Vanguard
Equipment,
Inc.

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Operation and Maintenance Manual

Auto Tie-in Crane - An Attachment

S/N 037202650021 – UP (Auto Tie-in Crane)

To be used with the carrier vehicle's Operation and Maintenance Manual

VANGUARD EQUIPMENT, INC.
15627 EAST PINE ST
TULSA, OKLAHOMA
74116, USA
☎/🖷: 918.437.1796

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Foreword

Literature Information

This manual should be stored in the Auto Tie-in Crane Attachment's tool box, in the Welding Package's genset compartment's literature holder in the left door (closest to the radiator end), or in the operator's compartment in the literature holder or seat back literature storage area of the carrier vehicle.

This manual contains safety information, operation instructions, transportation information, lubrication information and maintenance information.

Some photographs or illustrations in this publication show details or attachments that can be different from your machine. Guards and covers might have been removed for illustrative purposes.

Continuing improvement and advancement of product design might have caused changes to your machine which are not included in this publication. The latest version of this publication is available for downloaded from the internet at http://vanguardequip.com/. Read, study and keep this manual with the machine.

Machine Description

Vanguard's Auto Tie-in Crane attachment is an attachment that can be mounted onto a Panther T12 tracked vehicle, tracked utility vehicle, track crawler carrier, etc.. It is typically used in conjunction with a welding package such as Vanguard Equipment's CPW-125-4 or CPW-125-4-S2. The Auto Tie-in Crane is powered and controlled by the carrier vehicle's existing hydraulic implement system.

The primary use of this attachment is to lift an automatic welding shack for petroleum-product pipeline construction.

The operator should read, understand, and follow both the carrier's and the Auto Tie-in Crane's operating and maintenance instructions. The operator must comply with all pipeline-construction procedures, regulations, and safety precautions.

This equipment is to be operated by qualified personnel only.

This equipment is to be serviced and maintained by qualified personnel only.

The daily service/inspection procedure should be performed before start-up.

The Auto Tie-in Crane uses a remote control for operation. Operate the appropriate controls before commencing actual work until familiar with the Auto Tie-in Crane operation.

Safety

The safety sections list basic safety precautions. In addition, these sections identify the text and locations of warning signs and labels used on the machine.

Read and understand the basic precautions listed in the safety sections before operating or performing lubrication, maintenance and repair on this machine.

This equipment is to be operated and serviced by qualified personnel only. To become familiar with the basic safety precautions and warning sign locations and wording, at a minimum they must read and understand the safety section before operating or performing lubrication, maintenance and repair on this equipment.

Do not attempt to bypass any of the safety equipment or instrumentation on this equipment.

Do not attempt to operate this equipment with any of the safety equipment or instrumentation bypassed.

Machines that are operating safely in various applications depend on machine maintenance, operating speed of the machine, conditions of the terrain, fluid levels. **The most important criteria are the skill and judgment of the operator.**

Certain conditions and precautions are peculiar to pipeline construction operations. The following represents the minimum considerations for safe operation of this equipment.

NOTICE

Other safety precautions related to the operation of the crane also apply.
Refer to the Autocrane HC-12 Owners Manual, Safety Section.

Other safety precautions related to the operation of the carrier also apply.
Refer to the Panther T12 Operation and Maintenance manual, Safety Section.

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Operation

The operation section is a reference for the new operator and a refresher for the experienced operator. This section includes a discussion of machine controls, and transportation information.

Photographs and illustrations guide the operator through correct procedures of checking, starting, operating, and stopping the equipment.

Operating techniques outlined in this publication are basic. Skill and techniques develop as the operator gains knowledge of the machine and its capabilities.

Maintenance

The maintenance section is provided for quick, general reference only.

The maintenance sections are guides to equipment care. The Maintenance Interval Schedules (MIS) list the items to be maintained at a specific service interval. Items without specific intervals are listed under the "When Required" service interval.

Maintenance Intervals

Use the carrier vehicle’s service hour meter to determine servicing intervals. Calendar intervals shown (daily, weekly, monthly, etc.) can be used instead of service hour meter intervals if they provide more convenient servicing schedules and approximate the indicated service hour meter reading. Recommended service should always be performed at the interval that occurs first.

Under extremely severe, dusty or wet operating conditions, more frequent lubrication than is specified in the maintenance intervals charts might be necessary.

Perform service on items at multiples of the original requirement. For example, at every 500 service hours or 3 months, also service those items listed under every 250 service hours or monthly and every 10 service hours or daily.

Safety Section

Safety Signs and Labels

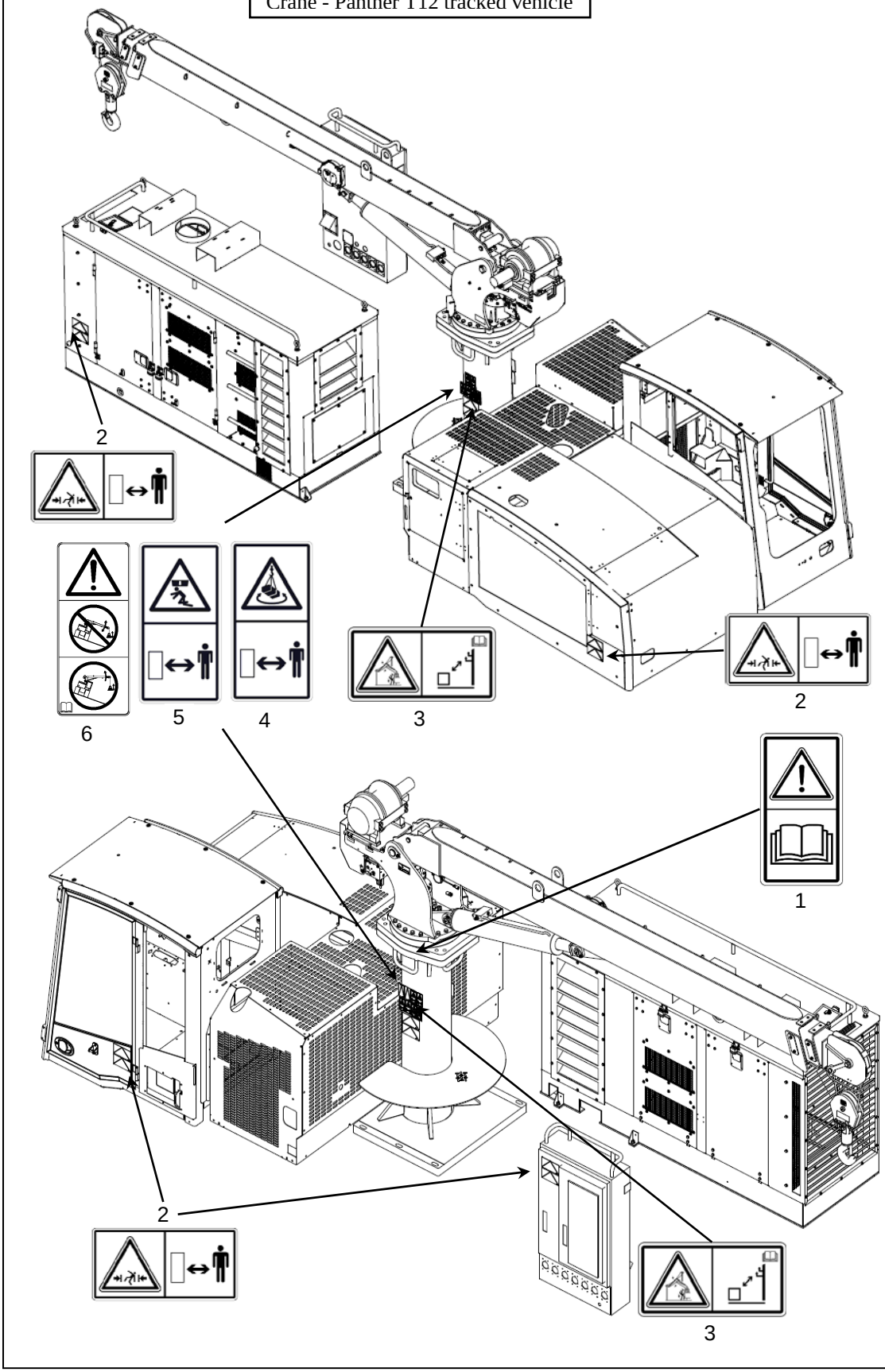
There are several specific safety signs on this equipment. The exact location of the hazard and the description are reviewed in this section. Become familiarized with all safety signs.

Make sure that all of the safety signs are legible. Clean or replace the safety signs if you cannot read the words. Replace the illustrations if the illustrations are not visible. Use a cloth, water, and mild soap to clean the safety signs. Do not use solvent, gasoline, or other harsh chemicals to clean the safety signs. Solvents, gasoline, or harsh chemicals could loosen the adhesive that secures the safety message. Loose adhesive will allow the safety message to fall.

Do not use pressure washers to clean the safety signs.

Replace any safety sign that is damaged, or missing. If a safety sign is attached to a part that is replaced, install a safety sign on the replacement part. Vanguard Equipment can provide new safety signs.

Safety Sign locations - Auto Tie-in Crane - Panther T12 tracked vehicle



Do Not Operate (1)

⚠ WARNING

WARNING! Do not operate or work on this machine unless you have read and understand the instructions and warnings in the Operation and Maintenance Manuals. Failure to follow the instructions or heed the warnings could result in injury or death. Contact your dealer for replacement manuals. Proper care is your responsibility.

Safety message (1) is located on the left hand side of the Auto Tie-in crane base.

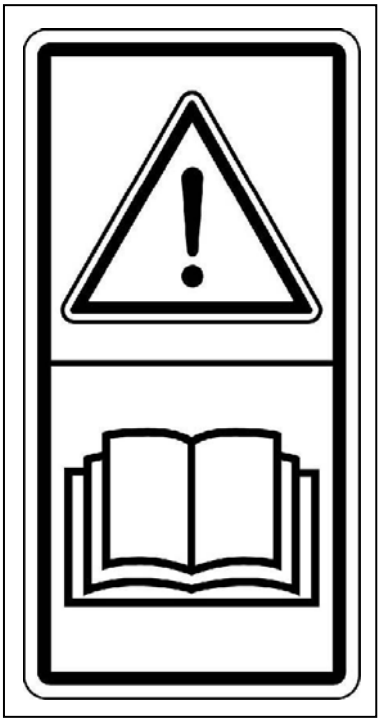


Figure 1: Do not operate (1)

Pinch Point (2)

⚠ WARNING

Pinch Point Hazard! Stay back a safe distance. Pinch points present in this area when Auto Tie-in crane turns. Severe injury or death from crushing could occur.

Safety message (2) is located near the left hand door on the genset enclosure front side, and the front of the control/distribution centre on the main door. On the Panther T12 tracked vehicle, Safety message (2) is located on the exterior hinged side of the cab door, and near the exterior right hand side of the engine enclosure door.

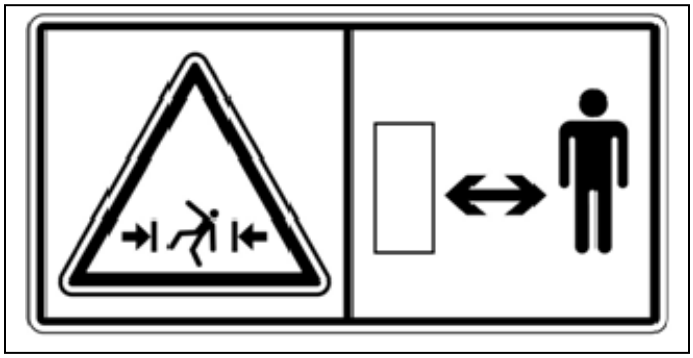


Figure 2: Pinch Point (2)

Electrical Power Lines (3)

DANGER

Electrocution Hazard! Keep the machine and attachments a safe distance from electrical power. Stay clear 3 M (10 ft) plus twice the line insulator length. Read and understand the instructions and warnings in the Operation and Maintenance Manual. Failure to follow the instructions and warnings will cause serious injury or death.

Safety message (3) is located on both sides of the Auto Tie-in Crane Base

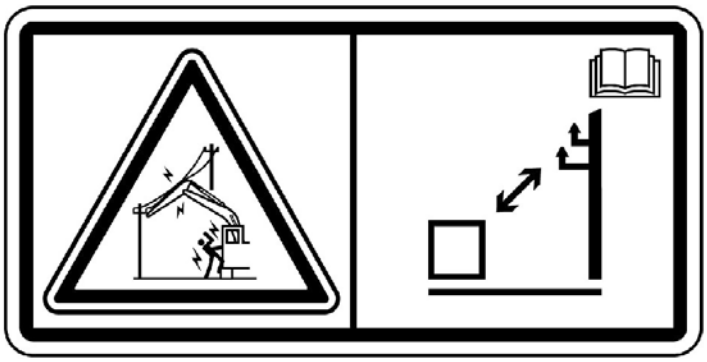


Figure 3: Electrical power lines (3)

Load May Rotate (4)

WARNING

Overhead load crushing hazard! Overhead load may rotate when supported by the Auto Tie-in Crane. Do not work under load or in rotation zone, maintain a safe distance from the load and rotation zone at all times. Failure to keep clear may result in severe injury or death.

Safety message (4) is located on the left hand and right hand sides of the Auto Tie-in Crane Base.

Figure 4: Load May Rotate (4)

Overhead Load (5)

⚠ WARNING

Crushing hazard! Overhead load crushing hazard is present when load is being supported by the Auto Tie-in Crane. Do not work under load, maintain a safe distance from the load at all times. Failure to keep clear may result in severe injury or death.

Safety message (5) is located on the left hand and right hand sides of the Auto Tie-in Crane Base.

Figure 5: Overhead Load (5)

Overload (6)

⚠ WARNING

Overload hazard! Boom overload hazard is present when load is being supported by the Auto Tie-in Crane with the boom below horizontal. Do not lift or support a load with the boom below horizontal. Attempting a lift in this situation could cause severe injury or death.

Safety message (6) is located on the left hand and right hand sides of the Auto Tie-in Crane Base.

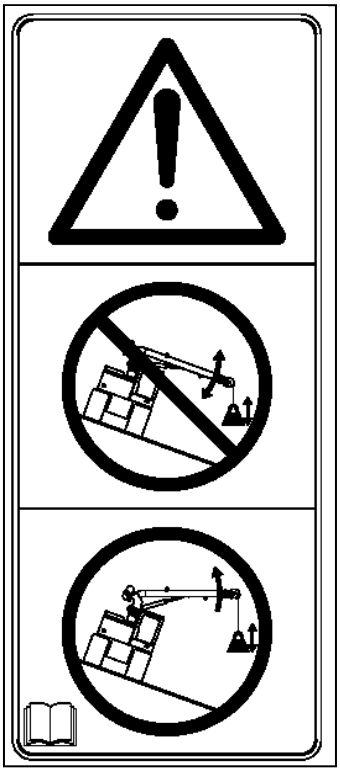


Figure 6: Overload (6)

For additional crane safety films see Appendix 1.
For additional carrier safety films see the carrier OMM.
For T12 carrier tie-in crane specific films see Appendix 2.

General Hazard Information

Before you service the equipment or before you repair the equipment, attach a “Do Not Operate” tag or similar tag to the start switch or controls.

Know the width of your equipment in order to maintain proper clearance near fences, boundary obstacles, etc.

This attachment extends significantly beyond the carrier increasing the overall length and/or width, be especially aware of the additional length and/or width when turning and maneuvering the carrier vehicle.

Follow all safety regulations, procedures and precautions that govern the work site, including: wearing a hard hat, protective glasses and other protective equipment in order to accommodate job conditions.

Do not wear loose clothing or jewelry that can catch on controls or other parts of the equipment.

Keep all equipment free from foreign material. Remove debris, oil, tools and other items.

Secure all loose items that are not part of the machine; tools, lunchboxes, water bottles, etc.

Know the appropriate work site hand signals. Also, know the personnel that are authorized to give the hand signals. Accept signals from one person only.

Never put maintenance fluids into glass containers. Drain all liquids into a suitable container.

When you discard liquids, obey all local regulations.

Use all cleaning solutions with care.

Report all necessary repairs.

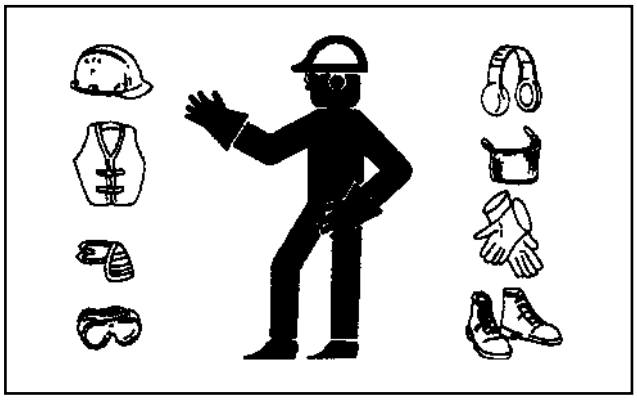
Do not allow unauthorized personnel on the machine.

Perform the maintenance with the carrier parked on level ground as per the manufacturer's instructions

Pressure Air and water

Pressurized air and/or water can cause debris and/or hot water to be blown out. The debris and/or hot water could result in personal injury.

When pressurized air and/or pressurized water are used for cleaning, wear protective clothing, protective shoes, and eye protection. Eye protection includes goggles or a protective face shield.



The maximum air pressure for cleaning purposes must be reduced to 205 kPa (30 psi) when the nozzle is deadheaded and the nozzle is used with an effective chip deflector and personal protective equipment. The maximum water pressure for cleaning purposes must be below 275 kPa (40 psi).

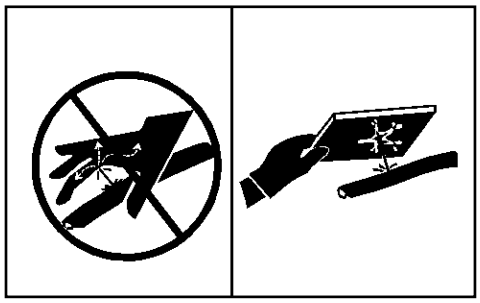
Trapped Pressure

Pressure can be trapped in a hydraulic system. Trapped pressure can cause sudden equipment movement. Use caution if you disconnect hydraulic lines or fittings. High-pressure oil that is released can cause a hose to whip. High-pressure oil that is released can cause oil to spray. Fluid penetration can cause serious injury and possible death.

Fluid Penetration

Pressure can be trapped in the hydraulic circuit long after the engine has been stopped. The pressure can cause hydraulic fluid or items such as pipe plugs to escape rapidly if the pressure is not relieved correctly.

Do not remove any hydraulic components or parts until pressure has been relieved or personal injury may occur. Do not disassemble any hydraulic components or parts until pressure has been relieved or personal injury may occur. Refer to the Service Manual for any procedures that are required to relieve the hydraulic pressure.



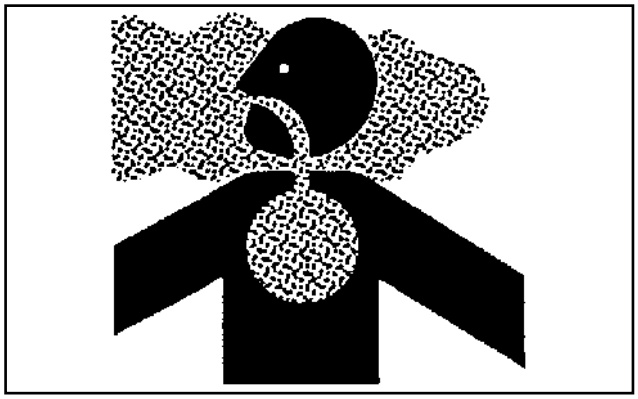
When you check for a leak, use a board or cardboard. Leaking fluid that is under pressure can penetrate body tissue. Fluid penetration can cause serious injury and possible death. A pin hole leak can cause severe injury. If fluid is injected into your skin, you must obtain treatment immediately. Seek treatment from a doctor that is familiar with this type of injury.

Containing Fluid Spillage

Care must be taken in order to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting, and repair of the equipment. Prepare to collect the fluid with suitable containers before opening any compartment or disassembling any component that contains fluids.

Obey all local regulations for the disposal of liquids.

