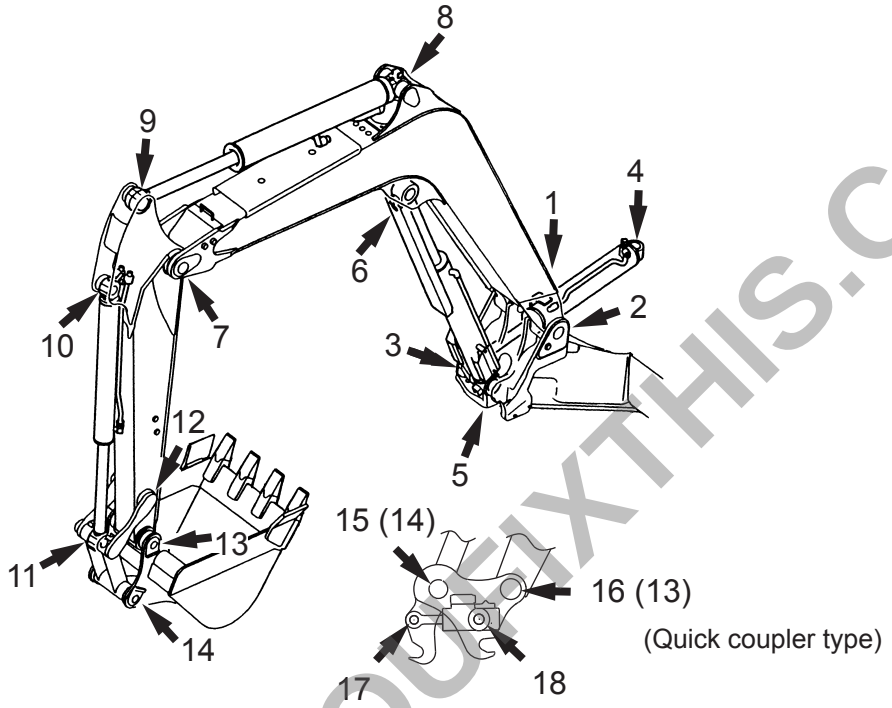
3-6 Implement

3-6-1 Front Attachments



Unit : in. (mm)

No.	Applicable model : ViO75-A Measuring point	Standard	Wear limit	
			Pin	Bore of bush or hole
1	Boom swing fulcrum	Ø1.97 (Ø50)	-0.02 (-0.5)	+0.02 (+0.5)
2	Boom fulcrum	Ø1.77 (Ø45)		
3	Boom swing cylinder, rod	Ø1.57 (Ø40)		
4	Boom swing cylinder, bottom	Ø1.57 (Ø40)		
5	Boom cylinder, bottom	Ø1.57 (Ø40)		
6	Boom cylinder, rod	Ø1.57 (Ø40)		
7	Arm fulcrum	Ø1.57 (Ø40)		
8	Arm cylinder, bottom	Ø1.57 (Ø40)		
9	Arm cylinder, rod	Ø1.57 (Ø40)		
10	Bucket cylinder, bottom	Ø1.38 (Ø35)		
11	Bucket cylinder, rod	Ø1.38 (Ø35)		
12	Link “A” arm	Ø1.38 (Ø35)		
13	Bucket fulcrum	Ø1.38 (Ø35)		
14	Bucket “link A”	Ø1.38 (Ø35)		
15 (14)	Bucket link pin (Quick coupler)	Ø1.97 (Ø50)		
16 (13)	Arm link pin (Quick coupler)	Ø1.97 (Ø50)		
17	Quick coupler cylinder, rod	Ø1.77 (Ø45)		
18	Quick coupler cylinder, bottom	Ø1.77 (Ø45)		

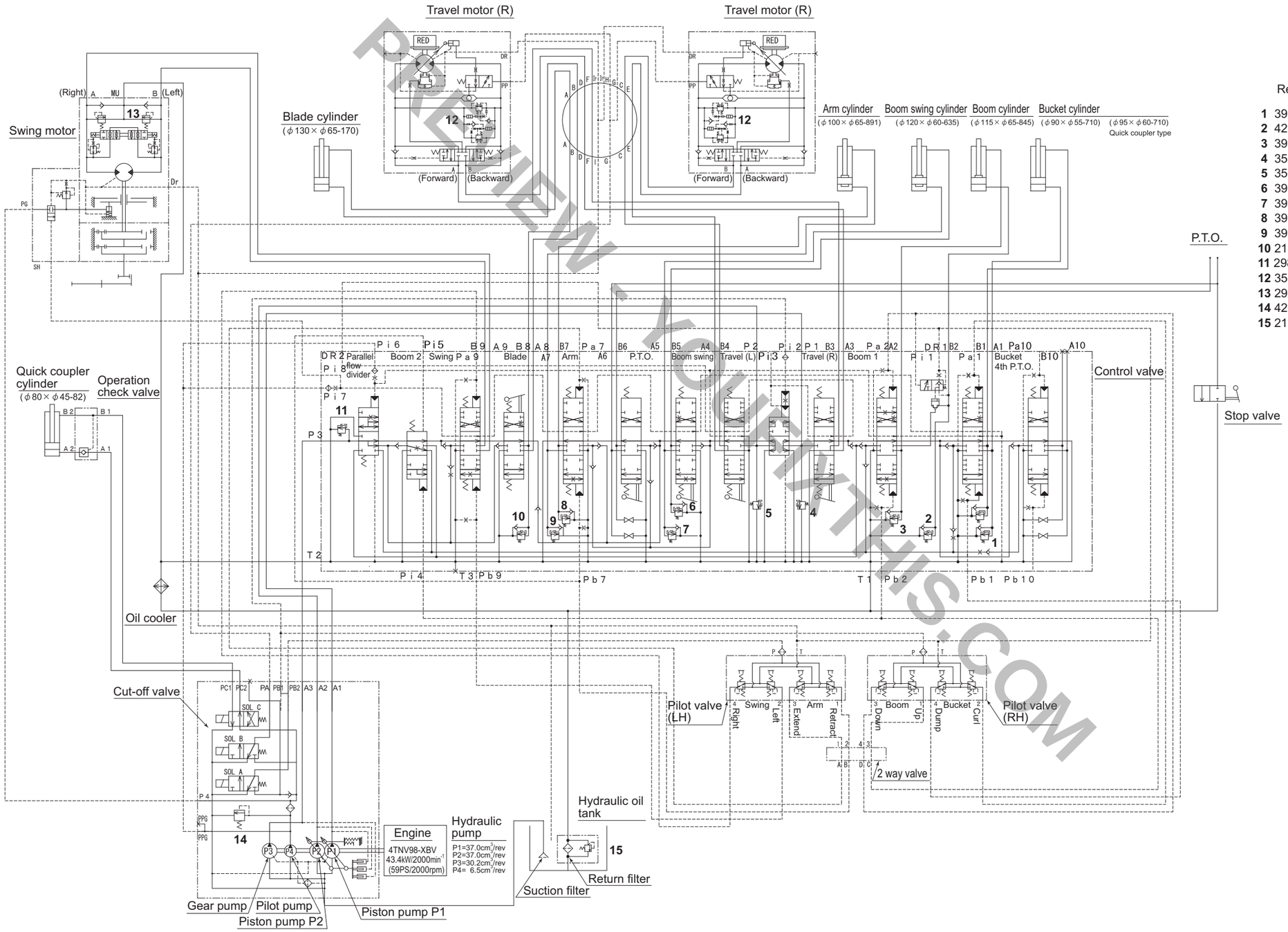
Note : *Allowable clearance is 0.04 in. (1.0 mm).*

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5. HYDRAULIC SYSTEM

5-2 Hydraulic Circuit Schematic

5-2-1 For Standard Type Machines



Relief valve set pressure

1 3981.6 PSI (27.5 MPa)
2 4266.0 PSI (29.4 MPa)
3 3981.6 PSI (27.5 MPa)
4 3555.0 PSI (24.5 MPa)
5 3555.0 PSI (24.5 MPa)
6 3981.6 PSI (27.5 MPa)
7 3981.6 PSI (27.5 MPa)
8 3981.6 PSI (27.5 MPa)
9 3981.6 PSI (27.5 MPa)
10 2133.0 PSI (14.7 MPa)
11 2986.2 PSI (20.6 MPa)
12 3555.0 PSI (24.5 MPa)
13 2986.2 PSI (20.6 MPa)
14 426.6 PSI (2.9 MPa)
15 21.3 PSI (0.15 MPa)

