



TECHNICAL PUBLICATIONS



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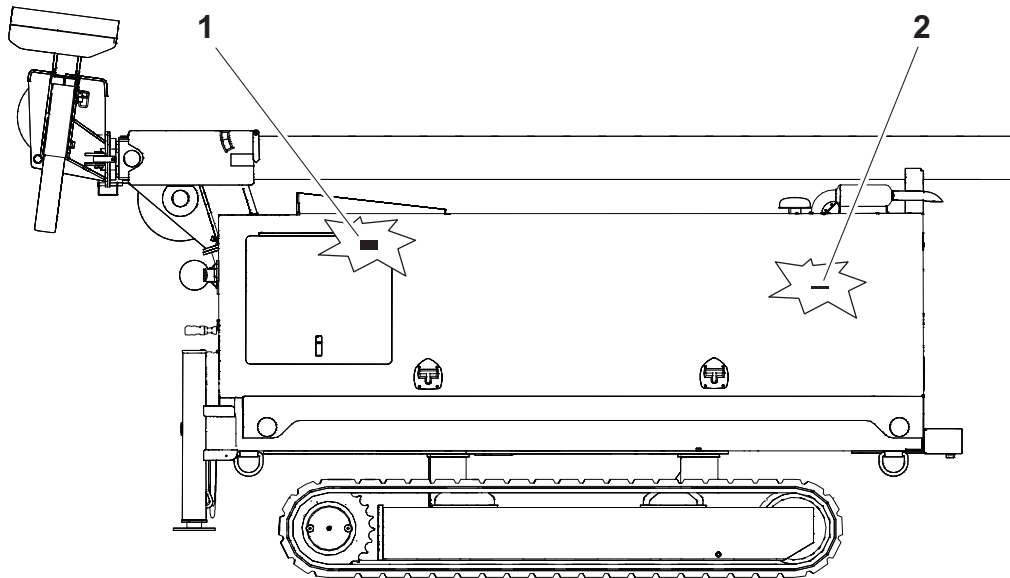
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Serial Number Location

Record serial numbers and date of purchase in spaces provided.



j64om002w.eps

date of manufacture	
date of purchase	
winch unit serial number (1)	
engine serial number (2)	

Intended Use

HammerHead® winches are intended for pedestrian controlled pipe bursting, pipe slitting, slip lining, and cable pulling. The HG2200 HydroGuide® Winch is a dual capstan design winch with the capacity of utilizing multiple sizes of wire cable. The HG2200 provides up to 22 tons (20 tonnes) of constant tension for pipe bursting, pipe slitting, slip lining, and cable pulling.

The unit is designed for operation in temperatures typically experienced in earth moving and construction work environments. Contact your HammerHead dealer for provisions required for operating in extreme temperatures. Use in any other way is considered contrary to the intended use.

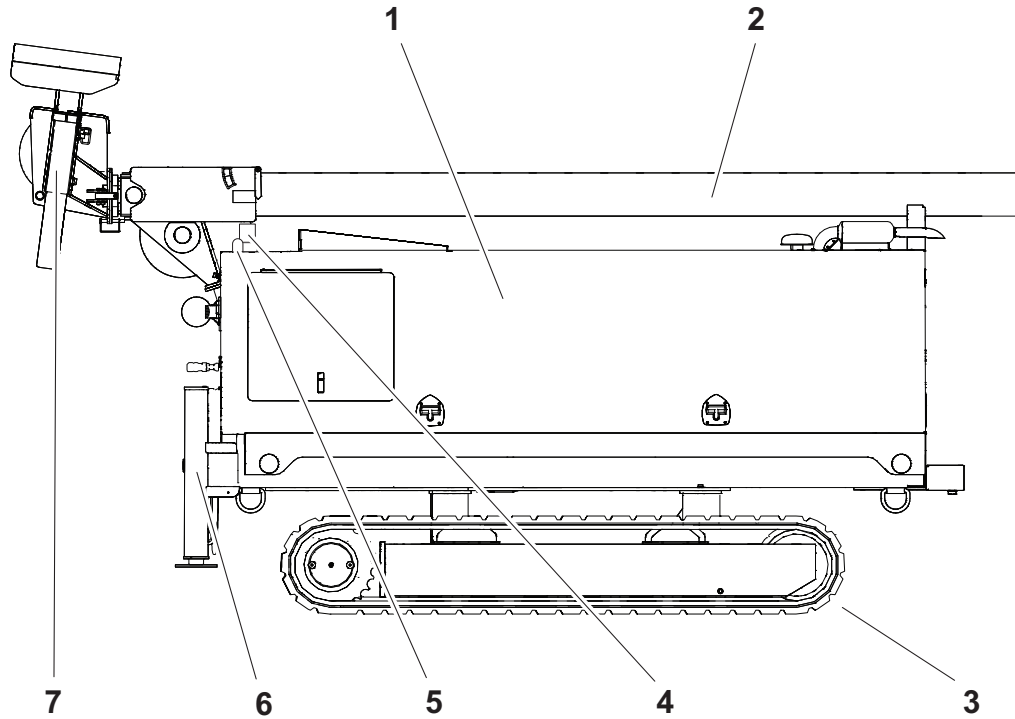
HammerHead pipe bursters and power units should be operated, serviced, and repaired only by persons familiar with their particular characteristics and acquainted with the relevant safety procedures.

Equipment Modification

This equipment was designed and built in accordance with applicable standards and regulations. Modification of equipment could mean that it will no longer meet regulations and may not function properly or in accordance with the operating instructions. Modification of equipment should only be made by competent personnel possessing knowledge of applicable standards, regulations, equipment design functionality/requirements and any required specialized testing.

Unit Components

Tracked Unit

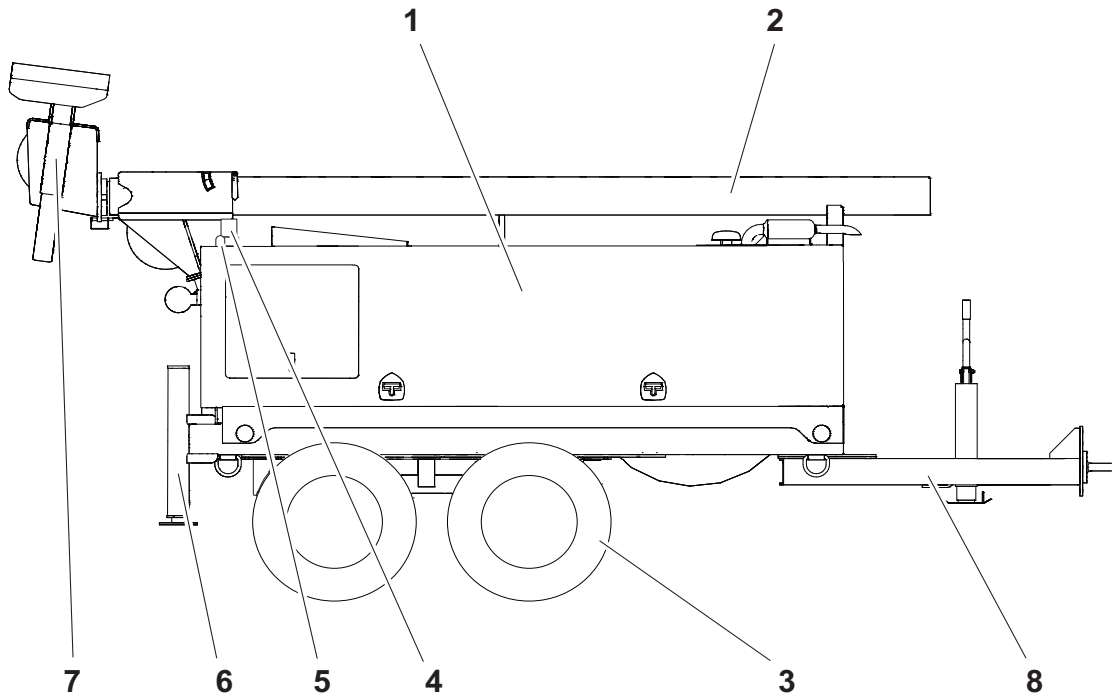


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- | | |
|-----------------|-----------------------------------|
| 1. Winch | 5. Wireless remote control lights |
| 2. Mast | 6. Stabilizer |
| 3. Tracks | 7. Downhole unit |
| 4. ESID strobe* | |

*Optional

Wheeled Unit



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- | | |
|-----------------|-----------------------------------|
| 1. Winch | 5. Wireless remote control lights |
| 2. Mast | 6. Stabilizer |
| 3. Tires | 7. Downhole unit |
| 4. ESID strobe* | 8. Hitch |

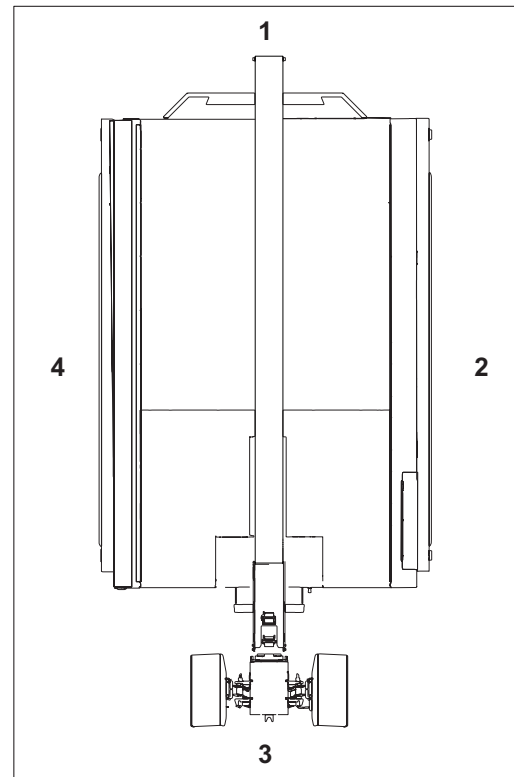
*Optional

Operator Orientation

Tracked

IMPORTANT: Top view of unit is shown.

1. Front of unit
2. Right side of unit
3. Rear of unit
4. Left side of unit

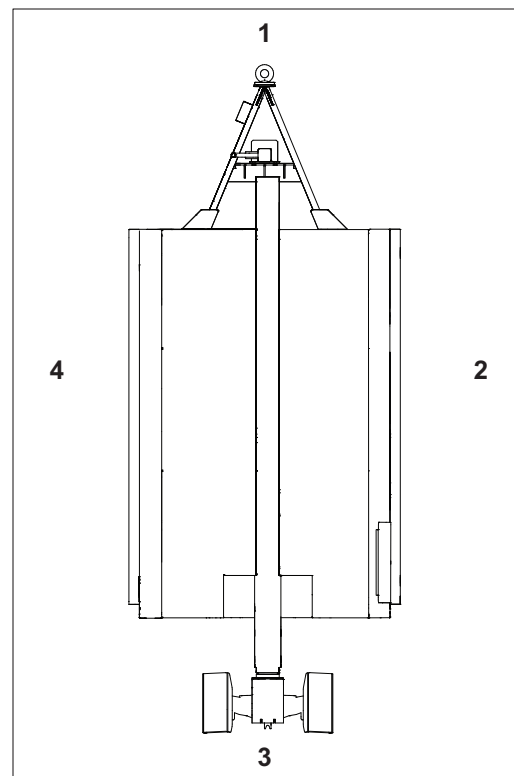


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Wheeled Unit

IMPORTANT: Top view of unit is shown.

1. Front of unit
2. Right side of unit
3. Rear of unit
4. Left side of unit



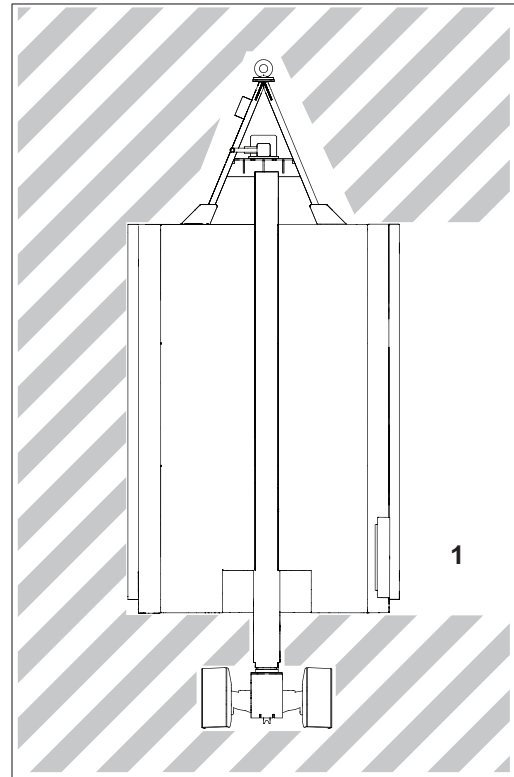
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Operating Area

Winch

IMPORTANT: Top view of unit is shown.

Operator should stand only in the location marked by number 1.

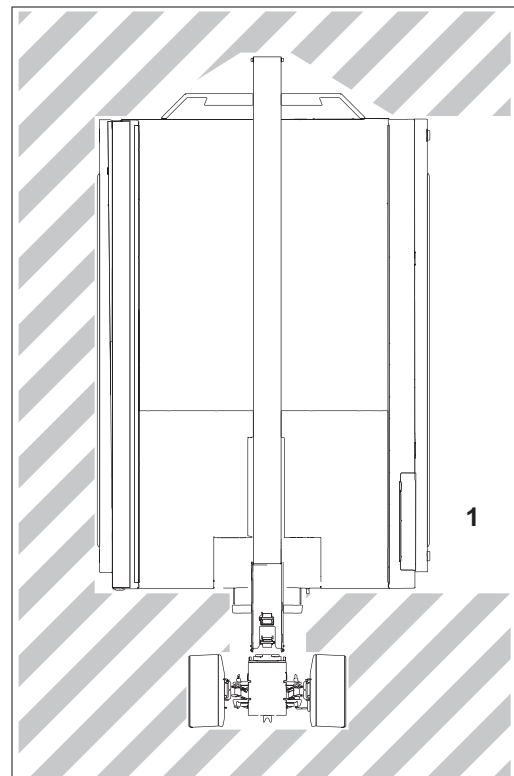


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Tracks

IMPORTANT: Top view of unit is shown.

Operator should stand only in the location marked by number 1.



j64om007w.eps

About This Manual

This manual contains information for the proper use of this machine. See **Operation Overview** for basic operating procedures. Cross references such as "See page 50" will direct you to detailed procedures.

Bulleted Lists

Bulleted lists provide helpful or important information or contain procedures that do not have to be performed in a specific order.

Numbered Lists

Numbered lists contain illustration callouts or list steps that must be performed in order.

Foreword

This manual is an important part of your equipment. It provides safety information and operation instructions to help you use and maintain your HammerHead® equipment.

Read this manual before using your equipment. Keep it with the equipment at all times for future reference. If you sell your equipment, be sure to give this manual to the new owner.

If you need a replacement copy, contact your HammerHead dealer. If you need assistance in locating a dealer, visit our website at **www.hammerheadtrenchless.com** or write to the following address:

HammerHead Trenchless Equipment
500 South C.P. Avenue
Lake Mills, WI 53551
USA

The descriptions and specifications in this manual are subject to change without notice. Earth Tool Company LLC reserves the right to improve equipment. Some product improvements may have taken place after this manual was published. For the latest information on HammerHead equipment, see your HammerHead dealer.

Thank you for buying and using HammerHead equipment.

Reporting Safety Defects

If you believe that your vehicle has a defect which could cause a crash or could cause injury or death, you should immediately inform the National Highway Traffic Safety Administration (NHTSA) in addition to notifying The Charles Machine Works, Inc, Attn: Product Safety Coordinator.

If NHTSA receives similar complaints, it may open an investigation, and if it finds that a safety defect exists in a group of vehicles, it may order a recall and remedy campaign. However, NHTSA cannot become involved in any individual problems between you, your Ditch Witch dealer, or The Charles Machine Works, Inc.

To contact NHTSA you may either call the Auto Safety Hotline toll-free at 1-800-424-9393 (366-0123 in Washington, DC area) or write to:

NHTSA
U.S. Department of Transportation
400 7th Street SW (NSA-11)
Washington, DC 20590

You can also obtain other information about motor vehicle safety from the Hotline.



A CHARLES MACHINE WORKS COMPANY

**HG2200/HG2200AT
Operator's Manual**

Issue number 2.1/OM/09/11

Part number 960-1119













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This product and its use may be covered by one or more patents at <http://patents.charlesmachine.works>.

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Service Record

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Guidelines



When you see this safety alert sign, carefully read and follow all instructions.
YOUR SAFETY IS AT STAKE. Read this entire section before using your equipment.

Follow these guidelines before operating any jobsite equipment:

- Complete proper training and read operator's manual before using equipment.
- Mark proposed path with white paint and have underground utilities located before working. In the US or Canada, call 811 (US) or 888-258-0808 (US and Canada). Also contact any local utilities that do not participate in the One-Call service. In countries that do not have a One-Call service, contact all local utility companies to have underground utilities located.
- Classify jobsite based on its hazards and use correct tools and machinery, safety equipment, and work methods for jobsite.
- Mark jobsite clearly and keep spectators away.
- Wear personal protective equipment.
- Review jobsite hazards, safety and emergency procedures, and individual responsibilities with all personnel before work begins. Safety Data Sheets (SDS) are available at www.hammerheadshop.com/resources/technical-sheets/.
- Fully inspect equipment before operating. Repair or replace any worn or damaged parts. Replace missing or damaged safety shields and safety signs. Contact your HammerHead® dealer for assistance.
- Use equipment carefully. Stop operation and investigate anything that does not look or feel right.
- Do not operate unit where flammable gas may be present.
- Only operate equipment in well-ventilated areas.

Contact your HammerHead dealer if you have any question about operation, maintenance, or equipment use

California Proposition 65 Warning

This product may contain chemicals known to the State of California to cause cancer, birth defects, or other reproductive harm.

- battery posts, terminals, and related accessories
- engine exhaust
- ethylene glycol

Emergency Procedures

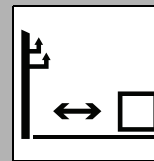
**WARNING**

Jobsite hazards could cause death or serious injury. Use correct equipment and work methods. Use and maintain proper safety equipment.

Before operating any equipment, review emergency procedures and check that all safety precautions have been taken.

EMERGENCY SHUTDOWN - Turn ignition switch to stop position or push remote engine stop button (if equipped).

Electric Strike Description

**DANGER**

Electric shock. Contacting electric lines will cause death or serious injury. Know location of lines and stay away.

When working near electric cables, remember the following:

- Electricity follows all paths to ground, not just path of least resistance.
- Pipes, hoses, and cables will conduct electricity back to all equipment.
- Low voltage current can injure or kill. Many work-related electrocutions result from contact with less than 440 volts.

Most electric strikes are not noticeable, but indications of a strike include:

- power outage
- smoke
- explosion
- popping noises
- arcing electricity

If any of these occur, assume an electric strike has occurred.

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Emergency Procedures

If an Electric Line Is Damaged

If you suspect an electric line has been damaged and you are **in pit**, DO NOT MOVE and DO NOT TOUCH ANYTHING. Remain in pit and take the following actions. The order and degree of action will depend upon the situation.

- Warn people nearby that an electric strike has occurred. Instruct them to leave the area and contact utility.
- Contact utility company to shut off power.
- Do not leave pit until given permission by utility company.

If you suspect an electric line has been damaged and you are **out of pit**, DO NOT TOUCH ANYTHING. Take the following actions. The order and degree of action will depend upon the situation.

- LEAVE AREA. The ground surface may be electrified, so take small steps with feet close together to reduce the hazard of being shocked from one foot to the other.
- Contact utility company to shut off power.
- Do not return to jobsite or allow anyone into area until given permission by utility company.

If you suspect an electric line has been damaged and you are **on other piece of equipment**, DO NOT MOVE. Remain on truck or trailer and take the following actions. The order and degree of action will depend upon the situation.

- Warn people nearby that an electric strike has occurred. Instruct them to leave the area and contact utility.
- Contact utility company to shut off power.
- Do not return to area or allow anyone into area until given permission by utility company.

If a Gas Line is Damaged

⚠ WARNING Fire or explosion possible. Fumes could ignite and cause burns. No smoking, no flame, no spark.



⚠ WARNING Explosion possible. Serious injury or equipment damage could occur. Follow directions carefully.

If you suspect a gas line has been damaged, take the following actions. The order and degree of action will depend on the situation.

- Immediately shut off engine(s), if this can be done safely and quickly.
- Remove any ignition source(s), if this can be done safely and quickly.
- Warn others that a gas line has been cut and that they should leave the area.
- Leave jobsite as quickly as possible.
- Immediately call your local emergency phone number and utility company.
- If jobsite is along street, stop traffic from driving near jobsite.
- Do not return to jobsite until given permission by emergency personnel and utility company.

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Do not look into cut ends of fiber optic or unidentified cable. Vision damage can

If a Fiber Optic Cable is Damaged

Do not look into cut ends of fiber optic or unidentified cable. Vision damage can occur. Contact utility company.

California Proposition 65 Warning

This product may contain chemicals known to the State of California to cause cancer, birth defects, or other reproductive harm.

- battery posts, terminals, and related accessories
- engine exhaust
- ethylene glycol

Emergency Procedures

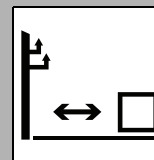


⚠ WARNING Jobsite hazards could cause death or serious injury. Use correct equipment and work methods. Use and maintain proper safety equipment.

Before operating any equipment, review emergency procedures and check that all safety precautions have been taken.

EMERGENCY SHUTDOWN - Turn ignition switch to stop position or push remote engine stop button (if equipped).

Electric Strike Description



⚠ DANGER Electric shock. Contacting electric lines will cause death or serious injury. Know location of lines and stay away.

When working near electric cables, remember the following:

- Electricity follows all paths to ground, not just path of least resistance.
- Pipes, hoses, and cables will conduct electricity back to all equipment.
- Low voltage current can injure or kill. Many work-related electrocutions result from contact with less than 440 volts.

Most electric strikes are not noticeable, but indications of a strike include:

- power outage
- smoke
- explosion
- popping noises
- arcing electricity

If any of these occur, assume an electric strike has occurred.

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Emergency Procedures

If an Electric Line Is Damaged

If you suspect an electric line has been damaged and you are **in pit**, DO NOT MOVE and DO NOT TOUCH ANYTHING. Remain in pit and take the following actions. The order and degree of action will depend upon the situation.

- Warn people nearby that an electric strike has occurred. Instruct them to leave the area and contact utility.
- Contact utility company to shut off power.
- Do not leave pit until given permission by utility company.

If you suspect an electric line has been damaged and you are **out of pit**, DO NOT TOUCH ANYTHING. Take the following actions. The order and degree of action will depend upon the situation.

- LEAVE AREA. The ground surface may be electrified, so take small steps with feet close together to reduce the hazard of being shocked from one foot to the other.
- Contact utility company to shut off power.
- Do not return to jobsite or allow anyone into area until given permission by utility company.

If you suspect an electric line has been damaged and you are **on other piece of equipment**, DO NOT MOVE. Remain on truck or trailer and take the following actions. The order and degree of action will depend upon the situation.

- Warn people nearby that an electric strike has occurred. Instruct them to leave the area and contact utility.
- Contact utility company to shut off power.
- Do not return to area or allow anyone into area until given permission by utility company.

If a Gas Line is Damaged

⚠ WARNING Fire or explosion possible. Fumes could ignite and cause burns. No smoking, no flame, no spark.



⚠ WARNING Explosion possible. Serious injury or equipment damage could occur. Follow directions carefully.

If you suspect a gas line has been damaged, take the following actions. The order and degree of action will depend on the situation.

- Immediately shut off engine(s), if this can be done safely and quickly.
- Remove any ignition source(s), if this can be done safely and quickly.
- Warn others that a gas line has been cut and that they should leave the area.
- Leave jobsite as quickly as possible.
- Immediately call your local emergency phone number and utility company.
- If jobsite is along street, stop traffic from driving near jobsite.
- Do not return to jobsite until given permission by emergency personnel and utility company.

If a Fiber Optic Cable is Damaged

Do not look into cut ends of fiber optic or unidentified cable. Vision damage can occur. Contact utility company.

If Machine Catches on Fire


Perform emergency shutdown procedure and then take the following actions. The order and degree of action will depend on the situation.


- Immediately move battery disconnect switch (if equipped and accessible) to disconnect position.
- If fire is small and fire extinguisher is available, attempt to extinguish fire. If fire cannot be extinguished, leave area as quickly as possible and contact emergency personnel.


Safety Alert Classifications

These classifications and the icons defined on the following pages work together to alert you to situations which could be harmful to you, jobsite bystanders or your equipment. When you see these words and icons in the book or on the machine, carefully read and follow all instructions. **YOUR SAFETY IS AT STAKE.**

Watch for the three safety alert levels: **DANGER**, **WARNING** and **CAUTION**. Learn what each level means.

 **DANGER** indicates a hazardous situation that, if not avoided, will result in death or serious injury. This signal word is to be limited to the most extreme situations.

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

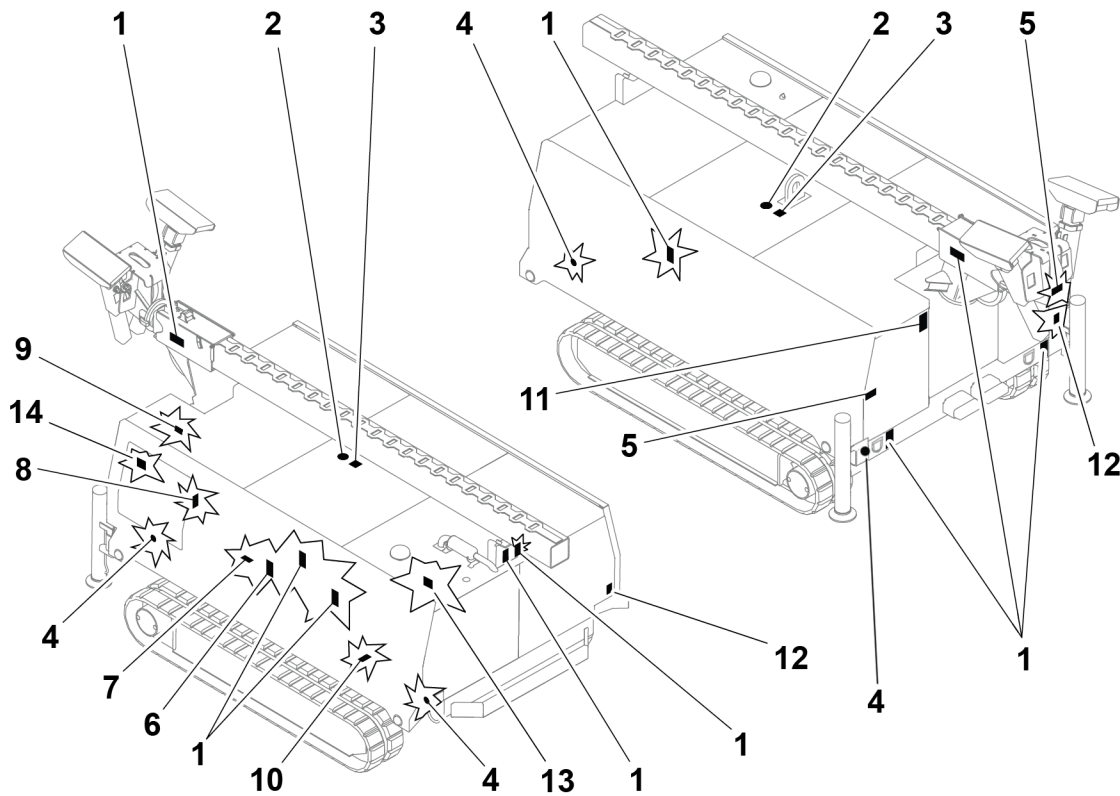
 **CAUTION** indicates a hazardous situation that, if not avoided, could result in minor or moderate injury.

Watch for two other words: **NOTICE** and **IMPORTANT**.

NOTICE indicates information considered important, but not hazard-related (e.g., messages relating to property damage).

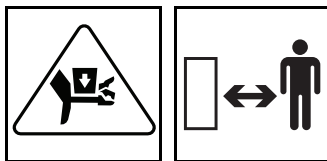
IMPORTANT can help you do a better job or make your job easier in some way.

Machine Safety Alerts



Decal_HG2200.png

1



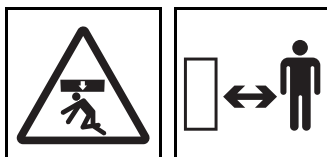
⚠ WARNING Moving parts can crush and cut hand or foot. Stay away.