Inhalation



Asbestos Information

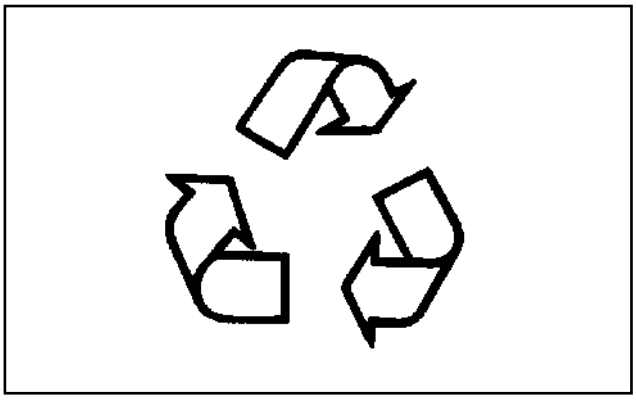
Equipment and replacement parts that are shipped from Vanguard are asbestos free. Use only genuine OEM replacement parts. If any replacement parts that contain asbestos are used, follow the manufacturer's handling guidelines and procedures as outlined in their instruction documentation.

Obey environmental regulations for the disposal of asbestos.

Stay away from areas that might have asbestos particles in the air.

Dispose of Waste Properly

Improperly disposing of waste can threaten the environment. Potentially harmful fluids should be disposed of according to local regulations.



Always use leak proof containers when you drain fluids. Do not pour waste onto the ground, down a drain, or into any source of water.

Crushing Prevention and Cutting Prevention

Support the equipment properly before you perform any work or maintenance beneath that equipment. Do not depend on hydraulic cylinders to hold up the equipment. Equipment can fall if a control is moved, or if a hydraulic line breaks.

Unless you are instructed otherwise, never attempt adjustments while the machine is moving or while the engine is running.

Whenever there are equipment control linkages the clearance in the linkage area will change with the movement of the equipment or the machine. Stay clear of areas that may have a sudden change in clearance with machine movement or equipment movement.

Stay clear of all rotating and moving parts.

If it is necessary to remove guards in order to perform maintenance, always install the guards after the maintenance is performed.

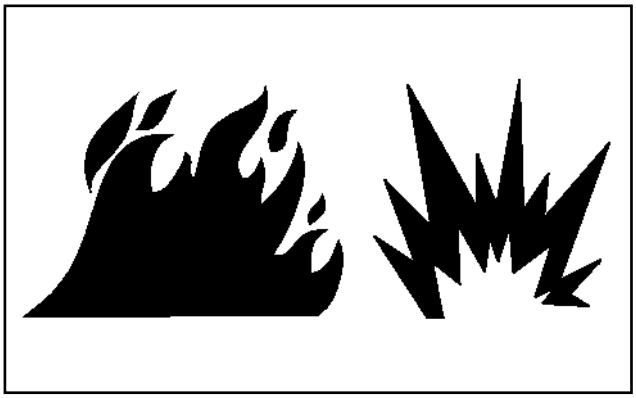
When you strike a retainer pin with force, the retainer pin can fly out. The loose retainer pin can injure personnel. Make sure that the area is clear of people when you strike a retainer pin. To avoid injury to your eyes, wear protective glasses when you strike a retainer pin.

Chips or other debris can fly off an object when you strike the object. Make sure that no one can be injured by flying debris before striking any object.

Oils

Hot oil and hot components can cause personal injury. Do not allow hot oil to contact the skin. Also do not allow hot components to contact the skin.

Fire Prevention and Explosion Prevention



General

All fuels, most lubricants, and some coolant mixtures are flammable.

To minimize the risk of fire or explosion, the following actions are recommended.

Always perform a Walk-Around Inspection, which may help you identify a fire hazard. Do not operate a machine when a fire hazard exists. Contact your dealer for service.

Do not operate a machine with a fluid leak. Repair leaks and clean up fluids before resuming machine operation. Fluids that are leaking or spilled onto hot surfaces or onto electrical components can cause a fire. A fire may cause personal injury or death.

Remove flammable material such as leaves, twigs, papers, trash, and so on. These items may accumulate around hot areas and hot parts on the machine.

Clean all flammable materials such as fuel, oil, debris, etc. from the machine.

Do not operate the machine close to the any flames.

Do not weld or flame cut on tanks or lines that contain flammable fluids or flammable material. Empty and purge the lines and tanks. Then clean the lines and tanks with a nonflammable solvent prior to welding or flame cutting. Ensure that the components are properly grounded in order to avoid unwanted arcs.

Dust that is generated from repairing nonmetallic components may be flammable and/or explosive. Repair such components in a ventilated area away from open flames or sparks. Use suitable Personal Protection Equipment (PPE).

Inspect all lines and hoses for wear or deterioration. Replace damaged lines and hoses. The lines and the hoses should have adequate support and secure clamps. Tighten all connections to the recommended torque. Damage to the protective cover or insulation may provide fuel for fires.

Store fuels and lubricants in properly marked containers away from unauthorized personnel. Store oily rags and flammable materials in protective containers. Do not smoke in areas that are used for storing flammable materials.

Properly clean areas of spillage.

Never store flammable fluids in the operator compartment of the carrier vehicle.

Wiring

Check electrical wires daily. If any of the following conditions exist, replace parts before you operate the machine.

- Fraying
- Signs of abrasion or wear
- Cracking
- Discoloration
- Cuts on insulation
- Other damage

Make sure that all clamps, guards, clips, and straps are reinstalled correctly. This action will help to prevent vibration, rubbing against other parts, and excessive heat during machine operation.

Attaching electrical wiring to hoses and tubes that contain flammable fluids or combustible fluids should be avoided.

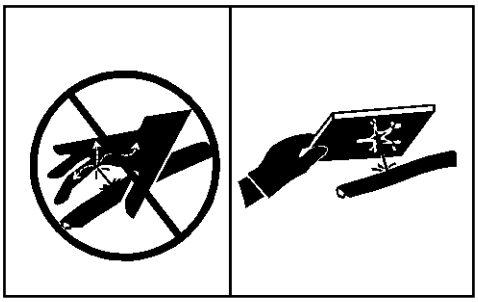
Consult your dealer for repair or for replacement parts.

Keep wiring and electrical connections free of debris.

Lines, Tubes and Hoses

Do not bend high-pressure lines. Do not strike high-pressure lines. Do not install bent lines, bent tubes, or bent hoses. Do not install damaged lines, damaged tubes, or damaged hoses.

Repair loose lines, loose tubes, and loose hoses. Repair damaged lines, damaged tubes, and damaged hoses. Use the appropriate backup wrenches in order to tighten all connections to the recommended torque. Leaks can cause fires. Contact Vanguard Equipment for replacement parts.



Check lines, tubes and hoses carefully. Wear Personal Protection Equipment (PPE) in order to check for leaks. Do not use your bare hands to check for leaks. Always use a board or cardboard to check for leaks. Leaking fluid that is under pressure can penetrate body tissue. Fluid penetration can cause serious injury and possible death. A pin hole leak can cause severe injury. If fluid is injected into your skin, you must get treatment immediately. Seek treatment from a doctor that is familiar with this type of injury.

Replace the affected parts if any of the following conditions are present:

- End fittings are damaged or leaking.
- Outer coverings are chafed or cut.
- Wires are exposed.
- Outer coverings are swelling or ballooning.
- Flexible parts of the hoses are kinked or crushed.
- Outer covers have exposed embedded armoring.
- End fittings are displaced.

Make sure that all clamps, guards, and heat shields are installed correctly. During machine operation, this action will help to prevent vibration, rubbing against other parts, excessive heat, and failure of lines, tubes, and hoses.

Do not operate a machine when a fire hazard exists. Repair any lines that are corroded, loose, or damaged. Leaks may provide fuel for fires. Consult your dealer for repair or for replacement parts. Use genuine OEM parts or the equivalent, for capabilities of both the pressure limit and temperature limit.

Fire Extinguisher

A fire extinguisher is typically carried on the vehicle carrier.

Be familiar with the operation of the fire extinguisher. Inspect the fire extinguisher and service the fire extinguisher regularly. Obey the recommendations on the fire extinguisher's instruction-plate.

Fire Safety

Note: Locate fire extinguishers and how to use a fire extinguisher before you operate the machine.

Follow the instructions covering Fire Safety outlined in the carrier vehicle's Operation and Maintenance Manual, and/or the welding-package's Operation and Maintenance Manual.

If you find that you are involved in a machine fire, your safety and that of others on site is the top priority. The following actions should only be performed if the actions do not present a danger or risk to you and any nearby people. At all times you should assess the risk of personal injury and move away to a safe distance as soon as you feel unsafe.

Move the machine away from nearby combustible material such as fuel/oil stations, structures, trash, mulch and timber.

Lower any implements and turn off the engine as soon as possible. If you leave the engine running, the engine will continue to feed a fire. The fire will be fed from any damaged hoses that are attached to the engine or pumps.

If possible, turn the battery disconnect switch to the OFF position. Disconnecting the battery will remove the ignition source in the event of an electrical short. Disconnecting the battery will eliminate a second ignition source if electrical wiring is damaged by the fire, resulting in a short circuit.

Notify emergency personnel of the fire and your location.

Use the on-board fire extinguisher, per the instructions on the fire extinguisher's instruction-plate, use the following procedure:

1. Pull the pin.
2. Aim the extinguisher or nozzle at the base of the fire.
3. Squeeze the handle and release the extinguishing agent.
4. Sweep the extinguisher from side to side across the base of the fire until the fire is out.

Remember, if you are unable to do anything else, shut off the machine before exiting. By shutting off the machine, fuels will not continue to be pumped into the fire. Use the emergency Stop button on the welder package to shut off the machine.

If the fire grows out of control, be aware of the following risks:

- Tires on wheeled machines pose a risk of explosion as tires burn. Hot shrapnel and debris can be thrown great distances in an explosion.
- Tanks, accumulators, hoses, and fittings can rupture in a fire, spraying fuels and shrapnel over a large area.
- Remember that nearly all of the fluids on the machine are flammable, including coolant and oils. Additionally, plastics, rubbers, fabrics, and resins in fiberglass panels are also flammable.

Fire Extinguisher Location

Make sure that a fire extinguisher is available. Be familiar with the operation of the fire extinguisher. Inspect the fire extinguisher and service the fire extinguisher. Obey the recommendations on the instruction plate.

Mount the fire extinguisher in the accepted location per local regulations.

Electrical cables and wire-harnesses

Do not bend electrical cables or wire-harnesses to a tighter radius than already installed. Do not strike electrical cables or wire-harnesses. Do not kink electrical cables or wire-harnesses. Do not install kinked electrical cables or wire-harnesses. Do not install damaged electrical cables or wire-harnesses.

Note: Only qualified personnel should work on electrical equipment, including electrical cables or wire-harnesses. Follow established safety procedures when working on electrical equipment, including locking out operator controls as described in the "General Hazard Information" section above.

Replace electrical cables or wire-harnesses with the same electrical rating, properties, and specifications as the original. Contact your dealer or Vanguard for replacement parts.

Replace electrical cables or wire-harnesses if any of the following conditions are present:

- The outer covering is chafed or cut.
- The insulation is chafed, cut, or damaged in any way.
- Signs of burning or arcing through the outer covering/insulation are present.
- The electrical cable or wire-harness has been crushed by a heavy object.

Make sure that all clamps and guards are installed correctly. During operation, this will help prevent vibration and rubbing against other parts.

Before Operating Equipment

Clear all personnel from the equipment and from the area.

Remove all obstacles from the path of the machine. Beware of hazards such as wires, ditches, etc.

Reference: Refer to Operation and Maintenance Manual, "Daily Inspection" in this manual, “Preparing the Crane for Operation” in the Cranes's Owner’s manual, and “Pre-Operation Inspection” in the Carrier’s manual.

Check for obvious signs of damage, loose bolts, loose equipment, and foreign objects or debris on and around the equipment.

Visibility Information

Before you start the machine, perform a walk-around inspection in order to ensure that there are no hazards around the machine.

While the machine is in operation, constantly survey the area around the machine in order to identify potential hazards as hazards become visible around the machine.

Your machine may be equipped with visual aids. Some examples of visual aids are Closed Circuit Television (CCTV) and mirrors. Before operating the machine, ensure that the visual aids are in proper working condition and that the visual aids are clean. Adjust the visual aids using the procedures that are located in the carrier-vehicle's Operation and Maintenance Manual.

This attachment extends significantly beyond the carrier increasing the overall length and/or width, be especially aware of the additional length and/or width when turning and maneuvering the carrier vehicle. The installation of the Auto Tie-in Crane may restrict vision, and it may not be possible to provide direct visibility to all areas around the machine. Appropriate job site organization is required in order to minimize hazards that are caused by restricted visibility. Job site organization is a collection of rules and procedures that coordinates machines and people that work together in the same area. Examples of job site organization include the following:

- Safety instructions
- Controlled patterns of machine movement and vehicle movement
- Workers that direct traffic to move when it is safe
- Restricted areas
- Operator training
- Warning symbols or warning signs on machines or on vehicles
- A system of communication
- Communication between workers and operators prior to approaching the machine

Operation

Machine Operating Temperature Range

When using the correct hydraulic oil weight, as specified by the carrier vehicle OEM, the Auto Tie-in Crane configuration is intended for use within an ambient temperature range -40°C (-40°F) to 50°C (122°F). Consult the carrier vehicle’s Operation and Maintenance Manual for additional information on special configurations.

Machine Operation

Keep the machine under control. Do not overload the machine beyond capacity.

Be careful to avoid any condition which could cause the machine to tip. The machine can tip when you work on hills, banks and slopes. Also, the machine can tip when you cross ditches, ridges or other obstacles.

Whenever it is possible, operate the machine up the slopes and down the slopes. Avoid operating the machine across the slope.

Do not go or work close to the edge of a cliff, an excavation, or an overhang.

Follow the Operation instructions of the carrier-vehicle.

Follow the Operation instructions of the crane.

Report any needed repairs that were noted during operation.

Stability

A well trained operator that follows the instructions in the Operation and Maintenance Manual has the greatest impact on stability. Operator training provides a person with the following abilities: observation of working and environmental conditions, feel for the machine, identification of potential hazards, and operating the machine safely by making appropriate decisions.

When you work on side hills and when you work on slopes, consider the following important points:

Speed of travel - At higher speeds, forces of inertia tend to make the machine less stable.

Roughness of terrain or surface - The machine may be less stable with uneven terrain.

Direction of travel - Avoid operating the machine across the slope. When possible, operate the machine up the slopes and operate the machine down the slopes. Place the heaviest end of the machine uphill when you are working on an incline.

Mounted equipment - Balance of the machine may be impeded by the following components: equipment that is mounted on the machine, machine configuration, weights, and counterweights.

Nature of surface - Ground that has been newly filled with earth may collapse from the weight of the machine.

Surface material - Rocks and moisture of the surface material may drastically affect the machine's traction and machine's stability. Rocky surfaces may promote side slipping of the machine.

Slippage due to excessive loads - This may cause downhill tracks to dig into the ground, which will increase the angle of the machine.

Height of the working load of the machine - When the working loads are in higher positions, the stability of the machine is reduced.

Operated equipment - Be aware of performance features of the equipment in operation and the effects on machine stability.

Operating techniques - Keep all attachments or pulled loads low to the ground for optimum stability.

Machine systems have limitations on slopes - Slopes can affect the proper function and operation of the various machine systems. These machine systems are needed for machine control on slopes.

Note: Safe operation on steep slopes may require special machine maintenance. Excellent skill of the operator and proper equipment for specific applications are also required. Consult the Operation and Maintenance Manual sections for the proper fluid level requirements and intended machine use.

Note: Refer to the carrier’s operation and maintenance manual for further specific requirements for safe operation on steep slopes.

Additional counterweight added to the vehicle may be required to ensure the carrier vehicle is stable, contact the carrier vehicle dealer for more information.

Load Capacities

Maintain control of the machine. Do not overload the machine beyond the machine capacity. Ensure that the correct load capacity indication film is referenced. The supported load must be within the capabilities of the machine to ensure that the carrier vehicle does not become unstable. Load capacity decreases as the load is moved further from the machine.

Wire rope limitations, soil conditions, and slope of terrain reduce actual capacity. All lifts must be made with the load line vertical, and the boom centerline directed toward the load.

To prevent cable from slipping off the drum, a minimum of five full-wraps of cable must remain on the winch drum at maximum working extension of the hook or boom

The machine may tip and personal injury may occur if the maximum load capacities are exceeded. Load capacities assume that the machine is stationary on a level concrete surface. Lift capabilities/capacities will decrease on slopes or soft ground.

Equipment Lowering with Engine Stopped

Before lowering any equipment with the engine stopped, clear the area around the equipment of all personnel. The procedure will lower the boom against the counterbalance valve. Wear appropriate personal protective equipment and follow the established procedure in the crane Owner's Manual, "EMERGENCY CRANE OPERATION" (see Appendix 1)

Electrical Power Lines

⚠ WARNING

Serious injury or death by electrocution can result if the machine or attachments are not kept the proper distance from electrical power lines.

Use the following chart as a reference to determine the safe distance from high voltage wires during these conditions:

- machine operation
- machine transportation

When Operating Near High Voltage Power Lines	
Normal Voltage (Phase to Phase)	**Minimum Clearance Required**
0 Volts to 50 kVolts	3.05 Meters (10 Feet)
Over 50 kVolts to 200 kVolts	4.60 Meters (15 Feet)
Over 200 kVolts to 350 kVolts	6.10 Meters (20 Feet)
Over 350 kVolts to 500 kVolts	7.62 Meters (25 Feet)
Over 500 kVolts to 750 kVolts	10.67 Meters (35 Feet)
Over 750 kVolts to 1000 kVolts	13.72 Meters (45 Feet)
While in Transit Near High Voltage Power Lines	
Normal Voltage (Phase to Phase)	**Minimum Clearance Required**
0 Volts to 0.75 kVolts	1.22 Meters (4 Feet)
Over 0.75 kVolts to 50 kVolts	1.83 Meters (6 Feet)
Over 50 kVolts to 345 kVolts	3.05 Meters (10 Feet)
Over 345 kVolts to 750 kVolts	6.10 Meters (20 Feet)
Over 750 kVolts to 1000 kVolts	7.62 Meters (25 Feet)

Table 1: Power lines, minimum clearance

Machine Parking

Refer to the carrier's Operation and Maintenance Manual for specific machine parking instructions.

Sound Level Information

The Auto Tie-in Crane itself does not produce elevated sound pressure levels.

Refer to the carrier's Operation and Maintenance Manual for sound level information.

Vibration

When the machine is operated according to the intended use, the vibration data for the carrier-vehicle is unaffected by attachment of the Auto Tie-in Crane.

Guards (Operator Protection)

There are different types of guards that are used to protect the operator. The machine and the machine application determine the type of guard that should be used.

A daily inspection of the guards is required in order to check for structures that are bent, cracked or loose. Never operate a machine with a damaged structure.

The operator becomes exposed to a hazardous situation if the machine is used improperly or if poor operating techniques are used. This situation can occur even though a machine is equipped with an appropriate protective guard. Follow the established operating procedures that are recommended for your machine.

