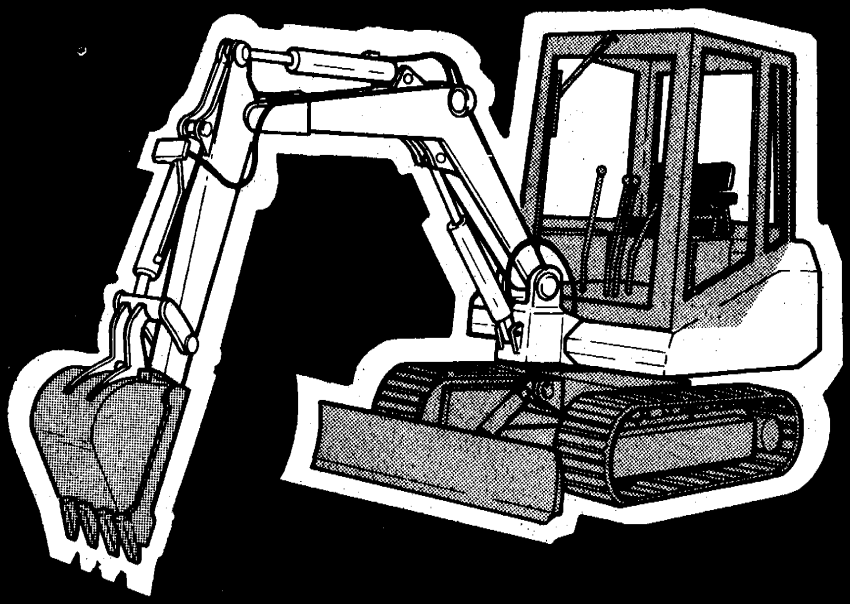
bobcat

116 HYDRAULIC EXCAVATOR

SERVICE MANUAL



MELROE COMPANY

6570484 (4-87)-5C

A BUSINESS UNIT OF CLARK EQUIPMENT COMPANY

Printed in U.S.A.

WEIGHT TABLE

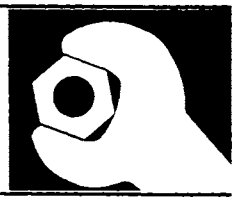
⚠ This weight table is a guide for use when transporting or handling components

Unit: kg

Machine model	116
Serial No.	12001 and Up
Engine assembly	252
• Engine (including engine mount)	237
Hydraulic tank (dry)	49
Fuel tank (dry)	22
Operator cab assembly (if equipped)	162
Revolving frame assembly	469
Swing machinery assembly	36
Center swivel joint assembly	32
Travel motor assembly (with reduction gear)	46.5 x 2
Counterweight	251
Track frame assembly	737
• Recoil spring assembly	25 x 2
• Swing circle assembly	62
Track shoe assembly Standard track shoe (400 mm wide)	524
Boom assembly	169
Arm assembly	79
Bucket assembly	100
Boom cylinder assembly	48
Arm cylinder assembly	33.5
Bucket cylinder assembly	30.5
Swing cylinder assembly	39.5
Blade cylinder assembly	28
Swing bracket assembly	83
Blade	190

ENGINE

13 DISASSEMBLY AND ASSEMBLY

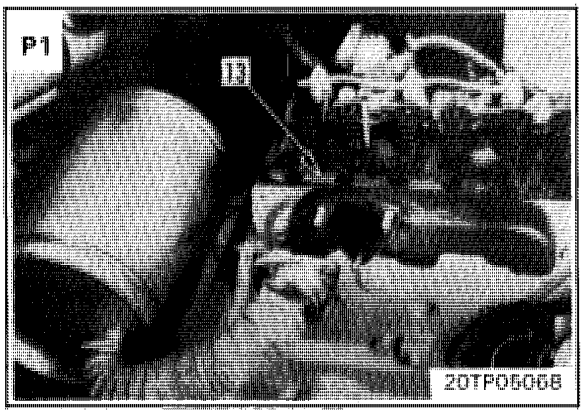


★ When operating the hydraulic cylinders for the first time after reassembling cylinders, pumps and piping, always bleed the air as follows:

1. Start engine and run at low idling.
2. Operate hydraulic cylinder 4 to 5 times, stopping 100 mm from stroke end.
3. Next, operate cylinder 3 to 4 times to stroke end.
4. After doing this, run engine at normal speed.

★ After repair or long storage, follow the same procedure.

P1



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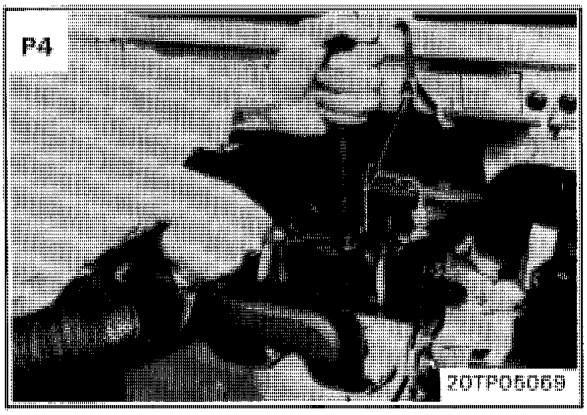

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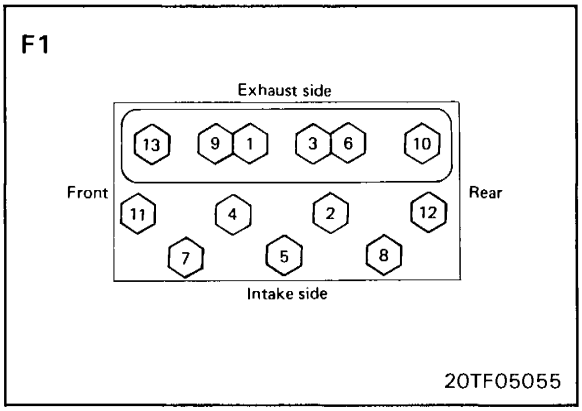

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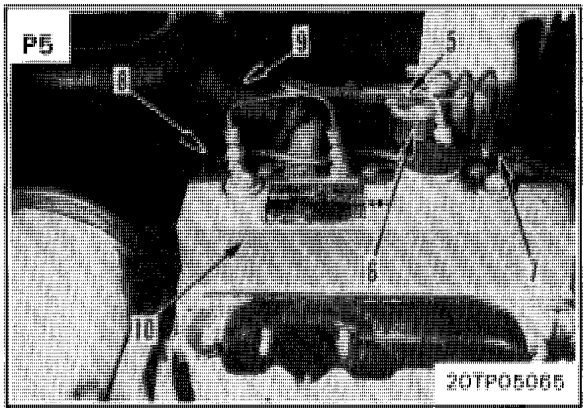

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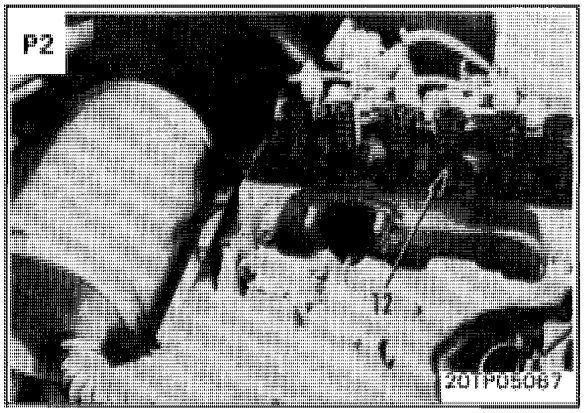

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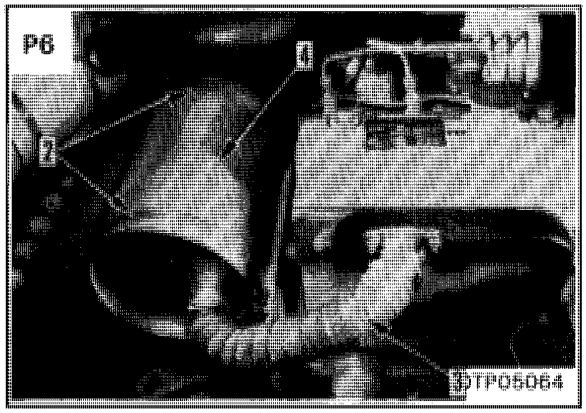

