YANMAR

SERVICE MANUAL

EXCAVATOR

ViO33-6
ViO38-6

PREVIEW - YOUFIXTHIS.COM

Download full manual at youfixthis.com

CONTENTS

CHAPTER 1
General Cautions for Maintenance Work

1-1 Correct Work 1-1
1-2 Safety Precautions 1-1
1-3 Preparations 1-1
1-4 Cautions for Disassembly and Reassembly 1-1
1-5 Cautions for Removal and Installation of Hydraulic Equipment 1-2
1-6 Cautions for Removal and Installation of Hydraulic Piping 1-2
1-7 Cautions for Handling Seals 1-3
1-8 Correct Installation of Hydraulic Hose 1-3
1-9 Specifications of Hydraulic Hose 1-6
1-10 Air Release of Hydraulic Equipment 1-8

CHAPTER 2
Technical Data

2-1 Specifications 2-1-1
2-2 Outline Drawing and Working Area 2-2-1
2-3 Weight List of Main Parts 2-3-1
2-4 Lifting Capacity List 2-4-1
2-5 Specifications for Attachment 2-5-1
2-6 Periodic Inspection and Servicing 2-6-1
2-7 Fuel, Lube Oil and Grease Recommended 2-7-1
2-8 Hydraulic Circuit Schematic 2-8-1
2-9 Wiring Diagram 2-9-1

CHAPTER 3
Service Standards

3-1 Machine Performance 3-1-1
3-2 Engine 3-2-1
3-3 Undercarriage 3-3-1
3-3-1 Rubber Crawler Specifications 3-3-1
3-3-2 Steel Crawler Specifications 3-3-2
3-3-3 Common Specifications of Steel & Rubber Crawlers 3-3-3
3-4 Controls 3-4-1
3-5 Hydraulic Equipment 3-5-1
3-5-1 Hydraulic Cylinders 3-5-1
3-6 Implement 3-6-1
3-6-1 Front Attachments 3-6-1
3-6-2 Blade Moving Device 3-6-2
3-6-3 Bucket Teeth 3-6-2
3-7 List of Tightening Torque 3-7-1
3-7-1 Machine 3-7-1
3-7-2 Engine 3-7-6
3-7-3 Tightening Torque for General Bolts and Nuts 3-7-7
3-7-4 Hydraulic Fitting 3-7-8
3-8 Pressure Adjustment 3-8-1
3-8-1 Relief Valves 3-8-1

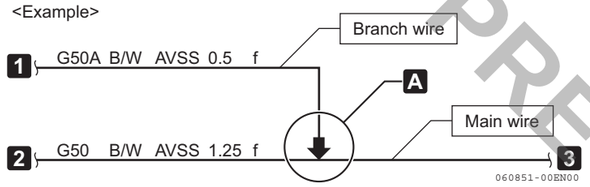
PREVIEW - YOUFIXTHIS.COM

2-9 Wiring Diagram

■ How to Read Wiring Diagrams

● Intersections and Wire Connections

<Example>



The point of arrow **A** on the main wire shown in the figure above represents an intersection of the branch wire and the main wire.
The direction of the arrow indicates which one is the branch wire (the arrowed line represents the branch wire) and also shows the division between the branch wire and the main wire.

In the example above, the wires are divided as follows.

1 to the point of arrow **A** : Branch wire G50A B/W AVSS 0.5 f
2 to **3** : Main wire G50 B/W AVSS 1.25 f

● How to Read Wiring Symbols

G50 B/W AVSS 1.25 f

- G50: Circuit symbol
- B/W: Wire color (Ground color/stripe color)
- AVSS 1.25 f: Wire type and size

Wire color: B/W means:
Stripe color: White
Ground color: Black
Band symbol (No relation to the color)

Wire color: B means:
Ground color: Black
Band symbol (No relation to the color)

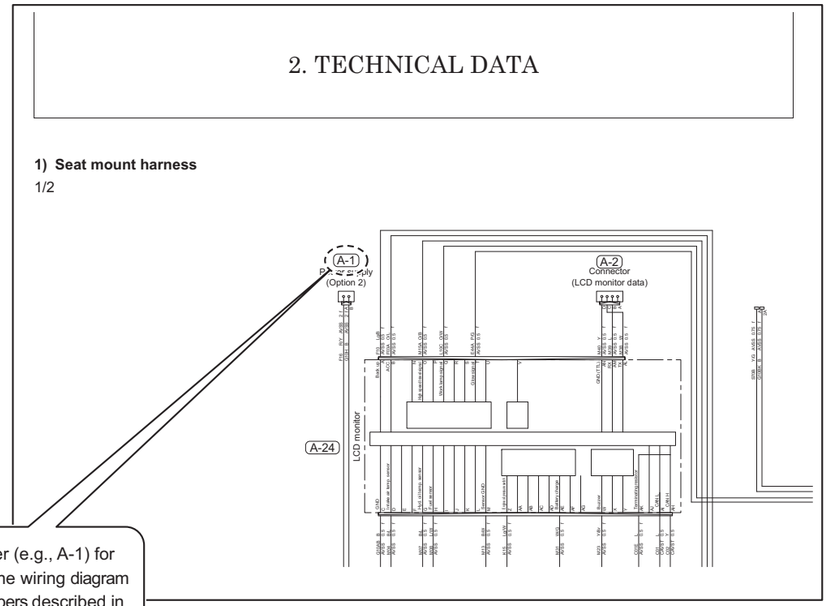
Wire color codes

W	White	P	Pink
R	Red	Br	Brown
B	Black	Lg	Light green
Y	Yellow	Sb	Sky blue
G	Green	Or	Orange
L	Blue	Gr	Gray
		V	Violet

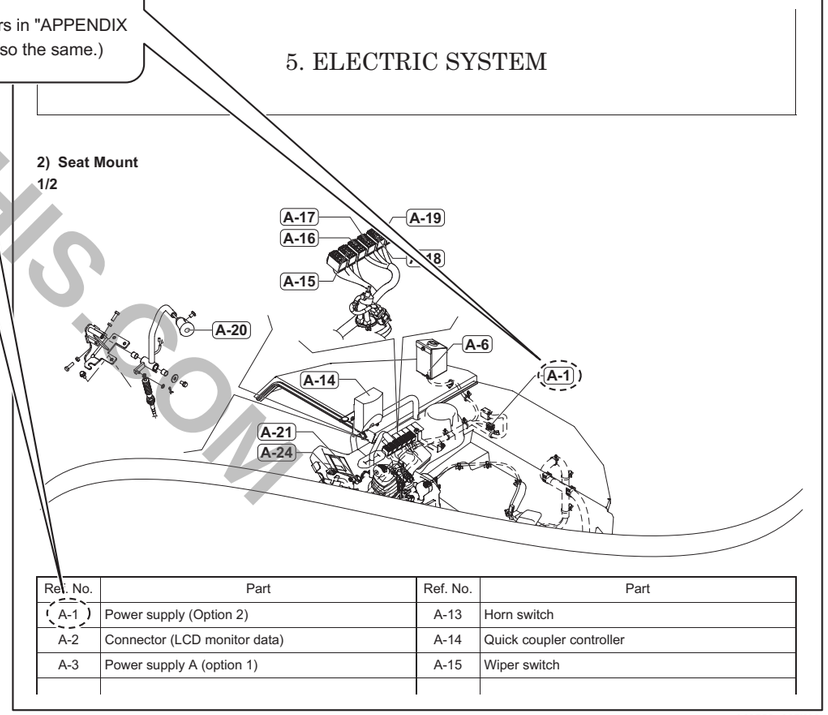
060860-00EN00

● 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.)



