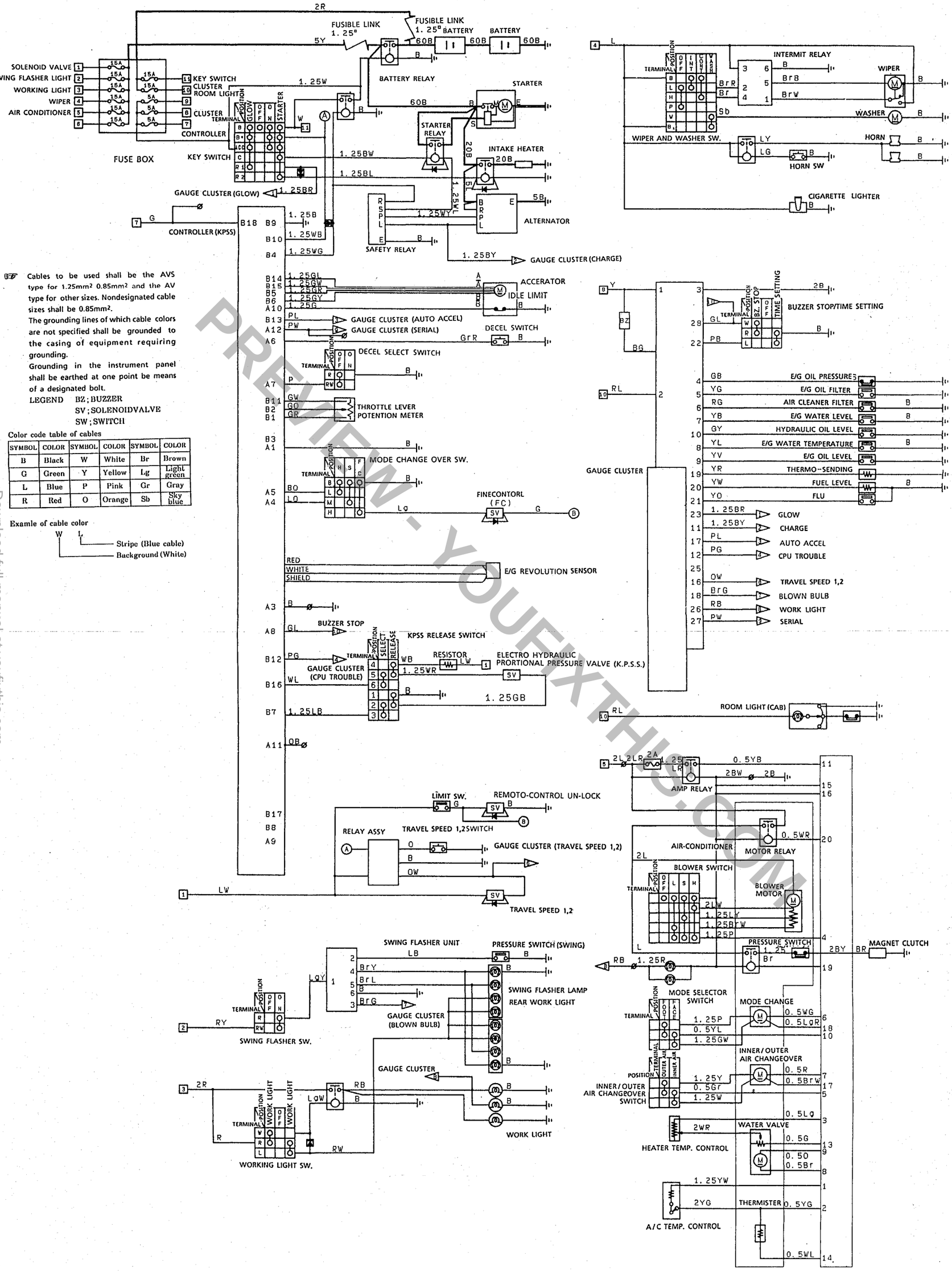


☞ Cables to be used shall be the AVS type for 1.25mm² 0.85mm² and the AV type for other sizes. Nondesignated cable sizes shall be 0.85mm².
The grounding lines of which cable colors are not specified shall be grounded to the casing of equipment requiring grounding.
Grounding in the instrument panel shall be earthed at one point be means of a designated bolt.

LEGEND BZ ; BUZZER
SV ; SOLENOIDVALVE
SW ; SWITCH

Color code table of cables

SYMBOL	COLOR	SYMBOL	COLOR	SYMBOL	COLOR
B	Black	W	White	Br	Brown
G	Green	Y	Yellow	Lg	Light green
L	Blue	P	Pink	Gr	Gray
R	Red	O	Orange	Sb	Sky blue

Examle of cable color

W L
Stripe (Blue cable)
Background (White)

PREVIEW - YOUFIXTHIS.COM

Download full manual at youfixthis.com

2. HYDRAULIC SYSTEM DIAGRAM

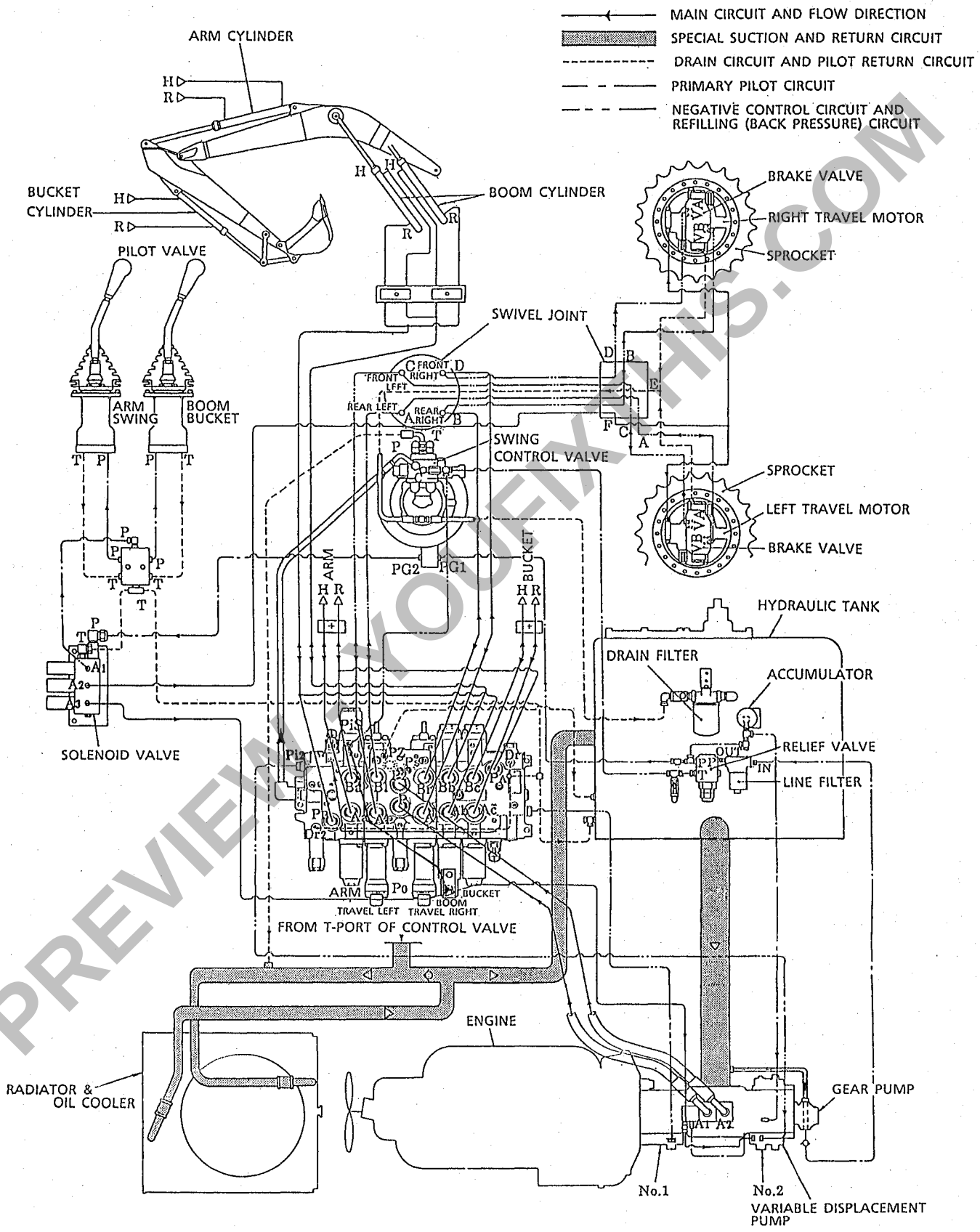


Fig. 1 Diagram of Major Hydraulic circuits

PREVIEW ONLY YOUFIXTHIS.COM

Download full manual at youfixthis.com

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 kgf · m (ft-lbs)

