



Technical Manual
EHC-4
NEXSTAR III



Serial No. _____

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At the time of publishing this manual is accurate to the best of our knowledge. Auto Crane reserves the right to change any or all items, components and parts, necessary for any reason. This right does not obligate Auto Crane to immediately update the manual. If in doubt, please call your local Auto Crane distributor for the most up-to-date information.

Auto Crane Company issues a limited warranty with each unit sold. See warranty pages at the end of the manual.

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1 Safety Tips and Precautions

DANGER

Indicates a hazardous situation which, if not avoided, will result in death or serious injury.

WARNING

Indicates a hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION

Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

NOTICE

Indicates information considered important, but not hazard-related.

WARNING

Federal law (49 cfr part 571) requires that the Final Stage Manufacturer of a vehicle certify that the vehicle complies with all applicable federal regulations. Any modifications performed on the vehicle prior to the final state are also considered intermediate stage manufacturing and must be certified as to compliance. The installer of this crane and body is considered one of the manufacturers of the vehicle. As such a manufacturer, the installer is responsible for compliance with all applicable federal and state regulations, and is required to certify that the vehicle is in compliance.

WARNING

It is the further responsibility of the installer to comply with the OSHA Truck Crane Stability Requirements as specified by 29 CFR part 1910.180 (C) (1). In applications, where the rotation of the load is hazardous, a tag or restraint line should be used, (ref. OSHA 1910.180(h)(3)(xvi)). To reduce the potential for the load to rotate or rope twist, operate at minimal boom angles and extension.

WARNING

Do not attempt to lift or drag a load from the side! The boom can fail far below its rated capacity.

WARNING

Do not weld, modify, or use unauthorized components on any Auto Crane unit! This will void any warranty or liability. Also failure of the crane may result.

WARNING

Failure to correctly plumb and wire crane can cause inadvertent operation and damage to crane and/or personnel!

WARNING

Auto Crane Company remote controlled cranes are not designed or intended for use for any applications involving the lifting or moving of personnel. Any such use is considered to be improper and the seller shall not be responsible for any claims arising from such use. This sale is made with the express understanding there is no warranty the goods are fit for the purpose of lifting or moving persons or other improper use. There is no implied warranty or responsibility for such uses.

NOTICE

Keep this manual with the crane at all times.

Auto Crane products are designed to provide many years of safe, trouble-free, dependable service when properly used and maintained.

To assist you in obtaining the best service from your crane and to avoid untimely crane and/or vehicle failure, this manual provides the following operating and service instructions. It is specifically recommended that all operating and service personnel consider this manual as mandatory material for reading and study before operating or servicing Auto Crane products. It is highly recommended crane owners, equipment managers, and supervisors also read this manual.

Auto Crane has incorporated several safety features in the crane for your protection.

For your convenience the overall dimensions of the crane are included on the General Dimension Drawing. Rotation and turning radius are also listed on that drawing.

Remember, the crane adds weight to the vehicle. Adding weight may change the driving and riding characteristics of the vehicle unless the appropriate overload spring(s) are installed on the truck. The payload of the vehicle is reduced by the weight of the crane. The operator should exercise care when loading the vehicle. Distributing the payload on the vehicle evenly will greatly improve the driving and riding characteristics of the vehicle.

Auto Crane Company issues a limited warranty certificate with each unit sold. See last page for warranty.

The cranes are attached to your 12-volt truck electrical system through the vsu provided. The crane is another highly efficient Auto Crane product. The use of a maintenance-free battery is not recommended on any Auto Crane product. The recommended alternator and battery that will give the longest life with the most useful duty cycle is a 60-amp alternator with a 500 cold cranking amp battery. These specifications should be considered minimum.

It has always been Auto Crane Company policy to handle all warranty claims we receive as promptly as possible. If a warranty claim involves discrepant material or workmanship, Auto Crane will take immediate corrective action. It is understandable that Auto Crane Company cannot assume responsibility of liability when it is obvious that our products have been abused, misused, overloaded or otherwise damaged by inexperienced persons trying to operate the equipment without reading the manual.

2 Introduction

NOTICE

Auto Crane will not assume responsibility or liability for any modifications or changes made to unit, or installation of component parts without authorization.

Auto Crane maintains a strong distributor network and a knowledgeable Customer Service Department. In most cases, an equipment problem is solved via phone conversation with our customer service department. The customer service department also has the ability to bring a local distributor, a regional sales manager, or a factory serviceman into the solution of an equipment problem.

If, through no fault of Auto Crane Company, it is necessary to send an experienced factory serviceman on a field service call the rates stated in the Auto Crane Distributor's Flat Rate Manual will apply.

Auto Crane Company's extensive Research and Development Program allow our customers to use the best equipment on the market. Our Engineering Staff and our knowledgeable sales people are always available to our customers in solving crane and winch-type application problems. When in doubt, call the Auto Crane factory.

Should you require any assistance not given in this manual, we recommend that you consult your nearest Auto Crane Distributor. Our distributors sell authorized parts and have service departments that can solve almost any needed repair. This manual does not cover all maintenance, operating, or repair instructions pertinent to all possible situations.

If you require additional information, please contact the Auto Crane Company at the following telephone number: **1-800-777-2760**

The information contained in the manual is in effect at the time of this printing. Auto Crane Company reserves the right to update this material without notice or obligation.

3.1 DIMENSIONS

- Width: 22 in. (0.56 m)
- Height: 25-9/16 in. (0.65 m)
- Length: 11 ft. 5-3/8 in. (3.36 m), stored length.
- Weight: 1,055 lbs. (479 kg)

3.2 CAPACITY

- 16,000 ft-lbs (2.31 ton-m)
- Ft-lbs = horizontal distance from center line of rotation to free hanging weight (feet) x amount of weight (pounds).

3.3 REACH

- Second boom reach: 10 ft. 4 in. to 16 ft. 4 in.
- Third boom reach: 16 ft. 4 in. to 20 ft. 4 in.

3.4 CABLE

- 80 ft. (24.4 m) of 5/16 in. (7.9 mm) diameter aircraft quality cable. This cable has a single line breaking strength of 9,800 lbs. (4,445 kg).

3.5 CHASSIS AND MOUNTING REQUIREMENTS

- 10,500 lbs. (4,763 kg) GVWR minimum.
- 210,600 in-lbs. Resistive Bending Moment (RBM)
- 3/4", Grade 8-UNF Bolts. Tightened to 335 ft. lbs.
- 9" Mounting hole to run electrical lines to the crane from the body.

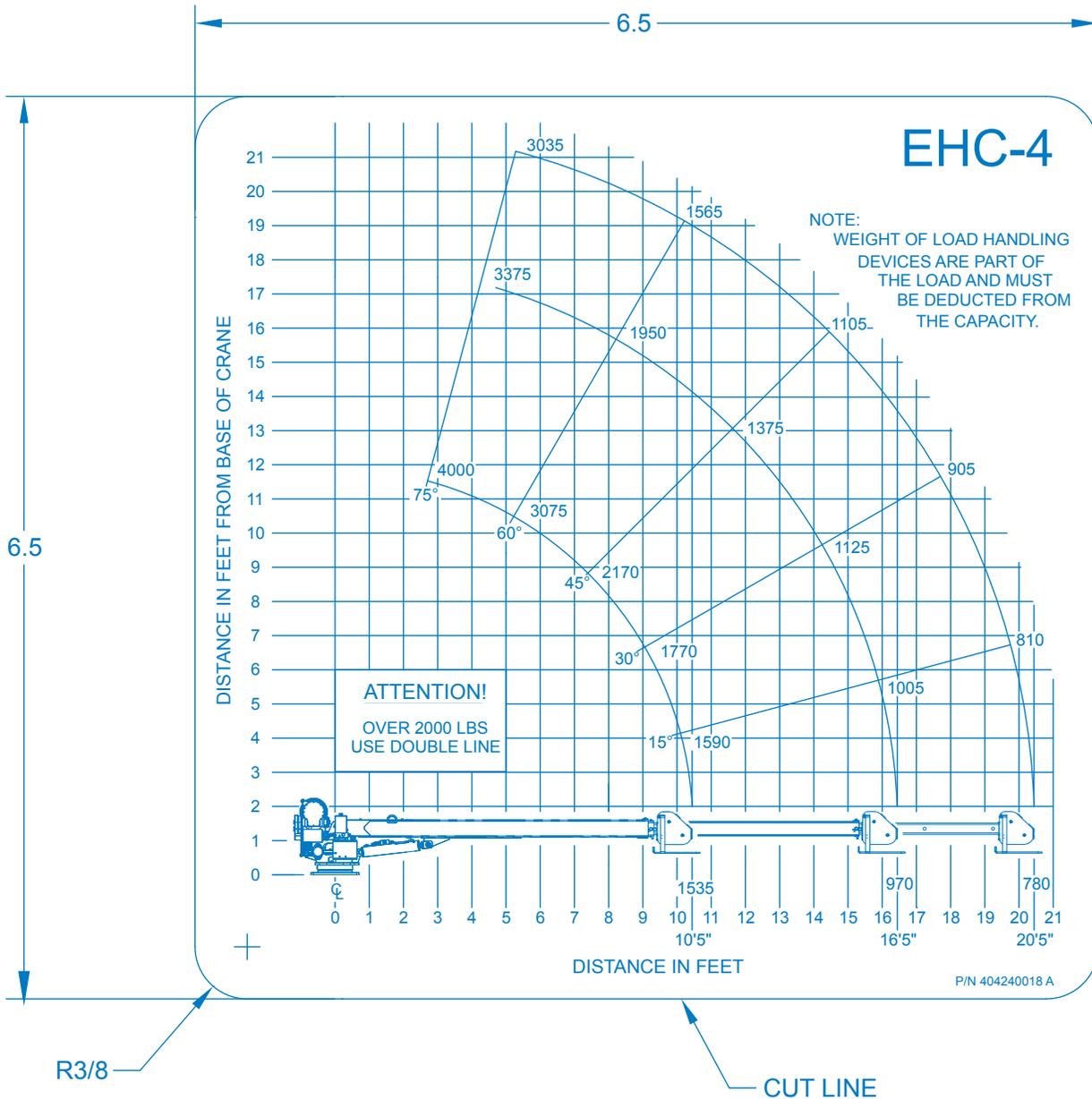
3.6 ELECTRICAL SYSTEM REQUIREMENTS

- Voltage: 12 VDC
- Alternator: 75 amps minimum
- Battery: 130 minute reserve capacity minimum. Maintenance Type battery

3.7 ROTATION

- 360° continuous rotation

4 Load Chart



⚠ WARNING

All load ratings are based on crane capacity, not the vehicle stability. When lifting a heavy load, the weight can create enough tipping moment to overturn the vehicle. **DO NOT USE** the overload shutdown device to determine maximum rated loads, if the crane is equipped with this type of device.

⚠ WARNING

Always comply with load chart capacities.

Qualifications and Operating Practices 5

THIS IS ONLY AN OVERVIEW OF ALL APPLICABLE QUALIFICATION REQUIREMENTS. REFERENCE ASME B30.5A AND OSHA 1910.180 FOR COMPLETE QUALIFICATION REQUIREMENTS.

5.1 OPERATORS

1. Crane operation shall be limited to personnel with the following minimum qualifications:
 - A. Designated persons.
 - B. Trainees under the direct supervision of a designated person.
 - C. Maintenance and test personnel (when it is necessary in the performance of their duties).
 - D. Inspectors (crane).
2. No one other than the personnel specified above shall enter the operating area of a crane with the exception of persons such as oilers, supervisors, and those specified persons authorized by supervisors whose duties require them to do so and then only in the performance of their duties and with the knowledge of the operator or other persons.

5.2 QUALIFICATIONS FOR OPERATORS

1. Operators shall be required by the employer to pass a practical operating examination.
2. Qualifications shall be limited to the specific type of equipment for which examined.
3. Operators and operator trainees shall meet the following physical qualifications:
 - A. Vision of at least 20/30 Snellen in one eye and 20/50 in the other, with or without corrective lenses.
 - B. Ability to distinguish colors, regardless of position, if color differentiation is required for operation.
 - C. Adequate hearing with or without hearing aid for the specific operation.
4. Evidence of physical defects or emotional instability, which render a hazard to operator or others, which in the opinion of the examiner could interfere with the operator's performance, may be sufficient cause for disqualification. In such cases, specialized clinical or medical judgment and tests may be required.
5. Evidence that operator is subject to seizures or loss of physical control shall be sufficient reason for disqualification. Specialized medical Tests may be required to determine these conditions.
6. Operators and operator trainees should have normal depth perception, coordination, and no tendencies to dizziness or similar undesirable characteristics.
7. In addition to the above listed requirements, the operator shall:
 - A. Demonstrate the ability to comprehend and interpret all labels, operator's manuals, safety codes, and other information pertinent to correct crane operations.
 - B. Possess the knowledge of emergency procedures and implement it.
 - C. Demonstrate to the employer the ability to operate the specific type of equipment.
 - D. Be familiar with the applicable safety regulations.
 - E. Understand the operating procedures as outlined by the Auto Crane.
 - F. Be thoroughly familiar with the crane and its control functions.

5 Qualifications and Operating Practices

5.3 CONDUCT OF OPERATORS

1. The operator shall not engage in any practice, which will divert his attention while actually operating the crane.
2. Each operator shall be responsible for those operations under the operator's direct control. Whenever there is any doubt as to safety, the operator shall consult with the supervisor before handling the loads.
3. The operator should not leave a suspended load unattended unless specific precautions have been instituted and are in place.
4. If there is a warning sign on the switch or engine starting controls, the operator shall not close the switch or start the engine until the warning sign has been removed by the appointed person.
5. Before closing the switch or starting the engine, the operator shall see that all controls are in the "OFF" or neutral position and all personnel are in the clear.
6. If power fails during operation, the operator shall:
 - A. Move power controls to the "OFF" or neutral position.
 - B. Land the suspended load and boom, if practical.
7. The operator shall be familiar with the equipment and its proper care. If adjustments or repairs are necessary, the operator shall report the same promptly to the appointed person, and shall also notify the next operator.
8. The operator at the start of each shift shall test all controls. If any controls do not operate properly, they shall be adjusted or repaired before operations are begun.
9. Stabilizers shall be visible to the operator while extending or setting unless a signal person assists operator.

5.4 OPERATING PRACTICES/HANDLING THE LOAD



CAUTION

Never use two cranes to support a load too large for either crane.

1. Size of load.
 - A. No crane shall be loaded beyond the rated load except for test purposes
 - B. The load to be lifted is to be within the rated load of the crane and its existing configuration.
 - C. Know the weight of the rigging and deduct from the load rating to prevent overloading the crane.
 - D. When loads that are not accurately known are to be lifted, the person responsible for the job shall determine the weight of the load does not exceed the crane rated load at the radius at which the load is to be lifted.
2. Attaching the load.
 - A. Ensure the load is properly attached to the hook by means of slings or other devices of sufficient capacity.
 - B. Ensure the vehicle is in a level position when loading or unloading.
 - C. Hoist rope shall not be wrapped around the load.
3. The operator shall determine that:
 - A. The crane is level and, where necessary, the vehicle/carrier is blocked properly.
 - B. The load is well secured and balanced in the sling or lifting device before it is lifted more than a few inches.
 - C. Means are provided to hold the vehicle stationary while operating the crane.
 - D. Before starting to lift, the hook shall be positioned over the load in such a manner as to minimize swinging.
4. During lifting care shall be taken that:
 - A. There is no sudden acceleration or deceleration of the moving load.

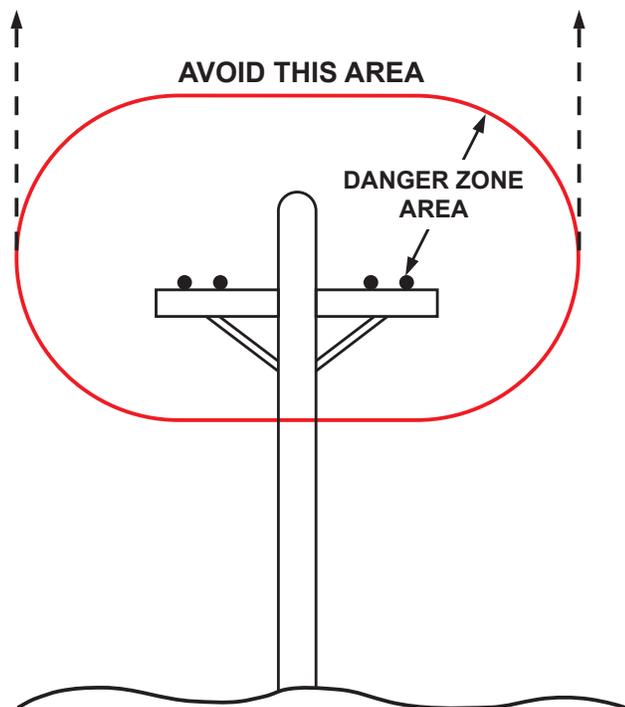
Qualifications and Operating Practices 5

- B. When rotating the crane, sudden starts and stops shall be avoided. Rotational speed shall be such that the load does not swing out beyond the radius at which it can be controlled.
- C. Load, boom or other parts of the crane do not contact any obstruction.
- D. Cranes shall not be used for dragging loads sideways.
- E. This standard recognizes that telescopic boom cranes are designed and intended for handling materials. They do not meet personnel lift or elevator requirements. Therefore, no lifting, lowering, swinging or traveling shall be done while a person is on the hook or load. Hook attached suspended work platforms (baskets) shall not be used with cranes covered by this standard.
- F. The operator should avoid carrying loads over people.
- 5. When the crane is so equipped, the stabilizers shall be fully extended and set. Blocking under stabilizers shall meet the requirements as follows:
 - A. Strong enough to prevent crushing.
 - B. Of such thickness, width and length as to completely support the stabilizer pad.
 - C. Firm footing under all tires, or individual stabilizer pads should be level. Where such a footing is not otherwise supplied, timbers, cribbing, or other structural members to distribute the load so as to not exceed allowable bearing capacity or the underlying material should provide it.
- 6. In transit, the boom shall be carried in stowed position.
- 7. The crane shall not be transported with a load on the hook.

5.5 OPERATING NEAR ELECTRICAL POWER LINES



Never operate the crane near electrical lines or in the danger zone area.



5 Qualifications and Operating Practices

1. Do not place any part of the crane or load inside the Danger Zone.

EXCEPTIONS:

- A. The Danger Zone may be entered after confirmation by an appointed person the electrical distribution and transmission lines are de-energized and visibly grounded at the point work.
- B. The Danger Zone may be entered if insulating barriers are erected to prevent physical contact with the lines. These can't be a part of or attached to the crane.

2. For the minimum safe distance between electrical lines and any part of the crane or load (including handling appendages), or while in the transit with the boom stowed, see Table 1. Safe Operating Distance.

3. Exercise caution when working near overhead lines. They can move horizontally and vertically due to wind, shifting the location of the Danger Zone.

4. Assign a qualified, signal person observe the clearance and warn the crane operator before approaching the Safe Operating Distance limits.

- A. Treat all overhead wires as energized until the person or utility owning the line verifies it is not energized.
- B. Exceptions ensuring equivalent protection are allowed, if approved by the administrative or regulatory authority in writing.
- C. Install durable signs at the operator's station and on the outside of the crane, warning that electrocution or serious bodily injury may occur if the Table 1. Safe Operating Distance limits aren't adhered to.

| Safe Operating Distance for Cranes Near Electrical Lines | | |
|---|----------------------------|---------|
| When operating near high voltage power lines | | |
| Normal Voltage, kV - (phase to phase) | Minimum Required Clearance | |
| | Ft. | (m) |
| 0 - 50 | 10 | (3.5) |
| 50 - 200 | 15 | (4.6) |
| 200 - 350 | 20 | (6.1) |
| 350 - 500 | 25 | (7.62) |
| 500 - 750 | 35 | (10.67) |
| 750 - 1000 | 45 | (13.72) |
| When in transit with no load and boom stowed | | |
| 0 - 0.75 | 4 | (1.22) |
| 0.75 - 50 | 6 | (1.83) |
| 50 - 345 | 10 | (3.83) |
| 345 - 750 | 16 | (4.87) |
| 750 - 1000 | 20 | (6.1) |

Qualifications and Operating Practices 5

5.6 PREPARING THE CRANE FOR OPERATION

1. Ensure the manual has been thoroughly read by all crane operating and maintenance personnel and supervisors.
2. Perform a routine inspection of the crane before operation each day. Correct any defects immediately.
3. At the job site, position the vehicle so the crane can reach the load within the rated capacity (center line of rotation to hoist hook).
4. Keep the vehicle as level as possible during operation.

NOTICE

At a 10° slope, all crane functions are limited to 50% speed. At a 15° slope, all crane functions are disabled.

5. Allow the vehicle engine to warm up before operation.
6. For Auto Crane units using only electric operation:
 - A. Engage the emergency brake.
 - B. Leave the ignition on with the transmission in neutral (or park for automatic transmissions).
 - C. Activate any crane power switches.
7. For Auto Crane units using electric and hydraulic operation:
 - A. Engage the emergency brake.
 - B. Place the transmission in neutral.
 - C. Press the clutch in.
 - D. Activate PTO (Power Take Off).
 - E. Release the clutch.
 - F. Allow sufficient time for the hydraulic fluid to warm up.
 - G. Set the throttle control to the proper engine speed.
8. For all outrigger usage:
 - A. Always extend the outriggers from the vehicle to the ground before crane operation. Ensure they are firmly positioned on solid ground.
 - B. Stand clear of outriggers while being extended.
 - C. If a curb or other object prevents the outrigger from being fully extended, shorten the bearing or fulcrum point and reduce the maximum load accordingly.
 - D. If an outrigger will not reach the ground because of holes or grades, block up the outrigger pad to provide level and firm support to the vehicle.
 - E. If working in soft ground, use wide pads under the outrigger feet to prevent sinking.
 - F. Always store the outriggers before transportation.
 - i. For Auto Crane units with Manual Outriggers:
 1. Pull the lock pins to release the jackleg or drop down outrigger. Move to the outermost lock position.
 2. Ensure lock pins are reinstalled properly.
 3. Lower the Outrigger pad to firm ground and adjust the foot to remove slack.
 - ii. For Auto Crane units with Hydraulic Outriggers:
 1. Shift the diverter valve to the Outrigger position.
 2. Extend the Outriggers to their horizontal limit.
 3. Extend the Outriggers vertically until they make solid contact with the ground with the ground and the truck is approximately level side-to-side.
 4. With the Outriggers properly positioned, return the diverter valve to the Crane position.

5 Qualifications and Operating Practices

9. Remove the remote control from the cab or storage area. Power the remote control on. Detach the hook from the dead man.
10. The crane is now ready for operation.

