i02036664

Air Cleaner - Remove and Install

SMCS - 1051-010

Removal Procedure

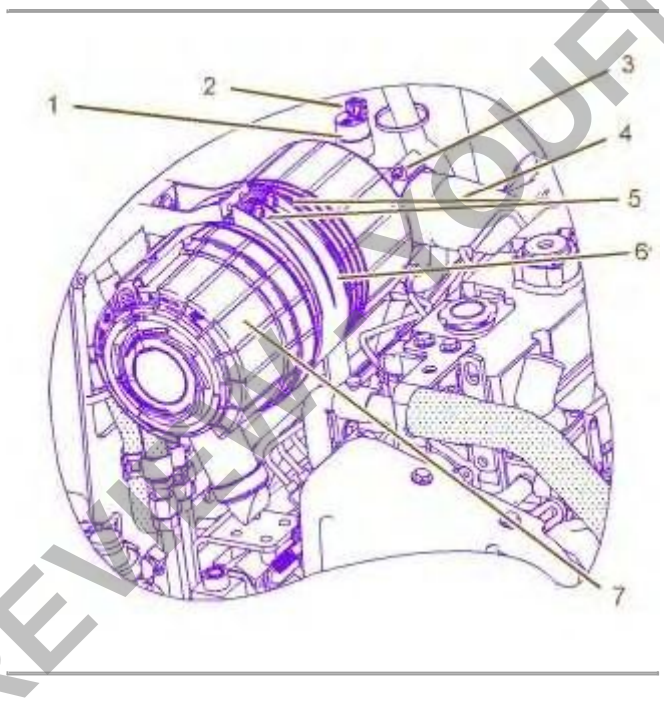


Illustration 1 g01048892

1. Remove harness assembly (2). Loosen hose clamp (3). Disconnect hose (4) .
2. Remove bolts (5). Rotate bracket (6). Remove air cleaner assembly (7). Remove service indicator (1) from air cleaner assembly (7) .

Installation Procedure

Table 1

Required Tools

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i01901484

Main Bearing Journal

SMCS - 1202; 1203

Table 1

Main Bearing Journal		
Crankshaft main bearings	**Diameter of the crankshaft journal**	**Service limit of the crankshaft journal**
Original Size Journal	67.957 to 67.970 mm (2.6755 to 2.6760 inch)	67.90 mm (2.673 inch)
Undersize Journal 0.25 mm (0.010 inch)	67.707 to 67.720 mm (2.6656 to 2.6661 inch)	67.65 mm (2.663 inch)
Undersize Journal 0.50 mm (0.020 inch)	67.457 to 67.470 mm (2.6558 to 2.6563 inch)	67.40 mm (2.654 inch)

Note: If the clearance between the main bearing and the crankshaft journal is not within the specified tolerance, the crankshaft must be replaced.

Clearance between the main bearing and the crankshaft journals ... 0.044 to 0.102 mm (0.0017 to 0.0040 inch)

Service limit of the main bearing ... 0.20 mm (0.008 inch)

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i03636418

Rocker Shaft and Pushrod - Install

SMCS - 1102-012; 1208-012

Installation Procedure

NOTICE

Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.

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4. Fill the radiator with coolant. Refer to the Operation and Maintenance Manual, "Cooling System Coolant (ELC) - Change" for the proper procedure.

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Illustration 14 g01700354

"Confirmation: User Permissions" screen

(10) Confirmation message

(11) Check boxes

6. Click on "OK". You have successfully updated the existing user and will be returned to the "Manage Existing User" screen.

   Note: Check marks in the check boxes (11) indicate permissions that are granted to the user. Permissions that display the letter "X" over the check mark indicate that these permissions are not granted to the user.

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Field	Description
Header	
"Equipment ID"	The id of the equipment
"Manufacture"	The manufacturer of the equipment
"Model"	The model of the equipment
"Serial Number"	The serial number of the equipment
"Start Date"	The start date for the range of data
"End Date"	The end date for the range of data
"Usage Summary"	
"Average Daily Usage"	The average of daily hours for the dates that are within the range of the defined date
"Total Usage Hours"	The total hours for the dates that are within the range of the defined date
"Total Available Hours"	The total hours of available work for the machine that are within the range of the defined date
"Usage %"	The percentage of the operational time for the equipment as compared to the total available hours
"NonUse %"	The percentage of time the equipment was not in operation as compared to the total usage hours
"Idle %"	The percentage of time the equipment was in operation but engine speed was lower than 1150 rpm
"Usage" pie chart	A pie chart that displays the "Usage %" and the "NonUse %"
"Utilization" pie chart	The Utilization of the machine during hours of operation displayed in a pie chart with "Usage %" indicating the percentage of time the machine operated at an engine speed greater than 1150 rpm and "Idle %" indicating the percentage of time the machine operated at an engine speed lower than 1150 rpm
"Daily Use/Idle Hours" bar chart	A bar chart that displays the daily used hours and idle hours with the Y-axis representing the date and time and with the X-axis representing the number of hours of operation for the machine

