SERVICE MANUAL

TWO SPEED FORWARD AND REVERSE TRANSMISSION

H-25A

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FORM
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SAY "HUFF"
HOUGH®
THE FRANK G. HOUGH CO. LIBERTYVILLE, ILL.
SUBSIDIARY - INTERNATIONAL HARVESTER COMPANY

TWO SPEED FORWARD AND REVERSE TRANSMISSION

SPECIFICATIONS

SPEEDS:

Forward	Two
Reverse	Two

RATIOS:

High, Forward and Reverse	.713 to 1
Low, Forward and Reverse	2.29 to 1

TYPE OF OIL: Automatic Transmission Type A

OIL CAPACITY:

Fill to full mark on dip stick with cold oil after operating at engine idle in all shift positions. Volume required will depend upon vehicle plumbing.

WEIGHT, DRY:

Without Converter	361 lbs.

CLUTCHES:

Multi-plate, Hydraulically Actuated

A.	Forward	3 Plates.
B.	Reverse	3 Plates.
C.	High	3 Plates.
D.	Low	4 Plates.

GEARS:

Constant Mesh Spur Gears	9
Diametral Pitch	8
Pressure Angle	20

VALVES:

A. Regulator Valve
B. Clutch Control Valve
C. Forward and Reverse Selector Valve
D. High and Low Selector Valve
E. Converter Regulating Valve
F. Cooler Bypass Valve

MAXIMUM REGULATED PRESSURE: 120 to 130 p.s.i.

PARKING BRAKE:

Enclosed External Band Type, Mechanically Actuated.

NOTES

TWO SPEED FORWARD AND REVERSE TRANSMISSION

FUNCTIONS

The transmission provides operation in forward and reverse along with a neutral to interrupt the flow of power through the transmission and allow engine operation with the vehicle at standstill. In forward and reverse operation, two gear ratios are available: a high gear ratio of .713 to 1 and a low gear ratio of 2.29 to 1. The transmission may be power shifted in all gear combinations and the forward and reverse clutches may be released or applied with the engine in operation. A parking brake is provided to hold the vehicle in a stationary position.

NOTES

TWO SPEED FORWARD AND REVERSE TRANSMISSION

COMPONENTS

A. HYDRAULIC:

1. Oil Pump of spur gear crescent type with drive gear operating at engine r.p.m.

2. Oil Intake Screen in bottom of transmission case housing.

3. Collector Ring mounted between pump and transmission case cover contains hydraulic circuits and acts as converter stator reaction member.

4. Valve Block Assembly, mounted on top of the transmission case housing, regulates main line pressure and directs flow of pressure regulated oil into the required channels by using the following valves:

   A. Regulator Valve
   B. Clutch Control Valve
   C. High and Low Clutch Selector Valve
   D. Forward and Reverse Clutch Selector Valve

5. Miscellaneous Valves

   A. Converter Regulator Valve
   B. Cooler Bypass Valve
   C. Centrifugal Release Valves

6. Clutches

   Forward, reverse, high and low, hydraulically actuated, multi-plate clutches containing centrifugal release valves to facilitate bleed following clutch release.

B. TRANSMISSION CASE:

1. Transmission Case Cover mounts on front face of transmission case housing and contains converter valve, cooler bypass valve and pump intake oil passage. Serves as mount for oil collector ring, converter housing, oil pump and shaft bearings.

2. Transmission Case houses the gear train, provides sump and oil passages and serves as mount for shaft bearings.

NOTES

TWO SPEED FORWARD AND REVERSE TRANSMISSION

(Components continued)

C. GEARS

The continuous mesh gear set is made up of nine (9) spur gears.

D. SHAFTS

Input Shaft
Output Shaft
Idler Shaft
Countershaft
High and Low Clutch Shaft

E. PARKING BRAKE

Mounted on rear of transmission case, the brake is an enclosed external band type, mechanically actuated.

NOTES

TWO SPEED FORWARD AND REVERSE TRANSMISSION

OPERATION

A. GENERAL:

Whenever vehicle engine is operating normally and transmission is properly filled with the specified lubricant, the following hydraulic conditions are common to all gear combinations:

1. The transmission oil pump operated at engine r.p.m. supplies oil to the main line circuits where maximum line pressure is controlled by the pressure regulator.

2. Regulated main line pressure is supplied to the clutch control valve and the high and low selector valve.

3. Regulated main line pressure is passed through the converter regulator valve to the converter supply orifice in pump collector ring. After passing through the orifice, the oil under reduced pressure passes through the converter into the cooler and then into the clutch cooling and lubrication circuits before returning to the sump.

