

Dozer Maintenance Safety

Safety Instructions

WARNING

AVOID DEATH OR SERIOUS INJURY

Instructions are necessary before operating or servicing machine. Read and understand the Operation & Maintenance Manual and signs (decals) on machine. Follow warnings and instructions in the manuals when making repairs, adjustments or servicing. Check for correct function after adjustments repairs or service. Untrained operators and failure to follow instructions can cause death or serious injury.

General

Safe Operation is Operator's Responsibility

Only trained and authorized personnel should operate and maintain the machine.

Follow all safety rules, regulations and instructions when operating or performing maintenance on machine.

- Do not operate machine if you are under the influence of drugs or alcohol. An operator who is taking prescription drugs must get medical advice to determine if he or she can safely operate a machine.
- When working with other personnel on a work site, be sure that all personnel know nature of work and understand all hand signals that are to be used.
- Be sure that all guards and shields are installed in their proper location. Have guards and shields repaired or replaced immediately if damaged.
- Be sure that you understand the use and maintenance of all safety features such as safety lever and seat belt. Use them properly.
- Never remove, modify or disable any safety features. Always keep them in good operating condition.
- Always check for and know the location of underground and overhead utility lines before excavating.
- Failure to use and maintain safety features according to instructions in this manual, Safety Manual and Shop Manual can result in death or serious injury.

Know Your Machine

Know how to operate your machine. Know the purpose of all controls, gauges, signals, indicators and monitor displays. Know the rated load capacity, speed range, braking and steering characteristics, turning radius and operating clearances. Keep in mind that rain, snow, ice, loose gravel, soft ground, slopes etc., can change operating capabilities of your machine.

Proper Work Tools and Attachments

Only use work tools and attachments that are recommended by dealer for use on machines. When installing and using optional attachments, read instruction manual for attachment, and general information related to attachments in this manual. Because HD HYUNDAI CONSTRUCTION EQUIPMENT cannot anticipate, identify or test all attachments that owners may want to install

Hot Coolant and Oils - Burn Prevention

Figure 6



FG019095

Do not touch any part of an operating engine. Immediately after operations are stopped, coolant, engine oil, and hydraulic oil are at their highest temperatures. The radiator and hydraulic tank are still under pressure. Always wait for temperature to cool down. Attempting to remove caps, drain oil or coolant, or replacing filters may lead to serious burns, if done when hot. Relieve all pressure in air system, hydraulic oil system, lubrication system, fuel system, and cooling system, before any lines, fittings or related items are disconnected.

To prevent hot oil or coolant from spraying out, stop engine, wait for oil and coolant to cool. Using gloves, slowly loosen cap to relieve pressure.

Figure 7



FG019096

Fire and Explosion Prevention

Figure 8



H D O 1 C

All fuels, most lubricants and some coolant mixtures are flammable and can cause a fire resulting in death or serious injury, and property damage. Flammable fluids that are leaking or spilled onto hot surfaces or onto electrical components can cause fire.

Inspect for and remove all flammable materials such as spilled fuel and oil, and debris from machine. Do not allow any flammable materials to accumulate on machine.

Always observe the following:

1. Keep batteries fully charged to prevent freezing. If distilled water is added to batteries, run engine at least one hour to mix electrolyte solution. When temperature drops below -10°C, efficacy of the battery is reduced accordingly. Insulation of the battery prevents reduction of efficacy, and supports improvement of starting power of the starter.

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Explosion of the battery can cause death or serious injury. Never attempt to directly heat the battery with open fire.

2. Keep engine in good mechanical condition for easy starting and good performance during adverse weather.
3. Use engine oil with proper specifications for expected temperatures. Refer to Operation and Shop Manual for details.
4. Always keep the fuel tank fully filled after completion of the operation. Always drain water from the fuel tank before and after the operation. In addition, check the water separator, and drain it if required. The fuel filter, if frozen, may interrupt the flow of fuel. Periodically remove water from the fuel tank, drain water from the filter, and replace the filter upon regular basis. To prevent fuel from being clogged because of formation of wax in fuel, make sure that wax formation point of fuel is lower than atmospheric temperature.

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5. Lubricate entire machine according to Operation and Maintenance Manual or lubrication chart on machine.
6. Start engine and allow it to reach normal operating temperature before operating.
 - If mud and ice collects and freezes on any of moving parts while machine is idle, apply heat to thaw frozen material before attempting to operate machine.
 - Operate hydraulic units with care until they have reached a temperature which enable them to operate normally.
 - Check all machine controls and functions to be sure they are operating correctly.
7. An extra outer air filter must be kept in operator's cabin to replace element that could become iced and cause restricted airflow to engine.
8. Clean off all mud, snow and ice to prevent freezing. Cover machine with a tarp if possible, keep ends of tarp from freezing to ground.

