2. HYDRAULIC SYSTEM DIAGRAM

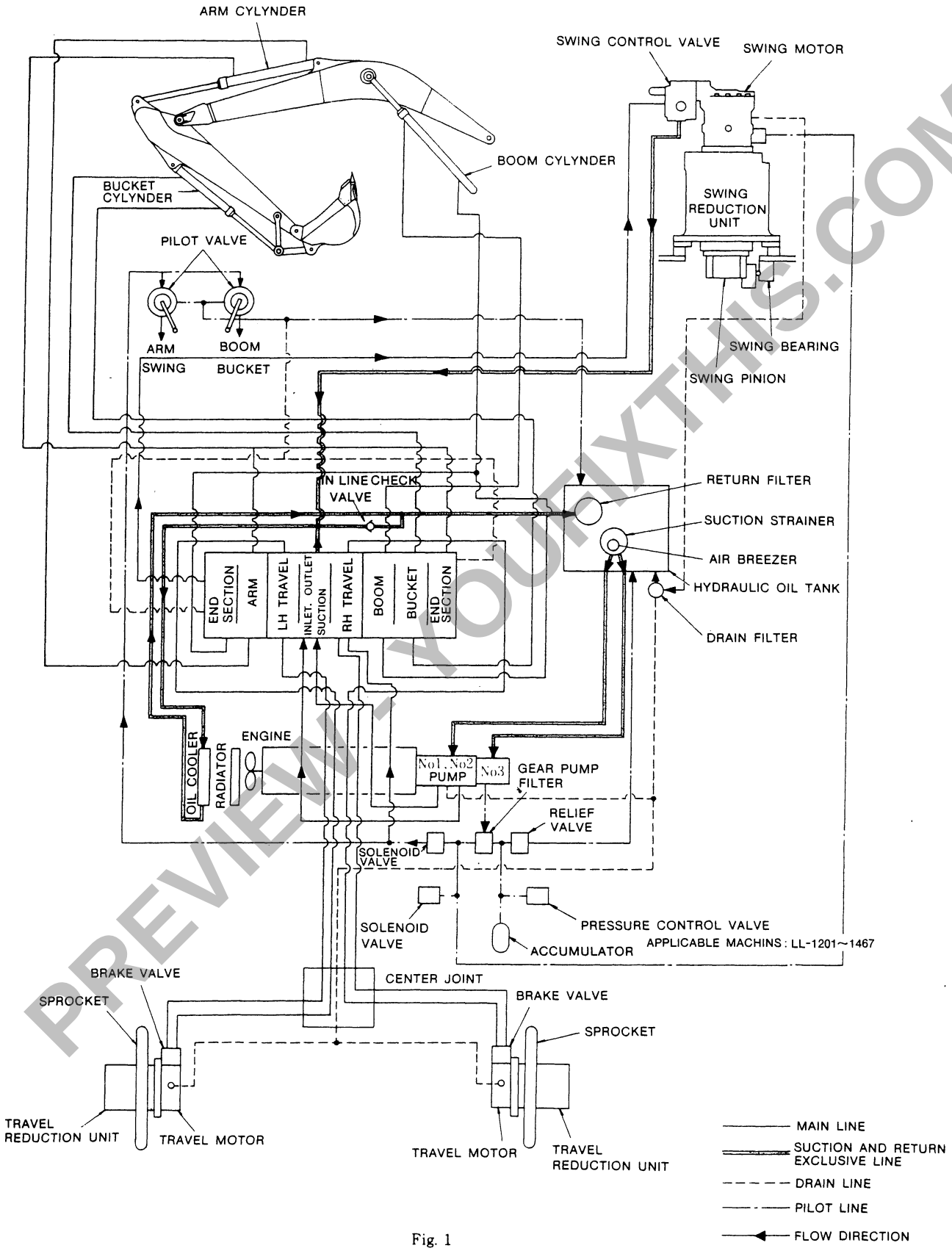
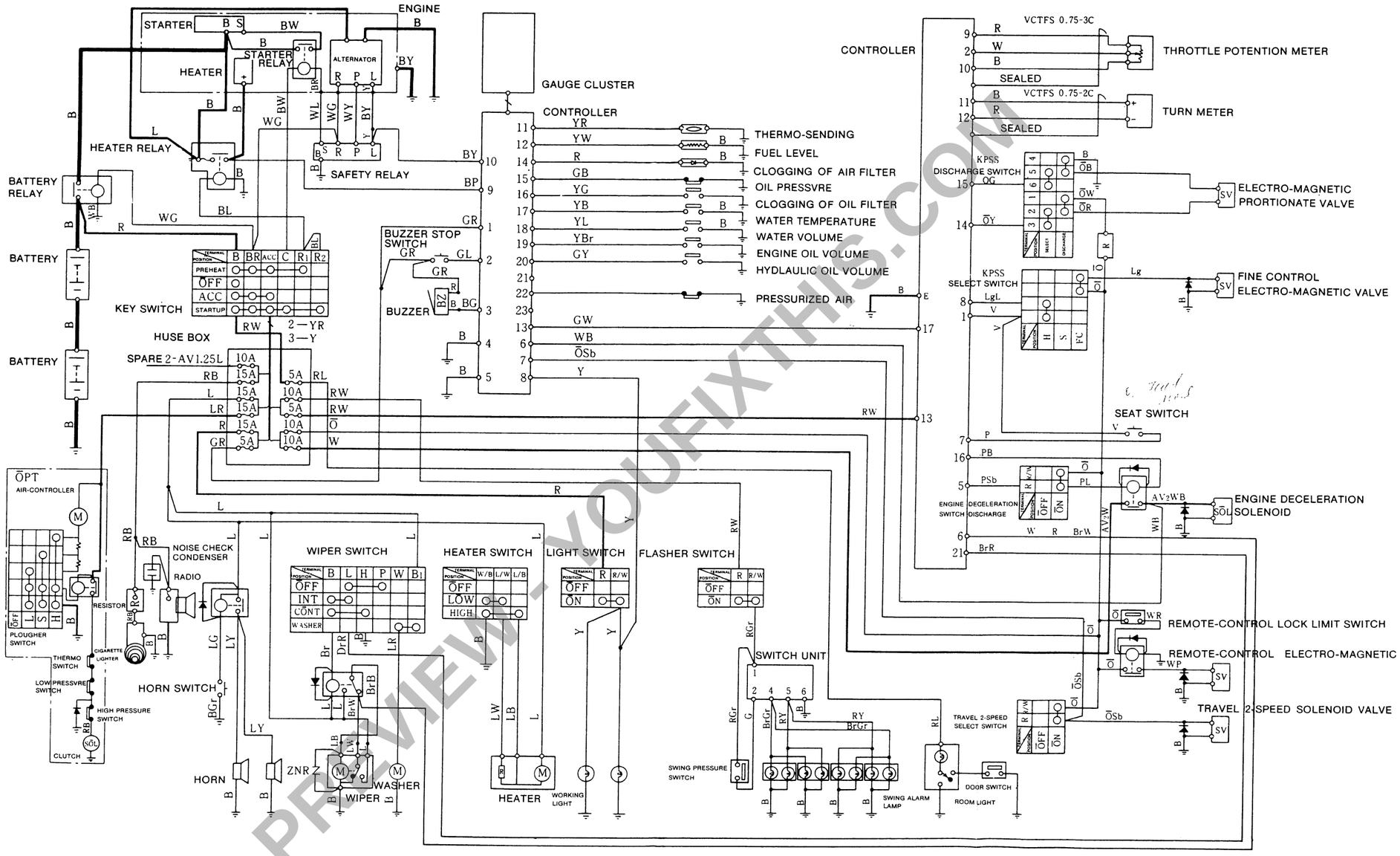


Fig. 1

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1. ELECTRIC SYSTEM DIAGRAM



WIRING COLOR SAMPLE W L

LINE COLOR (BLUE LINE)

GROUND COLOR (WHITE GROUND)

Color table of wiring

Symbol	Color	Symbol	Color
B	Black	**W**	White
G	Green	**Y**	Yellow
L	Blue	**P**	Pink
R	Red	**Õ**	Orange

Symbol	Color	Symbol	Color
Br	Brown	V	Violet
Lg	Leave green		
Gr	Gray		
Sb	Lead		

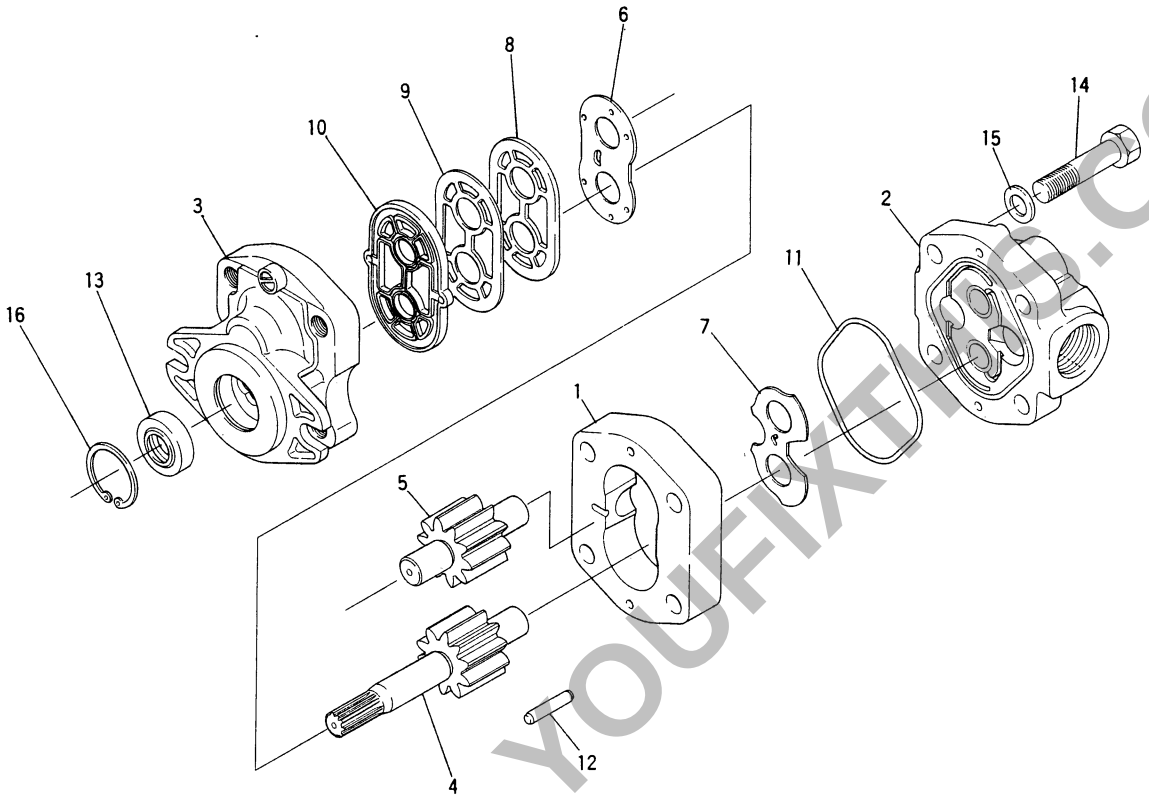
Table of classified wiring	
AV60	———
AV20	———
AV5	———
AV2	———
AV0.85	———

