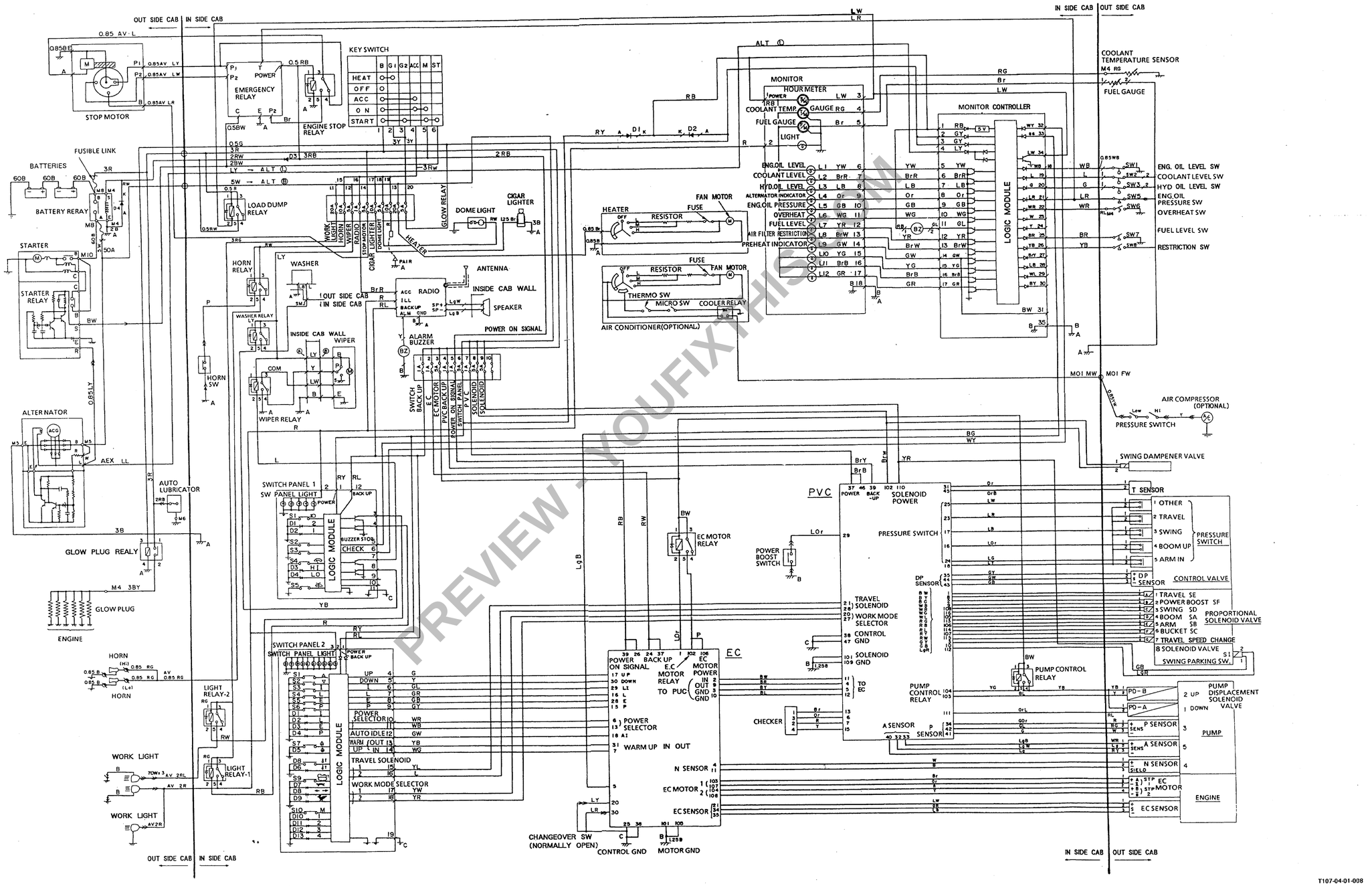


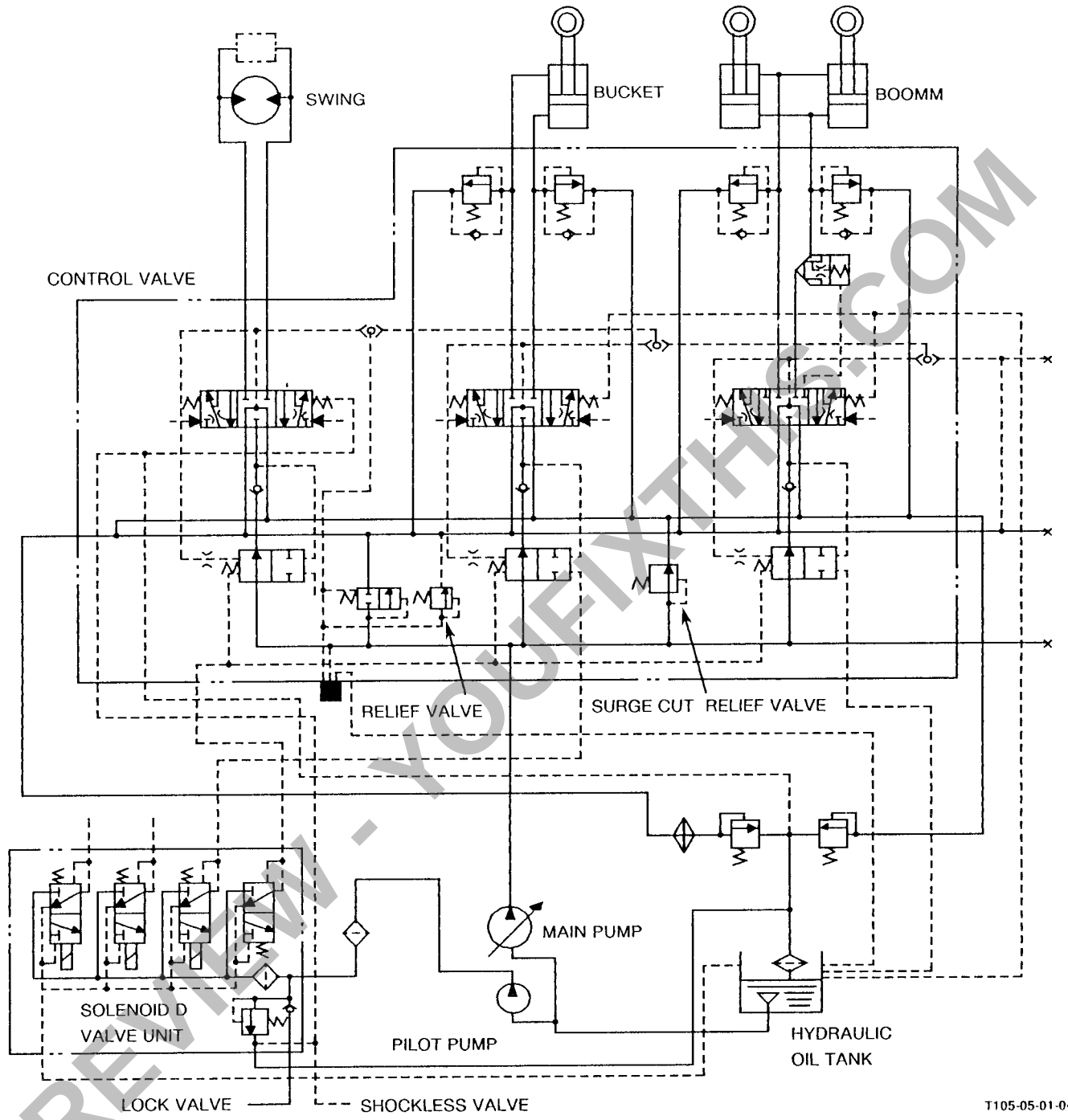
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Eiectric wiring diagram

