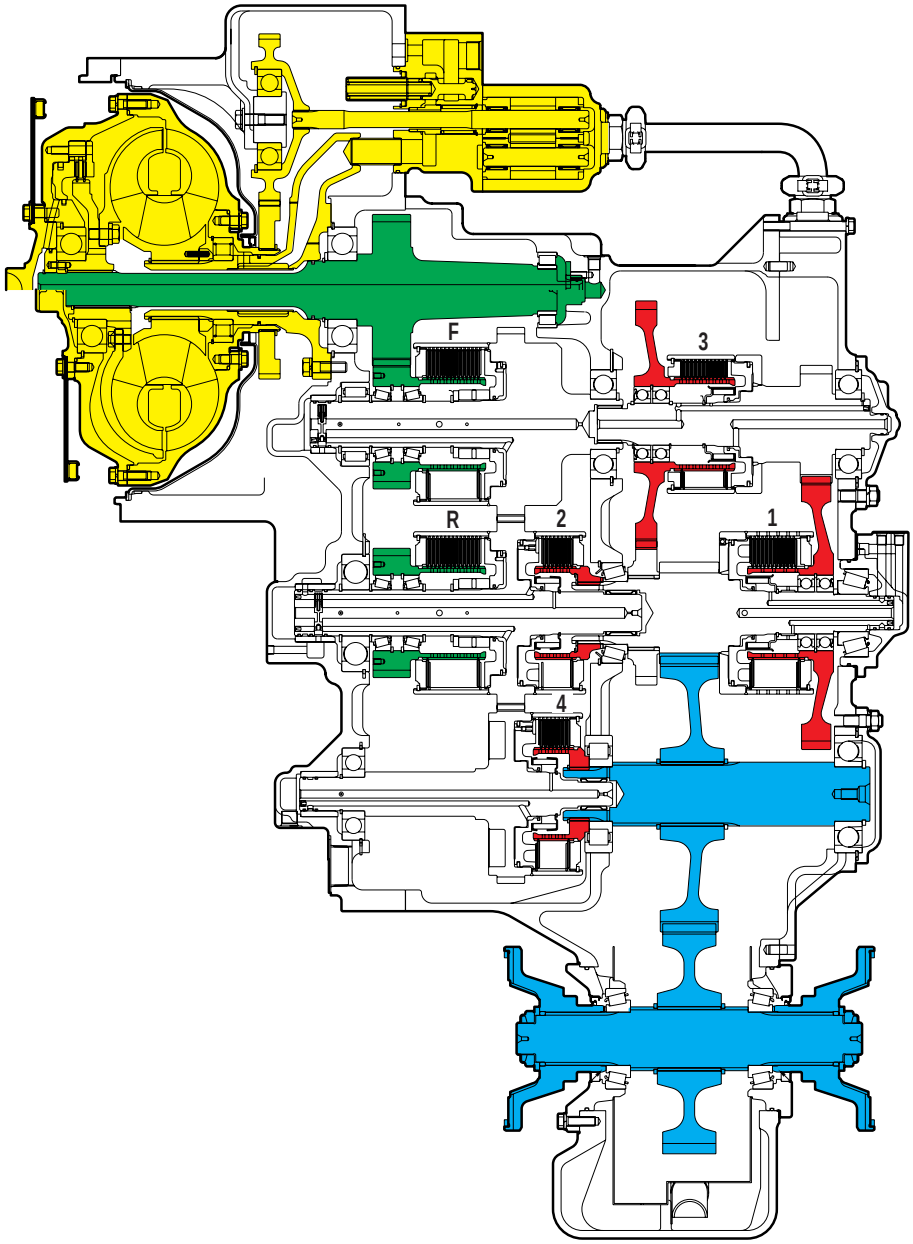
- Minimum 31.7 mm (1.25 inch) internal diameter for lines and fittings.
- Suitable for operation from ambient to 120 °C (248 F) continuous operating temperature.
- Must withstand 20 bar (290 psi) continuous pressure and with 40 bar (580 psi) intermittent surges.
- Conform SAE J1019 and SAE J517,100RI.

6. OPERATION OF THE TRANSMISSION

6.1 THE TRANSMISSION ASSEMBLY

Basically the transmission is composed of five main assemblies:

1. The converter, pump drive section and pressure regulating valve.
2. The input shaft and directional clutches.
3. The range clutches.
4. The output section.
5. The transmission control valve.



6.1.1 The converter, pump drive section and pressure regulating valve

Engine power is transmitted from the engine flywheel to the impeller through the impeller cover.

This element is the pump portion of the hydraulic torque converter and is the primary component which starts the oil flowing to the other components which results in torque multiplication. This element can be compared to a centrifugal pump in that it picks up fluid at its centre and discharges it at the outer diameter.

The torque converter turbine is mounted opposite the impeller and is connected to the turbine shaft of the torque converter. This element receives fluid at its outer diameter and discharges it at its centre.

The reaction member of the torque converter is located between and at the centre of the inner diameters of the impeller and turbine elements. Its function is to take the fluid which is exhausting from the inner portion of the turbine and change its direction to allow correct entry for recirculation into the impeller element. This recirculation will make the converter to multiply torque.

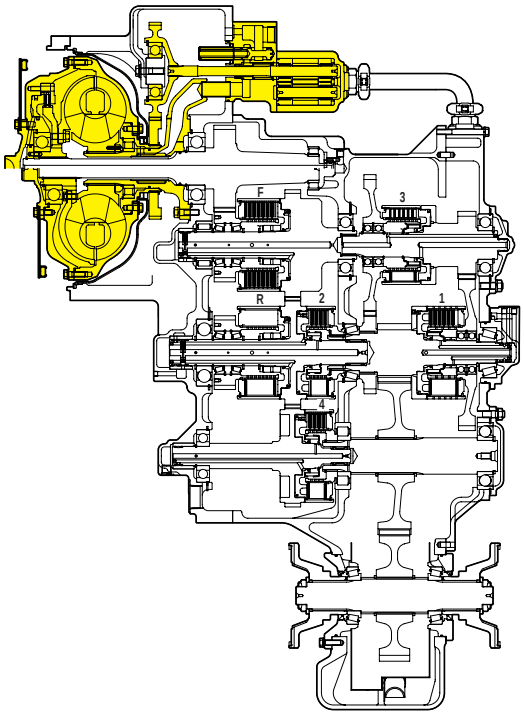
The torque multiplication is function of the blading (impeller, turbine and reaction member) and the converter output speed (turbine speed). The converter will multiply engine torque to its designed maximum multiplication ratio when the turbine shaft is at zero RPM (stall).

Therefore we can say that as the turbine shaft is decreasing in speed, the torque multiplication is increasing.

The hydraulic pump is connected with the pump drive gear. This pump drive gear is driven by the impeller hub gear. Since the impeller hub gear is connected with the impeller cover, the pump speed is in direct relation with the engine speed.

Note

THE PRESSURE REGULATOR VALVE IS MOUNTED BETWEEN THE CONVERTER AND THE CHARGING PUMP.



THE CONVERTER, PUMP DRIVE SECTION AND PRESSURE REGULATING VALVE

6.1.2 The input shaft and directional clutches

The turbine shaft driven from the turbine transmits power to the forward or reverse clutches.

These clutches consists of a drum with internal splines and a bore to receive a hydraulic actuated piston. The piston is oil tight by the use of sealing rings. The steel discs with external splines, and friction discs with internal splines, are alternated until the required total is achieved.

A back up plate is then inserted and secured with a retainer ring. A hub with outer diameter splines is inserted into the splines of discs with teeth on the inner diameter. The discs and hub are free to increase in speed or rotate in the opposite direction as long as no pressure is present in that specific clutch.

To engage the clutch, the control valve will direct oil under pressure through tubes and passages to the selected clutch shafts.

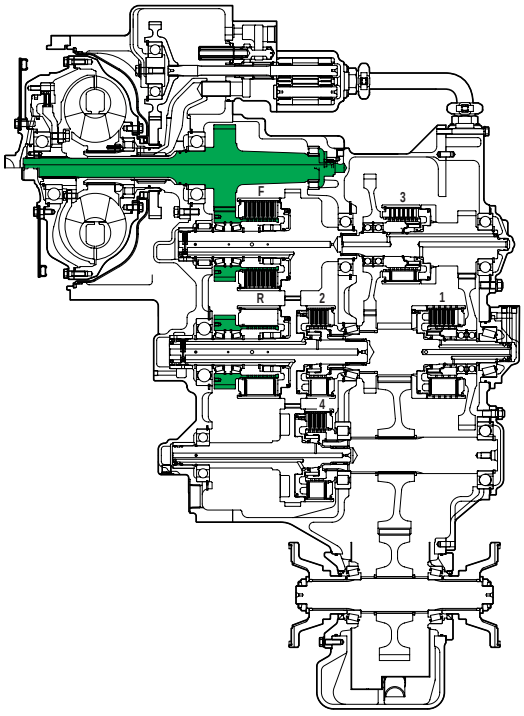
Oil sealing rings are located on the clutch shafts. These rings direct the oil through a drilled passage in the shaft to the desired clutch.

Pressure of the oil forces the piston and discs against the back up plate. The discs with splines on the outer diameter clamping against discs with teeth on the inner diameter enables the drum and hub to be locked together and allows them to drive as one unit.

When the clutch is released, a return spring will push the piston back and oil will drain back via the control valve, the bleed valve or holes in the clutch piston into the transmission sump.

These bleed valve will only allow quick escape of oil when the pressure to the piston is released.

As an option the engagement of the directional clutches can be modulated. This means that clutch pressure is built up gradually. This will enable the unit to make forward, reverse shifts while the vehicle is still moving and will allow smooth engagement of drive. The modulation is done hydraulically.



THE INPUT AND DIRECTIONAL CLUTCHES

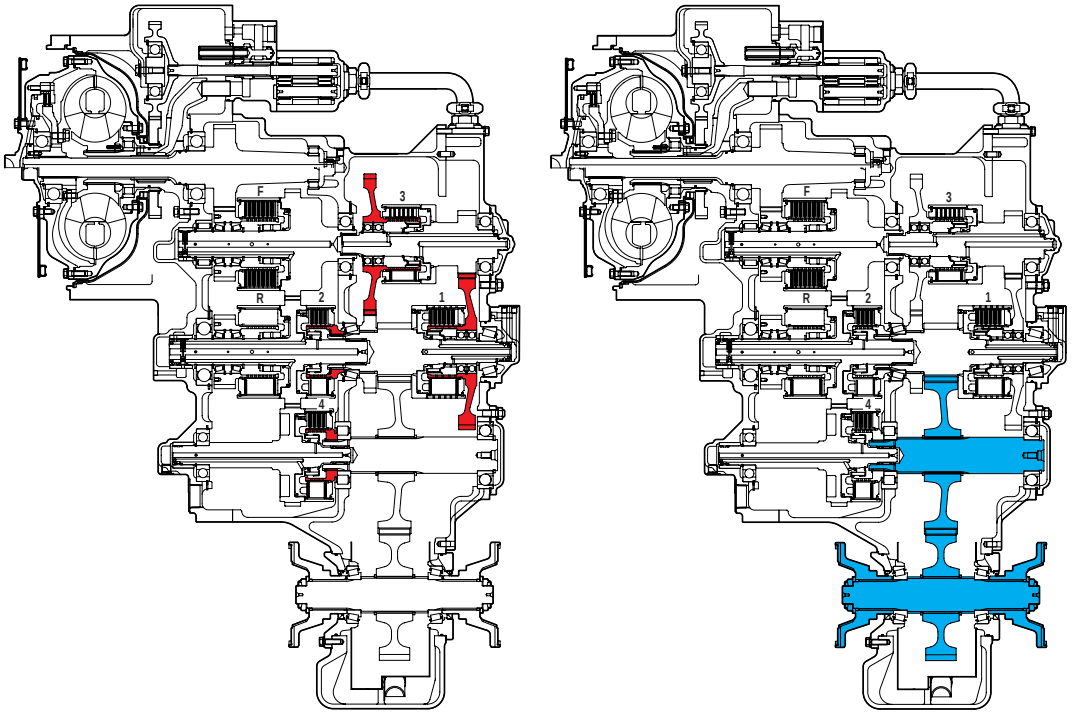
6.1.3 The range clutches

Once a directional clutch is engaged power is transmitted to the range clutches (1st, 2nd, 3rd or 4th).
Operation and actuation of the range clutches is similar as the directional clutches.
The engagement of the range clutches is not modulated.

6.1.4 The output section

With a range clutch engaged, power is finally transmitted to the output shaft.
Output rotation is the same as the engine rotation when the forward clutch is engaged.

An axle disconnect is optional and is located on the output shaft.
The drive to the front or rear axle can be disconnected or connected by manual shifting.



THE RANGE CLUTCHES

THE OUTPUT SECTION

6.1.5 The transmission controls (refer to hydraulic diagram)

The transmission is controlled by the control valve. The control valve assembly may be mounted directly on the side of the convertor housing or front transmission cover, or remote mounted and connected to the transmission by means of flexible hoses. The function of the control valve assembly is to direct oil under pressure to the desired directional and speed clutch. A provision is made on certain models to neutralize the transmission when the brakes are applied (inching or declutch). This is accomplished through use of a brake actuated shutoff valve.

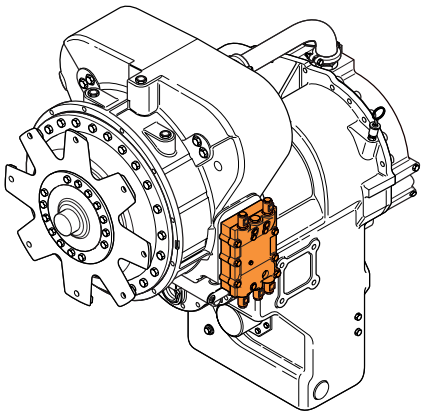
The control valve has 5 solenoids and 5 shift spools. A control valve with optional neutral has an extra spool and solenoid.

Operation of the valve

Forward can be selected by activating the forward solenoid. The forward solenoid will then allow pilot pressure to move the forward shift spool. Due to this movement of the shift spool the forward clutch is fed with oil pressure.

When the reverse solenoid is activated, pilot pressure will move the reverse shift spool.
The reverse clutch will be fed with oil pressure.

The shift spools of forward and reverse are located opposite each other separated by a return spring.
This ensures that only one direction can be selected.



THE TRANSMISSION CONTROLS

Selection of range

If the range solenoids 1st, 2nd and 3rd are activated, regulated pressure is fed through the shift spools to the 1st clutch.

If the range solenoids 2nd and 3rd are activated, regulated pressure is fed through the shift spools to the 2nd clutch.

If the range solenoid 3rd is activated, regulated pressure is fed through the shift spool to the 3rd clutch.

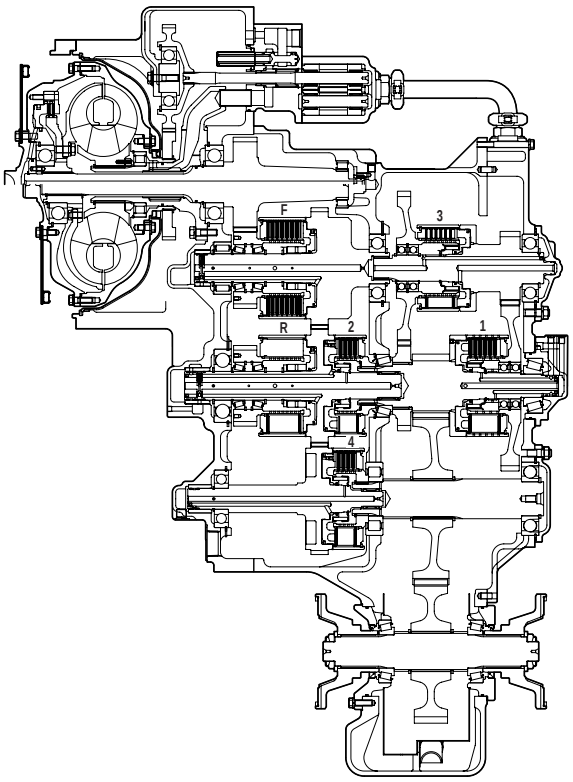
If no range solenoids are activated, the regulated pressure is fed to the 4th clutch.

6.2 ELECTRIC SOLENOID CONTROLS

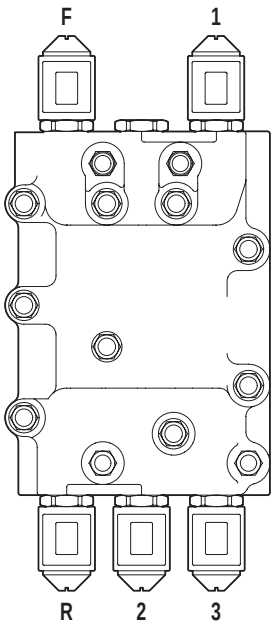
Transmission gear	Activated solenoids	Activated clutches
Forward 4	Forward	Forward 4th
Forward 3	Forward 3rd	Forward 3rd
Forward 2	Forward 2nd / 3rd	Forward 2nd
Forward 1	Forward 1st / 2nd / 3rd	Forward 1st
Neutral 4	—	Neutral 4 th
Neutral 3	3rd	Neutral 3 rd
Neutral 2	2nd / 3rd	Neutral 2 nd
Neutral 1	1st / 2nd / 3rd	Neutral 1 st
Reverse 4	Reverse	Reverse 4 th
Reverse 3	Reverse / 3rd	Reverse 3 rd
Reverse 2	Reverse / 2nd / 3rd	Reverse 2 nd
Reverse 1	Reverse / 1st / 2nd / 3rd	Reverse 1 st

6.3 POWER FLOWS, ACTIVATED SOLENOIDS, SPOOLS AND HYDRAULIC CIRCUIT

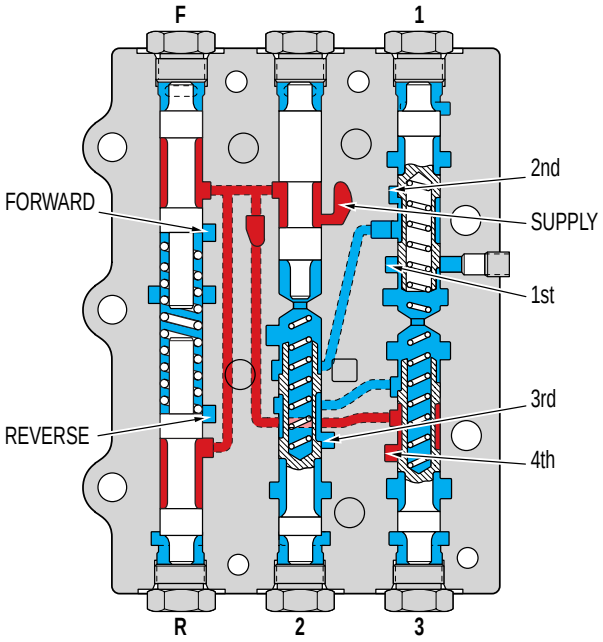
6.3.1 Neutral and 4th clutch engaged



NEUTRAL (POWERFLOW)

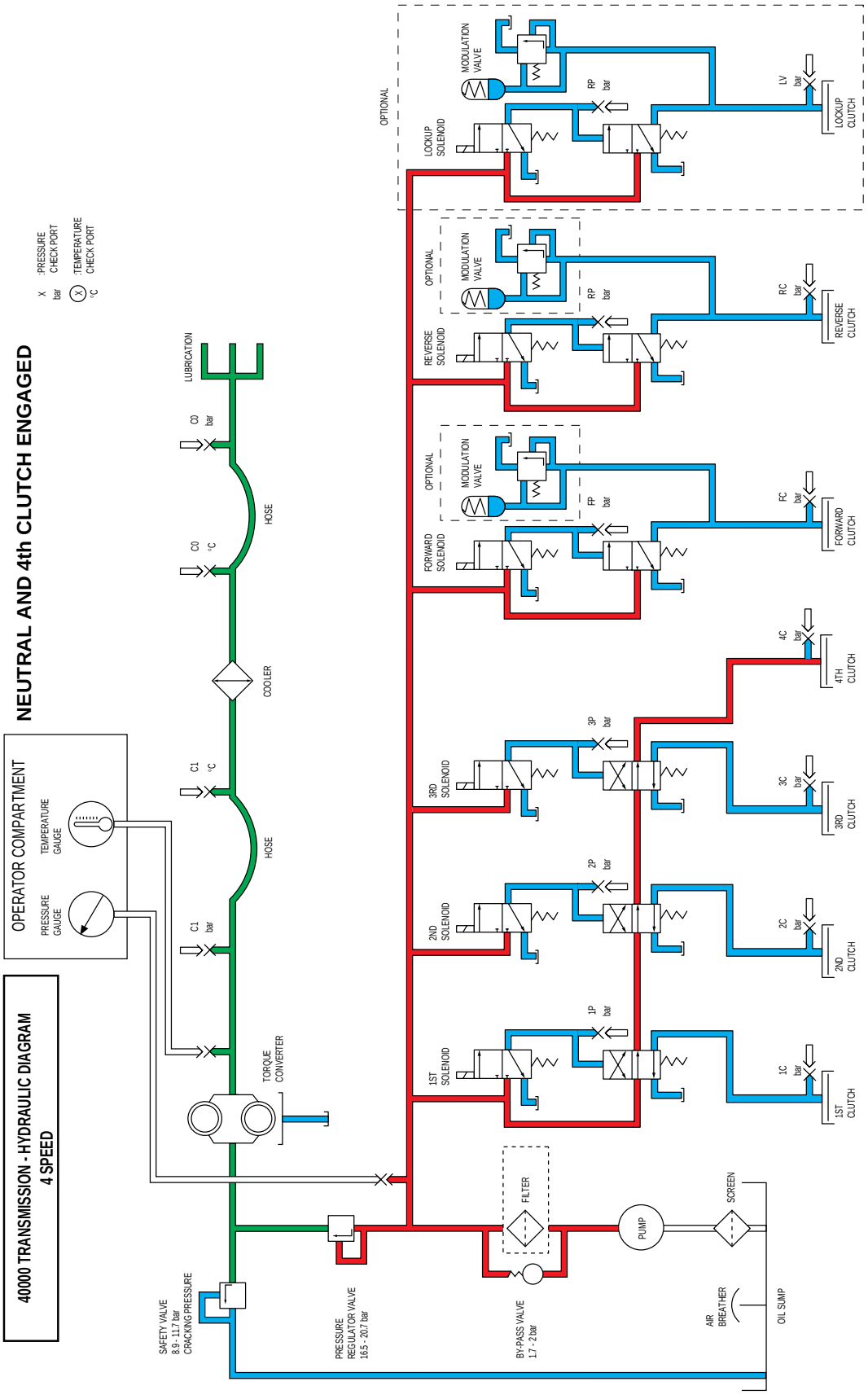


NEUTRAL (ACTIVATED SOLENOIDS)

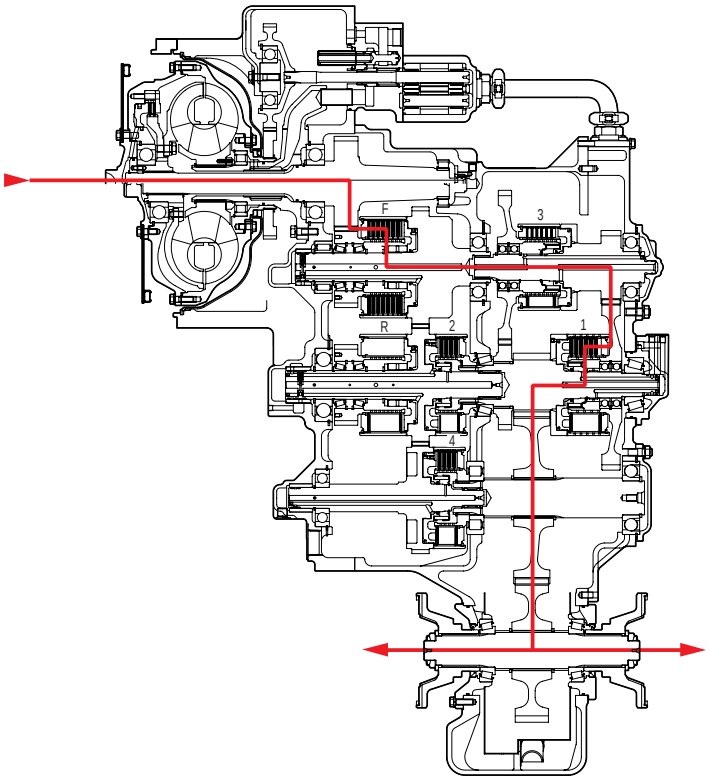


NEUTRAL (ACTIVATED SPOOLS)

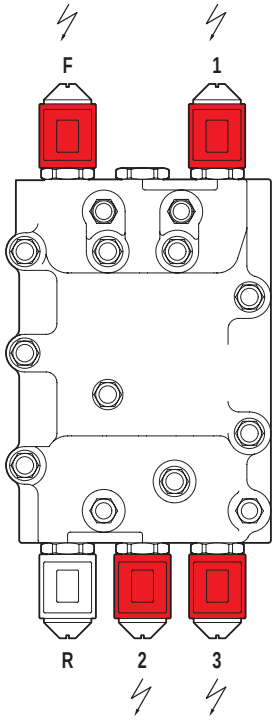
6.3.1 Neutral and 4th clutch engaged (Continued)



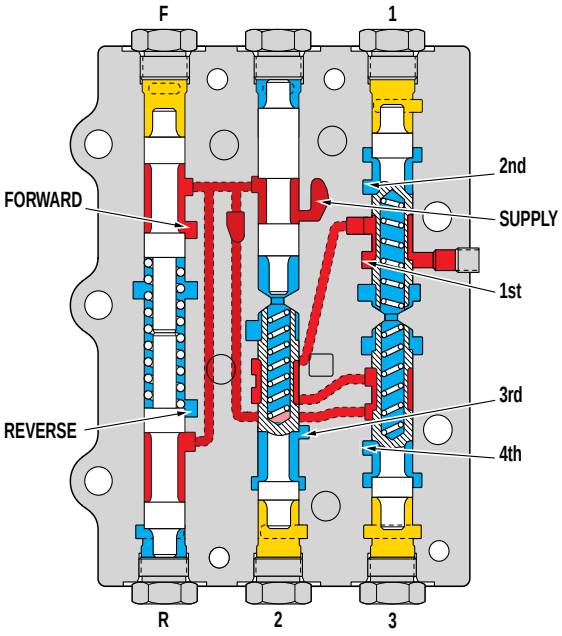
6.3.2 Forward 1st speed



1st SPEED FORWARD (POWERFLOW)

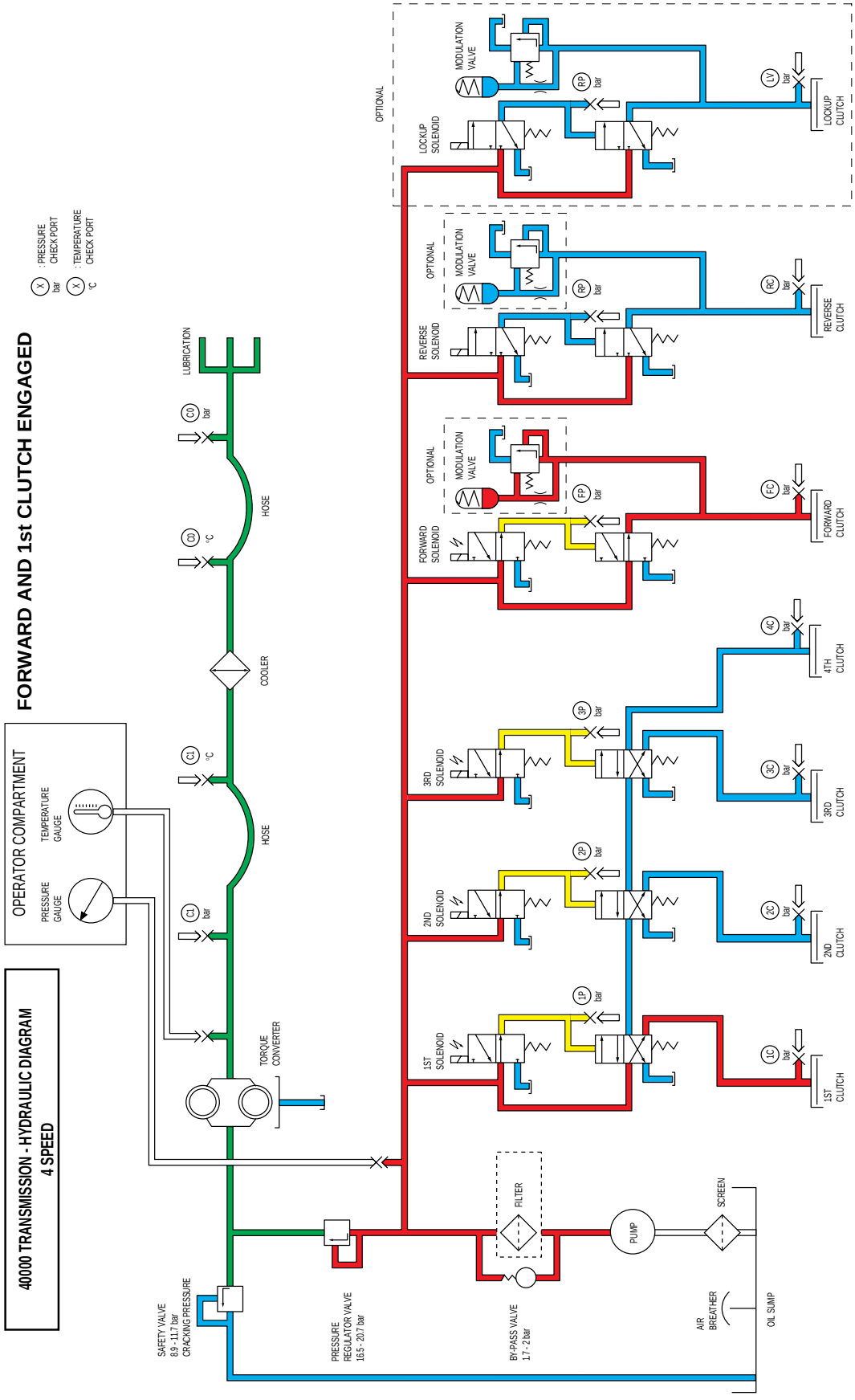


1st SPEED FORWARD (ACTIVATED SOLENOIDS)