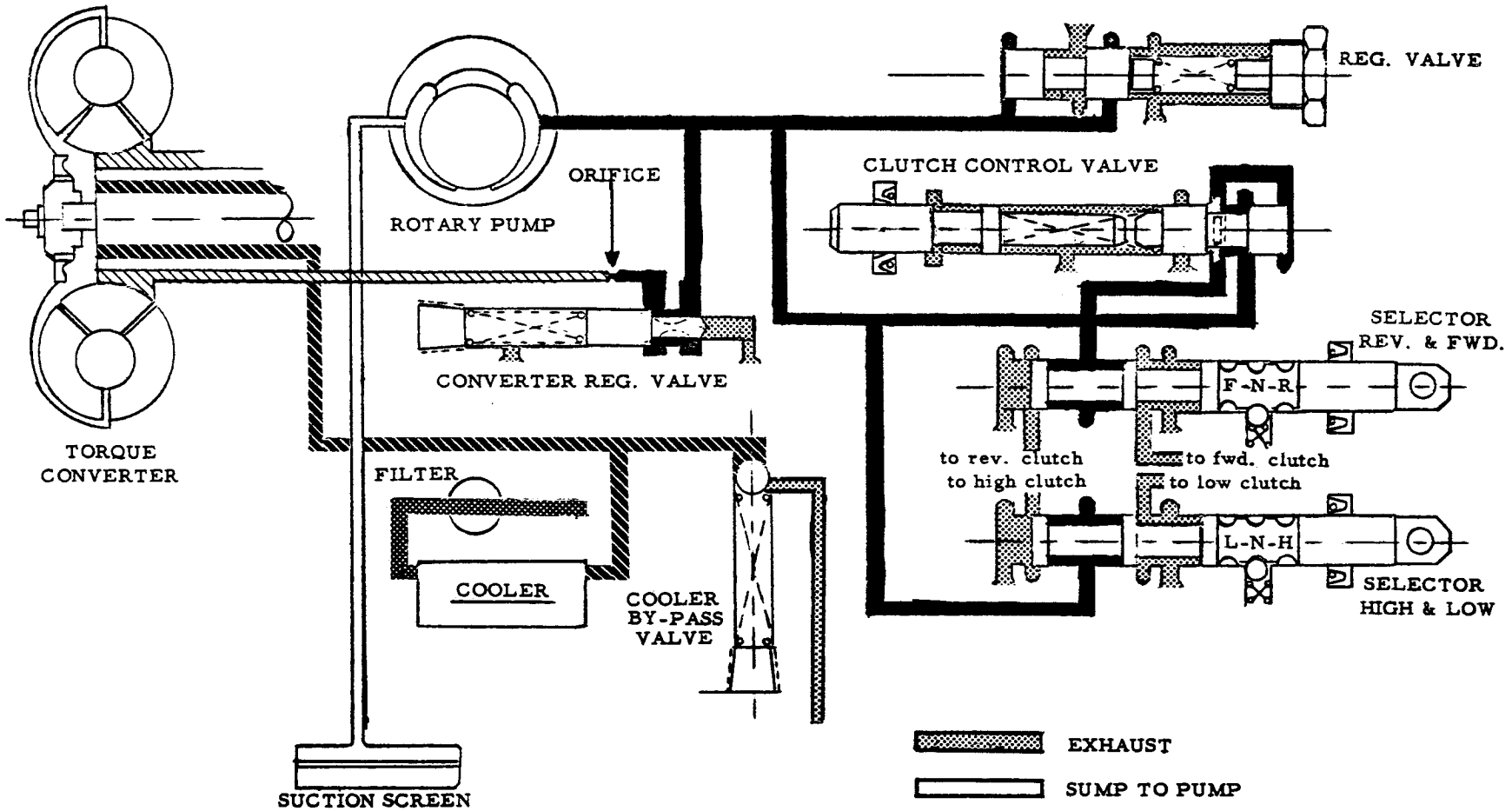
B. SHIFTING:

All gear combinations are obtained by positioning the selector valves in the desired poppet located positions and thereby directing pressure regulated oil to flow through the proper channels to apply the desired clutches. This in turn locks the required gears to their mating shafts and produces the gear ratio desired. The clutches not in use are vented to sump.

C. THE CLUTCH CONTROL VALVE:

When the vehicle is in operation, functioning of the clutch control valve is controlled by the position of the clutch control actuating plunger which is connected by external linkage to the vehicle brake pedal. When the brake pedal is in the fully released position, the forward or reverse clutch is applied by full regulated line pressure. When the brake pedal is gradually depressed, the applied pressure to the forward or reverse clutch gradually drops to zero, whereupon the vehicle brakes are applied. This clutch release and apply action can be carried out while the engine is operating at sufficient speeds to actuate the vehicle attachments.

