i01586925

Air Inlet and Exhaust System - Inspect

SMCS - 1050-040

Air Inlet Restriction

There will be a reduction in the performance of the engine if there is a restriction in the air inlet system or the exhaust system.

Table 1

Tools Needed		
Part Number	**Part Name**	**Quantity**
1U-5470	Engine Pressure Group	1

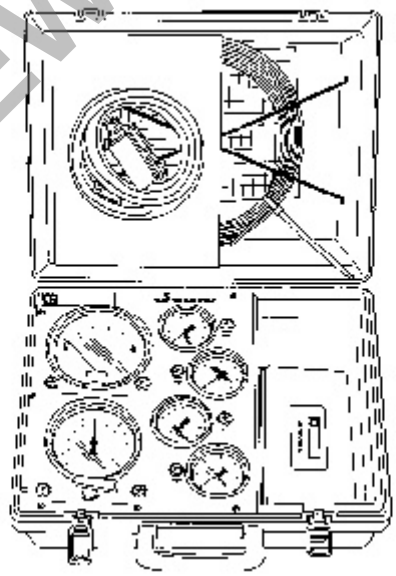


Illustration 1 g00293196

1U-5470 Engine Pressure Group

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Disassembly and Assembly
446 and 446B Backhoe Loaders, Lexion 450 Combine, 3114 and 3116 Engines, IT18F Integrated Toolcarrier, D6M Track-Type Tractor and 928F, 950F and 950G Wheel Loaders
Media Number -SENR3611-18 **Publication Date -01/05/2009** **Date Updated -27/05/2009**

i01929472

Aftercooler - Remove

SMCS - 1063-011

Removal Procedure

Table 1

Required Tools			
Tool	**Part Number**	**Part Description**	**Qty**
A	8T-0292	Bolt	2

NOTICE

Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.

NOTICE

Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting and repair of the product. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Refer to Special Publication, NENG2500, "Caterpillar Tools and Shop Products Guide" for tools and supplies suitable to collect and contain fluids on Caterpillar products.

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Vibration Damper, Pulley and Crankshaft Front Seal

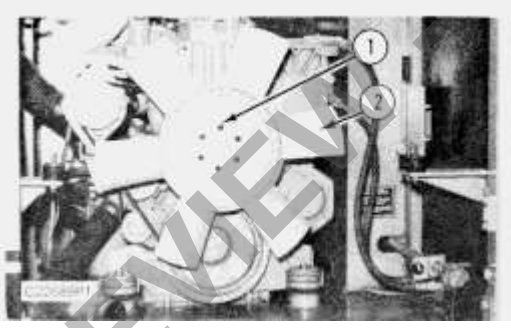
SMCS - 1160-010; 1205

Remove And Install Vibration Damper, Pulley and Crankshaft Front Seal

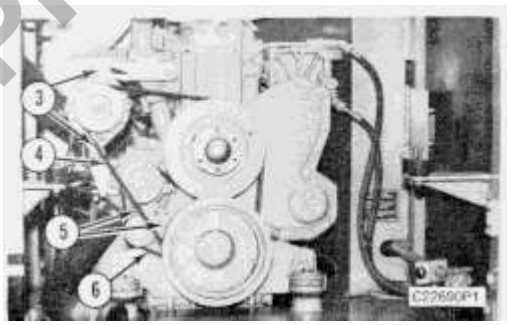
Tools Needed		A	B
1P3075	Slide Puller Group	1	
1U7430	Seal Installation Group		1

Start By:

a. remove radiator



1. Remove six bolts (1) and fan (2).



2. Loosen alternator adjusting bolts (3) and remove belt (4).

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Systems Operation
3114, 3116 and 3126 MUI Engine Governors
Media Number -SENR6454-05 **Publication Date -01/02/2002** **Date Updated -01/03/2002**

i01020971

Fuel Shutoff Solenoid

SMCS - 1259

The fuel shutoff solenoid is used to move the fuel rack to the OFF position. When the fuel rack reaches the OFF position, the engine will shut off. There are three different types of solenoids that are used in various applications.

Latching Solenoids

Mechanical Latching Solenoid

1. This solenoid uses an internal mechanical latching system to hold the solenoid in the Run position during engine operation. There are two coils in the solenoid. The first coil is the start coil. The start coil is energized during engine cranking. The start coil pulls the plunger into the solenoid to the Fuel ON position. The plunger position is maintained mechanically by the mechanical latching system. The second coil is the stop coil. The stop coil disengages the mechanical latching system. This allows the plunger to return to the Fuel OFF position. The solenoid contains a switch that disconnects the stop coil when the solenoid is in the Fuel OFF position. During engine operation, neither one of the coils are energized.

Magnetic Latching Solenoid

1. This solenoid uses an internal magnetic latching system to hold the solenoid in the Run position during engine operation. There are two coils in the solenoid. The first coil is the start coil. The start coil is energized during engine cranking. The start coil pulls the plunger into the solenoid to the Fuel ON position. The plunger position is maintained magnetically by a permanent magnet. The second coil is the stop coil. The permanent magnet maintains the plunger position until the stop coil is activated. When the stop coil is activated, the stop coil pushes the plunger away from the magnet and the plunger spring pushes the plunger toward the Fuel OFF position. The solenoid contains a switch that disconnects the stop coil when the solenoid is in the Fuel OFF position. During engine operation, neither one of the coils are energized.

Manual Override Procedure for Latching Type Solenoids

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Systems Operation
EquipmentManager Dealer Administrator Manual
Media Number -KENR6304-08 **Publication Date -01/05/2010** **Date Updated -18/05/2010**

i03319401

General Information

SMCS - 7600; 7606

Use of this Manual

EquipmentManager provides valuable information that allows remote monitoring of either a single machine or a fleet of machines. Customers can perform the following tasks if the customer can provide the location of the machine, Service Meter Unit (SMU), and information about the health of the machine:

- Manage the location and the basic usage of engines and machines.
- Schedule maintenance that is planned and schedule major repairs.
- Manage fault codes or diagnostic codes.
- Detect problems before problems cause a major component failure.
- Increase the availability and the productivity for the machines by avoiding unexpected downtime for repairs.
- Identify the need for training in order to improve the efficiency of the operator.