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2. CONSTRUCTION AND FUNCTION

2.1 CONSTRUCTION



1. GEAR PLATE
2. COVER
3. MOUNTING FLANGE
4. DRIVE GEAR
5. DRIVEN GEAR
6. SIDE PLATE A
7. SIDE PLATE B
8. GASKET A
9. GASKET B
10. BALANCE SEAL
11. O RING
12. DOWEL PIN
13. OIL SEAL
14. BOLT
15. WASHER
16. SNAP RING

Fig. 2 Right (Clockwise) Revolution Type

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1. TIGHTENING TORQUES FOR CAPSCREWS AND NUTS

Tables 1 and 2 indicate tightening torques applicable to cases where no special note is given.
Overtightening of bolts may result in a twist-off and a fracture under load. Undertightening may lead to a loosening or loss of bolts. Always tighten bolts to proper torques.

Table 1 Standard tightening torques for metric coarse screw threads

Unit: kgf·m (ft·lbs)

Classification / Nominal size	4 T		7 T		10 T	
	No lubrication	Oil lubrication	No lubrication	Oil lubrication	No lubrication	Oil lubrication
M 6 P=1	0.45±0.05 (3.2±0.4)	0.38±0.04 (2.7±0.3)	0.98±0.10 (7.1±0.7)	0.83±0.08 (6.0±0.6)	1.77±0.18 (12.8±1.3)	1.5±0.15 (10.8±1.1)
M 8 P=1.25	1.09±0.11 (7.9±0.8)	0.92±0.09 (6.6±0.6)	2.4±0.20 (17.3±1.4)	2.0±0.20 (14.4±1.4)	4.3±0.40 (31.0±2.9)	3.6±0.40 (26.0±2.9)
M10 P=1.5	2.2±0.20 (15.9±1.4)	1.83±0.18 (13.2±1.3)	4.7±0.50 (33.9±3.6)	4.0±0.40 (28.9±2.9)	8.5±0.90 (61.3±6.5)	7.2±0.70 (52.0±5.1)
M12 P=1.75	3.7±0.40 (26.7±2.9)	3.2±0.30 (23.1±2.2)	8.1±0.80 (58.4±5.8)	6.8±0.70 (49.1±5.1)	14.6±1.50 (105±10.8)	12.3±1.20 (88.8±8.7)
M14 P=2	5.9±0.60 (42.6±4.3)	5.0±0.50 (36.1±3.6)	12.8±1.30 (92.4±9.4)	10.8±1.10 (77.9±7.9)	23±2 (166±14.4)	19.5±1.90 (140±13.7)
M16 P=2	9.0±0.90 (64.9±6.5)	7.6±0.70 (54.8±5.1)	19.5±2 (140±14.4)	16.4±1.6 (118±11.5)	35±4 (252±28.9)	29±3 (209±21.6)
M18 P=2.5	12.4±1.20 (89.5±8.7)	10.5±1 (75.8±7.2)	27±3 (194±21.6)	23±2 (166±14.4)	49±5 (353±36.1)	41±4 (295±28.9)
M20 P=2.5	17.5±1.7 (126±12.3)	14.7±1.40 (106±10.1)	38±4 (274±28.9)	32±3 (230±21.6)	68±7 (490±50.5)	57±6 (411±43.3)
M22 P=2.5	23±2 (166±14.4)	19.6±2.0 (141±14.4)	51±5 (368±36.1)	43±4 (310±28.9)	92±9 (663±64.9)	77±8 (555±57.7)
M24 P=3	30±3 (216±21.6)	24±3 (173±21.6)	65±7 (469±50.5)	53±5 (382±36.1)	118±12 (851±86.6)	96±10 (692±72.2)
M27 P=3	44±4 (317±28.9)	36±3 (259±21.6)	96±10 (692±72.2)	78±8 (562±57.7)	173±17 (1248±122)	140±14 (1010±101)
M30 P=3.5	60±6 (433±43.3)	50±5 (360±36.1)	131±13 (945±93.8)	110±11 (793±79.4)	235±24 (1695±173)	198±20 (1428±144)
M33 P=3.5	81±8 (584±57.7)	68±7 (490±50.5)	176±18 (1270±129)	148±15 (1068±108)	317±32 (2287±230)	266±27 (1919±194)
M36 P=4	105±10 (757±72.2)	88±9 (635±64.9)	227±23 (1638±166)	190±19 (1371±137)	409±41 (2951±295)	343±34 (2475±245)

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2. REMOVAL AND INSTALLATION OF HYDRAULIC PUMP

Applicable machines for ※ : LQ-1789～
LL-1488～

2.1 REMOVING HYDRAULIC PUMP

1) After stopping the engine, remove panel (30) and bracket (31) of the hydraulic pump top guards.

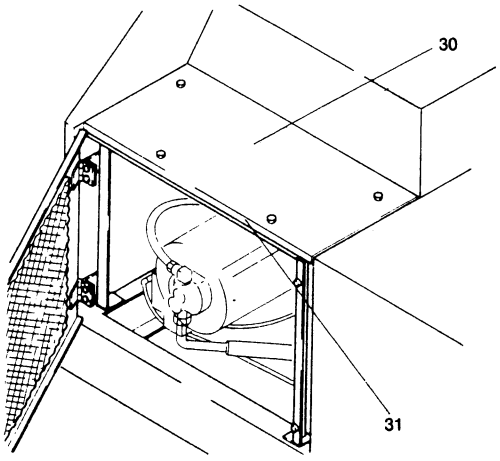


Fig 4

2) Fix suction stopper (32) to the suction port of the hydraulic oil tank.

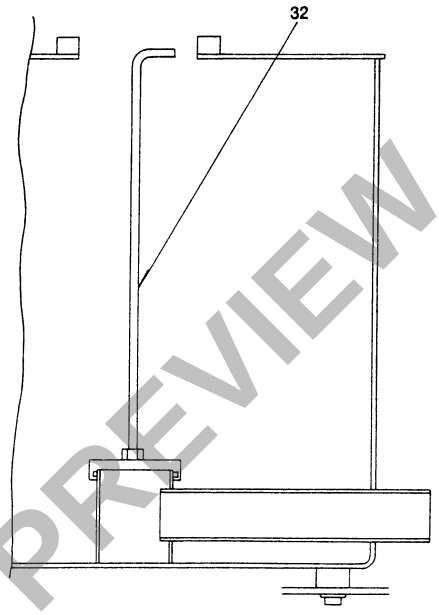


Fig 5

NOTE

For the suction stopper (32), refer to procedure section "Suction Stopper Detail"

3) Disconnect suction hoses (33,34) discharge hoses (35,36), drain hose (37) and external pilot hose (38), and apply a plug to the opening of each hose and to each port of the hydraulic pump.

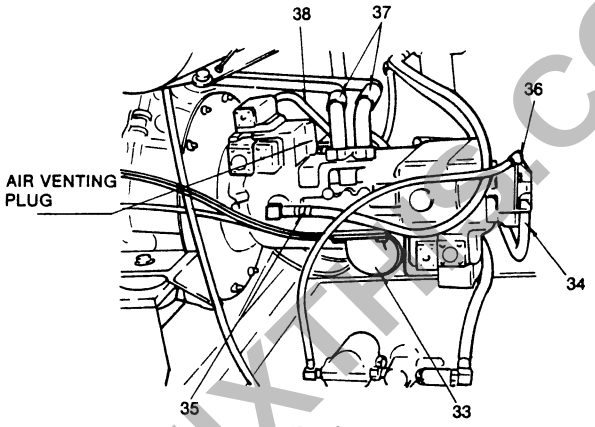


Fig 6

4) Place a wire sling around the point a little toward the engine side of the center of the hydraulic pump and lift it with a crane to the extent that the pump is just held. Remove nut (6) and washer of this condition.

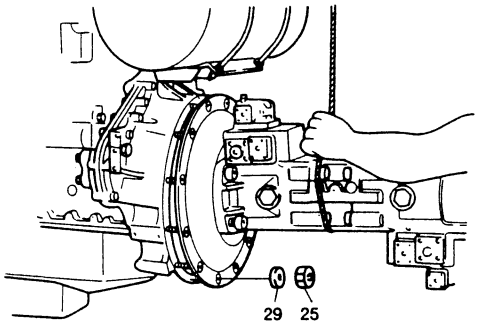


Fig 7

5) When nuts (※socket bolts) (25) and washers (29) have been removed, slacken the wire sling a little, draw out hydraulic pump (1) toward yourself slowly and after confirming that coupling (27) is off, lift up and remove the pump with bracket (24)

