# 40 Crawler
# Series D

## Service Manual

**S-406294**

Reprinted

CASE

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## SAFETY

**THIS SAFETY ALERT SYMBOL INDICATES IMPORTANT SAFETY MESSAGES IN THIS MANUAL, WHEN YOU SEE THIS SYMBOL, CAREFULLY READ THE MESSAGE THAT FOLLOWS AND BE ALERT TO THE POSSIBILITY OF PERSONAL INJURY OR DEATH.**

**WARNING:** Always use a non-flammable solvent for cleaning parts. DO NOT use gasoline or other flammable substances.

**WARNING:** Clean Rubber parts by washing in clean brake fluid. DO NOT use mineral base cleaning solvents such as acetone or paint thinner on any rubber parts. If a mineral base solvent is used, the rubber will start to deteriorate and continue to deteriorate after the part is put back into service. The continued deterioration of the rubber could cause the part to fail.

**WARNING:** DO NOT service the machine with the engine running. If necessary to make checks with engine operating, have one man stay at the controls while the other makes the check.

Whenever servicing the machine, always tag mark the ignition switch to alert other operators and prevent accidental start-ups.

**WARNING:** To help prevent eye injury, wear eye protection when servicing this machine.

**CAUTION:** When checking coolant level, remove cap on radiator slowly to relieve pressure within the system.

**CAUTION:** Disconnect both leads from the batteries when working on the engine or electrical system. Always disconnect the Ground lead first.

**WARNING:** Use extreme care when handling the track. Never insert fingers between track shoes when removing track.

**DANGER:** Exhaust fumes can kill. If necessary to start engine in an enclosed area, be sure to provide adequate ventilation.

**CAUTION:** ENGINE FAN AND BELTS - To prevent possible serious injury avoid contact with rotating fan and belts.

**WARNING:** BATTERIES PRODUCE EXPLOSIVE GASES. Keep flames, sparks and cigarettes away. Ventilate when charging or using in enclosed space. Always shield eyes when working near batteries.

**POISON/DANGER:** BATTERY ACID CAUSES SEVERE BURNS. Batteries contain sulfuric acid. Avoid contact with skin, eyes or clothing.

Antidote: EXTERNAL - flush with water. INTERNAL - drink large quantities of water or milk. Follow with Milk of Magnesia, beaten egg or vegetable oil. Call physician immediately. EYES: Flush with water for 15 minutes and get prompt medical attention.

KEEP OUT OF REACH OF CHILDREN.

**WARNING:** Do not allow battery fluid to contact skin, eyes, fabric or painted surfaces. Battery fluid is sulfuric acid solution which could cause serious injury or property damage.

**CAUTION:** When working on the hydraulic system, be sure to relieve all pressure in the lines by working the controls back and forth several times before removing component.

**CAUTION:** NEVER lay metal objects across the battery posts to check the charge. The air directly above the batteries contains highly explosive hydrogen gas. Sparks may cause an explosion.

