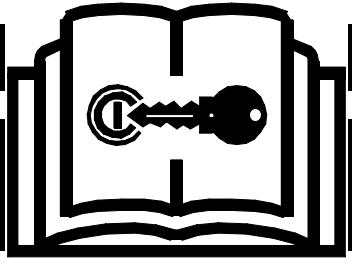
HAMMERHEAD™

HG12 Winch



Operator's and Maintenance Manual

HG12_Winch_o1_03
Serial No. 96095 and up
Order No. OM1001

INTRODUCTION

This manual explains the proper operation of your machine. Study and understand these instructions thoroughly before operating or maintaining the machine. Failure to do so could result in personal injury or equipment damage. Consult your HammerHead dealer if you do not understand the instructions in this manual, or need additional information.

The instructions, illustrations, and specifications in this manual are based on the latest information available at time of publication. Your machine may have product improvements and features not yet contained in this manual.

Earth Tool Company LLC reserves the right to make changes at any time without notice or obligation.

Operation and maintenance instructions are included in the Operator's Manuals provided with the machine. The tethered (cabled) manual must remain attached to the machine for ready reference. Store it in the manual storage box when not in use.

Additional copies of the manuals are available from your dealer. Use the reorder number on the front cover to order additional manuals.

Earth Tool Company LLC
P.O. Box 3
Oconomowoc, WI 53066

NOTE: Right and left sides of the machine are determined by facing in the direction of forward travel.

PATENTS

This machine may be covered by one or more of the following patents:

US 5,025,868	US 5,199,151	US 5,487,430	US 5,317,953	US 5,465,797
US 5,440,797	US 5,494,116	US 5,505,270	US 5,603,383	US 5,651,639
US 5,687,803	US 5,782,311	US 6,148,935	US 6,171,026 B1	US 6,260,634 B1
US 6,261,027 B1	US 6,263,983 B1	US 6,269,889 B1	US 6,273,201 B1	US 6,283,229 B1
US 6,302,410 B1	US 6,299,382 B1	US 5,337,837	US 6,321,858 B1	US 6,390,207 B2
US 6,371,223 B2	US 6,390,087 B1			

(Other U.S. and foreign patents pending.)

HAMMERHEAD EQUIPMENT LIMITED WARRANTY

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 hereunder 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 Oconomowoc, 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 products 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

Oconomowoc, Wisconsin

HG12 Winch

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Receiving and Delivery Report

DEALER PREP

Check or perform the following:

___ Check machine for shortage or damage in transit.

Engine

___ Check the coolant level/anti-freeze mix.

___ Check the oil level of the engine.

___ Check the battery electrolyte level and charge.

___ Check the condition of the air cleaner.

___ Check the engine for proper operation.

Hydraulics

___ Check the level of the hydraulic fluid.

___ Check all hydraulic components for leaks or damage.

Winch

___ Check the level of the oil in the gear boxes.

General

___ Check the alternator/fan belt for proper tension.

___ Check all shields for installation and condition.

___ Check the machine for proper lubrication.

___ Check the wheel lug nuts for tightness, 90-95 ft-lb (122-130 Nm).

___ Check the tires for proper air pressure, 75 psi (5.1 bar) maximum.

___ Check the condition of all decals.

___ Check the operation of the taillights.

___ Check that the safety towing chains are installed.

___ Check that break-away brake switch is installed and functions.

___ Check all phases of operation.

___ Complete “Dealer/Customer Information”, *page iii*.

___ Complete “Identification Numbers - Record”, *page iv*.

DEALER/CUSTOMER INFORMATION

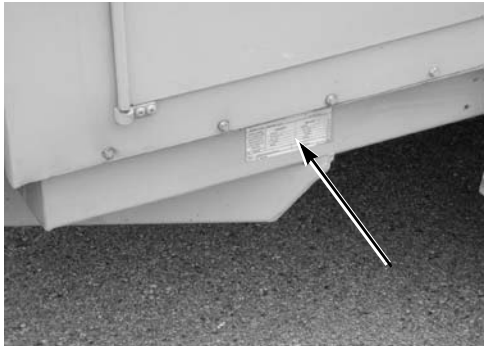
dealer	owner
address	address
city	city
state / province	state / province
zip / postal code	zip / postal code
country	country

IDENTIFICATION NUMBERS - RECORD

Machine Identification Numbers

Model Number_____

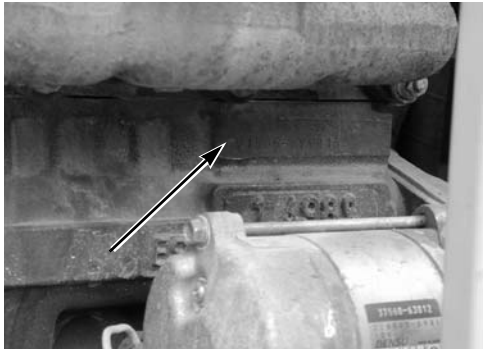
Serial Number_____



Engine Identification Numbers

Model Number_____

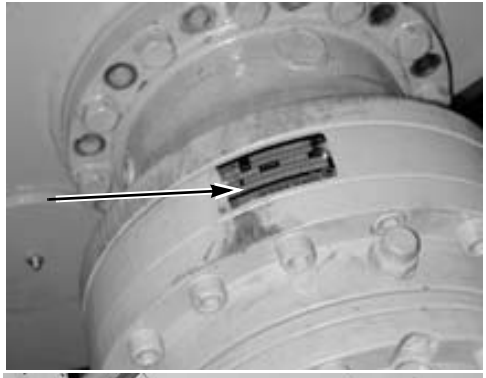
Serial Number_____



Winch Identification Numbers

Model Number_____

Serial Number_____



Bull Wheel Identification Numbers

Model Number_____

Serial Number_____

DELIVERY

Check and perform the following with the customer:

Winch

___ Review all sections of the *Operator's Manual.*

___ Grease or oil all lubrication points; review lubrication, decal, and maintenance intervals.

___ Ensure all requested options are installed.

___ Review Winch operation (refer to to the *Controls* section, *page 25-1* and to the *Operating the Winch* section, *page 50-1*.

Dealer Installed Options

___ Review all appropriate operation and adjustment information.

Review of Operation

___ Review and demonstrate with customer the various aspects of winch operation.

- overall explanation of how the Winch works
- Winch safety
- preparing the Winch for operation

TABLE OF CONTENTS

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Section 10: Safety Messages

General safety messages appear in this Safety Messages section. Specific safety messages are located in appropriate sections of the manual where a potential hazard may occur if the instructions or procedures are not followed.

Understand Safety Alert Symbol

This is the safety alert symbol. This symbol placed on your machine or in the manual and is used to alert you to the potential for bodily injury or death.

Understand Signal Words

A signal word **"DANGER"**, **"WARNING"**, or **"CAUTION"** is used with the safety alert symbol.

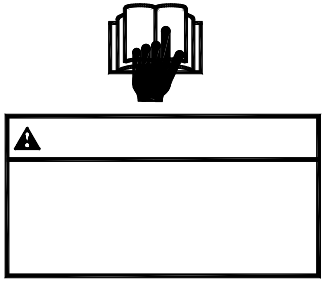
Safety signs with signal word **"DANGER"**, **"WARNING"**, or **"CAUTION"** are located near specific hazards.

DANGER — Imminent hazards which, if not avoided, will result in serious personal injury or death.

WARNING — Potential hazards or unsafe practices which, if not avoided, could result in serious personal injury or death.

CAUTION — Potential hazards or unsafe practices which, if not avoided, could result in minor personal injury or product or property damage.

READ, UNDERSTAND, AND FOLLOW INSTRUCTIONS



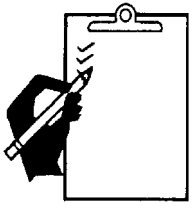
Read, understand, and follow all safety instructions and safety messages included in this manual and on decals attached to the machine. These instructions and safety messages contain important information.

Allow only responsible, properly instructed individuals to operate and service the machine.

Failure to follow the instructions and safety messages in this manual and on the decals attached to the machine could result in serious injury or death.

Keep all safety decals and instruction decals in good condition. Replace any missing or damaged decals.

KEEP MACHINE IN GOOD CONDITION



Be sure the machine is in good operating condition and that all safety devices are installed and functioning properly.

Visually inspect the machine daily before starting the machine.

Make no modifications to your equipment unless specifically recommended or requested by Earth Tool Company LLC.

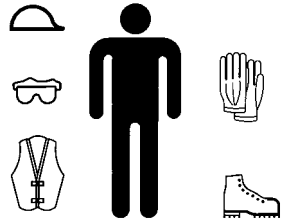
REPORTING SAFETY DEFECTS

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 Earth Tool Co. LLC.

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 individual problems between you, your dealer or Earth Tool Co. LLC.

To contact NHTSA, you may either call the Auto Safety Hot line toll-free at 1-800-424-9393 (or 366-0123 in Washington, D.C. area) or write to: NHTSA, U.S. Department of Transportation, Washington, D.C. 20590. You can also obtain other information about motor vehicle safety from the Hot line.

PERSONAL PROTECTIVE EQUIPMENT



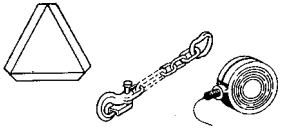
Operating this machine will require you to wear personal protective equipment. Wear close-fitting clothing and confine long hair.

Avoid wearing jewelry, such as rings, wrist watches, necklaces, or bracelets.

Always wear:

- safety glasses
- work shoes
- hard hat
- leather gloves when handling wire rope
- high visibility clothing when working near traffic

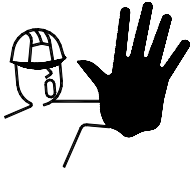
TRANSPORTING THE MACHINE



To reduce risk of injury or loss of vehicle control, refer to the ""“Transporting the Winch”, *page 40-1*" section before towing the machine.

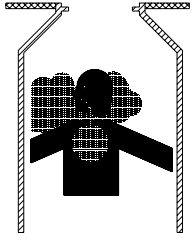
Use good judgement and obey all applicable laws governing road use.

KEEP SPECTATORS AWAY FROM MACHINE



Keep all spectators and other workers away from the machine and work area while in operation.

CONFINED SPACE REGULATIONS



Do not work in a confined space, such as a sewer, until requirements are met to ensure a hazard free environment. Specific requirements for confined space entry are available from federal and state O.S.H.A. offices.

WIRE ROPE FAILURE

- Wire rope may break or suddenly release while pulling. Serious injury or death will occur if struck. Stay away!
- Inspect wire rope and hook for damage or wear before each pull.
- Securely hook winch rope to attachment tool.
- The last fire wraps of cable must be left on drum to hold the load.

SAFE WINCH OPERATING PRACTICES

- Do not guide wire rope by hand while pulling with winch.
- Do not exceed maximum line pull of 24,000 lb (10,886 kg).
- Do not use winch to lift, support, or transport personnel.
- Do not lift loads over personnel.

- Use the winch for pipe bursting only.
- Do not disengage drum under load.
- Keep winch trailer access doors closed while pulling.

WORK IN VENTILATED AREA

Exhaust fumes can be fatal.

If operating the machine in an enclosed area, remove the exhaust fumes with an exhaust pipe extension to the outside.

HANDLE FUEL SAFELY

Fuel and fumes can catch fire or explode and cause serious injury from burns.

Shut off engine before refueling. No smoking. No flame.

AVOID HIGH PRESSURE LEAKS

Pressurized fluid can penetrate body tissue and result in serious injury or death. Leaks can be invisible. Relieve pressure before working on system. When searching for a leak, use an object like cardboard - not your hand. Fluid injected under the skin must be removed immediately by a surgeon familiar with this type of injury.

CLEAN FLAMMABLE MATERIALS FROM MACHINE

Prevent fires by keeping engine compartment, battery, hydraulic lines, fuel tank and operator's station clean of accumulated trash, grease, and debris.

AVOID COOLANT BURNS

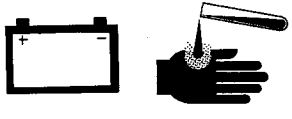
Hot fluid under pressure can erupt and scald if opened.

Allow to cool before opening.

AVOID BATTERY EXPLOSION

Battery fumes are flammable and can explode. Keep all burning materials away from battery. Do not smoke. Tools and cable clamps can make sparks. Shield eyes and face from battery.

AVOID BATTERY BURNS



Battery contains sulfuric acid which can cause severe burns. Avoid contact with eyes, skin, and clothing.

In case of acid contact:

External: Flush with plenty of water. If eyes have been exposed, flush with water for 15 minutes and get prompt medical attention.

Internal: Drink large quantities of water or milk, follow with milk of magnesia, beaten egg, or vegetable oil. Call a physician immediately.

AVOID TIRE EXPLOSION

Tire explosion can result if the following procedures are not followed:

- Maintain correct tire pressure. Do not inflate tire above recommended pressure.
- Low tire pressure can cause internal tire damage. Inflate to recommended pressure.
- Replace any tire with cuts or bubbles. Replace any damaged rims.
- Do not weld or heat wheel assembly. Heating will increase tire pressure.

USE SHUTDOWN PROCEDURE

For your safety and the safety of others, the *Starting Procedure*, page *30-1* must be followed before servicing, cleaning, repairing, inspecting, lubricating, fueling, or transporting the machine.