Product Information Section (Auto Tie-in Crane)

General Information

Equipment Information Section (Auto Tie-in Crane)

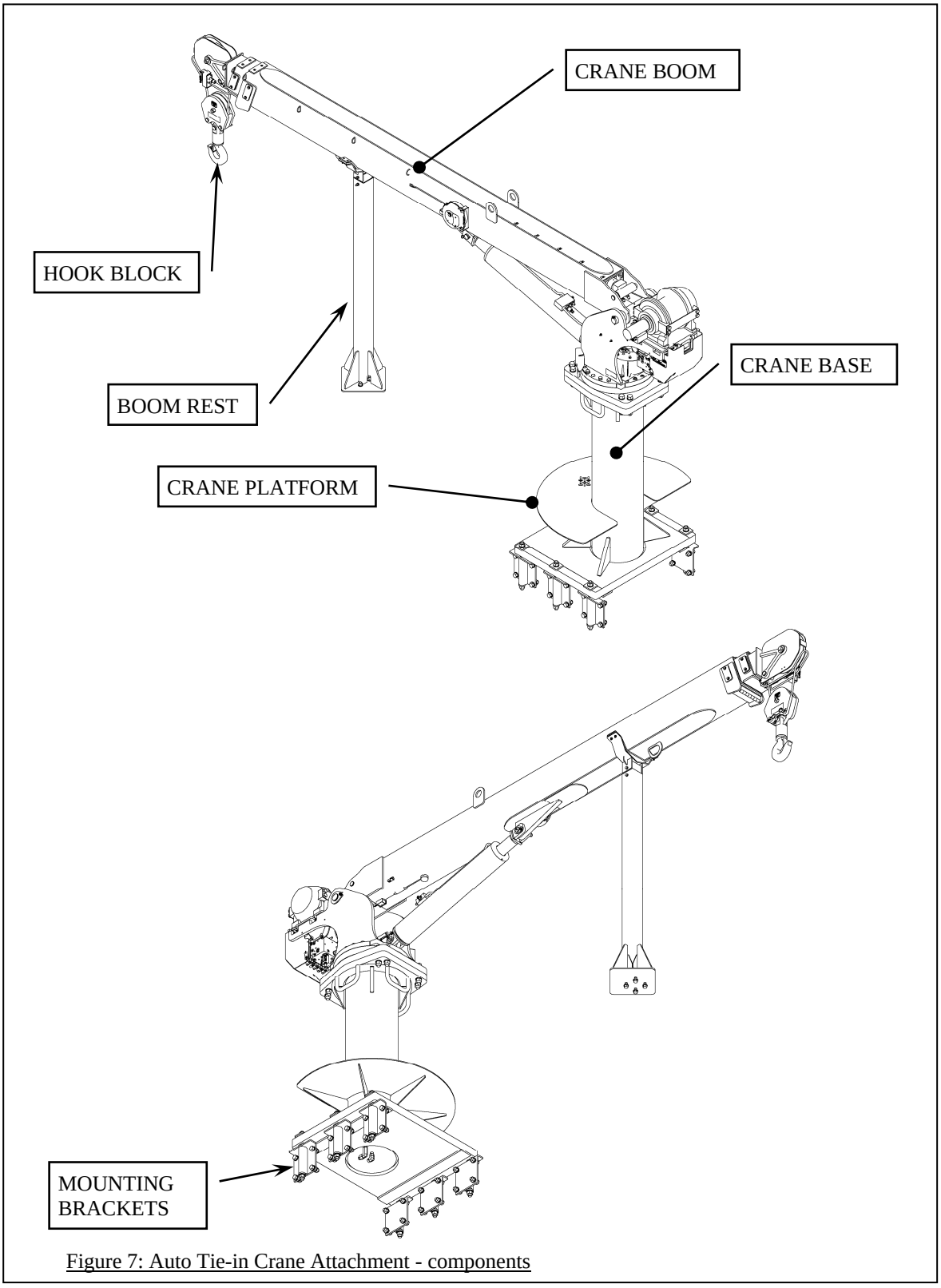
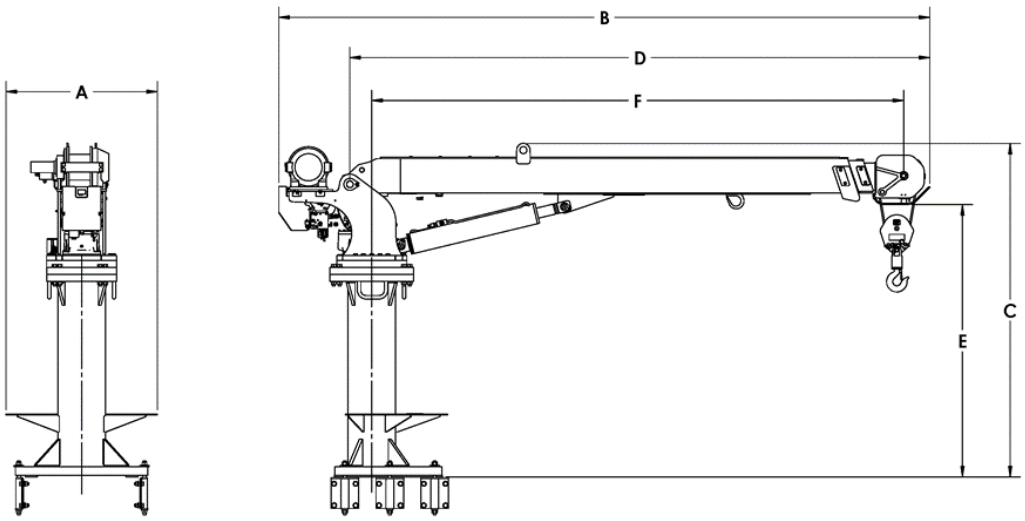


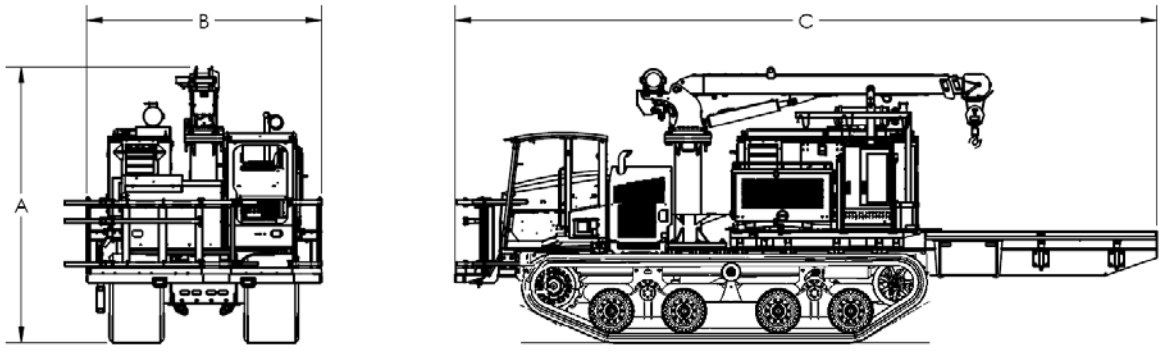
Figure 7: Auto Tie-in Crane Attachment - components

Auto Tie-in Crane Attachment Specification (Carrier-vehicle weights not included)



(A) Overall Width		1125.5 mm	44.31 in
(B) Overall Length with Boom Horizontal (Shipping)		4838 mm	190.47 in
(C) Maximum Height Above Top of C-Rail	Boom Horizontal (Shipping)	2473.4 mm	97.38 in
	Boom Fully Raised	11342.7 mm	446.56 in
	Boom Fully Lowered (To Top of Boom)	2449.3 mm	96.43 in
(D) Boom Slewing Radius	Boom Horizontal (Shipping)	4309.4 mm	169.66 in
	Boom Fully Raised	2557.6 mm	100.69 in
	Boom Fully Lowered	9289.6 mm	365.73 in
(E) Working Space Height (Sheave Guard Above Top of C-Rail)	INSTALLED ON PANTHER T12		
	Boom Horizontal (Shipping)	2020.7 mm	79.55 in
	Boom Fully Raised (Extended)	10914.4 mm	429.70 in
	Boom Fully Lowered (Extended)	87.0 mm	3.42 in
(F) Boom Load Radius	Boom Horizontal (Shipping)	3953 mm	155.63 in
	Boom Fully Raised	2179.2 mm	85.79 in
	Boom Fully Lowered	8955.2 mm	352.57 in
Weight Auto Tie-in Crane Attachment	INSTALLED ON PANTHER T12 (Includes Stow Arm)	2073 kg	4570 lb

Auto Tie-in Crane Panther T12 Configuration Dimensions



(A) Maximum Height - Boom Horizontal (Shipping)	3758.4 mm	147.97 in
(B) Overall Width (Shipping)	3196.8 mm	125.86 in
(C) Overall Length with Boom Retracted & Horizontal (Shipping)	9545.8 mm	375.82 in
Shipping Weight (5% fuel)	19733 kg	43504 lb
Operating Weight (100% fuel, Operator, Full Bottle Rack, 4 x 456MP welders)	20211 kg	44558 lb

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Intended Use

The primary use of this attachment is to lift a lightweight automatic welding-shack or other miscellaneous lightweight equipment for petroleum-product pipeline construction.

Load Capacity

⚠ WARNING

The machine may tip and personal injury may occur if the maximum load capacities are exceeded. Load capacities assume that the machine is stationary on a level concrete surface. Lift capacities will decrease on slopes or soft ground.

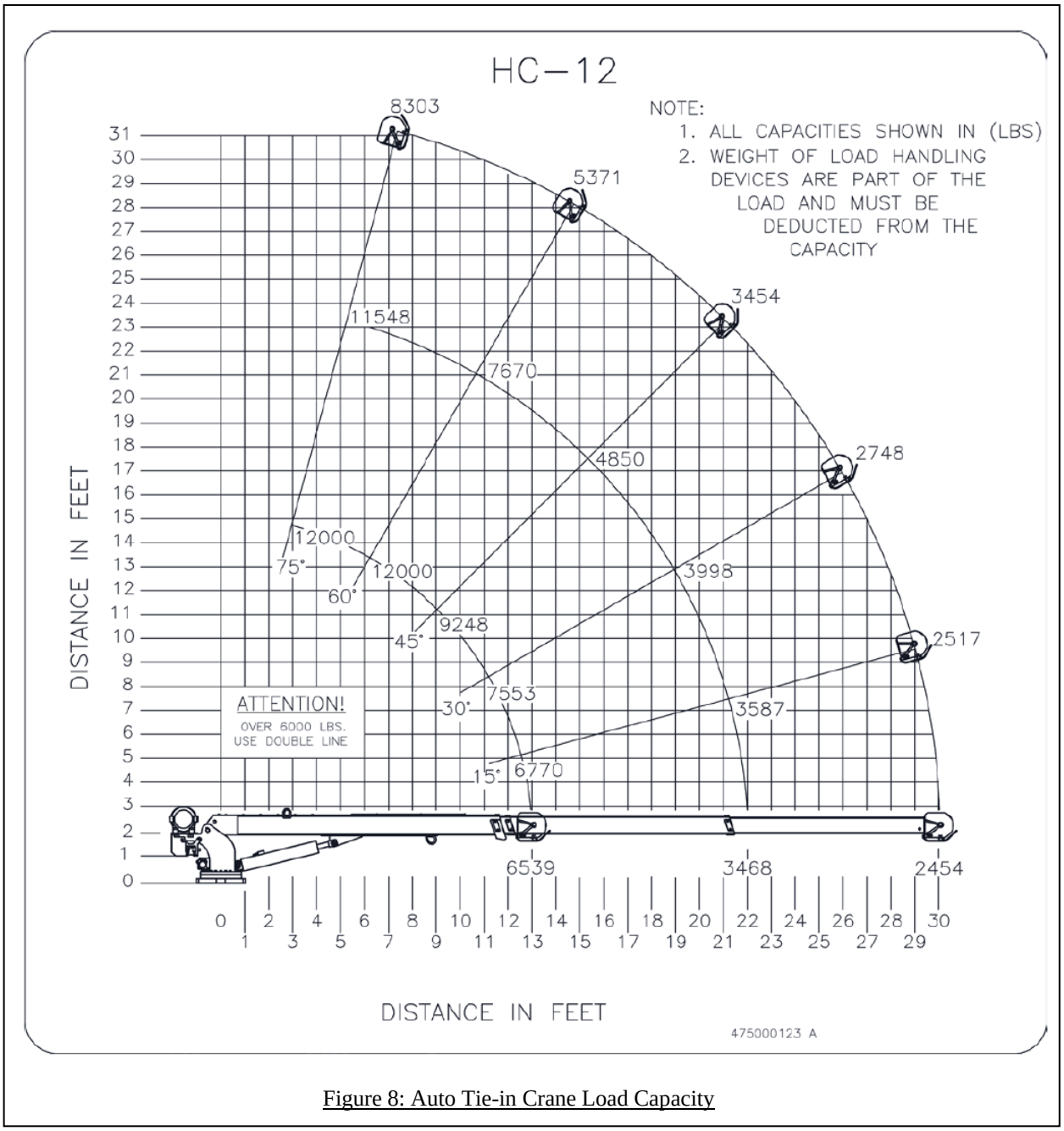


Figure 8: Auto Tie-in Crane Load Capacity

NOTE: Do not exceed the load capacity that is shown in the chart in illustration above.

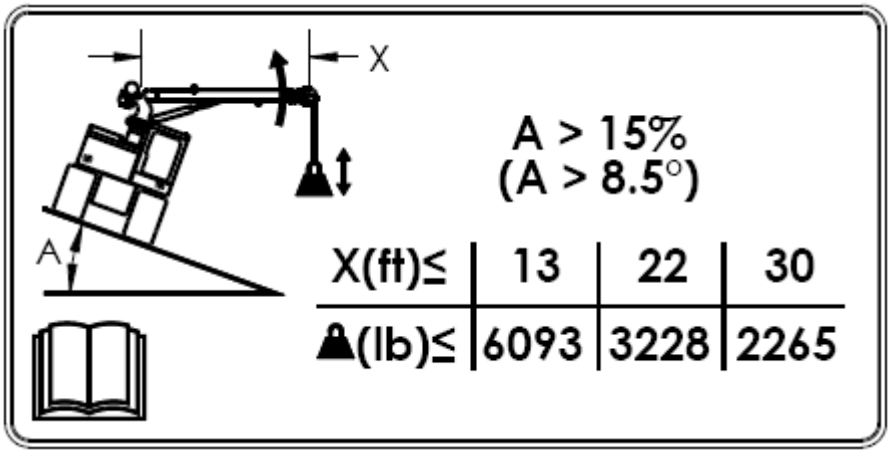


Figure 9: Slope Operation Load Capacity Reduction

When operating on a slope above 15% grade (8.5°) reduce the maximum load to the values shown in Figure 9 above.

When approaching the maximum slope or maximum load the boom operation will drop to 50% speed and the yellow light on the boom will illuminate. When the maximum slope or maximum load is reached all load raising functions are disabled, the red light on the boom will illuminate, and an alarm will sound. Note automatic crane limitations may not allow lifts above 15% grade (8.5°). Do not attempt lifts when the load raising functions are disabled.

Refer to the crane owner's manual in Appendix 1 for further details.

The lift capacity chart and slope operation decal are located on the left hand side of the crane base and inside the cab to the right of the manual. The load capacities are based on a level stationary machine in the Auto Tie-in configuration as shown in Figure 10 with the following specifications:

Auto Tie-in	
Wire rope diameter	**0.4375 inch (11.1 mm)**
Minimum breaking strength of the wire rope	**21,000 lb (93.41 kN)**
2 part hook line	
Standard boom length	**30 ft (9.1 m)**
Minimum operating weight of the Panther T12 Auto Tie-in Configuration[1]	**43669 lb (19808 kg)**

Table 2: Stationary specifications

If the load capacity chart indicates that the lift operation is within the capability of the machine, attempt to perform the operation but proceed with care. Remember that the load may weigh more than the estimate for the load. Removal of equipment or configurations other than shown in Figure 10 may reduce the load capacity characteristics of the machine below those indicated in the chart.

[1] Operating Weight: Includes lubricants, coolant, 5% fuel, hydraulic controls and fluids, backup alarm, seat belt, rubber tracks, counterweight, boom and pulley blocks, and operator.

Notice

Do not attempt a lift a load with the crane's boom over the cab as per OSHA 1910.180(h)(3)(vii). Lifting over the cab is a crushing hazard. Failure to exclude this lifting area may result in severe injury or death. See Appendix 2.

Do not exceed the load capacity shown on the load chart. The vehicle may tip if the load capacity is exceeded which may result in severe injury or death. See Appendix 2.

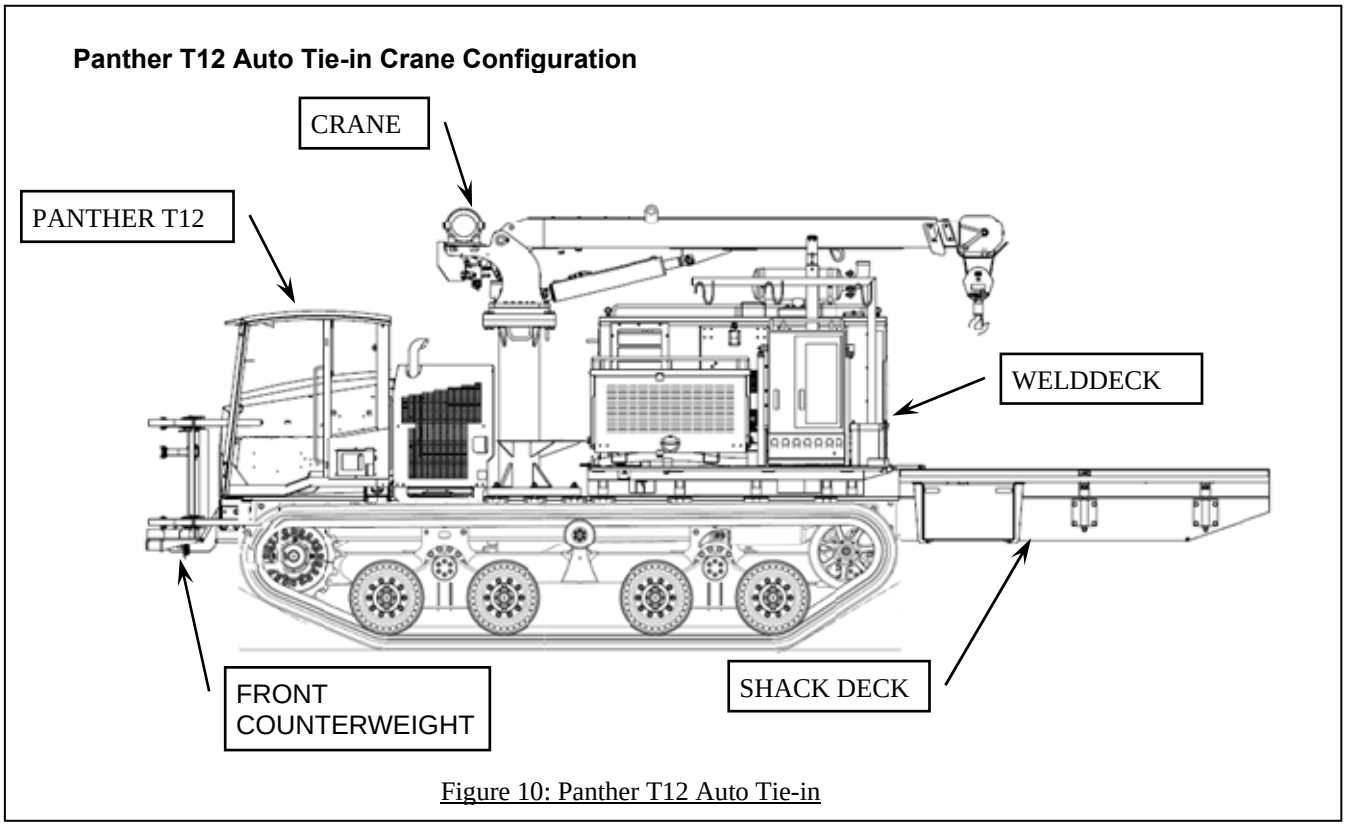
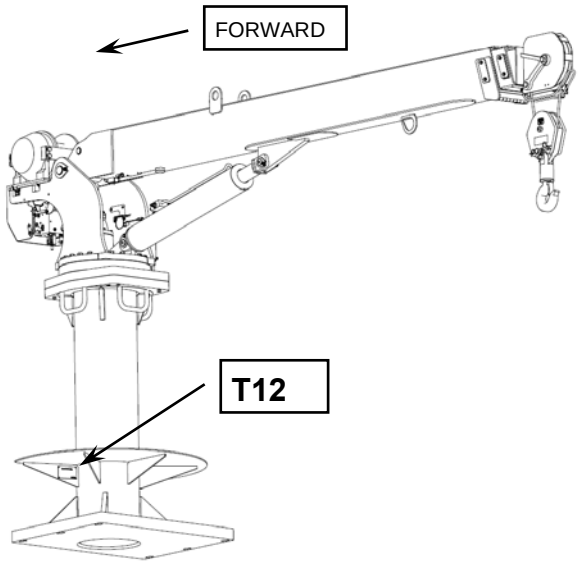


Figure 10: Panther T12 Auto Tie-in

Identification Information

Plate Locations and Film Locations

The attachment/component information plate is attached to the component to identify the model name/number and the serial number. It is not a Product Information Number (PIN). The attachment/component information plate is located on the rear of the Auto Tie-in Crane Base, below the platform, per the illustration below. For quick reference, record this information in the spaces that are provided below. The serial number (S/N) and Model name/number (M/N) information is stamped onto the ID plate. For quick reference, record this information in the spaces provided below:



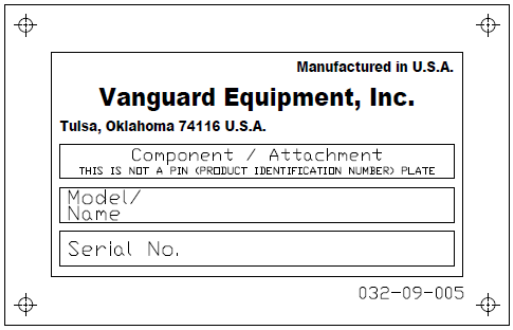


Figure 11: Attachment/component information plate

Operation Section

Before Operation

Mounting and Dismounting

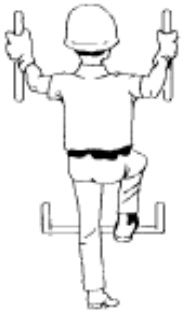


Figure 12: Mounting and dismounting machine

Refer to the carrier vehicle's Operation and Maintenance Manual for specific instructions and machine access way information.

