Read and fully understand the precautions contained in this manual before operating or servicing this machine. Refer to Section 1 for important safety information.
This manual is a guide for the operation and routine maintenance of a NORDCO Railroad Maintenance Machine. It covers product technical information, basic operating and maintenance procedures, and safety information and is provided for use by the qualified personnel who will supervise, operate or service the equipment described herein.

Measurements in this manual are given in both metric and customary U.S. unit equivalents.

Personnel responsible for the operation and maintenance of this equipment should thoroughly study the manual before commencing operation or maintenance procedures.

This manual should be considered a permanent part of your machine and should remain with the machine at all times.

Additional copies of this manual are available either as a part (Operation Manual only) or a whole (operation and parts manual), at a nominal cost, through our Part Sales Department. Additional service information, parts, and application information is available through these Nordco product support resources:

NORDCO Sales: Milwaukee, Wisconsin
(414) 766-2180
sales@nordco.com

NORDCO Parts:

NORDCO Service: 1-800-445-9258
service@nordco.com

We ask that if you have any comments or suggestions about this manual, let us hear from you. We are here to be of service to you, our customers. Direct your comments and inquiries to:

Technical Documentation Department
NORDCO Inc.
245 W. Forest Hill Avenue
Oak Creek, WI  53154
HAZARDOUS MATERIAL DATA

In an effort to provide information necessary for your employee safety training program and to meet the requirements of OSHA Hazard Communication Standard 1910.1200, we have OSHA Form 20 Safety Data Sheets available that cover the material contained in this machine.

If you are interested in receiving this information, please refer to the Name, model, and Serial Number of your machine when calling or writing, and direct your inquiries to:

Vice-President of Operations
NORDCO Inc.
245 W. Forest Hill Avenue
Oak Creek, WI  53154

Fax: (414) 766-2299
Phone: (414) 766-2249
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SAFETY

Please read and comply with all of the safety precautions in this manual BEFORE operating this machine.

GENERAL

DO NOT use this machine for machine operations other than for which it was intended.

NORDCO is not responsible for any modifications made without authorization or written approval. Replace all NORDCO and OEM parts with genuine NORDCO or OEM parts. Use of non-OEM parts could compromise the safety of your machine.

FRA regulations require that a copy of this Operation Manual be kept on the machine at all times. Additional copies of the Operation Manual only can be ordered from Nordco Parts Sales at 1-800-647-1724.

FOLLOW SAFETY INSTRUCTIONS

Carefully read all safety messages in this manual. Learn how to operate the machine and how to use controls properly. Do not let anyone operate this machine without instruction. Failure to understand the contents of this manual could result in serious personal injury or death.

The safety alerts in this manual are for this machine as it was designed. The operator and job-site supervisor should have knowledge of applicable OSHA regulations (in USA), CSA Standards (in Canada Z150-98) and suggested ASME/ANSI safety standards for Cranes.

A good reference source for Crane Safety is the "DOE Standard for Hoisting and Rigging". A copy of this standard (excerpts specifically related to these Rail Cranes) can be found on the DVD or CD supplied with this machine. It is NOT provided on paper format.

SAFETY ALERT SYMBOLS!

These are the safety-alert symbols. These symbols means pay attention! Your safety is at risk!

DANGER is used to indicate a definite hazardous situation which, if not avoided, WILL result in severe bodily harm or even death.

WARNING indicates a potentially hazardous situation which, if not avoided, COULD result in severe bodily harm or even death.

CAUTION indicates a potentially hazardous situation which, if not avoided, MAY result in minor or moderate injury.

SAFETY means that the following points are instructions for safely operating the machine or the specific component of the machine.
GENERAL SAFETY TIPS

Only trained and authorized personnel should be allowed to operate this machine. In addition, all personnel at the worksite (gang) should be aware of the safety concerns and their individual responsibilities prior to working this machine.

1. Handle fuel safely. It is highly flammable and prolonged breathing of fumes may cause bodily harm.
3. Wear good-fitting pants and shirt, no baggy or loose clothing.
4. Protect your head and eyes by wearing a hard hat and safety glasses.
5. Wear leather gloves to protect your hands from vibration or flying metal particles.
6. Use safety-toed work boots.

SAFETY PRIOR TO WORKING

All personnel at the worksite (gang) should be aware of the safety concerns and their individual responsibilities prior to working this machine:

- Review the operating instructions if you are unsure of anything.
- Use the “Startup Checklist” to check the machine for obvious faults. Repair or replace as necessary PRIOR to operating the machine.
- Before climbing onto the machine, make certain the area around and under the machine is clear of obstructions and personnel.
- Use care when climbing onto the machine. Always use the steps and handrails provided. (If an area does not have tread grips, walkways, or other methods to access the area, then DO NOT attempt to access that area.)
- Make seat and control adjustments PRIOR to starting the machine. ALWAYS wear a seatbelt.
- Know the weather forecast and plan your work speeds accordingly.
- There are guards on this machine. These are to be removed ONLY when service or maintenance is being performed on that area of the machine. Make certain they have been re-installed PRIOR to starting the machine.
- Check and service the fire extinguisher at regular intervals. Make certain all personnel are trained in its use. Note - Non-use of fire extinguisher still requires that it be recharged at the interval stated on its last inspection notice.
- Keep the stairs, cab entry platform and cab interior free and clear of ice, tools and personal items. Use the accessories provided on the machine (tool box, cup holder, coat hook, etc.) to properly store your gear.
- Never climb or allow climbers onto the machine while it is in motion.
- There are lockups on this machine that are used for both work and travel. These should be kept clear and free of debris, grease, etc. See Lockup section for instructions on their use.
- Inspect safety decals and replace when they become unreadable or are damaged. (See “Safety Decals” at the end of this Safety section).
SAFETY WHILE STARTING THE MACHINE

NORDCO recommends the use of a Command position. This means that the machine is never running unless someone is at or near the main control panel or remote control boxes. To prevent injury to personnel or damage to the machine, it is highly recommended to:

1. Only start and operate the machine from the operator’s seat.
2. Use the “STARTUP Checklist” to check the machine controls and gauges to make certain all systems are operating correctly.

SAFETY WHILE OPERATING AND TRAVELING

1. Assume all power lines are live. When operating the boom, make certain the boom and load is at least 10 feet away from electrical power lines. If you do not know the voltage of the power lines you are working in close proximity to, assume maximum voltage and stay clear at least 45 feet. If you do hit a power line:
   A. Swing the crane clear.
   B. If the power line breaks or is stuck on the boom or machine, DO NOT attempt to clear the line from the machine. Stay in the cab until you know the power is OFF.
   C. Do not allow anyone to touch any part of the machine. IT IS ALL LIVE!
   D. If the machine catches fire, and you need to get out of the cab before power has been turned off and line has been cleared, you must JUMP CLEAR of the machine (do not touch any part of the machine during your escape – do not touch the crane while stepping on the ground – this WILL BE FATAL.
2. Be especially careful when swinging loads, momentum can effectively case the load to exceed the crane’s capacity.
3. Be aware of the reduced crane capacity when the load is at right angles to the track (over the side). Refer to the Capacity Chart and Dimensional Information in the GENERAL section of this manual for more information.
4. Never over-hoist the boom (lift past 80°). It is possible to cause the boom to buckle and fall backwards over the crane body.
5. Use extreme caution when releasing a load. When the crane is supporting a load, there is stretch in the boom pendant cables and deflection of the boom structure. If the load is suddenly released, the boom will spring backwards when the pendant stretch and boom deflection comes out. If this happens while the boom is raised at a high angle, the boom could topple backwards over the crane.
6. If the crane is on super-elevated track, the lifting capacity over the low side is reduced.
7. The crane is equipped with stop clamps. Stop clamps must be placed on the inner tube of the stabilizer to act as a mechanical stop in case the cutout, system fails. These stop clamps are provided with the machine and they should be located according to the diagram shown below.

Hitting mechanical stops may cause damage to the boom. If the cutout system falls and the mechanical stop is hit, inspect the boom for damage before attempting any lifts.
8. Never operate the crane with a damaged boom. Even slight damage can greatly reduce boom strength. The boom must be replaced or repaired before the crane is used.

9. Never use the winch to drag a load into position before lifting. This may side load the crane or stress the wire rope beyond safe limits. Damage to the equipment may result.

10. Never allow more riders than seats and seatbelts allow. This machine was designed to be operated by one person and allows for one passenger.

11. The machine is equipped with a seat cut-off switch which disables machine functions if the operator attempts to stand and operate the machine. DO NOT disable this function!

12. Press the EMERGENCY STOP pushbutton on the center control console in emergencies and potentially dangerous situations.

13. If personnel or bystanders are near the machine during operation, give a warning signal using the horn. If they fail to respond to this warning, stop operation immediately.

14. Slow down the work cycle and use slower travel speeds in congested or populated areas.

15. Halt work if visibility is poor. Strong rains, fog, and extremely dusty conditions can affect visibility in your work area. Wait for the weather to improve before continuing work.

16. Halt work if winds exceed 19 mph. High winds can affect stability.

17. Never allow ice to build up on brake shoes, this can greatly impair braking efficiency.

18. NEVER operate the machine without a working Cranesmart LMI. This is an essential piece of safety equipment.

SAFETY WHILE PARKED

The following guidelines are suggested when parking this machine:

1. Never allow ice to build on brake shoes. This can greatly impair your ability to apply brakes.

2. Always store the machine will all attachments in the “stored” position, with safety pins, chains, etc., in their proper place.

3. Always downshift the machine to Park, apply the air brake, and set the brake valve in the cab to the ON position. Climb out of the machine and set the manual train brake with handwheel on the lower frame of the machine as well as the train brakes on all attached rail cars (if applicable).

4. When leaving a machine engine running, make certain that the train line brake is applied and the electrical interlock button has been activated.

5. NEVER stop and park this machine on an incline unless the machine wheels have been chocked.

SAFETY DURING MAINTENANCE

The following guidelines are suggested when performing maintenance:

1. Always chock the wheels and set handwheel parking brake.

2. Alert others in the area that service or maintenance is being performed on this machine.

3. Become familiar with, and use, your company’s lockout/tagout procedures when performing maintenance on this machine. See LOCKOUT/TAGOUT REQUIREMENTS later in this Safety Section for a chart on energy sources located on this machine.
4. Do not start the engine if repairs or work is being performed alone. You should always have at least two people working together if the engine must be run during service. One person needs to remain in the **command** position (at the controls), ready to stop the machine and shut off engine if the need arises.

5. Collect oils and fuels and dispose of them properly. There is a danger of scalding when working with engine and transmission oils.

6. Use only Nordco supplied repair parts for this machine. Use of non-OEM designed parts could comprise the integrity of this machine.

7. There are welding cautions on this machine. Pay attention to them PRIOR to welding. Never weld to the boom. It can be detrimental to the structural integrity and cause failure and collapse of the boom.

8. Kits supplied by Nordco have welding instructions included. Welding of any components NOT of Nordco’s manufacture or failure to follow these instructions may affect the stability of this machine.
**MACHINE SAFETY ALERTS**

---

**DANGER**

AN UNTRAINED OPERATOR SUBJECTS HIMSELF AND OTHERS TO DEATH OR SERIOUS INJURY

YOU MUST NOT OPERATE THIS CRANE UNLESS

You are trained and authorized for crane operation.

You read, understand, and follow the safety and operating recommendations contained in this manual, your employers work rules, and applicable government regulations. Certification is required in some U.S. States. You are sure that all safety signs, guards, and other safety features are in place and in proper condition.

---

**DANGER**

TWO BLOCKING THE CRANE WILL CAUSE DEATH, SERIOUS INJURY, OR PROPERTY DAMAGE. Do not allow the hook block to contact the boom tip by holding up, extending or lowering the boom.

---

**DANGER**

TIPPING HAZARD

* TO AVOID DEATH OR SERIOUS INJURY, ENSURE LOAD AND CRANE'S CONFIGURATION ARE WITHIN CAPACITY AS SHOWN ON CRANE'S LOAD RATING CHART AND NOTES.