EquipmentManager is part of Dealer Web site and works with other applications such as PartStore and EquipmentManager. EquipmentManager enables customers to remotely manage fleets. The customer is alerted to only those machines that need immediate attention.

The "EquipmentManager Dealer Administrator Manual" includes the following information:

- Setting up Product Link Modules (PLM)
- Registering PLM
- Setting up and maintaining the accounts of the customer
- Customizing EquipmentManager for optimum use
- Managing EquipmentManager functions

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Systems Operation
EquipmentManager User Guide
Media Number -KENR6303-08 **Publication Date -01/05/2010** **Date Updated -18/05/2010**

i03319401

General Information

SMCS - 7600; 7606

Use of this Manual

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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

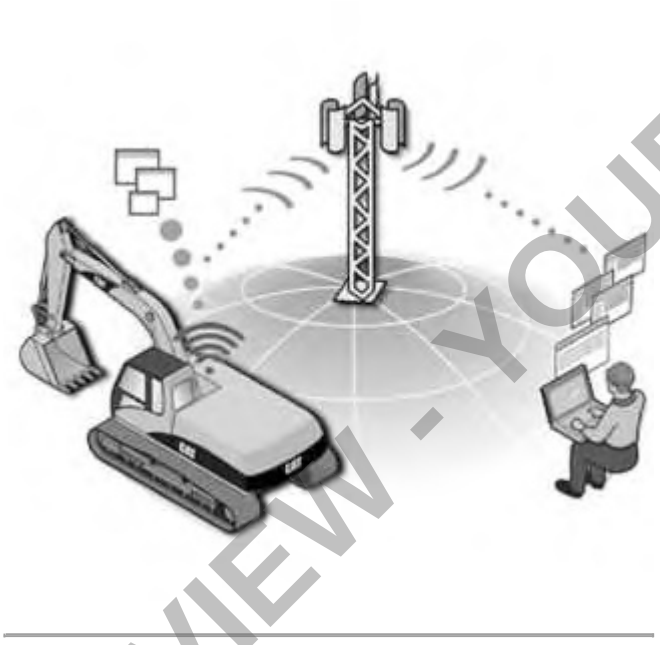


Illustration 1 g02167864

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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SENR37960001

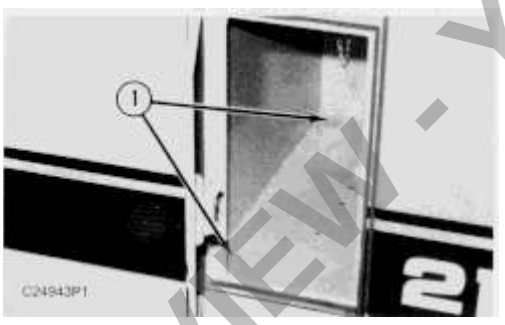
Battery Box

SMCS - 1401-010

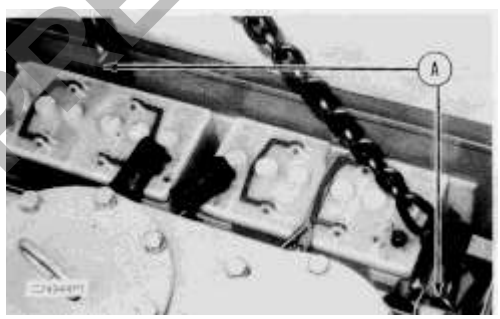
Remove And Install Battery Box

Tools Needed		A
6V2156	Link Bracket	2

1. Disconnect battery cables.



2. Remove four bolts (1).



3. Attach tool (A) to battery box and remove box. The weight of the battery box with batteries is 136 kg (300 lb).

NOTE: The following steps are to install the battery box.

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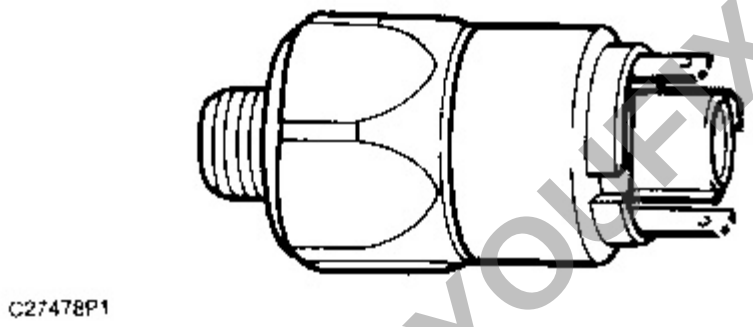
Specifications

213B, 214B, 214B FT & 224B EXCAVATORS HYDRAULIC SYSTEM

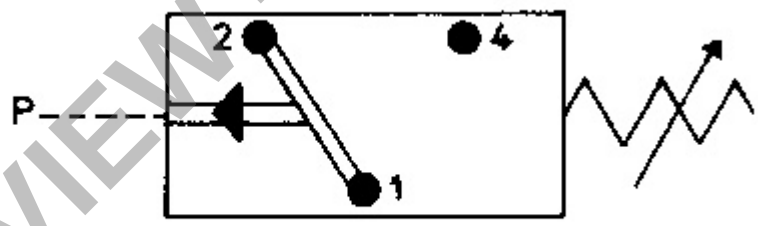
Media Number -SENR3797-01 **Publication Date -01/01/1989** **Date Updated -22/01/2003**