WARNING: Failure to follow any of the preceding safety instructions, or those that follow within this manual, could result in serious injury or death. This machine is to be used only for those purposes for which it was intended, as explained in this Operator's Manual.

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Section 15: Safety Decals

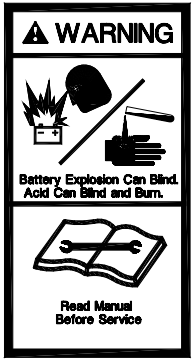
SAFETY DECAL MAINTENANCE

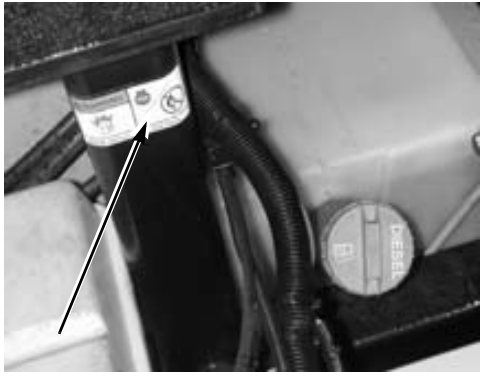
Safety decals located on your machine contain important and useful information that will help you operate your equipment safely.

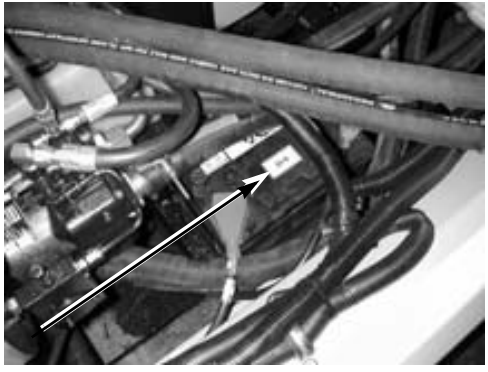
To assure that all decals remain in place and in good condition, follow these instructions:

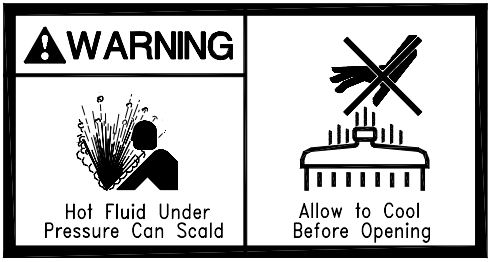
- Keep decals clean. Use soap and water - not mineral spirits, abrasive cleaners, or other similar cleaners that will damage the decal.
- Replace any damaged or missing decals. When attaching decals, surface temperature of the metal must be at least 40°F (5°C). The metal must be clean and dry.
- When replacing a machine component with a decal attached, replace the decal also.
- Replacement decals can be purchased from your HammerHead equipment dealer.

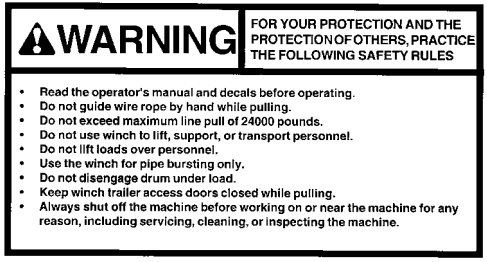

WARNING
Fuel and Fumes Can Explode and Burn
No Smoking. No Flame. Stop Engine


WARNING
Battery Explosion Can Blind. Acid Can Blind and Burn.
Read Manual Before Service






WARNING
Hot Fluid Under Pressure Can Scald
Allow to Cool Before Opening


WARNING
FOR YOUR PROTECTION AND THE PROTECTION OF OTHERS, PRACTICE THE FOLLOWING SAFETY RULES
• Read the operator's manual and decals before operating.
• Do not guide wire rope by hand while pulling.
• Do not exceed maximum line pull of 24000 pounds.
• Do not use winch to lift, support, or transport personnel.
• Do not lift loads over personnel.
• Use the winch for pipe bursting only.
• Do not disengage drum under load.
• Keep winch trailer access doors closed while pulling.
• Always shut off the machine before working on or near the machine for any reason, including servicing, cleaning, or inspecting the machine.


DANGER

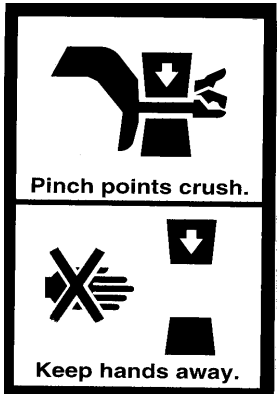
DANGER

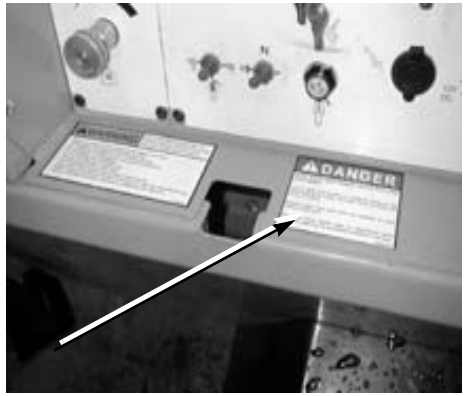
Wire rope may break or suddenly release while pulling. Serious injury or death will occur if struck. Stay away.

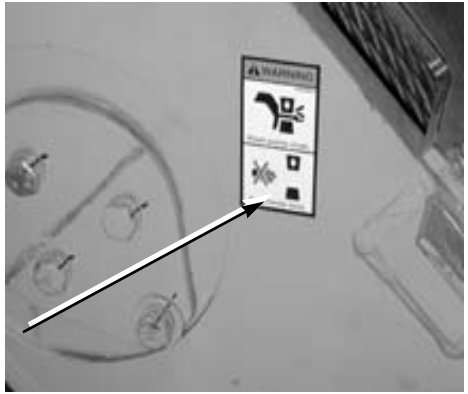
Inspect wire rope and hook for damage or wear before each pull.

Securely hook winch rope to attachment tool.

The last five wraps of cable must be left on drum to hold the load.







Section 20: How the HG12 Winch Works

The HammerHead HG12 HydroGuide Power Winch has a dual capstan design coupled with a large take-up reel with a capacity of 2000 ft (610 m) of 5/8″ (15.8 mm) wire rope.

The HG12 provides up to 12 Tons of constant tension for pipe bursting, pipe splitting, slip lining, and cable pulling. Speed is infinitely variable up to a maximum no-load speed of 48 ft/min (14.6 m/min). Line pull can be preset from 1/2 to 12 tons.

The HG12 is set up at one end of the job in a manhole or receiving pit. The cable is fed through the existing line to be burst into the entrance pit where it is attached to the HammerHead Mole. The tool and burst head assembly are then winched into the entrance pit and lined up with the existing service. The tool is then started and the winch assists the tools forward progress through the old service while simultaneously pulling in the new service.

The purpose of the HG12 Winch is to keep the tool and new service on grade and in the same location as the old pipe. The HG12 also assists in helping the forward progress of the tool whether it is in loose or tight soil conditions.

When the tool and burst head assembly are received at the end of the burst, the cable is unattached, the down-rigger assembly removed, and the HG12 Winch moved out of the way.

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Section 25: Controls

ENGINE CONTROLS

(1) Key Switch

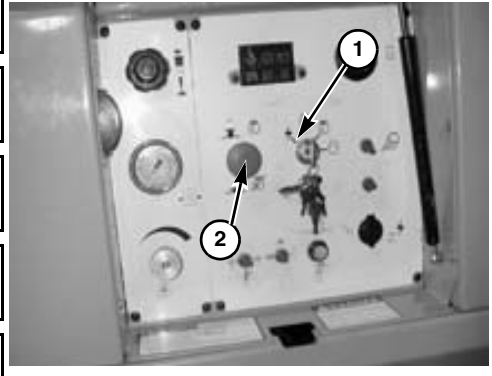
Center position..... ignition system OFF

Fully Counterclockwise .....turns on preheat system

1st position clockwise .....turns on electrical system

1st position clockwise ..... engine run

2nd position clockwise .....starts the engine

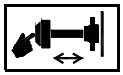


(2) Emergency Shutdown Switch

Push in.....Shuts down all systems

NOTE: Engine does have an electronic fuel shut off. Pushing the throttle in will not shut down the engine.

(3) Throttle



Push center button to push in or pull out:

Push knob ..... does not stop engine

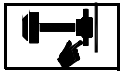
Pull knob..... increase speed

Push knob ..... decrease speed

Turn knob to make fine adjustments:

Clockwise ..... decrease

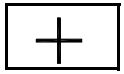
Counterclockwise ..... increase

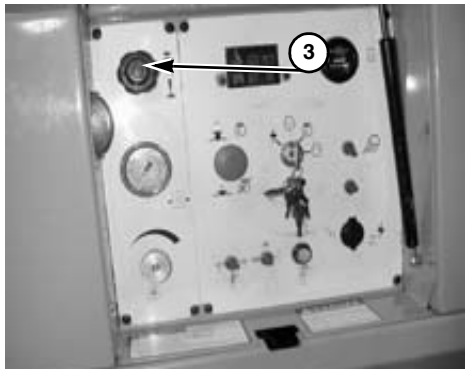


Turn base ring to lock setting:

Clockwise .....lock

Counterclockwise .....unlock





ENGINE MONITORS

(1) Control Panel/Remote Selector

Up position ..... Remote

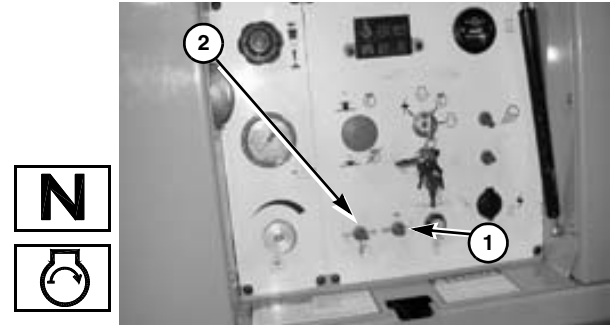
down position .....Panel

(2) Neutral Start Indicator

Winch Control Knob

Center position .....neutral

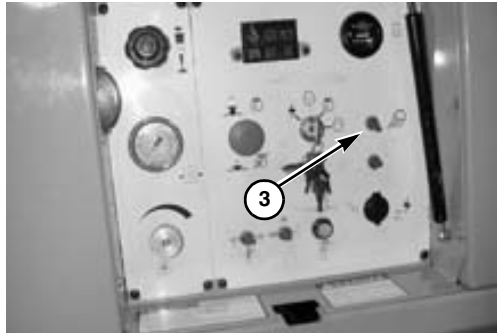
Center position ..... engine can be started



(3) Auxilary Light Selector

Up position.....On

Down position..... ..... Off



(4) Oil Pressure Indicator

On ..... oil pressure is low

(5) Temperature Indicator

On ..... engine is overheating

(6) Voltage indicator

On .....alternator is not changing

(7) Glow Plug Indicator

On ..... glow plug is hot

(8) High Hydraulic Oil Temperature Indicator

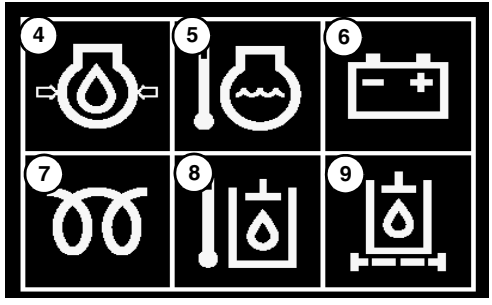
On.....hydraulic oil hot

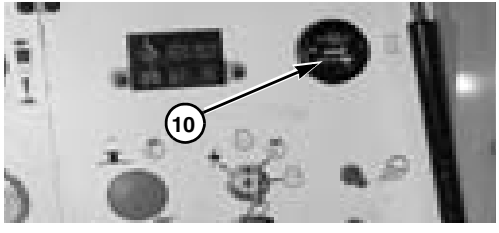
(9) Hydraulic Oil Filter Condition Indicator

On.....hydraulic filter flow restricted

(10) Hourmeter

Hours.....total number of hours machine has been in operation



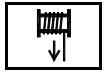


WINCH CONTROL

(1) Winch Control Knob

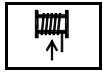
With Control Panel/Remote Selector switch left:

Left position ..... pay out cable

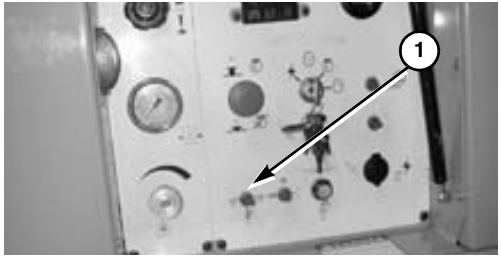


Centered.....neutral

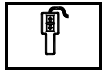
Right position.....pay in cable



NOTE: Cable will pay in or out at any engine speed.



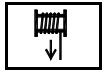
(2) Remote Control



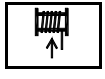
Remote can be plugged into panel for remote operation.