Classification	4	T	7	T	10	T
Nominal size	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±0.1 (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±0.7)	2.4±0.2 (17.3±1.4)	2.0±0.2 (14.4±1.4)	4.3±0.4 (31.0±2.9)	3.6±0.4 (26.0±2.9)
M10 P=1.5	2.2±0.2 (15.9±1.4)	1.83±0.18 (13.2±1.3)	4.7±0.5 (33.9±3.6)	4.0±0.4 (28.9±2.9)	8.5±0.9 (61.3±6.5)	7.2±0.7 (52.0±5.1)
M12 P=1.75	3.7±0.4 (26.7±2.9)	3.2±0.3 (23.1±2.2)	8.1±0.8 (58.5±5.8)	6.8±0.7 (49.1±5.1)	14.6±1.5 (105±10.8)	12.3±1.2 (88.8±8.7)
M14 P=2	5.9±0.6 (42.6±4.3)	5.0±0.5 (36.1±3.6)	12.8±1.3 (92.5±9.4)	10.8±1.1 (78.0±7.9)	23±2 (166±14)	19.5±1.9 (140 ±14)
M16 P=2	9.0±0.9 (64.9±6.5)	7.6±0.7 (54.8±5.1)	19.5±2.0 (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±1.2 (89.6±8.7)	10.5±1.0 (75.8±7.2)	27±3 (195±22)	23±2 (166±14)	49±5 (354±36)	41±4 (296±29)
M20 P=2.5	17.5±1.7 (126±12.3)	14.7±1.4 (106±10.1)	38±4 (274±29)	32±3 (231±22)	68±7 (491±51)	57±6 (412±43)
M22 P=2.5	23±2 (166±14)	19.6±2.0 (142±14)	51±5 (368±36)	43±4 (310±29)	92±9 (663±65)	77±8 (555±58)
M24 P=3	30±3 (217±22)	24±3 (173±22)	65±7 (469±51)	53±5 (383±36)	118±12 (852±87)	96±10 (693±72)
M27 P=3	44±4 (318±29)	36±3 (260±22)	96±10 (693±72)	78±8 (563±58)	173±17 (1250±120)	140±14 (1010±100)
M30 P=3.5	60±6 (433±43)	50±5 (361±36)	131±13 (946±94)	110±11 (794±79)	235±24 (1700±170)	198±20 (1430±140)
M33 P=3.5	81±8 (585±58)	68±7 (491±51)	176±18 (1270±130)	148±15 (1070±110)	317±32 (2290±230)	266±27 (1920±200)
M36 P=4	105±10 (758±72)	88±9 (636±65)	227±23 (1640±170)	190±19 (1370±140)	409±41 (2950±300)	343±34 (2480±250)

Table 2 Standard tightening torques for metric fine screw threads kgf · m (ft-lbs)

Classification	4	T	7	T	10	T
Nominal size	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±0.1 (7.0±0.7)	2.5±0.2 (18.0±1.4)	2.1±0.2 (15.2±1.4)	4.5±0.4 (32.5±2.9)	3.8±0.4 (27.4±2.9)
M10 P=1.25	2.3±0.2 (16.6±1.4)	1.91±0.19 (13.8±1.4)	4.9±0.5 (35.4±3.6)	4.2±0.4 (30.3±2.9)	8.9±0.9 (64.2±6.5)	7.5±0.7 (54.2±5.1)
M12 P=1.25	4.0±0.4 (28.9±2.9)	3.4±0.3 (24.5±2.2)	8.7±0.9 (62.8±6.5)	7.3±0.7 (52.7±5.1)	15.7±1.6 (113±12)	13.2±1.3 (95.3±9.4)
M16 P=1.5	9.4±0.9 (67.9±6.5)	7.9±0.8 (57.0±5.8)	20±2 (144±14)	17.2±1.7 (124±12)	37±4 (267±29)	31±3 (224±22)
M20 P=1.5	19±1.9 (137±14)	15.8±1.6 (114±12)	41±4 (296±29)	34±3 (246±22)	74±7 (535±51)	62±6 (448±43)
M24 P=2	32±3 (231±22)	27±3 (195±22)	70±7 (506±51)	58±6 (419±43)	126±12 (910±87)	105±10 (758±72)
M30 P=2	65±6 (469±43)	54±5 (390±36)	142±14 (1030±100)	118±12 (852±87)	255±26 (1840±190)	212±21 (1530±150)
M36 P=3	109±11 (787±79)	91±9 (657±65)	238±23 (1720±170)	198±20 (1430±140)	428±43 (3090±310)	357±36 (2580±260)

PREVIEW - YOUFIXTHIS.COM

Download full manual at youfixthis.com

2.4 ADJUSTING THE ENGINE REVOLUTION BY MECHATRO CONTROLLER

The adjustment of the mechatro controller which will be mentioned hereinunder must be performed whenever the above engine revolution runs out of a target tolerance or whenever either the controller or the stepping motor is replaced. If you follow the adjusting procedure incorrectly, adjustment data may be broken. Always stick to the procedure and reminders.

〔 Procedure for adjusting the engine revolution 〕

(1) Setting engine stop high positions

1) Starting reading adjust signals (TEST)
2) Adjustment start condition
3) Adjustment signal timing
4) Setting the engine revolution stop position
5) Setting engine revolution and high speed position
6) Fixing engine revolution and high speed position
7) Storing engine revolution and high speed position

(2) Setting engine revolution

1) Starting reading adjustment signals (TEST)
2) Adjustment start condition
3) Adjustment signal timing
4) Storing the revolution and position of the stepping motor
5) Closing the reading of adjust signals (RUN)

2.5 SETTING THE ENGINE STOP AND HIGH POSITIONS

(1) Starting reading adjustment signals (TEST)

1) Take off the operator seat and remove controller cover (1) fixed to the seat stand.

2) Remove cap (2) of the controller.

3) After confirming that the engine key is "OFF", put your finger into the hole in the rubber cap, push the adjust switch (3) in the controller toward TEST and start reading adjustment signals.

⚠ Adjustment data may be broken unless the switch (3) is pressed with the engine key in "OFF" position.

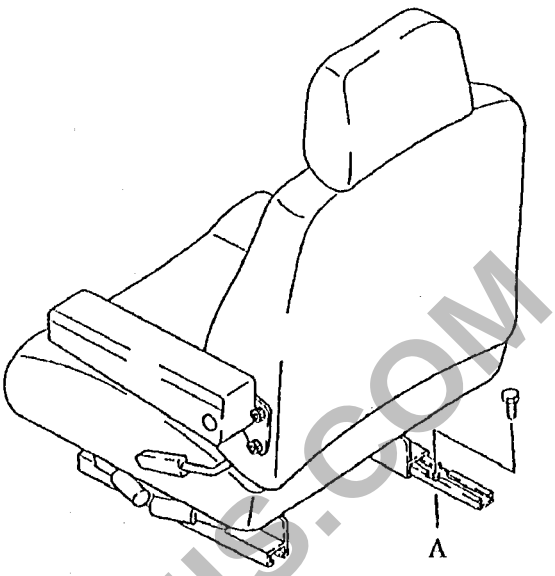


Fig. 5 Removing the operator seat

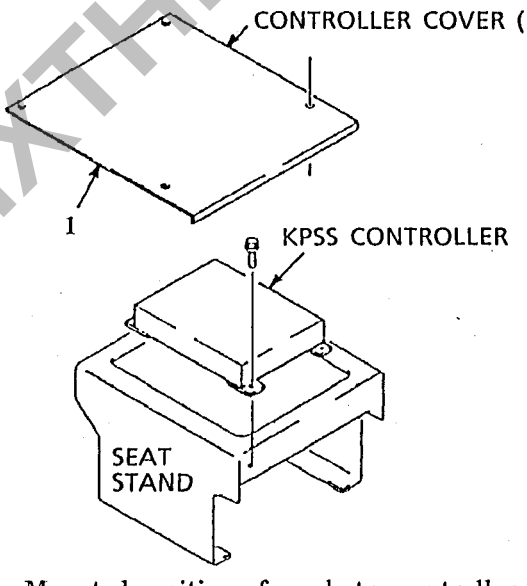


Fig. 6 Mounted position of mechatro controller

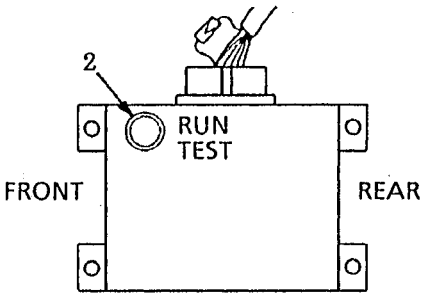


Fig. 7 Removing controller cap (2)

