YANMAR

SERVICE MANUAL

EXCAVATOR

SV60-A

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CHAPTER 1

GENERAL CAUTIONS FOR MAINTENANCE WORK

1-1 Correct Work....1-1
1-2 Safety Precautions....1-1
1-3 Preparations....1-1
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1-10 Air Release of Hydraulic Equipment....1-8

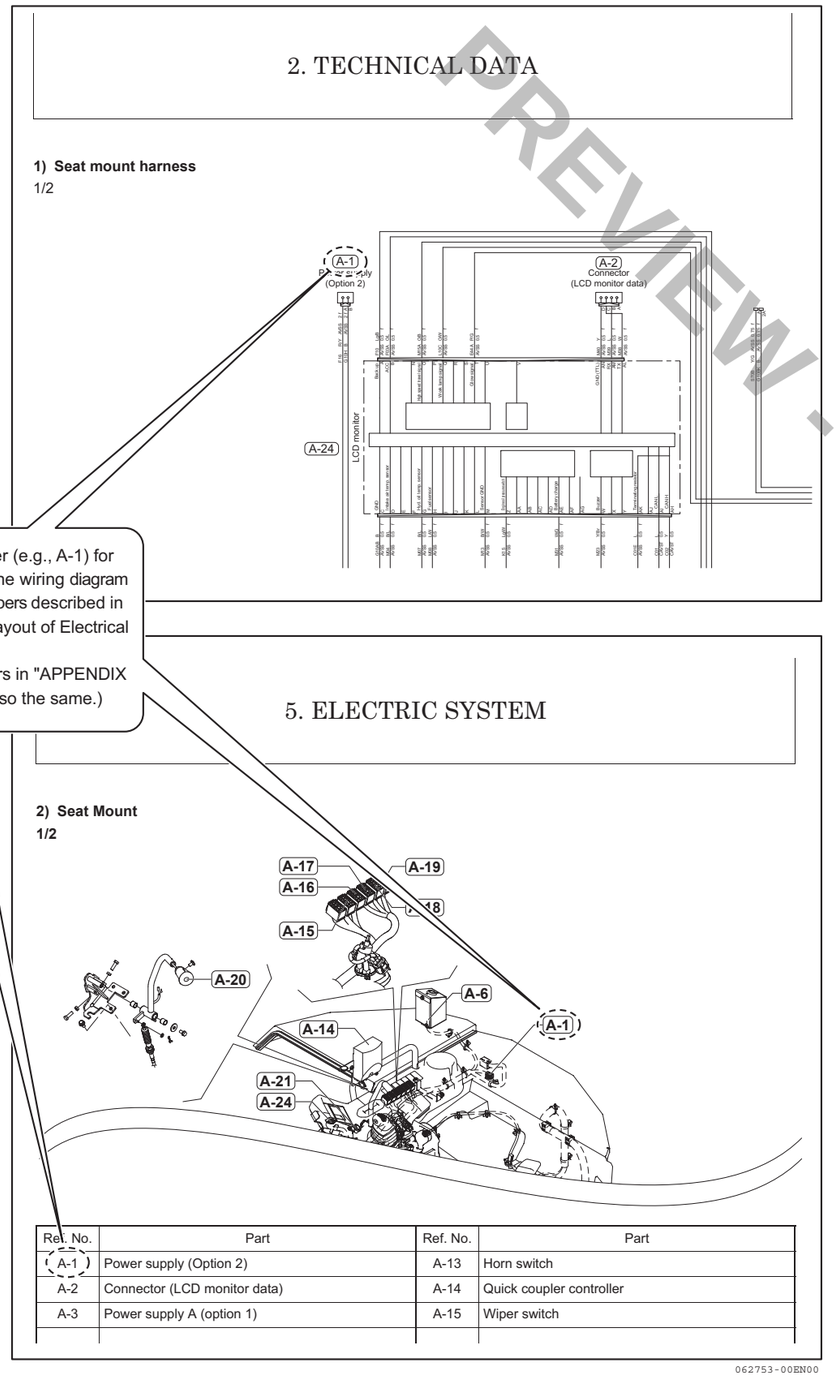
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2-9 Wiring Diagram

● Reference numbers

<Example>



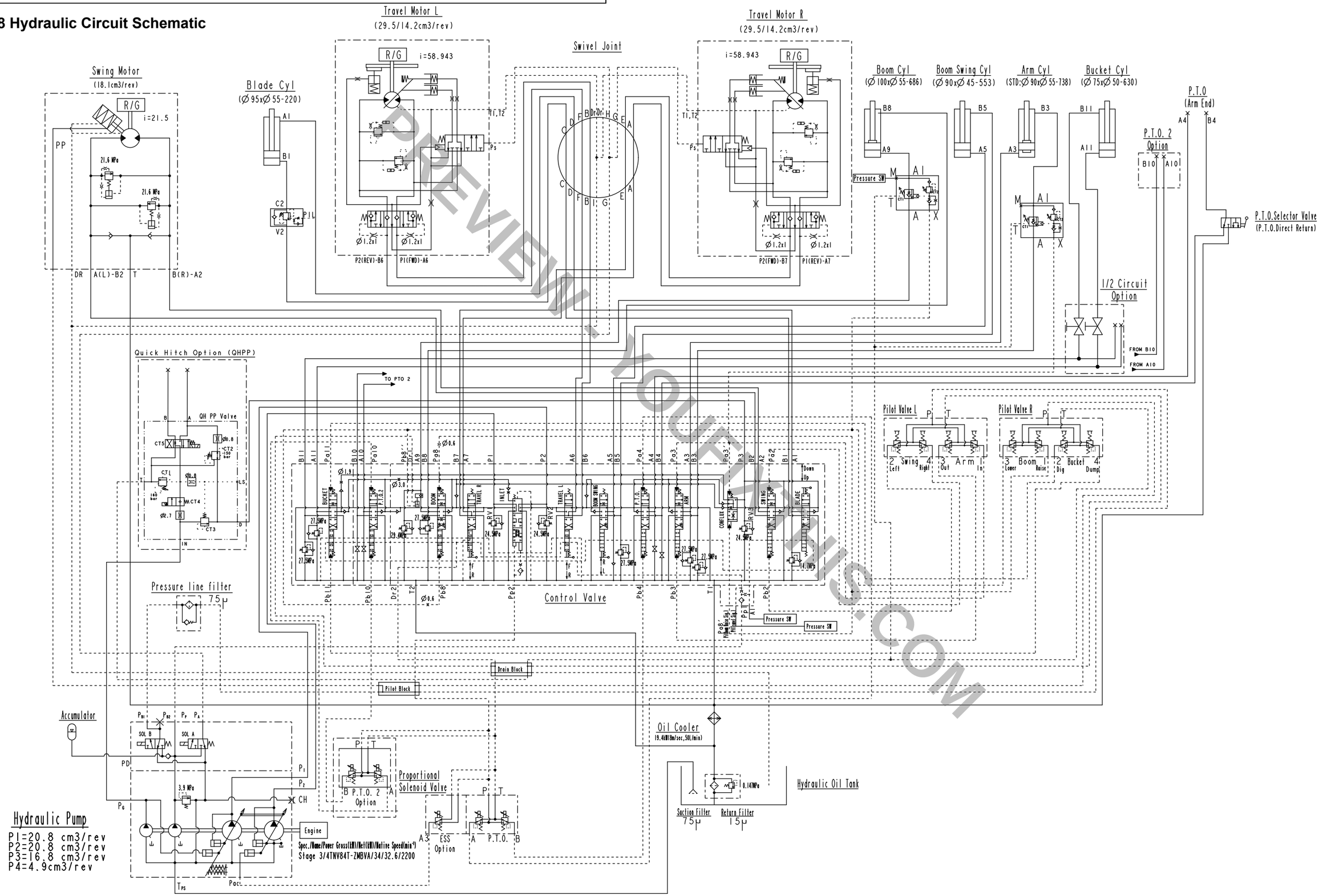
Each reference number (e.g., A-1) for electric equipment in the wiring diagram corresponds to the numbers described in Section "5-1-1 Parts Layout of Electrical Equipment".
(The reference numbers in "APPENDIX Wiring Diagram" are also the same.)

