

GROVE

SERVICE MANUAL

This Manual has been prepared for and is considered part of -

3340B/YB4411

Crane Model Number

Crane Serial Number

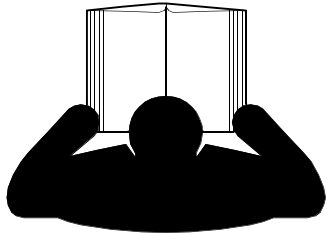
This Manual is Divided into the following Sections:

SECTION 1	INTRODUCTION
SECTION 2	SAFETY PRACTICES
SECTION 3	ELECTRIC SYSTEM
SECTION 4	HYDRAULIC SYSTEM
SECTION 5	MAINTENANCE
SECTION 6	ENGINE AND ENGINE SYSTEMS
SECTION 7	TRANSMISSION AND TORQUE CONVERTER
SECTION 8	AXLES/DRIVE SHAFTS/WHEELS AND TIRES
SECTION 9	BRAKE SYSTEM
SECTION 10	STEERING SYSTEM
SECTION 11	STRUCTURALS

NOTICE

The crane serial number is the only method your distributor or the factory has of providing you with correct parts and service information.

The crane serial number is identified on the builder's decal attached to the operator's cab. **Always furnish crane serial number** when ordering parts or communicating service problems with your distributor or the factory.



WARNING

To prevent death or serious injury:

- Avoid unsafe operation and maintenance.
- This crane must be operated and maintained by trained and experienced personnel. Manitowoc is not responsible for qualifying these personnel.
- Do not operate or work on this crane without first reading and understanding Operator's Manual and Rating Plate supplied with crane.
- Store Operator's Manual in holder provided on crane.
- Attach laminated Capacity Charts supplied with crane to chain in operator's cab.
- If Operator's Manual or Capacity Charts are missing from cab, contact your distributor for new ones.

GENERAL DESCRIPTION

General

A hydraulic system uses liquid to make a transfer of force. Any force on a confined liquid is applied to any point in the system that the liquid reaches. Oil is used as the hydraulic liquid for this system because the liquid must be a lubricant for the components of the system.

There are several main components in a hydraulic system. Each component has a specific function in the system.

The **pump** moves the oil through the system. It is important to remember that the pump causes the flow, not the pressure in the system. Pressure is caused by resistance to the flow. This resistance can be **external** (for example, a load on a cylinder or motor), or **internal** (the resistance of the components of the system). Pressure increases as the resistance to the flow increases. The pump will continue to push more oil into the system until the resistance is overcome or the relief valve opens (fixed displacement pumps) or the pump compensator setting is reached (variable displacement pumps).

Valves are used to control the flow, pressure, direction, and volume of the oil in the system. There are many different types of valves. An explanation of the different valves used on this machine is given in the description of each circuit.

Filters remove dirt and particles of foreign materials from the oil in the system. The oil in the system must be kept clean to inhibit damage to the pumps, cylinders, valves, and other components of the system.

Motors and Cylinders are the actuators or working tools of the system. In the motors and cylinders, hydraulic energy is changed into mechanical force (rotary or straight line movement).

The **Hydraulic Oil Tank** has three important functions: storage, cooling, and supply of oil to the pumps. Because piston rods take space in the cylinders, the level of the oil in the tank will be higher when all the cylinders are retracted.

To understand how a hydraulic system works, it is important to understand the following words:

Flow - The flow through the system is caused by the pump. The amount of fluid which is sent to a circuit or actuator generally controls the speed of that function. The flow is measured in gallons per minute (gpm) or liters per minute (L/min).

Pressure - is caused by any resistance to the flow of the oil. Pressure is normally measured in pounds per square inch (psi) or kilopascals (kPa). There are four general types of pressure.

1. **High Pressure**, which is normally the result of an external load on the system.
2. **Low Pressure**, normally the result of the internal resistance of the components in the system.
3. **Static Pressure**, where the oil is closed in a circuit between two components. There is no movement of the oil, but there is pressure on the oil, normally because there is an external load on the circuit.
4. **Series Pressure**, which is found where oil is confined between two components in a series arrangement, for example when the rod port of one cylinder is connected to the base port of another cylinder. Movement of either cylinder will cause movement in the other cylinder.