Pressure Switch
214B, 214B FT & 224B 5W9972 (For Pressure Drop Warning Buzzer), 8U2160 (For Parking Brake Warning Light), 8U2158 (For Stop Signal))

SMCS - 1453-010



C27478P1



C27479P1

Maximum pressure limit:

5W9972 ... 60 000 kPa (8700 psi)

8U2160, 8U2158 ... 30 000 kPa (4350 psi)

Switching range:

5W9972 ... 9500 to 10 500 kPa (1375 to 1525 psi)

8U2160 ... 6500 to 7500 kPa (950 to 1100 psi)

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Systems Operation
213B, 214B, 214B FT & 224B EXCAVATORS HYDRAULIC SYSTEM
Media Number -SENR3798-01 **Publication Date -01/02/1989** **Date Updated -11/10/2001**

Systems Operation

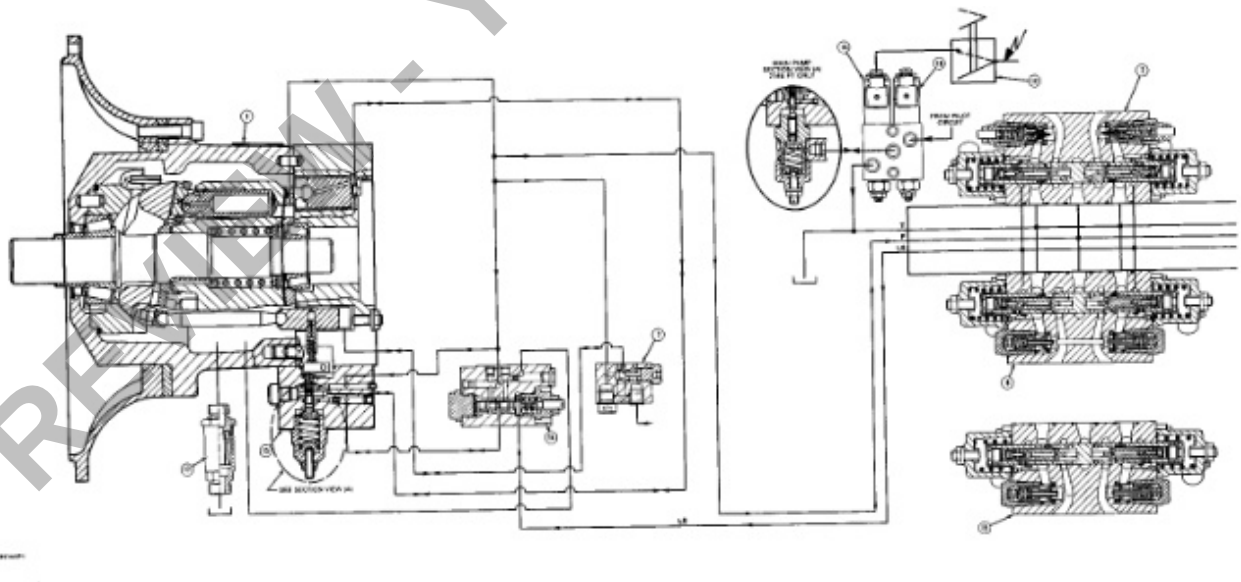
SMCS - 5054-010; 5054-017

Introduction

Reference: For Testing And Adjusting instructions, make reference to Testing And Adjusting for 213B, 214B, 214B FT & 224B Excavators Hydraulic System & Steering, Form No. SENR4301.

Reference: For Specifications with illustrations, make reference to Specifications for 213B, 214B, 214B FT & 224B Excavators Hydraulic System, Form No. SENR3797.

Main Pump And Load Sensing System Schematic (213B, 214B & 214B FT)



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Systems Operation
214B, 214B FT & 224B EXCAVATORS STABLIZER/DOZER, STEERING, B
Media Number -SENR4303-01 **Publication Date -01/03/1989** **Date Updated -11/10/2001**

Systems Operation

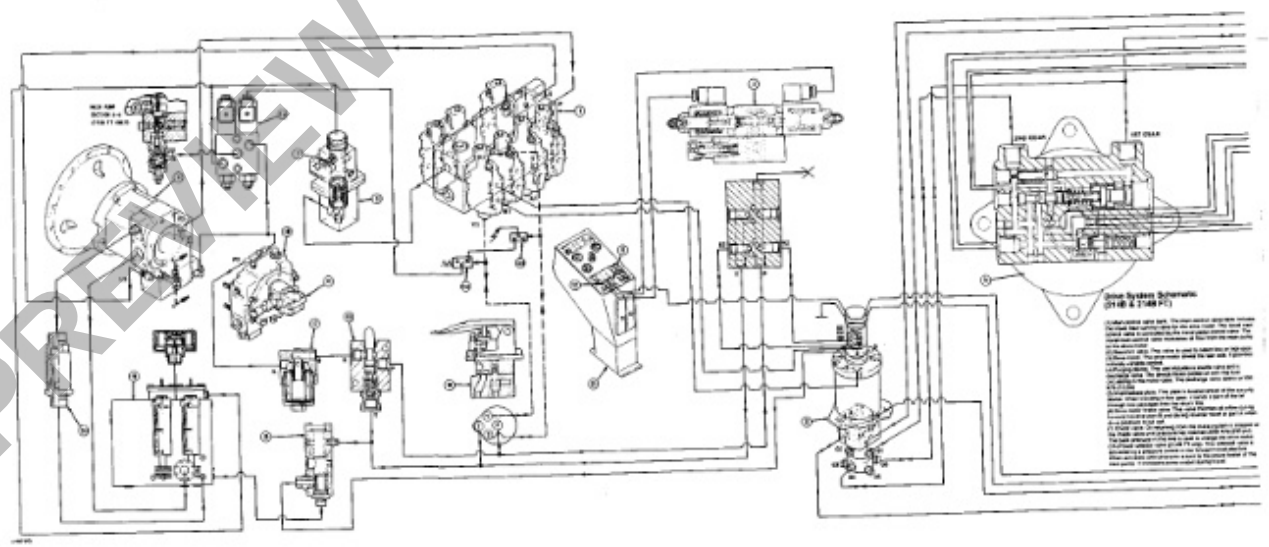
SMCS - 5054-010; 5054-017

Introduction

Reference: For Testing And Adjusting, refer to the Testing And Adjusting Module for the 213B, 214B, 214B FT & 224B Excavators Hydraulic System & Steering, Form No. SENR4301. If the Specifications in Form No. SENR4301 are not the same as listed in the Systems Operation, look at the print date on the back cover of each book. Use the Specifications listed in the book with the latest date.