Operation in Extreme Heat

Continuous operation of machine in high temperatures can cause machine to overheat. Monitor engine and hydraulic system temperatures and stop machine to let it cool, when necessary.

1. Make frequent inspections and services of fan and radiator. Check coolant level in radiator. Check grilles and radiator fins for accumulation of dirt, debris and insects which could block cooling passages.

Item			Unit	Performance Standard	Value	Clearance
		Auto Idle	rpm	Dial Min.	800	±20
		High Idle	rpm	Auto Idle activated	2,180	±50
	Load	Front Relief	rpm	-	2,180	±50
	Engine Stops	Front Relief + Blade Up	-	Blade Angle Relief, Blade Up Sudden Command	Not Stop Engine	-100 Above
Pressure Set	Main Pump	Pump Relief Pressure	bar	-	-	±10
		LS Relief Pressure	bar	Front Relief Status	236	±10
	Pilot Supply Valve	Parking Brake Release	bar	-	32	-0 +2
Cylinder Speed	Lift Cylinder	Up	sec	*Standard, Sudden Command. * Max. Stroke	2.7	±0.2
		Down	sec		2.3	±0.2
	Tilt Cylinder	Right	sec	* Sudden Command, Max. Blade Lift Up	1.1	±0.1
		Left	sec		0.8	±0.1
	Angle Cylinder	Right	sec		3.0	±0.2
		Left	sec		3.0	±0.2
	Ripper Cylinder	Up	sec	*Standard, Sudden Command.	2.5	±0.2
		Down	sec		2.8	±0.2
Travel Speed	Forward	0.5	km/hr	Power Mode, Dial Max, Operating Joystick Forward	1.1	±0.5
		2nd			3.8	±0.5
		3rd			5.0	±0.5
		4th			6.4	±0.5
		5th			8.5	±0.5
	Backward	0.5	km/hr	Power Mode, Dial Max, Operating Joystick Backward	1.1	±0.5
		3rd			5.0	±0.5
		5th			8.5	±0.5
	ECO Mode	Engine Speed	rpm		1,950	±50
		0.5	km/hr	Power Mode, Dial Max.	1.0	±0.5
		5th			7.0	±0.5
	Inching Pedal	-	-	Inching Pedal Max.	Do Not Operate Machine	
Cooling Fan	Max. Performance	Min. Current	mA	Dial Min., Forced Drive	200	-
		Max. Fan Speed	rpm		2,400	±50

Engine Specifications

Safety Instructions

WARNING

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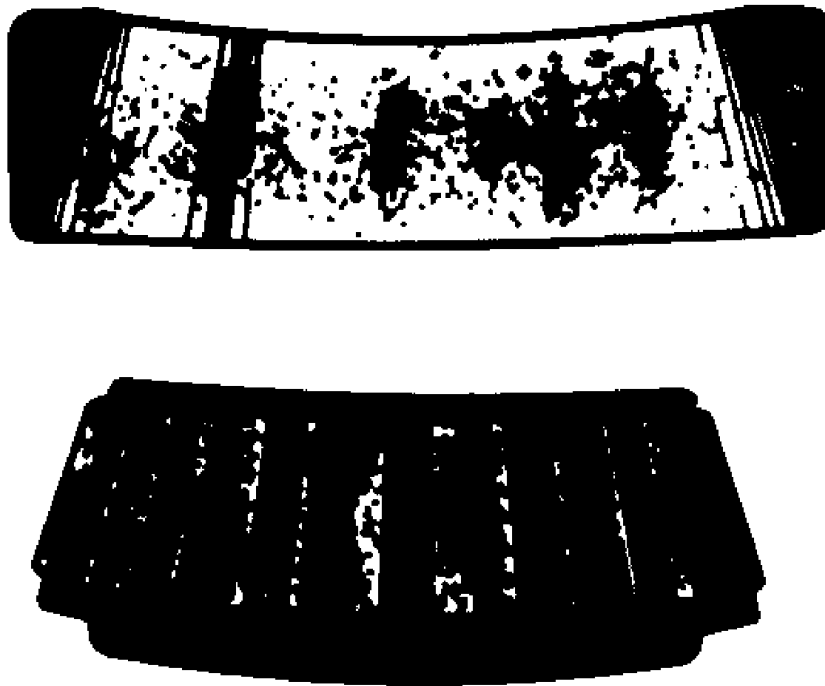
Instructions are necessary before operating or servicing machine. Read and understand the Operation & Maintenance Manual and signs (decals) on machine. Follow warnings and instructions in the manuals when making repairs, adjustments or servicing. Check for correct function after adjustments repairs or service. Untrained operators and failure to follow instructions can cause death or serious injury.