T04-01-09

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DELIVERY PRESSURE CONTROL

The unload relief valve in the control valve limit the output pressure of the pump.The setting pressure is 330 kgf.cm² (4693 psi) used for all operations.

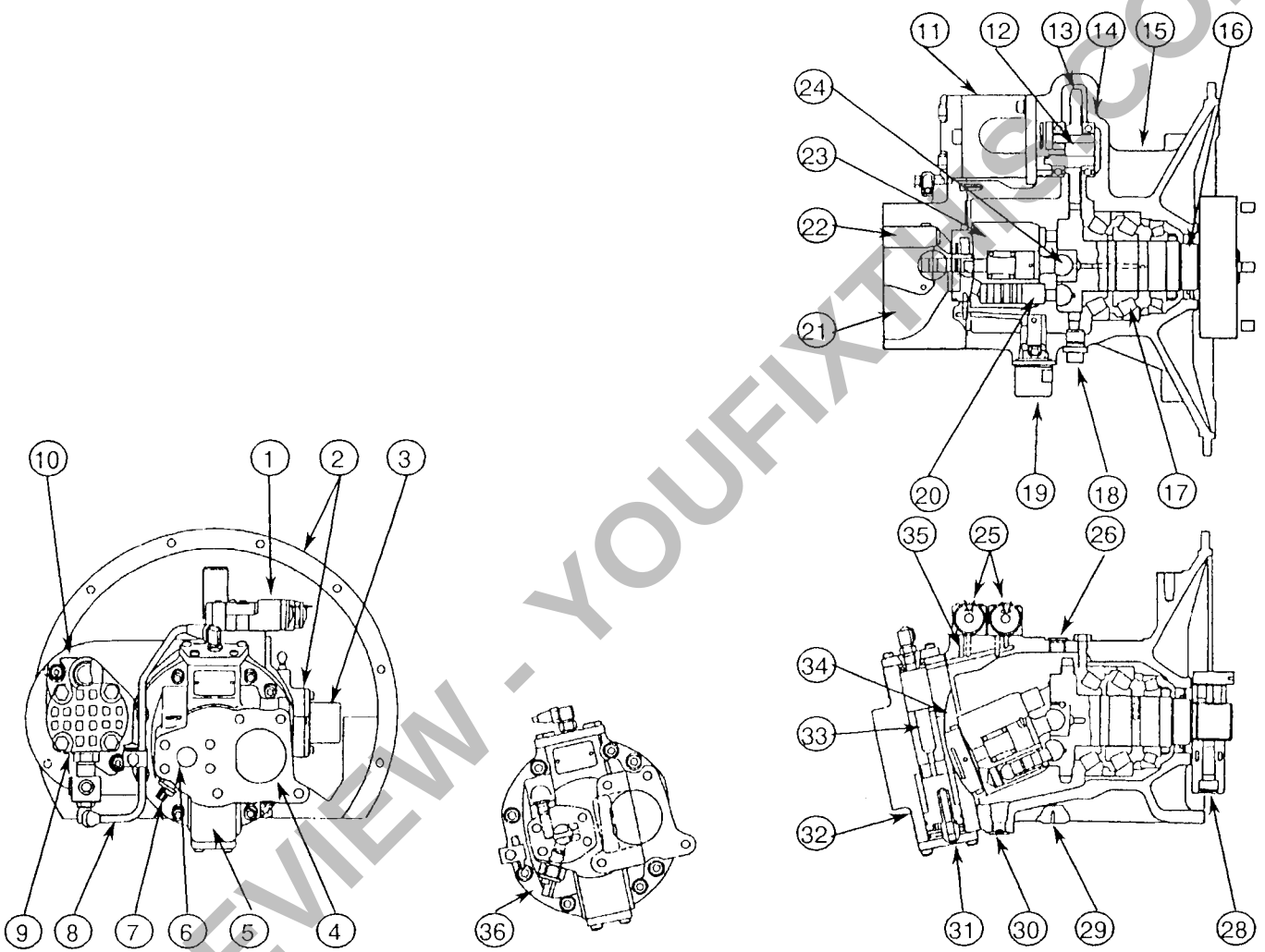
The surge cut relief valve releases the high pressure oil to the hydraulic tank for preventing the hydraulic units and the engine from overloading.

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CONSTRUCTION AND FUNCTION

The pump device is composed of two (2) pumps;the main pump (2) (HPV091DS) and the pilot pump (9) (HYßZFS11ß16.8L) . The main pump is a variable displacement, bent -axis piston type pump. This pump supplies main hydraulic oil to operate all hydraulic component of the main hydraulic system.

