



SHERMAN+REILLY™
A Textron Company



Sherman + Reilly™ Revolution Series

PTV-6013 Puller Tensioner

Operator s Manual

SHERMAN + REILLY™

Revolution Series

PTV-6013 Puller Tensioner with V-Groove

OPERATOR'S MANUAL

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Important Safety Notice

Before using a Sherman + Reilly™ Revolution Series PTV-6013 Puller Tensioner, operators must read and understand all procedures and safety instructions. Note all safety information and specific safety requirements as explained in this manual.

Failure to follow these instructions could result in serious personal injury or death.

Advertencia

Por favor, lea atentamente todas las instrucciones operacionales y de seguridad antes de operar esta maquinaria. Si no entiende las instrucciones, por favor consulte a su supervisor antes de utilizar esta maquinaria. El uso inadecuado de estas instrucciones puede resultar en lesiones graves o en muerte.

Save this operator's manual for future reference.

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Communication with the Manufacturer

For information on Sherman + Reilly™ products, contact us by phone at **(423) 756-5300** or **800-251-7780** or via email at help@sherman-reilly.com or at 400 W. 33rd Street, Chattanooga, TN 37410; www.sherman-reilly.com.

NOTE: Product images shown are for illustration purposes only and may not be an exact representation of your product. Actual product may vary due to product enhancement and improvement.

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1 Introduction

1.1 Terms of Use

It is important that every machine is operated in a safe manner. To properly, safely operate this machine, it is required that operators and service people read and understand the information in this and the engine manufacturer's manual. ANYONE working around the machine should read the safety precautions in the manuals. Be aware each warning and precaution is to help protect against injury. Taking unnecessary risks and ignoring warnings is the primary cause of personal injury and fatal accidents in the work place. If you have any questions regarding operation or safety of a procedure or situation, contact the Sherman+ Reilly™ Customer Service Manager at 800-251-7780 or via email at help@sherman-reilly.com

Publication of this manual and the safety precautions in it does not in any way represent an all-inclusive list. It is the operator's responsibility to make sure the machine is operated in accordance with all state and local safety requirements and codes, including all applicable OSHA- (Occupational Safety and Health Administration) and EPA- (Environmental Protection Agency) regulations, as well as ANSI- (American National Standards Institute) accredited standards.

Should a problem or unsafe condition arise, shut the machine down using the normal shut-down procedure. In the event of an emergency, use the emergency stop procedure described in this manual, and then notify the proper authorities or follow your employer's prescribed procedure for an emergency situation.

Sherman+Reilly™ strongly recommends that only persons who have a full understanding of the provided manual and who are knowledgeable in the use of overhead line pulling and tensioning machines, including all applicable laws, regulations, and safety standards, be allowed to operate this machine. There are significant hazards inherent to the use of this machine; therefore, all operators should be educated on all functions, procedures, and safety measures outlined in this manual prior to their use or maintenance of this machine.

Sherman+Reilly™ strongly recommends that only personnel that are literate in the English language and who verbally understand the English language be considered as operators or service personnel for this machine.

Sherman+Reilly™ also recommends following the guidance published by the Institute of Electrical and Electronics Engineers (IEEE), and specifically IEEE Standard 524 – Guide to the Installation of Overhead Transmission Line Conductors (IEEE 524-2003 or subsequent).

This manual was prepared to help the operator use and service the machine in a safe manner. Responsibility for safety during operation and service rests with the person(s) performing the work. Being alert of surroundings and observing all safety precautions, and all rating requirements and standards is required to help reduce the possibility of an accident. This manual is of no value if the operator does not read and understand the instructions and precautions- before starting or trying to operate the machine. The operator must be aware of the machine's capacities and limitations. It is the operator's responsibility to watch for situations and conditions which could affect the normal performance of the machine and the safety of the operating/work environment.

Sherman+Reilly™ Puller Tensioners are powered, hydraulically actuated machines. This machine has variable speed and line tension controls; however, if tensioning multiple conductors using a running board, the total line pull applied from all conductors must not exceed the capacity of the machine.

2 Safety

2.1 Hazard Overview

Familiarize yourself with the following symbols before operating machinery. Read and follow all safety precautions. Your company's safety precautions take precedence.

DANGER

Indicates an imminently hazardous situation which **WILL** result in death or serious injury if not avoided.

WARNING

Indicates a potentially hazardous situation which **COULD** result in death or serious injury if not avoided.

CAUTION

Indicates a potentially hazardous situation which **MAY** result in minor or moderate injury and property damage if not avoided. It may also be used to alert against unsafe practices.

NOTE

Indicates a potentially hazardous situation which **MAY** result in property damage if not avoided. It may also be used to alert against unsafe practices.

CAUTION: When washing down the unit:

- Use only freshwater for cleaning.
- Do not use high pressure spray.
- Do not spray water directly at the instrument panel, or any electrical components, electrical fittings, hydraulic fittings, hydraulic pistons, or hydraulic manifolds.
- Do not spray water into the cooling air intake or the engine air intake.
- Do not wash a hot or running engine. Use compressed air to clean the engine and radiator fins to reduce the potential for corrosion and moisture contamination.

2.2 Commonly used ISO Symbols:

These symbols may appear on the unit or in operational instructions. Use common sense. Do not presume that caution is not needed if there is no label.



High voltage hazard



Eye and/or Ear Hazard



Electrical shock hazard



Risk of Explosion Hazard



Pinch point and/or entanglement hazard



Toxic Hazard



Cutting and/or crushing hazard



Flammable Material Hazard



Crushing of body hazard



Automatic Start-Up Hazard



Crushing of Foot Hazard



Carcinogen Hazard



Hot Surface Hazard

2.3 Operator Safety Precautions

CAUTION

- Do not place any part of the body into a potential pinch point. The machine must be turned off and locked out in accordance with OSHA regulations before attempting to correct a problem, work on the machine, or perform preventive maintenance.
- Do not attempt to operate any Sherman+Reilly™ equipment without proper instruction, including reading and understanding the provided manual.
- Obey and enforce all warnings including OSHA requirements and ANSI standards.
- Never allow anyone to ride on the unit while it is being towed.
- Always wear proper safety equipment as required by employer.
- Never bypass safety switches or operate equipment with faulty safety devices.
- Be sure all guards and access covers are in place and secured when the machine is being operated.
- Be aware of people in the work area who may be at risk during operation.
- Know all emergency shutdown procedures.
- Do not obstruct controls or fire extinguisher and make sure fire extinguisher is fully charged.
- Never operate equipment while under the influence of any substance which could impair ability or judgment.
- Do not operate equipment if work ability is impaired by fatigue, illness, or other causes.
- Always use employer approved grounding procedures when operating the machine.
- Never use hands to check for hydraulic system leaks. Hydraulic fluid escaping under pressure can cause personal injury.
- Avoid contact with pumps, cylinders, hoses, engine components, and exhaust system.
- Do not refuel unit while the engine is running or hot.
- Keep all body parts, to include head and limbs, away from all moving parts.
- Refer to engine manufacturer's manual for all additional safety precautions which relate to engine operation and service.
- Know location and function of all controls, gauges, instruments, and protective devices.
- Never use unit to tow or winch another vehicle.
- Never use controls or hoses for hand holds.
- Do not exceed unit specifications and limitations, to include weight.
- Know where to get help in the event of an emergency or injury.
- When towing this machine/unit trailer, the driver should use caution and adjust speed based on road, weather, and terrain conditions, as well as applicable laws and speed limits.
- Do not make physical contact with rope or cable as it enters or leaves the machine or drum.
- To prevent the possibility of electrocution, do not enter or leave the unit while it is operating or allow anyone to touch or lean on the machine when in use.
- Avoid direct inhalation of engine exhaust gases.

2.4 Employer Safety Precautions

CAUTION

This guideline is intended to assist owners, employers, job site supervisors, and operators in ensuring that the equipment is operated in a safe manner. Each job site may have additional situations and conditions which need consideration. Information in this manual applies to all the operators charged with the use and/or maintenance of the machine. This manual is not a training manual. This manual must be kept with the machine for the entire life the machine in order to be available to all potential users and operators. This manual should be kept in a sheltered dry place.

Monitor the operators to be sure they observe and practice safety procedures and operate the support equipment as outlined in this manual.

Establish a regular inspection program which includes malfunction reports, inspection, and service records. This inspection should cover the machine condition, adjustment, and ensure all safeguards are in place and functional. Additionally, all pre/post-operation inspections should be conducted at prescribed intervals.

Make sure that any malfunction or breakdown affecting the safe operation of the equipment is properly corrected or repaired before returning the machine to service.

The employer must provide training and instruction in chemical safety and safe methods of work before assigning workers to operate, service, or repair the machine and equipment. A record of training dates, employee names, and level of training shall be maintained. Only persons who have a full understanding of the provided manual- (*provided in English only*), and who are competent in the use of overhead pulling and tensioning machines; to include all applicable laws, regulations, and safety standards, should be allowed to operate this machine. There are significant hazards inherent to the use of this machine, therefore all operators should be educated on all functions, procedures, and safety measures outlined in this manual- prior to their use or maintenance of this machine.

Employer must utilize a lock-out/tag-out procedure which complies with OSHA Standard, Part 1910.147, Title 29 of the Code of Federal Regulations or subsequent. This procedure must include control of all keys.

The employer will specifically inspect all safety equipment and protective devices on the equipment to ensure they are not bypassed or disabled. Operation of equipment will not be permitted unless all safety devices are in place and functional. The employer shall meet all appropriate information dissemination and protection requirements for the workers.

Operators and maintenance/service personnel should take appropriate precautions, to include wearing all (PPE)- Personal Protection Equipment, prior to the operation, maintenance, or service of the machine. Operators must wear suitable clothing to reduce the possibility of entanglement in the machines moving parts. Operators must not wear chains or other jewelry for the same reason.

2.5 Chemical Safety

CAUTION

Exposure to chemicals during normal operation of the machine is limited; however, chemical exposure may be encountered through preventive maintenance and repair. Operators and maintenance/service personnel should take appropriate precautions, to include wearing all (PPE)-Personal Protection Equipment, prior to the operation, maintenance, or service of the machine. All Material Safety Data Sheets (MSDS's) or Safety Data Sheets (SDS's) for OEM chemicals present upon initial manufacture/shipment of machine can be made available upon request to Sherman+Reilly™.

Any additional chemicals introduced to the machine or used in conjunction with maintenance or repair of the machine must have a MSDS/SDS available for work being done, and would thereby be the responsibility of the operator's employer or the organization providing the maintenance. All chemical handling and disposal should be done in accordance with environmental, federal, state, and local laws and regulations. Sherman+Reilly™ is not liable for the mishandling, misuse, or improper disposal of chemicals, with regard to the use or maintenance of Sherman+Reilly™ machines or equipment.

All responsibilities, including but not limited to: handling and disposal of chemicals, availability and maintenance of MSDS's/SDS's, labeling of chemical containers, and training of employees and operators, should be fulfilled in accordance with the Hazard Communication Act, Hazardous Materials Transportation Act, Occupational Safety and Health Administration's Hazard Communication Standard- (29 CFR) Part 1910.1200, and all applicable Environmental Protection Agency Standards and Regulations- (*additional standards may apply*). For further information on safety standards regarding chemicals see OSHA and EPA websites.

2.6 Temperature Limits for Hydraulic Oil

WARM-UP HYDRAULIC FLUID. For safe operations, it is recommended that the hydraulic fluid be allowed to warm-up to a working temperature prior use of any hydraulic functions. Cold hydraulic fluid can damage the machine.

2.7 Precautions

2.7.1 Before Starting Operations

Only trained and authorized personnel can operate and maintain the machine.

Follow all safety, precautions, and instructions in this manual when operating or performing inspection or maintenance on the machine.

If you are not feeling well, or if you are under the influence of alcohol or medication, your ability to safely operate or repair your machine may be severely impaired, putting yourself and everyone else on your job site in danger.

When working with another operator if with the person on the worksite traffic duty, discuss the content of the operation beforehand and use the determined signals when performing the operation.

2.7.2 Understand the Machine

- Before operating the machine, read this manual thoroughly. If there is any place in this manual that you do not understand, ask the person in charge of safety for explanation.
- If you find any problem in the machine during operation or maintenance (noise, vibration, smell, incorrect gauges, smoke, oil leakage, etc., or any abnormal display on the warning devices or monitor), report the problem(s) to the person in charge and take the necessary action. Do not operate the machine until the problem has been corrected.

2.7.3 Preparations for Safe Operation

Preparations for Safety Related Equipment

- Be sure that all guards, covers, and safety devices are in their proper position. Repair them immediately if they are damaged.
- Understand the application of safety-related devices and use them properly.
- Never remove any safety-related devices. Always keep them in good operating condition.
- Wear Well-Fitting Cloths and Personal Protective Equipment (PPE).
- Do not wear loose clothes or any accessories that could catch the control levers or protruding parts, and could cause the machine to engage unexpectedly.
- Always wear appropriate PPE: hard hat, safety shoes; protective eyeglasses, ear plugs, gloves, and/or face shield, depending on the work.
- Long hair hanging down could become entangled in the machine. Tie the hair up and be careful that it is not caught in the machine.
- Check that all personal protective items function properly before using them.

Keep the Machine Clean.

- Wipe off any mud or oil from the machine. Always keep the machine clean.
- If water gets into the electrical system, it could cause systems malfunctions which could cause the unit to engage unexpectedly and could cause serious personal injury or death. When washing the machine with water or steam, do not allow the water or steam to come into direct contact with electrical components.

- Do not use high-pressure water to clean the unit. Do not spray water directly onto electrical fittings, hydraulic fittings, hydraulic pistons, or hydraulic manifolds. Wipe off any dirt from electrical and hydraulic fittings and components with soft cloth.

Precautions for Inside the Cab

- Do not leave tools or machine parts lying around inside the operator's cab. If tools or parts get into the control devices, it may obstruct operation and cause the machine to move unexpectedly, resulting in serious personal injury or death.
- Do not use a cellular phone when operating the machine. This may lead to mistakes in operation and may be cause serious personal injury or death.
- Never bring any dangerous objects such as flammable or explosive items into the cab.

Use Handrails and Step when Getting on or Off Machine.

To prevent personal injury caused by slipping or falling off the machine, always observe the following:

- Always face the machine and maintain at least three-point contact (both feet and one hand or both hands and one foot) with the handrails and steps to ensure that you support yourself.
- Before getting on and off the machine, check the handrails and steps if there is any oil, grease, or mud on them. Wipe it off immediately so as not to slip. In addition, tighten any loose bolts on the handrails and steps. If the handrails and steps are damaged or deformed, they need to be repaired immediately.
- Do not grip the control levers or lock lever when getting on or off the machine.
- Never climb on the engine hood or covers where there are no non-slip pads.
- Never jump-off or leap from the Machine – unless necessary to avoid electrical shock.



Precautions to Prevent Fire

- Do not bring any open flame close to flammable substances such as fuel, oil, coolant, or window washer fluid. There is a danger that they may catch fire.
- Do not smoke or use an open flame near fuel or other flammable substances.
- Shut down the engine before adding fuel.
- Do not leave the machine when adding fuel or oil.
- Tighten all the fuel and oil caps securely.
- Be careful not to spill fuel on overheated surfaces or on parts of the electrical system.
- After adding fuel or oil, wipe up any spilled fuel or oil.
- Put greasy rags and other combustible materials into a safe container.
- When washing parts with oil, use non-flammable oil. Do not use diesel fuel or gasoline.
- Do not weld or use a cutting torch to cut any pipes or tubes that contain combustible liquids.
- Determine well-ventilated areas for storing oil and fuel. Keep the oil and fuel in the specified place and do not allow unauthorized person to enter.
- When performing grinding or welding work on the machine, move any flammable materials to a safe place before starting.
- Remove any dry leaves, chips, pieces of paper, dust, or any other combustible materials accumulated or affixed around the engine exhaust manifold, muffler, battery, or cowling.
- To prevent fires from spreading sparks or burning particles from other fires, remove any combustible materials such as dry leaves, chips, pieces of paper, or any other combustible materials accumulated on the machine or inside the engine cowling.
- Short circuits in the electrical system can cause fires. Check to see that all power cables and wirings are in good condition. Keep all electrical connections clean. Bare wire or frayed insulation can cause a dangerous electrical shock and personal injury.

- Keep all the electric wiring connections clean and securely tightened.
- Check the wiring every day for looseness or damage. Reconnect any loose connectors or refasten wiring clamps. Repair or replace damaged wiring.
- Check that all the hose and tube clamps, guards, and cushions are securely fixed in position. If they are loose, they may vibrate during operation and rub against other parts. There is danger that this may lead to damage to the hoses and cause high-pressure oil to spurt out, leading to fire and serious personal injury.

Precautions regarding highly heated exhaust gas

- The machine is equipped with Diesel Particulate Filter (hereafter DPF). DPF is a device to purify the soot in the exhaust gas. Exhaust gas temperature may increase during the filter cleaning/purification process (regeneration / ReGen). Do not bring any combustible material close to the outlet of the exhaust pipe. Be aware of nearby combustible materials that may be inadvertently heated by exhaust gases. (See Section about DPF Codes).
- When there is brush, trees, dry leaves or other combustible matter near the job site, be aware that the DPF regeneration may present a fire hazard. The system can be set to disable DPF ReGen if necessary.

Precautions regarding sensitive electrical components and welding

- The machine is equipped multiple electronic controllers and electronically actuated hydraulics. Electrical surges to the machine can damage the sensitive electronic controls.
- Do not weld on the unit without disconnecting the batteries and all electronic controllers. Locate the weld grounding wire as absolutely near as possible to welding point.
- Contact Sherman+Reilly for instructional supplement regarding welding on the unit.
- Electrical components damaged by welding are not covered under warranty.



Precautions regarding corrosion

Regularly inspect the unit for corrosion. To help prevent rust on the unit, it is important to regularly apply a corrosion inhibitor / lubricant like TC-11™ Corrosion Inhibitor or equivalent to exposed metal as well as fairlead rollers and pins. If the unit is stored outdoors, a corrosion inhibiting product should be reapplied every 6 months. The product should also be reapplied if a visual inspection indicates that surface areas are no longer glossy. The friction between the ropes and the surface of the reel and rollers can accelerate the degradation of any corrosion inhibiting coating, therefore, the reel and rollers should be examined after each use to determine if reapplication would be beneficial.

Precautions regarding rope, rope eyes, grips, and swivels.

All mechanical components are subject to wear. Worn components do not have the same *Maximum Load Limit* rating as do new components. The total responsibility for the inspection, maintenance, lubrication, and continued use is entirely up to the purchaser/user. Remember, visual inspection may not be sufficient and examination methods such as X-ray, ultrasonic testing, magnetic particle inspection, dielectric resistance and others, might be required to establish the present integrity of the product. External factors will affect the longevity of the product. There is no defined time period for the useful life of any of these products.

Check to see that your equipment is being inspected and tested in accordance with all applicable governmental rules and regulations and Original Equipment Manufacturer (OEM) guidance. Should any products become worn and in

need of repair, the responsibility for the actual repair work will be borne solely by the party making such repairs. It is recommended that the OEM be contacted should there be any questions whatsoever relating to a repair.

Contact information for the Original Equipment Manufacturers (OEM) for the peripheral equipment: grips, swivels, wire, and rope - provided with Sherman+Reilly™ equipment is provided at the back of this manual. This contact information is provided as a courtesy by Sherman+Reilly in an effort to keep end users well informed of the maintenance and safety requirements for this equipment. For the latest information on any of this accessory equipment check with the Original Equipment Manufacturer.

2.8 In the Event a Fire Occurs

CAUTION

Most Sherman+Reilly™ equipment comes standard with a fire extinguisher mounted somewhere on the equipment for quick access by the operator. However, should a fire occur with S+R equipment; the **operator should only utilize the provided fire extinguisher, if trained in its use, if safe to do so, if in accordance with employer policy, and in these described situations:**

- a. To save your own life, if in jeopardy from fire.
 - b. To save someone else's life, if in jeopardy as a result of a fire- but only if safe to do so.
 - c. To put out small equipment fires to avoid further damage to equipment or prevent a dangerous explosion- but only if safe to do so.
- Turn the starting switch to OFF position, and stop the engine.
 - Use the handrails and steps to escape from the machine.
 - Do not jump off the machine; there is the danger of falling, which could cause serious personal injury.
 - The fume generated by a fire contains harmful materials which have a bad influence on your body when they are inhaled.
 - Do not breathe the fumes.
 - After a fire, harmful compounds may be left. If it touches your skin, it may have a bad influence on your body.
 - Be sure to wear rubber gloves when handling the materials left after the fire. The material of the gloves, which is recommended as polychloroprene (Neoprene) or polyvinyl chloride (in the lower temperature environment).
 - When wearing cotton work gloves, wear rubber gloves under them.

CAUTION: Operators should exercise caution when attempting to put out fires, as **the provided extinguisher is only intended to suppress small localized fires**, and is not intended to put out or "fight" large scale fires, should one occur.

With the presence of flammable fluids and other operational environment factors, even small fires can grow out of control quickly- operators must maintain awareness of these factors.

Proper training must also be provided by employer before engaging in any firefighting efforts. Should a fire occur with Sherman+Reilly™ equipment, the operator should **not** use the equipment until it has been inspected for safety and approved to be returned to service- regardless of the size of the fire.

2.9 Emergency Stop Procedure

CAUTION

In the event of an emergency, the operator must be aware of how to shut down the machine so as to avoid any additional injuries or equipment damage. In these emergency situations, the lives of linemen, work crews, surrounding bystanders, as well as the operator may become at risk- dependent upon the severity of the situation. As an operator in these situations, the level of operating knowledge and proficiency can be tested. These factors alone make this procedure one of the most important to know.

1. The first step of an emergency shut down during operations is to de-energize the drive system/engine and stop all equipment rotation and power as quickly as possible. This is done by **pushing the Emergency Stop Button** located on the control panel.

2. If the Emergency Stop Button is pushed during operations and other machines/operators are being utilized in tandem or sync with your machine, notify them as quickly as possible that an emergency has occurred and advise to halt rotations.

3. Quickly assess situation and assist any injured personnel to get free from hazards- only if safe to do so.

4. Notify proper authorities and get help.

5. Follow all employer emergency procedures.



See the Operator Controls section for location of the Emergency Stop switches.

