SHERMAN+REILLY™
A Textron Company

SHERMAN + REILLY Revolution Series
PT-2000X Puller

Operators Manual

Rev. April 2015

Table of Contents

1

Introduction

Liability

Publication of this manual and the safety precautionses 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 on page 53 of 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 competent in the use of overhead line pulling and tensioning machines, to include 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.

Introduction

Terms of Use

It is very important to all of us at Sherman+Reilly that every machine is operated in a safe manner. We have taken every precaution to guard against the possibility of an accident. To properly and safely operate this machine, it is necessary that operators and maintenance personnel read and understand the information in this manual, to include appendices and other provided materials.

Anyone working around the machine should also, at a minimum, read the safety precautions listed in this manual. Be aware of each warning and precaution, as they are designed to help protect against injury. Taking unnecessary risks and ignoring warnings are usually the primary causes of personal injury and fatal accidents in the workplace. If you have questions regarding any operational steps or the safety of a procedure listed in this manual, contact Sherman+Reilly at 1-800-251-7780 or by email at help@sherman-reilly.com.

The Sherman+Reilly Model P-2000X Puller is a diesel engine powered, hydraulically actuated machine. This machine has variable speed and line tension controls; however, if pulling multiple conductors using a running board, the total line tension applied from all conductors must not exceed the pulling capacity of the machine.

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, including OSHA, EPA, and all rating requirements and standards, is a must 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.

2

Specifications

P-2000X General Overview

The Sherman+Reilly Revolution Series P-2000X Single Reel Bullwheel Puller is capable of pulling up to 20,000 lbs. This transmission class puller utilizes an automatic horizontal levelwind that permits overhead rope retrieval with precision control. The P-2000X is equipped with an ACG (advanced control group), allowing for a single operator at a protected central console to control payout speed, pulling speed, levelwind controls, and jack position. The operator controls employ electronic machine control with CAN-bus technology, providing for accurate to-the-second display readouts of the machine system status.

The automatic electrically actuated levelwind helps to keep operators focused on the pull by reducing the need to focus on levelwinding. The P-2000X is equipped with a 175 HP industrial diesel engine capable of delivering an even 20,000 lbs. from the start of the pull to the end. The fully hydraulic direct drive system provides the operator with precise and intuitive automatic drive/drum braking. The P-2000X's tandem electric brake axle trailer is equipped with four hydraulic jacks, an adjustable pintle eye, safety chains/hooks, emergency brake away switch, and U.S. DOT-approved LED lighting.

The P-2000X features a Safe-Zone™ Cab providing ultimate safety and comfort for the operator. The Safe-Zone™ Cab employs a floor to ceiling polycarbonate front window for maximum visibility while providing superior protection against impact. The cab includes climate control, a fully adjustable ergonomic seat, and all required electronic controls and gauges. The Safe-Zone Cab™ is designed to reduce operator fatigue, reduce distractions to improve operator communication, and to provide an "off-ground" envelope for greatly reducing the risk of "touch potential" in energized environments.

Key Features

- Fully Hydraulic/Direct Drive System
- Full 20,000 lbs. of Pulling Power
- Safe-Zone™ Cab
- 76 inch Drum with Opt. 23,000 ft. (Max) 20mm Anti-Twist Steel Cable
- Precision Automatic Levelwind
- 4 Hydraulic Jacks for Leveling
- 10.4 cu. ft. Frame Mounted Tool Box
- Centralized Engine Controls- CAN-bus technology

Specifications

Specification Details: P-2000X

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

Pulling Capacity	Max: 20,000 lbs., (*Rated maximum)*	
Average Line Speed	Pulling: 4 mph / Payout: 10 mph	
Controls	Digital with real-time tension monitoring and recording	
Hardline Reel Dimensions	Core Diameter:	30 in.
	Total Outside Width:	76 in.
	Inside Width:	50 in.
	Flange Diameter:	76 in. (84 Optional)
Reel Capacity	21 mm. dia. Unitrex™	21,500 ft.
	20 mm. dia. anti-twist steel cable	23,000 ft.
Drive System	Twin 22in. Bullwheels w/Direct Hydraulic Drive	
Drive System Engine	Diesel, 175 HP, water cooled Tier 3	
Fuel Capacity	12 gallon	
Hydraulic Fluid	ISO Grade 32	
Hydraulic Reservoir	20 gallon	
Hydraulic Fluid Filtration (2)	10 micron, *both supply and return filters*	
Levelwind	Electrically-actuated, automatically-controlled	
Operator's Safety Enclosure	Safe-Zone™ Cab, fully-enclosed/single door	
Frame Construction	Steel tubing, steel plate, continuous weld	
Length (Overall, Nom.)	23 ft., 8 in.	
Width (Overall, Nom.)	8 ft., 6 in.	
Height (Overall, Nom.)	10 ft., 10 in.	
Weight (With Rope)	45,000 lbs.	
GVWR	50,000 lbs.	
Suspension	Leaf-spring	
Axle Configuration	Tandem	
Wheel Configuration and Tires	Dual 245/70R 17.5	
Brakes (Trailer)	Electric brakes w/anti-lock feature	
Towing Attachment	3 in. pintle eye, with two safety chains and hooks	
Tie Downs (4)	(2) 5/8 in. dia. steel D-Rings, (2) 1 in. dia. steel D-Rings	
Rear (R/L) Jacks (2)	Hydraulic, horizontal folding, with shoe	
Front/Nose Jack (2)	Hydraulic, horizontal folding, 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	
Grounding (4)	¾ in. dia. copper-clad steel loops	
Wheel Chocks	Standard	
Fire Extinguisher	ABC	
Color	S+R White	

3

Safety

Hazard Overview

Please pay attention to all safety warning labels and information placards posted on the machine, components, and trailer assembly. These labels and placards are provided to assist in identifying areas containing potential hazards while also providing information regarding equipment specifications and limitations. Please see below for examples:

Warning Terms: signal words in this manual that call the operator's attention to safety concerns.

The word **DANGER** indicates the information relates to a specific immediate hazard which, if disregarded, will result in severe personal injury or death.

The word **CAUTION** indicates the information pertains to a potential hazard or unsafe practice which, if disregarded, may result in minor personal injury or equipment damage.

The word **WARNING** indicates the information relates to a specific immediate hazard or unsafe practice which, if disregarded, could result in personal injury or death.

The word **NOTE** indicates the information is important to the correct operation or maintenance of the machine.

Safety

General Warnings

WARNING: Ear protection should be worn when operating machines with operator ear noise levels above 85dB.

WARNING: This machine must not be used as a winch for pulling another vehicle. For trailer models, this trailer must not be modified to allow towing of another trailer behind and in tandem with this trailer.

WARNING: California Proposition 65: Engine exhaust, some of its elements, and certain vehicle components contain or emit chemicals known to the State of California to cause cancer and birth defects or other reproductive harm.

WARNING: Batteries produce explosive gases, contain corrosive acid, and supply levels of electrical current high enough to cause burns.

WARNING: To prevent serious injury from hot and high pressure oil, never use your hands to check for oil leaks; use paper or cardboard. Hydraulic fluid escaping under pressure can have sufficient force to penetrate skin. If fluid is injected into the skin, it must be surgically removed within a few hours by a doctor familiar with this form of injury; otherwise, gangrene may develop.

Operator Safety Precautions

- 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.

Employer Safety Precautions

This guideline is intended to assist owners/employers to ensure equipment is serviced and operated in a safe manner. Each job site may have additional situations and conditions which need consideration.

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 shall 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 shall utilize a lock-out/tag-out procedure which complies with OSHA Standard, Part 1910.147, Title 29 of the Code of Federal Regulations. 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.

Chemical Safety

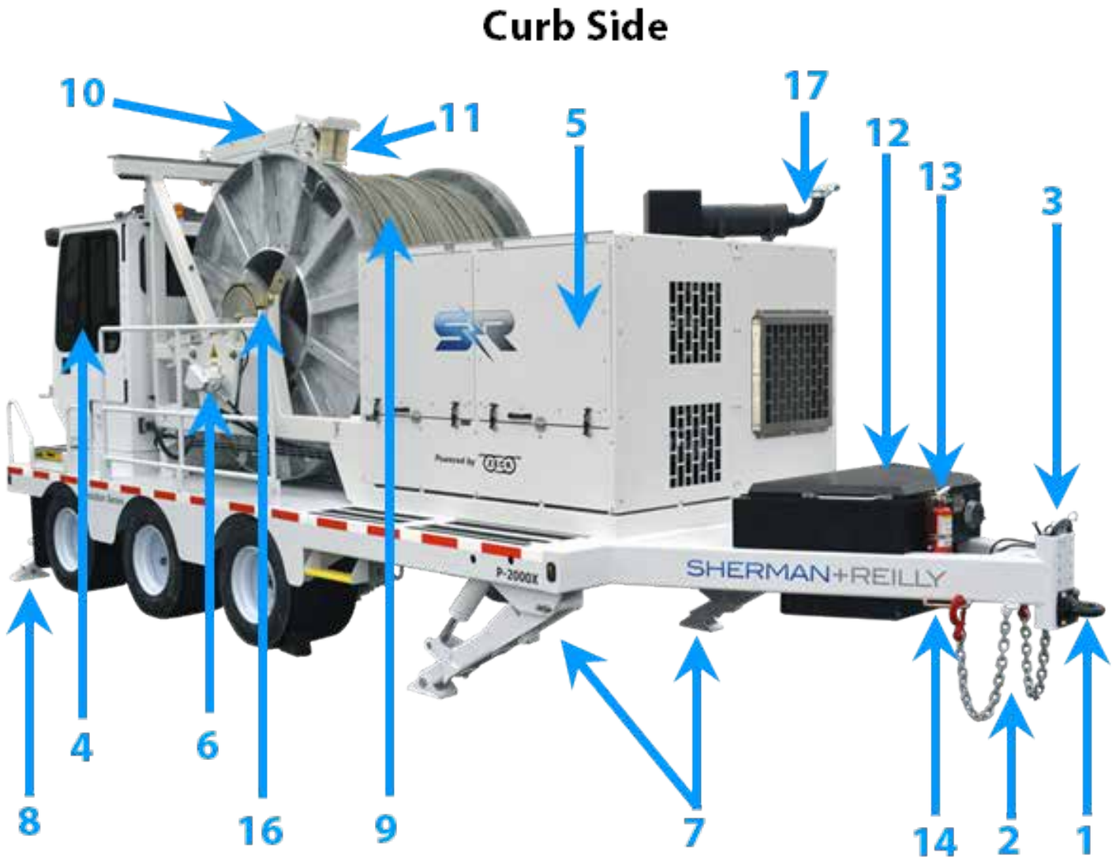
Exposure to chemicals during normal operation of the machine is limited; however, chemical exposure may be encountered through preventive maintenance and repair. Operators and maintenance/service personnel should take appropriate precautions, to include wearing all (PPE)-Personal Protection Equipment, 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.