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Applicable model				4TNV98-XBV	
Item			Unit	Standard	Wear limit
Piston ring					
	Oil ring	Ring groove width	in. (mm)	0.1187 to 0.1193 (3.015 to 3.030)	0.1232 (3.130)
		Ring width		0.1169 to 0.1177 (2.970 to 2.990)	0.1161 (2.950)
		Clearance between groove and ring		0.0010 to 0.0024 (0.025 to 0.060)	0.0071 (0.180)
		End gap		0.0098 to 0.0177 (0.250 to 0.450)	0.0217 (0.550)
Connecting rod					
	Crank pin side	Crank pin metal inside dia.	in. (mm)	2.2835 to 2.2845 (58.000 to 58.026)	–
		Crank pin metal thickness		0.0578 to 0.0591 (1.492 to 1.500)	–
		Crank pin outside dia.		2.2816 to 2.2820 (57.952 to 57.962)	2.2796 (57.902)
		Oil clearance		0.0015 to 0.0029 (0.038 to 0.074)	0.0059 (0.150)
	Piston pin side	Bush inside dia.		1.1821 to 1.1826 (30.025 to 30.038)	1.1838 (30.068)
		Piston pin outside dia.		1.1806 to 1.1811 (29.987 to 30.000)	1.1795 (29.959)
		Oil clearance		0.0010 to 0.0020 (0.025 to 0.051)	0.0043 (0.109)
	Twist and parallelism			0.0012 (0.03) or less for 3.94 (100)	0.0031 (0.08)
Cam					
	Gear side	Cam shaft outside dia.	in. (mm)	1.9656 to 1.9665 (49.925 to 49.950)	1.9642 (49.890)
		Oil clearance		0.0016 to 0.0051 (0.040 to 0.130)	0.0094 (0.240)
	Intermediate	Cam shaft outside dia.		1.9650 to 1.9659 (49.910 to 49.935)	1.9636 (49.875)
		Oil clearance		0.0026 to 0.0045 (0.065 to 0.115)	0.0089 (0.225)
	Flywheel side	Cam shaft outside dia.		1.9656 to 1.9665 (49.925 to 49.950)	1.9642 (49.890)
		Oil clearance		0.0020 to 0.0039 (0.050 to 0.100)	0.0083 (0.210)
	Bend			0 to 0.0008 (0 to 0.02)	0.0020 (0.05)
	Cam height	Intake cam		1.7087 to 1.7165 (43.400 to 43.600)	1.6988 (43.150)
		Exhaust cam		1.7087 to 1.7165 (43.400 to 43.600)	1.6988 (43.150)
Crank shaft					
	Journal	Outside dia.	in. (mm)	2.5572 to 2.5576 (64.952 to 64.962)	2.5552 (64.902)
		Main metal thickness		0.0785 to 0.0791 (1.995 to 2.010)	–
		Oil clearance		0.0015 to 0.0027 (0.038 to 0.068)	0.0059 (0.150)
	Bend			–	0.0008 (0.02)

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3-7 List of Tightening Torque

3-7-1 Machine

Applicable model			ViO75-A		
Equipment			Thread size	Tightening torque ft•lbf (N•m)	Adhesive
	No.	Tightening part			
Engine / Electrical equipment					
	1	Engine mount vibroisolating rubber	M16 (10.9T)	151.9 to 173.6 (205.9 to 235.4)	Three Bond 1324
	2	Engine × Engine mount (Flywheel side)	M10 (11T)	61.5 (83.4)	Three Bond 1324
	3	Engine × Engine mount (Radiator side)	M12 (10.9T)	79.6 to 94.0 (107.9 to 127.5)	Three Bond 1324
	4	Clamp	M10 Nut 10	18.1 to 23.9 (24.5 to 32.4)	
	5	Air cleaner	M8	14.5 to 16.6 (19.6 to 22.6)	
	6	Air cleaner intake hose	Hose clip 70	1.5 to 2.1 (2.0 to 2.9)	
	7	Air cleaner intake hose	Hose clip 80	1.5 to 2.1 (2.0 to 2.9)	
	8	Air cleaner intake hose	Hose clip 80	0.7 to 1.5 (1.0 to 2.0)	
	9	Cooling water hose	Hose band 50	2.1 (2.9)	
	10	Fuel gauge unit	Pan-head machine screw M5	0.7 to 1.5 (1.0 to 2.0)	
	11	Fuel gauge hose	Hose band 14	0.7 to 1.5 (1.0 to 2.0)	
	12	Fuel tank	M16	123.0 to 151.9 (166.7 to 205.9)	Three Bond 1324
	13	Buttery holding rod	Nut M8	2.1 (2.9)	
	14	Radiator bracket R	M16	195.3 to 224.2 (264.8 to 304.0)	Three Bond 1324
	15	Radiator mount vibroisolating rubber	Nut M8	9.4 to 12.3 (12.7 to 16.7)	
	16	Radiator mount vibroisolating rubber	Nut M10	18.1 to 23.9 (24.5 to 32.4)	
	17	Exhaust duct vibroisolating rubber	Nut M10	18.1 to 23.9 (24.5 to 32.4)	
	18	Heater hose	Hose clip 22	1.5 to 2.1 (2.0 to 2.9)	
	19	Starter switch	Fine lock nut M18	21.7 to 25.3 (29.4 to 34.3)	
	20	Safety switch	Fine lock nut M16	21.7 to 25.3 (29.4 to 34.3)	

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4-2 Troubleshooting

4-2-1 Quick Reference Table for Troubleshooting

The following table summarizes the general trouble symptoms and their causes. If ant trouble symptom occurs, take corrective action before it develops into a serious problem so as not to shorten the engine service life.

	Trouble symptom / Cause	Starting failure: Engine does not start	Starting failure: Engine starts but stops soon: Exhaust smoke: None	Starting failure: Engine starts but stops soon: Exhaust smoke: Little	Starting failure: Engine starts but stops soon: Exhaust smoke: Much	Insufficient engine output: Exhaust color: Ordinary	Insufficient engine output: Exhaust color: White	Insufficient engine output: Exhaust color: Black	Poor exhaust color: During work: White	Poor exhaust color: During work: Black	High knocking sound during combustion	Abnormal engine sound	Uneven combustion sound	Hunting: During idling	Hunting: During work	Large engine vibration	Difficulty in returning to low speed	Excessive fuel consumption	Lubricating oil: Excessive consumption	Lubricating oil: Dilution by fuel oil	Lubricating oil: Mixture with water	Lubricating oil: Low L.O. pressure	Much blow-by gas	Cooling water: Overheat	Cooling water: Low water temperature	Air intake: Pressure drop	Air intake: Pressure rise	Exhaust temperature rise		Corrective action
Engine system	Improper clearance of intake/exhaust valve	○	○			○						○														○		○		Adjust the valve clearance.
	Compression leakage from valve seat					○		○		○		○						○					○			○		○		Lap the valve seat.
	Seizure of intake/exhaust valve	○			○	○		○		○		○		○	○					○			○			○				Correct or replace.
	Blowout from cylinder head gasket					○															○			○						Replace the gasket.
	Seized or broken piston ring	○			○		○		○			○		○		○			○	○			○	○				○		Replace the piston ring.
	Worn piston ring, piston or cylinder	○			○		○		○										○	○			○							Perform honing and use oversize parts.
	Seized crankpin metal or bearing	○	○									○		○	○	○							○							Repair the replace.
	Improper arrangement of piston ring joints		○				○												○				○							Correct the ring joint positions.
	Reverse assembly of piston rings						○		○										○				○							Reassemble correctly.
	Worn crankpin and journal bearing					○						○		○	○	○						○								Measure and replace.
	Loosened connecting rod bolt											○				○						○								Tighten to the specified torque.
	Foreign matter trapped in combustion chamber	○										○							○				○							Disassemble and repair.
	Excessive gear backlash											○																		Adjust gear meshing.
	Worn intake/exhaust valve guide						○												○				○							Measure and replace.
	Defective governor		○											○	○	○	○													Make adjustment.
	Improper open/close timing of intake/exhaust valves	○					○	○	○	○		○																		Adjust the valve clearance.

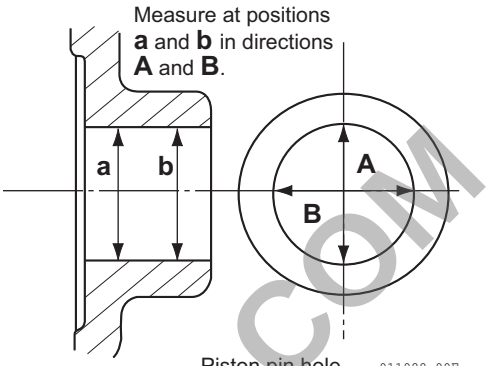
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[2] Piston pin hole measurement

in. (mm)

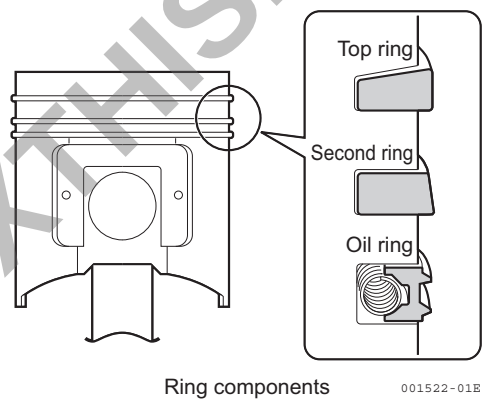
	Standard	Limit
Pin hole diameter	1.1811 to 1.1815 (30.000 to 30.009)	1.1826 (30.039)
Pin outside diameter	1.1807 to 1.1811 (29.989 to 30.000)	1.1795 (29.959)
Oil clearance	0.000 to 0.0008 (0.000 to 0.020)	0.0031 (0.080)



Piston pin hole 011088-00E

[3] Piston ring, ring groove and end clearance measurement

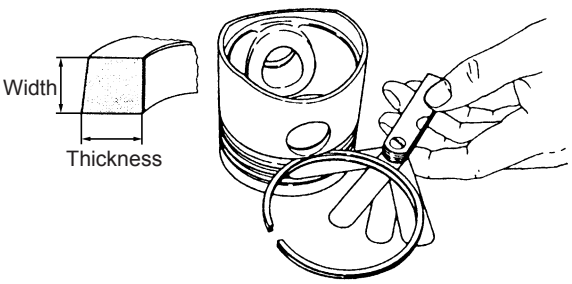
- Except for the top ring, to measure the piston ring groove width, first measure the width of the piston ring. Then insert the piston ring into the ring groove. Insert a thickness gage in between the piston ring and groove to measure the gap between them. Obtain the ring groove width by adding ring width to the measured side clearance.
- To measure the end clearance, push the piston ring into the sleeve using the piston head, insert a thickness gage in end clearance to measure. The ring shall be pushed in to approx.1.18 in. (30 mm) above the bottom end of the cylinder. For the top ring, measure only the piston ring joint end clearance in normal state.