2

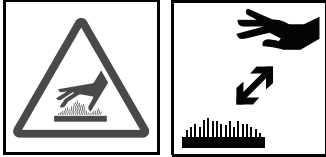
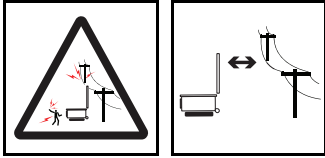


Lift point. See Transport chapter for more information.

3



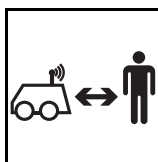
⚠ WARNING Crushing weight could cause death or serious injury. Stay away.

4		Tiedown location. See Transport chapter for more information.
5		⚠ WARNING Crush hazard. Machine can move during operation. Lower stabilizers and chock wheels or tracks before operating winch.
6		⚠ CAUTION Hot parts may cause burns. Do not touch until cool or wear gloves.
7		⚠ WARNING Fire or explosion possible. Fumes could ignite and cause burns. No smoking, no flame, no spark.
8		⚠ DANGER Do not get boom near power lines. Death or serious injury will occur. Keep required distance between boom and power lines. Use a spotter.
9		⚠ WARNING Jobsite hazards could cause death or serious injury. Use correct equipment and work methods. Use and maintain proper safety equipment.
10		⚠ WARNING Misuse of machine can cause death or serious injury. Read and understand operator's manual and all other safety instructions before use.
11		⚠ DANGER Cable may break while pulling and strike you. Serious injury or death may occur. Stay away.

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Machine Safety Alerts

12



CAUTION Equipment can be operated by remote control. Stay away.

13



WARNING Fire or explosion possible. Do not use starter fluid.

14



CAUTION Exposure to high noise levels may cause hearing loss. Wear hearing protection.

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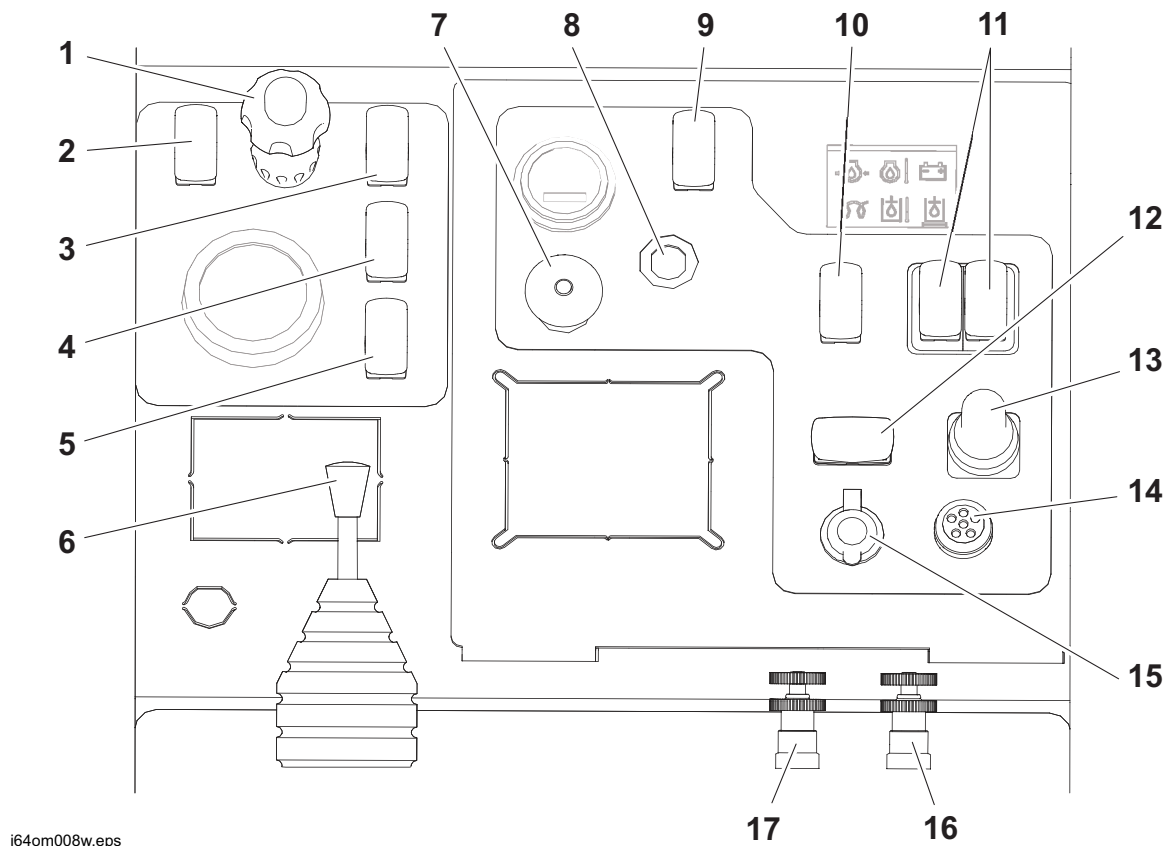
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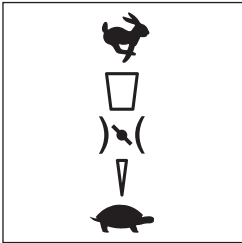
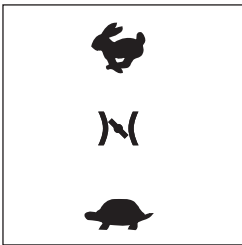
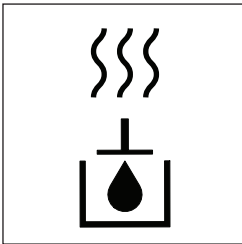
Winch Controls



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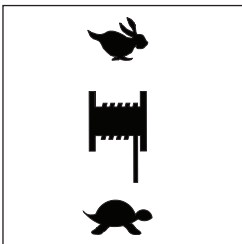
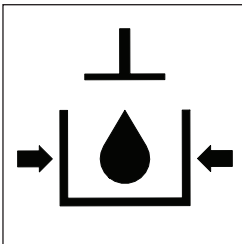
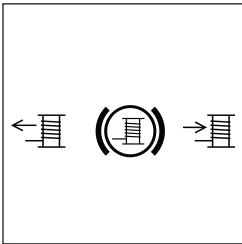
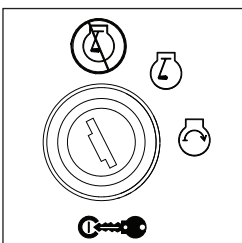
- | | |
|-----------------------------------|--|
| 1. Manual throttle | 10. Wireless remote controller enable switch |
| 2. Electronic throttle switch | 11. Stabilizer control switch* |
| 3. Hydraulic fluid warm-up switch | 12. Mode selection switch |
| 4. Capstan speed control switch | 13. Mast control |
| 5. Pressure adjustment switch | 14. Remote hardwire connection |
| 6. Winch control lever | 15. Auxiliary outlet |
| 7. Remote engine stop button | 16. Pull force control |
| 8. Ignition switch | 17. Cable speed control |
| 9. Auxiliary light switch | |

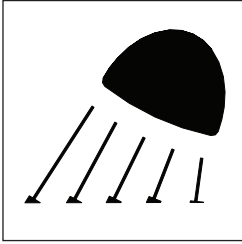
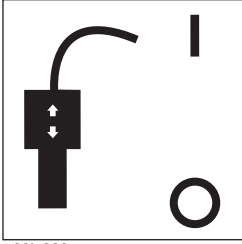
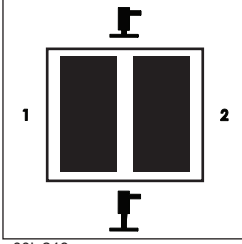
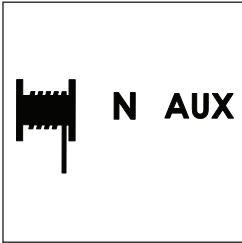
*Optional

Item	Description	Notes
1. Manual throttle  <p>c00ic240w.eps</p>	<p>To decrease engine speed, press center button and push knob in.</p> <p>To increase engine speed, press center button and pull knob out.</p> <p>To increase engine speed with fine adjustments, turn knob counterclockwise.</p> <p>To decrease engine speed with fine adjustments, turn knob clockwise.</p> <p>To lock throttle into place, turn base ring clockwise.</p> <p>To unlock throttle settings, turn base ring counterclockwise.</p>	<p>IMPORTANT: Pushing throttle adjustment control all the way in does not stop the engine.</p>
2. Electronic throttle switch  <p>c00ic029w.eps</p>	<p>To run engine at full throttle, press top.</p> <p>To run engine at low throttle, press bottom.</p>	<p>IMPORTANT: Throttle is to be run at maximum speed during operation of winch. Cable pullback speed is adjusted with the cable speed adjustment control. See "Cable speed control" on page 33.</p>
3. Hydraulic fluid warm-up switch  <p>c00ic259w.eps</p>	<p>To start hydraulic fluid warm-up cycle, press top.</p> <p>To interrupt cycle, press bottom.</p>	<p>Unless interrupted, switch will automatically shut off when hydraulic fluid is warmed to operating temperature.</p>

HG2200/HG2200AT Operator's Manual

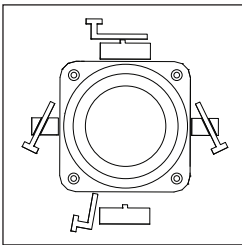
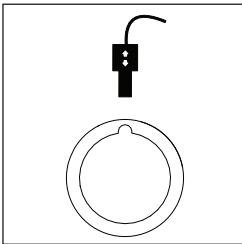
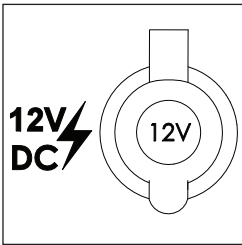
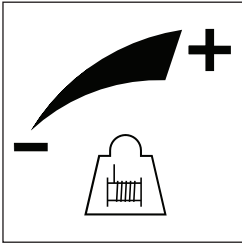
Winch Controls

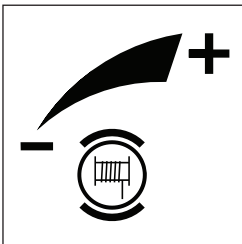
Item	Description	Notes
4. Capstan speed control switch  <small>c00ic244w.eps</small>	<p>To select high for capstan drive motor, move up.</p> <p>To select low for capstan drive motor, move down.</p>	<p>IMPORTANT: To achieve maximum pull force switch must be in the low speed.</p>
5. Pressure adjustment switch  <small>c00ic243w.eps</small>	<p>To set pulling force to a known value, press.</p>	<p>Use pressure gauge to determine pulling force.</p> <p>Use with pull force control. See page 32 for more information.</p>
6. Winch control lever  <small>c00ic174w.eps</small>	<p>To push cable out, move lever to the left.</p> <p>To put winch in neutral, move lever to center position.</p> <p>To pull cable in, move lever to the right.</p>	<p>NOTICE: Lever will remain engaged until moved to other position.</p> <p>IMPORTANT:</p> <ul style="list-style-type: none"> Cable will push out or pull in at any engine speed. Must be in neutral to start engine. Must be in neutral for remote control option to function.
7. Remote engine stop button	<p>To shut engine down, press.</p>	<p>IMPORTANT: Engine does have an electronic fuel shut off. Pushing the throttle in will not shut down the engine.</p>
8. Ignition switch  <small>c00ic263w.eps</small>	<p>To turn electrical system on, but not engine, insert key and turn one position clockwise.</p> <p>To turn engine on, insert key and turn two positions clockwise.</p> <p>To turn unit off, turn key to center position.</p>	<p>See page 64 for more information.</p>

Item	Description	Notes
9. Auxiliary light switch  <small>c00ic245w.eps</small>	<p>To turn lights on, move up.</p> <p>To turn lights off, move down.</p>	Controls lights on unit.
10. Wireless remote controller enable switch  <small>c00ic260w.eps</small>	<p>To enable wireless remote controller, press top.</p> <p>To disable wireless remote controller, press bottom.</p>	Enabling wireless remote controller disables control panel.
11. Stabilizer control switch  <small>c00ic246w.eps</small>	<p>To raise left stabilizer, move 1 up and hold.</p> <p>To lower left stabilizer, move 1 down and hold.</p> <p>To raise right stabilizer, move 2 up and hold.</p> <p>To lower right stabilizer, move 2 down and hold.</p>	See "Manual Stabilizer Controls" on page 47.
12. Mode selection switch  <small>c00ic248w.eps</small>	<p>To enable winch controls, press left.</p> <p>To put controls in neutral position, move switch to neutral position.</p> <p>To enable auxiliary mode, press right.</p>	<p>If using remote control, see "Wireless Remote Controller" on page 34.</p> <p>IMPORTANT:</p> <ul style="list-style-type: none"> Winch controls include paying in and pushing out cable and moving the mast. Control must be in neutral position for engine to be started. Auxiliary mode includes raising and lowering optional hydraulic stabilizers and operating external hydraulic tools.

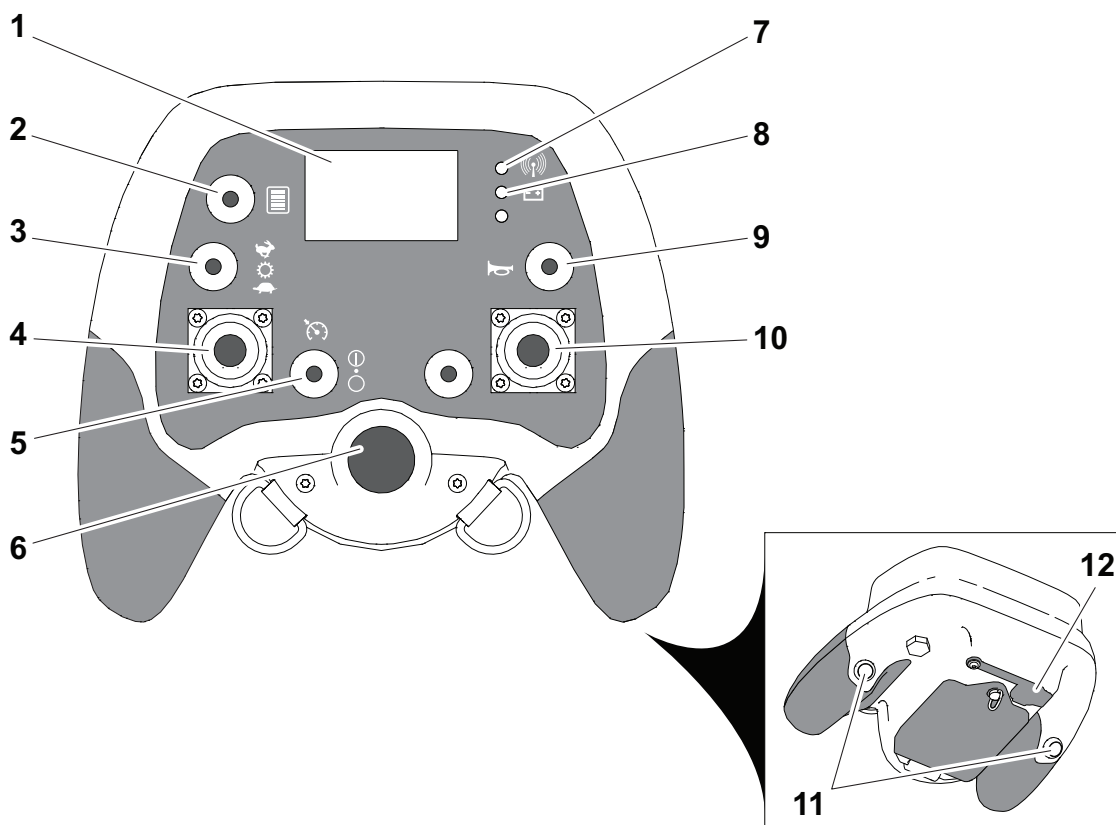
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Winch Controls

Item	Description	Notes
13. Mast control  c00ic247w.eps	<p>To raise mast, move up and hold.</p> <p>To lower mast, move down and hold.</p> <p>To rotate mast clockwise, move to the right and hold.</p> <p>To rotate mast counterclockwise, move to the left and hold.</p>	
14. Remote hardwire connection  c00ic173w.eps	<p>To connect wireless remote controller to winch via cable harness, plug in.</p>	<p>IMPORTANT: Connecting the wireless remote controller to winch via cable harness instead of radio signals eliminates interference from nearby sources.</p>
15. Auxiliary outlet  c00ic172w.eps	<p>Provides power for other equipment.</p>	<p>Power output is 12VDC, 5A.</p>
16. Pull force control  c00ic177w.eps	<p>To increase pull force, turn knob to the right.</p> <p>To decrease pull force, turn knob to the left.</p>	<p>IMPORTANT:</p> <ul style="list-style-type: none"> There is a minimum setting that needs to be achieved before cable will start to move. Use with pressure adjustment switch. See page 30 for more information.

Item	Description	Notes
17. Cable speed control  <small>c00ic175w.eps</small>	<p>To increase speed while pulling cable in, turn knob to the right.</p> <p>To decrease speed while pulling cable in, turn knob to the left.</p>	<p>IMPORTANT: There is a minimum setting that needs to be achieved before cable will start to move.</p>

Wireless Remote Controller


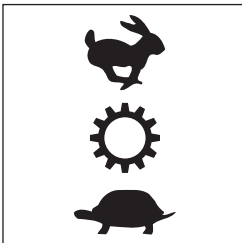
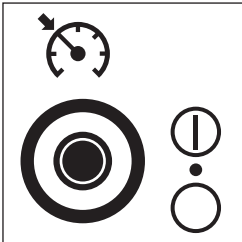


j64om010w.eps

- | | |
|--------------------------------|----------------------------------|
| 1. LCD display | 7. Communication link indicator |
| 2. Menu select switch | 8. Power status indicator |
| 3. Speed selection switch | 9. Power/Start/Horn switch |
| 4. Left multifunction joystick | 10. Right multifunction joystick |
| 5. Capstan cruise control | 11. Operator presence switches |
| 6. Engine stop | 12. Remote hardwire connection |


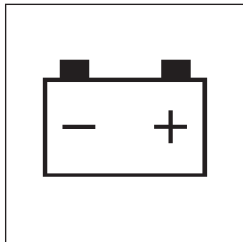

IMPORTANT: Throttle is automatically set to high when any machine functions are being used. If no functions are being used, throttle will return to low after 15 seconds.

Item	Description	Notes
1. LCD display	Indicates the selected mode of operation, battery status, radio link status, and signal strength.	

Item	Description	Notes
2. Menu select switch  <small>c00ic251w.eps</small>	<p>To move up through the secondary functions, move up.</p> <p>To move down through the secondary functions, move down.</p> <p>Release switch to stop moving through secondary functions.</p>	<p>IMPORTANT:</p> <ul style="list-style-type: none"> Operator presence switches must be released and pressed again after changing secondary functions to enable new functions. See page 37 for more information. Power/Start/Horn switch must be pushed to initialize the wireless remote controller each time the menu selection changes. See page 36 for more information.
3. Speed selection switch  <small>c00ic252w.eps</small>	<p>To select High speed range, move up.</p> <p>To select Medium speed range, move down.</p> <p>To select Low speed range, move down again.</p>	
4. Left multifunction joystick	<p>Move joystick to control selected system.</p>	<p>See "Wireless Remote Controller Secondary Functions" on page 37.</p>
5. Capstan cruise control  <small>c00ic253w.eps</small>	<p>To change speed, move left joystick to desired speed and move switch up.</p>	<p>IMPORTANT:</p> <ul style="list-style-type: none"> Operator can use speed selection switch to change speed range without disengaging the cruise. Speed is variable within selected speed range by moving left joystick.
6. Engine stop	<p>To stop engine, press red button.</p>	<p>IMPORTANT: To restart engine, turn ignition switch off and then back on.</p>

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Wireless Remote Controller

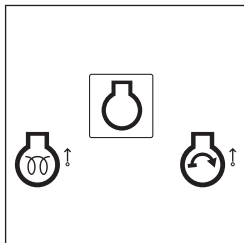
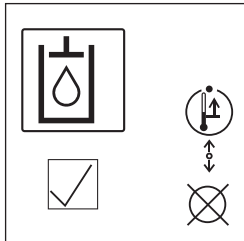
Item	Description	Notes
7. Communication link indicator  <small>c00ic713h.eps</small>	<p>Indicates the status of the transmitter and receiver link.</p> <ul style="list-style-type: none"> Blinking yellow indicates no communication link. Blinking green indicates good communication link. Steady red indicates an internal problem. Contact your HammerHead® dealer. 	<p>An active communication link is required for wireless control.</p>
8. Power status indicator  <small>c00ic008w.eps</small>	<p>Indicates battery status and cable connection.</p> <ul style="list-style-type: none"> Off indicates good battery level. Blinking red indicates low battery level. Solid green indicates transmitter is connected to machine. 	
9. Power/Start/Horn switch  <small>c00ic044h.eps</small>	<p>To turn power on, hold switch up until yellow LED indicator comes on and then blinks green. Release switch. Wireless remote control light (page 4) will shine.</p> <p>To start operation, hold switch up with joystick controls in neutral position until horn sounds. Release switch.</p> <p>To use horn, move switch up. Release switch to stop horn.</p> <p>To turn power off, hold switch down until LED indicators go off.</p>	<p>Wireless remote controller shuts off and yellow LED indicator blinks after one minute of inactivity. Hold switch up twice to restart.</p> <p>IMPORTANT: Must be pushed to initialize the transmitter each time the menu selection changes.</p>
10. Right multifunction joystick	<p>Move joystick to control selected system.</p>	<p>See "Wireless Remote Controller Secondary Functions" on page 37.</p>

Item	Description	Notes
11. Operator presence switches	To operate wireless controller, press one or both switches. To disable controller, release.	IMPORTANT: Operator presence switches must be released and pressed again after changing secondary functions to enable new function. See "Menu select switch" on page 35.
12. Remote hardwire connection	To connect wireless remote controller to winch via cable harness, plug in.	IMPORTANT: Connecting the wireless remote controller to winch via cable harness instead of radio signals eliminates interference from nearby sources.

Wireless Remote Controller Secondary Functions

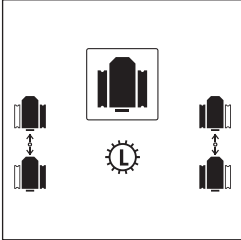
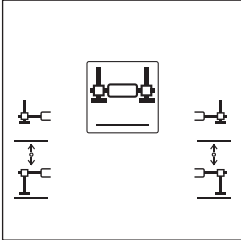
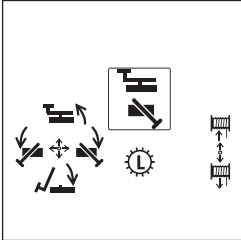
The multifunction joystick controls are capable of controlling multiple systems by selecting various secondary functions.

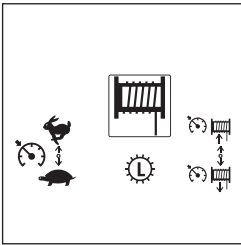
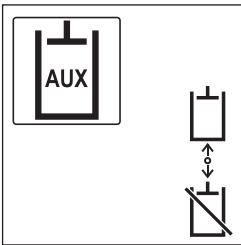
IMPORTANT: To switch between secondary functions, see "Menu select switch" on page 35.

Item	Description	Notes
1. Engine start  <small>c00ic766h.eps</small>	To start engine, move the right joystick up.	Ignition switch must be in first position for engine to start. IMPORTANT: If engine does not start, press the engine stop button and try again.
2. Hydraulic warm-up  <small>c00ic767h.eps</small>	To start warm-up cycle, move the right joystick up. To stop warm-up cycle, move the right joystick down.	IMPORTANT: <ul style="list-style-type: none"> Ensure the pull force control on the control panel is completely tightened. Engine will remain at high throttle until hydraulic fluid reaches 140°F (60°C). Operator cannot change modes while the warm-up cycle is engaged.

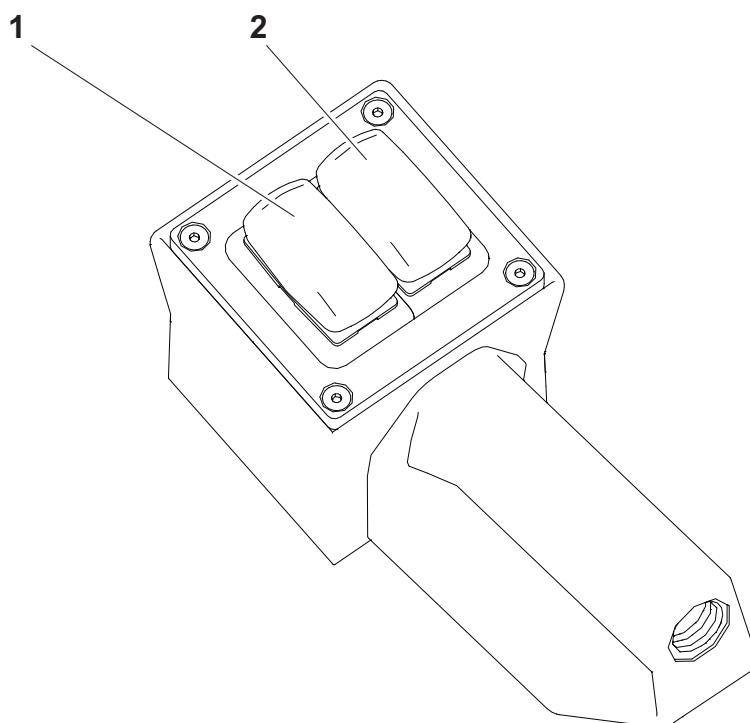
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Wireless Remote Controller

Item	Description	Notes
3. Track drive  <p>c00ic768h.eps</p>	<p>To move the right track forward, move the right joystick up.</p> <p>To move the right track backward, move the right joystick down.</p> <p>To move the left track forward, move the left joystick up.</p> <p>To move the left track backward, move the left joystick down.</p> <p>To pivot the machine, move both joysticks.</p>	<p>To select track drive speed, see “Speed selection switch” on page 35.</p> <p>IMPORTANT: High speed should be used for travel only.</p>
4. Stabilizers  <p>c00ic769h.eps</p>	<p>To raise right stabilizer, move right joystick up.</p> <p>To lower right stabilizer, move right joystick down.</p> <p>To raise left stabilizer, move left joystick up.</p> <p>To lower left stabilizer, move left joystick down.</p>	<p>IMPORTANT: Lower left and right stabilizers to the ground together, then adjust individually.</p>
5. Mast/Winch set-up  <p>c00ic770h.eps</p>	<p>To raise the mast, move the left joystick up.</p> <p>To lower the mast, move the left joystick down.</p> <p>To rotate the mast clockwise, move the left joystick to the right.</p> <p>To rotate the mast counterclockwise, move the left joystick to the left.</p> <p>To push cable out, move the right joystick up.</p> <p>To pull cable in, move the right joystick down.</p>	<p>To select speed, see “Speed selection switch” on page 35.</p> <p>IMPORTANT:</p> <ul style="list-style-type: none"> When using cable to set the mast depth, speed should be set to low. When stowing mast, ensure cable is extended at least 1' (30.5 cm) beyond lower sheave to prevent damage to the boom or cable.