Engine Specification

Items		Specification
Engine	Type	4-Cycle water-cooled, Variable Geometry Turbocharged (2 stage), Common Rail Direct Injection
	Emission	Stage V
	Model	1204J
	Gross Power	117 kW (156.9 HP) @ 2,200 rpm (SAE J1995)
Number of Cylinders		4
After-treatment		DOC + SCR + DPF
Displacement		4,400 cc
Compression Ratio		16.5 : 1
Low Idle Speed		800 ± 10 rpm
High Idle Speed		2,200 ± 25 rpm
Weight, without Coolant and Oil		534 kg (1,177 lb)
Alternator		24 V, 100 A
Battery		12 V * 2, 100 AH
Start Motor		24 V, 7.8 kW

Heat Discoloration

Figure 49



HASA600S

Heat discoloration can range from faint yellow to dark blue resulting from overload or incorrect lubrication.

Excessive heat can cause softening of races or rollers.

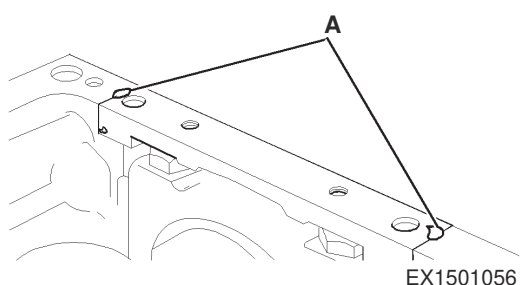
To check for loss of temper on races or rollers, a simple file test may be made. A file drawn over a tempered part will grab and cut metal, whereas a file drawn over a hard part will glide readily with no metal cutting.

Replace bearing if overheating damage is indicated. Check seals and other related parts for damage.

Front Sealant

NOTE: Apply a sealant bead of 3.5 mm (0.1378 inch) that is shown in **Figure 16**.

Figure 69

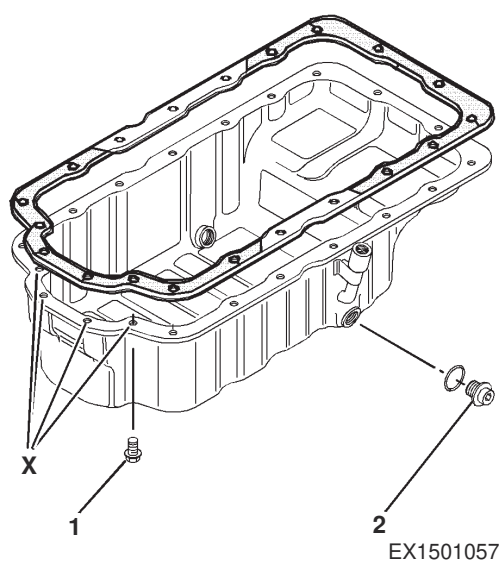


Rear Sealant

NOTE: Install the rear oil seal before sealant is applied to the bridge.

Apply a suitable tool to the bridge. The sealant must not protrude more than 5 mm (0.1969 inch) above the bridge.

1. Figure 70



Tighten the four front bolts in position (X) to the following torque (1): 22 N.m (2.2 kg.m, 16.2 ft lb)

- Tighten the remaining bolts to the following torque: 22 N.m (2.2 kg.m, 16.2 ft lb)

2. Drain plug (2)

- Tighten the drain plug for the engine oil pan to the following torque: 34 N.m (3.5 kg.m, 25 ft lb)

The Rated Fuel Limit enables the engine power and torque outputs to conform to the power and torque curves of a specific engine model.

These limits are in the programmable software and these limits cannot be changed.

The ECM controls the following characteristics:

- Boost pressure
- Operation of the NOx reduction system

Diagnostic Codes

When the ECM detects an electronic system problem, the ECM generates a diagnostic code. Also, the ECM logs the diagnostic code in order to indicate the time of the problems occurrence. The ECM also logs the number of occurrences of the problem.