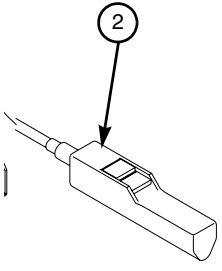
With Control Panel/Remote Selector switch right:

Press lower button.....pay out cable

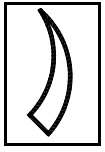


Press upper button .....pay in cable



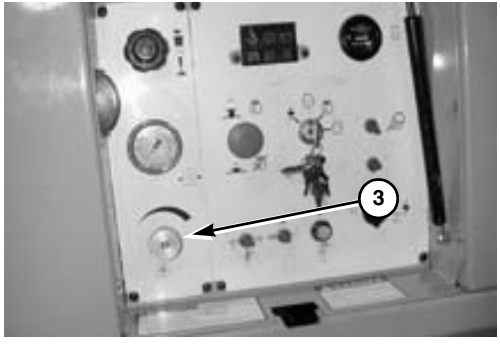


(3) Pressure Control Knob



Clockwise .....more pressure/pulling power

Counterclockwise ..... less pressure/pulling power



HYDRAULIC PRESSURE GAUGE

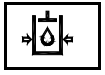
(1) Hydraulic Pressure Gauge

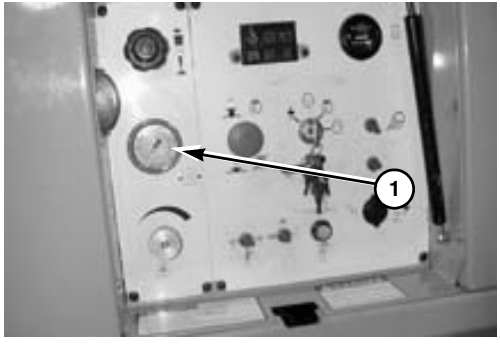
Winch:

in neutral..... approximately 0-300 psi (20 bar)

in use:

operational pressure..... up to approximately 3000 psi (207 bar)



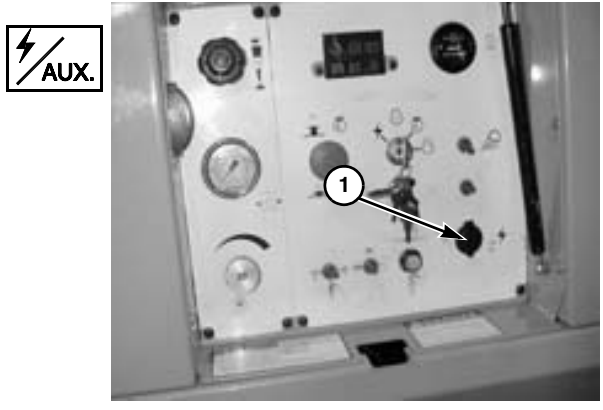


AUXILIARY ELECTRICAL CONNECTOR

(1) Connector

12V DC

Use connector to operate a 12 volt electrical accessory. The circuit is on when the ignition switch is in the run position and is protected by a 15 amp fuse.

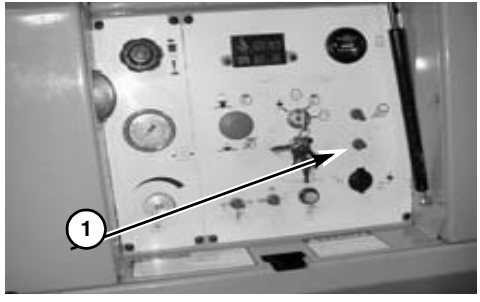


DOWNRIGGER CONTROL

(1) Downrigger direction selector

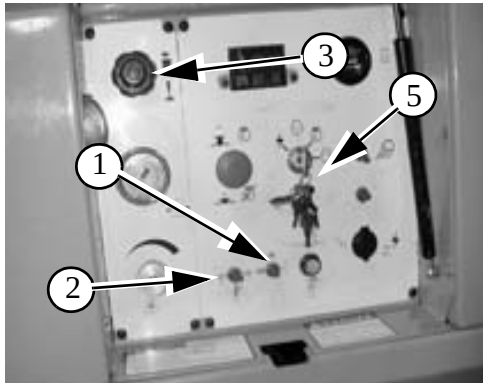
Up ..... Raises downrigger.

Down..... Lowers downrigger



Section 30: Starting Procedure

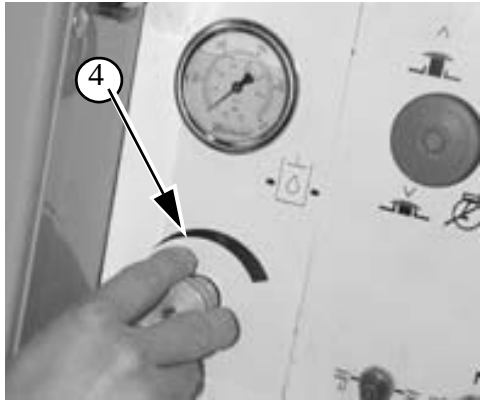
STARTING THE ENGINE



Step 1: Check to make sure the area is clear of personnel.

Step 2: Place Cylinder/Winch Switch (**1**) and Cable Direction Switch (**2**) in center (neutral) position.

Step 3: Set throttle (**3**) at 1/8 to 1/4 throttle.



Step 4: Turn pressure regulator control (**4**) completely out and back in two full turns to set setup pressure.

Step 5: On a cold engine turn key (**5**) fully counterclockwise to turn on the preheat system and hold, see time duration below.

Step 6: Start the engine and warm it up at medium speed.

IMPORTANT: Never run the starter for more than 10 seconds at a time. Wait 30 seconds between attempts

Approximate Preheating Times (Cold Engine)

- Above 23 F (-5 C).....5 Seconds
- Below 23 F (-5 C).....10 Seconds

NOTE: Maximum continuous use is 20 seconds.

COLD WEATHER STARTING

When operating in cold weather it is important to use the recommended engine oil viscosity and fuel to reduce starting problems.

In cold weather, the hydraulic oil will become thicker causing hydraulic functions to move slower until the oil is warmed.

In cold weather, a longer warm-up period will become necessary. Let the engine run for a minimum of five minutes at a fast idle before starting any operating functions.

Before starting the engine, refer to the Engine Operation Manual section on cold weather starting for correct procedures. Also refer to Starting the Engine procedures located in this section.

IMPORTANT: Do not spray starting fluid into the air cleaner. Engine damage can result.

JUMP STARTING

Do not jump start or charge a battery that is frozen or low on electrolyte.

Avoid explosion hazard. Battery caps must be in place and tight on all batteries.

IMPORTANT: Use only a 12 volt system for jump starting. Do not allow vehicles to touch.

WARNING: Wear protective clothing and face shield when working around batteries. Batteries produce and explosive gas when being charged. Keep flames and sparks away from the battery area.

Jump Starting Procedure

Step 1: Turn ignition key OFF.

Step 2: Make jumper cable connections in following order:

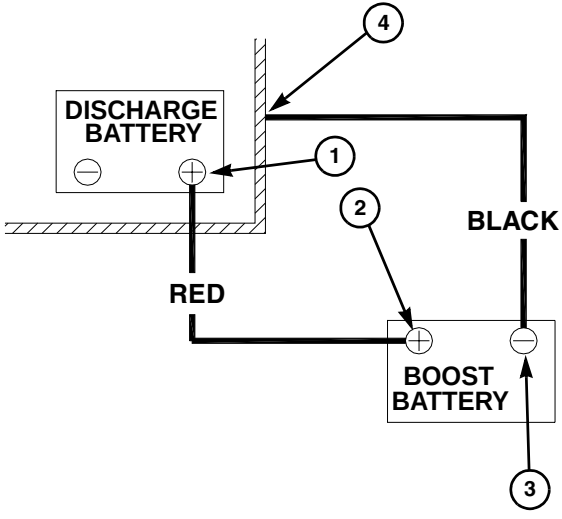
(1) Red to discharged battery POSITIVE (+).

(2) Red to boost battery POSITIVE (+).

(3) Black to boost battery NEGATIVE (-).

(4) Black to discharged machine frame (away from battery, fuel lines, and moving parts). Do not attach to negative (-) terminal of discharged battery.

Step 3: While at the controls, start engine. Remove cables in REVERSE order.



Section 35: Shutdown Procedure

STOPPING THE ENGINE

When stopping the machine, use the following shutdown procedure:

Step 1: Return the winch control switches to neutral.

Step 2: Reduce engine speed to idle.

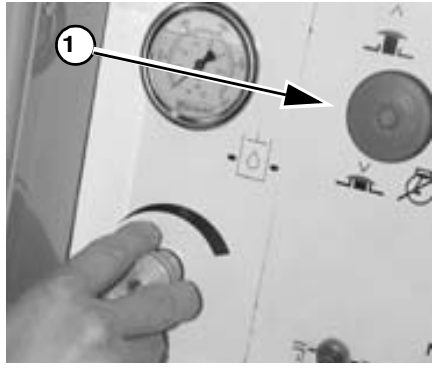
Step 3: Turn ignition key counterclockwise to off position.

Step 4: Remove the key.

For your safety and the safety of others, use this shutdown procedure before servicing, cleaning, inspecting, or transporting the winch.

A variation of the above procedure may be used if so instructed within this manual or if an emergency requires it.

NOTE: The Emergency Shutdown Switch will immediately shutdown all the HG12 Winch systems completely when pushed.



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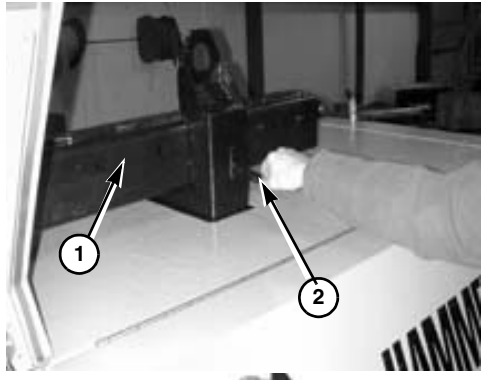
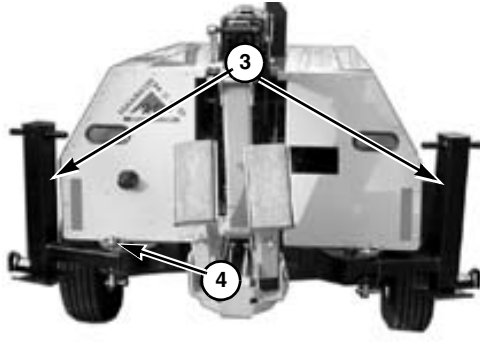
Section 40: Transporting the Winch

PREPARE FOR TRANSPORT

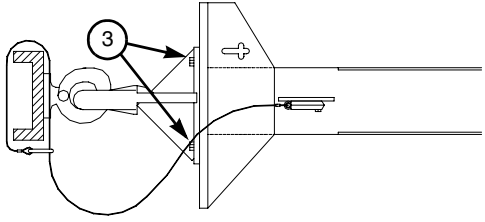
Store downrigger **(1)** in horizontal position and make sure latch (**2**) is engaged.



Fully raise the jacks **(3)** and rotate the outriggers to the side toward the fenders. Rotate them completely and insert lock pin (**4**) and secure the pin with the linchpin.



Adjust Hitch Height



Before attaching the machine to the towing vehicle, check the height of the hitch on the towing vehicle to the hitch on the machine. The height of the machine hitch and towing vehicle hitch need to be approximately the same to keep the machine level during transport.

Step 1: To adjust the hitch:

Step 2: Remove four hitch bolts **(3)**.

Step 3: Raise or lower hitch to match towing vehicle height.

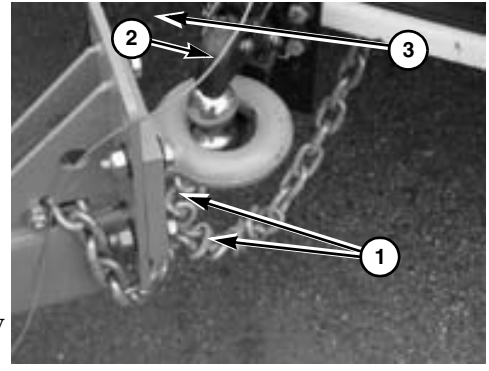
Step 4: Replace the four hitch bolts and tighten. Torque to 145 ft. lbs (197 Nm).

NOTE: There is only the Pintle type hitch available from the factory for the HG12 Winch.

ATTACHING TO TOWING VEHICLE

NOTE: It is recommended that towing vehicle be equipped with mud flaps. The HG12 comes standard with a pintle hitch. No other option is available through the factory.

Pintle Hitch



- Cross the safety chains **(1)** under the tongue and attach them to the towing vehicle. Keep the chains as short as possible, but leave enough slack to turn corners.
- Attach the breakaway cable **(2)** to the towing vehicle bumper or frame.

IMPORTANT: The breakaway cable length should be adjusted so the breakaway system applies the brakes only after both the hitch and the safety towing chains have disconnected. The breakaway system is not to be used as a parking brake.

- Attach the electrical connector **(3)** to the towing vehicle. Check that the highway lights and electric brakes are functioning properly.

IMPORTANT: The towing vehicle must be equipped with a brake controller that automatically applies the trailer's electric brakes when stopping.

- Fully raise the jack to prevent the jack from hitting any obstructions.