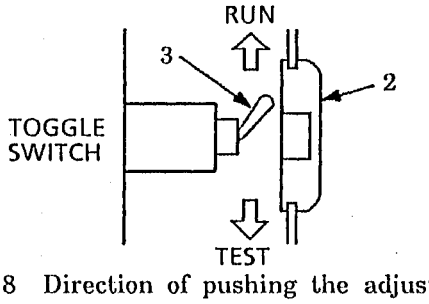


Fig. 8 Direction of pushing the adjust switch in the controller

PREVIEW - YOUFIXTHIS.COM
Download full manual at youfixthis.com

1. INTRODUCTION

1.1 MACHINE IN GENERAL

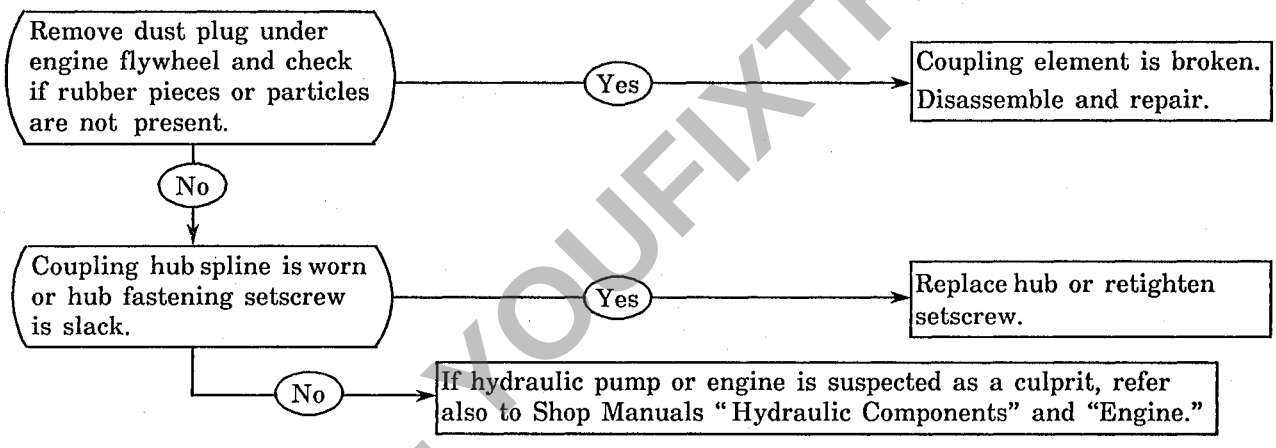
(1) If even a minor fault is left intact and operation is continued, a fatal failure may be caused, entailing a large sum of expenses and long hours of restoration. Therefore when even a small trouble occurs, do not rely on your intuition and experience, but look for the cause based on the troubleshooting principle and perform maintenance and adjustment to prevent major failure from occurring.

Keep in mind that a fault results from a combination of different causes.

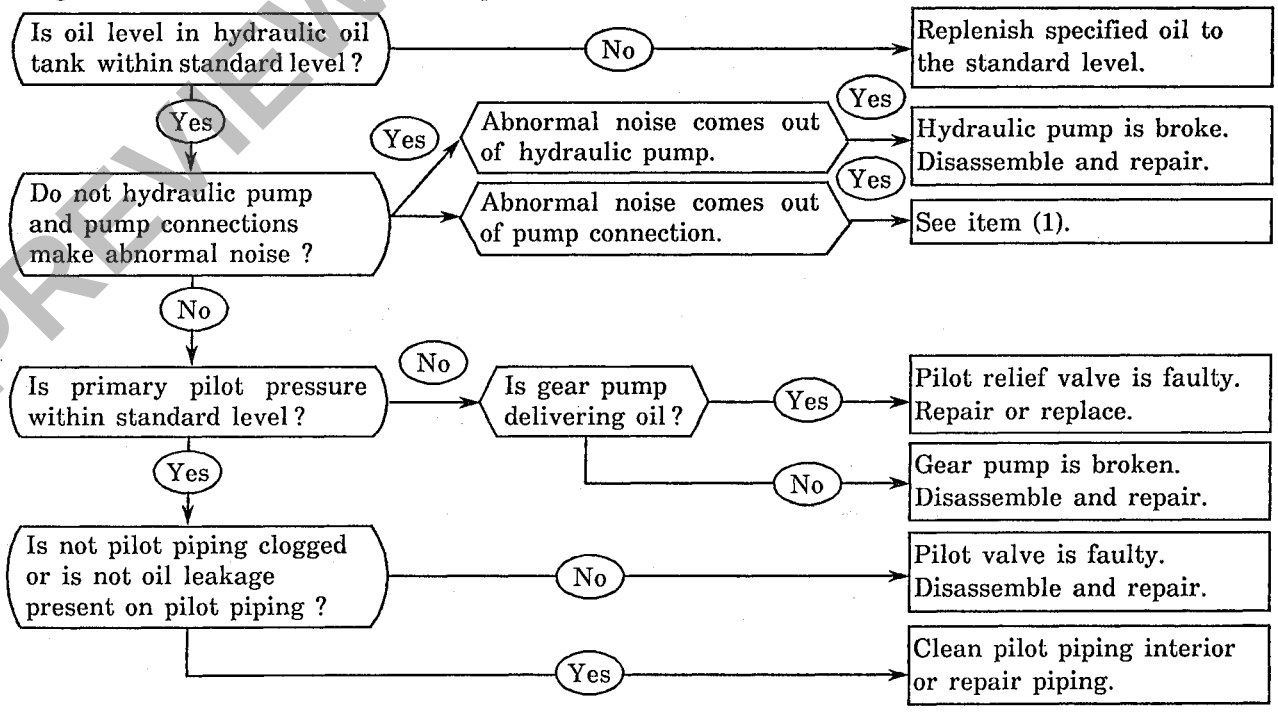
(2) The following lists up commonly occurring faults and possible causes with this machine. For the troubleshooting of the engine, refer to the Shop Manual – Engine. For the troubleshooting of hydraulic components, refer to a separate Shop Manual – Hydraulic Components.

2. DRIVE SYSTEM

(1) Unusual noise comes out of pump connection.



(2) Engine starts but machine does not operate at all.



PREVIEW - YOUFIXTHIS.COM
Download full manual at youfixthis.com

3. SPECIFICATIONS AND PERFORMANCE

■ SPEED AND CLIMBING ABILITY

Item \ Model	SK220	SK220LC
Swing speed	12rpm	
Travel speed	5.5 / 4km / h (3.4 / 2.5 MPH)	
Gradeabilicy	35° (70%)	

■ ENGINE

Model		Mitsubishi 6 D15-T
Type		Water-cooled 4-cycle, direct injection type with exhaust turbo supercharger
Number of cylinder - Bore x Stroke		6 - 113mm(4.45in) x 115mm(4.53in)
Total displacement		6,919c.c. (1,073cuin)
Rated output power/revolution	JIS D 1005 Net	165ps/2,150rpm
	SAE J 1345 Net	121kw/2,150rpm
	DIN 6270 Net	121kw/2,150rpm
Maximum torque/revolution	JIS D 1005 Net	60kgf·m / 1,600rpm
	SAE J 1349 Net	588N-m / 1,600rpm
	DIN 6270 Net	60kgf·m / 1,600rpm

■ HYDRAULIC COMPONENTS

Hydraulic pump	Double-pump variable displacement, axial piston + gear pump
Hydraulic motor (swing)	Axial piston motor
Hydraulic motor (travel)	Axial piston motor
Control valve	5-section multiple control valve + 1-section control valve (swing)
Cylinders (boom, arm, and bucket)	Double acting cylinder
Return filter	Safety valve containing filter type
Oil cooler	Air-cooled type

■ WEIGHT

Unit : kg (lbs)

Fully-equipped weight	22,900 (50,500)	23,500 (51,800)
Upper machinery	9,980 (22,000)	←
Lower machinery (with 600mm (24″) grocer shoe)	8,860 (19,500)	9,460 (20,900)
Attachment 〔 6.02m(19ft 9in) boom + 2.98m (9ft 9in) arm + 0.9m³ (0.92cuyd) bucket 〕	4,070 (8,970)	←