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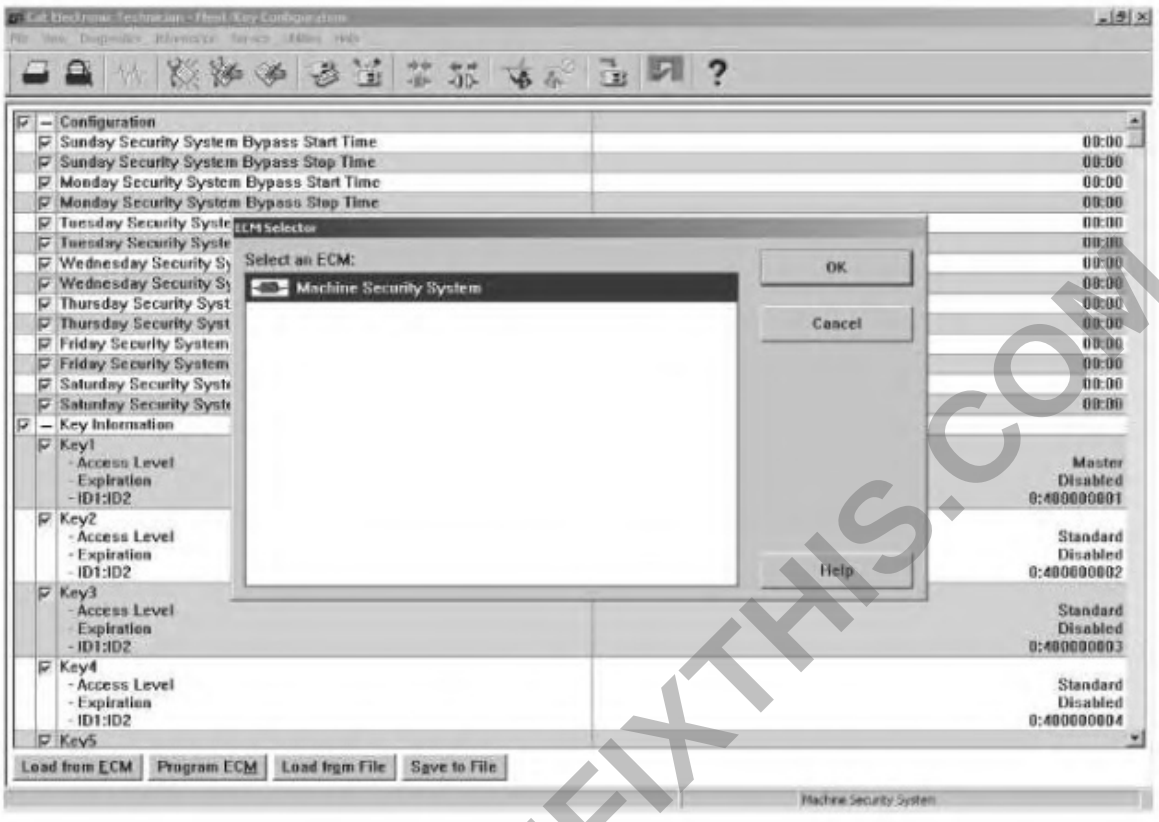


Illustration 9 g01101974

ECM Screen

2. Highlight an ECM and press "OK" The "Please wait" message box displays. Then the "Testing ECM" progress bar displays.

Note: You can cancel the uploading process at any time, by pressing the "Cancel" push button. The "Are you sure..." message box displays. Press "Yes" to cancel uploading the data or "No" not to cancel.

Refer to the following procedures when you "Append" or "Replace" the key list. Refer to the "Append" section to append the list. Refer to the "Replace" section to replace the list.

Append

1. Connect the service tool to the ECM to be programmed.
2. Start the Caterpillar Electronic Technician (ET)

   Note: This procedure requires Caterpillar Electronic Technician (ET) version 2004 SP1 or later.

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The resistance is less than 5.0 ohms.

Results:

- **OK -** The resistance is less than 5.0 ohms. The machine harness is correct. Proceed to Test Step 3.
- **NOT OK -** The resistance is greater than 5000 ohms. The resistance measurement is not correct. There is an open circuit in the machine harness.

  Repair: The open is in wire P981-PU or in wire L999-GN of the machine harness. Repair the machine harness or replace the machine harness.

  Stop.

Test Step 3. CHECK IF THE DIAGNOSTIC CODE REMAINS.

A. Inspect the contacts of the harness connectors and clean the harness connectors.

B. Reconnect all harness connectors.

C. Turn the key start switch to the ON position.

D. Operate the machine.

E. Check the status of the CID 1931 FMI 05.

Expected Result:

The CID 1931 FMI 05 is active.

Results:

- **YES -** The CID 1931 FMI 05 is active. The diagnostic code has not been corrected. The ECM may have failed.

  Repair: The ECM is very unlikely to have failed. Reconnect all connections and visually inspect the wire harness. Verify that the values that are present on the machine configuration screen match the machine's options. Verify that the values that are present on the machine configuration screen are installed correctly. Verify that the diagnostic code still exists. If the diagnostic code still exists perform the test steps again.Replace the ECM, if the cause of the diagnostic code was not found after the second attempt. See Testing and Adjusting, "Electronic Control Module (ECM) - Replace".

  Stop.

- **NO -** The CID 1931 FMI 05 is not active. The diagnostic code does not exist at this time.

  Repair: The initial diagnostic code was probably caused by a poor electrical connection or a short at one of the harness connectors that was disconnected and reconnected. Resume normal machine operation.

  Stop.

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Repair: Clear the fault if all the following conditions occur:

- A problem is not found with the charging system.
- A problem is not found with the wiring.
- The fault has occurred a few times.

Monitor the module and the machine for further occurrences. If the fault occurs again, the PL522 or 523 module has not failed as other electronic control modules are displaying the same fault. Recheck the system voltage.

STOP

- **NO -** No other "CID 168 FMI 00" diagnostic codes can be found on other ECMs.

  Repair: Clear the fault if all the following conditions occur:

  - A problem is not found with the charging system.
  - A problem is not found with the wiring.
  - The fault has occurred a few times.

