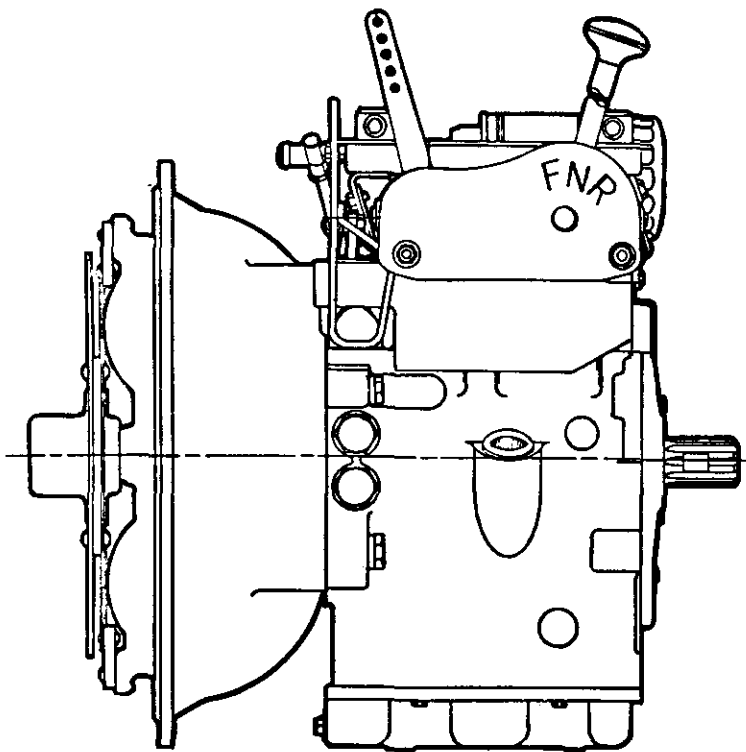


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DESCRIPTION

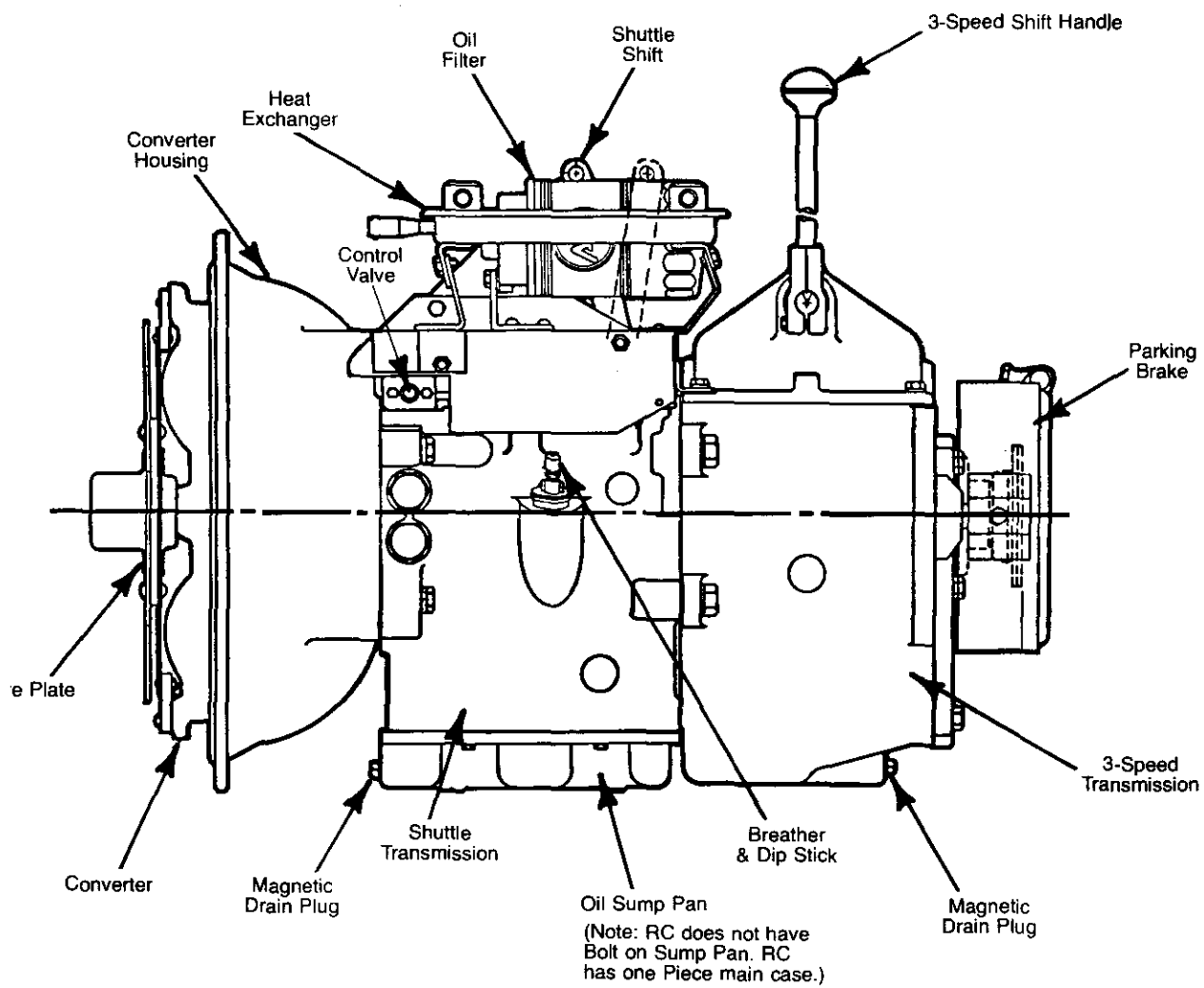
The Funk Revers-O-Matic[™] Drive is a shuttle type transmission consisting basically of (2) two hydraulically actuated, spring released, multiple disc clutches. When the front clutch is engaged, the output shaft rotates enginewise and in most applications forward vehicular motion is obtained. The rear clutch is driven by an idler/countershaft gear train and its rotation is opposite to that of the front clutch. Therefore, when the rear clutch is engaged, the output shaft rotates anti-enginewise and in most applications rearward vehicular motion is obtained.