Item	Description	Notes
6. Winch  c00ic771h.eps	<p>To push cable out, move the right joystick up.</p> <p>To pull cable in, move the right joystick down.</p>	<p>To select speed, see "Speed selection switch" on page 35.</p>
7. Mode Selection  c00ic772h.eps	<p>To enable auxiliary mode, move the right joystick up.</p> <p>To disengage auxiliary mode, move the right joystick down.</p>	

Track Tethered Remote Control



j64om009w.eps

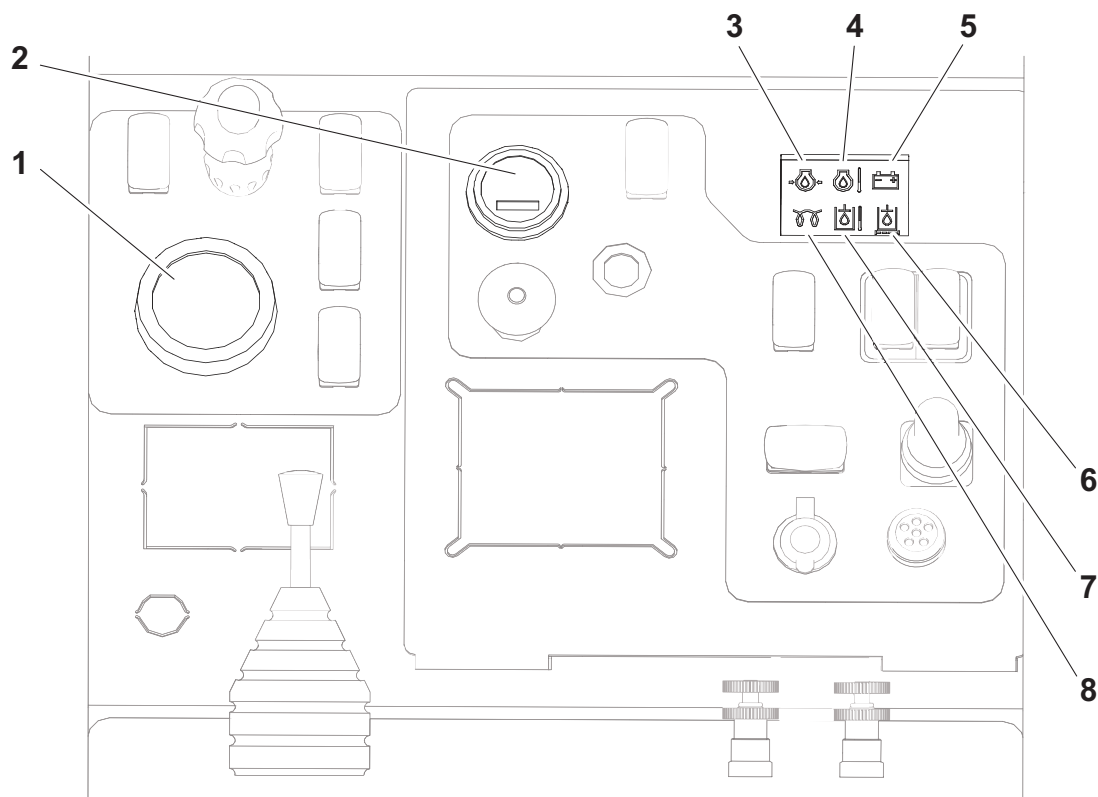
1. Left track control

2. Right track control

Item	Description	Notes
1. Left track control	To move left track forward, move lever forward. To move left track backward, move lever back.	
2. Right track control	To move right track forward, move lever forward. To move right track backward, move lever back.	

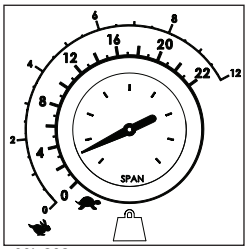
IMPORTANT: Track tethered remote control should only be used if wireless remote controller is damaged. For more information see "Track Tethered Remote Control" on page 90.

Gauges and Indicators



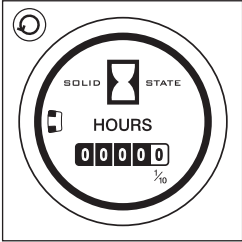
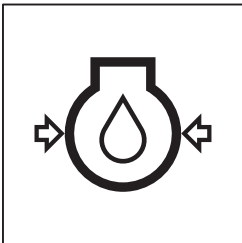
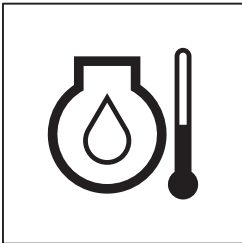
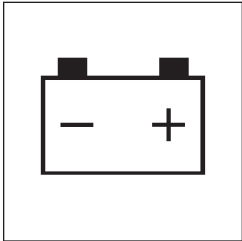
j64om011w.eps

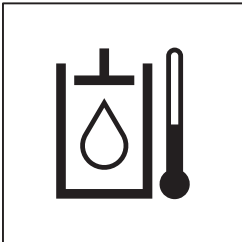
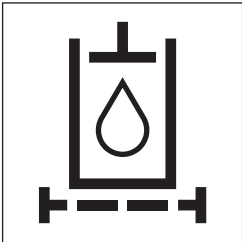
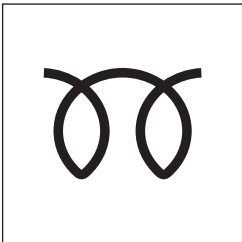
- | | |
|----------------------------------|---|
| 1. Hydraulic pressure gauge | 5. Voltage indicator |
| 2. Hourmeter | 6. Hydraulic fluid temperature indicator |
| 3. Engine oil pressure indicator | 7. Hydraulic fluid filter restriction indicator |
| 4. High temperature indicator | 8. Cold start wait indicator |

Item	Description	Notes
1. Hydraulic pressure gauge  <p>c00ic262w.eps</p>	Displays hydraulic pressure for unit.	<p>In neutral the gauge readings should be approximately 0-300 psi (0-20 bar).</p> <p>When operating the gauge readings can be up to approximately 3500 psi (241 bar).</p>

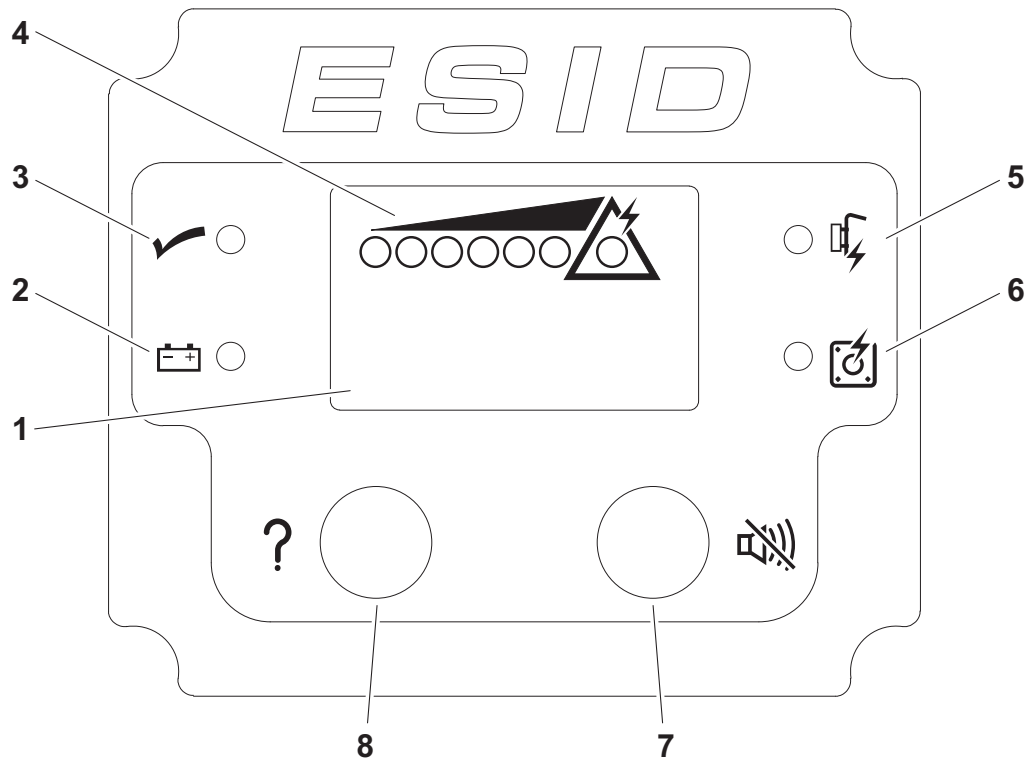
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Gauges and Indicators

Item	Description	Notes
2. Hourmeter  c00ic090h.eps	Displays engine operating time.	Use engine operating time to schedule service.
3. Engine oil pressure indicator  c00ic096a.eps	Flashes red on start-up and when engine oil pressure is low.	NOTICE: <ul style="list-style-type: none"> If engine pressure is too low the unit will shut down in 15 seconds. Check engine oil level.
4. High temperature indicator  c00ic097a.eps	Flashes red on start-up and when engine is overheating.	NOTICE: If engine temperature is too high the unit will shut down in 15 seconds.
5. Voltage indicator  c00ic008w.eps	Lights red when alternator is not charging.	

Item	Description	Notes
<p>6. Hydraulic fluid temperature indicator</p>  <p>c00ic098a.eps</p>	<p>Lights red when hydraulic fluid is overheating.</p>	<p>NOTICE: If indicator lights, stop engine and service unit.</p>
<p>7. Hydraulic fluid filter restriction indicator</p>  <p>c00ic578h.eps</p>	<p>Lights yellow when hydraulic fluid filter flow is restricted.</p>	<p>NOTICE: If indicator lights, stop engine and service unit.</p>
<p>8. Cold start wait indicator</p>  <p>c00ic477h.eps</p>	<p>Lights yellow when engine preheater (glow plug) is on.</p> <p>Wait until light goes off before starting engine.</p>	

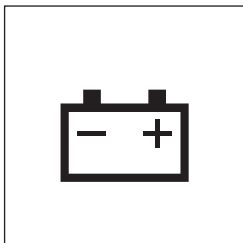
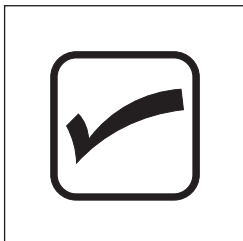
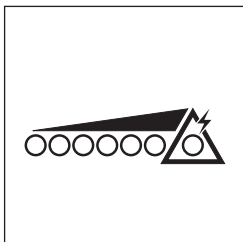
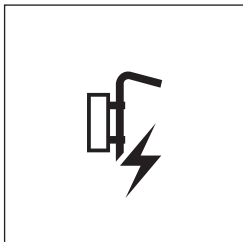
Electric Strike System* (ESID)



ESID.eps

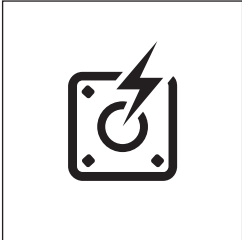


- | | |
|--------------------------------------|--|
| 1. LCD display | 5. Voltage limiter problem indicator |
| 2. Electrical power supply indicator | 6. Current detection problem indicator |
| 3. ESID OK indicator | 7. ESID Alarm interrupt button |
| 4. Strike indicator | 8. ESID Self test button |

Item	Description	Notes
1. LCD display	<p>Displays the amount of current and voltage being detected as a percentage of a strike condition.</p> <p>Displays status icons during certain error conditions.</p> <p>The line with the "V" shows voltage reading and the line with the "A" shows current reading.</p>	

Item	Description	Notes
<p>2. Electrical power supply indicator</p>  <p>c00ic081h.eps</p>	<p>Green light means control box has sufficient electrical power for operation.</p>	<p>Strike system is ready to operate if OK indicator is also on.</p>
<p>3. ESID OK indicator</p>  <p>c00ic056h.eps</p>	<p>Green light indicates ESID self test reports no problems.</p>	
<p>4. Strike indicator</p>  <p>c00ic077h.eps</p>	<p>The indicator bubbles are filled as strike percent readings increase.</p> <p>A filled indicator bubble in the triangle represents a strike warning condition and will trigger the alarm(s) and strobe(s).</p>	<p>NOTICE: The ESID does not indicate proximity to electric lines. System will activate only when voltage and/or amperage detected at the unit are above threshold minimum limits.</p> <p>Remember that the system can go from one or two indicator bubbles to an electric strike immediately.</p>
<p>5. Voltage limiter problem indicator</p>  <p>c00ic078h.eps</p>	<p>Blinking red light indicates a problem has been detected in the voltage limiter circuit.</p>	<p>See "Troubleshoot Strike System" on page 97.</p>

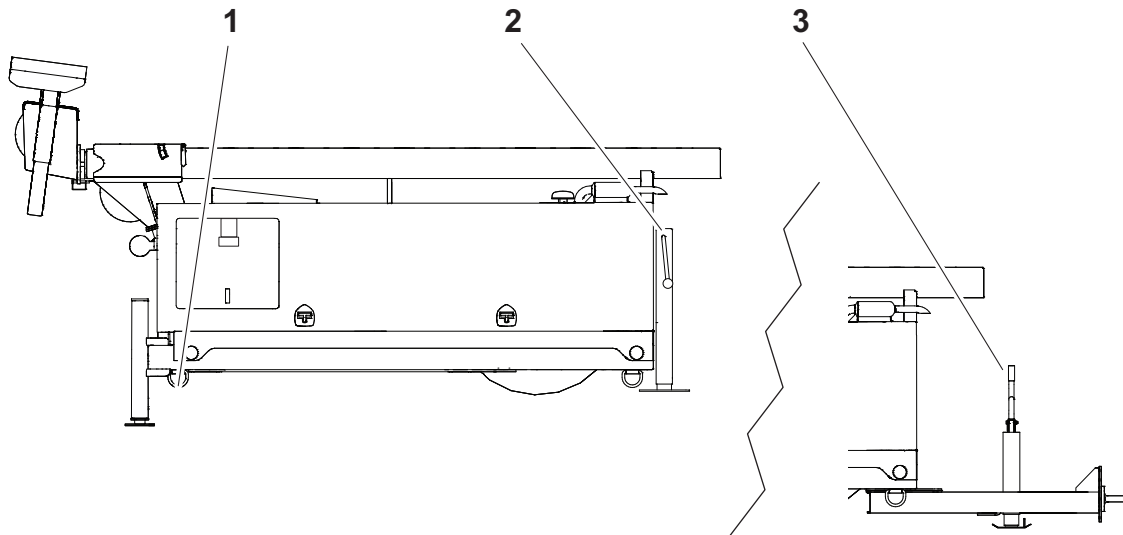
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Electric Strike System* (ESID)

Item	Description	Notes
6. Current detection problem indicator  <small>c00ic080h.eps</small>	<p>Blinking red light indicates a problem has been detected in the current sensing circuit.</p>	<p>See "Troubleshoot Strike System" on page 97.</p>
7. ESID alarm interrupt button  <small>c00ic078h.eps</small>	<p>To turn off strike alarm at unit, press.</p>	
8. ESID self test button  <small>c00ic075h.eps</small>	<p>To start a manual self test, press.</p> <p>To reset the system after a strike has been detected, press and hold.</p>	<p>IMPORTANT:</p> <ul style="list-style-type: none"> Self-test checks all systems and circuits except voltage limiter. See "If an Electric Line Is Damaged" on page 14.

*Optional

Manual Stabilizer Controls

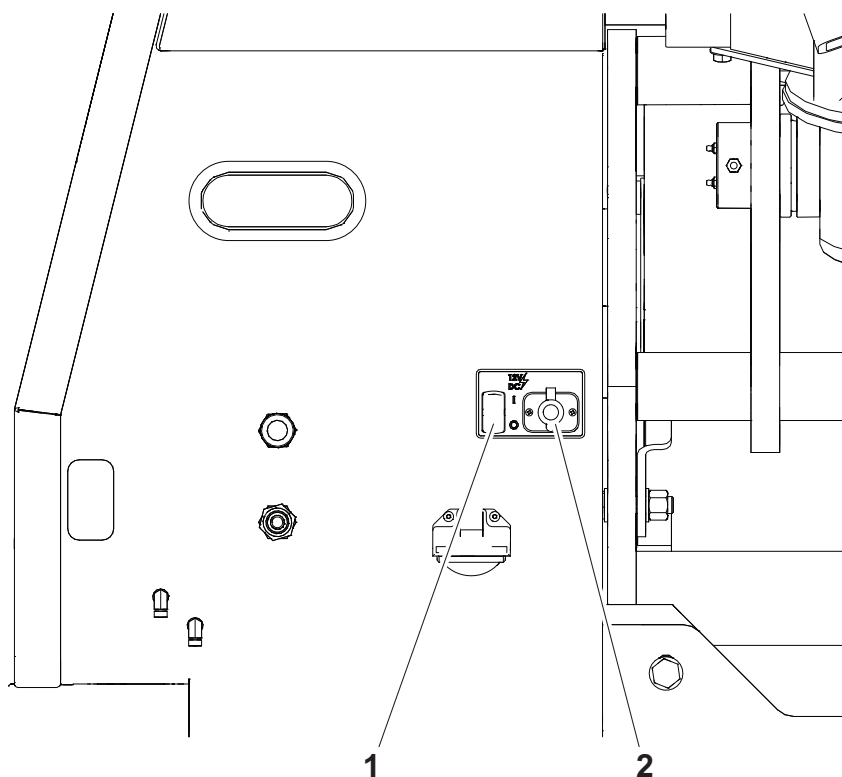


j64om055w.eps

1. Rear stabilizers
2. Manual stabilizer handle (skid unit only)
3. Manual trailer jack handle (wheeled unit only)

Item	Description	Notes
1. Rear stabilizers	Pull down and secure with pins.	
2. Manual stabilizer handle (skid unit only)	Turn handle clockwise to lower stabilizer. Turn handle counterclockwise to raise stabilizer.	
3. Manual trailer jack handle (wheeled unit only)	Turn handle clockwise to lower front of trailer. Turn handle counterclockwise to raise front of trailer.	

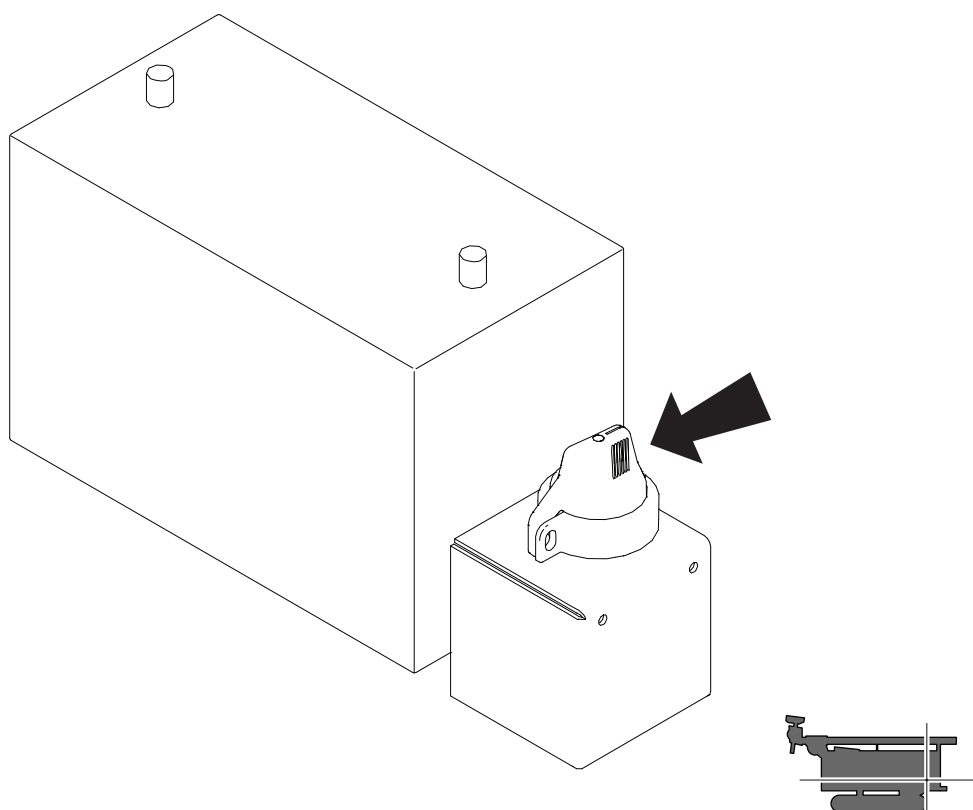
Auxiliary Work Light



j64om068w.eps

Item	Description	Notes
1. Auxiliary work light switch	To turn auxiliary work light on, press top. To turn auxiliary work light off, press bottom.	
2. Auxiliary work light outlet	Provides power for auxiliary work light.	See “Auxiliary Work Light” on page 90.

Battery Disconnect



j64om013w.eps

Item	Description	Notes
Battery disconnect switch	To connect, move right. To disconnect, move left.	NOTICE: <ul style="list-style-type: none">Do not operate battery disconnect switch with engine running.To avoid equipment damage, wait two minutes after turning engine off before disconnecting battery.

Prepare

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- Check Supplies 60
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Gather Information

A successful job begins before the pull. The first step in planning is reviewing information already available about the job and jobsite.

Review Job Plan

Review blueprints or other plans and make sure you have taken enlargement during pullback into account. Check for information about existing or planned structures, elevations, or proposed work that may be taking place at the same time.

Notify One-Call Services

Mark proposed path with white paint and have underground utilities located before working.

- In the US or Canada, call 811 (US) or 888-258-0808 (US and Canada). Also contact any local utilities that do not participate in the One-Call service.
- In countries that do not have a One-Call service, contact all local utility companies to have underground utilities located.

Examine Pullback Material

Ask for a sample of the new product material you will be pulling back. Check its weight and stiffness. Contact the manufacturer for bend radius information. Check that you have appropriate pullback devices.

Arrange for Traffic Control

If working near a road or other traffic area, contact local authorities about safety procedures and regulations.

Plan for Emergency Services

Have the telephone numbers for local emergency and medical facilities on hand. Check that you will have access to a telephone.

Inspect Site

Identify Hazards

Inspect jobsite before transporting equipment. Check for the following:

- overall grade or slope
- changes in elevation such as hills or open trenches
- obstacles such as buildings, railroad crossings, or streams
- signs of utilities
 - “buried utility” notices
 - utility facilities without overhead lines
 - gas or water meters
 - junction boxes
 - drop boxes
 - light poles
 - manhole covers
 - sunken ground
- traffic
- access
- soil type and condition
- depths of existing pipes

Have an experienced locating equipment operator sweep area within 20' (6 m) to each side of burst path to verify previously marked line and cable locations. Mark location of all buried utilities and obstructions.

Select Installation and Bursting Pit Locations

Consider the following when selecting pit locations:

Slope

Unit should be parked on a level site. Consider how slope will affect unit setup and operation. Assess the risks on each slope to determine if factors affecting risks create an unsafe condition for pipe bursting.

Traffic

Vehicle and pedestrian traffic must be a safe distance from pulling equipment. Allow at least 10' (3 m) buffer zone around equipment.

Space

Check that starting and ending points allow enough space for installation and bursting pits. See "Dig Bursting Pit" on page 59.

Check that installation area has enough space for product to be installed.

Check that there is enough space to work.

Access

Consider shade, wind, fumes, and other site features.

Classify Jobsite


WARNING

Jobsite hazards could cause death or serious injury. Use correct equipment and work methods. Use and maintain proper safety equipment. 274-050; 274-724 (2P)

To help avoid injury:

- Wear personal protective equipment including hard hat, safety eye wear, and hearing protection.
- Do not wear jewelry or loose clothing.
- Mark proposed path with white paint and have underground utilities located before working.
- Comply with all utility notification regulations before digging or winching.
- Verify location of previously marked underground hazards.
- Mark jobsite clearly and keep spectators away.

Remember, jobsite is classified by hazards in place -- not by line being installed.

Select a Classification

Jobsites are classified according to underground hazards present.

If working . . .	then classify jobsite as . . .
within 10' (3 m) of a buried electric line	electric
within 10' (3 m) of a natural gas line	natural gas
in concrete, sand, or granite which is capable of producing crystalline silica (quartz) dust	crystalline silica (quartz) dust
within 10' (3 m) of any other hazard	other

NOTICE: If you have any doubt about jobsite classification, or if jobsite might contain unmarked hazards, take steps outlined previously to identify hazards and classify jobsite before working.

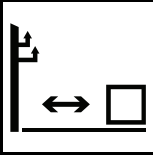

HG2200/HG2200AT Operator's Manual

Classify Jobsite

Apply Precautions

Once classified, precautions appropriate for jobsite must be taken. Follow U.S. Department of Labor regulations on excavating and trenching (Part 1926, Subpart P) and other similar regulations.

Electric Jobsite Precautions





⚠ DANGER Electric shock will cause death or serious injury. Stay away. 274-049

Use one or both of these methods.

- Expose line by careful hand digging or soft excavation.
- Have service shut down while work is in progress. Have electric company test lines before returning them to service.

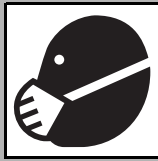
Natural Gas Jobsite Precautions



⚠ WARNING Fire or explosion possible. Fumes could ignite and cause burns. No smoking, no flame, no spark. 275-419 (2P)

Position equipment upwind from gas lines and use one or both of these methods.

- Expose lines by careful hand digging or soft excavation.
- Have gas shut off while work is in progress. Have gas company test lines before returning them to service.

Crystalline Silica (Quartz) Dust Precautions**CAUTION**

Breathing crystalline silica dust may cause lung disease. Cutting, drilling, or working materials such as concrete, sand, or rock containing quartz may result in exposure to silica dust. Use dust control methods or appropriate breathing protection when exposed to silica dust.

To help avoid injury:

- Use water spray or other means to control dust.
- Refer to U.S. Department of Labor Occupational Safety and Health Administration guidelines to learn more about appropriate breathing protection and permissible exposure limits.

Crystalline silica dust is a naturally occurring substance found in soil, sand, concrete, granite, and quartz. Breathing silica dust particles while cutting, drilling, or working materials may cause lung disease or cancer. To reduce exposure:

- Use water spray or other means to control dust.
- Refer to U.S. Department of Labor Occupational Safety and Health Administration guidelines to learn more about appropriate breathing protection and permissible exposure limits.

Other Jobsite Precautions

You may need to use different methods to safely avoid other underground hazards. Talk with those knowledgeable about hazards present at each site to determine which precautions should be taken or if job should be attempted.

Plan Pull Path

Plan the pull path, from entry to end, before job begins. Locate the entire route of the pipe to be replaced to ensure a straight path. Expose all crossing or parallel utilities in accordance with local regulations.

Prepare Jobsite



⚠ WARNING

Jobsite hazards could cause death or serious injury. Use correct equipment and work methods. Use and maintain proper safety equipment. 274-050; 274-724 (2P), 700-133

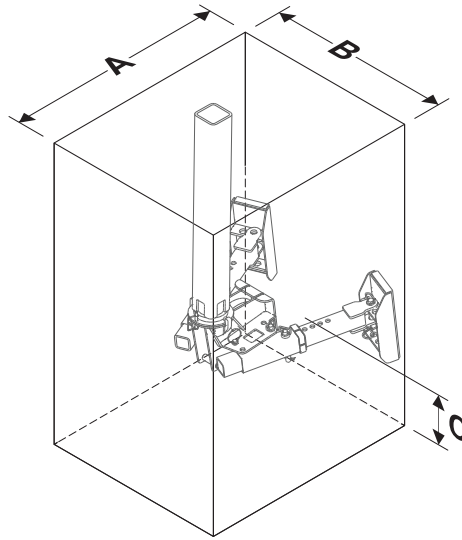
To help avoid injury:

- If jobsite classification is in question or the possibility of unmarked electric utilities exists, classify jobsite as electric.
- Cutting high voltage cable can cause electrocution. Expose lines by hand before digging.
- All vegetation near operator's station must be removed. Contact with trees, shrubs, or weeds during electrical strike could result in electrocution.

Mark Pull Path

Mark your planned pull path with white flags or paint.

Dig Bursting Pit



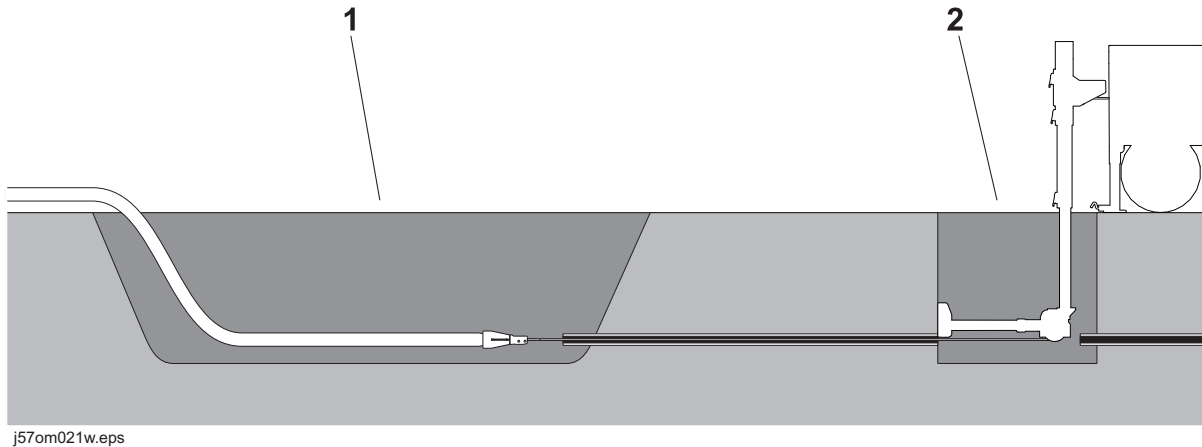
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Minimum Bursting Pit	
Length (A)	Width (B)
U.S. (metric)	U.S. (metric)
37.1" (94.2 cm)	40.0" (101.6 cm)
Centerline of cable is 0.44" (11.2 mm) above the bottom plate (C).	

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Check Supplies and Prepare Equipment

Requirements



Installation Pit (1)

- Pit dimensions depend on pipe depth and product being installed.
- Must be in line with existing pipe.
- Sloped back end aids new product installation. Consider new product bend radius.

Bursting Pit (2)

- Must accommodate the length and angle of the downhole unit.

