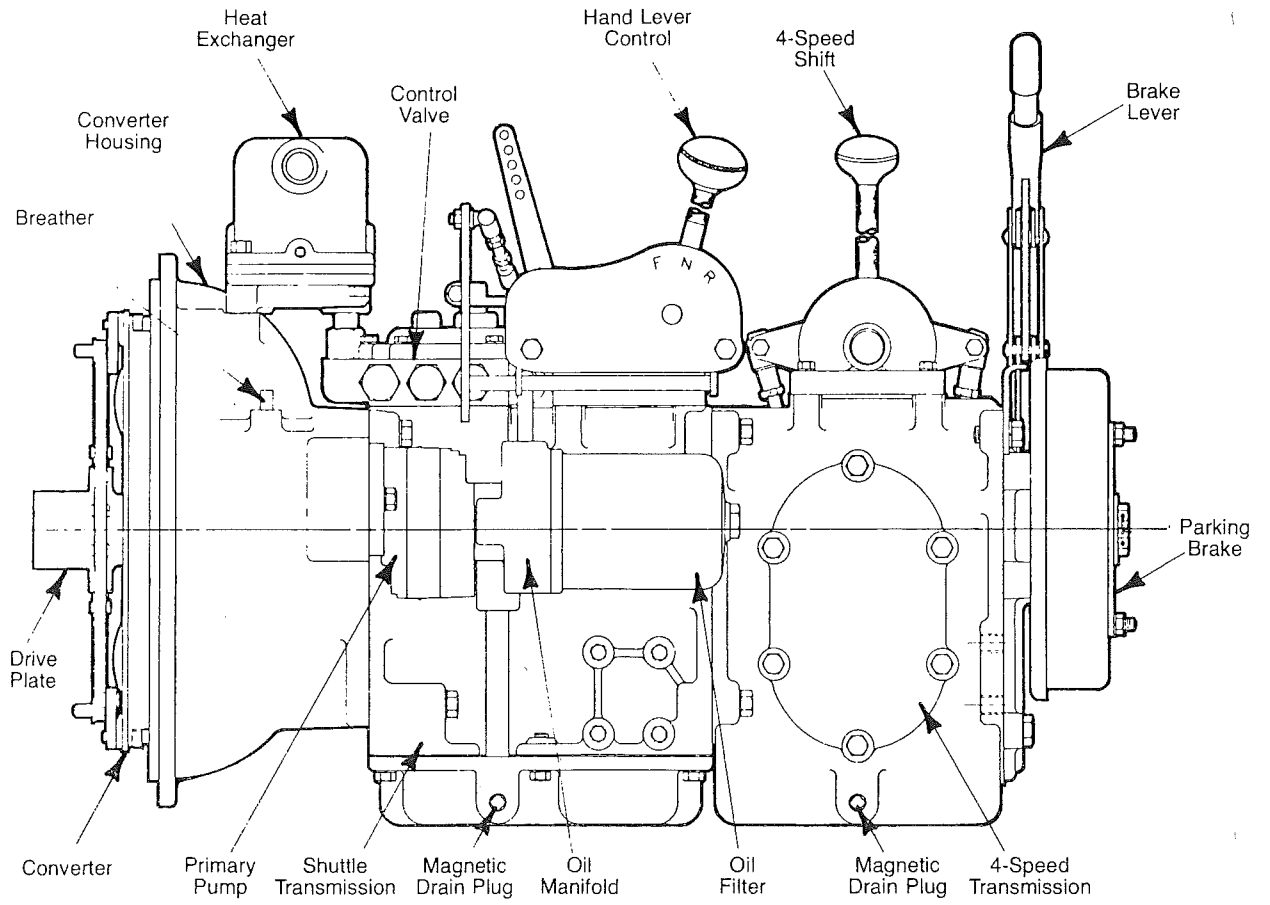


UNIT IDENTIFICATION



OPERATION

Like all mechanical equipment, the Funk Revers-O-Matic™ Drive will need attention and servicing. Routine checks will help prevent down-time. The operator can aid in preventive maintenance by occasionally reading the instrument panel gauges and keeping a watchful eye; reporting weak, borderline malfunctioning.