Power is transmitted from an engine to the Revers-O-Matic[™] Drive through the use of a torque converter. Being no direct mechanical connection between power and load, a very smooth and shock-free drive is obtained with complete absence of engine stalling and lugging. Consequently the maintenance of axles, bearings, differentials, and gears is reduced to a minimum. Another feature of the torque converter drive is the automatic multiplication of engine torque during the periods of heavy pull-down loads. When loads are light, the converter transmits the engine power directly at almost engine speed without torque multiplication. With the output torque automatically adjusting to the load demand, the net result is an action like a transmission with infinitely variable and automatic speed ratios. The need for shifting gears, although present, is greatly reduced along with driver fatigue.

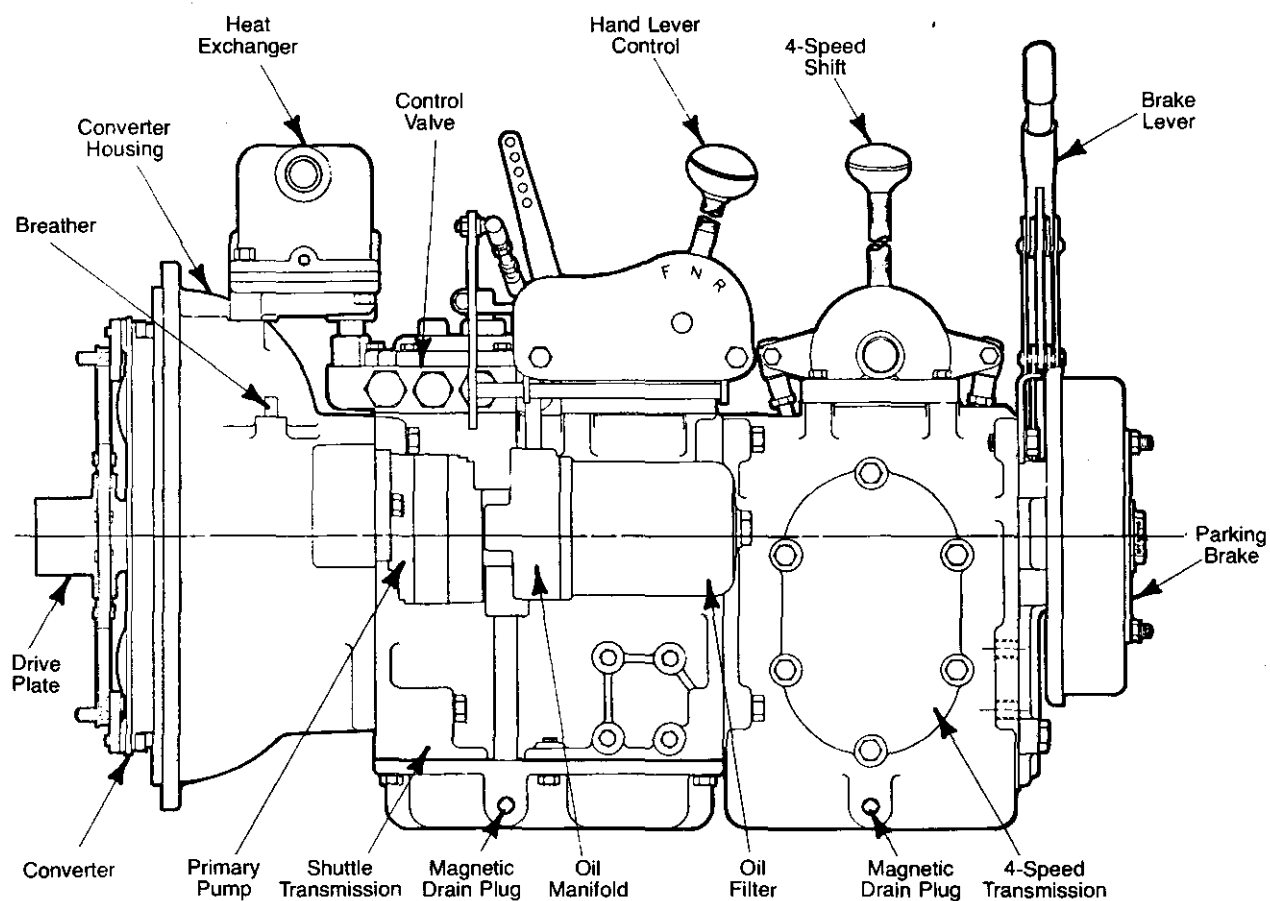
Due to the design of the control system, the clutches are engaged prior to engine acceleration. This means the clutches do not absorb the power and cannot be subjected to slippage under load. This arrangement greatly increases the life of the clutches. Since the clutches are hydraulically controlled, there is automatic compensation for normal wear; thus no adjustment is necessary.

UNIT IDENTIFICATION

SERIES
RC AND
50000



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.

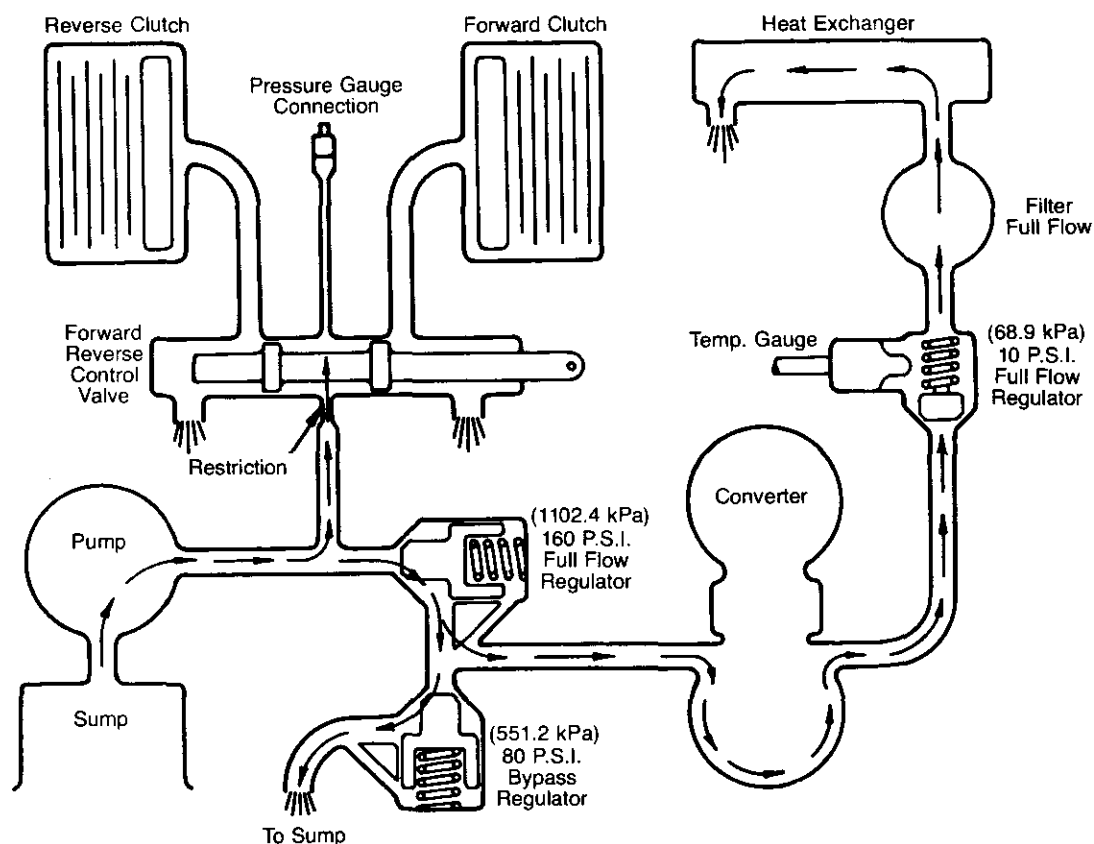
2. Always shift the Revers-O-Matic to neutral before starting engine, or when the vehicle is parked and the engine is running.

