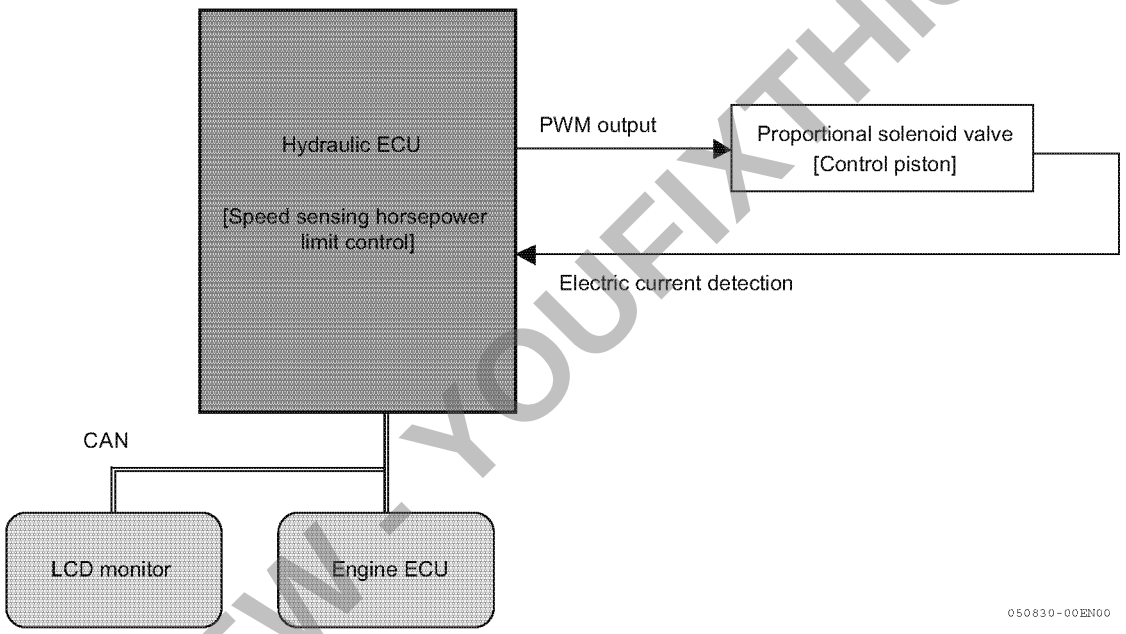
5-4 Hydraulic ECU (Controller)

1) Speed Sensing Horsepower Limit Control

In cases where the hydraulic horsepower exceeds the engine horsepower, for example, when the machine is operating with the air conditioner switched on at high attitude, the ECU reduces the hydraulic horsepower based on the control amount calculated to avoid significant drops in engine speed.

Function	Outline
Acquisition of engine information	Information including engine speed is received via CAN communication.
Control of pump swash plate	Control amount for the pump swash plate is calculated based on the difference between the target engine speed and actual engine speed and, based on the calculated control amount, the control piston is controlled by the proportional solenoid valve.



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Error code	Classification	Error description	Detection condition	Causes	Corrective measures
00 522251.03	Caution	EGR stepping motor "A": circuit fault B		• Connection failure of connectors • Harness wiring failure (EGR stepping motor phase A line short circuited to power supply) • Faulty phase A of EGR stepping motor • Engine ECU internal circuit failure	
				• Connection failure of connectors	

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4. Remove the main bearing caps **(Figure 4-1-61, (3))**. Be sure to note the markings on the main bearing caps, or mark them yourself, so they can be reinstalled in the same order as they were removed. Do not remove the bearing inserts at this time.

Note: The “arrows” on the main bearing caps point to the flywheel end of the engine.

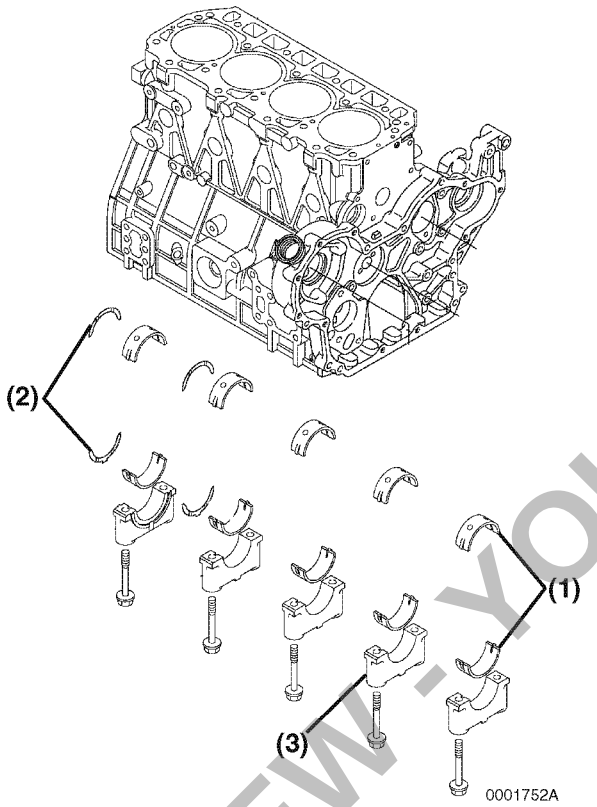


Figure 4-1-61

5. Measure bearing oil clearance prior to removing the crankshaft to determine extent of wear. Record the measurements.
   (a) Wipe oil from the bearing insert and crankshaft journal surfaces.
   (b) Place a piece of PLASTIGAGE **(Figure 4-1-62, (1))** along the full width of each bearing insert.

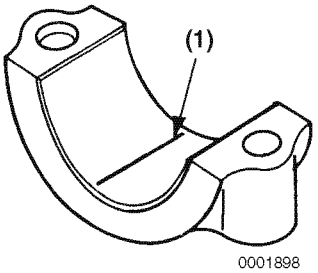


Figure 4-1-62

IMPORTANT

Do not rotate the crankshaft when using PLASTIGAGE. A false reading may result.

   (c) Reinstall bearing caps and tighten to specification. *See "3-7-2 Engine Tightening Torque" section for tightening torque.*
   (d) Remove bearing caps.
   (e) Compare the width of the flattened PLASTIGAGE to the graduation marks on the package **(Figure 4-1-63, (1))**. The mark that most closely matches the width of the flattened PLASTIGAGE will indicate the bearing oil clearance.

