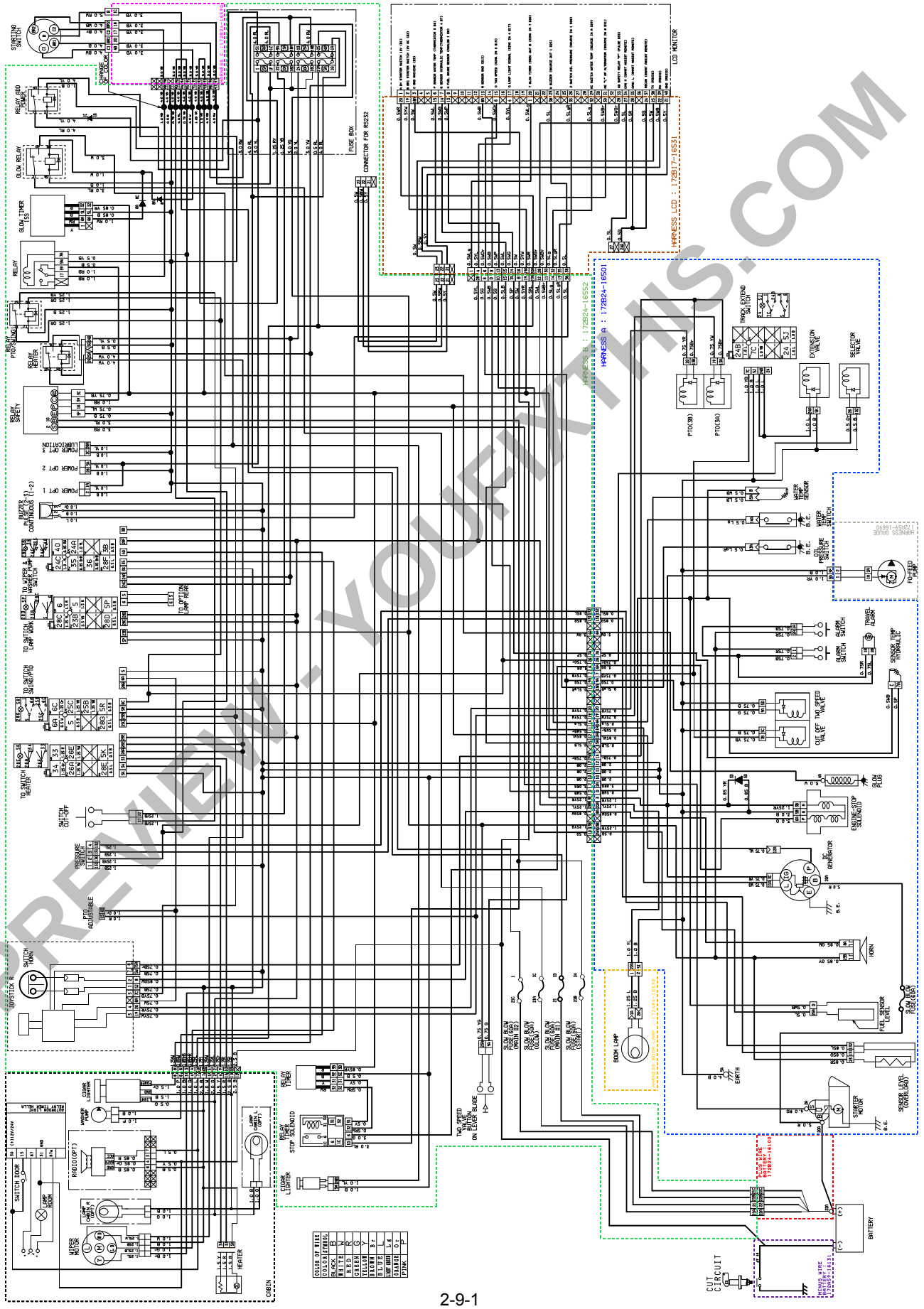
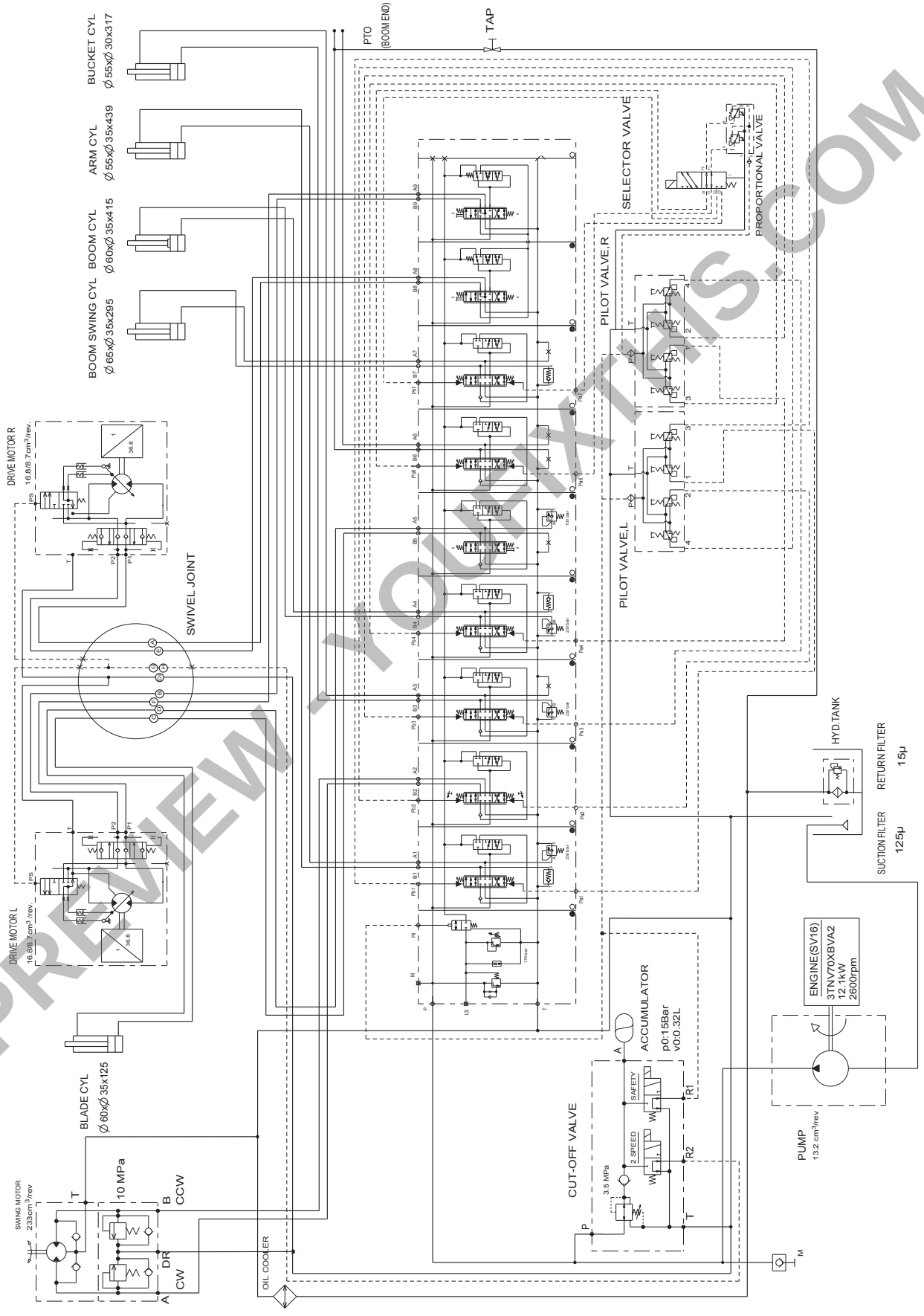
2-9 Wiring Diagram



