



**Troubleshooting The  
Hydraulic System  
Service Manual 9-50632**

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**INGERSOLL**  
Ingersoll Equipment Co., Inc.

# TROUBLE SHOOTING THE HYDRAULIC SYSTEM

## INTRODUCTION

Loss of available engine horsepower to the rear wheels of the tractor may be attributed to several different areas. The specific area where the loss is occurring should be determined before any components are replaced.

The loss of power may be caused by (a) an engine that is not performing up to specification (b) mechanical drag caused by worn bearings or misalignment in the final drives or an attachment (c) a loss of efficiency in one or more of the hydraulic components.

This section, Trouble Shooting The Hydraulic System, includes the hydraulic drive components, as well as, the attachment lift system, the 644, 646 and 648 Loader bucket circuits and the hydraulic rotary tiller.

Use of a 3000 PSI pressure gauge and the Hydra-Sleuth as described in the Hydraulic Test Procedures section of The Outdoor Power Equipment Master Service Manual are necessary for accurate diagnosis.

## I. TROUBLE SHOOTING – THE HYDRAULIC DRIVE SYSTEM

### A. LOSS OF HYDRAULIC DRIVE POWER

| POSSIBLE CAUSE  | CORRECTIVE ACTION  |
|---|--|
| 1. Two-speed transaxle in high range instead of low.            | Put transaxle in low.  |
| 2. Oil level low.   | Fill reservoir to the correct level with API SE or CC 20W-40 motor oil in summer. (Use API SE or CC 5W-20 motor oil in winter.) See your operator's manual or the decal on the reservoir for the proper level. |
| 3. Hydraulic System filled with wrong oil.                      | Use API SE or CC 20W-40 motor oil in summer. (Use API SE or CC 5W-20 motor oil in winter.)<br><b>(DO NOT USE HYDRAULIC OIL).</b>   |
| 4. Travel control spool linkage not allowing full spool travel. | (a) Check for interference or foreign matter in linkage.<br>(b) Check for binding of linkage or interference.<br>(c) Check for excessive play in linkage.  |
| 5. Relief valve set too low.                                    | Adjust relief valve. Verify pressure setting with pressure gauge.  |
| 6. Relief valve spring broken.                                  | Replace relief valve spring and re-adjust pressure.  |
| 7. Chip under relief ball or seat damaged.                      | Remove valve, disassemble, clean, and flush. Reseat ball. Replace and reset pressure.  |
| 8. Loss of engine RPM.  | Check, tune and adjust engine to proper specifications.  |
| 9. *Restriction or air entry in suction line.                   | Inspect reservoir vent, res. outlet, suction line and pump inlet areas for blockage, deterioration or weakness (which could cause collapsing).   |
| 10. *Loss of pump efficiency.                                   | Remove and replace or rebuild pump as required. Use service manual.  |
| 11. *Excessive internal leakage in hydraulic motor.             | Remove and replace or rebuild hydraulic motor as required. Use service manual.   |
| 12. *Excessive internal leakage in control valve.               | Remove and replace or rebuild control valve as required. Use service manual.   |

\* - To be determined by Flow Meter Test.

## B. PULSATING OR INTERMITTENT HYDRAULIC DRIVE POWER

| POSSIBLE CAUSE   | CORRECTIVE ACTION   |
|--|---|
| 1. Low oil level.  | Fill reservoir to the correct level with API SE or CC 20W-40 motor oil in summer (API SE or CC 5W-20 motor oil in winter). See your operator's manual or the decal on the reservoir for the proper level.<br><br>Inspect Reservoir, suction line and pump inlet for restriction and remove.<br><br>Tighten suction line clamps and fittings, see low oil level above. |
| 2. Intermittent restriction - such as, foreign matter floating in reservoir. |   |
| 3. Air Entry.  |   |

## C. EXCESSIVE NOISE (HOWL) FROM HYD - SYSTEM

**NOTE:** Some howl on 1972 and older units is normal when oil is cold.

| POSSIBLE CAUSE                  | CORRECTIVE ACTION  |
|---------------------------------|--|
| 1. Oil is cold.                 | Allow oil to warm at low engine RPM. Put two-speed transaxle in neutral and travel lever in full forward or reverse to allow oil to circulate and warm.<br><br>Use API SE or CC 20W-40 motor oil in summer (API SE or CC 5W-20 motor oil in winter.)<br><br>Inspect reservoir, suction line and pump inlet for restriction and remove.<br><br>Install clamps or move tubes to eliminate noise. |
| 2. Wrong oil.                   |  |
| 3. Suction line restriction.    |  |
| 4. Hydraulic tube(s) vibrating. |  |