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**



OIL SYSTEM **50000 AND RC**

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	10 P.S.I. (68.9 kPa)

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

OIL CAPACITY

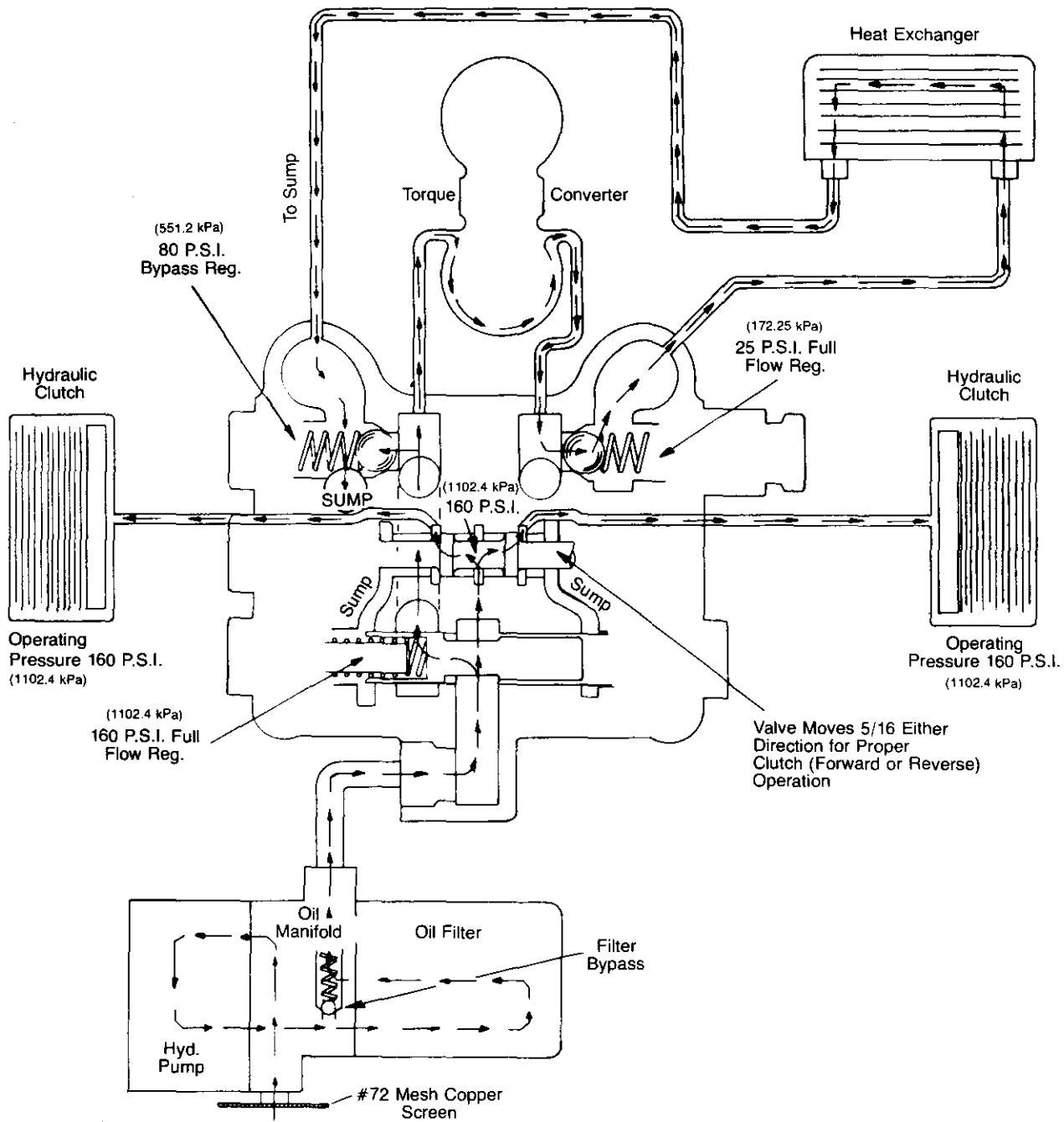
	50000	RC
Without Selective Speed Transmission	10 Qts. (9.464 l)	9 Qts. (8.517 l)
With Selective Speed Transmission	14 Qts. (13.249 l)	13 Qts. (12.303 l)

LUBRICATION

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

REVERS-O-MATICTM 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)

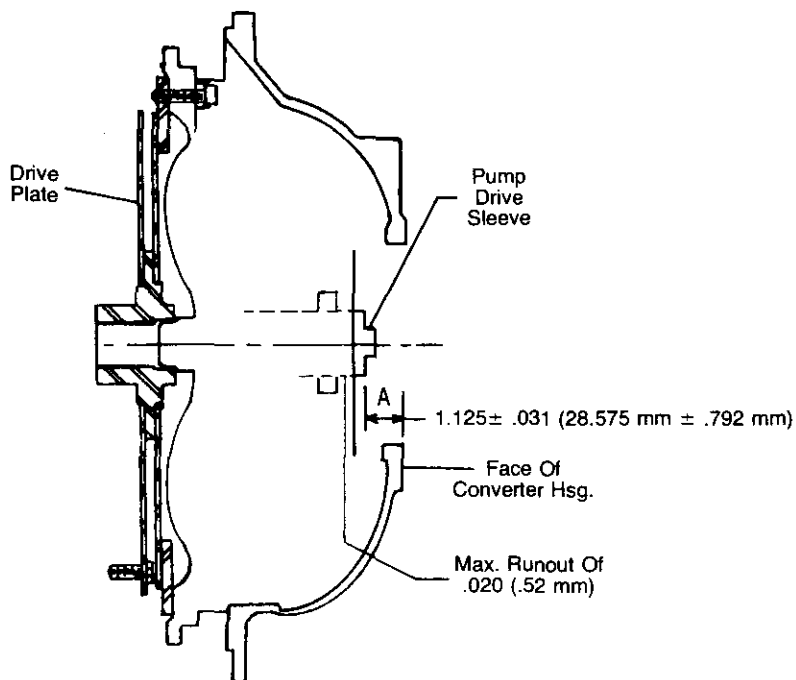
CAUTION:

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.

