

SERVICE MANUAL

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

3330F/FL & YB4409/XL

Crane Model Number

Crane Serial Number

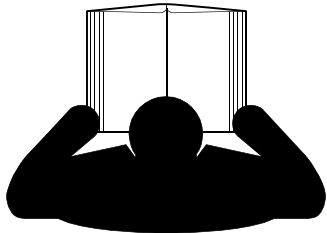
This Manual is Divided into the following Sections:

SECTION 1	INTRODUCTION
SECTION 2	SAFETY PRACTICES
SECTION 3	ELECTRIC SYSTEM
SECTION 4	HYDRAULIC SYSTEM
SECTION 5	PREVENTATIVE 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
SECTION 12	SCHEMATICS/WIRING DIAGRAMS

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.

Adjustable Straight**Table 1-5****Adjustable Straight Thread O-ring**

T-2-6

ADJUSTABLE STEEL STR. THREAD O-RING FITTINGS	
SAE SIZE	(F.F.F.T.)
2	1.0 ± 0.25
3	1.0 ± 0.25
4	1.5 ± 0.25
5	1.0 ± 0.25
6	1.5 ± 0.25
8	1.5 ± 0.25
10	1.5 ± 0.25
12	1.5 ± 0.25
14	1.5 ± 0.25
16	1.5 ± 0.25
20	2.0 ± 0.25
24	2.0 ± 0.25
32	2.0 ± 0.25

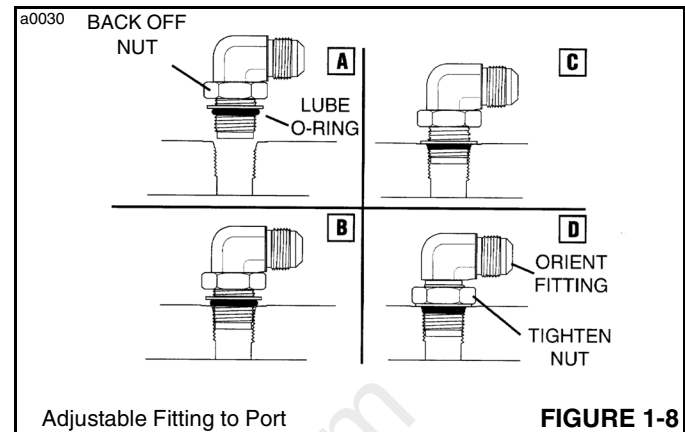
Thread O-ring Fitting - Fitting to Port (Table 1-5)

1. Inspect both mating parts for burrs, nicks, scratches, or foreign particles.
2. Lubricate O-ring with a light coat of clean oil (Figure 1-8A).
3. Back off locknut as far as possible (Figure 1-8A).
4. Screw fitting into port by hand until the backup washer contacts face of port and is pushed all the way towards the locknut (Figure 1-8B).
5. To orientate the fitting, unscrew the fitting the required amount, but not more than one full turn (Figure 1-8C).
6. Hold the fitting in the desired position and tighten the nut (Figure 1-8D) following the F.F.F.T. method, See F.F.F.T. METHOD (Flats from Finger Tight) starting with step 4.

Nonadjustable Straight Thread O-ring Fitting - Fitting to Port (Table 1-6)

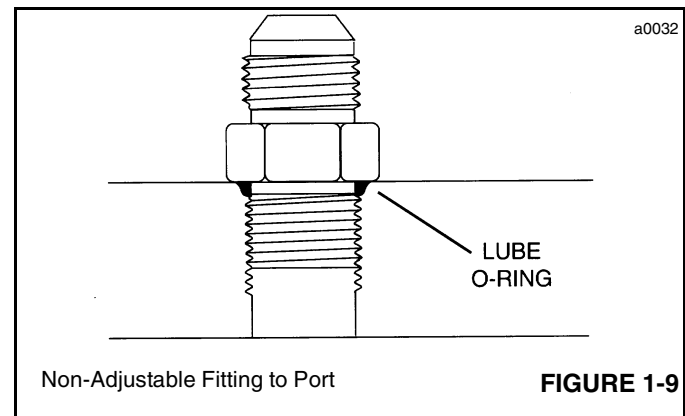
1. Make sure both threads and sealing surfaces are free of burrs, nicks, scratches or any foreign particles.
2. Lubricate O-ring with clean oil (Figure 1-9).
3. Turn fitting until finger tight.