NOTICE: Follow U.S. Department of Labor regulations on excavating and trenching (Part 1926, Subpart P) and other similar regulations.

Check Supplies and Prepare Equipment

Check Supplies

- marking flags or paint
- fuel
- hydraulic oil
- keys
- cutting heads, clevis
- barrier cones and tape
- Wire cable (See "Wire Cable" on page 92.)
- personal protective equipment, such as hard hat and safety glasses
- notepad and pencil

Prepare Equipment

Install Wire Cable




WARNING

Moving parts can crush and cut hand or foot. Stay away.

To help avoid injury: Install wire cable with engine off.

1. Support shipping reel so it turns freely as it unwinds the wire cable to prevent kinking.
2. Securely wrap end of wire cable to prevent fraying.

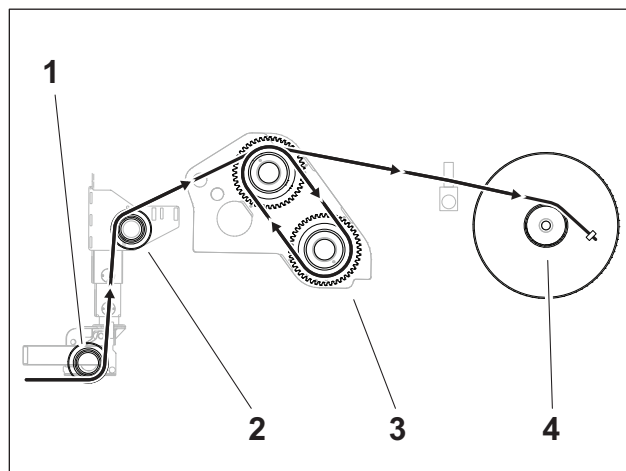
IMPORTANT: If wire rope is not installed correctly the brake will not hold the load.

3. Remove bolts securing shield to expose the bull wheels (3).

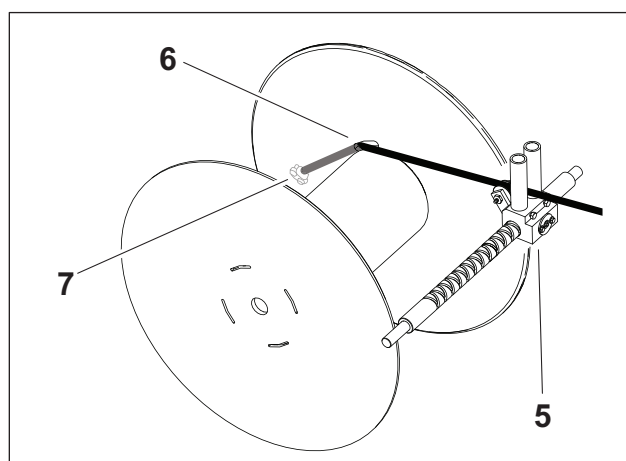
IMPORTANT: It may be necessary to remove the shields on both sides of the capstans while installing cable.

4. Route wire cable through sheaves (1, 2).
5. Loop wire cable around bottom bull wheel (3) and over top bull wheel.
6. Feed cable down and around the bottom bull wheel and back up over the top (3).
7. Continue this process until all slots on bull wheels have been used.
8. Thread end of cable through the level wind system (5) and secure it to the take-up drum (4) using the cable clamp supplied.
9. Wrap one complete wrap of cable onto the drum.
10. Set the start position of the second wrap on drum between 12:00 (6) and 1:00 (7).
11. Install drive chain from drum assembly to level wind assembly with tension set to the bottom side of the sprockets.
12. Hammer over the first wrap to close the gap between the first cable wrap and the drum plate.
13. Wrap the next two to three consecutive wraps of cable and hammer over to close gaps between cables and the drum plate.
14. Load the rest of the cable to the drum assembly.

IMPORTANT: Do not operate winch with less than five full cable wraps on the drum.



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HG2200/HG2200AT Operator's Manual

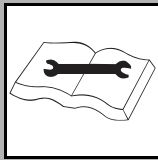
Check Supplies and Prepare Equipment

Fluid Levels

- fuel
- hydraulic fluid
- engine coolant
- engine oil

Condition and Function

- all controls



⚠ WARNING

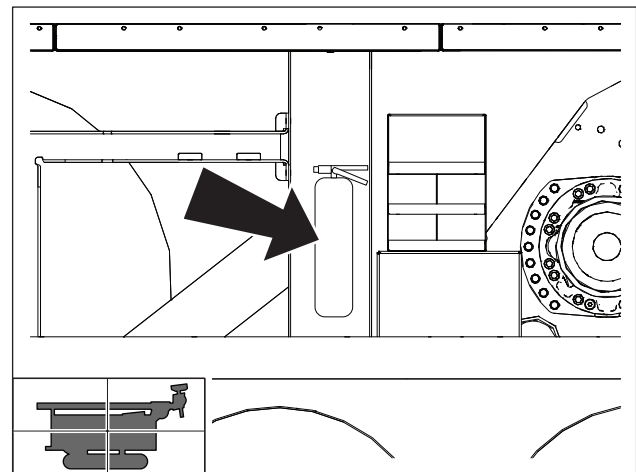
Improper control function could cause death or serious injury. If control does not work as described in instructions, stop machine and have it serviced.

- filters
- couplers
- tracks or tires
- hoses and valves

Assemble Accessories

Fire Extinguisher

If required, mount a fire extinguisher near the power unit but away from possible points of ignition where shown. The fire extinguisher should always be classified for both oil and electric fires. It should meet legal and regulatory requirements.



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Drive

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Start Unit 64

Steer Unit 65

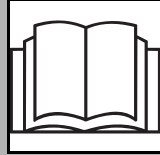
- Tips to Reduce Track Wear 65
- Safe Slope Operation 66

Shut Down Unit 66



Start Unit

Before operating machine, read engine manufacturer's starting and operating instructions.



WARNING Misuse of machine can cause death or serious injury. Read and understand operator's manual and all other safety instructions before use.

To help avoid injury:

- Wear hard hat, safety glasses, and other protective equipment required by job. Do not wear jewelry or loose clothing that can catch on controls.
- Clear the area around the machine of all bystanders.

1. Ensure winch control lever is in neutral.
2. Ensure mode selection switch is in neutral.
3. Set throttle at 1/8 to 1/4 throttle.
4. Turn ignition switch to the run position (key on, engine off). Cold start indicator will light if necessary.



WARNING Fire or explosion possible. Do not use starter fluid.

5. When cold start wait indicator turns off, turn ignition switch clockwise to start machine.

NOTICE: If engine turns but not start within 20 seconds, allow starter to cool one minute before trying to start again.

6. Run engine at half throttle or less for five minutes before operating machine. Ensure all controls function properly.

Steer Unit

IMPORTANT: These steer instructions cover the tracked unit only.

To steer winch unit, follow instructions for type of steering desired. See page 30 for more information.

To steer while moving forward, move one control slightly more than the other to turn in the desired direction. Winch unit will gradually turn to left or right.

To steer while moving backward, move one control slightly more than the other to turn in the desired direction. Winch unit will gradually turn to left or right.

For tight steering at low speed, one control to reverse and one control to forward to turn in the desired direction. Tracks will counter-rotate and turn winch unit in a tight circle.

Tips to Reduce Track Wear

Rubber tracks are best suited at soil-based job sites with minimal rock and debris. Sharp objects such as gravel, steel shards, and broken concrete will damage rubber tracks and undercarriage components. Excessive operation on concrete or asphalt will shorten track life. When storing your machine, keep tracks away from rain and direct sunlight.

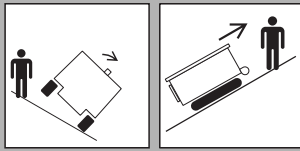
Wash tracks daily to remove foreign objects and abrasive soil from sprockets and idler rollers. Drive slowly and make wide turns when possible. Regularly check undercarriage components (sprocket, rollers, idler) for wear and damage. Maintain proper track tension. See "Check Track Tension and Condition (Tracked Unit)" on page 112.

To prevent premature wear, avoid the following:

- Spinning tracks under heavy load.
- Turning on sharp objects such as stones, stumps and debris.
- Quick turns or "spin" turns on asphalt or concrete.
- Driving over curbs, ledges, and sharp objects.
- Driving with sidewall edges pressed against hard walls, curbs or other objects.
- Driving on slopes.
- Operating on corrosive materials such as salt or fertilizer. Wash immediately.



Safe Slope Operation



WARNING Tipover possible. Machine can tip over and crush you.

To help avoid injury:

- Always operate from the uphill side of the unit.
- Drive cautiously at all times.
- Do not drive across slopes.
- Never jerk control levers. Use a steady even motion.
- Do not park machine on slope without returning all controls to neutral position, shutting down machine, and blocking tracks.

Operating safely on a slope depends upon many factors including:

- Distribution of machine weight (weight of machine may change due to configuration)
- Even or rough ground conditions
- Potential for ground giving way causing unplanned tilt forward, reverse or sideways
- Nearness of ditches, ruts, stumps or other obstructions and sudden changes in slope
- Speed
- Turning
- Operator skill

Shut Down Unit

1. Return winch controls switches to neutral.
2. Reduce engine speed to idle.
3. Lower rear stabilizers to the ground.
4. Turn ignition key to off position.
5. Lower manual stabilizer/manual trailer jack if equipped.
6. For maintenance or long-term storage, turn battery disconnect switch to the OFF position.

NOTICE: To avoid equipment damage, wait two minutes after turning engine off before disconnecting battery.

Transport

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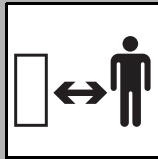
- Points 68
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Haul 70

- Wheeled Unit. 69
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Retrieve Tracked Unit 73

Lift



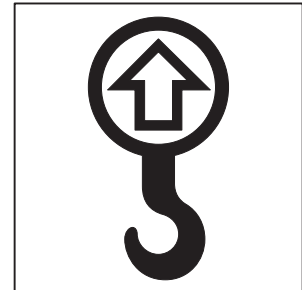
Crushing weight could cause death or serious injury. Stay away.

To help avoid injury:

- Use only appropriate lifting devices and lifting equipment.
- Use only approved lifting points.
- Stay away from lifted load.

Points

Lifting points are identified by lifting decals. Lifting at other points is unsafe and can damage machinery.

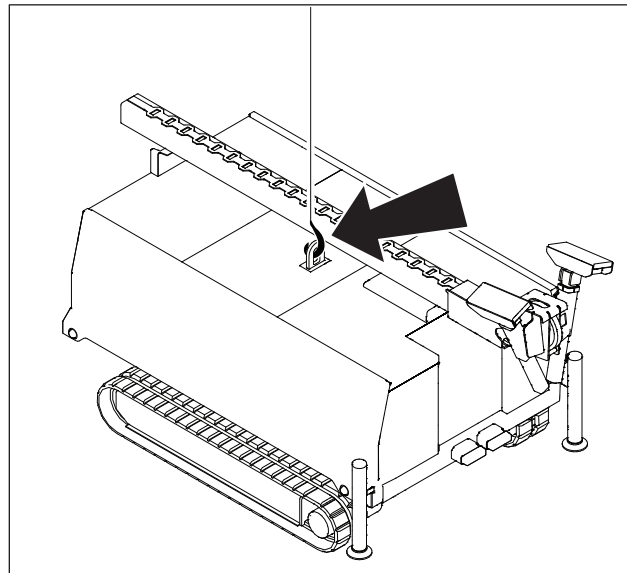


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Procedure

Tracked Unit

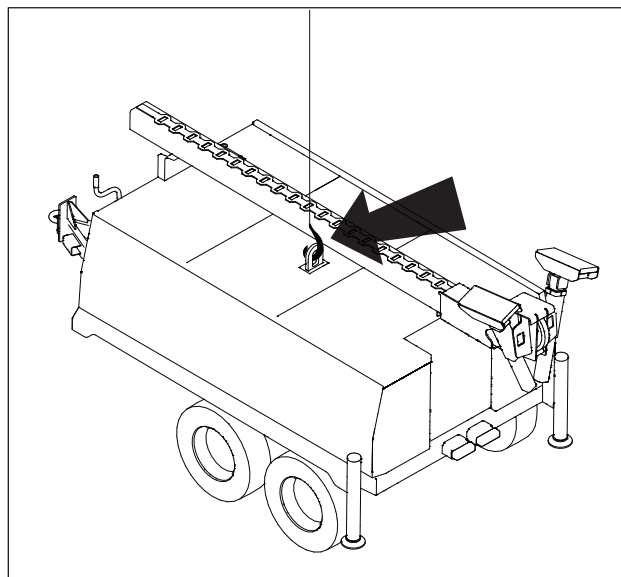
Use equipment capable of supporting the unit's size and weight. See "Specifications" on page 129 or measure and weigh equipment before lifting.



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Wheeled Unit

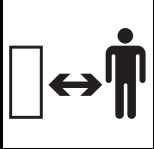

Use equipment capable of supporting the unit's size and weight. See "Specifications" on page 129 or measure and weigh equipment before lifting.



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Haul

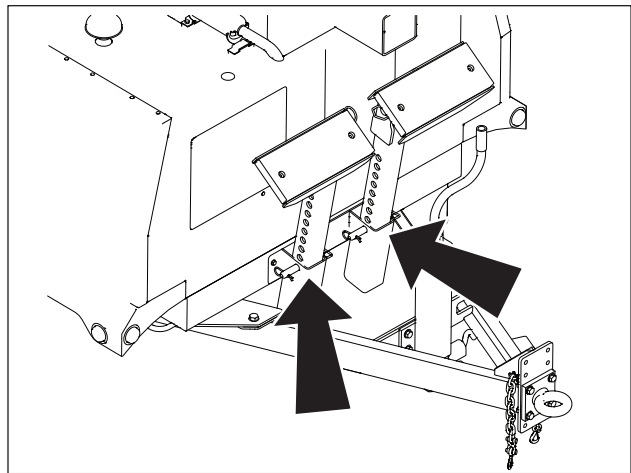
Wheeled Unit



WARNING Crushing weight could cause death or serious injury. Stay away.

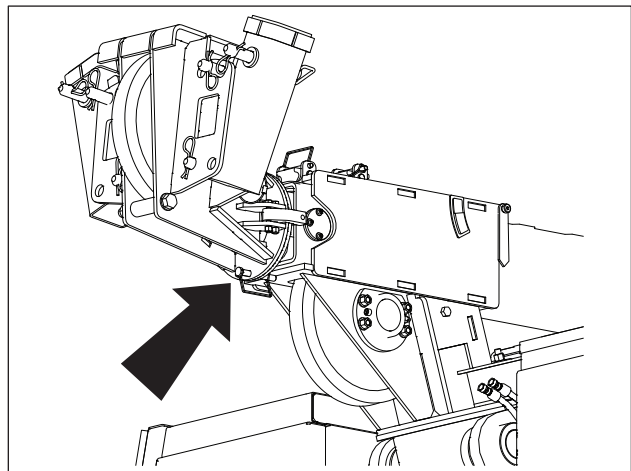
Prepare Unit

1. Remove legs from downhole unit. Using pins, secure in storage location as shown. T



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2. Turn downhole unit to the upright position and secure with pin (shown).



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Inspect Unit

- Check hitch for wear and cracks. Lubricate if needed.
- Check battery for 12 volt charge.
- Inspect lights for cleanliness and correct operation. Inspect reflectors and replace if needed.
- Check tire pressure. Check lug nut torque with a torque wrench.

Hitch Unit

1. Back tow vehicle to winch unit.
2. Put manual transmission into first or reverse gear or automatic transmission into park. Turn off ignition. Set parking brake.
3. Lower hitch over the ball of the tow vehicle.
4. Connect safety chains to tow vehicle chain keepers (cross-shaped slots on bumper of tow vehicle). Attach left chain to right side of tow vehicle and vice versa to cradle hitch. Connect breakaway switch cable to tow vehicle. Do not connect to hitch or hitch ball.
5. Attach breakaway cable to the towing vehicle bumper or frame.
6. Plug trailer electrical connector into tow vehicle connector.
7. Use jack crank to raise jack base and stow.
8. Remove wheel blocks.

IMPORTANT: If your towing vehicle is equipped with an electric brake controller, it must be capable of automatic and manual brake application. Do not use a brake controller that is a manually operated controller only. If your towing vehicle is equipped with a manually operated controller only, remove it and install one that can be applied both automatically and manually.

Unhitch Unit

1. Stop tow vehicle and trailer on level ground.
2. Put manual transmission into first or reverse gear or automatic transmission into park. Turn off ignition. Set parking brake.
3. Block trailer wheels.
4. To unhitch trailer from tow vehicle, reverse "Hitch Unit" steps.

Tracked Unit

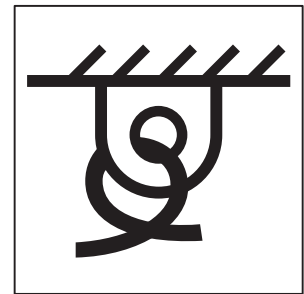
Load Unit

1. Stow mast in horizontal position.
2. Start unit. See "Start Unit" on page 64.
3. Raise stabilizers.
4. Move winch to rear of trailer and align with ramps.
5. Ensure engine is at full throttle and slowly drive unit onto trailer.
6. Lower stabilizers to trailer floor.
7. Stop engine when unit is safely positioned on trailer bed.
8. Attach tiedowns to winch where indicated on "Procedure" on page 72.

Tie Down Unit

Points

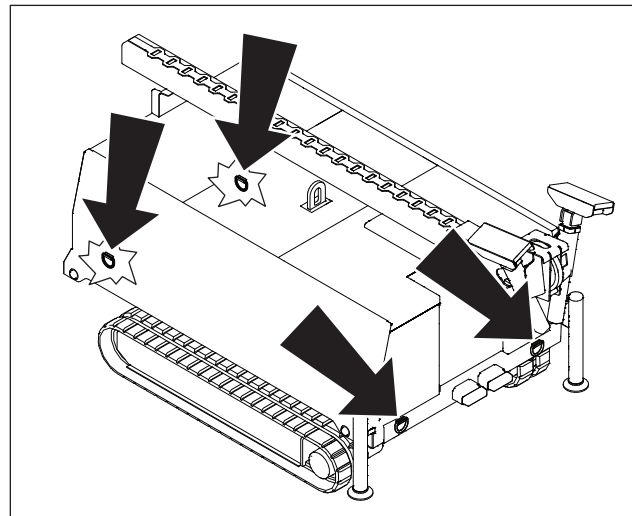
Tiedown points are identified by tiedown decals. Securing to trailer at other points can damage machinery.



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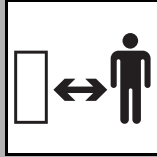
Procedure

To tie down unit, use D-rings shown.



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Unload Unit



WARNING Crushing weight could cause death or serious injury. Use proper procedures and equipment or stay away.

To help avoid injury:

- Load and unload trailer on level ground.
- Ensure trailer wheels are blocked.
- Attach trailer to vehicle before loading or unloading.

1. Lower ramps.
2. Remove tiedowns.
3. Start unit. See "Start Unit" on page 64.
4. Raise stabilizers.
5. Ensure engine is at full throttle and slowly back unit down trailer or ramps.

Retrieve Tracked Unit

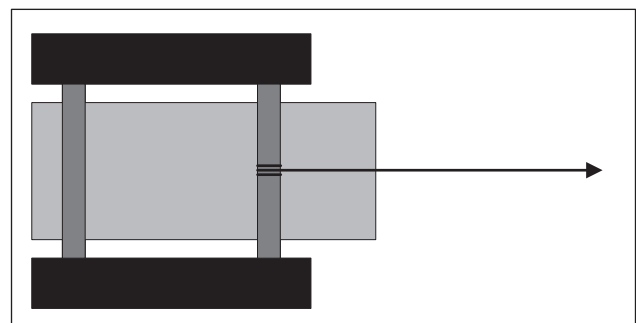
Under normal conditions, winch should not be towed. If unit breaks down and retrieval is necessary:

- tow for short distances at less than 1 mph (1.6 kph),
- use maximum towing force of 1.5 times unit weight,
- use towing chains appropriately rated for maximum towing force,
- attach chains to indicated tow points facing towing vehicle.

IMPORTANT: When hydraulics are disengaged, unit has brakes.

To attach chains to tow points, determine which points are facing towing vehicle.

Loop chains around crossmember (either front or back) on winch frame.



Towing.eps

Burst Pipe

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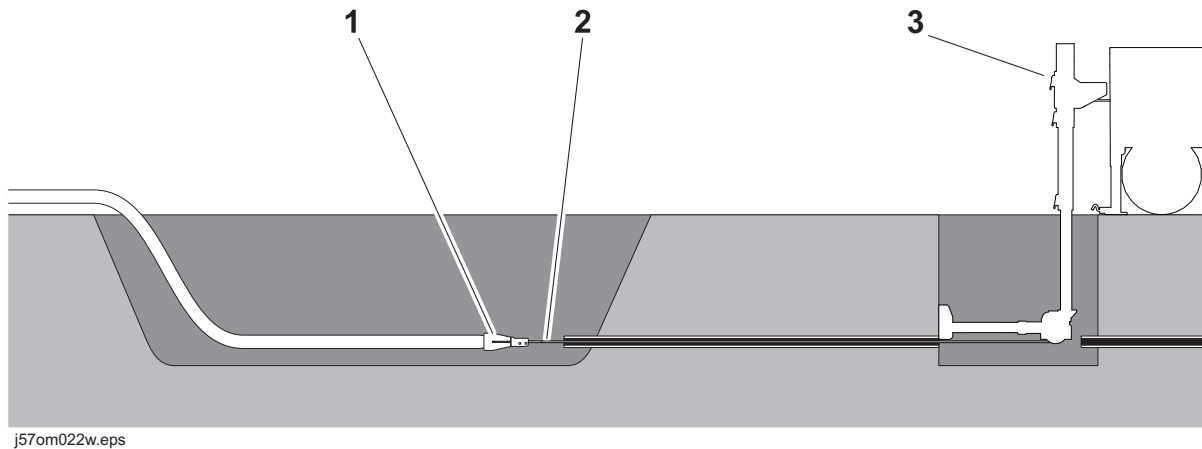
Connect Tooling Head 81

- Same Path™ Pipe Slitting Technology81
- Burst Head82

Pull New Product 83

Finish Installation 85

Set Up and Configure

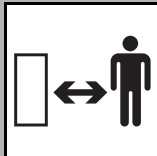


- 1. Tooling head
- 2. Wire cable
- 3. Winch

NOTICE: Follow U.S. Department of Labor regulations on excavating and trenching (Part 1926, Subpart P) and other similar regulations.

1. Position winch unit outside of bursting pit with winch bumper approximately 4-6 in (100-150 mm) inside the edge of bursting pit or manhole.
2. Lower manual stabilizer/manual trailer jack if equipped and disconnect from towing vehicle.
3. Lower rear stabilizers in the desired location.

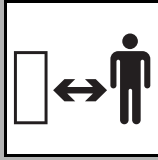
NOTICE: If stabilizers are lowered on unstable ground, place steel road plate under stabilizers.



WARNING Crushing weight could cause death or serious injury. Use proper procedures and equipment or stay away.

To help avoid injury: Ensure no personnel are in the pit as equipment is lowered.

Set Up Mast



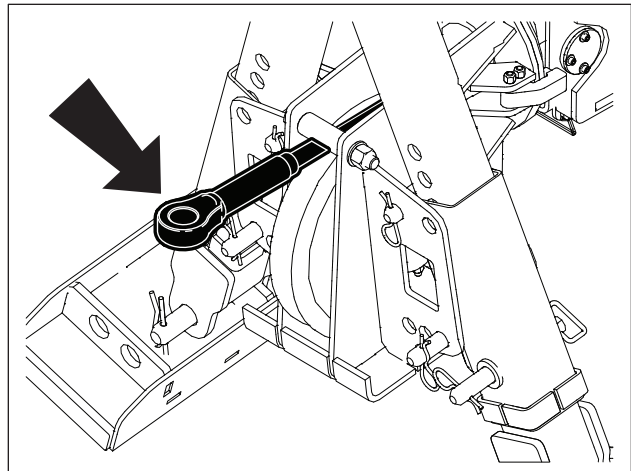
WARNING

Moving parts can crush and cut hand or foot. Stay away.

To help avoid injury:

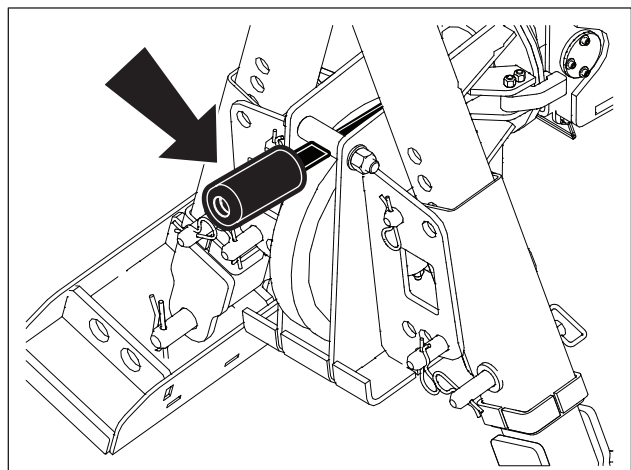
- Keep hands and fingers clear of the mast.
- Ensure no personnel are in the pit as equipment is lowered.
- Keep winch doors closed during operation.

1. Remove mast from storage position.
2. Ensure cable has eye (shown).



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3. If cable does not have eye, use a mast stop (shown).



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Set Up and Configure

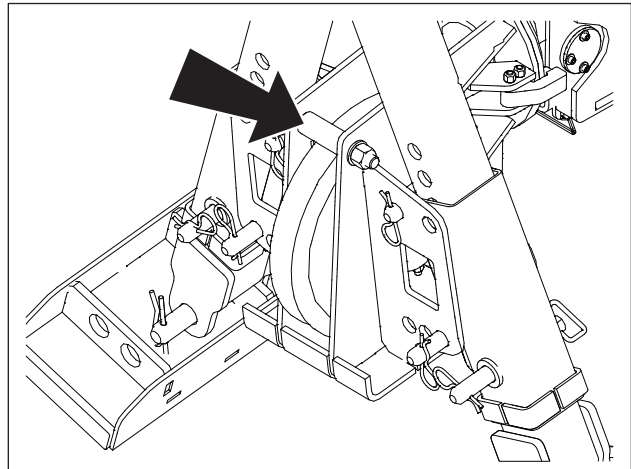
4. Ensure bushing (shown) is in place.
5. Start unit. See "Start Unit" on page 64.
6. Move mode selection switch to winch position.
7. Move mast control switch to position mast over bursting pit or manhole.

IMPORTANT: Warning will sound to alert personnel that the mast hydraulic circuit is engaged

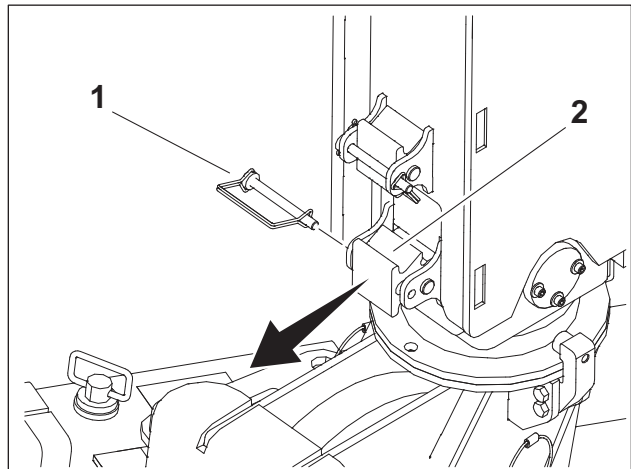
8. Adjust pull force control to achieve desired mast lift speed.
9. Use winch control lever to move mast up or down to open latch (2).
10. Use winch control lever to lower the mast to the desired depth. Cable speed control may be used to control how quickly the mast is lowered.
11. When mast reaches desired depth, lock latch into the mast and secure with pin (1).

12. Indicator (shown) will align with green side of decal if mast position is acceptable.

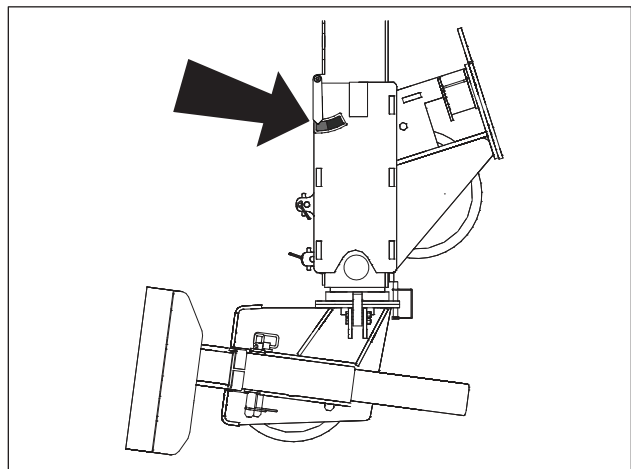
NOTICE: If mast is operated with indicator aligned with red side of decal, damage to the winch will occur.