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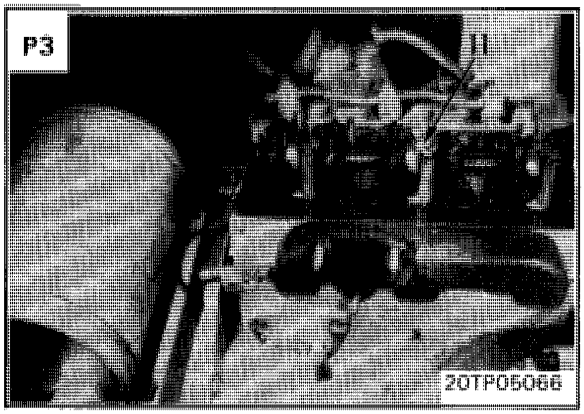

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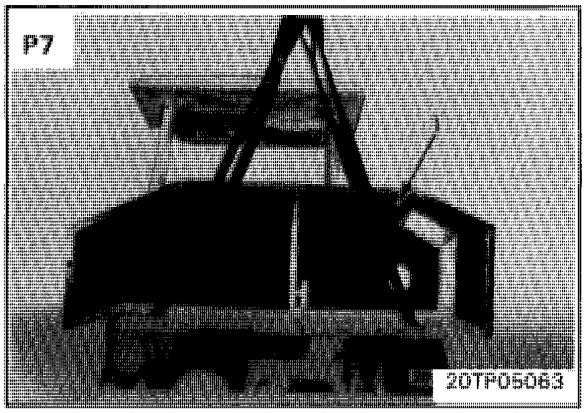

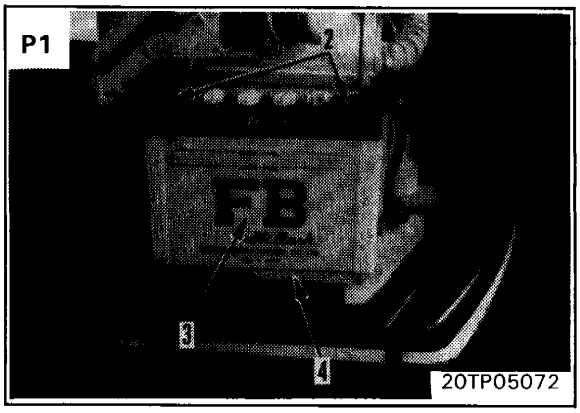
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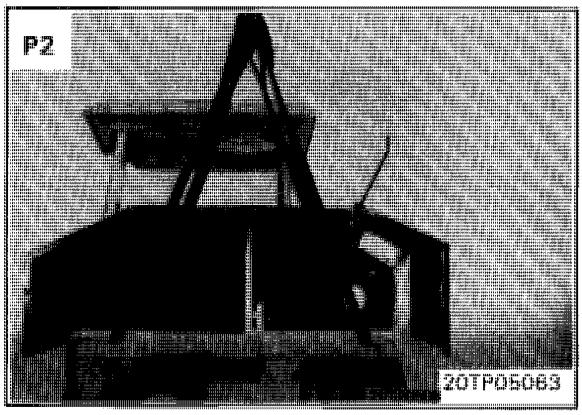
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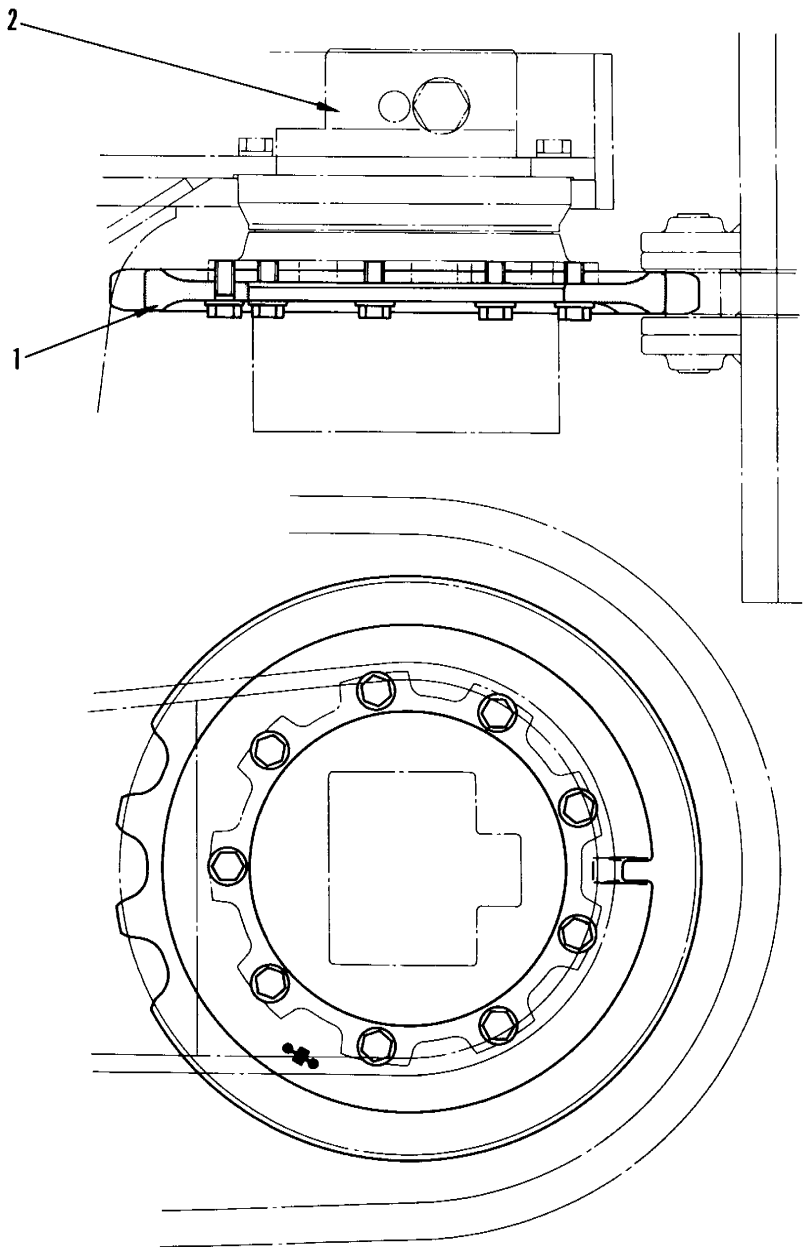
SPROCKET
(S/N 12001 & Above)

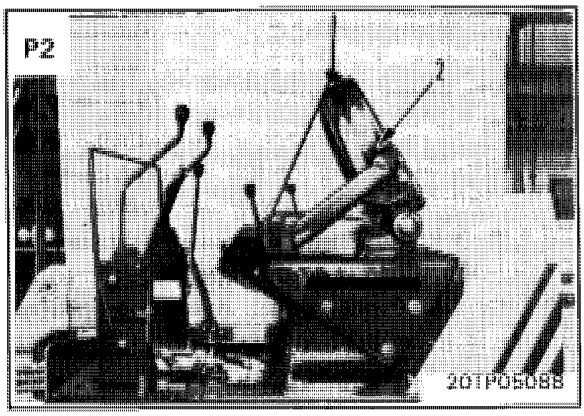


20TF05006

OUTLINE

- The travel speed is reduced through the eccentric differential planetary gear system in the travel motor. A sprocket is bolted to the travel motor output flange.