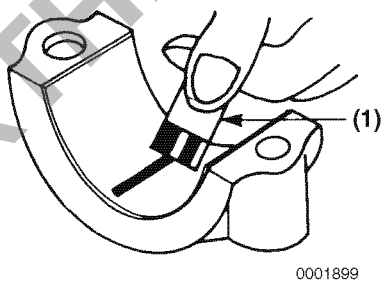


Figure 4-1-63

6. Remove the crankshaft from the engine.
7. Remove the bearing inserts **(Figure 4-1-61, (1))** and thrust bearings **(Figure 4-1-61, (2))**.

Note: Do not remove the crankshaft gear unless the gear or crankshaft are damaged and require replacement.

8. If necessary, remove the crankshaft gear **(Figure 4-1-64, (1)),** parallel pin **(Figure 4-1-64, (2))** and key **(Figure 4-1-64, (3))**. If using a gear puller, be careful not to damage the threads in the end of the crankshaft.

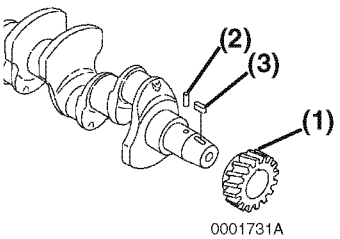
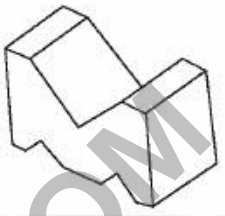


Figure 4-1-64

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No.	Instrument Name		Application	Illustration
9	V-Block	Locally Available	For measuring shaft bend	

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5-5 Error Code List

Error code	Classification	Error description	Detection condition	Causes	Corrective measures
00 000091.00	Caution	Accelerator sensor malfunction: above normal operating range (SAEJ1843)		• Connection failure of connectors • Harness wiring failure (engine control dial wiring disconnected or short circuited to GND) • Defective foot pedal • Engine ECU internal circuit failure	Check the connectors, harnesses and engine control dial. Turn the starter switch to the "OFF" position and then the "ON" position. Then check that the error code is displayed again.
00 000091.01	Caution	Accelerator sensor failure: below normal operating range (SAEJ1843)			

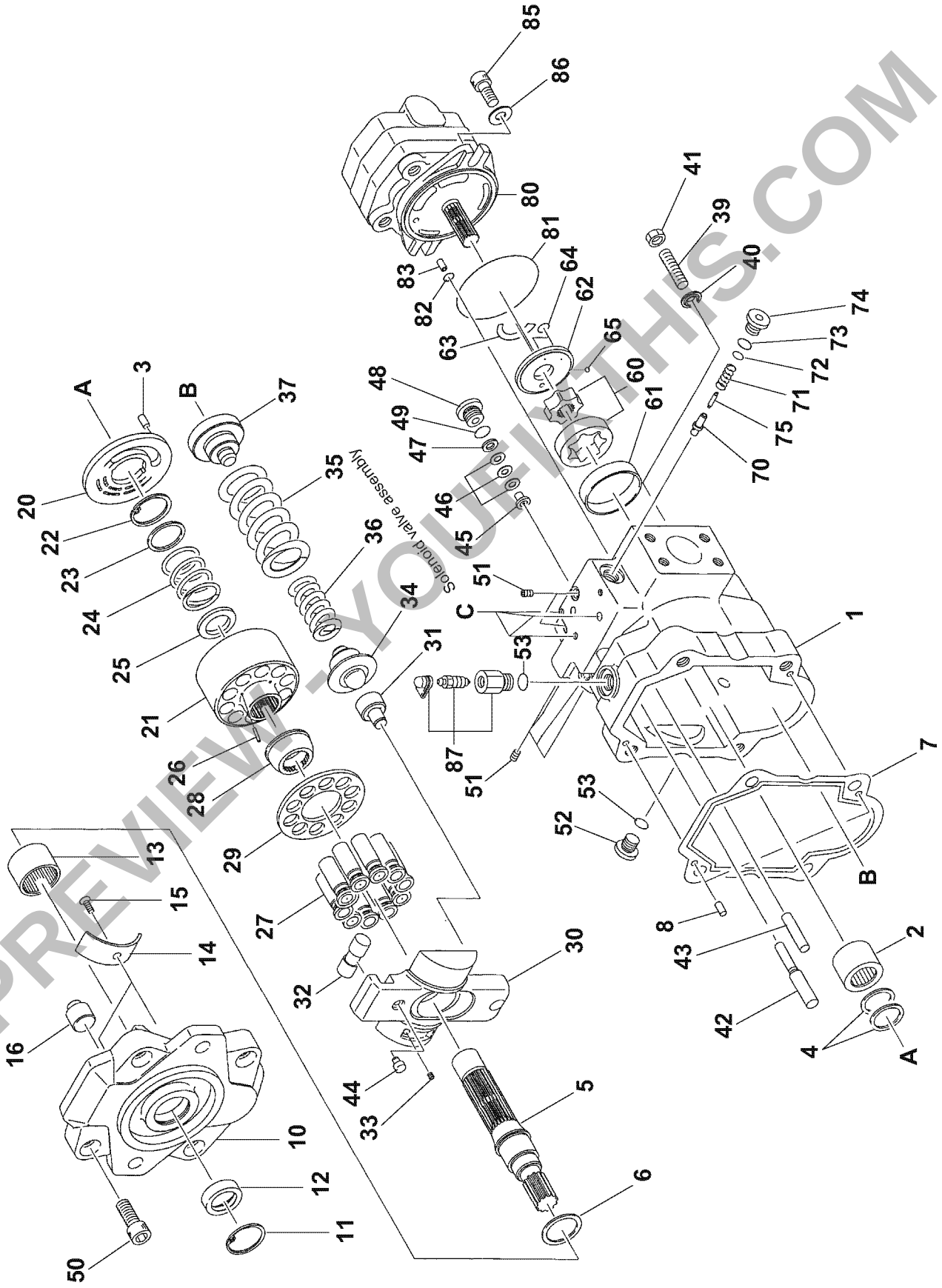
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3. Exploded View and Parts Comprised