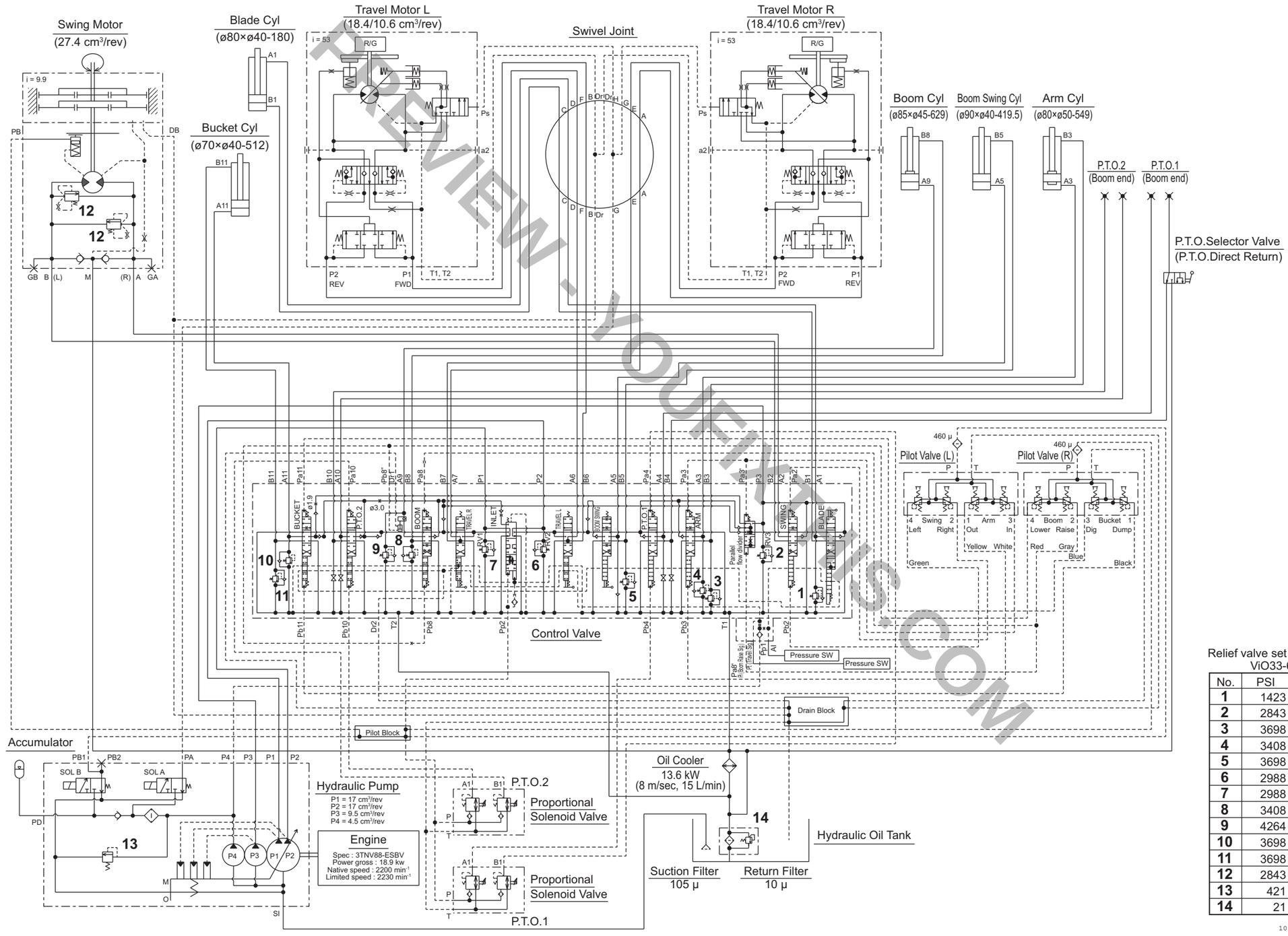
Ref. No.	Part	Ref. No.	Part
A-1	Power supply (Option 2)	A-13	Horn switch
A-2	Connector (LCD monitor data)	A-14	Quick coupler controller
A-3	Power supply A (option 1)	A-15	Wiper switch

062753-00EN00

PREVIEW - YOUFIXTHIS.COM
Download full manual at youfixthis.com

2-8 Hydraulic Circuit Schematic

Applicable model : ViO33-6



Relief valve set pressure
ViO33-6

No.	PSI	MPa
1	1423	9.81
2	2843	19.6
3	3698	25.5
4	3408	23.5
5	3698	25.5
6	2988	20.6
7	2988	20.6
8	3408	23.5
9	4264	29.4
10	3698	25.5
11	3698	25.5
12	2843	19.6
13	421	2.9
14	21	0.147

109962-00EN00

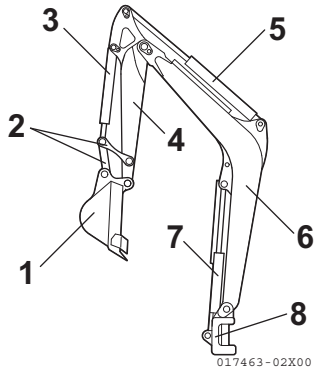
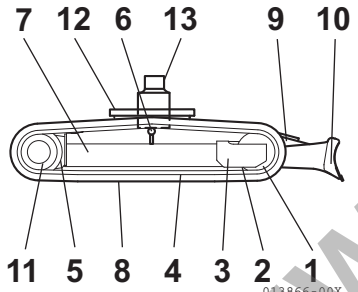
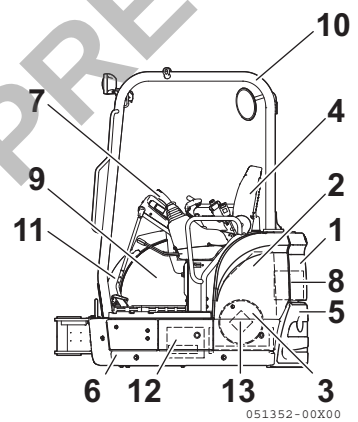
PREVIEW - YOUFIXTHIS.COM

Download full manual at youfixthis.com

2-3 Weight List of Main Parts

1) ViO33-6

[Unit : lbs. (kg)]

Equipment	No.	Part	ViO33-6			
			Canopy		Cabin	
			Steel crawler	Rubber crawler	Steel crawler	Rubber crawler
Front implement						
	1	Bucket Ass'y	165.3 (75)			
	2	Bucket arm & link Ass'y	33.1 (15)			
	3	Bucket cylinder Ass'y	55.1 (25)			
	4	Arm Ass'y	119.0 (54) <141.9 (64)>			
	5	Arm cylinder Ass'y	77.2 (35)			
	6	Boom Ass'y	264.6 (120)			
	7	Boom cylinder Ass'y	86.0 (39)			
	8	Boom bracket Ass'y	136.7 (62)			
Undercarriage						
	1	Idler Ass'y	46.3 (21) × 2	49.6 (22.5) × 2	46.3 (21) × 2	49.6 (22.5) × 2
	2	Crawler guard Ass'y	5.5 (2.5) × 2	-	5.5 (2.5) × 2	-
	3	Crawler adjuster Ass'y	37.5 (17) × 2			
	4	Track roller Ass'y	17.1 (7.75) × 8			
	5	Sprocket Ass'y	16.5 (7.5) × 2			
	6	Carrier roller Ass'y	6.6 (3) × 2			
	7	Track frame Ass'y	681.2 (309)			
	8	Steel crawler/Rubber crawler Ass'y	405.7 (184) × 2	302.0 (137) × 2	405.7 (184) × 2	302.0 (137) × 2
	9	Blade cylinder Ass'y	37.5 (17)			
	10	Blade Ass'y	335.1 (152)			
	11	Travel motor Ass'y	77.2 (35) X 2			
	12	Swing bearing Ass'y	103.6 (47)			
	13	Swivel joint, hose & fitting Ass'y	46.3 (21)			
Upperstructure						
	1	Engine hood Ass'y	57.3 (26)			
	2	Hydraulic oil tank with filter Ass'y	92.6 (42)			
	3	Engine Ass'y	383.6 (174)			
	4	Operator's seat & mount Ass'y	121.3 (55)			
	5	Counter weight Ass'y	418.9 (190)			
	6	Turning frame Ass'y	828.9 (376)			
	7	Controls Ass'y	66.1 (30)			
	8	Battery Ass'y	27.6 (12.5)			
	9	Fuel tank & piping Ass'y	8.8 (4)			
	10	Canopy/Cabin Ass'y	196.2 (89)		485.0 (220)	
	11	Covers, steps and panels	41.9 (19)		19.8 (9)	
	12	Swing motor Ass'y	70.5 (32)			
	13	Pump, mount & hoses Ass'y	69.4 (31.5)			
	-	Control valve, fitting & hoses Ass'y	121.3 (55)			
	-	Canopy mount Ass'y	119.0 (54)			
	-	Boom swing cylinder Ass'y	59.5 (27)			