Because the unit operates "IN" oil and "BY" oil, most of the maintenance is concerned with oil replenishment and oil cleanliness.

RULES OF OPERATION

1. Check oil level daily, stopping engine before checking.

Make sure area around oil fill is clean before removing dipstick. A drain cock or plug is provided on the oil fill side of the unit at oil level. If working conditions are severe, it is recommended that the oil level be checked using the drain cock; that is, if oil starts to drip out when opening the drain a proper oil level is being maintained. This method of checking the oil is especially desirable on units operating in mines, sand and gravel pits, etc. where it is highly possible to have foreign material packed around the oil fill where it could fall into the unit when the dipstick is removed.

2. Always shift the Revers-O-Matic to neutral before starting engine, or when the vehicle is parked and the engine is running.

To move the vehicle, select the speed range desired by shifting the transmission behind the shuttle box and then engage the directional clutch (forward or reverse) in the Revers-O-Matic.

3. Engage forward and reverse clutches at idle speed only.

4. Use brakes to slow vehicle before applying the opposite clutch.

5. Pay particular attention to the instrument panel to monitor clutch pressure and oil temperature.

6. The oil pressure gauges should read approximately 160 P.S.I. (1102.4 kPa) with the engine running above 1200 R.P.M. If pressure varies more than 15 P.S.I. (103.35 kPa) from the above, check per "IRREGULAR OIL PRESSURE" section on a later page. At engine idle speeds, and/or when the hydraulic clutches are engaged, the pressure will momentarily drop, but should return to normal as soon as the engine speed is increased.

7. If the oil temperature gauge which is the converter oil "OUT" temperature rises above 250°F. (121°C.), stop the vehicle immediately. Shift Revers-O-Matic to neutral and run the engine at 1000-1200 R.P.M. The temperature should drop rapidly to the engine water temperature within (3) three to (4) four minutes. If the temperature does not drop, trouble is indicated. The cause of trouble should be determined before further operation of the vehicle; refer to "TROUBLE SHOOTING" instructions to be found elsewhere in this manual.