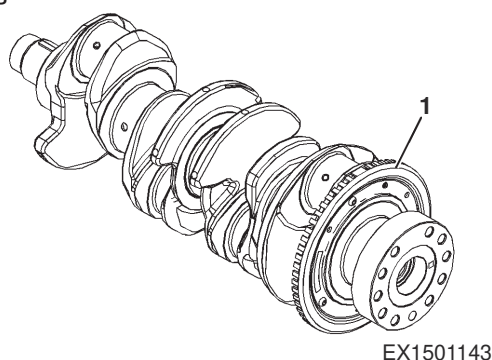
Diagnostic codes are provided in order to indicate that the ECM has detected an electrical problem or an electronic problem with the engine control system.

In some cases, the engine performance can be affected when the condition that is causing the code exists.

If the operator indicates that a performance problem occurs, the diagnostic code may indicate the cause of the problem. Use a laptop computer to access the diagnostic codes. The problem should then be corrected.

Event Codes

Figure 92



detected an abnormal engine operating condition.

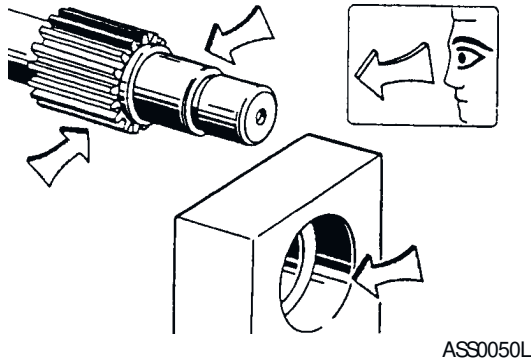
The ECM will log the occurrence of the event code.

This does not indicate an electrical malfunction or an electronic malfunction. If the temperature of the coolant in the engine is higher than the permitted limit, then the ECM will detect the condition. The ECM will then log an event code for the condition.

Speed/Timing Sensors

The primary speed/timing sensor is located on the left-hand side of the cylinder block close to the flywheel housing. The primary speed/timing sensor generates a signal by detecting the movement of the teeth that are located on the crankshaft timing ring (1). The signal that is generated by the speed/timing sensor is transmitted to the ECM. The ECM uses the signal from the speed/timing sensor to calculate the position of the crankshaft. The signal is also used to determine the engine speed.

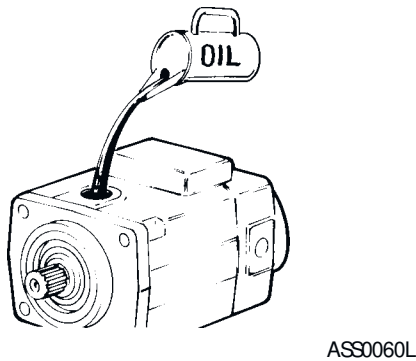
3. Figure 117



Check all sealing and sliding surfaces for wear.

NOTE: Do not rework sliding surfaces using crocus cloth or other similar materials. It can damage the surface.

4. Figure 118



Fill hydraulic unit with clean hydraulic oil before putting into operation.

