i01563814

Air Inlet and Exhaust System

SMCS - 1050

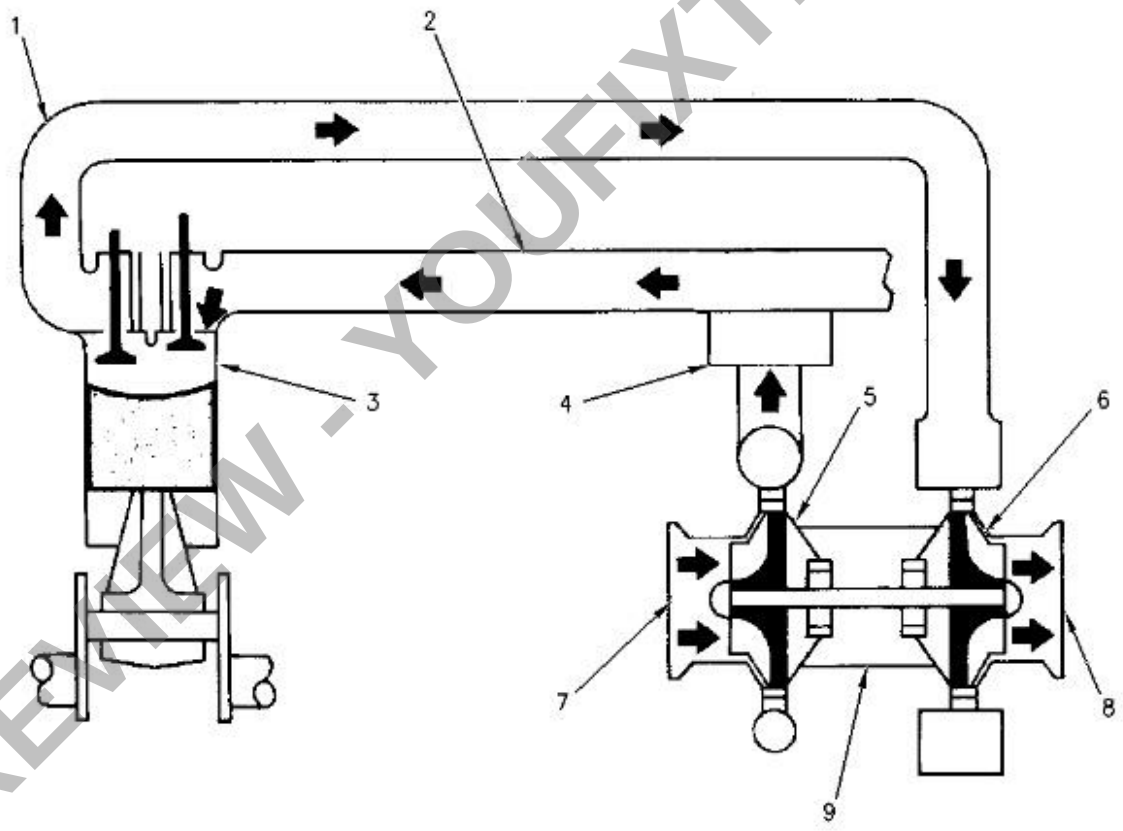


Illustration 1 g00549374

Air Inlet and Exhaust System Schematic

(1) Exhaust manifold

(2) Inlet manifold

(3) Engine cylinder

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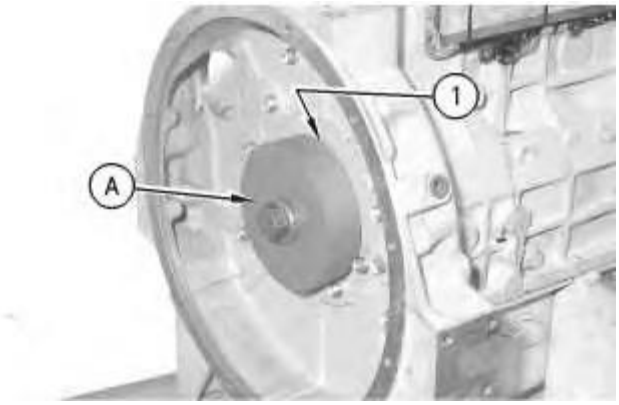


Illustration 3 g00604874

e. Remove Tool (A) and check crankshaft rear seal (1) (not shown) for correct installation.

End By: Install the flywheel. Refer to Disassembly and Assembly, "Flywheel - Install".

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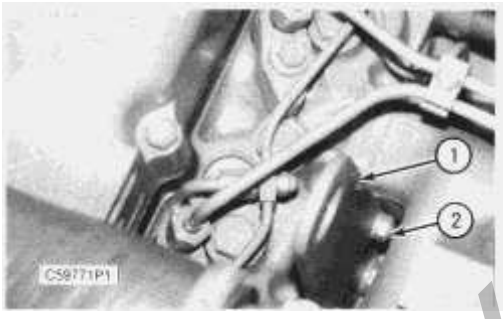
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Lifting Eye (Front)

SMCS - 1122-010

Remove & Install Lifting Eye (Front)

1. Open the engine hood assembly.



2. Remove two bolts (2) and washers.

3. Remove lifting eye (1).

NOTE: For installation of the lifting eye (front), reverse the removal steps.

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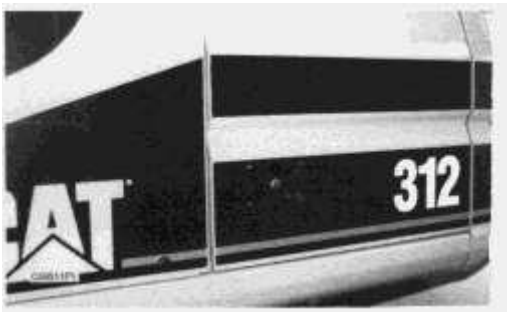
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Media Number -SENR6149-00 Publication Date -01/08/1993 Date Updated -12/10/2001

Water Temperature Regulator

SMCS - 1355-010

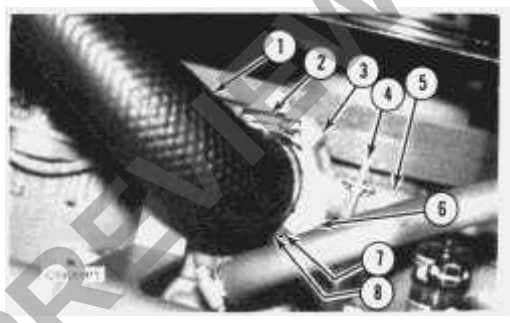
Remove & Install Water Temperature Regulator



