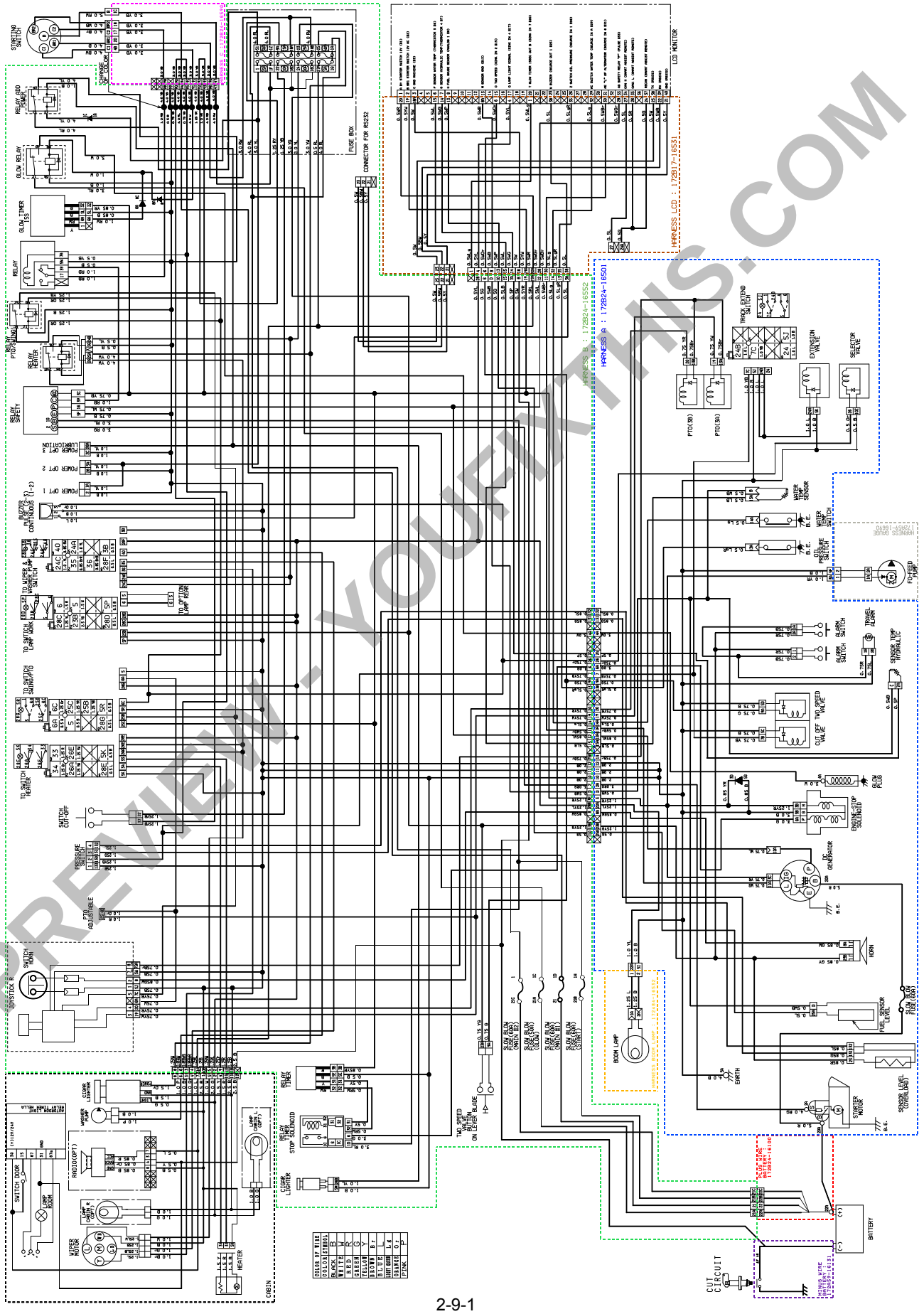
