OWNER'S MANUAL

SUMMIT

TRUCK BODIES

Safety, Installation, Maintenance, and Operation

1020 Telescopic Crane

MANUAL #700-20042

Release Date: July 2026

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Wathena, KS 66090
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SUMMIT TRUCK BODIES WARRANTY REGISTRATION

To: Warranty Department Date: _____

From: _____ 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
Or E-mail

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REVISION RECORD

Date	Section(s) or Page(s) Revised	Description of Change	Initials
June 2026	Initial Release	Initial release of manual	

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: October 17, 2024
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 3)

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, 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 the 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 for establishing 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, 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 controls system to prevent an overload, but 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 the 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

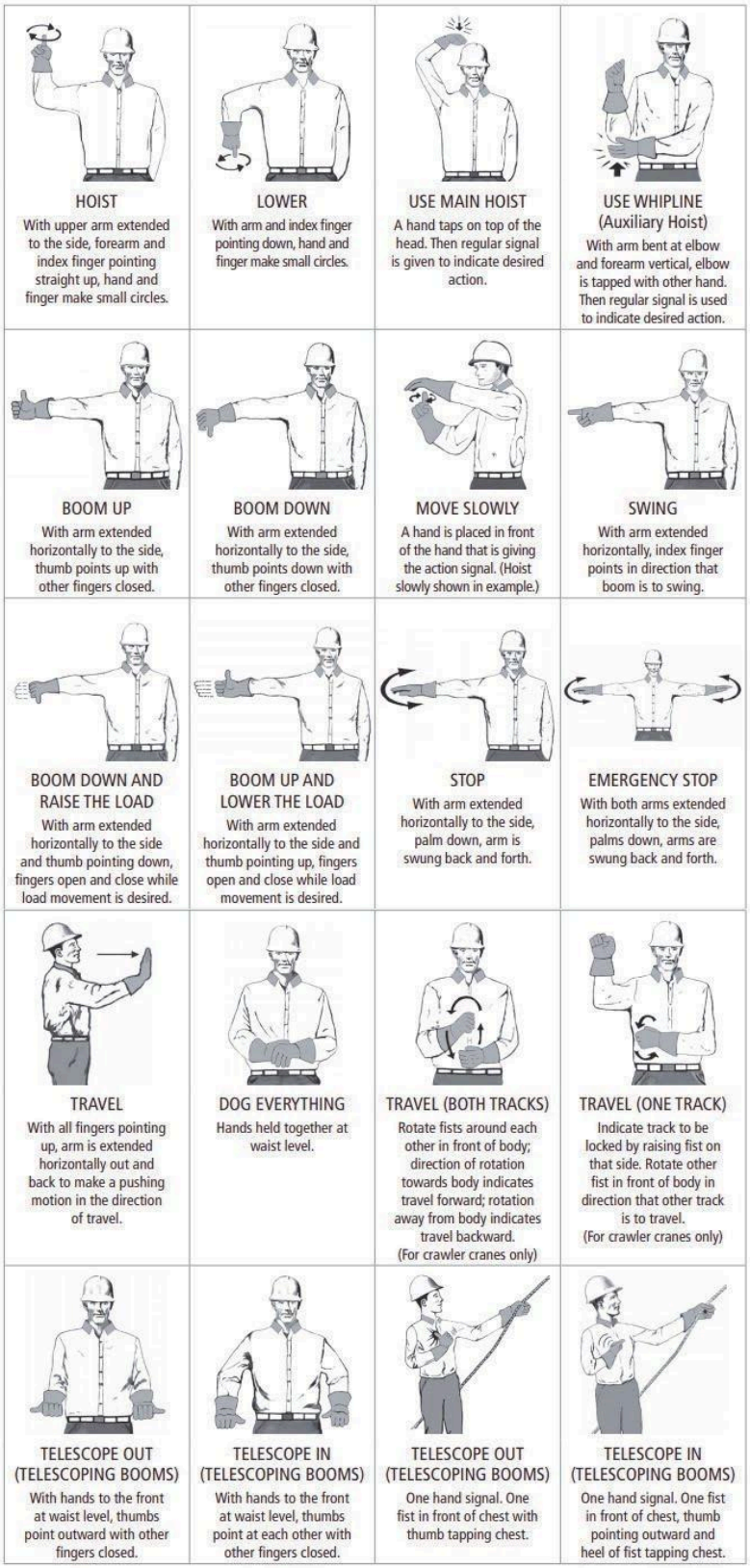
- Use extra personnel to signal when operating near electrical wires.
- Keep, at least, the distance between any portion of the crane and an electrical line. See Table A
- Allow extra space during windy conditions for swaying power lines.
- Death or serious injury can occur when working during electrical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

SPECIFICATION SHEET

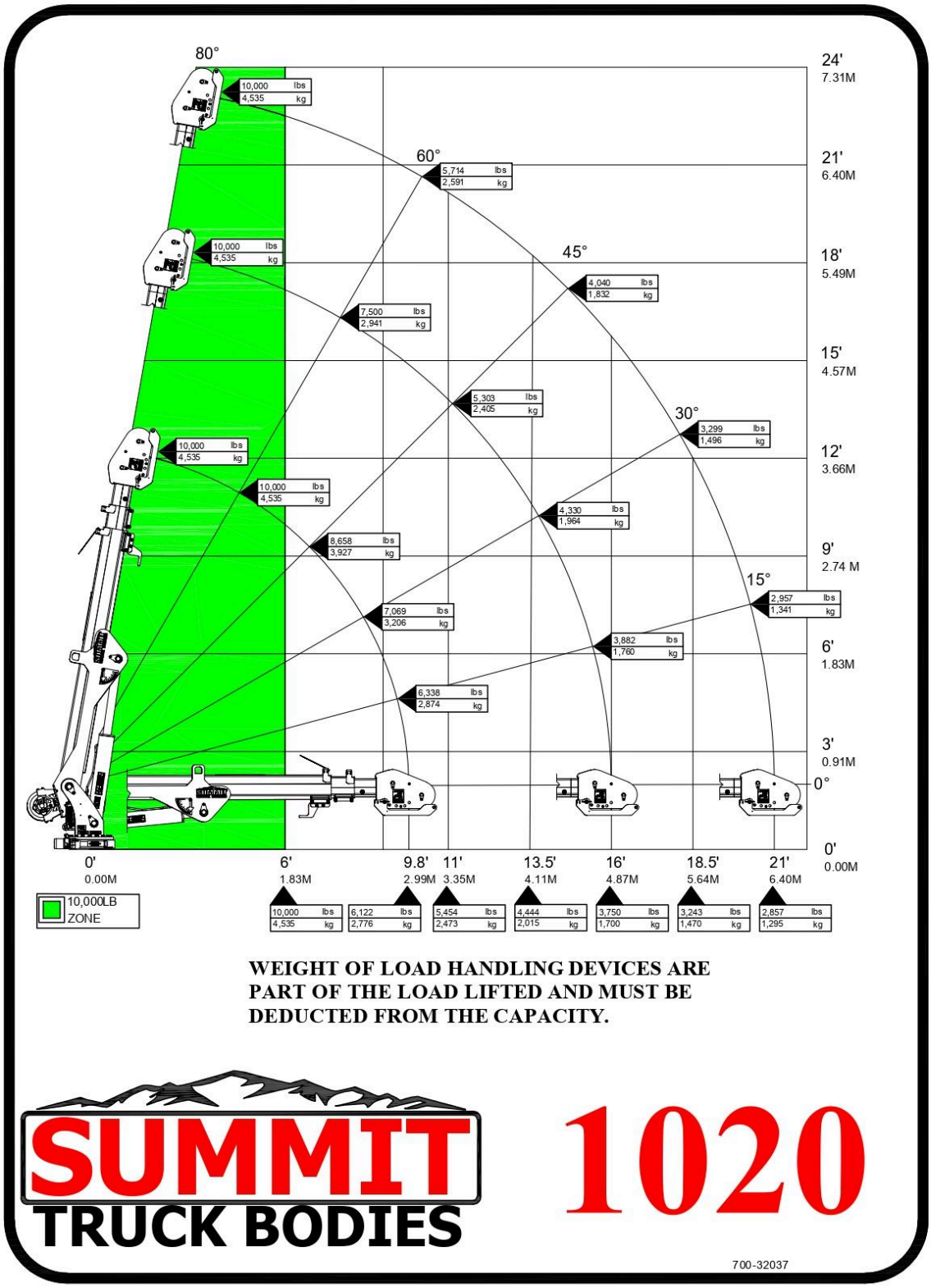
Crane Rating:	60,000 ft-lb (8.2 ton-meters)
Retracted Horizontal Lifting Radius:	9' 9" (2.98 m) from CL of Crane
Boom Extension:	1st Stage Hydraulic 60.13” (132 cm) 2nd Stage Hydraulic 62.75” (138 cm)
Extended Horizontal Reach:	21' (6.4 m) from CL of Crane
Maximum Vertical Lift: (from crane base)	22 ft (6.7 m)
Boom Elevation:	-10 to + 78 degrees
Stowed Height (crane only)	40" (97.9 cm)
Mounting Space Required	18.6 in x 23.6 in. (47.2 cm x 59.9 cm)
Approximate Shipping Weight	2104 lb. (956 kg)
Controls	Radio control standard for all functions.
Winch Specification	
Rope Diameter:	11 mm (7/16”), Rotation Resistant
Line pull speed:	60 ft/min (18.29 m/min)
Max. two part line:	10,000 lb. (4,535 kg)
Max. single part line:	6,000 lb (2,272 kg)
Rotation: (worm gear)	Continuous Rotation
Lifting Capacities	10,000 lb. @ 6' (4,535 kg @ 1.83 m)
	6,122 lb. @ 9.8' (2,777 kg @ 2.99 m)
	4,444 lb. @ 13.5' (2,015 kg @ 4.11 m)
	3,243 lb. @ 18.5' (1,471 kg @ 5.64 m)
	2,857 lb. @ 21' (1,296 kg @ 6.40 m)
Hydraulic Requirements	PTO and Pump
	(8 gpm @ 3000 psi)

Specifications Model 1020 Crane*

*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.

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PERFORMING A LIFT

To prevent serious injury or death, thoroughly understand, and annually review information in this chapter. Become familiar with the capacity chart and load chart before performing a lift. Know how to use both, as described in this section.

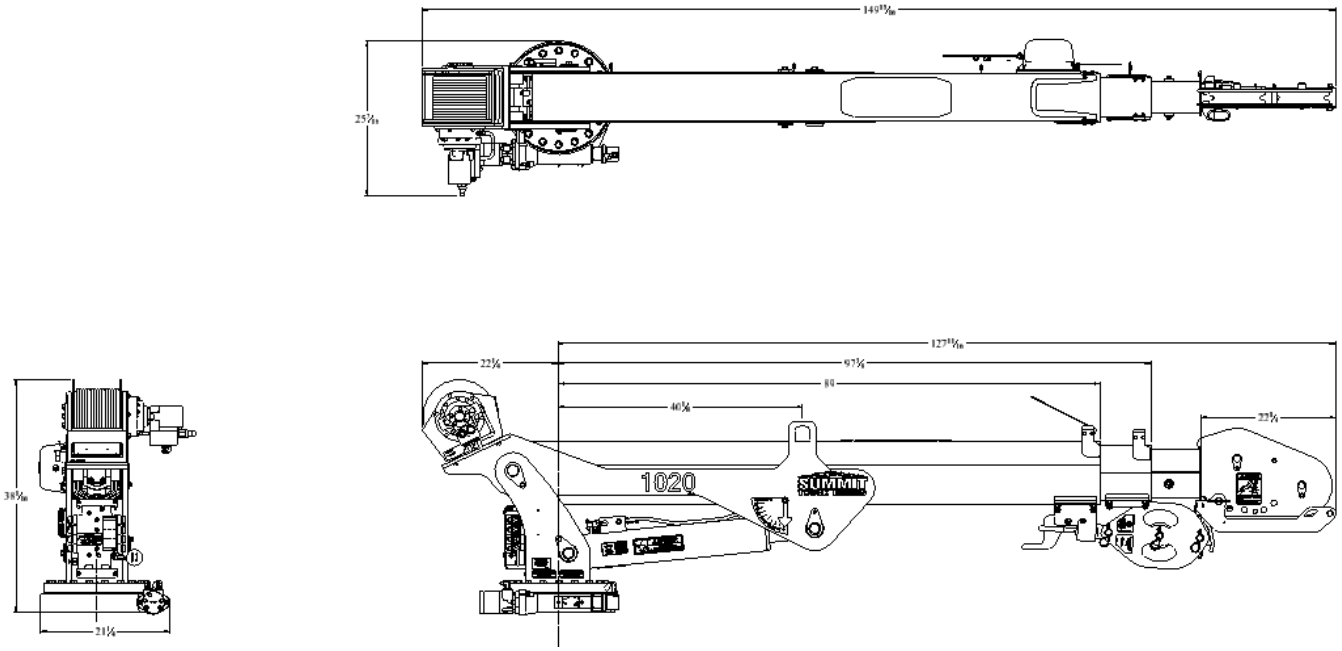
WARNING

Posted capacity/ load charts and physical measurements MUST be used. This crane may include LMI (Load Moment Indicator) systems, or other load management aids; LMI systems are not a substitute for capacity/ load charts and physical measurements. Failure to follow capacity/ load charts may result in damage, injury, or death.

