

SERVICE MANUAL

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

800H Telescoping Crane

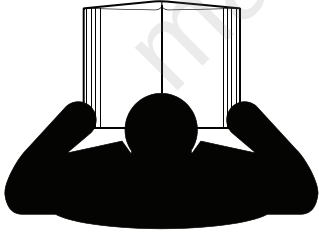
This Manual is Divided into the following Sections:

SECTION 1	INTRODUCTION
SECTION 2	HYDRAULIC SYSTEM
SECTION 3	ELECTRIC SYSTEM
SECTION 4	BOOM
SECTION 5	WINCH
SECTION 6	SWING
SECTION 7	OUTRIGGERS
SECTION 8	LUBRICATION
SECTION 9	CRANE INSTALLATION
SECTION 10	SCHEMATICS

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 crane frame. ***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. National Crane 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.
- If Operator's Manual or Capacity Charts are missing from crane, contact your distributor for new ones.

Keep The System Clean

When removing components of a hydraulic system, cover all openings on both the component and the crane.

If evidence of foreign particles is found in the hydraulic system, flush the system.

Disassemble and assemble hydraulic components on a clean surface.

Clean all metal parts in a nonflammable cleaning fluid. Then lubricate all components to aid in assembly.

Sealing Elements

Inspect all sealing elements (O-ring, gaskets, etc.) when disassembling and assembling the hydraulic system components. Installation of new elements is recommended.

Hydraulic Lines

When disconnecting hoses, tag each one to ensure proper identification during assembly.

When installing metal tubes, tighten all bolts finger-tight. Then, in order, tighten the bolts at the rigid end, the adjustable end, and the mounting brackets. After tubes are mounted, install the hoses. Connect both ends of the hose with all bolts finger-tight. Position the hose so it does not rub the machine or another hose and has a minimum of bending and twisting. Tighten bolts in both couplings.

Due to manufacturing methods there is a natural curvature to a hydraulic hose. Reinstall the hose so any bend is with this curvature.

Electrical**Batteries**

Clean the batteries with a solution of baking soda and water. Rinse with clear water and dry. Clean the battery terminals with fine sandpaper and coat the terminals dielectric grease. Do not use a non-dielectric grease.

Remove the batteries If the machine is not used for an extended period of time. Store the batteries in a warm, dry place, preferably on wooden shelves. Never store on concrete. A small charge should be introduced periodically to keep the specific gravity rating at recommended level.

CAUTION

Disconnect batteries prior to working on the electrical system.

When disconnecting wires, tag each one to ensure proper identification during reassembly.

Connectors, Harnesses, Wires, and Connectors

Visually inspect all electrical harnesses, cables, and connectors every month or 250 hours for the following:

- Damaged, cut, blistered, or cracked insulation.
- Exposed bare wires.
- Kinked or crushed wires and cables.
- Cracked or corroded connectors, battery terminals, and ground connections.

If any the above conditions exist, evaluate and replace as necessary.

The climate in which the crane operates affects the service life of the electrical components. The climate zones are defined in the table on page 1-5. Recommended replacement of harness and cables is as follows:

- Climate zone C after 10,000 hours of service.
- Climate zones A and C with high ambient temperatures and duty cycles after 8000 hours of service.
- Climate zones D and E after 10,000 hours of service.
- Salt water conditions after 8,000 hours of service.

Climate Zone Classification

Zone	Classification
A (Tropical Moist)	Latitude 15° - 25° North and South (All months average above 64° F [18° C])
B (Dry or Arid)	Latitude 20° - 35° North and South (Deficient of precipitation most of the year)
C (Moist Mid-Latitude)	Latitude 30° - 50° North and South (Temperate with mild winters)
D (Moist Mid-Latitude)	Latitude 50° - 70° North and South (Cold winters)
E (Polar)	Latitude 60° - 75° North and South (Extremely cold winters and summers)

Fatigue Of Welded Structures

Highly stressed welded structures are subject to cracking (fatigue) when repeatedly subjected to varying stresses caused by twisting, shock, bending, and overloads. Inspect

equipment periodically for weld fatigue. The frequency of inspections depends on the age of the equipment, the severity of the application, and the experience of the operators and the maintenance personnel. The following are

SERVICING THE CONTROL VALVES

Disassembly And Reassembly Of Control Valves To Replace Seals

NOTE: For clarification, the inlet cover containing the main relief is called the left side of the main control valve assembly.