1. Open the left access door to the engine compartment.

2. Open the radiator drain. Drain the coolant into a suitable container.

3. Open the engine hood assembly.



4. Loosen hose clamp (2).

5. Disconnect hose (1).

6. Loosen wire clamp (4).

7. Disconnect hose (5).

8. Remove three bolts (6) and washers.

9. Remove elbow (3).

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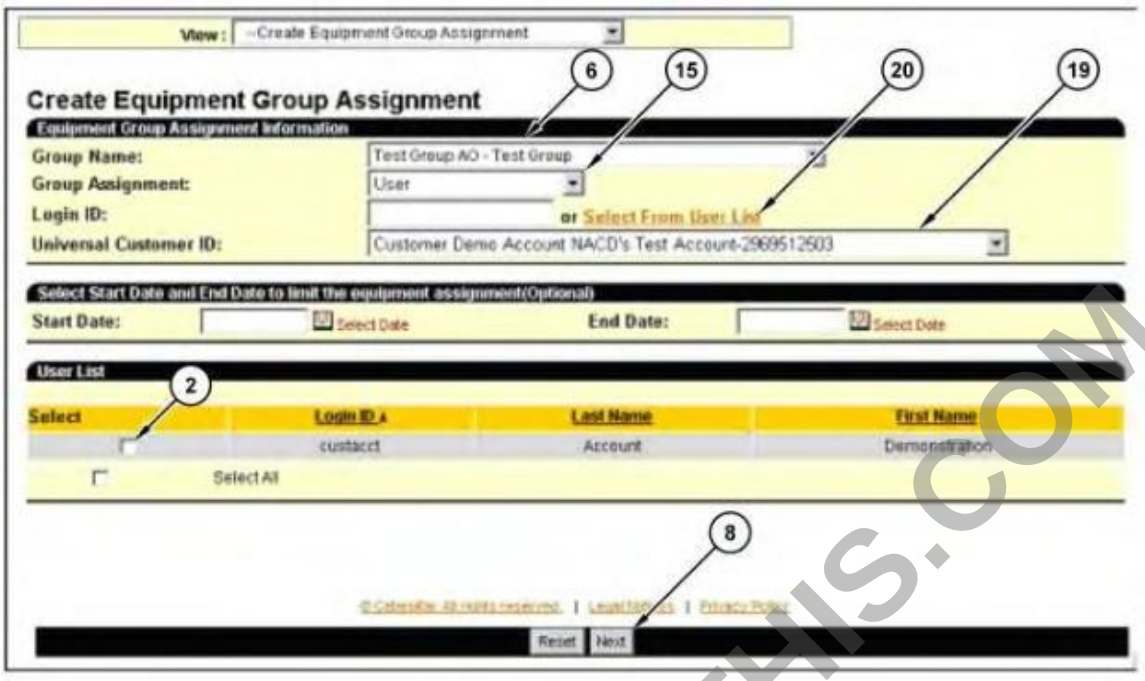


Illustration 27 g01730061

"Create Equipment Group Assignment" for the user

(6) "Group Name" drop-down menu

(15) "Group Assignment" drop-down menu

(20) "Login ID" field and "Select From User List" link

(19) "Universal Customer ID" drop-down menu

(2) Check box

(8) "Next" button

1. From either the "Equipment Groups" section of the "Administration" screen or the "View" drop-down menu, select "Create Equipment Group Assignment". The "Create Equipment Group Assignment" screen will be displayed.
2. Select the name of the group you wish to assign to a user from the "Group Name" drop-down menu (6) .
3. Select "User" from the "Group Assignment" drop-down menu (15) . The "Login ID" field and "Select FromUser List" link (20) will appear below the "Group Assignment" drop-down menu.
4. Enter a valid CWS-ID in the "Login ID" field or click the "Select From User List" (20) .

   If you entered a CWS-ID, skip to Step 6. If you clicked "Select From User List", a "Universal Customer ID" drop-down menu (19) will appear below the "Login ID" field.
5. From the "Universal Customer ID" drop-down menu (19) , select the UCID for which the user you wish to assign the equipment group pertains.

   The users that pertain to the selected UCID appear in the "User List" section
6. Enter the timeframe for the assignment to last by clicking the calendar icons next to the "Start Date" field and "End Date" field and selecting a date.

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(1) Check box

(2) "Fault Codes" link

View "Fault Code History" (Event code and Diagnostic Code)

By using Health Watch, you can view a record of all previous fault codes that were recorded through EquipmentManager software.

In order to view the "Fault Code History" screen, use the following procedure:

1. From the "Fault Codes" screen, click the "Fault Codes" link (2) or the "view history details" link in the "Latest Fault Codes" column. The "Fault Code History" screen will be displayed.

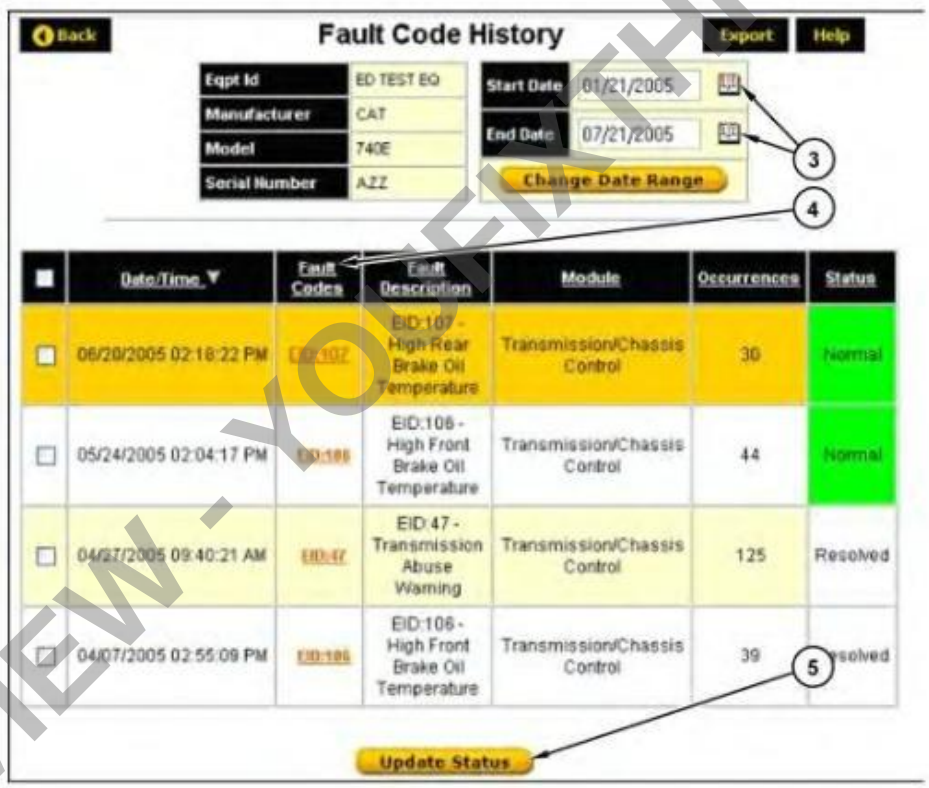


Illustration 2 g01737839

"Fault Code History"

(3) "Start Date" field and "End Date" field

(4) "Fault Codes" column

(5) "Update Status" button

2. Click on the icon for the calendar next to the "Start Date" field and "End Date" field (3) . Select a date in order to indicate a time period for the history of the fault code.