NOTE: For Series RC & 50000, the following dimensional check must be made prior to installation of Revers-O-Matic box.

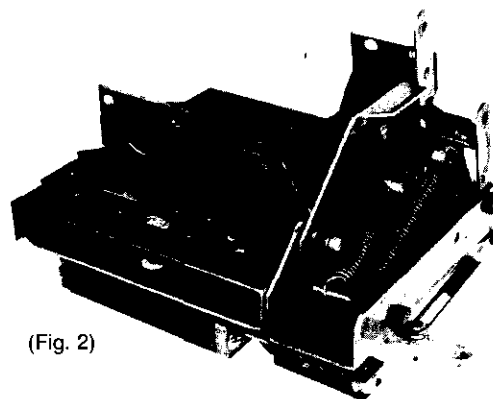
- a. After the drive plate and torque converter has been attached to the engine flywheel, remove the converter housing from the Revers-O-Matic[™] and attach this to the engine flywheel housing. The capscrews and lockwashers for this are not ordinarily supplied.
- b. The location of the pump drive end of the converter (shown as dimension "A" Fig. #1) must be checked on all installations. Due to the flexibility of the drive plate allowing the converter to tilt slightly, it will be necessary to hold the converter hub in the center position.
- c. The dimension "A" is to be $1\frac{1}{8}$ " (28.575 mm) plus or minus $\frac{1}{32}$ " (.792 mm) and may be checked with a depth mike or a closely graduated scale rule and a straight edge. The dimension "A" is to be checked at the end of the pump drive sleeve and not at the ends of the two driving lugs. (see Fig. #1)



(Fig. 1)

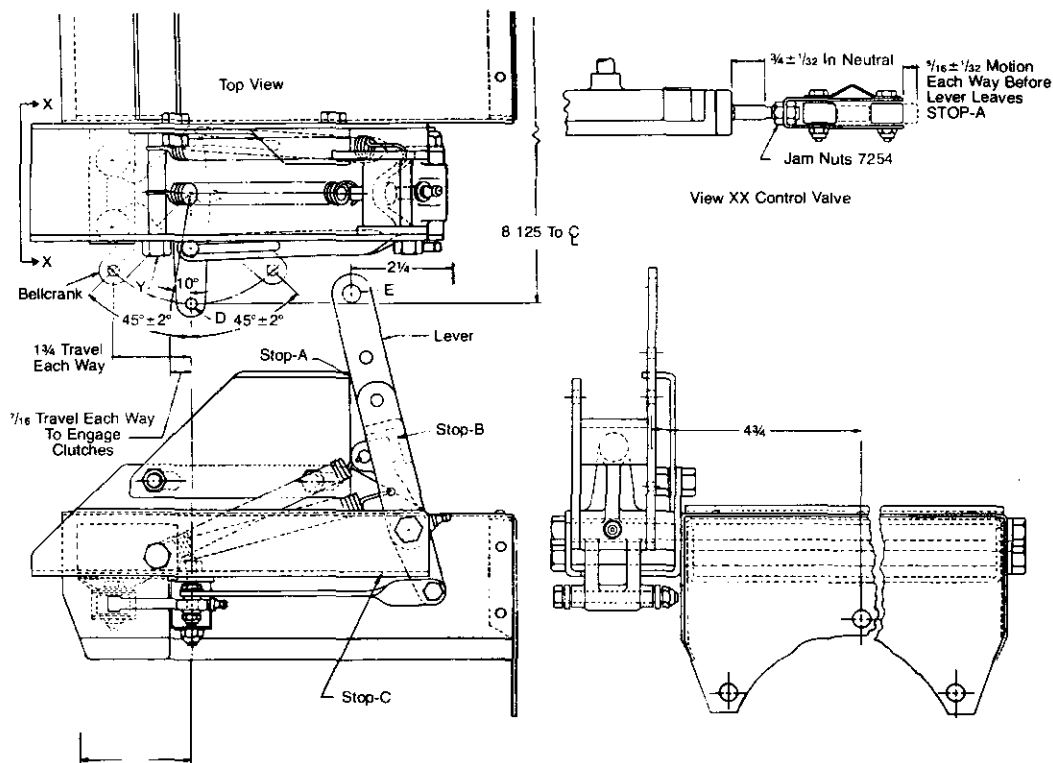
VALVE SELECTOR

The Revers-O-Matic™ Drive is controlled by (1) one of (2) two basic control systems. The standard control (fig. 2) is a very unique system that sorts out motions from a single hand lever that FIRST engages one of the clutches and then accelerates the engine as the lever is moved further. Therefore, it is a unified control that regulates both the direction of travel and the speed of travel. Movement of the lever from a neutral position in one direction produces forward motion, and opposite movement of the lever produces rearward motion.



(Fig. 2)

ADJUSTMENTS



ADJUSTMENTS

Centering control valve. Adjust Jam Nuts to hold $\frac{3}{4} \pm \frac{1}{32}$ (19.05 mm \pm .792 mm) dim. Shown when control system is in neutral. (View XX)

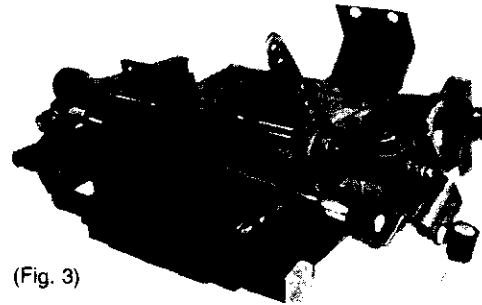
STOP ADJUSTMENTS

Stop-A should be adjusted fore or aft to a position that will allow valve to move in or out $\frac{1}{16} \pm \frac{1}{32}$ (7.937 mm \pm .792 mm) before lever leaves stop-A-and-stop-B has closed.