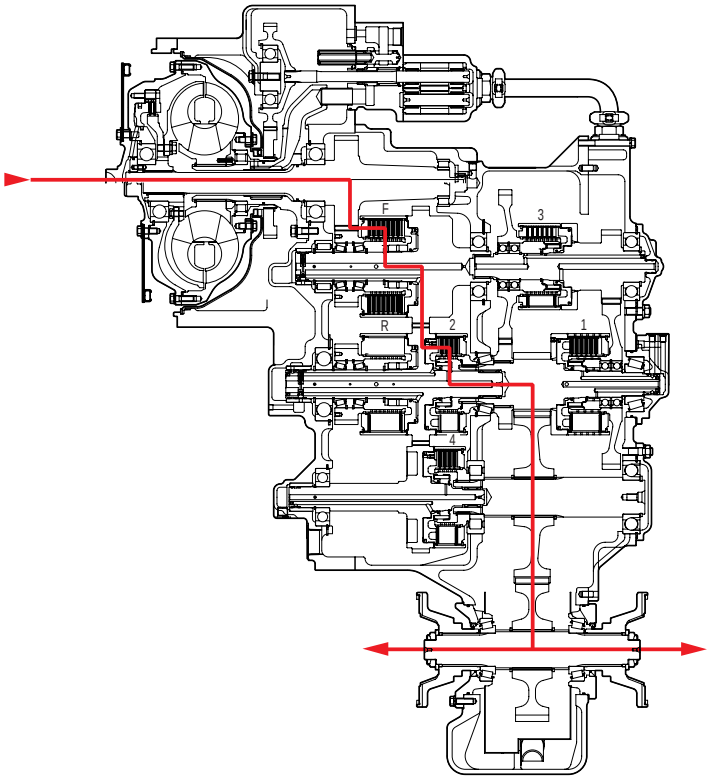


1st SPEED FORWARD (ACTIVATED SPOOLS)

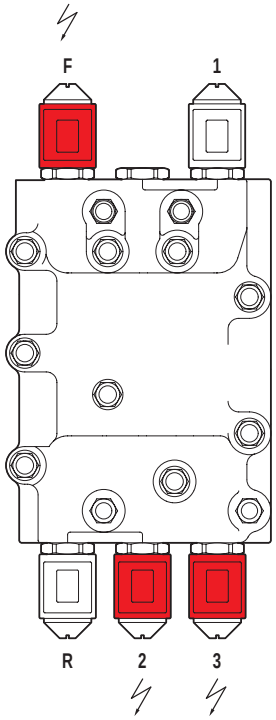
6.3.2 Forward 1st speed (Continued)



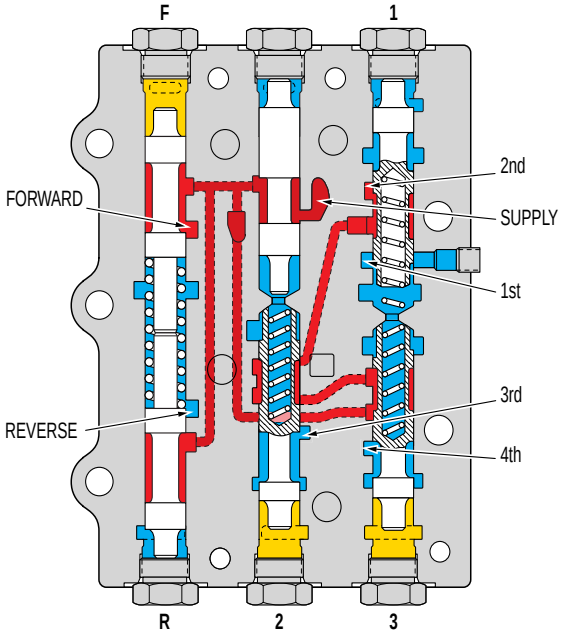
6.3.3 Forward 2nd speed



2nd SPEED FORWARD (POWERFLOW)

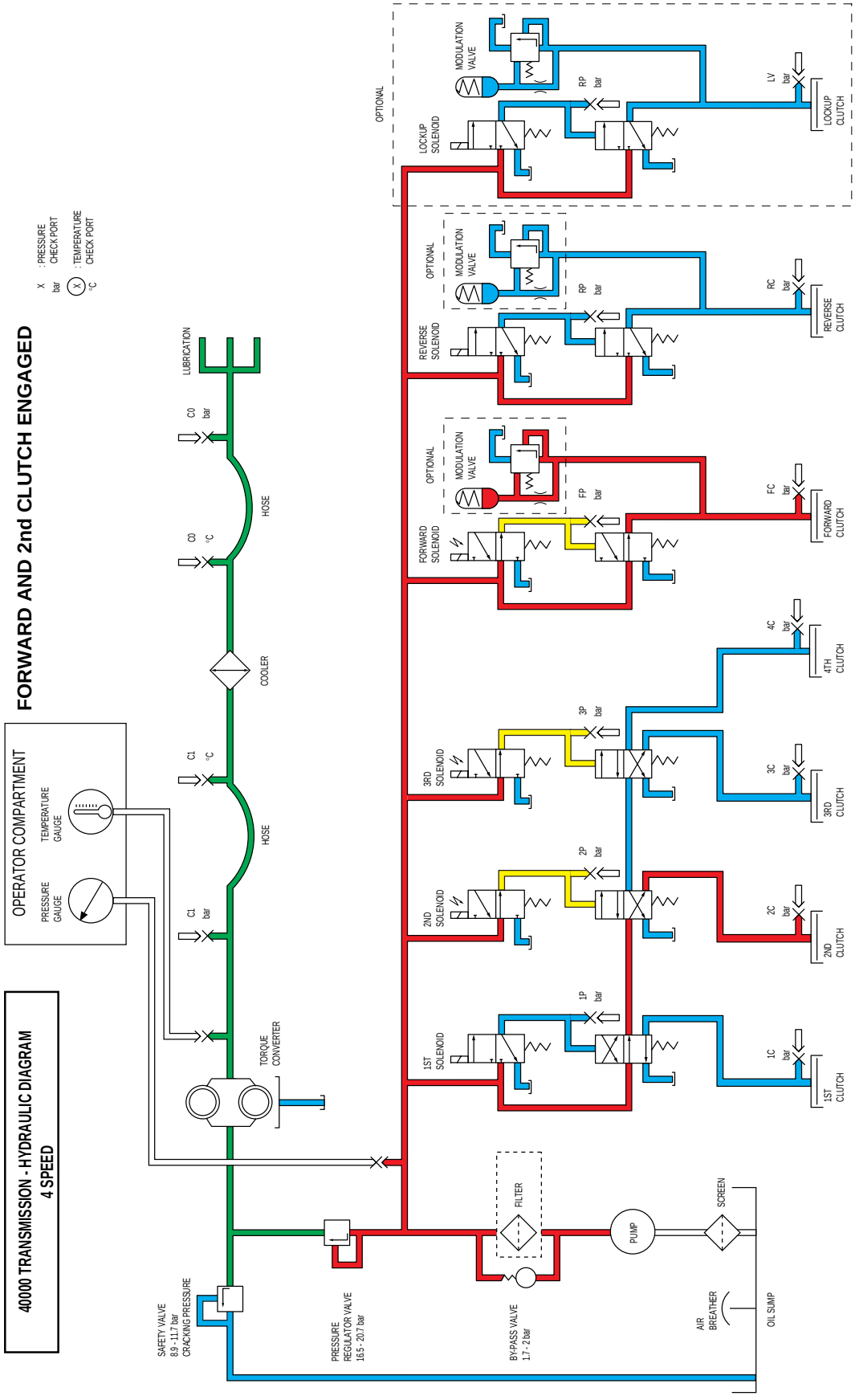


2nd SPEED FORWARD (ACTIVATED SOLENOIDS)

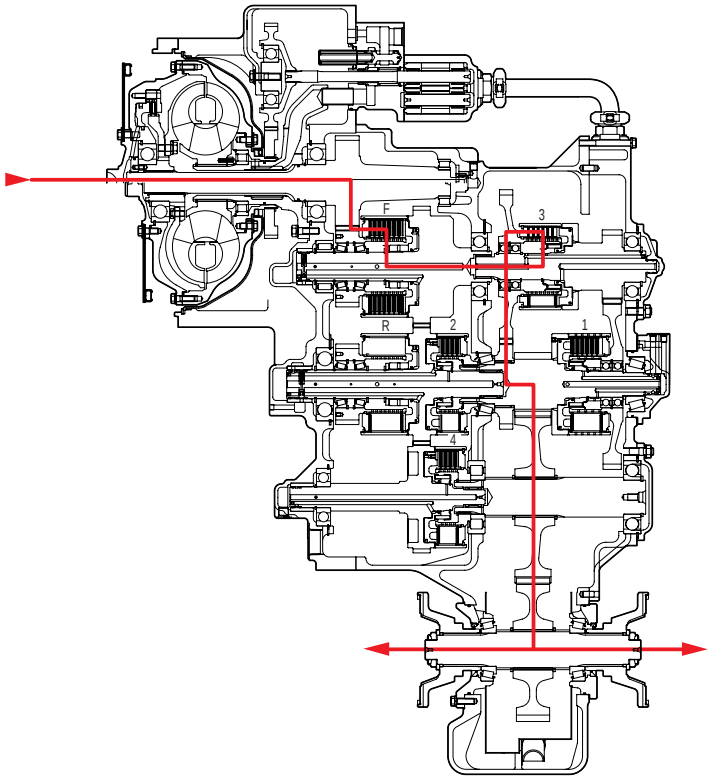


2nd SPEED FORWARD (ACTIVATED SPOOLS)

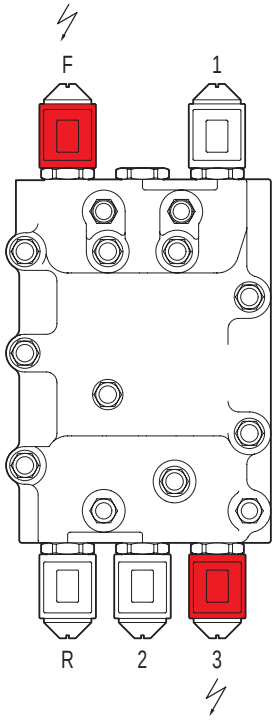
6.3.3 Forward 2nd speed (Continued)



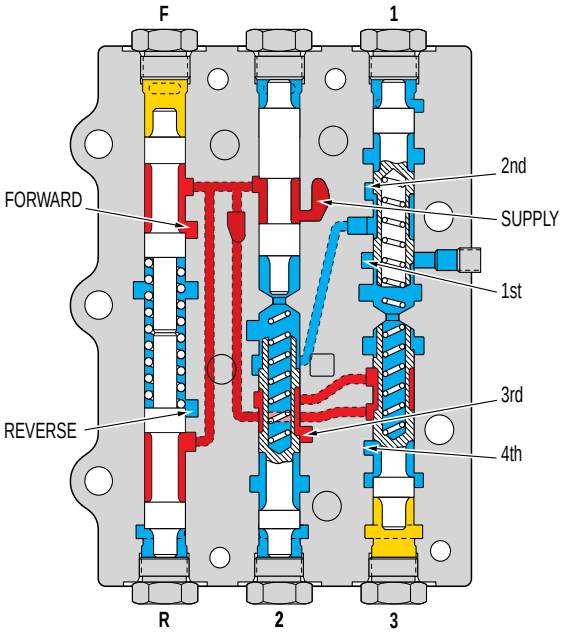
6.3.4 Forward 3rd speed



3rd SPEED FORWARD (POWERFLOW)

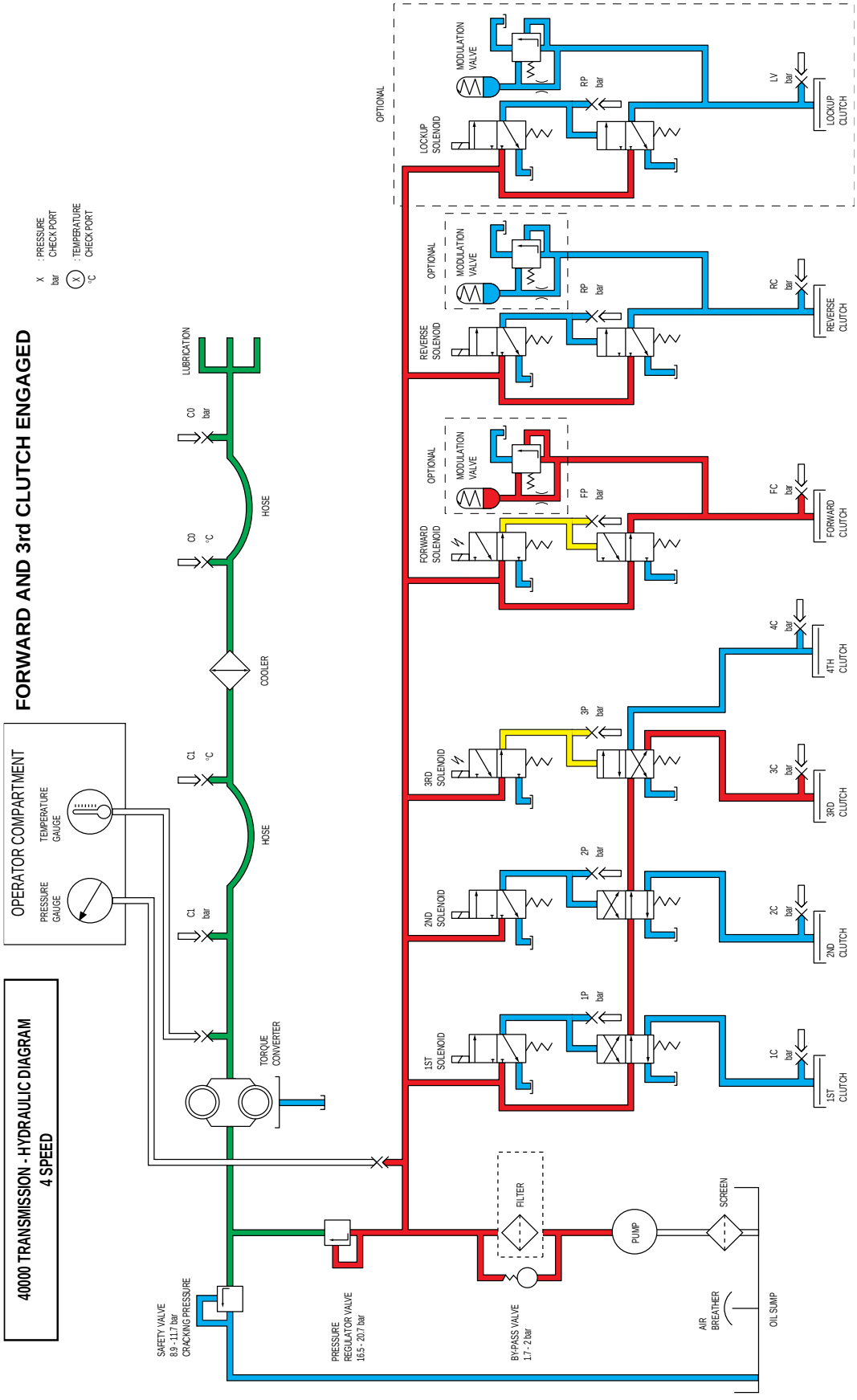


3rd SPEED FORWARD (ACTIVATED SOLENOIDS)

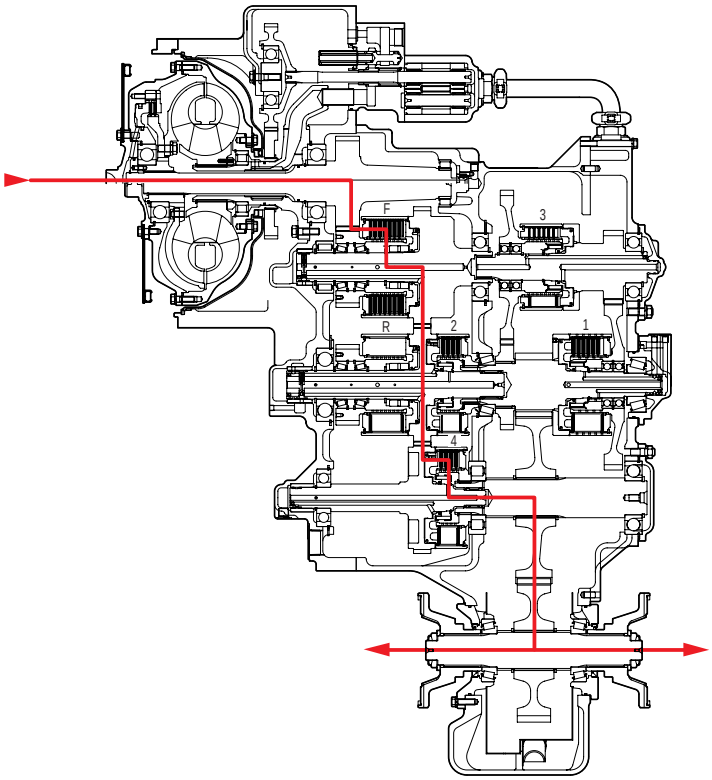


3rd SPEED FORWARD (ACTIVATED SPOOLS)

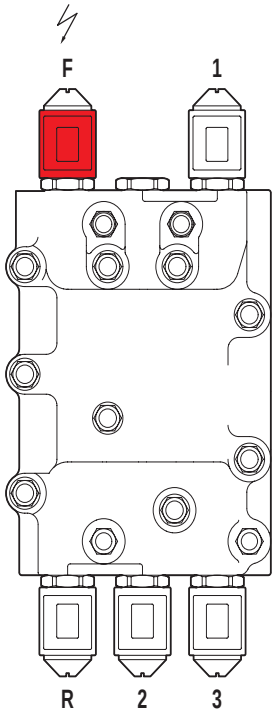
6.3.4 Forward 3rd speed (Continued)



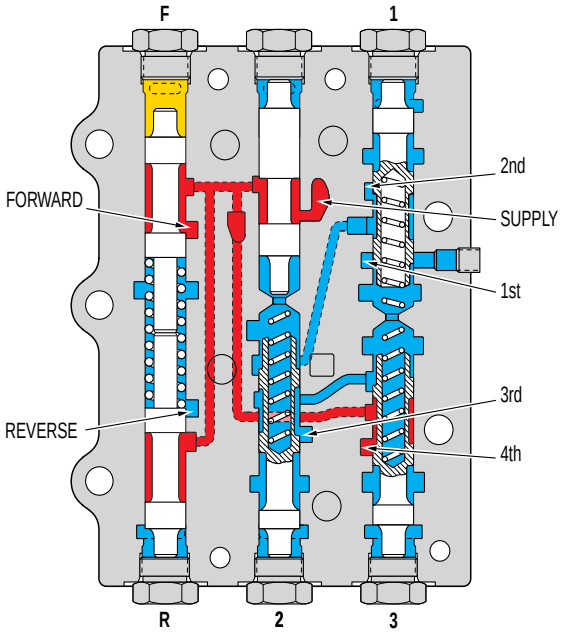
6.3.5 Forward 4th speed



4th SPEED FORWARD (POWERFLOW)

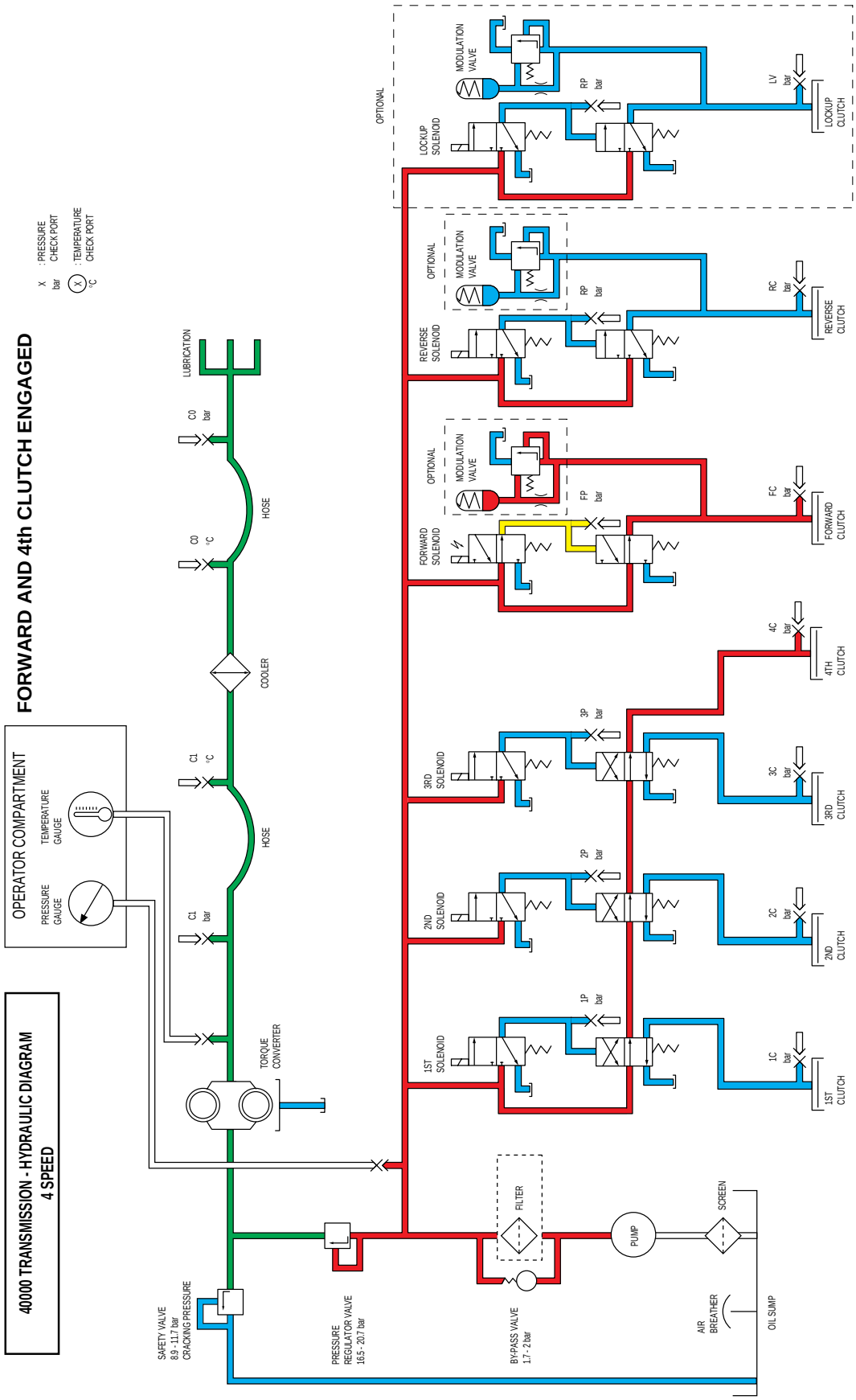


4th SPEED FORWARD (ACTIVATED SOLENOIDS)

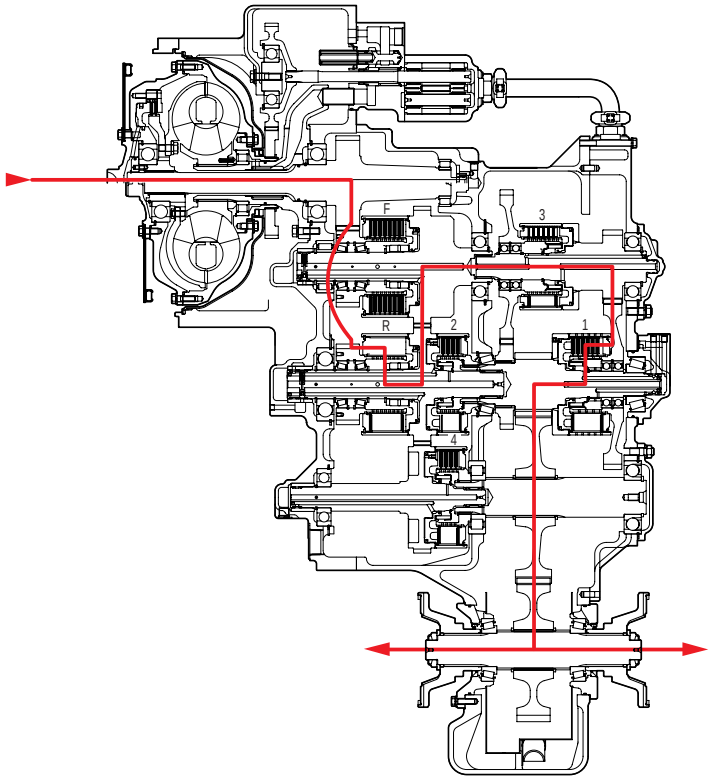


4th SPEED FORWARD (ACTIVATED SPOOLS)

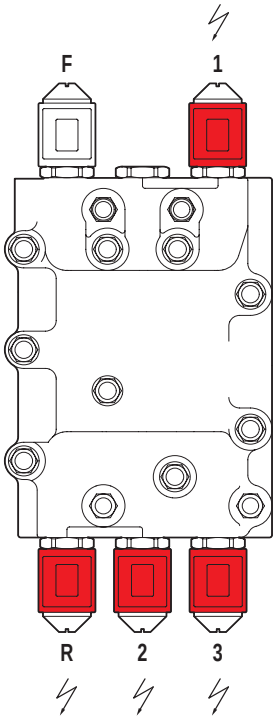
6.3.5 Forward 4th speed (Continued)



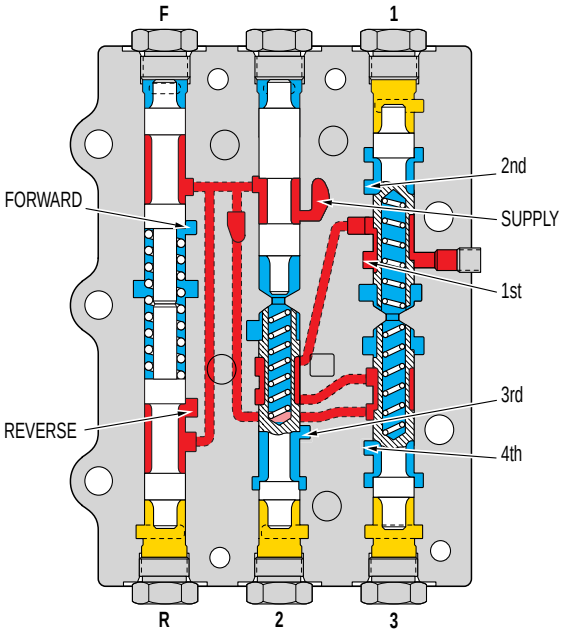
6.3.6 Reverse 1st speed



1st SPEED REVERSE (POWERFLOW)

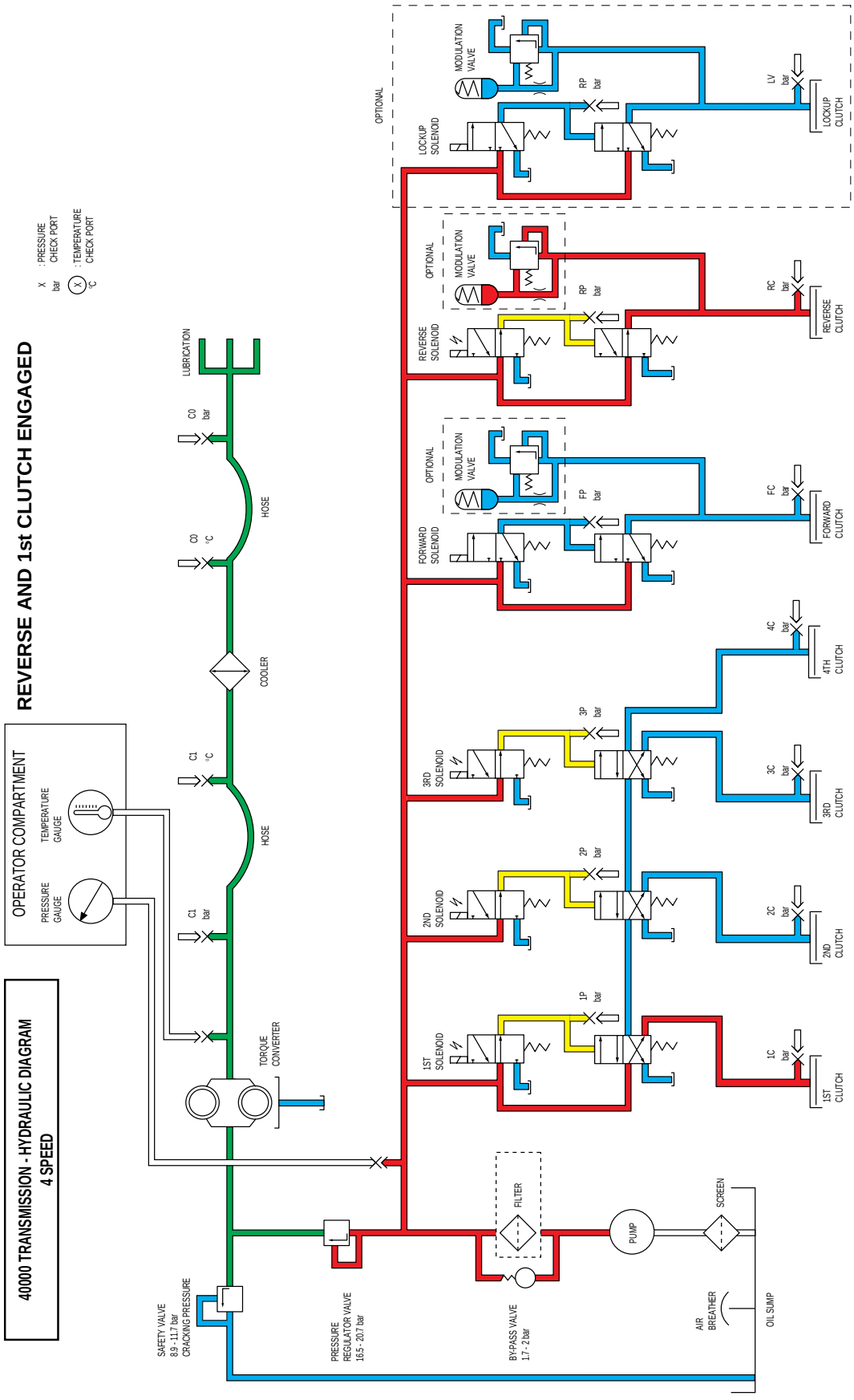


1st SPEED REVERSE (ACTIVATED SOLENOIDS)

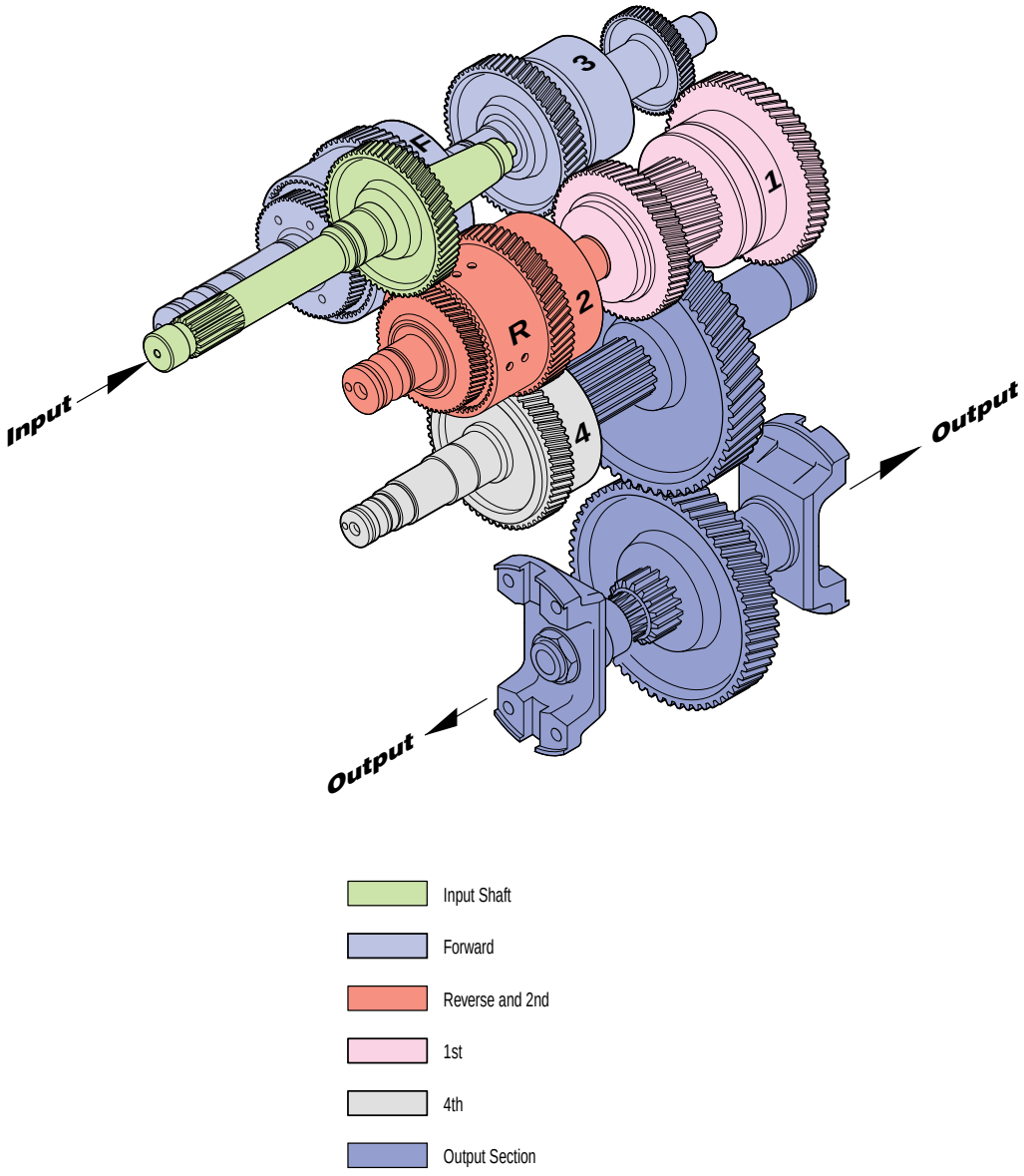


1st SPEED REVERSE (ACTIVATED SPOOLS)

6.3.6 Reverse 1st speed (Continued)



6.4 GEAR AND CLUTCH LAYOUT



7. TROUBLESHOOTING GUIDE FOR THE T40000 TRANSMISSION

The following information is presented as an aid to isolating and determining the specific problem area in a transmission that is not functioning correctly.