Refer to Vanguard Equipment's CPW-125-4 or CPW-125-4-S2 Weld-deck Operation and Maintenance Manuals for specific instructions and machine access way information for Vanguard Equipment's weld-decks.

Daily Inspection

For maximum service life of the machine, perform a daily walk-around inspection.

Note: Watch closely for leaks. If leaking is observed, find the source of the leak and correct the leak. If leaking is suspected or leaking is observed, check the fluid levels more frequently.

Inspect the machine for the following items:

- Inspect the hydraulic system for leaks. Repair any hydraulic system leaks. Inspect the hoses, the seals, and the flanges.
- Inspect covers and the guards for damage, for loose bolts, and for missing bolts.
- Inspect mirrors and make sure they are in good condition and replace if broken.

Note: Refer to the carrier vehicle's operation manual for detailed information on the specific daily inspection of the carrier unit.

Notice

Accumulated grease and oil on a machine is a fire hazard.

Remove debris with steam cleaning or high-pressure water, at the specified interval in the Maintenance Interval Schedule or each time any significant quantity of oil is spilled on the machine.

Daily Checks

After you inspect the machine, perform the daily maintenance that is listed in the maintenance interval schedule. Perform the daily maintenance before you mount the machine in order to operate the machine.

Refer to Operation and Maintenance Manual, "Maintenance Interval Schedule" for the correct procedures for the following checks:

- Controls for proper operation of Auto Tie-in Crane – Check
- Hydraulic Hoses and fittings for leaks – Check
- Electrical cables for signs of damage to insulation - Check, replace if damaged
- Carrier Vehicle Hydraulic System Oil Level – Check
- Load hook for deformation, cracks, and corrosion - Check
- Cable drum wound evenly - Check
- Pin retaining bolt torque - Check

Note: Refer to the carrier vehicle's operation manual for detailed information on the specific daily checks of the carrier unit.

Operator Controls

The hydraulic functions of the Auto Tie-in Crane Attachment are controlled by a remote control.

Figure 13: Typical crane remote control layout

The speed of the Auto Tie-in Crane will be dependent on the engine RPM speed driving the hydraulic implement pump. The faster the engine RPM, the faster the Auto Tie-in Crane operational speed.

Auto Tie-in Crane Controls

Note: Refer to the specific carrier vehicle's Operation and Maintenance manual for information regarding operation of the implement controls when they are released.

1. **Emergency Stop Button –** Push to activate. Pull to release. When activated the Emergency Stop Button stops all outputs from the receiver.
2. **Display Screen –** LCD screen that displays many crane operating parameters. See Figure 14.
3. **On/Off/Link Switch –** Turns the Remote control on and off. Press and release the switch up to link the remote control to the truck. “Link” the remote control to the truck every time it is turned on. Press and Hold the switch up to access the Speed and Mode selection screen.
4. **High Idle/Aux Switch –** Press the toggle down to activate the High Idle on the vehicle. Aux activates an optional feature.
5. **Horn Button –** Activates the Horn on the vehicle.
6. **Right Joystick –** Press the Joystick Up to raise the hook. Press the Joystick Down to lower the hook. Press the Joystick Right to extend the boom and Left to retract the boom.
7. **Left Joystick –** Press the Joystick Up to raise the boom. Press the Joystick Down to lower the boom. Press the Joystick Right to rotate the boom Clockwise. Press the Joystick Left to rotate the boom Counter clockwise.
8. **Start/Stop Switch –** Press the switch up to start the engine of the vehicle. Press the switch down to turn off the engine of the vehicle

.

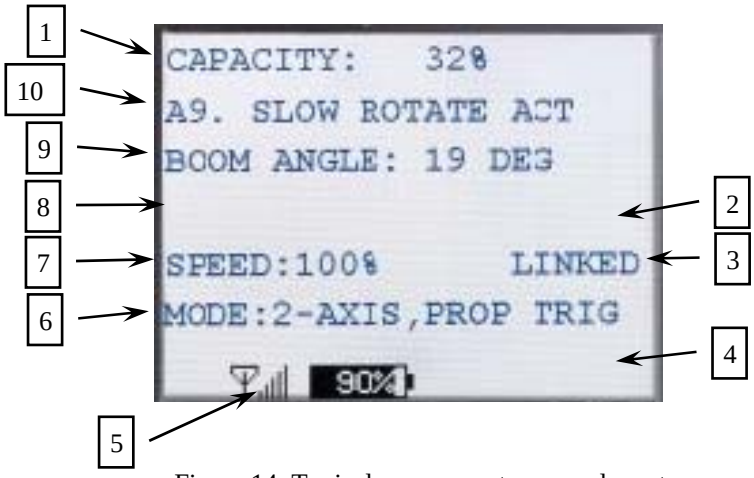


Figure 14: Typical crane remote screen layout

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

Auto Tie-in Crane Controls – Speed and Mode Selection

SPEED SELECTION

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

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

MODE SELECTION

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

MODE DESCRIPTION

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

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

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

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

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

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

Notice

The control motion of the Auto Tie-in Crane must be observed by the operator at all times. Significant risk of injury or even death may result if the Auto Tie-in Crane or its supported load contacts personnel under force of the hydraulic controls or gravity. Significant risk of damage to equipment on or near the carrier vehicle may result if the Auto Tie-in Crane or supported load contacts equipment under force of the hydraulic controls or gravity.

Always ensure that you are watching the Auto Tie-in Crane and are aware of personnel near or around the work area whenever the hydraulic controls are being operated.

Machine Parking

Refer to the carrier's Operation and Maintenance Manual for specific machine parking instructions.

Transportation Information

⚠ WARNING

Do not transport the machine with the Auto Tie-in Crane unsecured. Do not transport the machine with the Shack Deck unsecured. Do not transport the machine with the Auto Tie-in Crane facing forwards.

Note: The total combined weights and Dimensions of the Auto Tie-in Crane, the Carrier Vehicle, and any additional attachments must be considered when transporting the machine.

Note: The Auto Tie-in Crane should also be configured for transport whenever the carrier vehicle is being driven from one location to another or whenever the carrier vehicle travels at a speed greater than normal "working" speed. For example, when being driven from one work area to another, without any welding work being carried out between nearby pipe joints, or when traveling from one welding set-up site to another.

Transport the machine with the Auto Tie-in Crane facing rearwards, never transport with the Auto Tie-in Crane facing forwards.

Obey all jurisdictional transportation laws that apply. Refer to the *Equipment Information Section (Auto Tie-in Crane)* of this manual for weight and dimension considerations of the Auto Tie-in Crane.

T12 Auto Tie-in Crane configure for transport

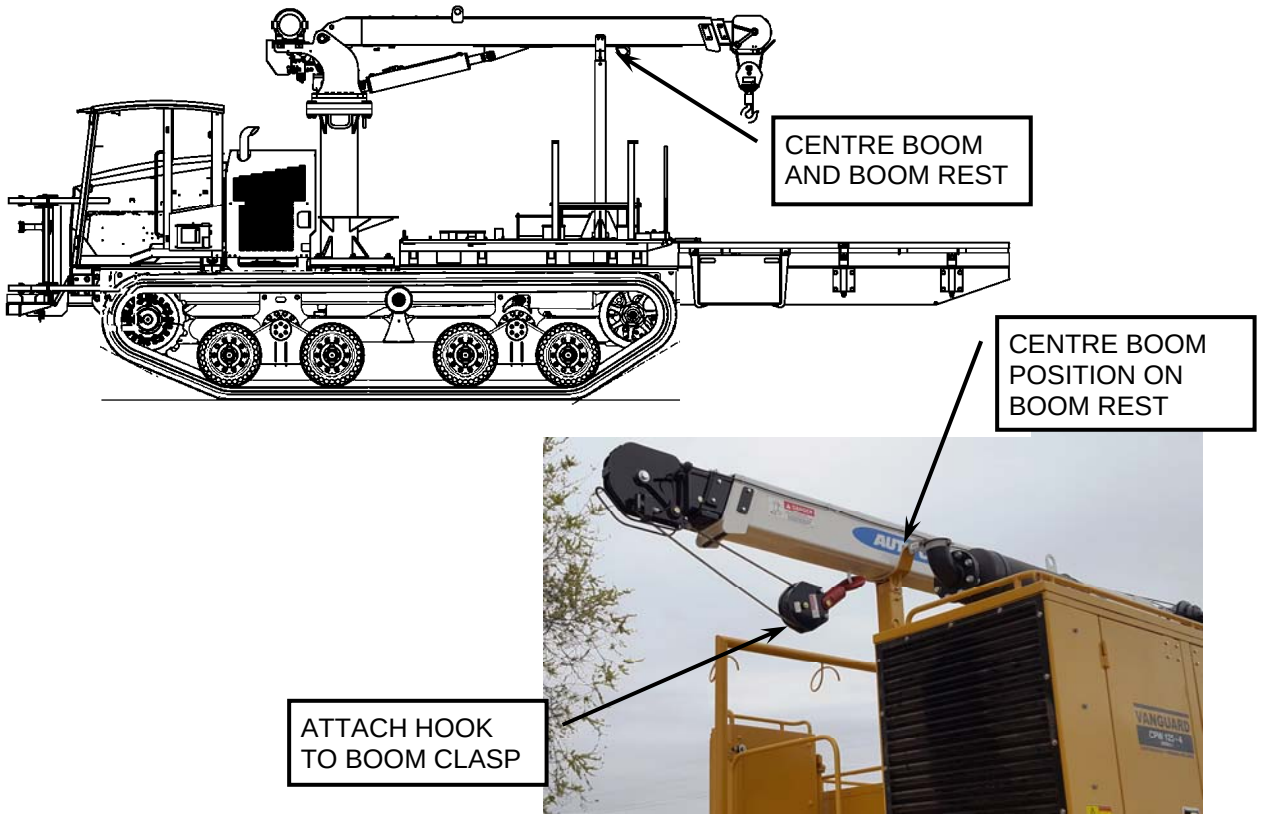


Figure 15: T12 Auto Tie-in Crane configured for transport.

1. Rotate the Auto Tie-in Crane rearward over the carrier vehicle, so that the boom is centred on the boom rest.
2. Slowly lower the Auto Tie-in Crane boom until it contacts the boom rest. Note, when the crane is stowed in the rest the green and yellow lights will flash on the boom. This is normal

T12 Shack Deck configure for transport

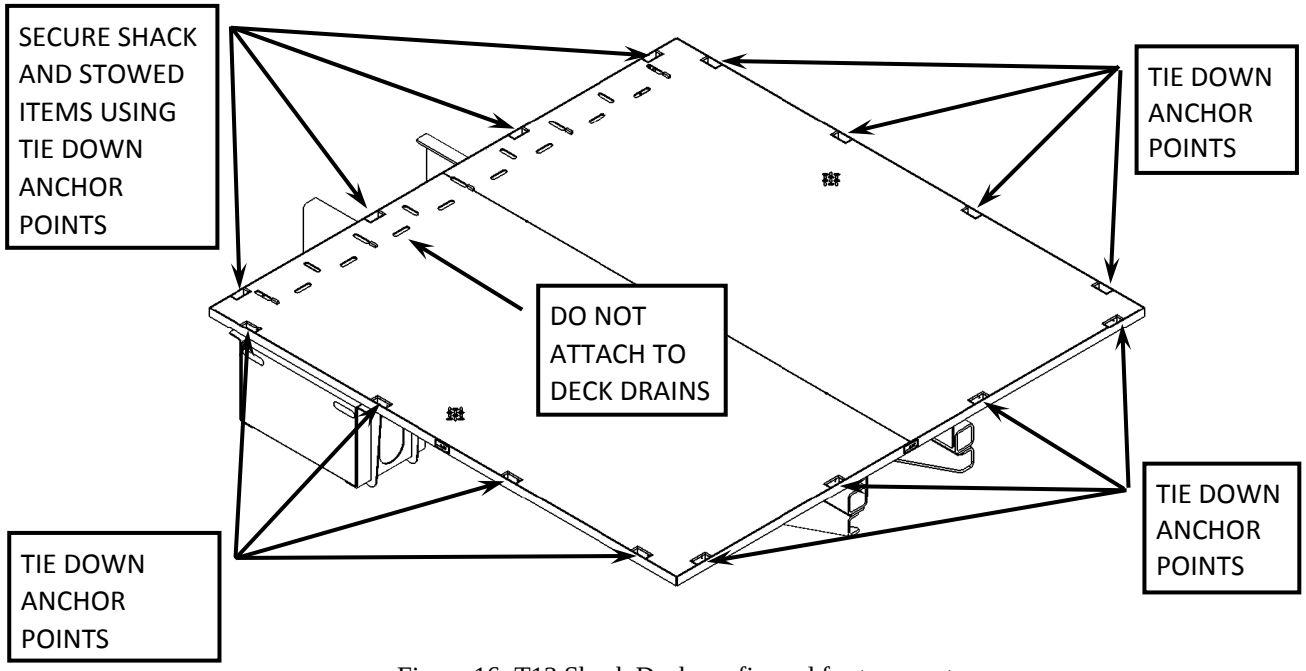


Figure 16: T12 Shack Deck configured for transport.

1. Ensure tie-down straps are of adequate strength to secure all of the items on the shack deck.
    a. Inspect the straps for nicks, cuts, and wear.
2. Secure the shack and any stowed items using the tie down anchor points.

Towing the Carrier

Note: DO NOT connect to any part of the Auto Tie-in Crane or its mounting base for towing purposes of any kind.

Refer to the carrier vehicle's *Operation and Maintenance Manual* for correct towing procedures.

Maintenance and Lubrication Section

Lubricant Viscosities

General

- Follow Carrier Vehicle manufacture's maintenance and lubrication instructions for vehicle service as required.

Refer to the maintenance and lubrication instructions in the Crane manufacture's Owner's manual in Appendix 1 of this manual.

Maintenance Interval Schedule (MIS)

Ensure that all safety information, warnings, and instructions are read and understood before any operation or any maintenance procedures are performed. The user is responsible for the performance of maintenance, including all adjustments, the use of proper lubricants, fluids, filters, and the replacement of components due to normal wear and aging. Failure to adhere to proper maintenance intervals and procedures may result in diminished performance of the product and/or accelerated wear of components. Use mileage, fuel consumption, service hours, or calendar time, WHICH EVER OCCURS FIRST, in order to determine the maintenance intervals. Products that operate in severe operating conditions may require more frequent maintenance.

Service Intervals

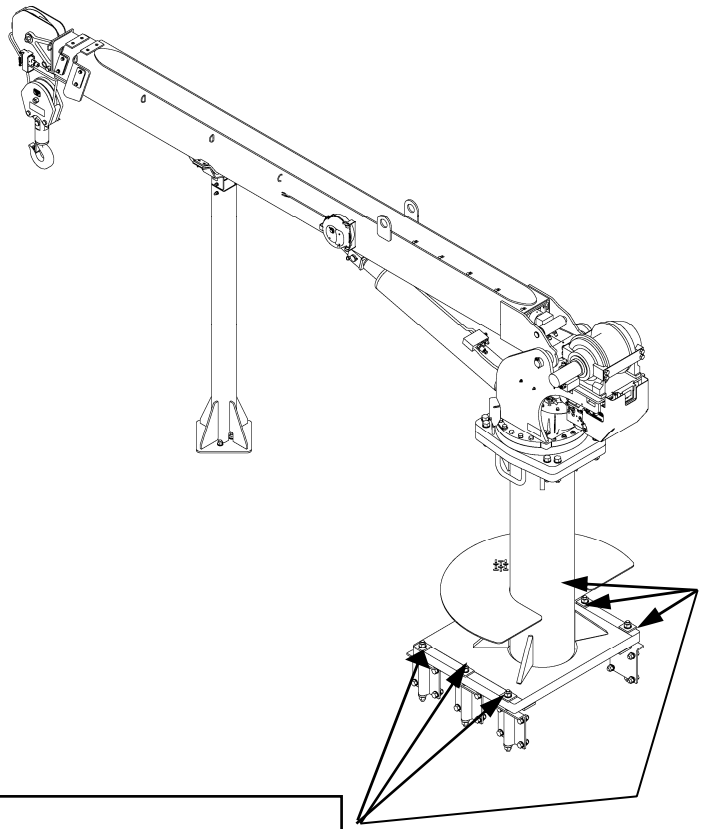
Note: Before each consecutive interval is performed, all maintenance from the previous interval must be performed. Perform the following servicing at EVERY interval they occur; for example, the 10-hour and 50-hour service are also performed at the 200-hour interval, etc.

Break-in Period

Auto Tie-in Crane Base Mounting Studs

To compensate for possible settling, it is necessary to retighten the crane base mounting studs to the prescribed torque. This shall be done after no more than 100 hours of operation and without external load applied to the stud connection. In case of loose studs, replace all studs and washers with new ones. Refer to Figure 17 for inspection torque.

Auto Tie-in Crane Inspection Torque

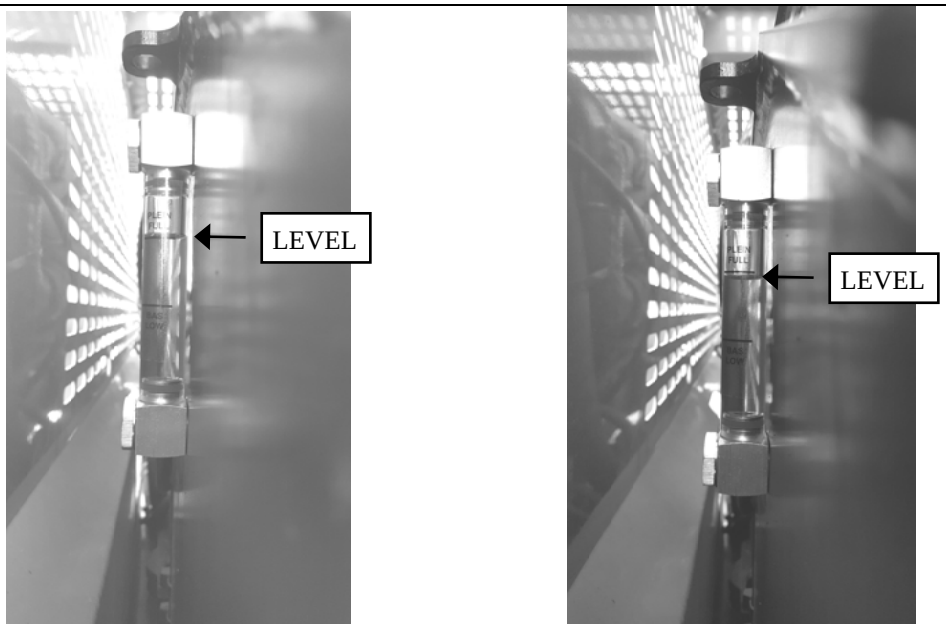


STUD TORQUE:
STATIC INSPECTION TORQUE=540 Nm (400 Lb-ft)

Figure 17: Auto Tie-in Crane Base Inspection Torque

Every 10 Service Hours or Daily

- Controls for proper operation of Auto Tie-in Crane – Check
- Hydraulic Hoses and fittings for leaks – Check
- Electrical cables for signs of damage to insulation - Check, replace if damaged
- Carrier Vehicle Hydraulic System Oil Level – Check
  - **Panther T12 Carrier**:
    - Check that the hydraulic oil level is at the "full mark" with the boom fully lowered and fully retracted. Hydraulic oil level will be slightly (~3mm) below "full" with the boom retracted on the boom rest.