2.10 Precautions When Getting On or Off the Machine

Use Handrails & Step When Getting on or off the Machine

To prevent personal injury caused by slipping or falling off the machine, always observe the following:

- Always face the machine and maintain at least three-point contact (both feet and one hand or both hands and one foot) with the handrails and steps to ensure that you support yourself.
- Before getting on and off the machine, check the handrails and steps if there is any oil, grease, or mud on them. Wipe it off immediately so as not to slip. In addition, tighten any loose bolts on the handrails and steps. If the handrails and steps are damaged or deformed, they need to be repaired immediately.
- Do not grip the control levers or lock lever when getting on or off the machine.
- Never climb on the engine hood or covers, or where there is no non-slip material.
- Never jump off the machine, unless necessary to avoid electric shock.



2.11 Precautions When Standing up from Operator's Seat

- Stop operations before standing up from the operator's seat or adjusting the position of the seat.
- There is a safety switch on the seat that will stop operations if the operator is not in the seat for longer than 10 seconds. If the operator is not sitting in the seat for longer than 10 seconds, the control system will react as follows:
 - The system display will indicate the icon for the seat switch.
 - In pulling mode (via bull wheel or via V-groove): The bull wheel drive or the bull wheel with the V-groove will be stopped and blocked.
 - As long as the operator is not sitting in the seat no rope will be pulled in or paid out.

2.12 Unauthorized Modifications

- Sherman+Reilly™ will not be responsible for any personal injuries, product failures, physical loss or damage, or impacts to the environment resulting from modifications made without written authorization from Sherman+Reilly™.
- Any modifications made without written authorization from Sherman+Reilly™ can create hazards. Before making any modifications, consult Sherman+Reilly™.
- Any modifications made without authorization from Sherman+Reilly™ will void any written or implied warranty.

2.13 Precautions When Running Engine Inside Building

- The engine exhaust gas contains substances that may damage your health or even cause death. Start or operate the engine in a place where there is good ventilation. If the engine or machine must be operated inside a building or underground, where the ventilation is poor, take steps to ensure that the engine exhaust gas is removed and that ample fresh air is brought in.

2.14 Investigate and Confirm Jobsite Conditions

CAUTION

- On the jobsite, there can be various hidden dangers that may lead to serious personal injury or death. Before starting operations, always check the following to confirm that there is no danger on the jobsite:
- Always be careful when performing operations near materials such as shingled roofs, dry timber, dry leaves, or dry grass because they are easily combustible and may cause fire.
- Check the terrain and condition of the ground at the jobsite, and determine the safest method of operation. Do not operate in a dangerous area where landslides or rock fall may occur.
- If water lines, gas lines, or high-voltage electrical lines may be buried under the jobsite, contact the appropriate authority to identify their locations, and be careful not to damage any of these lines.
- In particular, if you need to operate on a road, protect pedestrian and cars by designating a person for jobsite traffic duty or by installing fences around the jobsite.

2.15 Precautions When Working on Loose Ground

- Avoid operating the machine near the edge of cliffs, bluffs, road edges, and deep ditches. The ground may be weak in such areas. If the ground should collapse under the weight or vibration of the machine, there is a hazard that the machine may fall or tip over. Remember that the soil is weak in these areas, especially after heavy rain, blasting, or earthquakes.
- When working on embankments or near excavated ditches, there is a hazard that the weight and vibration of the machine will cause the soil to collapse. Before starting operations, take steps to ensure that the ground is safe and to prevent the machine from rolling over or falling.

2.16 Precautions Related to Cab Glass

- If the cab glass is broken during operations, stop operations and repair the cab glass immediately.
- If the cab glass on the work equipment side is broken, there is a hazard that the operator may be directly hit or caught in the work equipment. If the glass is broken, stop operation immediately and replace the glass.
- Use only non-ammonia-based cleaners to clean the front polycarbonate window. Using ammonia on polycarbonate will cause structural damage to the polycarbonate material, thereby degrading the impact resistance of the front window. This can create a hazard for the operator should a line brakeage situation occur.

3 Operations

3.1 General Overview



The Sherman + Reilly™ Revolution Series PTV-6013 is a puller/tensioner/reconductor in a single unit delivering 13,000 lbs. of pulling force and tensions up to 8,000 lbs. With a max speed of 4 mph, the 60 inch bullwheels provide constant tension and handles transmission class conductors. The PTV-6013 also features a reconductoring 60-inch V-groove application for "wrecking" old conductor.

Included is a self-loading reel stand capable of supporting a 96H inch by 67W inch reel, up to 18,000 lbs. The operator controls employ PLC machine control with CAN-bus technology, and uses a removable/replaceable memory card to store all relevant stringing data. The onboard computer system allows for self-diagnostics of all hydraulic circuits with results shown on a large color display.

The PTV-6013 features a Safe-Zone™ Cab providing ultimate safety and comfort for the operator. The Safe-Zone™ Cab employs a polycarbonate front window for maximum visibility while protection against impact. The cab also has a fully adjustable ergonomic seat, and all required electronic controls and gauges. The Safe-Zone™ Cab is design to reduce operator fatigue, and provide an "off-ground" envelop for greatly reducing the risk of touch potential in energized environments.

Key Features

- Fully Hydraulic/Direct Drive System
- Puller/Tensioner/Reconductor in a single unit.
- Safe-Zone™ Cab- Fully Enclosed, w/Climate Control
- 60" Bullwheels- Hydraulically Driven
- Centralized Engine Controls- CAN-bus technology
- Digital Controls and Self Diagnostics



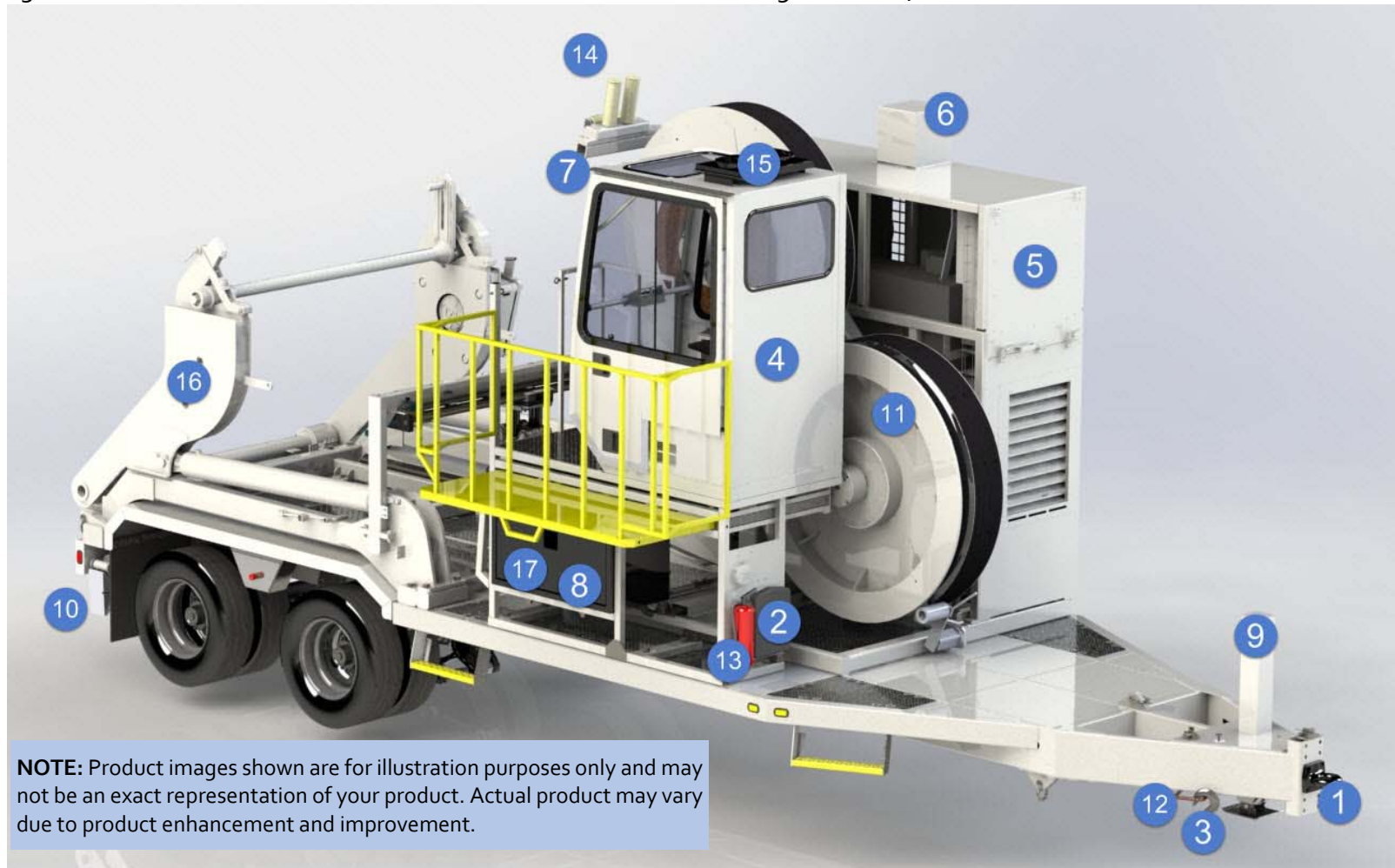
3.2 Specifications PTV-6013

(Dimensions, weights, and capacities listed are approximate. All specifications are subject to change without notice.)

Maximum Pulling Capacity	13,000 lbs. per bullwheel set
Tensioning Capacity	500 to 8,000 lbs. per bullwheel set
Maximum Line Speed	Pulling: 4 mph.
Bullwheel Size/ Count / Grooves	60 in. dia. / 2 (1 pair) / 5 grooves per bullwheel
Groove Radius:	1 in.
Groove Lining Material	Rubber, machine-groove
Tension Brake	Hydraulic, motor-driven
Brake Control	Hydraulic-Applied, Automatic, per operator setting
Fail-Safe Brake	Spring-applied, released by hydraulic pressure
Drive System:	Direct Drive: hydraulic motor, bullwheel
Engine	174hp Diesel, Turbo-charged, CAT C4.4 ACERT L4, T4 Final
Hydraulic Fluid	ISO grade 32
Hydraulic Reservoir	20 gallons
Fuel Capacity	12 gallons
Fairlead Rollers	(1)Tension Bottom (1) V-Groove
Operator's Safety Enclosure	Safe-Zone Cab, Fully enclosed/Single door
Frame Construction	Steel tubing, continuous-weld
Length x Width x Height (feet)	28 L x 8.5 W x 12 H overall, nominal.
Weight, nom.	24,500 lbs.
GVWR	43,400 lbs.
Suspension	Leaf Spring
Axle Configuration	Tandem, 22,500 lb. per axle (2 total)
Wheel Configuration & Tires	Dual 6000 lb. per wheel, 235 / 70R 17.5
Brakes, Trailer	Air brakes
Towing Attachment	3 in. adjustable pintle eye
Safety Chains	2 ea., with hooks
Front/Nose Jacks	Hydraulic, with shoe
Corner Stability Jacks	2 Hydraulic, vertical cylinder type, with shoe
Electrical System	Split 12/24 VDC
Battery (2)	12 V, 720 CCA, BCI group 93
Lights / Navigation	12 V, LED, U.S. DOT-approved
Lights, Work Site	Cab top floods
Tie Downs (4)	2x 5/8 in. dia. steel D-Rings, 2 x 3/4 in allow shackles (7 ton working
Grounding (4)	¾ in. dia. copper-clad steel loops
Winch	Electric, 12,000 lb.
Deck Cover	Non-slip surface
PLC machine control	CAN-Bus Technology
Data Logging	Removable/Replaceable Memory Card
Reel Size Capacity	96 in. Flange, 67 in. width.
Self-loading Reel	18,000 lb.
PTO Termination	10,000 PSI pressure
Wheel Chocks	Standard
Fire Extinguisher	ABC
Color	S+R White

3.3 Terms to Know

- | | | |
|---|--|---|
| <ol style="list-style-type: none"> 1. Pintle Eye Hitch 2. Document holder 3. Safety Chains 4. Safe-Zone™ Cab 5. Hydraulic Power Engine/Pump Enclosure 6. Engine Exhaust | <ol style="list-style-type: none"> 7. Exterior Work Lighting 8. Wheel Chocks/holders 9. Front/Nose [L/R] Jacks (1) 10. Rear [L/R] Jacks (2) 11. Bullwheels (2) 12. Grounding Bracket (4) | <ol style="list-style-type: none"> 13. Fire Extinguisher 14. Fairleads 15. A/C Condenser and Fan 16. Self-loading Reel Stand 17. Toolbox |
|---|--|---|



NOTE: Product images shown are for illustration purposes only and may not be an exact representation of your product. Actual product may vary due to product enhancement and improvement.

Terms to Know

3.4 Pre-Operation Inspection

Perform the following checks before starting the engine. At the beginning of the day's work to ensure that there is no problem with the operation of the machine. If these checks are not performed properly, problems may occur with the operation of the machine, and there is a danger which may lead to serious personal injury or death. If any problem is found, repair it before any operations. (Refer to Cat® Manual as needed.)

- 1. Check the engine radiator coolant level**, by opening the radiator cap. **CAUTION:** Ensure radiator cap is reinstalled and tightened prior to operations.
- 2. Check for proper engine oil level.** After checking oil level, wipe dipstick clean of any debris prior to reinserting into spout.
- 3. Check hydraulic fluid reservoir level**, by viewing the sight gauge on the side of the tank.
- 4. Check inside engine compartment for any fluid leakage or debris.** Remove any accumulated debris. NOTE: Be sure the engine covers are replaced and latched in position properly before transport or operating the machine.
- 5. Inspect bullwheel surfaces** for signs of damage or excessive wear.
- 6. Inspect hydraulic systems** - pump, drive motors, cylinders, linkages, and hoses for loose fittings, leaking fluid, and damage or cracks.
- 7. Inspect the battery, terminals, and wires** for any signs of corrosion or damage.
- 8. Close and re-secure all latches**, engine compartments, and panels.
- 9. Inspect for damage**, bent or broken parts, cracked or broken welds, missing pins and retainers.
- 10. Inspect all equipment grounds** for any signs of damage.
- 11. Inspect all jacks** for damage or leaking hydraulic components.
- 12. Inspect connected** reel stands, drive motors, drive bars, drive pins, and reel shaft couplings to ensure they are secure and that there are no obvious signs of damage- if damaged do not operate, service may be required.
- 13. Inspect fairleads and rollers** for any obvious signs of damage, and ensure rollers move freely.
- 14. Check fuel level and battery charge-** With key inserted in master power key switch, turn key to the ON position to activate the display. The fuel level will show on the engine information screen.
- 15. Adjust the operator's seat** to a comfortable position.
- 16. Check surrounding area.**
 - a. Check that there is no combustible material that could be ignited by high temperature exhaust during operations.
 - b. Check that the ground where the machine is located is stable.
 - c. Check that there are no persons in the area around the machine.
- 17. Check windshield washer fluid level.** Reservoir is mounted inside the engine enclosure, on the curb-side of the machine). Remove all dirt from the surface of the window glass to ensure a good view.
- 18. Conduct towing readiness inspection.**

- a. Inspect all trailer connections, and ensure that the hitch is secured, and air supply/electrical hoses and trailer lighting are connected.
- b. Inspect tail lights to ensure all lights work- replace bulbs as needed. If none of the lights work, inspect vehicle fuses and trailer wiring for corrosion.
- c. Ensure that trailer brakes work and that wheel chocks are available.
- d. Check tire pressure- tire pressures are posted on the tire sidewall.
- e. If tire pressure is low, inspect tire for damage or punctures. If damaged or punctured, have repaired or replace.
- f. Ensure that all jacks are raised and that trailer is clean and free from trash or debris.

19. Inspect all Fire Extinguishers.

- a. Inspect fire extinguisher charge, and ensure that gauge shows within charge limits.
- b. Inspect the physical condition of the extinguisher- (cylinder, hose/cone assembly, etc.), for any signs of damage or corrosion.
- c. Ensure that hinge pin is in place, to prevent accidental discharge.
- d. Ensure that the plastic safety seal is secured to hinge pin, and that it has not been removed.
- e. Inspect mounting strap/bracket assembly to ensure extinguisher is secured to structure.

CAUTION: Unless operating in an extreme heat environment, ensure all engine compartment panels are re-secured and latched in position properly before operating or transporting the machine.

3.5 Start Up and Set Up Procedure

- 1) Perform all pre-operation inspections.
- 2) Position the machine in a suitable location for the pull. The drums should be positioned centered on the lead block, and rotation should be parallel to the direction that line is being pulled, prior to beginning operations. Wheels should be chocked to prevent the unit from rolling.
- 3) Ensure that all controls (levers, switches, etc.) are in the neutral and disengaged position (see Operator Controls section). Ensure Emergency Stop switches are in neutral position.
- 4) Ensure the Transport/Parking Brake has been released.
- 5) With the key inserted, turn master power key switch to power the unit. / ENGINE START position; hold briefly (~ 2 seconds) and release.
- 6) Start the Engine. See Master Power Switch and Engine Power Switch section.
- 7) Jacks should be deployed to level and stabilize the unit. (*See Jacks section*).
- 8) Properly ground and anchor the machine to prevent the machine from moving under tension or line load.

CAUTION: All jacks must be extended for stabilization, and the machine must be leveled, anchored, and properly grounded prior to conduction operations.

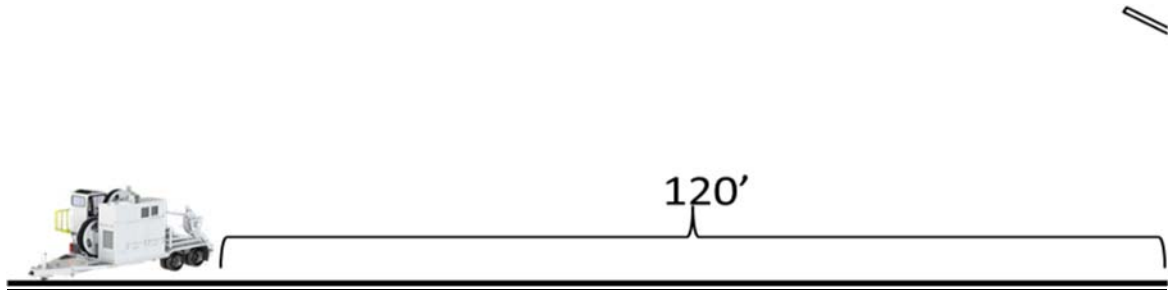
3.6 Towing

1. Make certain tow vehicle has the capacity and rating to tow machine safely.
2. Inspect pintle eye for excessive wear, corrosion, cracked welds or structural damage. Check the bolts holding the pintle eye in place.
3. Inspect tow vehicle hitch and ensure hitch.
4. Make sure trailer brakes are operable.
5. Make sure the unit is safe for towing with tires in good condition and properly inflated.
6. Make sure there are no tools, objects, or trash items which could fall off during transport.
7. Ensure that the reel transport brake is set to prevent the reel/drum from spinning during transport.
8. Ensure that the reel engagement hydraulic cut off valve is set to closed (see Reel Engagement Hydraulic Valve).
9. Chock wheels on both sides of the machine/unit trailer, then start machine/unit engine- (*See Operator Controls and Start-Up Procedure*).
10. Make sure the right and left jacks are fully retracted- (*See Jack Controls*).
11. Open the tow vehicle hitch and back vehicle into position. Set tow vehicle parking brake.
12. Slowly retract trailer nose/hitch jacks, so that the pintle eye rests correctly in hitch strike plate.
13. Ensure the hitch is secured.
14. After the trailer is secured to the vehicle, stop the machine/unit engine, and remove the key from the ignition key switch.
15. For pneumatic brakes, connect all appropriate air hoses for the trailer brakes, and begin charging the trailer air system
16. Connect the electrical plug to the tow vehicle and check:
 - Clearance lights
 - Brake Lights
 - Turn Signals
 - Brakes

3.7 Positioning the Machine

The driver/operator should position the machine in a suitable location where it will be free from obstructions and clear of any obvious hazards. For overhead pulling, the puller should be approximately three times the distance of the lead block height.

Example: If the lead block is 40 feet high, it is recommended that the puller be positioned approximately 120 feet from the base of the pole whenever possible. By allowing the distance to the lead block as specified, this reduces the direct downward forces that would be created otherwise. In some situations, however, it may not be possible to achieve these distances- see note below.



The unit should be leveled as much as possible, centered on the lead block, and parallel to the line being pulled prior to beginning operations.

The operator must chock all trailer wheels and dump the trailer air system prior to operations and any time the vehicle is parked. All appropriate grounding, anchoring, and protective equipment must be installed and secured to machine prior to operations.

NOTE: In some situations, for example; due to rough terrain, it may not be possible to achieve these safe distances from the lead block. In these situations, operators should try and achieve as much distance as possible from the lead block, and be aware of the increased down forces during operations.

CAUTION: Trailer air suspension system should be dumped prior to operating any component of the machine. Follow all posted trailer warnings and safety precautions.

CAUTION: All jacks must be extended for stabilization, and the machine must be leveled prior to conduction operations.

3.8 Operator Control Panels



#	Control
1	Emergency Stop
2	Horn
3	Levelwind Speed Trim
4	Levelwind ON / OFF
5	V-Groove / Bullwheel Toggle Switch *Pull Up when switching
6	Pull Mode ON / OFF
7	Tension Adjust
8	Tension High / Low Force
9	Work Lights
10	Cup or Radio Holder.
11	Summer / Winter switch (Optional)
12	12 V DC Outlet
13	Key Switch
14	Engine On Switch
15	Engine Start Switch
16	Rope Guide Extend/Retract
17	Jack Controls
18	Joystick
19	Joystick Rocker Switch
22	Reel Stand Potentiometer
21	Wiper Control
22	USB Port
23	HVAC Control
24	Alarm Beep Volume



3.9 Operator Controls

3.9.1 Master Power Key Switch

This switch is used to control power to the operator controls and engine. This switch must be turned to the [ON] position to start the machine.

CAUTION: Always ensure that the master power key switch is turned to the [OFF] position when the machine is not in use. If the machine is to be left unattended, remove key from the key switch and stow in a secure place, while also securing the operators cab to prevent any unauthorized access to the controls or operation of the machine.