- If boom length, load radius, or boom angle are between two values, use the lower value that has the smallest, conservative capacity. Do NOT guess or attempt to interpolate between two values.
    - If Boom Length is between values, use longer length
    - If Radius is between values, use the larger radius value
    - If Angle is between values, use lowest boom angle

DIMENSIONS

General Dimensions for an 1020 Crane



Note:

All dimensions are in inches.

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 the truck body is able to support the weight of a crane.
3. The crane weight is 1,870 lbs (850 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 1020 crane:

- Minimum cab to axle 84 in. (2134 mm).
- Body length nominal 132 in. (3353 mm).
- Body width 98 in. (2490 mm).
- Compartment depth 22 in. (559 mm)
- Floor width 54 in. (1372 mm)

ATTENTION

2. **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.**

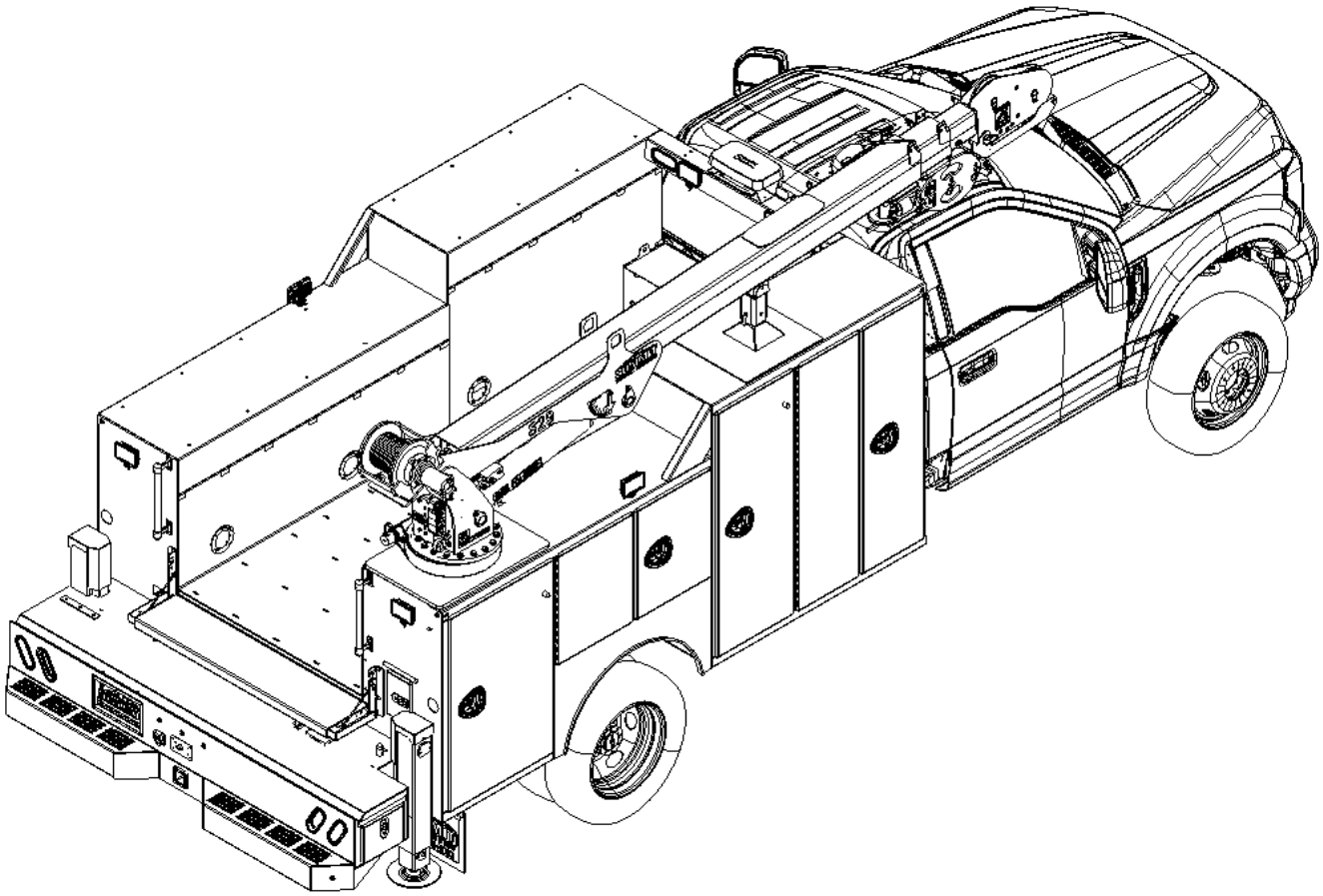


Figure 1-1.

3. Install a boom cradle that will allow the crane to be balanced and level during the installation.

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 the rotate.
6. Secure the crane to the truck body as follows:
   a. Lower the crane into place with the boom facing the rear and drive motor forward.

b. Make sure the crane is resting properly on the mounting plate.

c. Apply Loctite® thread locker #277 to mounting bolts and install them from the underside of the base. 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 the hydraulic hoses to the crane combination swivel per the list below.

- Port 1: Pressure -6
- Port 2: Return -8
- Port 3: Rotate A -6
- Port 4: Rotate B -6

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. Connect electrical at the combination slip ring
10. Install crane receiver in crane compartment
11. Check all bolts and pins for presence, torque, and condition.
12. Visually inspect all welds for cracks, holes, etc.
13. Engage PTO.
14. Slowly operate the crane through all functions. Inspect all hoses, cylinders, and structural members for proper operation. Verify all remote functions match the desired crane process.
15. After the crane has been installed, check all hydraulic lines for:

- Free movement through full rotation and -5 to 75 degrees elevation
- Any abrasive contact between the hydraulic plumbing and/or electrical wires and any structural components
- Tightness of fittings
- Leaks

16. Return crane boom to its support. The unit is ready for operation.
17. 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.

INSTALLATION

- 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 _____

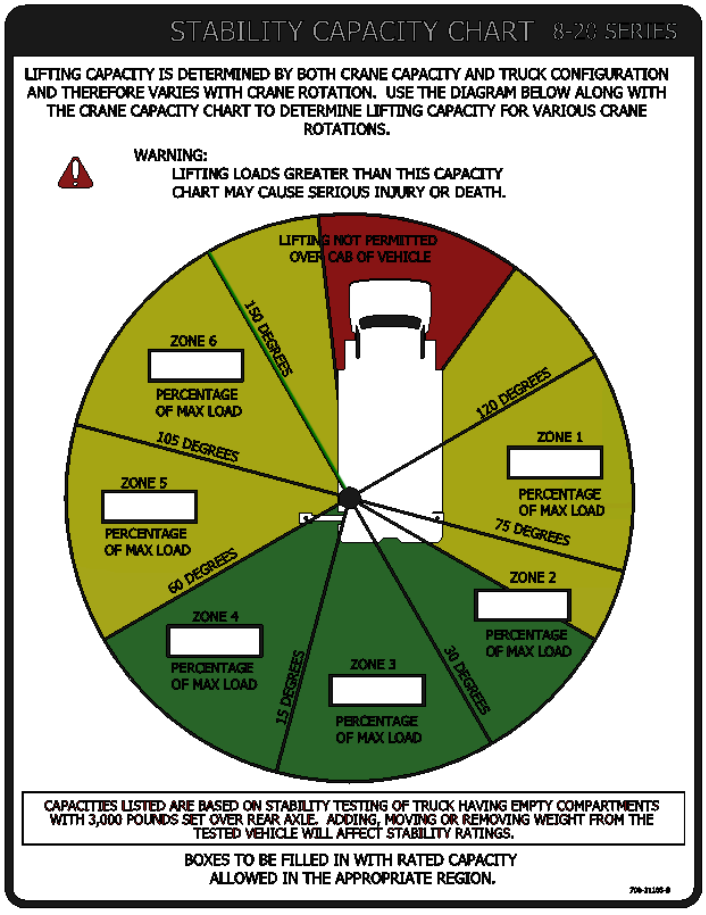
Temperature at conclusion of test _____ Total time of tested _____

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 not designed for the body or chassis is installed, the crane and the stability of it will 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.



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 the 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. 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 center of load). This is the stable horizontal location in this zone.
7. Divide the 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 1-8 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 the truck is level before using a 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 set 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 the load as close to the ground as possible.
- Never lift a load directly over any person(s).
- Do not rotate the load too quickly. Rotating the load too quickly will result in an unstable load that could cause injury or damage the crane's 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 (Section: Safety) (OSHA 1926.1408).
- 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 the crane. Side loading of the crane will result in damage to the crane assembly.
- Never use a 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 beyond 360 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 crane's rotation system.
- A suspended load must remain clear of all personnel. Never pass a suspended load over a person(s) for any reason.
- Wear Personal PPE when operating the crane.

2.7.1 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.

2.8 Deploying Outriggers

2.8.1 Hydraulic Outriggers

1. Rotate locking pins into the unlocked position
2. Go to the 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

2.8.2 Manual Outriggers

1. Rotate locking pin to release drivers side outrigger leg.
2. Pull out the outrigger leg and rotate the locking pin to lock the 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.

2.9 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 stationary on a flat, level surface. Follow the stability chart for all lifting ratings.

2.9.1 Pre-lift 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.

2.9.2 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 signalman is required.

5. Check the 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.

2.9.3 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 counterbalance 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 the crane, extend, and rotate the boom to position the load hook above the center of gravity of the load.. The crane is now ready to perform a lift.

2.9.4 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(s) 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.

2.9.5 Shutting Down the Crane

1. Retract the boom and cable. Make sure the cable is properly wrapped on the 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.

2.10 General Remote Controls

2.10.1 Overview

The crane comes standard with a Summit Truck Bodies brand Radio Remote Equipment Control. 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. Practice using the remote before lifting a load.
If the remote panel decal becomes damaged, call the Summit Truck Bodies service department for a replacement.

2.10.2 Crane Wireless Remote Control Instructions

2.10.2.1 Remote Power Startup

1. Supply power to the crane receiver.
2. Make sure the E-STOP switch on the remote is up.
3. Depress the TRANSMITTER ON/HORN button to wake the remote up. The screen should come on.

2.10.2.2 Remote Manual Shutoff

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

2.10.2.3 Emergency Shutoff

Press the E-Stop switch to immediately break all communications between the remote and receiver.

2.10.2.4 Remote Automatic Shutoff

The transmitter will automatically power down after a programmable time of non-use.

2.10.2.5 Remote Tether Cord

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

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 remote.
2. Attach the other end of the tether cord to the plug point in the crane compartment.

2.10.2.6 Engine Start/Stop

1. Make sure the park brake is set.

2. Press and hold the start button on the remote. When the engine is not running, pressing up the start switch will signal to activate the starter, and start the engine.
3. Repeat Steps 1-2 to stop the engine.

2.11 Phase V Controls

2.11.1 Overview

The Phase V control system for Summit Truck Bodies consists of a main controller that branches out to multiple zone modules controlling high amp loads, along with various Input-Output (I/O) modules and control modules, controlled by two interface devices located in the cab, or the rear compartment. The main controller is commonly located under the floor of the body and monitors and messages various Input-Output (I/O) devices around the truck. The main controller sends signals to the chassis engine to directly control features such as remote start and RPM without the need for J1939 connection. A separate J1939 network is set up between Summit modules to communicate and monitor the health of the system. The Summit Phase V system paired with digital displays and the radio remote system allows control of numerous devices and systems, at the operators fingertips.

2.11.2 Screen Navigation

2.11.2.1 Splash Screen



Figure 2-24

The splash screen displays the Summit Truck Bodies logo during the initial power-up, before transitioning to the Main Screen. This splash screen serves as the background for the rest of the screens as well.

2.11.2.2 Home Screen (Home)



Figure 2-25

From the main screen, there are buttons to navigate through the Operation, Manuals, and Maintenance screens using the touchscreen. On most screens, a ribbon may appear at the top of the screen to indicate an error/warning.