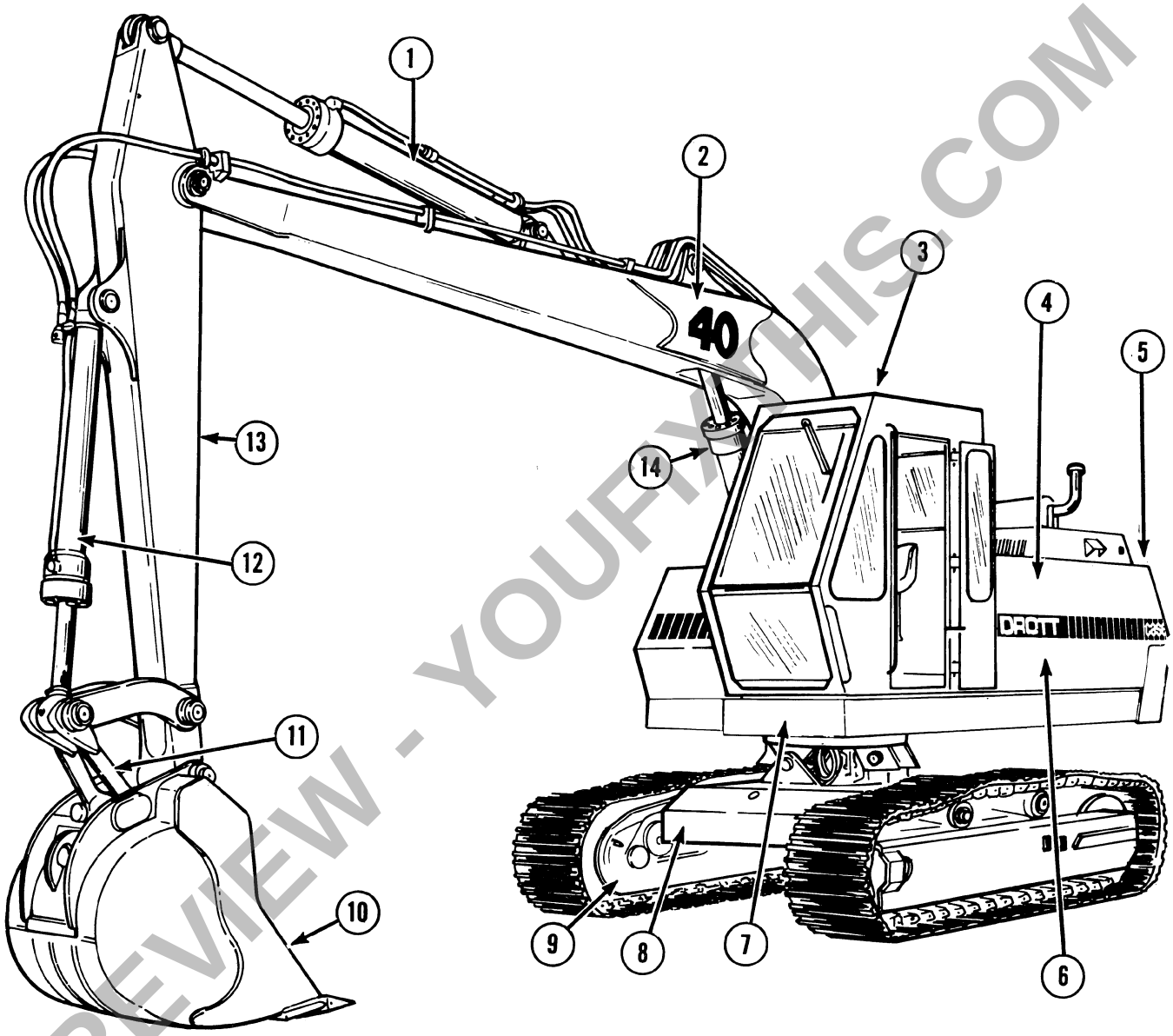
DO NOT wear loose clothing which may catch in moving parts.

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## NOMENCLATURE




**(Unit Shown in Digging Position)**

1. Boom Crowd Cylinder
2. "E" Main Boom
3. Operator's Compartment with Controls
4. Engine Location
5. Counterweights
6. Hydraulic Oil Reservoir Location
7. Turntable Bearing, Ring Gear and Leveler
8. Track Drive Motor and Track Brake Location
9. Final Drive Transmission
10. Tool - (Backhoe Buckets Shown)
11. Tool Link and Levers
12. Boom Tool Cylinder
13. "E" Boom Dipperstick
14. Boom Hoist Cylinder