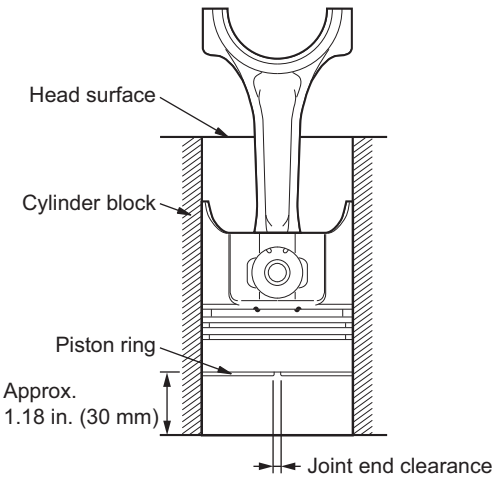
Ring components 001522-01E

in. (mm)

		Standard	Limit
Top ring	Ring groove width	0.0803 to 0.0811 (2.040 to 2.060)	–
	Ring width	0.0764 to 0.0772 (1.940 to 1.960)	0.0756 (1.920)
	Side clearance	0.0031 to 0.0047 (0.080 to 0.120)	–
	End clearance	0.0098 to 0.0177 (0.250 to 0.450)	0.0213 (0.540)
Second ring	Ring groove width	0.0189 to 0.0825 (2.08 to 2.095)	0.0864 (2.195)
	Ring width	0.0776 to 0.0783 (1.970 to 1.990)	0.0768 (1.950)
	Side clearance	0.0035 to 0.0049 (0.090 to 0.125)	0.0096 (0.245)
	End clearance	0.0177 to 0.0256 (0.450 to 0.650)	0.0287 (0.730)
Oil ring	Ring groove width	0.1187 to 0.1193 (3.015 to 3.030)	0.1232 (3.130)
	Ring width	0.1169 to 0.1177 (2.970 to 2.990)	0.1161 (2.950)
	Side clearance	0.0010 to 0.0024 (0.025 to 0.060)	0.0071 (0.180)
	End clearance	0.0098 to 0.0177 (0.250 to 0.450)	0.0217 (0.550)



Measuring side clearance



Ring joint end clearance measurement 001524-01E

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2. TECHNICAL DATA

2. Technical Data

2-1 Specifications

Item				Unit	ViO75-A
Main specifications of machine					
Dimensions					
Overall length (Transportation position)				in. (mm)	250.4 (6360)
Cabin	Overall height	Transportation position		in. (mm)	106.9 (2715)
		Traveling position		in. (mm)	106.9 (2715)
	Overall width	Full machine width		in. (mm)	89.4 (2270)
Canopy	Overall height	Transportation position		in. (mm)	-
		Traveling position		in. (mm)	-
	Overall width	Full machine width		in. (mm)	-
Tumbler center distance (steel / rubber)				in. (mm)	89.6 (2277) / 90.1 (2288)
Track gauge				in. (mm)	73.6 (1870)
Minimum ground clearance				in. (mm)	15.0 (380)
Traveling performance					
Travel speed	Steel crawler	Low speed (Forward/Reverse)		MPH (km/hr)	1.55 (2.5)
		High speed (Forward/Reverse)		MPH (km/hr)	2.80 (4.5)
	Rubber crawler	Low speed (Forward/Reverse)		MPH (km/hr)	1.68 (2.7)
		High speed (Forward/Reverse)		MPH (km/hr)	2.92 (4.7)
Permissible water depth limit				in. (mm)	19.7 (500)
Work performance					
Bucket	Width (Standard) *including side cutter			in. (mm)	29.5 (750)
	[Standard. JIS heaped capacity]			cu.ft. (cu.m)	9.89 (0.28) [Old JIS 8.83 (0.25)]
	Number of teeth / Installation method			pcs.	4 / rubber pin lock type
Maximum digging depth	With blade raised			in. (mm)	175.2 (4450)
	With blade on the ground			in. (mm)	185.0 (4700)
Maximum depth of vertically digging				in. (mm)	157.5 (4000)
Maximum dumping height				in. (mm)	184.3 (4680)
Minimum front swing radius (with boom in front)				in. (mm)	94.9 (2410)
Minimum front swing radius (at 68 degrees right boom swing)			Cabin	in. (mm)	78.0 (1980)
			Canopy	in. (mm)	-
Rear end swing radius				in. (mm)	44.5 (1130)
Boom swing angle		Cabin	Left	degrees	68
			Right	degrees	68
		Canopy	Left	degrees	-
			Right	degrees	-
Maximum digging force		Bucket		lbs. (k•N)	11015 (49.0)
		Arm		lbs. (k•N)	8048 (35.8)

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4-3-12 Periodic Maintenance Schedule

The engine periodic inspection timing is hard to determine as it varies with the application, load status, qualities of the fuel and lubricating oils used and handling status. General rules are described here.

○ : Inspection ◇ : Parts replacement

Classification	Item	Daily	Maintenance period				
			Every 50 hours	Every 250 hours	Every 500 hours	Every 1000 hours	Every 2000 hours
Fuel oil system	Fuel tank level check and fuel supply	○					
	Fuel tank draining		○				
	Water separator draining (Option)		○ Every 100 hours				
	Water separator cleaning (Option)				○		
	Fuel filter element replacement				◇		
Lube oil system	Lube oil level check	○					
	Lube oil replacement		◇ 1st time	◇ 2nd time and there after			
	Lube oil filter replacement						
Cooling water system	Cooling water level check and replenish	○					
	Radiator fin cleaning			○			
	Cooling fan V-belt tension check	○					
	Cooling water replacement					◇	
	Cooling water path flushing and maintenance					○ within one years	
Fuel oil, lube oil and cooling water leakage check		○					
Rubber hose	Fuel pipe and cooling water pipe inspection and maintenance						○
Air intake system	Air cleaner cleaning and element replacement			○	◇		
	Turbocharger blower cleaning					○	
Electrical system	Warning lamp & instruments function check	○					
	Battery electrolyte level check and battery recharging	○					
Cylinder head	Intake/exhaust valve head clearance adjustment					○	
Fuel injection pump and valve	Fuel injection valve pressure inspection					○	
	Fuel injection timing inspection						○

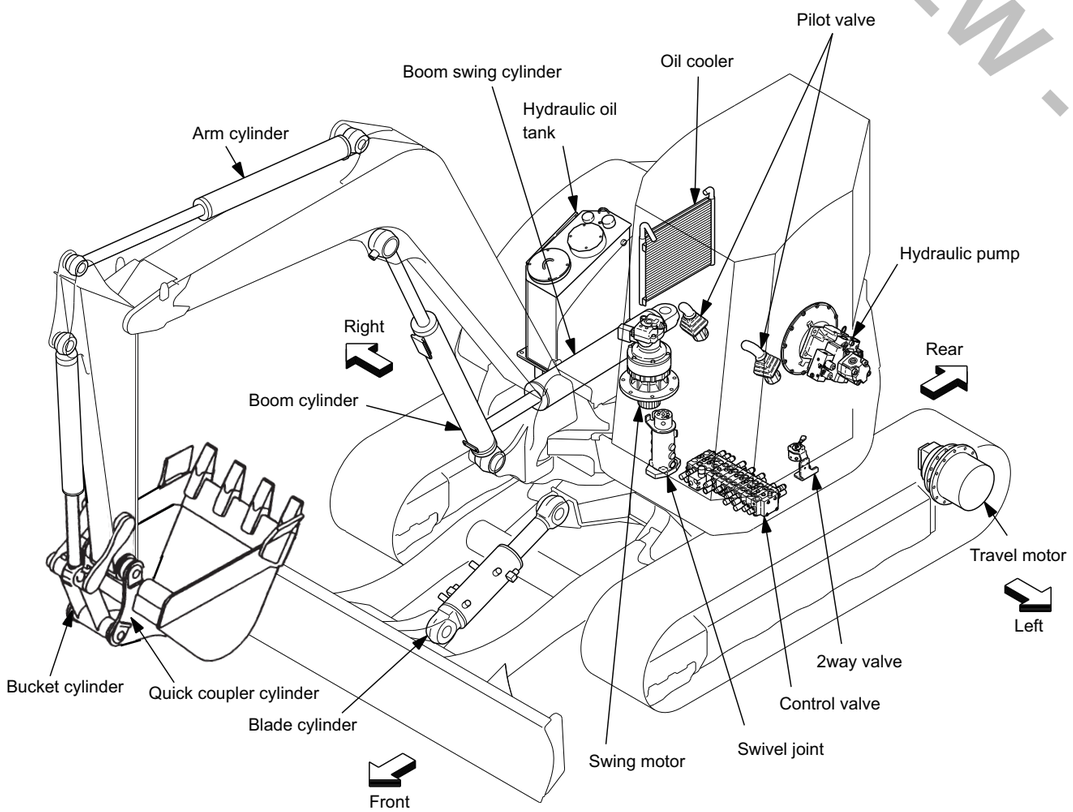
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5. HYDRAULIC SYSTEM