2.11.2.3 Maintenance Screen (Home > Maintenance)

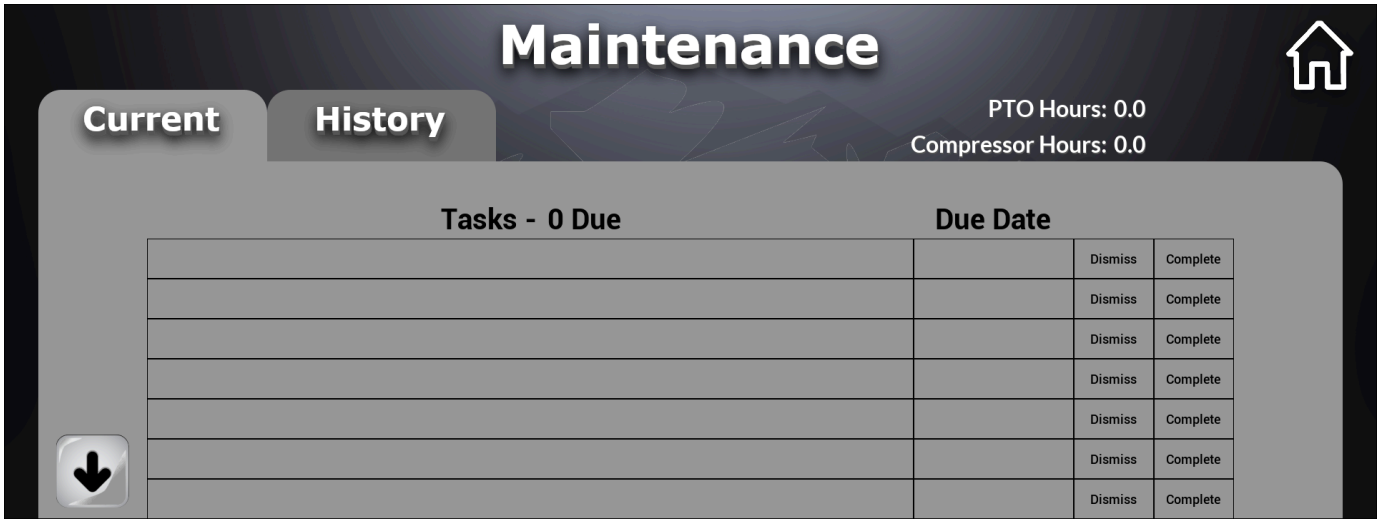


Figure 2-26

The maintenance screen displays the current maintenance task and their due date. In the columns to the right, there are buttons to Complete or Dismiss tasks. The History tab will list all completed maintenance tasks as well as the date and time they were completed. The PTO and Compressor hours are located in the top right, and are stored in

the module's Electrically Erasable Programmable Read-Only Memory (EEPROM). The house icon in the top right corner of the screen will navigate back to the Home screen.

2.11.2.4 Manuals Screen (Home > Manuals)



Figure 2-27

The Manuals screen contains scannable QR codes with corresponding URLs to Summit truck manuals and videos. The icons at the bottom middle of the screen appear on most other screens. The left-most of these buttons is the back button, which navigates to the previous screen. The middle button navigates to the Warnings screen. The right-most button navigates back to the Home screen.

2.11.2.5 Operation Screen (Home > Operation)



Figure 2-28

The Operation screen acts as a hub to access most of the other screens. On this screen, the engine and the PTO can be toggled on and off by pressing their corresponding buttons. Each of the other buttons navigates to their corresponding screens:

- Aux Screen
- Service Screen
- Crane Screen
- Outriggers Screen
- Lighting Screen
- Settings Screen

2.11.2.6 Aux Screen (Home > Operation > Compressor/Aux)



Figure 2-29

The Compressor/Aux screen holds buttons for toggling the state of the compressor or auxiliary functions. The text on the auxiliary buttons will change depending on the functions selected in the Truck Options Screen.

2.11.2.7 Service Screen (Home > Operation > Service)

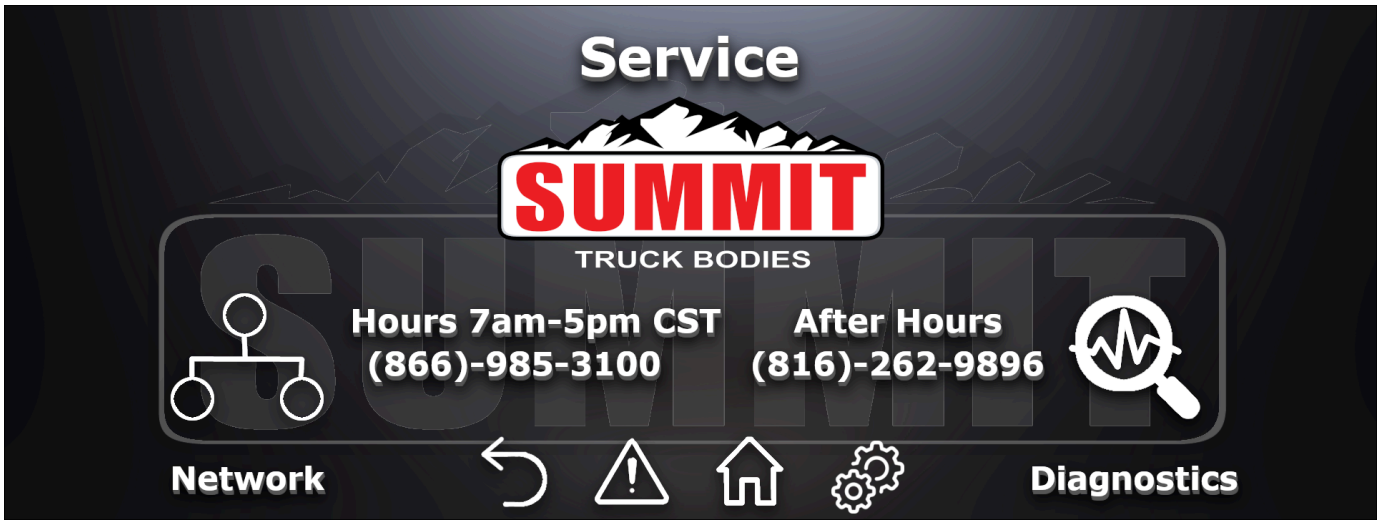


Figure 2-30

The Service screen contains two buttons. The button on the left navigates to the Network screen. The button on the right navigates to the Diagnostics screen. The cogs icon next to the home icon points to the Settings screen.

2.11.2.8 Network Screen (Home > Operation > Service > Network)

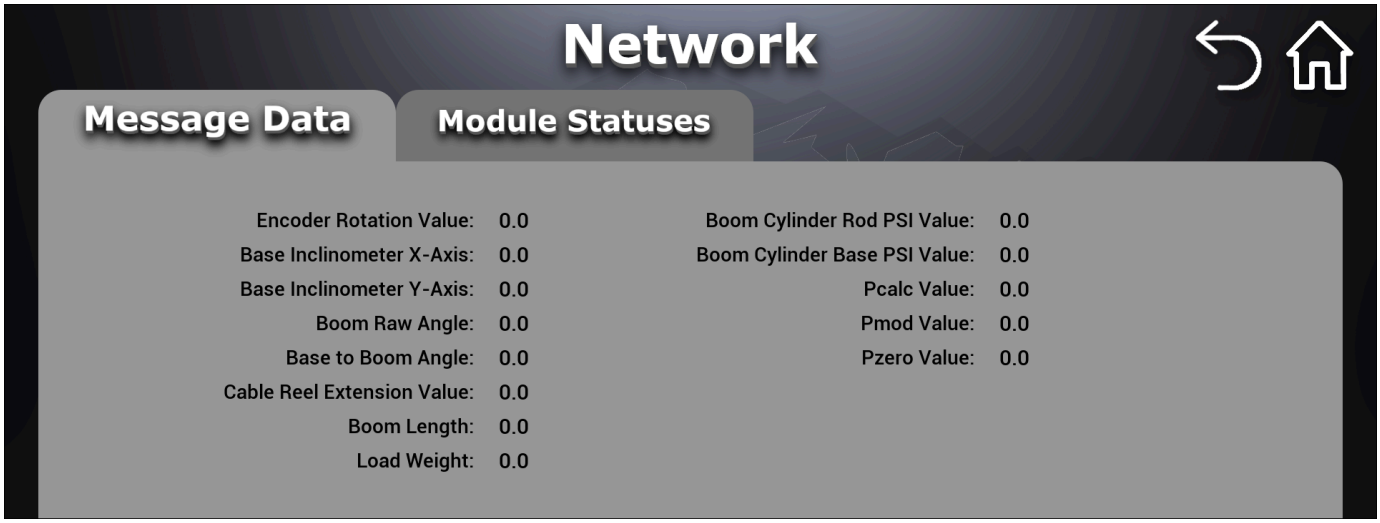


Figure 2-31

The Network screen is comprised of two tabs. The Message Data tab displays sensor data, while the Module Statuses tab reports on the current status of the modules on the truck.

2.11.2.9 Diagnostics Screen (Home > Operation > Service >Diagnostics)



Figure 2-32

The Diagnostics screen displays the status and/or values of various sensors, accessories, and components on the truck. Press the navigation arrows on the left of the screen to move up or down the list. There are two selectable tabs to toggle between viewing the inputs or the outputs.

2.11.2.10 Crane Screen (Home > Operation > Crane Control)

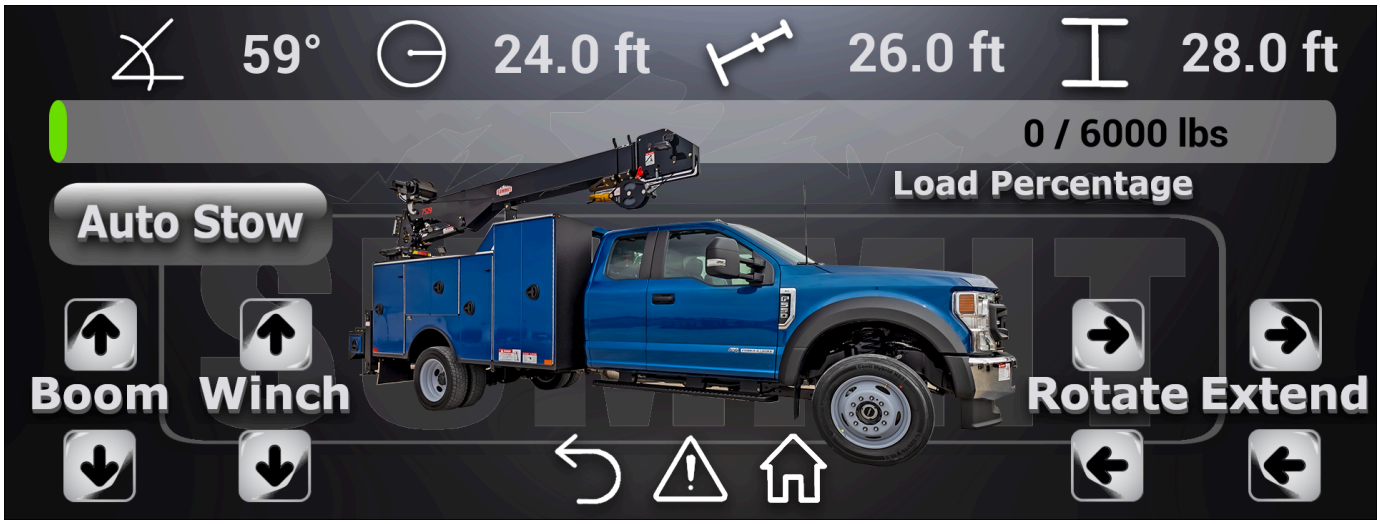


Figure 2-33

The Crane screen allows for operation of the crane from the display. The top of the display reads out the current angle, radius, extension, and height of the crane, in that order. The Auto Stow button can also be pressed in order to navigate to the Auto Stow screen.

2.11.2.11 Autostow Screen (Home > Operation > Crane Control > Auto Stow)



Figure 2-34

Press and hold the button on this screen to automatically stow the crane. The auto stow operation will cease function whenever the button is released.

2.11.2.12 Outriggers Screen (Home > Operation > Outriggers)



Figure 2-35

The Outriggers screen retains the two buttons that operate the engine start/stop and the PTO. This screen is used to operate the rear outriggers. The front outriggers can also be operated from this screen through a toggle button that is visible only if the front outriggers exist on that truck. The arrows on the screen are momentary buttons that function the outriggers. The Auto Deploy button navigates to the Auto Deploy screen.

