i02558839

Air Inlet and Exhaust System

SMCS - 1050

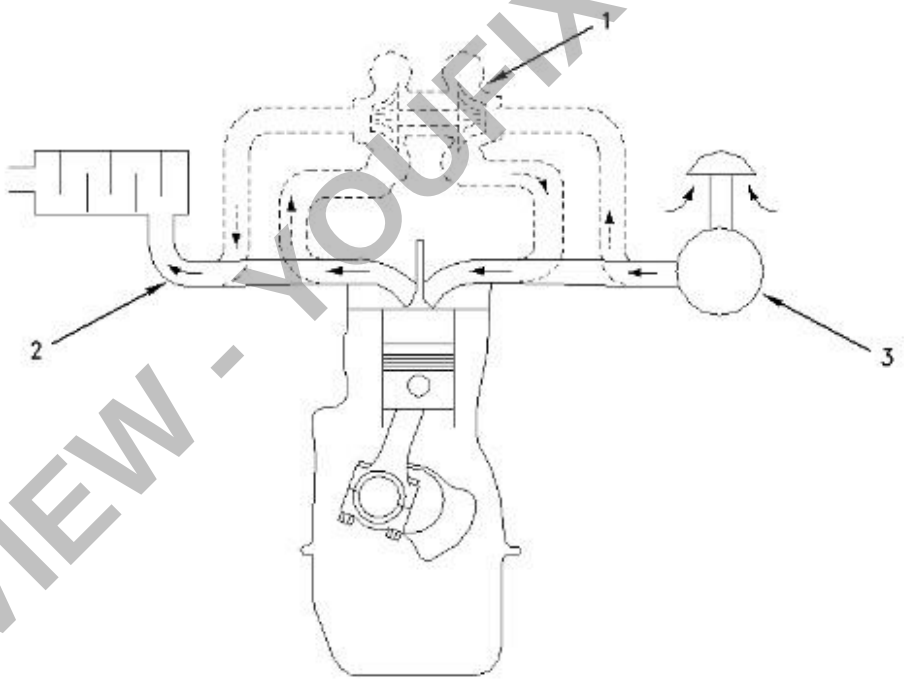


Illustration 1 g00987178

Flow diagram of the air inlet and exhaust system

(1) Turbocharger

(2) Exhaust

(3) Air inlet

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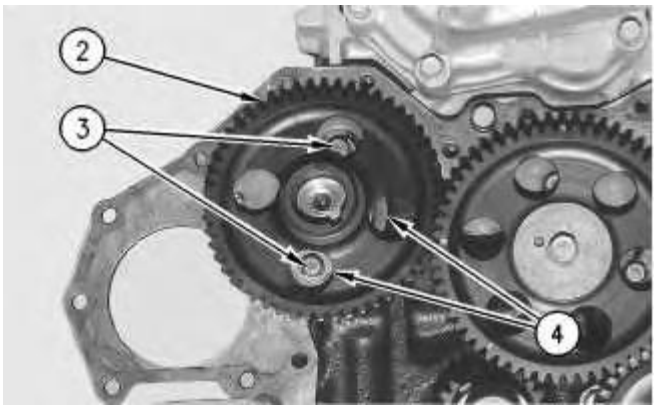


Illustration 12 g00534473

3. Position camshaft gear (2) so that the gear's slots align from the top to the bottom. Install two bolts (3) and the washers that hold thrust plate (4). Tighten bolts (3) to a torque of 10 to 13 N·m (7 to 10 lb ft).

4. If necessary, install the bearing onto the front of the camshaft gear.

End By:

a. Install the cylinder head. Refer to Disassembly and Assembly, "Cylinder Head - Install".
b. Install the timing gear cover. Refer to Disassembly and Assembly, "Housing (Front) - Install".

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Place the flywheel on a surface plate. Use a dial indicator in order to measure the flatness of the flywheel.

Standard at assembly of flywheel ... 0.15 mm (0.006 inch)

Repair limit of flywheel ... 0.50 mm (0.020 inch)

Note: Refinish the flywheel if the repair limit is exceeded.