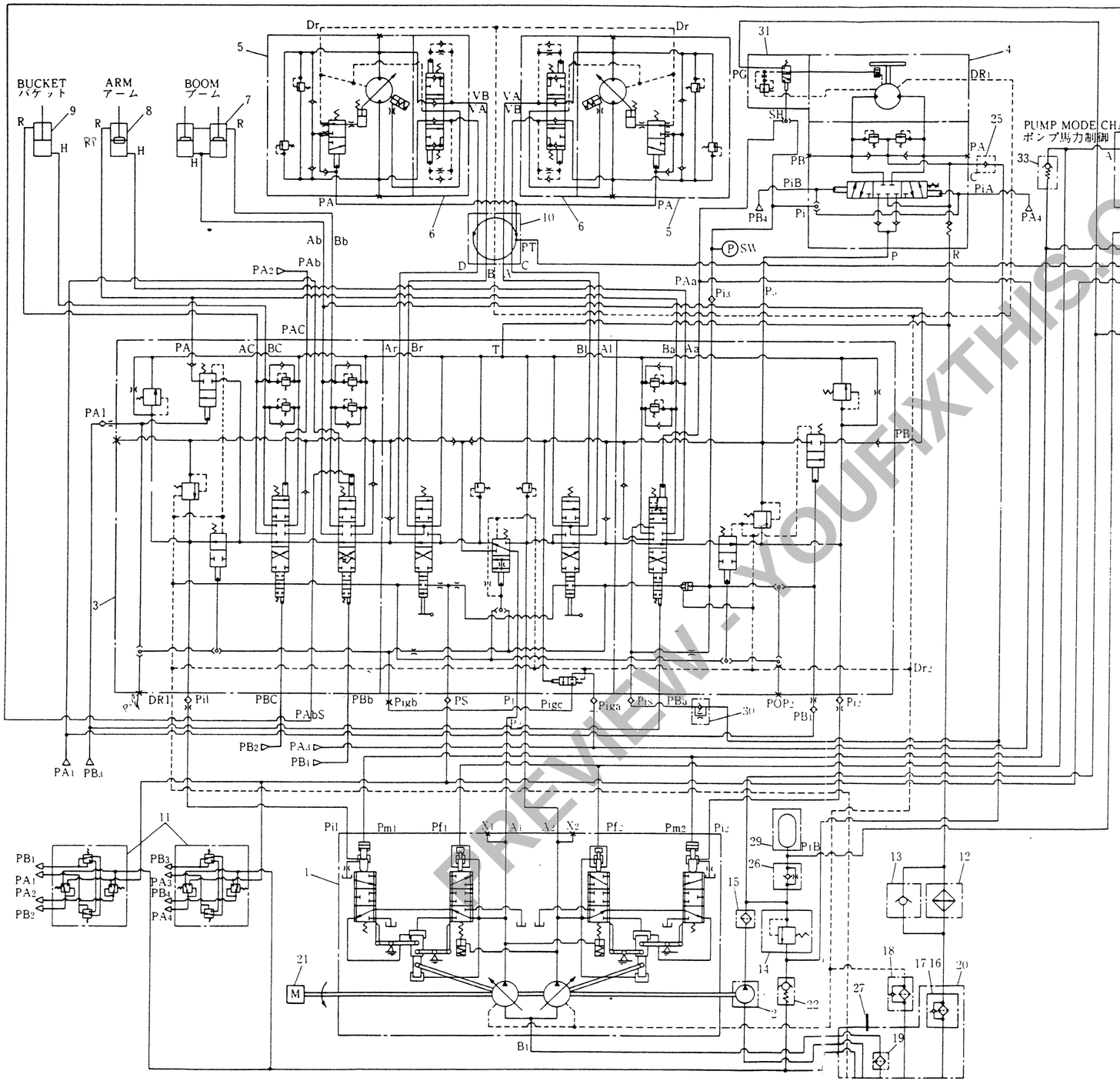
NOTE

When lifting the hydraulic pump (1), exercise care so it may not contact the guard frame and others.

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3. HYDRAULIC CIRCUITS AND COMPONENTS

APPLICABLE MACHINS : LQ-1601～1788
LL-1201～1487



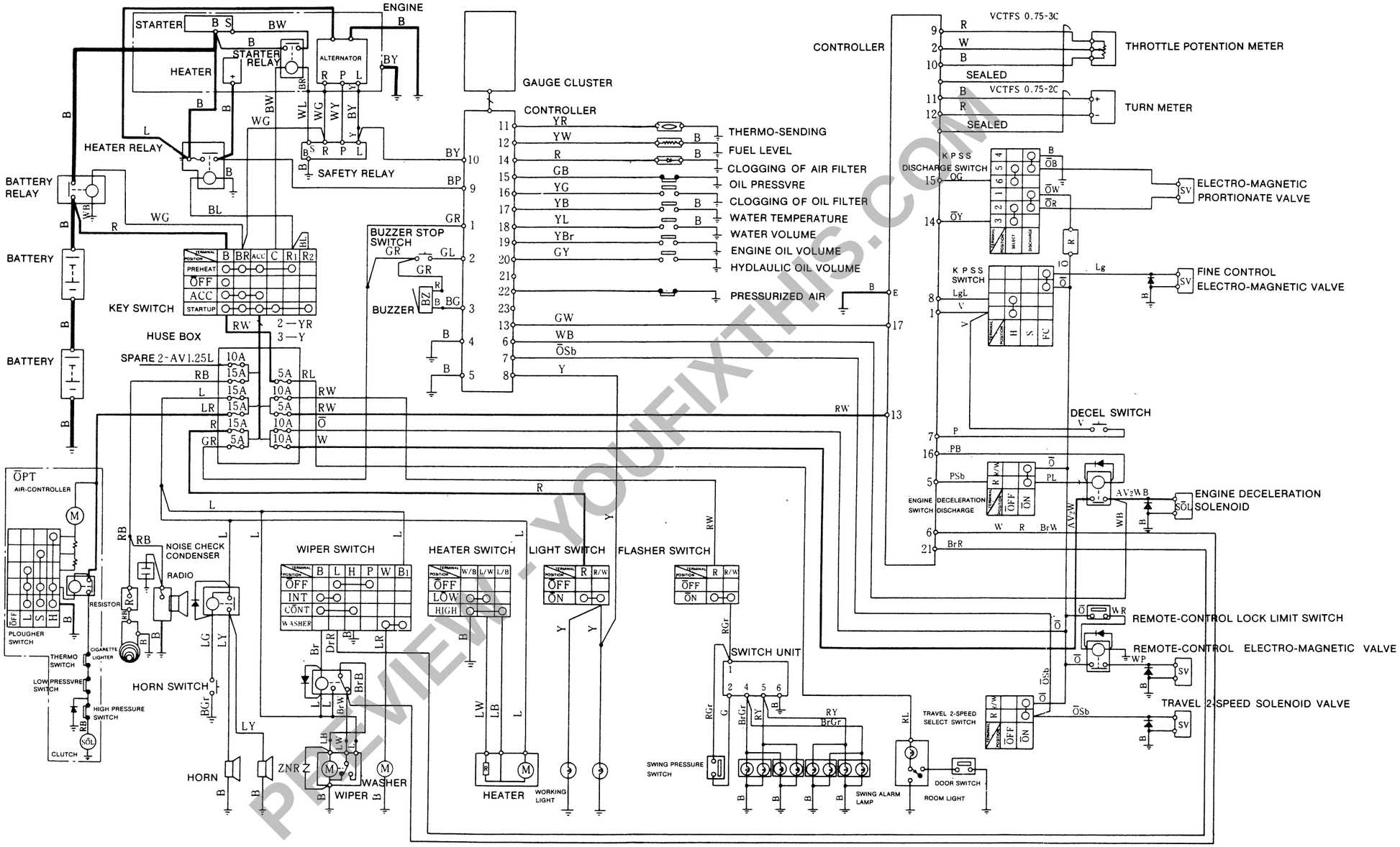
No	NAME	名　　称	型　　番
1	PUMP	ポンプ	NV111DT
2	PUMP GEAR	ギヤポンプ	KP1007
3	VALVE CONTROL	コントロールバルブ	KMX15B
4	MOTOR ASSY	モータ（旋回）	MX173—KSC20R
5	MOTOR	モータ（走行）	MY200/140Z
6	VALVE BRAKE	ブレーキバルブ	RBV24B
7	CYLINDER	シリンダ（ブーム）	
8	CYLINDER	シリンダ（アーム）	
9	CYLINDER	シリンダ（バケット）	
10	JOINT SWIVEL	スイベルジョイント	
11	VALVE PILOT	パイロットバルブ	TH40K
12	OIL COOLER	オイルクーラ	
13	VALVE CHECK	チェックバルブ	Y-2395
14	VALVE RELIEF	リリーフバルブ	YRD-03
15	FILTER LINE	ラインフィルタ	Y-1795
16	ELEMENT FILTER	フィルタエレメント	Y-1635
17	VALVE ASSY	バルブ	Y-1506
18	FILTER DRAIN	トレンフィルタ	C-SP04-10
19	SUCTION STRAINER	サクションストレーナ	F1877
20	TANK ASSY HYDR	ハイドロリックタンク	
21	ENGINE ASSY	エンジン	6D31T
22	VALVE CHECK	チェックバルブ	VBY111
23	VALVE SOLENOID	ソレノイドバルブ	KDRDE6A-10/5CL
24	VALVE PRESSCONTROL	プレッシャコントロールバルブ	
25	VALVE CHECK	チェックバルブ	
26	VALVE RESTRICTOR	リストリクタバルブ	
27	SCHEMATIC AIR LINE	エアライン	
29	ACCUMULATOR	アキュムレータ	WE70-500-30
30	VALVE RESTRICTOR	リストリクタバルブ	
31	VALVE REDUCING	リテューシングバルブ	
33	VALVE CHECK	チェックバルブ	

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1. ELECTRIC SYSTEM DIAGRAM

APPLICABLE MACHINES : LQ-1601～1657
LL-1201～1244



WIRING COLOR SAMPLE W L

LINE COLOR (BLUE LINE)

GROUND COLOR (WHITE GROUND)

Color table of wiring

Symbol	Color	Symbol	Color
B	Black	**W**	White
G	Green	**Y**	Yellow
L	Blue	**P**	Pink
R	Red	**Ō**	Orange

Symbol	Color	Symbol	Color
Br	Brown	V	Violet
Lg	Leave green		
Gr	Gray		
Sb	Lead		

Table of classified wiring	
AV60	━━━
AV20	━━━
AV5	━━
AV2	──
AV0.85	──

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2. CONSTRUCTION AND FUNCTION

2.1 CONSTRUCTION

(1) Spec.-1 (NV50DT)
Spec-4,5 (NV64DT)

