SUMMIT

TRUCK BODIES

Safety, Installation, Maintenance, and Operation

6620 Telescopic Crane

MANUAL #700-20013

Revision Date 05/10/23

Summit Truck Bodies
990 Vernon Road
Wathena, KS 66090
866-985-3100
Fax: 785-989-3563
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SUMMIT TRUCK BODIES WARRANTY REGISTRATION

Fax Transmission

To: Warranty Department Fax: (785) 989-3563
From: Date:
Re: Production Registration Pages:

End user information: (Required for Warranty Activation)

Name: Phone
Address:
City State: Zip:
Contact: E-mail Address:

Distributor information: (Required for Warranty Activation)

Name: Phone
Address:
City State: Zip:
Contact: E-mail Address:

Product information: (Required for Warranty Activation)

Model Number: Serial Number:
Date Product Delivered: Date Processed:*
Original Vehicle Vin: *For Summit Use Only

ONE REGISTRATION FORM PER UNIT (CRANE OR BODY)

Registration form must be mailed or faxed within 30 days of customer installation.

Mail to:
Warranty Department
Summit Truck Bodies
990 Vernon Road
Wathena, KS 66090

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REVISION RECORD

Date	Section(s) or Page(s) Revised	Description of Change	Initials
01/30/09	Initial Release	Initial release of manual	
05/01/09	Section 5	Brought parts and graphics up to date	
03/01/10	1, 3, 13, 15, 17, 18, 21, 23, 26, 27, 28, 52	Updated Logo and various graphics	
7/15/10	1, 8, 9-12, 17, 20-22, 29-31, 34-39, 44	Updated text for clarification	
08/03/10	Full Manual	Edited typographical errors	
09/19/12	Full Manual	Updated with new crane design	
06/12/15	Section 2.6, 2.7, and 2.8	Updated sections adding phase II	
10/13/16	Page 69	Updated callouts on control valve view	
07/03/17	Section 2.9	Updated section adding phase III	
09/06/17	Full Manual	Updated contents	NB
03/16/18	Full Manual	Updated Contents	CG
11/06/18	Introduction	Warranty Info Update	CG
08/06/19	Crane Capacity	Updated Contents	CG
04/02/20	All Sections	Update to Current Status	R&D
07/06/20	Limited Warranty	Update to Current Status	CG
05/10/23	Safety, Chapter 1, 2, 3	Updated Maintenance	CG

Note:

1. The information contained in this manual is in effect at the time of this printing. It does not cover all instructions, configurations, accessories, etc. If additional information is required, please contact Summit Truck Bodies (866) 985-3100.
2. Summit Truck Bodies reserves the right to update this material without notice or obligation.

REVISION RECORD

Inspection Notes

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INTRODUCTION

READ CAREFULLY

Congratulations on your purchase. You are the owner of what we consider to be one of the leading cranes in the service body field. This crane will provide you with both quality and safety if you follow the guidelines of working with a well-maintained piece of equipment in a safe manner using the correct Personal Protective Equipment (PPE) for your work environment. Your crane carries a 5-year warranty on paint and weldments, a 1-year warranty on the remote system and 1-year warranty on parts.

For continued quality service, carefully read the information contained in this manual before operating the equipment. This manual provides basic guidelines for the safe and proper operation of the crane. After reading and understanding the material in this manual, work with the crane and safely learn basic operations.

To prevent injury or death, maintain the crane, operate it safely, and know your surroundings. Be cautious of such things as overhead wiring, overloading of the crane, and side loading of the crane, and wear prescribed PPE.

The operator must have a working knowledge of existing federal, state, and local codes and regulations governing the safe use and maintenance of this crane.

This crane was tested to conform to the following code:

ASME B30.5a
Test Documented On: December 20, 2014
MOBILE AND LOCOMOTIVE CRANES
The American Society of Mechanical Engineers

This crane carries a warranty, but the warranty will be null and void if the crane is misused or abused by overloading, side loading, pulling a load through open terrain, lack of maintenance as directed in this manual, or making modifications to the crane without the expressed permission of Summit Truck Bodies, in writing.

Treat the equipment with respect and service it regularly.

These two things can add up to a safer working environment, longer equipment life, and prevention of loss of life and limb

Summit Truck Bodies issues a limited warranty certificate with each unit sold. See warranty information located in this manual. (Chapter 9)

Distributor Assistance:

Should you require any assistance not given in this manual, we recommend you consult your nearest Summit Truck Bodies 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 Summit Truck Bodies at the following telephone number: (866) 985-3100.** The information contained in this manual is in effect at the time of this printing. Summit Truck Bodies reserves the right to update this material without notice or obligation.

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SAFETY

To prevent serious injury or death, thoroughly read this chapter. Make sure safety practices discussed in this chapter are put into practice when operating the crane or truck (any vehicle or structure the crane has been mounted on). This chapter is **NOT** all-inclusive. Become familiar with all other safety precautions implemented by the company, owner of the equipment, or state and federal government.

Make sure the work environment is safe.

Know the surroundings. Be aware of the following:

- Power lines
- Ground condition not allowing for solid footing
- Lack of PPE at the job site

Safety should be the number one priority from the beginning to the end of each job. The following safety requirements listed provide basic requirements for safety on the job.

To qualify as a safe operator first know and understand the equipment.

- Know the limitations of the crane. Do not overload the crane. Overloading the crane may lead to either gradual or sudden failure of structural components of the crane.
- Properly maintain the equipment. If not kept clean and in working order, the crane will likely malfunction. Follow a preventive maintenance schedule as described in the Maintenance chapter of this manual and OSHA § 1926.1412 and a routine visual inspection of the crane by the operator, before the start of any job; however, routine visual inspections alone are not a sufficient preventative maintenance schedule.
- The operator must have a working knowledge of all safety and government regulations. Refer to current Occupational Safety and Health Administration (OSHA) manual for guidance. Summit Truck Bodies is not liable for accidents caused by the operation of the crane.

Safety Tips

- The truck or mounting structure should be equipped with a fire extinguisher and first-aid kit.
- Use best practices with PPE.
- Avoid any type of body jewelry that might get caught on moving objects.
- Avoid using moving parts of the truck or mounting structure as a foothold or handhold. Use the grab bars and steps designed for this purpose.
- Avoid walking under a load.
- Never use the crane as a mode of transportation from the ground level to an elevated surface unless properly equipped with approved personnel moving provisions.

General

The equipment owner is responsible to establish a training process for the operators. Qualified personnel should be established before starting any job. As with any equipment, be it a motor vehicle or machinery, this equipment should not be operated by anyone under the influence of alcohol, drugs, or prescription medication, or any substance that impairs the operator physically, mentally, or physiologically.

Personal Safety

The use of PPE is critical to the safety of the operation and the well being of the operator. The following PPE (this list is not all-inclusive) should be used in the safe operation of the crane:

- Protective helmets
- Safety shoes, preferably steel toed
- Cut proof gloves, preferably snug fitting
- Ear plugs or any form of hearing protection
- Safety glasses or shields
- Reflective vests

Follow the established safety rules and regulations. If the established rules and regulations are not available, consult the appropriate OSHA manual.

Routine inspection of the safety decals must be performed for the safety of the operator. Make sure all decals are legible and in good condition. Replace any and all missing or damaged labels.

When performing maintenance follow these safety guidelines:

- Disengage the power source before working on the equipment.
- There is stored hydraulic pressure in the hydraulic lines. Stored hydraulic pressure must be released prior to working on the crane components or any part of the hydraulic system.
- Stay clear of all moving parts of the equipment. Failure to do so could cause equipment failure, personal injury, or death.
- Only trained and competent personnel should record and perform maintenance.
- Never bypass electrical circuits and/or hydraulic plumbing. Failure to do so could cause equipment damage, injury, or death.

Stability

- Never exceed the crane capacity chart or the stability chart. These ratings are based on tested capacities of the truck or mounting structure, the structural design or the crane, and mechanical abilities of the crane's components.
- Be aware of the limitations of the crane. Improper use of the crane could cause damage to the crane, service truck, lifted load, surroundings, and cause injury or death.
- Park the truck on level ground if possible, use outrigger pads if needed, and always fully extend the outriggers out and then down.
- Be aware of the surroundings when lowering outriggers. Stay clear of outriggers when lowering.
- Never operate the crane before the truck or structure is positioned on stable, level ground.
- Put the truck in park or neutral (for manual transmissions), and set the parking brake before attempting a lift.

Load Safety

Before lifting a load, know the weight of the load that will be lifted. Consult the capacity chart and stability chart located on the rear of the truck if applicable, comparing the two to ensure the crane will safely handle the job.

The crane has a safety built into the remote and receiver to prevent an overload, but like any mechanical device, it can be overridden by an operator. Please be advised that if this happens, **the warranty is null and void**. Consult with our service department to return the crane safety features back to the required setting established at the plant.

The traveling block is equipped with a safety hook at the point of attachment to a load. Always make sure the load is secured to the hook with the safety latch in the closed position prior to lifting the load. Directions can be found in an applicable OSHA manual.

- The gear rotation mechanism is equipped with a ring and pinion gear. These are not designed for side loading of the crane, which will result in failure of the gears.
- A load suspended overhead should be avoided; never walk under one.
- When leaving the crane, lower the load to the ground. Failure to do so can result in injury or death if the load were to become unstable while unattended.
- Keep all people away from the suspended load; never position the load over a person.
- Dragging the load with either the winch or the boom will result in damage to the equipment and could cause injury to the people around the load.
- The crane boom is designed to lift; it is not intended to be used to force downward pressure on any type of operation.

Environment

The crane operates at maximum performance if there is a good preventive maintenance program in place. The work site is generally full of contaminants, so weekly washing of the truck and/or crane is a good prevention tool. The use of lubricants on mechanical parts on the equipment should be followed on a weekly, monthly, and quarterly basis. Prevention of the general wear and tear due to corrosives is insurance that the machine will last.

- Avoid using the crane at the highest point during a storm.
- Keep crane at the prescribed clearance from all power lines.

If operating the truck in extreme cold, follow these guidelines to prevent equipment failure or damage to hydraulic system components:

- Start the truck and let it run for 15 minutes before engaging the Power Take Off (PTO).
- With the PTO engaged, wait an additional 15 minutes prior to operating the compressor or crane. This allows the systems to warm up before putting them under pressure.
- Do not rev the truck engine with the PTO engaged. This will damage the hydraulic pump and other hydraulic system components.
- Make sure guidelines attached to the truck owner's manual for extreme cold conditions are read and followed to allow for maximum performance of the truck.

Maintenance Safety

The Summit Truck Bodies truck or crane is designed for years of use. Do not modify the components or the systems of the truck or crane. This will cause damage to the equipment and impede the functions of the truck.

Electrocution

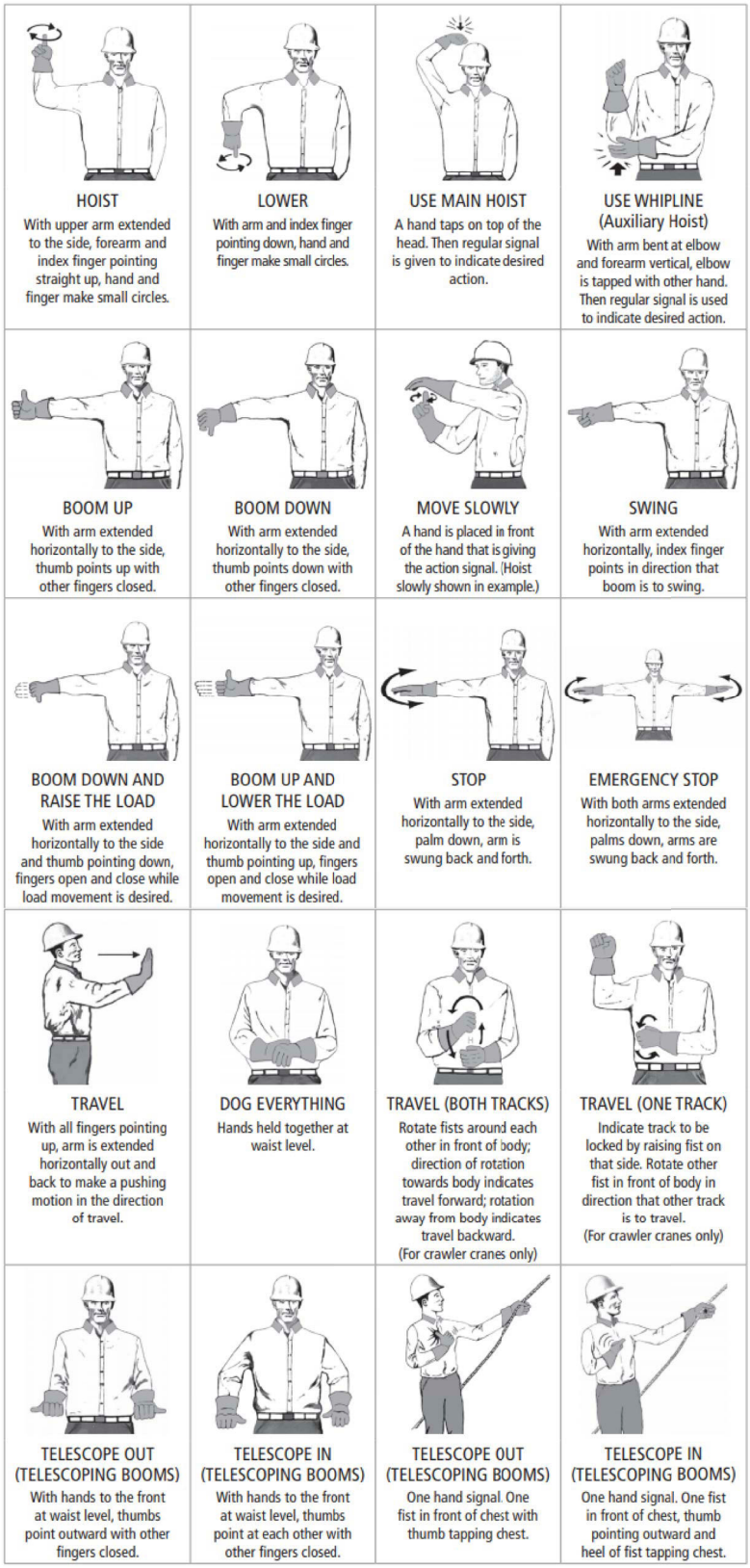
- Use extra personnel to signal when operating near electrical wires.
- Keep at least distance between any portion of the crane and an electrical line. See Table A
- Allow extra space during windy conditions for swaying power lines.
- Death or serious injury can occur when working during electrical storms or near power lines.

TABLE A—MINIMUM CLEARANCE DISTANCES

Voltage (nominal, kV, alternating current)	Minimum clearance distance (feet)
up to 50	10
over 50 to 200	15
over 200 to 350	20
over 350 to 500	25
over 500 to 750	35
over 750 to 1,000	45
over 1,000	(as established by the utility owner/operator or registered professional engineer who is a qualified person with respect to electrical power transmission and distribution).

Note: The value that follows "to" is up to and includes that value. For example, over 50 to 200 means up to and including 200kV.

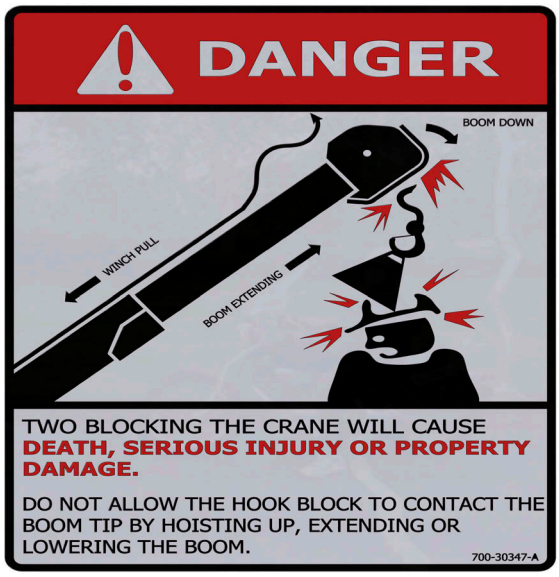
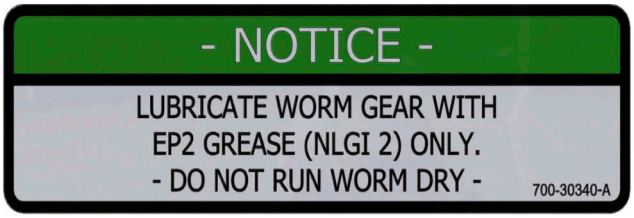
Table A [OSHA 1926.1408]

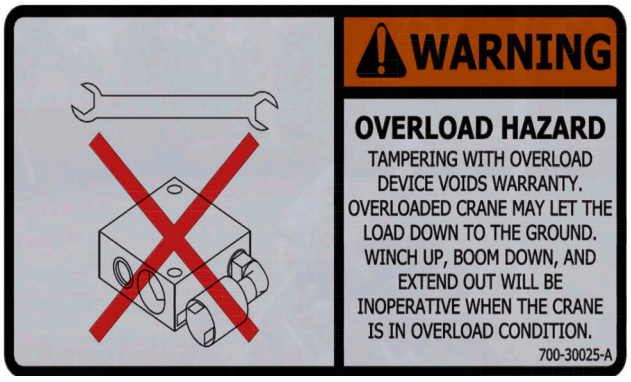


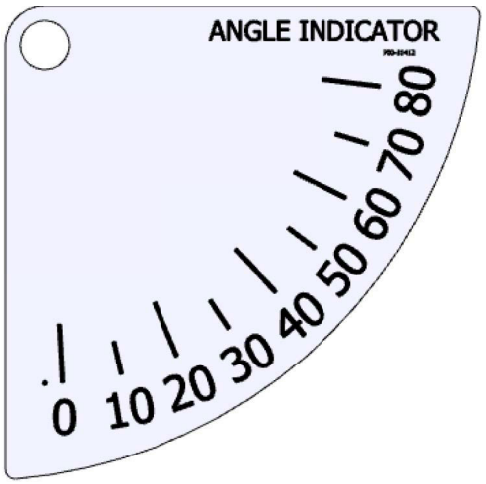
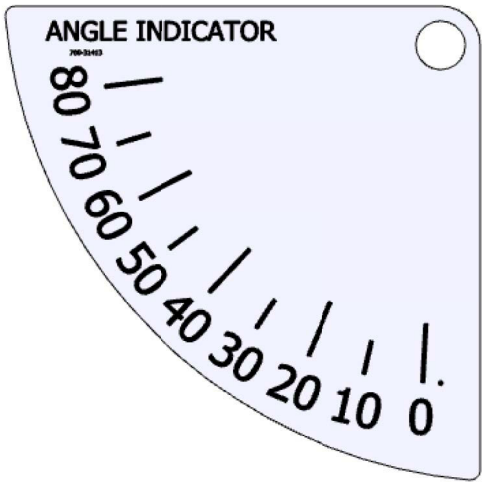
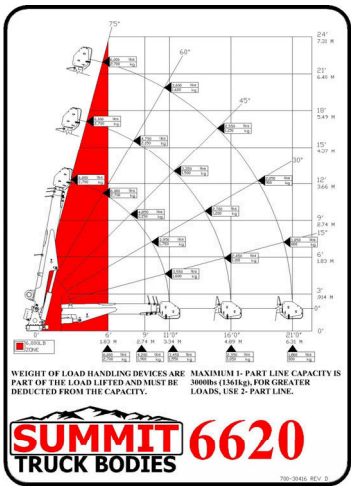
HOIST With upper arm extended to the side, forearm and index finger pointing straight up, hand and finger make small circles.	**LOWER** With arm and index finger pointing down, hand and finger make small circles.	**USE MAIN HOIST** A hand taps on top of the head. Then regular signal is given to indicate desired action.	**USE WHIPLINE (Auxiliary Hoist)** With arm bent at elbow and forearm vertical, elbow is tapped with other hand. Then regular signal is used to indicate desired action.
BOOM UP With arm extended horizontally to the side, thumb points up with other fingers closed.	**BOOM DOWN** With arm extended horizontally to the side, thumb points down with other fingers closed.	**MOVE SLOWLY** A hand is placed in front of the hand that is giving the action signal. (Hoist slowly shown in example.)	**SWING** With arm extended horizontally, index finger points in direction that boom is to swing.
BOOM DOWN AND RAISE THE LOAD With arm extended horizontally to the side and thumb pointing down, fingers open and close while load movement is desired.	**BOOM UP AND LOWER THE LOAD** With arm extended horizontally to the side and thumb pointing up, fingers open and close while load movement is desired.	**STOP** With arm extended horizontally to the side, palm down, arm is swung back and forth.	**EMERGENCY STOP** With both arms extended horizontally to the side, palms down, arms are swung back and forth.
TRAVEL With all fingers pointing up, arm is extended horizontally out and back to make a pushing motion in the direction of travel.	**DOG EVERYTHING** Hands held together at waist level.	**TRAVEL (BOTH TRACKS)** Rotate fists around each other in front of body; direction of rotation towards body indicates travel forward; rotation away from body indicates travel backward. (For crawler cranes only)	**TRAVEL (ONE TRACK)** Indicate track to be locked by raising fist on that side. Rotate other fist in front of body in direction that other track is to travel. (For crawler cranes only)
TELESCOPE OUT (TELESCOPING BOOMS) With hands to the front at waist level, thumbs point outward with other fingers closed.	**TELESCOPE IN (TELESCOPING BOOMS)** With hands to the front at waist level, thumbs point at each other with other fingers closed.	**TELESCOPE OUT (TELESCOPING BOOMS)** One hand signal. One fist in front of chest with thumb tapping chest.	**TELESCOPE IN (TELESCOPING BOOMS)** One hand signal. One fist in front of chest, thumb pointing outward and heel of fist tapping chest.

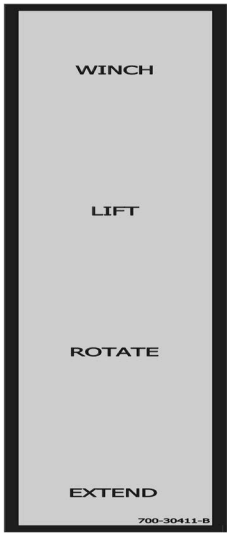
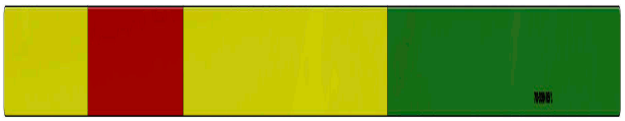
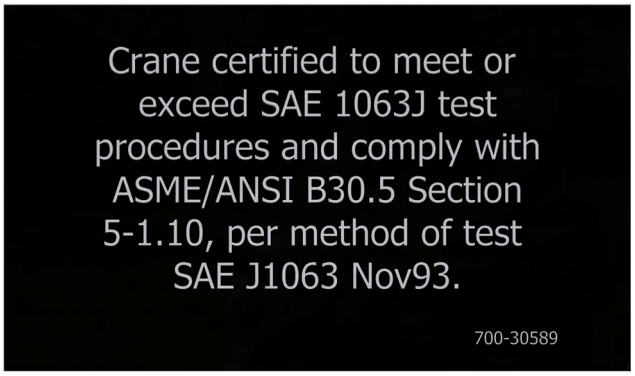
[ASME B30.5 5-3.3.4]

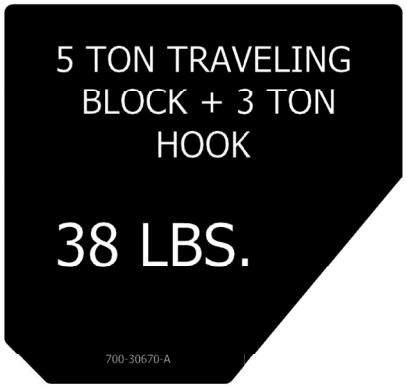
LABELS AND DECALS

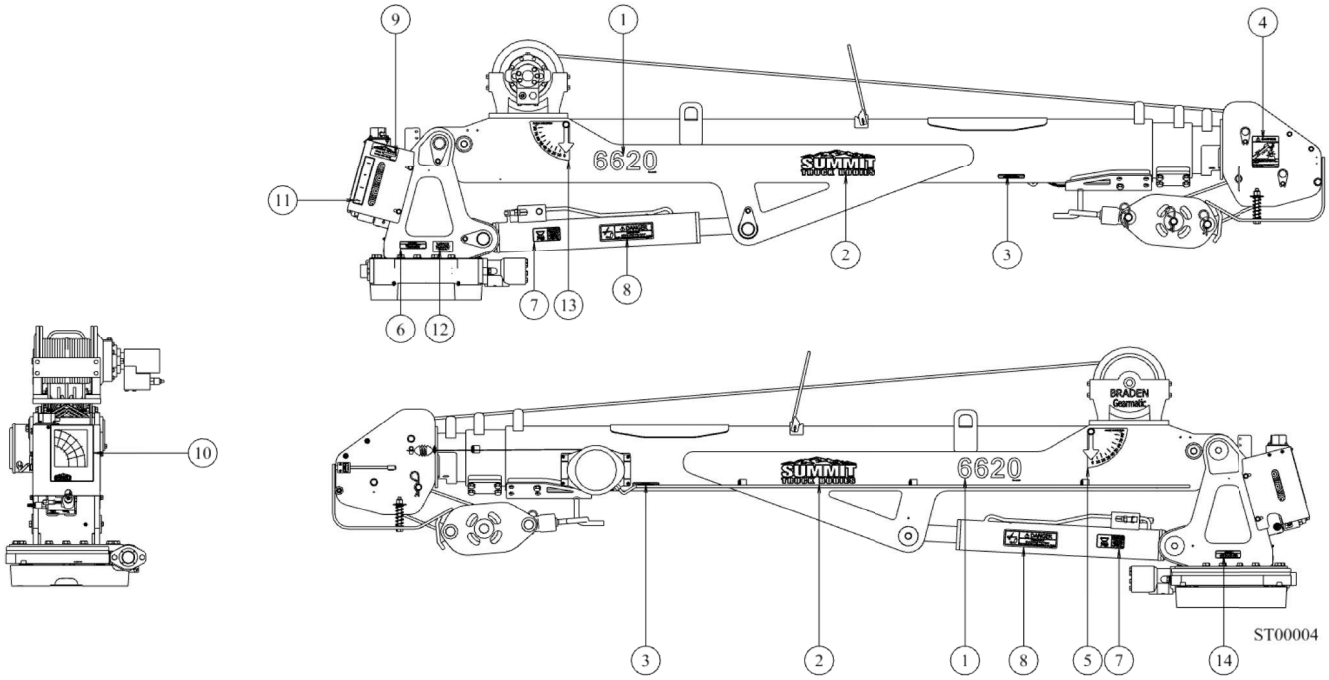
Decal Number: **Title:** **Description:** **Location:**	700-30347 Danger, Two Blocking Crane Informs the operator not to allow the hook block to come into contact with the boom tip by hoisting up, extending, or lowering the boom tip. Boom Tip	
Decal Number: **Title:** **Description:** **Location:**	700-30340 Notice, Lubricate Worm Gear Informs the operator to inspect the worm gear. Do not run the worm gear dry. Pedestal	
Decal Number: **Title:** **Description:** **Location:**	700-30339 Caution, Do Not Use Stow Hook for Lifting Informs the operator not to use the stow hook for lifting purposes. Base boom section by stow hook	
Decal Number: **Title:** **Description:** **Location:**	700-30373 White Outline Logo Identifies Summit Truck Bodies as the crane manufacturer. Both sides of the base boom	