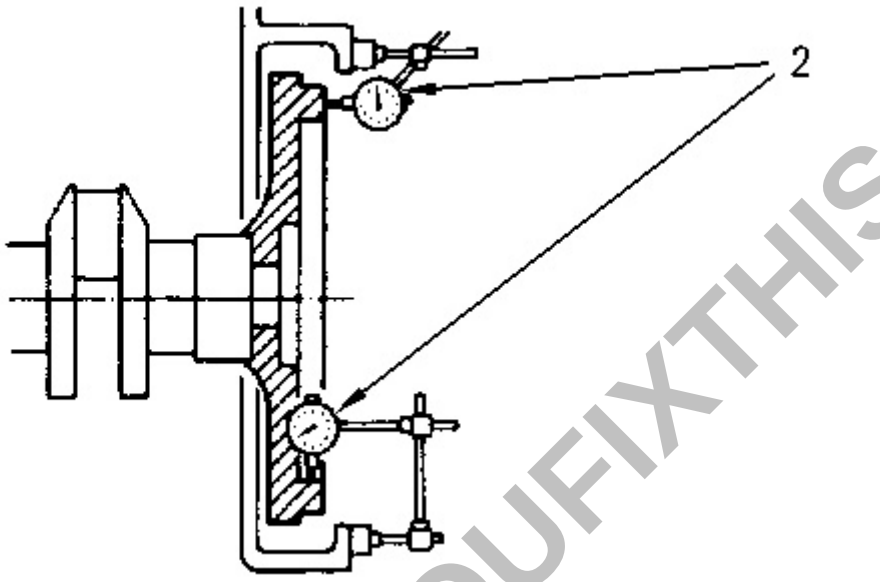


Illustration 2 g00555459

(2) Measure the runout on the flywheel face with a dial indicator. Maximum face runout ... 0.15 mm (0.006 inch)

Repair limit of face runout ... 0.50 mm (0.020 inch)

Note: Refinish the flywheel if the repair limit is exceeded.

Maximum permissible temperature of the ring gear for installation on the flywheel without using a torch ... 150 °C (302 °F)

Note: The ring gear is pressed on the flywheel.

Tighten the flywheel bolts to the following torque. ... 83 ± 5 N·m (61 ± 4 lb ft)

Number of teeth of the flywheel ring gear ... 126

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i05183360

Water Temperature Regulator - Test

SMCS - 1355-081-ON; 1355-081

Introduction

This procedure is intended to give information on testing the water temperature regulator.

Test Procedure

WARNING

Personal injury can result from escaping fluid under pressure.

If a pressure indication is shown on the indicator, push the release valve in order to relieve pressure before removing any hose from the radiator.

1. Remove the water temperature regulator from the engine.
2. Heat water in a pan until the temperature of the water is equal to the fully open temperature of the water temperature regulator. Refer to Specifications, "Water Temperature Regulator" for the fully open temperature of the water temperature regulator. Stir the water in the pan. This will distribute the temperature throughout the pan.
3. Hang the water temperature regulator in the pan of water. The water temperature regulator must be below the surface of the water. The water temperature regulator must be away from the sides and the bottom of the pan.
4. Keep the water at the correct temperature for ten minutes.
5. After ten minutes, remove the water temperature regulator. Immediately measure the opening of the water temperature regulator. Refer to Specifications, "Water Temperature Regulator" for the minimum opening distance of the water temperature regulator at the fully open temperature.

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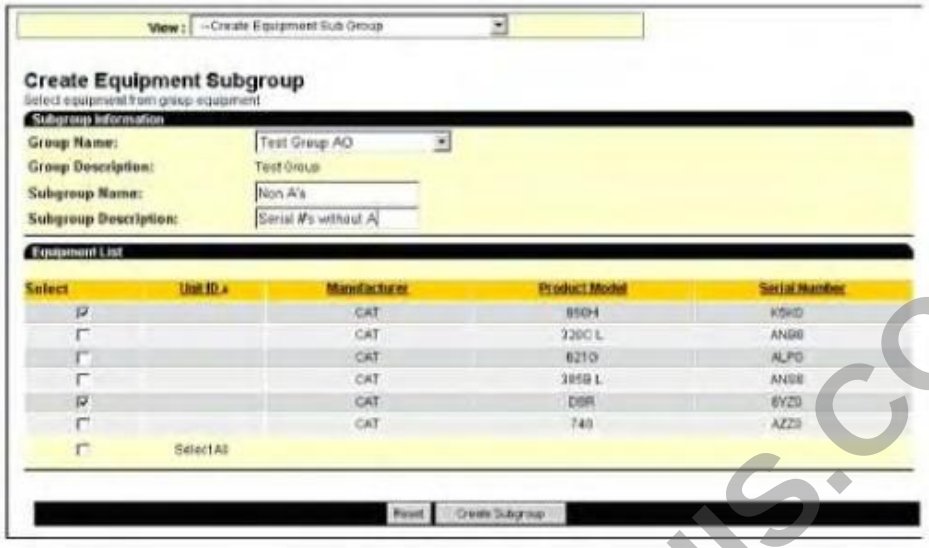


Illustration 14 g01270520

"Create Equipment Subgroup" confirmation

7. Click the "Done" button. The new subgroup has been created.

Modify Equipment Subgroup

You have the ability to change the name and/or the description of an equipment subgroup as well as add or remove pieces of equipment from the subgroup.