1. Sprocket
2. Travel motor
   (with reduction gear and brake valve)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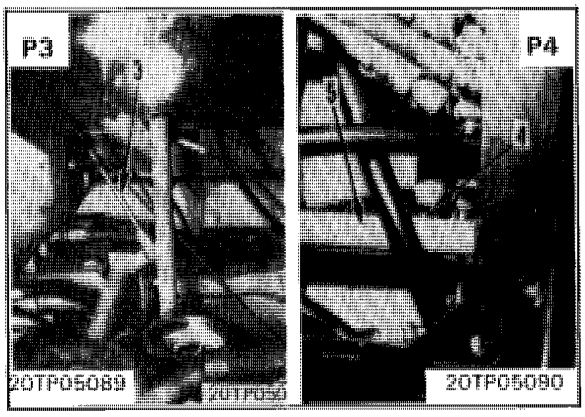
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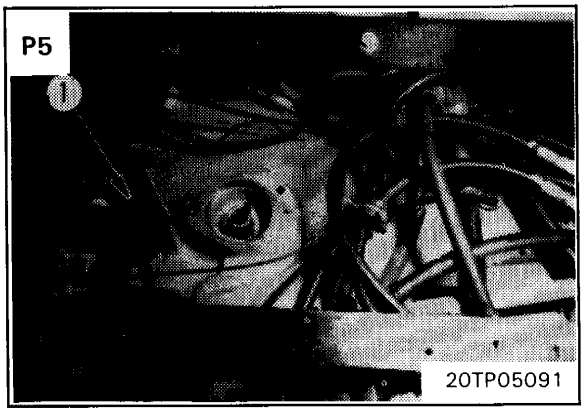
P4
20TP05090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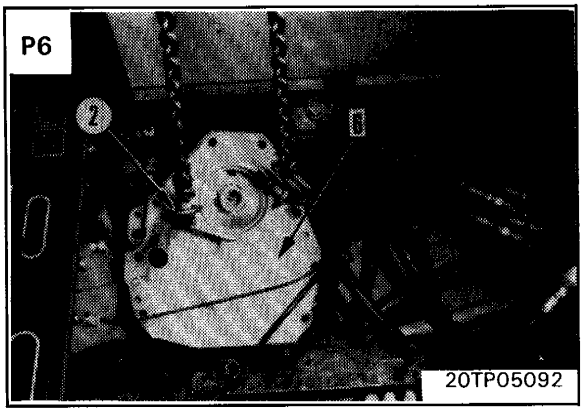
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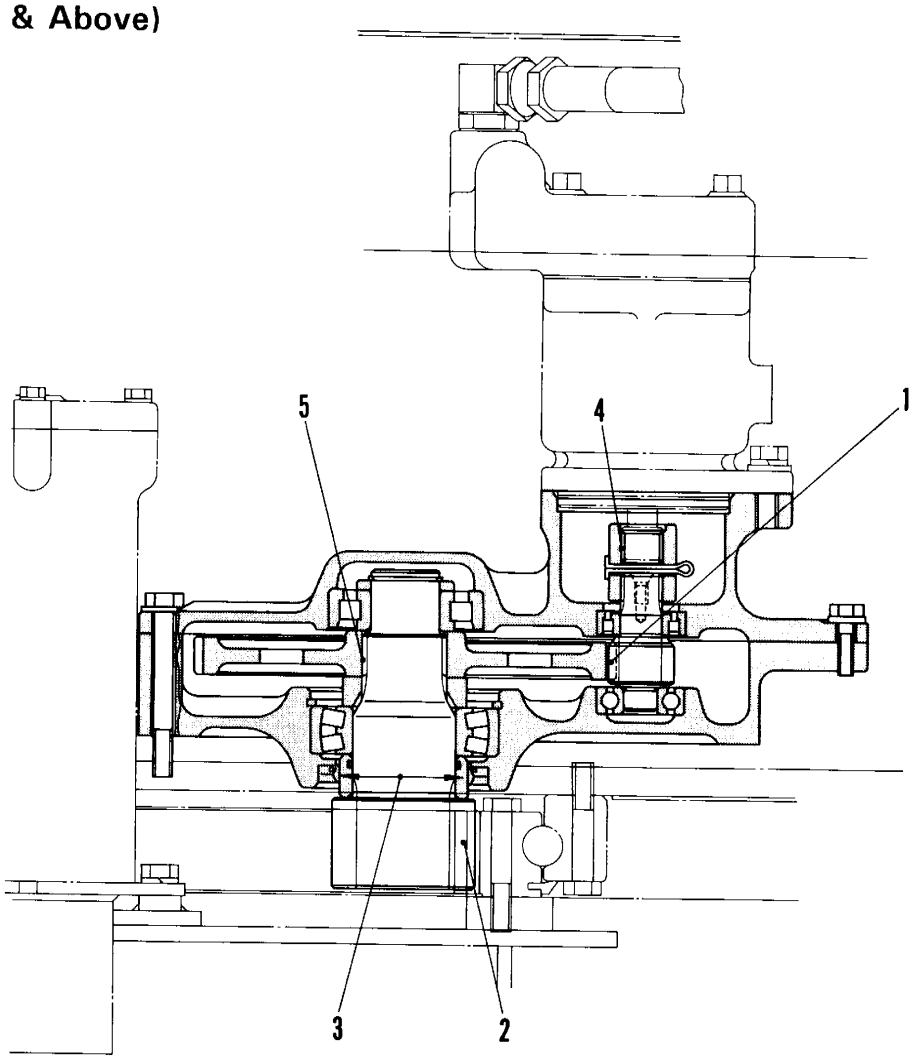
20TP05092

SWING MACHINERY
(S/N 12001 & Above)

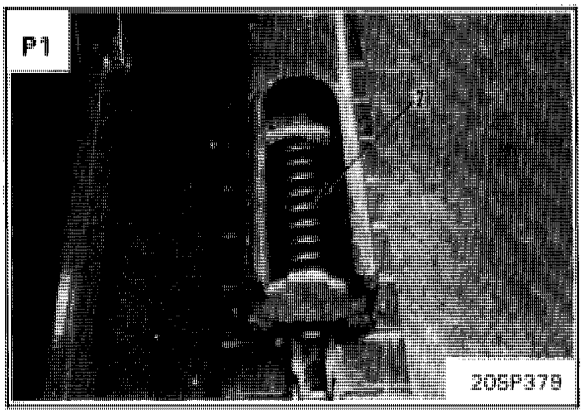


20TF06017

Unit: mm

No.	Check item	Criteria		Remedy
1	Backlash between 1st pinion and 1st gear	Standard clearance	Clearance limit	Replace
		0.14 to 0.50	1.0	
2	Backlash between output shaft (pinion) and swing circle	0.202 to 0.982	2.0	
3	Wear of output shaft collar surface contacting with oil seal	Standard size	Repair limit	Apply hard-chrome plating or replace
		$75\ ^{0}_{-0.074}$	74.8	
4	Clearance in the rotating direction between coupling and 1st pinion spline	Standard clearance	Clearance limit	Replace
		0.074 to 0.179	0.36	
5	Clearance in the rotating direction between output shaft and 1st gear spline	0.072 to 0.178	0.36	

P1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20SP379

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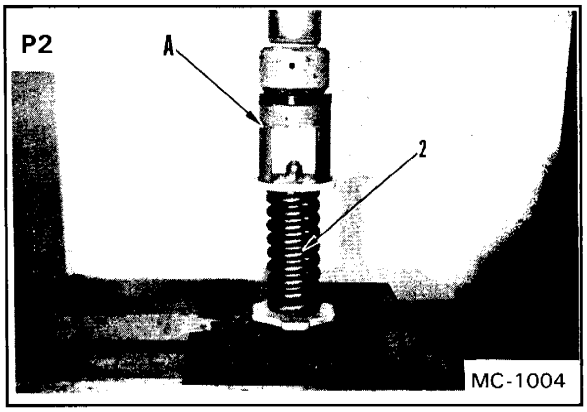
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2
MC-1004