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2-8 Hydraulic Circuit Schematic



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4-2-4 Cylinder Head

Cylinder Head Components

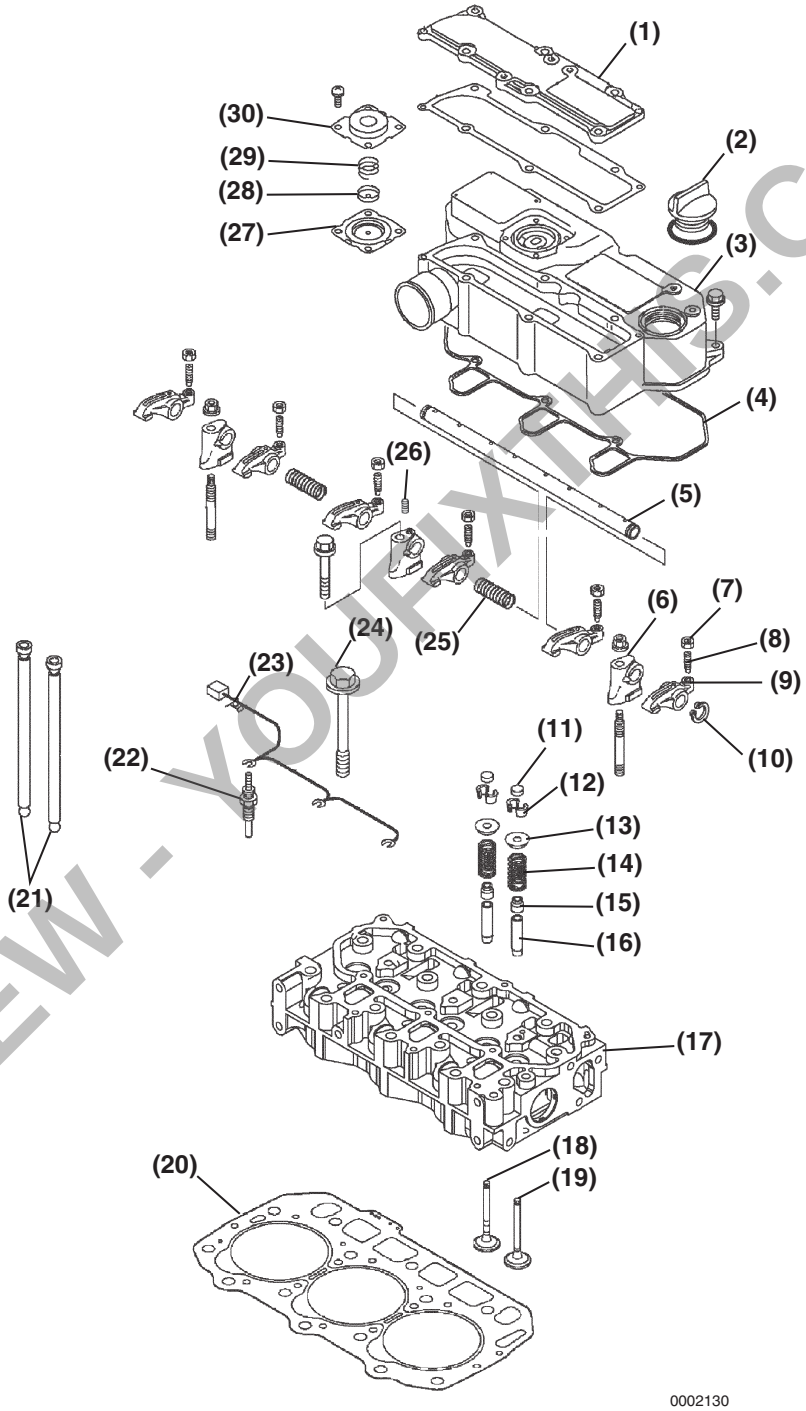


Figure 4-2-1

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3-7 List of Tightening Torque