In order to modify an equipment subgroup, use the following procedure:

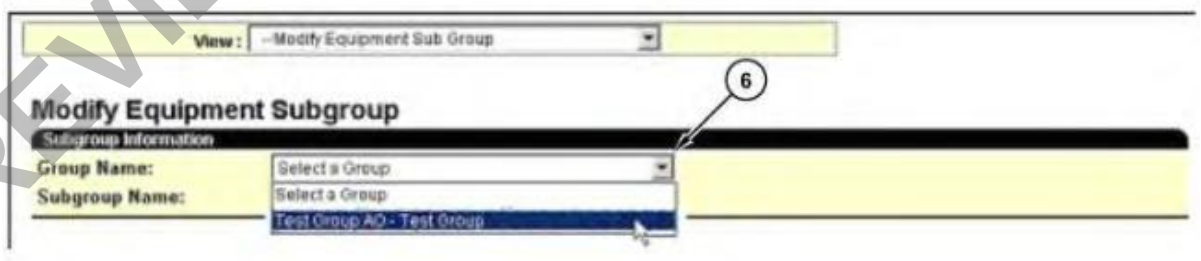


Illustration 15 g01730050

"Modify Equipment Subgroup"

(6) "Group Name" drop-down menu

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Illustration 4 g01737057

"Configure Repair Tracking intervals" screen if repairs have been deleted from "Track Major Repair" details

(2) "Save" button

If you removed any events or major repairs, clicking the "Save" button (2) will result in Illustration 4.

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Systems Operation
Product Link - PL522/523
Media Number -RENR8143-02 Publication Date -01/07/2013 Date Updated -23/07/2013

i04526739

System Overview

SMCS - 7606

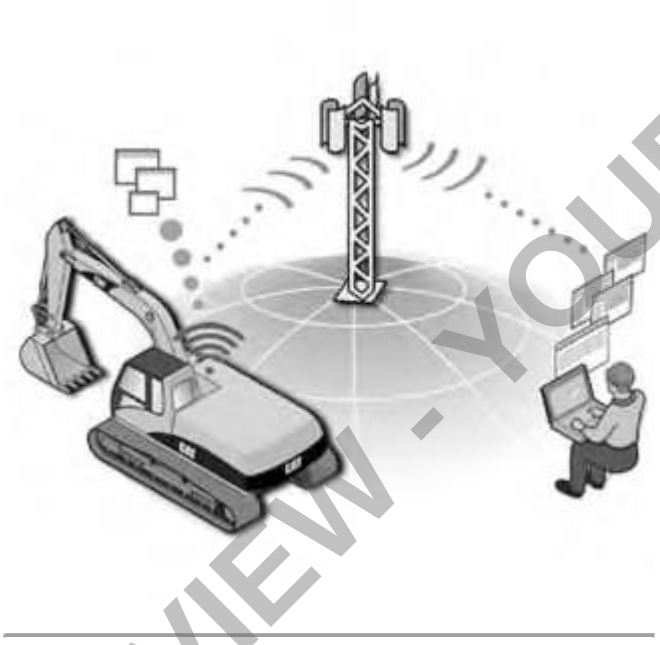


Illustration 1 g02167864

The PL522 and 523 is a communications device that uses a cellular network in order to transmit information to the following: Caterpillar, Caterpillar dealers and Caterpillar customers. The unit contains a Global Positioning System (GPS) satellite receiver and a cellular communication transceiver.

Note: The time periods that are referenced in this publication are dependent upon the performance of the communications network which may vary at times.

The PL522 and 523 are compatible with the communication protocol that is used on the Cat Data Link. All logged events and diagnostic codes that are available to the Caterpillar Electronic Technician (Cat ET) on the Cat Data Link can be sent to the web interface, VisionLink. The PL522 and 523 are not compatible with the communication protocol that is used on the ATA data link for on-highway trucks.

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Media Number -RENR8143-02 Publication Date -01/07/2013 Date Updated -23/07/2013

i03995042

Electrical Connector - Inspect

SMCS - 7553-040-WW

ReferenceSpecial Instruction, SEHS9615, "Servicing DT Connectors".

ReferenceSpecial Instruction, REHS0148, "Listing Of Deutsch Connector Components"

ReferenceSpecial Instruction, SEHS9065, "Use Of CE Connector Tools".

ReferenceService Magazine, SEPD034227 January 97, "Field Repair Of Single Wire Breaks In Harnesses (Sealed Splice)".

ReferenceService Magazine, SEPD037128 July 97, "Protection Of Unsealed Electrical Terminations For Machines In Corrosive Applications".

ReferenceService Magazine, SEPD047324 May 99, "New DT Connector Plugs With Improved Seal Retention".

ReferenceService Magazine, SEPD054509 October 00, "Dielectric Grease Should Not Be Used In Electrical Connectors".

ReferencePocket Guide, SEBD0402, "Guidelines For Routing And Installing Wire Harness Assemblies".

Use this procedure under the following situation:

Use the following steps to help determine if the connector is the cause of the problem. If a problem is found in the electrical connector, repair the connector and verify that the problem has been corrected.

The following background information is related to this procedure:

Many of the operational procedures and the diagnostic code procedures in this troubleshooting guide will instruct you to check a specific electrical connector.

Intermittent electrical problems are often caused by poor connections. Always check for an active diagnostic code before breaking any connections. Also, always check for an active diagnostic code after the connector is reconnected in order to verify that the problem disappears.

