5. Disconnect air cleaner (3) from the hose.

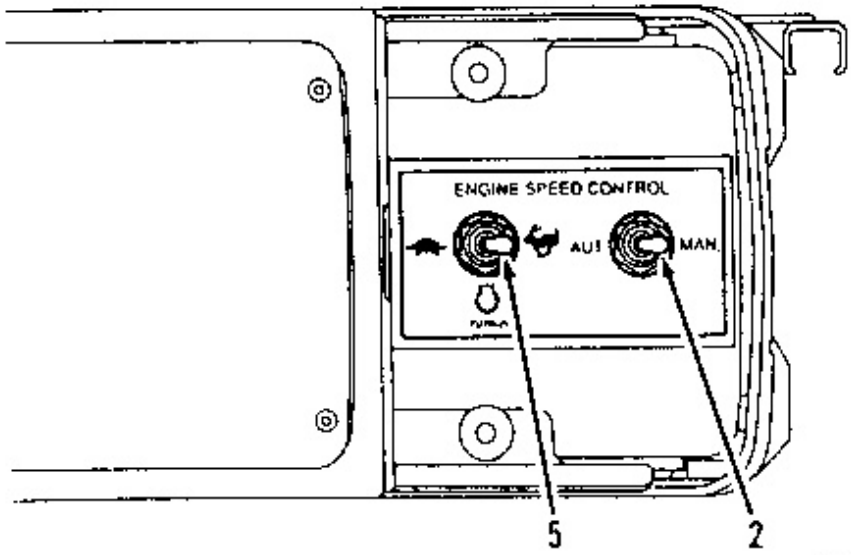
6. Remove air cleaner (3).

NOTE: For installation of the air cleaner, reverse the removal steps.

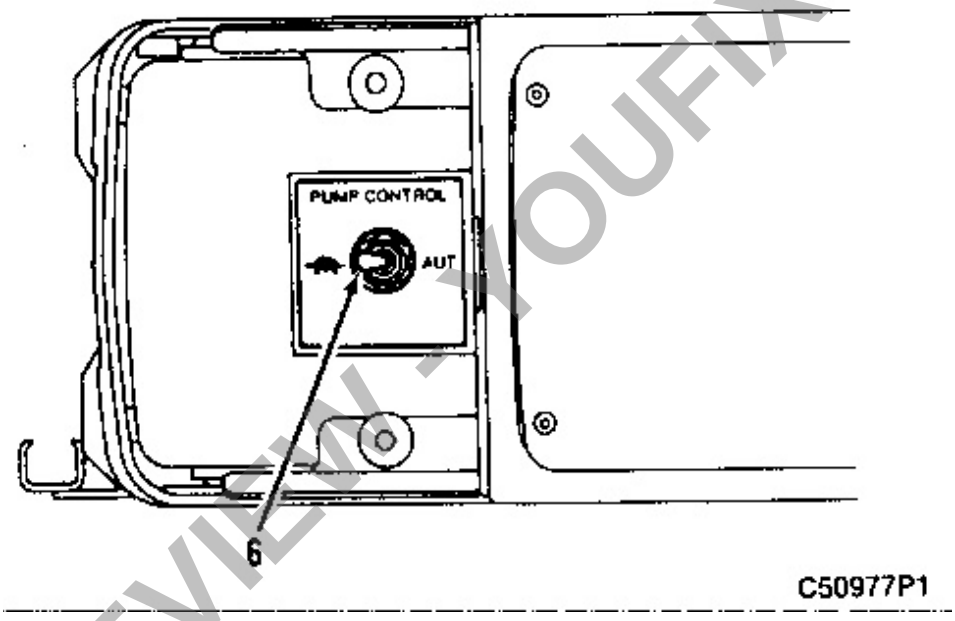
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Rear Of Right Console (Access Cover Removed)
(2) Governor backup switch. (5) Speed change switch.



Rear Of Left Console (Access Cover Removed)
(6) Pump backup switch.

Governor backup switch (2) and speed change switch (5) are located in the rear of the right console. Pump backup switch is located in the rear of the left console. When the controller is normal, governor backup switch (2) should be in AUT (OFF) position with speed change switch (5) upright. Pump backup switch (6) should be in AUT (OFF) position.

Governor backup and pump backup can be controlled separately.

Governor Backup

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Illustration 14 g01721401

"Send Commands" with a successful message

6. Click"OK".

"Product Link Module Status Report"

The "PLM Status Report" will display the "Product Link Module Details". In order to display these details perform the following procedure:



Illustration 15 g01458356

"Product Link Module Details" screens

1. Select "Product Link Module Statue Report" from the "Administration" menu.
2. Enter the "Product Link Module ID" in the "Search" field.
3. Click "Display Details"

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Illustration 11 g01716422

"Message Delivered Successfully" screen

6. Click the "OK" button. Refer to Illustration 11.

"Mark PM Completed"

Once you have used the "PM Checklist" to complete a PM, mark the PM as completed so that the PM will no longer appear as an event in EquipmentManager. If you do not mark a PM as completed, the note will appear as PM that has been missed.

In order to mark a PM as completed, use the following procedure:

1. From the "Planned Maintenance" screen, select the check box (1) next to the equipment of the PM that is to be marked as a note completed. Refer to Illustration 1.
2. Click the "Mark PM Complete" button. Refer to Illustration 1. The "Mark Planned Maintenance (PM) Completed" window will appear.