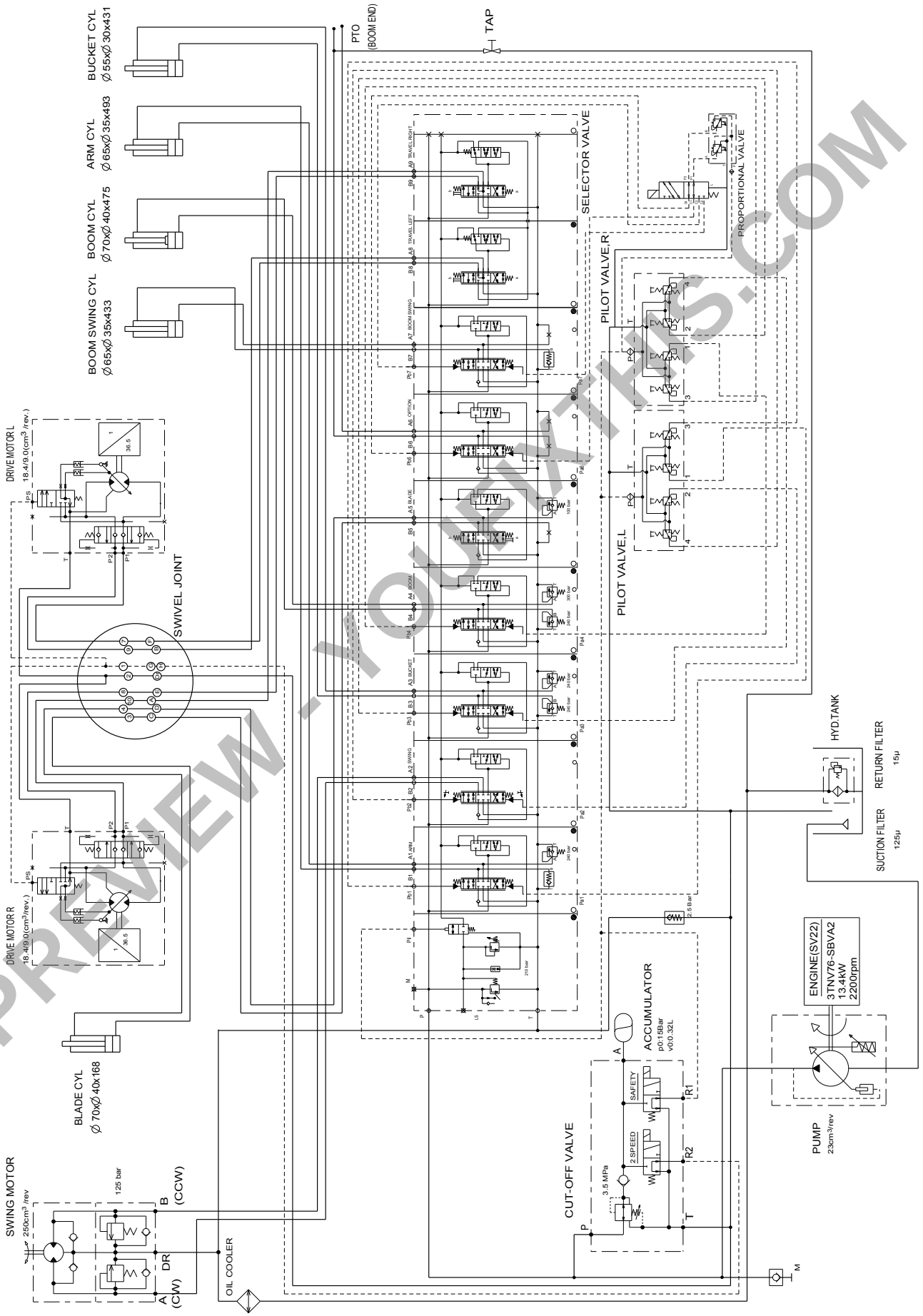
2-9 Wiring Diagram



