
Warrior Shotcrete Pump

OPERATOR'S MANUAL

500
600
X500

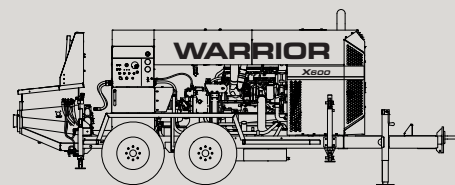


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Warranty Information

The following individual, who has signed below, hereby acknowledges receipt of this manual on behalf of the purchaser of the shotcrete pump.

Model: _____

Machine Serial No. _____

Sold To: _____

Name: _____

Title: _____

Signature: _____

Date: _____

After signing for this manual, please mail the manual back to the following address.

Western Shotcrete Equipment, Inc.

3026 Scott Lane

West Haven, UT 84401

NOTE! Warranty void until Western Shotcrete Equipment, Inc. receives the signed Signature Page.



WARRANTY

Western Shotcrete Equipment, Inc. warrants each new shotcrete pump sold by it to be free from defects in material and workmanship under normal use and service for a period of twelve (12) months from the date of delivery to the first retail purchaser.

Western Shotcrete Equipment is not responsible for failures resulting from accident, owner or operator abuse or neglect, improper repair, modification of standard parts or the use of parts not authorized by Western Equipment.

This warranty does not apply to normal maintenance service or to normal replacement of certain machine parts such as concrete cylinders, valve mechanisms, o-rings, seals, delivery systems, etc. which are subject to normal wear.

Western Shotcrete Equipment's sole obligation under this warranty must be to cause the repair or replacement without charge or granting of a credit reimbursement, at its discretion, through its warranty processing procedures, for any defective part of a concrete pump sold by Western Shotcrete Equipment when returned prepaid to an authorized concrete pump dealer appointed by Western Shotcrete Equipment or a point designated by Western Shotcrete Equipment. Determination of defect must result from the exclusive examination of the part by Western Shotcrete Equipment or the authorized dealer.

Western Shotcrete Equipment does not warrant components or accessories which bear the name of another company, such being subject to the warranties of their respective manufacturers.

Western Shotcrete Equipment will not be responsible for travel or transportation expenses, rented equipment, outside contractor's fees or unauthorized repair shop expenses.

Western Shotcrete Equipment assumes no liability for loss of use or any direct, indirect or consequential damages of any kind in respect to the use or operation of concrete pumps sold by Western Shotcrete Equipment or any equipment or accessories in connection therewith.

THIS WARRANTY IS THE SOLE WARRANTY BY WESTERN SHOTCRETE EQUIPMENT FOR CONCRETE PUMPS. THIS WARRANTY IS EXCLUSIVE AND IS IN LIEU OF ALL OTHER WARRANTIES EXPRESSED OR IMPLIED AND THERE IS NO IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

Western Shotcrete Equipment does not authorize any person or company to assume for it any other warranty obligation in connection with the sale of the Western Shotcrete Equipment product. Any enlargement or modification of this warranty by a dealer or other selling agent must become the exclusive responsibility of such dealer or selling agent

Safety

Safety Warnings

WARNING

Do not attempt to operate this equipment without a thorough understanding of the operating, maintenance, and safety considerations contained in this manual. To prevent damage to equipment and or injury to you or other personnel, these instructions must be carefully followed.

WARNING

Diesel is extremely flammable and is explosive under certain conditions. Work in a well-ventilated area with the engine stopped. Do not smoke or allow flames or sparks in your working area or where diesel is stored.

WARNING

If the engine must be running to perform maintenance, make sure your workspace is well ventilated. Never run the engine in an enclosed space. The exhaust contains poisonous carbon monoxide gas that may cause loss of consciousness and lead to death.

WARNING

Use dry nitrogen gas only to pressurize the accumulator bladder. Never use compressed air. The use of an unstable gas such as compressed air can cause a fire or explosion resulting in serious injury or death.

WARNING

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.

Personnel Qualifications

Introduction

Western Shotcrete Equipment, Inc. Warrior Shotcrete Pumps are high-pressure, hydraulic-powered pumps for shotcreting or pumping of concrete. This manual describes the operation, maintenance, and safety considerations that must be followed. Close attention to these details by the operator and maintenance personnel are necessary to ensure a minimum of problems while striving for maximum productivity and safety.

Prior to pump operation an operator must be thoroughly familiar with the equipment and its operation so that he or she can operate it in a safe manner. His or her eligibility to operate the pump must be based on the following qualifications.

Qualifications

Only experienced operators, or trainees under the direct supervision of an experienced operator, must operate the equipment. No unauthorized person should be permitted to assist or remain in the immediate vicinity of the machine while it is in operation or during the performance of any maintenance, inspection, cleaning, repair, or in preparatory operations.

Individuals who cannot read and understand the signs, notices, and operating instructions that are part of the job must not operate the machine.

Individuals who are not familiar with the operating instructions, have not received some on-the-job supervised training, or are not familiar with the signal codes used at the construction site must not operate the machine.

Anyone under the age of 21 years must not operate the machine.

Anyone with seriously defective eyesight or hearing and/or physical or mental impairment must not operate the machine. (Such as epilepsy or heart disease) This should be verified annually.

The machine must not be operated while the operator is eating, drinking, reading, talking on a phone, or is more than six feet distance from the controls.

An operator who has asked to be relieved because he or she feels physically or mentally unfit must not operate the machine.

Machine must not be operated at any new site, or at the start of a new shift, until a visual inspection is made of the condition of the equipment.

The operator must report and damage, defects, problems, or accidents to his/her work supervisor and next shift operator.

Safety Regulations

All personnel operating, transporting, assembling, or maintaining a Warrior Shotcrete Pump should understand and comply with the following safety regulations:

Anyone near the unit must wear appropriate clothing (NO loose clothing, neck ties, rings, open-toed shoes) and protective equipment (e.g. hard hat, safety goggles, hearing protection, and close-toed shoes) required by Federal, States, local, and job site regulations. [[Hearing protection OSHA requirements are listed in "29 CFR Ch. XVII Section 1910.95 Occupational Noise Exposure," which can be found at www.osha.gov]]

Do not operate a malfunctioning unit or if it has not been leveled and stabilized.

Before use, check machine's operating condition.

Never open hopper grate cover while operating pump. Though Warrior Shotcrete Pumps are equipped with a trigger sensor to shut off machine when grate is opened, it may not work, and the operator is in danger of contacting moving parts in hopper.