DURING OPERATION

1. Always boom up before rotating so the boom will clear the boom support.
2. Always maintain clearance between the boom crown and the traveling block or hook hoist during boom extension. Always observe all relevant safe policies and procedures during crane operation.
4. Always use slow and smooth movements with the crane to avoid causing the load to swing like a pendulum.

AFTER OPERATION

1. After completing the lifting operations, return the boom to the stowed position on the boom support.
2. Replace remote control to its storage location.
3. Return the Outriggers to the stowed position. Ensure they are pinned in place or jack legs are returned to the storage compartment.
4. Always store the crane in its stowed position for transportation.
5. Release the throttle control, press the clutch in, and disengage the PTO. Deactivate any crane power switches.
6. Check vehicle surroundings before moving.
7. Record any unusual occurrence during crane operation which may indicate required maintenance or repair.

This section describes the general operation for cranes with the NEXSTAR III control system.

WARNING

Before operating the Remote Control, read and understand all safety information in this manual, any manual supplements, and any applicable local, state, or federal rules and regulations.

WARNING

Never drive with a load suspended from the crane.

WARNING

Ensure personnel and objects are clear of the crane path during operation. Do not move loads over personnel.

6.1 GENERAL

Radio controlled equipment operates in several directions. Frequently there are other pieces of equipment and personnel in close proximity. The operator must exercise extreme caution at all times.

Only properly trained operators should operate the radio controlled equipment. This includes knowing and following all applicable operating and maintenance manuals, safety procedures, regulatory requirements, and industry standards and codes.

6.2 REMOTE CONTROL UNIT

Never mechanically block the switches ON or OFF. When not in use, turn the Remote Control OFF. Always store the Remote Control in a secure space when not in use. Store spare Remote Controls in a secure space and only remove after the current Remote Control has been turned OFF, taken out of the service area, and secured. Before disposing of batteries, consult local and governmental regulatory requirements for instructions on proper disposal.

6.3 REMOTE CONTROL INITIALIZATION

After powering on the remote control, the LCD Display Screen turns on and will perform a self-test. During the self-test, the Nexstar III remote control scans for any switches, buttons, and joysticks are in the OFF position. If any switches, buttons, or joysticks are on, the failure displays on the Display Screen and the remote control powers down.

After a successful self-test, the Nexstar III remote control will enter the Normal Operating Mode.

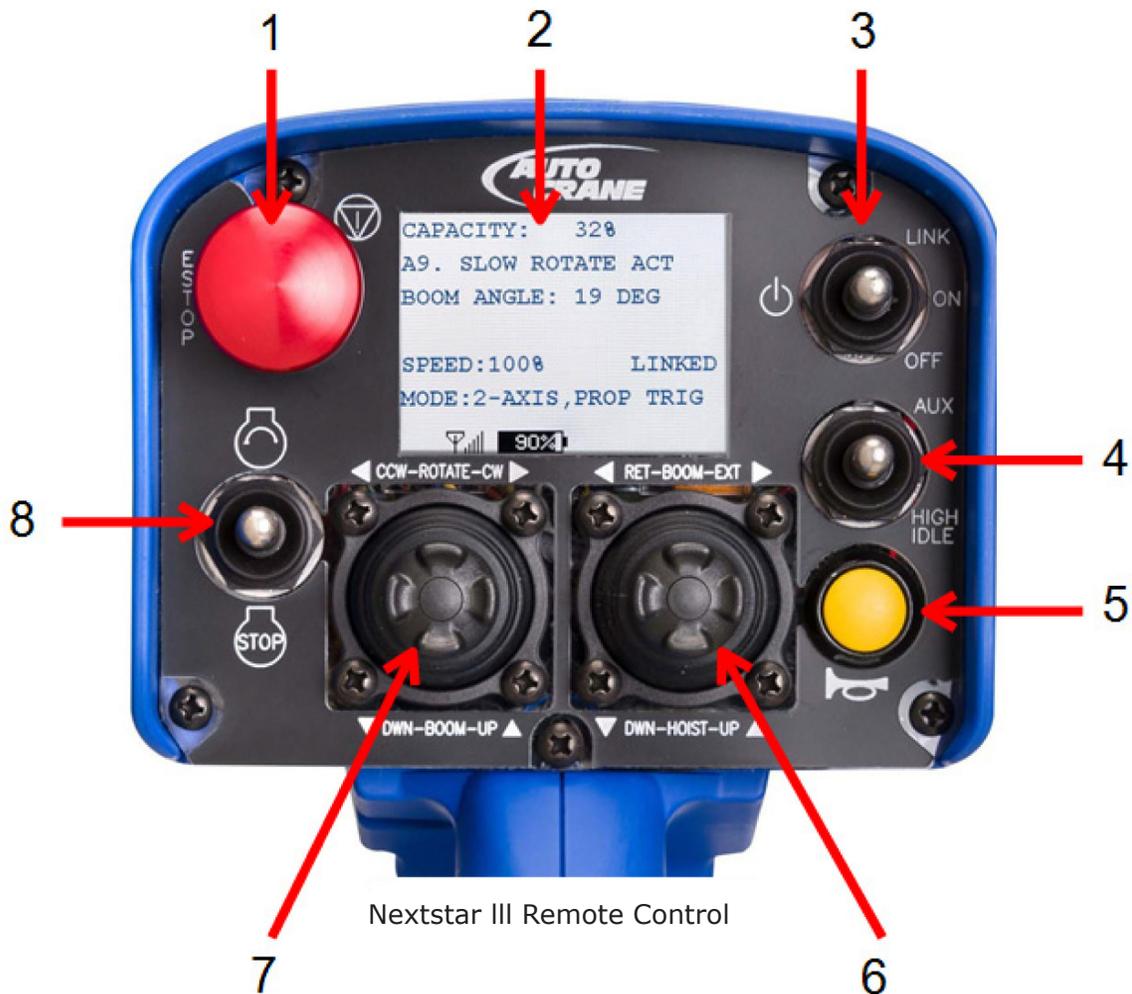
6.4 PRE-OPERATION TEST

Before operating the crane, or when a new operator takes control of the equipment, operators should perform the following checks of the equipment before making a lift:

- Test all warning devices.
- Test all functions.
- Test the Remote Control E-Stop function.

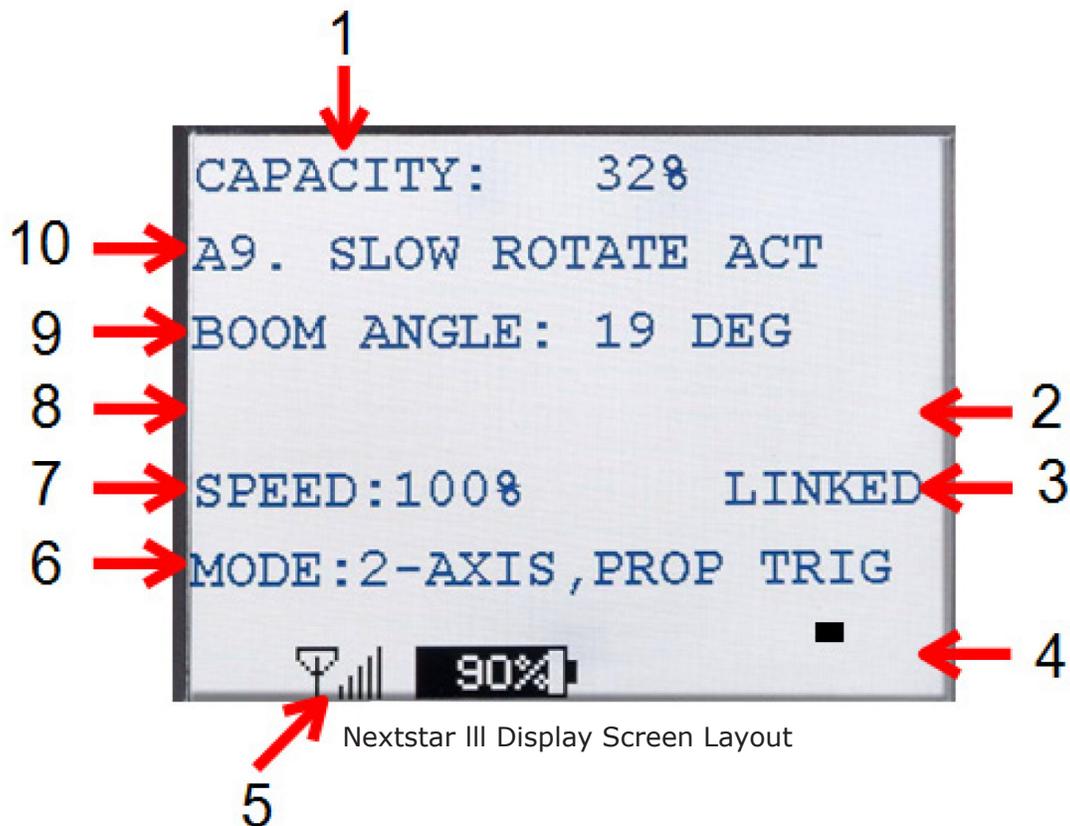
6 NexStar III Operation

6.5 REMOTE CONTROL LAYOUT



1. Emergency Stop Button – Push to activate. Pull to release. When activated the emergency stop button stops all outputs from the receiver.
2. Display Screen – LCD screen that displays many crane operating parameters. See Figure 4.
3. On/Off/Link Switch – Turns the Remote control on and off. Press and release the switch up to link the remote control to the truck. “Link” the remote control to the truck every time it is turned on. Press and hold the switch up to access the speed and mode selection screen.
4. High Idle/Aux Switch – Press the toggle down to activate the high idle on the vehicle. Aux activates an optional feature.
5. Horn Button – Activates the horn on the vehicle.
6. Right Joystick – Press the joystick up to raise the hook. Press the joystick down to lower the hook. Press the joystick right to extend the boom and left to retract the boom.
7. Left Joystick – Press the joystick up to raise the boom. Press the joystick down to lower the boom. Press the joystick right to rotate the boom clockwise. Press the joystick left to rotate the boom counterclockwise.
8. Start/Stop Switch – Press the switch up to start the engine of the vehicle. Press the switch down to turn off the engine of the vehicle.

6.6 DISPLAY SCREEN LAYOUT



1. Capacity – The current load on the boom as a percentage of total capacity. The unloaded value of the boom may be higher than 0% due to the boom weight beyond the retracted position.
2. Aux – AUX will display on the screen when active.
3. Communication Status – LINKED will display when the remote control is communicating with the crane.
4. Watchdog Timer – The black dot should always be moving in a diagonal. If the timer stops, contact your Auto Crane representative.
5. Signal Strength and Battery Life – Displays the signal strength coming from the crane. The approximate range is 300 ft. The battery displays the percent remote control battery life remaining.
6. Mode – Displays the current mode selected.
7. Max Speed Setting – Displays the current max speed setting.
8. High Idle – HIGH IDLE will display when activated.
9. Boom Angle – Displays the current boom angle in degrees.
10. Crane Status – Displays the current status of the crane. Alarms will be displayed here.

6 NexStar III Operation

SPEED AND MODE SELECTION

6.7 SPEED SELECTION

1. Press and hold the Link Switch in the up position.
2. While holding the Link Switch in the up position:
 - A. Move the Left Joystick up to increase the max speed.
 - B. Move the Left Joystick down to decrease the max speed.
3. Release the Link Switch when the desired speed is selected.

A slower speed setting decreases the maximum speed of the controls and allows more precise control of the load. The speed percentage on the screen shows the current speed setting of the remote control.

6.8 MODE SELECTION

1. Press and hold the link switch in the up position. While holding the link switch in the up position, press the right joystick up or down to place the remote control in the desired setting.
3. Release the Link Switch when the desired mode is selected.

6.9 MODE DESCRIPTION

In 1-AXIS operation, once the joystick is moved in the direction of the desired function, the other functions are locked out until the joystick returns to the center position. For example, if you are booming up, you cannot rotate at the same time. But one function of the other joystick will be available to use.

In 2-AXIS operation, each joystick can perform two functions simultaneously.

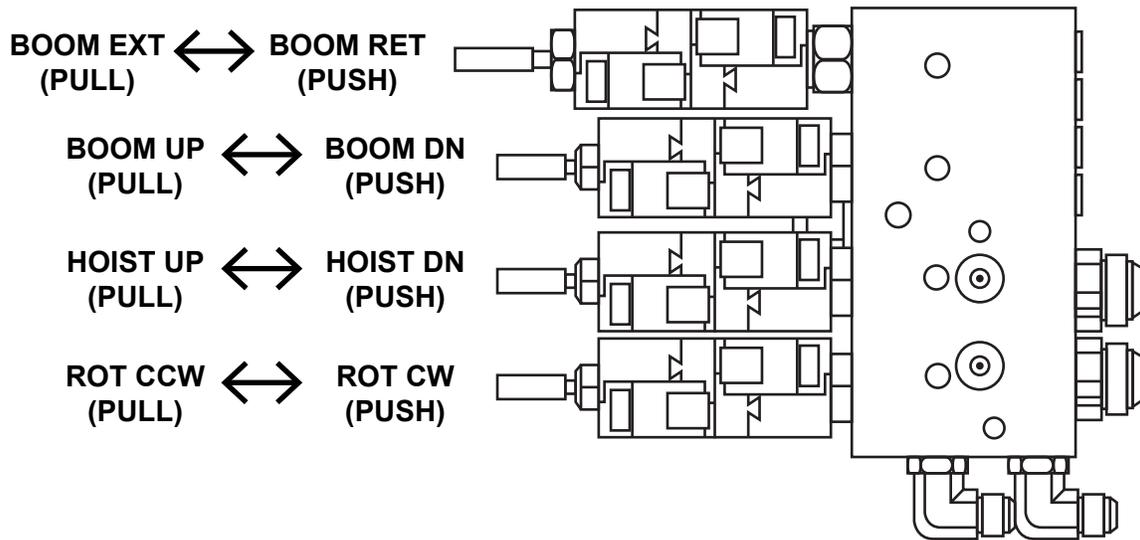
1-AXIS, TRIGGER PROP – Allows only one function to operate on each joystick. The joysticks are on-off and only need to be moved in the direction of the desired function. The speed control is located in the trigger. The more the trigger is pulled, the faster the function will operate.

2-AXIS, TRIGGER PROP – Allows two functions to operator on each joystick. The joysticks are on-off and only need to be moved in the direction of the desired function. The speed control is located in the trigger. The more the trigger is pulled, the faster the function will operate.

1-AXIS, TRIGGER EN – Allows only one function to operate on each joystick. The speed is controlled by the joystick. The more the joystick is moved in the direction of the desired function, the faster the function will operate.

2-AXIS, TRIGGER EN – Allows two functions to operate on each joystick. The speed is controlled by the joystick. The more the joystick is moved in the direction of the desired function, the faster the function will operate.

6.10 OPERATION—VALVE OVERRIDE



1. Push the unloader valve (ULV) red button. This will send hydraulic fluid to the valve block.
2. Select the desired function.
3. Close the gap between the collar and the end on the override button.
4. Push or pull the override button for the desired direction of movement. The farther the button is pressed or pulled, the faster the function will operate.
5. When the manual operation is complete, release the ULV to its original position.
6. Ensure the collar is returned to the locked position. If not, the function may move on its own.

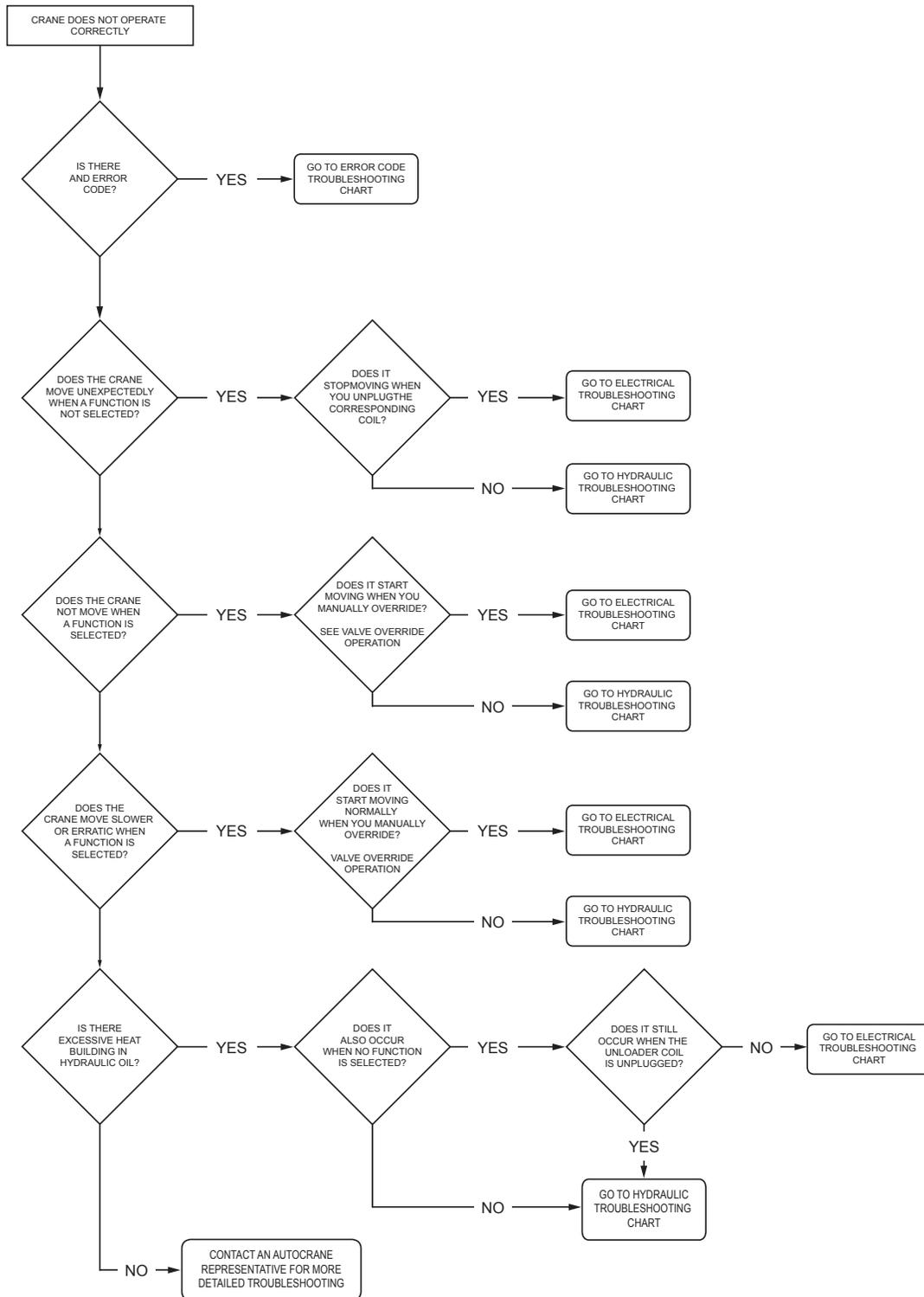
6 NexStar III Operation

6.11 Transmitter Layout

| LABEL | DIRECTION | FUNCTION | GRAPHIC | DESCRIPTION |
|-------|-----------|-------------------------------|---|---|
| SW1 | Up | Engine Start |  | |
| | Down | Engine Stop |  | Sends a 12VDC signal from crane to stop vehicle |
| SW2 | Up | Boom Up |  | Moving the joystick up activates boom up function |
| | Down | Boom Down |  | Moving the joystick down activates boom down function |
| | Left | Rotate CCW |  | Moving the joystick to the left activates counter-clockwise rotation function |
| | Right | Rotate CW |  | Moving the joystick to the right activates clockwise rotation function |
| SW3 | Up | Hoist Up |  | Moving the joystick up activates hoist up function |
| | Down | Hoist Down |  | Moving the joystick down activates hoist down function |
| | Left | Boom Retract |  | Moving the joystick to the left activates the boom retract function |
| | Right | Boom Extend |  | Moving the joystick to the right activates the boom extend function |
| SW4 | Up | Auxiliary | AUX | Sends a Latching signal that activates an auxiliary output to operate an external component (i.e. compressor, worklights) |
| | Down | High Idle | HIGH IDLE | Sends a latching signal that activates High Idle on Vehicle |
| SW5 | Up | Link, Speed & Mode Adjustment | Link | Links transmitter to crane (Press & Release) Access to the Speed & Mode Selection Screen (Press & Hold) |
| | Center | On |  | Transmitter is on* |
| | Down | Off | Off | Turns off Transmitter |
| PB1 | In | E-stop Activated |  | Activates Estop |
| | Out | E-stop Deactivated | | Deactivates Estop |
| PB2 | In | Horn |  | Momentarily activates an audible signal device |

* Although switch maybe in the "On" position, it does not necessarily mean there is communication between the transmitter and the crane. The transmitter goes to sleep after a certain amount of time. If the unit goes to sleep, the transmitter will need to be turned back on. Reference the steps under "Turning On Transmitter" if this occurs.