Ref. No.	Part	Ref. No.	Part
A-1	Power supply (Option 2)	A-13	Horn switch
A-2	Connector (LCD monitor data)	A-14	Quick coupler controller
A-3	Power supply A (option 1)	A-15	Wiper switch

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2. TECHNICAL DATA

2-8 Hydraulic Circuit Schematic



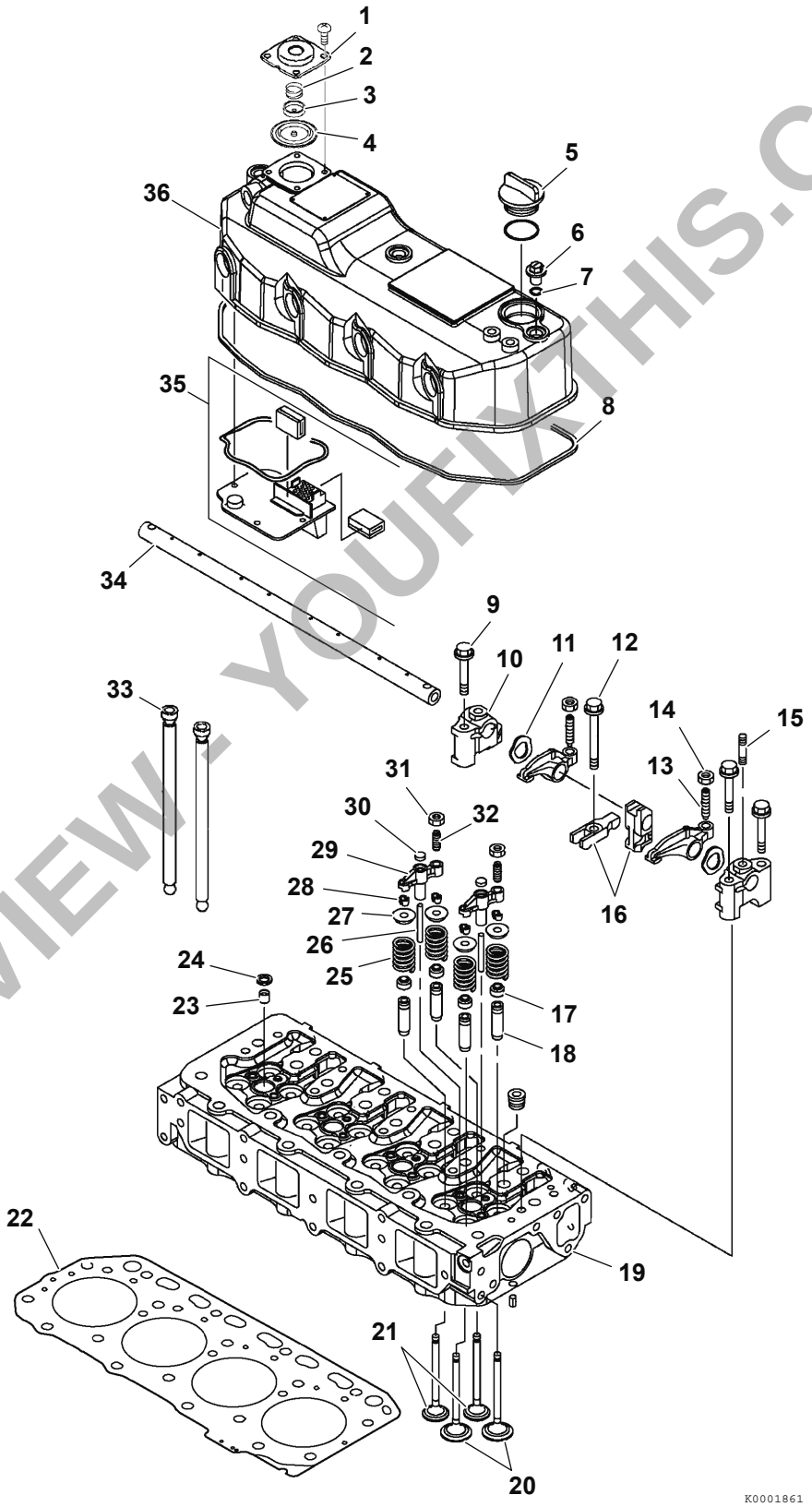
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4-2-5 Cylinder Head

4-Valve Cylinder Head

Cylinder Head Components



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3-7 List of Tightening Torque

3-7-1 Machine

Applicable model			SV60-A		
Equipment No		Tightening part	Thread size	Tightening torque N•m	Adhesive
Engine / Electrical equipment					
	1	Engine mount vibroisolating rubber	M16 × 150 (10.9T)	206 to 235	ThreeBond 1324
	2	Engine × Engine mount L <Fan side>	M10 × 35 (12.9T)	75 to 95	ThreeBond 1324
	3	Engine × Engine mount R <Flywheel side>	M10 × 40 (10.9T)	67 to 79	ThreeBond 1324
	4	Air cleaner intake hose	Hose clip 80	2,5 to 3,5	
	5	Cooling water hose	Hose clip 41	2,5 to 3,5	
	6	Cooling water hose	Hose clip 48	2,5 to 3,5	
	7	Fuel tank holding band	Nut 10	2,5 to 3	
	8	Fuel tank holding band	M10 × 25	44,1 to 58,9	
	9	Fuel pump bracket	M8 × 16	9 to 11	
	10	Fuel drain plug	M18 × 1.5	8 to 12	
	11	Canopy mount CMP A ×Turning frame	M16 × 70 (10.9T)	291 to 339	ThreeBond 1324
	12	Canopy mount CMP A × Canopy mount CMP B	M10 × 30 (10.9T)	67 to 79	ThreeBond 1324
	13	Canopy mount CMP B ×Turning frame	M12 × 45 (10.9T)	116 to 138	ThreeBond 1324
	14	Air cleaner	M8 × 20	23 to 27	
	15	Fuel pump control	M5 × 16	2,5 to 3,5	
	16	LCD monitor × Panel cover	M5 × 16	5,5 to 6,1	
	17	Safety switch (High speed travel pedal)	Locknut (Fine thread) 18	29,4 to 34,3	
	18	Safety switch (Cut-off lever)	Locknut (Fine thread) 18	29,4 to 34,3	
	19	Accelerator dial (holding nut)	Nut (Fine thread) M5	1,33 to 1,47	
	20	Panel cover (lower) × Panel cover (upper)	M5 × 14 (Tapping screw)	2,8 to 3,5	
	21	Battery holding rod	Nut 8	2 to 3 (Lower <holding>)	5 to 6 (Upper <Locknut>)
	22	Harness × Starter motor terminal	Nut 8	7,5 to 10	
	23	Air conditioner hoses	Hose clip 22 - 41	4 to 5	