Decal Number: **Title:** **Description:** **Location:**	700-30153 6620 Crane ID Identifies size and reach of the crane. Base boom sections on both sides of the base	
Decal Number: **Title:** **Description:** **Location:**	700-30131 Danger Scissor Point Notifies the operator of a potential scissor point. Both sides of the lift cylinder	
Decal Number: **Title:** **Description:** **Location:**	700-30025 Warning, Overload Hazard Notifies operator not to tamper with the overload device. Both sides of the lift cylinder	
Decal Number: **Title:** **Description:** **Location:**	700-30342 Notice, Crane Designed Informs the operator this crane has been designed and manufactured to ASME/ANSI. Pedestal	

Decal Number: **Title:** **Description:** **Location:**	700-31412 Angle Indicator Informs the operator of the angle. Left side base boom	
Decal Number: **Title:** **Description:** **Location:**	700-31413 Angle Indicator Informs the operator of the angle. Right side base boom	
Decal Number: **Title:** **Description:** **Location:**	700-30416 Capacity Chart, 6620 Informs operator of the lifting capacity of the crane. Cover panel of valve assembly	

Decal Number: **Title:** **Description:** **Location:**	700-30411 Crane Solenoid Override Informs operator of solenoid override locations. Cover panel of valve assembly	
Decal Number: **Title:** **Description:** **Location:**	700-30403 Serial Number, Model 6620 Informs operator of the model and serial number of the crane. Cover panel of valve assembly	
Decal Number: **Title:** **Description:** **Location:**	700-30364 Crane Color Zone Helps to identify possible dangers in load capacity zones. Rotation gear	
Decal Number: **Title:** **Description:** **Location:**	700-30589 Certification Statement Informs operator that the crane capacity is certified. Pedestal side plate	

Decal Number: **Title:** **Description:** **Location:**	700-30670 5 Ton Traveling Block Displays capacity of traveling block, hook, and weight of traveling block. Traveling Block	
Decal Number: **Title:** **Description:** **Location:**	700-30157 Danger, Stay Clear Informs operator to stay clear of load. Traveling Block	



ITEM	PART NUMBER	DESCRIPTION
1	700-30153	6620 Crane ID
2	700-30373	White Outline Logo
3	700-30339	Caution, Do Not Use Stow Hook For Lifting
4	700-30347	Danger, Two Blocking Crane
5	700-31412	Angle Indicator Left
6	700-30340	Notice, Lubricate Worm Gear
7	700-30025	Warning, Overload Hazard
8	700-30131	Danger, Scissor Point
9	700-30403	Serial Number, Model 6620
10	700-30416	Crane Capacity Chart, 6620
11	700-30411	Crane Solenoid Override
12	700-30589	Certification Statement
13	700-31413	Angle Indicator Right
14	700-30342	Crane Design Statement

SPECIFICATION SHEET

Specifications Model 6620 Crane*

Crane Rating:	38,000 ft-lb (5.25 ton-meters)
Retracted Horizontal Lifting Radius:	11 ft (3.35 m) from CL of crane
Boom Extension:	1st stage: Hydraulic 60 in. (152.4 cm) 2nd stage: Hydraulic 60 in. (152.4 cm)
Extended Horizontal Reach:	20 ft 9 in (6.32 m) from CL of crane
Maximum Vertical Lift: (from crane base)	22 ft (6.71 m)
Boom Elevation:	-5 to + 75 degrees
Stowed Height (crane only)	32.5 in. (82.6 cm)
Mounting Space Required	21 x 25 in. (53.3 cm x 63.5 cm)
Approximate Shipping Weight	1,750 lbs (794 kg)
Controls	Radio control standard for all functions.
Winch Specification	
Rope Diameter:	0.375 in. (0.953 cm)
Line pull speed:	60 ft/min (18.29 m/min)
Max. Synthetic line:	6,000 lb (2,722 kg)
Max. two part line:	6,000 lb (2,722 kg)
Rotation: (worm gear)	400-degree power
Lifting Capacities	6,000 lb @ 6 ft (2,700 kg @ 1.83 m)
	4,200 lb @ 9 ft (1,900 kg @ 2.75 m)
	3,450 lb @ 11 ft (3,450 kg @ 3.35 m)
	2,350 lb @ 16 ft (2,350 kg @ 4.88 m)
	1,800 lb @ 21 ft (1,800 kg @ 6.40 m)
Hydraulic Requirements	PTO and Pump
	(8 gpm @ 2800 psi)

*Subject to change without notification

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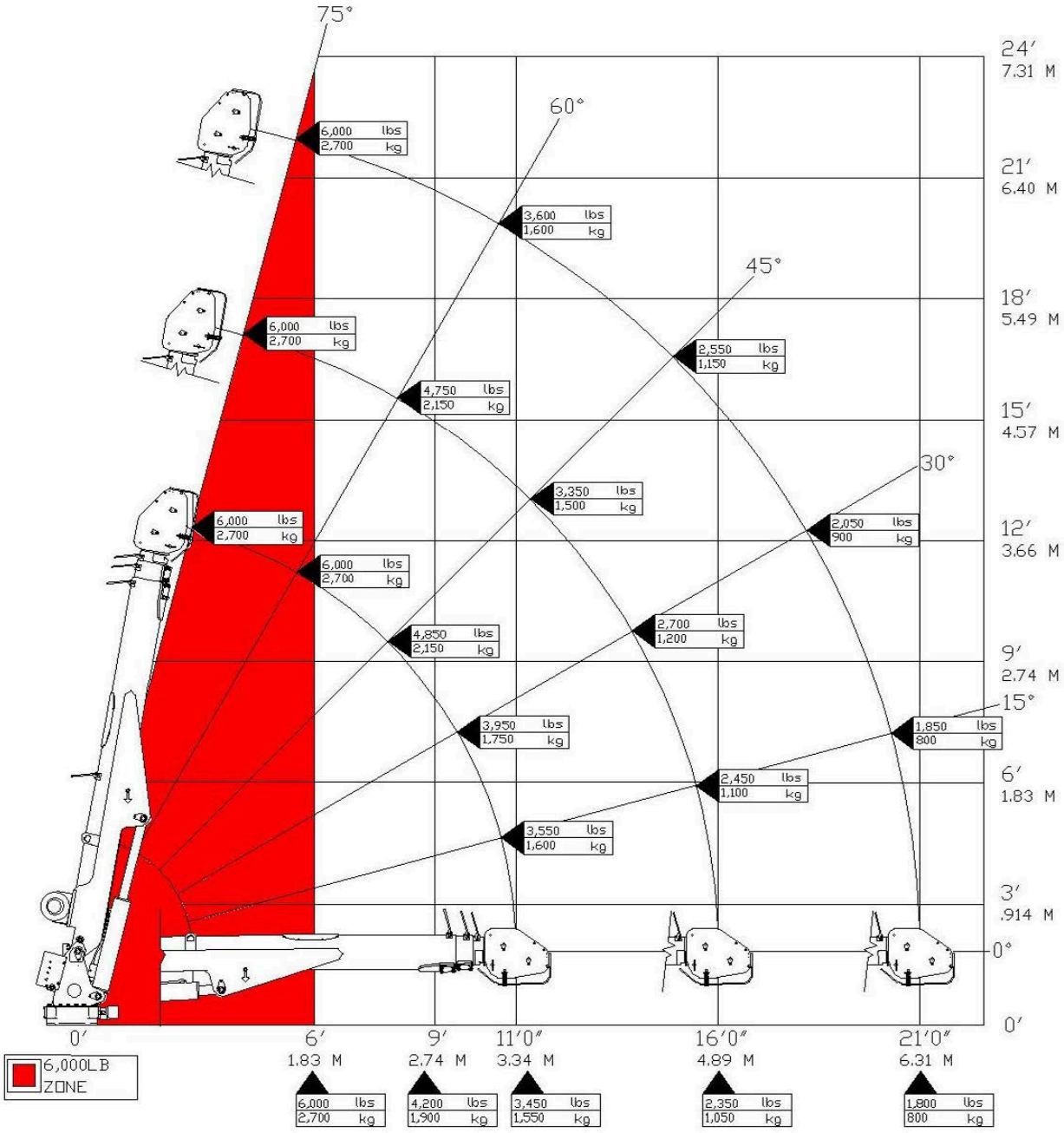
CRANE CAPACITY



WEIGHT OF LOAD HANDLING DEVICES ARE PART OF THE LOAD LIFTED AND MUST BE DEDUCTED FROM THE CAPACITY.

MAXIMUM SINGLE PART LINE CAPACITY IS 3,000 LB (1,361 KG). FOR GREATER LOADS, USE 2-PART LINE.

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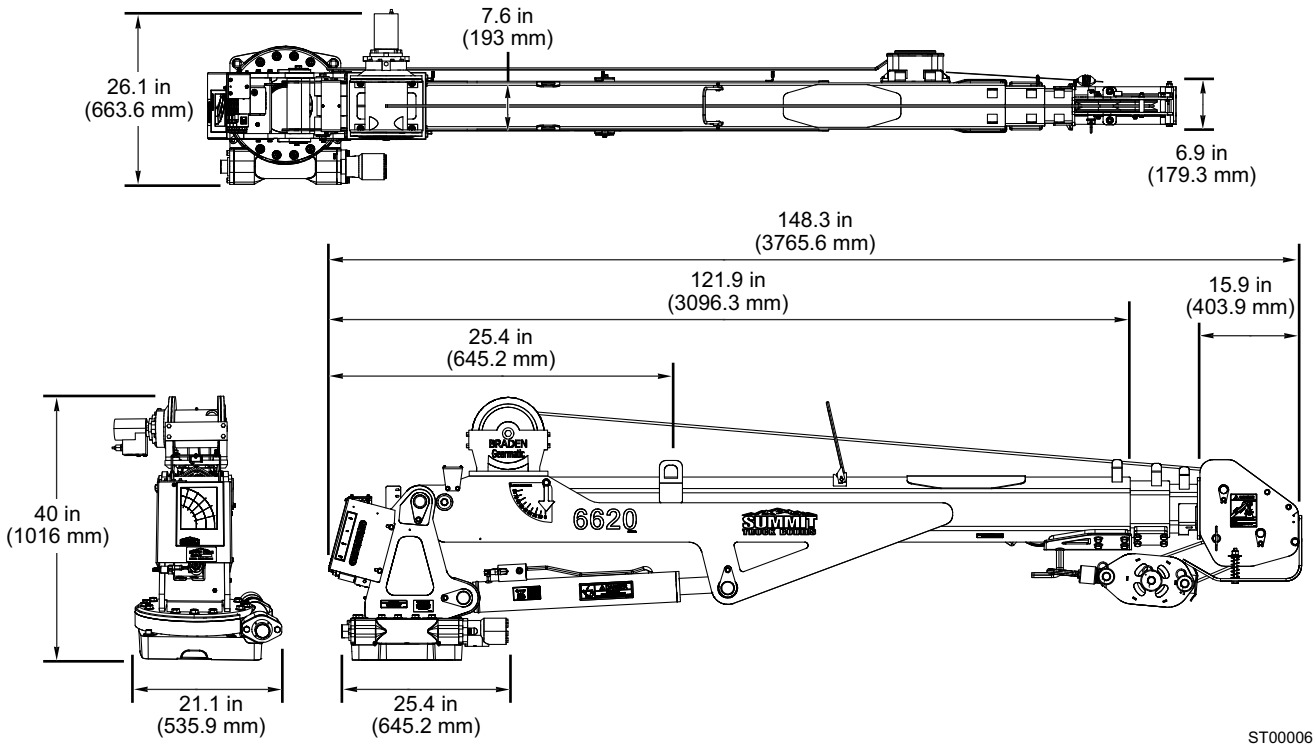
DIMENSIONS

General Dimensions for a 6620 Crane



Note:

All dimensions are in inches.

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CHAPTER 1 - INSTALLATION

WARNING

To avoid injury or death, the following procedure must be followed when crane installation is performed.

1.1 Overview

The crane and truck body may be purchased separately. To mount the crane to the truck body, please follow the instructions to avoid accidents and/or personal injury or injury to others. It is likely the truck body manual has an instruction guide to help aid in the mounting of the crane. If available use the manual for the particular truck body the crane will be mounted to. Knowing the truck's capacity will allow for the best installation possible for a particular application.

For ease of operation take note of the following:

1. Total Gross Vehicle Weight (GVW) after the crane is installed.
2. If truck body is able to support the weight of a crane.
3. The crane weight 1,750 lbs (794 kg).
4. Determine manufacturer recommended weight requirements before mounting the crane.

1.2 Installation

ATTENTION

Before installing the crane to truck body read and understand the guidelines established under federal law (Title 49 cfr part 568.6). Note Section 567.5 of the law. The end user and installer of the crane is required to certify the vehicle is in compliance with Federal Motor Vehicle Safety Standards and other regulations issued under the National Traffic and Motor Vehicle Safety Act. Visit https://www.nhtsa.gov/laws-regulations/fmvss for further information. The vehicle must comply with all applicable federal and state regulations.

NOTE

There are multiple PTO and pump combinations available. All vary depending upon the chassis, transmission, flow requirements of the crane, and flow requirements of the compressor. Please contact Summit Truck Bodies Customer Service for the individual truck requirements.

1. Make sure the weight and chassis of the vehicle coincides with the chassis requirements of the crane to be installed. The following recommendations should be met for the 6620 crane:
   - Minimum cab to axle 80 in. (2032 mm).
   - Body length nominal 132 in. (3353 mm).
   - Body width 94 in. (2388 mm).
   - Compartment depth 22 in. (559 mm)
   - Floor width 50 in. (1270 mm)

ATTENTION

To prevent damage to the vehicle, truck body, or crane, make sure all modifications made to the truck body have been approved by the truck body manufacturer. Any components used to modify the crane and/or Summit Truck Bodies will void the warranty and liability of the manufacturer.

2. Make sure all modifications made to the truck body have been approved by the body manufacturer and will properly and safely support the weight of the crane.

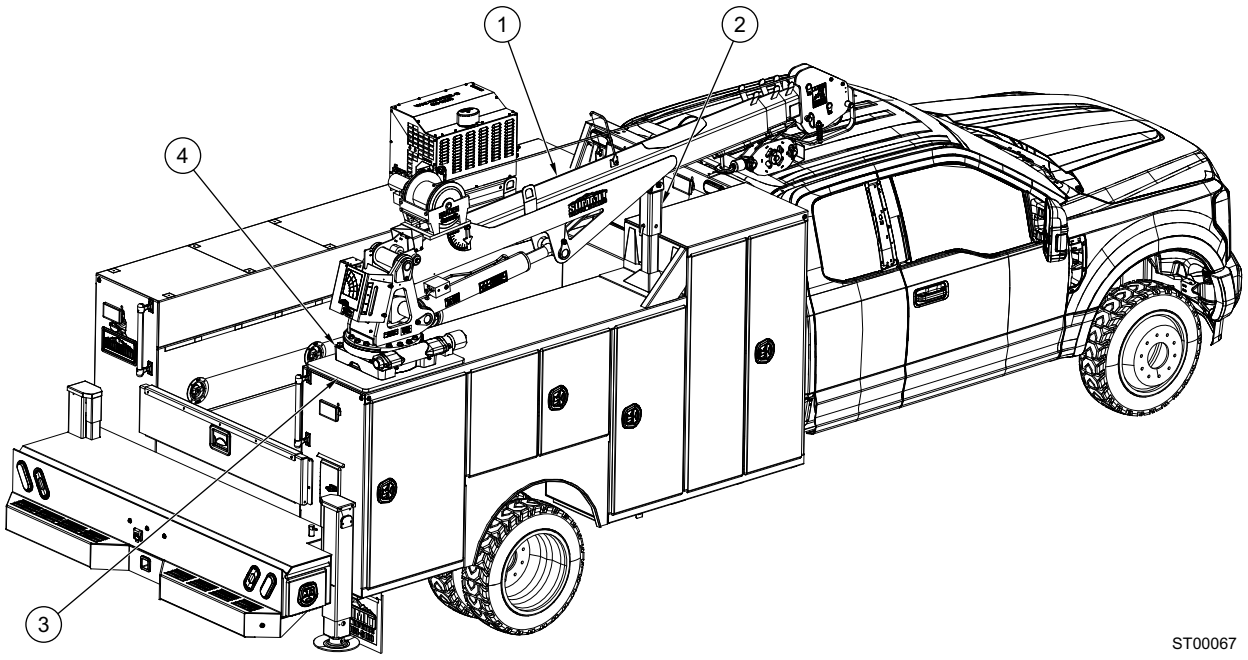

Figure 1-1.

3. Install boom cradle. A boom cradle (Figure 1-1, Item 2) is required on the body to support the crane boom during transportation.

WARNING

To avoid injury or death an appropriate lifting device must be used to support the crane during installation procedure.

4. Use an appropriate lifting device to support the crane.
5. Make sure all hoses and control wires are routed through the clearance hole in rotate.
6. Secure the crane to the truck body as follows:
   a. Lower the crane into place with the boom (Figure 1-1, Item 1) facing the rear, with drive motor forward.
   b. Make sure the crane is resting properly on the base (Figure 1-1, Item 3).

c. Apply OEM thread locker to rotate/base mounting bolts (Figure 1-1, Item 4) and install them from the underside of the base (Figure 1-1, Item 3). Torque the mounting bolts. Do not oil any bolts.

7. Connect the wiring harness. This provides power to the crane and feedback to auxiliary functions.
8. Connect two hydraulic hoses located under the base plate to the crane. When connecting two hydraulic hoses take note of the following:

   - The pressure connections are “06 JIC” and tank connections are “08 JIC” fittings.
   - The factory-set pressure relief valve is included in the crane valve.
   - Recommended operating pressure between crack pressure and full flow is 2800 psi (19,305 kPa).

ATTENTION

It is recommended that the return line be no less than 1/2 in (13 mm). Do not use the hose on a hydraulic system with less than 100R1 rating.

9. Check all bolts and pins for presence, torque, and condition.
10. Visually inspect all welds for cracks, holes, etc.
11. Engage PTO.
12. Slowly operate crane through all functions. Inspect all hoses, cylinders and structural members for proper operation.
13. After the crane has been installed, check all hydraulic lines for:

    - Free movement through 400 degrees of crane rotation and -5 to 75 degrees elevation
    - Sharp corners (which may cut into hose) and kinks
    - Abrasions and chafing
    - Tightness of fittings
    - Leaks

14. Return crane boom to its support. The unit is ready for operation.
15. Install all safety decals supplied with the crane in a visible area as close to the crane as possible.

1.3 Testing:

1.3.1 Initial Use Checks

ATTENTION

To prevent damage to equipment, testing should be performed by designated personnel only.

Prior to initial use all new, altered, modified, or extensively repaired cranes must be tested for compliance with the operational requirements of this crane as follows:

- Test all functions to verify speed and operation.
- Check that all safety devices are working properly.
- Confirm operating controls comply with appropriate function labels.
- Test the crane with a load. Loads must not exceed 110 percent of the manufacturer’s load rating.
- Complete and maintain written reports showing test procedures and confirming the adequacy of repairs.

Crane Size _____

Tester _____ Date _____

1.) Actual time to fully lower outrigger legs _____ seconds.

2.) Actual time to fully extend boom _____ seconds.

Pressure at operating _____psi, pressure at dead heading function _____psi.

3.) Actual time to fully retract boom _____ seconds.

Pressure at operating _____psi, pressure at dead heading function _____psi.

4.) Actual time boom up from bottom stop to top stop _____ seconds.

Pressure at operating _____psi, pressure at dead heading function _____psi.

5.) Actual time boom down from top stop to bottom stop _____ seconds.

Pressure at operating _____psi, pressure at dead heading function _____psi.

6.) Actual time to rotate crane 400° from stop to stop _____ seconds.

Pressure at operating _____psi, pressure at dead heading function _____psi.

7.) Rotate winch drum 5 complete rotations or approximately 12-1/2 foot of cable, winching out

_____ seconds.

Pressure at operating _____psi.

8.) Rotate winch drum 5 complete rotations or approximately 12-1/2 foot of cable, winching in

_____ seconds.

Pressure at operating _____psi.

9.) Actual time to fully raise outrigger legs _____ seconds.

Remote Test

1.) Power Button ☐ 2.) Proportional Trigger ☐

3.) Speed control ☐ 4.) Compressor ☐

5.) Boom Up ☐ 6.) Boom Down ☐

7.) Boom Extend ☐ 8.) Boom Retract ☐

9.) Winch Up ☐ 10.) Winch Down ☐

11.) Rotate Clockwise ☐ 12.) Rotate counter clockwise ☐

13.) Start ☐ 14 Stop ☐

Operation Test

1.) Unplug pressure switch and test movement ☐

(Should ONLY be able to retract, winch down, boom up and rotate)

2.) Plug in pressure switch test movement ☐

3.) Unplug the limit switch and test movement ☐

(Should ONLY be able to retract, winch down, boom up and rotate)

4.) Unplug A2B and test movement ☐

(Should NOT be able to drop boom, winch up or extend boom)

5.) Plug in A2B and test movement ☐

6.) Raise boom vertically to stop and drop boom to test the raise limit switch ☐

(Should stop when fully vertical then boom should be able to lower back down)

Oil Temperature (Should not exceed 180°)

Temperature at start of test _____

Temperature 15 min into test _____

Temperature 30 min into test _____

Temperature at conclusion of test _____ Total time of tested _____

1.3.2 Stability Capacity Test:

ATTENTION

Under federal law, all crane mountings must be tested for stability. All trucks loaded or unloaded will have a different weight, which affects the stability. Once the truck is loaded to the approximate hauling capacity, a stability test must be completed.

ATTENTION

Summit Truck Bodies takes no liability for the placement of a crane by an outside source. If a crane is not installed in a location specifically designed for this crane, the crane and the stability of it and the structure could fail. Summit Truck Bodies has completed extensive testing of the crane and has formulated a stability chart for the truck body and chassis on which it is mounted. Summit Truck Bodies has designed a load-limiting feature in its trucks. If the owner installs the crane on a different truck and/or vehicle, it is the responsibility of the owner to include any load-limiting features on that system.

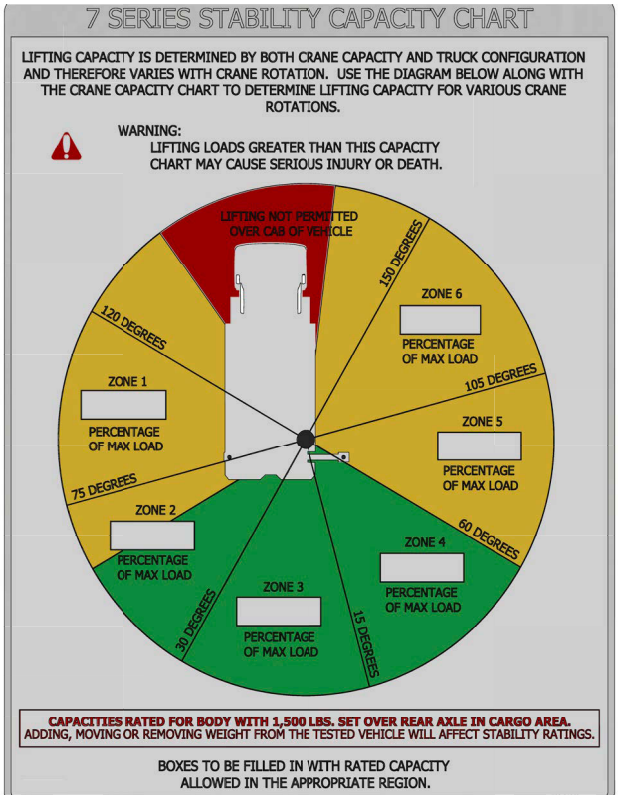

Figure 1-2.

NOTE

The above Stability Capacity Chart is to be used by the installer of the crane. The installer may be unaware of the stability of Summit Truck Bodies cranes being mounted on unknown bodies and chassis.

ATTENTION

A Stability Capacity Chart must be completed by the crane installation personnel.

1. Position truck in a flat open area in lifting setup. If multiple lifting setups exist, a stability chart will need to be made for each lifting setup.
2. Place crane in the Zone 1 position (see Figure 1-2).
3. Extend boom until it reaches full extension or begins to become unstable using the weight shown at max horizontal extension in Crane Capacity Chart (xxi). Instability can be the result of outriggers not making full, sturdy contact, or tires lifting from the ground.

ATTENTION

Only lift a few inches off the ground.

4. If the crane is stable with full extension, 100% can be written in the data box for Zone 1 (see Figure 1-2).
5. If the truck becomes unstable prior to the crane achieving full extension, retract the boom until the truck becomes stable.
6. Measure the horizontal reach in this position (center of rotation to end of boom). This is the stable horizontal location in this zone.
7. Divided stable horizontal location by the maximum horizontal location and multiply by 100. This is the percentage of rated capacity for this zone.
8. Record the percentage of rated capacity in the data box for Zone 1 (see Figure 1-2). This is the revised load capacity for this zone due to stability of the service truck.
9. Repeat Steps 1-7 for all other zones until the stability capacity chart is complete.
10. After the test has been completed, return the boom to the transport position.

For more information please contact Summit Truck Bodies at (866)-985-3100

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CHAPTER 2 - OPERATION

2.1 General

For ease of operation, become familiar with the crane and truck combination. Practice lifting without a load, and then graduate to a small load, gradually becoming larger in load size. Do this prior to actually going to the job site to perform the job task. As with all jobs, there is an element of risk, so prepare the operator for emergency situations and, much like testing for a fire drill, they will master the situation with each practice.

2.2 Load Limits

Know the lifting limits before starting a lift. Study the charts supplied with the crane, including the capacity chart, stability chart, and the angle indicator plates. Exceeding the limits within the radius of operation can result in tipping of the truck and/or structure failure, voiding the warranty.