7.1 TROUBLESHOOTING FLOW CHART



7 NexStar III Troubleshooting

7.2 NEXSTAR III REMOTE CONTROL TROUBLESHOOTING TABLE

| Problem | Possible Reason | Action |
|--|---|--|
| REMOTE CONTROL WILL NOT TURN ON | Remote control emergency stop switch is down or pressed. | Ensure the E-Stop switch is pulled up. |
| | Batteries are dead or installed backwards; battery holder is damaged. | Ensure all switches, buttons, and joysticks are in the off position. |
| | Remote control momentarily powers-up and displays an error code prior to turning off. | Ensure all switches, buttons, and joysticks are in the off position. |
| REMOTE CONTROL WILL NOT RESPOND WITH THE RECEIVER | Incorrect system RF channel. | Ensure the remote control and the receiver are set to the same RF channel. |
| | Incorrect system access code. | Ensure the tether cable is installed and secured correctly. Inspect the tether cable and connectors for damage. |
| | System out of range. | Ensure the startup procedure is initiated within 300 ft. from the receiver. Ensure the signal strength indicator level is greater than 0%. |
| REMOTE CONTROL WILL NOT TURN ON IN TETHER MODE | The connecting tether cable is not installed, installed improperly, or is damaged. | Ensure the tether cable is installed and secured correctly. Inspect the tether cable and connectors for damage. |
| | Remote control is failing switch scan. | Ensure all switches, buttons, and joysticks are in the off position. |
| | Remote control emergency stop switch is pressed down. | Ensure the E-Stop switch is pulled up. |
| REMOTE CONTROL WILL NOT RESPOND WITH RECEIVER IN TETHER MODE | System not in tether mode. | Ensure the startup procedure is initiated with the tether cable attached. |
| | The tether cable or connectors are damaged. | Inspect the tether cable and connectors for damage. |
| REMOTE CONTROL WILL NOT RESPOND WITH THE RECEIVER IN WIRELESS MODE | System not in wireless mode. | Ensure the startup procedure is initiated within 300 ft. from the receiver. Ensure the signal strength indicator level is greater 0%. |

7.3 ERROR CODE TABLE

| ERROR CODE | CAUSE | DIAGNOSIS | SOLUTION |
|-------------------------------|--|--|---|
| S0. E-STOP ACTIVE | E-STOP ACTIVATED | ALL OUTPUTS WILL BE DISABLED | DEACTIVATE E-STOP PER OPERATION PROCEDURES. |
| S1. CAN RX TO | RECEPTION OF A CAN MESSAGE TIMED OUT | ALL OUTPUTS WILL BE DISABLED | DETERMINE WHY MESSAGE(S) IS (ARE) NOT BEING RECEIVED. WHEN PROBLEM IS CORRECTED THE ALARM WILL CLEAR. |
| S2. TEMP OUT OF RANGE | OUTSIDE OPERATING TEMPERATURE -40C TO 85C | ALL OUTPUTS WILL BE DISABLED | GET TEMPERATURE INTO ACCEPTABLE RANGE. ALARM WILL CLEAR AFTER 1 MINUTE. |
| S16-S31 OUT X OVERCURRENT ERR | WHEN THE OUTPUT WAS ACTIVATED, A CURRENT OF OVER 3.5 A WAS BEING DRAWN | THAT OUTPUT IS DISABLED | CYCLE POWER TO RECEIVER. IF PROBLEM CONTINUES, FIND WHAT CAUSED OVER CURRENT DRAW AND CYCLE POWER. |
| S32-S47 OUT X +VB SHORT | WHEN THE OUTPUT WAS SUPPOSED TO BE A GROUND IT HAD A POSITIVE VOLTAGE | THAT OUTPUT IS DISABLED | DETERMINE THE CAUSE OF THE SHORT, FIX THE CAUSE, AND CYCLE POWER TO RECEIVER. |
| S32-S47 OUT X -VB SHORT | WHEN THE OUTPUT WAS SUPPOSED TO BE A POSITIVE VOLTAGE IT HAD A GROUND | THAT OUTPUT IS DISABLED | DETERMINE THE CAUSE OF THE SHORT, FIX THE CAUSE, AND CYCLE POWER TO THE RECEIVER. |
| A1. BOOM PSI LOW | LIFT CYLINDER PRESSURE BELOW 80 PSI | DISABLES ALL FUNCTIONS EXCEPT BOOM UP AND HOIST DOWN | HOIST DOWN LOAD IF APPLICABLE, AND RAISE BOOM OFF ANY SUPPORTS. ALARM WILL CLEAR ONCE PRESSURE IN CYLINDER IS RESTORED. |
| A2. CW LIMIT | CRANE HAS REACHED THE LIMIT OF ROTATION IN THE CW DIRECTION | DISABLES CLOCKWISE ROTATION | ROTATE CCW TO CLEAR ERROR. ONCE SWITCH IS DEACTIVATED THE ALARM WILL CLEAR. |
| A3. CCW LIMIT | CRANE HAS REACHED THE LIMIT OF ROTATION IN THE CCW DIRECTION | DISABLES COUNTER-CLOCKWISE ROTATION | ROTATE CW TO CLEAR ERROR. ONCE SWITCH IS DEACTIVATED THE ALARM WILL CLEAR. |
| A4. TRK TILT WARN | TRUCK ANGLE EXCEEDS 5.7 DEGREES OR 10% SLOPE | ALL FUNCTIONS WILL ONLY OPERATE AT 50% OF SPEED | MOVE VEHICLE TO LEVEL GROUND |
| A5. TRK TILT ALARM | TRACK ANGLE EXCEEDS 8.5 DEGREES OR 15% SLOPE | ALL FUNCTIONS ARE DISABLED | MOVE VEHICLE TO LEVEL GROUND |
| A6. ANTI 2-BLOCK | ANTI 2-BLOCK IS ACTIVATED. TRAVELING BLOCK HAS COME INTO CONTACT WITH BOOM | DISABLES BOOM DOWN, EXTEND, AND HOIST UP | MOVE LOAD AWAY FROM BOOM BY EITHER RETRACTING, HOISTING DOWN, OR BOOMING UP. IF THERE IS NO LOAD NEAR TIP OF BOOM CHECK FUNCTION OF THE BAIL WELDMENT. IT MUST COME INTO CONTACT WITH SWITCH PLUNGER UNDER NORMAL CONDITIONS. |
| A7. 90% LOAD WARN | REACHED 90% OF RATED CAPACITY | REDUCES SPEED OF ALL FUNCTIONS BY 50% | REDUCE LOAD TO CLEAR ALARM. |

7 NexStar III Troubleshooting

7.3 ERROR CODE TABLE

| ERROR CODE | CAUSE | EFFECT | SOLUTION |
|-----------------------|---|--|---|
| A8. 100% LOAD ALARM | REACHED 100% OF RATED CAPACITY | DISABLES BOOM DOWN, EXTEND, AND HOIST UP | REDUCE LOAD BY EITHER RETRACTING, BOOMING UP, OR HOISTING DOWN. |
| A9. SLOW ROTATE ACT | LIFT CYLINDER HAS EXCEEDED 600 PSI | REDUCES ROTATE FUNCTIONS BY 50% | THIS IS A SAFETY FEATURE THAT PREVENTS EXCESSIVE SWINGING OF HEAVY LOADS. WILL RESET WHEN LOAD DECREASES AND FUNCTION IS DEACTIVATED. |
| A10. BOOM SENSOR ERR | BOOM ANGLE SENSOR FAILED | ALL FUNCTIONS ARE REDUCED BY 50% | CHECK CONNECTIONS TO BOOM ANGLE SENSOR. |
| A11. BOOM ANGLE RANGE | ANGLE SENSOR IS OUT OF RANGE | OPERATES NORMALLY | BOOM ANGLE SENSOR IS MOUNTED INCORRECTLY. CHECK MOUNTING. THE ARROW SHOULD BE FACING THE TIP OF THE CRANE. |
| A12. BOOM PT ERR | BOOM PRESSURE TRANSDUCER ERROR | ALL FUNCTIONS ARE DISABLED EXCEPT BOOM DOWN & HOIST DOWN | CHECK CONNECTIONS TO PRESSURE TRANSDUCER LOCATED ON LIFT CYLINDER. |
| A13 DIRTY FILTER | FILTER IS DIRTY IF TEMPERATURE OF OIL IS AT LEAST 100 DEGREES | OPERATES NORMALLY | REPLACE FILTER |
| A14 ADDRESS TAG ERROR | CONTROLLER NOT RECOGNIZING ADDRESS TAG | ALL OUTPUTS ARE DISABLED | CHECK CONNECTION AT ADDRESS TAG. CHECK FOR WATER IN CONNECTION. DRY OUT IF REQUIRED. |

7.4 ELECTRICAL TROUBLESHOOTING TABLE

| ERROR CODE | CAUSE | EFFECT | SOLUTION |
|------------------------------------|---------------------------|---|--|
| CRANE MOVES UNEXPECTEDLY | JAMMED TRANSMITTER BUTTON | ACTIVATE E-STOP TO SEE IF MOVEMENT STOPS. | VERIFY THAT NOTHING WAS ACTIVATING THE FUNCTION AT THE TIME OF MOVEMENT. IF IT WAS NOT ACTIVATED THEN REPLACE TRANSMITTER. |
| | SHORT IN HARNESS | UNEXPECTED MOVEMENT WOULD ONLY OCCUR WHEN MULTI-FUNCTIONING. UNPLUG COIL TO SEE IF MOVEMENT STOPS. CHECK AMPERAGE TO COIL USING MULTI-METER IN LINE WITH COIL. IT SHOULD BE NO MORE THAN 100MA. | TRACE WIRE BACK TO RECEIVER. VERIFY NO DAMAGE TO THE WIRE. CHECK CONNECTORS, THEY SHOULD BE CLEAR OF DEBRIS AND WATER. |
| | RECEIVER LOCKED UP | BOTTOM RIGHT CORNER IS A CIRCLE WITH AN ARROW. THIS SHOULD BE ROTATING AT ALL TIMES. | IF THE ARROW STOPS ROTATING, SHUT POWER OFF TO THE CRANE. LET SET OF A COUPLE OF MINUTES AND TURN POWER BACK ON. IF THIS PROBLEM PERSISTS CONTACT TECHNICAL SUPPORT. |
| NO FUNCTION OPERATES ON THE CRANE. | TRANSMITTER TURNED OFF | NSII- THE STATUS LIGHT ON THE TRANSMITTER SHOULD BE FLASHING GREEN WHEN NO BUTTON IS DEPRESSED. NSIII- LCD SCREEN IS ON. | TURN ON TRANSMITTER. REFERENCE OPERATION SECTION OF MANUAL |
| | E-STOP ACTIVE | CHECK LCD SCREEN. YOU WOULD HAVE AN ERROR STATING E-STOP IS ACTIVE. | TURN ON TRANSMITTER. REFERENCE OPERATION SECTION OF MANUAL |
| | RECEIVER TURNED OFF | CHECK THE LCD SCREEN. IF IT IS BLANK, THE RECEIVER IS TURNED OFF. | CHECK MAIN POWER SWITCH LOCATED IN CRANE BOX DIRECTLY UNDER THE CRANE. |
| | LOW BATTERY | WHILE THE TRANSMITTER IS TURNED ON, CHECK THE LCD SCREEN ON RECEIVER. BATTERY INDICATOR SHOULD BE AT LEAST 10%. | REPLACE TRANSMITTER BATTERIES. NSII- REQUIRES (2) AA BATTERIES NSIII- REQUIRES (4) AA BATTERIES |
| | RECEIVER LOCKED UP | BOTTOM RIGHT CORNER IS A CIRCLE WITH AN ARROW. THIS SHOULD BE ROTATING AT ALL TIMES. | IF THE ARROW STOPS ROTATING, SHUT POWER OFF TO THE CRANE. LET SET OF A COUPLE OF MINUTES AND TURN POWER BACK ON. IF THIS PROBLEM PERSISTS CONTACT TECHNICAL SUPPORT. |
| | TRUCK TILT ALARM ACTIVE | CHECK SCREEN FOR ERROR CODE. IT WOULD READ TRK TILT ALARM. | THIS ERROR OCCURS WHEN THE TRUCK ANGLE EXCEEDS A 15% SLOPE (8.5 DEGREES). RELOCATE THE TRUCK TO A FLATTER SURFACE. |
| | POWER UNIT NOT ACTIVATING | IF RECEIVER HAS POWER BUT THE POWER UNIT DOESN'T TURN ON WHEN A FUNCTION IS SELECTED. | CHECK POWER UNIT RELAY CHECK GROUNDING WIRE FROM RELAY TO PUMP CHECK MAIN GROUNDING WIRE FROM PUMP TO GROUNDING BOLT ON PEDESTAL. |

7 NexStar III Troubleshooting

7.4 ELECTRICAL TROUBLESHOOTING TABLE

| ERROR CODE | CAUSE | EFFECT | SOLUTION |
|--|--|---|---|
| THE FOLLOWING FUNCTIONS ARE INOPERABLE BOOM DOWN, EXTEND, HOIST UP | ANTI-2 BLOCK | CHECK SCREEN FOR ERROR CODE. IT WOULD READ ANTI-2 BLOCK ERROR. | VERIFY THAT THE TRAVELING BLOCK IS NOT IN CONTACT WITH BAIL. IF SO, HOIST DOWN AND CHECK FUNCTIONS AGAIN. INSPECT END OF BOOM TO VERIFY BAIL IS IN CONTACT WITH ANTI-2 BLOCK SWITCH. CHECK BAIL SPRING. CHECK CORD REEL & WIRE ON SIDE OF CRANE FOR DAMAGE. |
| | CRANE OVERLOAD | CHECK SCREEN FOR ERROR CODE. IT WOULD READ 100% OVERLOAD. | VERIFY LOAD ON CRANE DOES NOT EXCEED MOMENT RATING. REFERENCE LOAD CHART. TAP HOIST DOWN OR RETRACT FUNCTION TO RESET OVERLOAD. CHECK OPERATION AGAIN. |
| ALL FUNCTIONS ARE INOPERABLE EXCEPT BOOM DOWN AND HOIST DOWN | PRESSURE TRANSDUCER IS UNPLUGGED | CHECK LCD SCREEN. IT WOULD READ "BOOM PT ERROR" | VERIFY THAT PRESSURE TRANSDUCER LOCATED ON THE LIFT CYLINDER VALVE BLOCK IS PLUGGED INTO THE HARNESS. |
| CRANE ROTATES SLOWLY | SLOW ROTATE ACTIVATED | CHECK LCD SCREEN. IT WOULD READ "SLOW ROTATE ACT" | THIS IS A SAFETY FEATURE TO PREVENT GETTING THE LOAD INTO AN UNSAFE CONDITION (EXCESSIVE SWINGING). SLOW ROTATE WILL REMAIN ACTIVE UNTIL THE LOAD IS REMOVED AND THE ROTATION FUNCTION IS DESELECTED. |
| | CLOSE TO MAX CRANE LOAD | WHEN THE TRUCK IS TILTED AND UNDER HIGH LOAD A DECREASE IN SPEED IS POSSIBLE. | BRING LOAD IN CLOSER TO DECREASE THE LOAD |
| | ADEQUATE OPERATING CLEARANCES BETWEEN WORM GEAR AND WORM | ROTATION WILL SLOW AT A PARTICULAR POINT ON THE WORM GEAR. | SLIGHTLY LOOSEN BOLTS ATTACHING TAPERED BEARINGS TO PEDESTAL. TAP THE BEARING HOUSING USING A HAMMER AWAY FROM THE WORM GEAR. RETIGHTEN BOLTS. |

7.4 ELECTRICAL TROUBLESHOOTING TABLE

| ERROR CODE | CAUSE | EFFECT | SOLUTION |
|------------------------------|------------------------|--|---|
| ALL FUNCTIONS OPERATE SLOWLY | 90% OVERLOAD ACTIVATED | CRANE IS AT OR OVER 90% OF IT'S RATED CAPACITY | THIS IS A SAFETY FEATURE TO PREVENT GETTING INTO AN UNSAFE CONDITION (SUDDEN MOVEMENT OF HEAVY LOAD). 90% OVERLOAD WILL REMAIN ACTIVATED UNTIL LOAD IS DECREASED. |
| | TRUCK TILT WARNING | CRANE IS BETWEEN A 10% AND 15% SLOPE. CHECK LCD SCREEN FOR ERROR CODE, IT WOULD READ "TRK TILT WARN" | MOVE VEHICLE OR RAISE OUTRIGGER TO A MORE STABLE, LEVEL POSITION. |
| | LOW VOLTAGE | VOLTAGE WILL BE 10 VOLTS OR LOWER | VERIFY TRUCK IS RUNNING WHILE OPERATING CRANE. CHECK VEHICLE BATTERY FLUID LEVEL. CHECK FOR ADEQUATE WIRE SIZING FOR LENGTH AND AMPERAGE REQUIREMENTS |

7 NexStar III Troubleshooting

7.5 HYDRAULIC TROUBLESHOOTING TABLE

| ERROR CODE | CAUSE | EFFECT | SOLUTION |
|---------------------------------|--|--|--|
| CRANE MOVES UNEXPECTEDLY | JAMMED CARTRIDGE | TRY TO MANUALLY OVERRIDE VALVE IF UNABLE TO MOVE STEM. CARTRIDGE IS JAMMED. | REPLACE CARTRIDGE |
| | COUNTERBALANCE SET TOO LOW (BOOM-UP & BOOM-DN) | ADJUST THE COUNTER-BALANCE OUT TO SEE IF MOVEMENT STOPS. | CONTACT AUTO CRANE FOR PROPER SETTING OF COUNTERBALANCE. YOU MAY NEED TO REPLACE COUNTERBALANCE. |
| | CONTAMINATE IN CARTRIDGE | VALVE STICKS IN CERTAIN POSITIONS. | REFERENCE FOR CLEANING PROCEDURE. |
| NO FUNCTION OPERATES ON CRANE | HYDRAULIC TANK IS LOW OR EMPTY | VISUALLY INSPECT THE HYDRAULIC OIL LEVEL IN THE TANK. | FILL TANK TO PROPER LEVEL. |
| | VEHICLE IS NOT RUNNING | VERIFY ENGINE IS RUNNING. | START VEHICLE. |
| ALL FUNCTIONS OPERATE SLOWLY | CONTAMINATION IN CARTRIDGES | VISUALLY INSPECT THE CARTRIDGE FOR CLOGGED PORTS. | REFERENCE FOR CLEANING PROCEDURE. |
| EXCESSIVE HEAT DURING OPERATION | OPERATION TIME | CRANE OPERATION IS GENERALLY DESIGNED FOR INTERMITTENT DUTY (7 MIN. LOADED / 30 MIN. COOL DOWN). | REDUCE USE OF CRANE TO ALLOW OIL TO COOL. |

8.1 INSPECTION REQUIREMENTS

NOTICE

Reference ASME B30.5a and OSHA 1910.180 for complete inspection requirements.



WARNING

All inspections shall be performed by the designated personnel only.

8.2 INSPECTION CLASSIFICATION

1. Initial Inspection
 - A. Prior to initial use, all new, altered, modified, or extensively repaired cranes shall be inspected by a designated person to ensure compliance with provisions of this standard.
2. Regular Inspection
 - A. Inspection procedures for cranes in regular service are divided into two general classifications based upon the intervals at which the inspection should be performed. The intervals in turn are dependent upon the nature of the components of the crane and the degree of their exposure to wear, deterioration, or malfunction. The two general classification are herein designated as "frequent" and "periodic" with respective intervals as defined below:
 - i. Frequent Inspection – daily or before each use
 - ii. Periodic Inspection – one to twelve-month intervals or as specifically recommended by the manufacturer or qualified person.

8.3 FREQUENT INSPECTION

Inspections should also occur during operation for any deficiencies that might appear between regular inspections. Any deficiencies, such as those listed below, shall be carefully examined and a determination made as to whether they constitute a hazard:

1. Inspect control mechanisms for maladjustment that interferes with proper operation.
2. Inspect control mechanisms for excessive wear of components and contamination by lubricants or other foreign matter.
3. Inspect safety devices for malfunction.
4. Visually inspect all hydraulic hoses, particularly those that flex in normal operation of crane functions.
5. Inspect hooks and latches for deformation, chemical damage, cracks, and wear.
6. Inspect for proper rope reeving.
7. Inspect electrical wiring and components for malfunctioning, signs of excessive deterioration, dirt and moisture accumulation.
8. Inspect hydraulic system for proper oil level and leaks.
9. Inspect tires for recommended inflation pressure, cuts, and loose wheel nuts.
10. Inspect connecting pins and locking device for wear damage and loose retaining bolts.
11. Inspect rope for gross damage, such as listed below, which may be an immediate hazard.
 - A. Distortion such as kinking, crushing, un-stranding, birdcaging, main strand displacement, or core protrusion. Loss of rope diameter in a short length or unevenness of outer strands should be replaced.

8 Maintenance

- B. General corrosion.
- C. Broken or cut strands.
- D. Use care when inspecting sections of rapid deterioration around flange points crossover points, and repetitive pickup points on drums.
- E. Inspect number, distribution, and type of visible broken wires.

NOTICE

Continued use of rope depends upon good judgment by a designated person in evaluating remaining strength in a used rope after allowance for deterioration disclosed by inspection. Continued rope operation depends upon this remaining strength.

8.4 PERIODIC INSPECTION

Any deficiencies, such as those listed below, shall be carefully examined and determination made as to whether they constitute a hazard:

1. Inspect for deformed, cracked or corroded members in the crane structure and entire boom.
2. Inspect for loose bolts, particularly mounting bolts.
3. Inspect for cracked or worn sheaves and drums.
4. Inspect for worn, cracked, or distorted parts such as pins, bearings, shafts, gears, rollers and devices.
5. Inspect for excessive wear on brakes and clutch system parts and linings.
6. Inspect crane hooks for cracks.
7. Inspect travel steering, braking, and locking devices for malfunction.
8. Inspect for excessively worn or damaged tires.
9. Inspect hydraulic hose, fittings, and tubing for the following problems:
 - A. Evidence of leakage at the surface of the flexible hose or its junctions with the metal and coupling.
 - B. Blistering, or abnormal deformation to the outer covering of the hydraulic or pneumatic hose.
 - C. Leakage at threaded or clamped joints that cannot be eliminated by normal tightening or recommended procedures.
 - D. Evidence of excessive abrasion or scrubbing on the outer surface of a hose, rigid tube, or fitting. Means shall be taken to eliminate the interference of elements in contact or otherwise protect the components.
10. Inspect hydraulic pumps and motors for the following problems:
 - A. Loose bolts and fasteners.
 - B. Leaks at joints between sections.
 - C. Shaft seal leaks.
 - D. Unusual noises or vibrations.
 - E. Loss of operating speed.
 - F. Excessive heating of fluid.
 - G. Loss of pressure.
11. Inspect hydraulic valves for the following:
 - A. Cracks in valve housing.
 - B. Improper return of spool to neutral position.
 - C. Leaks at spools or joints.
 - D. Sticking spools.
 - E. Failure of relief valves to attain or maintain correct pressure setting.
 - F. Relief valve pressure shall be checked as specified by the manufacturers.

12. Inspect hydraulic cylinders for the following problems:
 - A. Driving caused by fluid leaking across piston.
 - B. Rod seals leaking.
 - C. Leaks at welding joints.
 - D. Scored, nicked, or dented cylinder rods.
 - E. Damaged case (barrel).
 - F. Loose or deformed rod eyes or connecting joints.
13. Inspect hydraulic filters for evidence of rubber particles on the filter elements indicating possible hose, O-ring, or other rubber component deterioration. Metal chips or pieces on the filter may denote failure in pumps, motors, or cylinders. Further inspection will be necessary to determine the origin of the problem before corrective action can be taken.
14. Inspect labels to confirm correct location and legibility. Reference decals layout in this manual for proper location of decals.
15. Rope inspections need not be at equal calendar intervals and should be more frequent as the rope approaches the end of useful life. A qualified person shall inspect the wire rope based on such factors as:
 - A. Expected rope life as determined by experience on the particular installation or similar installations.
 - B. Severity of environment.
 - C. Percentage of capacity lifts.
 - D. Frequency rates of operation.
 - E. Exposure to shock loads.
 - i. This inspection shall cover the entire length of the rope. Only the surface wires need to be inspected and no attempt should be made to open the rope. Any deterioration resulting in appreciable loss of original strength shall be noted and determination made as to whether use of the rope would constitute a hazard. A few notable deterioration points are listed below:
 1. Reduction of rope diameter below nominal diameter due to loss of core support.
 2. Internal or external corrosion.
 3. Wear of outside wires.
 4. Severely corroded, cracked, bent, worn, or improperly applied connections.

8.5 CRANES NOT IN REGULAR USE

A crane, which has been idle for a period of more than one month or more, shall be given an inspection conforming to the "initial" and "periodic" inspection requirements of this section.

