



OPERATION AND SERVICE MANUAL

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

N105 Series Articulating Crane

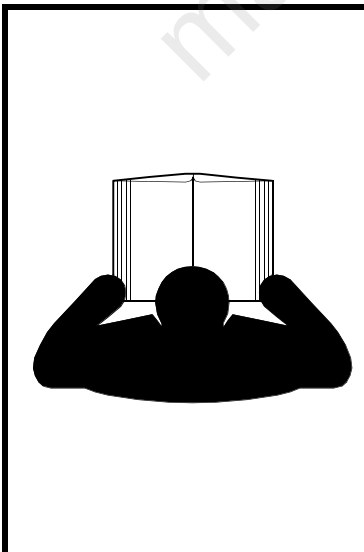
This Manual is Divided into the following Sections:

SAFETY AND OPERATION
SERVICE AND MAINTENANCE
SPECIFICATIONS
CRANE INSTALLATION

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.



4. The vehicle shall be located on a firm and level surface that will provide adequate support for the outrigger loading. Use caution when setting up near overhanging banks or excavations.
5. The vehicle park brake shall be set and drive axle disengaged.
6. The outriggers shall be extended to stabilize the truck. A signal person shall be used to be sure the outriggers are set safely.

OPERATING THE CRANE

Safety Tips - Introduction

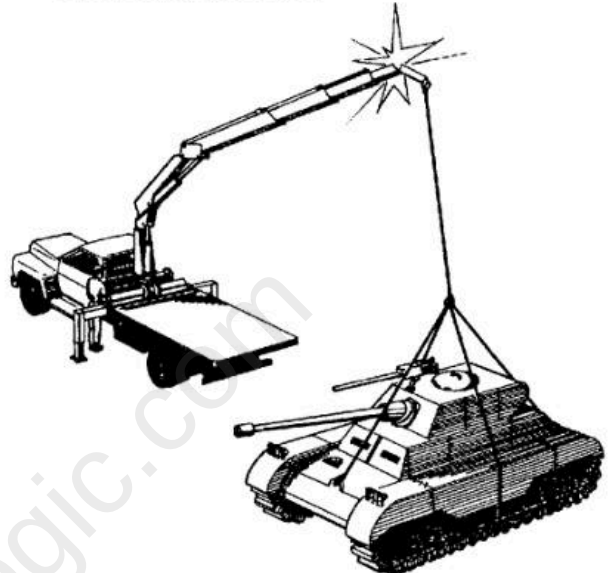
This section of the safety manual is designed to present some of the daily work problems which can be encountered by the operator, service and other personnel.

The crane operator and service mechanic are the key in any safety program, and must study all sections of the safety manual to be aware of the safety precautions presented to help prevent serious injury to themselves and other personnel.

Operator Safety Tips - Articulating Cranes

- Control lever movement should be slow and smooth to meter oil flow for safe operation. Jerky or sudden movement of the controls should be avoided.
- Do not use stability to determine loads.
- Be constantly aware of the boom(s) position when operating the controls.

- Make certain the boom tip is centered directly over the load before lifting.
- Do not drag loads with winch or boom.
- Do not attempt to lift fixed loads.
- Do not load boom in sideward direction.
- Know the weight of your rigging and load to avoid overloading the crane.



DO NOT OVERLOAD CRANE

- Deduct the weight of the load handling equipment from the maximum load rating to determine how much weight can be lifted.
- When manual extensions are deployed and hydraulic extensions are retracted, load is limited to that of the respective manual extension.
- Do not stand in front of manual boom extensions when removing pin to unstow manual boom extension.
- When not using manual boom extension, make certain it is properly stowed and secured before operating the boom.
- Do not rotate or extend a load over anyone.
- Keep the load close to the ground whenever possible.
- Use non-conductive tag lines.
- Do not push down on anything with boom extension, lift or fold function.
- Do not load boom so that it is forced up at the boom point. For example, do not use boom to force the clam or grapple into a pile of material and then hold it thus while closing the clam or grapple.
- Do not permit loose objects on booms or on loads. Remove before operating the crane.
- When load is out of sight of the operator, a qualified signal person shall be used.