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2-8 Hydraulic Circuit Schematic



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4-2-4 Cylinder Head

Cylinder Head Components

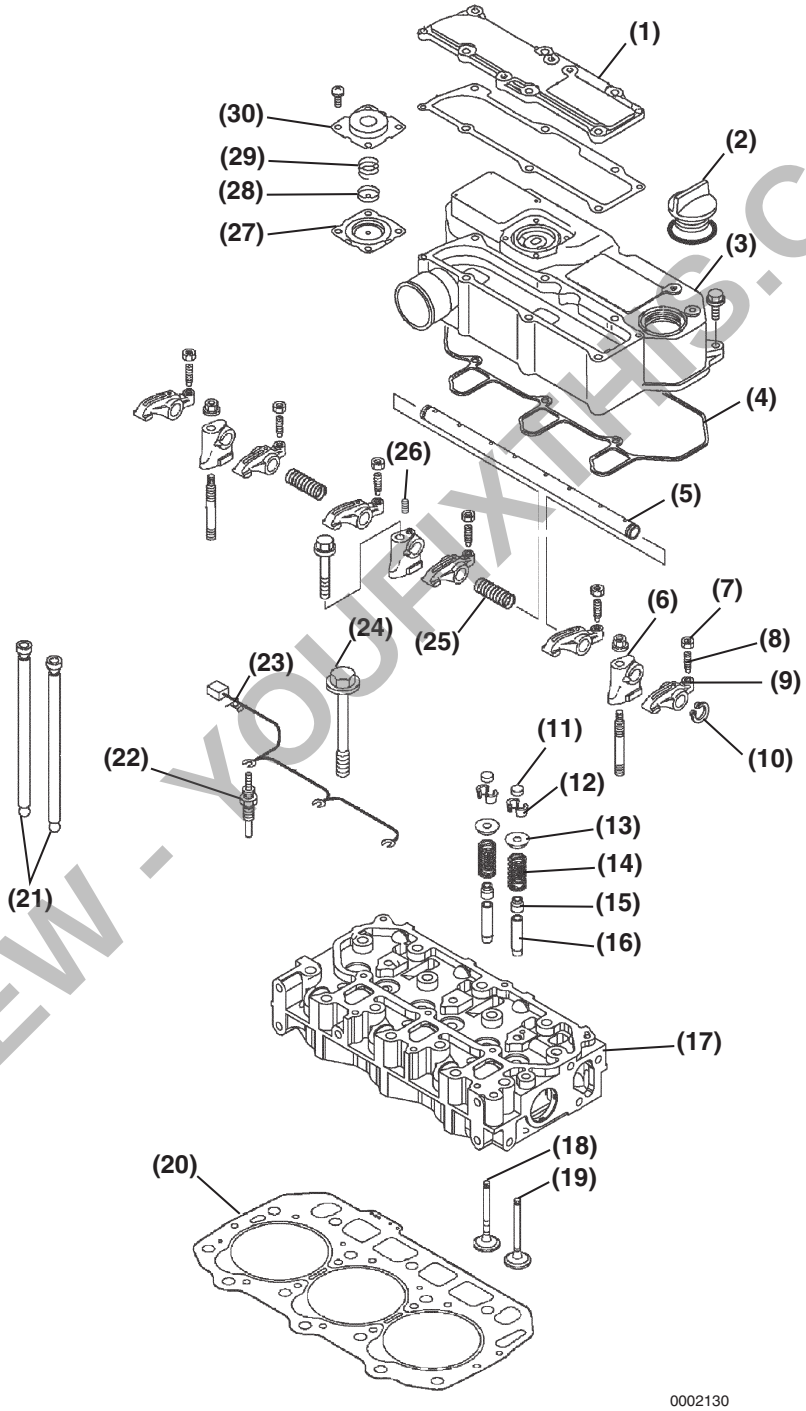


Figure 4-2-1

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3-7-3 Tightening Torque for General Bolts and Nuts

Item		Thread size × Pitch	Tightening torque [Unit : N•m]	Remarks
Nut		M5	5,5 to 6,5	
		M6	9,5 to 11,5	
		M8	23 to 27	
		M10	46 to 54	
		M12	79 to 93	
		M14	127 to 149	
		M16	198 to 230	
		M18	283 to 329	
		M20	402 to 464	
		M22	552 to 634	
		M24	691 to 798	
Hexagon head bolt	8.8T	M5	5,5 to 6,5	
		M6	9,5 to 11,5	
		M8	23 to 27	
		M10	46 to 54	
		M12	79 to 93	
		M14	127 to 149	
		M16	198 to 230	
		M18	283 to 329	
		M20	402 to 464	
		M22	552 to 634	
		M24	691 to 798	
Hexagon head bolt	10.9T	M5	8 to 9	
		M6	14 to 16	
		M8	34 to 40	
		M10	67 to 79	
		M12	116 to 138	
		M14	187 to 219	
		M16	291 to 339	
		M18	402 to 470	
		M20	570 to 662	
		M22	783 to 905	
		M24	981 to 1137	
		M27	1452 to 1674	

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NOTICE

Do not allow the honing tool to operate in one position for any length of time. Damage to the cylinder wall will occur. Keep the tool in constant up-and-down motion.

NOTICE

Any part which is found defective as a result of inspection or any part whose measured value does not satisfy the standard or limit must be replaced.

NOTICE

Any part determined to not meet the service standard or limit before the next service, as determined from the state of current rate of wear, should be replaced even though the part currently meets the service standard limit.

NOTICE

- 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.”

NOTICE

The fuel return line is a one-piece assembly. Use care not to bend or twist the fuel return line.

NOTICE

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

NOTICE



NEVER permit anyone to operate the engine or driven machine without proper training.

- Read and understand this Operation Manual before you operate or service the machine to ensure that you follow safe operating practices and maintenance procedures.
- Machine safety signs and labels are additional reminders for safe operating and maintenance techniques.
- See your authorized Yanmar industrial engine dealer or distributor for additional training.

