i01563814

Air Inlet and Exhaust System

SMCS - 1050

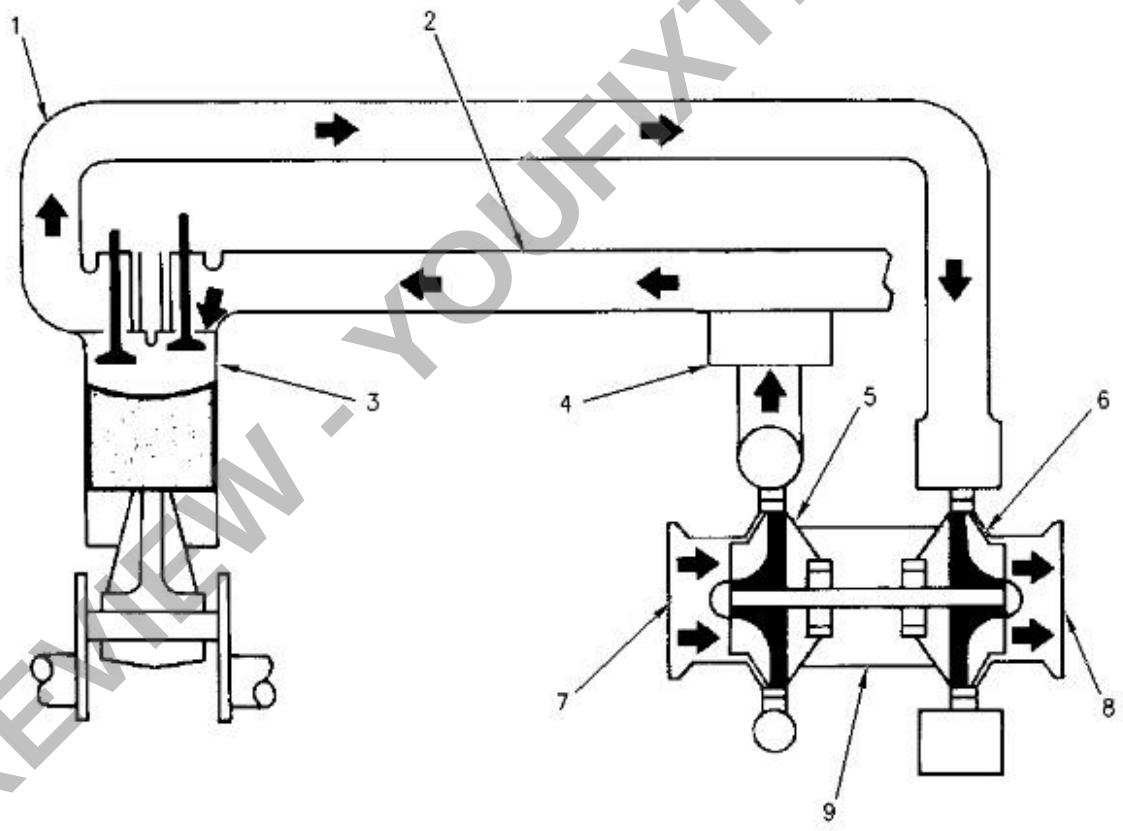

Illustration 1 g00549374

Air Inlet and Exhaust System Schematic

(1) Exhaust manifold

(2) Inlet manifold

(3) Engine cylinder

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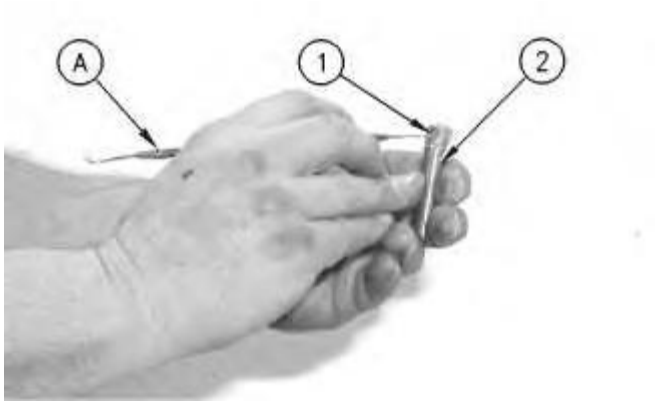

Illustration 1 g00610601

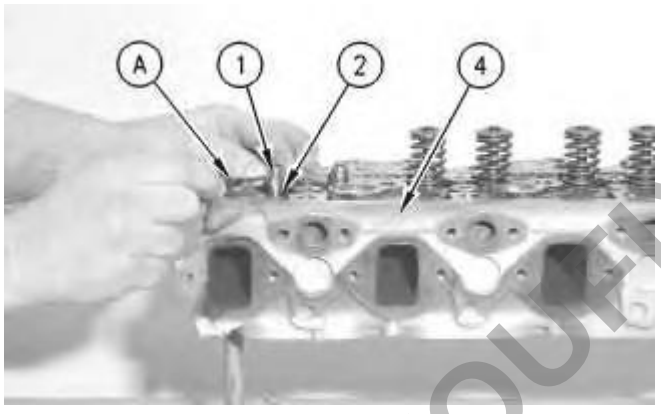

Illustration 2 g00610605

1. Use Tool (A) to remove valve stem seal (1) from the inlet and exhaust valve guide.

   Illustration 1 shows the removal of the valve stem seal, when the valve guide (2) is removed from cylinder head (4) .

   Illustration 2 shows the removal of the valve stem seal, while the valve guide (2) is installed in cylinder head (4) .

Installation Procedure

Table 2

Required Tools			
Tool	**Part Number**	**Part Description**	**Qty**
A	5P-1720	Seal Pick	1

NOTICE

Keep all parts clean from contaminants.

