OPERATOR'S MANUAL

SLSD Power Pack

Power Pack SN: F40788F

Supplement for the Sliplining System Operator's Manual

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SERVICE • RELIABILITY • INNOVATION

Introduction

This supplement to your Sliplining System Operator's Manual contains important safety, operation, and maintenance information for your Akkerman Sliplining Power Pack. You must read and understand this manual, and the Sliplining System Operator's Manual before you operate and maintain this equipment. Keep this manual with your Power Pack at all times. Additional copies of this supplement may be purchased from the Akkerman Aftermarket Support Department, or downloaded from the Akkerman web site at www.akkerman.com.

The contractor is responsible for the overall safety program on the job site. Use this manual as a part of the safety program.

The use of second rate parts could affect the efficient performance of the Power Pack. ALWAYS use genuine Akkerman parts.

Understand safety signal words, DANGER, WARNING, CAUTION, SAFETY INSTRUCTIONS, and NOTICE. When you see these words in this manual or on safety decals mounted on your equipment, follow the safety message to avoid personal injury and/or property damage.

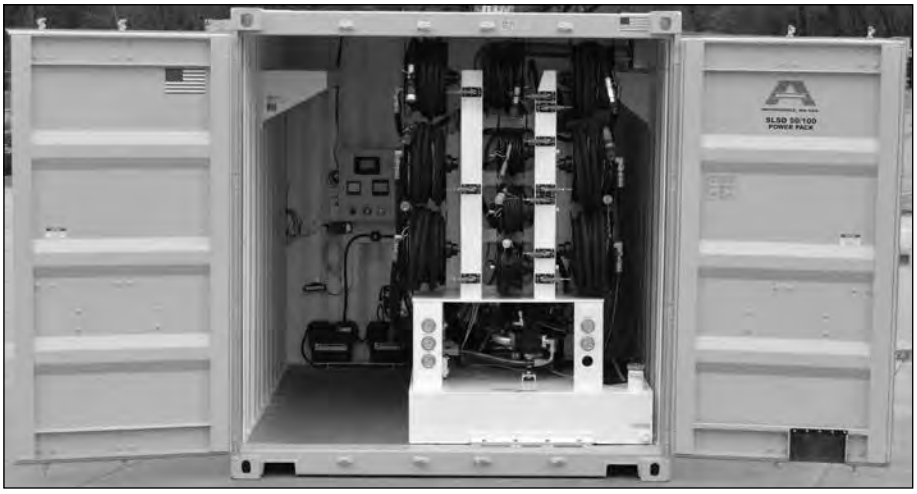
⚠DANGER Indicates an extremely hazardous situation which, if not avoided, WILL result in death or serious injury.

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

⚠CAUTION Indicates a potentially hazardous situation, which, if not avoided, MAY result in minor or moderate injury. It may also be used to alert against unsafe practices.

SAFETY INSTRUCTIONS Usually consists of individual messages stating procedures or actions that must be followed for the safe operation of a product.

NOTICE Identifies potential property damage and important installation, operator, or maintenance information.



Sliplining System Diesel Power Pack

The power to the sliplining system is provided by the Akkerman Sliplining Diesel Power Pack; a 215 HP tier IV final diesel engine that powers a triple pump located adjacent to the sliplining frame. The engine drives a dual hydrostatic piston pump and a load sense pump. The dual piston pump is the source for the hydraulic piston motors integral to the planetary gearboxes. The load sense pump is the source for the auxiliary functions. The auxiliary functions of the frame include the four elevators, pipe clamp, winch, and one auxiliary function for future use.

If you find any errors with this supplement or know of ways to improve procedures, please let us know. Mail your suggestions to:
Akkerman Inc, ATTN: Technical Publications, 58256 266th Street, Brownsdale, MN 55918.

Akkerman Inc. reserves the right to improve its product without notice or obligation.

NOTES

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NOTES

Safety

BE ALERT FOR SAFETY INFORMATION

When you see this safety alert symbol on your equipment or in this manual, be alert to the possibility of personal injury or property damage.

Read all safety information.

Keep safety decals clean and in good condition. Replace missing or damaged safety decals.

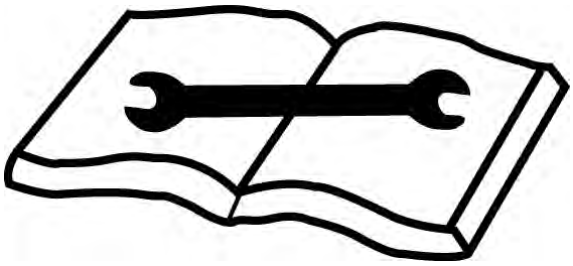
ATTENTION!
BECOME ALERT!
YOUR SAFETY IS INVOLVED!

READ OPERATOR'S MANUAL

⚠WARNING Unsafe operation or maintenance can cause severe injury or death.

Read and understand the Operator's Manual before operating or servicing this equipment.

Any unauthorized modifications will void the warranty.



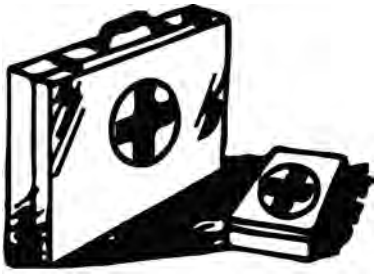
WEAR PROTECTIVE CLOTHING

Wear OSHA approved protective clothing, such as hard hat, gloves, safety goggles, earmuffs or ear plugs, face shield, and steel-toed boots, when operating and servicing this equipment.

Wear reasonably close fitting clothing and remove jewelry before working on or near this equipment. This will help prevent the danger of catching them in moving parts or controls.

KEEP FIRST-AID KIT ACCESSIBLE

Keep a first-aid kit handy and properly maintained. Call 9-1-1 for emergencies.



LOCKOUT/TAGOUT POWER BEFORE SERVICING

⚠DANGER Failure to lockout power before servicing will cause severe personal injury or death.

LOCKOUT/TAGOUT main power supply before servicing. Electrical repairs must be performed only by a certified electrician.

HYDRAULIC OIL/FLUIDS UNDER PRESSURE

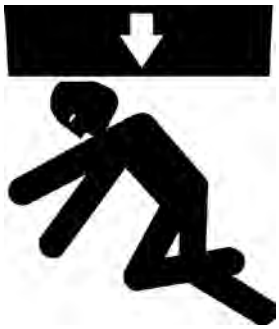
⚠WARNING Escaping oil or other fluids under pressure can penetrate your skin causing serious injury or death.

Release all pressure before performing maintenance or repairs. Never weld near pressurized fluid lines.

DO NOT use your hands to check for leaks. When searching for leaks, use a piece of wood or cardboard.

Contact medical help immediately if any oil or fluid is injected into your skin. A serious infection or reaction can emerge without proper medical treatment.

BEWARE OF SUSPENDED LOADS

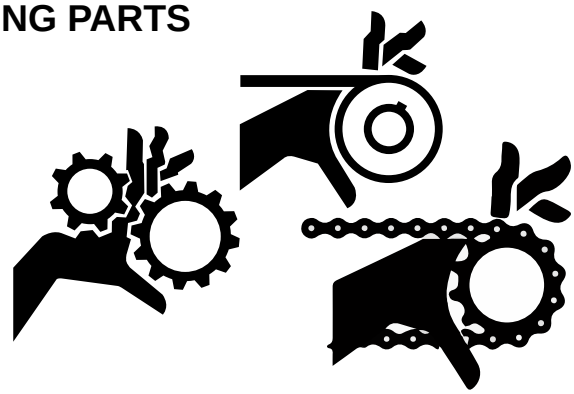


⚠WARNING Suspended loads may fall and cause severe personal injury or death.

If a hydraulic hose from the boom of a crane or excavator breaks, the boom can fall instantly.

Do not enter area under or around a load.

KEEP AWAY FROM ROTATING & MOVING PARTS



⚠DANGER Contact with rotating or moving parts will cause severe injury or death.

Keep hands, body, and objects clear of operating drive/elevator chains and winch cable.

Do not operate without covers and guards in place.

Lockout/tagout power before servicing.

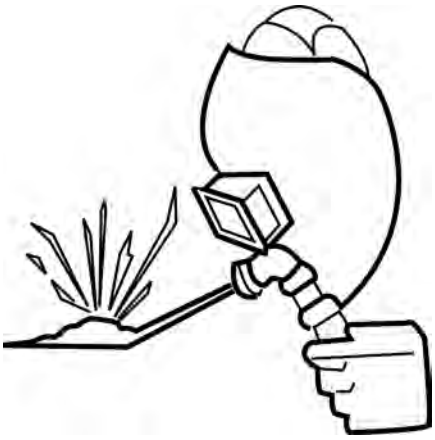
KEEP PERSONNEL AWAY FROM MOVING PARTS

⚠WARNING Crushing hazard.
Keep personnel away from inside of sliplining frame. Failure to do so could result in serious personal injury or death.

INSPECT ELECTRICAL CONNECTIONS

⚠WARNING Regularly inspect electrical connections to be sure they are secure. Failure to do so could cause an explosion if moisture enters an unsecured electrical connection.

UNAUTHORIZED WELDING



⚠WARNING Unauthorized welding can cause structural failure resulting in possible injury or death.

Do not weld on any structural member. Unauthorized welding or repair will void the warranty.

REGULARLY CLEAN AND INSPECT EQUIPMENT

Remove any grease, oil, or debris buildup to avoid potential injury or equipment damage.

Inspect equipment for damage. If damaged, repair or replace immediately.

AVOID PINCH POINTS

⚠WARNING Moving parts or the mishandling of parts can cause severe personal injury.

Keep hands away from moving parts.

Watch your fingers, hands, and legs while equipment is in operation.

Handle parts carefully to avoid crushing and pinch point hazards.

PRACTICE SAFE MAINTENANCE

⚠WARNING Unexpected equipment movement may cause serious personal injury.

LOCKOUT TAGOUT power before performing any maintenance.

Shut down equipment before making repairs, adjustments, or removing obstructions.

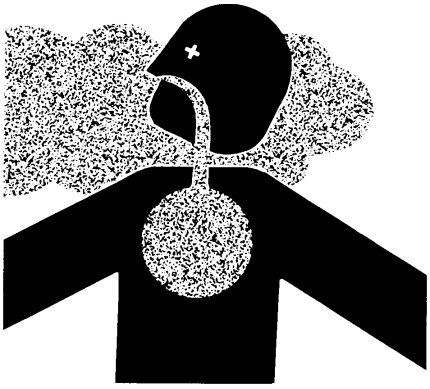
Only trained and qualified personnel should perform any maintenance or repairs.

Keep the area around the equipment clean and dry when performing maintenance.

Do not service the machine while it is in motion.

Replace worn or damaged parts. Remove grease, oil, or debris buildup.

TEST SHAFT/TUNNEL VENTILATION



⚠WARNING Keep shafts and tunnel well ventilated at all times.

Use an approved air analyzer to detect hazardous gases and oxygen content.

Before and during the shaft operation, test for combustible and toxic gases and oxygen deficiency.

If the levels exceed OSHA prescribed levels, leave shaft and tunnel immediately! Do not activate or deactivate any electrical or hydraulic devices, since any spark could cause an explosion.

Once ALL personnel are out of tunnel/shaft, cut power from power source.

Gases must be removed before reentering tunnel/shaft.

HIGH PRESSURE HYDRAULICS

⚠WARNING The Sliplining System contains high pressure hydraulics.

Keep all guards in place.

SLIPPERY WHEN WET

⚠WARNING Slips and falls can cause serious personal injury.

Ensure firm footing in wet or slippery conditions.

Replace skid-resistant material if it is damaged or missing to prevent slips and falls.

Remove any buildup of grease, oil, or debris.

WEAR SAFETY HARNESS

⚠WARNING Falling can cause serious injury or death.

Wear an OSHA approved safety harness while working on the sliplining system.

Proper training is necessary for harness selection, inspection and usage.

FIRE PREVENTION

⚠CAUTION Fires can cause injury or property damage.

Keep equipment clean. Remove all debris from equipment.

Have fully charged fire extinguishers on the job site at all times.

NO SMOKING IN SHAFT OR TUNNEL

⚠WARNING Smoking in shaft or tunnel could cause an explosion if combustible gases are present.

Do not smoke in shaft or tunnel.

KEEP JOB SITE CLEAN AND ORGANIZED

⚠WARNING Tripping can cause serious personal injury.

Be sure to keep job site clean and organized.

PATHOGEN EXPOSURE

⚠WARNING Exposure to pathogens can cause severe injury or death.

Wear appropriate personal protective equipment (PPE) before any contact with possible pathogens.

Know procedures, practices and vaccination requirements for exposure to pathogens.

USE HANDHOLDS, STEPS & PLATFORMS

⚠WARNING Slips and falls can cause serious personal injury.

When getting on and off sliplining frame, always maintain a three point contact with the handholds, steps and platforms while facing the frame.

NEVER jump on or off the machine.

Be careful of slippery conditions on platforms, steps and handrails

USING A PRESSURE WASHER WAND

⚠WARNING Using a pressure washer wand can generate enough fluid pressure and velocity to penetrate skin resulting in serious personal injury.

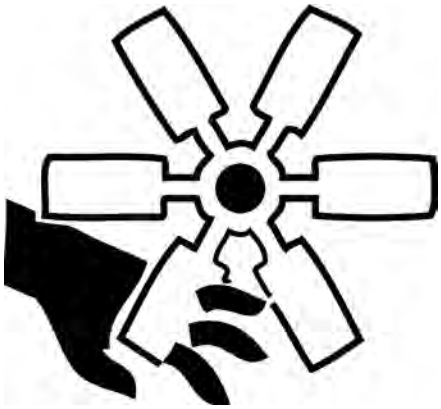
Contact medical help immediately if fluid is injected into your skin. A serious infection or reaction can emerge without proper medical treatment.

NEVER point the wand towards a person or animal.

Be sure to release pressure after use and before performing maintenance to prevent accidental fluid injection.

Wear safety glasses and gloves, and depending on the wand use, a particle mask may be necessary.

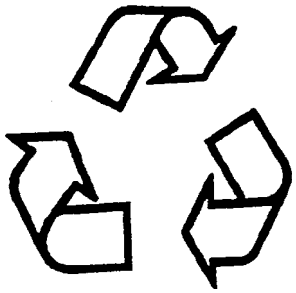
ROTATING COOLING FAN BLADES



⚠WARNING Serious personal injury could result if contact is made with rotating fan blade. Fan blades can rotate at any time power is connected and the battery disconnect switch is in the ON position.

If the power is connected to the power pack and the main disconnect is in the ON position, the fan can rotate anytime the hydraulic oil is at 120°F (49°C) (factory default setting).

RECYCLE WASTE



Follow local, state, federal, and international regulations when recycling or disposing of waste. Waste includes fluids/oil, fuel, filters, coolant, and batteries.

Use leakproof containers when draining fluids/oil. Do not pour waste on the ground, down a drain, or into any water source.

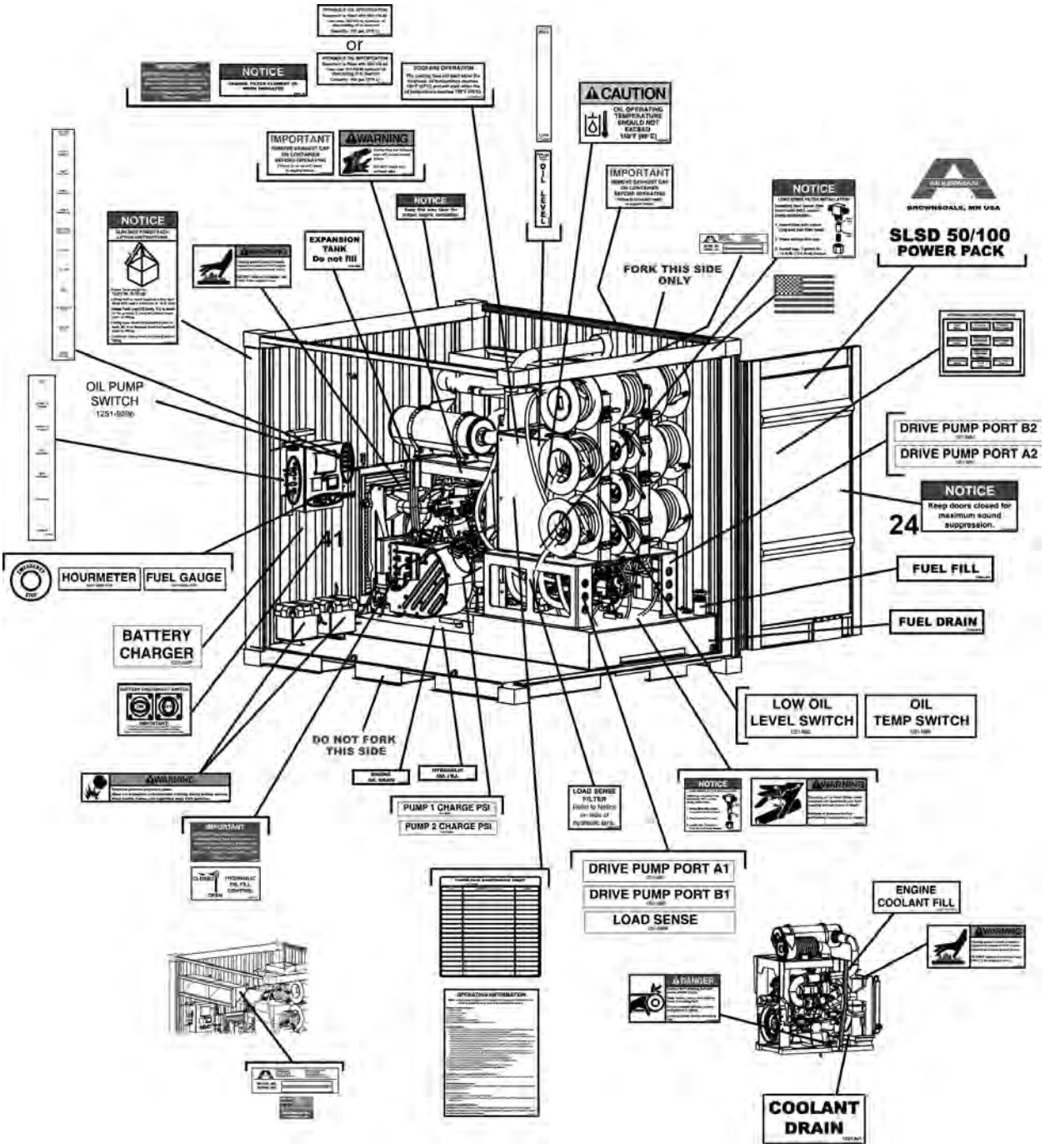
Safety Decals

Keep all decals clean and readable. Use soft cloth, water, and a mild soap to clean the decals if they are too dirty to read. DO NOT clean decals with solvent. Solvent will damage the surface of the decal. Replace safety decals immediately if they are damaged, missing, or hard to read.

Serious injury or property damage can occur if safety instructions are not followed. Contact your Akkerman Aftermarket Support representative for free replacement safety decals.

If a part is replaced that has a safety decal on it, apply a new safety decal to the replacement part. Before applying a new decal, be sure the surface is clean and dry.

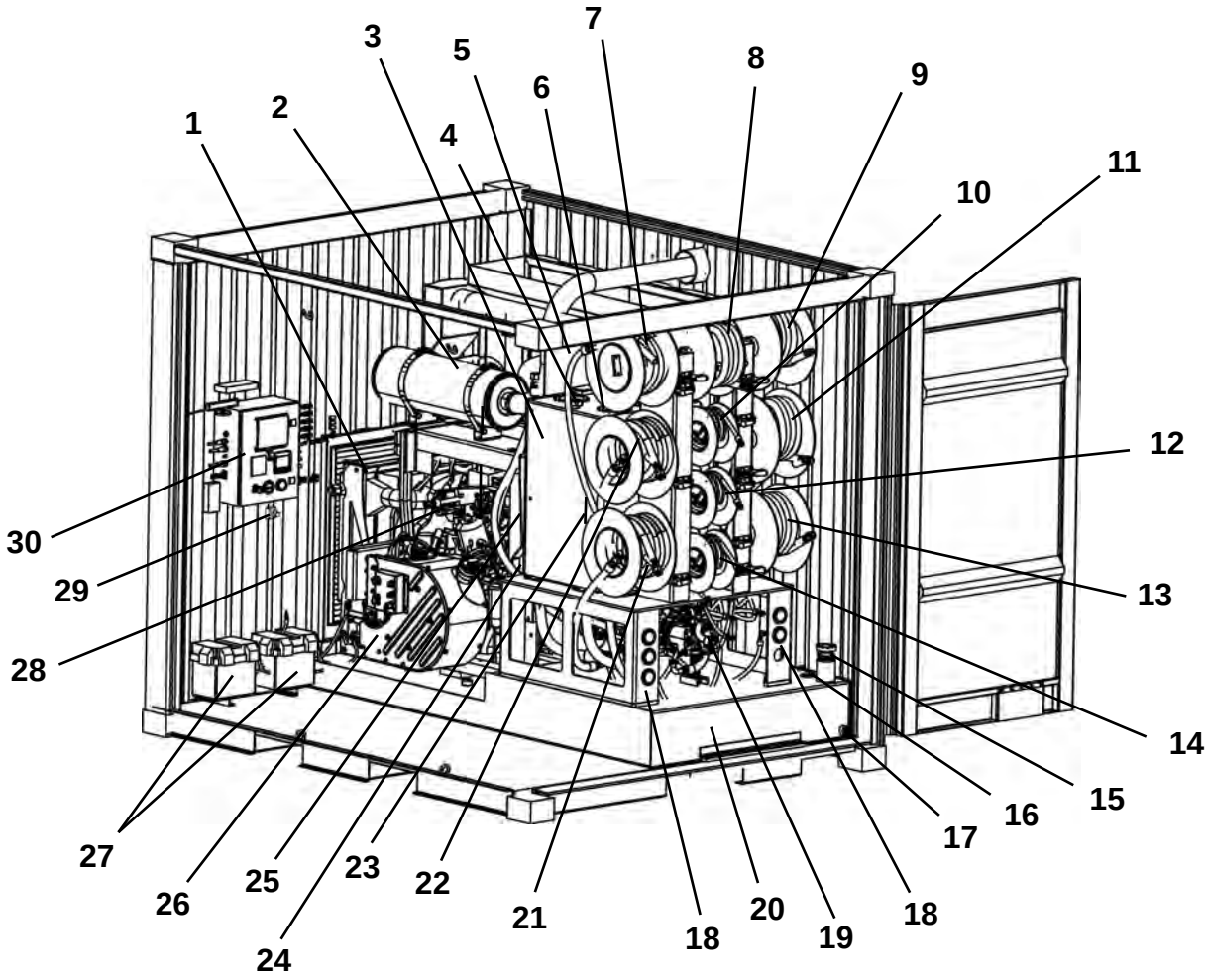
SLS DIESEL POWER PACK



NOTES

Terminology

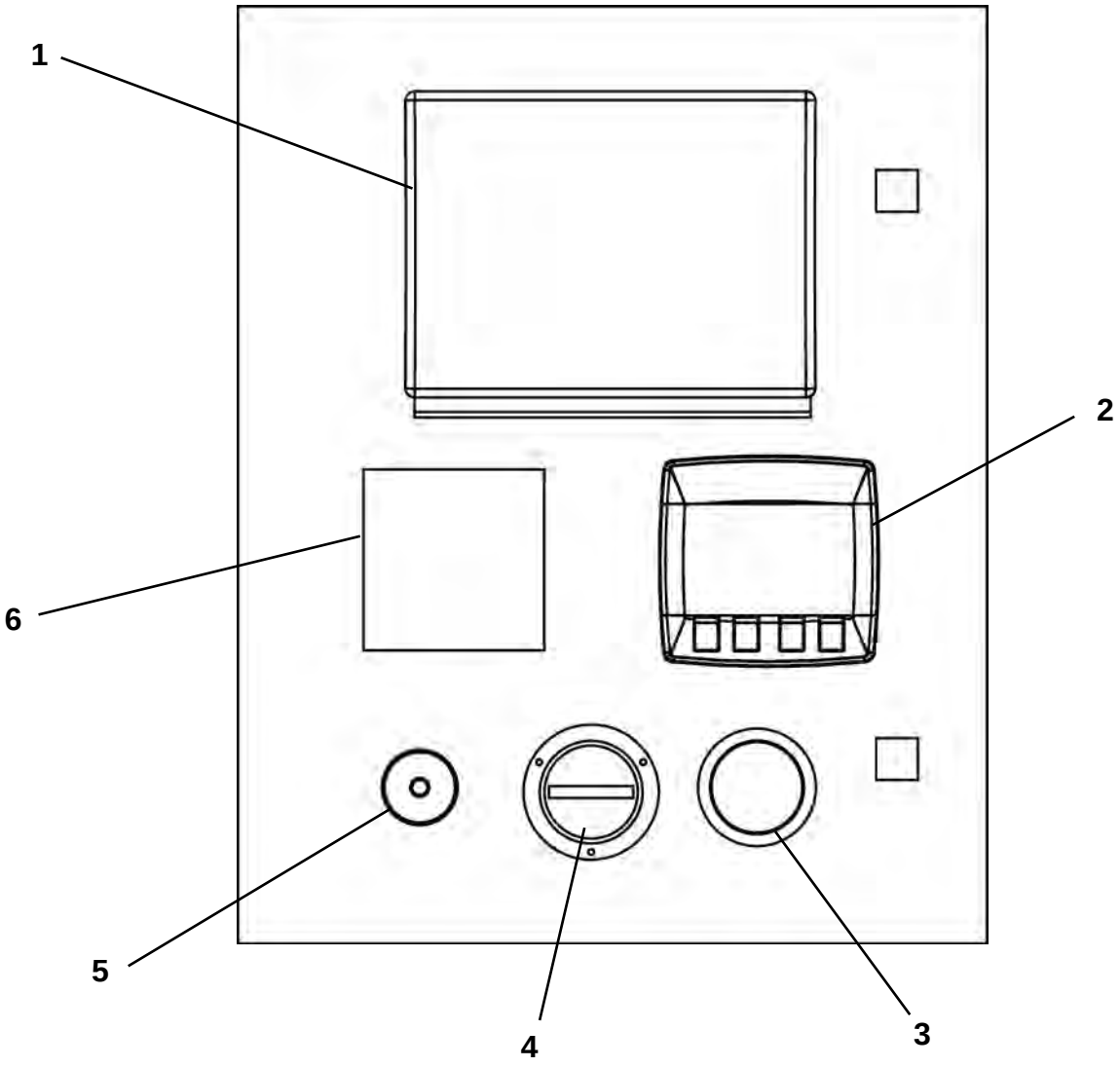
SLIPLINING POWER PACK - DIESEL



1. Cooling Fan / Oil Cooler
2. Exhaust System
3. Hydraulic Reservoir 100 Gal.
4. Reservoir Vent
5. Air Cleaner
6. Hydraulic Return Filters (2)
7. Motor Case Drain Hyd. Hose Reel
8. 5 Section Valve* Return Hyd. Hose Reel
9. 5 Section Valve* Supply Hyd. Hose Reel
10. High Speed Shift/Brake Return Hose Reel
11. Drive Pump 1 Hyd. Hose Reel (B Port)
12. High Speed Shift/Brake Supply Hose Reel
13. Drive Pump 1 Hyd. Hose Reel (A Port)
14. Load Sense Hyd. Hose Reel
15. Fuel Tank Cap
16. Fuel Tank Level Sensor
17. Fuel Tank Plug
18. Pressure Gauge Panel
19. Load Sense/5 Section Pump
20. Fuel Tank 200 Gal. (757 L)
21. Drive Pump 2 Hyd. Hose Reel (B Port)
22. Drive Pump 2 Hyd. Hose Reel (A Port)
23. Oil Level / Temperature Gauge
24. Oil Transfer (Fill) Pump
25. Drive Charge Pumps
26. AdBlue®/DEF Tank
27. Batteries 12 Volt
28. Diesel Engine 215 HP
29. Battery Disconnect Switch
30. Control Panel

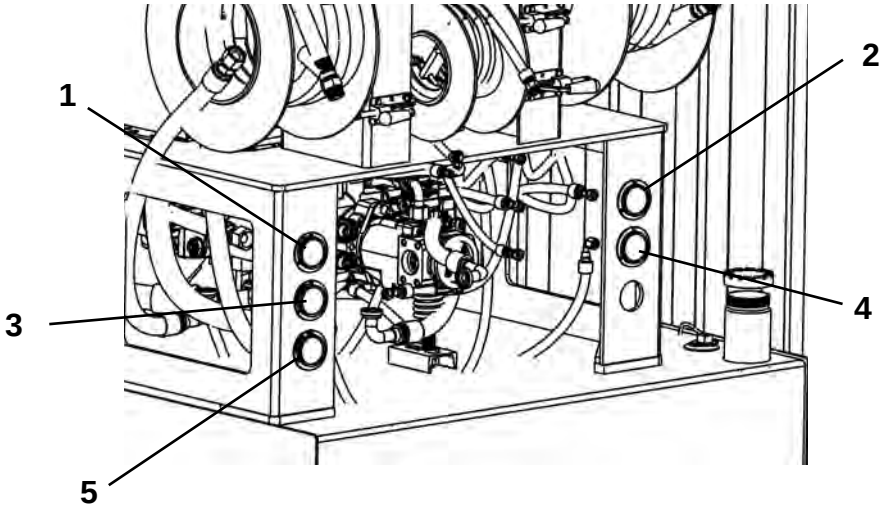
* 5 section valve functions - Pipe Clamp, Elevators, Winch and Auxiliary Hydraulics

POWER PACK CONTROL PANEL



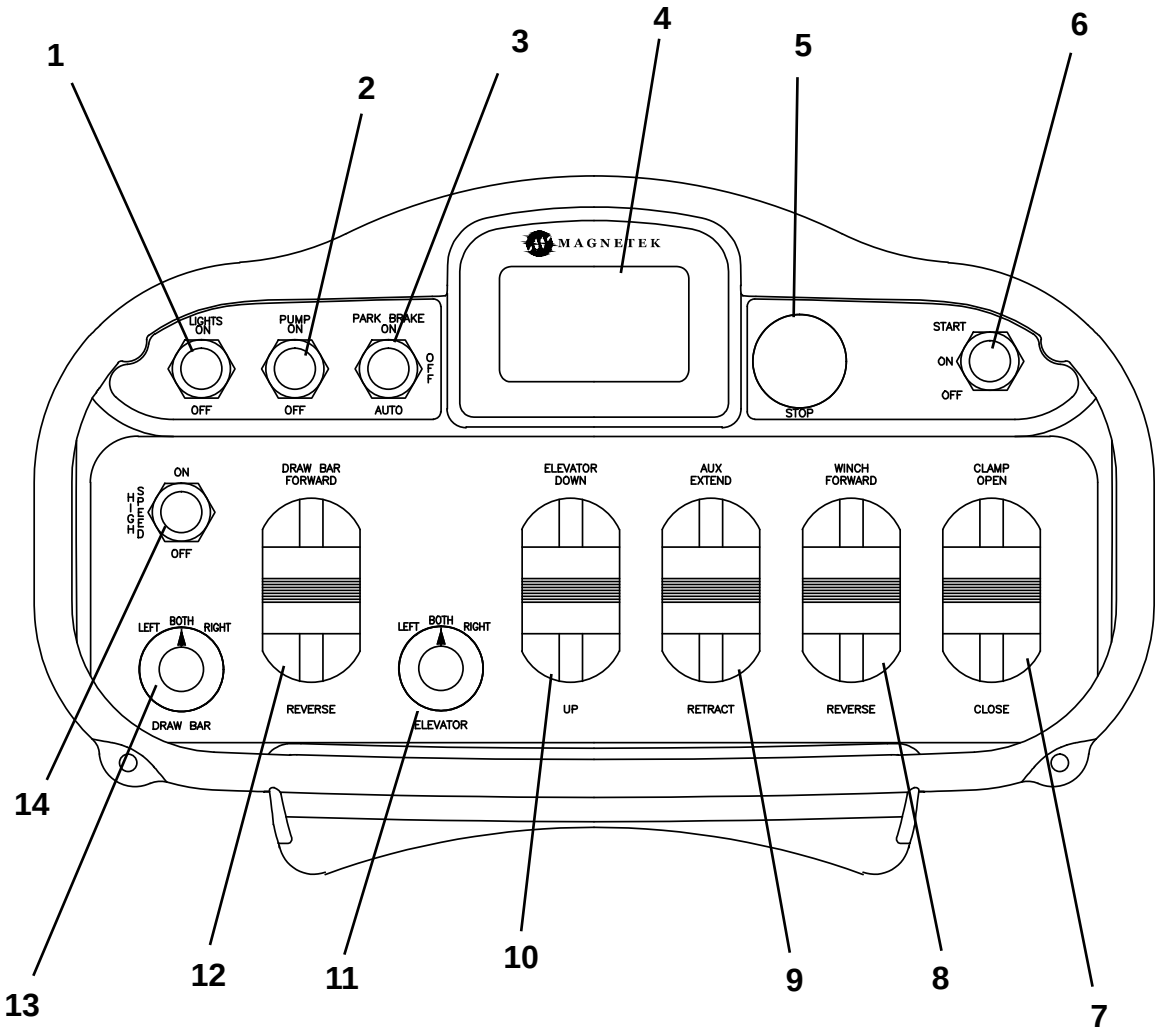
1. Engine Display Control Unit
2. Diagnostic Display
3. Fuel Tank Level Gauge
4. Hourmeter
5. Emergency Stop Button
6. Tonnage Log Display

POWER PACK PRESSURE GAUGE PANEL



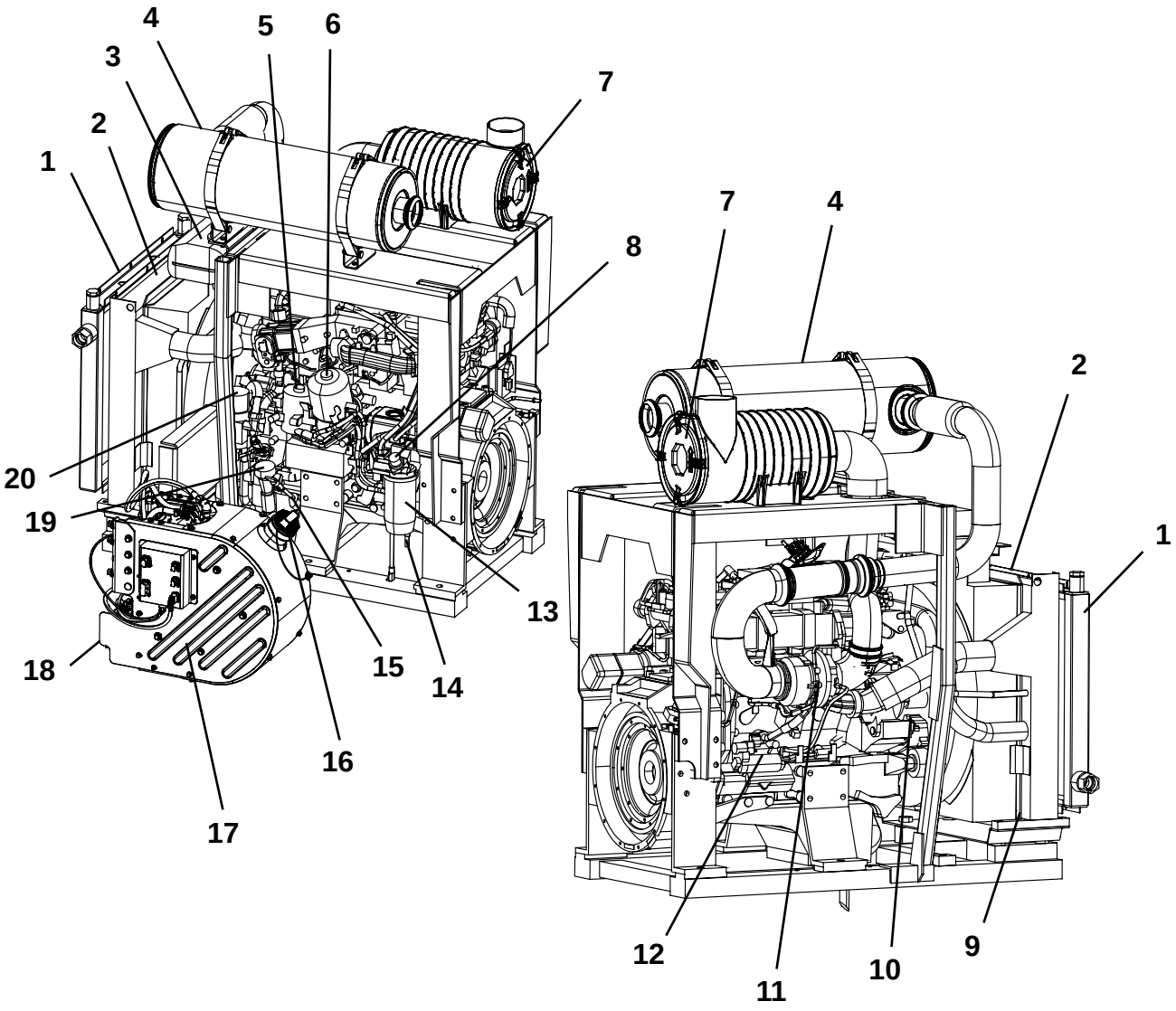
1. Drive Pump 1 (Port A) Pressure
2. Drive Pump 2 (Port B) Pressure
3. Drive Pump 1 (Port B) Pressure
4. Drive Pump 2 (Port A) Pressure
5. Load Sense Pressure

WIRELESS REMOTE PENDANT



1. Light Switch
2. Power Pack Main Hyd. Pump Switch
3. Brake Control Switch
4. Machine Information LCD Display
5. Emergency Stop (E-Stop) Button
6. Controller Start / Control Orientation Switch
7. Pipe Clamp Control
8. Winch Control
9. Auxiliary Cylinder Control
10. Elevator Control
11. Elevator Three Position Control
12. Drawbar Control
13. Drawbar Three Position Control
14. Speed Control Switch

ENGINE



1. Oil Cooler
2. Radiator
3. Coolant Reservoir
4. Exhaust System
5. Primary Fuel Filter
6. Primary Oil Filter
7. Air Cleaner
8. Fuel Hand Pump
9. Radiator Drain Valve
10. Drive Belt/Tensioner
11. Turbocharger
12. Starter
13. Pre-Fuel Filter/Water Separator
14. Water Separator Drain Valve
15. Engine Oil Dipstick
16. DEF Fill
17. AdBlue®/DEF Tank
18. SCR Pump Filter
19. Engine Oil Fill Cap
20. Oil Bypass Filter

NOTES

Controls & Instruments

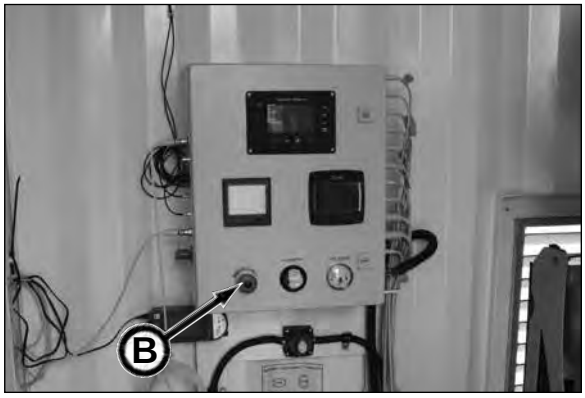
EMERGENCY STOP (E-STOP)

The Emergency Stop buttons on the slipliner wireless remote pendant (A) and the Power Pack control panel (B) will stop the diesel engine power, control system functions and hydraulic power.