< >:Long arm type

PREVIEW - YOUFIXTHIS.COM

3-7 List of Tightening Torque

3-7-1 Machine

Applicable model			ViO33-6, ViO38-6		
Equipment No		Tightening part	Thread size	Tightening torque ft•lbf (N•m)	Adhesive
Engine / Electrical equipment					
	1	Engine mount vibroisolating rubber	Nut 12	32.5 to 43.4 (44.1 to 58.8)	-
	2	Engine mount CMP L × Turning frame	M12×40 (10.9T)	79.6 to 94.0 (107.9 to 127.5)	ThreeBond 1324
	3	Engine mount CMP R × Turning frame	M12×35 (10.9T)	79.6 to 94.0 (107.9 to 127.5)	ThreeBond 1324
	4	Engine bracket × Turning frame	M12×35 (10.9T)	79.6 to 94.0 (107.9 to 127.5)	ThreeBond 1324
	5	Engine × Engine bracket CMP	M10×35 (11T)	47.0 to 54.2 (63.7 to 73.5)	ThreeBond 1324
	6	Engine × Plate L	M10×35 (11T)	47.0 to 54.2 (63.7 to 73.5)	ThreeBond 1324
	7	Engine × Bracket CMP (Engine FR)	M10×35 (11T)	47.0 to 54.2 (63.7 to 73.5)	ThreeBond 1324
	8	Engine × Bracket CMP (Engine FL)	M10×35 (11T)	47.0 to 54.2 (63.7 to 73.5)	ThreeBond 1324
	9	Canopy mount CMP A × Turning frame	M16×55 (10.9T)	123.0 to 151.9 (166.7 to 206)	ThreeBond 1324
	10	Canopy mount CMP A × Canopy mount CMP B	M10×30 (10.9T)	47.0 to 54.2 (63.7 to 73.5)	ThreeBond 1324
	11	Canopy mount CMP B × Turning frame	M12×45 (10.9T)	79.6 to 94.0 (107.9 to 127.5)	ThreeBond 1324
	12	Canopy mount CMP A × Cabin mount CMP B	M10×30 (10.9T)	47.0 to 54.2 (63.7 to 73.5)	ThreeBond 1324
	13	Cabin mount CMP B × Turning frame	M12×45 (10.9T)	79.6 to 94.0 (107.9 to 127.5)	ThreeBond 1324
	14	Clamp (Exhaust pipe)	M10×65	18.7 to 23.9 (25.4 to 32.4)	ThreeBond 1324
	15	Air cleaner	M8×25	9.4 to 10.8 (12.8 to 14.7)	-
	16	Air cleaner intake hose (Engine side)	Hose clip 70	1.8 to 2.5 (2.5 to 3.4)	-
	17	Air cleaner intake hose (Air cleaner intake side)	Hose clip 70	1.8 to 2.5 (2.5 to 3.4)	-
	18	Cooling water hose	Hose clip 41	2.9 to 3.6 (3.9 to 4.9)	-
	19	Cooling water hose	Hose clip 48	3.6 to 4.4 (4.9 to 5.9)	-
	20	Fuel gauge unit	M5×12 (Pan-head machine screw)	0.87 to 1.08 (1.18 to 1.47)	-
	21	Fuel gauge hose	Hose band 13	0.72 to 1.08 (0.98 to 1.47)	-
	22	Fuel drain valve	R3/8	14.5 to 21.7 (19.6 to 29.4)	Loctite 577
	23	Fuel tank holding band	Nut 10	1.81 to 2.17 (2.45 to 2.94) (Tank holding side)	18.1 to 23.8 (24.5 to 32.3) (Lock nut side)

PREVIEW - YOUFIXTHIS.COM

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 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)			
00 000091.02	Caution	Accelerator sensor malfunction: intermittent failure		• 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 the “ON” position. Then check that the error code is displayed again.
00 000091.03	Caution	Accelerator sensor malfunction: short circuit to high voltage side		• 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	
00 000091.04	Caution	Accelerator sensor malfunction: short circuit to low voltage side		• 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	
00 000091.15	Caution	Accelerator sensor malfunction: disabled (SAEJ1843)		Engine ECU map data setting fault	Turn the starter switch to the “OFF” position and then the “ON” position. Then check that the error code is displayed again.
00 000110.00	Warning	Engine cooling water temperature sensor malfunction: too high	Sensor voltage is 4.8 V or more.	• Engine overheating • Insufficient amount of engine cooling water • Defective engine cooling system • Defective cooling water temperature sensor system	Inspect the engine cooling system. Check the connectors, harnesses and cooling water temperature sensor. Turn the starter switch to the “OFF” position and then the “ON” position. Then check that the error code is displayed again.
00 000110.02	Warning	Engine cooling water 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 cooling water temperature sensor • Engine ECU internal circuit failure	Check the connectors, harnesses and cooling water temperature sensor. Turn the starter switch to the “OFF” position and then the “ON” position. Then check that the error code is displayed again.
00 000110.03	Warning	Engine cooling water 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 cooling water temperature sensor • Engine ECU internal circuit failure	
00 000110.04	Warning	Engine cooling water temperature sensor malfunction: short circuit to low voltage side	Sensor voltage is 0.2 V or less.	• Connection failure of connectors • Harness wiring failure (sensor signal line short circuited to GND or sensor GND line short circuited to power supply) • Defective cooling water temperature sensor • Engine ECU internal circuit failure	
00 000158.00	Caution	Abnormal system power supply voltage: too high	Detected engine ECU power supply voltage is 16.0 V or more.	• Use of battery with wrong specifications • Incorrect wiring of battery • Defective alternator • Disconnection or short circuit of harness • Engine ECU internal circuit failure	Inspect the battery charging system of the engine. Check the battery voltage and harnesses. Turn the starter switch to the “OFF” position and then the “ON” position. Then check that the error code is displayed again.
00 000158.01	Caution	Abnormal system power supply voltage: too low	Detected engine ECU power supply voltage is 10.0 V or less.	• Battery deterioration • Incorrect wiring of battery • Defective alternator • Disconnection or short circuit of harness Engine ECU internal circuit failure	

PREVIEW - YOUFIXTHIS.COM

Download full manual at youfixthis.com

CAUTION

- **NEVER remove or attempt to remove the tamper-proof devices from the full-load fuel adjusting screw or the high-speed throttle limit screw on the fuel injection pump and governor assembly. These adjustments have been made at the factory to meet all applicable emissions regulations and then sealed.**
- **NEVER attempt to make any adjustments to these sealed adjustment screws. If adjustments are required, they can be made only by a qualified fuel injection shop that will ensure the injection pump continues to meet all applicable emissions regulations and then replace the tamper-proof seals.**
- **Tampering with or removing these devices may void the "Yanmar Limited Warranty."**

0000146en

CAUTION

Never use a steel wire brush to clean fuel injectors. Damage to the nozzle and other components is likely to result.

0000172en

CAUTION

Allow the engine to warm-up for at least five minutes and the idle speed of the engine to return to normal before engaging the transmission or any PTOs. Engaging the transmission or PTO at an elevated engine speed could result in an unexpected movement of the equipment.

0000159en

CAUTION

Shut down the engine if the fault indicator comes on.

Continuing running the engine with the fault indicator being on may result in a serious malfunction of or damage to the engine, and will void the engine warranty.

9999999en

CAUTION

Do not energize the starter for a period of longer than 15 seconds.

Take a pause of at least 30 seconds between energization of the starter.

Otherwise the starter could suffer damage.