When troubleshooting a “transmission” problem, it should be kept in mind that the transmission is only the central unit of a group of related powertrain components. Proper operation of the transmission depends on the condition and correct functioning of the other components of the group. Therefore, to properly diagnose a suspected problem in the transmission, it is necessary to consider the transmission fluid, charging pump, torque converter, transmission assembly, oil cooler, filter, connecting lines, and controls, including the engine, as a complete system.

By analyzing the principles of operation together with the information in this section, it should be possible to identify and correct any malfunction which may occur in the system.

7.1 T40000 TRANSMISSION

T40000 (power shift with torque converter transmission) troubles fall into three general categories:

1. Mechanical problems.

2. Hydraulic problems.

3. Electrical problems.

In addition to the mechanical and electrical components, all of which must be in the proper condition and functioning correctly, the correct functioning of the hydraulic circuit is most important. Transmission fluid is the “life blood” of the transmission. It must be supplied in an adequate quantity and delivered to the system at the correct pressures to ensure converter operation, to engage and hold the clutches from slipping, and to cool and lubricate the working components.

7.2 TROUBLESHOOTING PROCEDURES

7.2.1 Stall Test

A stall test to identifies transmission, converter, or engine problems.

Use following procedure:

1. Put the vehicle against a solid barrier, such as a wall, and/or apply the parking brake and block the wheels.

2. Put the directional control lever in FORWARD (or REVERSE, as applicable).

3. Select the highest speed.
   With the engine running, slowly increase engine speed to approximately one-half throttle and hold until transmission (converter outlet) oil temperature reaches the operating range.

CAUTION

DO NOT OPERATE THE CONVERTER AT STALL CONDITION LONGER THAN 30 SECONDS AT ONE TIME, SHIFT TO NEUTRAL FOR 15 SECONDS AND REPEAT THE PROCEDURE UNTIL DESIRED TEMPERATURE IS REACHED.
EXCESSIVE TEMPERATURE 120 °C (250 F) MAXIMUM WILL CAUSE DAMAGE TO TRANSMISSION CLUTCHES, FLUID, CONVERTER, AND SEALS.

7.2.2 Transmission pressure checks

Transmission problems can be isolated by the use of pressure tests. When the stall test indicates slipping clutches, then measure clutch pack pressure to determine if the slippage is due to low pressure or clutch plate friction material failure.

In addition, converter charging pressure and transmission lubrication pressure may also be measured.

7.2.3 Mechanical and electrical checks

Prior to checking any part of the system for hydraulic function (pressure testing), the following mechanical and electrical checks should be made:

- Check the parking brake for correct adjustment.
- Be sure all lever linkage is properly connected and adjusted in each segment and at all connecting points.
- The controls are actuated electrically. Check the wiring and electrical components.
- Be sure that all components of the cooling system are in good condition and operating correctly. The radiator must be clean to maintain the proper cooling and operating temperatures for the engine and transmission. Air clean the radiator, if necessary.
- The engine must be operating correctly. Be sure that it is correctly tuned and adjusted to the correct idle and maximum no-load governed speed specifications.

7.2.4 Hydraulic checks

Also, before checking the transmission clutches, torque converter, charging pump, and hydraulic circuit for pressure and rate of oil flow, it is important to make the following transmission fluid check:

Check oil level in the transmission. The transmission fluid must be at the correct (full level). All clutches and the converter and its fluid circuit lines must be fully charged (filled) at all times.

Note

THE TRANSMISSION FLUID MUST BE AT OPERATING TEMPERATURE OF 82 - 93 °C (180 - 200 F) TO OBTAIN CORRECT FLUID LEVEL AND PRESSURE READINGS.
DO NOT ATTEMPT TO MAKE THESE CHECKS WITH COLD OIL.

To raise the oil temperature to this specification it is necessary to either operate (work) the vehicle or run the engine with converter at “stall” (Refer to 7.2.1 “Stall test”).

CAUTION

BE CAREFUL THAT THE VEHICLE DOES NOT MOVE UNEXPECTEDLY WHEN OPERATING THE ENGINE AND CONVERTER AT STALL RPM.

7.3 TROUBLESHOOTING GUIDE

Refer to the following troubleshooting guide for the diagnosis of typical transmission troubles.

7.3.1 Low clutch pressure

CAUSE	REMEDY
1. Low oil level.	1. Fill to proper level.
2. Clutch pressure regulating valve stuck open.	2. Clean valve spool and housing.
3. Faulty charging pump.	3. Replace pump.
4. Broken or worn clutch shaft or piston sealing rings.	4. Replace sealing rings.

7.3.2 Low charging pump output

CAUSE	REMEDY
1. Low oil level.	1. Fill to proper level.
2. Suction screen plugged.	2. Clean suction pump.
3. Defective charging pump.	3. Replace pump.

7.3.3 Overheating

Cause	Remedy
1. Worn oil sealing rings.	1. Remove, disassemble, and rebuild converter assembly.
2. Worn charging pump.	2. Replace charging pump.
3. Low oil level.	3. Fill to proper level.
4. Dirty oil cooler.	4. Clean cooler.
5. Restriction in cooler lines.	5. Change cooler lines.

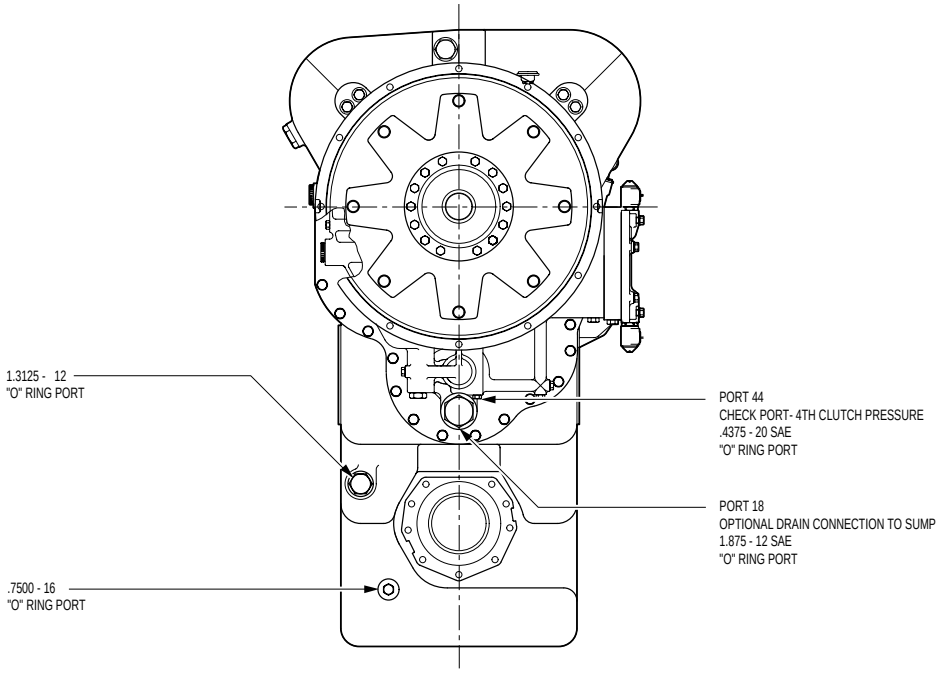
7.3.4 Noisy converter

Cause	Remedy
1. Worn charging pump.	1. Replace charging pump.
2. Worn or damaged bearings.	2. A complete disassembly will be necessary to determine which bearing is faulty.

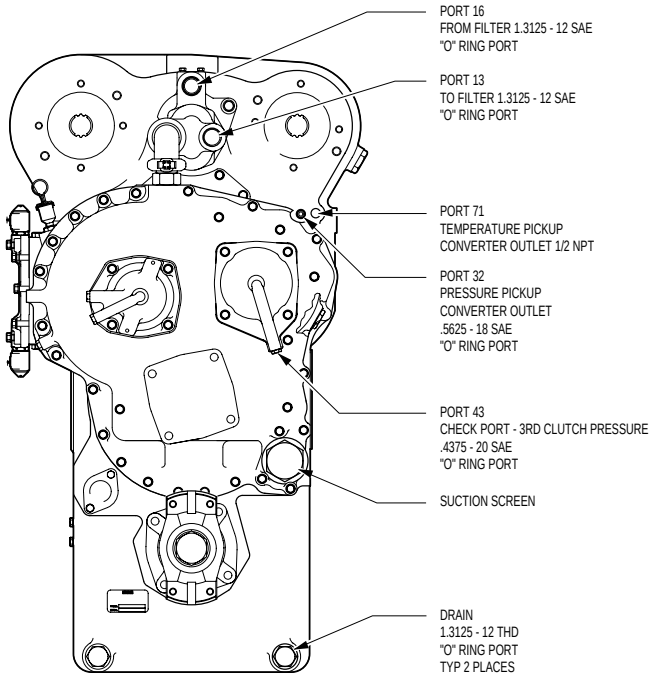
7.3.5 Lack of power

Cause	Remedy
1. Low engine RPM at converter stall.	1. Tune engine check governor.
2. See “Overheating” and make same checks.	2. Make corrections as explained in “Overheating”.

7.4 CHECK POINTS

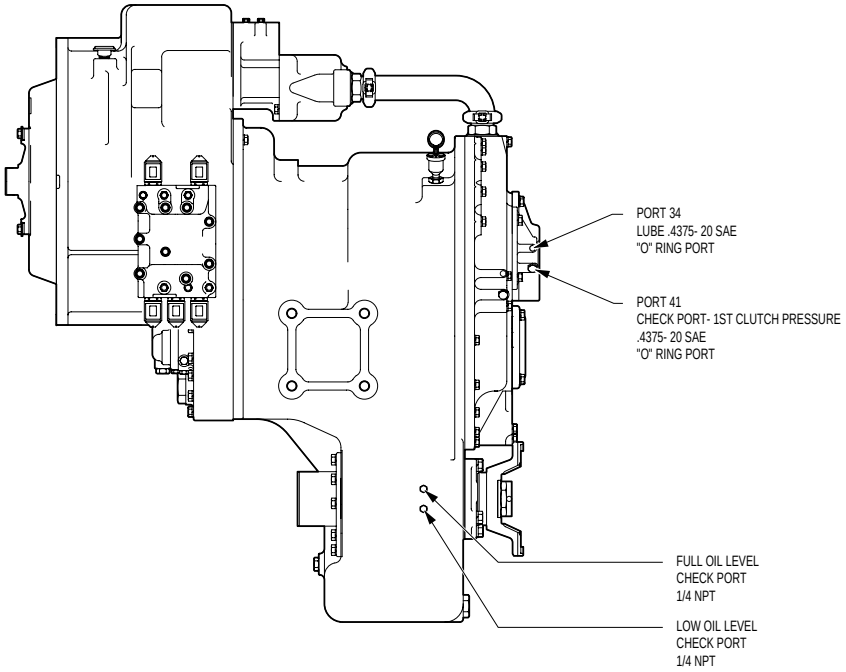


FRONT VIEW

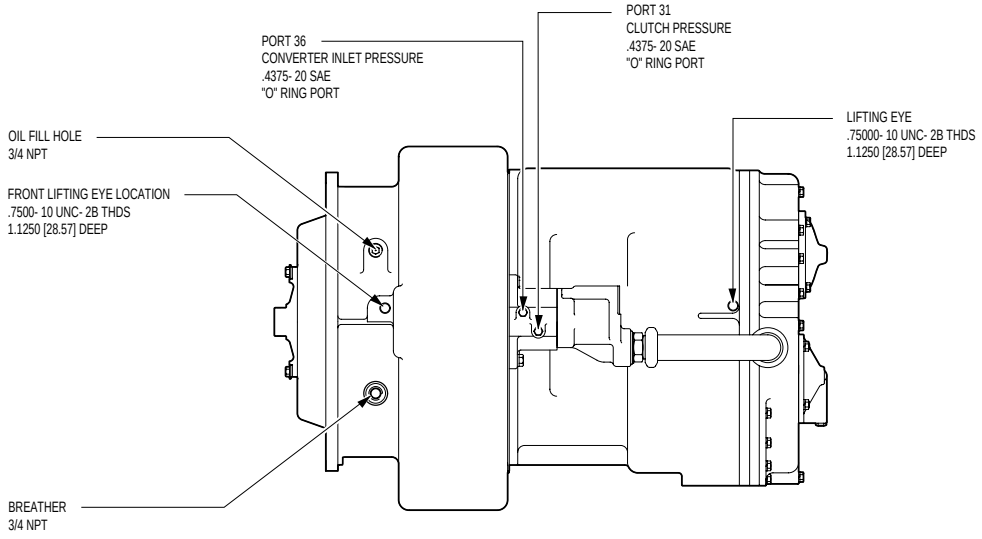


REAR VIEW

7.4 CHECK POINTS (CONTINUED)

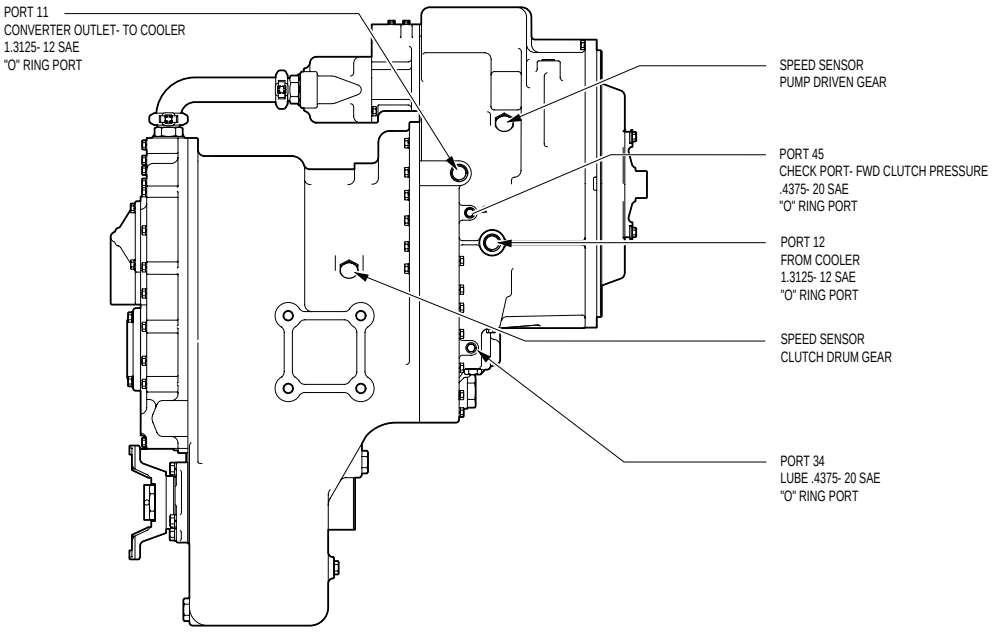


LEFT SIDE VIEW



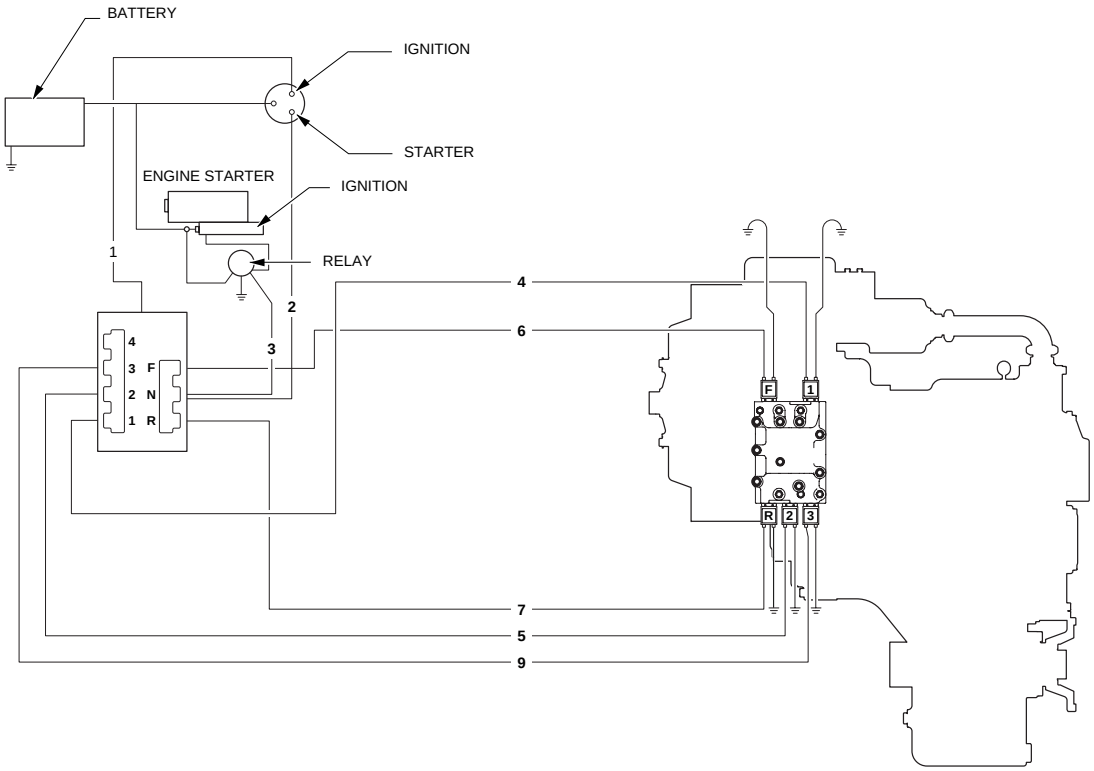
TOP VIEW

7.4 CHECK POINTS (CONTINUED)



RIGHT SIDE VIEW

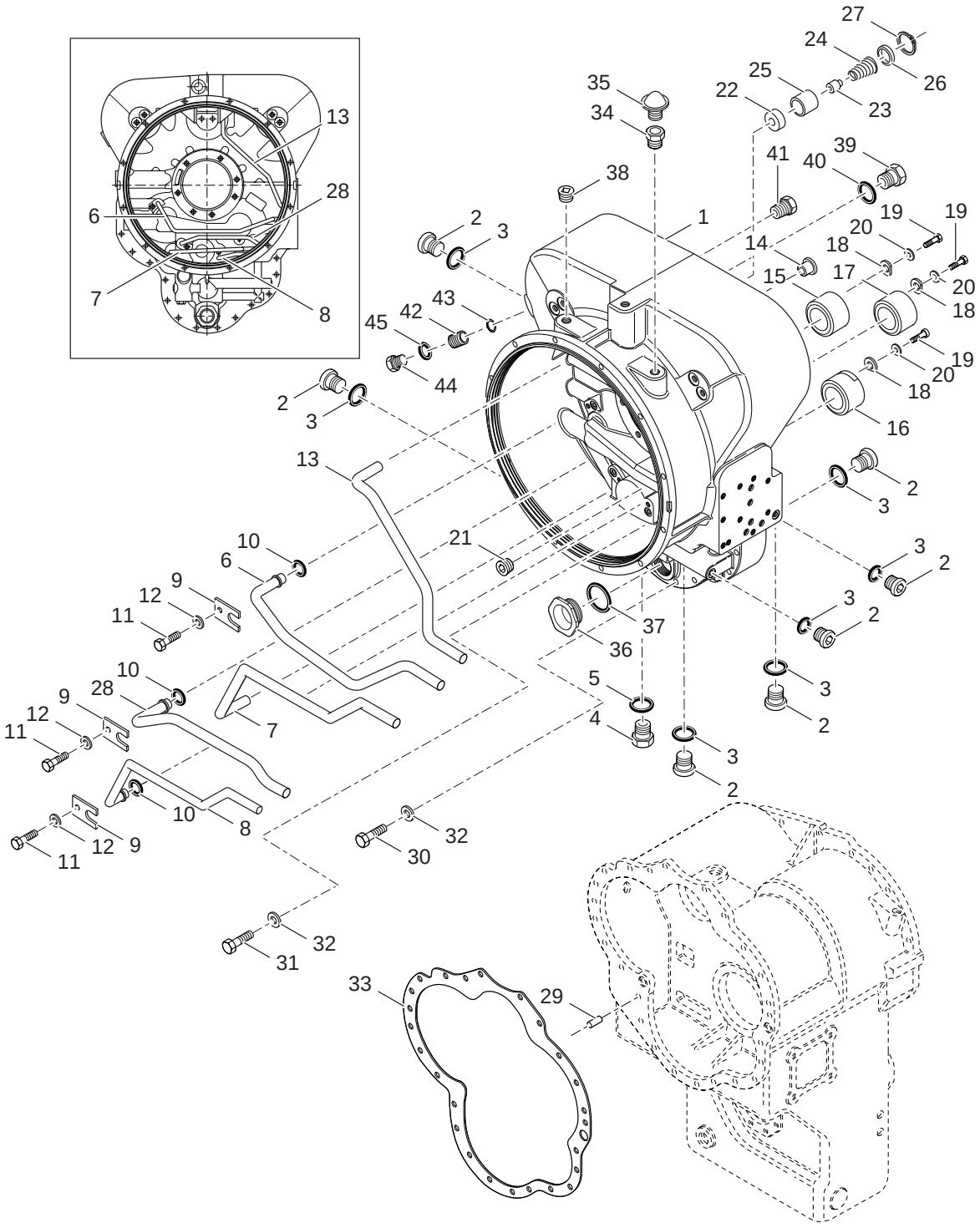
7.5 ELECTRICAL WIRING



SPEED	ENERGISED WIRES
F1	4 - 5 - 6 - 9
F2	5 - 6 - 9
F3	6 - 9
F4	6
N4	2 - 3
R1	4 - 5 - 7 - 9
R2	5 - 7 - 9
R3	7 - 9
R4	7

WIRE NO.	COLOUR CODE
1	White
2	Black
3	Red
4	Yellow
5	Green
6	Blue
7	Brown
8	Not used
9	Orange

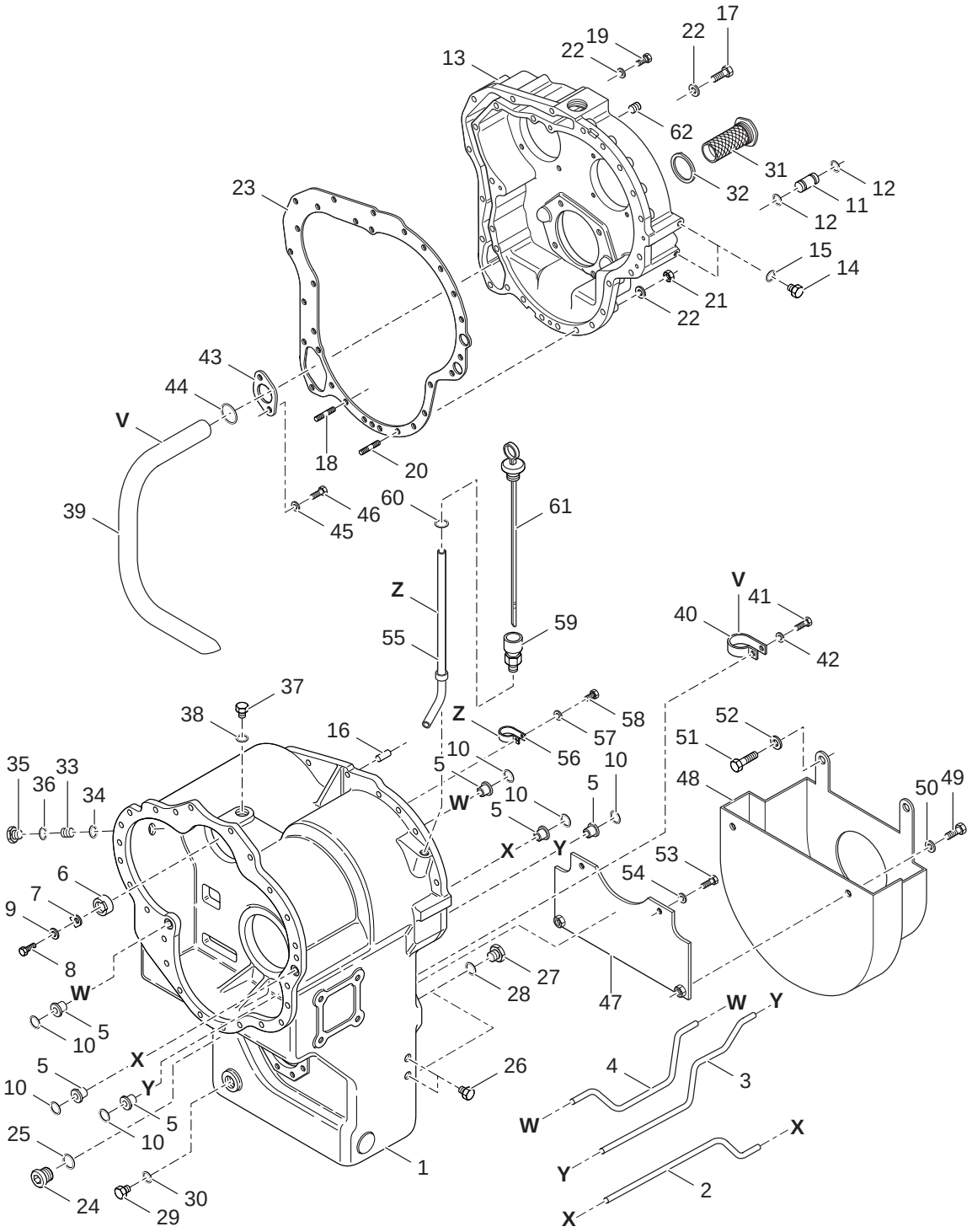
8. SECTIONAL VIEWS AND PARTS IDENTIFICATION


27
24
26
25
22
23
35
34
41
40
39
38
1
2
3
14
18
20
19
19
15
17
20
18
43
42
45
44
19
20
18
16
2
3
13
10
6
21
3
2
9
12
11
3
2
37
36
10
28
9
12
11
7
5
4
3
2
10
8
12
9
11
32
30
32
31
33
29

GROUP - CONVERTER HOUSING

Item	Description	Quantity
1	Assembly - Converter housing and tube	1
2	Plug - port	7
3	“O”-ring	7
4	Plug - Oil lube return	1
5	“O”-ring	1
6	Assembly - Forward pressure tube	1
7	Tube - 3rd pressure	1
8	Tube - 4th pressure	1
9	Clip - Tube	3
10	“O”-ring	3
11	Screw - Tube retaining	3
12	Lockwasher - Retaining screw	3
13	Tube - Valve oil supply	1
14	Sleeve - Tube	2
15	Sleeve - Converter housing Forward and Low	1
16	Sleeve - Converter housing Reverse and 2nd	1
17	Sleeve - Converter housing 3rd & 4th clutch	1
18	Lock - Converter housing sleeve	3
19	Screw - Sleeve lock	3
20	Lockwasher - Sleeve lock screw	3
21	Plug	1
22	Seat - Safety valve	1
23	Plunger - Pressure relief valve	1
24	Spring - Pressure relief valve	1
25	Retainer - Valve seat	1
26	Washer	1
27	Ring - Retaining	1
28	Assembly - Modulator bypass tube	1
29	Pin - Converter housing to transmission case dowel	2
30	Screw - Converter housing to transmission case	14
31	Screw - Converter housing to transmission case	9
32	Lockwasher - Converter housing to transmission case screw	23
33	Gasket - Converter housing to transmission case	1
34	Bushing - Reducing	1
35	Breather	1
36	Cap	1
37	Gasket	1
38	Plug - Fill	1
39	Plug - Converter out pressure	1
40	“O”-ring	1
41	Plug - Converter out temperature	1
42	Bushing	1
43	Washer - Shim	AR
44	Plug - speed sensor bushing	1
45	“O”-ring	1

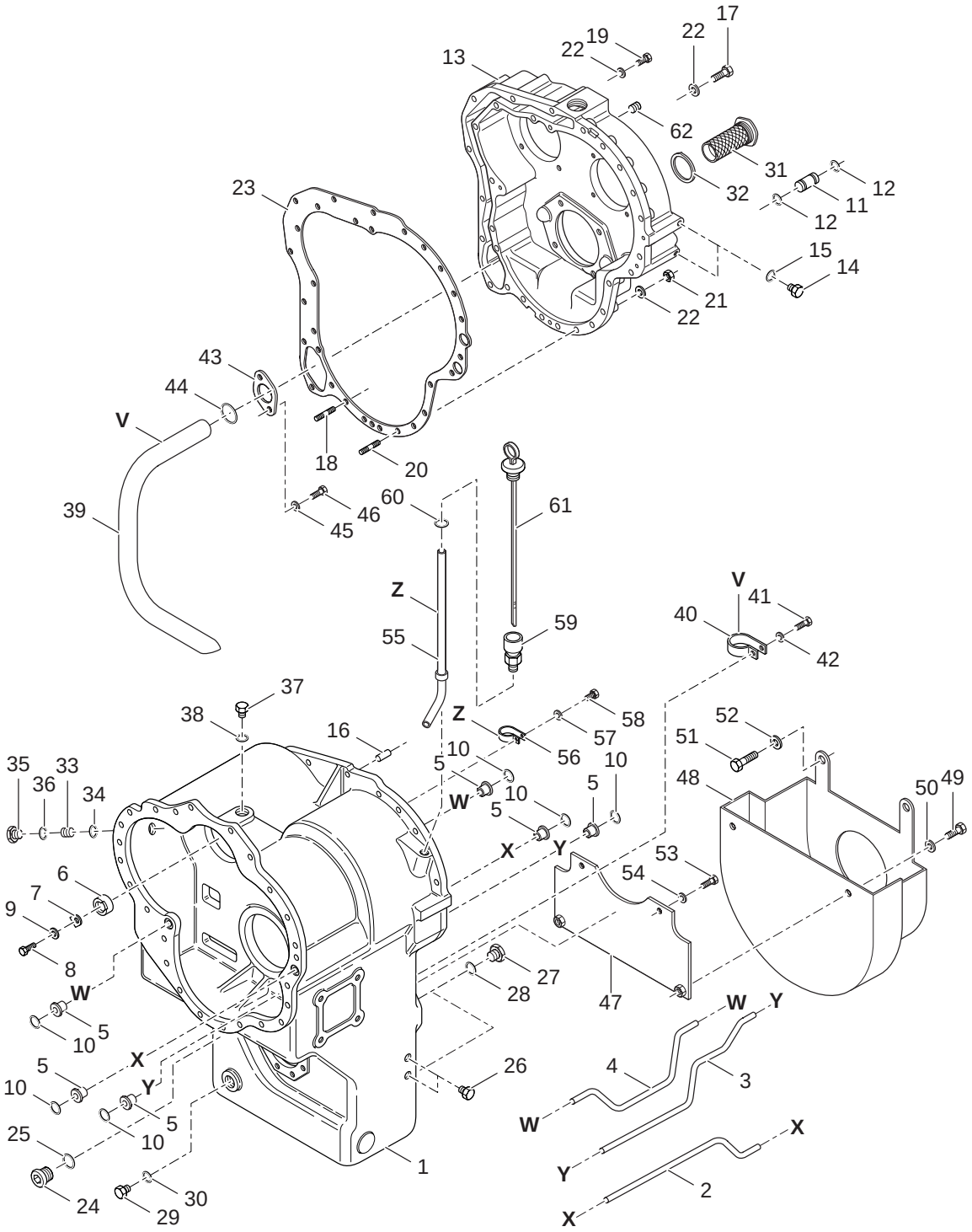
AR - As required.