**Figure 3. Nomenclature**



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## COMPONENT CAPACITIES

| Component | Lubricant/Fluid | Capacity |
|---|---|---|
| Engine Cooling System | ½ ethylene glycol base anti-freeze, ½ water | 8½ gallons (32 litres) |
| Engine Crankcase | See Engine Manufacturer's Manual | See Specifications, page 8 |
| Fuel Tank | No. 2 Diesel Fuel, See Engine Manual | 75 gallons (284 litres) |
| Hydraulic System (Complete) | DROTT DHF Fluid or See Page 10 | 55 gallons (208 litres) |
| Hydraulic Oil Tank | | 25 gallons (95 litres) |
| Final Drive Transmissions | HD80-90 Gearlube | 14 quarts (13.2 litres) |
| Swing Gearbox | HD80-90 Gearlube | 11 pints (5.2 litres) |
| Turntable Bearing Ring Gear | Open Gear Lubricant, such as Mobil Mobitac E, Texaco Crater Compound, or functional equivalent | Apply liberal amount. Rotate turntable so pinion spreads the lubricant |
| Pressure Grease Fittings | Multipurpose E.P. No. 2 lithium grease, molydisulfide grease, or functional equivalent | Use sufficient amount to remove the old, contaminated grease at each location (See List of Grease Fittings) |

## RATED PUMP OUTPUT @ GOV. RPM

| ENGINE | OUTPUT PER SECTION GPM | L/MIN |
|---|---|---|
| Detroit Diesel 4-71N | 46 | 174 |
| Case 504BDT | 51 | 193 |

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# SECTION 1
# SCHEDULED PREVENTIVE MAINTENANCE

## INTRODUCTION

Scheduled preventive maintenance is necessary to keep the machine in top operating condition. Decide from the start upon a maintenance schedule that will best suit your particular needs. The type of work being done, the size of loads, and ground and weather conditions should all be taken into consideration when establishing a schedule.

Use the engine hourmeter along with a calendar and checklist to ensure that all recommended maintenance is performed at the prescribed intervals. Recommendations contained in this manual are based upon average operating conditions, and should be considered as MINIMUM maintenance requirements for the CRAWLER.

Depart from recommended intervals only when conditions warrant shortening them, or when changes in ambient temperature require it. Recommended intervals should be shortened whenever the machine is operated under extreme conditions, such as on a dusty job site, in extreme heat or cold, under intermittent operation or extremely heavy loads.

## LUBRICANTS

It is not Drott policy to publish lists of approved lubricants or to guarantee lubricant performance. The responsibility for the quality of any lubricant rests solely with the distributor or manufacturer of the lubricant.

In various paragraphs of this manual, you will find the statement "Use (lubricant brand name) or functional equivalent". This statement does not constitute an unconditional guarantee of the performance of the brand of oil mentioned; it is intended only as a guide to the type of lubricant recommended for a given application.



## SOUNDPROOFING INSULATION

Care must be taken when cleaning the cab interiors that have soundproofing insulation. To clean the insulating material, use only a vacuum cleaner or damp cloth with plain water or mild detergent solution.

DO NOT steam clean, wash or rinse with a water hose, etc., since only slight wetting of the insulation will substantially reduce its soundproofing capabilities.

## SPARK ARRESTOR

Laws of some states or provinces may require that this unit be equipped with a spark arrestor or spark arresting muffler. The State of California, as an example, is one state which has such regulations for agricultural and forestry applications, plus a regulation for construction applications in forest-covered, brush-covered or grass-covered lands.

Typically, such laws and regulations require spark arresting devices to be maintained in good working order and typically to be attached to the exhaust system on naturally aspirated engines (engines without a turbo-charger).

**IMPORTANT: Always install new decals whenever the old decals are destroyed, lost, painted over, or illegible. When individual parts are replaced that have decals attached, be sure to install a new decal with the new part. Replacement decals are available from your Drott dealer.**



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# SECTION 5
# TROUBLESHOOTING

In order that repair time be cut to the minimum it is necessary to isolate problems as quickly as possible. In most cases mechanical breakdowns are visual and therefore not difficult to locate. This is not always true with troubles in the electrical or hydraulic systems.

Guidelines for troubleshooting the electrical system are included in the Electrical System Section.