5. Hydraulic System

5-1 Outline

The hydraulic system consists of an engine, variable displacement piston pumps, a gear pump, a control valve, a boom cylinder, an arm cylinder, a bucket cylinder, a boom swing cylinder, a blade cylinder, a quick coupler cylinder, a swing motor, a swivel joint, two travel motors, 2 way valve and a hydraulic oil tank. The oil discharged from the variable displacement piston pumps and that from the gear pump flow to the actuators through the control valve.
The hydraulic pilot control system comprises a pilot pump, a cut-off valve mounted on the hydraulic pump and two pilot valves. The oil discharged from the pilot pump flows into the pilot ports of the control valve through the cut-off valve, the pilot valves and 2 way valve to control the valve spool movement in proportion to the pressure at the port.



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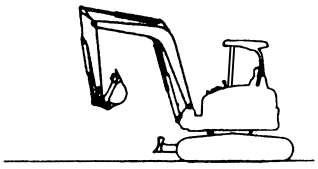
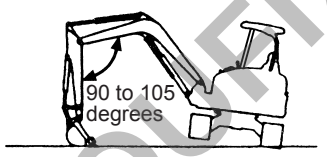
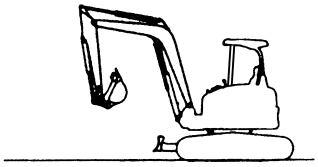
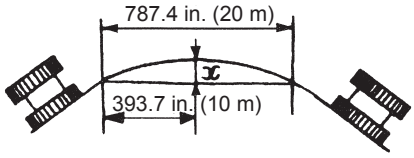
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Applicable model			ViO75-A	
Item	Measuring condition	Unit	Standard	Allowance
Machine performance				
Travel speed	Machine position  • Engine : rated speed • Hydraulic oil temp. : 122 to 140 °F (50 to 60 °C) • Site : Firm, flat ground • Traveling time for 787.4 in. (20 m) after an approach run of 196.9 in. (5 m) or more.	sec. ( ) : Value is rubber track spec.	High speed 17.0 (16)	20.0 (19)
			Low speed 28.5 (27)	31.5 (30)
Track speed	Machine position  • Engine : rated speed • Hydraulic oil temp. : 122 to 140 °F (50 to 60 °C) • Site : Firm, flat ground • Travel lever : Full throttle (Floating crawler side) • Float one side of the crawler. Make a mark on the crawler. After turning the floating crawler side more than once, measure the time needed for 3 turns of the crawler.	sec.	High speed 14.5	16.5
			Low speed 25	28
Track deviation	Machine position  • Engine : rated speed • Hydraulic oil temp. : 122 to 140 °F (50 to 60 °C) • Site : Firm, flat ground • Measure the deviation (χ) in a travel distance of 787.4 in. (20 m) after an approach run of 196.9 in. (5 m) or more. 	in. (mm)	11.8 (300) or less	14.2 (360) or less

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The adjustment method of reducing the flywheel turning numbers (for reference):
Set No.1 cylinder to the compression T.D.C. and adjust the clearance of the ● mark of the below table. Next, turn the flywheel once, and adjust the clearance of the ○ mark.

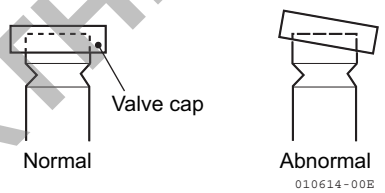
Ignition order of 3 cylinder engines: 1→3→4→2

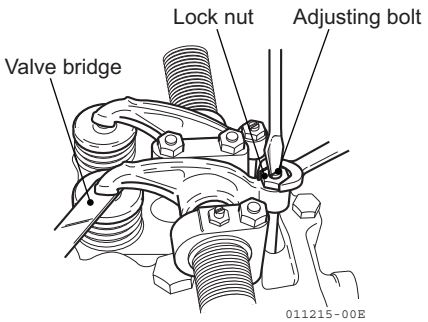
Cylinder No.	1		2		3		4		
Valve	Suction	Exhaust	Suction	Exhaust	Suction	Exhaust	Suction	Exhaust	
No.1 compression T.D.C	●	●	●			●			The first time
No.4 compression T.D.C				○	○		○	○	The second time

(b)Valve clearance inspection and adjustment

[1] Loosen adjusting bolts

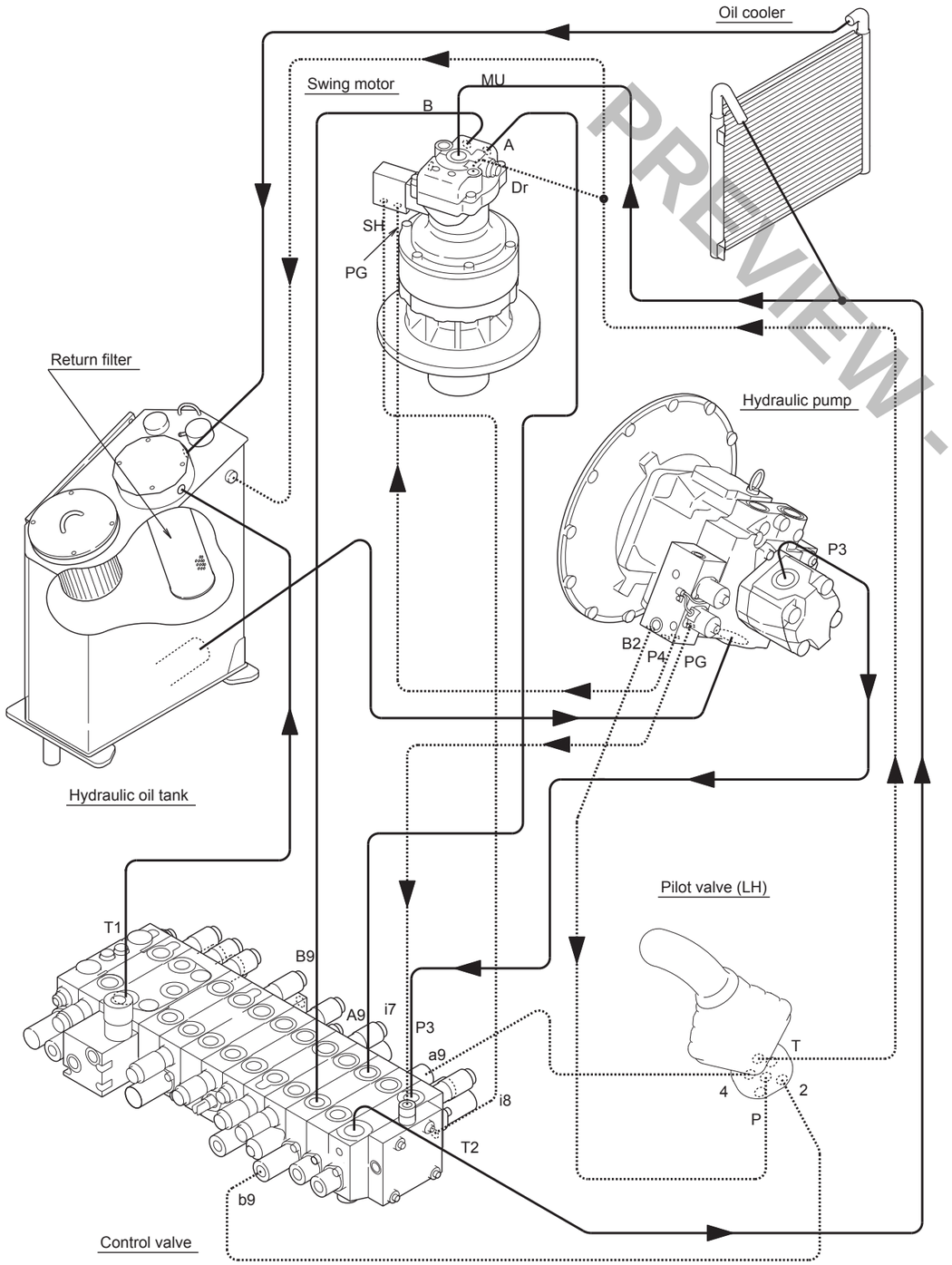
Loosen the lock nut and adjusting screw. Check the valve for any inclination of valve cap, dirt or wear.