1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60
61
62
V
W
X
Y
Z

GROUP -TRANSMISSION CASE AND REAR COVER

Item	Description	Quantity
1	Assembly - Transmission case and tube	1
2	Tube - 1st speed clutch pressure	1
3	Tube - Low shaft rear bearing lube	1
4	Tube - 3rd speed clutch pressure	1
5	Sleeve - Tube	6
6	Sleeve - Lockup piston ring	1
7	Washer - Lockup sleeve retainer	1
8	Screw - Lockup sleeve retainer	1
9	Lockwasher - Lockup sleeve retainer	1
10	“O”-ring - 1st and 3rd clutch rear bearing pressure tube	6
11	Transfer tube - 1st speed clutch pressure and bearing lube	2
12	“O”-ring - Pressure transfer tube	4
13	Cover - Rear	1
14	Plug - Rear cover 1st and reverse bearing lube supply	2
15	“O”-ring	2
16	Pin - Transmission case to rear cover dowel	2
17	Screw - Rear cover to transmission case	11
18	Stud - Rear cover to transmission case	5
19	Screw - Rear cover to transmission case	5
20	Stud - Rear cover to transmission case	7
21	Nut - Rear cover to transmission case stud	12
22	Lockwasher - Rear cover to transmission case stud	28
23	Gasket - Rear cover to transmission case	1
24	Plug - Drain back	1
25	“O”-ring	1
26	Plug - Oil level	2
27	Plug - Drain	2
28	“O”-ring	2
29	Plug - Auxiliary drain	1
30	“O”-ring	1
31	Assembly - Screen and plug	1
32	Gasket - Screen assembly	1
33	Bushing - Sensor	1
34	Washer - Bushing shim	AR
35	Plug - Speed sensor	1
36	“O”-ring	1
37	Plug - Lockup supply hole	1
38	“O”-ring	1
39	Tube - Suction	1
40	Clip - Suction tube to transmission case	1
41	Screw - Suction tube to transmission case	1
42	Lockwasher - Suction tube to transmission case	1
43	Flange - Tube	1
44	“O”-ring - Suction tube assembly	1
45	Washer - Suction tube assembly retainer	2
46	Screw - Retainer washer	2
47	Assembly - Baffle mounting plate	1
48	Baffle - Oil	1
49	Screw - Baffle to mounting plate	2
50	Washer - Baffle to mounting plate screw	2

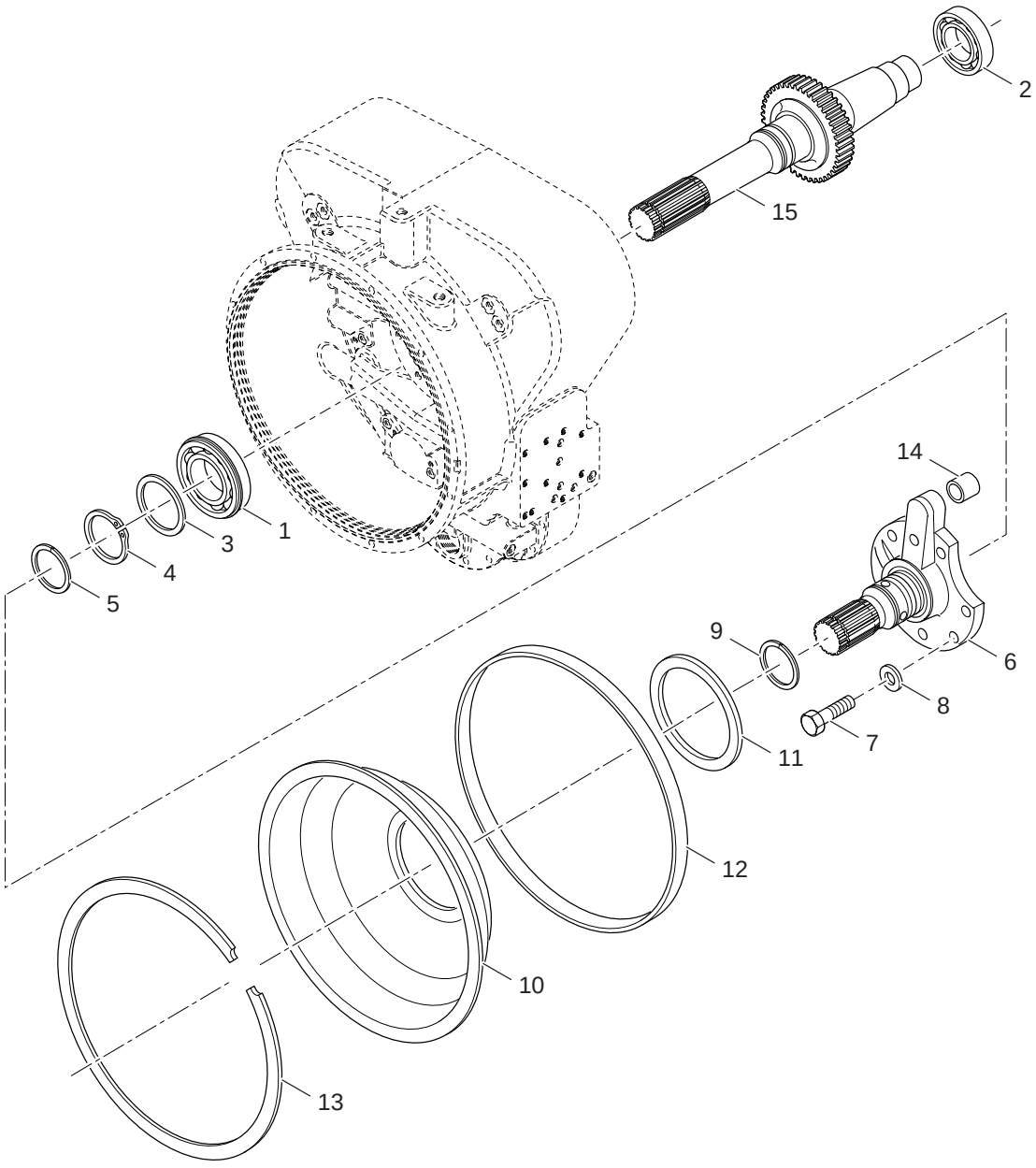
AR - As required.


1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60
61
62
V
W
X
Y
Z

GROUP -TRANSMISSION CASE AND REAR COVER

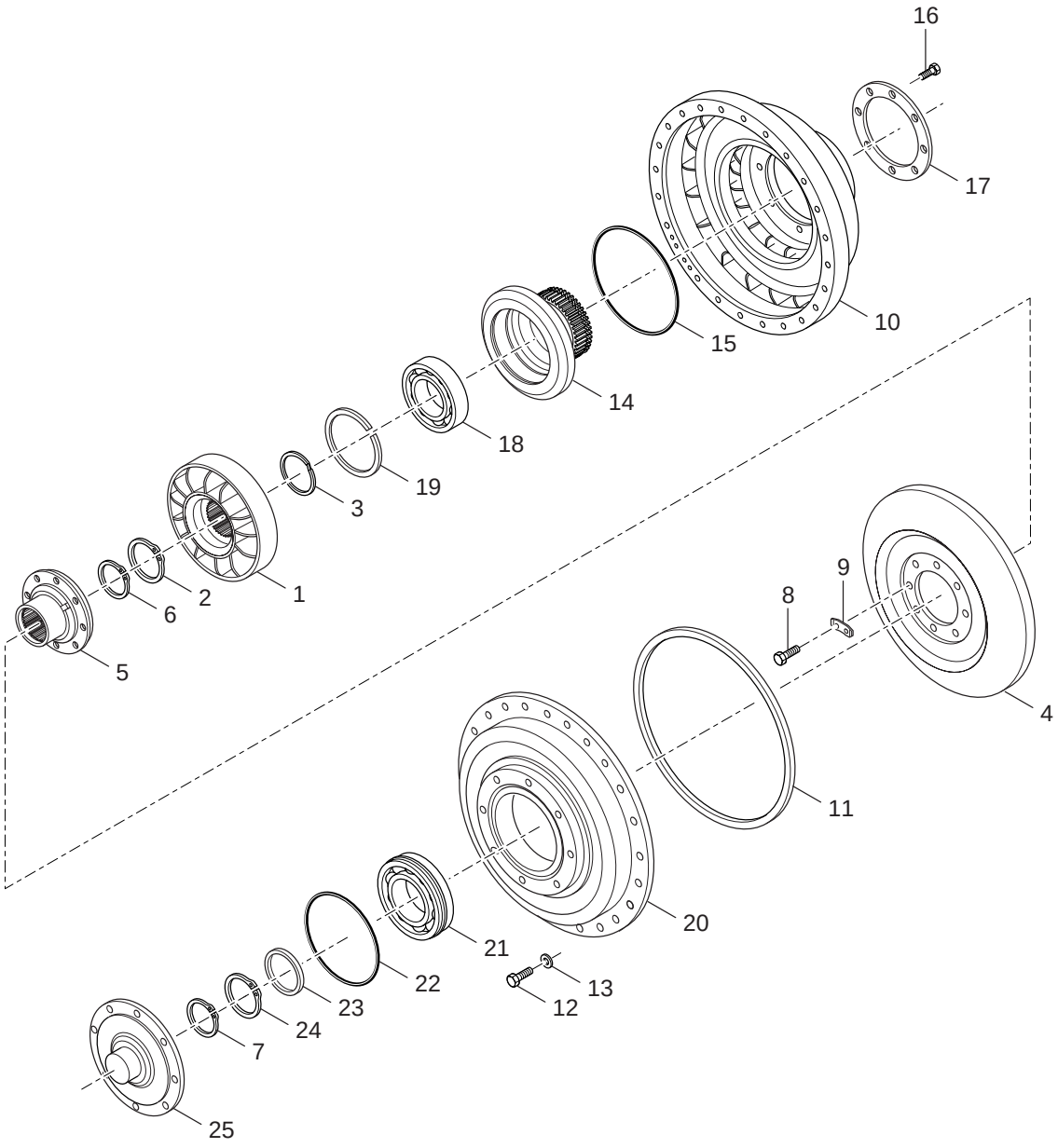
Item	Description	Quantity
51	Screw - Oil baffle to rear of transmission case	2
52	Lockwasher - Baffle to rear of transmission case	2
53	Screw - Oil baffle to transmission case	2
54	Washer - Oil baffle to transmission case	2
55	Tube - Dipstick	1
56	Clip - Dipstick tube	1
57	Lockwasher	1
58	Screw - Dipstick tube clip	1
59	Housing - Dipstick	1
60	“O”-ring - Dipstick housing	1
61	Dipstick	1
*62	Plug	1

AR - As required.
* - Not used on all models.


2
15
14
1
3
4
5
9
6
8
7
11
12
10
13

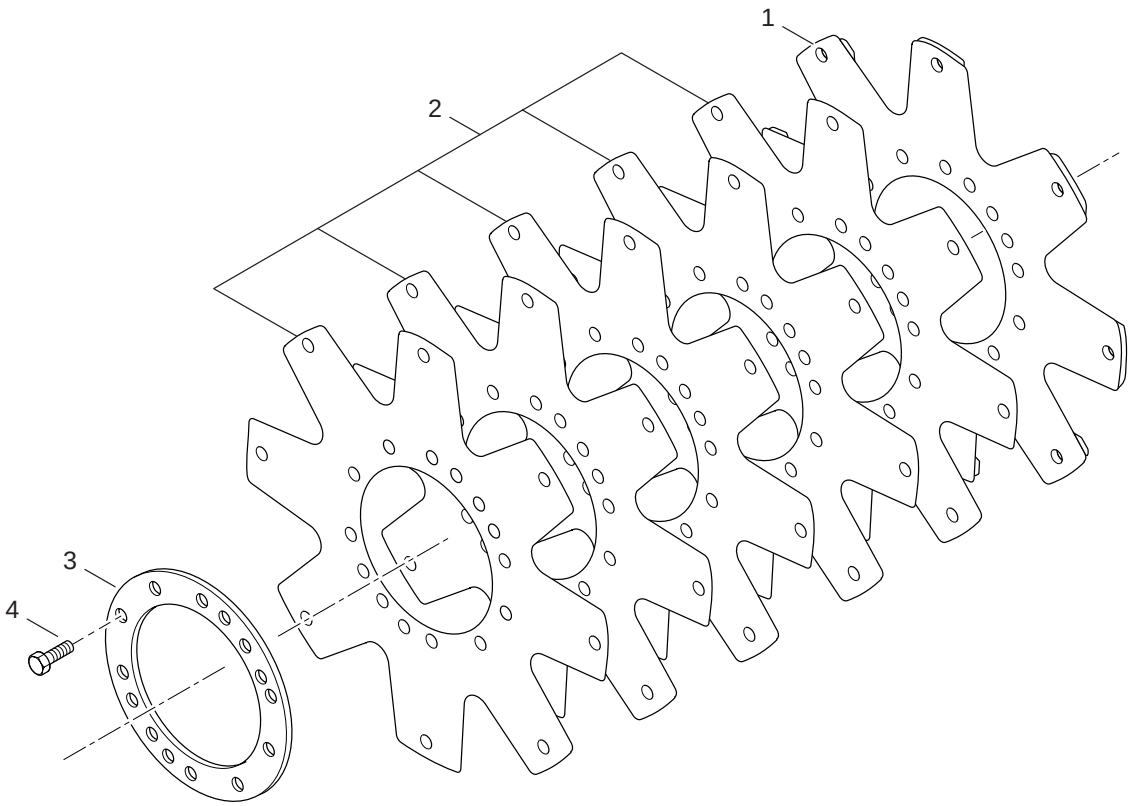
GROUP - TURBINE SHAFT, STATOR SUPPORT & OIL BAFFLE

Item	Description	Quantity
1	Bearing - Turbine shaft, front	1
2	Bearing - Turbine shaft, rear	1
3	Washer - Bearing	1
4	Snap ring - Bearing	1
5	Ring - Piston	1
6	Assembly - Stator support and sleeve	1
7	Screw - Stator support	7
8	Lockwasher - Stator support screw	7
9	Ring - Piston	1
10	Baffle - Oil	1
11	Seal - Baffle oil	1
12	Ring - Oil baffle seal	1
13	Ring - Oil baffle retainer	
14	Tube - Converter inlet	1
15	Shaft - Idler	1


16
17
10
15
14
18
19
3
1
2
6
5
8
9
4
11
20
21
22
23
24
7
25
12
13

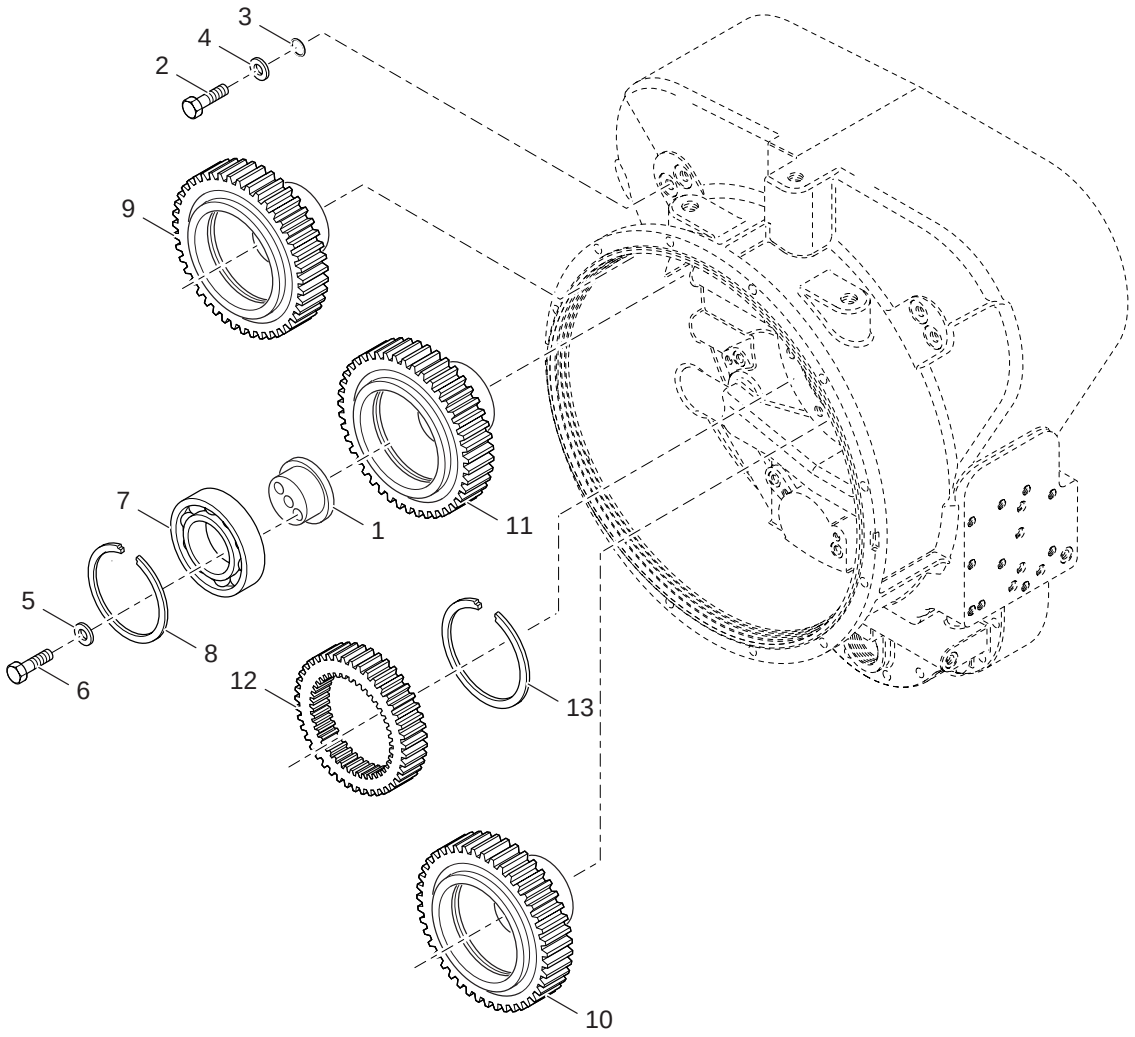
GROUP - WHEEL

Item	Description	Quantity
1	Member - Reaction	1
2	Snap ring - Reaction member hub	1
3	Spacer - Reaction member	1
4	Turbine	1
5	Hub - Turbine	1
6	Snap ring - Turbine hub	1
7	Snap ring - Turbine hub, front	1
8	Screw - Turbine hub	10
9	Locktab - Turbine hub screw	5
10	Impeller	1
11	“O”-ring - Impeller to impeller cover	1
12	Screw - Impeller to impeller cover	32
13	Lockwasher - Impeller to impeller cover screw	32
14	Hub - Impeller	1
15	“O”-ring - Impeller hub	1
16	Screw - Impeller to hub	8
17	Ring - Impeller hub screw backing	1
18	Bearing - Impeller hub	1
19	Snap ring - Bearing	1
20	Cover - Impeller	1
21	Bearing - Turbine hub	1
22	“O”-ring - Impeller cover to impeller cover hub	1
23	Spacer - Impeller cover hub bearing	1
24	Snap ring - Impeller cover hub bearing	1
25	Hub - Impeller cover	1


1
2
3
4

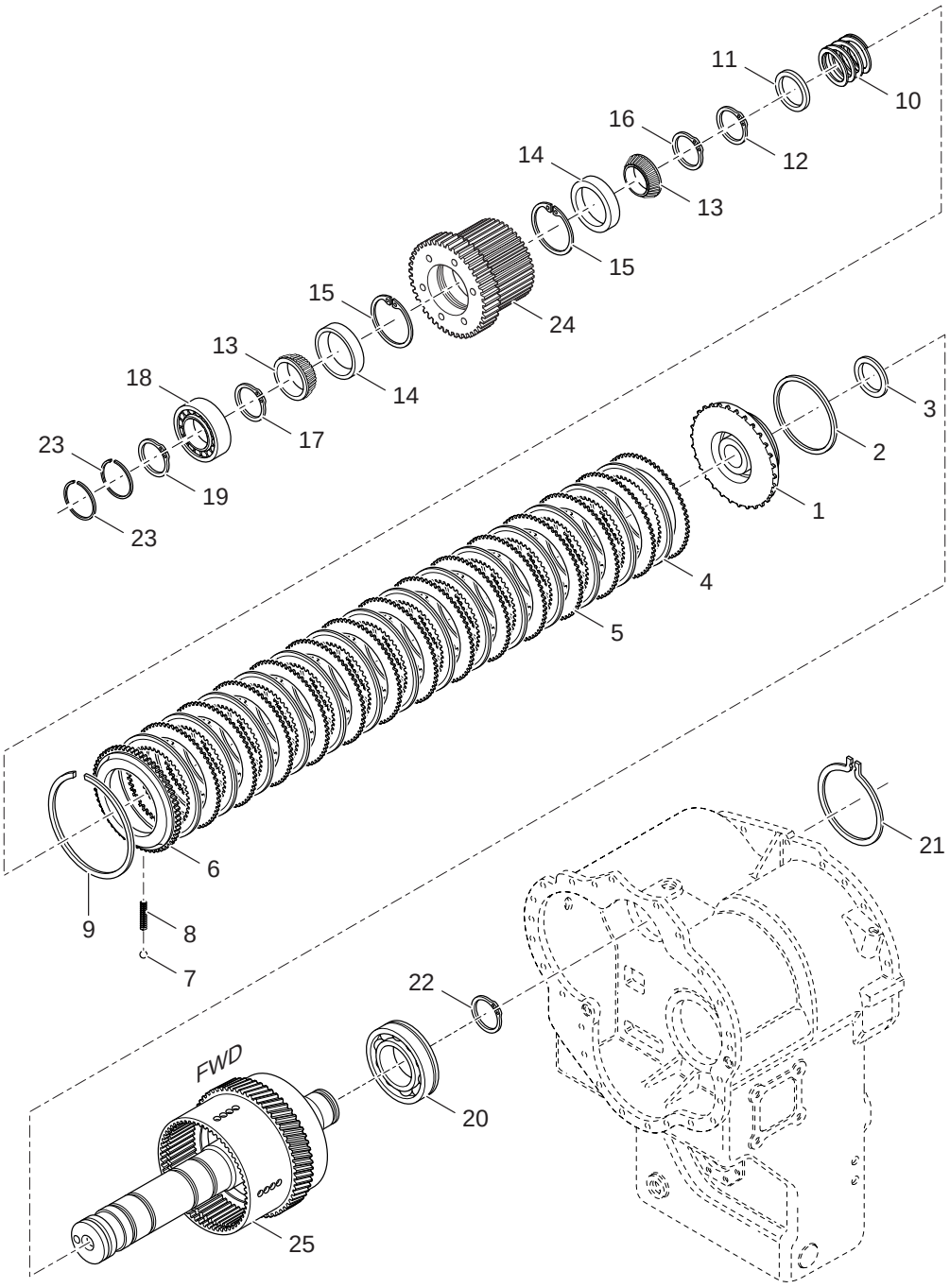
GROUP - DRIVE PLATE

Item	Description	Quantity
1	Assembly - Drive plate and (when used) weld nut	1
2	Plate - Drive	5
3	Ring - Backing	1
4	Mounting screw - Drive plate	14


3
4
2
9
11
1
7
5
8
6
12
13
10

GROUP - PUMP DRIVE

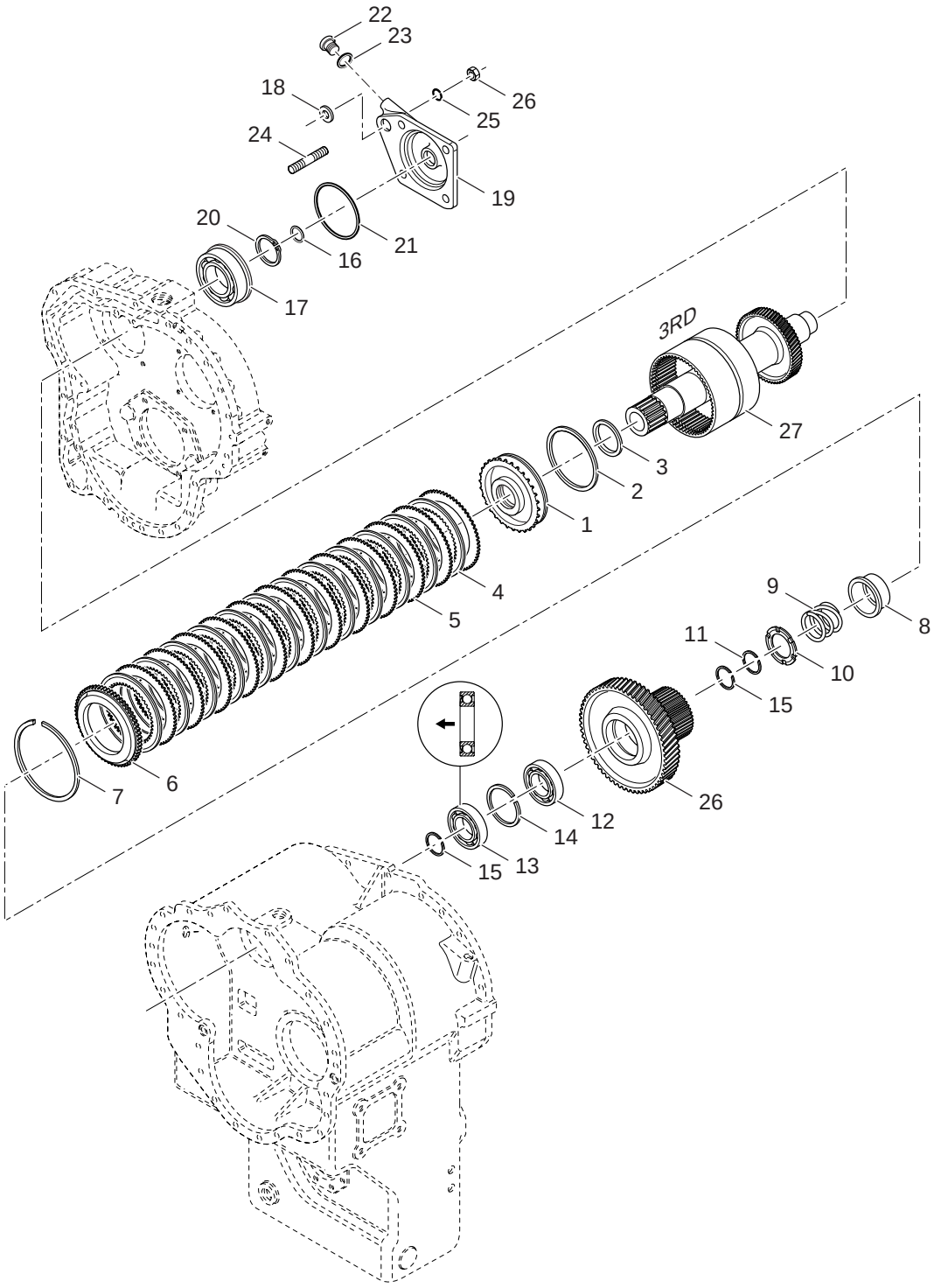
Item	Description	Quantity
1	Support - Pump drive bearing	3
2	Screws - Bearing support	4
3	“O”-ring Bearing support screw	4
4	Washer - Flat	4
5	Lockwasher - Bearing pump screw	2
6	Screw - Bearing support	2
7	Bearing - Pump drive gear	3
8	Snap ring - Pump gear	3
9	Gear - Auxiliary pump drive, RH	1
10	Gear - Auxiliary pump drive, LH	1
11	Gear - Charge pump drive	1
12	Gear - Impeller hub	1
13	Snap ring - Impeller hub gear	1


11
10
16
12
14
13
15
15
24
13
14
18
17
23
19
23
3
2
1
4
5
6
9
8
7
21
22
20
FWD
25

GROUP - FORWARD CLUTCH SHAFT

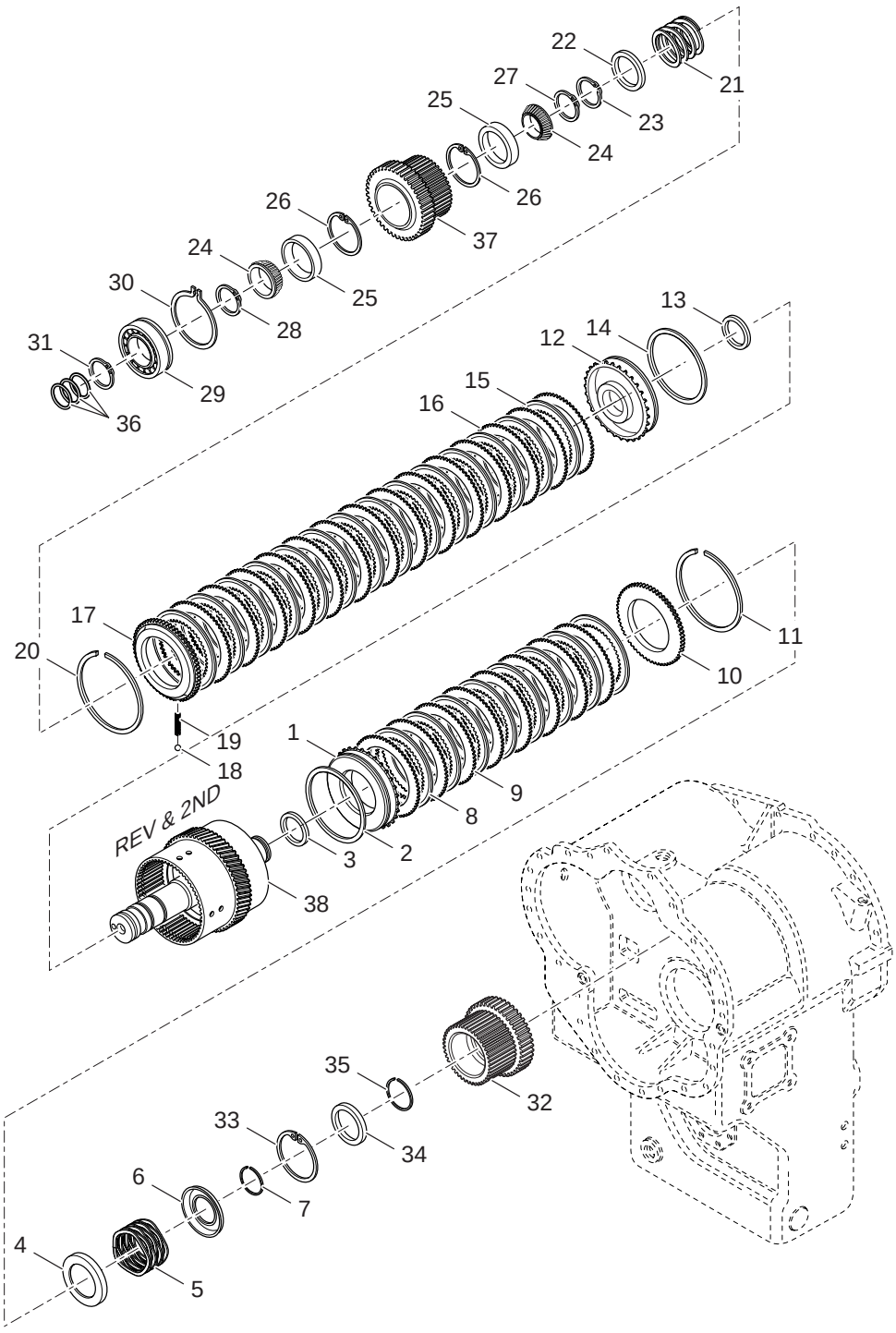
Item	Description	Quantity
1	Assembly - Clutch piston	1
2	Seal - Clutch piston, outer	1
3	Seal - Clutch piston, inner	1
4	Disc - Clutch, inner	10 (Standard) 14 (Modulation)
5	Disc - Clutch, outer	10 (Standard) 14 (Modulation)
6	Plate - Clutch disc backing	1
*7	Ball - End plate retaining	1 (Only used with modulation)
*8	Spring - End plate retaining	1 (Only used with modulation)
9	Snap ring - Backing plate	1
10	Spring - Piston return	1
11	Retainer - Spring	1
12	Snap ring - Spring retainer	1
13	Bearing - Clutch driven gear (Cone)	2
14	Bearing - Clutch driven gear (Cup)	2
15	Ring -Bearing clutch drive gear locating	2
16	Ring - bearing retaining, inner	1
17	Ring - Forward clutch gear tap bearing retainer	**
18	Bearing - Forward shaft front	1
19	Ring - Forward shaft front bearing retainer	1
20	Bearing - Forward shaft rear	1
21	Snapring - Forward shaft rear bearing	1
22	Ring - Forward shaft rear bearing retainer	1
23	Ring - Forward shaft piston	2
24	Gear - Forward clutch driven	1
25	Assembly - Forward shaft and drum	1

* - Not used on all models.
** - Variable thickness retainer rings. Select one at assembly to assure proper bearing tightness.