CAUTION: Before starting the machine or engaging any machine component, read and observe all safety precautions and operational procedures listed in this manual.



NOTE: After the key switch is turned to the [ON] position, the system will begin a start-up phase, where the computer system boots up, and the ventilators, button lamps, and circuits are tested. This process takes approximately 30 seconds.

NOTE: The System will not initiate if any Emergency Stops are activated.

3.9.2 Engine Power Switch

This button controls power to the engine. To turn on power to the engine, first ensure that the master power key switch is turned to the [ON] position, then push the top of the RUN switch. After the engine power is engaged, the button will illuminate, and the engine control device will run through a function check. If the glow plugs are required, they will also engage automatically during this process.

To turn the engine off, or turn off power to the engine, press the bottom RUN switch. If this RUN switch is pressed during the engine start-up process, it will interrupt the start process, the lamp will go out, and the engine will stop.



NOTE: The Engine may continue to run for 7 minutes after switching the Engine Run switch to off. This is to regenerate the diesel particulate filter. Do not use the Master Power Key Switch to turn off the Engine, but wait for it to shut down. After the engine shuts down, turn off the Master Power Key switch in order to shut down all system power.

3.9.3 Engine Start Switch

This rocker switch, when pressed, will start the engine. However, the Engine RUN light must be on, indicating that the engine is ready to be started.

NOTE: If an engine error occurs, the engine will be stopped automatically by the system control- (see System Control Panel section).

NOTE: The starter engagement is limited in time by the engine control system to reduce drain on the battery charge. If the engine starter engagement times-out, repeat by pressing the [START] button again.

3.9.4 Emergency Stop Button

There are three (3) Emergency Stop Buttons located on the unit – one in the cab, one on each side adjacent to the reel stand. When pushed, this red push button stops all operation functions, turning off system and engine power, while disengaging all controls. After being depressed, the button must be rotated and released to the disengaged position to restore power to the system and re-engage operator controls.



NOTE: The emergency stop button should only be used to stop the machine in an emergency situation where there poses a risk of injury or death to personnel or to prevent equipment or property damage. When this button is pushed, line tensions can change rapidly. For more information on emergency shut down situations- (see the *Emergency Stop Procedure*).

3.9.5 Support Jacks

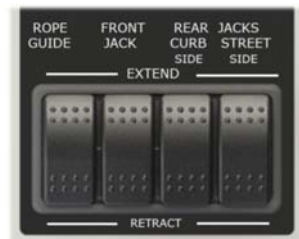
The PTV-6013 has three (3) hydraulically actuated jacks for leveling the unit; two (2) rear/bumper jacks and one (1) front/tongue jack. The engine must be turned on and running to use the jack controls. Each jack is operated from inside the cab at the system control panel. The jacks will not work unless the machine is in neutral.

To operate the jacks:

- 1) Press the Jack function key in the Display (third button from left).
- 2) Now the user can push one of the buttons for the support jacks.



Ensure that all jacks are fully raised and clear of the ground before towing the trailer.



Exterior Jack Switches

There are also exterior jack switches that can be used to level the machine. The machine must be turned on a running for the hydraulic jacks to work. There is a jack switch located on the tongue and the two (2) rear/bumper jacks can be controlled from two (2) switches located on the StreetSide fender, adjacent to the Emergency Stop switch.

CAUTION: Crush Hazard. Stand clear of the jacks when they are being extended or retracted.



NOTE: Product images shown are for illustration purposes only and may not be an exact representation of your product. Actual product may vary due to product enhancement and improvement.

3.9.6 Lift / Lower Reel Stand

The PTV-6013 is equipped with a self-loading reel stand which is operated by a switch located on the StreetSide fender, adjacent to the Emergency Stop and rear jack switches.



3.9.7 Seat Switch

The unit is equipped with a seat switch for safety reasons, to monitor the presence of the operator.

If, during operations, pulling or paying out, the operator vacates the seat for longer than 10 seconds, the control system reacts as follows:

- The Display will indicate with a large blue icon for the seat switch.
- In pulling mode (via bull wheel or via V-groove):
 - The bull wheel drive or the bull wheel with the V-groove will be stopped and the brake set. As long as the operator is not sitting in the seat, no rope will be pulled in or paid out.
- In tensioning mode:
 - The machine will automatically default to the maximum tensioning force. Only if the user is sitting down on the seat can the tensioning force can be reduced.

CAUTION: The abrupt operational change initiated by the seat safety switch may have consequent effects on operations.

3.9.8 Reel Transport / Parking Brake

Before transporting the PTV-6013, the Reel Transport / Parking Brake should be applied by utilizing the pictured crank, located on the StreetSide of the reel stand. Turn clockwise to apply, and counter-clockwise to release.

NOTE: Be certain to release this transport/parking brake before operations.



3.9.9 Joystick Control

Dependent upon the mode selected, the joystick can control the levelwind position, bull wheel, line speed and tension. Once the operational Mode is selected the operator can control the drum speed/tension and direction using the joystick.

The joystick is used in Pull Mode to control the bullwheel/line speed and direction.

- To pull in the line, pull backward (toward the operator) on the joystick.
- To payout the line, push forward (away from the operator) on the joystick.



The farther away from the center point the joystick is moved in either direction, the faster the bullwheels will turn, thereby increasing line speed. To slow the line speed from either payout or pulling directions, move the joystick closer to the center point.

Once the joystick reaches the neutral/center position, the bullwheel motion and line speed will stop, and the hydraulic brake will set.

3.9.10 Hydraulic Brake Release

By default, the brake should be set to ON when the machine is first started up. To disengage the hydraulic brake, simply depress the joystick trigger and move the joystick forward or back to begin rotation of the bullwheels. There may be a pause while the system builds up hydraulic pressure.

To set the brake, move the joystick to the center/neutral position with the trigger released. The process for setting the hydraulic brake is the same for both [PULL] and [TENSION] Modes

3.9.11 Levelwind Control

The PTV-6013 is equipped with an automatic Levelwind. When in Pull Mode, the levelwind is used to ensure that rope is wound evenly onto the drum. The faster the rope drum turns the faster the Levelwind moves.

The direction of the Levelwind automatically changes at each of the end points, which are set by the operator prior to operations (See next section: Setting Levelwind Points). The levelwind endpoint position must correspond with the rope drum's width. At the control panel in the cab, the operator can change the moving direction and speed of the Levelwind at any time.



The Levelwind must be parked to the right (StreetSide) off the drum during Tension Mode. **The PTV-6013 will not tension until the Levelwind is "parked" to the far right, from the operator's perspective, of the reel.** Using the thumb rocker switch located on the joystick, the operator can adjust the location of the Levelwind into the "parked" position.

Levelwind control and direction change

The operator can also manually position Levelwind using the Lateral Rocker Switch located on top of the control Joystick. To move the levelwind left, push and hold the rocker switch to the left. To move the levelwind to the right, push and hold the rocker switch to the right. When the switch is released, the motion will stop.



NOTE: The levelwind is automatically controlled; however, the operator will need to set the lateral "stops" to align with the size reel on the unit. The initial starting position and direction of the levelwind must also be set to align with the rope or line.

Setting Levelwind Stops

AS the PTV-6013 can be utilized with various size reels, it is necessary for the operator to set the lateral limits or "Stops" for the levelwind head. These are electrical sensor stops, the position of which is set by hand at the levelwind mechanism.

These "Stops" on each side are adjusted by loosening the pictured red handle, sliding the stop along the slot and retightening the Stop Handle so that it is in line with the edge of the reel or drum.

CAUTION: Loosen the red handle no more than one or two turns - only as much as needed to slide the stop. If the screw is over loosened, it will come out of the slide plate and need to be reinserted and threaded into the plate.



Levelwind Stop Handle

Parking the Levelwind for Tensioning

1) Remove the line from the Levelwind Head.

- a) Loosen the two large wingnuts on the bottom side of the levelwind head.
- b) Slide open the entry plate.
- c) Remove the line
- d) Slide closed the entry plate
- e) Retighten the wingnuts.




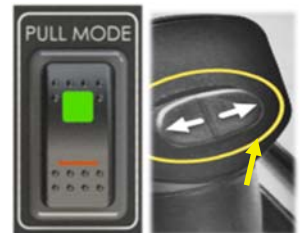
- 2) **Move the Levelwind Stop:** Loosen the Streetside (right side if looking out of the operator's seat) Levelwind Stop Handle and move it to the furthest outside portion of the slot, as pictured.



"Parked" Levelwind Stop

3) Park the Levelwind

- a) The engine must be running.
- b) The unit in [Pull Mode], indicated on screen by this symbol. 
- c) At the joystick press the right side of the thumb-rocker switch to move the Levelwind to the right end stop.
- d) At the joystick, **again** press the right side of the thumb-rocker switch to move the Levelwind to the "parked" position. The Levelwind will move another 1/2 inch~ to the "parked" position and stop there.
- e) Turn off [Pull Mode].



"Parked" Levelwind Head

To bring the rope guidance back from "parked" position, reverse the preceding instructions.

3.9.12 Reel Engagement Hydraulic Valve

The PTV-6013 is equipped with a Reel Engagement Hydraulic Valve, located on the StreetSide of the reel stand. This valve can be opened to bypass the reel hydraulic motor. When the valve is closed, the motor is engaged.



Valve closed – Motor engaged



Valve open – motor disengaged

WARNING: When the line is being driven out with a truck or other off road vehicle, ensure that the payout vehicle has completely stopped prior to returning the joystick to the center neutral position to set the brake. Otherwise, serious personal injury and/or equipment damage will result. Also, limit off road vehicle speed to account for sudden accidental changes in line tension.

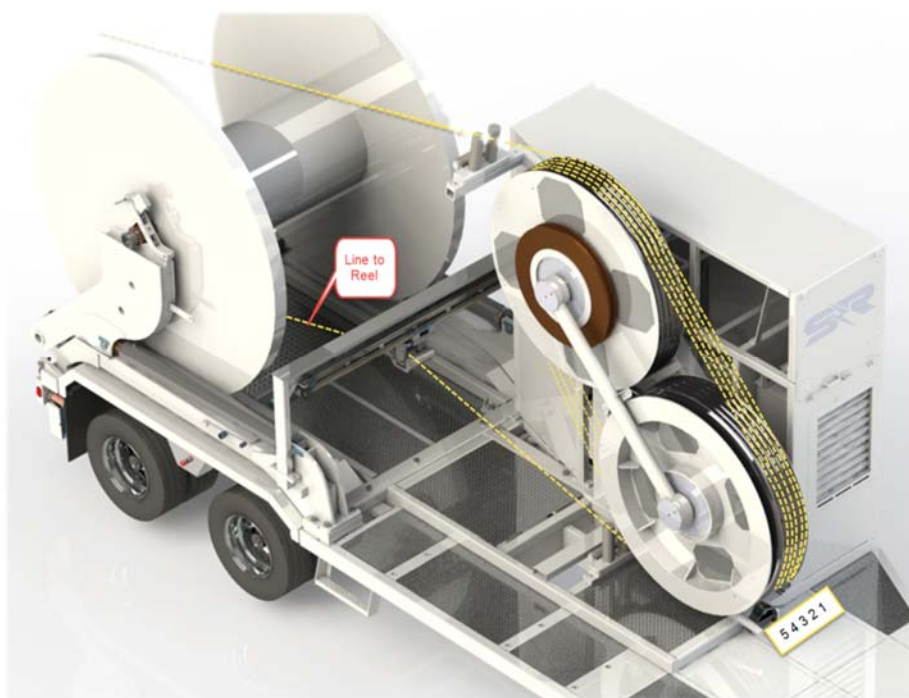
WARNING: Never touch a fast-moving rope or conductor, whether energized or not. If clothing or gloves are snagged by moving conductor/rope, this machine has more than enough force to pull a person into a fairlead or bullwheels. All precautions should be taken by cordoning off all line paths and operating areas. Signs and barriers should be used where applicable, and in accordance with safety regulations. Machine operators should maintain visibility of all operating areas, using line of sight, cameras, or spotters- where applicable, and be ready to react in the event of an emergency.

3.9.13 Reeving the Bullwheels

The PTV-6013 ships with a yellow nylon reeve line rove through the bullwheels. This yellow nylon reeve line can be tied onto in order to correctly reeve a line/conductor.

To reeve a line around the bullwheels, start by wrapping the line in the path outlined below.

Start from the StreetSide groove, adjacent to the engine, of the top (rear) bullwheel going downward toward the tongue and lower bullwheel – wrapping clockwise around both bullwheels from the top (rear) – wrapping from the groove adjacent to the engine towards the groove adjacent to the cab with each successive wrap. Reeve from adjacent to the engine towards the center of the machine.



Line passes through the Levelwind when in Pull Mode.



WARNING: Shut down the machine prior to manually reeving the bullwheels. Workers should take care to avoid pinch points.



3.10 Operational Modes

NOTE: Before beginning operations, the operator should perform all pre-operation inspections. (See *Pre-Operation Inspection Checklist*.) Pre-operation inspections are important for the safe operation of the machine and are required under OSHA Regulations.

Sherman + Reilly™ PTV-Series Puller-Tensioner utilizes hydraulically driven motors that apply up to 13,000 lb of pulling force to the pulling line. In the Tension Mode, the PTV is capable of 8,000 lb of tension.

3.10.1 Pull Mode

Pulling mode via bull wheel drive

In this operating mode both bull wheels are driven if the operator moves the joystick. This operating mode is intended for winding up rope that is running around both bull wheels.

The brake is automatically applied when the joystick is in the center/neutral position. If the operator does not move the joystick, the brake will remain applied to both bull wheels. Once the operator determines a direction for the line transport and releases the brake, both brakes will be hydraulically released and then the bull wheels are driven hydraulically.

With the trigger depressed the operator can rotate the bullwheels forward to payout the line by pushing the joystick forward.

The joystick trigger should always be released once the hydraulic brake is released or after crossing over neutral to begin forward payout rotation—see BRAKE ON/BRAKE OFF Section.

The joystick itself can be released once the desired line speed is achieved, and it will stay in place. This allows the operator to set the line speed for extended operations, without the need to constantly hold the joystick in position. To stop rotation at any time, return the joystick to the center neutral position with the trigger released.

To rotate the bullwheels backward and pull in the line, depress the trigger and pull the joystick backward toward the operator. To stop the drum at any time, return the joystick to the center neutral position with the trigger depressed.

Switching to Pull Mode

When the unit is powered on, by default, it is Pull Mode. If the unit is in another mode, to switch to Pull Mode:

- 1) Confirm that the bullwheels are motionless and the brake is applied.
- 2) Press the “Pull Mode” switch.
- 3) Confirmation: “Pull Mode” LED is illuminated.

To wind or unwind line, depress and hold the joystick trigger and move the joystick in the desired direction – forward to payout; back to pull in.



3.10.2 Pulling mode via V-groove

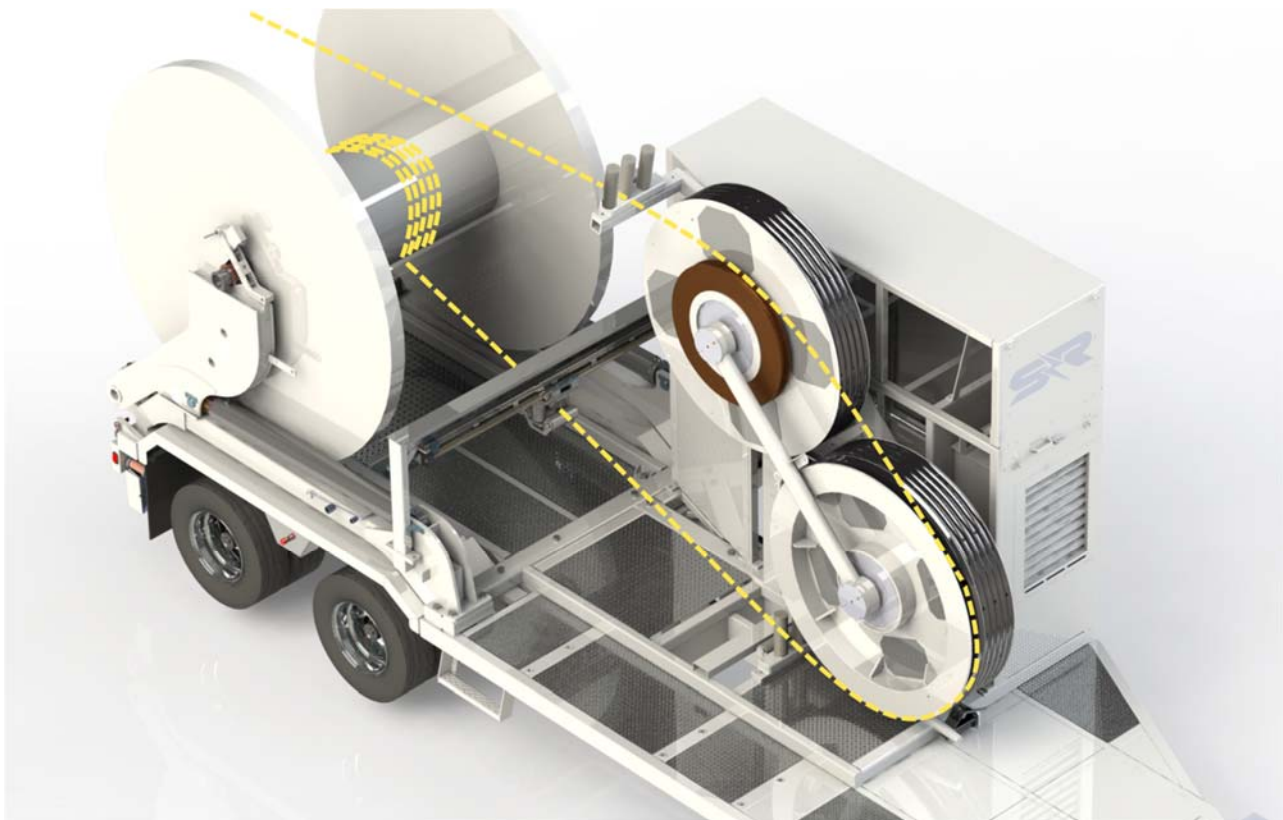
In this operating mode only the lower bull wheel (with the V-groove) is hydraulically driven, if the operator releases the brake. This operating mode is only intended for winding up old line via the V-groove to the drum stand. The brake remains applied to the upper bull wheel at all times during this mode.

NOTE: The V-Groove / Bullwheel toggle switch is designed so that it cannot accidentally be switched. The switch must be pulled up in order to switch between modes.



WARNING: Do not switch to Tension Mode while using V-Groove Mode to wreck conductor. Switching to Tension Mode from V-Groove Mode while wrecking conductor will cause the bullwheels to spin freely. This will release and drop the conductor. Line or conductor must first be reeved around the bullwheels for Tension Mode.


The old conductor runs across the idler sheave as pictured, then around the V-groove portion of the lower bullwheel, to then be wrapped on the reel.



Pulling via V-Groove

3.10.3 Tensioning mode

The PTV-6013 has two (2) separate tensioning modes:

1) High Force Tension – 1800 lb to 8000 lb. 

2) Low Force Tensioning. 500-2200 lb. 

NOTE: Low Force Tension Mode should be utilized for applications under 2200 lb - for conductors with lower tensile strength such as fiber optic cable.



When in either of these tension modes, the machine is designed to hold line/conductor being unwound (pulled) from the drum at a consistent tension by another machine and bull rope. In this mode, the conductor or line must be guided around both bull wheels for the tensioning function to operate as designed.

Switch to HIGH FORCE Tension Mode: 1800 lb to 8000 lb.

When the unit is powered on, by default, it is Pull Mode. To switch from Pull Mode to Tension Mode, do as follows:

- 1) Confirm that the bullwheels are motionless and the brake is applied.
- 2) Confirm that the line is removed from the levelwind head.
- 3) Confirm the Levelwind is "Parked" at the far-right sensor (as viewed from the cab. (see previous section **Parking the Levelwind for Tensioning.**)



- On the left console, press the "Tension Mode" button in towards HIGH FORCE.
 - The indicator LED associated with HIGH FORCE tension force begins blinking.
 - The bullwheel brakes are still applied and the bullwheels are motionless.
- 4) Set the **BULLWHEEL Potentiometer** to the desired tensioning force.
 - 5) Press the Tension Mode button again towards HIGH FORCE.
 - The unit will release the bullwheel brakes and hold the tensions set at the potentiometer. The approximate tension value is indicated on the display.
 - Confirmation: "High Tension Mode" LED is illuminated.



- 6) **TO STOP** tensioning and apply brakes onto the bullwheels, press the PULL MODE button to deactivate tensioning.



Switch to LOW FORCE Tension Mode: 500 lb to 2200 lb



When the unit is powered on, by default, it is Pull Mode. To switch from Pull Mode to Tension Mode, do as follows:

In low force tensioning mode, the machine is working optimized for low tensioning force (500-2200 lbs). In the LOW FORCE operating mode, the force is dependent upon the position of the potentiometer and the speed. The force is displayed correctly only if the bullwheels are moving.

WARNING: Only switch to low force tensioning mode when low or no load is applied. If the safety brake is released while supporting too much load the rope will run out uncontrolled.

- 1) Confirm that the bullwheels are motionless and the brake is applied.
- 2) Confirm that the line is removed from the levelwind head.
- 3) Confirm the Levelwind is "Parked" at the far right sensor (as viewed from the cab. (see previous section **Parking the Levelwind for Tensioning.**)



- Press the "Tension Mode" button in towards LOW FORCE.
 - The indicator LED associated with LOW FORCE tension force begins blinking.
 - The bullwheel brakes are still applied and the bullwheels are motionless.
- 4) Set the **BULLWHEEL Potentiometer** to the desired tensioning force.
 - 5) Press the Tension Mode button again towards LOW FORCE.
 - The unit will release the bullwheel brakes and hold the tensions set at the potentiometer. The approximate tension value is indicated on the display.
 - Confirmation: "Tension Mode" LED is illuminated.



NOTE: The bullwheels stop slowly in LOW FORCE tension mode. The operator can anticipate in advance and plan for the delayed or slow stop. Alternatively, there are options for stopping more quickly. See the following section.