3-7-1 Machine

Applicable model			SV16		
Equipment No		Tightening part	Thread size	Tightening torque N•m	Adhesive
Engine / Electrical equipment					
	1	Engine mount vibroisolating rubber	Nut M10	46 to 54	
	2	Engine × Engine mount (Front Left)	M10×25	67 to 79	ThreeBond 1324
	3	Engine × Engine mount (Front Right)	M10×25	67 to 79	ThreeBond 1324
	4	Engine × Engine mount (Rear Left)	M10×25	67 to 79	ThreeBond 1324
	5	Engine × Engine mount (Rear Right)	M10×25	67 to 79	ThreeBond 1324
	6	Engine mount × Stopper (Left)	M10×20	46 to 54	ThreeBond 1324
	7	Engine mount × Stopper (Front Right)	M10×20	46 to 54	ThreeBond 1324
	8	Air cleaner	M8×16	23 to 27	
	9	Air cleaner intake hose	Hose clip 60	2,5 to 3,5	
	10	Cooling water hose	Hose clip 25 & 35	2,5 to 3,5	
	11	Fuel oil hose	Hose clip 16	2,5 to 3,5	
	12	Fuel level gauge unit	M5×16 (Pan head screw)	1,9 to 2,0	
	13	Fuel oil tank drain plug	-	7	Loctite 577
	14	Fuel oil tank holding band	Nut 10	2,5 to 3 <For Tension>	
			Nut 10	46 to 54 <For lock nut>	
	15	Battery holding rod	Nut 8	2,45 to 2,94 <For Tension>	
			Nut 8	23 to 27 <For lock nut>	
	16	LCD monitor × Panel cover	M6×20	1,0 to 1,5	
	17	Panel cover (lower) × Panel cover (upper)	M5×16	2,55 to 3,3	
	18	Safety switch (Cut-off lever)	Locknut (Fine thread) 20	19.6 to 24.5	
	19	Accelerator dial (holding nut)	M6	5.5 to 6.5	

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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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3-7-4 Hydraulic Fitting

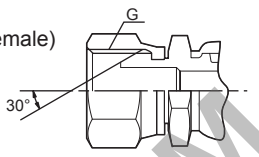
(1) Tightening torque of parallel pipe thread

For 30° sheet type joint and the O-ring sheet type joint.

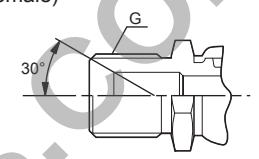
Unit : N•m

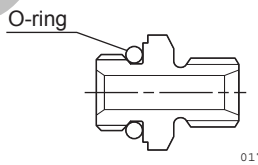
Nominal designation of screw thread G (PF)	Tightening torque
	Material : Steel, Cast iron
1/8	13,7 to 16,7
1/4	22,6 to 27,5
3/8	44,1 to 53,9
1/2	53,0 to 64,7
3/4	106 to 129
1	124 to 151
1 1/4	150 to 183
1 1/2	186 to 226

Example
Parallel pipe thread (female)
(male 30° sheet)



Parallel pipe thread (female)





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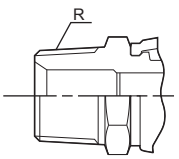
(2) Tightening torque of taper pipe thread

Apply seal tape

Unit : N•m

Nominal designation of screw thread G (PF)	Tightening torque
	Material : Steel, Cast iron
1/8	6,9 to 8,8
1/4	9,8 to 14,7
3/8	29,4 to 39,2
1/2	39,2 to 49,0
3/4	49,0 to 63,7
1	68,6 to 88,3
1 1/4	98,1 to 118

Example
Parallel pipe thread (female)



017501-00E

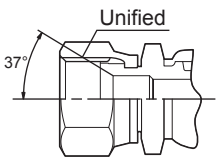
(3) Tightening torque of unified screw thread

For 30° sheet type joint and the O-ring sheet type joint.

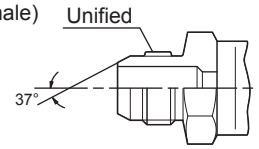
Unit : N•m

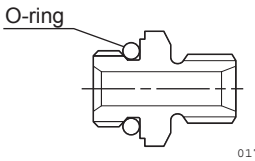
Nominal designation of screw thread G (PF)	Tightening torque
	Material : Steel, Cast iron
7/16-20UNF	17,7 to 21,6
9/16-18UNF	35,3 to 43,1
3/4-16UNF	44,1 to 53,9
7/8-14UNF	53 to 64,7
1 1-16-12UN	106 to 129
1 5/16-12UN	124 to 151
1 5/8-12UN	150 to 183

Example
Unified screw thread (female)
(male 37° sheet)



Example
Unified screw thread (female)
(male 37° sheet)





017502-00E

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2-6 Periodic Inspection and Servicing

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

Parts & Operations		Daily	Every 50h	Every 250h	Every 500h	Every 1000h / Every year	Every 2000h / Every two years
General.	Missing or broken parts	○					
	Tightening of nuts and bolts	○					
	Motor state	○					
	Machine	□					
Transmissions	Oil for travel gears		● 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		●*		
	Oil filter		● 1st time		●*		
	Cooling fluid	○					●
	Belt	○				●	
	Radiator vents	○			□		
	Fuel hose, coolant hose						●
	Intake and exhaust valves					○	
	Injectors and injection pressure						○
Heating						○	