22
23
18
26
25
24
19
20
21
16
17
3RD
27
3
2
1
4
5
9
8
11
10
15
7
6
26
12
14
15
13

GROUP - 3RD SPEED CLUTCH SHAFT

Item	Description	Quantity
1	Assembly - Clutch piston	1
2	Seal - Clutch piston, outer	1
3	Seal - Clutch piston, inner	1
4	Disc - Clutch, inner	12
5	Disc - Clutch, outer	12
6	Plate - Clutch disc backing	1
7	Snap ring - Backing plate	1
8	Retainer - Clutch piston return spring	1
9	Spring - Clutch piston return	1
10	Retainer - Clutch piston return spring	1
11	Snapring - Spring retaining	1
12	Bearing - 3rd speed gear	1
13	Bearing - 3rd speed gear	1
14	Ring - 3rd speed bearing locating	1
15	Ring - 3rd speed bearing retaining	2
16	Ring - 3rd speed shaft piston	1
17	Bearing - 3rd speed shaft rear	1
18	“O”-ring - Rear bearing cap / transfer tube	1
19	Cap - 3rd speed shaft rear bearing	1
20	Snap ring - 3rd speed rear bearing	1
21	“O”-ring - Bearing cap	1
22	Plug - Bearing cap	1
23	“O”-ring plug	1
24	Stud - Bearing cap	4
25	Lockwasher - Bearing cap stud	4
26	Nut - Bearing cap stud	4
26	Gear 3rd speed	1
27	Assembly - 3rd speed clutch shaft and drum	1

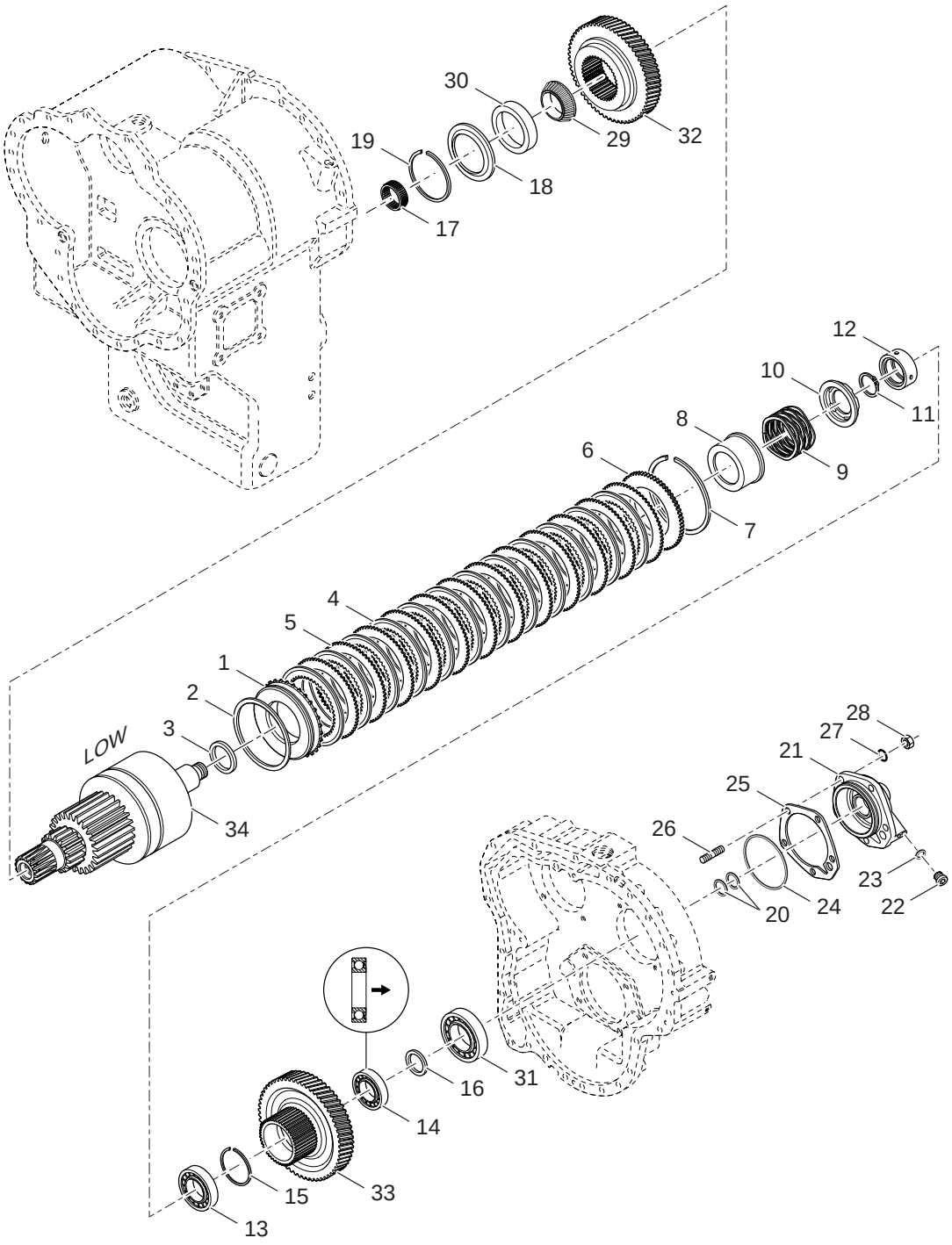

22
21
27
23
25
24
26
26
37
24
25
30
28
31
29
36
13
12
14
15
16
17
20
11
10
19
18
1
9
8
REV & 2ND
3
2
38
35
32
33
34
6
7
4
5

GROUP - REVERSE AND 2ND CLUTCH SHAFT

Item	Description	Quantity
1	Assembly - Clutch piston	1
2	Seal - Clutch piston, outer	1
3	Seal - Clutch piston, inner	1
4	Retainer - Spring	1
5	Spring - Clutch piston return	1
6	Retainer - Spring	1
7	Snap ring - Spring retainer	1
8	Disc - Clutch, inner	8
9	Disc Clutch, outer	8
10	Plate - Clutch disc backing	1
11	Snap ring - Backing plate	1
12	Assembly - Clutch piston	1
13	Seal - Clutch piston, inner	1
14	Seal - Clutch piston, outer	1
15	Disc - Clutch, inner	10 (Standard) 14 (Modulation)
16	Disc - Clutch, outer	10 (Standard) 14 (Modulation)
17	Plate - Clutch disc backing	1
*18	Ball - End plate retaining	1 (Only used with modulation)
*19	Spring - End plate retaining	1 (Only used with modulation)
20	Snap ring - Backing plate	1
21	Spring - Piston return	1
22	Retainer - Spring	1
23	Snap ring - Spring retainer	1
24	Bearing - Clutch driven (Cone)	2
25	Bearing - Clutch driven (Cup)	2
26	Ring - Clutch driven gear locating	2
27	Ring - Bearing retainer, inner	1
**28	Ring - Reverse clutch gear tap bearing retainer	**
29	Bearing - Reverse and 2nd shaft, front	1
30	Ring - Reverse and 2nd shaft front bearing retaining	1
31	Ring - Reverse and 2nd shaft front bearing retainer	1
32	Hub - 2nd clutch disc	1
33	Snap ring - 2nd clutch disc hub retainer	1
34	Retainer - 2nd clutch disc hub retaining ring	1
35	Ring - 2nd clutch disc hub retaining	1
36	Ring - Reverse and 2nd shaft piston	3
37	Gear - Reverse clutch driven	1
38	Assembly - Reverve & 2nd shaft, drum	1

* - Not used on all models.

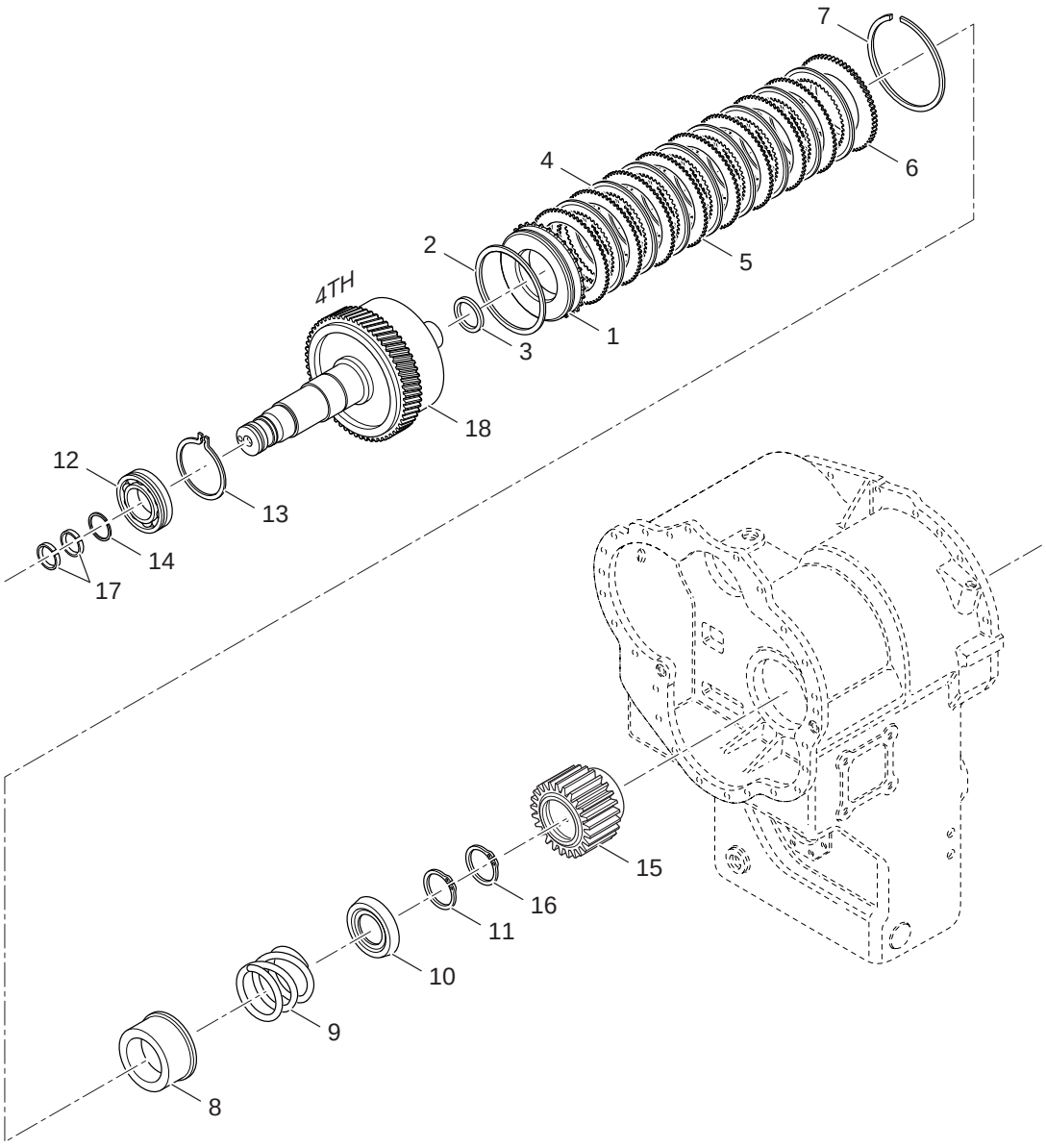
** - Variable thickness retainer rings. Select one at assembly to assure proper bearing tightness.


30
29
32
19
18
17
12
10
11
8
9
6
7
4
5
1
2
3
LOW
34
28
27
21
25
26
23
24
20
22
31
16
14
33
15
13

GROUP - LOW (1ST) SPEED CLUTCH SHAFT

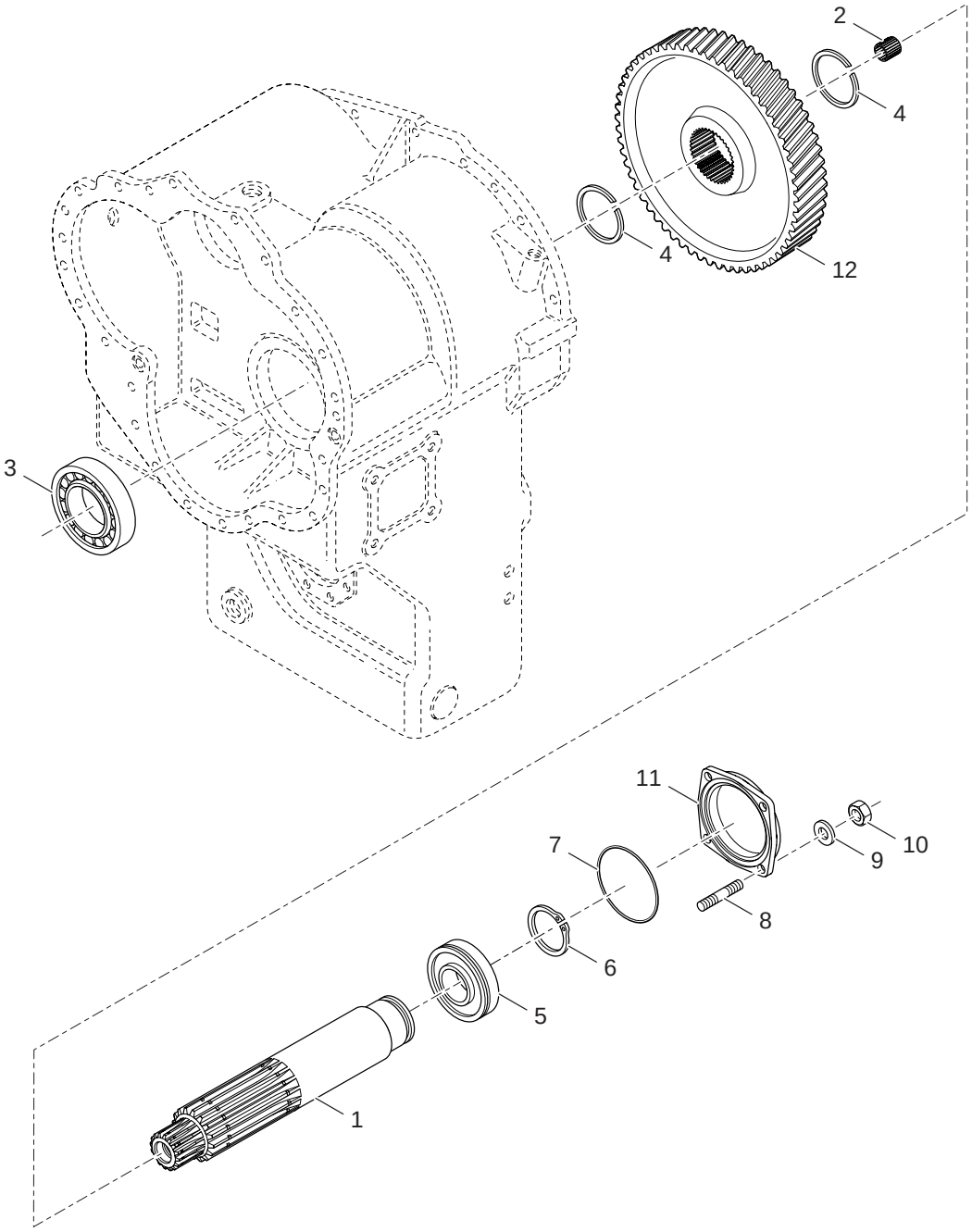
Item	Description	Quantity
1	Assembly - Clutch piston	1
2	Seal - Clutch piston, outer	1
3	Seal - Clutch piston, inner	1
4	Disc - Clutch, inner	12
5	Disc - Clutch, outer	12
6	Plate - Clutch disc backing	1
7	Snap ring - Backing plate	1
8	Retainer - Spring	1
9	Spring - Clutch piston return	1
10	Retainer - Spring	1
11	Ring - Spring retaining	1
12	Spacer - 1st speed gear	1
13	Bearing - 1st speed gear	1
14	Bearing - 1st speed gear	1
15	Ring - 1st speed gear bearing locating	1
16	Washer - 1st speed gear bearing thrust	1
17	Bearing - 1st speed clutch shaft pilot	1
18	Spacer - 1st speed clutch shaft front bearing	1
19	Ring - 1st speed clutch shaft front bearing retaining	1
20	Ring - 1st speed clutch shaft piston	2
21	Cap - 1st speed clutch shaft rear bearing	1
22	Plug - Bearing cap, lube and clutch pressure	2
23	“O”-ring - Plug	2
24	“O”-ring - Bearing cap	1
25	Shim - Bearing cap	AR
26	Stud - Bearing cap	4
27	Lockwasher - Bearing cap stud	4
28	Nut - Bearing cap stud	4
29	Cone - 1st speed clutch shaft front bearing	1
30	Cup - 1st speed clutch shaft front bearing	1
31	Assembly - 1st speed clutch shaft rear bearing	1
32	Gear - 3rd speed driven	1
33	Gear - 1st speed	1
34	Assembly - 1st speed clutch shaft and drum	1

AR - As required.


7
6
4
5
2
1
3
4TH
18
12
13
14
17
15
16
11
10
9
8

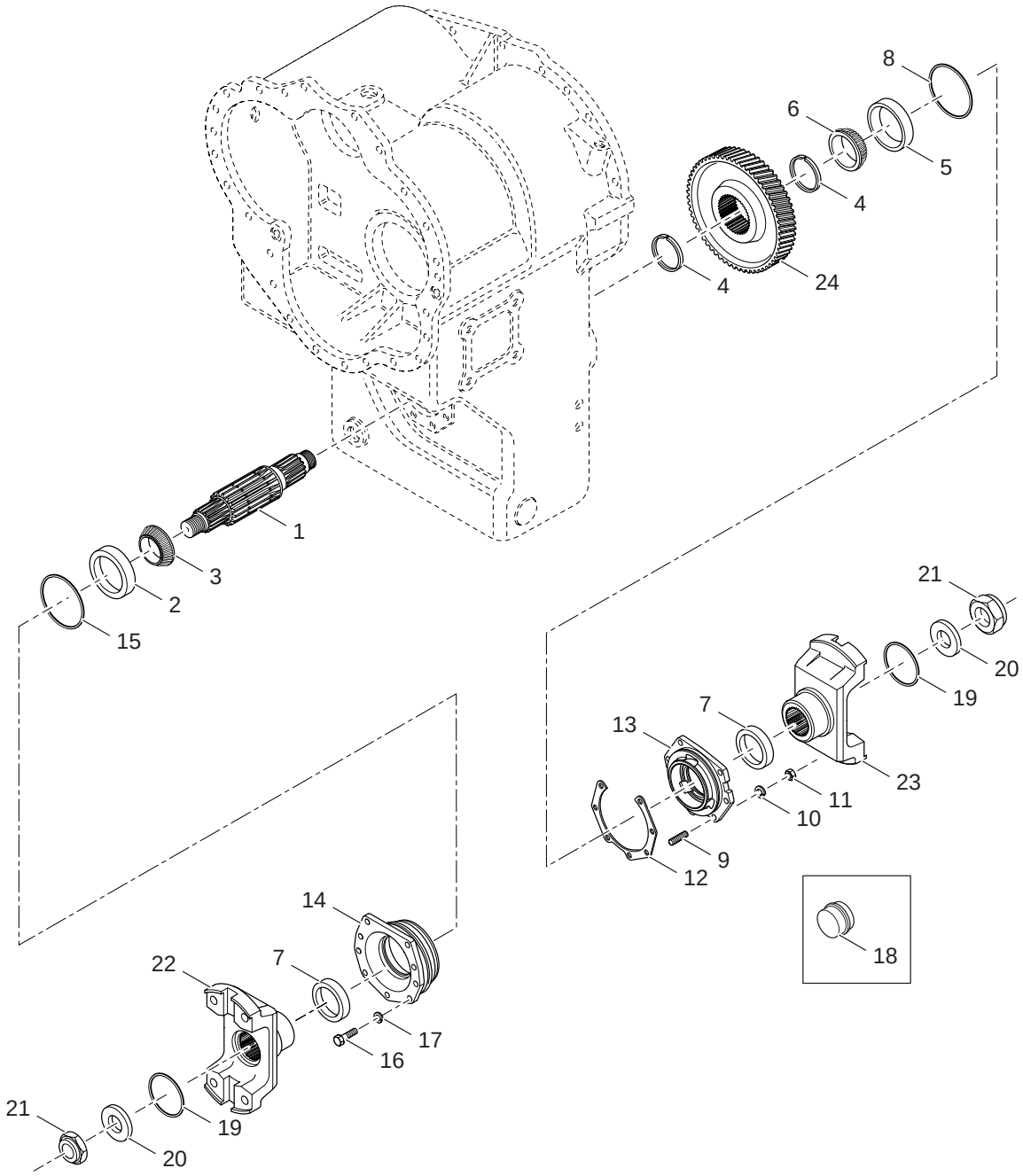
GROUP - 4TH SPEED CLUTCH SHAFT

Item	Description	Quantity
1	Assembly - Clutch piston	1
2	Seal - Clutch piston, outer	1
3	Seal - Clutch piston, inner	1
4	Disc - Clutch inner	8
5	Disc - Clutch outer	8
6	Plate - Clutch disc backing	1
7	Snap ring - Backing plate	1
8	Retainer - Spring	1
9	Spring - Piston return	1
10	Retainer - Spring	1
11	Snap ring - Spring retainer	1
12	Bearing - 4th speed shaft front	1
13	Snap ring - 4th shaft front bearing	1
14	Ring - 4th speed shaft front bearing retaining	1
15	Hub - 4th clutch disc	1
16	Ring - 4th clutch disc hub retaining	1
17	Ring - 4th speed shaft piston	2
18	Assembly - 4th clutch shaft and drum	1


2
4
4
12
3
11
7
10
9
8
6
5
1

GROUP - IDLER SHAFT

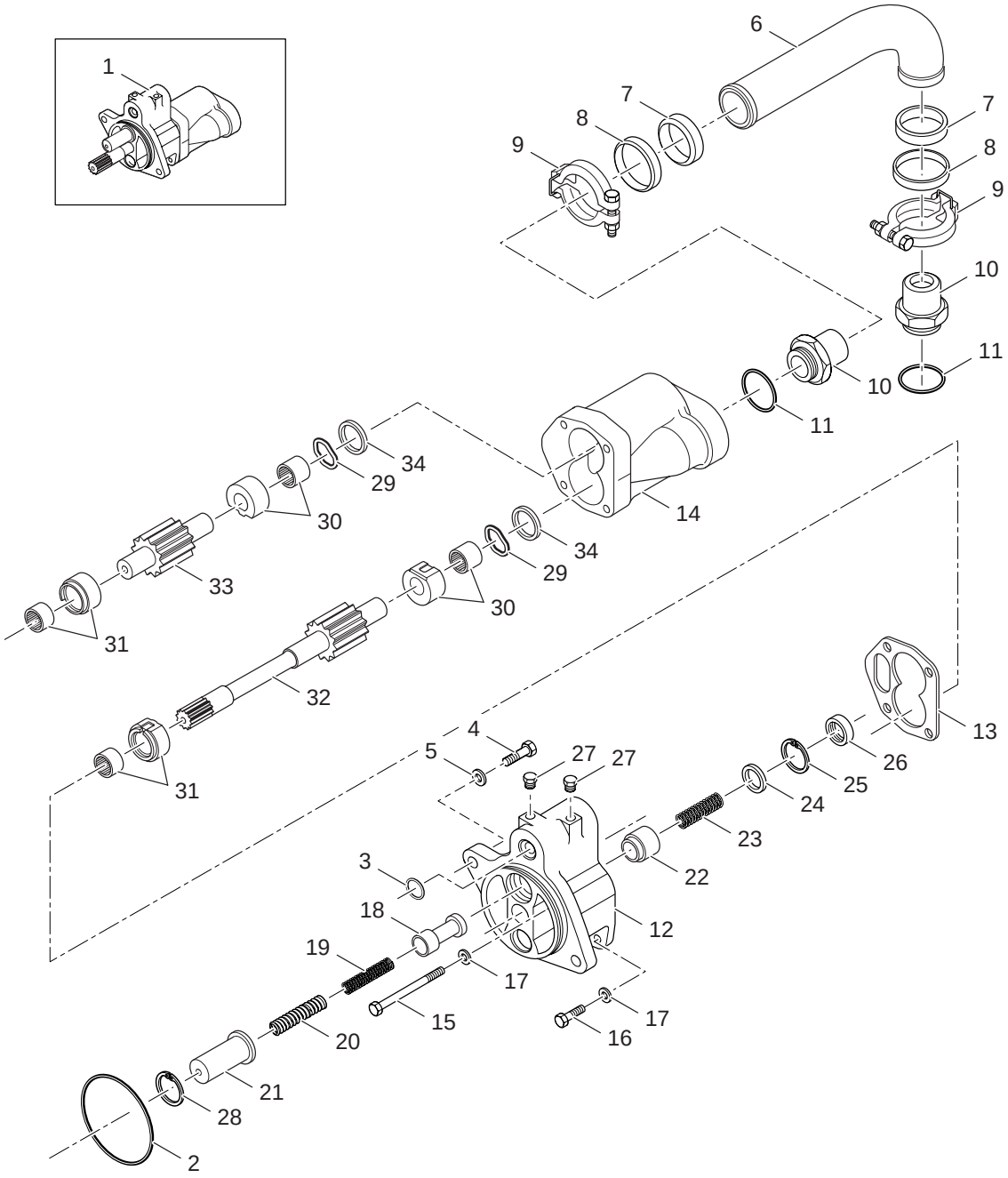
Item	Description	Quantity
1	Shaft - Idler	1
2	Bearing - Idler shaft pilot	1
3	Bearing - Idler shaft front	1
4	Ring - Idler gear retaining	2
5	Bearing - Idler shaft rear	1
6	Ring - Rear bearing retaining	1
7	“O”-ring - Rear bearing cap	1
8	Stud - Bearing cap	4
9	Lockwasher - Bearing cap stud	4
10	Nut - Bearing cap stud	4
11	Cap - Rear bearing	1
12	Gear - Idler shaft	1


8
6
5
4
4
24
1
3
2
15
21
20
19
7
13
23
11
10
9
12
18
14
22
7
17
16
21
20
19

GROUP - OUTPUT SHAFT

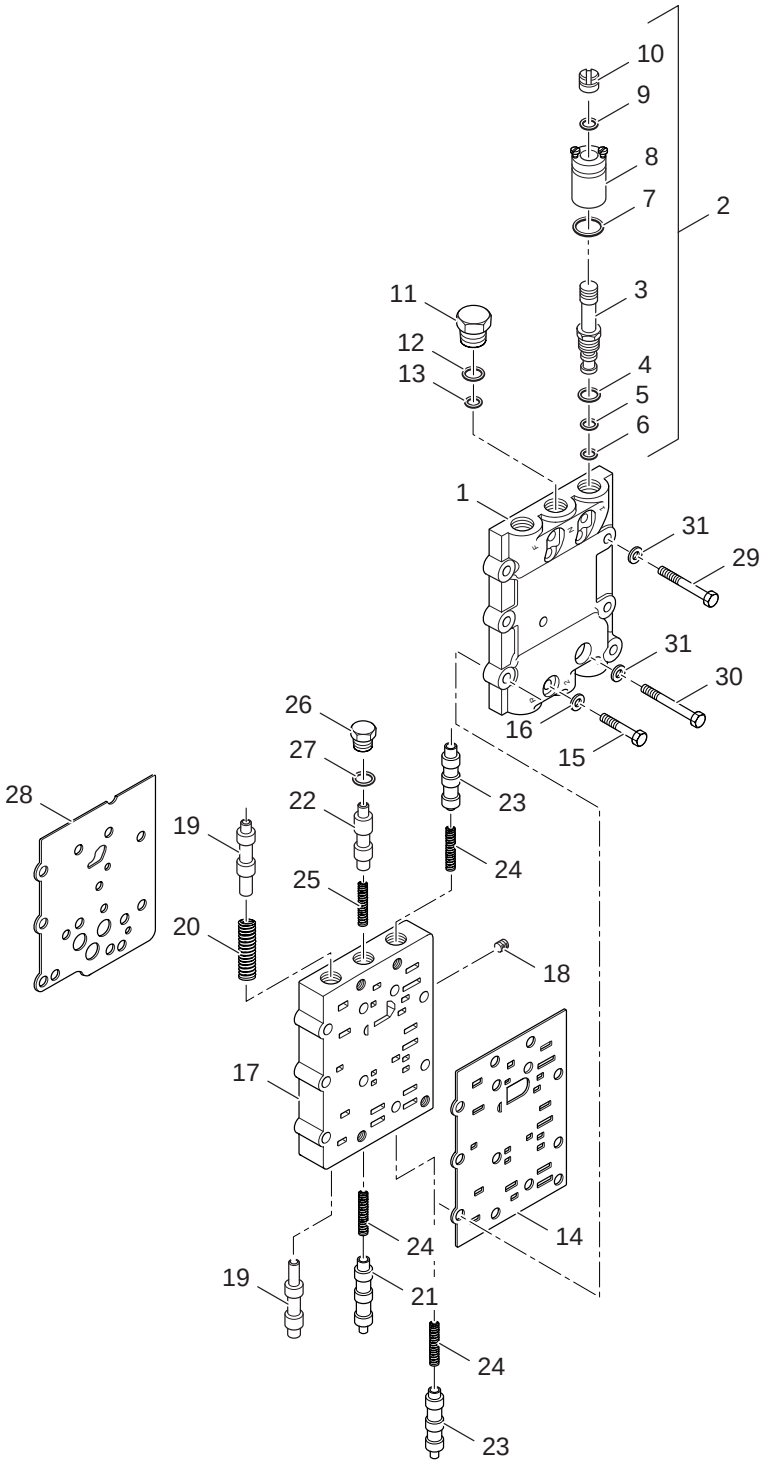
Item	Description	Quantity
1	Shaft - Output	1
2	Cup - Front bearing	1
3	Cone - Front bearing	1
4	Ring - Output gear retaining	2
5	Cup - Rear bearing	1
6	Cone - Rear bearing	1
7	Seal - Bearing cap oil	2
8	“O”-ring - Rear bearing cap	1
9	Stud - Rear bearing cap	7
10	Lockwasher - Rear bearing cap stud	7
11	Nut - Rear bearing cap stud	7
12	Shim - Rear bearing cap	AR
13	Cap - Rear bearing	1
14	Cap - Front bearing	1
15	“O”-ring - Front bearing cap	1
16	Cap screw - Front bearing cap	9
17	Lockwasher - Bearing cap screw	9
18	Plug - Bearing cap bore	1
19	“O”-ring - Output flange	2
20	Washer - Output flange	2
21	Nut - Output flange	2
22	Flange - Output front	1
23	Flange - Output rear	1
24	Gear - Output shaft	1

AR - As required.