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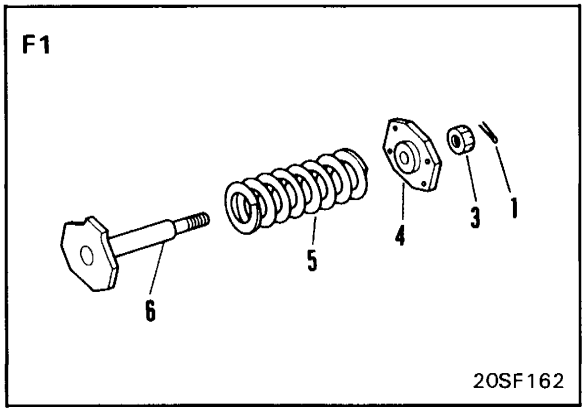
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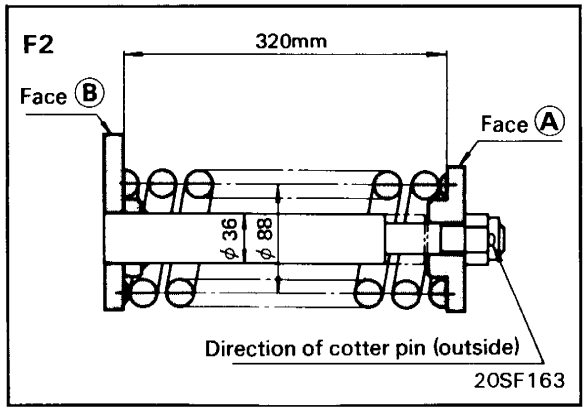
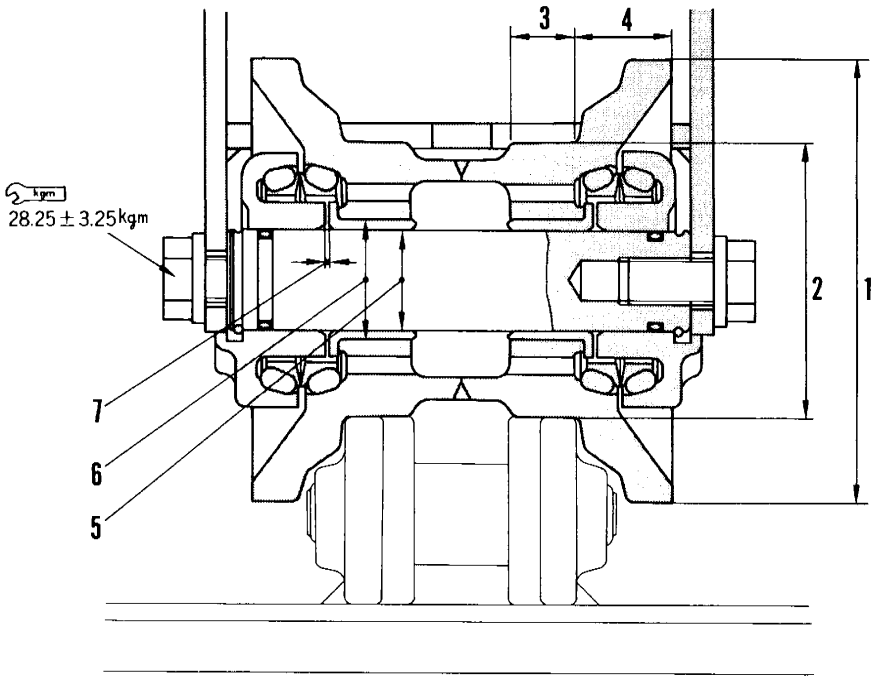
5
4
3
1
20SF162

F2


320mm
Face B
Face A
φ 36
φ 88
Direction of cotter pin (outside)
20SF163

TRACK ROLLER
(S/N 12001 & Above)