When a problem develops within the hydraulic system, the use of the troubleshooting aids and the systematic approach described below will normally keep machine downtime to a minimum.

## TROUBLESHOOTING AIDS

The following troubleshooting aids are available to the mechanic:

1. The **hydraulic schematic** is an exact reproduction of the flow paths taken by the oil while performing the various functions within the hydraulic system. The schematic is used to help determine which components are within a circuit, without requiring that the circuit be traced out tubeline by tubeline.

2. The **flowmeter** measures fluid flow and registers it in terms of gallons per minute (GPM). This instrument is primarily used to determine pump output, but can also be used to locate problem areas (restrictive flow, leaks, etc.) throughout the system.

3. The **pressure gauge** measures fluid pressure and registers in pounds per square inch (PSI). On the machine, one quick connect pressure tap is installed on each pump circuit (for location, see page 80.) Pressures taken at the above check points can be used to indicate both system and relief pressure.

## SYSTEMATIC APPROACH

The systematic approach to troubleshooting involves step-by-step analysis of the problem, starting with the overall system and working down, by process of elimination, until the faulty component is located.

### Determine the Problem:

When analyzing a machine with hydraulic problems, the first thing you must do is determine what the problem is.

Find the symptoms by:

1. Looking for the obvious - is there a bent tubeline or hose, leakage around the hydraulic components, low hydraulic oil level, etc.?

2. Talk to the operator - has the machine lost speed (slow cycle time), or has it lost power (will not lift the load)?

3. Determine whether the problem is common to all circuits or is only found in one or two particular circuits.

### Find the problem component:

Once the symptoms have been determined systematic troubleshooting is using the symptoms along with the troubleshooting aids to determine which component could cause the problem. Find the problem by using the hydraulic schematic to trace oil flow within the system and using the flowmeter and pressure gauge to isolate the problem components.

Use the hydraulic schematic to determine oil flow. Ask yourself, where is the oil coming from and what could cause a problem with these symptoms?





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Inspect the splined coupling for broken splines and scoring on bearing surfaces. Replace all damaged or worn parts.

**Reassembly**

1. Install dowel in gearcase cover (figure 151). Also install mounting bolt for gearbox directly under the brake housing. This bolt can not be installed after the brake housing is in place.

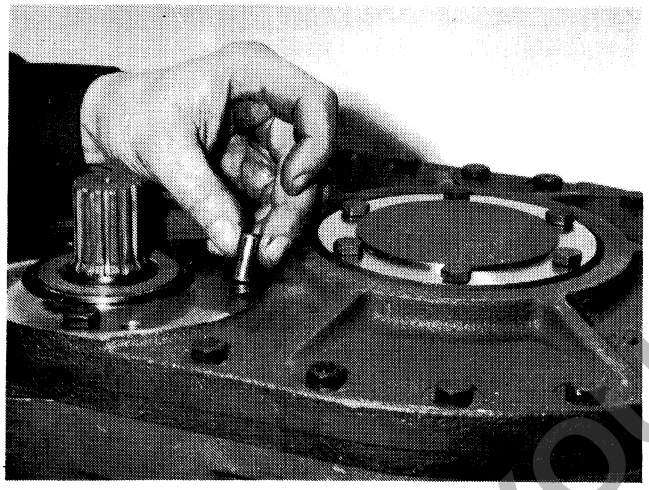


**Figure 151. Installing Dowel for Brake**

2. Apply Loctite TL-271 (Red) to mating surface of gearbox, then position brake housing and install capscrews. Use Loctite TL-242 on mounting capscrews. Torque to 42 lb-ft (57 Nm).

