



OPERATION AND SERVICE MANUAL

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

1800 Series Telescoping Crane

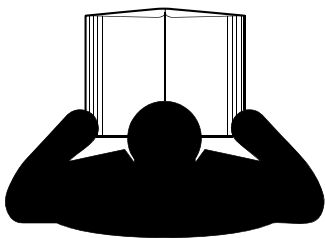
This Manual is Divided into the following Sections:

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SECTION 2	CONTROLS
SECTION 3	OPERATING PROCEDURES
SECTION 4	JIB OPERATION
SECTION 5	INSPECTION AND MAINTENANCE
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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.

ERRATA SHEET
for
National Crane Owner's Manuals
(March 2007)

DOCUMENT CHANGES:

The following needs to be added to the Safety Information:

PERSONNEL HANDLING

The American Society of Mechanical Engineers issued an American National Standard entitled, Personnel Lifting Systems, ASME B30.23-1998. This standard provides, lifting and lowering of personnel using ASME B30 standard hoisting equipment shall be undertaken only in circumstances when it is not possible to accomplish the task by less hazardous means. Unless all of the applicable requirements of this volume are met, the lifting or lowering of personnel is prohibited by ASME B30. This standard is consistent with the U.S. Department of Labor, Occupational Safety and Health Administration (OSHA) regulations for construction that are stated in 29CFR1926.550(g)(2): "General Requirements". The use of a crane or derrick to lift employees on a personnel platform is prohibited except when the erection, use, and dismantling of conventional means of reaching the worksite such as personnel lift, ladder, stairway, aerial lift, elevating work platform, or scaffold would be more hazardous or is not possible because of structural design or worksite conditions. Additional requirements for crane operations are stated in ASME B30.5, Mobile and Locomotive Cranes, and in OSHA regulations 29CFR1910.180 for General Industry and 29CFR1926.550(g)(2) for Construction.

Use of a National crane to handle personnel is acceptable provided the following:

- The requirements of the applicable national, state, local regulations, and safety codes are met.
- A determination has been made that use of a crane to handle personnel is the least hazardous means to perform the work.
- The crane operator shall be qualified to operate the specific type of hoisting equipment used in the personnel lift.
- The crane operator and occupants have been instructed in the recognized hazards of personnel platform lifts.

- The crane is in proper working order.
- The crane's load capacity chart is affixed to the crane, readily accessible to the operator. The total weight of the loaded personnel platform and related rigging shall not exceed 50 percent of the rated capacity for the radius and configuration of the crane.
- The crane is uniformly level within one percent of level grade and located on a firm footing. Cranes with outriggers shall have them all fully deployed following manufacturer's specifications.
- The crane's Operator Manual and other operating manuals are provided with the crane, accessible to the operator.
- The platform meets the requirements as prescribed by applicable standards and regulations.
- Never handle personnel on the loadline unless the requirements of applicable national, state, and local regulations and safety codes are met.
- Never permit anyone to ride loads, hooks, slings, or other rigging for any reason.
- For wire rope suspended platforms:
 - The crane is equipped with a hook that can be closed and locked, eliminating the throat opening.
 - The crane is equipped with a functional anti-two-block device
 - The platform is properly attached and secured to the load hook.
- For boom/jib mounted platforms:
 - Use only National Crane approved personnel platforms attached to the boom or jib.
 - The platform is properly attached and secure.

	Aux Boom Head	100 lb
5 Ton	Downhaul Weight	180 lb
15 Ton	1 Sheave Block	375 lb
25 Ton	2 Sheave Block	640 lb
35 Ton	3 Sheave Block	870 lb
40 Ton	4 Sheave Block	970 lb