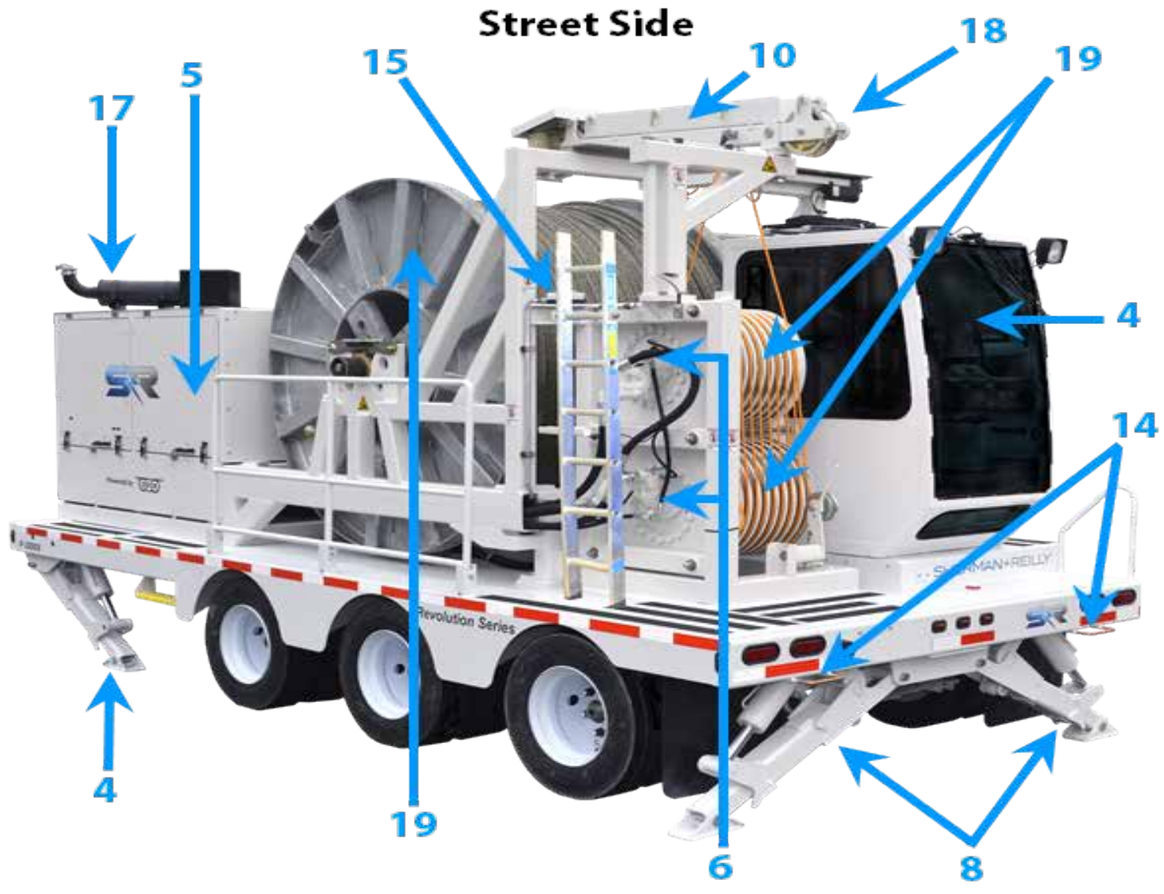
Any additional chemicals introduced to the machine or used in conjunction with maintenance or repair of the machine must have a MSDS/SDS available for work being done, and would thereby be the responsibility of the operator's employer or the organization providing the maintenance. All chemical handling 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, OSHA's Hazard Communication Standard- (29 CFR) Part 1910.1200, and all applicable EPA Standards and Regulations- *(additional standards may apply)*. For further information on safety standards regarding chemicals, see OSHA and EPA websites.

Terms You Need to Know

1. Pintle Hitch
2. Safety Chains
3. Electric Brake Connections
4. Safe-Zone™ Cab
5. Hydraulic Power Engine
6. Hydraulic Drive Motor(s)
7. Rear/Nose Jacks (2)
8. Front [L/R] Jacks (2)
9. Drum
10. Levelwind Arm
11. Levelwind Head
12. Tool Box
13. Fire Extinguisher
14. Grounding Bracket (4)
15. Manual Levelwind Controls
16. Drum/Drive Coupling(s)
17. Engine Exhaust
18. Fairlead Roller
19. Bullwheels





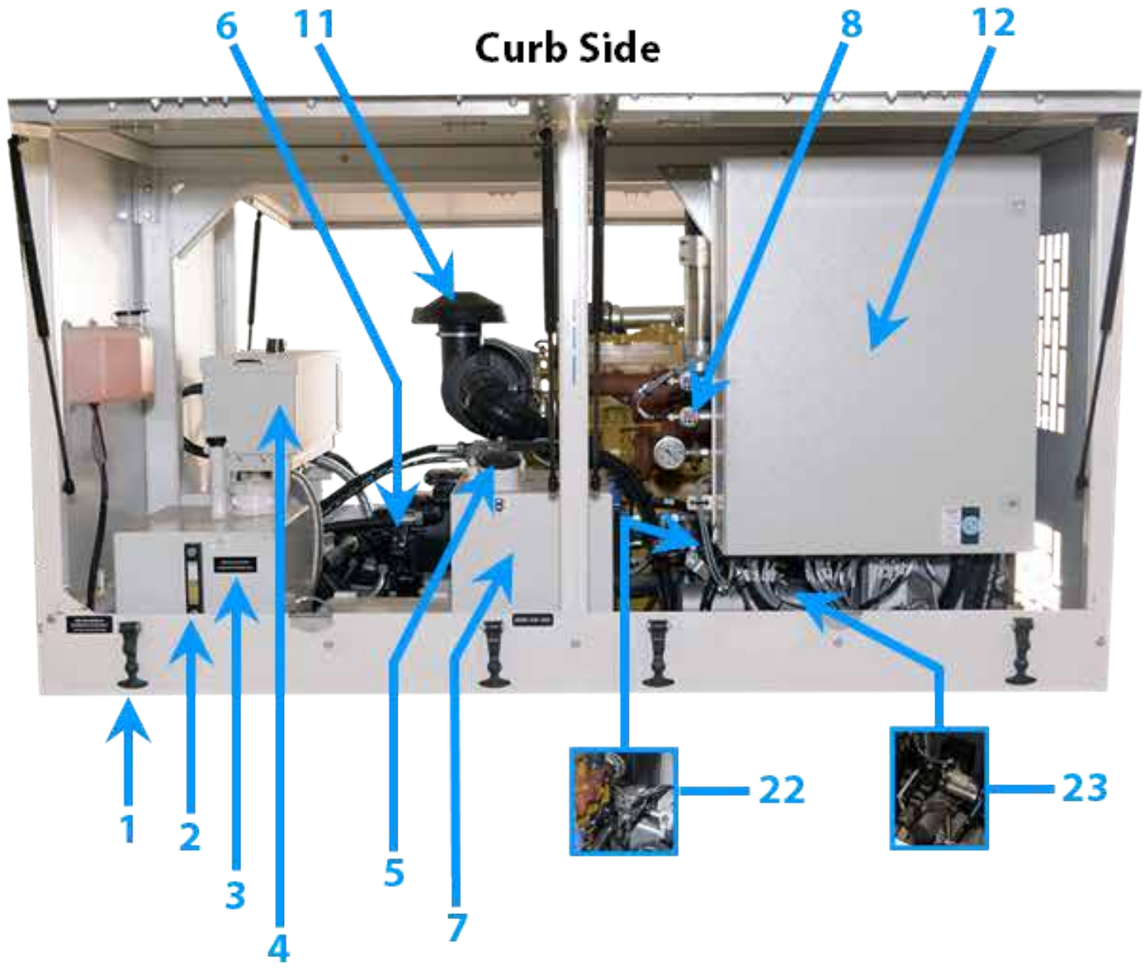
Operation

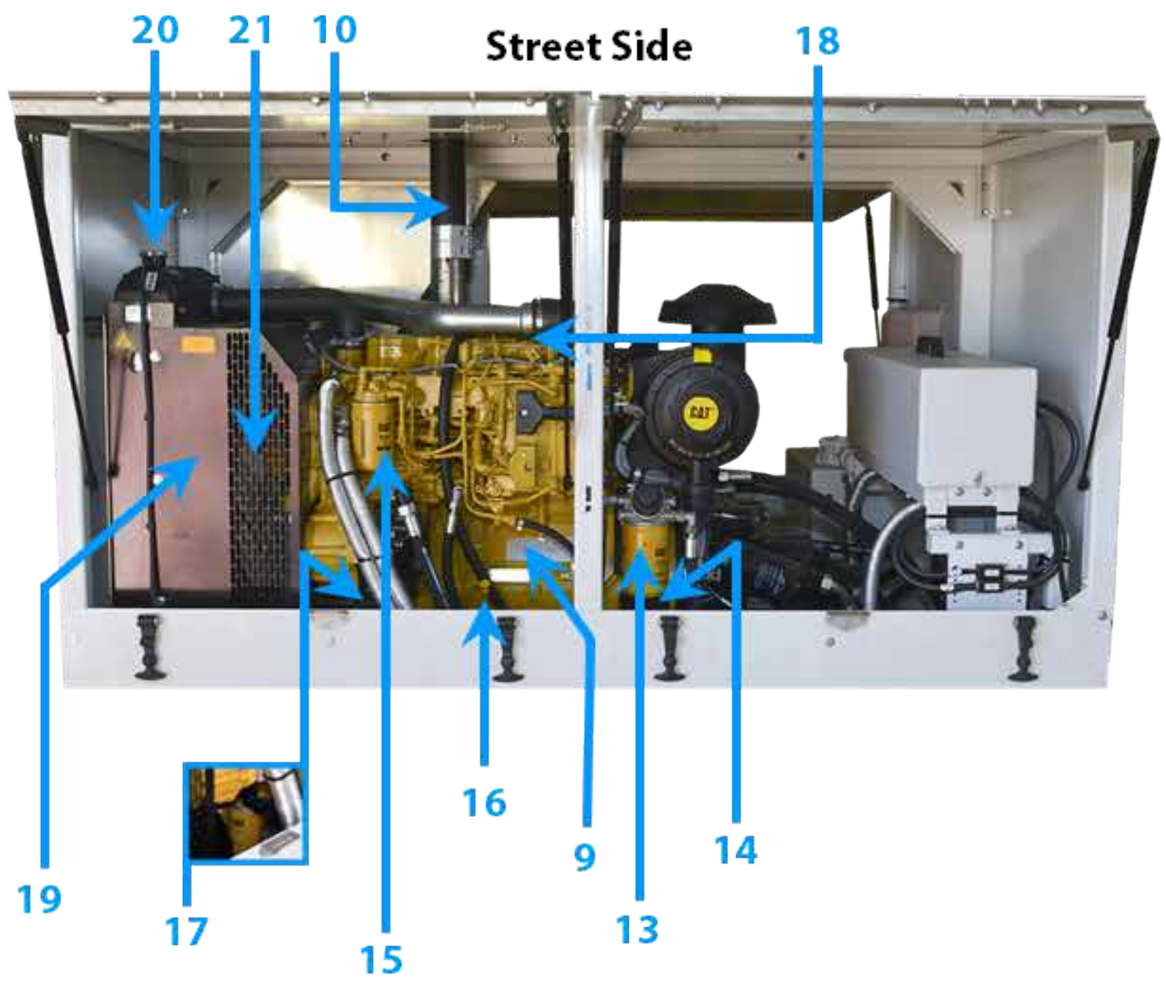
4

Terms You Need to Know

Under the Hood

1. Rubber Compartment Latches
2. Sight Gauge
3. Hydraulic Tank w/Filters
4. Batteries
5. Diesel Fuel Tank Cap
6. Hydraulic Pump
7. Diesel Fuel Tank
8. Hydraulic System Gauges
9. Hydraulic Power Engine
10. Engine Exhaust Pipe
11. Engine Air Intake Pipe
12. Fuse Box
13. Engine Fuel Pre-filter/Water Separator
14. Fuel/Water Separator Drain Cock
15. Main Fuel Filter
16. Engine Oil Dipstick
17. Engine Oil Filter
18. Engine Oil Fill Port
19. Engine Radiator
20. Engine Radiator Cap/Fill
21. Engine Radiator Cooling Fan
22. AC Compressor
23. Arctic Kit Burner





Under the Hood

Operation

Safe-Zone™ Cab

The Safe-Zone™ Cab is designed to keep the operator off the ground while the equipment is in use, and is built with a polycarbonate front window, fully adjustable ergonomic seat, high-resolution color LCD screen, and a full set of electronic controls. The Safe-Zone™ Cab comes in several sizes and forms, dependent upon the machine. It is designed to reduce operator fatigue, reduce errors and injuries in the field, and also reduce the risk of "touch potential" in energized environments.