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from EquipmentManager. This frequency will be used for the entry of data of service meter units for equipment with Maintenance Watch subscriptions. The following values are available: "Weekly", "Monthly", "6 Weeks" and "Never".



Illustration 13 g01708156

The "Planned Maintenance" screen with "Load SMU"

(11) "Load SMU" link

Illustration 13 above displays the "Planned Maintenance" screen for a piece of equipment that has no PLM and a Maintenance Watch subscription. Notice that "Load SMU" link (11) is present in the "Current" column. In order to update the SMU manually, select this link. After clicking this link, the "Manual Maintenance – Service Meter Update" window will be displayed.

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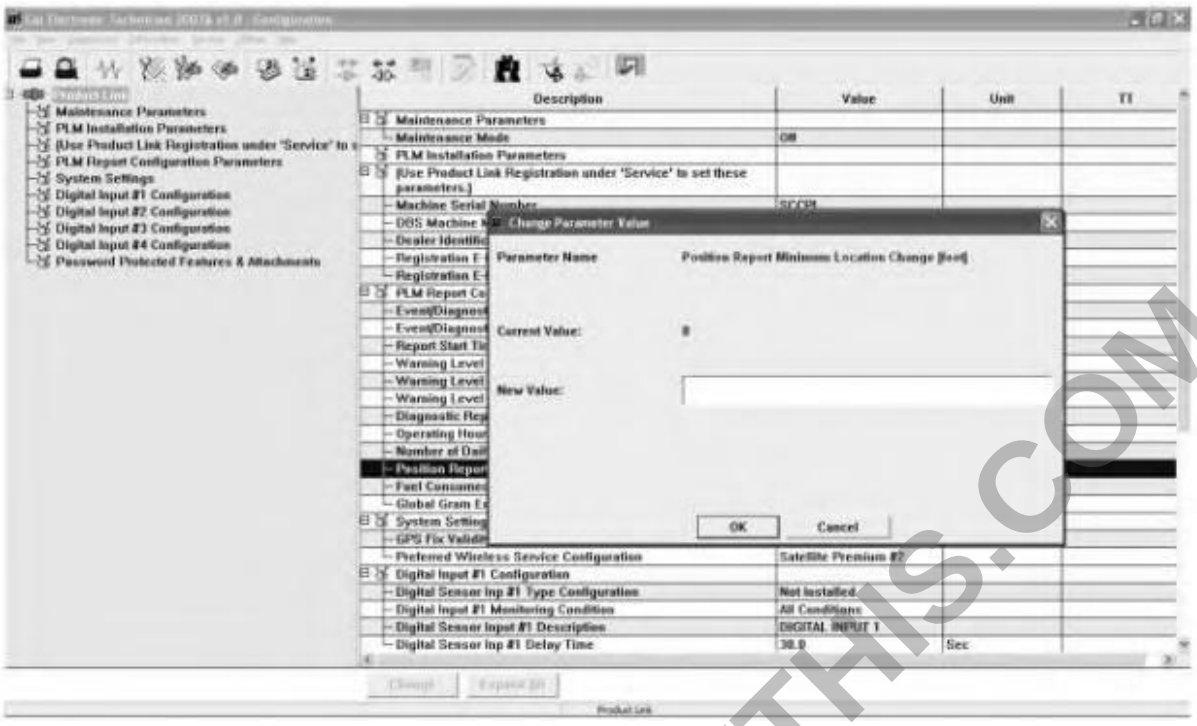


Illustration 8 g01361744

Screen of "Position report Minimum Location Change" Parameter

"Fuel Consumed Report Configuration Status" Parameter

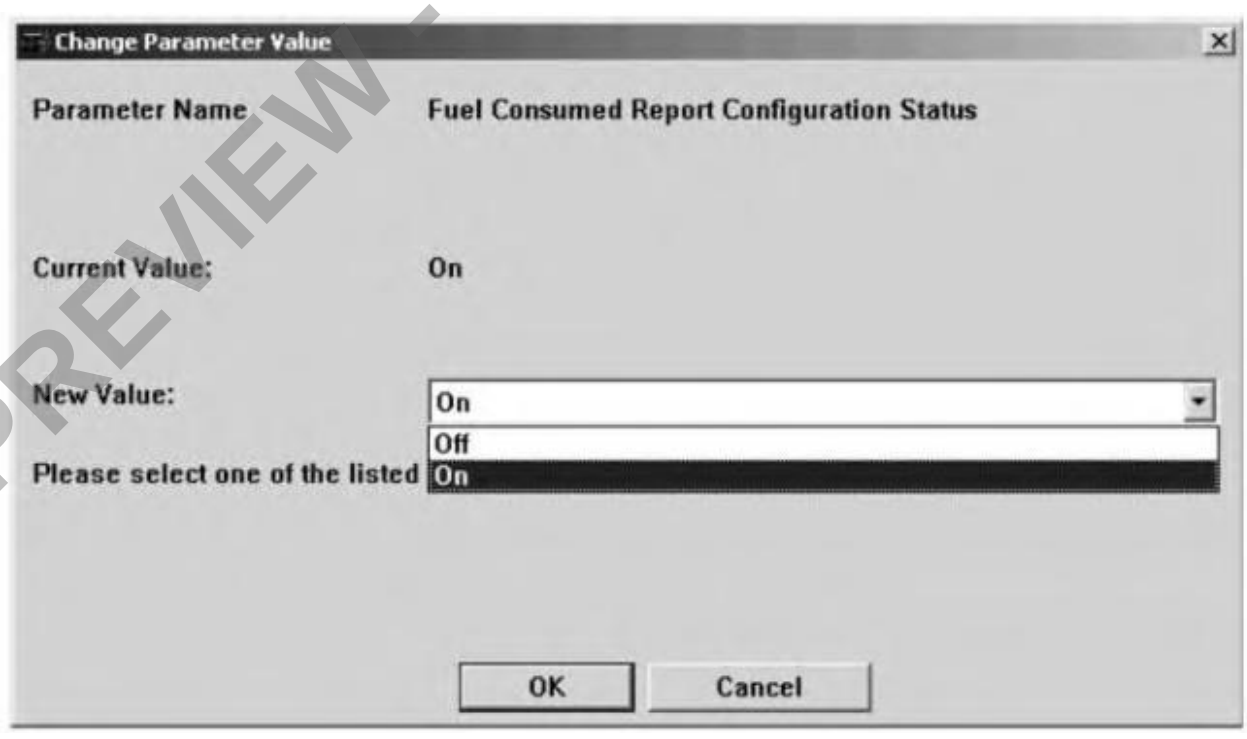
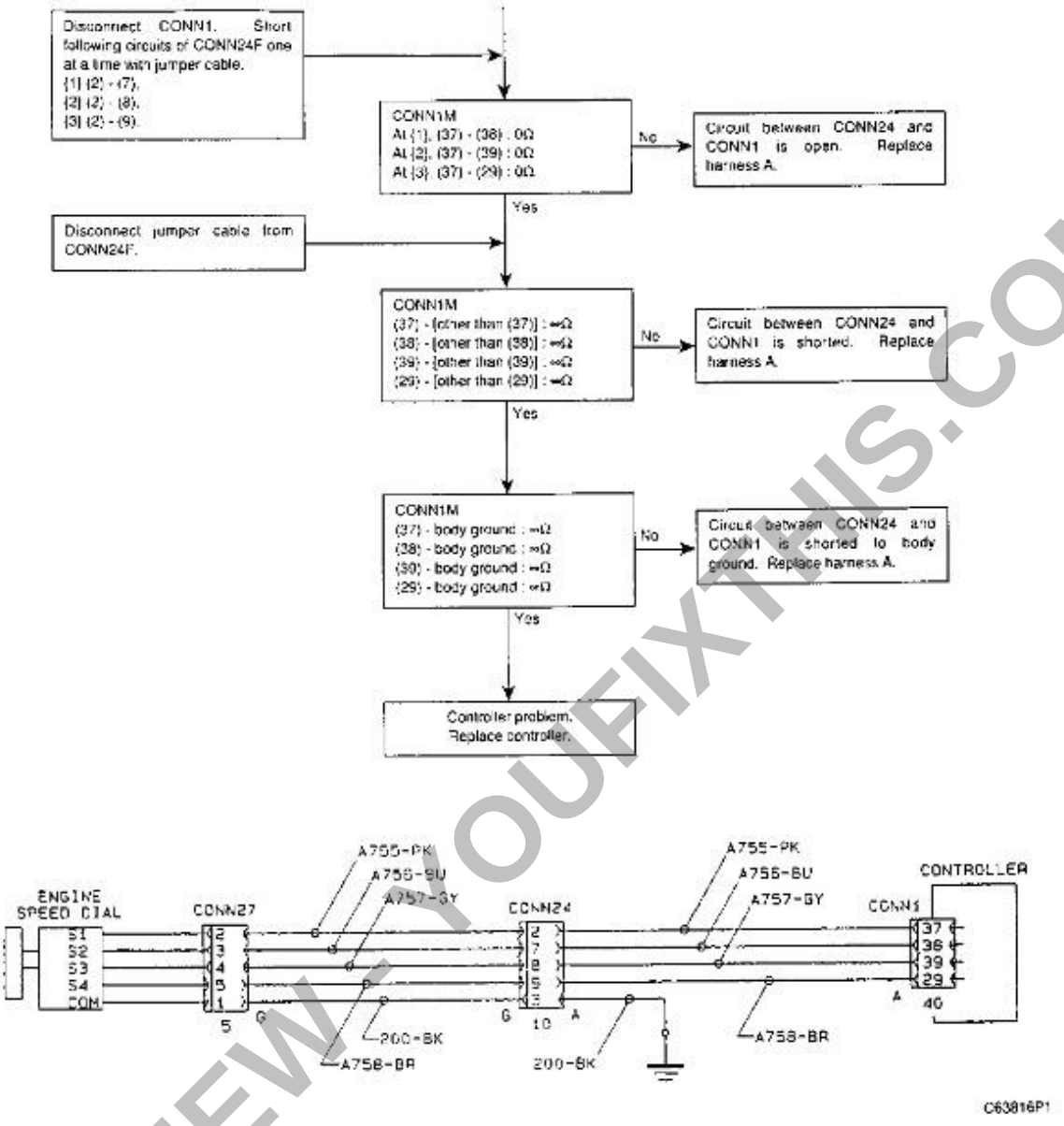