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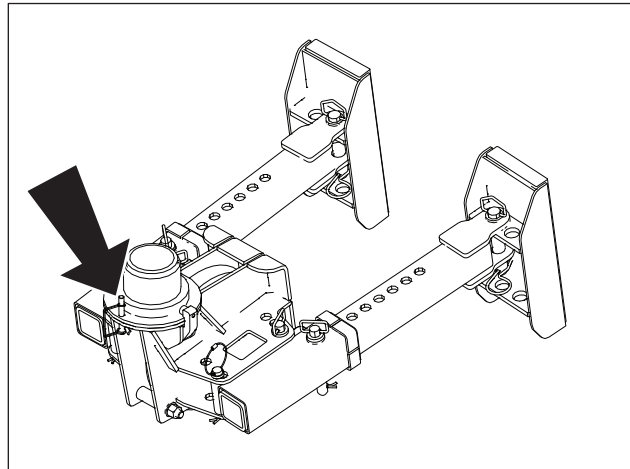
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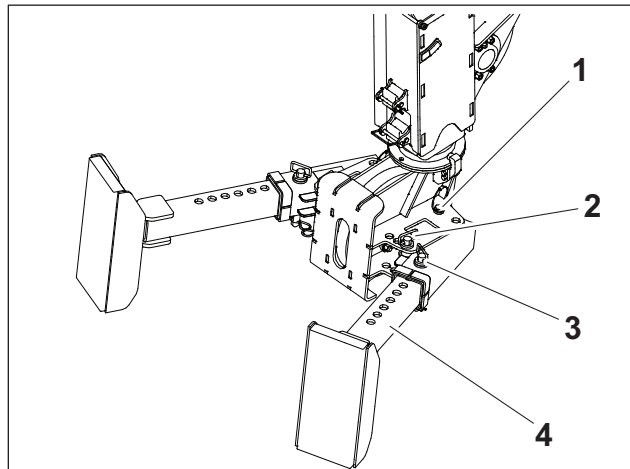
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Position Downhole Unit Legs

1. Ensure there is slack in cable before positioning downhole unit.
2. Use stabilizers to fine tune the downhole unit up or down from the centerline of the existing utility.
3. Remove pin (shown) to pivot downhole assembly to desired position. Reinsert pin to secure in place.
4. Pivot legs to desired position and secure with pins (1, 2).
5. Remove pins (3) to extend legs to face wall.
6. Reinsert pins to lock legs into the extended position.
7. Move the mode selection switch to the neutral position.

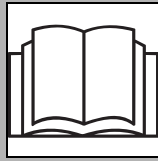


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Push Cable



WARNING

Misuse of machine can cause death or serious injury.
Read and understand operator's manual and all other safety instructions before use.

To help avoid injury:

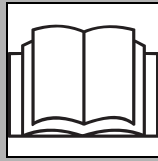
- Maintain 2-way communication between bursting pit and all other personnel.
- Make sure all personnel are clear of moving parts.
- Do not attempt to use any part of body to assist wire cable entering/exiting bursting unit.
- Keep winch doors closed during operation.

1. Start unit. See "Start Unit" on page 64.
2. Use control panel or remote control to push cable into existing utility.

IMPORTANT:

- It is necessary to apply tension to winch cable to push cable.
- It is not necessary to stop winch when the cable is not being pulled. When cable is relaxed the cable will stop pushing out even though the capstans continue to turn.

Connect Tooling Head

**WARNING**

Misuse of machine can cause death or serious injury. Read and understand operator's manual and all other safety instructions before use.

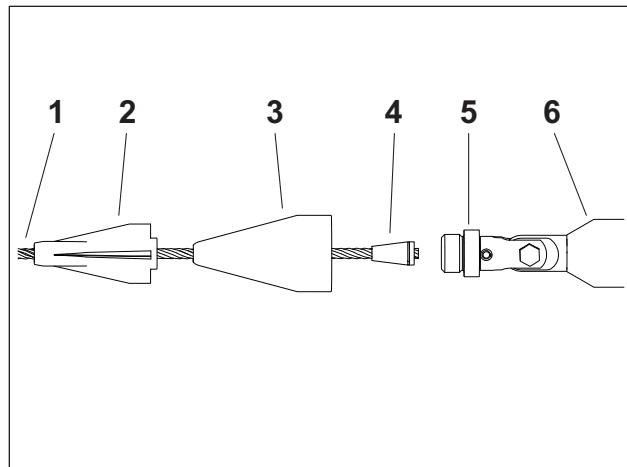
To help avoid injury:

- Maintain 2-way communication between bursting pit and all other personnel.
- Make sure all personnel are clear of moving parts.
- Do not attempt to use any part of body to assist wire cable entering/exiting bursting unit.
- Keep winch doors closed during operation.

IMPORTANT: See "Same Path™ Pipe Slitting Technology" on page 76 for more information.

Same Path™ Pipe Slitting Technology

1. Shut down unit. See "Shut Down Unit" on page 66.
2. Thread wire cable (1) through blade set (2) and expander (3).
3. Slide jaws (4) onto wire cable and allow 1/4" (6.35 mm) of wire cable to extend past the jaws.
4. Pull jaws into the expander.
5. Attach swivel (5) to the wire cable.
6. Tighten swivel in the expander.
7. Attach swivel to pipe puller (6).



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HG2200/HG2200AT Operator's Manual

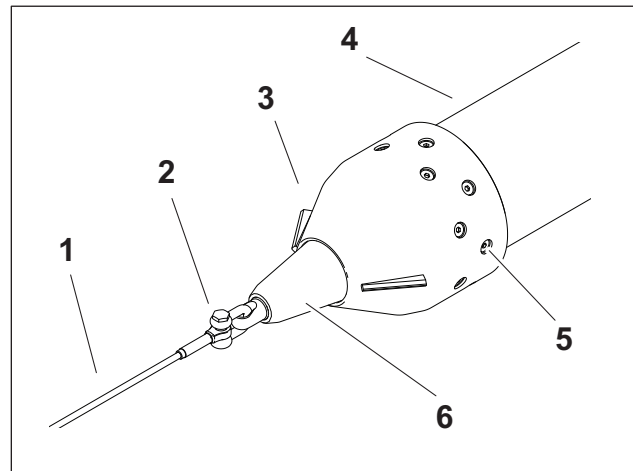
Connect Tooling Head

Burst Head

1. Pull wire cable (1) through existing utility leaving the swaged button-end of the cable at the installation pit.
2. Connect the burst head (3) to the product (4) using burst head bolts (5).

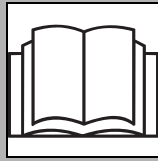
NOTICE: Ensure the length of the new pipe is long enough to replace the length of pipe being replaced.

3. Insert pneumatic tool (6) into product pipe and burst head assembly.
4. Connect cable (1) to shackle (2) that has been inserted through nose of pneumatic tool.



j57om074w.eps

Pull New Product

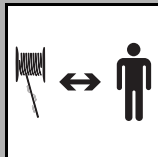


⚠ WARNING

Misuse of machine can cause death or serious injury. Read and understand operator's manual and all other safety instructions before use.

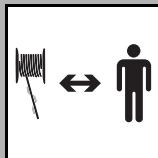
To help avoid injury:

- Maintain 2-way communication between bursting pit and all other personnel.
- Make sure all personnel are clear of moving parts.
- Keep personnel at the proper operating area. See "Operating Area" on page 7.
- Keep hands and feet away.
- Do not attempt to use any part of body to assist wire cable entering/exiting bursting unit.
- Use winch for pipe bursting only.
- Keep winch doors closed during operation.



⚠ DANGER

Cable may break while pulling and strike you. Serious injury or death may occur. Stay away.



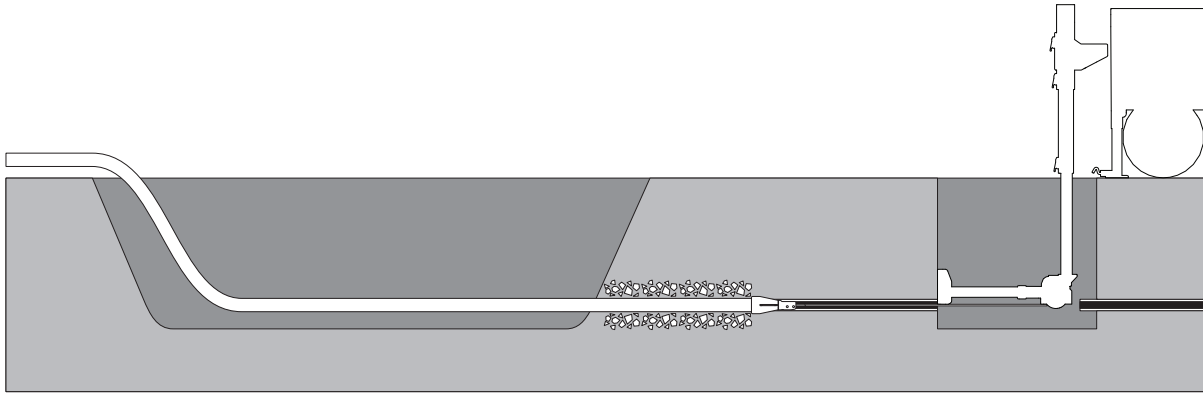
⚠ DANGER

Sudden cable movement can cause serious injury or death. Stay clear.

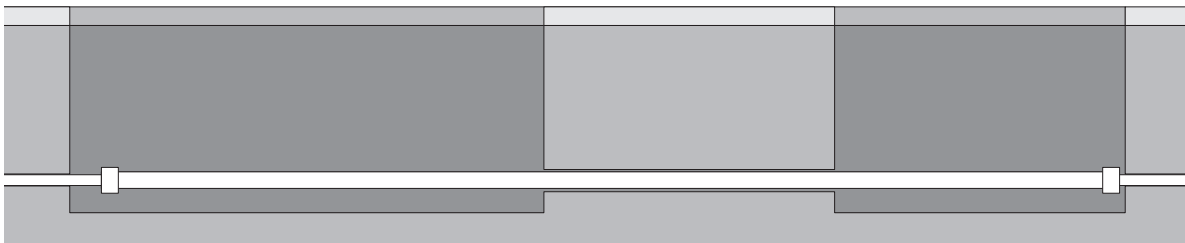
HG2200/HG2200AT Operator's Manual

Pull New Product

1. Ensure winch control lever is in neutral.
2. Start unit. See "Start Unit" on page 64.
3. Set mode selection switch to the winch position.
4. Move winch control lever to pull cable in.
5. Pull in a small amount of cable and check cable wrap on drum.
6. Pull in cable at approximately 1500 lb. (608 kg) of pull.



7. Set pressure to approximately 1000 psi (69 bar) and start to winch the tooling and pipe assembly into the installation pit aligning the tooling string with the mount of the exiting pipe.
8. While winching the new pipe into the entrance pit, inspect the legs, feet and position of the mast.
9. When the tooling string is in the old line, start the winch.
10. Once winch is started, pressure can be increased to the desired tonnage.
11. Continue to pull wire cable into pit until all new product is installed.
12. Connect both ends of new product to existing pipe to complete job.



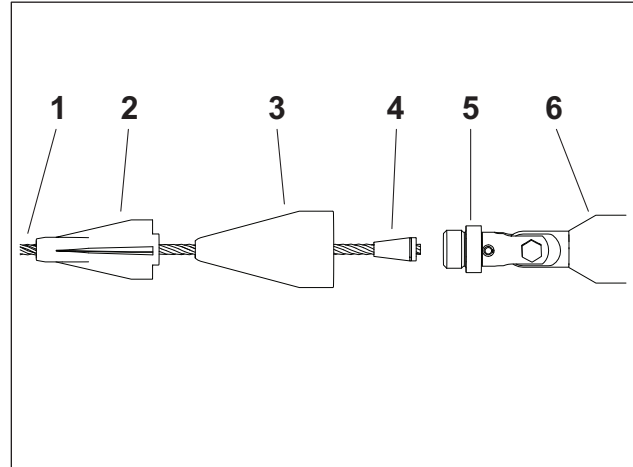
j19om012h.eps

Finish Installation

Once the installation is finished, remove the tooling head.

Same Path™ Pipe Slitting Technology

1. Shut down unit. See “Shut Down Unit” on page 66.
2. Remove pipe puller from swivel.
3. Remove wire cable from jaws and pull out of the blade set and expander.



j57om058w.eps

Burst Head

1. Shut down unit. See “Shut Down Unit” on page 66.
2. Remove the burst head and disconnect the bursting head from the pipe.
3. Remove wire cable from shackle.

Systems and Equipment

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Track Tethered Remote Control 88

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Wire Cable 92

- Maintaining Wire Cable 92

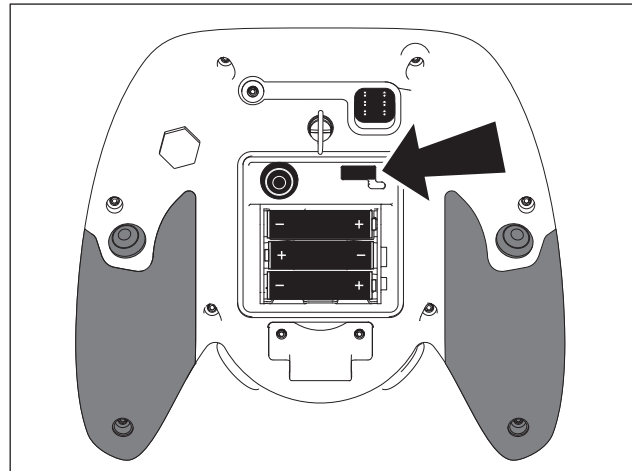
Electric Strike System (Optional) 93

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- Assemble Grid Mat 94
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- Troubleshoot Strike System 97
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Wireless Remote Controller

Before Each Use

1. Check transmitter unit battery status.
Replace batteries if necessary. See page 127.
2. Ensure USB key (shown) is installed. This key is a lockout feature to prevent unauthorized use.



Remote_USB.eps

Operation



CAUTION

270-6037

Equipment can be operated by remote control. Stay away.

To help avoid injury:

- Keep unit in sight at all times when using wireless remote controller.
- Keep a safe distance away from unit when operating wireless remote controller.
- Ensure bystanders are not near the area the unit will be driven.
- Remove strap from around neck when using wireless controller near moving parts. Place wireless controller in storage box after use. Take care not to store with neck strap on top of switches.

EMERGENCY STOP: Press engine stop on wireless remote or machine.

1. Start the remote transmitter by moving the power/start/horn switch up until communication link indicator is steady yellow and then blinks green.
 - Clear wireless remote control light (page 4) will shine when machine is ready to operate.
 - Green wireless remote control light (page 4) will shine when remote is in contact with machine.
2. Ensure wireless remote control enable switch is on. See page 31.
3. Move power/start/horn switch up again with controls in neutral until horn sounds.

IMPORTANT: Wireless controller will shut down after one minute of inactivity. Move power/start/horn switch up to restart.

4. To drive machine, select the desired secondary function. Press one or both operator presence switches and then set throttle and use the joysticks to steer.
5. Shut down the transmitter by moving power/start/horn switch down until LED indicators go off.

Troubleshooting

If unit does not respond as expected when using wireless track drive, turn transmitter off and use alternate track drive controls.

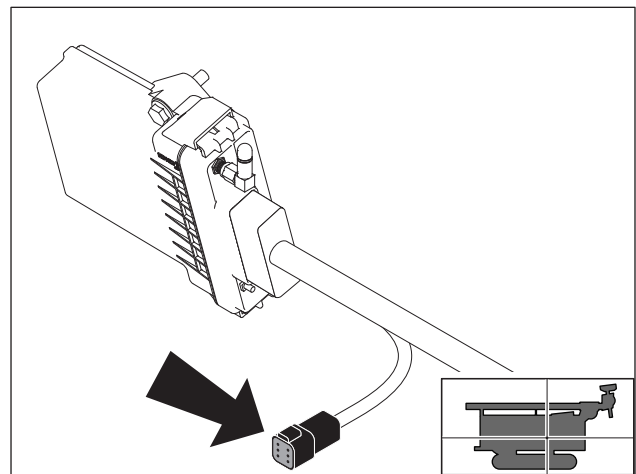
If communication link indicator is blinking yellow, communication between transmitter and receiver has stopped. Move wireless remote closer to machine while maintaining a safe distance. If in an area with interference, try changing the channel (see below).

If communication link indicator is red, communication has been lost. Shut down wireless remote and restart to try to enable communication. If that doesn't work, contact your HammerHead® dealer.

If battery and communication link indicators both display red for several seconds and then the wireless controller shuts off, USB key is not installed.

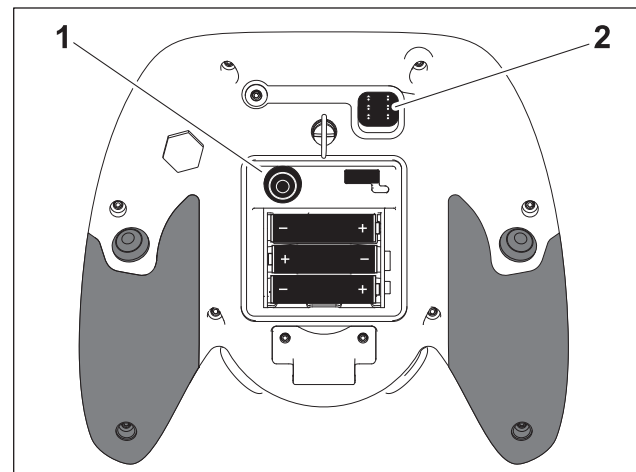
To change channels:

1. Turn machine ignition key on with engine off.
2. Connect harness (shown) to transmitter (2).
3. Ensure battery indicator is solid green.



j64om065w.eps

4. Press the channel switch (1) until communication link indicator begins to blink green/yellow and then release the channel switch.
 - Rapid blinking green indicator signals successful channel connection.
 - Blinking yellow indicator signals unsuccessful channel connection.



Remote_Channel.eps

Track Tethered Remote Control

The track tethered controller should be used if the wireless remote controller is damaged or cannot be used.

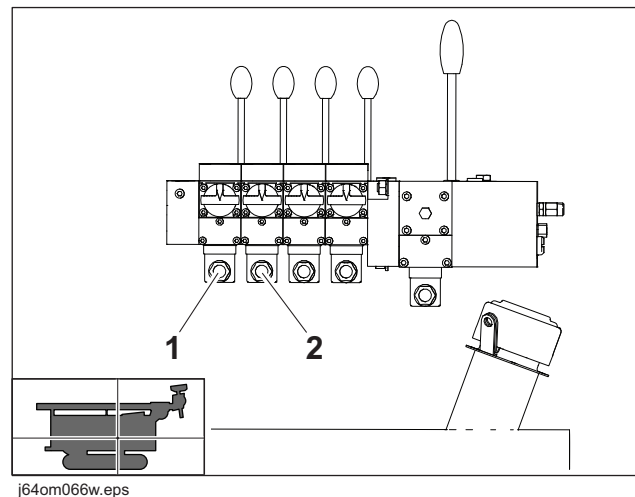
IMPORTANT:

- The track tethered remote control is intended for emergency use only. Do not use for normal operation.
- Connecting the track tethered remote control overrides the wireless remote controller function.

To connect:

1. Remove electrical connections from main control valve (1, 2).
2. Install cable from track tethered remote control labeled "left track" into main control valve (2).
3. Install cable from track tethered remote control labeled "right track" into main control valve (1).
4. Connect red clamp to positive battery terminal.
5. Connect black, ground clamp to machine frame away from battery.

IMPORTANT: Ensure paint is removed and surface area is clean when connecting clamp.

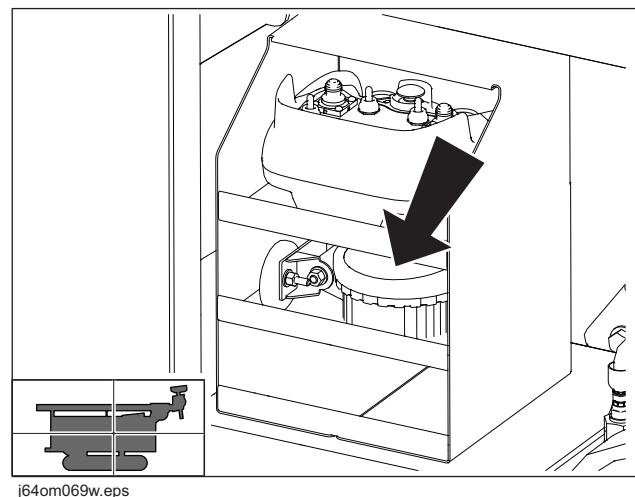


6. Operate tracks using track tethered remote control. See "Track Tethered Remote Control" on page 40.

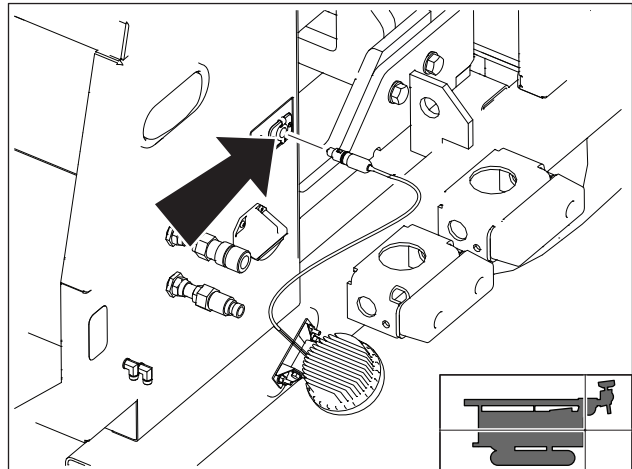
Auxiliary Work Light

The auxiliary work light can be used if additional light is needed at the jobsite. The base is magnetic and enables the light to be moved as needed.

1. Remove light from storage position (shown).



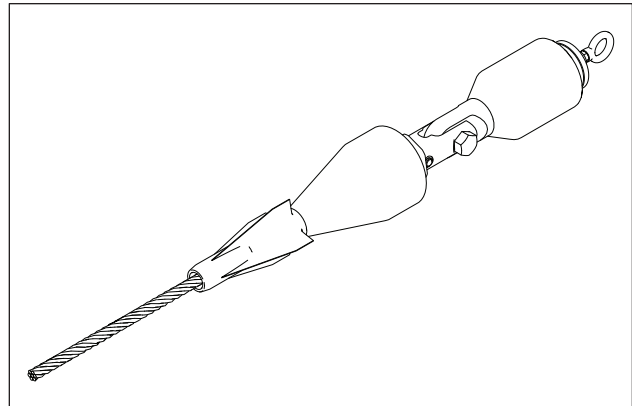
2. Connect light to auxiliary work light outlet and turn auxiliary work light switch to the on position. See "Auxiliary Work Light" on page 90.



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Same Path™ Pipe Slitting Technology

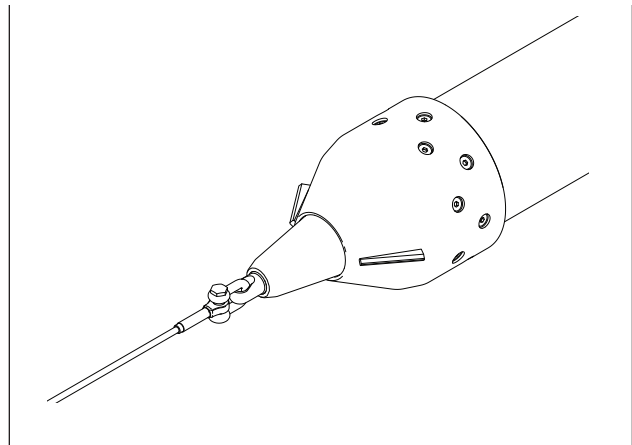
The tooling is used when installing polyethylene and high-density polyethylene pipe.



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Burst Head

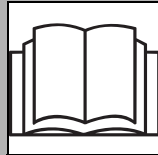
The bursting head is used when installing polyethylene and high-density polyethylene pipe.



Wire Cable

Wire Cable	Length	
cable, 7/8"	2590 feet (789 m)	2500 feet (762 m) usable

Maintaining Wire Cable



⚠ WARNING

Misuse of machine can cause death or serious injury.
Read and understand operator's manual and all other safety instructions before use.

To help avoid injury:

- Replace damaged wire cable immediately. Obvious damage includes permanent bends, flat spots, worn spots, broken wires, frays, rust, and corrosion.
- Inspect button end of the cable before each use.

For maximum wire cable life:

- Install wire cable properly.
- Do not use over-sized wire cable.
- Keep wire cable protected from the elements.
- Keep wire cable from kinking.
- Do not over-stress wire cable.
- Only use wire cable for the specified job.

Electric Strike System (ESID)

Any time you burst pipe in an electric jobsite, electric strike system must be properly set up, tested, and used. You should wear protective boots and protective gloves should be within reach, all meeting the following standards:

- Boots must have high tops and meet the electric hazard protection requirements of ASTM F2413 or ASTM F1117 when tested at 18,000 volts. Tuck legs of pants completely inside boots.
- Gloves must have 17,000 AC maximum use voltage, according to ASTM specification D120.

If working around higher voltage, use gloves and boots with appropriately higher ratings.

NOTICE: The strike system does not prevent electric strikes or detect strikes before they occur. **If alarms are activated, a strike has already occurred** and equipment is electrified.

Read and follow "Prepare Jobsite" on page 58. Review safety procedures before each job.

If an electric strike occurs, immediately contact your local HammerHead® dealer to have the electric strike system tested.

FCC Statement

The Electric Strike System has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, can cause harmful interference to radio communications. Operation of this equipment in a residential area could cause harmful interference which the user will be required to correct at his own expense.

Changes or modifications not expressly approved in writing by The Charles Machine Works, Inc. may void the user's authority to operate this equipment.

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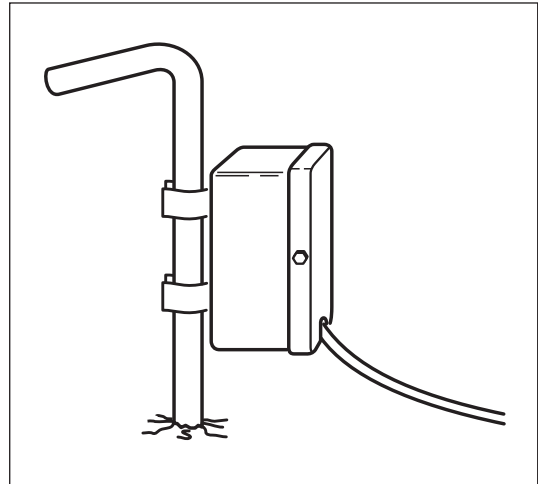
Electric Strike System (ESID)

Assemble Voltage Detector

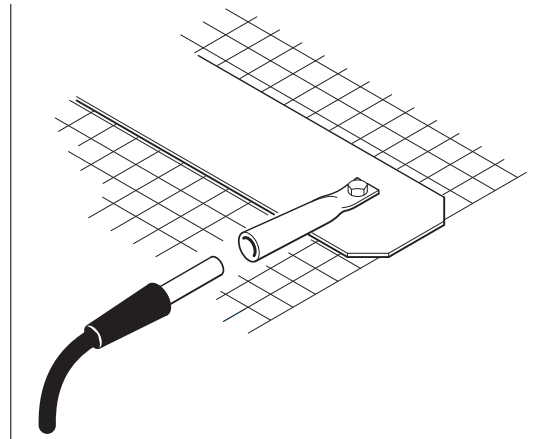
1. Drive voltage stake into ground at least 6' (2 m) away from any part of system.
2. Clip voltage limiter to voltage stake.

Assemble Grid Mat

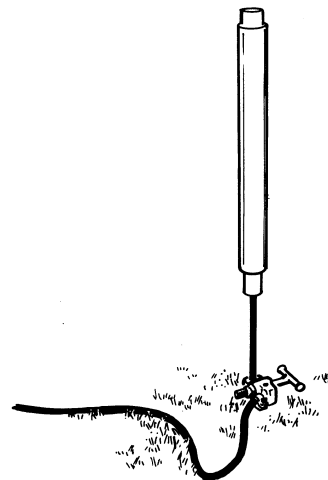
1. Remove mat from storage.
2. Place mat next to operator's station.
3. Connect bonding cables to grid mats.
4. Remove ground rod from storage.
5. Drive ground rod into soil near grid mat.
6. Move cords and cables under grid mat.
7. Connect ground cable clamp to ground rod.