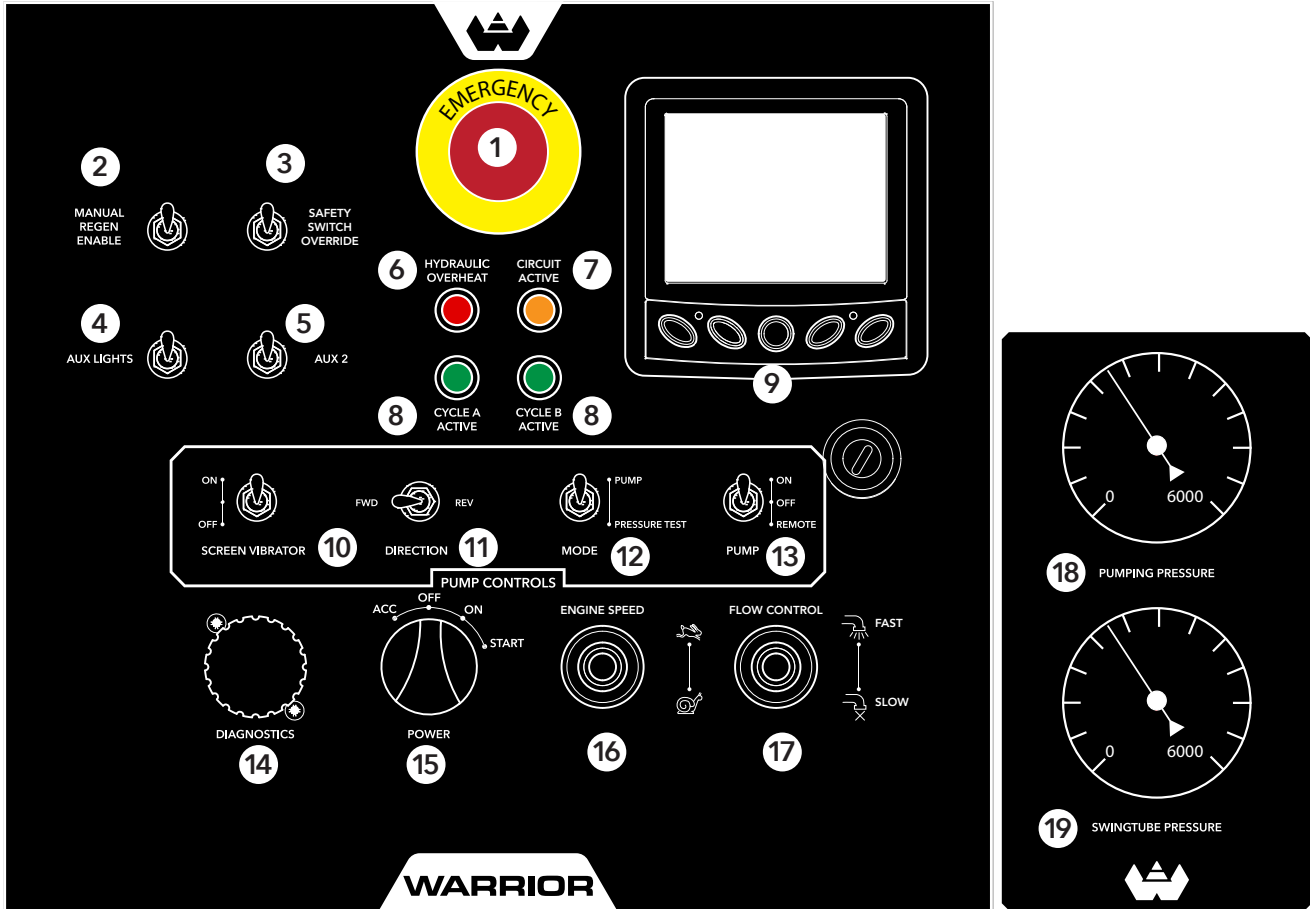
Never enter the hopper grate with any part of your body while the machine is on.

Do not stand on hopper grate.

If the hopper needs repairs, ensure the machine is OFF and the accumulator pressure reads ZERO. The system uses a hydraulic accumulator which contains a stored charge of high pressure oil to shift the S-tube. Stop engine, turn ignition key to OFF, and wait 10-15 seconds until the accumulator pressure gauge reads zero.

Make sure decals and operations instructions are legible.

General Technical Description



Control Panel

Emergency Stop Button (1)

Push this button in case of emergency. It will cause the machine to terminate all functions.

Manual Regen Switch (2)

Switch enables operator to perform a manual regen via PowerView monitor. Not required for normal machine operation.

Safety Switch Override (3)

Switch bypasses hopper safety switch in case of emergency or switch failure. Switch must never be used for operating purposes.

Aux Lights (4)

Switch used for optional hopper lighting package.

Aux 2 (5)

Switch used for optional functions.

Hydraulic Fluid Overheat Alert (6)

Light illuminates when the hydraulic fluid temperature exceeds the normal operating range (>180°).

Circuit Active Light (7)

Light illuminates when hopper safety sensor is engaged when grate is closed and hydraulic circuit is powered.

Cycle A/B Light (8)

Light illuminates to show which drive cylinder is active.

PowerView Display (9)

Multifunction display provides information such as engine speed, active regeneration, exhaust temperature, diesel exhaust fluid level, error codes, and service reminders.

Hopper Screen Vibrator Switch (10)

Activates the optional hopper screen vibrator if equipped.

Pump Forward/Reverse Switch (11)

Switch is used for forward or reverse pumping. Forward is normal pumping operation.

Pressure Test Switch (12)

Must be up in the Pump position for normal operation. In the Pressure Test position, the pump will make one reverse stroke, stop, then the main hydraulic system will go to maximum pressure.

On/Off/Remote Switch (13)

Turns the pump on and off at the Control Panel. When in the Remote position, the pump can be turned on and off with a Remote Control Cable.

Diagnostics Connection (14)

Plug used for troubleshooting machine errors.

Ignition Switch (15)

Two positions: OFF and ON. On allows the engine to start. Off shuts off the fuel to the engine.

Engine Speed (16)

Sets the engine speed. Push the level up for more RPM or down for less RPM to set the engine speed.

Flow Control (17)

Sets the hydraulic pump output and thus the concrete pumping output. Push the lever up for more flow and down for less flow or volume.

Pumping Pressure (18)

Gauge indicates hydraulic system pressure in psi.
Note: this is hydraulic fluid pressure not actual pump outlet pressure.

Swingtube Pressure (19)