2.11.2.13 Auto Deploy Screen (Home > Operation > Outriggers > Auto Deploy)

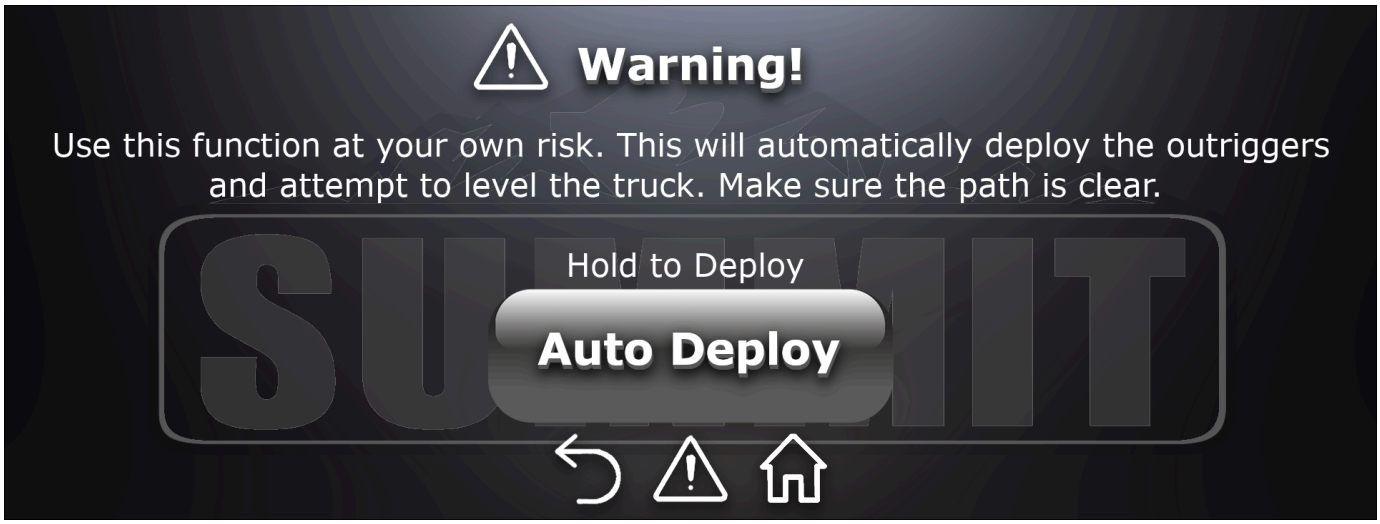


Figure 2-36

Press and hold the button on the Auto Deploy screen to initiate the Auto Deploy sequence. The button is momentary, so releasing the button will cease the deployment.

2.11.2.14 Lighting Screen (Home > Operation > Lighting)



Figure 2-37

The lighting screen contains up to 7 buttons for all available lighting options. If a lighting option is not available, its text will be greyed out and it will not allow any function. Pressing the All Lights button will toggle all available lights. Lights can be added to the truck at a later date by contracting Summit Parts Department.

2.11.2.15 Settings Screen (Home > Operation > Settings)



Figure 2-38

To get into the Settings screen, the password (5150) must be entered. The Settings screen contains 6 buttons that navigate to their respective screens.

2.11.2.16 System Info Screen (Home > Operation > Settings > Version Info)



Figure 2-39

Pressing the Version Info button from the Settings screen will pull up the software versions for each of the displays and the main controller.

2.11.2.17 Truck Options Screen (Home > Operation > Settings > Truck Options)

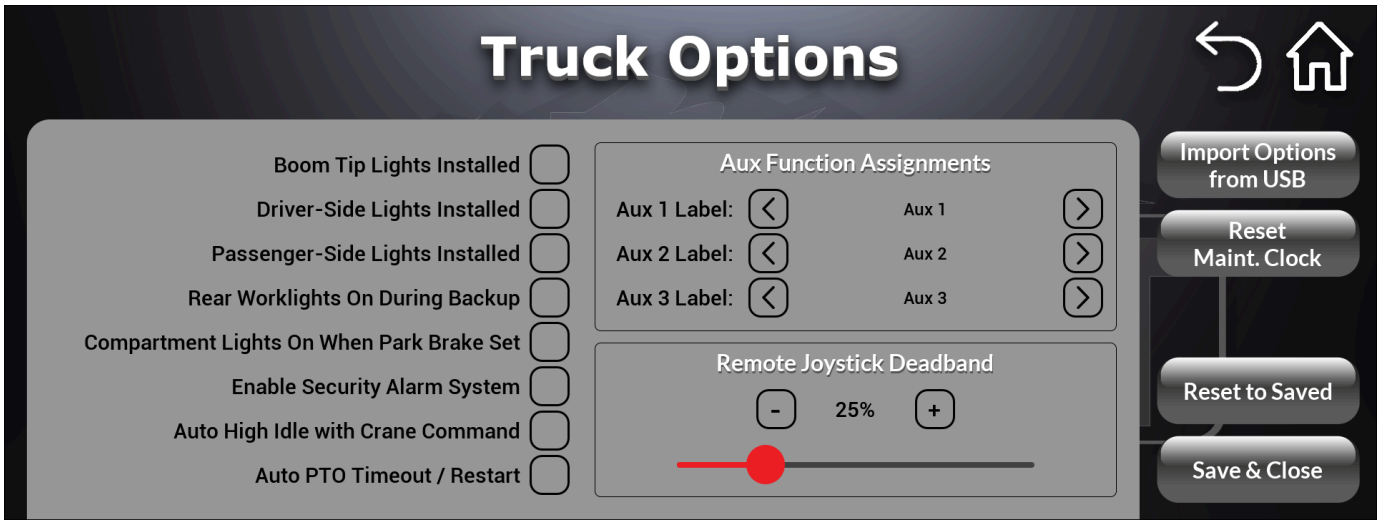


Figure 2-40

The Truck Options screen contains customization options as well as optional components that can be toggled on or off. On this screen, the auxiliary functions can be assigned specific functions, which will change the text on all Aux buttons on the truck to reflect the options chosen on this screen. In this screen, there are buttons to import OEM settings from a USB drive, reset the maintenance clock, reset any changed settings back to their previously saved settings, and the option to save all settings and close the screen.

Note: Some of the features on this screen require hardware that may not come with the truck. If there is a feature listed that is not a part of your specific configuration, reach out to

2.11.2.18 Crane Settings Warning Screen (Home > Operation > Settings > Crane Settings)

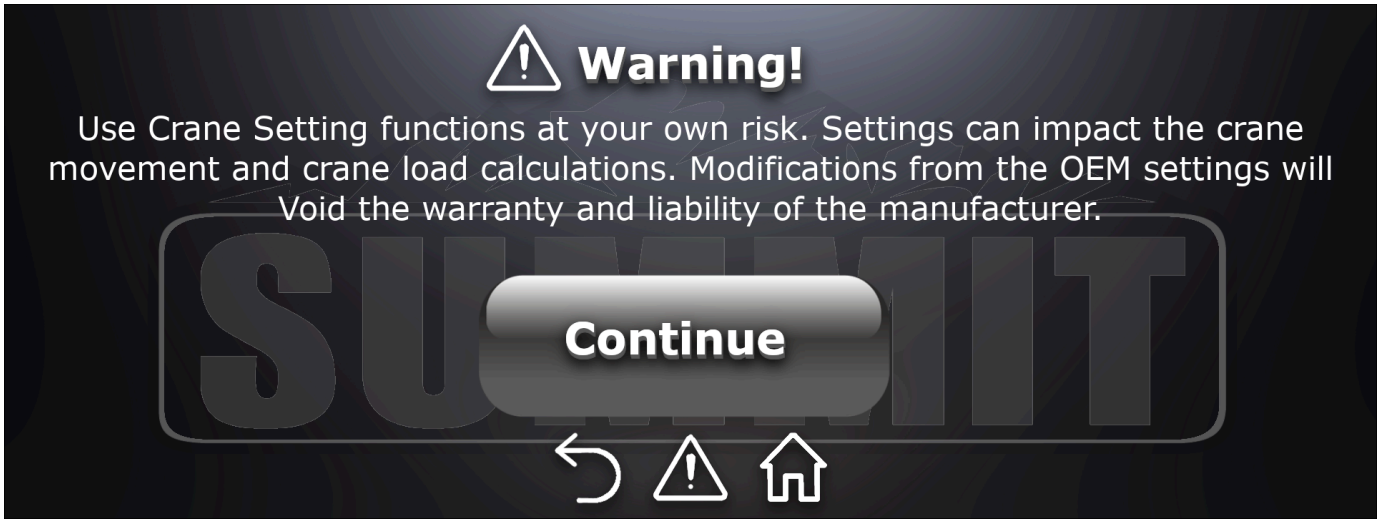


Figure 2-41

The Crane Settings Warning screen appears when the Crane Settings button is pressed from the Settings screen. This screen contains a warning message and a Continue button that transitions into the Crane Settings screen.

2.11.2.19 Crane Settings Screen (Home > Operation > Settings > Crane Settings)



Figure 2-42

The Crane Settings screen allows the operator to change the crane's settings. A momentary tap on any button will give a description of how to complete the task. Holding the button will initiate or complete the task. The operator is able to set the crane stow position, the boom up limit, and the perimeter protection settings. The operator is also able to calibrate the crane level and the cable length. The perimeter protection and Novice Mode can both be toggled on from this screen. Novice mode allows the user to operate the crane at 57% of regular speed. The Set

Perimeter button will navigate to the Set Perimeter Screen. This screen will not display warning ribbons except those created by operating the functions from this screen.

2.11.2.20 Set Perimeter Screen (Home > Operation > Settings > Crane Settings > Set Perimeter)

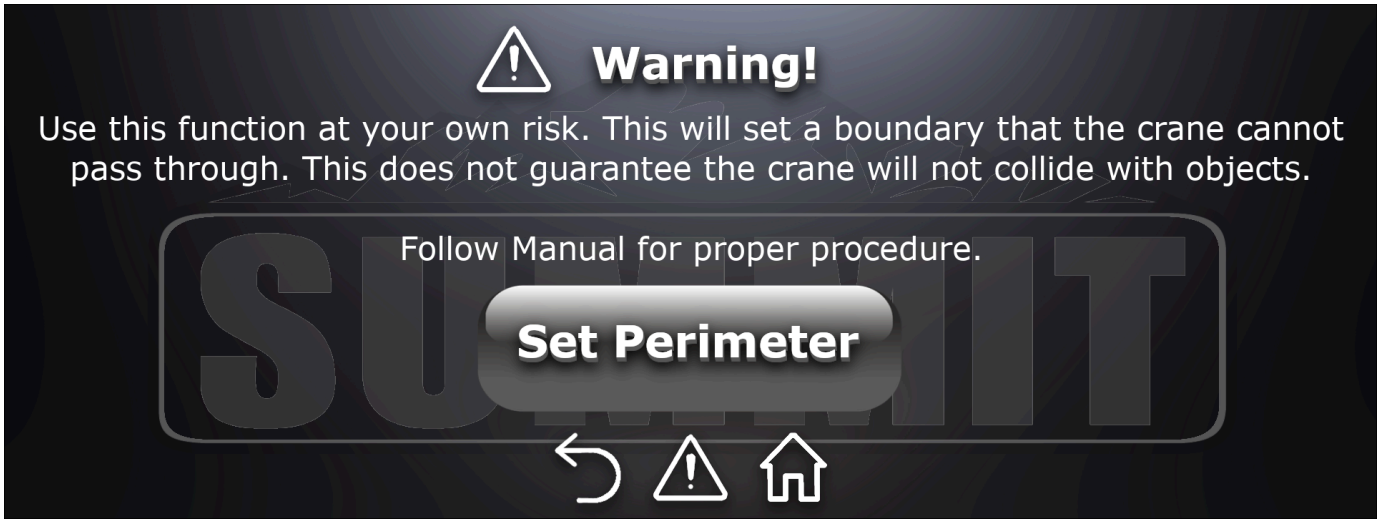


Figure 2-43

The Set Perimeter screen contains a warning statement and a button that initiates the perimeter protection tracing. This screen will not display any active warning ribbons or faults other than those thrown by functioning the Perimeter See Section: Perimeter Protection for completing this task.

2.11.2.21 Set Date Screen (Home > Operation > Settings > Set Date)



Figure 2-44

The Set Date screen shows the current set date and contains buttons to change the values, with the central button saving and exiting the screen and navigating back to Settings.