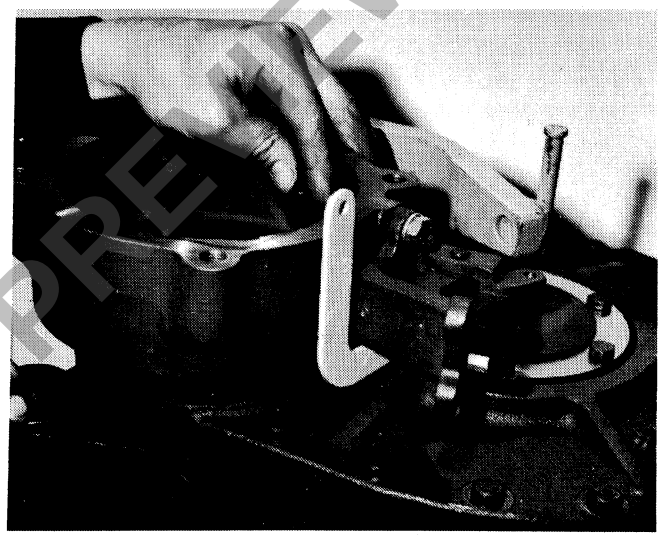


**Figure 152. Installing Brake Housing**

**NOTE: If work is to be done on the swing gearbox, do not install brake housing. Gearcase cover cannot be removed with brake in place.**

3. Insert snap ring inside of splined coupling. Install coupling into place on swing gearbox input shaft.

4. Insert actuating yoke through housing and install rubber boot. Assemble brake lever and linkage, insert yoke through seat in lever, and install ball seal nut. Do not tighten.

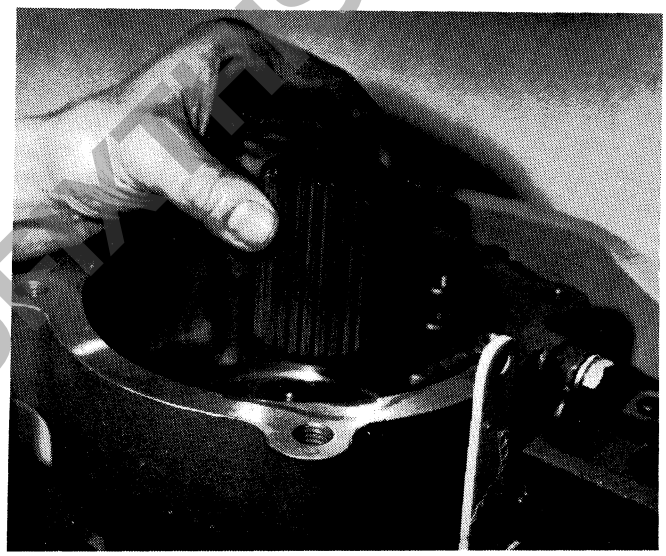


**Figure 153. Installing Brake Coupling**

5. Apply "Dri-Slide" to finished surface at bottom of housing. Install lower disc in place in housing.




**Figure 154. Applying "Dri-Slide"**



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## MAXIMUM RECOMMENDED TORQUE VALUES FOR JIC SWIVEL NUTS (37° SEAT)

| THD. SIZE | SIZE | OD TUBE | TORQUE | |
|---|---|---|---|---|
| | | | Lb-Ft | Nm |
| 7/16 - 20 | -4 | 1/4 | 9 | 12 |
| 1/2 - 20 | -5 | 5/16 | 17 | 23 |
| 9/16 - 18 | -6 | 3/8 | 20 | 27 |
| 3/4 - 16 | -8 | 1/2 | 30 | 40 |
| 7/8 - 14 | -10 | 5/8 | 40 | 54 |
| 1-1/16 - 12 | -12 | 3/4 | 85 | 115 |
| 1-3/16 - 12 | -14 | 7/8 | 100 | 135 |
| 1-5/16 - 12 | -16 | 1 | 110 | 150 |
| 1-5/8 - 12 | -20 | 1-1/4 | 150 | 200 |
| 1-7/8 - 12 | -24 | 1-1/2 | 170 | 230 |
| 2-1/2 - 12 | -32 | 2 | 300 | 400 |
| | -40 | 2-1/2 | 400 | 540 |
| | -48 | 3 | 500 | 680 |

These values are recommended torque values for JIC (37° Seat) swivel nuts either swaged or brazed type. The swivel nuts will normally withstand this torque for a minimum of 15 repeated assemblies.