1
6
7
8
9
7
8
9
10
11
10
11
34
29
30
14
34
29
30
33
31
32
31
13
4
5
27
27
26
25
24
23
22
3
18
12
19
17
15
16
17
20
21
28
2

GROUP - PRESSURE REGULATING VALVE & CHARGING PUMP

Item	Description	Quantity
1	Assembly - Regulator valve and charging pump	1
2	“O”-ring - Regulator valve pilot	1
3	“O”-ring - Clutch pressure supply	1
4	Screw - Valve to converter housing	2
5	Lockwasher - Valve to converter housing screw	2
6	Tube - Suction pump	1
7	Gasket	2
8	Retainer	2
9	Coupling	2
10	Fitting - Pump suction adapter	2
11	“O”-ring - Pump suction adapter	2
12	Housing - Pressure regulator valve	1
13	Gasket - Valve body to pump	1
14	Housing - Charging pump	1
15	Screw - Valve to pump	2
16	Screw - Valve to pump	2
17	Lockwasher - Valve to pump screw	4
18	Spool - Valve regulator	1
19	Spring - Valve, inner	1
20	Spring - Valve, outer	1
21	Cup - Valve spring retainer	1
22	Piston - Safety valve	1
23	Spring - Safety valve piston	1
24	Retainer - Piston spring	1
25	Snap ring	1
26	Seal - Pump drive shaft oil	1
27	Plug	2
28	Ring - Retaining	1
29	Spring - Wave	2
30	Assembly - Thrust plate and bearing	2
31	Assembly - Thrust plate and bearing	2
32	Assembly - Pump drive shaft	1
33	Assembly - Pump driven shaft	1
34	Seal - Pump shaft	2

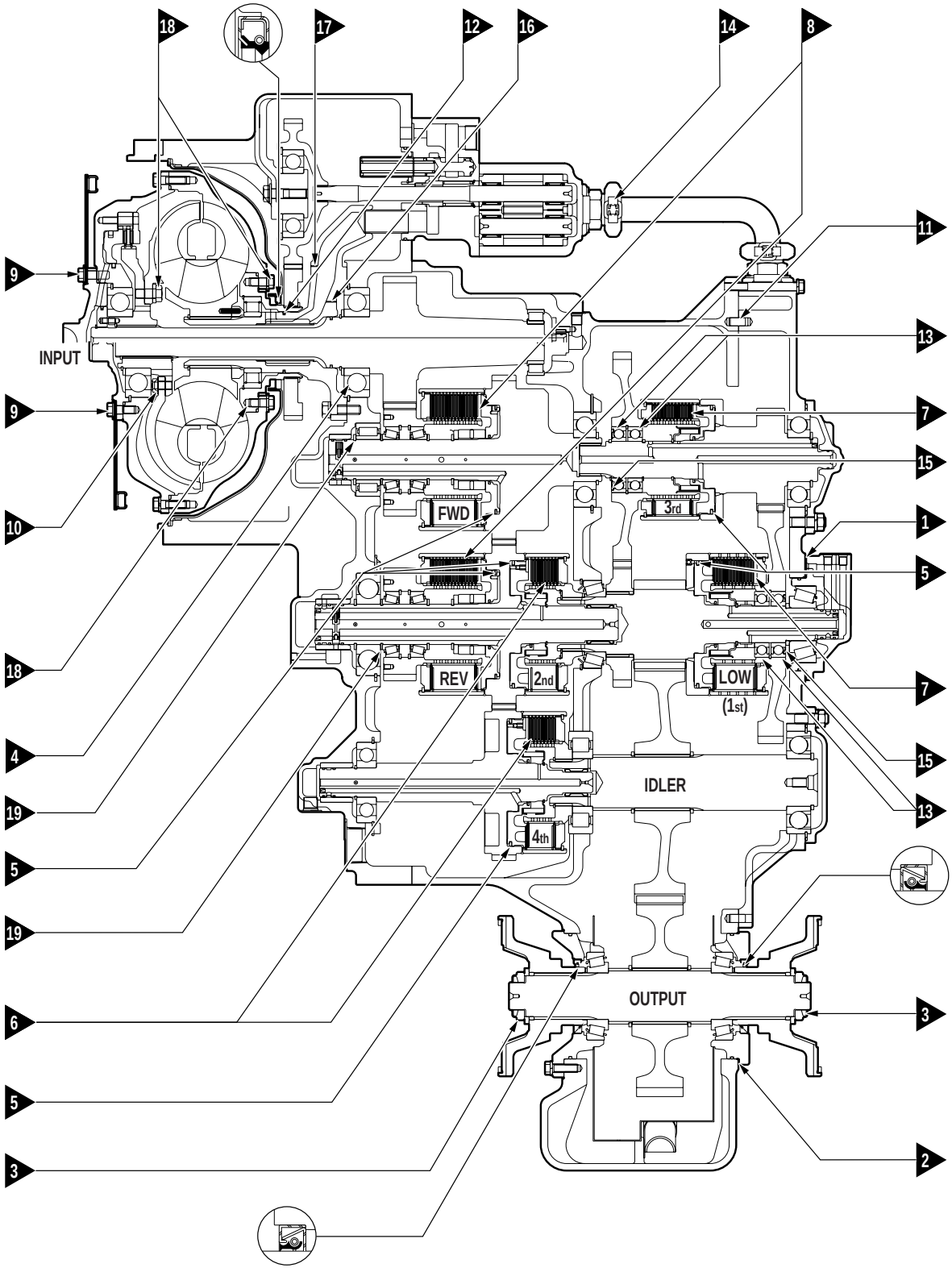

10
9
8
7
2
11
3
12
13
4
5
6
1
31
29
31
30
16
15
26
27
22
23
28
19
24
25
20
18
17
24
19
21
24
23
14

GROUP - ELECTRIC CONTROL VALVE

Item	Description	Quantity
1	Housing - Solenoid control	1
2	Assembly - Spool type solenoid cartridge	5
3	Cartridge - Spool type	5
4	“O”-ring cartridge	5
5	“O”-ring cartridge	5
6	“O”-ring cartridge	5
7	“O”-ring cartridge to coil	5
8	Coil - Solenoid	5
9	“O”-ring - Coil to nut	5
10	Nut - Solenoid	5
11	Plug - Solenoid	1
12	“O”-ring - Solenoid plug	1
13	“O”-ring - Solenoid plug	1
14	Gasket - Solenoid housing to control valve housing	1
15	Screw - Solenoid housing to control valve housing	4
16	Lockwasher - Solenoid housing to control valve housing	4
17	Housing - Control valve	1
18	Plug - Pipe	1
19	Spool - Forward and reverse	2
20	Spring - Forward and reverse spool	1
21	Spool - 2nd speed	1
22	Spool - Range	1
23	Spool - 1st and 3rd speed	2
24	Spring - Spool	3
*25	Spring - Spool	1 (Only used with total neutral)
26	Valve housing plug	6
27	“O”-ring - Valve housing plug	6
28	Gasket - Control valve housing to converter	1
29	Screw - Valve mounting	5
30	Screw - Valve mounting	4
31	Lockwasher - Valve mounting screw	9

* - Not used on all models.

9. ASSEMBLY INSTRUCTIONS



9. ASSEMBLY INSTRUCTIONS (CONTINUED)

All lead in chamfers for oil seals, piston rings and “O”-rings must be smooth and free from burrs. Inspect as assembled.

Prelube before assembly. All piston ring grooves and “O”-rings, with Multi-purpose grease Grade 2.

Apply thin coat of Loctite 638 (colour green) to outside diameter of all oil seals, bore plugs and bores they are to be installed into, before assembly. Use extreme care not to allow sealant to come into contact with seal lip material.

Apply thin coat of Loctite 270 (colour green) to all through hole stud threads which do not have pre-applied sealant.

Apply thin coat of Vibra Seal 516 (colour burnt orange) to all pipe thread fittings which do not have pre-applied sealant.

If grease is required for positioning gasket during assembly, use Multi-purpose grease Grade 2.

After assembly of parts using Loctite, there must not be any free excess material which might enter the oil circuit. Only use Loctite where specified.

General bearing installation procedure

If a thermal assembly aid is used, (expanding by heating 135 °C ±14 °C (275 F ±25 F) a check must be made after mating parts have reached the same temperature within 11 °C (20 F) of ambient, to be sure the bearings are positioned solidly against their respective shoulders.

1. Low (1st) clutch taper bearing adjustment (See 9.1).

2. Shim output shaft bearings to produce 0.67 - 0.90 Nm (4 - 10 ln. lbs.) preload rolling torque.

3. See “3.3.2 Elastic stop nut torque”.

4. Special turbine shaft bearing 314 MG loading notches must be on same side as retaining ring.

5. Cast iron piston rings in outer piston ring location and Viton Rings at inner piston ring location. All speed versions, all clutches.

6. 8 outer steel plates, 8 inner friction plates, alternately assemble, starting with outer steel plate.

7. 12 outer steel plates, 12 inner friction plates, alternately assemble, starting with outer steel plate.

8. Modulated Forward and Reverse clutches. 14 outer steel plates, 14 inner friction plates, alternately assembled starting with outer steel plate.

   Non-modulated Forward and Reverse clutches use 10 outer steel plates and 10 inner friction plates, which are alternately assembled, starting with outer steel plate.

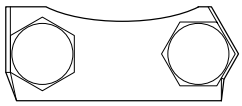
9. Place bolts to be used at these locations.

   Requires special torque:

PLACE BOLT	TORQUE LB. FT.	TORQUE N.m.
0.4375	52 - 57	71 - 77
0.3750	33 - 36	45 - 49

9. ASSEMBLY INSTRUCTIONS (CONTINUED)

10 Bend lock tabs at assembly, after tightening cap screws to proper torque. Tabs must be set against screw head flats or around corners as shown below.



11 All dowel pins must be installed in transmission case before assembly of mating parts.

12 When installing clutch support piston ring, centre the piston rings in the ring groove.

13 Must be loose internal fit bearings with a number “3” etched on the bearing.

14 Oil pump sleeve and coupling assembly. Torque clamp bolt 10 - 12 N.m. (7.5 - 9 ft. lbs.).

15 Bearing shield must face OUT on low and 3rd clutch.

16 Lube hole in converter support [1.17 - 1.24 mm (0.046 - 0.049 inch) diameter] must be checked prior to assembly. Must be free of dirt and burrs.

17 Lube hole in converter support [1.95 - 2.05 (0.077 - 0.081) diameter] must be checked prior to assembly. Must be free of dirt and burrs.

9. ASSEMBLY INSTRUCTIONS (CONTINUED)

18 Impeller hub and turbine hub assembly with backing ring and special self-locking screws.

1. Clean hub mounting surface and tapped holes with solvent. Dry thoroughly, being certain tapped holes are clean and dry.
2. Install backing ring and special self-locking screws. Tighten the screws to 122 - 134 N.m. (90 - 99 ft. lbs.) for turbine and 79 - 87 N.m. (58 - 64 ft. lbs.) for impeller.

Note

ASSEMBLY OF HUB MUST BE COMPLETED WITHIN A FIFTEEN MINUTE PERIOD FROM START OF SCREW INSTALLATION. THE SPECIAL SCREW IS TO BE USED FOR ONE INSTALLATION ONLY. IF THE SCREW IS REMOVED FOR ANY REASON, IT MUST BE REPLACED. THE EPOXY LEFT IN THE HUB HOLES MUST BE REMOVED WITH THE PROPER TAP AND CLEANED WITH SOLVENT. DRY HOLE THOROUGHLY AND USE A NEW SCREW FOR REINSTALLATION.

19 Select the thickest of the clutch gear retaining rings that can be installed into the retaining ring groove to assure proper bearing tightness.

20 Tighten oil screen assembly 13 - 20 N.m. (10 - 15 ft. lbs.).

9.1 LOW (1ST) CLUTCH TAPER BEARING ADJUSTMENT 1

9.1.1 General bearing installation procedure

If a thermal assembly aid is used, (expanding by heating up to 135 °C ± 14 °C [275 F ± 25 F]) a check MUST be made after mating parts have reached the same temperature within 11 °C [20 F] of ambient, to be sure bearings are positioned solidly against their respective shoulders before bearing adjustment can be made. This check must be made when installing the front and rear bearings on the low (1st) clutch shaft and before clutch assembly is installed in the transmission housing.

9.1.2 Taper bearing adjustment

Build up transmission as explained in assembly section of the service manual through converter housing installation on transmission housing. Place transmission assembly in a horizontal position with low (1st) clutch vertical (low clutch rear taper bearing up). If the clutch shaft rear bearing cap was temporarily installed remove bearing cap. This bearing adjustment must be made with the bearing cap “O”-ring, clutch pressure sleeve, lube sleeve and clutch shaft rear oil sealing ring removed. Measure thickness of bearing cap “D” with a micrometer at location “A” and “B”. Add the two dimensions together and divide by two, to get an average thickness and record.

Example

“A”	22,123 (0.871)	
“B”	+ 22,174 (0.873)	
	44,298 (1.744)	
	÷ 2	
“D”	22.149 (0.872)	Average thickness [Example only].

Lubricate taper bearing and bearing cap bore. Be sure bearing cap “Slip fits” in bearing bore. Install bearing cap on rear cover using all four (4) cap studs. Install all four (4) stud nuts.

Rotate the output shaft flange to seat taper bearings and rap transmission rear cover adjacent to taper bearing while tightening stud nuts in a crisscross sequence 20,3 - 27,0 N.m. (15 to 20 ft. lbs.) torque. Use a mechanical advantage (a socket and extension on the output flange nut) to rotate flange if needed.

9.1.2 Taper bearing adjustment (Continued)

After seating the bearings, remove two (2) nuts 180° apart. (Remove the two (2) nuts that are not next to the raised machine surface). Loosen the remaining two (2) nuts "G" until they are finger tight.

Using a micrometer depth gauge "C" set firmly against raised machined surface "A" and "B" and using a calibrated metric or equivalent inch lbs. torque wrench, tighten the two remaining nuts in 1.13 N.m. (10 inch lbs.) increments, from 1.13 N.m. (10 inch lbs.) through 11.3 N.m. (100 inch lbs.). Rotate the output shaft flange while tightening the nuts. Measure "A" and "B" at each 1.13 N.m. (10 inch lbs.) increment. The difference between dimension "A" and "B" must not exceed 0.1270 mm (0.005 inch). If variation greater than 0.1270 mm (0.005 inch) occurs start seating procedure over, beginning at bearing installation procedure. Plot on the bearing record chart the average measurement of "A" and "B" at each 1.13 N.m. (10 inch lbs.) increments.

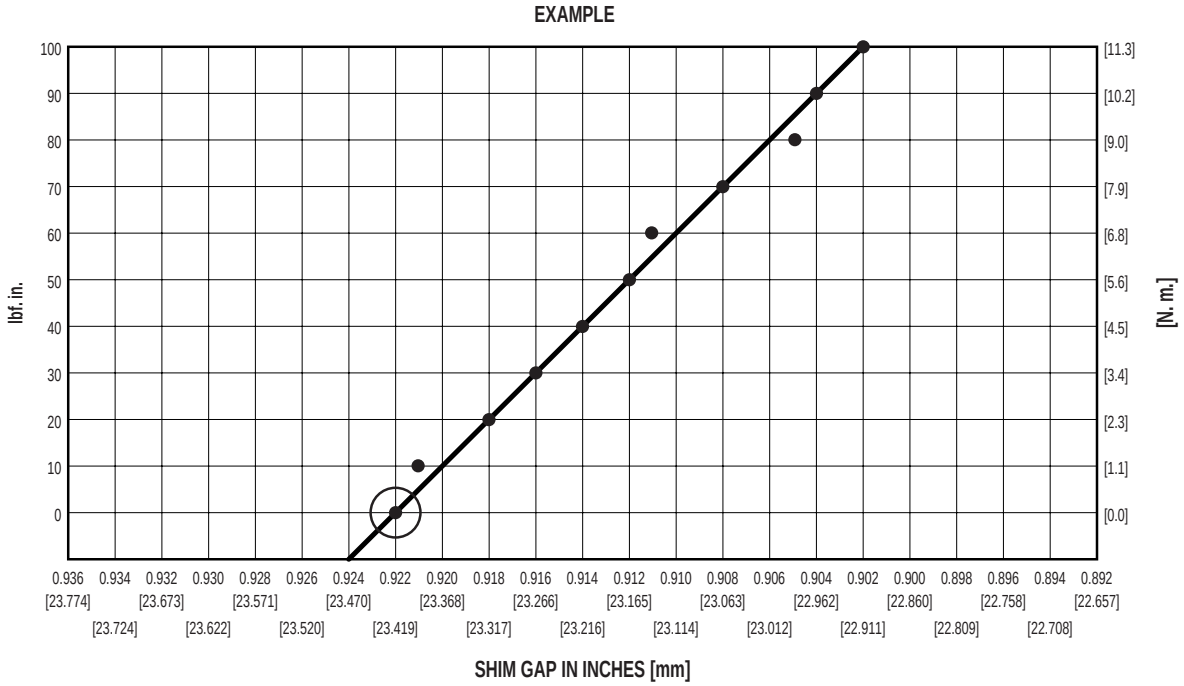
Draw a "Best fit" straight line through the data points plotted on the record chart. The gap value where the line crosses "Zero" torque minus the average of previously recorded "A" and "B" is the no endplay, no preload shim gap. To this gap add 0.1524 ±0.0254 mm (0.006 ±0.001 inch) to equal final shim gap.

Establish the shim pack, using a micrometer, measure each shim to obtain the total shim pack compliment. Measure the total shim pack to check if it equals exactly the total sum of each shim. If the pack compliment does not equal the total sum then repeat the shim pack selection process from the beginning.

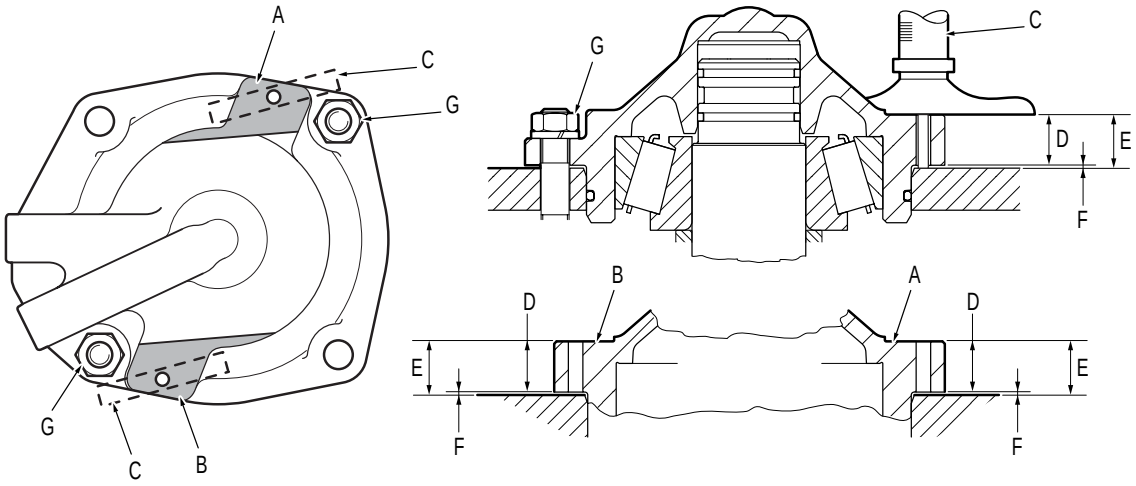
After proper low (1st) speed clutch taper bearing adjustment is made, remove bearing cap, and install a new clutch shaft oil sealing ring, new "O"-rings on clutch pressure sleeve, lube sleeve and bearing cap. Install pressure and lube sleeve.

Install bearing cap with proper shim pack.

Install stud nut lockwashers and stud nuts and tighten to 55.6 - 61.0 N.m. (41 - 45 lbs. ft.).
Rotate output shaft to seat bearings and recheck stud nut torque.



9.1.2 Taper bearing adjustment (Continued)

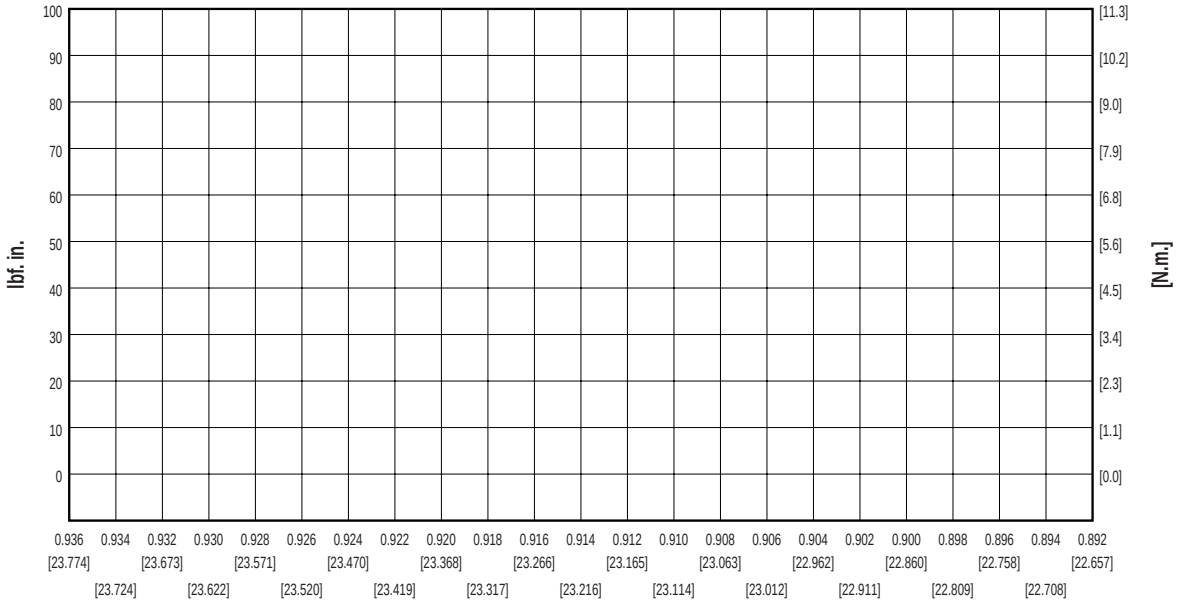


SHIM GAP (Example shown)			
		SHIM GAP DIMENSION "E" taken at "A" & "B" location divided by two (2) for average dimension	
N.m.	**Inch - Pounds**	**mm**	**Inch**
1.1	10	23.393	0.921
2.3	20	23.317	0.918
3.4	30	23.266	0.916
4.5	40	23.216	0.914
5.6	50	23.165	0.912
6.8	60	23.139	0.911
7.9	70	23.063	0.908
9.10	80	22.987	0.905
10.2	90	22.962	0.904
11.3	100	22.911	0.902

The “Best fit” straight line through the data points, where the line crosses zero, is 23.419 (0.922). Subtract average “A” and “B” dimension 22.149 (0.872) “D”. This is 1.270 (0.050) “F” shim gap. No preload, no endplay. To this “F” 0.050 shim gap, add 0.0254 (0.006 ±0.001 inch). Final shim pack 1.40 - 1.44 (0.055 - 0.057). This is an example only. See page 9-7 for plotting charts.

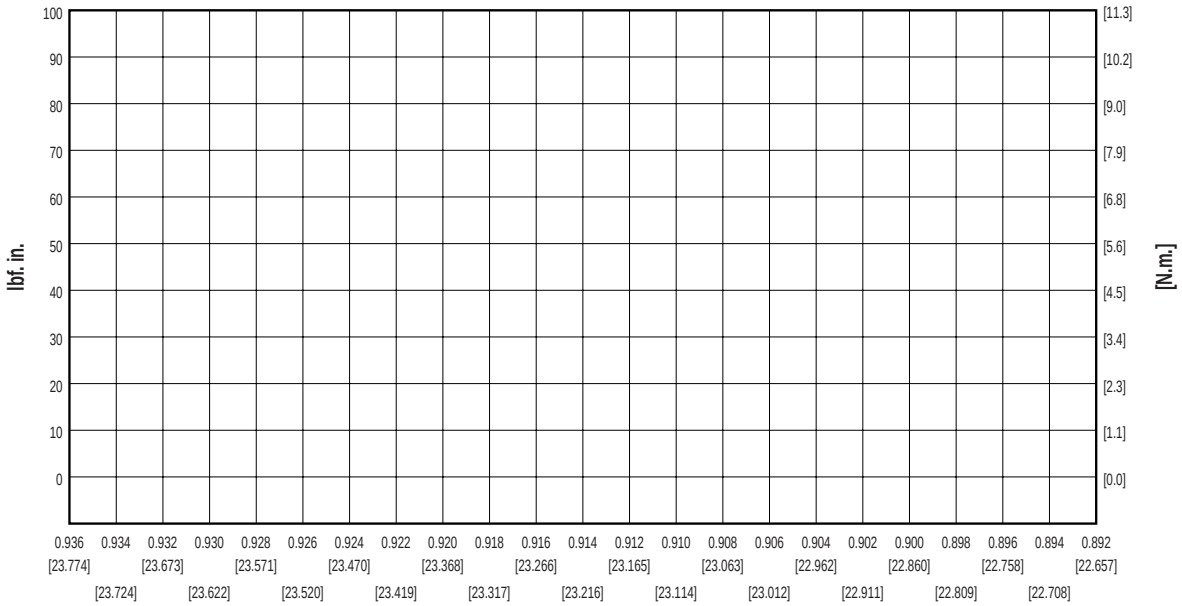
9.2 LOW 1ST CLUTCH TAPER BEARING ADJUSTMENT PLOTTING CHARTS

THIS CHART IS FOR PLOTTING USE



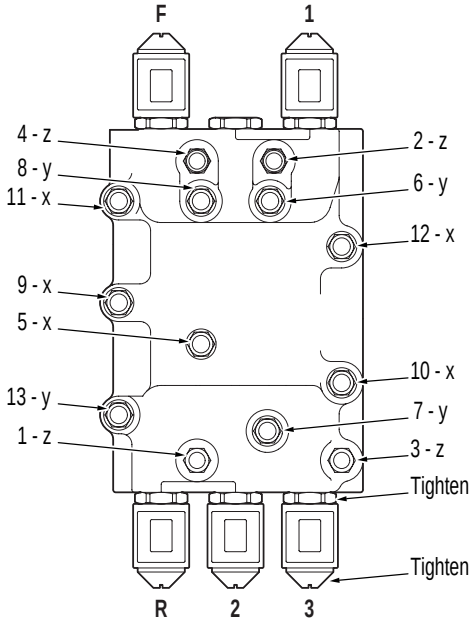
SHIM GAP IN INCHES [mm]

THIS CHART IS FOR PLOTTING USE



SHIM GAP IN INCHES [mm]

9.3 CONTROL VALVE BOLT TIGHTENING SEQUENCE DIAGRAM



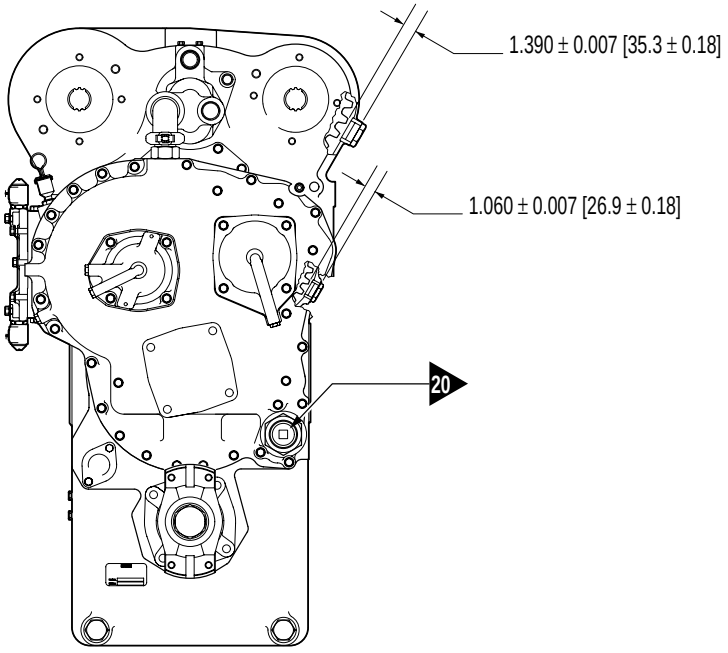
NON MODULATION		MODULATION	
z	1 3/4"	z	1 3/4"
x	2 3/4"	x	4 3/4"
y	3"	y	5"

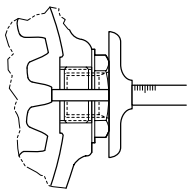
Tighten control value mounting screw to 31 - 33.8 N.m. (23 - 25 lbf. ft.)