The gear type pilot pump (9) is a fixed displacement pump. The pilot pump provides oil for pilot system and main pump.
The main pump is driven directly by engine through the couplings (28) and the gear pump is driven through the gear driven system (13). (i = 1)



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1— Pump displacement solenoid valve
2— Pump casing (Main body)
3— A-Sensor
4— Suction side port
5— Servo piston casing
6— Delivery side port
7— P-Sensor
8— Pump piping
9— Gear pump (Main body)
10— Inlet side of gear pump
11— Gear pump casing
12— Shaft (Gear pump)
13— Gear (Pilot pump)
14— Bearing
15— Pump casing (Main body)
16— Shaft (Main pump)
17— Bearing
18— N-Sensor
19— A-Sensor
20— Piston
21— Suction side port
22— Delivery side port
23— Cylinder block
24— Center shaft
25— Pump displacement solenoid valve
26— Plug
28— Coupling
29— Plug
30— Plug
31— Stop bar
32— Main pump head
33— Servo piston (Large diameter)
34— Valve plate
35— Controlled pressure oil path
36— P-Sensor (Pressure)

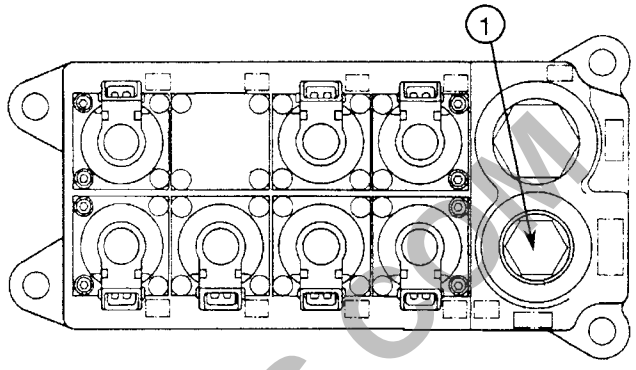
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OPERATIONAL PERFORMANCE TEST / Component Test

* PILOT PRIMARY PRESSURE ADJUSTMENT

Adjust pilot relief valve (1) using the following procedure:

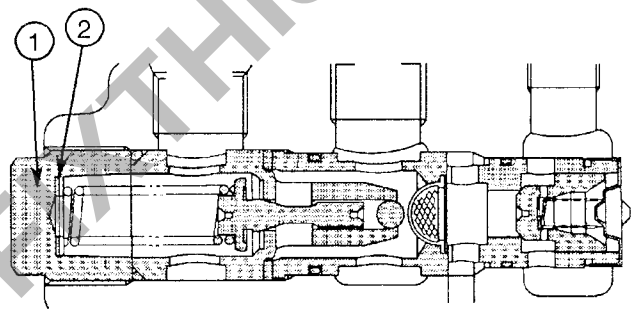
: 22 mm



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1. Remove plug (1).
2. Install the estimated necessary numbers of shims (2).
3. Tighten plug (1) to the specified torque.

: 25 N·m (2.5 kgf·m, 18 lbf·ft)



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Thickness	Change in relief pressure kgf / cm^2(psi)
0.25	0.8 (11.4)
0.5	1.6 (22.8)
1.0	3.2 (45.5)

4. Check the relief pressure of relief valve (1).
5. Repeat steps 1 to 4 when readjustment is required.

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LIST OF EC RELATING FAULT CODES

Fault Code	Trouble	Corrective Action
01	Failure (type-1) of EC	1) Retry diagnostic procedure A 2) Replace EC if Power selector control and /or auto-idle is abnormal
02	Failure (type-2) of EC	1) Retry diagnostic procedure A 2) Replace EC if Power selector control and /or auto-idle is abnormal
03	Failure (type-3) of EC	1) Retry diagnostic procedure A 2) Replace EC if Power selector control and /or auto-idle is abnormal
04	Failure (type-4) of EC	1) Retry diagnostic procedure A 2) Replace EC if Power selector control and /or over 8 fault codes are found
05	Signal from PVC is not transmitted to EC	1) Retry diagnostic procedure B 2) Check harness 3) Replace PVC or EC if auto-idle is abnormal
06	Failure (type-6) of EC	1) Retry diagnostic procedure B 2) Replace EC if Power selector control is abnormal
09	Short-circuit of EC sensor and/or harness	1) Retry diagnostic procedure B 2) Check harness 3) Replace EC sensor
10	Disconnected EC sensor and/or harness	1) Retry diagnostic procedure B 2) Check harness 3) Replace EC sensor
13	N sensor is abnormal	1) Retry diagnostic procedure B 2) Check N sensor harness 3) Replace N sensor

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OPERATIONAL PERFORMANCE TEST / Engine Test

2.1 ENGINE SPEED

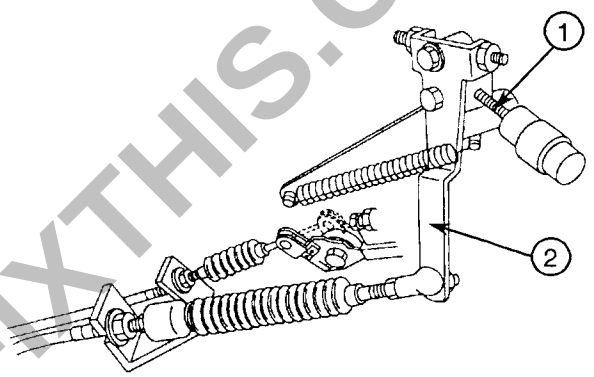
Measure the engine speed at each power mode (recommended testing equipment: Dr. EX).

NOTE: The engine speed at each power mode must meet standard RPMs; if not, all other operational performance data will be unreliable. It is essential to perform this test first.

Preparation:

(1) Warm up the machine, until the engine coolant temperature reaches 50°C or more, and the hydraulic oil is 50 ± 5°C.

(2) Push the P-mode switch and confirm that the fuel injection pump governor lever (2) comes into contact with the high-idle stopper (1).

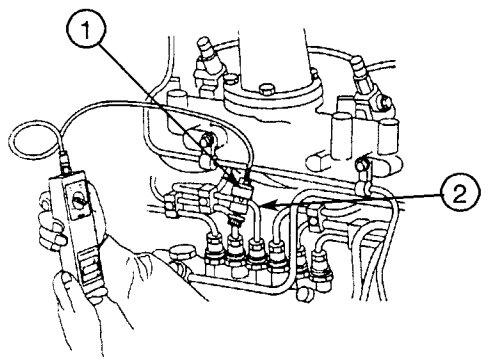


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(3) To measure engine RPM:

(3.1) Connect Dr. EX to the diagnosing connector of the PVC, located behind the operator's seat, to obtain real-time engine RPM data.