Illustration 9 g01361745

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"CONTROLLER RECEIVES SIGNAL OF ENGINE SPEED OTHER THAN SPECIFIED 10 FROM THE ENGINE SPEED DIAL" Continued...



[Elec #6-1] Governor Actuator Feedback Sensor Circuit Is Open Or Shorted To Battery Voltage

Problem:

Governor actuator feedback sensor circuit is open or shorted to battery voltage.

Solution:

Check to ensure that CONN44, 10, 6, 9, and 2 are properly connected. If the problem still exists, troubleshoot according to the following sequence chart.

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i04905743

Wiring Harness (Open Circuit) - Test

SMCS - 1408-081

An open is a failure of an electrical circuit that results in no flow of electrical current. An open circuit is usually caused by failed electrical wires or a poor connection of electrical connectors. If an electrical wire or a connection is broken, the flow of electrical current through the circuit is interrupted. A normally closed circuit will have less than 5 ohms of resistance. The following procedure explains the test for an open circuit:

ReferenceFor a complete electrical schematic, refer to Electrical System Schematic for the machine that is being serviced.

TEST FOR AN OPEN CIRCUIT.

1. Identify the connectors and the wire numbers of the suspect circuits. Use the Electrical System Schematic of the machine to identify the circuits.
2. Turn the key start switch and the disconnect switch to the OFF position.
3. Disconnect the component and the ECM from the wiring harness.
4. At one of the disconnected harness connections, place a jumper wire from the contact of the suspect wire to frame ground.
5. At the other connector of the machine harness, use the multimeter probes to measure the resistance from the contact of the suspect wire to frame ground.

   Expected Result: The resistance is less than 5 ohms.

   OK - The resistance is less than 5 ohms. The harness circuit is correct.

   Stop.

   NOT OK - The resistance is greater than 5000 ohms. There is an open in the machine harness.

   Repair: Repair the machine harness or replace the machine harness.

   Stop.

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EID	Level		
861	1	Synchronized clock notification of manual synch required	In a PL321 system using sync-clock and Product Link is not the master ECM, the Product Link module will automatically sync to the master ECM hours if the difference is not greater than 50 hours. If the difference is greater than 50 hours, a diagnostic will be generated in Cat ET that indicates that a manual sync is required. In that instance, sync the hours. In Cat ET, use "Service/Synchronize Service Meter Hours".
2131	2	Inclusion Geo-Fencing boundary violated	Inclusive Geo-Fence sets up a "virtual fence" around a work site. Once Inclusive Geo-Fence is activated, a report is generated if the machine leaves the work site area. No repair or service is required.
2132	2	Exclusion Geo-Fencing boundary violated	Exclusive Geo-Fence sets up a "virtual fence" around areas that the machine is not allowed to enter. A report is generated if a machine enters a restricted area. No repair or service is required.
2133	2	Time-Fencing boundary violated	Time Based Fence allows the owner of a machine to choose the time that a machine can be operated. A report is generated if the machine is operated outside of the time that is set for machine operation. No repair or service is required.
630	2	Switched Sensor #1 trip condition is activated	The Product Link PL300 has four additional inputs that can be configured in order to monitor switches on the machine. These inputs can be configured by using Caterpillar Electronic Technician (Cat ET service tool). Troubleshoot input as setup by the dealer.
631	2	Switched Sensor #2 trip condition is activated	The Product Link PL300 has four additional inputs that can be configured in order to monitor switches on the machine. These inputs can be configured by using Caterpillar Electronic Technician (Cat ET service tool). Troubleshoot input as setup by the dealer.
632	2	Switched Sensor #3 trip condition is activated	The Product Link PL300 has four additional inputs that can be configured in order to monitor switches on the machine. These inputs can be configured by using Caterpillar Electronic Technician (Cat ET service tool). Troubleshoot input as setup by the dealer.
633	2	Switched Sensor #4 trip condition is activated	The Product Link PL300 has four additional inputs that can be configured in order to monitor switches on the machine. These inputs can be configured by using Caterpillar Electronic Technician (Cat ET service tool). Troubleshoot input as setup by the dealer.