8.6 INSPECTION RECORDS

Dated records of periodic inspection should be made on critical items such as brakes, crane hooks, rope, cylinders, and relief pressure valves.

8.7 TESTING REQUIREMENTS

NOTICE

Reference ASME B30.5a and OSHA 1910.180 for complete testing requirements.

8 Maintenance



WARNING

All testing shall be performed by designated personnel only. Prior to initial use, all new, altered, modified, or extensively repaired cranes shall be inspected by a designated person to ensure compliance with provisions of this standard.

1. Test all functions to verify speed and operation.
2. Ensure all safety devices are working properly.
3. Confirm operating controls comply with appropriate function labels.
4. Test loads shall not exceed 110% of the manufacturer's load rating.
5. Written reports shall be maintained showing test procedures and confirming the adequacy of repairs.

8.8 GENERAL REPAIRS AND MAINTENANCE

NOTICE

Reference ASME B30.5a and OSHA 1910.180 for complete maintenance and repair requirements.



WARNING

All repairs and maintenance shall be performed by designated personnel only. Establish a preventative maintenance program based on this section. Obtain all replacement parts from your local authorized distributor.

8.9 MAINTENANCE PRECAUTIONS

1. Place crane where it will cause the least interference with other equipment or operations.
2. Verify all controls are in the OFF position and all operating features secured from inadvertent motion by brakes, pawls, or other means.
3. The means for starting the crane shall be rendered inoperative.
4. The boom should be secured in place before maintenance.
5. Relieve hydraulic oil pressure from all hydraulic circuits before loosening or removing hydraulic components.
6. Warning or "OUT OF ORDER" signs shall be placed on all crane controls.
7. After adjustments and repairs have been made, the crane shall not be returned to service until all guards have been reinstalled, trapped air removed from hydraulic system (if required), safety devices reactivated, and maintenance equipment removed.

8.10 ADJUSTMENTS AND REPAIRS

1. Any hazardous conditions disclosed by the inspection requirement shall be corrected before operation of crane is resumed.
2. Adjustments shall be maintained to assure correct of functioning of components, the following are examples:
 - A. Function operating mechanism.
 - B. Safety devices.
 - C. Control systems.
3. Repairs or replacements shall be provided as needed for operation, the following are examples:
 - A. Critical parts of functional operating mechanisms which are cracked, broken, corroded, bent, or excessively worn.

- B. Critical parts of the crane structure which are cracked, bent, broke, or excessively corroded.
 - C. Crane hooks showing cracks, damage, or corrosion shall be taken out of service. Repairs by welding are recommended.
4. If bleeding the hydraulic system is required, run each crane function until smooth operation of that particular function is noticeable.

8.11 LUBRICATION

All moving parts of the crane, for which lubrication is specified, should be regularly lubricated per the manufacturer's recommendations and procedures.

8.12 ROPE REPLACEMENT

No precise rules can be given for determination of the exact time for replacement of rope, since many variable factors are involved.

Replacement rope shall have a strength rating at least as great as the original rope furnished or recommended by Auto Crane. A rope manufacturer, Auto Crane, or a qualified person shall specify any deviation from the original size, grade, or construction.

Conditions such as the following shall be reason for questioning continued the rope or increasing the frequency of inspection:

1. In running ropes, six randomly distributed broken wires in one strand in one lay.
2. One outer wire broken at the contact point with the core of the rope structure and protrudes or loops out of the rope structure. Additional inspection of this section is required.
3. Wear of one third of the original diameter of the outside individual wire.
4. Kinking, crushing, bird caging, or any other damage resulting in distortion of the rope structure.
5. Evidence of any heat damage from any cause.
6. Reduction of nominal diameter of more than:
 - A. 1/64" (0.4mm) – for diameters up to and including 5/16" (8mm)
 - B. 1/32" (0.8mm) – for diameters 3/8" (9.5mm) through and including 1/2" (13mm)
 - C. 3/64" (1.2mm) – for diameters 9/16" (14.5mm) through and including 3/4" (19mm)
 - D. 1/16" (1.6mm) – for diameters 7/8" (22mm) through and including 1-1/8" (29mm)
 - E. 3/32" (2.4mm) – for diameters 1-1/4" (32mm) through and including 1-1/2" (38mm)
7. In standing ropes, more than two broken wires in one lay in sections beyond end connections or more than one broken wire at an end connection.

8.13 ROPE INSTALLATION AND MAINTENANCE

1. Rope should be stored to prevent damage and deterioration.
2. Unreeling or uncoiling of rope shall be done as recommended by the rope manufacturer and with care to avoid kinking or inducing twist.
3. Before cutting a rope, seizing shall be placed on each of the place where the rope is to be cut to prevent unlaying of the strands. On pre-formed rope, one seizing on each side of the cut is required. On non-preformed ropes of 7/8" (22mm) or smaller, two seizings on each side of the cut are required. For non-preformed rope 1 in. (25mm) diameter or larger, three seizings on each side of the cut are required.

8 Maintenance

4. During installation care should be exercised to avoid dragging of the rope in the dirt or around objects that will scrape, nick, crush, or induce sharp bends in it.
5. Rope should be maintained in a well-lubricated condition. It is important that lubricant applied as a part of the maintenance program shall be compatible with the original lubricant and to this end the rope manufacturer should be consulted. Lubricant applied shall be the type that does not hinder visual inspection. Those sections of rope that are located over sheaves or otherwise hidden during inspection and maintenance procedures require special attention when lubricating rope. The object of rope lubrication is to reduce internal friction and to prevent corrosion.
6. When an operating rope shows greater wear or well-defined localized areas than on the remainder of the rope, rope life can be extended in some cases by shifting the wear to different areas of the rope.

8.14 PAINT FINISH MAINTENANCE

The paint finish on Auto Crane products can become damaged during normal use when chipped, scratch, exposed to harsh chemicals, cleaned with pressure washers, or similar. During periods when the truck is exposed to salt or other corrosive chemicals, wash Auto Crane products weekly. Inspect the paint finish monthly or when washed. Immediately repair any exposed bare metal or rust. Repair damaged paint on Auto Crane products with the following procedure:

1. Sand the damaged area to bare metal.
2. Use a solvent to clean the sanded area to remove sanding debris and residue.
3. Wipe dry with a clean cloth to remove any remaining debris and residue.
4. Use a primer compatible with Sherwin Williams E2W932 epoxy primer.
5. Prime the sand areas to a minimum 2 mm dry film thickness per the primer manufacturer's instructions.
6. Use a paint compatible with Sherwin Williams E2W932 epoxy primer and Sherwin Williams Genesis polyurethane top coat paint.
7. Apply the top coat paint to a minimum 2 mm dry film thickness within 24 hours of applying the primer.
8. The final primer and top coat should have approx. a 4 mm dry film thickness.

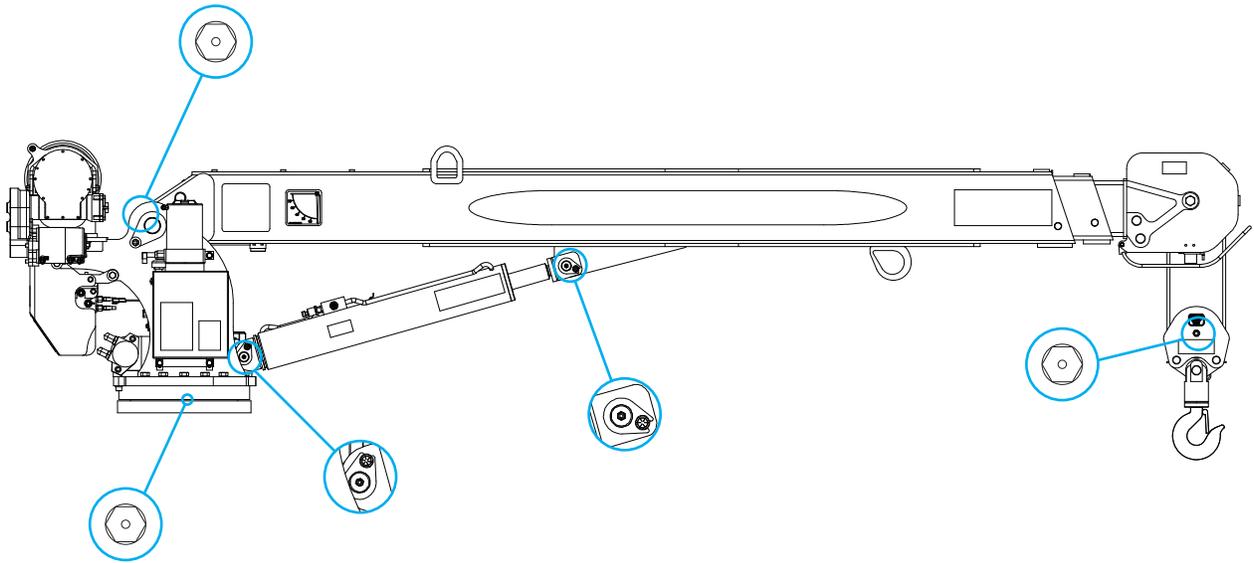
8.15 LUBRICATION AND MAINTENANCE SCHEDULE

| Service Performed | Instructions | Daily | Weekly | 3 Months | 6 Months | Yearly |
|--|--|----------|----------|----------|----------|----------|
| Load Hook | Inspect hook and latch for deformation, cracks, and corrosion. | X | | | | |
| Cable Drum | Ensure cable is wound evenly on drum. | X | | | | |
| Hoist/Boom Cable | Check for flattening, kinks, broken strands. | X | | | | |
| Hyd. Hoses | Visual inspection. | X | | | | |
| Hyd. Fluid | Check fluid level. | X | | | | |
| Pin Retaining Bolts | Check torque to 23 ft lbs(Grade 5) 35 ft- lbs (Grade 8) as required. | X | | | | |
| Mounting Bolts | Check torque to 335 ft-lbs as required. | | X | | | |
| Rotating Ring Gear | Lube with MobileTac LL or Lubriplate. | | X | | | |
| Sheave Bearings | Sealed bearing, replace if rough or loose. | | X | | | |
| All Other Bolts | Check and tighten as required. | | X | | | |
| Lift Cylinder Bearings | Grease with MobilePlex EP-2 or equivalent at zerk fittings | | | X | | |
| Rotation Bearing | Grease with MobilePlex EP-2 or equivalent at zerk fittings | | | X | | |
| Rotation Bearing Bolts | Check torque to 170 ft-lbs (hex head) 180 ft-lbs (socket head) as required | | | X | | |
| Hydraulic Fluid | Drain, flush, and refill with Mobile DTE 13 oil | | | | | X |
| Boom Slide Pads | Pads greased when replaced. | | | | | |
| Filter, Valve Block | Replace annually or every 200 hours of operation as directed by the dirty filter sensor. | | | | | |
| For additional information, see OSHA 1910.180 and ASME B30.5a. | | | | | | |

8 Maintenance

8.16 LUBRICATION POINTS

1. Use only authorized parts. Any damage or malfunction caused by the use of unauthorized parts is not covered by Warranty or Product Liability.
2. Once a bolt has been tightened to specification then removed, the bolt should be replaced with a new one. Auto Crane Company recommends this crane be serviced per the "Crane Inspection Log" P/N 999978. Fill these logs in at the intervals noted and kept as a permanent record. Additional copies are available from your local distributor.



8.17 NEXSTAR III CARTRIDGE MAINTENANCE



Verify movement in ports while manually overriding cartridge



Use the following procedure to inspect the cartridge for proper operation.

1. Clean the area around the valve spool before it is removed from the valve bank.
2. Remove the valve spool from the valve bank. Be careful not to touch any surrounding objects.
3. Use any off-the-shelf automotive brake cleaning fluid to remove any visible debris from the valve spool. Wear skin and eye protection while spraying the valve spool clean.
4. Inspect the O-rings for damage. Replace if necessary.
5. Dip the valve spool into fresh hydraulic fluid to lubricate and fill the cavities.
6. Install the valve spool into the valve block.
7. Validate the operation of the crane related to this valve spool.

8 Maintenance

8.18 ADJUSTING OIL COOLED WORM BRAKE

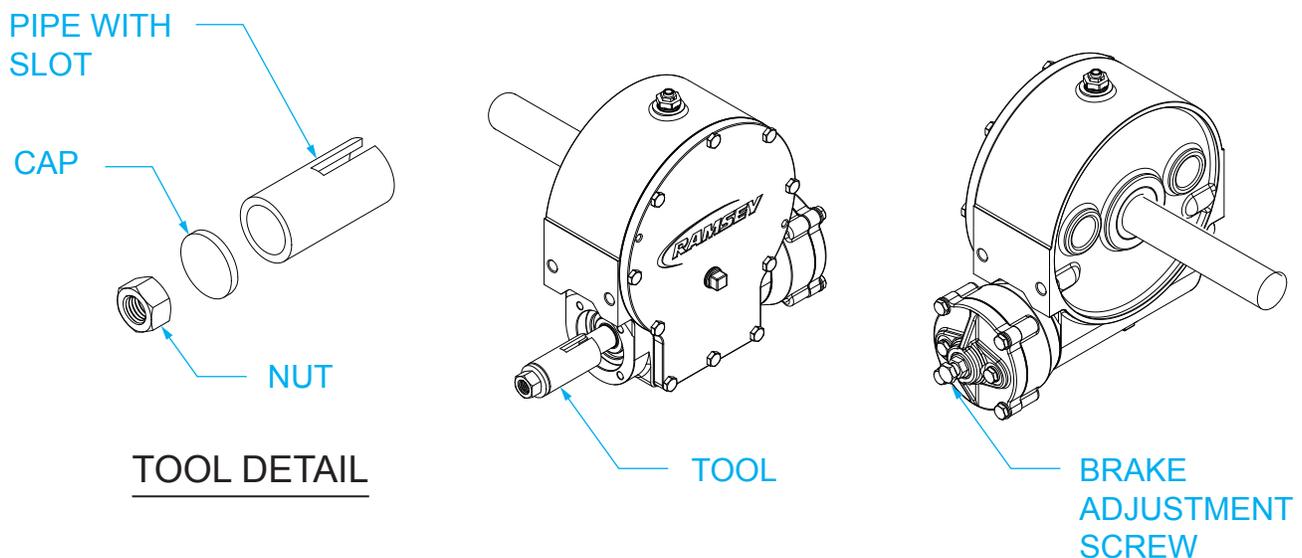
The oil-cooled, fully adjustable, automatic safety brake operates in the worm housing lubricant, all part being submerged in oil. When the brake wears to the point that the load begins to drift, the brake can be adjusted as follows:

1. Loosen the lock nut on the adjusting screw.
2. Tighten the brake by turning the adjusting screw clockwise.

CAUTION: Only $\frac{1}{4}$ turn is usually required to adjust the brake. Over-tightening can cause overheating, and damage to the brake parts. Tighten the lock nut after adjustment is completed.

If the brake does not respond to adjustment then a new leaf spring and brake disc is needed. A torque wrench can be equipped with a special adapter to fit the input shaft (worm) of the winch. The adapter can be made by welding a nut to the end of a piece of tubing as shown in the following figure.

8.19 Brake Adjustment



After welding the cap and nut to the tubing, slot the tubing as shown. This will allow the special adapter to slide over the keyway and then act as a large socket. A torque wrench can then be used to apply the proper torque. Turn the torque wrench so that the drum turns in the spool out direction or lowering direction. The torque ratings should be between 8-13 ft-lbs.

If the torque wrench does not show the proper value as it turns, then the worm brake adjusting bolt should be turned clockwise $\frac{1}{4}$ turn. Each time the adjusting bolt is turned, check the torque reading. Continue this procedure until the proper torque reading is achieved. Then tighten the lock nut.

9 Crane Mounting and Installation

For information specific to your crane, such as mounting hole diameter, bolt size and grade, and hydraulic requirements, see General Dimensions.

1. Refer to the Bill of Materials included with your ship kit. Ensure all items listed on the Bill of Materials are included with your crane.



CAUTION

Failure to use clean hydraulic hoses and components may contaminate the crane and hydraulic system and void warranty.

NOTICE

Excess flow will cause erratic operation and too little flow will cause poor crane operation.

2. Vehicle shall meet minimum GVWR dependent on crane model:
3. The vehicle must be equipped with an engine speed control and tachometer.
4. Ensure the mounting surface is properly reinforced to withstand the capacity loading of the crane. Ensure the outriggers are used to provide total stability for the truck.
5. Cut the proper sized hole in the mounting location (centered with mounting bolts) for access to hydraulic connections.
6. Ensure the mounting bolts are the proper size and grade. Tighten to the correct specification. See General Dimension.
7. Use a boom support when the crane is not in operation. Connect the traveling block to the hook loop.
8. Electrical hookup:



WARNING

Failure to correctly plumb and wire crane can cause inadvertent operation and damage to crane and/or personnel.

9. Ensure the Owner's Manual is delivered to the customer.
10. Install voltage switching unit inside compartment safe from weather and contamination.
11. See following page for additional electrical installation.
12. For additional help: Call the Service Department at the Auto Crane Company, 1-800-777-2760, located in Tulsa, OK.

IMPORTANT!

FEDERAL LAW (49 CFR PART 571) REQUIRES THAT THE FINAL STAGE MANUFACTURER OF A VEHICLE CERTIFY THAT HE VEHICLE COMPLIES WITH ALL APPLICABLE FEDERAL REGULATIONS. ANY MODIFICATIONS PERFORMED ON THE VEHICLE PRIOR TO THE FINAL STAGE ARE ALSO CONSIDERED INTERMEDIATE STAGE MANUFACTURING AND MUST BE CERTIFIED AS TO COMPLIANCE. THE INSTALLER OF THIS CRANE AND BODY IS CONSIDERED ONE OF THE MANUFACTURERS OF THE VEHICLE. AS SUCH A MANUFACTURER, THE INSTALLER IS RESPONSIBLE FOR COMPLIANCE WITH ALL APPLICABLE FEDERAL AND STATE REGULATIONS, AND IS REQUIRED TO CERTIFY THAT THE VEHICLE IS IN COMPLIANCE.

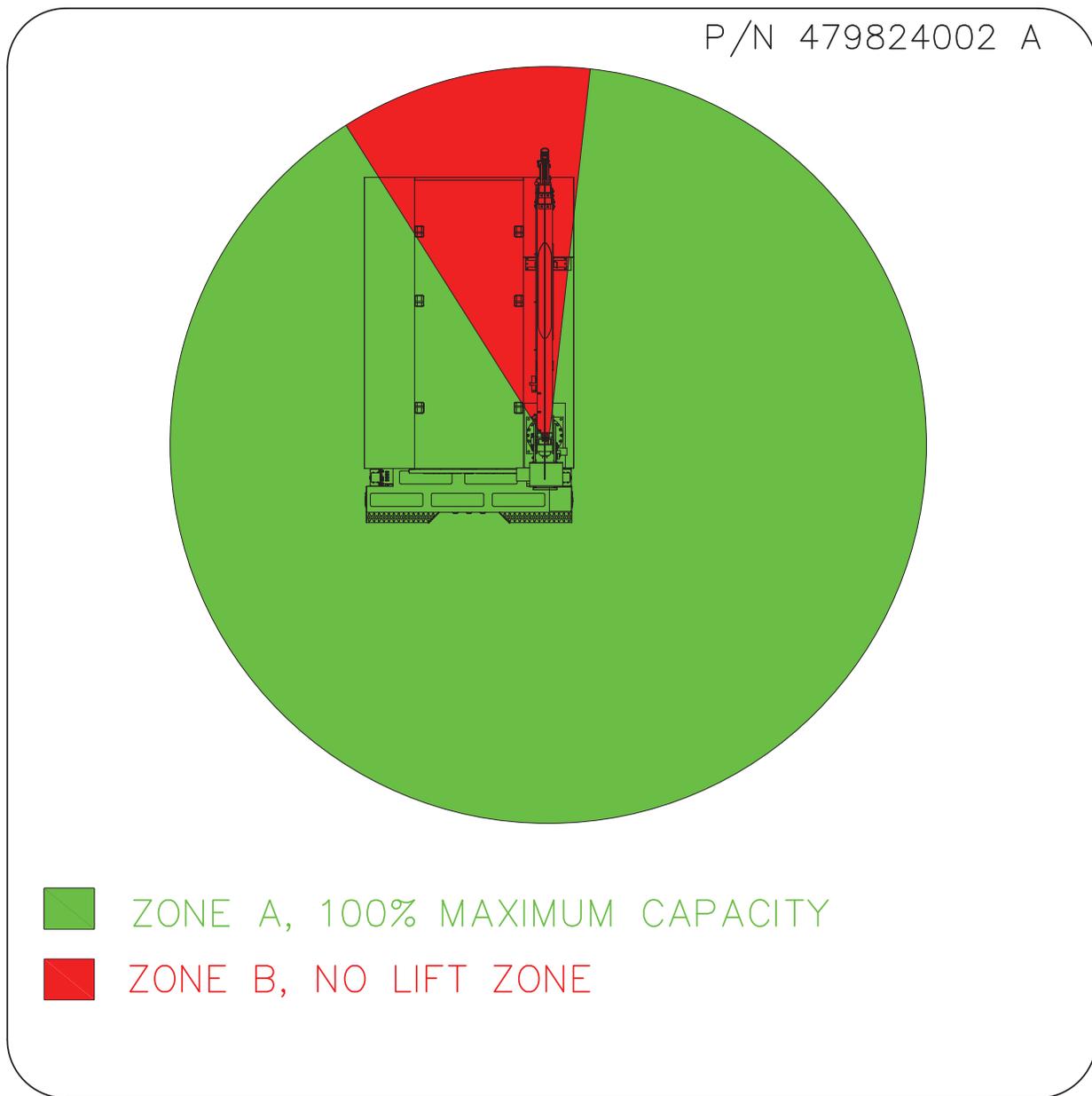
IT IS THE FURTHER RESPONSIBILITY OF THE INSTALLER OF THE CRANE TO COMPLY WITH THE OSHA TRUCK CRANE STABILITY REQUIREMENTS AS SPECIFIED BY 29 CFR PART 1910.180 (C) (1).