Reference: For Specifications with illustrations, refer to the Specifications for the 213B, 214B, 214B FT & 224B Hydraulic System, Form No. SENR3797. If the Specifications in Form No. SENR3797 are not the same as listed in the Systems Operation, look at the print date on the back cover of each book. Use the Specifications listed in the book with the latest date.

Drive System Schematic (214B & 214B FT)



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Testing and Adjusting

SMCS - 5054-010; 5054-017

Troubleshooting

Introduction

Reference: For illustrated Specifications, make reference to the Specifications for 213B, 214B, 214B FT & 224B Hydraulic System, Form No. SENR3797. If the specifications given in Form SENR3797 are not the same as given in the Testing And Adjusting, look at the print date on the back of each book. Use the Specifications given in the book with the latest date.

Reference: For Systems Operation description, make reference to Systems Operation for 213B, 214B, 214B FT & 224B Hydraulic System, Form No. SENR3798, Systems Operation for 213B Drive System, Form No. SENR3799 and System Operation for 214B, 214B FT & 224B Stabilizer/Dozer, Steering, Brake & Drive Systems, Form No. SENR4303.

WARNING

Hydraulic oil, under pressures that can be higher than 40 000 kPa (5800 psi) 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 subject Release Of Pressure before any fitting, hose or component is loosened, tightened, removed or adjusted.

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

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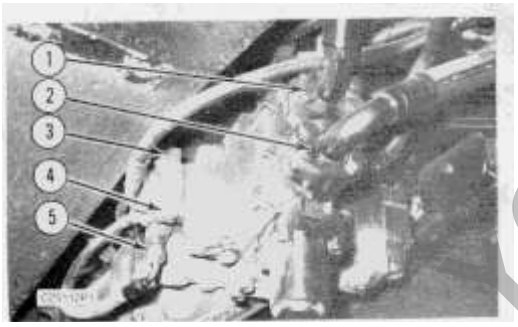
Travel Motor

SMCS - 4351-010; 4351-017

Remove And Install Travel Motor

Start By:

a. remove rear drive shaft



1. Remove five hydraulic lines (1), (2), (3), (4) and (5).



2. Remove two hydraulic lines (6) and (7).

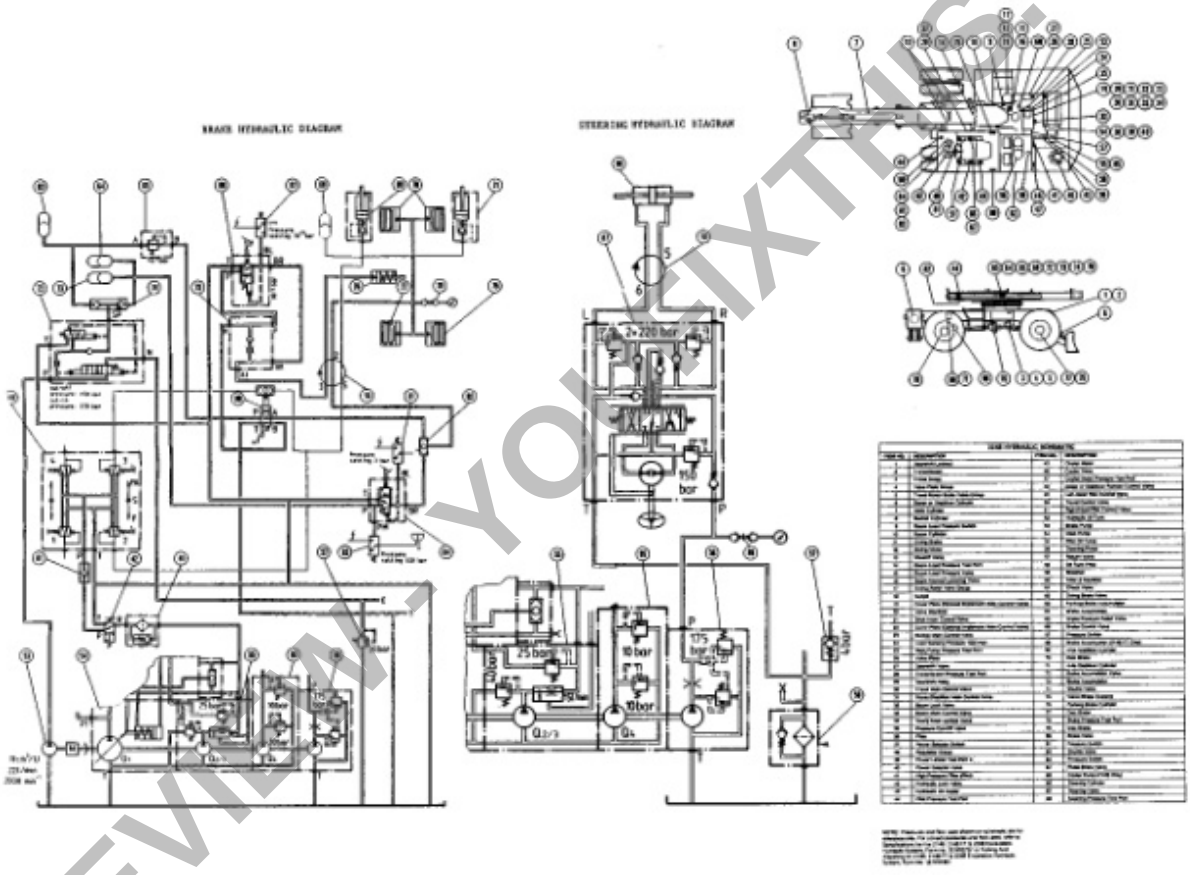
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Schematic
224B EXCAVATOR HYDRAULIC SYSTEM
Media Number -SENR4319-00 **Publication Date -01/02/1989** **Date Updated -11/10/2001**