Fan Pump

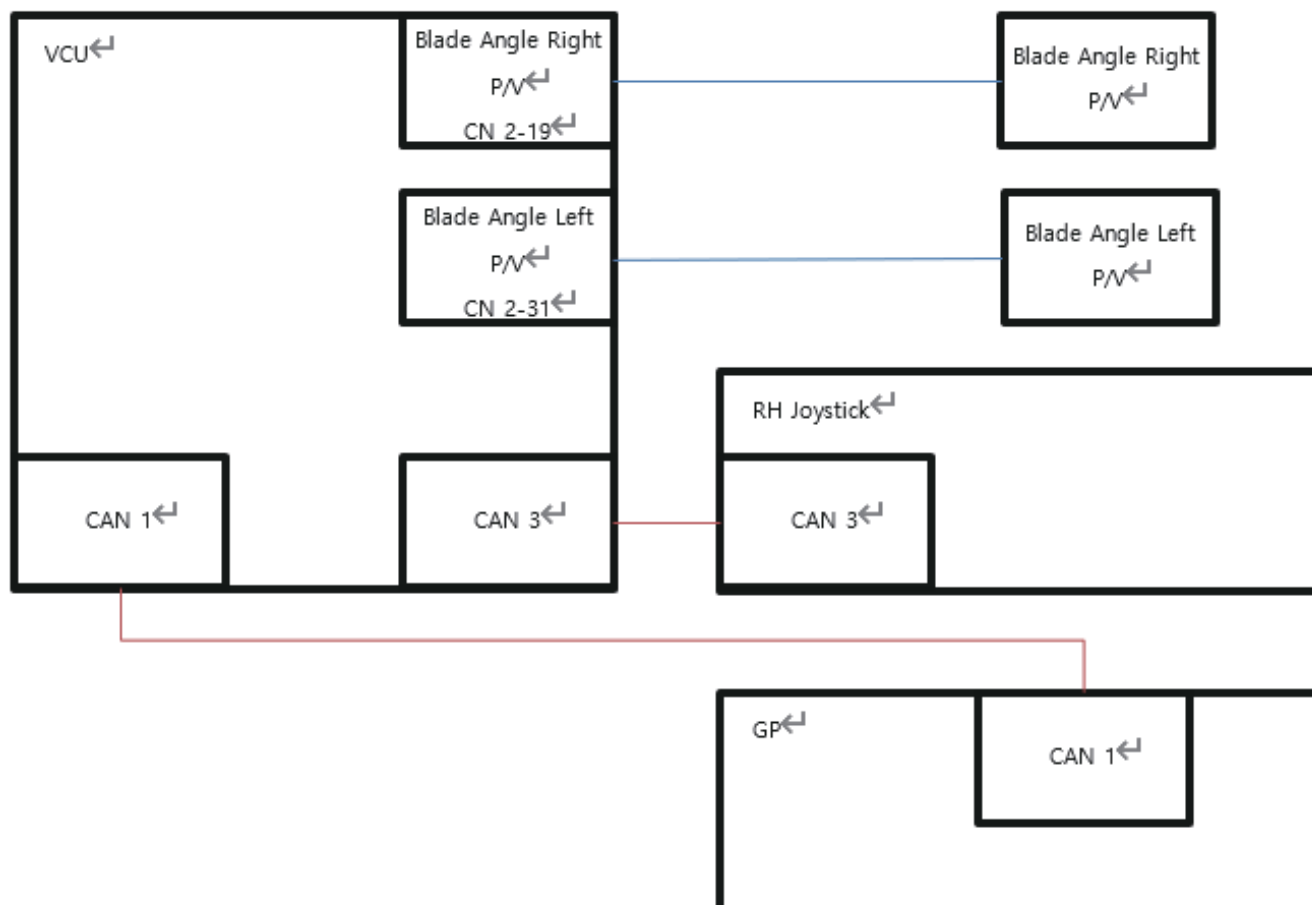
Overview

Fan pump is a piston type pump of variable displacement, discharging flow is controlled by EPPR current value with EPOS.

The low temperature of the cooling system the discharging flow is decreasing to low flow amount, and high temperature of the cooling system the discharging flow is increased to high flow amount.

Discharging flow depends on the angle of the swash plate even the pump shaft rotating speed is low or high.