The button functions as follows.

STOP - Push button IN
Power for Start Circuit - Pull button OUT

Sliplining Wireless Remote Pendant E-Stop Button



Power Pack E-Stop Button

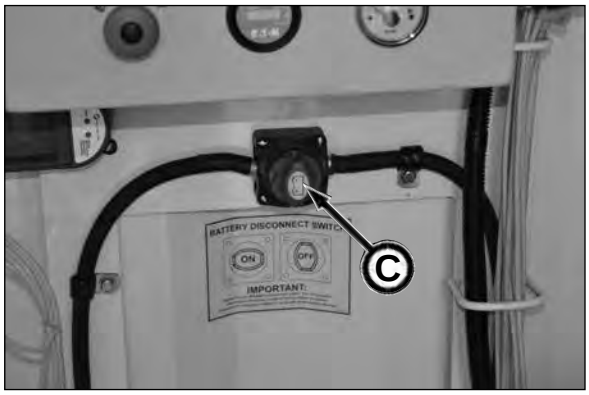
BATTERY DISCONNECT SWITCH

The Battery Disconnect Switch (C) disconnects/connects power from the batteries to the engine. It will prevent battery drainage when power pack is not in use.

Turning the switch to the OFF position will cut power to the electrical control box and the wireless connection to the control pendant.

Turn the switch as follows.

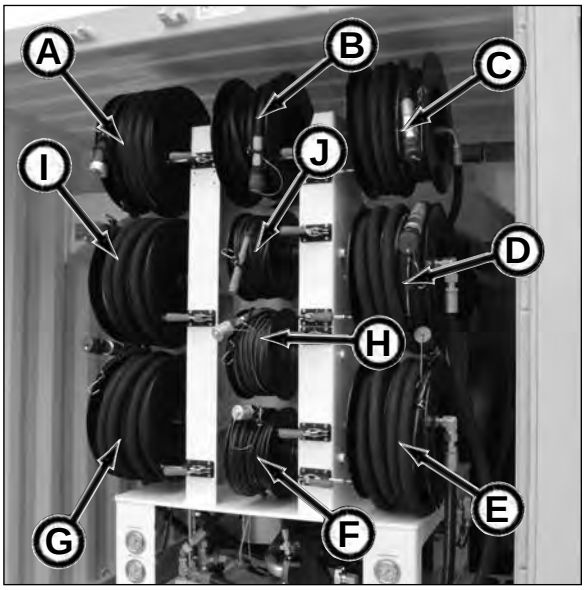
Power ON - CW (clockwise) (horizontal position)
Power OFF - CCW (counterclockwise) (vertical position)



IMPORTANT: DO NOT shut off battery disconnect switch for 120 seconds after engine shutdown to allow for the engine shutdown sequence to complete. Failure to do so will cause engine damage.

POWER PACK CONTROLS

The Power Pack provides hydraulic power for the sliplining frame. The 215 HP diesel engine drives one independent load sensing, variable volume, and torque limiting piston pump and two hydrostatic pumps.

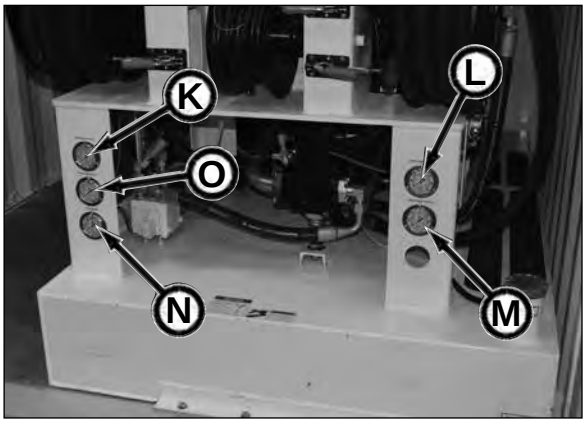


The hydraulic hoses are stored on hose reels for ease of routing hoses to sliplining frame.
The hoses are connected to the sliplining connections as follows:

A – Motor Case Drain Hyd. Hose Connection
B – 5 Section Valve* Return Hyd. Hose Connection
C – 5 Section Valve* Supply Hyd. Hose Connection
D – Drive Pump 1 Hyd. Hose Connection (B Port)
E – Drive Pump 1 Hyd. Hose Connection (A Port)
F – Load Sense Hyd. Hose Connection
G – Drive Pump 2 Hyd. Hose Connection (B Port)
H – High Speed Shift/Brake Supply Hose Connection
I – Drive Pump 2 Hyd. Hose Connection (A Port)
J – High Speed Shift Brake Return Hose Reel

* 5 section valve controls the Pipe Clamp, Elevators (2), Winch and Auxiliary hydraulic functions.

Hydraulic Pressure Gauges
Use the pressure gauges to monitor the sliplining pressures:



K – Drive Pump 1 (Port A) Pressure
L – Drive Pump 2 (Port B) Pressure
M – Drive Pump 2 (Port A) Pressure
N – Load Sense Pressure
O – Drive Pump 1 (Port B) Pressure

Drive Pump Pressures: 45 gpm @ 4,200 psi

Load Sense Pressure: 25 gpm @ 2,000 psi

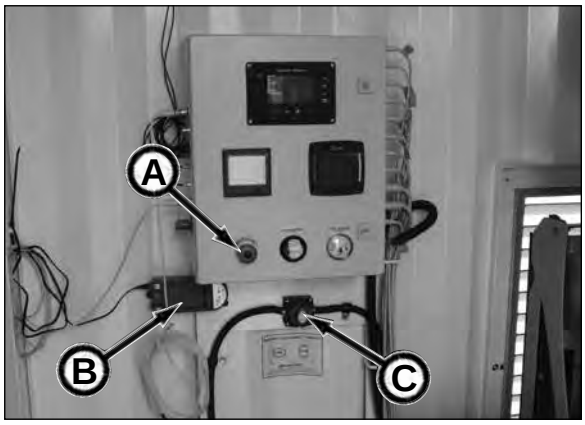
POWER PACK CONTROLS (continued)

Emergency Stop (A)
The Emergency Stop button (A) is located on the side of the control panel.

Push Emergency Stop button IN to stop all engine, control and hydraulic functions.

The button will illuminate when it is pulled OUT.

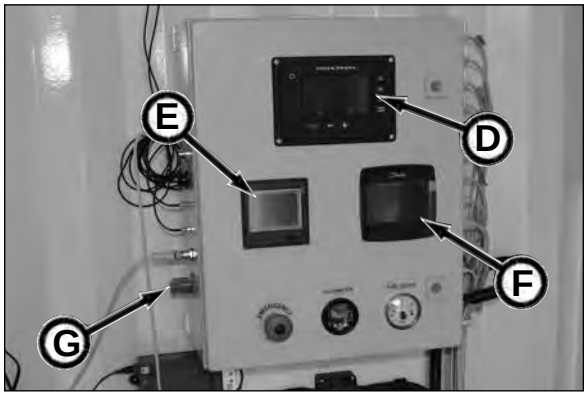
NOTICE All emergency stop buttons must be pulled out for engine to start.



Battery Charger (B)
Battery charger for charging remote wireless pendant batteries. Charger is only for recharging the NiMH battery packs. Do not charge AA battery packs.

Battery Disconnect Switch (C)
Switch disconnects/connects power from the battery to the engine. It will prevent battery drainage when power pack is not in use.

Engine Display Control Unit (D)
Control unit regulates the engine operation while displaying control, monitoring and diagnostic functions.



Tonnage Log Display (E)
Graphically displays the sliplining thrust tonnage.

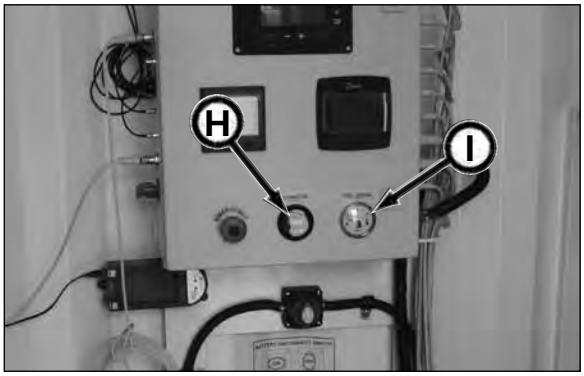
Diagnostic Display (F)
Diagnostic display for troubleshooting, calibration, inputs, outputs, fault monitors and lever travel adjustment controls.

CANbus Port (G)
Optional port used to transfer data logging information from controller to laptop computer.

Hourmeter (H)
The power pack is equipped with an hourmeter (H) on the main disconnect panel.

The hourmeter displays the operating hours in full hours and 1/10ths hours of the engine and should be used as a guide for scheduling periodic maintenance.

Time accumulates when engine is running.

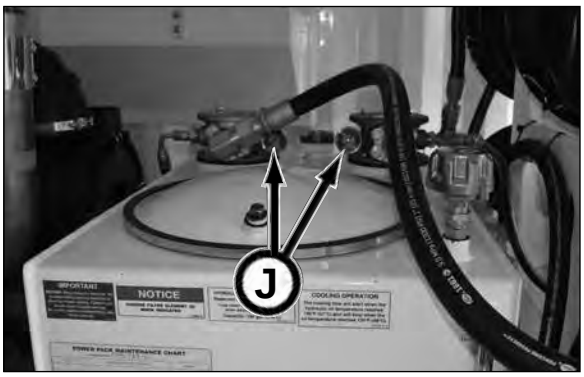


Fuel Gauge (I)
Displays the fuel level in the fuel reservoir.

Hydraulic Return Filter Indicators (J)
To prevent under or over servicing of the hydraulic filter elements, filter indicators have been installed in the Power Pack.

The green OK zone indicates that the filter is functioning properly. The yellow zone indicates that the filter will soon require replacement.

Replace return filter when the needle on the gauge is in the red CHANGE zone (refer to 20. Check Hydraulic Filter Indicators in Section 9, Periodic Maintenance section).

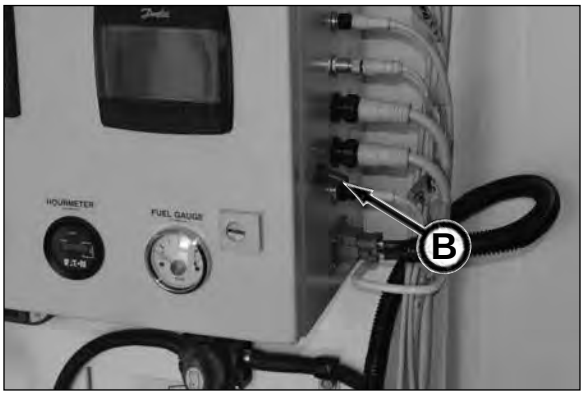


POWER PACK CONTROLS (continued)

Hydraulic Oil Fill Control (A)
Open/Close control (A) as needed when filling hydraulic oil reservoir.

Open - to fill reservoir
Close - to prevent leaking from fill hose

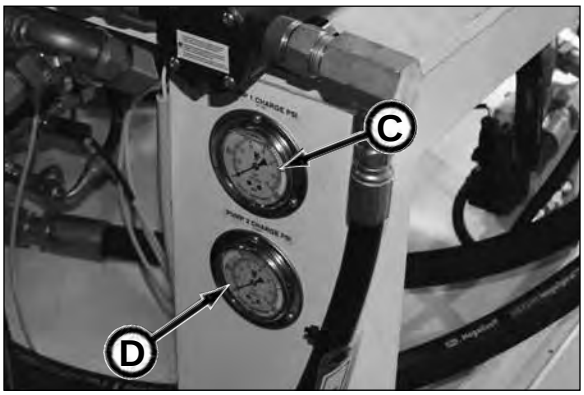
Oil Transfer Pump Switch (B)
Turn switch (B) ON to pump hydraulic oil into the hydraulic reservoir when the hydraulic oil fill control is open.



Pump Charge Pressure Gauges
Use the pressure gauges to monitor the Drive Pump 1 (C) and Drive Pump 2 (D) charge pressure.

Charge pressure at 120° F (49°C):

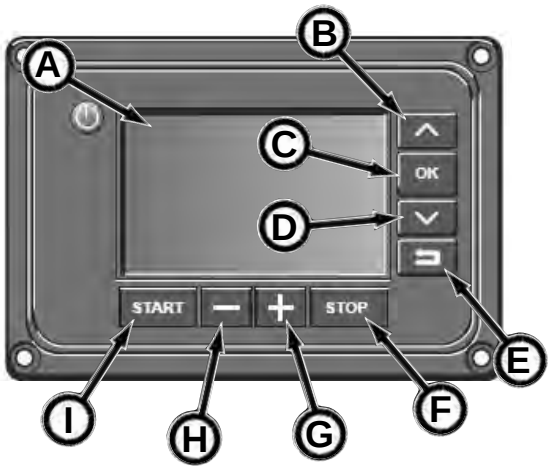
Neutral - 390 psi
In Stroke - 290 psi



ENGINE DISPLAY CONTROL UNIT

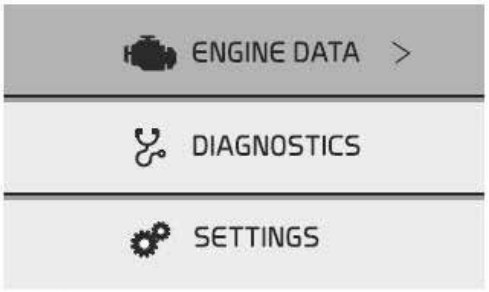
NOTICE Refer to your engine operator's manual for more information.

The control unit regulates the engine operation while displaying control, monitoring and diagnostic functions.



A – LCD Display
B – Scroll Upwards In Menus
C – Select and Confirm In Menus
D – Scroll Downwards In Menus
E – Return To Previous Menu Selection (Back)
F – Stop The Engine
G – Increase Engine RPM
H – Reduce Engine RPM
I – Start The Engine

Display
The display control unit basic view shows three main menus.



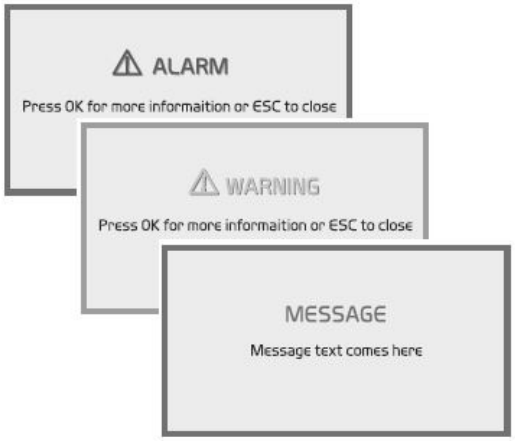
- ENGINE DATA shows current engine data.
- DIAGNOSTICS shows active fault codes. Refer to engine manual for any fault codes.
- SETTINGS, shows display, particulate filter, language, buzzer, units, information, save/restore and engine settings.

Press OK to proceed in the submenus and scroll using the panel arrow buttons.
Press ⮌ to return to previous menu.

Status Bar
The status bar with symbols for active malfunctions is shown in the top right of the display.

	Emission related malfunction
⚠	EMS system malfunction

Alarms and Messages
Messages to the operator are of three types; color coded according to the degree of severity.
When a message is shown on the display, press OK to reach the diagnostic menu to get more information regarding registered faults and instructions to remedy actions.



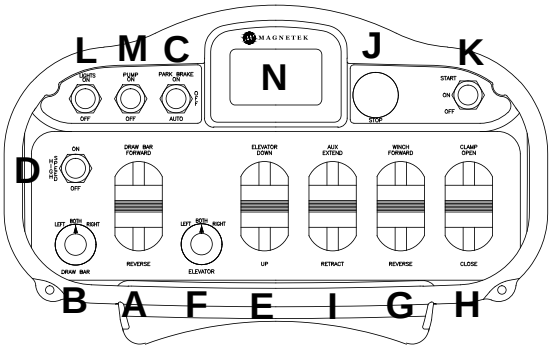
- ALARM: red text, the system has detected a serious fault. Contact a Volvo Penta qualified engine dealer immediately.
- WARNING: yellow text, the system has detected a fault. Contact a Volvo Penta qualified engine dealer as soon as possible.
- MESSAGE: blue text, non-critical engine message for the operator.

WIRELESS REMOTE PENDANT

The wireless remote pendant allows the operator in the starting shaft to control the power pack engine, hydraulic and the control system operations of the sliplining systems.

All lever controls are proportional; the more the lever is moved from the center or neutral position, the faster the component will move.

DRAWBAR DRIVE MOTOR SYSTEM CONTROL (A)
With the thrust ring mounted to the drawbar, the drawbar/thrust ring is the sliplining jacking (thrust) system. The drawbar can be controlled with both left and right motors (typical thrust operation) or independently with ***positioning switch (B)*** for repositioning drawbar to the stops or lining up the thrust ring to the pipe sections.



The drive motors are equipped with a brake system using ***brake switch (C)***. The drive motor brakes are normally on. In Auto mode, the brake will automatically release when the drawbar control is actuated. Or the brake can be used manually in the on or off position.

The drive motors are also equipped with a ***two speed control (D)***:

Low Speed ..... 13 ft per min.
High Speed ..... 27 ft per min.

ELEVATOR SYSTEM CONTROL (E)
The elevator system is used for positioning the new pipe in the shaft to the thrust ring and pipe string. The elevators also retain the pipe in position from movement until the thrusting system is in place.

Use ***positioning switch (F)*** as needed to adjust pipe position; Dual, Left or Right. The left or right position may need to be used to even the lifting action.

WINCH CONTROL (G)
The winch retains the pipe string from flowing away from the jacking frame with the flowing forces of the fluid in the pipe line.

PIPE CLAMP CONTROL (H)
The pipe clamp control will grip the pipe to prevent the pipe line from flowing back into the frame with the flowing fluid. The control regulates the cylinder attached to the pipe shoe.

AUXILIARY CONTROL (I)
Available for hydraulic equipment external to the Akkerman equipment (10 gpm @ 3,000 psi).

E-STOP BUTTON (J)
The Emergency Stop (E-Stop) button will stop the the diesel engine power, control system functions and hydraulic power.
The button functions as follows:

STOP - Push Button IN
Power for Start Circuit - Pull Button OUT

START ON/OFF & PENDANT ORIENTATION SWITCH (K)
The start switch activates/deactivates the power to the controller. This switch also controls the pendant orientation switch; changes the drive direction (forward - reverse) on the pendant to match the direction of the pushing of pipe.

LIGHT SWITCH (L)
Flip light switch to turn the power pack light ON or OFF. The light assembly is magnetically mounted therefore they can be moved to desired location.

PUMP SWITCH (M)
The pump switch powers the power pack main hydraulic pump ON/OFF. The power pack must be powered on for this switch to function.

LCD DISPLAY (N)
Machine status information such as jacking tons, load sense pressure, hydraulic oil temperature will be displayed.

LCD DISPLAY - DEFAULT OPERATION SCREEN

Once the wireless remote pendant is online, the default operation screen appears on the LCD display to provide the operator important machine status information.

Thrust Tons (A): displays the calculated tons of thrust that is being applied to the pipe by the sliplining frame.

Load Sense PSI (B): displays the load sense pump pressure of the 5 section valve functions (elevators, pipe clamp, winch and auxiliary).

Oil Temp F (C): displays the temperature of the hydraulic oil reservoir in degrees Fahrenheit.

Forward/Reverse (D): displays the pendant travel orientation. The drive direction on the pendant can be changed to match the direction of the pushing pipe.
Once the pendant is started (refer to Wireless Remote Pendant Start Up Procedure in section 6, Operation), the travel orientation can be toggled between Forward and Reverse orientation by flipping the Start switch momentarily up to the Start position and hold switch for five seconds for it to change to desired direction.

Park Brake Auto (E): this field will show control usage (functions on/off, lever stroke %, fault) and will change depending on the use of any of the controls and levers on the pendant.

Lights On (F): this field will show control usage (functions on/off, lever stroke %) and will change depending on the use of any of the controls and levers on the pendant.

Wireless Signal Strength Indicators: displays the wireless signal in three modes:

a. **Wireless Symbol (G)** indicating the pendant is receiving a wireless signal from the receiver.
b. **Wireless Signal Bar Meter (H)** provides a visual indicator of the general strength of the signal.
c. **Wireless Signal (I)** is the actual wireless signal power strength from the receiver.

Pendant Battery Level Remaining (Approx.) (J): displays the approximate battery level of the pendant in both graphical representation and numeric value.

Remote Program Status Indicator (K): displays the status of the remote wireless pendant program.

a. Program is operational with a spinning program indicator
b. Program is not operational with a static program indicator

NOTES

Pre-Start Inspection

⚠WARNING Do not operate this equipment until you read, study, and understand this manual, your Sliplining System Operator's Manual, your engine operation manual and any additional equipment manuals before you operate and maintain this equipment. A daily inspection of the equipment must be performed to prevent severe personal injury or death and equipment damage.

The contractor is fully responsible for the safety of all personnel on the job site. Check with the contractor that all site preparation requirements are in place. Be sure to comply with all OSHA regulations, such as: an active safety program is in practice, a confined space permit (if needed) is issued, personal protective equipment is being worn, monitoring of combustible and toxic gases including the depletion of oxygen; flammable, combustible, and hazardous materials are properly stored; and a lockout/tagout procedure is in place.

Use the following checklist ✓ as a guide for your daily pre-start inspection.

	1. Use "ONE-CALL" notification to check for buried utility lines prior to tunneling.
	2. Check the excavated launch and reception shafts for proper shoring or bracing to prevent slides or cave-ins.
	3. Thoroughly clean equipment of mud and dirt.
	4. Check condition of personal protective equipment. Replace equipment if defective.
	5. Contractor is responsible for all personnel to wear proper protective equipment on the job site.
	6. Remove combustible or flammable materials from equipment. Store materials properly.
	7. Test E-Stop operation. If operation is faulty, E-Stop MUST be repaired before operation.
	8. Test air monitoring and ventilation detectors for proper operation. Tunnel/shafts must be ventilated with fresh air.
	9. Thoroughly inspect all equipment for damage. Repair or replace before operating.
	10. Check engine diesel fuel level. Add as needed.
	11. Check engine crankcase oil level. Add as needed.
	12. Check engine cooling air intake areas and external surfaces of engine. Be sure they are clean and unobstructed.
	13. Check engine air cleaner components; in place and securely fastened.
	14. Check controls for proper operation. Repair or replace if damaged or worn.
	15. Check hydraulic reservoir oil level. Add as needed.
	16. Inspect equipment for damage. Repair or replace as needed.
	17. Be sure all covers and guards are in place before operation.
	18. Check for loose or missing hardware. Replace damaged or missing hardware.
	19. Check for worn, loose, or damaged wire. Repair or replace wiring.
	20. Tighten loose clamps or fittings.
	21. Check wire harnesses and cables for frayed or worn insulation or wires. Replace damaged or worn harnesses or cables.
	22. Add AdBlue®/DEF as needed. Follow refilling procedure in the engine operator's manual.
	23. Check for fluid leaks. Repair leak or replace components.
	24. Test each function and control to ensure correct operation.
	25. Keep job site clean and organized.
	26. Perform all lubrication and maintenance procedures. Refer to Section 9, Periodic Maintenance.
	27. Check hydraulic hoses for leaks, wear or damage. Replace any defective hoses and/or lines.
	28. Decals must be clean and legible.

NOTES

Operation

OPERATING GUIDELINES

⚠WARNING Do not operate this equipment until you read, study, and understand this manual, your Sliplining System Operator's Manual, your engine operation manual and any additional equipment manuals before you operate and maintain this equipment.

1. BEFORE operating, read and understand the Safety, Pre-Start Inspection, Operation and Maintenance sections in this manual, your Sliplining System Operator's Manual, your engine operation manual and any additional equipment manuals.
2. Do not operate this equipment while under the influence of alcohol, drugs, or medication.
3. Follow all Federal, State, and Local safety regulations and procedures.
4. Be sure OSHA prescribed safety protective equipment is being worn by all personnel.
5. Be sure the area is safe for operation. Keep worksite clean and orderly.
6. NEVER operate equipment if it has been engulfed with water. Contact your Akkerman Aftermarket Support representative for proper procedures on how to restore equipment for operation.
7. Have fully charged fire extinguishers on the job site at all times.
8. Before operating, inspect all equipment and repair equipment problems. Check hoses for cuts or bulges. Replace worn or damaged hoses.
9. Be sure the excavated launch and reception shafts are properly shored or braced to prevent slides or cave-ins.
10. Test air monitoring and ventilation detectors for proper operation. Never enter a shaft or tunnel without properly functioning detectors. Shaft and tunnel must be well ventilated.
11. A fully trained and qualified signal person must direct the excavator or crane operator when lifting and lowering equipment into the launch or reception shafts.
12. Pressure peaks cause hoses to jump without notice. Keep all personnel away from hoses during operation of equipment.
13. Never walk or work under any part of the excavator or crane and suspended loads.
14. Test each function and control to make sure they work properly.
15. Do not make any non-authorized modifications to any Akkerman products. Doing so could cause structural failure and will void the warranty.
16. Check shields and guards. All must be in place and undamaged.
17. Test all Emergency Stop circuits for proper operation at the start of each shift.
18. Before starting equipment, walk completely around all equipment. Let all job site personnel that you are starting up the equipment. Do not start until all unauthorized personnel are clear of the equipment.
19. After start-up, observe all gauges, controls and warning devices to assure they are functioning properly and their readings are within the operating range.
20. Perform lockout/tagout procedure on all equipment before performing maintenance.

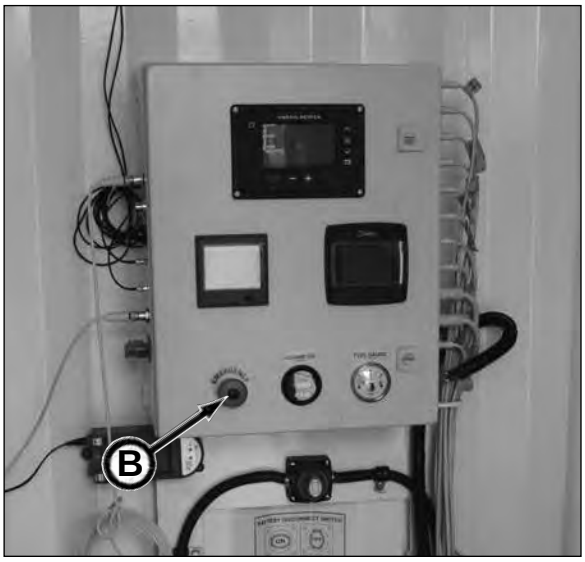
USING EMERGENCY STOP (E-STOP)

The Emergency Stop buttons on the slipliner wireless remote pendant (A) and the Power Pack control panel (B) will stop the diesel engine power, control system functions and hydraulic power.

The button functions as follows.

STOP - Push button IN
Power for Start Circuit - Pull button OUT

Sliplining Wireless Remote Pendant E-Stop Button



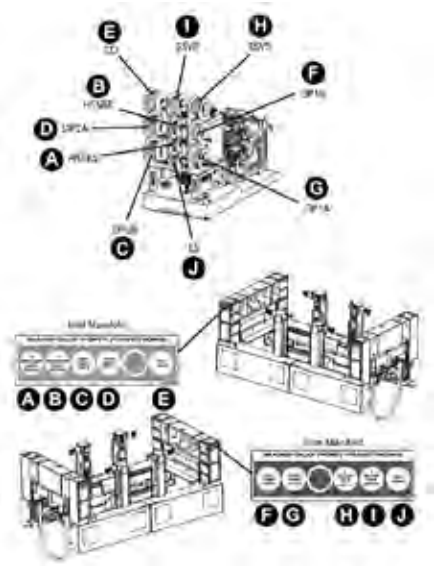
Power Pack E-Stop Button

SETTING UP THE POWER PACK

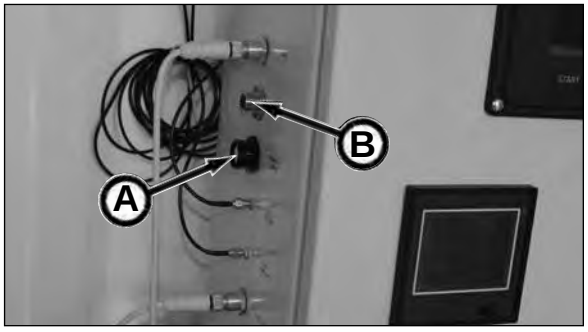
1. Position the Power Pack on firm, level ground at the top of the launch shaft.

⚠WARNING Do not position the Power Pack near the edge of the shaft where the ground may be unstable and cause a slide or cave-in. Doing so could cause severe injury or death.

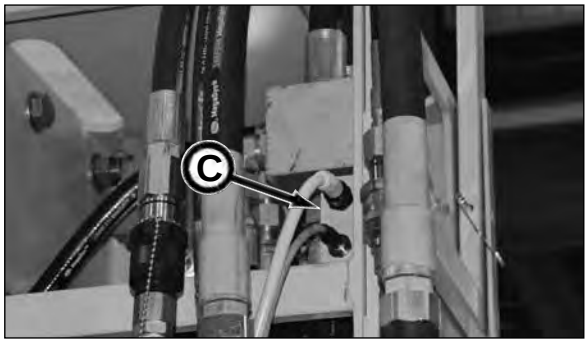
2. Perform the pre-start and daily maintenance items listed in section 9, Periodic Maintenance of this manual.



3. Connect the power pack hydraulic hoses to the sliplining frame hydraulic hose quick disconnects. Refer to Connecting Power Pack Hydraulic Hoses to Sliplining Frame in this section.



4. Connect the power pack power (A) and communication (B) cables to the sliplining frame electrical harness bulkhead (C). Refer to Connecting Power Pack Power & Communication Cables to Sliplining Frame in this section.



CONNECTING POWER PACK HYDRAULIC HOSES TO SLIPLINING FRAME

The power pack and sliplining frame have color coded hydraulic hose quick disconnects to make it easier for plumbing the two components together. Connect the power pack hydraulic hose quick disconnects to the sliplining frame manifold hose quick disconnects as follows:

NOTICE **NEVER** clamp on the coupler sleeve. This will cause distortion, resulting in coupler damage.

1. There are two types of quick disconnect connectors on the sliplining system. Use the instructions below to properly install the couplers. BEFORE installation, be sure to clean ALL mating surfaces to prevent contamination.

• Case Drain Quick Disconnect

NOTICE If quick disconnect is not fully locked, valve assembly damage will occur.

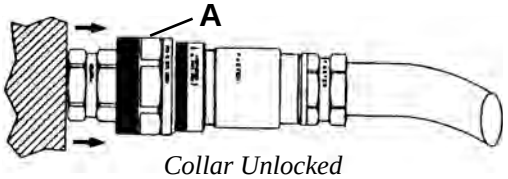
CONNECT

a. Rotate main sleeve (A) clockwise (CW) until locking collar (B) snaps against fitting end (C).

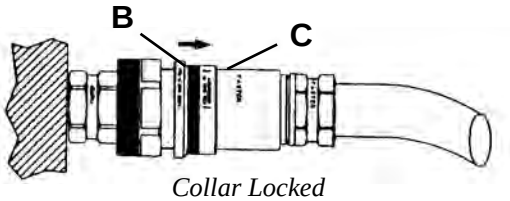
b. Check the locking mechanism, by rotating the main sleeve counterclockwise (CCW). If sleeve rotates, then the locking collar is not properly locked.

DISCONNECT

c. Pull locking cover back and rotate main sleeve counterclockwise (CCW) until coupler is removed.



Collar Unlocked



Collar Locked

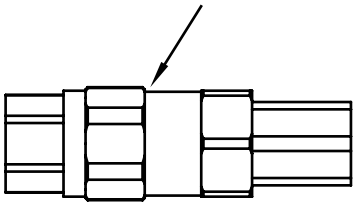
• All Other Quick Disconnects

CONNECT

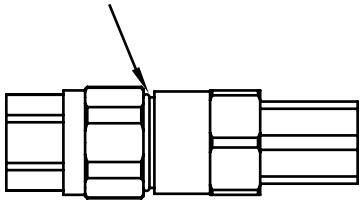
a. Hand tighten coupler by rotating clockwise (CW) until o-ring is no longer visible. If o-ring is visible, the connection is not locked.

DISCONNECT

b. Rotate hose coupler counterclockwise (CCW) until coupler is removed.



Connection Locked
Metal To Metal Contact



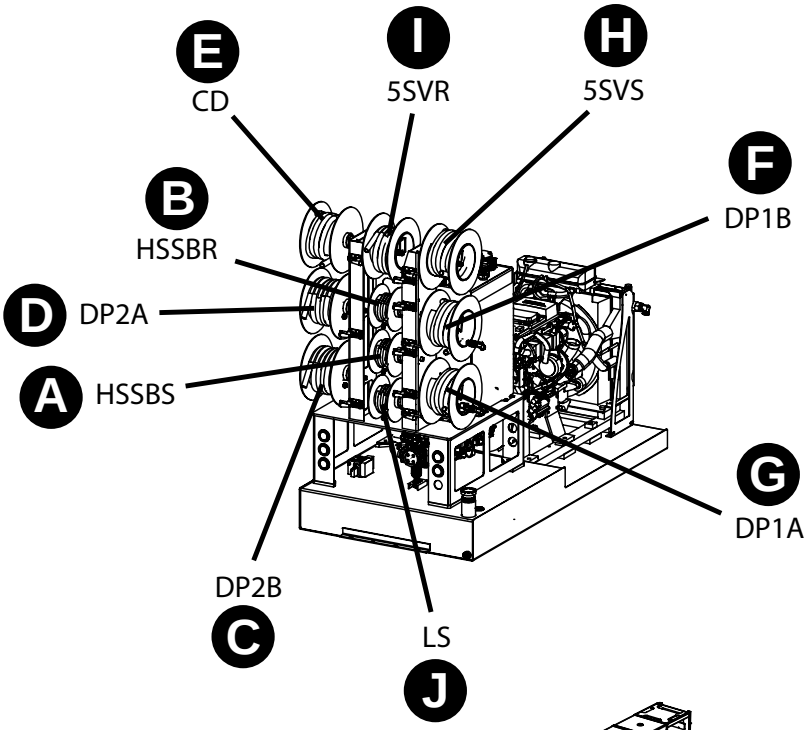
Connection Unlocked
O-Ring Partially Exposed

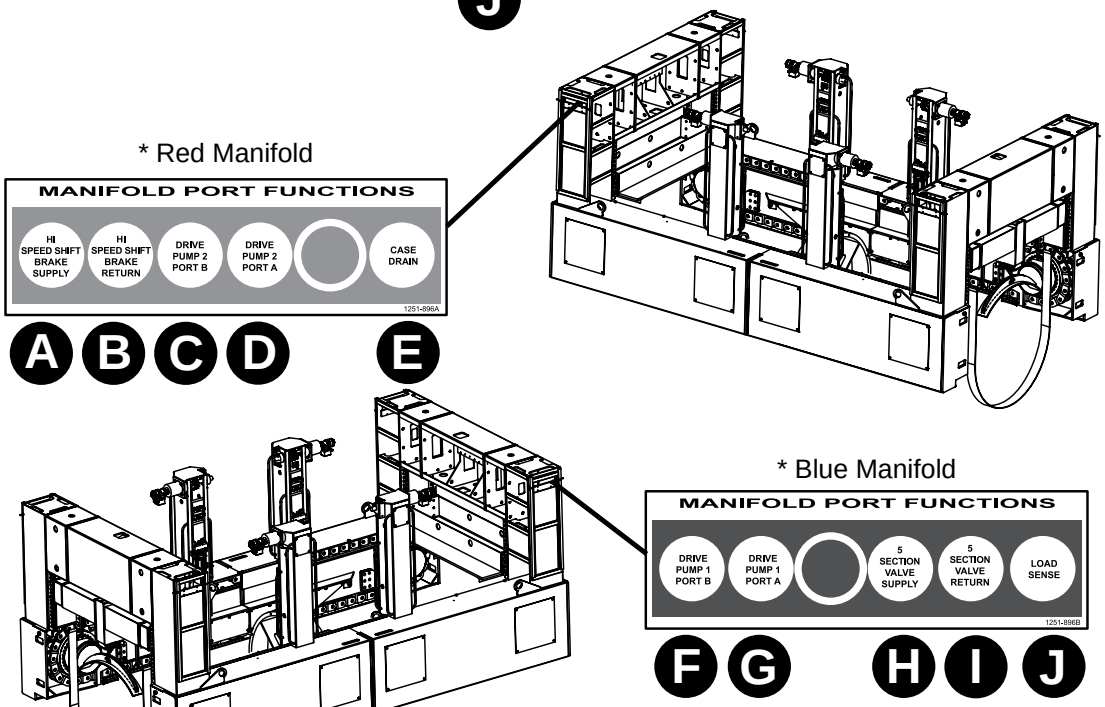
(continued on next page)

2. Using the corresponding letters below, route the hoses from the power pack hose reels to the appropriate sliplining frame manifold quick disconnects as shown in the illustration below. Be sure quick disconnects are properly connected.

Red Manifold
- A - High Speed Shift/Brake Supply (HSSBS)
- B - High Speed Shift/Brake Return (HSSBR)
- C - Drive Pump 2 Port B (DP2B)
- D - Drive Pump 2 Port A (DP2A)
- E - Case Drain (CD)

Blue Manifold
- F - Drive Pump 1 Port B (DP1B)
- G - Drive Pump 1 Port A (DP1A)
- H - 5 Section Valve Supply (5SVS)
- I - 5 Section Valve Return (5SVR)
- J - Load Sense (LS)



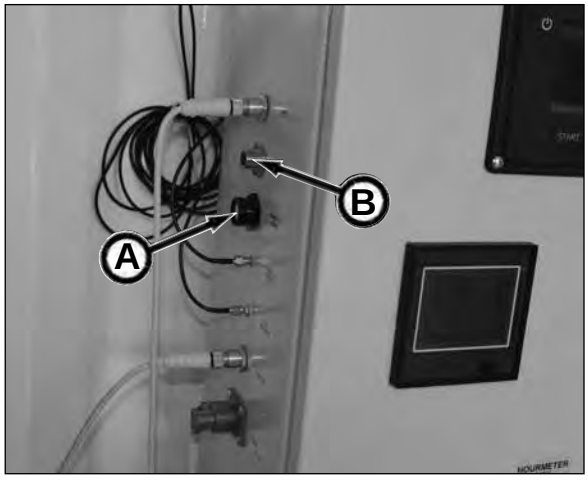


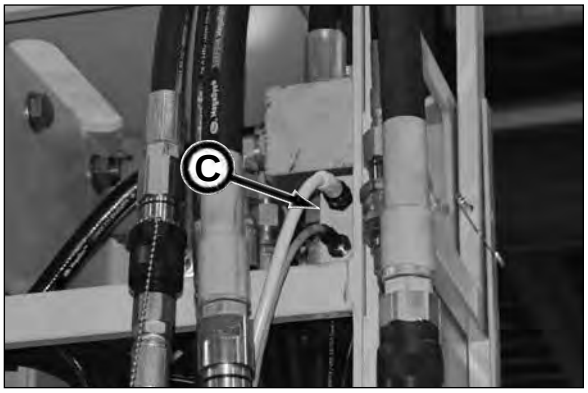
** Reference Only. Refer to the decal on your sliplining frame for manifold connections.*

CONNECTING POWER PACK POWER & COMMUNICATION CABLES TO SLIPLINING FRAME

1. Connect cable from Power To Frame (A) and Comm To Frame (B) connections on control panel to electrical harness bulkhead (C) on sliplining frame.