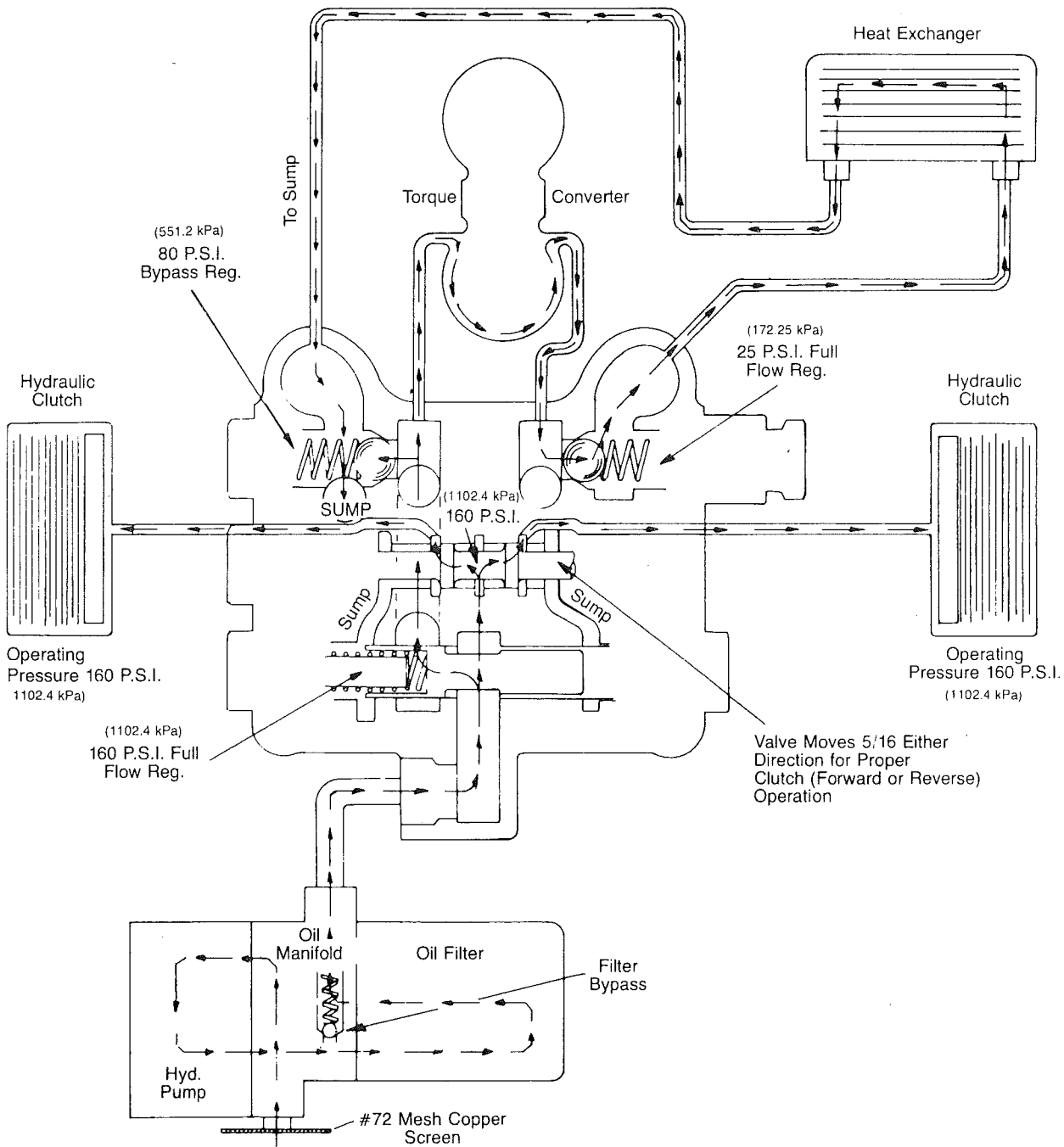
Generally when overheating does occur, it is due to rapid reversals in the higher gear ratios. Shifting to a lower gear will help eliminate overheating due to this cause.

8. When towing the vehicle, always disconnect the drive shaft. The standard transmissions do not have towable features.

NOTE: The right or left hand side is determined by viewing from rear of unit, looking forward to the engine flywheel.

REVERS-O-MATIC™ HYDRAULIC FLOW DIAGRAM

MODEL
12000



OIL SYSTEM 12000

OPERATING PRESSURES

Clutch Operating Pressure	160 P.S.I. (1102.4 kPa)
Converter Charge Pressure	80 P.S.I. (551.2 kPa)
Converter Out Pressure	25 P.S.I. (172.25 kPa)

OPERATING TEMPERATURE Maximum 250°F. (121°C.)

OIL CAPACITY

Without Selective Speed Transmission	11 Qts. (10.41 l)
With Selective Speed Transmission	15 Qts. (14.196 l)

LUBRICATION

Revers-O-Matic™	Pressure Lubricated
Selective Speed Transmission	Splash Lubricated

RECOMMENDED OILS SERIES RC, 50000, & 12000

LUBRICANT TYPE: Any oil which meets Dexron or Dexron II Automatic Transmission Fluid Specifications.
or

Any Oil which meets Allison Type C2 or C3 Hydraulic Transmission Fluid Specifications.

NOTE: Type "A", suffix "A" ATF is not approved for use.

LUBRICANT GRADE: Weather Temperature

1. If Fluid is below -10°F. (-23°C.), an external heat source must be used to raise the fluid temperature to -10°F. (-23°C.)