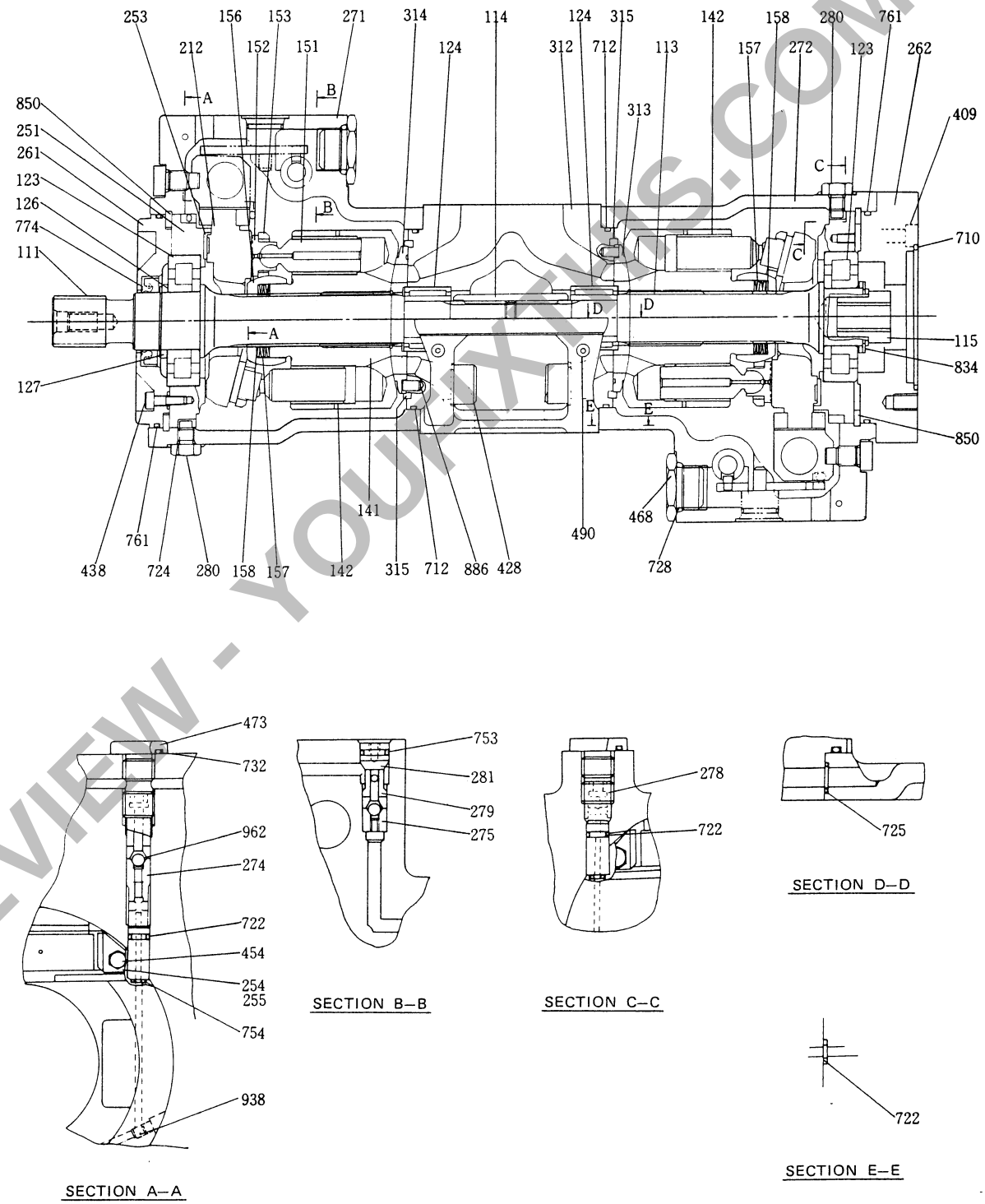


Fig. 3 Tandem Type Double Pump

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Table 2 Standard tightening torques for metric fine screw threads

Unit: kgf·m (ft·lbs)

Classification / Nominal size	4 T		7 T		10 T	
	No lubrication	Oil lubrication	No lubrication	Oil lubrication	No lubrication	Oil lubrication
M 8 P=1	1.15±0.11 (8.3±0.8)	0.97±0.10 (7.0±0.7)	2.5±0.2 (18.0±1.4)	2.1±0.20 (15.2±1.4)	4.5±0.40 (32.5±2.9)	3.8±0.40 (27.4±2.9)
M10 P=1.25	2.3±0.20 (16.6±1.4)	1.91±0.19 (13.8±1.4)	4.9±0.5 (35.4±3.6)	4.2±0.40 (30.3±2.9)	8.9±0.90 (64.2±6.5)	7.5±0.70 (54.1±5.1)
M12 P=1.25	4.0±0.40 (28.9±2.9)	3.4±0.3 (24.5±2.2)	8.7±0.9 (62.8±6.5)	7.3±0.70 (52.7±5.1)	15.7±1.6 (113±11.5)	13.2±1.3 (95.3±9.4)
M16 P=1.5	9.4±0.90 (67.8±6.5)	7.9±0.8 (57.0±5.8)	20±2 (144±14.4)	17.2±1.70 (124±12.3)	37±4 (267±28.9)	31±3 (223±21.6)
M20 P=1.5	19±1.90 (137±13.7)	15.8±1.6 (114±11.5)	41±4 (295±28.9)	34±3 (245±21.6)	74±7 (534±50.5)	62±6 (447±43.3)
M24 P=2	32±3 (230±21.6)	27±3 (194±21.6)	70±7 (505±50.5)	58±6 (418±43.3)	126±12 (909±86.6)	105±10 (757±72.2)
M30 P=2	65±6 (469±43.3)	54±5 (389±36.1)	142±14 (1024±101)	118±12 (851±86.6)	255±26 (1840±187)	212±21 (1529±151)
M36 P=3	109±11 (786±79.4)	91±9 (656±64.9)	238±23 (1717±166)	198±20 (1428±144)	428±43 (3088±310)	357±36 (2576±259)

2. TIGHTENING TORQUES FOR NUTS AND SLEEVES

Table 3 indicates standard tightening torques applicable to cases where no particular note is given.

Overtightening or undertightening of nuts and sleeves in bite type tube fittings may develop oil leaks through pipe connections. Always tighten nuts and sleeves to proper torques.

Table 3

Manufacturer's name	Working pressure kgf/cm² (lbs/in²)	Tube size O.D. × thickness mm (in)	Tightening torque kgf·m (ft·lbs)
Nippon A.M.C.	280 (3981)	10×1.5 (0.4×0.059)	6 ±1 (43.3±7.2)
		15×2.0 (0.6×0.079)	15±2 (108±14.4)
		18×2.5 (0.7×0.098)	18±2 (129±14.4)
		22×3.0 (0.9×0.1)	22±2 (158±14.4)
		28×4.0 (1.1×0.2)	28±3 (202±21.6)
Ihara Koatu	280 (3981)	35×5.0 (1.4×0.2)	35±3.5 (252±25.3)

Applicable machines : LQ−1601∼
LL−1201∼

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2.2 INSTALLING HYDRAULIC PUMP

1) Remove burr and stain on the mounting flange face of hydraulic pump (1) and the mounting surface of bracket (24).
2) Install bracket (24) to the mounting flange face of hydraulic pump (1). Then tighten socket bolt (26) to the specified torque.
3) Install coupling to the pump drive shaft and the engine flywheel.
4) Install coupling element (27.4) to the insert MA (27.3) on the engine flywheel side. Then lift the hydraulic pump (1) with bracket (24) level by means of wire sling.
5) As fitting coupling element (27.4) on flywheel side to insert MR (27.2) on hydraulic pump sede,match bracket (24) hole to the flywheel housing bolt. Then press pump into the engine sede. (Refer to Fig. 6)

NOTE

When fixing hydraulic pump (1), exercise care so it may not contact the guard frame and others.

6) After confirming that coupling has fixed, enter washer (29) to the bolt, and tighten nut (25) to the specified torque.
7) Reconnect the once-disconnected hoses and tighten the capscrews and the hose bands.
8) Remove suction stopper (32) of the hydraulic oil tank and fit a suction strainer instead.
9) Start the engine and loosen the air venting plug of hydraulic pump (1) with the engine at slow speed to vent the air contained.
10) Confirm that there is no oil leak through the connections.
11) Install panel (30) and bracket (31) to the top guards of the hydraulic pump. (Refer to Fig. 3.)

3. REMOVAL AND INSTALLATION OF COUPLING

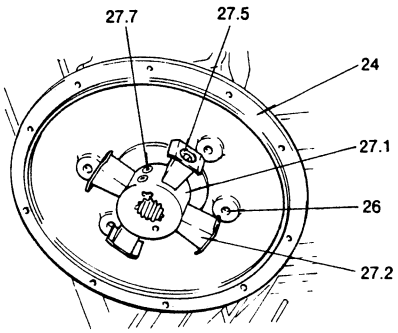
3.1 REMOVING COUPLING

1) Remove hydraulic pump (1). (Refer to Para. 2.1.)
2) Loosen setscrew (27.7) of coupling hub (27.1) and take it off from the drive shaft of hydraulic pump (1).
3) Loosen pump mounting socket bolt (26) and take off bracket (24).
4) Remove socketscrew (27.5) by means of coupling hub (27.1), entering to pump drive shaft or using vice.
5) Remove insert MR (27.2). Then draw out spring pin (27.6), using pliers.

NOTE

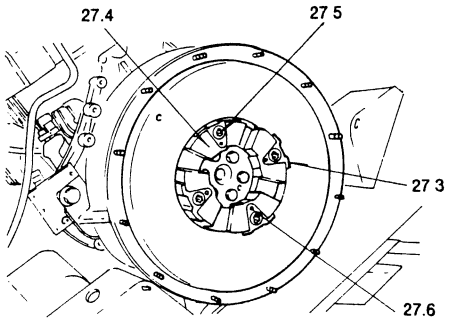
Use the existing spring pin (27.6) as it is if it has no fault.

6) Remove sockek bolt (27 5) on the engine flywheel side. Then remove insert MR (27.3).
7) Draw out spring pin (27.6) that is knocking into engine flywheel, using pliers.