2. Proceed to Checkout Equipment Prior Start-Up in this section.





CHECKOUT EQUIPMENT PRIOR TO START-UP

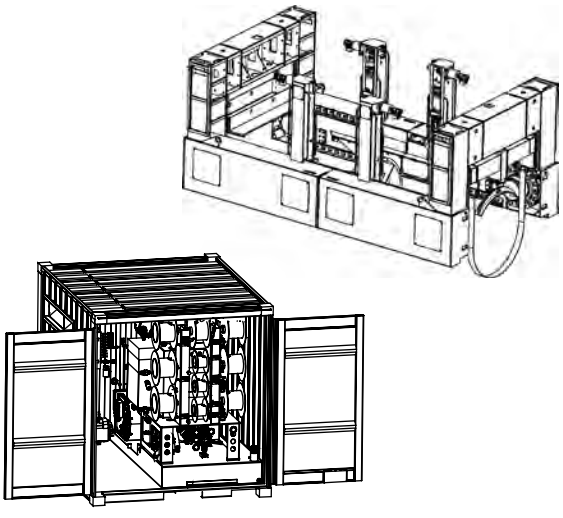
1. Before checking equipment, the shaft must be properly vented and monitored for accumulation of combustible and toxic gases including the depletion of oxygen.

2. Check the operation of ALL E-Stop buttons before operating sliplining system.

3. All cables and hydraulic hoses must be properly installed and in good working condition.

4. Perform maintenance in Prior To Each Drive Launch in section 9, Periodic Maintenance before operation.

5. Proceed to Wireless Remote Pendant Start Up Procedure in this section.

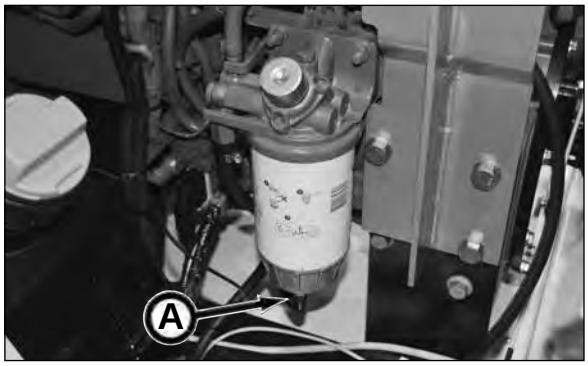


BEFORE STARTING ENGINE

NOTICE Refer to your engine operator's manual for more information.

1. With power pack on level ground, shutdown engine. Check engine oil level. Oil level must be between MIN and MAX marks on the dipstick.

2. Check fuel pre-filter. Place an appropriate sized catch pan below water separator, loosen drain plug (A). Drain fluid into catch pan until no water is present and only pure diesel fuel runs out. TIghten drain plug.



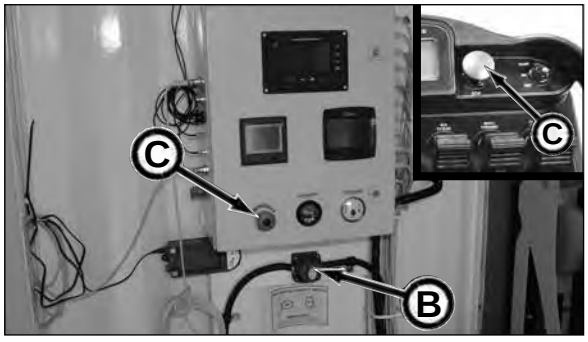
3. Check engine for leaks.

4. Check coolant level.

5. Turn battery disconnect switch (B) to ON position.

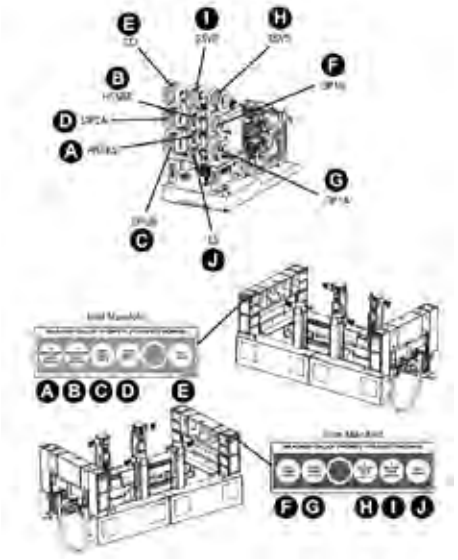
6. Pull out all E-Stop buttons (C).

7. Proceed to Wireless Remote Pendant Start Up Procedure.



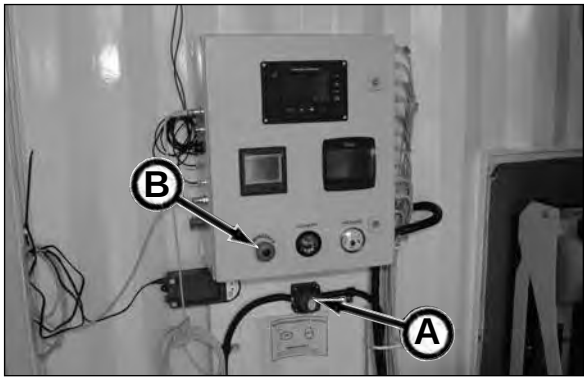
WIRELESS REMOTE PENDANT START UP PROCEDURE

Once cables and hydraulic hoses from the power pack to the sliplining frame are properly connected, the wireless remote pendant can be started as follows:



1. Connect hydraulic hoses, power and communication cables from power pack to the sliplining frame. Refer to Connecting Power Pack Hydraulic Hoses to Sliplining Frame in this section.

2. Connect power and communication cables from power pack to the sliplining frame. Refer to Connecting Power Pack Power & Communication Cables to Sliplining Frame in this section.



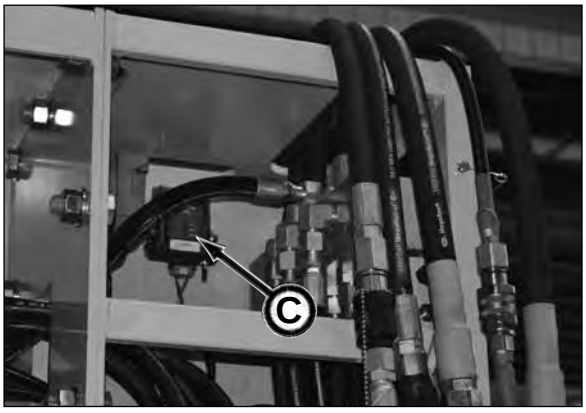
3. Turn battery disconnect switch (A) to the ON position.

4. Verifying with all job site personnel that it is acceptable to start the equipment, pull out all E-Stop buttons (B).

(continued on next page)

5. On the wireless remote pendant, flip the Start switch (A) to the ON position. A system initializing sequence will appear on the LCD display (B). After initializing is complete, the LCD display will show “Rx Offline,” indicating the pendant is on but not online.

NOTICE When the wireless remote pendant no longer receives a signal, or the pendant batteries are dead, the hydraulic and electrical functions will stop.



6. Once receiver LED (C) on sliplining frame flashes red, momentarily flip Start switch (A) up to the Start position (do not hold switch).

7. The receiver LED (C) will turn green and the default screen (D) is now shown on the LCD display. The wireless remote pendant is now online.

8. Proceed to Engine Start Up Procedure in this section to start the power pack engine.

NOTICE If the Start switch is in the ON position but the remote pendant is not connected to receiver (sleep mode or screen is off), then the Start switch will need to be switched to OFF and then to the ON position to bring the pendant back online.

ENGINE START UP PROCEDURE

NOTICE Refer to your engine Operator's Manual for detailed information on the proper break-in/cold weather starting and operation of your engine.

1. Start up wireless remote pendant (refer to Wireless Remote Pendant Start Up Procedure in this section).

2. Press Back button (A) to clear warning screen on engine display control.

3. Press and hold START button (B) until engine starts.

NOTICE Do not operate starter for more than 20 seconds at a time. Doing so may cause the starter to overheat.

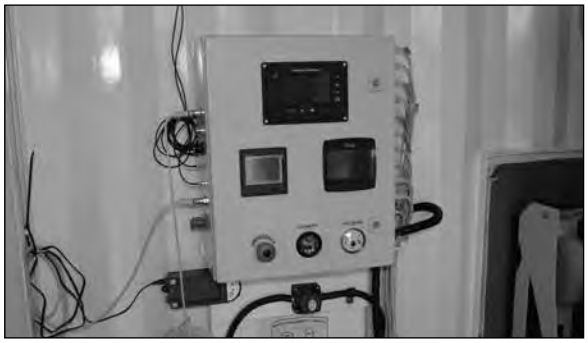
4. Warm up the engine to operating temperature. Do not place engine under full load until it is properly warmed up.

5. Flip Pump Switch (C) to the ON position. The engine and pumps in the power pack will start up. Engine will run at 1,800 rpm.

NOTICE If the Pump switch is in the ON position before connecting wireless remote pendant, the remote pendant will connect, but the Pump switch will need to be switched to OFF and then ON for the engine and pumps to operate.

6. Check for leaks. Clean up as needed.

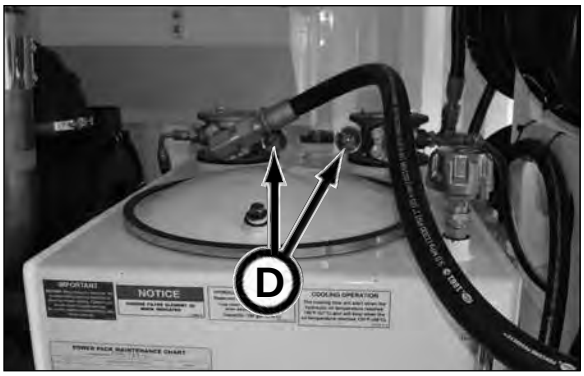
7. Check instruments after starting and periodically during operation.



8. Operator must observe the engine display control unit for any engine faults or warnings. Refer to the engine manual.

9. Avoid long periods of operation at idle.

10. Check filter indicators (D). Replace filters as needed.



11. Be sure all air purged from the hydraulic system and check for any leaks.

ENGINE SHUTDOWN PROCEDURE

NOTICE Refer to your engine Operator's Manual for detailed information on the proper engine shutdown procedure.

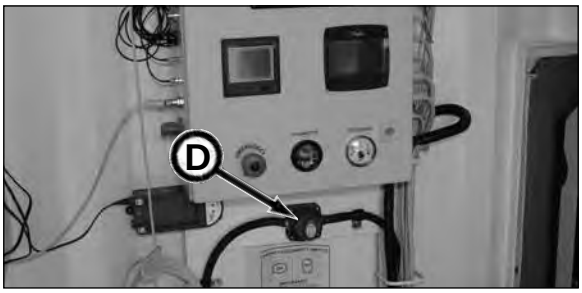
1. Let the engine run at high idle (1,800 rpm) for a minimum of 5 minutes before the shutdown after normal use (minimum 50% load).

2. Flip pendant Pump switch (A) to the OFF position.

3. Press the STOP button (B) on the engine display control or flip pendant Start switch (C) to the OFF position.

4. Check for leaks. Clean up as needed.

IMPORTANT: DO NOT shut off battery disconnect switch (D) for at least 120 seconds after engine shutdown to allow for the engine shutdown sequence to complete. Failure to do so will cause engine damage.



5. If the sliplining system will no longer be used for the day, turn the battery disconnect switch to the OFF position to prevent battery drainage.

SYSTEM START-UP

⚠DANGER Hazardous voltage. Disconnect and lock out/tag out power from source before servicing.

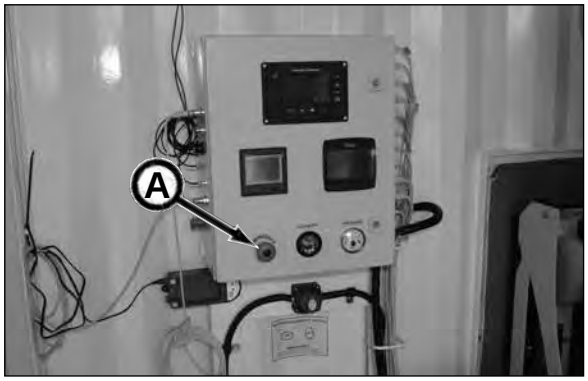
1. Push in all E-Stop buttons (A) to prevent accidental powering of equipment.

2. With **verification** for start up approval from all sliplining system equipment operators/workers, perform the following procedures:

   a. Before Starting Engine (refer to Before Starting Engine in this section).

   b. Wireless Remote Pendant Start Up Procedure (refer to Wireless Remote Pendant Start Up Procedure in this section).

   c. Engine Start Up Procedure (refer to Engine Start Up Procedure in this section).



3. Using the pendant, run the drawbar under no load from one end of the travel to the other end for a minimum of five minutes. This will cycle the hydraulic system and purge any air from the hydraulic lines.

4. Operate the main drive, elevators, pipe clamp, winch and auxiliary (if used) functions. All functions must work properly before operating sliplining equipment.

5. The sliplining equipment is now available for use.

CHECK HYDRAULICS AFTER ENGINE START-UP

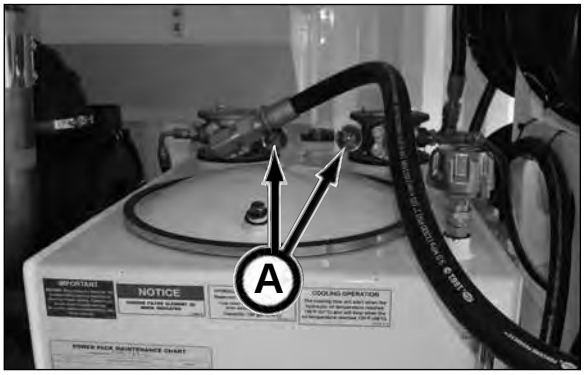
⚠WARNING Escaping oil or other fluids under pressure can penetrate your skin causing serious injury or death.

Release all pressure before performing maintenance or repairs, Never weld near pressurized fluid lines.

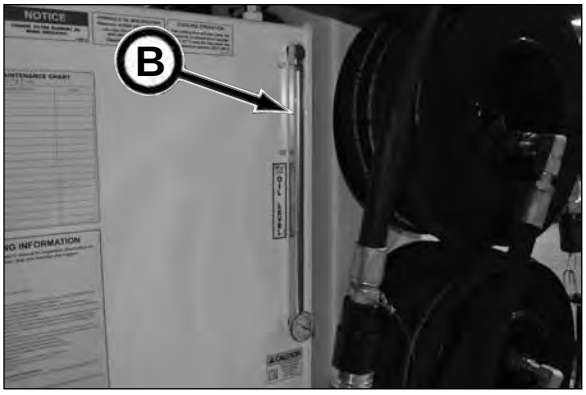
DO NOT use your hands to check for leaks. When searching for leaks, use a piece of wood or cardboard.

Contact medical help immediately if any oil or fluid is injected into your skin. A serious infection or reaction can emerge without proper medical treatment.

1. Check return filter indicators (A). Once operating temperature reaches at least 100°F (38°C), if the filter indicator needle is in the red CHANGE zone, replace filter. Refer to 20. Check Hydraulic Filter Indicators in section 9, Periodic Maintenance for filter replacement instructions.



2. Check hydraulic components and hoses for leaks. Repair or replace as needed.



3. Check hydraulic reservoir oil level (B). Add as needed. Refer to Power Pack Hydraulic Oil Reservoir Lubricant in section 8, Fuels & Lubricants for the proper oil specification.

SETTING FORCE (TONNAGE) LIMIT CONTROL (EARLY MODELS)

NOTICE To protect the product pipe, you must be sure the product pipe rating can withstand the thrust pressure of the sliplining system. Set the force (tonnage) limit control to prevent pipe damage. The control can be set from 30 to 180 tons; with an accuracy of ± 15 tons. The additional range in the limit control above the maximum sliplining system thrust capacity is to disable the force limit control.

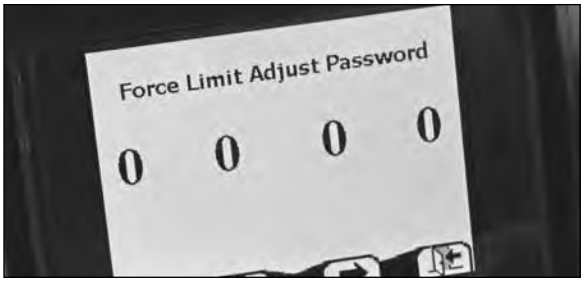
IMPORTANT: The force applied values displayed are calculated from pressure readings (pressure transducer data from the pumps). Due to the variables (temperature, viscosity, component wear, etc.) in the mechanical and hydraulic systems, the force calculation displays only theoretical force applied values. Thus the actual jacking thrust may be different than the displayed force applied values.

1. Check the thrust pressure (tonnage) rating for your product pipe.

2. On the Diagnostic Display (A) home screen, press CAL button.

3. The Select Calibration screen appears. Press Menu 1 tab for Force Limit screen.

4. The Force Limit Adjust Password window appears.



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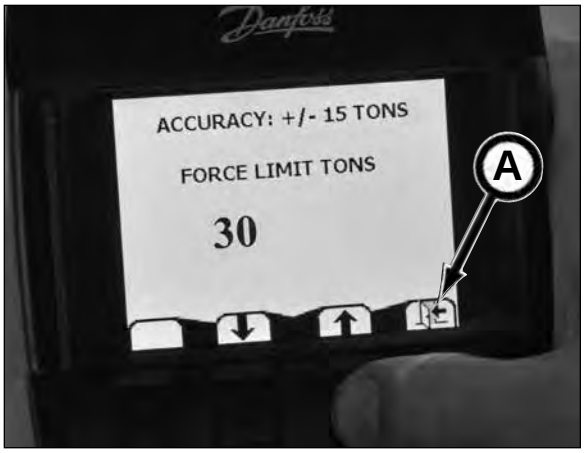
5. Using the up, down, and forward arrow buttons, enter the password 3 9 2 1. Press the forward button to enter password.

6. If the password is correct, the Force Limit Ton window appears.

7. Using the arrow buttons, enter the maximum tonnage for the product pipe. Once tonnage is set, press Home/Back button (A) to return to the home screen.

8. The maximum tonnage is now set.

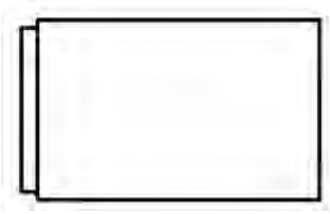


SETTING DRIVE PRESSURE LIMIT CONTROL (LATER MODELS)

NOTICE To protect the product pipe, you must be sure the product pipe rating can withstand the thrust pressure of the sliplining system. Set the drive pressure limit control to prevent pipe damage. The control can be set from 1,000 psi to 4,250 psi; with an accuracy of 500 psi. To achieve maximum force, set pressure limit to maximum 4,250 psi.

IMPORTANT: The force applied values displayed (Thrust Tons Est.) are calculated from pressure readings (pressure transducer data from the pumps). Due to the variables (temperature, viscosity, component wear, etc.) in the mechanical and hydraulic systems, the force calculation displays only theoretical force applied values. Thus the actual jacking thrust may be different than the displayed thrust tons est. values.

1. Check the thrust pressure (tonnage) rating for your product pipe.

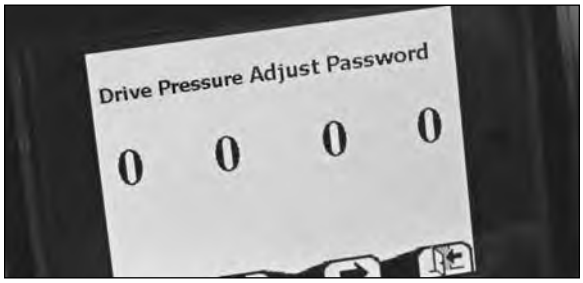


NOTICE Contact your Akkerman Aftermarket Support representative for the Pressure to Tons Load Conversion chart.

2. On the Diagnostic Display home screen, press CAL button.

3. The Select Calibration screen appears. Press Menu 1 tab for Drive Pressure Limit screen.

4. The Drive Pressure Adjust Password window appears.



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5. Using the up, down, and forward arrow buttons, enter the password 3 9 2 1. Press the forward button to enter password.

6. If the password is correct, the Drive Pressure Limit window appears.

7. Using the arrow buttons, enter the maximum pressure for the product pipe. Once pressure is set, press Home/Back button (A) to return to the home screen.

8. The maximum pressure for the product pipe is now set.

IMPORTANT: The photo depicts the maximum pressure limit setting for the sliplining system. Be sure to set the pressure setting for your pipe based on the actual pipe rating. Failure to do so will cause pipe damage.

ADJUSTING DRIVE MOTOR SPEED MATCHING

IMPORTANT: DO NOT adjust the drive motor speed matching unless the automatic speed matching becomes out of range or when hydraulic components are replaced.

The Sliplining System is equipped with hydraulic motor speed sensors to keep both Drive 1 and Drive 2 in similar linear speed. The speed sensors are used for an automatic fine adjustment when matching the drive speed.

Setting pump calibration will be required anytime the automatic speed matching becomes out of range or when hydraulic components are replaced. The pump calibration is used as a manual coarse adjustment.

NOTICE On SLS Electric Power Pack SN F40710F-01, set the travel limit stops before calibrating the drive motor speed matching. Refer to Setting Travel Limit Stops in this section.

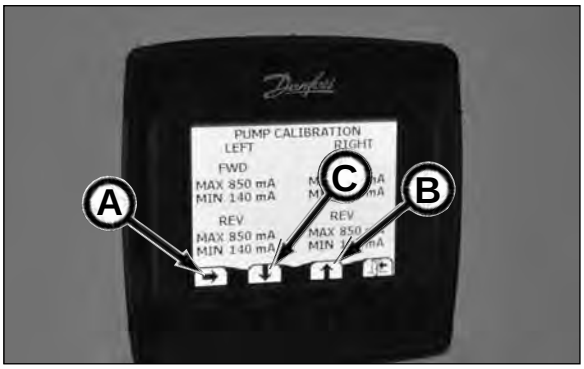
On the Diagnostic Display Module in the power pack:

1. Press CAL tab on default home screen.

2. The Select Calibration window appears. Press tab 3 Straight Track.

3. The Pump Calibration window appears.

4. If calibration adjustment is needed:
   - Use right arrow tab button (A) to navigate to the value to be changed.
   - Use the up (B) or down (C) arrow tab buttons to change the value.



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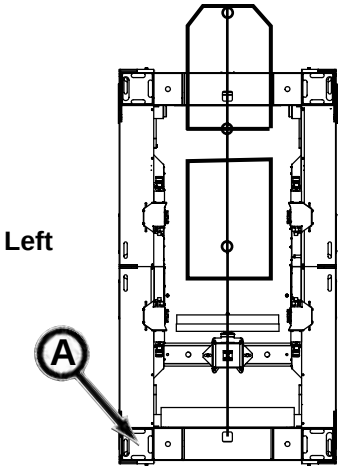
NOTICE **BEFORE** making changes on the pump calibration screen, be sure to change the correct left and/or right values. The left and right direction is referenced by the controller (A) always being in the rear location.



5. ***Observe start drive operation.***
   With the pendant drawbar control (A), SLOWLY move the drawbar (B) in the forward direction.

   • If one side drive starts moving before the other, on the pump calibration screen, change MIN value on the slower side to a larger value. Once change is made, watch the operation to verify change is correct.

   It is recommended to start the speed adjustment at 10 mA per trial and then use smaller increments to fine tune the speed matching.

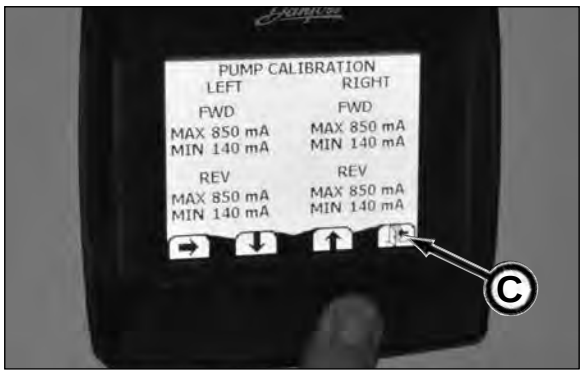
   Repeat procedure for reverse direction.

6. ***Observe the drive movement operation.***
   With the pendant drawbar control (A), move the control completely forward, at full speed moving the drawbar (B) the full operating range of the machine. DO NOT contact the drawbar to the drawbar stop.

   • Compare the position of each side of the drawbar. If one side of the drawbar moves ahead of the other, on the pump calibration screen, change MAX value on the faster side to a smaller value. Once change is made, watch the operation to verify change is correct.

   It is recommended to start the speed adjustment at 10 mA per trial and then use smaller increments to fine tune the speed matching.

   Repeat procedure for reverse direction.



7. Use the Exit tab (C) button to go back to Select Calibration window (D).

8. Use the Exit tab to go back to the default Diagnostic Display Module home screen (E).

Contact your Akkerman Aftermarket Support representative with any questions.

ADJUSTING PVG FUNCTION SPEED CONTROL

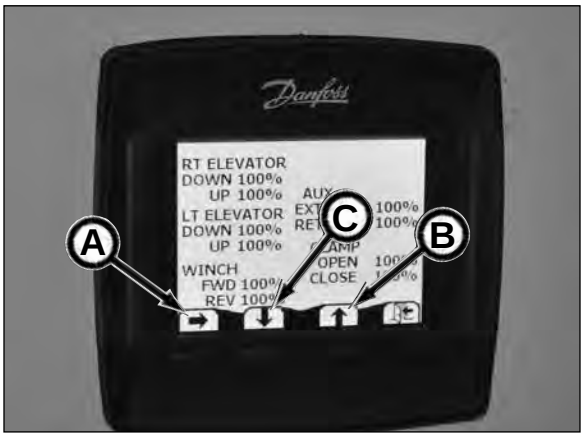
The Sliplining System is equipped with a PVG valve which allows the operator to adjust the speed of the left and right elevators, clamp, winch and auxiliary functions.

On the Diagnostic Display Module in the power pack:

1. Press CAL tab on default home screen.

2. The Select Calibration window appears.

   Press tab 2 PVG .

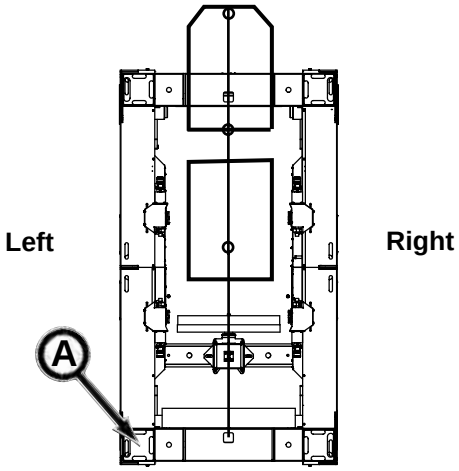


3. The PVG function window appears.

4. If function adjustment is needed:
   - Use right arrow tab button (A) to navigate to the value to be changed.

   - Use the up (B) or down (C) arrow tab buttons to change the value.

NOTICE **BEFORE** making changes on the PVG screen, be sure to change the correct left and/or right values. The left and right direction is referenced by the controller (A) always being in the rear location.



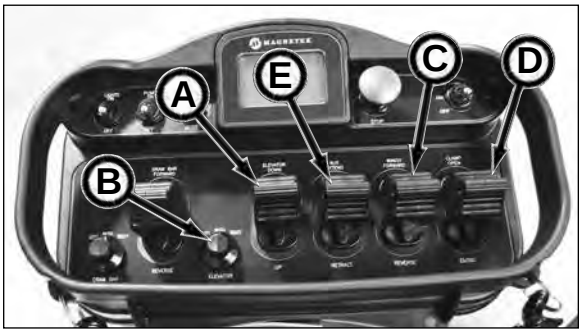
5. Observe the operation speed of the function to be modified.

   • Elevator Control (A)
   - Elevator Selector Switch (B)
   • Winch Control (C)
   • Clamp Control (D)
   • Auxiliary Control (E)

6. Change the percentage value to the desired function speed.

   Slower is a lower %, 100% is full speed.

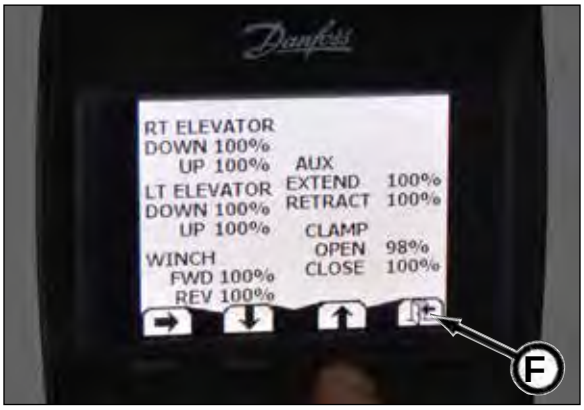
   Changing the percentage of the function in the settings, changes the full output speed of the function joystick on the pendant control.



7. Once the function speed is modified, observe and verify that the operation of the function is correctly adjusted.

8. Repeat procedure for other functions as needed.

9. Use the Exit tab (F) button to go back to Select Calibration window (G).



10. Use the Exit tab to go back to the default Diagnostic Display Module home screen (H).

    Contact your Akkerman Aftermarket Support representative if you have any questions.

SETTING DISPLAY TIME, DATE & BRIGHTNESS

To set the display time, date and brightness, go to the Diagnostic Display Module in the power pack:

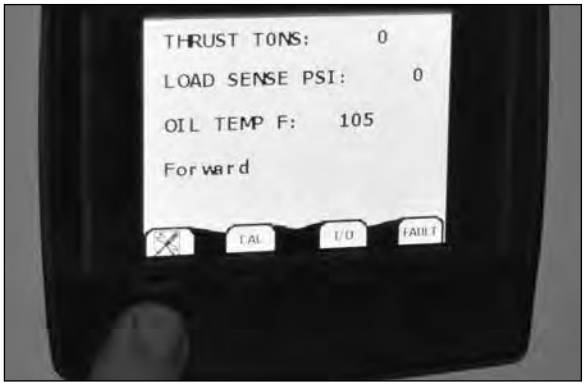
1. Press Tools tab on default home screen.

2. The Time, Date and Brightness screen appears.

3. To change time or date settings:
   a. Press Set tab as needed to navigate to the time or date setting that requires updating.
   b. Use the up and down arrows to change the time or date setting.
   c. Press the Set tab to navigate to the next setting to update.
   d. Repeat as needed to change settings.
   e. Press Set tab again to enter the setting.

4. To change the brightness setting:
   a. Press Set tab as needed to navigate to the brightness setting.
   b. Use the up and down arrows to the desired brightness setting.
   c. Press Set tab to enter the setting.

5. To go back to the home screen, press the Exit tab (A).



VIEWING INPUT/OUTPUT DATA

The electrical sensor inputs and outputs (raw data) are available on the Diagnostic Display. The values cannot be changed though they are useful for troubleshooting the machine operation.

To view the inputs/outputs go to the Diagnostic Display Module in the power pack:

1. Press I/O tab on default home screen.

2. There are two input screens and one output screen. Navigate through the screens using the left and right arrows.

   If an input or output is active, a red square (B) will appear next to the input/output.

3. To go back to the home screen, press the Exit tab (C).

4. Contact your Akkerman Aftermarket Support representative with any questions.

VIEWING FAULTS

The machine inputs and outputs are constantly monitored. If there is an error in an input and/or output, a fault will display on the pendant LCD display and the power pack diagnostic display.

To determine the area of the fault, go to the Diagnostic Display Module in the power pack:

1. Press FAULT tab on default home screen.

2. There are two screens showing the available faults. Navigate through the fault screens using the left and right arrows.

   If a fault occurs, a red square (A) will appear next to the fault.

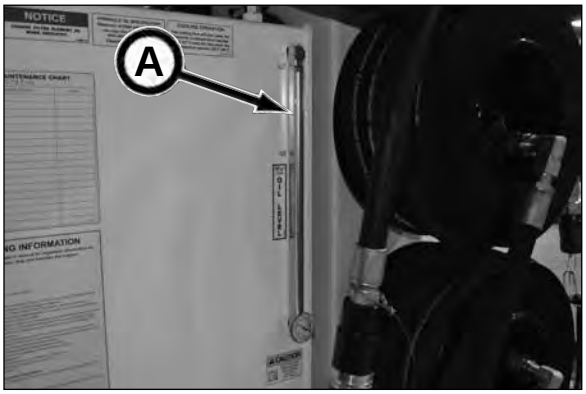
3. To go back to the home screen, press the Exit tab.

4. A fault will require troubleshooting to clear the fault.

   Contact your Akkerman Aftermarket Support representative with any questions.

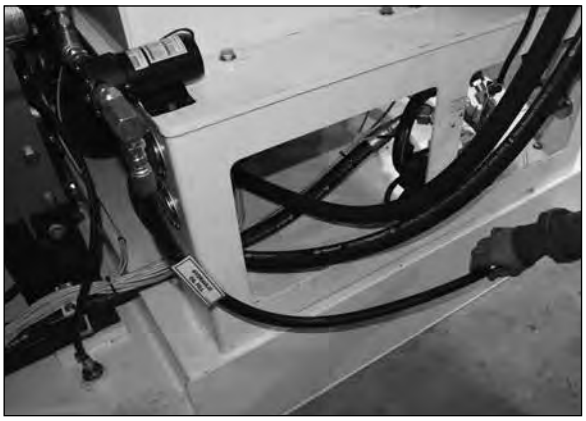
FILLING THE HYDRAULIC OIL RESERVOIR

Check hydraulic tank oil level gauge (A).



If the fluid level in the reservoir is less than 3/4 full, fill the reservoir with ISO-VG-68 Premium Hydraulic Turbine Oil as follows:

1. Remove hydraulic oil fill hose from storage location. Clean hose cap and hose end and remove cap from hose.



2. Place hose into clean hydraulic oil container.

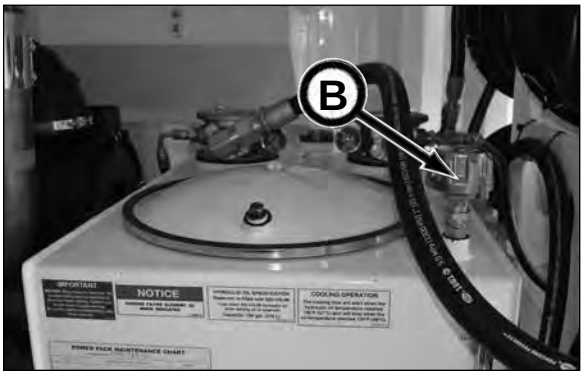
NOTICE Refer to Fuels & Lubricants section for recommended hydraulic oil.

(continued on next page)

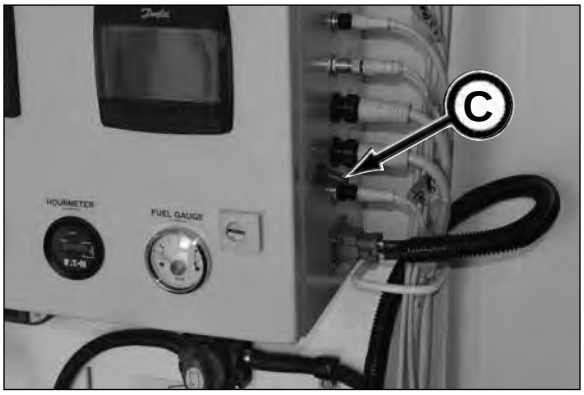
3. Open hydraulic oil fill control by moving handle (A) down to the 6 o'clock position.

IMPORTANT: BEFORE filling hydraulic reservoir, the breather/fitting must be removed to allow for proper venting. Failure to do so will result in pump damage. Be sure to replace breather/fitting after filling reservoir.

4. Remove breather/fitting (B) from reservoir BEFORE filling reservoir to allow for proper venting during filling process.



5. Flip Oil Transfer Pump switch (C) up to the ON position to pump hydraulic oil into the hydraulic reservoir.



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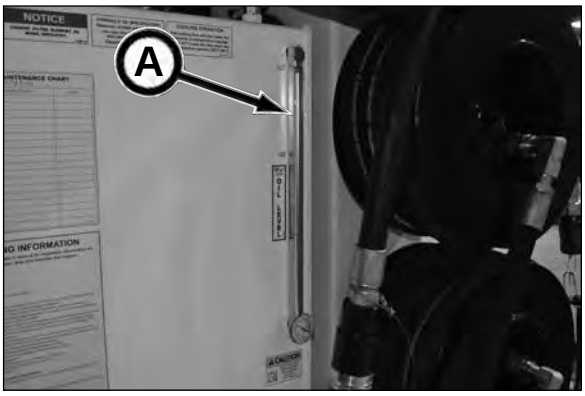
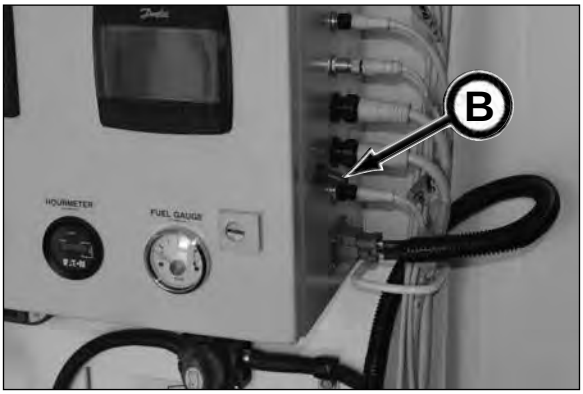
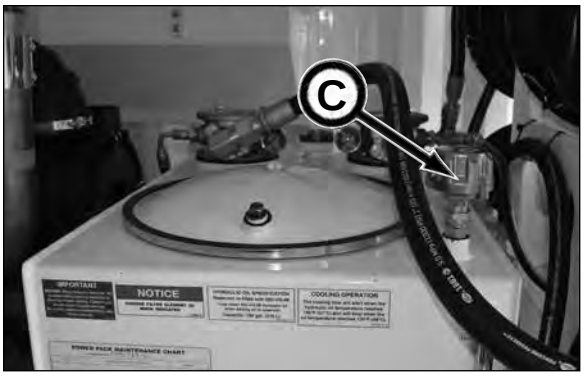
6. Fill until oil reaches the high mark on gauge (A).