Hydraulic System

There are four hydraulic systems on this machine. Information on the hydraulic system for the transmission, brakes, and steering is found in Sections 7, 9 and 10 respectively. Only the main hydraulic system is included in this section. The main hydraulic system gives hydraulic power to:

1. The swing motor
2. The boom cylinders
3. The front and rear outrigger cylinders
4. The main winch motor

The hydraulic components on the boom and mast are connected to the hydraulic components on the lower structure through a hydraulic swivel. The hydraulic swivel is at the center of rotation of the mast. The design of the hydraulic swivel permits operation of the hydraulic functions through full rotation of the mast.

TROUBLESHOOTING

To find a problem in the hydraulic system with minimum loss of time, use the following aids and procedures.

Troubleshooting Aids

1. **Hydraulic schematics** - an exact illustration of the arrangement of the system. The schematic shows all the components in relation to the system. The ability to understand the schematic is important to good troubleshooting. The schematic can be found at the end of this section.
2. **Flowmeter** - an instrument that can be connected into the system to measure the flow of the oil in the system. The flow is measured in gallons per minute (gpm) or liters per minute (Lpm). Normally, the flowmeter is used to check the output of the pump. The flow meter can also be used to find the location of leakage or restriction in the system. Instructions for installation of the flow meter

3. *Standard Outriggers* - Remove the side panel to gain access to the valve area (Figure 4-59).

Independent Outriggers with out Auxiliary Front Winch - Access to the valves can be obtained through the cutout opening in the front plate of the crane (Figure 4-60).

Independent Outriggers with Auxiliary Front Winch - The front top deck plate must be removed to gain access to the valve.

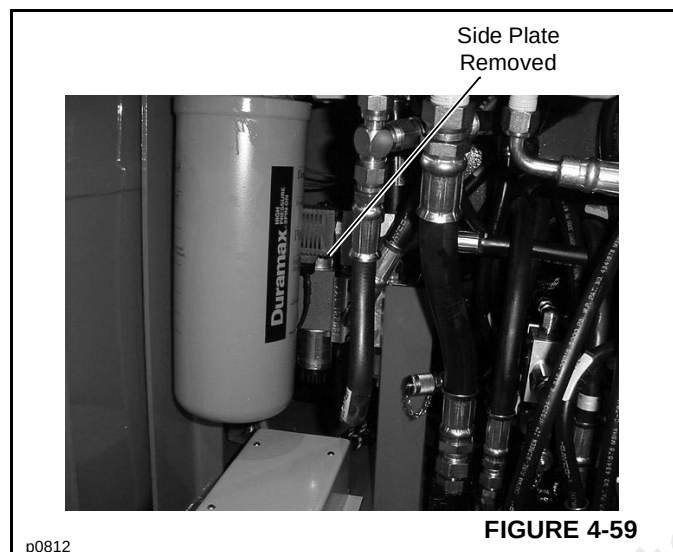


FIGURE 4-59

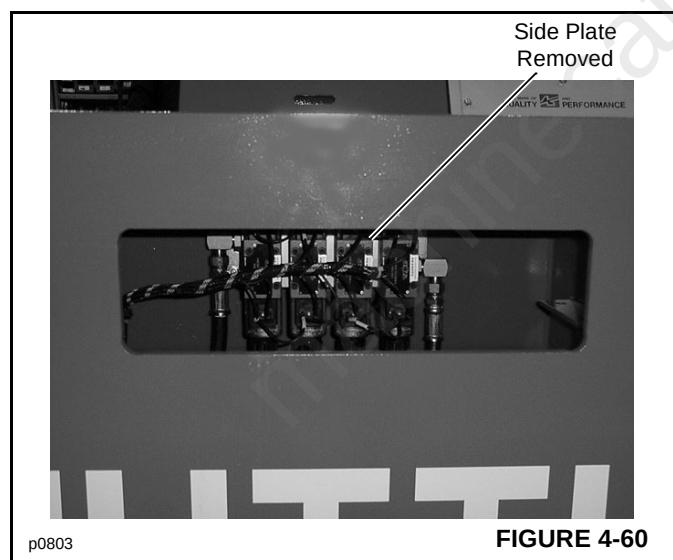


FIGURE 4-60

4. Individual sections can be removed from the manifold block without removing the complete valve. Disconnect the electrical leads from the outrigger valve solenoids. Remove the four socket head capscrews securing the valve section to the manifold block. Remove the valve section.

5. If the complete valve assembly must be removed, tag all hydraulic lines for correct assembly. Clean the valve and connecting lines. Disconnect the hydraulic lines from the valve ports. Put plugs in the hose ends and cap the valve ports to keep dirt out of the hydraulic system. Remove the valve mounting screws and remove the valve.