TORQUE VALUES FOR GRADE 5 AND 8 BOLTS

UNC SIZE	GRADE 5 TIGHTENING TORQUE		GRADE 8 TIGHTENING TORQUE	
	ft - lb	(N.m)	ft - lb	(N.m)
1/4 — 20	8 ± 2	(11 ± 3)	12 ± 2	(16 ± 3)
5/16 — 18	17 ± 3	(23 ± 4)	25 ± 4	(34 ± 5)
3/8 — 16	30 ± 5	(41 ± 7)	45 ± 7	(61 ± 10)
7/16 — 14	50 ± 8	(68 ± 11)	70 ± 11	(95 ± 15)
1/2 — 13	75 ± 11	(100 ± 15)	110 ± 11	(150 ± 15)
9/16 — 12	110 ± 11	(150 ± 15)	150 ± 15	(200 ± 20)
5/8 — 11	150 ± 15	(200 ± 20)	220 ± 22	(300 ± 30)
3/4 — 10	260 ± 26	(350 ± 35)	380 ± 38	(520 ± 52)
7/8 — 9	400 ± 40	(540 ± 54)	600 ± 60	(810 ± 81)
1 — 8	580 ± 58	(790 ± 79)	900 ± 90	(1220 ± 122)
1- 1/8 — 7	800 ± 80	(1080 ± 108)	1280 ± 128	(1740 ± 174)
1- 1/4 — 7	1120 ± 112	(1520 ± 152)	1820 ± 182	(2470 ± 247)
1- 3/8 — 6	1460 ± 146	(1980 ± 198)	2380 ± 238	(3230 ± 323)
1- 1/2 — 6	1940 ± 194	(2630 ± 263)	3160 ± 316	(4280 ± 428)

UNF SIZE	GRADE 5 TIGHTENING TORQUE		GRADE 8 TIGHTENING TORQUE	
	ft - lb	(N.m)	ft - lb	(N.m)
1/4 — 28	10 ± 2	(14 ± 3)	14 ± 2	(19 ± 3)
5/16 — 24	19 ± 3	(26 ± 4)	25 ± 4	(34 ± 5)
3/8 — 24	35 ± 5	(47 ± 7)	50 ± 8	(68 ± 11)
7/16 — 20	55 ± 8	(75 ± 11)	80 ± 12	(110 ± 16)
1/2 — 20	90 ± 14	(120 ± 16)	120 ± 12	(160 ± 16)
9/16 — 18	120 ± 12	(160 ± 16)	170 ± 17	(230 ± 23)
5/8 — 18	180 ± 18	(240 ± 24)	240 ± 24	(320 ± 32)
3/4 — 16	300 ± 30	(410 ± 41)	420 ± 42	(570 ± 57)
7/8 — 11	440 ± 44	(600 ± 60)	660 ± 66	(890 ± 89)
1 — 12	640 ± 64	(870 ± 87)	1000 ± 100	(1360 ± 136)
1- 1/8 — 12	880 ± 88	(1190 ± 119)	1440 ± 144	(1950 ± 195)
1- 1/4 — 12	1240 ± 124	(1680 ± 168)	2000 ± 200	(2710 ± 271)
1- 3/8 — 12	1680 ± 168	(2280 ± 228)	2720 ± 272	(3690 ± 369)
1- 1/2 — 12	2200 ± 220	(2980 ± 298)	3560 ± 356	(4830 ± 483)

NOTE:

Torque values are in foot pounds (N.m). Torque values apply to plain finish and zinc plated fasteners. Torque values specified are dry with as received residual oils. Special lubricants are not recommended.