9999998en

CAUTION

- **High-pressure washing not recommended.**
- **Avoid using high-pressure washing for electronic or electric devices installed in, on or around the engine, including the E-ECU, relays and harness couplers.**

Otherwise such devices may suffer malfunction due to water ingress into them.

9999997en

PREVIEW - YOUFIXTHIS.COM

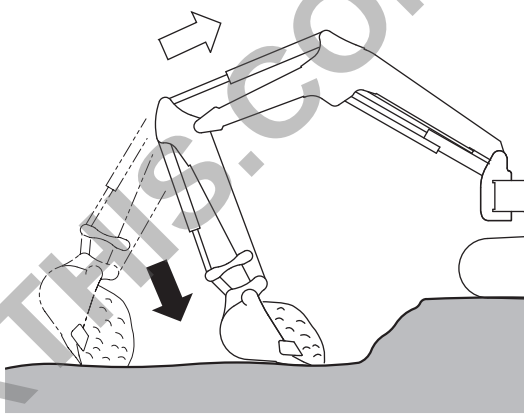
8. Troubleshooting

8-1 Non-Breakdowns

8-1-1 Natural Release of Bucket

Phenomenon

When the arm is extended while scooping with the bucket, the scooping side of the bucket is restricted by the arm and causes back pressure because oil cannot be supplied to the bucket cylinder in time.
When the boom is raised immediately in this condition, the bucket is released naturally because of the back pressure in the piston side of the cylinder

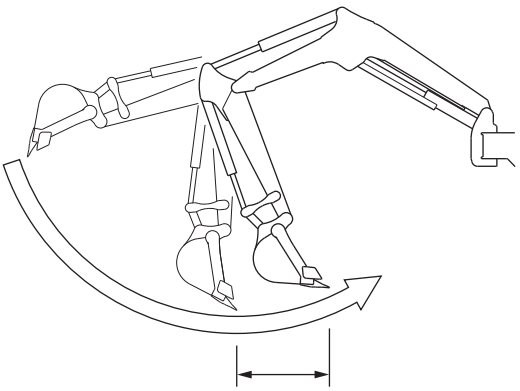

013929-00X

Operation

This problem can be solved by using a sequence of three actions of bucket scooping, arm extension and boom raising.
(For the models that cannot make the triple sequence actions, extend the arm after raising the boom.)

8-1-2 Discontinuous Arm Movement

When scooping with the arm, the arm tends to move slower as it draws near to the perpendicular and it may stop momentarily.



013930-00E

Reason

This may happen because the oil supply cannot catch up with the cylinder extension speed. This is a characteristic of hydraulic equipment.

Specifically, this phenomenon appears when the engine speed is in the low to medium speed range.
Advise your users fully that this will happen in hydraulic equipment and that this is not a breakdown.

PREVIEW - YOUFIXTHIS.COM

2. TECHNICAL DATA

2. Technical Data

2-1 Specifications

1) ViO33-6

Item					Unit	ViO33-6
Main specifications of machine						
Dimensions						
	Overall length (Transportation position)				in. (mm)	176.0 (4470) <177.6 (4510)>
	Cabin	Overall height	Transportation position		in. (mm)	96.9 (2460)
			Traveling position		in. (mm)	96.9 (2460)
		Overall width	Full machine width		in. (mm)	61.0 (1550)
	Canopy	Overall height	Transportation position		in. (mm)	96.9 (2460)
			Traveling position		in. (mm)	96.9 (2460)
		Overall width	Full machine width		in. (mm)	61.0 (1550)
	Tumbler center distance (steel / rubber)				in. (mm)	67.3 (1710)
	Track gauge				in. (mm)	49.2 (1250)
	Minimum ground clearance				in. (mm)	12.6 (320)
Traveling performance						
	Travel speed	Steel crawler	Low speed (Forward/Reverse)		MPH (km/hr)	1.6 (2.7)
			High speed (Forward/Reverse)		MPH (km/hr)	2.7 (4.5)
		Rubber crawler	Low speed (Forward/Reverse)		MPH (km/hr)	1.6 (2.7)
			High speed (Forward/Reverse)		MPH (km/hr)	2.7 (4.5)
	Permissible water depth limit				in. (mm)	19.7 (500)
Work performance						
	Bucket	Width (Standard) *including side cutter			in. (mm)	21.3 (540)
		[Standard. JIS heaped capacity]			cu.ft. (cu.m)	3.53 (0.10)
		Number of teeth / Installation method			pcs.	4 / rubber pin lock type
	Maximum digging depth	With blade raised			in. (mm)	111.0 (2820) <121.0 (3070)>
		With blade on the ground			in. (mm)	116.1 (2950) <125.6 (3190)>
	Maximum depth of vertically digging				in. (mm)	90.2 (2290) <100.4 (2550)>
	Maximum dumping height				in. (mm)	124.4 (3160) <131.1 (3330)>
	Minimum front swing radius (with boom in front)				in. (mm)	80.7 (2050) <83.5 (2120)>
	Minimum front swing radius (at boom swing)			Cabin	in. (mm)	72.4 (1840) <74.8 (1900)>
				Canopy	in. (mm)	72.4 (1840) <74.8 (1900)>
	Rear end swing radius				in. (mm)	30.5 (775)
	Boom swing angle		Cabin	Left	degrees	43
				Right	degrees	65
			Canopy	Left	degrees	43
				Right	degrees	65
	Maximum digging force		Bucket		lbs. (k•N)	6722 (29.9)
			Arm		lbs. (k•N)	4101 (18.2) <3616 (16.1)>

< >: Long arm type

PREVIEW - YOUFIXTHIS.COM

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	●		
	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	●7		
	Oil filter		● 1st time	●7		
	Cooling fluid	○				●
	Belt	○			●	
	Radiator vents	○		□		
	Fuel hose, coolant hose					●
	Intake and exhaust valves				○	
	Injectors and injection pressure					○
	EGR valve				□	
Air conditioning					○	

Note :

- *When machine is used at dusty worksites clean and replace filter element twice or more frequently than specified in the table.*
- *Execution of periodic inspection and servicing is indispensable to conform the EPA emission control regulations. Keep a record of the results.*

PREVIEW - YOUFIXTHIS.COM

1. GENERAL CAUTIONS FOR MAINTENANCE WORK

1. General Cautions for Maintenance Work

1-1 Correct Work

Correct work means the quickest possible completion of according to the correct procedures and the specified standards.

It is important when conducting certain operations always to bear in mind the equipment, tools, gauges, materials, oil and grease, etc. that you must have ready, as well as items to be checked, adjusted, or disassembled, and cautions to watch out for.

1-2 Safety Precautions

(1) Never attempt servicing while engine is running or immediately after stopping operation.
(2) Wear work cloths, safety shoes and helmet.
(3) Check the equipment and tools before use. Especially, be sure to check the crane, lifting equipment and tools.
(4) When working together with other persons, allocate everyone's share of job, arrange the signals and act in concert with the other persons.
(5) The operation of the crane and slinging work must be performed by qualified persons.
(6) Do not enter or pass under the raised load.
(7) Lift and support the massive parts by crane before removing the installation bolts.
(8) Disconnect cables from battery before repairing the electric system.
(9) Remove the battery when welding the machine.

1-3 Preparations

(1) Check the service record of the machine. (That is, check how many months or hours the machine has been used since the preceding overhaul, what was the trouble then and what parts were replaced.)
(2) Have all servicing tools ready, i.e., tools, measuring devices (which have received periodic maintenance), containers, oil & grease, etc.
(3) Have the service literature (operation manual, parts catalog, etc.) ready.

1-4 Cautions for Disassembly and Reassembly

(1) Clean the machine before disassembly.
(2) Check and record the condition of the machine before disassembly :
  • Model, machine number, operation hours
  • Reasons for repair, history of repair
  • Contamination of filters
  • Fuel and oil condition
  • Damage to parts, etc.
(3) Place alignment marks on the necessary parts to facilitate reassembly.
(4) Clean all the removed parts and new replacement parts and put them in order.
(5) Use new seals, split pins, etc. for reassembly.