* THIS CRANE SHOULD HAVE A FUNCTIONAL LOAD MOMENT INDICATOR AND CONTROL LOCK-OUT SYSTEM TEST DAILY FOR PROPER OPERATION.

* DO NOT CHANGE PRE-PROGRAMMED ECON SETTING WITHOUT FIRST CALLING NORDECO.

---

**DANGER**

DO NOT ExCEED WORK LOAD LIMIT (WLL)

---

**DANGER**

FAILURE TO OBEY THE FOLLOWING WILL RESULT IN DEATH, SERIOUS INJURY, INSTABILITY OR STRUCTURAL DAMAGE

Read, understand and follow the crane load and work area charts.

Do not exceed winch or crane ratings.

Weights of accessories attached to the boom or load line must be deducted from the load chart ratings or be added to the load weight.

Do not exceed manual boom extension or jib load ratings at reduced boom lengths.

---

**DANGER**

KEEP CLEAR OF SWING RADIUS OF CRANES

---

**DANGER**

DO NOT WALK UNDER HANGING LOAD
DANGER

CRUSHING HAZARD
DEATH OR SERIOUS INJURY
COULD RESULT FROM BEING CRUSHED BY MOVING MACHINERY.
CLEAR ALL PERSONNEL FROM THE CLEARANCE AND SUPERSTRUCTURE AREA BEFORE ROTATING THE SUPERSTRUCTURE.
FOLLOW INSTRUCTIONS IN OPERATOR'S AND SAFETY HANDBOOK.

DANGER

RIDING ON BOOM, HOOK, LOAD OR LOADLINE WILL RESULT IN DEATH OR SERIOUS INJURY
Never ride on boom, hook, load or any device attached to crane boom or loadline.

DANGER

FAILUERE TO MAINTAIN THE ANTI-TWO-BLOCK SYSTEM WILL RESULT IN DEATH OR SERIOUS INJURY

- The anti-two-block system on this crane MUST BE TESTED DAILY FOR PROPER OPERATION see owners manual for detail.

- When the anti-two-block system is activated the boom telescope and winch up function will cease operation. To restore normal functioning the winch down function or boom retract function must be operated until the loadline block allows the anti-two-block sensing weight at the sheave case to hang freely.

DANGER

ELECTROCUTION HAZARD
THIS CRANE IS NOT INSULATED
DEATH OR SERIOUS INJURY
WILL RESULT FROM CONTACT OR INADEQUATE CLEARANCE
Maintain safe clearance from electrical lines. Allow for boom, electrical line, and loadline swaying.

This crane does not provide protection from contact with or proximity to an electrically charged conductor.

Maintain a clearance of at least 10 feet between any part of the crane, loadline or load and any electrical line carrying up to 50,000 volts (50KV). If electrical line voltage is unknown, assume maximum voltage and maintain a clearance of at least 45 feet.

<table>
<thead>
<tr>
<th>Nominal Voltage, kV</th>
<th>Minimum Required Distance</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Phase to Phase)</td>
<td></td>
</tr>
<tr>
<td>50</td>
<td>10 feet</td>
</tr>
<tr>
<td>Over 50 to 200</td>
<td>20 feet</td>
</tr>
<tr>
<td>Over 200 to 350</td>
<td>25 feet</td>
</tr>
<tr>
<td>Over 350 to 500</td>
<td>30 feet</td>
</tr>
<tr>
<td>Over 500 to 750</td>
<td>35 feet</td>
</tr>
<tr>
<td>Over 750 to 1000</td>
<td>40 feet</td>
</tr>
</tbody>
</table>
### ADDITIONAL DANGER ALERTS

<table>
<thead>
<tr>
<th>Alert</th>
</tr>
</thead>
<tbody>
<tr>
<td>Improper use of this machine for any type of operation can cause serious injury or death.</td>
</tr>
<tr>
<td>To avoid serious injury or death, make certain that the area around and under the machine is clear of all personnel and obstructions BEFORE travelling or working.</td>
</tr>
<tr>
<td>Serious injury or death can result from reaching into working components while machine is running. Make all observations from a distance and SHUT OFF machine while making adjustments.</td>
</tr>
<tr>
<td>Shut off engine when checking battery electrolyte level. Do not check or fill battery in presence of open flame, sparks, or when smoking. Battery fumes are flammable and/or explosive and if ignited will result in severe bodily injury or death.</td>
</tr>
<tr>
<td>Do not ride on couplers or in any rail equipment not designed for that purpose. Falling from a moving vehicle may cause serious injury or death.</td>
</tr>
</tbody>
</table>

### WARNING ALERTS

<table>
<thead>
<tr>
<th>Alert</th>
</tr>
</thead>
<tbody>
<tr>
<td>Failure to engage swing locks before propelling at travel speed can result in injury to personnel and/or extensive damage to the machine.</td>
</tr>
<tr>
<td>Remove hoses/fittings only when system is not pressurized. High pressure leaks can cause personal injury.</td>
</tr>
<tr>
<td>Always turn off machine when performing maintenance, making adjustments, or whenever unintended movement of machine could occur; unless directed otherwise. Failure to comply could result in personal injury and/or damage to the machine.</td>
</tr>
<tr>
<td>Exhaust emissions caused by the use of the engine on this machine may cause cancer, birth defects, or other reproductive harm if inhaled.</td>
</tr>
<tr>
<td>Disconnect the battery before servicing this machine. Failure to do so could result in personal injury from accidental engine startup.</td>
</tr>
</tbody>
</table>
LOCKOUT AND/OR TAGOUT REQUIREMENTS

The following list suggests lockout procedures to use on all components of the machine that require lockout due to the storage of various forms of energy. It is your company's responsibility to Lockout/Tagout Procedures based on this list, train you in their proper and safe use, and to periodically inspect your work area to verify that you are complying with the procedures. Lockout/Tagout Procedures must be followed!

NORDCO has provided the means to lockout this machine. NORDCO cannot be held responsible for injury caused by failure to comply with your company's Lockout/Tagout Procedures.

LOCKOUT-TAGOUT PROCEDURES

The following procedures are designed to lead the operator through the steps required to shut the machine down and prepare it for performing mechanical maintenance work. These procedures are intended to release potentially dangerous stored energy forms and make the machine safe to begin repairs.

SAFETY PROCEDURES

1. Chock wheels to prevent accidental rolling of machine on grade.
2. If you have not already done so, determine which components are to have maintenance. Place all machine mechanical systems or workheads in the full up and locked positions.
3. When working on the boom, lower the boom to the 0° position or place on stands.
4. Turn the ignition switch to the OFF position. This turns off the power to the control circuits on the machine. Place a TAGOUT card in close proximity to the ignition switch.
5. Turn the battery disconnect switch (BDS) to the OFF position. Place a TAGOUT device on the switch.
7. Follow all of your company's lockout/tagout rules before proceeding. Note: When working on machine components, be aware that moving components during repairs may create energy (i.e., moving a hydraulic cylinder). Proper precautions should be taken.
SAFETY DECALS ON THIS MACHINE

Safety decals and plaques that have been placed on this machine are to be kept clean and legible. Replace any decals or plaques that have become illegible or are missing.

When repairing or replacing components that had safety decals on them, it is your responsibility to replace the safety decals. These can be ordered from the Parts Sales Department.

Refer to Figure 6-4 in the Mechanical Section for part numbers of all safety decals and plaques.
GENERAL

This manual contains information for the Rail Crane RB-UG machine rebuilt by NORDCO INC., Oak Creek, Wisconsin. Information is provided in this manual for operation and maintenance of the machine. Information regarding operation and maintenance of OEM parts not of NORDCO manufacture can be found at the back of this manual, behind the tab marked “Component Data”.

Become familiar with all safety instructions, controls and instruments before operating this machine. Follow all instructions carefully.

ABOUT THIS MANUAL

This manual has been broken down into sections which have been separated by index tabs:

VOLUME 1:

Mechanical has individual parts breakdown drawings and lists for each assembly

Hydraulic includes adjustment instructions and troubleshooting for the hydraulic system; and all piping and functional drawings for a standard machine and optional equipment

Electrical, includes electrical schematics, distribution and control boxes, and cabling drawings for the machine; as well as troubleshooting instructions

Pneumatic includes adjustment instructions and troubleshooting for the pneumatic system; and all piping and functional drawings for a standard machine and optional equipment

VOLUME 2:

Component Data includes parts breakdowns and service instructions for components installed on the machine that are not of NORDCO’s manufacture. For example, the engine and pumps, transmission, air compressor, and generator.
### General

<table>
<thead>
<tr>
<th>Model</th>
<th>Rail Crane RB-UG</th>
</tr>
</thead>
</table>

**Gross Weight***
- Rebuilt Machine S/N 8329: 82,000 lbs. (37,195 kg)
- Rebuilt Machine S/N 9009: 98,500 lbs. (44,679 kg)

**Rated Capacity**
- Rebuilt Machine S/N 8329: 15 Tons
- Rebuilt Machine S/N 9009: 18 Tons

**Length**
- Without Boom: 17 ft. 4 in. (5.273 meters)
- Overall Length with Boom in the Travel Position: 49 ft. 9 in. (15.163 meters)

**Width**: 10 ft. 4 in. (3.15 meters)

**Height**
- Top of Engine Exhaust (Crane at Lowest Angle and Position): 13 ft. 6 in. (4.11 meters)
- With Crane at Highest Angle (78.5°): 42 ft. 6 inc. (12.95 meters)

**Boom Lengths**
- Primary: 17 ft. 7 in. (5.36 meters)
- Secondary: 17 ft. 6 in. (5.36 meters)

**Travel Speed**: 28 mph max. (45 km/h)

**Towing Speed**: 30 mph (48 km/h)

**Towing Limitations**: 10 Rail Cars Maximum

**Tail Swing**: 6 ft. 11 in.

### Capacities

<table>
<thead>
<tr>
<th>Fuel Tank</th>
<th>110 gallons (416 liters)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydraulic Oil Tank</td>
<td>220 gallons (833 liters)</td>
</tr>
<tr>
<td>Axle Housing</td>
<td>4.2 gallons (15.9 liters)</td>
</tr>
<tr>
<td>Oil Cooler</td>
<td>2 @ 44.25 gpm, 89.5 gpm total (339 l/min total)</td>
</tr>
<tr>
<td>Air Compressor</td>
<td>3/4 gallons (2.83 liters)</td>
</tr>
<tr>
<td>Cable Winder</td>
<td>2 gallons (7.5 liters)</td>
</tr>
<tr>
<td>Boom Capacity</td>
<td>See Load Chart</td>
</tr>
</tbody>
</table>

### Engine

<table>
<thead>
<tr>
<th>Make</th>
<th>John Deere</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>6068HF485, Tier 3</td>
</tr>
<tr>
<td>Idle Speed</td>
<td>1,100-1,200 rpm</td>
</tr>
<tr>
<td>Rated HP (under load)</td>
<td>275 hp @ 2400 rpm</td>
</tr>
<tr>
<td>Run Speed***</td>
<td>2100 rpm</td>
</tr>
</tbody>
</table>

### Transmission

<table>
<thead>
<tr>
<th>Type</th>
<th>Funk 2000 Series, 3-Speed</th>
</tr>
</thead>
</table>

* Items or capacities may vary according to options on your machine.

* Approximate weight. Actual weight may vary according to options on your machine. Actual weight of your machine is as stenciled.