Nut-Y should be drawn up snug but not tight --- if tension on this nut is changed or if control system is replaced. Recheck centering of control valve.

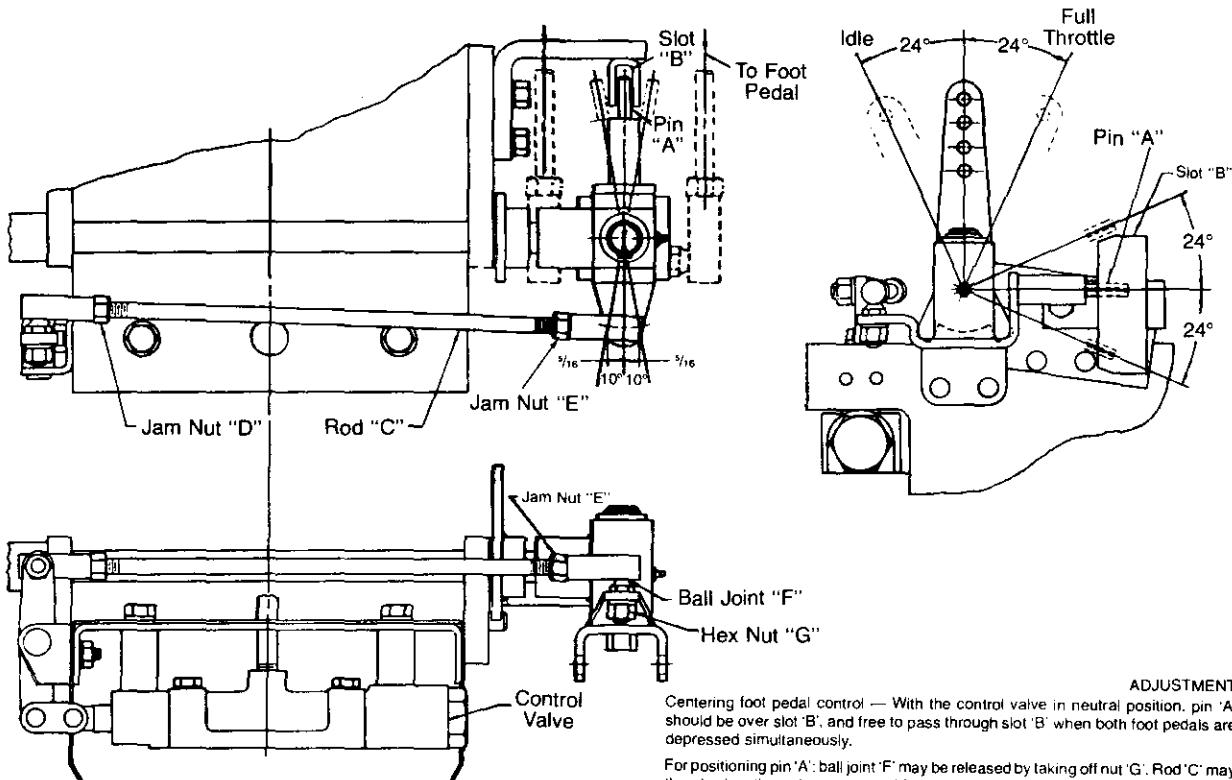
DESCRIPTION

The optional control (Fig. 3) is basically the same type as the standard control, except that it is actuated by foot pedals instead of a hand lever. The action of the foot pedal is essentially the same, except that one pedal produces forward motion and the other rearward motion.



(Fig. 3)

ADJUSTMENTS



ADJUSTMENT

Centering foot pedal control — With the control valve in neutral position, pin 'A' should be over slot 'B', and free to pass through slot 'B' when both foot pedals are depressed simultaneously.

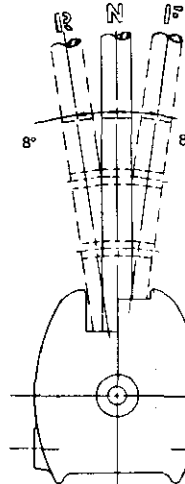
For positioning pin 'A': ball joint 'F' may be released by taking off nut 'G'. Rod 'C' may then be lengthened or shortened for the positioning of pin 'A'.

After adjustment, when pressure is applied to only one foot pedal, the pin assembly will swing 10° respectively.

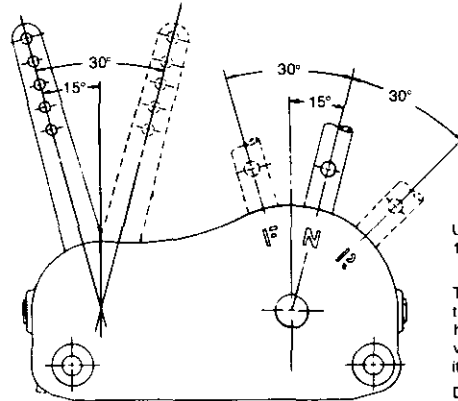
While depressing the foot pedal, pin 'A' will move down, and should clear the outside of the slot.

VALVE-SELECTOR

The Model 12000 Revers-O-Matic Drive is equipped with a unified control system that regulates both the direction of travel and the speed of travel. This is generally accomplished thru the use of a single hand lever control. Sideways movement of the control lever from the neutral (center) position engaged one of the hydraulically actuated clutches; either forward or reverse. (Figure 1) Back and forth movement of the lever controls the speed of travel. (Figure 2)



(Figure 1)



(Figure 2)