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5-4 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)	Sensor voltage is 4.6 V or more, or 0.2 V or less.	• Connection failure of connectors • Harness wiring failure (engine control dial wiring disconnected or short circuited to GND) • Defective accelerator sensor • Engine ECU internal circuit failure	Check the connectors, harnesses and engine control dial. Turn the starter switch to the “OFF” position and then to the “ON” position to check if the error code is displayed again.
00 000091.01	Caution	Accelerator sensor failure: below normal operating range (SAEJ1843)	Sensor voltage is 4.6 V or more, or 0.2 V or less.	• Connection failure of connectors • Harness wiring failure (engine control dial wiring disconnected or short circuited to GND) • Defective accelerator sensor • Engine ECU internal circuit failure	Check the connectors, harnesses and engine control dial. Turn the starter switch to the “OFF” position and then to the “ON” position to check if the error code is displayed again.
00 000091.02	Caution	Accelerator sensor malfunction: intermittent failure	Sensor voltage is 4.6 V or more, or 0.2 V or less.	• Connection failure of connectors • Harness wiring failure (nearly broken wiring of sensor signal line, sensor 5 V line or sensor GND line) • Defective accelerator sensor • Engine ECU internal circuit failure	Check the connectors, harnesses and accelerator sensor. Turn the starter switch to the “OFF” position and then to the “ON” position to check if the error code is displayed again.
00 000091.03	Caution	Accelerator sensor malfunction: short circuit to high voltage side	Sensor voltage is 4.6 V or more, or 0.2 V or less.	• Connection failure of connectors • Harness wiring failure (sensor GND line disconnected or sensor signal line short circuited to power supply) • Defective accelerator sensor • Engine ECU internal circuit failure	Check the connectors, harnesses and accelerator sensor. Turn the starter switch to the “OFF” position and then to the “ON” position to check if the error code is displayed again.
00 000091.04	Caution	Accelerator sensor malfunction: short circuit to low voltage side	Sensor voltage is 4.6 V or more, or 0.2 V or less.	• Connection failure of connectors • Harness wiring failure (sensor signal line disconnected or short circuited to GND, or sensor 5V line disconnected or short circuited to GND) • Defective accelerator sensor • Engine ECU internal circuit failure	Check the connectors, harnesses and accelerator sensor. Turn the starter switch to the “OFF” position and then to the “ON” position to check if the error code is displayed again.
00 000091.15	Caution	Accelerator sensor malfunction: disabled (SAEJ1843)	Sensor voltage is 4.6 V or more, or 0.2 V or less.	Engine ECU map data setting fault	Turn the starter switch to the “OFF” position and then to the “ON” position to check if the error code is displayed again.
00 000100.01	Warning	Abnormal engine oil pressure	Engine oil pressure switch is on after engine has started.	• Low engine oil pressure • Defective engine oil system • Harness wiring failure (engine oil pressure switch wiring short circuited to GND) • Defective engine oil pressure switch • Engine ECU internal circuit failure	Inspect the engine oil system. Check the harnesses and engine oil pressure switch. Turn the starter switch to the "OFF" position and then to the "ON" position to check if the error code is displayed again.
00 000100.04	Warning	Engine oil pressure switch failure	Engine oil pressure switch is off while engine is stopped with starter switch in the "ON" position.	• Connection failure of connectors • Harness wiring failure (engine oil pressure switch wiring disconnected or short circuited to power supply) • Defective engine oil pressure switch • Engine ECU internal circuit failure	Check the connectors, harnesses and engine oil pressure switch. Turn the starter switch to the "OFF" position and then to the "ON" position to check if the error code is displayed again.
00 000110.00	Warning	Engine coolant temperature sensor malfunction: too high	Sensor voltage is 4.8 V or more.	• Engine overheating • Insufficient amount of engine coolant • Defective engine cooling system • Defective coolant temperature sensor system	Inspect the engine cooling system. Check the connectors, harnesses and coolant temperature sensor. Turn the starter switch to the “OFF” position and then to the “ON” position to check if the error code is displayed again.
00 000110.02	Warning	Engine coolant temperature sensor malfunction: intermittent failure	Error undefined is detected 10 times.	• Connection failure of connectors • Harness wiring failure (nearly broken wiring of sensor signal line, sensor 5 V line or sensor GND line) • Defective coolant temperature sensor • Engine ECU internal circuit failure	Check the connectors, harnesses and coolant temperature sensor. Turn the starter switch to the “OFF” position and then to the “ON” position to check if the error code is displayed again.
00 000110.03	Warning	Engine coolant temperature sensor malfunction: short circuit to high voltage side	Sensor voltage is 4.8 V or more.	• Connection failure of connectors • Harness wiring failure (sensor signal line disconnected or short circuited to power supply, or sensor GND line disconnected) • Defective coolant temperature sensor • Engine ECU internal circuit failure	Check the connectors, harnesses and coolant temperature sensor. Turn the starter switch to the “OFF” position and then to the “ON” position to check if the error code is displayed again.

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1 – Crankcase breather cover
2 – Diaphragm spring
3 – Diaphragm cup
4 – Crankcase breather diaphragm
5 – Oil fill cap
6 – Valve cover nut
7 – Valve cover nut O-ring
8 – Valve cover gasket
9 – Support bolt
10 – Rocker arm shaft support
11 – Wave washer
12 – Fuel injector retainer bolt
13 – Valve adjusting screw (primary)
14 – Valve adjusting screw lock nut (primary)
15 – Rocker arm shaft aligning stud
16 – Fuel injector retainer
17 – Valve stem seal
18 – Valve guide
19 – Cylinder head
20 – Intake valve
21 – Exhaust valve
22 – Cylinder head gasket
23 – Fuel injector nozzle protector
24 – Fuel injector nozzle seat
25 – Valve spring
26 – Valve bridge guide
27 – Spring retainer
28 – Valve keepers
29 – Valve bridge
30 – Valve bridge seat
31 – Valve adjusting screw lock nut (secondary)
32 – Valve adjusting screw (secondary)
33 – Push rod
34 – Rocker arm shaft
35 – Crankcase breather components
36 – Valve cover

Disassembly of 4-Valve Cylinder Head

Prepare a clean, flat working surface on a workbench large enough to accommodate the cylinder head assembly. Discard all gaskets, O-rings and seals. Use new gaskets, O-rings and seals on reassembly of the cylinder head.

1. Drain the coolant from the engine into a suitable container.

NOTICE

Identify all parts and their location using an appropriate method. It is important that all parts are returned to the same position during the reassembly process.