Simply disconnecting the connectors and then reconnecting the connectors can temporarily solve a problem at times. If reconnecting the connectors solves the problem, likely causes are loose

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Troubleshooting
Product Link - PL522/523
Media Number -RENR8143-02 Publication Date -01/07/2013 Date Updated -23/07/2013

i04461523

Operating Hours Discrepancy

SMCS - 7606-038

System Operation Description:

There are problems that could be reported with the PL522 or 523 system but the problems are not caused by the PL522 or 523 system. The description of the problem is described as a discrepancy of the service meter units. This section contains steps that are used to determine the possible cause. Check for active diagnostic codes for the PL522 or 523. Correct any diagnostic codes before proceeding. visually inspect the following items for damage: PL522 or 523 module, antenna and cables. Verify that there are no loose connections.

The PL522 or 523 system depends on several communication links in order to transfer data from the machine to the office. The following procedures assume that these communication links are operating properly. The proper communication links are listed below:

- The network for Cellular communications is operational in the geographic area of concern. The network is operational when messages can be sent to VisionLink.
- The PL522 or 523 system is correctly configured to communicate on the network for Cellular communications.
- The worldwide network of Caterpillars computers is passing messages to software for the Caterpillar VisionLink web application.
- The VisionLink web Application is configured properly and the software is functioning.

The PL522 or 523 modules should not be replaced without verifying that these issues have been investigated. Contact your Caterpillar Technical Communicator for aid in resolving these issues.

Note: The Service Meter Hours that are reported by the PL522 and 523 modules should approximately match the machine operating hours.

Test Step 1. ACCESS THE PL522 AND 523 THROUGH THE CAT ET SERVICE TOOL.

A. Connect the Cat ET service tool to the machine.

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

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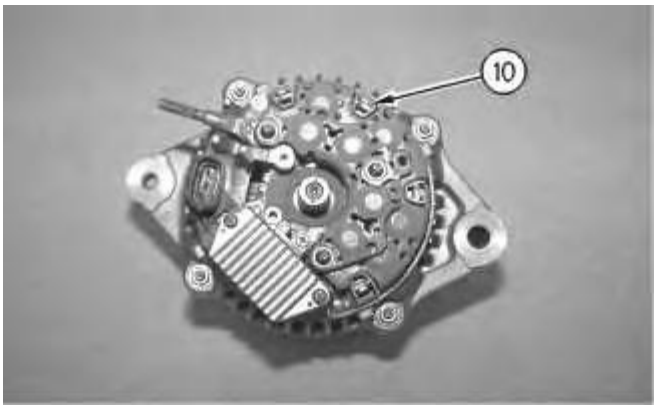


Illustration 7 g00477517

Alternator (90 Ampere) With Terminal Type Leads From Stator

5. On 55 ampere alternators, remove the four screws that are holding the stator leads. Use needle nose pliers to straighten the stator leads. On 90 ampere alternators, remove the four screws that are attaching the terminal type leads to the rectifier. Remove the rectifier.

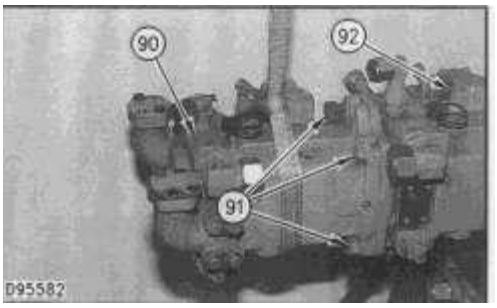


Illustration 8 g00477518

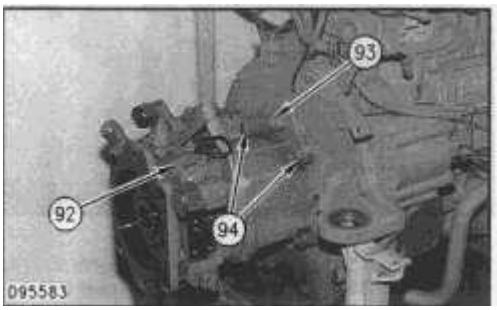
55 Amp Alternator

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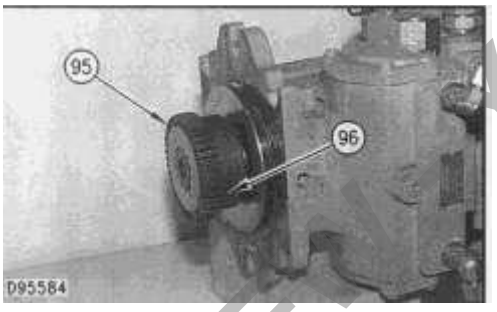
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40. Attach a strap and suitable lifting device to pump (90). Loosen four bolts (91) and slowly remove pump (90) from pump (92). As the pump disengage, remove four bolts (91) and washers. The weight of this pump is **75 kg (165 lb)**.