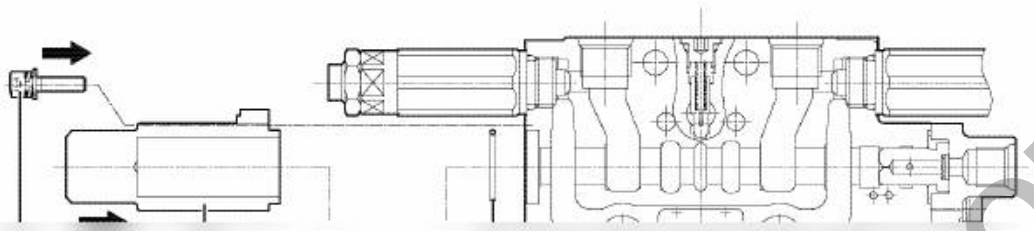
1) Hydraulic Pump



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(3) P1/P2 inlet section (straight travel valve section)



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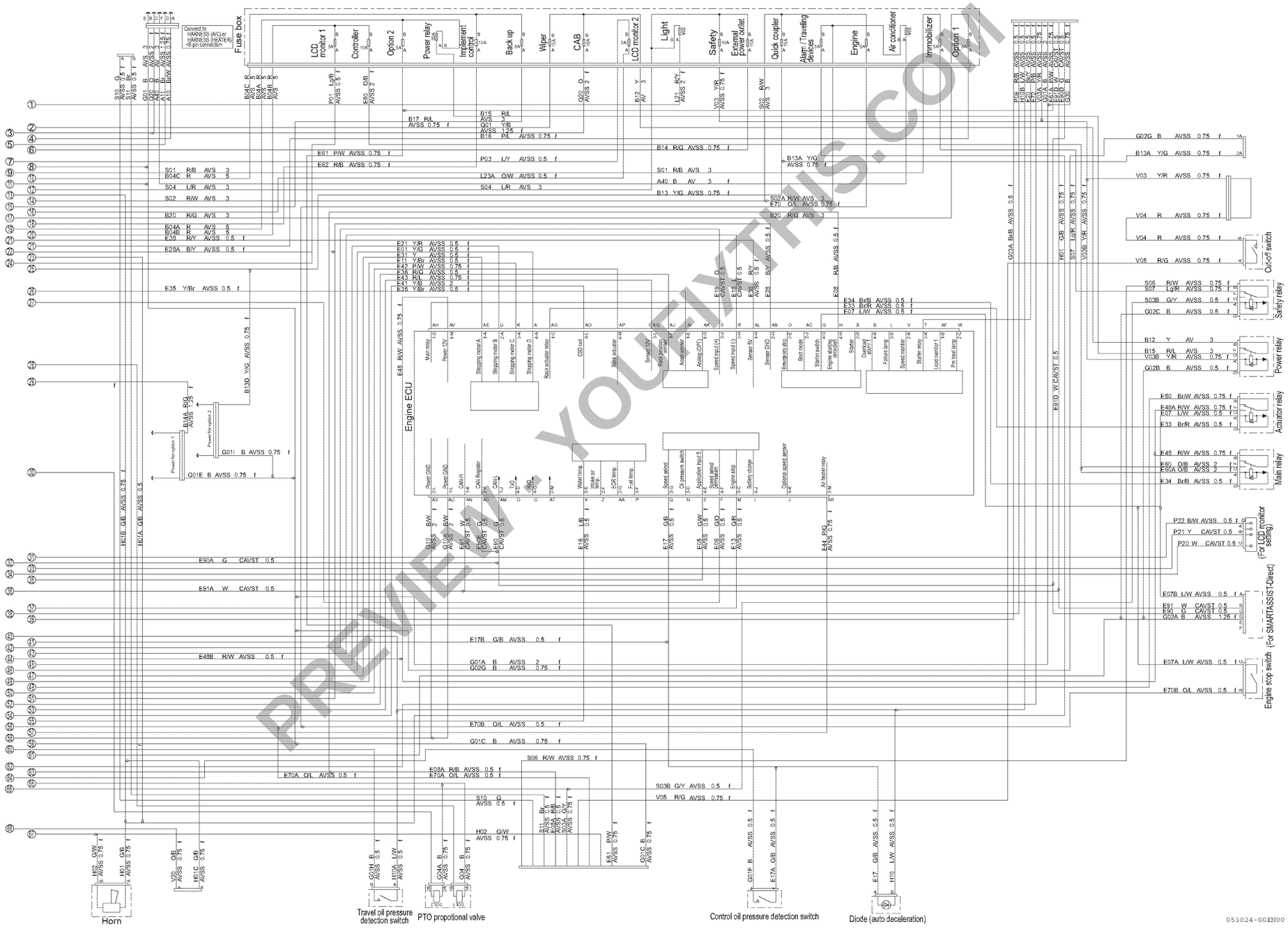
2. TECHNICAL DATA

Item		Unit	ViO35-6A	
			W/O Quick coupler	Quick coupler
Main specifications of machine				
	Work performance			
		Maximum tractive force (Oil pressure force) (steel / rubber)	lbs. (k•N)	7891 (35.1) / 7306 (32.5)
		Maximum swing inclination angle (with standard bucket)	degrees	20

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3-8-2 Swing Brake Valve 3-8-4
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CHAPTER 4
Engine

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3. SERVICING STANDARDS

3. Service Standards

3-1 Machine Performance

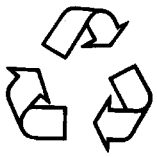
Applicable model			ViO35-6A	
Item	Measuring condition	Unit	Standard	Allowable
Machine performance				
Working speed				

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CAUTION



- ALWAYS be environmentally responsible.
- Follow the guidelines of the EPA or other governmental agencies for the proper disposal of hazardous materials such as engine oil, diesel fuel and engine coolant. Consult the local authorities or reclamation facility.
- NEVER dispose of hazardous materials irresponsibly by dumping them into a sewer, on the ground, or into ground water or waterways.
- Failure to follow these procedures may seriously harm the environment.

0000013en

CAUTION

NEVER engage the starter motor while the engine is running. This may damage the starter motor pinion and / or ring gear.