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6. Install the counterweight in the reverse order of removal.

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i02825655

Fuel Filter and Water Separator

SMCS - 1261; 1263

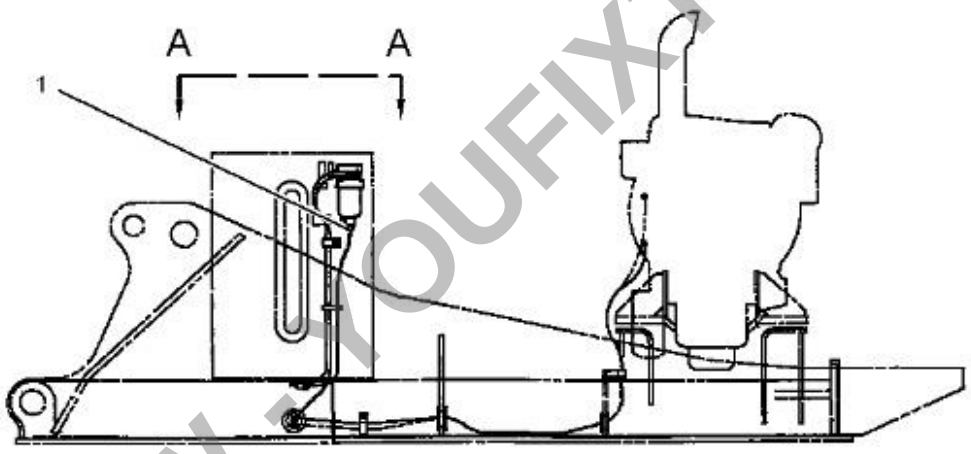
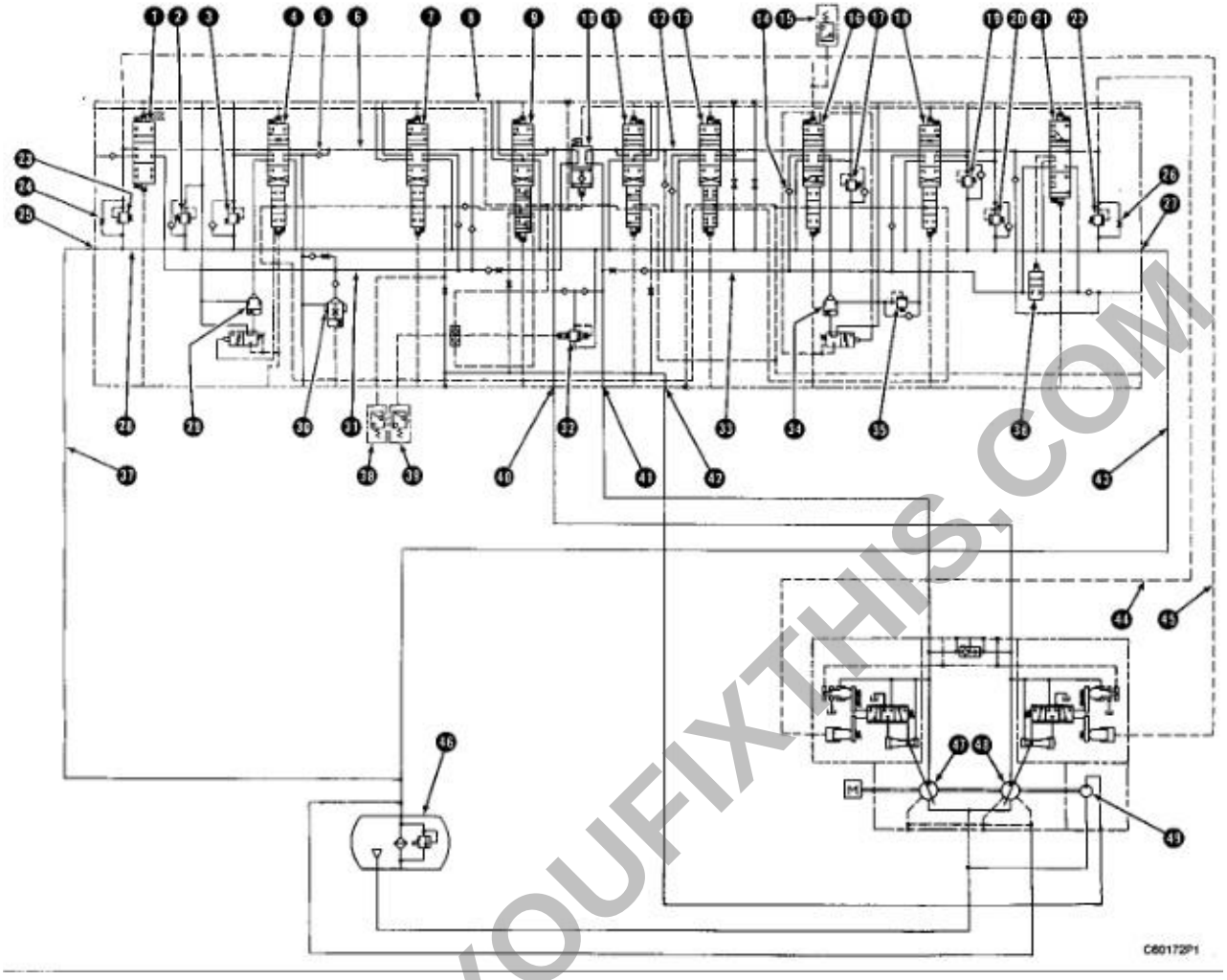


Illustration 1 g01409495

(1) Torque for the hose clamp ... 6.0 ± 0.5 N·m (55 ± 4 lb in)

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(1) Boom II control valve.

(2) Line relief valve (stick cylinder rod end).

(3) Line relief valve (stick cylinder head end).

(4) Stick I control valve.

(5) Load check valve.

(6) Center bypass passage.

(7) Swing control valve.

(8) Main control valves.

(9) Left travel control valve.

(10) Straight travel valve.

(11) Right travel control valve.

(12) Center bypass passage.

(13) Attachment control valve.

(14) Load check valve.

(15) Boom raise pressure switch.