(3.2) If Dr.EX is not available, connect engine tachometer (1) to fuel injection pipe (2).



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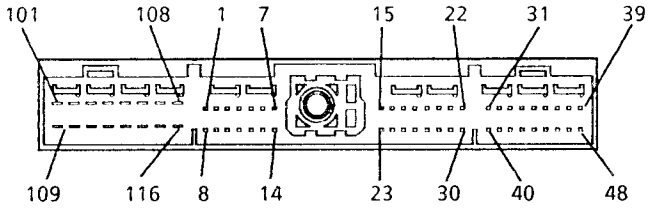
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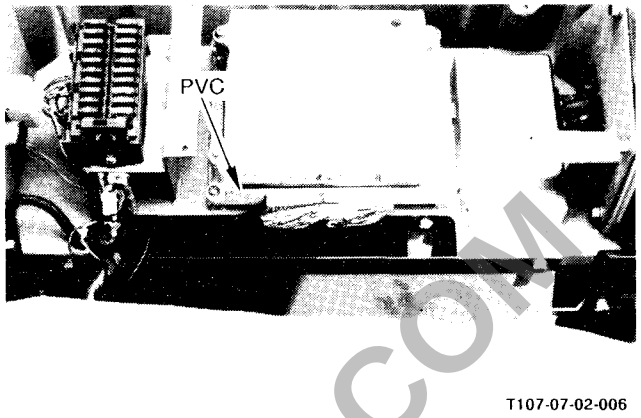
TROUBLESHOOTING / Connector

PUMP and VALVE CONTROLLER (PVC)

PVC Side

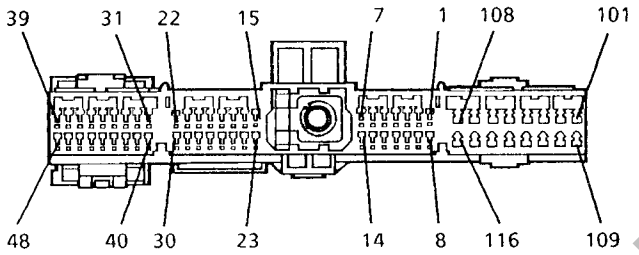


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T107-07-02-006

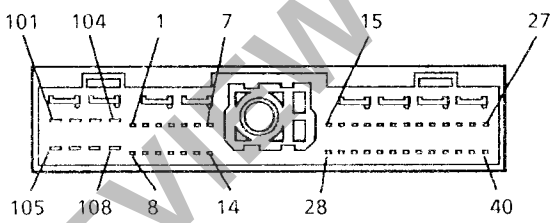
Wire Harness Side



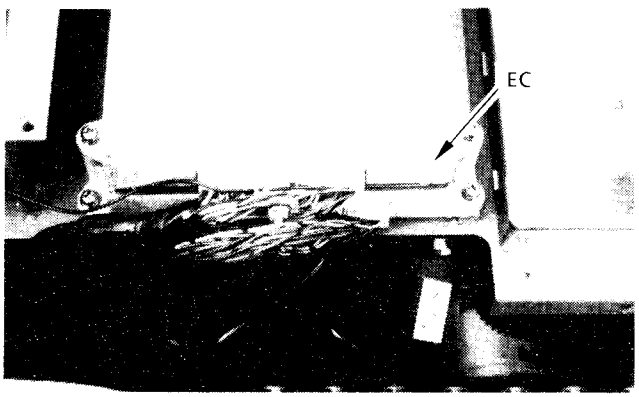
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ENGINE CONTROLLER (EC)

EC Side

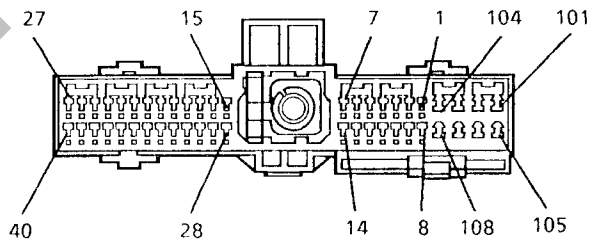


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T107-07-02-009

Wire Harness Side



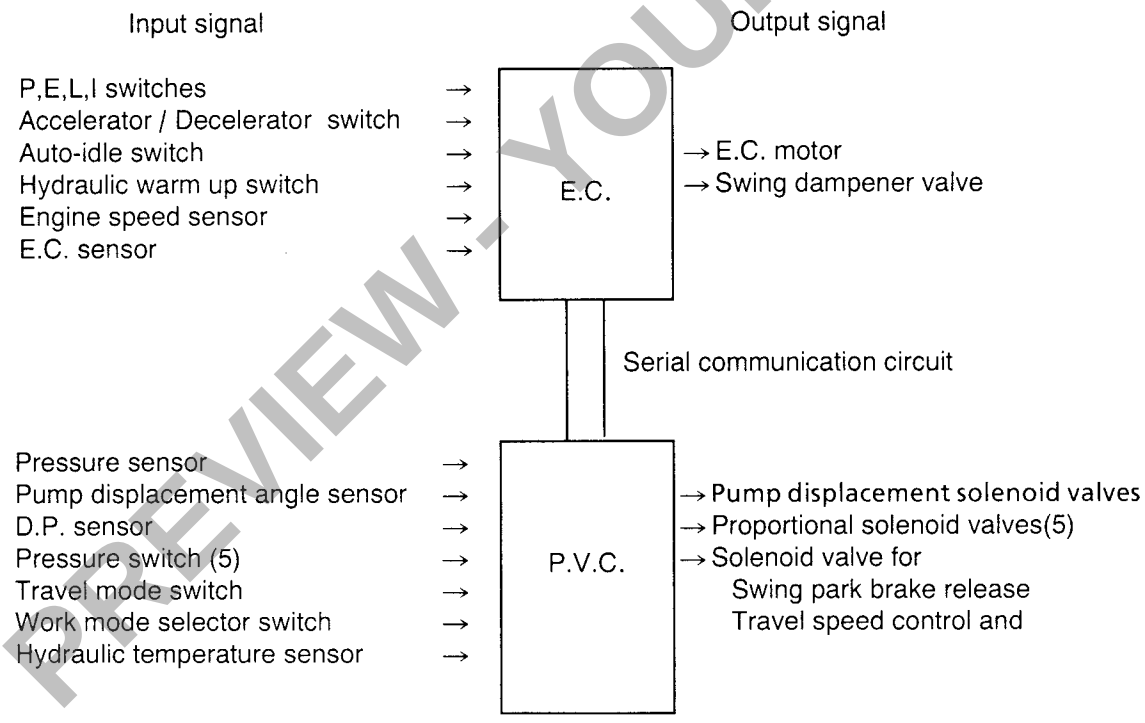
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Outline of the control system