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j18om036h.eps



Test Strike System

If system fails any part of this test, see "Troubleshoot Strike System" on the following page. Do not winch until test is completed successfully.

1. Turn on unit. "Start Unit" on page 64
2. ESID control module will perform internal tests which check everything but alarms and strobe.
3. If green OK indicator and electrical power supply indicator lights remain on, press self test button to perform total test of strike system. During this test:
 - All lights should glow.
 - Alphanumeric readout should display numbers.
 - Alarms and strobes on all connected units should sound.
4. If this test is successful, OK indicator and electrical power supply indicator lights will remain on.
5. Use Electric Strike Simulator to test voltage and current sensors. See page 99.

ESID Diagnostic Codes

When strike system detects a problem, an error code will be displayed. Anytime this happens, press self-test button to retest. If error code is still displayed and does not appear in this chart, have control module checked or replaced.

Code	Display	Condition	Result
502	2.5V REF	2.5V reference error in ESID	Internal reference failure, ESID may not give valid readings
503	-5V REF	-5V reference error in ESID	internal reference failure, ESID may not give valid readings
504	CLK RESP	clock response error	clock my not be working
505	LCD RESP	LCD response error	LCD display my not work
506	LED RESP	LED response error	LED display my not work
507	LCD CONTR	LCD contrast error	LCD contrast not saved properly
508	COP RESET	cop watchdog error	processor has reset, unknown status of ESID code
510	STRB DVR	strobe driver output error	strobe may not function
511	HORN DVR	horn driver output error	horn may not function
512	BAT POWER	battery power/horn driver error	strike hold on power may not function
513	TEST WIRE	no continuity on test wire for testing ESID	information center may not be able to reset ESID
515	STR VOLT	strike voltage input error	

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Electric Strike System (ESID)

Code	Display	Condition	Result
516	STR COIL	strike current input error	
517	POST AC V	self-test ac voltage input error	self-test of ac voltage stake failed
518	POST AC I	self-test ac current input error	self-test of ac current coil failed
519	POST CD V	self-test dc voltage input error	self-test of dc voltage input amplifier failed
520	POST DC I	self-test dc current input error	self-test of dc current input amplifier failed
521	V NOT GND	strike voltage input stake not grounded	self-test of voltage stake failed
588	EEP WRITE	EEProm write error	ESID may not be able to record strike history
5895	MISC CODE	invalid error report entry	software error report

Troubleshoot Strike System



When strike system detects a problem, an error icon will be displayed. Anytime this happens, press self test button to retest. If error icon is still displayed and does not appear in this chart, have control module checked or replaced.

Other problem situations and their possible causes and solutions are listed in the chart below.

Problem	Possible cause	Possible solution
No lights or readings showing after key has been on at least one minute	No power to strike system control module	Check unit electric system
		Check that harness from unit to control module is connected
	Defective control module	Have control module checked or replaced
LCD screen is blank	Strike system is not getting adequate power from unit	Check unit electric system
		Check that harness from unit to control module is connected
	Defective control module	Have control module checked or replaced
OK indicator is on, but electrical power supply indicator is off	Strike system is not getting adequate power from unit	Check unit electric system
		Check that harness from unit to control module is connected
		Check that harness from unit carries more than 10V
	Defective control module	Have control module checked or replaced
Electrical power supply indicator is on, but OK indicator is off	Problem detected during test	Check for error code and have control module checked or replaced
	Defective control module	Have control module checked or replaced
Strobe light on unit does not work during total test	Improper connections with control module	Check connections and wiring harness
	Defective strobe light	1. Disconnect strobe and connect to external 12V power source. 2. If strobe does not work, replace it.
	Defective control module	Have control module checked or replaced

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Electric Strike System (ESID)

Problem	Possible cause	Possible solution
Alarm on unit does not work during total test	Improper connections with control module	Check connections and wiring harness
	Defective alarm	1. Disconnect alarm and connect to external 12V power source. 2. If alarm does not work, replace it.
	Defective control module	Have control module checked or replaced
Strobe light and alarm on unit do not work during total test	Improper connections with control module	Check connections and wiring harness
	Defective control module	Have control module checked or replaced
Current detection problem indicator is flashing 	Improper connections with control module	Check cable connections on control module and current transformer
	Defective current transformer	1. Disconnect current transformer. 2. Check for 20-40 ohms from pin 1 to pin 4, 20-40 ohms from pin 1 to pin 2, and less than 1 ohm from pin 2 to pin 4.
	Defective current transformer cable	1. Disconnect cable from transformer and control module. 2. Check continuity of cable. 3. If continuity is zero or cable is damaged, replace.
	Defective control module	Have control module checked or replaced
Voltage limiter problem indicator is flashing 	Improper connection of voltage limiter to ground stake	Check voltage limiter connection to ground stake and verify that ground stake is driven into the ground
	Improper connections with control module.	Check cable connection on control module.
	Defective voltage limiter	Have voltage limiter checked or replaced
	Defective control module	Have control module checked or replaced

Use Electric Strike Simulator

Use the Electric Strike Simulator to test voltage and current sensors on ESID. If readings are less than indicated here, replace 9V battery in simulator and retest. If readings are still less than indicated, contact your HammerHead® dealer to have ESID repaired before winching.

Current Test

To test for current at normal levels:

1. Thread one lead wire through current transformer.
2. Clip ends of lead wires together to make one loop.
3. Move simulator switch to "current" and press test button.
4. Watch screen and lights above display on strike system.
 - Three or four lights should turn on.
 - Current "A" should show 30% or higher in display.

To test for current at strike levels:

1. Put two or three loops through current transformer.
2. Follow steps above to test.
3. Display should show the following:
 - All lights should turn on.
 - Alarm and strobe should turn on.

With two loops,

- Current "A" should be 80% or higher.
- Strike indication might go on and off.

With three loops,

- Current should be 130% or higher.
- Strike indication should be continuous.

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Electric Strike System (ESID)

Voltage Test

1. Place voltage limiter on something insulated from ground and unit (such as dry board or tire), but near frame of unit.
2. Clip one lead to frame.
3. Clip other lead to one voltage limiter mount.
4. Move simulator switch to "voltage" and press test button.
5. Watch screen and lights above display on strike system.
 - All lights should turn on.
 - Alarm and strobe should turn on.
 - Voltage "V" should show 90% or higher.

IMPORTANT: IT is normal for simulator voltage levels to drift below 100%.

Complete the Job

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Stow Components	102
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Stow Tools	102

Stow Components

Load unit as specified. See “Transport” on page 67 for more information.

Restore Jobsite

Fill in installation, bursting and service connection pits.

Stow Tools

Make sure all accessories and tools are loaded and properly secured on trailer.

Service

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- Welding Precaution104
- Washing Precaution104

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- Engine Oil Temperature Chart.106
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- Approved Fuel.107

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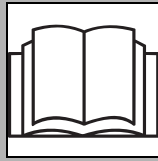
200 Hour. 120

500 Hour. 122

1000 Hour. 124

As Needed 126

Service Precautions



⚠ WARNING

Misuse of machine can cause death or serious injury.
Read and understand operator's manual and all other safety instructions before use.

To help avoid injury:

- Unless otherwise instructed, all service should be performed with engine off and engine cool.
- Refer to engine manufacturer's manual for engine maintenance instructions.
- Wear personal protective equipment.

Welding Precaution











NOTICE: Welding can damage electronics.

- Welding currents can damage electronic components. Always disconnect the ECU ground connection from the frame, harness connections to the ECU, and other electronic components prior to welding on machine or attachments. Connect welder ground close to welding point and make sure no electronic components are in the ground path.
- Disconnect battery at battery disconnect switch before welding to prevent damage to battery. See "Check Battery" on page 119.
- Do not turn off battery disconnect switch with engine running, or alternator and other electronic devices may be damaged.

Washing Precaution

NOTICE: Water can damage electronics. When cleaning equipment, do not spray electrical components with water.

Recommended Lubricants/Service Key

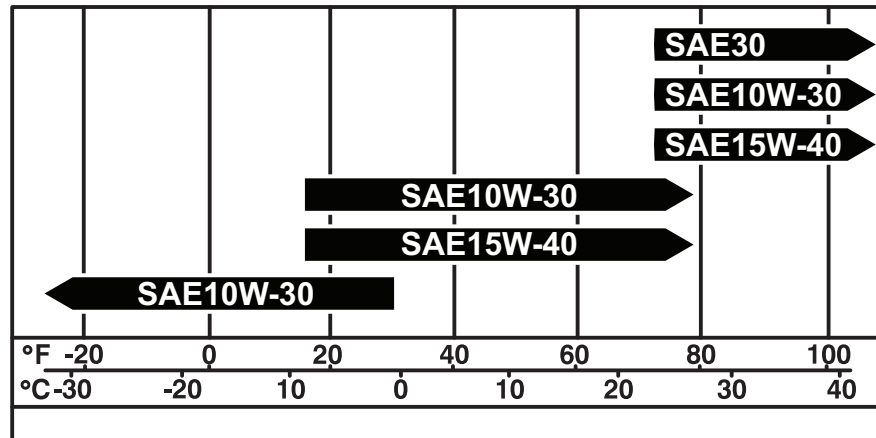
Item	Description		
 DEO	Diesel engine oil meeting or exceeding API CF, SAE 10W-30		
 DEAC	Low silicate, fully formulated diesel engine antifreeze/coolant meeting ASTM D6210		
 HF	Hydraulic fluid, Grade: Tetra 46 or equivalent meeting or exceeding ISO 45		
 EPG	Extreme-Pressure Grease - Use lithium based NLGI GC-LB Grade 2, with extreme pressure additives.		
 MOB	Open gear lube Mobitack 375 NC		
	Check level of fluid or lubricant		
	Filter		Check condition
	Adjust, service or test		Change, replace, adjust, service or test

Proper lubrication and maintenance protects HammerHead® equipment from damage and failure. Service intervals listed are minimum requirements. In extreme conditions, service machine more frequently. Use only recommended lubricants. Use only genuine HammerHead parts and approved lubricants to maintain warranty.

For more information on engine lubrication and maintenance, see your engine manual.

NOTICE: Use the "Service Record" to record all required service to your machine.

Engine Oil Temperature Chart



j60om070w.eps

Temperature range anticipated before next oil change

Approved Coolant

This unit was filled a 50/50 anti-freeze mix. Refill with 0.82 gal (3.1 L) of 50/50 mix. Add or replace only with coolant meeting this specification.

NOTICE:

- Do not use water or high-silicate automotive-type coolant. This will lead to engine damage or premature engine failure.
- Do not mix heavy-duty diesel engine coolant and automotive-type coolant. This will lead to coolant breakdown and engine damage.
- Use only distilled water for mixing coolants. Do not use tap water.

Approved Fuel

U.S., Canada, EU, and Japan

**WARNING**

Avoid static electricity when fueling. Ultra Low Sulfur Diesel (ULSD) poses a greater static ignition hazard than earlier diesel formulations. Avoid death or serious injury from fire or explosion. Consult with your fuel system supplier to ensure the delivery system is in compliance with fueling standards for proper grounding and bonding practices.

This engine is designed to run on diesel fuel. Use only high quality fuel meeting ASTM D975 No. 2D, EN590, or equivalent. At temperatures below 32°F (0°C) winter fuel blends are acceptable. See the engine operation manual for more information.

NOTICE: Use only Ultra Low Sulfur Diesel (less than 15ppm sulfur content in US and Canada or 10 mg/kg sulfur content in Japan) in this unit. Operating with higher sulfur content will increase emissions and violate regulations.

Biodiesel blends up to 5% (B5) are approved for use in this unit. The fuel used must meet the specifications for diesel fuel shown above. In certain markets, higher blends may be used if certain steps are taken. Extra attention is needed when using biodiesel, especially when operating in cold weather or storing fuel. Contact your HammerHead® dealer or the engine manufacturer for more information.

Less Regulated Markets (Outside the U.S., Canada, EU, and Japan)

This engine is designed to run on diesel fuel. Use only high quality fuel meeting ASTM D975 No. 2D, EN590, or equivalent. At temperatures below 32°F (0°C) winter fuel blends are acceptable. See the engine operation manual for more information.

IMPORTANT: Fuel sulfur content should be less than 10,000 ppm (10,000 mg/kg). Worldwide, fuel sulfur regulations vary widely. Fuel used should always comply with local regulations. Prior to shipping, this unit was filled with API CJ-4 DEO. If operating fuel with sulfur content above 500 ppm (500 mg/kg), change oil initially at 50 hours.

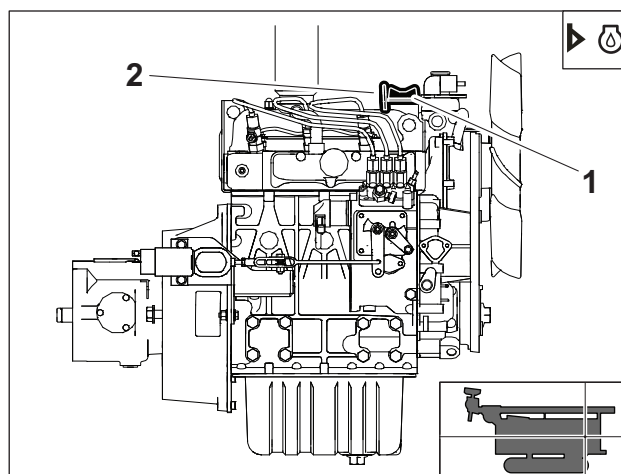
Biodiesel blends up to 5% (B5) are approved for use in this unit. The fuel used must meet the specifications for diesel fuel shown above. In certain markets, higher blends may be used if certain steps are taken. Extra attention is needed when using biodiesel, especially when operating in cold weather or storing fuel. Contact your HammerHead dealer or the engine manufacturer for more information.

Each Use

Tasks	Notes
Check engine oil level	DEO
Check engine coolant level	DEAC
Check hydraulic fluid level	HF
Check tire pressure and lug nut torque	Wheeled unit, 90 ft•lb (122 N•m)
Check fuel level and refuel	
Grease level wind follower and level wind shaft bearings	EPG
Grease level wind shaft	EPG
Grease bull wheel bearings	EPG
Check track tension and condition	Tracked unit, EPG
Grease take up drum bearings	EPG
Clean dust ejector valve	
Inspect wire cable	

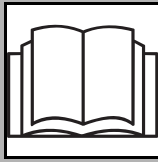
Check Engine Oil Level

With unit on level surface, check engine oil at dipstick (2) before startup and every 10 hours of operation. Add DEO at fill (1) as necessary to keep oil level at highest line on dipstick.



j64om026w.eps

Check Engine Coolant Level



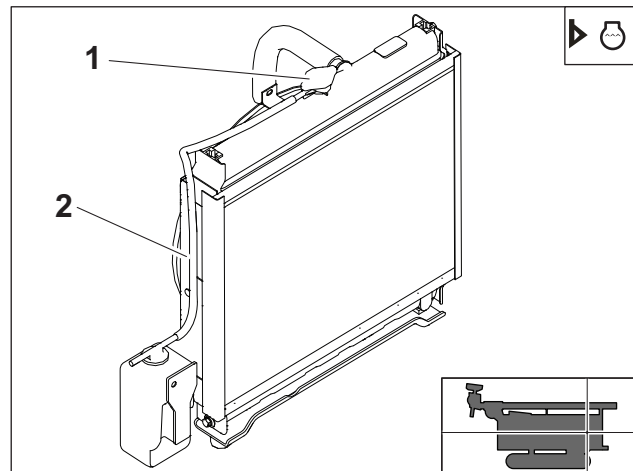
⚠ WARNING Contents under pressure. Relieve pressure before opening. Death or injury could occur.

To help avoid injury:

- Do not remove the pressure cap from a hot engine.
- Wait until the coolant temperature is below 122°F (50°C) before removing pressure cap.
- Do not stand near or over the expansion tank while operating the engine with the pressure cap off.

With engine cool and unit on level surface, check coolant level at fill before startup and every 10 hours of operation. Add DEAC at fill (1) to maintain coolant level at halfway to the bottom of the fill pipe (2).

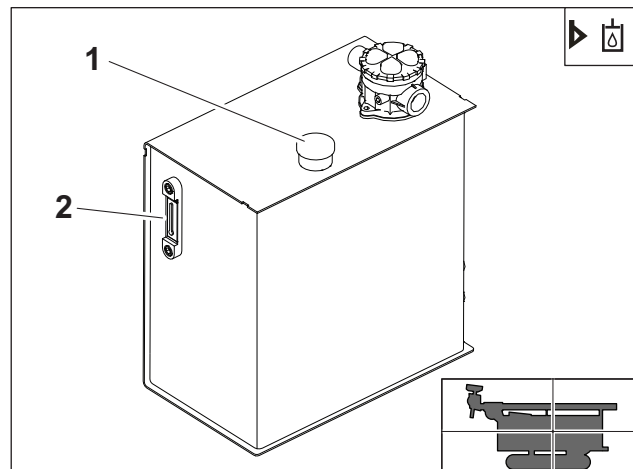
IMPORTANT: See “Approved Coolant” on page 106 for information on approved coolants.



j64om027w.eps

Check Hydraulic Fluid Level

With engine cool and unit on level surface, check hydraulic oil level before startup and every 10 hours of operation. Add HF at fill (1) to maintain fluid level at halfway point on sight glass (2).



j64om028w.eps

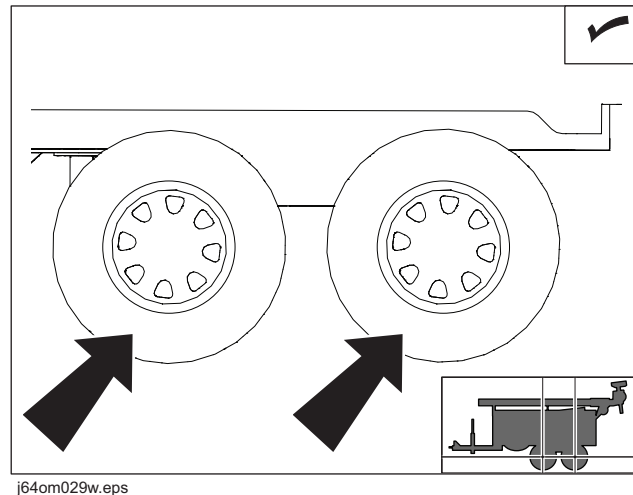
HG2200/HG2200AT Operator's Manual

Each Use

Check Tire Pressure and Lug Nut Torque (Wheeled Unit)

Check tire pressure and lug nut torque before start up and every 10 hours of operation. Tighten lugnuts in a star pattern using a three stage sequence. See below for correct pressure and torque.

Pressure	Stage	Torque
105 psi (7.2 bar)	First	50-60 ft•lb (68-81 N•m)
	Second	90-200 ft•lb (122-271 N•m)
	Final	275-325 ft•lb (373-441 N•m)



Check Fuel Level and Refuel

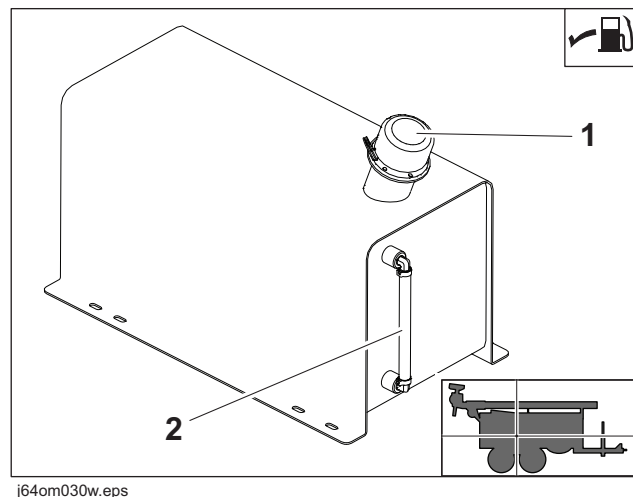


⚠ WARNING

Fuel and its vapors are extremely flammable. Fire or explosion can cause death or serious injury.

To help avoid injury:

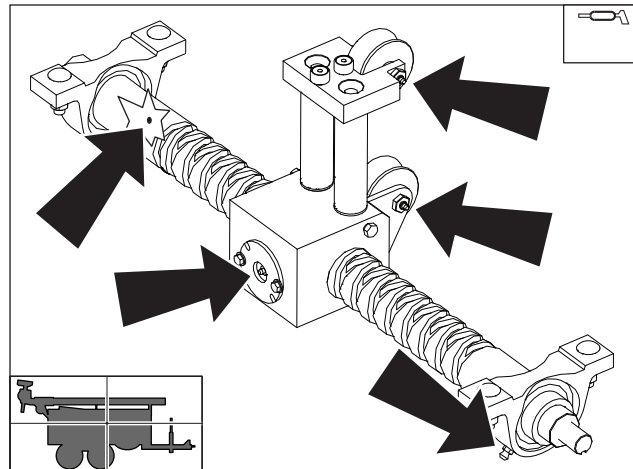
- Keep heat, sparks, flames and other ignition sources away.
- Refuel only with engine off.
- Refuel only outdoors.
- Wipe up spilled fuel immediately.



Check fuel level before start up and every 10 hours of operation. Fill fuel tank at fill (1) with approved fuel to fill line on fill pipe (2) at the end of each day to prevent condensation.

Grease Level Wind Follower and Level Wind Shaft Bearings

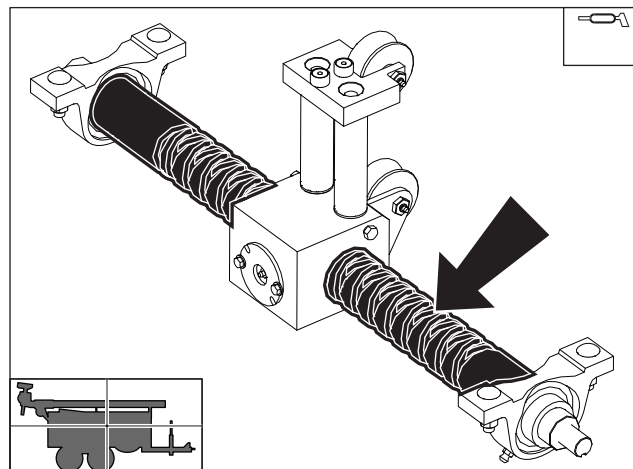
Grease level wind follower and level wind shaft bearings (shown) before startup and every 10 hours of operation with EPG.



j64om031w.eps

Grease Level Wind Shaft

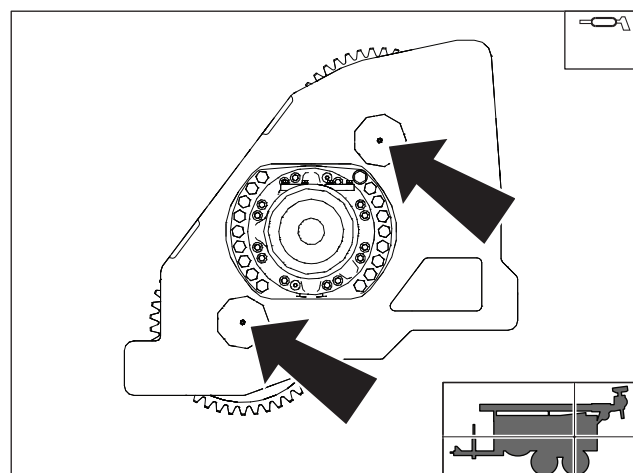
Grease level wind shafts before startup and every 10 hours of operation with EPG



j64om032w.eps

Grease Bull Wheel Bearings

Grease bull wheel bearings before startup and every 10 hours of operation with EPG.



j64om033w.eps

Check Track Tension and Condition (Tracked Unit)

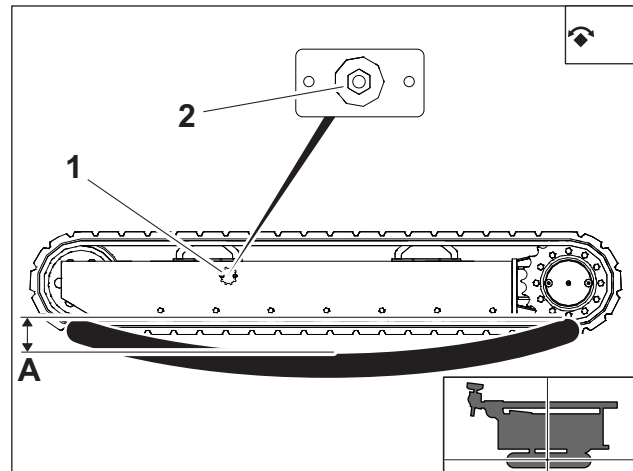
Check track tension and adjust or replace before startup and every 10 hours of operation.

To adjust:

1. Lift right track using right stabilizer.

IMPORTANT: Raise enough to allow the track to hang freely from the machine.

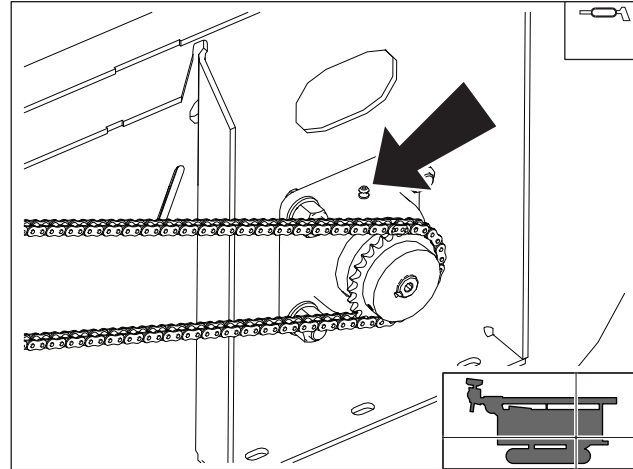
2. Remove cover (1).
3. Place straightedge across front track span from idler to sprocket as shown.
4. Pump EPG into fitting (2) until distance between top edge of bottom of track and straightedge (A) is 1-1/2" to 2" (37.5-50 mm).
5. Lower stabilizer.
6. Drive straight forward one machine length and check tension again.
7. Repeat the process for the left track.



j64om034w.eps

Grease Take Up Drum Bearings

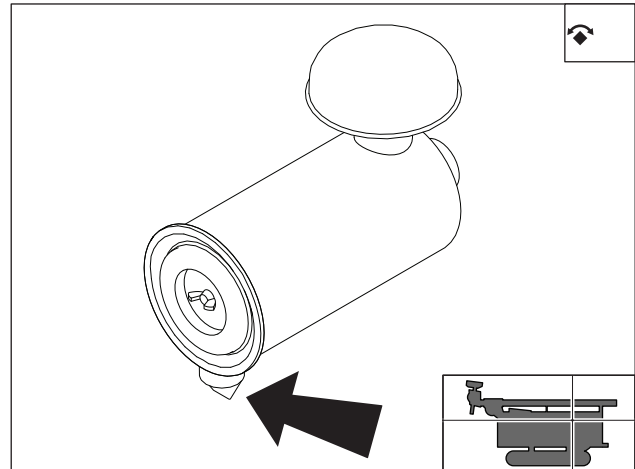
Grease take up drum bearings before startup and every 10 hours of operation with EPG.



j64om035w.eps

Clean Dust Ejector Valve

Check dust ejector valve (shown) before startup and every 10 hours of operation. Ensure that valve is not inverted, damaged, plugged, or cracked.



j64om036w.eps

Inspect Wire Cable

Inspect wire cable before each use. Replace damaged wire cable immediately. Obvious damage includes permanent bends, flat spots, worn spots, broken wires, frays, rust, and corrosion. For more information see "Wire Cable" on page 92.

50 Hour

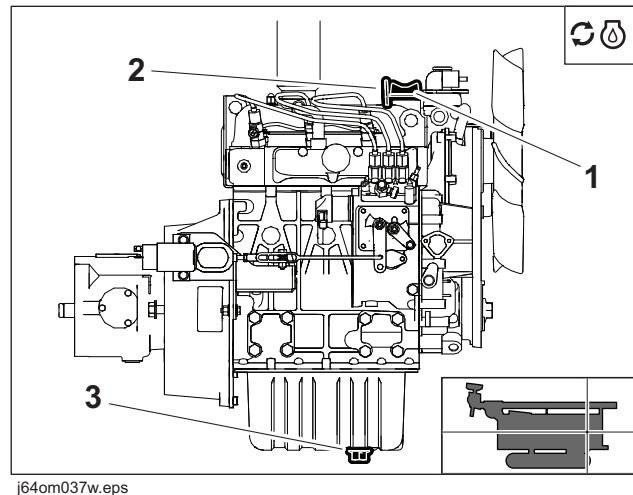
Task	Notes
Change engine oil and filter	Initial service, DEO
Clean air filter	
Check fuel lines	
Grease bull wheel sprockets	MOB
Check hydraulic hoses	
Grease mast pivots	EPG
Grease mast cable sheave bearings	EPG

Change Engine Oil and Filter (Initial Service)

Change engine oil after 50 hours of operation, and every 100 hours thereafter.