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1 – Baffle Plate
2 – Oil Fill Cap
3 – Valve Cover / Intake Manifold
4 – Gasket
5 – Rocker Arm Shaft
6 – Rocker Arm Shaft Support
7 – Adjuster Lock Nut
8 – Valve Adjuster Screw
9 – Rocker Arm
10 – Circlip
11 – Valve Cap
12 – Keeper
13 – Valve Spring Retainer
14 – Valve Spring
15 – Valve Stem Seal
16 – Valve Guide
17 – Cylinder Head
18 – Exhaust Valve
19 – Intake Valve
20 – Cylinder Head Gasket
21 – Push Rod (2 per cylinder)
22 – Glow Plug
23 – Glow Plug Wiring Harness
24 – Cylinder Head Bolt

Disassembly of 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 cylinder head.

IMPORTANT

Mark all valve train components so they can be installed in their original locations.

Note: Record all measurements taken during disassembly.

1. Drain coolant from 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 coolant pump. *See Disassembly of Engine Coolant Pump on page 4-4-4.*
3. Remove the high-pressure fuel lines and fuel injectors from the cylinder head. *See Removal of Fuel Injectors on page 4-3-18.*

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2. TECHNICAL DATA

2. Technical Data

2-1 Specifications

Item				Unit	SV22
Main specifications of machine					
Dimensions					
Overall length (Transportation position)			Standard	mm	3775
			W/ long arm		-
Cabin		Overall height	Transportation position		2360
			Traveling position		2360
		Overall width	Full machine width		1380
Canopy		Overall height	Transportation position		2320
			Traveling position		2320
		Overall width	Full machine width		1380
Tumbler center distance (Steel track / rubber track)					1467
Track gauge					1160
Minimum ground clearance					280
Traveling performance					
Travel speed		Rubber track	Low speed (Forward/Reverse)	km/hr	2,4
			High speed (Forward/Reverse)	km/hr	4,1
Permissible water depth limit				mm	360
Work performance					
Bucket		Width (Standard)		mm	400
		[Standard. JIS heaped capacity]		m^3	0,067
		Number of teeth / Installation method		pcs.	3 / Bolt
Work range					
	Maximum digging depth	With blade raised		mm	2480
		With blade on the ground)		mm	2645
	Maximum depth of vertically digging			mm	2085
	Maximum dumping height			mm	2760
	Minimum front swing radius (with boom in front center)		Cabin	mm	1700
			Canopy	mm	1700
	Minimum front swing radius (with boom in full swing)		Cabin	mm	1460
			Canopy	mm	1460

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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.

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3-2 Engine

1) Nominal and Allowable Values

Applicable model			3TNV76-SBVA2	
Item		Unit	Standard	Allowable limit
Cylinder head				
Adjustment of valve clearance		mm	0,15 to 0,25	-
Cylinder head distortion (Flatness)		mm	0,05 or less	0,15
Valve sink	Intake	mm	0,4 to 0,6	0,9
	Exhaust	mm	0,4 to 0,6	0,8
Valve seat angle	Intake	degrees (°)	120	-
	Exhaust	degrees (°)	90	-
Valve seat correction angle		degrees (°)	40, 150	-
Intake valve	Guide inside diameter	mm	6 to 6,012	6,08
	Valve stem outside diameter	mm	5,96 to 5,975	5,9
	Oil clearance	mm	0,025 to 0,052	0,15
	Valve stem bend	mm	-	0,01
Exhaust valve	Guide inside diameter	mm	6 to 6,012	6,08
	Valve stem outside diameter	mm	5,945 to 5,96	5,9
	Oil clearance	mm	0,040 to 0,067	0,17
	Valve stem bend	mm	-	0,01
Valve guide	Projection from cylinder head	mm	9,8 to 10	-
	Installation method	-	Cold fitted	-
Valve guide projection from cylinder head		mm	9,8 to 10	-
Valve stem seal projection from cylinder head		mm	10,9 to 11,2	-
Valve guide installation method		-	Cold-fitted	-
Push rod bend		mm	Less than 0,03	0,03
Rocker arm and shaft	Arm shaft hole diameter	mm	12 to 12,02	12,07
	Shaft outside diameter	mm	11,966 to 11,984	11,94
	Oil clearance	mm	0,016 to 0,054	0,13
Valve spring	Free length	mm	37,8	-
	Squareness	mm	-	1,3

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4. Lubricate the camshaft lobes and 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 until they make solid contact with the camshaft.
5. If removed, reinstall the fuel injection pump. Adjust the fuel injection timing after installation. *See Checking and Adjusting Fuel Injection Timing on page 4-3-15.*

Installation of Timing Gears

1. Set No. 1 piston to top dead center.
2. Rotate the camshaft until mark **(Figure 4- 2-98, (C))** is approximately at the 9 o'clock position.
3. Lubricate the idler gear **(Figure 4-2-97, (3))**, bushing **(Figure 4-2-97, (2))** and idler gear shaft **(Figure 4-2-97, (1))** with clean engine oil or assembly lube.