Operators Controls

A 12-Volt DC power port has been provided on the operator control console. This port can be used to charge field radios or cellular telephones, or provide power for other similar devices.

CAUTION: <u>Do not use ammonia-based cleaners.</u> 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 breakage situation occur.

Ergonomic Operators Chair

Safe-Zone™ Cab

Climate Control System

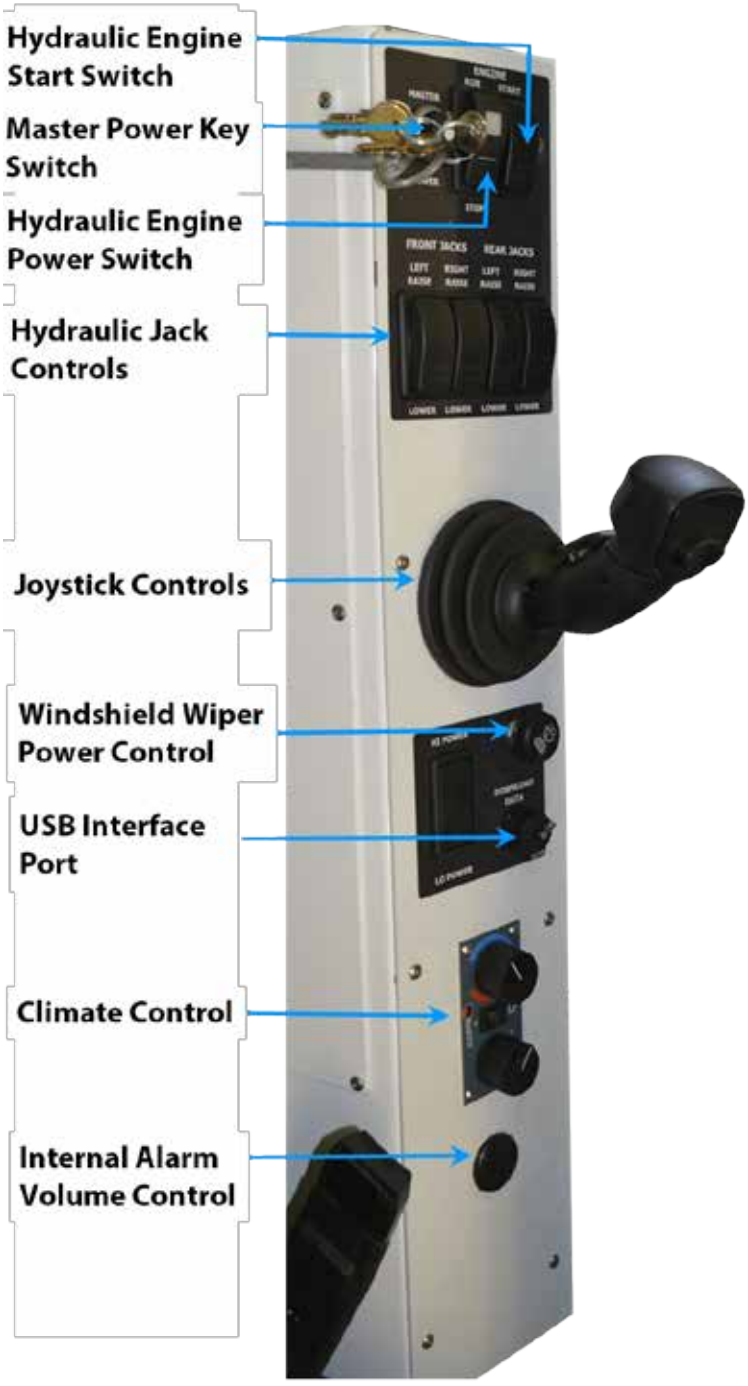
The P-2000X Safe-Zone™ Cab comes equipped with a climate control system providing customized air temperature controls for both heating and cooling.

The climate control system has multiple air fan speeds- [OFF, LO, MED, HI], with overhead and foot level multidirectional vents.

Operator Controls

Left Side Console

Right Side Console



Operator Controls

***For control locations see Operator Control Panel Section on page 21.*

Master Power Key Switch

This switch is used to control power to the operator controls. This switch must be turned to the On position to start the machine.

Emergency Stop Button

When pushed, this red push button stops engine power. After being depressed, the button must be rotated and released to the disengaged position to restore power to the system and reengage operator controls.

Hydraulic Engine Power Switch

To start the engine, first ensure that the master power key switch is turned to the on position, then push the hydraulic engine power switch upward to the [RUN] position. If the glow plugs are required, they will engage automatically when the switch is placed in the On position. Then, push the [START] button.

Exterior Work Lighting Power Switch

This control switch, located on the door panel, operates in a rocking pattern, and is designed to turn on and off the exterior work lights, thereby allowing operations during low light conditions. To turn on the exterior work lights, depress the switch forward, from the position of the operator's chair. To turn off the exterior work lights, depress the switch backward toward the operator's chair. When the switch is engaged, the light in the center of the switch will illuminate.

Automatic Levelwind Controls

This switch and knob, located on the door panel, are used to control the automatic levelwind function. The switch is pushed up to turn on the automatic levelwind function and back to turn off. Then knob is used to increase and decrease the overall speed of the levelwind. ***For more information, see the Automatic Levelwind Controls section.***

Operator Controls

***For control locations see Operator Control Panel Section on page 21.*

System Control Panel

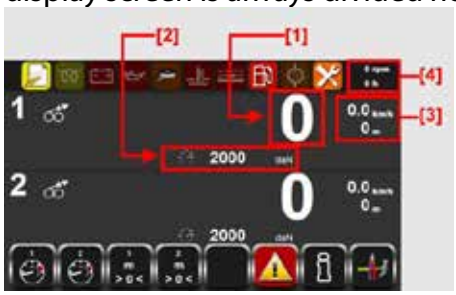
The system control panel has eight backlit soft key buttons for control of machine and computer functions. The panel is also equipped with a seven inch widescreen high-definition color liquid crystal display showing system and operation specific information.

Once the master power key switch is turned on and the system loads, the first screen the operator sees (after the S+R logo screen) is the **MAIN MENU screen**. This screen allows the operator to access the functions of the system, while also allowing access to settings and diagnostics.

[1] The display indicates all relevant information for the respective mode.

[2] Eight function buttons are arranged under the display, and the functions assigned to the individual buttons are at the lower edge of the display. Button assignments change with the displayed screen. Only the functions which are currently authorized in operating mode are displayed. Some display fields require the input of numbers or the selection of options. To this effect, appropriate input fields are displayed, if necessary.

Regardless of the version of the machine, the display screen is always divided horizontally.



[1] The display of the pulling force is the central display element in pulling mode.

[2] The selectable limit value of overload indication is displayed directly underneath. If the pulling force in pulling mode gets close to the limit value of the overload device, the value flashes yellow and the machine drive is automatically reduced. If the limit value is exceeded, the value flashes red and the machine drive is stopped.

[3] The current rope speed and the length of the unwound or wound rope are indicated. The current counters starting from the actuation of the reset button are counted. The wound-up rope is added to the current value, and the unwound rope is subtracted.

[4] Display for engine speed and operating hours is in the upper right corner.

For machines with a single set of bullwheels, the lower part of the display remains empty and the page numbers at the bottom are not indicated.

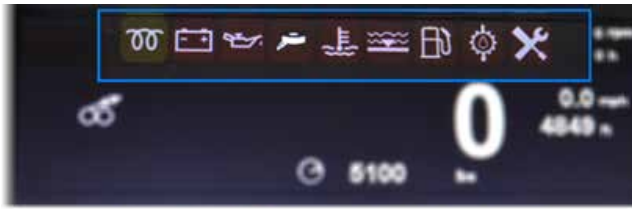
Operator Controls

***For control locations see Operator Control Panel Section on page 21.*

System Control Panel

UPPER INDICATOR BAR

The bar at the top of the screen shows informational symbols pertaining to engine control functions and specific status updates. A bright luminous sign indicates a malfunction or a message.



The display fields described above are only for information purposes. If during operation one or several of the admissible machine limits are exceeded, the control immediately stops operation. If necessary, the engine is automatically switched off to protect the machine. The current malfunction will always show on the display.

Recording active: the recording function must have been activated previously

Pre-glow indicator

Loading indicator: indicates that the battery is not being charged

Oil pressure indicator: "Engine oil pressure too low." This display must go out when the engine is running

Air filter indicator: "Dirty air filter" – clean

Coolant temperature indicator

Coolant level indicator: "Coolant level too low" - refill

Diesel level indicator

Hydraulic oil temperature indicator

Maintenance indicator

Operator Controls

***For control locations see Operator Control Panel Section on page 21.*

System Control Panel

LOWER CONTROL BAR

A bar with eight fields is at the lower edge of the display.

These eight fields correspond to the buttons directly below each field. The assignment of the function fields/buttons changes with each screen.

Back / Return Button

This button is present on all sub level screens and, when pressed, returns the user to the previous or MAIN Screen.

Input Overload Button

This function button, when pressed, opens the overload setting screen, which allows the operator the ability to program the overload setting that limits the maximum amount of force during pulling operations. These buttons are specific to each page (1 and 2).

INPUT OVERLOAD SETTINGS Screen

This screen allows the operator to set the force limitation or "overload setting" employed by the system. The system will use this setting (in pulling mode only) to limit the force from the system based on the amount programmed.

To increase or decrease the amount, press the UP and DOWN arrow buttons. The operator can increase or decrease the amount in increments of 100 or 1,000.

To apply the adjusted overload setting, once completed, press the green check mark button. This button will save the changes in the system and return the user to the MAIN screen.

NOTE: If no action is made on this page for a period of 10 seconds, the display returns automatically to the MAIN screen, and changes are not applied.

Operator Controls

***For control locations see Operator Control Panel Section on page 21.*

System Control Panel

INPUT OVERLOAD SETTINGS Screen (Cont.)
To verify that the Overload setting is applied correctly, from the MAIN screen, view the setting listed at the bottom of the active page- (*see item* **[2]**).