* Every 500h / Every year

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2. TECHNICAL DATA

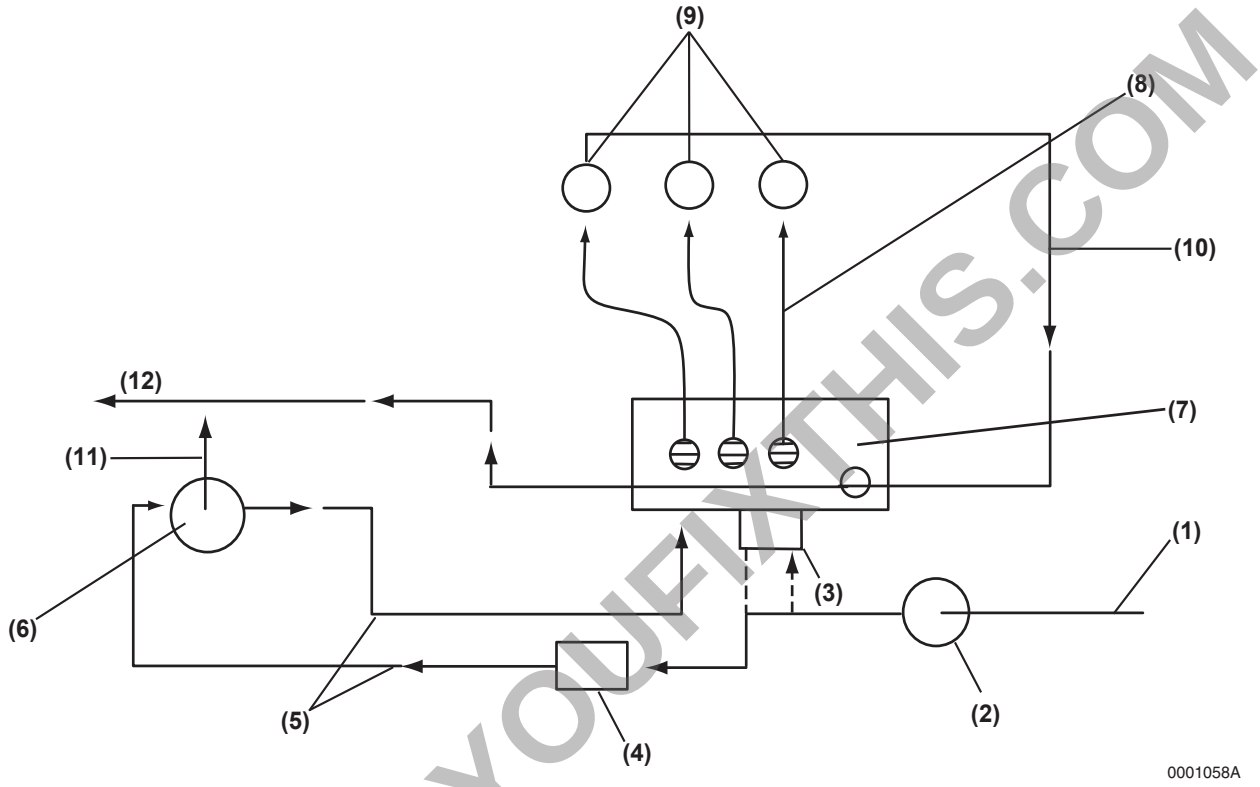
2. Technical Data

2-1 Specifications

Item				Unit	SV16
Main specifications of machine					
Dimensions					
Overall length (Transportation position)			Standard	mm	3450
			W/ long arm		3485
Cabin	Overall height		Transportation position		2280
			Traveling position		2280
	Overall width		Full machine width		980
Canopy	Overall height		Transportation position		2205
			Traveling position		2205
	Overall width		Full machine width		980
Tumbler center distance (Steel track / rubber track)					1200
Track gauge					750
Minimum ground clearance					190
Traveling performance					
Travel speed	Steel track		Low speed (Forward/Reverse)	km/hr	1,7
			High speed (Forward/Reverse)	km/hr	3,3
	Rubber track		Low speed (Forward/Reverse)	km/hr	1,7
			High speed (Forward/Reverse)	km/hr	3,3
Permissible water depth limit				mm	300
Work performance					
Bucket	Width (Standard)			mm	300
	[Standard. JIS heaped capacity]			m^3	0,03
	Number of teeth / Installation method			pcs.	3 / Rubber pin lock type
Work range					
Maximum digging depth	With blade raised (cabin <canopy>)			mm	2360 <2160>
	With blade on the ground (cabin <canopy>)			mm	2205 <2005>
Maximum depth of vertically digging (cabin <canopy>)				mm	1920 <1710>
Maximum dumping height (cabin <canopy>)				mm	2575 <2440>
Minimum front swing radius (with boom in front center)			Cabin	mm	1520
			Canopy	mm	1480
Minimum front swing radius (with boom in full swing)			Cabin	mm	1320
			Canopy	mm	1290

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4-3-5 Fuel System Diagram



1 – Diesel Fuel Supply
2 – Fuel Filter / Water Separator
3 – Mechanical Fuel Pump (Used in place of the electric fuel pump on some models)
4 – Electric Fuel Pump (Used on models without mechanical fuel pump)
5 – Low-Pressure Fuel Supply Lines
6 – Fuel Filter
7 – Fuel Injection Pump
8 – High-Pressure Fuel Injection Lines
9 – Fuel Injectors
10 – Fuel Return from Fuel Injectors
11 – Air Bleed Orifice
12 – Fuel Return to Tank