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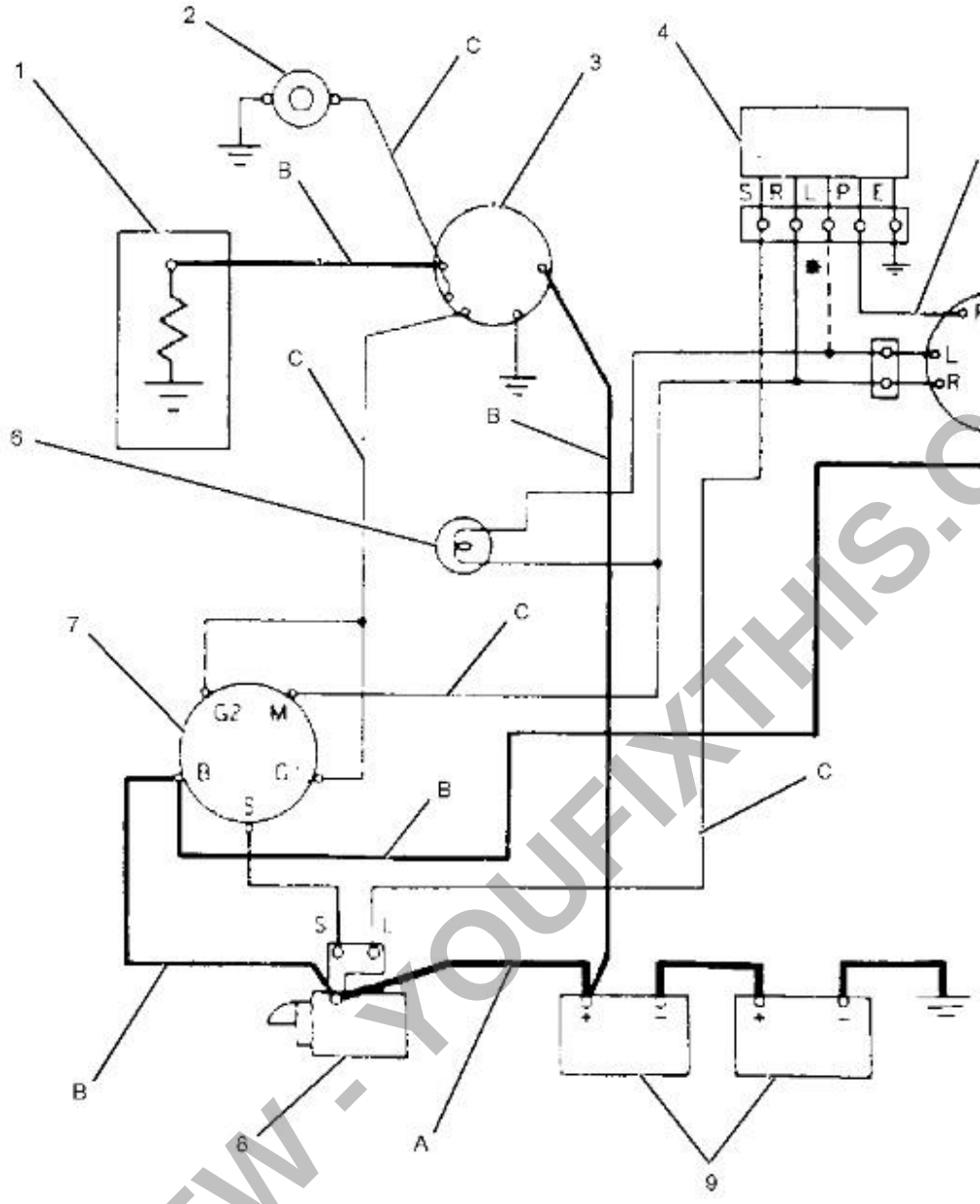

Illustration 1 g01432420

Electrical circuit

(1) Air inlet heater

(2) Indicator

(3) Relay

(4) Relay

(5) Alternator

(6) Pilot light for battery charge

(7) Switch for starting motor

(8) Starting motor

(9) Battery

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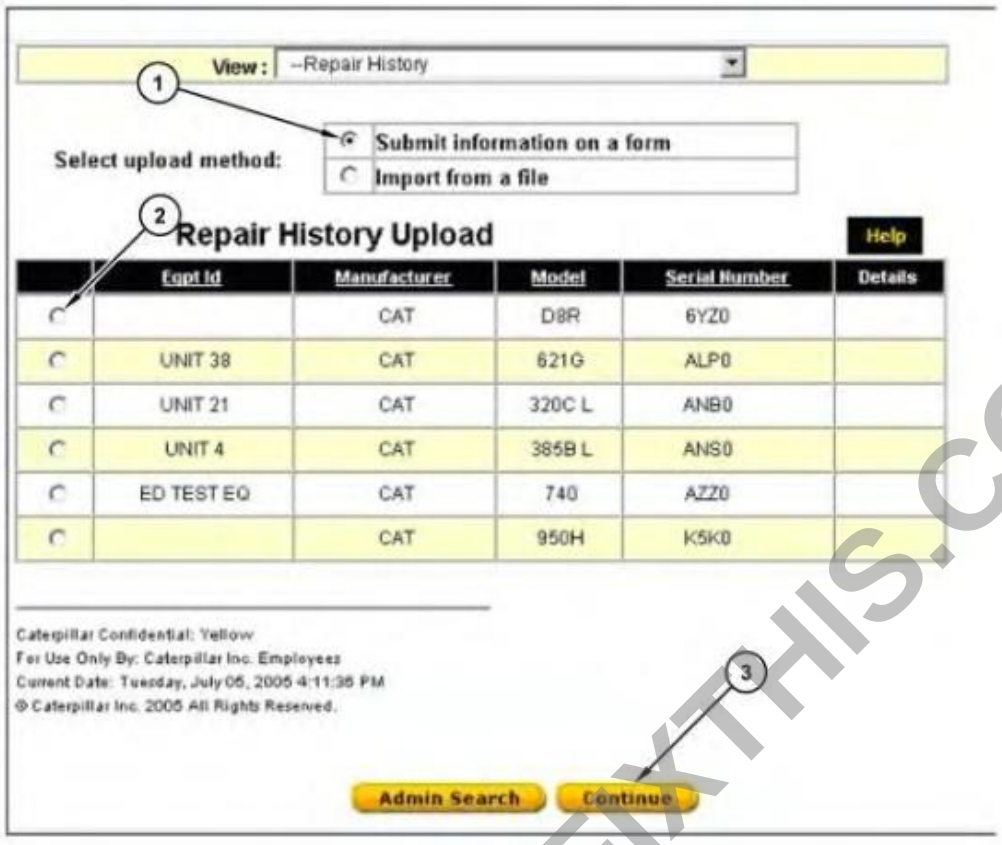

Illustration 1 g01740013

"Repair History Upload" screenusing a form

(1) "Submit information on a form" radio button

(2) Radio button

(3) Continue

1. From either the "Administration" screen or the "View" menu, select "Repair History".

   If equipment has already been selected, the "Repair History Upload" screen is displayed.

   If you have not already selected equipment, the "Equipment Search" screen is displayed. Perform your search, and then click the "Display Equipment" button. The "Repair History Upload" screen will appear.

2. Select the "Submit information on a form" radio button (1) if "Submit information on a form" is not already selected.

3. Select the radio button (2) that is next to the desired machine in order to upload the repair history.

4. Click the "Continue" button (3) .

   The "Report Service" screen will be displayed.