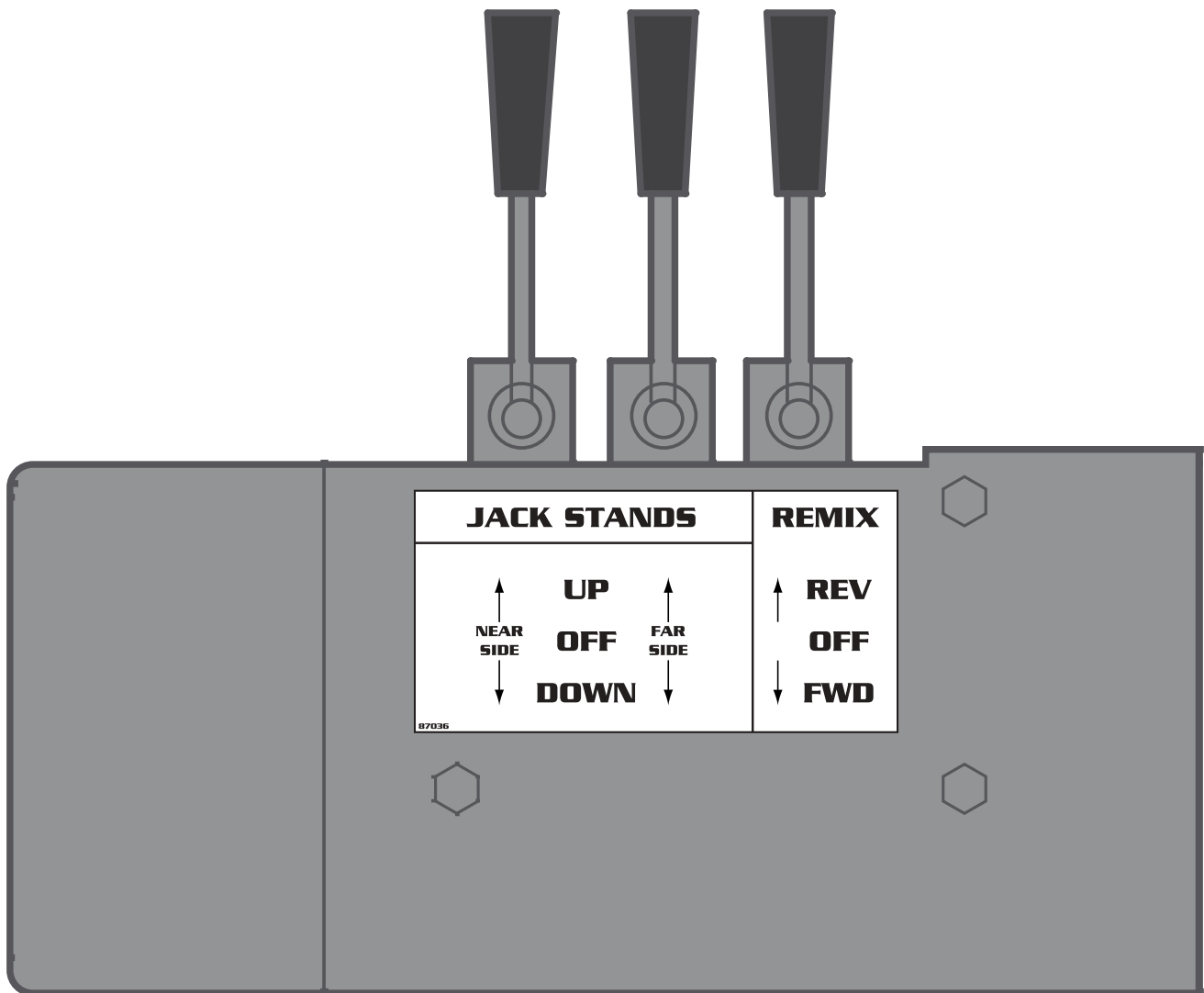
Gauge indicates stored hydraulic pressure within the swingtube in psi.

General Technical Description

Outrigger Controls

Hydraulic Jackstand Levers
Control the extending/retracting of the machine support stands.

Remixer Forward/Reverse Lever
Shifts the remixer motor between Forward, Reverse, or Neutral. This control lever is detented to remain in position selected by the operator. This lever is normally in the Forward position so that concrete will be drawn from the walls of the hopper and pushed into the material cylinders.



Operation

Principles of Operation

The Warrior is a hydraulically operated concrete pump that is designed to pump wet concrete through a system of pipes and hoses. Normal operation is controlled at the control panel.

A diesel engine drives the main hydraulic pump. The hydraulic pump powers the two hydraulic cylinders, which drive the two delivery cylinder pistons. A swingtube automatically shifts from one delivery cylinder to the other to provide a continuous flow of concrete through the system.

During the pumping cycle, the continuous flow of concrete is accomplished as one of the hydraulic cylinders which has the delivery cylinder open to the hopper retracts, it pulls the piston of the delivery cylinder. At this point, the concrete is drawn into the delivery cylinder from the hopper. When the fully-retracted position is reached, the proximity switch sends a signal to the swingtube shift valve. The swingtube then shifts to the loaded delivery cylinder. The hydraulic cylinder extends and the delivery cylinder piston pushes the concrete through the swingtube, out the discharge and into the delivery line. The cycle is repeated to provide an uninterrupted concrete flow.

The flat pack seen in the following illustration performs the following functions, (1) cools the delivery pistons and piston rods, and (2) rinses the inner wall of the delivery cylinders.

Flat Pack Assembly

The Flat Pack is made up of the hopper, swingtube, concrete cylinders, hydraulic cylinders, water box.

WARNING

The operator must carefully determine that the hopper is clear of personnel and/or equipment before engaging the Remixer. The operator must carefully determine that personnel and/or equipment are clear of the jack stand feet before extending the hydraulic jackstands.

Hydraulic Fluid Level and Temperature Gauge

Never operate the pump when oil level is below the Low Level mark. Inspection of oil level periodically during operation and at shutdown is considered good operator awareness. This will protect against accidental loss of oil. With the motor running, the proper level should be between the low and high mark on the gauge.

Normal range of oil temperature is 100°-160°F. Oil temperature of less than 50°F is in the cautionary range. The machine should not be operated at full output until the oil temperature is above 50°F, otherwise hydraulic pump damage may occur. Oil that is below 10°F should be preheated to 50°F ideally but at least to 20°F prior to starting the engine.

Diesel Fuel Safety

WARNING

Diesel is extremely flammable and is explosive under certain conditions. Work in a well-ventilated area with the engine stopped. Do not smoke or allow flames or sparks in your working area or where diesel is stored.

WARNING

If the engine must be running to perform maintenance, make sure your workspace is well ventilated. Never run the Engine in an enclosed space. The exhaust contains poisonous carbon monoxide gas that may cause loss of consciousness and lead to death.

WARNING

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.

Operation

Hydraulic System

Hydraulic Fluid Precautionary Measures

Avoid prolonged breathing of vapor, mist, or gas. Workers should wash exposed skin several times daily with soap and water.

Hydraulic Fluid First Aid

- Eye contact: Flush eyes with plenty of water for several minutes. Get medical attention if eye irritation persists.
- Skin contact: Wash skin with plenty of soap and water for several minutes. Get medical attention if skin irritation develops or persists.
- Ingestion: If more than several mouthfuls of hydraulic fluid are swallowed give two glasses (160 oz) of water. Get medical attention.
- Inhalation: If irritation, headaches, nausea, or drowsiness occurs, remove to fresh air. Get medical attention if breathing becomes difficult or respiratory irritation persists.

Note to Physician: High-pressure injection of material can cause severe injury. Failure to debride the wound of all residual material can result in disfigurement, loss of function, or may require amputation of the affected area.

Hydraulic fluid Fire

In case of fire use water spray, dry chemical, or carbon dioxide. Water may cause frothing. Use water spray to cool fire-exposed containers.

Operation

The Western Shotcrete Equipment Warrior Shotcrete Pump has two 6" x 42" (85401) chrome plated concrete pumping cylinders powered by the 4" x 39" hydraulic main drive cylinders.

The main pump is an axial piston pump (L), which generates the main oil flow. Flow from this pump is directed through a flow control valve (B) then into the Cycle block. The Cycle block (Anodized Gold) houses four cartridge logic valves (C) and one relief valve (D) and is located on top center of the hydraulic fluid tank (83650). The cartridge logic valves are required to duplicate the functions of a spool type four-way directional valve. By controlling the opening and closing of each valve, four different flow paths are obtained. The Logic valves are opened by venting the pilot oil from the main pump to the tank through the solenoid actuated pilot cycle valve (A).