2. Remove the high pressure fuel injection lines **(Figure 4-2-40, (1))**. *See Removal of Fuel Injectors on page 4-3-25.*

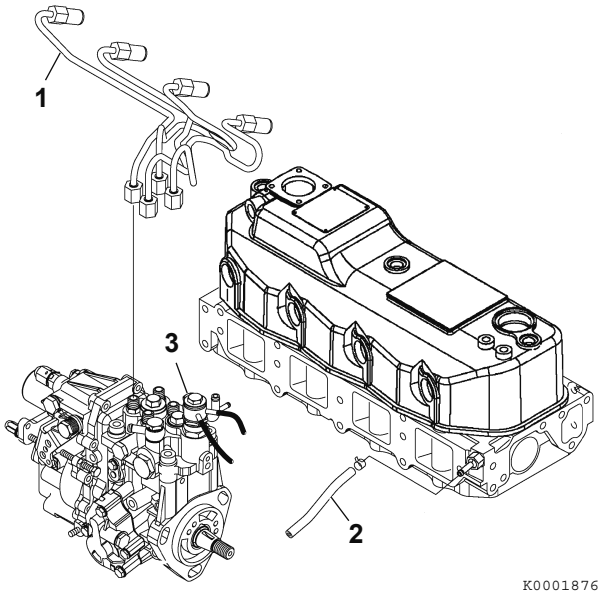


Figure 4-2-40

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8-2 Quick Reference Table for Troubleshooting

The following table summarizes the general trouble symptoms and their causes.
If any trouble symptom occurs, take corrective action before it becomes a serious problem.

Trouble symptoms are shown in columns and their causes are shown in rows.

Whether boxes where the column and rows intersect are marked with a circle should be checked.

Example: When the bucket does not move at all

Trouble symptom: Implement does not move at all. (Bucket)

Items relevant to causes whose corresponding boxes are marked with a circle must be inspected and repaired.

Cause \ Symptoms and conditions of failures		Implement does not move at all										Implement's force			
		All implements	Boom	Arm	Bucket	Boom swing	Swing	Blade	Travel R	Travel L	P.T.O.	Boom	Arm	Bucket	Boom swing
1. Hydraulic pump	Hydraulic pump ASSY	○													
	Piston pump P1			○		○				○	○		○		○
	Piston pump P2		○		○				○			○		○	
	Gear pump P3						○	○							
	Pilot pump P4		○	○	○	○	○		○	○	○	○	○	○	○
	Cut-off valve	○	○	○	○	○	○		○	○	○	○	○	○	○
	Travel speed switch valve														
2. Control valve	Sections related to P1 flow														
	Sections related to P2 flow														
	Sections related to P3 flow														
	Boom section		○									○			
	Arm section			○									○		
	Bucket section				○									○	
	Boom swing section					○									○
	Blade section							○							
	Swing section						○								
	Travel R section								○						

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2. TECHNICAL DATA

2. Technical Data

2-1 Specifications

Item					Unit	SV60-A
Main specifications of machine						
Dimensions						
	Overall length (Transportation position)				mm	5595 (Long arm : 5675)
	Cabin	Overall height	Transportation position		mm	2540
			Traveling position		mm	2540
		Overall width	Full machine width		mm	1970
	Tumbler center distance (steel / rubber)				mm	2070
	Track gauge				mm	1590
	Minimum ground clearance				mm	345
Traveling performance						
	Travel speed	Steel crawler	Low speed (Forward/Reverse)		km/hr	2,2
			High speed (Forward/Reverse)		km/hr	4,7
		Rubber crawler	Low speed (Forward/Reverse)		km/hr	2,2
			High speed (Forward/Reverse)		km/hr	4,7
	Permissible water depth limit				mm	500
Work performance						
	Bucket	Width (Standard) *including side cutter			mm	700
		[Standard. JIS heaped capacity]			cm^3	0,16
		Number of teeth / Installation method			pcs.	4 / rubber pin lock type
	Maximum digging depth	With blade raised			mm	3650 <3945>
		With blade on the ground			mm	3910 <4200>
	Maximum depth of vertically digging				mm	1165
	Maximum dumping height				mm	4280 <4460>
	Minimum front swing radius (with boom in front)				mm	2240
	Minimum front swing radius (at boom swing)				mm	1840
	Rear end swing radius				mm	1325
	Boom swing angle			Left	degrees	70
				Right	degrees	70
	Maximum digging force		Bucket		k•N	41,9
			Arm		k•N	27,3 (Long arm : 24,8)

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2-7 Fuel, Lube Oil and Grease Recommended

Components	Fluid	Temperatures °C								Quantity prescribed (L)	
		-	-20	-10	0	10	20	30	+		
Thermal engine	Engine oil		SAE 10W CDSAE 10W CJ-4							7,4	–
			SAE 10W-30 CDSAE 10W-30 CJ-4								
				SAE 15W-40 CDSAE 15W-40 CJ-4							
Travel gears	Box oil	SAE 90 (GL-4)								0,9	by reducer
Hydraulic circuit	Hydraulic oil			ISO VG46						38,0	in the tank
										36,0	the rest
Fuel tank	Diesel				N° 2-D					97,0	–
			N° 3-D								
		N° 3-D (S)									
Cooling system	Long-life cooling fluid **YANMAR POWER COOLANT B–36**									6,7	radiator
										0,4	the expansion flask

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2-6 Periodic Inspection and Servicing

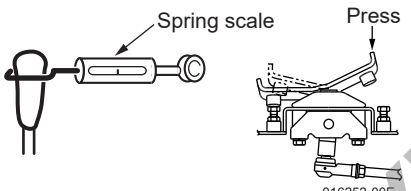
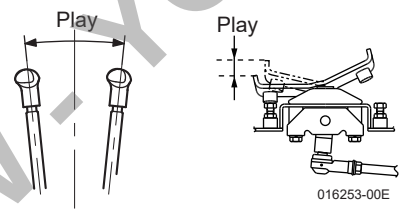
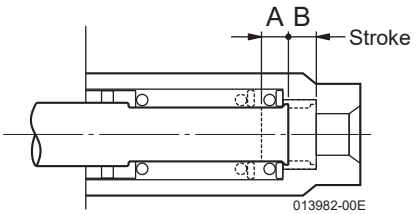
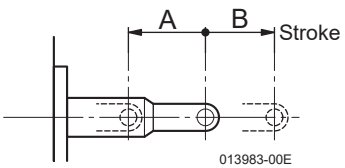
○: Verification and adjustment ●: Replacement □: Cleaning ■: Greasing

Parts & Operations		Daily	Every 50h	Every 500h	Every 1000h / Every year	Every 2000h / Every two years
General	Missing or broken parts	○				
	Tightening of nuts and bolts	○				
	Engine and battery in good condition	○				
	Machine	□				
Transmissions	Travel gears		● 1st time	○	●	
	Rotation reducer		● 1st time	○	●	
Hydraulic circuit	Hydraulic oil	○			●	
	Aspiration filter				□	
	Hydraulic oil return filter		● 1st time	●		
	Control filters				●	
	Operation of the accumulator	○				
Greasing	Greasing points	■				
	Rotation pin and crown		■			
Chassis	Bearing rollers and bearings, idler wheels	○			■	
	Track tension	○				
Electrical equipment	Headlights, horn, travel alarm	○				
	Dashboard and indicators	○				
	System state	○				
Engine	Water separator	○				
	GO filter			●		
	Air filter (dusty atmosphere every 250 h)			●		
	Engine oil	○	● 1st time	●[1]		
	Oil filter		● 1st time	●[1]		
	Cooling fluid	○				●
	Belt	○			●	
	Radiator vents	○		□		
	Fuel hose, coolant hose					●
	Intake and exhaust valves				○	
	Injectors and injection pressure					○
	EGR valve				□	
Air conditioning					○	