Hydraulic Pump Side

Fig 8



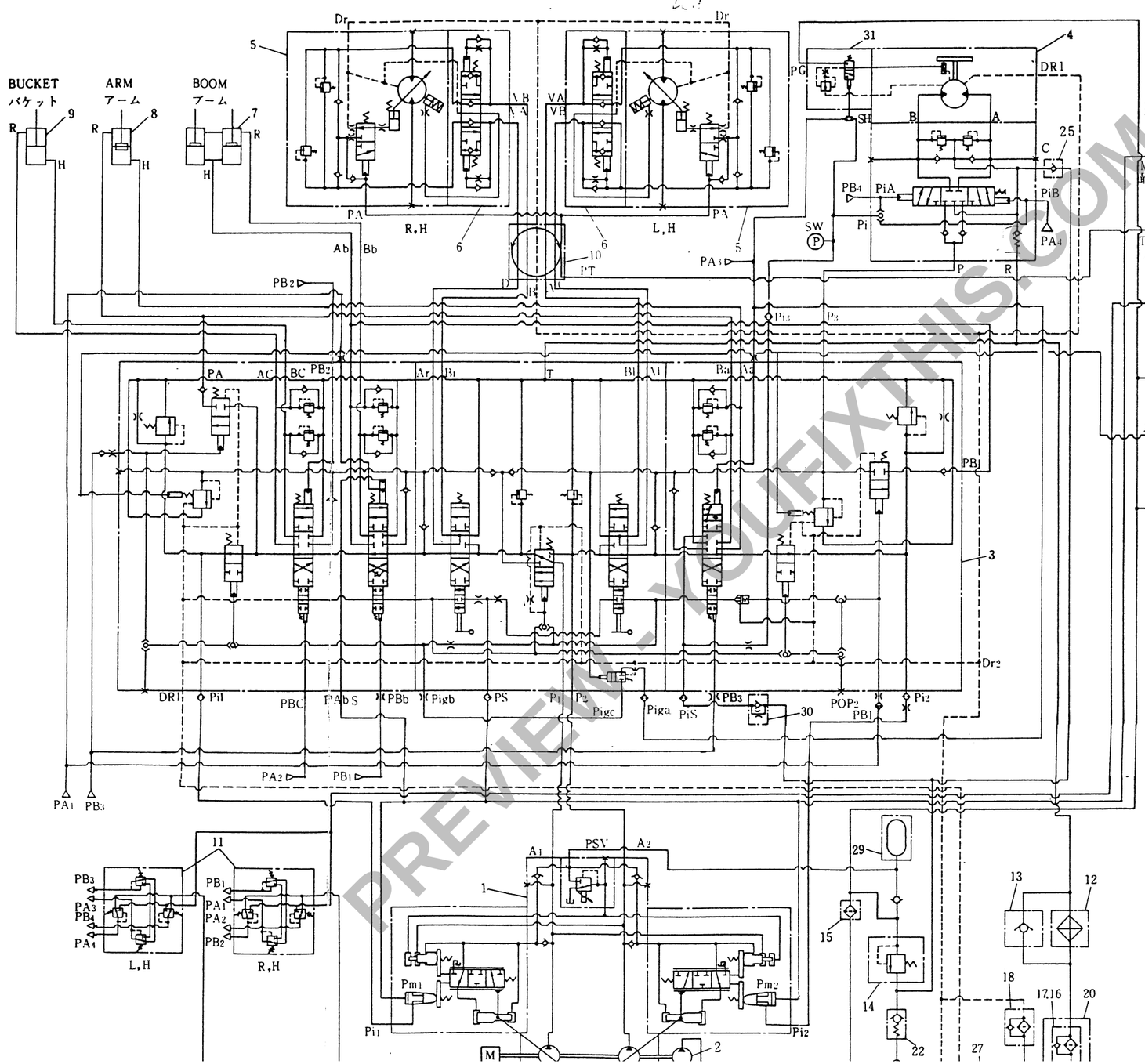
Engine Flywheel Side

Fig 9

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HYDRAULIC CIRCUITS AND COMPONENTS

APPLICABLE MACHINS : LQ-1789～
LL-1488～



No	NAME	名　称	型　番
1	PUMP	ポンプ	K3V112DT
2	PUMP. GEAR	ギヤポンプ	KP1007
3	VALVE. CONTROL	コントロールバルブ	KMX15B
4	MOTOR ASSY	モータ（旋回）	M2X170-KSC20R
5	MOTOR	モータ（走行）	MY200/140Z
6	VALVE. BRAKE	ブレーキバルブ	RBV24B
7	CYLINDER	シリンダ（ブーム）	
8	CYLINDER	シリンダ（アーム）	
9	CYLINDER	シリンダ（バケット）	
10	JOINT SWIVEL	スイベルジョイント	
11	VALVE. PILOT	パイロットバルブ	TH40K
12	OIL COOLER	オイルクーラ	
13	VALVE. CHECK	チェックバルブ	Y-2395
14	VALVE. RELIEF	リリーフバルブ	VRD-03
15	FILTER. LINE	ラインフィルタ	Y-1795
16	ELEMENT. FILTER	フィルタエレメント	Y-2303
17	VALVE. ASSY	バルブ	Y-1506
18	FILTER. DRAIN	トレンフィルタ	SP08-10
19	SUCTION STRAINER	サクションストレーナ	F1877
20	TANK ASSY HYDR	ハイトロリックタンク	
21	ENGINE ASSY	エンジン	6D15T
22	VALVE. CHECK	チェックバルブ	
23	VALVE. SOLENOID	ソレノイドバルブ	VBY111
27	SCHEMATIC AIR LINE	エアライン	
29	ACCUMULATOR	アキュムレータ	WE70-500-30
30	VALVE. RESTRICTOR	リストリクタバルブ	

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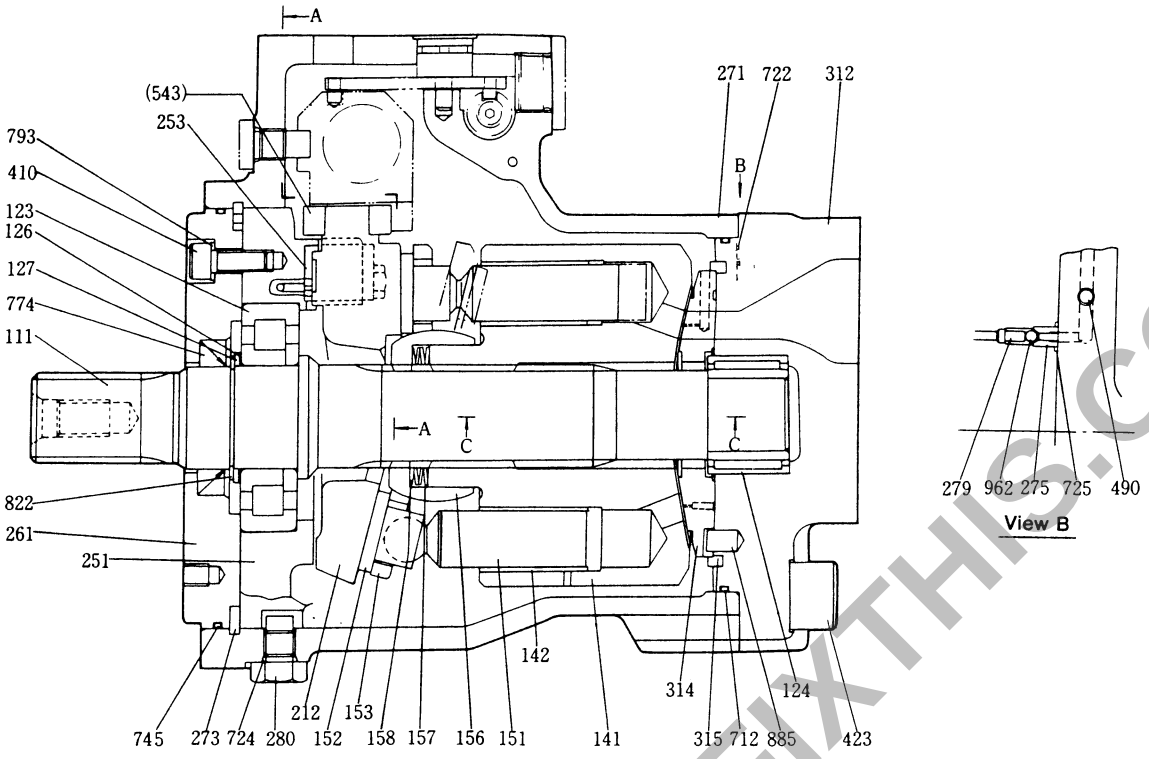