2.11.2.22 Set time Screen (Home > Operation > Settings > Set Time)

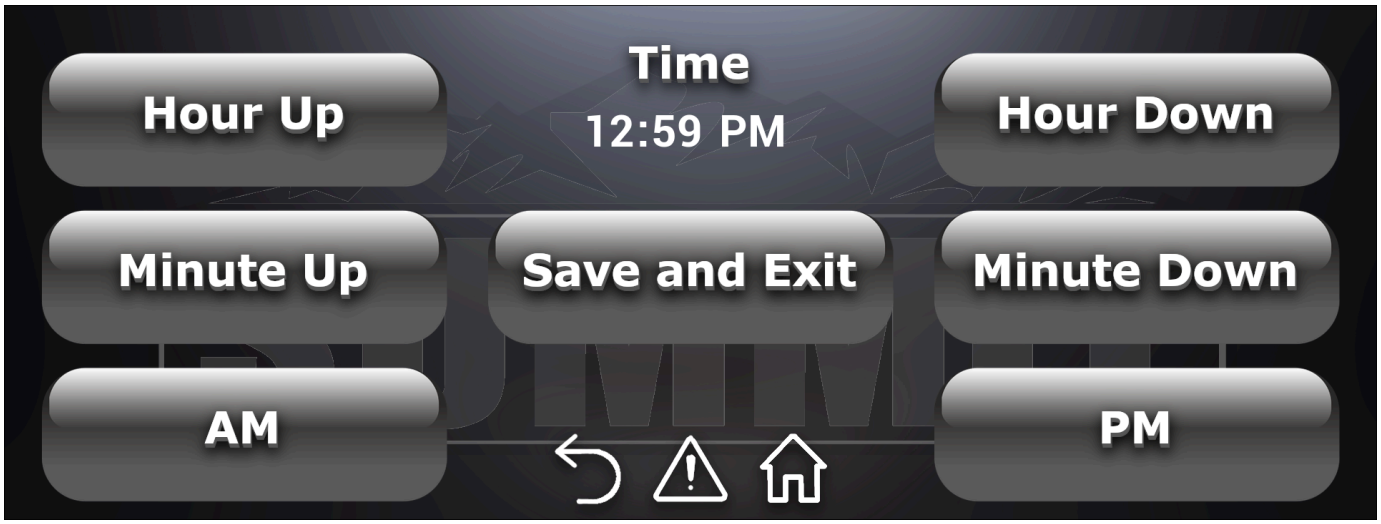


Figure 2-45

The Set Time screen displays the current set time and contains buttons to change the hour and minute values, with the central button saving and exiting the screen and navigating back to Settings. Daylight saving time is not accounted for in this setting.

2.11.3 Warning Ribbons



Figure 2-46

The warning ribbon (Figure 2-46, Item 1) is displayed at the top of the display on most screens. If there are multiple active warnings, the warning will be displayed for 5 seconds before cycling to the next warning. The warnings can be manually cycled by pressing the right-facing arrow on the left side of the ribbon (Figure 2-46, Item 2). The ribbon can be minimized by pressing the up arrow in the bottom right of the ribbon (Figure 2-46, Item 3). Certain warnings have been given a higher priority.

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.

2.11.3.1 Filter Service Req'd

The filter service required warning ribbon will become active if the input that monitors the hydraulic filter pressure differential is greater than 20 PSI and the hydraulic oil temperature is greater than 80° F (27° C).

2.11.3.2 Hyd Fluid High Temp

The hydraulic fluid high temperature warning ribbon will become active if hydraulic oil temperature transducer is reading greater than 160° F . This warning ribbon is reset when temperature falls below 160° F . This warning ribbon will not be shown if the hydraulic fluid over temperature ribbon is active.

2.11.3.3 Hyd Fluid Over Temp

The hydraulic fluid over temperature warning ribbon becomes active if the hydraulic oil temperature transducer is greater than 180° F . Disengage the PTO or turn off Alternate Power Unit (APU). This warning ribbon is reset when temperature falls below 180° F.

2.11.3.4 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.

2.11.3.5 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 within .5 degrees.

2.11.3.6 Battery Voltage Low

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

2.11.3.7 Crane Zone 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

2.11.3.8 Reduced Rotate Speed

If in an overload situation, within 80% of max load, or in maneuver mode, rotate speed is reduced to Reduced Rotate Speed set by manufacturer.

2.11.3.9 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.

2.11.3.10 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.

2.11.3.11 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.

2.11.3.12 Outriggers Not Deployed

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

2.11.3.13 Remote Not In Stow

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

2.11.3.14 Outriggers Disabled

The outriggers disabled warning ribbon will become active if the outriggers have been disabled for any reason. This is common in man basket mode, to avoid shifting outrigger with personnel in the air.

2.11.3.15 Boom Up Limit Reached

The boom up limit angle reached warning ribbon is determined by the inclinometer data.

2.11.3.16 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.

2.11.3.17 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.

2.11.3.18 Outriggers Deployed

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

2.11.3.19 Level Calibrated

Displayed upon successful level calibration. This will display for 3 seconds then reset to false. Level Calibration is the process of zeroing the inclinometer differential when the crane is horizontal at zero degrees.

2.11.3.20 Crane Homed

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.

2.11.3.21 Auto Stow Failed

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. This will occur if the auto stow function does not reach zero in slewing angle and the preset home boom angle before termination of the program.

2.11.3.22 Auto Stow Successful

The auto stow successful warning ribbon displays if the auto stow function is successful. This will display for 3 seconds then reset to false. This will occur if the auto stow function does reach zero in slewing angle and the preset home boom angle before termination of the program.

2.11.3.23 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.

2.11.3.24 Maneuver Mode

The maneuver mode warning ribbon is displayed if either of the outriggers are not planted, and the crane is moved from the home position. Stability is derated to 45% of capacity including Zone Derate Capacity.

2.11.3.25 Auto Stow in Progress

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

2.11.3.26 Auto Deploy in Progress

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

2.11.3.27 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

2.11.3.28 Length Calibrated

The Length Calibrated warning ribbon becomes active if cord reel length calibration is successful. This will display for 3 seconds then reset to false

2.11.3.29 Crane Sensor Fail

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

2.11.3.30 Comm Error - Hyd Temp

If communication is lost with the Hydraulic Temperature Switch, the comm error – Hyd Temp ribbon will become active.

2.11.3.31 Comm Error - FSP

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

2.11.3.32 Comm Error - Incline

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

2.11.3.33 Comm Error - Encoder

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

2.11.3.34 Comm Error - FOM

If communication is lost with the Front Outrigger Manifold, the comm error – FOM warning ribbon will become active.

2.11.3.35 Comm Error - Receiver

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

2.11.3.36 Comm Error - PDM

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

2.11.3.37 Perimeter Stop

The Perimeter Stop warning ribbon is displayed if the crane enters an area protected by perimeter protection.

2.11.3.38 Apply Parking Brake

The Apply Parking Brake warning ribbon is displayed if hydraulic function is requested when the parking brake is not applied.

2.11.3.39 Comm Error - Cable Reel

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

2.11.3.40 Comm Error - Rod PSI

If communication is lost with the Rod Pressure Transducer, the comm error – Rod PSI warning ribbon will become active.

2.11.3.41 Comm Error - Base PSI

If communication is lost with the Base Pressure Transducer, the comm error – Base PSI warning ribbon will become active.

2.11.3.42 High Boom Pressure

The High Boom Pressure warning ribbon is present if pressure in the rod or base pressure transducers are above Boom Overload PSI

2.11.3.43 Crane Bridged

The crane bridge warning ribbon is displayed if Rod PSI is greater than Base PSI. A threshold may apply.

2.11.4 Function Operation

2.11.4.1 Lighting Operation

All lights can be operated individually or through the “All Lights” button from either the cab display or the Lighting screen of the rear display. Each lighting button is a multiplexed toggle style switch. If the cab switch is in the on position, the rear display can be used to turn the respective light off. The light switches are not interlocked with anything.

2.11.4.2 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.

2.11.4.3 Auxiliary Operation

The three auxiliary buttons on the Compressor/Aux screen are multiplexed toggle style switches that can be toggled on or off from either the rear or cab displays. The function of each of the three buttons can be configured through the Truck Options screen. Once configured, both the rear and the cab displays will update the text on the labels to normalize functionality.

2.11.4.4 Hour Meter Operation

2.11.4.4.1 PTO Hours

Whenever the PTO pressure switch input is true, the PTO hour meter will begin to be calculated. This value will be stored in EEPROM and will be displayed in the Maintenance screen.

2.11.4.4.2 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 Maintenance screen.

2.11.4.5 Hydraulic Oil Temperature

The hydraulic oil temperature field on the Inputs tab of the Diagnostics 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 a high setpoint a warning ribbon is triggered. When the value exceeds the over-temperature setpoint, a warning ribbon is triggered and the PTO and APU disengage.

2.11.5 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.

2.11.5.1 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 the engine.

2.11.5.2 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 the engine.

2.11.5.3 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:

- When the PTO is engaged and the park brake set, the engine speed will automatically increase to a pre determined RPM for hydraulic operation.
- When necessary, desired and programmed, the RPM can be increased to a second elevated rpm to allow compressor operation or faster crane operation .
- Using this feature will disable the in-cab throttle control.
- If the PTO is disengaged, park brake released or vehicle taken out of park, the engine will return to its base idle RPM.

2.11.6 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).

2.11.7 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.

2.11.8 Outrigger Operation

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

WARNING

To prevent injury or death, make sure the vehicle is parked on level, solid ground before deploying outriggers. If a 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.

2.11.8.1 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.

2.11.8.2 Outrigger Operation Using Remote - See section 2.15.6.6 for remote outrigger function

2.11.8.3 Outrigger Auto Leveling

1. Make sure the PTO is engaged and the park brake is set.
2. Check the pitch angle of the 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 outrigger 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 so as to not increase the roll angle. However, if the 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 expire, 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 the 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.

2.11.8.4 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. This will de-rate the crane capacity. The extend override button is not available on units with front outriggers.

1. Make sure the PTO switch is engaged and the park brake is set.
2. Check the pitch angle of the 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 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 switch opens for each jack cylinder, indicating the outriggers are contacting the ground.
5. Both outriggers will continue to extend 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 the 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 expire, 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 the 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.

2.11.9 Crane Operation

2.11.9.1 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, all crane speeds will be reduced to 57%.

2.11.10 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.

2.11.11 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.

2.11.12 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.

2.11.13 Auto Stow

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

2.11.13.1 Boom Position Sensors Homing

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

2.11.13.2 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 auto stow screen.
2. The crane’s angular position will be 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 be 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.

2.11.14 Pendant Not Stowed

If the pendant is not stowed and the park brake is disengaged, the front switch panel will display a warning ribbon.

2.11.15 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.

2.11.16 Date/Time

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

- Tracking maintenance tasks and due dates.
- Tracking warning ribbons.
- Displaying date and time on the screen.

The time will need to be set on each module.

2.11.17 Perimeter Protection (Virtual Fence)

NOTICE

The proximity of an 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.

2.11.17.1 Setting and calibrating perimeter protection

NOTE

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

1. Press the set perimeter button on the Set 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 and 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 enable 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.



Figure 2-47.

2.11.18 Remote Function Operation

2.11.18.1 Boom Controls

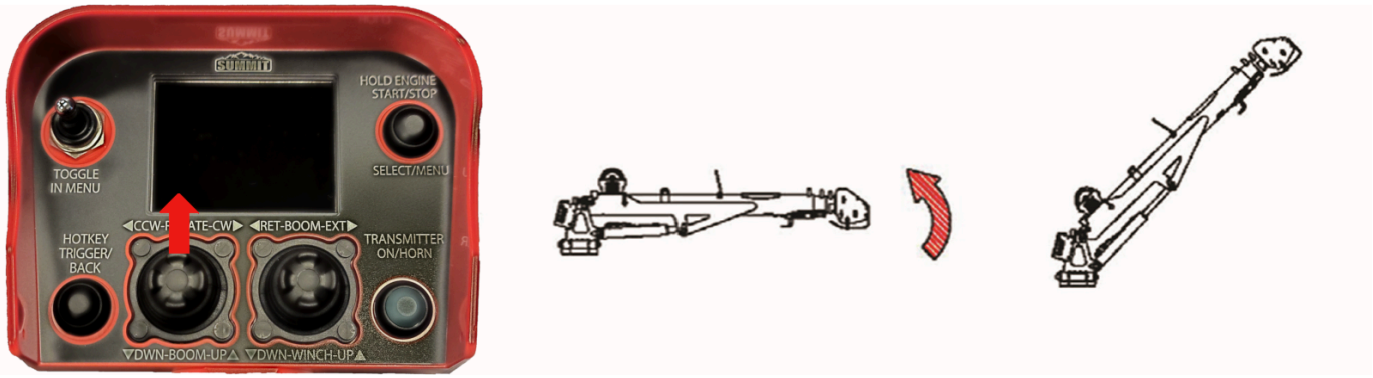


Figure 2-48.