NOTE: ALL models of the Revers-O-Matic™ with a selective speed transmission, have a common oil fill with the exception of the drop-box transmission version only. This means that in a majority of the applications the entire unit may be filled with lubricating oil from one oil fill location, positioned on the left or right hand side of the Revers-O-Matic shuttle transmission.

When draining for an oil change, the Revers-O-Matic™ and ALL variable speed transmissions must be drained separately.

INSTALLATION

TRANSMISSION TO ENGINE:

1. Remove drive plate assembly and converter from Revers-O-Matic™ by pulling straight out.
2. Detach drive plate assembly from converter.
3. Fasten drive plate assembly to engine flywheel with capscrew and lockwashers provided in parts bag.
4. Fasten converter to drive plate assembly with eight socket head capscrews provided in parts bag.
5. Center converter hub gear seal ring in its groove. Grease should hold ring in position.
6. Align Revers-O-Matic with converter and mate together. (See Note - Pg. 8)

CAUTION:

Unit should be supported by hoist so that it can be positioned directly in line with converter hub. Carefully insert input shaft into bore of converter keeping shaft well centered in bore. Advance unit toward engine slowly in order to feel when splines begin to mate. If unit stops advancing at this point, rock gently to permit splines to line up. **DO NOT FORCE UNIT AT ANY TIME**, when splines and gear teeth line up, unit will close up easily.

7. Install bolts holding unit to engine bell housing.
8. Install water hoses between heat exchanger and engine cooling system.

PERFORMANCE AND STALL TEST

If all preliminary checks are satisfactory, make a performance and stall test as described below.

1. Run the engine at 1000-1200 R.P.M. with the unit in neutral until normal engine operating temperature is reached.
2. Attach a tachometer to the engine and position the instrument so that it can be read from the drivers seat.
3. Apply the service and parking brakes firmly .
4. With a steady pressure, depress the forward pedal or lever to the wide open throttle position. Observe the tachometer reading. The engine speed should increase to the TOP governor R.P.M. as shown on the torque curve sheet. If engine speed is below the minimum requirements, it is an indication that the engine is not operating at peak efficiency. Take all necessary steps to correct the engine deficiency, and again perform the test. Check the R.P.M. with the reverse pedal or lever fully depressed. The engine speed should be the same as above.
5. Next, place the transmission behind the Revers-O-Matic (shuttle box) in high gear, leaving all brakes applied.

With a steady pressure, depress the forward pedal or lever to the wide open throttle position. Make note of the tachometer reading. The engine speed should increase to the "MINIMUM" static R.P.M. as shown on the torque curve sheet. If engine speed is below the minimum requirements, it is an indication that the engine is at fault and should be checked out as described in (4) above. If a drop in stall speed persists, it indicates trouble in the transmission. If the stall speed is considerably below the minimum specified, it is an indication that the trouble is more likely in the converter. The remedy is to disassemble the converter and examine the converter parts for wear and any irregularities. Check out the stator, making sure it is not in backwards, and examine the one way clutch if your unit is equipped with a 11 $\frac{3}{4}$ " (298.45 mm) or 12" (304.80 mm) converter.

If the engine speed is over the "MAXIMUM" static R.P.M. as shown on the torque curve sheet, or if engine runaway is apparent, release the accelerator pedal or return the lever to neutral immediately to prevent possible damage to the transmission. This is an indication of transmission malfunction, and should be checked out per the "CHECKLIST" instructions following. Repeat the same test, with the reverse pedal or lever depressed to the wide open throttle position.

Stall test tachometer readings require careful interpretation. During a stall test, the engine, torque converter, and hydraulic clutches are all under test at the same time.

CAUTION: Because of the rapid rise in oil temperature, the stall condition should be maintained only long enough for the tachometer reading to stabilize. Five seconds is usually adequate time for an accurate reading. Under no circumstances should the stall period exceed 30 seconds at a time. Between test, run the engine for at least (2) two minutes at 1000-1200 R.P.M. with the Revers-O-Matic in neutral. This will permit the converter oil to flow into the heat exchanger and back to the transmission sump.