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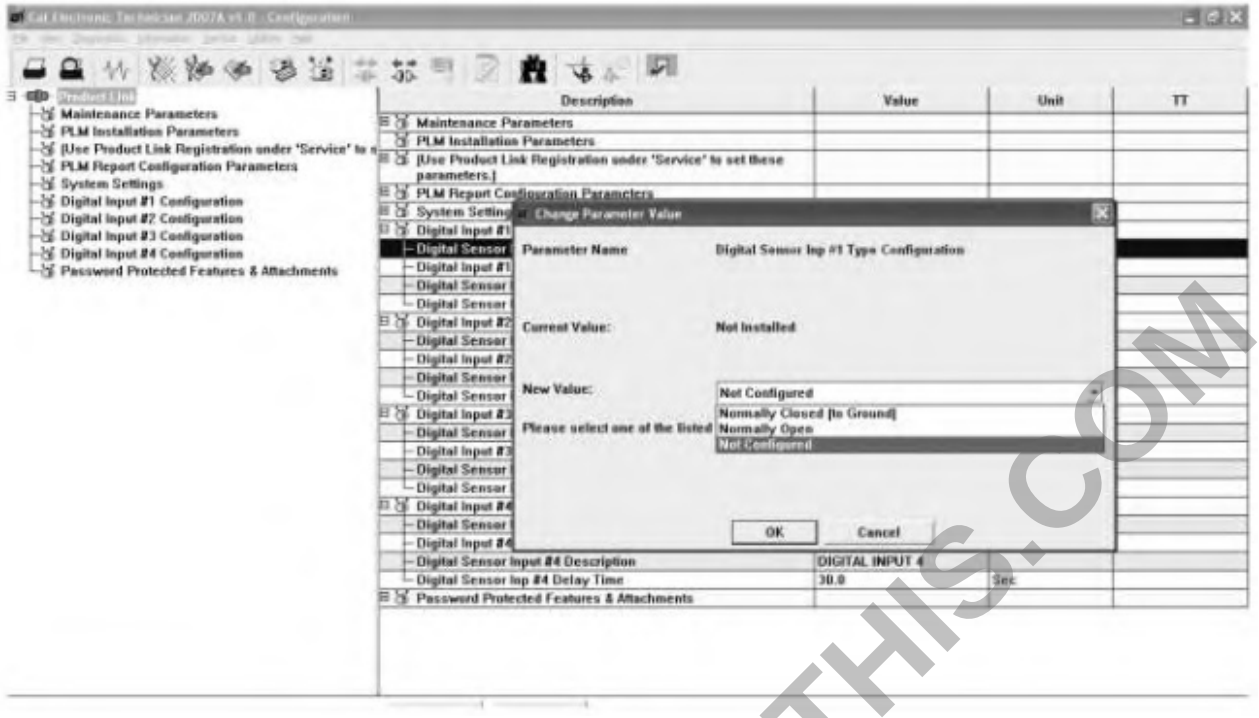


Illustration 2 g01361927

"Digital Input Type Configuration" Screen

The digital sensor type configuration informs the system of how to interpret the data from the attached sensor. Refer to Systems Operation, Troubleshooting, Testing and Adjusting, "Configuration" for the following information:

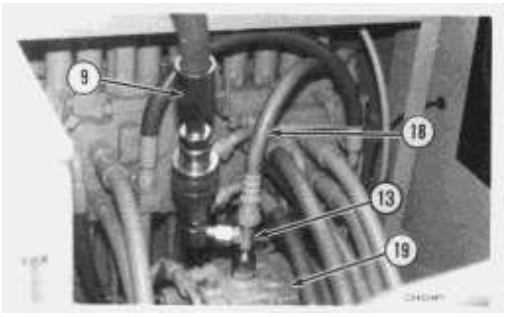
- Accessing parameters
- Changing parameters

Refer to Table 1 for further information about this parameter.

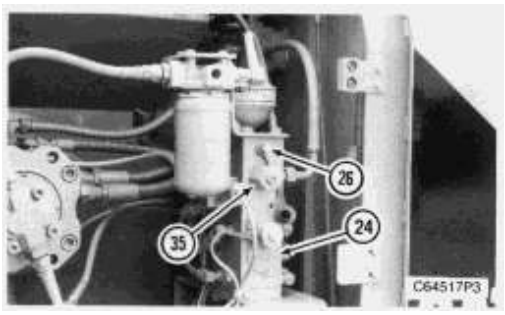
"Digital Sensor Input #x Monitoring Condition" Parameter

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Main Control Valve Compartment
(9) Hose (return line from flow meter). (13) Tee. (18) Return line. (19) Swing motor.



Pilot Oil Manifold Compartment
(24) Pilot oil manifold. (26) Tap. (35) Pilot relief valve.

1. Position the machine on level ground and stop the engine.

2. Release the pressure in the hydraulic system. See the section in this module "Release Of Pressure In The Hydraulic System".

3. Install the following tools in accordance with flow meter tool layout illustration and circuit diagram.

a. Disconnect delivery hose (16) from front pump (14).

b. Install plug (12) and seal (11) to the end of delivery hose (16).

c. Disconnect return line (18) from swing motor (19).

d. Install tee (13) and two seals (11) to the swing motor (19) return port. Connect return line (18) to tee (13).

e. Connect flow meter (1) between front pump (14) and return line (18).

f. Install pressure gauge (22) at front pump tap (23). [A 49 000 kPa (7100 psi) pressure gauge can be used in place of pressure gauge (22).] Tap (23) is used to measure the front pump delivery pressure.

g. Install multitach group (32) on engine (31). This is used to read engine speed.

h. Disconnect negative flow control line (21) from front pump (14) and install plug (29).

i. Install test hose (28) to front pump negative flow control port.

j. Install tee (27) and pressure gauge (30) on pilot oil manifold tap (26). Connect test hose (28) to tee (27).

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- Exposed insulation
- Points of rubbing wire

b. Check all of the hold down clamps for the harness in order to verify that the harness is properly clamped. Also check all of the hold down clamps for the harness in order to verify that the harness is not compressed by the clamp. Pull back the harness sleeves in order to check for a flattened portion of wire. The flattened portion of wire is caused by the clamp that holds the harness.

Expected Result: The wires are free of abrasion, nicks, or cuts and the harness is properly clamped.

Results:

OK - The wires are free of abrasion, nicks, or cuts and the harness is properly clamped. Proceed to test step 5.

NOT OK - A problem exists with the wiring.

Repair: Repair the wires or replace the wires, as required.