41. Attach a strap and suitable lifting device to pump(92). Remove two nuts (93) and washers. Loosen four nuts (94) and slowly remove pump (92) from the engine. As the pump and the engine disengage, remove four nuts (94) and washers. The weight of the pump is **75 kg (165 lb)**.



42. Loosen screw (96) and remove coupling (95).

NOTE: Install in reverse order.

End By:

a. install radiator

b. install air cleaner

c. install muffler

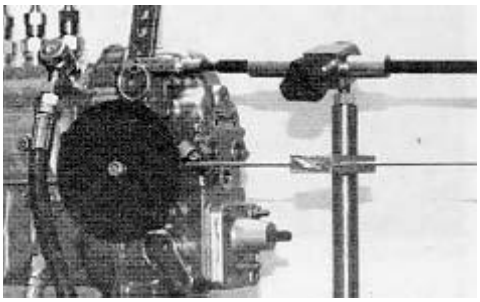
d. install air conditioning compressor

e. install cab

f. install front and rear guards (belly guards)

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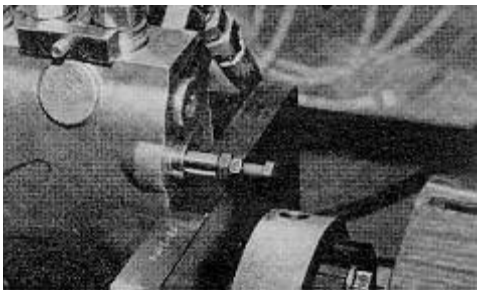


Control Lever Angle at Idle Position and Full Speed Position

1. Adjust the angle of the control lever to 10° forward of the full speed angle specification in TMI.

2. Measure the control lever angle at the Idle Position and at the Full Speed Position.

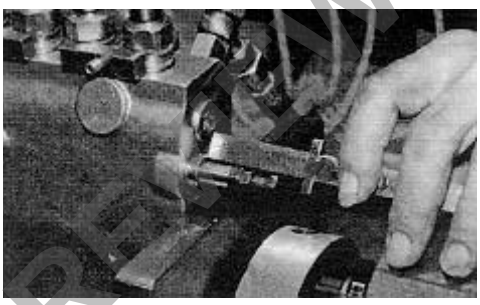
Starting Rack Measurement



Dial Indictor Removed

1. Remove the dial indicator and measurement adapter.

2. Use a screwdriver to push the control pinion forward.



Measuring Rack

3. Measure the distance from the front of the housing to the end of the bolt in the rack.

4. Run the pump at 100 rpm.

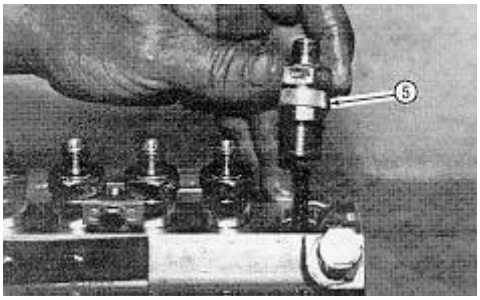
5. Measure the distance from the front of the housing to the end of the bolt in the rack. The distance must be greater than the distance measured in Step 3.

Lockwiring Caps of Adjustment Screws

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3. Install delivery valve spring (4) and stopper (3).



4. Put a new O-ring seal on delivery valve holder (5) and install the delivery valve holder.

NOTE: The following procedure is for the tightening of the delivery valve holder.

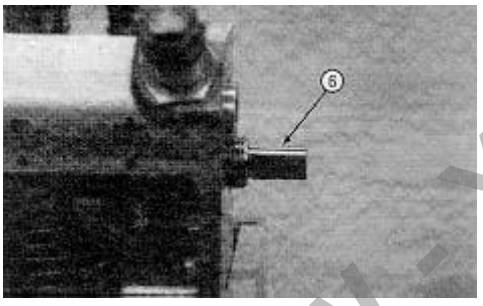
a. Tighten the delivery valve holder to a torque of 39 ± 5 N·m (29 ± 4 lb ft).

b. Loosen the delivery valve holder.

c. Retighten the delivery valve holder to a torque of 39 ± 5 N·m (29 ± 4 lb ft).

d. Loosen the delivery valve holder.

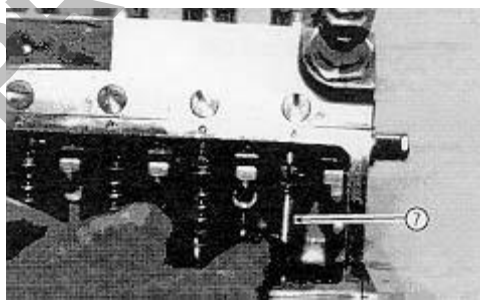
e. Finally tighten the delivery valve holder to a torque of 39 ± 5 N·m (29 ± 4 lb ft).