** Disconnect driveshafts before towing to prevent transmission damage.

*** Running Faster will cause cavitation damage to the load sense pump.
Electrical System (24-Volt)

Battery.......................................................................................... (2x) 12 Vdc, 1150 Cold Cranking Amps
Ground.................................................................................................. Negative

Brakes

Type.................................................................................................... Heavy Duty Air Brakes
Compressor ........................................................................................ 1800 rpm, 78.8 cfm
Tank Drier ............................................................................................ SKF Turbo 2000
Hand Brakes .................................................................................. Ellcon National Model 1180

Hydraulic System

Double Gear Pump (Option) ........................................................ Permco 257 Series, 48.3 gpm @ 2100 rpm (x2)
Single Gear Pump................................................................................ Permco 257 Series, 48.3 gpm @ 2100 rpm
Load Sensing Pump............................................................................ 77.5 gpm, 2175 psi, 2100 rpm, 500 psi LS setting

- Crane Hoist Information is on next Page -
Crane System

Boom Lengths
- Primary: 17 ft. 7 in. (5.36 meters)
- Secondary: 17 ft. 6 in. (5.36 meters)

Boom Rated Capacity: See Load Chart

Main Winch: Pullmaster Planetary Winch Model H12 (High Speed Reverse)
- Hoisting Line Pull at Maximum Pressure
  - Full Drum: 6,250 lb (27.8 kN)
  - Bare Drum: 9,756 lb (43.4 kN)
- Lowering Line Pull at Maximum Pressure
  - Full Drum: 1,474 lb (6.6 kN)
  - Bare Drum: 2,252 lb (10 kN)
- Hoisting Line Speed at Maximum Volume
  - Full Drum: 201 fpm (61 m/min)
  - Bare Drum: 129 fpm (39 m/min)
- Lowering Line Speed at Maximum Volume
  - Full Drum: 871 fpm (266 m/min)
  - Bare Drum: 558 fpm (170 m/min)

Cable Type: 5/8" Diameter, Class 6-19 IWRC, Non Rotating
- Maximum Cable Capacity: 262 feet (80 meters)
- Maximum Operating Pressure: 2200 psi (152 bar)
- Minimum/Maximum Operating Volume: 17 gpm (64 l/min)/50 gpm (189 l/min)
- Lubricating Oil Volume Required: 1.5 gallons/5.7 liters

Boom Winch: Pullmaster Planetary Winch Model M12 (Equal Speed Reverse)
- Line Pull at Maximum Pressure
  - Full Drum: 6,250 lb (27.8 kN)
  - Bare Drum: 9,756 lb (43.4 kN)
- Line Speed at Maximum Volume
  - Full Drum: 201 fpm (61 m/min)
  - Bare Drum: 129 fpm (39 m/min)

Cable Type: 5/8" Diameter, Class 6-19 IWRC, Non Rotating, Right Lay/Normal Lay
- Maximum Cable Capacity: 262 feet (80 meters)
- Maximum Operating Pressure: 2200 psi (152 bar)
- Minimum/Maximum Operating Volume: 17 gpm (64 l/min)/50 gpm (189 l/min)
- Lubricating Oil Volume Required: 1.5 gallons/5.7 liters

Magnet Reel: Rud-O-Matic Single Barrel
- Cable Type: 2 Core, #8 Gauge Cab Type Wire
- Maximum Cable Capacity: 60 Ft. (Meters)
- Lubricating Oil Type/Volume Required: SAE 90 Heavy Oil

Magnet Generator: Gensco Model HMG - 10 kW
- Maximum Allowable Round Magnet Size (based on Generator): 45” Diameter

Denotes that OEM Maintenance Instructions are included in Volume 2 of this Manual.

All rights reserved. In view of the constant improvements to our equipment, the specification data and other technical information included in this manual are subject to change. No part of this manual may be reproduced in any form or by any means without our written permission.

Note: This manual applies to various capacity Rail Cranes. Therefore, load charts will not be included in this manual and must be purchased separately when ordering a replacement manual. Refer to the load chart in your cab for a part number to order.
### SLING ANGLE WEIGHT DEDUCTIONS

SLING ANGLE WEIGHT DEDUCTION FOR RATED SLING LOAD CAPACITY

<table>
<thead>
<tr>
<th>SLING ANGLE</th>
<th>FACTOR</th>
<th>SLING ANGLE</th>
<th>FACTOR</th>
</tr>
</thead>
<tbody>
<tr>
<td>15°</td>
<td>.259</td>
<td>55°</td>
<td>.819</td>
</tr>
<tr>
<td>20°</td>
<td>.342</td>
<td>60°</td>
<td>.866</td>
</tr>
<tr>
<td>25°</td>
<td>.423</td>
<td>65°</td>
<td>.906</td>
</tr>
<tr>
<td>30°</td>
<td>.500</td>
<td>70°</td>
<td>.940</td>
</tr>
<tr>
<td>35°</td>
<td>.574</td>
<td>75°</td>
<td>.966</td>
</tr>
<tr>
<td>40°</td>
<td>.643</td>
<td>80°</td>
<td>.985</td>
</tr>
<tr>
<td>45°</td>
<td>.707</td>
<td>85°</td>
<td>.966</td>
</tr>
<tr>
<td>50°</td>
<td>.766</td>
<td>90°</td>
<td>1.00</td>
</tr>
</tbody>
</table>

Example: If load capacity of sling is 12,000 pounds, and slings are at a 45° angle, multiply 12,000 x .707 to find the new load capacity. In this case your sling load capacity for the lift would be 8,484 pounds.

---

### NORDCO Recommendations
(based on Modified Beaufort Wind Scale)

<table>
<thead>
<tr>
<th>Beaufort Number</th>
<th>Wind Speed mph</th>
<th>Wind Speed km/hr</th>
<th>Description</th>
<th>What you should do:</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>&lt;1</td>
<td>&lt;1</td>
<td>Calm</td>
<td>Continue Working Operations</td>
</tr>
<tr>
<td>1</td>
<td>1-3</td>
<td>1-5</td>
<td>Light Air</td>
<td>Continue Working Operations, adjust/derate load as necessary</td>
</tr>
<tr>
<td>2</td>
<td>4-7</td>
<td>6-11</td>
<td>Light Breeze</td>
<td>Continue Working Operations, adjust/derate load as necessary</td>
</tr>
<tr>
<td>3</td>
<td>8-12</td>
<td>12-19</td>
<td>Gentle Breeze</td>
<td>Continue Working Operations, adjust/derate load as necessary</td>
</tr>
<tr>
<td>4</td>
<td>13-18</td>
<td>20-28</td>
<td>Moderate Breeze</td>
<td>Postpone lifting operations, lower boom, land payload and secure.</td>
</tr>
<tr>
<td>5.9</td>
<td>&gt;19</td>
<td>&gt;29</td>
<td>Fresh Breeze</td>
<td>DO NOT LIFT, lower boom and store</td>
</tr>
</tbody>
</table>
DIMENSIONAL INFORMATION
BEFORE OPERATION

GENERAL

DO NOT use this machine for machine operations other than for which it was intended.

FRA regulations require that a copy of this Operation Manual be kept on the machine at all times. Additional copies of the Operation Manual only can be ordered from Nordco Parts Sales at 1-800-647-1724.

It is always good practice to become totally familiar with the machines you are going to operate. Improper use of this machine for any type of operation can cause serious injury or death. The following pages detail this machine.

⚠️ DANGER ⚠️

AN UNTRAINED OPERATOR SUBJECTS HIMSELF AND OTHERS TO DEATH OR SERIOUS INJURY

YOU MUST NOT OPERATE THIS CRANE UNLESS

You are trained and authorized for crane operation.

You read, understand, and follow the safety and operating recommendations contained in this manual, your employers work rules, and applicable government regulations. Certification is required in some U.S. States.

You are sure that all safety signs, guards, and other safety features are in place and in proper condition.
UPPER FRAME (SUPERSTRUCTURE)

CAB (1)

The cab is steel reinforced and contains almost all the controls for running this machine. This includes, but is not limited to, the center and overhead control consoles, hand controllers, and the propulsion and braking foot switches.

The cab contains two seats, one for the operator and one for a rider, two outer doors, and an access door to the winch components.

It should be noted that when parking the machine the operator is required to set the hand wheel brake (red wheel) that is located on one corner of the lower deck.

Always use your seat belt when in your seats. Always use the handrail and steps provided to climb on to and off of the machine.

ENGINE HOUSING (2)

The engine is enclosed in a reinforced housing. The engine drives four (4) hydraulic pumps, one of which is used to drive the compressor (which in turn provides braking power). An alternator supplies electrical power to charge the batteries, provides power for crane control circuits, accessories and lighting.

HYDRAULIC TANK (3)

A single 220 gallon (833 liter) hydraulic tank (painted blue) is located between the fuel tank and the engine on the left side (in relation to cab) of the upper frame. The hydraulic tank contains the suction and return filters, and the 60 gpm oil cooler is mounted to the top of the tank.

FUEL TANK (4)

A single 140 gallon (530 liter) fuel tank (painted green) is mounted on the left side (in relation to cab) of the upper frame. Access stairs are provided for access to the filler cap.

COMPRESSOR HOUSING (7)

This houses the air compressor for the brakes. Mounted below the compressor is the generator for the electromagnet as well as the batteries supplying voltage to the various control consoles, lighting, cab fans, etc.

TURNTABLE (SLEWING RING)

An antifriction roller bearing (slewing ring) supports the upper frame (superstructure) on the lower frame (carrier). This bearing allows 360 degrees of continuous rotation (swing) in either direction and movement of the superstructure is controlled via the left hand controller in the cab.

The rotation is directed by a swing drive unit mounted to the upper frame. At the rear of the machine, a positive swing lock prevents swing during travel.

- See Next Page for Lower Deck (Carrier) -
The lower deck houses the axle and drive train assemblies, suspension, brakes (both hydraulic and manual hand brake), the transmission mounting, and the train coupling system.

All electrical and hydraulic power and signals are transferred from the upper (rotating) deck to the lower deck through the rotary union (hydraulic swivel and electrical slip ring). Air for the braking system also passes through the rotary union.

Hydrostatic motor drives a 3-speed transmission through a coupler. Transmission multiplies torque and reduces speed, and transmits power to the driveshafts. The axle has a solid axle shaft with a pinion and ring gear with a 4.58:1 ratio. The wheels are solid mounted on the axle, with an outer bearing attached to the machines suspension.

The suspension should always be locked out during working operation.

- See Next Page for Boom and Winch System -
BOOM AND WINCH SYSTEM

- **Boom Angle Indicator**
  Measures the angle of the boom. The Cranesmart LMI will stop operations if the boom is too high. Bypass to lower the boom to prevent boom damage or tipping of machine.

- **Level**
  Measures super-elevation of the track.

- **Load Sheaves**

- **Anti-Two-Block**
  Prevents hook block contact with sheaves. Hook block is too high, lower it if you see this alarm.

- **Load Cell**
  Measures the weight of the total load.

- **Primary Boom**
  A sensor is mounted on the upper deck directly below the winch area. This sensor is used with 8 directional tags mounted on the lower deck. When it comes into close proximity of the tag, information is sent back to the LMI.

- **Secondary Boom**

- **Rudomatic Electric Cable Winch**

- **Mast Pendants**

- **Inner/Outer Stabilizers**

- **These items work in concert with each other to determine if stability is compromised according to preprogrammed load charts.**
The boom and winch system includes a primary boom (mounted to the upper deck), a secondary boom, and the main and secondary winch systems. An auxiliary winch system is optional.

BOOM SYSTEM

The boom provides structure to lift the load with the winches. Rebuilt cranes are fitted with LATTICE style booms.

The boom system is comprised of two or three sections. The crane ships from the factory with the Primary and Secondary Booms installed. The boom extension is shipped loose if ordered as an option.

The boom closest to the superstructure is the Primary Boom. The secondary boom can be mounted to either the primary boom or the boom extension – which is mounted to the primary boom.

The boom system maxes out at the following angles:

- Sides: 80°
- Front/Rear: 77°
- Incline: 70°

CRANESMART LMI

Read and understand the Cranesmart LMI Booklet included in Volume 2, behind the “CRANE SYSTEM” tab. The LMI system can prevent machine damage and injury by stopping unsafe operation, but it can also be bypassed temporarily. Only use the bypass to get out of an unsafe condition, never to push beyond the machines limits.

ANTI TWO-BLOCK SYSTEM

This machine is equipped with an “Anti Two-Blocking” System. Do NOT rely on this system. Use good judgment, experience, and accepted safe crane operating practices!