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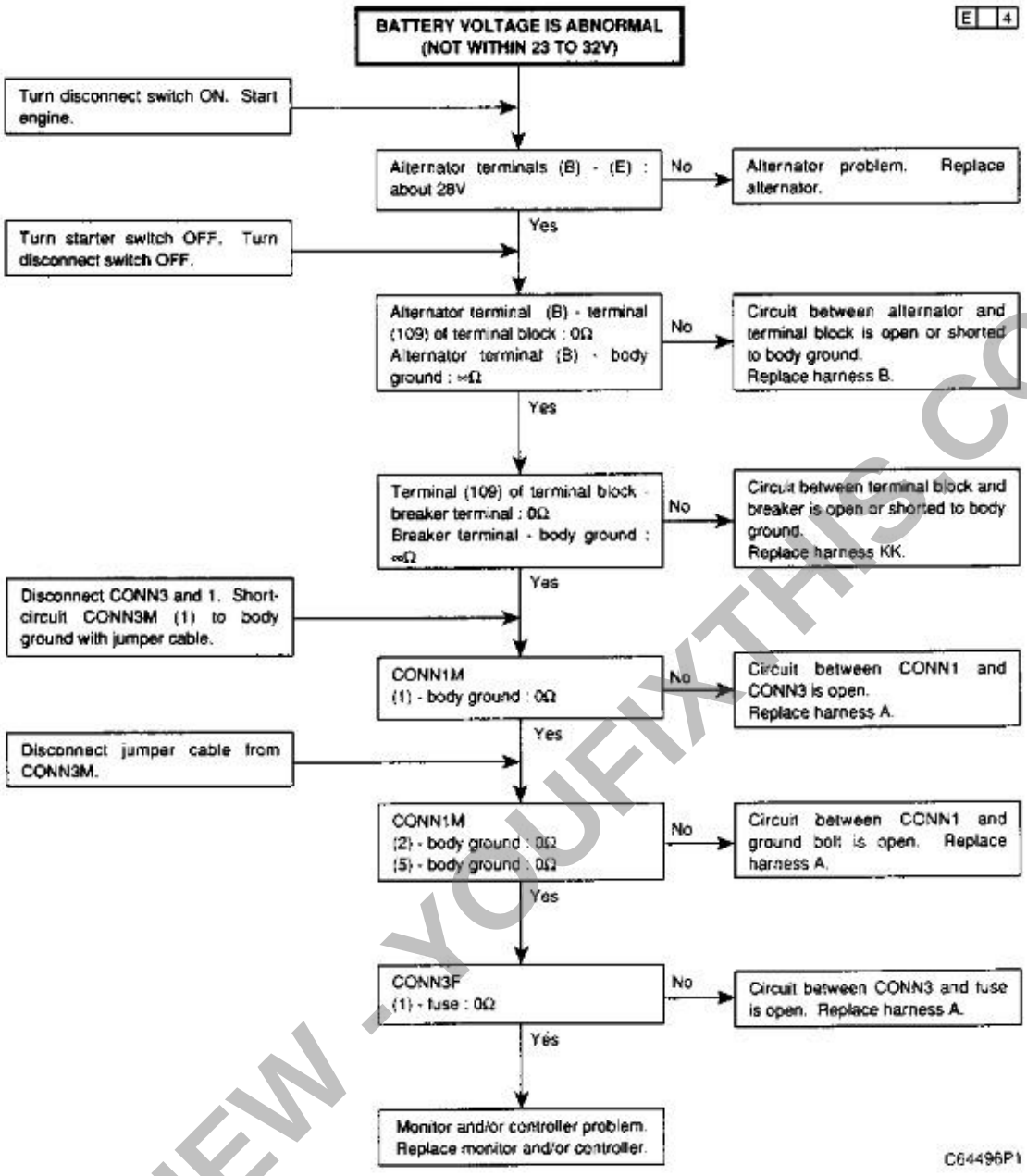
REAL TIME ERROR CODES		
Code	Description Of Problems	Checking Procedure Chart No.
E00	No problem	
E 1	Engine oil pressure is too low.	23
E 2	Engine coolant temperature is too high.	22
E 3	Hydraulic oil temperature is too high.	24
E 4	Battery voltage is too high.	18-1
E 5	Alternator terminal P is open.	18-2
E 6	Speed sensor is not installed correctly or its circuit is open.	3
E 7	Engine speed is not normal.	3
E 9	Voltage of governor actuator feedback sensor is too low.	21
E10	Governor actuator feedback sensor circuit is shorted to battery voltage or open.	6-1
E11	Governor actuator feedback sensor circuit is shorted to body ground.	6-2
E12	Governor actuator feedback sensor voltage is not stable.	21
E13	Governor actuator motor circuit is shorted to body ground.	6-3
E14	Governor actuator motor does not rotate or motor circuit is shorted to battery voltage.	6-4
E15	Governor backup switch is in "Man" (backup) position or governor actuator motor circuit is open.	6-5
E16	Proportional reducing valve circuit is shorted to body ground.	2-2
E17	Proportional reducing valve circuit is shorted to battery voltage.	2-3
E18	Proportional reducing valve circuit is open.	2-1
E25	Engine coolant temperature sensor circuit is shorted to body ground.	15-2
E27	Hydraulic oil temperature sensor circuit is shorted to body ground.	16-2
E31	Controller receives signal of engine speed other than specified ten from engine speed dial.	5
E32	There is more than 100 rpm difference between dial setting and actual rpm.	25
E33	Digital output circuit is shorted to battery voltage.	See Note item 2
E34	Governor actuator remains deactivated an elapse time of 2.5 seconds after speed dial setting.	6-6
E36	Monitor takes at least 1 second to respond to controller's signal.	26
E37	Monitor RAM (Random Access Memory) is not normal.	27
E38	Controller is informed of its error signal by monitor.	28
E39	Controller detects its error signal by itself.	29
E40	Error in controller memory.	30
E41	A controller for a different machine is installed or harness cord problem.	31
E48	Engine stalls.	32

NOTE: Go to the appropriate "Electronic Sequence Chart" to troubleshoot the problem on [E33] in accordance with the following:

Checking Procedure	Description
[Elec No.8-1]	Fine control solenoid valve circuit
[Elec No.8-1]	Swing priority solenoid valve circuit
[Elec No.9-1]	Travel speed solenoid valve circuit
[Elec No.11-2]	Chassis light circuit
[Elec No.11-4]	Boom light circuit
[Elec No.12-2]	Wiper circuit
[Elec No.12-4]	Washer circuit
[Elec No.14-3]	Action alarm circuit

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[Elec #18-2] Alternator Terminal P Circuit Is Open

Problem:

Alternator terminal P circuit is open.

Solution:

Check to ensure that CONN11, 9, and 2, and terminal P are properly connected. If the problem still exists, troubleshoot according to the following sequence chart.

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During diagnosis of the hydraulic system, remember that correct oil temperature, flow, and pressure are necessary for correct operation. Pump output (oil flow) is a function of engine speed (rpm). Oil pressure is caused by resistance to the flow of oil.

Machines Without Swing Lock Pin

WARNING

Hydraulic oil pressure can remain in the hydraulic systems on this machine after the engine and pump have been stopped. Serious injury can be caused if this pressure is not released before any service is done on the hydraulic systems. To prevent possible injury, refer to section, Release Of Pressure In The Hydraulic System, before any fitting, hose or component is loosened, tightened, removed or adjusted.

When possible, the bucket must always be lowered to the ground before service is started. When it is necessary for the boom to be in the raised position while tests or adjustments are done, be sure that boom, stick and bucket have correct support.