NOTES



HYDRAULIC CIRCUIT DIAGRAM

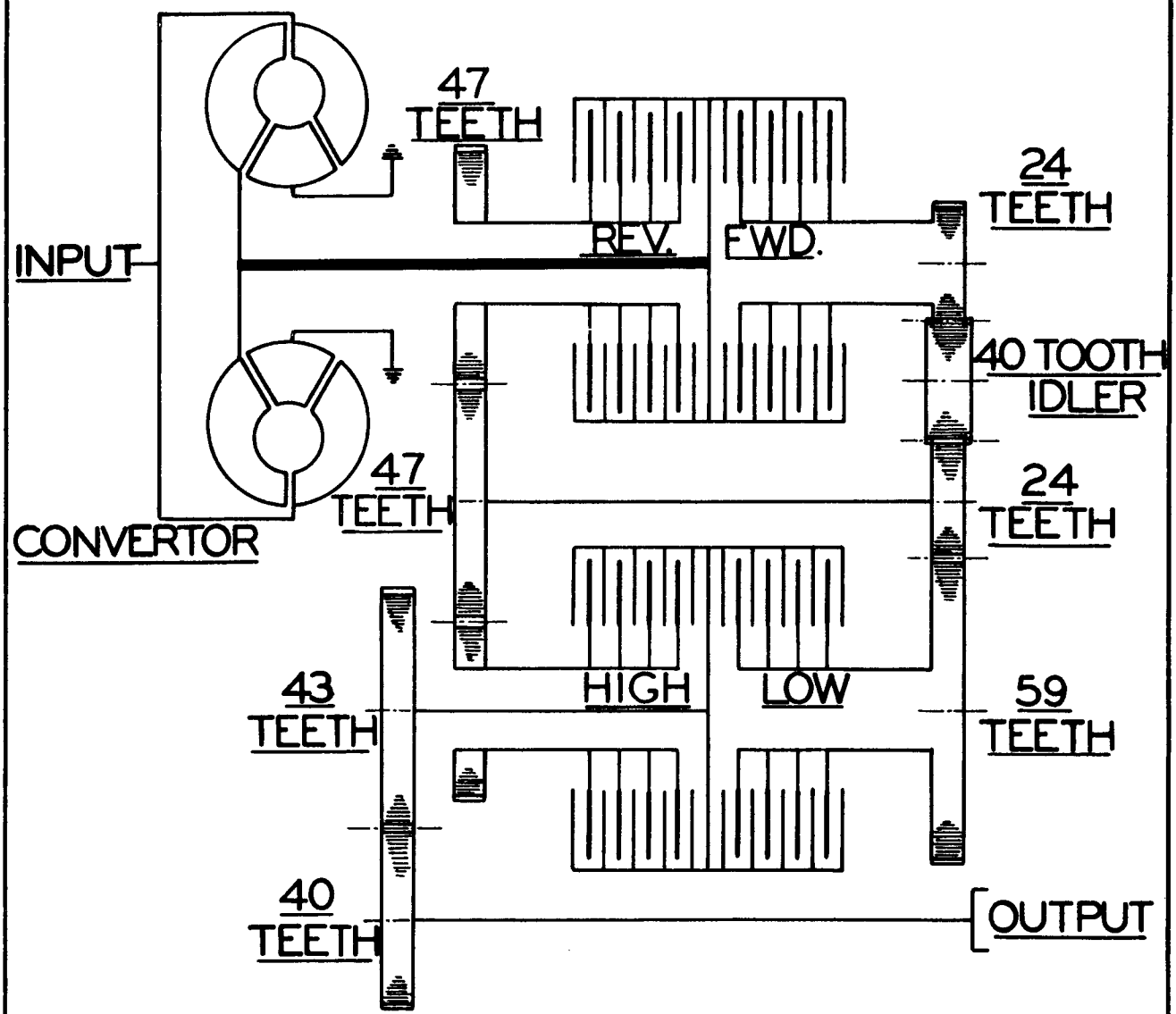
TWO SPEED
FORWARD AND REVERSE
TRANSMISSION