Tighten cartridge to 22 - 27 N.m. (16 - 20 lbf. ft.)

Tighten cartridge nuts to 5 - 7 N.m. (4 - 5 lbf. ft.)

9.4 SPEED SENSOR BUSHING INSTALLATION





SHIM TYPE BUSHING
Assemble Speed Sensor Bushing with shims. Clean thread on bushing and housing with Loctite cleaner. Use Loctite No. 270 or No. 262 on both bushing and housing. Tighten bushing to 45 - 50 lbf. ft. [61 - 68 N.m.] torque.

10. DISASSEMBLY AND REASSEMBLY OF THE T40000 TRANSMISSION

Figure 1
Side view.

Figure 2
Remove flexplate mounting screws.

Figure 3
Remove flexplates.

Figure 4
Remove impeller cover bearing cap and “O”-ring.

Figure 5
Remove turbine shaft outer retainer ring.

Figure 6
Remove impeller to impeller cover mounting screws.

Figure 7
Using pry slots provided, pry impeller cover and turbine from turbine shaft.

Figure 10
Remove reaction member retainer ring.

Figure 8
Remove impeller cover and turbine as an assembly. Remove impeller cover “O”-ring.

Figure 11
Remove reaction member and spacer.

Figure 9
Remove turbine locating ring from turbine shaft.

Figure 12
Remove oil baffle retainer ring.

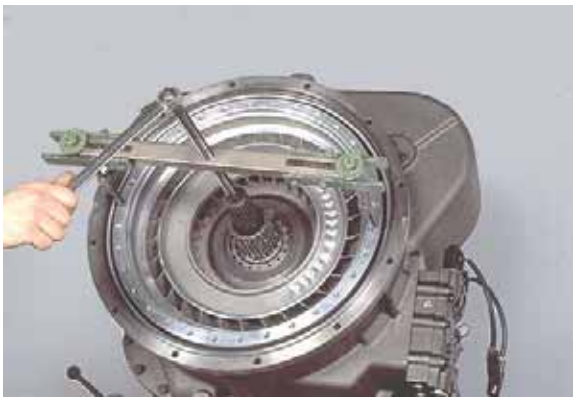


Figure 13

An impeller removal tool, like the one shown, can be fabricated to facilitate the removal of impeller and oil baffle.

Figure 16

Remove charging pump and pressure regulating valve assembly.

Figure 14

Remove pump suction tube and suction tube coupling.

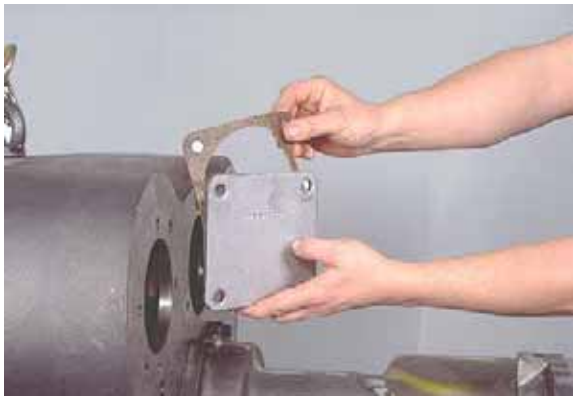


Figure 17

If used, remove pump hole covers.

Figure 15

Remove pump suction adaptor fittings and “O”-rings.

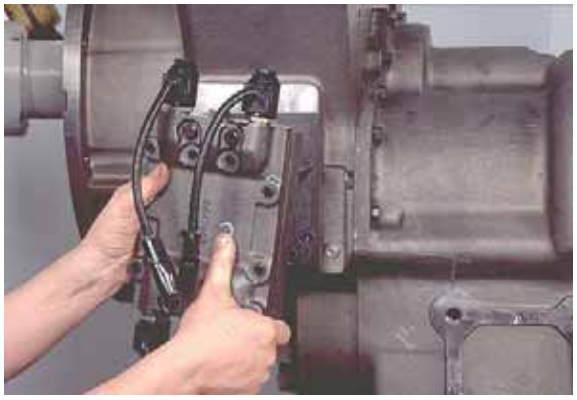


Figure 18

Remove control valve mounting screws, remove control valve and gasket.

Figure 19
Remove stator support bolts.

Figure 22
Remove pump drive gears.

Figure 20
Turn support to clear drive gear.
Remove stator support.

Figure 23
Support converter housing with a chain hoist and strap. Remove converter housing to transmission housing screws and lockwashers.

Figure 21
Remove pump drive gear bearing support bolts.

Figure 24
Separate converter housing from transmission assembly.
Note: reverse and 2nd, and forward high and 4th clutch will remain in the converter housing.

Figure 25
Remove converter housing to transmission housing gasket and “O”-rings.

Figure 28
Remove idler shaft bearing cap stud nuts and lockwashers.

Figure 26
Remove 3rd shaft bearing cap stud nuts and lockwashers.

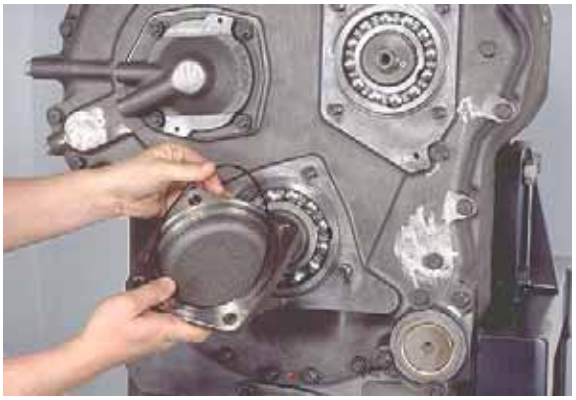


Figure 29
Remove idler shaft bearing cap and “O”-ring.

Figure 27
Remove 3rd shaft bearing cap and “O”-rings.

Figure 30
Remove low (1st) clutch shaft bearing cap stud nuts and lockwashers.

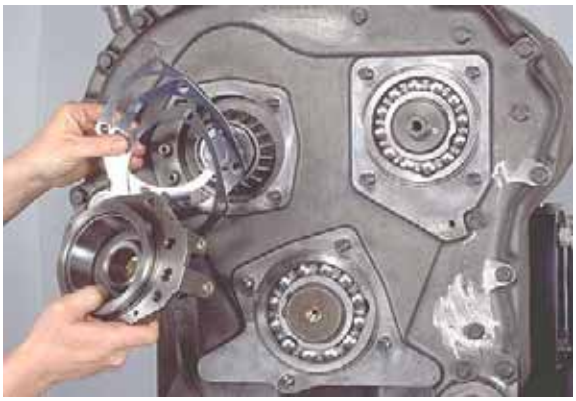


Figure 31
Remove low (1st) clutch shaft bearing cap and shims.

Figure 34
Remove idler shaft rear bearing locating ring.

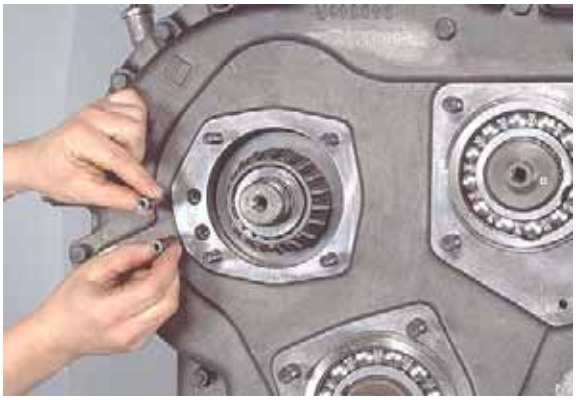


Figure 32
Remove low (1st) speed clutch pressure and lube sleeve.

Figure 35
Remove output flange nut, washer and “O”-ring . Remove output flange.

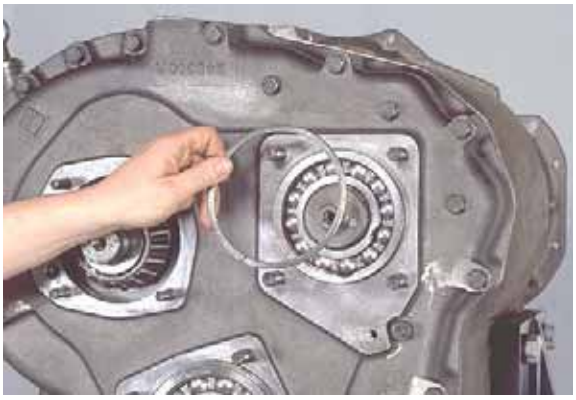


Figure 33
Remove 3rd shaft rear bearing locating ring.

Figure 36
Remove rear cover bolts, nuts and lockwashers.

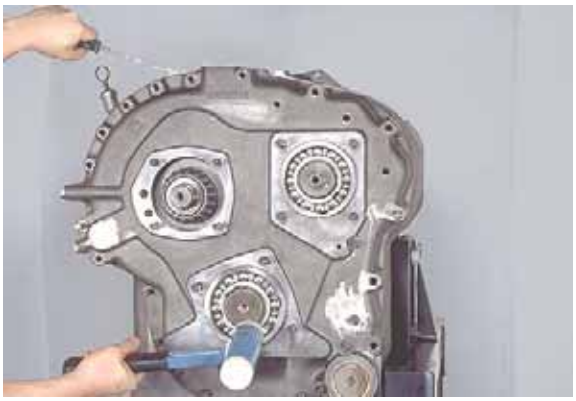


Figure 37

Using pry slots provided, pry cover from transmission housing, tapping on idler shaft and 3rd clutch shaft to allow cover to be removed without shaft binding.

Figure 38

Rear cover and gasket removed.

Figure 39

Remove 4th clutch hub retaining ring.

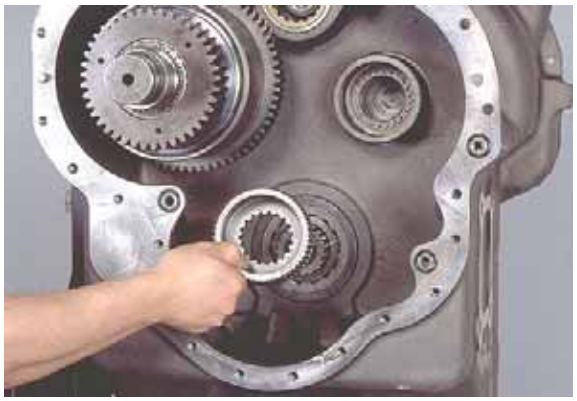


Figure 40

Remove 4th clutch hub.

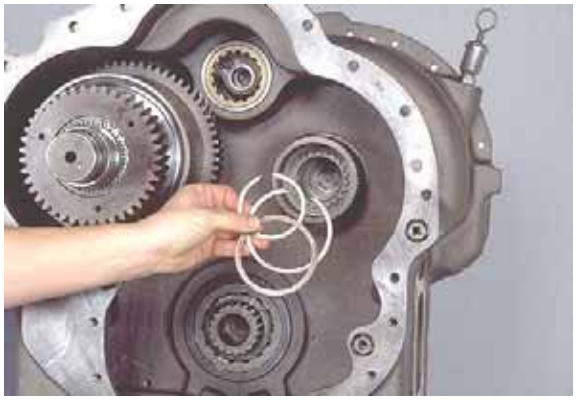


Figure 41

Remove 2nd clutch hub retaining ring, retaining ring retainer and retainer snap ring.

Figure 42

Remove 2nd clutch hub.

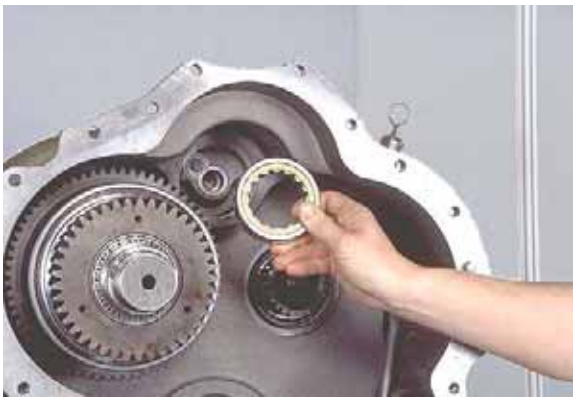


Figure 43
Remove turbine shaft rear bearing outer race.

Figure 46
Remove low (1st) clutch and idler shaft together from housing.

Figure 44
Remove idler shaft rear bearing retaining ring.

Figure 47
Remove idler shaft front bearing.

Figure 45
Remove idler shaft rear bearing.

Figure 48
Remove 3rd speed clutch assembly.

Figure 49
Spread forward shaft rear bearing retainer ring and tap clutch assembly from housing.

Figure 52
Output shaft front bearing cap and “O”-ring removed.

Figure 50
Remove forward clutch assembly.

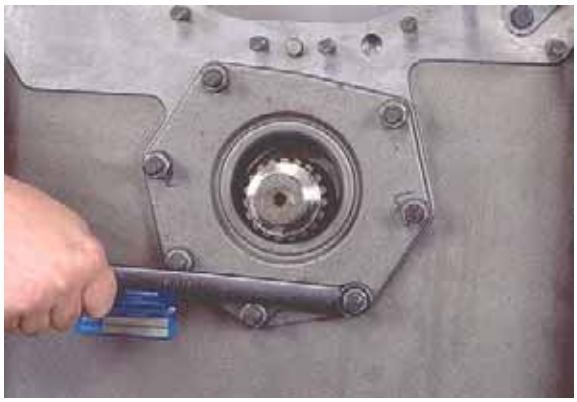


Figure 53
Remove output shaft rear bearing cap stud nuts and lockwashers.

Figure 51
Remove output shaft front bearing cap screws and lockwashers.

Figure 54
Output shaft rear bearing cap, “O”-ring and shims removed.

Figure 55
Remove output shaft rear bearing cone.

Figure 58
From the rear side. Remove output shaft gear.

Figure 56
Remove output shaft gear retaining ring.

Figure 59
Remove oil baffle mounting screws and lockwashers.

Figure 57
From the front side. Remove output shaft and bearing cone as an assembly.

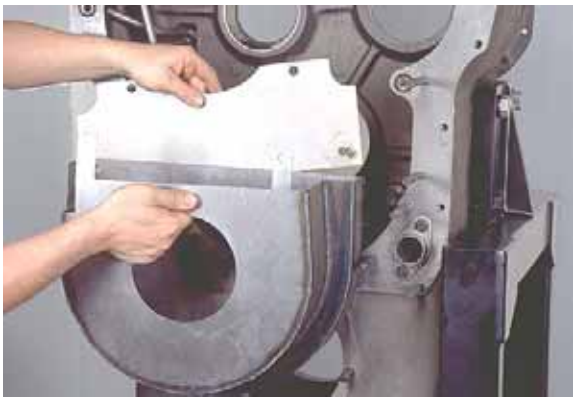


Figure 60
Oil baffle removed.

Figure 61
Dipstick and dipstick housing removed.

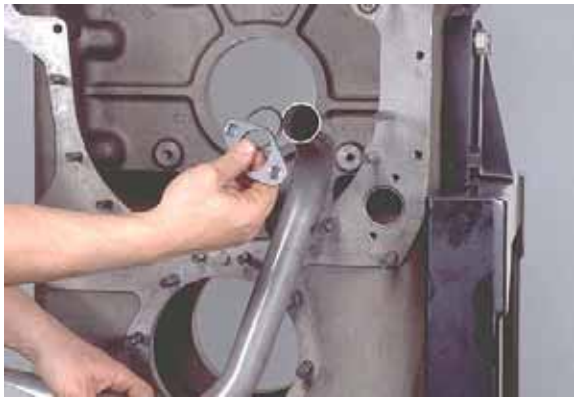


Figure 64
Suction tube, “O”-ring and retainer removed.

Figure 62
Dipstick tube, clip and screw removed.

Figure 65
Remove low clutch shaft front bearing cup baffle plate and retaining.

Figure 63
Remove suction tube mounting screw (3).

Figure 66

Spread 4th clutch front bearing retainer ring and pry clutch assembly from converter housing.

Figure 69

Remove turbine shaft outer bearing retainer ring.

Figure 67

Spread reverse clutch front bearing retainer ring and pry reverse and 2nd clutch assembly from converter housing.

Figure 68

Remove forward shaft front bearing outer race.

Figure 70

Tap turbine shaft and bearing from converter housing.

Figure 71
Remove clutch shaft oil sealing rings (piston rings).

Figure 74
Remove clutch gear outer bearing retaining ring.

Figure 72
Remove front bearing retaining ring.

Figure 75
Remove clutch gear and outer bearing cone.

Figure 73
Remove front bearing.

Figure 76
Remove clutch gear inner bearing cone.

Figure 77
Remove clutch gear inner bearing cone retaining ring.

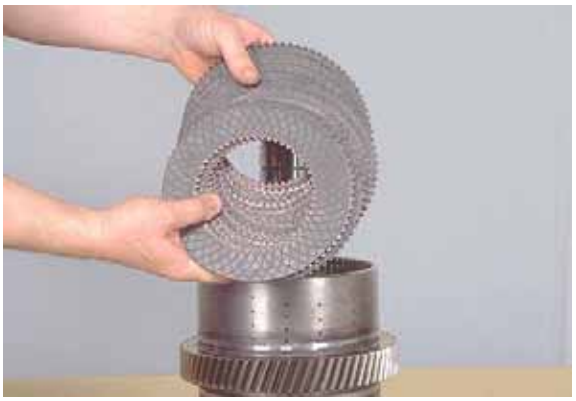


Figure 80
Remove inner and outer clutch discs.

Figure 78
Remove end plate retainer ring.

Figure 81
Compress piston return spring. Remove spring retaining ring.

Figure 79
Remove end plate.

Figure 82
Remove spring retainer.

Figure 83
Remove piston return spring.

Figure 84
Remove clutch piston.

Figure 85
Remove end plate retaining ring.

Figure 88
Compress piston return spring.
Remove return spring retainer ring.

Figure 86
Remove end plate.

Figure 89
Remove spring retainer.

Figure 87
Remove inner and outer clutch discs.

Figure 90
Remove piston return spring.

Figure 91
Remove spring retainer.

Figure 92
Remove clutch piston.

Figure 93

Make sure clutch piston bleed valve is clean and free of foreign material. Install inner seal ring.
Install piston outer piston ring.
Lock piston ring joint securely.
Grease ring to stabilize in ring groove.

Figure 96

Install clutch piston return spring.

Figure 94

Position piston in clutch drum, use caution as not to damage the inner and outer piston seal rings.

Figure 97

Install spring retainer.

Figure 95

Install spring retainer.

Figure 98

Compress return spring.
Install retainer ring in groove.

Figure 99

Install one steel disc. Install one friction disc. Alternate steel and friction discs until the proper amount of discs are installed. First disc next to the piston is steel, last disc installed is a friction disc.

Figure 100

Install clutch disc end plate.

Figure 101

Install end plate retainer ring.

Figure 102

Make sure clutch piston bleed valve is clean and free of foreign material. Install inner seal ring.
Install piston outer piston ring.
Lock piston ring joint securely.
Grease ring to stabilize in ring groove.

Figure 103

Position piston in clutch drum, use caution as not to damage the inner and outer piston seal rings.

Figure 104

Install clutch piston return ring.

Figure 105

Install spring retainer.

Figure 106

Compress return spring.
Install retainer ring in groove.

Figure 107

Install one steel disc. Install one friction disc. Alternate steel and friction discs until the proper amount of discs are installed. First disc next to the piston is steel, last disc installed is a friction disc.

Figure 108
Install clutch disc end plate.

Figure 111
Install clutch gear inner bearing cone witch small diameter of taper up.

Figure 109
Install end plate retainer ring.

Figure 112
Make sure clutch gear bearing cups and locating rings are installed. Install clutch gear and hub into clutch drum. Align splines on clutch hub with internal teeth of friction discs. Tap gear into position. Do not force this operation. Gear splines must be aligned with internal teeth of all friction discs.

Figure 110
Install clutch gear inner bearing cone retaining ring.

Figure 113
Install clutch gear outer bearing cone with small diameter of taper down.

Figure 114
Install clutch gear outer bearing retaining ring.

Figure 117
Install clutch shaft oil sealing rings (piston rings).

Figure 115
Warm bearing to 110 °C (230 F).
Install clutch shaft front bearing
Note: bearing outer retainer ring groove must be down.

Figure 116
Install front bearing retainer ring.

Figure 118
Remove clutch shaft oil sealing rings (piston rings).

Figure 121
Remove clutch gear outer bearing retaining ring.

Figure 119
Remove front bearing retaining ring.

Figure 122
Remove clutch gear and outer bearing cone.

Figure 120
Remove front bearing inner race.

Figure 123
Remove clutch gear inner bearing cone.

Figure 124
Remove clutch gear inner bearing cone retaining ring.

Figure 127
Remove inner and outer clutch discs.

Figure 125
Remove end plate retaining ring.

Figure 128
Compress piston return spring. Remove spring retaining ring.

Figure 126
Remove end plate.

Figure 129
Remove spring retainer.

Figure 130
Remove piston return spring.

Figure 133
Remove clutch shaft rear bearing.

Figure 131
Remove clutch piston.

Figure 132
Remove clutch shaft rear bearing retaining ring.

Figure 134

Warm bearing to 110 °C (230 F).
Install clutch shaft rear bearing.
Note: bearing outer retainer ring groove must be up.

Figure 135

Install rear bearing retaining ring.

Figure 136

Make sure clutch piston bleed valve is clean and free of foreign material. Install piston inner seal ring. Install piston outer piston ring.
Lock piston ring joint securely.
Grease ring to stabilize in ring groove.

Figure 137

Position piston in clutch drum, use caution as not to damage the inner and outer piston seal rings.

Figure 138

Install clutch piston return spring.

Figure 139

Install spring retainer.

Figure 140

Compress return spring.
Install retainer ring in groove.

Figure 143

Install end plate retainer ring.

Figure 141

Install one steel disc. Install one friction disc. Alternate steel and friction discs until the proper amount of discs are installed. First disc next to the piston is steel, last disc installed is a friction disc.

Figure 144

Install clutch gear inner bearing cone retaining ring.

Figure 142

Install clutch disc end plate.

Figure 145

Install clutch gear inner bearing cone with small diameter of taper up.

Figure 146

Being sure clutch gear bearing cups and locating rings are installed. Install clutch gear and hub into clutch drum. Align splines on clutch hub with internal teeth of friction discs. Tap gear into position. Do not force this operation. Gear splines mut be in full position with internal teeth of all friction discs.

Figure 149

Install clutch shaft front bearing inner race.

Figure 147

Install clutch gear outer bearing cone with small diameter of taper down.

Figure 150

Install clutch shaft front bearing outer race.

Figure 148

Install clutch gear outer bearing retaining ring.

Figure 151

Install front bearing retaining ring.

Figure 152
Install clutch shaft oil sealing rings (piston rings).

Figure 153
Remove clutch shaft oil sealing rings (piston rings).

Figure 156
Remove gear thrust washer.

Figure 154
Pry rear taper bearing up, far enough to use a bearing puller.

Figure 157
Remove low clutch gear and outer bearing.

Figure 155
Remove rear bearing.

Figure 158
Remove end plate retaining ring.

Figure 159
Remove clutch disc end plate.

Figure 160
Remove inner and outer clutch discs.

Figure 161
Remove clutch gear inner bearing.

Figure 162
Remove low gear spacer.

Figure 163
Compress piston return spring.
Remove spring retaining ring.

Figure 164
Remove spring retainer.

Figure 165
Remove piston return spring.

Figure 168
Using a gear puller, remove gear and taper bearing from clutch shaft.

Figure 166
Remove spring retainer.

Figure 167
Remove clutch piston.

Figure 169

Position clutch shaft gear on clutch shaft with long hub of gear up.

Figure 170

Position rear taper bearing on shaft with small diameter of taper up. Press bearing into position. **Note:** If thermal assembly aid is used, (expanding by heating 275 +/-25 F. [135 °C+/- [14 °C]) a check must be made after mating parts have reached the same temperature within 20 F [11 °C] of ambient, to be sure the bearings are positioned solidly against their respective shoulders before bearing adjustment can be made.

Figure 171

Make sure clutch drum bleed valve is clean and free of foreign material. Install inner seal ring.
Install piston outer piston ring. Lock piston joint securely. Grease ring to stabilize in ring groove.
Position piston in clutch drum, use caution as not to damage the inner and outer piston seal rings.

Figure 172

Install spring retainer.

Figure 173

Install piston return spring.

Figure 174

Install spring retainer.

Figure 175

Compress piston return spring and install retainer ring.

Figure 178

Install one steel disc. Install one friction disc. Alternate steel and friction discs until the proper amount of discs are installed. First disc next to the piston is steel. Last disc installed is friction.

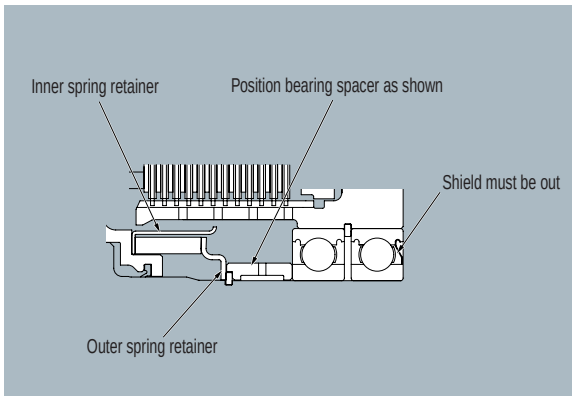


Figure 176

Figure 179

Install clutch disc end plate.

Figure 177

Install bearing spacer, being sure spacer is in full position over spring retainer ring. See figure 176.

Figure 180

Install clutch disc end plate retainer ring.

Figure 181

Install clutch gear inner bearing.
Note: this bearing does not have a shield unit. See figure 176.

Figure 184

Install clutch gear bearing washer.

Figure 182

Being sure clutch gear bearing locating ring is installed. Install clutch driven gear into clutch drum. Align splines one clutch hub with internal teeth of friction discs. Tap gear into position. Do not force this operation. Gear splines must be in full position with internal teeth of all friction discs.

Figure 185

Install rear taper bearing on clutch shaft with small diameter of taper up (See note in figure 170).

Figure 183

Install clutch gear outer bearing.
Note: this bearing has a shield in it, this shield must be up. See figure 176.

Figure 186

Install clutch shaft sealing rings (piston rings).

Figure 187
Remove clutch shaft rear oil sealing ring (piston ring).

Figure 190
Turn clutch over and remove clutch gear retaining ring.

Figure 188
Remove clutch shaft rear bearing retaining ring.

Figure 191
Remove clutch gear and outer bearing from clutch.

Figure 189
Remove clutch shaft rear bearing.

Figure 192
Remove end plate retaining ring.

Figure 193
Remove end plate.

Figure 196
Remove inner bearing locating ring.

Figure 194
Remove inner and outer clutch discs.

Figure 197
Compress piston return spring.
Remove spring retaining ring.

Figure 195
Remove clutch gear inner bearing.

Figure 198
Remove spring retainer.

Figure 199
Remove piston return spring.

Figure 200
Remove spring retainer.

Figure 201
Remove clutch piston.

Figure 202

Make sure clutch piston bleed valve is clean and free of foreign material. Install piston inner seal ring. Install clutch piston outer piston ring. Lock piston ring securely. Grease ring to stabilize in ring groove. Position piston in clutch drum, use caution as not to damage the inner and outer piston seal.

Figure 203

Install inner spring retainer.

Figure 204

Install clutch piston return spring.

Figure 205

Install outer spring retainer.

Figure 206

Compress return spring.
Install retainer ring in groove.

Figure 207

Install one steel disc. Install one friction disc. Alternate steel and friction discs until the proper amount of discs are installed. First disc next to the piston is steel, last disc installed is friction.

Figure 208
Install clutch disc end plate.

Figure 211
Install clutch gear inner bearing. Note : this bearing does not have a shield in it.

Figure 209
Install end plate retainer ring.

Figure 212
Being sure clutch gear bearing retaining ring is installed.
Install clutch gear and hub into clutch drum.
Align splines on clutch hub with internal teeth of friction discs.
Tap gear into position. Do not force this operation. Gear splines must be in full position with internal teeth of all friction discs.

Figure 210
Install clutch gear inner bearing locating ring.

Figure 213
Install clutch gear outer bearing.
Note: this bearing has a shield in it, this shield must be up.

Figure 214
Install outer bearing retaining ring.

Figure 217
Install clutch shaft rear oil sealing ring (piston ring).

Figure 215
Warm bearing to 110 °C (230 F).
Install clutch shaft rear bearing.
Note: bearing outer retainer ring groove must be up.

Figure 216
Install rear bearing retaining ring.

Figure 218
Remove clutch shaft oil sealing rings (piston rings).

Figure 221
Remove end plate retainer ring.

Figure 219
Remove 4th shaft front bearing retaining ring.

Figure 222
Remove end plate.

Figure 220
Remove 4th shaft front bearing.

Figure 223
Remove inner and outer clutch discs.

Figure 224

Compress piston return spring.
Remove return spring retainer ring.

Figure 227

Remove spring retainer.

Figure 225

Remove spring retainer.

Figure 228

Remove clutch piston.

Figure 226

Remove piston return spring.

Figure 229

Make sure clutch piston bleed valve is clean and free of foreign material. Install inner seal ring.
Install piston outer piston ring. Lock piston ring joint securely. Grease ring to stabilize in ring groove.
Position piston in clutch drum, use caution as not to damage the inner and outer piston seal rings.

Figure 230

Install spring retainer.

Figure 231

Install clutch piston return spring.

Figure 232

Install spring retainer.

Figure 233

Compress return spring.
Install retainer ring in groove.