1. Every 500h / Every year

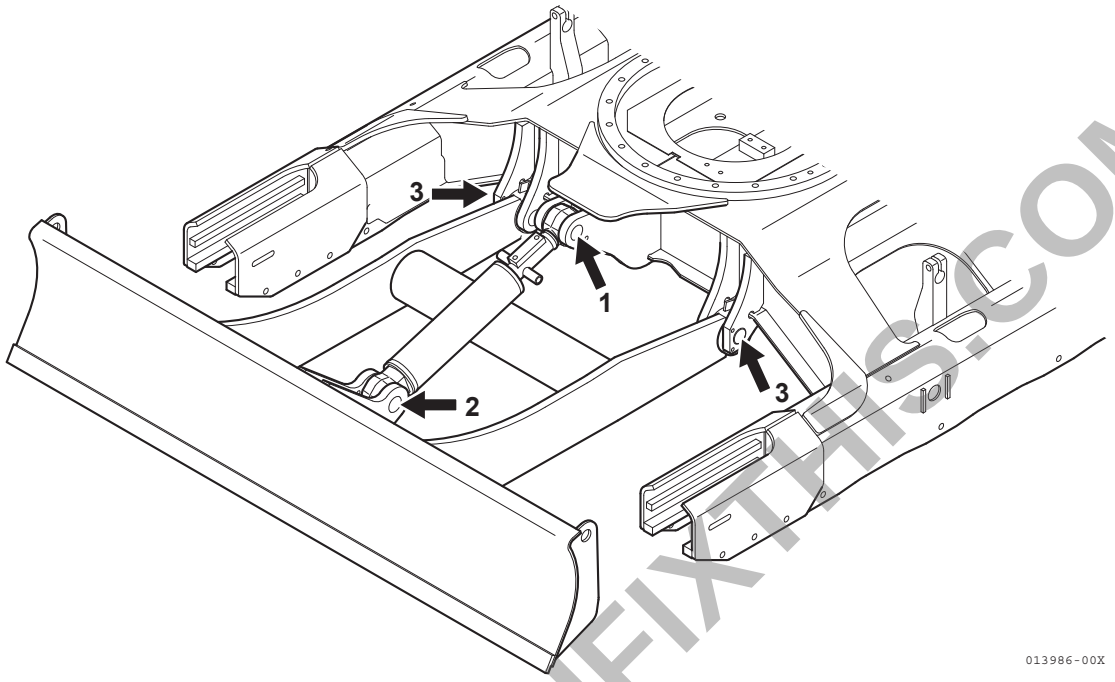
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3-4 Controls

Applicable model			SV60-A		
Item		Measuring conditions	Unit	Standard	Allowable limit
Controls					
Operating force					
	Right control lever (Boom & Bucket)	• Engine : stopped • Hydraulic oil temp. : 50 to 60 °C • Lever operating force : Measure the force by hanging the spring scale on the lever grip. • Pedal operating force : Measure the force by applying load as shown below. 	N	12,8	17,7
	Left control lever (Arm & Swing)			12,8	17,7
	Blade lever			31,4	41,2
	Travel levers			Forward: 20,6 Reverse: 19,6	Forward: 25,5 Reverse: 24,5
	-			–	–
	Boom swing pedal			83,4	93,2
	-			–	–
Play of control lever & pedal					
	Right control lever (Front & rear / left & right)	• Engine : stopped • Hydraulic oil temp. : 50 to 60 °C • Play of each control lever and pedal : Measure the total play (front, rear, left and right) at the lever grip end or the pedal end. 	mm	–	–
	Left control lever (Front & rear / left & right)			–	–
	Blade lever			15 or less	–
	Travel levers			10 or less	–
	Boom swing pedal			5 or less	–
	-			–	–
Control valve					
Spool stroke					
	Boom Bucket Arm Swing Parallel-flow divider Inlet		mm	7	–
	Right travel Left travel Blade Boom swing		mm	7	–
	-			–	

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3-6-2 Blade Moving Device



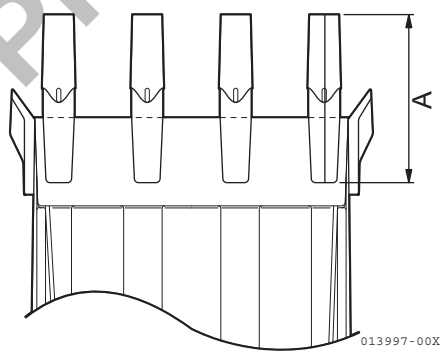
Unit: mm

No.	Applicable model: SV60-A Measuring point	Standard	Wear limit	
			Pin	Bore of bush or hole
1	Blade cylinder, rod	Ø45	-0,5	+0,5
2	Blade cylinder, bottom	Ø45		
3	Blade fulcrum	Ø45		

Note: *Allowable clearance between pin and bore of bush or hole is 1.0 mm.*

3-6-3 Bucket Teeth

Unit: mm

Applicable model: SV60-A Measuring point	Standard	Wear limit	Measure
	245	200	Replace

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■ Reassembly of the valve cover

1. Lightly grease a new valve cover gasket **(Figure 4-2-76, (6))**. Place the gasket in the groove of the valve cover **(Figure 4-2-76, (3))**.
2. Place the valve cover on the cylinder head.
3. Be sure new O-rings **(Figure 4-2-76, (5))** are installed on the valve cover nuts. Reinstall and tighten the valve cover nuts **(Figure 4-2-76, (4))**.

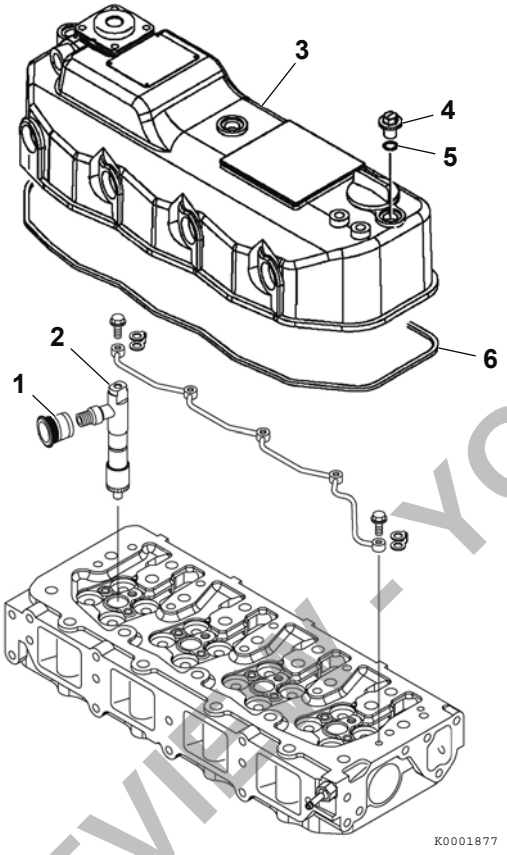


Figure 4-2-76

4. Reinstall the fuel injector grommets **(Figure 4-2-76, (1))**.
5. Reinstall the exhaust manifold using a new gasket. Tighten the bolts to specification.
6. Reinstall the intake manifold using a new gasket. Tighten the bolts to specification.
7. Reconnect the fuel injector return hose and fuel injection pump coolant hoses.
8. Reinstall the high-pressure fuel line grommets into the valve cover.
9. Reinstall the high pressure and fuel return lines. *See Installation of the Fuel Injectors on page 4-3-30.*
10. Reinstall the coolant pump. *See Reassembly of Engine Coolant Pump on page 4-4-8.*
11. Reinstall the alternator. *See Installation of Alternator on page 4-8-11.*
12. Reconnect the turbocharger oil supply and drain lines.
13. Reconnect the air intake hose.