NOTES

TWO SPEED FORWARD & REVERSE TRANSMISSION

GEAR NEUTRAL

RATIO

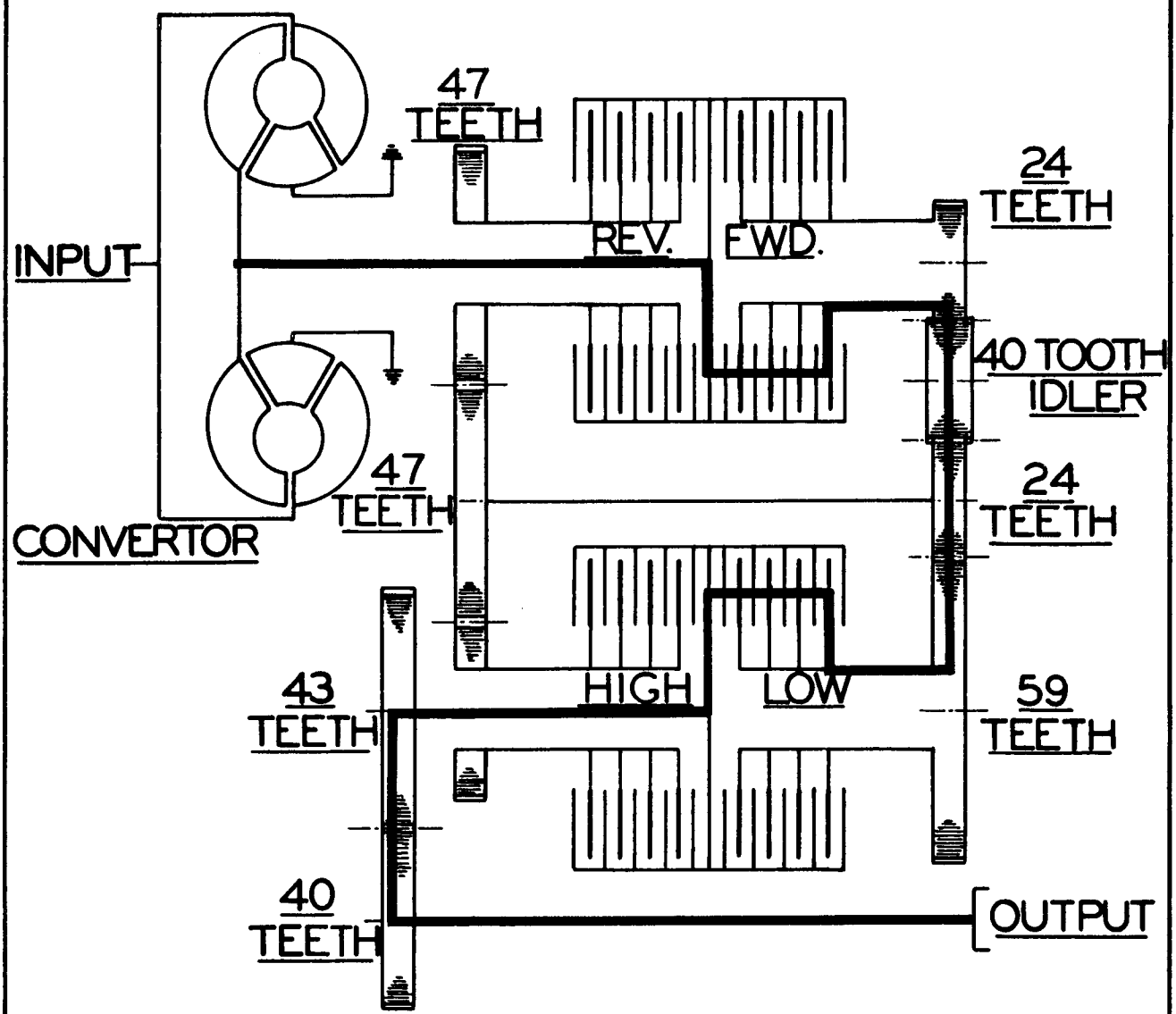


NOTES

TWO SPEED FORWARD & REVERSE TRANSMISSION

GEAR FORWARD-LOW

RATIO 2.29:1

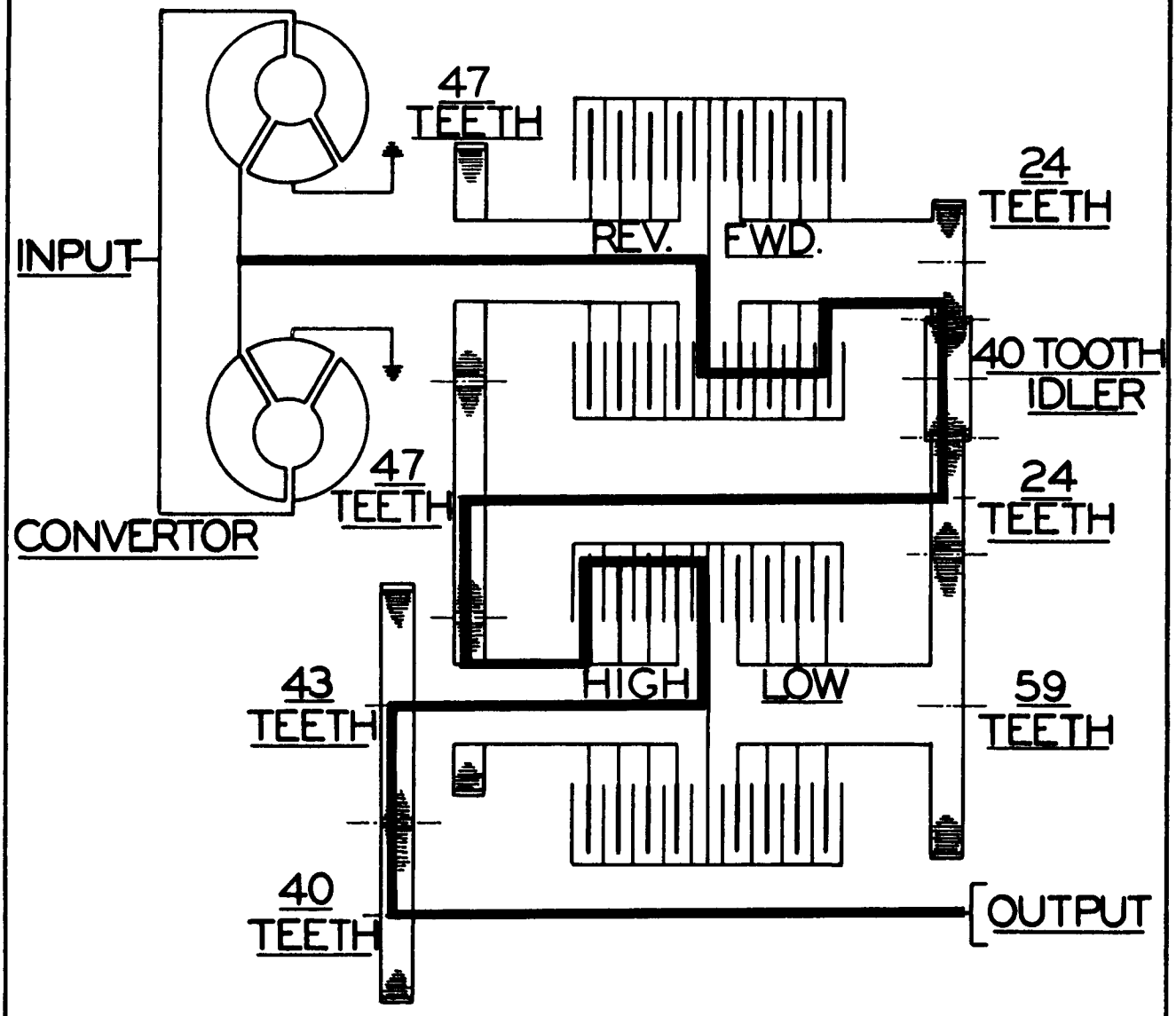


NOTES

TWO SPEED FORWARD & REVERSE TRANSMISSION

GEAR FORWARD-HIGH

RATIO .713:1

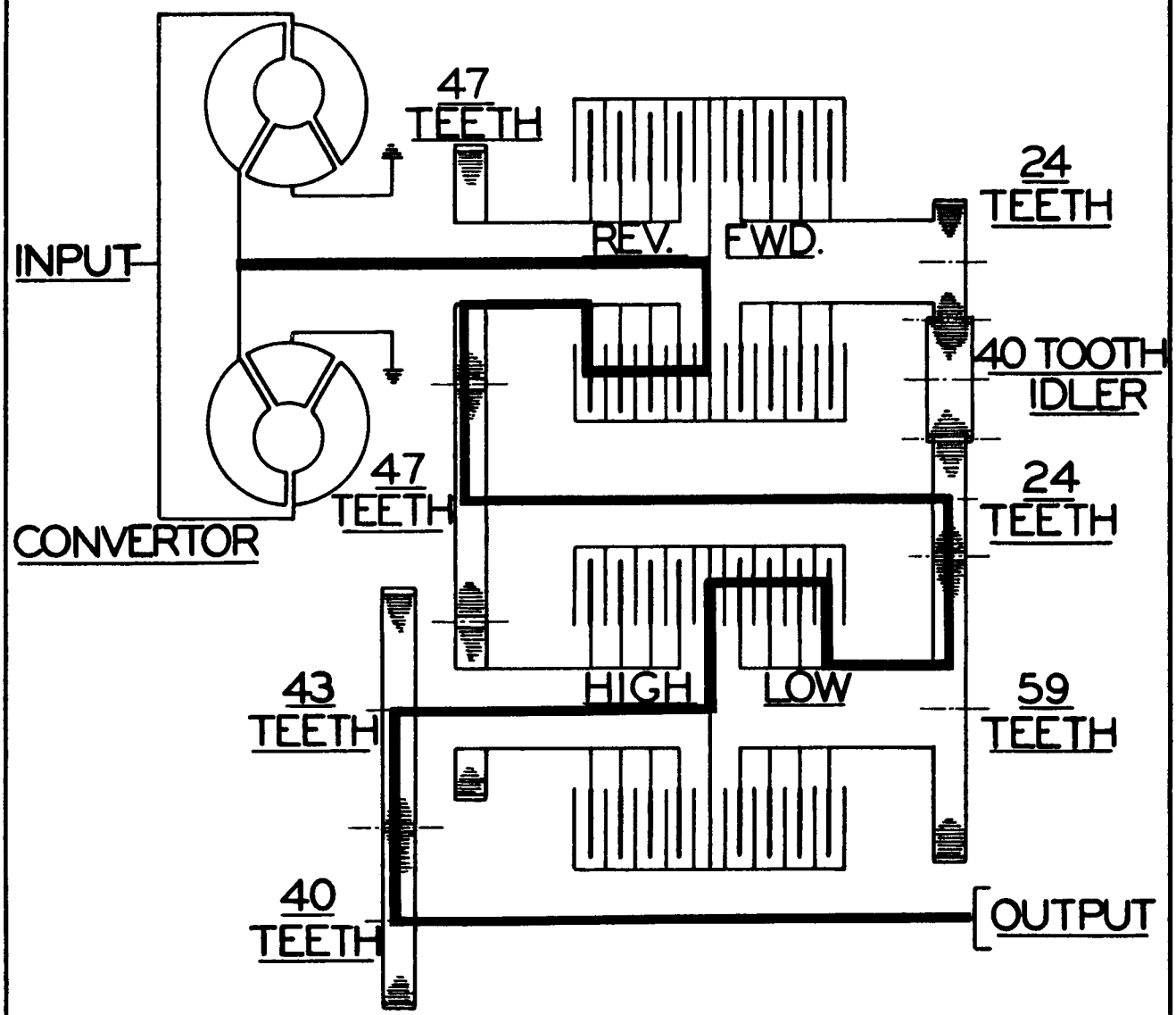


NOTES

TWO SPEED FORWARD & REVERSE TRANSMISSION

GEAR REV.- LOW

RATIO 2.29:1

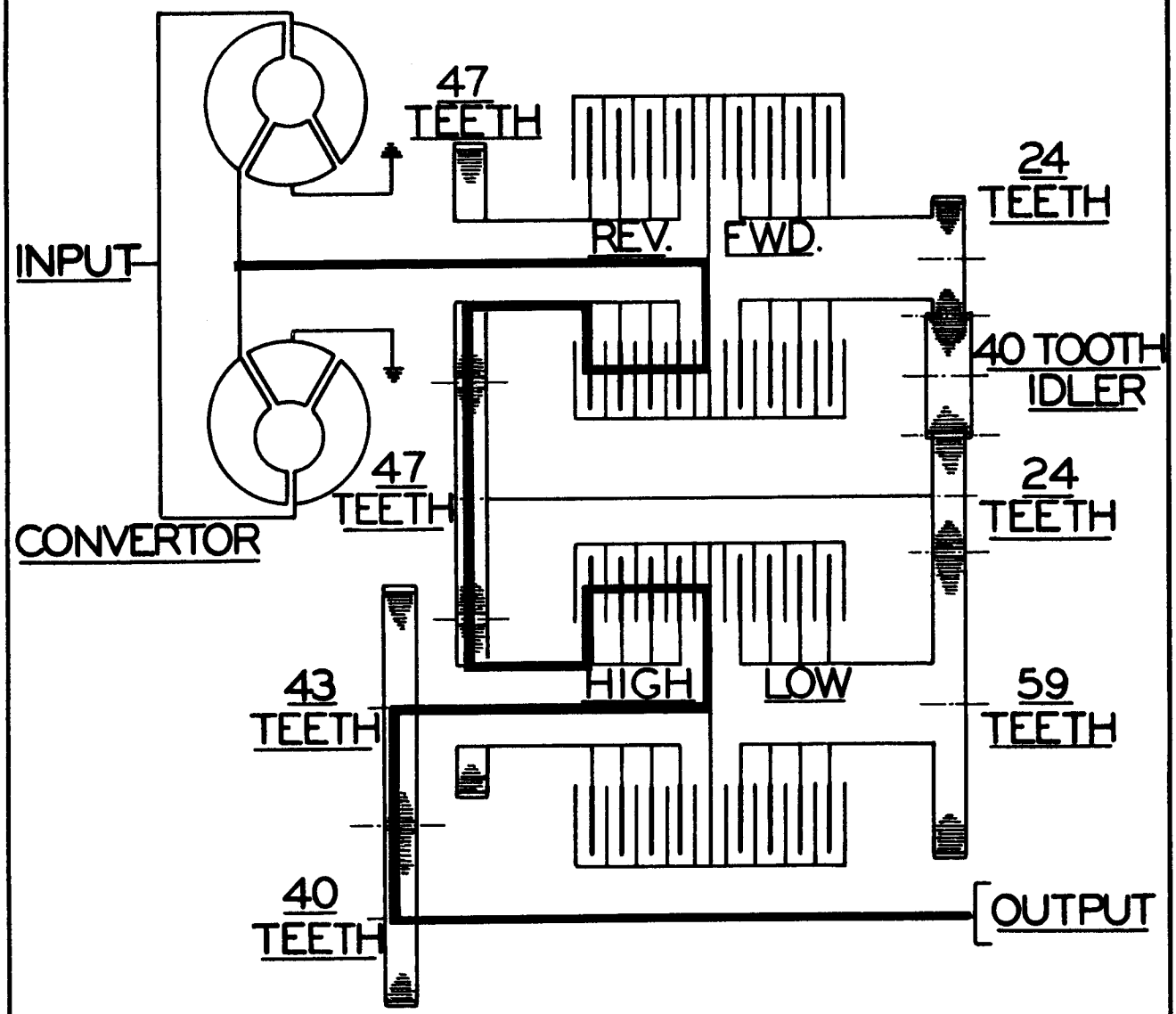


NOTES

TWO SPEED FORWARD & REVERSE TRANSMISSION

GEAR REVERSE-HIGH

RATIO .713:1



NOTES

TWO SPEED FORWARD AND REVERSE TRANSMISSION

Suggested Disassembly Procedure

With the transmission assembly removed from the vehicle and placed on its back on a clean, suitable working surface, proceed with the disassembly as follows:

1. Removal of Valve Block Assembly:

   Remove twelve (12) hex head cap screws holding Valve block and valve block plate to transmission case. Lift valve block, valve block gasket, valve block plate and valve block plate gasket off of transmission case.

2. Removal of Converter Housing:

   Remove eight (8) hex head cap screws holding converter housing to transmission case and lift off converter housing.

3. Removal of Front Collector Ring and Pump Assembly:

   Remove eight (8) hex head cap screws holding front collector ring to transmission case and pull off front collector ring and pump assembly. Remove gasket and bearing spacer.

4. Removal of Front Pump Body and Gears from Front Collector Ring:

   A. Remove one (1) flat head 10 - 24 screw and four (4) hex socket head 5/16 - 18 screws and separate collector ring and pump body.

   B. Remove the large seal ring from between pump and front collector.