5. Insert control rack (6) into the fuel injection pump housing.

6. Screw the guide screw into the back of the fuel injection pump housing and ensure the control rack moves freely.

NOTE: Control rack (6) must be installed at the position measured before it was removed. If this measurement was not made, make sure the center tooth is aligned with the mark.



7. Install control sleeve (7) with the control pinion slit facing out as shown.

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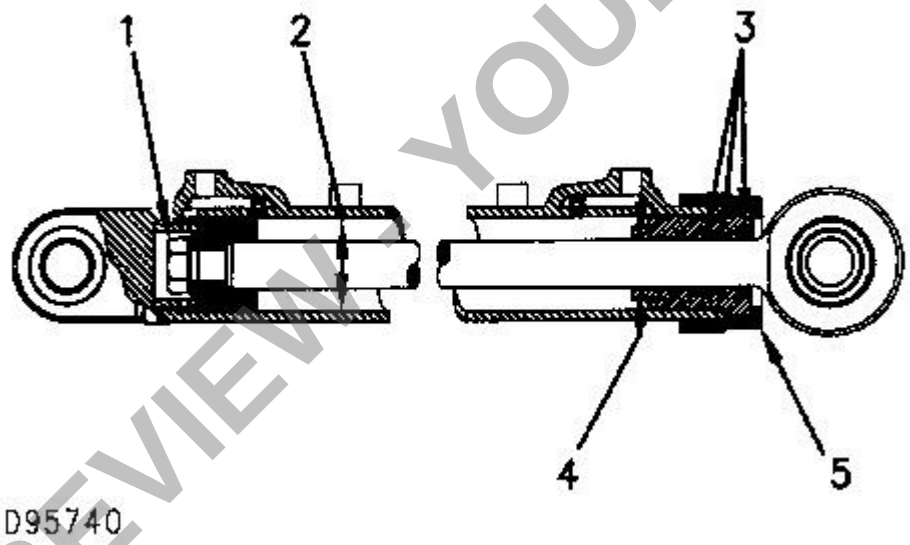
SENR12520012

Angling Cylinders - Optional

SMCS - 1374-010

136-3156

D3C - (4KS1-UP, 4TS1-UP, 5GS1-UP)



(1) Lubricate threads and torque bolt to ... 1050 ± 150 N·m (775 ± 110 lb ft)

(2) Bore of cylinder (new) ... 88.90 ± 0.08 mm (3.500 ± .003 in)

(3) Lubricate sealing lips with small amount of oil being sealed.

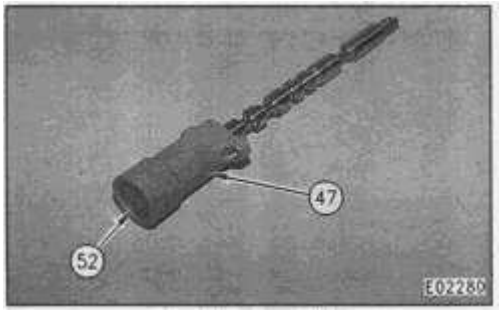
(4) Bore of head (new) ... 38.43 ± 0.03 mm (1.513 ± .001 in)

Diameter of rod (new) ... 38.050 ± 0.038 mm (1.4980 ± .0015 in)

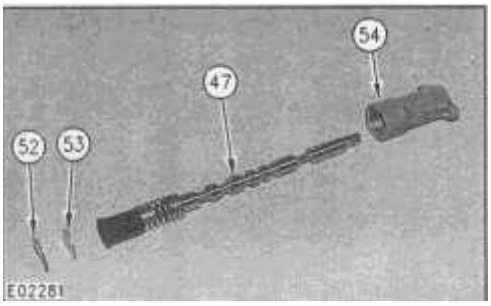
(5) Lubricate head and crown with clean grease and torque heat to ... 600 ± 130 N·m (440 ± 95 lb ft)

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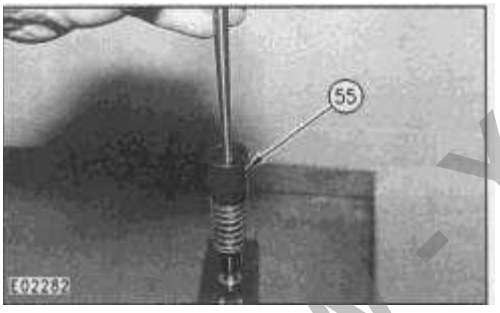


g. Remove ring (52) from valve spool assembly (47).



h. Remove cap (53) and cap (54).

NOTE: Use care not to cause damage to the valve spool assembly.



i. Carefully place the flat end of the valve spool assembly in a vise.

WARNING

Sleeve (55) has spring force behind it.

j. Press the center ball downward and remove sleeve (55).

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Opening pressure of engine oil bypass valve ... 1.1 MPa (160 psi)

Note: One engine oil bypass valve is mounted on the inside of the engine oil pan along the left side oil pan rail.

Note: There may be a second engine oil bypass valve located within the engine oil filter assembly.