Options for stopping the bullwheels more quickly:

1. Increasing the BULLWHEEL Potentiometer that controls the tension level to bring bullwheels to a stop. This will increase tension on the line.
2. Increasing REEL STAND Potentiometer to increase the line tension on the drum stand potentiometer to assist the bullwheels in stopping.

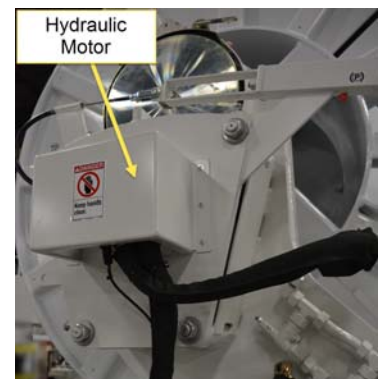
CAUTION: This could potentially bury the cable into the drum stand as well as snap the cable by increasing the drum pressure too much with a small diameter reel scenario. This should be used as a last resort if necessary and only if the cable can take the back tension on the drum stand with no issues.

3. Pressing the Pull Mode Switch and engaging the brakes on the bullwheels bringing the line to a stop and disengaging tension mode.

CAUTION: This will cause the brake to be applied to the bullwheels and will result in a sudden stop. Exercise caution to ensure the pulling unit is not pulling line while attempting to disengage low force tension. The operator must communicate with pulling operator to ensure pulling has stopped.

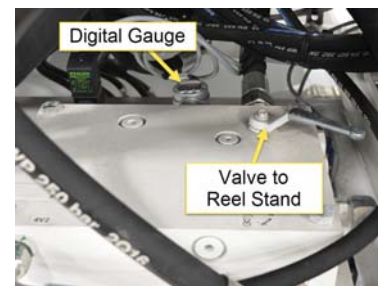
3.10.4 Reel Stand Tension Control

The torsion of the reel stand integrated on the PTV is controlled by hydraulic pressure applied to the drive motor mounted on the lifting arm located on the street side of the machine.

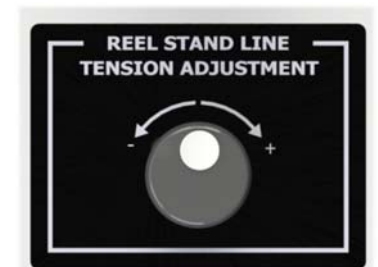


The valve providing pressure to this motor is located at the bottom right corner of the power pack, while viewing from the street side of the machine.

The reel stand valve has a digital gauge on the valve that should read between 45 -250 bar based on the potentiometers position.



The pressure to the valve is controlled by the electronic potentiometer located on the right-hand control panel in the operator's cab labeled "Reel Stand Line Tension Adjustment".



3.10.5 Rope Guide Operation

The rope guide located above the bullwheels



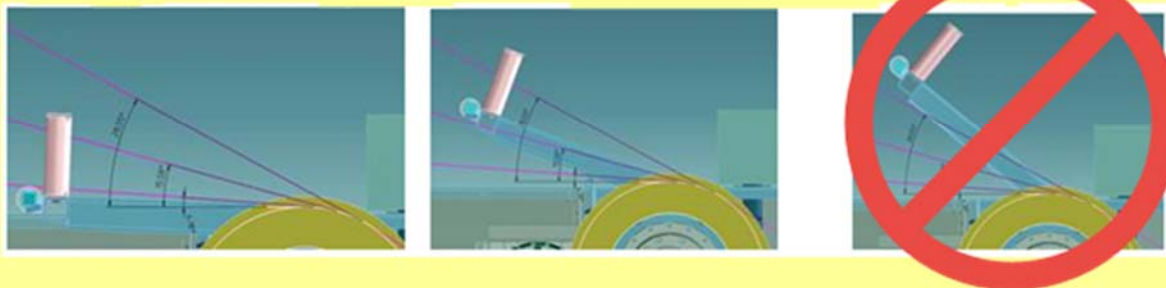
The rope guide switch, located on the right hand control panel in the cab, controls the extension of the guide

The primary design of the rope guide is to control lateral guidance of the conductor going into the bullwheels.

NOTE: The bottom roller of the rope guide should only be touching the conductor with light pressure during operation. Heavy pressure may bend the extension cylinder.



CAUTION: The rope guide is only made to with stand 2300 lbs of linear vertical compression, Overloading the cylinder will result in bending of the cylinder. Cylinder should only be extended less than halfway under any loading application. See image below.



3.10.6 Selective Catalytic Reduction (SCR) Regeneration (ReGen)

To promote a cleaner environment and adhere to EPA guidelines, the PTV-6013 employs a T4 Diesel Engine that utilizes a Selective Catalytic Reduction (SCR) system to remove undesired combustion gas from the exhaust system. This system uses a Diesel Exhaust Fluid (DEF) to react with and change the oxides of nitrogen (NOx) emissions.

The dosing cabinet mixes the right dosage of compressed air and urea drawn from the urea tank and transfers it to the SCR module where it is injected in to the exhaust stream. In the SCR module water evaporates and the urea is converted into NH₃. When ammonia comes in contact with the SCR catalyst there is a reduction in NOx. The final output is carbon dioxide, nitrogen, water and oxygen.

During normal operation, the SCR system functions automatically (passive regeneration). However, after certain operating conditions, the engine will require active regeneration. During active regeneration, the unit cannot be operated for pulling or tensioning during the regeneration process.



The Control System will indicate the need for active regeneration by displaying a blinking DPF icon.

The operator will need to instruct the control system to perform an active regeneration by touching the soft key associated with the ReGen icon. The function key icon will change to green color and the active regeneration starts. During active regeneration, tensioning and pulling are not possible.

The active regeneration lasts 30 to 45 minutes. During regeneration the DPF ReGen icon lights continuously. After regeneration the indication symbol and the soft key in the taskbar disappear.

To Perform Active Regeneration

- ✓ At the upper edge of the Display the information icon for active regeneration is flashing.
- ✓ At the lower edge of the Display the icon for Active regeneration is displayed.
- ✓ The engine is running.
- ✓ Machine is not in operation.
- ✓ The coolant temperature is at least 167° F (75 °C). If necessary, let the engine warm up.
- ✓ The machine is positioned with sufficient safety distance to any combustible material.
- ✓ During the next 30 to 45 minutes neither higher exhaust temperatures nor higher noise level will create a problem for the environment.



1. At the Display press the function key Active regeneration.

- The engine's control performs the active regeneration.
- The rotational speed of the drive engine increases.
- The exhaust temperature increases. The corresponding icon is shown in the display.
- Until active regeneration is complete the icon for the DPF function is lit green.

After active regeneration is complete (about 30 minutes) the control reduces the rotational speed of the engine to idle speed. The icons for active regeneration are no longer shown in the Display.

CAUTION: HIGH EXHAUST TEMPERATURES during Parked Regeneration. Always monitor the surrounding area during ReGen. Be sure that exhaust will not come into contact with any combustible materials. Do not operate the unit during a Parked ReGen, this will abort the process.

Interrupt

CAUTION

It is recommended that Active Regeneration not be interrupted, except in the case of an emergency.

To interrupt a running active regeneration, do the following:

1. At the Display press the function key Active regeneration.
 - The active regeneration is interrupted.
 - The icon for the function key Active regeneration flashes red.
 - To continue the active regeneration directly press the function key again.
 - To continue the active regeneration later proceed as described above.



CAUTION: HIGH EXHAUST TEMPERATURES during Parked Regeneration. Always monitor the surrounding area during ReGen. Be sure that exhaust will not come into contact with any combustible materials. Do not operate the unit during a Parked ReGen, this will abort the process.

3.10.7 Diesel Exhaust Fluid

Diesel Exhaust Fluid (DEF) is a precisely mixed solution of 32.5% high purity chemical grade urea and 67.5% de-ionized water that is injected into the exhaust system to reduce NOx emissions in Cat® engines equipped with a Selective Catalytic Reduction (SCR) system. DEF used in Cat SCR systems must meet the requirements outlined in the International Organization for Standardization (ISO) standard 22241-1. ISO 22241-1 requirements are met by many brands of DEF, including those that carry the AdBlue or API certifications.

On Sherman+Reilly™ products equipped with Cat® engines with a SCR system, DEF consumption is approximately 2-3% of fuel consumption depending on the product and application. **The DEF tank has a 1:1 fill rate with the fuel tank. If fuel is added, DEF needs to be added.** The DEF fill cap is an industry standard blue and easily identifiable on the product.



DEF should be stored in a cool, dry, well-ventilated area. The ideal storage temperature for DEF is between 15°F and 77°F (-9°C and 25°C). It should not be exposed to direct sunlight for long periods of time as the urea will decompose. Refer to ISO 22241-3 for further information regarding DEF handling, transportation and storage.

CAUTION

- DO NOT use any other fluid in the DEF tank, such as diesel fuel, water, antifreeze, beverages, etc. Only use DEF that meets ISO 22241-1 standards.
- DO NOT use additives to prevent freezing.
- DO NOT make your own DEF solution. DEF must meet the ISO 22241-1 standard to prevent potential SCR system damage.
- DO NOT use incorrect dispensing materials, such as metal funnels, steel transfer containers, incorrect pumps, steel fittings, etc. Only use materials specifically designed for DEF.
- DO NOT use contaminated transfer containers. Only use clean containers that are dedicated for DEF.
- DO NOT fill the DEF tank without first cleaning the fill area.
- DO NOT store DEF in direct sunlight or in high ambient temperatures.
- DO NOT operate Cat® products requiring DEF with an empty DEF tank. Always fill the DEF tank when refueling the product.
- DO NOT turn off the master disconnect until the "wait to disconnect" lamp turns off, unless an emergency

requires immediate battery isolation.

CAUTION**Handling DEF**

Follow all local regulations covering transport and handling. All transfer equipment and intermediate containers should be used exclusively for DEF. Containers should not be reused for any other fluids. Ensure that transfer equipment is made from DEF-compatible materials. Recommended materials for hoses and other non-metallic transfer equipment include: Nitrile Rubber (NBR), Fluoroelastomer (FKM), Ethylene Propylene Diene Monomer (EPDM). The conditions of hoses and other non-metallics that are used with DEF should be monitored for signs of degradation. DEF leaks are easily recognizable by white urea crystals that accumulate at the site of the leak. Solid urea can be corrosive to galvanized or unalloyed steel, aluminum, copper, and brass. Leaks should be repaired immediately to avoid damage to surrounding hardware.

DEF cleanliness is extremely important as contaminants can degrade the life of DEF and SCR system components. Several points to consider are:

- Clean the fill area prior to refilling
- Filtering DEF is recommended by CAT® when dispensed into the DEF tank. Filters should be compatible with DEF and used exclusively with DEF.
- Avoid transfer containers when possible. If transfer containers are used, keep the container clean and dedicated for DEF
- Poor handling practices will contaminate the DEF supply and potentially lead to fault codes and emission system failures.
- Spills should be cleaned immediately. Machine or engine surfaces should be wiped clean and rinsed with water. DEF is corrosive.
- Caution should be used when dispensing DEF near and engine that has recently been running. Spilling DEF onto hot components will cause harmful vapors.

For more information, see the Cat® Engine Manual.

NOTE: Cat® recommends adding Diesel Emissions Fluid (DEF) every time fuel is added to the fuel tank.



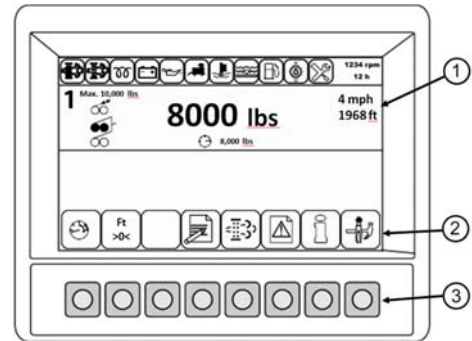
4 System Control Panel and Operations

Components The system control panel consists of the display - ① and eight (8) function keys - ③.

Display In the display the system control system displays the different function screens

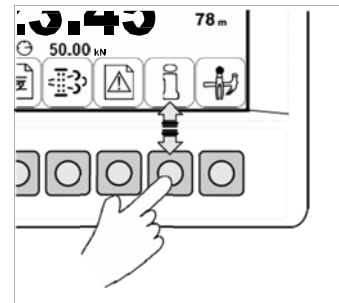
Function keys ③: The eight (8) function keys will open other screens or issue commands to the system.

These function keys can have different functions in each screen. The system control panel displays the assigned functions at the lower margin of the display above each function key (Item ②). If a function is assigned to a function key the button is illuminated.



Example:

In this example the operator presses the function key for which the Information icon is assigned in the display.



4.1.1 Information icons at the display

(Depending on the type and equipment of the machine some of the following icons will not be displayed.)

Icon	Meaning
	HIGH FORCE Tensioning mode LOW FORCE
	Pulling mode
	First set the reel engagement hydraulic valve lever to pulling mode then start the machine.
	Connection to the display is interrupted.
	Torque switch: Tensioning force too high.
Max. 8,000 lbs	Torque switch: Max. possible force.
	Pulling mode: Set value for overload protection. Flashes yellow: Overload protection reduces the pulling force. Flashes red: Overload protection has switches off the machine operation.

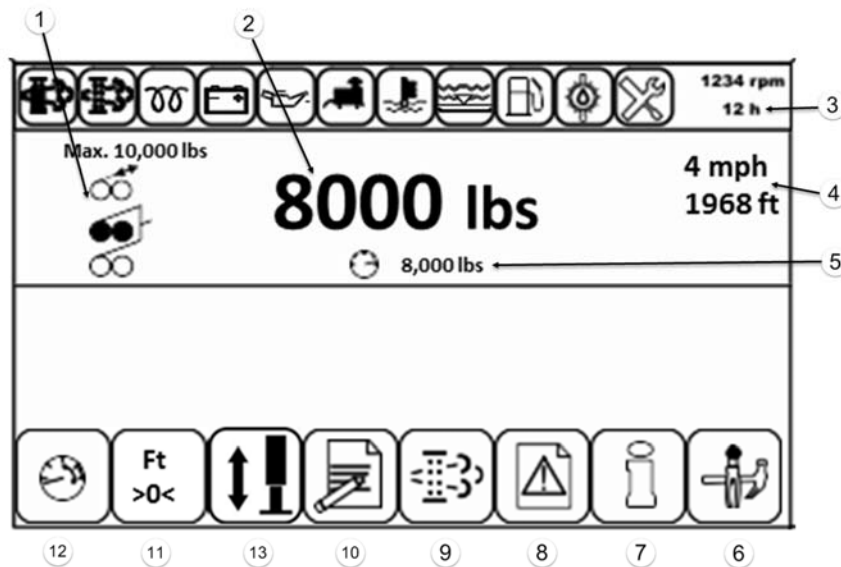


8,000 lbs

Pretension regulation is active. Aside: Nominal value set.

4.2 Main Screen

Information related to any ongoing operations is displayed on the System Control Screen.



#	Function
①	Operating mode and further information. See next table.
②	Current pulling or tensioning force. The indicated value is rounded and is to be regarded as orientation because it can vary from the actual force value.
③	Rotational speed and operating hours for the engine.
④	Current stringing speed and rope length installed.
⑤	Set value for overload protection. Is displayed in pulling mode only.
⑥	Open the "Settings" screen.
⑦	Open the "Information" screen.
⑧	Open the "Error display" screen. Icon is lit yellow: At least one error message available.
⑨	Perform or interrupt regeneration.
⑩	Start or stop recording.
⑪	Reset the feet counter.
⑫	Open the "Overload protection" screen.
⑬	Leveling Jacks - Start mode

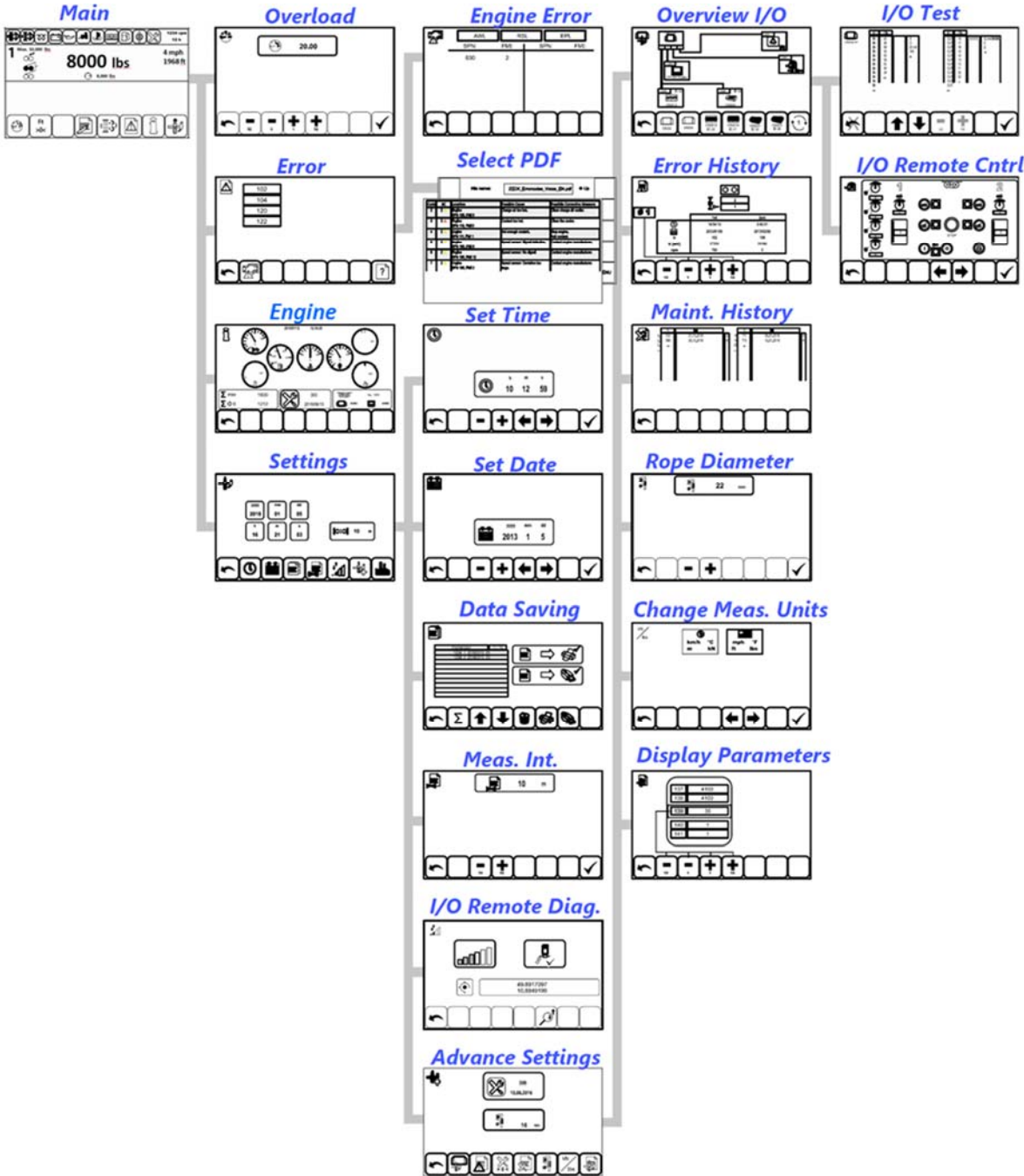
4.3 Screen hierarchy

This overview illustrates the most important screens. All screens can be opened either directly or via other screens from the main view.

The Main view is the central screen from which the operator can open all other screens.

When the machine is restarted, the machine control system first displays the initial screen and then the main view.

**Not all screens appear on all units.*



4.3.1 Set overload protection

The "Main view" screen is opened.

1. Press Overload function key.

The "Overload protection" screen is open.

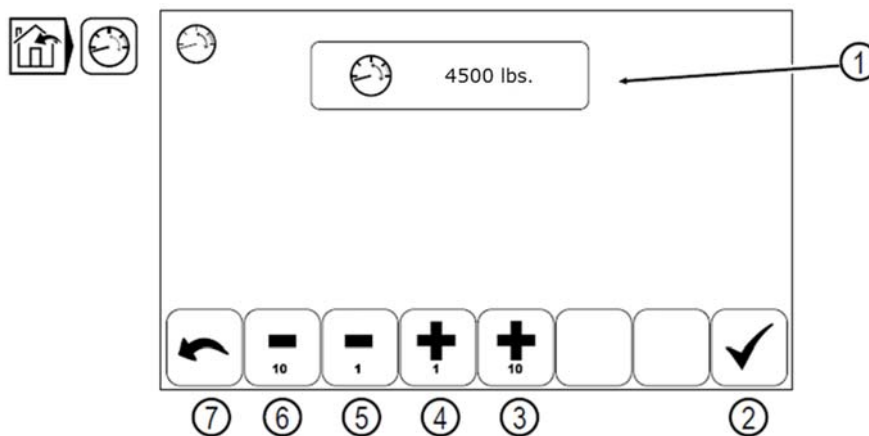
2. Cancel setting: Press left function key. The display returns to the main view. Changed values are not accepted.

If the engine is running and for 10 seconds no function key is pressed the display automatically returns to the main view.

3. Change the value: Press function keys or
4. Accept displayed value: Press right function key.



"Overload protection" screen



#	Function
①	Value for overload protection.
②	Accept value and return to previous screen.
③	Increase value by 1000.
④	Increase value by 100.
⑤	Reduce value by 100.
⑥	Reduce value by 1000.
⑦	Back to previous screen.

4.3.2 Reset counter

The "Main view" screen is opened. 1. Press Reset Counter function key. → Feet counter is reset to zero.



4.3.3 Error Display

The "Main view" screen is opened.

1. Press  function key.

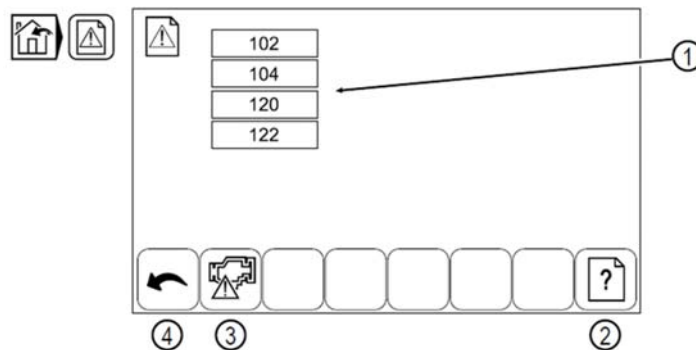
→ The "Error display" screen will be opened.