0000012en

CAUTION

New Engine Break-in:

- On the initial engine start-up, allow the engine to idle for approximately 15 minutes while you check for proper engine oil pressure, diesel fuel leaks, engine oil leaks, coolant leaks, and for proper operation of the indicators and / or gauges.
- During the first hour of operation, vary the engine speed and the load on the engine. Short periods of maximum engine speed and load are desirable. Avoid prolonged operation at minimum or maximum engine speeds and loads for the next four to five hours.
- During the break-in period, carefully observe the engine oil pressure and engine temperature.
- During the break-in period, check the engine oil and coolant levels frequently.

0000011en

CAUTION

- NEVER attempt to modify the engine's design or safety features such as defeating the engine speed limit control or the fuel injection quantity control.
- Failure to comply may impair the engine's safety and performance characteristics and shorten the engine's life. Any alterations to this engine may affect the warranty coverage of your engine. *See Yanmar Limited Warranty in Warranty Section.*

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7. Measure the outside diameter of the wrist pin in three places and at 90° **(Figure 4-1-70)**. *See "3-2 Engine Service Standard" section for the service limit.* Record the measurements.

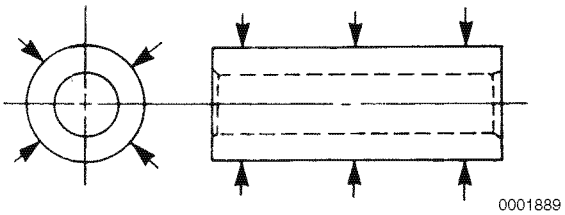


Figure 4-1-70

8. Using a micrometer, measure the thickness of each piston ring. *See "3-2 Engine Service Standard" section for the service limit.* Record the measurements.

   Notes:

   - On an engine with low hours, the pistons, piston rings and cylinders may be reused if they are found to be within specifications.
   - On an engine with high hours, the pistons rings should be replaced and the cylinder honed *(see Honing and Boring)* or replaced. The piston should be replaced as necessary.

9. Place each compression piston ring in the groove as shown **(Figure 4-1-71)**. Use a feeler gauge to measure the clearance between the piston ring and the piston ring land. Record the measurements. *See "3-2 Engine Service Standard" section for the service limit.* Replace the piston if not within specification.

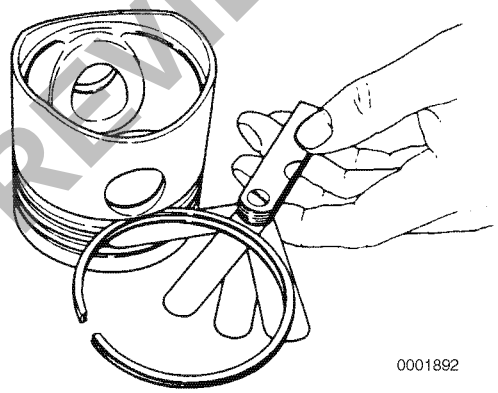


Figure 4-1-71

10. To measure piston ring end gap, insert each compression piston ring **(Figure 4-1-72, (1))**, one at a time, into the cylinder. Use a piston with the piston rings removed to slide the ring into the cylinder bore until it is approximately 1.18 in. (30 mm) **(Figure 4-1-72, (2))** from the bottom of the bore. Remove the piston. Measure the end gap **(Figure 4-1-72, (3))** of each piston ring. Record the measurements. *See "3-2 Engine Service Standard" section for the service limit.*

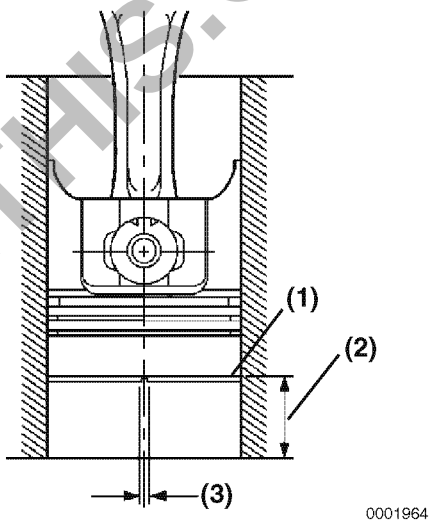


Figure 4-1-72

Note: Always check the piston ring end gap when installing new piston rings. *See "3-2 Engine Service Standard" section for the service limit.* Use a piston ring end gap filing tool to adjust the piston ring end gap on new piston rings.

11. Repeat the above steps for each cylinder and piston assembly.

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16. Prime the fuel system.
17. Operate the engine and check for fuel and coolant leaks.

CHECKING AND ADJUSTING FUEL INJECTION TIMING

2. Using the FIR number for the engine being serviced use the Fuel Injection Reference (FIR).

   FIR number for the engine is as follows;

Model	FIR number
3TNV88F-ESBV	3.0

EXAMPLE: The following example is for an engine



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Installation of Starter Motor

1. Reinstall the starter motor to the flywheel housing.
2. Reinstall the starter mounting bolts **(Figure 4-5-36, (1))**. Tighten the bolts to specification. *See "3-7-2 Engine Tightening Torque" section for tightening torque.*

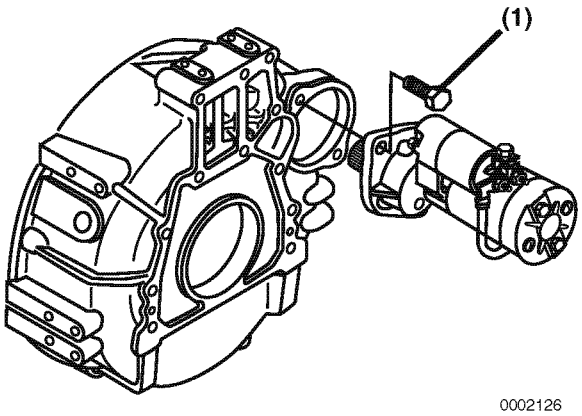


Figure 4-5-36

3. Reconnect the electrical wires to the magnetic switch assembly (solenoid). Be sure to place the cover over the battery positive (+) cable connection.
4. Reconnect the battery cables at the battery.