PREVIEW - YOUFIXTHIS.COM

CAUTION

If any problem is noted during the visual check, the necessary corrective action should be taken before you operate the engine.

0000021en

CAUTION

NEVER hold the key in the START position for longer than 15 seconds or the starter motor will overheat.

0000007en

CAUTION

Make sure the engine is installed on a level surface. If a continuously running engine is installed at an angle greater than (IDI = 25°, DI = 30°) in any direction or if an engine runs for short periods of time (less than three minutes) at an angle greater than (IDI = 30°, DI = 35°) in any direction, engine oil may enter the combustion chamber causing excessive engine speed and white exhaust smoke. This may cause serious engine damage.

0000010enTNV

CAUTION

Observe the following environmental operating conditions to maintain engine performance and avoid premature engine wear:

- **Avoid operating in extremely dusty conditions.**
- **Avoid operating in the presence of chemical gases or fumes.**
- **Avoid operating in a corrosive atmosphere such as salt water spray.**
- **NEVER install the engine in a floodplain unless proper precautions are taken to avoid being subject to a flood.**
- **NEVER expose the engine to the rain.**

0000003en

CAUTION

Observe the following environmental operating conditions to maintain engine performance and avoid premature engine wear:

- **The standard range of ambient temperatures for the normal operation of Yanmar engines is from +5°F (-15°C) to +113°F (+45°C).**
- **If the ambient temperature exceeds +113°F (+45°C) the engine may overheat and cause the engine oil to break down.**
- **If the ambient temperature is below +5°F (-15°C) the engine will be hard to start and the engine oil may not flow easily.**
- **Contact your authorized Yanmar industrial engine dealer or distributor if the engine will be operated outside of this standard temperature range.**

0000065en

PREVIEW - YOUFIXTHIS.COM

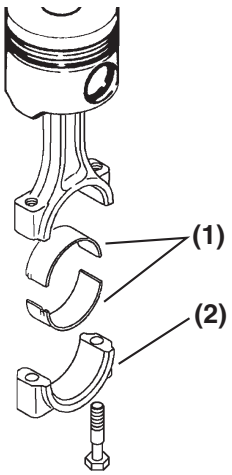


Figure 4-1-95

7. Reinstall the remaining pistons in their respective cylinders.

Reassembly of Camshaft and Timing Components

Installation of Gear Case or Front Plate

1. If removed, install a new camshaft bushing **(Figure 4-1-96, (3))** using the appropriate service tool.
2. Apply a continuous bead of ThreeBond Liquid Gasket No. 1212, Yanmar Part No. 977770-01212 to the mounting area of the gear case or front plate. Be sure to circle each bolt hole.
3. Reinstall the dowels **(Figure 4-1-96, (5))** and a new O-ring **(Figure 4-1-96, (2))**.

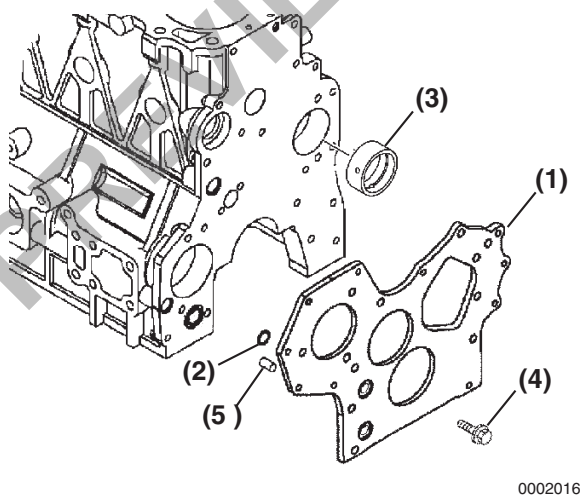


Figure 4-1-96

4. Reinstall the gear case **(Figure 4-1-96, (1))**. Tighten the bolts to the specified torque.

Installation of Camshaft

Note: The gear housing or front plate must be reinstalled prior to installing the camshaft. *See Installation of Gear Case or Front Plate.*

1. If removed, reinstall the camshaft end plate **(Figure 4-1-97, (1))**, key, and timing gear **(Figure 4-1-97, (4))** onto the camshaft using a press.

Note: Heat the gear to 356 - 392°F (180 - 200°C) and press onto the end of the camshaft.

2. Rotate the cylinder block so that gravity will keep the tappets **(Figure 4-1-97, (5))** in place and out of the way of the camshaft lobes when the camshaft is being reinstalled.

Note: If the engine is not installed on an engine repair fixture, stand the engine upright on the flywheel end mounting flange.

Note: The tappets are “mushroom” shaped and must be installed from inside the engine crankcase.

3. Lubricate the tappets with clean oil or assembly lube. Reinstall the tappets in their respective locations in the cylinder block. Push the tappets fully into the tappet bores so they will not interfere with the installation of the camshaft.

PREVIEW - YOUFIXTHIS.COM

Reassembly of Oil Pump

1. Apply clean lubricating oil to the lubricating oil pump body and inner rotor assembly as well as to the outer rotor.
2. Insert the outer rotor into the lubricating oil pump body and inner rotor assembly and install the cover.
3. Replace the packing with new one.
4. Install the lubricating oil pump assembly to the gear case flange by tightening the bolts with the specified torque.
5. Install the gear case cover. For more information, See Installation of Gear Case Cover.
6. Install the crank shaft pulley.
7. Install the cooling water pump V-pulley **(Figure 4-4-10, (1))**, spacer **(Figure 4-4-10, (2))**, cooling water fan **(Figure 4-4-10, (3))**, and fan guard (if equipped).