STOP.

5. **CHECK THE CONNECTORS FOR MOISTURE OR CORROSION.**

a. Ensure that the connector seals and the white sealing plugs are in place. If any of the seals or plugs are missing, replace the seal or plug. If necessary, replace the connector.

b. Check all of the wiring harnesses in order to verify that the harness does not make a sharp bend out of a connector. Sharp bends will deform the connector seal and will create a path for the entrance of moisture. See Illustration 1.

Note: Minor seal abrasion is normal on the ECM connector seals. Minor seal abrasion will not allow the entry of moisture.

c. Thoroughly inspect ECM connectors for evidence of moisture entry. If moisture or corrosion is evident in the connector, the source of the moisture entry must be found. Also, the source of the moisture entry must be repaired. If the source of the moisture entry is not repaired, the problem will reoccur. Simply drying the connector will not fix the problem. Likely paths for the entrance of moisture are from missing seals, improperly installed seals, nicks in exposed insulation, and improperly mated connectors.

Note: Moisture can also travel from one connector through the inside of a wire to the ECM Connector. If moisture is found in the ECM connector, thoroughly check all connectors and wires on the harness that connect to the ECM. The ECM is not the source of the moisture. Do not replace an ECM if moisture is found in either ECM connector.

Note: If corrosion is evident on the contacts or the connector, use only denatured alcohol to remove the corrosion. Use a cotton swab or a soft brush to remove the corrosion. Do not use cleaners that contain trichloroethylene because trichloroethylene may damage the connector.

Expected Result: All of the connectors must be coupled and all of the seals must be inserted. The harness and the wiring should be free of corrosion, moisture, abrasion, and pinch points.

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B. Verify that the ECM (VIMS Main Module) is present.

Expected Result:

The ECM (VIMS Main Module) is present.

Results:

- **OK -** The ECM (VIMS Main Module) is present. Proceed to Test Step 2.
- **NOT OK -** The ECM (VIMS Main Module) is not present in the Cat ET screen.

  Repair: Verify that the wiring for the PL522 or 523 has been installed correctly. Check the wiring with a multimeter. If the ECM (VIMS Main Module) is not available, see Systems Operation, Troubleshooting, Testing and Adjusting, "Electronic Service Tool Does Not Communicate with ECM".

  STOP

Test Step 2. CHECK FOR LOGGED EVENTS OR DIAGNOSTICS THAT MAY HAVE OCCURRED.

Use the Cat ET service tool to verify the existence of logged events or diagnostics on other ECM systems. Note any events and diagnostics that are not reported.

Expected Result:

There are no logged events or diagnostics that should have been reported.

Results:

- **OK -** There are no logged events or diagnostics that should have been reported. The PL522 or 523 appears to be working correctly.**STOP**
- **NOT OK -** There are logged events or diagnostics that should have been reported. Monitor the operation of the PL522 or 523 for reporting of events and diagnostics. Problems in this area are not usually a problem with the device. The device should not be replaced.**STOP**

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Previous Screen

Product: EXCAVATOR
Model: 311 EXCAVATOR 9LJ
Configuration: 311 TRACK-TYPE EXCAVATOR 9LJ00262-UP (MACHINE) POWERED BY 3064 ENGINE

Troubleshooting
Product Link 121S/300
Media Number -RENR7911-10 **Publication Date -01/06/2013** **Date Updated -27/06/2013**

i04907016

MID 122 - CID 1251 - FMI 03

SMCS - 1406-038

Conditions Which Generate This Code:

The Product Link module tracks the machine operating hours for reporting to the office. The Alternator R-Terminal signal is used to detect when the machine is operating. If the input continually receives a voltage signal that is above normal, then machine operation cannot be detected. If the input continually receives a voltage signal that is above normal, the reported Service Meter Hours (SMU) would be inaccurate.

Test Step 1. CHECK THE R-TERMINAL CABLING FOR SHORT TO BATTERY.

A. Disconnect the Product Link cable (P1) from the Product Link module.

B. Measure the resistance from the Alternator R-terminal input J1-4 (403MC9-GN-18 to battery (J1-1).

Expected Result:

The resistance should be greater than 5000 ohms.

Results:

- **OK -** The Product Link harness is likely correct. Proceed to Test Step 2.
- **NOT OK -** The Product Link cable has a probable short to battery.

  Repair: Repair the cable and verify that the fault has been removed.

  STOP

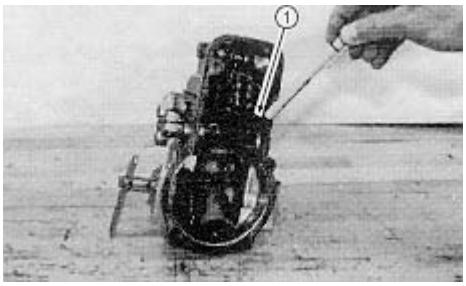
Test Step 2. CHECK THE PRODUCT LINK HARNESS FOR A SHORT TO A VOLTAGE SOURCE.

A. Disconnect the Product Link cable (P1) from the Product Link module.

B. Start the engine.

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17. Install start spring (1).

End By:

a. connect the governor to the fuel injection pump housing

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NOTE: If necessary, refer to Testing & Adjusting Manual, Form No. SENR6137 for adjusting the fuel injection timing after pump is installed.

NOTE: For installation of the fuel injection pump and governor, reverse the removal steps.

End By:

a. install fuel filter base

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Anti-reaction valve. (26) Check valve. (27) Check valve. (28) Relief valve. (29) Relief valve. (30) Swing parking brake control valve. (31) Port (parking brake pilot). (32) Port.

Introduction

The swing motor is divided into the following four groups:

1. Rotary group; consists of barrel (5), pistons (4), shoes (2), and retainer plate (3).
2. Parking brake group; consists of springs (19), brake piston (17), separator plates (15), friction plates (16), and swing parking brake control valve (30).
3. Relief and makeup valve group; consists of relief valve (28), relief valve (29), check valve (26), and check valve (27).
4. Anti-reaction valve group; consists of anti-reaction valves (24) and (25).