## D. HYDRAULIC OIL GETS EXCESSIVELY HOT

**NOTE:** Oil temperature should be approximately 100° F above ambient during normal operation.

| POSSIBLE CAUSE  | CORRECTIVE ACTION  |
|---|--|
| 1. Heat exchanger plugged or blocked with grass, etc. | Clean heat exchanger fins with soft brush or compressed air.<br><br>Fill reservoir to the correct level with API SE or CC 20W-40 motor oil in summer (API SE or CC 5W-20 motor oil in winter). See your operator's manual or the decal on the reservoir for the proper level.<br><br>Use API SE or CC 20W-40 motor oil in summer. (API SE or CC 5W-20 motor oil in winter.)<br><br>Adjust relief valve to specification. Use 3,000 PSI pressure gauge. |
| 2. Low oil level.                                     |  |
| 3. Wrong oil.   |  |
| 4. Relief valve set too low.                          |  |

## E. HYDRAULIC OIL FOAMY

| POSSIBLE CAUSE                                      | CORRECTIVE ACTION  |
|---|--|
| 1. Low oil level.                                   | Fill reservoir to the correct level with API SE or CC 20W-40 motor oil in summer (API SE or CC 5W-20 motor oil in winter). See your operator's manual or the decal on the reservoir for the proper level.<br><br>Replace reservoir. Not all reservoirs have internal baffles.<br><br>Inspect suction line connections for tightness and hose areas for deterioration or holes. |
| 2. Return oil baffle missing or loose in reservoir. |  |
| 3. Air entry at suction line leak.                  |  |

| POSSIBLE CAUSE   | CORRECTIVE ACTION  |
|--|--|
| 4. Wrong oil.  | Use only API SE or CC 20W-40 motor oil in summer, 5W-20 in winter. (High detergent and non foaming). |
| 5. Relief valve set too low and bypassing excessively. | Set relief valve to proper pressure setting. Verify setting with pressure gauge.                     |
| 6. Water in oil.                                       | Drain and flush hydraulic system. Fill with specified oil.   |

#### F. LOSS OF HYD DRIVE OIL

| POSSIBLE CAUSE          | CORRECTIVE ACTION   |
|-------------------------|---|
| 1. External leaks.      | Inspect and replace or tighten fittings as required.                              |
| 2. Leak into transaxle. | Replace hydraulic motor or hydraulic motor output shaft seal. Use service manual. |

## II. TROUBLESHOOTING – HYDRAULIC ATTACHMENT LIFT AND 3 PT HITCH

#### A. WILL NOT LIFT

| POSSIBLE CAUSE  | CORRECTIVE ACTION   |
|---|---|
| 1. Lift spool not moving full stroke.   | Check for proper linkage movement and remove any obstructions that might interfere.             |
| 2. Relief valve set too low.  | Set relief to proper specification and verify setting with pressure gauge check.                |
| 3. O-ring packing on lift cylinder piston leaking internally (both attachment lift and 3 PT hitch cyl). | Remove cylinder and replace O-ring.<br>Check cylinder bore for scores and replace if necessary. |
| 4. Oil leaking by control spool lands.  | Replace control valve.  |
| 5. Load excessive.  | Reduce load.  |

#### B. ATTACHMENT DROPS

| POSSIBLE CAUSE                         | CORRECTIVE ACTION      |
|--|------------------------|
| 1. Oil leaking by control spool lands. | Replace control valve. |

### C. ATTACHMENT LIFT LEVER WON'T STAY IN FLOAT

| POSSIBLE CAUSE                      | CORRECTIVE ACTION   |
|-------------------------------------|---|
| 1. Detent ball springs weak.        | Remove one detent plug and add a small amount of shim stock to increase spring tension. |
| 2. Detent ridge worn smooth.        | Replace detent spool.   |
| 3. Detent balls missing or cracked. | Replace detent balls.   |

### D. RELIEF VALVE SQUEELS IN FLOAT

| POSSIBLE CAUSE   | CORRECTIVE ACTION   |
|--|---|
| 1. Detent spool has unscrewed part way out of control spool. | Remove detent spool - clean, apply locktite to threads and screw tight. |

### E. CONTROL LEVER FAILS TO RETURN TO CENTER (NEUTRAL) WHEN RELEASED

| POSSIBLE CAUSE                      | CORRECTIVE ACTION                                   |
|-------------------------------------|---|
| 1. Linkage binding.                 | Inspect all pivot points for binding and lubricate. |
| 2. Centering spring weak or broken. | Replace centering spring.                           |
| 3. Lever pushed into float detent.  | Pull lever out of float.                            |

### F. LIFT ARMS TEND TO RAISE IN FLOAT (NO ATTACHMENT MOUNTED)

| POSSIBLE CAUSE      | CORRECTIVE ACTION   |
|---------------------|---|
| 1. Normal reaction. | Use float with heavy attachments only (example snow blade, caster, or rotary tiller). |