NOTICE			1 Part Line	2 Part Line	3 Part Line	4 Part Line	5 Part Line	6 Part Line	7 Part Line	8 Part Line
- Do not deadhead line block against boom tip when extending boom. - Keep at least 3 wraps of loadline on drum at all times. - Use only 5/8" diameter rotation resistant cable with 56,400 pounds breaking strength on this machine.										
MAXIMUM BOOM LENGTH AT MAXIMUM ELEVATION WITH RIGGING SHOWN WITH LOAD BLOCK AT GROUND LEVEL			158' BOOM & JIB	114'	83'	64'	52'	43'	36'	31'
Winch	Cable Supplied	Average Breaking Strength	Lift and Speed	Lift and Speed	Lift and Speed	Lift and Speed	Lift and Speed	Lift and Speed	Lift and Speed	Lift and Speed
Standard Planetary Winch Low Speed	5/8" diameter rotation resistant IWRC	56,400 lb	10,000 lb 205 fpm	20,000 lb 103 fpm	30,000 lb 68 fpm	40,000 lb 51 fpm	50,000 lb 41 fpm	60,000 lb 34 fpm	70,000 lb 29 fpm	80,000 lb 26 fpm
Standard Planetary Winch High Speed	5/8" diameter rotation resistant IWRC	56,400 lb	5,000 lb 410 fpm	10,000 lb 205 fpm	15,000 lb 137 fpm	20,000 lb 103 fpm	25,000 lb 82 fpm	30,000 lb 68 fpm	35,000 lb 59 fpm	40,000 lb 51 fpm

All winch pulls and speeds are shown on the fifth layer. Winch line pulls would increase on the first, second, third and fourth layers. Winch line speed would decrease on the first, second, third and fourth layers. Winch line pulls may be limited by the winch capacity or the ANSI 5 to 1 cable safety factor. These are shown below:

Winch
Standard planetary
& Auxiliary planetary

Full Drum Pull
5,000 pounds (high speed)
10,000 pounds (low speed)

Allowable Cable Pull
11,280 pounds

FIGURE C

Identification of fastener grade is always necessary. When marked as a high strength bolt (grade 8, 5, etc.), the mechanic must be aware that he is working with a highly stressed component and the fastener should be torqued accordingly.

If a fastener must be replaced and a similar grade is not available, always use a higher grade torqued to the same value as the original grade. As soon as available, the correct grade fastener should be installed to avoid a future state of confusion by the improper installation.

Special attention should be given to the existence of lubricant, plating, or other factors that might require variation from standard torque values.

When maximum recommended torque values have been exceeded, the fastener should be replaced.

Note: Temperature variation, vibration, and elasticity of metals can result in the gradual reduction of bolt torque. Bolts should be retorqued as outlined in the inspection and maintenance procedure.

Torque wrenches are precision instruments and are to be handled with care to ensure calibrated accuracy. Calibration checks should be made on a scheduled ba-

sis. Whenever the wrench might be either overstressed or damaged, it should immediately be removed from service until recalibrated. An erratic or jerking motion of the wrench can easily result in excessive torque. **ALWAYS** use a slow wrench movement and **STOP** when the predetermined value has been reached.

LABEL PARTS WHEN DISASSEMBLING

When removing or disconnecting a group of wires or cables, tag each one to ensure proper identification during re-assembly.

When shims are removed, tie them together and identify them as to location. Keep shims clean and flat until they are reinstalled.

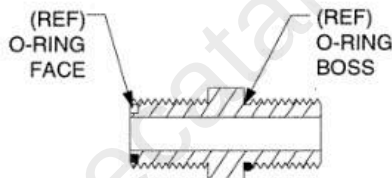
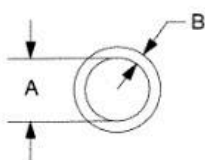
WELDING PRECAUTIONS

Sensitive truck computer system and crane's LMI computer system components may be damaged by welding on the truck or crane. The following precautions should be taken:

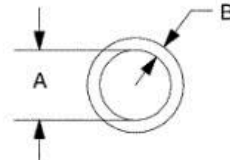
- Disconnect truck battery cables (positive and negative)
- Attach welding ground lead as close as possible to area to be welded.