Figure 4-3-2

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CHAPTER 1

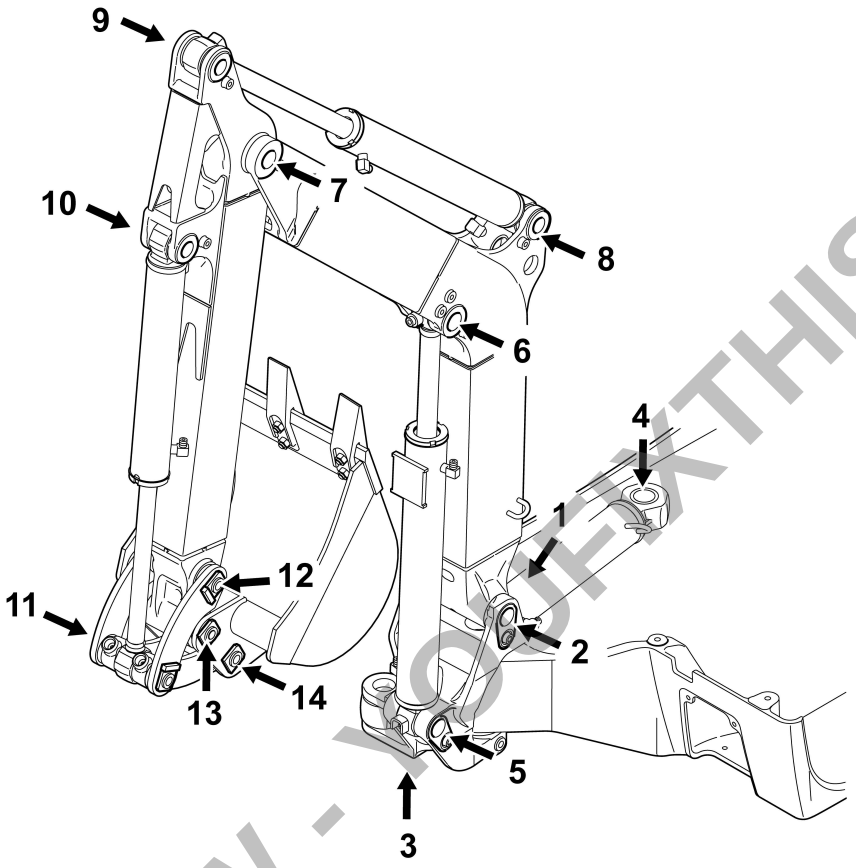
GENERAL CAUTIONS FOR MAINTENANCE WORK

1-1 Correct Work 1-1
1-2 Safety Precautions 1-1
1-3 Preparations 1-1
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

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3-6 Implement

3-6-1 Front Attachments



Unit : mm

No.	Measuring point	Applicable model SV16	Wear limit	
			Pin	Bore of bush or hole
1	Boom swing fulcrum	Ø 50	-0,5	+0,5
2	Boom fulcrum	Ø 35		
3	Boom swing cylinder, rod	Ø 40		
4	Boom swing cylinder, bottom	Ø 40		
5	Boom cylinder, bottom	Ø 35		
6	Boom cylinder, rod	Ø 35		
7	Arm fulcrum	Ø 35		
8	Arm cylinder, bottom	Ø 30		
9	Arm cylinder, rod	Ø 30		
10	Bucket cylinder, bottom	Ø 30		
11	Bucket cylinder, rod	Ø 30		
12	Link "A" arm	Ø 30		
13	Bucket fulcrum	Ø 30		
14	Bucket "link A"	Ø 30		

Note : *Allowable clearance is 1 mm*

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6. Clean the engine by washing with solvent, air or steam cleaning. Carefully operate to prevent any foreign matter or fluids from entering the engine, fuel system, or electrical components remaining on the engine.
7. Drain the engine oil into a suitable container. Remove oil filter.
8. Remove the cylinder head. *See Disassembly of Cylinder Head on page 4-2-7.*
9. Remove the fuel injection pump from the gear case only if it must be sent out for repair, or will interfere with other procedures such as “hot tank” cleaning. *See Removal of Fuel Injection Pump on page 4-3-9*.
10. Remove the starter motor. *See Removal of Starter Motor on page 4-6-6.*

Disassembly of Camshaft and Timing Components

Discard all gaskets, O-rings and seals. Use new gaskets, O-rings and seals on reassembly of camshaft and timing components.

Removal of Timing Gear Case Cover

1. Remove the bolt and washer retaining the crankshaft pulley.

IMPORTANT

Use care not to damage the threads in the end of the crankshaft when removing the crankshaft pulley.

2. Remove the crankshaft pulley with a gear puller.
3. Remove the bolts that retain the gear case cover to the cylinder block and oil pan.
4. Remove the gear case cover **(Figure 4- 2-39, (1))**.
5. Remove the dowel pins **(Figure 4-2-39, (3))** and O-ring **(Figure 4-2-39, (2))**.

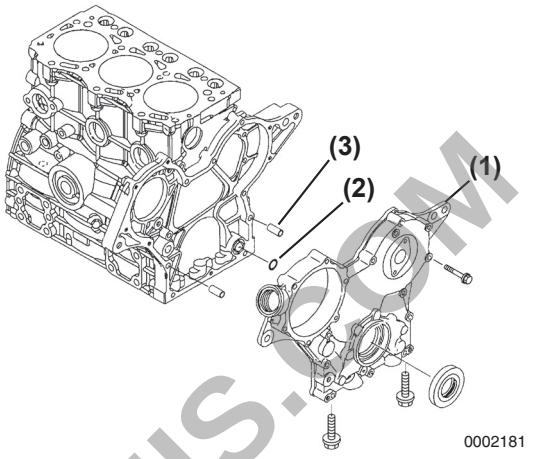
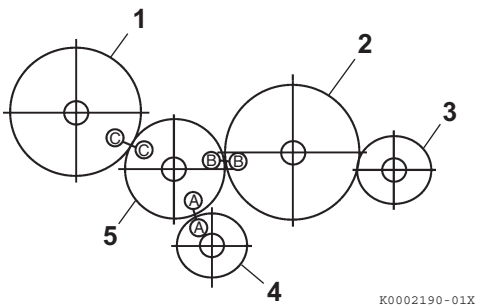


Figure 4-2-39

Checking Timing Gear Backlash

Prior to removing the timing gears, measure the gear backlash and determine the gear wear.