STOP ADJUSTMENTS

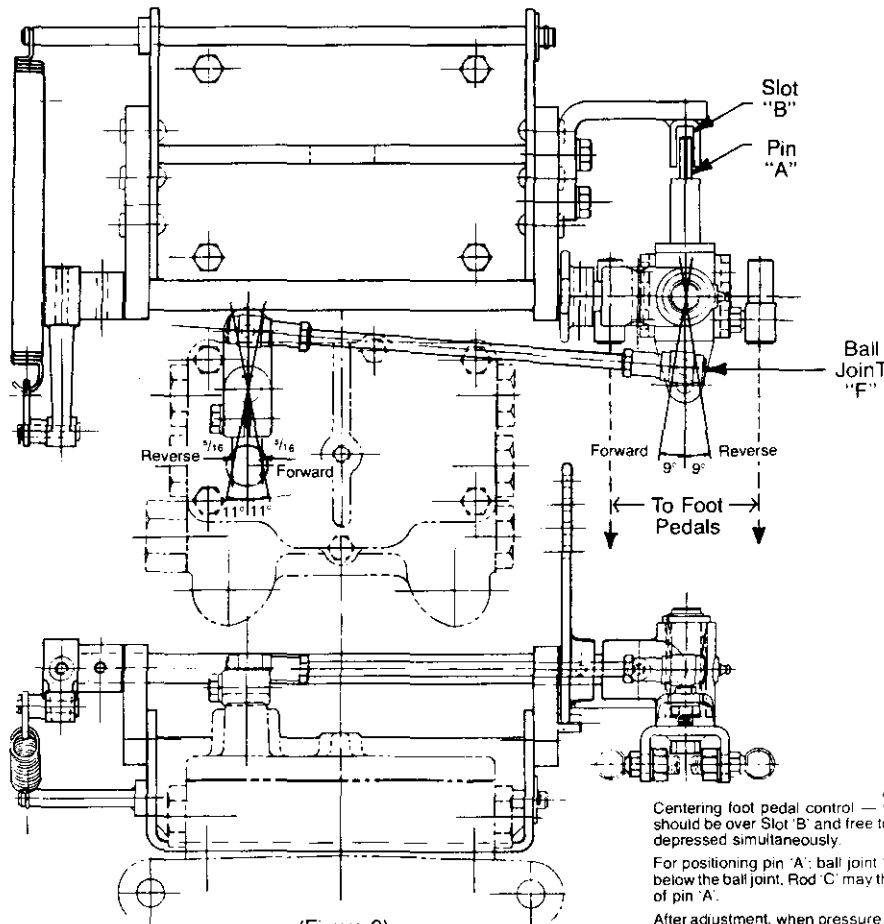
Unlike the valve selectors for the RC & 50000, there are no stop adjustments for the 12000 Series.

ADJUSTMENTS

The control valve for the 12000 is either "three position" or "self centering." The three position valve incorporates a detent ball and spring and allows the operator to have a distinct feel for each position; forward, neutral and reverse. The self centering valve incorporates a spring on the spool which will return the valve to neutral when it's not held in forward or reverse.

Due to these designs, no adjustment of the valve is necessary to assure neutral position.

The unit is also available with a double pedal set-up. The action of the foot pedals is essentially the same as the hand lever control except that one pedal produces forward motion and the other rearward motion. (Figure 3)



(Figure 3)

ADJUSTMENTS

Centering foot pedal control — with the control valve in neutral position, pin 'A' should be over Slot 'B' and free to pass through Slot 'B' when both foot pedals are depressed simultaneously.

For positioning pin 'A': ball joint 'F' may be released by removing the nut directly below the ball joint. Rod 'C' may then be lengthened or shortened for the positioning of pin 'A'.

After adjustment, when pressure is applied to only one foot pedal, the pin assembly will swing 9° respectively.

While depressing the foot pedal, pin 'A' will move down, and should clear the outside of the slot.

HYDRAULIC COOLING SYSTEM

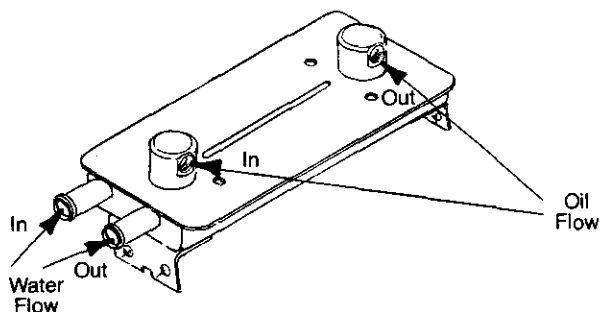
Oil coolers / or heat exchangers are offered as an option on all Funk Revers-O-Matics. Your particular transmission may or may not be equipped with a Funk oil cooler.

All Funk oil coolers are the "Oil to Water" type, and in most applications will be mounted on the top of the Revers-O-Matic box.

NOTE: Should repair be necessary on any Revers-O-Matic, be sure to clean the oil cooler and all the oil lines. This will help prevent contamination, which could cause premature wear, from entering the repaired transmission.

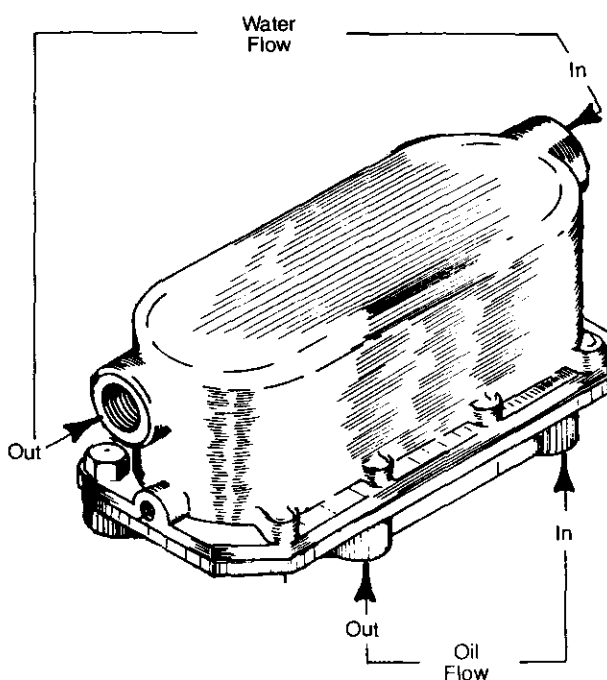
OIL COOLER INSTALLATION

RC & 50000



Line Size
Water $\frac{1}{2}$ " Heater Hose (12.70 mm)
Oil $\frac{5}{16}$ " (7.937 mm) O.D. with .035 (.90 mm) wall thickness

12000



Line Size
Water $\frac{3}{4}$ " Heater Hose (19.05 mm)
Oil $\frac{3}{4}$ " I.D. Min. (19.05 mm)

HYDRAULIC SYSTEM FILTER

Since the hydraulic system is the heart of the transmission, it is especially important that the oil be kept clean. The following is a recommended time interval for changing the lubricating oil and oil filter, based on hours of service and operation conditions.

20 hours	New and/or repaired transmission drained and refilled with new fluid. (DO NOT USE A FLUSHING FLUID) but the recommended grade of oil.
250 hours	Operation in severe dust, sand, or in underground environment.
375 hours	Operation in normal off highway conditions, rapid changes in ambient or transmission temperature, or in the presence of chemical fumes.
500 hours	Operation in clean environment. (Hard Surface roads, minimum dust, etc.)