→ The error codes of current machine errors are displayed.




If the engine is running and for 10 seconds no function key is pressed the display automatically returns to the main view.

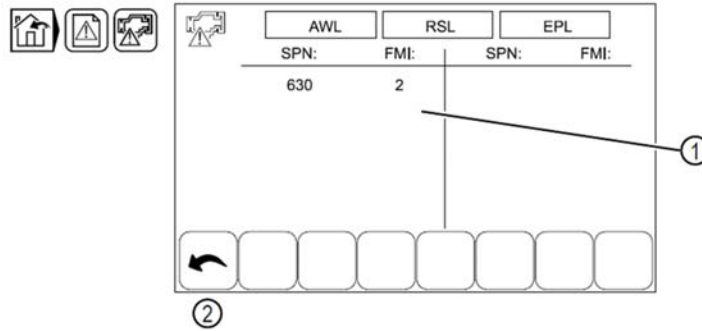
Error Display screen



#	Function
①	Error codes of current errors.
②	Open the "Error codes help" screen.
③	Open the "Engine error" screen.
④	Back to previous screen.

4.3.4 Engine Error screen

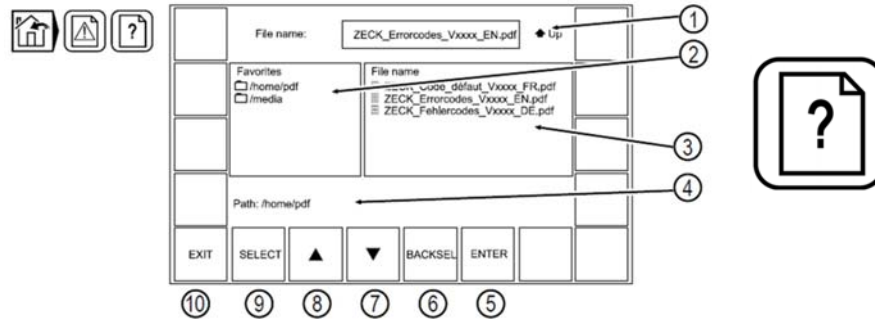
Display special engine errors: Press  function key. If this icon is not visible this function is not available for the machine's engine.



#	Function
①	Flashing codes and error numbers SPN and FMI of the errors reported by the engine control. Meaning of error codes: See instructions for drive engine.
②	Back to previous screen.

4.3.5 Error codes help screen

The meaning of the error codes is summarized in a list. This list is included in the back of this manual and saved in the display as PDF file. To open, first start the PDF display module, then select and display the PDF file with the error codes in the chosen language.



#	Function
①	Name of the selected PDF file.
②	Overview of lists.
③	Overview PDF files.
④	Current file path.
⑤	Open selected PDF file (ENTER).
⑥	Back (BACKSEL).
⑦	Down (DOWN).
⑧	Up (UP)
⑨	Select (Select)
⑩	Back to previous screen.

4.3.6 List of Error Codes

To access the control panel at any time while the machine is running proceed with one of the following: Memorize or make a note of the occurred error code. Stop the machine, stop the engine and then open the display "Help for error codes".

Or:

Read the meaning of the error codes in the list included in these instructions.

Start PDF display module The "Error display" screen is opened.



1. Press function key .
 - The "Error codes help" screen will be opened.
2. Select "OPEN NEW PDF-FILE" with the function keys (arrows).
3. Press function key ENTER.
 - The "PDF file directory" screen will be opened.

Select PDF file

1. Select the favored PDF file with the function keys (arrows). The last two letter of the file name indicate the file's language.
2. Press function key ENTER.
 - The selected PDF with the error codes help is displayed.

Use the function key "Page +" and "Page -" to browse in the PDF file.

Code	EC	Location	Possible Cause	Possible Corrective Measure
2	2 ▲	Engine SPN 105, FMI 0	Charge air too hot.	Clean charge air cooler.
3	3 ▲	Engine SPN 110, FMI 0	Coolant too hot.	Clean the cooler.
4	2 ▲	Engine SPN 111, FMI 1	Not enough coolant.	Stop engine. Add coolant.
5	2 ▲	Engine SPN 190, FMI 8	Speed sensor: Signal defective.	Contact engine manufacturer.
6	2 ▲	Engine SPN 190, FMI 12	Speed sensor: No signal.	Contact engine manufacturer.
7	2 ▲	Engine SPN 190, FMI 2	Speed sensor: Deviation too large.	Contact engine manufacturer.

EXIT						PAGE -	PAGE +
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Quit PDF display module

1. To quit the PDF file, press the "Exit" function key.
 - The "PDF file directory" screen will be opened.
2. Press MENU function key.
 - The "Error codes help" screen will be opened.
3. Select "RETURN TO APPLICATION" with the function keys (arrows).
4. Press function key ENTER.
 - The Display program starts again. The initial view is displayed for a few seconds.
 - After the Display started again the "Main View" screen is displayed.

Display temporarily blocked

When the operator ends the PDF display, the machine control system restarts the display, displaying the initial screen.


When displaying PDFs or during the restart of the display, the machine can be controlled as usual via the system controls. During this time, the machine control does not display any information, warning or status messages.

Please bear in mind that switching from the display of "Help for error codes" to normal display takes a few seconds.

4.3.7 Display Information Screen

Main View → → "Information" Screen

In this screen:

- View important operation parameters and information.
- 1. Press  function key.
- →The "Information" screen will be opened.
- If the engine is running and for 10 seconds no function key is pressed the display automatically returns to the main view.



4.3.8 Open Settings screen

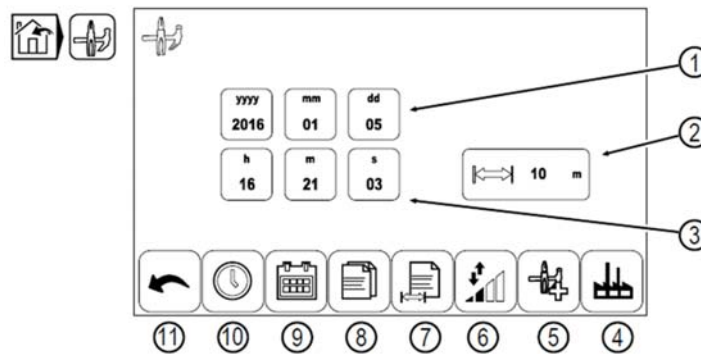


The "Main view" screen is opened.

1. Press  function key.

→ The "Settings" screen will be opened.

If the engine is running and for 10 seconds no function key is pressed the display automatically returns to the main view.



#	Function
①	Set date
②	Set metering point interval
③	Set time
④	Open factory menu (only for manufacturer)
⑤	Open the "Advanced settings."
⑥	Not applicable
⑦	Open "Measuring point interval" screen
⑧	Open the "Data saving"
⑨	Open the "Date" screen
⑩	Open the "Time" screen

4.3.9 Factory Menu

The factory menu is password protected. Only the manufacturer is allowed to access the factory menu.



4.3.10 Setting Measuring Point Interval


The measuring point interval determines in which distances pulling data will be measured and recorded. On the PTV, the measuring point interval is a length indication (rope length installed in feet or meters).




✓ "Settings" screen is opened.

1. Press  function key.

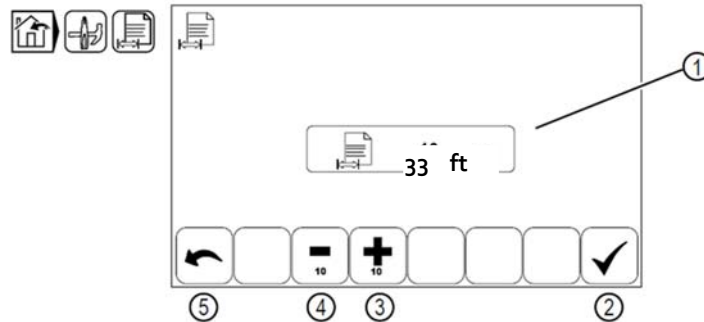
□ The "Measuring point interval" screen will be opened.

2. Cancel setting: Press left function key . The display returns to the main view. Changed values are not accepted.

3. Change the value: Press function key  or .

4. Accept the displayed values and return to previous screen: Press right function key .




"Measuring point interval" screen



#	Function
①	Current value.
②	Accept value and return to previous screen.
③	Increase value by 33 ft.
④	Reduce value by 33 ft
⑤	Back to previous screen

4.3.11 Data Logging

The "Main view" screen is opened.

1. Start recording or finish current recording: Press  function key.
 - Recording is running: Function key  is lit green.
 - Recording is not running: Function key  is not lit.



4.3.12 Data Saving


Save, print or delete data records

To write out stored pulling data to a USB flash drive or a USB printer, first connect the device to the USB port. If next to the icon of the device there is a green checkmark the device is correctly connected.






Open the "Data saving" screen

"Settings screen is opened.

1. Press  function key.
The "Data saving" screen will be opened

Select individual data records or all data records.

1. To select all data records, press function key .
2. To select one data record, press function key  or .


Print data

A suitable USB printer is connected to the USB port.




1. Press  function key.
 - The control sends the selected data records to the USB printer.

Copy data

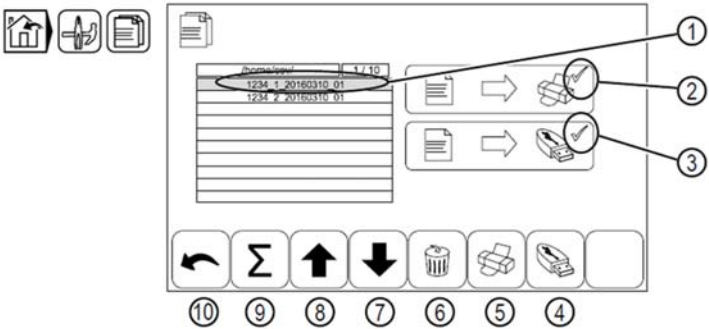
A USB flash drive is connected to the USB port.

1. Press  function key.
 - The control sends the selected data records to the USB flash drive.

Delete data

1. Press  function key.
2. Confirm safety query: Press function key  and mark the checkmark.
3. Press  function key.
 - The selected data records are deleted from the control memory.

"Data saving" screen

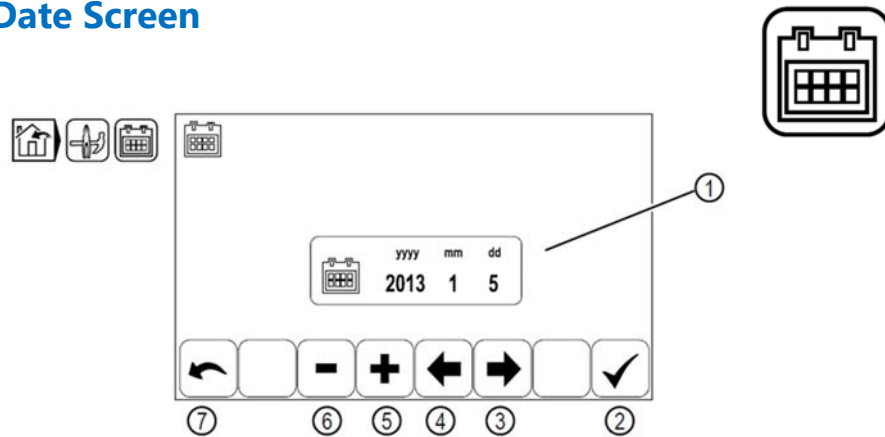


#	Function
①	Example for selected data record.
②	Check mark visible: USB printer connected.

- ③ Check mark visible: USB flash drive connected.
- ④ Copy selected file to USB flash drive.
- ⑤ Print selected file.
- ⑥ Delete selected file.
- ⑦ Down.
- ⑧ Up.
- ⑨ Select all.
- ⑩ Back to previous screen

4.3.13 Set Date Screen

Date screen



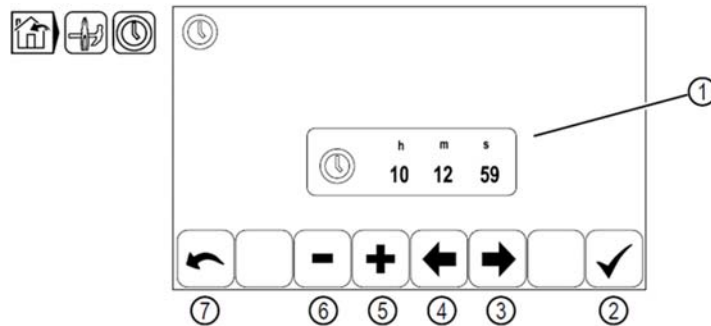
#	Function
①	Date
②	Accept value and return to previous screen.
③	Right
④	Left
⑤	Increase value
⑥	Reduce value
⑦	Back to previous screen

4.3.14 Set Time Screen



- √ "Settings" screen is opened.
- 1. Set time: Press function key . Set date. Press function key.
- The "Time" screen or the "Date" screen will be opened.
- 2. Cancel setting: Press left function key . The display returns to the main view. Changed values are not accepted.
- 3. Select value: Press function key or until the selected value is highlighted.
- 4. Change the value: Press function key or .
- 5. Accept the displayed values and return to previous screen: Press function key.

"Time" screen



#	Function
①	Time
②	Accept value and return to previous screen.
③	Right
④	Left
⑤	Increase value
⑥	Reduce value
⑦	Back to previous screen

4.3.15 Open the "Advanced settings" screen

The "Main view" screen is opened.

1. Press  function key.

— The "Settings" screen will be opened.

2. Press  function key.

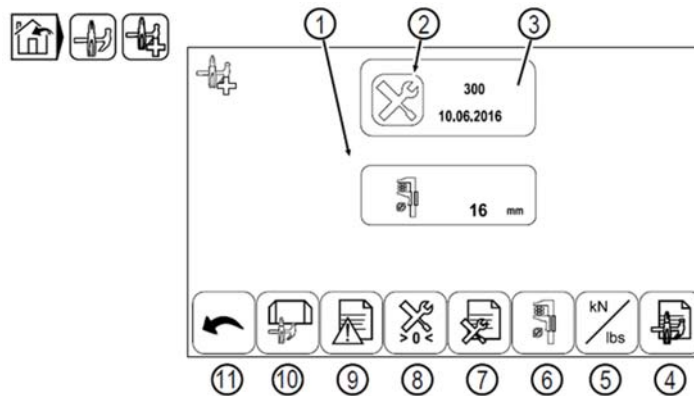
— The "Advanced settings" screen will be opened.



From this screen:

- Open the Overview I/O test.
- Open error history,
- Reset maintenance message.
- Open maintenance history.
- Set line diameter.
- Switch units.
- Display parameters.

"Advanced settings" screen



#	Function
①	Set line diameter.
②	Yellow icon: Maintenance is due.
③	Next maintenance: Operating hours or date.
④	Open the "Parameter" screen.
⑤	Open the "Units" screen.
⑥	Open "Rope diameter" screen.
⑦	Open the "Maintenance history" screen. Service password required.
⑧	Reset maintenance message. Customer password or service password required.
⑨	Open the "Error history" screen. Service password required.
⑩	Open the "Overview I/O test" screen.
⑪	Back to previous screen

4.3.16 Display Parameters

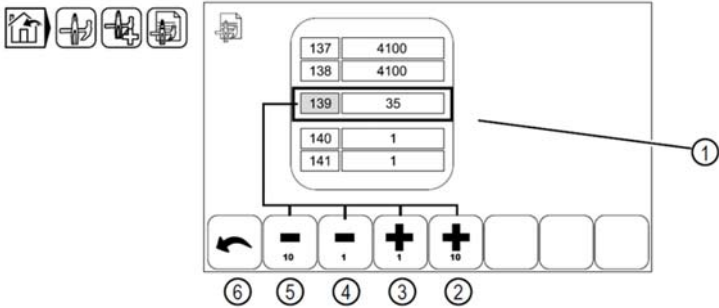


The "Advanced settings" screen is open.

- 1. Press the function key.
- The "Parameter" screen will be opened.

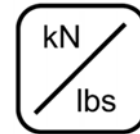
To increase or decrease the number of the parameter indicated press the function keys or .






"Parameter" screen

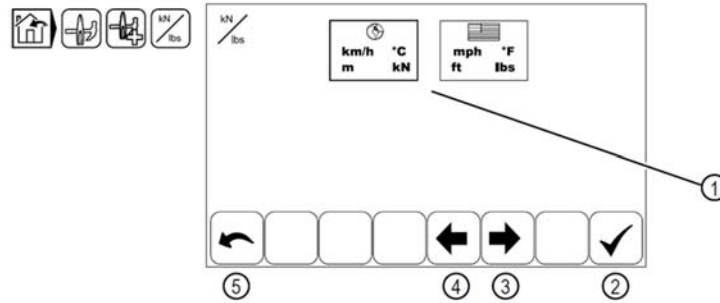


#	Function
①	Parameter: Number and value.
②	Increase number by 10.
③	Increase number by 1.
④	Reduce number by 1.
⑤	Reduce number by 10.
⑥	Back to previous screen

4.3.17 Changing Measurement Units



- ✓ The "Advanced settings" screen is open.
- 1. Press the  function key.
- The "Basic units" screen will be opened.
- 2. The input can be stopped at any time with function key .
- 3. Change selection: Press function key  or .
- 4. Accept selection: Press  function key.

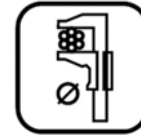







#	Function
①	Left: Metric units. Right: American units.
②	Accept selection.
③	Left.
④	Right.
⑤	Back to previous screen

Metric Units	U.S. Standard Units
km/h	mph
°C	°F
m	ft
kN	lbs
mm	inch

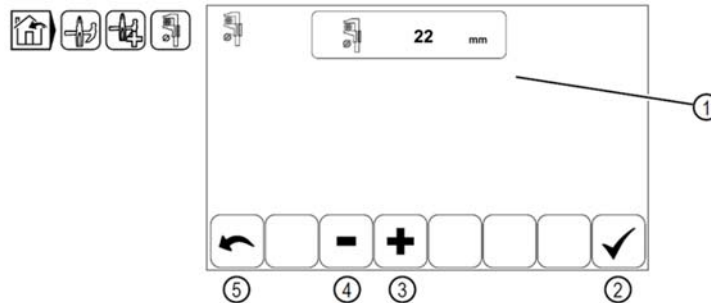
4.3.18 Set rope diameter

The "Advanced settings" screen is open.




1. Press the  function key.
 - The "Rope diameter" screen will be opened.
2. Cancel setting: Press left function key . Changed values are not accepted.
3. Change the value: Press function key  or .
4. Accept displayed value: Press right function key .

"Rope diameter" screen



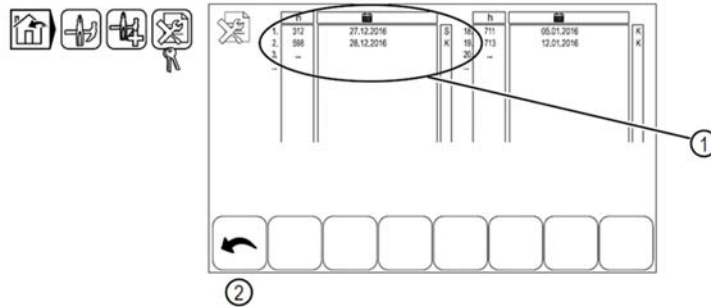
#	Function
①	Set Value
②	Accept value and return to previous screen
③	Increase value
④	Reduce value
⑤	Back to previous screen

4.3.19 Maintenance History

- ✓ The "Advanced settings" screen is open.
- 1. Press  function key.
- 2. Enter password for service staff.
- The "Maintenance history" screen will be opened.




Maintenance history screen



#	Function
①	Protocol entries for reset maintenance messages with number of operation hours and date. Letter "K": Maintenance message was reset with the user password. Letter "S": Maintenance message was reset with the service staff password.
②	Back to previous screen.

4.3.20 Reset Maintenance Message

The "Advanced settings" screen is open.

- 1. Press the  function key.
- 2. Enter password for service staff or user.
- The maintenance message is reset.



The operation is recorded in the maintenance history. — The icon for the due maintenance is not lit anymore. "Client menu" or "Service menu" screen is opened.

- 1. Press function key.
- The maintenance interval is reset. The information symbol in the main view disappears. Resetting the maintenance interval is recorded in the service history.

4.3.21 Open Error History

✓ The "Advanced settings" screen is open.

1. Press the  function.

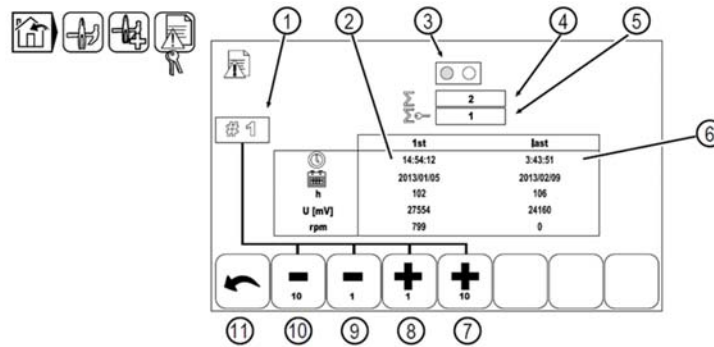
2. Enter password for service staff.

□ The "Error history" screen will be opened.

To increase or decrease the error code press the function keys  or .




4.3.22 Error History screen



#	Function
①	Error code.
②	Information when this error occurred for the first time: time, date, operating hour, battery tension, engine speed.
③	Is lit yellow (right): This error is currently active.
④	Number, indicating how often this error has occurred all in all.
⑤	Number indicating how often this error has occurred since the last time ignition was switched- on.
⑥	Information when this error occurred last: time, date, operating hour, battery tension, engine speed.
⑦	Increase error code by 10.
⑧	Increase error code by 1.
⑨	Reduce error code by 1.
⑩	Reduce error code by 10.
⑪	Back to previous screen.