4. Using the assembly torque method, tighten to given torque for size from Table 1-6.

**Table 1-6**

T-2-7

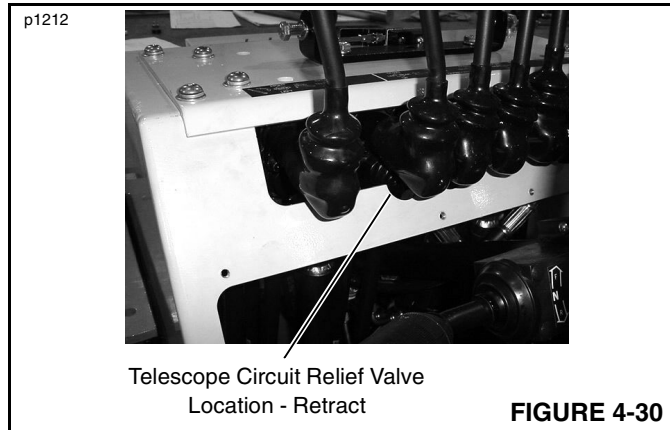
NON-ADJUSTABLE STEEL STR. THREAD O-RING FITTINGS		
SAE SIZE	TORQUE	
	(lb in)	(lb ft)
2	90 ± 5	7.5 ± 0.5
3	170 ± 10	14 ± 1.0
4	220 ± 15	18 ± 1.0
5	260 ± 15	22 ± 1.0
6	320 ± 20	27 ± 2.0
8	570 ± 25	48 ± 2.0
10	1060 ± 50	90 ± 5.0
12	1300 ± 50	110 ± 5.0
14	1750 ± 75	145 ± 6.0
16	1920 ± 25	160 ± 6.0
20	2700 ± 150	225 ± 12.0
24	3000 ± 150	250 ± 12.0
32	3900 ± 200	325 ± 15.0



Port Relief Valve (Retract Function)

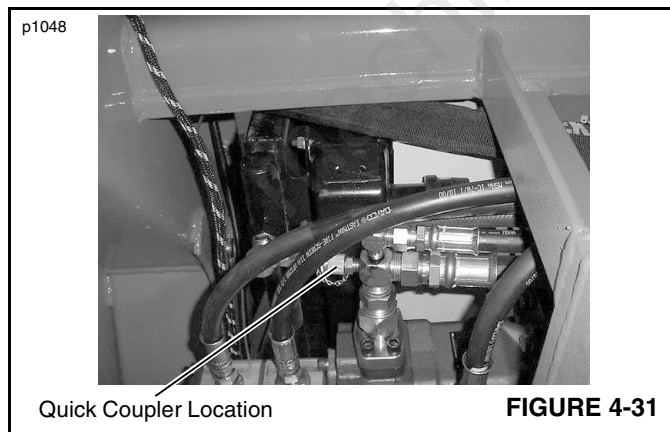
The port relief valve installed in the telescope circuit is used to protect the telescope cylinder and booms from damage caused by high oil pressure in the telescope retract circuit.

The valve is installed in the telescope section of the main control valve. See Figure 4-30.



Checking the Telescope Circuit Relief Valve Setting

1. With the engine shut down, install a 0 - 5000 psi (0 - 34 450 kPa) pressure gauge on the quick coupling located at the outlet (pressure) line of the primary pump. See Figure 4-31.
2. Start the engine and accelerate the engine to maximum rpm.
3. Fully retract the boom sections. Continue to hold the control in position after the sections have stopped moving.



4. Read the pressure gauge when the relief valve opens. The reading should be 2500 ± 50 psi ($17\,237 \pm 345$ kPa).
5. Release the control.
6. If the pressure reading is correct, stop engine and remove the pressure gauge.