Torque values for bolts listed above are not affected with the use of Loctite. Loctite should not be used on rotation bearing fasteners. Hardend washers should be used with Grade 8 fasteners.

Hex socket and Torx head fasteners are considered Grade 8, and unless otherwise specified, Grade 8 tightening torques should be used. Grade 5 tightening torques should be used for all wear pad fasteners.



Grade of stud bolts is identified by radial lines stamped in the end with the shortest thread length.



ADJUSTING THE RELIEF VALVE PRESSURE

The control valve supplied on this crane is equipped with screw adjustable port relief valves on the work sections. After some time of use, it may be necessary to make some adjustment in pressure because of spring weakening, etc. The work port reliefs are screw adjustable. Loosen the jam nut to adjust pressure. Screw the adjustment nut in to increase pressure, out to reduce pressure. One revolution (360°) of the adjustment nut changes pressure by 1100 psi. Remember to tighten the jam nut after any adjustments are made. There is a port relief on the "B" port of the outrigger section, the "B" port on the lift section, and the "B" port of the fold section. There are also port reliefs on the "A" and "B" ports of the extend section and the turn section. To check the relief valve pressure setting, install a pressure gage onto the tee going into the inlet port of the control valve then run the function in question to the end of the cylinder stroke to read the pressure. See "Specification Section" for correct circuit pressure settings. ***Never set Pressure above recommendations.***

DANGER

If the machine does not perform properly at these pressures, the problem is not the relief valve and no attempt should be made to readjust the setting. If the relief valves are set to higher pressures than those listed above the warranty on the machine is void. Also the machine could operate in a manner such as to endanger personnel safety.

ADJUSTING THE MAIN RELIEF VALVE PRESSURE

The control valve is equipped with a screw adjustable main relief which is located on the inlet section. To check the pressure setting on the main relief, install a pressure gage onto the tee going into the inlet port of the control valve. The pressure can then be checked by booming the lift cylinder up against the end of the cylinder stroke. Loosen the jam nut and turn screw in to increase pressure, out to reduce pressure. After adjustment remember to tighten the jam nut. Recheck pressure to be sure that it has not drifted. Main relief pressure setting shall always be checked after installing a new main relief valve cartridge. See "Specification Section" for correct circuit pressure settings. ***Never set pressure above recommendations.***

MINIMUM TRUCK REQUIREMENTS

Many factors must be considered in the selection of a proper truck for an N105 series crane. Items which must be considered are:

1. **Axle Rating.** The required axle ratings are dependent upon the type of mounting configuration. See "*Mounting configuration*" pages in this section. Axle ratings are determined by the axles, tires, rims, springs, brakes, steering and frame strength of the truck. If any one of these components is below the required rating, the gross axle rating is reduced to its weakest component value.
2. **Wheelbase, Cab-to-Axle (CA).** The minimum wheelbase and CA required are determined by the mounting configuration of the particular unit. The truck cab-to-axle dimension is then determined by the length of the bed (the bed should be approximately centered over the rear axle) and the mounting space that the crane frame takes up between the cab and the bed.
3. **Truck Frame.** Try to select a truck frame that will minimize or eliminate frame reinforcement. Many frames are available that have the necessary section modulus (S.M) and resistance to bending moment (RBM) so that reinforcing is not required. See "*Mounting Configurations*" and "*Frame Strength*" pages for the necessary section modulus and resistance to bending moment values.
4. **Additional Equipment.** In addition to the axle ratings, wheelbase, cab-to-axle requirements and frame, it is recommended that the truck is equipped with power steering, increased cooling and a transmission with two PTO openings available with heavy duty or extra heavy duty PTO's. See "*PTO Selection*" pages. A conventional cab truck must be used for all behind the cab crane mounts. A cab-over truck may be used for a rear mounted crane.

Full Version Available

National Crane N105 Articulating Crane Service Manual

National Crane N105 articulating crane service manual with repair procedures, adjustments and troubleshooting for the main systems. Instant PDF download.

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