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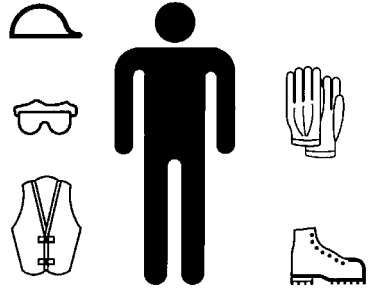
Section 45: Preparing the Winch and Work Area

Personal Protective Equipment



Operating the machine will require you to wear protective equipment. You should always wear a hard hat, work shoes, and eye protection. Wear leather gloves when handling the wire rope. If working near traffic, wear high visibility clothing.

Wire Rope

Specification

5/8 inch x 2080 feet with swaged on closed eye; 6 x 25 IWRC; Extra Improved Plow Steel; all purpose flexible rope.

The wire rope has a breaking strength of 40,600 pounds (18,454 kg). It must be maintained in good condition for use with the winch, which is rated at 24,000 pounds (10,909 kg) line pull.

Damage

Damaged wire rope must be replaced immediately. Obvious damage includes permanent bends, flat spots, worn spots, frayed spots, rust, and corrosion.

Wire Rope Failure

Wire rope will break if abused or misused. Failure is usually cumulative. A wire rope that almost fails under a heavy load can fail under a lighter load on the next pull.

DANGER: Wire rope whip lash can be fatal. Be sure the wire rope is in good condition and that it is securely attached to the load.

When it breaks, wire rope will whip or lash because of the sudden release of tension on the wire rope. The wire rope can also whip or lash if it is suddenly pulled loose from its load. Be sure the wire rope is securely attached to its load.

Maintaining Wire Rope

For maximum wire rope life:

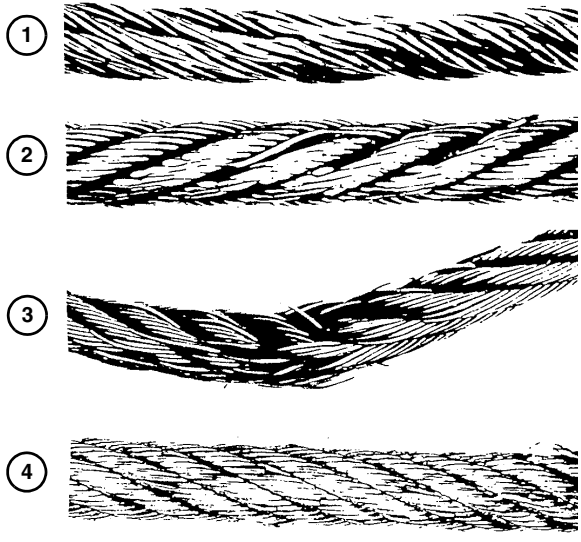
- Install wire rope properly

The top illustration shows what can happen when wire rope is loosely wound on the drum **(1)**. When tightened, it was pulled between underlying wraps and crushed out of shape.

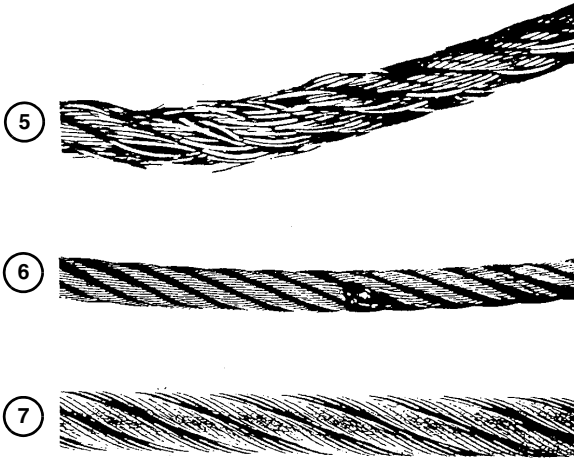
Spot abrasion ("dog leg") is caused by improper handling and/or installation **(2)**.

Illustration **(3)** shows signs of reverse bending. Routing the wire cable over one sheave and under another caused fatigue breaks in the wires.

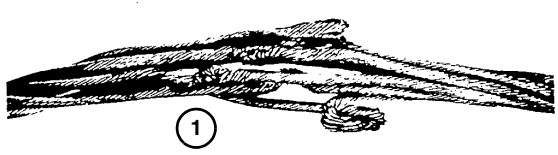
- Keep wire rope lubricated. Lack of lubrication causes strands to "lock" and break prematurely **(4)**.



- Don't use over-sized wire rope. The strands will be pinched and the wire will fail in the valley between the strands as shown **(5)**.
- Protect the wire rope from damage. Poor work procedures can lead to unnecessary damage. The illustration shows how electrical arcing can damage a wire rope **(6)**.
- Keep wire rope from corroding. Exposure to elements combined with wear and loss of lubrication causes corrosion and pitting **(7)**.



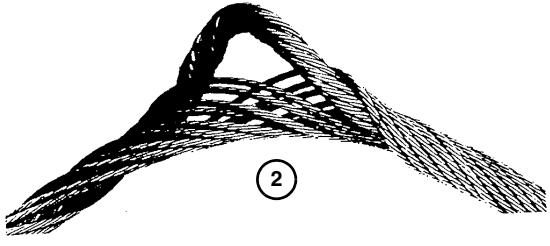
The following conditions increase corrosion: acid and alkaline solutions, gases, fumes, brine and salt air, sulphurous compounds, high humidity, and temperature. Lubricants are available to reduce the damage caused by these conditions.



- Keep wire rope from kinking or bending sharply. Kinks and sharp bends permanently bend wires and strands, ruining the wire rope.

  To prevent kinks, remove loops in the wire rope before tightening it, or it will kink as shown **(1)**.

  To keep the wire rope from bending sharply, do not route it around sharp corners and do not wrap it around the load.



- Do not overstress wire rope. Snapping the wire rope by adding or removing/releasing **(2)** the load quickly will shorten its life and lead to failure.
- Only use the wire rope for the specified job. Wire rope tends to “set” to the conditions of a job. Using it for a different task can lead to premature failure due to the different bends and stresses.

INSTALLING WIRE ROPE

Step 1: To prevent kinking, roll the shipping reel along the ground to unwind the wire rope.

Step 2: To prevent fraying, securely wrap the end of the wire rope.

IMPORTANT: Note drum rotation for winding the wire rope. If wire rope is not installed correctly, the brake will not hold the load.

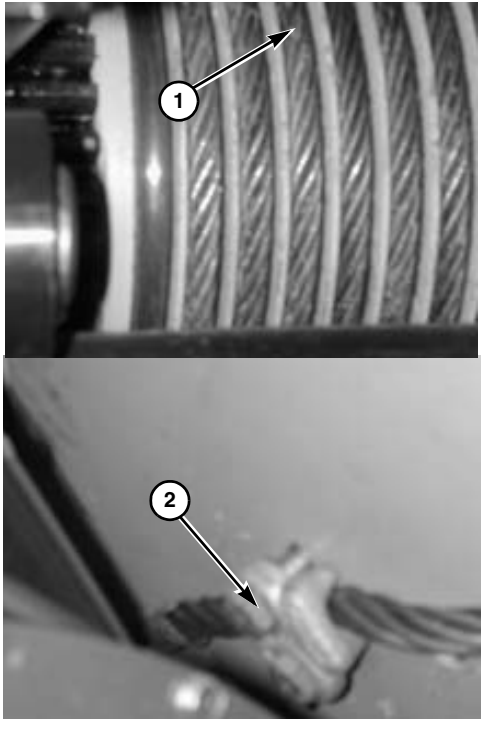
Step 3: Remove the bolts securing the shields to expose the bull wheels. It may be necessary to remove the shields on both sides of the capstans.

Step 4: Insert the end of the cable over the top bull wheel **(1)**. Feed the cable down and around the bottom bull wheel and back up over the top.

Step 5: Continue this procedure until all of the slots on the bull wheels have been used.

Step 6: Thread the end of the cable through the level wind system and secure it to the take-up drum using the cable clamp supplied **(2)**.

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



WINCH SETUP

Set up the winch in a safe and efficient working position. If setting up near traffic, use the necessary warning and diversion systems for motor vehicles and pedestrian traffic. Use the necessary signs, cones, and flag persons needed for the work situation.

When setting up at an excavated hole, make sure the ground is stable and proper shoring is used.

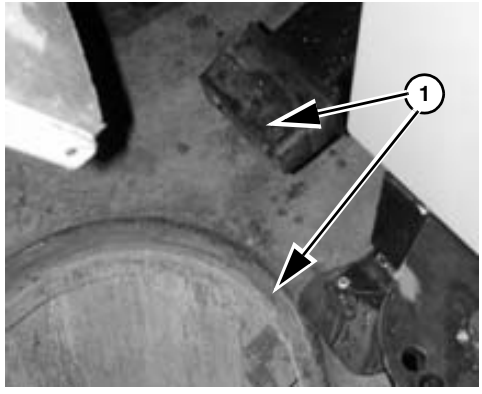
If entry into a confined space is necessary, follow all OSHA requirements for working in confined spaces.

Outrigger Initial Setup

Step 1: Position winch bumper (**1**) approximately 4 to 6 in (100 - 150 mm) inside the edge of excavation or manhole.

Step 2: Lower front jack and disconnect from towing vehicle.

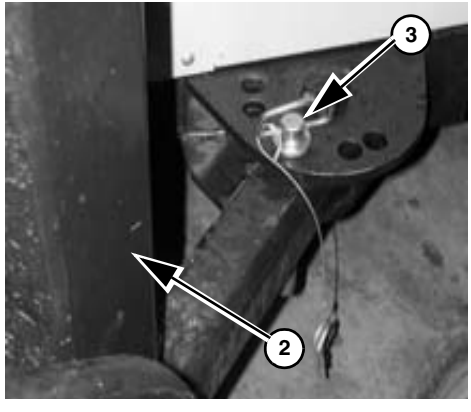
NOTE: Outriggers **(2)** can be positioned to extend to either the side or back of the trailer to clear obstructions or for locating over secure footings.



To position the outrigger:

A. Remove pin **(3)** and rotate the outrigger toward the back of the unit.

B. Install outrigger in the desired location and install pin (**3**).

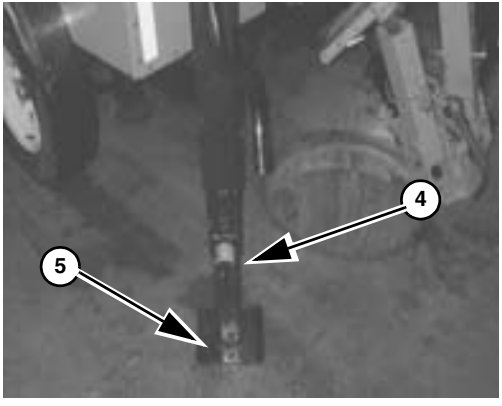


Step 3: Pull jack extension pin **(4)** and push extension **(5)** to the ground. Install pin in nearest available hole.

NOTE: The outrigger extension is spring loaded and must be manually pushed down. Use caution when retracting the extension as it will spring up when the pin is pulled.

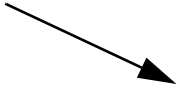
Step 4: Lower jacks until contact is made with ground. Final adjustment will be made after downrigger assembly is installed.

NOTE: The outriggers are stabilizers, although they are capable of supporting the full weight of the HG12, it is not recommended.



Downrigger Setup

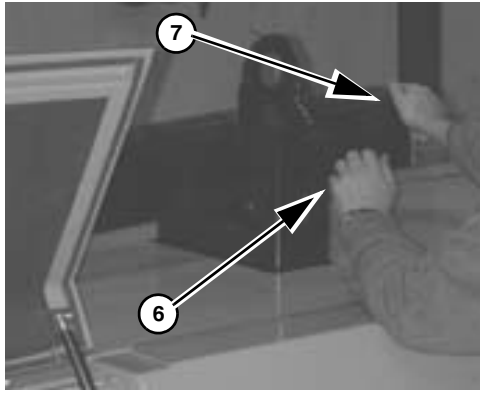
NOTE: Make sure the cable eye is securely fastened to the mast with the clevises as shown in the photo. Failure to attach the cable will prevent the mast from being extended or compressed.



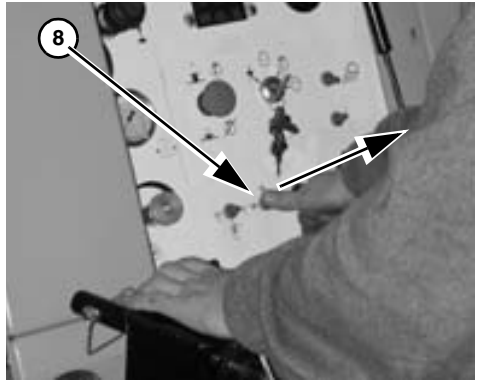
DANGER: Do not allow personnel below the equipment while lowering equipment into the manhole. Serious injury or death may occur if equipment falls.

Step 1: Start the engine. Refer to “Starting the Engine”, *page 30-1* for detailed instructions.

Step 2: Release Mast Latch (**6**) and push mast (**7**) away from latch.