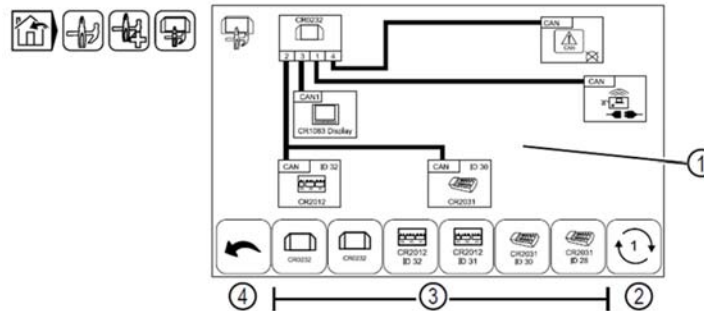
4.3.23 Open the overview I/O test

The "Advanced settings" screen is open.

1. Press the  function button.
- The Overview I/O test" screen will be opened.






"Overview I/O test" screen



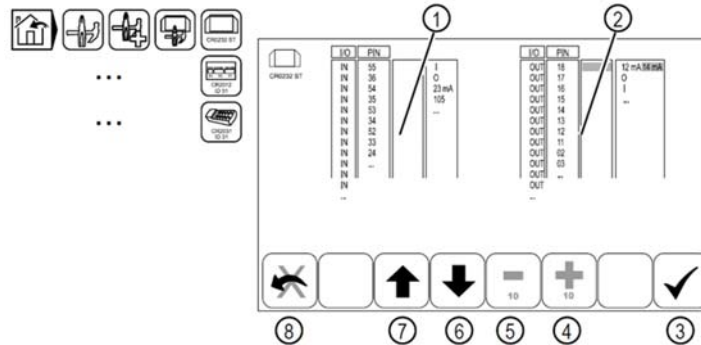
#	Function
①	Overview over CAN bus of the machine. Display of active communication errors.
②	Not applicable
③	Open the I/O page for illustrated PLC module.
④	Back to previous screen
⑤	Connection is established
⑥	Connection is interrupted.
⑦	Drive engine is idle.
⑧	CAN connection is interrupted.

The illustration above is just an example. The display on the machine can vary. But the functions are similar.

4.3.24 Open "I/O test" screen for a single PLC module.

- Depending on the intent and the machine type, press one of the function keys ,  or .
- The "I/O test" screen for the favored PLC module will be opened.

"I/O test PLC" screen



#	Function
①	Inputs of PLC module.
②	Outputs of SPS module.
③	Change value or accept changed value.
④	Increase value by 10.
⑤	Reduce value by 10.
⑥	Down.
⑦	Up.
⑧	Arrow: Back to previous screen.
⑨	Red X: Resets edited value to zero.

The illustration above is just an example. The display on the machine can vary. But the functions are similar.

Type of inputs and outputs:

Possible types of inputs:

- Digital (logically true or false)
 - Analog (current value in mA)
 - Analog (ratiometric value from 0 to 255)
- Possible types of outputs:
- Digital (logically true or false)
 - Analog, current-controlled.

State of digital inputs and outputs

TRUE: Green highlighted icon "I" (logically true). FALSE: Grey highlighted icon "O" (logically false).

Display of analog inputs:





For analog inputs the current values or the ratiometric values are displayed.

Display of analog outputs:












For current-controlled outputs, two current values are displayed: The actual value and on the right side the reference value. The reference value is highlighted in grey.

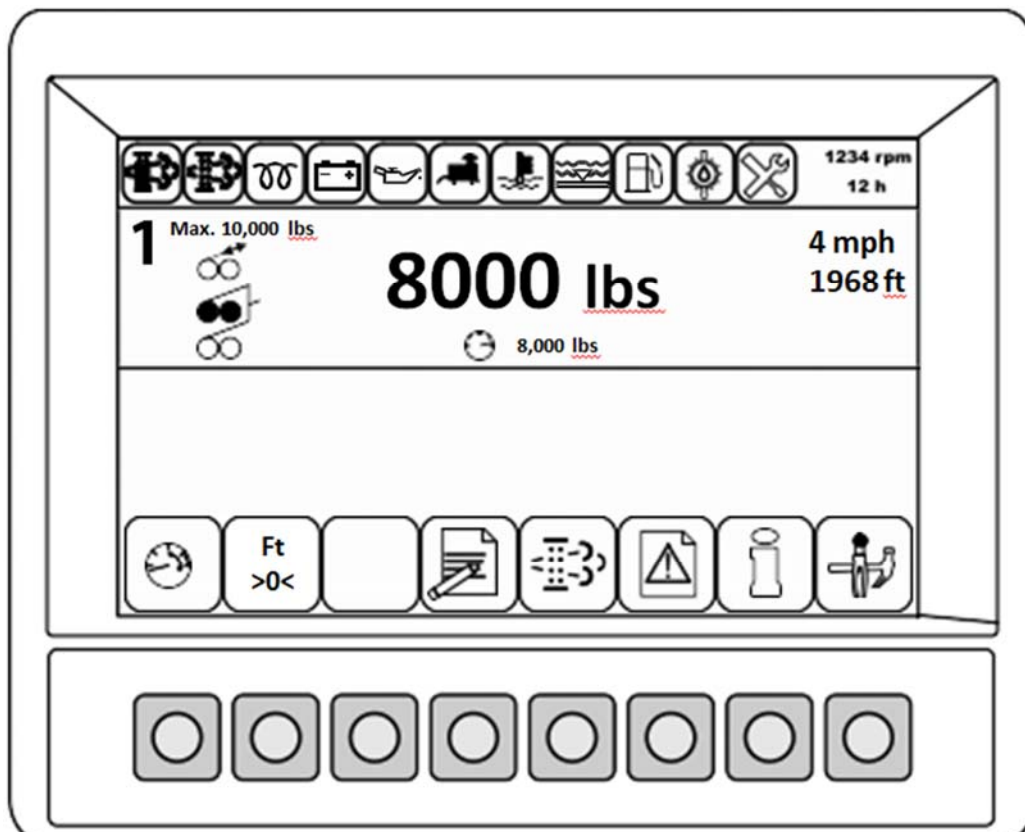
4.3.25 Edit I/O Signals of PLC

Change a digital value:


1. The input can be stopped at any time with function key .
2. To select a value, press function key  or .
3. Switch the selected digital value from TRUE to FALSE or vice versa: Press  function key.

Change an analog value:

1. The input can be stopped at any time with function key .
2. To select a value, press function key  or .
3. Open the selected analog value in order to change it: Press  function key.
— In the toolbar now the function keys ,  and  are displayed.
4. Change the analog value: Press function key  or .
5. Cancel changed value: Press  function key.
6. Accept changed value: Press  function key.



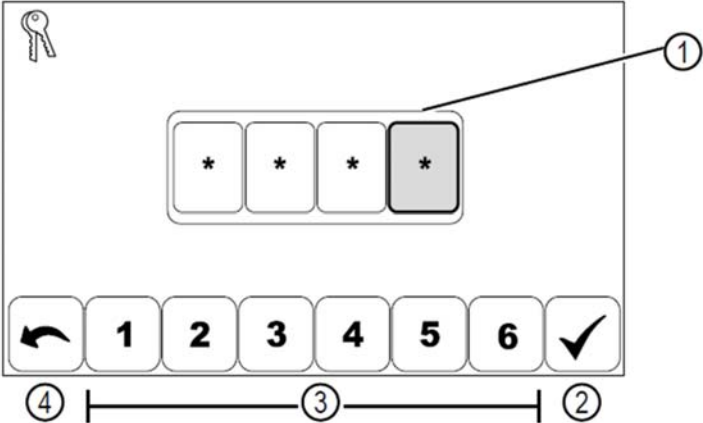
4.3.26 Password Screen

- ✓ The "Advanced settings" screen is open.
- 3. Press function key .
- 4. Enter password for service staff.
 - The "Error history" screen will be opened.



To increase or decrease the error code press the function keys  or .

"Password" screen


















#	Function
①	Current position for password input.
②	Accept password.
③	Digits 1 to 6 for password input.
④	Back to previous screen

Password for user: 4444

Password for service staff: Request from manufacturer.

4.4 Information bar icons






























At the upper edge of the display the machine control indicates via different icons operational modes and warnings. The messages marked with a (*) are not only indicated by an icon but additionally with a warning tone.

Icon	Message, meaning, possible corrective response
	Maintenance is due. Carry out service.
	Hydraulic oil too hot. Eliminate cause.
	Engine preheats.
	Battery is not charging. Eliminate cause.
	Engine oil pressure too low. Eliminate cause.
	Air filter blocked. Clean or replace.
	Coolant too hot. Yellow: Eliminate cause immediately. Red: The control stopped the engine.
	Not enough coolant. Replenish.
	Not enough or no fuel. Yellow: Replenish fuel soon. Orange: Replenish fuel immediately. Red: No more fuel. Replenish fuel.
	Particulate filter is full. Replace. (*)
	Regeneration necessary. Flashes slowly: Regeneration is necessary. Flashes fast and function key flashes red: Regeneration is necessary, but has been suppressed by the operator. (*)
	Regeneration is running. Exhaust temperature is significantly higher than normal.
	Not enough urea. (*) Yellow: Replenish urea. Orange: The control has reduced the engine performance. Replenish urea. Red: The control continued to reduce the engine performance further. Replenish urea.
	Urea: Quality problem, manipulation or hardware failure. (*). Yellow: Quality problem. Open error display. Orange: The control has reduced the engine performance. • Red: The control continued to reduce the engine performance further. Open error display.
	Cable connection to drum stand/reel winder is interrupted.

4.5 Toolbar icons

At the lower edge of the display the machine control system has icons for possible actions on each screen. To perform an action, press the function key directly under the icon.

Not all of these icons are applicable to all machines.

Icon	Message, meaning, possible corrective response	Icon	Message, meaning, possible corrective response
	Back to previous screen		Indicate Error
	Perform or interrupt DPF ReGen		Accept value or change
	Set Overload protection		Reset counter
	Open Information		Open Settings
	Open Engine Errors		Open data saving
	Open Help for Error Codes		Set Time
	Set Date		Set measuring point interval
	START / STOP Data Recording		Open Factory Settings (only for S+R)
	Open "Advanced Settings" Screen		Delete selected file
	Select All		Copy selected file to USB flash drive
	Reset Maintenance Password		Set rope diameter
	Switch Units		Open Parameters
	Display Maintenance History		Display error history (Password protected)
	Open the Overview I/O Test		Previous Screen
			Next Screen

5 Maintenance



Safety and Reliability Disclaimer: The reliability and working life of the machine depends on the regular inspection and preventive maintenance of the machine. Further, all inspections and preventive maintenance described in this section are deemed as critical to the safe operation of the machine, and should be regarded as such.

The indicated intervals for maintenance work apply to normal operating conditions and stress. The manufacturer is not responsible for damages caused through faulty maintenance or inappropriate handling/operation of the machine.

Safety

- Prior to work being performed, ensure the machine is locked/tagged out in accordance with OSHA safety requirements and all applicable safety regulations.
- Take all fire prevention safety measures before using a welder or cutting device, including grinders. This should include having a fully charged fire extinguisher near the location of the work.
- To avoid injury, make sure that all precautions are taken to support components before loosening or removing bolts.
- Be sure everyone involved in the maintenance, service, or repair process understands what is being done and all of the safety precautions which need to be taken during the procedure.
- Make sure all lifting devices, chains, slings, and hooks are in good condition and have the rated capacity to do the job. Use guide lines when necessary for control during the lifting process.
- Always wear proper protective clothing and equipment when performing service: gloves, safety glasses, etc.

Familiarize yourself with the following symbols before operating machinery. Read and follow all safety precautions. Your company's safety precautions take precedence.

DANGER

Indicates an imminently hazardous situation which **WILL** result in death or serious injury if not avoided.

WARNING

Indicates a potentially hazardous situation which **COULD** result in death or serious injury if not avoided.

CAUTION

Indicates a potentially hazardous situation which **MAY** result in minor or moderate injury and property damage if not avoided. It may also be used to alert against unsafe practices.

NOTE

Indicates a potentially hazardous situation which **MAY** result in property damage if not avoided. It may also be used to alert against unsafe practices.

5.1 General Care and Inspections Instructions

CAUTION: When washing down the unit:

- Use only freshwater for cleaning.
- Do not use high pressure spray.
- Do not spray water directly at the instrument panel, or any electrical components, electrical fittings, hydraulic fittings, hydraulic pistons, or hydraulic manifolds.
- Do not spray water into the cooling air intake or the engine air intake.
- Do not wash a hot or running engine. Use compressed air to clean the engine and radiator fins to reduce the potential for corrosion and moisture contamination.

Fault and Malfunction Detection

Faults detected in supporting parts or parts which have an impact on safety must be corrected immediately. So long as the faults are not corrected, the machine must not be operated.

“Machines, including their support construction and rope blocks should be inspected by an expert before being put into operation for the first time as well as after having undergone substantial modification “.

“Machines, including their support construction and line blocks should be inspected at least once a year by an expert. They should, however, if necessary, be inspected more often depending on the operating and working conditions “.

Essentially, the checking process consists of making sure that the *safety devices* are available, fitting properly and effective, as well as checking the state of the machine, the

hitching gear, the rollers, the equipment, and the support construction.

Safety devices described are, e.g. brakes, rope reeling devices, devices against overcharging, et cetera.

Experts are persons who through their education and experience have sufficient knowledge in the field of pullers, lifters, and traction machines. Further, they are familiar with the valid regulations for protection at work, for the prevention of accidents, and with the regulations and rules generally accepted in technology. “Experts” referred to are also able to decide if the pullers, lifters and traction machines are in a safe working condition.

Source: BGV D8.

5.2 Drive Assembly

WARNING: Loss of Limb/Death: System must be off and tagged out prior to attempting any maintenance on the drive assembly.

The PTV-6013 employs a fully hydraulic direct drive system. This drive system consists of hydraulic motors and bullwheels.

Drive Motors

The machine comes equipped with two (2) hydraulic motors- one for each bullwheel.

- ✓ The drive motor(s), should be inspected for obvious signs of damage prior to each operation- (*See Pre-Operation Checklist*).
- ✓ The drive motor(s) mounting bolts/nuts should be inspected for damage or signs of cracking.
- ✓ Inspect the sensor connection to ensure that there is no damage. Inspect the sensor wires for frayed or cut wires. Ensure that all sensor connections to the motor are secure.
- ✓ The hydraulic hose connections should also be inspected for damage and leaks prior to operation. If leaks are found, replace the damaged hose/fitting.

WARNING: Never check for hydraulic leaks with hands or body. When under pressure, leaks can penetrate the skin. Small or pinhole size leaks may be invisible during visual inspection. (Using a piece of cardboard or wood is recommended).



Bullwheels

Bullwheels should be inspected as part of the Pre-Operation Checklist.

- ✓ The bullwheels must be inspected to ensure that they are free from debris and that there is no damage.
- ✓ The bullwheel surfaces must also be inspected for excessive wear before each operating period. (*See Pre-Operation Checklist*).

If excessive wear is found the part should be replaced prior to operation- contact Sherman+Reilly™ Service Department for service.



Checking/Adding Bullwheel Gear Oil

Planetary gear oil level should be checked in accordance with the preventive maintenance schedule.

- ✓ When checking the gear oil for new model bullwheel planetary gears, the outside bullwheel panels must first be removed in order to access the plugs.
- ✓ When checking the gear oil for the older model bullwheel planetary gears, there are no covers on the outside of the bullwheels, and there is open access to the plugs.



NOTE: The bullwheels will need to be rotated so that one oil plug is at the bottom with the other at the half full point.

WARNING: Do not touch bullwheels while they are in motion. Wait until they have stopped, brake is set, and engine is off to resume maintenance.



WARNING: Loss of Limb/Death: System must be off and tagged out prior to attempting any maintenance on the drive assembly.

- ✓ Once the plugs are accessible, using a hex head wrench with extension, loosen the plug at the half way point on the gear housing. If oil begins to pour out of the plug at the half point, then the oil level is at the appropriate half full level.
- ✓ If no oil drips out of the halfway point, oil level may be low. Add oil, as needed, until oil level fills half of the gear housing (just under the half way plug).
- ✓ Once complete, reinstall and tighten plugs.



Lubricate the Levewind

In order to maintain smooth levelwind operations from side to side, S+R suggests periodic application of a lubricating oil to the Levelwind Acme screw.



Changing Bullwheel Gear Oil

Bullwheel planetary gear oil level should be changed in accordance with the preventive maintenance schedule.

- ✓ When changing the gear oil for newer model bullwheel planetary gears, the outside bullwheel panels must first be removed in order to access the plugs.
- ✓ When changing the gear oil for older model bullwheel planetary gears, there are no covers on the outside of the bullwheels, and there is open access to the plugs.



NOTE: The bullwheels will need to be rotated so that one oil plug is at the bottom with the other at the half full point. Turn off machine once they are rotated.

- ✓ Once the plugs are accessible, and with a proper reservoir in place to catch the gear oil, use a hex head wrench with extension to loosen and remove the lower plug on the gear housing. Oil will drain out of this plug.
- ✓ When oil has drained completely, reinstall lower plug, and remove upper halfway point plug.
- ✓ Add new oil to the halfway point plug until fluid is just below the plug- (oil should fill half of the gear housing).
- ✓ Clean up any residual oil and replace plugs and panels and close compartments once complete.

Greasing

Both bullwheels and the reel drive should be greased in accordance with the preventive maintenance schedule following this section.

- ✓ Grease the bullwheels
- ✓ Grease the reel drive and (P) brake.
- ✓ Grease the hydraulic pistons
- ✓ Grease the cabstand platform



5.3 Hydraulic System

Maintaining cleanliness of the hydraulic system is important. The smallest amount of foreign material in the system can cause extensive damage to the pump, motor or valves.

Sherman+Reilly™ has taken precautions to assure that each component and fitting was thoroughly cleaned and the system purged before this machine was delivered. Therefore, maintenance of the system should be carried out with extreme care.

Maintenance Notes: (See Preventive Maintenance Schedule section for full details.)

- The hydraulic filters should be replaced as outlined in the [Preventive Maintenance Schedule](#) section.
- Only use recommended hydraulic fluids. Sherman+Reilly™ units ship with ISO 32 hydraulic fluid. See lubricant table for more information.
- When adding hydraulic fluid, be sure to wipe all dirt and grime from around reservoir filler cap before removing.
- Clean hoses, fittings, and other components thoroughly prior to replacing, and then assemble carefully.
- Hydraulic coolers should be inspected for damaged fins and clogged surfaces daily, and cooler surfaces should be cleaned.
- Always ensure that hydraulic fluid and system have cooled prior to attempting maintenance.
- ***Always follow all federal, state, local, and environmental laws and regulations, to include but not limited to OSHA, EPA, and Hazard Communication Act, with regard to the storage, maintenance, and disposal of hydraulic fluid and other chemicals used in the maintenance of described mechanical equipment.***

Hydraulic System

When working on any hydraulic connections or parts:

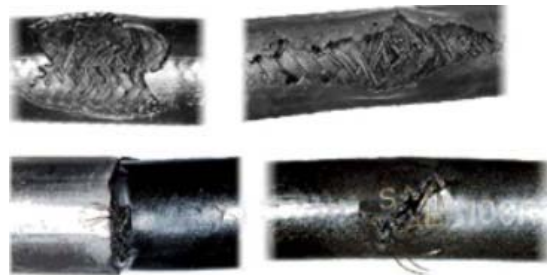
- Be sure there is no pressure on fluid at the location of the work.
- Make sure nothing will move or drop when loosening a connection.
- Collect all the hydraulic fluid which will drain from the loosened connection.
- Use oil-dry or some absorbent material to soak up any fluid spills to keep working surfaces from becoming slippery.
- Cover all open connections to prevent loss and contamination to the hydraulic system.

When the hydraulic system has a problem or is opened at any point, filters and fluid should be replaced to prevent contamination or damage to the system.

Hydraulic System/Hose Inspection

- ✓ Check the outer surface of the hoses for damages, e.g. tears, bends, cuts, loosened parts, abrasions, brittle spots, etc.

WARNING: Do not check for hydraulic leaks with hands or body. When under pressure, leaks can penetrate the skin. Small or pinhole size leaks may be invisible during visual inspection. (Using a piece of cardboard or wood is recommended).



- ✓ Check the hoses for deformations (when pressure free as well as when under pressure).
- ✓ Special attention should be given to the connection between hose and fitting. If hose, fitting, or component damages are identified, they must be replaced immediately.
- ✓ All hydraulic hoses must be replaced after 2,500 working hours or, at the latest, every 10 years (starting from the year of the construction of the machine- (see *Preventive Maintenance Schedule* section).

Hydraulic System

Checking Hydraulic Fluid

- ✓ To check hydraulic fluid level, first ensure that all cylinders: (jacks) are retracted, as much as possible, and that the pump is off.
- ✓ View the hydraulic fluid level in the reservoir through the sight gauge.
- ✓ Fluid should show within (High/Low) limits of the sight gauge.

Adding Hydraulic Fluid

- ✓ The hydraulic tank fill port is accessed from the top hatch.
- ✓ Clean around hydraulic fluid reservoir cap, and then remove reservoir cap.
- ✓ Carefully pour fluid into tank until it reaches within the (HIGH/LOW) limits of the sight gauge- about $\frac{3}{4}$ of the way full just below the HIGH mark is recommended.
- ✓ Replace and tighten the fluid reservoir cap.
- ✓ Clean-up any residual or spilled fluid.
- ✓ Sherman+Reilly™ units ship with ISO 32 fluid.



Hydraulic System

Replacing Hydraulic Fluid and Filter

Filter replacements are necessary if the indicator icon shows on the system control display. If the system indicates that a filter replacement is necessary, all filters must be replaced.



- ✓ First, ensure that all cylinders: (jacks, hoop, etc.) are retracted, as much as possible, and that the pump is off.

****For Filter Only Replacement skip next step:**

- ✓ **With proper reservoir in place to catch hydraulic fluid, loosen and remove plug at the bottom of the hydraulic tank.

***Filter Only Replacement continue here:**

- ✓ Loosen and remove the three retaining screws at the top of each tank filter housing. Remove both filter housing caps, and then remove both tank filters. Loosen pump filters using filter wrench, then carefully unscrew filters from hydraulic pump.

NOTE: Once removed, filters will still have fluid in them. Use care when removing filter so as not to spill remaining hydraulic fluid. A small collection reservoir may be needed.