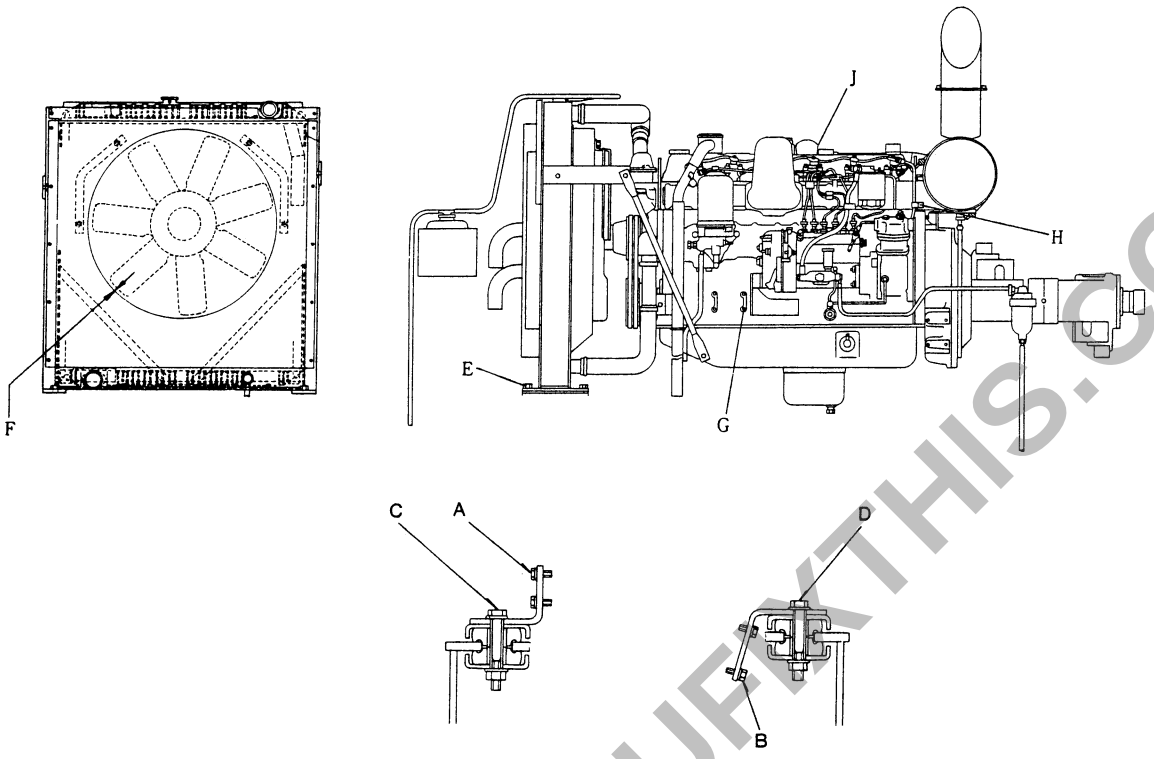
Fig. Single Pump

111. DRIVE SHAFT (F)	255. RETAINING METAL (F)	413. CAPSCREW	728. O RING
113. DRIVE SHAFT (R)	261. FRONT COVER	423. CAPSCREW	732. O RING
114. SPLINE JOINT	262. REAR COVER	428. CAPSCREW	734. O RING
115. SPLINE JOINT	271. PUMP CASING (F)	431. CAPSCREW	735. O RING
123. ROIIER BEARING	272. PUMP CASING (R)	438. CAPSCREW	745. O RING
124. NEEDLE BEARING	273. RETAINER	454. CAPSCREW	746. O RING
126. INNER RACE SHIM	274. SEAL PIPE (F)	455. HEX. HEAD BOLT	753. O RING
127. BEARING SPACER	275. SEAT S	466. VP PLUG	754. O RING
141. CYLINDER		468. VP PLUG	755. O RING
142. CYLINDER BUSH	278. SEAL PIPE (R)	469. VP PLUG	761. O RING
151. PISTON	279. STOPPER (2)	473. PO PLUG	774. OIL SEAL
152. SHOE	280. SWASH PLATE SUPPORT		793. SEAL WASHER
153. RETAINER	FIXING BOLT	490. PLUG	822. STOP RING
156. SPHERICAL BUSH	281. BUSH	543. SLIDE RING	833. STOP RING
157. FLAT SPRING	312. VALVE BLOCK	710. O RING	834. STOP RING
158. FLAT SPRING SHIM	313. VALVE PLATE (R)	712. O RING	850. LOCKING RING
212. SWASH PLATE	314. VALVE PLATE (F)	714. O RING	885. VALVE PLATE PIN
251. SWASH PLATE SUPPORT (R)	315. GUIDE RING	722. O RING	886. VALVE PLATE PIN
253. BEARING METAL	409. CAPSCREW	724. O RING	938. KENIK PLUG
254. RETAINING METAL (R)	410, CAPSCREW	725. O RING	962. STEEL BALL

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5. 3 INSTALLING ENGINE MOUNT AND RADIATOR



Installing Engine Mount

Fig 14

Table 3

Symbol	Item	Standard Value	Remedy
A	Tightening torque of front engine mount bracket mounting capscrew	6±0.6kgf·m (43.3±4.3ft·lbs)	Apply Loctite #242 (locking compound)
B	Tightening torque of rear engine mount bracket mounting capscrew		
C	Tightening torque of front engine mount upper frame mounting capscrew	23±2kgf·m (166±14.4ft·lbs)	Apply Loctite #271 (locking compound)
D	Tightening torque of rear engine mount upper frame mounting capscrew		
E	Tightening torque of radiator upper frame mounting capscrew	15 kgf·m (108 ft·lbs)	Apply Loctite #242 (locking compound)
F	Adjusting dimension of fan and radiator shroud	$15^{+4}_{-1.5}$mm ($0.59^{+0.15}_{-0.06}$ in)	Adjust according to the tightening condition (E).
G	Tightening torque of engine control bracket mounting capscrew	6±0.6kgf·m (43.3±4.3ft·lbs)	Apply Loctite #242 (locking compound)
H	Tightening torque of muffler bracket mounting capscrew	4.2±0.6kgf·m (30.3±4.3ft·lbs)	
J	Tightening torque of spacer mounting capscrew at side of turbo charger duct	2.4kgf·m (17.3ft·lbs)	Retighten.

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3.2 INSTALLING COUPLING

1) Remove burr and stain on the mounting surfaces of hydraulic pump (1), braket (24) and the engine flywheel.
2) Tighten bracket (24) to the specified torque into hydraulic pump (1), using pump mounting socket bolt (26).
3) Knock spring pin (27.6) into coupling hub (27.1) and the engine flywheel.

NOTE

Drive in spring pin (27.6) to full depth.

4) Put coupling hub (27.1) into the shaft of hydraulic pump (1) and tighten setscrew (27.7) to the specified torque.
5) Install insert MR (27.2) to coupling hub (27.1). Then tighten socketscrew (27.5) to the specified torgue.
6) Install insert MA (27.3) to the engine flywheel. Then tighten socketscrew (27.5) to the specified torque, and install element (27.4).
7) Install hydraulic pump (1) to the engine. (Refer to Para. 2.2.)

4. REMOVAL AND INSTALLATION OF RADIATOR

4.1 REMOVING RADIATOR

1) Remove the guards at the top, right and left of the engine and take off capscrews (40) fastening the right and left radiator stays.
2) Fit lifting metal (M12) into bolt hole (H) for the lifting hook at the top of the radiator and lift the radiator with a wire sling to the extent that it is just tensioned.
3) Take off capscrews (42) fastening fan guard (41) and remove the fan guard.
4) Loosen drain plug (43) of the radiator and drain out the cooling water of the engine and the radiator.
5) Disconnect all hoses between the engine and the radiator.
6) Desconnect the hose (49) between the reserve tank (48) and the radiator (5). Then draw out wiring connector (50) under the raditor tank (48).
7) Loosen capscrews (52) of bracket (51) mounting reserve tank (48) and remove it.

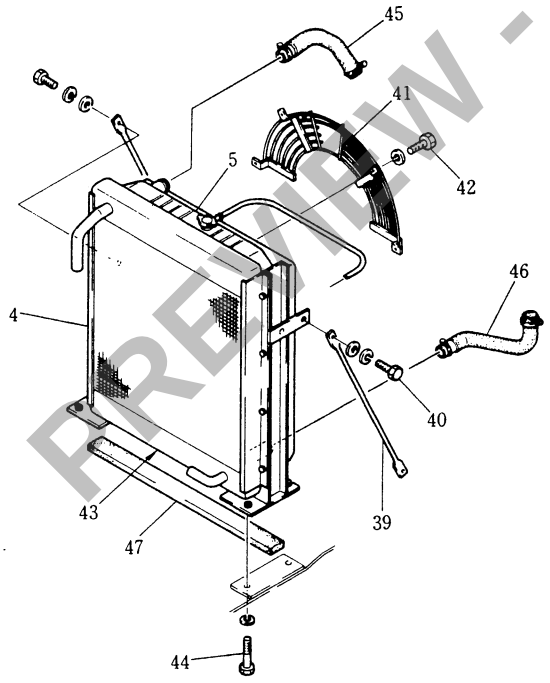


Fig 10

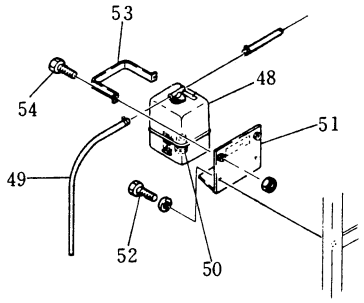


Fig 11

8) Disconnect the coupling and the hose attached to the oil cooler and put a plug into the connection.
9) Remove capscrews (44) and nut of the radiator.
10) Lift the radiator a little and remove it so it may not hit the engine fan.

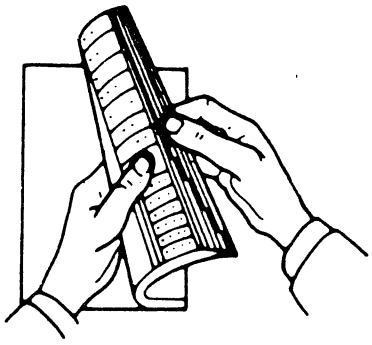
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SHOP MANUAL model K909-II K909LC-II

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○ How to Index each Shop Manual Section
The GENERAL of this shop manual consists of 7 headings as shown above. Each section can be easily referred to by indexes appended to the margin of the page as indicated on the right. Please use the indexes for speedy reference.



KOBELCO

GENERAL

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5. SWING PERFORMANCE

A . Swing performance

Condition:

Engine at high idling, oil temperature of 50 ± 5℃, fully retract the bucket cylinder and arm cylinder, and hold the bucket (empty) at 1.5 m (4 ft-11 in) above ground.

Procedure:

Measure the time required to make two turns after one turn of start-up with a stop watch and give the time required to make one turn. Repeat it three times and give an average value.

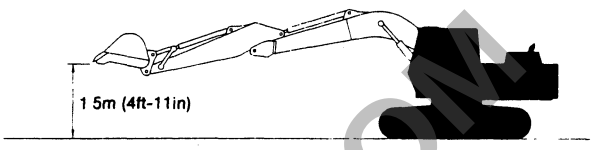


Fig. 19

B . Swing brake

condition:

Engine at high idling, oil temperature of 50 ± 5℃, fully extend the bucket cylinder and fully retract the arm cylinder, and hold the bucket (empty) at 1.5m (4ft-11 in) above ground.

Procedure:

Measure the braking distance at the top end of the bucket, actuating swing relief valve after one turn of start-up. Repeat it three times on clockwise and counterclockwise direction respectively and give an average value for each direction.

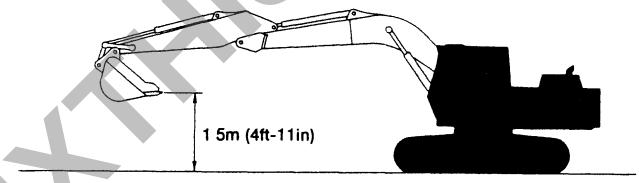


Fig. 20

C . Swing maintain performance

Condition:

Engine stopped, oil temperature of 50 ± 5℃, fully retract the bucket cylinder and the arm cylinder, and set the machine on a 10 deg. slope, holding the bucket at 1.5m (4ft-11 in) above ground.

Direct the attachment perpendicular to the slope and measure the swing (overrun) at the bucket top end for 20 seconds. Measure it in both the clockwise and counterclockwise directions.

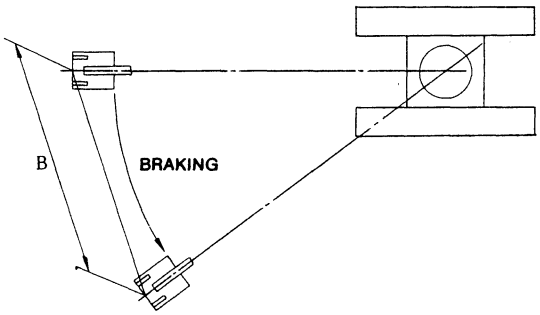


Fig. 21

Table 10

Symbol	Item	Standard value	Remarks
A	Swing speed	5.3～5.9 sec/rev	
B	Swing brake performance	6.0～11.3 m (20 ft～37 ft)	48°～88°
C	Swing maintain performance	0 mm/20 sec (0 in/20 sec)	

NOTE

Measure the swing drift value in "C" 10 seconds after the engine stops.