## III. TROUBLESHOOTING – THE ROTARY TILLER, HYD PTO AND FLOW CONTROL

### A. LOSS OF HYDRAULIC DRIVE POWER TO ROTARY TILLER

| POSSIBLE CAUSE         | CORRECTIVE ACTION  |
|------------------------|--|
| 1. Mechanical Binding. | Check for mechanical binding of tiller before making any hydraulic repair.   |
| 2. Low oil level.      | Add API SE or CC 20W-40 motor oil to the correct level. See your operator's manual or the decal on the reservoir for the proper level. |

| POSSIBLE CAUSE                                     | CORRECTIVE ACTION  |
|--|--|
| 3. Hyd. system filled with wrong oil.              | Use API SE or CC 20W-40 motor oil. (DO NOT USE HYDRAULIC OIL).   |
| 4. Loss of engine RPM.                             | Check, tune and adjust engine to proper specifications.  |
| *5. Restriction or air entry in suction line.      | Inspect reservoir vent, res. outlet, suction line and pump inlet areas for blockage, deterioration or weakness (which could cause collapsing). |
| *6. Loss of pump efficiency.                       | Remove and replace or rebuild pump as required.  |
| *7. Faulty relief in Hyd PTO valve.                | Remove and inspect relief ball, spring, and seat. Reinstall and set pressure to specification.   |
| *8. Excessive internal leakage by spool lands.     | Remove and replace Hyd. PTO valve.   |
| *9. Excessive internal leakage in hydraulic motor. | Remove and replace or rebuild motor as required. Use service manual.   |
| * To be determined by flow meter test.             |  |

### B. ROTARY TILLER WON'T LIFT

| POSSIBLE CAUSE  | CORRECTIVE ACTION  |
|---|--|
| 1. See Hydraulic Attachment Lift and 3 PT Hitch Troubleshooting Guide Page 4. |  |
| 2. Flow Control in wrong position.  | Lift will not raise unless flow control valve is in the travel position. |

## IV. TROUBLESHOOTING – THE LOADER LIFT AND BUCKET CIRCUITS

### A. LOADER WILL NOT LIFT RATED LOAD OR BUCKET WILL NOT DEVELOP RATED BREAKOUT FORCE

| POSSIBLE CAUSE  | CORRECTIVE ACTION  |
|---|--|
| 1. Cylinder piston packing leaking.                     | Remove and replace worn or damaged packing.  |
| 2. Loader valve relief valve set too low.               | Reset pressure to proper specification. Verify setting with pressure gauge.  |
| 3. Loader Bucket valve relief valve damaged.            | Remove and inspect valve spring and ball. Reseat ball. Reset pressure to proper specification. Verify setting with pressure gauge. |
| 4. Attachment lift relief valve set too low.            | Reset pressure to proper specification. Verify setting with pressure gauge.  |
| 5. Power beyond O-ring in tractor travel valve leaking. | Replace O-ring.  |

**POSSIBLE CAUSE****CORRECTIVE ACTION**

6. Leakage at loader spool or attachment lift spool.
7. Main Hydraulic system deficiency.

Verify leakage point with flow meter test and replace proper component.

Refer to paragraphs 2, 3, 5, 6, 7, 8, 9, 10 and 12 under "Loss of Hyd. Drive Power." Page 2.

**B. LOADER MOVEMENT JERKY****POSSIBLE CAUSE****CORRECTIVE ACTION**

1. Unsteady operator.
2. Low oil level.

Reduce engine RPM and practice "feathering" valve spools to achieve smooth, gradual movement of loader.

Steady right arm on knee if difficulty persists.

Fill reservoir to the correct level with API SE or CC 20W-40 motor oil in summer (API SE or CC 5W-20 motor oil in winter). See your operator's manual or the decal on the reservoir for the proper level.

**C. LOADER SPONGY****POSSIBLE CAUSE****CORRECTIVE ACTION**

1. Air trapped in loader cylinders.

Find and eliminate source of air entry. Refer to paragraphs 2 and 9 under "Loss of Hyd. Drive Power." Cycle loader several times to purge air and recheck oil level.

**D. LOADER SETTLES****POSSIBLE CAUSE****CORRECTIVE ACTION**

1. Leak by lift spool lands.

Remove and replace control valve.

**E. OIL SPEWS OUT RESERVOIR FILL CAP****POSSIBLE CAUSE****CORRECTIVE ACTION**

1. Reservoir overful.
2. Loader arms being lowered without engine running.
3. Baffle loose in hyd reservoir.
4. Baffle (incert) missing from reservoir cap.
5. Air entry.

Fill reservoir to the correct level with API SE or CC 20W-40 motor oil in summer (API SE or CC 5W-20 motor oil in winter). See your operator's manual or the decal on the reservoir for the proper level.

Avoid lowering loader arms with engine off.

Replace reservoir.

Replace incert.

Refer to paragraph 9 under "Loss of Hyd Drive Power."

**F. CONTROL LEVER FAILS TO RETURN TO CENTER (NEUTRAL) WHEN RELEASED**

| POSSIBLE CAUSE  | CORRECTIVE ACTION  |
|---|--|
| 1. Mechanical bind on linkage.<br>2. Broken or weak centering springs on one or both spools.<br>3. Lift spool locked in float detent. | Make sure all pivot points are free and well lubricated.<br>Replace centering springs.<br>Pull lever out of float. |

**G. LOADER LIFT SPOOL WON'T STAY IN FLOAT**

| POSSIBLE CAUSE                                      | CORRECTIVE ACTION |
|---|-------------------|
| 1. See "ATTACHMENT LIFT LEVER WON'T STAY IN FLOAT." |                   |