Figure 234

Install one steel disc. Install one friction disc. Alternate steel and friction discs until the proper amount of discs are installed. First disc next to the piston is steel last disc installed is friction.

Figure 235
Install clutch disc end plate.

Figure 238
Install bearing retaining ring.

Figure 236
Install end plate retainer ring.

Figure 239
Install clutch shaft oil sealing rings (piston rings).

Figure 237
Warm bearing to 110 °C (230 F).
Install clutch shaft front bearing.
Note: bearing outer retainer ring groove must be up.

Figure 240
Remove idler shaft front bearing inner race.

Figure 243
Remove idler shaft gear retaining ring.

Figure 241
Remove idler shaft gear retaining ring.

Figure 242
Remove idler shaft gear.

Figure 244
Install idler shaft gear retaining ring.

Figure 247
Install idler shaft front bearing inner race.

Figure 245
Install idler shaft gear with long hub down.

Figure 248
Install idler shaft front bearing outer race.

Figure 246
Install idler shaft gear retaining ring.

Figure 249
Install 4th clutch disc hub.

Figure 250
Install clutch disc hub retaining ring.

Figure 251
Remove turbine shaft piston ring.

Figure 252
Remove turbine shaft front bearing retaining ring.

Figure 253
Remove front bearing washer.

Figure 254
Pry front bearing from shaft.

Figure 255
Install turbine shaft bearing with snap ring groove up.

Figure 258
Install turbine shaft piston ring.

Figure 256
Install front bearing washer.

Figure 257
Install front bearing retaining ring.

Figure 259
Remove impeller hub gear retaining ring.

Figure 262
Remove hub bolts. **Note:** some units will have lock tabs instead of a backing ring; straighten lock tabs. Impeller and hub must be reassembled as explained in figure 273.

Figure 260
Remove impeller hub gear.

Figure 263
Remove impeller hub screw backing ring.

Figure 261
Remove oil baffle from impeller.

Figure 264
Remove impeller from hub.

Figure 265
Remove impeller hub “O”-ring.

Figure 266
Remove impeller hub bearing retaining ring.

Figure 267
Remove impeller hub bearing.

Figure 268

Install impeller hub bearing.
Tap bearing into place.

Figure 271

Align holes in impeller with impeller hub, use caution as not to disrupt “O”-ring.

Figure 269

Install impeller hub bearing retaining ring.

Figure 272

Position impeller hub screw backing ring.

Figure 270

Position a new impeller to hub “O”-ring on impeller hub.

Figure 273

Clean hub mounting surface and tapped holes with solvent.
Dry thoroughly being certain tapped holes are clean and dry. Install backing ring and special self locking screws. Tighten screws 58 - 64 ft.lbs [79 - 87 N.m].
Note: assembly of hub must be completed within a fifteen minute period from start of screw installation. The special screw is to be used for one installation only. If the screw is removed for any reason it must be replaced. The epoxy left in the hub holes must be removed with the proper tap and cleaned with solvent. Dry hole thoroughly and use a new screw for reinstallation. If lock tabs are used, bend lock tabs.

Figure 274

Apply a light coat of loctite 638 to the outer diameter of the oil baffle oil seal, press oil seal in oil baffle with lip of seal down.

Figure 277

Install impeller hub gear retainer ring.

Figure 275

Install a new oil baffle oil seal ring on oil baffle. Position oil baffle on impeller assembly.

Figure 276

Install impeller hub gear.

Figure 278

Block impeller cover and turbine assembly as shown. Remove turbine hub to front bearing retainer ring.

Figure 281

Remove turbine hub bolts and lock tabs.

Figure 279

Remove turbine hub bearing washer.

Figure 280

Tab turbine hub from front bearing.

Figure 282

Align holes in turbine with holes in turbine. Position lock tabs and install turbine to turbine hub bolts. Tighten bolts to specified torque (See torque chart). Bend a corner of the lock tab over a flat of the bolt heads.

Figure 283

Center impeller cover over turbine hub. Install impeller cover bearing in impeller cover and over turbine hub. Tap bearing into place.

Figure 284

Install bearing washer.

Figure 285

Install bearing retaining ring.

Figure 286
Remove bearing and support retaining ring.

Figure 287
Remove bearing and support.

Figure 288

Press support in bearing.
Press bearing and support assembly in gear.

Figure 289

Install bearing retaining ring.

Figure 290

Position pump drive gear and bearing assembly in converter housing.

Figure 293

From front of housing, install turbine shaft bearing locating ring. Tap shaft until bearing locating ring shoulders in groove in housing.

Figure 291

Align holes in pump drive gear bearing support with holes in converter housing. Install bolts and washers and tighten to specified torque.

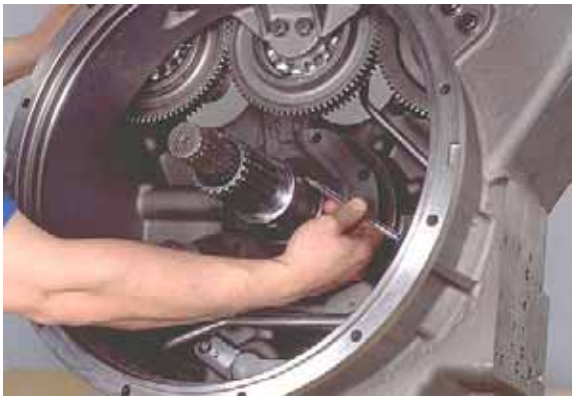


Figure 294

Install new sealing ring on support.
Position support on turbine shaft.
Turn support to clear pump drive gear.
Align support holes with converter housing.

Figure 292

From the rear of the housing. Tap turbine shaft and bearing in converter housing. Tap shaft until gear shoulders against converter housing.

Figure 295

Install stator support bolts and lockwashers. Tighten bolts to specified torque.

Figure 296

Spread reverse clutch front bearing locating ring and tap reverse and 2nd clutch assembly into converter housing. Be certain locating ring is in full position in ring groove.

Figure 297

Install forward shaft front bearing outer race.

Figure 298

Spread 4th speed clutch assembly front bearing locating ring and tap clutch assembly into position. Be certain locating ring is in full position in ring groove.

Figure 305

Install dipstick tube and dipstick as shown. Install mounting screw and lockwasher and tighten screw to specified torque.

Figure 308

From the front of case, insert output shaft, cone and gear retaining ring assembly through output gear.

Figure 306

View of output shaft as it would be positioned in transmission case.

Figure 309

Position new “O”-ring on front bearing cap. Install bearing cap.

Figure 307

From the rear, position output gear in transmission case.

Figure 310

Install front bearing cap screws and lockwashers. Tighten screws to specified torque.

Figure 311

From the rear, install output gear retaining ring.

Figure 314

Install rear bearing cap nuts and lockwashers. Tighten nuts to specified torque (See torque chart).

Figure 312

Install rear taper bearing cone with large diameter of taper in.

Figure 315

Tap and rotate output shaft to seat taper bearings, loosen rear bearing cap nuts. Using an inch lb. torque wrench, determine the rolling torque of the output shaft and record. Tighten rear bearing cap nuts to specified torque. Check rolling torque with nuts tight. Torque must be 4 to 10 inch lbs [0.46 - 1.1 Nm] more than when bearing cap nuts were loose. Add or omit shims on the rear bearing cap to achieve the proper preload.

Figure 313

Coat outer diameter of oil seal with Loctite 638 and press seal in the output shaft bearing cap with lip of seal in. Using new “O”-ring; install rear output bearing cap and shims on transmission case.

Figure 316

From the front, position the forward clutch assembly into housing.
Push clutch shaft rear bearing through housing bore. From the rear open rear bearing snap ring tap clutch shaft till snap ring is in bearing groove.

Figure 317

From the rear install 3rd speed clutch assembly.

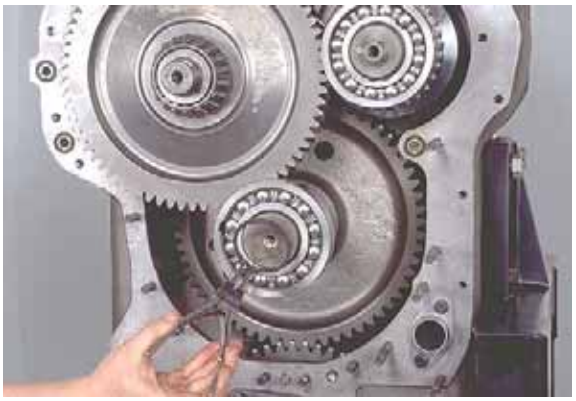


Figure 320

Install idler shaft rear bearing. Retaining ring.

Figure 318

The low clutch (1st) assembly and idler shaft assembly must be installed together. Be sure clutch and idler are in full position in housing.

Figure 321

Position a new gasket and “O”-rings (3) on rear of transmission case.

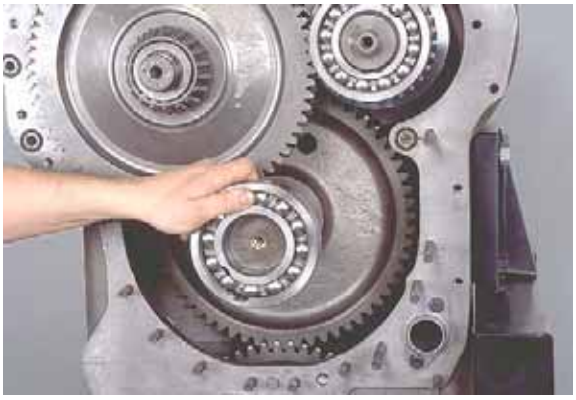


Figure 319

Warm bearing to 110 °C (230 F). Install idler shaft rear bearing with snap ring groove to the rear side.

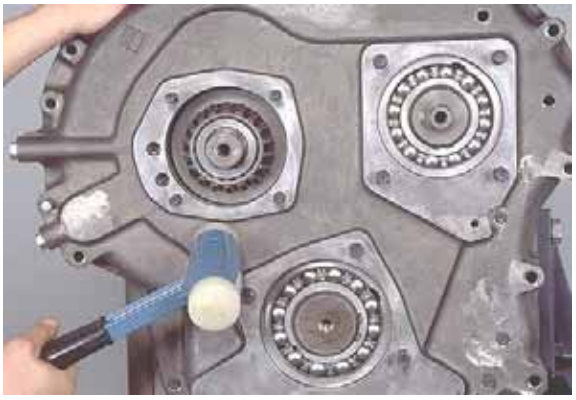


Figure 322

Install rear cover and tap cover into place.

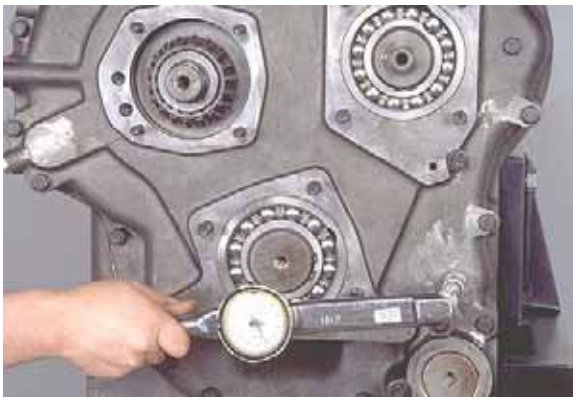


Figure 323

Install rear cover to case screws, nuts and lockwashers. Tighten screws and nuts to specified torque.

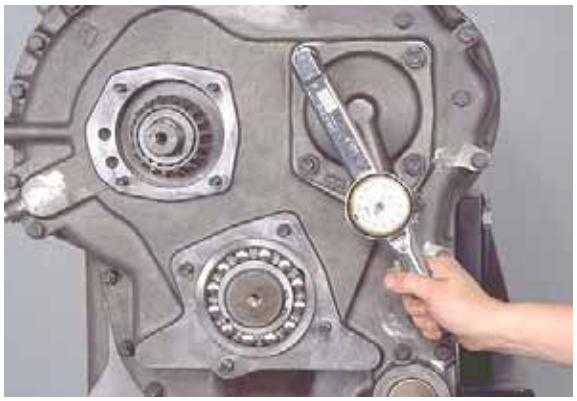


Figure 326

Position 3rd shaft rear bearing cap on studs. Use caution as not to damage oil sealing ring. Install stud nuts and lockwashers. Tighten nuts to specified torque.

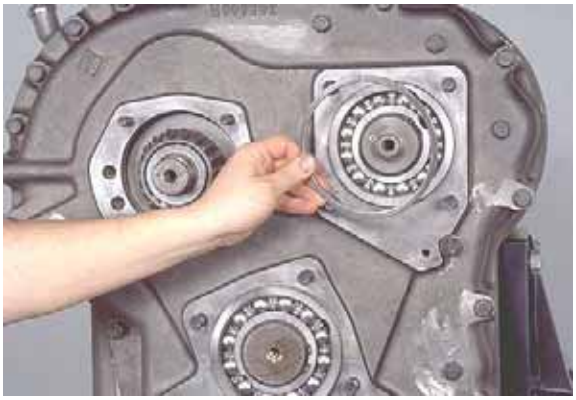


Figure 324

Install 3rd shaft rear bearing locating ring.

Figure 327

Install idler shaft rear bearing retaining ring.

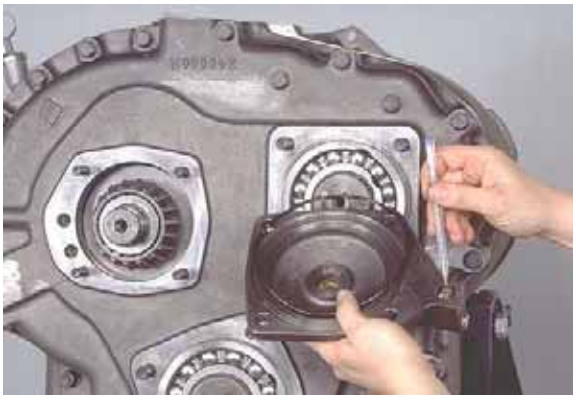


Figure 325

Install new “O”-rings on 3rd shaft rear bearing cap.

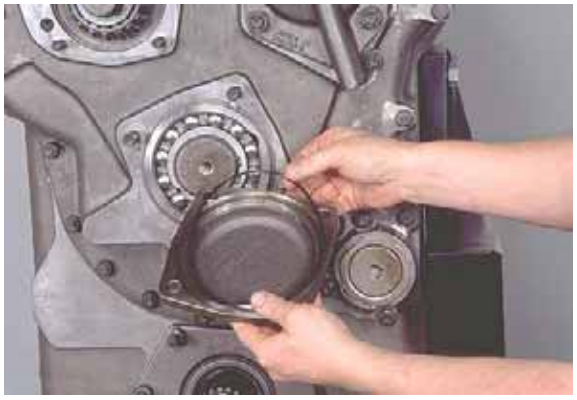


Figure 328

Position new “O”-ring on idler shaft bearing cap. Install bearing cap.

Figure 329

Instal idler shaft bearing cap nuts and lockwashers. Tighten nuts to specified torque. **Note:** Do not install low (1st) clutch rear bearing cap at this time, or install bearing cap temporarily. See note below figure 337.

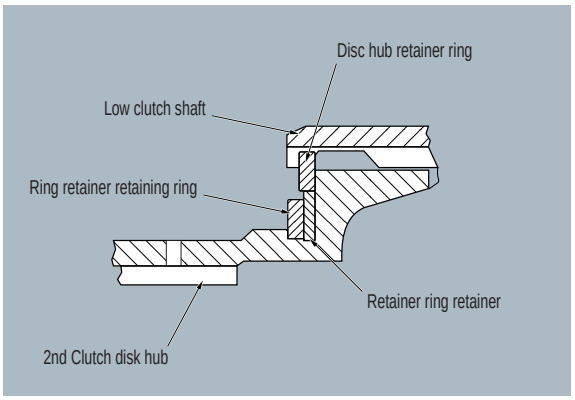


Figure 332

Figure 330

Install output flange “O”-ring, flange washer and flange nut.
Secure flange to prevent turning. Tighten flange nut. “See elastic stop nut torque chart”.

Figure 333

Install turbine shaft rear bearing outer race.

Figure 331

Position the 2nd speed clutch disc hub on the low (1st) clutch shaft. Install disc hub retainer ring. Install retainer ring retainer. Install ring retainer ring - see figure 332.

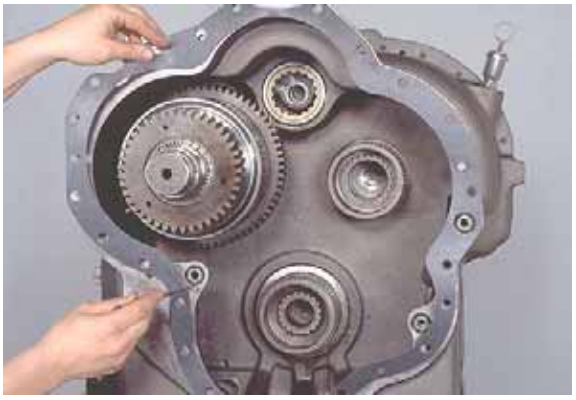


Figure 334

Position new transmission housing gasket and “O”-rings. **Note:** the use of alignment studs will facilitate housing to housing assembly.

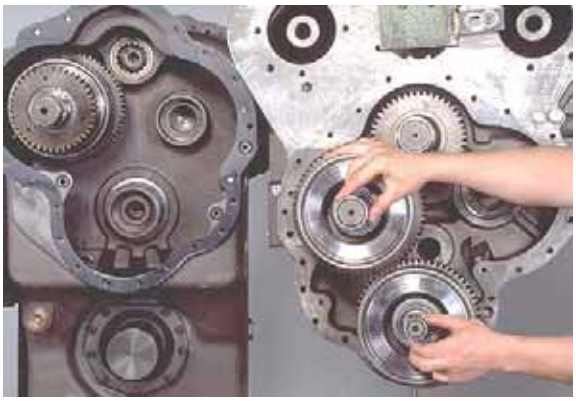


Figure 335

Position clutch shaft pilot bearings on 2nd and 4th clutch shafts. A high quality grease will hold bearings in position during assembly.

Figure 336

Install alignment studs and position converter housing on studs. **Note:** turn output shaft to align clutch disc hub in clutch and final assembly.

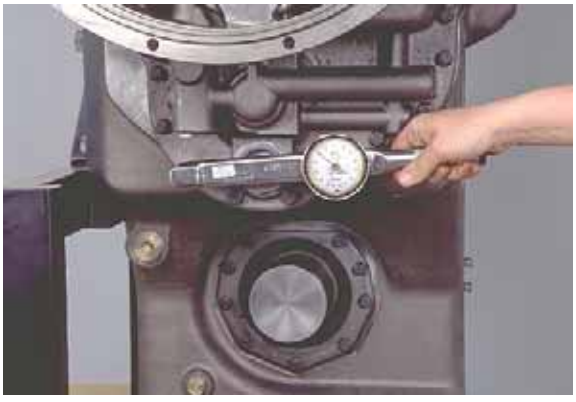


Figure 337

Install converter housing to transmission housing bolts and lockwashers and tighten screws to specified torque. **Caution:** Bolts are not to be used to pull converter housing to transmission housing. **Note:** See assembly instructions for low 1st speed clutch taper bearing adjustment.

Figure 338

Install impeller and oil baffle assembly.

Figure 339

Install impeller hub bearing inner race.

Figure 340

Install oil baffle retainer ring.

Figure 341
Install reaction member spacer.

Figure 344
Install turbine locating ring on turbine shaft.
Note: This is the thinnest of the two turbine to turbine shaft snaprings.

Figure 342
Install reaction member.

Figure 345
Position new “O”-ring on impeller cover.

Figure 343
Install reaction member retainer ring.

Figure 346
Install impeller cover and turbine assembly on turbine shaft.

Figure 347

Install impeller cover to impeller bolts and lockwashers. Tighten bolts to specified torque.

Figure 350

Position flex plates. Install flex plates mounting screws. See converter drive coupling.

Figure 348

Install turbine retaining ring.
Note: this is the thickest of the two rings.

Figure 351

If used, install pump hole covers and pump adaptors, torque cover screws to specified torque.

Figure 349

Position a new “O”-ring on impeller cover bearing cap; install bearing cap.

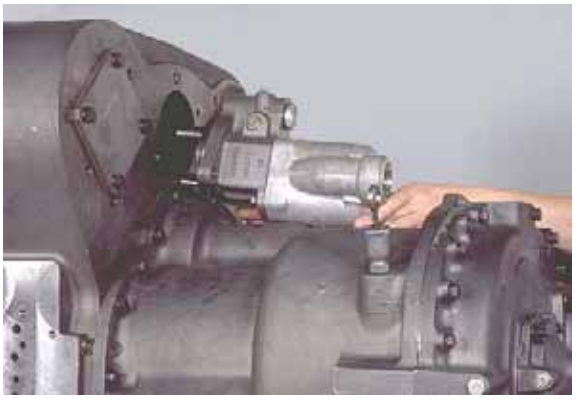


Figure 352

Position new “O”-rings on pressure regulator valve. Install pressure regulating valve and charging pump on housing.

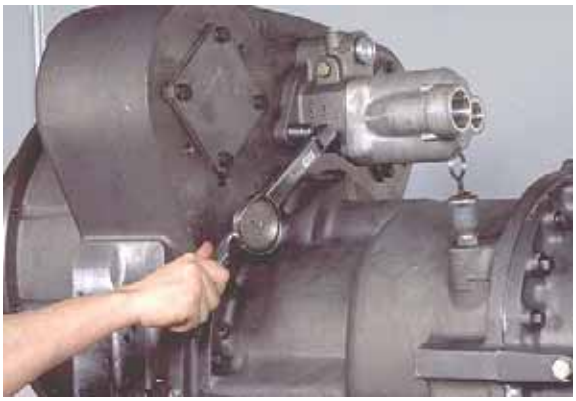


Figure 353

Install regulating valve to housing bolts and lockwashers. Tighten bolts to specified torque.

Figure 356

Position new control valve gasket on housing.

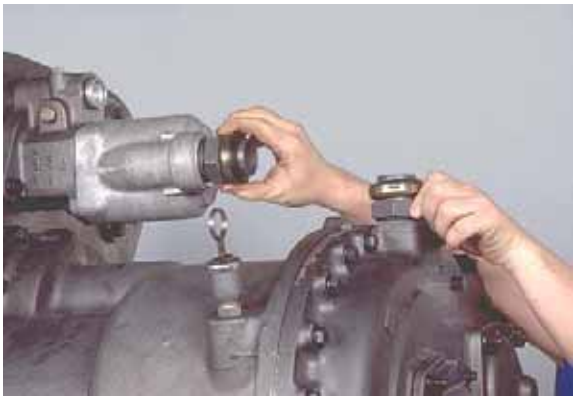


Figure 354

Install pump suction adaptor fittings and “O”-rings.

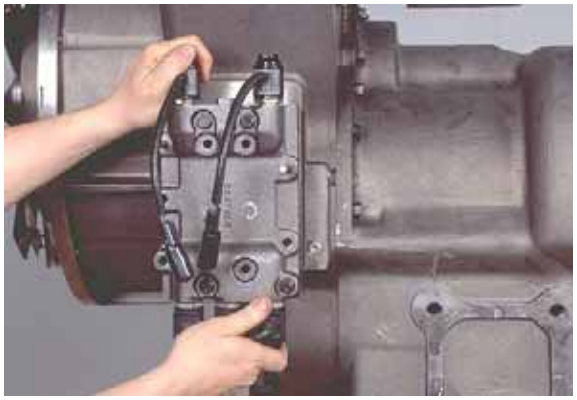


Figure 357

The use of alignment studs will facilitate valve to housing assembly. Position control valve on housing.

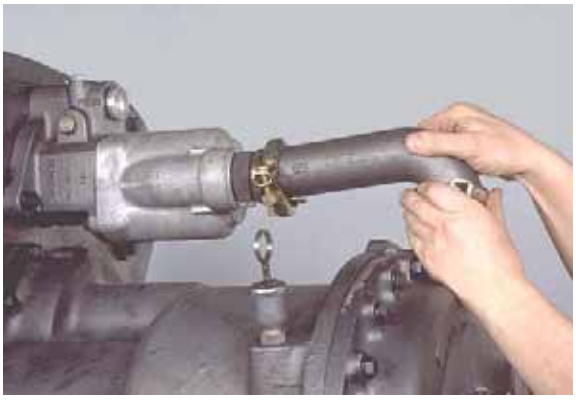


Figure 355

Install suction tube and couplings.

Figure 358

Install all valve to housing bolts and lockwashers in their specified locations (see control valve bolts tightening sequence diagram). Tighten bolts to 23 to 25 ft. lbs. torque [31.2 - 33.8 N.m.].

11. OPTIONS

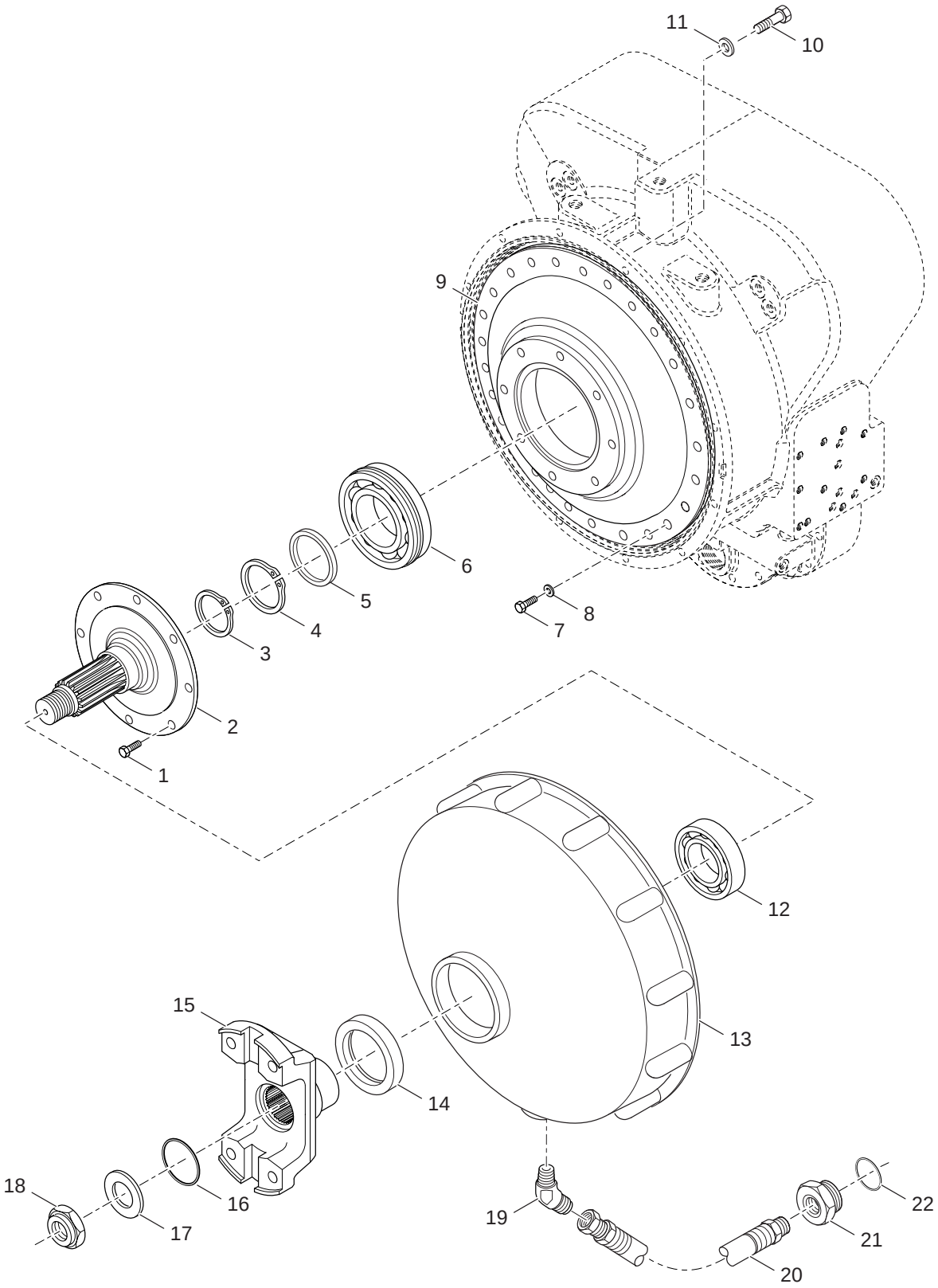
11.1 MHR SECTION

The information contained herein must be used in conjunction with a T40000 LD section.

The MHR model is the midship mounted T40000 series transmission with an integral convertor unit.

11.1.1 Sectional views and parts identification

Refer to following pages.


11
10
9
6
5
4
3
8
7
2
1
12
15
13
14
18
16
17
19
22
21
20

GROUP - MHR SECTION

Item	Description	Quantity
1	Input shaft screw	8
2	Input shaft	1
3	Turbine hub retainer ring	1
4	Impeller cover bearing retainer ring	1
5	Impeller cover bearing spacer	1
6	Impeller cover bearing	1
7	Impeller cover to impeller screw	24
8	Impeller cover to impeller screw lockwasher	24
9	Impeller cover	1
10	Converter housing to front cover screw	12
11	Converter housing to front cover screw lockwasher	12
12	Input shaft bearing	1
13	Front cover	1
14	Input shaft oil seal	1
15	Input shaft flange	1
16	Input shaft flange “O”-ring	1
17	Input shaft flange washer	1
18	Input shaft flange nut	1
19	Front cover drainback hose adapter	1
20	Front cover drain back hose	1
21	Drain back hose to transmission fitting	1
22	Fitting “O”-ring	1

11.1.3 Disassembly MHR Section

Figure 1
Overall view of the transmission.

Figure 4
Remove bolts and lockwashers securing converter housing front cover to converter housing.

Figure 2
Remove input flange nut, washer and “O”-ring.

Figure 5
Remove converter housing front cover.

Figure 3
Remove drain hose from front cover as shown.

Figure 6
Remove input shaft support bearing.

Figure 7
Remove input shaft mounting bolts.

Figure 8
Input shaft removed.

11.1.4 Reassembly MHR Section

Reassemble transmission following step by step procedures as explained in the T40000 LD section up to and including “Install turbine retaining ring”.

Figure 9
Position new “O”-ring on input shaft.

Figure 11
Install input shaft bearing on shaft.

Figure 10
Install input shaft on impeller cover.
Install input shaft bolts, tighten 37 - 41 ft. lbs. torque (50.2 - 55.5 N.m.).

Figure 12
Tap input shaft bearing in place.

Figure 13

Apply a light coat of Loctite 515 between the convertor housing and front cover.
Press seal in front cover with lip of seal in.

Figure 16

Connect drain hose to front cover.

Figure 14

Install bolts and lockwashers and tighten 37 - 41 ft. lbs. torque (50.2 - 55.5 N.m.).

Figure 15

Install input flange “O”-ring, washer, nut and flange. Tighten nut to specified torque (see elastic stop nut torque chart).

For product inquiries or support,
visit www.dana.com or call 419-887-6445
For other service publications,
visit www.SpicerParts.com/literature.asp
For online service parts ordering,
visit www.SpicerParts.com/order.asp

DANA

SPICER®

Off-Highway Products