  Monitor the module and the machine for further occurrences. If the fault occurs again, then the PL522 or 523 module is possibly faulty. The PL522 or 523 should be replaced. Refer to Systems operation, Troubleshooting, Testing and Adjusting, "Electronic Control Module (ECM) - Replace". If the PL522 or 523 has been replaced, recheck the system and check the status of the diagnostic code.

  STOP

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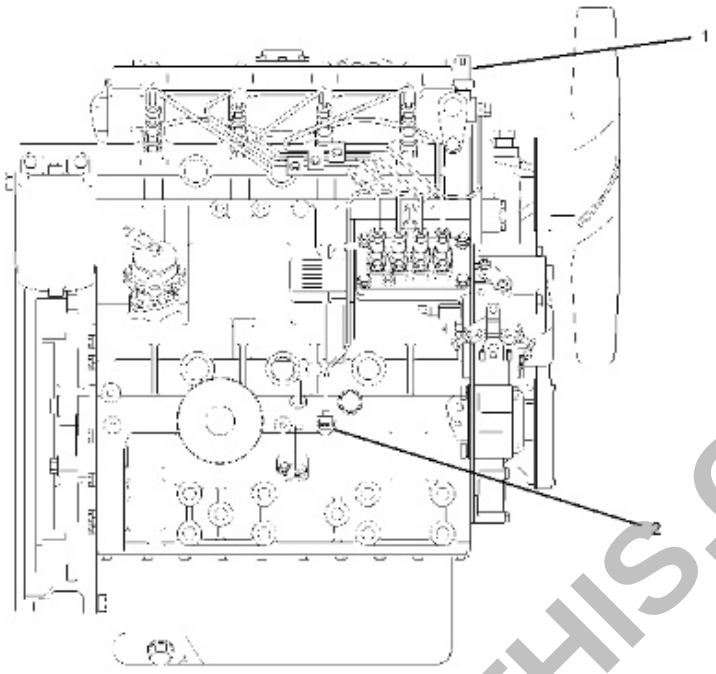


Illustration 1 g01108876

Typical example

1. Disconnect the harness assembly for the oil pressure switch.
2. If the engine oil pressure switch is located in the valve mechanism cover (1), remove the engine oil pressure switch.

   If the oil pressure switch is located in the cylinder block (2), remove the engine oil pressure switch and adapter assembly. Remove the engine oil pressure switch from the adapter.
3. Clean the engine oil pressure switch.

Installation Procedure

Table 1

Required Tools			
Tool	**Part Number**	**Part Description**	**Qty**
A	5P-3413	Pipe Sealant	1

Note: The engine oil pressure switch can be located in one of two positions, in the valve mechanism cover (1) or in the cylinder block (2). Refer to Specifications Manual, "Engine Oil Pressure Switch" for the correct location.

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The fuel transfer pump creates a vacuum in order to force fuel from the fuel tank. Pressure is created in order to pump the fuel to the fuel injection pump. The diaphragm (3) prevents the leakage of the fuel into the cylinder block. The diaphragm creates part of the pumping action of the fuel transfer pump. Outlet valve (1) and inlet valve (2) operate as check valves.

A lobe on the camshaft causes arm (5) to move up and down. When the arm moves down, diaphragm assembly (4) moves down. This down movement increases the size of the chamber above the diaphragm assembly. This suction opens inlet valve (2) which draws fuel into the chamber above the diaphragm assembly (4) to the fuel transfer pump (IN).

When the arm moves up, the diaphragm assembly moves up. This up movement pressurizes the chamber above the diaphragm assembly. This pressure opens outlet valve (1) which allows fuel to flow out of the fuel transfer pump (OUT) toward the fuel injection pump.

Glow Plugs

Each cylinder has a glow plug in order to aid the cold starting of the engine. The glow plugs may be energized by two different methods:

- The ignition switch is moved to the auxiliary position (if equipped).
- The starting aid switch (if equipped) is moved to the ON position.

Usually, energizing the glow plugs for six seconds will heat the cylinder sufficiently for easy starting of the engine. The glow plugs should not be activated for more than 15 seconds continuously.

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i02619207

Fuel Shutoff Solenoid

SMCS - 1259

S/N - -

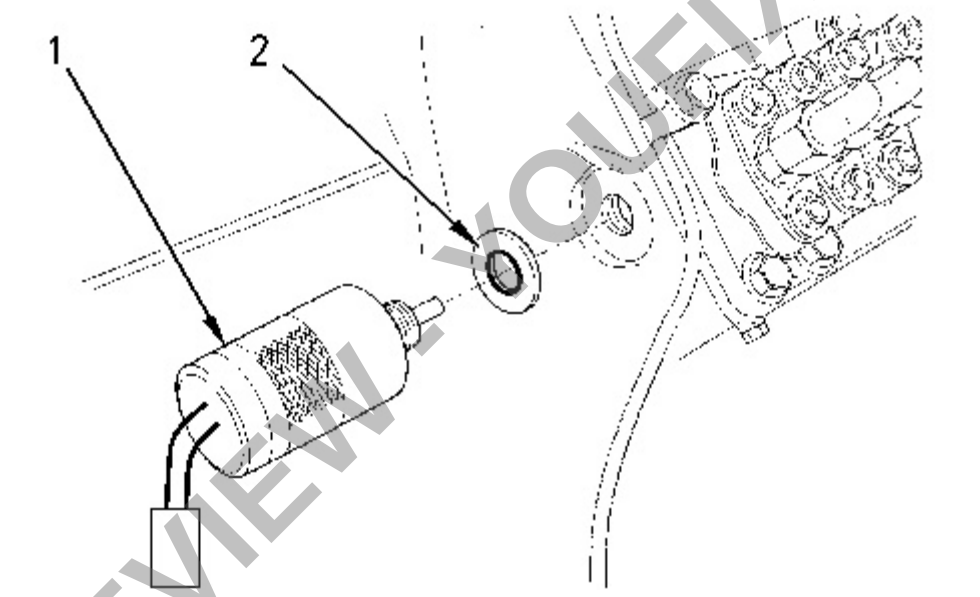


Illustration 1 g00820306

(1) Tighten the fuel shutoff solenoid to the following torque. ... 17 N·m (13 lb ft)

(2) Washer

Ensure that the washer is replaced with a new washer during the installation of the fuel shutoff solenoid (1).