Crane Mounting and Installation 9

9.1 STABILITY CHART INSTALLATION

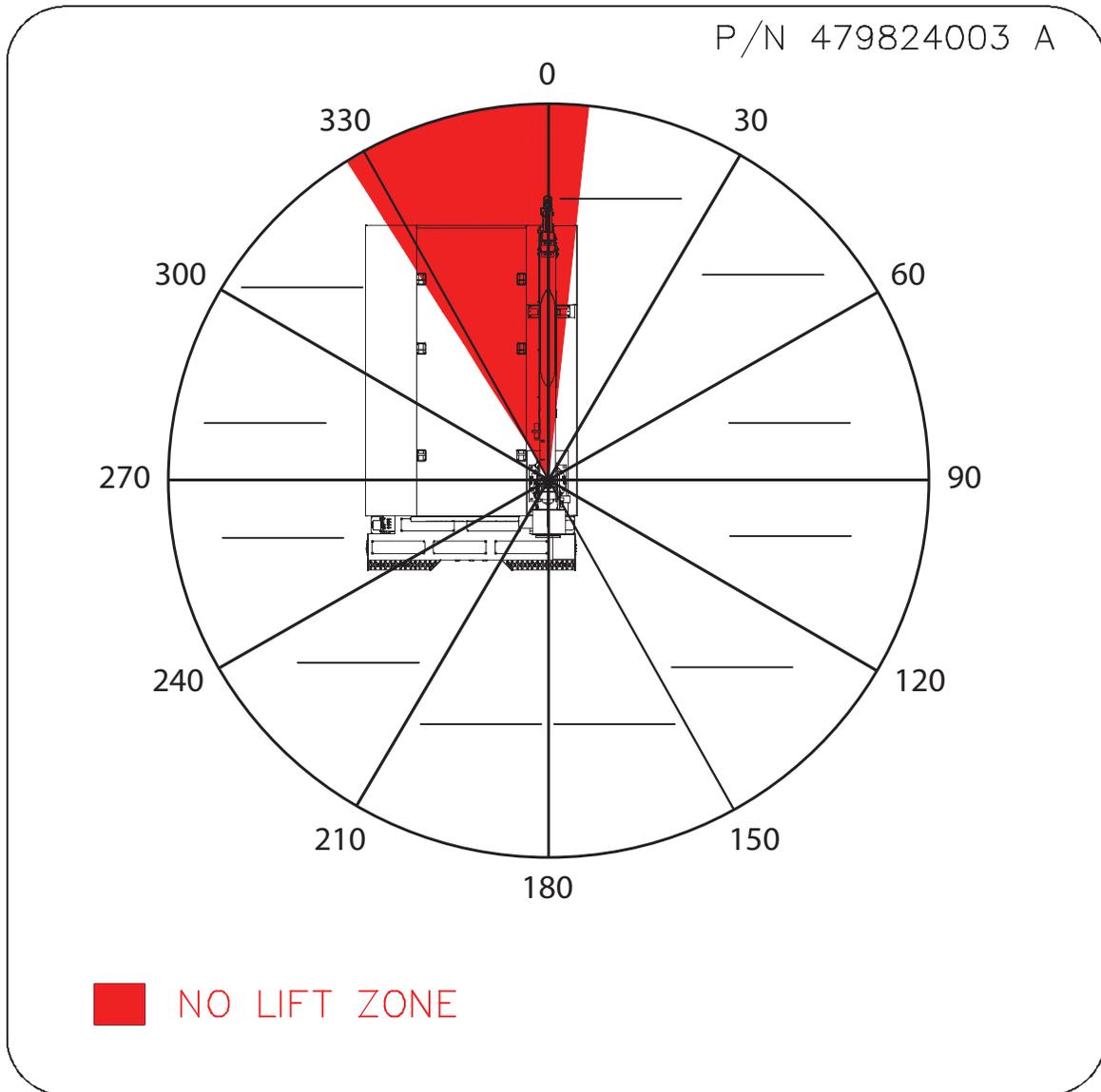
There is a stability chart included in the ship kit. This decal is typically installed on the inside of the door of the crane box. This decal is to alert the user of the available crane capacities around the vehicle.

- 479824002 decal will be installed on an Auto Crane body that was outfitted with an Auto Crane crane and Auto Crane outriggers. Auto Crane has designed the body, crane and outrigger to have stability based on the chart below:



9 Crane Mounting and Installation

- 479824003 decal will be installed on an Auto Crane body that was not outfitted with an Auto Crane crane and Auto Crane outriggers. Auto Crane has designed the body, crane, and outrigger to have stability based on the chart. The stability chart provides lines to write in the tested stability percentage at each section below:



9.2 NEXSTAR III COUNTERBALANCE VALVE ADJUSTMENT



WARNING

Do not try to adjust valves while the boom is moving

1. Ensure the PTO is disengaged and the boom is properly supported.
2. Remove the plug on the counterbalance valve.
3. Install a pressure gauge (0-3000 psi) into the port.
4. Use an in-line flow meter to ensure pump flow is eight to nine gallons per minute.
5. Engage the PTO.
6. With no load on the boom, raise to boom to an approx. 70° angle.
7. Lower the boom and read the pressure gauge. If the pressure reading is not approx. 1300 psi, the counterbalance valve requires adjustment.
 - A. To increase the pressure, loosen the nut on the adjustment screw, and turn the Allen head screw counterclockwise.
 - B. To decrease the pressure, loosen the nut on the adjustment screw, and turn the Allen head screw clockwise.
8. Tighten the nut on the adjustment screw and repeat steps 6 and 7 until the proper pressure reading is obtained.



CAUTION

If the proper pressure reading cannot be obtained, please contact your Auto Crane distributor for assistance.

9. Disengage the PTO.
10. Remove the pressure gauge and install the plug. The crane is now ready for operation.

9.3 EMERGENCY CRANE OPERATION

If for any reason hydraulic flow or pressure is lost to the crane, use the following procedure to lower the boom until the problem can be fixed.

1. In an emergency situation when it becomes necessary to lower the boom without hydraulic assistance, the counterbalance valve can be used to lower the boom.
2. Ensure the boom will be lowered onto an appropriate support.
3. Loosen the lock nut and slowly turn the Allen head screw clockwise.
4. Count the number of turns and continue to slowly turn the Allen head screw clockwise until the boom just begins to lower.

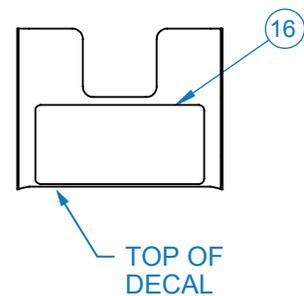
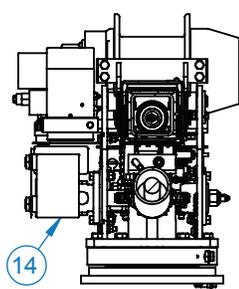
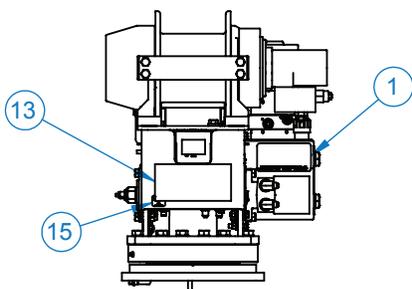
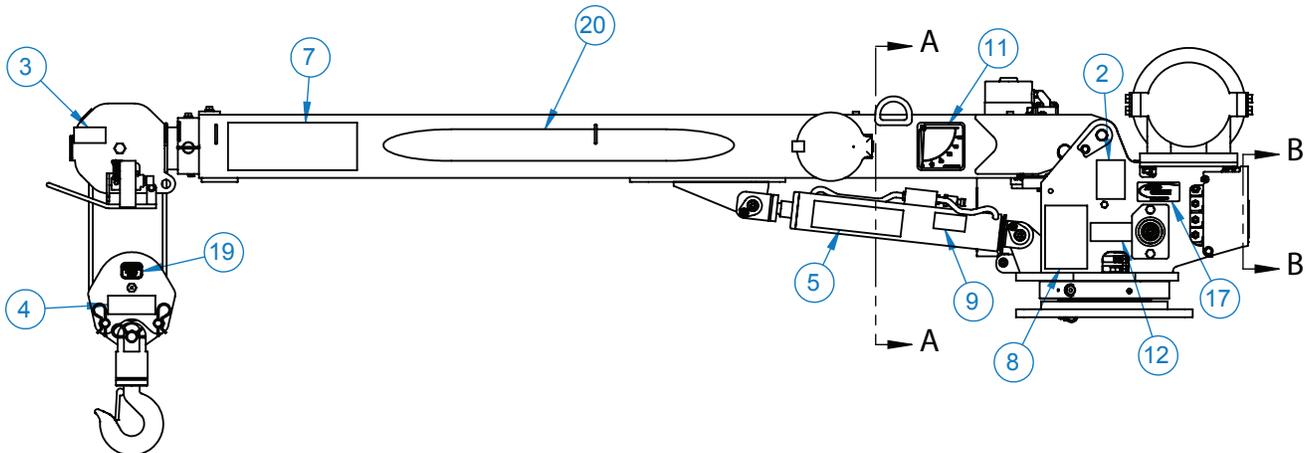
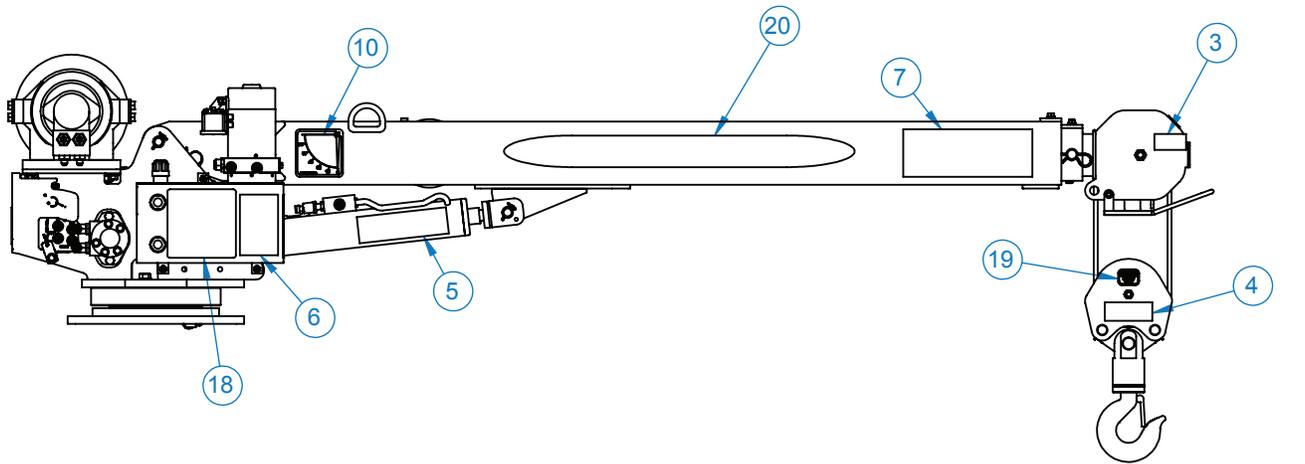


CAUTION

Remove any personnel from near the crane as the load is lowering.

5. If the Allen head screw is turned too far, the internal valve will come apart. This condition is not repairable.
6. After the boom is lowered onto the boom support, turn the Allen head screw the same number of turns counterclockwise into the counterbalance valve.
7. After the problem is corrected, readjust the counterbalance valve to ensure proper operation.

10 Decal Layout



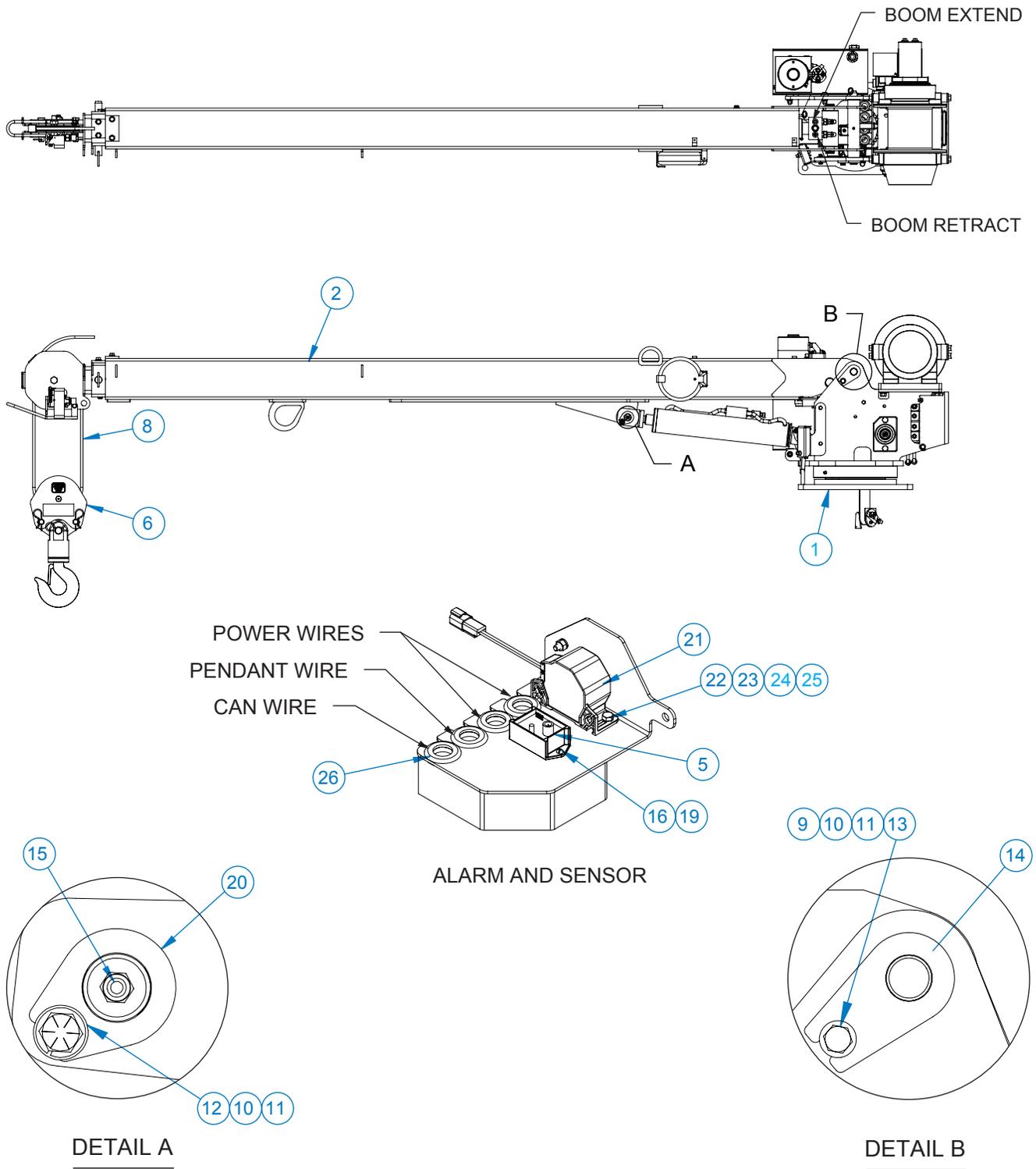
SECTION A-A

SECTION B-B

Decal Layout 10

| ITEM NO. | QTY | PART NUMBER | DESCRIPTION |
|----------|-----|-------------|--|
| 1 | 1 | 040824000 | DECAL, AMERICAN FLAG, MADE IN THE U.S.A. |
| 2 | 1 | 040632000 | DECAL WARNING - OVERLOAD |
| 3 | 2 | 040517000 | DECAL STAY CLEAR OF BOOM |
| 4 | 2 | 040518000 | DECAL STAY CLEAR OF LOAD |
| 5 | 2 | 040519000 | DECAL DANGER SCISSOR POINT |
| 6 | 1 | 040579000 | DECAL OPERATION INSTRUCTIONS |
| 7 | 2 | 040529000 | DECAL DANGER "ELECTROCUTION HAZARD" POWER LINE |
| 8 | 1 | 040580000 | DECAL TRAINED OPERATOR |
| 9 | 1 | 040587000 | DECAL WARNING LOAD SENSOR |
| 10 | 1 | 320318000 | DECAL ANGLE INDICATOR CS |
| 11 | 1 | 320318001 | DECAL ANGLE INDICATOR SS |
| 12 | 1 | 330622000 | DECAL SERIAL NO |
| 13 | 1 | 360034000 | DECAL AUTO CRANE LOGO |
| 14 | 1 | 460169000 | DECAL WARNING, REMOTE CONTROL |
| 15 | 1 | 320991302 | DECAL, PENDANT CONNECTION |
| 16 | 1 | 320991301 | DECAL, MAN OVERRIDE NEXSTAR SMALL EH |
| 17 | 1 | 040619001 | DECAL AUTO CRANE LOGO |
| 18 | 1 | 404207001 | LOAD CHART, EHC-4 |
| 19 | 2 | 404212000 | DECAL MAX BLOCK LOAD 4004 |
| 20 | 2 | 600047016 | DECAL, AUTO CRANE EHC-4 NS LOGO, FLATTENED OVAL, 33.25 IN LONG |