7. Flip Oil Transfer Pump switch (B) down to the OFF position.



8. Replace breather/fitting (C) on reservoir.



9. Close hydraulic oil fill control by moving handle (D) clockwise to the 9 o'clock position.

10. Replace cap on fill hose and place hose in storage location.

DAILY SHUTDOWN

NOTICE Refer to your engine Operator's Manual for detailed information on the proper engine shutdown procedure.

1. Let the engine run at high idle (1,800 rpm) for a minimum of 5 minutes before the shutdown after normal use (minimum 50% load).

2. Flip pendant Pump switch (A) to the OFF position.

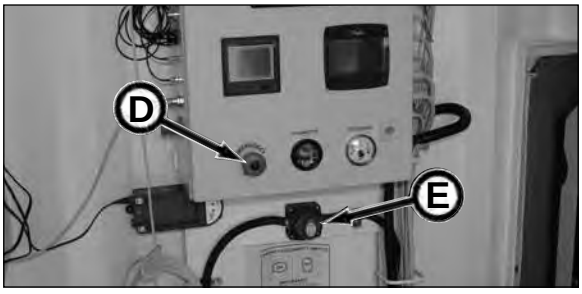
3. Press the STOP button (B) on the engine display control or flip pendant Start switch (C) to the OFF position.

4. Wait at least 120 seconds after engine shutdown to allow for the engine shutdown sequence to complete.

5. Check for leaks. Clean up as needed.

6. Push IN all E-Stop buttons (D).

IMPORTANT: DO NOT shut off battery disconnect switch (E) for at least 120 seconds after engine shutdown to allow for the engine shutdown sequence to complete. Failure to do so will cause engine damage.



7. Turn the battery disconnect switch (E) to the OFF position to prevent battery drainage.

REMOTE ACCESS DATA

The Sliplining Power Pack System automatically logs data to be remotely accessed by the customer. The connection is achieved over a cellular data network. A customer supplied SIM card with a public IP address is required. The SIM card will be installed into the data modem installed in the Power Pack. The data is then collected, stored and provided to the remote user from the server module that is mounted in the power pack.

1. On the remote computer with the VPN client, ZyWall installed on the computer, double click the ZyWall program from the desktop to open the program.

2. On the VPN Connections window, click Open on the Slip_Liner_VPN1-....

3. Once VPN is connected, open the Google Chrome™ browser (preferred), and type in the IP address 192.168.10.25 address bar to open the remote access web dashboard.

4. From the web dashboard or the menu column on the left side of the window, click on the desired data:

   - **Home:** web dashboard window
   - **Live Data:** view near real time key engine, power pack hydraulics and frame tonnage data
   - **Live Data Graph:** select parameters to graph over a period of time
   - **Log Files:** management of tonnage data logs
   - **Error Log:** internal server module data event log (used for troubleshooting)
   - **Documentation:** view or download PDF manuals and schematics

(continued on next page)

5. LIVE DATA

Click on Live Data to view the near real time engine, power pack hydraulics and tonnage data.

6. LIVE DATA - Power Pack Map Location

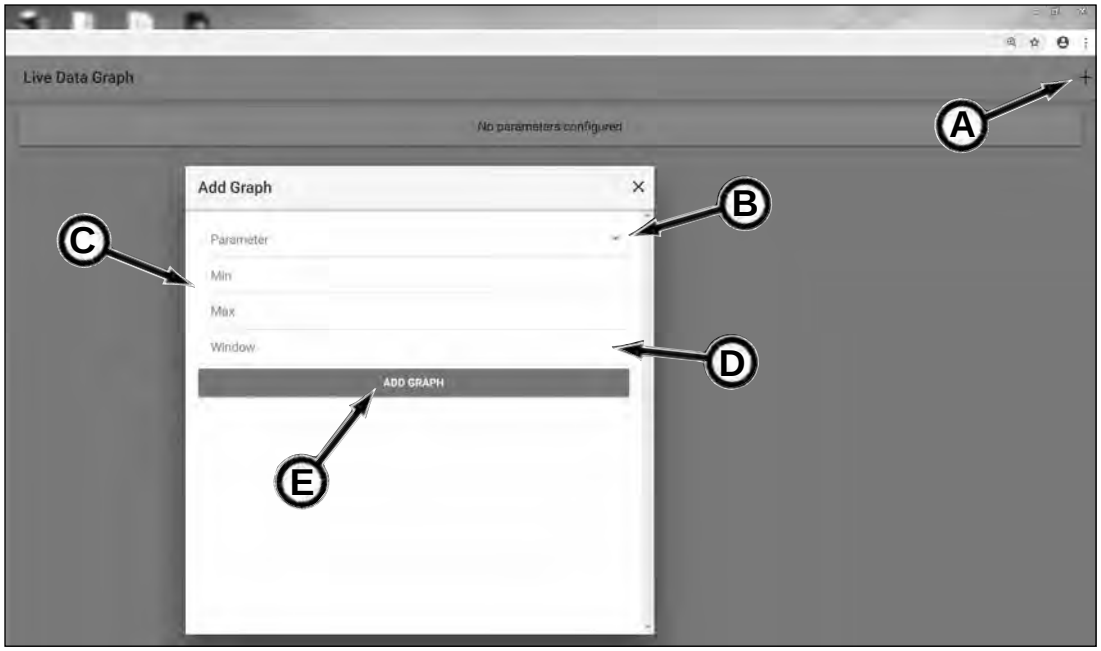
To show the actual location of the power pack, highlight location information, right click and then select Go To link (A). A new window will open with a photo and location coordinates of the power pack (B), providing a GPS signal is available.

(continued on next page)

7. LIVE DATA GRAPH - Trend Data

Select Live Data Graph to visually graph live data trends for a period of time.

- To add Graph, click + (A). The Add Graph window will appear.
- Use the pull down menu (B) to select the desired data parameter.
- Scale the graph by typing in the minimum and maximum (C) variables of the data.
- In the Window field (D), type in the length of time in seconds to graph the data trend. The graph will accumulate up to the maximum seconds and then remove the oldest data while continuing to graph the data trend.
- Once graph values are entered, click Add Graph (E) button.



- To edit the values in the graph, click the pencil icon (F). The Edit Graph window will appear. Change the values as needed. Click Update Graph button (G) to display the new graph.

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8. LOG FILES

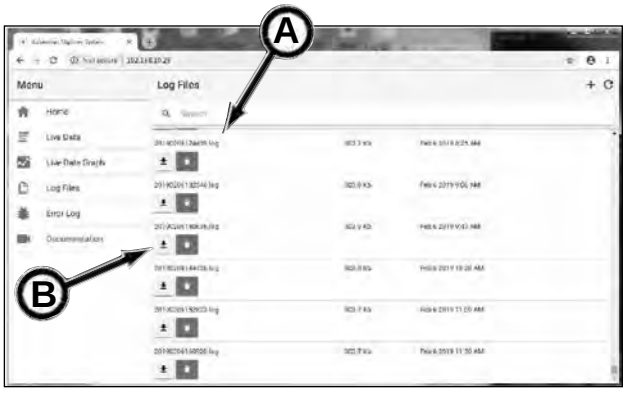
A listing of the log files is shown on the Log Files window which allows for the retrieval and management of the data log files.

Data logging files (A) are automatically generated (from power pack internal flash drive) with the drawbar tonnage, hydraulic oil temperature, engine coolant temperature and engine oil pressure every second with the date and time.

Once job is complete, clear data log files to eliminate confusion of files before starting new job. If required, download all .log files to a project folder on computer before deleting log files.

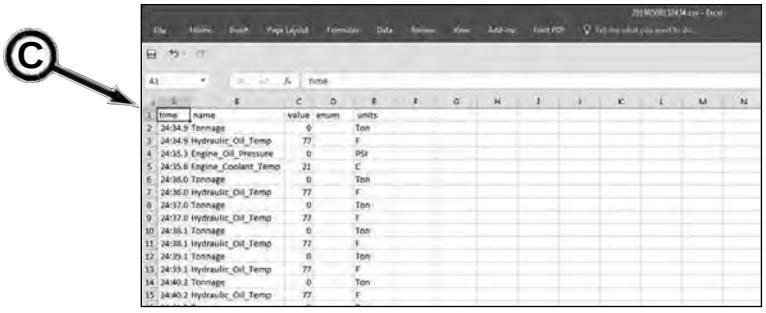
To view the data information:

- Click on the desired log file download button (B). Save the file on the computer desktop or other desired directory location.



- Change the file name from .log to .csv (Comma Separated Value). The .csv file is a spread sheet program format and will open in Microsoft® Excel or other spread sheet program.

- Open .csv file (C) to view data. Reformat columns as needed.



To delete log files:

- After job completion, delete .log files. On the log file(s) to delete, click the appropriate trash can icon (D). A Confirm window appears. Click Delete (E).

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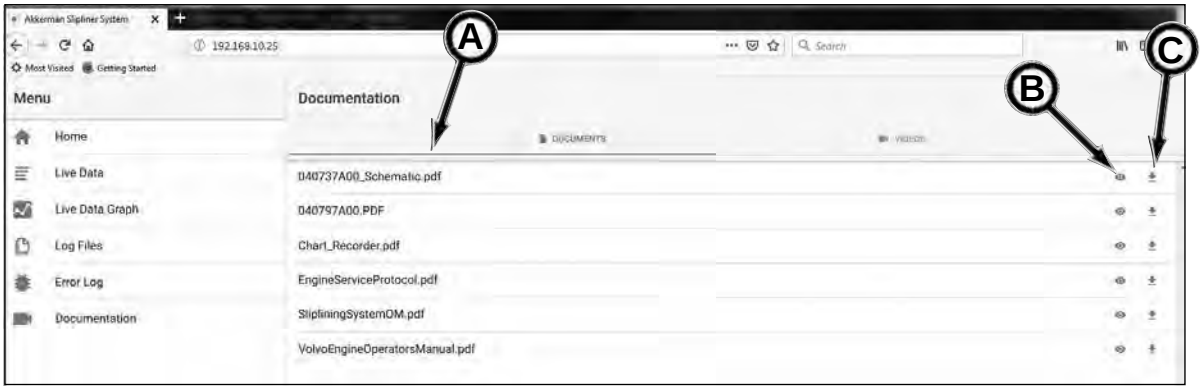
9. ERROR LOG

The error log page creates a log file of the internal server module operating system. This may be used during troubleshooting.

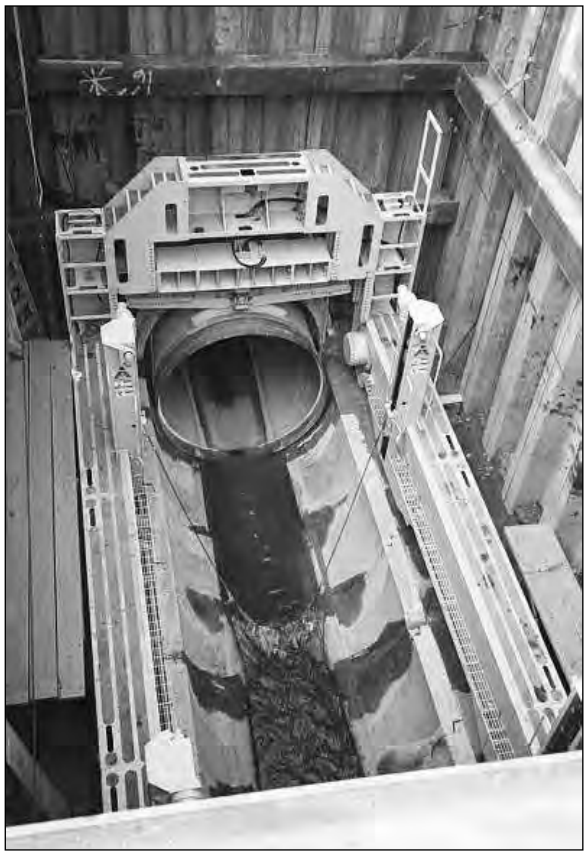
10. DOCUMENTATION

The Documentation page displays a listing of manuals and schematics (A). Click on the view (B) or download (C) icons.



COLD WEATHER OPERATION

Freezing temperatures during the sliplining process, creates the necessity to prepare the site and equipment for the cold weather. Failure to do so will cause damage to components and supporting equipment.



- **Refer to the engine operator's manual for important details for operating the engine in cold weather to prevent damage.**
- For all equipment, use proper lubricant based on ambient temperature to prevent damage.
- Install heaters for hydraulic systems.
- If systems were shut down for freezing weather, be sure to start systems slowly and let them run for at least five minutes to allow for warm up and in the case of a pump, to displace any surface ice that may have accumulated in the fluid before going back to full operation mode.
- Remember it is also critical to keep the work site safe and employees comfortable during the freezing weather. Good training, supervision, proper clothing and limiting personal exposure to the weather is essential for keeping personnel and equipment safe on the job site.

Transporting

TRANSPORTING GUIDELINES

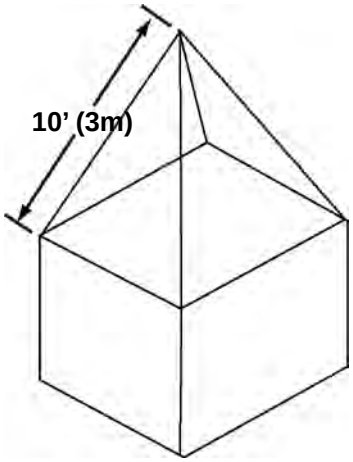
⚠WARNING Suspended load may fall and cause severe personal injury or death.

Do not enter area under or around a load.

1. Know the local, state, and federal transportation regulations.
2. Obtain required permits for transporting.
3. Remove any obstacles from the trailer floor.
4. Clean debris from equipment.
5. Turn battery disconnect switch to the OFF position.
6. Load and unload on level ground.
7. If lifting equipment with a hoist or other lifting device, the equipment lifting eyes and sling must be inspected for damage before lifting. If damaged, replace before lifting.
8. Securely fasten equipment to trailer floor.
9. Secure all loose items.
10. Observe the lifting instructions on the power pack (refer to the lifting instructions below).

LIFTING INSTRUCTIONS

- Power Pack weight is 13,500 lbs. (6,123 kg).
- Lifting with a crane requires a four part sling with legs a minimum of 10 ft. (3 m) long.
- Container must lift freely. If it is stuck to the ground, it must be broken loose prior to lifting.
- Lifting eyes and sling must be inspected prior to each lift. Any damage must be repaired prior to lifting.
- All container doors must be closed before lifting.



NOTES

Fuels & Lubricants

NOTICE Use of inferior fuels or lubricants can affect the efficient performance of your sliplining system. Always use high quality fuel and lubricants as specified in this section.

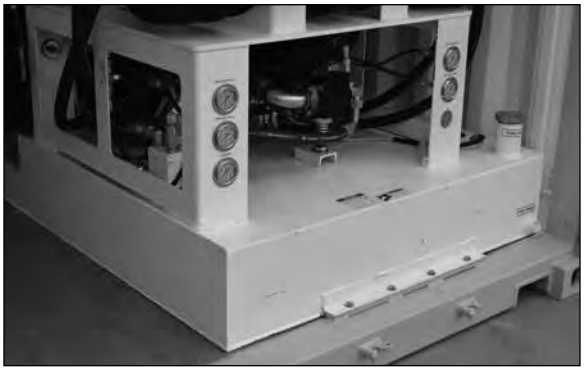
Refer to the Periodic Maintenance section for proper fuel and lubrication quantities, maintenance intervals, and procedures.

FUEL SPECIFICATIONS

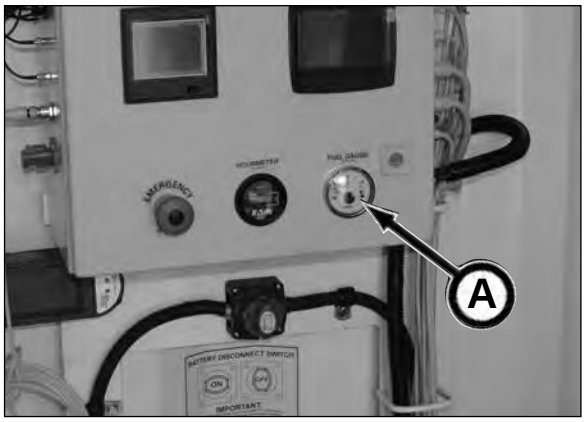
NOTICE For more information on maintaining the fuel and additional fuel specifications, refer to your engine manual.

Diesel fuels specified to EN 590, ASTM D975, JIS K2204 and paraffinic diesel standard EN 15940. (No. 1-D, 2-D) are required.

Refer to your engine manual for other fuel requirements and restrictions.



Fuel tank capacity is 200 gal. (757 L).



A fuel gauge (A) is installed on the power pack control panel.

NOTICE The battery disconnect switch must be ON and the E-Stop buttons pulled out to view the fuel level.

ENGINE OIL

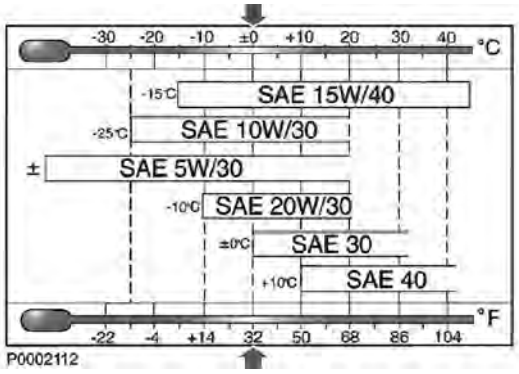
NOTICE For more information on the engine oil specifications, refer to your engine manual.

Change the oil and filters after the first 100 hours of operation, then every 500 hours thereafter with SAE engine oil or other oil viscosity based on the expected air temperature range during the period between oil changes as shown in the chart.

Other oils may be used (refer to engine manual).

The engine is filled with SAE 15W-40 engine oil. When changing oil and filters, use SAE 15W-40 engine oil or other oil viscosity per stable ambient temperature as shown in the chart.

The engine oil capacity including filters is approximately 4.23 gal. (16 L). Oil level must always be between the MIN and MAX marks. DO NOT fill above the maximum oil level mark.



Engine Oil Specification Chart

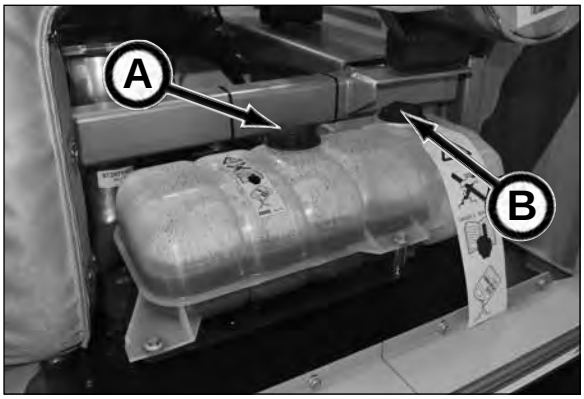
ENGINE COOLANT

NOTICE For more information on engine coolant specifications, refer to your engine manual.

⚠WARNING Cooling system under pressure. Explosive release of HOT engine coolant can cause severe burns. SLOWLY remove the fill cap ONLY if the engine is cool. DO NOT remove the fill cap when the engine is hot.

The engine radiator coolant is a 50% mixture of VCS Yellow coolant and distilled, deionized water. NEVER mix with green coolant or swap from yellow to green coolant. This coolant system must use VCS yellow coolant.

This mixture provides protection against corrosion and the build up of deposits, and winter freeze protection to -34°F (-37°C) (when using 50% mixture of coolant and water). If protection at lower temperatures is required, contact your engine dealer for recommendations.



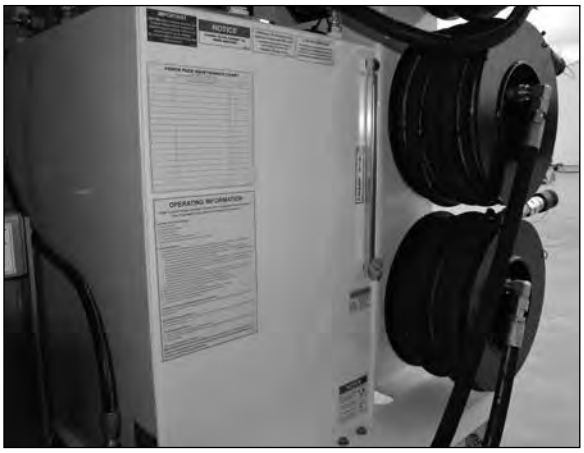
When adding coolant, open only the filler cap (A). Do not open the pressure cap (B) on the expansion tank.

IMPORTANT:

- Always use the same type of coolant that is already in the engine (VCS Yellow).
- Different types of coolant must not be mixed with each other.
- Risk of reduced cooling function and performance by clogging and isolation.

POWER PACK HYDRAULIC OIL RESERVOIR LUBRICANT

The power pack oil reservoir is typically filled with ISO-VG-68 Premium Hydraulic/Turbine Oil.



Use an API GL-1/GL-2 or equivalent when adding or changing lubricant.

NOTICE If using a too heavy of viscosity oil in cold temperatures, hydraulic oil pump damage could result due to pump cavitation. On the contrary, using ISO 32 oil above 150°F operating temperatures (oil temp. in reservoir) will result in reduced hydraulic power to functions.

Recommended hydraulic oil:

Ambient Temp.	**Hydraulic Oil**
-25°F to 60°F (-32°C to 16°C)	ISO 32
0°F to 95°F (-18°C to 35°C)	ISO 46
32°F to 105°F (-0°C to 41°C)	ISO 68

NOTICE If you change to a different oil, use a reputable oil supplier to meet or exceed the ISO-VG-68 or API GL-1/GL-2 oil specification. **Do not mix oil manufacturers or grades.**

Oil capacity is approximately 100 US gal. (379 L).

DIESEL EXHAUST FLUID (DEF)

IMPORTANT: Refer to engine manual for the proper diesel exhaust fluid specifications and filling procedure.

AdBlue®/DEF is mandatory for the engine to comply with emission directive certification.

When adding AdBlue®/DEF, the solution must fulfill ISO22241 standards. If the solution does not meet the ISO standard, engine warranty claims will be rejected.

Do not overfill. If the tank is overfilled and the solution freezes at temperatures below 12.2°F (-1°C), the tank and hoses may be permanently damaged.

STORING LUBRICANTS

Your equipment can operate at maximum performance only if clean lubricants are used. Use clean containers to handle all lubricants.

Lubricants should be stored in an area protected from dust, moisture, and other contaminates.

Store barrels inside whenever possible or at least under cover. Keep barrel bungs tight.

If barrels must be stored outside, lay barrels on their sides. If barrels cannot be laid on their sides, tilt them slightly so water or other contaminates cannot be drawn in around the bung.

NOTES

Periodic Maintenance

⚠WARNING Review the Safety section in this manual and your Sliplining Operator's Manual before performing maintenance. Failure to do so, could cause severe injury or death.

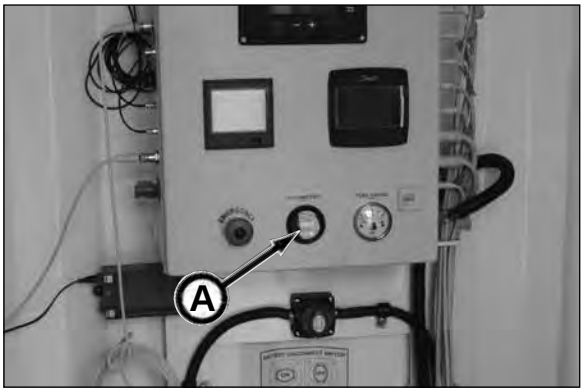
Maintenance and repairs must only be performed by a qualified service technician.

LUBRICATION & MAINTENANCE INTERVALS

The requirements for lubrication and maintenance are shown on the maintenance charts in this section.

Intervals of maintenance are based on normal operating conditions. If operating under more difficult conditions, use a shorter time interval between maintenance.

Use the hourmeter (A) to determine proper lubrication and maintenance intervals.

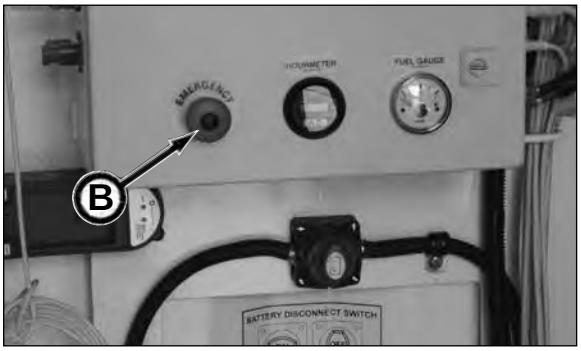


USING EMERGENCY STOP

Push Emergency Stop button (B) IN to stop diesel engine power, control system functions and hydraulic power.

The buttons will illuminate when it is pushed IN.

All E-Stop buttons must be pulled OUT to restart engine.



LOCKOUT TAGOUT POWER BEFORE SERVICING

⚠WARNING Severe personal injury or death can result from unexpected power pack start-up or machine movement.

LOCKOUT, TAGOUT power before attempting to make repairs or adjustments to this equipment, unless otherwise indicated. Proper lockout, tagout will prevent accidents and save lives. Performing the lockout, tagout will also prevent the equipment from moving or operating unexpectedly.

BEFORE PERFORMING MAINTENANCE

1. Perform daily shutdown procedure. Refer to Daily Shutdown in section 6, Operation of this manual.

2. Relieve hydraulic pressure.

3. Push in all E-Stop button(s).

4. Do not work on hydraulic system if oil temperature exceeds 150° F (66° C).

5. **Lockout/tagout all power. Perform lockout/tagout procedure.**

HYDRAULIC OIL/FLUIDS UNDER PRESSURE

⚠WARNING Escaping oil or other fluids under pressure can penetrate your skin causing serious injury or death.

Release all pressure before performing maintenance or repairs. Never weld near pressurized fluid lines.

DO NOT use your hands to check for leaks. When searching for leaks, use a piece of wood or cardboard.

Contact medical help immediately if any oil or fluid is injected into your skin. A serious infection or reaction can emerge without proper medical treatment.

AVOID PINCH POINTS

⚠WARNING Moving parts or the mishandling of parts can cause severe personal injury.

Keep hands away from moving parts.

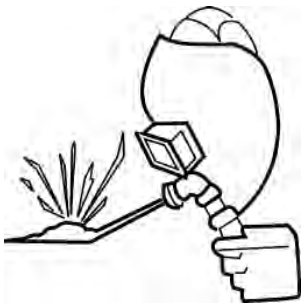
Watch your fingers, hands, and legs while equipment is in operation.

Handle parts carefully to avoid crushing and pinch point hazards.

UNAUTHORIZED WELDING

⚠WARNING Unauthorized welding can cause structural failure resulting in possible injury or death.

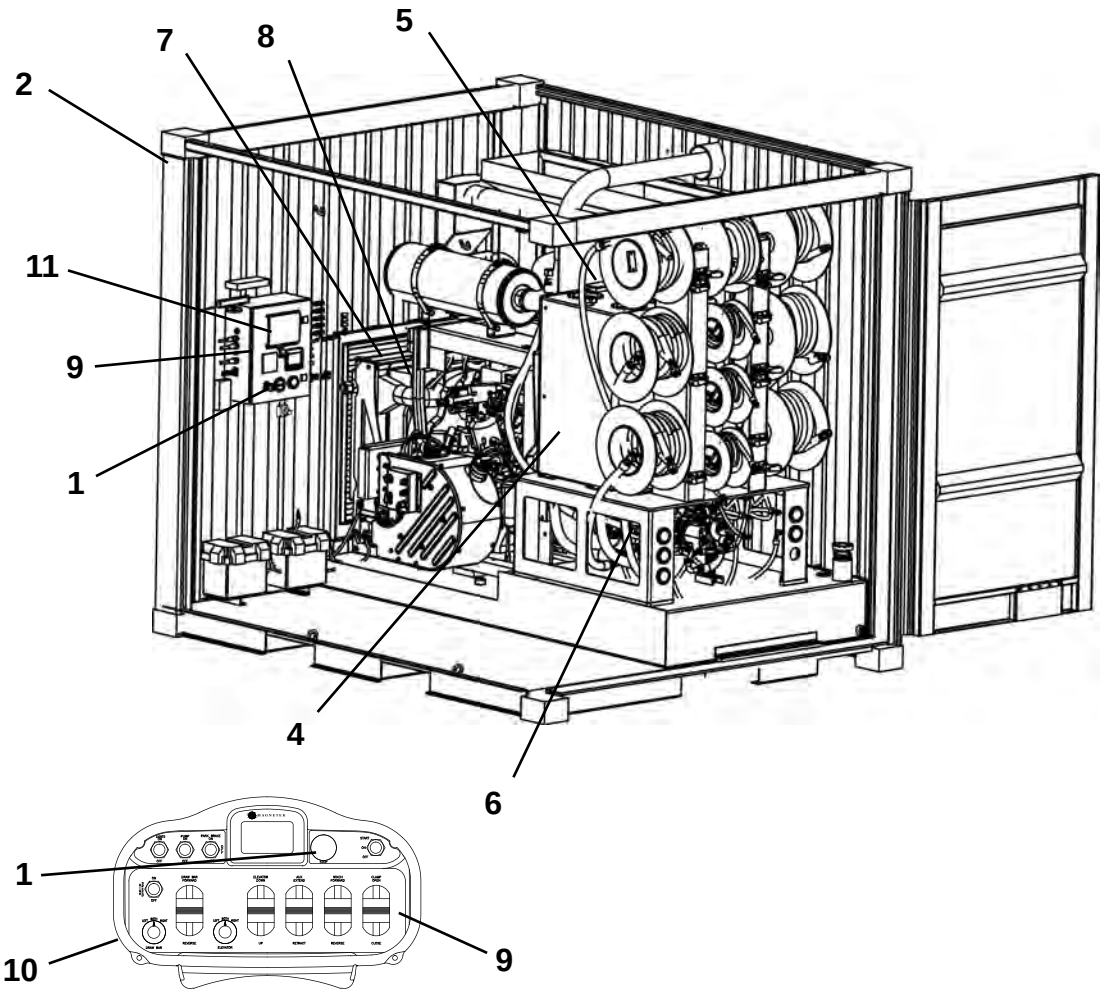
Do not weld on any structural member. Unauthorized welding or repair will void the warranty.



MAINTENANCE CHARTS

Use the item number in the chart to refer to the detailed maintenance procedures later in this section.

IMPORTANT: The engine maintenance in this section covers only general engine maintenance. You must refer to your Engine Operator's Manual for specific maintenance intervals and procedures.

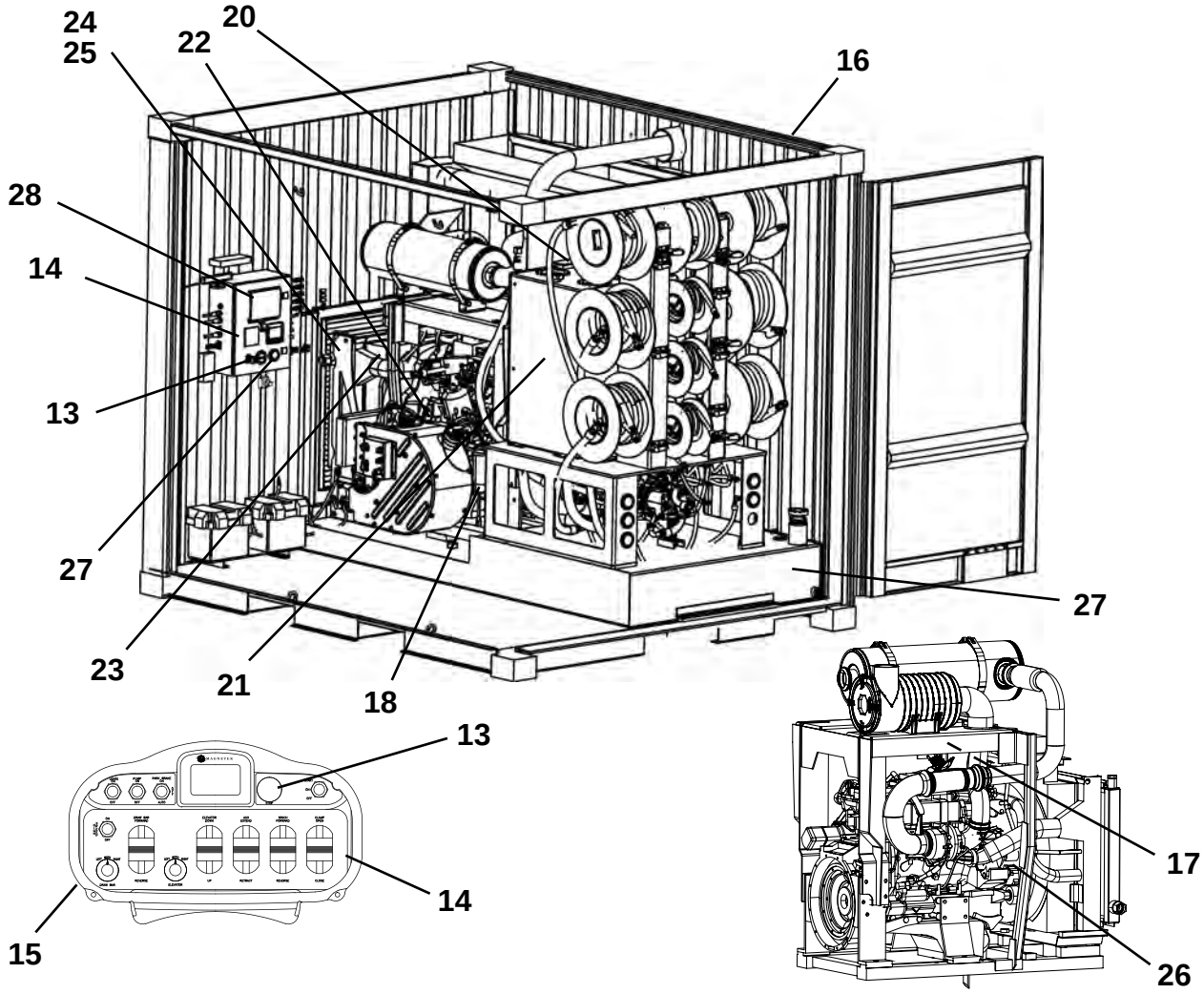


* PRIOR TO EACH JOB LAUNCH

ITEM	COMPONENT	SERVICE	REQUIREMENT	MATERIAL
1.	E-Stop	Check Operation	E-Stop- Power Pack & Controller	
2.	Power Pack Frame	Visual Inspection	If damaged, repair or replace	
**3.	Hyd/Cable Connect.	Check	Connections must be secured.	
4.	Hydraulic Oil	Check Level & Condition	Refill or replace as needed.	ISO-VG-68
5.	Hyd. Return Filters	Check	Replace filters per indicator.	Return Filters
6.	Hydrostatic Pump	Replace Filters (2)	Replace before launch.	
7.	Oil Cooler	Clean	As needed.	
8.	Cooling Fan	Clean & Inspect		
9.	Controls	Check Operation		
10.	Pendant Battery	Check	Recharge battery as needed.	
11.	Engine Diag. Cntl.	Monitor	Resolve any warnings & faults.	
*12.	Decals	Inspect	Must be legible. Replace as needed.	

*** Refer to your engine manual for additional engine maintenance information.**

** Not Shown

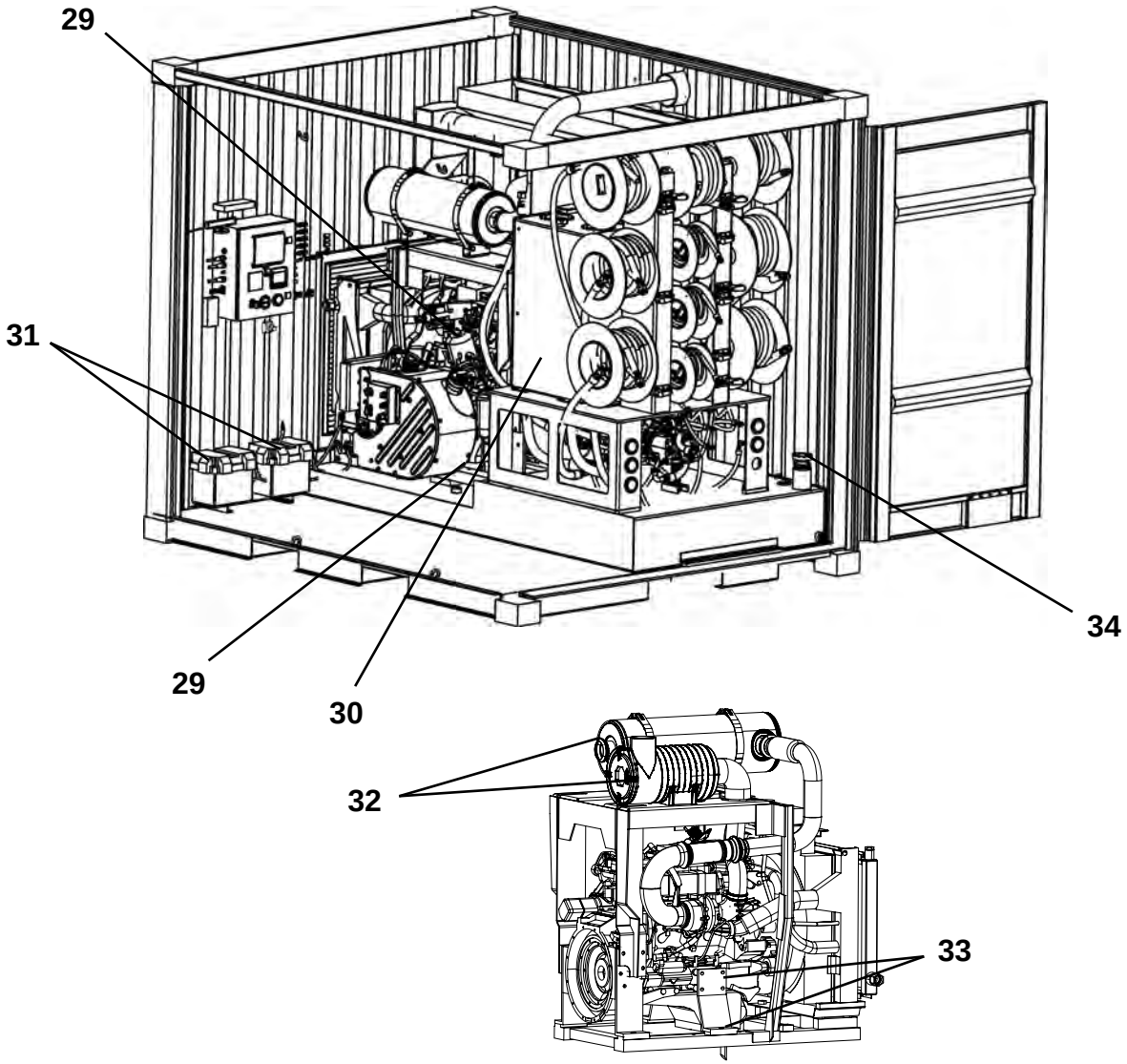


* DAILY OR EVERY 10 HOURS OF OPERATION

ITEM	COMPONENT	SERVICE	REQUIREMENT	MATERIAL
13.	E-Stop	Check Operation	E-Stop- Power Pack & Pendant	
14.	Controls	Check For Proper Operation		
15.	Pendant Battery	Check	Recharge battery as needed.	
16.	Power Pack	Visual Inspection	If parts are damaged or missing, replace.	
17.	Air Cleaner Dust Unloader	Clean Out		
18.	Fuel/Water Separator	Drain Water	Drain until fuel is visible.	
**19.	Hoses/Cables	Inspect	Replace if damaged before operating.	
20.	Hyd. Return Filters	Check Filter Indicators	Replace filters per indicator	Return Filters
21.	Hydraulic Reservoir	Check Fluid Level	Add hydraulic fluid as needed.	ISO-VG-68
22.	Engine Crankcase**	Check Oil Level	Add oil as needed.	See Section 8
23.	Fan	Inspect Fan & Guard	If damaged, replace with new.	
24.	Radiator	Check Coolant Level	Add coolant as needed.	VCS - Yellow Cool.
25.	Radiator/Oil Cooler	Clean	As needed.	
26.	Belt, Tensioner	Inspect	If damaged, replace with new.	
27.	Fuel Tank	Check Fuel Level	Add diesel fuel as needed.	Diesel Fuel
28.	Engine Diag. Cntl.	Monitor	Resolve any warnings & faults.	