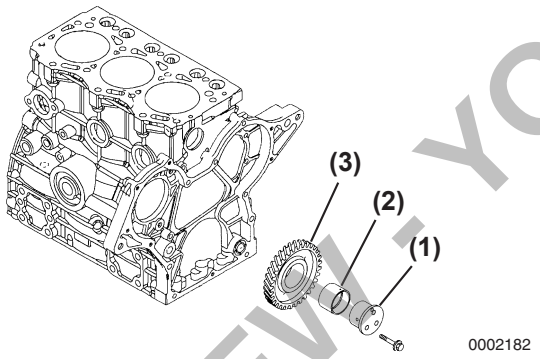
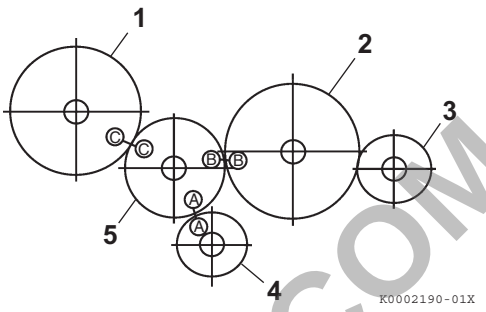


Figure 4-2-97

4. Align the timing gears as shown in **Figure 4- 2-98**.
5. Reinstall the idler gear and idler gear shaft. Be sure the oil hole in the bushing is facing toward the top of the engine.
6. Ensure all three timing marks **(Figure 4- 2-98, (A, B, and C))** are aligned.



1 – Fuel Injection Pump Gear
2 – Camshaft Gear
3 – Optional Accessory Drive Gear
4 – Crankshaft Gear
5 – Idler Gear

Figure 4-2-98

7. When all gears are properly aligned, tighten the idler gear retaining bolts to specified torque. *See "3-7-2 Engine Tightening Torque" section for tightening torque.*

Installation of Gear Case Cover

1. Apply a continuous bead of ThreeBond Liquid Gasket No. 1212, Yanmar Part No. 977770-01212 to the mounting area of the gear case cover **(Figure 4-2-99, (1))**. Be sure to circle the bolt holes.

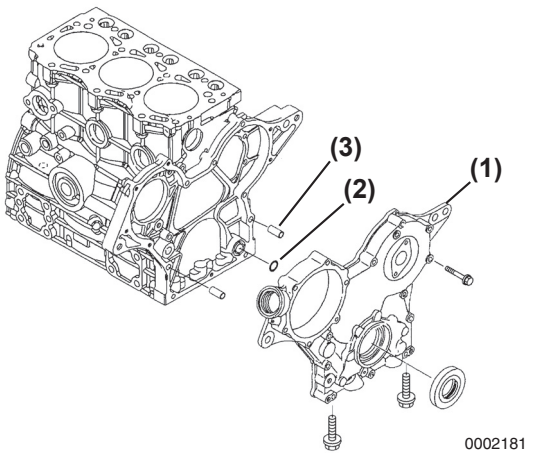


Figure 4-2-99

2. Reinstall the dowels **(Figure 4-2-99, (3))** and a new O-ring **(Figure 4-2-99, (2))**.

IMPORTANT
Be sure to align the flats on the oil pump with the flats on the crankshaft gear.