CHECK LIST SERIES 12000

When trouble shooting the Model 12000 Revers-O-Matic Drive, the items listed below are the most likely source of trouble.

LOW ENGINE SPEED AT CONVERTER STALL

Conduct stall test previously described, checking the following:

1. CHECK ENGINE FOR LOW OUTPUT TORQUE - Tune the engine and check output.
2. CHECK FOR CONVERTER ELEMENT INTERFERENCE - Listen for noise at stall, overhauling converter if necessary.
3. CHECK STATOR FOR IMPROPER INSTALLATION - Disassemble converter and examine parts affected, making sure stator is not in backwards. Examine one way clutch if your unit is equipped with a 12" (304.80 mm) converter.

HIGH ENGINE SPEED AT CONVERTER STALL

1. CHECK TRANSMISSION FOR LOW OIL LEVEL - Add oil; refer to the identification tag on shuttle box.
2. CHECK FOR LOW CONVERTER "OUT" PRESSURE - (This is a pressure of approximately 25 P.S.I. (172.25 kPa) and is not normally checked with a pressure gauge). For indication of malfunction due to this cause, check the following:
 - a. Check for leakages.
 - b. Disassemble the third regulator valve (one closest to the front, on right hand side looking from rear) by first removing the oil temperature line. Inspect ball, ball seat in valve body, and spring. Ends of spring must be free of burrs and sharp edges.
 - c. Check for clogged or dirty lines in the hydraulic system, cleaning as required.
 - d. Check for damaged oil pump, replacing worn or damaged parts.
3. CHECK UNIT FOR HIGH OIL TEMPERATURE - Observe oil temperature gauge on instrument panel; refer to the "HIGH OIL TEMPERATURE" section below.
4. CHECK FOR CLUTCH SLIPPAGE - Observe the oil pressure gauge on the instrument panel, checking per the "IRREGULAR OIL PRESSURE" section below. If unit is still malfunctioning, disassemble clutch stack and inspect for worn or damaged parts.

HIGH OIL TEMPERATURE

If the oil temperature gauge on the instrument panel indicates that the oil temperature is running above normal as specified under the "OPERATING TEMPERATURE" section.

1. CHECK TRANSMISSION OIL LEVEL - Add oil if required. Drain to full mark by using drain cock or plug at oil level if overfilled.
2. CHECK WATER LEVEL IN ENGINE COOLING SYSTEM - Add water if required and inspect for leaks.
3. CHECK FOR LOW CONVERTER "OUT" PRESSURE - Refer to the "HIGH ENGINE SPEED AT CONVERTER STALL" section.
4. CHECK FOR CLOGGED OR DIRTY HEAT EXCHANGER - Clean or replace as necessary.
5. CHECK POSSIBILITY OF OPERATING TOO LONG IN AN INEFFICIENT CONVERTER RANGE - Shift transmission, adjusting work cycle to allow operation in a more efficient range.
6. CHECK FOR LOW STALL SPEED - Check for lack of power at converter stall; refer to "LOW ENGINE SPEED AT CONVERTER STALL" section.

BUZZING VALVE

A buzzing valve is closely related to "IRREGULAR OIL PRESSURE" and "HIGH OIL TEMPERATURE", and as such, these two items must be checked if the buzzing condition exists. Pay particular attention to the high pressure valve check, and inspect for foaming oil.