PREVIEW - YOUFIXTHIS.COM
Download full manual at youfixthis.com

1. GENERAL

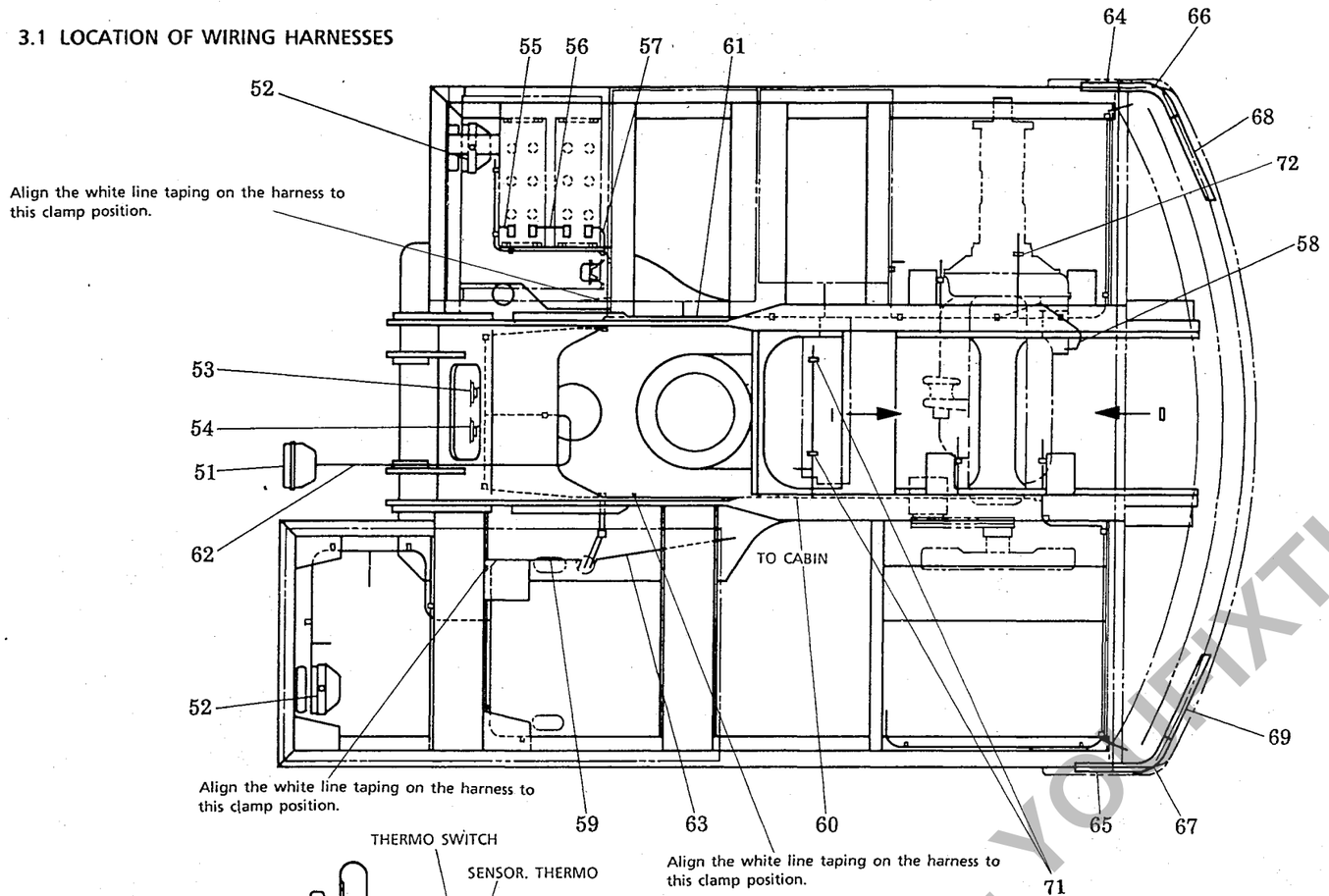
1) The terms used in this Maintenance Standards shall have definitions as follows:
   Standard value:
   Standard values for adjustment or assembly of a new machine, provided the values are for standard specifications (machine with standard attachments and shoes) unless otherwise specified.
   Allowable value:
   A limit value that shall not be exceeded. If it is exceeded, remedy or replacement is required. Avoid using a machine, exceeding this value to maintain the performance or safety of the machine.
   Limit value of use:
   A value at which machine adjustment or parts replacement becomes unnecessary if it is exceeded. If the machine is still used beyond the limit value, the machine will be faced with failures leading to the out-of operation and will develop safety problems.
   Oil temperature:
   Temperature to be applied. The temperature of hydraulic oil refers to that in the hydraulic oil tank. Hydraulic oil must be circulated continuously so that the oil temperature in the circuits may be leveled off with that of the tank.
2) For items without allowable values, adjust and repair or replace them with reference to the standard values.
3) Rubber products such as hydraulic hoses, O rings and oil seals deteriorate with time. Replace them regularly or at overhaul.
4) It is advisable that important hoses for safety purpose be designated as very important parts (V.I.P.) and be replaced regularly.
5) In proceeding to maintenance, it is essential to get familiar with machine operating procedures, precautions to be observed and inspection / lubrication procedures. Read through the Operators Manual as well.

PREVIEW - YOUFIXTHIS.COM

Download full manual at youfixthis.com

3. WIRING HARNESSES

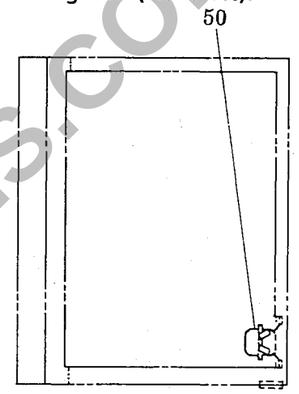
3.1 LOCATION OF WIRING HARNESSES



NOTE :
1. THE TIGHTENING TORQUE OF THE BATTERY TERMINALS IS 90~120 kg · cm (6.5~18.1 ft · lbs)
2. CLIP (71,72) TIGHTENING STRONG 5~8 kg (11~18 lbs)

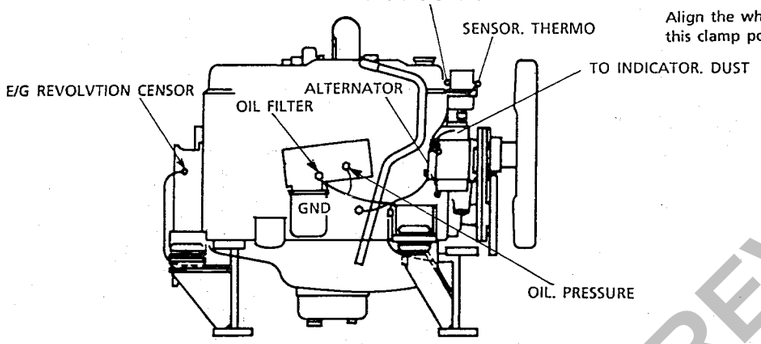
Starter side
BA(FOR M10) TERMINAL

The max. tightening torque of terminals : 80kgf · cm (5.8 ft · lbs).

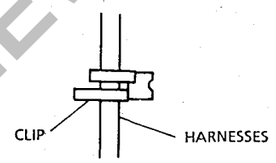


Detail of battery relay

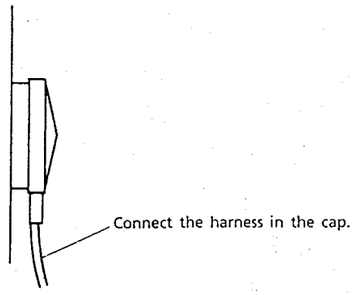
No.	NAME	Q'ty
50	BATTERY RELAY	1
51	WORKING LIGHT	1
52	WORKING LIGHT	2
53	HORN ASSY	1
54	HORN ASSY	1
55	BATTERY CABLE	1
56	BATTERY CABLE	1
57	BATTERY CABLE	1
58	BATTERY CABLE	1
59	WIRING HARNESS	1
60	WIRING HARNESS	1
61	WIRING HARNESS	1
62	HARNESSES	1
63	HARNESSES	1
64	LAMP ASSY	1
65	LAMP ASSY	1
66	LAMP ASSY	1
67	LAMP ASSY	1
68	LAMP ASSY	1
69	LAMP ASSY	1
71	CLIP	5
72	CLIP	5