The timing circuit (P) is the oil that is on the rod-end side of the main cylinders. The oil from the rod side on cylinder A when extending is forced through the crossover tube located on the bottom side of the cylinder next to the water-box and causes the cylinder B piston to retract. While the cylinder B piston is retracting, a constant flow of make-up oil is supplied by bypass oil from the cylinder A piston, thus overfilling the B cylinder. This overfilling ensures that the cylinder B ram will be fully retracted and ready to deliver a full stroke. As the retracting piston reaches the end of its stroke. It passes a crossover port. When this occurs, the overflow oil is exhausted through the crossover line and check-valve then into the end cap, through the Cycle block and into the tank. When the cylinder B ram starts to extend it retracts the cylinder A ram in the same manner.

Note: Should the rams become out of sync simply put the machine in pressure test mode. Through the water-box window, observe the retracting ram. When the ram has fully retracted, toggle the Pressure Test switch to the normal (Pumping) position.

The secondary pump is a tandem gear pump. The pump is mounted piggyback style on the main pump. The 1st stage pump (M) charges the accumulator. (Q) Flow from this pump is directed through the Control block to the accumulator. (Q) The Control block houses the unloading/relief valve (F) and the unloading/check valve (E). The solenoid operated accumulator dump valve (K) must be energized by the PLC in order for the accumulator to retain a charge. This is so that the accumulator will automatically discharge when the machine is shut down.

Note: The Western Shotcrete Equipment Warrior Shotcrete Pump's, frame No.109 and higher are equipped with this automatic accumulator discharging system that will discharge the accumulator if the ignition key-switch is in the off position, if the electrical system loses power, or if the hopper grate is opened-NOT if the engine stalls. (i.e. Engine runs out of fuel, is manually shut off, etc.) The operator should not rely solely on this system: he or she must use extreme caution when working around the hopper.

The accumulator (Q) charge is directed through the pilot operated directional valve (H) then into the swingtube-actuating cylinder. (R) The pilot operated directional Valve is controlled by pilot oil from the solenoid operated pilot control valve (G), The solenoid operated pilot control valve is controlled by the PLC.

The 2nd stage of the tandem gear pump (N) powers the Remixer motor (S) and/or the jack stands. (T) The oil from this pump (N) is directed through the hand operated triple spool valve with a built-in relief valve (U) then to the Remixer motor (S) and/or the jack stands. (T) The oil is then routed to the hydraulic fluid storage tank through the oil cooler and the 10-micron filter.

The system has two electrically powered proximity sensors* (V) that send a signal to the PLC when the cylinder piston has reached the end of its stroke. The PLC also receives signals from the operator control panel. The PLC then automatically controls the switching of the solenoid operated pilot cycle valve (A) and the solenoid operated pilot control valve (G) to pump a smooth flow of concrete in forward or reverse depending on the operators input.

Valves

Setting the main relief valve 83301 (Sun RPGC-FCN):

- Loosen locking nut with a 9/16" wrench.
- Turn adjuster all the way out.
- Start engine, place in pressure test mode, turn pump on and observe main hydraulic pressure gauge.
- Turn adjuster in until the pressure gauge stops climbing. (It should stop climbing when it reaches the pump setting at 3800 psi.)
- Turn adjuster In an additional 1/2 turn and tighten locking nut.

Setting the Unloader/Check valve 83410 (Sun QCDB-LAN) and the Unloader/Relief valve. 83411 (Sun RVCA-LAN):

- Loosen locking nuts with a 9/16" wrench.
- Screw top valve (Unloader/Check-83410) adjuster all the way in using a 3/16" hex key.
- Screw the bottom valve (Unloader/Relief-83411) adjuster all the way out.
- Start engine and observe accumulator pressure gauge.
- Screw the bottom valve (Unloader/Relief)

adjuster in until the accumulator gauge reads 2200~2500 psi.

- Screw the top valve (Unloader/Check) adjuster out until the pump unloads then turn out an additional 1/4 turn. You can tell when the pump unloads by three ways:
 - a) Listening for a slight clicking noise in the Unloader/Relief valve.
 - b) Hearing the engine work less.
 - c) Seeing the accumulator charge hose relax.
- If you have difficulty determining when the pump unloads, place a 4000# gauge in-line at the pump output. When the pump unloads the gauge will drop from 2500 psi to near 0 psi.
- Tighten locking nuts.
- Test operation by shifting S-Tube with the Forward/Reverse switch and observing Accumulator gauge. The pump should promptly charge the Accumulator to 2300~2500 psi and then unload.

Accumulator

WARNING

Use dry nitrogen gas only to pressurize the accumulator bladder. NEVER use compressed air. The use of compressed air or any other unstable gas can cause a fire or explosion resulting in serious injury or death.

An accumulator stores hydraulic pressure. This hydraulic pressure is potential energy since it can change to kinetic energy.

The Warrior Shotcrete Pump is equipped with a 1 gallon bladder type accumulator (83500) rated @ 5000 psi maximum.

A bladder type accumulator consists of a synthetic rubber bladder inside a metal shell: the bladder contains the nitrogen gas. As hydraulic fluid enters the shell, gas in the bladder is compressed. Gas pressure decreases as fluid flows from the shell. When all fluid has been discharged, gas pressure attempts to push the bladder through the outlet. But, as the bladder contacts the poppet valve at the outlet, flow from the shell is automatically shut off.

Since the charged accumulator is a source of hydraulic potential energy, stored energy of an accumulator can be used to develop system flow when system demand is greater than

Operation

pump delivery. This is the case for the S-Tube valve actuator circuit. Since the actuator cycles infrequently, a small displacement pump (33701) is used to fill the accumulator over a period of time. When the moment arrives for the S-Tube valve to operate, a directional valve (83402) is shifted downstream and the accumulator delivers the required pressurized flow to the 2.5" x 5" actuator (83708). Using an accumulator in combination with a small pump in this manner conserves peak horsepower. For instead of using a large pump/motor to generate a large horsepower all at once. The work can be evenly spread over a given time period.

Operating Procedures

Positioning of the shotcrete pump will, of course, differ from job to job. The operator must determine how close the machine can be placed to the work location while still providing good access to ready-mix trucks. After a relatively flat location is found, the outrigger legs must be extended to isolate the machine's road suspension from the weight of the loaded hopper.



WARNING

The operator must carefully determine that personnel and/or equipment are clear of the jack stand feet before extending the hydraulic jack stands.

Start up

An important part of pumping is the proper lubrication of the pipeline and/or hose system at the start of the pour. More downtime has been caused by inattention to this detail than any other reason.

First, the hopper must be wetted. Then a rich, sloppy grout must be introduced to the hopper and slowly pumped into the pipeline system. The grout should be a 1:1 sand/cement mix about the consistency of thick soup. It coats the pipeline system ahead of the concrete mix and prevents packing or bleeding of the material to be pumped when it is introduced to the line.

The amount of grout depends on the length of line and its diameter. The minimum is 5 to 6 cubic feet for short runs of small diameter line. It can be a cubic yard or more for several hundred feet of 5" line. Experience will indicate the proper amount,

but it is always safer to have too much rather than too little.

A small amount of grout should be kept in the hopper and blended with the mix to provide a transition into the pumping operation.