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5. HYDRAULIC SYSTEM



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5. Disassembly and Reassembly

1) Precautions for Disassembly and Reassembly

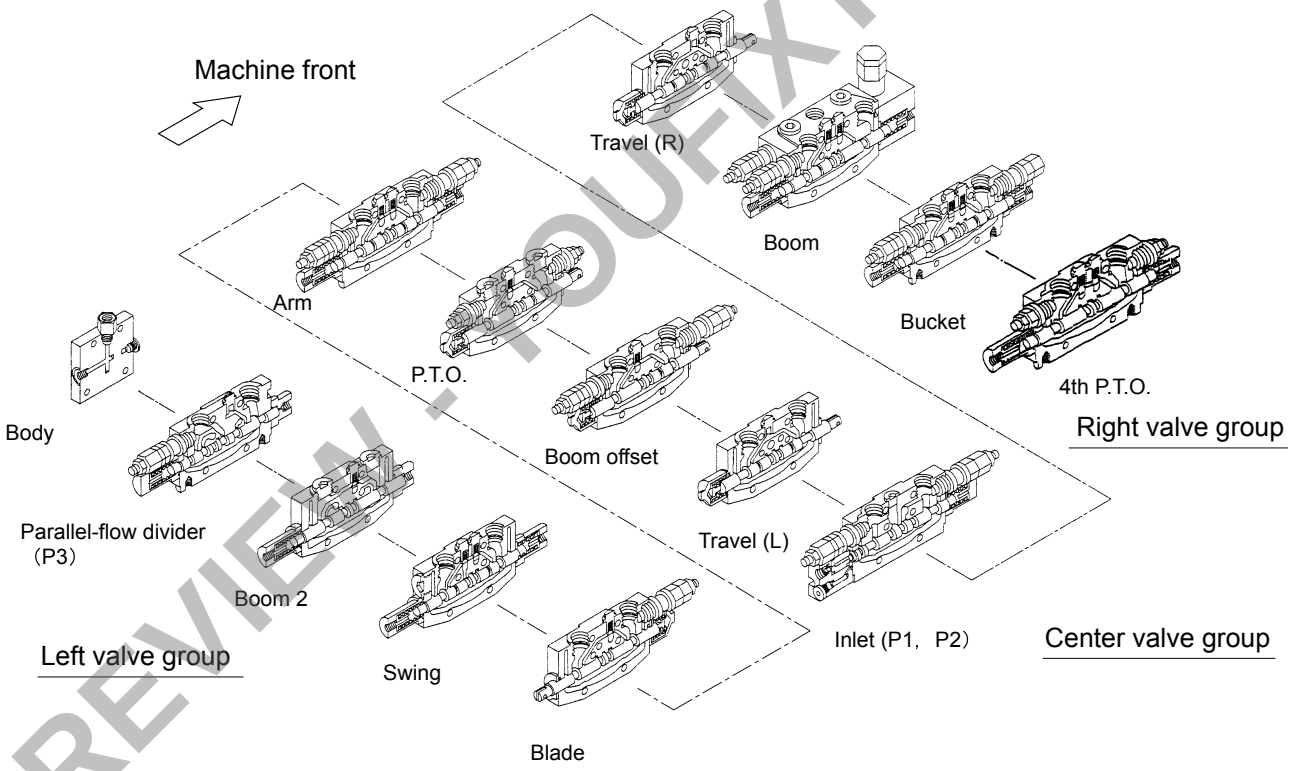
(1) Since the parts of this hydraulic system are precision made for tight clearances, be sure to perform disassembly and reassembly in a clean area that is free from dust.
(2) Prepare clean tools and cleaning oil and handle them carefully.
(3) First clean the external surface of removed assemblies.
(4) Before beginning, review the drawings of the internal construction and prepare the required parts according to the purpose and extent of disassembly.
(5) Never disassemble or readjust adjust screws unless required.
(6) In principle, seals and rings that have been removed must be replaced with new ones. As some replacement parts are available only in sub-assemblies, refer to the parts catalogue to prepare the necessary subassemblies in advance.
(7) O-rings
  [1] Lubricate the O-ring and the O-ring fitting seat with clean grease or hydraulic oil.
  [2] O-rings may not be damaged or distorted by heat.
  [3] Do not permanently deform O-rings.
  [4] Avoid rolling the O-ring when fitting it.
    A distorted O-ring may not return to its original shape, and therefore may cause oil leaks.
(8) Before beginning reassembly, check the mating surfaces of each section to be sure that there is no cleaning oil or hydraulic oil present. If reassembly is performed without cleaning this oil, it may be mistaken for oil leakage.
(9) Follow torque specifications.

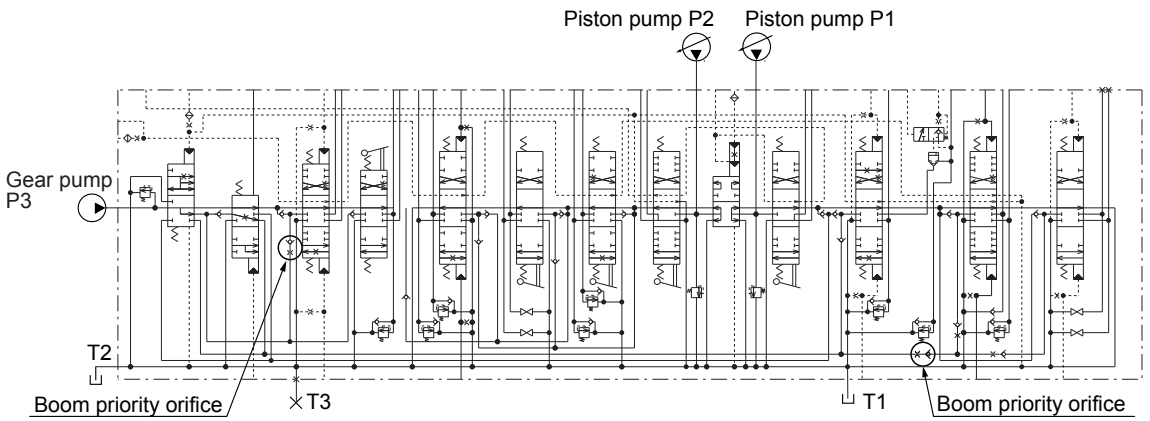
2) Tools for Disassembly and Reassembly

Tools	Size
Hexagon socket screw key	3 mm, 4 mm, 6 mm, 8 mm, 12 mm
Hexagon socket screw key	6  L=0.79 in. (20 mm)
Plastic hammer	Medium
Snap ring pliers	For internal snap ring 80 mm
Snap ring pliers	For external snap ring 35 mm
Screw driver	Medium
Torque wrench	
Grease	
Adhesive	Loctite 241, 270 Three Bond 1305

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When all the spools are in the neutral position, the hydraulic oil sent from the piston pump P1 to the inlet spool section flows through the neutral passage and the bucket section to the return passage, and returns to the hydraulic oil tank through the return ports of the boom and parallel-flow divider sections.
The oil sent from the piston pump P2 to the inlet spool section and the oil sent from the gear pump P3 to the inlet spool section flow through the neutral passage and are combined in the arm section. The combined oil flows to the return passage between the arm and blade sections and returns to the hydraulic oil tank through the return ports of the boom and parallel-flow divider sections. When any one of the three spools in the right valve group is operated and is out of the neutral position, the neutral passage is blocked and no oil flows to the return passage. This is the same for the center and left valve groups.
The right valve group has parallel passages which allows the simultaneous operation of the boom and bucket sections. In the simultaneous operation, a check valve with an orifice is installed in the parallel passage before the bucket section to let oil flow to the boom section even when the boom has got heavier load than the bucket. (boom priority orifice)
In the single operation of the bucket section, oil is supplied to the bucket section from the neutral passage. (tandem circuit)
In the center valve group, the arm section is also supplied with oil from the neutral passage of the gear pump P3. (combined circuit)
The left valve group has parallel passages to allow the simultaneous operation of the swing and blade sections. In the simultaneous operation, a check valve with an orifice is installed in the parallel passage before the swing section to let oil flow to the blade section even when the blade has got heavier load than the swing motor. (boom priority orifice)
In the single operation of the swing section, oil is supplied to the swing section from the neutral passage. (tandem circuit)

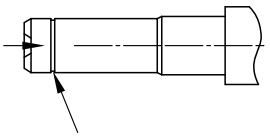
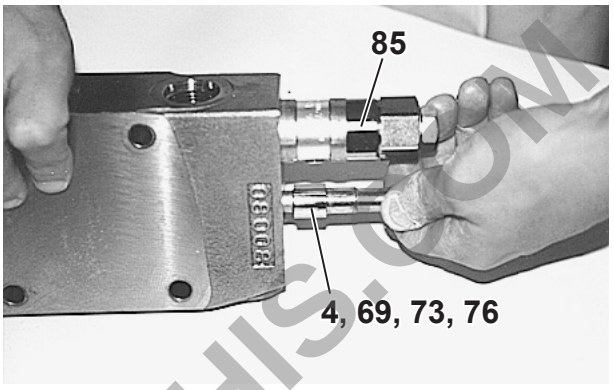
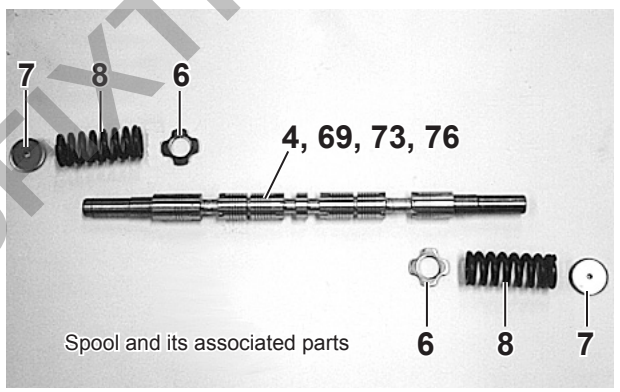