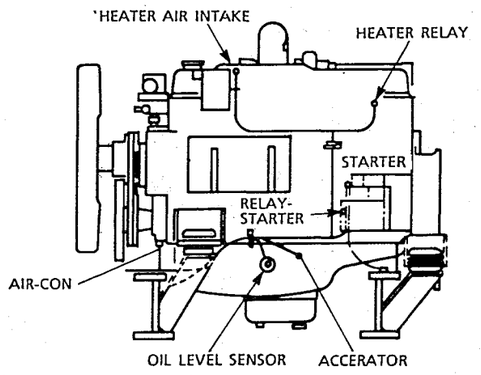
VIEW I



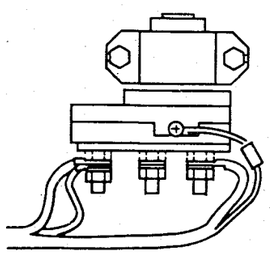
Fixing method harness



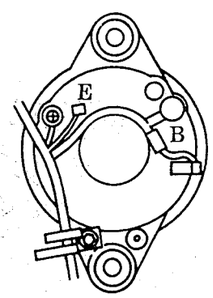
Detail of sending unit-fuel



VIEW II



Detail of heater relay

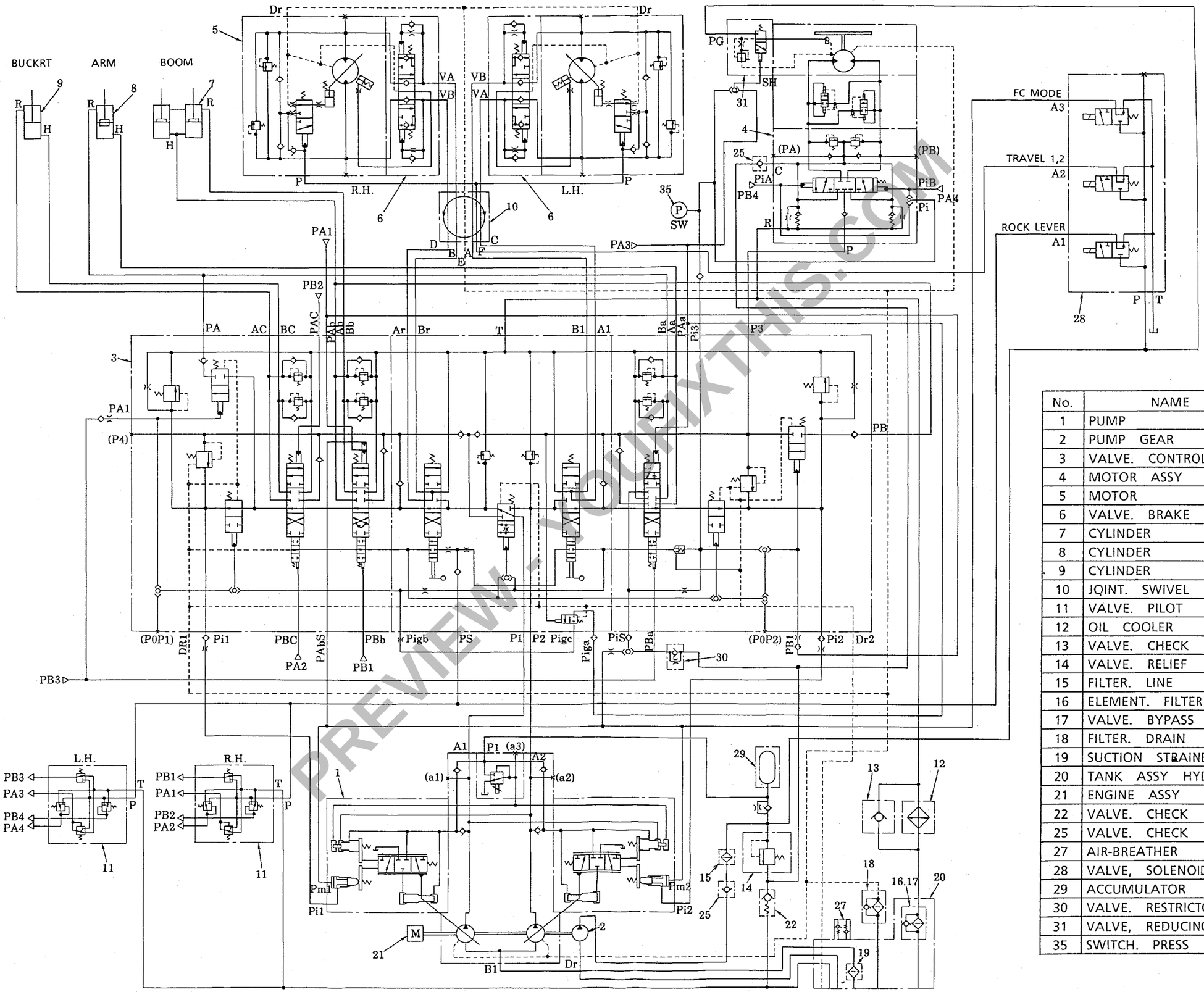


Detail of alternator

PREVIEW - YOUFIXTHIS.COM

Download full manual at youfixthis.com

APPLICABLE MACHINES YN−07922~
YQ−01226~



No.	NAME	TYPE
1	PUMP	K3Y112DT
2	PUMP GEAR	KP1009
3	VALVE. CONTROL	KM×15C
4	MOTOR ASSY	M2×150+15R
5	MOTOR	MV150/114
6	VALVE. BRAKE	RBV24
7	CYLINDER	
8	CYLINDER	
9	CYLINDER	
10	JOINT. SWIVEL	
11	VALVE. PILOT	TH40K
12	OIL COOLER	
13	VALVE. CHECK	Y-2395
14	VALVE. RELIEF	VRD-03
15	FILTER. LINE	Y-1795
16	ELEMENT. FILTER	Y-1635
17	VALVE. BYPASS	Y-1506
18	FILTER. DRAIN	SP04-10
19	SUCTION STRAINER	F1877
20	TANK ASSY HYDR	
21	ENGINE ASSY	
22	VALVE. CHECK	
25	VALVE. CHECK	
27	AIR-BREATHER	
28	VALVE, SOLENOID	VBY-121
29	ACCUMULATOR	ME70-500-30
30	VALVE. RESTRICTOR	
31	VALVE, REDUCING	
35	SWITCH. PRESS	

PREVIEW - YOUFIXTHIS.COM

Download full manual at youfixthis.com

2. TIGHTENING TORQUES FOR NUTS AND SLEEVES

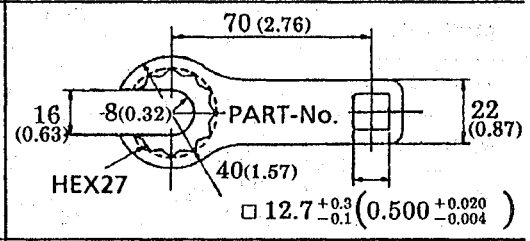
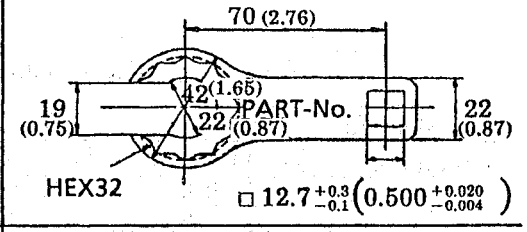
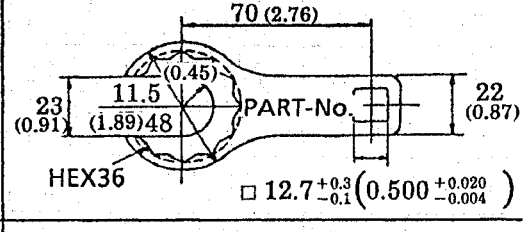
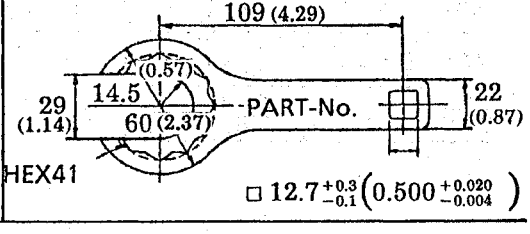
Table 3 indicates standard tightening torques applicable to cases where no particular note is given. Overtightening or undertightening of nuts and sleeves in bite type tube fittings may develop oil leaks through pipe connections. Always tighten nuts and sleeves to proper torques.