CAUTION: Operators should always verify that the setting changes are applied correctly prior to commencing operations.

NOTE: If the system times out and automatically returns the user to the MAIN screen, or the user manually presses the Back/Return button to return to the MAIN screen, the changed value will not be saved, and the new overload setting will not take effect. Operators must save the new setting before exiting the screen, before it will take effect.

If the pulling force during pulling operations gets close to the limit value of the overload device, the value flashes yellow and the machine drive is automatically reduced. If the limit value is exceeded, the value flashes red and the machine drive is stopped.

The operator can change the overload setting during pulling operations, at any time by:

1  Accessing the INPUT OVERLOAD SETTINGS Screen.

2  Changing the value.

3  Saving the changes.

The adjusted overload limit will take effect once the setting is saved.

Operator Controls

***For control locations see Operator Control Panel Section on page 21.*

System Control Panel

Meter Counter Reset Button

When this button is pressed, it resets the respective meter counter shown on page 1 or page 2 to "zero." See item **[3]** below.

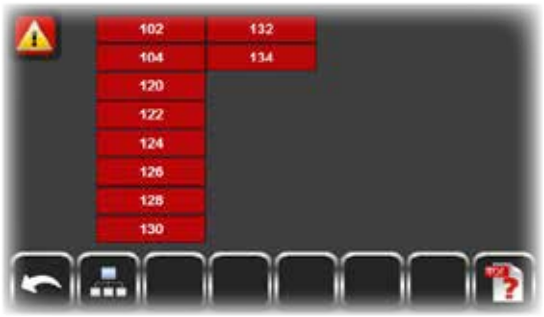
Error Indicator and FUNCTION Screen

This symbol at the bottom left is displayed only in the case of a malfunction. Otherwise, the symbol will be grayed out. If an error occurs during operation, the error indicator will become active.

Active Indicator- (**Errors Present**)

Inactive Indicator- (**No Errors**)

When the corresponding button for the active error indicator is pressed, the system will display the error page where the operator can access individual errors.



All active errors are displayed with their error number.

The presence of the [**PDF ?**] option indicates that error descriptions are available in clear text, as well as the reasons for the errors and repair information. To access these error descriptions, press the corresponding button for the [PDF ?] option.

Pressing the communications link button opens a screen displaying the CAN bus overview specific to the machine. If red lines are shown, this indicates a communication error, and error codes are shown.

The back/return button is present on all sub level screens and, when pressed, returns the user to the previous or MAIN Screen.

Operator Controls

***For control locations see Operator Control Panel Section on page 21.*

System Control Panel

INFORMATION Screen

Press the **[i]** symbol button to call the screen "information." This will provide additional information on the activity being performed, such as detailed engine data.

At the top of this display resides the date and time bar. This bar provides the current date and time- based on what is set in the system.

The gauge on the far right displays the engine coolant temperature.

The middle gauge shows the fuel level.

The third gauge displays the hydraulic oil temperature.

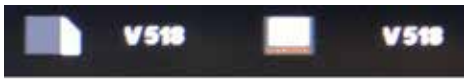
The information screen consists of the following additional display information:

Displays full load hours as well as residual operating time.

Display of next maintenance

Display of chassis identification number (machine number).

Display of software version of control and display.



The back/return button is present on all sub level screens and, when pressed, returns the user to the previous or MAIN Screen.

Operator Controls

***For control locations see Operator Control Panel Section on page 21.*

System Control Panel

SETTINGS Screen/Button

When this button is pressed, it will access the SETTINGS screen.

The settings screens show information for the current date and time:

The status indicator for the data recorder is also located on this page. The status indicator tells the operator whether or not the data recorder is active or not.

The power symbol represents the status indicator. The white indicator signifies that the data recorder is not active. The green indicator signifies that the data recorder is active. *See the Data Recorder On/Off Button section.*

The triangle symbol represents the recording intervals setting for the system. The recording interval setting is programmed using length in the measurement of feet or meters. Therefore, the values for pulling or tensioning force and velocity within the length difference are recorded every [_____] feet/meters. For longer recording segments, enter a higher number of feet/meters, and for shorter recording segments, enter a smaller number of feet/meters. *For information on how to change this setting see the RECORDING INTERVALS Screen/Button section.*

At the bottom of the Setting screen are multiple option buttons.

The back/return button is present on all sub level screens, and when pressed returns the user to the previous or MAIN Screen.

TIME SETTING Screen/Button

When pressed, this button will display the TIME SETTING screen, which allows the operator the ability to change the current time for the system. The time is displayed as 24 hour time.

Operator Controls

***For control locations see Operator Control Panel Section on page 21.*

System Control Panel

TIME SETTING Screen/Button (Cont.)

To change the time in the system, use the right and left arrow buttons to move the green selection box between Hour, Minute, and Second intervals. Once an interval is selected, use the Up and Down arrow keys to adjust the number up or down.

Once the time is entered correctly, press the green check mark button to save the new time setting and return to the previous SETTINGS Screen.

The back/return button is present on all sub level screens and, when pressed, returns the user to the previous or MAIN Screen.

NOTE: If the Back/Return button is pressed prior to saving the changes, the changed value will not be saved, and the new time setting will not take effect. Operators must save the new time setting before exiting the screen.

DATE SETTING Screen/Button

When pressed, this button will display the DATE SETTING Screen, which allows the operator to change the date programmed in the system.

To change the date in the system, use the right and left arrow buttons to move the green selection box between Month, Day, and Year intervals. Once an interval is selected, use the Up and Down arrow keys to adjust the setting up or down.

Once the time is entered correctly, press the green check mark button to save the new time setting and return to the previous SETTINGS Screen.

The back/return button is present on all sub level screens and, when pressed, returns the user to the previous or MAIN Screen.

NOTE: If the Back/Return button is pressed prior to saving the changes, the changed value will not be saved, and the new time setting will not take effect. Operators must save the new time setting before exiting the screen.

Operator Controls

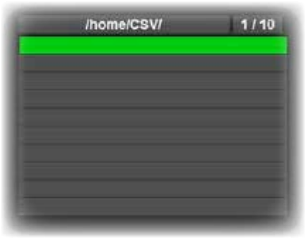
***For control locations see Operator Control Panel Section on page 21.*

System Control Panel

DATA RECORDING Screen

When this button is pressed, it will display the DATA RECORDING Screen.

This screen allows the operator to see information related to the storage and transfer of recorded system data logs.



This section displays the recorded data stored in the system computer memory. Stored data will show with the file name of the record consisting of the machine number with the bullwheel number, the current date, and a two-digit counter number. A new file is created each time recording is initiated.

Status indicator "Print file"

Status indicator "Copy file on USB stick"

Pressing the [ALL] button will select all data in the memory.

Press the Up or Down arrow buttons to select the desired data.

Pressing the "Delete" button will delete the data previously selected.

When this printer button is pressed, the system will send the selected data to a printer connected to the USB port.

NOTE: In order for the printer function to work correctly with the available USB interface, it must be a Zeck supplied printer.

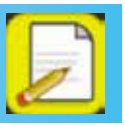
Press USB Symbol button to copy the selected data to the USB stick connected to the USB port.

The back/return button is present on all sub level screens, and when pressed, returns the user to the previous or MAIN Screen.

Data Recorder On/Off Button

This button, when pressed, will toggle between starting and stopping the data recorder. If the data recorder is active, the power icon on the screen will show green; if deactivated, the screen icon will appear white.

NOTE: A Data Recording On/Off indicator is also displayed on the main menu screen.



Operator Controls

***For control locations see Operator Control Panel Section on page 21.*

System Control Panel

RECORDING INTERVALS Screen/Button

When this button is pressed, it will display the RECORDING INTERVALS screen. The triangle symbol represents the recording intervals setting for the system. The recording interval setting is programmed using length in the measurement of feet or meters. Therefore, the values for pulling or tensioning force and speed within the length difference are recorded every [_____] feet/meters. (*See the ADDITIONAL SETTINGS Screen/Button section for instructions on how to change from feet to meters.*)

Once on the RECORDING INTERVALS screen, the operator can change the frequency of recording intervals by changing the length.

To increase the frequency of recording segments, reduce the length by pressing the Down arrow button. To decrease the frequency of recording segments, increase the length by pressing the Up arrow button.

The outcome of these changes results in longer recording segments for a higher number of feet/meters, and shorter recording segments for a smaller number of feet/meters.

Once the changes are made, press the green check mark button to save the changes and return to the previous SETTINGS screen.

The back/return button is present on all sub level screens, and when pressed, returns the user to the previous or MAIN Screen.

NOTE: If the Back/Return button is pressed prior to saving the changes, the changed value will not be saved, and the new time setting will not take effect. Operators must save the new time setting before exiting the screen.

Operator Controls

***For control locations see Operator Control Panel Section on page 21.*

System Control Panel

ADDITIONAL SETTINGS Screen/Button

When this button is pressed, it will display a password screen. This password screen requires the user to enter a password to access the ADDITIONAL SETTINGS Screen.

There are two menus within the ADDITIONAL SETTINGS Screen: **Client Menu** and **Service Menu**. Each menu has an independent password, therefore to access each menu, the user must enter the specific password for that menu-Client or Service.

To enter a password, press a button to select a number from [1] to [6], to be populated in the green highlighted cell. Each password will be four digits in total.

Once the password is entered correctly, press the green check mark button to submit the password and access the corresponding screen (Client or Service).

Service Menu

The service menu is only accessible by authorized service personnel, as this menu provides the user the ability to change critical system configurations, and complete advance system and machine diagnostics.

Client Menu

After entering the correct password to access the Client Menu within the ADDITIONAL SETTINGS Screen, the system will display the Client Menu.

This screen indicator represents the maintenance due notification, showing the client when the next maintenance is due. If the maintenance is due, the pictogram is illuminated. Otherwise, the pictogram is not illuminated.

This screen field shows the diameter of cable/rope programmed in the system.

Operator Controls

***For control locations see Operator Control Panel Section on page 21.*

System Control Panel

ADDITIONAL SETTINGS Screen/Button (cont.)

Pressing this button opens the screen Input/Output- I/O Test Overview. This screen indicates the machine-specific bus topology as well as CAN network communication errors.

The selection buttons at the bottom of this screen represent communication components, and they may vary across different models and versions of the machine. Press the individual buttons to open the I/O pages of each different communication component.

This symbol represents the machine interface remote control module. Press this button to open the machine-specific I/O-remote control screen.

The back/return button is present on all sub level screens, and when pressed returns the user to the previous or MAIN Screen.

Press this key to reset the maintenance interval. "K" or "S" in the service history indicates whether the reset was made from the client-(K) menu or from the service-(S) menu.

When this button is pressed, the INPUT CABLE/ROPE DIAMETER screen populates.

INPUT CABLE/ROPE DIAMETER Screen

When this screen is populated, the user will be able to change the cable/rope diameter by pressing the Up arrow button to increase the diameter or the Down arrow button to decrease the diameter. The available diameter setting range is between (10 mm to 80 mm) or (.40 in to 3.20 in).

Once the diameter is showing the correct value, press the green checkmark button to save the new setting and return to the Client/Service menu.

To return to the Client/Service menu <u>without</u> saving the new setting, press the back button.

NOTE: If the Back/Return button is pressed prior to saving the changes, the changed value will not be saved, and the new rope/cable diameter setting will not take effect.