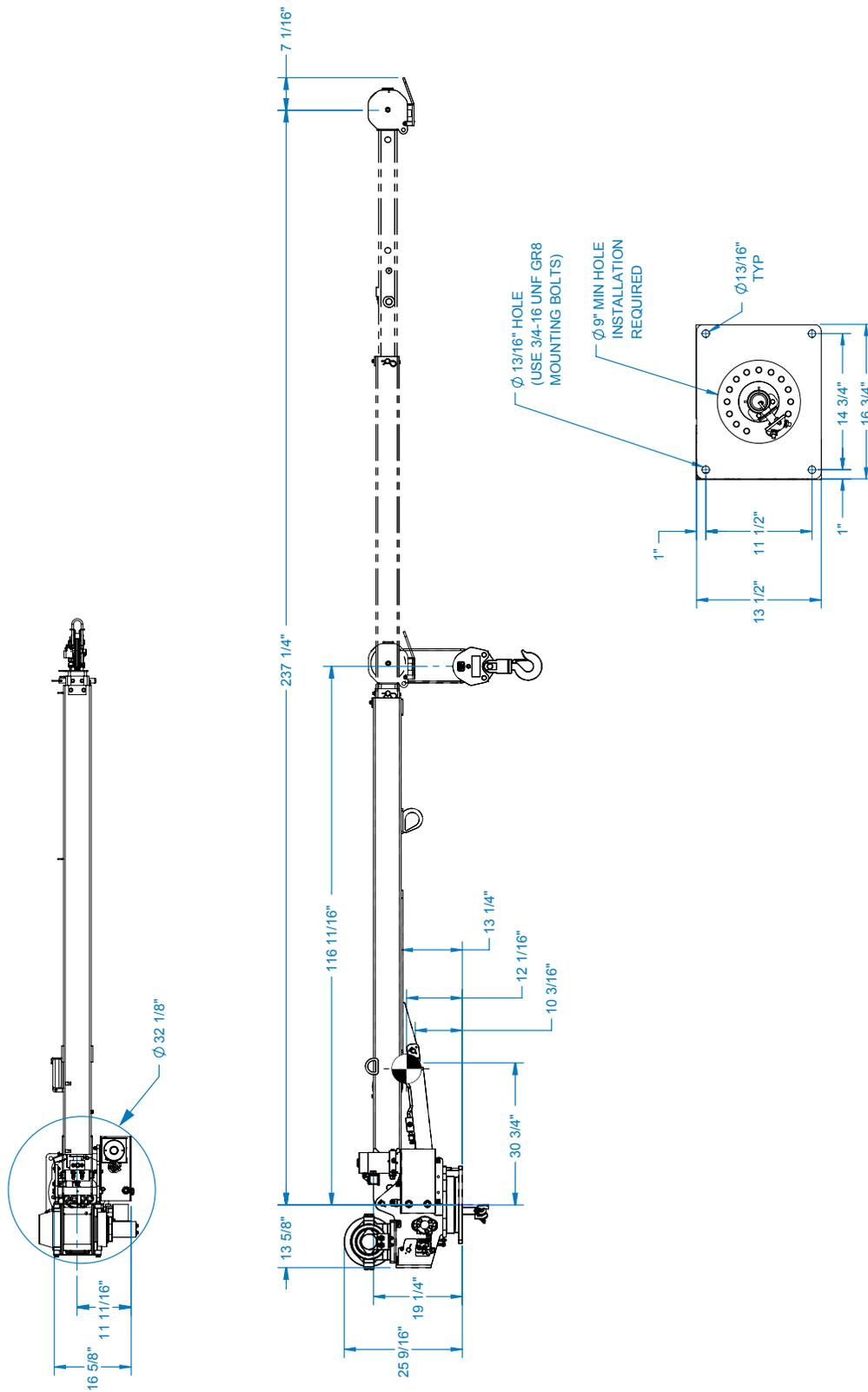
11 General Assembly P/N: 404241005



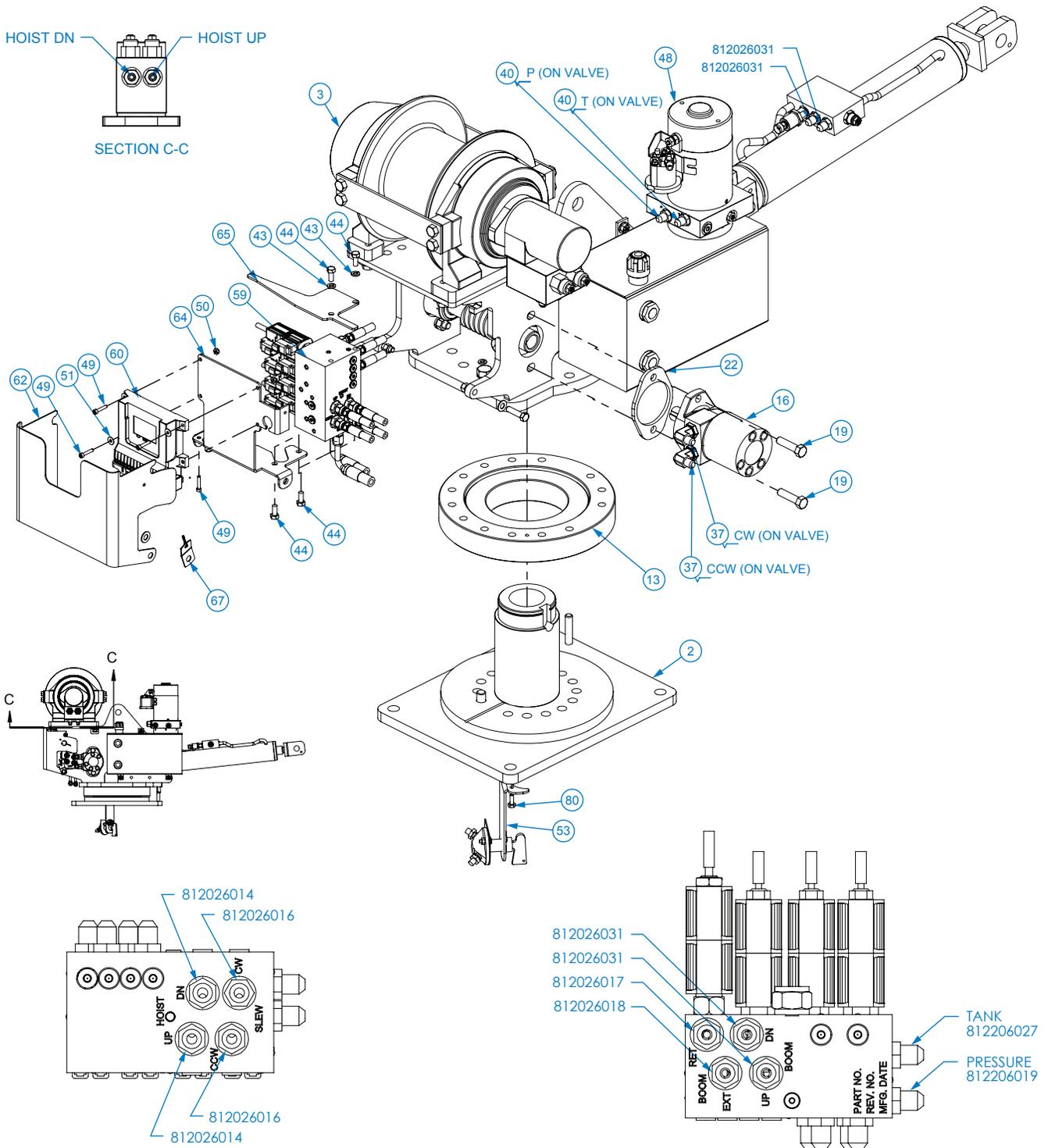
General Assembly P/N: 404241005 11

| ITEM NO. | QTY | PART NO. | DESCRIPTION |
|----------|-----|-----------|---|
| 1 | 1 | 404241205 | PEDESTAL ASS'Y, 4004EH NEXSTAR III, FM |
| 2 | 1 | 404240100 | 4004EH BOOM (20FT), SINGLE SHEAVE |
| 3 | 1 | 005901000 | SCREW HX HD 1/4-20UNC X 1/2 LG |
| 4 | 1 | 366823254 | SENSOR, TRI-AXIS |
| 5 | 1 | 404241035 | KIT, SHIP 4004EH NEXSTAR 20' BOOM |
| 6 | 1 | 404211050 | TRAVELING BLOCK ASSY, 4004 |
| 7 | 1 | 366823236 | LIGHT, LED (RED, GREEN, YELLOW) |
| 8 | 1 | 360758000 | ROPE ASSY |
| 9 | 1 | 330372000 | NUT HX 3/8 NC GR5 |
| 10 | 2 | 021100000 | WASHER SP LK 3/8 |
| 11 | 2 | 021200000 | WASHER FL 3/8 |
| 12 | 1 | 330371000 | SCREW HX HD 3/8-16UNC X 1 LG GR8 |
| 13 | 1 | 009109000 | SCREW HX HD 3/8-16UNC X 1 1/2 LG |
| 14 | 1 | 404220000 | PIN WDMT BOOM/PED |
| 15 | 1 | 239300000 | ZERK, GREASE |
| 16 | 4 | 001302000 | SCREW RD HD #8-32UNC X 1/2 LG |
| 17 | 2 | 360678000 | PIN, 3/16 COTTERLESS RING |
| 18 | 4 | 019700000 | WASHER SP LK #8 |
| 19 | 4 | 015500000 | NUT HX #8-32UNC CP |
| 20 | 1 | 320824000 | PIN, LIFT CYLINDER |
| 21 | 1 | 366823223 | KIT, ALARM, CONSTANT TONE, W/ DEUTSCH PLUG |
| 22 | 2 | 005500000 | SCREW HX HD 1/4-20UNC X 3/4 LG |
| 23 | 2 | 020200000 | WASHER SP LK 1/4 |
| 24 | 2 | 020300000 | WASHER FL 1/4 |
| 25 | 2 | 015900000 | NUT HX 1/4-20UNC SS |
| 26 | 4 | 750169010 | RUBBER GROMMET, 7/8" I.D., 1 5-8" O.D. 1/8" PANEL THICKNESS |
| 27 | 1 | 404241351 | DECAL LAYOUT, 4004EH 20' BOOM NEXSTAR |

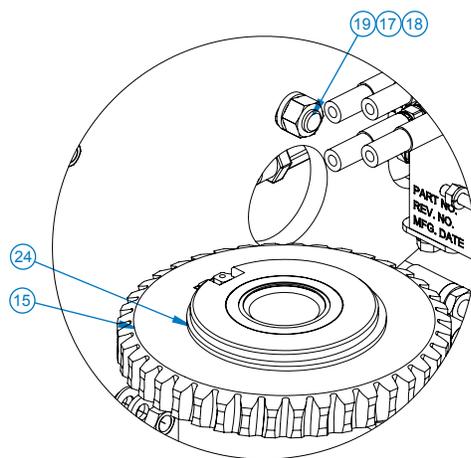
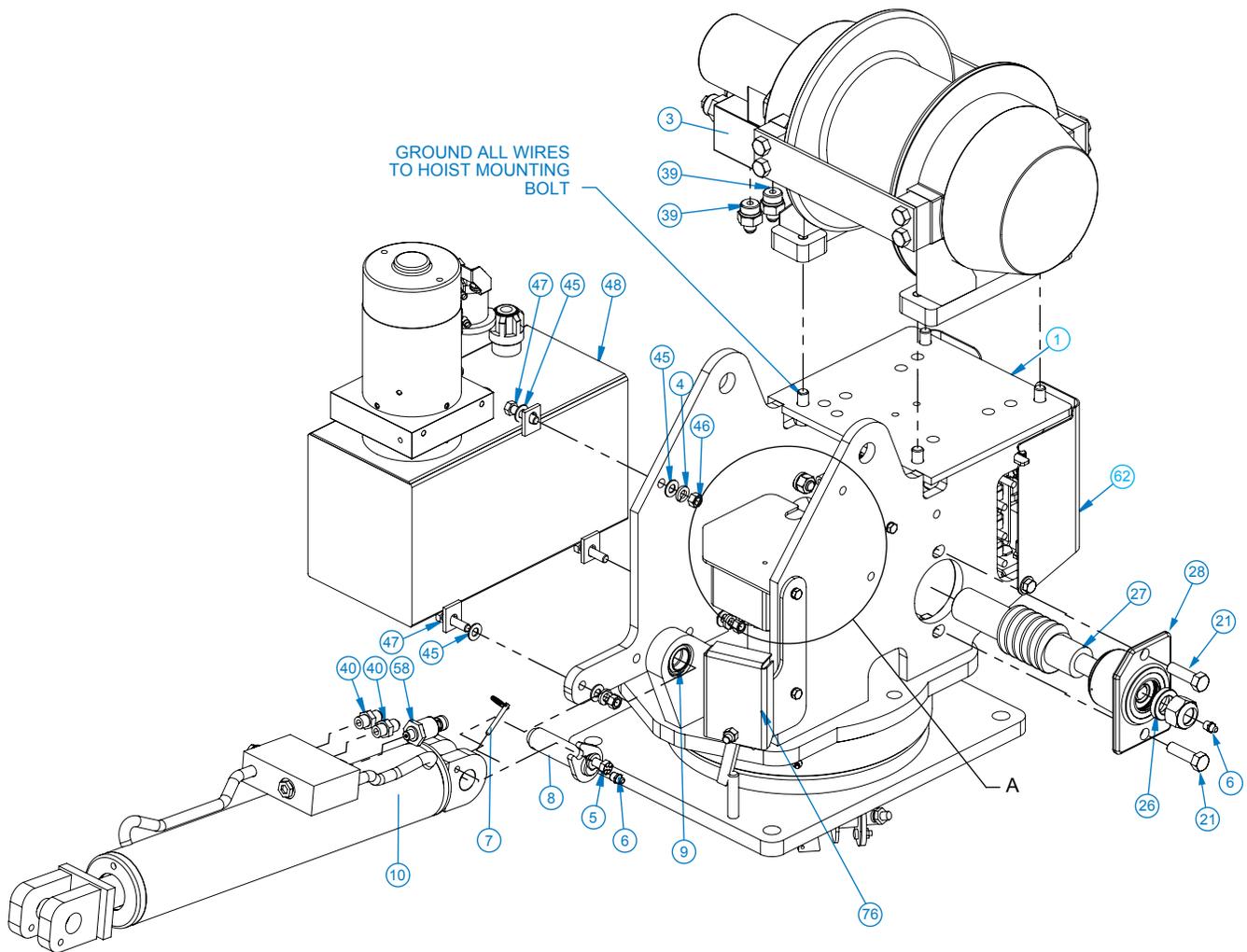
12 General Dimensions P/N: 404241005



Pedestal Assembly P/N: 404241205 13

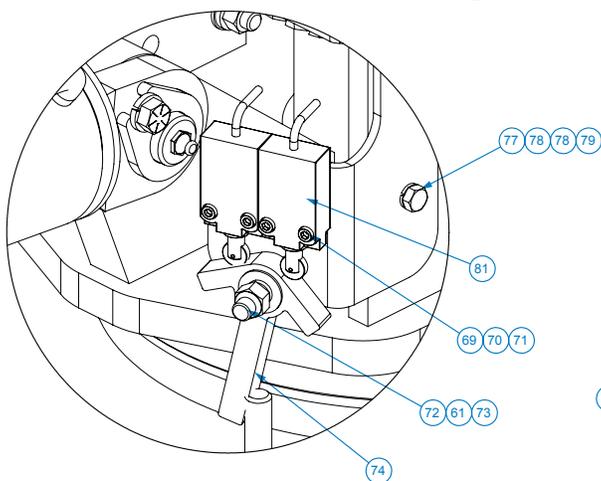
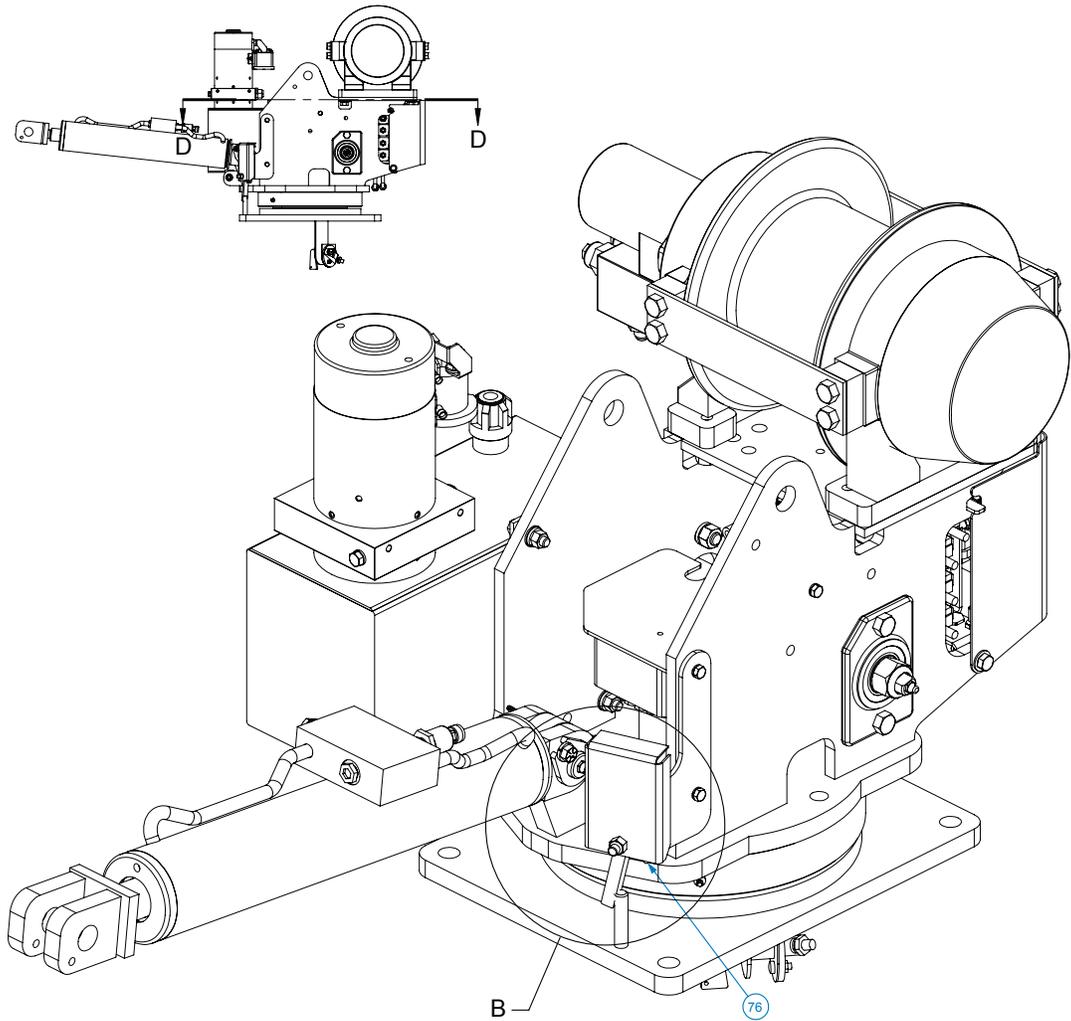


13 Pedestal Assembly P/N: 404241205

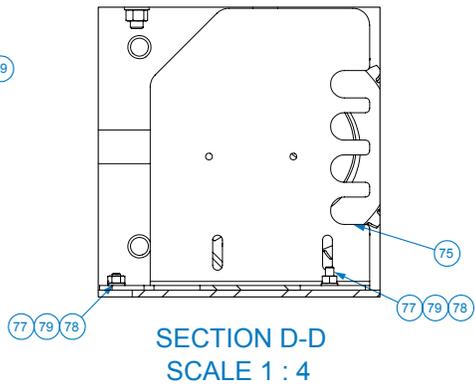


DETAIL A
GEAR COVER NOT SHOWN

Pedestal Assembly P/N: 404241205 13



DETAIL B
ROTATION SWITCH COVER NOT SHOWN



SECTION D-D
SCALE 1 : 4

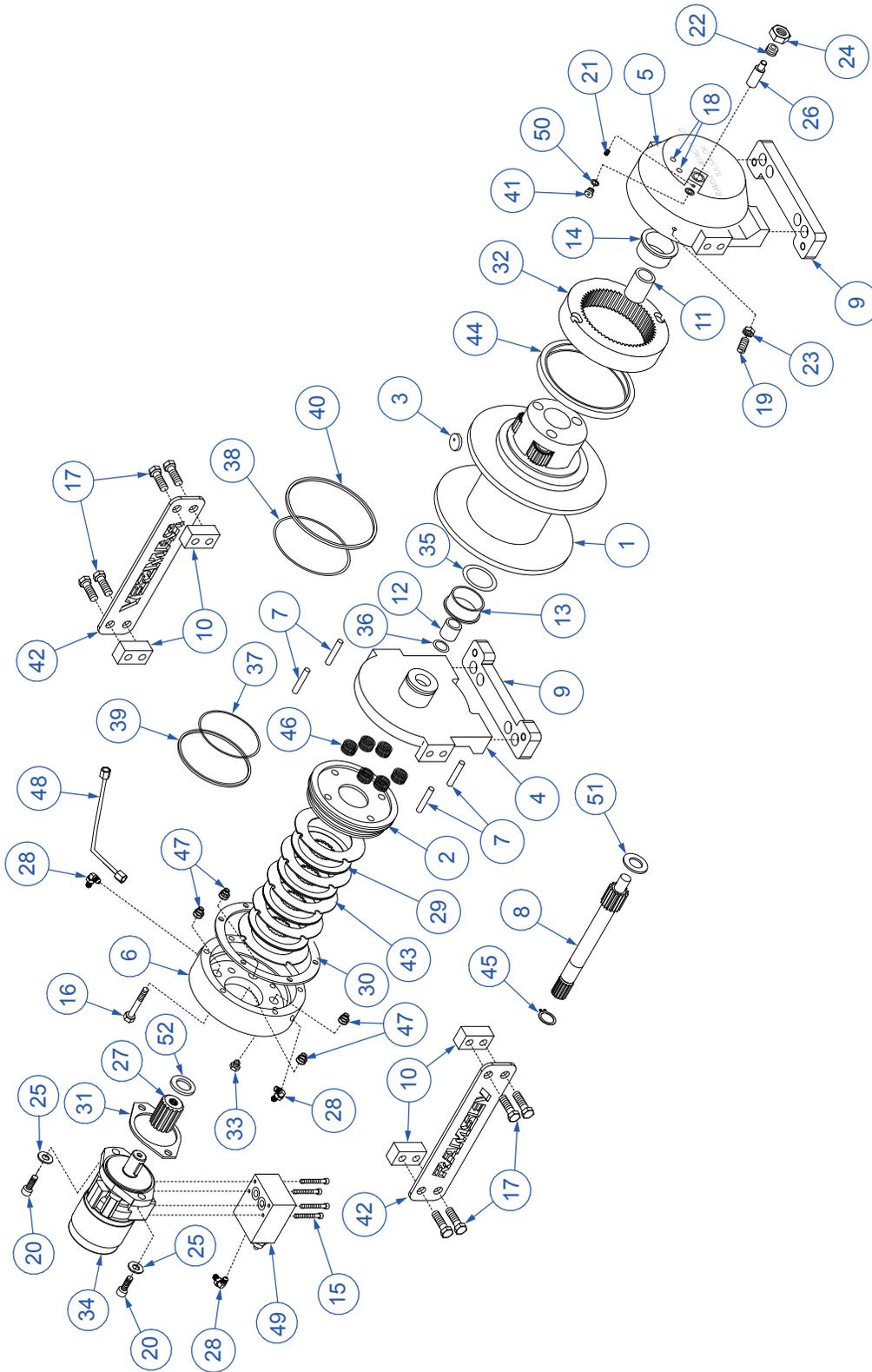
13 Pedestal Assembly P/N: 404241205

| ITEM NO. | QTY | PART NO. | DESCRIPTION |
|----------|-----|-----------|---|
| 1 | 1 | 320991215 | PEDESTAL WMT, 3203/4004 EH |
| 2 | 1 | 404193100 | BASE WMT, 3203 PR/PRX, W/ ROT. STOP |
| 3 | 1 | 123331000 | HOIST, RPH2000 |
| 4 | 5 | 021100000 | WASHER SP LK 3/8 |
| 5 | 1 | 330371000 | SCREW HX HD 3/8-16UNC X 1 LG GR8 |
| 6 | 2 | 239300000 | ZERK, GREASE |
| 7 | 1 | 360678000 | PIN, 3/16 COTTERLESS RING |
| 8 | 1 | 320824000 | PIN, LIFT CYLINDER |
| 9 | 1 | 320858000 | BEARING, SPHERICAL 1.00 ID |
| 10 | 1 | 320845000 | CYLINDER, LIFT |
| 11 | 2 | 023902000 | WASHER FL 5/8 HARDENED |
| 12 | 2 | 012198000 | SCREW HX HD 5/8-11UNC X 1 3/4 LG GR8 |
| 13 | 1 | 320878000 | ROTATION BEARING |
| 14 | 1 | 008400000 | SCREW HX HD 3/8-16UNC X 3/4 LG GR 5 |
| 15 | 1 | 320991282 | GEAR, WORM, 6.667PD, 4.00 ID, w/GROUND, 3203 |
| 16 | 1 | 404241285 | MOTOR, HYD 8.0 CU IN, SAE 2-BOLT 1" SHAFT |
| 17 | 4 | 017701000 | NUT HX 1/2-13UNC |
| 18 | 8 | 021500000 | WASHER, SP LK 1/2 |
| 19 | 2 | 011608000 | SCREW HX HD 1/2-13UNC X 2 LG |
| 20 | 1 | 019000000 | NUT HX NYLK 7/8-14UNF |
| 21 | 2 | 011603000 | SCREW HX HD 1/2-13UNC X 1 3/4 LG |
| 22 | 1 | 320879000 | SPACER ROTATION |
| 23 | 1 | 404213000 | SEAL, 2.50 OD X 1.5 ID |
| 24 | 1 | 404028000 | RETAINING RING, SNAP RING |
| 25 | 1 | 340602000 | KEY, 3/4 SQ X 1 |
| 26 | 1 | 330483000 | SPACER |
| 27 | 1 | 404015000 | WORM SHAFT |
| 28 | 1 | 330478000 | BEARING HOUSING ASSY |
| 29 | 1 | 320991240 | KIT, HOSE NEXSTAR 3203PRX/4004EH |
| 30 | 1 | 812206027 | HOSE, 3/8" x 3/8"JICF x 3/8"JICF 90° LONG x 27" |
| 31 | 2 | 812026014 | HOSE, 1/4" x 3/8"JICF x 3/8"JICF x 14" |
| 32 | 2 | 812026016 | HOSE, 1/4" x 3/8"JICF x 3/8"JICF x 16" |
| 33 | 1 | 812026017 | HOSE, 1/4" x 3/8"JICF x 3/8"JICF x 17" |
| 34 | 1 | 812026018 | HOSE, 1/4" x 3/8"JICF x 3/8"JICF x 18" |
| 35 | 1 | 812206019 | HOSE, 3/8" x 3/8"JICF x 3/8"JICF 90° LONG x 19" |
| 36 | 2 | 812026031 | HOSE, 1/4" x 3/8"JICF x 3/8"JICF x 31" |
| 37 | 2 | 490198000 | FITTING 10SAE(M)/6JIC ELBOW 90 |
| 38 | 1 | 369611000 | ADAPTER, STR -6 ORM/ -4 ORF |
| 39 | 2 | 202755000 | FITTING, -10 SAE/-6 JIC, STR |
| 40 | 3 | 200876000 | FITTING 6 SAE/6 JIC STRAIGHT |
| 41 | 4 | 738647000 | SCREW HX HD 1/2-13UNC X 1 1/4 LG GR8 |
| 42 | 4 | 021600000 | WASHER FL 1/2 |
| 43 | 5 | 020600000 | WASHER 5/16 LOCK SS |
| 44 | 5 | 007807000 | SCREW HX HD 5/16-18UNC X 3/4 LG GR5 |
| 45 | 10 | 021200000 | WASHER FL 3/8 |
| 46 | 3 | 330372000 | NUT HX 3/8 NC GR5 |

