Section B
Troubleshooting

A. Troubleshooting Chart

The following troubleshooting chart contains many of the troubles and probable cause that can be encountered during transmission operation. Corrective action is listed for each malfunction. Proper use of this chart will permit a quick diagnosis of trouble and will indicate the corrective action necessary. Item numbers given are for Models 48 - 60.

MALFUNCTION	PROBABLE CAUSE	REMEDY
LOSS OF OIL DUE TO EXTERNAL LEAKAGE	INSPECT VISUALLY UNDER LOAD	
Leakage at fittings.	Loose fitting.	Tighten.
Leakage at hose or tubing.	Worn or cracked hose or tubing.	Replace.
MOTOR	(REFER TO SECTION M FOR MODEL 48 - 60)	
Leakage at shaft seal.	Defective seal (64) in shaft seal retainer (65)(66A).	Replace seal or shaft seal retainer assembly.
Leakage at shaft seal assembly.	Defective square ring (62) or O'Ring (63) between shaft seal retainer (65)(66) and flange (50)(51).	Replace defective square ring or O'Ring.
Leakage at plugs.	Defective O'Rings (23) at high pressure plugs (22).	Replace defective O'Rings.
Leakage between valve housing and cover.	Defective O'Rings (16)(17) and/or (18)(19) between valve housing (1) and cover (24)(25).	Replace defective O'Ring.
Leakage at high pressure relief valve.	Defective O'Rings (8) at high pressure relief valves (7).	Replace defective O'Rings.
Leakage between cover and housing.	Defective gasket (27) between cover (24)(25) and housing (31).	Replace gasket (27).
Leakage between flange and housing.	Defective square ring (49) between flange (50)(51) and housing (31).	Replace defective square ring.
PUMP	(REFER TO SECTION M FOR MODEL 48 - 60)	
Leakage at shaft seal.	Defective seal (61) in shaft seal retainer assembly (62)(62A).	Replace seal (61) or the shaft seal retainer assembly.
Leakage at shaft seal.	Defective O'Ring (60)(60A) between shaft seal retainer assembly (62)(62A) and flange (51)(51A).	Replace defective O'Ring.
Leakage at plugs.	Defective O'Ring (9) on plug (8) or O'Ring (15) at plug (14), or O'Ring (23) on plug (22).	Replace defective O'Rings.
Leakage at low pressure relief valve.	Defective O'Ring (9) at low pressure relief valve Plug (12)	Replace defective O'Ring.

MALFUNCTION	PROBABLE CAUSE	REMEDY
LOSS OF OIL DUE TO EXTERNAL LEAKAGE (continued)		
PUMP (Cont'd.)	(REFER TO SECTION M)	
Leakage between cover and charge pump.	Defective O'Ring (4) between cover (7) or (7A) and Charge Pump (1).	Replace defective O'Ring or gasket.
Leakage between cover and housing.	Defective gasket (17) between cover (7) or (7A) and housing (20).	Replace defective O'Ring or gasket.
Leakage at trunnions.	Defective gasket (27) at trunnion (24).	Replace defective gasket.
Leakage between flange and housing	Defective square ring (50) between flange (51A) (51) and housing (20).	Replace defective square ring.
CONTROL ASSEMBLY	(REFER TO SECTION I)	
Leakage between pump/motor housing and control assembly.	Defective gasket (56) or O'Ring (60) between pump/motor housing and control assembly.	Replace defective gasket or O'Ring.
Leakage at control lever seal.	Defective seal (30) in control seal plate assembly (33).	Replace seal or seal plate assembly.
Leakage at control lever seal plate.	Defective gasket (18) between control seal plate assembly (33) and control housing (48).	Replace defective gasket.
Leakage at valve housing cover.	Defective gasket (18) between valve housing cover (17) and control housing (48).	Replace defective gasket.
Leakage at transfer tube.	Defective O'Ring (5) on transfer tube (8).	Replace defective O'Rings.
Leakage at cylinder tube.	Defective O'Rings (37) at cylinder tube.	Replace defective O'Rings.
Leakage at end cap.	Defective gasket (41) at end cap (25).	Replace defective gasket.
Leakage at adjustment cap.	Defective O'Ring (21) on spring retainer (22) permitting leakage at adjusting cap (49).	Replace defective O'Ring.
LOSS OF CONTROL	Low oil level in reservoir.	Fill reservoir as necessary.
	System oil filter clogged.	Clean or replace filter element.
	Hydraulic line clogged.	Clean or replace as necessary.
	O'Ring (60, figure 9-1) between pump/motor housing and control assembly installed incorrectly or is defective.	Replace defective O'Ring.
	Neutral detent not adjusted properly.	Adjust per instructions in Section VIII.