Figure 152

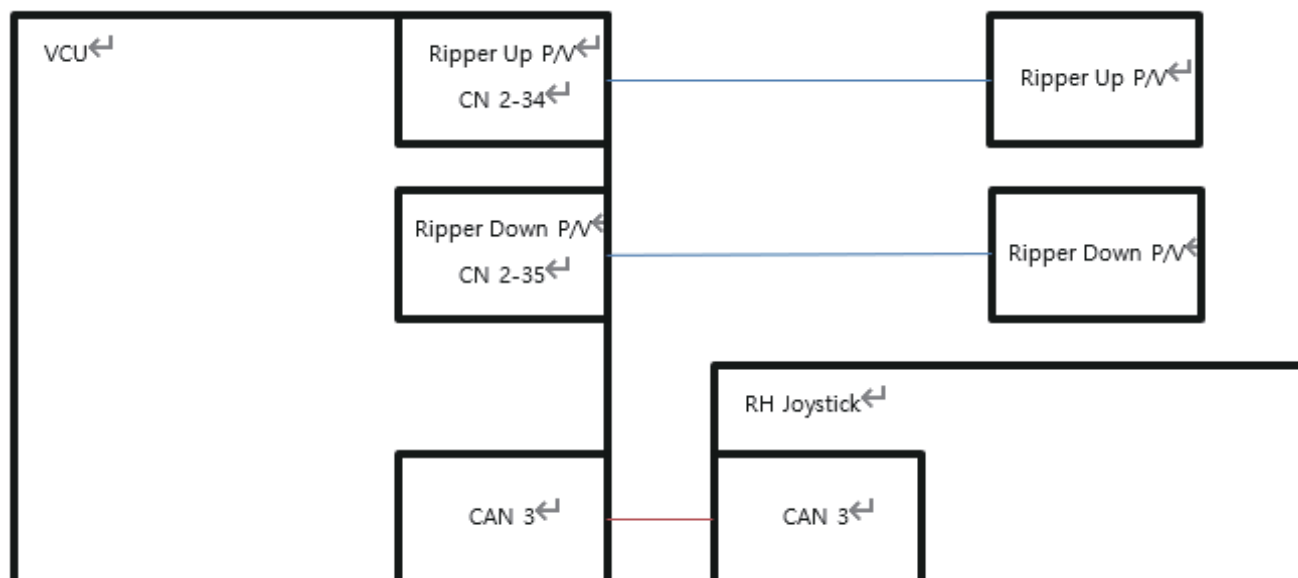


DS2201491

Blade Angle Control

Purpose - Controls Ripper operation according to Joystick operation

Figure 153

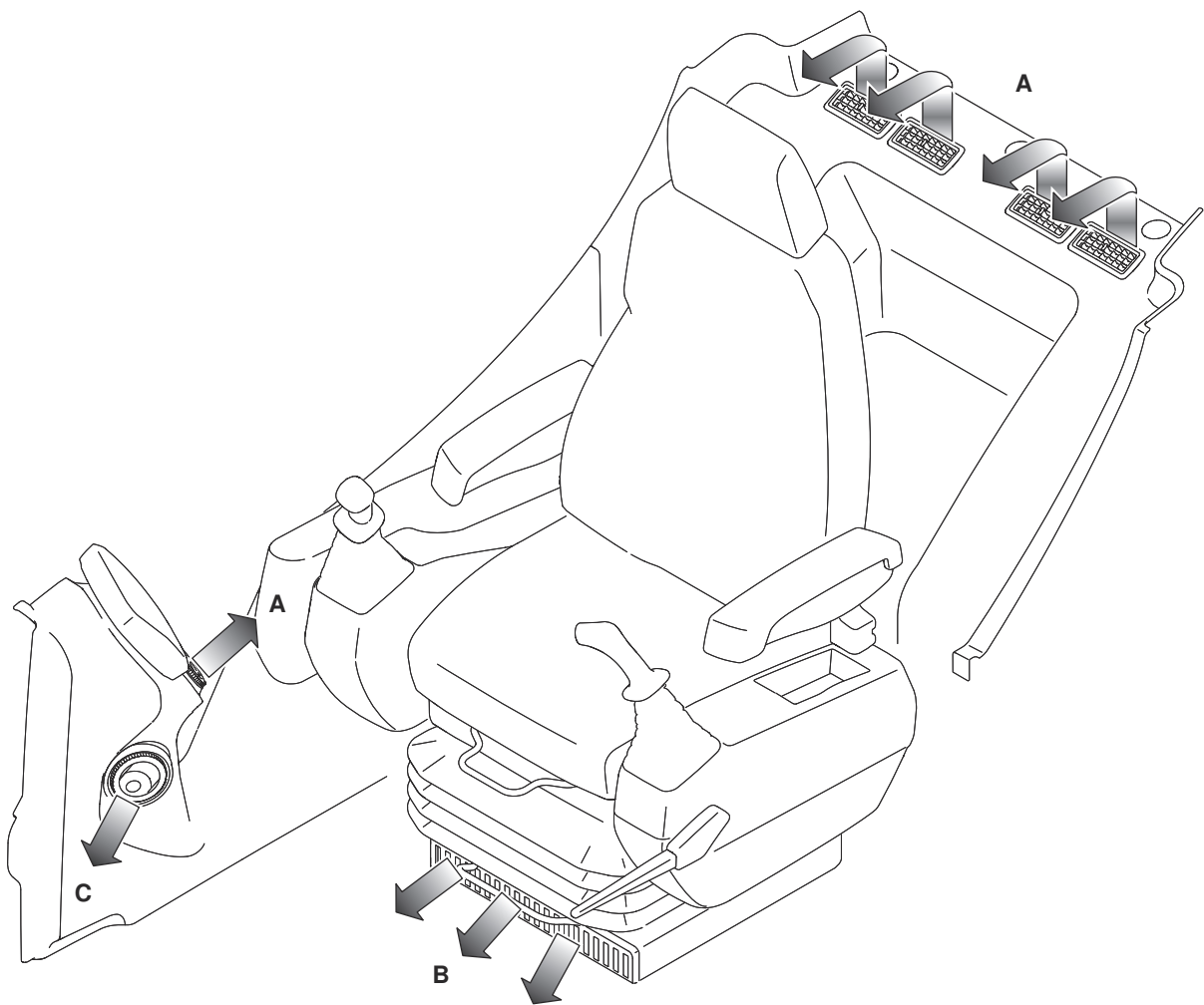


DS2201492

Air Conditioner System

Outline

Figure 184



EX1301100

Solid-type heater and air conditioner are installed in the cover behind the operator's seat. Temperature of the operator's cabin is adjusted automatically to the temperature set by operator. (Please refer to the Operation & Maintenance Manual for detailed full automatic control. Vent mode selects the direction of discharged air.

Outlets by vent modes

Modes				
Outlets	A	A+B	B	B+C

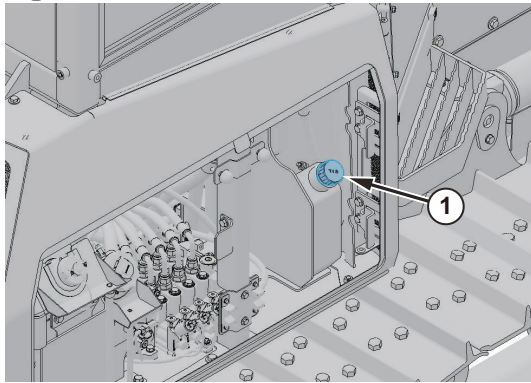
Internal and External Filters

Internal and external air purification filters are installed for the operator's room. If machine operates in an excessively contaminated environment, filters must be cleaned more frequently and if necessary, replaced with new ones.

4	High-pressure: Over 6 bar (85 psi) Low-pressure: Approximately 760 mmHg (Negative Pressure)		
	E. Recheck high/ low-pressure readings. Low-pressure: 1.5 - 3.3 bar (21.3 - 46.9 psi)		
5	High-pressure: Over 6 - 18 bar (85 - 256 psi) Low-pressure: 500 mmHg (Negative Pressure) - Dial indicator needle unstable.		