NATIONAL CRANE FITTING O-RING PART NUMBERS

O-RING FACE SEAL



O-RING BOSS



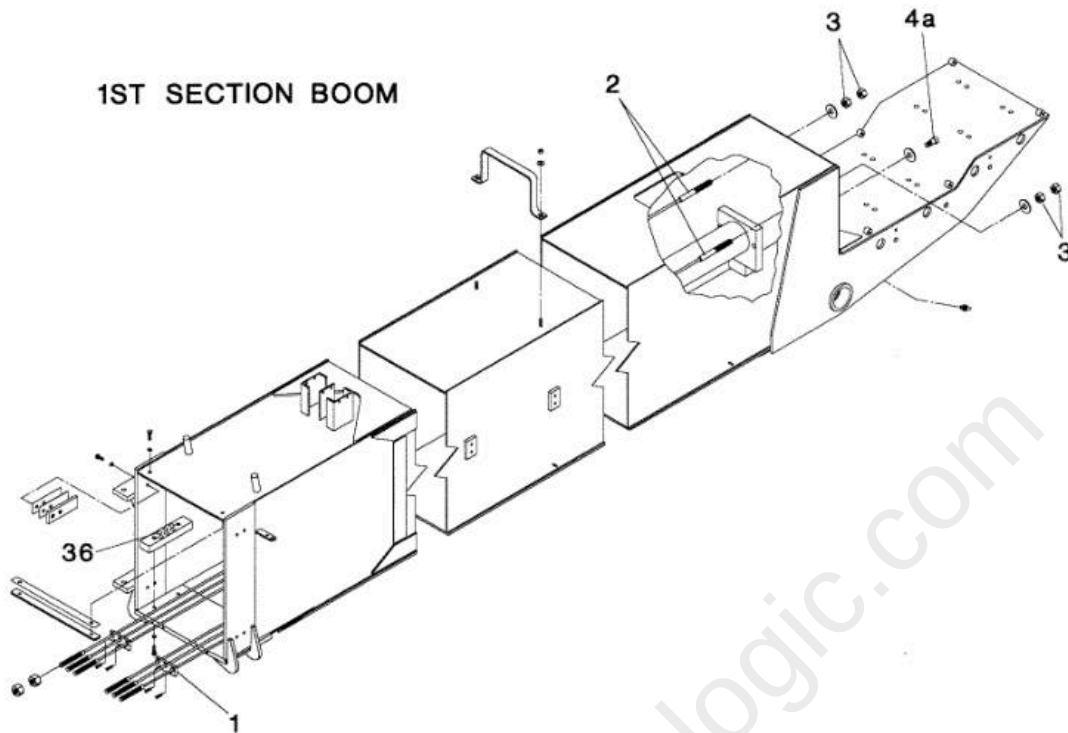
O-RING FACE SEAL				FITTING SIZE		O-RING BOSS			
NATIONAL CRANE PART NO.	THREAD SIZE	B	A	TUBE O.D.	MFGR'S SIZE CODE	A	B	THREAD SIZE	NATIONAL CRANE PART NO.
**897063	9/16-18	.07	.301	.250	4	.351	.072	7/16-20	888412*
**897064	11/16-16	.07	.364	.375	6	.458	.078	9/16-18	888414*
**897065	13/16-16	.07	.489	.500	8	.644	.087	3/4-16	888415*
**897066	1-14	.07	.614	.625	10	.755	.097	7/8-14	888416*
**897067	1 3/16-12	.07	.739	.750	12	.924	.116	1 1/16-12	888417*
**897068	1 7/16-12	.07	.926	1.000	16	1.171	.116	1 5/16-12	888419*
**897069	1 11/16-12	.07	1.176	1.250	20	1.475	.118	1 5/8-12	888420*
**897070	2-12	.07	1.489	1.500	24	1.720	.118	1 7/8-12	888421*

* 888422 O-Ring Boss Seal Kit (12 EA)