Operation

The oil from the rear pump passes through the swing control valve and is directed to port (21) or (22).

For a swing right operation, rear pump oil enters port (21) in head (10). In the head, pump oil goes through passages (20) and (9). Oil from passage (9) enters passage (7) in port plate (8) and goes through passage (6) into cylinder barrel (5).

Pump oil in barrel (5) acts against piston (26) to force it out of barrel (5) and force shoe (10) against swashplate (1). The piston and shoe slide along the inclined surface of the swashplate as barrel (5) rotates.

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NOTE: If the error code [- 1], [- 2], [- 3], [-15], or [-16] is indicated on character display (4), readjust the accelerator/decelerator cables. See the section "Adjustment After Replacement Of Major Components".

NOTE: If the error code [- 4] through [-12] or [-14] is indicated on character display (4), check the corresponding checking procedure in the section "Checking Procedures (Electronic Control System)".

NOTE: The character display reading [-52] will change to another code as a guidance to adjust the accelerator cable screw. When the code [10] is displayed, the "1" position represents the number of turns to rotate the adjusting screw to tighten the accelerator cable.

NOTE: The character display reading [-53] will change to another code as a guidance to adjust the accelerator cable screw. When the code [10] is displayed, the "1" position represents the number of turns to rotate the adjusting screw to tighten the accelerator cable.

7. Stop "Calibration Mode" (unless another function selection is desired). See the section, "Calibration Mode Stop Procedure".

Calibration Of Proportional Reducing Valve

NOTE: This calibration procedure must be performed when either the proportional reducing valve and/or the controller has been replaced. This procedure is made at two power shift pressure points of 5 kgf/cm^2 [490 kPa (72 psi)] and 25 kgf/cm^2 [2450 kPa (355 psi).



Pump Compartment
(40) Power shift pressure tap.

1. Stop the engine and install a 4900 kPa (700 psi) pressure gauge to power shift pressure tap (40).

2. Make sure that the pump control backup switch is in the "AUT" position.

3. Start the "Calibration Mode". Refer to the section "Calibration Mode Start-up".

NOTE: The engine must be running and have a hydraulic oil temperature of approximately 50°C (122°F) to perform this calibration procedure.

4. Run the engine with engine speed dial switch at position "10".

NOTE: Activation of this calibration mode overrides the AEC function. If the engine speed dial switch is not at position "10" character display (4) will show an "E" in the first column. The engine speed must be corrected within specifications to continue the calibration procedure.

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Product: EXCAVATOR
Model: 311 EXCAVATOR 9LJ
Configuration: 311 TRACK-TYPE EXCAVATOR 9LJ00262-UP (MACHINE) POWERED BY 3064 ENGINE

Specifications
311 AND 312 EXCAVATORS HYDRAULIC SYSTEMS
Media Number -SENR6134-02 **Publication Date -08/11/1995** **Date Updated -20/02/2008**

SENR61340016

Cycle Times (New Machine)

SMCS - 1518-010

Boom, Stick, Bucket, Swing, And Travel (312 Excavator)

Cycle times are measured with the machine at the following conditions:

Engine speed ... High idle, 1980 ± 80 rpm

Oil temperature ... 55 ± 5°C (131 ± 9°F)

At the specified line relief valve pressure settings:

With 4.65 m (15 ft 3 in) boom, 2.5 m (8 ft 2 in) stick, and SAE 0.52 m^3 (5/8 yd^3) bucket.

With bucket empty.

With power mode setting at ... Mode III

Boom Raise

NOTE: Boom raise cycle time is the amount of time it takes to lift the boom from ground level to maximum height with stick and bucket cylinders fully retracted, starting with the bucket on the ground.

Boom raise cycle time (in seconds) ... 3.2 ± 0.5

Boom Lower

NOTE: Boom lower cycle time is the amount of time it takes to lower the boom from the maximum height to the ground level with the stick and bucket cylinders fully retracted.

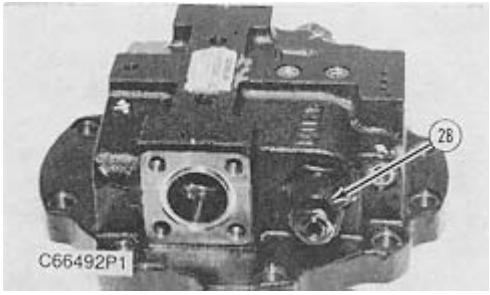
Boom lower cycle time (in seconds) ... 2.6 ± 0.5

Stick Out

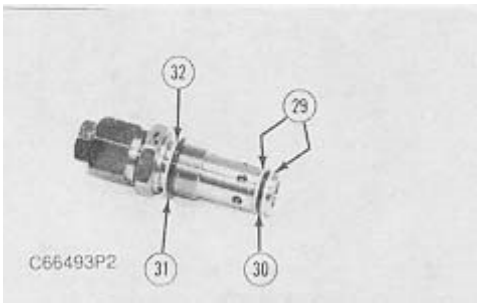
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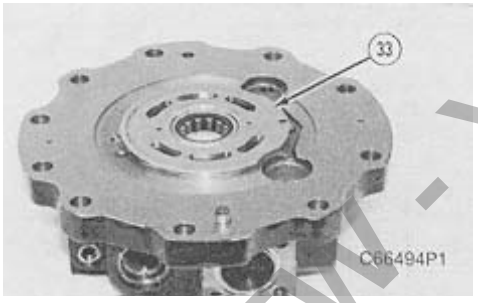
16. Remove spring (25) and washer (26) from the travel brake valve. Remove O-ring seal (27) from the valve body.