CAUTION: Make sure hydraulic fluid system has had at least 30 minutes to cool prior to maintenance.

NOTE: 25 micron filters must be used when replacing the hydraulic system filters.

- ✓ Install new filter(s) using the following steps:
 - Insert tank filters into the housings, then replace housing caps and screws. Thread screws by hand, then tighten using wrench.
 - Next, hand thread new pump filters to filter ports on pump, then tighten filters with hand until snug.
- ✓ Once fluid has finished draining from the tank, re-tighten tank plug and refill tank using sight gauge or line of sight for proper level- (see *Adding Hydraulic Fluid* section).
- ✓ After hydraulic filter change is completed, the engine must be run at idle for approximately 10 minutes- without engaging the bullwheels. This will ensure that air is purged from the system. After the air purge, check the fluid level and replace any needed fluid.

NOTE: Filters should be changed in accordance with the **Preventive Maintenance Schedule**. However, the filters can be changed sooner as needed.

Operators should watch for maintenance indicators on the system display.



Hydraulic System

Hydraulic Hose Replacement

- ✓ Ensure that all cylinders: (jacks) are retracted, and that the pump is off.
- ✓ If tank drain is necessary, drain the tank and replace the plug- (see *Replacing Hydraulic Fluid and Filter* section).
- ✓ With proper reservoir in place to catch hydraulic fluid, loosen hose connection for hose being replaced, and remove hose.
- ✓ Clean fitting using a non-scoring clean cloth, and ensure there is no damage to threads.
- ✓ Carefully thread new hose to fitting and tighten.

- ✓ Refill tank, run system at idle to purge air, and then replenish any lost hydraulic fluid, using sight gauge or line of sight for proper level- (see *Adding Hydraulic Fluid* section).



5.4 Hydraulic Power Engine

All maintenance to the engine should be done in according to the instructions located in the engine manufacturer's manual.

Keep all fluids at their proper level. (See engine manufacturer's manual for minimum fluid levels.)

Maintenance Notes: (See Preventive Maintenance Schedule section for full details.)

- Engine coolants and oil should meet minimum manufacturer's specifications. (For further details see engine manufacturer's manual- Appendix A.)
- When replacing hoses, fittings or other components, clean thoroughly and then assemble carefully.
- **Always follow all federal, state, local, and environmental laws and regulations, to include but not limited to OSHA, EPA, and Hazard Communication Act, with regard to the storage, maintenance, and disposal of engine oils, coolants, and other chemicals used in the maintenance of described mechanical equipment.**

CAUTION: Never add ETHER to fuel to start cold engine. Ether WILL damage diesel engines. Use available heater system as needed.

CAUTION: Do not exceed 50% of anti-freeze in the coolant. More anti-freeze will damage diesel engines.

NOTE: Some hoses with fittings at the top of the tank may not require draining the hydraulic fluid prior to replacing hydraulic hoses.

5.5 Safe-Zone™ Cab

CAUTION: Do not use ammonia-based cleaners.
Use only non-ammonia based cleaners to clean the front polycarbonate window.



Inspection of Operators Chair

The operators chair should be inspected for damage and loose or missing parts. (For replacement parts, see Parts section.)



Climate Control System

(Not installed on open cab platforms, and may not be available on all models. System types vary by model.)

The climate control systems are designed for both cooling and heating comfort functions.



- ✓ Routine visual inspections of the machine/unit should include the climate control system, (compressor, condenser, fans, hoses, etc.).
- ✓ Climate control system should be regularly inspected for damages and leaks.



NOTES:

Any maintenance or modifications to the climate control system must be in accordance with US Federal EPA and State regulations.

Only qualified HVACR technicians should perform work on Safe-Zone™ climate control systems. For maintenance concerns, contact the Sherman+Reilly™ Parts & Service Department at parts@sherman-reilly.com.

5.6 Trailer Assembly

Disclaimer: Any modifications to the Sherman+Reilly™ trailer assemblies or attached structures could result in damages to equipment, injury to operators, personnel, or others, and voiding of the manufacturer's warranty.

(United States Only) Any and all maintenance or modifications to the Sherman+Reilly™ trailer assemblies must be done in accordance with United States Federal and State Department of Transportation Standards, to include all applicable Federal Motor Vehicle Standards covered under Section 571.

Brakes

The PTV-6013 is equipped with a self-adjusting air brake system.

- ✓ Brakes should be adjusted after the **first 200 miles**, and then every **3,000 miles thereafter**. (See self-adjusting instructions in manufacturer's manual).

NOTE: Replacement of linings is necessary when thickness is worn to **1/16inch or less**.

For Air brakes, see trailer manufacturers manual.

For all additional inspection, cleaning, adjustment, and replacement instructions see the manufacturer's manual.

CAUTION: Some older brake linings may contain asbestos dust which can cause serious health problems. Certain precautions should be taken when servicing brakes. See manufacturer's manual for instructions.



Towing

Prior to towing, the trailer must be hooked up to a vehicle and hitch capable of supporting and towing a trailer/machine of this size and weight, while ensuring that the hitch is secure, and trailer lighting and air hoses are connected.

- ✓ Hitches and the trailer king pin(s) should be inspected prior to towing the vehicle.
- ✓ If air suspension system or brake system does not fully charge with air after connecting vehicle air supply system, or there is an obvious air leak, a full inspection must take place.
- ✓ If air leaks are identified, they must be fixed prior to attempting to tow the trailer.

NOTE: Approximate trailer weight is: **15,000 lb.**

Trailer Assembly

Tires

- The required air pressure for these tires is posted on the tire sidewall.
- Tire pressure should be checked each time before towing/operation, and weekly thereafter to ensure proper inflation.
- Tires should be inspected for wear and damage at least every **3,000 miles or 3 months**.
- The specifications for the tires can be found on the tire sidewall.



CAUTION: Replacement tires must meet the same specifications as the originals. Tires for Sherman+Reilly™ machines meet specific duty requirements, as well as weight and roadway/speed ratings. Mismatched tires and rims may come apart with explosive force causing personal injury. Mismatched and underrated tires can also blow out causing vehicle and roadway accidents that can create serious injury or death for those involved.

Wheels

- Wheel lug nuts should be torqued in accordance with manufacturer's specifications.
- Wheel lug nut torque should be checked in accordance with the maintenance schedule to ensure safe towing operations. *(See Preventive Maintenance Schedule)*



CAUTION: Wheel nuts or bolts must be tightened and maintained at the proper torque levels to prevent loose wheels, broken studs, and potential dangerous separation of the wheel from the axle, which can cause accidents, personal injuries, and death.

For all additional inspection, cleaning, adjustment, and replacement instructions see the manufacturer's manual.

Trailer Assembly

Axle Drum Oil

- Axle drum oil should be checked each time prior to towing or moving the trailer.
- Axle drum oil should be just below oil cap plug hole.
- If axle drum oil level is low, remove axle drum oil cap plug, pour in fluid until fluid level is just below oil cap plug hole, and replace the plug. (A funnel may be required to avoid spilling fluid.)



Axles

The PTV is equipped with tandem Dexter axles with a rated capacity of 22,500 lb each.

Dexter Axle provides maintenance instructional videos at www.dexteraxle.com/video_gallery.

Dexter Axle Service TEL:(574)-295-7888

If you need to call Dexter Axle, it is helpful to have the nine-digit lot number located on the axle beam, approximately 18" from the curbside of the trailer. Look for the words DEXTER AXLE and the lot number will be located directly under the name, as in this example below.



For all additional inspection, cleaning, adjustment, and replacement instructions, see the provided axle manufacturer's manual or visit: www.dexteraxle.com.



Trailer Assembly

Trailer Lighting

All trailer lights should be inspected to ensure they work prior to transport. (For replacement see Parts section.)



If none of the lights work:

- ✓ Check vehicle/trailer wire and wire connectors for damage or corrosion.

The vehicle/trailer wire connectors can vary, dependent upon owner/customer requirements.

- ✓ Also, check lighting junction box for damage. Open and inspect wires for loose or corroded connections.

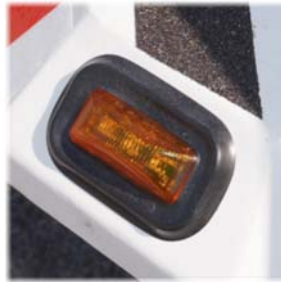


Trailer Assembly

Lighting Replacement

To replace trailer lighting, remove existing lighting by one of several methods, dependent upon the light:

- ✓ Pop out the lighting pod from its rubber grommet holder, by pushing from the inside toward the outside, or pushing in from the outside and reaching into the hole to pull the pod back through to the outside of the trailer. Once out of the rubber, unplug connection, and replace with new pod:
- ✓ Pop Tabs: Some lighting may require the use of a screw driver to unsnap the light from its retaining tabs.
- ✓ Unscrew: Some lighting may require the use of a screw driver to unscrew the light from its housing.



5.7 Electrical Equipment

Only authorized and qualified personnel should be allowed to work on the electrical system.

- ✓ If connectors, cables or other electrical parts show breaks, tears, cuts, are scoured out or show brittle spots, etc., they must immediately be replaced. During these operations, keep the covers of the electrical devices shut.

- ✓ Checking the electrical parts is limited to checking the correct connection of cables and connectors. Scoured cables must be fixed. Charred contacts must be replaced.

- ✓ Furthermore, the lighting system of the chassis must be checked. This check should be made while the traction vehicle is connected. The trailer lighting system must function in sync with the traction vehicle. Defective light bulbs must be replaced.
(See Towing and Road Safety).

- ✓ The electrical circuit diagrams of the machine describing the cable routes in detail can be made available upon request to S+R. The fuses and relays are located under the dash in the operator's cab.



5.8 Preventive Maintenance Schedule (Page 1)

NOTE: All preventive maintenance steps detailed in this sections are in addition to the required pre/post-operation inspection steps.

NOTE: All Preventive Maintenance should be conducted in accordance with OSHA requirements, to include OSHA Standard- 29 CFR, Part 1910.147.

WARNING: System must be tagged/locked out prior to removing any machine guarding, removing any system component, or performing any maintenance outside of basic visual inspections.

Reference Hydraulic Power Engine Manufacturer’s (DEUTZ) Manual

For all hydraulic power engine models, please refer to manufacturer’s manual for complete maintenance schedule and instructions (See Appendix A).

Reference Axle/Brake/Suspension Assembly Manufacturer’s Manual

For all axle, brake, and trailer suspension assembly models, please refer to manufacturer’s manual for complete maintenance schedule and instructions- (See Appendix B).

Break-In Period

First 50 hours	Check Battery for Proper Charge, Corrosion of Battery Terminals.
First 25 miles	Check Trailer Wheel Lug Nut Torque. <i>See Trailer Wheels Section</i>
First 50 miles	Check Trailer Wheel Lug Nut Torque. <i>See Trailer Wheels Section</i>
First 100 miles	Check Trailer Wheel Lug Nut Torque. <i>See Trailer Wheels Section</i>
First 200 miles	Adjust Brakes. <i>See Brake Section</i>

Trailer Safety

Weekly/Routinely	Inspect trailer axle assembly for alignment, broken or damaged spring leaves- where applicable.
Weekly/Routinely	Inspect axle drum oil level, and fill to just below drum plug.
Weekly/Routinely	Check tire air pressure. <i>See Tires Section</i>
3 Months/3,000 Miles	Inspect tires for wear and damage. <i>See Tires Section</i>
3 Months/3,000 Miles	Check trailer wheel lug nut torque. <i>See Trailer Wheels Section</i>
3 Months/3,000 Miles	Adjust brakes. <i>See Brake Section</i>
6 Months/6,000 Miles	Inspect trailer Brake Magnets and Brake Controller. <i>See Brake Section</i>
6 Months/6,000 Miles	Inspect Trailer Air Brake System Components. <i>See Brake Section</i>
6 Months/6,000 Miles	Inspect Trailer Suspension for bending, loose fasteners, and wear.
6 Months/6,000 Miles	Inspect wheels for damage, (i.e. cracks, dents, or distortions).

Preventive Maintenance Schedule (Page 2)

NOTE: All preventive maintenance steps detailed in this sections are in addition to the required pre/post-operation inspection steps. All Preventive Maintenance should be conducted in accordance with OSHA requirements, to include OSHA Standard- 29 CFR, Part 1910.147.

WARNING: System must be tagged/locked out prior to removing any machine guarding, removing any system component, or performing any maintenance outside of basic visual inspections.

The indicated intervals for basic preventive maintenance work apply to normal operating conditions and stress. The manufacturer is not responsible for damages caused through faulty and inappropriate handling of the machine. The below table represents basic preventive maintenance outline, all other maintenance and instructions can be found in OEM equipment manuals. In the table below the following key letters are used:



PN CHECK, if necessary REFILL	S LUBRICATE
PE CHECK, if necessary. REGULATE 7 ADJUST	W CHANGE
PW CHECK, if necessary CHANGE	P CHECK
R CLEAN	L CHARGE

Maintenance work to be performed	Before each use of the machine	Weekly or when necessary	Yearly or every 300 hours of service	Every 2 years or 600 hours of service
Cleaning and care	—	R	R	R
Mechanical system	PW	PW	PW	PW
Electrical equipment	PW	PW	PW	PW
Hydraulic system	—	PW	PW	PW
Hydraulic oil	PN	PN	W	—
Hydraulic oil return filter	—	PW	PW	W
Oil filter cartridge at the hydraulic pump	—	PW	PW	W
Transmission oil in the bull wheel gearing	—	—	PN	W
Motor oil	PN	PN	W	W
Coolant	PN	PN	PN	PN
Hydraulic and engine coolant		R	R	R
Battery	—	—	PW	PW
Fuel filter	—	—	—	W
Air filter	P	R	W	W
Lubrication	—	S	S	S
Groove tread			PW	PW

5.9 Torque Ratings for Machine Fasteners

Torque ratings for fasteners on this piece of equipment follow ANSI accredited guidelines for ASTM/ASME specifications on tightening torque. As a general rule, tightening torque should be set according to the below table, with a tolerance of approximately + / - 5%, unless other specific torque rating is noted in this manual. The below table is for advisory purposes only.

General Recommended Torque for Fasteners by Size:

Nominal Dia. (in.)	 SAE J429 Grade 5			 SAE J429 Grade 8		
	Tightening Torque			Tightening Torque		
	K = 0.15	K = 0.17	K = 0.20	K = 0.15	K = 0.17	K = 0.20
Unified Coarse Thread Series						
1/4	76 in-lbs	86 in-lbs	101 in-lbs	107 in-lbs	122 in-lbs	143 in-lbs
5/16	157	178	209	221	251	295
3/8	23 ft-lbs	26 ft-lbs	31 ft-lbs	33 ft-lbs	37 ft-lbs	44 ft-lbs
7/16	37	42	49	52	59	70
1/2	57	64	75	80	90	106
9/16	82	92	109	115	130	154
5/8	113	128	150	159	180	212
3/4	200	227	267	282	320	376
7/8	322	365	429	455	515	606
1	483	547	644	681	772	909
1 1/4	840	952	1121	1363	1545	1817
1 1/2	1462	1657	1950	2371	2688	3162
Fine Thread Series						
1/4	87 in-lbs	99 in-lbs	116 in-lbs	123 in-lbs	139 in-lbs	164 in-lbs
5/16	174	197	231	245	278	327
3/8	26 ft-lbs	30 ft-lbs	35 ft-lbs	37 ft-lbs	42 ft-lbs	49 ft-lbs
7/16	41	47	55	58	66	78
1/2	64	72	85	90	102	120
9/16	91	103	121	128	146	171
5/8	127	144	170	180	204	240
3/4	223	253	297	315	357	420
7/8	355	403	474	502	568	669
1	542	614	722	765	867	1020
1 1/4	930	1055	1241	1509	1710	2012
1 1/2	1645	1865	2194	2668	3024	3557

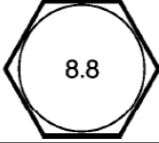
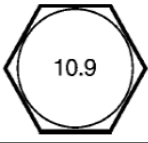
Source: Fastenal

Torque ratings for 1/4" and 5/16" are listed in inch-pounds. All other torque ratings are listed in foot-pounds. (K = .15 for "lubricated" conditions) (K = .17 for Zinc plated and dry conditions) (K = .20 for plain and dry conditions).

Maintenance Torque Ratings for Machine Fasteners

Torque ratings for fasteners on this piece of equipment follow ANSI accredited guidelines for ASTM/ASME specifications on tightening torque. As a general rule, tightening torque should be set according to the below table, with a tolerance of approximately + / - 5%, unless other specific torque rating is noted in this manual. The below table is for advisory purposes only.

General Recommended Torque for Fasteners by Size:

Nominal Dia. (mm)	 Class 8.8			 Class 10.9		
	Tightening Torque			Tightening Torque		
	Lubricated (ft-lbs)	Zinc Plated (ft-lbs)	Plain&Dry (ft-lbs)	Lubricated (ft-lbs)	Zinc Plated (ft-lbs)	Plain&Dry (ft-lbs)
4	1.7	1.9	2.3	2.4	2.7	3.2
5	3.4	3.9	4.5	4.9	5.5	6.5
6	5.8	6.6	7.7	8.3	9.4	11.1
7	9.7	11.0	13.0	13.9	15.8	18.5
8	14.1	16.0	18.8	20.2	22.9	26.9
10	27.9	31.6	37.2	39.9	45.2	53.2
12	48.7	55.1	64.9	69.6	78.9	92.8
14	77.8	88.1	103.7	111.3	126.1	148.4
16	121	137	161	173	196	230
18	167	189	222	239	270	318
20	236	267	314	337	382	449
22	321	364	428	460	521	613
24	407	461	543	582	660	777
27	597	676	796	854	968	1139
30	809	917	1079	1158	1312	1544
33	1101	1248	1468	1576	1786	2101
36	1415	1603	1886	2024	2294	2699

Source: Fastenal

All torque ratings are listed in foot-pounds. Torque value formula $T=KDF$ where; ($K = .15$ for "lubricated" conditions) ($K = .17$ for Zinc plated and dry conditions) ($K = .20$ for plain and dry conditions).

CAUTION: Under/Over tightening fasteners can result in costly equipment failure or personal injury.

5.10 Lubrication Chart

CAUTION: Do not mix transmission oils on polyalphaolefine base with oils on polyglycol base.

	Engine oil to -10°C	Engine oil to -25°C	Hydraulic oil to -10°C	Hydraulic oil to -25°C	Transmission oil	Multi-purpose grease
Identification Qualification	SAE 10W-40	SAE 5W-30	HLP 32 HEES 46	HVLP(D) 32 HEES 22	CLP 220 based onPAO	KP2K-30
	ACEA E4-99	ACEA E4-99	DIN 51524-T2	DIN 51524-T3	DIN 51517-T3	DIN 51502
	MB 228.5	MB 228.5	Bosch Rexroth RE 90 220-1			MB 267
	MAN 3277	MAN 3277				MAN 283 Li-P 2
Oil company			Oil Type			
Agip	Sigma TFE 10W-40	Agip SIGMA TRUCKSINT TFE	Agip OSO 32 Arnica S46	Autol HVI 32 Arnica S22	BLASIA 220	Agip GR MU / EP 2
Aral	Extra Turboral 10W-40	SuperTurboral 5W-30	Vitam GF 32 Vitam EHF 46	Vitam HF 32 Vitam EHF 22	Degol PAS 220	Aralub HLP 2
AVIA	AVIA TURBOSYNT H HT-E 10W-40	AVIA TURBOSYNT H HT-U 5W-30	AVIA FLUID RSL 32 AVIA SYNTOFLUID N 46	AVIA FLUID HVI 32 AVIA SYNTOFLUID N 22	AVIA GEAR RSX 220	AVIALITH 2 EP
BP	Vanellus E7 Plus 10W-40	Vanellus E8 Ultra 5W-30	Energol HLP HM 32	Energol EHPM 32	Energol HTX 220	Energol LS-EP 2
Castrol	Enduron 10W-40		Hyspin AWS 32 Biohyd SE46	Hyspin AWH-M 32 Biohyd SE22	Alphasyn T 220	Tribol 3020/1000-2
Fuchs	TITAN CARGO MC 10W-40	TITAN CARGO SL 5W-30	RENOLIN B 10 Plantosyn 3268 ECO	RENOLIN MR 520 Plantohyd 22S	Renolin Unisyn CLP 220	RENOLIT EP 2
Klüber			LAMORA LP 32		Klübersynth GEM 4-220 N	CENTOPLEX 2 EP
Mobil	Delvac XHP LE 10W-40	Delvac XHP Ultra 5W-30	Nuto H 32 EAL Hydraulic Oil 46	Univis N 32	Mobilgear SHC 220	Mobilgrease MB 2
Shell	Shell Rimula Signia 10W-40	Shell Rimula Ultra 5W-30	Tellus 32 Naturelle HF-E 46	Arctic 32	Omala HD 220	Shell Retinax EPL2
Texaco	URSA SUPER TDX 10W-40	URSA PREMIUM FE 5W-30	RANDO HD 32 Hydra 46	RANDO HDZ 32	PINNACLE EP 220	MULTIFAK EP 2
TOTAL	RUBIA TIR 8900 10W-40	RUBIA TIR 9200 FE 5W-30	AZOLLA AF 32 Biohydran SE 46	EQUIVIS ZS 32	Carter SH 220	MULTIS EP 2

5.11 Service & Repair

NOTE: For service or repair please contact the Sherman+Reilly™ Parts & Service Department at parts@sherman-reilly.com or call (423)756-5300.

EQUIPMENT INFORMATION	
Company Name:	_____
Date of Purchase:	_____
Date of Manufacture:	_____
Equipment/Unit Model Number:	_____
Equipment/Unit VIN Number:	_____
Engine Serial Number:	_____

Major Fault:

A "major fault" describes a system malfunction or other system degradation that, by equipment failure, operator error, or other environmental condition, renders that machine inoperable. A major fault can be identified when, through normal operations, the machine would create; an unsafe condition, further or permanent equipment damage, or other situations deemed outside of the operator's ability to effectively and safely operate the machine.