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Illustration 16 g01732841

"Customize PM Schedule - Select Equipment"

(1) Radio buttons

(2) "Customize" button

2. Select the radio button (1) next to the piece of equipment you wish to configure for hour based scheduling.
3. Click the "Customize" button (2) . The "Customize PM Schedule" screen will be displayed.

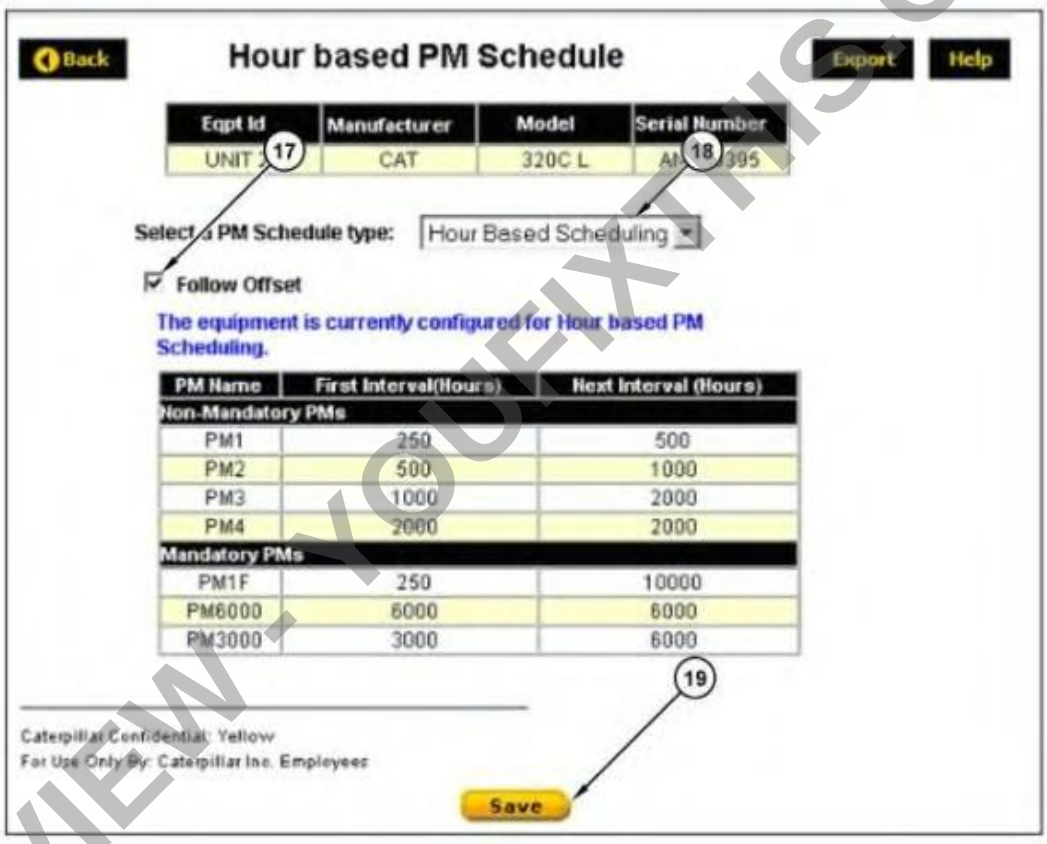

Illustration 17 g01732842

"Hour Based PM Scheduling"

(17) "Follow Offset" check box

(18) "Select a PM Schedule type" drop-down menu

(19) "Save" button

4. If not already selected, select "Hour Based Scheduling" from the "Select a PM Schedule type" drop-down menu (18) .
5. In order for the PM Schedule to follow offset, select the "Follow Offset" check box (17) .

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i01548897

Logged Event Mode

SMCS - 1931

The logged event mode will log a condition of the machine that is out of the normal range without the failure of a component. This condition is logged as an "event".

Illustration 1 g00688506

1. Enter the service mode. Highlight the second line by using the keys for direction. The third line of the illustration shows the number of the total number of logged events.

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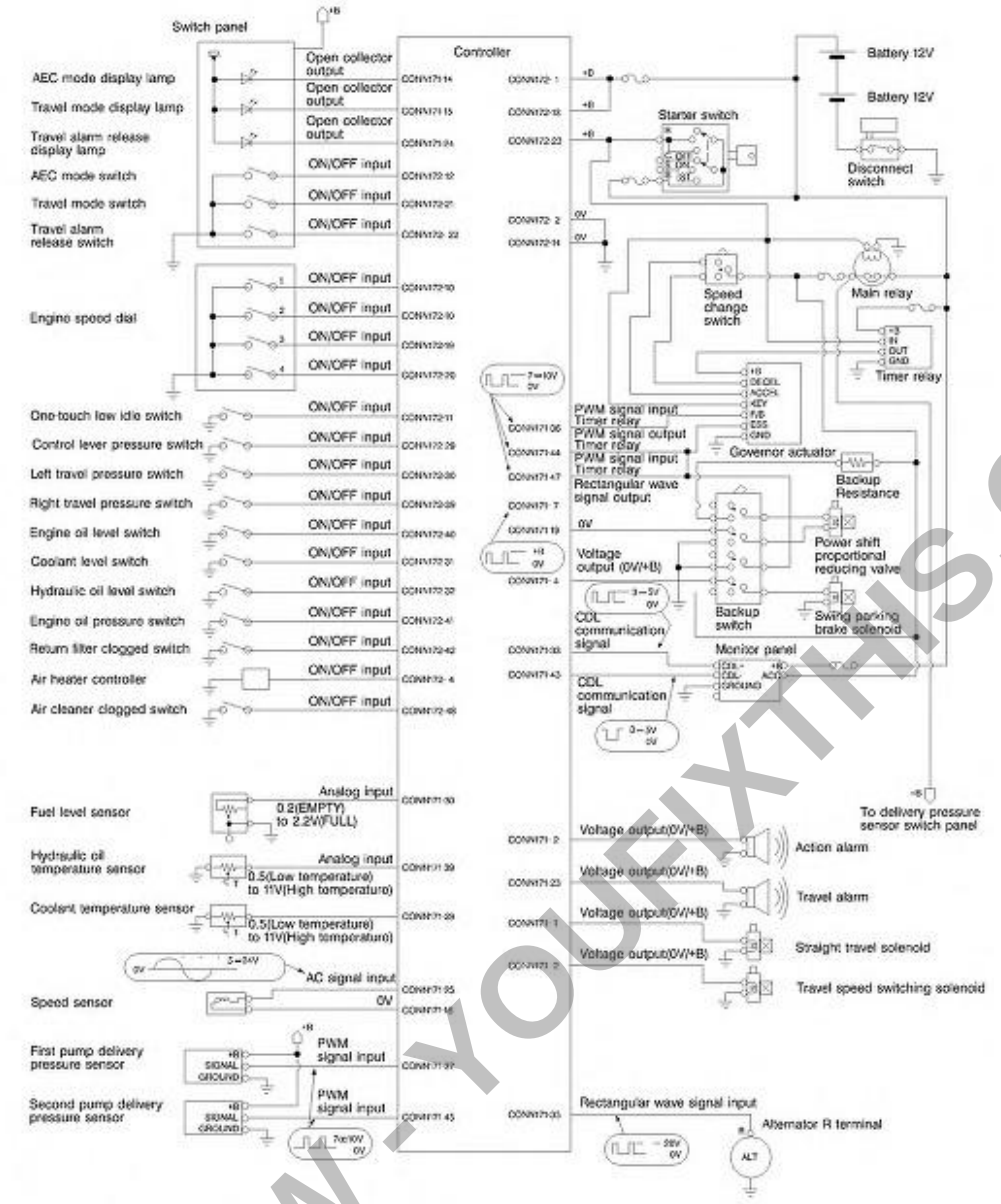