2.3 Equipment Inspection

2.3.1 OSHA Regulations

OSHA regulation 1910.180 calls for frequent and periodic inspections. The inspection record must include the following:

- Date of inspection
- Signature of the person doing the inspection
- Serial number of the crane inspected
- The certification record must be available upon request

2.3.2 Safety Checks / Shift Checks

Safety checks must be current and made prior to the operation of the crane. Safety checks/shift checks are not a substitute for a preventative maintenance schedule.

1. Check periodic inspection papers.
2. Ensure the crane is structurally sound by inspecting the unit for damaged members and loose fasteners.
3. Check tamper paint on pedestal mounting bolts.
4. With the crane in a stored position, and all cylinders retracted, check the oil level.
5. Examine hydraulic lines for damage or hydraulic leaks.
6. Test controls for proper operation.
7. Inspect wire rope for damage, kinks, and/or fraying.
8. Correct and note all defects and malfunctions before the crane is put into service.

2.4 Operating Restrictions and Guidelines

WARNING

When operating the crane, rotate slowly. If the crane must be stopped quickly, the weight of the load will cause stress on both the crane and load. This could cause equipment damage, injury, or death.

- Make sure truck is level before using crane for loading or unloading.
- The emergency brake must be engaged prior to any PTO operation.
- Engage the PTO while the truck is in the neutral or park position. If the truck is equipped with a manual transmission, depress the clutch pedal before engaging the PTO.
- The outriggers must be extended and sit on a solid surface to stabilize the truck before operating the crane.
- Extend the wire rope prior to extending the boom. Failure to do so will cause the hook and traveling block to contact the crane.
- Never lift the load any further than necessary. Keep load as close to the ground as possible.
- Never lift load directly over any person(s).
- Do not rotate load too quickly. Rotating the load too quickly will result in an unstable load that could cause injury or damage the crane rotate gears.
- Avoid power lines if at all possible. If it is necessary to make a lift near a power line, do so with extreme caution. Refer to Table A (xi).
- The crane should be used for lifting up to the rated load capacity. Lifting over the rated load capacity will result in personal injury or damage to equipment.
- Never leave a load unattended.
- Do not side load crane. Side loading of the crane using the winch will result in damage to the crane assembly.
- Never use crane to move people unless properly equipped with approved equipment. The crane is designed to lift a material load only.
- Due to the height of the crane, avoid electrical storms and/or high winds.
- Do not attempt to make repairs to a crane while it is in operation.
- When operating the crane, rotate slowly. If the crane must be stopped quickly, the weight of the load will cause stress on both the crane and load. This could cause equipment damage, personal injury, or death.
- The crane can rotate up to 400 degrees. While rotating the crane do not attempt a full speed stop. If a full speed stop is attempted, the weight of the load will cause stress on both the crane and load.

2.5 Operator Requirements

NOTE

The crane should only be operated by qualified personnel.

- The crane operator must be trained and certified as an operator per OSHA § 1926.1427.
- All trainees must be accompanied by a certified trained operator.
- If a crane inspector is required to inspect and operate the crane, the inspector must have credentials qualifying them to perform the inspection.
- To perform the preventive maintenance on the crane, the maintenance crew must be certified and trained on proper operation of the crane.
- The operator must be competent and have a working knowledge of the crane, safe operation of the crane, and of the owner's manual.
- The operator should know safety and other policies dictated by state and/or federal regulations, ANSI B30.5 and ANSI B30.22, and job site guidelines for safety.
- The operator must be able to perform all controls of the crane in a safe manner and know how to implement an emergency procedure if needed.
- The operator must read and understand all guidelines.

2.6 Operator Conduct

As outlined above, the operator is responsible for the safety and welfare of themselves and others at the job site. They should follow the rules of conduct listed below:

- A suspended load must never be left unattended.
- When lifting a load, the operator must give full attention to the lifting of the load.
- All operations of the crane are directly in the control of the operator at the time of the lift.
- A good preventive maintenance policy must be followed by the operator for the safety and maintenance of the crane.

2.7 Crane Precautions

To avoid an accident or injury, follow the guidelines listed below:

- Make sure the equipment is neat, clean, and clearly marked.
- If any equipment damage is visible, it must be repaired before operating the crane.
- Become familiar with capacity and stability charts before performing a lift.
- Use a minimum lifting height when lifting a load. Never lift a load higher than necessary.
- Be aware of moving loads, which can alter the stability and capacity of the crane.
- Be aware of the load and the crane tip locations at all times during the lift.
- Center the load directly under the crane tip. This will help to provide a safe, smooth lift.
- Do not allow the load to swing from side to side. This will cause a load to shift, creating an unsafe and uncontrolled load.
- Do not attempt to lift over capacity.
- Never attempt to lift a fixed object.
- Do not side load the crane. Side loading of the crane will result in damage and/or failure of the cranes rotation system.
- A suspended load must remain clear of all personnel. Never pass a suspended load over a person/persons for any reason.
- Wear Personal PPE when operating the crane.

2.8 Hook Precautions

- Be aware of all ratings of the hook being used. Each crane hook is rated with a specific load rating.
- Do not exceed the rated capacity of the hook with any lift and/or load attempted lift.
- As part of the preventive maintenance plan, include visual inspections of the hook for stress, wear, and as worn safety latch.

WARNING

Do not attempt to repair a hook by welding. Heat from a weld will compromise the integrity of the hook material causing it to fail and could result in injury or death.

2.9 Deploying Outriggers

2.9.1 Hydraulic Outriggers

1. Rotate locking pins into the unlocked position
2. Go to home screen on the control box.
3. Press the Outriggers button. This will then navigate to the outrigger control screen.
4. Press the buttons DS deploy and PS deploy to deploy the outriggers.
5. Press the DS retract and PS retract buttons to retract the outriggers

2.9.2 Manual Outriggers

1. Rotate locking pin to release drivers side outrigger leg.
2. Pull out outrigger leg and rotate locking pin to lock outrigger leg in position.
3. Lower outrigger leg until it has firm contact with the ground.
4. Repeat Steps 1-3 for the drivers side.

2.10 Performing a Lift

To ensure a safe lift, the crane must meet all manufacturers' required mounting procedures. All lifts are to be completed with outriggers fully extended, and the truck setting on a flat, level surface. Follow the stability chart for all lifting ratings.

2.10.1 Prelift Checks

1. Test all crane functions for proper operation.
2. Make sure all safety devices are operational.
3. Make sure all functional labels match the operations of the crane.
4. Written reports for maintenance and repairs must be kept for future reference.
5. Check winch drum for proper lay of cable.

2.10.2 Planning the Lift

1. Position the truck and crane as close to the lift site as possible.
2. Park on a solid level surface.
3. Engage the PTO.

WARNING

Use extreme caution when setting up near overhanging banks or excavations. Failure to do so could result in personal injury or equipment damage.

4. Set outriggers. If setting outriggers on sandy or soft soil additional support, such as wooden cribbing or bearing pads, may be required under the outriggers to prevent sinking.

NOTE

Keep a wide berth when working near power lines and the use of a secondary signal man is required.

5. Check surrounding area for overhead power lines, tree limbs, and/or any other obstructions that may come into contact with the crane while performing the lift.

2.10.3 Performing the Lift

ATTENTION

Before extending the boom, always pay out the winch cable. Failure to do so may result in cable damage or failure.

NOTE

Summit Truck Bodies cranes are equipped with counter-balance valves that are located in the manifold block that is welded to the lift cylinder. These valves function as a deceleration control and serve as a safety device locking the load in case of a hydraulic line breakage or in the event of accidental or unauthorized operation of the directional valve when the pump is not operating.

1. Raise crane, extend, and rotate the boom in the center of the load. The crane is now ready to perform lift.

2.10.4 Handling the Load

WARNING

Make sure the load weight does not exceed the crane's capacity. Failure to do so could cause equipment damage, personal injury, or death.

1. Measure the weight and size of the load being lifted.
2. Make sure the lifting capacity of the crane is not being exceeded.

WARNING

The crane is equipped with wire rope intended to rotate on the sheave of the travel block while performing a lift. Never use this device to wrap around the load. Failure to do so could cause equipment damage, injury, or death.

3. Use only approved lifting straps or lifting devices that are properly secured to the crane hook to perform the lift.
4. Prior to lifting the load make sure the outriggers are firmly set and the truck base is stable.
5. Balance the load evenly with the wire rope directly in the center of the load.

ATTENTION

Do not attempt to drag the load sideways. Side loading will result in damage to the rotation gear of the crane.

6. Lift load slightly, making sure the load is both stable and centered.

WARNING

Make sure the load remains stable throughout the lift. Avoid swinging the load. A swinging load could result in injury or death.

WARNING

A suspended load must remain clear of all personnel. Never pass a suspended load over a person/persons for any reason. Failure to do so may result in injury or death.

7. Perform lift using smooth, gentle operation of the controls. Sharp jerking motions while performing a lift should be avoided.

2.10.5 Shutting Down the Crane

1. Retract the boom and cable. Make sure cable is properly wrapped on winch spool.
2. Secure the snatch block and hook to the stow hook attachment on the boom.
3. Stow the boom into the boom cradle.
4. Retract the outriggers.
5. Disengage the PTO.

2.11 Phase I Controls

2.11.1 Overview

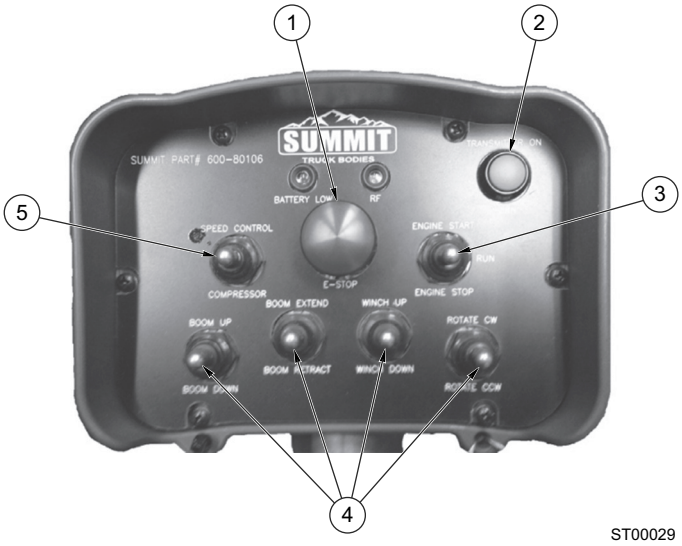


Figure 2-1.

The crane comes standard with a Summit Truck Bodies brand PGT Radio Remote Equipment Control (Figure 2-1). There is a wireless or tethered option for this feature. The wireless functions allow the operator to control the crane operation at a range of 0-200 ft, allowing for obstruction within the line of the remote to the receiver.

- Study the remote and know the control panel and how each function corresponds within the operation of the crane.
- If the remote panel decal becomes damaged, call the Summit Truck Bodies service department for a replacement.
- Keeping the remote decal clean will ensure safe operation of the remote.
- Practice using the remote before lifting a load.

NOTE

The tether cable will not charge the battery of the transmitter. The optional Nickel–metal Hydride (NiMH) battery of the transmitter needs to be recharged in one of the Summit Truck Bodies-approved battery chargers. If the battery level reaches 10 percent, the status Light Emitting Diode (LED) will illuminate red to indicate a low battery level.

2.11.2 Crane Function Speed Control

The speed control trigger is located at the upper portion of the pistol grip controls. The trigger is proportional and allows the operator to control the speeds of the selected operations by pulling back on the trigger, allowing for a gentle touch or a faster pace depending on the needs of the operator.

NOTE

The below steps must be followed in order. A safety feature is built into the remote that will not allow the crane to operate if this procedure is not followed.

1. Select the desired function by depressing the appropriate toggle switch (Figure 2-1, Item 4).
2. Gently pull back on the speed control trigger until the desired speed is reached. This will allow for a smooth operation of the selected function.

2.11.3 Crane Wireless Remote Control Instructions

2.11.3.1 Remote Power Startup

1. Supply power to the crane receiver.
2. Make sure the E-STOP switch (Figure 2-1, Item 1) on remote is up.
3. Depress the TRANSMITTER ON button (Figure 2-1, Item 2) after the status LED illuminates.
4. Once the status LED illuminates green the unit will run an initialization process, checking for switches or motions that may be active. If any are detected, the status LED will illuminate red and the unit will turn off.
5. After initialization is successfully completed, the unit will enter Normal Operation Mode and be ready to use.

2.11.3.2 Remote Manual Shutoff

The remote can be turned off by pressing the E-STOP switch down to the OFF position.

2.11.3.3 Emergency Shutoff

Press the E-Stop switch (Figure 2-1, Item 1) to immediately break all communications between the remote and receiver. This will stop electrical functions on the crane.

2.11.3.4 Remote Automatic Shutoff

The transmitter will automatically power down after a programmable time of non-use. A tether cord is available for job sites that do not allow radio signals. Once installed properly, the tether mode turns off the wireless transmissions and diverts signals through the tether cable.

2.11.3.5 Remote Tether Cord

A tether cord is supplied with the crane that can directly tie the remote transmitter to the remote receiver.

NOTE

In order for the tether cord to work properly, the remote must be powered down and powered up following tether installation.

1. Connect one end of the tether cord to the tether plug point on the side of the remote.
2. Attach the other end of the tether cord to the plug point in the crane compartment.

2.11.3.6 Engine Start/Stop

1. Make sure the park brake is set.
2. Toggle the start button (Figure 2-1, Item 3) on the remote. When the engine is not running, pressing up the start switch will close the K1 relay, activate the starter, and starting the engine.
3. Repeat Steps 1-2 to stop engine.

2.12 Phase III Controls

ST00002

Figure 2-2.

2.12.1 Overview

The control system for Summit Truck Bodies consists of a J1939 based main controller (Figure 2-2), engine module, and a cab switch panel. The main controller is most commonly located in one of the rear cabinets of the truck. The main controller is sometimes referred to as the rear control or rear display panel. The main controller has a 10-button user interface with color display. The main controller has various Input-Output (I/O) that monitors and controls several of the main functions on the truck. A J1939-based engine module is mounted in the engine compartment and operates and monitors various functions associated with that area of the truck. Inside the cab of the truck there is a six-button J1939-based switch panel used to operate various functions.

The control system also includes several external J1939 nodes and devices. These devices include a dual multi-axis inclinometer, rotary encoder, high current I/O module, and a radio remote system.

A radio remote system is used to operate the crane from a remote location. The radio remote system uses a transmitter that communicates through Radio Frequency (RF) to a receiver. The receiver is equipped with a J1939 interface, transmitting and receiving data through the data link. The transmitter's screen displays basic system info, boom load, current operation, as well as a screen that displays the present fault. The main control panel is located in the rear passenger side cabinet.

2.12.2 Screen Navigation

2.12.2.1 Splash Screen

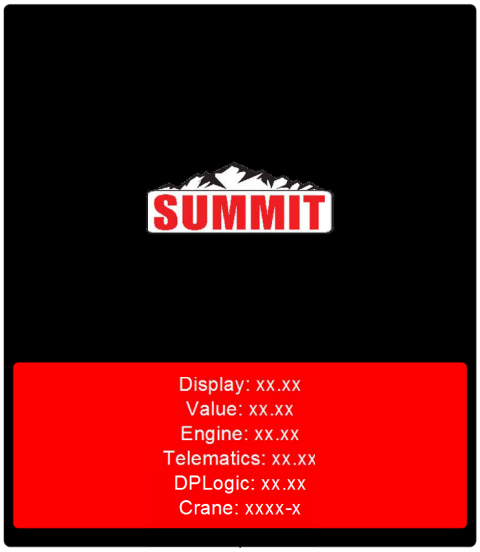


Figure 2-3.

The splash screen displays the Summit Truck Bodies logo and current software and hardware versions for 7 seconds during initial power up of the control system.

2.12.2.2 Home Screen (Home)

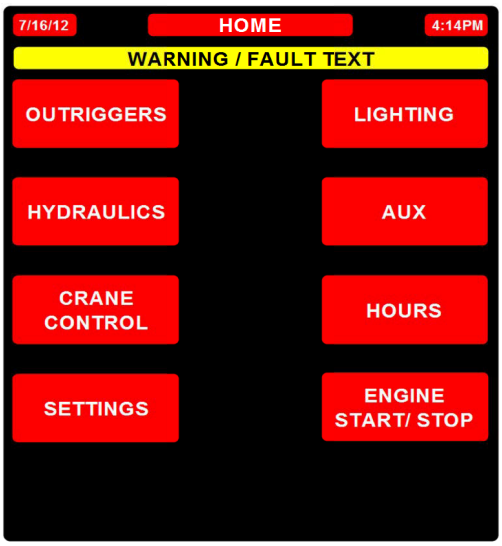


Figure 2-4.

Navigating from this to other screens is done with 10 buttons on the control panel. The buttons are numbered 1-10 with 1-4 on the left, 5-8 on the right, 9 on the bottom left, and 10 on the bottom right of the screen. The system will navigate to the Home screen any time the Home button is pressed. There is also a button on this screen to perform engine start/stop.

The LED on each switch will change state from white to red when the function is active. A 1-Hz flash on the 6-position switch panel indicates an error/warning. Errors and warnings are displayed on the warning panel of the main display and remote. There is also an audible tone when any navigation function is pressed.

2.12.2.3 Lighting Screen (Home> Lighting)

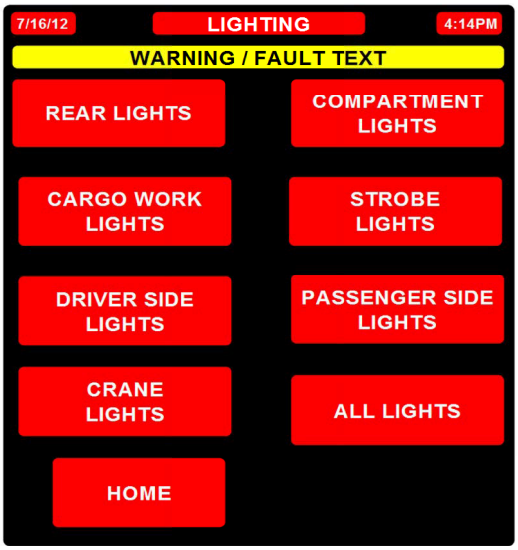


Figure 2-5.

The lighting screen will allow desired lighting to be turned on or off. All functions on this screen operate as a toggle on/off. When toggled on, ALL LIGHTS will turn on all lights, other than the strobe light, which are not already illuminated. When toggled off, ALL LIGHTS will turn off all lights that are illuminated, including the strobe light.

2.12.2.4 Aux Screen (Home> Aux)

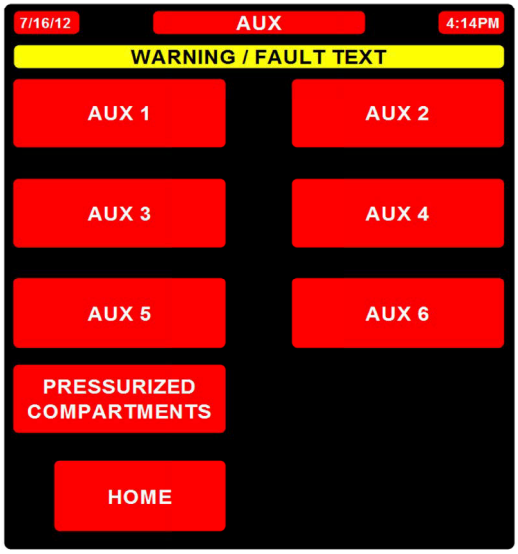


Figure 2-6.

This screen is used for six auxiliary functions and the pressurized compartments. All functions on this screen operate as a toggle on/off. Two spare buttons on the cab switch panel will also toggle the aux outputs 1 and 2.

2.12.2.5 Hours Screen (Home> Hours)

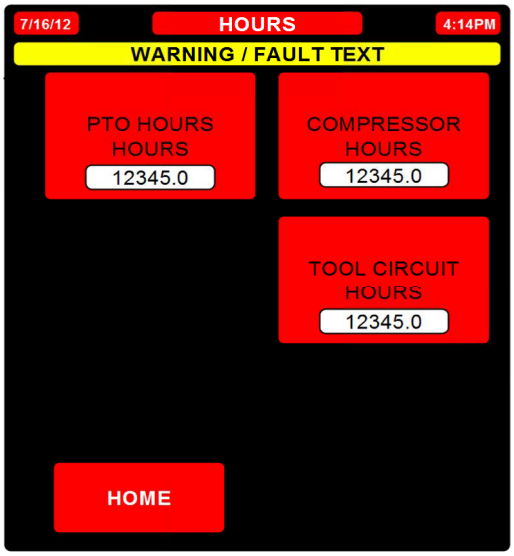


Figure 2-7.

This screen displays the hour meter values stored in Electrically Erasable Programmable Read-Only Memory (EE-PROM).

2.12.2.6 Outriggers Screen (Home> Outriggers)

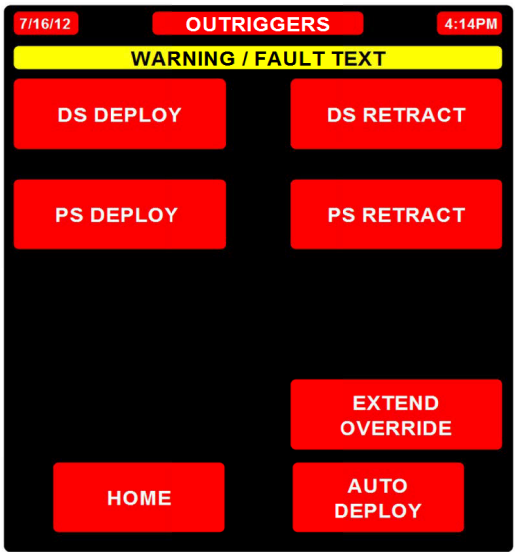


Figure 2-8.

The outriggers screen is the default outrigger control. The outriggers screen is used to operate the rear outriggers. All outrigger functions are controlled with momentary controls. AUTO DELPOY is used to navigate to the Auto Deploy Caution screen so the auto-deploy feature can be used.

2.12.2.7 Hydraulics Screen (Home> Hydraulics)

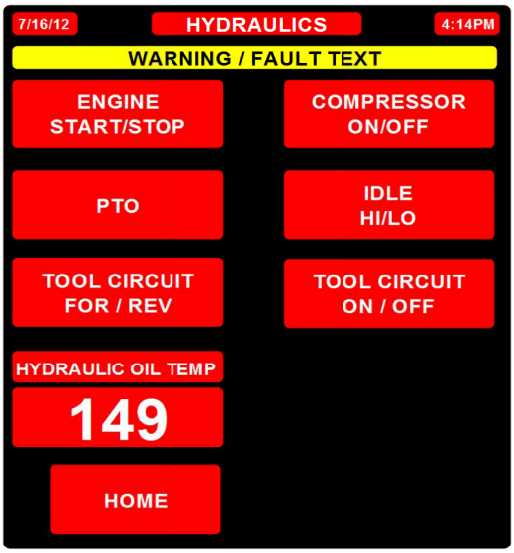


Figure 2-9.

Six functions can be operated and the hydraulic oil temperature can be monitored from this screen. All functions on this screen operate as a toggle on/off. This screen has active fields that will appear or disappear based on their selection from the Truck Option Screen.

2.12.2.8 Crane Screen (Home> Crane Control)

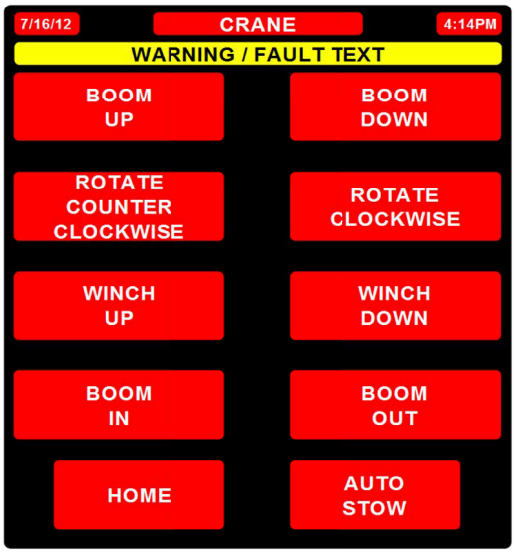


Figure 2-10.

The crane screen allows for operation of the crane from the control panel. All functions on this screen operate as momentary on. AUTO STOW is used to navigate to the Auto Stow Caution screen.

2.12.2.9 Settings Screen (Home> Settings)

The settings screen allows for navigation to several other screens. To progress through the settings screen, provide the OEM password (5150) or the new password created.

2.12.2.10 Diagnostics Screen (Home> Settings> Diagnostics)

The diagnostic screens display various diagnostic information.

2.12.2.11 Network Information Screen (Home> Settings> Network Information)

The network information screen will display the status of the following items if they are available:

- Engine RPM
- Oil temperature
- Water temperature
- Encoder position
- Boom angle
- Master X axis
- Master Y axis
- Other

2.12.2.12 Alarm History Screen (Home> Settings> Alarm History)

The alarm history screen logs warning ribbons and assigns a time and date to them.

2.12.2.13 Auto Deploy Caution Screen (Home> Outriggers> Auto Deploy)

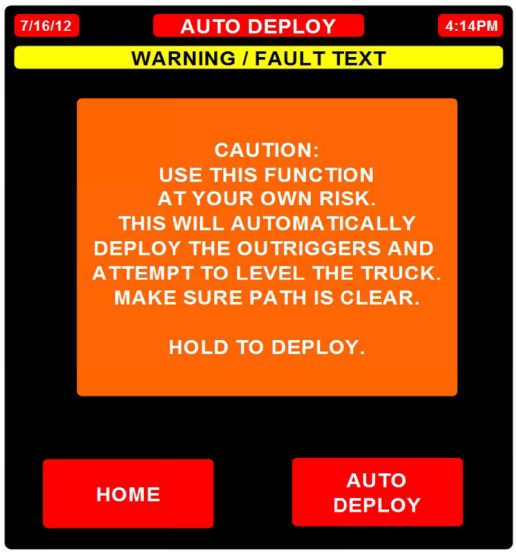


Figure 2-11.

If the auto deploy button is pressed on the outrigger screen, it will navigate to the auto deploy caution screen.