Before turning the pump on, push the Flow-Control lever down to a minimum level. This will set the hydraulic pump output to minimum. Use the throttle control to set the engine speed to about 1800~2200 rpm. Make sure that the Forward/Reverse switch is set to "FWD" and the Pressure Test switch is set to "Pumping". Turn the pump on by setting the pump switch to the "ON" position. Slowly push the Flow-Control lever up to increase the pumping rate. As the mix is starting to flow through the line careful attention must be paid to pump pressure to see if a plug or blockage is forming. Only after this should the pump speed be increased to the planned operation rate.

Note: The Warrior shotcrete machine is designed to develop a theoretical pressure of 1870-psi at the discharge outlet of the machine. Although the average pumping pressure will normally be somewhat less than the maximum, remember that the pressure on the concrete is a 2.25 to 1 ratio to the hydraulic pressure gauge on the control panel. For example, when the hydraulic pressure gage reads 2000-psi. ($2000 / 2.25 = 889$) The actual concrete pressure at the 5" outlet flange is 889 psi.

The transport system must be capable of withstanding the maximum pumping pressure of 1870 psi. (Check with the manufacturer on products not supplied by Western Shotcrete Equipment.)

Pressures are highest at the pump's 5" outlet flange and reduce uniformly to zero at the discharge end of the transport line under normal pumping conditions.



WARNING

If a dry-pack or blockage does occur in the delivery system, pressures up to 1870-psi will be developed and contained within the entire delivery system from the pump to the point of pack or blockage. USE extreme cautionary procedures under these conditions.

 **WARNING**

It is the responsibility of each pump owner/operator to check with the manufacturer of the delivery system pressure capability that is not supplied by Western Shotcrete Equipment. Failure to observe these guidelines can result in serious personal injury and/or damage to equipment.

Western Shotcrete Equipment recommends only the usage of shouldered or heavy-duty pipeline system, hose, and clamping devices that are specifically designed for high-pressure concrete pumping applications.

Clearing a Dry Pack

When a block or dry-pack occurs in the delivery system, the pumping pressure gauge will reach the maximum 4200-psi. Immediately switch the pump off. Switch the swingtube from forward to reverse, pump at least two or more strokes in reverse to relieve the pressure from the dry-pack back to the concrete pump. Shut the pump off.

 **WARNING**

It is possible there will still be pressure contained in the delivery system. Extreme caution must be used when opening the clamping devices on any part of the delivery system.

Warn all persons in the immediate area of this danger. Clear the area of persons prior to opening the clamp and protect eyes and body while opening clamp.

After the dry-pack has been cleared and the reducer, pipeline, and/or hose system restored, return the swingtube to forward. Start the pump up at a low volume rate until a steady flow of material is being pumped.

 **WARNING**

Never attempt to clear a pack in the transport system with pump pressure.

Shut Down & Clean up

It is very important that the operator knows and follows the correct procedure for cleaning the

machine. Because there are moving parts in the hopper, the operator must use caution when cleaning the machine. The operator **MUST USE EXTREME CAUTION** when using his or her hands to clean in the hopper area. When it is necessary to clean out the hopper or swingtube, the operator must shut down the engine and carefully determine that the accumulator has discharged. The operator must also warn anyone that may assist him in cleaning the machine.

Clean the machine in the following manner:

- 1) Pump the remaining material out of the hopper until it is half empty, and then turn the pump off.
- 2) Add enough water to the material in the hopper to make a thin slurry.
- 3) Switch the swingtube to reverse and turn the pump on. The reverse pumping will cause the water to mix with the material to form a thin slurry.
- 4) Pump the slurry through the line followed with water.
- 5) Remove and thoroughly clean the hopper clean-out door.
- 6) With the pump turned on and in reverse pumping, turn a water hose into the discharge outlet. This will draw water into the concrete cylinders and push rock and sand out through the hopper door.
- 7) Before cleaning the inside of the hopper the operator must shut down the engine and carefully make sure that the accumulator pressure is fully discharged. Check that the accumulator is discharged in the following manner:
 - a) With the engine shut down, turn the ignition key-switch to the on position.
 - b) Turn the pump switch to the on position.
 - c) Repeatedly switch the swingtube from reverse to forward until the swingtube no longer shifts.
- 8) Clean the hopper out using a stiff brush and water.

Operation

WARNING

THE OPERATOR SHOULD NEVER PUT HIS OR HER HANDS IN THE CYLINDERS!

- 9) Start the engine and turn the pump on. Cycle a few times to make sure there is no material left in the cylinders.
- 10) With a bent rod or broom handle remove any build up of material.
- 11) Clean the clean-out door opening. The clean door and opening must have a good seal. (Not leak water) If the seal is not good the pump will suck air through it instead of concrete- resulting in partially filled material cylinders.
- 12) Lubricate the pump module at these five locations:
 - a) Flange Bearing.
 - b) S-Tube shift Cylinder Base.
 - c) S-Tube shift Cylinder Yoke.
 - d) Remixer Housing.
 - e) Outlet Flange.

It is important to lubricate the pump module after clean up. This pushes out water, cement, and other contaminants before they can harden. Failure to lubricate the pump module properly even once will cause premature wear and or damage to the machine resulting in expensive downtime.