*** Refer to your engine manual for additional engine maintenance information.**

** Not Shown



* FIRST 100 HOURS OF OPERATION & EVERY 500 HOURS THEREAFTER

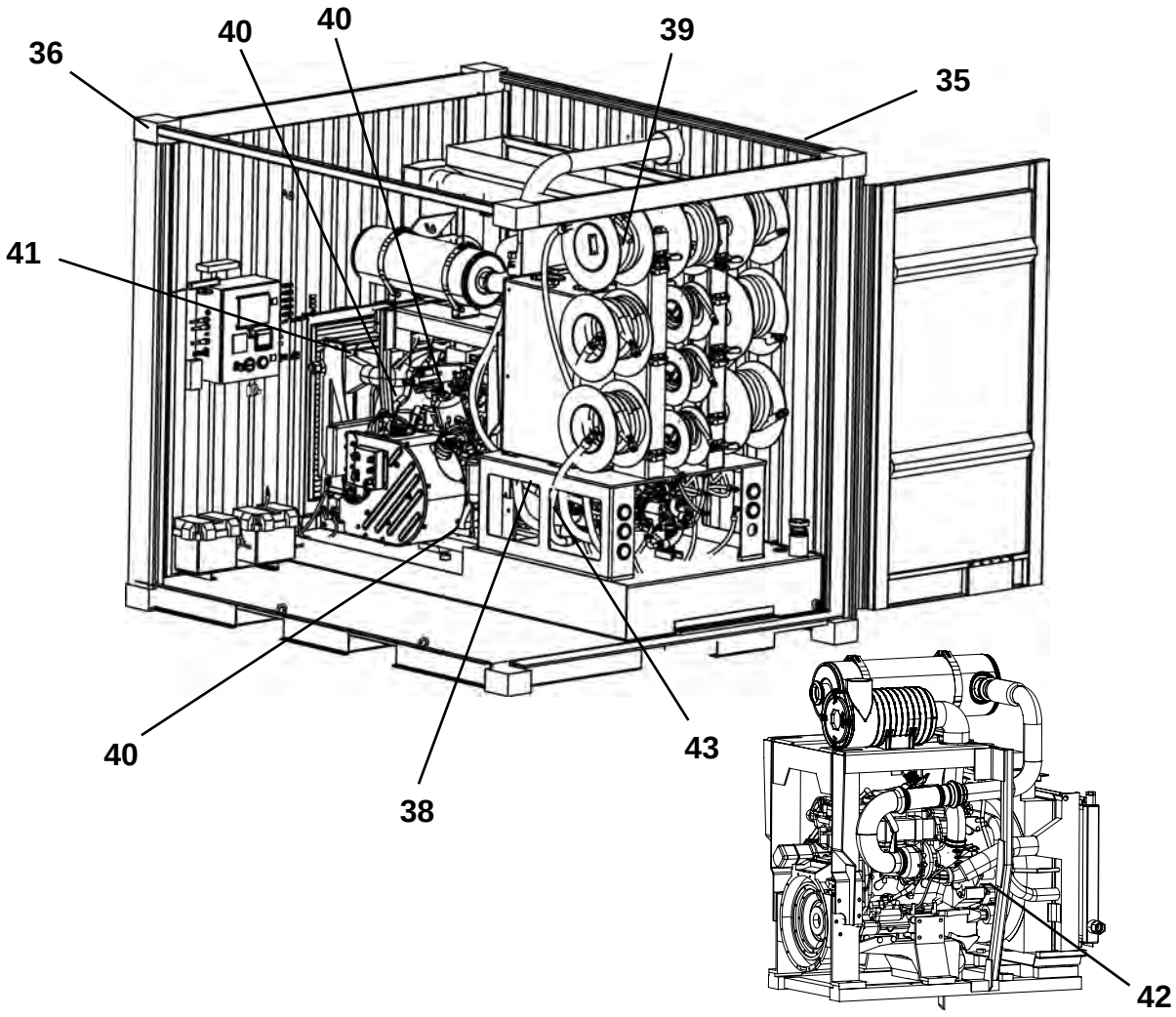
ITEM	COMPONENT	SERVICE	REQUIREMENT	MATERIAL
29.	Engine Crankcase	Drain & Fill & Filter	Replace with new oil & filter.	See Section 8

*** Refer to your engine operation manual for additional maintenance information.**

* MONTHLY OR EVERY 250 HOURS OF OPERATION

ITEM	COMPONENT	SERVICE	REQUIREMENT	MATERIAL
30.	Pwr Pack Oil Analysis	Perform Analysis	Oil Sample	
31.	Battery	Inspect	Check for damage or frayed cables.	Battery/Cable
32.	Air Intake & Exhaust System	Inspect All Connections	Repair or replace as needed.	
33.	Engine Mounts	Inspect	Replace as needed.	
34.	Fuel Tank Cap	Inspect & Clean	Replace if damaged.	

*** Refer to your engine manual for additional engine maintenance information.**



* COMPLETION OF EACH DRIVE

ITEM	COMPONENT	SERVICE	REQUIREMENT	MATERIAL
35.	Power Pack Frame	Inspect	If damaged, repair or replace.	
36.	Lift Eyes	Inspect	Repair or replace bore lifting.	
**37.	Hoses/Cables	Inspect	Replace if damaged before operating.	
38.	Hydraulic Reservoir	Drain Water	Drain until water is removed.	
39.	Case Drain Thermal Relief Tank	Connect frame case drain to relief tank QD.		

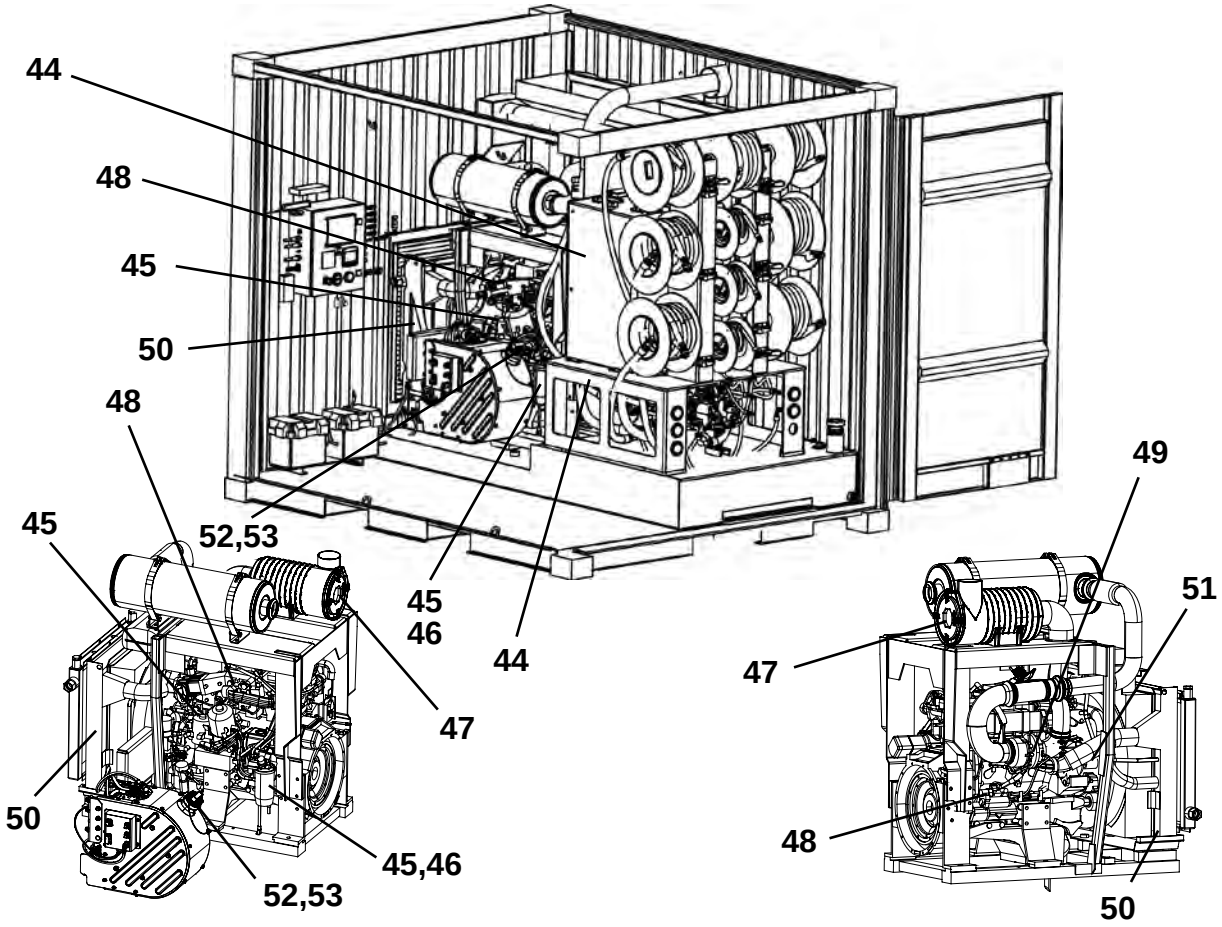
*** Refer to your engine operation manual for additional maintenance information.**

** Not Shown

* EVERY 500 HOURS OF OPERATION

ITEM	COMPONENT	SERVICE	REQUIREMENT	MATERIAL
40.	Engine Oil/Filter	Drain & Replace	Replace with new oil and filters.	See Section 8
41.	Cooling System	Check Condition	Refer to engine manual.	Water/Anti-Freeze
42.	Belt & Belt Tensioner	Check		
43.	Load Sense Filter	Replace (1 place)	Replace with new.	LS Filter

*** Refer to your engine manual for additional engine maintenance information.**



* EVERY 1000 HOURS OF OPERATION

ITEM	COMPONENT	SERVICE	REQUIREMENT	MATERIAL
44.	Hydraulic Reservoir	Drain & Fill	Drain and fill with new oil.	ISO-VG-68
45.	Fuel System	Replace Fuel Filters	Refer to engine manual.	Fuel Filters
46.	Fuel System	Bleed Fuel System	Refer to engine manual.	
47.	Air Cleaner	Install New		Element
48.	Engine	Inspect Hoses & Clamps	Refer to engine manual.	
49.	Turbocharger	Inspect & Clean	Refer to engine manual.	

*** Refer to your engine manual for additional engine maintenance information.**

* EVERY 2000 HOURS OF OPERATION

ITEM	COMPONENT	SERVICE	REQUIREMENT	MATERIAL
50.	Cooling System	Flush & Fill	Refer to engine manual.	Water/Anti-Freeze
51.	Drive Belt	Replace	Refer to engine manual.	
52.	AdBlue/DEF Filter	Replace	Refer to engine manual.	

*** Refer to your engine manual for additional engine maintenance information.**

AS REQUIRED

ITEM	COMPONENT	SERVICE	REQUIREMENT	MATERIAL
53.	SCR System	Add BlueDEF Fluid	Refer to engine manual.	See Section 8

*** Refer to your engine operation manual for additional maintenance information.**

PRIOR TO EACH JOB LAUNCH

1. CHECK EMERGENCY STOP OPERATION

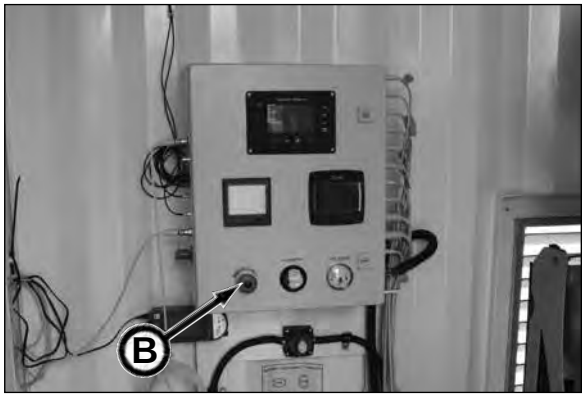
⚠WARNING Emergency Stop (E-Stop) buttons MUST function properly BEFORE operating the sliplining system. Failure to do so may cause severe injury or death.

Check E-Stop buttons (A and B) for proper operation. When pushed in, the E-Stop must stop the diesel engine power, control system functions and hydraulic power. Be sure to check the function of both E-Stop buttons; the pendant controller and the power pack.

The button will function as follows:

STOP	- Push button IN
Power for Start Circuit	- Pull button OUT

Pendant Controller E-Stop Button (A)



Power Pack E-Stop Button (B)

2. INSPECT POWER PACK FRAME

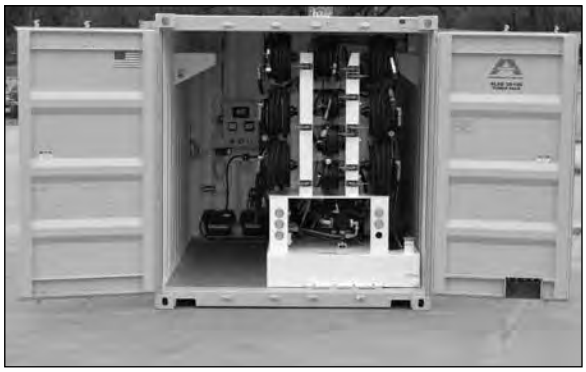
Perform a visual inspection of the power pack. Inspect structures, mountings and lubricant levels.

Immediately report any structural problems to your Akkerman aftermarket support representative.

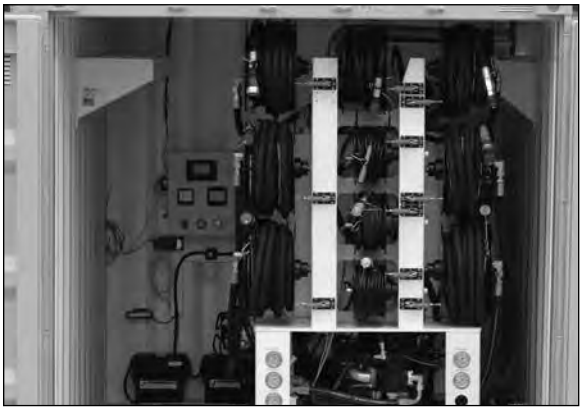
Check for fuel and oil leaks and debris buildup. Make repairs as needed and remove debris.

Check for loose, damaged, or missing parts. Repair or replace as necessary. Replace any defective parts.

Tighten hardware as needed. Do not overtighten hardware.



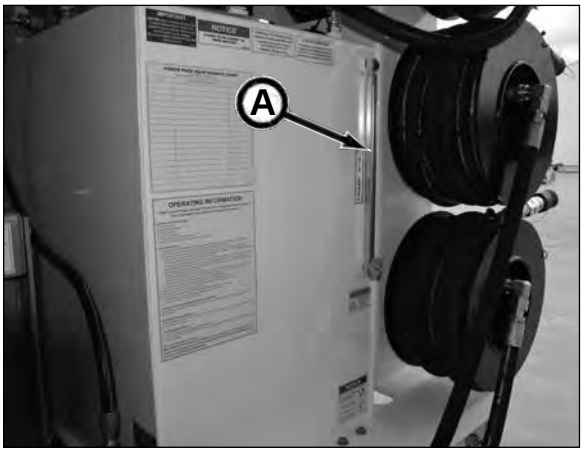
3. INSPECT HYDRAULIC HOSES, POWER & COMMUNICATION CABLES



Inspect ALL hydraulic hoses for cracks, wear or other damage. Repair or replace BEFORE operation.

Inspect power and communication cables and connections for fraying, wear or damage. If damaged, the cables must be replaced BEFORE operation. Check to be sure the cable connections are secure.

4. CHECK POWER PACK HYDRAULIC OIL RESERVOIR CONDITION & LEVEL OF OIL



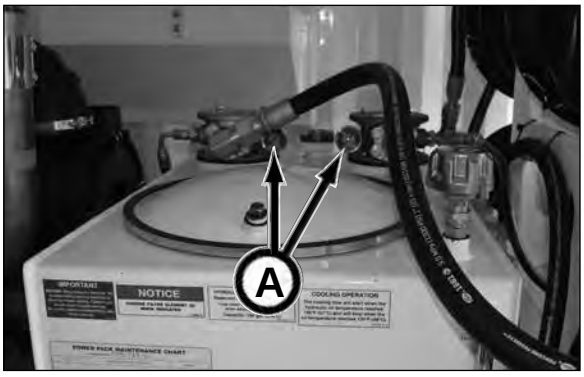
1. Check reservoir hydraulic oil for the following:

   a. Check for oil bubbles or foaming oil. This may indicate an air leak in the system.
   b. Check for milky oil. This indicates that there is water in the system. Be sure your oil is being properly stored.
   c. Large particle contamination from oil sample.

If any of these conditions are found, the reservoir must be drained, cleaned, and refilled with new, clean filtered hydraulic oil. All hydraulic filters also require replacement. Refer to Every 1000 Hours of Operation, “44. Drain & Fill Hydraulic Oil” in this section.

2. Check the hydraulic reservoir sight gauge (A) for the proper oil level. Keep oil maintained between the low and high marks on the gauge. If needed, add clean, filtered oil to the reservoir.

5. CHECK HYDRAULIC RETURN FILTER INDICATORS



To prevent over or under servicing of the hydraulic return filters, filter indicators (A) are installed on the filter head assemblies in the power pack.

Always check gauges when the oil is at normal operating temperature and the system is at normal operating flow. Otherwise, the gauges may indicate a false reading.

All filters and oil require replacement if any of the following situations occur:

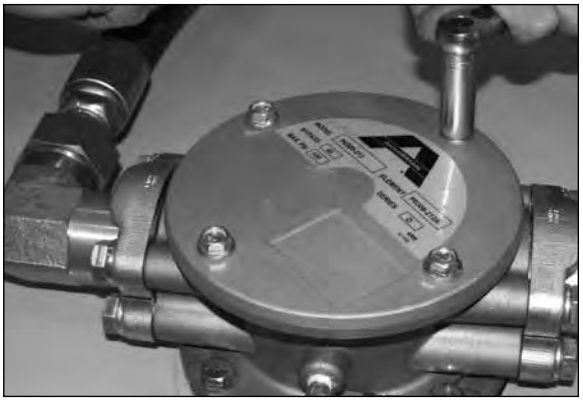
- A major component fails.
- Any sign of water contamination from an oil analysis or if oil is milky or foaming.
- A hydraulic oil sample indicates large particle contamination.

The green OK zone indicates that the filter is functioning properly.

The yellow zone indicates that the filter will soon require replacement.

When the needle on the gauge is in the red CHANGE zone, replace filter(s) as soon as possible to prevent hydraulic component damage (see Replacing In-Tank Filters below).

REPLACING IN-TANK FILTER(S)



1. With power pack shutdown, clean and dry area around the filter head assembly.

2. Remove filter head fasteners and retain for later use.

3. Remove head assembly from housing.

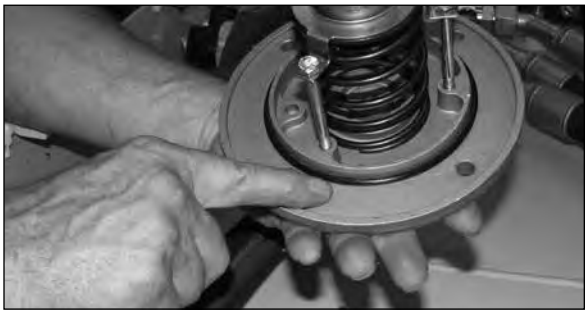
(continued on next page)

4. Remove filter.

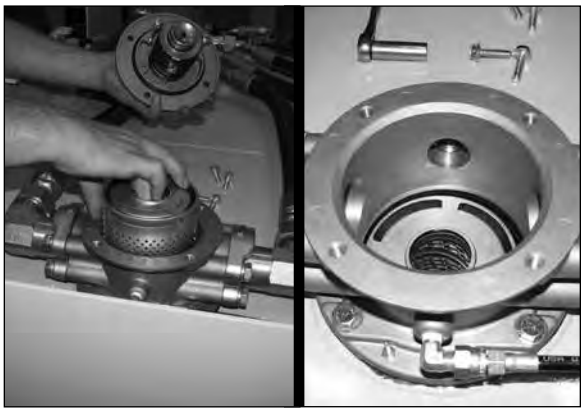
5. Check for metal flakes on filter. If metal flakes are visible, replace all filters and reservoir oil.

6. Dispose of filter properly.

7. Check filter gasket in filter head. If worn or damaged replace with new. Install new gasket (if needed) with a light coat of clean hydraulic oil into filter head. Be sure the gasket is not twisted and is correctly in place.



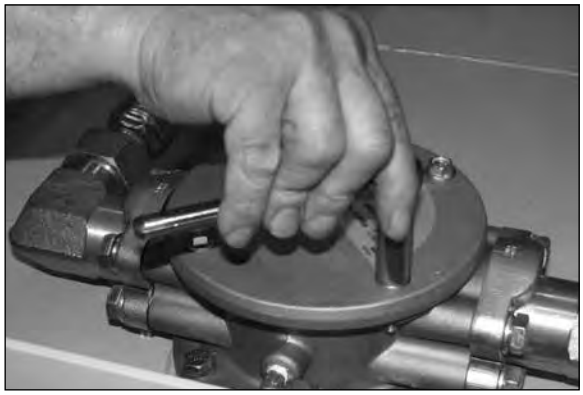
8. Carefully install new filter into filter housing until it is fully seated into housing.



9. Replace filter head assembly onto housing and secure with fasteners removed in step 2.

10. Start up power pack and run until hydraulic system is warm. Check for leaks.

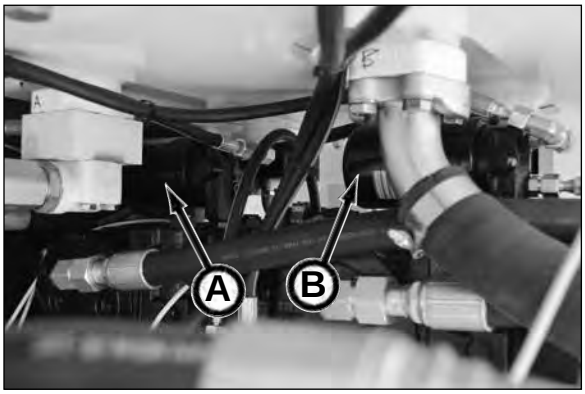
11. Shutdown power pack. Replace other filter as needed.



6. REPLACE HYDROSTATIC PUMP FILTERS

Replace hydrostatic pump filters Drive 1 (A) and Drive 2 (B) before each drive.

1. Place a catch pan below filter being removed.
2. Remove filter. Dispose of filter properly.
3. Apply clean hydraulic oil on oring seal of new filter. Install new spin-on filter (hand tighten only).
4. Replace other filter using steps 2 through 3.

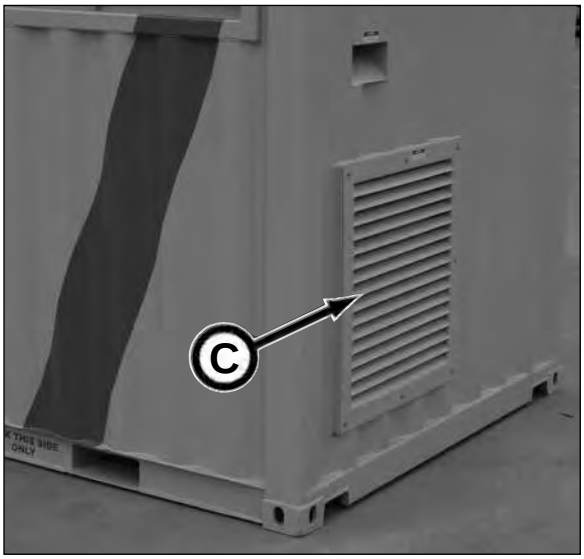


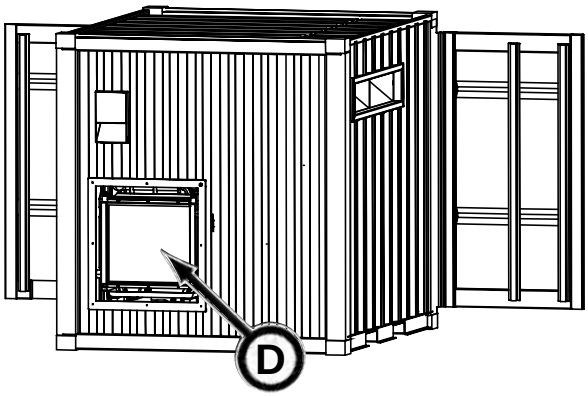
7. CLEAN OIL COOLER

1. Remove louver cover (C) on power pack to gain access to the oil cooler.

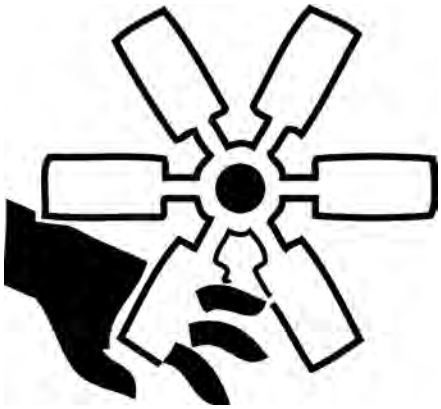
⚠WARNING Louver cover is heavy. Use assistance when removing, moving and replacing.

2. Clean oil cooler (D) fins and tubes with compressed air (50 psi maximum).
3. Replace louver and secure with hardware removed in step 1.





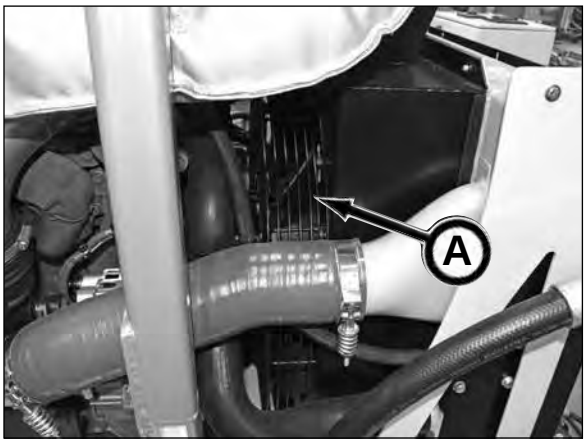
8. CLEAN & INSPECT COOLING FAN



⚠WARNING Serious personal injury could result if contact is made with rotating fan blade.

Fan blades can rotate at any time the battery disconnect switch is at the ON position and the E-Stop buttons pulled out when the hydraulic oil temperature is above 120°F (49°C) (factory default setting).

The cooling flow will start when the hydraulic oil temperature reaches 135°F (57°C) and will stop when the oil temperature reaches 120°F (49°C).



With the battery disconnect switch in the OFF position and the Emergency Stop button pulled out to prevent accidental starting:

1. Carefully clean cooling fan fins with compressed air (50 psi max.).

2. Check cooling fan (A) for cracks, and bent or loose blades or other damage. If possible straighten fins and blades. Otherwise replace or replace damaged fan.

9. CHECK CONTROL OPERATION

⚠WARNING BEFORE checking control operations, be sure all personnel are away from machine. Unexpected movement may cause severe injury or death.

Check power pack and pendant controller controls a for proper operation. If controls do not function properly, repair or replace BEFORE operation.

- ALL E-Stop buttons
- Power Pack controls
- Wireless pendant controller functions
- Light operation

10. CHECK PENDANT BATTERY LEVEL

With the wireless remote pendant on, check the pendant battery level (A) on the LCD display. If the level is low, replace battery before operation.

An extra battery is stored on the under side of the pendant assembly.

If charging is required:

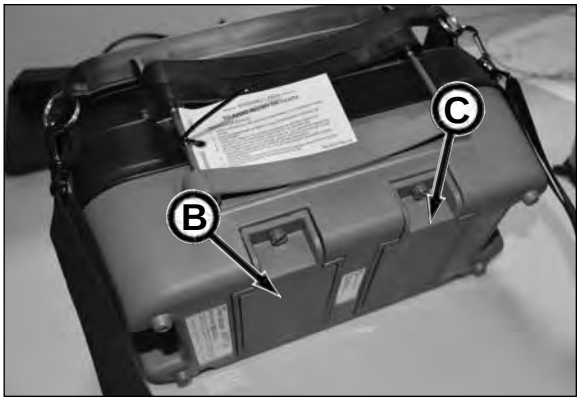
1. Flip pendant assembly on its side.

2. Remove pendant power battery door (B).

3. Remove battery.

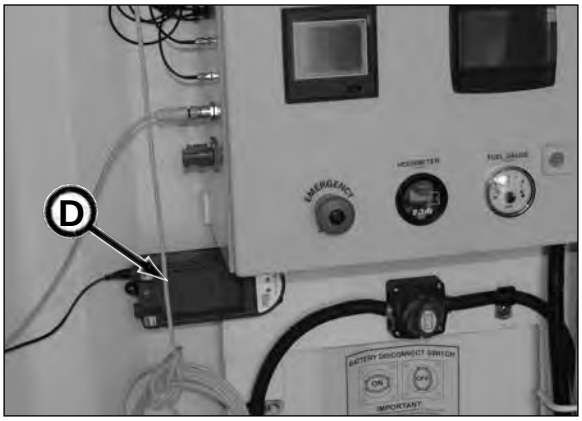
4. Remove spare battery door (C) and battery. Replace battery door.

5. Install spare battery in pendant power battery compartment. Replace battery door.



NOTICE Charger is only for recharging the NiMH battery packs. Do not charge AA battery packs.

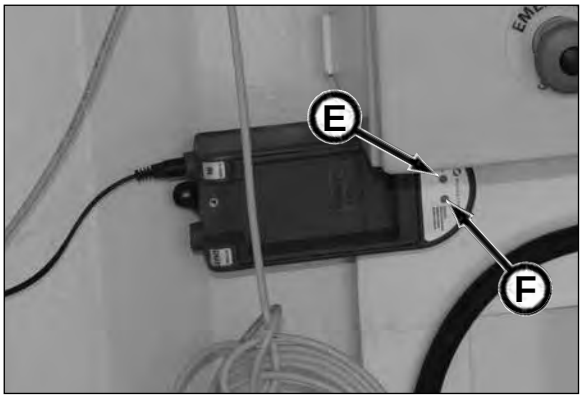
6. Place battery to be recharged in battery charger (D) located in the power pack. The battery disconnect switch must be ON and the E-Stop buttons must be pulled out for charger to function.



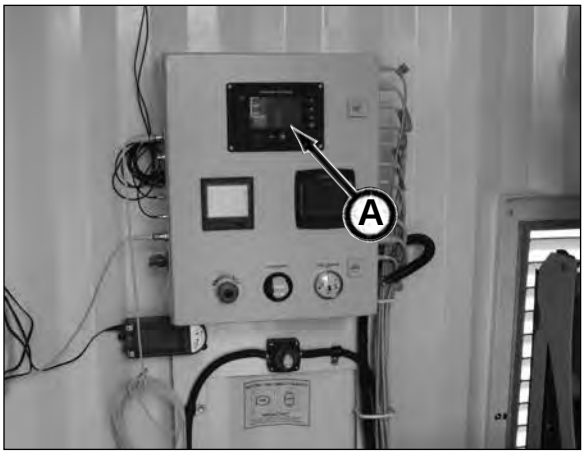
7. With the charger power light (E) on, mount battery into charger. Refer to Status LED (F) on battery charger.

   Red light - charging
   Green light - charging complete
   Blink light - error

8. Once battery is charged, replace the battery in the spare battery compartment on the pendant assembly.



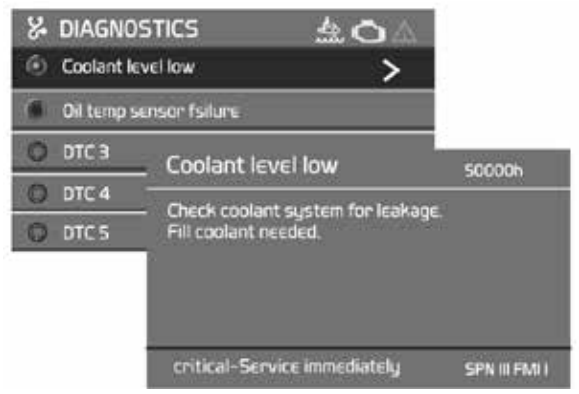
11. INSPECT ENGINE DIAGNOSTIC CONTROL UNIT



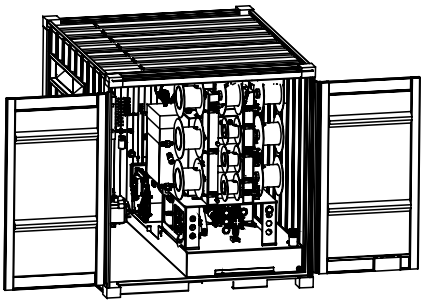
Inspect the display control unit (A) for any malfunctions, warnings or fault codes.

If the system detects a malfunction, a pop-up message will appear on the display. The fault codes are listed in the diagnostics menu; active fault codes are at the top of the list and denoted by a green dot. For more detailed information regarding the cause and solutions, use the arrow button to scroll to the fault concerned and press OK . This will also provide information about the number of engine hours when the fault became active and the SPN and FMI codes. Refer to your engine manual for additional information regarding fault codes.

Resolve malfunctions, warnings or fault codes before operation.



12. INSPECT DECALS



Inspect ALL operational and safety decals to be sure they are clean and readable.

Use soft cloth, water, and a mild soap to clean the decals if they are too dirty to read. DO NOT clean decals with solvent. Solvent will damage decals. Replace decals immediately if they are damaged, missing, or hard to read.

Before applying a new decal, be sure the surface is clean and dry.

DAILY OR EVERY 10 HOURS OF OPERATION OR SHIFT CHANGE

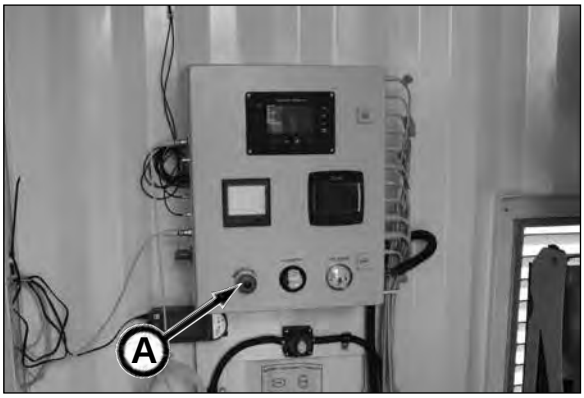
13. CHECK E-STOP OPERATION

⚠WARNING Emergency Stop (E-Stop) buttons MUST function properly BEFORE operating the sliplining system. Failure to do so may cause severe injury or death.

Check E-Stop buttons (A) for proper operation. When pushed IN, the E-Stop must stop the diesel engine power, control system functions and hydraulic power. Be sure to check the function of both E-Stop buttons; the pendant controller and the power pack.

If E-Stop button does not function properly, it MUST be repaired or replaced BEFORE operation.

Pendant Controller E-Stop Button



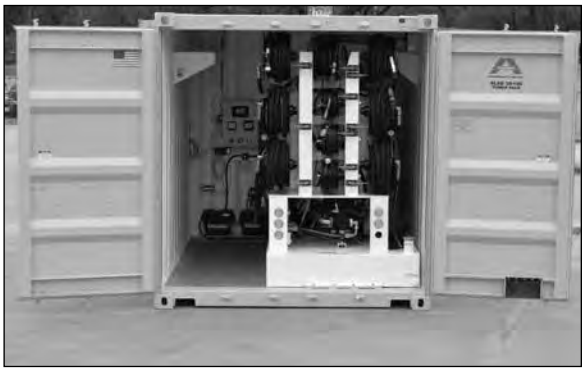
Power Pack E-Stop Button

14. CHECK CONTROL OPERATION

⚠WARNING BEFORE checking control operations, be sure all personnel are away from machine. Unexpected movement may cause severe injury or death.

Check power pack and pendant controller controls a for proper operation. If controls do not function properly, repair or replace BEFORE operation.

- ALL E-Stop buttons
- Power Pack controls
- Wireless pendant controller functions
- Light operation



15. CHECK PENDANT BATTERY LEVEL

With the wireless remote pendant on, check the pendant battery level (A) on the LCD display. If the level is low, replace battery before operation.

An extra battery is stored on the under side of the pendant assembly.

If charging is required:

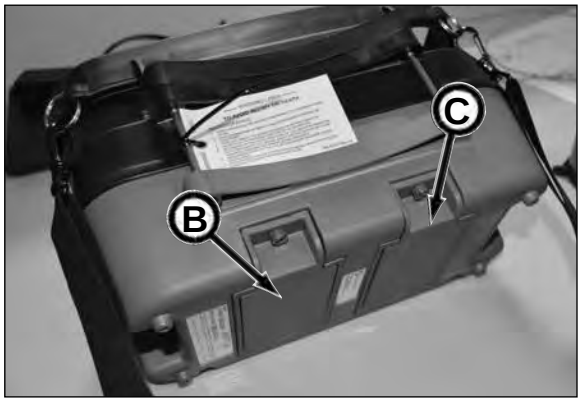
1. Flip pendant assembly on its side.

2. Remove pendant power battery door (B).

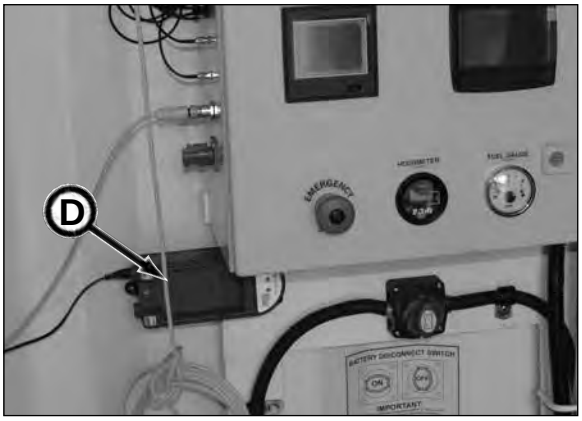
3. Remove battery.