Note: Check the backlash between each pair of mating gears. If not within specification, replace both mating gears. Do not allow the gear being checked to move axially as excess end play could cause a false reading. *See "3-2 Engine Service Standard" section for the service limit.*



1 – Fuel Injection Pump Drive Gear
2 – Camshaft Drive Gear
3 – Auxiliary Drive Gear (Optional)
4 – Crankshaft Drive Gear
5 – Idler Gear

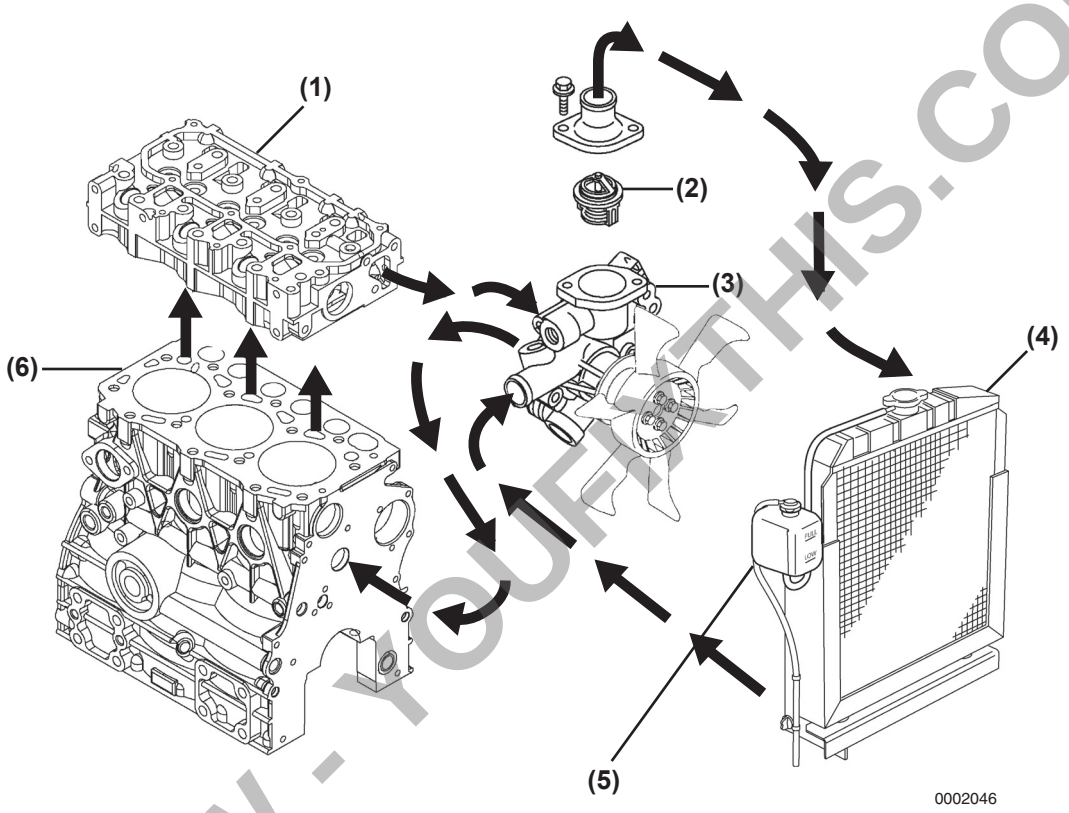
Figure 4-2-40

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4-4-2 Introduction

This section of the *Service Manual* describes the procedures necessary to service the 3TNV70 engine coolant pump.

4-4-3 Cooling System Diagram



1 – Cylinder Head
2 – Thermostat
3 – Engine Coolant Pump
4 – Radiator
5 – Coolant Recovery Tank
6 – Cylinder Block