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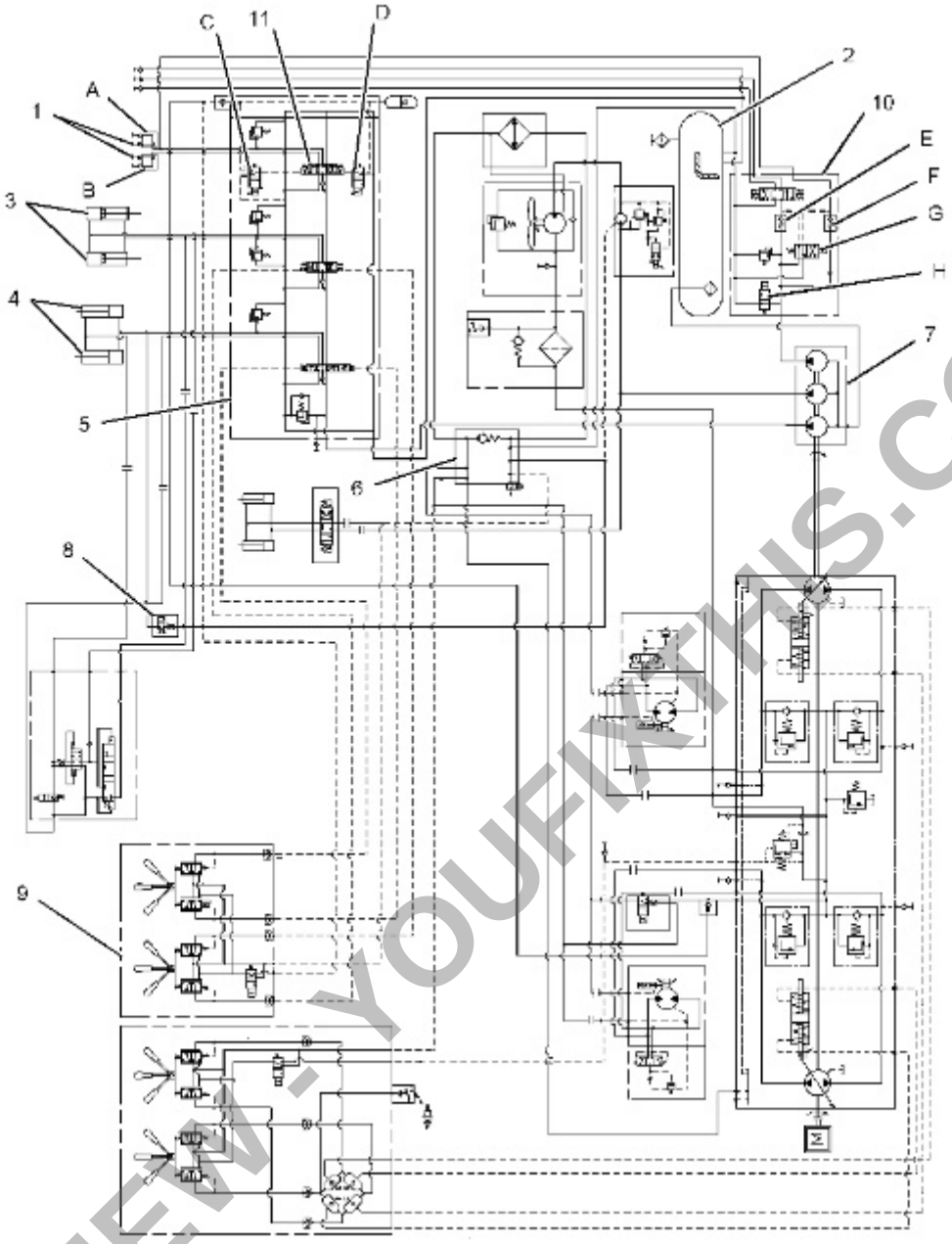


Illustration 14 g01060471

257B2 Multi Terrain Loader hydraulic schematic

(1) Auxiliary couplings

(2) Hydraulic tank

(3) Tilt cylinders

(4) Lift cylinders

(5) Control valve (work tool)

(6) Return manifold

(7) Gear pump

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Conditions that could cause this diagnostic code to be activated are:

- The energize circuit of the solenoid is shorted to a ground source.
- The solenoid has failed.
- The ECM has failed. ECM failure is unlikely.

Note: Before performing this procedure, inspect the harness connectors that are involved in the circuit. Poor connections can often be the cause of a problem in an electrical circuit. Verify that all connections in the circuit are clean, that all connections are secure and that all connections are in good condition. If a problem with a connection is found, correct the problem and verify that this diagnostic code is active before performing this procedure.

Note: The following test procedure may create other diagnostic codes. Ignore these created diagnostic codes. Clear any created diagnostic codes after the original diagnostic code has been corrected.

Test Step 1. CHECK THE SOLENOID

A. Turn the disconnect switch and the key start switch to the ON position. Do not start the engine.

B. Observe the status of the diagnostic code.

C. Disconnect the solenoid with the active diagnostic code from the machine harness.

Expected Result:

The active 1939-6 diagnostic code, changes to a 1939-5 diagnostic code, when the solenoid is disconnected.