NOTE : If there is no waveform shown, it means direct current voltage.
The described voltage is shown for reference. (Sometimes, the figures may be different.)
+B indicates 18 to 32 V. ON/OFF input indicates that when contact is close: 0V, when switch contact is open: 14 to 17V.

Illustration 3 g00989438

318C and 322C System Schematic

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Media Number -RENR2462-17 Publication Date -01/05/2013 Date Updated -03/05/2013

i01756926

MID 124 - CID 1392 - FMI 04

SMCS - 7631-038-OJ

Conditions Which Generate This Code:

This diagnostic code is recorded when the second output driver in the MSS ECM is shorted to ground. **This circuit is not used on all machines. Check for the presence of wires at contact 5 and contact 52 before you perform the procedure.**

The possible causes of this diagnostic code are listed below:

- The wiring in the machine harness has failed.
- The driven component in the circuit has failed.
- The ECM has failed. This is unlikely.

Test Step 1. CHECK THE WIRING HARNESS.

A. Disconnect the wiring harness connector from the MSS ECM.

B. Measure the resistance between pin 18 in the wiring harness and a ground on the machine.

Expected Result:

The resistance is greater than 5000 Ohms.

Results:

- **YES -** The resistance is greater than 5000 Ohms (no continuity). Harness circuit resistance is correct. Proceed to Test Step 3.
- **NO -** Resistance is less than 5000 Ohms (continuity). The machine harness is faulty. There is a short between frame ground and the machine harness. The driven component in the circuit may also be bad. Proceed to Test Step 2.

Test Step 2. CHECK THE COMPONENT.

A. Trace the harness to the driven component in the circuit. The component will be a relay. The component may also be a solenoid.

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3. Damaged Brushes In Alternator

   Install new brushes.

4. Damaged Rotor (Field Coil)

   Install a new rotor.

Problem 27

The Alternator Charge Rate Is Low Or The Alternator Charge Rate Is Not Regular.

Probable Cause

1. Loose Drive Belt For The Alternator

   Adjust the drive belt in order to obtain the correct tension.

2. Damaged Charging, Ground Return Circuit Or Battery Connections

   Inspect all cables and connections. All connections should be cleaned and tightened. Replace all damaged parts.

3. Damaged Alternator Regulator

   Repair the alternator regulator or replace the alternator regulator.

4. Damaged Brushes In Alternator

   Install new brushes.

5. Damaged Rectifier Diodes

   Replace the damaged rectifier diode.

6. Damaged Rotor (Field Coil)

   Install a new rotor.

Problem 28

The Alternator Charge Is Too High.

Probable Cause

1. Loose Connections On The Alternator Or The Alternator Regulator

   Tighten all connections to the alternator or the alternator regulator.

2. Damaged Alternator Regulator

   Install a new alternator regulator.

Problem 29

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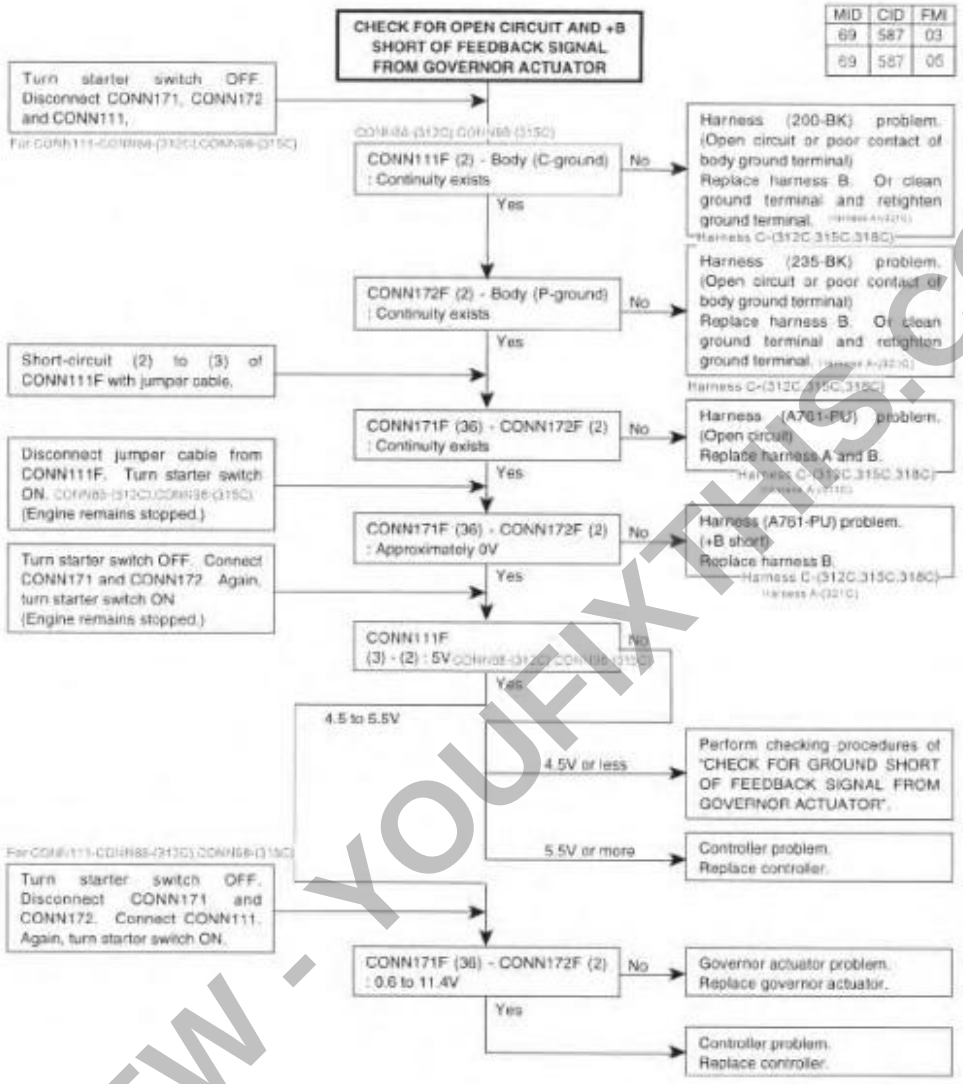