3. Reinstall the timing gear case cover.
4. Reinstall and tighten the gear case cover bolts.

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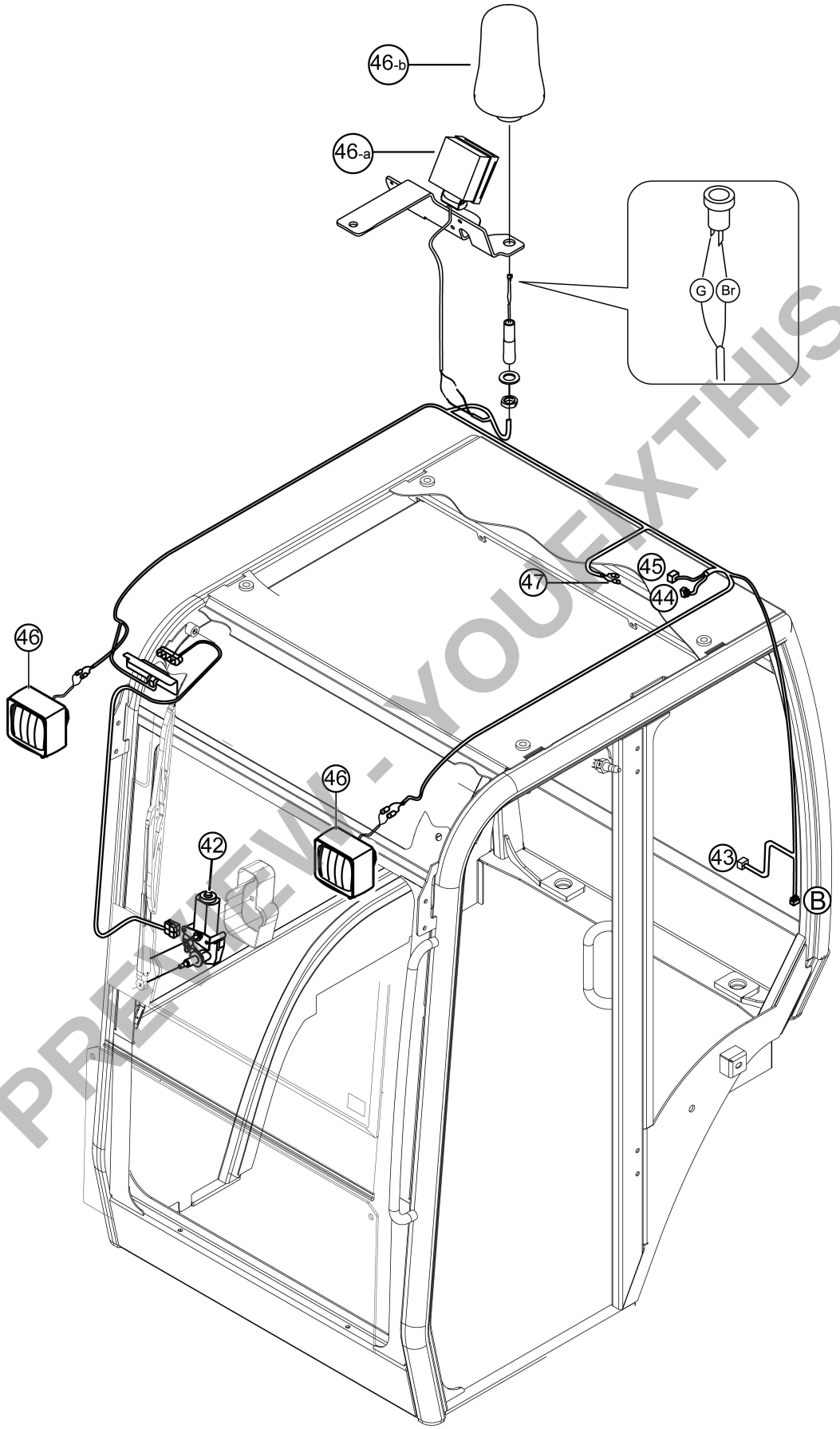
4-6 Starter Motor

4-6-1 Before You Begin Servicing

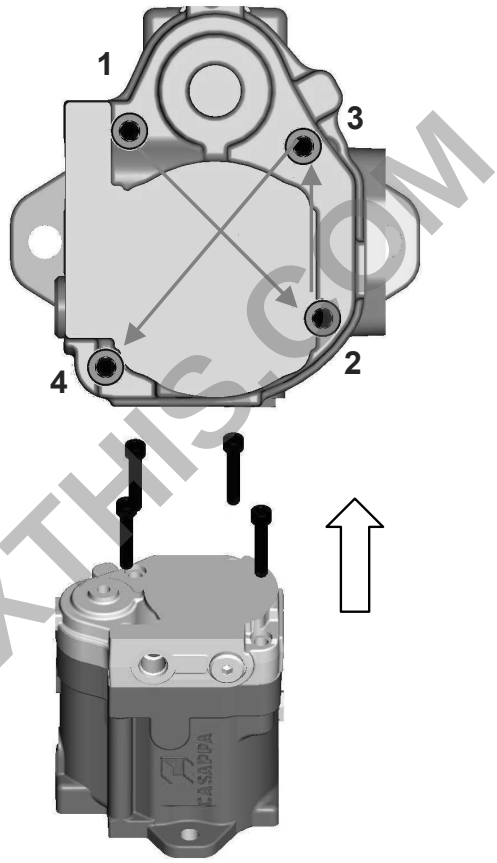
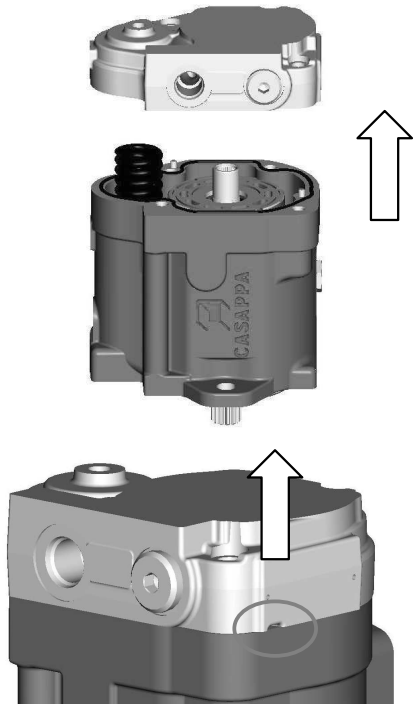
Before performing any service procedures within this section, read the following safety information and review the *Safety* section on page *4-1-1*.