1. Press up on the left joystick to raise the boom (see Figure 2-48).

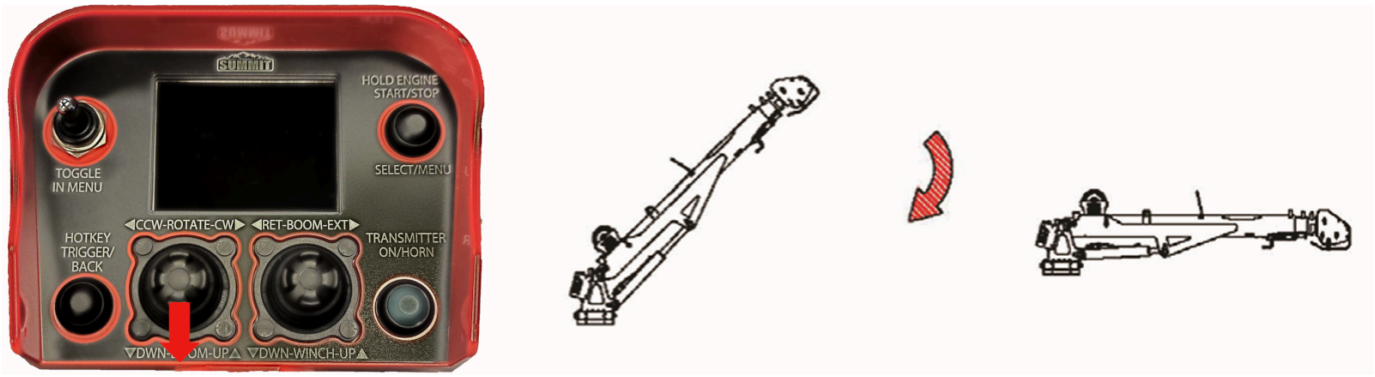


Figure 2-49.

2. Press down on the left joystick to lower the boom (see Figure 2-49).

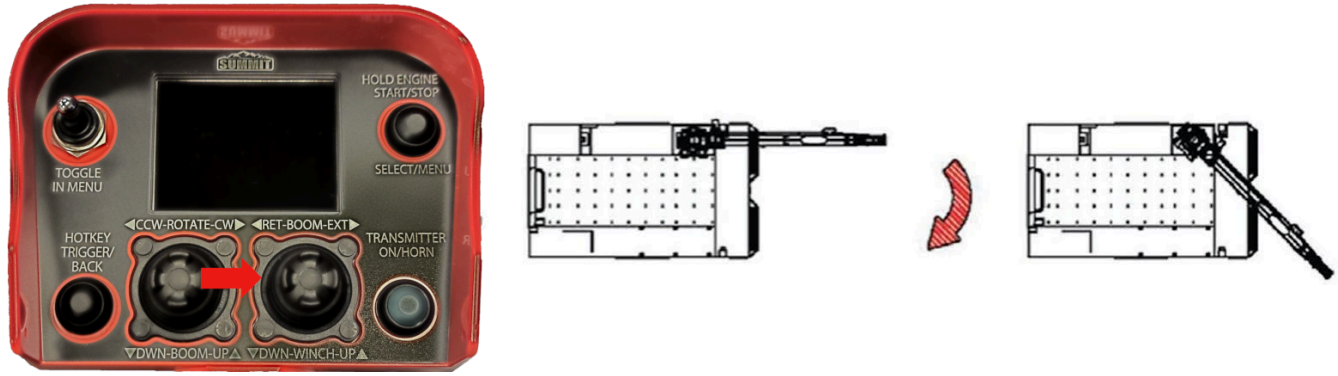


Figure 2-50.

3. Press the left joystick to the right to rotate the boom clockwise (see Figure 2-50).

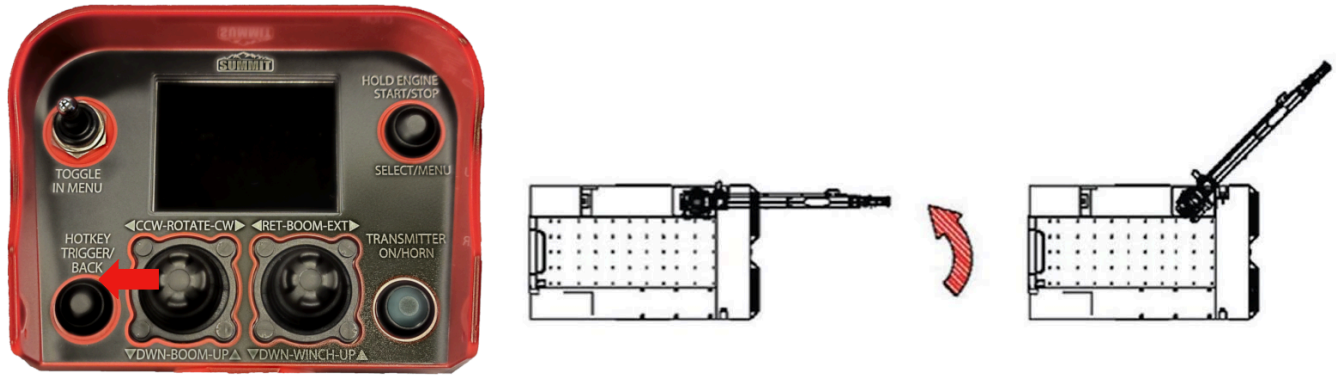


Figure 2-51.

4. Press the left joystick to the left to rotate the boom counterclockwise (see Figure 2-51).

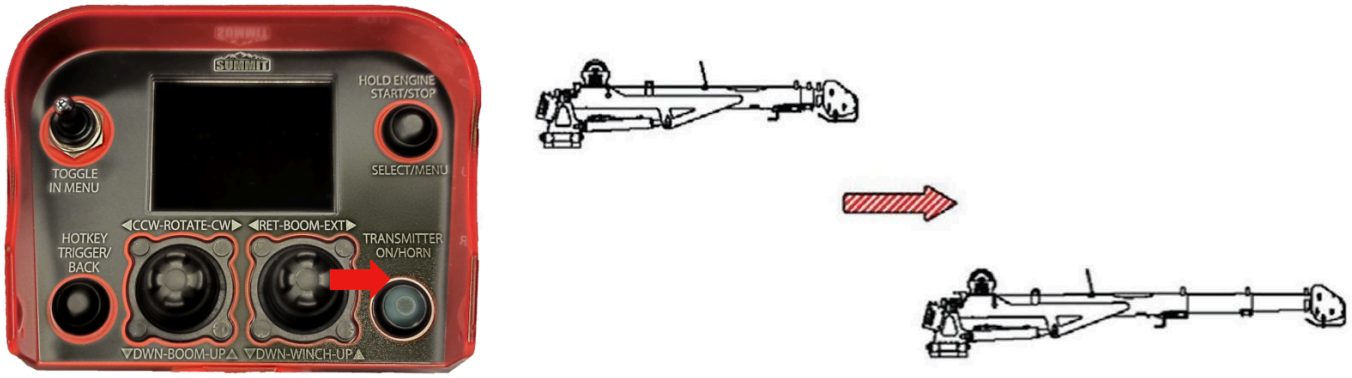


Figure 2-52.

5. Press the right joystick to the right to extend the boom (see Figure 2-52).



Figure 2-53.

6. Press the right joystick to the left to retract the boom (see Figure 2-53).

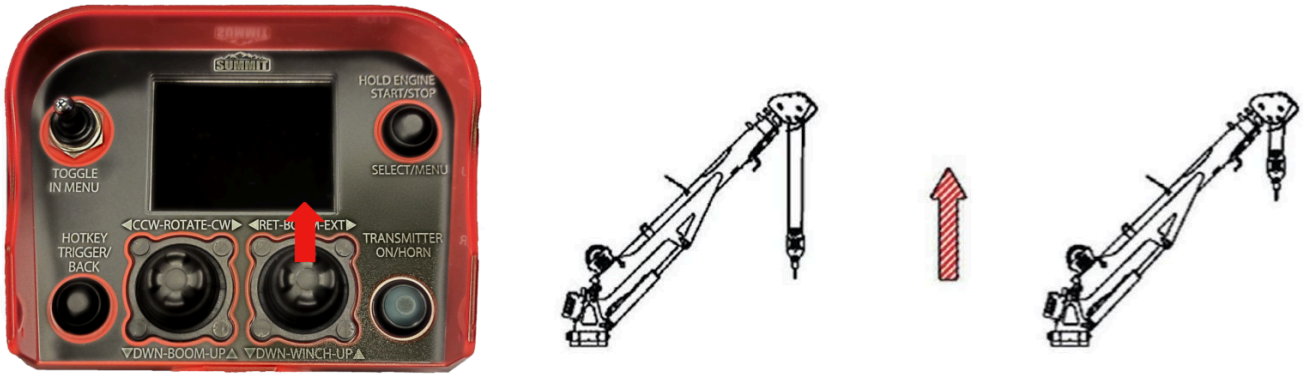


Figure 2-54.

7. Press the right joystick up to raise the winch (see Figure 2-54).

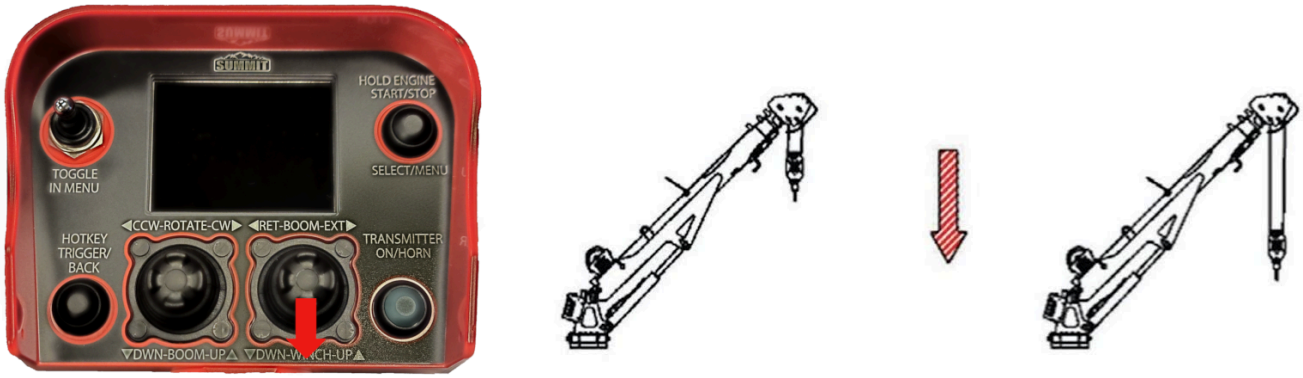


Figure 2-55.

8. Press the right joystick downward to lower the winch (see Figure 2-55).



Figure 2-56.

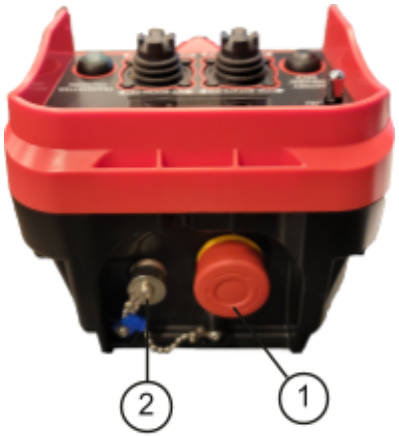


Figure 2-57.

2.11.18.2 Engine Start/Stop

1. Make sure the park brake is set.
2. Press (and hold, if necessary) the start button (Figure 2-56, Item 1) 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. Pressing the button again while the engine is running will stop the engine.

2.11.18.3 Hotkey functions

The hotkey button (Figure 2-56, Item 3) is a momentary button which overrides the crane functionality and allows for use of the left joystick to trigger one of four configurable hotkey functions. The states of the functions are handled by the main control module, so if the function is turned on from the screen, it can be turned off from the remote; the reverse is true as well.

1. Make sure the park brake is set, if the desired function requires.
2. Press and hold the hotkey button
3. While holding the hotkey button, move the left joystick in the same direction that the desired hotkey function's arrow (Figure 2-56, Item 5) points. This will trigger the function to activate.
4. To turn the function off, repeat step 3 and the function will be turned off.

2.11.18.4 E-Stop/Remote On

1. Pull out on the E-stop/remote on button (Figure 2-57, Item 1) to turn on remote.
2. Push E-stop/remote on button to turn off the remote or perform an emergency stop.