2.12.2.14 Auto Stow Caution (Home> Crane Control> Auto Stow)

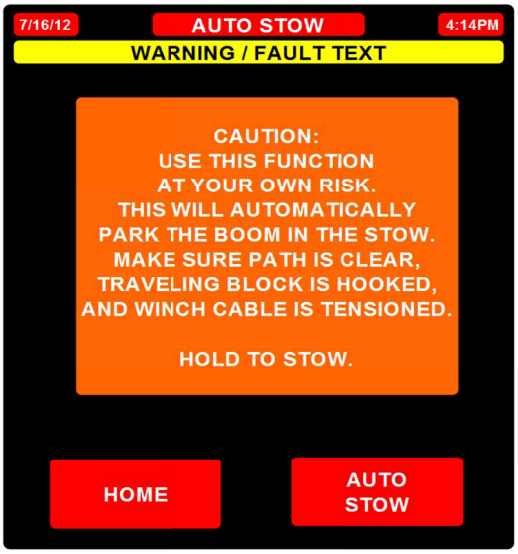


Figure 2-12.

If the auto stow feature is accessed from Crane screen. The auto stow caution screen contains a caution statement about using auto stow.

2.12.2.15 Truck Options Screen (Home> Settings> Truck Options)

The truck options screen displays multiple different options depending on the setup.

2.12.2.16 Crane Settings Screen (Home> Settings> Crane Settings)

The crane settings screen allows the operator to set the home position on the crane and set a boom up limit angle. It also allows for perimeter protection and novice mode to be enabled. **Novice Mode allows the user to operate at 57% of regular speed.** The states of both of these functions will be saved in EEPROM, and will remain selected through a power cycle. If these functions are active the associated button LED will be red. If these functions are inactive the associated button LED will be false. **Pressing the set perimeter button will navigate to the Perimeter Program screen. Protection On/Off will activate or deactivate the perimeter set**.

2.12.2.17 Perimeter Program Screen (Home> Settings> Crane Settings> Set Perimeter)

The perimeter program screen includes a caution statement that defines and warns about the use of the perimeter protection (also referred to as virtual fence). This screen is also used to program the perimeter protection boundaries.

2.12.2.18 Date/Time Screen (Home> Settings> Date and Time)

The date/time screen allows navigation to the date and the time screen, to set the date and time.

2.12.3 Warning Ribbons

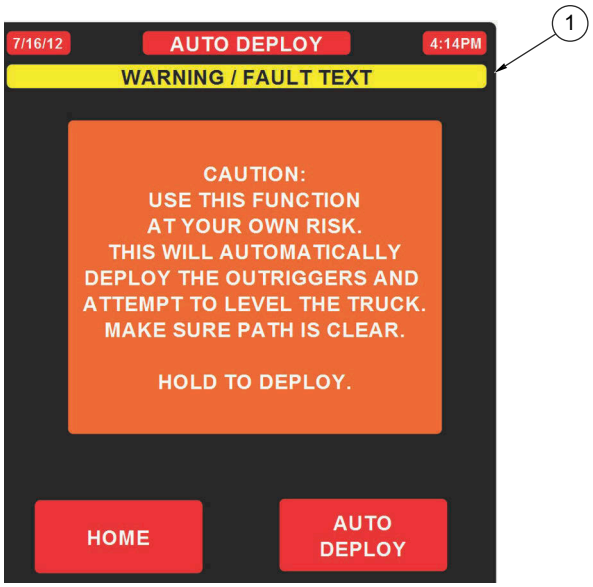


Figure 2-13.

The warning ribbons (Figure 2-13, Item 1) are presented on the display. If multiple warnings are in effect one warning will be displayed for 3 seconds. The switch panel will also sound 3 times upon initial warning and will sound every 30 seconds until all warnings are false. If warning/alarms are active the front switch panel lights and buzzer will go into alarm state. Warning ribbons have been prioritized so that critical warnings will override informational or less significant warnings.

The following warning ribbons are considered priority warnings and will be prioritized over other warnings:

- Auto deploy successful
- Crane overload
- No auto stow with load
- Outriggers not deployed
- Outriggers disabled
- Outriggers deployed
- Crane homing successful
- Auto stow failed, please stow manually
- Auto stow successful
- Auto deploy failed
- Auto stow in progress
- Auto deploy in progress

The following sections describe the warning ribbons and how they are enabled.

For assistance with warnings please call (866) 985-3100.

2.12.3.1 Filter Service Required

The filter service required warning ribbon will become active if the input that monitors the hydraulic filter pressure differential switch is true and the hydraulic oil temperature is greater than 80° F (27° C).

2.12.3.2 Hydraulic Fluid High Temperature

The hydraulic fluid high temperature warning ribbon will become active if hydraulic oil temperature transducer is reading greater than 180° F (82° C). This warning ribbon is reset when temperature falls below 172° F (78° C). This warning ribbon will not be shown if the hydraulic fluid over temperature ribbon is active.

2.12.3.3 Hydraulic Fluid Over Temperature

The hydraulic fluid over temperature warning ribbon becomes active if the hydraulic oil temperature transducer is greater than 190° F (88° C). Disengage the PTO or turn off Alternate Power Unit (APU). This warning ribbon is reset when temperature falls below 182° F (83° C).

2.12.3.4 Boom Not Stowed

If the boom is not stowed and the park brake input is false, the boom not stowed warning ribbon becomes active. There is a 5-second debounce timer to avoid nuisance warning ribbons while driving on rough surfaces. This warning ribbon will also be active if attempting to auto deploy outriggers when the crane is not stowed. The crane must be stowed for proper alignment when leveling.

2.12.3.5 Auto Deploy Successful

When auto deploy is successful, the auto deploy warning ribbon will become active, display for 3 seconds, and then become inactive. A successful auto deploy is indicated by the outriggers being deployed (indicated by the outrigger prox inputs) and the vehicle being level.

2.12.3.6 Battery voltage low

If the truck battery voltage is less than 10 VDC, the battery voltage low warning ribbon becomes active.

2.12.3.7 Crane Overload

If the transducer monitoring pressure in the boom up hydraulic circuit is greater than the maximum boom pressure set point for that zone, the crane overload warning ribbon will become active. Maximum crane load is based upon crane position. Different zones have been developed with unique limits.

Limits operation of the following:

- Boom extend
- Boom down
- Winch up
- Reduces rotate speed

2.12.3.8 Input / Output Fault

The input / output fault warning ribbon becomes active when there is one or more output faults. Output faults are reset by cycling main power.

2.12.3.9 Truck Not Level

If truck's roll angle is +/- 4 degrees out of level, the PTO or APU is on, and if the crane is in operation the truck not level warning ribbon will become active. The warning ribbon is set to display at 4.2 degrees out of level and is reset at 3.8 degrees out of level with a 1-second reset debounce to account for slight truck rocking. This warning ribbon does not include truck pitch with rear outrigger only. The inclinometer is mounted on the boom turret that rotates, so this warning ribbon can only be displayed when the boom is parallel with the roll axis of the truck.

2.12.3.10 No Auto Stow With Load

If boom load exceeds 60% of the zone set point the auto stow feature will not work causing the no auto stow with load warning ribbon to become active. This warning ribbon only becomes active if the operator is attempting to auto stow the crane.

2.12.3.11 Outriggers Not Deployed

The outriggers not deployed warning ribbon will become active if outriggers are not planted and crane operation is attempted.

2.12.3.12 Pendant Not In Stow

If the pendant stow input is false and the park brake input is false the pendant not in stow warning ribbon becomes active. This warning ribbon will cause the 6 position switch panel lights to flash and a buzzer to sound.

2.12.3.13 Outriggers Disabled

The outriggers disabled warning ribbon will become active if the outriggers have been disabled for any reason.

2.12.3.14 Boom Up Limit Angle Reached

The boom up limit angle reached warning ribbon is determined by the inclinometer data. By pressing button 8 on the crane settings page, the crane will set the boom up limit to the current angle of the crane.

2.12.3.15 A2B Switch

If the A2B switch (N/C) is false, the A2B switch warning ribbon will become active. If this warning ribbon is active the winch up and boom extend functions will be disabled.

2.12.3.16 Unit In Tether Operation

The unit in tether operation warning ribbon will only be displayed if the remote is connected through the tether cable and a function is active. Operating the transmitter with the tether cable will disable RF. Once the tether is disconnected RF will resume.

2.12.3.17 Outriggers Deployed

The outriggers deployed warning ribbon is displayed if the outriggers are not retracted with the park brake false.

2.12.3.18 Driver Side Outrigger Sensor Fail

The drivers side outrigger sensor fail warning ribbon is displayed when a divers side outrigger sensor failure is detected.

2.12.3.19 Crane Homing Successful

The crane homing successful warning ribbon is displayed when the crane has been successfully homed. This will display for 3 seconds then reset to false. Homing is the process of calibrating or zeroing the inclinometer and encoder when the boom is stowed.

2.12.3.20 Auto Stow Failed, Please Stow Manually

The auto stow failed, please stow manually warning ribbon displays if the auto stow function is not successful. This will display for 3 seconds then reset to false.

2.12.3.21 Auto Deploy Failed

The auto deploy failed warning ribbon is displayed if the auto deploy function fails. This will display for 3 seconds then reset to false.

2.12.3.22 Auto Stow In Progress

The auto stow in progress warning ribbon is displayed when the auto stow feature is under operation.

2.12.3.23 Auto Deploy In Progress

The auto deploy in progress warning ribbon is displayed when the auto deploy feature is in progress.

2.12.3.24 Low Pump Pressure

The low pump pressure warning ribbon becomes active if PTO pump pressure is not received within 5-seconds of the PTO solenoid output becoming true.

2.12.3.25 Passenger Side Outriggers Sensor Fail

The passenger side outrigger sensor fail warning ribbon is displayed when a passenger side outrigger sensor failure is detected.

2.12.3.26 Crane Sensor Fail

If a crane sensor is out of its operation range the crane sensor fail warning ribbon will become active.

2.12.3.27 Temperature Sensor Fail

If the temperature sensor is out of its operation range the temperature sensor fail warning ribbon will become active.

2.12.3.28 Comm Error – Engine

If communication is lost with the engine, the comm error – engine warning ribbon will become active.

2.12.3.29 Comm Error – FSP

If communication is lost with the FSP, the comm error – Front switch panel warning ribbon will become active.

2.12.3.30 Comm Error Incline

If communication is lost with the inclinometer, the comm error incline warning ribbon will become active.

2.12.3.31 Comm Error – Encoder

If communication is lost with the encoder, the comm error – encoder warning ribbon will become active.

2.12.3.32 Comm Error – LCM

If communication is lost with the LCM, the comm error – LCM warning ribbon will become active.

2.12.3.33 Comm Error – Receiver

If communication is lost with the receiver, the comm error – receiver warning ribbon will become active.

2.12.3.34 Comm Error – PDM

If communication is lost with the PDM, the comm error – Power distribution module warning ribbon will become active.

2.12.4 Lighting Operation

2.12.4.1 Rear Lights

The rear lights can be operated from either the cab switch panel or the rear control panel. The switch operation is a multiplexed toggle style switch. If the cab switch is in the lights on position, the rear control panel switch can be used to turn the rear lights off. The rear lights are not interlocked with anything.

2.12.4.2 Strobe Lights

The strobe lights can be operated from either the cab switch panel or the rear control panel. The switch operation is a multiplexed toggle style switch. If the cab switch is in the lights on position, the rear control panel switch can be used to turn the strobe lights off. The strobe lights are not interlocked with anything. There is no reset operation from the park brake input.

2.12.4.3 All Other Lights

The remaining lights are all toggle style operation. There are no interlocks preventing operation of these lights; however the lights reset if the falling edge of the park brake input is detected.

2.12.4.4 All Lights Button

The all lights button will turn on all lights, with the exception of the strobe lights, when all lights are off. It will turn off all lights, including strobe light, when any light is on.

2.12.5 Auxiliary Operation

Auxiliary buttons 1-6 on the Aux screen will toggle Aux outputs 1-6. The outputs are Multiplexed Vehicle Electrical Center (mVEC) relays and the auxiliary digital outputs on the 32007 VDM. Aux 1-3 can also be toggled on the six-switch cab module using switches 4-6. Cab switch 6 is used to control pressurized compartments (mVEC Relay 8) if that option is enabled. Aux 3 cannot be controlled from the cab if the cab switch 6 is used to control the pressurized compartments.

2.12.6 Hour Meter Operation

2.12.6.1 PTO Hours

Whenever the PTO pressure switch input is true, the PTO hour meter will begin to calculate. This value will be stored in EEPROM and will be displayed in the hours screen. The PTO hours field is an active field that will appear or disappear based on the APU selection on the truck options screen.

2.12.6.2 Compressor Hours

Whenever the compressor output is true, the compressor hour meter will begin to calculate. This value will be stored in EEPROM and will be displayed in the hours screen. This is an active field that will appear or disappear based on the APU selection on screen.

2.12.6.3 Tool Circuit Hours

Whenever the tool circuit output is true, the tool circuit hour meter will begin to calculate. This value will be stored in EEPROM and will be displayed in the hours screen. This is an active field that will appear or disappear based on the tool circuit selection on screen.

2.12.7 Hydraulic Oil Temperature

The hydraulic oil temperature field on the hydraulics screen will display the hydraulic oil temperature. The controller receives the hydraulic temperature from a temperature transducer. The controller will read this value and convert it to a value from 0° to 300° F (-18° to 149° C). When the value exceeds high setpoint a warning ribbon is triggered. When value exceeds the over temperature setpoint, a warning ribbon is triggered and the PTO and APU disengages.

2.12.8 Engine Start/Stop Operation

NOTE

Both Engine Start/Stop keys on the home screen and hydraulics screen will be illuminated when the engine is running.

2.12.8.1 Engine Start/Stop From Switch Panel

1. Make sure the park brake is set.
2. Toggle the engine start button. When the engine is not running, toggling the engine start button will close the K1 relay, activate the starter, and start the engine.
3. Repeat Steps 1-2 to stop engine.

2.12.8.2 Engine Start/Stop From Radio Remote

1. Make sure the park brake is set.
2. Depress the start switch on the radio remote. When the engine is not running, depressing the start switch will close the K1 relay, activate the starter, and start the engine.
3. Repeat Steps 1-2 to stop engine.

2.12.8.3 Interlock operation

Interlock operation differs slightly depending on transmission type, automatic or manual, and hydraulic pump drive type, PTO or APU. The automatic transmission does not require the clutch to be depressed to engage the PTO, so the engine can be started without regard to PTO state. The PTO enable option is disabled on the rear panel with manual transmissions because of the required clutch operation. Engine start is disabled if the engine is already turning as indicated by engine speed monitored on the J1939 Controller Area Network (CAN bus).

Engine Idle Control Operation with J1939 Throttle Control Compatible Vehicles:

- When the PTO is engaged and the park brake set, the engine speed will automatically increase to 850 RPM.
- When the PTO is engaged and the park brake set and either the high idle switch is pressed on the radio remote or the idle hi/lo button is pressed on the rear control panel, the engine idle speed will increase to 1050 RPM.
- Using this feature will disable the in-cab throttle control.
- If the PTO is disengaged and the park brake released at any time, the engine will return to its base RPM. If reactivated, the engine will return to the default 850 RPM.

2.12.9 PTO Operation

The PTO switch is a multiplexed switch. There are two PTO switches, one located in the cab and the other on the rear panel. The LED on the PTO switches will be illuminated if the PTO switch is pressed, even if the feedback switch indicates no pump pressure. The PTO will be disabled if hydraulic fluid is over temperature.

1. Make sure the PTO switch is on (manual transmissions only).
2. Make sure the park brake is set.
3. Actuate the PTO switch to the on position. This will engage the PTO (automatic transmission only).

2.12.10 Compressor Operation

There are two compressor switches, one located on the radio remote and the other on the rear panel.

1. Make sure the PTO is engaged and the park brake is set.
2. Press the compressor switch radio remote or the rear control panel. This will activate the compressor.

2.12.11 Tool Circuit Operation

The tool circuit is an active content option and it is enabled in the truck options screen.

NOTE

Deploying outriggers and tool operation functions may not be available for use at the same time.

1. Make sure the PTO switch is engaged and the park brake is set.
2. Toggle the tool circuit on/off switch to the on position. This will activate the tool circuit.
3. With the tool circuit active the tool circuit will default to the Forward (FWD) function.

NOTE

Perform Step 4 only if the Reverse (REV) function is needed.

4. Depress the tool circuit FWD/REV button while the FWD function is active. The FWD function will become inactive and the REV function will become active.

2.12.12 Outrigger Operation

The outriggers can be operated by using outriggers buttons on the rear control panel or by using the auto leveling feature.

WARNING

To prevent injury or death, make sure make sure the vehicle is parked on level, solid ground before deploying outriggers. If vehicle is carrying a load, make sure the load is evenly distributed and that one side of the vehicle isn't significantly heavier than the other. Failure to do so may result in equipment damage, injury, or death.

NOTE

If the outriggers are deployed and the park brake is released, the front switch panel LEDs will flash white and red, an audible alarm will sound, and a warning ribbon will display.

2.12.12.1 Outrigger Operation Using Outriggers Buttons

1. Make sure the PTO switch is engaged and the park brake is set.
2. Use the following outriggers buttons to deploy the outriggers.
   - Driver side deploy
   - Driver side retract
   - Passenger side deploy
   - Passenger side retract.

2.12.12.2 Outrigger Auto Leveling:

1. Make sure the PTO is engaged and the park brake is set.
2. Check pitch angle of vehicle to verify it is within 4 degrees of level. There are no interlocks to disable auto deploy if the angle is considered too steep. If the pitch angle is not in range, the truck not level warning ribbon will display when operating the crane.

NOTE

Each outrigger jack cylinder is equipped with a normally closed proximity switch to indicate the outrigger has contacted the ground.

3. Press the auto deploy button. The outriggers will deploy until the proximity switch opens for each jack cylinder, indicating the outriggers are contacting the ground.
4. Both outriggers will continue extending so the outriggers will be more firmly planted after both outriggers contact the ground. The outriggers are extended together as to not increase the roll angle. However, if hydraulic system is not performing properly, there is an uneven load on the outriggers, a mechanical malfunction, uneven cargo loads, or a number of other circumstances could prevent this from happening. Once the extend timers are expired, the outriggers will be considered planted.
5. Once planted the truck will attempt to level side to side by monitoring the roll angle of the vehicle. Based on this angle, the correct outrigger will be extended until vehicle is level within 0.5 degrees. If level is not reached, it is possible a cylinder is bottomed out. The auto deploy failed warning will be displayed. Cylinders will never be retracted automatically as part of the auto leveling process.

2.12.12.3 Extend Override

Outrigger override is available if there are space limitations at job sites. It is not always possible to fully extend all outriggers with the horizontal cylinders. It is preferable to lower the jack cylinder and plant the outrigger even if not fully extended. An override is required that will allow each outrigger jack cylinder to be lowered when the outrigger is not fully extended. The extend override button is located on the outriggers screen. The extend override button is not available on units with front outriggers.This will de-rate the crane capacity.

1. Make sure the PTO switch is engaged and the park brake is set.
2. Check pitch angle of vehicle to verify it is within 4 degrees of level. There are no interlocks to disable auto deploy if the angle is considered too steep. If the pitch angle is not in range, the truck not level warning ribbon will display when operating the crane.
3. Press the extend override button.

NOTE

Each outrigger jack cylinder is equipped with a normally closed proximity switch to indicate the outrigger has contacted the ground.

4. Press the auto deploy button. The outriggers will stop extending and immediately begin lowering until the proximity switch opens for each jack cylinder, indicating the outriggers are contacting the ground.
5. Both outriggers will continue extended so the outriggers will be more firmly planted after both outriggers are contacting the ground. The outriggers are extended together as to not increase the roll angle. However if hydraulic system is not performing properly, there is an uneven load on the outriggers, a mechanical malfunction, uneven cargo loads, or a number of other circumstances could prevent this from happening. Once the extend timers are expired, the outriggers will be considered planted.
6. Once planted, the truck will attempt to level side to side by monitoring the roll angle of the vehicle. Based on this angle, the correct outrigger will be extended until vehicle is level within 0.5 degrees. If level is not reached, it is possible a cylinder is bottomed out. The Auto Deploy Failed warning will be displayed. Cylinders will never be retracted automatically as part of the auto leveling process.

2.12.13 Crane Operation

The open center system will use a single proportional flow control that feeds directional valves for each of the eight boom functions.

2.12.13.1 Crane Interlocks

The crane interlocks must be met for operation. This would include that the PTO output is engaged, park brake is set, the outriggers are planted, and the truck's engine must be running.

- If the A2B switch is false (N/C switch), the winch up output and boom out output is inactive.
- If the boom up angle setpoint is active the boom up output will deactivate.
- If the boom transducer input value is out of operating range, the crane will not operate. This could indicate the transducer is disconnected
- All crane functions, with the exception of winch down and boom retract, will be disabled if the outriggers are partially planted (e.g., one outrigger is planted and one is not).
- Boom up, Boom Extend, Boom down, and Winch up operation will be disabled if the zone overload pressure is exceeded.
- If novice mode is active, the all crane speeds will be reduced to 57%.

2.12.14 Zone Load De-Rating:

The zone load de-rating system works based on the values entered in the zone load de-rating settings screen. It associates those values with the six zones found in the 360-degree rotation of the screen. Based on the rotational position of the crane, the boom overload pressure is multiplied by the de-rate value. A seventh no-load zone exists directly over the truck cab. The lowest value from zones one and six are used for the no-load zone.

2.12.15 Crane Control From Rear Control Panel

The crane can be operated from the rear control panel using the crane screen. When a function is pressed, it will operate the crane at a predetermined speed, approximately 25-50% of the maximum speed.

2.12.16 Crane Control With Radio

The crane can be operated from the transmitter by either RF or tethered communication. The functions will operate the same way regardless. On the transmitter there are two two-axis joysticks that control crane direction and speed. The crane speed will be nearly proportional to the position of the joystick. A 10% deadband will be added to the joystick output to eliminate unintended activation of the other function on the joystick. If the stop button is pressed on the transmitter it will attempt to stop crane movement.

2.12.17 Auto Stow

This feature automatically returns the boom to the stowed position when the button is pressed and held.

2.12.17.1 Boom Position Sensors Homing

1. Move the crane to the stow position.
2. Once stowed, navigate to the crane settings screen and press the home crane button. This will home the encoder and inclination sensors. The Crane Homed ribbon will be shown for 3 seconds when successful.

2.12.17.2 Auto Stow Operation

Crane speed during auto stow is approximately 50% of maximum. When approaching changes in direction the crane will slow to 25% of maximum speed. When approaching the stow position, the crane will stow to 10% of maximum speed.

1. Press the auto stow button on the crane screen. This will navigate to the autostow screen.
2. The crane's angular position will set to the auto stow angle. If it is greater than the auto stow angle, the boom will lower itself to the auto stow angle +/- 2 degrees. If the crane angle is less than the auto stow angle, the boom will raise itself to the auto stow angle +/- 2 degrees.
3. The crane's rotational position will set to the auto stow position. The boom will rotate to the stow position +/- 1 degree.
4. The crane will lower until the inclinometer reaches the homed setpoint. Once a predetermined point has been reached, the crane operation will slow to allow gentle seating in the boom stow.
5. Confirm the crane has been properly stowed by monitoring the boom angle.

2.12.18 Pendant Not Stowed

If the pendant is not stowed and the park brake is disengaged, the front switch panel LEDs will flash white and red, an audible alarm will sound, and a warning ribbon will display.

2.12.19 APU Option

The APU uses the PTO output, high idle output, ignition circuit, starter output from the Engine module, and the compressor output.

Operation is the same as PTO driven units, with the following exceptions:

- The APU has a running signal to the engine module indicating the APU is running instead of the engine.
- There is no pressure feedback device on the APU.
- The APU has a built-in timeout feature that requires a power cycle before starting the engine.
    - The key switch must be turned to the off position and then back to the on position to complete the power cycle.
    - The oil pressure switch is used to determine if the APU engine is running.

2.12.20 Open Center Option

If open center option is selected the crane will operate using a single proportional valve to control speed and eight digital valves to control direction. When multiple functions are active the proportional valve will derive its value from the average proportional value.

This option will also require the outriggers to sequence electronically. Up to eight of the following outrigger solenoid valves are controlled:

- Passenger side extend
- Passenger side retract
- Passenger side up
- Passenger side down
- Driver side extend
- Driver side retract
- Driver side up
- Driver side down.

Extend and retract are optional for both the driver and passenger sides. All installed outrigger functions will have an associated proximity switch that will indicate full travel has been reached.

When operating any outrigger function, an unloading valve will be active.

2.12.21 Date/Time

The controller is equipped with an on-board real-time clock. The onboard clock is used to perform the following functions:

- Tracking warning ribbons.
- Displaying date and time on the screen.

The time will need to be set on each module. This is done to prevent the RTC battery from being enabled before the controller is on a truck. The time and date can be changed in their corresponding screens.

2.12.22 Perimeter Protection (Virtual Fence)

NOTICE

The proximity of the exhaust stack to the boom stow position makes it nearly impossible to protect the exhaust stack.

The perimeter protection system creates a boundary set in the software by the crane position sensors. When the crane position sensors are active, the crane cannot pass through. This is to limit collisions between the boom and other objects mounted to the truck, such as compressors or welders. The perimeter protection is not intended for personal injury protection. The equipment must be in good working order for this system to operate properly.

The boom cannot be stopped instantaneously due to the momentum of the crane, the hydraulic system response, electronic processing time, and many other factors. The required stopping distance will increase over time with wear of mechanical components. A horizontal and vertical buffer of 5 degrees is added to the perimeter to compensate for system response time. For example, if a perimeter is set at 30 degrees of vertical elevation, the electronic control system will attempt to stop the crane if lowered to 35 degrees of elevation. The distance will vary depending on inclination and length of the boom. For reference, at 10 feet from the center of the turret with a nearly horizontal boom, the buffer is approximately 10 in (254 mm).

A missing data point can be filled in by averaging with adjacent points; however two or more continuous missing points cannot be handled in this manner. Missing data points are otherwise populated with a maximum value equivalent to 90 degrees (straight up) resulting in a vertical perimeter. If a 360-degree perimeter is not set, no movement will be allowed into the untraced area. If an area is retraced, the most recent data will be used. Since some latitude is required to stow the crane, a window of 2 degrees will be created around the stow or home position where movement is unrestricted.

2.12.22.1 Setting and calibrating perimeter protection

NOTE

When setting the perimeter protection, the crane is forced to novice mode, or half speed, to insure proper fence data capture. Non-critical functions, including warning ribbons, are disabled during programming to minimize lost data.

1. Press the program button on perimeter program screen.

NOTE

The program button is maintained so that the operator is free to move about the truck for better visibility.