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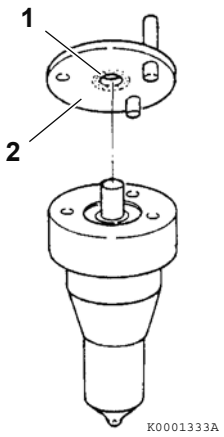


Figure 4-3-53

7. Perform a nozzle valve slide test:
   1- Wash nozzle body and valve in clean diesel fuel.
   2- While holding the nozzle body vertical, pull the nozzle valve about 2/3 of the way out **(Figure 4-3-54)**.
   3- Release the valve. It should fall smoothly to its seat by it's own weight.

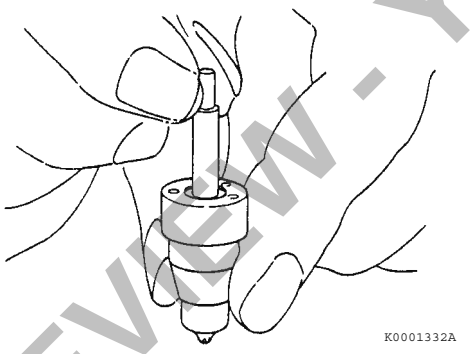
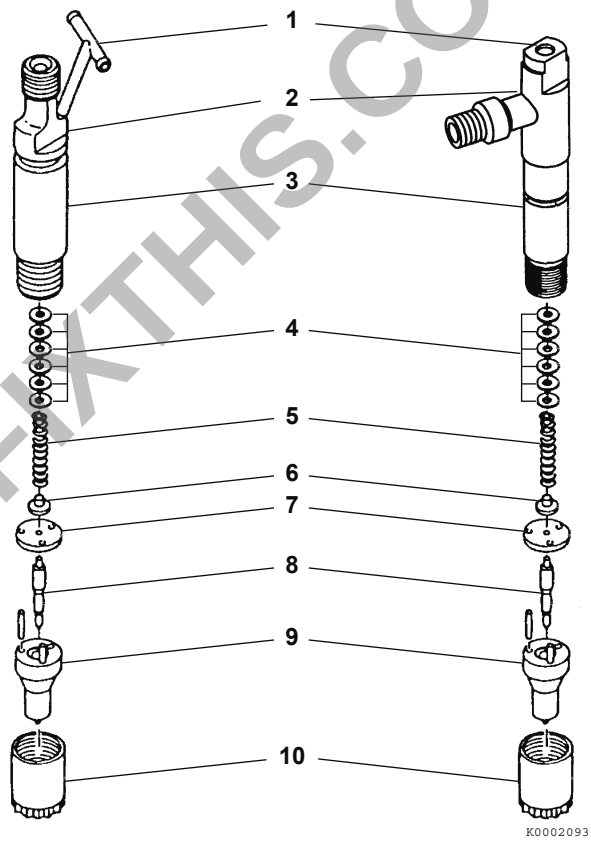


Figure 4-3-54

8. Replace the fuel injector assembly if it fails any inspection.

Adjusting Fuel Injector Pressure

The fuel injectors open when pressure reaches a predetermined pressure threshold. They close when the pressure is reduced below that threshold. The pressure threshold can be adjusted by adding or removing shims **(Figure 4-3-55, (3))**.



1 – Fuel return passage
2 – Injector ID location
3 – Injector body
4 – Pressure adjusting shims
5 – Spring
6 – Spring seat
7 – Valve stop spacer
8 – Nozzle valve
9 – Nozzle body
10 – Nozzle case nut

Figure 4-3-55

The injection pressure will change by approximately 1,9 MPa for every 0,1 mm in shim thickness.

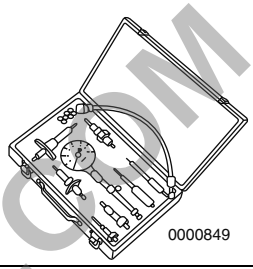
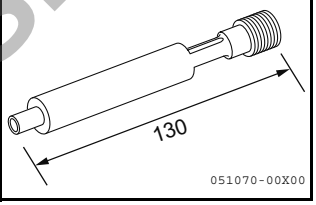
See the parts catalog for available shims.

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4-11 Failure Diagnosis

4-11-1 Special Service Tools

Compression Gauge Kit	For measuring compression pressure Yanmar Gauge Set Part No. TOL-97190080	
	Adapter for direct injection 2-valve cylinder head Yanmar Adapter Part No. 119802-92950	

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6-2-2 Arm

1) Arm "Retract"

(1) Pilot oil flow

When the arm control lever is pulled back to retract the arm, the oil from the pilot pump P4 flows through the cut-off valve and the port 1 of the pilot valve (L) to the port Pa3 of the arm section and the port Pa3' of the parallel-flow divider to move their spools.

(2) Oil flow from hydraulic pump

The oil from the piston pump P1 flows through the port P2 of the inlet section to the arm section. The oil from the gear pump P3 flows through the port P3 of the parallel-flow divider and the parallel passage to the arm section and combines with the oil from the piston pump P1. The combined oil flows through the port A3 of the control valve to A3 of the arm cylinder to extend its cylinder rod. The return oil from B3 of the arm cylinder flows back to the hydraulic oil tank through the port B3 of the arm section, the ports T1 and T2 of the control valve and the oil cooler.

Note: If the machine is equiped with a safety valve, the return oil from the port B3 of the arm cylinder flows back to the port A1 of the safety valve and from A to B3 of the arm of the boom sec-tion, the ports T1 and T2 of the control valve and the oil cooler.

2) Arm "Extend"

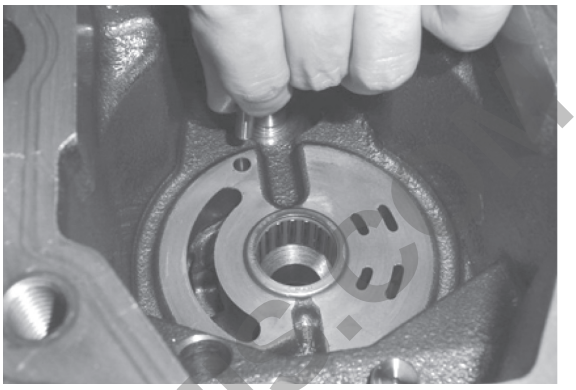
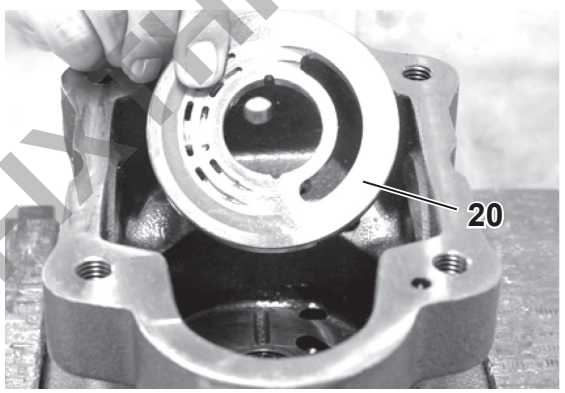
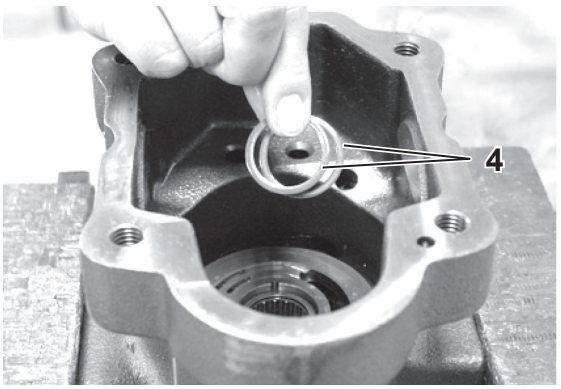
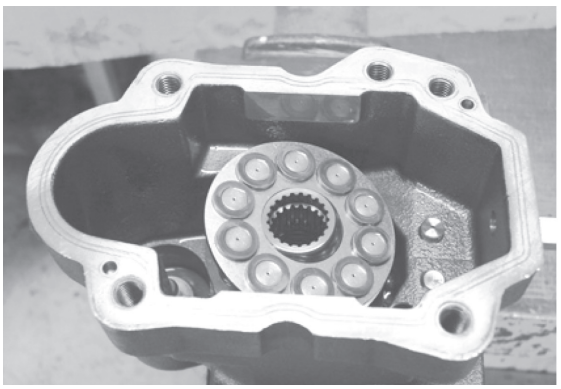
(1) Pilot oil flow