Results:

- **OK -** The active 1939-6 diagnostic code changes to a 1939-5 code when the solenoid is disconnected. The solenoid circuit in the machine harness is correct.

  Repair: The solenoid has failed. Repeat this test to verify the solenoid failure.Temporarily connect a new solenoid to the harness and verify that the replacement solenoid has cleared the diagnostic code. If the 1939-6 code is no longer active, permanently install the new solenoid.Verify that there are no active diagnostic codes for the solenoid. Clear any logged diagnostic codes.

  STOP

- **NOT OK -** The CID 1939-6 diagnostic code remains active. Disconnecting the solenoid did not change the status of the active diagnostic code. The solenoid is not the cause of the problem. Proceed to Test Step 2.

Test Step 2. CHECK THE ENERGIZE CIRCUIT OF THE SOLENOID FOR A SHORT TO GROUND

The solenoid remains disconnected from the machine harness.

A. Turn the key start switch and the disconnect switch to the OFF position.

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i02903860

Gear Pump - High Flow or Boost Flow

SMCS - 5073

S/N - SLK1-7299

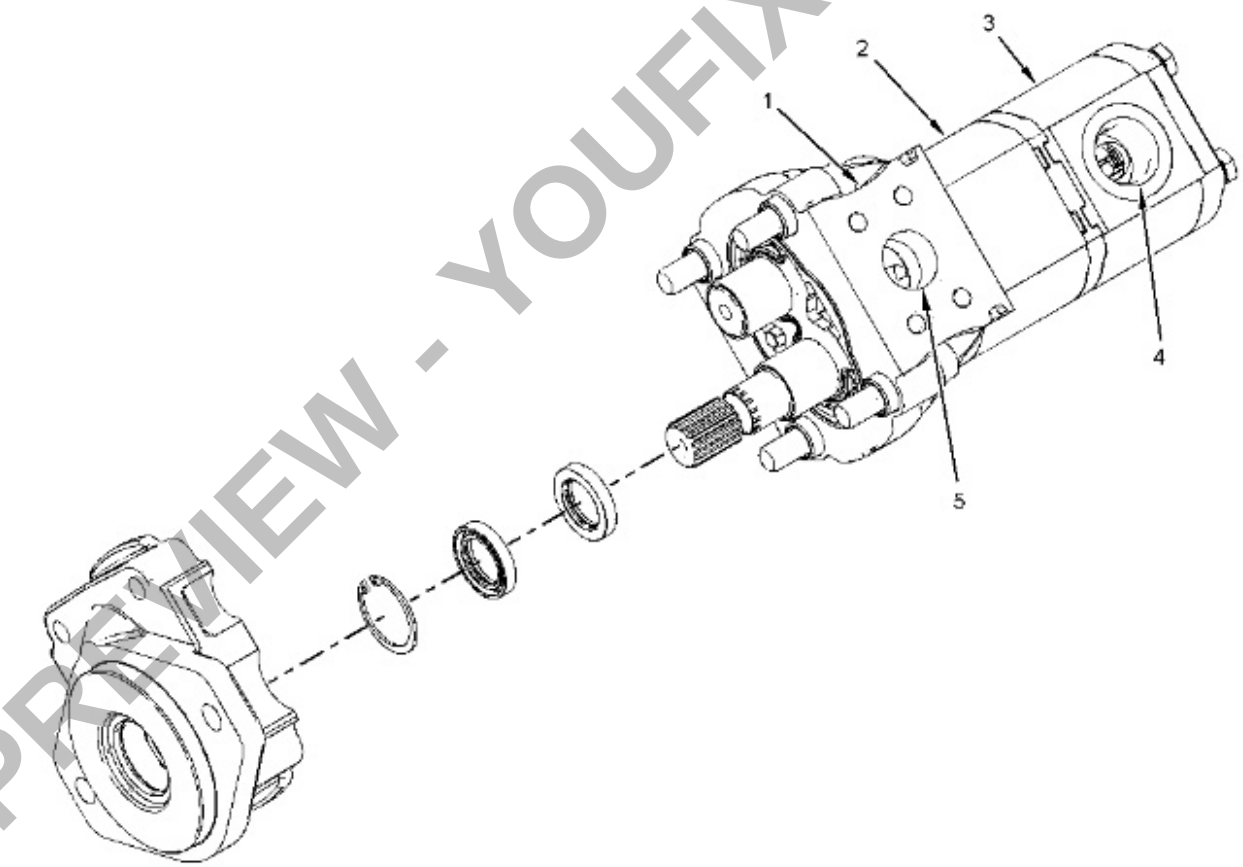


Illustration 1 g01031888

(1) The work tool section of the gear pump

(2) The section for pilot oil and the section for charge oil of the gear pump

(3) The high flow section of the gear pump

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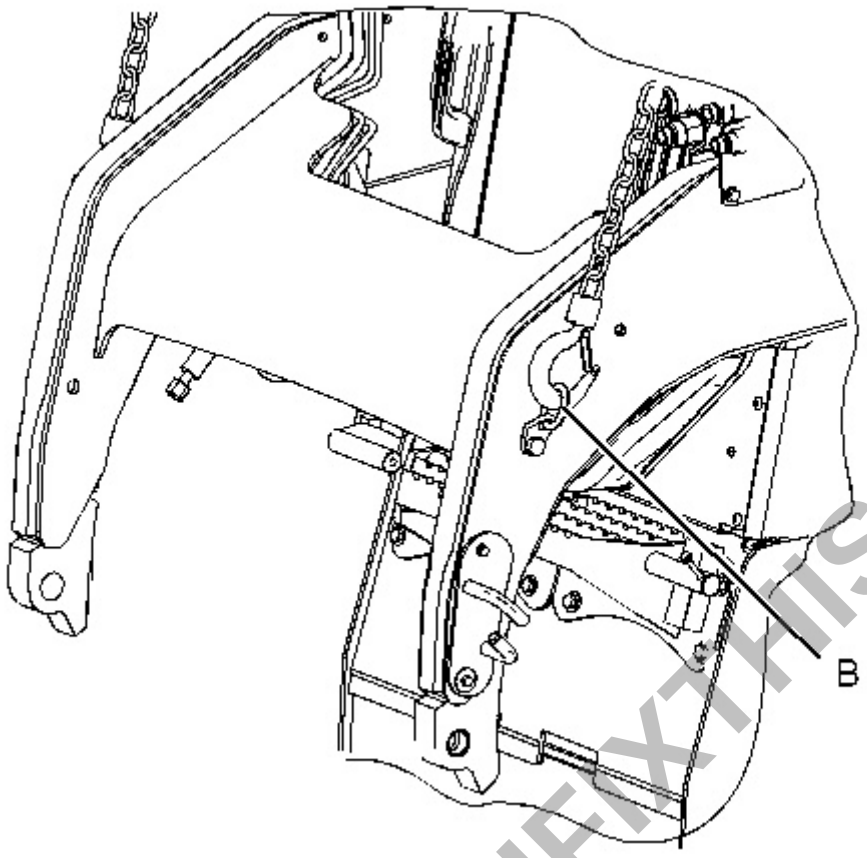


Illustration 1 g01062494

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Systems Operation

All Products Air Conditioning and Heating R134a for All Caterpillar Machines

Media Number -SENR5664-22 **Publication Date -01/08/2012** **Date Updated -13/08/2012**

i03007150

General Information

SMCS - 7309

The purpose of this service manual is to describe the operation, testing and adjusting procedures, and disassembly and assembly procedures of Caterpillar operator station heating and air conditioning systems.

These systems are designed to provide thermal comfort to machine operators in various conditions.

Both systems are closed loop systems that work by exchanging heat between the system fluid and the air that is supplied to the operator station. The fluid in the air conditioning system is refrigerant, and the fluid in the heating system is engine coolant.