Two micro computers, the engine controller (E.C) and pump and valve controller (P.V.C), control the system.
The E.C. and P.V.C. receive electrical signals from the systems sensors and switches. Logic modules in the E.C. and P.V.C. analyze the signals received and send electrical control signals to move actuators.
Example: The operator pushes the "P" mode switch. An electrical signal is sent from the "P" mode switch to E.C. The E.C. logic module sends a control signal to the E.C. motor to increase engine speed. At the same time the E.C. sends a signal to the P.V.C. The P.V.C. analyses the signal and sends a control signal to the pump displacement solenoids on the main hydraulic pump to increase pump flow.

The E.C. and P.V.C. regulate engine speed, hydraulic pump flow and main control valve compensator valve movement.
The E.C. and P.V.C. are connected electrically and exchange signals to improve unit control and efficiency.
During function operation when hydraulic demand is greater then pump capacity the P.V.C. limits pump flow.
The P.V.C. receives engine speed, pump pressure, displacement angle, differential pressure, and pilot pressure signals. Priority is always given to minimize pump flow. After analyzing all the signals the P.V.C. sends a control signal to the pump regulator (pump displacement solenoid valve) to adjust pump flow. Pump flow is then adjusted to give maximum performance and improved efficiency.



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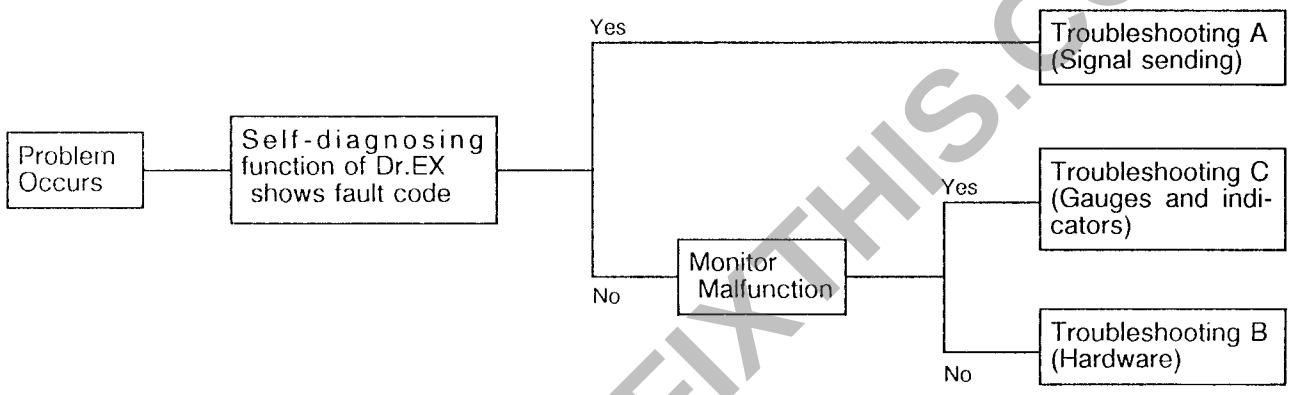
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TROUBLESHOOTING / Diagnosing Procedure

INTRODUCTION

Flow charts are provided in this section in order to make inspection and troubleshooting procedures easy to follow.
Use these charts to guide you in locating the source of any problems that may arise.

Potential problems are roughly divided into three groups as shown below; namely, those in signal sending (Group A), machine hardware (Group B), and gauges and indicators (Group C).



TROUBLESHOOTING A (Signal sending)

Use these charts when the self-diagnosing function of Dr.EX shows any fault code. (Controllers automatically diagnose and memorize malfunctions that have occurred in the signal sending system.)
Example : Wire disconnection in the Differential Pressure Sensor(DP sensor)

TROUBLESHOOTING B (Hardware)

Use these charts when the machine is exhibiting trouble but no fault code is shown on Dr.EX's display.
Example : Slow travel speed.

TROUBLESHOOTING C (Gauges and indicators)

Use these charts when any gauges or indicators malfunction.
Example : The fuel gauge does not operate.

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OPERATIONAL PERFORMANCE TEST / Adjustment

5.2 PC PRESSURE ADJUSTMENT

Adjust the proportional solenoid valves for travel (right and left) (1), swing(2), bucket(3), boom(4) and arm (5) circuits.

NOTE: (1) The Hitachi EX200-2 is equipped with one of two types of proportional solenoid valves. Since the post-adjustment checking method differs depending on the model, make certain of the manufacturing number of the proportional solenoid valve and refer to the chart below before making the adjustment.

Part No.	Manufacturing No.
4254647	Previous model : upto 07108020
	Current model : after 07108021

NOTE: (2) Be sure not to loosen adjusting screw (2) over three turns from the original position. Otherwise, O-ring (3) will unseat, resulting in oil leaks.

1. Put a mark on the end face of adjusting screw (2) with white paint or a similar-substance, to record the original position. (Take care not to get paint on the thread surface.)
2. Loosen lock nut (1) and turn adjusting screw (2) to adjust PC pressure.