   C. Before removing pump gears from pump body, mark gears for proper mating during reassembly.

5. Removal of Transmission Case Cover:

   A. Disconnect and remove lubrication feed tube, high clutch feed tube and low clutch feed tube, using a flare nut wrench of the proper size.

   B. Remove the thirteen (13) hex head cap screws holding transmission case cover to the transmission case.

NOTES

TWO SPEED FORWARD AND REVERSE TRANSMISSION

(Suggested Disassembly Procedure Continued)

(Removal of Transmission Case Cover Continued)

C. With special care in keeping transmission cover level, remove cover from the transmission case, leaving the complete gear train in the transmission case.

D. Remove transmission case cover gasket.

6. Removal of Output Shaft Front Bearing:

Using suitable puller, remove ball bearing from front end of output shaft.

7. Removal of Gears:

Lift gears from front end of:

A. Output Shaft (40 tooth)
B. High-Low Clutch Pack (43 tooth)
C. Countershaft (47 tooth)

8. Removal of Forward and Reverse Clutch Assembly and Input Shaft:

Remove forward and reverse clutch assembly and input shaft as follows:

A. Remove ball bearing on front of input shaft.
B. Lift off first thrust washer, 47 tooth gear and second thrust washer.
C. Lift forward and reverse clutch assembly from input shaft.
D. Pull input shaft out of rear bearing leaving 24 tooth gear, two thrust washers and rear ball bearing in case.
E. Lift 24 tooth gear and two adjacent thrust washers from case.

9. Removal of High and Low Clutch Assembly:

A. Lift front bronze thrust washer, 36 tooth gear and rear bronze thrust washer.
B. Lift out the high-low clutch pack.
C. Lift out the high-low shaft.