This system provides warning to the Operator that a Two-Block condition is about to occur so that they can take action to prevent it. The system is an integral part of the CraneSmart LMI.
FIGURE 3. CENTER CONTROL CONSOLE
(Reference Drawing 31440093 in Electrical)
<table>
<thead>
<tr>
<th>CALLOUT</th>
<th>ITEM</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>IGNITION</td>
<td>Switches power to all circuits. Activates starter (when held fully clockwise.)</td>
</tr>
<tr>
<td>2</td>
<td>ENGINE SPEED</td>
<td>Push momentary toggle switch towards HIGH to increase engine speed. Max speed is set at 2100 rpm.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Push momentary toggle switch towards LOW to decrease engine speed. Minimum speed is set at 1100 rpm.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Note: Engine always starts at LOW idle. Switch to HIGH for track travel and working operations.</td>
</tr>
<tr>
<td>3</td>
<td>GEAR INDICATOR</td>
<td>Status lights indicate which gear the machine is in. Gear shifting is done using the LEFT hand controller rocker switch. (See HAND CONTROLLERS later in this section) (See Also “Downshift Status LED”, below.)</td>
</tr>
<tr>
<td>4</td>
<td>ENGINE SHUTDOWN OVERRIDE</td>
<td>Overrides engine shutdown for emergency travel purposes.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Red pilot light is lit when engine shutdown override is activated.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CAUTION: The engine is NOT protected from low oil pressure or high temperature damage while in this mode.</td>
</tr>
<tr>
<td>5</td>
<td>EMERGENCY PUMP SWITCH</td>
<td>Used to raise hook block and lower and straighten the crane boom in the event of catastrophic hydraulic failure. See more detailed instructions later in this manual.</td>
</tr>
<tr>
<td>6</td>
<td>ELECTRICAL INTERLOCK</td>
<td>ELECTRICAL INTERLOCK: When pushed in, disables propulsion and joystick functions.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Should be used during machine warmup or inspection.</td>
</tr>
<tr>
<td>7</td>
<td>EMERGENCY STOP</td>
<td>EMERGENCY STOP: Press button to shut down engine. Pull out button to reset. See &quot;EMERGENCY STOPPING&quot; at the end of this OPERATION section.</td>
</tr>
<tr>
<td>8</td>
<td>DOWNSHIFT STATUS LED</td>
<td>Red LED that comes on if the speed of the machine is not low enough for the transmission to downshift safely (shifting at higher speeds will cause damage to either the engine or transmission). This light will remain on until the lower speed is reached, at which time the gear will shift and dynamic braking will increase. You cannot override the delayed downshift. To cancel the downshift and stay in the current gear, tap on the upper front button of the left hand controller.</td>
</tr>
</tbody>
</table>
FIGURE 4. CENTER CONTROL CONSOLE
(Reference Drawing 31440093 in Electrical)
## FIGURE 4 – ENGINE GAUGES

<table>
<thead>
<tr>
<th>CALLOUT</th>
<th>ITEM</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>DUPLEX AIR PRESSURE GAUGE</td>
<td>Displays system pressure and train line (brake) pressure.</td>
</tr>
<tr>
<td>10</td>
<td>TRANSMISSION TEMPERATURE</td>
<td>Shows temperature of transmission oil. Should be no more than 210° F (99° C).</td>
</tr>
<tr>
<td>11</td>
<td>TRANSMISSION PRESSURE</td>
<td>Shows pressure of transmission fluid. Normal range is 230-290 psi.</td>
</tr>
<tr>
<td>12</td>
<td>HOURMETER</td>
<td>Displays working hours. Used to determine maintenance tasks as well as keeping track of engine hour use.</td>
</tr>
<tr>
<td>13</td>
<td>HYD. OIL TEMPERATURE</td>
<td>Shows temperature of hydraulic oil. Should be no more than 180° F (82° C).</td>
</tr>
<tr>
<td>14</td>
<td>FUEL LEVEL</td>
<td>Measures the level of diesel fuel in the fuel tank. Do not allow to go into the red zone.</td>
</tr>
<tr>
<td>15</td>
<td>SPEEDOMETER ODOMETER COMBO</td>
<td>Displays speed in MPH or KPH.</td>
</tr>
<tr>
<td>16</td>
<td>MURPHY DIAGNOSTICS</td>
<td>Shows a complete range of engine parameters, including engine speed, oil pressure, coolant temperature, etc. See next page for Murphy Gauge Use.</td>
</tr>
</tbody>
</table>
Turn the ignition switch to the first detent (power will come on, but engine is not started) and wait.

The Powerview will come on, and a "WAIT TO START-PREHEAT" message will appear on the screen. A light (Wait to Start) directly beneath the Powerview will turn on.

When the message disappears and the light goes out, it is safe to start the engine.
<table>
<thead>
<tr>
<th>Instrument or Control</th>
<th>Type of Control</th>
<th>Functional Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Menu Key</td>
<td>Menu Key</td>
<td>The Menu Key is touched to either enter or exit the menu screens. The <strong>Menu</strong> key is only used during factory setup procedures. (See Component Data Section for additional operation and setup instructions.)</td>
</tr>
<tr>
<td>Left Arrow</td>
<td>Left Arrow</td>
<td>Use the <strong>left to move to the left or upward in a 4-Up screen</strong>. You can use the left arrow at any time to return to the previous screen.</td>
</tr>
<tr>
<td>Right Arrow</td>
<td>Right Arrow</td>
<td>Use the right arrow key to move to the right or downward in a 4-Up screen, or to move to the next set of 4 controls.</td>
</tr>
<tr>
<td>Enter Key</td>
<td>Enter Key</td>
<td>The <strong>enter key</strong> is used when a fault occurs. Generally, any fault that occurs will come up on the screen at the time it happens. In order to go back to the original status screen you have to push the enter key once. <strong>NOTE:</strong> This will hide the fault screen until you 1) correct the fault, or 2) you press enter again.</td>
</tr>
<tr>
<td>Warning Light</td>
<td>Amber LED</td>
<td>The <strong>Amber Warning LED</strong> signals an <strong>ACTIVE FAULT</strong> code. When the light comes on, an abnormal condition exists. It is not necessary to shut down the engine immediately, but problem should be corrected as soon as possible. This light will remain on until all faults are corrected. <strong>Note:</strong> There may be more than one fault if <strong>&lt;NEXT or MORE&gt;</strong> appears at the bottom of the screen. You can also hide the faults by hitting the ENTER key. (Hitting the enter key again will take you back to the fault). <strong>NOTE:</strong> Ignoring active fault codes (warnings or shutdown) could result in severe engine damage.</td>
</tr>
<tr>
<td>Shutdown Derate Light</td>
<td>Red LED</td>
<td>The <strong>Red Shutdown Derate LED</strong> signals a fault has occurred that requires immediate action. Shutdown the engine, but do not turn the switch to the off position. You must go through the codes on the screen and correct the problems prior to restarting the engine. (The Powerview remembers the errors). <strong>NOTE:</strong> Ignoring active fault codes (warnings or shutdown) could result in severe engine damage.</td>
</tr>
<tr>
<td>Screen Display</td>
<td></td>
<td>Used to monitor engine and engine controls.</td>
</tr>
</tbody>
</table>
HIDING FAULTS AND WARNINGS

If you have hidden (hit the ENTER key at any fault condition), and have returned to the original 4-Up (or 1-Up) screen, the screen will now show icons in the upper right hand corner of a 1-UP screen or in the middle of the 4-UP screen (see figure below) to show you where the faults occurred. (In the 4-up shown below, the exclamation point appears in the middle and at the status that is showing a fault – the oil pressure.) Remember, the screen will show a <NEXT or MORE> if more than one error has occurred. Scroll through the screen until you find the individual component that has a fault. Highlight the component and press the ENTER key to read the fault.

Each fault icon has a different meaning and different methods to correct. These are:

- Indicates Auxiliary Gage Fault
- Indicates Fault Warning
- Indicates Derate or Shutdown Condition

NOTE: Faults can only be cleared when the fault has been corrected.

SHUTDOWN MACHINE as soon as possible when you have encountered a Shutdown Fault.
FIGURE 6. OVERHEAD CONTROL CONSOLE
(Reference Drawing 31440094 in Electrical)

FIGURE 6 – MISCELLANEOUS CONTROLS

<table>
<thead>
<tr>
<th>CALLOUT</th>
<th>ITEM</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>MAGNET &quot;OVERHEAT&quot; WARNING ALARM</td>
<td>The force of the magnet lessens over time if they are overheated. To avoid overheating, the magnet signal goes to a timer that turns the alarm on if it is continuously on for 5 minutes (adjustable timer inside the box). The silence button will turn the audible alarm off temporarily.</td>
</tr>
<tr>
<td>2</td>
<td>MAGNET &quot;ON&quot; STATUS LED</td>
<td>Red LED will come on when magnet is turned on. Magnet is turned on using the RIGHT hand controller. See Hand Controller later in this section.</td>
</tr>
<tr>
<td>3</td>
<td>SILENCE ALARM BUTTON</td>
<td>Press to reset timer and silence audible alarm.</td>
</tr>
<tr>
<td>4</td>
<td>GENERATOR ON/OFF</td>
<td>Turns magnet generator ON/OFF. Used only when magnet is to be used.</td>
</tr>
<tr>
<td>5</td>
<td>FILTER STATUS LEDS</td>
<td>Lights will give status of return &amp; pressure line filters and optional case drain filter.</td>
</tr>
<tr>
<td></td>
<td>GREEN LED: Filter does not require servicing.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>RED LED: Alarm state. Filter requires servicing or element requires replacing.</td>
<td></td>
</tr>
</tbody>
</table>
**FIGURE 7 – MISCELLANEOUS CONTROLS**

<table>
<thead>
<tr>
<th>CALLOUT</th>
<th>ITEM</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>LIGHT ON/OFF SWITCHES</td>
<td>Turns lights on and off. Note: Some lights are optional.</td>
</tr>
<tr>
<td>7</td>
<td>LOCOMOTIVE LIGHT (Optional)</td>
<td>Three position switch, center position OFF. Used to turn lights to HIGH beam, OFF, or low beam.</td>
</tr>
<tr>
<td>8</td>
<td>PRESSURIZER (Optional)</td>
<td>Turns the cab pressurizer ON/OFF.</td>
</tr>
<tr>
<td>9</td>
<td>WIPERS</td>
<td>Turns wipers on and on.</td>
</tr>
</tbody>
</table>

See Next Pages for Optional Espar Controls
**FIG 8. OPTIONAL AIRTRONIC HEATER**

![Diagram of AirTronic heater control panel]

<table>
<thead>
<tr>
<th>CONTROL OR INSTRUMENT</th>
<th>LOCATION/FUNCTION</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>HEATER BUTTON</strong></td>
<td>Press button to start heater. You can adjust the required temperature by using the temperature control knob. (Note: Red LED to left will go on when heater is on)</td>
</tr>
<tr>
<td><strong>RED LED</strong></td>
<td>Indicates whether or not the Heater is the piece of equipment (heater or fan) operating.</td>
</tr>
<tr>
<td></td>
<td>RED LED ON: Heater selected</td>
</tr>
<tr>
<td></td>
<td>RED LED OFF: Heater not selected</td>
</tr>
<tr>
<td><strong>OFF BUTTON</strong></td>
<td>Turns off the equipment controlled by the mini-controller (heater or fan).</td>
</tr>
<tr>
<td><strong>FAN BUTTON</strong></td>
<td>Press button to start fan (Note: Blue LED to left will go on when fan is on). Note: When used with the heater button, temperature control knob does not function.</td>
</tr>
<tr>
<td><strong>BLUE LED</strong></td>
<td>Indicates whether or not the fan is the piece of equipment (heater or fan) operating.</td>
</tr>
<tr>
<td></td>
<td>BLUE LED ON: Fan selected</td>
</tr>
<tr>
<td></td>
<td>BLUE LED OFF: Fan not selected</td>
</tr>
<tr>
<td><strong>TEMPERATURE CONTROL KNOB</strong></td>
<td>Controls the heat.</td>
</tr>
<tr>
<td></td>
<td>Lowest setting - approx. 47°F (8.5°C)</td>
</tr>
<tr>
<td></td>
<td>Highest setting - approx. 97°F (36°C)</td>
</tr>
</tbody>
</table>

**NOTE:** More information on the AirTronic system can be found behind the “OTHER” tab in Volume 2 of this manual.
FIG 9. OPTIONAL 7-DAY TIMER

The timer allows for pre-selection of turn on time, up to 7 days in advance, as well as an option for run times up to 2 hours before automatically turning off. In addition, there is an on/off switch for manual operation. By default the timer is pre-set by Espar to operate for two hours.