Illustration 2 g01009338

"Check For Ground Short Of Feedback Signal From Governor Actuator"

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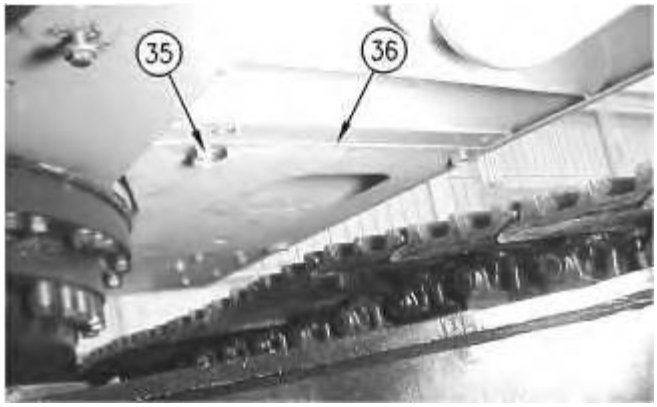

Illustration 4 g00716826

7. Position access cover (36) on the machine. Install the washers and bolts (35) .

Illustration 5 g00716828

8. Position access cover (33) on the machine. Install the washers and bolts (34) .

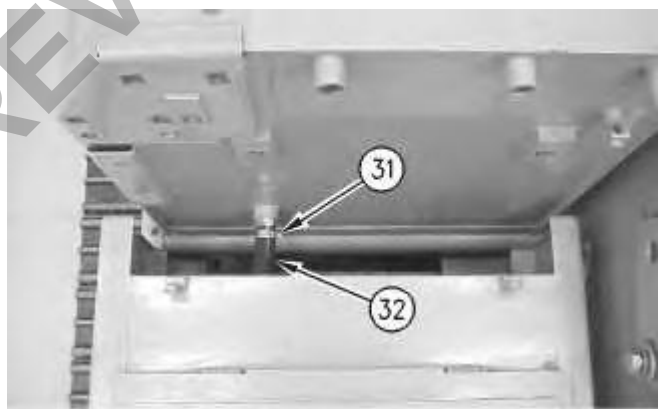

Illustration 6 g00702777

9. Connect hose (32) to the fuel tank. Tighten hose clamp (31) .

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i03320320

Travel Counterbalance Valve

SMCS - 5051-KV

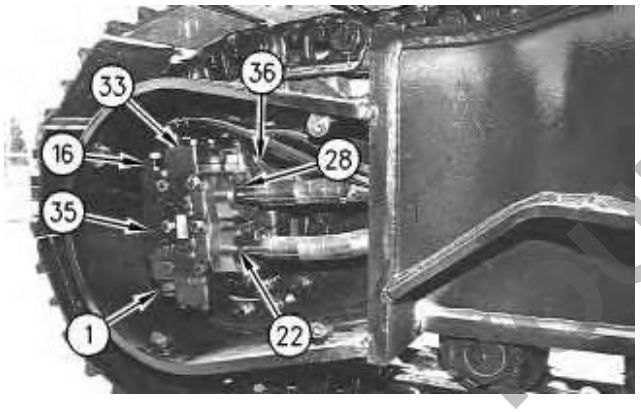

Illustration 1 g00701651

Left travel motor and travel counterbalance valve

(1) Crossover relief valve (reverse travel)

(16) Crossover relief valve (forward travel)

(22) Port (supply port for forward travel)

(28) Port (supply port for reverse travel)

(33) Counterbalance valve

(35) Travel counterbalance valve

(36) Left travel motor

Travel counterbalance valve (35) consists of counterbalance valve (33) , crossover relief valve (1) and crossover relief valve (16) . The travel counterbalance valve is bolted to the travel motor. The travel counterbalance valve has the following four functions.

- The travel counterbalance valve prevents a shock load when travel is stopped.

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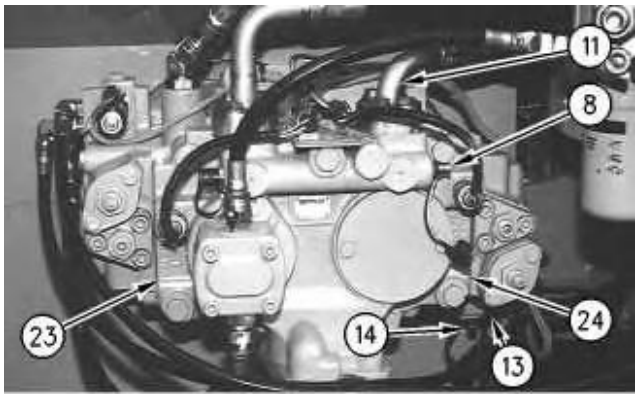

Illustration 6 g00822311

Pump compartment

(8) Pressure tap (left pump delivery pressure)

(11) Delivery line (left pump)

(13) Negative flow control line (left pump)

(14) Pressure tap (power shift pressure)

(23) Right pump

(24) Left pump

1. Position the machine on level ground.
2. Stop the engine.
3. Release the pressure in the hydraulic system. Refer to Testing And Adjusting, "Hydraulic System Pressure - Release".
4. Install the following tools in accordance with the circuit diagram. Refer to Illustration 2.
   a. Disconnect delivery line (11) from left pump (24) .
   b. Install seal (42) , half flanges (48) and blocking cover (17) to the end of delivery line (11) by using bolts (46) and washers (47) .
   c. Assemble and install seal (42) , adapter (49) , seals (34) , fitting (29) and nipple assembly (36) to left pump (24) by using half flanges (48) , bolts (46) and washers (47) .

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3. Release the pressure in the hydraulic system. Refer to Testing and Adjusting, "Hydraulic System Pressure - Release" for the machine.