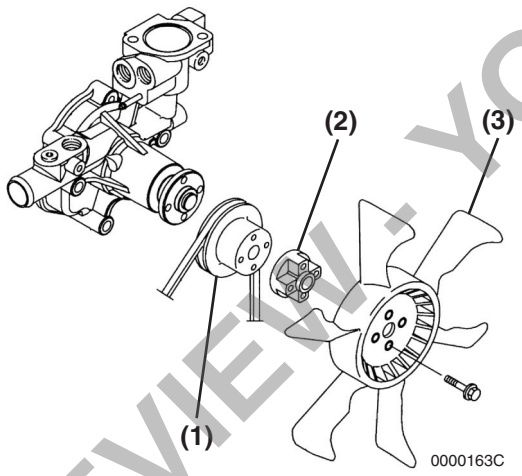


Figure 4-4-10

8. Install the V-belt. Adjust the belt to uniform tensile strength.

PREVIEW: YOUFIXTHIS.COM

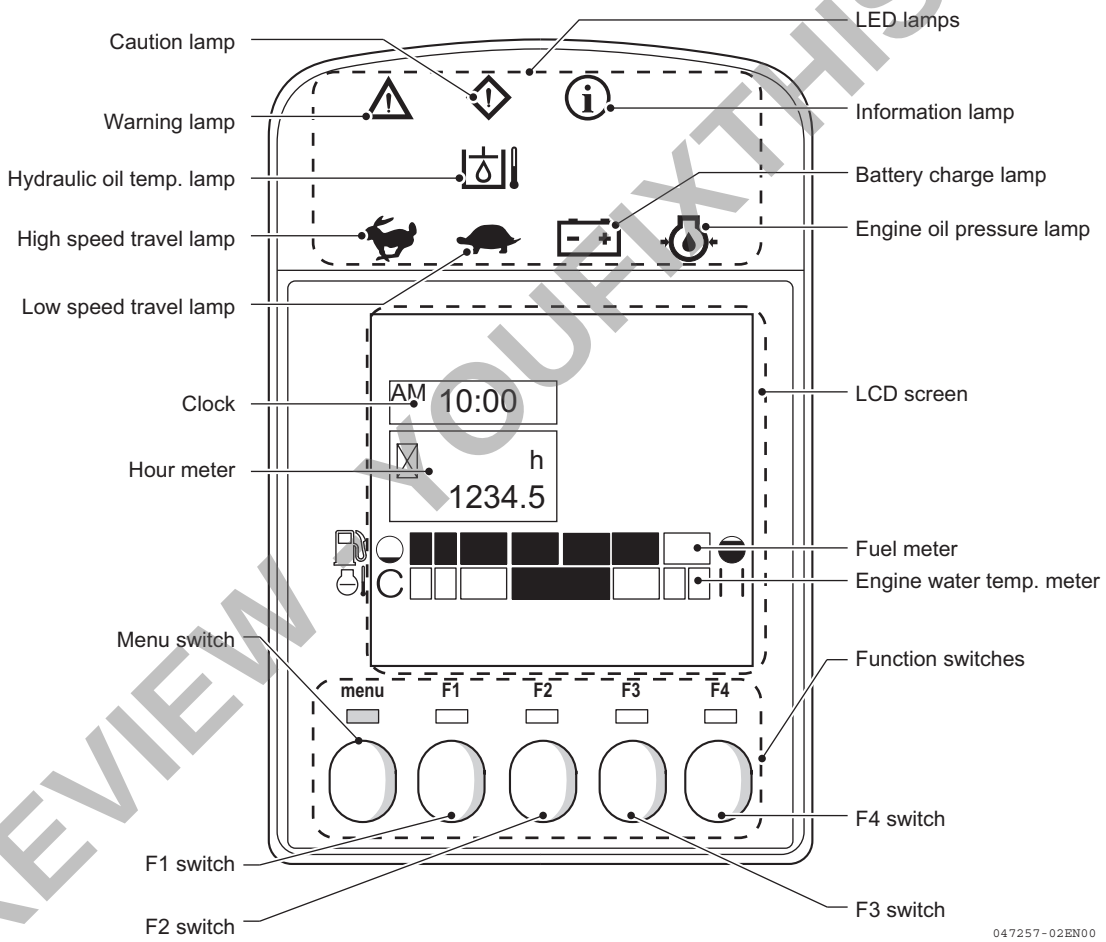
5-1-2 LCD Monitor and Alarm Systems

For safer machine operation, the operator needs to have a clear understanding of the machine's condition. However, it is difficult for the operator to keep an eye on every aspect of the machine he/she is operating.
Therefore, gauges and alarms are installed to warn the operator of any trouble of the machine at the early stage.

Note:

The monitors do not give a full assurance of the machine's condition. The indications shown on them should be used as a guide for daily check and periodic maintenance according to the operation and maintenance manual.

1) Part Name



PREVIEW YOUFIXTHIS.COM

6. HYDRAULIC SYSTEM

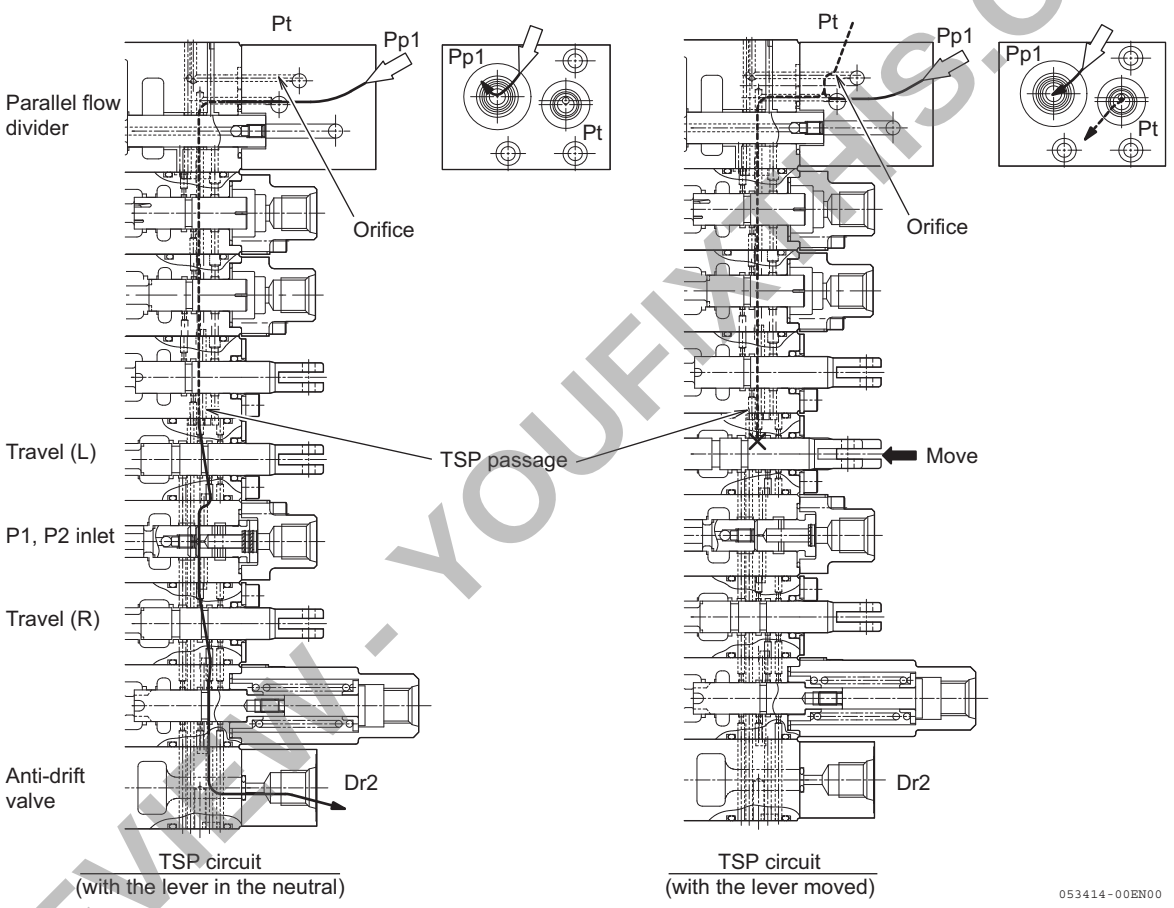
No.	Part	Q'ty	No.	Part	Q'ty
1	Body S	1	28	Coned disc spring	4
2	Body H	1	29	Internal snap ring	1
3	Drive shaft	1	30	Internal snap ring	1
4	Cylinder barrel	1	31	External snap ring	1
5	Valve plate	1	32	O-ring	1
6	Piston	10	33	O-ring	3
7	Shoe	10	34	Plug	1
8	Shoe holder	1	35	O-ring	1
9	Barrel holder	1	36	Hexagon socket head bolt	5
10	Swash plate	1	37	Hexagon socket head plug	5
11	Needle	3	38	Plug	1
12	Rocking pin	2	40	Spring pin	1
13	Packing	1	41	Hexagon socket head set screw	1
14	Spring C	1	42	Hexagon nut	1
15	Spring T1	1	43	Seal washer	1
16	Spring holder	1	44	Gear pump kit	1
17	Spring guide	1	45	Coupling	1
18	Pin	1	46	Collar	1
19	Rod	1	47	Hexagon bolt	2
21	Retainer	2	48	O-ring	1
22	Stopper pin A	1	49	Washer	2
23	Stopper pin B	1	50	O-ring	1
24	Pin	1	51	O-ring	2
25	Ball bearing	1	52	Valve assembly	1
26	Needle bearing	1	53	Hexagon socket head bolt	3
27	Oil seal	1	54	Spring washer	3

PREVIEW - YOUFIXTHIS.COM

When the TSP (traveling signal pilot) circuit is used

The oil from the port Pp1 flows to the TSP passage through the orifice in the P3 inlet section. When the travel lever is not moved, the oil in the TSP passage flows to the port Dr2 and its pressure equals at down stream passage of the orifice to that at the port Pt (TSP port) connected to upstream oil passage of the travel section.

When right or left travel lever is moved, TSP passage is blocked in the travel section operated, so that the pressure at the port Pt goes up to that at the port Pp1.