MALFUNCTION	PROBABLE CAUSE	REMEDY
LOSS OF CONTROL (Continued)	Check valves in pump cover malfunctioning.	Check items 8, 10 & 11, Section M and replace defective parts.
	Control assembly sensing line check valve malfunction.	Inspect ball seats in elbow fittings (1, figure 9-1) and replace if necessary.
	Faulty high pressure relief valves(s) in motor.	Replace high pressure relief valve item (7).
	Charge pump worn out. Charge pump pressure measured at plug (45, figure 9-1) should be 150 psi minimum.	Replace charge pump.
	Loose or broken connections on external control linkage.	Repair or replace parts as necessary.
	Internal control assembly failure. Check internal mechanism by actuating the control lever. If there is no response, check as follows:	
	Broken lever arm or pin (45 or 47 Section M)	Replace broken part.
	Valve sleeve assembly (13, figure 9-1) broken or not assembled properly.	Replace being sure to reassemble the valve sleeve assembly correctly.
	Broken cam follower (46, figure 9-1).	Replace.
	Broken override spring (20, figure 9-1).	Replace.
	Broken sleeve spring (9, figure 9-1).	Replace.
	Sticking valve sleeve (11, figure 9-1).	Replace or rework valve sleeve.
	Pressure sense pin (24, figure 9-1) sticking.	Rework or replace pin.
	Defective O'Ring (37, figure 9-1) on piston.	Replace defective O'Ring.
EXCESSIVE NOISE.	Dirty filter causing cavitation.	Replace or clean system filter element.
	Inlet line clogged or otherwise restricted.	Clean or replace hoses as necessary.
	Transmission oil too viscous.	Make sure the proper oil is used.
	Water in the system oil. Water in the oil forms an emulsion which acts like viscous oil.	Replace the system oil. If a heat exchanger is used, check for possible leaks.

MALFUNCTION	PROBABLE CAUSE	REMEDY
	Remove the case drain connection and check for steel or brass particles which indicate wear and damage to internal moving parts. A loss of pressure and flow may also be noticed.	Unit should be completely overhauled.
	CAUTION: Dirt or foreign matter will cause serious damage to internal moving parts. On initial installation, steam clean the reservoir and all piping and filter the system fluid through a 10 micron filter.	
	Air in oil.	Check oil in reservoir. If necessary, add oil to maintain level above return line. Check inlet line for possible leaks which could allow air to get into the system. Air in the system at initial installation will gradually bleed out of the system and the noise level will decrease.
OVERHEATING	High pressure relief valve(s) set too low, bypassing fluid and causing excessive heat.	Adjust high pressure relief valves a minimum or 500 psi above normal operating pressure or 500 psi above the override control setting, whichever is highest.
	If a water type heat exchanger is used, check that it is operating correctly.	Repair or replace the heat exchanger.
	If an air type heat exchanger is used in the system, check that it is clean and operating properly.	Clean coils or replace as required.
	Excessively worn internal parts indicated by excessive case drain flow.	Unit should be completely overhauled.
NO PRESSURE	**NOTE:** System pressure can be determined by installing gages in the proper ports. (See Field Test and Adjustment pg. B-6.) The indicated pressure with the motor stalled should be within 100 psi of the pressure stamped on the identification plate.	
	Defective high pressure relief valve(s) in motor.	Attempt to adjust the high pressure relief valve settings to system pressure. If they do not respond, replace high pressure relief valve settings to system pressure. If they do not respond, replace high pressure relief valve cartridge item (7).
	Air in oil.	Check oil in reservoir. If necessary, add oil to maintain lever above return line. Check inlet line for possible leaks which could allow air to get into the system.

MALFUNCTION	PROBABLE CAUSE	REMEDY
	Charge pump malfunction. Charge pump pressure measured at control port (page B-9) should be 200 psi minimum.	Replace charge pump.
	Excessive flow out of case drain may indicate separation between valve cover and cylinder block. Steel or brass particles in the case drain indicates internal damage from contamination.	Unit should be completely overhauled.

B. Field Test And Adjustment Of Dynapower Generation II Units

Attached are recommended procedures and instructions to follow when necessary to make various pressure adjustments in the field. Gage port locations for Models 48, 60 and 90 pumps, motors, and for Part No.'s 892 & 898XXX controls, are identified to assist you.

The various plugs and fittings noted on the gage port locations are available in Kit Part No. 894387.

Recommended Test Procedures To Service Generation II Transmissions In The Field

CASE LEAKAGE

A. Pump

Case Flow While Operating Pump At:

1750 RPM
3000 PSI
140° F Fluid Temperature

Model	GPM
48	1.4
60	1.4
90	3.2

1. Install high pressure gages at motor and charge pressure gage at pump control. (Refer to attached drawings for location.)
2. Lock motor shaft from rotating.
3. Remove case drain line from pump and provide some means of measuring pump case drain flow.
4. Remove charge pump relief valve plug, spring and plunger and install blanking plug P/N 842345 for Models 48 and 60, or plug P/N 842256 for Model 90. (Refer to attached drawings for location.)
5. Start power supply to pump with control actuator just out of neutral position.
6. Move control lever slightly more off neutral to build up 3000 PSI system pressure. Exercise CAUTION as pressure should develop quickly and at less than 1/3 cam angle.
7. Measure case flow.
8. Stop pump. Remove plug P/N 842345 or P/N 842256 and replace plunger, spring and plug to their original position in the pump cover.