D. Lift out the remaining 59 tooth gear and its two adjacent thrust washers.

NOTES

TWO SPEED FORWARD AND REVERSE TRANSMISSION

(Suggested Disassembly Procedure Continued)

10. Removal of Countershaft and 24 Tooth Gear:

    Remove countershaft and 24 tooth gear on rear of countershaft.

11. Place Transmission Case on Side Locating Dip Stick and Filler Tube on What is Now the Top Side of the Transmission Case.

12. Removal of Idler Gear:

    Remove lock wire and four (4) hex head cap screws and lift off idler shaft retainer and retainer gasket. Press the idler gear shaft far enough into the transmission case to be able to hold the idler gear and the two (2) thrust washers together to avoid dropping any of the forty-one (41) needle rollers and remove the shaft, gear, thrust washers and needle rollers as a unit.

    If desired, remove countershaft ball bearing from transmission case using a suitable puller.

13. Removal of Hand Brake Housing and Band Assembly:

    Remove 3/4 - 16 hex lock nut, plain washer, cork washer and yoke from output shaft.

    Remove eight (8) hex head cap screws holding hand brake housing and band assembly to transmission case and remove brake housing and band. Remove brake drum from output shaft. Remove one outer gasket, bearing retainer and inner gasket.

14. Removal of Output Shaft and Rear Bearing:

    Using plastic hammer, tap rear end of output shaft, moving shaft and bearing forward and out of bearing retainer.

15. Removal of Output Shaft Rear Bearing Retainer:

    Remove outer gasket, bearing retainer and inner gasket.

16. Removal of Oil Screen Assembly:

    Remove two (2) hex head cap screws and remove oil screen assembly and oil screen assembly gasket.