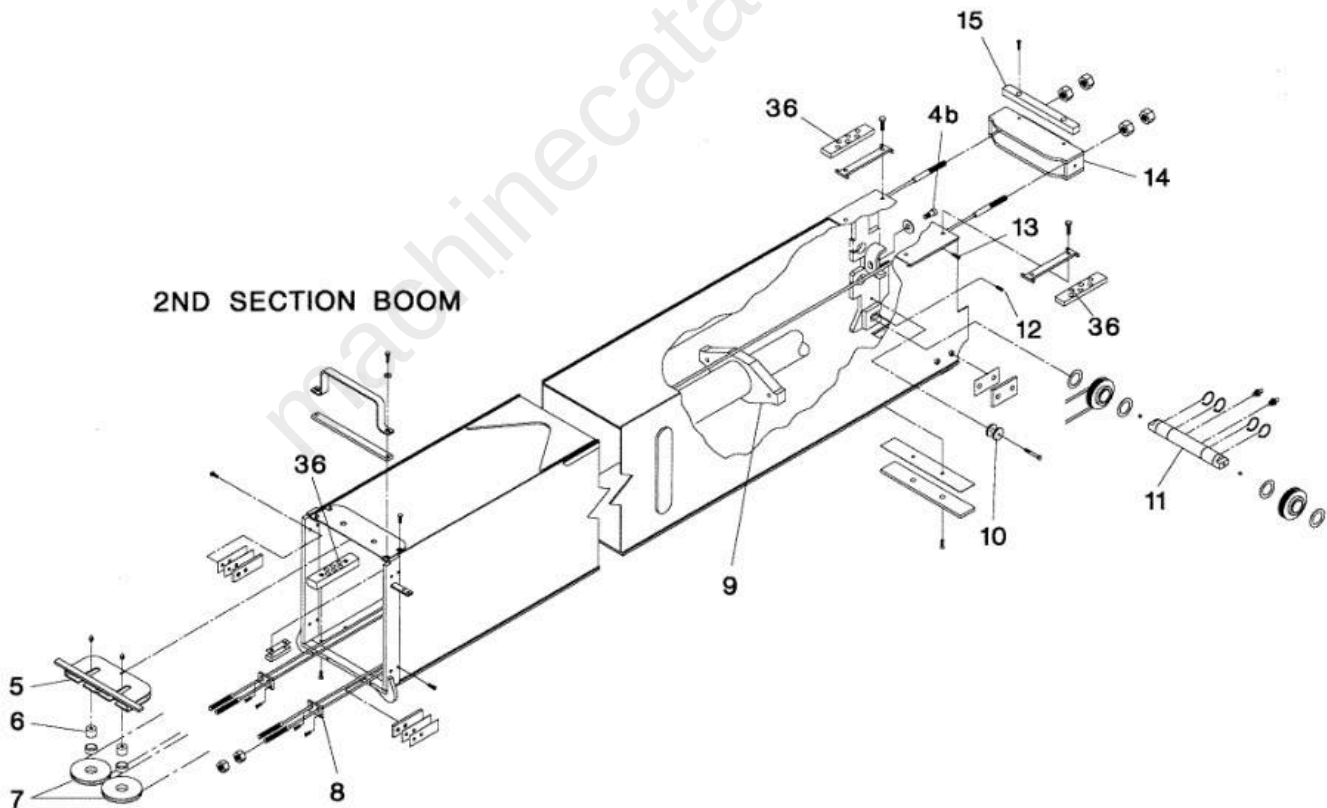
** 897234 O-Ring Face Seal Kit (12 EA)

FOUR SECTION BOOM

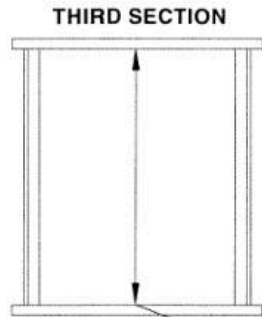
1ST SECTION BOOM



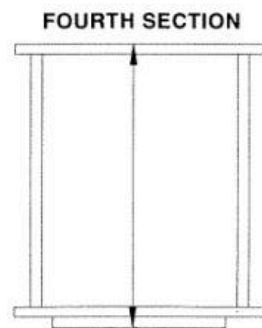
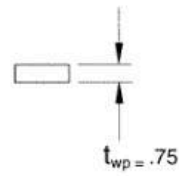
2ND SECTION BOOM



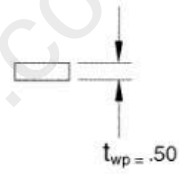
EXAMPLE



$H_i = 19.38$ AT FRONT
 19.38 AT BACK
 NEAR CYLINDER
 ANCHOR BARS



$H_o = 17.88$



H_i	=	19.38
$-H_o$	=	-17.88
$-t_{wp}$	=	-.75
$-t_{wp}$	=	-.50
Clearance	=	.25
Bottom shims	=	-.19
Final Clearance	=	.06