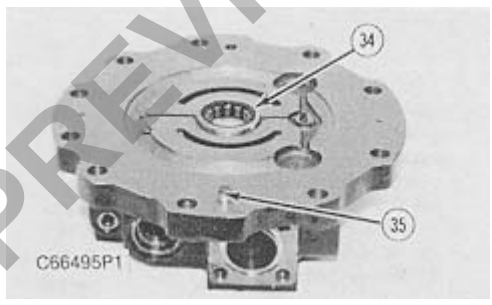
17. Remove relief valve (28) from the valve body.



18. Remove back-up rings (29), O-ring seal (30), O-ring seal (31) and back-up ring (32) from the relief valve.



19. Reposition the travel brake valve body as shown. Remove plate (33) from the body.



20. If necessary, remove bearing (34) and location pin (35).

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Previous Screen

Product: EXCAVATOR
Model: 311 EXCAVATOR 9LJ
Configuration: 311 TRACK-TYPE EXCAVATOR 9LJ00262-UP (MACHINE) POWERED BY 3064 ENGINE

Disassembly and Assembly
311 AND 312 EXCAVATORS MACHINE SYSTEMS
Media Number -SENR6139-02 **Publication Date -01/11/2004** **Date Updated -28/04/2005**

SENR61390027

Hydraulic Oil Tank

SMCS - 5056-010

Remove & Install Hydraulic Oil Tank

Tools Needed		A
6V2156	Link Bracket	2

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.

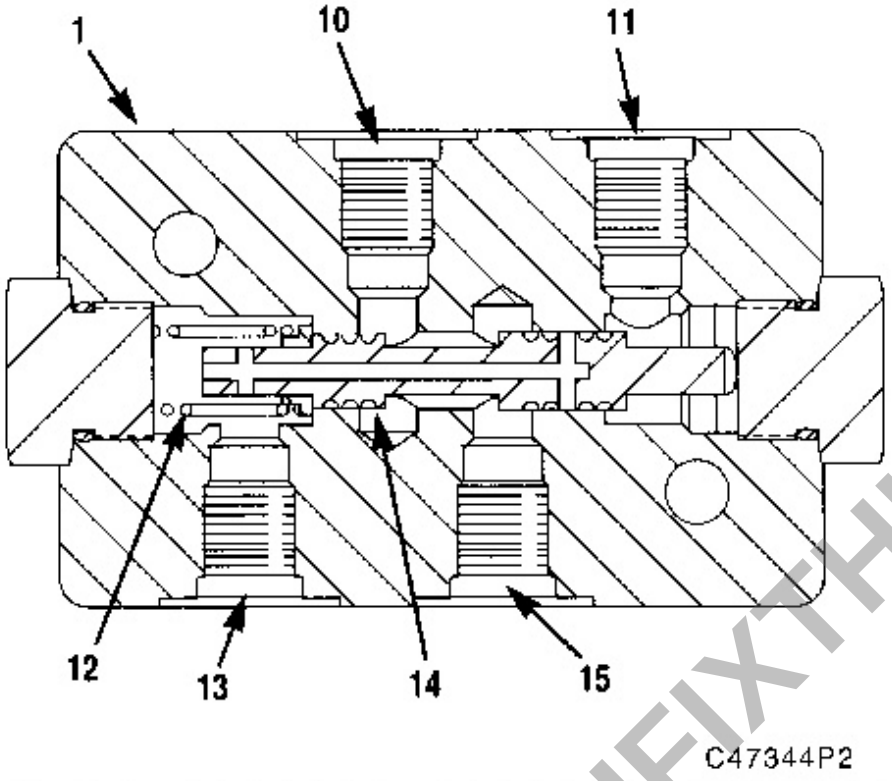
1. Release the pressure in the hydraulic system as follows:

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.
e. Move the control levers for the boom, bucket, stick and swing through their full travel strokes. This will relieve any pressure that may be present in the pilot system.
f. Slowly loosen the air breather cap on the hydraulic oil tank to release the pressure.
g. Tighten the air breather cap on the hydraulic oil tank.
h. The pressure in the hydraulic system has now been released. Lines and components can now be removed.

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(1) Pilot valve. (2) Pilot line from attachment control valve to pilot valve. (3) Main control valve. (5) Return line to pilot oil manifold. (8) Pilot line to the bottom of Boom II control valve. (9) Pilot line to the top of Boom II control valve.



Pilot Valve (1)

(10) Passage from attachment control valve. (11) Passage to top of Boom II control valve. (12) Spring. (13) Passage to drain. (14) Spool. (15) Passage to bottom of Boom II control valve.

Pilot supply oil from pilot manifold (7) goes through line (6) and enters the attachment control valve through port (4). When the attachment is not being used, the pilot oil passes through the attachment stem in the main control valve and goes to drain.

When the foot pedal for the attachment is operated, the attachment stem is shifted. The shifting of the stem blocks the flow of pilot oil through the attachment stem. The pilot oil then flows through the orifice tee at port (4) and goes through line (2) to pilot valve (1) and passage (10). The pilot oil in passage (10) flows around spool (14) and out passage (15).

The pilot oil now flows through line (8) and enters the bottom of the Boom II control valve. The pilot oil shifts the Boom II control valve stem up. With the stem shifted, the front pump oil is blocked from flowing through the boom stem center passage. With the front pump oil flow blocked, the pressure in the front pump circuit increases.