Schematic

SMCS - 7566



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Schematic
Fluid Power and Electrical Graphic Symbols
Media Number -SENR3981-05 **Publication Date -01/09/2012** **Date Updated -05/09/2012**

i03480700

Fluid Power Graphic Symbols

SMCS - 5050

Note: Use this module as a basic reference guide for graphic symbols. Do not use this module as a comprehensive reference guide.

Line Identification

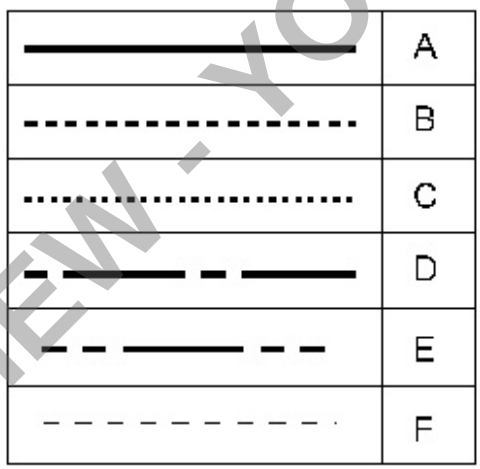


Illustration 1 g01387054

(A) Pressure line

(B) Pilot/Load sensing pressure line

(C) Drain/Return line

(D) Component line

(E) Attachment line

(F) Air Line

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Torque Specifications

Torque Specifications

Media Number -SENR3130-14 **Publication Date -01/01/2013** **Date Updated -09/01/2013**

i02357647

General Information

SMCS - 7553

WARNING

Mismatched or incorrect fasteners can result in damage or malfunction, or personal injury.

Take care to avoid mixing metric dimensioned fasteners and inch dimensioned fasteners.

Introduction to Torque

"Torque" is measured in terms of force and distance. Force is the amount of pushing or pulling applied at the end of the lever. Distance is the length of the lever that is being used. Torque values are given in the following units: NEWTON meters (N·m), pound inches (lb in) and pound feet (lb ft)

This manual is intended to provide the operator with a reference. This manual will provide the standard torque settings for the following: bolts, nuts, plugs, fittings and clamps.

Exceptions to these torques are given in the Service Manual, if necessary.

Be sure to use a torque wrench that has the proper range. Torque wrenches must be used properly in order to ensure that the correct torque is applied. Always use a smooth pull for torque wrenches. Do not jerk a torque wrench. Do not use adapters that change the length of the torque wrench. For the correct use of your torque wrench, refer to the instructions that were packaged with your torque wrench. For more information on the correct use of torque wrenches, refer to Special Publication, SEBV0516, "An Introduction to Torque".

Prior to installation of any hardware, ensure that components are in near new condition. Bolts and threads must not be worn or damaged. Threads must not have burrs or nicks. Hardware must be free of rust and corrosion. Clean reused fasteners with a noncorrosive cleaner. Lightly lubricate

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Back pressure is the difference in the pressure between the exhaust at the outlet elbow and the atmospheric air.

Table 2

Tools Needed		
Part Number	**Part Name**	**Quantity**
1U-5470	Engine Pressure Group	1

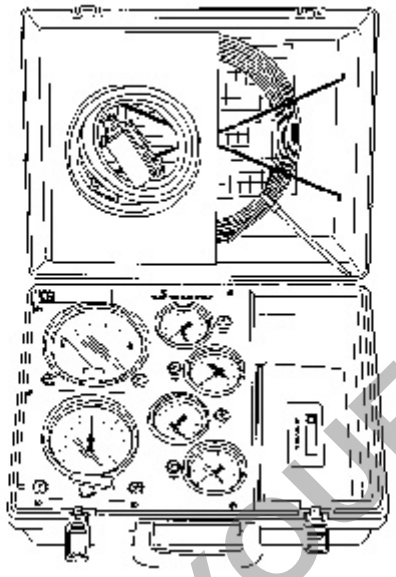


Illustration 3 g00293196

1U-5470 Engine Pressure Group

Refer to Special Instruction, SEHS8907, "Using the **1U-5470** Engine Pressure Group " for the instructions that are needed to use the **1U-5470** Engine Pressure Group.

WARNING

Hot engine components can cause injury from burns. Before performing maintenance on the engine, allow the engine and the components to cool.