To change:

1. While oil is warm, remove drain plug (3). Drain oil and replace plug.
2. Remove filter (1) and replace with new filter each time oil is changed.
3. Add DEO at fill until oil level is at highest capacity on dipstick (2).

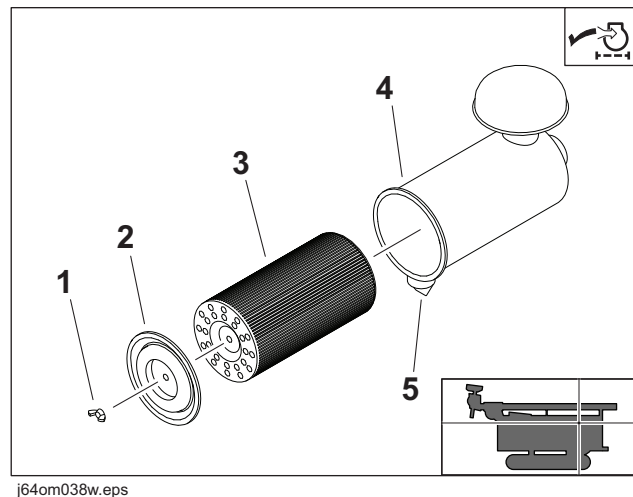


Clean Air Filter

Clean air filter after 50 hours.

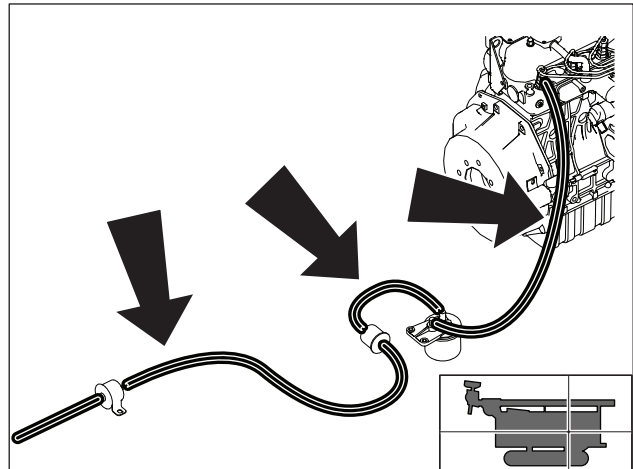
To change:

1. Remove wing nut (1) to remove cover (2).
2. Remove and clean filter element (3). Replace if needed. See "Change Air Filter" on page 126.
3. Wipe inside of housing (4) and wash cover.
4. Replace filter element and ensure it is seated correctly.
5. Clean dust ejector valve (5).
6. Replace cover. If cover does not fit, filter element is not properly locked into housing. Remove cover and element and repeat step 4.



Check Fuel Lines

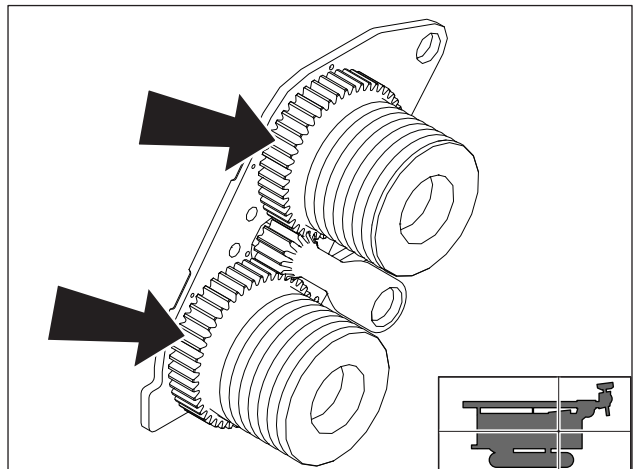
Check fuel lines after 50 hours for wear or cracks.
Check fuel line for loose or broken clamp bands.



j64om039w.eps

Grease Bull Wheel Sprockets

Grease the bull wheel sprockets every 50 hours
with MOB.



j64om040w.eps

Check Hydraulic Hoses

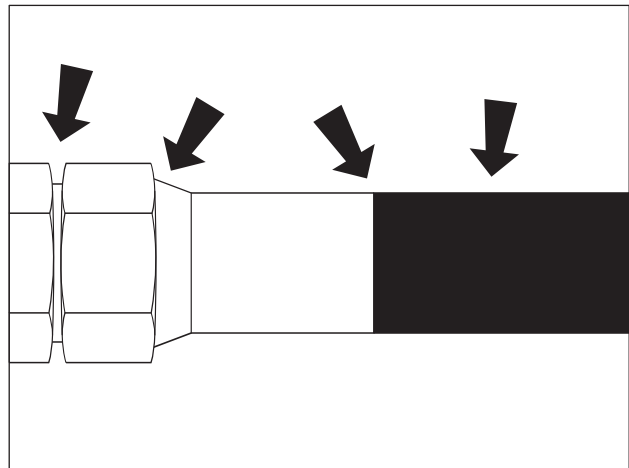


⚠ WARNING Pressurized fluid or air could pierce skin and cause severe injury. Refer to operator's manual for proper use.

To help avoid injury:

- Use a piece of cardboard or wood, rather than hands, to search for leaks.
- Wear protective clothing, including gloves and eye protection.
- Before disconnecting a hydraulic line, turn engine off and operate all controls to relieve pressure.
- Lower, block, or support any raised component with a hoist.
- Cover connection with heavy cloth and loosen connector nut slightly to relieve residual pressure. Catch all fluid in a container.
- Before using system, check that all connections are tight and all lines are undamaged.
- If you are injured, seek immediate medical attention from a doctor familiar with this type of injury.

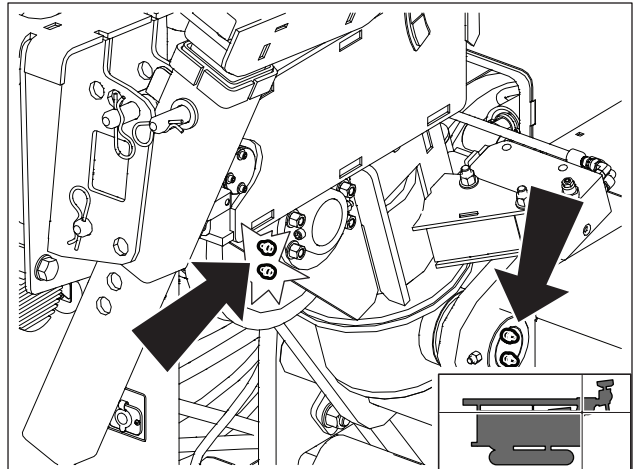
Check hydraulic hoses for leaks every 50 hours of operation.



CheckHoses.eps

Grease Mast Pivots

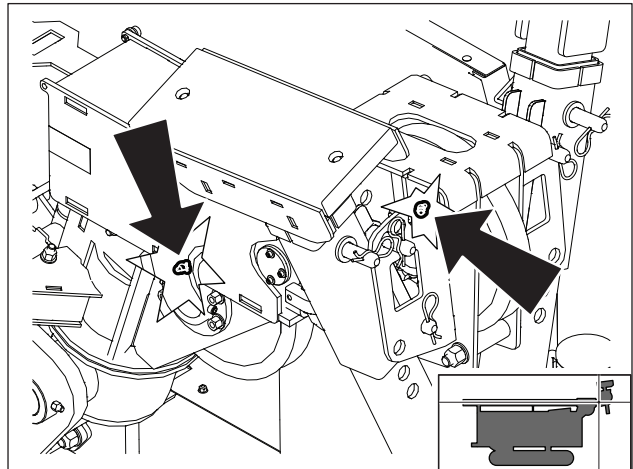
Grease mast pivots (shown) every 50 hours with EPG.



j64om041w.eps

Grease Mast Cable Sheave Bearings

Grease mast cable sheave bearings (shown) every 50 hours with EPG.



j64om042w.eps

100 Hour

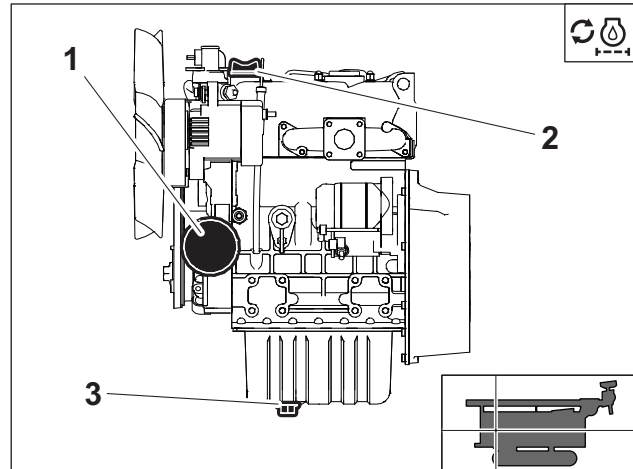
Task	Notes
Change engine oil and filter	DEO
Check fan belt	
Check battery	

Change Engine Oil and Filter

Change engine oil and filter every 100 hours.

To change:

1. While oil is warm, remove drain plug (3). Drain oil and replace plug.
2. Remove filter (1) and replace with new filter each time oil is changed.
3. Add DEO at fill (2) until oil level is at highest capacity on dipstick.

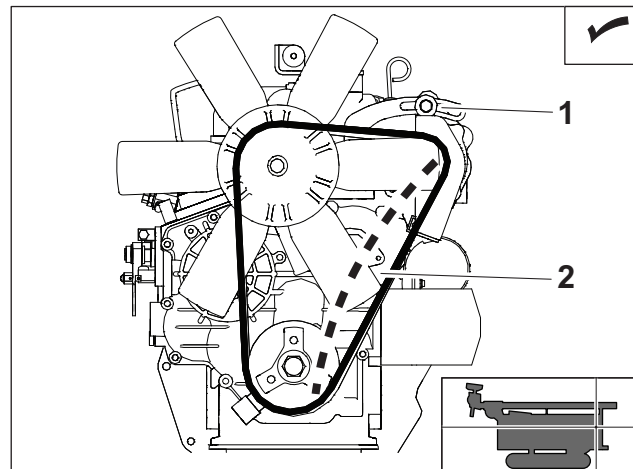


j64om043w.eps

Check Fan Belt

Check alternator fan belt tension every 100 hours.

1. Apply pressure to fan belt (2) between pulleys. Belt should move between 0.28-0.35" (7-9 mm) when pressed.
2. If the belt is outside of normal tension adjust alternator arm (1) until belt is within normal limits.
3. Replace fan belt if damaged.



j64om044w.eps

Check Battery



WARNING

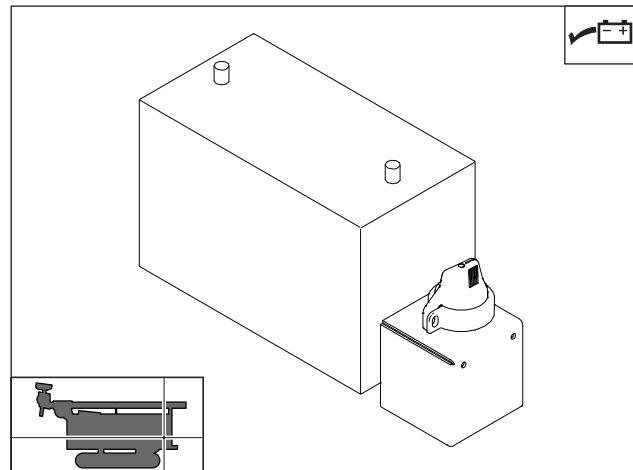
Explosion possible. Serious injury or equipment damage could occur. Follow directions carefully.

To help avoid injury:

- Wear safety glasses and face shield and rubber gloves.
- Use flashlight to check electrolyte level.
- Work in a well-ventilated area.
- Avoid breathing fumes from battery, and avoid contact with skin, eyes, or clothing.
- Keep flames and sparks away.
- Keep out of reach of children.
- Do not short across battery terminals or allow tools to short from battery terminals to frame.
- Do not jump-start or charge a battery with frozen electrolyte.

Check battery electrolyte level and clean terminals every 100 hours.

1. Turn battery disconnect to the OFF position.
2. Ensure that no ignition sources are near batteries.
3. Loosen and remove battery cable clamps carefully, **negative (-)** cable first.
4. Clean cable clamps and terminals to remove dull glaze.
5. Check for signs of internal corrosion in cables.
6. Remove cell caps
7. Fill each cell with distilled water, replace cell caps.



j64cm045w.eps

NOTICE: In freezing weather, run the engine immediately after filling battery to allow water and electrolyte to mix.

8. Connect battery cable clamps, **positive (+)** cable first.
9. Tighten any loose connections.
10. Ensure that battery tiedowns are secure.
11. Turn battery disconnect to the ON position.

200 Hour

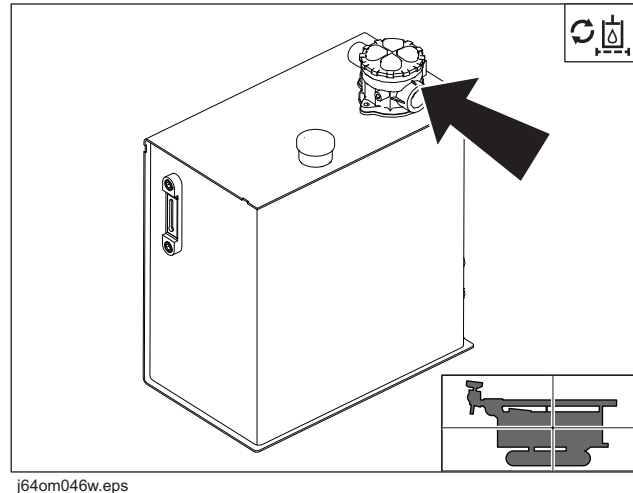
Task	Notes
Change hydraulic fluid filter	
Change fuel filter	
Add cooling system additive	

Change Hydraulic Fluid Filter

Change hydraulic fluid filter after 200 hours or as indicated by the hydraulic fluid filter restriction indicator. See "Hydraulic fluid filter restriction indicator" on page 43.

To change:

1. Turn filter (shown) counterclockwise to remove.
2. Clean filter head surface.
3. Apply thin film of oil to gasket of new filter.
4. Install filter, turning clockwise by hand until filter head contacts the filter head surface.



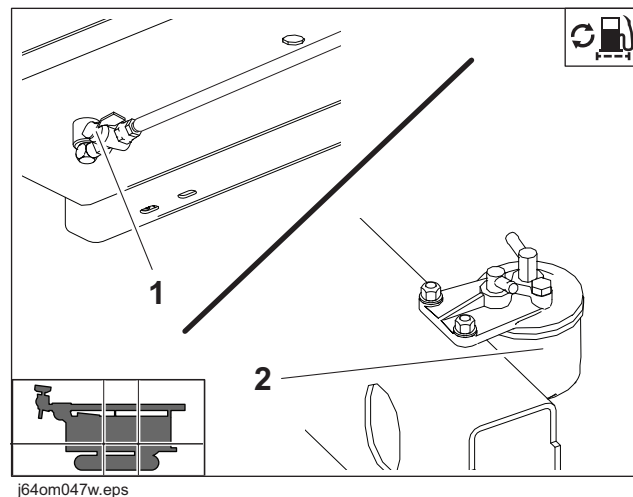
NOTICE: Tighten filter only enough to stop leaks.

5. Start engine and cycle control levers to pressurize system.
6. Stop engine, check hydraulic fluid level, and check for leaks around filter.

Change Fuel Filter

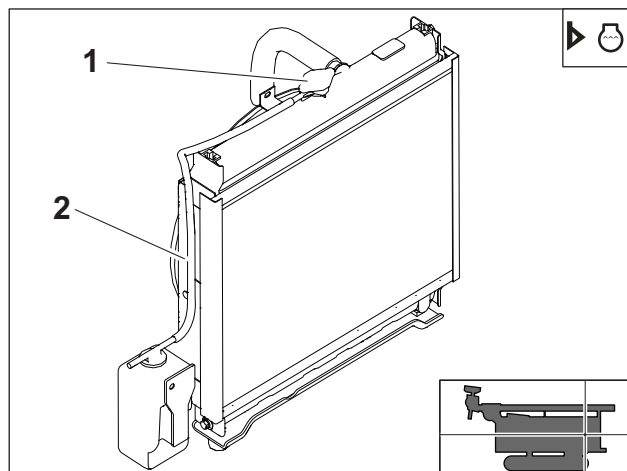
Change fuel filter every 200 hours.

1. Close fuel shutoff valve (1).
2. Replace fuel filter (2).
3. Open fuel shutoff valve.



Add Cooling System Additive

Add cooling system additive to radiator at fill (1) every 200 hours. Capacity is 0.8 oz (24 cc).



j64om027w.eps

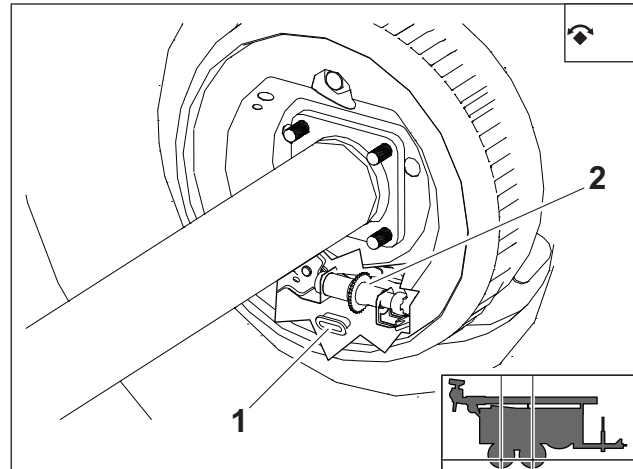
500 Hour

Task	Notes
Adjust brakes	Wheeled unit
Change fan belt	
Change engine coolant	

Adjust Brakes (Wheeled Unit)

Adjust brakes every 500 hours.

1. Place adequate jack stands under frame and remove wheels.
2. Remove cover from adjusting slot (1) on bottom of backing plate.
3. Rotate adjuster starwheel with screwdriver or brake spoon to expand brake shoes (2). Adjust until drum is very difficult to turn by hand.
4. Rotate starwheel the other direction until drum turns with slight drag.
5. Replace adjusting slot cover and replace wheel.
6. Repeat procedure for all remaining brakes.
7. Remove jack stands and lower wheels to ground.

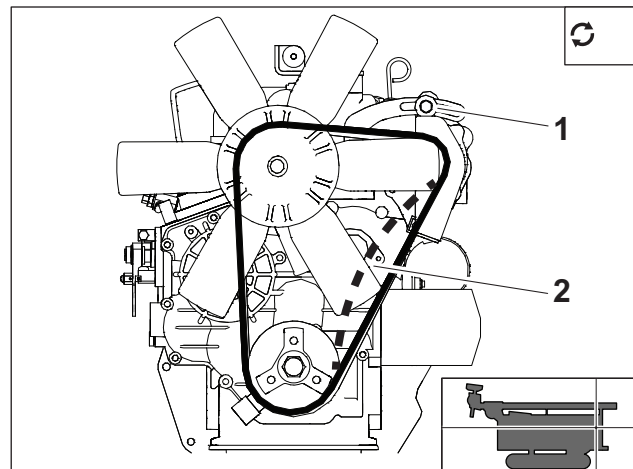


j64om048w.eps

Change Fan Belt

Change alternator fan belt every 500 hours.

1. Loosen alternator arm (1) to remove fan belt (2).
2. Install new fan belt.
1. Adjust alternator arm until movement between the pulleys is between 0.28-0.35" (7-9 mm) when pressed.



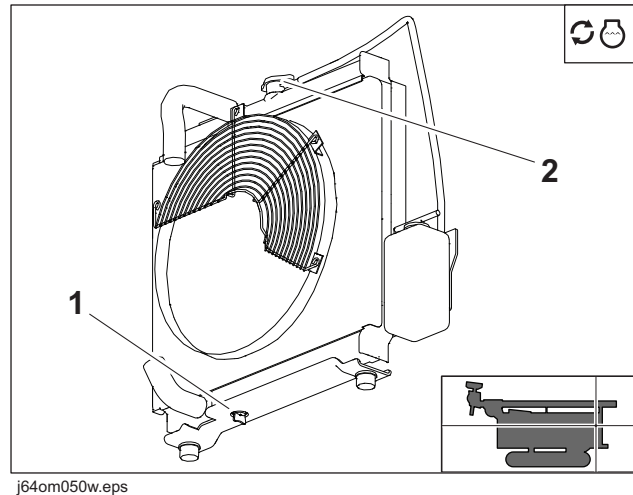
j64om049w.eps

Change Engine Coolant

Drain and clean cooling system every year or 1000 hours.

To change:

1. Remove drain plug (1) and drain old coolant.
2. Fill radiator with clean water at fill (2).
3. Check for signs of rust and add cooling system cleaner to the water if necessary.
4. Run engine long enough to ensure thermostat has opened.
5. Let system cool, drain water.
6. Add coolant at fill. Do not fill to the top.



NOTICE: See “Approved Coolant” on page 106.

7. Run engine until mixture has circulated in the system.
8. Add 3.25 oz (97 cc) of Fleetguard DCA4.
9. Finish filling radiator with DEAC.

1000 Hour

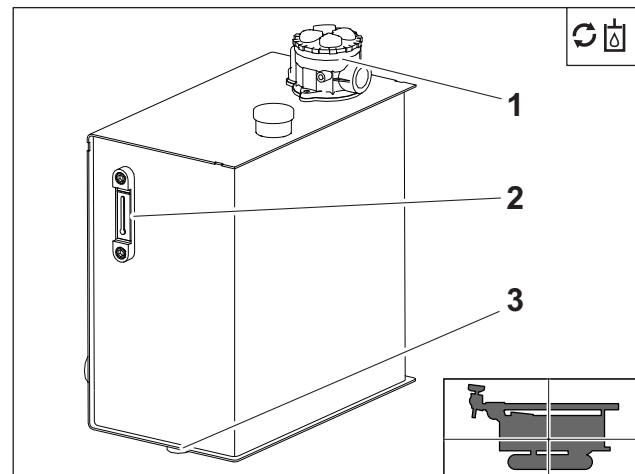
Task	Notes
Change hydraulic fluid	HF
Check wheel bearings	Wheeled units, EPG

Change Hydraulic Fluid

Change hydraulic fluid every 1000 hours.

To change:

1. Remove cap (1) and drain plug while (3) fluid is warm and drain.
2. Clean, inspect, and install drain plug.
3. Change hydraulic filter. See "Change Hydraulic Fluid Filter" on page 120.
4. Add HF at fill (1) until level is at halfway point on sight glass (2).
5. Operate hydraulic system.
6. Follow shutdown procedure and recheck oil level.

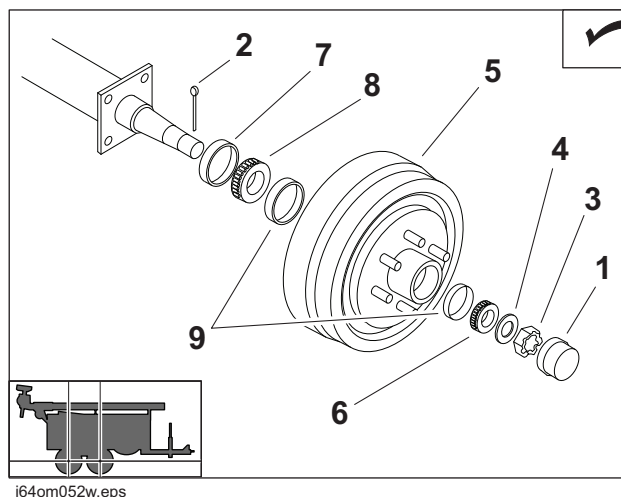


j64om051w.eps

Adjust and Lubricate Wheel Bearings (Wheeled Unit)

Adjust and lubricate bearings every 1000 hours.

1. Place adequate jack stands under frame rails and remove wheels.
2. Unscrew grease cap (1) while holding the hub stationary.
3. Remove cotter pin (2). Inspect cotter pin for wear or damage. Replace if necessary.
4. Remove castellated nut (3) and spindle washer (4).
5. Remove hub (5) from spindle. Do not drop outer bearing.
6. Remove inner bearing (8) and pry seal (7) from hub. Inspect seal for wear or damage. Replace if necessary.
7. Inspect brake drum for excessive wear or heavy scoring.



Condition	Recommended Action
Brake drum worn more than 0.020" (.5 mm).	Remachine drum surface
Brake drum worn out of round more than 0.015" (0.39 mm).	
Brake drum has scoring and other wear greater than 0.090" (2.29 mm)	Replace drum

8. Clean all grease from bearing cups (9), bearings (6, 8), hardware, and hub bore using suitable solvent. Dry components with lint free cloth.
9. Inspect bearing cups and bearings for pitting, spalling, and corrosion. Replace if damaged.
10. Pack all bearings with EPG. Apply light coating of grease to bearings.
11. Reinstall seal on hub and replace inner bearing.
12. Ensure the bearings and bearing cups are seated correctly into the hub.
13. Replace hub.
14. Replace spindle washer and castellated nut.
15. Hand tighten the nut and back it off 1/4 to 3/4 of a turn.
16. Replace cotter pin.
17. Replace grease cap.
18. Rotate the hub and check bearing adjustment. Allowable end play is 0.001-0.010" (0.025-0.25 mm).

As Needed

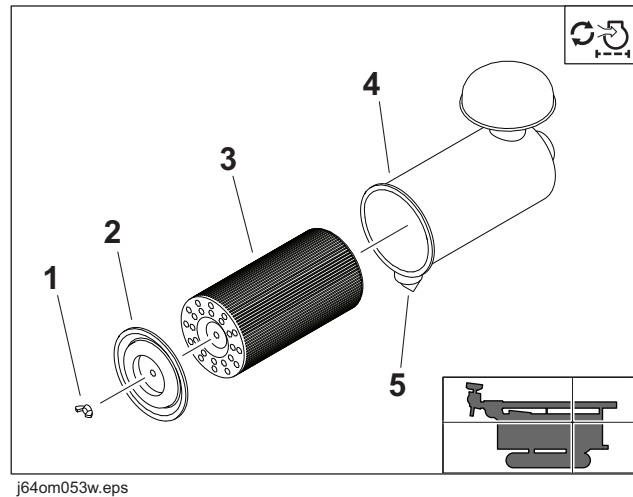
Task	Notes
Change air filter	
Change wireless remote controller batteries	
Change battery	

Change Air Filter

Replace air filter as needed.

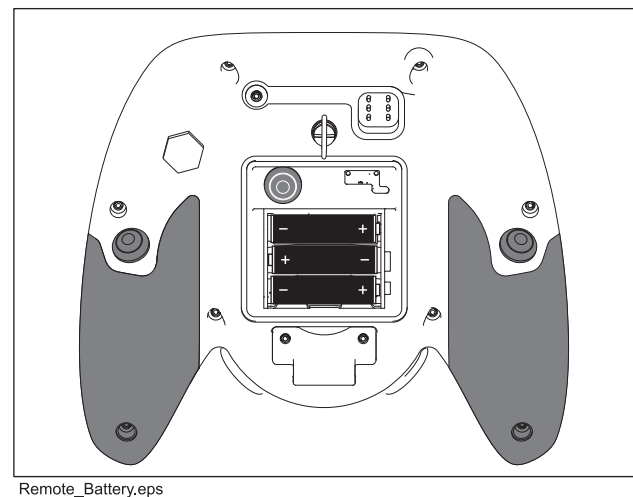
To change:

1. Remove wing nut (1) to remove cover (2).
2. Remove filter element (3).
3. Wipe inside of housing (4) and wash cover.
4. Replace filter element and ensure it is seated correctly.
5. Clean dust ejector valve (5).
6. Replace cover. If cover does not fit, filter element is not properly locked into housing. Remove cover and element and repeat step 4.

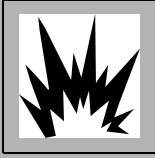


Change Wireless Remote Controller Batteries

Replace batteries when low battery indicator is displayed. Install 6 AA batteries as shown.