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(11) Desiccant

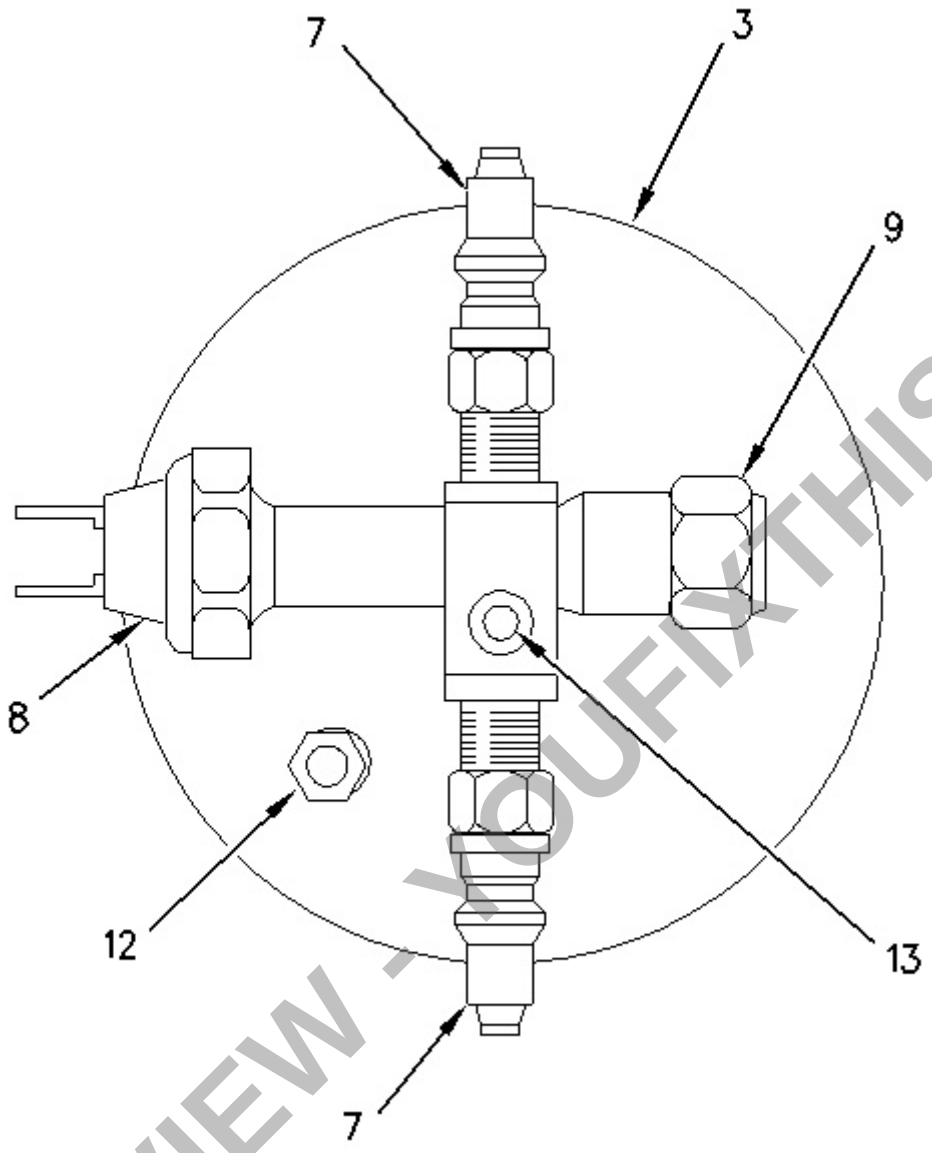


Illustration 3 g00645970

Top View of Receiver-Dryer

(3) Receiver-dryer

(7) Quick coupler

(8) Low pressure cutoff switch

(9) High pressure relief valve

(12) Moisture indicator

(13) Sight glass

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2. Do a performance check to insure correct system operation.

Problem 2: Little Or No Cool Temperature To The Air Flow From The Evaporator

System Condition

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

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

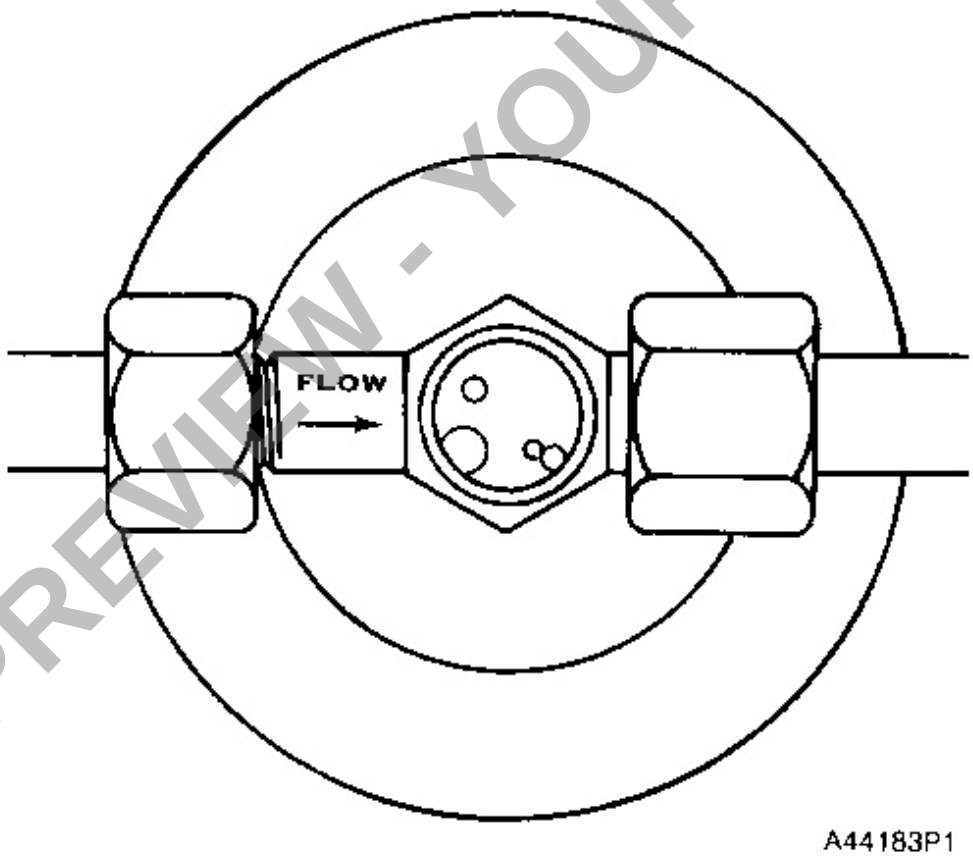
3. Occasional bubbles in receiver-drier sight glass.
4. Air flow temperature from evaporator warm.