RECOMMENDED OIL FILTERS

Series RC & 50000 AC Type PF2

Series 12000 In the past, the AC #PF-141 oil filter element has been acceptable to use. However, AC has redesigned this filter to use a sheet metal sleeve in each end, which will lock on the inner pilot of the filter cover. If the AC filter is to be used, the diameter of the inner pilot, in the oil filter cover, must be machined to 1.220" (31 mm)

The acceptable oil filter elements are the following:

Purolator	P-141
Fram	CH 200 PL
Atlas	G 64
Fleetguard	LF-553

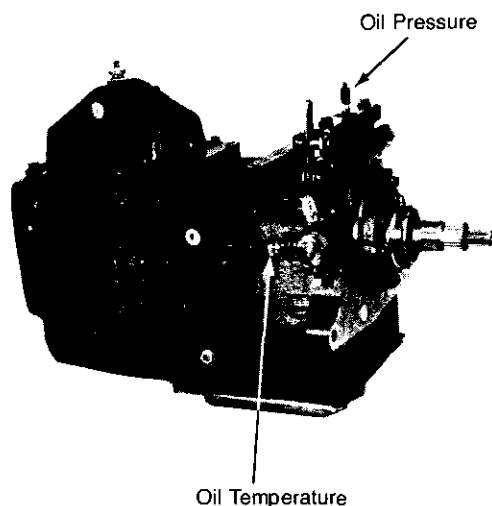
GAUGE CONNECTION POSITIONS

Oil pressure and oil temperature gauges are valuable tools for preventive maintenance. They will help the operator recognize possible transmission problems in the early stages. Correcting problems in the early stages will help prevent extensive damage, thus reducing down time and repair costs.

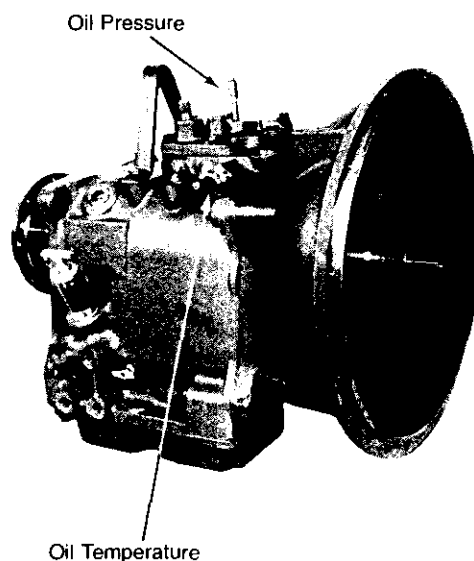
GAUGE REQUIREMENTS FOR ALL REVERS-O-MATICS

Oil Pressure	0 P.S.I. to 200 P.S.I. Capacity (0 to 1378 kPa)
Oil Temperature	0°F to 300°F (-17.7 to 148.8°C)

SERIES RC & 50000 CONNECTION POSITIONS



SERIES 12000 CONNECTION POSITIONS



GENERAL MAINTENANCE

1. Stop engine before checking or adding oil.
2. Always check the oil level of the Revers-O-Matic Drive immediately after stopping the engine.
3. Clean around oil fill before checking or adding oil.
4. The oil in the system must be changed whenever the oil shows traces of dirt or the effects of high operating temperature evidenced by discoloration or strong odor.

If the oil in the system has become contaminated with metal particles, all the components of the hydraulic system (oil tubes, oil pump, control valve, torque converter, sump pan and screens) must be thoroughly cleaned. Generally this means a tear-down of the unit. Metal particles in the oil is evidence of a damaged part.

5. Drain dirty oil while the unit is still warm, examining for contamination as described above.
6. Clean all magnetic drain plugs before re-installing.
7. Replace oil filter element.
8. Always use clean oil from clean containers.
9. Do not overfill.
10. Keep all joints in the Revers-O-Matic and standard transmission controls properly lubricated with grease.
11. If radiator on the vehicle is drained for winter storage, the heat exchanger on the transmission must also be drained.

TROUBLE SHOOTING

The diagnosis of trouble in the transmission should always start by making certain preliminary checks before it is assumed that the transmission is at fault, or before carrying out any other trouble shooting procedures.

1. Check the coolant level in engine radiator.
2. Check the oil level in transmission. A low oil level can affect the operation of the transmission, and may indicate fluid leaks that could cause transmission damage. A high level can cause foaming of the oil which, in turn, may result in clutch slippage, dragging, or leakage at the breather.
3. Check the oil pressure gauge on instrument panel.
4. Check the oil temperature gauge on instrument panel. This should never exceed 250°F. (121°C.).
5. Check the adjustment of the control and governor linkages. The engine speed should increase immediately after the pedal or lever leaves the neutral zone, and the governor should be held wide open with pedal or lever in the full throttle position. All interferences that limit top R.P.M. should be remedied.
6. Should problems arise with engine-transmission performance, first check the engine to see if it is performing satisfactorily.

SERIES RC & 50000 PERFORMANCE CHECK

Attach a tachometer to the engine with the transmission in neutral. Holding the forward pedal or lever wide open, the engine speed should increase to the top governor R.P.M. as shown in the specification sheet. If the R.P.M. is less than this, check the control and governor linkage to make sure that the governor is being held wide open, or tune up the engine. Check the R.P.M. with the reverse pedal or lever fully depressed. The engine speed should be the same as above.

Next, place the transmission in high gear and lock the brakes. Holding the forward pedal or lever wide open, the engine speed should increase to the minimum static R.P.M. as shown on the specification sheet. If the R.P.M. is less than this, tune up the engine. If the engine speed is over the maximum static R.P.M. as shown on the specification sheet, the torque converter or hydraulic clutches in the Revers-O-Matic are slipping. Repeat the test, using the reverse pedal or lever.