Possible Cause: Moisture in system has iced up the expansion valve. NOTE: <i>When the absorbed moisture freezes the pressure readings may look normal. Careful readings must be made to determine whether pressure is in normal range.</i>			
A. Recover any remaining refrigerant. B. Vacuum out system. C. Recharge system. NOTE: <i>During refrigerant recovery and refilling, the desiccant and filter must be replaced.</i>			
6	High-pressure: Over 22.0 - 23 bar (313 - 327 psi) Low-pressure: 2.5 bar(36 psi)		
Possible Cause: Refrigerant pressure problem because of defective expansion valve or temperature sensor.			
Step	Inspection Item		Remedy
1	Inspect whether the temperature sensor is installed properly.	Yes	Replace expansion valve.
		No	Exchange duct sensor.
7	High-pressure: Over 7.0 - 11.0 bar (100 - 156 psi) Low-pressure: 4.0 - 6.0 bar(57 - 85 psi)		
Possible Cause: Low refrigerant pressure because of poor compressor compression.			
Inspect and replace compressor if necessary.			

2. Remove hydraulic oil fill cap (1) from tank.

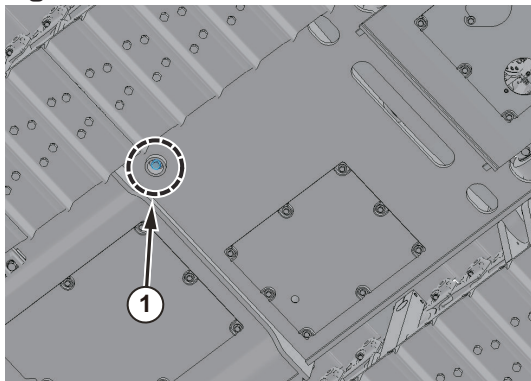
Figure 46



DS2300047

3. Position a container under hydraulic tank drain plug.

Figure 47



DS2300048

4. Remove hydraulic oil drain plug (1) from oil tank.
5. Drain hydraulic oil.

- Hydraulic tank level: 74 L (19.5 U.S. gal)

NOTE: *Dispose of drained fluids according to local applicable environmental laws and regulations.*

For details, refer to Hydraulic Oil Tank - Removal and Installation.