Differential opening pressure of engine oil bypass valve within the engine oil filter assembly ... 80 to 120 kPa (11.6 to 17.4 psi)

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

i03862489

Refrigerant System - Flush

SMCS - 1809-046

WARNING

Personal injury can result from contact with refrigerant.

This system is under pressure at all times, even if the engine is not running. Heat should never be applied to a charged system.

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 caution when a fitting is removed. Slowly loosen the fitting. If the system is still under pressure, evacuate the system recovering the refrigerant before removing the fitting.

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.

Before any checks of the air conditioning and heating system are made, move the machine to a smooth horizontal surface. Lower all implements to the ground. Make sure the transmission is in neutral or park and that the parking brake is engaged. Keep all other personnel away from the machine or where they can be seen.

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on the wiring harness for voltage. One of the two pins should supply 12 V for a 12 V system or 24 V for a 24 V system.

6. In order to check the ground path from the compressor clutch coil to the chassis, turn off the air conditioning switch in the cab. Set the **146-4080** Digital Multimeter OHMS. Remove the 2-pin connector from the compressor clutch coil. Connect the negative lead to a suitable ground. Check each of the two pins on the two pin connectors for continuity. One of the two pins should display OL.

7. If both the correct voltage and ground are present check the resistance of the compressor clutch coil. Refer to the Service Manual, SENR 5664, "Refrigerant Compressor" section in Specifications.

Pressure Switch Tests

Test Procedure for 114-5333 Pressure Switch and 114-5334 Pressure Switch (NORMALLY OPEN)

Pressure switches are used in order to protect the a/c compressor. The two most commonly used pressure switches are the **114-5333** Pressure Switch and the **114-5334** Pressure Switch. The only difference between the two switches is the connector. Only one of these switches is used per machine. The high pressure and low-pressure switches have three possible switch positions which are given below:

OPEN - System pressure is low.

CLOSED - System pressure is correct.

OPEN - System pressure is high.

The two OPEN positions of the pressure switch protect the air conditioning system. The OPEN position prevents the compressor from actuating when potentially harmful pressures exist in the system. The CLOSED position is the normal operating switch position. The following table contains the logic for the pressure switches:

Table 2

Pressure	Range	Contact Position (Pressure Rise)	Contact Position (Falling Pressure)
High Position 3	Above 2800 kPa (406 psi)	OPEN	OPEN
Hysteresis Band (1)	1750 kPa (254 psi) to 2800 kPa (406 psi)	CLOSED	OPEN
Middle (Position 2)	275 kPa (40 psi) to 1750 kPa (254 psi)	CLOSED	CLOSED

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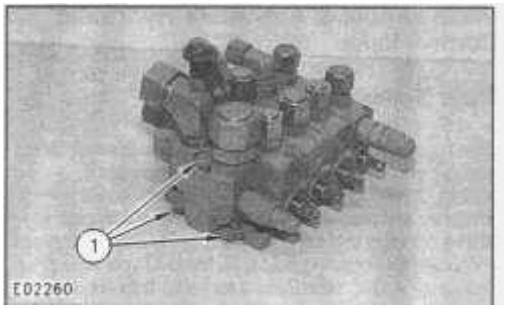
NOTE: Place identification marks on all lines, hoses, wires and tubes for installation purposes. Cap and plug all lines, hoses and tubes to prevent fluids loss and contaminants from entering the system.

NOTE: Do not mix the components of the pilot control valve during disassembly and assembly.

Start By:

a. remove hydraulic control valve

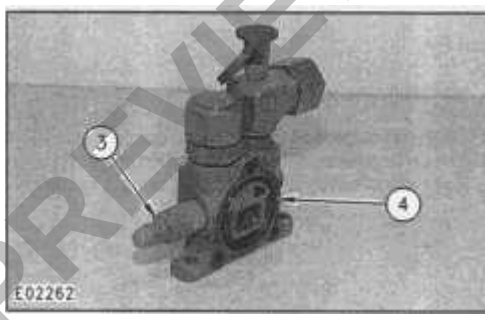
1. Clean the outside of the hydraulic control valve to reduce to possibility of contamination in the system. Place identification on all parts for correct assembly.



2. Remove three nuts (1) from the rods.



3. Remove manifold (2) from the rods.



4. Remove relief valve group (3) and O-ring seal (4) from the manifold.

5. Disassemble the relief valve group as follows:

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(4) Cage

(5) Pinion gear

(6) Housing

(7) Spindle

(8) Shaft

(9) Carrier

(10) Gear

(11) Gear

(12) Hub

(13) Sprocket segment

(14) Hub

(15) Gear

The final drives transmit power from the piston motors to the tracks. There is a final drive for each side of the machine. The piston motors are driven by the piston pumps. When the piston pumps send oil flow to the piston motors, the motors cause the final drives to rotate.

The final drive cases have reservoirs for oil for the final drives. As the components of the final drives turn, lubricant is thrown around the inside of the cases in order to lubricate the components.