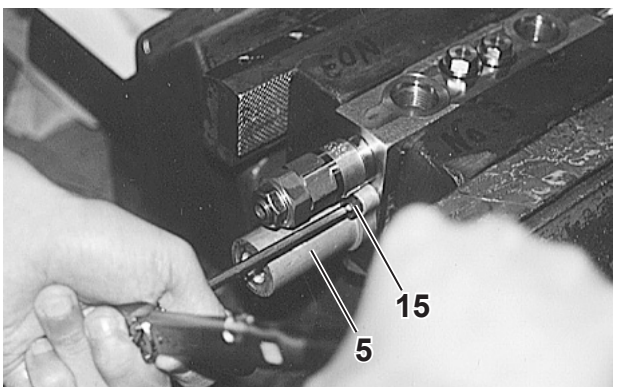


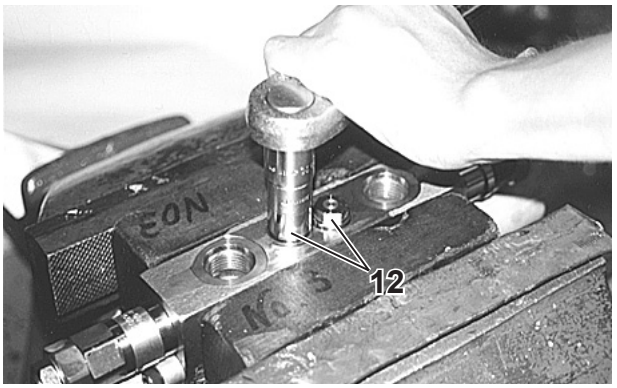
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5) Reassembly

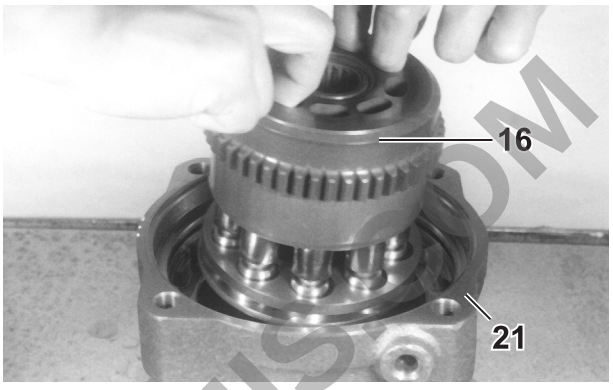
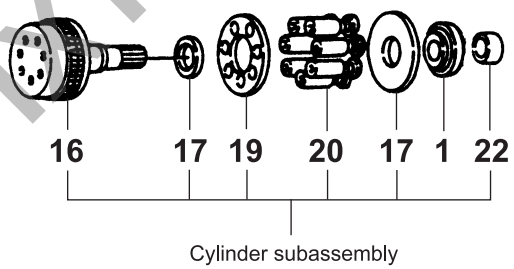
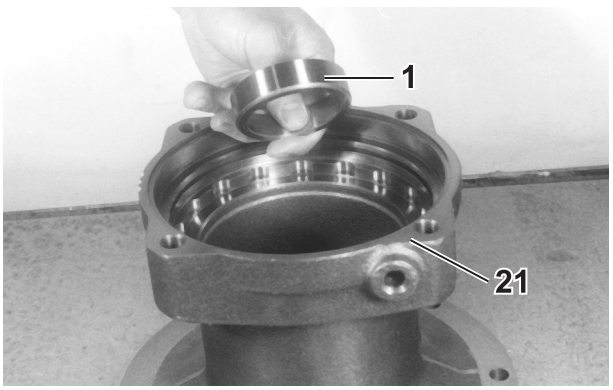
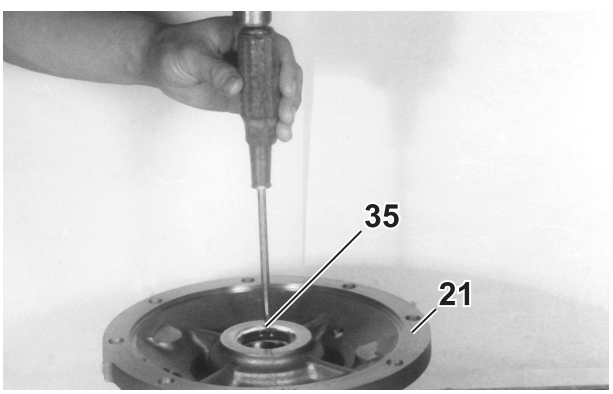
• Bucket, arm, swing and boom 2 sections

Procedure	
(1) Apply clean hydraulic oil to each spool assembly and slowly install it into the valve housing. ***Notes :*** *a) Take care not to install the spool assembly in the wrong direction.* *b) A left-right asymmetry spool has a groove for identification in its top part. (insert the spool with the groove on the port B side of the section.)* Applicable sections : Bucket and arm  Groove for identification	  Spool and its associated parts

(2) Install caps **5** (with O-rings **14**), spring seats **6** and **7** and springs **8** to each valve housing. Tightening torque: 6.50 to 7.95 ft·lbf (8.8 to 10.8 N·m)	

(3) Install check valves **9** and **10** or **74**, springs **11** and plugs **12** to each valve housing. Tightening torque: 22.4 to 23.9 ft·lbf (30.4 to 32.4 N·m) (4) Install O-ring **19** to the valve housing.	

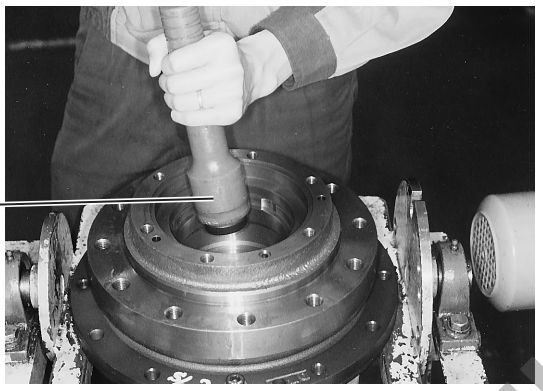
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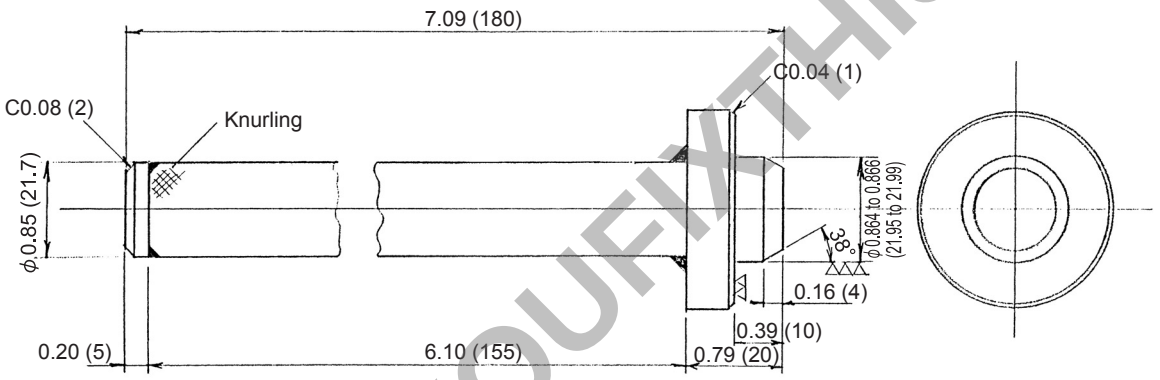
Procedure	
(12) Remove cylinder assembly from housing **21**. ***Notes :*** • *Oil seal **35** and outer race of taper roller bearing **1** remain in housing **21**.* • *Take care not to damage cylinder sliding surfaces.* • *Mark each piston S/A and cylinder bore to aid in assembly.*	 
(13) Remove outer race of taper roller bearing **1** from housing **21**.	
(14) Tap oil seal **35** with using a screw driver and a hammer to remove it from housing **21**. ***Note :*** *Discard oil seal **35** and replace it with a new one.*	

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Retainer (3) Unit : in. (mm)