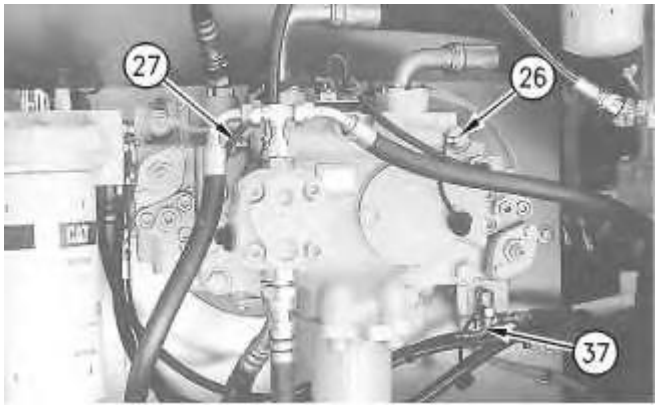

Illustration 1 g01000947

Pump compartment for the 325C

(26) Pressure tap (idler pump)

(27) Pressure tap (drive pump)

(37) Pressure tap (power shift)

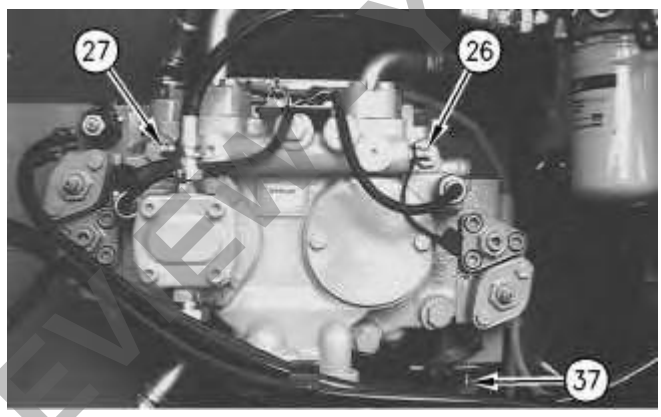

Illustration 2 g01000946

Pump compartment for the 320C

(26) Pressure tap (idler pump)

(27) Pressure tap (drive pump)

(37) Pressure tap (power shift)

4. Connect a 40000 kPa (5800 psi) pressure gauge to pressure tap (27) .

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- The implement ECM has failed. This is unlikely.

System Response:

When this diagnostic code occurs, there is no warning on the monitor. The diagnostic code will be active when the control for the work tool is actuated. The diagnostic code will be active when the control for the work tool is not actuated. The diagnostic code will cause the solenoid to be energized at all times.

Test Step 1. CHECK THE SOLENOID CIRCUIT FOR A SHORT TO THE +BATTERY CIRCUIT.

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

B. Disconnect the machine harness from the solenoid.

C. Disconnect the two machine harness connectors from the implement ECM.

D. At the machine harness connector, measure the resistance from the signal contact CONN171-8 (wire M737-WH) of the machine harness to all possible sources of +battery circuit. Measure the resistance to all contacts that are used in the CONN171 and CONN172 harness connectors.

Expected Result:

Each resistance measurement should be greater than 5000 ohms.

Results:

- **OK -** Each resistance measurement is greater than 5000 ohms. The machine harness is correct. Proceed to test step 2.

- **NOT OK -** One or more resistance measurements is not correct. There is a short in the machine harness. The short is between signal contact CONN171-8 (wire M737-WH) and the circuit with the low resistance measurement. Repair the machine harness or replace the machine harness.**STOP**

Test Step 2. CHECK IF THE DIAGNOSTIC CODE REMAINS.

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

B. Reconnect all harness connectors.

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

D. Enter the service mode of the operator monitor and clear all of the inactive diagnostic codes.

E. Operate the machine.

F. Determine if CID 1524 FMI 03 is present. Check the "ACTIVE ERROR" screen on the monitor.

Expected Result:

The diagnostic code for the solenoid is NOT present.

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Illustration 19 g00716705

27. Remove bolts (38) and the washers in order to disconnect tube assembly (39) from the hydraulic tank.

28. Remove the O-ring seal from tube assembly (39) .

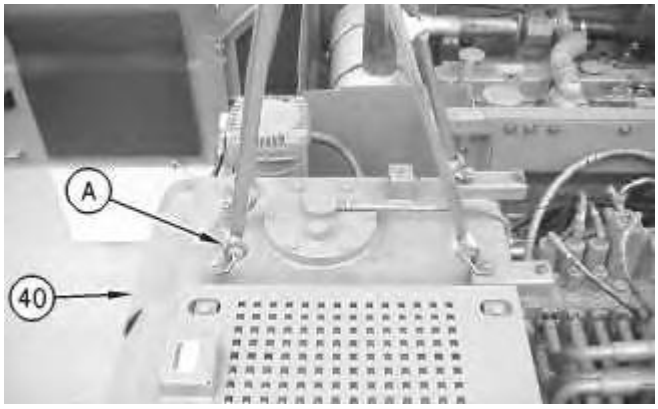

Illustration 20 g00716707

29. Attach Tooling (A) , and a suitable lifting device to hydraulic tank (40) .

Illustration 21 g00716709

30. Remove bolts (41) and the spacers that secure the hydraulic tank to the frame.

31. Remove hydraulic tank (40) . The weight of hydraulic tank (40) is approximately 170 kg (375 lb).

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Maintenance Manual, "Sampling Interval and Location of Sampling Valve" for the correct location.

1. Release the hydraulic system pressure.

   ReferenceRefer to Disassembly and Assembly, "Hydraulic System Pressure - Release" in this manual.

WARNING

Personal injury can result from contact with refrigerant.

Contact with refrigerant can cause frost bite. Keep face and hands away to help prevent injury.

Protective goggles must always be worn when refrigerant lines are opened, even if the gauges indicate the system is empty of refrigerant.

Always use precaution when a fitting is removed. Slowly loosen the fitting. If the system is still under pressure, release it slowly in a well ventilated area.

Personal injury or death can result from inhaling refrigerant through a lit cigarette.

Inhaling air conditioner refrigerant gas through a lit cigarette or other smoking method or inhaling fumes released from a flame contacting air conditioner refrigerant gas, can cause bodily harm or death.

Do not smoke when servicing air conditioners or wherever refrigerant gas may be present.

Use a certified recovery and recycling cart to properly remove the refrigerant from the air conditioning system.

NOTICE

Effective July 1, 1992 regulations prohibit the venting of any refrigerant into the atmosphere. Refer to Caterpillar publications Service Manuals, SENR3334, SENR5664, and NEDG5065 for the proper procedure, the proper equipment, and the proper tools needed in order to reclaim refrigerant from any Caterpillar equipment.

Note: Reclaim the refrigerant before any lines are loosened or before any bolts are loosened.