<table>
<thead>
<tr>
<th>CONTROL OR INSTRUMENT</th>
<th>LOCATION/FUNCTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 and 7 TIME SET</td>
<td>Press and hold the button to change time or day.</td>
</tr>
<tr>
<td>2 and 6 PREHEAT TIME SET</td>
<td>There are three memory locations (Display Item 6) for Preheat. Press this button until you have reached the preheat setting you wish to use. To reset a preset “heater start” time, Press the preheat button and use the left or right scan buttons to set the time.</td>
</tr>
<tr>
<td>3 and 9 HEATER STATUS</td>
<td>If the heater is on (display item 9 will be on), this button is pressed to turn off the heater. The heater icon should disappear when the heater is not functioning.</td>
</tr>
<tr>
<td>4) BACKWARD SCAN</td>
<td>Scrolls backward in displays or time/date settings, depending on which button you have pressed prior to the scan button.</td>
</tr>
<tr>
<td>5) FORWARD SCAN</td>
<td>Scrolls forward in displays or time/date settings, depending on which button you have pressed prior to the scan button.</td>
</tr>
</tbody>
</table>

NOTE: More information on the AirTronic system can be found behind the “OTHER” tab in Volume 2 of this manual.
If you are a certified crane operator, you understand the dangers of crane overloading and how overload protection systems such as a “Load-Moment Indicator” (LMI) can assist you in keeping safe.

Basically the LMI will stop the crane if the load is too heavy or imbalanced. These could cause the crane boom system to collapse, or tip over. The Cranemaster LMI system has an alarm system to indicate when a crane has been overloaded. It should NEVER be manually overridden (bypassed) except to correct an unsafe condition.

The Cranesmart LMI is to be used as an aid to the operator, not to replace safe operating practices and procedures established by your company. The operator should know how to read load charts, know the swing and height limits of the machine during lifts, and never rely solely on the LMI to indicate when it is safe to operate this machine. This is done for a variety of reasons, first and most important: the operator should be able to complete a lift in the event the LMI malfunctions.

The LMI is pre-programmed for use with the primary and secondary booms only. Do NOT install extensions and attempt to lift loads without first contacting Nordco. You MUST have the LMI re-programmed!
FIGURE 8. CRANESMART LMI PRIMARY OPERATING (MAIN) SCREEN
<table>
<thead>
<tr>
<th>ITEM</th>
<th>FUNCTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Displays the actual load on the hook in pounds. (Main and Aux). To change winches on this screen, use the UP arrow.</td>
</tr>
<tr>
<td>2</td>
<td>Displays the percentage of the pre-set maximum load defined by the pre-programmed load chart. (If there is no load, the bar graph will be blank.)</td>
</tr>
<tr>
<td>3</td>
<td>Displays the maximum allowable load as defined by the pre-programmed load chart.</td>
</tr>
<tr>
<td>4</td>
<td>Displays the angle of the boom in degrees using the horizontal line as zero.</td>
</tr>
<tr>
<td>5</td>
<td>Displays the current radius.</td>
</tr>
<tr>
<td>6</td>
<td>Allows the operator to by-pass existing alarms and restore crane functions while the system is in alarm. The duration of the by-pass is 30 seconds, which should allow a load to be set in the event of an emergency.</td>
</tr>
<tr>
<td>7</td>
<td>Allows the operator to enter any highlighted field.</td>
</tr>
<tr>
<td>8</td>
<td>At the Primary Operating screen, allows Operator to view data on different winches. At other screens, it allows the operator to toggle between menus.</td>
</tr>
<tr>
<td>9</td>
<td>At the Primary Operating screen, allows Operator to view data on different winches. At other screens, it allows the operator to toggle between menus.</td>
</tr>
<tr>
<td>10</td>
<td>Used to accept and save any adjusted setting.</td>
</tr>
<tr>
<td>11</td>
<td>Sample Alarm State (Refer to the Cranemaster Manual in the Component Data Manual (behind “other tab”) for more information on alarm states. An audible alarm will sound whenever an alarm state occurs. Depending on the severity of the alarm, the machine may or may not shut down. A number in the lower right screen reflects the alarm code number. This is helpful when referencing the Alarm Codes in the OEM guide.</td>
</tr>
</tbody>
</table>

**SAFETY**

In addition to Alarm States that will shut down the operation of the machine, The LMI will also indicate battery status. If the “Low Battery” state appears On the screen, you have approximately 3 weeks before the battery fails. It is NOT Recommended that you wait that long. When “Low Battery” appears, make Certain that the next weekly maintenance includes replacing the battery. Cranesmart offers free battery replacement kits that include seals. Do NOT attempt to install Your own battery. Contact them at: **1-888-562-3222**  
You will need to have the S/N of the LMI in order to get the free kit. This can Be found on either the display in the cab or on the load cell itself.
FIGURE 9A-9C. BRAKING AND PROPULSION

Manual Train Brake

"A9" Locomotive Brake Lever

BRAKE PEDAL

PROPULSION PEDAL
<table>
<thead>
<tr>
<th>PEDAL</th>
<th>FUNCTION</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1</strong></td>
<td>BRAKE Left Foot Pedal</td>
</tr>
<tr>
<td></td>
<td>Press this foot switch to apply brakes.</td>
</tr>
<tr>
<td></td>
<td>Stopping work operations: apply the hand brake valve in the cab and press the electrical interlock button on the Center Control Console before exiting the cab.</td>
</tr>
<tr>
<td></td>
<td>During work operations: Apply the hand brake valve in the cab, press the electrical interlock button on the Center Control Console, and exit machine to set the manual train brake located on the lower frame.</td>
</tr>
<tr>
<td><strong>2</strong></td>
<td>PROPEL FOOT PEDAL</td>
</tr>
<tr>
<td></td>
<td>The foot pedal is a bi-directional electronically controlled pedal. The more the pedal is depressed (toe end or heel end), the faster the speed of travel of the machine. Note: Used with the gear selector pushbuttons on the LEFT Hand Controller.</td>
</tr>
<tr>
<td></td>
<td>NEVER reverse the direction of travel of machine without first letting the machine come to a complete stop.</td>
</tr>
<tr>
<td><strong>3</strong></td>
<td>&quot;A9&quot; LOCOMOTIVE BRAKE LEVER</td>
</tr>
<tr>
<td></td>
<td>4 Detent positions which allow for varying degrees of braking. Normal running (OFF) position is all the way forward. This brake lever is only used when there is a train line attached to the crane.</td>
</tr>
<tr>
<td></td>
<td>Training is &quot;A9&quot; locomotive brake operation must be provided by employer prior to use by operator.</td>
</tr>
<tr>
<td><strong>4</strong></td>
<td>MANUAL TRAIN BRAKES</td>
</tr>
</tbody>
</table>
FIGURE 10
HAND CONTROLLER FUNCTIONS

<table>
<thead>
<tr>
<th>Gear Select Switch And LED</th>
<th>1st Gear (Low Gear)</th>
<th>Used during lift and carry operations.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2nd Gear</td>
<td>Used during normal working conditions.</td>
</tr>
<tr>
<td></td>
<td>3rd Gear</td>
<td>Used for high speed track travel (28 MPH MAX)</td>
</tr>
</tbody>
</table>

DOWNSHIFT STATUS LED

Red LED that comes on if the speed of the machine is not low enough for the transmission to downshift safely (shifting at higher speeds will cause damage to either the engine or transmission). This light will remain on until the lower speed is reached, at which time the gear will shift and dynamic braking will increase. You cannot override the delayed downshift. To cancel the downshift and stay in the current gear, tap on the upper front button of the left hand controller.

CAUTION

ALWAYS START TRAVEL IN 1st GEAR AND SHIFT UP AS NECESSARY (POWERSHIFT TRANSMISSION). STARTING IN 2nd OR 3rd GEAR WILL LEAD TO PREMATURE FAILURE OF TRANSMISSION.
## TABLE 11 – MISCELLANEOUS CONTROLS
**LOCATED REMOTELY ON MACHINE**

<table>
<thead>
<tr>
<th>CONTROL OR INSTRUMENT</th>
<th>FUNCTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>HYDRAULIC OIL TANK SIGHT LEVEL</td>
<td>Located on the hydraulic oil tank. It indicates the level of hydraulic oil in the tank.</td>
</tr>
<tr>
<td>HYDRAULIC OIL TEMPERATURE GAGE</td>
<td>Located on the bottom of the hydraulic oil sight level gage. It indicates the temperature of the hydraulic oil. Normal operating temperature is 80-150°F.</td>
</tr>
<tr>
<td>EMERGENCY PUMP (OPTIONAL)</td>
<td>Located on the rear right corner of the center area of the machine. This pump is used when there is a loss of main hydraulic power and movement of the boom and swing drive is necessary. Pump flow is supplied by momentarily holding the toggle switch (electric pump option). See “Emergency Pump Operation” at the end of Section 6 for more details on the use and operation of the emergency pump.</td>
</tr>
<tr>
<td>TOP-OFF PUMP (OPTIONAL)</td>
<td>Located on left side of the frame under the fuel tank. Pump is used for filling the hydraulic tank. This pump is manually operated by pushing and pulling on the handle.</td>
</tr>
<tr>
<td>FREE FALL VALVE</td>
<td>Located on cab wall next to left handcontroller. This valve is to be used only in the event of an emergency and when personnel are NOT under the load. Pressing this valve handle will cause the load to drop.</td>
</tr>
<tr>
<td>REMOTE DRAIN VALVES</td>
<td>Located under the Hydraulic Tank. Green is for draining the fuel tank. Blue is for draining the hydraulic tank. Black is for draining the engine oil.</td>
</tr>
</tbody>
</table>
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PREPARING THE MACHINE FOR WORK

As with any machine, startup checks and preventative maintenance should be performed before use. We suggest that you follow the guidelines listed below before actually operating the machine.

1. Position the machine on level track so fluid levels can be accurately checked and filled if necessary.
2. See TOWING section if machine is to be towed to worksite.
3. Perform the pre-operational inspection of the entire machine as on the following pages. Find defects and correct them before serious damage or failure results.
4. If necessary, follow any applicable instructions under MAINTENANCE FOR EXTREME CONDITIONS.
5. Perform applicable preventative-maintenance procedures in MAINTENANCE AND SERVICE section.
6. Be ready to operate the machine with an alert and safety-conscious attitude.
7. Understand the use of the machine's Lock-Ups. See LOCK-UPS section.
8. Make sure the unit is setup for rail and tie size being worked on. Adjustments, if required, are described in the MACHINE SETUP.
9. Wear proper safety clothing.

Before you begin the Startup checklist you should become familiar with the controls that you will be checking. Knowing these controls and their functions may will help you in troubleshooting the machine at a later time.
Engine Operation

**CAUTION**

Before starting a new or overhauled engine that has been in storage, consult the engine manual for initial start instruction. Failure to follow those instructions can result in serious engine damage.

**WARNING**

Exhaust emissions caused by the use of this machine may cause cancer, birth defects or other reproductive harm if inhaled.

NOTE: Avoid unnecessary idling.

1. Ensure the suction strainer valve on the hydraulic oil tank is open and the Battery Disconnect Switch (right side of the Center Console) is ON.

2. Make certain the EMERGENCY STOP pushbutton on the Center Control Console is pulled out and the brakes are set using both the Manual Train Brake on the lower frame and the valve in the cab.

3. Turn the ignition switch clockwise until the engine starts. Release the ignition switch (will spring back to centered position). Allow 5-7 minutes of warmup if first start of the day.

NOTE: Engine will not start if emergency stop pushbutton is pushed in.