Table 3

Manufacturer's name	Working pressure kgf/cm² (psi)	Tube size OD×thickness mm (in)	Tightening torque kgf·m (ft·lbs)
Nippon A.M.C.	300 (4270)	10×1.5 (0.394×0.059)	6.5±0.5 (46.9±3.6)
		15×2.0 (0.591×0.079)	11.5±0.5 (83.1±3.6)
		18×2.5 (0.709×0.098)	18±2 (130±14.4)
		22×3.0 (0.866×0.118)	22±2 (159±14)
		28×4.0 (1.10×0.157)	28±3 (202±22)
Ihara Koatu	300 (4270)	35×5.0 (1.38×0.20)	35±3.5 (253±25)

3. SPECIAL SPANNER FOR TUBE

Table 4

Applicable tube diameter mm (in)	Part No	Opposing flats of a hex-agon nut mm (in)	Drawing of a special spanner (in)
15 (0.59)	2421T160	27 (1.06)	
18 (0.71)	2421T138	32 (1.26)	
22 (0.87)	2421T130	36 (1.42)	
28 (1.10)	2421T115	41 (1.61)	

PREVIEW - YOUFIXTHIS.COM
Download full manual at youfixthis.com

(2) Adjustment start condition

1) Adjust switch in controller·····TEST

2) KPSS (operation mode)
changeover switch ·····H mode

3) Auto accel select switch·····ON

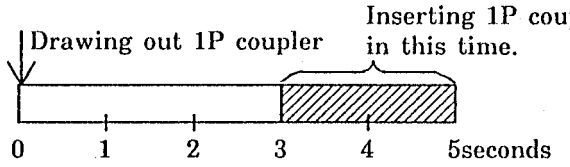
4) Throttle lever·····Low idle

5) Starter key·····Engine at rest with the starter switch "ON"

(3) Adjust signal timing

1) Adjust signal
To receive an adjust signal that actuates the stepping motor, pull out and put in 1P coupler (4) at the inlet of the controller.

2) Adjust timing
There is a timing at which the pulling out and inserting signals of the 1P coupler work effective-ly. It is limited to seconds in the hatching of the figure below.



☞ If the 1P coupler is inserted within the adjusting timing, "CPU" is indicated on the multi display, indicating that adjustment is under way.

3) When insertion of the 1P coupler runs out of the adjustment timing:
When a time display appears on the multi display even if the 1P coupler is inserted, draw out the 1P coupler above match the insertion timing.

(4) Procedure of positioning the engine rotation stop

1) Manipulation of adjust signals
Within 3~5 seconds after the 1P coupler is drawn out, insert it and the controler is moved next programed.

2) Lighting the CPU display and transferring the motor stop position
CPU display comes out on the multi display and then the stepping motor returns to the engine stop position.

3) Adjusting the length of governor lever adjust rod (9)
Insert a 0.1mm leaf of the thickness gauge between engine stop set bolt (13) and governor lever (7), adjust the length of adjust rod (9) and lock the nuts on both ends.

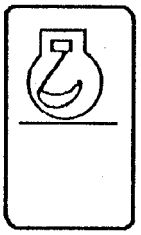


Fig. 9 Auto accel select switch

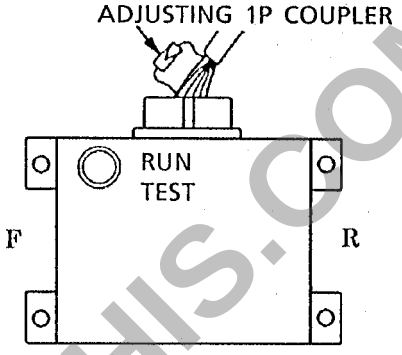


Fig. 10 Position of the adjusting 1P coupler of the controller

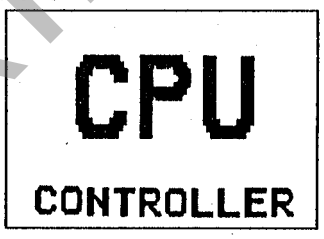


Fig. 11 CPU indication on multi display

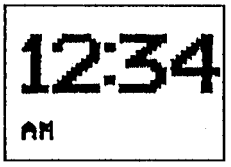
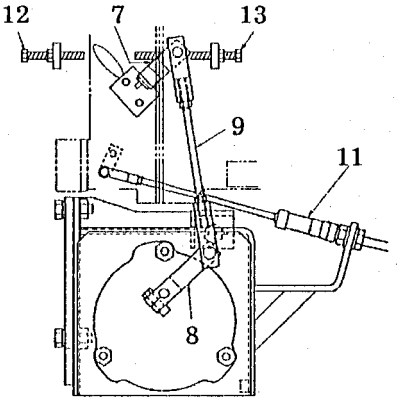


Fig. 12 An example of time display on the multi display



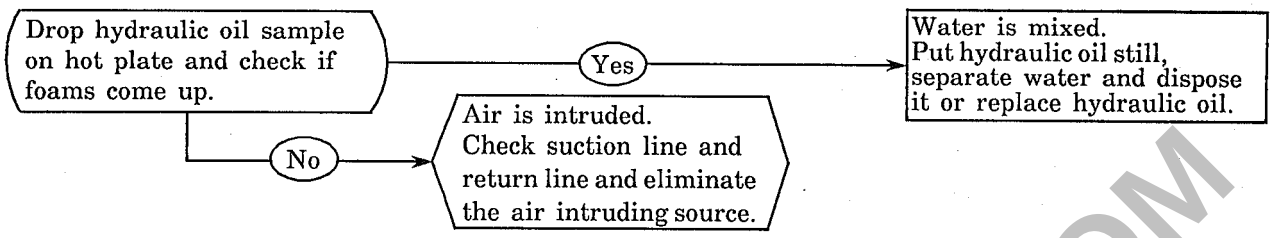
7 Governor lever
8 Stepping motor lever
9 Adjust rod
11 Emergency stop cable
12 High idle set screw
13 Engine stop set screw

Fig. 13 Governor lever adjusting clearance

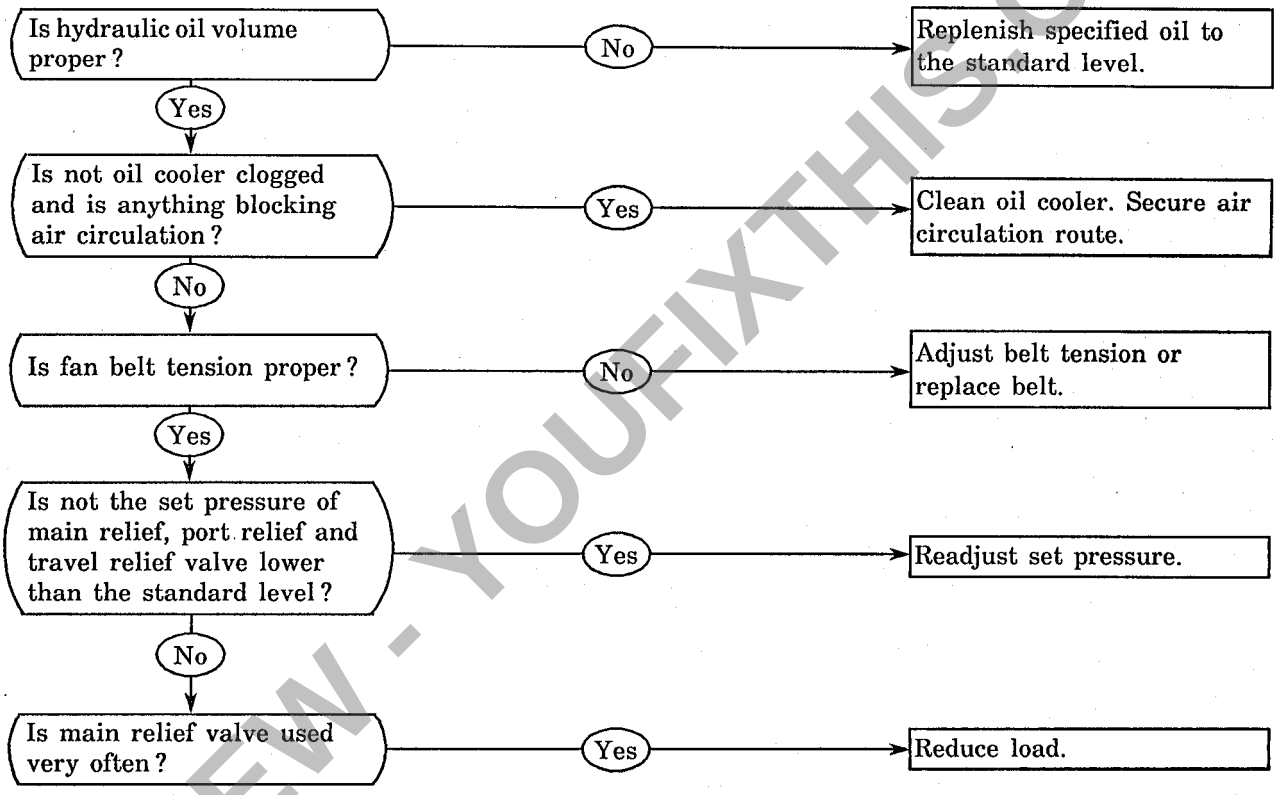
PREVIEW - YOUFIXTHIS.COM
Download full manual at youfixthis.com