: 13 mm、 : 4 mm

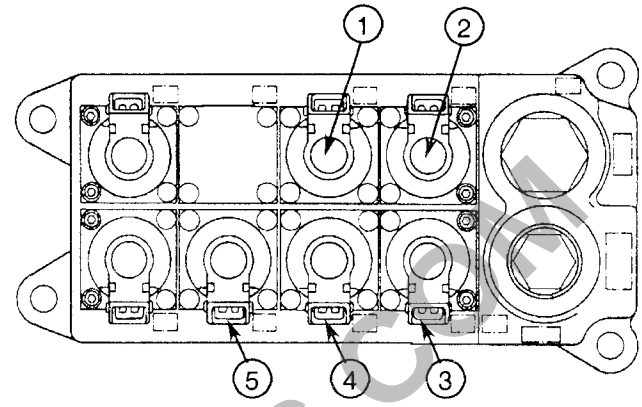
: 9 N·m (0.9 kgf·m, 7 lbf·ft)

Turning direction of adjusting	Counterclockwise	Clockwise
Change in PC pressure	Decrease	Increase
PC pressure oil flow rate	Increase	Decrease

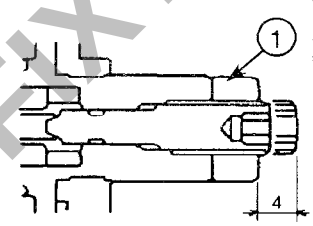
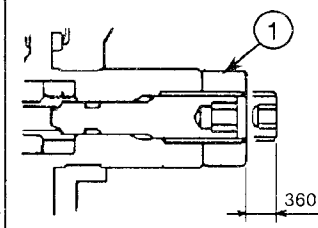
Adjusting screw turns	1/4	1/2	3/4	1
Change in PC pressure (kgf/cm^2)	1	2	3	4

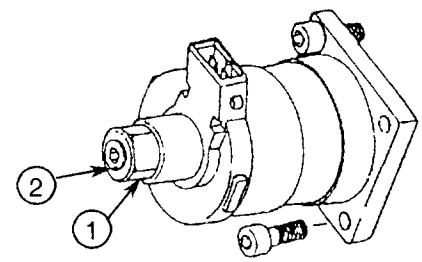
3. Check the adjustment of adjusting screw (2), referring to the following:
   When the current model of proportional solenoid valve is employed: the extrusion of adjusting screw (2) from the end face of lock nut (1) must be less than 4 mm.

   When the previous model of proportional solenoid valve is employed: the turning angle of adjusting screw (2) from the original position must be less than 360°.



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Current Model	Previous Model
The extrusion of the adjusting screw from the end face of the nut must be less than 4 mm.	The turning angle of the adjusting screw from the original position must be less than 360°.
	



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OPERATIONAL PERFORMANCE TEST / Standard

OPERATIONAL PERFORMANCE STANDARD

Refer to Group 02--05 for testing procedure.

* Power selector switch : P mode
Work mode switch : General Purpose mode
Hydraulic oil temperature : 50 ± 5 °C (122 ± 9 °F)

Upper row : Standard
Lower row : Limit of use

	ITEM \ PVC Version No.	~0800	1000 1001 1002	1200~	Remarks
2-1	**ENGINE SPEED** (min^{-1})				
	P mode	2350 ± 50	←	←	
	E mode	1950 $^{+100}_{-50}$	←	←	
	L mode	1500 ± 100	←	←	
	I mode	950 $^{+100}_{-50}$	←	←	
	Auto-idle	1200 ± 100	←	←	
	Start idle	1050 ± 100	←	←	
2-2	**ENGINE COMPRESSION PRESSURE** (kgf/cm^2)	31.0 26.0	← ←	← ←	difference among cylinder 2.0≧
3-1	**TRAVEL SPEED** (sec/20m)				
	Fast speed	13.0 ± 1.0 16.5	← ←	← ←	
	Medium speed	(21.0 ± 1.0)	←	←	
	Slow speed	(34.5 ± 2.0)	(33.0 ± 4.0)	←	
3-2	**TRAVEL REVOLUTION SPEED**(sec/3回転)				
	Fast speed	14.5 ± 2.0 19.1	12.2 ± 2.0 16.4	← ←	
3-3	**MISTRACK** (mm/20m) (Slow/ Medium/ Fast)	200≧ 230	← ←	← ←	
3-4	**TRAVEL MOTOR LEAK** (mm/5min)	0	←	←	
3-5	**SWING SPEED** (sec/3rev)	16.4 ± 1.4 21.0	← ←	← ←	
3-6	**SWING FUNCTION DRIFT** (mm/180°)	690≧ 800	← ←	← ←	
3-7	**SWING MOTOR LEAK** (mm/5min)	0	←	←	
3-8	**SWING BEARING PLAY** (mm)	1.1≧ 3.7	← ←	← ←	

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FUEL

Tank capacity: 250 liter (66 US gal, 55 Imp gal)

Service points	Numbers of service points	Interval (Hours)						
		8	50	100	250	500	1000	2000
1. Drain water from fuel tank	1	■						
2. Check water sedimenter	1		■					
3. Replace fuel filter element	1					■		
4. Clean feed pump strainer	1						■	

RECOMMENDED FUEL

Use high quality diesel fuel only (ASTM D 975 No.2D).
Kerosene must not be used.

IMPORTANT: Be careful not to allow dust, dirt, water or other foreign materials into the fuel system.

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FOLLOW SAFE PROCECURES

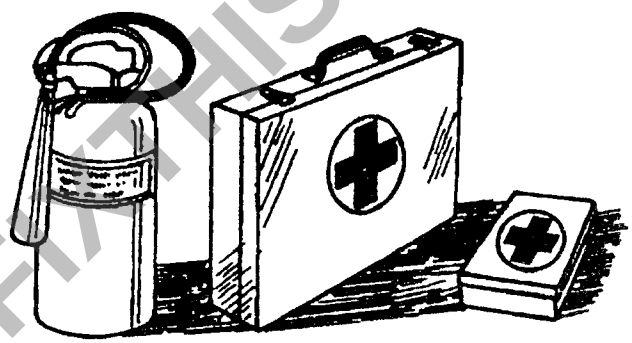
Unsafe work practices are dangerous. Understand service procedure before doing work; do not attempt shortcuts.

PREPARE FOR EMERGENCIES

Be prepared if a fire starts.

Keep a first aid kit and fire extinguisher handy.

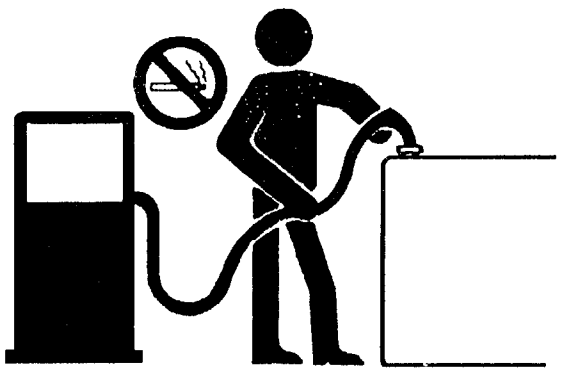
Keep emergency numbers for doctors, ambulance service, hospital, and fire department near your telephone.