7. If the pressure reading is incorrect, adjust the pressure setting of the relief valve.

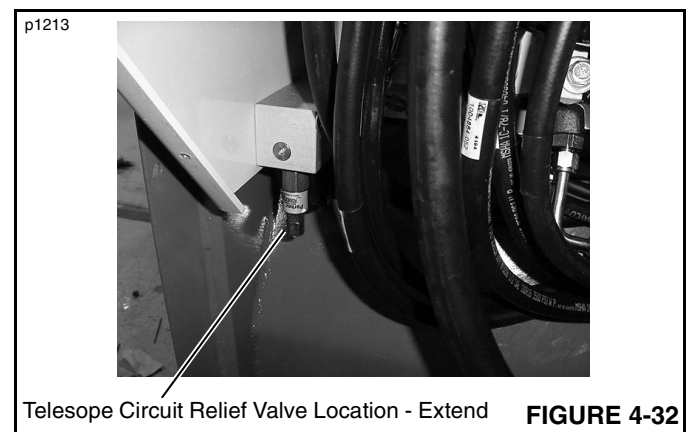
Adjusting the Telescope Circuit Relief Valve Setting

1. Loosen the jam nut on the relief valve (Figure 4-30)
2. With a pressure gauge installed and the engine running at full rpm, retract the boom sections. Hold the control in position after the boom sections are retracted all the way.
3. Turn the relief valve adjusting screw until a pressure setting of 2500 ± 50 psi ($17\,237 \pm 345$ kPa) is obtained. 1/4 turn equals 225 psi (1551). Turning the adjusting screw clockwise increases the pressure. Turning the adjusting screw counterclockwise decreases the pressure.
4. Release the control lever.
5. Tighten the jam nut against the relieve valve body.
6. Check the pressure again. If correct, shut down the engine and remove the pressure gauge. If incorrect, repeat the adjustment procedure.

Telescope Relief Valve (Extend Function)

The relief valve installed in the telescope circuit is used to protect the telescope cylinder and booms from damage caused by high oil pressure in the telescope extend circuit.