Solenoid Replacement

The solenoids on each valve section can be removed without removing the valve section from the manifold valve.

1. Stop the engine and engage the parking brake. Place chocks under the wheels.
2. Disconnect the battery cables from the battery. For safety, disconnect the negative (-) cable first.
3. Gain access to the outrigger valve. See "Removal" procedures on page 4-58.
4. Tag and then disconnect the wire leads from the solenoid.
5. Remove the plastic nut (Figure 4-61) from the solenoid shaft. Slide the solenoid off of the shaft.

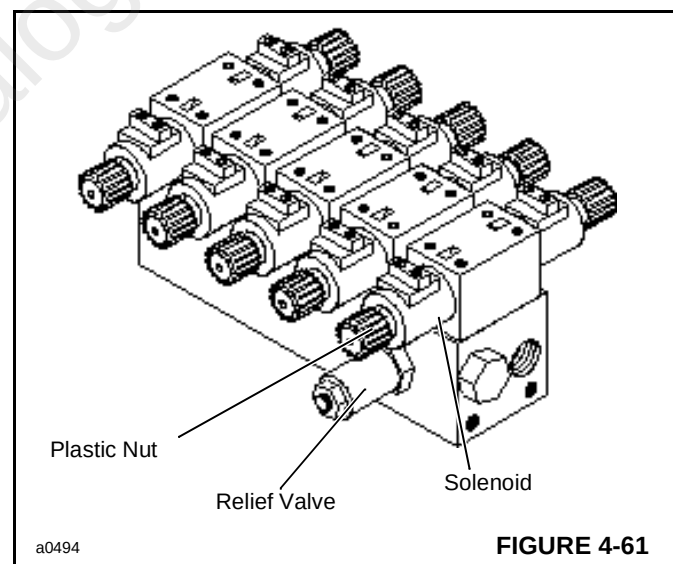
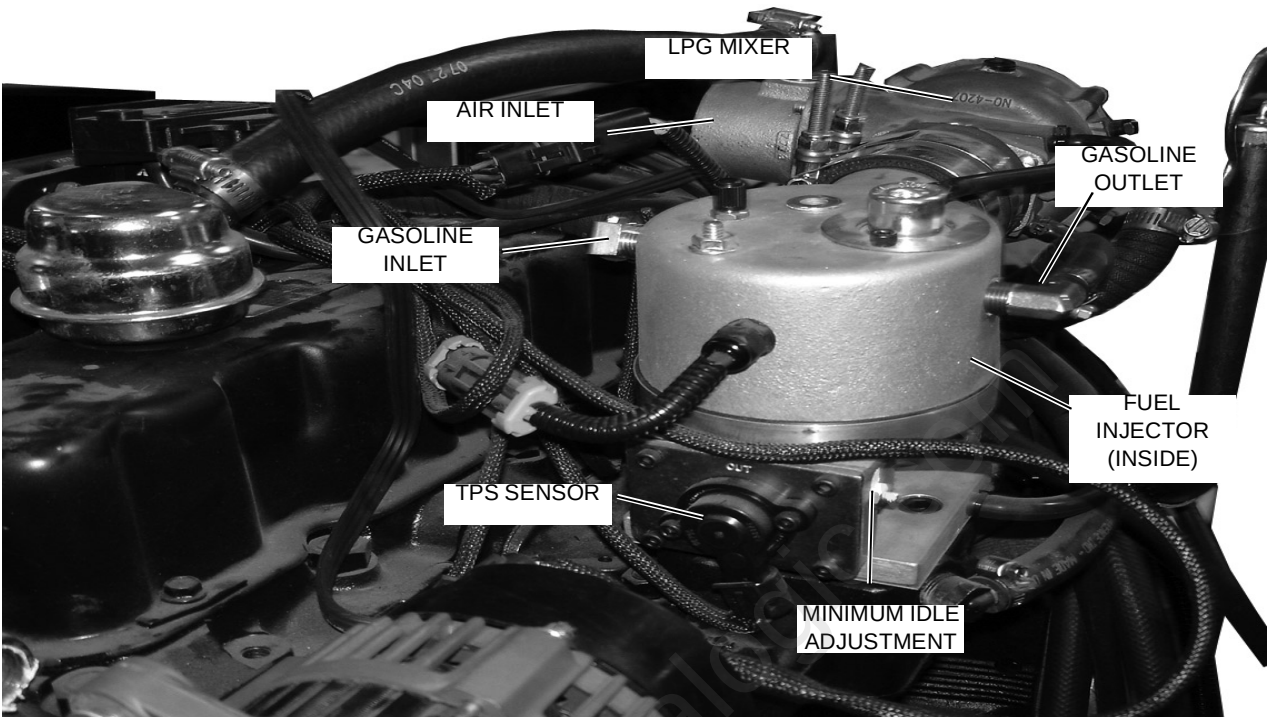