Figure 4-4-1

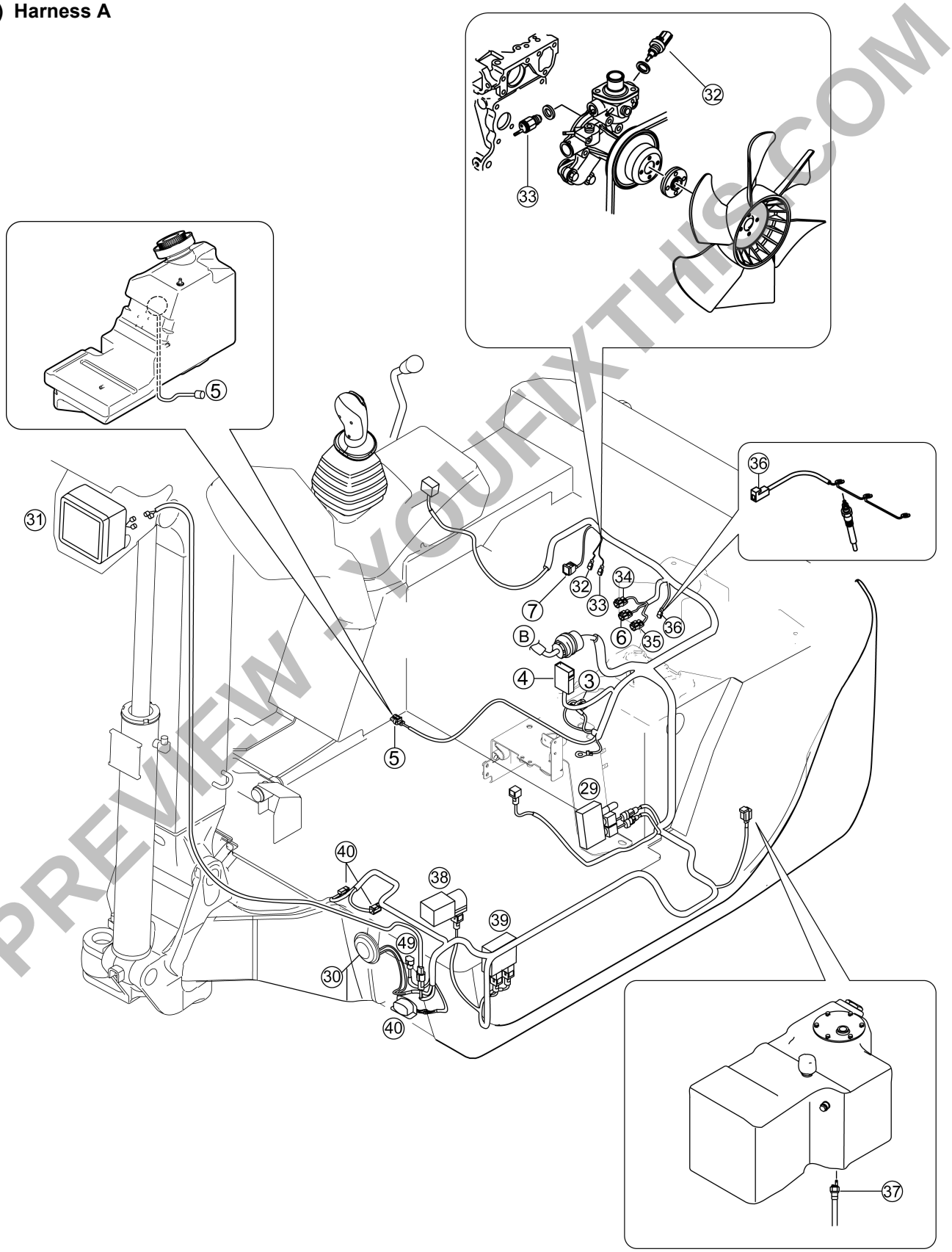
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5. Electric System

5-1 Electric Equipment of Machine

5-1-1 Parts Layout of Electrical Equipment

1) Harness A



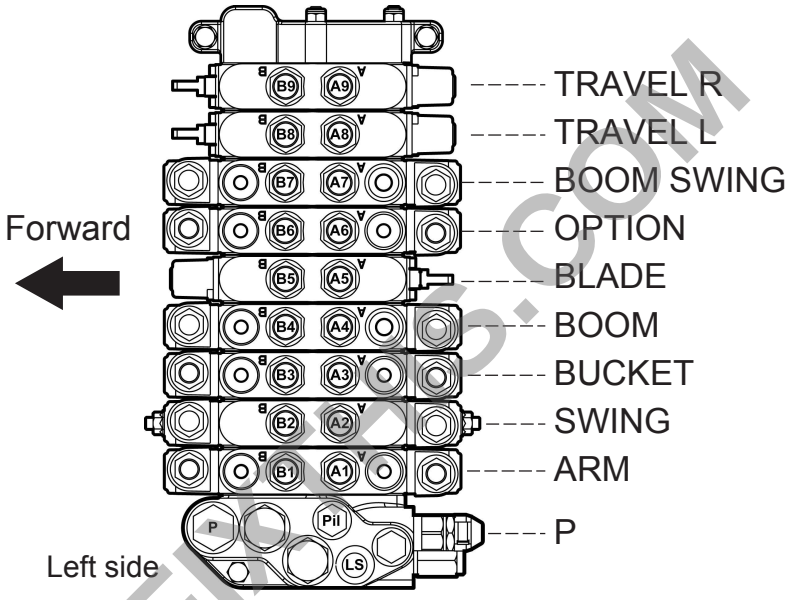
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6-4 Control Valve

Directional control block with flow distribution inde-pendent of the pressure and available flow

Type SX 10, series 1X





6-4-1 Introduction

1) Foreword

This manual deals with the instructions relative to servicing and maintenance operations for the SX 10 control block. For the inspections and servicing operations associated with the hydraulic system of the machine to which the block is connected, please consult the maintenance manual supplied by the equipment manufacturer.
It is recommended that only qualified personnel perform the installation, connection and maintenance of this device, and that all operations be carried out in compliance with the technical standards in force and the cleanliness regulations specific to this type of installation.

To ensure maximum performance and safety during maintenance operations we advise you to **Read this manual thoroughly**

All information, illustrations, instructions and characteristics contained in this document are based on the latest product information available at the time of publication. In its attempts to maintain a high-quality product, BOSCH REXROTH reserves the right to make design or technical modifications at any time and without prior notification.

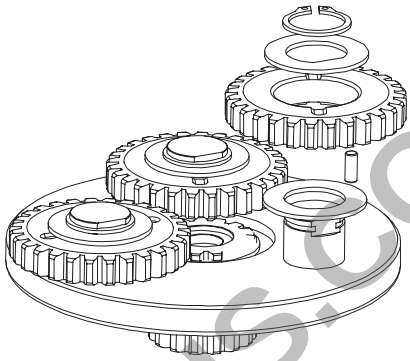
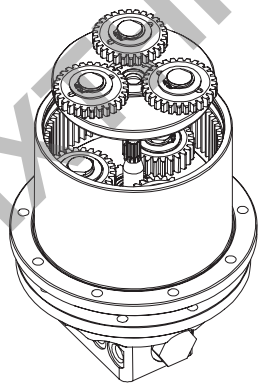
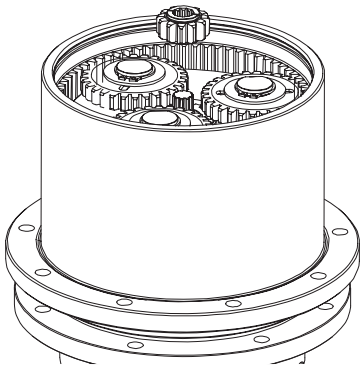
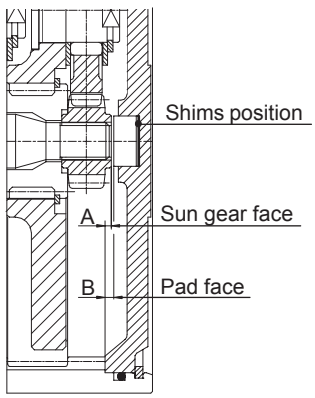
2) Safety Instructions

Please pay a particular attention to the signals of the safety alerts and special instructions in this manual.
They are indicated in the following manner:

Indicates information or instructions which must be followed to guarantee your safety during operations.