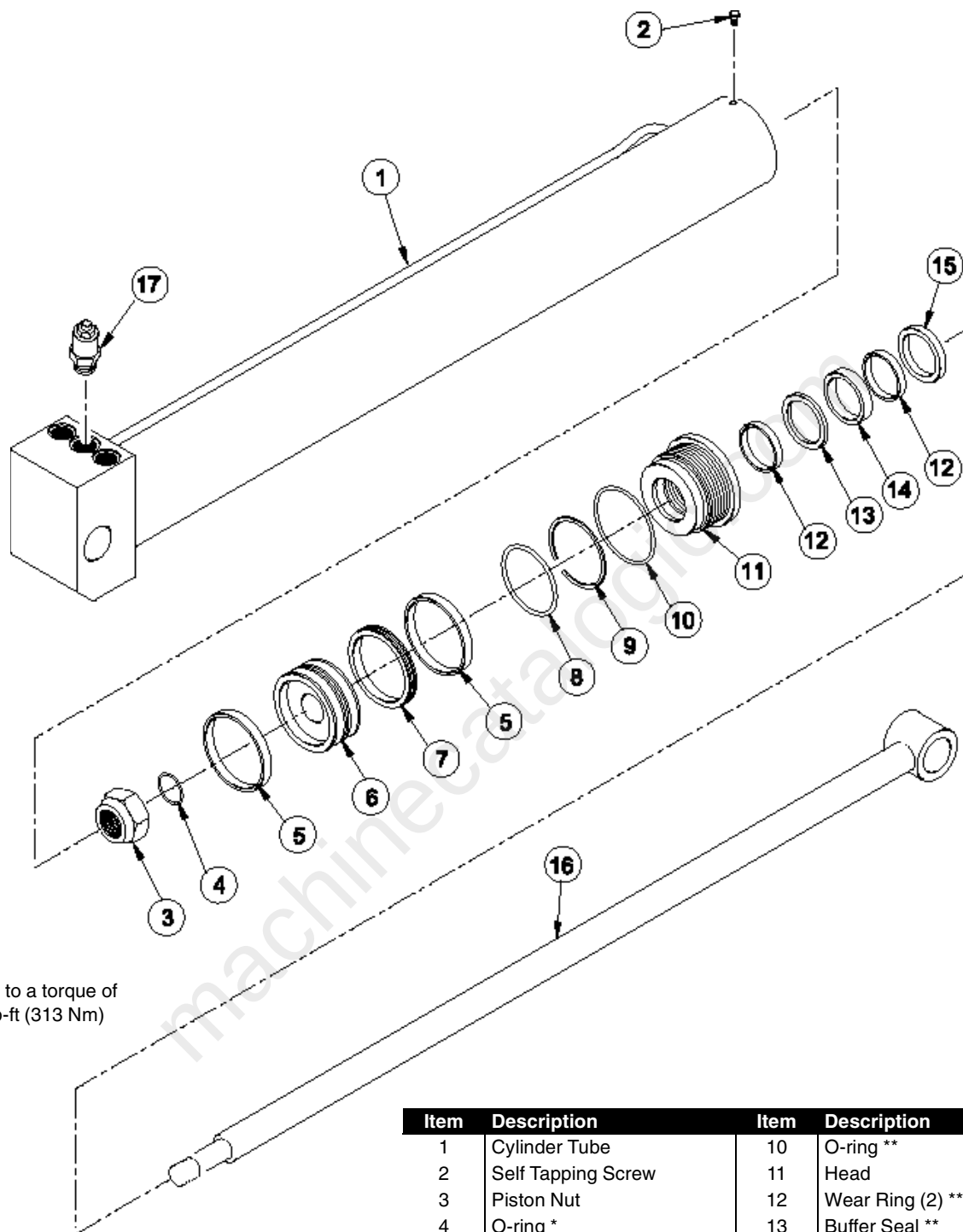
The valve is installed in the valve block of the anti-double blocking solenoids (Figure 4-32).



Checking the Telescope Circuit Relief Valve Setting

1. With the engine shut down, install a 0 - 5000 psi (0 - 34 450 kPa) pressure gauge on the quick coupling located at the outlet (pressure) line of the primary pump. See Figure 4-31.
2. Start the engine and accelerate the engine to maximum rpm.

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Tighten to a torque of
230 lb-ft (313 Nm)

Item	Description	Item	Description
1	Cylinder Tube	10	O-ring **
2	Self Tapping Screw	11	Head
3	Piston Nut	12	Wear Ring (2) **
4	O-ring *	13	Buffer Seal **
5	Wear Ring (2) *	14	Rod Seal **
6	Piston	15	Wiper
7	Piston Seal *	16	Cylinder Rod
8	O-ring **	17	Pilot Operated Check Valve
9	Backup Ring **		