4. If the engine fails to start within 30 seconds, allow the starting motor to cool a few minutes before trying again.

5. Perform the startup check:
### STARTUP CHECKLIST

#### GENERAL MACHINE STATUS:

- ✓ Verify all load charts, safety & warning labels, and control labels are present and legible.
- ✓ Make certain all safety devices function properly.
- ✓ Ensure swing lock is installed between the counterweight and the lower deck prior to engine start.
- ✓ Check hydraulic system (hoses, tubes and fittings) for leaks.
- ✓ Inspect Lattice Booms, checking for bends or other damage. **DO NOT OPERATE MACHINE IF DEFECTS ARE PRESENT!**
- ✓ Inspect Winches. Make certain wire rope is properly reeved on sheeves.
- ✓ Make certain all connecting pins and retaining devices are properly installed.
- ✓ Inspect the wire rope. **DO NOT OPERATE MACHINE IF DEFECTS ARE PRESENT!**
- ✓ Check for damaged or missing parts, cracks, and bends. If any of these are present **DO NOT operate the machine** until repaired.
- ✓ Operate all lights, alarms, and horns to check for proper operation.
- ✓ Test anti 2-blocking (A2B) device to check for proper operation.
- ✓ Inspect all controls and cables/harnesses to make certain all connections are tight and controls function properly.

#### Maintenance and Lubrication Check:

- ✓ Check Engine Oil Level
- ✓ Check Engine Coolant Level
- ✓ Check Hydraulic Tank Fluid Level
- ✓ Check Diesel Fuel Tank Level
- ✓ Perform all Daily Maintenance Requirements (See Inspection and Maintenance later in this manual.)
TRAVEL

It is important that you read about and understand all operating controls, Cautions, Warnings, and Dangers before traveling.

⚠️ DANGER ⚠️

Make certain that the area around and under the machine is clear of all personnel and obstructions before traveling or working. Failure to do so will cause serious injury or death.

GENERAL

This machine is equipped with a Sauer Plus One Travel Control Module located inside the Center Control Console. This controller takes inputs from the motor, gear shift switch, and travel pedal and controls the pump and transmission to prevent damage to the traction system and engine that may be caused by inertia of the machine.

DOWN-SHIFTING

The Travel Control Module prevents an Operator from downshifting too fast, which affects the dynamic braking of the machine.

Pressing the front bottom button on the left hand controller will do one of two things, depending on the speed of travel. If the speed is within the safe zone for that gear, the transmission will down shift. If the button is pushed when it is outside the safe zone, the “DOWNSHIFT” LED on the Center Control Console will come on and remain on until the safe zone is reached, at which time the gear will change and dynamic braking will increase. This cannot be overridden except by cancelling the downshift and staying in the current gear by pressing the front top button on the hand controller.

ENGINE SPEEDS

Engine speed settings are preset. High and low speeds are selected using the engine speed control switch on the center control console.

Engine speed should be at high (2100 rpm) during travel and work operations and at low (1100 rpm) when idling.

PROPELLING

The propulsion pedal is a bidirectional pedal. Pressing the top of the pedal propels the machine one direction, the bottom of the pedal the opposite direction. The harder you press on the pedal, the faster the machine will travel in that gear.

Gear shifting is done through use of the rocker switch on the LEFT hand controller.

⚠️ CAUTION ⚠️

This machine is equipped with downshift protection. The travel controller will disallow or delay downshifting when necessary to protect the engine from overspeeding.

The operator of this machine MUST maintain a controlled speed using the air brake system on inclines and not rely on engine braking. Failure to do so could result in serious damage to the machine.

NOTE: If the speed is determined to be too high when attempting to downshift, the RED “Downshift Delay” LED on the front console will come on. Once a low enough speed is reached, the transmission will downshift. To cancel an impending downshift, press the Gear UP side of the rocker switch.

To propel:

1. Make certain that the engine and hydraulics are warmed up. (Refer to “Engine Startup” earlier in this section.
2. Make certain all brakes (brake valve in cab, manual train brake wheel on side of lower frame) are released and you are applying the foot brake.
3. Make certain that suspension lockups have been removed and properly stored.
4. Set engine speed to HIGH using the engine speed (throttle) control switch on the center control console.
5. Release the brake foot pedal.
6. Using the rocker switch on the LEFT hand controller front pushbuttons, and looking at gear selection LEDs on the center control console, press the switch in the UP direction once.
7. Slowly press propulsion pedal until the machine reaches its top speed in that gear.
8. Release pedal half way (50%) and press...
gear switch again. Repeat until desired speed and gear has been reached.

9. To change direction, apply brakes and then press the propulsion pedal for the opposite direction. When changing direction, the transmission will automatically go to 1st gear. If you do not apply brakes, dynamic braking will take place, but you will take a lot longer to stop.

DISABLING THE PROPULSION PEDAL

You can disable the propulsion pedal by shifting down until the Park LED comes on. The 1st Gear LED will remain on as well. This is considered the default startup gear on this machine.

NOTE: Always shift to PARK and set the air brakes before leaving the cab for any reason.

BRAKING

This machine is equipped with a hydrostatic drive system in which the pump and motor work together to control the speed of the machine. Dynamic or engine braking is a feature of this type of system, but is hydraulically limited on this machine because of potential damage to the engine caused by inertia. The air brakes should always be used in tandem with dynamic braking to slow and stop the machine, ESPECIALLY on grades.

To brake:

1. Slowly release propulsion pedal.
2. Slowly apply brake pedal.
3. Downshift as permitted.

PARKING BRAKES

![WARNING]

Do NOT leave crane unattended without setting and testing the manual brake system.

Failure to follow parking brake procedure could result in a runaway train, which may cause severe injury and death, as well as serious machine damage.

Parking brake procedure is as follows:

1. Ensure machine has come to a complete stop, then shift transmission to “park”.
2. Set train brakes with 'A9' hand valve.
3. With the engine running and air brakes set, leave the cab to set manual brakes on crane (handwheel) and cars.
4. Re-enter cab, and release air brakes. Shift to 3rd gear and use travel pedal to attempt to move the crane in both directions. The manual brakes should resist all motion.
5. Shift transmission back to park. Shut down machine.
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SETTING UP THE CRANE

PLAN YOUR LIFT

Proper rigging of the crane is the most crucial part of Crane Operation. The wrong choice can mean the difference between life and death.

HIGH VOLUME TRACK INSTALLATION

Full load chart ratings should be reduced by 20 percent if high speed, high volume track installation is being done. The speed of these operations produces increases in crane loads from sideloads, swing-out and impact, as well as higher temperatures in critical components such as brakes, clutches, pumps and motors; therefore, ratings should be reduced.

In addition, rapid hoist acceleration produces hook loads higher than the actual load weight.

SLING ANGLES AFFECT LOAD CAPACITY

The angle of slings you add for your lift affects the load capacity of the sling and MUST be taken into account prior to any lifting activities.

Before a crane can be properly rigged, all equipment should be properly inspected and all load tags on the equipment legible.

Familiarize yourself with all components of this machine BEFORE you attempt to operate it. Make certain you understand all the safety precautions listed in the SAFETY section of this manual.
RAPID STOPPING OF LOADS

Rapid stopping of loads increases the hook load and ultimately the stopping distance of the load.

Take care when stopping a load.

<table>
<thead>
<tr>
<th>LINE SPEED FT/MIN.</th>
<th>STOPPING DISTANCE (FEET)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>10</td>
</tr>
<tr>
<td>100</td>
<td>0.4%</td>
</tr>
<tr>
<td>150</td>
<td>1.0%</td>
</tr>
<tr>
<td>200</td>
<td>1.7%</td>
</tr>
<tr>
<td>250</td>
<td>2.7%</td>
</tr>
<tr>
<td>300</td>
<td>3.9%</td>
</tr>
<tr>
<td>350</td>
<td>5.3%</td>
</tr>
</tbody>
</table>

Rapid Releasing Of Load

When you release a load suddenly, the crane boom will be subjecting to recoil, followed by the full weight of the load being applied to the hook.

This sudden release of energy can result in the machine tipping or even a structural failure in the lattice boom. All loads should be gently raised and lowered.

In the event of an emergency the free fall valve next to the Left hand controller is to be used. But use it only when personnel are not in harm’s way.

Rapid Swing Rate

Load chart ratings apply only when the load is vertically in line with the boom tip at all times. Rapid swing rates (like that in high speed track installation) make this an impossible condition to meet. Nordco’s Load Chart does not allow for rapid swings and is based on the machine being perfectly level in all directions. The swing rate must be adjusted to keep the load directly below the boom tip at all times.

The centrifugal force of a high speed swing creates a high forward tipping load. At high boom angles, the boom can collapse over the back of the machine if the boom motion is accelerated or decelerated rapidly.

Super-Elevated Track

Since Nordco’s Load Chart is based on a machine being perfectly level, working on super-elevated track causes side loads on the machine and therefore the load capacity is now lower. Super elevation values are shown on the Load Chart.

Boom Angle

The capacities listed in the load chart are also based on and vary with the boom angle of the machine. Because of boom and machine deflection as well as pendant stretch, the boom angle will differ between no load and loaded conditions.

Working Near Transmitters

When operating near radio, TV or microwave transmitters, the crane boom and load can become electrically charged. While not as dangerous as hitting live electrical lines, it can still cause burns to personnel handling the load.

Anti Two-Blocking System

This machine is equipped with an “Anti Two-Blocking” System. Do NOT rely on this system. Use good judgment, experience, and accepted safe crane operating practices!
Two-blocking the winch cable can happen with untrained or inexperienced operators. Two-blocking occurs when the winch cable has been retracted too fast or if the boom is extended without letting out cable. Either way, the winch cable can be damaged by crimping or over tensioning, and the sheave may also be damaged.

The “Anti Two-Blocking” system helps prevent this kind of damage by sensing the position of the winch cable end attachments with respect to the sheave case and shutting down the functions that cause two-blocking.

Normal function of the crane is restored by winching down (letting out line) or retracting the boom until the anti two-blocking weight is suspended freely.

Crane Capacity

This machine comes equipped with a Load Moment Indicator. This panel and alarm system is meant to assist an operator in making lifts. However, it is the recommendation of Nordco that the Operator calculate their lifting capacity and capability on their own, and use the LMI to verify their results.

CONNECTING THE MAGNET

This machine can be run with or without a magnet. However, DO NOT turn on the generator unless a magnet is attached.

TESTING THE LMI

The lifting capacity of the crane varies according to the height and angle of the boom, the angle over the centerline of the machine, the weather conditions, and the type of load being lifted.

Refer to Section 2, General, for detailed information regarding crane capacity, in addition to the following:

1. Know the capacity of the crane.
2. Know the weight of the load being lifted and DO NOT exceed the capacity of the crane.
3. Add the weight of any and all load handling devices from the load capacity to determine the ACTUAL load capacity.

Brief the Crew Working with You

Safety is the primary concern when working with a crane.

Tell them to never enter the swing radius of a working crane unless absolutely necessary. Tell them that the crane operator is concentrating on the load, not stray workers.
WEATHER SAFETY CONSIDERATIONS

Weather conditions can adversely affect lifting activities. They need to be thoroughly considered both during the planning and execution of a lift. Special efforts may be required to ensure adequate warning is provided to avoid a sudden storm disrupting a lift in progress.
OPERATION IN EXTREME COLD

General Problems

Extreme cold generally causes fluids to thicken or gel, presents a risk of freezing and weakening the battery, can crack electrical insulation, can cause difficult starting and causes rubber and plastic parts to become hard, brittle and easily damaged.

Lubricants

Use the correct grade of lubricants wherever they are used on the machine. Drain and refill if the lubricant is not correct for cold weather operation. See Lubrication under SERVICE AND MAINTENANCE. Cold weather also can cause moisture to accumulate in lubricants. If water is found in any lubricant, drain and refill.

Fuel System

Precautions can be taken to keep moisture out of the fuel system:

1. Keep fuel tank as full as possible to avoid condensation.
2. Remove ice and snow from the area of the filler opening before refilling.
3. Whenever moisture does accumulate in the fuel system, drain water from tank and filters.
4. If fuel is seriously contaminated with moisture, drain, flush, and refill fuel tank.