LOSS OF POWER

If unit appears to be suffering from lack of power after engine performance has proven satisfactory:

1. CHECK STATOR FOR IMPROPER INSTALLATION - Disassemble converter and examine parts affected, making sure stator is not in backwards. Examine one way clutch if your unit is equipped with a 12" (304.80 mm) converter.
2. CHECK FOR LOW STALL SPEED - Refer to "LOW ENGINE SPEED AT CONVERTER STALL" section.
3. CHECK FOR CLUTCH PLATE SLIPPAGE - If slippage is suspected:
 - a. Check for low clutch pressure; refer to "IRREGULAR OIL PRESSURE" section.
 - b. Check unit for worn piston seals; disassemble clutch stack and check piston seals for nicks, cuts, or wear.
4. CHECK FOR FOAMING OIL - If foaming oil is prevalent:
 - a. Check for improper oil level, adding oil if required. Drain to full mark by using drain cock or plug at oil level if overfilled.
 - b. Check for water in oil, replacing oil if necessary.
 - c. Check for air leaks around oil tubes, making corrections per "LEAKY OIL TUBE" section.
 - d. Check oil pump for worn parts, replacing damaged parts as required.

NO POWER TRANSMITTED IN EITHER CLUTCH

If the condition exists:

1. CHECK CLUTCH SELECTOR VALVE FOR PROPER OPERATION.
 - a. Adjust linkages from shuttle control box to valve for proper adjustment.
 - b. Remove valve cover and inspect arm that actuates the clutch selector valve for proper operation.
 - c. Disassemble the clutch selector valve (one in center, on left hand side looking from the rear), by removing end cap. NOTE: Valve cover must be off in order to accomplish this. Inspect parts and bore for wear, replacing worn parts as necessary. Parts must be free from burrs and sharp edges.
2. CHECK FOR LOW CLUTCH PRESSURE - Refer to the "IRREGULAR OIL PRESSURE" section.

POWER TRANSMITTED IN ONLY ONE CLUTCH

If this condition is apparent:

1. FIRST CHECK UNIT UNDER "NO POWER TRANSMITTED IN EITHER CLUTCH" above.
2. DISASSEMBLE CLUTCH STACK AND CHECK FOR BROKEN SEAL RINGS ON OUTPUT SHAFT, INPUT SHAFT, AND OIL SLEEVE DISTRIBUTOR TUBE - Replace broken seal rings.
3. WITH CLUTCH STACK DISASSEMBLED, CHECK PARTS IN INOPERATIVE CLUTCH FOR WEAR AND MALFUNCTION - Replace worn or damaged parts, checking closely for damaged seals.

SLOW CLUTCH ENGAGEMENT

If either clutch appears to suffer from slow clutch engagement:

1. CHECK FOR FOAMING OIL - Refer to "IRREGULAR OIL PRESSURE" and "LOSS OF POWER" sections.
2. CHECK FOR LOW CLUTCH PRESSURE - Refer to "IRREGULAR OIL PRESSURE" section.
3. CHECK FOR WORN PISTON SEALS - Disassemble and inspect seals for wear, replacing as required.

VEHICLE DRIVES IN FORWARD, AND CREEPS FORWARD IN NEUTRAL, BUT STALLS WHEN SHIFTED TO REVERSE

1. CHECK FOR FAILED FORWARD CLUTCH - Overhaul forward clutch replacing all worn and damaged parts.

If oil and filter show contamination, the entire system must be thoroughly washed and cleaned; changing oil and filter.

VEHICLE DRIVES IN REVERSE, AND CREEPS BACKWARD IN NEUTRAL, BUT STALLS WHEN SHIFTED TO FORWARD

1. CHECK FOR FAILED REVERSE CLUTCH - Overhaul reverse clutch replacing all worn or damaged parts.

If oil and filter show contamination, the entire system must be thoroughly washed and cleaned; changing oil and filter.

NOISY TRANSMISSION

If the noise level of the unit appears to be excessive:

1. CHECK FOR IMPROPER OIL LEVEL - Add oil if required. Drain to full mark by using drain cock or plug if oil level is overfilled.
2. CHECK FOR CLOGGED FILTER - Replace filter if necessary.
3. CHECK FOR AIR LEAKS - Inspect around oil tubes, seals, and gaskets.
4. CHECK FOR LOOSE MOUNTING BOLTS - Tighten bolts to proper torque.
5. CHECK FOR DAMAGED GEAR TEETH - Replace as necessary.
6. CHECK FOR FLAWS IN GEAR SHAFT - Replace as necessary.
7. CHECK FOR FLYWHEEL HOUSING MISALIGNMENT - Realign using indicator if required.