FIGURE 4-61

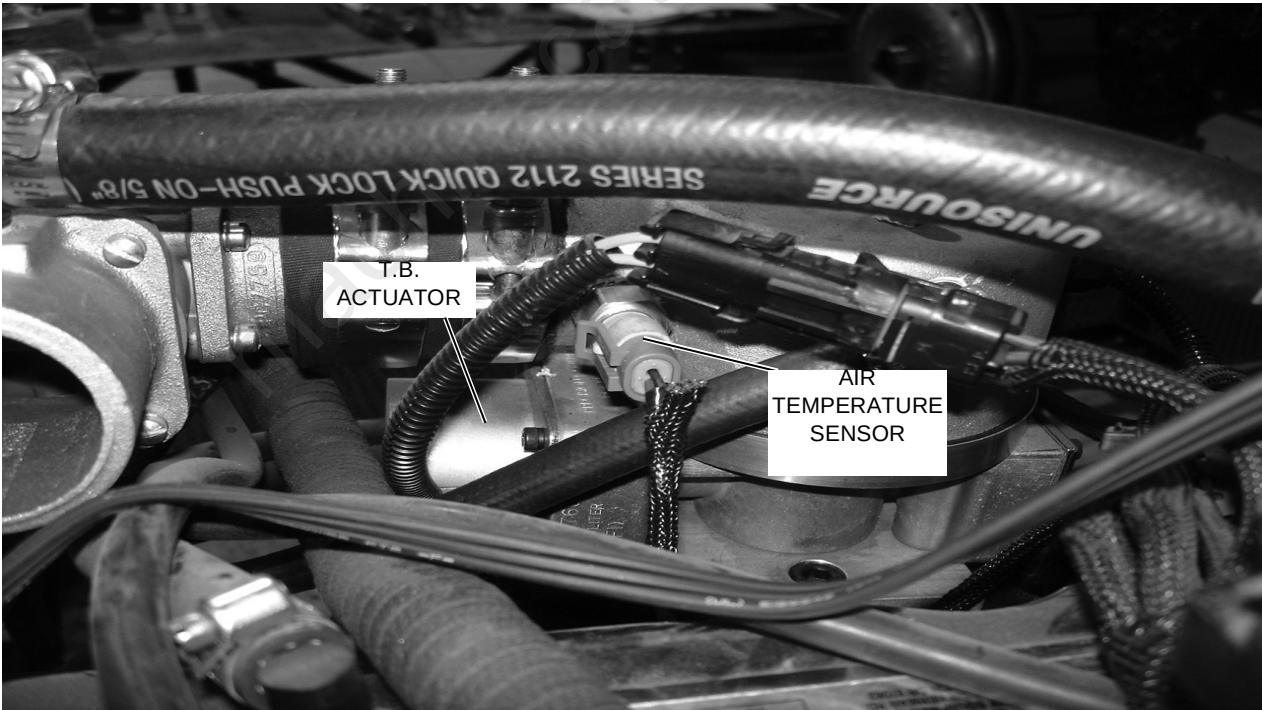
6. Place the new solenoid over the solenoid shaft and install the plastic nut.
7. Connect the wire leads to the solenoid.
8. Connect the battery cables. Positive cable first; negative cable second.
9. Start the engine and test outrigger function.
10. Install any removed covers or plates.

NOTE: Figure 6-50 & Figure 6-51 show items referenced in the dual fuel troubleshooting guide.