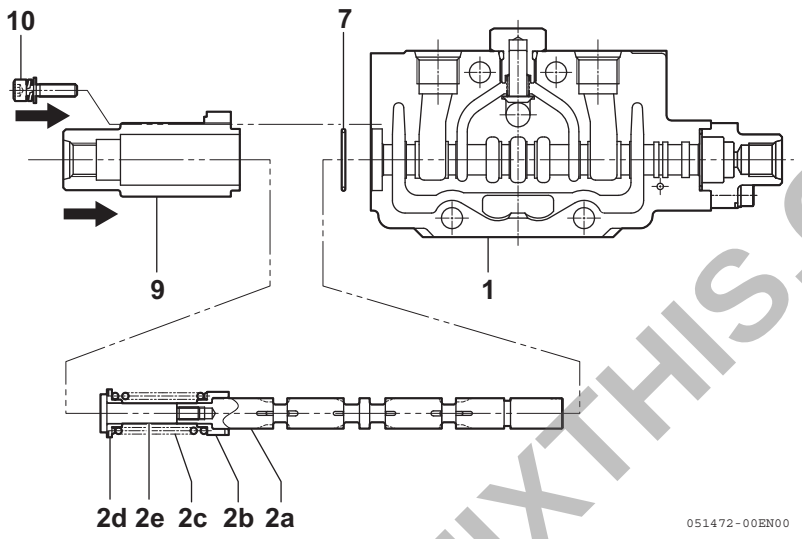


PREVIEW - YOUFIXIT.COM

4)-6. Reassembly of spools

(1) Pilot operated type

Taking the swing spool as an example, the assembly procedure is described below.



Pilot operated type

[1] Check that no dirt or any other foreign matter is attached to the spool assembly or around the spool bore of the valve body and that O-ring **7** is securely installed on the flanged bottom of the valve body. Then insert the spool assembly into the spool bore of the valve body in the correct position and direction.

Note:

Before inserting the spool assembly, apply a small amount of hydraulic oil to the spool.

CAUTION:

Carefully insert the spool assembly horizontally into the bore.

If the spool assembly is not inserted easily, do not force it into the bore. Doing so may cause dents inside the bore or on the spool, resulting in malfunction of the machine.

If the spool assembly is not installed into the bore smoothly, do not forcibly insert it. Remove it and check it for dirt, flaws and burrs.

If there are any flaws or burrs, be sure to replace the spool assembly together with the valve body to avoid malfunctions.

Note:

Even if the spool assembly is inserted smoothly, take it in and out several times to check again that it moves smoothly.

[2] Install pilot oil chamber case **9** so that it fits securely onto the flange portion of the valve body from which the spring of the spool assembly is protruding. Then install and tighten hexagon socket head bolts (w/washer) **10** to the specified torque with a hexagon bar wrench (4 mm).
[Tightening torque: 4.4 to 5.1 ft·lbf (5.9 to 6.9 N·m)]

[3] To assemble other spools of the same pilot operated type, follow the same procedure as above.

PREVIEW - YOUFIXTHIS.COM

2. Theory of Operation

1) Motor

When the travel control valve is switched to "Travel", the hydraulic oil flows through the counter balance valve to the port A of the valve plate.

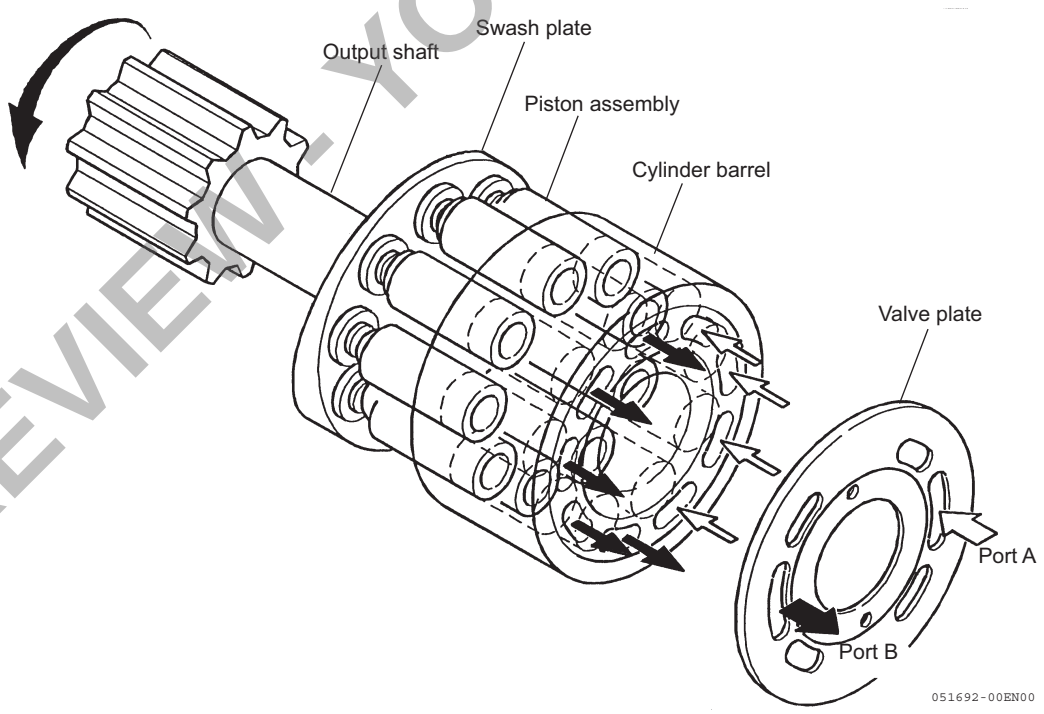
When the pressure at the port A rises, the hydraulic oil flows into the bores corresponding to the port A in the cylinder barrel.

When the hydraulic oil flows into the bores, the pistons are pressed against the sliding surface of the swash plate, and the shoes fitted on the pistons slide on the sliding surface of the swash plate towards the circumference. That motion of more than one piston on the high pressure side is converted into the rotational motion of the cylinder barrel.

The output shaft splined to this cylinder barrel also starts to rotate together with the rotation of the cylinder barrel.

When the pistons move to the low pressure side, the pistons are pushed into the bores and discharge hydraulic oil from them. The hydraulic oil discharged from the cylinder barrel flows through the port B of the valve plate to the return passage.

When the travel control valve is switched to the opposite side, the pressure at the port B becomes high and the pressure at the port A becomes low, so that the rotation of the output shaft is reversed.