The torque required to seal swivel female fittings or hose couplings to a male connector depends on many variables such as fluid medium, surface finish, etc. The above values are intended only as a guide for the maximum values the fittings may be subjected to.

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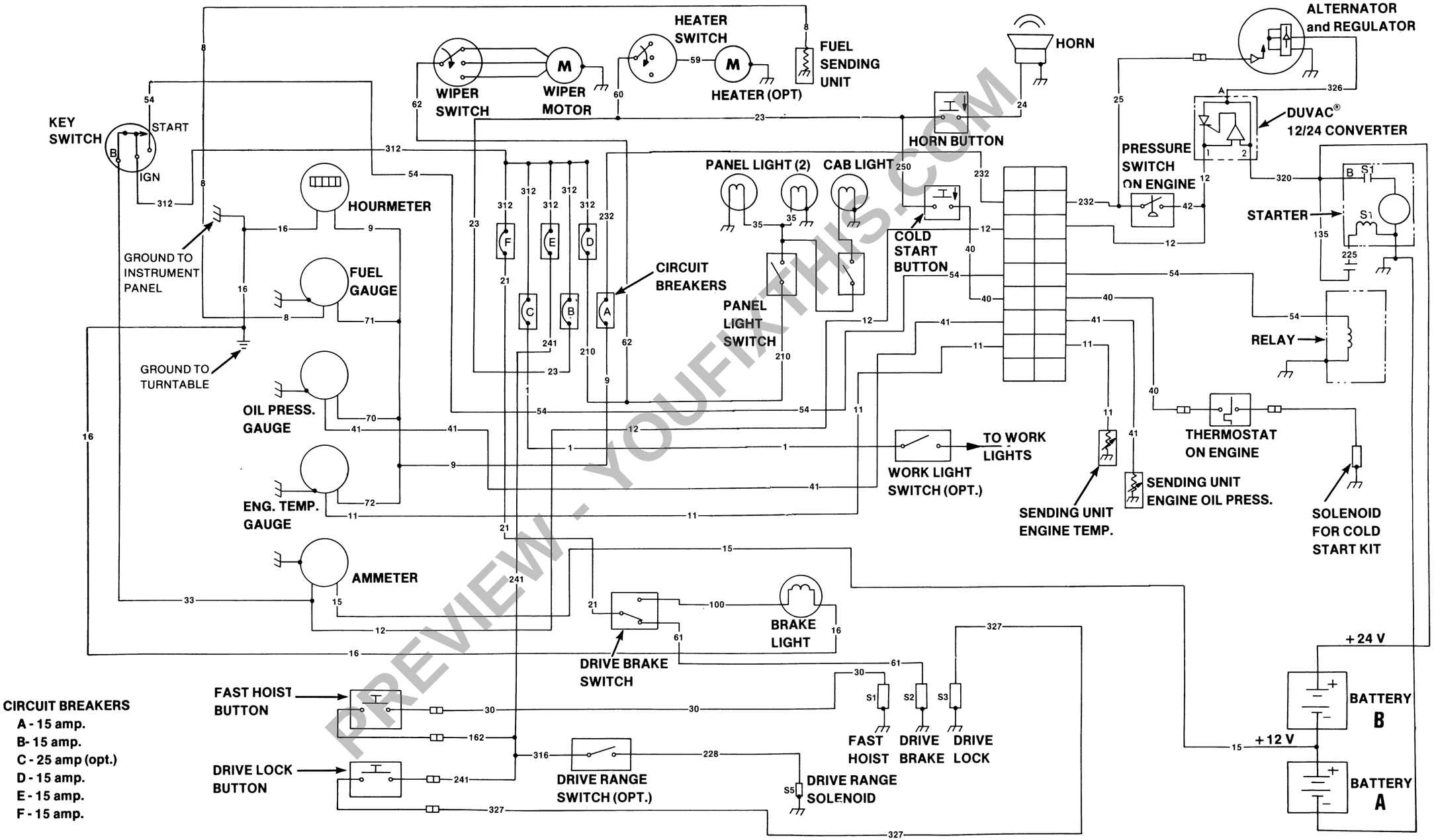