NOTES

TWO SPEED FORWARD AND REVERSE TRANSMISSION

(Suggested Disassembly Procedure Continued)

17. Disassembly of High and Low Clutch Assembly:

Note: In the assembly, the high clutch has three (3) clutch friction plates and the low clutch has four (4) friction plates.

High Clutch: Remove outer snap ring, clutch retainer plate and clutch separator plates and the four (4) clutch friction plates.

Low Clutch: Turn assembly over and remove outer snap ring, clutch retainer plate and clutch separator plate and four (4) clutch friction plates.

Note: The clutch separator plates are coned slightly. It is important that the dish or cone in the plates is checked because upon reassembly, all separator plates should have the dish in the same direction in the clutch pack.

18. Disassembly of Forward and Reverse Clutch Assembly:

Note: In this assembly both the forward and reverse clutches have three (3) clutch friction plates.

Disassembly procedure is the same as for the high and low clutch assembly except that both clutch retainer plates are the same.

19. Disassembly of Cylinder and Pistons Assembly:

Note: This assembly is the same in both the high and low clutch assembly and the forward and reverse clutch assembly. Place cylinder assembly in arbor press. Place a horseshoe collar of proper size on spring retainer, compress clutch retractor spring and remove snap ring. Release pressure on spring, remove assembly from arbor press and remove clutch spring retainer, clutch retractor spring and clutch piston. Unhook at ring opening the small piston ring and remove from clutch cylinder. Unhook at ring opening the large piston ring and remove from clutch piston. Repeat this procedure to remove the other three (3) clutch pistons.

20. Disassembly of Clutch Centrifugal Release Valve:

Removal of the large piston ring from the outside diameter of clutch piston allows the retaining pin to move out radially and free the ball for removal purposes.

NOTES

TWO SPEED FORWARD AND REVERSE TRANSMISSION

ASSEMBLY PRECAUTIONS

1. When reassembling clutch shaft into clutch assembly, make sure that the oil feed passages in the shaft and clutch assembly are indexed properly.

2. The steel clutch separator plates are coned. It is necessary to assemble the plates with this cone pointed in one and the same direction for a given clutch pack.

3. The use of rags for a final wipe of parts before reassembly can lead to lint coated parts and the eventual plugging of the intake screen. After a final wash before reassembly, air dry parts or assemble parts wet.

NOTES

TROUBLE DIAGNOSIS, GENERAL

When a transmission malfunction is encountered, the following general procedure will aid in isolating the failure:

1. Check oil level; if low, bring level up to full mark and recheck operation of vehicle.

2. Check external linkage connections to both selector valves and to the clutch control valve.

3. Using the included drawings and power flow diagrams, mount pressure gages on the transmission at appropriate locations and check for absence or presence of operating pressure.