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3) Cabin



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Procedure	
5. Loosen the screws. **Important** Remove the screws following the sequence shown in the picture.	
6. Remove the rear cover from the SVP pump body. **Note** Pay attention to the valve plate doesn't fall down. Keep the pump in the disassembly position. **Note** If the cover is stuck, put a screwdriver into the slot to leverage on the cover as in the picture.	

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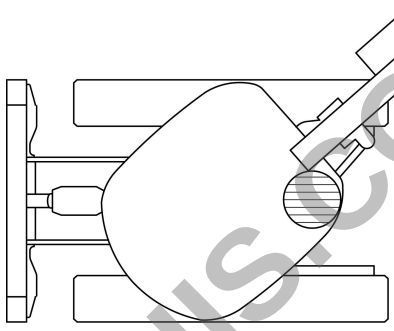
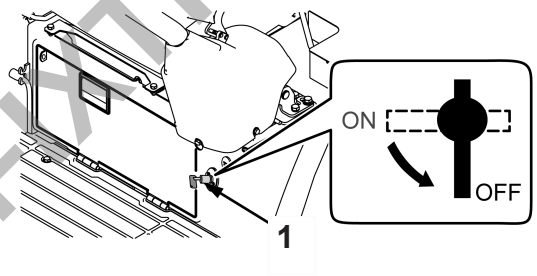
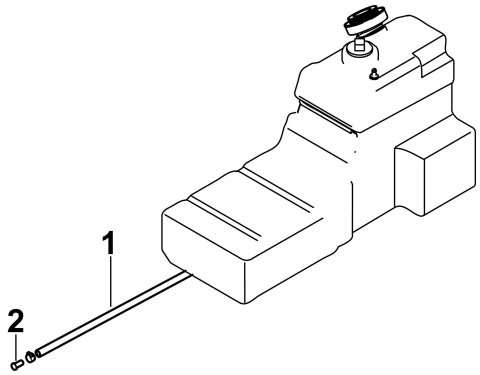
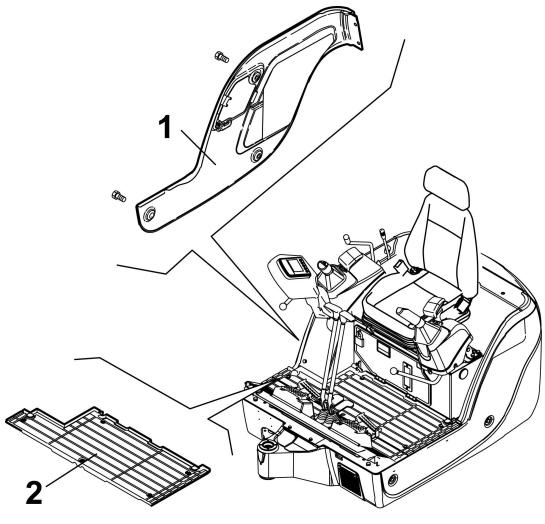
Item	Description
1	Handle TT
3	Lever kit
4	Rubber boot
7	Retaining plate
8	Cardan kit composed of : 1 cardan + shims
10	Plunger kit composed of : a. 4 plunger guides b. 4 plain plungers c. 4 spring rings
12	Regulating kit
15	Set of 4 return springs

Item	Description
1	Handle SH1 PRAH + Deutsch connectors 2 & 6 pins
3	Lever kit
4	Rubber boot
7	Retaining plate
8	Cardan kit composed of : 1 cardan + shims
10	Plunger kit composed of : a. 4 plunger guides b. 4 plain plungers c. 4 spring rings

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7-1-4 Removal and Reinstallation of Fuel Tank