SA-020

HANDLE FLUIDS SAFELY – AVOID FIRES

Handle fuel with care; it is highly flammable Do not refuel the machine while smoking or when near open flame or sparks. Always stop engine before refueling machine. Fill fuel tank outdoors.



SA-018

Store flammable fluids away from fire hazards. Do not incinerate or puncture pressurized containers.

Make sure machine is clean of trash, grease, and debris.

Do not store oily rags; they can ignite and burn spontaneously.



SA-019

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SPECIFICATIONS

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PREVENT BATTERY EXPLOSIONS

Keep sparks, lighted matches, and flame away from the top of battery. Battery gas can explode.

Never check battery charge by placing a metal object across the posts. Use a volt-meter or hydrometer.

Do not charge a frozen battery; it may explode. Warm battery to 16°C (60°F).



SA-032

PREVENT ACID BURNS

Sulfuric acid in battery electrolyte is poisonous. It is strong enough to burn skin, eat holes in clothing, and cause blindness if splashed into eyes.

Avoid the hazard by:

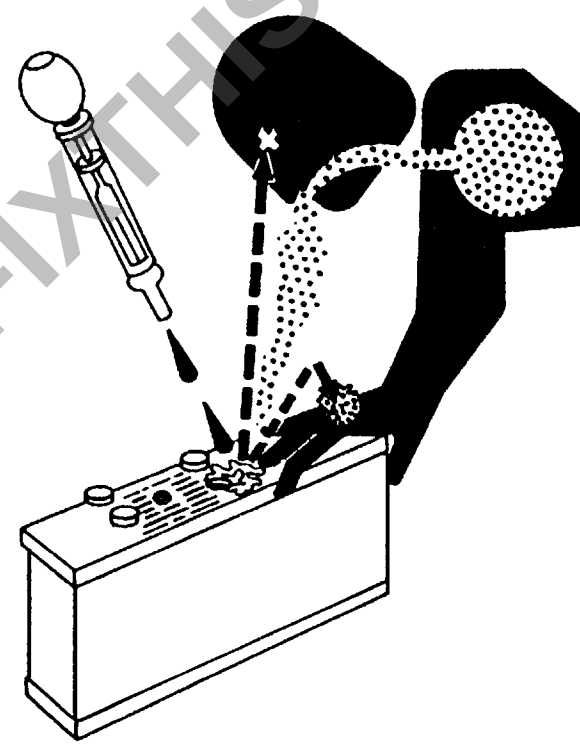
1. Filling batteries in a well-ventilated area.
2. Wearing eye protection and rubber gloves.
3. Avoiding breathing fumes when electrolyte is added.
4. Avoiding spilling or dripping electrolyte.
5. Use proper jump start procedure.

If you spill acid on yourself:

1. Flush your skin with water.
2. Apply baking soda or lime to help neutralize the acid.
3. Flush your eyes with water for 10-15 minutes. Get medical attention immediately.

If acid is swallowed:

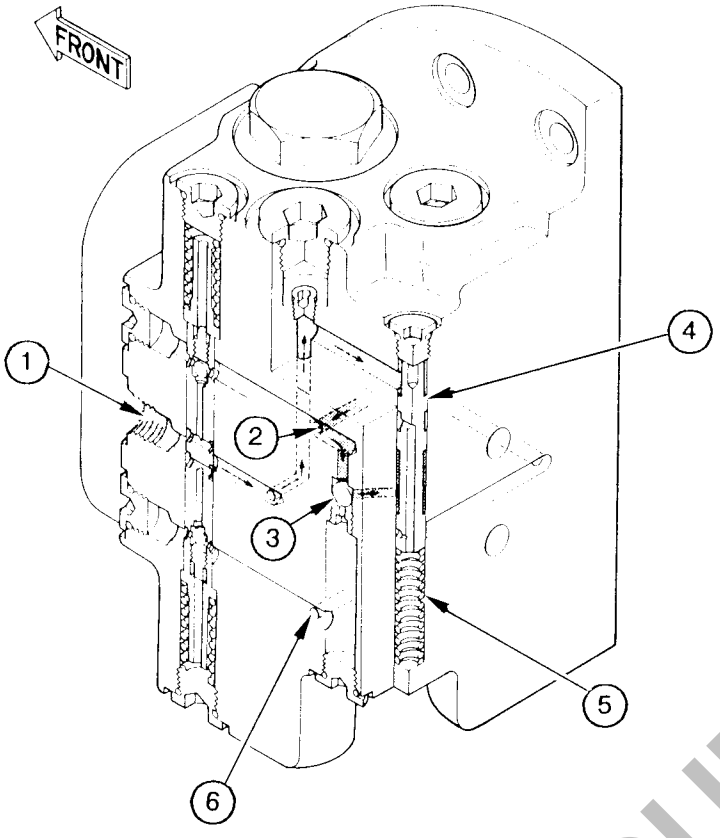
1. Drink large amounts of water or milk.
2. Then drink milk of magnesia, beaten eggs, or vegetable oil.
3. Get medical attention immediately.