- just seated. If you can hold the output shaft (2) and rotate the gear housing (1) while the bearing (7) on, it will be seated when all rollers are rotating evenly. Note: If bearing (7) is replaced, bearing race (6) must also be replaced.
4. Slide the lockwasher (8) down the threaded end of the output shaft (2) until it reaches the end of the bearing (7).
 5. Thread the locknut (9) down the threads of the output shaft (2) and tighten until it is snug.
 6. Set the bearing preload by tightening locknut (9) onto output shaft (2) to 20-25 ft lbs. Proper bearing preload will be determined by the rolling torque method. This method involves increasing press load on the bearings (4 and 7) until drag or rolling resistance of 15-20 in. lbs. torque is achieved when rotating the case. This torque includes bearing as well as seal drag. This torque is equal to a force of 15-20 in. lbs. if pulling on a bolt screwed into one of the brake assembly mounting holes to rotate the case. Bend tang of lockwasher (8) into place on locknut (9).
 7. Again place the gear housing (1) on a table with the gear end of the output shaft (2) on the table surface.
 8. Lower the output gear set (10) into the gear housing (1) until the planet gears engage the teeth in the gear housing. Lower the output gear set (10) until the planet gears engage the teeth on the output shaft (2). Rotate the output gear set (10) or the output shaft (2) until the gear set (10) slides down to allow full contact between the two sets of gear teeth.
 9. While firmly holding the pinion end of the output shaft (2), slowly rotate the gearbox assembly to ensure that the assembly to this point allows free rotation of installed gear sets.
 10. Install thrust washer (11) and the output sun gear (12) in the end of the output gear set (10).
 11. Lower the input gear set (13) into the gear housing (1) until the planet gears engage the teeth on the input end of the output sun gear (12).
 12. Rotate the input gear set (13) or the output shaft (2) until the input gear set (13) slides down to allow full contact between the two sets of gear teeth.
 13. Again, firmly holding the pinion end of the output shaft (2), slowly rotate the gearbox assembly to ensure that the assembly to this point allows free rotation of installed gear sets.
 14. Install thrust washer (11) and the input sun gear (14) into the input gear set (13).
 15. Lubricate a new O-ring (3-brake) and install in the groove in the top of the gear housing (1).
 16. Place the brake assembly (15) onto the top of the gear housing (1). The marks made during the disassembly process will aid in properly lining up the brake assembly (15) on the gear housing (1).
 17. Install the eight capscrews (16) in the brake assembly (15) and torque to 30 ft-lbs.
 18. Put pipe sealant on one of the pipe plugs (17) and install the plug in the lower hole of the gear housing (1).
 19. Fill the gear housing (1) with 1 gallon of EP 80-90 gear grease.
 20. Put pipe sealant on the other pipe plug (17) and install the plug in the top hole in the gear housing (1).

PIN BEARING INSPECTION AND INSTALLATION PROCEDURE

PIN INSPECTION

1. Remove the protective covering from pins and inspect each pin for nicks, gouges or deep wide scratches. A small nick or gouge up to 1/8 diameter can be repaired by dressing the edges of the imperfection with a file so that no metal protrudes above the circular surface of the pin.
2. A circular scratch of up to 1/6 wide or deep can be repaired as in 1 above.
3. A lengthwise scratch on the pin of up to 1/32 wide or deep can be repaired as in 1 above.
4. Pins with defects larger than those listed in 1, 2 or 3 should be replaced.

BEARING INSPECTION

1. The bearings furnished with this machine are made up of a tough epoxy impregnated wound glass backing shell with a thin inner layer of filament wound bearing material. The outer bearing material should be visually checked for imperfections. Bearings with cracks or gouges larger than 1/4" diameter on the outside diameter should be replaced.
2. Inspect the inner diameter surface of the bearing. any scratches, cut or gouges which have penetrated through the inner liner may cause premature failure of the bearing. The bearing should be replaced.

TRUNNION INSPECTION

1. The trunnion bore should either have a machined step or have a spring spacer installed to prevent inward movement of the bearing. If equipped with a spring spacer, check to make sure the opening is positioned over the grease hole.

INSTALLATION

1. Two bearings are to be installed in the boom pivot trunnion located directly below the winch and the remaining four bearings are to be installed in the lift cylinder, two at each side of the rod end of the

cylinder and two at each side of the butt end of the cylinder.

2. The bearings should be started in their respective bores by rotating the bearing while applying inward pressure with the hand. Once the bearing has been started squarely into its bore, it can be driven to its full counterbored depth by tapping lightly with a rubber mallet. The head diameter of the mallet should exceed the outside diameter of the bearing to ensure that the bearing is not damaged during assembly into the bore.
3. If the bearing appears to be loose in the bore (if it can be pushed in with hand pressure alone), it is permissible to tighten the bearing by center punching the bore diameter in approximately 50 places around and throughout the 2" deep bored area. Center punching will raise the metal around the edge of the punch mark and this raised metal will hold the bearing firmly in place during machine operation.
4. After all bearings have been installed and before attempting to assemble the machine, insert the pins through both bearings in each end of the lift cylinder and through the boom pivot bearings to insure alignment and fit are correct. Also check the two sets of pin holes in the turret and the pin holes in the boom ears to ensure that the pins will slide freely through the leading hole and start in the opposite hole. If a pin starts to bind through the leading hole, do not force the pin any further to avoid damaging the pin surface finish. Remove the pin and clean any corrosion or burrs out of the holes with a round file or emery cloth.
5. When pinning the boom to the turret, and the lift cylinder to the turret and boom, use a round smooth bar of approximately 1-1/2 inch diameter as a pry bar to align the pin holes. A pry bar with a sharp edge, such as a crowbar, can gouge or cut bearing and this may lead to premature bearing failure.