WARNING

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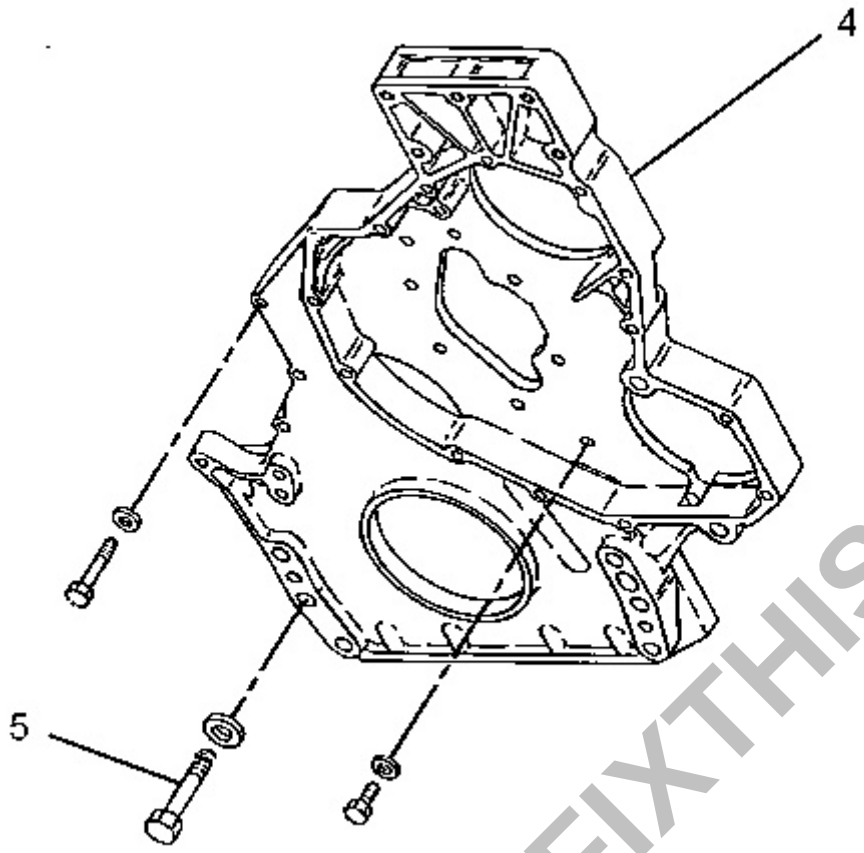


Illustration 1 g01011906

1. Clean the joint face on front housing (4) with Tooling (A) .
2. Apply Tooling (B) to the joint face. Allow the primer to dry for at least three to five minutes.

   Note: Do not allow Tooling (C) to seal the main oil passage on front housing (4) .
3. Apply Tooling (C) to the joint face. Spread the sealant uniformly. The front housing must be installed within ten minutes of applying the sealant.
4. Position the front housing on the cylinder block.
5. Install bolts (5) that fasten the front housing to the cylinder block and the engine oil pan.

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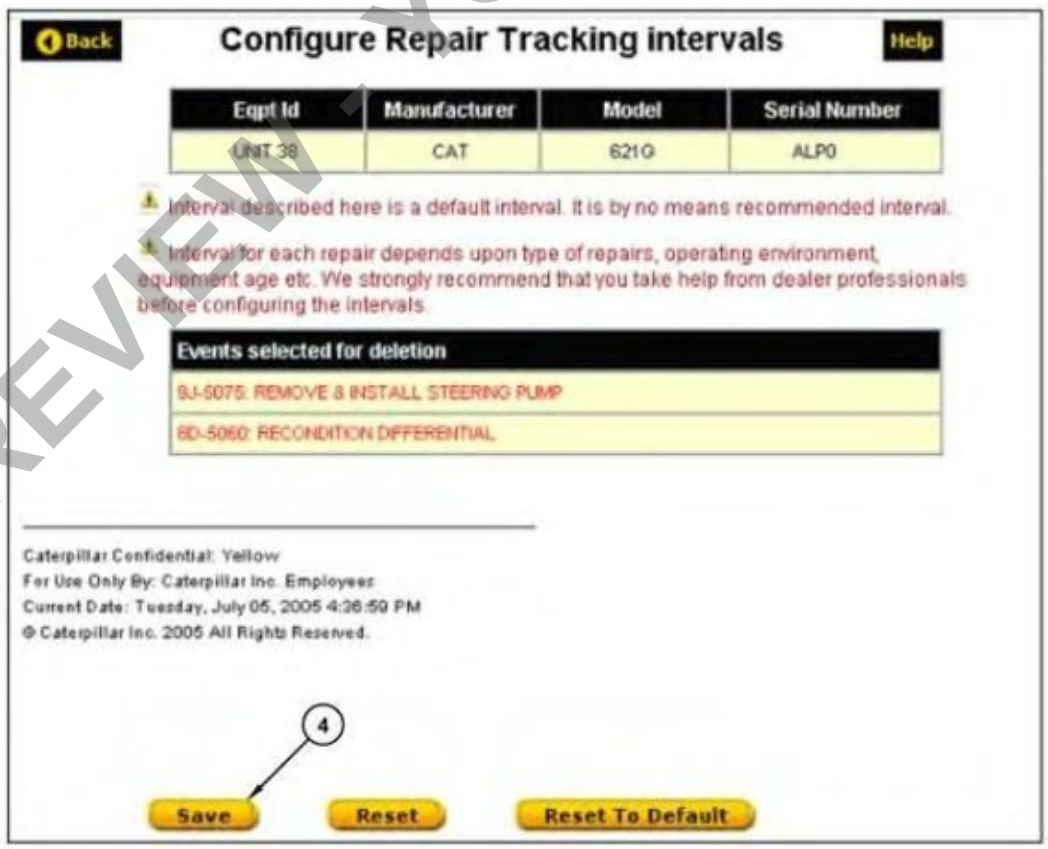
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Illustration 3 g01737056

"Confirmation – Configure Repair Tracking Intervals" screen

12. Click "OK". The major repair tracking is saved.



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The PL522 and 523 enables the customer to receive the following information: SMH (Service Meter Hours), location, diagnostic codes, events and other Cat Data Link (CDL) information.

The system allows two-way communication between the machine and a remote user such as a Caterpillar dealer or a customer. At any time, a user can request updated information from a machine. Also, the system parameters for the PL522 and 523 module can be changed. The information goes from the machine to VisionLink via the cellular communications network.