Boom Fully Lowered & Retracted

Boom Retracted & On Rest

Figure 18: Panther T12 Auto Tie-in Crane Sight Glass

Auto Tie-in Crane Lubrication & Maintenance Schedule

SERVICE PERFORMED	INSTRUCTIONS	DAILY	WEEKLY	3 MONTHS	6 MONTHS	YEARLY
Load Hook	Inspect hook and latch for deformation, cracks, and corrosion.	X				
Cable Drum	Ensure cable is wound evenly on drum.	X				
Hoist/Boom Cable	Check for flattening, kinks, broken strands.	X				
Hyd. Hoses	Visual inspection.	X				
Hyd Fluid	Check fluid level.	X				
Pin Retaining Bolts	Check torque to 23 ft lbs(Grade 5) 35 ft-lbs (Grade 8) as required	X				
Mounting Bolts	Check torque to 501 ft-lbs as required		X			
Rotating Ring Gear	Lube with MobileTac LL or Lubriplate P/N 15263, or equivalent		X			
Sheave Bearings	Sealed bearing, replace if rough or loose		X			
All Other Bolts	Check and tighten as required		X			
Lift Cylinder Bearings	Grease with MobilePlex EP-2 or equivalent at zerk fittings			X		
Rotation Bearing	Grease with MobilePlex EP-2 or equivalent at zerk fittings			X		
Rotation Bearing Bolts	Check torque to 170 ft-lbs (hex head) 180 ft-lbs (socket head) as required			X		
Rotation Gear Box	Check torque to 90 ft-lbs (socket head) and 55 ft-lbs (hex head) as required			X		
Rotation Gear Box	EP gear lube, SAE 80-90				X	
Hydraulic Fluid	Drain, flush, and refill with Mobile DTE 13 oil					X
Boom Slide Pads	Pads greased when replaced.					
Filter, Valve Block	Replace annually or every 200 hours of operation as directed by the dirty filter sensor.					
For additional information, see OSHA 1910.180 and ASME B30.5a.						

Figure 19: Auto Tie-in Crane Lubrication & Maintenance Schedule

Every 500 Service Hours or 6 months Service

Check the torque on the crane base mounting threaded studs, see Figure 17 for inspection torque. See the *Break-in Period* section.

Every 1000 Service Hours or Yearly Service

Check carrier frame below crane base for cracks or damage to the vehicle structure. If any damage noted contact the vehicle manufacturer or dealer

Refer to the carrier vehicle's Operators Manual.

Refer to the maintenance and lubrication instructions in the Crane manufacture's Owner's manual in Appendix 1 of this manual for all other crane related maintenance.

Bleeding air from the crane hydraulic system

To purge the air from the boom extension cylinders, lower the boom lift cylinder and cycle the boom extension cylinders in and out. When the boom extension cylinders are purged cycle the boom lift cylinders raising and lowering the boom to purge the remaining air from the system. Purging is complete when the system runs smoothly without unusual noise.

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Appendices: Equipment Modules' Operation and Maintenance Manuals

1. Crane Owner's Manual
2. Panther T12 Specific Warning Decals

Appendix 1) — Crane Owner's Manual

The following pages are taken from information published by the original equipment manufacturer (OEM), and are subject to change without notice.

HC-12
NEXSTAR III
OWNERS MANUAL

Serial No. _____

Mailing Address:
P.O. Box 580697
Tulsa, OK 74158-0697

Physical Address:
4707 N. Mingo Rd.
Tulsa, OK 74117-5904

Phone: 1-800-777-2760
Fax: (918) 269-6688
http://www.autocrane.com

475000103-0816-A

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

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

Table of Contents

1.1 WARNINGS

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

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

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

NOTICE *Indicates information considered important, but not hazard-related.*

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

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

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

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

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

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

2.1 INTRODUCTION

NOTICE *Keep this manual with the crane at all times.*

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

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

Auto Crane has incorporated several safety features in the HC-12 crane for your protection.

For your convenience the overall dimensions of the HC-12 crane are included on the General Dimension Drawing. Rotation and turning radius are also listed on that drawing.

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

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

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

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

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

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

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

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

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

If you require additional information, please contact the Auto Crane Company at the following telephone number: 1-800-777-2760. The information contained in the manual is in effect at the time of this printing. Auto Crane Company reserves the right to update this material without notice or obligation.

3.1 GENERAL SPECIFICATIONS

DIMENSIONS

- Width: 27.0 in. (0.69 m)
- Height: 39.0 in. (0.99 m)
- Length: 15 ft. 9 in. (4.80 m), stored length.
- Weight: 3,040 lbs. (1379 kg)

CAPACITY

- 85,000 ft-lbs (11.75 ton-m)
- Ft-lbs = horizontal distance from centerline of rotation to free hanging weight (feet) x amount of weight (pounds).

REACH

- Second boom reach: 13 ft. to 22 ft. 2 in.
- Third boom reach: 22 ft. 2 in. to 30 ft..

CABLE

- 120 ft. (36.6 m) of 7/16 in. (11.1 mm) diameter aircraft quality cable. This cable has a single line breaking strength of 21,000 lbs. (9,525 kg).

CHASSIS AND MOUNTING REQUIREMENTS

- 33,000 lbs. (14,969 kg) GVWR minimum.
- 1,000,000 in-lbs. Resistive Bending Moment (RBM)
- 7/8", Grade 8-UNF Bolts. Tightened to 501 ft. lbs.
- 13-1/2" Mounting hole to run hydraulic and electrical lines to the crane from the body.

HYDRAULIC REQUIREMENTS

- 15 gpm flow @ 2,750 psi.
- Pressure and return hoses are not furnished with this crane. The installer must provide hoses and determine proper lengths at installation.
    - **RETURN LINE:** The Return Line from the crane to the reservoir (in compartment) must be **-10 SAE 100R2** or equivalent. The installer will determine the hose length. Return lines longer than 6 ft. must be **-12** in size. Hose end fittings are **-10JIC female swivel.**
    - **PRESSURE LINE:** The Pressure Line from the pump to the crane must be **-8SAE R100R2** or equivalent. The installer will determine the hose length. Hose end fittings are **-8JIC female swivel**.

ELECTRICAL SYSTEM REQUIREMENTS

- Voltage: 12 VDC
- Alternator: 60 amps minimum
- Battery: 100 minute reserve capacity minimum. Maintenance Type battery

ROTATION

- 370° rotation with electric stop

3.2 HC-12 NEXSTAR III, GENERAL DIMENSIONS

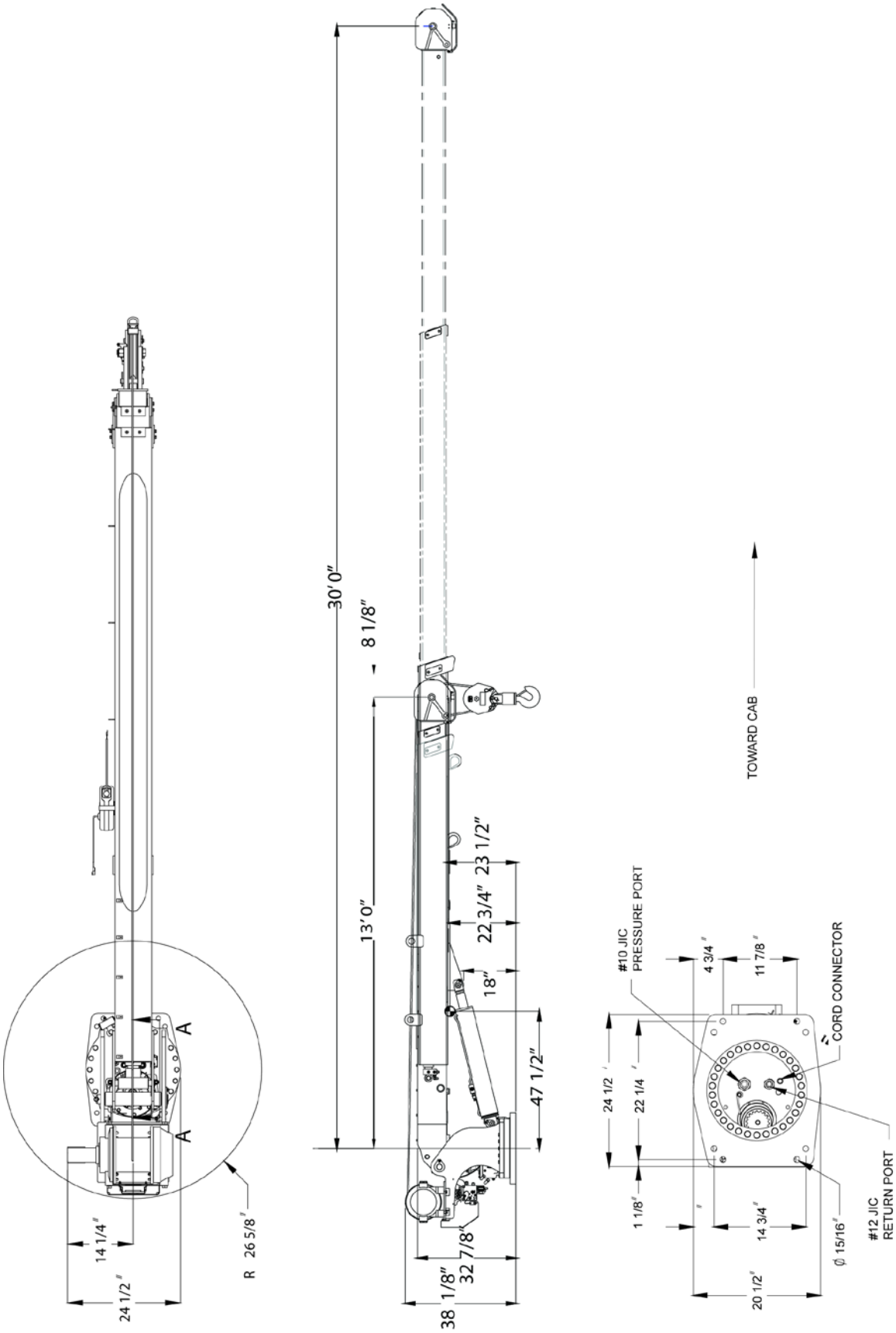


Figure 1. General Dimensions

3.3 LOAD CHART

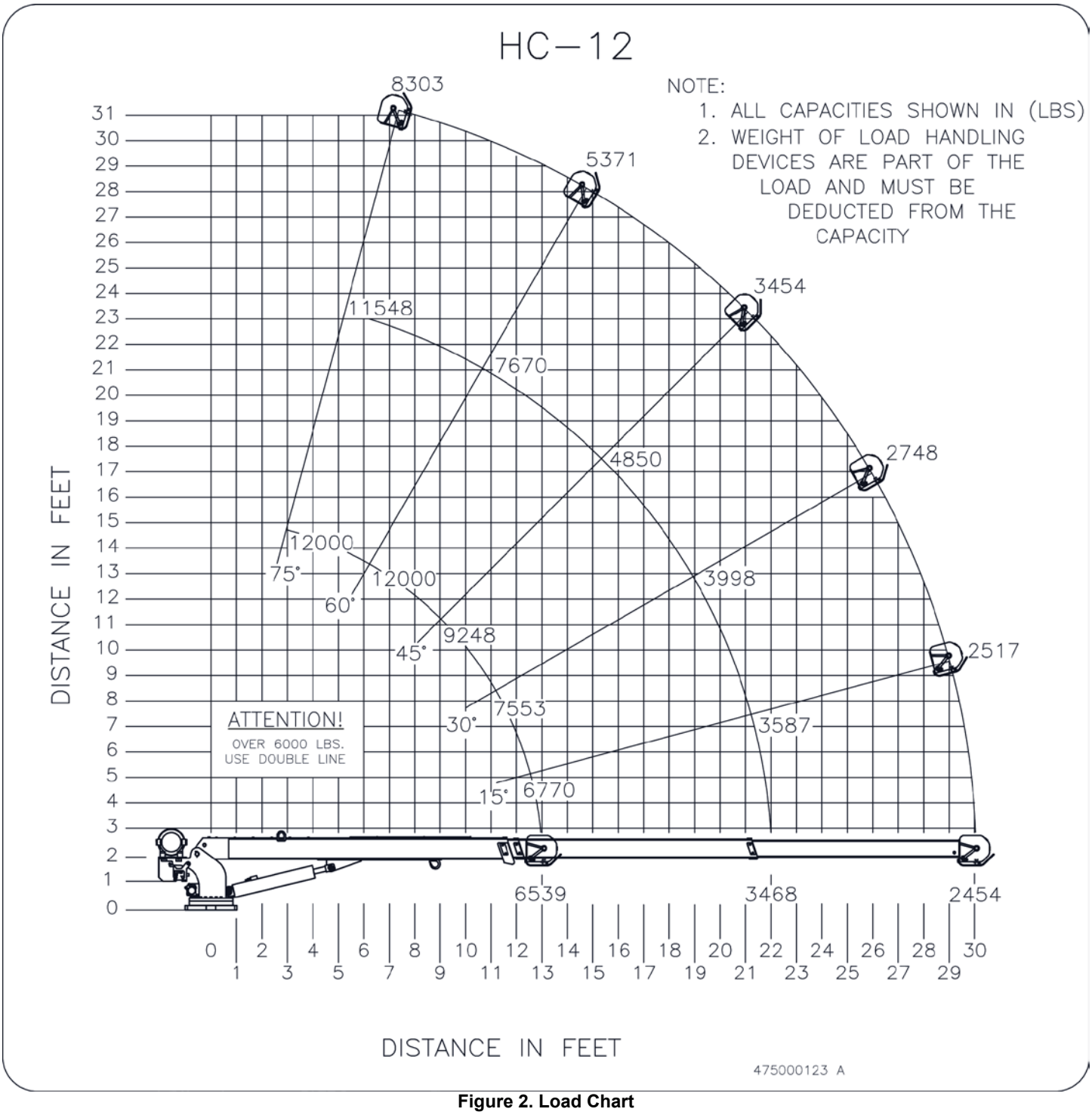
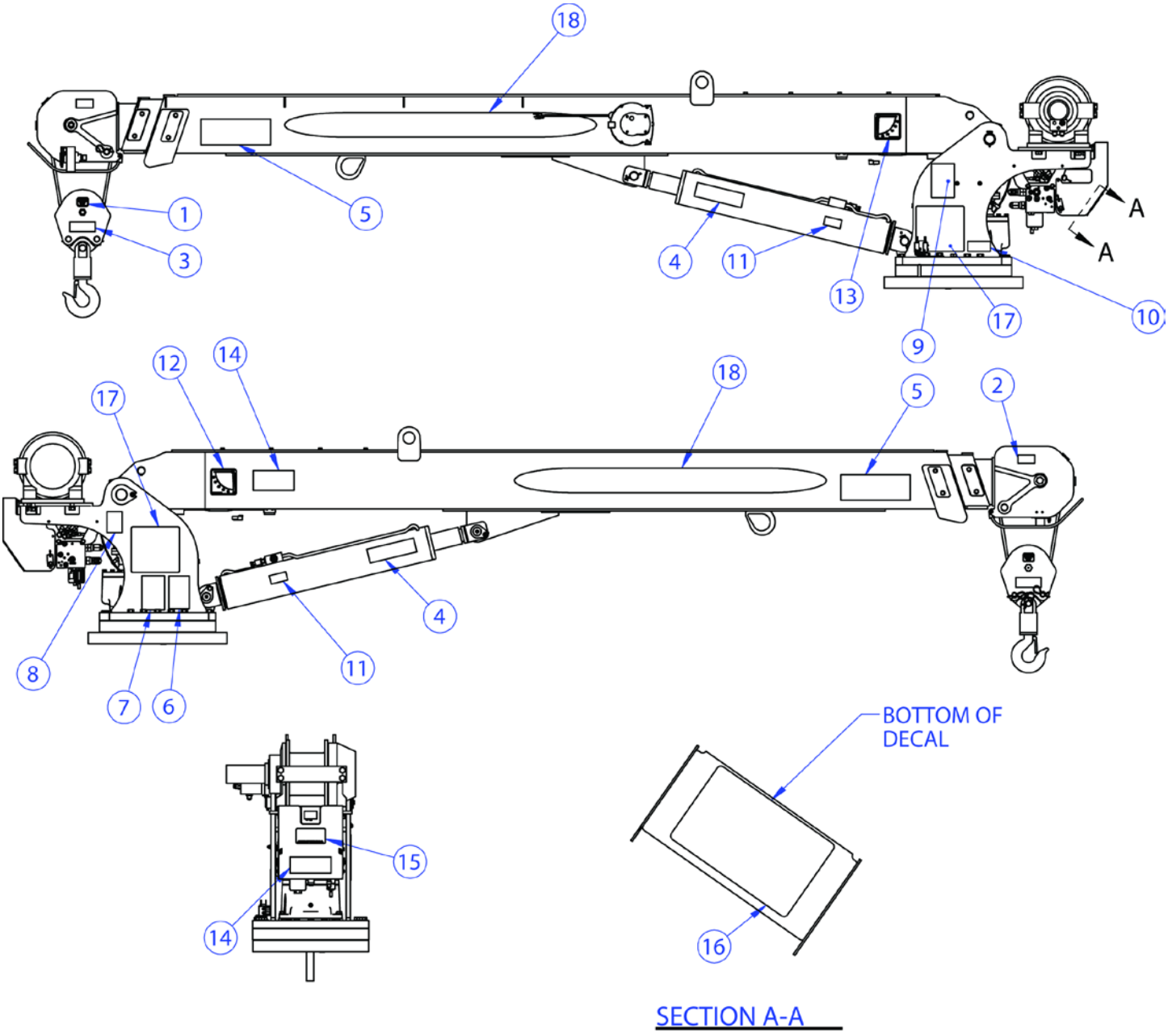


Figure 2. Load Chart

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

WARNING *Always comply with load chart capacities.*

3.4 HC-12 NEXSTAR III DECAL LAYOUT, P/N 475000202



4.1 QUALIFICATIONS AND OPERATING PRACTICES

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

4.2 OPERATORS

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

4.3 QUALIFICATIONS FOR OPERATORS

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

4.4 CONDUCT OF OPERATORS

1. The operator shall not engage in any practice, which will divert his attention while actually operating the crane.
2. Each operator shall be responsible for those operations under the operator's direct control. Whenever there is any doubt as to safety, the operator shall consult with the supervisor before handling the loads.
3. The operator should not leave a suspended load unattended unless specific precautions have been instituted and are in place.
4. If there is a warning sign on the switch or engine starting controls, the operator shall not close the switch or start the engine until the warning sign has been removed by the appointed person.

5. Before closing the switch or starting the engine, the operator shall see that all controls are in the “OFF” or neutral position and all personnel are in the clear.
6. If power fails during operation, the operator shall:
    A. Move power controls to the “OFF” or neutral position.
    B. Land the suspended load and boom, if practical.
7. The operator shall be familiar with the equipment and its proper care. If adjustments or repairs are necessary, the operator shall report the same promptly to the appointed per-son, and shall also notify the next operator.
8. The operator at the start of each shift shall test all controls. If any controls do not operate properly, they shall be adjusted or repaired before operations are begun.
9. Stabilizers shall be visible to the operator while extending or setting unless a signal person assists operator.

4.5 OPERATING PRACTICES/HANDLING THE LOAD

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

1. Size of load.
    A. No crane shall be loaded beyond the rated load except for test purposes
    B. The load to be lifted is to be within the rated load of the crane and its existing configuration.
    C. Know the weight of the rigging and deduct from the load rating to prevent overloading the crane.
    D. When loads that are not accurately known are to be lifted, the person responsible for the job shall determine the weight of the load does not exceed the crane rated load at the radius at which the load is to be lifted.
2. Attaching the load.
    A. Ensure the load is properly attached to the hook by means of slings or other devices of sufficient capacity.
    B. Ensure the vehicle is in a level position when loading or unloading.
    C. Hoist rope shall not be wrapped around the load.
3. The operator shall determine that:
    A. The crane is level and, where necessary, the vehicle/carrier is blocked properly.
    B. The load is well secured and balanced in the sling or lifting device before it is lifted more than a few inches.
    C. Means are provided to hold the vehicle stationary while operating the crane.
    D. Before starting to lift, the hook shall be positioned over the load in such a manner as to minimize swinging.
4. During lifting care shall be taken that:
    A. There is no sudden acceleration or deceleration of the moving load.
    B. When rotating the crane, sudden starts and stops shall be avoided. Rotational speed shall be such that the load does not swing out beyond the radius at which it can be controlled.
    C. Load, boom or other parts of the crane do not contact any obstruction.
    D. Cranes shall not be used for dragging loads sideways.
    E. This standard recognizes that telescopic boom cranes are designed and intended for handling materials. They do not meet personnel lift or elevator requirements. Therefore, no lifting, lowering, swinging or traveling shall be done while a person is on the hook or load. Hook attached suspended work platforms (baskets) shall not be used with cranes covered by this standard.
    F. The operator should avoid carrying loads over people.
5. When the crane is so equipped, the stabilizers shall be fully extended and set. Blocking under stabilizers shall meet the requirements as follows:
    A. Strong enough to prevent crushing.
    B. Of such thickness, width and length as to completely support the stabilizer pad.
    C. Firm footing under all tires, or individual stabilizer pads should be level. Where such a footing is not otherwise supplied, timbers, cribbing, or other structural members to distribute the load so as to not exceed allowable bearing capacity or the underlying material should provide it.
6. In transit, the boom shall be carried in stowed position.
7. The crane shall not be transported with a load on the hook.