1. Before disassembly, numerically mark each valve for correct reassembly.
2. Remove three stud nuts from the end section.
3. Remove valve sections by sliding from assembly studs.
4. If valve sections are to be added or removed, use the proper length stud.

NOTE: Use assembly nuts, three required, with all assembly studs. No lockwashers! All studs are stress-proof material and should be replaced only with original equipment replacement parts.

5. Thoroughly clean o-ring counterbores and ground surfaces of each section.
6. Replace the four o-rings for crane valve, the three o-rings for the winch valve, and seals. There are two seals per section. Buna-N seals are standard.
7. Replace the valve sections on assembly studs in the same order in which they were removed.

NOTE: Use care in replacing valve sections to avoid dislodging o-rings from counterbores.

8. When all valve sections are positioned on assembly studs, replace stud nuts and tighten evenly to 32 ft-lb (43 N.m) torque for crane valve and 25 ft-lb (34 N.m) torque for winch valve.

NOTE: If stud nuts are not tightened to the proper torque, valve spools may bind or stick, or cause section seals to extrude.

Replacing Spool Seals

Valve sections and covers are identified by numbers cast into the body.

1. Remove bonnet assembly parts from back of valves and keep in order of disassembly.
2. Remove all parts connected to the spool on the front of the valve.

NOTE: Do not remove the spool because the seals can be replaced externally. To prevent the spool from turning, insert a screw driver through clevis slot. Do not hold the spool with a wrench. This will destroy the finish.

3. Remove retainer plate, retainer plate washers, back-up washers, and spool seals.
4. Thoroughly clean counterbore.
5. Lightly oil new seals. Slide over valve spool and insert in seal counterbore.

BOOM REMOVAL

Boom Length	Boom Weight	Cg From Pivot Point
71 ft (21.6 m)	5583 lb (2832 kg)	140 in (3.56 m)
47 ft (14.3 m)	4294 lb (1948 kg)	96 in (3.02 m)
38 ft (11.5 m)	3782 lb (1716)	79 in (2.01m)

1. Extend and set machine outriggers. Boom must be completely retracted and stowed in the boom rest.
2. If equipped, remove swing around jib. See Section 4 Operator's Handbook, Section 4.
3. Remove hook block or downhaul weight. Wind up rope on winch drum and stow wedge socket on pegs provided on 1st section. Shut down truck engine.
4. Attach a lifting device to rod end of lift cylinder, remove boom lift cylinder pin keeper and pin from bottom of the 1st section boom. Lower lift cylinder to a suitable support.
5. Tag and disconnect extend cylinder lines and winch hydraulic lines. Cap all open lines and ports.
6. Attach a lifting device to provide even weight distribution and raise the boom until weight is removed from the boom pivot pin. Remove boom pivot pin keeper and boom pivot pin. Lift boom free of turret.

BOOM DISASSEMBLY

The 800H boom can be disassembled by using two different methods. Alternative #1 disassembles the boom in the conventional manner. Alternative #2 removes the extend cylinder from the rear of the boom, after removal of the winch. This feature facilitates cylinder service without complete boom teardown.

For reference, the front of the boom refers to the sheave case end, the rear of the boom is the winch mount end. Left and right are viewed from front to rear.

If the boom is to be unpinned from the turret of the crane structure, please refer to the Boom Removal Procedure section in this book. If the required service procedure is to be performed on the boom while still pinned to the turret, please follow these directions.