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Applicable Machines

LQ-1601~
LL-1201~

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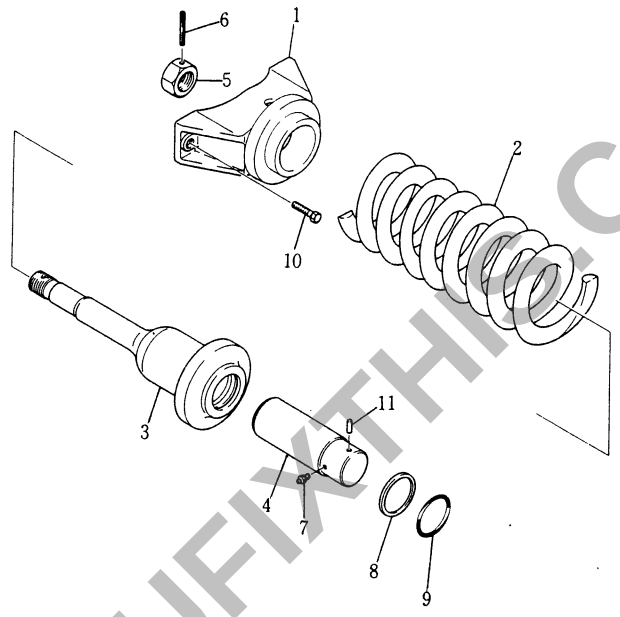
Revision	Date of Issue	Remarks
First edition	July, 1987	250K
First revison	September, 1988	120K

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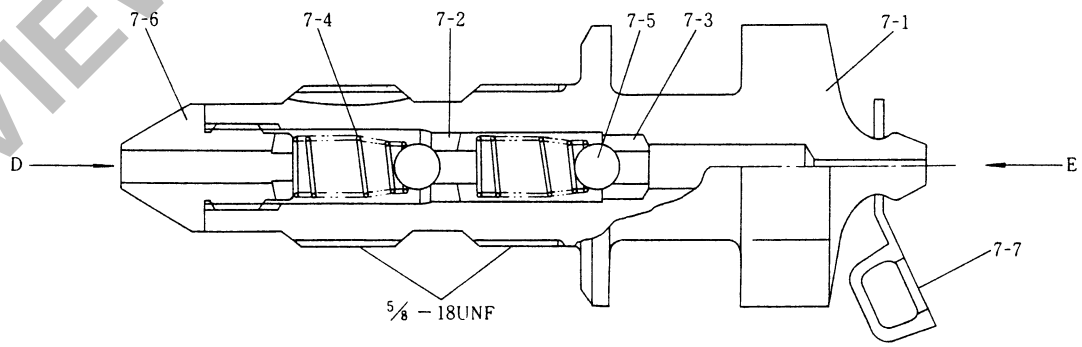
6.4 CONSTRUCTION OF TRACK SPRING

Specification

Set load	14,000±750kg (30800±1,653lbs)
Weight	148kg (325lbs)



1. BRACKET	7-1. BODY	8. OIL SEAL
2. SPRING	7-2. BUSHING	9. O RING
3. GREASE CYLINDER	7-3. BUSHING	10. CAPSCREW
4. PISTON	7-4. SPRING	11. PIN
5. NUT	7-5. BALL	
6. SPLIT PIN	7-6. HEAD	
7. GREASE NIPPLE	7-7. CAP	



Specification Of grease nipple Unit : kgf/㎠ (psi)

Oil sealing pressure	20~27 (284~384) (From E direction)
Normal max pressure	500 (7,110)
Max. resisting pressure	1,200 (17,064) (From D direction)

Fig. 42

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4. REMOVAL AND INSTALLATION OF CAB

4.1 REMOVING CAB

1) Place wire slings into hooks (1) on the cab top, and lift the cab up so the slings are tense with a crane.
2) Loosen and remove (eight) cab mounting capscrews (2, 3).
3) Disconnect the wiring couplers of the wiper, room lamp and radio antenna.
4) Lift the cab a little with a crane. After confinning safety, take it off.

NOTE

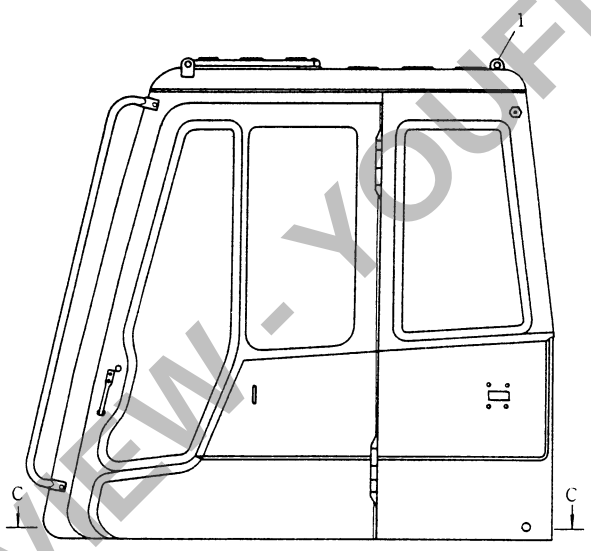
Since there is only a small gap between the frame and the instrument panel, exercise care not to bling the cab into contact with them when lifting it with a crane.

4.2 INSTALLING CAB

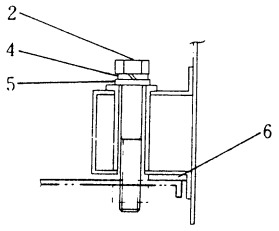
1) Inspect that rubber seat (6) is not broken or deformed, and place it to the mounting position of floor plate.
2) Place wire slings into hooks (1) on the cab top, lift the cab with a crane, and place it in its mounting position.
3) Insert and tighten (eight) cab mounting capscrews (2, 3) to the specified torque.
4) Remove the wire slings on the cab top.
5) Reconnent the wiring couplers of the wiper, room lamp and radio antenna.

NOTE

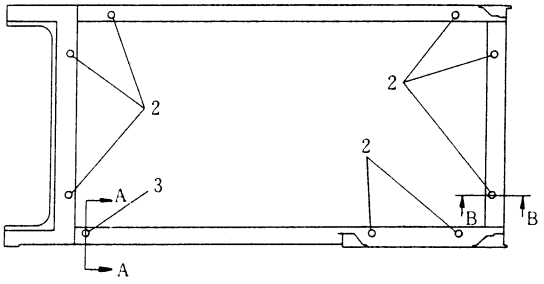
When bringing the cab up and then down to its mounting position with a crane, use care not to allow it to contact the frame and the instrument panel.



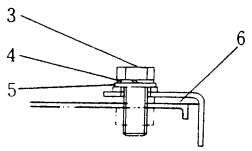
1. LIFTING HOOK
2. CAPSCREW M12X2.75" (M12X70)
3. CAPSCREW M12X1.38" (M12X35)
4. LOCK WASHER
5. WASHER
6. RUBBER SHEET



SECTION A—A



SECTION C—C

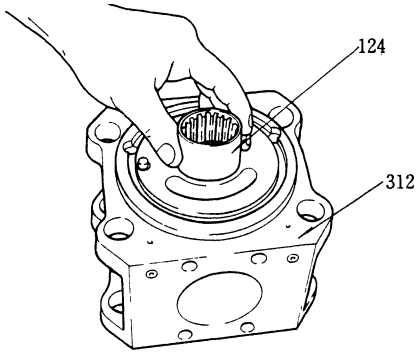


SECTION B—B

Fig. 6

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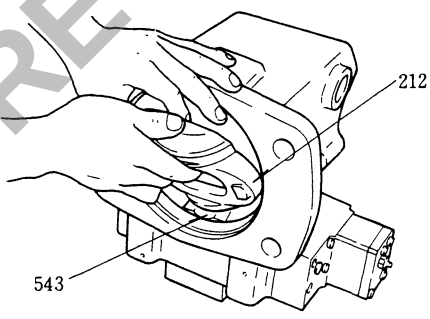
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No.	Procedure	Notes
12	1) If necessary, take out needle bearing (124) and spline joint (114) from the valve block or from valve cover (312). 2) Roller bearing (123) of the drive shaft may be removed if the stop ring is taken off and the bearing is knocked with a steel bar.  Fig. 19	Avoid removing the bearing as much as possible. Draw it out only when the bearing life is considered to have ended.

3.3 ASSEMBLY

Assembly is the reverse order of disassembly, but notice the following in assembly.

1) Be sure to repair parts damaged at disassembly. Get replacement parts ready beforehand.
2) Wash all parts in cleaning oil and dry them with jet air.
3) Do not forget to coat sliding surface and bearings with clean hydraulic oil before proceeding to assembly.
4) Replace all sealing parts such as O rings and oil seals as a rule.
5) Tighten all socket bolt and plugs to the specified torques in Maintenance Standards, using a torques wrench.
6) Use care so as not to intermingle the front pump parts with the rear pump parts.
7) Reassembly deals with Spec.-1, 4, and 5. For Spec.-2, 3, 6, and 7, special notes are given.

No.	Procedure	Notes
1	Insert slide ring (543) into swash plate (212) and put the swash plate into the pump casing, while inserting the slide ring into the groove of the regulator's tilting lever.  Fig. 20	

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(2) Flow Reset Function

As the self pump's delivery pressure P_1 or the companion pump's delivery pressure P_2 decreases, compensating rod (623) is pushed back by the action of springs (625, 626) to turn lever 1 on point E. Turning of lever 1 causes the feedback lever to turn on point D which shifts the spool leftwards As the result, port C_1 opens a path to the tank port. This causes the servo piston to move to the left and the pump's delivery rate to increase.