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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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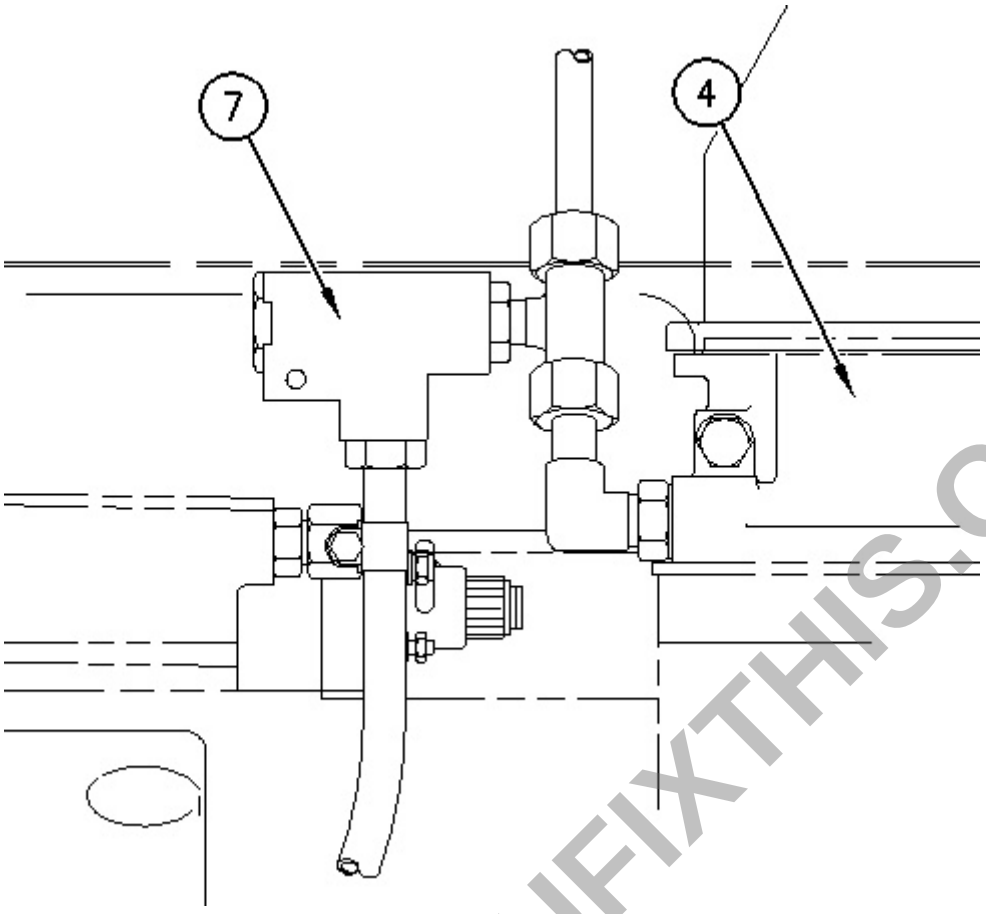


Illustration 3 g00629788

1. Install fuel pressure relief valve (7) on fuel filter base (4) .

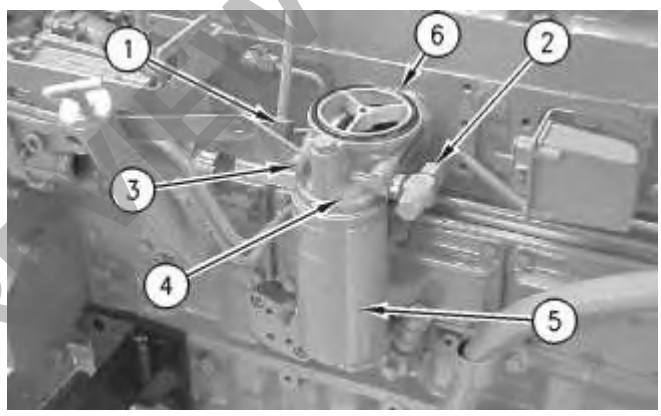


Illustration 4 g00629777

Typical example

2. Inspect the condition of the gasket. Replace the gasket, if necessary.
3. Position the gasket and fuel filter base (4) on the engine.

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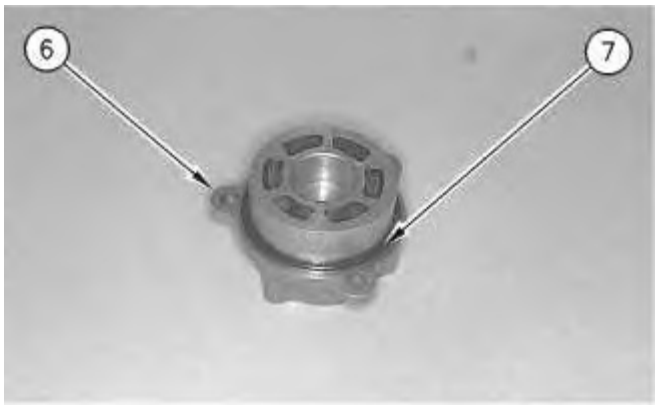


Illustration 5 g00521802

6. Remove O-ring seal (7) from cover assembly (6). Inspect the O-ring seal for wear or for damage. If the O-ring seal is worn or damaged, use a new part for replacement.