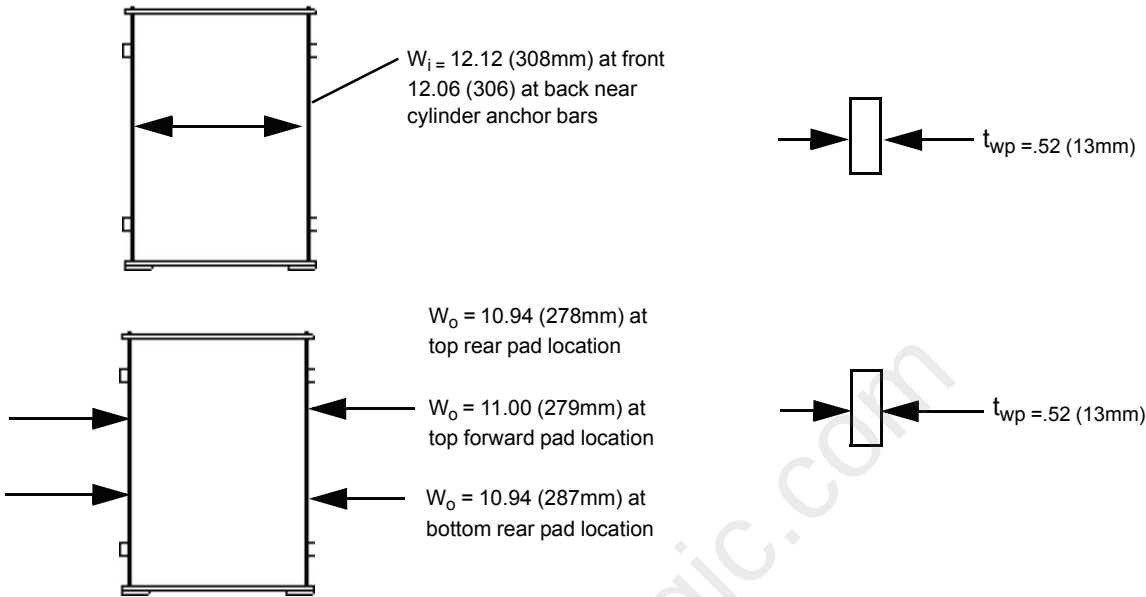
DANGER

Do not, under any circumstances, work at an elevated height without using proper fall protection as required by local, state or federal regulations.

Boom Disassembly Alternative #1

1. Gaining access through rear of boom, loosen capscrews retaining the extend cable anchor in the rear of the 3rd section as well as the capscrew on the anti-two-block wire clamp on the anchor assembly.
2. Extend boom 24 inches (60 cm). Loosen and remove the nuts which secure the extend cables to the cable anchor plate. Remove nut from anti-two-block spade bolt. Tag and disconnect hydraulic lines to the extend cylinder.
3. Drape extend cables and anti-two-block cable inside boom, and slide cable anchor plate out of the side of the winch mount if winch has been removed from boom.
4. Loosen and remove two capscrews, lockwashers and spacers which anchor the extend cylinder rod butt plate to the rear of the 1st section.
5. Loosen and remove two capscrews and lockwashers securing spacer bar to the inside top of the front of the 1st section. Remove spacer bar.
6. Loosen and remove four capscrews securing wear pads to the bottom of the 1st section. Removal of side wear pads is optional. Adequate clearance exists between adjoining section side pads for boom disassembly. If side pad removal is required, tag all pads, shims, and corresponding locations for proper reassembly.
7. Support 2nd 3rd assembly at the front with an appropriate lifting method. Raise the 2nd 3rd assembly inside the 1st section to allow for front bottom pad removal. Remove bottom wear pads.
8. With the 2nd & 3rd assembly supported, slide assembly out of the 1st. Relocation of the sling point on the 2nd & 3rd assembly will be necessary for proper balancing of the assembly as it slides out of the 1st section. Keep tension on retract cables as the assembly is pulled out of the 1st, to minimize the chance of retract cable damage.
9. Place 2nd & 3rd assembly on a suitable horizontal surface. Take care not to pinch or crush retract cables while lifting or supporting assembly.
10. Remove top rear wear pads on the 2nd section. They will lift off the cam plates easily. Do not remove or loosen the capscrews holding the cam plates to the section. This will affect side clearance during re-assembly.
11. Loosen and remove four capscrews securing the rear bottom wear pads on the 2nd section. This pad serves as a bottom and side pad as well as the retract cable keeper under the retract sheaves. Removal of this pad will allow the retract cables to uncoil off the retract sheaves. Place retract cable ends in a location to minimize the possibility of damage.

Shim Calculation for Wear Pads (Example)



	Top Rear	Bottom Rear
$W_i =$	12.06 (306 mm)	12.06 (306) mm
$-W_o =$	-10.94 (-278 mm)	-10.94 (-278 mm)
$-t_{wp} =$	-0.52 (-13 mm)	-0.52 (-13 mm)
$-t_{wp} =$	-0.52 (-13 mm)	-0.52 (-13 mm)
Clearance Before Shims =	0.008 (2 mm)	0.08 (2 mm)
Left Side Shim =	-0.03 (-0.8 mm)	-0.03 (-0.8mm)
Final Clearance =	0.05 (1.2 mm)	0.05 (1.2 mm)

FIGURE 4-6

FOUR SECTION BOOM OPERATION

The boom service and maintenance section of this manual includes both the three and four section boom information. Use appropriate information for your particular boom length.