Hydraulic Hoses and Fittings

1. When disconnecting the hose, oil left in the hose may flow out. Therefore, place the end of the hose into a suitable container to prevent contamination of the ground and environment.

Figure 48



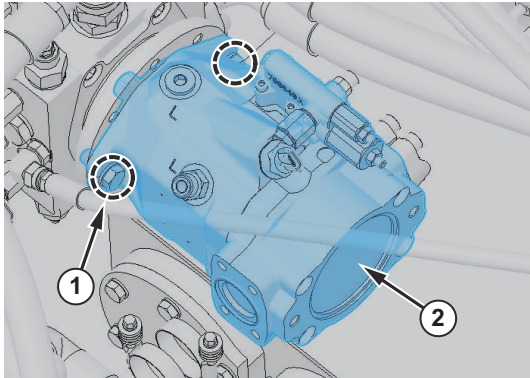
EX1504170

NOTE: Attach identification tags to the removed hoses for reassembling. After disconnecting hoses from main pump, plug them to prevent dirt or dust from entering. Disconnect the hoses from the bottom to top of main pump.

Main Pump

1. Tie pump with rope to lift it.

Figure 126



DS2200913

2. Remove mounting bolts (1) and main pump (2) from HST pump.

- Tool: 19 mm ()
- Torque: 107.9 N.m (11 kg.m, 79.6 ft lb)
- Main pump weight: about 28 kg (61.7 lb)

Installation

1. Perform installation in the reverse order to removal.
2. When installing the pump to engine, be careful assembling pump shaft and drive coupling. Refer to drive coupling installation.

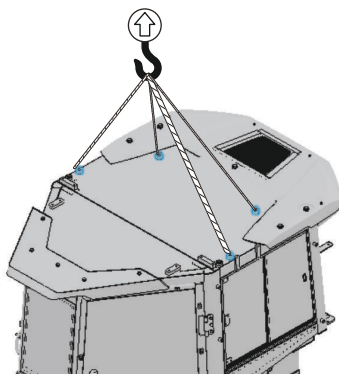
HST Pump

Repair Procedure Quick Guide

- Step-A. Tilt the cabin
- Step-B. Disconnect hydraulic hoses and fittings
- Step-C. Remove fan pump
- Step-D. Disconnect wiring harness
- Step-E. Disconnect hydraulic hoses and fittings
- Step-F. Remove main pump
- Step-G. Remove support
- Step-H. Disconnect wiring harness
- Step-I. Disconnect hydraulic hoses and fittings
- Step-J. Remove HST pump

5. Lift cabin approximately 25 - 50 mm (1" - 2") above deck.

Figure 199



DS2200910

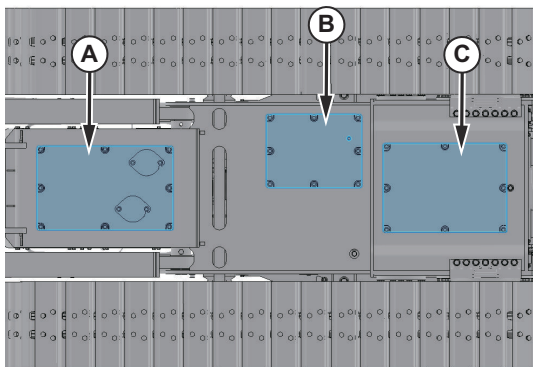
6. Check that all electrical connections have been disconnected and all other items unbolted.

NOTE: *Lift operator's cabin slowly to prevent damaging.*

Undercover

1. Remove the undercover (C).

Figure 200



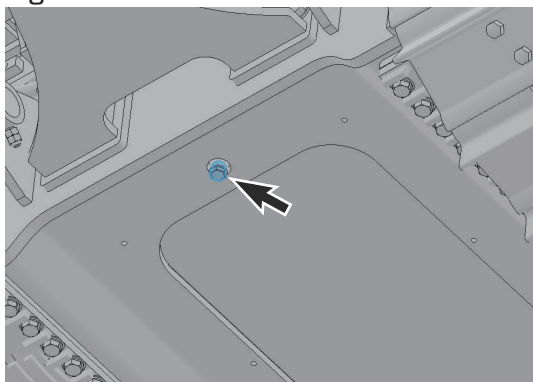
DS2201816

For details, refer to Undercovers - Removal and Installation.

Fuel

1. Remove drain plug from fuel tank.

Figure 201



DS2201818

- Fuel tank capacity: 190 L (50.2 U.S. gal)