Change Battery



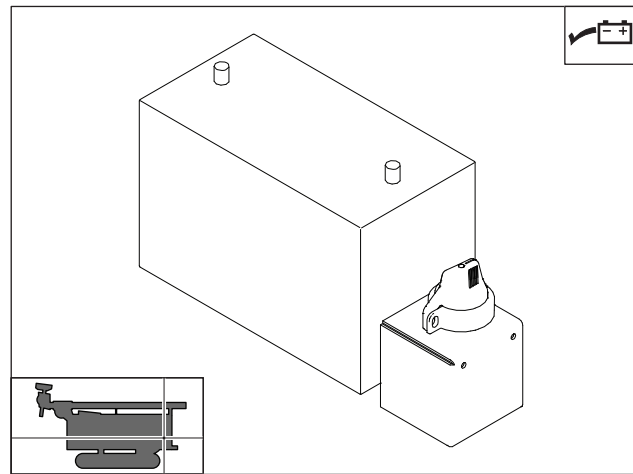
WARNING Explosion possible. Serious injury or equipment damage could occur. Follow directions carefully.

To help avoid injury:

- Use a single 12V maximum source for charging. Do not connect to rapid chargers or dual batteries.
- Use caution and wear personal protective equipment such as safety eyewear, when charging or cleaning battery.
- Keep sparks, flames, and any ignition source away from batteries at all times. Internal contents are extremely hazardous. Leaking fluid is corrosive. Battery may be explosive at higher temperatures.
- NEVER lean over battery when making connections.
- Do not allow vehicles to touch when charging.
- Do not attempt to charge a battery that is leaking, bulging, heavily corroded, frozen, or otherwise damaged.
- NEVER short-circuit battery terminals for any reason or strike battery posts or cable terminals.
- Refer to MSDS for additional information regarding this battery.

Change battery as needed.

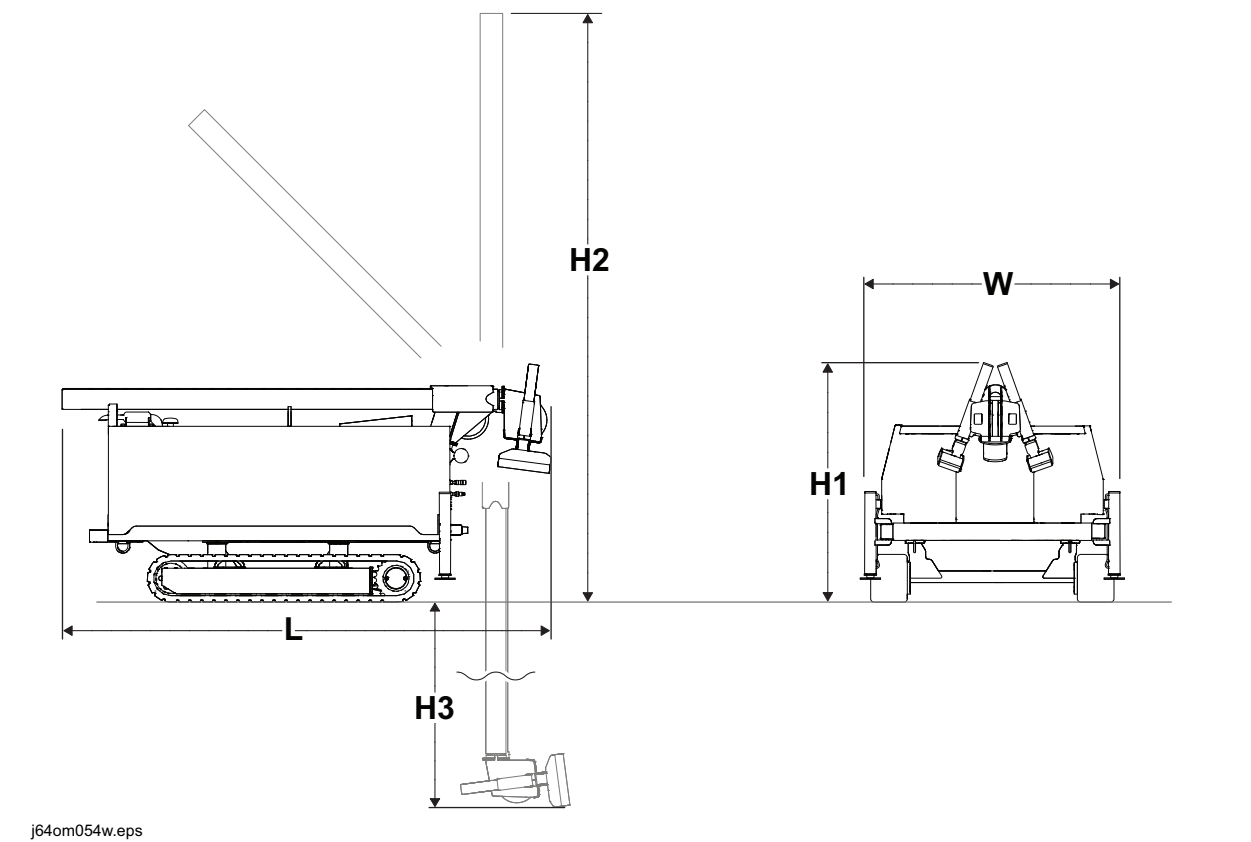
1. Ensure that no ignition sources are near battery.
2. Loosen and remove battery cable clamps carefully, **negative (-)** cable first.
3. Remove battery.
4. Install new battery.
5. Connect battery cable clamps, **positive (+)** cable first.
6. Tighten any loose connections.
7. Ensure that battery tiedowns are secure.



j64om045w.eps

Specifications

Winch Unit



Dimensions		U.S.	Metric
L, length (with trailer tongue)		17 ft	5.2 m
L, length (without trailer tongue)		14.1 ft	4.3 m
W, width		7 ft	2.1 m
H1, height		6.5 ft	2 m
H2, boom height			
	Tracked unit	15.5 ft	4.73 m
	Wheeled unit	15.75 ft	4.80 m
H3, boom length in ground		23 ft	7 m
Weight (with cable)			

HG2200/HG2200AT Operator's Manual

Winch Unit

Dimensions		U.S.	Metric
	Tracked unit	15,000 lbs	6804 kg
	Wheeled unit	14,500 lbs	6577 kg

Operational	U.S.	Metric
Pullback force, maximum	22 tons	20 tonnes
Working pressure, maximum	3475-3525 psi	240-243 bar
Working flow rate	25-27 gpm	95-102 lpm
Push cable speed, maximum	100 ft/min	30.5 m/min
Pullback cable speed, maximum	60 ft/min	18 m/min

Power	U.S.	Metric
Engine: Kubota® D1105, EPA Tier 4, EU Stage IV		
Fuel: Diesel		
Cooling medium: liquid		
Manufacturer's gross power rating (per SAE J1955)	24.8 hp	18.5 kW

Trailer Unit	U.S.	Metric
Tire		
	235/75R17.5, H/16, 143/141L	105 psi 7.2 bar
Load rating		
	Should not exceed	16,000 lbs 7257 kg

Load ratings for speeds up to 75 mph (121 km/h).

Noise Levels
Operator ear sound pressure level is 88 dBA sound pressure per ISO 6396.

Declaration of Conformity Information

Countries in the European Union should have received a Declaration of Conformity (DOC) with this machine similar to the example below.

Earth Tool Company, LLC.
500 South C.P. Avenue
Lake Mills, Wisconsin, 53545
Phone: 920 648 4848
FAX: 920 648 1780

Declares that the product:

Model: **HammerHead® XXXX**
Type: **(machine type)**
Engine Power: **xxx kW**
Serial Number: **(model) XXXXX**

Conforms to the requirements of:

2006/42/EC Machinery Directive
2014/30/EU Electromagnetic Compatibility Directive
2000/14/EC Noise Emission Directive

Measured sound power level (Annex V): **xxx dBA**
Guaranteed sound power level (Annex V): **xxx dBA**

The Technical Construction File is maintained at the manufacturer's location.

The manufacturer's European representative is:

Ditch Witch Barcelona
International Underground Systems, S.L.
C/EL PLA, 130 * Poligon Industrial El Pla
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Support

Procedure

Notify your dealer immediately of any malfunction or failure of HammerHead® equipment.

Always give model, serial number, and approximate date of your equipment purchase. This information should be recorded and placed on file by the owner at the time of purchase.

Return damaged parts to dealer for inspection and warranty consideration if in warranty time frame.

Order genuine HammerHead replacement or repair parts from your authorized HammerHead dealer. Use of another manufacturer's parts may void warranty consideration.

Resources

Publications

Contact your HammerHead dealer for publications and videos covering safety, operation, service, and repair of your equipment.

HammerHead Training

For information about on-site, individualized training, contact your HammerHead dealer.

Warranty

Limited Warranty Policy

Earth Tool Company LLC, hereinafter sometimes referred to as ETC warrants each new industrial product of its own manufacture to be free from defects in material and workmanship, under normal use and service for one full year after delivery to the owner or 1000 operating hours, whichever occurs first. During the warranty period, the authorized selling HammerHead® Dealer shall furnish parts without charge for any HammerHead product that fails because of defects in material and workmanship. Warranty is void unless warranty registration card is returned within ten days from the date of purchase. This warranty and any possible liability of Earth Tool Company LLC here under is in lieu of all other warranties, express, implied, or statutory, including, but not limited to any warranties of merchantability or fitness for a particular purpose.

The parties agree that the Buyer's SOLE AND EXCLUSIVE REMEDY against ETC, whether in contract or arising out of warranties, representations, or defects shall be for the replacement or repair of defective parts as provided herein. In no event shall ETC's liability exceed the purchase price of the product. The Buyer agrees that no other remedy (including, but not limited to, incidental or consequential loss) shall be available to him. If, during the warranty period, any product becomes defective by reason of material or workmanship and Buyer immediately notifies ETC of such defect, ETC shall, at its option, supply a replacement part or request the return of the product to its plant in Lake Mills, Wisconsin. No part shall be returned without prior written authorization from ETC, and this warranty does not obligate ETC to bear any transportation charges in connection with the repair or replacement of defective parts. Earth Tool Company LLC will not accept any charges for labor and/or parts incidental to the removal or remounting of parts repaired or replaced under this Warranty.

This Warranty shall not apply to any part or product which shall have been installed or operated in a manner not recommended by ETC nor to any part or product which shall have been neglected, or used in any way which, in ETC's opinion, adversely affects its performance; nor negligence of proper maintenance or other negligence, fire or other accident; nor with respect to wear items; nor if the unit has been repaired or altered outside of an ETC authorized dealership in a manner of which, in the sole judgment of ETC affects its performance, stability or reliability; nor with respect to batteries which are covered under a separate adjustment warranty; nor to any product in which parts not manufactured or approved by ETC have been used, nor to normal maintenance services or replacement of normal service items. Equipment and accessories not of our manufacture are warranted only to the extent of the original Manufacturer's Warranty and subject to their allowance to us, if found defective by them. ETC reserves the right to modify, alter, and improve any product or parts without incurring any obligation to replace any product or parts previously sold with such modified, altered, or improved product or part. No person is authorized to give any other Warranty, or to assume any additional obligation on ETC's behalf unless made in writing, and signed by an officer of ETC.

EARTH TOOL COMPANY LLC

Lake Mills, Wisconsin

Service Record

[illegible]

HG2200/HG2200AT Operator's Manual

[illegible]

Appendix



Chapter Contents

Tire Safety Information

TIRE SAFETY INFORMATION

1.1. STEPS FOR DETERMINING CORRECT LOAD LIMIT – TRAILER

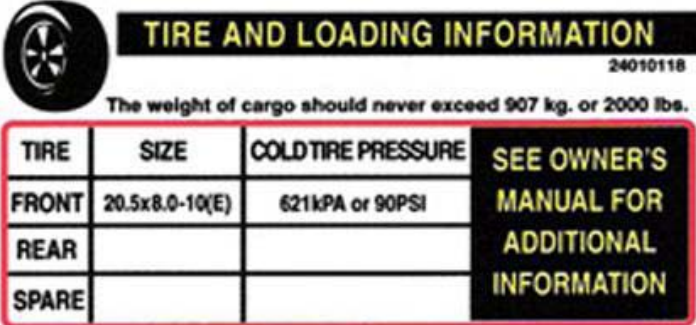
Determining the load limits of a trailer includes more than understanding the load limits of the tires alone. On all trailers there is a Federal certification/VIN label that is located on the forward half of the left (road) side of the unit. This certification/VIN label will indicate the trailer's Gross Vehicle Weight Rating (GVWR). This is the most the fully loaded trailer can weigh. It will also provide the Gross Axle Weight Rating (GAWR). This is the most a particular axle can weigh. If there are multiple axles, the GAWR of each axle will be provided.

If your trailer has a GVWR of 10,000 pounds or less, there is a vehicle placard located in the same location as the certification label described above. This placard provides tire and loading information. In addition, this placard will show a statement regarding maximum cargo capacity. Cargo can be added to the trailer, up to the maximum weight specified on the placard. The combined weight of the cargo is provided as a single number. In any case, remember: the total weight of a fully loaded trailer can not exceed the stated GVWR.

When loading your cargo, be sure it is distributed evenly to prevent overloading front to back and side to side. Heavy items should be placed low and as close to the axle positions as reasonable. Too many items on one side may overload a tire. The best way to know the actual weight of the trailer is to weigh it at a public scale. Talk to your dealer to discuss the weighing methods needed to capture the various weights related to the trailer. This would include the weight empty or unloaded, weights per axle, wheel, hitch or king-pin, and total weight.

Excessive loads and/or underinflation cause tire overloading and, as a result, abnormal tire flexing occurs. This situation can generate an excessive amount of heat within the tire. Excessive heat may lead to tire failure. It is the air pressure that enables a tire to support the load, so proper inflation is critical. The proper air pressure may be found on the certification/VIN label and/or on the Tire Placard. This value should never exceed the maximum cold inflation pressure stamped on the tire.

1.1.1. TRAILERS 10,000 POUNDS GVWR OR LESS



The placard features a tire icon on the left. The title 'TIRE AND LOADING INFORMATION' is in yellow on a black background. Below the title is the number '24010118' and a warning statement: 'The weight of cargo should never exceed 907 kg. or 2000 lbs.'. A table with three columns (TIRE, SIZE, COLD TIRE PRESSURE) and three rows (FRONT, REAR, SPARE) is shown. The FRONT row is filled with '20.5x8.0-10(E)' and '621kPA or 90PSI'. The REAR and SPARE rows are empty. To the right of the table, the text 'SEE OWNER'S MANUAL FOR ADDITIONAL INFORMATION' is displayed in yellow on a black background.

TIRE	SIZE	COLD TIRE PRESSURE
FRONT	20.5x8.0-10(E)	621kPA or 90PSI
REAR		
SPARE		

Tire and Loading Information Placard – Figure 1-1

1. Locate the statement, "The weight of cargo should never exceed XXX kg or XXX lbs.," on your trailer's placard. See figure 1-1.
2. This figure equals the available amount of cargo load capacity.
3. Determine the combined weight of cargo being loaded on the trailer. That weight may not safely exceed the available cargo load capacity.

The Tire Information Placard is attached adjacent to or near the trailer's VIN (Certification) label at the left front of the trailer.

1.1.2. TRAILERS OVER 10,000 POUNDS GVWR (NOTE: These trailers are not required to have a tire information placard on the trailer.)

1. Determine the empty weight of your trailer by weighing the trailer using a public scale or other means. This step does not have to be repeated.
2. Locate the GVWR (Gross Vehicle Weight Rating) of the trailer on your trailer's VIN (Certification) label.
3. Subtract the empty weight of your trailer from the GVWR stated on the VIN label. That weight is the maximum available cargo capacity of the trailer and must not be exceeded.

1.2. STEPS FOR DETERMINING CORRECT LOAD LIMIT – TOW VEHICLE

1. Locate the statement, "The combined weight of occupants and cargo should never exceed XXX lbs.," on your vehicle's placard.
2. Determine the combined weight of the driver and passengers who will be riding in your vehicle.
3. Subtract the combined weight of the driver and passengers from XXX kilograms or XXX pounds.
4. The resulting figure equals the available amount of cargo capacity. For example, if the "XXX" amount equals 1400 lbs. and there will be five 150 lb. passengers in your vehicle, the amount of available cargo and luggage capacity is 650 lbs. ($1400 - 750 (5 \times 150) = 650$ lbs.).
5. Determine the combined weight of cargo being loaded on the vehicle. That weight must not exceed the available cargo capacity calculated in Step # 4.
6. If your vehicle will be towing a trailer, load from your trailer will be transferred to your vehicle. Consult the tow vehicle's manual to determine how this weight transfer reduces the available cargo and luggage capacity of your vehicle.

1.3. GLOSSARY OF TIRE TERMINOLOGY

Bead - the part of the tire that is made of steel wires, wrapped or reinforced by ply cords and that is shaped to fit the rim.

Bead separation - the breakdown of the bond between components in the bead.

Bias ply tire - a pneumatic tire in which the ply cords that extend to the beads are laid at alternate angles substantially less than 90 degrees to the centerline of the tread.

Carcass - the tire structure, except tread and sidewall rubber which, when inflated, bears the load.

Chunking - the breaking away of pieces of the tread or sidewall.

Cold inflation pressure - the pressure in the tire before you drive.

Cord - the strands forming the plies in the tire.

Cord separation - the parting of cords from adjacent rubber compounds.

Cracking - any parting within the tread, sidewall, or inner liner of the tire extending to cord material.

Curb weight - the weight of a vehicle with standard equipment.

Groove - the space between two adjacent tread ribs.

Gross Axle Weight Rating (GAWR) - the maximum weight that any axle can support, as published on the Certification / VIN label on the front left side of the trailer. Actual weight determined by weighing each axle on a public scale, with the trailer attached to the towing vehicle.

Gross Vehicle Weight Rating (GVWR) - the maximum weight of the fully loaded trailer, as published on the Certification / VIN label. Actual weight determined by weighing trailer on a public scale, without being attached to the towing vehicle.

Tongue Weight - the downward force exerted on the hitch ball or lunette by the trailer coupler.

Innerliner - the layer(s) forming the inside surface of a tubeless tire that contains the inflating medium within the tire.

Innerliner separation - the parting of the innerliner from cord material in the carcass.

Light truck (LT) tire - a tire designated by its manufacturer as primarily intended for use on lightweight trucks or multipurpose passenger vehicles.

Load rating - the maximum load that a tire is rated to carry for a given inflation pressure.

Maximum load rating - the load rating for a tire at the maximum permissible inflation pressure for that tire.

Maximum permissible inflation pressure - the maximum cold inflation pressure to which a tire may be inflated.

Maximum loaded vehicle weight - the sum of curb weight, accessory weight, vehicle capacity weight, and production options weight.

Outer diameter - the overall diameter of an inflated new tire.

Overall width - the linear distance between the exteriors of the sidewalls of an inflated tire, including elevations due to labeling, decorations, or protective bands or ribs.

Ply - a layer of rubber-coated parallel cords.

Ply separation - a parting of rubber compound between adjacent plies.

Pneumatic tire - a mechanical device made of rubber, chemicals, fabric and steel or other materials, that, when mounted on an automotive wheel, provides the traction and contains the gas or fluid that sustains the load.

Radial ply tire - a pneumatic tire in which the ply cords that extend to the beads are laid at substantially 90 degrees to the centerline of the tread.

Recommended inflation pressure - the inflation pressure provided by the vehicle manufacturer on the Tire Information label and on the Certification / VIN tag.

Rim - a metal support for a tire or a tire and tube assembly upon which the tire beads are seated.

Rim diameter - the nominal diameter of the bead seat.

Rim size designation - the rim diameter and width.

Rim type designation - the industry of manufacturer's designation for a rim by style or code.

Rim width - the nominal distance between rim flanges.

Sidewall - that portion of a tire between the tread and bead.

Sidewall separation - the parting of the rubber compound from the cord material in the sidewall.

Special Trailer (ST) tire - the "ST" is an indication the tire is for trailer use only.

Tread - that portion of a tire that comes into contact with the road.

Tread rib - a tread section running circumferentially around a tire.

Tread separation - pulling away of the tread from the tire carcass.

Treadwear indicators (TWI) - the projections within the principal grooves designed to give a visual indication of the degrees of wear of the tread.

Vehicle maximum load on the tire - the load on an individual tire that is determined by distributing to each axle its share of the maximum loaded vehicle weight and dividing by two.

Vehicle normal load on the tire - the load on an individual tire that is determined by distributing to each axle its share of the curb weight and dividing by 2.

1.4. TIRE SAFETY - EVERYTHING RIDES ON IT

The National Traffic Safety Administration (NHTSA) has published a brochure (DOT HS 809 361) that discusses all aspects of Tire Safety, as required by CFR 575.6. This brochure is reproduced in part below. It can be obtained and downloaded from NHTSA, free of charge, from the following web site: http://www.nhtsa.dot.gov/cars/rules/TireSafety/ridesonit/tires_index.html

Studies of tire safety show that maintaining proper tire pressure, observing tire and trailer load limits (not carrying more weight in your trailer than your tires or trailer can safely handle), avoiding road hazards, and inspecting tires for cuts, slashes, and other irregularities are the most important things you can do to avoid tire failure, such as tread separation or blowout and flat tires. These actions, along with other care and maintenance activities, can also:

- ◇ Improve vehicle handling
- ◇ Help protect you and others from avoidable breakdowns and accidents
- ◇ Improve fuel economy
- ◇ Increase the life of your tires.

This booklet presents a comprehensive overview of tire safety, including information on the following topics:

- ◇ Basic tire maintenance
- ◇ Uniform Tire Quality Grading System
- ◇ Fundamental characteristics of tires
- ◇ Tire safety tips.

Use this information to make tire safety a regular part of your trailer maintenance routine. Recognize that the time you spend is minimal compared with the inconvenience and safety consequences of a flat tire or other tire failure.

1.5. SAFETY FIRST—BASIC TIRE MAINTENANCE

Properly maintained tires improve the steering, stopping, traction, and load-carrying capability of your trailer. Underinflated tires and overloaded vehicles are a major cause of tire failure. Therefore, as mentioned above, to avoid flat tires and other types of tire failure, you should maintain proper tire pressure, observe tire and trailer load limits, avoid road hazards, and regularly inspect your tires.

1.5.1. FINDING YOUR TRAILER'S RECOMMENDED TIRE PRESSURE AND LOAD LIMITS

Tire information placards and vehicle certification labels contain information on tires and load limits. These labels indicate the vehicle manufacturer's information including:

- ◇ Recommended tire size
- ◇ Recommended tire inflation pressure
- ◇ Vehicle capacity weight
- ◇ Front and rear gross axle weight ratings

Both placards and certification labels are permanently attached to the trailer near the left front.

1.5.2. UNDERSTANDING TIRE PRESSURE AND LOAD LIMITS

Tire inflation pressure is the level of air in the tire that provides it with load-carrying capacity and affects the overall performance of the trailer. The tire inflation pressure is a number that indicates the amount of air pressure—measured in pounds per square inch (psi) or kilopascals (kpa)—a tire requires to be properly inflated.

This number based on the trailer's design load limit, that is, the greatest amount of weight a trailer can safely carry and the tire size. The proper tire pressure for your trailer is referred to as the "recommended cold inflation pressure." (As you will read below, it is difficult to obtain the recommended tire pressure if your tires are not cold.)

Because tires are designed to be used on more than one type of vehicle, tire manufacturers list the "maximum permissible inflation pressure" on the tire sidewall. This number is the greatest amount of air pressure that should ever be put in the tire under normal driving conditions.

1.5.3. CHECKING TIRE PRESSURE

It is important to check your trailer's tire pressure at least once a month for the following reasons:

- ◇ Most tires may naturally lose air over time.
- ◇ Tires can lose air suddenly if you drive over a pothole or other object or if you strike the curb when parking.
- ◇ With radial tires, it is usually not possible to determine underinflation by visual inspection.

For convenience, purchase a tire pressure gauge to keep with your trailer. Gauges can be purchased at tire dealerships, auto supply stores, and other retail outlets.

The recommended tire inflation pressure that manufacturers provide reflects the proper psi when a tire is cold. The term cold does not relate to the outside temperature. Rather, a cold tire is one that has not been driven on for at least three hours. When you drive, your tires get warmer, causing the air pressure within them to increase. Therefore, to get an accurate tire pressure reading, you must measure tire pressure when the tires are cold or compensate for the extra pressure in warm tires.

1.5.4. STEPS FOR MAINTAINING PROPER TIRE PRESSURE

Step 1: Locate the recommended tire pressure on the trailer's tire information placard, certification label, or in the owner's manual.

Step 2: Record the tire pressure of all tires.

Step 3: If the tire pressure is too high in any of the tires, slowly release air by gently pressing on the tire valve stem with the edge of your tire gauge until you get to the correct pressure.

Step 4: If the tire pressure is too low, note the difference between the measured tire pressure and the correct tire pressure. These "missing" pounds of pressure are what you will need to add.

Step 5: Add the missing pounds of air pressure to each tire that is underinflated.

Step 6: Check all the tires to make sure they have the same air pressure (except in cases in which the front and rear tires are supposed to have different amounts of pressure).

If you have been towing your trailer and think that a tire is underinflated, fill it to the recommended cold inflation pressure indicated on your trailer's tire information placard or certification label.

While your tire may still be slightly underinflated due to the extra pounds of pressure in the warm tire, it is safer to drive with air pressure that is slightly lower than the recommended cold inflation pressure than to drive with a significantly underinflated tire. Since this is a temporary fix, don't forget to recheck and adjust the tire's pressure when you can obtain a cold reading.

1.5.5. TIRE SIZE

To maintain tire safety, purchase new tires that are the same size as the trailer's original tires or another size recommended by the manufacturer. Look at the tire information placard, the owner's manual, or the sidewall of the tire you are replacing to find this information. If you have any doubt about the correct size to choose, consult with your dealer.

1.5.6. TIRE TREAD

The tire tread provides the gripping action and traction that prevent your trailer from slipping or sliding, especially when the road is wet or icy. In general, tires are not safe and should be replaced when the tread is worn down to 1/16 of an inch. Tires have built-in treadwear indicators that let you know when it is time to replace your tires. These indicators are raised sections spaced intermittently in the bottom of the tread grooves. When they appear "even" with the outside of the tread, it is time to replace your tires. Another method for checking tread depth is to place a penny in the tread with Lincoln's head upside down and facing you. If you can see the top of Lincoln's head, you are ready for new tires.

1.5.7. TIRE BALANCE AND WHEEL ALIGNMENT

To avoid vibration or shaking of the trailer when a tire rotates, the tire must be properly balanced. This balance is achieved by positioning weights on the wheel to counterbalance heavy spots on the wheel-and-tire assembly. A wheel alignment adjusts the angles of the wheels so that they are positioned correctly relative to the trailer's frame. This adjustment maximizes the life of your tires. These adjustments require special equipment and should be performed by a qualified technician.

1.5.8. TIRE REPAIR

The proper repair of a punctured tire requires a plug for the hole and a patch for the area inside the tire that surrounds the puncture hole. Punctures through the tread can be repaired if they are not too large, but punctures to the sidewall should not be repaired. Tires must be removed from the rim to be properly inspected before being plugged and patched.

1.5.9. TIRE FUNDAMENTALS

Federal law requires tire manufacturers to place standardized information on the sidewall of all tires. This information identifies and describes the fundamental characteristics of the tire and also provides a tire identification number for safety standard certification and in case of a recall.

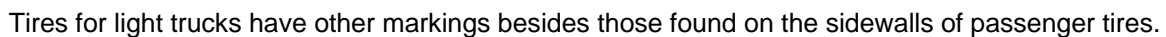
1.5.9.1. UTQGS Information

Treadwear Number - indicates the tire's wear rate. The higher the treadwear number is, the longer it should take for the tread to wear down. For example, a tire graded 400 should last twice as long as a tire graded 200.

Traction Letter - indicates a tire's ability to stop on wet pavement. A higher graded tire should allow you to stop your car on wet roads in a shorter distance than a tire with a lower grade. Traction is graded from highest to lowest as "AA", "A", "B", and "C".

Temperature Letter - indicates a tire's resistance to heat. The temperature grade is for a tire that is inflated properly and not overloaded. Excessive speed, underinflation or excessive loading, either separately or in combination, can cause heat build-up and possible tire failure. From highest to lowest, a tire's resistance to heat is graded as "A", "B", or "C".

Please refer to the diagram below.



ST - indicates the tire is for trailer use only.

Max. Load Single kg (lbs) at kPa (psi) Cold - indicates the maximum load and tire pressure when the tire is used as a single.

Load Range - identifies the tire's load-carrying capabilities and its inflation limits.

Preventing Tire Damage

- ## Tire Safety Checklist

- ◇ Check tire pressure regularly (at least once a month), including the spare (if equipped).
- ◇ Inspect tires for uneven wear patterns on the tread, cracks, foreign objects, or other signs of wear or trauma.
- ◇ Remove bits of glass and foreign objects wedged in the tread.
- ◇ Make sure your tire valves have valve caps.
- ◇ Check tire pressure before going on a long trip.
- ◇ Do not overload your trailer. Check the Tire Information and Loading Placard or Owner's Manual for the maximum recommended load for the trailer.



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