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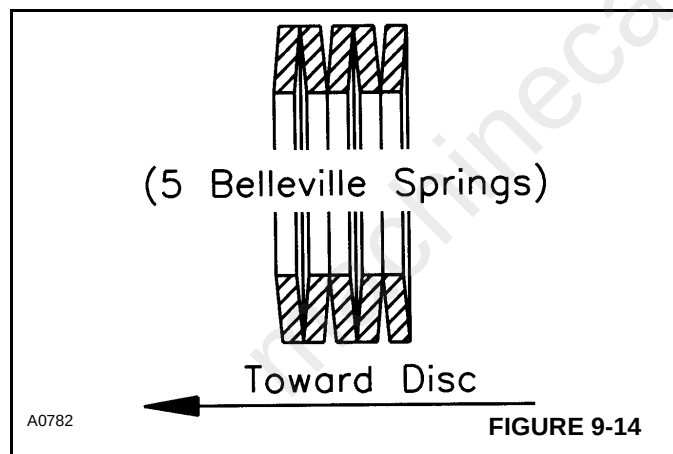
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Dual Fuel System

FIGURE 6-50

20. Install new lining (20) on piston (19) using new flat head screws (21). Tighten screws to a torque of 30-40 lb-in (3.4-4.5 Nm). Install new o-rings (18) on piston (19) and insert lining and piston assembly (22) into housing (26) bore.
21. Carefully install two new seals (28) in housing (26). Be sure to install the seals the same direction as they were removed.
22. Install bleed screw (30). Tighten to a torque of 9-15 lb-ft. (12.2-20.3 Nm).
23. Install new o-rings (13 and 16) and new backup rings (14 and 17) on piston (15). Be sure they are installed in the correct order.
24. Install piston (15) into housing (26) bore. Be sure piston is installed in the correct direction. Be careful not to pinch the o-rings on the inlet ports.
25. Install new backup ring (10) and new o-ring (11) on piston (9). Be sure they are installed in the proper order. Install push rod (12) in bore of piston (9). Install piston into housing (26) bore.
26. Fully lubricate the threads of adjusting screw (7) and lock nut (9) and install into cover (3).
27. Install washer (6), if used, and new belleville springs (5) over end of piston (9). Follow the stacking sequence shown in Figure 9-14.



28. Install new seal (4) in cover (3). Be sure inside of cover is coated with grease.
29. Install new gasket (23), cover (3), lockwashers (2) and capscrews (1). Tighten the screws evenly in the order of A, B, C and D as shown in Figure 9-13. When installed, tighten each screw to a torque of 22-27 lb-ft. (29.8-36.6 Nm).
30. Assemble the brake assembly onto the mounting bracket (31).

31. Install the parking brake assembly onto the frame of the crane.
32. Attach the hydraulic hose.
33. Adjust the lining clearance as described on page 9-6.
34. Open the accumulator needle valve and then bleed air from the system as described on page 9-5.

NOTE: The needle valve must be in the open position for the brake system to operate properly. If it is not open, the charging pump will cycle every time the brake pedal is depressed and if the crane's engine stops there may not be enough pressure to stop the crane.

Seal Kit Installation

The parking brake has a seal kit available. It includes all the parts necessary to replace all the seals in the brake. These parts are indicated in Figure 9-12 with a symbol.

NOTE: The needle valve must be in the open position for the brake system to operate properly. If it is not open, the charging pump will cycle every time the brake pedal is depressed and if the crane's engine stops there may not be enough pressure to stop the crane.



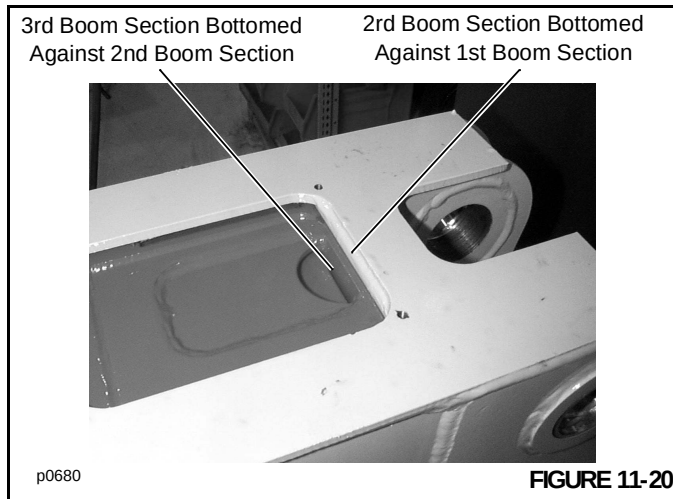
WARNING

Before replacing the parking brake seals, make sure that the machine is on level ground. Place chocks on both sides of the four tires. Remove the ignition key. If these precautions are not adhered to, the crane could run you over while performing the repair.