2. Operate the crane with the radio remote, moving rotating it 360-degrees at various angles. Keep clear of obstructions.
3. Once the perimeter is set, press the protection button on the crane settings screen to enabled perimeter protection.
4. Once the perimeter is set, the perimeter protection will be active. Based on the rotational and angular position of the crane, this system will attempt to prevent operation of the crane if it passes through the fence buffer area. If the crane is stopped because it has passed through the buffer, the operator must raise the crane until it is above the buffer to resume operation.

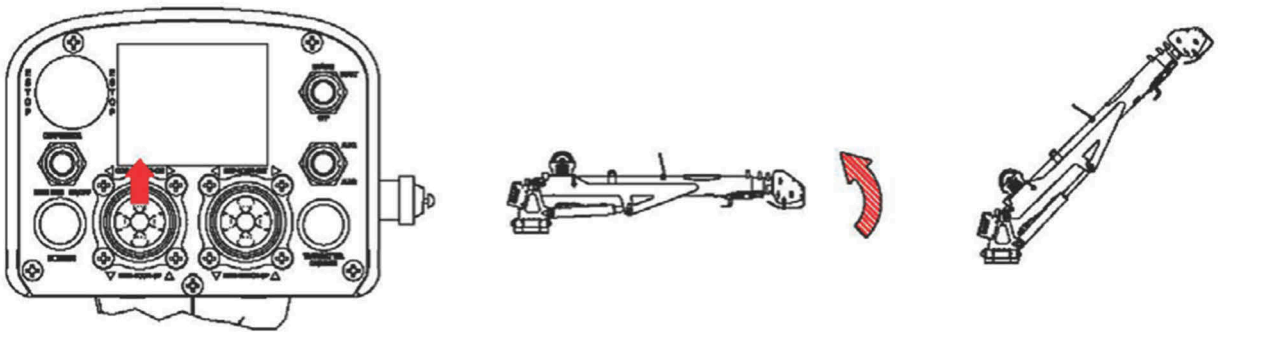
2.13 Phase III Controls

ST00030

Figure 2-14.

2.13.1 Remote Functions and Screen Displays

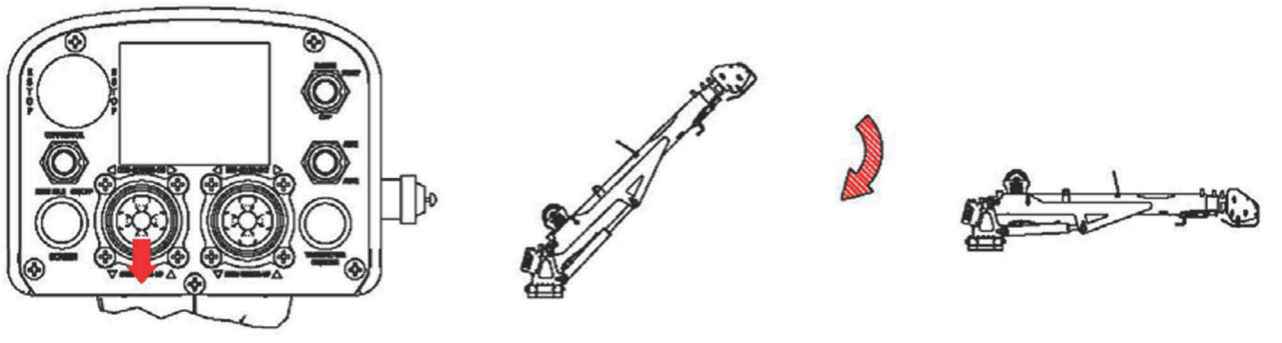
2.13.1.1 Boom Controls



ST00020

Figure 2-15.

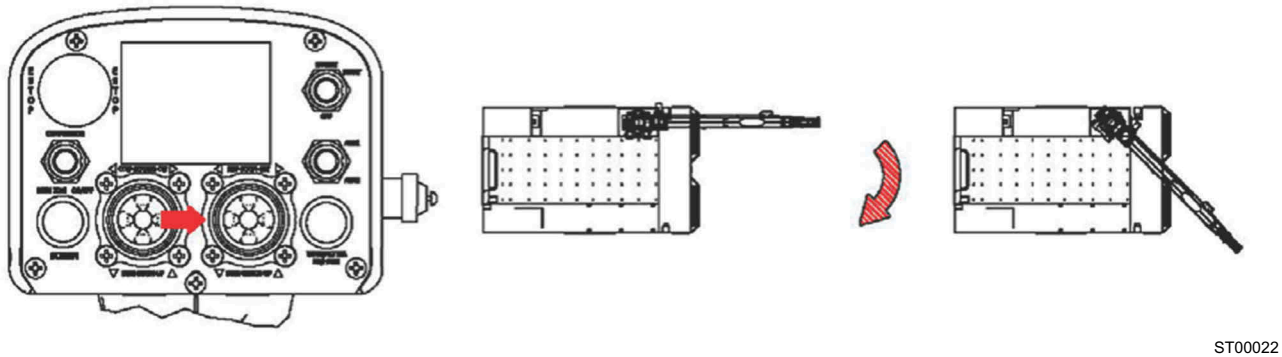
1. Press up on the left joystick to raise the boom (see Figure 2-15).



ST00021

Figure 2-16.

2. Press down on the left joystick to lower the boom (see Figure 2-16).



ST00022

Figure 2-17.

3. Press the left joystick to the right to rotate the boom clockwise (see Figure 2-17).

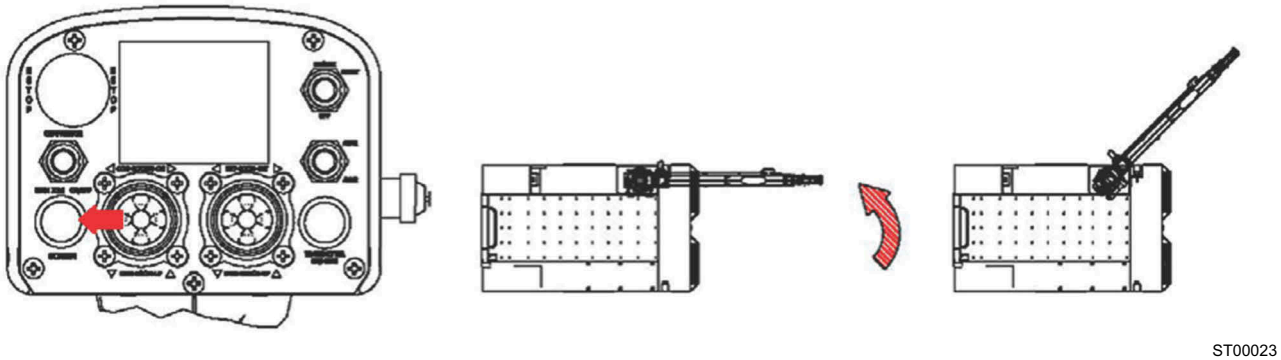


Figure 2-18.

4. Press the left joystick to the left the rotate the boom counterclockwise (see Figure 2-18).

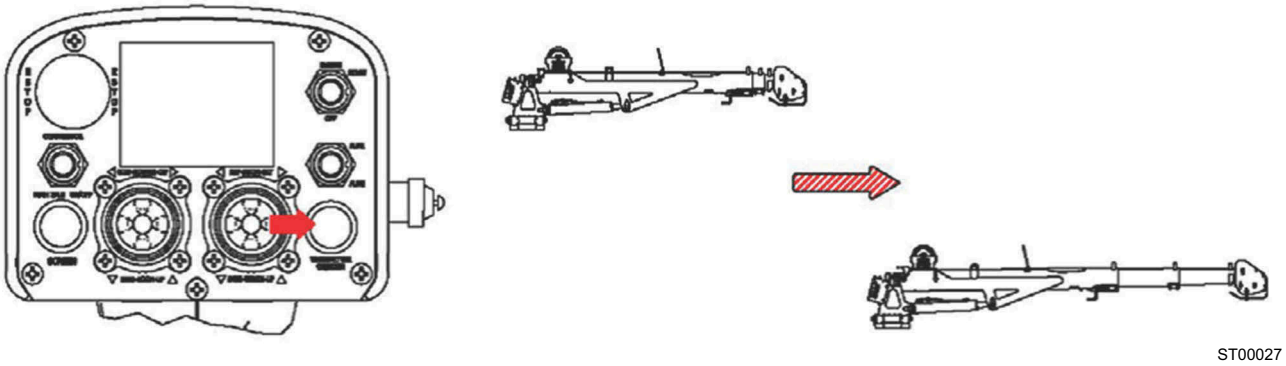


Figure 2-19.

5. Press the right joystick to the right to extend the boom (see Figure 2-19).

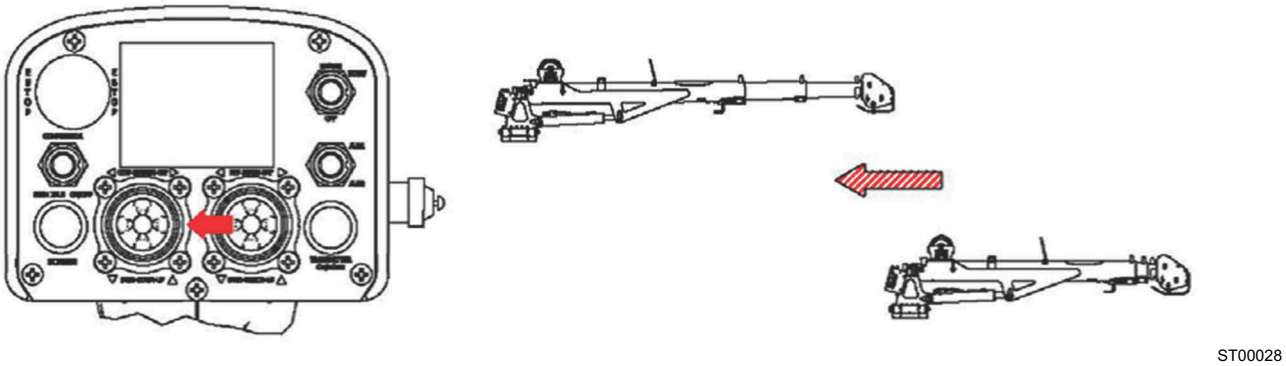


Figure 2-20.

6. Press the right joystick to the left to retract the boom (see Figure 2-20).

2.13.1.2 Winch Controls

Figure 2-21.

1. Press the right joystick forward to raise the winch (see Figure 2-21).

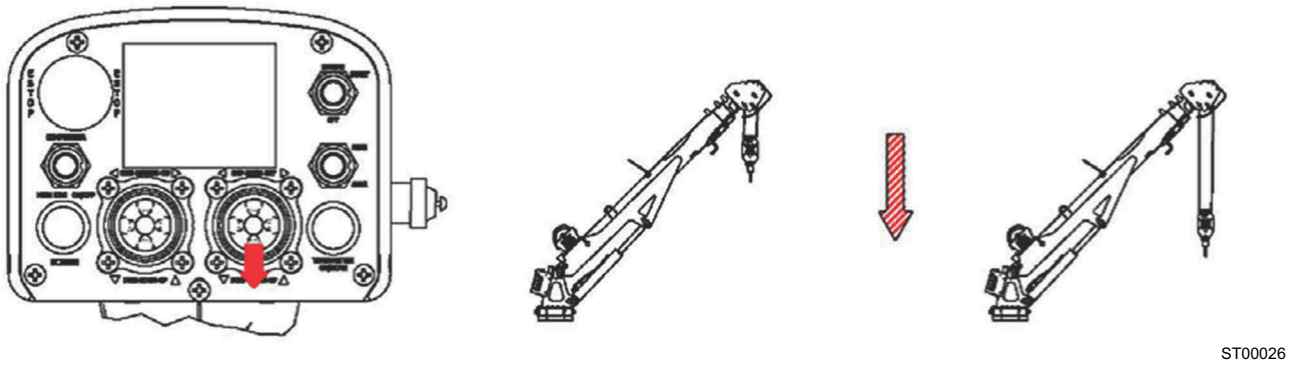


Figure 2-22.

2. Press the right joystick downward to lower the winch (see Figure 2-22).

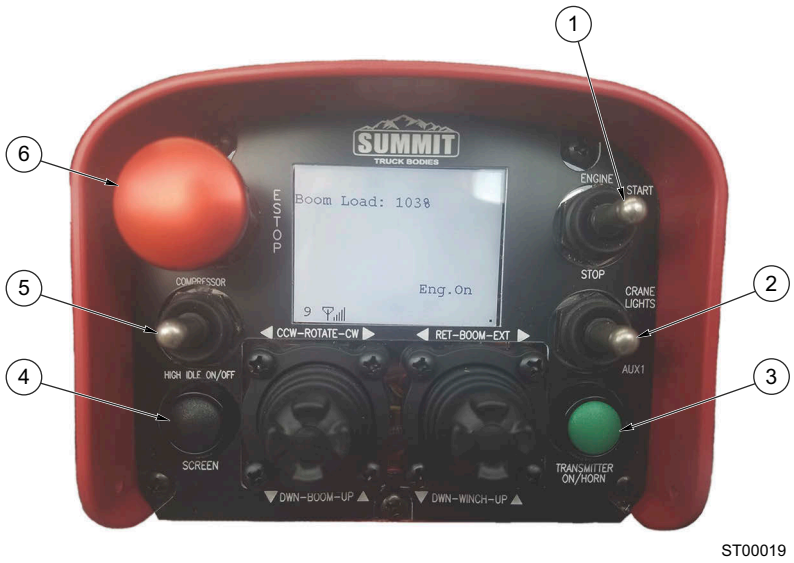


Figure 2-23.

2.13.1.3 Engine Start/Stop

1. Make sure the park brake is set.
2. Toggle the start button (Figure 2-23, Item1) on the remote. When the engine is not running, pressing the start/stop switch to close the K1 relay, activate the starter, and start the engine. Toggle up will start the engine. Toggle down will stop the engine.

2.13.1.4 Compressor and High Idle On/Off

1. Make sure the park brake is set.
2. Toggle the compressor button (Figure 2-23, Item 5) up. This will turn the compressor on. Toggle switch down. This will turn the compressor's high idle on or off.

2.13.1.5 Aux 1/Aux 2 On/Off (Optional)

If equipped with an optional accessory, this button will toggle that option on or off. For example, a common option is boom tip lights.

1. Toggle button (Figure 2-23, Item 2) to toggle option on or off.

2.13.1.6 Transmitter On/Horn

1. Press transmitter on/horn button (Figure 2-23, Item 3) to connect the remote to the receiver.
2. After the remote has been connected to the receiver, press the transmitter on/horn button to sound the horn.

2.13.1.7 E-Stop/Remote On

1. Pull out on the E-stop/remote on button (Figure 2-23, Item 6) to turn on remote.
2. Push E-stop/remote on button in to turn off the remote or perform an emergency stop.

2.13.1.8 Initial Screen

The initial screen is what is displayed under normal operation. The initial screen and LMI screen can be toggled. The percentage of the maximum boom load and percentages of functions being used are displayed on this screen.

2.13.1.9 Toggled LMI Screen

The initial screen and LMI screen can be toggled by pressing the button (Figure 2-23, Item 4). The LMI screen displays the following LMI data:

- Approximate load
- Radius of extension
- Percent of maximum capacity being used
- Boom angle

2.13.2 Data Panel with LMI Data

1. Press the crane control button on the data panel main screen. This will navigate to the crane control screen.
2. The LMI data can be viewed in the center of the crane control screen.

2.14 Manual Operation

WARNING

This procedure is only to be used in the case of an emergency. Contact Summit Truck Bodies customer support prior to performing this procedure. The assistance of a qualified Summit Truck Bodies customer support representative is required to provide guidance through this procedure, to avoid equipment damage, injury, or death.

Follow the procedure below to override the remote, so the crane can be operated manually.

WARNING

If manual control must be activated, take truck in for service as soon as possible to prevent equipment damage, injury, or death.

WARNING

Return override to original setting to prevent unintentional movement causing possible equipment damage, injury, or death.

1. Locate the override screw on the block.
2. Rotate the override screw clockwise three to five full turns.This will activate the flow control.
3. Using a small screwdriver, insert tip into the hole of the manual override and press in.
4. To deactivate the flow control, reverse the procedure.

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CHAPTER 3 - MAINTENANCE

WARNING

Read the following before maintaining any part of the crane. Only authorized and trained service personnel are to perform maintenance on the crane. Failure to do so could result in personal injury or death.

ATTENTION

Routine maintenance ensures proper operation of equipment. All warranties are void if maintenance is neglected. Failure to follow any routine maintenance listed in this section could result in equipment damage of failure.

NOTE

- Use only authorized parts. Any damage or malfunction caused by the use of unauthorized parts is not covered under Warranty or Product Liability.
- Once a bolt has been torqued to its rated capacity and then removed, the bolt should be replaced.

3.1 General

If you, as the owner of the crane, lease and/or rent the crane to another party, it is your responsibility to ensure that the preventative maintenance of the crane is preformed. A daily, weekly, monthly, and quarterly Preventive Maintenance (PM) plan should be established to prevent damage to the equipment and keep it operating at maximum levels. Follow all safety practices before undergoing maintenance on the equipment. For non-OEM bolts, lubricants, and/or thread-locking compounds, adjust installation torque per manufacturer's specifications.

1. Set the emergency brake.
2. Lower the crane to a resting position, supported by the crane cradle on the truck or a stationary support on the ground level. The crane goes to -5 degrees.
3. Disable the PTO.
4. Attempt to manually override the remote. This allows hydraulic pressure to be released. Use caution on lines that contain counter balance valves as pressure may still be present.
5. Perform required PM on the equipment.
6. Any worn or broken parts should be replaced at this time. Replacement parts are available through Summit Truck Bodies.

3.1.1 Service

To better service the crane, it may be helpful to follow these guidelines:

1. Identify the problem. Knowing what the problem generally helps determine the solution.
2. Troubleshoot the problem. Identify all possible causes. Use Chapter 4 to assist in determining the actual cause of the problem.
3. Repair or replace all worn or damaged items.
4. Make any necessary repairs and or adjustments.
5. Check the function and proper operation of the equipment to ensure all components are working properly.
6. Put the crane back into service.

3.2 Lubrication

Follow the guidelines established in the manual for all lubrication requirements. Extreme heat or cold can adversely affect the life of the lubricant. Pay special attention to periods of heavy use of the equipment, as this will also shorten lubricant life.

3.3 Hydraulic Fluid Specification

NOTE

These recommendations are based on normal working parameters. If operating in less than favorable conditions (e.g., excessive dust, moisture, etc.), reduce service interval hours.

- Conoco Super Hydraulic Oil 46 or equivalent is recommended for use under normal conditions. This is the minimum viscosity specification to eliminate the need for seasonal oil changes under normal temperature conditions.
- For operation in extreme cold temperatures, hydraulic fluid with a viscosity of 3000 SSUs at the lowest temperature is required.
- Operating temperature of the hydraulic fluid should be able to reach 190° F (88° C).
- The hydraulic fluid must contain the following additives:
    - Antifoam
    - Antioxidant inhibitors
    - Rust resistant
    - Antiwear additives.
- Summit Truck Bodies recommends the first hydraulic oil filter be changed after 25 hours of service.
- After first hydraulic oil filter change, the hydraulic oil filter should be replaced every 500 hours of service.
- The hydraulic oil should be replaced at 3,000 hours or every year, whichever occurs first. If guidelines have not been followed, hydraulic oil may need to replaced sooner.

3.4 Hydraulic Oil Deterioration

Hydraulic oil will break down over time and/or excessive use. To avoid damage to hydraulic components, take a sample of the hydraulic oil if deterioration or contamination is suspected and perform inspection as follows:

1. Put a sample of the hydraulic oil in a clean glass jar.
2. Inspect the hydraulic oil for a burnt or foul odor.
3. Make sure the hydraulic oil is clear and clean. Contaminated hydraulic oil generally is cloudy or is very dark in appearance.
4. Let the hydraulic oil settle in glass for 5 minutes. Inspect for water at the bottom of the glass jar.
5. If any issues are found in Steps 1-4 the hydraulic oil should be replaced.

3.5 Hydraulic Oil Replacement

The hydraulic oil should be changed at 3,000 hours of operation or every year, whichever occurs first. Follow these guidelines to purge the hydraulic system:

1. Make sure PTO is disengaged.
2. Turn off truck engine.
3. Remove drain plug from hydraulic reservoir and drain hydraulic oil reservoir.
4. Remove hoses located on the bottom of the hydraulic reservoir.
5. Remove wire mesh strainers located on the bottom of the hydraulic reservoir.
6. Clean wire mesh strainers.
7. Install wire mesh strainers in bottom of the hydraulic reservoir.

8. Install two hoses in bottom of the hydraulic reservoir.
9. Install drain plug
10. Fill hydraulic reservoir with new hydraulic oil.
11. Start the truck engine.
12. Engage the PTO.
13. Allow the system to cycle for 5 to 10 minutes, then fill the hydraulic oil reservoir to the full mark.

3.6 Purging Air From the Hydraulic System

Air in the hydraulic system will cause choppy, erratic crane functions.

NOTE

Do not purge the system for the winch circuit function.

3.6.1 Purging Air From One Hydraulic Function

If the choppy, erratic condition is only noticed when performing one function, perform the following procedure:

1. Operate the choppy or erratic function until the cycle is complete.
2. Operate the function in the opposite direction, holding the control in the open position. This should eliminate the air.
3. Operate the crane to check the performance. If the system operates smoothly, it is purged. If the system does not operate smoothly, repeat the Steps 1-3.

3.6.2 Purging Air From Hydraulic Cylinders

If the choppy, erratic condition is noticed in a hydraulic cylinder, perform the following procedure:

1. Hold the control open in one direction after the cylinder has bottomed out.
2. Operate the affected cylinder in the opposite direction. Hold the control open after cylinder has bottomed out.
3. Operate the crane to check the performance. If the cylinder operates smoothly, it is purged. If the cylinder does not operate smoothly, repeat the Steps 1-3.

3.7 Hydraulic System Relief Pressure Check

To check the hydraulic system relief pressure follow the procedure bellow:

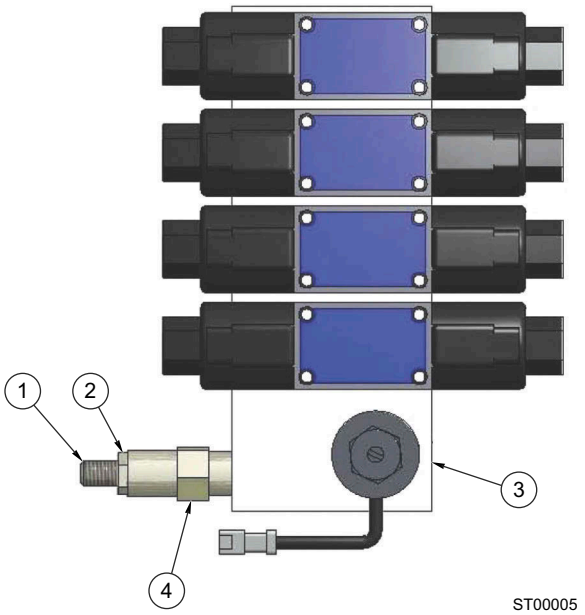


Figure 3-1.

1. Locate pressure gauge in the near the front bottom side of valve manifold (Figure 3-1, Item 3).
2. Start the truck engine, engage the PTO, and allow the system to idle until it reaches operating temperature.
3. Retract the boom until the cylinder is fully retracted.

NOTICE

Hold valve to the extend position while reading the pressure gauge. Note reading. If the reading is 2800 PSI, the hydraulic system relief pressure is correct. If the hydraulic system relief pressure is above or below 2800 PSI, the hydraulic system relief pressure must be adjusted.

NOTE

Perform the following steps only if hydraulic system relief pressure needs to be adjusted.

4. Loosen jam nut (Figure 3-1, Item 2) on the relief valve (Figure 3-1, Item 4).
5. Turn relief valve screw clockwise (Figure 3-1, Item 1) if hydraulic system relief pressure needs to be increased, or counterclockwise if hydraulic system relief pressure needs to be decreased.
6. Tighten jam nut (Figure 3-1, Item 2) on relief valve (Figure 3-1, Item 4).
7. Repeat procedure until the relief valve pressure is set to 2800 PSI.

3.8 Counter Balance Valve Check

The crane is equipped with hydraulic cylinders with counter balance valves. The counter balance valves prevent the failure of the cylinder rods in a downward motion in the event there is a component failure within the hydraulic system. To check for proper function of the counter balance valves, follow the procedure below:

1. Locate cylinder where problem is suspected.
2. Determine which counter balance valve is for retraction and which is for extension.
3. Safely lift a lighter load than the crane has capacity for.
4. Disengage the hydraulic system.
5. Safely monitor cylinder. If cylinder allows the load to lower, the counter balance valve is faulty and needs to be replaced. If the cylinder does not lower, the counter balance valve is operational.

3.9 Rotation Gear

Castrol Molub-Alloy 936 SF Heavy Lubricant or equivalent gear lube is recommended to grease the worm and ring gear.

3.10 Planetary Winch

No adjustments are to be made to the planetary winch without prior consultation with Summit Truck Bodies. The planetary winch is only to be serviced by a trained technician through the Summit Truck Body service department.

3.11 Wire Rope

3.11.1 Wire Rope Daily Inspection

WARNING

An inspection of the wire rope is required. Failure to do so could result in equipment damage, property damage, injury, or even death.

The safety of the personnel, crane, and load is dependent on the wire rope. A thorough visual inspection is required daily.

1. Inspect the entire wire rope as it is unwound from the winch. Inspect wire rope for the following:
   - Rust or corrosion
   - Worn or frayed strands
   - Heavy bends or kinks
   - Excessive wear due to rubbing
   - Ends at attachment points for damage and/or rust
   - Winch drum for damage
   - Sheaves for any unusual wear
2. If any defects are observed in Step 1, replace wire rope or components.

3.11.2 Wire Rope Quarterly Inspection

WARNING

A quarterly inspection of the wire rope is required. Failure to do so could result in equipment damage, property damage, injury, or even death.

The safety of the personnel, crane, and load is dependent on the wire rope. A thorough quarterly inspection is required. The quarterly inspection is a detailed inspection that should only be performed by qualified personnel with knowledge of the equipment and its features and functions.