4.6 OPERATING NEAR ELECTRICAL POWER LINES

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

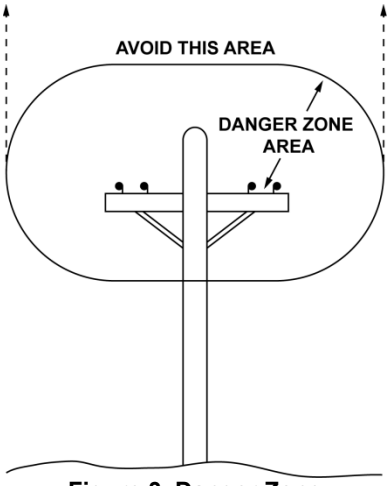


Figure 3. Danger Zone

1. Do not place any part of the crane or load inside the Danger Zone.
   EXCEPTIONS:
   A. The Danger Zone may be entered after confirmation by an appointed person the electrical distribution and transmission lines are de-energized and visibly grounded at the point work.
   B. The Danger Zone may be entered if insulating barriers are erected to prevent physical contact with the lines. These can't be a part of or attached to the crane.
2. For the minimum safe distance between electrical lines and any part of the crane or load (including handling appendages), or while in the transit with the boom stowed, see Table 1. Safe Operating Distance.

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

Table 1. Safe Operating Distance

3. Exercise caution when working near overhead lines. They can move horizontally and vertically due to wind, shifting the location of the Danger Zone.
4. Assign a qualified, signal person observe the clearance and warn the crane operator before approaching the Safe Operating Distance limits.
   a. Treat all overhead wires as energized until the person or utility owning the line verifies it is not energized.

b. Exceptions ensuring equivalent protection are allowed, if approved by the administrative or regulatory authority in writing.
c. Install durable signs at the operator's station and on the outside of the crane, warning that electrocution or serious bodily injury may occur if the Table 1. Safe Operating Distance limits aren't adhered to.

4.7 PREPARING THE CRANE FOR OPERATION

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

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

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

DURING OPERATION

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

AFTER OPERATION

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

5.1 NEXSTAR III OPERATION

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

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

Never drive with a load suspended from the crane.

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

5.2 GENERAL

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

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

5.2.1 REMOTE CONTROL UNIT

Never mechanically block the switches ON or OFF. When not in use, turn the Remote Control OFF. Always store the Remote Control in a secure space when not in use. Store spare Remote Controls in a secure space and only remove after the current Remote Control has been turned OFF, taken out of the service area, and secured.

Before disposing of batteries, consult local and governmental regulatory requirements for instructions on proper disposal.

5.2.2 REMOTE CONTROL INITIALIZATION

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

After a successful self-test, the Nexstar III remote control will enter the Normal Operating Mode. See 5.4 DISPLAY SCREEN LAYOUT.

5.2.3 PRE-OPERATION TEST

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

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

5.3 REMOTE CONTROL LAYOUT

Figure 4. Nexstar III Remote Control

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

5.4 DISPLAY SCREEN LAYOUT

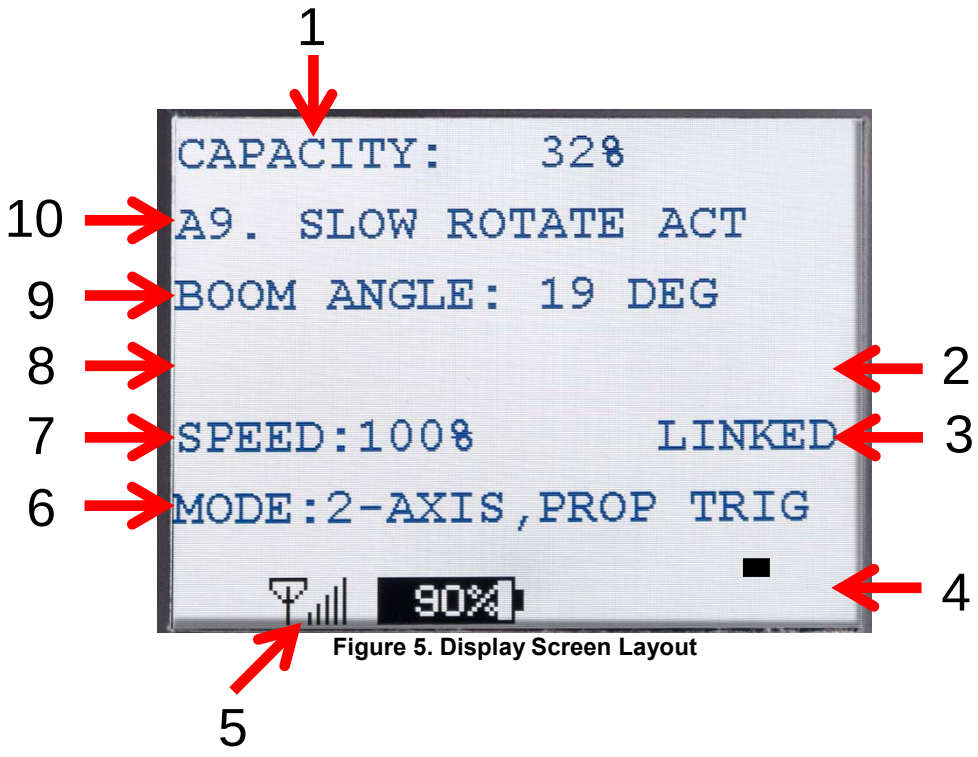


Figure 5. Display Screen Layout

1. **Capacity –** The current load on the boom as a percentage of total capacity. The unloaded value of the boom may be higher than 0% due to the boom weight beyond the retracted position.
2. **Aux –** AUX will display on the screen when active.
3. **Communication Status –** LINKED will display when the remote control is communicating with the crane.
4. **Watchdog Timer –** The black dot should always be moving in a diagonal. If the timer stops, contact your Auto Crane representative.
5. **Signal Strength and Battery Life –** Displays the signal strength coming from the crane. The approximate range is 300 ft. The battery displays the percent remote control battery life remaining.
6. **Mode –** Displays the current mode selected. See 5.5 SPEED AND MODE SELECTION for details.
7. **Max Speed Setting –** Displays the current max speed setting. See 5.5 SPEED AND MODE SELECTION for details.
8. **High Idle –** HIGH IDLE will display when activated.
9. **Boom Angle –** Displays the current boom angle in degrees.
10. **Crane Status –** Displays the current status of the crane. Alarms will be displayed here.

5.5 SPEED AND MODE SELECTION

5.5.1 SPEED SELECTION

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

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

5.5.2 MODE SELECTION

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

5.5.3 MODE DESCRIPTION

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

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

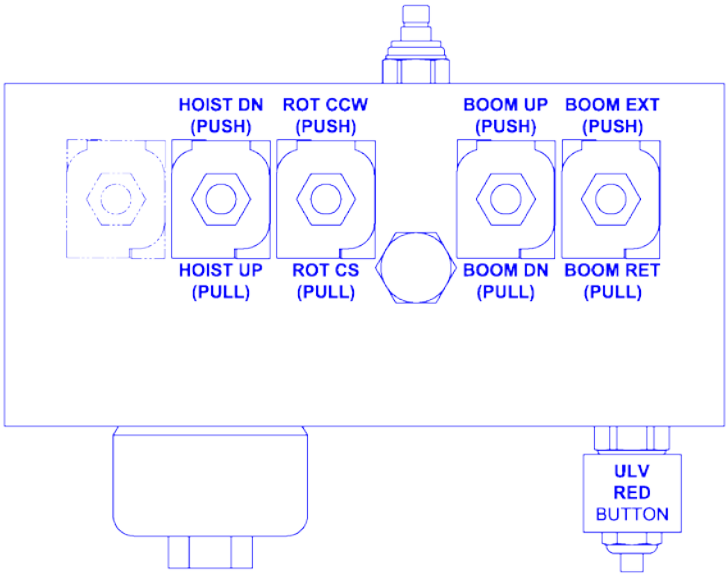
1 AXIS, TRIGGER PROP – Allows only one function to operate on each joystick. The joysticks are on-off and only need to be moved in the direction of the desired function. The speed control is located in the trigger. The more the trigger is pulled, the faster the function will operate.

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

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

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

5.6 OPERATION – VALVE OVERRIDE



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

6.1 NEXSTAR III TROUBLESHOOTING

6.1.1 TROUBLESHOOTING FLOW CHART

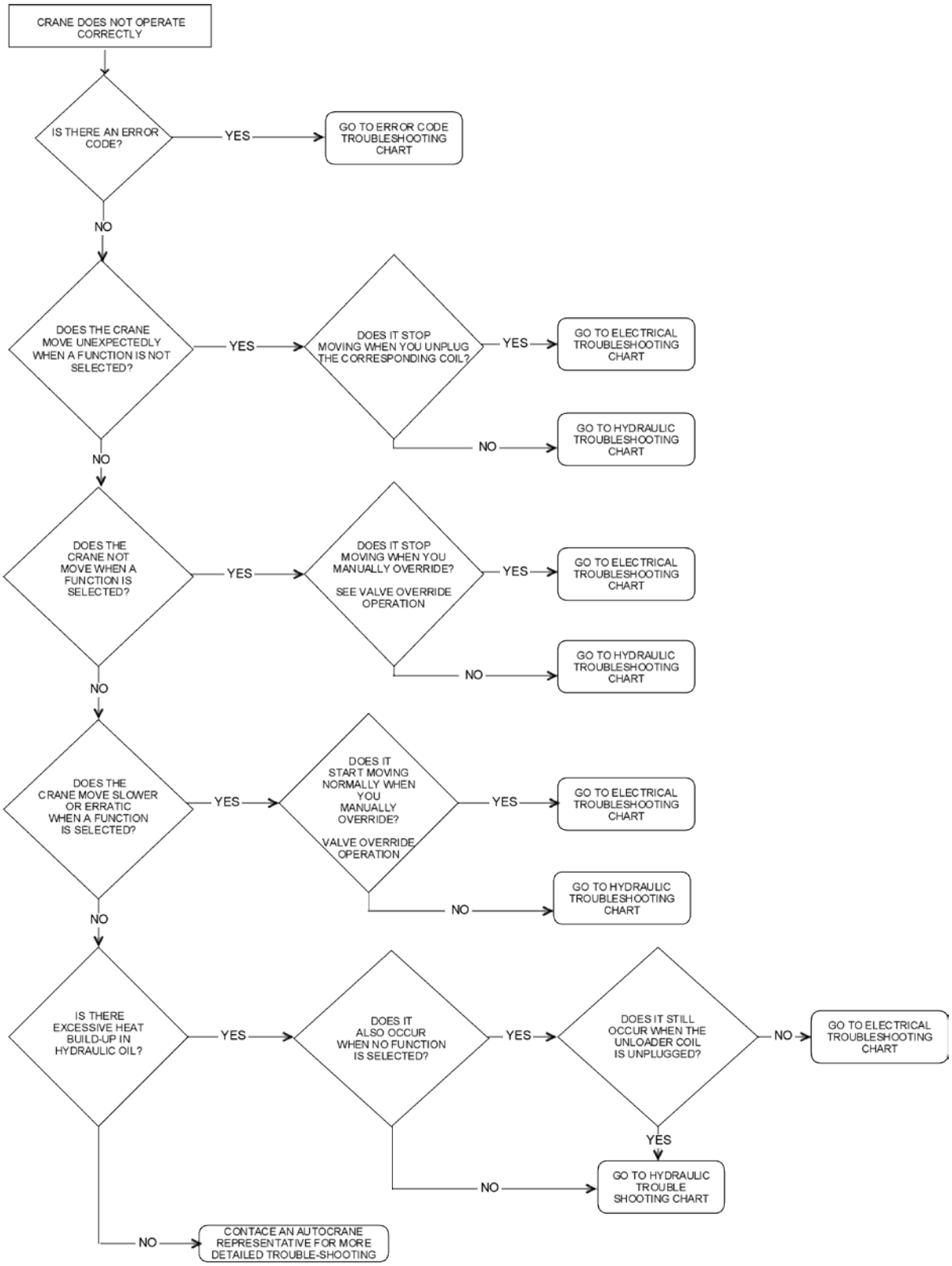


Table 2. Troubleshooting Flow Chart

6.1.2 NEXSTAR III REMOTE CONTROL TROUBLESHOOTING TABLE

Problem	Possible Reason	Action
Remote control will not turn on	Remote control Emergency Stop Switch is down or pressed.	Ensure the E-Stop switch is pulled up.
	Batteries are dead or installed backwards; battery holder is damaged.	Replace the battery pack with the label facing out. This ensures it is installed properly. Inspect all battery pack contents for damage.
	Remote control momentarily powers-up and displays an error code prior to turning-off.	Ensure all switches, buttons, and joysticks are in the off position.
Remote control will not respond with the receiver	Incorrect system RF channel.	Ensure the remote control and the receiver are set to the same RF channel.
	Incorrect system access code.	Ensure the remote control and the receiver have the same access code.
	System out of range.	Ensure the startup procedure is initiated within 300 ft. from the receiver. Ensure the signal strength indicator level is greater than 0%.
Remote control will not turn on in tether mode	The connecting tether cable is not installed, installed improperly, or is damaged.	Ensure the tether cable is installed and secured correctly. Inspect the tether cable and connectors for damage.
	Remote control is failing switch scan.	Ensure all switches, buttons, and joysticks are in the off position.
	Remote control emergency stop switch is pressed down.	Ensure the E-Stop switch is pulled up.
Remote control will not respond with receiver in tether mode	System not in tether mode.	Ensure the startup procedure is initiated with the tether cable attached.
	The tether cable or connectors are damaged.	Inspect the tether cable and connectors for damage.
Remote control will not respond with the receiver in wireless mode	System not in wireless mode.	Ensure the startup procedure is initiated within 300 ft. from the receiver. Ensure the signal strength indicator level is greater 0%.

Table 3. Remote ControlTroubleshooting Table

6.1.3 NEXSTAR III ERROR CODE TABLE

Error Code	Cause	Effect	Solution
S1 CAN RX TO	Reception of a can message timed out	All outputs will be disabled	Determine why messages are not being received. When problem is corrected the alarm will clear
S2 TEMP OUT OF RANGE	Outside of operating temperature - -40° c to 85° c	All outputs will be disabled	Get temperature into acceptable range and alarm will clear after 1 minute
S16-S31 OUT X OVER-CURRENT ERR	When the output was activated, a current of more than 3.5a was being drawn.	That output will be disabled	Cycle power to receiver. If problem continues. Find what caused the overcurrent draw and cycle power.
S32-S47 OUT X +VB SHORT	When the output was supposed to be a ground, it had a positive voltage.	That output will be disabled	Determine the cause of the short. Fix the cause and cycle power to the receiver
S32-S47 OUT X – VB SHORT	When the output was supposed to be a positive voltage, it had a ground.	That output will be disabled	Determine the cause of the short. Fix the cause and cycle power to the receiver
A1 BOOM PSI LOW	Lift cylinder pressure below 50 psi	Disables all functions except boom up and hoist down	Hoist down load if applicalble. Raise boom off any supports. Alarm will clear once pressure in cylinder is restored.
A2 CW LIMIT	Crane has reached the limit of rotation in the cw direction	Disables clockwise rotation	Rotate ccw to clear the error. Once the switch is deactivated the alarm will clear.
A3. CCW LIMIT	Crane has reached the limit of rotation in the ccw diretion	Disables counterclockwise rotation	Rotate cw to clear the error. Once the switch is deactivated the alarm will clear.
A4. TRK TILT WARN	Truck angle exceeds 5.7 degrees or 10% slope	All functions will only operate at 50% of speed	Move vehicle to level ground
A5 TRK TILT ALARM	Truck angle exceeds 8.5 degrees or 15% slope	Ll functions are disabled	Move vehicle to level ground
A6. ANTI 2-BLOCK	Anti 2-block is activated. The boom has contacted the traveling block.	Disables boom down, extend, and hoist up	Move load away from the boom by either retracting, hoisting down, or booming up. If there is no load near the tip of the boom check function of the bail weldment, it must come into contact with the switch plunger under normal conditions
A7 90% LOAD WARN	Reached 90% of rated capacity	All functions will only operate at 50% of speed	Reduce load to clear the alarm
A8. 100% LOAD ALARM	Reached 100% of rated capacity	Disables boom down, extend, and hoist up	Reduce the load by retracting the boom, lowering the boo, or raising the boom.
A9 SLOW ROTATE AC	Lift cylinder has exceeded 600 psi	Reduces rotation speed by 50%	This is a safety feature that prevents excessive swinging of heavy loads. It will reset when the load decreases and function is deactivated.
A10. BOM SENSOR ERR	Boom angle sensor signal failed	All functions will only operate at 50% of speed	Check connections to boom angle sensor. Verify lights are on at sensor base.
A11 BOOM ANGLE RANGE	Angle sensor is out of range	Operates normally	Boom angle sensor is mounted incorrectly. Check the mounting. The arrow should be facing the tip of the crane.
A12 BOOM PT ERR	Boom pressure transducer error	All functions are disabled except boom down and hoist down	Check connections to pressure transducer located on the lift cylinder. Check the wiring harness for damage
A13 DIRTY FILTER	Filter is dirty if temperature of oil is at least 100°	Operates normally	Replace filter. Part number is 366823910

Table 4. Error Code Table

6.1.4 NEXSTAR III MECHANICAL TROUBLESHOOTING TABLE

Problem	Cause	Effect	Solution
CRANE MOVES UNEXPECTEDLY	Jammed cartridge	Try to manually override the valve. If unable to move stem, cartridge is jammed.	Replace the cartridge
	Counter-balance set too low (boom up and boom down)	Adjust the counter-balance out to see if movement stops.	Contact Auto Crane for proper setting of counter-balance. Counter-balance valve may need to be replaced.
	Contaminant in cartridge	Valve sticks in certain positions	See cartridge maintenance for cleaning procedure
NO FUNCTION OPERATES ON THE CRANE	PTO not engaged	Check PTO activation light, usually located in the cab	Engage PTO
	Crane diverter valve not engaged	Is using Auto Crane outriggers, check the crane diverter valve located at the outrigger valve	Engage crane diverter valve
	Hydraulic tank is low or empty	Inspect the hydraulic oil level in the tank	Fill tank to proper level
	Vehicle is not running	Verify engine is running	Start the vehicle
ALL FUNCTIONS OPERATE SLOWLY	Fast idle not activated	If vehicle is manual transmission, verify fast idle is shown in the LCD screen	Activate fast idle
	Filter clogged	Check LCD screen	Replace filter
EXCESSIVE HEAT DURING OPERATION	Operation time	Crane operation is generally designed for intermittent duty. 2 hours before oil gets hot	Reduce use of crane, increase hydraulic tank size, or add oil cooler
	Unloader valve overridden	Check the unloader valve and verify the manual override is not activated ref. Page.	Deactivate unloader valve
	Undersized hydraulic tank	Hydraulic tank should be at least 2 x gpm = gallons. This includes any other accessories that operate from the same tank	This is a general rule. Many factors affect heat: ambient temperature pressure loss, operation time. For example, a smaller tank could be used with more intermittent use or in cold environments
CRANE MOVES UNEXPECTEDLY	Jammed cartridge	Try to manually override the valve. If unable to move stem, cartridge is jammed.	Replace the cartridge
	Counter-balance set too low (boom up and boom down)	Adjust the counter-balance out to see if movement stops.	Contact autocrane for proper setting of counter-balance. Counter-balance valve may need to be replaced.
	Contaminant in cartridge	Valve sticks in certain positions	See cartridge maintenance for cleaning procedure
NO FUNCTION OPERATES ON THE CRANE	PTO not engaged	Check PTO activation light, usually located in the cab	Engage PTO
	Crane diverter valve not engaged	Is using Auto Crane outriggers, check the crane diverter valve located at the outrigger valve	Engage crane diverter valve
	Hydraulic tank is low or empty	Inspect the hydraulic oil level in the tank	Fill tank to proper level

Table 5. Mechanical Troubleshooting Table

6.1.5 NEXSTAR III ELECTRICAL TROUBLESHOOTING TABLE

Problem	Cause	Effect	Solution
CRANE MOVES UNEXPECTEDLY	Jammed transmitter button	Activate e-stop to see if movement stops	Verify that nothing had depressed the button at the time of movement. If it was not depressed, replace the transmitter
	Short in wiring harness	Unexpected movement would only occur when multi-functioning. Unplug the coil to see if movement stops. Check amperage to coil using multimeter in line with coil. It should be no more than 100ma	Verify there is no damage to the wiring harness. Verify the connectors are free of debris and water
	Receiver locked up	Bottom right corner is a circle with an arrow. This should be rotating at all times when the crane is turned on	If the arrow stops rotating, shut power off to the crane for two minutes before turning the power back on. If the problem persists, contact technical support.
NO FUNCTION OPERATES ON THE CRANE	Transmitter turned off	Screen on transmitter is off	Turn on transmitter. Pull e-stop button out.
	E-stop active	Check LCD screen. Error stating e-stop is active displays on screen.	Pull e-stop button out.
	Receiver turned off	Check the LCD screen, if it is blank, the receiver is turned off.	Most cranes have a toggle switch to turn on the crane. This is usually located in the cab or crane box.
	Low battery	While the transmitter is turned on, the battery indicator on the LCD screen should be at least 10%.	Replace transmitter batteries. It requires 4 aa batteries.
	Receiver locked up	Bottom right corner is a circle with an arrow. This should be rotating at all times when the crane is turned on.	If the arrow stops rotating, shut power off to the crane for two minutes before turning the power back on. If the problem persists, contact technical support.
	Truck tlt alarm active	Check the LCD screen for the error code "trk tlt alarm"	This error occurs when the truck angle exceeds a 15% slope (8.5°). Relocate the truck to a flatter surface.
BOOM DOWN, EXTEND, HOIST UP ARE INOPERABLE.	Anti-two block	Check screen for error code. It will display "anti 2 block error."	Verify the traveling block is not contacting the bail. If hoist down and check function again. Inspect end of boom to verify bail is in contact with anti-2 block switch. Check bail spring. Check cord reel and wire on side of crane for damage.
	Crane overload	Check screen for error code. It will display 100% overload.	Verify load on crane does not exceed moment rating. Reference load chart. Tap hoist down or retract function to reset overload, check operation again.
EXTEND, RETRACT, HOIST UP, BOOM UP, ROTATE CW, ROTATE CCW ARE INOPERABLE	Low boom pressure	Check screen for error code. It will display "boom psi low."	Verify boom is not supported by anything except the lift cylinder. This includes the boom support on the vehicle.