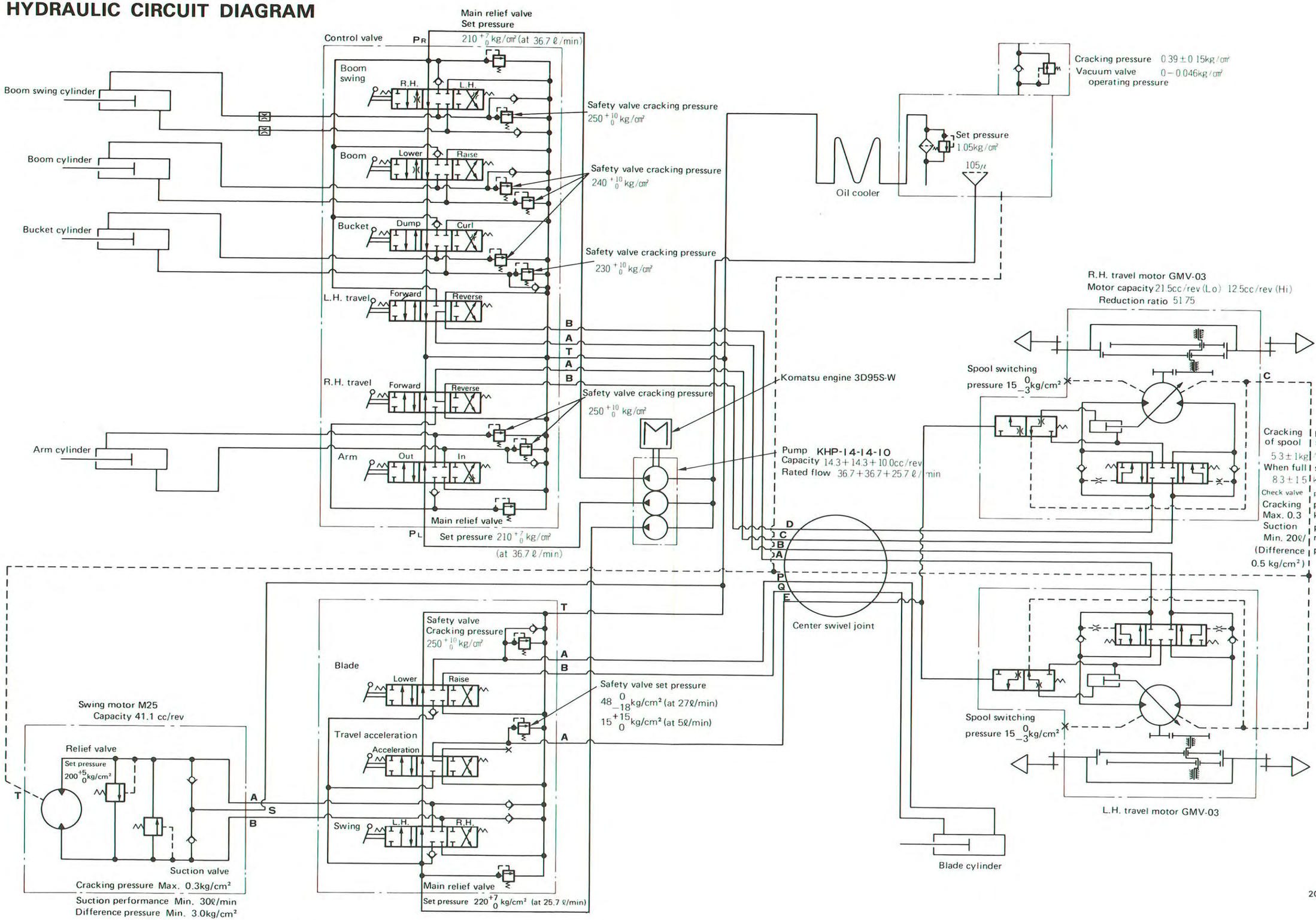


20TF06020

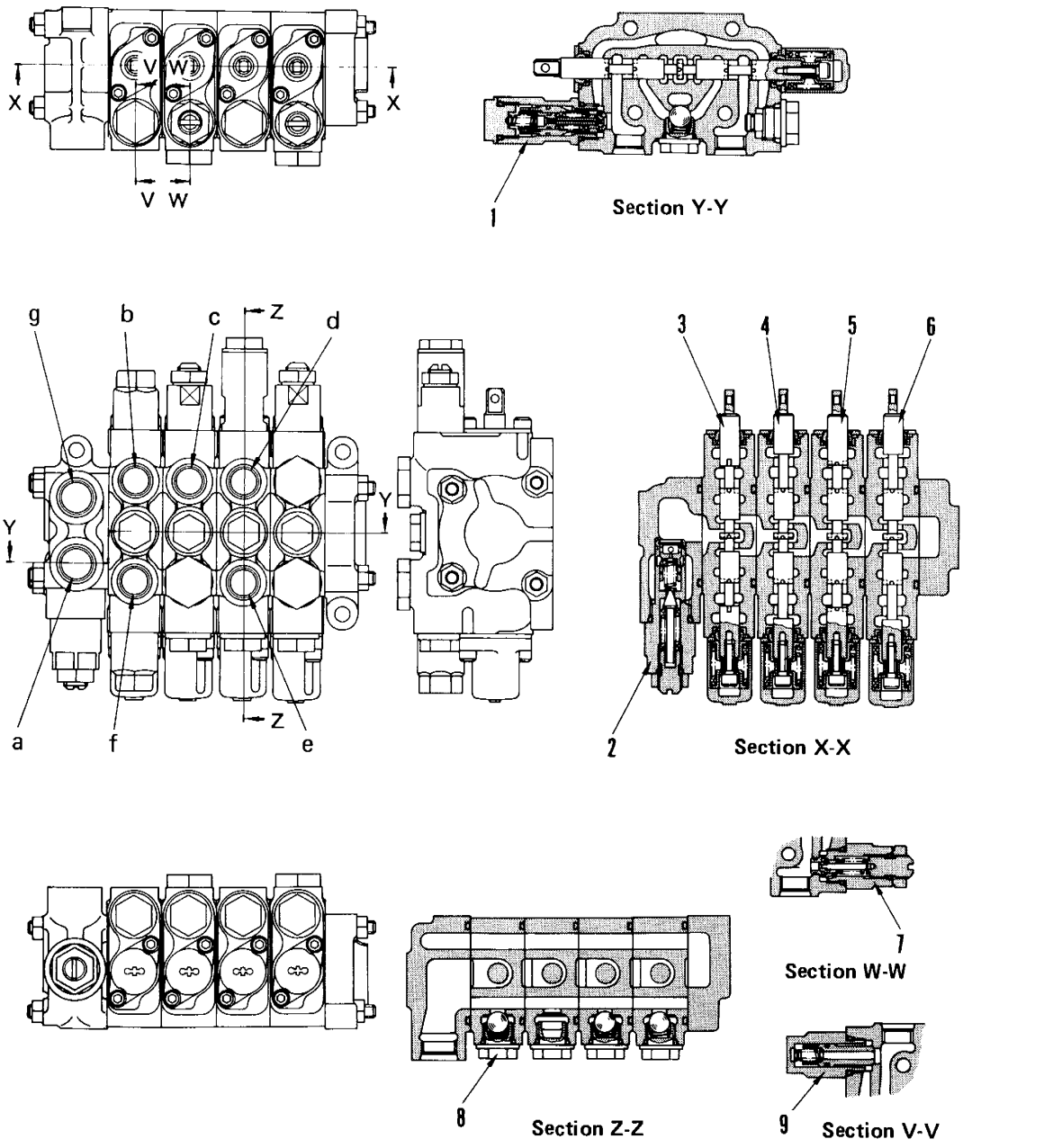
Unit: mm

No.	Check item	Criteria					Remedy
1	Flange (outside) outer dia.	Standard size			Repair limit		Build up welding or replace
		151			145		
2	Tread outside dia.	95			87		
3	Tread width	22			26		
4	Flange width	15.5			13.0		
5	Clearance between shaft and bushing	Standard size	Tolerance		Standard clearance	Clearance limit	Replace bushing
			Shaft	Hole			
		35	−0.025 −0.050	+0.142 +0.080	0.105 to 0.192	1.5	
6	Interference between roller and bushing	Standard size	Tolerance		Standard interference		
			Shaft	Hole			
		42	+0.079 +0.054	+0.039 0	0.015 to 0.079		
7	End play of roller	Standard clearance			Clearance limit		Replace
		0.25			1.0		

HYDRAULIC CIRCUIT DIAGRAM



4-SPOOL CONTROL VALVE
(S/N 12001 & Above)

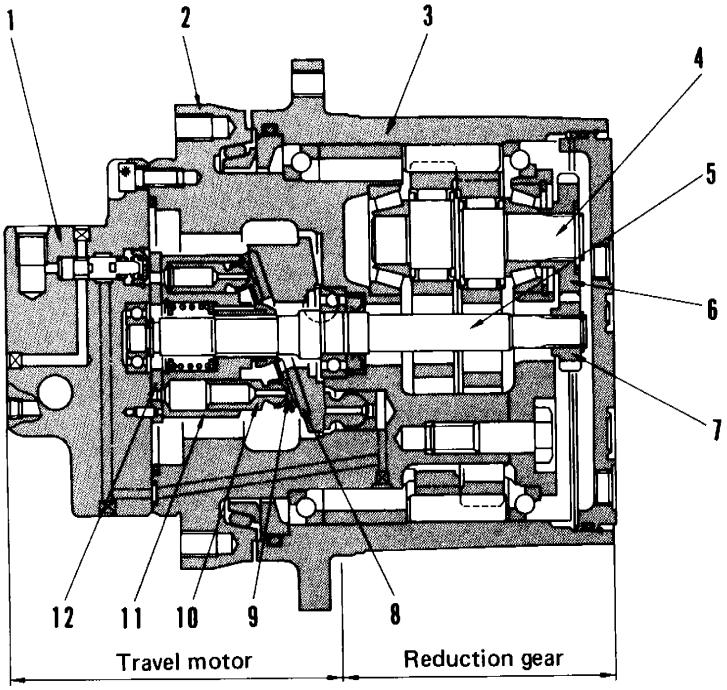


20SFM6019

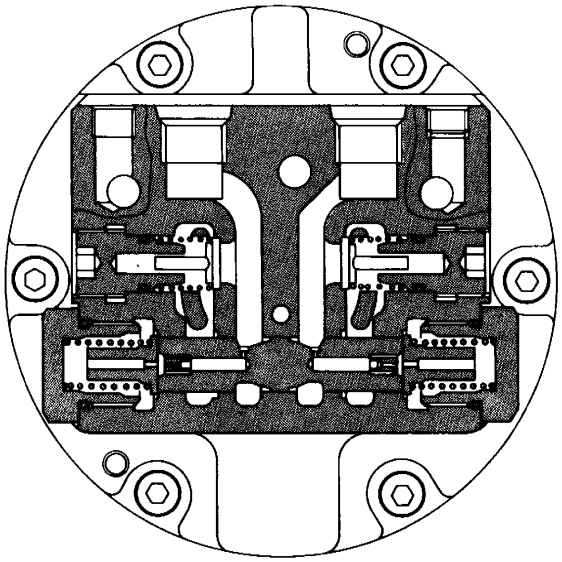
1. Safety valve with suction
2. Main relief valve
3. Swing control spool
4. Travel acceleration control spool
5. Blade control spool
6. Breaker spool
7. Safety valve
8. Check valve
9. Suction valve

a. To tank
b. To swing motor
c. To travel acceleration control motor
d. To blade cylinder
e. To blade cylinder
f. To swing motor
g. From pump

TRAVEL MOTOR (with reduction gear) (Cont'd)
(S/N 12001 & Above)



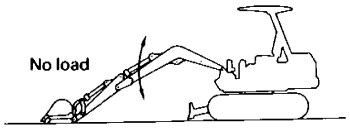
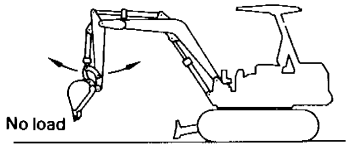
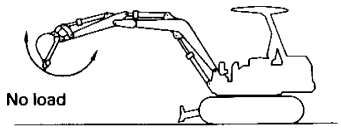
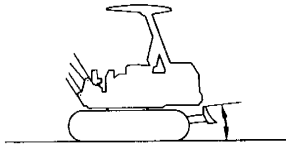
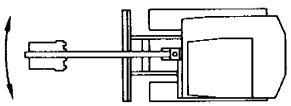
20SF6033



20SF6034

1. Rear flange
2. Case
3. Case
4. Crank shaft
5. Output shaft
6. Gear
7. Gear
8. Swash plate
9. Shoe
10. Piston
11. Cylinder
12. Plate