1. Inspect the entire wire rope for the following:
   - Rust or corrosion
   - Worn or frayed strands
   - Heavy bends or kinks
   - Excessive wear due to rubbing
   - Ends at attachment points for damage and/or rust
   - Signs of stretching
   - Winch drum for wear (with wire rope unwound)
   - Sheaves for any unusual wear (with wire rope unwound)
2. Measure the diameter of the wire rope with a micrometer or calipers with at least 0.003 in precision. It is necessary when judging the diameter of the wire rope to determine the life expectancy of the rope. Make sure there is no more than 0.03 in (0.76 mm) of wear.
3. Inspect wire rope for signs of exposure to extreme heat such as discoloration, melting, or charring.
4. If any defects are found replace wire rope.

3.11.3 Wire Rope Care

In order to properly maintain the wire rope:

- Store in winch if off the crane
- Lubricate with WD-40 cable and wire rope lubricant (or equivalent) monthly
- Avoid using wire rope over sharp objects
- Avoid situations where wire rope can become snagged or caught
- Avoid situations where wire rope can become crushed

3.12 Crane Mounting Bolts

WARNING

Do not reuse any bolts. Reuse of bolts will result in compromised bolt integrity. Reuse of bolts can change the integrity of the bolted connection and could result in injury or death.

Grade 5 and Grade 8 fasteners are produced to specific strength requirements. Replacing Grade 5 and Grade 8 fasteners with fasteners of different grades (even if they are the same size and thread pattern) will compromise the integrity of the crane and can result in crane failure, property damage, injury, or death.

Bolts that are damaged, reused, installed with improper torque, or not maintained at proper torque in service, can loosen, crack, and fail, potentially resulting in collapse of the crane and severe risk of property damage, injury, or death.

Overloading the crane by attempting to lift loads in excess of the load rating at the given boom angle and extension, or by jarring the load on a boom can result in failure, stretching, and/or loosening of bolts. Bolt failures may occur at the time of overloading or an extended period of time after the overload event. Do not assume that no damage to the crane has occurred during an overloading event even if no damage to the bolts is apparent. Following a known or suspected overloading event, all crane mounting bolts must be replaced with new equivalent fasteners and torqued to factory specifications before the crane is returned to service.

- Crane mounting bolts include the pedestal bolts that mount the crane to the rotation base as well as the rotate/base bolts that mount the rotation base to the frame of the truck. Crane mounting bolts should not be re-used if found loose or removed. If loose, removed, or damaged, crane mounting bolts must be replaced using bolts of identical size and grade, installing in accordance with manual instructions.
- Proper torque is critical for safe and effective performance of bolts and the crane as a whole. Figure 3-2 shows required installation torques for various sizes of non-plated Grade 5 and Grade 8 Fasteners; these bolt are black oxide finish only and are installed without lubricants. Figure 3-3 shows required adjustments to standard torque values for various bolt lubricants, coatings, and finishes.

Figure 3-2. Bolt Torque Specifications

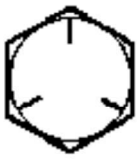
U.S. BOLT TORQUE SPECIFICATIONS				
		SAE GRADE NO. 5	SAE GRADE NO. 8	Socket Head Cap Screw Grade 8
				
Dia. inch	Thread per inch	lb-ft (N•m) Dry	lb-ft (N•m) Dry	lb-ft (N•m) Dry
1/4	20	8 (11)	12 (16)	14 (19)
5/16	18	17 (23)	25 (34)	29 (39)
3/8	16	30 (41)	45 (61)	49 (66)
7/16	14	50 (68)	70 (95)	76 (103)
1/2	13	75 (102)	110 (149)	113 (153)
9/16	12	110 (149)	150 (203)	163 (221)
5/8	11	150 (203)	220 (298)	230 (312)
3/4	10	260 (353)	380 (515)	400 (542)
7/8	9	430 (583)	600 (813)	640 (868)
1	8	645 (875)	910 (1234)	960 (1302)
1 1/8	7	795 (1078)	1290 (1749)	1375 (1864)
1 1/4	7	1120 (1519)	1875 (2542)	1980 (2685)
1 3/8	6	1470 (1993)	2380 (3227)	2535 (3437)
1 1/2	6	1950 (2644)	3160 (4284)	3340 (4528)

Figure 3-3. Bolt Torque Factors for Various Finishes

BOLT TORQUE FACTORS	
Lubricant or Finish	**Torque Changes**
Zinc Plating	Reduce torque 15%
OEM Threadlocker	Reduce torque 10%
EcoGuard	Reduce torque 35%
Zinc Plating with OEM Threadlocker	No Change
EcoGuard with OEM Threadlocker	Reduce torque 27%

3.13 Inspections

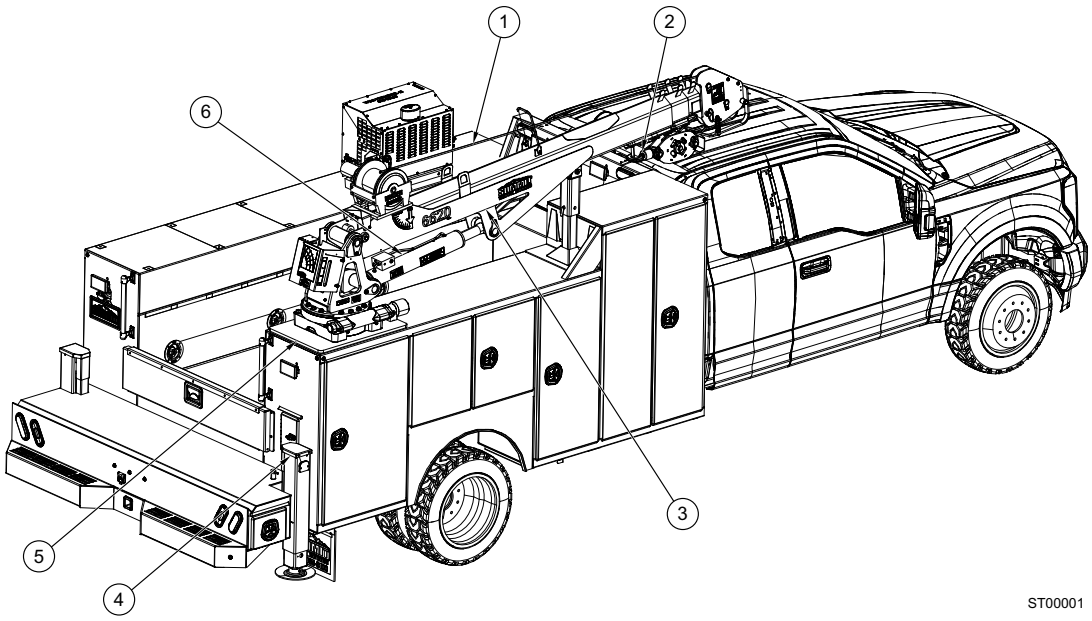


Figure 3-4.

3.13.1 Responsibility

1. If you, as the owner of the crane, lease and/or rent the crane to another party, it is your responsibility to ensure that the preventative maintenance of the crane is preformed.

3.13.2 Maintenance Definitions

1. Components: Any Summit original equipment part that makes up the crane assembly or weldment.
2. Fastener: A bolt, nut, pin, or other hardware that attaches or limits a degree of freedom of any component.
3. Safety Device: Any mechanical or electrical device that prevents motion, reduces damage, or transmits data such as the anti-two-block, counterbalance valve, relief valves rotate stop, pressure sensor, cord reel, or inclinometer.

3.13.3 Daily Inspection

Before operating crane, a daily inspection of the following will help reduce the risk of injury or death, damage to the crane, and unplanned maintenance.

1. Make sure fluid levels in the crane, compressor, and engine are within the manufacturers' specifications.
2. Visually check structural components such as welds and fasteners for cracks, breaks, looseness, or other damage. If loose, broken, or missing bolts are found, all bolts in the affected pattern must be replaced with new fasteners of proper size and grade, and torques to factory specifications in accordance with the requirements in Figure 3-2 and 3-3. Bolt torque of pedestal bolts must follow the torque pattern procedure as described in Section 3.13.7.
3. Check for leaking cylinder seals & condition of hydraulic hoses.
4. Check the following components for oil leaks:
   - Engine
   - Transmission
   - PTO
   - Pump

- Hydraulic reservoir

5. Inspect wire rope (Figure 3-4, Item 1). See Wire Rope Daily Inspection.
6. Check for proper function of the counter balance valves to ensure the crane load will not be compromised.
7. Make sure outriggers (Figure 3-4, Item 4) operate as specified.
8. Make sure all safety devices are in place and in good working order, and labels are legible.

3.13.4 Weekly Inspection

The inspection should be a routine inspection and should only be performed by qualified personnel with knowledge of the equipment and its features and functions.

1. Wash the truck, body, and crane.
2. Visually check structural components such as welds and fasteners for cracks, breaks, looseness, or other damage. If loose, broken, or missing bolts are found, all bolts in the affected pattern must be replaced with new fasteners of proper size and grade, and torques to factory specifications in accordance with the requirements in Figure 3-2 and 3-3. Bolt torque of pedestal bolts must follow the torque pattern procedure as described in Section 3.13.7.

3.13.5 Monthly Inspection

A monthly inspection schedule should be developed. Monthly inspections should be performed at the same time every month by qualified personnel with knowledge of the equipment and its features and functions.

1. Check the following for leaks
   - Engine
   - Transmission, PTO, and pump
   - Crane
   - Outriggers (Figure 3-4, Item 4)
   - Hydraulic reservoir
   - All cylinders
   - All other fluids or lubricants on truck
2. Make sure all fluid levels in the crane, compressor, and engine are within the manufacturers' specifications.
3. Visually check structural components such as welds and fasteners for cracks, breaks, looseness, or other damage. If loose, broken, or missing bolts are found, all bolts in the affected pattern must be replaced with new fasteners of proper size and grade, and torques to factory specifications in accordance with the requirements in Figure 3-2 and 3-3. Bolt torque of pedestal bolts must follow the torque pattern procedure as described in Section 3.13.7
4. Make sure all safety devices are in place and in good working order, and labels are legible.
5. Check cable drum for wear.
6. Record Inspection

3.13.6 Quarterly Inspection

A quarterly inspection schedule should be developed. Quarterly inspections should be done by qualified personnel with knowledge of the equipment and its features and functions.

This inspection should include, but not be limited to, the following:

1. Check structural components such as welds and fasteners for cracks, breaks, looseness, or other damage. If loose, broken, or missing bolts are found, all bolts in the affected pattern must be replaced with new fasteners of proper size and grade, and torques to factory specifications in accordance with the requirements in Figure 3-2 and 3-3. Bolt torque of pedestal bolts must follow the torque pattern procedure as described in Section 3.13.7.

2. Special attention must be paid to the crane rotate/base bolts shown in Figure 3-5 & Figure 3-6.

Figure 3-5. Pedestal Bolts

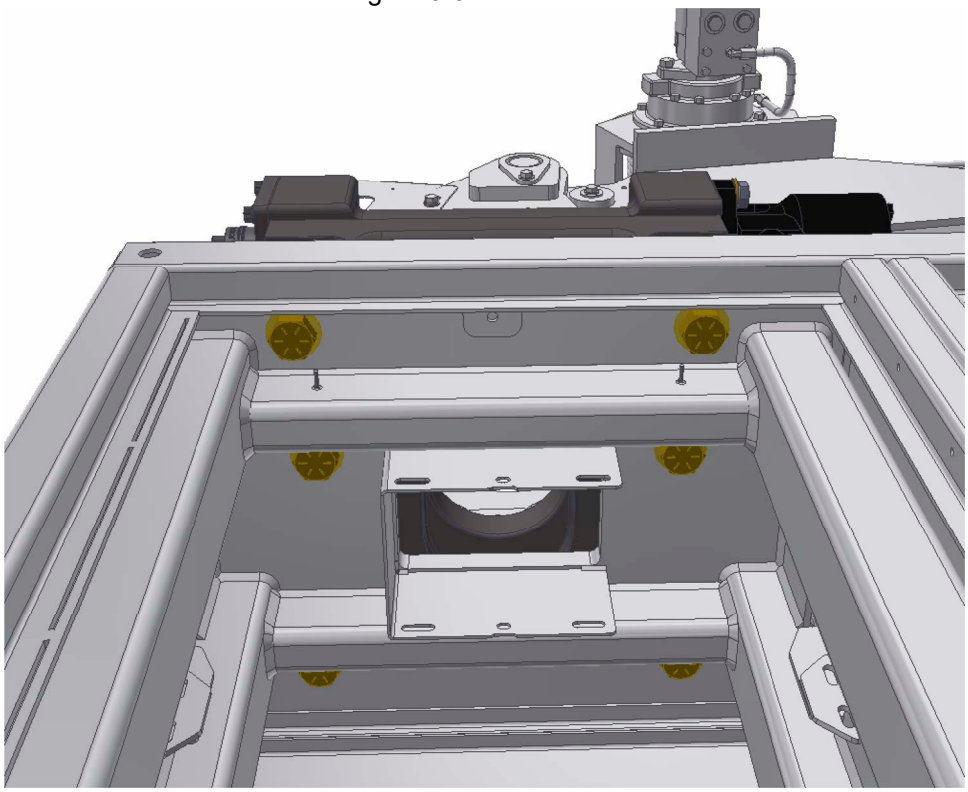


Figure 3-6. Rotate/Base Mounting Bolts

3. The crane mounting bolts (shown in Figure 3-5 and 3-6) must be checked using the following procedure:
   a. Mark the position of all bolt heads relative to the frame or pedestal using a permanent marker as shown in Figure 3-7.

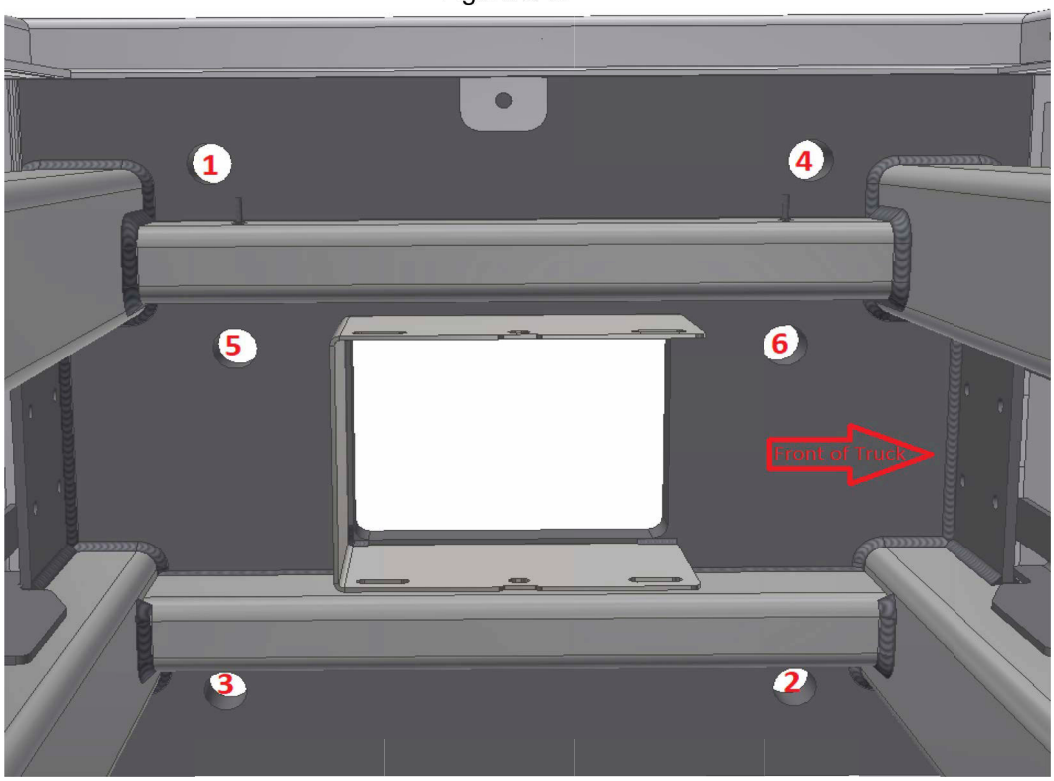
Figure 3-7. Marking Bolt Heads Prior to Torque Check

   b. Torque check bolts by applying factory-specific torque (161 ft-lbs for 5/8 inch OEM pedestal bolts, and 1034 ft-lbs for 1 inch OEM rotate/base bolts) with a calibrated torque wrench.
   c. Check the position of the permanent marker line on the bolt head relative to the line on the frame or pedestal. If the bolt head does not rotate more than 60° (i.e. one bolt head flat), move to the next fastener in the pattern. If any bolt in the pattern rotates more than this specified limit, remove all bolts in that pattern, clean and deburr the female threads, obtain an OEM replacement set of the proper size and grade of bolts, apply OEM-specified thread locker compound to the bolt threads, and torque to the factory specifications in accordance with the Pedestal Mounting Bolt Torque Pattern shown in Sections 3.13.7.
4. Inspect crane hook and safety latch for wear or damage.
5. Make sure hydraulic pressure is within specification to the cylinders, main block assembly, and cartridges.
6. Lubricate pivot points on crane, such as the bearings, and slewing ring.
7. Check for damage or wear to hydraulic hoses.
8. Check PTO for damage or wear. Refer to the manufacturer’s maintenance manual for inspection procedure.
9. Replace hydraulic oil.
10. Check cylinders for the following:
    - Leaks
    - Drifting cylinders
    - External damage
    - Proper operation
11. Record Inspection

3.13.7 Crane Pedestal & Rotate/Base Bolt Installation Torque Pattern

1. When crane pedestal bolts are replaced, torque must be applied in the following pattern shown in Figure 3-8 and Figure 3-9.

Figure 3-8.



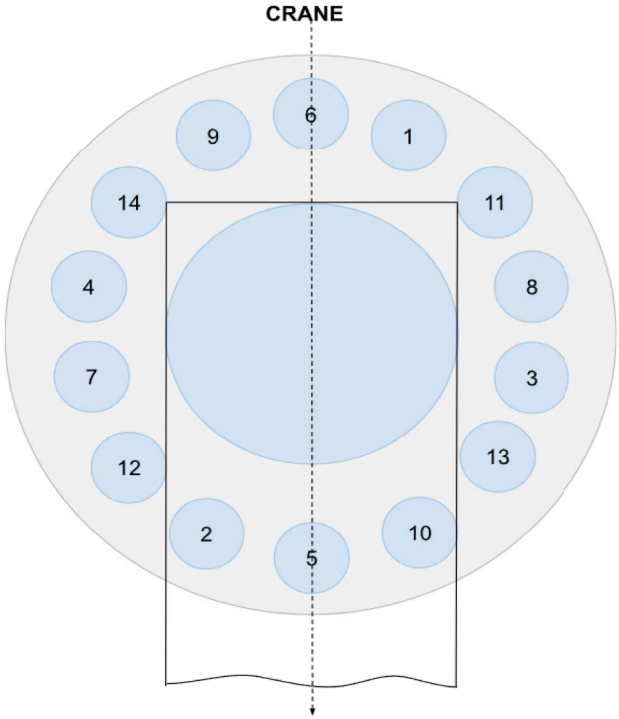


Figure 3-9.

Table 3-1. Crane Pedestal & Rotate/Base Bolt Torque Pattern

2. Apply 50% of final installation torque (approx. 80 ft-lbs for pedestal bolts, and 500 ft-lbs for rotate/base bolts) in the same pattern.
3. Apply 75% of final installation torque (approx. 120 ft-lbs for pedestal bolts, and 750 ft-lbs for rotate/base bolts) in the same pattern.
4. Apply 100% of final installation torque (approx. 161 ft-lbs for pedestal bolts, and 1034 ft-lbs for rotate/base bolts) in the same pattern.
5. Apply 100% of final installation torque (approx. 161 ft-lbs for pedestal bolts, and 1034 ft-lbs for rotate/base bolts) in a circular pattern.

3.13.8 Lubrication and Maintenance Schedule

LUBRICATION & MAINTENANCE SCHEDULE					
Service Performed	**Day**	**Weekly**	**Monthly**	**3 Month**	**Notes**
Hydraulic Fluid	X		X		Check fluid level
Hydraulic Hoses	X			X	Visually inspect for leaks, cracks, and wear
Cylinders and Seals	X		X	X	Check cylinders and seals for leaks
Load Hook				X	Inspect hook and latch for deformation
Winch Cable	X				Check for broken strands, flattening, and deformation
Cable Drum			X		Make sure cable is wound evenly on drum
Inspect Safety Devices	X		X	X	Inspect proper function of all safety devices
Pins and Retaining Bolts	X	X	X	X	Check bolts for loose, missing, and/or damaged fasteners
Wash		X			Wash body, crane, and chassis
Rotation Ring Gear				X	Lube with Castrol Molub – Alloy, 936 SF Heavy Lubricant or equivalent
Sheaves	X	X	X	X	Inspect for wear and bearing fatigue
Rotate/Base Bolts				X	Check torque to 1034 ft-lbs and replace if required
Pedestal Bolts				X	Check torque to 161 ft-lbs and replace if required
All other Bolts				X	Check with a torque wrench and tighten/replace as required
Rotation Gear Box				X	Grease zerks with multipurpose grease
Lubricate				X	Lubricate all applicable components
Hydraulic Fluid				X	Drain, flush, and refill with ISO 46 Hydraulic Oil
Hydraulic Pressure				X	Check for proper hydraulic pressure
Outriggers	X		X	X	Check for proper operation and leaks
Oil Leaks	X		X	X	Check for leaks in all systems
PTO				X	Check PTO based on manufacturer’s manual
Record Inspection			X	X	Record inspection and tests preformed

CHAPTER 4 - TROUBLESHOOTING

NOTE

The following is meant as a reference for diagnosing on-the-job-malfunctions.
*If probable causes are checked and no solution is present on phase 2 or 3, please call (866-985-3100)

SYMPTOM	PROBABLE CAUSE*
Crane will not operate manually or electrically	1. Parking brake is not engaged
	2. PTO is not engaged
	3. Radio receiver does not have 12-VDC power supply
	4. Transmitter not on
	5. Transmitter batteries have low voltage
	6. Hydraulic pump is not operating at rated pressure
Crane will not rotate	1. Hydraulic fluid level is low
	2. Obstruction in control valve solenoid
	3. Adjustable speed is improperly set
	4. Bad ground on control valves
	5. Rotation direction slope is too extreme (not on level ground)
Crane will operate manually but will not operate electrically.	1. Radio receiver does not have 12-VDC power supply
	2. Transmitter not on
	3. Radio receiver is not functioning properly
	4. Parking brake is not engaged
	5. Parking brake switch is not working properly
Function does not respond to controls	1. The toggle switch is not working properly
	2. Hydraulic fluid is low
	3. PTO is not engaged
	4. Ruptured/obstructed pressure line
	5. Faulty hydraulic pump
	6. Short circuit in remote control
	7. Broken wire in remote control
	8. Crane is not grounded to truck
	9. Solenoid in control valve is malfunctioning
	10. Bad ground on the control valve

SYMPTOM	PROBABLE CAUSE*
Two functions operate at the same time while only toggling one function.	1. Obstruction in solenoid control valve
	2. Toggle switch has failed and is stuck in the on function
Functions operating slowly	1. Hydraulic pump is operating at reduced speed
	2. Relief valve is set too low
	3. Flow control valve is not functioning properly
	4. Low hydraulic fluid
	5. Dirty filter/strainer
	6. Obstruction in solenoid control valve
Unusual noise in operation	1. Cavitation due to low hydraulic oil supply
	2. Excessive loading
	3. Restriction/collapse of suction line
	4. Flow control valve is not functioning properly
	5. Suction line filter is dirty
	6. Relief valve is set too low
	7. Relief valve is defective
	8. Air in the lines
Outriggers will not react	1. Adjustment speed is set improperly
	2. Control valve is defective
	3. Loss of power and/or ground to coil
	4. Sensor needs adjustment
Boom drifts under load	1. Cylinder piston seals are leaking
	2. Counterbalance valve is defective
Boom or winch won't lift	1. Restriction in the line
	2. Relief valve is not set properly
	3. Overload condition
	4. Counterbalance valve is malfunctioning or defective
Rotation speed too fast or too slow	1. Hydraulic lines are restricted or ruptured
	2. Hydraulic motor is defective

SYMPTOM	PROBABLE CAUSE*
Winch brake will not hold	1. Back pressure on the return line of the winch is greater than 50 psi
	2. Excessive loading
	3. Winch relief valve is not set properly
	4. Counter balance valve is not set properly
Crane operates slowly	1. Air in the system
	2. Pump is not delivering rated oil volume
	3. Holding valves are not operating
	4. Hydraulic fluid is low
	5. Flow control valve is restricted
	6. Pressure relieve valve is sticking open
	7. Speed control option is not engaged

Crane Interlock Summary					
If:	Both Outriggers Unplanted	One Outrigger Planted	Both Outriggers Planted and Fully Extended	Both Outriggers Planted, Not Fully Extended	Zone Overload
Warning Ribbon Displayed					
Phase 2	Outriggers Not Deployed	Maneuver Mode		Maneuver Mode	Crane Zone Overload
Phase 3	Outriggers Not Deployed	Outriggers Not Deployed		Maneuver Mode	Crane Zone Overload

Functions					
Boom Up	Enabled	Disabled	Enabled	Enabled	Enabled
Boom Down	Enabled	Disabled	Enabled	Enabled	Disabled
Rotate	Enabled	Disabled	Enabled	Enabled	Enabled
Boom Extend	Disabled	Disabled	Enabled	Enabled	Disabled
Boom Retract	Disabled	Enabled	Enabled	Enabled	Enabled
Winch Up	Disabled	Disabled	Enabled	Enabled	Disabled
Winch Down	Disabled	Enabled	Enabled	Enabled	Enabled

Zone Rating					
Zone 1	45% of nominal (Stability Derate Factor Setting)	No lift capability, see above	Stored Value for Zone 1	45% of nominal (Stability Derate Factory Setting)	Allow rotate to 2
Zone 2	45% of nominal (Stability Derate Factor Setting)	No lift capability, see above	Stored Value for Zone 2	45% of nominal (Stability Derate Factory Setting)	Allow rotate to 3
Zone 3	Stored Value for Zone 3	No lift capability, see above	Stored Value for Zone 3	Stored Value for Zone 3	Allow rotate
Zone 4	45% of nominal (Stability Derate Factor Setting)	No lift capability, see above	Stored Value for Zone 4	45% of nominal (Stability Derate Factory Setting)	Allow rotate to 3
Zone 5	45% of nominal (Stability Derate Factor Setting)	No lift capability, see above	Stored Value for Zone 5	45% of nominal (Stability Derate Factory Setting)	Allow rotate to 4
Zone 6	45% of nominal (Stability Derate Factor Setting)	No lift capability, see above	Stored Value for Zone 6	45% of nominal (Stability Derate Factory Setting)	Allow rotate to 5
No Load Zone	45% of nominal (Stability Derate Factor Setting)	No lift capability, see above	Stored Value for Zone 1 and 6	45% of nominal (Stability Derate Factory Setting)	Allow rotate to 6

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CHAPTER 5 - PARTS

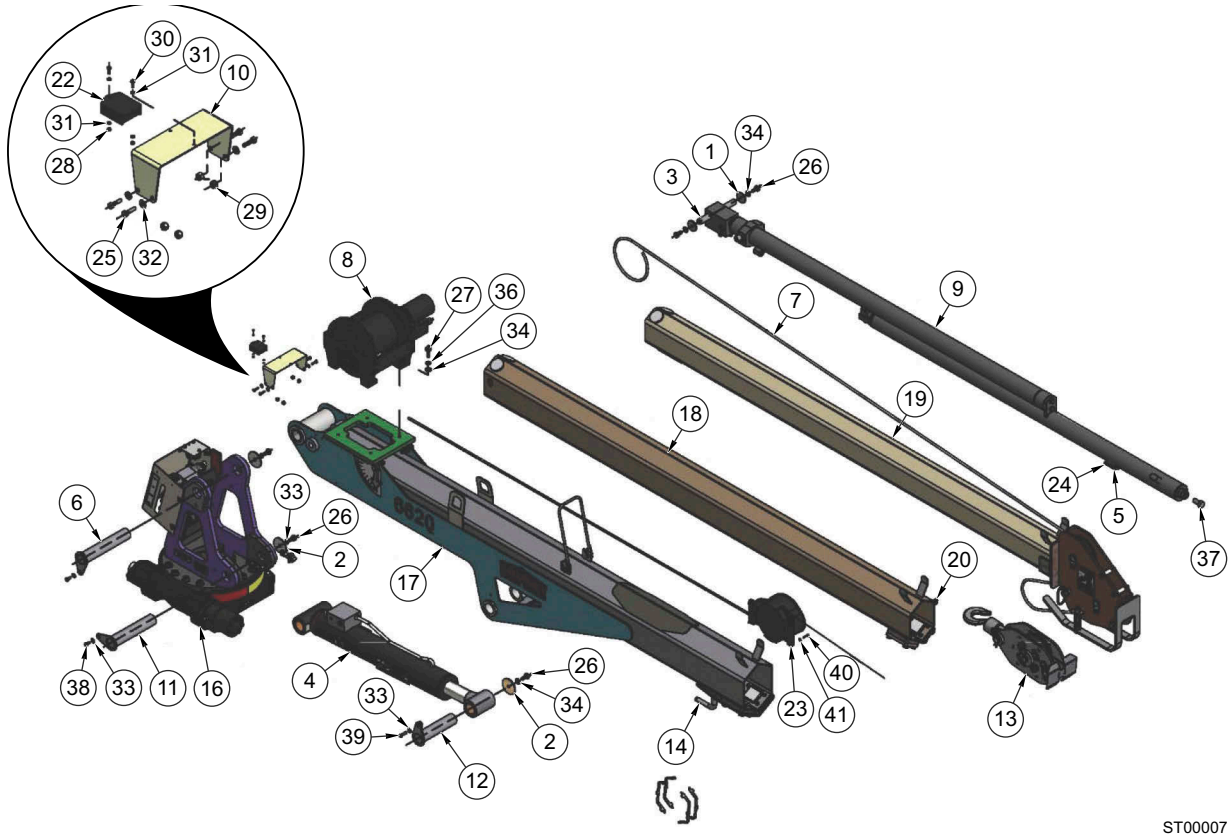

Figure 5-1.