A rod-fed, two-stage double-acting cylinder, attached to the 1st, 2nd, and 3rd boom sections, supports and propels the 2nd and 3rd boom sections. The extend cables attach to the base end of the 2nd boom section, are reeved around sheaves attached to the cylinder, and attach to the base end of the 4th boom section, therefore providing support and extension of the 4th boom section. The 3rd section retract cables attach to the tip end of the 1st boom section, are reeved around

sheaves attached to the 2nd boom section, and attach to the base end of the 3rd boom section, therefore providing retraction of the 3rd boom section. The 4th section retract cables attach to the tip end of the 2nd boom section, are reeved around sheaves attached to the 3rd boom section, and attach to the base end of the 4th boom section, therefore providing retraction of the 4th boom section. A proportioning cable attached to the rear of the 1st section, reeved around a sheave at the tip of the 2nd section, and anchored to the rear of the 3rd section maintain proper cylinder extension proportion, therefore maintaining equal boom section proportion. Detailed service and maintenance is required to insure smooth and proper operation.

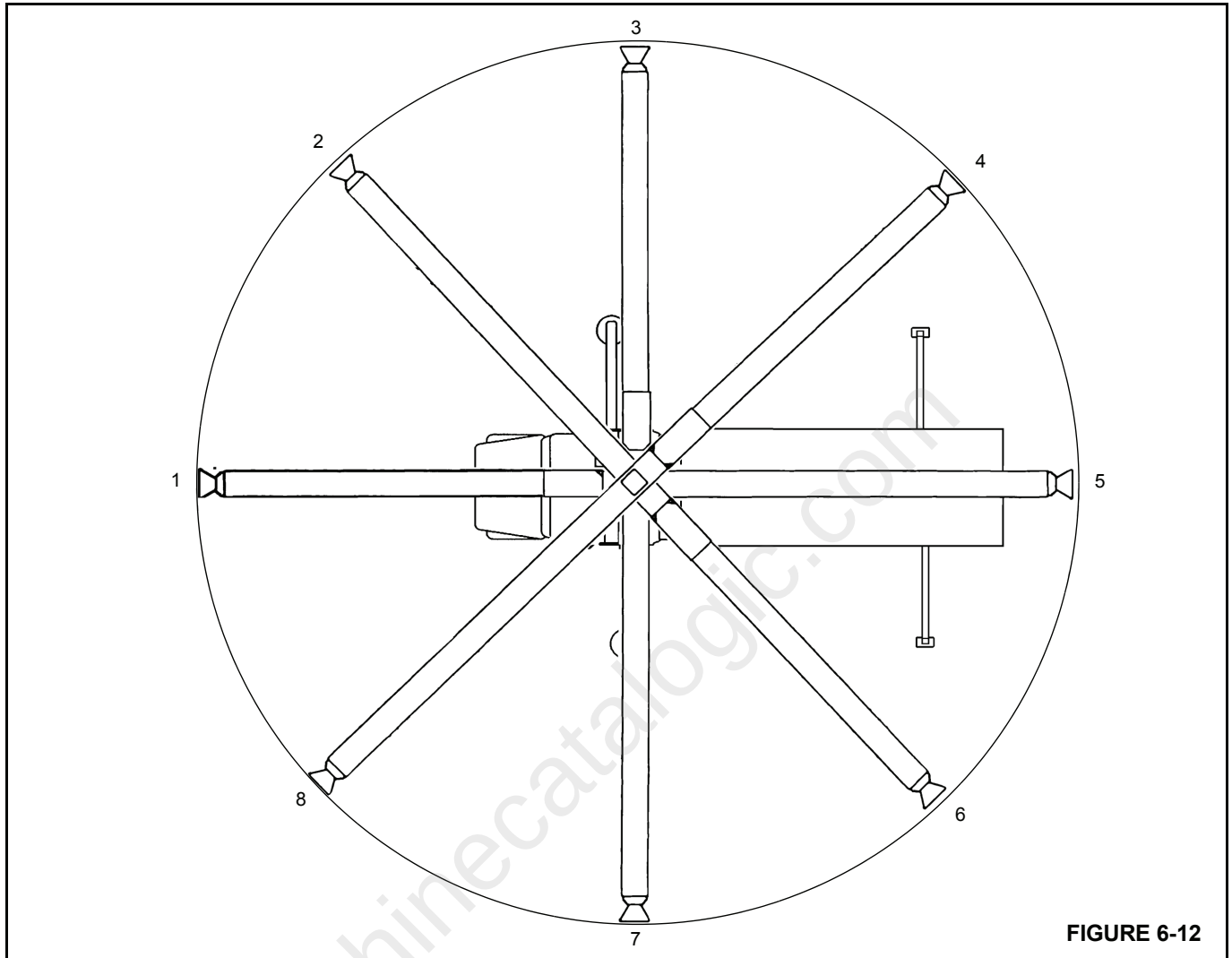


FIGURE 6-12

BEARING REPLACEMENT

Removal

1. Fully extend and set the outriggers enough to take up the slack in the pads.

NOTE: Do not raise the machine on the outriggers.