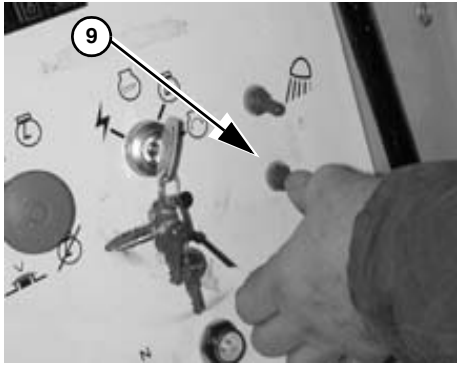


Step 3: Move Cylinder/Winch Mode Switch (**8**) to cylinder position. The warning beeper will sound to alert personnel that the downrigger mast hydraulic circuit is engaged.



Step 4: Move Cylinder Control Switch (**9**) up to raise mast into the vertical position over the manhole or exit pit.

NOTE: Cylinder lift will not function with pressure control set at the minimum pressure.

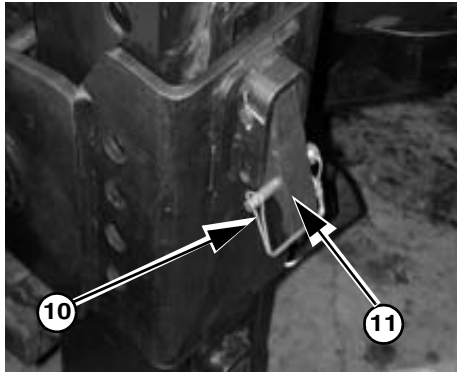


Step 5: Pull pin (**10**) on Mast Latch (**11**). Leaving the cylinder/winch switch in the cylinder mode, use the cable direction switch to jog mast up or down to free the latch.

Step 6: Once the latch is free, replace the pin in the hole in the latch to prevent the latch from locking the mast until the desired depth.

Step 7: Lower the mast by keeping the cylinder/winch switch in the cylinder position and using the cable direction switch to pay out cable. This will extend the telescopic sections to the desired depth.

NOTE: The mast will be in "Float" mode or be movable whenever the Cylinder/Winch switch is in the winch position. This will aid in manually positioning the lower unit in the manhole. Mast raise and lower times are approximately 30 sec./ft. and 15 sec./ft. respectively regardless of pressure setting.



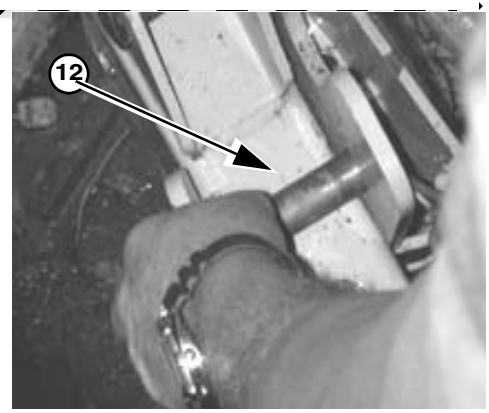
Step 8: Once the desired depth is reached, remove pin in latch and lock latch into the mast. Reinstall the pin to lock the mast in place.

NOTE: For deeper installation lower the bottom telescopic section first, lock in place, then proceed to the middle section and so on. Each section of the telescopic mast has stops on it to prevent the sections from coming completely apart during setup.

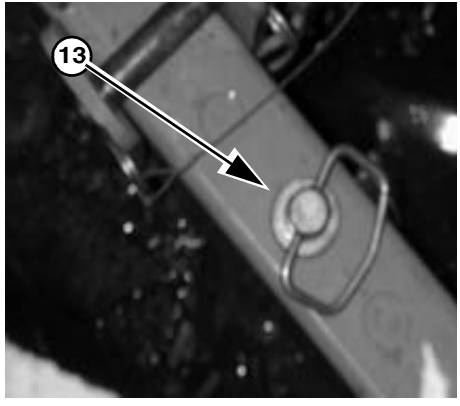
Step 9: Use the outriggers if necessary to fine tune the bottom of the sheave of the lower unit up or down to the centerline of the existing utility.

WARNING: Do not disconnect the cable eye from the mast until all sections of the mast have been locked and secured in place.

Step 10: Remove the pin (**12**) securing the lower unit's legs in the up position. Fold the legs down and reinstall the pins to lock the legs in the down position.



Step 11: Remove pin (**13**) to extend leg to face of wall and reinsert pin to lock leg into extended position.

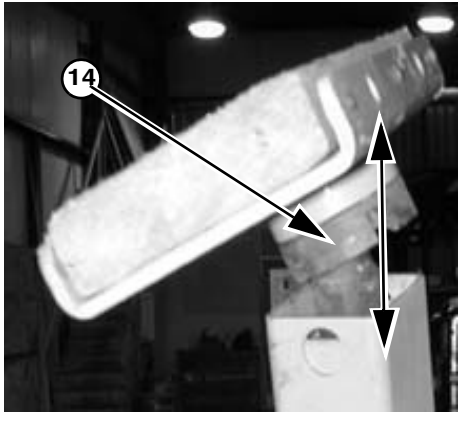


Step 12: Fine adjustment of the leg can be made by turning adjustment screw (**14**) on foot of each leg in or out with a pipe wrench or 1-5/8" flat wrench.

Step 13: Once the lower unit and mast is secure and in place, disconnect the cable eye from the clevis securing it to the mast.

Step 14: Place the cylinder/winch switch into the winch position.

NOTE: The HG12 winch payout speed is 48' (14.6 m) per minute at full throttle. Attempting to pull the cable out faster than this is not possible.



Step 15: Place the cable direction switch into the payout position and pull the cable through the existing utility to the entrance pit. When paying out cable or pulling it through the existing service, it is not necessary to stop the winch when the cable is not being pulled. As soon as the cable is relaxed the cable will stop feeding out even though the capstans continue to turn.

Section 50: Operating the Winch

INTENDED USE

The HG12 is for installing or refurbishing underground utilities. The machine is specifically designed to assist a pneumatic piercing tool to burst existing underground pipe while installing replacement HDPE pipe.

To use 100% of its cable pulling force, the machine must be used with the downrigger, lower unit and outrigger jacks.

Careful inspection of the job site should be made to ensure adequate support for the winch and the lower unit feet.

PAYING OUT WIRE ROPE

Powered Pay Out

Start engine and use control panel or remote control to rotate drum (refer to the *Controls* section, *page 25-1*).

When paying out cable or pulling it through the existing service, it is not necessary to stop the winch when the cable is not being pulled. As soon as the cable is relaxed the cable will stop feeding out even though the capstans continue to turn.

NOTE: Although the capstans will turn in the payout position, it may be necessary to apply tension to the winch cable in order to pay out the cable.

STARTUP

Step 1: With the downrigger and outriggers in place and the cable connected to the bursting tool, start the engine.

Step 2: Set engine to full throttle.

NOTE: Unit must be operated at full throttle.

Step 3: Set Cylinder/Winch Selector Switch to the winch position.

Step 4: Pay in a small amount of cable and check cable wrap on drum. The take up reel supplies approximately 1500 lb. (608 kg) of pull. It is not critical if the cable does not wind absolutely perfect.

Step 5: Set the pressure using the control knob to approximately 1000 psi. and start to winch the burst head/tool and pipe assembly into the entrance pit aligning the burst head with the mouth of the existing pipe.

Step 6: While winching the new pipe into the entrance pit, inspect the legs, feet and position of the lower unit.

Step 7: When the tool and burst head assembly is in the old line, still keeping tension on the winch cable, start the tool.

Step 8: Once the tool is started, pressure can be increased to the desired tonnage.

NOTE: Although the pressure knob is turned in, the resulting pressure on the gauge may not increase.

When finished winching, follow the “Shutdown Procedure”, *page 35-1*.

Section 55: Maintenance

WARNING: Before performing any maintenance on the machine, follow the *Shutdown Procedure*, page *35-1*, unless instructed differently in the maintenance manual.

- The maintenance sections of this Operator's Manual contains general maintenance guidelines for the machine. Do not attempt any maintenance procedure that is not fully understood, or that cannot be safely and accurately performed with the available tools and equipment.
- If a problem is encountered that is not understood or cannot be solved, contact your authorized independent HammerHead dealer.
- To provide a better view, some photographs or illustrations in the maintenance sections may show the machine shields removed. **Never operate the machine with the shields removed - keep all shields in place.** If removing a shield is necessary, return it to its operating position before operating the machine.

MAINTENANCE INTERVALS

The maintenance intervals outlined in the following maintenance sections are based on normal operating conditions. When operating under severe conditions, the maintenance intervals should be shortened.

GREASING THE MACHINE

As a general rule, grease the machine after it is shut down for the day. This protects the metal under the seals from corrosion caused by condensation as the temperature drops.

Make sure all fittings and the nozzle of the grease applicator are clean before applying the grease. If any grease fittings are missing, replace them immediately.

Section 60: Maintenance - 10 Service Hours or Daily

FLUID LEVELS - CHECK

Check fluid levels daily before operating the machine. Also inspect the machine and make any necessary adjustments and repairs before starting the engine.

Engine Coolant Level

WARNING: Do not remove radiator cap from a hot engine. Wait until the temperature has cooled before removing the pressure cap. Failure to do so can result in personal injury from heated coolant spray or steam. Remove the filler cap slowly to relieve coolant system pressure.

Fill to within 1/2″ (13 mm) of the bottom of the fill pipe with a low silicate (ethylene-glycol) antifreeze and clean water mixture.

NOTE: Never add pure antifreeze to a cooling system. We recommend using a 50/50 mixture. Never use high silicate antifreeze or antifreeze that is higher than 60/40 mixture.

Crankcase Oil Level

With engine level, fill to full mark on dipstick. Do not overfill.

Hydraulic Fluid Level

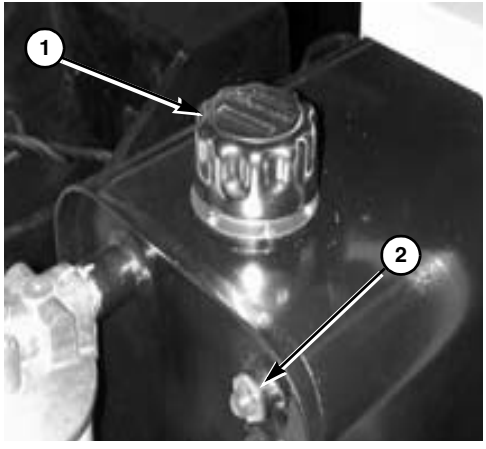
Clean hydraulic fluid is very important so do not spill dirt or other contaminants into the reservoir. Filter all hydraulic fluid through a 10 micron filter before adding it to the reservoir.

Fluid level must be showing in the site glass **(2)**. Refer to Fuel and Lubricants Section for correct fluid.

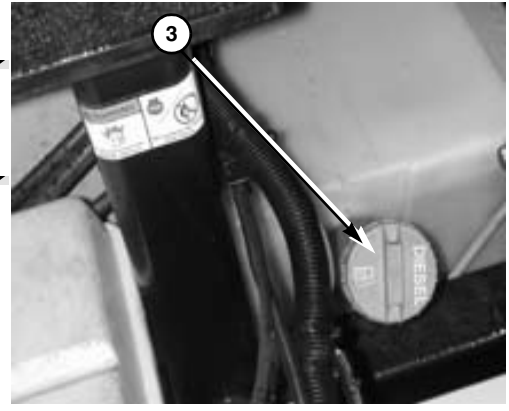
(1) Fill Cap

(2) Site Glass

NOTE: The hydraulic fluid must be free of bubbles. Bubbles indicate trapped air in the hydraulic system.



Fuel Tank - Fill



WARNING: Never refuel machine while smoking or with engine running. Fill fuel tank outdoors. Clean up spilled fuel. Do not allow any hot or burning material near the machine.

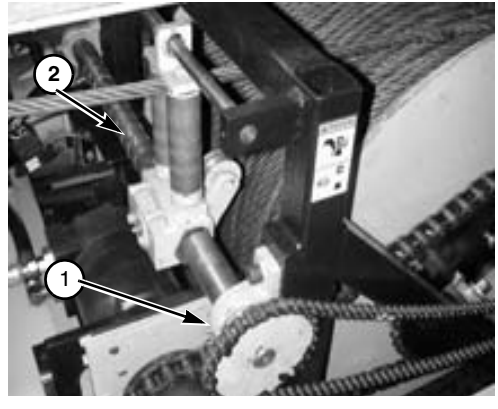
Fill the fuel tank at the end of each day to prevent condensation. Do not fill tank to the very top, leave room for expansion.

(3) Fill Cap

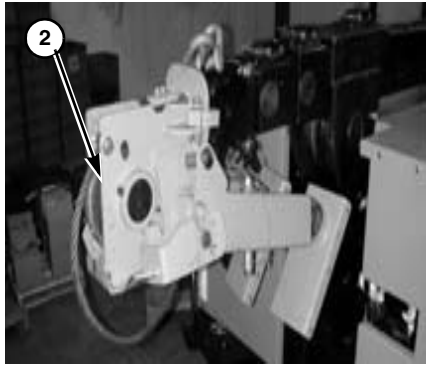
FAIRLEAD ROLLERS - GREASE

(1) Fairlead Roller Bearings
Grease ..... one fitting per side
..... two shots

(2) Screw Ball Reverse Shaft
Grease ..... coat with grease



(3) Lower Unit Sheave Bearings
grease ..... two shots



WINCH GEARBOX OIL - INITIAL CHANGE

Change the oil:

- after the first 10 service hours
- every 50 service hours or yearly

Refer to the *Maintenance - 50 Service Hours or Weekly* section, *page 65-1*.