Pedestal Assembly P/N: 404241205 13

| ITEM NO. | QTY | PART NO. | DESCRIPTION |
|----------|-----|-----------|---|
| 47 | 3 | 366159000 | SCREW HX HD 3/8-16UNC X 1 1/2 LG GR8 |
| 48 | 1 | 320991306 | POWER UNIT, NEXSTAR 3203/4004 EH |
| 49 | 5 | 460094000 | SCREW, SOC HD, #10-24 X 1"L, ZPL |
| 50 | 5 | 015801000 | NUT HX NYLK #10-24UNC ZP |
| 51 | 5 | 020000000 | WASHER FL #10 ZP |
| 52 | 1 | 320991294 | KIT, HARNESS SMALL EH FM NEXSTAR III |
| 53 | 1 | 320991233 | MASTER SWITCH ASSY |
| 54 | 1 | 320991269 | HARNESS, ELEC SMALL EH FM NEXSTAR III |
| 55 | 1 | 320991291 | CABLE, 2GA 5/16 TERM 24LG |
| 56 | 1 | 320991293 | CABLE, 2GA, 1/4-3/8 TERM, 72"LG |
| 57 | 1 | 320991264 | KIT, ELEC/HYD 3203PRX/4004EH FM NS III |
| 58 | 1 | 366823255 | TRANSDUCER, PRESSURE 0-3000 PSI |
| 59 | 1 | 320991251 | VALVE BLOCK, 3203PRX/4004EH PROPORTIONAL |
| 60 | 1 | 366823963 | TRANSCIEVER, NEXSTAR III |
| 61 | 3 | 017301000 | NUT HX NYLK 3/8-16UNC CP |
| 62 | 1 | 320991224 | COVER, VALVE/RECIEVER NEXSTAR |
| 63 | 1 | 404241254 | TAG, ID 4004EH NS III W/ROT STOPS |
| 64 | 1 | 320991223 | BRACKET, LOWER VALVE & RECEIVER, 3203/4004 EH |
| 65 | 1 | 320991222 | BRACKET, UPPER VALVE 3203/4004 EH |
| 66 | 2 | 009109000 | SCREW HX HD 3/8-16UNC X 1 1/2 LG |
| 67 | 1 | 366823240 | PIN, 3/16 W/LANYARD |
| 68 | 1 | 320989216 | BRACKET, SWITCH MNT, ROT STOP, 3203 PR/PRX |
| 69 | 4 | 006210000 | CAPSCREW-#8-32 X 7/8 LG SOC HD Z/P |
| 70 | 4 | 019700000 | WASHER SP LK #8 |
| 71 | 4 | 725321000 | NUT HX NYLK #8-32UNC |
| 72 | 1 | 366673000 | PIN, ROTATION STOP |
| 73 | 1 | 460079000 | BEARING, ROTATION STOP |
| 74 | 1 | 366671000 | ARM, ROTATION STOP |
| 75 | 1 | 320991220 | WELDMENT, GEAR COVER |
| 76 | 1 | 320989217 | COVER, ROTATION STOP, 3203 PR/PRX |
| 77 | 3 | 006200000 | SCREW HX HD 1/4-20UNC X 1 1/4 LG |
| 78 | 6 | 020200000 | WASHER SP LK 1/4 |
| 79 | 3 | 015900000 | NUT HX 1/4-20UNC SS |
| 80 | 2 | 005500000 | SCREW HX HD 1/4-20UNC X 3/4 LG |
| 81 | 1 | 460110100 | ROTATION STOP SWITCH ASSEMBLY, 24" |

14 Hoist Assembly P/N: 123331



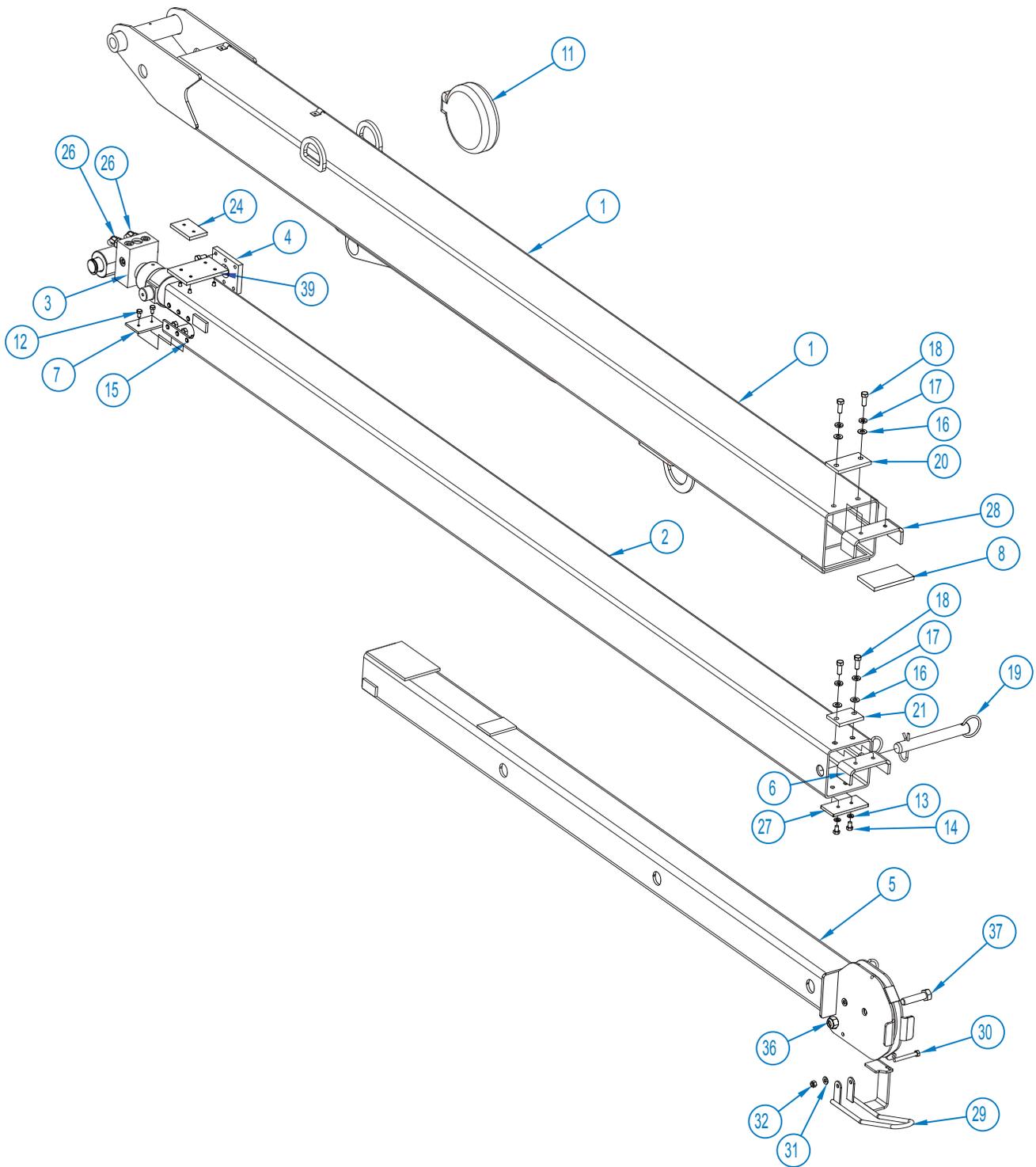
Hoist Assembly P/N: 123331 14

| ITEM NO. | QTY | PART NO. | DESCRIPTION |
|----------|-----|----------|-------------------------------------|
| 1 | 1 | 234189 | DRUM ASSEMBLY |
| 2 | 1 | 306042 | PISTON-BRAKE |
| 3 | 1 | 315004 | ANCHOR- CABLE |
| 4 | 1 | 338300 | END BRG-MOTOR END |
| 5 | 1 | 338301 | END BRG-GEAR HSG. |
| 6 | 1 | 338302 | HSG-BRAKE |
| 7 | 4 | 346045 | PIN-BRAKE |
| 8 | 1 | 357513 | SHAFT- INPUT |
| 9 | 2 | 408435 | SPACER - FOOT MOUNTING |
| 10 | 4 | 362284 | SPACER - TIE PLATE |
| 11 | 1 | 402120 | BEARING |
| 12 | 1 | 402121 | BEARING |
| 13 | 1 | 412084 | BUSHING-DRUM,MOTOR END |
| 14 | 1 | 412085 | BUSHING-DRUM,GEAR END |
| 15 | 4 | 414129 | CAPSCREW 5/16-18NCX3 LG HX HD GR-5 |
| 16 | 6 | 414303 | BOLT-3/8-16NC X2 1/2,HXHD,GR-5, Z/P |
| 17 | 8 | 414548 | CAPSCREW-1/2-13NCX1 1/2,HXHD,Z/P,G5 |
| 18 | 2 | 414854 | SCREW-1/4-20NCX1/2LG,RDHD,SLOT,Z/PL |
| 19 | 1 | 414926 | SETSCREW-3/8-16NC X1,SOCKET,NYLON |
| 20 | 2 | 414948 | CAPSCREW-1/2-13NCX1 1/4LG,SOCKET HD |
| 21 | 1 | 416016 | SETSCREW1/4-20NCX1/4 HX SOCK HD CUP |
| 22 | 1 | 416080 | SETSCREW-5/8-18NF X1 LG,HXSOCHD,CUP |
| 23 | 1 | 418036 | NUT-3/8-16 NC,HEX JAM,Z/P |
| 24 | 1 | 418088 | NUT-JAM 5/8-18NF HEX HD,ZINC PLT |
| 25 | 2 | 418218 | LOCKWASHER-1/2 ID MED SECT,ZINC PLT |
| 26 | 1 | 426048 | PLUNGER-CLUTCH,BLOCKED |
| 27 | 1 | 431015 | COUPLING-MOTOR |
| 28 | 2 | 432018 | FITTING |
| 29 | 4 | 438022 | DISC-BRAKE |
| 30 | 1 | 442220 | GASKET-BRAKE HSG. |
| 31 | 1 | 442223 | GASKET-MOTOR FLANGE |
| 32 | 1 | 444140 | GEAR-RING,P/M |
| 33 | 1 | 456038 | FITTING-VENT,BREATHER |
| 34 | 1 | 458222 | MOTOR-HYDRAULIC (RPH-4900) |
| 35 | 1 | 462046 | O-RING |
| 36 | 1 | 462056 | O-RING |
| 37 | 1 | 462057 | O-RING |
| 38 | 1 | 462058 | O-RING |
| 39 | 1 | 462059 | O-RING-BACK-UP |
| 40 | 1 | 462060 | O-RING-BACK-UP |
| 41 | 1 | 472052 | PLUG |
| 42 | 2 | 395426 | TIE PLATE |
| 43 | 5 | 474111 | PLATE-SEPARATOR, BRAKE |
| 44 | 1 | 486080 | SEAL |
| 45 | 1 | 490037 | SNAP RING |
| 46 | 6 | 494110 | SPRING-BRAKE |

14 Hoist P/N: 123331

| ITEM NO. | QTY | PART NO. | DESCRIPTION |
|----------|-----|----------|---------------------|
| 47 | 4 | 494112 | SPRING |
| 48 | 1 | 509009 | TUBE ASSY |
| 49 | 1 | 516068 | VALVE-MOTOR CONTROL |
| 50 | 1 | 518037 | THRUST WASHER |
| 51 | 1 | 518047 | THRUST WASHER |
| 52 | 1 | 518052 | THRUST WASHER |

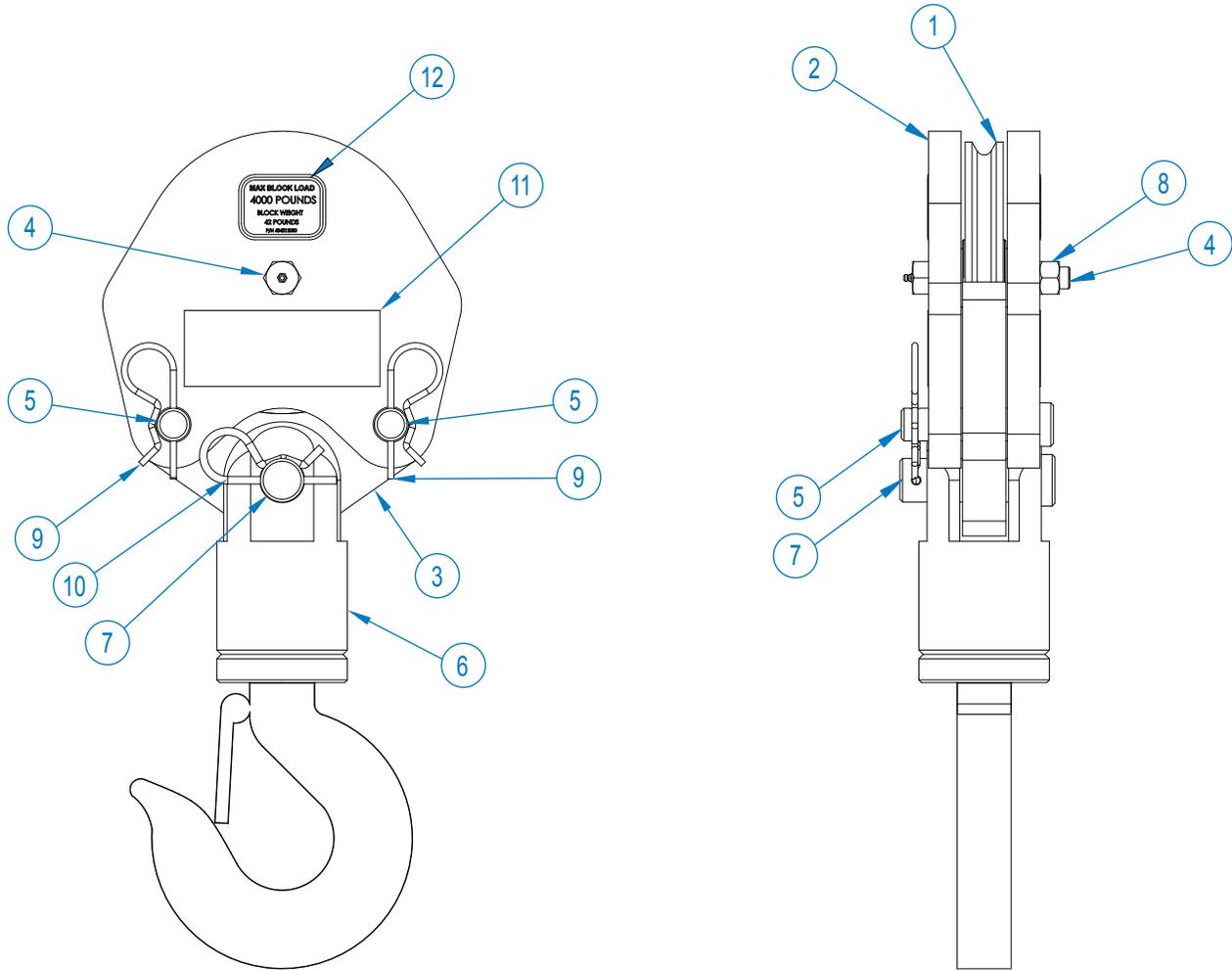
15 Boom Assembly P/N: 404240100



Boom Assembly P/N: 404240100 15

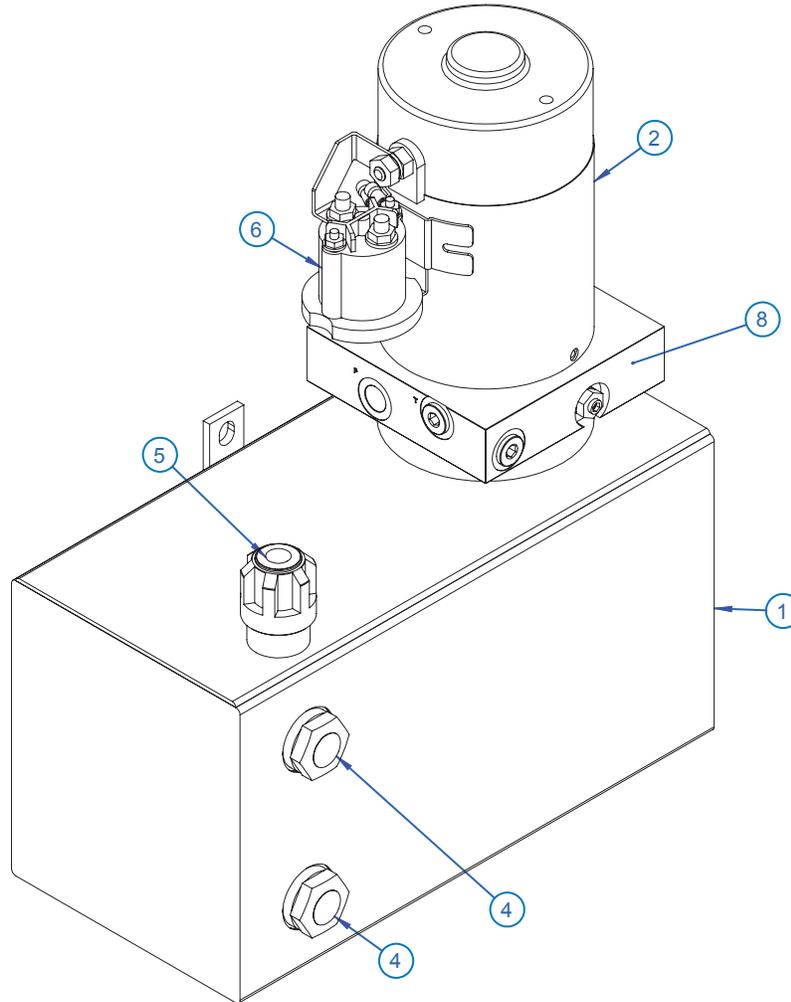
| ITEM NO. | QTY | PART NO. | DESCRIPTION |
|----------|-----|-----------|---|
| 1 | 1 | 404240002 | LOWER BOOM WELDMENT, 4004EH (20FT) |
| 2 | 1 | 404240004 | MID BOOM WELDMENT, 4004EH (20FT) |
| 3 | 1 | 404240010 | CYLINDER, EXTENSION, 72 INCH STROKE |
| 4 | 1 | 366184 | RETAINER, EXTENSION CYLINDER |
| 5 | 1 | 404186010 | UPPER BOOM WLDMT 4004, SINGLE SHEAVE |
| 6 | 1 | 366112 | STOP UPPER BOOM |
| 7 | 1 | 480120 | KB PAD |
| 8 | 1 | 360791000 | WEAR PAD 4.5 X 2.63 X .35 |
| 9 | 1 | 404204000 | PIN 1-1/4 DIA X 7.163 LG, 4004 |
| 10 | 2 | 480029 | RING RETAINING |
| 11 | 1 | 404205000 | CORD REEL ASSY |
| 12 | 6 | 005406 | SCREW HX HD 1/4-28UNF X 1/2 LG |
| 13 | 2 | 020600 | WASHER 5/16 LOCK SS |
| 14 | 2 | 007808 | SCREW 5/16-24UNF X 1/2 LG |
| 15 | 12 | 008400 | SCREW HX HD 3/8-16UNC X 3/4 LG GR 5 |
| 16 | 4 | 021200 | WASHER FL 3/8 |
| 17 | 4 | 021100 | WASHER SP LK 3/8 |
| 18 | 4 | 008800 | SCREW HX HD 3/8-24UNF X 1 LG |
| 19 | 1 | 366190000 | PIN ASSY W/LANYARD |
| 20 | 1 | 366201 | WEAR PAD 3.75 X 2.00 X .313 |
| 21 | 1 | 366202 | PAD, BOOM TOP |
| 22 | 1 | 239000 | ZERK DRIVE GR |
| 23 | 1 | 320858000 | BEARING, SPHERICAL 1.00 ID |
| 24 | 2 | 480036 | PAD BOOM SIDE |
| 25 | 2 | 200876 | FITTING 6 SAE/6 JIC STRAIGHT |
| 26 | 2 | 330647 | FITTING -6JIC SWIVEL NUT 45 DEG ELBOW |
| 27 | 1 | 366199 | PAD BOOM |
| 28 | 1 | 366183 | STOP CENTER BOOM |
| 29 | 1 | 320871000 | BAIL WELDMENT |
| 30 | 1 | 811029 | SCREW HX HD 5/16-18UNC X 2 1/2 LG |
| 31 | 4 | 020901 | WASHER FL 5/16 |
| 32 | 1 | 016801 | NUT HX NYLK 5/16-18UNC CP |
| 33 | 1 | 646900 | SWITCH, ANTI-TWO BLOCK |
| 34 | 1 | 642918 | CORD CONNECTOR |
| 35 | 1 | 366678000 | SPRING, EXTENSION |
| 36 | 1 | 018200 | NUT HX NY LK 5/8-11UNC |
| 37 | 1 | 366393 | SCREW HX HD 5/8-11UNC X 2 1/2 LG GR8 |
| 38 | 1 | 320883001 | SHEAVE ASSEMBLY, 4004 |
| 39 | 1 | 320988156 | BOOM PAD WITH NUTS, 4.75 X 3 X .313, 3203 |