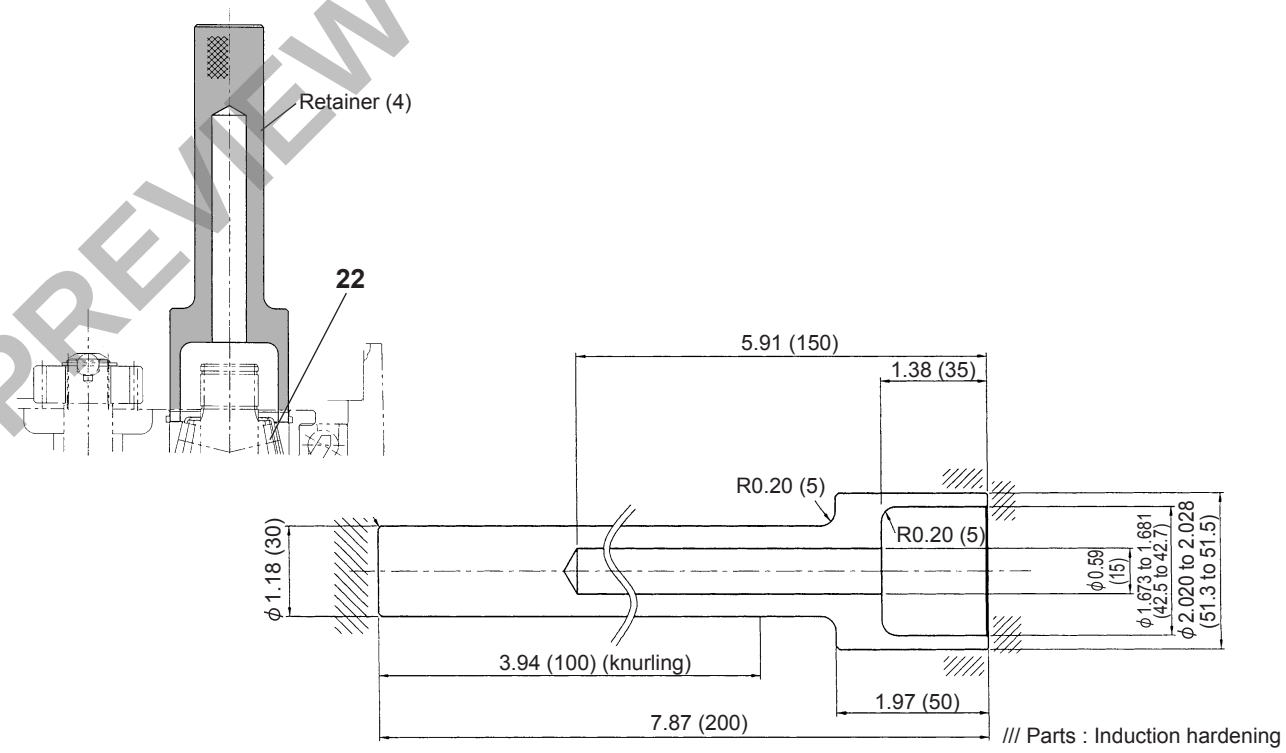
To be used for pushing oil seal **132** when installing it in spindle **2**.





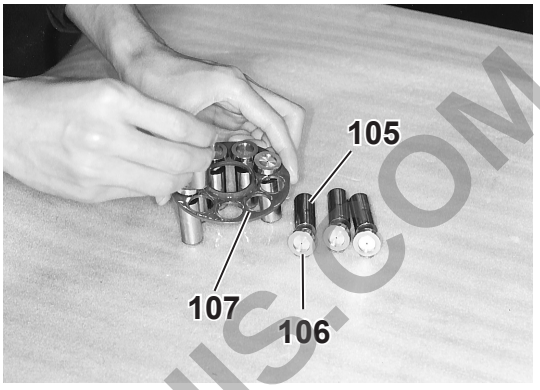
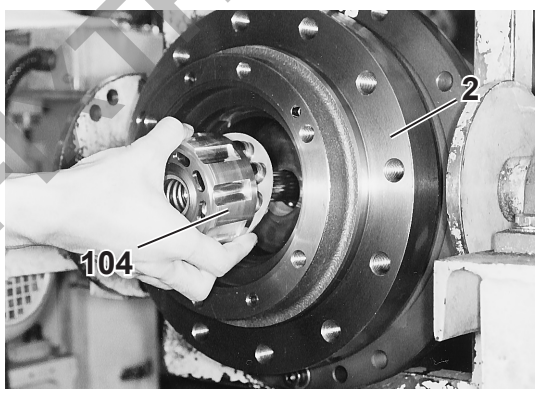
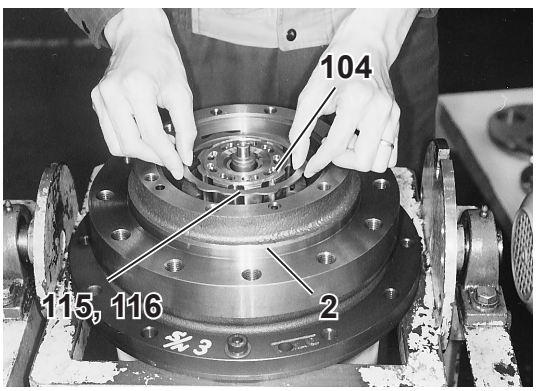
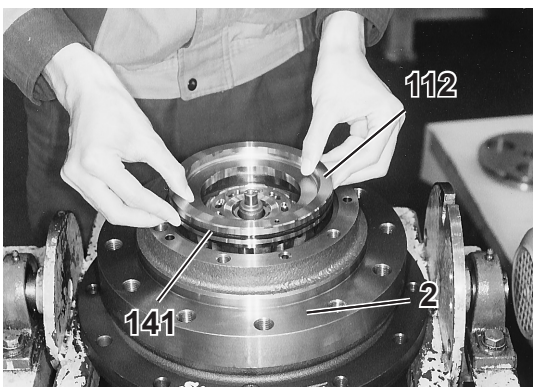
Retainer (4) Unit : in. (mm)

To be used for installing RV gear sub-assembly on spindle **2**.

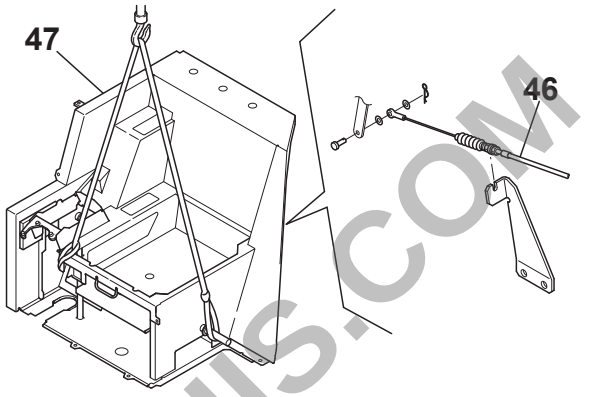
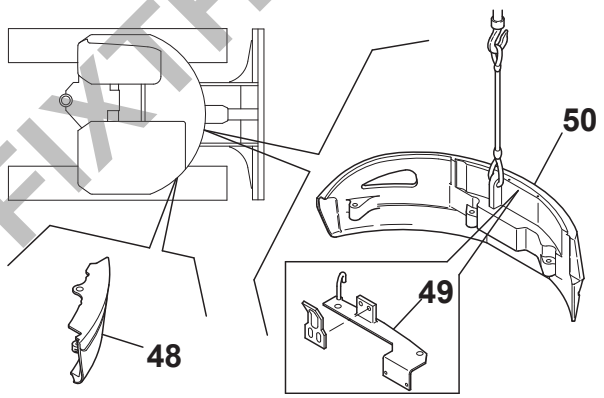
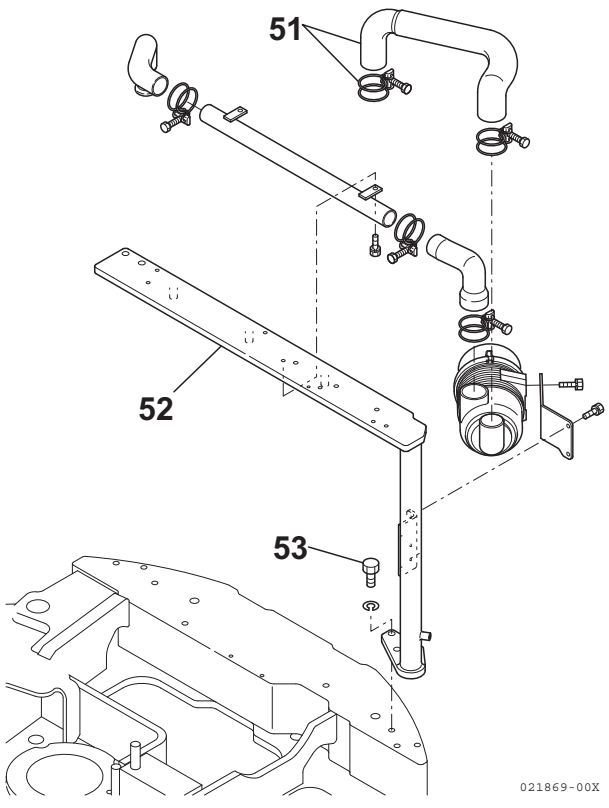