Specifications
Hydraulic motor
- Capacity
  Low speed: 23.6 cc/rev
  High speed:12.7 cc/rev
- Rated pressure:210 kg/cm^2
- Speed
  Low speed: 1,204 rpm
  High speed: 2,298 rpm

Machine model						116	
Classification	Item		Condition		Unit	Standard value	Permissible value
Work equipment	Work equipment speed	Boom Bucket teeth on the ground ↕ Cylinder fully extended	Measuring posture  • Engine speed: High idling • Hydraulic oil temperature: 45–55°C	RAISE	Sec.	4 ± 0.5	Max. 5
				LOWER		2.5 ± 0.5	Max. 3.5
		Arm Cylinder fully retracted ↕ Cylinder fully extended	Measuring posture  • Engine speed: High idling • Hydraulic oil temperature: 45–55°C	IN		5.6 ± 0.5	Max. 6.6
				OUT		3 ± 0.5	Max. 4
		Bucket Cylinder fully retracted ↕ Cylinder fully extended	Measuring posture  • Engine speed: High idling • Hydraulic oil temperature: 45–55°C	CURL		4.3 ± 0.5	Max. 5.5
				DUMP		2.4 ± 0.5	Max. 3.4
		Blade Blade on the ground ↕ Cylinder fully retracted	Measuring posture  Engine speed: High idling Hydraulic oil temperature: 45–55°C	RAISE		0.8 ± 0.3	Max. 1.4
				LOWER		0.7 ± 0.3	Max. 1.3
		Boom swing Cylinder fully retracted ↕ Cylinder fully extended	Measuring posture  Engine speed: High idling Hydraulic oil temperature: 45–55°C	L.H. SWING		7 ± 0.7	Max. 8.4
				R.H. SWING		6 ± 0.6	Max. 7.2

Checking the Output of the Hydraulic Pump at the Arm Cylinder

The tools listed will be needed to do the following procedure:

MEL-1238 – Hydraulic Tester
(Also order 2 hoses P/N 947589)
MEL-1355 – Hydraulic Excavator Kit

Adaptors are available in 14 mm, 18 mm and 22 mm. Select the correct adaptor for the application.

NOTE: Make sure that all the air is removed before beginning the test. Air in the system can give an inaccurate test.

Disconnect the hose at the base end of the arm cylinder and connect it to the INLET hose of the tester [A].

Connect the OUTLET hose from the tester to the other hose at the arm cylinder [A].

NOTE: Make sure the restrictor valve on the tester is fully open.

Start the engine and run it at idle RPM.

Pull the lever to the rear to check if the indicator is connected correctly. Increase the engine RPM to full RPM and record the flow.

Pump flow: 37 L/M (10 GPM)

Check the main relief setting by closing the restrictor valve.

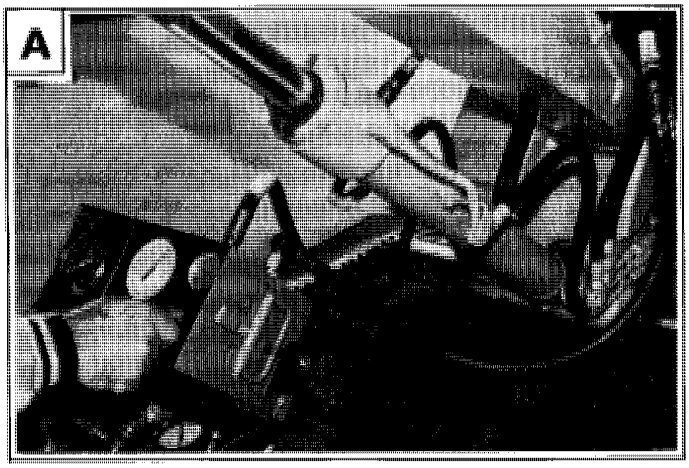
NOTE: Each full turn is 15 kg/cm^2.

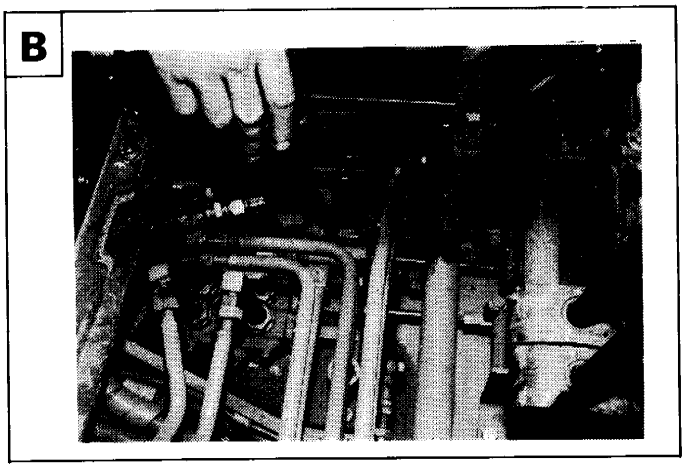
Adjusting the Main Relief Valve

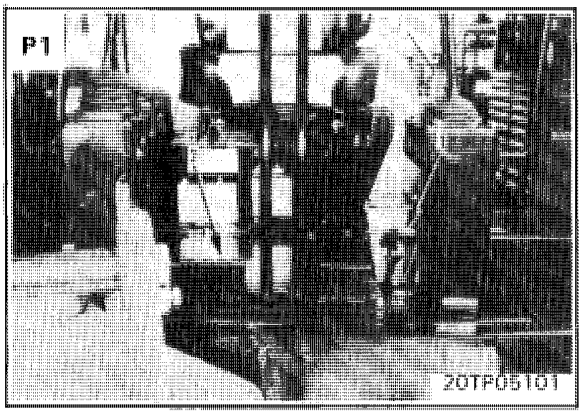
Remove the floor panel.

Loosen the locking nut, and adjust the pressure on the relief valve with a straight slot screwdriver [B].

Main relief setting: 210 kg/cm^2 (2980 PSI).