16 Traveling Block Assembly P/N: 404211050



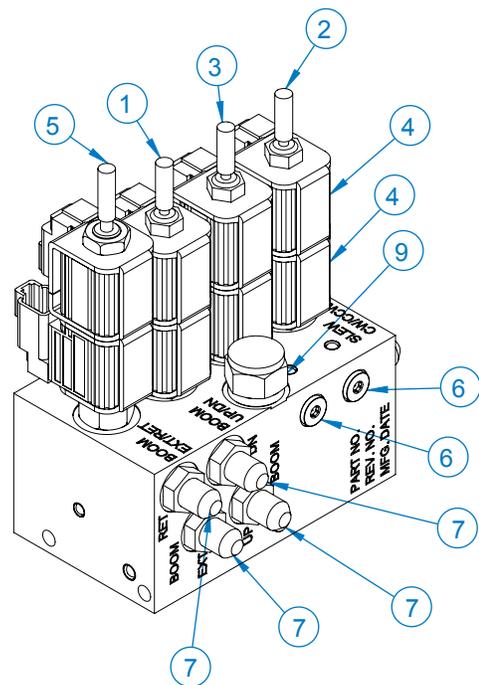
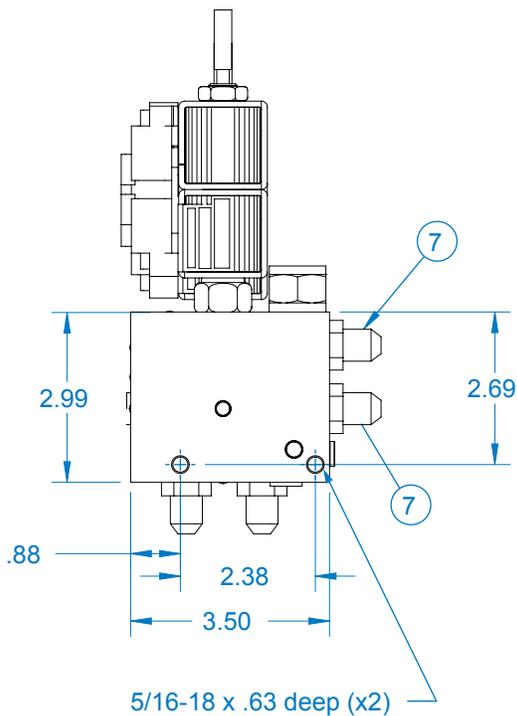
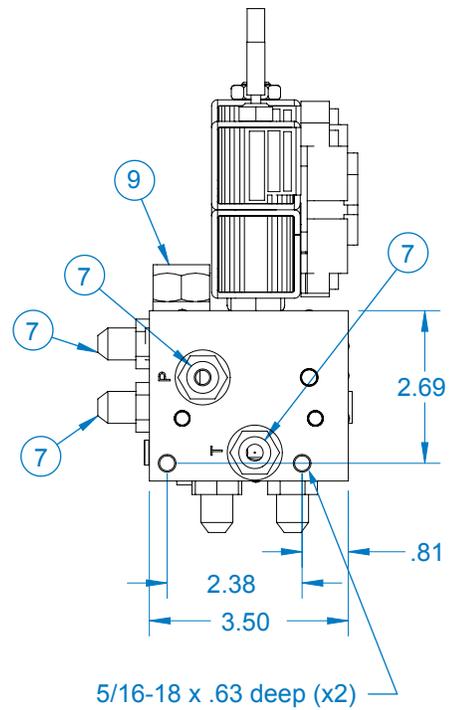
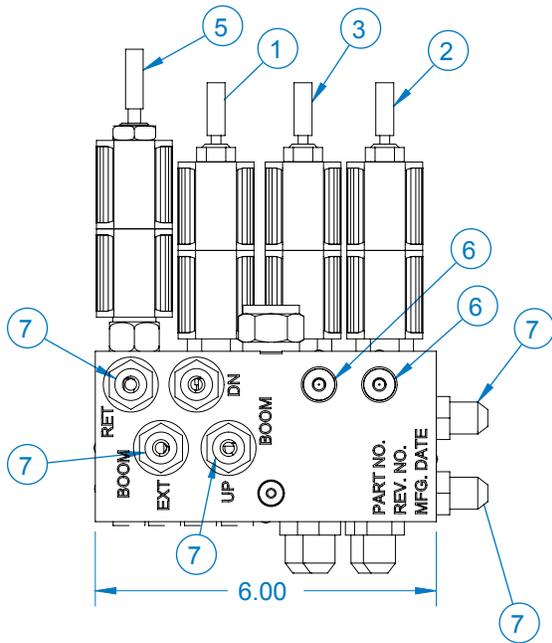
| ITEM NO. | QTY | PART NO. | DESCRIPTION |
|----------|-----|-----------|------------------------------|
| 1 | 1 | 480130 | SHEAVE ASSY |
| 2 | 2 | 480363 | SHORT BLOCK SIDE PLATE |
| 3 | 1 | 480364 | TACKLE LOWER |
| 4 | 1 | 480372 | BOLT, SHEAVE W/ ZERK FITTING |
| 5 | 2 | 480367 | PIN BLOCK |
| 6 | 1 | 480371 | HOOK SWIVEL 3 METRIC TON |
| 7 | 1 | 480368 | PIN SWIVEL HOOK |
| 8 | 1 | 017800 | NUT, HX LK 1/2-20UNF |
| 9 | 2 | 366813 | PIN HITCH |
| 10 | 1 | 360124 | PIN HITCH |
| 11 | 2 | 040518 | DECAL STAY CLEAR OF LOAD |
| 12 | 2 | 404212000 | DECAL MAX BLOCK LOAD 4004 |

Hydraulic Power Unit P/N: 320991306 17

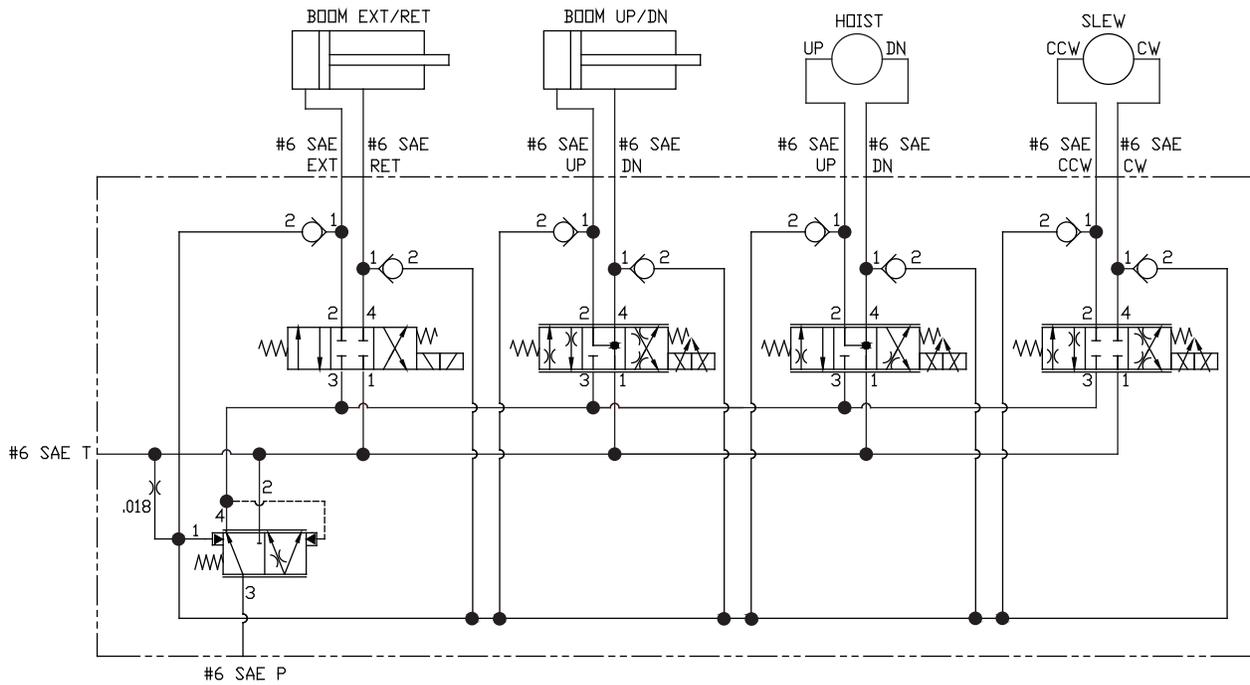


| ITEM NO. | QTY | PART NO. | DESCRIPTION |
|----------|-----|-----------|---------------------------------|
| 1 | 1 | 320991305 | TANK, NEXSTAR 3203/4004EH |
| 2 | 1 | 320991271 | MOTOR, NEXSTAR 3203/4004EH |
| 3 | 1 | 320991286 | PUMP, 3203/4004EH |
| 4 | 2 | 320991274 | GLASS, SIGHT USED W/320991270 |
| 5 | 1 | 320991275 | CAP, FILLER USED W/ 320991270 |
| 6 | 1 | 320991276 | STARTER, MOTOR USED W/320991270 |
| 7 | 1 | 320991277 | VALVE, RELIEF USED W/320991270 |
| 8 | 1 | 320991284 | BASE ASSEMBLY USED W/ 320991270 |
| 9 | 1 | 320991285 | O-RING USED W/320991270 |

18 Hydraulic Control Valve P/N: 320991251

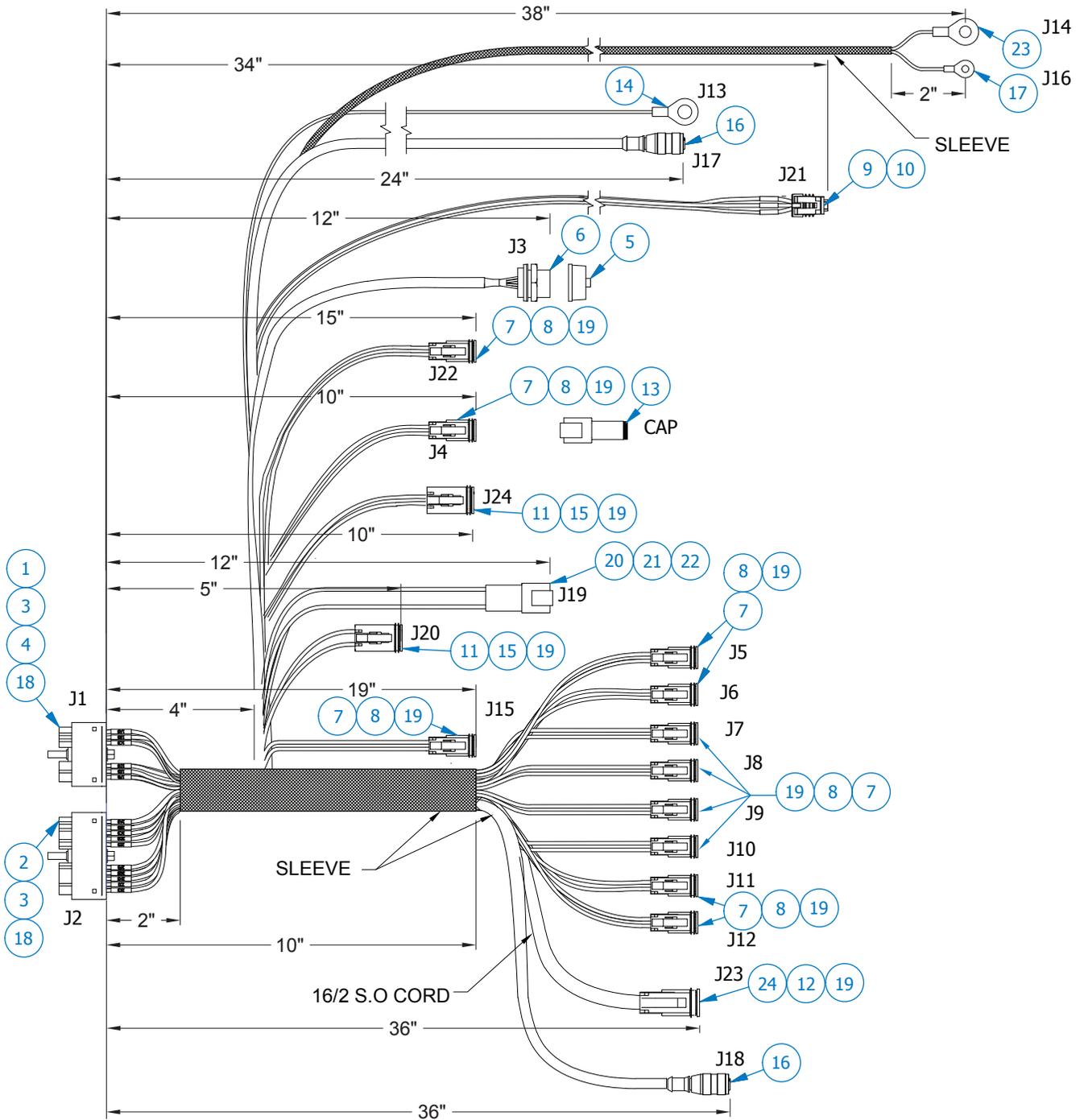


Hydraulic Control Valve P/N: 320991251 18



| ITEM NO. | QTY | PART NO. | DESCRIPTION |
|----------|-----|-----------|--|
| 1 | 1 | 320991914 | VALVE, CARTRIDGE PROPOTIONAL 3203/4004 NEXSTAR FLOAT CENTER |
| 2 | 1 | 320991912 | VALVE, CARTRIDGE PROPOTIONAL 3203/4004 NEXSTAR CLOSED CENTER |
| 3 | 1 | 320991913 | VALVE, CARTRIDGE PROPOTIONAL 3203/4004 NEXSTAR FLOATING CENTER |
| 4 | 8 | 320991901 | COIL, SOLENOID 12VDC 1/2" DIA |
| 5 | 1 | 320991902 | VALVE, CARTRIDGE 3203/4004 NEXSTAR |
| 6 | 8 | 320991905 | VALVE, CHECK SIZE 04 |
| 7 | 10 | 200876000 | FITTING 6 SAE/6 JIC STRAIGHT |
| 8 | 1 | 320991904 | ORIFICE, 1/4-20UNC 3/8LG 0.018 DIA |
| 9 | 1 | 320991903 | VALVE, LOGIC |

19 Harness P/N: 320991269

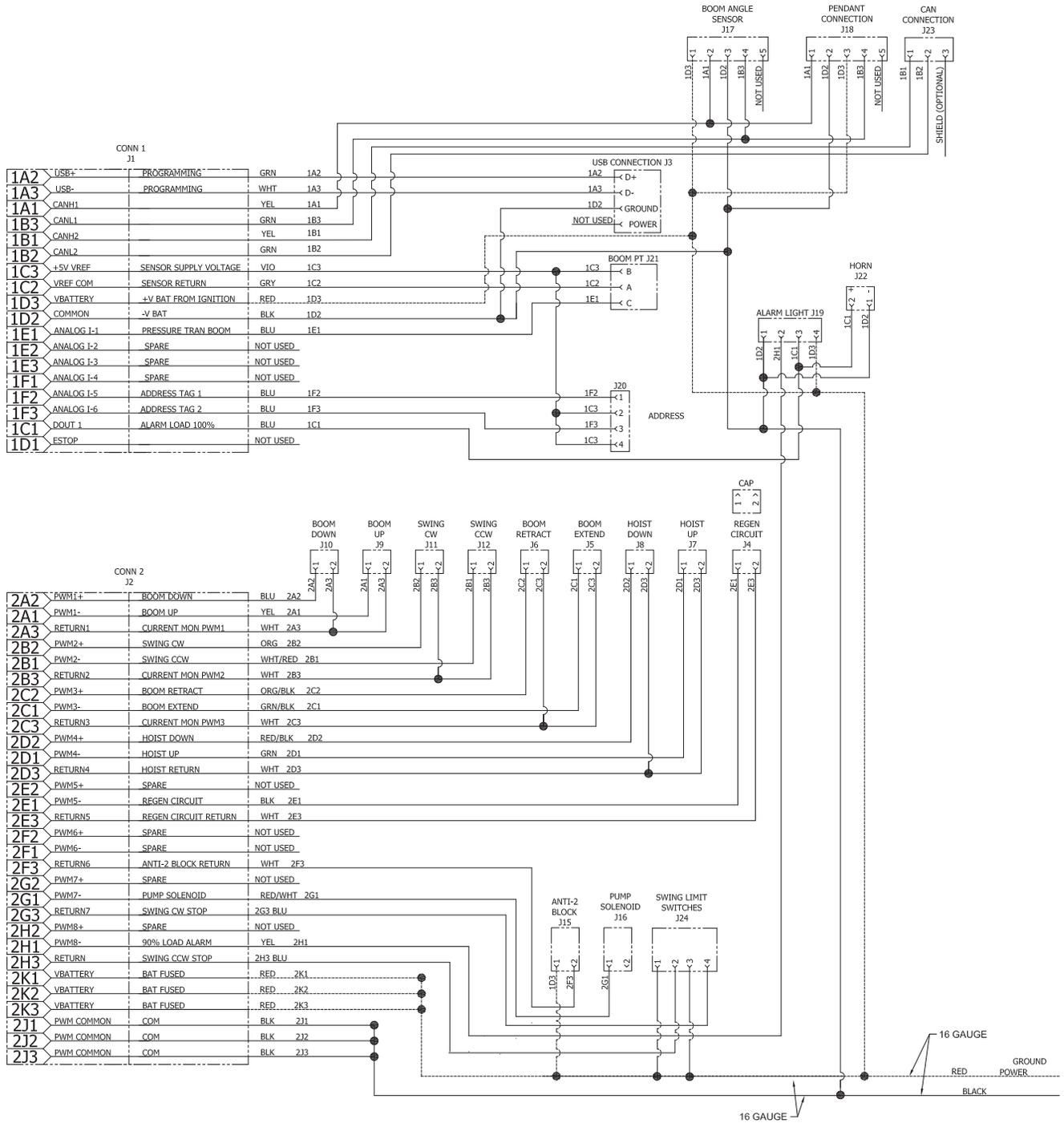


Harness P/N: 320991269 19

| ITEM NO. | QTY | PART NO. | DESCRIPTION |
|----------|-----|----------------------|---|
| 1 | 1 | 581-01-18-023 | 18 POSITION CONN |
| 2 | 1 | 581-01-30-029 | 30 POSITION CONN |
| 3 | 33 | 425-00-00-873/PCS | SOCKET CONTACT 16-18 AWG GXL |
| 4 | 2 | 425-00-00-872/PCS | SOCKET CONTACT 18-20 AWG TXL |
| 5 | 1 | WPCVR-USB-1394 | WATERPROOF COVER, USB |
| 6 | 1 | SP44180 | CABLE, WATER PROOF, USBB-F, 2PR X 22 AWG |
| 7 | 11 | DT06-2S | Deutsch DT Plug, 2-Pole "A" Key |
| 8 | 11 | W2S | Deutsch DT Wedgelock, 2-Pole |
| 9 | 1 | 12065287-B | ASM CONNECTOR 3F M/P |
| 10 | 3 | 12103881-L BIN STOCK | TERMINAL M/P 150 |
| 11 | 2 | DT06-4S | RECEPTACLE, 4 WAY |
| 12 | 1 | W3P-1939 | DEUTSCH WEDGE 3 WAY RECPT |
| 13 | 1 | DT04-2P-C017 | SEALED CONNECTOR CAP |
| 14 | 1 | | 3/8" TERMINAL RING 16GA |
| 15 | 2 | W4S | WEDGE LOCK |
| 16 | 2 | RK 4.4T-1 | MPS-CAN-M2 1 METER CAN CABLE |
| 17 | 1 | | #10 TERMINAL RING 16GA |
| 18 | 13 | 581-00-00-011 | CAVITY PLUGS |
| 19 | 34 | 0462-201-16141 | SOCKET CONTACT |
| 20 | 1 | DT04-4P | CAP SEALED 4 POLE |
| 21 | 1 | W4P | DEUTSCH WEDGELOCK |
| 22 | 4 | 0460-202-16141 | DEUTSCH TERM SIZE 16 PIN 16-20 AWG NICKEL |
| 23 | 1 | | 5/16" TERMINAL RING 16GA |
| 24 | 1 | DT04-3P-PO06 | DEUTSCH 3 WAY RECEPTACLE DT SERIES |

| CONNECTOR ID | | | |
|--------------|----------------------------|-----------|--------------------|
| CONNECTOR | DESCRIPTION | CONNECTOR | DESCRIPTION |
| J1 | RECIEVER 18 PIN CONNECTION | J13 | GROUND |
| J2 | RECIEVER 30 PIN CONNECTION | J14 | POWER |
| J3 | USB CONNECTION | J15 | ANTI-2 BLOCK |
| J4 | REGEN CIRCUIT | J16 | PUMP SOLENOID |
| J5 | BOOM EXTEND | J17 | BOOM ANGLE SENSOR |
| J6 | BOOM RETRACT | J18 | PENDANT CONNECTION |
| J7 | HOIST UP | J19 | ALARM LIGHT |
| J8 | HOIST DN | J20 | ADDRESS |
| J9 | BOOM UP | J21 | BOOM PT |
| J10 | BOOM DN | J22 | HORN |
| J11 | ROTATE CW | J23 | CAN CONNECTOR |
| J12 | ROTATE CCW | J24 | ROTATION STOPS |

20 Electrical Schematic P/N: 320991298





P.O. Box 580697 Phone: (918) 438-2760
4707 N. Mingo Rd. Tulsa, OK 74158-0697

LIMITED WARRANTY

1 YEAR PURCHASED REPLACEMENT PARTS

Auto Crane will warranty to the consumer for a period of (1) year from the date that a new Auto Crane replacement part was purchased from an authorized Auto Crane distributor. Each new Auto Crane part they sell will be free under normal use and service from defects in material and workmanship. Date of purchase will be honored as the date indicated on the Bill of Sale to the consumer.

The obligation of Auto Crane under this warranty does not apply to parts replaced under the limited warranty for a new Auto Crane product. The warranty for parts replaced under the limited warranty of a new Auto Crane product expires when the warranty for that product expires.

The obligation of Auto Crane under this warranty is limited to the replacement or repair of purchased replacement parts that appear to the manufacturer to be defective after review of documentation (Auto Crane Warranty Claim Form, photos, data etc.) provided by the Auto Crane distributor and/or inspection of parts returned to Auto Crane. This warranty does not obligate Auto Crane to bear labor costs to replace the defective parts or travel time charges in connection with the replacement or repair of defective parts. Responsibility for customer's claims arising from misapplication, abuse, misuse or alteration of equipment or parts lies with the distributor or user and no warranty obligation is assumed in these circumstances by Auto Crane.

Auto Crane will in no event be liable for any consequential damages or contingent liabilities arising out of the failure of any Auto Crane product or parts to operate properly

Auto Crane makes no warranty in respect to parts for component accessories, it being subject to the warranties of their respective manufacturers.

If field service, at the request of the distributor, is rendered and fault is found not to be with Auto Crane's product, the distributor shall pay the time and expense of the field representative.

Claims for service labor or other expenses that have incurred by the buyer without approval or authorization or Auto Crane will not be accepted

When applying for warranty claims may be handled by contacting your nearest authorized Auto Crane **Distributor. All claims are to be filed in writing on an Auto Crane Warranty Claim Form.**



P.O. Box 580697 Phone: (918) 438-2760
4707 N. Mingo Rd. Tulsa, OK 74158-0697

LIMITED WARRANTY 2 YEAR PARTS AND LABOR

Auto Crane will warranty to the consumer for a period of (2) years parts and labor from the date of purchase. Each new Auto Crane unit they sell will be free under normal use and service from defects in material and workmanship. Date of purchase will be honored as the date indicated on the Bill of Sale, which must accompany the Warranty Registration and be on file with Auto Crane. Absent a valid Warranty Registration and appropriate documentation, the original date of manufacture, as indicated by the serial number on the product, will be used to determine the effective date of the 2 year warranty.

The obligation of Auto Crane under this warranty is limited to the replacement or repair of parts that appear to the manufacturer after review and/or inspection to be defective and paid flat rate labor for replacing defective parts. This warranty does not obligate Auto Crane to bear the travel time charges in connection with the replacement or repair of defective parts. Responsibility for customer's claims arising from misapplication, abuse, misuse or alteration of equipment or parts lies with the distributor or user and no warranty obligation is assumed in these circumstances by Auto Crane.

Auto Crane will in no event be liable for any consequential damages or contingent liabilities arising out of the failure of any Auto Crane Product or parts to operate properly.

Auto Crane makes no warranty in respect to component accessories, it being subject to the warranties of their respective manufacturers.

If field service, at the request of the distributor, is rendered and fault is found not to be with Auto Crane's product, the distributor shall pay the time and expense of the field representative.

Claims for service labor or other expenses that have incurred by the buyer without approval or authorization or Auto Crane will not be accepted.

When applying for warranty, claims may be handled by contacting your nearest authorized Auto Crane Distributor. All claims are to be filed in writing on an Auto Crane Warranty Claim Form.

AUTO CRANE COMPANY IS UNDER NO OBLIGATION TO EXTEND THIS WARRANTY TO ANY CUSTOMER FOR WHICH AN AUTO CRANE DELIVERY REPORT FORM HAS NOT BEEN COMPLETED AND ON FILE WITH AUTO CRANE COMPANY