In the air conditioning system, heat is transferred from the hot cab air to the cold refrigerant in the evaporator. The refrigerant is then transported to the condenser. Heat is deposited outside the condenser.

In the heating system, heat is transferred from the hot engine coolant to the cold cab air in the heater coil. The engine coolant is then transported to the engine. When the coolant is back in the engine, the coolant is heated again.

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Illustration 1 g01036152

Schematic of the auxiliary control for the auxiliary hydraulics

Do NOT start the machine for any of the following Test Steps.

Note: After any repair to the auxiliary hydraulic control, cycle the key start switch five times with at least five seconds between cycles in order to reset the calibrations within the auxiliary hydraulic ECM.

Test Step 1. CHECK THE DUTY CYCLE OF THE AUXILIARY HYDRAULIC CONTROL

A. Turn the key start switch to the OFF position.

B. Remove the access panel for the work tool control (joystick).

C. Locate the connector for the auxiliary hydraulic control beneath the work tool control (joystick).

D. Connect the **7X-1710** Multimeter Probe to contact 3 (P996-GN) and contact 2 (P997-BR) on the harness side of the connector.

E. Turn the key start switch to the ON position.

Do NOT start the machine.

F. Measure the duty cycle of the auxiliary hydraulic control by using the multimeter.

Note: This measurement is performed without actuating the auxiliary hydraulic control.

Expected Result:

The duty cycle should be 50% ± 3%.

Results:

- **OK -** The duty cycle is 50% ± 3%. Proceed to Test Step 5.
- **NOT OK -** The duty cycle is NOT 50% ± 3%. Proceed to Test Step 2.

Test Step 2. CHECK THE CONTINUITY OF THE GROUND CIRCUIT OF THE WIRING HARNESS

Check the resistance from contact 2 (wire P997-BR) to frame ground.

Expected Result:

The resistance should be less than 5 ohms.

Results:

- **OK -** The resistance is less than 5 ohms. Proceed to Test Step 3.

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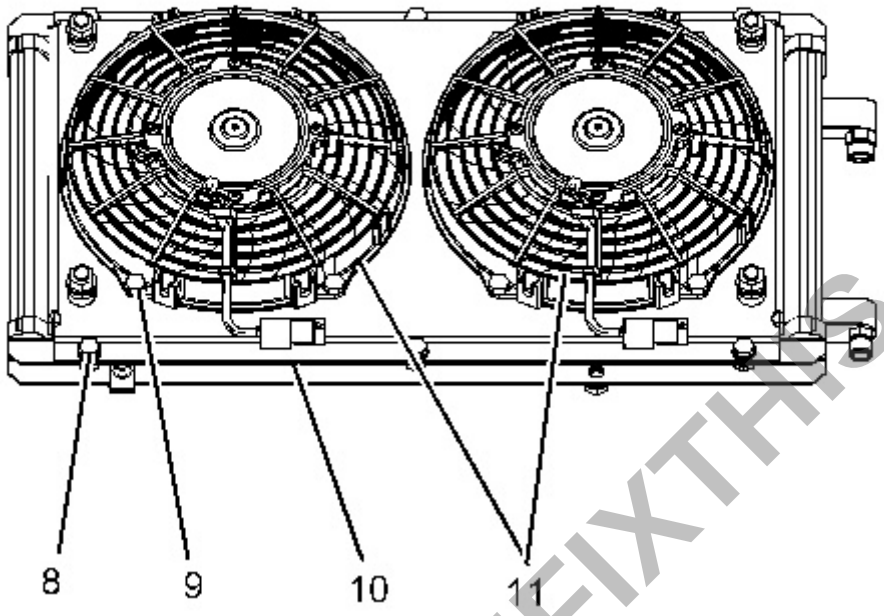