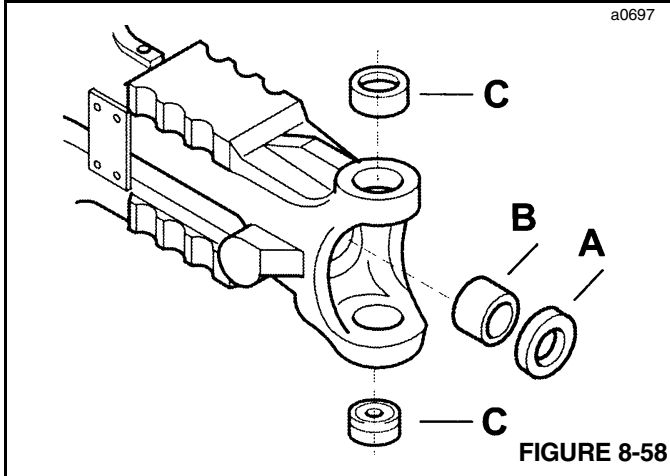
*Included In Piston Kit

** Included In Head Seal Kit

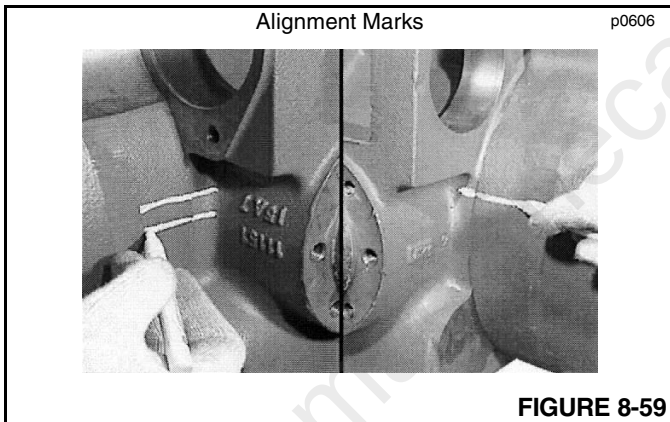
FIGURE 4-79

Axle Beam and Brake Disassembly

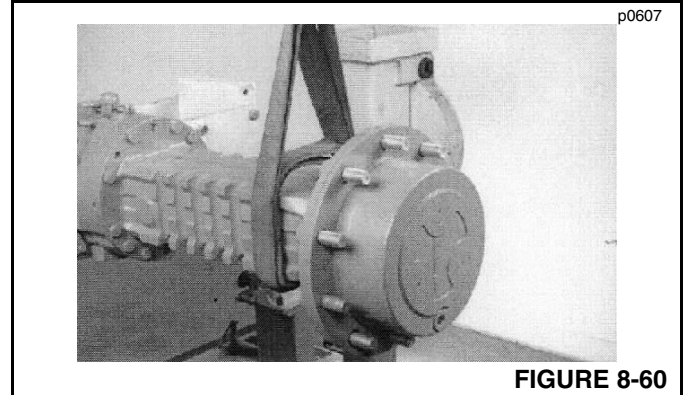
1. Pry the seal ring (A, Figure 8-58) from the axle beam. The seal ring will be damaged during the removal procedure. Using a chisel and hammer, remove bushing (B) from the axle beam. Using a suitable puller, remove bushings (C) from the king pin housings.



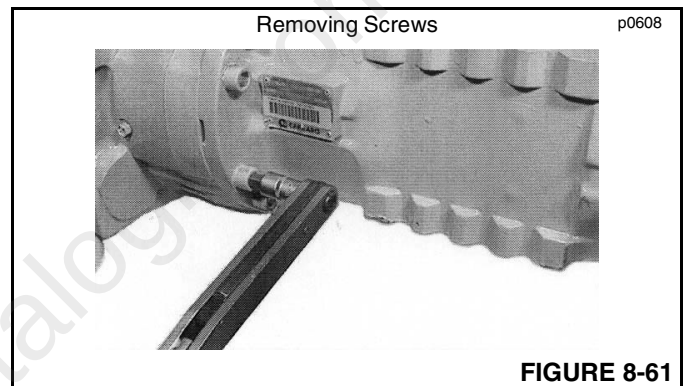
2. Put alignment marks on the axle beam and on the differential supporting flanges (Figure 8-59) to identify the right and left sides during assembly.



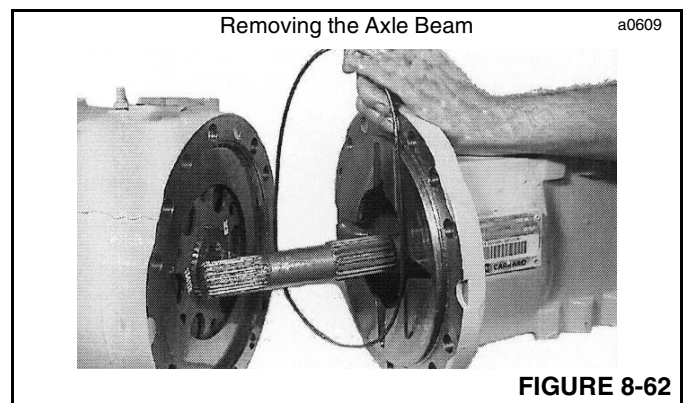
3. Place the axle on supports. The center housing and two axle beams must have their own supports, which must support each component during disassembly. If supports are not available, use a hoist and sling to support each part separately (Figure 8-60).