Probable Cause: Improper condenser operation.

NOTE: System may have a normal or overcharge of R-12 refrigerant.

1. Check for obstruction in the flow of air through the condenser.

2. If an obstruction is found in the condenser, remove all obstructions and do a performance check to insure proper system operation.



Receiver-Drier (Typical Example)
Occasional bubbles.

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1.5 kg (3.25 lb)	
1.6 kg (3.5 lb)	0
1.7 kg (3.75 lb)	30
1.8 kg (4 lb)	50
1.9 kg (4.25 lb)	70
2.0 kg (4.5 lb)	90
2.2 kg (4.75 lb)	110
2.3 kg (5.0 lb)	130
2.4 kg (5.25 lb)	150
2.5 kg (5.5 lb)	170
2.6 kg (5.75 lb)	190
2.7 kg (6.0 lb)	210
2.8 kg (6.25 lb)	230
2.9 kg (6.5 lb)	260
3.1 kg (6.75 lb)	280
3.2 kg (7.0 lb)	300
3.3 kg (7.25 lb)	330
3.4 kg (7.5 lb)	350
3.5 kg (7.75 lb)	370
3.6 kg (8.0 lb)	390
3.7 kg (8.25 lb)	410

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- Recover the refrigerant. Refer to the Service Manual, SENR5664, "Refrigerant Recovery" section.
- Replace the receiver-dryer or the in-line dryer. The desiccant may be full of moisture. This will release water into the system. Refer to the Service Manual, SENR5664, "Receiver-Dryer - Remove and Install" section in Disassembly and Assembly. For in-line dryers, refer to the Service Manual, SENR5664, "In-Line Refrigerant Dryer - Remove and Install" section in Disassembly and Assembly.
- Evacuate the system. Refer to the Service Manual, SENR5664, "Refrigerant System - Evacuate" section in Testing and Adjusting.
- Charge the system with the correct amount of refrigerant. Measure the refrigerant by weight. Refer to the Service Manual, SENR5664, "Refrigerant System - Charge" section in Testing and Adjusting.
- After the system is charged and operated for a minimum of 10 minutes, perform a performance check. Service Manual, SENR5664, "Air Conditioning Performance - Test"

System Condition 4

1. **Low-pressure gauge reading is below normal.** For normal operating pressures, refer to Table 1.
2. **High-pressure gauge reading is normal to the below normal range.** For normal operating pressures, refer to Table 1.

   Note: Ambient temperature is above 21°C (70°F).
3. The temperature of the air flow from the evaporator is partially cool.
4. The high side liquid line or the receiver-dryer is frosted. The high side liquid line or the receiver-dryer is cool to the touch.

Probable Cause

Restriction in the high-pressure liquid line can cause the refrigerant to be removed from the evaporator at a faster rate. The restriction can cause the evaporator to be low on refrigerant from the receiver-dryer or from the in-line dryer. Clogged filters or a failure of the blower motor can cause possible restrictions to the air flow.

- Recover the refrigerant. Refer to the Service Manual, SENR5664, "Refrigerant Recovery" section.
- If the restriction is found at the receiver-dryer, replace the receiver-dryer. Refer to the Service Manual, SENR5664, "Receiver-Dryer - Remove and Install" section in Disassembly and Assembly.
- If the restriction is found at the in-line dryer, replace the in-line dryer.
- If the restriction is found at the liquid line, replace the liquid line.
- Cap all the open lines and fittings.

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3. Maneuver air conditioning compressor V-belt (1) from the pulley.

NOTE: For installation of the air conditioning compressor V-belt, reverse the removal steps.

NOTE: Refer to Specifications Manual, Form No. SENR6134 for adjusting the tension for the air conditioning compressor V-belt.

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8. Remove two bolts (10) if required.

9. Remove valve (11).

NOTE: For the installation of the water valve (heating system), reverse the removal steps.

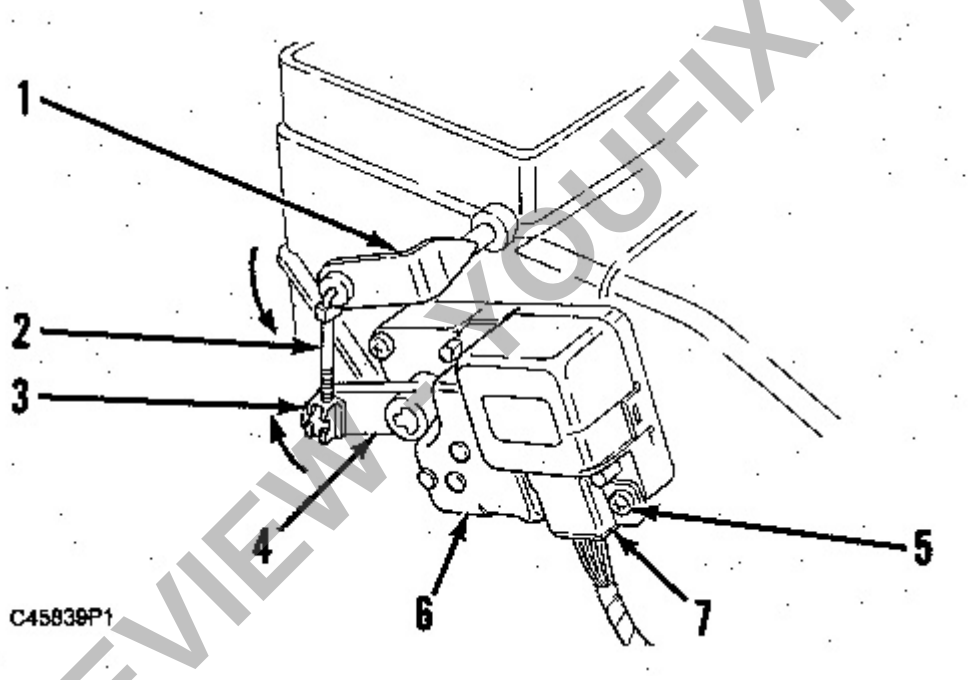
NOTE: During the installation of the water valve, do the following:

a. Correctly position spring (4) and washer (5).
b. Use a new hose (6).