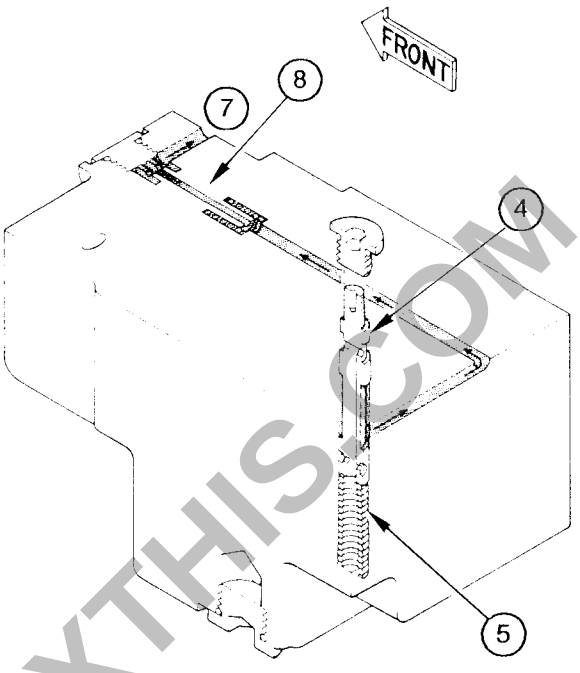
SA-036

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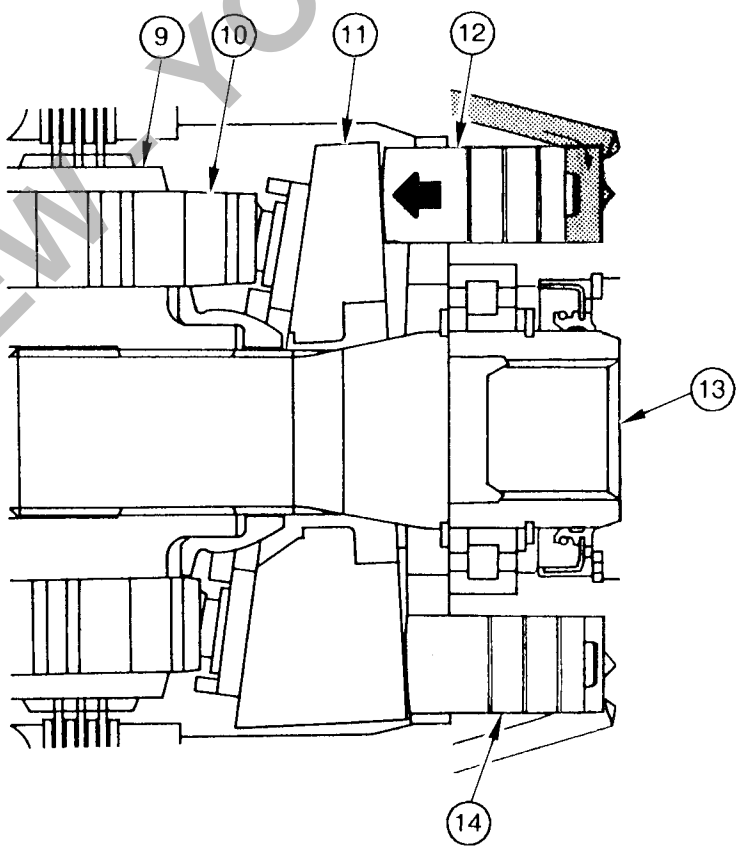
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T105-03-04-008



T105-03-04-009

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T03-04-08

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VALVE CONTROL SYSTEM

JOB MODE SELECTOR SYSTEM

Job mode selector is one function of the flow dividing control system and allows the machine to work meeting the work requirements. Job mode selector switch function to operate the variable pressure compensated valve by which the oil flow rate to each cylinder or motor is regulated as shown in the following table.

Job Mode	Action of Excavator	Component preferentially controlled by Pilot Pressure
General Purpose Mode	Standard	None
Trenching Mode	Swing operation has priority when swing and boom raise combined operation are made	Variable pressure compensated valve for arm operation
Leveling Mode	Boom raise and bucket action speed become slower when arm is retracted	Variable pressure compensated valves for arm,boom and bucket operation
Precision Mode	Boom raise, arm, bucket and swing action speed become slower.	Variable pressure compensated valves for boom,arm,bucket and swing operation

GENERAL PURPOSE MODE

All actuators are operated to meet work requirements for general loading and unloading jobs.

TRENCHING MODE

When swing and boom reise operation are made simultaneously, swing operation has priority. When the command signal from the job selector switch is input to the PVC, the PVC sends out the control signal to the proportional solecoid valve to let the pilot oil pressure (PC) flow to the variable pressure compensated valve by which the oil flow from the main pump to the boom raise circuit is restricted giving swing circuit priority.

LEVELING MODE

When the leveling mode switch is selected is selected and the arm is retracted, boom raise and bucket control speed become slower.

Each variable pressure compensated valve for the arm, boom and bucket is regulated by the PVC so as to restrict the oil flow from the main pump to the cylinders, then, they can be operated at suitable speed for leveling work. Operating speeds of the boom, arm and bucket recover to nomal speed as soon as the arm retract opration is stopped.

PRECISION MODE

Operating speeds of all actuators except boom lowering become slower. Traveling speed is controlled with the travel mode swich independently.

Each variable pressure compensated valve for the boom raise, arm, bucket and swing is regulated by the PVC so as to restrict the oil flow from the main pump to the cylinders, then, their opration is controlled at slower speed to meet precise work.

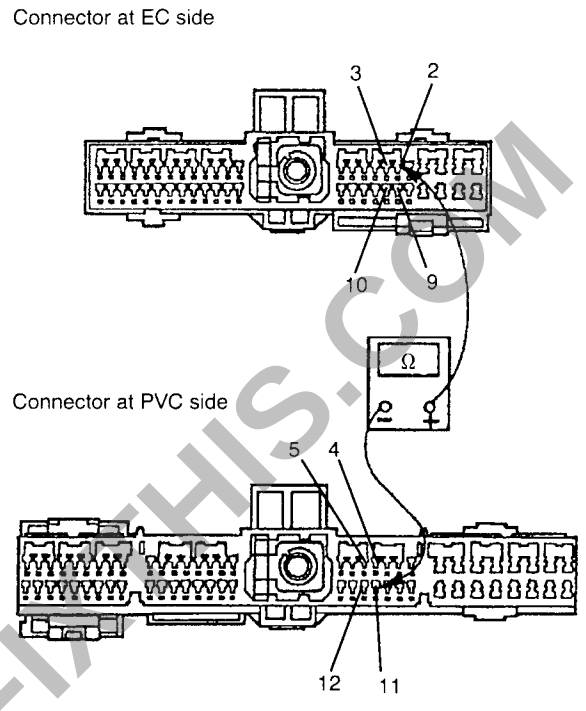
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HARNESS CHECK BETWEEN PVC and EC

1. Turning OFF the key switch, remove the connectors of PVC and EC.

2. Check the continuity of each harness between following terminals:

   No. 11 of PVC and No. 2 of EC;
   No. 4 of PVC and No. 9 of EC;
   No. 5 of PVC and No. 3 of EC;
   No. 12 of PVC and No. 10 of EC.



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