WIRE ROPE - INSPECT

Normal Wear

Check the wire rope for abrasions, cuts, frayed spots, and worn spots caused by normal wear. If it has any broken strands, replace it.

NOTE: Due to vibration and "whipping," wire rope will fatigue more quickly at the end that connects to the load.

Damage

Check the wire rope for permanent bends, flattened spots, rust and corrosion, and other damage. Refer to the *Preparing the Winch and Work Area* section, *page 45-1*. If there is any damage, replace the wire rope.

Section 65: Maintenance - 50 Service Hours or Weekly

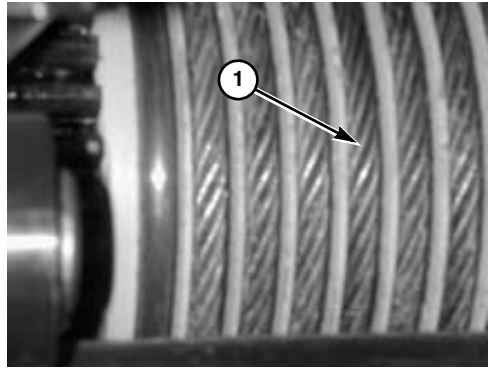
KUBOTA ENGINE MAINTENANCE

- Change engine oil.
- Clean air filter dust cap.
- Check fuel lines.

Refer to Engine Operation Manual supplied with machine for instructions.

WIRE ROPE - LUBRICATE

(1) Coat with light oil.



WINCH GEARBOX OIL - CHANGE

Refer to the *Service Specifications* section, *page 100-1* for required oil.

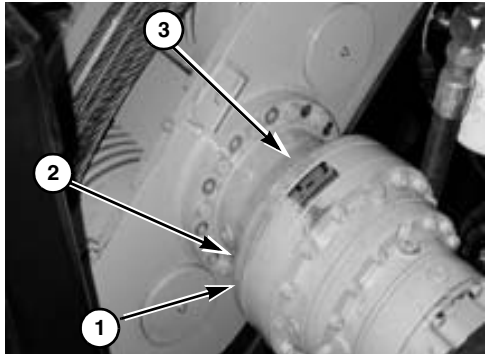
Clean both magnetic plugs and fill to check plug level.

Right side is shown. Change oil on both sides of winch.

(1) Drain Plug

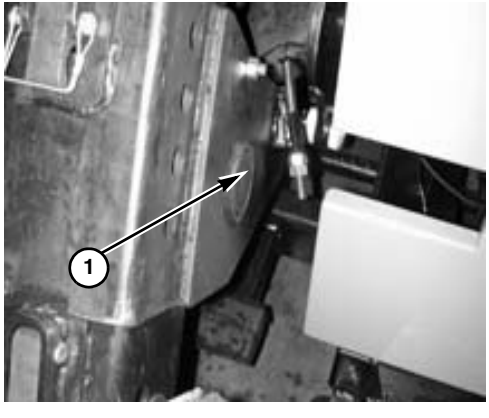
(2) Check Plug

(3) Fill

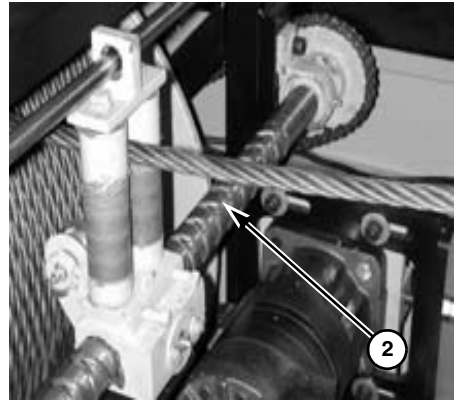


GREASE POINTS - GREASE

(1) Mast Pivots
Grease ..... one fitting per side
..... two shots

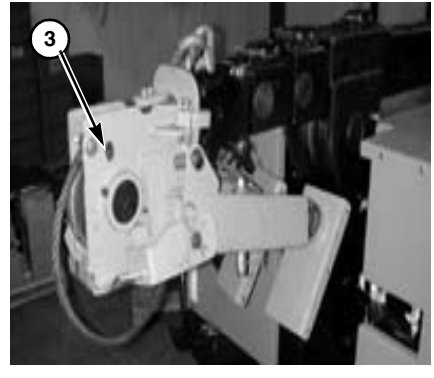


(2) Level Wind Reverse Shaft
Grease ..... coat with grease



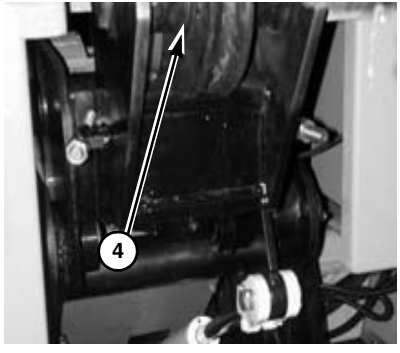
(3) Lower Unit Sheave Bearings
Grease ..... two shots

NOTE: Access to grease fitting may be easier through slot milled in lower unit.



(4) Mast Cable Sheave
Grease ..... two shots

NOTE: See the *Grease Points* section *page 65-2* for additional grease point locations if necessary.



Section 70: Maintenance - 100 Service Hours

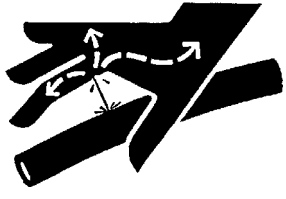
KUBOTA ENGINE MAINTENANCE

- Change alternator/fan belt adjustment.
- Change engine oil.
- Clean/replace air cleaner element.
- Clean fuel filter.

Refer to Engine Operation Manual supplied with machine for instructions.

HYDRAULIC SYSTEM - CHECK

WARNING: Pressurized fluid can penetrate body tissue and result in serious injury or death. Leaks can be invisible. Relieve pressure before working on system. When searching for a leak, use an object like cardboard - not your hand. Fluid injected under the skin must be removed immediately by a surgeon familiar with this type of injury.



Check hydraulic system for leaks, kinked hoses, and hoses or other parts that rub against each other.

TIRES AND RIMS - CHECK

- Check tires for correct pressure. Inflate to 75 psi (5.1 bar).
- Check tires and rims for damage.
- Check lug nuts for tightness. Torque to 90 ft-lb (122 Nm).

OVERALL MACHINE - CHECK

Shields and Guards - Check that all shields and guards are installed and are fastened securely to the machine. Replace or repair any shields or guards that are damaged or have missing parts.

Decals - Check the machine for any worn or missing safety and operating decals (Refer to the *Safety Decals* section, *page 15-1* and the *Controls* section, *page 25-1* sections)

Hardware - Check the machine for loose, worn, or missing parts and hardware. Tighten any loose parts and replace any worn or missing parts (refer to *Parts Manual* for replacement parts).

Frame - check frame and contact dealer immediately if you notice any bending or cracking.

Section 75: Maintenance - 200 Service Hours

KUBOTA ENGINE MAINTENANCE

Change engine oil filter.

Refer to *Engine Operation Manual* supplied with machine for instructions.

COOLING SYSTEM ADDITIVE - ADD

WARNING: Do not remove radiator cap from a hot engine. Wait until the temperature has cooled before removing the pressure cap. Failure to do so can result in personal injury from heated coolant spray or steam. Remove the filler cap slowly to relieve coolant system pressure.

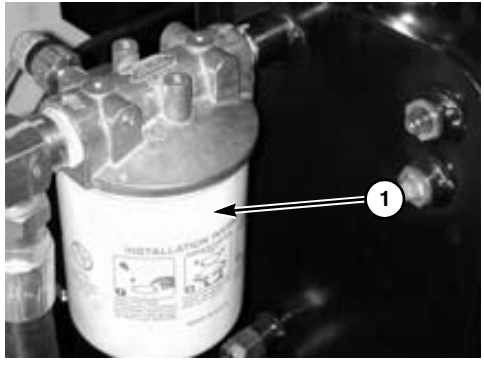
Add 0.8 ounces (24 cc) Fleetguard DCA4 to cooling system to restore corrosion inhibitors.

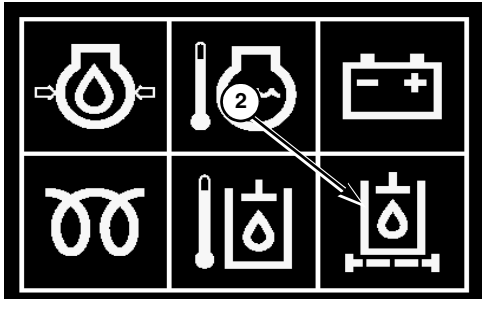
HYDRAULIC FLUID FILTER - CHANGE

Replace filter **(1)** when plugged filter gauge indicator **(2)** is illuminated with hydraulic oil at operating temperature.

If the indicator does not indicate filter maintenance is required, replace it:

- at 200 service hours
- every 500 service hours
- whenever hydraulic fluid is changed





Section 80: Maintenance - 400 Service Hours

KUBOTA ENGINE MAINTENANCE

- Change fuel filters.
- Clean cooling system.

Refer to *Engine Operation Manual* supplied with machine for instructions.

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Section 85: Maintenance - 500 Service Hours

BATTERY ELECTROLYTE LEVEL AND TERMINALS - CHECK/CLEAN

WARNING: Battery contains highly explosive hydrogen gas. Battery contains sulfuric acid which can cause severe burns.

Remember safety rules when working with a battery:

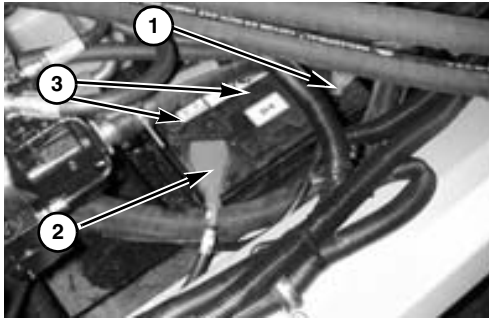
- **Wear safety glasses and face shield and rubber gloves.**
- **Use a flashlight to check electrolyte level.**
- **Work in a well-ventilated area.**
- **Avoid breathing fumes from battery.**
- **Avoid contact with skin, eyes or clothing.**
- **Keep flames and sparks away and do not smoke.**
- **Keep 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.**

In case of acid contact:

EXTERNAL: Flush with plenty of water. If eyes have been exposed, flush with water for 15 minutes and get prompt medical attention.

INTERNAL: Drink large quantities of water or milk; followed with milk of magnesia, beaten egg, or vegetable oil. Call a physician immediately.

To clean terminals and check electrolyte level:



Step 1: Remove negative (-) cable **(1)**, then positive (+) cable **(2)**.

Step 2: Clean terminals and clamps with a stiff wire brush.

Step 3: Apply a light coating of petroleum jelly around the base of each terminal.

Step 4: Remove cell caps **(3)**; fill each cell with distilled water (never add acid); then replace cell caps.

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

Step 5: Install the positive (+) cable **(2)**; then the negative (-) cable **(1)**.

ELECTRIC BRAKES - TEST

Electrical current from the tow vehicle controls the brakes. To function properly, the brakes must be correctly adjusted and the electrical components must be reliable.

Engage the brakes while coasting at

20 - 30 miles per hour (30 - 50 kph) in a traffic free area. The braking force should easily be noticed in the tow vehicle.

If not operating properly, adjust the brakes and check the following electrical components:

- All wire connections
- Trailer plug for corrosion
- While adjusting brakes, check magnets for wear or shorting
- Automatic brake controller

Brakes - Adjust

Step 1: Jack up one wheel until it is off the ground. Block the machine.

Step 2: Remove the dirt plug (A) in backing plate.

Step 3: While spinning the wheel, turn the adjuster screw (B) clockwise until the wheel has a heavy drag. Then turn the adjuster screw counterclockwise only until the wheel turns freely.

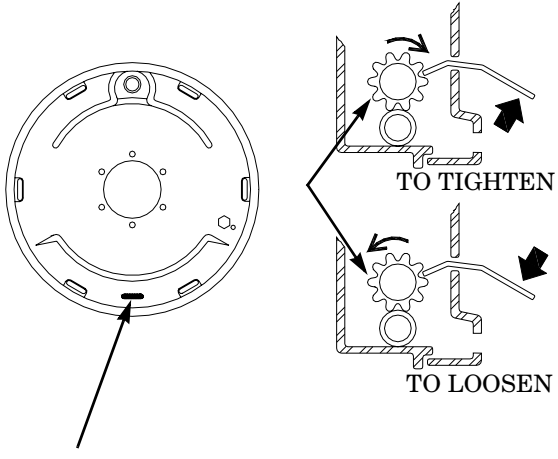
IMPORTANT: Rotate the drum only in the direction of forward rotation when adjusting the brakes.

The adjuster screw may be turned with a screwdriver blade or with a standard brake adjusting tool.

Step 4: Install dirt plug.

Step 5: Remove blocking and jack.

Step 6: Repeat steps 1 - 5 for the other brake.