Figure 285. Electrical Schematic - Machines through PIN 6270854

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4. Slide assembled piston onto rod. Install washer and locking nut. Tighten piston locking nut to proper torque (See Figures 280 through 282).

5. Lubricate cylinder bore and outside of piston, then carefully insert piston and rod assembly into cylinder bore. Take care that wear rings and seals are not cut or damaged during installation.

6. Slide head assembly into cylinder bore. Install the head bolts, tighten to proper torque in sequence shown in Figures 280 through 282.

7. Hand pump clean hydraulic oil into the cylinder.

8. To test piston sealing rings, continue to pump oil into rod end after cylinder has bottomed out. Check for leakage at base end port. There should be no oil flow from the open port.

9. Plug cylinder ports to prevent entry of dirt during installation.

**NOTE: After installing cylinder on machine, cycle cylinder several times, then recheck the oil level in the tank. Add oil as required.**

## 25. Hydraulic Oil Tank

### Removal

1. Drain tank.

2. Remove pump inlet lines, valve return lines and tank drain line.

3. Loosen mounting straps and slide them off to the side of the tank.

4. Attach lifting sling and hoist. Remove tank and transfer to work area.

### Disassembly

1. Remove top cover and fill breather cap and strainer.

2. From inside the tank, unscrew and remove the two diffuser screens.

3. Remove sight gauge.

### Cleaning

Steam clean or flush the tank with non-flammable solvent. Brush or scrape away all rust and scale. Flush thoroughly after cleaning.

### Reassembly and Testing

Reassemble in reverse order. Do not install sight gauge or breather/filter. Plug or cap all openings. Place tank in a cage or similar protective area. Vacuum test or pressure test the tank. Do not exceed 15 psi (103 kPa) of pressure. Connect pump to breather/filter port. Use a soap solution on seams and fittings to detect leaks. Repair or replace tank as required. Reassemble and install in reverse order. Use new nylock inserts on diffusers.

**NOTE: If tank is not being placed into immediate service, oil fog the interior and plug all openings to help retard rust.**



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## MAIN CONTROL VALVE (CON'T.)

| PROBLEM | POSSIBLE CAUSE | REMEDY |
|---|---|---|
| Unable to move spool in or out | 1. Dirt in valve<br>2. Binding linkage<br>3. Centering spring loose<br>4. Low pilot pressure | 1. Clean and flush<br>2. Check and correct<br>3. Tighten special capscrew on spring retainer<br>4. Adjust |
| Load will not hold | 1. Cylinder leaking or worn<br>2. Oil bypassing valve spool<br>3. Port relief valve leaking | 1. Replace cylinder packing<br>2. Replace valve; if external, replace spool seals<br>3. Remove and clean or replace |

## RELIEF VALVES

| PROBLEM | POSSIBLE CAUSE | REMEDY |
|---|---|---|
| Erratic pressure | 1. Pilot poppet seat damaged | 1. Replace damaged parts. Clean valve - remove surface marks for free movement |
| Pressure setting requires frequent adjustment | 1. Wear due to dirt<br>2. Lock nut on adjusting screw loose | 1. Drain and refill system<br>2. Tighten securely |
| Leaks | 1. Damaged valve seat or poppet<br>2. Worn o-rings<br>3. Parts sticking due to dirt or deposits | 1. Check seats for scratches, nicks or other marks. Replace worn or damaged parts<br>2. Replace worn or damaged o-rings.<br>3. Inspect for free movement of components. Replace worn or damaged parts |

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