Always move the machine to a location away from the travel of other machines. Be sure that other personnel are not near the machine when the engine is running and tests or adjustments are being made.

During diagnosis of the hydraulic system, remember that correct oil temperature, flow, and pressure are necessary for correct operation. Pump output (oil flow) is a function of engine speed (rpm). Oil pressure is caused by resistance to the flow of oil.

Visual Checks

A visual inspection of the system is the first step when troubleshooting a problem. Make the inspection with the engine off and the implements lowered to the ground.

1. Check the level of the oil in the hydraulic tank. Slowly loosen the hydraulic tank air vent plug and release the pressure before the filler cap is removed.

2. Remove the filter element and check it for material that would give an indication of damage to a component.

3. Inspect all lines and connections for damage or leaks.

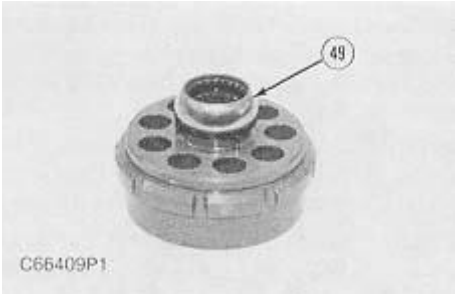
4. Inspect control linkage for bent, broken, or damaged components.

Checks During Operation

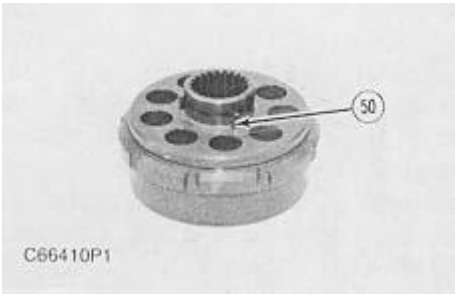
The checks during operation can be used to find leakage in the system. They can also be used to find a valve, pump, motor, or cylinder that is not working correctly. The speed of rod movement or the torque on a motor can be used to check the condition of the cylinders, motors, and pumps.

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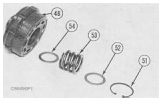


29. Remove bushing (49) from the barrel.



30. Remove three pins (50) from the barrel.





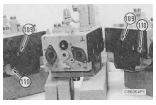
WARNING

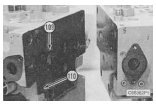
There is spring force against washer (52). When snap ring (51) is removed, the spring force will be released. To prevent possible personal injury, removal of the internal components in barrel (48) should be performed in a press in order to retain spring (53) and washer (52).

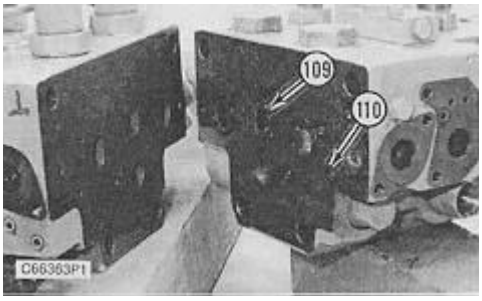
31. Put barrel (48) in a press. Install a suitable size drive plate that is slightly smaller in diameter than washer (52), on washer (52). Put a slight amount of compression on washer (52) with the

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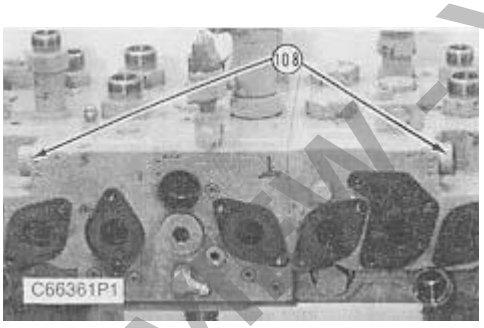
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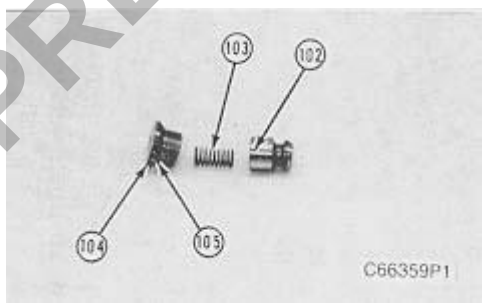




58. Install all large O-rings (109) and all small O-rings (110).



59. Install eight bolts (108) and connect the three sections of the main control valve.



60. Assemble check valve (102), install plug (104), O-ring (105) and spring (103).

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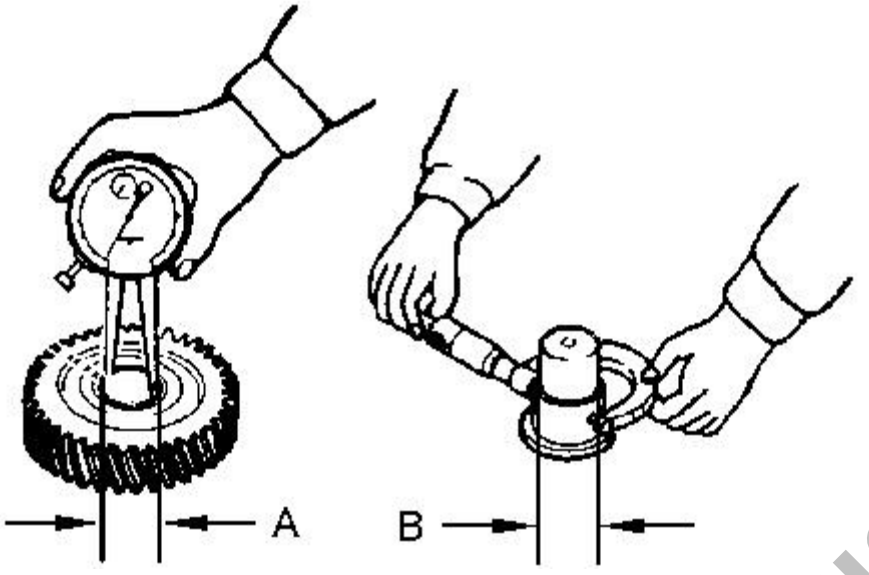


Illustration 4 g01412121

(A) Idler gear bushing

Inside diameter of idler gear bushing ... 25.000 to 25.021 mm (0.9842 to 0.9851 inch)

Maximum diameter of idler gear bushing for oil pump ... 25.059 mm (0.9866 inch)

(B) Spindle

Diameter of spindle ... 24.939 to 24.960 mm (0.9818 to 0.9827 inch)

Minimum diameter of spindle for oil pump ... 24.901 mm (0.9804 inch)