If a check indicates that the converter or the Revers-O-Matic are at fault, first check the oil level of the unit. Next, check the control oil pressure. Install a 200 P.S.I. (1378.0 kPa) pressure gauge in the pipe fitting located on top of the control valve and at the front end of the Revers-O-Matic Drive. With the engine speed at approximately 1500 R.P.M. the pressure should read 150 P.S.I. (1033.5 kPa) minimum. If less than this, remove and clean the pressure regulator valves as follows:

1. Remove the upper regulator cap on the left hand side of the unit near the front end of the case. Remove the spring, valve, and guide pin. Thoroughly clean the valve port as well as the various parts of the valve. Set the parts of the upper regulator valve aside so they will not be mixed with other parts later on.
2. Install the upper regulator cap only in the upper regulator valve port.
3. Remove the lower regulator cap, spring, valve and guide pin. Thoroughly clean the valve port as well as the various parts of the valve.
4. Reassemble the lower regulator valve completely, being sure that the valve slides freely in the valve port.
5. A pressure reading can now be taken on the lower regulator valve, using the gauge previously installed. The lower regulator should be set at 75 to 80 P.S.I. (516.75 to 551.2 kPa).
6. The pressure of the regulators can be adjusted by adding or removing washers under the springs in the regulator caps.
7. Remove the upper regulator cap and reassemble the upper regulator valve completely, being sure that the valve slides freely in the valve port.
8. The upper regulator valve should now be set at 160 to 170 P.S.I. (1102.4 to 1171.3 kPa) at 1800 R.P.M. in neutral. However, the pressure will drop momentarily below 100 P.S.I. (689 kPa) when the clutches are engaged. With the engine idling, the regulator should read approximately 100 P.S.I. (689 kPa).
9. With new oil in the unit, the pressure regulator valves may buzz. This is due to a foaming of the oil. Do not read the pressure gauge when the regulator valves are buzzing. Idle the engine for several minutes, then increase the speed and read the pressure gauge.
10. The 10 P.S.I. (68.9 kPa) pressure regulator valve located on the right hand side of the unit is rarely a source of service problems. However, if the valve should require cleaning, follow the steps described above for the regulator valves.

JERKING STARTS

If unit starts with a jerk, check the engine idle speed which is recommended to be 450 to 550 R.P.M. If idle speed is lower than this, unit will die too easily in rapid reversals, and if higher, the converter will transmit too much torque for smooth starts. Maladjustment of the control system caused by excessive friction or external interference may cause the clutches to engage after the engine has started to accelerate. The control valve should be completely open before the engine speed increases. This is mandatory for smooth starts.

SLUGGISHNESS

Check engine for proper operating performance (refer to performance check). Adjust the rod from the control system to the governor so the engine speed increases immediately after the control valve is opened.

All Interferences that limit top R.P.M. should be remedied.

CLUTCH FAILING TO RELEASE

First check for high oil level. Internally inspect the clutch affected for burned, damaged, or worn parts, and replace as necessary. If the output shaft exerts a turning force of 30 inch pounds (3.4 Nm) of torque or more with the unit in neutral, corrective measures should be taken. This would require disassembly of the unit and inspection of all parts.

OVERHEATING

First check for high oil level. Shifting to a lower gear will help eliminate the tendency to overheat. Inspect the heat exchanger and oil filter lines for obstructions and clean or replace as necessary. The possibility of insufficient oil flow to the heat exchanger caused by a worn or damaged oil pump should be checked. Inspect the oil filter for clogging.

NOISY CONVERTER

First, check for low oil level. Inspect the converter for worn or damaged parts. Check for damaged oil pump and replace if necessary.

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.

IRREGULAR OIL PRESSURE

If the instrument panel indicates the oil pressure is running at pressures outside those previously specified under "OPERATING PRESSURES", then:

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 FOR OIL AND AIR LEAKS** - Inspect for oil leaks around external oil pressure tubes and for air leaks on suction side of pump; making corrections as required. Check for gasket leaks, tightening capscrews to required torque as necessary.
3. **CHECK FOR FOAMING OIL** - Oil foaming is generally the result of improper oil level, air leaks, or worn parts in oil pump. Check for water in oil. Refer to "LOSS OF POWER" section.
4. **CHECK HIGH PRESSURE VALVE** - Before making a complete tear-down of the high pressure valve (one closest to rear) first remove the cap on the right hand side of control valve, looking from the rear of the unit. This cap will have some spring tension on it. With cap completely removed and spring tension released, joggle the valve part projecting from the valve body. This should release any torsional twist in the spring at the opposite end of the valve. Slowly replace the end cap.

If the above procedure does not alleviate the condition, proceed with the following:

- a. Disassemble the high pressure valve, removing end caps from both sides of the valve body.
 - b. Remove all high pressure valve parts from valve body bore and inspect for damaged parts. Pay particular attention for rubbed places which is an indication that the valve is not working freely. Remove any burrs or sharp edges, examining the spring very close.
 - c. Blow out the valve body bore with air pressure and inspect for burrs and defects in valve bore.
 - d. Wash all parts thoroughly, replacing damaged parts.
 - e. Coat all parts with light oil and assemble in valve body bore. Check for valve stickiness by moving valve back and forth in bore. If parts do not move freely, disassemble and inspect again. If everything appears to be satisfactory, replace end caps, the one on the left first.
5. **CHECK FOR INTERNAL OIL LEAKS** - Inspect closely for broken seal rings throughout the system, replacing as required.
 6. **CHECK FOR CLOGGED OR DIRTY LINES IN THE HYDRAULIC SYSTEM** - Clean as required.
 7. **CHECK FOR PLUGGED OIL FILTER** - Replace if necessary
 8. **CHECK FOR DAMAGED OIL PUMP** - Inspect for wear, replacing worn 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.

REPORTING TROUBLE AND PARTS ORDERING INSTRUCTIONS

The Funk Manufacturing Company is always available and happy to provide personal service. Should you require additional service information and/or repair parts, you must provide the model, specification number, and serial number of your unit. This information can be found on the identification tag attached to your unit.

PAT. NO.	FUNK	2,887,199
REVERS  MATIC		
USE DEXRON OR ALLISON TYPE C3 TRANSMISSION FLUID - KEEP OIL LEVEL AT FULL MARK ON DIPSTICK		
MODEL	<input type="text"/>	
SPEC	<input type="text"/>	
SERIAL	<input type="text"/>	
FUNK MANUFACTURING CO. COFFEYVILLE, KANSAS		

Should you require service assistance, in addition to the above information, you should provide a complete description of the problem along with the clutch pressure and oil temperature readings at the time the problem occurred.

YOU MAY WRITE
FUNK MANUFACTURING COMPANY
ATTN: (SERVICE OR PARTS) DEPARTMENT
P.O. BOX 577
1211 WEST 12th STREET
COFFEYVILLE, KANSAS 67337

OR TELEPHONE
316-251-3400 ASK FOR
(PARTS OR SERVICE)
DEPARTMENT

OR TWX
910-740-1908

THANK YOU
FUNK MANUFACTURING