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4. Remove bolt (56) and spring (57) from the spool.

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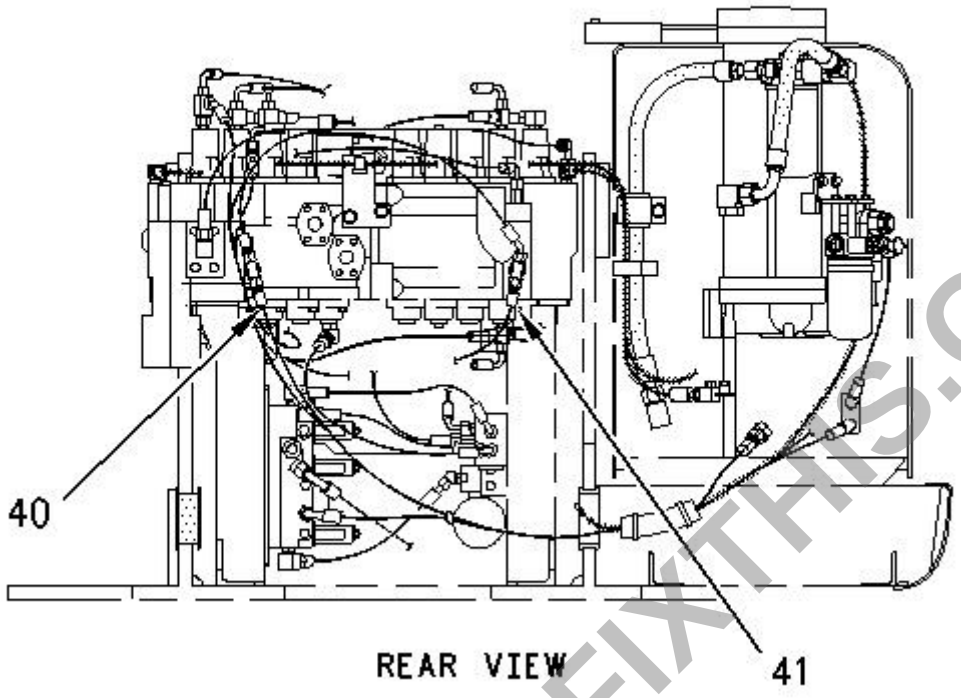

Illustration 7 g00718217

11. Connect hose assembly (40) to the back of the main control valve.

    Note: The opposite end of hose assembly (41) will be connected to the boom drift reduction valve.

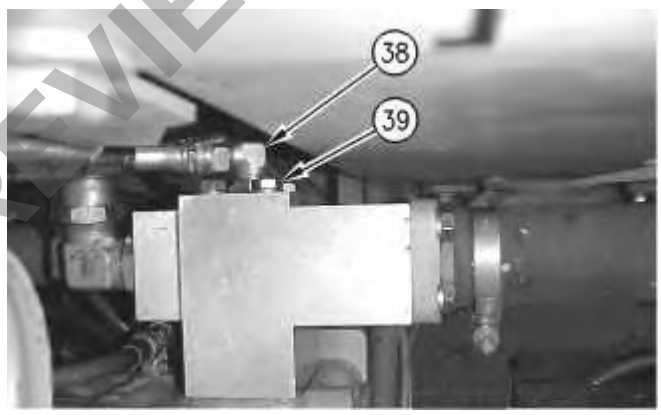

Illustration 8 g00717985

12. Install the washers and bolts (39) that hold the slow return check valve to the main control valve.

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12. Remove the spool assembly from the pilot valve.

13. Use the following procedure to disassemble the spool assembly.

    Note: Spool (22) is assembled in Port (1) and Port (3) in the pilot valve. Spool (23) is assembled in Port (2) and Port (4) in the pilot valve.

    a. Apply pressure to seat (11) by hand. Put the end of the spool in the slotted opening of seat (11). Remove seat (11) .

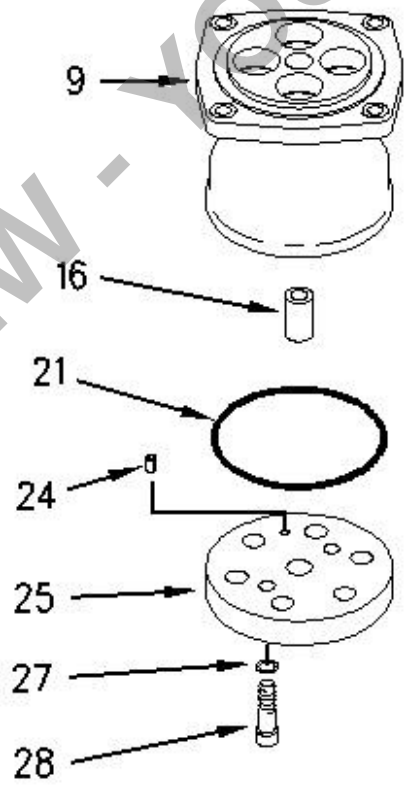
    Note: Spring (13) is installed on spool (22). Spring (15) is installed on spool (23) .

    b. Remove spring (13) or spring (15) from the spool.

    c. Remove washer (19) from the spool.

14. Remove spring (26) from the pilot valve.

15. Repeat Steps 7 through 14 in order to remove the other three spool assemblies.



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- Identifying the Refrigerant
- Identifying the Air Conditioning System
- Identifying the Heating System
- Refrigerant Expansion Valve System
- Refrigerant Orifice Tube System
- Refrigerant Compressor
- Refrigerant Condenser
- Refrigerant Receiver-Dryer
- Refrigerant Expansion Valve
- In-line Refrigerant Dryer
- Refrigerant Orifice Tube Assembly
- Evaporator Coil
- Refrigerant Accumulator
- Refrigerant Compressor Protection System
- Temperature Control
- Cab Pressurization and Filtration System
- Condensate Drainage System
- Service Intervals
- Glossary of Terms

Testing and Adjusting

312C, 315C, 318C, 319C, 320C, 321C, 322C, 325C, 330C and M325C Excavators and 325C MHPU and 330C MHPU Mobile Hydraulic Power Units Engine and Pump Control - V2 - RENR3814