2. Rotate the boom to about 10° off the rear position so that the boom is clear of the boom rest.

NOTE: The lift cylinder pins need to be accessible from the truck deck.

3. Elevate the boom slightly and shut down the engine.
4. Tag and disconnect the battery cables.
5. Remove the boom and lift cylinder following the procedures outlined in Boom Removal on page 4-3.

NOTE: If equipped with a swivel, tag and disconnect all hydraulic lines from the swivel on the carrier side. Cap or plug all lines and openings. The swivel is removed with the turret.

6. Attach a suitable lifting device to the turret. Remove any slack in the sling. Do not pull up on the turret.

DANGER

Ensure the lifting device is capable of supporting the boom assembly.

7. Remove all bolts and washers from the outer race of the swing bearing.

DANGER

Ensure blocking material can support the turret.



PTO HORSEPOWER REQUIREMENTS

The unit is equipped with a three section pump that supplies 34 GPM (129 LPM) to the winch, 18 GPM (68 LPM) to the boom and outriggers, and 10 GPM (38 LPM) to the swing (turn) circuit. To provide these flows, the pump shaft must turn at 2400 RPM. The PTO requirement is a torque rating of at least 200 ft-lb (271 Nm) or 40 HP (30 KW) per 1000 RPM of PTO shaft speed.

The PTO requirement is a torque rating of at least 200 ft-lb (271 N-m) or 40 HP (30 Kw) per 1000 RPM of PTO shaft speed.

Direct Mount Pump to PTO

Most pumps can be direct mounted to the PTO using adapter assemblies available from the PTO supplier. If the pump is direct mounted, its weight should be supported by a strap between the pump and the transmission. The splined shaft coupling in a direct mount pump installation requires lubrication. #200S Silver Streak Special Multi-Lube (Medium) should be applied to the shaft during original installation and reapplied to the shaft or zerk provided on PTO housing shaft semi-annually thereafter.

Pump Rotation

It is imperative that the three section hydraulic pump installed in a 800H application be the correct pump rotation configuration for the truck drive train/power take off rotation direction. Make certain which direction the power take off output shaft rotates before selecting a clockwise (cw) or counter-clockwise (ccw) rotation hydraulic pump. Either cw or ccw rotation pumps are available, and are marked clearly with a directional arrow on the pump housing.

 CAUTION

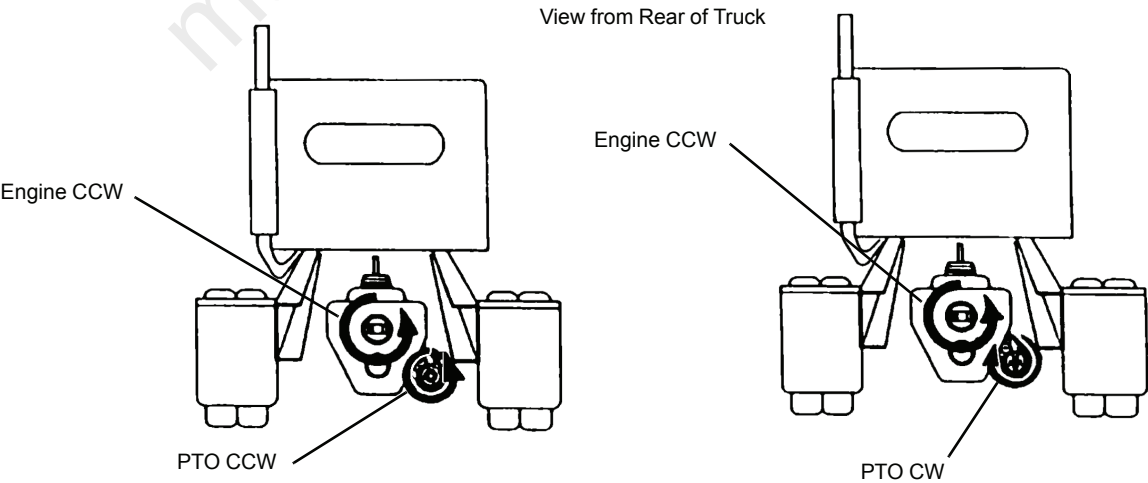
Do not turn the pump in the opposite direction of the indicating arrow on the pump housing. Pump failure will result.