When the arm control lever is pushed forward to extend the arm, the oil from the pilot pump P4 flows through the cut-off valve and the port 3 of the pilot valve (L) to the arm section through the port Pb3 of the arm section to move its spool.

(2) Oil flow from hydraulic pump

The oil from the piston pump P1 flows through the port P2 of the inlet section to the arm section. The oil from the gear pump P3 flows through the port P3 of the parallel-flow divider and the parallel passage to the arm section and combines with the oil from the port P2. The combined oil flows in the opposite direction to the oil flow in the arm retract operation with regard to the arm cylinder.

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Procedure	
(13) Install the pin **3** into the housing **1**.	
(14) Install the valve plate **20** with the copper alloy side up into the housing.	
(15) Install the two thrust washers **4** into the housing **1**.	
(16) Place the cylinder barrel assembly **21** to **29** onto the valve plate **20**. ***Note :*** *Install it carefully not to make flaws and dent on the valve plate and rotary parts, which can cause breakage.*	

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5) Precautions after Disassembly

CAUTION:

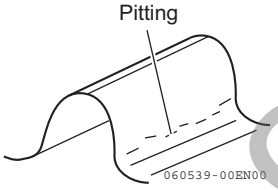
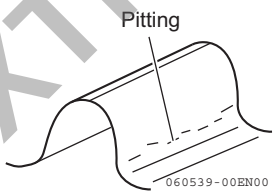
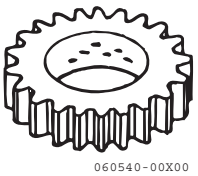
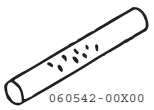
Carefully store and transport the parts removed during disassembly to prevent them from being damaged or contaminated.

When doing other work after removal of parts or when storing or transporting removed parts, cover the openings created by removing the parts with caps or tape in advance to prevent foreign matter such as dust and dirt from entering.

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6) Service Standards

(1) Reduction gear

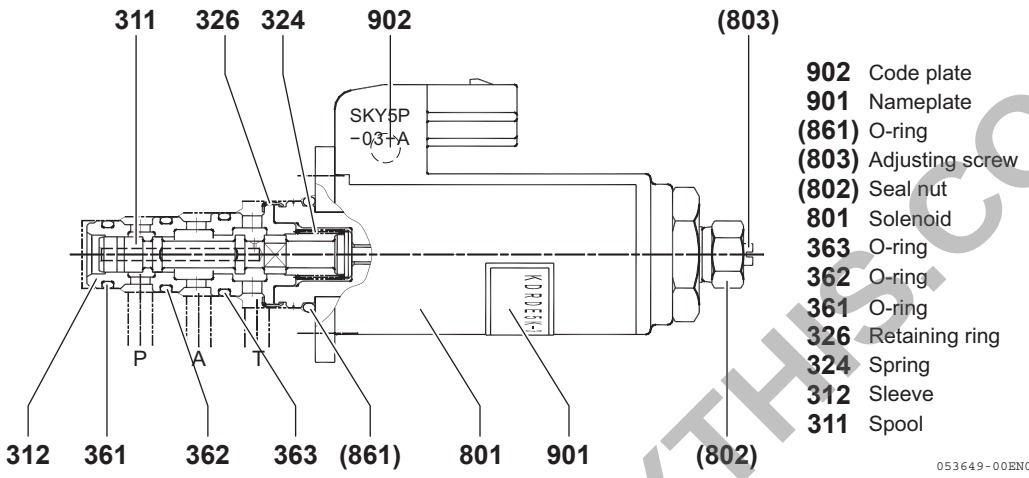
No.	Parts	Inspection item	Inspection standard		Remedy
1	Internal gear a	Wear of tooth surfaces	Pitting area rate : 5% or more of the engaged area	Rate of pitting area to tooth surface 	Replace pinion kit.
2	Carriers 1 and 2	Shear droop and damage in splined area	Check for any damage with eyes		Replace carrier kit.
3	Gears S1, S2, b1 and b2	Wear of tooth surfaces and damage of teeth	Pitting area rate : 5% or more of the engaged area	Rate of pitting area to tooth surface 	Replace carrier kit and / or S2 gear.
		Wear of surface contacted with roller bearing (Gears b1 and b2)	Flaking or pitting seen by eyes		
4	Pines b1 and b2	Wear of surface contacted with roller bearing	Flaking or pitting seen by eyes		Replace carrier kit.
5	Bearings	Wear of rollers and contacted surfaces of inner and outer races	Flaking or pitting seen by eyes		Replace carrier kit.
6	Others (Screws, bolts, O-rings, etc.)	Damage and excessive rust			Replace parts.

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4. Theory of Operation

Proportional solenoid pressure reducing valve

1) Structure



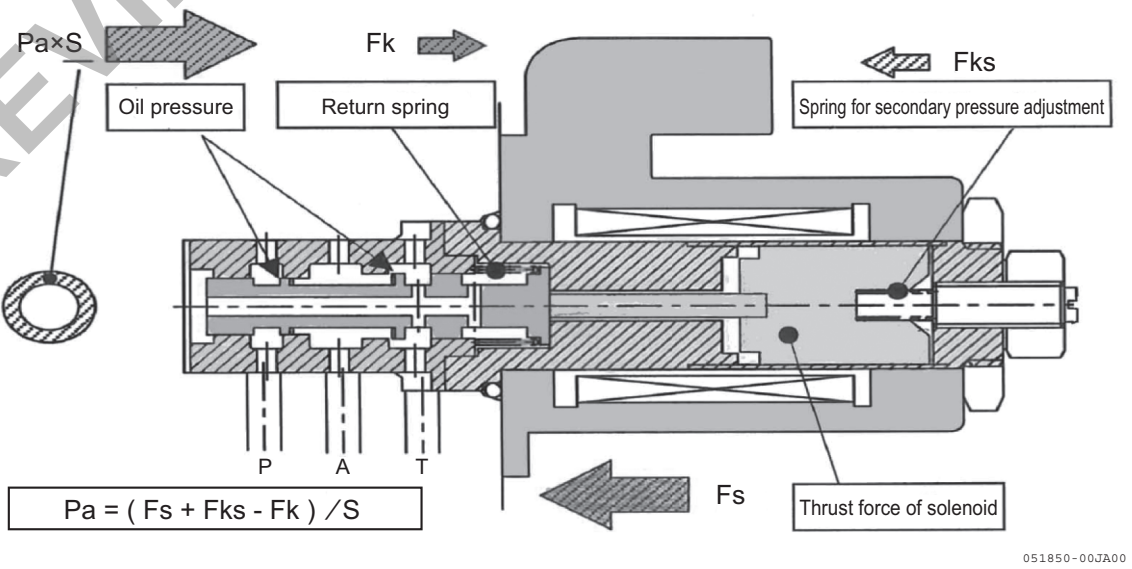
2) Theory of operation

Proportional solenoid **801** generates a thrust force proportional to the input current and pushes spool **311** with the thrust force. Accordingly, oil is led from the supply side (port P) via the notch of the spool into the secondary side (port A), resulting in a rise in pressure at port A.