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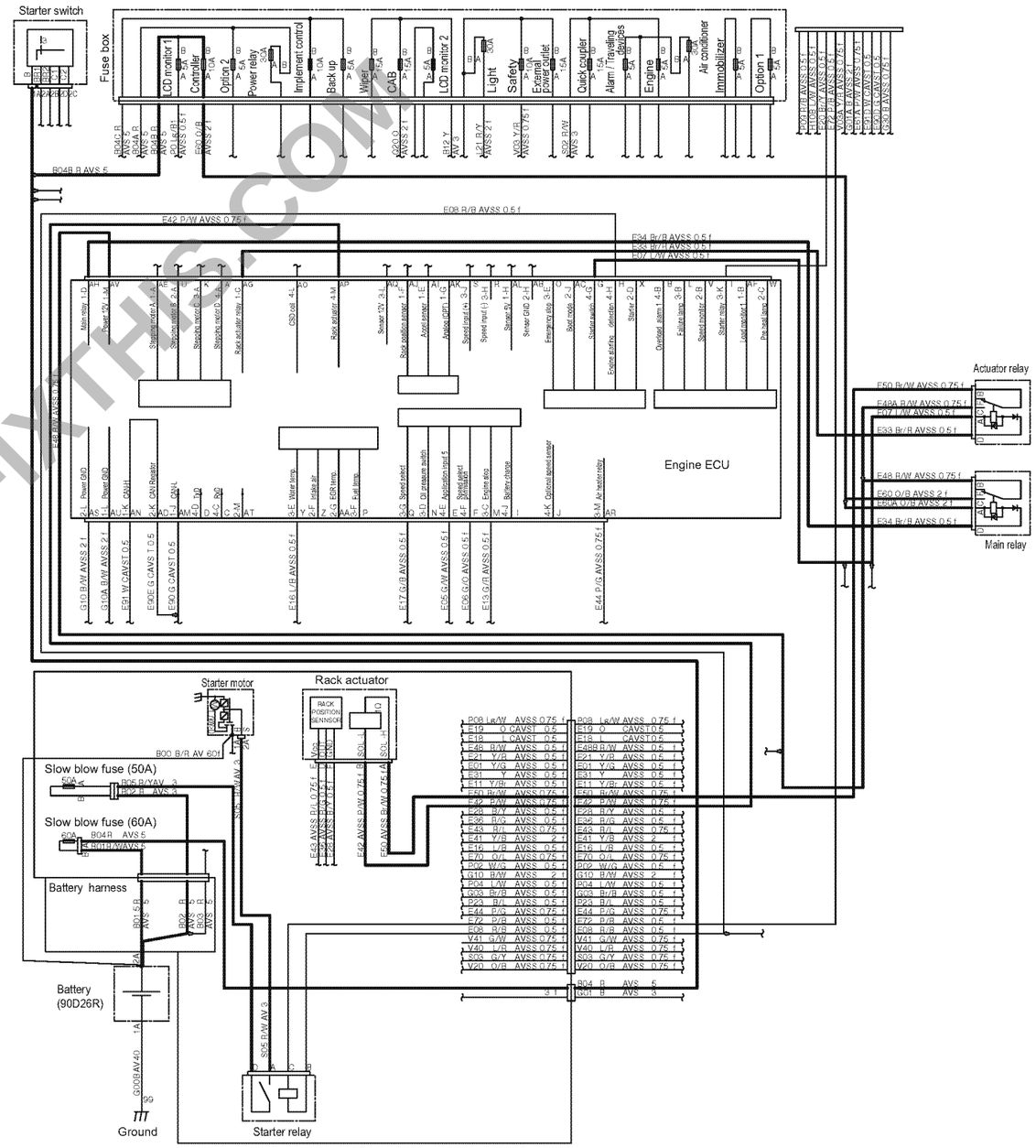
2. Engine Stop

Turn the starter switch to the "OFF" position.

↓

The signal is sent to the engine ECU.

The signal is sent to the engine ECU that controls the rack actuator to cut off fuel supply and stop the engine.



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3) Horsepower Control for Engine Speed Sensing spec. (with Air Conditioner)

Control the discharge volume of the piston pumps so that the amount of load in the piston pumps P1 and P2, the trochoid pump and the gear pump does not exceed the set torque.

The oil pressure from the piston pumps P1 and P2 flows to the control pin (A) through the oil passage inside the port block. The discharge pressure of the gear pump flows to the control pin (B) through the inner passage of the piston pump body.

The oil pressure discharged from the piston pumps P1 and P2 and the gear pump rises and presses the respective control pins, causing the inclination angle of the swash plate to decrease and the discharge volume of the pumps to reduce.

The one side of the swash plate is held with springs. The spring force is adjusted according to the discharge pressure of each pump. The amount of horsepower (torque) of the pumps is controlled by the springs not to exceed the set torque.

In addition, the piston pumps are provided with a horsepower reduction control function, which reduces a fixed amount of horsepower upon reception of an external pilot pressure signal.

External pilot pressure is led to the larger-diameter portion of the control pin (B) through the oil passages in the body and the piston pump body, pushes the control pin (B) and resists the force of the control springs, thus reducing the inclination angle of the swash plate to reduce the oil flow.