B. Motor

Case Flow While Operating Pump At:

1750 RPM
3000 PSI
140° F Fluid Temperature

Model	GPM
48	1.4
60	1.4
90	2.2

1. Install high pressure gages at motor and charge pressure gage at pump control. (Refer to attached drawings for location.)
2. Lock motor shaft from rotating.
3. Remove case drain line from motor and provide some means of measuring motor case drain flow.
4. Remove low pressure relief valve cartridge from motor cover and install blanking plug P/N 842344.
5. Start power supply to pump with control in neutral.
6. Move control lever slightly off neutral to build up 3000 PSI system pressure. Exercise CAUTION as pressure should develop quickly and at less than 1/3 cam angle.
7. Measure case flow from motor.
8. Stop pump, remove blanking plug P/N 842344 and replace low pressure relief valve cartridge in motor cover.

NOTE: The case flow values, listed above, are test stand values of a unit in new condition. Case flow of a unit which has seen service may be higher than this value.

An extremely high case flow - for example, three times the rated new unit operating values, indicates serious leakage problems and further inspection of the unit should be pursued.

Through all these procedures it is mandatory that charge pressure not fall below a minimum of 200 PSI.

ADJUSTMENTS

A. High Pressure Relief Valves

1. Install gages in high pressure ports of motor. (Refer to attached drawings.)

2. Disconnect sense tubes if pump has override control. Cap the tube fittings in the cover.
3. Lock motor shaft from rotating.
4. Start power supply to pump with control in neutral.
5. Move control lever slightly off neutral until pressure reaches maximum setting. (Observe pressure gages.) Do not leave the pump on stroke unnecessarily, as extended flow over the high pressure relief valve, in a locked system, creates an extremely high fluid temperature build-up which affects pressure readings.
6. If readjustment is required, loosen lock nut of the high pressure relief valve cartridge which is opposite the gage indicating pressure.
7. Stroke unit as in Step 4 and turn adjusting screw IN to raise pressure setting, or OUT lower pressure setting. (One turn of the adjusting screw will change the setting approximately 1200 PSI.) Tighten the lock nut.
8. Destroke pump and restroke to insure correct relief valve setting.
9. Move control to opposite side, as was used in Step 5.
10. Repeat Steps 5 thru 8 for other high pressure relief valve.

B. Low Pressure Relief Valve

1. Install gage in low and high pressure ports of motor. (Refer to attached drawings.)
2. Lock motor shaft from rotating.
3. Start power supply to pump with control in neutral.
4. Move control lever slightly off neutral to build up 1000 PSI system pressure. Exercise CAUTION as pressure should develop quickly and at less than ⅓ cam angle.
5. Observe low pressure gage. Value should be approximately 250 PSI with pump speed approximately 1750 GPM.
6. If necessary to readjust, loosen nut on low pressure relief valve and turn adjusting screw IN to raise pressure setting, and turn OUT to lower pressure setting. (One turn of the adjusting screw will change setting approximately 35 PSI.) Tighten lock nut.

C. Controls

NOTE: High pressure relief valves must be set 500 PSI above control setting before attempting to set control.

Factory setting of full cut-off pressure is indicated on control name plate. EX.: 892XXX-30 indicates full cut-off control setting of 3000 PSI.

SHORT DIFFERENTIAL (PRESSURE LIMITING)

1. Install high pressure gage in high pressure gage port of pump control. (Refer to attached drawings.)
2. Lock motor shaft from rotating.
3. Start power supply to pump with control in neutral.
4. Move control lever slightly off neutral until pressure reaches maximum setting. Observe pressure gage.
5. If necessary to adjust, loosen lock nut on adjusting screw on end of control.
6. Turn adjusting screw IN to raise the pressure, and OUT to lower the pressure. (One turn of adjusting screw will change the setting approximately 1000 PSI.) Retighten lock nut.
7. Recheck full cut-off control setting in both directions of control lever.

LONG DIFFERENTIAL (INPUT TORQUE LIMITING)

NOTE: Only full cut-off pressure can be adjusted. Do not adjust screw on end of control. This is factory set for input torque (horsepower) curve.

1. Install high pressure gage in high pressure gage port of pump control. (Refer to attached drawings.)
2. Lock motor shaft from rotating.
3. Start power supply to pump with control in neutral.
4. Move control lever slightly off neutral until pressure reaches maximum setting. Observe pressure gage.

5. If necessary to adjust full cut-off pressure:

   a. On Models 90, 120 and 210, loosen lock nut on socket head screw on top of control.(See attached drawings.)

      Moving indicator mark on socket head screw toward pump cover, decreases pressure; toward flange, increases pressure. Tighten lock nut.

      Recheck full cut-off setting in both directions of control lever.

   b. On Models 48 and 60, full cut-off adjustment is accomplished by shimming the control sleeve. (Refer to Sales Bulletin D-107 for this procedure.)