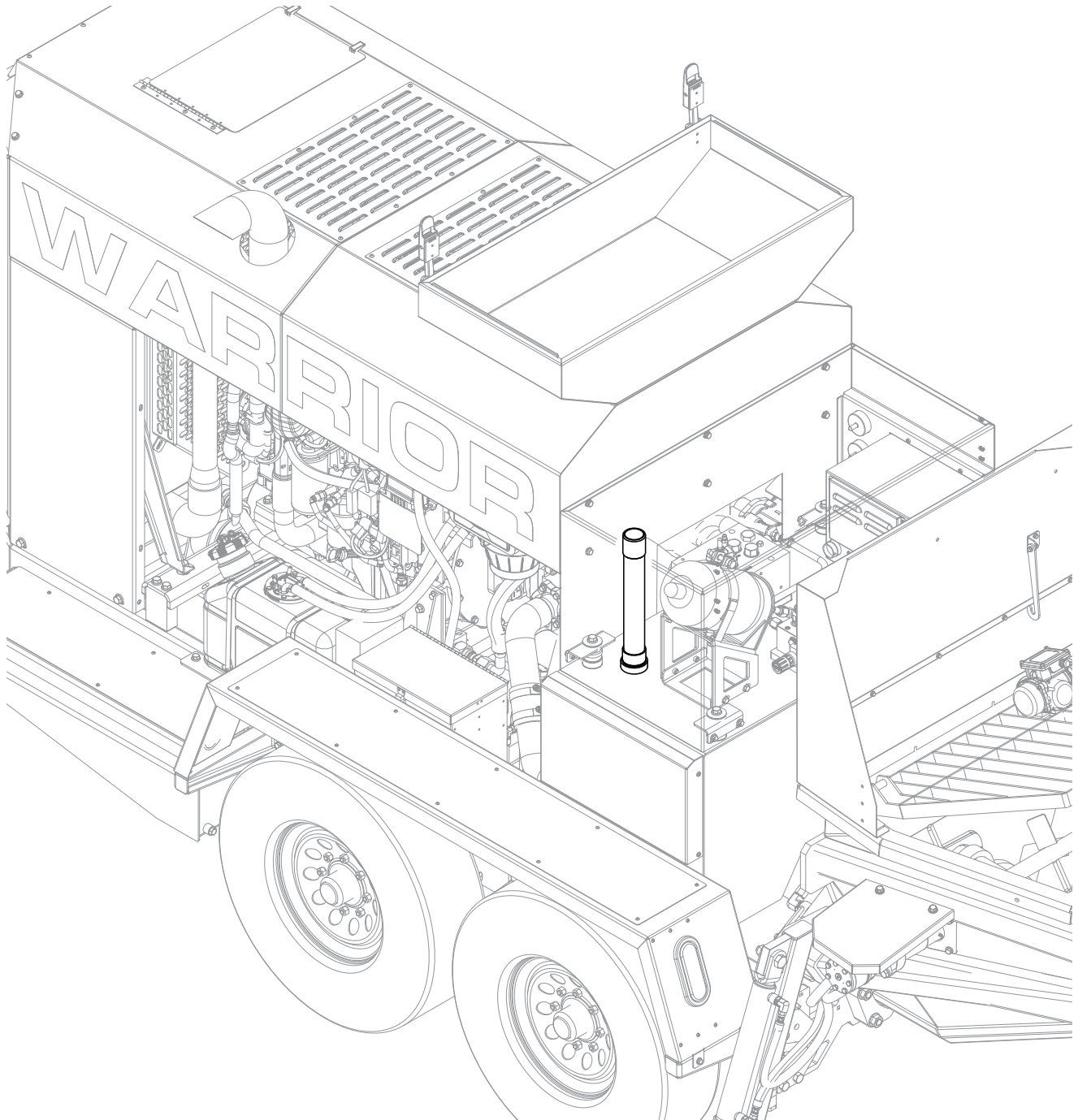
Maintenance

Hydraulic Oil Tank

Hydraulic Oil: AW-68 Oil

X500, 500, 600: 60 gallons

Service Interval: Every 1000 hours or 1 year.