2.11.19 Remote Screens

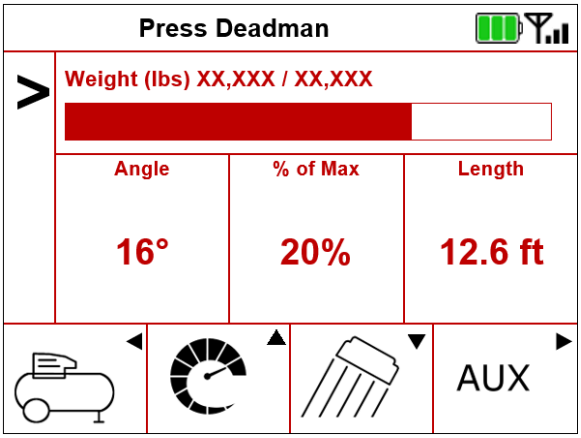


Figure 2-58.

2.11.19.1 Main Screen (Figure 2-58).

The main screen is the default screen which is loaded when the remote is started up and connected. This screen allows for the crane functions and the hotkey functions to be activated. To get to the menu from this screen, toggle the switch (Figure 2-56, Item 4) up or down.

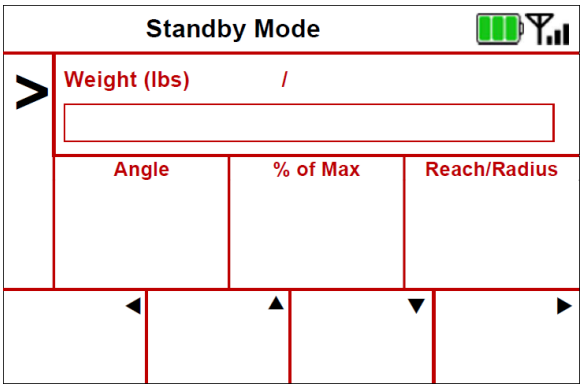


Figure 2-59.

2.11.19.2 Standby Mode (Figure 2-59).

The standby screen is active when the remote goes into Standby Mode. This occurs when there is no user input for the number of seconds set in the “Standby Timer” setting in the menu screen (Figure 2-61). When this mode is activated, a timer begins for the duration set in the “Inactivity/Shutoff Timer” setting. When that timer reaches its end, the remote will be turned off. When in Standby Mode, the remote will cease to transmit and will not activate any functions. To exit Standby mode, or turn the remote back on after shutoff, press the transmitter on button (Figure 2-56, Item 2). The display will populate the main screen values and images when the receiver is reconnected to the main controls system.

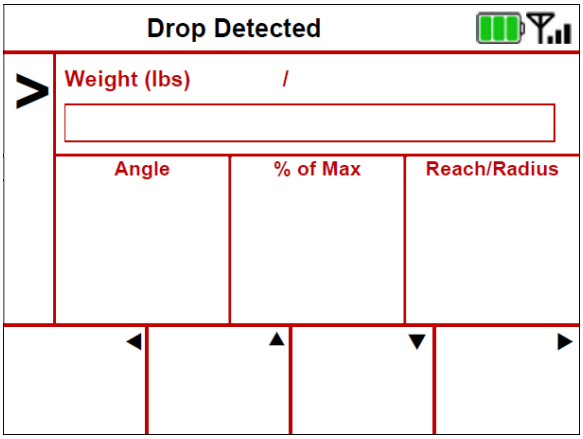


Figure 2-60.

2.11.19.3 Drop Detect Mode (Figure 2-60).

The drop detect screen becomes active only when the remote detects that it has been dropped. When this mode is active, all remote functions will cease to function and the remote will need to be turned off then on again before it can be used. To do this, push in the machine stop button (Figure 2-57, Item 1) on the top of the remote to turn the remote off. Then, pull the machine stop button out until it clicks, then press the transmitter on button (Figure 2-56, Item 2) to wake the remote.

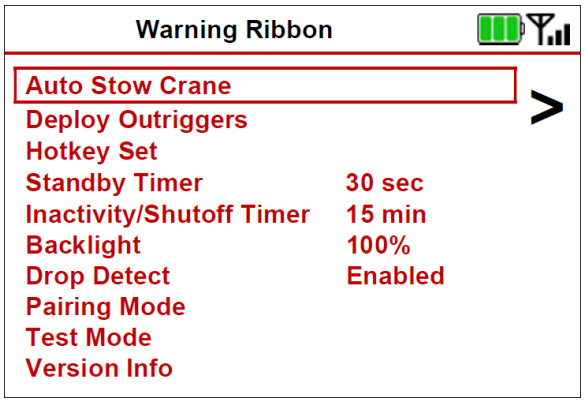


Figure 2-61

2.11.19.4 Menu Screen (Figure 2-61).

The main screen acts as an intermediary screen between changing screens or changing settings. To navigate through the menu, press the toggle in menu switch (Figure 2-56, Item 4) up or down, and the cursor will move the same direction as the switch. To move into a menu item, press the select/menu button (Figure 2-56, Item 1). To move back out of a screen or to exit the menu, press the hotkey trigger/back button (Figure 2-56, Item 3).

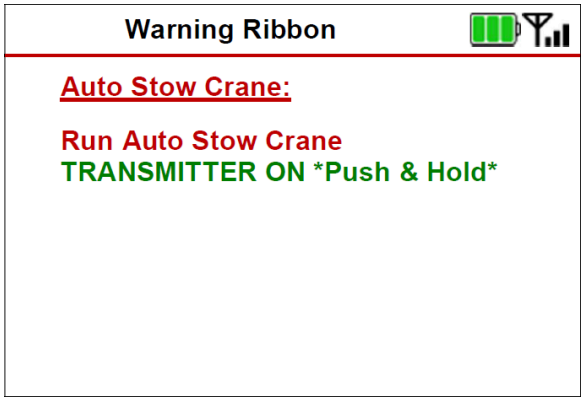


Figure 2-62

2.11.19.5 Auto Stow Crane Screen (Figure 2-62)

The auto stow screen contains instructions on running the auto stow function of the crane from the remote. To run the auto stow:

1. Make sure the engine is running, the PTO is on, and the park brake is set.
2. Be sure the traveling block is hooked and the winch cable is tensioned. Then, be sure there are no obstacles in the way of the boom.
3. When ready, press and hold the green transmitter on button for about 6 seconds. The auto stow will begin.
4. Once the auto stow function has run, a warning ribbon will appear stating whether the function was successful or failed.

To back out of this screen, press the back button (Figure 2-56, Item 3).

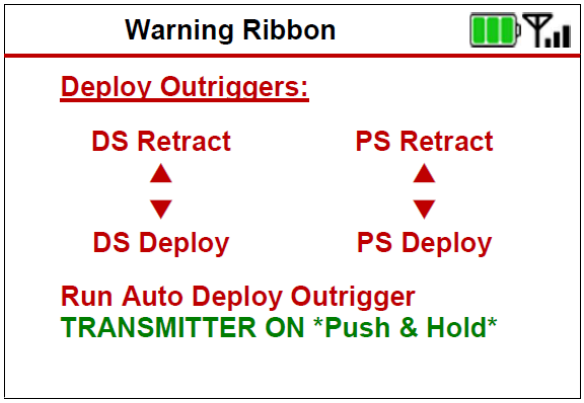


Figure 2-63

2.11.19.6 Deploy Outriggers Screen (Figure 2-63)

The deploy outriggers screen allows for operation of the outriggers using either the joysticks, or the transmitter on button to auto deploy/level the outriggers. To run the auto deploy, press and hold the transmitter on button for about 3 seconds. There will be a warning ribbon indicating whether the auto deploy succeeded or failed.

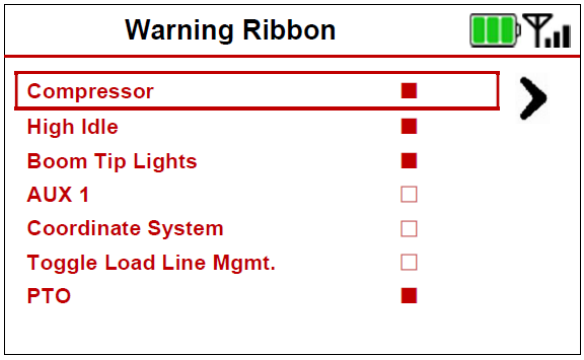


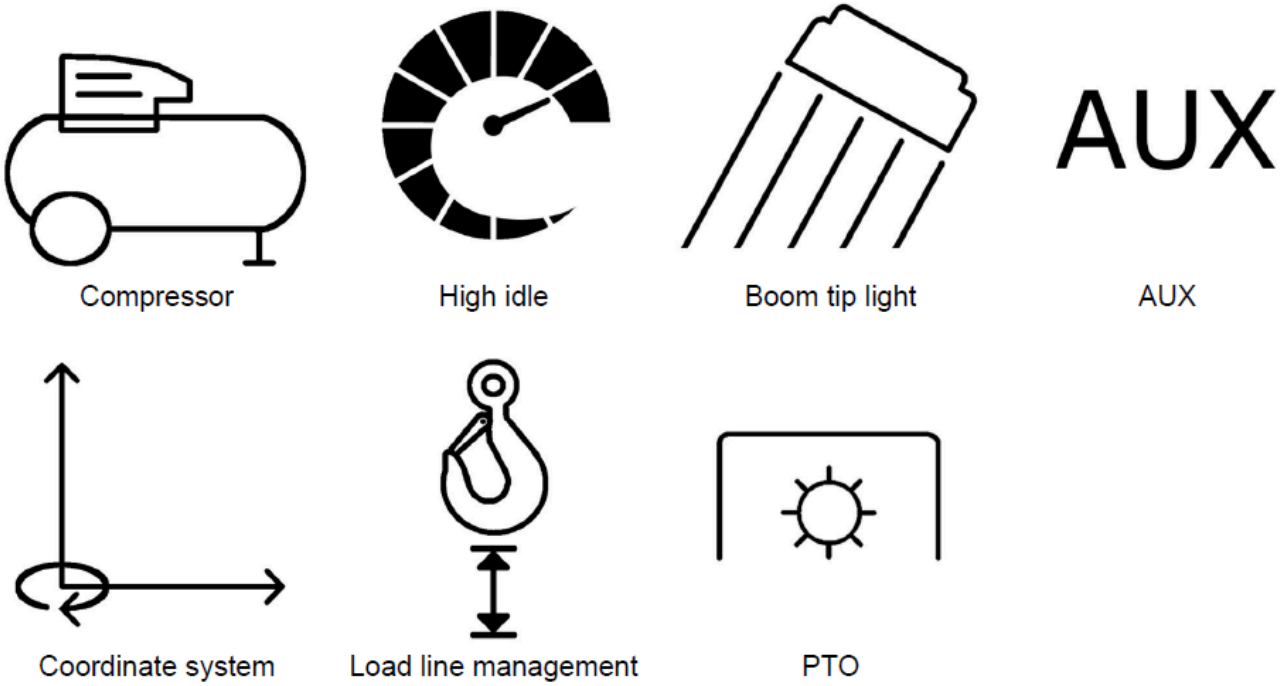
Figure 2-64

2.11.19.7 Hotkey Set Screen (Figure 2-64)

The hotkey set screen contains the functions that can be set to the hotkey buttons. To select or de-select a hotkey:

1. Use the toggle in menu switch (Figure 2-56, Item 4) to move the cursor to the desired function
2. Press the select/menu button to select or de-select a function. Only four of these functions can be set at a time. The functions will automatically be assigned to a position on the main screen based on the order in which they appear. For example, in Figure 2-64, the “left” option will be Compressor, the “up” option will be High Idle, the “down” function will be Boom Tip Lights, and the “right” function will be PTO.
3. The hotkey options will be automatically saved when backing out of this screen. To back out, press the hotkey trigger/back button.

The hotkey symbols are as follows (some options not available or in development):



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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 or 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 performed. 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 approximately -10 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 counterbalance 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 is, generally helps determine the solution.
2. Troubleshoot the problem. Identify all possible causes. Use Chapter 4 (Troubleshooting) 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 be 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 has a very dark 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 the 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 the bottom of the hydraulic reservoir.
8. Install two hoses in the bottom of the hydraulic reservoir.
9. Install drain plug
10. Fill the 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 the 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 below:

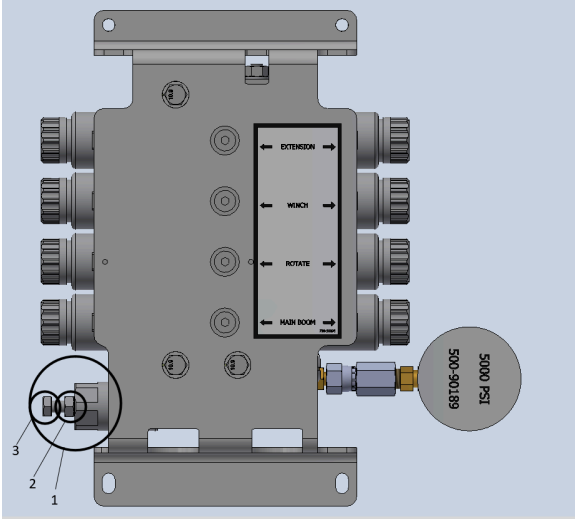


Figure 3-1.