Illustration 6 g00521803

7. Remove governor spring seat (9) from the riser shaft.

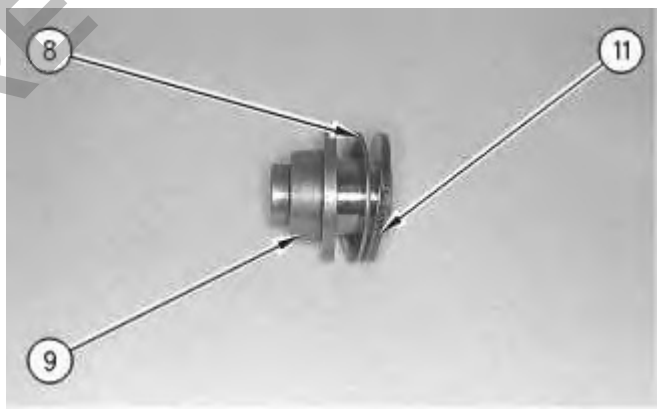
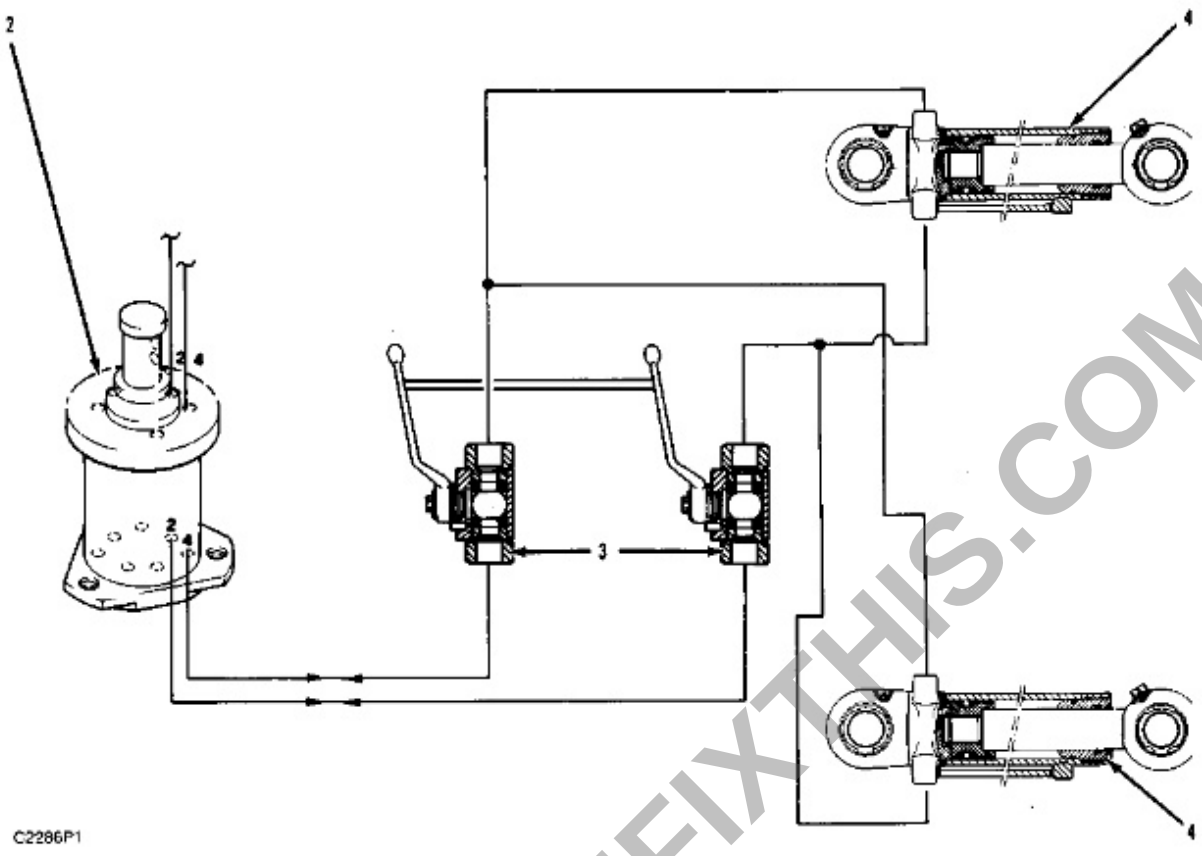


Illustration 7 g00522509

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Rear Dozer Schematic

(2) Swivel. The swivel makes a hydraulic and an electric connection between upper structure and undercarriage.

(3) Shutoff valve. The shutoff valve interrupts oil flow to the stabilizer cylinders.

(4) Dozer cylinder. The dozer cylinders are used to operate the dozer blade.

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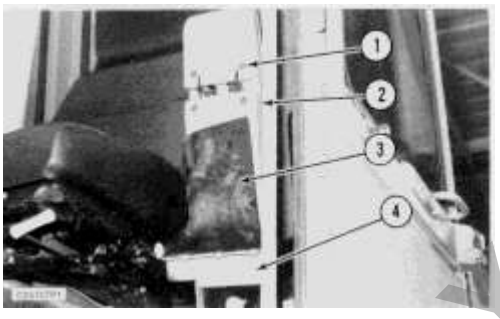
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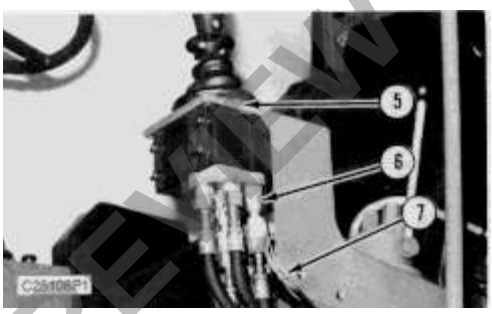
L.H. Pilot Control Valve

SMCS - 5452-010; 5472-017

Remove And Install L.H. Pilot Control Valve



1. Remove two bolts (4) and flap (3). Remove ten bolts (1) and panel (2).



2. Tag and disconnect two wires (7) and six hydraulic lines (6). Remove four bolts (5) and remove valve.

NOTE: The following steps are to install the L.H. pilot control valve.

3. Position valve and secure with four bolts (5). Connect six hydraulic lines (6) and two wires (7).

4. Position panel (2) and install ten bolts (1). Install flap (3) with two bolts (4).

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