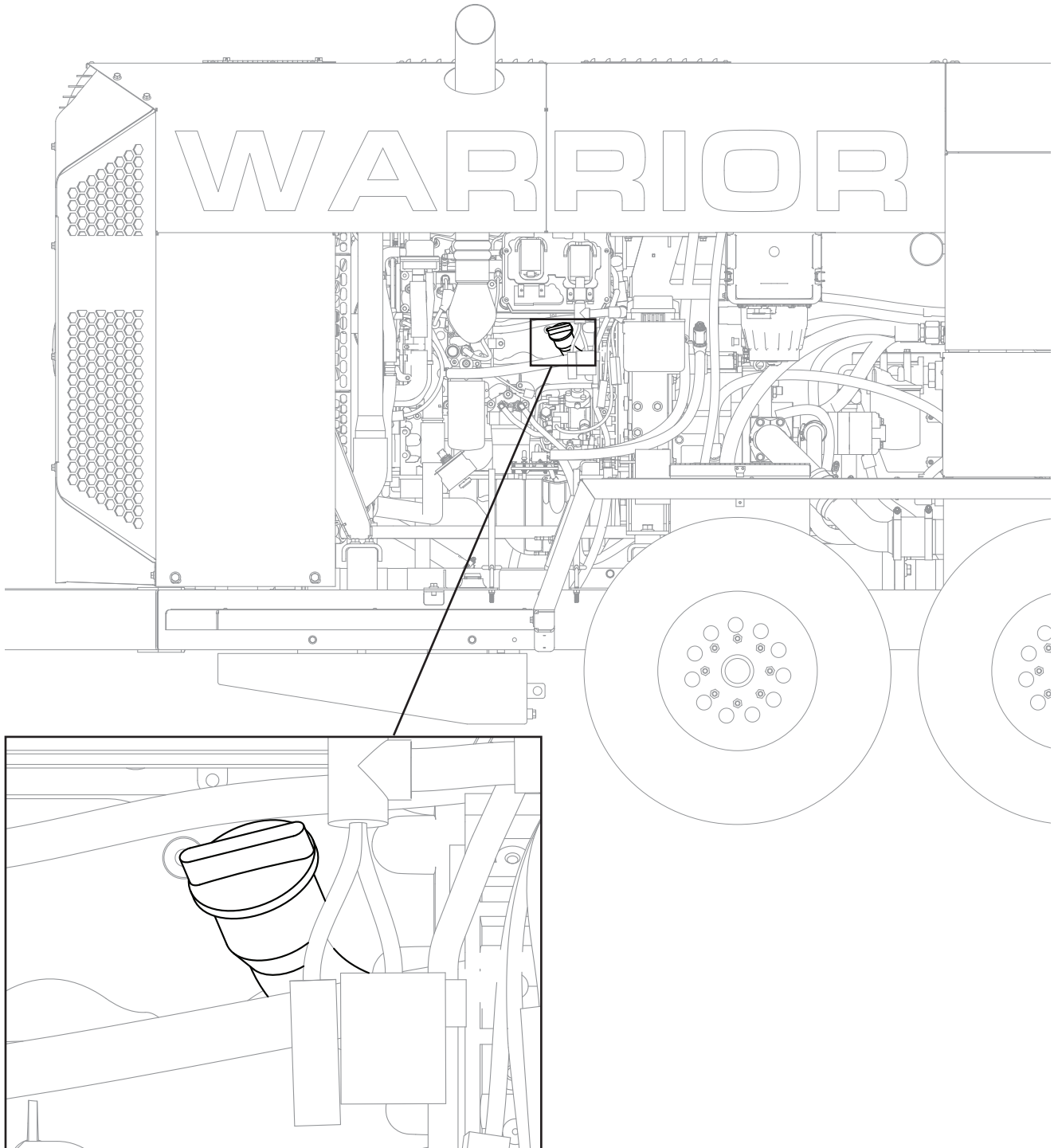
Maintenance

Oil/Filter Change Intervals

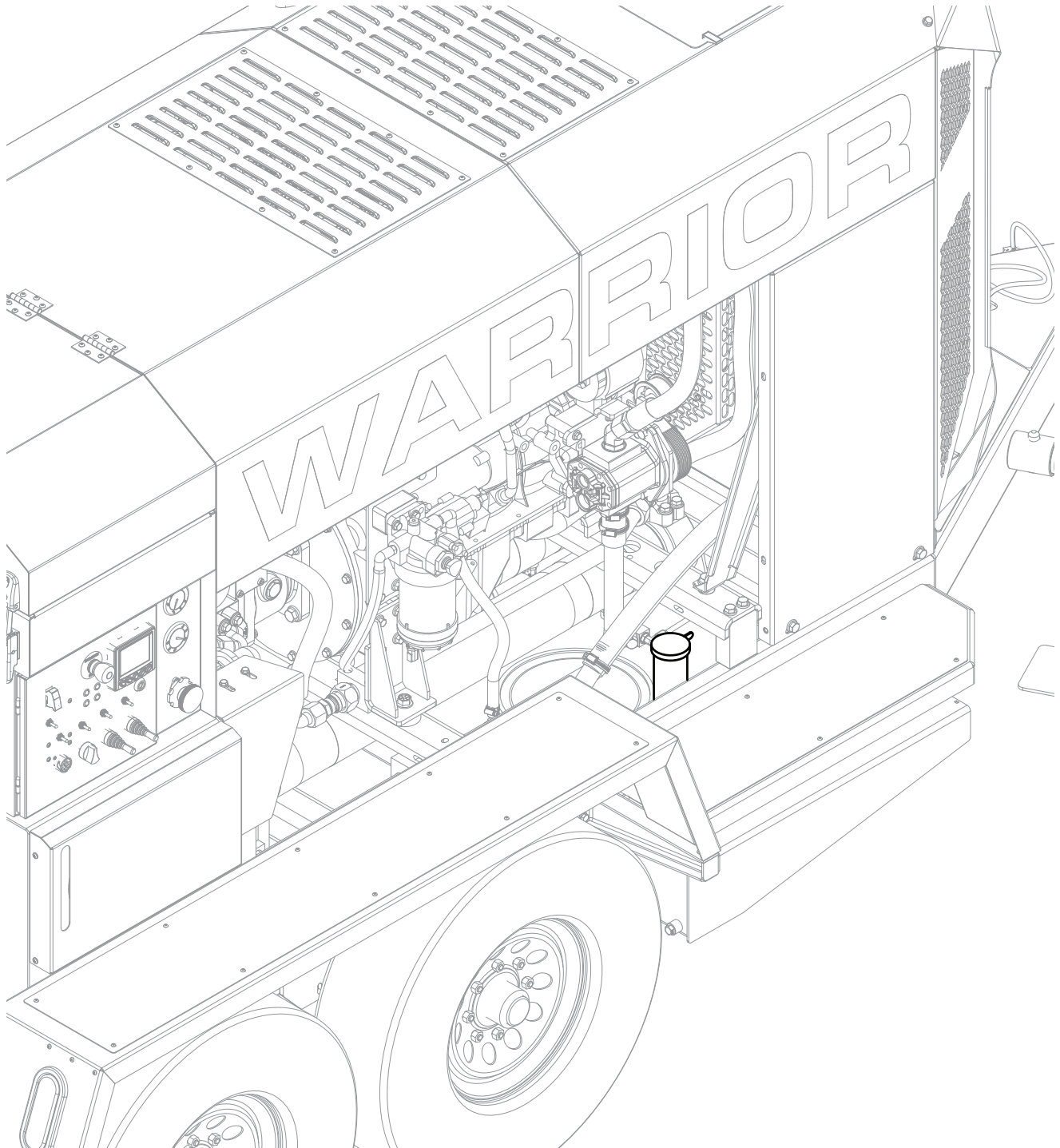
Engine Oil: 15W-40

API Service: CJ-4, CI-Plus, CI-4, CH-4, SN A

Service Interval: Every 500 hours or 5 months.