4. Remove spare battery door (C) and battery. Replace battery door.

5. Install spare battery in pendant power battery compartment. Replace battery door.



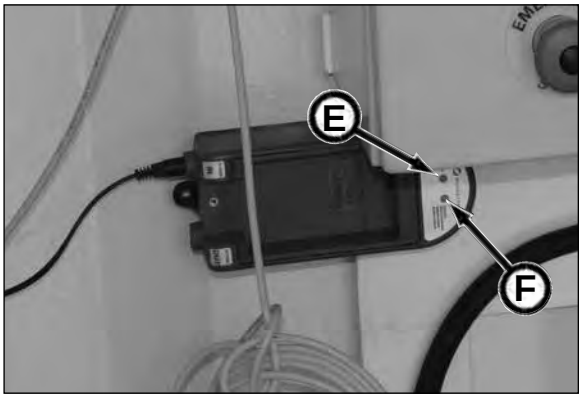
6. Place battery to be recharged in battery charger (D) located in the power pack. Power pack must be powered on for charger to function.



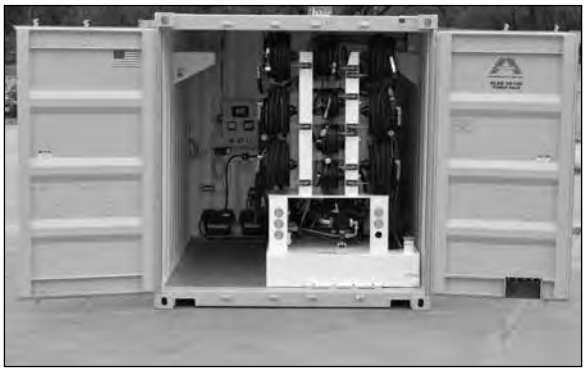
7. With the charger power light (E) on, mount battery into charger. Refer to Status LED (F) on battery charger.

   Red light - charging
   Green light - charging complete
   Blink light - error

8. Once battery is charged, replace the battery in the spare battery compartment on the pendant assembly.



16. INSPECT POWER PACK FRAME



Perform a visual inspection of the power pack. Inspect structures, mountings and lubricant levels.

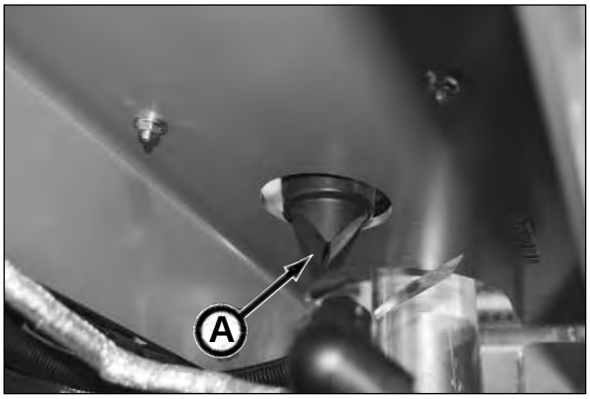
Immediately report any structural problems to your Akkerman aftermarket support representative.

Check for fuel and oil leaks and debris buildup. Make repairs as needed and remove debris.

Check for loose, damaged, or missing parts. Repair or replace as necessary. Replace any defective parts.

Tighten hardware as needed. Do not overtighten hardware.

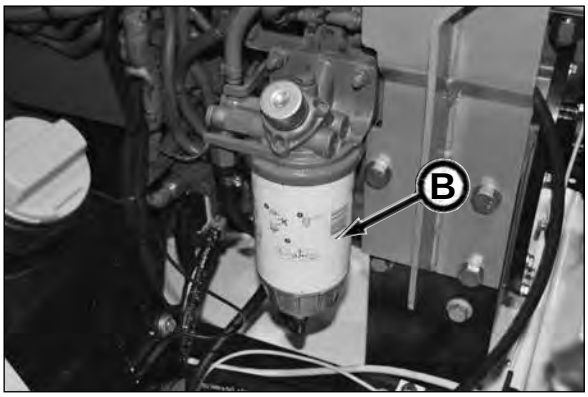
17. CLEAN OUT DUST UNLOADER VALVE



NOTICE Refer to your engine manual for more information.

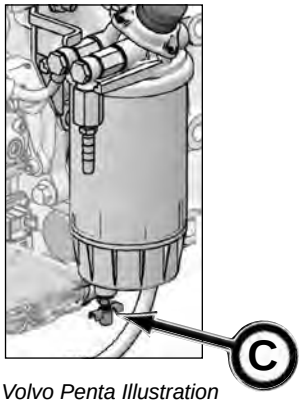
Squeeze air cleaner dust unloader valve (A) on air cleaner assembly to release any trapped dirt particles. If the sealing tip of the valve is damaged, life of the air filter element will be greatly reduced.

18. DRAIN FUEL/WATER SEPARATOR



NOTICE Refer to your engine manual for more information.

1. Shutdown engine.
2. Place an appropriate sized catch pan under the fuel pre-filter assembly (B).

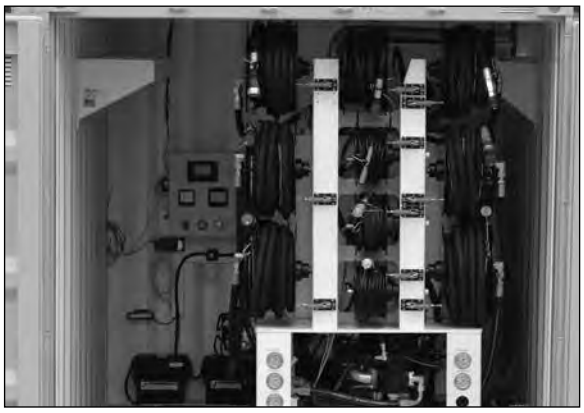


A Volvo Penta Illustration

3. Loosen drain plug (C).
4. Drain fluid into catch pan until no water is present and only pure diesel fuel runs out.
5. Tighten drain plug.
6. Dispose of fluid properly.

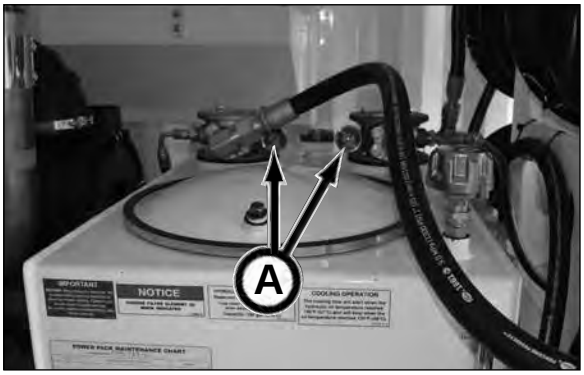
19. INSPECT HYDRAULIC HOSES, POWER & COMMUNICATION CABLES

Inspect ALL hydraulic hoses for cracks, wear or other damage. Repair or replace BEFORE operation.



Inspect power and communication cables and connections for fraying, wear or damage. If damaged, the cables must be replaced BEFORE operation. Check to be sure the cable connections are secure.

20. CHECK HYDRAULIC FILTER INDICATORS



To prevent over or under servicing of the hydraulic return filters, filter indicators (A) are installed on the filter head assemblies in the power pack.

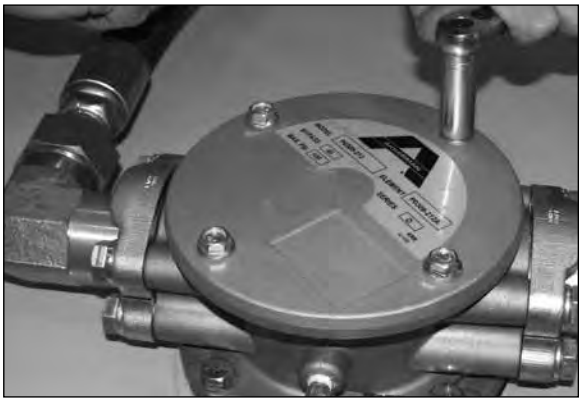
Always check gauges when the oil is at normal operating temperature and the system is at normal operating flow. Otherwise, the gauges may indicate a false reading.

All filters and oil require replacement if any of the following situations occur:
- A major component fails.
- Any sign of water contamination from an oil analysis or if oil is milky or foaming.
- A hydraulic oil sample indicates large particle contamination.

The green OK zone indicates that the filter is functioning properly.

The yellow zone indicates that the filter will soon require replacement.

When the needle on the gauge is in the red CHANGE zone, replace filter(s) as soon as possible to prevent hydraulic component damage (see Replacing In-Tank Filters below).



REPLACING IN-TANK FILTER(S)

1. With power pack shutdown, clean and dry area around the filter head assembly.

2. Remove filter head fasteners and retain for later use.

3. Remove head assembly from housing.

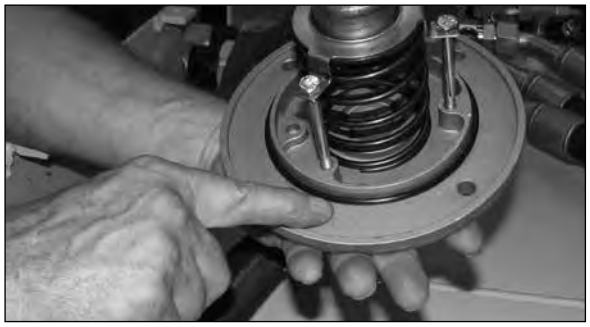
(continued on next page)

4. Remove filter.

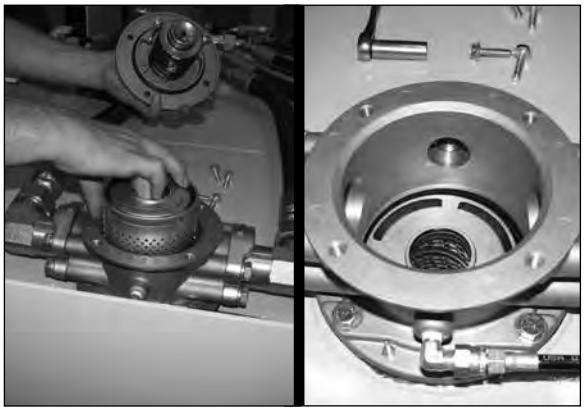
5. Check for metal flakes on filter. If metal flakes are visible, replace all filters and reservoir oil.

6. Dispose of filter properly.

7. Check filter gasket in filter head. If worn or damaged replace with new. Install new gasket (if needed) with a light coat of clean hydraulic oil into filter head. Be sure the gasket is not twisted and is correctly in place.



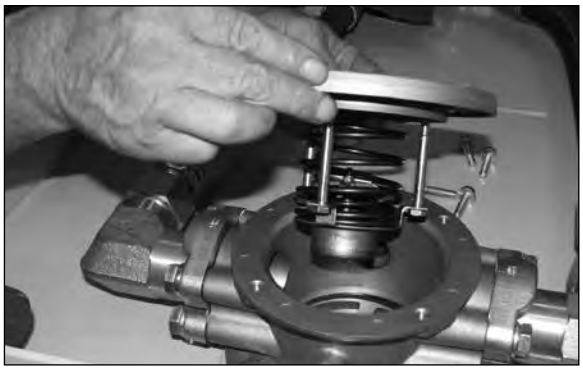
8. Carefully install new filter into filter housing until it is fully seated into housing.

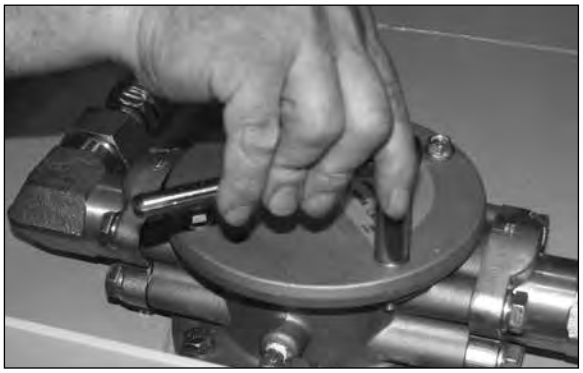


9. Replace filter head assembly onto housing and secure with fasteners removed in step 2.

10. Start up power pack and run until hydraulic system is warm, start boring head and jacking motors and check for leaks.

11. Stop motor and shutdown power pack. Replace other filter if needed.





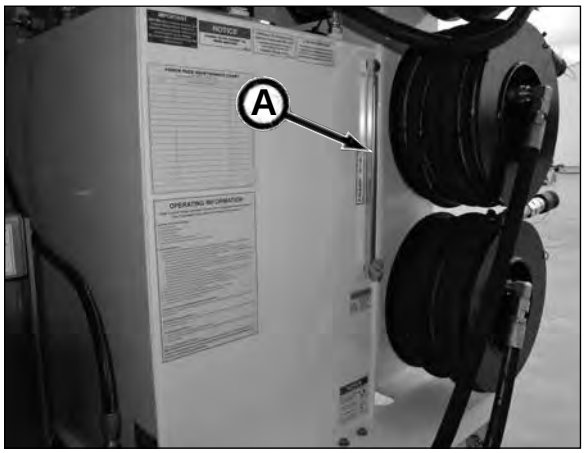
21. CHECK HYDRAULIC RESERVOIR CONDITION & LEVEL OF OIL

1. Check reservoir hydraulic oil for the following:

   a. Check for oil bubbles or foaming oil. This may indicate an air leak in the system.
   b. Check for milky oil. This indicates that there is water in the system. Be sure your oil is being properly stored.
   c. Large particle contamination from oil sample.

If any of these conditions are found, the reservoir must be drained, cleaned, and refilled with new, clean hydraulic oil and all hydraulic filters must be replaced. Refer to Every 1000 Hours of Operation, “44. Drain & Fill Hydraulic Oil” in this section.

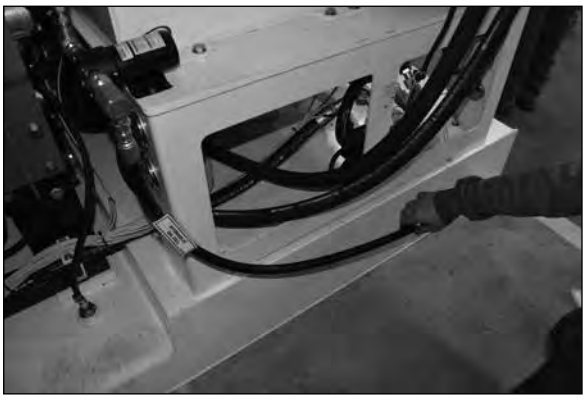
2. Check hydraulic tank oil level gauge (A).



FILLING RESERVOIR

If the fluid level in the reservoir is less than 3/4 full, fill the reservoir with ISO-VG-68 Premium Hydraulic Turbine Oil as follows:

1. Remove hydraulic oil fill hose from storage location. Remove cap from hose.



2. Place hose into a fresh, clean hydraulic oil container.

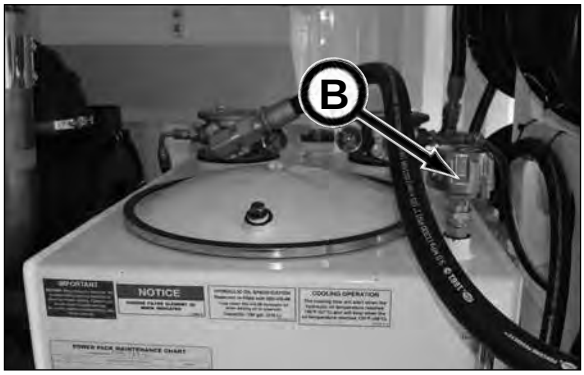
NOTICE Refer to Fuels & Lubricants section for recommended hydraulic oil.

(continued on next page)

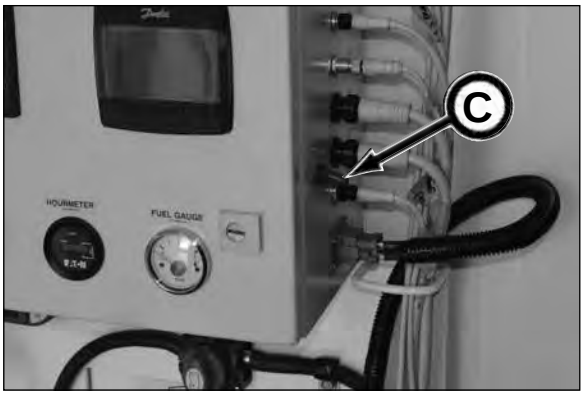
3. Open hydraulic oil fill control by moving handle (A) down to the 6 o'clock position.

IMPORTANT: BEFORE filling hydraulic reservoir, the breather/fitting must be removed to allow for proper venting. Failure to do so will result in pump damage. Be sure to replace breather/fitting after filling reservoir.

4. Remove breather/fitting (B) from reservoir BEFORE filling reservoir to allow for proper venting during filling process.

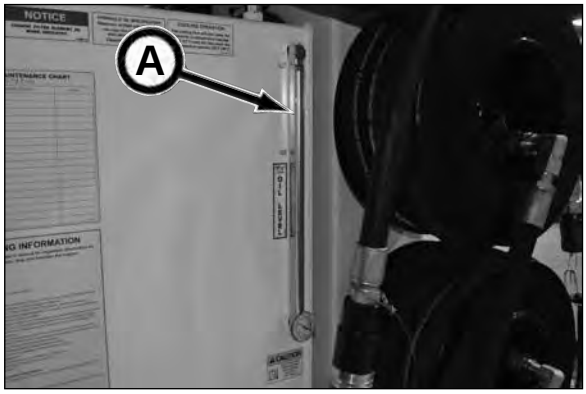


5. Flip Oil Transfer Pump switch (C) up to the ON position to pump hydraulic oil into the hydraulic reservoir.

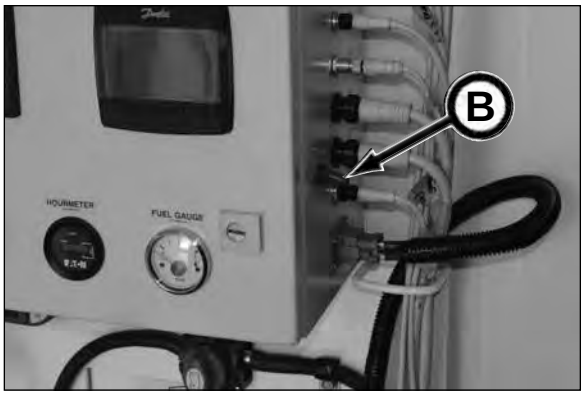


(continued on next page)

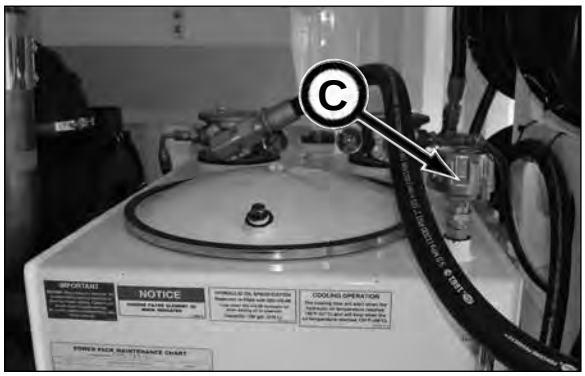
6. Fill until oil reaches the high mark on gauge (A).



7. Flip Oil Transfer Pump switch (B) down to the OFF position.



8. Replace breather/fitting (C) on reservoir.



9. Close hydraulic oil fill control by moving handle (D) clockwise to the 9 o'clock position.

10. Replace cap on fill hose and place hose in storage location.

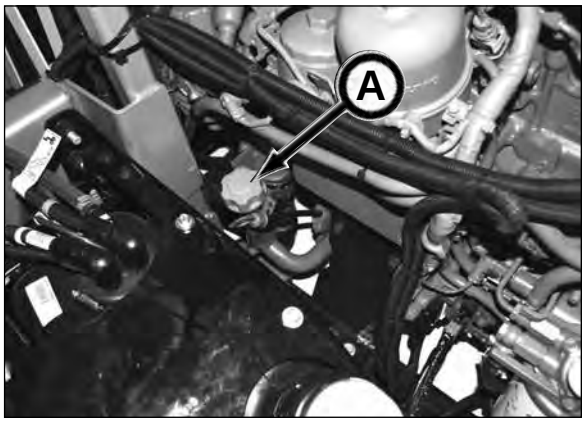
22. CHECK ENGINE OIL LEVEL

NOTICE Refer to your engine manual for more information.

Check engine oil level on dipstick. Oil level on must always be between the MIN and MAX marks on dipstick. DO NOT fill above the MAX mark on the dipstick.

1. Start engine and run until warm and check for leaks.

2. Shutdown engine. Wait approximately 5 minutes then check oil level. Oil level on dipstick must always be between the MIN and MAX marks. DO NOT fill above the MAX mark on the dipstick.

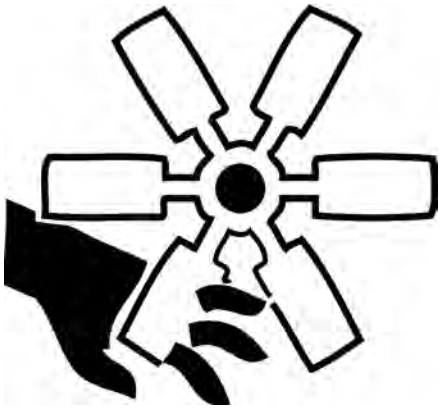


3. If necessary, add SAE 15W-40 engine oil or other engine oil that is currently in the engine. Remove fill cap (A). Replace cap when complete.

   Refer to Engine Oil in section 8, Fuels & Lubricants for the proper oil specification.

NOTICE During engine break-in (refer to the engine manual), change the oil filter for the first time at 100 hours of operation and then every 500 hours thereafter.

23. INSPECT FAN & FAN GUARD

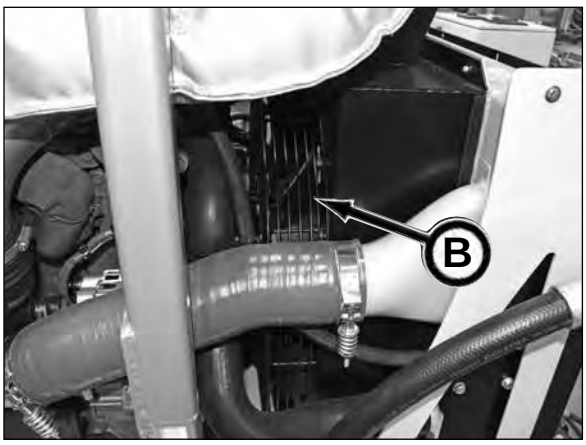


NOTICE Refer to your engine manual for more information.

⚠WARNING Serious personal injury could result if contact is made with rotating fan blade.

Fan blades can rotate at any time the battery disconnect switch is at the ON position and the E-Stop buttons pulled out when the hydraulic oil temperature is above 120°F (49°C) (factory default setting).

The cooling flow will start when the hydraulic oil temperature reaches 135°F (57°C) and will stop when the oil temperature reaches 120°F (49°C).



NOTICE Cooling flow will cycle off and on after other load sense functions are used.

With the battery disconnect switch in the OFF position and the Emergency Stop button pulled out to prevent accidental starting:

1. Check fan (B) for cracks, and bent or loose blades or other damage. If possible straighten fins and blades. Otherwise replace or replace damaged fan.

2. Inspect fan guard. If damaged, repair or replace.

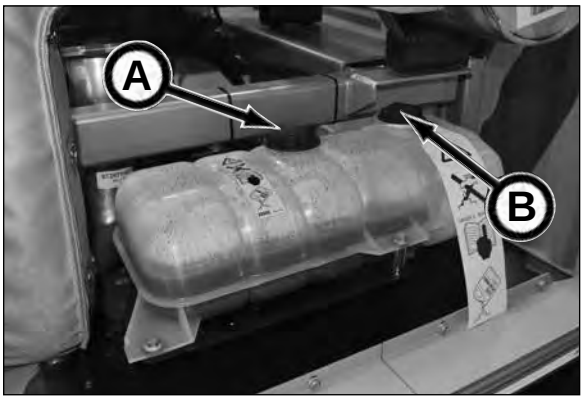
24. CHECK ENGINE COOLANT LEVEL

NOTICE Refer to your engine manual for more information.

⚠WARNING Cooling system under pressure. Explosive release of HOT engine coolant can cause severe burns.

SLOWLY remove the filler cap ONLY if the engine is cool. DO NOT remove the fill cap when the engine is hot.

The engine radiator coolant is a 50% mixture of VCS Yellow coolant and distilled, deionized water. NEVER mix with green coolant or swap from yellow to green coolant. This coolant system must use VCS yellow coolant.



Check coolant level when engine is cold.

1. Check that the coolant level is above the MIN mark on the expansion tank.

2. If coolant level is low, SLOWLY open fill cap (A). Fill coolant through the fill cap so that the coolant level is between the MIN and MAX marks on the expansion tank with proper coolant solution. DO NOT OVERFILL. DO NOT open the pressure cap (B) on the expansion tank.

See Engine Coolant in the Fuels & Lubricants section for proper coolant specification. Be sure to check levels after filling. DO NOT OVERFILL.

IMPORTANT:
- Always use the same type of coolant that is already in the engine (VCS Yellow).
- Different types of coolant must not be mixed with each other.

25. CLEAN RADIATOR/OIL COOLER FINS

NOTICE Refer to your engine manual for more information.

Inspect radiator and oil cooler fins for cleanliness. If necessary, clean radiator and oil cooler fins with compressed air (50 psi maximum).

26. INSPECT BELT, BELT TENSIONER & IDLER WHEELS

NOTICE Refer to your engine manual for more information.

⚠WARNING NEVER operate engine without belt guard in place. Serious personal injury could result if contact is made with rotating belt.

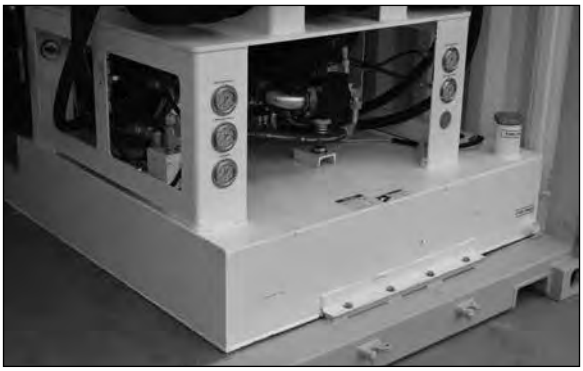
1. Visually inspect the drive belt for cracking, fraying or pieces of material missing. Replace belt as needed. Refer to your engine operator's manual for belt replacement.

2. Check the function of the belt tensioner and idler wheel bearings. If there is play in the bearings, the idler wheel must be replaced. Refer to your engine operator's manual for more information.

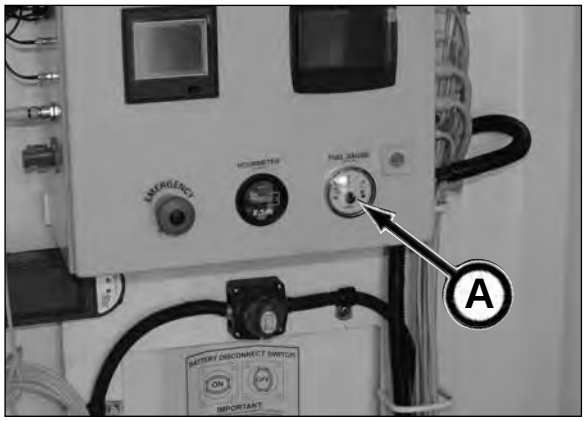
27. CHECK FUEL TANK LEVEL

Check fuel tank diesel fuel level.

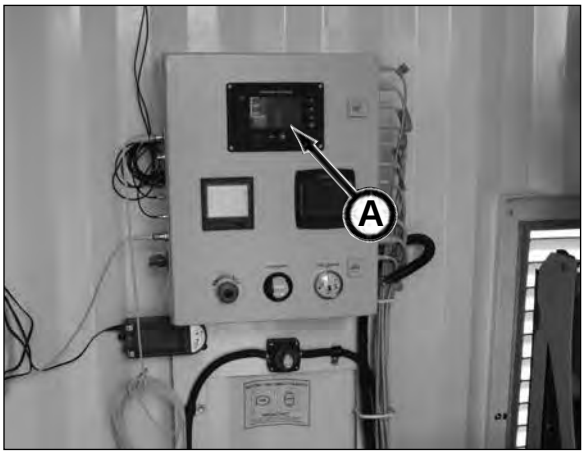
Refer to Fuel Specifications in section, 8 Fuels & Lubricants for proper fuel specification.



A fuel gauge (A) is installed on the power pack control panel.

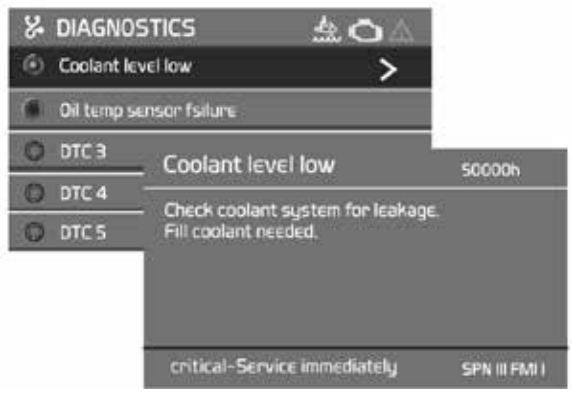


28. INSPECT ENGINE DIAGNOSTIC CONTROL UNIT



Inspect the display control unit (A) for any malfunctions, warnings or fault codes.

If the system detects a malfunction, a pop-up message will appear on the display. The fault codes are listed in the diagnostics menu; active fault codes are at the top of the list and denoted by a green dot. For more detailed information regarding the cause and solutions, use the arrow button to scroll to the fault concerned and press OK . This will also provide information about the number of engine hours when the fault became active and the SPN and FMI codes. Refer to your engine manual for additional information regarding fault codes.



Resolve malfunctions, warnings or fault codes before operation.

FIRST 100 HOURS OF OPERATION & EVERY 500 HOURS THEREAFTER

29. CHANGE ENGINE OIL & FILTER

NOTICE Refer to your engine manual for more information.

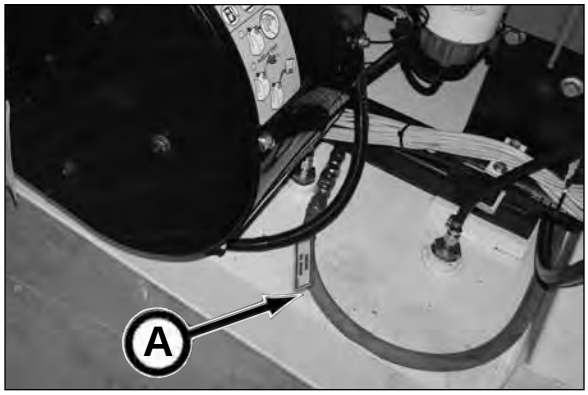
The primary oil filter needs to be replaced with a new filter.

1. Gain access to the engine oil drain hose.

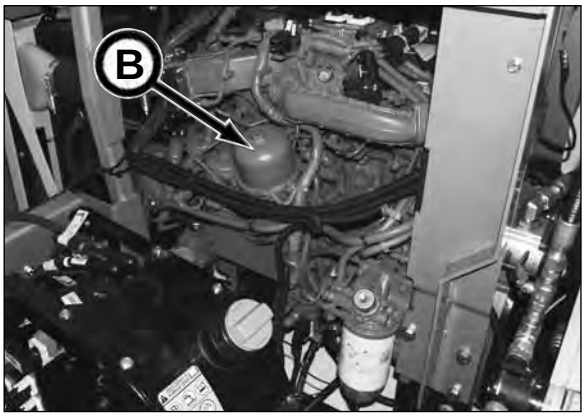
2. Remove cap from hose.

3. Drain oil into a catch pan of proper size.

4. Reinstall cap to hose.



5. Replace drain hose (A) to storage position.



6. Clean and dry area around the primary oil filter (B).

7. Carefully remove filter cover together with the oil filter.

8. Remove the oring and filter from the cover.

9. Drain filter and dispose of oil and filter properly.

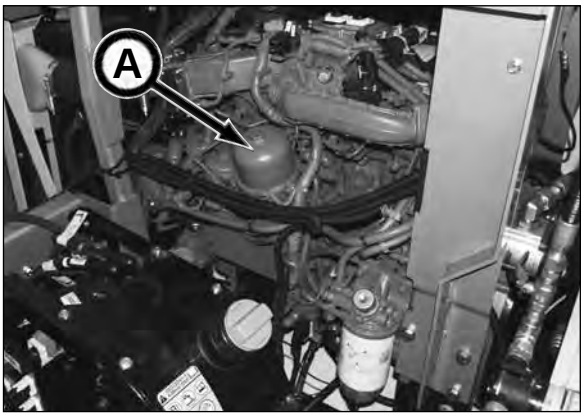
(Continued on next page)

10. Lubricate the new oring and gasket on new filter with clean oil.

11. Install the new filter and new oring in the filter cover. Be sure the filter is properly installed in the cover.

12. Install filter cover and filter (A) in the filter mount.

13. Tighten the filter cover to 29.5 ft.lb (40 N·m) torque.

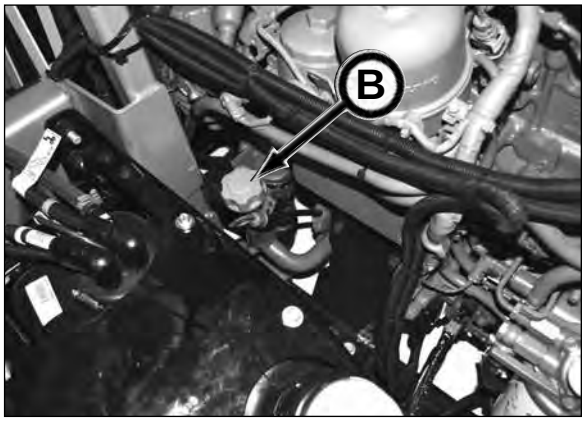


14. Remove fill cap (B).

15. Fill engine with engine oil specified in the Fuels & Lubricants section. The following fluid capacity is an approximate value. Be sure to check level after filling. DO NOT OVERFILL.

    Oil Capacity: 4.23 gal (16 L)

16. Install fill cap. Hold and screw cap handle clockwise to tighten. Clean up spills.



17. Start engine and run until warm and check for leaks.

18. Shutdown engine. Wait approximately 5 minutes and check oil level. Oil level must always be between the MIN and MAX marks on the dipstick. DO NOT OVERFILL!

MONTHLY OR EVERY 250 HOURS OF OPERATION

30. PERFORM HYDRAULIC OIL ANALYSIS

Test the quality of the hydraulic reservoir oil. Perform an oil analysis by sending an oil sample to a qualified testing facility.

If the test reveals higher contamination levels than allowed by your oil manufacturer, or if your oil is milky or discolored, drain and replace the hydraulic reservoir oil. If draining and replacing the hydraulic oil reservoir is required, all hydraulic filters should also be replaced.

31. CHECK BATTERY

NOTICE Refer to your engine manual for more information.

⚠WARNING Batteries product explosive gases. Wear eye protection and protective clothing during battery service. Keep sparks, flames, and cigarettes away from batteries.

Visually check the battery for damage. If damaged replace with new.

Check battery cables for damage or fraying. If damaged, replace with new.

Be sure cables are secured properly to the battery posts. Tighten the terminals securely and grease them with terminal grease or petroleum jelly. Loose battery connections may cause damage to the engine's electrical system.

Inspect battery case for damage. Replace if damaged.

Charge the batteries regularly. Batteries that are kept fully loaded have a maximum service life.

32. INSPECT AIR INTAKE & EXHAUST CONNECTIONS

Inspect all air intake and exhaust connections. Tighten clamps as needed and replace defective parts. Replace heat shield/wrap if removed.

Shown Without Exhaust Heat Shield/Wrap

33. INSPECT ENGINE MOUNTS

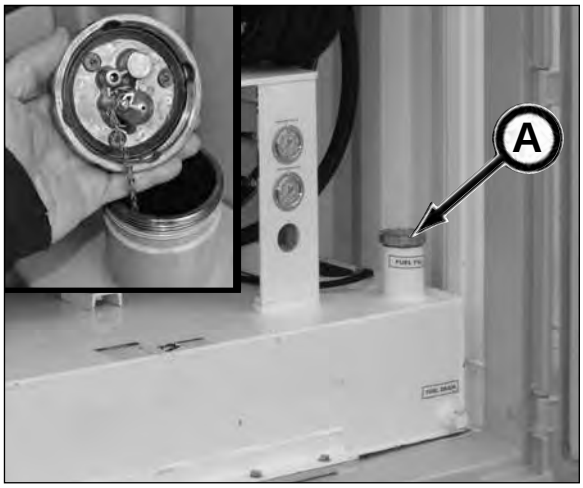
Visually inspect engine mounts for loose hardware or damaged parts.

Tighten all loose hardware and replace defective parts.

34. INSPECT & CLEAN FUEL TANK CAP

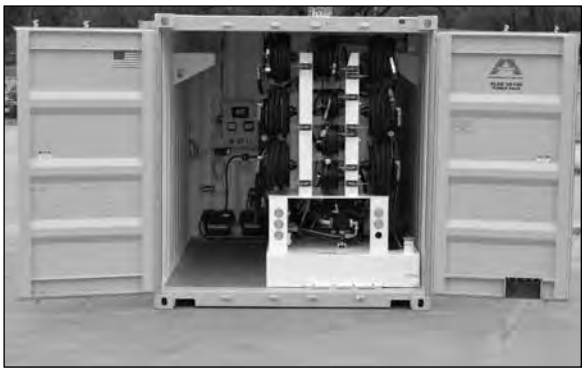
Inspect cap (A) for damage. If cap is damaged, replace with new.

Remove cap and clean any debris or dirt from cap body.



COMPLETION OF EACH DRIVE

35. INSPECT POWER PACK FRAME



Perform a visual inspection of the power pack. Inspect structures, mountings and lubricant levels.

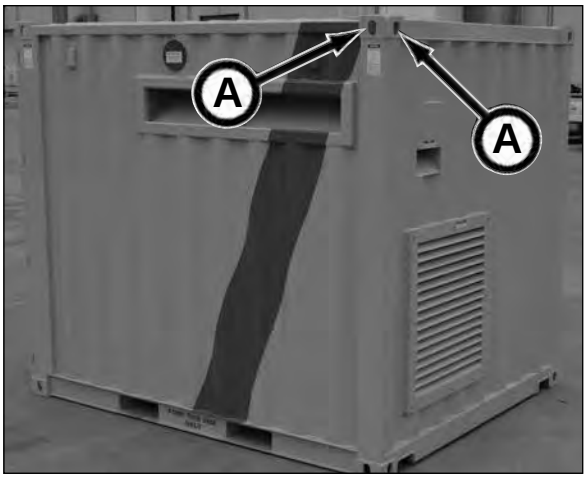
Immediately report any structural problems to your Akkerman aftermarket support representative.