Piston motor (1) is mounted to parking brake (3). Studs (2) that are a part of cage (4) mount the parking brake and the piston motor together. The parking brake is splined to the shaft of pinion gear (5). The teeth of pinion gear (5) turn gear (15) which is splined to shaft (8). Shaft (8) rotates and the shaft causes gear (10) to rotate.

Gear (10) is pinned in carrier (9). Carrier (9) is mounted with sprocket segments (13) to hub (14).

Gear (11) is splined to hub (12). Hub (12) is splined to spindle (7) and spindle (7) is mounted to housing (6).

As gear (10) rotates, the teeth of gear (10) contact the internal teeth of gear (11). Since gear (11) is stationary through spindle (7), the rotation of gear (10) causes carrier (9) to rotate.

The teeth on sprocket segment (13) contact the bushings of the track link assemblies.

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Towing Valve

SMCS - 4286-010

Remove & Install Towing Valve

Start By:

a. remove floor plates*

NOTE: * This procedure can be found in 3046 Engine Supplement for the D4C Tractor, Publication number SENR1248.

Fluid Spillage Containment

Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting and repair of the machine. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids. Refer to "Tools And Shop Products Guide", NENG2500 for tools and supplies suitable to collect and contain fluids in Caterpillar machines. Dispose fluids according to local regulations and mandates.

WARNING

Hot oil and components can cause personal injury. Do not allow hot oil or components to contact the skin. Be sure that the engine and components are cool enough to touch with your bare hand prior to performing any service work.

NOTE: Place identification marks on all lines, hoses, wires and tubes for installation purposes. Cap and plug all lines, hoses and tubes to prevent fluid loss and contaminants from entering the system.

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(3) Crossover Relief Valve (Forward) ... 47500 ± 750 kPa (6889.40 ± 108.78 psi)

Installation torque ... 100 ± 10 N·m (75 ± 5 lb ft)

(3) Crossover Relief Valve (Reverse) ... 47500 ± 750 kPa (6889.40 ± 108.78 psi)

Installation torque ... 100 ± 10 N·m (75 ± 5 lb ft)

(4) Charge pump ... 19 cc/rev (1.16 cu in/rev)

(6) Charge Relief Valve ... 2900 ± 100 kPa (420 ± 14 psi)

Installation torque ... 70 ± 5 N·m (50 ± 5 lb ft)

(7) Torque for two bolts ... 240 ± 40 N·m (180 ± 30 lb ft)

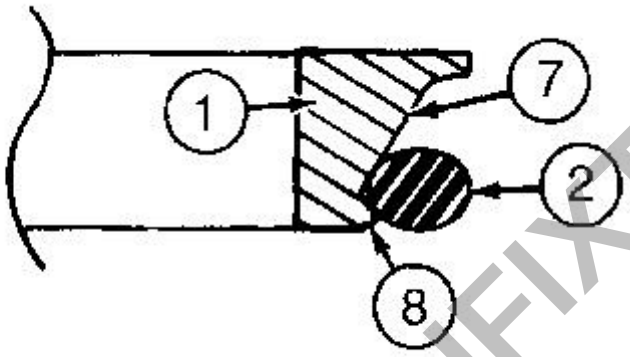
(8) Inch lever actuation is counter clockwise (location off) (dimension A) ... 35 degree

For test, use SAE 10W oil at 65°C (150°F).

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C20394P1

2. Put toric ring (2) on seal ring (1), at the bottom of seal ring ramp (7) and against retaining lip (8).

NOTICE

Make sure that toric ring (2) is straight on seal ring (1) and is not twisted. Be careful when you work on the rubber toric ring. Nicks, cuts and scratches can cause leaks.

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WARNING

Never visually inspect the vent holes or valves to see if grease or oil is coming out of them. Make sure the vent holes are clean before the tension is released on the track. Watch the cylinder to see that it moves.

Torque for adjustment and relief valves ... 35 ± 7 N·m (25 ± 5 lb ft)

For the correct track adjustment, use the procedure that follows:

NOTE: The track adjustment procedure should be performed under the same conditions in which the machine is used. Packing must NOT be removed from the track, if packing condition exist on the job.

1. Move the machine toward a distance of twice its length. Allow the machine to come to a stop without the use of the brakes.

2. Use the hydraulic track adjuster and move the idler forward toward the front of the machine until the track is in the full tight position. Make a mark (B) on the track roller frame, even with the front face of the idler bearing assembly. See Illustration 1.

3. Make a mark (C) on the track roller frame 13.0 + 0.0 - 1.5 mm (.5 + 0 - .06 in) behind mark (B).

4. Open the relief valve, and allow the idler to move back, until the front face of the idler bearing assembly is behind mark (C). See Illustration 2.

NOTE: It is necessary to move the machine in a back and forth motion to move the idler back.

Close the relief valve.

5. Use the hydraulic track adjuster and move the idler forward again until the front face of the idler bearing assembly is even with mark (C) on the track roller frame. See Illustration 3.

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