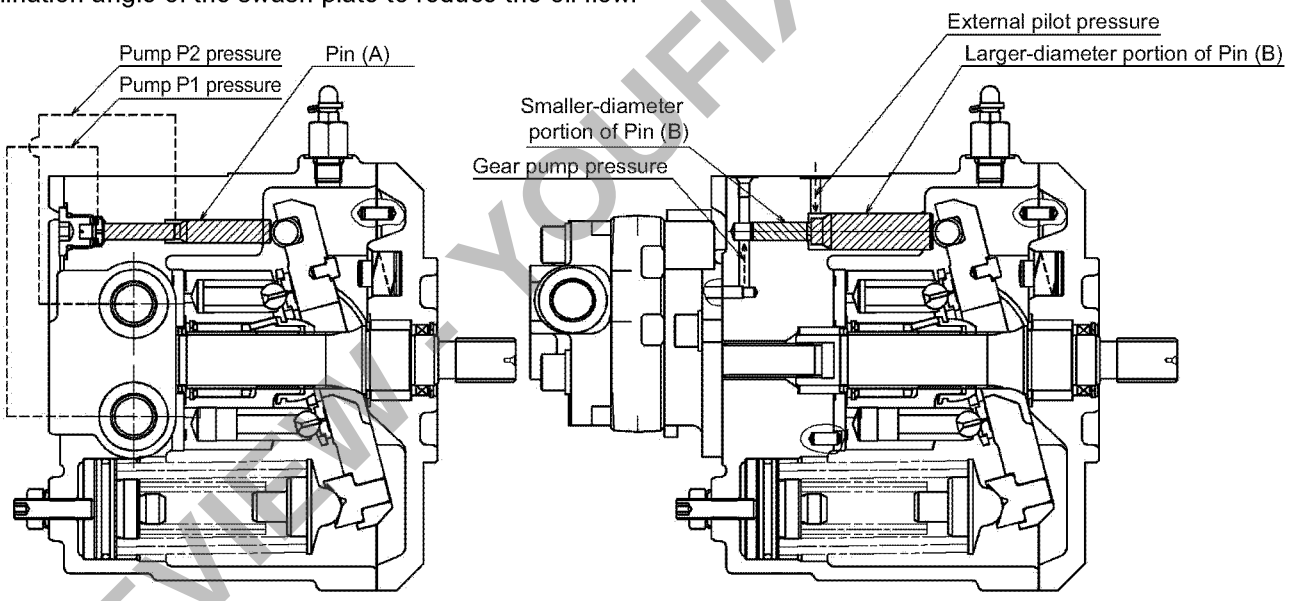
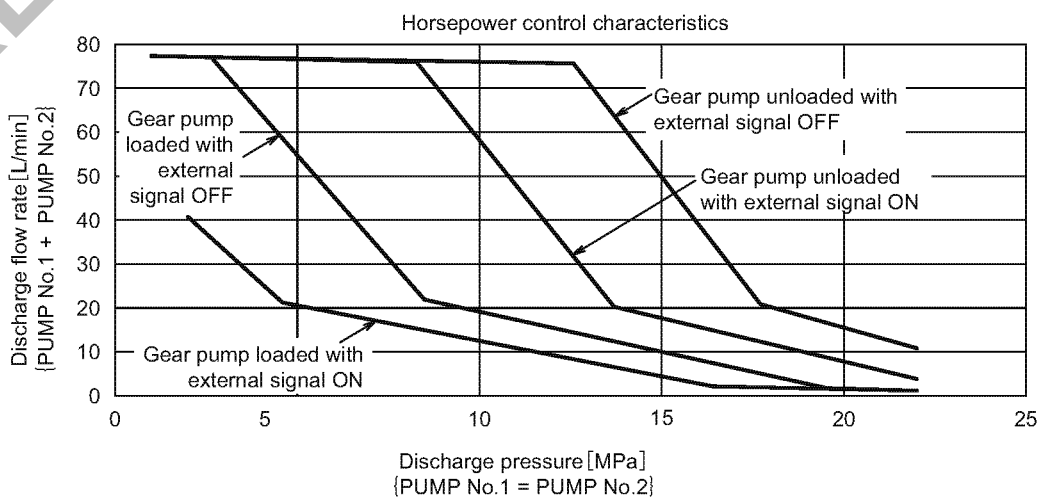


Illustration of horsepower control

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Horsepower control characteristic curves

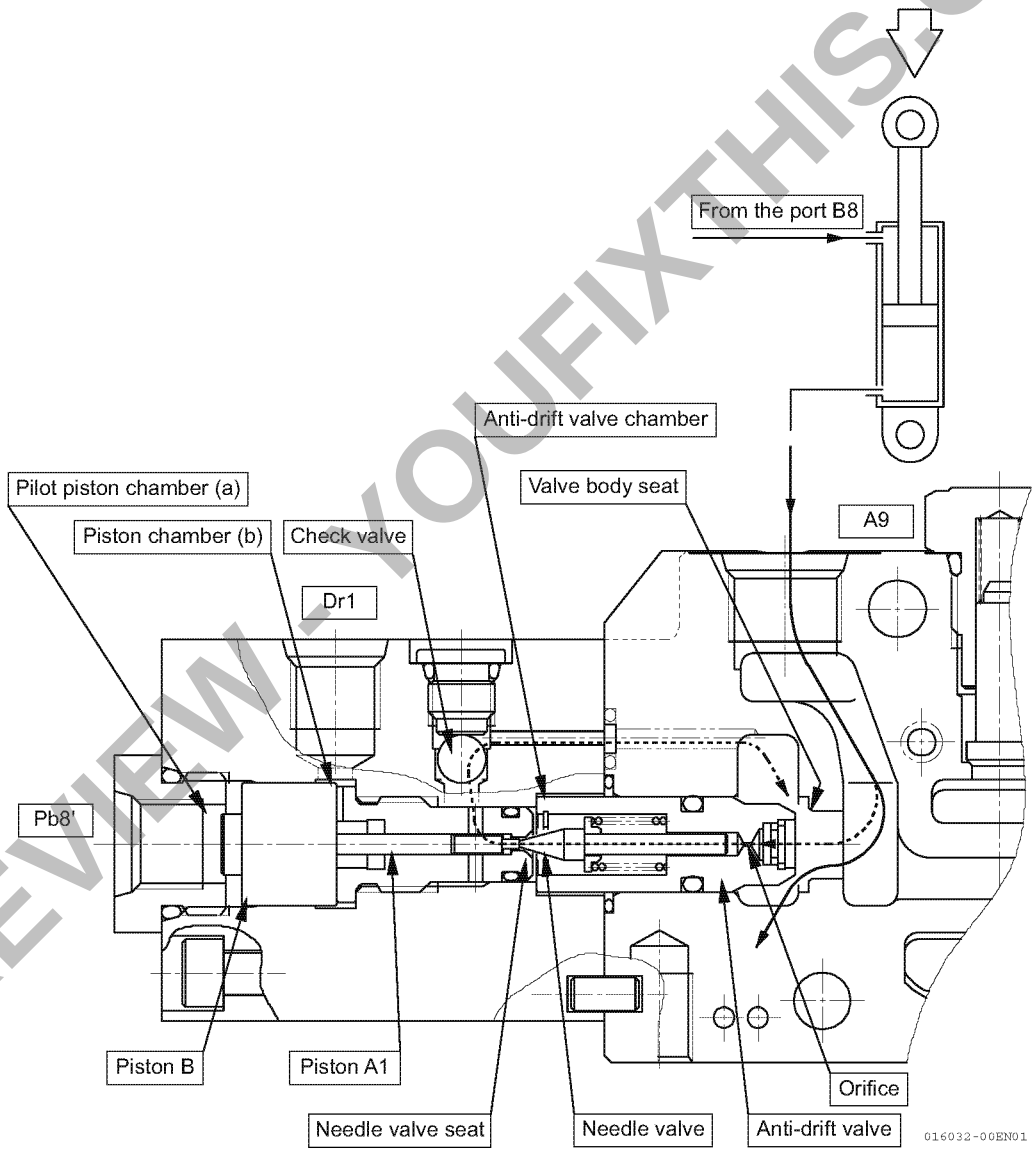
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(2) Releasing (boom down)