inspection as specified in the appropriate hoisting equipment ASME B30 volume shall be used.

12. Operate hoisting equipment with outriggers and front stabilizers properly set. Only operate with full horizontal extension of all of outrigger beams. Handling of personnel is not permitted with mid span or zero span outrigger positions.
13. Verify that the hoisting equipment is set up and maintained within one percent of grade level (0.56 degrees).
14. For hoisting equipment with a boom attached platform, verify that the platform is attached as specified in the basket installation section.
15. Not allow the total weight of the lifted load including rigging, platform, personnel, tools and material to exceed 50 percent of the hoisting equipment's rated load, under the planned conditions of operation. (Except during testing as outlined in Inspection Section.)
16. Not allow the platform's rating or the hoisting equipment's reduced rated load, to be exceeded when loads are transferred to the hoisted platform.
17. Perform a trial lift prior to lifting personnel with the platform on each shift and after any change of set up location, hoist equipment configuration or operator. These lifts shall be used to ascertain that hoist equipment set up and configuration is correct, load capacities are adequate, that no hazardous interferences exist, and to further demonstrate the operator's operational competence.
18. Verify that during the trial lift, the platform is loaded to at least the weight expected during the actual lift.
19. Not knowingly allow the platform load to exceed the platform rating. (Except during testing as out- lined in inspection section).
20. Not travel the hoisting equipment with personnel in the personnel platform.
21. Perform all movements of the platform under the direction of a designated signal person and in a slow, controlled manner to minimize sudden movements of the platform.
22. Remain at the hoisting equipment controls at all times when the platform is occupied.
23. Set all brakes and locks on the hoisting equipment after positioning of the personnel platform and before personnel perform any work.
24. Not move platforms over, under or in the vicinity of power lines unless the requirements of the minimum

clearance shown in the required clearance table and on the Electrocution Hazard decal are met.

25. Not lift any other loads, on any other load lines, while conducting a personnel lift. See item 13 under General Safety Requirements. When the hoisting equipment has a boom attached platform without controls it shall not be used for other lifting service.
26. Not disable, or allow to be disabled, any hoist equipment safety device during a personnel lift.
27. Not operate a platform with motion controls without the platform operation manual available in the platform.
28. Avoid the simultaneous operation of more than one of the hoisting equipment motion controls, unless such practice increases the safety of the lift operation.

Ground Crew

Ground Crew shall:

1. Visually inspect the personnel lifting platform, and its associated rigging, for hazardous conditions, prior to and during any operation.
2. Assist in the entrance and exit of personnel occupants at ground level.
3. Verify the personnel platform is securely attached to the hoisting equipment and in a manner specified by the platform manufacturer and that all attachments and the platform are secure.
4. Verify that boom attached personnel platforms are only attached using the pins and fittings specified by the hoist equipment manufacturer or a qualified person.
5. Keep people from passing under the raised personnel platform.
6. Not use a suspension system for lifting personnel that has been used for lifting loads other than the personnel platform.
7. Maintain continuous and positive communication between the personnel platform occupants and the operator, if signal persons are part of the ground crew.
8. Not engage in any practice or have any other duties that will reduce the safety of the personnel lift operation.
9. Observe the weight test and report any deformation or hazardous conditions to the Personnel Lift Supervisor.
10. Verify the platform is evenly loaded, material secured, and the total platform weight does not exceed the platform rating or the reduced hoisting equipment lift capacity.
11. Not allow an occupied platform over, under or in the vicinity of power lines unless the requirements minimum

Full Version Available

National Crane 1800 Boom Truck Service Manual

National Crane 1800 boom truck service manual, with repair, inspection and installation procedures for the main systems. 2 PDF files. Instant PDF download.

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