AUTOMATIC BRAKE CONTROLLER WITH MANUAL OVERRIDE (OPTIONAL) - CHECK

The instructions given below are for the Warner Electric 12 Volt Automatic Brake Controller with Manual Override (No. 1100-40). If your towing vehicle is already equipped with an electric brake controller, it must be capable of automatic and manual brake application. Some automatic controllers accomplish this by tapping into the brake line of the towing vehicle. Other controllers are pendulum operated which engages the brake by sensing the deceleration force of the towing vehicle. Do not use a brake controller that is purely a manually operated controller. If your towing vehicle is equipped with a manually operated controller, remove it and install one that can be applied both automatically and manually.

Adjustment

After the entire controller system is installed and operating, the controller must be adjusted to synchronize the towing vehicle and trailer braking systems. Proper adjustment of your controller/braking system is important for safe automatic operation.

NOTE: During the initial use of the controller, a slight electrical odor or smoking may be apparent which is normal during the break-in period.

Warner Electric's Push-Bar Controller has an adjustment knob to control the trailer brake rate of application. This adjustment does not affect maximum braking capacity of the trailer brakes.

Because of the wide variety of towing vehicles encountered, balancing towing vehicle brakes and trailer brakes is necessary for smooth, synchronized stops. To achieve this, the controller adjustment should be set to provide a slight lead in trailer braking over towing vehicle braking. Setting the adjustment in the "MORE" brake direction will increase the trailer brake rate of application, while setting in the "LESS" direction will decrease the trailer brake rate of application. When proper adjustment has been achieved, there should be no sensation of the trailer pushing or pulling the towing vehicle during a stop. When this setting has been reached, no further adjustment should be required.

Section 90: Maintenance - 1000 Service Hours or Yearly

COOLING SYSTEM - DRAIN AND CLEAN

WARNING: Do not remove radiator cap from a hot engine. Wait until the temperature has cooled before removing the pressure cap. Failure to do so can result in personal injury from heated coolant spray or steam. Remove the filler cap slowly to relieve coolant system pressure.

Step 1: Drain the old coolant from the system.

Step 2: Fill radiator with clean water. Check for signs of rust and add a cooling system cleaner to the water if necessary.

Step 3: Run the engine long enough to be sure thermostat has opened, allowing the engine and radiator to receive fresh water. Allow the system to cool, then drain the water.

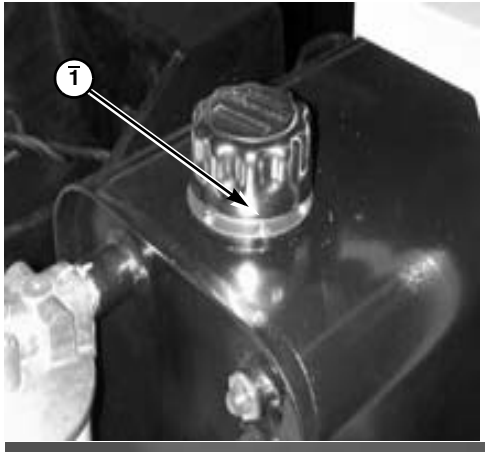
- Add a 50/50 mixture of low silicate ethylene-glycol antifreeze and clean water to the radiator. Do not fill completely. Run the engine until mixture has circulated in the system.
- Add 3.25 ounces (97 cc) of Fleetguard DCA4. Finish filling radiator. System capacity is approximately 0.82 gallons (3.2 liters).

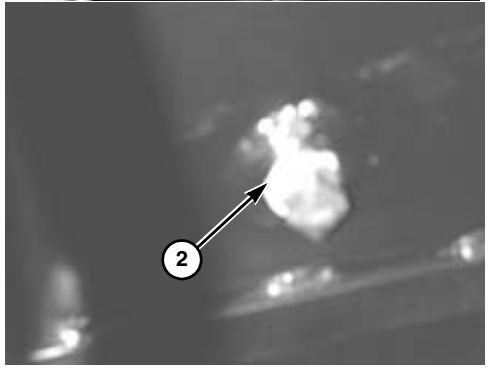
Step 4: Check radiator after engine has cooled overnight. Fill as necessary. Continue to check each time machine is run and cooled off until radiator remains full.

HYDRAULIC FLUID - CHANGE

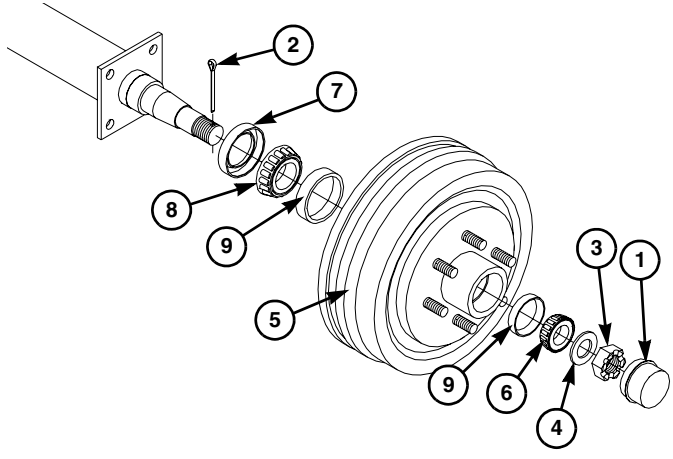
NOTE: If the fluid smells burned, contains air bubbles, or appears contaminated, consult HammerHead dealer immediately.

- When oil is warm, remove fill cap **(1)** and drain plug **(2)**. Drain fluid into a suitable container.
- Clean, inspect, and install drain plug.
- Change the hydraulic filters (refer to "Maintenance - 500 Service Hours" section).
- Inspect the hydraulic strainer (refer to "Inspect Hydraulic Fluid Strainers").
- Refer to "Fuel and Lubricants" section for approved oils and fill hydraulic fluid reservoir.
- Operate the hydraulic system.
- Follow shutdown procedure and recheck oil level.





WHEEL BEARINGS - CHECK



To Remove Hub:

Step 1: Block the machine so it cannot move; jack up one side until the wheel is off the ground; and, block the machine so it cannot fall.

Step 2: Remove tire, dust cap **(1)**, cotter pin **(2)**, castellated nut **(3)**, spindle washer **(4)**, and hub **(5)**.

Step 3: Remove outer bearing **(6)**, seal **(7)**, and inner bearing **(8)**.

To Inspect Bearing:

Step 1: Use a suitable solvent to wash all grease and oil from bearings. Dry them with a clean, lint-free cloth and inspect each roller. If there is any pitting or corrosion, replace bearing and cup **(9)**.

Step 2: Wash the inside of the hub with solvent and wipe clean.

To Pack Bearings with Grease:

Work grease (EP lithium complex, NLGI **2**) into the edge of the bearing until the bearing is filled with grease.

To Install Hub:

Step 1: Install inner bearing **(8)**; apply a sealant to the outside of a new seal **(7)**; and, install it.

Step 2: Install outer bearing **(6)** and hold in place while sliding hub **(5)** onto spindle.

Step 3: Install spindle washer **(4)** and the castellated nut **(3)**.

To Tighten Hub:

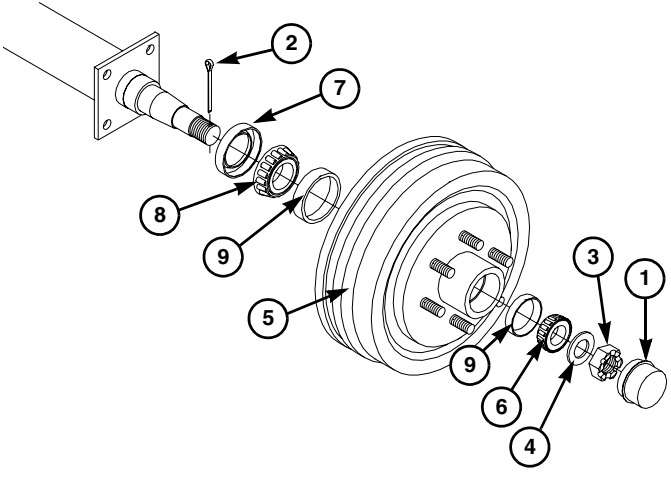
Step 1: Tighten nut to approximately 50 ft lb (70 Nm) then loosen it without rotating the hub.

Step 2: Hand tighten nut until snug then back it off just enough to install cotter pin **(2)**.

Step 3: Secure cotter pin and install dust cap**(1)**.

Step 4: Install tire; remove blocks; and lower jack.

Step 5: Repeat procedure for the other wheel.



Section 95: Maintenance - As Required

ENGINE SYSTEM - CHECK

An Engine Operation manual is supplied with each machine. Refer to the manual for service requirements.

Replace Battery

Replacement batteries must meet standard battery specifications provided in the Service Specifications Section.

To Replace Battery:

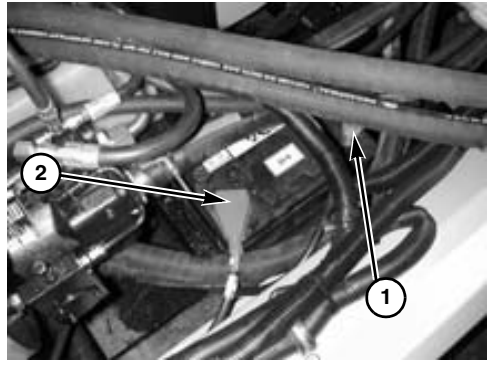
Step 1: Remove the negative (-) cable **(1)** first. Then remove the positive (+) cable **(2)**.

Step 2: Remove battery.

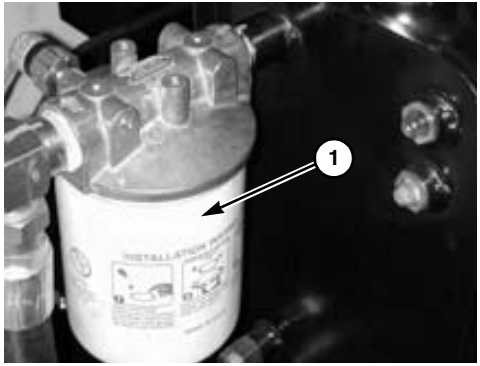
Step 3: Install new battery.

Step 4: Apply a light coating of petroleum jelly around base of each terminal.

Step 5: Install the positive (+) cable **(2)** first. Then install the negative (-) cable **(1)** and tighten.



HYDRAULIC FLUID FILTER - CHANGE



Replace filter **(1)** when plugged filter gauge indicator **(2)**is illuminated with hydraulic oil at operating temperature.

If the gauge does not indicate filter maintenance is required, replace it:

- at 200 service hours
- every 500 service hours
- whenever hydraulic fluid is changed

To Change Fluid Filter:

Step 1: Use a filter wrench to turn the filter counterclockwise to remove.

Step 2: Clean the filter head surface.

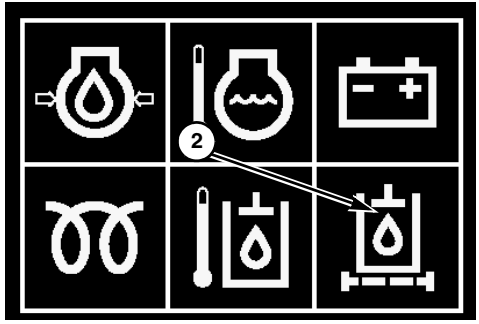
Step 3: Apply a thin film of oil to gasket of new filter.

Step 4: Install filter, by hand, clockwise onto the filter head until it contacts filter head surface.

Step 5: Tighten with filter wrench.

Step 6: Start engine and cycle control levers to pressurize system.

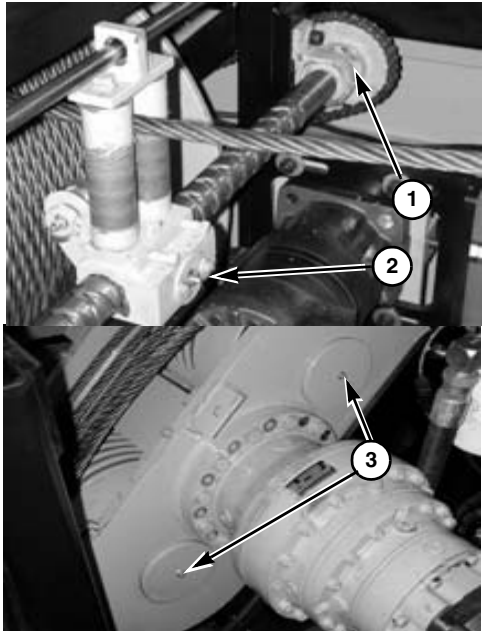
Step 7: Stop the engine. Check hydraulic fluid level (Refer to Fuel and Lubricants Section). Check for leaks around filter. Tighten filter only enough to stop leak.



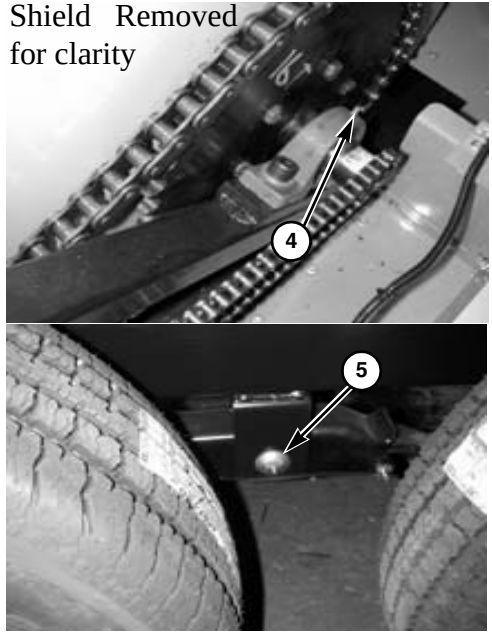
GREASE POINTS

NOTE: The Capstans or Bull wheels contain approximately 5 gal of grease each and should only need re-greasing when the bearings are replaced.