4. Unscrew the screws securing the axle beam to the center housing (Figure 8-61).



5. Remove the axle beam (Figure 8-62). When removing the axle beam be careful that the brake discs do not fall from the brake flange. Remove the O-ring from the axle beam.



SECTION 10

STEERING SYSTEM

TECHNICAL DATA

Rated pump output.....	9.8 gpm at 2500 rpm (37.1 Lpm at 2500 rpm)
Relief valve setting	2500 ± 50 psi (17 237 ± 345 kPa)
Description	

General

The main components of the standard steering system are the second section of the secondary hydraulic pump (Figure 10-1), the priority flow control valve, the load sensing steering orbitrol, hydraulic tank, one front steering cylinder, two rear steering cylinders and the steering solenoid valve. When crab steering is installed, another solenoid valve is installed in the steering circuit.

When the steering wheel is turned, a pressure demand is sensed by the priority flow control valve through load sensing line between the priority flow control valve and the load sensing steering orbitrol.

Oil from the second section of the secondary hydraulic pump is then distributed through the priority flow control valve and a check valve to the steering orbitrol.

When a turn is made, oil is distributed from the steering orbitrol directly through the steering solenoid valve and/or to the steering cylinders.

When the steering orbitrol is neutral, the load sense signal is ceased, full pump flow is then distributed to the outrigger and brake circuits through the priority flow control valve.

Maximum steering system pressure is controlled by a relief valve in the priority flow control valve.

Steering Modes

The crane can be operated in two standard steering modes, and one optional mode. These modes are selected using the steering selector switch located on instrument panel. The three modes are:

- Two-wheel steering
- Four-wheel steering
- Crab steering (Optional)

Boom Assembly**General**

NOTE: Apply Loctite 242 (Blue) on all retaining screws for the wear plates.

1. If a new boom section is being installed, thoroughly clean the boom section.
 - a. Remove all paint from the threads of all bolt holes.
 - b. Remove all residue from inside of the boom section. Compressed air may be used to remove the residue.
2. Install all wear blocks that were removed. Install all shims and spacer, as required.
3. Apply lubricant (bronze anti-seize) to the top inside surface of the third boom section (19) where the slide blocks on fourth boom section (18) travel.
4. Apply lubricant (bronze anti-seize) to bottom surface of fourth boom section (18) where the slide blocks in the third boom section (19) slide.
5. Using a hoist, slide fourth boom section (18) into the third boom section (19) until it bottoms out.
6. If brass guide bearing (25, Figure 11-2) where removed, install them into second boom section (10).
7. Apply lubricant (bronze anti-seize) to the top and bottom inside surfaces of second boom section (10) where the slide blocks travel.
8. Apply lubricant to the areas on third boom section (19) where brass guide bearings (25) slide.
9. Using a hoist, slide third boom section (19) into second boom section (10) until it bottoms out.
10. Make sure brass guide bearings (25) are installed in first boom section (2).
11. Apply lubricant to the top inside surface of boom section (2) where wear plates (20) slide.
12. Apply lubricant to the bottom outside surface of second boom section (10) where wear plates (23) slide.
13. Apply lubricant to the areas on second boom section (10) where brass guide bearings (25) slide.
14. Using a hoist, slide the assembled second boom section into first boom section (2) until it bottoms out.
15. Install sequencing boom and telescope cylinder. See Installation of Sequencing Boom and Telescope Cylinder.

Full Version Available

Grove 3330F FL + YB4409 XL Rough Terrain Crane Service Manual

Grove 3330F/FL, YB4409/XL rough terrain crane service manual with repair procedures, adjustments and troubleshooting. Instant PDF download.

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