- Communication Problem Between Controller and Monitor - Troubleshoot - "CID 248" and "CID 588"
- Warning "Fuel Leftover Is Little" Is Displayed - Troubleshoot - CID 96
- Warning "Engine Coolant Temperature Is High" Is Displayed - Troubleshoot - CID 110
- Warning "Hydraulic Oil Temperature Is High" Is Displayed - Troubleshoot - CID 600
- Warning "Engine Oil Pressure Is Low" Is Displayed - Troubleshoot
- Warning "Air Cleaner Filter Is Clogged" Is Displayed - Troubleshoot
- Warning "Engine Coolant Level Is Low" Is Displayed - Troubleshoot
- Warning "Hydraulic Oil Level Is Low" Is Displayed - Troubleshoot
- Warning "Engine Oil Level Is Low" Is Displayed - Troubleshoot
- Warning "Return Filter Is Clogged" Is Displayed - Troubleshoot
- Warning "Battery Charge Is Abnormal" Is Displayed While Engine Is Running - Troubleshoot - CID 167
- Check of Fault Alarm - Troubleshoot - CID 2002 for 319C, 320C and 322C or CID 271 for 312C, 315C, 318C, 321C, 325C, and 330C
- Check of Straight Travel Proportional Reducing Valve - Troubleshoot - CID 1525
- Warning "Water Separator Has Water" Is Displayed - Troubleshoot

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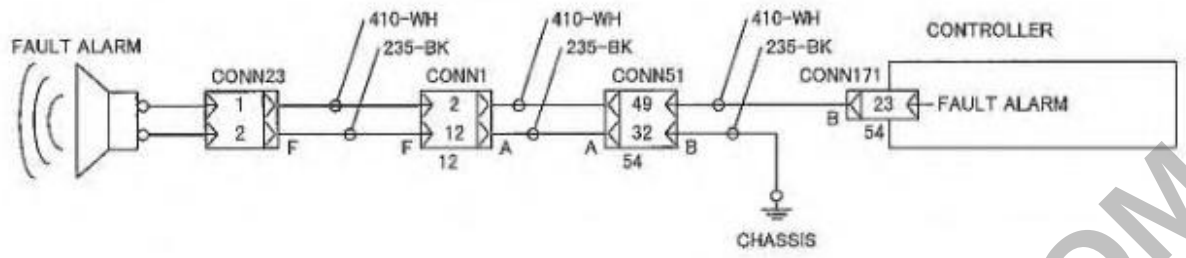

Illustration 11 g00824918

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5. Turn off the power supply.
6. Reconnect the sure seal connector (2) .
7. Disconnect the sure seal connector (5) .
8. Connect the multimeter leads to pin (A) and pin (C) on the sure seal connector that is on potentiometer assembly (6). Set the multimeter to read ohms. The multimeter should read 5000 ± 500 ohms.
9. Connect the multimeter leads to pin (A) and pin (B) on the sure seal connector that is on potentiometer assembly (6). Turn the knob on the potentiometer assembly (6). The resistance should vary smoothly.
10. Reconnect sure seal connector (5) .
11. Disconnect sure seal connector (4) .
12. Connect the multimeter leads to pin (3) and pin (5) on the sure seal connector that is on electronic water valve assembly (8). Set the multimeter to read ohms. The multimeter should read 5000 ± 500 ohms.
13. Connect the multimeter leads to pin (1) and pin (2) on the sure seal connector that is on board control assembly (7). Set the multimeter to DC voltage.
14. Turn on the power supply.
15. Turn the knob on the potentiometer assembly (6). The multimeter should read either 9 to 10 VDC or the multimeter should read −9 to −10 VDC.
16. Turn off the power supply.
17. Connect two wires to a remote 12 volt DC power supply.

    Note: Do not use a power supply higher than 12 volts DC. If you use a power supply higher than 12 volts DC, you may damage the water valve assembly.
18. Connect one wire to pin (2) on the sure seal connector that is on the electronic water valve assembly (8) .
19. Touch the other wire to pin (1) on the sure seal connector that is on electronic water valve assembly (8) in order to pulse motor (10). The motor should turn clockwise or counterclockwise. The polarity of the power supply determines the direction of rotation.

    Note: Do not pulse motor (10) for more than a fraction of a second. If you supply power for a longer period of time you may damage the water valve assembly.
20. Disconnect the test equipment and reconnect sure seal connector (4) .

Type 1B - Electronic Heat Control Circuit for Water Valve using a Potentiometer and Series Resistor, Regulated Supply Voltage

Note: An electronic heat control that only has an electronic water valve is classified as a Type 1 electronic heat control.

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Illustration 13 g00712119

13. Install packing (3) in plug (8) .

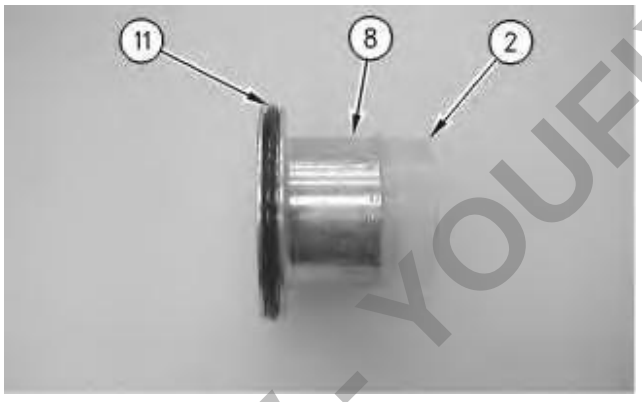

Illustration 14 g00712118

14. Install cap (2) and new O-ring seal (11) on plug (8) .

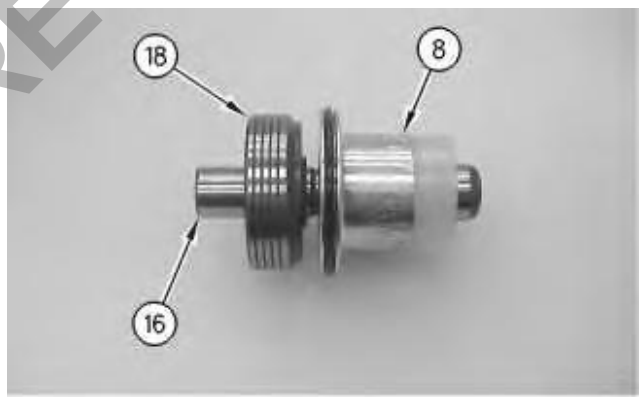

Illustration 15 g00712111

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Hydraulic Tank and Filter

SMCS - 5056; 5068

S/N - AKH1-UP

S/N - ALF1-UP

S/N - AMC1-UP

S/N - ANB1-UP

S/N - BCB1-UP

S/N - BDB1-UP

S/N - BDC1-UP

S/N - BER1-UP

S/N - BPR1-UP

S/N - BRX1-UP

S/N - CCD1-UP

S/N - EAG1-UP

S/N - GNG1-UP

S/N - HKT1-UP

S/N - MAB1-UP

S/N - PAB1-UP

S/N - RAW1-UP

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