Battery

Keep battery fully charged. Cranking power of battery is reduced in extreme cold.

Engine Operation

Run engine at LOW SPEED only long enough to circulate the oil through the engine, then increase speed to warm up the engine. Extended idling during extremely cold temperatures can cause incomplete combustion and heavy deposit formations on the valves.

OPERATION IN EXTREME HEAT

General

Precautions must be taken to avoid overheating. Check temperature gauges frequently for indications of overheating. When overheated, allow engine to idle until temperature is reduced.

Cooling System

Check condition of cooling fins frequently. Keep fins and air duct clean and free of dirt that would reduce efficiency. Replace a fan belt that is cracked, frayed, or excessively worn.

Lubrication

Lubricate the machine with correct grade of lubricants according to lubrication instructions. Change filter elements at shorter intervals than normal.

Air Cleaners

Check restriction indicator frequently. Service air cleaner at shorter-than-normal intervals.

OPERATION UNDER RAINY OR HUMID CONDITIONS

Fuel Tank

Keep fuel tank as full as possible and service filters more often than normal.

Lubrication

Keep all moving parts well lubricated.

Paint

If paint is chipped or scratched, the affected area should be refinished immediately to prevent rapid formation of rust. Remove all loose paint with paint remover, sandpaper, or sandblasting equipment. Apply two coats of primer and, when dry, apply finishing coat of paint.

OPERATION IN DUSTY OR SANDY AREAS

General

Sand and dust are abrasives which can cause wear on many parts of the machine. Airborne sand and dust can clog the air cleaners, cooler and radiator. Try to store machine in sheltered area when not in use.

Air Cleaners

Check the air cleaner indicator frequently and reduce the service intervals for the air cleaner.
Clean the air cleaner as often as necessary to prevent it from becoming clogged.

Lubrication

Lubricate the machine more often than specified in the Lubrication Chart. Clean all fittings and openings thoroughly before lubrication to keep out sand and dust. Take similar precautions with lubricant containers.

OPERATION IN SALT WATER AREAS

In salt water areas, keep the machine as clean as possible. Salt water vapor in the air causes corrosion of exposed parts. After operation, wash with fresh water if available. Keep all lubrication points wiped clean and well lubricated.
MACHINE OPERATION

OPERATION

The crane operator and maintenance personnel have the responsibility to familiarize themselves with all safety precautions applicable to the operation of this machine. This includes, but is NOT limited to: documentation within this Operating Manual, your company’s training procedures, and all government (US or Canada) regulations and/or codes.

Before operating this machine:

1. Always set the brakes before beginning crane operations.
2. Always keep the load as close to the ground as possible.
3. NEVER swing a load so that it passes over personnel on the ground.
4. ALWAYS make certain area around the superstructure is clear of personnel prior to rotation.
5. NEVER rotate the crane too fast with a load applied.
6. NEVER operate the crane if the boom is going to be within 10 feet of a power line.
7. NEVER exceed the lifting capacities and remember to deduct the weight of any load handling equipment from the rated capacity.
8. NEVER rely solely on the LMI installed on this machine.
9. NEVER leave a load suspended in the air.
10. NEVER use the hoist to drag a load into position before lifting.
11. NEVER side load the boom by dragging a load from the side.
12. NEVER pull the load block or sheave back so that it makes contact with the boom tip.
13. ALWAYS pay out load line before raising the boom, failure to do so will cause two-blocking of machine.

14. NEVER operate the crane during an electrical storm or in high wind conditions.
15. NEVER attempt to service or repair the crane while the crane is operating.
16. Make certain that you have read and understood all safety issues related to this machine PRIOR to operating it.
17. Always make slow movements when positioning the boom and when making lifts and placing loads. Fast, jerky movements may cause stress damage (birdcaging) of the winch cables and may cause dangerous hazards when lifting.
18. ALWAYS make certain there is at least three full wraps of wire rope (cable) on the winch drum at all times.

To operate this machine:

1. Using the left handcontroller, position the crane as close to the job as possible. Avoid overhead obstruction on the work side of the unit.
2. Using the right handcontroller, lower the main winch cable by pushing forward on the handcontroller.
3. If using the magnet, turn on the generator and allow the generator to run for approximately 5 minutes, and then turn on the magnet using the top pushbutton on the front of the right handcontroller.
EMERGENCY PROCEDURES

1. If a hydraulic hose fails, shut down the machine immediately and replace hose.

2. If indications on gauges are not within the normal range, shut down the engine. Repair before further operation.

3. If rapid release of the load is required, make certain all personnel are away from the area before pressing the emergency free fall valve pushbutton.

WARNING

While the crane is supporting a load, there is stretch in the boom pendant cables and deflection of the boom structure.

In the event that a “free fall” is required and the load is suddenly released, the boom will spring backwards when the pendant stretch and boom deflection canes out.

If this occurs when the boom is raised at a high angle, the boom could topple back over the crane. For this reason, use extreme caution while suddenly releasing a load.

If engine power is lost, stop and set the manual brakes.

Failure to do so could result in a runaway train, which may cause severe injury and death, as well as serious machine damage.

EMERGENCY PUMP PROCEDURE

To lower the boom:
1. Locate and open the "emergency boom lower" ball valve. It is mounted near the emergency pump below the winches (you will need to use the access door in the cab).
2. From the main operator seat, press and hold the "emergency pump" rocker switch located on the center console. This will release the brake on the winch for as long as you are holding it. The brake will reapply once you let go. There is no provision for raising the boom, so do not lower it more than necessary!
3. Important! Close the ball valve opened in Step #1.

To raise / lower main winch or swing the machine:
1. Ensure that the "emergency boom lower" ball valve is closed.
2. With the key on, press and hold the "emergency pump" rocker switch located on the center console. While holding the switch, use the joysticks to manipulate the swing and main winch functions.
AFTER OPERATION

GENERAL

Put the Travel/Work Switch in the TRAVEL mode. This will raise the workheads and clamps to allow insertion of lockup devices.

Set the engine speed to LOW and turn pump off. Let engine idle for 5 minutes to cool down engine.

Shut off engine.

Return all switches to their “Pre-Operational” state using the Pre-Operation checklist as a guide.

Install the handcontroller covers, lower logic box cover and secure them all with padlocks.

Turn off battery disconnect switch. Lock battery box.

PARKING OR LOCATING MACHINE

1. Park or locate machine on level track area, if possible; and where it will not be exposed to excessive dust.

2. If the machine was towed, disconnect towing vehicle and set the brakes. Move the towing vehicle well clear of the parked machine.

TOWING

To tow the crane in a train consist, the following steps MUST be taken:

1. Remove the suspension lock-out plates so that the machine is in the TRAVEL mode. Store the plates in the holders directly above the axles on the outside of the frame.

2. Disconnect the boom from the crane body.

3. Disconnect and remove both axle driveshafts.

4. Ensure that the brakes are released and that the train brake lines are attached (both ends). Test brakes.

5. Do NOT exceed 30 mph when towing this crane!
SAFETY DURING MAINTENANCE

Alert others in the area that service or maintenance is being performed on this machine. Become familiar with, and use, your company’s lockout-tagout procedures when performing maintenance on this machine. See LOCKOUT-TAGOUT REQUIREMENTS in the Safety Section of this manual.

Do not start the engine if repairs or work is being performed alone. You should always have at least two people working together if the engine must be run during service. One person needs to remain in the command position (at the controls), ready to stop the machine and shut off engine if the need arises.

USE OF OEM RECOMMENDED PRACTICES

Nordco has included the GENERAL recommended maintenance procedures for items not of its own making (pumps, generators, etc.) within the text of this document. It is not meant as a replacement for reading the OEM literature that is included in Volume 2. It is your responsibility to read and understand ALL the documentation in this manual, including the OEM literature found in Volume 2.

NORDCO'S SERVICE NETWORK

Need assistance? It’s only a phone call away! If you experience problems, contact your original sales representative first, he is the one listed on the front page of this manual. If you cannot reach him, we suggest that you contact the representative closest to your work area BEFORE calling NORDCO’s Service Manager. See map on the next page for the alternate representative closest to your work area.

REQUESTING ASSISTANCE

If you have any questions regarding maintenance and service on this machine, please call your local Nordco Representative or:

Nordco Service Manager
(414) 766-2342 (Wisconsin)
1-800-445-9258 (USA and Canada)

The process will be faster if you have the following information in hand before calling:

1. The Machine and Model Name: Rail Crane RB-UG
2. The Serial Number
TRANSMISSION

Check the oil level daily, with the engine at idle speed, the transmission in neutral, and the transmission oil temperature between 160-200°F (71-93.5°C). Always make certain the area around the dipstick is clear of debris before removing dipstick. Failure to do so may cause contamination of transmission fluid.

Transmission should be changed when transmission is at normal operating temperature.

Refer to Volume 2, Component Data, “Transmission” Tab for more information on inspection, maintenance and troubleshooting.

SLEWING RING

BEARING LUBRICATION

Lubrication of the bearing is recommended every 100 operating hours

Idle equipment should not be neglected. Grease dries out and “breathing,” due to temperature changes, can cause condensation within the bearing. Whether used or not, the bearing should have grease introduced every 6 months. The bearing should then be rotated a few revolutions to coat all surfaces with fresh grease.

GEAR LUBRICATION

There is a tendency to take much better care of the bearing than the gear. However, the meshing action and usual position of the gear tends to purge the lubricant; thus, the gear should be regreased frequently with a small amount of lubricant. A well maintained gear will provide long, smooth, and quiet service. It is recommended that grease be introduced at the point of mesh of pinion and gear every 8 hours of slow or intermittent operation, and more often for rapidly or continuously rotating applications.

INSPECTION AND TIGHTENING OF BOLTS

Inspection

Between 2 weeks to 3 months after putting machine into service: re-tight all bolts.

Once a year, or after 2000 hours of operation: re-tighten all the bolts. If one or more bolts have lost 20% or more of the prescribed preload, then the actual bolt(s) as well as the two adjacent ones, should be replaced. If 20% or more of the total number bolts of a single ring are found to have less than 80% of the prescribed preload, all the bolts should be replaced.

When replacing the bearing, always replace the bolts.

When inspecting the mounting, ensure that:
- the moving part is balanced (tilting moment close to zero)
- there are no radial forces upon it.
- Provided that the bearing is supporting a centrally-acting axial load, re-tighten the bolts individually in accordance with the prescribed procedure.

Never loosen or exchange more than one bolt at a time. Use the same tightening method, the same tools and the same type of bolts employed for the original mounting.

Check the bolts for damage or corrosion and replace if necessary.

Tightening

The bolt torque should be tightened with a torque wrench or a hydraulic tensioner in at least two stages. For alternative methods, please consult RKS/SKF Slewing Bearings.

The bolts must be tightened in the order shown in the diagram below.
INSPECTION & MAINTENANCE

INSPECTION OF SEALS

The seals or sealing system should be inspected at least every six months, for instance, during routine maintenance of the installation.

Check the condition of the seals and clean if necessary, if there are signs of damage, change the seal in order to prevent any possible contamination of the bearing. Furthermore, check the evenness of the ring of grease around the bearing. There should always be a sufficient amount of grease at the lip of the seal.

Seals should be inspected during routine maintenance as recommended by the designer, but the interval should not exceed 6 months. Check for tears, breaks, or other signs of damage. Depending on the lubrication frequency and protection, it may be necessary to clean some areas to conduct this inspection. Carefully remove any buildup of debris around the seal and lubricate the bearing. There should be a small bead of grease around the seal edge indicating the bearing is receiving sufficient lubrication.

TURBO 2000 AIR DRYER

Refer to Volume 2, Component Data, “Other” Tab for more information on inspection, maintenance and troubleshooting. The following is taken from SKF Turbo 2000 Manual. Refer to the manual for more information.