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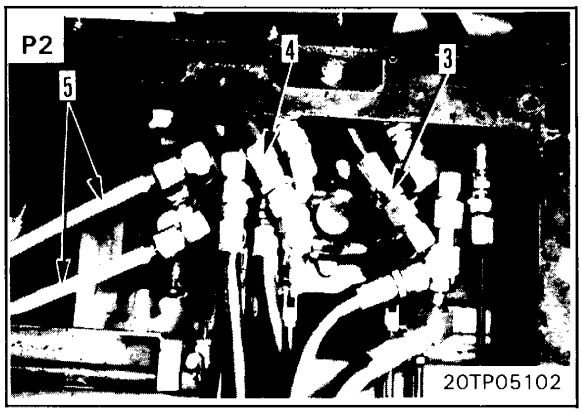
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P3
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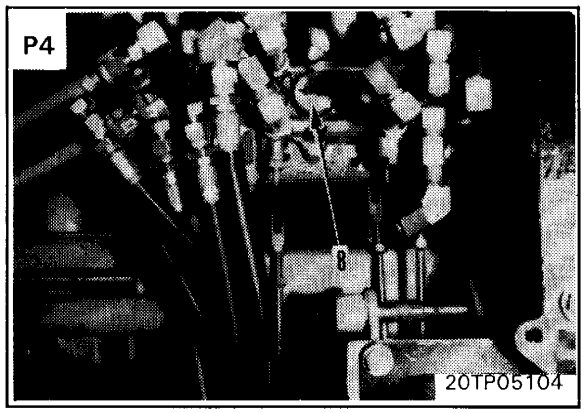
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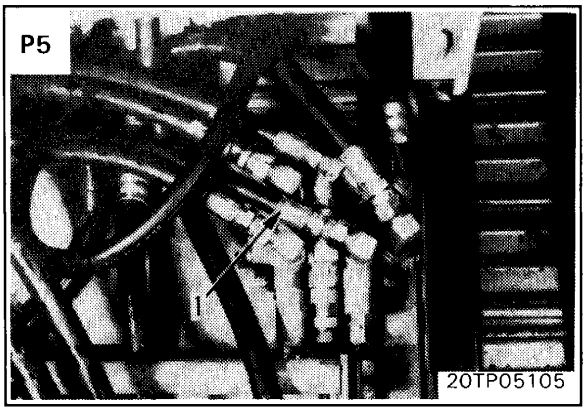
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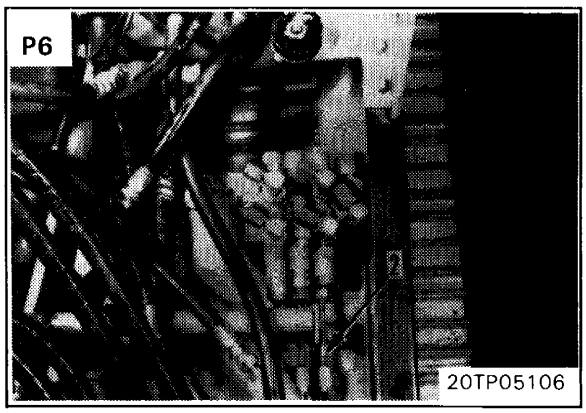
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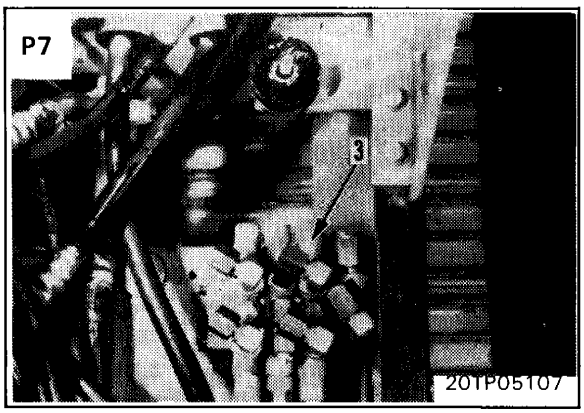
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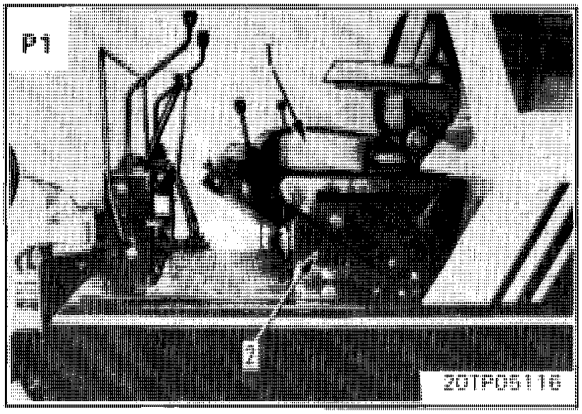
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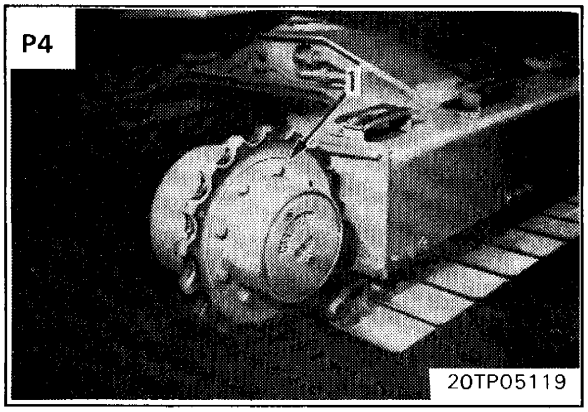
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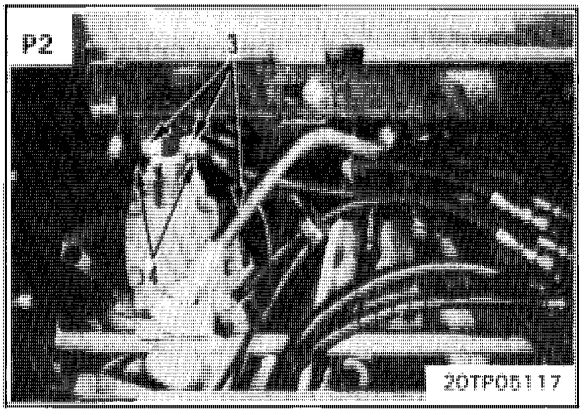
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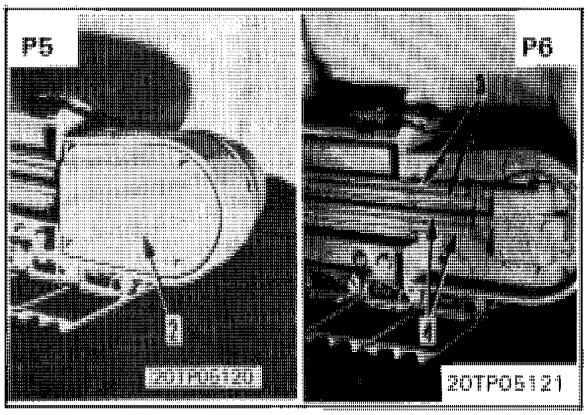
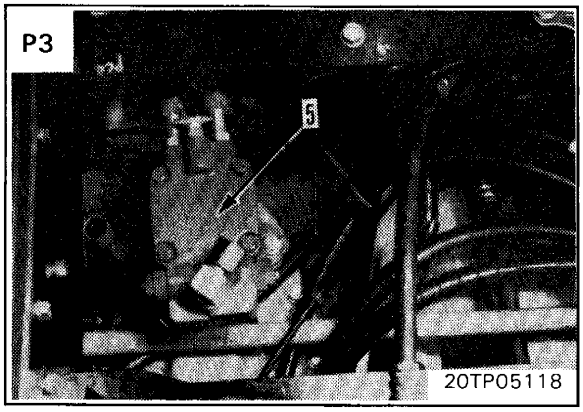