Table 5-1. Assy., Crane, Summit, 6620 Hydraulic PH 3

ITEM	PART NUMBER	DESCRIPTION
1	400-60200	WASHER, RETAINER
2	400-60201	WASHER, RETAINER
3	400-60205	PIN, INNER CYLINDER
4	400-60345	CYL,LIFT,4.00XB 22.25 STRK 2.50 ROD,6620&6629 CRANE
5	400-60414	EXTENSION CYLINDER SKID PADS 10K/12K 20'
6	400-60418	PEDESTAL TO CYLINDER PIN,10/12K
7	400-60473	CABLE,3/8 IN DIA. WIRE ROPE WITH THIMBLE,BS 7.55 TONS
8	400-60486	WINCH,6 AND 8K CRANS,5,000 LB SINGLE LINE, 3/8 CABLE
9	400-60487	CYLINDER, EXTEND,2.5 BORE LOWER 1.5 ROD,2 BORE 1.25 ROD,120 STROKE,6/8K
10	400-61276	BRACKET,HARTFIEL CRANE INCLINATION SENSOR 6620
11	400-61282	PEDESTAL TO CYLINDER PIN,6K
12	400-61284	BOOM TO CYLINDER PIN WELDMENT

Table 5-1. Assy., Crane, Summit, 6620 Hydraulic PH 3 (Continued)

ITEM	PART NUMBER	DESCRIPTION
13	400-63388	ASSY, TRAVELING BLOCK 6K 2019-2020
14	400-61886	STOW HOOK WLDMNT 6K, 10K & 12K
15	400-62104	BALL STOP,CRANE
16	400-62236	CRANE,SUMMIT,PEDESTAL 6620/6629 ASSEMBLY PH 3
17	400-62239	CRANE,SUMMIT,BASE BOOM 6620 ASSEMBLY PH 3
18	400-62242	CRANE,SUMMIT,INTERMEDIATE BOOM 6620 ASSEMBLY PH 3
19	400-62244	CRANE,SUMMIT,STINGER BOOM 6620 ASSEMBLY PH 3
20	600-10244	GROMMET,63 ID,SNG,RUBBER
21	600-10249	GROMMET,.38 ID,SNG,RUBBER
22	600-80003	JORAL DUAL AXIS INCLOS
23	600-80057	COBO CABLE REEL
24	700-10016	SCREW SOCKET FLAT CAP SS .25-20X.75
25	700-10019	.25-20X1 NC GR8 BOLT
26	700-10046	.50-13X1 NC GR8 BOLT
27	700-10047	.50-13X1.50 NC GR8 BOLT
28	700-10100	8-32 KEP NUT
29	700-10108	NUT,.25 NYLON LOCK
30	700-10125	8-32X.50 MAC SCREW RD/SLOT
31	700-10156	#8 WASHER GR2
32	700-10158	.25 HR SAE FLAT WASHER
33	700-10160	.38 HR SAE FLAT WASHER
34	700-10162	.50 HR FLAT WASHER
35	700-10164	.75 HR SAE FLAT WASHER
36	700-10173	.50 LOCK WASHER
37	700-10285	BOLT, FINE THREAD,.75-16X1.5 IN LG,HCS YZ8
38	700-10287	.38-16X.75 NC GR8 BOLT
39	700-10315	.38-16X1.25 NC GR8 BOLT
40	700-10536	SHCS 12-24X1" ZF
41	700-10537	#12 FLAT WASHER ZF
42	500-41071	ELBOW 90°,MOR -6 TO FMOR -6
43	600-80052	PRESSURE TRANSDUCER, -6 STW PHASE 3
44	500-40616	MOR X FOR 90 (.25-.25)
45	600-80051	PRESSURE TRANSDUCER,-4 STW PHASE 3

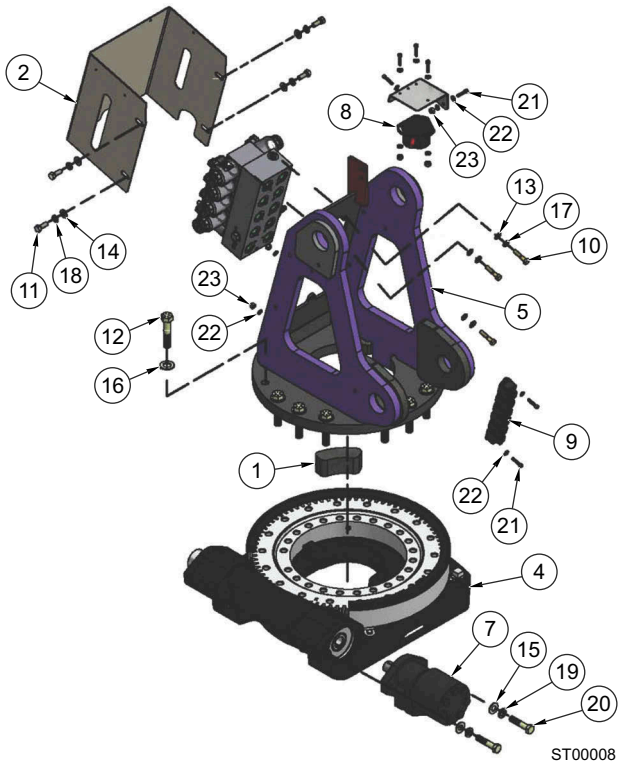

Figure 5-2.

Table 5-2. Crane, Summit, Pedestal 6620/6629 Assembly PH 3

ITEM	PART NUMBER	DESCRIPTION
1	400-60478	CRANE ROTATION STOP,SOLID,1.75 IN THK,4.25
2	400-61322	SHIELD,CRANE 6620 THRU 6629 VER.12 ONLY
3	400-61530	BRCKT,HARTFIEL CRANE INCLINATION BASE SENSOR
4	400-61809	ROTATOR,CRANE 6K-12K,85:1,W/ENCODER,W/SHIELD
5	400-62237	PEDESTAL WELDMENT,6620 CRANE PH 3
6	500-60055	VALVE ASSEMBLY,CRANE,4 STATION
7	600-60064	MOTOR,ROTATOR HYD
8	600-80053	C.O.B.O SpA INCLINOMETER
9	600-80056	PHASE 3 6 WAY CAN SPLITTER
10	700-10027	.31-18X1.5 NC GR8 BOLT
11	700-10033	.38-16X1 NC GR8 BOLT
12	700-10061	BOLT GR8 NC .625-11X3
13	700-10159	.31 HR SAE FLAT WASHER
14	700-10160	.38 HR SAE FLAT WASHER

Table 5-2. Crane, Summit, Pedestal 6620/6629 Assembly PH 3

ITEM	PART NUMBER	DESCRIPTION
15	700-10162	.50 HR FLAT WASHER
16	700-10163	.63 HR SAE FLAT WASHER
17	700-10170	.31 LOCK WASHER
18	700-10171	WASHER LOCK .375
19	700-10173	.50 LOCK WASHER
20	700-10296	.50-13X2.25 NC GR8 BOLT,YELLOW ZINC HEX CAPSCREW
21	700-10536	SHCS 12-24X1" ZF
22	700-10537	#12 FLAT WASHER ZF
23	700-10538	#12-24 SS NYLOCK NUT

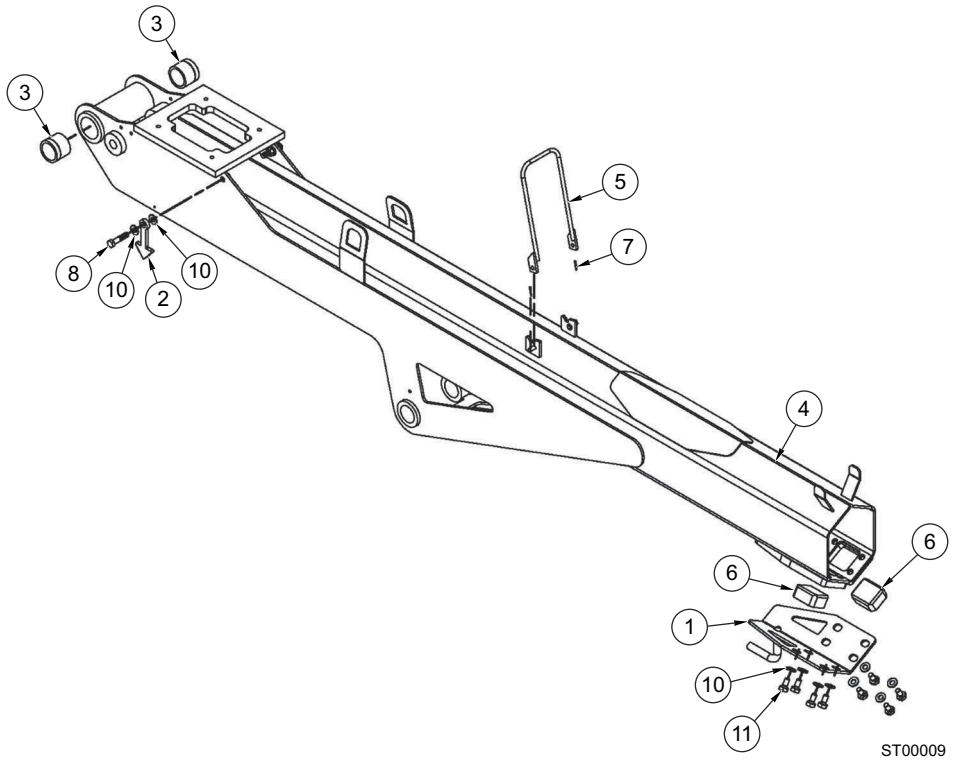

Figure 5-3.

Table 5-3. Crane, Summit, Base Boom 6620 Assembly PH 3

ITEM	PART NUMBER	DESCRIPTION
1	400-61886	STOW HOOK WLDMNT 6K, 10K & 12K
2	400-60217	ANGLE INDICATOR,CRANE
3	500-30021	BEARING,CRANE LIFT CYLINDERS
4	400-62240	BOOM WELDMENT,BASE,6620 PH 3
5	400-60226	CABLE GUIDE
6	400-60198	SKID BLOCK
7	700-10288	COTTER PIN,.125X.75,SS
8	700-10296	.50-13X2.25 NC GR8 BOLT,YELLOW ZINC HEX CAPSCREW
9	700-10162	.50 HR FLAT WASHER
10	700-10162	.50 HR FLAT WASHER
11	700-10046	.50-13X1 NC GR8 BOLT

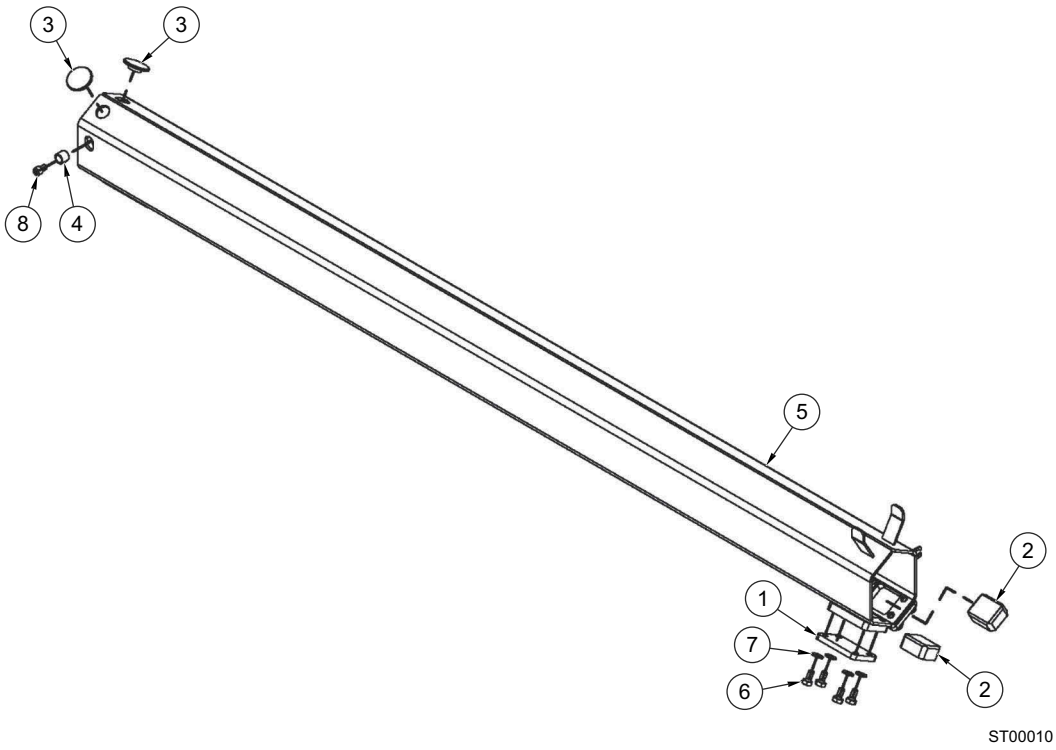

Figure 5-4.

Table 5-4. Crane, Summit, Intermediate Boom 6620 Assembly PH 3

ITEM	PART NUMBER	DESCRIPTION
1	400-60195	BLOCK,INTERMEDIATE RETAINER
2	400-60198	SKID BLOCK
3	400-60199	UPPER SKID PAD
4	400-60413	THRUST BUSHING
5	400-62243	BOOM WELDMENT INTERMEDIATE - 6620 PH 3
6	700-10046	.50-13X1 NC GR8 BOLT
7	700-10162	.50 HR FLAT WASHER
8	700-10291	SHCS 1/2-13X3/4"

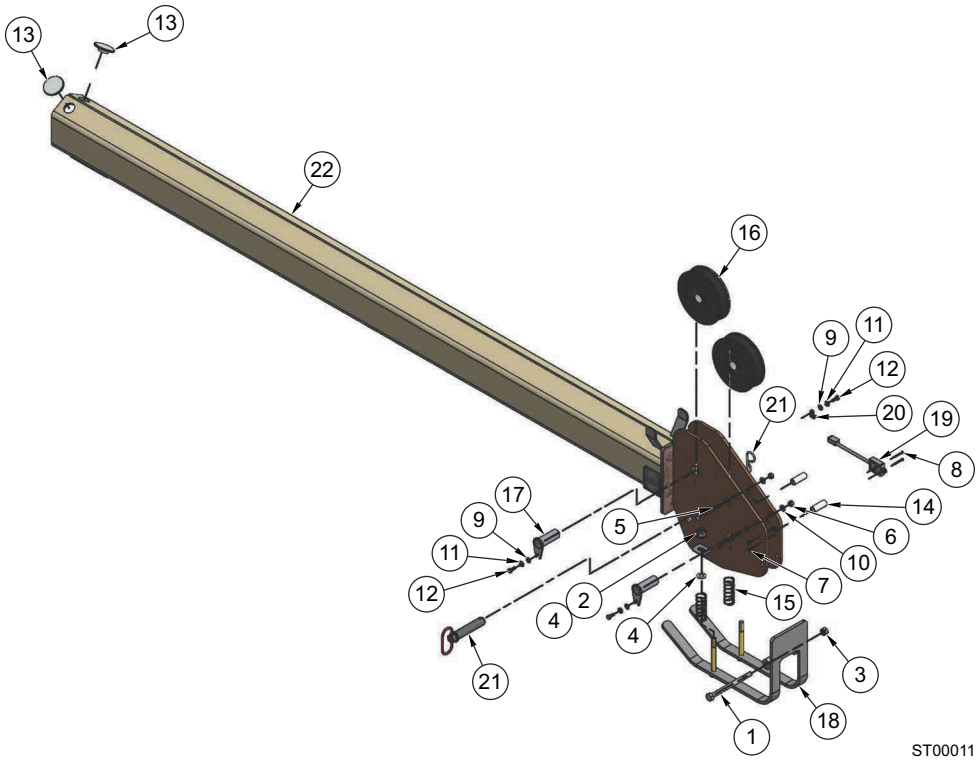

Figure 5-5.

Table 5-5. Crane, Summit, Intermediate Boom 6620 Assembly PH 3

ITEM	PART NUMBER	DESCRIPTION
1	700-10056	.50-13X6.50 NC GR8 BOLT
2	700-10111	.5"-13 NYLON LOCK NUT
3	700-10113	.50-13 STOVER LOCK NUT
4	700-10162	.50 HR FLAT WASHER
5	700-10038	.38-16X3-.50 NC GR8 BOLT
6	700-10105	.38-16 STOVER/TOP LOCK NUT
7	700-10107	10-24 NYLON LOCK NUT
8	700-10133	SCREW 10-24X1.5 MAC RD SLOT
9	700-10159	.31 HR SAE FLAT WASHER
10	700-10160	.38 HR SAE FLAT WASHER
11	700-10170	.31 LOCK WASHER
12	700-10245	.31-18X.75 NC GR8 BOLT
13	400-60199	UPPER SKID PAD
14	400-60388	SPACER,2 IN LG,.59 IN ID,1.00 IN OD,NATURAL NYLON

Table 5-5. Crane, Summit, Intermediate Boom 6620 Assembly PH 3

ITEM	PART NUMBER	DESCRIPTION
15	400-60397	SPRING,3 IN LG,1.0 IN DIA,ANTI TWO BLOCK
16	400-60705	SHEAVE ASSEMBLY 6.88
17	400-61278	PIN,1.125 DIA X 3.125 LG, SHEAVE PIN
18	400-61288	WINCH STOP WLDMENT LW
19	600-80127	LIMIT SWITCH WITH 6 INCH LEAD AND 4 PIN DEUTSCH CONNECTOR
20	700-00003	LOOM CLAMP (.25)
21	700-90024	PIN,1 IN DIA,4 IN USABLE LENGTH,RED HAND
22	400-62245	STINGER WELDMENT,DOUBLE SHEAVE 6620 PH3

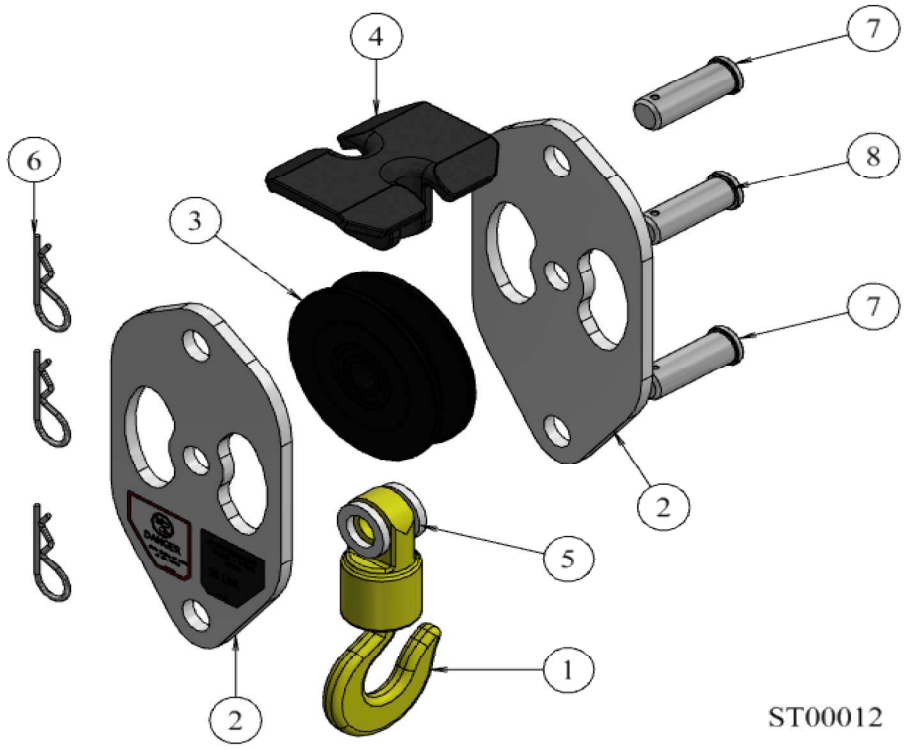

Figure 5-6.

Table 5-6. Travel Block Crane 6K 6000 # CAP

ITEM	PART NUMBER	DESCRIPTION
1	400-60093	3 TON EYE & HOOK SWIVEL MILLER ECONO 285 MODEL
2	400-63388	ASSY, TRAVELING BLOCK 6K 2019-2020
3	400-60705	SHEAVE ASSEMBLY 6.88
4	400-62117	TRAVELING BLOCK, A2B STOP, POLY
5	400-61542	SPACER,UHMW,CRANE HOOK, 1 5/16 ID,2 1/8 OD, 3/8 THICK
6	700-90011	HAIR PIN
7	400-63240	PIN, 1.25" X 3" LG, 303SS TRAVELING BLOCK UPPER/ LOWER PIN 7K-12K
8	400-63241	PIN, 1.18" X 3" LG, 303SS TRAVELING BLOCK UPPER/ LOWER PIN 7K-12K

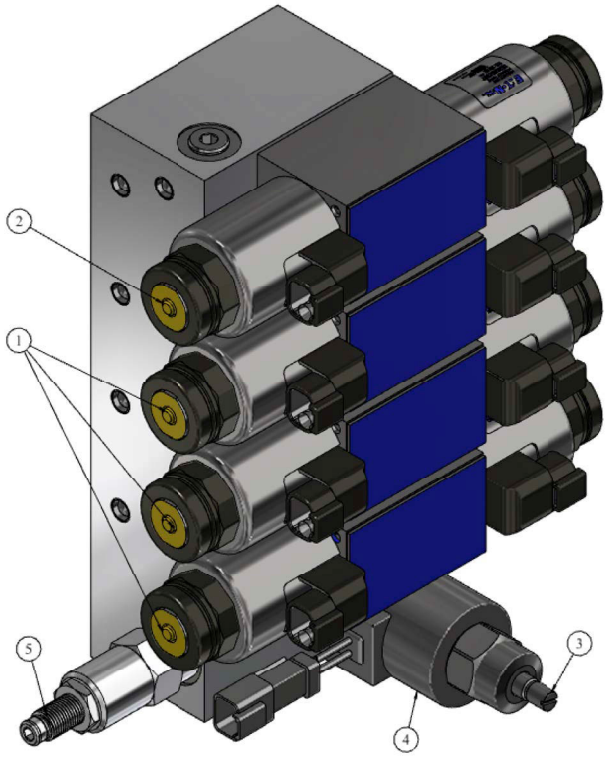

Figure 5-7.