The following photo's identify several of the grease point located throughout the machine. The bottom left photo shows the grease point locations for the capstans.



Shield Removed for clarity



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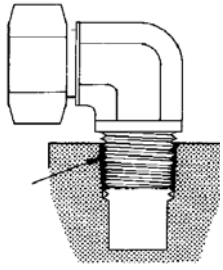
Section 97: Torque Values

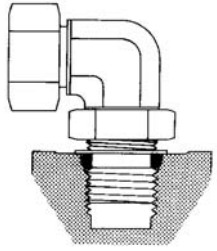
HYDRAULIC FITTINGS



Pipe Thread Fittings

- Ensure all threads are free from nicks, burrs, and dirt.
- Use a thread sealant such as Loctite Vibra-Seal, instead of pipe dope or Teflon tape, to seal the threads. Teflon tape can plug filters and drain orifices, and can cause hydraulic system failures.
- To tighten, turn the fitting approximately three turns past finger tight.

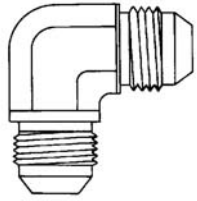
O-Ring Fittings



- Ensure the threads and sealing surfaces are free from nicks, burrs, scratches, or any foreign material.
- Lubricate the O-ring with a light coat of oil.
- To tighten adjustable O-ring fittings, hold the fitting and tighten the nut.
- To tighten non-adjustable O-ring fittings, tighten the fitting.

Size	Thread	Torque
#2	5/16″ -24	7 - 8 ft-lb (10 - 11 Nm)
#3	3/8″ -24	14 -16 ft-lb (19 - 21 Nm)
#4	7/16″ -20	16 - 18 ft-lb (21 - 24 Nm)
#5	1/2″ -20	22 - 24 ft-lb (29 - 32 Nm)
#6	9/16″ -18	24 - 26 ft-lb (33 - 35 Nm)
#8	3/4″ -16	40 - 43 ft-lb (54 - 59 Nm)
#10	7/8″ -14	68 - 70 ft-lb (93 - 95 Nm)
#12	1-1/16″ -12	98 - 102 ft-lb (133 - 138 Nm)
#16	1-5/16″ -12	146 - 154 ft-lb (197 - 209 Nm)

JIC Fittings



- Ensure the threads and sealing surfaces are free from nicks, burrs, scratches, or any foreign material.
- To tighten, turn the fitting until finger tight. Then turn the fitting an additional number of flats as indicated on the chart below. **One flat equals 1/6 of a turn.**

IMPORTANT: Do not overtighten the fitting. If overtightened, the female side of the fitting may deform or break, causing the oil flow to become restricted or a leak to form.

Flats from Finger Tight		
Size	New Fittings	Loose Fittings
#4 (1/4″)	2 to 2-1/2	3/4 to 1
#6 (3/8″)	2 to 2-1/4	1
#8 (1/2″)	1-1/2 to 1-3/4	1
#10 (5/8″)	1-1/2 to 1-3/4	3/4
#12 (3/4″)	1-1/2	3/4
#14 (7/8″)	2	1-1/4
#16 (1″)	1-1/4 to 1 1/2	3/4 to 1
#20 (1-1/4″)	1 1/2	3/4 to 1
#24 (1-1/2″)	1 1/4 to 1 1/2	1 to 1 1/4
#32 (2″)	1 1/4	3/4 to 1

FASTENERS

For SAE Grade 2, Grade 5, and Grade 8 Cap Screws and Bolts

NOTE: Torque values specified in text take precedence over values shown below. These values do not apply when used with lock nuts.

	Grade 2 		Grade 5 		Grade 8 	
Bolt Size	**Ft-Lb**	**Nm**	**Ft-Lb**	**Nm**	**Ft-Lb**	**Nm**
1/4″ -20 NC	4	5	6	8.5	10	13
1/4″ -28 NF	5	6	8	11	11	15
5/16″ -18 NC	9	12	13	18	20	27
5/16″ -24 NF	10	13	15	20.5	22	29.5
3/8″ -16 NC	16	22	25	35	35	47
3/8″ -24 NF	18	24	30	40	40	55
7/16″ -14 NC	25	35	40	55	55	75
7/16″ -20 NF	30	40	45	60	65	88
1/2″ -13 NC	40	55	60	80	90	120
1/2″ -20 NF	45	60	70	95	95	130
9/16″ -12 NC	55	75	90	120	120	165
9/16″ -8 NF	60	80	95	130	135	185
5/8″ -11 NC	75	100	120	165	180	245

	Grade 2 		Grade 5 		Grade 8 	
5/8″ -18 NF	80	110	145	200	195	265
3/4″ -10 NC	130	175	210	285	300	405
3/4″ -16 NF	145	200	240	325	340	460
7/8″ -9 NC	150	205	320	435	500	680
7/8″ -14 NF	170	230	350	475	560	760
1″ -8 NC	180	245	480	650	800	1085
1″ -14 NF	200	270	560	760	920	1250
1 1/8″ -7 NC	240	325	700	950	1180	1600
1 1/8″ - 2 NF	275	375	780	1060	1340	1815
1 1/4″ -7 NC	340	460	1020	1385	1720	2330
1 1/4″ - 2 NF	370	500	1140	1545	1900	2575
1 3/8″ -6 NC	460	625	1360	1845	2280	3090
1 3/8″ -12 NF	540	730	1580	2140	2620	3550
1 1/2″ -6 NC	640	870	1840	2495	3060	4150
1 1/2″ -12 NF	740	1000	2100	2850	3460	4690

For Metric Grade 5.8, 6.9, 8.8, 10.9, & 12.9 Cap Screws and Bolts

	Grade 5.8 		Grade 6.9 		Grade 8.8 		Grade 10.9 		Grade 12.9 	
Bolt Size	**Ft-Lb**	**Nm**	**Ft-Lb**	**Nm**	**Ft-Lb**	**Nm**	**Ft-Lb**	**Nm**	**Ft-Lb**	**Nm**
M4	1.1	1.5	1.7	2.3	2	2.7	2.9	4	3.6	5
M5	2.3	3.1	3.5	4.7	4	5.4	6	8	7	9.5
M6	3.9	5.3	5.8	7.8	7	9.5	10	13.5	11	15
M7	6.5	8.8	9.4	12.7	11	15	16	22	20	27
M8	10	13.5	14	19	18	24	25	34	29	39
M10	20	27	29	39	32	43	47	64	58	79
M12	34	46	50	68	58	79	83	112.5	100	136
M14	54	73	79	107	94	127	133	180	159	216
M16	80	108.5	122	165	144	195	196	266	235	319
M18	114	155	170	230.5	190	258	269	365	323	438
M20	162	220	220	298	260	353	366	496	440	597
M22	202	274	318	431	368	499	520	705	628	852
M24	245	332	410	556	470	637	664	900	794	1077
M27	360	488	606	822	707	959	996	1351	1205	1634
M30	500	678	815	1105	967	1311	1357	1840	1630	2210

For Grade B, C, F, and G Lock Nuts

	Grade B (Grade 5) 		Grade C (Grade 8) 		Grade F (Grade 5 Flange) 		Grade G (Grade 8 Flange) 	
Nut Size	**Ft-Lb**	**Nm**	**Ft-Lb**	**Nm**	**Ft-Lb**	**Nm**	**Ft-Lb**	**Nm**
1/4″ -20 NC	7.5 - 10	10 - 13	10 - 14	14 - 19	8 - 10	11 - 14	12 - 16	16 - 21.5
1/4″ -28 NF	8 - 10	11 - 14	10 - 14	14 - 19	9 - 12	12 - 16	12 - 17	16 - 23
5/16″ -18 NC	14 - 17.5	19 - 24	17.5-22.5	24 - 30.5	15 - 20	20 - 27	19.5 - 27	27 -36
5/16″ -24 NF	15 - 18	20 - 25	18 - 23	25 - 32	16 - 22	21.5 - 29	19.5 - 26	27 - 35
3/8″ -16 NC	21 - 27	28.5 - 37	29 - 37	39 - 50	22.5 - 32.5	30.5 - 44	30 - 41	41 - 56
3/8″ -24 NF	27.5 - 38	37 - 51.5	22.5 - 31	30.5 - 42	23.5 - 31.5	32 - 43	31 - 42	42 - 57
7/16″ -14 NC	31 - 40	42 - 54	39 - 53	53 - 72	36 - 50	49 - 68	45 - 62	61 - 84
7/16″ -20 NF	39 - 51	53 - 69	41 - 56	56 - 76	38 - 53	51.5 - 72	51 - 71	69 - 96
1/2″ -13 NC	49.5 - 62.5	67 - 85	62 - 79.5	84 - 108	50.5 -69.5	68.5 - 94	72 - 102	98 - 132
1/2″ -20 NF	50 - 65	68 - 88	67 - 87	91 - 118	56.5 -78.5	77 - 106	67 - 106	91 - 144
9/16″ -12 NC	67 - 87	91 - 118	95 - 120	129 - 163	72 - 102	98 - 132	105 - 145	142 - 197
9/16″ -18 NF	74.5 - 94.5	101 - 128	95 - 120	129 - 163	79 - 111	107-150.5	113 - 157	153 - 213
5/8″ -11 NC	95 - 120	129 - 163	125 -157.5	169.5-214	100 - 137	136 - 186	130 - 178	176 - 241
5/8″ -18 NF	97.5-122.5	132 - 166	125 - 160	169.5 -217	105 - 145	142 - 197	150 - 210	203 - 285
3/4″ -10 NC	160 - 200	217 - 271	200 - 255	271 - 346	170 - 230	230.5-312	205 - 285	278-386.5

	Grade B (Grade 5) 		Grade C (Grade 8) 		Grade F (Grade 5 Flange) 		Grade G (Grade 8 Flange) 	
3/4″ -16 NF	155 - 200	210 - 271	200 - 255	271 - 346	163 - 227	221 - 308	215 - 315	291.5-427
7/8″ -9 NC	235 - 300	319 - 407	295-382.5	400 - 519				
7/8″ -14 NF	250 - 320	339 - 434	295-382.5	400 - 519				
1 -8″ NC	345 - 445	468 - 603	450-512.5	610 - 695				
1 -14″ NF	370 - 470	502 - 637	452.5-590	617 - 800				

Section 100: Service Specifications

FUEL AND LUBRICANTS

Lubricant Recommended	Capacity	Specification / Notes
Fuel	11gal (47 L)	
Hydraulic Fluid	18 gal (68 L)	Note: Use of any other hydraulic oil without written factory approval will jeopardize warranty. Dextron II Transmission Fluid or Equivalent
Grease	As required	EP Grease: LF Ultra, or equivalent. To minimize condensation in bearings, grease machine after it is shut down for the day. Fittings and grease applicator nozzle must be clean before applying grease. Replace all missing fittings.
General Lubricating Oil	As required	SAE - 30 , 882 Heavy Moly Lube, or equivalent.
Winch Gearbox Oil	Approx. 1/2 full	10°F - 120°F (-12°C - 49°C)..... SAE50 -25°F - 40°F (-32°C - 4°C) ..... 75W90 -50°F - 30°F (-46°C - 34°C) ..... Conoco DN600 or equivalent

MACHINE SPECIFICATIONS

Specifications	
General	
Length:	171″ (434 cm)
Width:	70″ (178 cm)
Height:	71-3/4″ (182 cm)
Total Weight:	6970 lb (3161 kg)
Drawbar Weight::	700 lb (317 kg)
Tires	
Size:	P235 75R 15
Pressure:	75 psi (5.2 bar)
Lug Nut Torque:	90-95 ft-lb (122-130 Nm)
Winch	
Maximum Pull Capacity:	24,000 lb (10,886 Kg)
Cable - Tensile Rating:	40,000 lb (18,143 Kg)

INDEX

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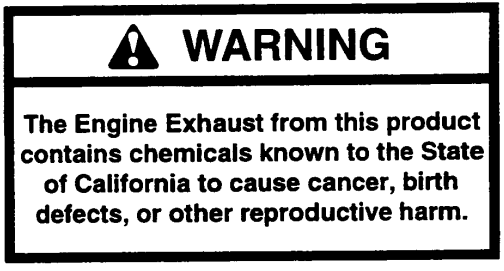
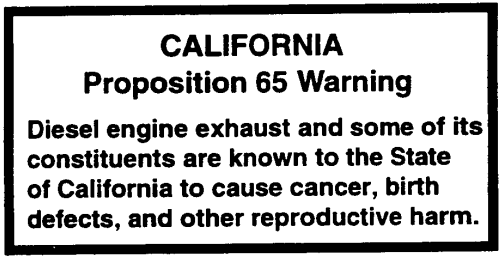
Revision History

Revision	Date	Page(s)	Description
o1_03	01/03	All	1st edition manual released.


WARNING
The Engine Exhaust from this product contains chemicals known to the State of California to cause cancer, birth defects, or other reproductive harm.


CALIFORNIA
Proposition 65 Warning
Diesel engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects, and other reproductive harm.