Illustration 3 g01078869

4. Remove bolts (8) and remove shroud (10). Remove bolts (9) and remove fan assemblies (11) .

Installation Procedure

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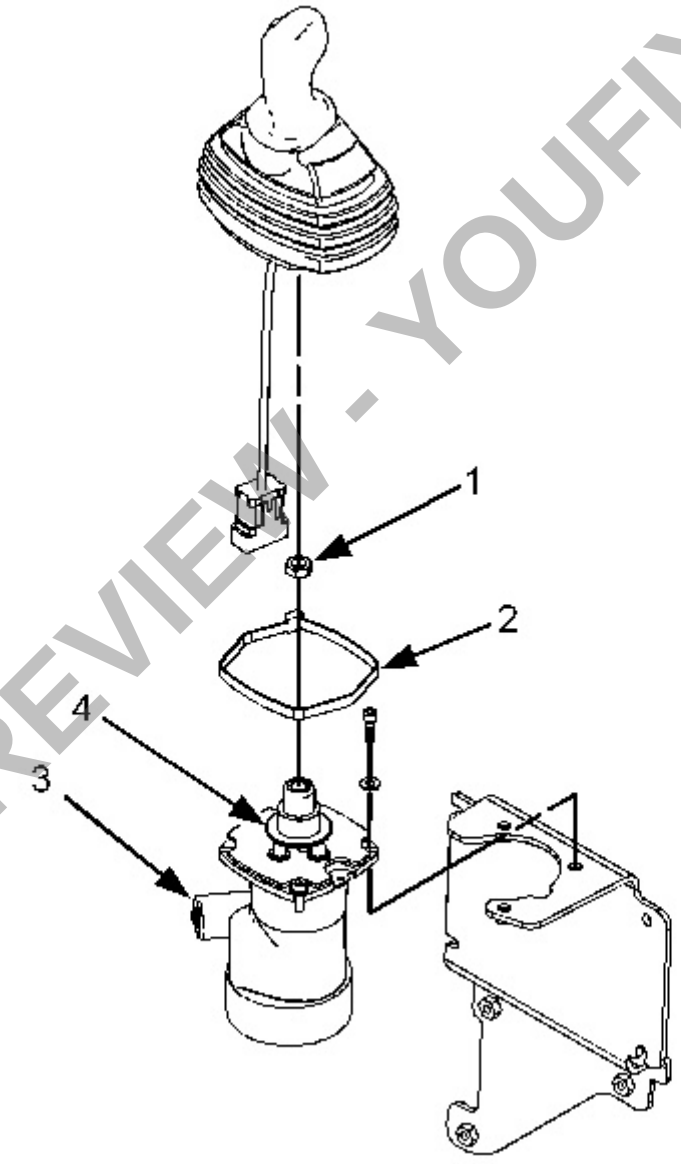
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Specifications
247B and 257B Multi Terrain Loaders Machine Systems
Media Number -RENR4875-02 **Publication Date -01/12/2007** **Date Updated -18/12/2007**

i01982122

Pilot Operated Hydraulic Control - Hydrostatic

SMCS - 5059; 5705



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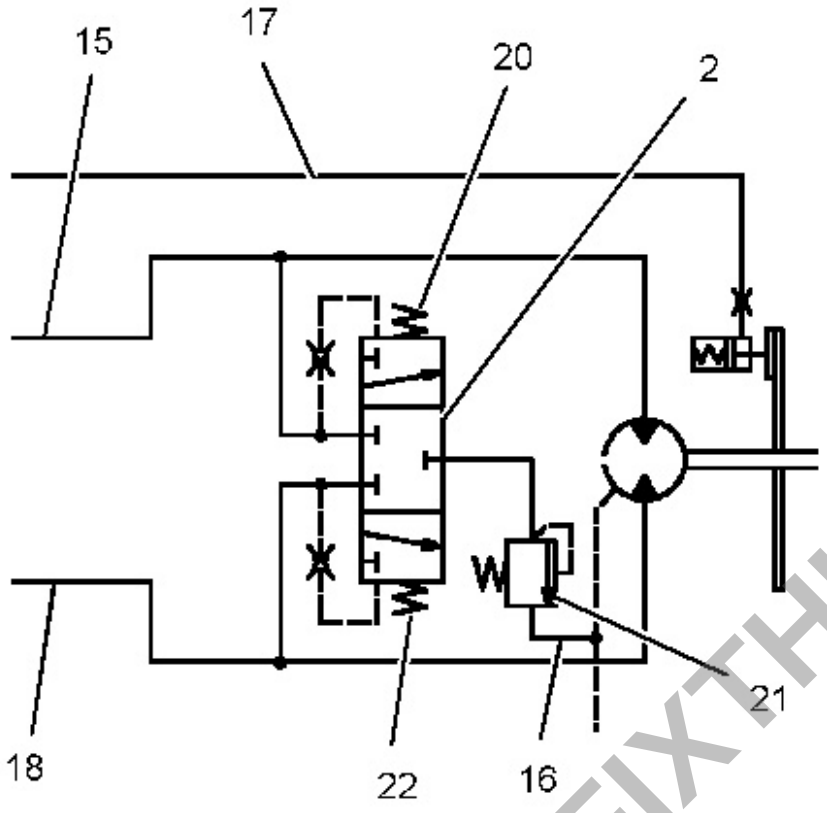


Illustration 3 g01445824

(2) Flushing valve

(17) Port for the brake release

(15) Port for the "A" or "B" high pressure loop

(16) Port for the motor case drain

(18) Port for the "A" or "B" high pressure loop

(20) Spring

(21) Regulator valve

(22) Spring

The oil from the low pressure passage flows past the spool to the regulator valve (21). The pressure of the oil from the low pressure passage forces the regulator valve to open.