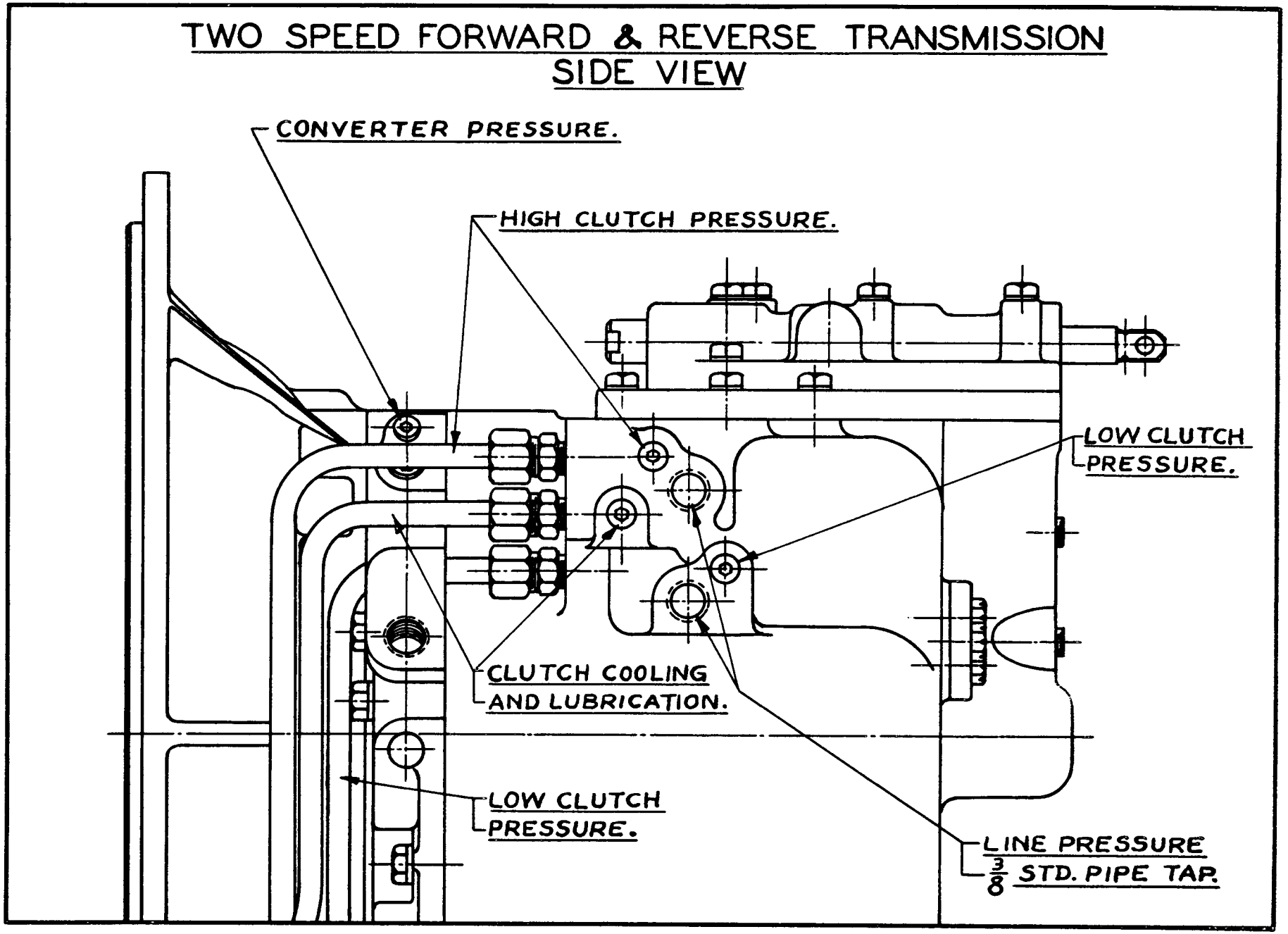
NOTES

TROUBLE DIAGNOSIS CHART

TROUBLE	SYMPTOMS	CAUSE
Loss of Drive	Low Oil Pressure	1. Low oil level. 2. Leaking oil seals. 3. Broken sealing rings. 4. Clogged intake screen. 5. Dirt in valve block.
	High Oil Pressure	1. Oil line restricted due to improper gasket assembly.
Transmission Tie-Up	Pressure Normal or Pressure Low	1. Clutch has been reassembled with cone of steel separator plates pointing in opposite directions.

NOTES

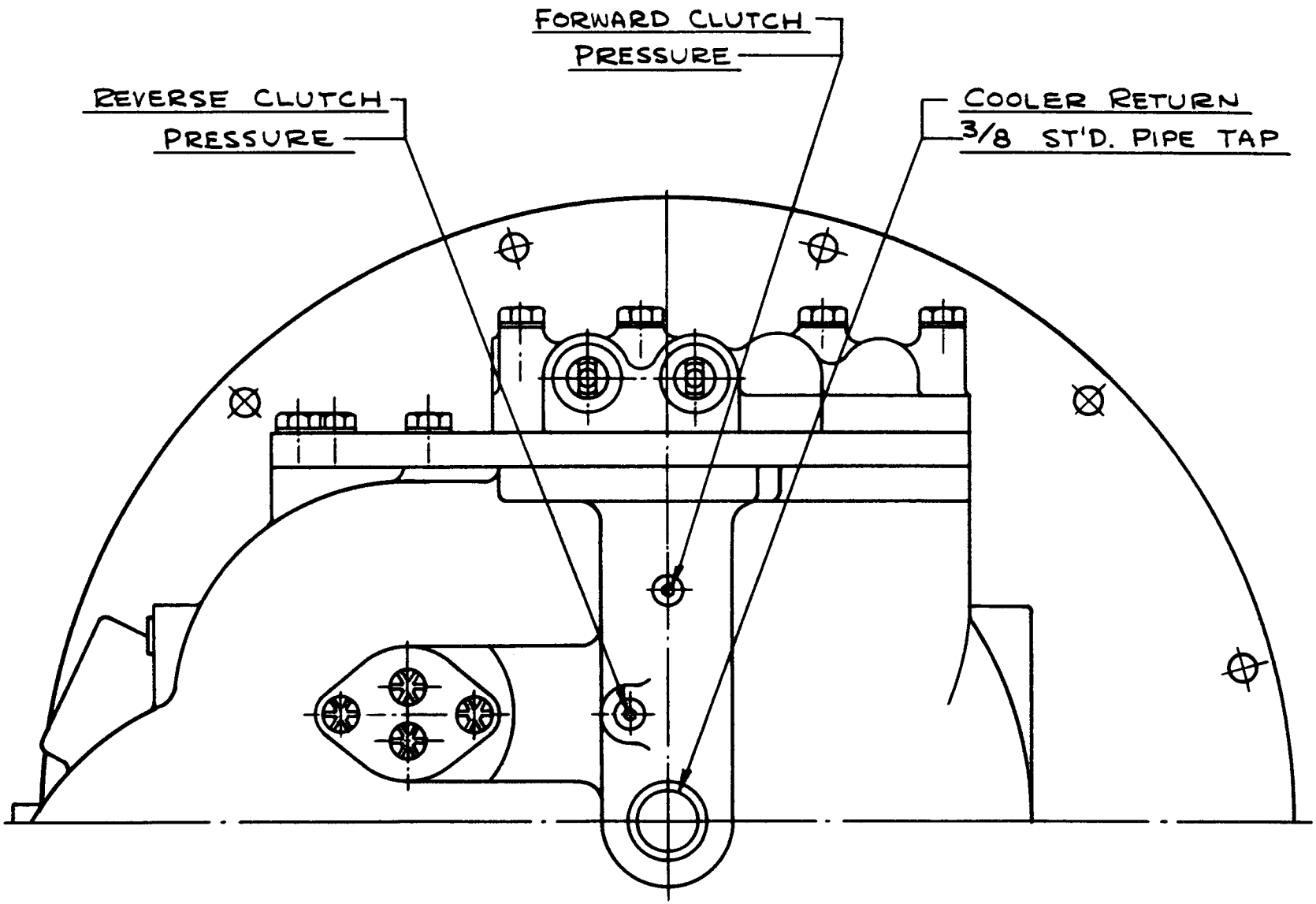
TWO SPEED FORWARD & REVERSE TRANSMISSION
SIDE VIEW



NOTES

TWO SPEED FORWARD & REVERSE TRANSMISSION

REAR VIEW



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