Table 5-7. Hydraulic Controls Valve Assembly

ITEM	PART NUMBER	DESCRIPTION
1	500-60144	VALVE,DO3, TANDEM CENTER
2	500-60145	VALVE,DO3, OPEN CENTER
3	500-60146	VALVE,CARTRIDGE,PROPORTIONAL
4	500-60069	VALVE,COIL,12V,DEUTSCH
5	500-60070	VALVE,RELIEF

CHAPTER 6 - HYDRAULICS / CONTROLS

6.1 Valve Assembly

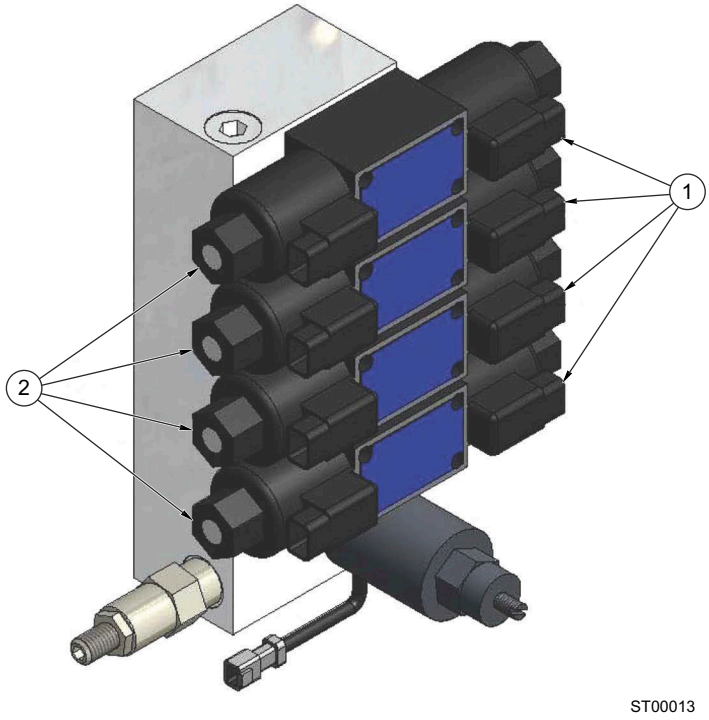

Figure 6-1.

Table 6-1. Valve Assembly

ITEM	DESCRIPTION
1	Deutsch Connector (Typical Both Sides)
2	Manual Overrides (Typical Both Sides)(2.14 **Manual Operation**)

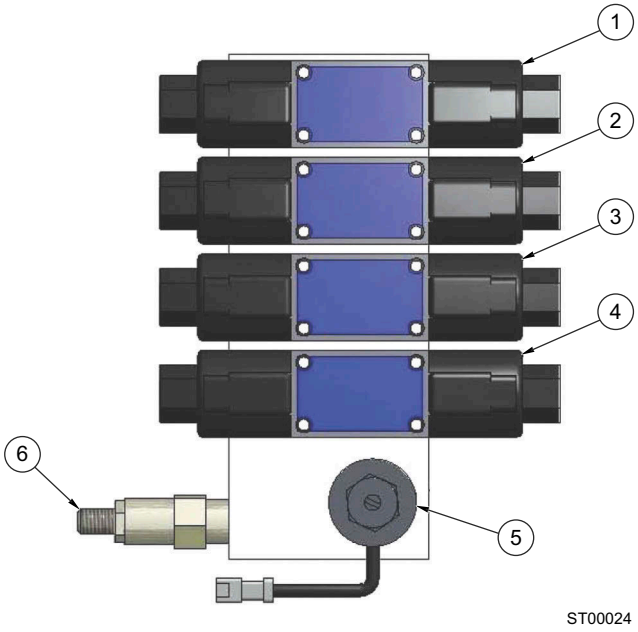

Figure 6-2.

Table 6-2. Valve Assembly Front and Rear View

ITEM	DESCRIPTION
1	Winch
2	Lift Cylinder
3	Rotate
4	Extend Cylinder
5	Flow Control
6	Pressure Relief

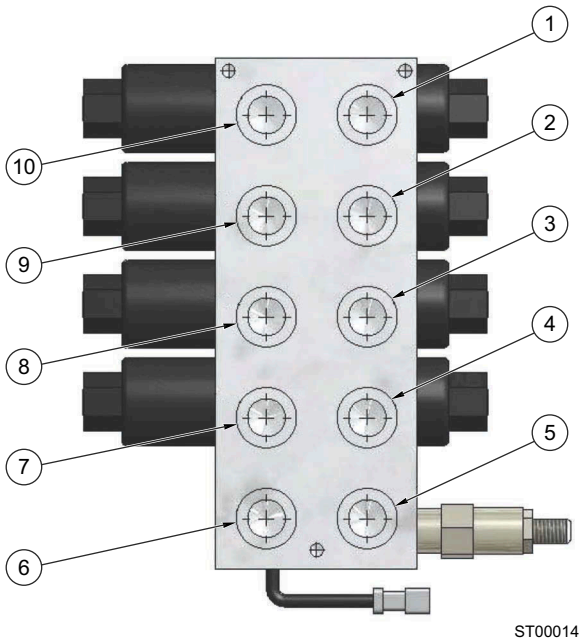

Figure 6-3.

Table 6-3. Valve Assembly Front and Rear View

ITEM	DESCRIPTION
1	Winch Up
2	Cylinder Down
3	Rotate LH
4	Cylinder Out
5	Tank Return
6	Pressure Feed
7	Cylinder In
8	Rotate RH
9	Cylinder Up
10	Winch Down

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CHAPTER 7 - WIRING HARNESS

7.1 Phase I

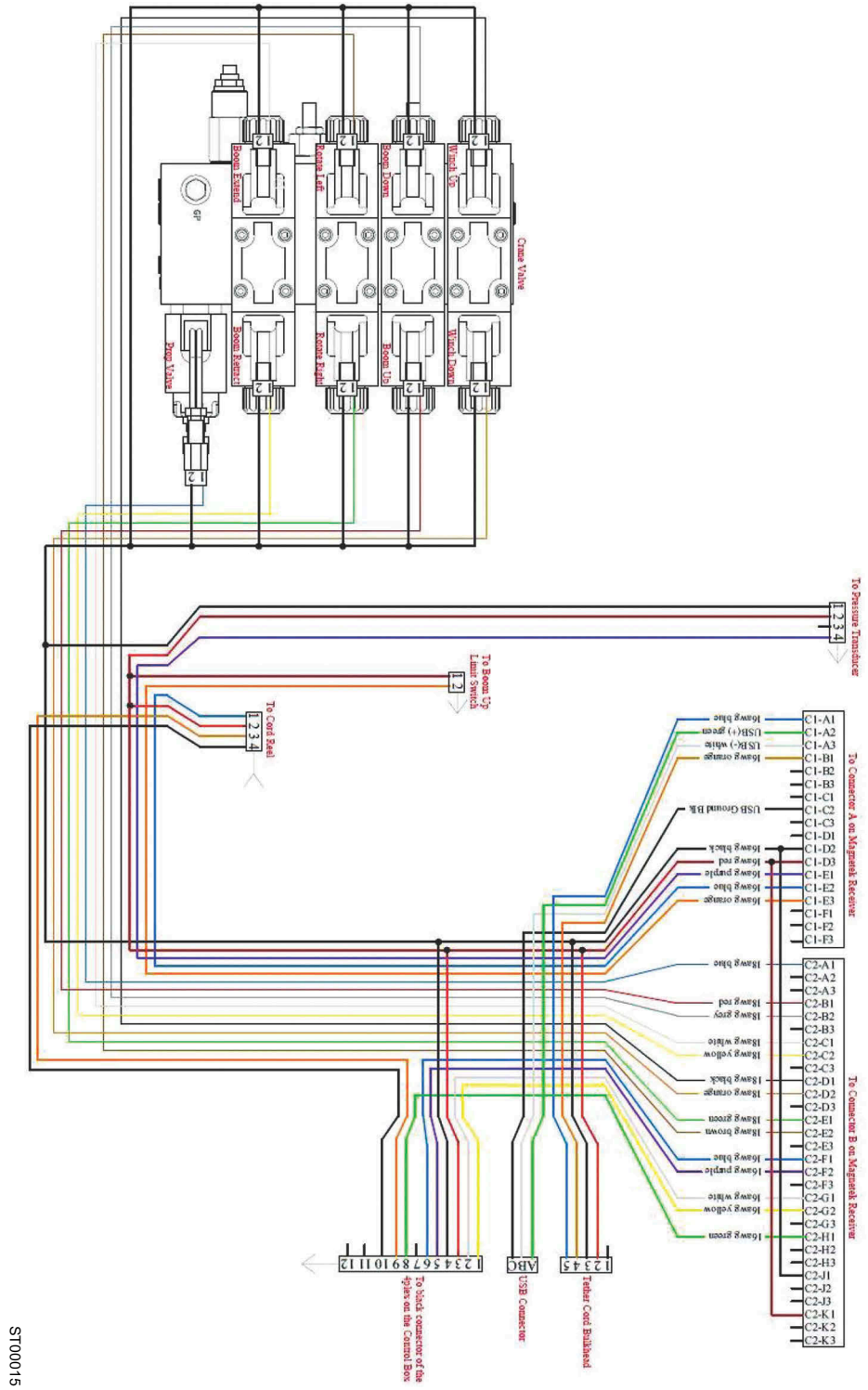

Figure 7-1.

7.2 Phase II

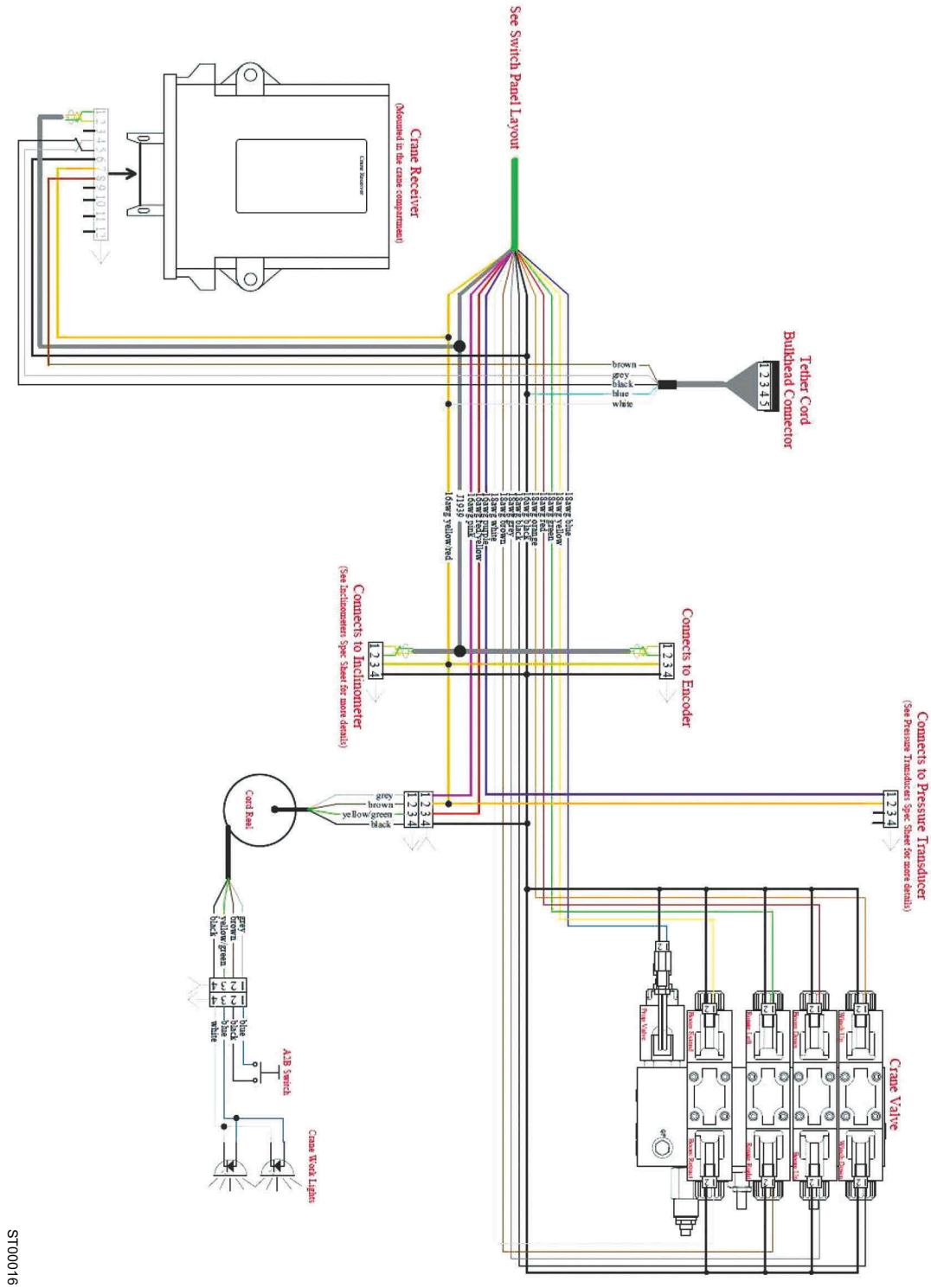

Figure 7-2.

7.3 Phase III

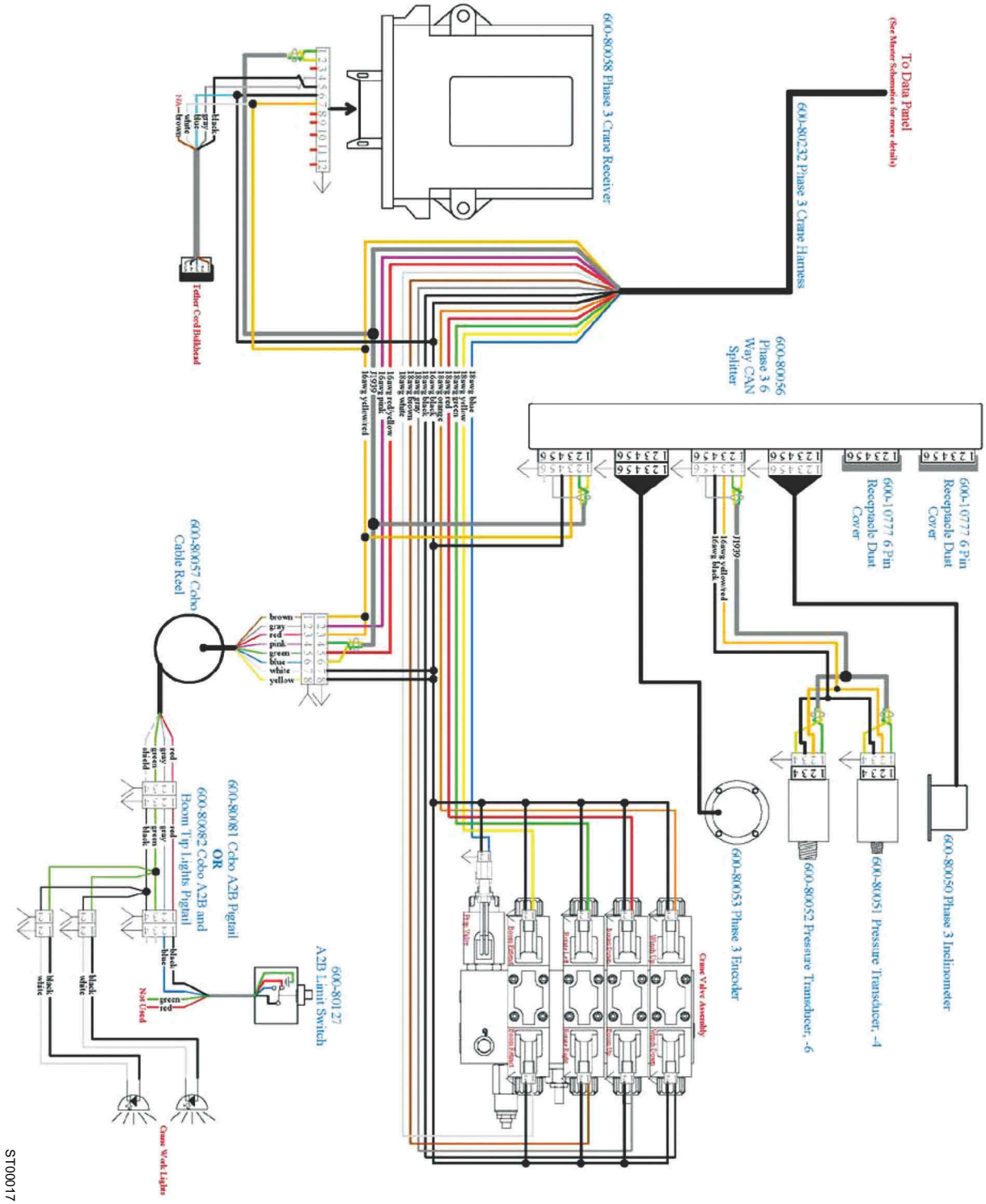

Figure 7-3.

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CHAPTER 8 - CERTIFICATION

8.1 CERTIFICATION

Crane certified to meet or exceed SAE 1063J test procedures and comply with ASME/ ANSI B30.5 Section5-1.10, per method of test SAE J1063 Nov93.
Crane load capacity verified by independent PE.

Figure 8-1.

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Summit Truck Bodies, LLC
990 Vernon Rd.
Wathena, KS 66090
Phone (866) 985-3100
Fax (785) 989-3563

Summit Crane Limited Warranty

Summit Truck Bodies, LLC (hereinafter "Summit") provides the following limited warranty on each new crane of Summit's manufacture ("Products") to be free from defects in material and workmanship, under normal use and service, as described below beginning on the date of purchase of the Product. This Limited Warranty extends to the first purchaser ("Purchaser") of the Product and is not transferable. This Limited Warranty is Purchaser's exclusive remedy, and applies to each new Product purchased in the United States which is accompanied by this written Limited Warranty and for which a completed warranty registration card has been received by Summit within 30 days after purchase of the Product.

Product Warranty – Five Years

Summit guarantees the Summit manufactured body, crane, & tank structure sheet metal will be free of "rust-through perforation", as defined below, and free of defects in material and workmanship for a period of five (5) years from the date of purchase. The Limited Warranty provided by this section shall apply only to Products manufactured and installed by Summit and which remains mounted upon the chassis it was originally installed by Summit.

Product Warranty – One Year

Summit guarantees the Summit manufactured crane & tank structure sheet metal will be free of "rust-through perforation", as defined below, and free of defects in material and workmanship for a period of one (1) year from the date of purchase. The Limited Warranty provided by this section shall apply only to Products manufactured but not installed by Summit, provided, and explicitly conditioned upon, that such Products (i) is installed in strict conformance with the installation instructions contained in the Products' applicable manual and the truck body manual of the chassis on which it is installed and (ii) remains mounted upon the chassis it was originally installed.

Product Warranty – One Year

Summit guarantees the Summit manufactured Advanced Safety Electronics, hydraulics, protective coatings, and parts shall be free of defects in material and workmanship for a period of one (1) year from the date of purchase.

Product Warranty – Ninety (90) Days

Summit guarantees the Summit manufactured replacement parts shall be free of defects in material and workmanship for a period of Ninety (90) days from the date of purchase.

Warranty Terms

During the applicable Limited Warranty period specified above, Summit will repair or replace, at Summit's sole discretion, any Product that appears to have a defect in material or workmanship, in Summit's sole discretion, not excluded below. Summit will pay for replacement parts and such approved repair facilities' labor in accordance with Summit's labor reimbursement policy, outlined below. Summit reserves the right to supply remanufactured replacement parts as it deems appropriate. Summit reserves the right, in lieu of the repair and replacement obligations set forth in this Limited Warranty, to refund the purchase price for the Product. Such right shall be exercised in Summit's sole discretion. If Summit elects to refund the purchase price, Purchaser agrees to deliver the Product to Summit prior to receipt of such refund.

Purchaser Responsibility

Summit's obligations under this Limited Warranty are expressly conditioned upon Purchaser's compliance with and performance of both required and recommended maintenance and repair of the Product warranted in accordance with the Operator's Manual. Purchaser shall conduct and record periodic inspections of the Product (including cranes and accessories) indicated in the Owner's Manual furnished with each Product or otherwise specified by Summit in writing. Purchaser is solely responsible for the cost of required or recommended maintenance and repair and periodic inspections. Purchaser must keep documented evidence that these services were performed and have it providable to Summit. This Limited Warranty is subject to cancellation if Purchaser fails to comply with its obligations set forth herein or in the Owner's Manual. Purchaser shall immediately remove from service any Product Purchaser claims is defective or contains a part that is defective or failed.

Exclusions from Warranty

1. All additions, add-on attachments, accessories, modifications, repairs, or services not manufactured or provided by Summit or a Summit authorized repair facility, including damage or corrosion caused by such additions, add-on attachments, accessories, modifications, repairs or services. This exclusion includes, but is not limited to, optional parts, after-market products, components, installation, painting or other finish, stickers, wraps, decals, lettering, wiring, or modifications.
2. Defects, damage, or corrosion caused, in Summit's sole judgment, by accidents, collision, improper operation, abnormal usage, misuse or negligence, overloading, failure to provide required and recommended maintenance and repair, unsuitable storage, acts of God, vandalism, and any other acts which are not the fault of Summit.
3. Normal wear and tear of any Product or part.
4. Any Product (including crane or accessories) whose identification numbers or marks have been altered or removed.
5. Any component of the Product (including crane or accessories) which has been repaired or maintained using parts not manufactured or supplied by Summit.
6. Products (including cranes or accessories) for which Purchaser has failed to deliver the warranty registration card to Summit within thirty (30) days from the date of delivery of the Product.

7. Transportation or towing costs, if any, of transporting, hauling, or towing the Product or any component to an approved repair facility.
8. Diagnostic and overtime premiums.
9. Depreciation.
10. Any Product that has been removed and installed on a chassis other than the original chassis the Product was installed upon. Removing and installing a Product on a chassis other than the original chassis shall void this Limited Warranty.
11. "Rust-through perforation", defined as corrosion that has created a perforation through the metal, caused in whole or in part by acid rain, application or transportation of corrosive chemicals, sealants or solvents, or the failure to repair damage to the finish.
12. Products, parts, components, or systems provided by Summit but not manufactured by Summit. Such products, parts, components, or systems are covered exclusively by the manufacturer's warranty, if any, in effect at the time of installation or delivery.
13. Products sold or shipped outside the United States and Canada.

Limitation of Parts Warranty

Parts replaced by Summit or an authorized Summit repair facility during the warranty period will be subject to the balance of this Limited Warranty and in no event shall this Limited Warranty be extended or recommenced by such replacement. Parts replaced by Summit or an authorized Summit repair facility after the original warranty period are warranted to be free from defects in material for ninety (90) days from the date of installation.

Labor Reimbursement Policy

Summit will, in its sole discretion, pay for the labor at a Summit authorized facility to repair or replace Products or parts manufactured by Summit, provided Purchaser obtains written approval from Summit prior to such repairs or replacement. Summit has no obligation to pay for labor that is not pre-approved by Summit. Contact the Service Department for details.

Shipping Costs

Summit will pay the costs for shipping replacement parts for parts covered by this Limited Warranty. Shipping shall be within the contiguous United States and by ground carrier only. Purchaser may choose expedited or another form of shipping at Purchaser's sole cost and expense. Purchaser shall pay for all shipping costs for the return of parts for Summit to examine for defects and coverage under this Limited Warranty. If Summit determines, in its sole discretion, such part is defective and covered under this Limited Warranty, Summit shall reimburse Purchaser for such costs of shipping provided Purchaser provides a legible copy of the shipping invoice.

Disclaimer of Warranties

SUMMIT WARRANTS ITS PRODUCTS, INCLUDING THEIR DESIGN AND WORKMANSHIP, ONLY AS STATED IN THIS LIMITED WARRANTY. EXCEPT FOR THE LIMITED WARRANTY

MADE HEREIN, SUMMIT MAKES NO OTHER WARRANTIES, EXPRESS OR IMPLIED, AND HEREBY EXPRESSLY DISCLAIMS AND EXCLUDES ALL OTHER WARRANTIES, INCLUDING, WITHOUT LIMITATION, ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

Summit reserves the right to modify, alter, and improve any Product previously sold without incurring any obligation under this Limited Warranty or otherwise, to modify, alter, or improve any Product previously sold without such modification, alteration, or improvement. No person is authorized to give any other warranty or assume any additional obligation on behalf of Summit.

Limitation of Liability

THE REPAIR, REPLACEMENT, OR REFUND AS PROVIDED UNDER THIS LIMITED WARRANTY IS THE PURCHASER'S SOLE AND EXCLUSIVE REMEDY, AND IS PROVIDED IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED. SUMMIT'S OBLIGATION, IF ANY, UNDER THIS LIMITED WARRANTY IS LIMITED TO THE REPAIR, REPLACEMENT OR REPURCHASE OF DEFECTIVE PRODUCTS, AS DETERMINED IN SUMMIT'S SOLE DISCRETION. TO THE FULLEST EXTENT ALLOWABLE UNDER APPLICABLE LAW, UNDER NO CIRCUMSTANCES, WHETHER IN CONTRACT, TORT, OR OTHERWISE, SHALL SUMMIT BE LIABLE TO THE ORIGINAL PURCHASER OR ANY OTHER PARTY FOR ANY LIQUIDATED, SPECIAL, INDIRECT, INCIDENTAL, EXEMPLARY, OR CONSEQUENTIAL DAMAGES, EXPENSES, LOSSES, FEES, PENALTIES, OR COSTS, INCLUDING, WITHOUT LIMITATION, LOST PROFITS, BUSINESS INTERRUPTION, RENTAL REIMBURSEMENT, LOSS OF VEHICLE USE, INCONVENIENCE, STORAGE, LOST TIME, OR LOST PAY, HOWSOEVER CAUSED, AND EVEN IF THE POTENTIAL OF SUCH DAMAGES WAS DISCLOSED TO AND/OR KNOWN BY SUMMIT.

Disputes Under This Limited Warranty

Any and all disputes and claims of any kind and nature whatsoever arising under this Limited Warranty shall be handled as provided in any agreement of purchase and sale for the Product. If such agreement does not include an express provision relating to the handling of disputes and claims, then the following terms shall apply to this Limited Warranty: This Limited Warranty shall be deemed to have been made in the State of Colorado (without regard to the conflict of law principles of the State), including all matters of construction, validity and performance regardless of the location of the Product. Purchaser expressly waives any and all right to a jury trial regarding any dispute hereunder. Purchaser hereby irrevocably agrees to submit to the exclusive jurisdiction and venue of courts sitting in Adams County, Colorado. Purchaser hereby irrevocably waives, and hereby agrees not to assert by way or motion, defense, or otherwise, any claim that Purchaser is not subject personally to the jurisdiction of such courts, that the Product or any other property of Purchaser is exempt or immune from attachment or execution, that any action brought under this Limited Warranty is brought in an inconvenient forum, that the venue of the action is improper, or that this Limited Warranty cannot be enforced by any such courts.

SUMMIT TRUCK BODIES IS UNDER NO OBLIGATION TO EXTEND THIS WARRANTY TO ANY PURCHASER FOR WHICH A SUMMIT CRANE WARRANTY FORM HAS NOT BEEN COMPLETED AND ON FILE WITH SUMMIT.

OWNER'S MANUAL

Summit Truck Bodies
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866-985-3100
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Subject to Change without Notification