/// Parts : Induction hardening

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Procedure	
(3) Mount the retainer plate **107** and 9 piston assemblies in the cylinder block **104**. ***Note :*** *Match the round surface sections of the retainer plate **107** and thrust ball **108**.*	
(4) Install cylinder block **104** on the motor shaft **102**, matching its splines to the shaft splines. ***Note :*** *Turn the cylinder block **104** back and forth to be sure there is no play.* *A play, if any, means that the splines are worn to require replacement of the part.*	
11. Assembly of parking brake section ***Note :*** *Mount the friction plate **115** after dipping in hydraulic fluid.* (1) Mount the friction plate **115**,mating plate **116** (2 each) alternately in the outer circumference groove of the cylinder block **104** and inner circumference groove of the spindle **2**.	
(2) Mount the O-rings **135**, **141** in the O-ring grooves of the piston **112**. At this time, apply a thin coat of grease to the O-rings **135**, **141**. (3) Mount the piston **112** in the spindle **2**. ***Note :*** *If it is difficult to place the piston **112** in the spindle **2** due to resistance of the O-rings **135**, **141**, insert by tapping the end face of the piston **112** with a plastic hammer.* *When mounting the piston **112**, be careful not to damage the O-rings.*	

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Procedure	
(19) Disconnect accelerator wire **46** on the engine side. Then put rope onto operator's seat mount **47** and lift to remove it. ***Note :*** *When lifting up the operator's seat mount, make sure that no harness and hose get caught.*	
(20) Remove side weight L **48**, lock bracket **49** (with a feed pump), and then counterweight **50**. ***Note :*** *Put rope onto counterweight **50**, and lift to remove it.*	
(21) Loosen hose clip **51** of the intake hose A in the connecting part on the engine side and remove the intake hose A. (22) Remove bolts **53** and then bracket **52** (with the air cleaner assembly and the intake pipe). ***Note :*** *For the air conditioner-equipped type, remove bracket **52** with the receiver dryer installed.*	

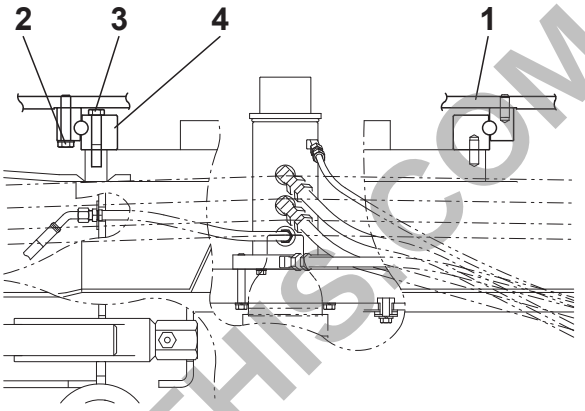
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7-4 Swing Bearing

7-4-1 Removal and Reinstallation of Swing Bearing

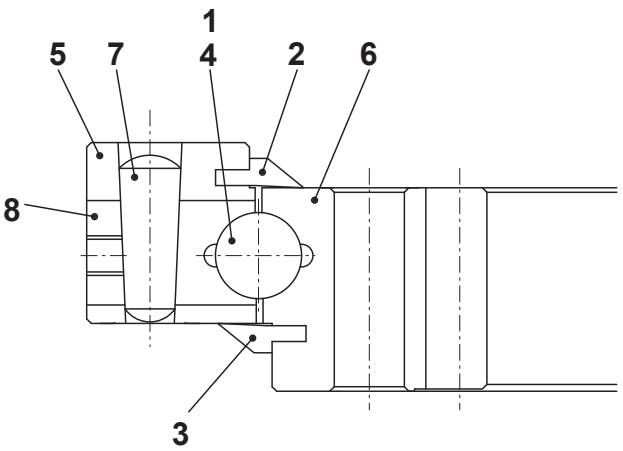
1) Removal

(1) Remove the implement. Refer to Section "7-6-1 Removal and Reinstallation of Implement".
(2) Remove the engine. Refer to Section "7-1-5 Removal and Reinstallation of Engine".
(3) Remove the swing motor. Refer to Section "7-5-3 Removal and Reinstallation of Swing Motor".
(4) Remove the hydraulic hoses of the swivel joint. Refer to Section "7-5-4 Removal and Reinstallation of Swivel Joint".
(5) Suspend turning frame **1** at three points temporarily.
(6) Remove bolts **2** (28 pcs.) for the outer race of the swing bearing.
(7) Lift up turning frame 1.
(8) Remove bolts **3** (30 pcs.) for the inner race of the swing bearing.



2) Exploded View and Component Parts of Swing Bearing

No.	Part	Q'ty
1	Steel ball	78
2	Seal A	1
3	Seal B	1
4	Support	78
5	Outer race	1
6	Inner race	1
7	Taper pin	1
8	Plug	1

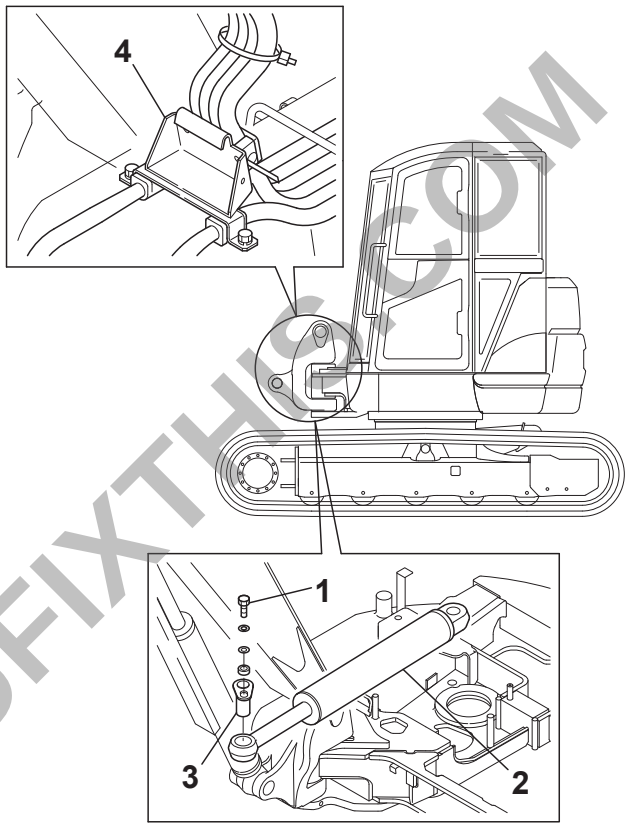
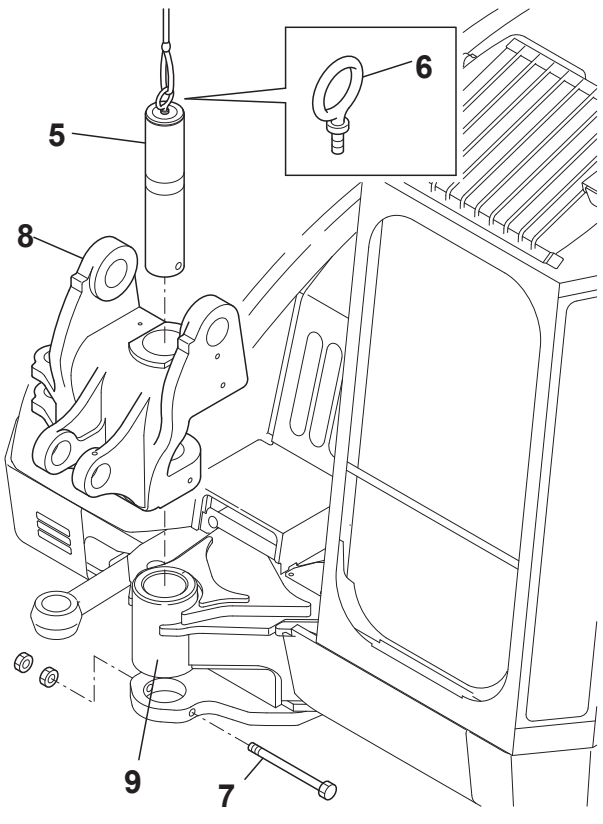


3) Inspection

(1) Check the gear tooth surfaces for the nicks, flaws, cracks, wear and breakage. Replace if the damage is excessive.
(2) Check for abnormal sound. Clean, grease or replace if necessary.
(3) Check for the play in the inner and outer races and rotation fluctuation. Refer to the service standards for repair or replacement.
(4) Check for the grease leak from the swing bearing seal. Replace if the leakage is excessive.

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[Removal of boom bracket]

Procedure	
(1) Remove the bucket. Refer to "Removal of Bucket" in Section 7-6-1. (2) Remove the arm. Refer to "Removal of Arm" in Section 7-6-1. (3) Remove the boom. Refer to "Removal of Boom" in Section 7-6-1. (4) Remove bolt (M14) **1** to pull out pin **3** from the rod side of boom swing cylinder **2**. (5) Remove hose clamp **4**.	
(6) Install eye bolt **6** into the tapped hole (M12) in pin **5** and put rope through eye bolt **6**. (7) Remove bolt (M18) **7** and lift up pin **5** to remove it from boom bracket **8**. (8) Lift up boom bracket **8** with rope to remove it from turning frame **9**.	

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