P5
2
P6
3
4
20TP05121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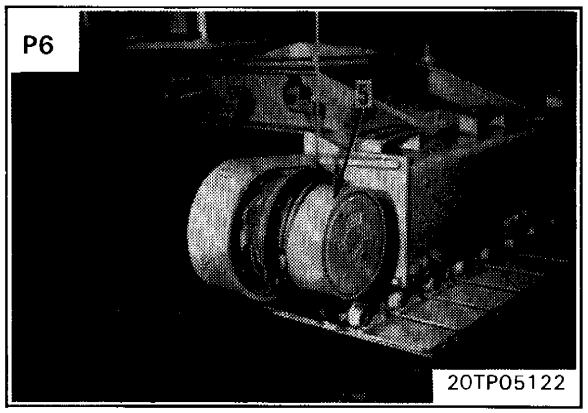
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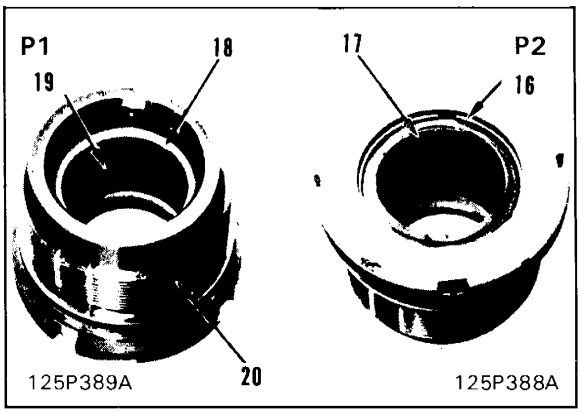
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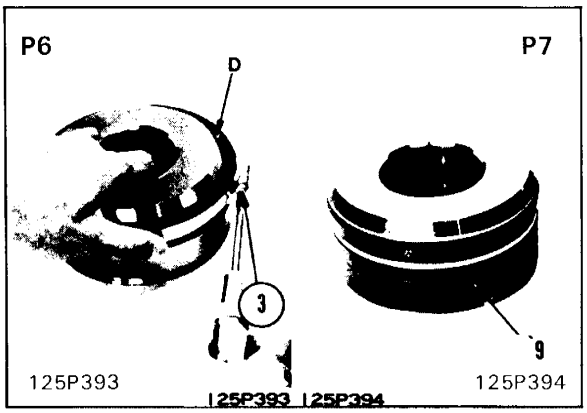
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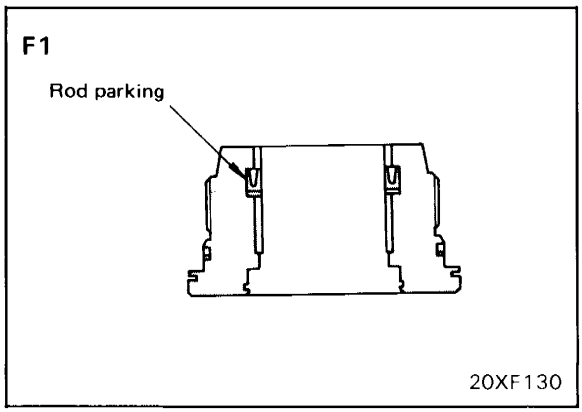
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Rod parking
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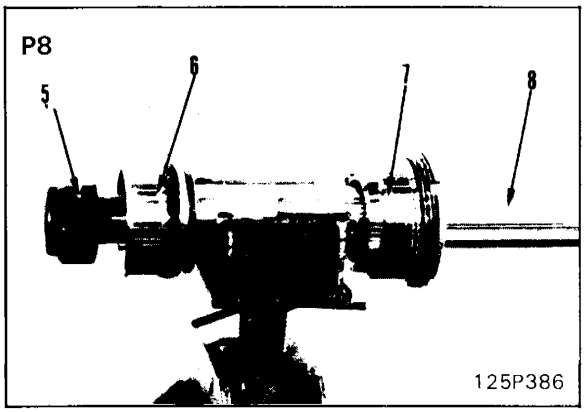
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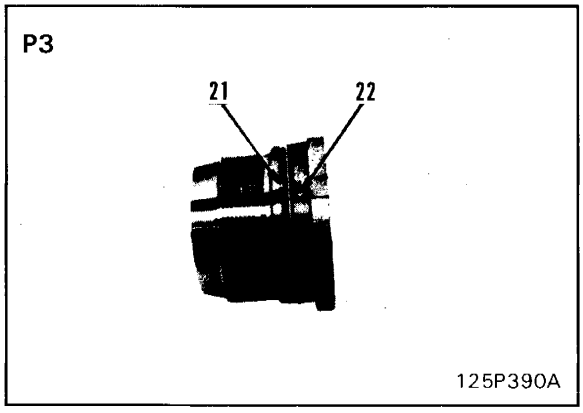
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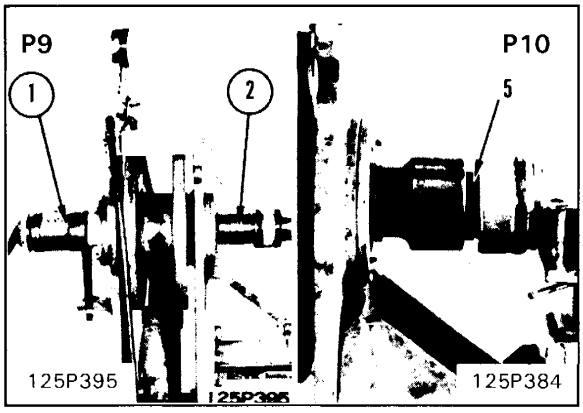
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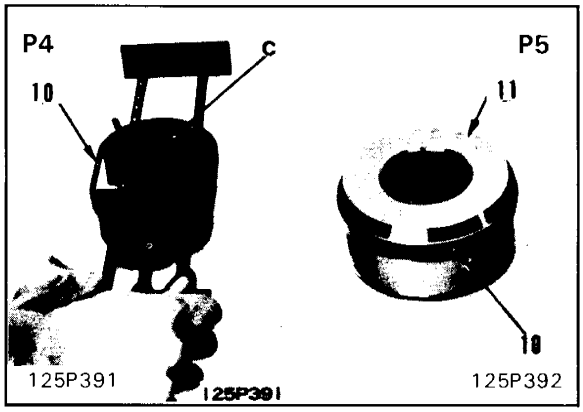
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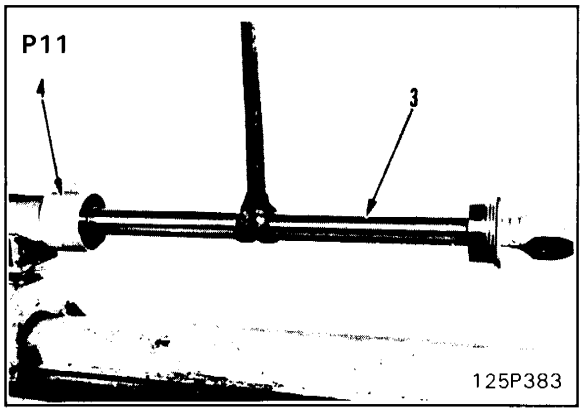
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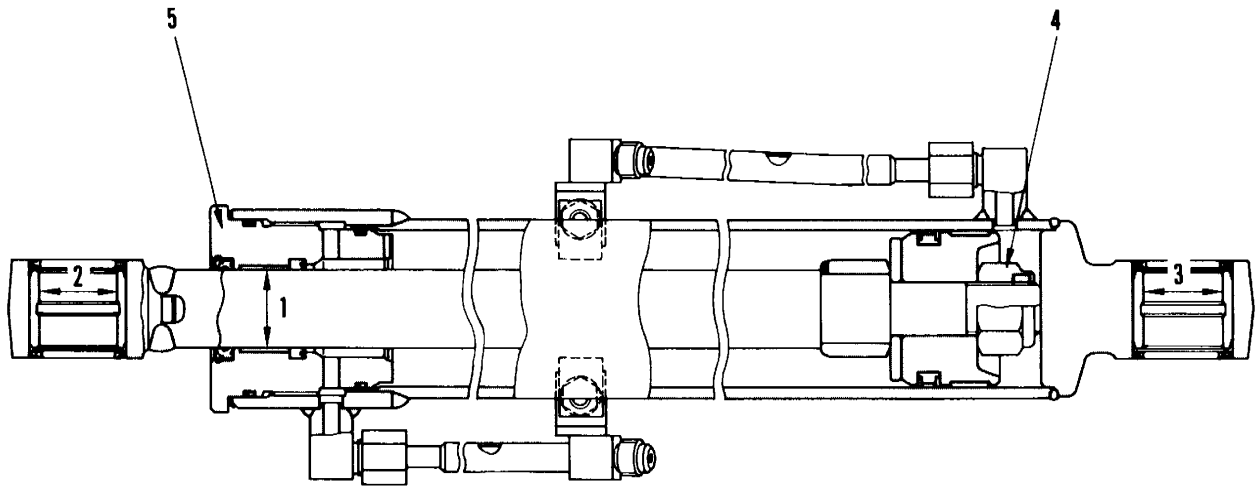
HYDRAULIC CYLINDER
(S/N 11999 & Below)



20RF5043

Unit: mm

No.	Check item	Criteria						Remedy
		Cylinder	Standard size	Tolerance		Standard clearance	Clearance limit	
				Shaft	Hole			
1	Clearance between piston rod and bushing	Boom	55	−0.100 −0.174	+0.163 +0.006	0.106 to 0.337	0.637	Replace bushing
		Arm	55	−0.100 −0.174	+0.163 +0.006	0.106 to 0.337	0.637	
		Bucket	55	−0.100 −0.174	+0.163 +0.006	0.106 to 0.337	0.637	
		Boom swing	50	−0.080 −0.142	+0.164 +0.007	0.087 to 0.306	0.606	
		Blade	45	−0.080 −0.142	+0.152 +0.007	0.087 to 0.294	0.594	

WORK EQUIPMENT

73 DISASSEMBLY AND ASSEMBLY

★ When operating the hydraulic cylinders for the first time after reassembling cylinders, pumps and piping, always bleed the air as follows:

1. Start engine and run at low idling.
2. Operate hydraulic cylinder 4 to 5 times, stopping 100 mm from stroke end.
3. Next, operate cylinder 3 to 4 times to stroke end.
4. After doing this, run engine at normal speed.

★ After repair or long storage, follow the same procedure.

WORK EQUIPMENT
74 MAINTENANCE STANDARD