Operator Controls

***For control locations see Operator Control Panel Section on page 21.*

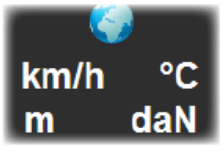
System Control Panel

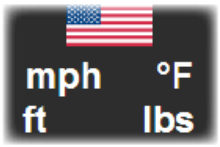
ADDITIONAL SETTINGS Screen/Button (Cont.)

The [daN/lbs] button represents a unit change option. When this button is pressed, it will display the UNITS CHANGE Screen.

UNITS CHANGE Screen

Once on the UNITS CHANGE Screen, the user can change the (UOM)-units of measure employed by the system.

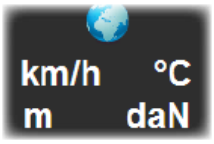


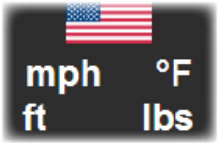


The two options are metric/decimal-(Globe) and non-metric/customary-(USA Flag). This setting change is a global change for the system, meaning that it will affect all system displays where units of measure are displayed. Additionally, this setting will also change how the data is recorded. Once the data is recorded for an operation under one UOM, it cannot be changed in the system.

NOTE: It is recommended that hte user select a suitable UOM prior to conduction operations.

To select between the two unit options, use the left and right arrow buttons.





Once the selection is made, press this the green check mark button to save the selection, change the UOM's in the system, and return to the Client/Service menu.

To return to the Client/Service menu <u>without</u> saving the new setting press the back button.

If no change is made on this page for a period of 10 seconds, the display will return to the Client/Service menu without saving any new settings.

NOTE: If the Back/Return button is pressed prior to saving the changes, the changed value will not be saved, and the new UOM setting will not take effect.

PARAMETER MENU Screen/Button

This icon represents the system parameters, and pressing this button from the Client/Service menu will open the PARAMETER MENU Screen. This screen allows the user to make critical parameters changes that may affect how the machine performs or functions.

NOTE: The parameters viewed on this screen through the Client menu can be read but not edited**. To edit the system parameters, the user must be signed in using the Service menu level password.**

Operator Controls

***For control locations see Operator Control Panel Section on page 21.*

System Control Panel

USB Interface

The S+R Revolution Series P-2000X comes

equipped with a Universal Serial Bus (USB) 2.0 interface port for attaching USB storage devices. The S+R Revolution Series P-2000X control system is designed to record pulling and tensioning operations information to its internal memory and allow transfers to a USB storage device.

1. To initiate recording, first ensure that Data Recorder is turned to ON.

See DATA RECORDING Screen for instructions.

NOTE: Once the data recorder is turned on, the system will record all operation data in length increments based on the set recording interval to the internal memory of the system. *See RECORDING INTERVALS Screen/Button section.*

2. Once operations are concluded, the operator can move the data from the internal memory to a USB storage device or "USB drive/stick." To do this, first insert the USB drive into the USB port. A green check mark indicator will appear just above the USB symbol once the USB drive is recognized by the system.

3. Next, select the file(s) to transfer, using the Arrow or All Buttons.

4. With the file(s) selected, press the USB transfer button on the DATA RECORDING Screen to copy the selected data file(s) to the USB stick connected to the USB port.

5. As the files are being transferred, the center screen image will change, showing an hour glass and folders.

6. Once the file transfer is completed, the center screen image will change, back to an arrow, but with a green check mark overlaid on top.

7. Remove the USB drive/stick.

NOTE: If copy errors are reported, this may be due to a faulty USB Drive, or that the USB drive is smaller than the data being transferred.

Operation

Operator Controls

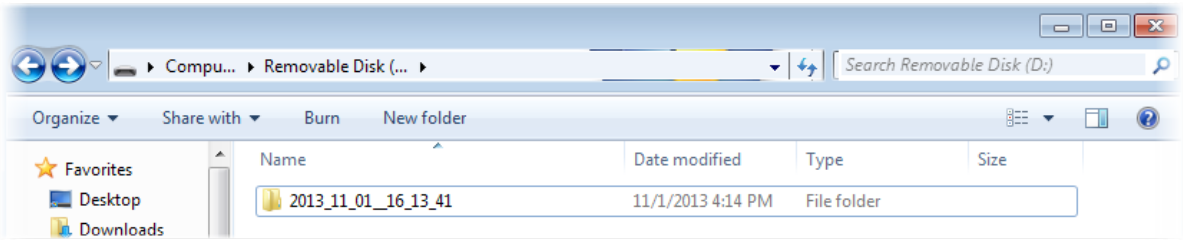
***For control locations see Operator Control Panel Section on page 21.*

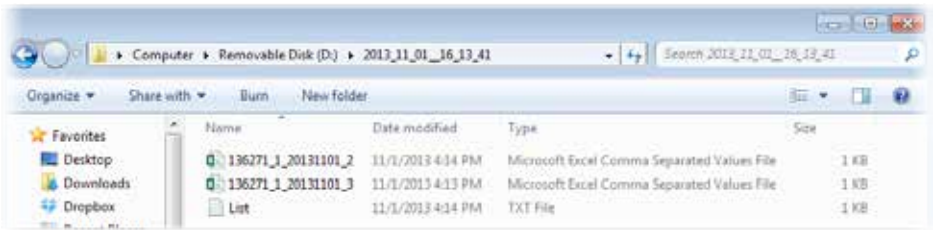
System Control Panel

USB Interface (cont.)

When the data is transferred to the USB drive/ stick, it will create a folder with the data and time. Inside the folder will be the log files and another file that is a list of all of the files transferred.

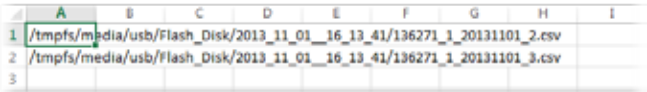
NOTE: The data in each file will be recorded based on the programmed (UOM)-Unit of Measure for the system. *See UNITS CHANGE Screen section for instructions on how to change UOM.*

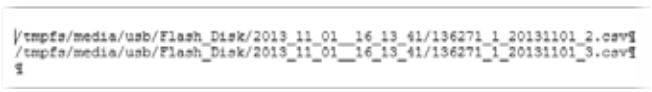




The list file will be a (.txt- text) file. These text files can be opened with many computer programs to include: Microsoft Excel/Word, Windows Note Pad, and Oracle's Open Office.

NOTE: Information within the text file may be displayed differently, depending upon which program the file is opened with. Microsoft Excel and Word will list the events in a single column by data/time stamp, whereas Note Pad will display the information in block format- making it difficult to read.





Operator Controls

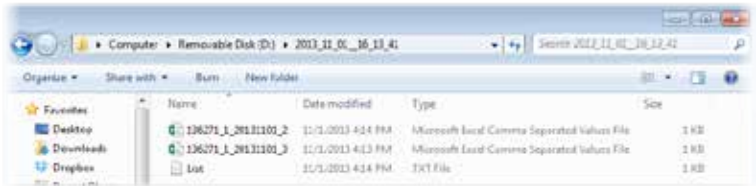
***For control locations see Operator Control Panel Section on page 21.*

System Control Panel

USB Interface (cont.)

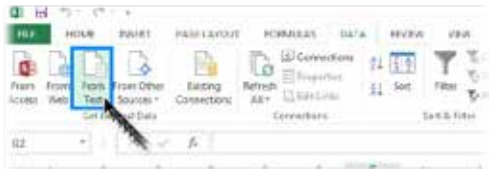
Each log file saved to the USB drive will be a (.csv- comma separated values) file. These files can be opened with many computer programs to include: Microsoft Excel, Microsoft Access, and Oracle's Open Office Calc.

NOTE: Information within the log file may be displayed differently, dependent upon which program the file is opened with.



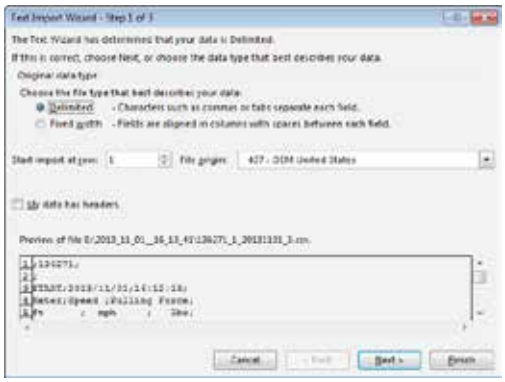
In order for the data to be properly displayed, the user must Import the files when using Microsoft Excel. The reason for this is that when importing the file, the text import wizard function will open allowing the user to select the Delimited option, along with the applicable delimiters- in this case a Semicolon. The semicolon delimiter is the default output for the P-2000X, and would apply when opening the .csv files with other computer programs.

1.

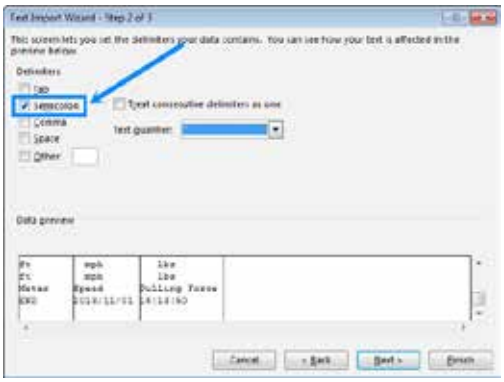


2.

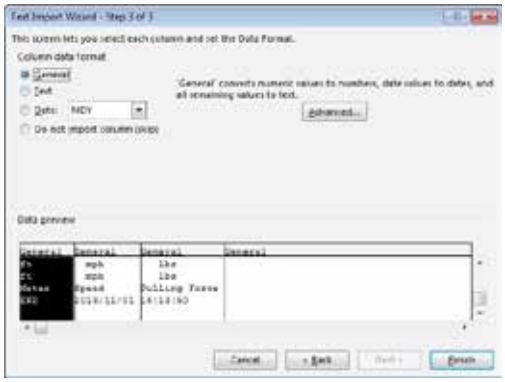
3.



4.



5.



The information contained in the file is displayed with a Start and End time using increments of length. *See the RECORDING INTERVALS Screen/Button section.*

6.

	A	B	C	D	E	F
1		136271				
2						
3	START	11/1/2013	16:12:13			
4	Meter	Speed	Pulling Force			
5	ft	mph	lbs			
6	ft	mph	lbs			
7	Meter	Speed	Pulling Force			
8	END	11/1/2013	16:13:50			
9						
10						

Operator Controls

***For control locations see Operator Control Panel Section on page 21.*

Joystick Control

The joystick can control the levelwind position and drum/line speed.

Levelwind Control:

The operator can manually position the drum levelwind using the control joystick top lateral rocker switch. 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 in either direction, the motion will stop. Continuous pressure or bumping motions can be used when adjusting the levelwind's lateral position.

NOTE: The levelwind is automatically controlled; however, the operator will need to set the initial direction and left/right boundaries of the levelwind to begin pulling operations *(See Automatic Levelwind Control section)*.

Drum/Line Control:

Once in Pull mode, the operator can control the drum speed/tension and direction using the joystick.

Pulling Mode: With the trigger depressed, the operator can rotate the drum forward to payout the line by pushing the joystick forward. The farther forward the joystick is pushed, the faster the drum will spin, thereby increasing line speed. To decrease speed, pull the joystick backward toward the operator and the neutral position.