When the pilot oil flows to the pilot port (Pb8') for release of the anti-drift valve, the pilot pressure moves the piston B to the right, and it presses the needle valve to open via the piston A1. At that time, the return oil from the boom cylinder flows through the orifice of the anti-drift valve, the anti-drift valve chamber, the needle valve seat, and check valve to the downstream chamber of the anti-drift valve (the boom section).

The downstream chamber connects to the return oil passage according to a boom spool movement and the pressure in the anti-drift valve chamber decreases as the needle valve has been opened, and the return oil from the boom cylinder has opened the anti-drift valve so that the return oil from the boom cylinder flows to the return oil passage through the notch in the boom spool, and the boom cylinder can retract.



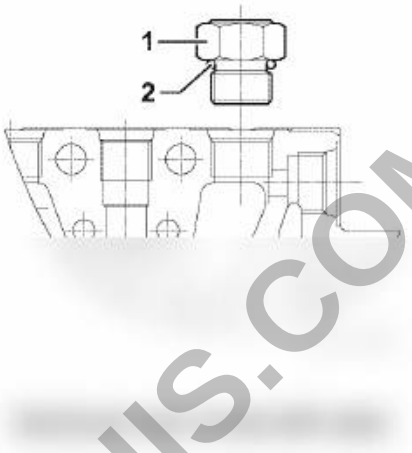
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(5) Anti-drift valve actuator port plug

[1] Check that O-ring **2** is securely installed on plug **1**.

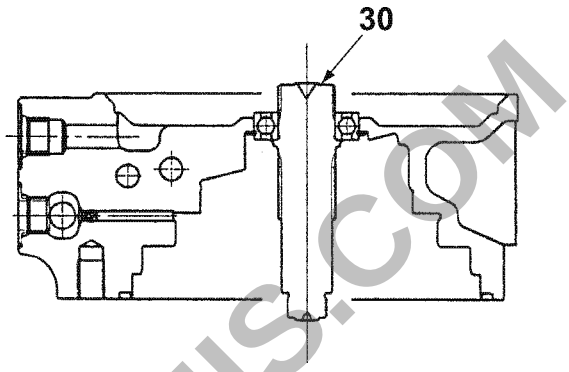
[2] Tighten plug **1** to the specified torque with a wrench or a socket wrench (21 mm).
[Tightening torque: 27.5 to 30.4 ft·lbf (37.3 to 41.2 N·m)]

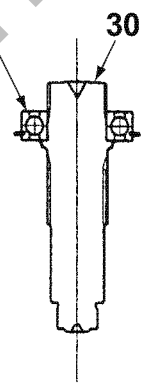


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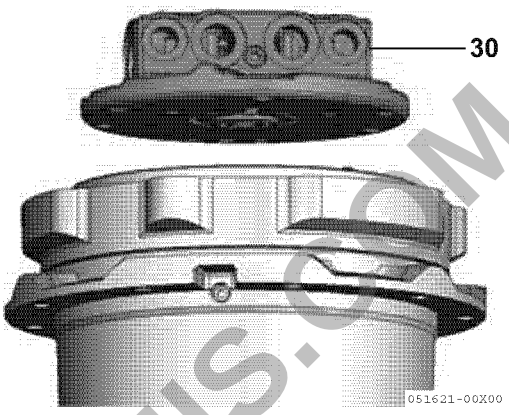
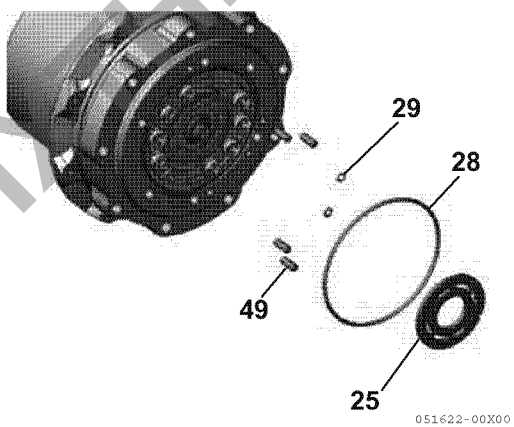
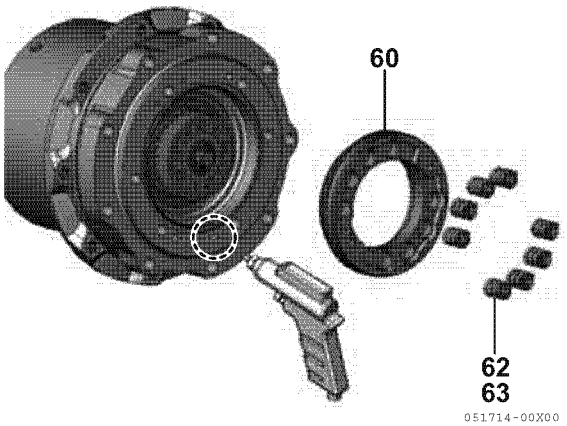
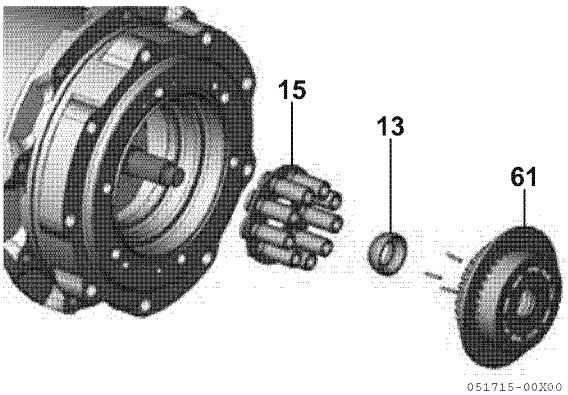
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Procedure	
(15) Tap an end of the shaft **30** with a plastic hammer, and then remove shaft **30**.	