Problem	Cause	Effect	Solution
ROTATE CW IS INOPERABLE	Reached limit for cw rotation	Check screen for error code. It will display "CW limit"	Verify the CW limit switch is not activated. This should normally be closed.
	Bad coil or damaged wire	Screen will display 0% next to sp but the rotate CW function will be shown.	Switch coil with another function. Replaced coil if bad. Check wiring for any damage.
ROTATE CCW IS INOPERABLE	Reached limit for CCW rotation	Check screen for error code. It will display "CCW limit"	Verify the CCW limit switch is not activated. This should normally be closed.
	Bad coil or damaged wire	Screen will display 0% next to sp but the rotate CCW function will be shown.	Switch coil with another function. Replaced coil if bad. Check wiring for any damage.
ALL FUNCTIONS ARE INOPERABLE EXCEPT BOOM DOWN AND HOIST DOWN	Pressure transducer is unplugged	Check LCD screen. It will display "boom pt error"	Verify pressure transducer located on the lift cylinder valve block is plugged into the harness.
ANY PARTICULAR FUNCTION IS NOT OPERABLE.	Bad coil or wiring harness damage	Check LCD screen when the function is selected, it should show the function operating but at 0%	Switch coil with another function. Replace coil if bad. Check wiring harness for damage
CRANE ROTATES SLOWLY	Slow rotate activated	Check LCD screen, it will display "slow rotate act"	This is a safety feature to prevent getting the load into unsafe condition (excessive swinging). Slow rotate will remain active until the load is removed and the rotation function is deselected.
	Close to max crane load	When the truck is tilted and under high load, a decrease in speed is possible	Retract the boom to decrease the load
ALL FUNCTIONS OPERATE SLOWLY	Wrong speed setting is selected	Check the transmitter. There should be a green led directly below the current speed selected.	Adjust the speed to the preferred speed. See mode and speed selection.
	Boom angle sensor error	Check LCD screen for error code. It will display "boom sensor err"	Verify the boom sensor is plugged into the harness. Check connection between harness and sensor
	90% load activated	Crane is at or over 90% of its rated capacity	This is a safety feature to prevent getting into an unsafe condition (sudden movement of heavy load). 90% load will remain activated until load is decreased.
	Truck tilt warning	Crane is between a 10% and 15% slope. Check LCD screen for error code. It will display "trk tilt warn."	Move vehicle or raise outrigger to a more stable, level position.

Table 6. Electrical Troubleshooting Table

7.1 MAINTENANCE

7.1.1 INSPECTION REQUIREMENTS

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

WARNING *All inspections shall be performed by designated personnel only.*

7.1.2 INSPECTION CLASSIFICATION

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

7.1.3 FREQUENT INSPECTION

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

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

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

7.1.4 PERIODIC INSPECTION

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

1. Inspect for deformed, cracked or corroded members in the crane structure and entire boom.
2. Inspect for loose bolts, particularly mounting bolts.
3. Inspect for cracked or worn sheaves and drums.
4. Inspect for worn, cracked, or distorted parts such as pins, bearings, shafts, gears, rollers and devices.
5. Inspect for excessive wear on brakes and clutch system parts and linings.
6. Inspect crane hooks for cracks.
7. Inspect travel steering, braking, and locking devices for malfunction.
8. Inspect for excessively worn or damaged tires.
9. Inspect hydraulic hose, fittings, and tubing for the following problems:
    a. Evidence of leakage at the surface of the flexible hose or its junctions with the metal and coupling.
    b. Blistering, or abnormal deformation to the outer covering of the hydraulic or pneumatic hose.
    c. Leakage at threaded or clamped joints that cannot be eliminated by normal tightening or recommended procedures.
    d. Evidence of excessive abrasion or scrubbing on the outer surface of a hose, rigid tube, or fitting. Means shall be taken to eliminate the interference of elements in contact or otherwise protect the components.
10. Inspect hydraulic pumps and motors for the following problems:
    a. Loose bolts and fasteners.
    b. Leaks at joints between sections.
    c. Shaft seal leaks.
    d. Unusual noises or vibrations.
    e. Loss of operating speed.
    f. Excessive heating of fluid.
    g. Loss of pressure.
11. Inspect hydraulic valves for the following:
    a. Cracks in valve housing.
    b. Improper return of spool to neutral position.
    c. Leaks at spools or joints.
    d. Sticking spools.
    e. Failure of relief valves to attain or maintain correct pressure setting.
    f. Relief valve pressure shall be checked as specified by the manufacturers.
12. Inspect hydraulic cylinders for the following problems:
    a. Driving caused by fluid leaking across piston.
    b. Rod seals leaking.
    c. Leaks at welding joints.
    d. Scored, nicked, or dented cylinder rods.
    e. Damaged case (barrel).
    f. Loose or deformed rod eyes or connecting joints.
13. Inspect hydraulic filters for evidence of rubber particles on the filter elements indicating possible hose, O-ring, or other rubber component deterioration. Metal chips or pieces on the filter may denote failure in pumps, motors, or cylinders. Further inspection will be necessary to determine the origin of the problem before corrective action can be taken.
14. Inspect labels to confirm correct location and legibility. Reference decals layout in this manual for proper location of decals.
15. Rope inspections need not be at equal calendar intervals and should be more frequent as the rope approaches the end of useful life. A qualified person shall inspect the wire rope based on such factors as:
    a. Expected rope life as determined by experience on the particular installation or similar installations.
    b. Severity of environment.
    c. Percentage of capacity lifts.
    d. Frequency rates of operation.
    e. Exposure to shock loads.
        i. This inspection shall cover the entire length of the rope. Only the surface wires need to be inspected and no attempt should be made to open the rope. Any deterioration resulting in appreciable loss of original strength shall be noted and determination made as to whether use of the rope would constitute a hazard. A few notable deterioration points are listed below:
            1. Reduction of rope diameter below nominal diameter due to loss of core support.
            2. Internal or external corrosion.
            3. Wear of outside wires.
            4. Severely corroded, cracked, bent, worn, or improperly applied connections.

7.1.5 CRANES NOT IN REGULAR USE

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

7.1.6 INSPECTION RECORDS

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

7.2 TESTING REQUIREMENTS

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

WARNING *All testing shall be performed by designated personnel only.*

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

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

7.3 GENERAL REPAIRS AND MAINTENANCE

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

WARNING *All repairs and maintenance shall be performed by designated personnel only.*

Establish a preventative maintenance program based on this section. Obtain all replacement parts from your local authorized distributor.

7.3.1 MAINTENANCE PRECAUTIONS

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

7.3.2 ADJUSTMENTS AND REPAIRS

1. Any hazardous conditions disclosed by the inspection requirement shall be corrected before operation of crane is resumed.
2. Adjustments shall be maintained to assure correct of functioning of components, the following are examples:
    a. Function operating mechanism.
    b. Safety devices.
    c. Control systems.
3. Repairs or replacements shall be provided as needed for operation, the following are examples:
    a. Critical parts of functional operating mechanisms which are cracked, broken, corroded, bent, or excessively worn.
    b. Critical parts of the crane structure which are cracked, bent, broke, or excessively corroded.
    c. Crane hooks showing cracks, damage, or corrosion shall be taken out of service. Repairs by welding are recommended.
4. If bleeding the hydraulic system is required, run each crane function until smooth operation of that particular function is noticeable.

7.3.3 LUBRICATION

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

7.3.4 ROPE REPLACEMENT

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

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

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

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

7.3.5 ROPE INSTALLATION AND MAINTENANCE

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

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

7.3.6 PAINT FINISH MAINTENANCE

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

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

7.4 LUBRICATION AND MAINTENANCE SCHEDULE

SERVICE PERFORMED	INSTRUCTIONS	DAILY	WEEKLY	3 MONTHS	6 MONTHS	YEARLY
Load Hook	Inspect hook and latch for deformation, cracks, and corrosion.	X				
Cable Drum	Ensure cable is wound evenly on drum.	X				
Hoist/Boom Cable	Check for flattening, kinks, broken strands.	X				
Hyd. Hoses	Visual inspection.	X				
Hyd Fluid	Check fluid level.	X				
Pin Retaining Bolts	Check torque to 23 ft lbs(Grade 5) 35 ft-lbs (Grade 8) as required	X				
Mounting Bolts	Check torque to 501 ft-lbs as required		X			
Rotating Ring Gear	Lube with MobileTac LL or Lubriplate P/N 15263, or equivalent		X			
Sheave Bearings	Sealed bearing, replace if rough or loose		X			
All Other Bolts	Check and tighten as required		X			
Lift Cylinder Bearings	Grease with MobilePlex EP-2 or equivalent at zerk fittings			X		
Rotation Bearing	Grease with MobilePlex EP-2 or equivalent at zerk fittings			X		
Rotation Bearing Bolts	Check torque to 170 ft-lbs (hex head) 180 ft-lbs (socket head) as required			X		
Rotation Gear Box	Check torque to 90 ft-lbs (socket head) and 55 ft-lbs (hex head) as required			X		
Rotation Gear Box	EP gear lube, SAE 80-90				X	
Hydraulic Fluid	Drain, flush, and refill with Mobile DTE 13 oil					X
Boom Slide Pads	Pads greased when replaced.					
Filter, Valve Block	Replace annually or every 200 hours of operation as directed by the dirty filter sensor.					
For additional information, see OSHA 1910.180 and ASME B30.5a.						

Table 7. Lubrication and Maintenance Schedule

7.5 LUBRICATION POINTS

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

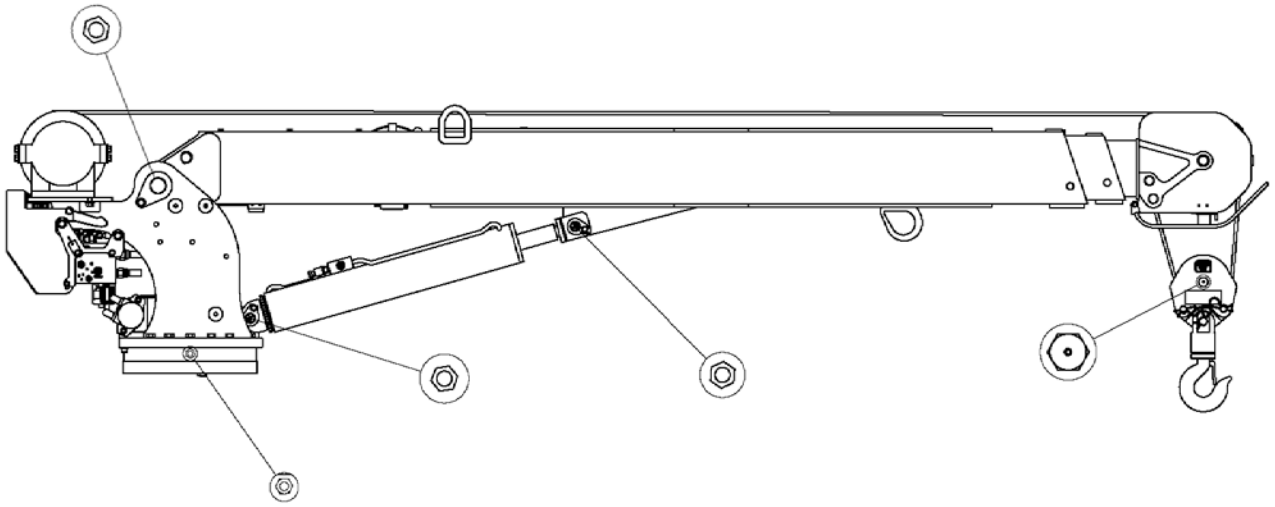


Figure 6. Lubrication Points

7.6 ROTATION BEARING REPLACEMENT

All bearings wear over time, including the main rotation bearing of the crane. There are no precise rules for replacing the main rotation bearing because of many variable factors. There are common symptoms during crane operation that may indicate rotation bearing wear. These include:

1. Excessive noise.
2. Rough rotation.
3. Increase drive power required to rotate.
4. Metal particles in grease.

7.6.1 REPLACE THE BEARING IF

1. Any noticeable cracking in the bearing housing.
2. Damage to internal teeth.
3. Excessive axial play. See Axial Play Allowance Check Procedure.

WARNING *Never try to repair a rotation bearing. For a replacement bearing contact your local authorized distributor*.

7.6.2 AXIAL PLAY ALLOWANCE CHECK PROCEDURE

1. Raise the boom to the maximum angle and measure the clearance between base plate and the rotation bearing with a dial or filler gauge. See Figure 1 for location.
2. Lower the boom to the horizontal position and measure the clearance between the base plate and the rotation bearing with a dial indicator or feeler gauge.
3. If the difference between the two measurements exceeds the specification, replace the bearing.

Crane Model	Axial Play Allowance	Rotation Bearing Replacement Kit
2003/3203/4004	1.5 mm	320878010
HC-12S, HC-6, HC-7, HC-8, HC-9, 8406	1.6 mm	480023010
HC10	1.8 mm	372064010
HC-12, HC-14	2.3 mm	470001000

4. Rotate crane 45° then repeat steps 1 and 2 until you reach 360° of rotation.

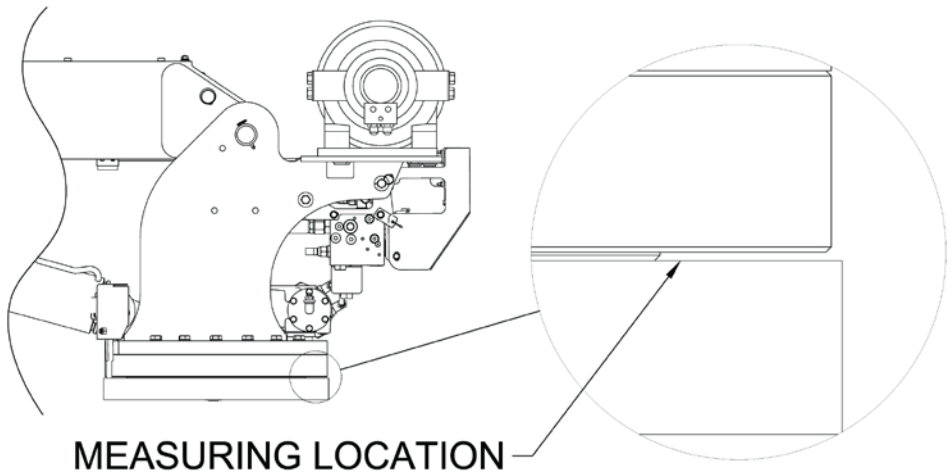


Figure 7. Rotation Bearing Replacement

WARNING *When replacing rotation bearing, use the new hardware included in the kit*.

7.7 HC-12NEXSTAR III, CARTRIDGE MAINTENANCE

Table 8. Cartridge Maintenance

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

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

8.1 CRANE MOUNTING AND INSTALLATION

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

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

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

2. Install the correct sized and length of hydraulic hose. See General Dimensions.

NOTICE *The recommended hydraulic reservoir size for the average industry application CRANE ONLY installation is two times the crane hydraulic flow rate. For crane applications requiring more than 25% crane operation time while the PTO is engaged and/or additional equipment is operated by the same hydraulic system, install an appropriately sized larger hydraulic reservoir and/or forced air, hydraulic oil cooler.*

⚠ CAUTION *Hydraulic reservoir oil temperature must not exceed 180 °F or crane performance may be adversely affected.*

3. The crane has minimum hydraulic requirements. See General Dimensions.

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

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

NOTICE *Use relays for all electrical connections between the crane and the vehicle. This will isolate the electrical systems as much as possible.*

   a. Connect the BLACK wire to the battery negative (ground).
   b. Connect the RED wire to fused 12VDC power. Supply 12VDC power through a dedicated switch that is only powered when the ignition switch is on.
      i. Optional connections:

NOTICE *If you have a BROWN wire instead of a WHITE wire, use the colors in parenthesis.*

      1. Connect the WHITE (BROWN) wire for engine fast/slow. 12VDC maintained-FM ONLY.
      2. Connect the BLUE (YELLOW) wire for engine start.
      3. Connect ORANGE (GREEN) wire for engine stop.
      4. Connect the GREEN (BLUE) wire for auxiliary. 12VDC maintained-FM ONLY.

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

11. With crane installed and plumbed on the truck, fill the reservoir to the top of the sight glass using Mobile DTE 13 or equivalent.
12. Before operating the crane, connect the pressure and return hoses together with a JIC union.
13. Engage the PTO with the engine running and allow the oil to circulate for 15-20 minutes. This will flush any contaminants from the system back to the return line filter.
14. Connect the pressure and return hoses to the correct locations on the crane.
15. Operate all cylinders to the fully extended and fully retracted positions at least six times to bleed air from the system.
16. Return all cylinders to the retracted and stored position.
17. Disengage the PTO.
18. Refill the reservoir to the top of the sight glass.
19. Install an in-line flow meter in the return hose between the crane and the reservoir. Ensure the crane is receiving the correct gallons per minute of flow based on your crane.
20. If there is sufficient flow to the crane, perform a load test to ensure proper operation of the crane and truck stability.
21. Ensure the Owner's Manual is delivered to the customer.
22. For additional help: Call the Service Department at the Auto Crane Company, 1-800-777-2760, located in Tulsa, OK.

IMPORTANT!