3. HYDRAULIC SYSTEM

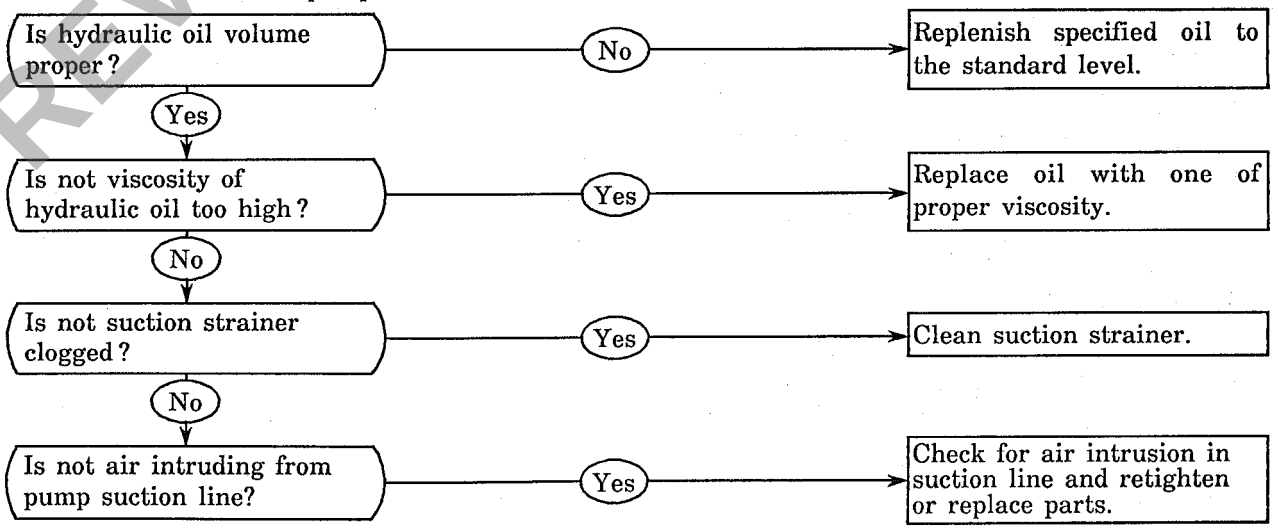
(1) Hydraulic oil is cloudy.



(2) Hydraulic oil temperature has risen abnormally.



(3) Cavitation occurs with pump.



PREVIEW - YOUFIXTHIS.COM

Download full manual at youfixthis.com

8. ENGINE SPECIFICATIONS

MAJOR SPECIFCATIONS

SK220, SK220LC

Type		Mitsubishi 6 D31-T		
No. of sylinders-Dir×Stroke		6-113mm×115mm (4.45 in×4.53 in)		
Total displacement		6,919cc (422 cuin)		
Compression ration		16		
Output rating		165PS/2,150rpm		
Max. torque		60kg · m/1.600rpm (433 ft · lbs/1,600rpm)		
High idling		2,320±20rpm		
Low idling		650±20rpm		
Injection start pressure		220kgf/cm² (3,128 psi)		
Injection timing		Before top-dead center 76.5°C (170°F) Full open 90°C (194°F)		
Ignition order		1-5-3-6-2-4		
Compression pressure		26kgf/cm² (370 psi)		
Lube oil pressure		Rating 3~4kgf/cm² (42.7~56.9 psi)		
Fuel injection timing		18°C before the top dead point		
Valve clearance, valve action timing		Valve clearance	Open	Close
	Suction valve	In cold state, in cold condition 0.4mm(0.016")	21° before the top dead point	37° before the bottom dead point
	Exhaust valve	In cold state, in cold condition 0.4mm(0.016")	62° before the bottom dead point	18° before the top dead point
Starter capacity		4.5kw		
Generator capacity		30A 800W		
Super Charging type		Turbo type		
Cooling fan drive method		ø600 (ø24in) suction type Belt drive pulley ratio : 1.0		
Engine oil volume		Engine body 24ℓ (6.34 gal)		
Dry weight		590kg (1300 lbs)		

PREVIEW - YOUFIXTHIS.COM

Download full manual at youfixthis.com

2.9 PERFORMANCE INSPECTION STANDARD

2.9.1 PERFORMANCE INSPECTION STANDARD (SK220, SK220LC)

Table 1

(NOTE ; Take measurement in the S mode, unless otherwise specified.
The standard tolerance shall be an allowable range in field measurements.)

Inspection item				Pressure measurement: Position	Port	Size	Basic Value	Tolerance: Upper limit	Tolerance: Lower limit	Unit	Control	Measurement: Condition, function
Standard measuring condition	Cleanliness of hydraulic oil			Hydraulic oil in tank			8	+1	−1	Class	–	Takeout of sample
	Temperature of hydraulic oil			Tank surface			50 (122)	+5 (+9)	−5 (−9)	°C	–	Air temperature 50°~−10°C (122~14°F)
	Water temperature			Radiator surface			75 (167)	+15 (+27)	−15 (−27)	(°F)	–	Air temperature 50°~−10°C (122~14°F)
	Engine revolution	Low idle		Multi display			875	+25	−25	rpm	Adjustment not neccessary	FULL throttle
		Hi idle					2320	+50	−50			
		S					2000	+50	−50			
		FC					1600	+50	−50			
		Decel					1050	+50	−50			
Main circuit	Main relief pressure	Attach	RH	Pump	a1	PF1/4	290 (4120)	+5 (+70)	0 (0)	※1	MR1	Bucket digging
			LH		a2						MR2	Boom hoisting
		Travel	RH		a1		350 (4980)	+5 (+70)	0 (0)		TR1	Simultaneous RH/LF operation in H mode and at 2-speed
			LH		a2						TR2	
	Port relief pressure	Boom	R	Pump	a1	PF1/4	335 (4760)	+5 (+70)	−5 (−70)		RV6	Boom lowering
			H				335 (4760)	+5 (+70)	−5 (−70)		RV5	Boom hoisting
		Arm	R		a2		335 (4760)	+5 (+70)	−5 (−70)		RV10	Arm discharge
			H								RV9	Arm digging
		Bucket	R		a1		335 (4760)	+5 (+70)	−5 (−70)		RV8	Bucket discharge
			H				335 (4760)	+5 (+70)	−5 (−70)		RV7	Bucket digging
		Swing	RH		a2		260 (3700)	+50 (+710)	+20 (+280)		RV11 RV12	Bucket lock
			LH									
	Lower relief		RH		a1		29 (412)	+20 (+284)	+6 (+85)	Kgf/cm² (psi)	–	H mode
			LH		a2		29 (412)	+20 (+284)	+6 (+85)		–	
Pilot circuit	Primary pressure	Discharge pressure		Pump G	P3	PF1/4	50 (711)	+3 (+43)	−3 (−43)		RV13	Mode H
	KPSS Solenoid proportional valve for secondary pressure	H		Pump	a3	PF1/4	0 (0)	+3 (+43)	0 (0)		–	
		S					0 (0)	+3 (+43)	0 (0)		–	
		FC					0 (0)	+3 (+43)	0 (0)		–	
		Release					16 (228)	+5 (+71)	−3 (−43)		–	

☞ ※1 Adjustment is not required if the ATT. main relief pressure in the H mode lies within 290~295 kgf/cm² (4120~4190 psi).