(16) Disassemble the ball bearing **29** and the shaft **30**. ***Note :*** *Replace the removed bearing with a new one.*	

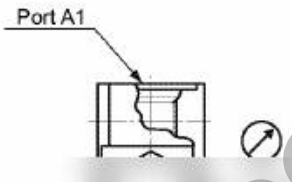
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Procedure	
(11) Remove base plate **30**, taking care not to pull out cylinder block **7**. When the base plate is hard to remove, knock it out with a plastic hammer. If it is still hard to remove, pry it up lightly with a screwdriver. **Tools:** • Plastic hammer 14 • Screwdriver 12	
(12) Remove pins **49**, valve plate **25** and O-rings **28** and **29**.	
(13) Remove springs **62** and **63**. Then remove brake piston **60**. To remove the brake piston, blow compressed air into the parking brake release port in flange holder **1-1**. ***Note:*** *Cover the entire brake piston with a cloth or the like before removal because the brake piston may suddenly jump out and oil may also splash out.*	
(14) Remove cylinder block **7**, pins **12**, retainer holder **13**, retainer plate **14**, piston ASSYS **15** and disc **61**. Take care not to damage the sliding surface of the cylinder block.	

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Procedure	
(5) Checking leakage [1] Apply pressure on the port **A2** to measure the oil quantity flowing out of the port **A1**. Standard value : Less than 0.000132 GPM (0.0005 L/min) at 14.2 PSI (0.1 MPa)	

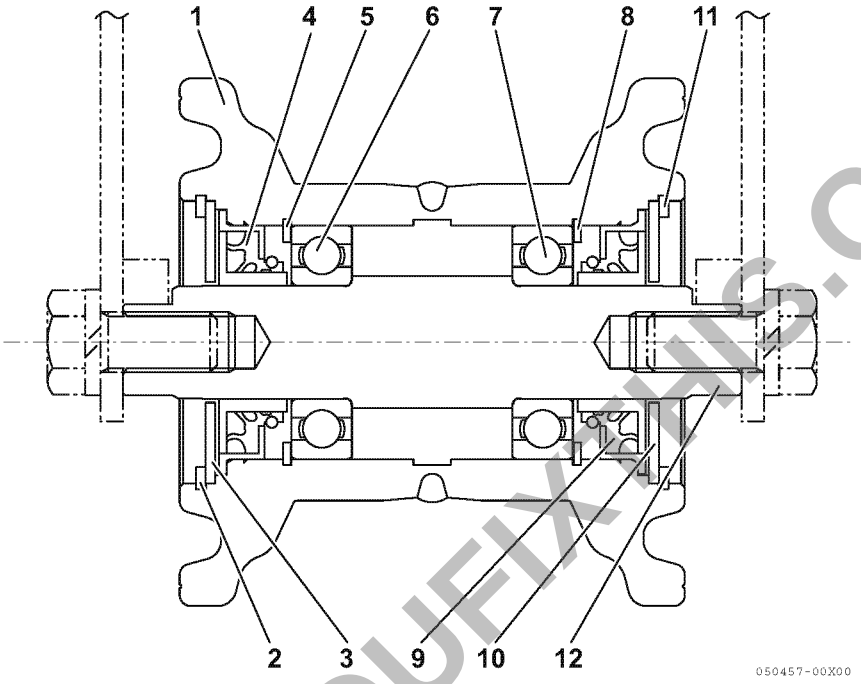
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7-2-8 Disassembly and Reassembly of Track Roller

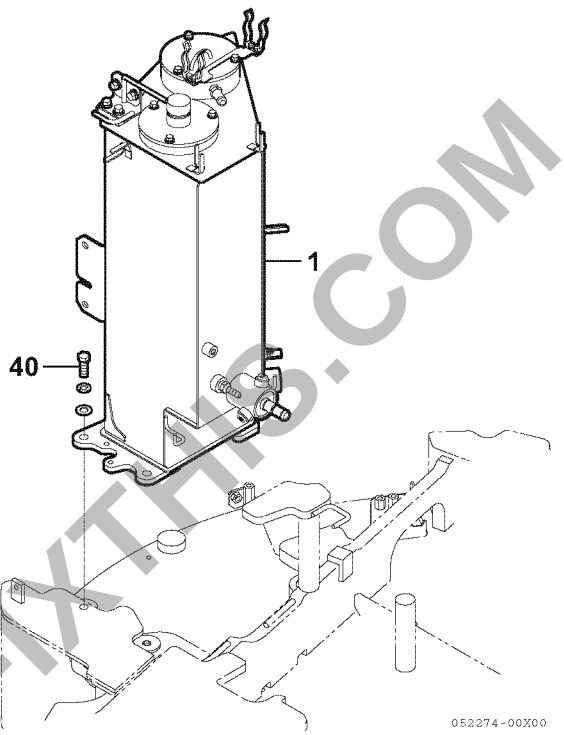
1) Structure



No.	Part	Q'ty	No.	Part	Q'ty
1	Roller	1	7	Bearing 6206YR8	1
2	Internal snap ring C (75)	1	8	Internal snap ring C (62)	1
3	Spacer (75×2.6)	1	9	Seal QLF 306212218	1
4	Seal QLF 306212218	1	10	Spacer (75×2.6)	1
5	Internal snap ring C (62)	1	11	Internal snap ring C (75)	1
6	Bearing 6206YR8	1	12	Shaft	1

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Procedure	
(27) Remove three bolts (M14) **40** and remove hydraulic oil tank **1**.	

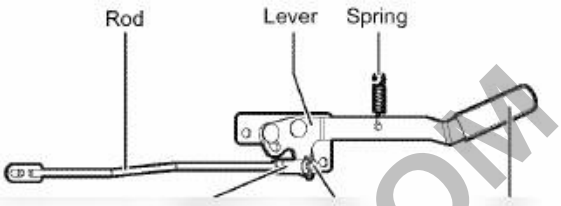
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5) Lever assembly

Key points for procedure

- Be sure not to deform, bend, stretch or otherwise damage the spring during installation. Be careful of the installation direction.
- Be sure to install the M6 washer on the yoke retaining pin with the rounded-edge side facing the lever.



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