CAUTION :
Warning against possible equipment damage.
Note :
Useful information.

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Procedure	
Assemble the primary planetary carrier assembly in the following sequence: bottom thrust washer, planetary gears and relatives needle bearing, antirotation thrust washer and external retaining rings. ***Note :*** *Always turn the opening of the retaining ring towards the outside.*	
Install the primary planetary stage into the ring gear/housing. ***Note :*** *Apply grease on contact surface.*	
Install the primary planetary sun gear, the shims (theoretical shimming 0,5mm) and lock with the retaining ring. ***Note :*** *Apply grease on contact surface.*	
Check the following measurement: Measurement A - The distance between the cover support face and the sun gear height. Measurement B - The distance between the cover face and the pad. The clearance given by the difference between the two measures shall be between 0,4mm and 0,6mm; in case such clearance was higher, remove the thrust pad and increase the thickness by adding more shims underneath. ***Note :*** *In case after the assembly there is no clearance or a slight interference, please check if the assembly was made correctly.*	

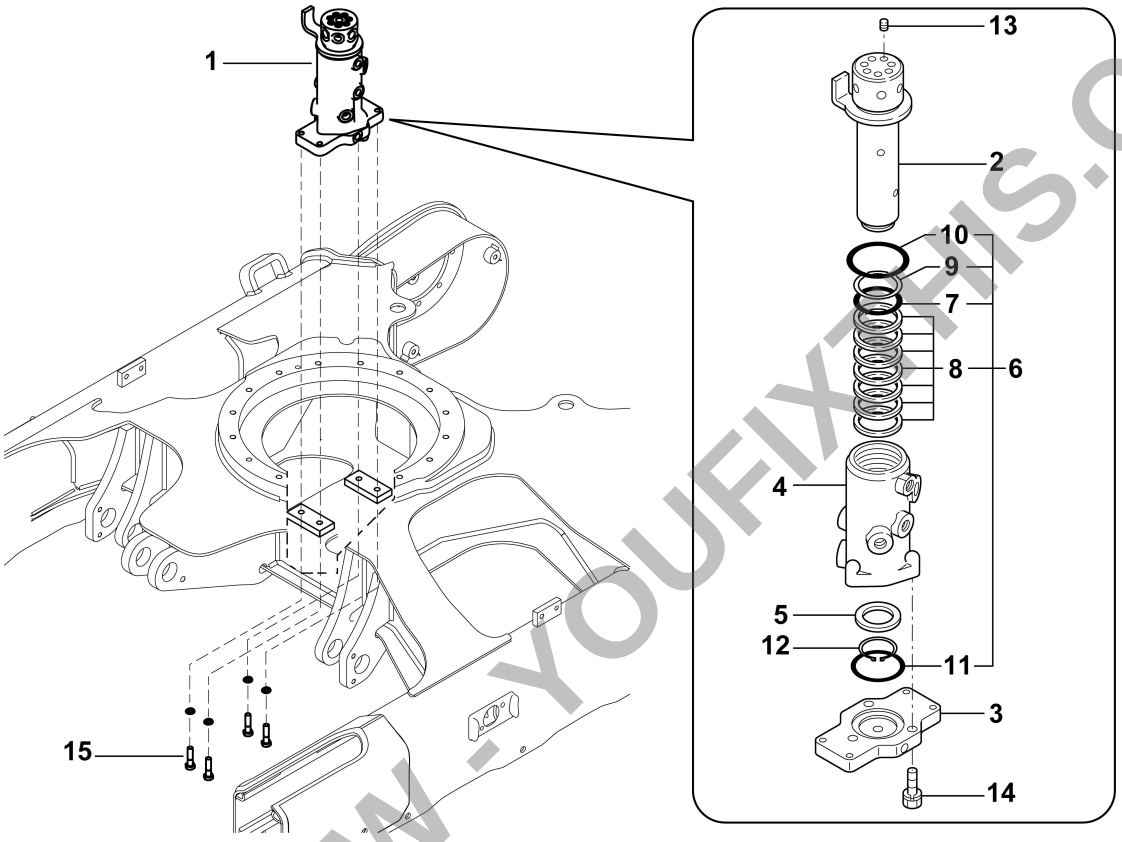
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7-5-5 Disassembly and Reassembly of Swivel Joint

1) Structure

The swivel joint is used to prevent the hydraulic piping from twisting when the upperstructure swings. The swivel joint consists of the shaft, hub and seal kit. The shaft and hub have holes and grooves, and the oil supplied from the port of the shaft, passing through the hub groove, is fed to the actuators of the undercarriage.



No.	Part	Quantity	No.	Part	Quantity
1	Swivel joint assembly	1	9	Back-up ring	1
2	Swivel shaft	1	10	O-ring	1
3	Swivel flange	1	11	O-ring	1
4	Swivel hub	1	12	Snap ring	1
5	Swivel spacer	1	13	Plug PT 1/4	
6	Seal kit	1	14	Bolt H M10x35 Or M10x40*	3
7	O-ring	1	15	Bolt H M10x40	4
8	O-ring	8			

* According to part code

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