The pressure (Pa) at port A acts on the pressure receiving area (S) of the spool and pushes the spool toward the solenoid.

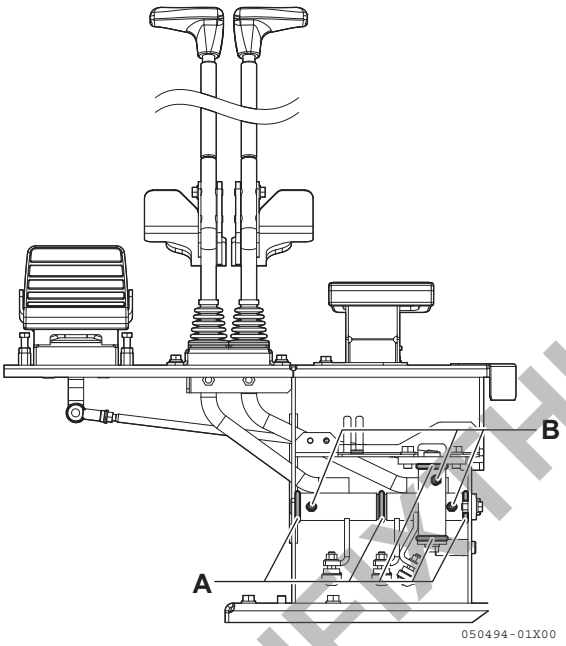
The spool is moved to the point where the sum of the oil pressure (Pa x S) and the force (Fk) of spring **324** is balanced by the thrust force (Fs) of the solenoid. In this state, secondary pressure corresponding to the thrust force of the solenoid is generated due to the relationship between the opening areas on the supply and discharge sides of the spool.

In addition, the load (Fks) of the spring for secondary pressure adjustment (the spring of the solenoid) acts in the direction (leftward in the figure below) in which the thrust force of the solenoid is supported.

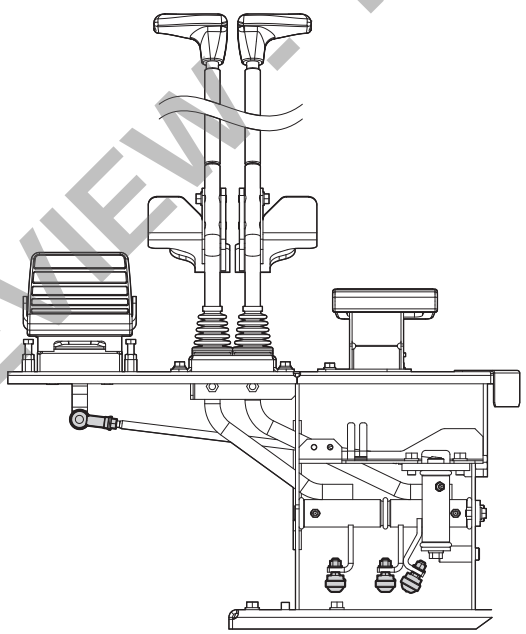


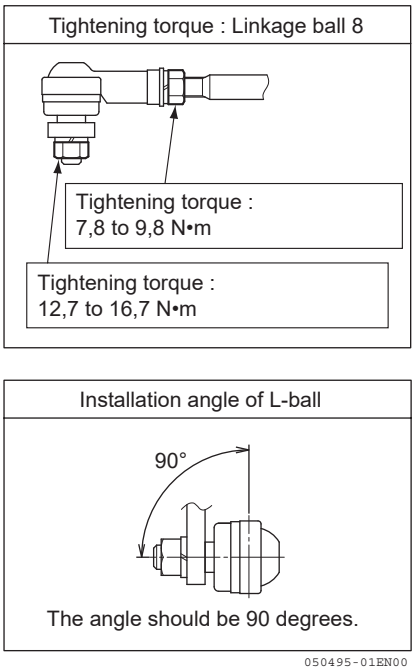
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(3) Apply grease to the linkages, and take care not to damage O-rings **A** when installing the linkages.
(4) Supply grease to the nipples **B** after installation.

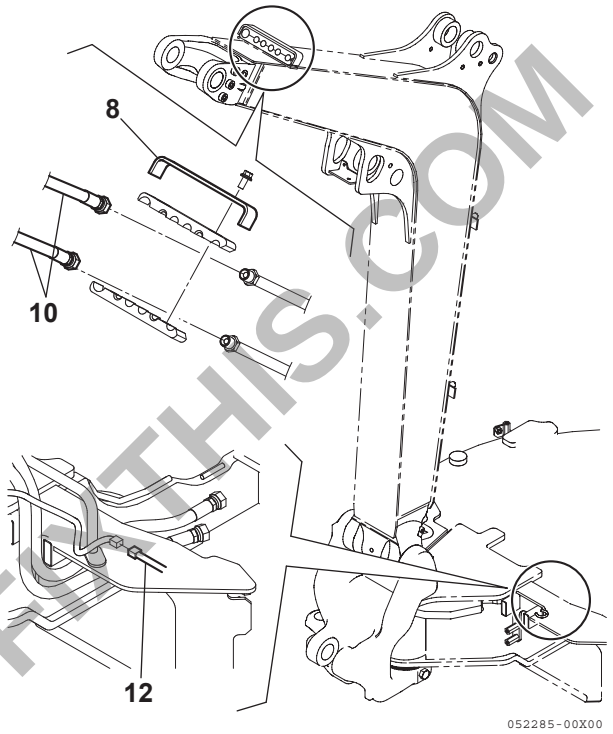
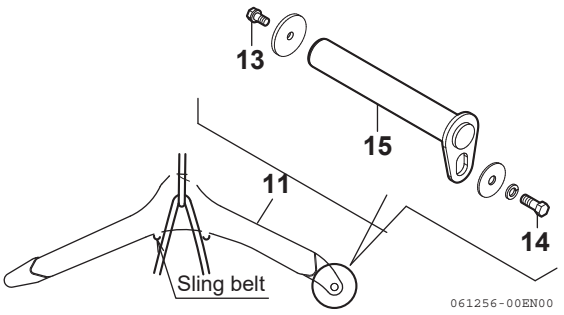


2) Torque Specs for Rod Joints





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Procedure	
(7) Remove clamp **8** and separate joint sections of hydraulic hoses **10** to bucket cylinder. (8) Disconnect hoses from frame. (9) Disconnect boom light wiring at connector section **12**.	
(10) Attach the boom **11** with a sling belt, remove bolts **13** (M12) and **14** (M14) to pull out the pin **15** and remove the boom **11**. ***Note :*** *Use a lifting device to remove the boom.*	

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