Disassemble & Assemble Dumper Assembly Motors (Heating System)

NOTE: The procedure for removing both of the dumper assembly motors is the same. The procedure that follows if for one of them.

NOTE: The dumper assembly motors open and close the vents that allow air to be directed to either the "FOOT" or to the "DEF".



1. Open clamp (3) to free one end of rod (2).

2. Disconnect connector (7).

3. Remove four screws (5).

4. Remove motor (6).

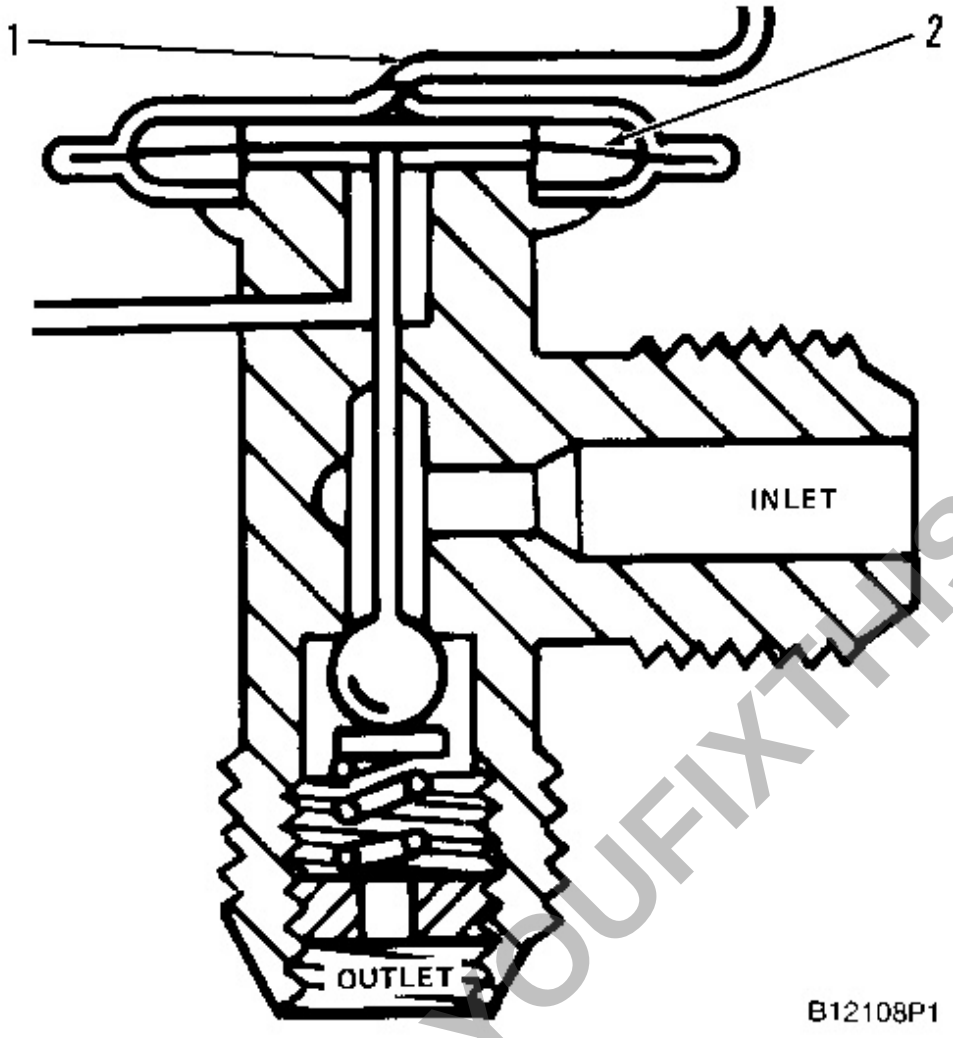
NOTE: The following steps are for the installation of the dumper assembly motor (heating system).

5. Position motor (6).

6. Connect connector (7).

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Expansion Valve In The Closed Position (Typical Example)
(1) Capillary tube. (2) Diaphragm and chamber.

5. Replace expansion valve.

NOTE: It is important in the operation of the expansion valve to insure the correct installation of the sensing bulb. Make sure bulb is securely clamped to evaporator coil outlet pipe, and completely covered with insulation material.

6. Evacuate the system.

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

8. After system is charged and allowed to operate for a minimum of TEN minutes, do a performance check.

b. If the low pressure (suction) gauge indicates the correct operation of the expansion valve, do the procedure that follows:

1. Make sure sensing bulb is in the correct position on the evaporator outlet pipe, and the bulb is the correct distance away from the evaporator outlet (bulb should be upstream of the pressure sensing connection in the evaporator outlet pipe). The insulation on the sensing bulb MUST NOT be around the pressure sensing connection in the evaporator outlet pipe.

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Illustration 3 g01186742

Table 6

Thread Size mm	**Torque**
M3	.6 ± .1 N·m (5 ± 0.9 lb in)
M4	2 ± .3 N·m (18 ± 3 lb in)
M5	4 ± .5 N·m (35 ± 4 lb in)
M6	6 ± 1 N·m (55 ± 9 lb in)
M8	15 ± 2 N·m (135 ± 18 lb in)
M10	30 ± 7 N·m (265 ± 62 lb in)
M12	50 ± 10 N·m (37 ± 7 lb ft)
M14	80 ± 15 N·m (60 ± 11 lb ft)
M16	125 ± 20 N·m (90 ± 15 lb ft)
M20	250 ± 40 N·m (185 ± 30 lb ft)
M24	425 ± 50 N·m (310 ± 37 lb ft)
M30	850 ± 100 N·m (620 ± 75 lb ft)
M36	1500 ± 200 N·m (1100 ± 150 lb ft)

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