The travel of the servo piston is transmitted to the spool by the action of the feedback mechanism to move it till the opening between the spool and the sleeve is closed

2. 2. 5 LOW TILTING (LOW FLOW) COMMAND PREFERENTIAL FUNCTION

As mentioned above, flow control and horsepower control tilting angle commands are transmitted to the feedback and the spool via the large hole parts (C and F) of lever 1 and lever 2, but since parts C and F have pin〔φ4 (φ0 15″)〕 that stands out of the large hole〔φ8 (φ0.31″)〕, only the lever lessening the tilting angle contacts pin (897); the〔φ8 (φ0.31″)〕hole in the lever that tilts more is freed without contacting pin (897). Such a mechanical selection method permits preference of the low tilting angle sides of flow control and horsepower control

2. 2. 6 POWER SHIFT CONTROL

Power shift pressure P_1 controls the set horsepower of the pump to a desired level, as shown in Fig.6.

As power shift pressure Pf rises, compensating rod (623) moves to the right via pin (898) and compensating piston (621). This decreases the pump's tilting angle and then a set horsepower in the same way as explained in the overload preventive function by horsepower control. On the contrary, a set horsepower rises as power shift pressure Pf falles.

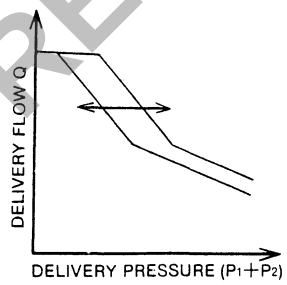


Fig. 6

2. 2. 7 QMAX CUT CONTROL

As shown in Fig.7, the pilot pressure Pm switches the maximum flow in two steps

When pilot pressure Pm is given, it is admitted to the lefthand side of piston QMC (648). The piston QMC moves stopper (647) and pilot piston (643) to the right, overcoming the force of pilot spring (646), thereby reducing the delivery rate of the pump.

Since adjust screw QMC (642) is provided with a flange, piston QMC stops upon contact with the flange, and the position of the pilot piston determines the maximum flow of the pump

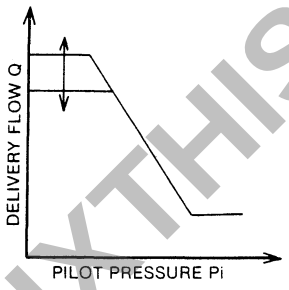


Fig. 7

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2) Hydraulic pump (P2) side

The same result is obtained when the LH travel spool and the arm spool are operated at the same time.

When the LH travel spool is switched over and if the swing signal pressure enters, the pressure connects with the chamber between the poppet and the plug of logic valve (80). This causes logic valve (80) to close, and the pilot pressure that has entered from port (PS) raises the pressure of port (F) and switch over the travel preferential changeover valve (61).

2.2.2 ARM FUNCTION

(1) Ae arm extending operation

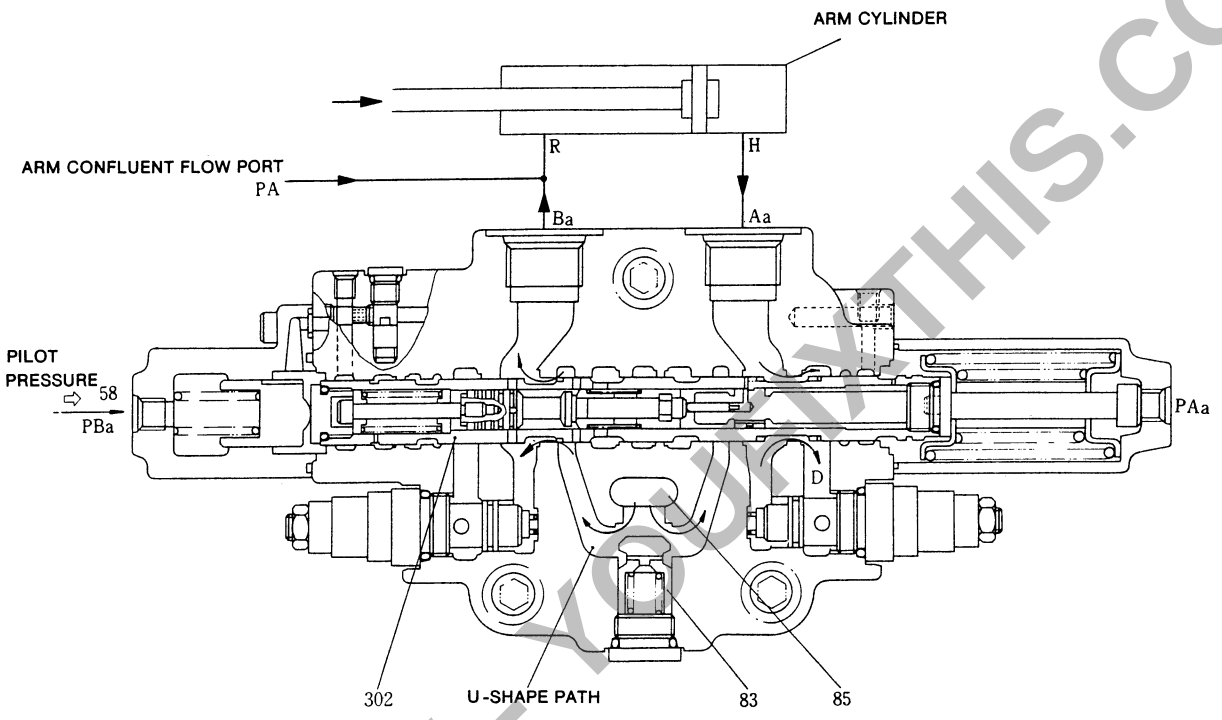


Fig. 15

When the arm extending operation is performed, the pilot pressure (58) acts on the LH pilot pressure receiving chamber of the LH arm section and causes arm spool (302) to move to the right. Concurrently, the pilot pressure acts on the pilot port (58) of the RH end section and then on the RH neutral cut valve (72) via arm confluent flow changeover valve (70) and shuttle valve (87) to change over each of the changeover valves.

The pressure oil discharged from pump (P2) runs to bypass line (52) past main path (51), but since the bypass line is cut by the shift of arm spool (302), the pressure oil forces check valve (84) open, runs into parallel line (85), pushes load check valve (83) open, passes through the peripheral notch of arm spool (302) via the U-shape path, and is fed to the arm cylinder rod from port (A).

In the meantime, the oil returning from the arm cylinder bottom passes through port (Aa), the outer circumference of arm spool (302), low-pressure line (D) and tank port (T), and returns to the hydraulic tank.

And the pressure oil discharged from pump (P1) passes through RH block bypass line (52), arm confluent flow tandem line (68), arm confluent changeover valve (70), arm confluent check valve (67) and arm confluent flow port (PA), and is combined with the oil of the arm cylinder rod side. (Arm tandem confluent flow)

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1. SPECIFICATIONS

1.1 GENERAL VIEW

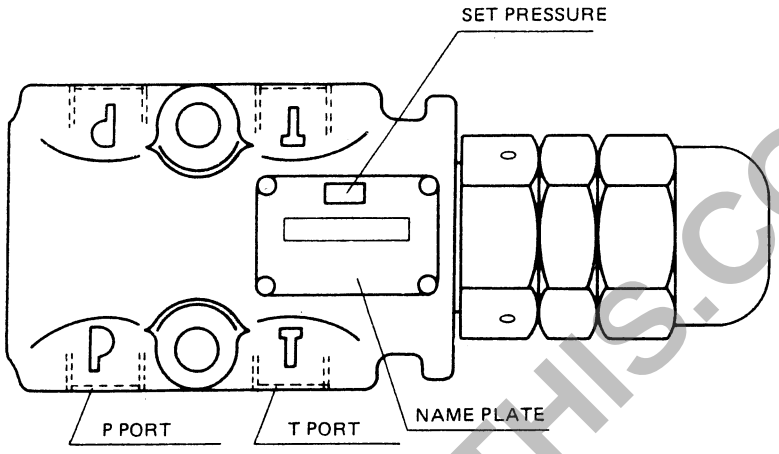


Fig. 1

1.2 MAJOR DIMENSIONS

Item \ Spec	1	2	3	4	5	15	25
Model	VRD–0300					VRD–03	VRD–06
P Port (Screw size)	PT3/8					JIS PF3/8 (O Ring Port)	JIS PF3/4 (O Ring Port)
T Port (Screw size)	PT3/8					JIS PF3/8 (O Ring Port)	JIS PF3/4 (O Ring Port)
Proof Pressure kgf/cm² (lbs/in²)	140 (1991)						200 (2986)
Relief Set Pressure kgf/cm² (lbs/in²)	10~100 (142.3~1422.5)						
Rated Flow ℓ/min (gal/min)	30 (7.9)						75 (19.8)
Relief Set Pressure kgf/cm² (lbs/in²)	35 (498)	20 (285)	40 (569)	125 (1778)	43 (611.6)	50 (711)	50 (711)
Relief Set Flow ℓ/min (gal/min)	20 (285)	18 (256)	18 (256)	30 (426.7)	17 (241.8)	18 (256)	45 (640)
Weight kg (lbs)	1.8 (3.9)						3.4 (7.5)

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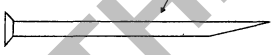
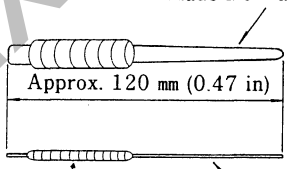
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3. DISASSEMBLY AND ASSEMBLY

3.1 PREPARATION

3.1.1 TOOLS

Table2

Symbol	Tool Name	Used for	Remarks
a	Hammer	Disassembly Assembly	1. Steel hammer 2. Wooden or plastic hammer
b	Rubber mat		Not less than 500 mm (1ft-7.7in) square
c	Wrench		1. Allen wrench 2. Double-ended and single-ended wrench 3. Extension pipe
d	Torque wrench	Assembly	10kgf·m (72.2ft·lbs)
e	Pin	Disassembly	Grind the tip of "a nail " to shape as a screwdriver. 
f	Spatula	Disassembly Assembly	Made from a hack-saw blade  Vinyl tape Remove the edge completely and make corner round smooth.
g	Vise	Disassembly Assembly	Vises movable over 150mm (5.9in)
h	Loctite		#242
i	Lubricating oil		Hydraulic oil or vaseline
j	Cleaning oil		

3.1.2 APPARATUS

(1) Hoist or crane.
The lifting device should be capable of lifting the swivel joint assembly.

(2) Work bench
The work bench should have an area of 1.2 m×1.5 m (3 ft-11.2in×4 ft-11in).

(3) Others
Also prepare waste cloth, wooden block and oil pan.

3.1.3 CLEANING OUTSIDE

Clean outside of the removed swivel joint with water or steam.

CAUTION

Clean swivel joint with their ports plugged up.

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