System checks should be done regularly and include:

Check for moisture in air system by opening reservoirs, drain cocks or valves. If moisture is present, replace desiccant cartridge T224. If contaminants are present, use service kit 619340 or 619360 for additional filtration performance and service compressor as needed.

Check for air leak by building system to cut-out pressure. The air dryer should not unload again while at idle. If it unloads within 4 to 5 minutes, there is a slow leak that needs to be addressed. Spray soapy water at fittings around the air dryer, wet tank and compressor. Repair as needed. Note that an E-Type dryer on a non-Holset compressor could leak air out the intake of the compressor. There is a yellow sticker on the air dryer that indicates E-Type or non-E-Type. A leak less than 4 minutes will likely be the result of a non-functioning valve or major leak in air system. If soapy water does not reveal the leak, replace air dryer unloader valve #235, Turbo valve #228, and check valve #238. Service kit 619340 includes all of these valves plus desiccant cartridge T224. Service kit 619360 includes additional filtration with T224-P.

Check heater element. Remove heater rod from dryer and with ignition off, use an ohmmeter to check resistance. The resistance for a 12V 75 watt heater is 1.8 watts with 6.6 amp draw and 24V 75 is 7.4 watts with 3.2 amp draw. If no ohmmeter is available, expose air dryer to temperature below 32° F, place hand on bottom portion of air dryer and feel for warmth.

Yearly Service to the Turbo-2000 should include:

- Replace Desiccant cartridge T224/upgrade contaminant filtration with T224-P
- Clean port area and replace purge valve #235
- Clean bottom cap and replace turbo valve #228
- Clean port area and replace check valve #238
- All above are included in 619340 or 619360 for T224-P

ENGINE

Refer to Volume 2, Component Data, “Engine” Tab for more information on inspection, maintenance and troubleshooting. The John Deere Lubrication and Maintenance Service Interval Chart is on page 25-2 of the manual.

AIR COMPRESSOR

Refer to Volume 2, Component Data, “Other” Tab for more information on inspection, maintenance and troubleshooting. The maintenance chart is on page 13 of the Worthington/Creyssonsac Manual.
HYDRAULICS

HYDRAULIC HOSES AND FITTINGS

Inspect for:

1. Evidence of leakage at the surface of the flexible hose or its junction with the metal couplings.
2. Blistering or abnormal deformation of the outer covering of the hydraulic or pneumatic hose.
3. Leakage at threaded or clamped joints that cannot be eliminated by normal tightening or recommended procedures.
4. Evidence of excessive abrasion or scrubbing on the outer surface of a hose, rigid tube, or fitting (means shall be taken to eliminate the interface of elements in contact or to otherwise protect the components).

HYDRAULIC PUMPS AND MOTORS

Inspect for:

1. Loose bolts or fasteners.
2. Leaks at joints between sections.
3. Shaft seal leaks.
4. Unusual noises or vibration.
5. Loss of operating speed.
6. Excessive heating of the fluid.
7. Loss of pressure.

More Information:

Refer to Volume 2, Component Data, “Pump” and “Motor” Tabs for more information on inspection, maintenance and troubleshooting.

HYDRAULIC VALVES

Inspect for:

1. Cracks in valve housing.
2. Improper return of spool to neutral position.
3. Leaks at spools or joints.
5. Failure of relief valves to attain correct pressure setting (relief valve pressures shall be checked as specified by the manufacturer).

More Information:

Refer to Volume 2, Component Data, “Valve” Tab for more information on inspection, maintenance and troubleshooting.

HYDRAULIC FILTERS

Evidence of rubber particles on the filter element may indicate deterioration of the hose, “O” ring, or other rubber components. Metal chips or pieces on the filter may denote failure in pumps, motors, or cylinders. Further checking will be necessary to determine the origin of the problem before corrective action can be taken.

Evidence of rubber particles on the filter element may indicate deterioration of the hose, “O” ring, or other rubber components. Metal chips or pieces on the filter may denote failure in pumps, motors, or cylinders. Further checking will be necessary to determine the origin of the problem before corrective action can be taken.
CRANE SYSTEM

GENERAL INSPECTION

Inspect for:

1. Deformed, cracked, or corroded members in the crane structure and entire boom (both primary and secondary booms).
2. Bolts, rivets, nuts, and pins for being loose or missing.
3. Cracked or worn sheaves and drums.
4. Hooks damaged from deformation, or cracks, any visibly apparent bend or twist from the plane of the unbent hook, or any distortion causing an increase in throat opening of 5% not to exceed 1/4 in. unless otherwise recommended by the manufacturer. Dye-penetrant, magnetic particle, or other suitable crack-detecting inspections should be performed at least once a year.
5. Worn, cracked, or distorted parts such as pins, bearings, shafts, gears, rollers, and locking devices.
6. Excessive wear on brake and clutch system parts, linings, pawls, and ratchets.
7. Load, boom angle, and other operating aids over their full ranges for any significant inaccuracies (if calibration is required, it shall be done by a qualified person).
8. Inspect wire rope for kinking, crushing, birdcaging, or any other damage such as heat, wear, and frays or breaks resulting in damage to the wire rope. Follow Standard Wire Rope Inspection Guidelines.

2) Disassemble the Planematic drive in accordance with the SERVICE INSTRUCTIONS.
3) Discard and replace all O-rings and oil seals.
4) Inspect all parts for wear and replace if necessary.
5) Clean all parts thoroughly with solvent before reassembly.
6) Follow INSTALLATION and OPERATING INSTRUCTIONS when returning Planematic drive to its mounting.

PLANETARY HYDRAULIC WINCH

PULLMASTER M12 and H12

Refer to Volume 2, Component Data, “Other” Tab for more information on inspection, maintenance and troubleshooting. The following is taken from Page 19 of the Pullmaster M12 manual. Refer to the manual for more information.

Winch gear train lubricating oil should be changed after the initial six months or 50 hours of operation, whichever comes first. Lubricating oil should then be changed every 12 months or 500 operating hours, whichever comes first.

Check the drums for signs of wear that could damage the rope. If there are signs of wire rope corrugation, this means that the wire rope has been improperly wound. Verify that the required minimum number of dead wraps remain on the drum. Don’t forget to check the condition of the drum flanges.

For optimum performance over an extended period of time, the following preventive maintenance service should be done every 12 months or 500 operating hours (whichever comes first):

1) Disconnect all hydraulic hoses and remove the winch from its mounting.
2) Disassemble the winch as per instructions.
3) Discard and replace all O-rings and oil seals.
4) Clean all parts and inspect for wear and damage as per instructions. Replace worn or damaged parts as required.
5) Reassemble the winch as per instructions.
6) Follow INSTALLATION and OPERATING INSTRUCTIONS when returning winch to its mounting.

PLANEMATIC DRIVE

Refer to Volume 2, Component Data, “Other” Tab for more information on inspection, maintenance and troubleshooting. The following is taken from Page 21 of the Pullmaster PM50 manual. Refer to the manual for more information.

In order to maintain the PULLMASTER Planematic drive in peak operating condition at all times, it is recommended that the following preventive maintenance procedure is carried out every 12 months or 500 operating hours, whichever occurs first.

1) Disconnect all hydraulic connections and remove the Planematic drive from its mounting.
MAGNET WINCH

Refer to Volume 2, Component Data, “Crane System” Tab for more information on inspection, maintenance and troubleshooting. The following is taken from Page 9 of the Rudomatic manual. Refer to the manual for more information.

LUBRICATION

Lubrication should be checked at the start of each new job. Use S.A.E. 90 heavy oil. Remove oil plug near reel on barrel housing. Add oil as necessary per decal guide until oil level lines up with plug hole on end plate. Do not fill past plug hole. Replace plug.

INSPECT FOR WEAR OR DAMAGE

Inspect unit and fairlead assembly for routine wear. Replace sheaves if uneven wear in grooves is apparent. Inspect tagline cable for routine wear. If signs of frayed ends or wear are visible, replace cable.

STORAGE BETWEEN USE

For brief periods of inactivity it is not necessary to drain oil from housing. CAUTION: ALWAYS STORE UNIT WITH HOUSING IN HORIZONTAL POSITION TO PREVENT OIL FROM LEAKING THROUGH OIL SEAL. For long periods of inactivity, lubrication oil should be drained from housing. Loosen four nuts on end plate. Tilt unit to remove final oil residue. Tighten four nuts. Store unit in horizontal position.

MAGNET GENERATOR

Refer to Volume 2, Component Data, “Crane System” Tab for more information on inspection, maintenance and troubleshooting. All maintenance on the generator should be performed at least 10 minutes AFTER the generator has been stopped and you have verified that no charge remains held in the generator.

PLANEMATIC DRIVE

Refer to Volume 2, Component Data, “Other” Tab for more information on inspection, maintenance and troubleshooting. The following is taken from Page 21 of the Pullmaster PM50 manual. Refer to the manual for more information.

In order to maintain the PULLMASTER Planematic drive in peak operating condition at all times, it is recommended that the following preventive maintenance procedure is carried out every 12 months or 500 operating hours, whichever occurs first.

1) Disconnect all hydraulic connections and remove the Planematic drive from its mounting.
2) Disassemble the Planematic drive in accordance with the SERVICE INSTRUCTIONS.
3) Discard and replace all O-rings and oil seals.
4) Inspect all parts for wear and replace if necessary.
5) Clean all parts thoroughly with solvent before reassembly.
6) Follow INSTALLATION and OPERATING INSTRUCTIONS when returning Planematic drive to its mounting.

PLANETARY HYDRAULIC WINCH

PULLMASTER M12 and H12

Refer to Volume 2, Component Data, “Other” Tab for more information on inspection, maintenance and troubleshooting. The following is taken from Page 19 of the Pullmaster M12 manual. Refer to the manual for more information.

Winch gear train lubricating oil should be changed after the initial six months or 50 hours of operation, whichever comes first. Lubricating oil should then be changed every 12 months or 500 operating hours, whichever comes first.

Hydraulic system fluid should be changed at least once every 12 months.

For optimum performance over an extended period of time, the following preventive maintenance service should be done every 12 months or 500 operating hours (whichever comes first):

1) Disconnect all hydraulic hoses and remove the winch from its mounting.
2) Disassemble the winch as per instructions.
3) Discard and replace all O-rings and oil seals.
4) Clean all parts and inspect for wear and damage as per instructions. Replace worn or damaged parts as required.
5) Reassemble the winch as per instructions.
6) Follow INSTALLATION and OPERATING INSTRUCTIONS when returning winch to its mounting.

INSPECTION OF SHEAVES

Rope sheaves should be periodically inspected for roughness and worn spots.

Worn sheaves may damage the rope which could result in rope breakage or bad spooling. A proper fitting sheave should support the rope over 135 – 150 degrees of rope circumference.

All sheaves should be checked for cracks, grooving, or damage from two-blocking. Undue looseness in the bearing or bushing should be noted. The sheave’s groove surface should be smooth and slightly larger than the wire rope being used.

Proper maintenance of the equipment on which the ropes operate has an important bearing on rope life. Worn grooves, poor alignment of sheaves and worn parts resulting in shock loads and excessive vibration will have a deteriorating effect.

INSPECTION OF WIRE ROPE

Check for abrasion, fatigue, corrosion and wear.

Corrosion usually occurs from the inside out and therefore is the hardest of all to find.

Wire rope that shows evidence of birdcaging, kinking, fraying, and any other damage MUST be removed from service.

SHEAVE BEARINGS

Check the bearings for lubrication, signs of wobble and ease of rotation. Worn bearings cause vibration in the rope, increasing wire fatigue. Repair the bearings or replace the sheave.

ROPE INSPECTION

Inspect rope daily and particularly before making heavy lifts. The figure below shows the critical points that need to be checked.

Pick-up Points “A” : Sections of rope which are repeatedly placed under stress when the initial load of each lift is applied such as those sections in contact with the sheaves.

End Attachments “B” : At each end of the rope, tow areas must be inspected. The fitting that is attached to the rope and the condition of the rope where it enters the attachment.

Drum “C” : The general condition of the drum and the grooves of the drum, if grooved, should be inspected carefully. If there is damage to the drum, there is damage to the rope as well.