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

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

8.1.1 HC-12 NEXSTAR III, COUNTERBALANCE VALVE ADJUSTMENT

WARNING *Do not try to adjust valves while the boom is moving.*

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

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

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

8.2 EMERGENCY CRANE OPERATION

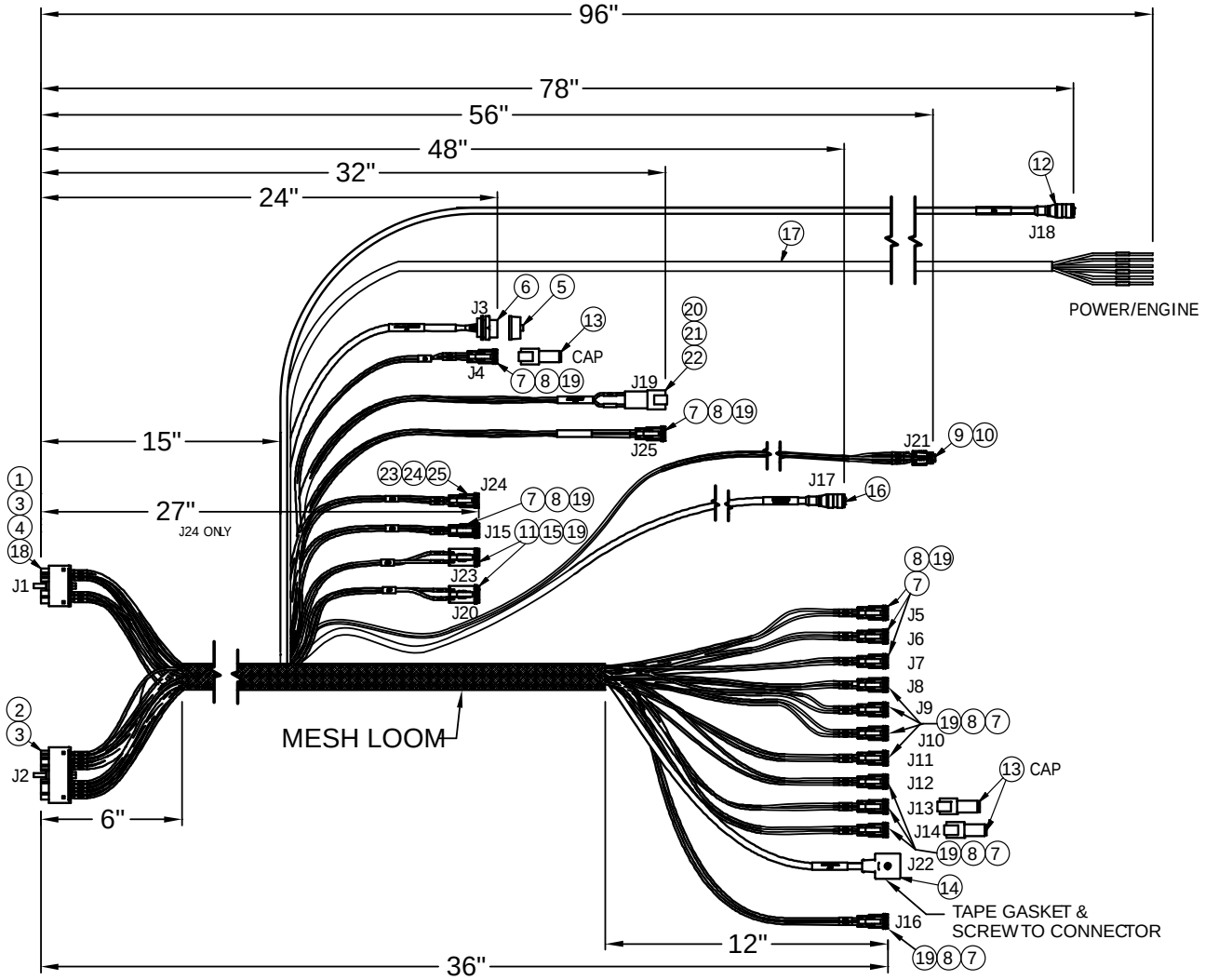
If for any reason hydraulic flow or pressure is lost to the crane, use the following procedure to lower the boom until the problem can be fixed.

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

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

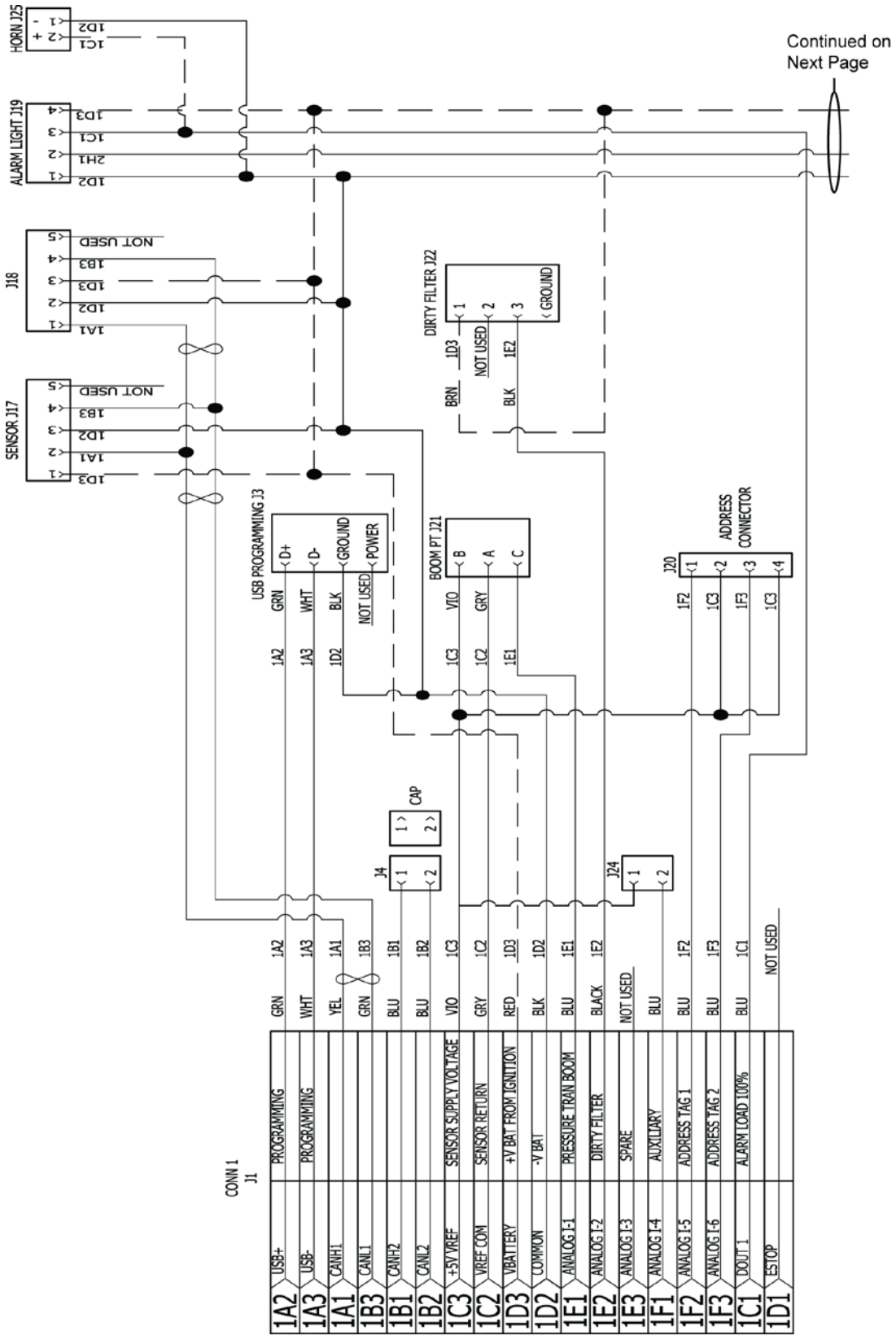
5. If the Allen head screw is turned too far, the internal valve will come apart. This condition is not repairable.
6. After the boom is lowered onto the boom support, turn the Allen head screw the same number of turns counterclockwise into the counterbalance valve.
7. After the problem is corrected,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

HC-12NEXSTAR III, MAIN HARNESS P/N: 366823220

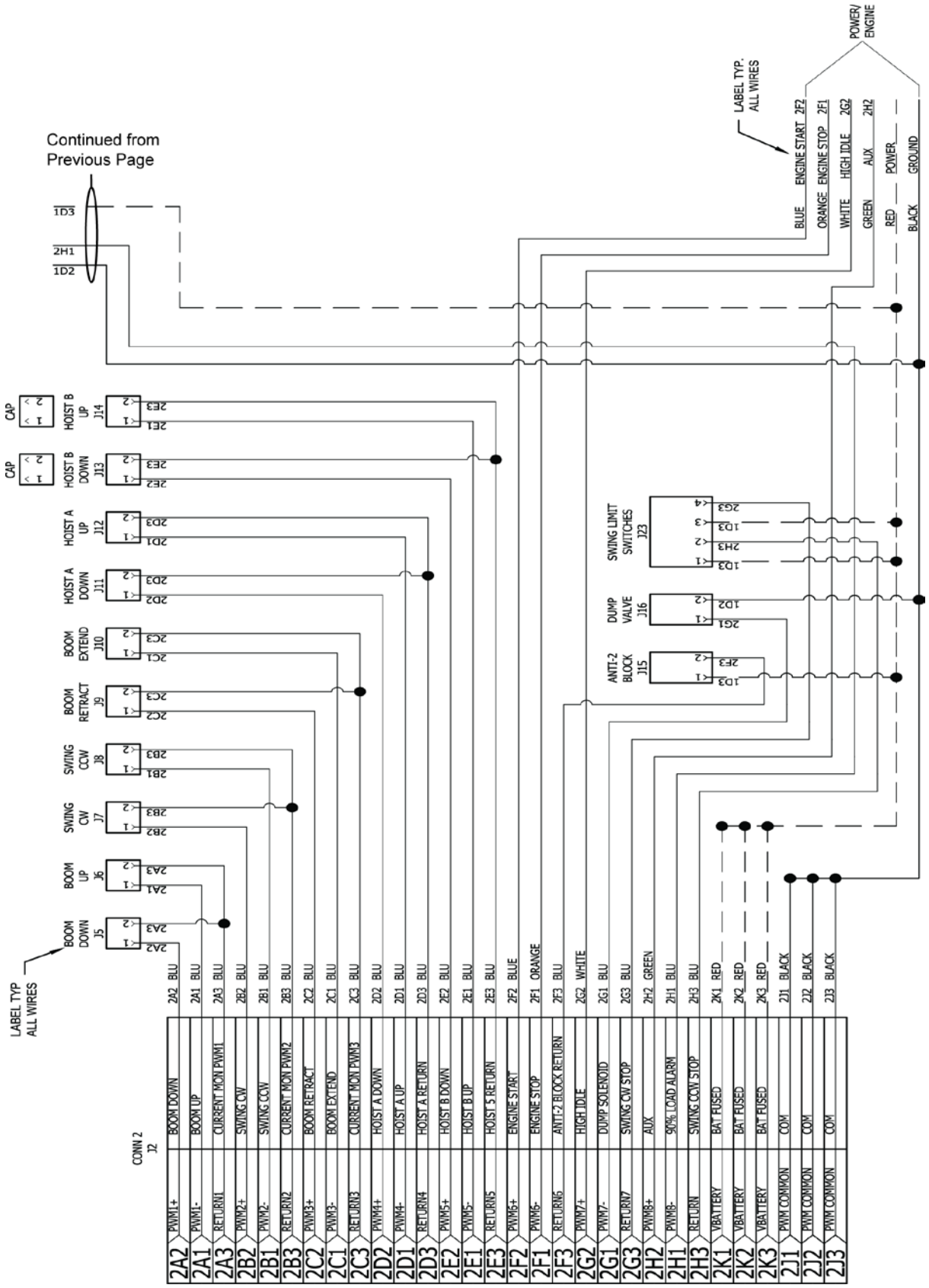


CONNECTOR ID	
CONNECTOR	DESCRIPTION
J1	RECIEVER 18 PIN CONNECTION
J2	RECIEVER 30 PIN CONNECTION
J3	USB CONNECTION
J4	CAN CONNECTOR
J5	BOOM DOWN
J6	BOOM UP
J7	SWING CW
J8	SWING CCW
J9	BOOM RETRACT
J10	BOOM EXTEND
J11	HOIST A DOWN
J12	HOIST A UP
J13	HOIST B DOWN
J14	HOIST B UP
J15	ANTI-2 BLOCK
J16	DUMP VALVE
J17	BOOM ANGLE SENSOR
J18	PENDANT CONNECTION
J19	ALARM LIGHT
J20	ADDRESS
J21	BOOM PT
J22	DIRTY FILTER
J23	SWING LIMIT SWITCHES
J24	AUXILIARY
J25	HORN

HC-12NEXSTAR III, ELECTRICAL SCHEMATIC P/N: 366823221



HC-12NEXSTAR III, ELECTRICAL SCHEMATIC P/N: 366823221



Appendix 2) — Panther T12 Specific Warning Decals

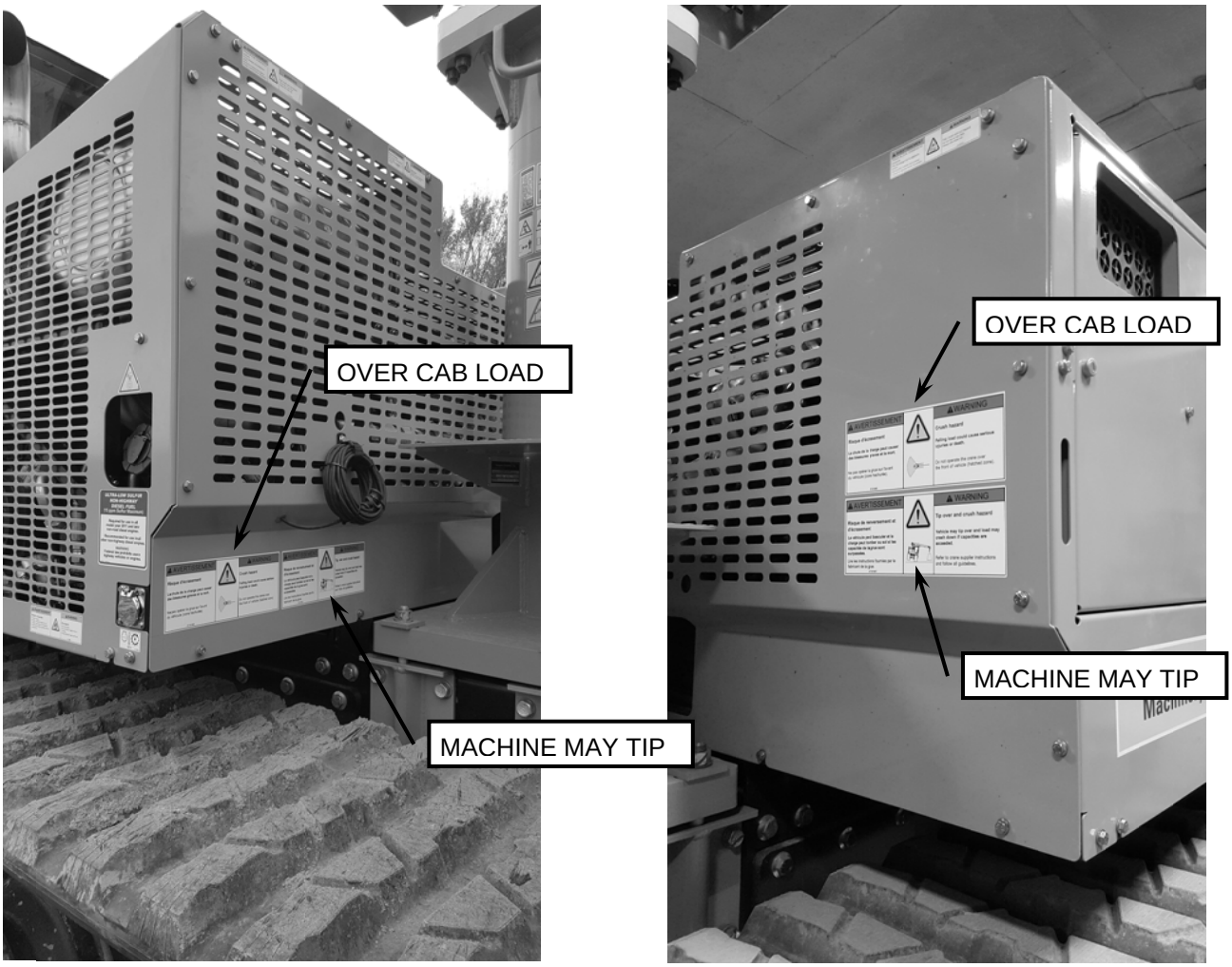


Figure 20: Panther T12 Specific Warning Decal Locations

Over Cab Load

⚠ WARNING

Crushing hazard! Over cab lift crushing hazard is present when load is being lifted by the Auto Tie-in Crane over the cab. Failure to exclude this lifting area may result in severe injury or death.

Prinoth Over Cab safety message is located on the Panther T12 rear guarding on the left hand and right hand side.

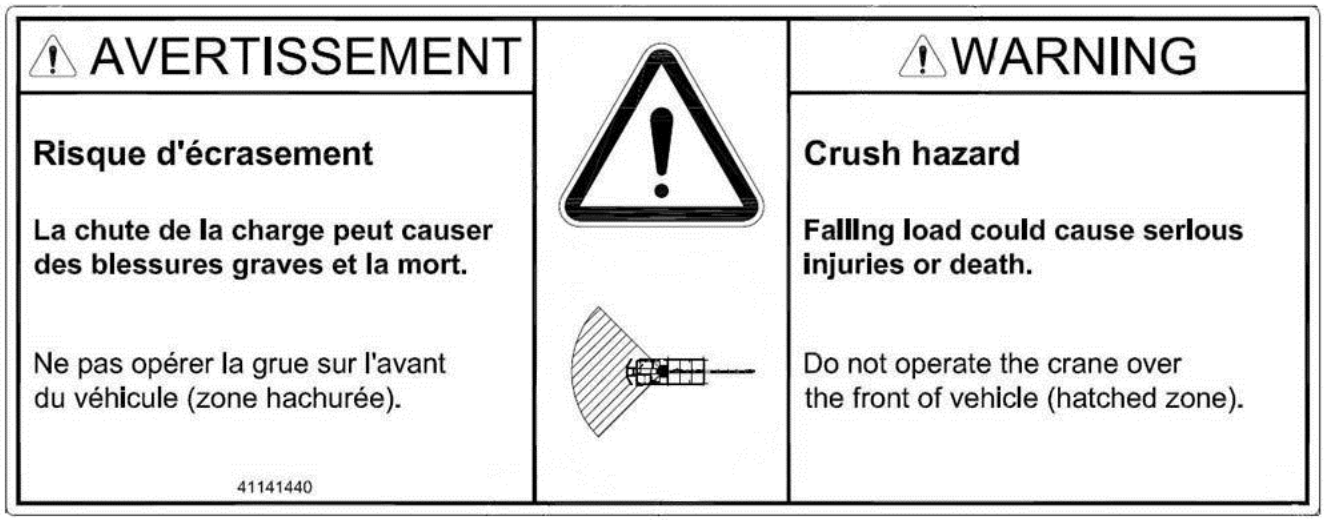


Figure 21: Do Not Lift Over Cab Decal

Machine May Tip

⚠ WARNING

Tipping hazard!

The vehicle may tip if the load capacity is exceeded which may result in severe injury or death.

Prinoth Over Cab safety message is located on the Panther T12 rear guarding on the left hand and right hand side.

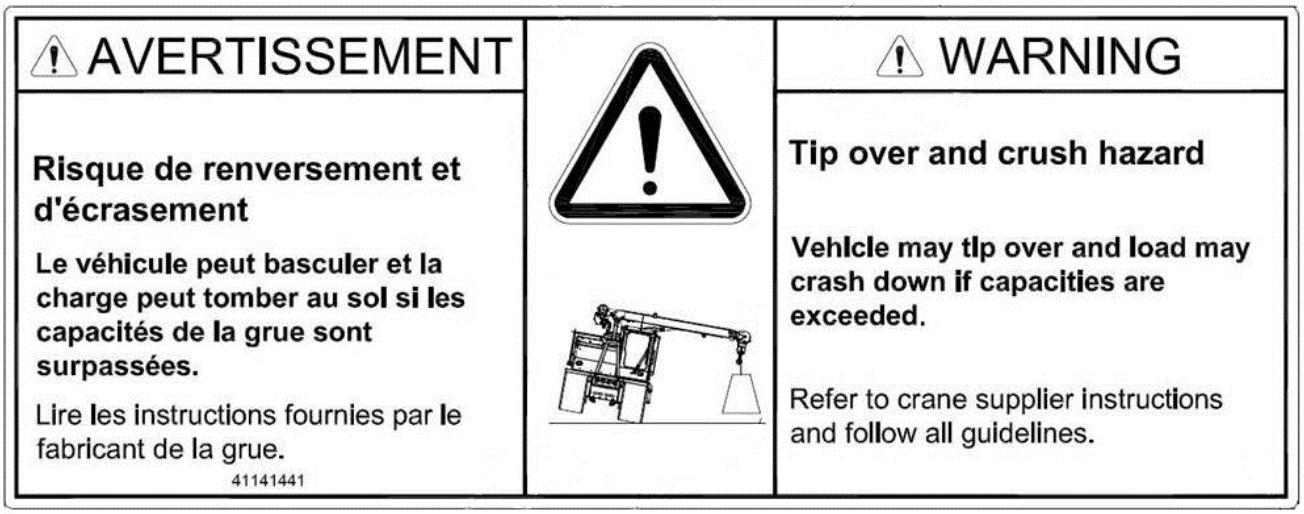


Figure 22: Machine May Tip Decal

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