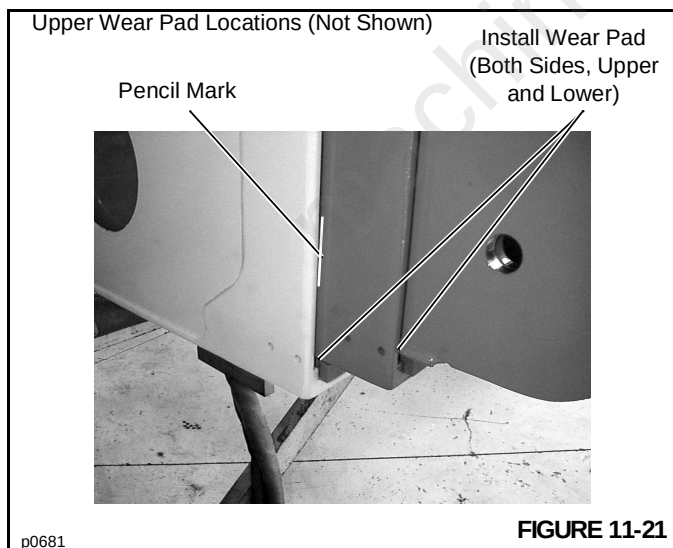
NOTE: When removing seals and back-up rings be careful not to scratch or mar the pistons.

The linings must be kept free of grease, oil, etc.

1. Close the needle valve located under the accumulator (Figure 9-9). This will shut off hydraulic pressure to the parking brake. Release system pressure by actuating the service brake pedal until no resistance is felt. Then, engage and disengage the parking brake to release its pressure.
2. Slowly, loosen the hydraulic hose from the parking brake. Some pressure may still be present in the hydraulic hose. Let the pressure escape and then remove the hydraulic hose.
3. Cap the hydraulic hose to prevent contamination from entering the hydraulic system.
4. Loosen lock nut (8, Figure 9-12) and back off adjusting bolt (7).



15. Remove the socket and special pin. Install cotter pin (57) in place of the pin.
16. Install lock wire (80) between cotter pins (57 and 58).
17. Turn jam nut (64) about 3/4 of the way onto threaded chain end (63).
18. At the front of the 1st boom section install the threaded chain end (63). Install nut (65).
19. Place a pencil mark on the 2nd boom section where the 1st boom section overlaps the 2nd (Figure 11-21).
20. Tighten nut (65) until the pencil mark starts to move away from the 1st boom section. Stop and tighten the jam nut against the boom bracket. Make sure that the chain is not twisted.



21. Install the hoses from the two telescope cylinder hoses to the bulkhead in the 1st boom section.

22. At the front of the second boom section (Figure 11-21), install brass wear pads (40) between the 2nd and 3rd boom sections.

Wear Pad (Units prior to S/N 100710-99)

P/N 1004468 = 0.44 inches (11.18 mm)

Wear Pads (Units with S/N 100710-99 and After)

P/N 1005703 = 0.25 inches (6.35 mm)

P/N 1005524 = 0.31 inches (7.87 mm)

Shims Units with S/N 100710-99 and After

P/N 1005522 = 0.04 inches (1.02mm)

P/N 1005475 = 0.07 inches (1.78 mm)

Install the wear pads and, if required, the shims at four places to center the 3rd boom assembly in the 2nd boom assembly.

23. Repeat Step 22 and install the wear pads between the 1st and 2nd boom sections.
24. Locate the pivoting boom head between the 3rd section ears. Install pin (6) and fasten with capscrew (8) and lockwasher (7).
25. Install pin (4) and fasten with lynch pin (5).
26. Install any components that were removed from the 1st boom section prior to disassembly, i.e. boom angle indicator, cord reel.

Installation

1. Connect the anti-double block system wire to the boom head wire.

NOTE: Use at least a 2 ton (1.8 Metric Ton) overhead crane when lifting the boom assembly. Be sure slings and/or chains are capable of handling 2 ton (1.8 Metric Ton).

2. Using a sling, or chains and overhead hoist, position the boom assembly between the ears of the mast. Install the mounting pin and fasten with a capscrew and lockwasher.
3. Attach the lift cylinder to the boom assembly.
4. Connect the hoses from the hydraulic swivel to the bulkhead fittings on the boom assembly.
5. Connect the anti-double block system electrical wire to the electrical swivel or connect the load moment indicator (LMI) electrical wire to the electrical swivel.
6. Install the wire rope over the boom head and reeve through boom head and drop block sheaves and dead end with wedge and socket. Connect the wedge socket to the pivoting boom head.

Full Version Available

Grove 3340B + YB4411 Rough Terrain Crane Service Manual

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