Check for oil leaks and debris buildup. Make repairs as needed and remove debris.

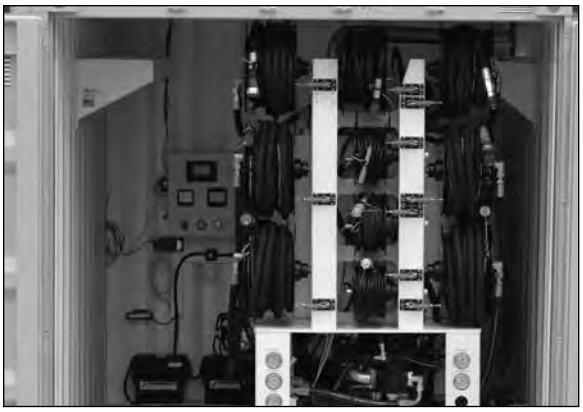
Check for loose, damaged, or missing parts. Repair or replace as necessary. Replace any defective parts.

Tighten hardware as needed. Do not overtighten hardware.

36. INSPECT LIFTING EYES



Inspect ALL lifting eyes (A) for wear or damage. Worn or damaged lifting eyes MUST be repaired before lifting.



37. INSPECT HYDRAULIC HOSES, POWER & COMMUNICATION CABLES

Inspect ALL hydraulic hoses for cracks, wear or other damage. Repair or replace BEFORE operation.

Inspect power and communication cables and connections for fraying, wear or damage. If damaged, the cables must be replaced BEFORE operation. Check to be sure the cable connections are secure.

38. DRAIN WATER FROM HYDRAULIC RESERVOIR

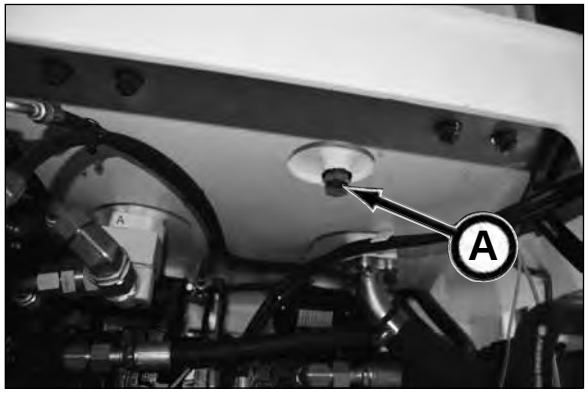
Remove water contamination from the hydraulic reservoir by draining water from the reservoir at the completion of each drive.

1. With power pack on level ground, allow oil in hydraulic reservoir to settle overnight.

2. Place catch pan under tank drain plug (A).

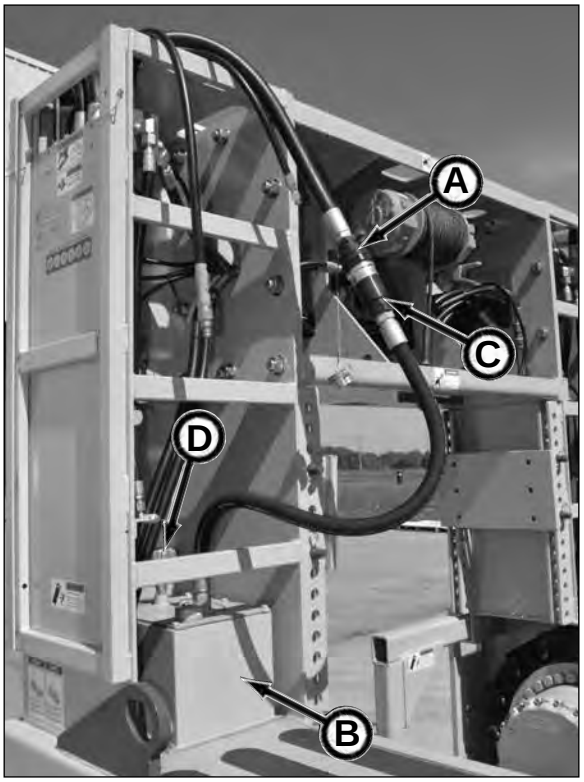
3. Slightly open drain plug and drain until there is no water in oil.

4. Once water is removed from tank, retighten drain plug.



39. CONNECT FRAME CASE DRAIN HOSE TO THERMAL RELIEF TANK

When sliplining frame hydraulic hoses are not connected to the power pack hydraulic hoses or when frame is in storage, the sliplining frame case drain hose (A) MUST be connected to the case drain thermal relief tank (B) on the frame. This will prevent oil expansion from causing damage to the shaft seals in the hydrostatic motors, resulting in oil leaking on the final drives. The relief tank will handle the expansion and contraction of the oil in the case drain circuit while preventing air from entering the system.



1. Disconnect the case drain hoses from the sliplining frame to the power pack.

2. Wind up the power pack case drain hose onto hose reel for storage.

3. Connect the frame case drain hose quick disconnect (A) to the case drain thermal relief tank hose quick disconnect (C).

NOTICE If oil is leaking out of the case drain thermal relief tank breather (D), the tank must be drained. If draining is necessary, one gallon (3.8 L) of oil must be left in the tank. The relief tank oil capacity is approximately 5 gal. (19 L).

EVERY 500 HOURS OF OPERATION

40. CHANGE ENGINE OIL & FILTER

NOTICE Refer to your engine manual for more information.

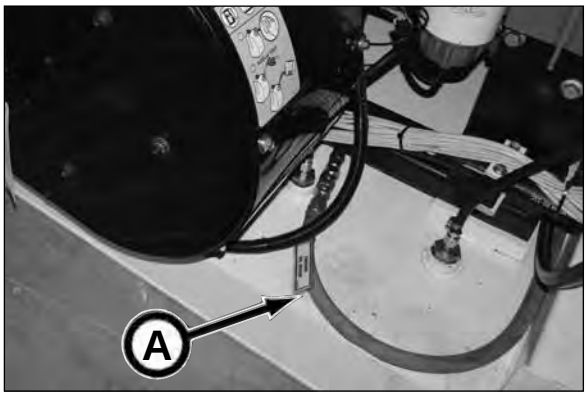
The primary oil filter and the bypass oil filter needs to be replaced with new filters every 500 hours of operation.

1. Gain access to the engine oil drain hose.

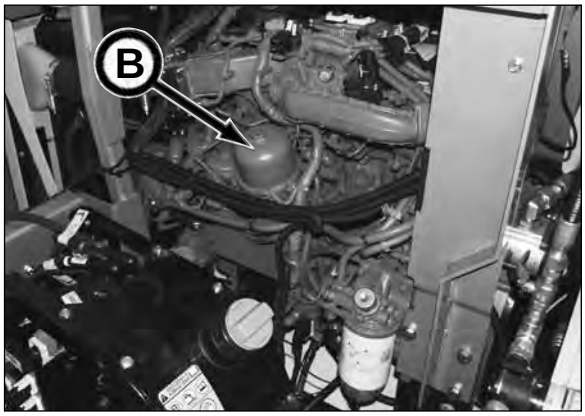
2. Remove cap from hose.

3. Drain oil into a catch pan of proper size.

4. Reinstall cap to hose.



5. Replace drain hose (A) to storage position.



6. Clean and dry area around the primary oil filter (B).

7. Carefully remove filter cover together with the oil filter.

8. Remove the oring and filter from the cover.

9. Drain filter and dispose of oil and filter properly.

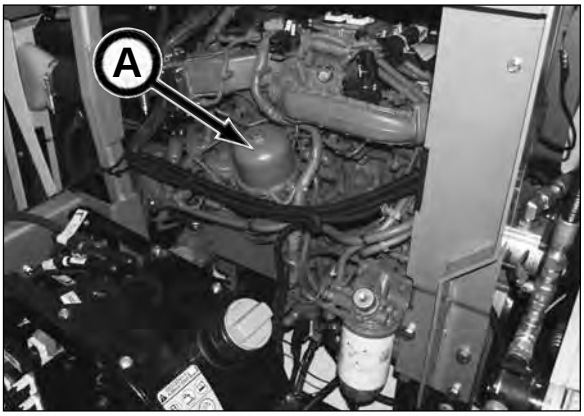
(Continued on next page)

10. Lubricate the new oring and gasket on new filter with clean oil.

11. Install the new filter and new oring in the filter cover. Be sure the filter is properly installed in the cover.

12. Install filter cover and filter (A) in the filter mount.

13. Tighten the filter cover to 29.5 ft.lb (40 N·m) torque.



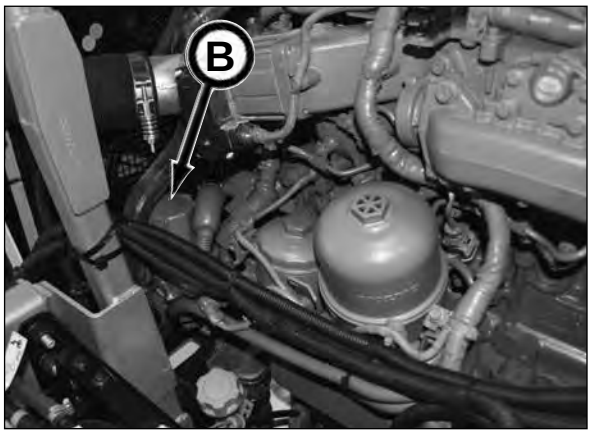
14. Clean and dry area around the bypass oil filter (B).

15. Carefully remove filter cover.

16. Remove the filter and insert a new filter.

17. Dispose of the bypass oil filter properly.

19. Replace filter cover.

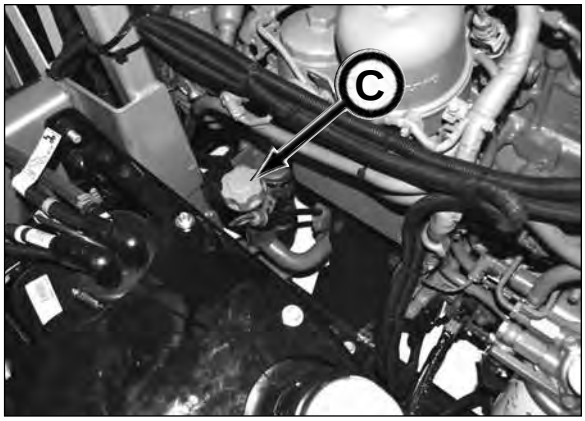


20. Remove fill cap (C).

21. Fill engine with engine oil specified in the Fuels & Lubricants section. The following fluid capacity is an approximate value. Be sure to check level after filling. DO NOT OVERFILL.

    Oil Capacity: 4.23 gal (16 L)

22. Install fill cap. Hold and screw cap handle clockwise to tighten. Clean up spills.



23. Start engine and run until warm and check for leaks.

24. Shutdown engine. Wait approximately 5 minutes and check oil level. Oil level must always be between the MIN and MAX marks on the dipstick. DO NOT OVERFILL!

41. CHECK COOLING SYSTEM

NOTICE Refer to your engine manual for more information.

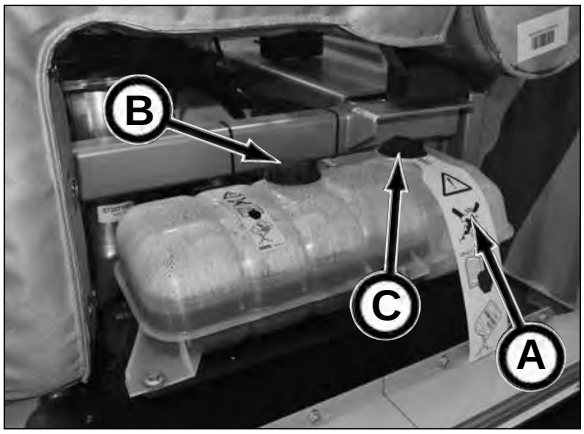
⚠WARNING Cooling system under pressure. Explosive release of HOT engine coolant can cause severe burns.

SLOWLY remove the filler cap ONLY if the engine is cool. DO NOT remove the fill cap when the engine is hot.

The engine radiator coolant is a 50% mixture of VCS Yellow coolant and distilled, deionized water. NEVER mix with green coolant or swap from yellow to green coolant. This coolant system must use VCS yellow coolant.

1. Visually check the cooling system for leaks. Tighten all clamps securely.

2. Check that the coolant level is above the MIN mark on the expansion tank (A).



3. If coolant level is low, and the engine is cold, SLOWLY open fill cap (B). Fill coolant through the fill cap so that the coolant level is between the MIN and MAX marks on the expansion tank with proper coolant solution. DO NOT OVERFILL. DO NOT open the pressure cap (C) on the expansion tank.

   See Engine Coolant in section 8, Fuels & Lubricants in this manual for proper coolant specification. Be sure to check levels after filling. DO NOT OVERFILL.

   IMPORTANT:
   • Always use the same type of coolant that is already in the engine (VCS Yellow).
   • Different types of coolant must not be mixed with each other.

4. Inspect all cooling system hoses. If the hoses are found to be in a hard, weak, or cracked condition, replace the hose(s).

5. Check the radiator for bent fins. Carefully straighten fins.

6. Check the inlet and outlet tubes for cracks, kinks, dents, or fractured seams. Repairs must be made by a qualified radiator technician.

7. Check the effectiveness of the coolant solution with a hydrometer or other measuring device. Refer to your engine manual for service information.

8. Pressure test the cooling system. Refer to your engine manual for service information.

42. INSPECT DRIVE BELT, BELT TENSIONER & IDLER WHEELS

NOTICE Refer to your engine manual for more information.

⚠WARNING NEVER operate engine without belt guard in place. Serious personal injury could result if contact is made with rotating belt.

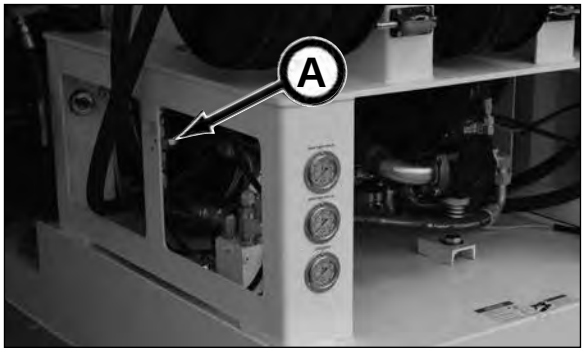
1. Visually inspect the drive belt for cracking, fraying or pieces of material missing. Replace belt as needed. Refer to your engine operator's manual for belt replacement.

2. Check the drive belt deflection after operation, when the belt is hot. It is possible that the belt can deflect .12 - .16 in. (3-4 mm) between the pulleys. If the belt deflection exceeds .12 - .16 in. (3-4 mm), refer to your engine manual for belt replacement.

IMPORTANT: ALWAYS replace a belt that is oily, worn or damaged.

3. Check the function of the belt tensioner and idler wheel bearings. If there is play in the bearings, the idler wheel must be replaced. Refer to your engine operator's manual for more information.

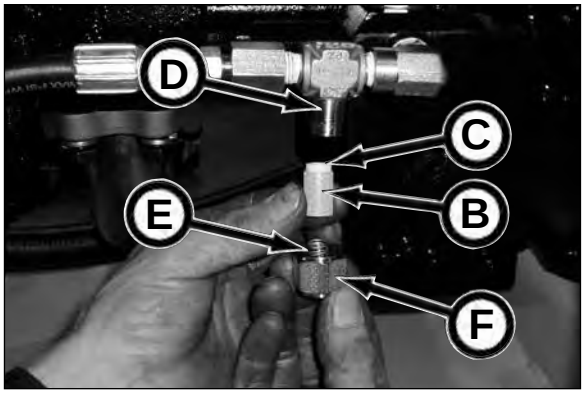
43. REPLACE LOAD SENSE FILTER



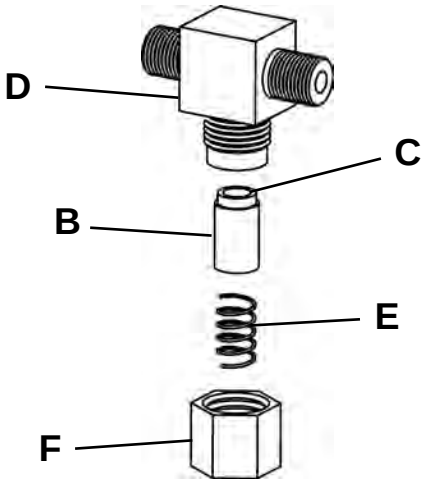
The load sense filter (A) must be replaced at:

- 500 hours or yearly, which ever occurs first
- a major component fails
- any signs of water contamination
- hydraulic fluid sample indicates large particle contamination
- controls are sluggish

NOTICE Installing a load sense filter incorrectly, WILL cause pump malfunction.



1. Remove cap, spring, and filter from filter head.
2. Insert new filter (B) with nylon ring end (C) into filter head (D).
3. Place spring (E) into cap (F).
4. Install cap onto filter head. Tighten to 10 ft-lb (13.6 N·m) torque.



Load Sense Filter Installation

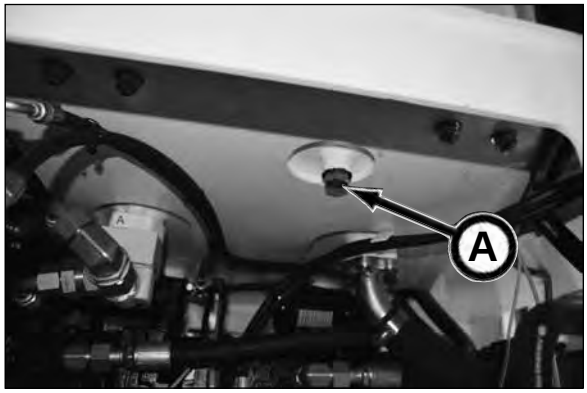
EVERY 1000 HOURS OF OPERATION

44. DRAIN & FILL HYDRAULIC RESERVOIR

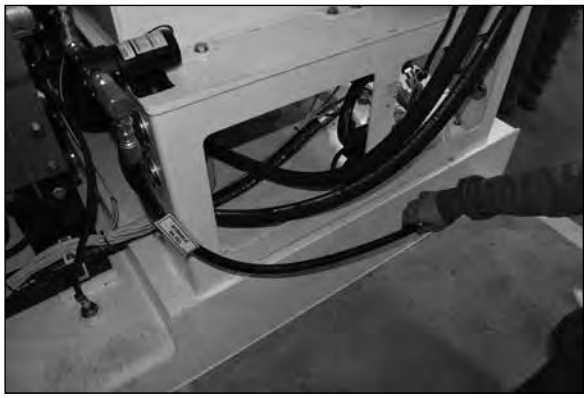
1. Place an appropriate sized catch pan under tank drain plug (A).

2. Remove drain plug and drain hydraulic oil from reservoir.

3. Once oil is drained from tank, replace drain plug. Securely tighten plug.



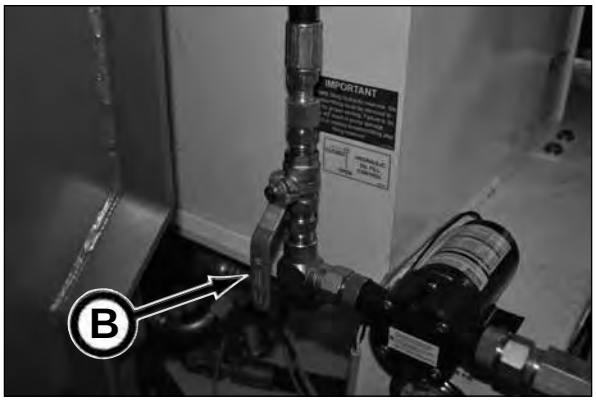
4. Remove hydraulic fill hose from storage location. Remove cap from hose.



5. Place hose into a fresh, clean hydraulic oil container.

NOTICE Refer to Lubricants section for recommended hydraulic oil.

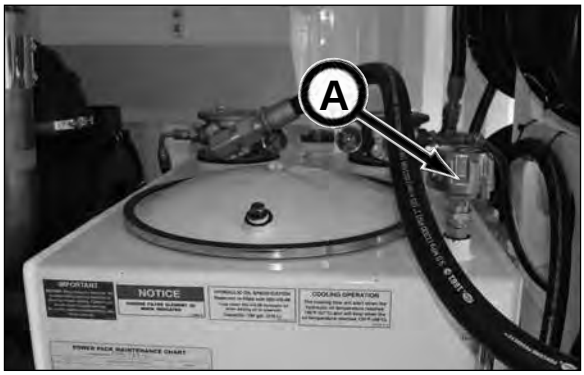
6. Open hydraulic oil fill control by moving handle (B) down to the 6 o'clock position.



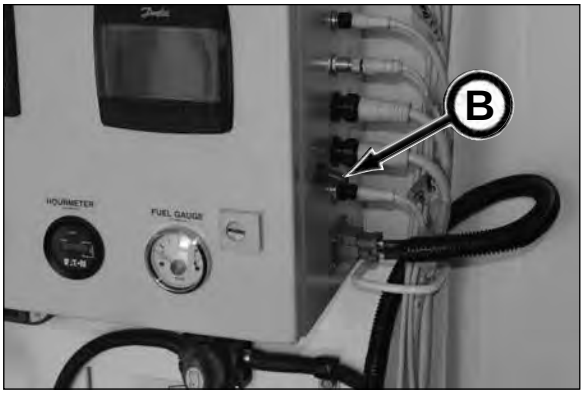
(continued on next page)

IMPORTANT: BEFORE filling hydraulic reservoir, the breather/fitting must be removed to allow for proper venting. Failure to do so will result in pump damage. Be sure to replace breather/fitting after filling reservoir.

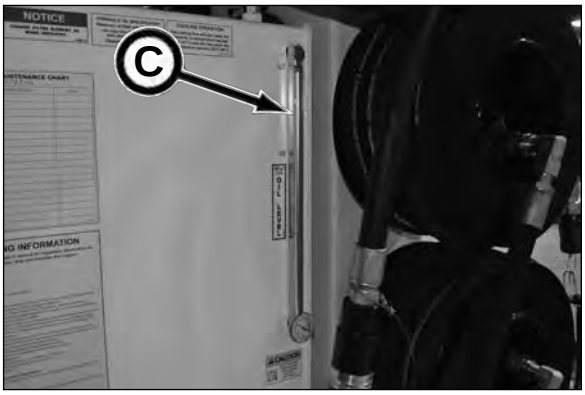
7. Remove breather/fitting (A) from reservoir BEFORE filling reservoir to allow for proper venting during filling process.



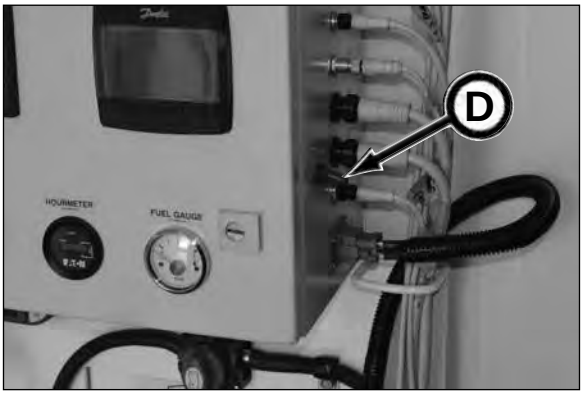
8. Flip Oil Transfer Pump switch (B) up to the ON position to pump hydraulic oil into the hydraulic reservoir.



9. Fill until oil reaches the high mark on gauge (C).



10. Flip Oil Transfer Pump switch (D) down to the OFF position.



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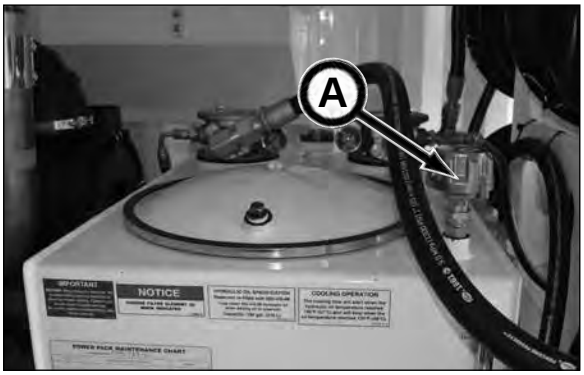
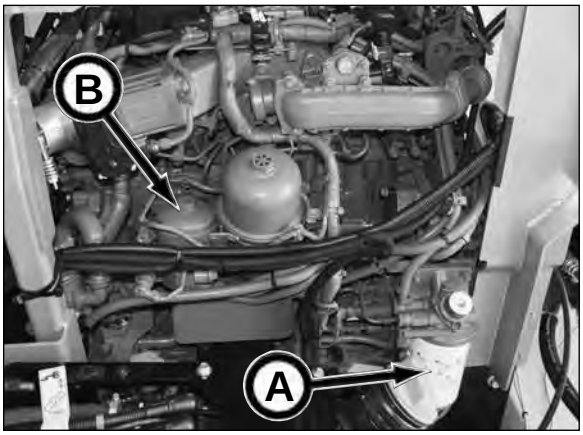
10. Replace breather/fitting (A) on reservoir.



11. Close hydraulic oil fill control by moving handle (B) clockwise to the 9 o'clock position.

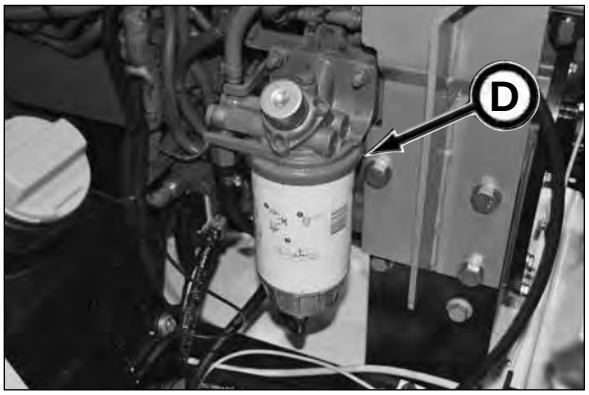
12. Replace cap on fill hose and place hose in storage location.

45. REPLACE FUEL FILTERS



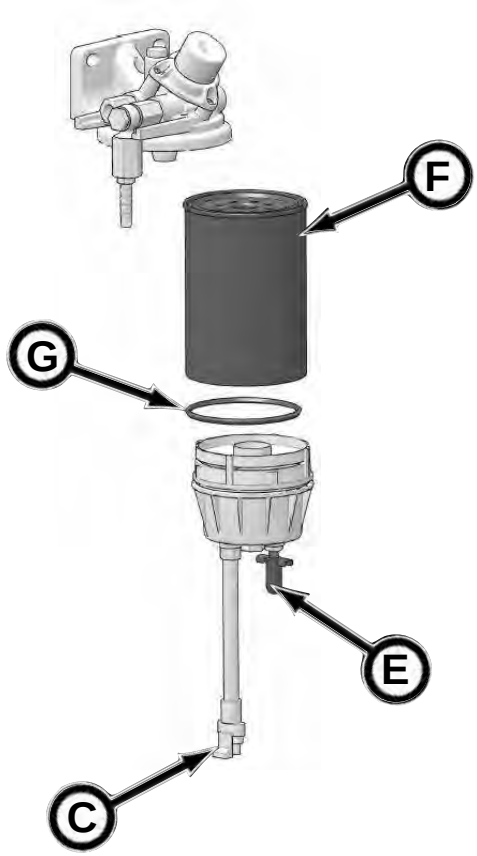
NOTICE Refer to your engine operation manual for more information.

The pre-fuel filter (A) and primary fuel filter (B) require replacement with new filters every 1000 hours of operation. Once the fuel filters are replaced, the fuel system will require bleeding before starting the engine.



Replacing Pre-Fuel Filter

1. Loosen the connector (C) to the water trap sensor.
2. Clean area around pre-fuel filter assembly (D).
3. Place a catch pan under the pre-fuel filter assembly.
4. Loosen the drain plug (E) and drain the filter.
5. Tighten drain plug.
6. Remove the pre-fuel filter (F) and seal together with the lower section of the water separator.
7. Remove the water separator and oring.
8. Dispose of the filter properly.
9. Clean the lower section of the water separator and the contact surfaces.
10. Clean the seal surfaces thoroughly and lubricate the gasket with diesel fuel.
11. Lubricate oring (G) with diesel and install the lower part of the water separator to the new filter.
12. Screw the filter onto the filter mount by hand until the rubber seal bottoms on the mating surface. Then tighten an additional 1/2-2/3 turns.
13. Reconnect the cable from the water trap sensor.
14. Clean up excess fuel spillage.
15. Proceed to next step Replacing Primary Fuel Filter below. DO NOT START ENGINE! Doing so will cause damage.



A Volvo Penta Illustration

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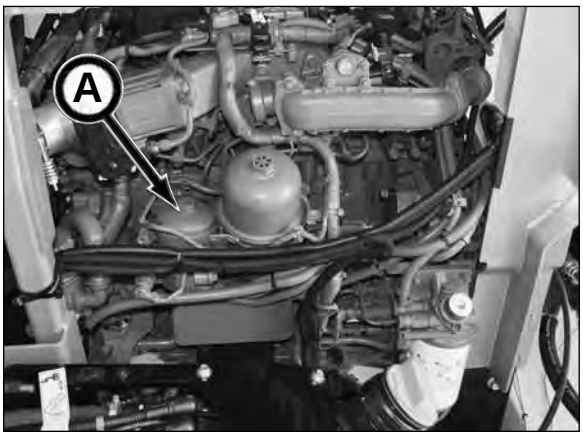
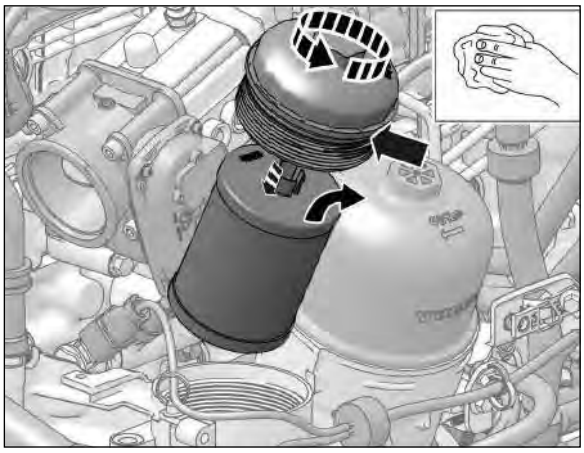
Replacing Primary Fuel Filter



1. Clean area around primary fuel filter assembly (A).

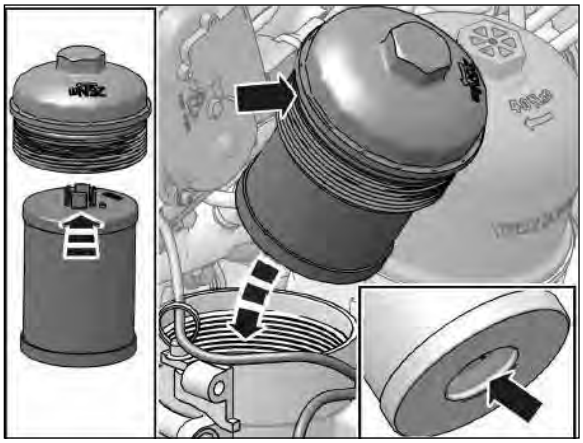
2. Place a catch pan under the fuel filter assembly.



3. Carefully remove fuel filter cover and filter.

4. Remove oring and filter. Dispose of filter properly.

A Volvo Penta Illustration



5. Lubricate new filter with diesel around the inner section of the filter sealing surface.

6. Lubricate oring with diesel before installing the filter cover.

7. Install the filter in the filter cover. Make sure the filter seats properly in the cover.

8. Install the filter cover and filter on the filter mount. Carefully screw in the cover and check that the oring does not get twisted. Re-lubricate the seal as necessary.

9. Tighten filter cover to 18.4 lbf. ft. (25 N·m)

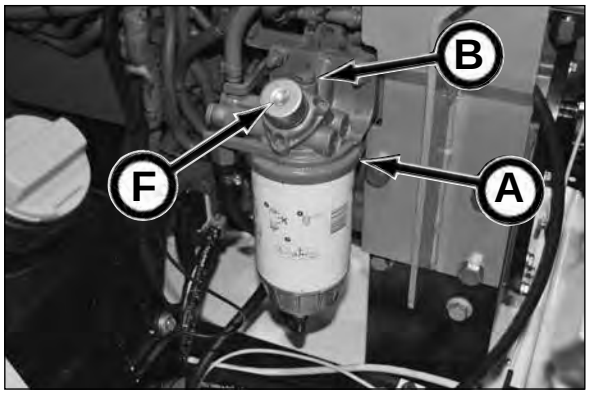
10. Proceed to 45. Bleeding The Fuel System in this section. DO NOT START ENGINE BEFORE BLEEDING FUEL SYSTEM. Doing so will cause damage.

A Volvo Penta Illustration

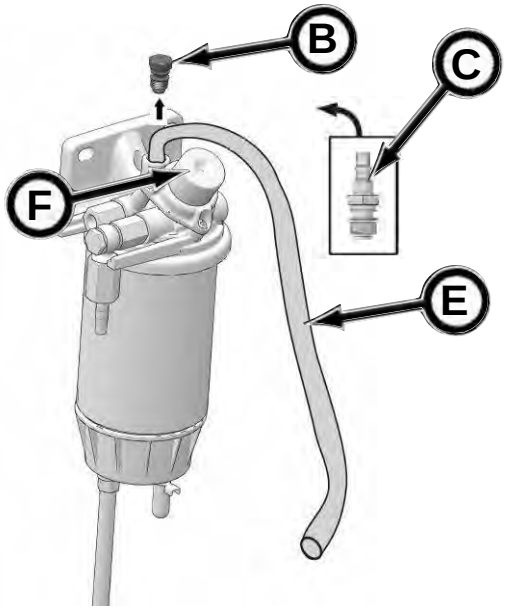
46. BLEEDING FUEL SYSTEM

NOTICE Refer to your engine operation manual for more information.

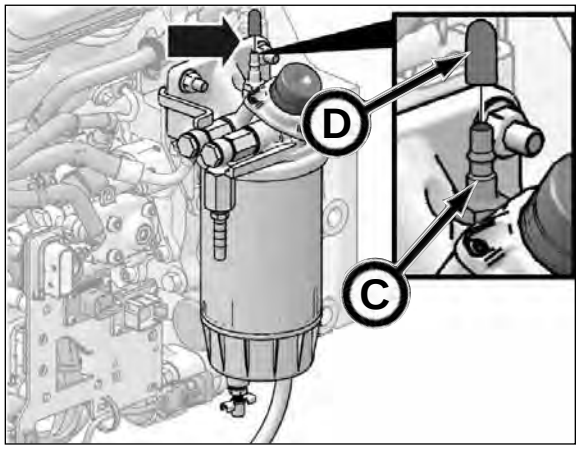
Whenever the fuel system has been opened up for service (lines disconnected or filter(s) replaced), it will be necessary to bleed the fuel system.



1. Clean area around pre-fuel filter assembly (A).
2. Remove plug (B). Retain plug for reinstallation when the fuel system bleeding procedure is complete.
3. Install a bleed nipple (C) into the plug location (order nipple through your Volvo Penta dealer).
4. Remove rubber cover (D) from bleed nipple.
5. Connect a transparent hose (E) to the bleed nipple.
6. Route the hose to a bottle or other container to collect fuel when bleeding.
7. Operate the hand pump (F) by pumping it until fuel flows through hose without air bubbles.
8. Remove the hose and bleed nipple. Replace rubber cover on bleed nipple.
9. Install and tighten plug removed in step 2.
10. Clean up any spilled fuel.
11. Start the engine and let it idle.
12. Check for leaks.



A Volvo Penta Illustration



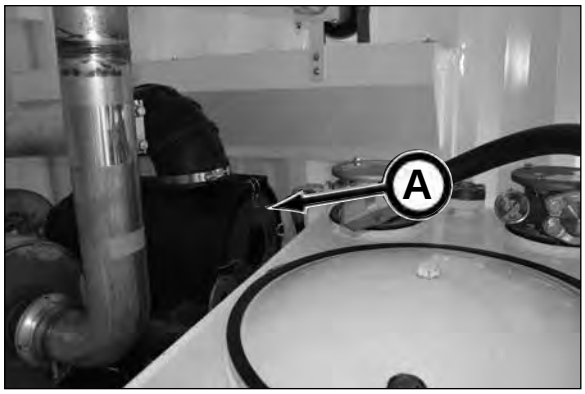
A Volvo Penta Illustration

47. REPLACE AIR CLEANER FILTER

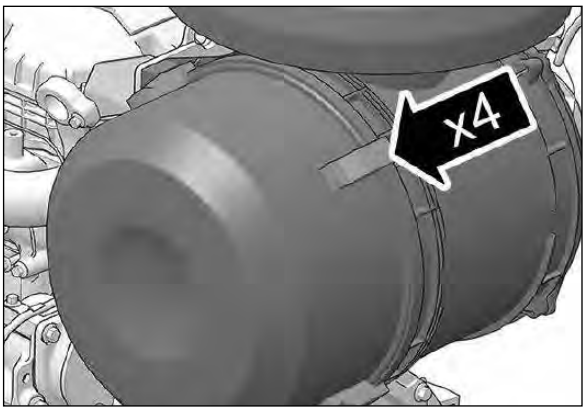
NOTICE Refer to your engine operation manual for more information.

Replace air cleaner element at 1000 hours or 12 months, whichever occurs first.

1. Clean area around the air cleaner assembly (A).



2. Unlatch clamps (four) and remove cover.



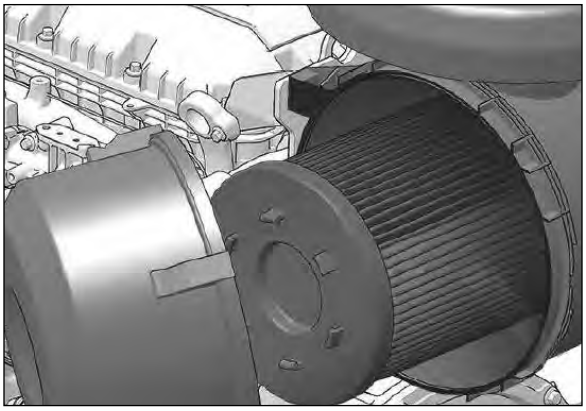
A Volvo Penta Illustration

3. Gently remove element by pulling it straight out. Bumping the element against air cleaner housing may contaminate the clean side of the filter housing with dirt and dust.

4. Properly dispose of element.

5. Thoroughly clean out the inside of filter housing with a clean, damp cloth. Dirt left in the filter housing will shorten the life of the filter elements.

6. Carefully install a new air cleaner filter element by applying pressure by hand at outer rim of filter.



A Volvo Penta Illustration

NOTICE Do not use latches on cover to force filter into air cleaner. Using cover to force filter into housing will damage cleaner housing.