EXCESSIVE VIBRATION

If vibration seems to be excessive:

1. CHECK FOR LOOSE MOUNTING BOLTS - Tighten bolts to proper torque.
2. CHECK FOR DAMAGED GEAR TEETH - Replace as necessary.
3. CHECK FOR FAULTY GEAR BOX BEARINGS - Inspect and replace as necessary.

DIFFICULT TO CHANGE GEAR RATIOS

If any difficulty is experienced when shifting gears:

1. CHECK FOR PROPER LUBRICANT - Replace if necessary.
2. CHECK TRANSMISSION LINKAGE FOR BENT, WORN, OR BORKEN PARTS - Replace worn parts and adjust linkage.
3. CHECK FOR ENGAGED CLUTCH IN REVERS-O-MATIC (SHUTTLE BOX) - Return pedal or lever to neutral.
4. CHECK FOR CLUTCH DRAG IN REVERS-O-MATIC (SHUTTLE BOX) - If transmission will not shift gears without raking teeth with vehicle stationary:
 - a. First check for proper control linkage adjustment between control box and control valve.
 - b. If clutch drag is still prevalent, disassemble the clutch stack and inspect parts in clutch affected for malfunction.

FOAMING OIL BREATHER:

If oil is foaming out of breather:

1. FIRST CHECK FOR IMPROPER OIL LEVEL, OIL AND AIR LEAKS, PUMP SUCTION TUBE LEAKS, WORN PUMP PARTS, AND WATER IN OIL - Refer to "IRREGULAR OIL PRESSURE" section and "LOSS OF POWER" section.
2. IF UNIT CONTINUES TO FOAM THRU THE BREATHER, CHECK FOR BROKEN CONVERTER HUB GEAR SEAL RING - Break unit at engine flywheel housing mounting face by removing 12 $\frac{3}{8}$ " (9.525 mm) capscrews. Pull unit off unit engine and inspect seal ring, replacing if necessary.

CAUTION! WHEN REASSEMBLING UNIT TO ENGINE:

- a. First apply heavy grease to the stator hub and input shaft splines. (the (2) two splines projecting out into the converter housing) and the converter hub gear seal ring.
- b. Center the converter hub seal ring in its groove. The grease should hold the ring in position.

The above procedures will greatly aid in the installation of the unit, and will insure the seal ring to a high degree against breakage.

WET CONVERTER HOUSING

If oil is leaking out the air vent holes in the bottom of the converter housing:

1. FIRST, BREAK UNIT AT ENGINE FLYWHEEL HOUSING MOUNTING FACE - Inspect converter hub gear seal ring for breakage as described under "FOAMING OIL BREATHER" section.
2. CHECK CONVERTER FOR LEAKS - Examine the converter, especially where the hub gear bolts onto the converter.
3. CHECK OIL SEAL INSIDE CONVERTER HOUSING - Replace if damaged.

LEAKY OIL TUBE

If oil is leaking around oil tube:

Straight tubes may be rotated back and forth using a pair of channel-lock pliers. This will generally seal the O-ring on the end of the tube sufficient to seal off the leak.

ATTACHED TRANSMISSIONS

FUNK REVERS-O-MATIC DRIVES WILL IN MANY APPLICATIONS HAVE A VARIABLE SPEED STANDARD TRANSMISSION MOUNTED DIRECTLY TO THE SHUTTLE BOX.

FOR ADDITIONAL SERVICE INFORMATION ON THE ATTACHED TRANSMISSIONS, REFER TO FUNK HMD SERVICE MANUAL NUMBER 4012010.