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 the drum at any time, return the joystick to the center neutral position with the trigger released.

To rotate the drum backward and pull in the line, depress the trigger and pull the joystick backward toward the operator. The farther the joystick is pulled backward, the faster the drum will spin, thereby increasing line speed. Push the joystick forward toward neutral to decrease line speed. To stop the drum at any time, return the joystick to the center neutral position with the trigger depressed.

NOTE: There is a small delay from the time the joystick is moved out of neutral, to when the drum will engage. This delay allows time for the hydraulic system to raise the pressure needed to hold any existing line tension to the drum prior to releasing the brake. **It is recommended that the operator position the joystick slightly out of the neutral position, wait until the hydraulic drum brake releases, then slowly increase drum speed.** Avoiding abrupt joystick movements will prevent any rapid jolts or increases in drum speed when the brake releases.

NOTE: To slowly decrease speed after releasing the joystick, the operator can slowly move the joystick toward the neutral position. If feathering speed close to the neutral position, be ready to place the joystick in the neutral position with the trigger released, or double tap the trigger to set the hydraulic drum brake and avoid a reverse equilibrium state and unintentional payout of the line.

Operator Controls

***For control locations see Operator Control Panel Section on page 21.*

Jack Controls

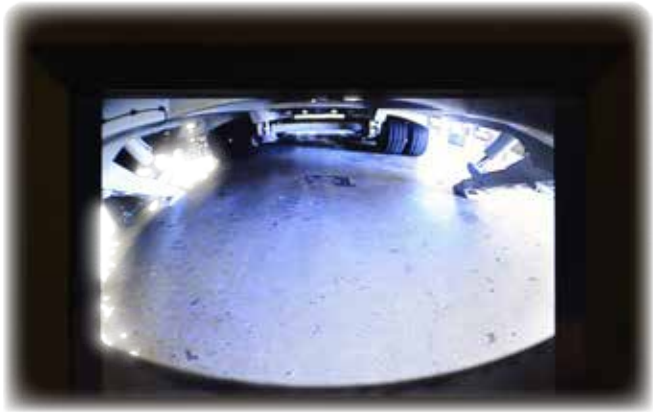
The P-2000X Puller has four hydraulically actuated jacks for ease of leveling: two front jacks- (Right and Left), and two rear jacks. The engine must be turned on and running to use the jack controls. Each jack can be operated manually from inside the cab- through the console buttons.

The operator can use the provided bubble gauge mounted on the machine to determine how level the machine is.

Jack Controls:

To lower the jacks using the inside console buttons, first ensure that the hydraulic power engine is on, and then push and hold the [JACK LOWER] buttons on the right hand panel to lower the jacks. At the same time, views of the jack cameras will be visible on the screen. When the button is released, the motion will stop. To retract the jack, press and hold the button toward [RAISE]. The jacks can be deployed seperately or together. Operators should utilize the available jack cameras, where available. Using the provided cameras and spotters to ensure that the area is clear while moving the jacks is a critical safety measure.

CAUTION: Ensure that all jacks are fully raised and clear of the ground before attempting to tow trailer.



NOTE: If the jack control buttons are not pushed for a period of time after enabling the jacks on the control panel screen, the system will time out, and the jacks will again be disabled.

Operation

Operator Controls

***For control locations see Operator Control Panel Section on page 21.*

Automatic Levelwind Controls

The levelwind can be manually operated, if needed, using the joystick or the outside panel; however, the levelwind is designed to operate automatically during pulling operations.

1. To initiate automatic levelwind functions, the operator must first manually position the levelwind's endpoints (left and right) using the manual controls located on top of the reel stand. *(See Pulling Operations step 7 for more detailed instructions).*

NOTE: If the push-button is released, the automatic rope guiding process will continue from the current position into the last manually set direction. The rope guiding process can be manually affected, if:

1. the main switch is on
2. EMERGENCY STOP is not active
3. NO supporting mode is active

The LED in the push-button is lit and shows thereby the respective rope guiding direction. In SET mode, the LEDs in the push-buttons are not lit.

2. Using the top joystick lateral rocker switch, adjust the R/L starting position of the levelwind so that the levelwind is centered over the exit rope.

3. Getting outside the cab, place the pulling rope through the levelwind head and secure all rollers and retaining pins.

4. Getting back into the cab, turn the levelwind automatic control switch to the ON position by pushing the rocker switch to the forward position.

NOTE: The operator will need to set the initial direction (Right/Left) of the levelwind before beginning operations. The direction will depend on which side of the drum the rope end leading off is located.

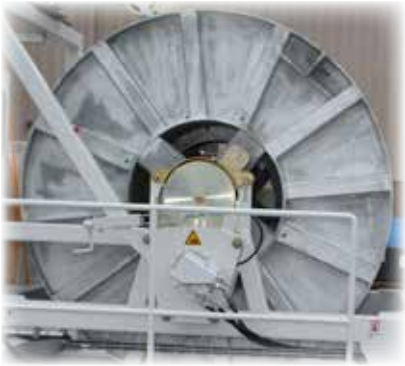
5. The system will now automatically manage the levelwind functions. However, the operators can adjust the speed of the levelwind, if needed, by rotating the levelwind speed control knob CW to increase and CCW to decrease speed.

Operation

Integral Reel Stand

P-2000X has an integral reel stand that is designed for pulling operations. The reel stand is hydraulically driven.

NOTE: The hydraulic power engine must be running before in order to operate the levelwind and jacks.



The integral reel stand comes equipped with a manual brake for restricting drum/reel rotation during transport. Additionally, the manual brake serves as an emergency brake to slow unintended overspin or hold tension if hydraulics where to fail.

To set the manual brake, rotate the handle CW until tight. To release the brake rotate the handle CCW.

CAUTION: The manual brake should only be used to hold the drum during transport or in emergency situations. Never use the manual brake to hold tension during operations or for extended periods of time.

CAUTION: Always set the manual brake prior to transporting the machine/trailer to prevent unintended drum/reel rotations during transit.

CAUTION: Line of sight view of the jacks and levelwind should always be established prior to operating these components using the outside hydraulic control panel. Operators should first ensure that all personnel are clear of the area.

Operation

Quick Start Guide

Sherman+Reilly P-2000X

Single Drum Puller– 20,000 lb. Capacity

Acronym/Terms Key:

CW – *Clockwise*

CCW – *Counter Clockwise*

DANGER *– Indicates the information relates to a specific immediate hazard which, if disregarded, will result in severe personal injury or death.*

WARNING *– Indicates the information relates to a specific immediate hazard or unsafe practice which, if disregarded, could result in personal injury or death.*

CAUTION *– Indicates the information pertains to a potential hazard or unsafe practice which, if disregarded, may result in minor personal injury or equipment damage.*

NOTE *– Indicates the information is important to the correct operation or maintenance of the machine.*

Start-Up Procedure		
Step	Action	Note
1	**Perform all pre-operation inspections.**	
2	**Position machine and chock wheels.**	The machine should be positioned in line with the tower and centered as much as possible on the line being pulled. Wheels should be chocked to prevent rolling. Ensure that operating areas and danger zones are clear of personnel.
3	**Ensure that all controls** (levers, switches, etc.) **are in the neutral** and disengaged position.	Rotate crank handle CCW to release brake.
4	With the key inserted, **turn master power key switch CW to the [ON] position**.	Wait for the system display to light up and the system to load.
5	**Start the engine**: Once the display and panel lights are on, place the [RUN/STOP] button to the RUN position. Then, press the [START] button.	In colder climates (below 40^{0}F), the preheat function- (glow plugs) may be needed. The glow plugs are automatically engaged once the Engine [RUN/STOP] button button is placed in the RUN position. After the preheat cycle has concluded, in about 10 seconds, the engine will start automatically.
6	**Ensure that there are no warnings** listed on the system control display screen.	The engine oil pressure and hydraulic pressure/flows are both monitored by the system.
7	**Level, stabilize, and anchor the machine**.	Use the jack control buttons and bubble gauge to level the machine.

CAUTION: Ensure that all personnel and objects are free and clear of the drum prior to attempting to rotate.

NOTE: The operator can stop the drum and apply the hydraulic drum brake by placing the joystick to the center neutral position or double tapping the joystick trigger. The icon will change to [BRAKE] and the drum brake will set.

Operation

Start Pulling Operations		
	Action	Note
1	**Position levelwind centered over exit rope, and place rope through levelwind head.**	Use the top joystick lateral rocker switch to adjust the R/L starting position of the levelwind. Ensure that all levelwind rollers and retaining pins are re-secured.
2	**Turn on the automatic levelwind control.**	Push the Automatic Levelwind Control Power Switch forward-(away) to the On position.
3	**Set the line tension limit**, prior to beginning pull.	The tension limit can be changed without halting operations by using the arrow icons in the control panel display.
4	**Begin pull**: Depress the joystick trigger, release the brake, let go of trigger, then slowly increase drum rotation by pulling backward-(toward the operator) on the joystick.	Pull slightly back on the joystick (out of neutral), and pause for about 3 seconds for the brake to release before continuing to pull backward on joystick. Once rotation speed is at the desired level, the joystick and trigger can be released.
5	**Continue to monitor line speed/tension and levelwind adjustment.**	To stop rotation at any time, return the joystick control to the center stop position with the trigger released. An override adjustment can be made to the levelwind position using quick (R/L) taps to the top joystick lateral rocker switch.

CAUTION: Before handling any pilot, pulling, or conductor lines attached to this machine, the operator must ensure that the hydraulic drum brake is set, and the joystick is in the neutral position with the joystick trigger released.

CAUTION: If using a vehicle to drive out line, ensure vehicle has stopped prior to setting hydraulic brake.

Towing and Road Safety

Connecting to the Tow Vehicle

1. Make certain tow vehicle has the capacity and rating to tow machine safely.

NOTE: The approximate trailer weight is **50,000 lbs.**

2. Inspect pintle eye and safety chains for excessive wear, corrosion, cracked welds or structural damage.

3. Make sure trailer brakes are operable- *(See Trailer Brakes section)*.

WARNING: Do not attempt to tow machine/trailer if there is any question about the condition of the safety chains, hitch or trailer brakes.

4. Make sure the unit is safe for towing with tires in good condition and properly inflated- *(See Trailer Tires section)*.

5. Make sure there are no tools, objects, or trash items which could fall off during transport.

6. Chock wheels on both sides of the machine/unit trailer, then start machine/unit engine- *(See Start-Up Procedure section)*.

7. Make sure the right and left jacks are fully retracted- *(See Jack Controls section)*.

8. Open the tow vehicle hitch and back vehicle into position under the pintle eye. Set tow vehicle parking brake.

9. Slowly retract trailer nose/hitch jack, so that the pintle eye goes over and rests correctly on hitch.

CAUTION: Ensure that the nose/hitch jack and all other jacks are fully retracted prior to transport.

10. Close and secure the hitch.

CAUTION: The hitch coupler is a pinch point. Keep hands and fingers clear.

Towing and Road Safety

Connecting to the Tow Vehicle (cont.)

11. After trailer is secured to the vehicle, stop the machine/unit engine and remove the key from the ignition key switch.

12. Connect all appropriate air hoses and electrical plugs for the trailer brakes. For air brake systems, begin charging the trailer air system.