1. Locate the pressure gauge mounted on the crane valve manifold
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 the valve to the extended position while reading the pressure gauge. Note reading. If the reading is 2800 PSI (+/- 150psi), 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 1).
5. Turn relief valve screw clockwise (Figure 3-1, Item 3) 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 1).
7. Repeat the procedure until the relief valve pressure is set to 2800 PSI.
8. Failure to achieve pressure could indicate a faulty component in the hydraulic system.

3.8 Counterbalance Valve Check

The crane is equipped with hydraulic cylinders with counterbalance valves. The counterbalance 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 counterbalance valves, follow the procedure below:

1. Locate the cylinder where the problem is suspected.
2. Determine which counterbalance 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 the cylinder. If the cylinder allows the load to lower, the counterbalance valve might be faulty and might need to be replaced. If the cylinder does not lower, the counterbalance valve is operational.

3.9 Rotation Gear

The rotation gear is a double row, sealed model that requires KP 2 K-30, EP grease. Do NOT pressure wash directly into rotation gear assembly. Grease schedule is dependent on usage.

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 (with wire rope unwound)
   - Sheaves for any unusual wear (with wire rope removed)
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 the 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, or cable and wire rope lubricant 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.

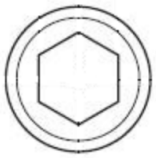
Grade 5 and Grade 8 fasteners are produced to specific strength requirements. Replacing Grade 5 and Grade 8 fasteners with fasteners of different grades (even if they are the same size and thread pattern) will compromise the integrity of the crane and can result in crane failure, property damage, injury, 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, installed 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 bolts 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. Refer to metric equivalent torque specification chart for metric fasteners.

U.S. BOLT TORQUE SPECIFICATIONS (Figure 3.2)				
		SAE GRADE NO. 5 	SAE GRADE NO. 8 	Socket Head Cap Screw 
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)

BOLT TORQUE FACTORS FOR VARIOUS FINISHES Figure 3-3	
Lubricant or Plating	**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

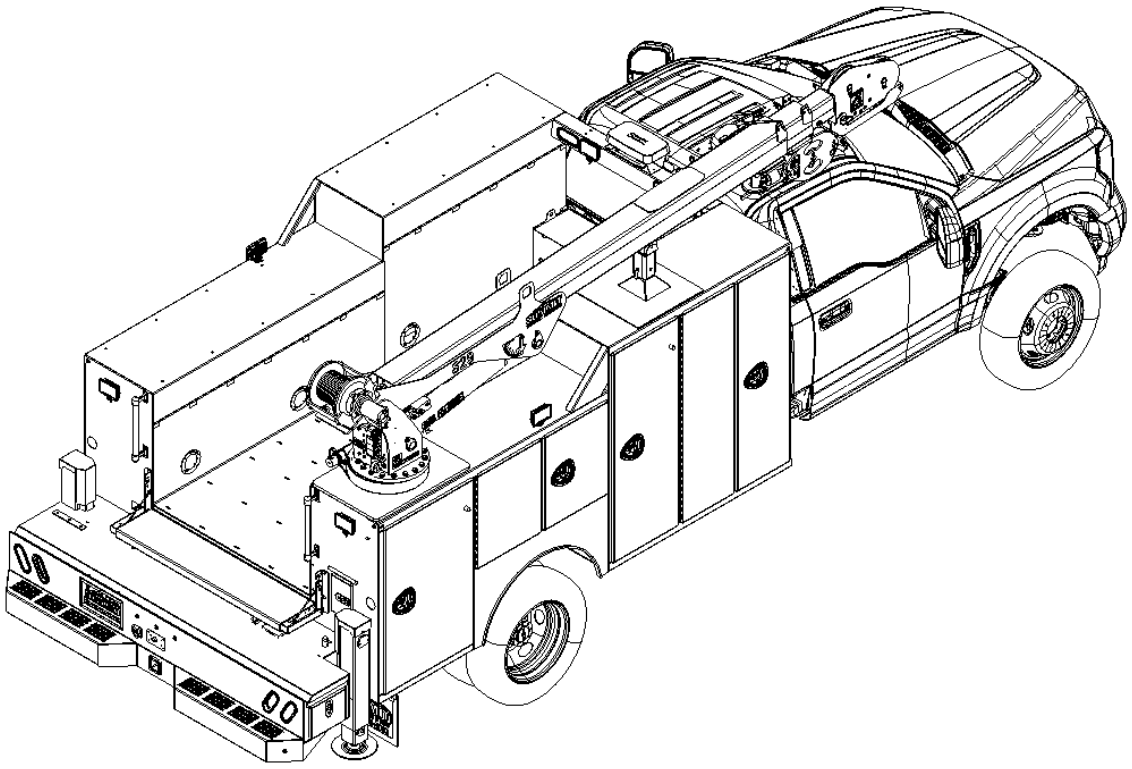


Figure 3-2.

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 performed.

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 valve, rotate stop, pressure sensor, cord reel, or inclinometer.

3.13.3 Daily Inspection

Before operating the crane, a daily inspection of the following will help reduce the risk of injury or death, damage to the crane, and unnecessary 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, grade, and torques to factory specifications in accordance with the

requirements in Figure 3-2. Bolt torque of pedestal bolts must follow the pattern procedure as described in Section “Crane Pedestal & Rotate/Base Bolt Installation Torque Pattern”.

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 3-2, Item 1). See Wire Rope Daily Inspection.
6. Check for proper function of the counterbalance valves to ensure the crane load will not be compromised.
7. Make sure outriggers (Figure 3-2, 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, 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 pattern procedure as described in Section “Crane Pedestal & Rotate/Base Bolt Installation Torque Pattern”.

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
   - 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, 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 pattern procedure as described in Section “Crane Pedestal & Rotate/Base Bolt Installation Torque Pattern”.
4. Make sure all safety devices are in place and in good working order, and labels are legible.
5. Check the 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. 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, grade, and torques to factory specifications. Bolt torque of pedestal bolts must follow the pattern procedure as described in Section “Crane Pedestal & Rotate/Base Bolt Installation Torque Pattern”.
2. Special attention must be paid to the crane rotate/base bolts shown in Figure 3-5 & Figure 3-6

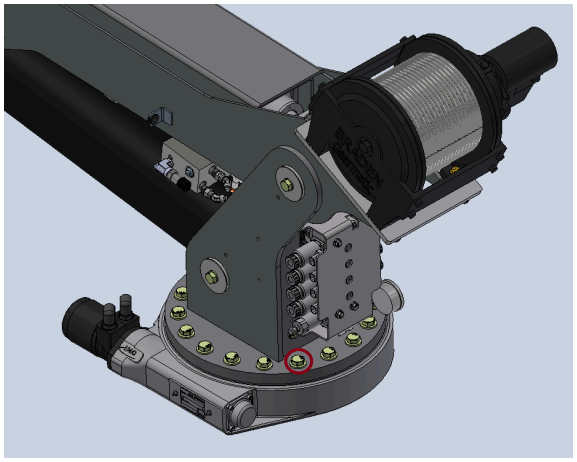


Figure 3-5 Pedestal Bolts

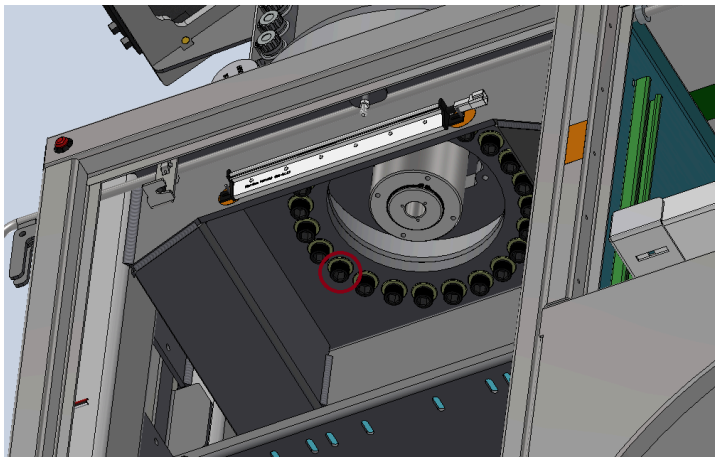


Figure 3-6 Rotate/Base Mounting Bolts

3. The crane mounting bolts (shown in Figure 3-5 and 4-6) 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.

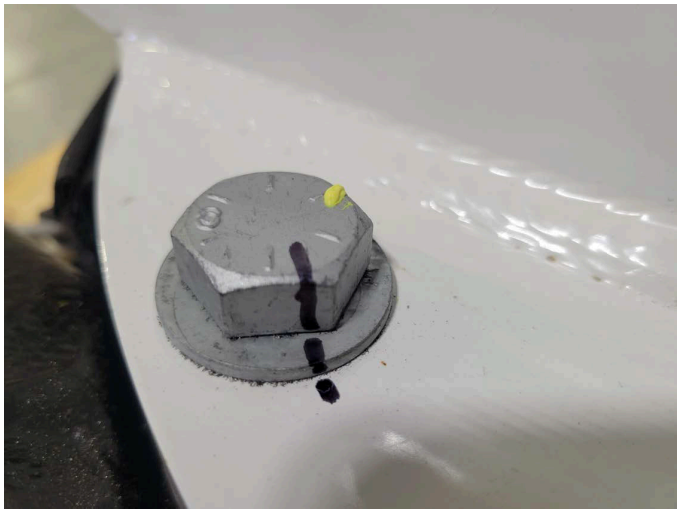


Figure 3-7. Marking Bolt Heads Prior to Torque Check

   b. Upper and lower crane mounting bolts are either M16x2.0 or ⅝-11 and should be checked against their original installation torque values.

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 30°, 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 Section “Crane Pedestal & Rotate/Base Bolt Installation Torque Pattern”.

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 the 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. Check hydraulic oil state and condition.
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.

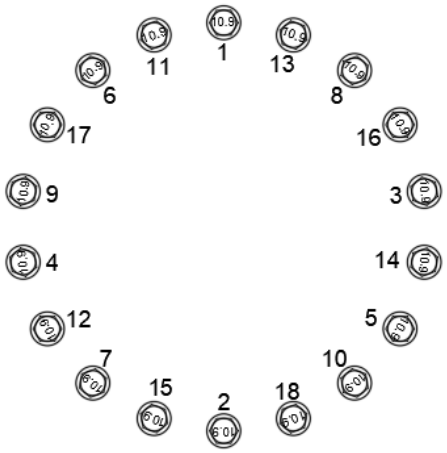


Figure 3-8

2. Apply 50% of the final installation torque (approximately 90 ft-lbs for pedestal bolts) in the same pattern.
3. Apply 75% of the final installation torque (approximately 135 ft-lbs for pedestal bolts) in the same pattern.

4. Apply 100% of the final installation torque (180 ft-lbs for pedestal bolts) in the same pattern.

3.13.8 Lubrication and Maintenance Schedule

LUBRICATION & MAINTENANCE SCHEDULE							
Service Performed	Daily	Weekly	Monthly	Quarterly	Annual	Hours	**Notes**
Hydraulic Fluid Check	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			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 180 ft-lbs and replace if required
Pedestal Bolts			X	X			Check torque to 180 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 Replace					X	3,000	Drain, flush, and refill with ISO 46 Hydraulic Oil
Hydraulic Oil Filter					X	500	Change filter after the first 25hrs, then every 500 hrs after, or if the pressure differential is high.
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

LUBRICATION & MAINTENANCE SCHEDULE							
Service Performed	Daily	Weekly	Monthly	Quarterly	Annual	Hours	**Notes**
Hydraulic Fluid Check	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			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
PTO				X			Check PTO based on manufacturer's manual
Record Inspection			X	X			Record inspection and tests performed

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, 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. Counterbalance 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 relief valve is sticking open
	7. Speed control option is not engaged

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CHAPTER 5-CERTIFICATION

5.1 CERTIFICATION

Crane certified to meet or exceed SAE 1063J test procedures and complies with requirements of ASME B30.5, Section 5-1.10 for structural performance. Crane load capacity tested and verified by independent testing.

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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 provable 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.

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