PREVIEW - YOUFIXTHIS.COM

CHAPTER 7

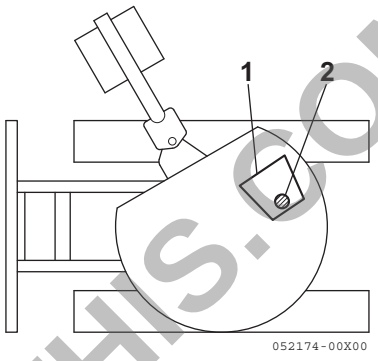
ADJUSTMENT AND REPAIR

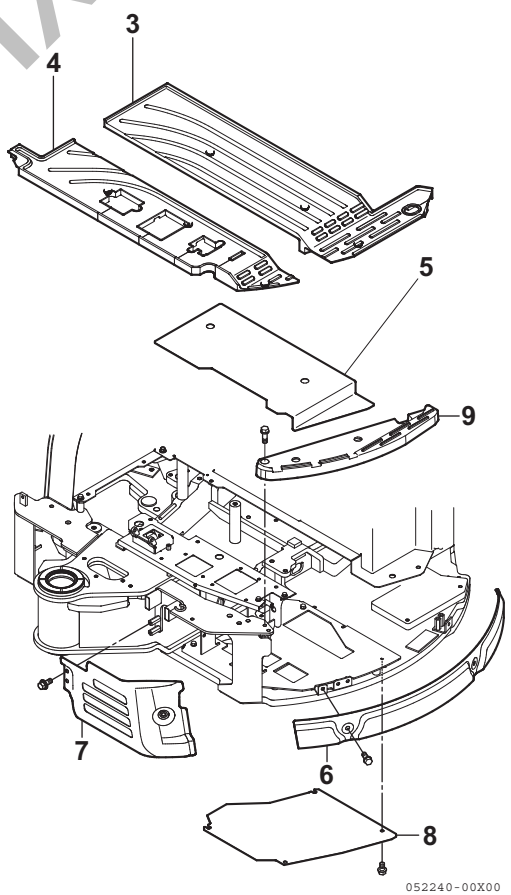
7-1 Engine and Electric Equipment 7-1-1
7-1-1 Removal and Reinstallation of Engine 7-1-1
7-1-2 Removal and Reinstallation of Starter Motor 7-1-14
7-1-3 Removal and Reinstallation of Radiator and Oil Cooler 7-1-16
7-1-4 Removal and Reinstallation of Fan Belt and Compressor Driving Belt 7-1-21
7-1-5 Removal and Reinstallation of Engine ECU ... 7-1-24
7-2 Undercarriage 7-2-1
7-2-1 Outline 7-2-1
7-2-2 Main Parts 7-2-1
7-2-3 Points of Reassembly (Rubber Track) 7-2-2
7-2-4 Points of Reassembly (Steel Track) 7-2-3
7-2-5 Removal and Reinstallation of Crawler 7-2-5
7-2-6 Removal and Reinstallation of Travel Motor 7-2-7
7-2-7 Disassembly and Reassembly of Idler 7-2-9
7-2-8 Disassembly and Reassembly of Track Roller 7-2-12
7-2-9 Disassembly and Reassembly of Carrier Roller 7-2-15
7-2-10 Installation of Floating Seal 7-2-17
7-2-11 Drawings of Jigs 7-2-18
7-3 Controls 7-3-1
7-3-1 Mechanical Control Linkage 7-3-1
7-3-2 Adjustment of Travel Levers 7-3-3
7-3-3 Adjustment of Boom Swing Pedal 7-3-4
7-3-4 Adjustment of Blade Lever 7-3-4
7-3-5 Adjustment of Lock Lever 7-3-5
7-4 Swing Bearing 7-4-1
7-5 Hydraulic Equipment 7-5-1
7-5-1 Removal and Reinstallation of Hydraulic Pump 7-5-1
7-5-2 Removal and Reinstallation of Control Valve ... 7-5-3
7-5-3 Removal and Reinstallation of Pilot Valves (L and R) 7-5-7
7-5-4 Removal and Reinstallation of Swing Motor 7-5-9
7-5-5 Removal and Reinstallation of Swivel Joint 7-5-11
7-5-6 Disassembly and Reassembly of Swivel Joint 7-5-15
7-5-7 Disassembly and Reassembly of Hydraulic Cylinder 7-5-18
7-5-8 Removal and Reinstallation of Hydraulic Oil Tank 7-5-23
7-5-9 Piping Layout 7-5-32
7-6 Work Implements 7-6-1
7-6-1 Removal and Reinstallation of Work Implements 7-6-1
7-7 Cabin 7-7-1
7-7-1 Removal and Reinstallation of Cabin 7-7-1
7-7-2 Disassembly and Reassembly of Cabin 7-7-5
7-8 Air Conditioner 7-8-1
7-8-1 Removal and Reinstallation of Air Conditioner 7-8-1

PREVIEW - YOUFIXTHIS.COM

7-5-2 Removal and Reinstallation of Control Valve

1) Removal

Procedure	
(1) Swing the upperstructure so that drain plug **2** of hydraulic oil tank **1** is positioned halfway between the right and left crawlers. Then lower the bucket to the ground and stop the engine. (2) Drain the hydraulic oil from the hydraulic oil tank or evacuate the hydraulic oil tank using the compression vacuum. (Refer to Section "7-5-8 Removal and Reinstallation of Hydraulic Oil Tank" for the procedure for draining the hydraulic oil.)	

(3) Remove floor mat A **3**, floor mat B **4** and step **5**. (4) Remove frame guard L **6**, T/F cover L **7** and valve stand cover **8**. ***Note:*** *For the canopy type, removing non-slip step **9** makes it easy to remove the control valve.*	

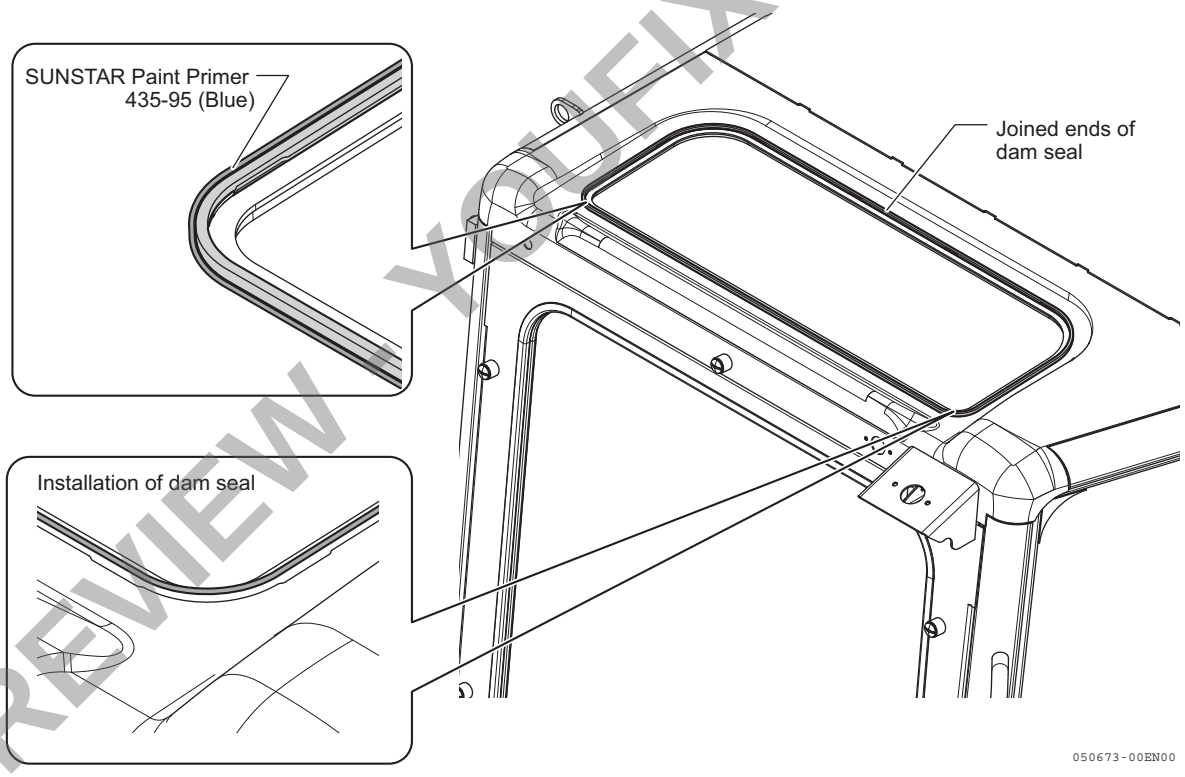
PREVIEW - YOUFIXTHIS.COM

4. Attachment of glass (Sunroof)

1) Installation of dam seal and application of primer

Key points for procedure

- Clean the surface where the dam seal is to be installed using white gasoline to remove grease and foreign matter such as dust.
- Join both ends of the dam seal in the middle of the rear side of the frame.
- Install the dam seal on the frame along the edge of the outer panel around the opening in the roof.
- During installation of the dam seal, be careful not to touch the surface of the frame where the primer is to be applied to prevent contamination.
- Do not stretch the dam seal too much during installation because it can become loose over time and come off easily.
- Use SUNSTAR Paint Primer 435-95.
- Apply the primer to the surface of the frame along the dam seal with a cotton swab or the like. The primer application width should be approximately 0.4 in. (10 mm).
- Be careful that the primer does not protrude outside the application area and that excess primer does not drip off.



PREVIEW - YOUFIXTHIS.COM

PREVIEW ONLY

You're viewing 23 of 709 pages

The full manual includes:

- All 709 pages, complete
- Searchable PDF (find any keyword)
- No watermarks
- Instant download
- Print-ready quality

GET FULL MANUAL NOW

Yanmar ViO33-6, ViO38-6 Service Manual

Scan or click anywhere
youfixthis.com

Click anywhere on this page to get the full manual