Do not confuse engine crankshaft rotation with power take off rotation. If the power take off shaft rotates opposite the engine crankshaft, it is turning in a clockwise (cw) direction when viewed from the rear of the truck. If the power take off shaft rotates the same as the engine crankshaft, it is turning in a counter-clockwise (ccw) direction when viewed from the rear of the truck. See illustration below.

Operating speeds and performance of the crane are based on proper pump outputs to the winch, lift, telescope and swing circuits. The speeds shown below are optimum operating speeds. The engine must be operated at a speed such that the horsepower developed is adequate to pull the pumps under pressure.

NOTE: The 600H pump rotation speed is 2400 RPM.

ENGINE SPEED (RPM)		PTO RATIO 2400 RPM PUMP
Gasoline Engine Optimum Speed Range	2900	82%
	2800	85%
	2600	92%
	2400	100%
Diesel Engine Optimum Speed Range	2200	109%
	2000	120%
	1800	133%
	1600	150%
	1500	160%



AFTER FRAME MODIFICATION

If additional suspension reinforcing is required, as may be the case with a truck frame that tapers down to approximately 6 inches (15.24 cm) deep through the suspension, a channel may be fabricated through the suspension for additional strength. To do this, install the angle as described in the previous step, making sure that the long leg of the angle extends to the top of the truck frame. A bar of the same material strength, thickness, length and flange width as the reinforcing angle is then added to the top of the truck frame. The bar is butt welded to the top of the forward reinforcing, then skip-welded with 6 inches (15.24 cm) of weld, 6 inches (15.24 cm) no weld, etc., along both edges of the bar, front to back. Length of after frame (AF) may have to be modified for crane installation. If AF is too long, cut off excess and remove any crossmembers from back of truck frame. If AF is too short, the frame will have to be lengthened. Use channels fabricated from 100,000 psi (758 MPa) yield material that are the same size as the truck frame. Weld these channels to the ends of the existing truck frame channels. Bevel the ends of the channels to get 100% weld joints with Grade 90 weld material. Fabricate an inner channel of the same thickness as the truck frame channels to span the weld joint for at least 12 inches (30 cm) on each side of joint. Plug weld this channel to the inside of the truck frame, then skip weld the inside edge of the top and bottom flanges to the truck frame flanges.

MOUNTING THE CRANE



DANGER

It is mandatory that swing bearing and crane anchor bolts be inspected and re-torqued after the first 300 hours of crane operation and every 500 hours thereafter. The bolts may loosen and cause the crane to separate from the carrier which will result in damage to the crane and possible injury or death to personnel.

Make sure the truck has been configured to meet the minimum truck, PTO, and frame strength requirements as described on page 9-1 through page 9-19. Mounting the crane to the truck frame is as follows:

- Position the torsion box (T-box) on the truck frame.
- Mount the frame assembly on the T-box and secure to the truck frame.
- Mount the front and rear outrigger boxes and secure to the truck frame (RM Configuration).
- Install the RSOD (BC Configuration).
- Install the boom rest on the T-box and rear bumper on the truck frame.
- Mount the operator stations and install the foot throttles.
- Install the boom, lift cylinder, and winch.
- Connect the slew potentiometer.
- Connect the electrical interface.
- Install the hydraulic system.
- Complete the initial crane run in procedure.
- Calibrate the LMI and do the stability test.

NOTE: Unless otherwise specified, use the tables in the section titled Fasteners And Torque Values on page 1-6 to torque all bolts.

Set the T-Box

Both front outrigger and rear outrigger boxes are integral to the T-box (Figure 9-4).

1. Position the truck so that the truck frame is level.
2. Place the T-box on the truck frame as determined by the configuration drawing and minimum truck requirements.

NOTE: If the T-box does not fit tightly against the truck frame, clamp the T-box and truck frame together to remove the gaps.

3. Bolt the T-box to the truck frame as shown in Figure 9-5.

Mount the Crane Frame Assembly

1. Position the frame assembly on the T-box so that the mounting bolts can be routed through the holes on the T-box.
2. Bolt the frame to the T-Box (Figure 9-5).

Full Version Available

National Crane 800H Boom Truck Service Manual

National Crane 800H boom truck service manual, with repair procedures, adjustments and troubleshooting for the main systems. Instant PDF download.

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