13. Properly connect the safety chains by latching in a crisscross pattern, as this provides added directional control. The safety chains should be crossed and short enough to prevent the tongue from digging into the ground, should the unit unintentionally become disconnected from the hitch. The chains should be no longer than necessary to allow slack for turning.

14. If not already, connect the electrical plug to the tow vehicle and check:

- Clearance lights
- Brake Lights
- Turn Signals
- Brakes

(For issues see Trailer Assembly section.)

CAUTION: Do not tow the machine/unit unless all the trailer lights and brakes are working correctly.

15. Remove and stow the wheel chocks.

NOTE: When towing the machine/trailer assembly, the driver should be knowledgeable and obey all applicable transportation laws and speed limits. Laws for towing speed of trailers differ widely between states, provinces, and localities.

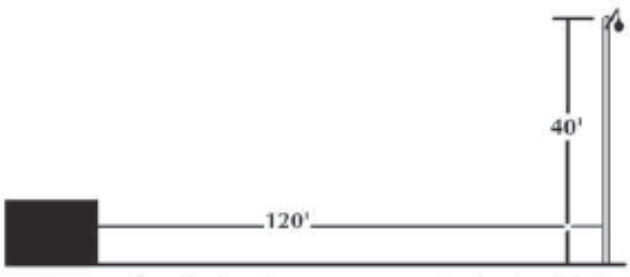
CAUTION: Drivers should use caution and drive slower at night and when hazardous conditions are present, such as heavy traffic, bad weather, or uneven or rough terrain.

Unless otherwise indicated by applicable laws, posted speed limits, or cautionary conditions (stated above), a recommended maximum safe operating speed for normal road conditions is 50/55mph for night/day conditions and 30mph in residential, urban, and business districts.

Positioning the Machine

The driver/operator should position the puller 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).*



NOTE: In some situations, (i.e., 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.

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.

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

The operator must chock all trailer wheels 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.

Start-Up Procedure

NOTE: Before beginning operations, the operator must 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 OHSA Regulations.

1. Perform all pre-operation inspections.

2. Position the machine and chock wheels. The machine should be positioned centered on the lead block, and parallel to the line being pulled prior to beginning operations. Wheels should be chocked to prevent the unit from rolling- *(see Positioning the Machine section).*

3. Ensure that all controls (levers, switches, etc.) are in the neutral and disengaged position- *(see Operator Controls section).*

4. With the key inserted, turn master power key switch to the On position- *(see Operator Controls section).*

5. Once display and panel lights are on, place Engine Start button to the [START/RUN] position to start the engine.

NOTE: The preheat function/glow plugs are automatically engaged once the Engine Start Button is placed in the [START/RUN] position. After the preheat cycle has concluded, about 10 seconds, the engine will start automatically- *(see Operator Controls section).*

6. View the control panel screen to ensure there are no warning or fault messages, and everything is working properly.

NOTE: Warnings and faults are displayed as a red icon or button. If warnings or faults are present, see the faults and diagnostics screens, and check system components prior to beginning operations- *(see GENERAL FAULTS section).*

7. Level and stabilize the machine using the available hydraulic jacks- *(see Jack Controls 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 and anchored prior to conduction operations.

Pulling Operations

NOTE: Before beginning pulling operations, the operator must 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 P-2000X Puller utilizes hydraulically driven motor(s) that apply up to 20,000 lbs. of pulling force to the pulling line. This puller comes equipped with a variable speed drive system.

1. Once the pulling line is safely tied off at the pole, and with the machine running, return to the cab.

2. Go back inside and engage the levelwind.

3. Using the top joystick lateral rocker switch, adjust the R/L starting position of the levelwind so that the levelwind is centered over the exit rope.

4. Getting outside the cab, place the pulling rope through the levelwind head, and secure all rollers and retaining pins.

5. If not completed already, have the cable end and the conductor pulling grips attached to opposite sides of swivel on the conductor side.

6. Get back inside the cab, and turn on the automatic levelwind control using the door panel rockers switch.

7. Set the levelwind starting direction by pressing and holding the levelwind arrow buttons. Depending on the width of the rope drum used, it is necessary to adjust the endpoints.

Pulling Operations

(Step 7 Continued)

In active SET mode, the currently set endpoints are without function. Automatic rope guiding is not possible, and Rope In/ Rope out is not possible.

Start the SET mode:

A. Bring the joystick into position "0".

B. Push the SET button for 5 seconds.

After 5 seconds, the LED in the SET push-button will light.

Set Endpoint:

With SET mode active, manually moving the rope guidance can occur only with "half" speed. Between the mechanical endpoints the rope guidance can be moved over the full pass.

A. Push the SET button together with the corre sponding direction button until the desired end point is reached.

B. Press only the corresponding direction button for 5 seconds.

C. After saving the settings successfully, the LED's of the SET button and the corresponding direc tion button blink 2 times (1 Hz) and then turn off.

D. After setting the new endpoint, the SET mode is stopped automatically. The LED of the corre sponding rope guiding direction is lit permanent ly. The automatic rope guiding function is active again.

E. If the setting of the endpoints is not correct, the LED's of the luminous push-buttons indicat ing the direction will both blink 3 times. In this case set the endpoints again.

Leave SET Mode without Modification

A. Press the SET button for 5 seconds.

B. In SET mode if you passed over an end point without setting a new endpoint, the linear engine automatically turns back to the last set endpoint.

Check the endpoints before each operation.

NOTE: Check the endpoints of the rope guidance before operating the machine. Manually move the rope guidance to its endpoints.

8. Set the line tension limit for the pull using the up and down arrows on the input overload setting display to lock in the new tension limit.

NOTE: The tension limits can be changed without halting operations by using the up and down arrows in the input overload setting display.

9. Begin pulling in the rope/old conductor by depressing the joystick trigger, then pull back slightly on the joystick, bringing it out of neutral. Pause for about three seconds for the brake to release. Once the brake is released, release the joystick trigger and continue to pull backward on the joystick until the desired rotation speed is reached. Once the speed is at the desired level, the joystick itself can be released.

NOTE: The reason the joystick must first be pulled back during payout is that this motion triggers the release of the hydraulic brake and begins the hydraulic pressure building sequence. As soon as the brake releases, the operator will notice the drum beginning to rotate very slowly backward toward the operator. This is also designed to pull any slack out of the line.

NOTE: The three second pause allows the hydraulic system time to build enough pressure to sustain any pre-existing line tension before releasing the brake. This is a safety feature of the system that prevents the drum from rapidly paying out or jolting as soon as the brake is released.

Pulling Operations

10. Continue to monitor the line speed, tension, and the footage counter. Adjust line tension as needed using the up and down arrows in the input overload setting display.

NOTE: To stop drum rotation at any time, return the joystick control to the center neutral position with the joystick trigger released, and the hydraulic drum brake will set.

11. Once the rope end reaches within sight of the drum, begin to slow the line speed by pushing forward slowly on the joystick.

12. Once the rope end reaches within its last several feet of length, bring the drum to a complete stop by placing the joystick control in the neutral position with the joystick trigger released or utilize a rapid double depression, "double tap," of the joystick trigger, and the hydraulic drum brake will set.

CAUTION: Before handling any pilot, pulling, or conductor lines attached to this machine, the operator must ensure that the hydraulic drum brake is set and the joystick is in the neutral position with the joystick trigger released.

13. Once the conductor is safely tied off, the operator may need to provide slack on the pulling line/old conductor to detach the rope/old conductor end from the new strung conductor. To do this, depress the joystick trigger then pull back slightly on the joystick, bringing it out of neutral. Then, pause for about three seconds for the brake to release. Once the brake releases, with the joystick trigger still depressed, cross over neutral by pushing the joystick forward. Once the joystick has crossed over neutral, release the joystick trigger, and continue slowly moving the joystick forward to begin forward payout drum rotation. Once enough slack is generated, the operator can place the joystick back into the neutral position with the joystick trigger released to stop the drum and set the brake.

Pulling Operations

14. Remove the conductor pulling grip from the strung conductor and the swivel. Also, remove the swivel from the rope/old conductor end, remove any pulling grips from the old conductor-(if applicable), and store pulling grip(s) and swivel in the tool box- unless further operations are planned.

15. When using a rope drum, ensure that the joystick is in neutral with the trigger released, and the hydraulic drum brake is set *(shown on screen)*. Then, using a tie-off rope around the drum, secure the rope end to the drum.

16. Lock the manual brake by turning it CW.

17. Raise all jacks prior to transport.

18. If tools were used during operations, store them in the tool box, unless further operations are planned.

19. Turn the hydraulic power engine off, by pushing the rocker switch backward to the [STOP] position.

20. Once the engine is off, turn the master power key switch CCW to the [Off] position, and remove the key.

21. Complete all towing and road safety procedures prior to towing machine- *(See Towing and Road Safety section)*.

CAUTION: The rope end must be secured prior to transport.

22. Complete all post-operation inspections on page 71.

Emergency Stop Procedure

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 lineman, work crews, surrounding bystanders, as well as the operator may become at risk, depending 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. Quickly assess the situation and assist any injured personnel to get free from hazards- only if safe to do so.

3. Notify proper authorities and get help.

4. Follow all employer emergency procedures.

Fire Extinguisher Usage:

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.

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.

5

Troubleshooting

Quick Tips

ENGINE WILL NOT START OR RUN
- Dead battery- could be caused by pulled breakaway switch.
- No fuel- check fuel gauge.
- Other- Refer to engine manufacturer's manual. *(Also, see General Faults section.)*

DRUM WILL NOT ROTATE
- Low system pressure drum clutch not releasing.
- Drum clutch out of adjustment.
- Obstruction between drum and inside fender/frame.
- Existing line tension in excess of line tension limit setting- brake set.
- Sides of machine are not fully retracted with drum coupler fully engaged.

HYDRAULIC JACK CREEPS DOWN
- If motor is running, control valve seals are bad.
- Motor off, or holding valve on jack is malfunctioning.

UNIT WILL NOT BUILD MAXIMUM HYDRAULIC SYSTEM PRESSURE
- Operator's tension setting set too low, restricting hydraulic pressure.
- Control valve blocked or malfunctioning.
- Pump relief valve malfunctioning.
- Pump failure.
- System pressure relief valve at the pump out of adjustment or malfunctioning.
- Contamination in hydraulic system.
- Wiring damage to pump actuators.

HYDRAULIC FLUID TEMPERATURE IS ABOVE NORMAL
- Drum clutch not fully releasing.
- Contamination in hydraulic system.
- Wiring damage to the hydraulic cooling system- fan, wiring, coil, or sensor.

TRAILER LIGHTS DO NOT WORK AFTER CONNECTED TO VEHICLE
- Check vehicle/trailer wire connectors for damage or corrosion.
- The vehicle/trailer wire connectors can vary depending upon owner/customer requirements. *(Also, see Trailer Lighting section).*

Troubleshooting

General Faults

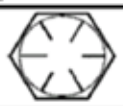
Fault	Possible Cause	Solution
Diesel engine does not start, and indicator lights do not come on.	The emergency stop switch is still locked after it has been pressed.	Release the emergency stop switch.
Function errors at the control.	Cable brake, defective sensor.	
	Error in electronics.	

Troubleshooting

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.	 SAE J429 Grade 5			 SAE J429 Grade 8		
	Tightening Torque			Tightening Torque		
(in.)	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 ¼" and 5⁄16" are listed in inch-pounds. All other 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).