7. Replace cover and secure with clamps.

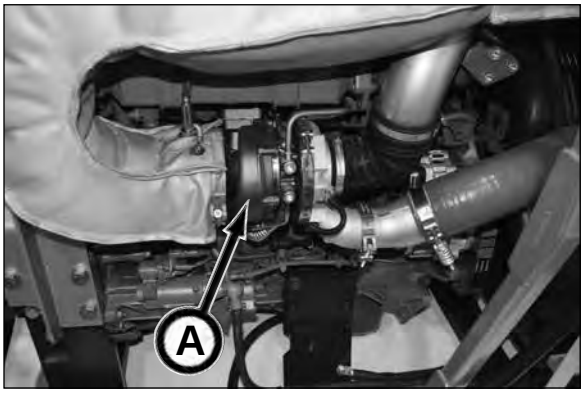
48. INSPECT ENGINE HOSES & CLAMPS

NOTICE Refer to your engine operation manual for more information.

Inspect engine hoses and clamps. Replace if worn, frayed or damaged.

49. INSPECT TURBOCHARGER

NOTICE Refer to your engine operation manual for more information.



1. Remove the inlet pipe from the turbocharger (A).
2. Remove the exhaust pipe from the turbocharger.
3. Check the turbocharger for damage to the compressor and turbine wheels.
4. If damage is found, replace the complete turbocharger. Turbocharger replacement must be performed by a qualified Volvo Penta engine dealer.

EVERY 2000 HOURS OF OPERATION

50. FLUSH & FILL COOLING SYSTEM

⚠WARNING Cooling system under pressure. Explosive release of HOT engine coolant can cause severe burns. SLOWLY remove the fill cap ONLY if the engine is cool. DO NOT remove the fill cap when the engine is hot.

Refer to your engine operator's manual when draining, flushing and refilling the cooling system.

NOTICE For more information on engine coolant specifications, refer to your engine manual.

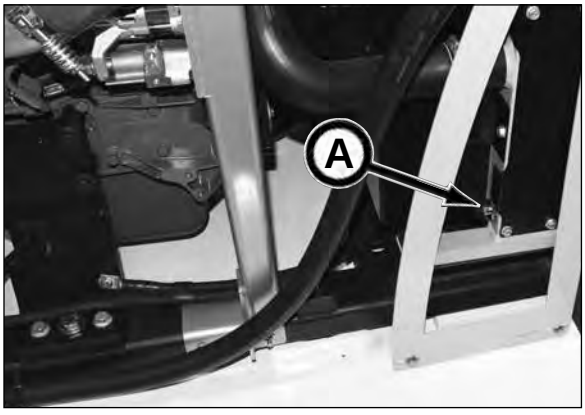
The engine radiator coolant is a 50% mixture of VCS Yellow coolant and distilled, deionized water. NEVER mix with green coolant or swap from yellow to green coolant. This coolant system must use VCS yellow coolant.

This mixture provides protection against corrosion and the build up of deposits, and winter freeze protection to -34°F (-37°C) (when using 50% mixture of coolant and water). If protection at lower temperatures is required, contact your engine dealer for recommendations.

IMPORTANT:
- Always use the same type of coolant that is already in the engine (VCS Yellow).
- Different types of coolant must not be mixed with each other.
- Risk of reduced cooling function and performance by clogging and isolation.

Coolant Reservoir

Radiator



Radiator Drain Valve (A)

51. REPLACE DRIVE BELT

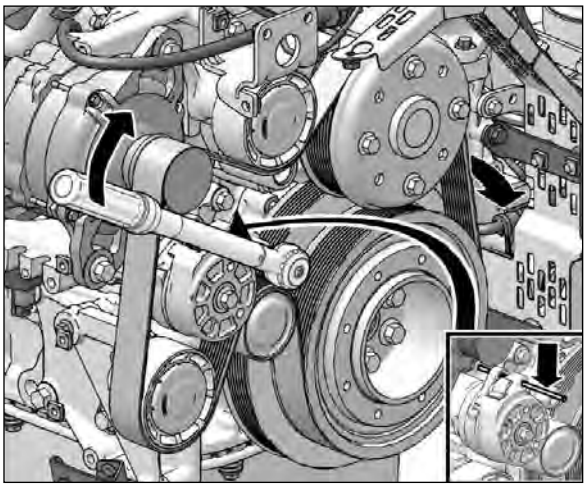
NOTICE Refer to your engine operation manual for more information.

⚠WARNING Pinch hazards. Keep fingers clear.

1. Release the belt tensioner and lock it in place with a drift or mandrel tool.

2. Remove the old drive belt.

3. Check the function of the belt tensioner and idler wheel bearings. If there is play in the bearings, the idler wheel must be replaced. Refer to your engine operator's manual for more information.



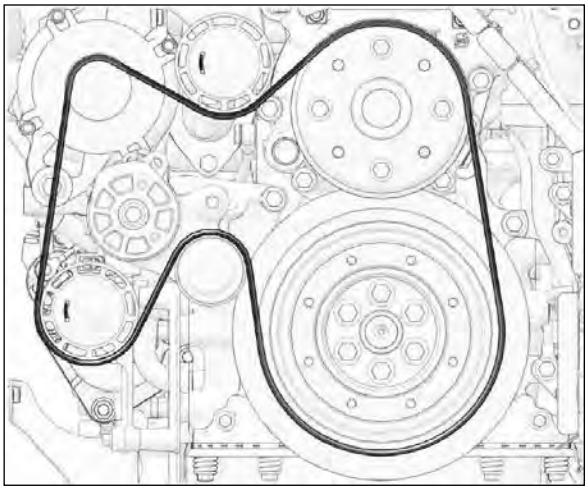
A Volvo Penta Illustration

4. Install new belt.

5. Release the belt tensioner and remove the drift.

6. Check that the belt is correctly aligned on all the pulley grooves and are correctly tensioned. The drive belt deflection should be 0.12 - 0.16 in. (3 - 4 mm) between the pulleys.

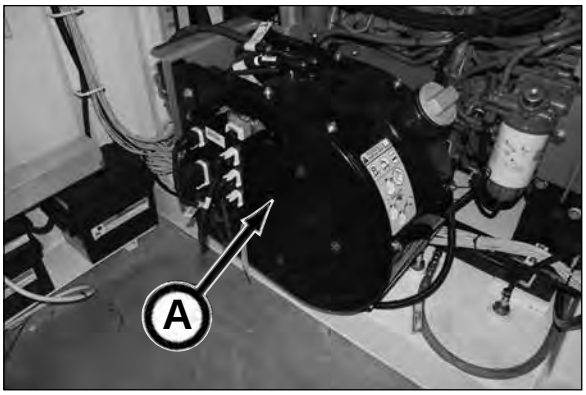
7. Reinstall any guarding.



A Volvo Penta Illustration

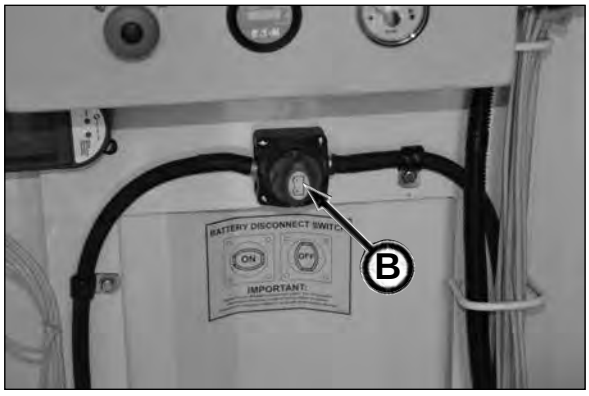
52. REPLACE SCR AdBlue®/DEF PUMP FILTER

NOTICE Refer to your engine operation manual for more information.

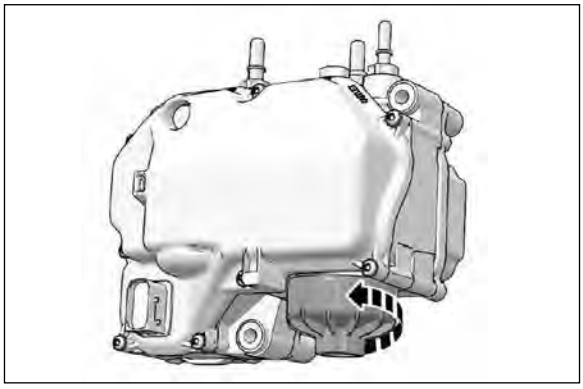


Your engine is equipped with SCR (Selective Catalytic Reduction) (A). This is an advanced active emissions control technology system that injects a liquid-reductant agent through a special catalyst into the exhaust stream of a diesel engine. The reductant source is usually automotive-grade urea, otherwise known as Diesel Exhaust Fluid (DEF).

SCR engines have a pump filter that must be replaced every 2000 hours or every 2 years whichever occurs first. Use a Volvo filter kit. Contact your Volvo Penta engine dealer.



1. With the engine off, turn the battery disconnect switch (B) to the OFF position.

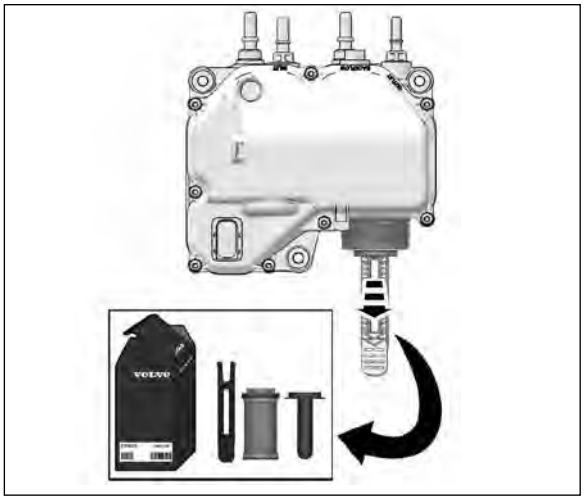


A Volvo Penta Illustration

2. Wipe clean around covers and connections.

3. Place a catch pan underneath the filter cover.

4. Remove filter cover.



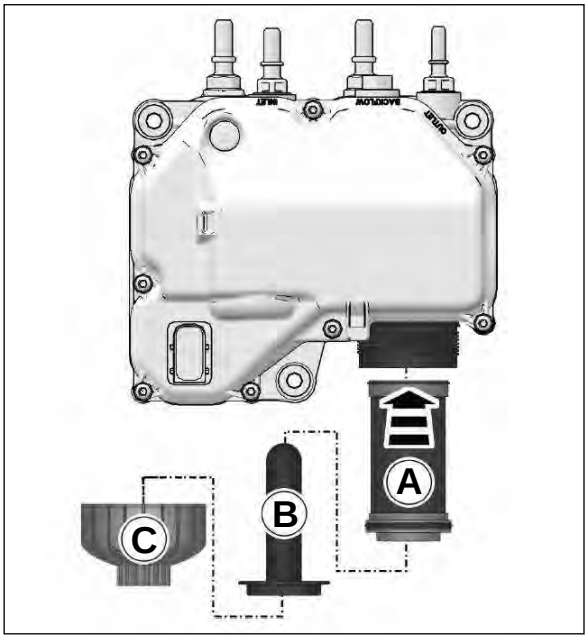
A Volvo Penta Illustration

5. Using the puller (supplied with the filter kit), pull out the filter by first pressing it into the filter hole until it clicks.

6. Pull out the filter.

(Continued on next page)

7. Install the new filter (A).
8. Install the rubber gasket (B).
9. Replace the filter cover (C) and securely tighten.



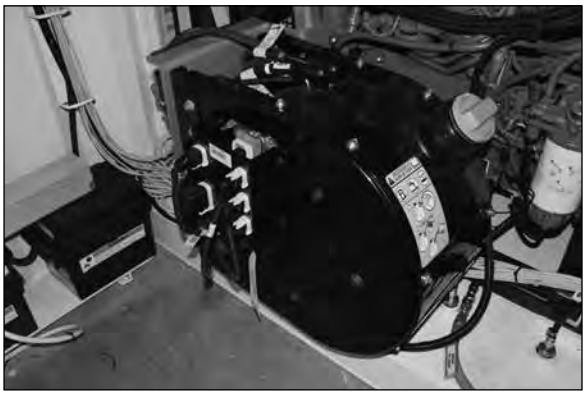
A Volvo Penta Illustration

10. Turn the battery disconnect switch (D) to the ON position.
11. Start the engine. Check operation and inspect for leaks.
12. Delete any fault codes.

AS REQUIRED

53. ADD SCR AdBlue®/DEF FLUID

NOTICE Refer to your engine operation manual for more information.



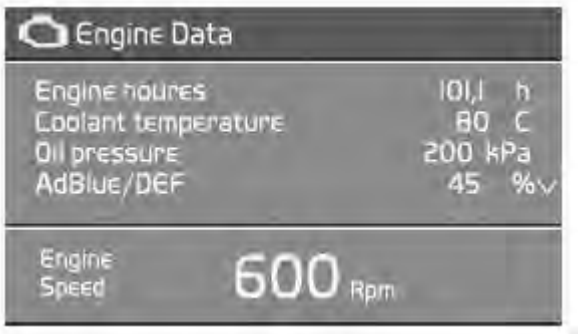
Add AdBlue®/DEF as needed. Follow refilling procedure in the engine operator's manual.

Your engine is equipped with SCR (Selective Catalytic Reduction). This is an advanced active emissions control technology system that injects a liquid-reductant agent through a special catalyst into the exhaust stream of a diesel engine. The reductant source is usually automotive-grade urea, otherwise known as Diesel Exhaust Fluid (DEF).

The solution that is added to the exhaust gases is a clear, transparent liquid with a faint odor of ammonia;it consists of de-ionized water mixed with 32.5% urea(the solution must meet ISO 22241 standards / API AUS 32). The urea in the exhaust is broken down into ammonia which reacts with NOx to form harmless nitrogen and water vapor, which occur naturally in our surroundings. The solution is not flammable or harmful to health with normal use; it is however very corrosive to metals,especially copper and aluminum.

The system is monitored to ensure that all system components are working as they should, that the quality of the AdBlue®/DEF fulfills set standards and that the tank level is not too low. Should the system detect deviations, the maximum engine torque and engine speed will be reduced and a fault code stored in the control unit.

When the level in the AdBlue®/DEF tank falls below the set limit, the level sensor in the tank transmits a signal that stops AdBlue®//DEF dosing. A fault code is set in the engine control unit, a warning lamp lights up and a fault message is shown on the control panel. If solution is not added, injection into the exhaust pipe will cease and engine torque and engine speed will be limited. When solution is added the fault message is canceled and the engine is able to revert to full power.



WARNING Risk of corrosive damage. Contact with the fluid can cause irritation and corrosion. Wear protective gloves! Change gloves and clothing that have been in contact with the liquid.
Contact with AdBlue®/DEF
- skin contact — flush with copious amounts of water and remove contaminated clothing.
- eye contact — flush thoroughly for several minutes;contact physician as necessary.
- inhalation — breathe fresh air and contact physician as necessary.

NOTES

Storage

PREPARING FOR STORAGE

IMPORTANT: Refer to the engine manual for proper engine storage.

NOTICE Follow the lubrication and maintenance requirements in the Periodic Maintenance section.

1. Repair worn or damaged parts.
2. Turn battery disconnect switch to OFF position.
3. Wash all equipment thoroughly. Never aim a power washer at the radiator, oil cooler, seals, rubber hoses or electrical components.
4. Wind all hydraulic hoses onto hose reels in power pack. Connect sliplining frame case drain hose to frame case drain thermal relief tank to prevent seal damage to the hydrostatic motors.
5. Drain engine oil, replace filter(s) and refill engine with oil specified in Fuels & Lubricants section.
6. Drain water and sediment from fuel system. Dispose of water and sediment properly.
7. Fill fuel tank completely. Refer to engine manual for adding fuel stabilizer into tank.
8. Store diesel fuel in plastic, aluminum, or steel containers specially coated for diesel fuel storage.
9. Loosen all belts.
10. Clean air cleaner.
11. Repaint equipment where necessary.
12. Check coolant level. If coolant level is low, check for leaks and add coolant as required.
13. Remove battery (negative cable first) and store it in a cool, dry place. Remove corrosion from cables and battery case. Use baking soda to neutralize acid. Place battery on wood (not concrete) and connect a small trickle charger to it to maintain charge; OR charge battery every 30 days it is in storage, if necessary.
14. Drain hydraulic oil, flush oil reservoir, change hydraulic filters, and refill hydraulic reservoir. Check for leaks.
15. Wipe up lube spills. Dispose of rags and trash properly. Store oily rags and other flammable material in protective containers.
16. If possible, store equipment under cover and out of the weather in a ventilated area.
17. Do not smoke in areas where flammable materials are stored.
18. Store fuels and lubricants in properly marked containers.

REMOVING FROM STORAGE

IMPORTANT: Refer to the engine manual when removing engine from storage.

1. Clean equipment thoroughly.
2. Check to make sure all decals including safety decals are clean and readable.
3. Check condition of wires and cables. Repair or replace as necessary.
4. Charge battery (if necessary) and install it.
5. Check coolant level. If coolant level is low, check for leaks and add coolant as required.
6. Adjust belt tension.
7. Check for leaks. Repair or replace as necessary.
8. Check hydraulic oil level. If fluid is low, check for leaks and add oil as required. See Power Pack Oil Reservoir Lubricant in section 8, Fuels & Lubricants.
9. Check condition of all hoses and connections. Tighten, repair or replace with new as needed.
10. Before operating, cycle hydraulic functions several times to purge air from the hydraulic system.
11. See your engine manual on how to restore engine to service.
12. If diesel fuel is stored for more than a month prior to use, or there is a slow turnover in fuel tank or supply tank, consult your engine manual .
13. Review this Operation Manual and your engine Operator’s Manual.

Troubleshooting

POWER PACK

NOTICE Refer to your engine manual for detailed troubleshooting information.

Problem	Cause	Solution
Power Pack will not start.	Emergency stop button pushed IN.	Pull out all E-STOP buttons.
	Main disconnect switch is OFF	Turn disconnect ON.
	Pendant not connected.	Connect pendant.
	Pump switch On before pendant is connected to receiver.	Toggle Pump switch off and on.
	Pendant is in sleep mode.	Toggle Start switch off and on.
	Generator or power supply faulty.	Repair or replace.
	Faulty Start/Stop switch.	Replace switch.
	Low oil level.	Fill reservoir with oil.
	Faulty low oil level switch or relay.	Replace switch or relay.
	Oil has reached high temp shutdown setting.	Check to be sure oil cooler is clear and there are no obstructions in front of louvers.
	Faulty high temp switch or relay.	Replace switch or relay.
	Faulty communication extension cable.	Test without extension cable, repair cable.
	Faulty low oil level switch, cable or relay.	Replace switch, cable or relay.
	Faulty E-stop cable, switch or relay.	Replace switch, cable or relay.
Slow drive travel response.	Dirty charge filters.	Replace charge filters.
Temperature gauge exceeds 150 degrees.	Excessive hydraulic circuit pressure to machine.	Replace filters.
	Hydraulic circuit disconnected causing a safety relief to be activated.	Connect hoses.
	Excessive ambient temperature.	Provide fresh air.
	Oil cooler fins/tubes plugged.	Clean oil cooler.
Power pack starts but no oil pressure available.	**NOTICE** DO NOT operate for extended periods with this condition. Doing so will result in pump damage.	
	Low oil level.	Add hydraulic oil as needed.
	Control valve not turned ON.	Turn control valve ON.
	Faulty control valve switch.	Repair or replace switch.
	Worn or damaged hydraulic pump.	Repair or replace pump.

Power Pack (Continued)

NOTICE Refer to your engine manual for detailed troubleshooting information.

Problem	Cause	Solution
Engine cranks but will not start.	No fuel.	Check fuel in tank. Open fuel shut-off valve.
	Fuel filter plugged or full of water.	Replace fuel filter and/or drain water from filter.
	Injection pump not getting fuel or air in fuel system.	Bleed fuel system.
	Wire harness or wires disconnected on injector pump.	Repair loose connections or replug harness.
Engine hard to start or will not start.	No fuel.	Check fuel in tank. Open fuel shut-off valve.
	Air in fuel line.	Bleed fuel system.
	Cold weather.	Use cold weather starting procedure.
	Crankcase oil too heavy.	Use proper oil viscosity.
	Clogged fuel filter.	Replace filter element.
	Water, dirt, or air in fuel system.	Drain, flush, fill, and vent fuel system.
Engine shuts down during operation.	Defective high water temperature sensor.	Replace water temp. sensor.
	Defective low oil pressure switch.	Replace low pressure switch.
Engine knocks.	Low engine oil level.	Add oil to engine crankcase.
	Low coolant temperature.	Remove and check thermostat.
Engine runs irregularly or stalls frequently.	Low coolant temperature.	Remove and check thermostat.
	Clogged fuel filter.	Replace filter element.
	Water, dirt, or air in fuel system.	Drain, flush, fill, and vent fuel system.
Below normal engine temperature.	Defective thermostat.	Remove and check thermostat.
	Defective temperature gauge or sender.	Check gauge, sender, and connections.
Lack of power.	Engine overloaded.	Reduce load on engine.
	Intake air restriction.	Service air cleaner.
	Clogged fuel filter.	Replace fuel filter.
	Improper type of fuel.	Use proper fuel.
	Below normal engine temperature.	Remove and check thermostat.
	Restricted fuel hose.	Clean or replace fuel hose.

(Continued on next page)

Power Pack (Continued)

Problem	Cause	Solution
Low oil pressure.	Low oil level.	Add oil.
	Improper oil type.	Drain, fill crankcase with proper oil and quantity.
High oil consumption.	Crankcase oil too light.	Use proper oil.
	Oil leaks. gaskets, and drain plug.	Check for leaks in lines,
	Restricted crankcase vent tube.	Clean vent tube.
Engine emits white smoke.	Improper type of fuel.	Use proper fuel.
	Low engine temperature.	Warm up engine to normal operating temperature.
	Defective thermostat.	Remove and check thermostat.
Engine emits black or gray exhaust smoke.	Improper type of fuel.	Use proper fuel.
	Clogged or dirty air cleaner.	Service air cleaner.
	Engine overloaded.	Reduce load on engine.
Engine overheats.	Engine overloaded.	Reduce load on engine.
	Low coolant level.	Fill radiator to proper level and check for leaks.
	Faulty radiator cap.	Have a technician check.
	Drive belt loose or defective.	Replace belt.
	Defective belt tensioner.	Replace tensioner.
	Low engine oil level.	Add oil as needed.
	Plugged radiator.	Clean.
	Cooling system requires flushing.	Flush cooling system.
	Defective thermostat.	Remove and check thermostat.
	Incorrect grade of fuel.	Use correct grade of fuel.
High fuel consumption.	Incorrect grade of fuel.	Use correct grade of fuel.
	Clogged or dirty air cleaner.	Service air cleaner.
	Engine overloaded.	Reduce load on engine.

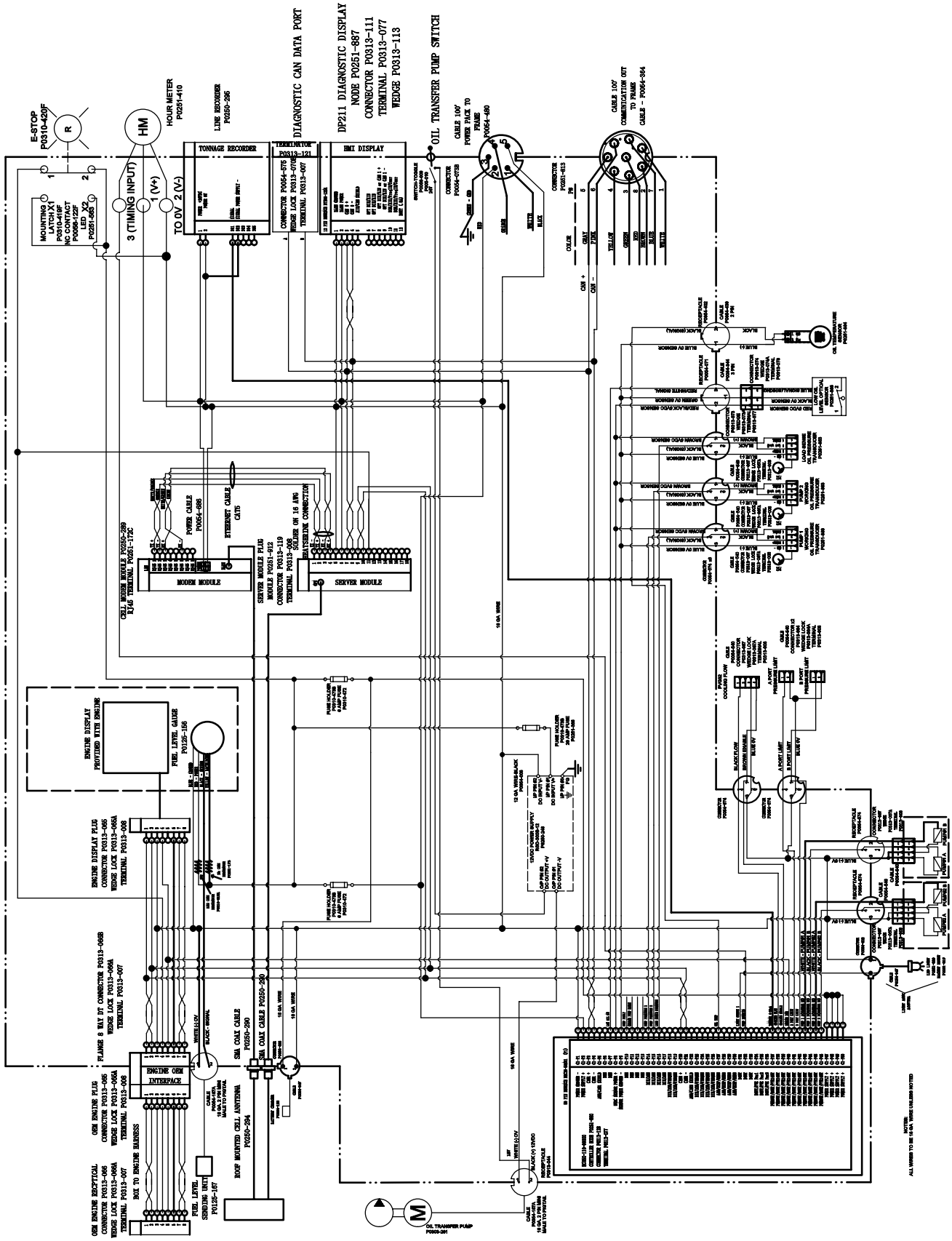
(Continued on next page)

Power Pack (Continued)

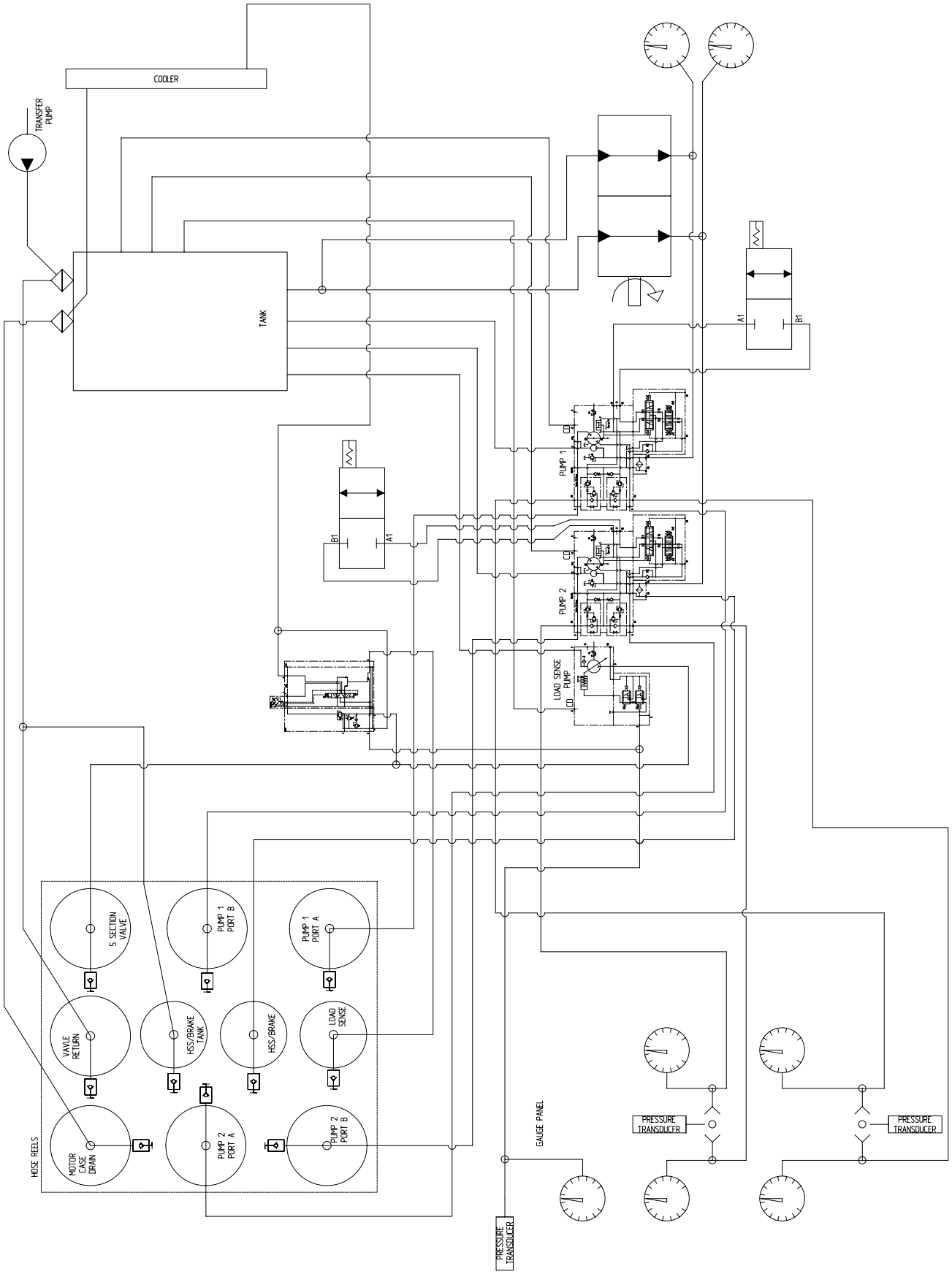
Problem	Cause	Solution
Undercharged system.	Excessive engine idling.	Increase engine rpm when heavy electrical load is used.
	Poor electrical connectors on battery, ground strap, starter, or alternator.	Inspect and clean or replace as necessary.
	Defective battery.	Test battery.
	Defective alternator. Replace alternator.	Test charging system.
Battery uses too much water.	Cracked battery case.	Replace battery.
	Defective battery.	Test battery. Replace if needed.
Battery will not charge.	Loose or corroded connections.	Clean and tighten connections.
	Worn out battery.	Replace battery.
	Drive belt loose or defective.	Replace belt.
	Defective belt tensioner.	Replace tensioner.
Starter will not crank.	Loose or corroded connections.	Clean and tighten connections.
	Defective battery.	Replace battery.
Starter cranks slowly.	Crankcase oil too heavy.	Use proper oil.
	Loose or corroded connections.	Clean and tighten connections.
Entire electrical system does not function.	Loose or faulty battery connection.	Clean and tighten connections.
	Worn out battery.	Replace battery.

NOTICE If the troubleshooting solutions still do not resolve the issue, contact your Akkerman Aftermarket Support Representative.

ELECTRICAL SCHEMATIC

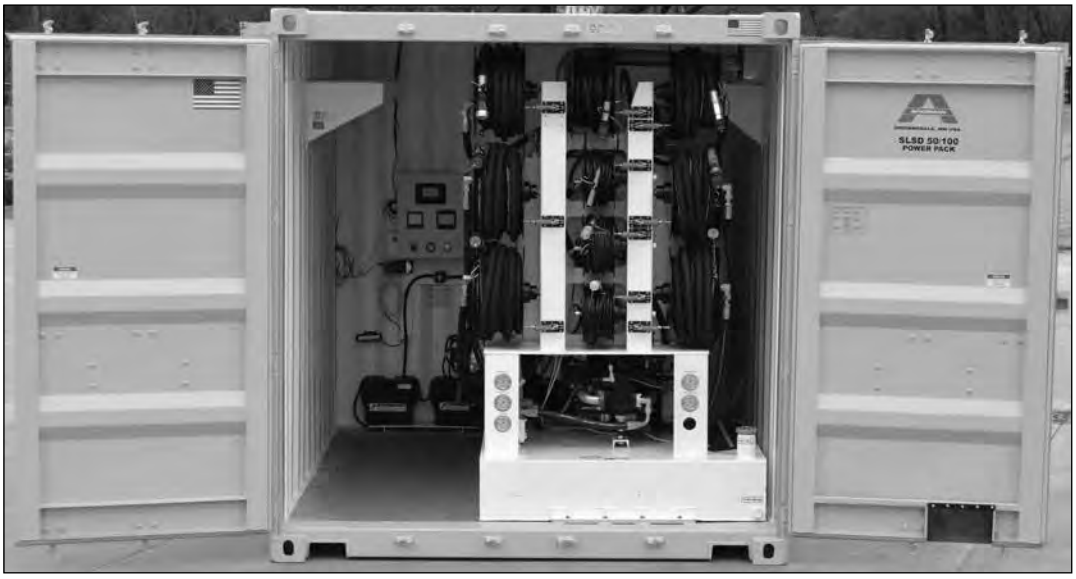


HYDRAULIC SCHEMATIC



Specifications

SLIPLINING SYSTEM DIESEL (SLSD) POWER PACK



Dimensions
- Length ..... 10 ft (3.05 m)
- Height ..... 8.6 ft (2.6 m)
- Width ..... 8 ft (2.4 m)

Weight (Approx.) ..... 13,500 lbs. (6,123 kg)

Hydraulic Oil Reservoir Capacity ..... 100 gal. (379 L)

Fuel Tank Capacity ..... 200 gal. (757 L)

Pumps
- Drive (Two Hydrostatic Pumps @ 100 cc) ..... 45 gpm @ 4,250 psi
- Load Sense ..... 25 gpm @ 2,000 psi

Power
- Diesel Engine, Tier IV ..... 215 HP (160 kW @ 2,300 rpm)

Akkerman Inc. reserves the right to improve its product without notice or obligation.

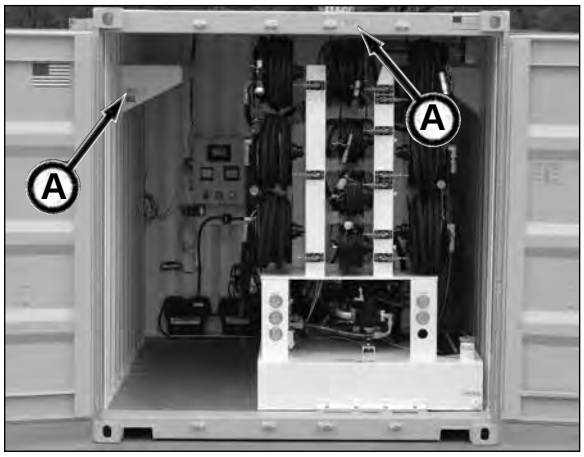
TORQUE CHART

Use these torque values as a guideline when tightening hardware unless otherwise specified in this manual.

Lubricated Coarse UNC Threads Grade 8 Fasteners			**Lubricated Fine UNF Threads Grade 8 Fasteners**		
Bolt Size	**Torque**		**Bolt Size**	**Torque**	
	ft. lbs.	**(N·m)**		**ft. lbs.**	**(N·m)**
1/4 - 20	10	(14)	1/4 - 28	11	(15)
5/16 - 18	20	(27)	5/16 - 24	22	(30)
3/8 - 16	35	(47)	3/8 - 24	39	(53)
7/16 - 14	56	(76)	7/16 - 20	62	(84)
1/2 - 13	85	(115)	1/2 - 20	96	(130)
9/16 - 12	123	(167)	9/16 - 18	137	(186)
5/8 - 11	170	(231)	5/8 - 18	192	(260)
3/4 - 10	301	(408)	3/4 - 16	336	(456)
7/8 - 9	450	(610)	7/8 - 14	500	(678)
1 - 8	680	(922)	1 - 12	740	(1003)
1-1/8 - 7	960	(1302)	1-1/8 - 12	1030	(1397)
1-1/4 - 7	1360	(1844)	1-1/4 - 12	1500	(2034)
1-1/2 - 6	2360	(3200)	1-1/2 - 12	2660	(3607)

Identification Numbers

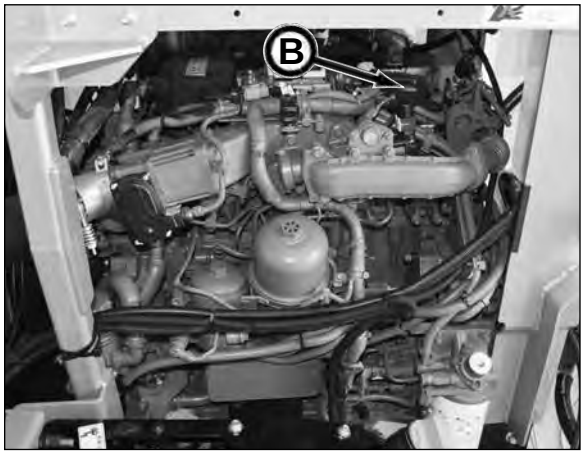
Model and serial numbers are required when ordering parts or requesting service information. Record your model and serial numbers below.



SLIPLINING DIESEL POWER PACK (A)

Model Number _____

Serial Number _____



DIESEL ENGINE (B)

Model Number _____

Serial Number _____

NOTES

Safety Data Sheets

The Federal Occupational, Safety, and Health Administration (OSHA) Standard 29 CFR 1910.1200, require that specific safety data sheets (SDS) be available to employees before operating this equipment. This may include information on substances contained in this equipment such as hydraulic fluid and gear lubricant.

Akkerman Inc. will provide, at no cost, SDS which apply to its product line. Simply contact your Akkerman Aftermarket Support representative for a copy.

To ensure a prompt response to your SDS request, include your return address (including zip or postal code) and the equipment's model numbers and serial numbers with your request.

NOTES

Warranty

Akkerman warrants that all equipment manufactured by it be free from defects due to workmanship or material when normally used and serviced for a period of 90 days from the date of shipment by Akkerman. Normal wear and tear to the equipment, including, but not limited to, wear on the cutter face tooling, hydraulic filters, augers, casings, slurry line and seals is not covered by this warranty. Akkerman does not warrant that the equipment meets the requirements of any particular safety code or rule governing equipment classification. If the Customer has questions about local safety codes, rules or ordinances, authorities local to the project should be consulted.

In order to be considered as a potential warranty claim, the component in question must be returned to Akkerman (freight prepaid) for factory inspection and analysis, and determination of warranty applicability. No warranty is provided for electronics or electrical components of any kind. The validity of all warranty claims are subject to the discretion and determination of the Akkerman Aftermarket Support Department. All such determinations are final.

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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.