The oil flows past the regulator valve (21) and out of port (16). The oil then flows to the return manifold. The oil then flows through the oil cooler. Then, the oil returns to the hydraulic oil tank.

If the oil pressure in the low pressure passage increases, the oil pressure acts against the spool for flushing valve (7). The oil pressure overcomes the force of the spring (22). The oil pressure forces the spool to shift upward. When the spool shifts upward, the spool opens a path to the return manifold for the oil that is in the passage.

The oil from the low pressure passage flows past the spool to the regulator valve (21). The pressure of the oil from the low pressure passage forces the regulator valve (21) to open.

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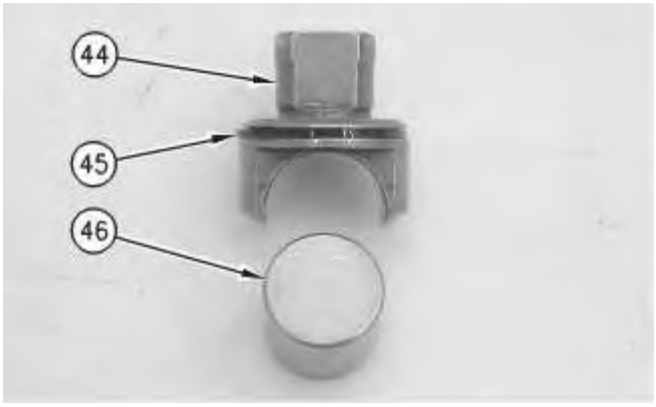


Illustration 26 g00883168

Note: Return the piston to the original bore.

22. Remove piston (44) from rotor (40). Remove O-ring seal (45) and roller (46) from piston (44) .

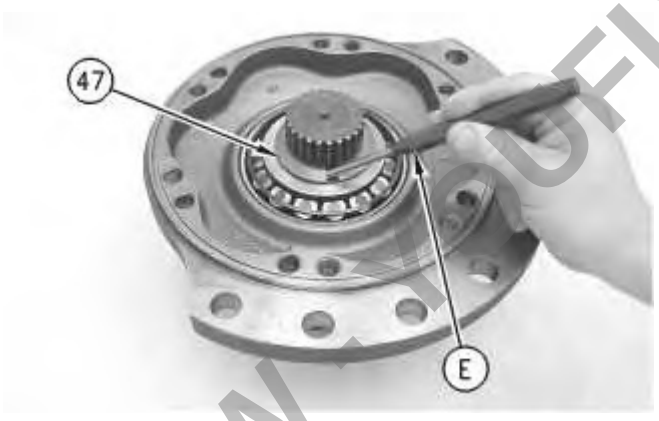


Illustration 27 g00883170

23. Use Tooling (E) to remove split ring (47) .



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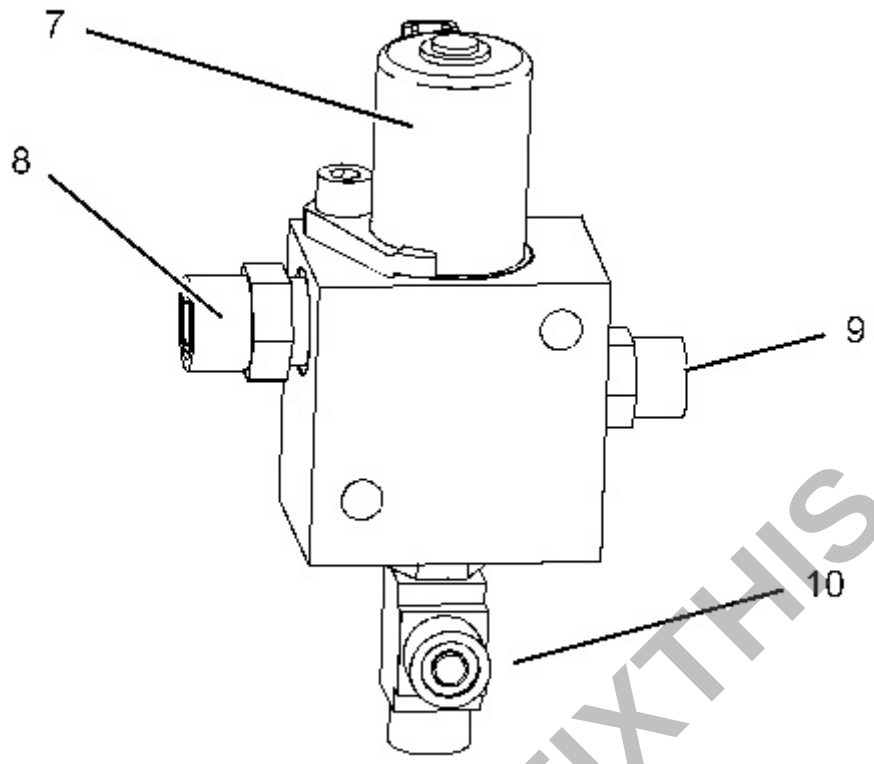


Illustration 2 g01053721

Note: Observe the fitting's orientation.

3. Remove solenoid (7). Remove fittings (8), (9), and (10) .

Installation Procedure

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