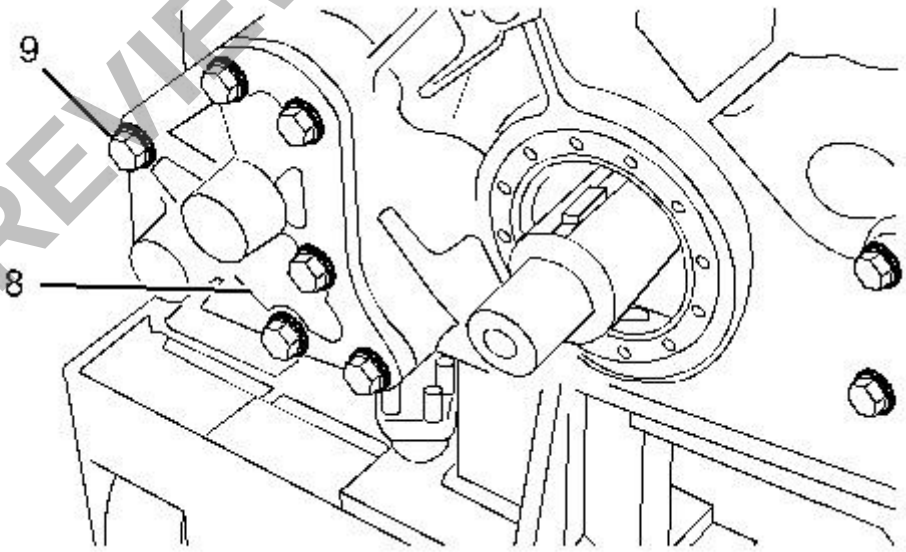


Illustration 5 g01412124

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APPROXIMATE TEST PRESSURE RANGE		
Ambient (Outside Air) Temperature C° (F°)	[1] At High Pressure Test Fitting kPa (psi)	[2] At Low Pressure Test Fitting kPa (psi)
21 (70)	820–1300 (120–190)	50–105 (7–15)
27 (80)	950–1450 (140–210)	50–105 (7–15)
32 (90)	1175–1650 (170–240)	50–105 (7–15)
38 (100)	1300–1850 (190–270)	70–210 (10–30)
43 (110)	1450–2075 (210–300)	70–210 (10–30)

[1] Pressure may be slightly higher on very humid days or lower on very dry days.
[2] Pressure just before clutch disengages.

Refrigerant Circuit Problems/Expansion Valve Systems

Problem: Little Or No Cool Temperature To The Air Flow From The Evaporator

System Condition 1:

1. Low pressure gauge reading **below normal**. For normal operating pressures see the Approximate Test Pressure Range chart at the beginning of this section.
2. High pressure gauge reading **below normal**. For normal operating pressures see the Approximate Test Pressure Range chart at the beginning of this section.

NOTE: Ambient (outside) temperature above 21°C (70°F).

3. Large amount of bubbles (foaming) in the receiver-drier sight glass.
4. Air flow temperature from the evaporator only slightly cool.

Probable Cause: Leak(s) in refrigerant circuit that will cause the system to be low on refrigerant.

a. Perform a leak test.

b. If leak(s) are found, recover the refrigerant from the system. See Purging The System in Testing And Adjusting of Air Conditioning And Heating, Form No. SENR3334.

c. Repair leak(s).

d. If a large amount of refrigerant was lost, it is important to check the compressor for loss of oil.

e. Evacuate the system.

f. Charge the system with the correct amount of R-12 refrigerant.

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32 °C (90.0 °F)	716 kPa (103.8 psi)
33 °C (91.0 °F)	729 kPa (105.7 psi)
33 °C (92.0 °F)	742 kPa (107.6 psi)
34 °C (93.0 °F)	755 kPa (109.5 psi)
34 °C (94.0 °F)	768 kPa (111.4 psi)
35 °C (95.0 °F)	782 kPa (113.4 psi)
36 °C (96.0 °F)	796 kPa (115.4 psi)
36 °C (97.0 °F)	809 kPa (117.4 psi)
37 °C (98.0 °F)	823 kPa (119.4 psi)
37 °C (99.0 °F)	838 kPa (121.5 psi)
38 °C (100.0 °F)	852 kPa (123.5 psi)
38 °C (101.0 °F)	866 kPa (125.6 psi)
39 °C (102.0 °F)	881 kPa (127.8 psi)
39 °C (103.0 °F)	896 kPa (129.9 psi)
40 °C (104.0 °F)	911 kPa (132.1 psi)
41 °C (105.0 °F)	926 kPa (134.3 psi)
41 °C (106.0 °F)	941 kPa (136.5 psi)
42 °C (107.0 °F)	956 kPa (138.7 psi)
42 °C (108.0 °F)	972 kPa (141.0 psi)

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S/N - 1GN1-UP

S/N - 1GS1-143

S/N - 1GW1-UP

S/N - 1HK424-UP

S/N - 1HS1-UP

S/N - 1JB1-UP

S/N - 1JD1-UP

S/N - 1JL1-UP

S/N - 1JM46-UP

S/N - 1JS1-484

S/N - 1JW1-UP

S/N - 1KD5600-UP

S/N - 1KF1040-UP

S/N - 1KL442-UP

S/N - 1KM1-UP

S/N - 1KS1-UP

S/N - 1PK1-UP

S/N - 1PZ1-UP

S/N - 1RW1-UP

S/N - 1SF1337-UP

S/N - 1SL510-UP

S/N - 1SW1-214

S/N - 1WN94-UP

S/N - 1XJ1-UP

S/N - 1XM118-UP

S/N - 1XS1-UP

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SENR61390021

Travel Motor & Final Drive

SMCS - 4050-010; 4050-017; 4351

Remove & Install Travel Motor & Final Drives

Tools Needed		A
6V2157	Link Bracket	2

Start By:

a. separate track assemblies

b. remove sprocket

WARNING

At operating temperature, the hydraulic oil tank is hot and under pressure. Hot oil can cause burns. To prevent possible personal injury, release the pressure in the implement hydraulic circuits (boom, stick and bucket) before any hydraulic lines or components are disconnected or removed.

1. Release the pressure the hydraulic system as follows:

a. Fully retract the rod in the stick cylinder.
b. Adjust the position of the bucket so it will be flat on the ground when the boom is lowered.
c. Lower the boom until the bucket is flat on the ground.
d. Shut off the engine, and put the hydraulic activation control lever in the "LOCK" position.

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SENR61390015

Track Assemblies

SMCS - 4170-076; 4170-077

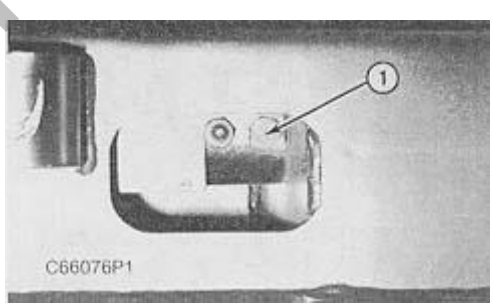
Separate Track Assemblies

Tools Needed		A
5P6214	Track Block Assembly	1

1. Put the machine on a flat level floor.

WARNING

The grease in the track adjusting cylinder is under high pressure. The grease coming out of the relief valve of the track adjuster, which is under high pressure, can penetrate the body causing personal injury or death. When loosening the tension on the track, loosen the relief valve only one turn. Do not visually inspect the relief valve to see if grease if being released from the track adjuster. Instead, watch the track to see if it loosens. If the track does not loosen, move the machine forward and backward to release the tension.



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