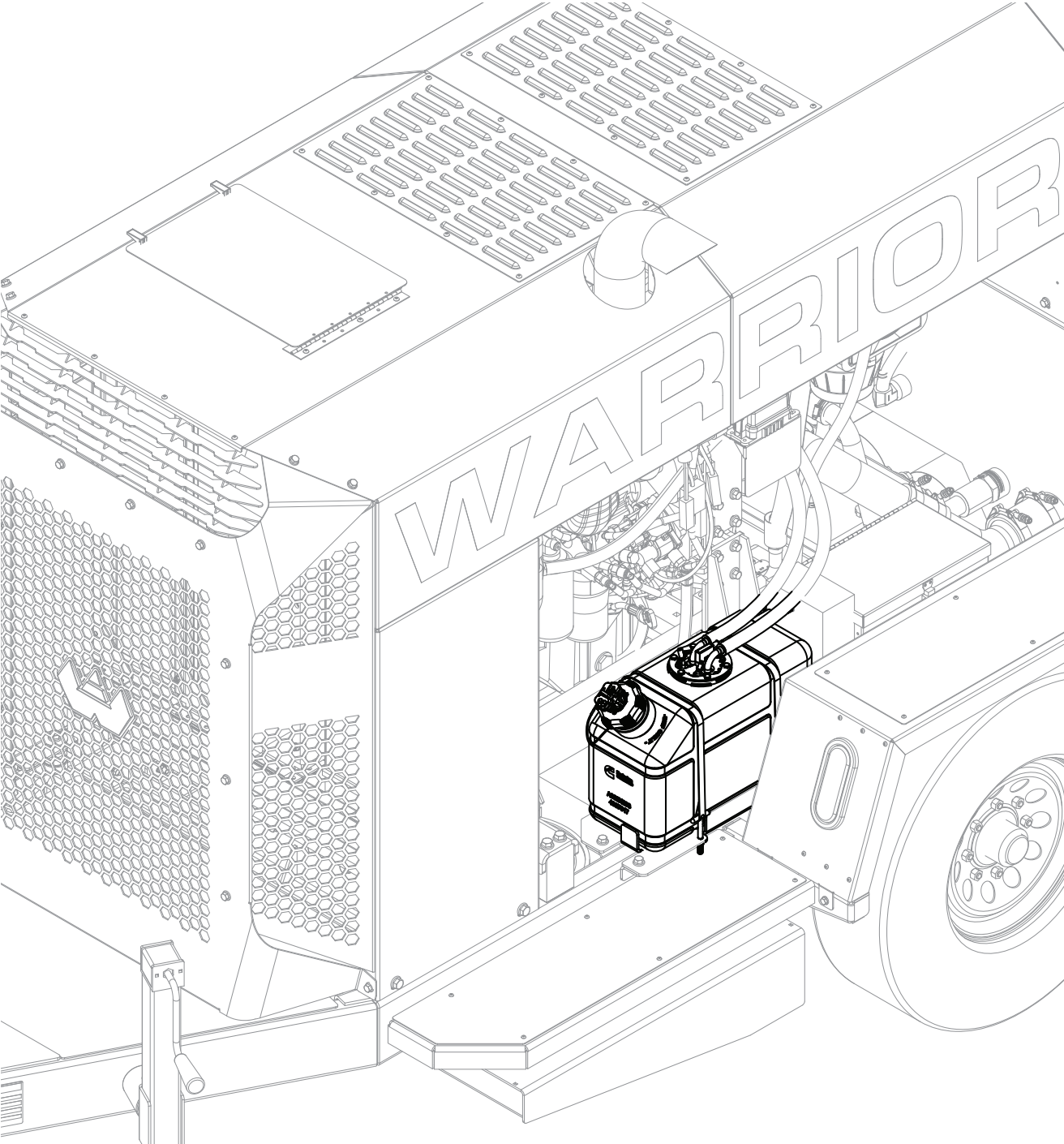


Diesel Tank and Prime

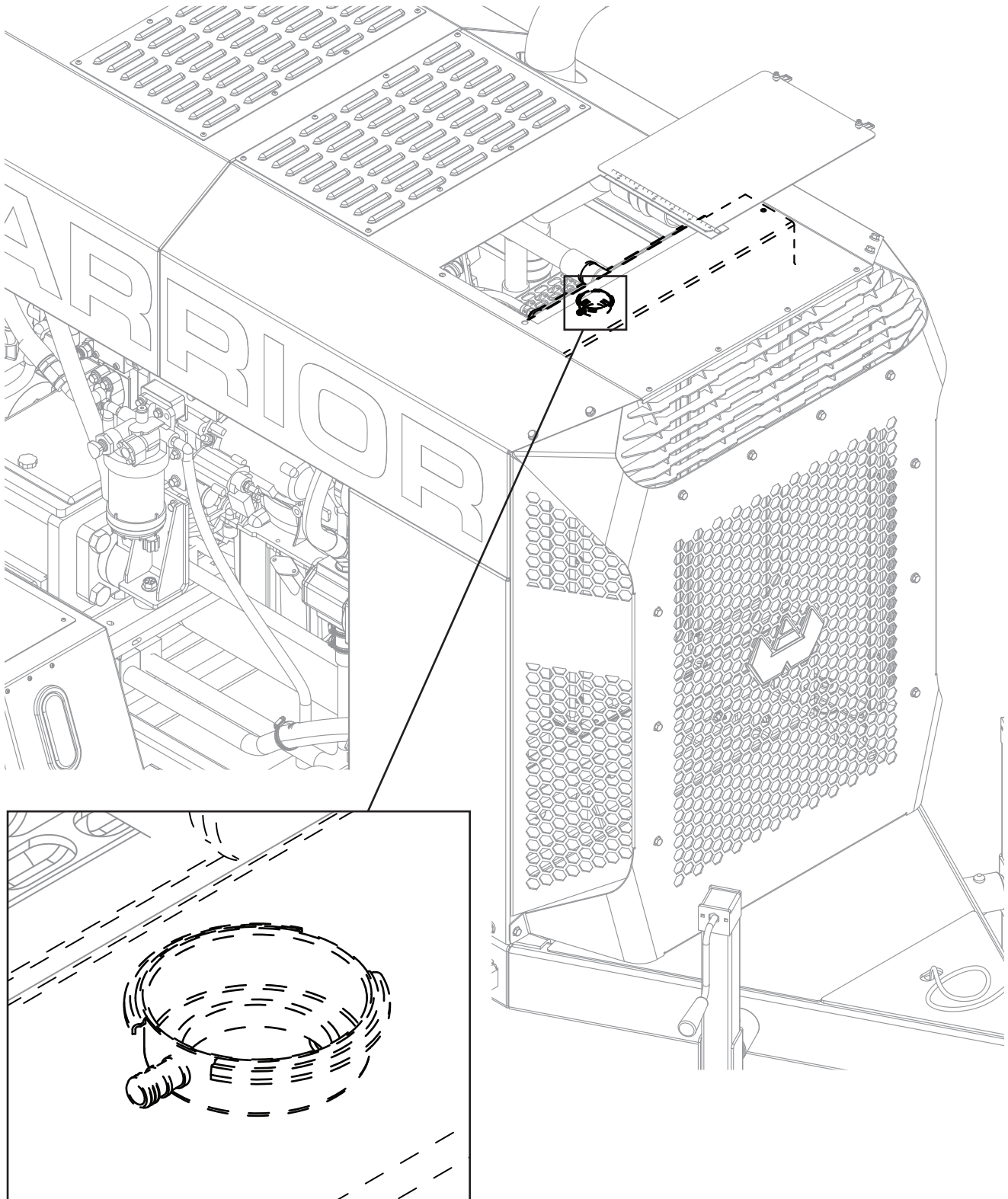


Maintenance

DEF Tank



Radiator Coolant



Maintenance

Service Information

- Recommended engine oil: Shell Rotella T 15W-40 or comparable. Capacity: 4 gallons.
- Recommended hydraulic fluid: ISO-68, AW-68 (20W), Qualified against Denison HF-0. Meeting requirements of Vickers M-2950-S and 1-286-S specifications.

Maintenance Schedule

- Grease machine twice daily at all grease fittings especially after clean up.
- Replace engine oil, oil filter, and fuel filter every 500 hrs.
- Drain water separator monthly and replace element every 1000 hours or every 1 year.
- Inspect and/or replace engine air filter every 250 hrs.
- Replace Cups (85704) and Cup adapter O-Rings (85707) when water-box is full of slurry or every 250 hrs. Fill water-box halfway with used or new hydraulic fluid.
- Replace Wear-plate (85131) & Wear-ring (85334) every 500 hrs or when build-up occurs.
- Change hydraulic fluid and Filter and inspect tank plumbing for loose fittings and/or breaks at the 1st 300 hrs, then every 1 year or every 1000 hrs.
- Inspect frame for cracks every 500 hrs.
- Inspect surge brake assembly for proper operation every 500 hrs.
- Inspect entire machine every 250 hours for loose parts, fittings, fasteners, etc.

	X500 CUMMINS 3.8 STAGE V	CUMMINS 6.7 TIER 3 MODELS	CUMMINS 6.7 TIER 4-I MODELS	CUMMINS 6.7 TIER 4-F MODELS	X600 CUMMINS 6.7 STAGE V
OIL FILTER	52131	82085			
FUEL FILTER	52132	82086	82086-ST5		
PRIMARY AIR FILTER	52133	82020.02			
SECONDARY AIR FILTER	52134	82020.03			
FUEL/WATER SEPARATOR	82020.48	82087	82020.40	82020.48	82020.49

Troubleshooting

Pump cylinders are making very short strokes and S-Tube is switching rapidly back and forth.

Probable cause: **Out of sync**

The pumping cylinders can become out of sync when idling a long period of time between trucks. If the cylinders become out of sync simply put the machine in pressure test mode by setting the Pressure test switch to "Press Test" and turning on the pump. Through the water-box window, observe the retracting ram. When the ram has fully retracted turn the pump off and set the pressure test switch to the normal (Pumping) position: this will place the rams in sync.

Overheating Hydraulic Fluid

Probable cause: **Heat generation.**

Heat is generated in a hydraulic system whenever oil dumps from a higher to a lower pressure without producing a mechanical work output. Bad o-ring seals, worn or improperly adjusted valves, and/or worn-out hydraulic pumps can cause this. Examine the o-ring seals on the four logic valves (83300) in the cycle block (83318). Examine the o-ring seals and the setting of the main relief valve. Examine the o-ring seals and the setting of the unloading relief (83411) and check valves. (83410) Examine the o-ring seals and the proper function of the accumulator dump valve. (83406) Measure the temperature of the tandem gear pump (83701) while the machine is in operation. It should only be about 10° higher than the tank temperature. If the pump temperature is excessive, or it struggles to charge the accumulator it should be replaced.

Cooling fan failure.

If both of the cooling fans (83719) are not operating the hydraulic system will overheat rapidly. Does the override switch operate the fans but not the temperature switch? Use a test light and check the temperature switch on top of the hydraulic oil cooler for proper operation. The switch should turn on at 120°.

Do the fans not work at all? Examine the fan relay for proper operation.

Remixer motor.

Examine the remixer motor (83780) operation. Is it turning unusually slow? A worn remixer motor will generate a lot of heat. Also check the built-in relief valve in the hand operated triple spool valve for proper operation.

Engine runs, but hydraulic system will not pump.

Probable cause: Hopper Grate Open
Check to ensure grate is fully closed.

Probably Cause: Faulty Safety Switch
Switch safety override switch at panel to verify pump will work if switch is disengaged.

Probably Cause: Blown fuse.

Open control panel and locate fuse box at bottom of panel and check fuse labeled "Safety Switch". Replace fuse if blown.



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