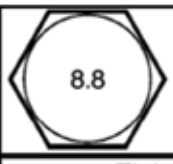
CAUTION: Under/Over tightening fasteners can result in costly equipment failure or personal injury.

Troubleshooting

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.

6

Maintenance

Safety and Reliability Disclaimer: The reliability and working life of the machine depends on the regular inspection and preventive maintenance of the machine. While this section may not include all maintenance for the machine, 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.

Maintenance

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.

Warning Terms: signal words in this manual that call the operator's attention to safety concerns.

The word **DANGER** indicates the information relates to a specific immediate hazard which, if disregarded, will result in severe personal injury or death.

The word **CAUTION** indicates the information pertains to a potential hazard or unsafe practice which, if disregarded, may result in minor personal injury or equipment damage.

The word **WARNING** indicates the information relates to a specific immediate hazard or unsafe practice which, if disregarded, could result in personal injury or death.

The word **NOTE** indicates the information is important to the correct operation or maintenance of the machine.

General Care and Inspections Instructions

Cleaning

Metal parts and canvas must be cleaned with a soft cloth and a neutral cleaning solution without solvents. Aggressive solvents like acetone or nitro thinners should not be used.

Clean petroleum ether is suitable to degrease the machine parts. No water should get on or around the bearings. If a steam blower is used to clean the machine, water may penetrate the machine causing damage to the bearings.

Make sure that no dirt gets into the bearings when vacuum cleaning the machine. If necessary, cover those parts beforehand. Bare metal parts can be cleaned and at the same time protected by using a slightly oiled cloth.

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 rope blocks, should be inspected at least once a year by an expert. However, if necessary, machines should 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, etc.

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.

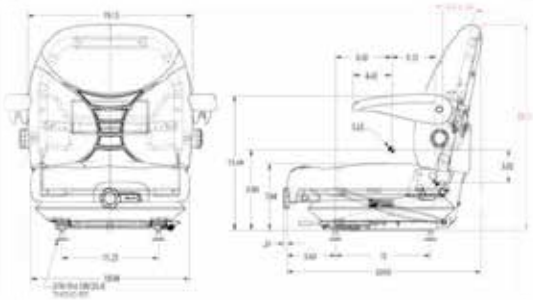
Maintenance

Safe-Zone™ Cab

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

Inspection of Operator's Chair

The operator's chair should be inspected for damage and loose or missing parts. (*For replacement parts, contact S+R.)*



CAUTION: For Turret Models: The operator must be seated while rotating the turret to avoid being accidentally thrown from the machine.

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 all maintenance concerns, contact the Sherman+Reilly Parts & Service Department at repairs@sherman-reilly.com.

Trailer Assembly

Disclaimer: Any modifications to the Sherman+Reilly P-2000X trailer assembly or attached structures could result in damages to equipment, injury to operators, personnel, or others, and voiding of the manufacturer's warranty.

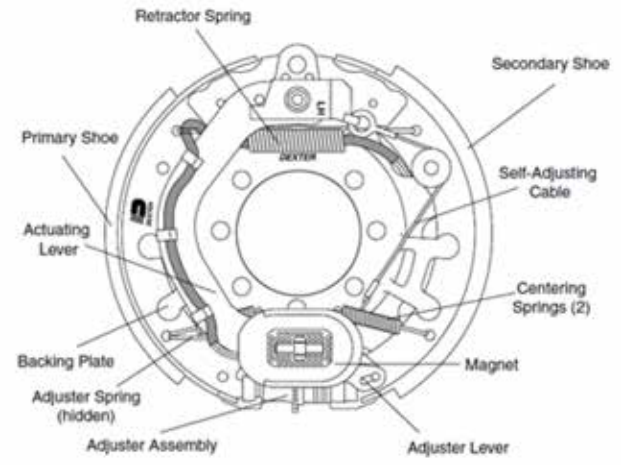
(United States Only) *Any and all maintenance or modifications to the Sherman+Reilly P-2000X trailer assembly must be done in accordance with United States Federal and State Department of Transportation Standards, to include all applicable Federal Motor Vehicle Standards covered under Section 571.*

Brakes

The P-2000X puller is equipped with an electrical 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 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 should be inspected prior to towing the vehicle.

NOTE: The approximate trailer weight is **50,000 lbs.**

Trailer Assembly

Tires

- The P-2000X comes with twelve tires.

- 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.

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.

Maintenance

Trailer Assembly

Axle Drum Oil- (if equipped)

- If trailer is equipped with axle drum oil access, the oil level 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.)*

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

Trailer Assembly

Trailer Lighting

All trailer lights should be inspected to ensure they work prior to transport. (*For replacement contact S+R.)*

If none of the lights work:

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

(The vehicle/trailer wire connectors can vary depending 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 two methods, depending upon which light is being replaced:

- Pop out: Some lighting requires being popped out. Remove pod from its rubber grommet holder by pushing from the inside toward the outside, or by 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 the connection, and replace with new pod.

- Unscrew: Some lighting may require unscrewing the unit from its retainer.

Maintenance

Pre-Operation Inspection Checklist (Page 1)

NOTE: Pre-operation checklist should be conducted in accordance with OSHA requirements, to include OSHA Standard-29 CFR, Parts 1926.601, 1926.952, 1926.955, and 1926.150, as well as NFPA Standard No. 10-2013. It is recommended that pre-operation inspections be done before leaving the yard or garage.

1. **Check fuel level-** With key inserted in master power key switch, turn key to the On position to activate the display. Once activated, the fuel level will show on the color display.

2. **Check the engine radiator coolant level** by viewing the level on the coolant reservoir to ensure that the fluid level is within the HI/LO limits.

3. **Check for proper engine oil level.** After checking oil level, wipe dipstick clean of any debris prior to reinserting into spout.

NOTE: It may be necessary to remove the engine cover to check the oil level. Be sure it is replaced and secured in position properly before transporting or operating the machine.

4. **Ensure proper hydraulic fluid level in reservoir for hydraulic system** by viewing the sight gauge on the side of the tank.

Maintenance

Pre-Operation Inspection Checklist (Page 2)

5. **Inspect hydraulic pump and hoses for loose fittings, leaking fluid, and damaged hoses**.

6. **Inspect for structural damage**, **bent or broken parts, cracked or broken welds, missing pins and retainers.**

7. **Inspect drive motor(s), drum, drum rollers, and drum couplers** to ensure they are secure and that there are no obvious signs of damage- if damaged, do not operate; service may be required.

8. **Inspect levelwind** for any obvious signs of damage, leaking hydraulic cylinders or hoses, and ensure rollers move freely.

9. **Inspect all equipment grounds** for any signs of damage.

10. **Inspect all jacks** for damage or leaking hydraulic components.

11. **Conduct towing readiness inspection.**
    a. Inspect trailer hook up: air hose connections, hitch is secure, safety chains are in place (crisscross pattern), and trailer lighting is connected.
        i. Inspect tail lights to ensure all lights work- replace bulbs as needed. If none of the lights work, inspect vehicle fuses, then trailer wiring for corrosion.
        ii. Ensure that trailer brakes work and that wheel chocks are available.
    b. Check tire pressure: tire pressure should be checked cold and read in accordance with manufacturer specifications.
        i. If tire pressure is low, inspect tire for damage or punctures. If damaged or punctured, repair or replace.

Maintenance

Pre-Operation Inspection Checklist (Page 3)

12. Inspect fire extinguisher.

a. Inspect fire extinguisher charge, and ensure that gauge shows within charge limits.

NOTE: If undercharged or overcharged, see instructions on label: replacement may be required. **(Additional minimum monthly/annual inspections required- see instruction label on extinguisher for details.)**

b. Inspect the physical condition of the extinguisher- (cylinder, hose/cone assembly, etc.), for any signs of damage or corrosion.

c. Ensure that the hinge pin is in place to prevent accidental discharge.

d. Ensure that the plastic safety seal is secured to the hinge pin, and that it has not been removed.

NOTE: If the safety seal is missing or is broken, extinguisher may have been tampered with or may have already been used- indicating the need for re-inspection/ replacement.

e. Inspect mounting strap/bracket assembly to ensure extinguisher is secured to structure.

Maintenance

Post-Operation Inspection Checklist (Page 1)

NOTE: Post-operation checklist should be conducted in accordance with OSHA requirements, to include OSHA Standard- 29 CFR, Part 1926.600.

1. Check engine oil and radiator coolant levels to ensure no leakage after operations.

NOTE: It is necessary to open the engine cover to check the oil level. Be sure all covers are replaced and latched in position properly before transporting or operating the machine. If machine is to be parked in a publicly accessible area or area adjacent to a roadway or construction site, the engine compartments must be closed and locked.

2. Close all windows on the Safe-Zone Cab, remove the master keys from the control panel, and shut and lock the door.

NOTE: It is important that the windows are closed, the door is locked, and that all keys are removed to prevent unauthorized access or tampering with the equipment, especially when the machine is parked in a publicly accessible area or area adjacent to a roadway or construction site.

3. If leaving machine parked/unattended at night adjacent to a roadway or occu pied construction area, caution should be taken to ensure that there is no obstruc tion of the reflectors- all reflectors must be visible.

4. When parking the machine, the wheels should be chocked and the parking brake should be set- (Parking brakes may not be available on all trailer models). When parking brake is not avail able or when park ing machine/trailer on an incline, having the wheel chocked is ex- tremely important.

5. Store all grips, blocks, and other tools/equipment used during operations back into the tool box. Then close and lock tool box.

6. Secure the rope end to the drum using a tie-off rope around the drum.

Post-Operation Inspection Checklist (Page 2)

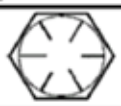
7. Remove any trash, rags, or other loose material from the machine to keep the machine clean, so as not to create a fire hazard.

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.	 SAE J429 Grade 5			 SAE J429 Grade 8		
	Tightening Torque			Tightening Torque		
(in.)	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	β0 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 ¼" and 5⁄16" are listed in inch-pounds. All other 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.

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)	8.8 Class 8.8			10.9 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.

Service & Repair

NOTE: For service or repair, please contact the Sherman+Reilly Parts & Service Department at **repairs@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- *(see Fault and Malfunction Detection section)*.

Parts

8

NOTE: Parts or features may only apply to certain models or build configurations, for questions, parts ordering , and pricing inquiries please contact the Sherman+Reilly Parts & Service Department at **parts@sherman-reilly.com** or call **(423)756-5300**.

Sherman + Reilly Accessories:

Bundle Block 70 Series 36.5 in. UUU	701410
Helicopter Attachment for Bundle Block 70 Series 36.5 in. UUU	370141
Block Ground Steel Center for Bundle Block 70 Series 36.5 in. UUU	306019
Block Ground Aluminum Center for Bundle Block 70 Series 36.5 in. UUU	303009
Bundle Block Rack	305712
Running Board (1) D-300 / (2) D-160	602058
Running Board (1) D-300 / (2) C-100	602056
Reel Stand CRS-96/67-20K	601233
Transmission Unit Hydraulic Hose Kit	600298

Miscellaneous Replacement Parts:

Fire Extinguisher	553858
Wheel Chocks, Rubber, (8”x5 ¼”x9”H)	552974
S+R Logo Mud Flap	550620