When to send for Service or Repair:

If after troubleshooting an issue or fault that cannot be resolved, or a major fault has been identified, the operator should stop all operation attempts and contact the Sherman+Reilly™ Parts & Service Department. Further operation should not continue until the issue or fault is resolved-

6 Error codes

The following error code table contains information about:

Error code | Error class | Location where the error occurs | Possible cause. | Possible corrective measures

Meaning of the 3 error classes

The error class of each error code is indicated in the second column of the error code table, which is a combination of digit and icon:

1 , 2  or 3 .

The following 3 safety warnings describe the meaning of each error class and the necessary measures for each to be carried out by the user.

NOTICE

Error class 1

General error without impact to the machine's safety.

} Eliminate the error as soon as possible.

CAUTION

Error class 2

The machine can possibly not be operated safely. Ignoring this error can cause injuries to persons.

} Terminate the current operation as fast and careful as possible.

} Only switch on the machine again if the error is eliminated.

WARNING



Error class 3

The machine cannot be operated safely. Certain functions can be operated only in a limited manner or not at all. Ignoring this error can cause injuries or death to persons.

} If the engine is still running: Terminate the current operation as fast and careful as possible.





} Only switch on the machine again if the error is eliminated.




















6.1.1 Error code table

Code	EClass	Location	Possible cause	Possible corrective measure
1	2 	Engine SPN 102, FMI 2	Charge air pressure too high.	Contact engine manufacturer.
2	2 	Engine SPN 105, FMI 0	Charge air too hot.	Clean charge air cooler.
3	3 	Engine SPN 110, FMI 0	Coolant too hot.	Clean the cooler.
4	2 	Engine SPN 111, FMI 1	Not enough coolant.	Stop Engine; Add Coolant
5	2 	Engine SPN 190, FMI 8	Speed sensor: Signal defective.	Contact engine manufacturer.
6	2 	Engine SPN 190, FMI 12	Speed sensor: No signal.	Contact engine manufacturer.
7	2 	Engine SPN 190, FMI 2	Speed sensor: Deviation too large.	Contact engine manufacturer.
8	2 	Engine SPN 97, FMI 3.4	Water in fuel.	Drain condensed water at fuel pre- filter. Use appropriate fuel.
9	2 	Engine SPN 94, FMI 1	Primary pressure of fuel too low.	Contact engine manufacturer.
10	3 	Engine SPN 174, FMI 0	Fuel too hot.	Contact engine manufacturer.
11	2 	Engine SPN 100, FMI 0	Oil pressure too high.	Contact engine manufacturer.
12	2 	Engine SPN 100, FMI 1	Oil pressure too low.	Check oil level.
13	3 	Engine SPN 175, FMI 0	Oil too hot.	Contact engine manufacturer.
14	2 	Engine SPN 98, FMI 1	Not enough oil.	Stop engine. Top up with oil.
15	2 	Engine SPN 107, FMI 0	Air filter: Differential pressure too high.	Clean or replace the air filter.
50	3 	Engine	Other engine error.	Contact engine manufacturer.
100	3 	CAN EMR2 / EMR3 / EMR4	Disturbed communication.	Check fuses and wiring.
101	3 	CAN Display	Disturbed communication.	Check fuses and wiring.
102	3 	CAN Node ID 32, Module CR2012	Disturbed communication.	Check fuses and wiring.
103	3 	CAN Node ID 31, Module CR2012	Disturbed communication.	Check fuses and wiring.















Code	EClass	Location	Possible cause	Possible corrective measure
104	3 	CAN Node ID 30, Module CR2031	Disturbed communication.	Check fuses and wiring.
105	3 	CAN Node ID 30, Module CR2012	Disturbed communication.	Check fuses and wiring.
106	3 	CAN Node ID 29, Module CR2031	Disturbed communication.	Check fuses and wiring.
107	3 	CAN remote control	Disturbed communication.	Check fuses and wiring.
108	3 	Program PLC Side 1	Radio contact: Disturbed communication.	Reduce distance between radio remote control and machine.
109	3 	Program PLC Side 2	Radio contact: Disturbed communication.	Reduce distance between radio remote control and machine.
110	3 	CAN Node ID 28, Module CR2031	Disturbed communication.	Check fuses and wiring.
111	3 	CAN Node ID 52, joystick 1	Disturbed communication.	Check fuses and wiring.
112	1 	CAN Node ID 22, remote diagnosis	Disturbed communication.	Check fuses and wiring.
113	2 	CAN Node ID 21, drum stand drive CR2530	Disturbed communication.	Check fuses and wiring. Disconnect connection and control drum stand manually.
120	2 	CR0232 / CR0032 System pressure sensor 1	No contact.	Check fuses and wiring.
121	2 	CR0232 / CR0032 System pressure sensor 1	Short circuit.	Check wiring. Replace sensor.
122	2 	CR0232 / CR0032 System pressure sensor 2	No contact.	Check fuses and wiring
123	2 	CR0232 / CR0032 System pressure sensor 2	Short circuit.	Check wiring. Replace sensor.
124	3 	CR0232 / CR0032 Pressure sensor rope in (1)	No contact.	Check fuses and wiring.
125	3 	CR0232 / CR0032 Pressure sensor rope in (1)	Short circuit.	Check wiring. Replace sensor.
126	3 	CR0232 / CR0032 Pressure sensor rope in (2)	No contact.	Check fuses and wiring.
127	3 	CR0232 / CR0032 Pressure sensor rope in (2)	Short circuit.	Check wiring. Replace sensor.
128	3 	CR0232 / CR0032 Pressure sensor rope out (1)	No contact.	Check fuses and wiring.

Code	EClass	Location	Possible cause	Possible corrective measure
129	3	CR0232 / CR0032 Pressure sensor rope out (1)	Short circuit.	Check wiring. Replace sensor.
130	3	CR0232 / CR0032 Pressure sensor rope out (2)	No contact.	Check fuses and wiring.
131	3	CR0232 / CR0032 Pressure sensor rope out (2)	Short circuit.	Check wiring. Replace sensor.
132	2	CR0232 / CR0032 Temperature sensor oil	No contact.	Check fuses and wiring.
133	2	CR0232 / CR0032 Temperature sensor oil	Short circuit.	Check wiring. Replace sensor.
134	1	CR0232 / CR0032 Level sensor fuel tank	No contact.	Check fuses and wiring.
135	1	CR0232 / CR0032 Level sensor fuel tank	Short circuit.	Check wiring. Replace sensor.
136	2	CR0232 / CR0032 Boost pressure sensor 1	No contact.	Check fuses and wiring.
137	2	CR0232 / CR0032 Boost pressure sensor 1	Short circuit.	Check wiring. Replace sensor.
138	2	CR0232 / CR0032 Boost pressure sensor 2	No contact.	Check fuses and wiring.
139	2	CR0232 / CR0032 Boost pressure sensor 2	Short circuit.	Check wiring. Replace sensor.
140	3	CR0232 / CR0032 Pressure sensor release brake 1	No contact.	Check fuses and wiring.
141	3	CR0232 / CR0032 Pressure sensor release brake 1	Short circuit.	Check wiring. Replace sensor.
142	3	CR0232 / CR0032 Pressure sensor release brake 2	No contact.	Check fuses and wiring.
143	3	CR0232 / CR0032 Pressure sensor release brake 2	Short circuit.	Check wiring. Replace sensor.
144	2	CR0232 / CR0032 Ultrasonic sensor upper winch	No contact.	Check fuses and wiring.
145	2	CR0232 / CR0032 Ultrasonic sensor upper winch	Short circuit.	Check wiring. Replace sensor.
146	2	CR0232 / CR0032 Ultrasonic sensor lower winch	No contact.	Check fuses and wiring.
147	2	CR0232 / CR0032 Ultrasonic sensor lower winch	Short circuit.	Check wiring. Replace sensor.
148	2	CR0232 / CR0032 Pressure sensor reel	No contact.	Check fuses and wiring.
Code	EClass	Location	Possible cause	Possible corrective measure
149	2	CR0232 / CR0032 Pressure sensor reel	Short circuit.	Check wiring. Replace sensor.


150	2 	CR0232 / CR0032 Program PLC	Temperature hydraulic oil too high.	Check: Oil cooler function? Stringing speed too high?
151	2 	CR0232 / CR0032 Program PLC	Disturbed communication (Synchro Couple).	Check wiring.
152	3 	CR0232 / CR0032 Program PLC	Boost pressure 1 too low.	Contact S+R parts & service.
153	3 	CR0232 / CR0032 Program PLC	Boost pressure 2 too low.	Contact S+R parts & service.
154	2 	CR0232 / CR0032 Program PLC	Error direction recognition PSL valve, signal from 2 directions	Check wiring. Replace path recognition PSL valve.
155	2 	CR0232 / CR0032 System pressure sensor 3	No contact.	Check fuses and wiring.
156	2 	CR0232 / CR0032 System pressure sensor 3	Short circuit.	Check wiring. Replace sensor.
157	2 	CR0232 / CR0032 System pressure sensor 4	No contact.	Check fuses and wiring.
158	2 	CR0232 / CR0032 System pressure sensor 4	Short circuit.	Check wiring. Replace sensor.
159	3 	CR0232 / CR0032 Pressure sensor rope in (3)	No contact.	Check fuses and wiring.
160	3 	CR0232 / CR0032 Pressure sensor rope in (3)	Short circuit.	Check wiring. Replace sensor.
161	3 	CR0232 / CR0032 Pressure sensor rope in (4)	No contact.	Check fuses and wiring.
162	3 	CR0232 / CR0032 Pressure sensor rope in (4)	Short circuit.	Check wiring. Replace sensor.
163	3 	CR0232 / CR0032 Pressure sensor rope out (3)	No contact.	Check fuses and wiring.
164	3 	CR0232 / CR0032 Pressure sensor rope out (3)	Short circuit.	Check wiring. Replace sensor.
165	3 	CR0232 / CR0032 Pressure sensor rope out (4)	No contact.	Check fuses and wiring.
166	3 	CR0232 / CR0032 Pressure sensor rope out (4)	Short circuit.	Check wiring. Replace sensor.
167	2 	CR0232 / CR0032 Program PLC	Engine protection triggered.	Contact S+R parts & service.

Code	EClass	Location	Possible cause	Possible corrective measure
168	2 	CR0232 / CR0032 Program PLC	Thermistor protection triggered.	Let the engine cool down.
169	2 	CR0232 / CR0032 Program PLC	Wrong phase rotation.	Check electrical connection: Right-hand phase rotation required.
170	1 	CR1083 / OPUS A3 Program Display	Error while writing a file, display memory full.	Copy saved files to an USB flash drive and delete them from display memory.
171	2 	CR0232 / CR0032 Pressure sensor reel	Pressure too low.	Contact S+R parts & service.
172	2 	CR0232 / CR0032 Linear motor spool winder	Error linear engine spool winder.	Contact S+R parts & service.
173	2 	CR2530 Pressure sensor drum stand 1	No contact.	Check fuses and wiring.
174	2 	CR2530 Pressure sensor drum stand 1	Short circuit.	Check wiring. Replace sensor.
175	2 	CR2530 Pressure sensor drum stand 2	No contact.	Check fuses and wiring.
176	2 	CR2530 Pressure sensor drum stand 2	Short circuit.	Check wiring. Replace sensor.
177	2 	CR2530 Pressure sensor drum stand 3	No contact.	Check fuses and wiring.
178	2 	CR2530 Pressure sensor drum stand 3	Short circuit.	Check wiring. Replace sensor.
179	2 	CR2530 Pressure sensor drum stand 4	No contact.	Check fuses and wiring.
180	2 	CR2530 Pressure sensor drum stand 4	Short circuit.	Check wiring. Replace sensor.
181	2 	CR2530 Ultrasonic sensor drum stand 1	No contact.	Check fuses and wiring.
182	2 	CR2530 Ultrasonic sensor drum stand 1	Short circuit.	Check wiring. Replace sensor.
183	2 	CR2530 Ultrasonic sensor drum stand 2	No contact.	Check fuses and wiring.
184	2 	CR2530 Ultrasonic sensor drum stand 2	Short circuit.	Check wiring. Replace sensor.
185	2 	CR2530 Ultrasonic sensor drum stand 3	No contact.	Check fuses and wiring.
186	2 	CR2530 Ultrasonic sensor drum stand 3	Short circuit.	Check wiring. Replace sensor.

Code	EClass	Location	Possible cause	Possible corrective measure
187	2 	CR2530 Ultrasonic sensor drum stand 4	No contact.	Check fuses and wiring.
188	2 	CR2530 Ultrasonic sensor drum stand 4	Short circuit.	Check wiring. Replace sensor.
189	3 	CR0232 / CR0032 Control hydraulic rope in for bull wheel 1	No contact.	Check fuses and wiring.
190	3 	CR0232 / CR0032 Control hydraulic rope in for bull wheel 1	Short circuit.	Check wiring.
191	3 	CR0232 / CR0032 Control hydraulic rope in for bull wheel 2	No contact.	Check fuses and wiring.
192	3 	CR0232 / CR0032 Control hydraulic rope in for bull wheel 2	Short circuit.	Check wiring.
193	3 	CR0232 / CR0032 Control hydraulic rope in for bull wheel 3	No contact.	Check fuses and wiring.
194	3 	CR0232 / CR0032 Control hydraulic rope in for bull wheel 3	Short circuit.	Check wiring.
195	3 	CR0232 / CR0032 Control hydraulic rope in for bull wheel 4	No contact.	Check fuses and wiring.
196	3 	CR0232 / CR0032 Control hydraulic rope in for bull wheel 4	Short circuit.	Check wiring.
197	3 	CR0232 / CR0032 Control hydraulic rope out for bull wheel 1	No contact.	Check fuses and wiring.
198	3 	CR0232 / CR0032 Control hydraulic rope out for bull wheel 1	Short circuit.	Check wiring.
199	3 	CR0232 / CR0032 Control hydraulic rope out for bull wheel 2	No contact.	Check fuses and wiring.
200	3 	CR0232 / CR0032 Control hydraulic rope out for bull wheel 2	Short circuit.	Check wiring.

Code	EClass	Location	Possible cause	Possible corrective measure
201	3 	CR0232 / CR0032 Control hydraulic rope out for bull wheel 3	No contact.	Check fuses and wiring.
202	3 	CR0232 / CR0032 Control hydraulic rope out for bull wheel 3	Short circuit.	Check wiring.
203	3 	CR0232 / CR0032 Control hydraulic rope out for bull wheel 4	No contact.	Check fuses and wiring.
204	3 	CR0232 / CR0032 Control hydraulic rope out for bull wheel 4	Short circuit.	Check wiring.
205	2 	CR0232 / CR0032 Proportional valve oil cooler	No contact.	Check fuses and wiring.
206	2 	CR0232 / CR0032 Proportional valve oil cooler	Short circuit.	Check wiring.
207	3 	CR0232 / CR0032 Control hydraulic tensioning force for bull wheel 1	No contact.	Check fuses and wiring.
208	3 	CR0232 / CR0032 Control hydraulic tensioning force for bull wheel 1	Short circuit.	Check wiring.
209	3 	CR0232 / CR0032 Control hydraulic tensioning force for bull wheel 2	No contact.	Check fuses and wiring.
210	3 	CR0232 / CR0032 Control hydraulic tensioning force for bull wheel 2	Short circuit.	Check wiring.
211	3 	CR0232 / CR0032 Control hydraulic tensioning force for bull wheel 3	No contact.	Check fuses and wiring.
212	3 	CR0232 / CR0032 Control hydraulic tensioning force for bull wheel 3	Short circuit.	Check wiring.
213	3 	CR0232 / CR0032 Control hydraulic tensioning force for bull wheel 4	No contact.	Check fuses and wiring.
214	3 	CR0232 / CR0032 Control hydraulic tensioning force for bull wheel 4	Short circuit.	Check wiring.

Code	EC	Location	Possible cause	Possible corrective measure
215	3 	CR0232 / CR0032 Drum stand 1 pre-tension	No contact.	Check fuses and wiring.
216	3 	CR0232 / CR0032 Drum stand 1 pre-tension	Short circuit.	Check wiring.
217	3 	CR0232 / CR0032 Drum stand 2 pre-tension	No contact.	Check fuses and wiring.
218	3 	CR0232 / CR0032 Drum stand 2 pre-tension	Short circuit.	Check wiring.
219	3 	CR0232 / CR0032 Drum stand 3 pre-tension	No contact.	Check fuses and wiring.
220	3 	CR0232 / CR0032 Drum stand 3 pre-tension	Short circuit.	Check wiring.
221	3 	CR0232 / CR0032 Drum stand 4 pre-tension	No contact.	Check fuses and wiring.
222	3 	CR0232 / CR0032 Drum stand 4 pre-tension	Short circuit.	Check wiring.
223	3 	CR0232 / CR0032 Non-return valve rope out 1.1	No contact.	Check fuses and wiring.
224	3 	CR0232 / CR0032 Non-return valve rope out 1.1	Short circuit.	Check wiring.
225	3 	CR0232 / CR0032 Non-return valve rope out 1.2	No contact.	Check fuses and wiring.
226	3 	CR0232 / CR0032 Non-return valve rope out 1.2	Short circuit.	Check wiring.
227	3 	CR0232 / CR0032 Non-return valve rope out 1.3	No contact.	Check fuses and wiring.
228	3 	CR0232 / CR0032 Non-return valve rope out 1.3	Short circuit.	Check wiring.
229	3 	CR0232 / CR0032 Non-return valve rope out 2.1	No contact.	Check fuses and wiring.
230	3 	CR0232 / CR0032 Non-return valve rope out 2.1	Short circuit.	Check wiring.
231	3 	CR0232 / CR0032 Non-return valve rope out 2.2	No contact.	Check fuses and wiring.
232	3 	CR0232 / CR0032 Non-return valve rope out 2.2	Short circuit.	Check wiring.
233	3 	CR0232 / CR0032 Non-return valve rope out 2.3	No contact.	Check fuses and wiring.
234	3 	CR0232 / CR0032 Non-return valve rope out 2.3	Short circuit.	Check wiring.
Code	EClass	Location	Possible cause	Possible corrective measure
235	3 	CR0232 / CR0032 Non-return valve rope out 3.1	No contact.	Check fuses and wiring.

236	3 	CR0232 / CR0032 Non-return valve rope out 3.1	Short circuit.	Check wiring.
237	3 	CR0232 / CR0032 Non-return valve rope out 3.2	No contact.	Check fuses and wiring.
238	3 	CR0232 / CR0032 Non-return valve rope out 3.2	Short circuit.	Check wiring.
239	3 	CR0232 / CR0032 Non-return valve rope out 3.3	No contact.	Check fuses and wiring.
240	3 	CR0232 / CR0032 Non-return valve rope out 3.3	Short circuit.	Check wiring.
241	3 	CR0232 / CR0032 Non-return valve rope out 4.1	No contact.	Check fuses and wiring.
242	3 	CR0232 / CR0032 Non-return valve rope out 4.1	Short circuit.	Check wiring.
243	3 	CR0232 / CR0032 Non-return valve rope out 4.2	No contact.	Check fuses and wiring.
244	3 	CR0232 / CR0032 Non-return valve rope out 4.2	Short circuit.	Check wiring.
245	3 	CR0232 / CR0032 Non-return valve rope out 4.3	No contact.	Check fuses and wiring.
246	3 	CR0232 / CR0032 Non-return valve rope out 4.3	Short circuit.	Check wiring.
247	3 	CR2031 Torque switch bull wheel front	No contact.	Check fuses and wiring.
248	3 	CR2031 Torque switch bull wheel front	Short circuit.	Check wiring.
249	3 	CR2031 Torque switch bull wheel rear	No contact.	Check fuses and wiring.
250	3 	CR2031 Torque switch bull wheel rear	Short circuit.	Check wiring.
251	2 	CR2530 Proportional valve force control drum stand 1	No contact.	Check fuses and wiring.
252	2 	CR2530 Proportional valve force control drum stand 1	Short circuit.	Check wiring.
253	2 	CR2530 Proportional valve force control drum stand 2	No contact.	Check fuses and wiring.
254	2 	CR2530 Proportional valve force control drum stand 2	Short circuit.	Check wiring.

OVERHEAD SWIVEL, GRIP, & ROPE SAFETY & INSPECTION INFORMATION

All mechanical components are subject to wear. Worn components do not have the same *Maximum Load Limit* rating as do new components. The total responsibility for the inspection, maintenance, lubrication, and continued use is entirely up to the purchaser/user. Remember, visual inspection may not be sufficient and examination methods such as X-ray, ultrasonic testing, magnetic particle inspection, dielectric resistance and others, might be required to establish the present integrity of the product. External factors will affect the longevity of the product. There is no defined period of time for the useful life of any of these products.

Check to see that your equipment is being inspected and tested in accordance with all applicable governmental rules and regulations and OEM guidance. Should any products become worn and in need of repair, the responsibility for the actual repair work will be borne solely by the party making such repairs. It is recommended that the Original Equipment Manufacturer be contacted should there be any questions whatsoever relating to a repair.

The following contact information is for the Original Equipment Manufacturers (OEM) for the peripheral equipment: grips, swivels, wire, and rope - provided with Sherman+Reilly™ equipment. This contact information is provided as a courtesy by Sherman+Reilly in an effort to keep end users well informed of the maintenance and safety requirements for this equipment. For the latest information on any of this accessory equipment check with the Original Equipment Manufacturer.

Original Equipment Manufacturers

Miller Lifting Products

swivels

Division of GHM Industries, Inc.

100A Sturbridge Road
Charlton, MA 01507 USA

Phone: (508) 248-3941

Toll Free: **800-733-7071**

www.millerproducts.net

http://www.millerproducts.net/for_your_safety.htm

<http://www.millerproducts.net/maintenance.htm>

overhead



Yale Cordage

rope

77 Industrial Park Road
Saco, ME 04072 USA

Phone: (207) 282-3396

www.yalecordage.com



For information about inspecting and maintaining pulling ropes, visit:

<http://www.yalecordage.com/splicing-and-instructions/rope-selection-and-inspection-guide>

Hubbell Wiring Device-Kellems

40 Waterview Drive

Shelton, CT 06484

Phone: (475) 882-4820

Email: techserv@hubbell.com

pulling grips



NOTE: The listed URLs to which these QR Codes are linked are not under the control of Sherman+Reilly. If the provided QR code link is

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www.hubbell-wiring.com

<http://www.hubbell-wiring.com/press/catalog/V.pdf>



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