1) Removal

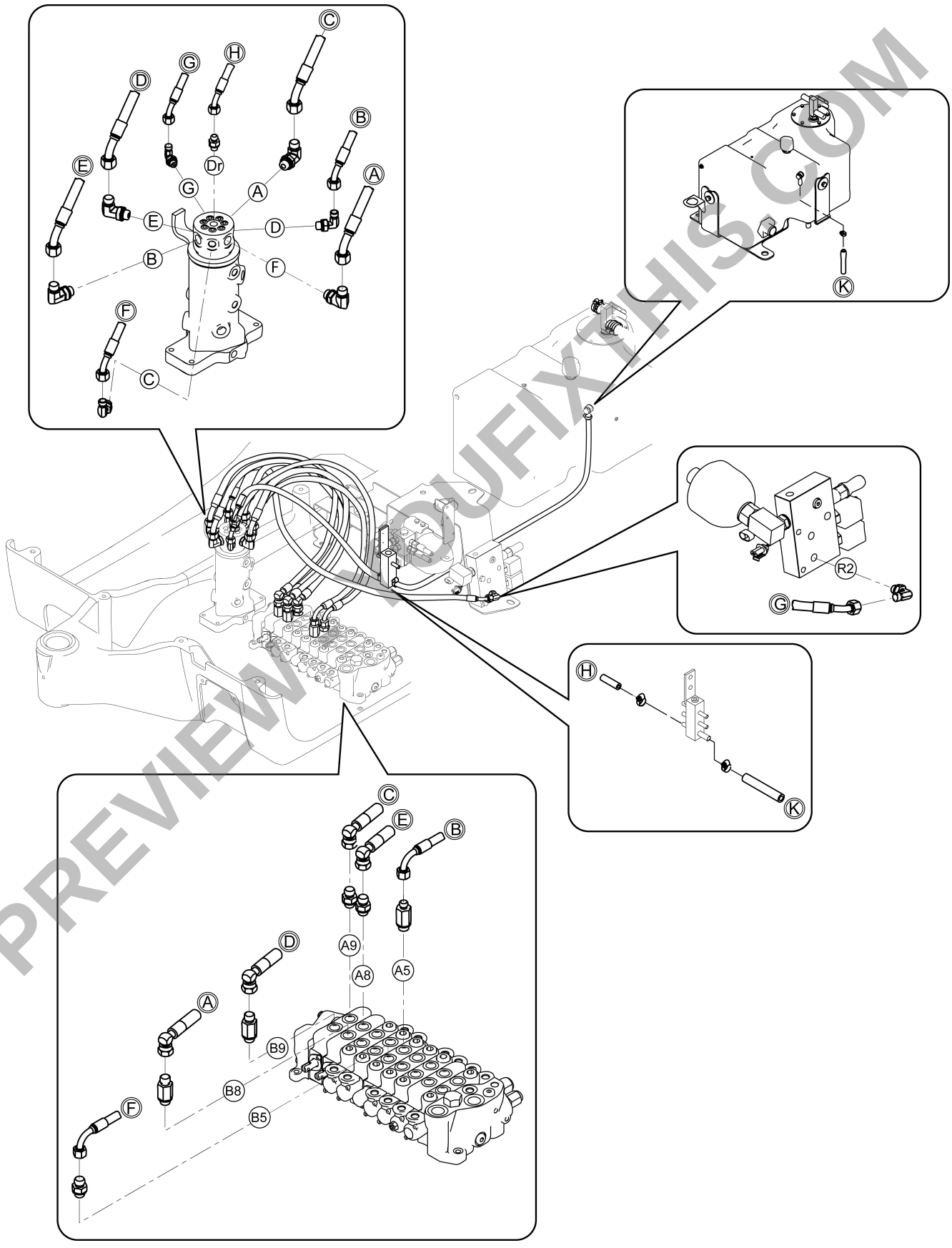
Procedure	
(1) Swing the upperstructure so that the under cover of the fuel tank is positioned halfway between the right and left crawlers. Then, lower the bucket to the ground and stop the engine.	
(2) Cut the main switch 1 to the OFF position to disconnect the battery of the machine. Note : Place a MAINTENANCE IN PROGRESS label on the machine.	
(3) Remove the under cover. (4) Take the end of fuel drain hose **1** out from the frame and pull out the plug **2** to drain fuel. Fuel quantity: 29 L Max. **Warning :** Put a container under fuel drain hose.	
(5) Remove the cover R **1** and the step B **2**.	

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3) Swivel joint

(Control valve → Swivel joint → Cut off valve, Drain block & Hydraulic oil tank)



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