PREVIEW - YOUFIXTHIS.COM

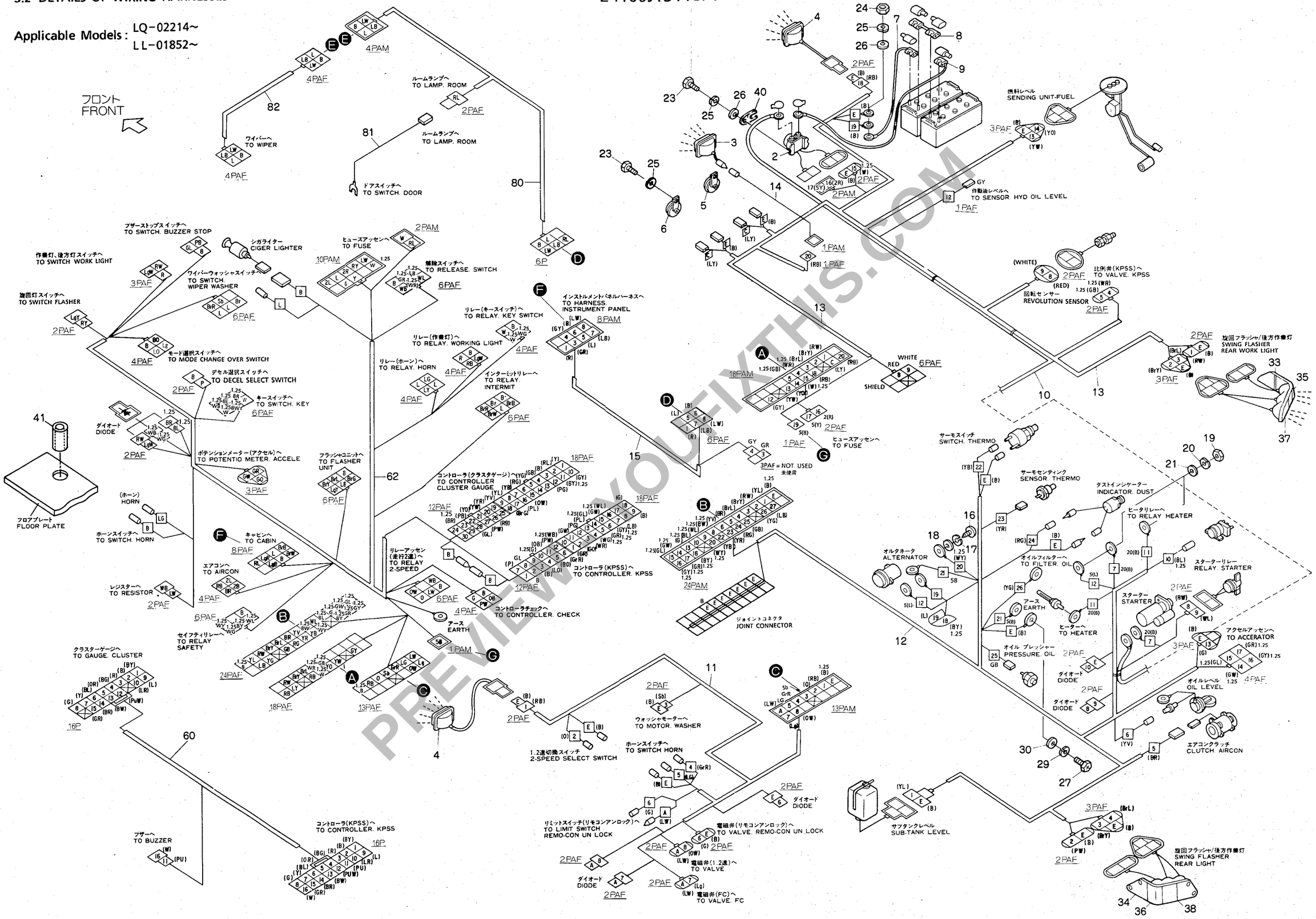
Download full manual at youfixthis.com

デンキ ハイセンアッセン・WIRING ASSY, ELEC

3.2 DETAILS OF WIRING HARNESSES

24100J13118F1

Applicable Models : LQ-02214~
LL-01852~



PREVIEW YOUFIXTHIS.COM

Download full manual at youfixthis.com

4. FUNCTIONAL DESCRIPTION OF HYDRAULIC CIRCUITS

4.1 NEUTRAL CIRCUIT

(1) Pilot circuit (Provided the lever is unlocked.)

1) Primary pilot pressure circuit

Oil discharged by the gear pump through its OUT port passes through the line filter (15) and relief valve (14) and enters the following components, completing the primary pilot pressure circuit.

P port of pilot valve (11)

PG port of reducing valve (31)

P1 ports of Solenoid proportionate reducing valve attached to pump

2) Negative control signal circuit

The advantage of this circuit is that it minimizes pump discharge when operation is not under way, thereby eliminating wasteful energy consumption (for energy conservation), and reducing fuel bills.

The operating principle is the negative control type in which the increase in pilot pressure Pi reduces the discharge from the pump.

Pilot pressure Pi rises when in neutral because all the oil discharged from the pump is directed through the throttle of the low pressure relief valve (611), increasing the flow through it.

In the negative control circuit for the No.1 pump, oil from port Pi1 of the control valve enters port Pi1 of the pump.

In the negative control circuit for the No.2 pump too, oil is directed from port Pi2 of the control valve to port Pi2 of the pump.

3) Negative control relief cut-off circuit

The advantage of this circuit is that it minimizes pump discharge when the cylinder is operated to the stroke end, thereby reducing fuel bills, as does the circuit mentioned above.

The operating principle is the same as that for the above circuit; pilot pressure Pi is increased by increasing the flow through the relief valve.

(2) Main circuit

Hydraulic oil cleaned by the strainer (19) in the tank is sucked in by the variable displacement pump (1).

This oil is then discharge by two pumps and enters the control valve (3).

When the low pressure relief valve in the control valve is actuated, the oil drains through tank port T.

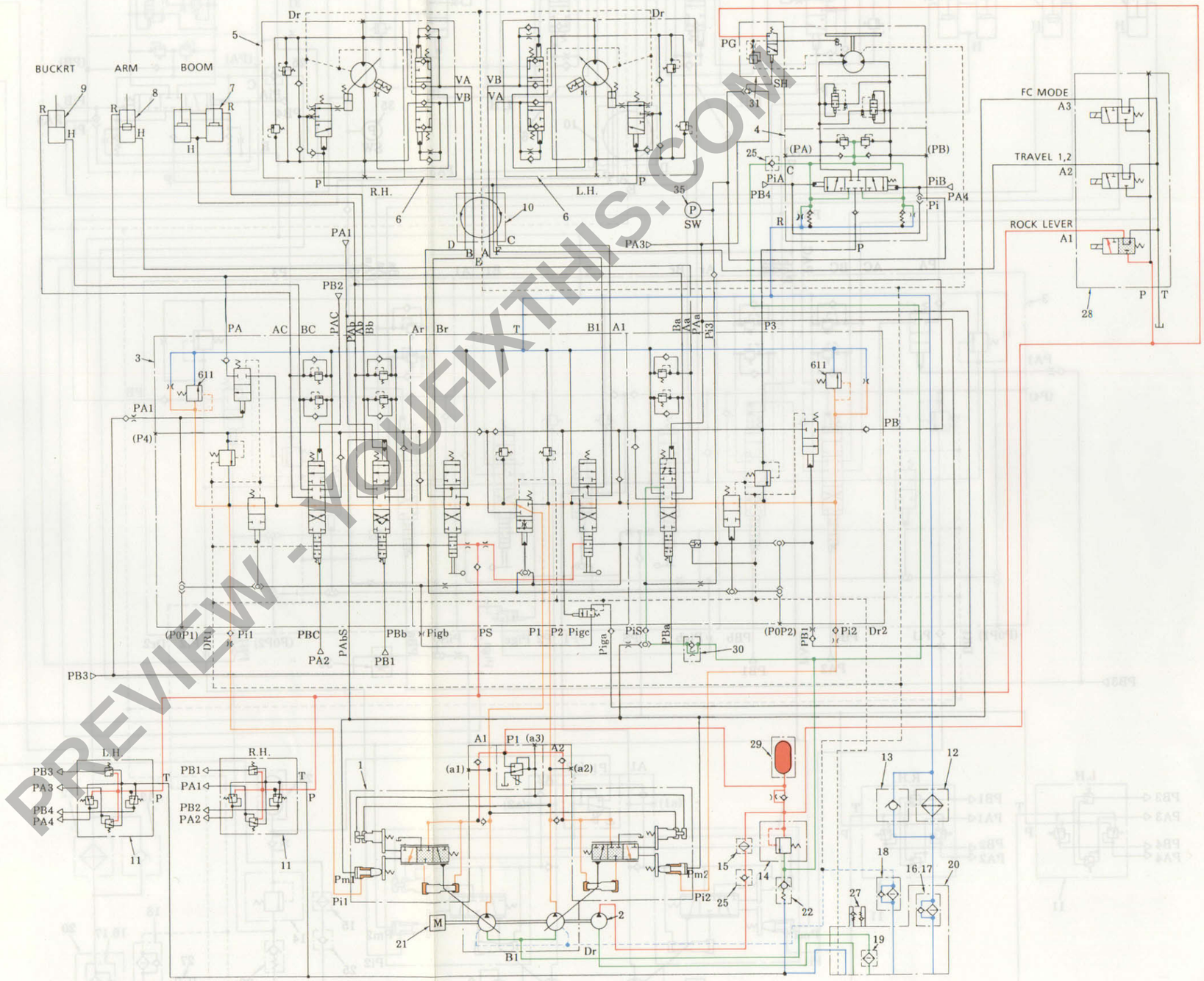


Fig. 3 Neutral Circuit

PREVIEW - YOUFIXTHIS.COM

Download full manual at youfixthis.com

11. MAINTENANCE STANDARDS

11.1 TIGHTENING TORQUE FOR LOWER MOUNTING

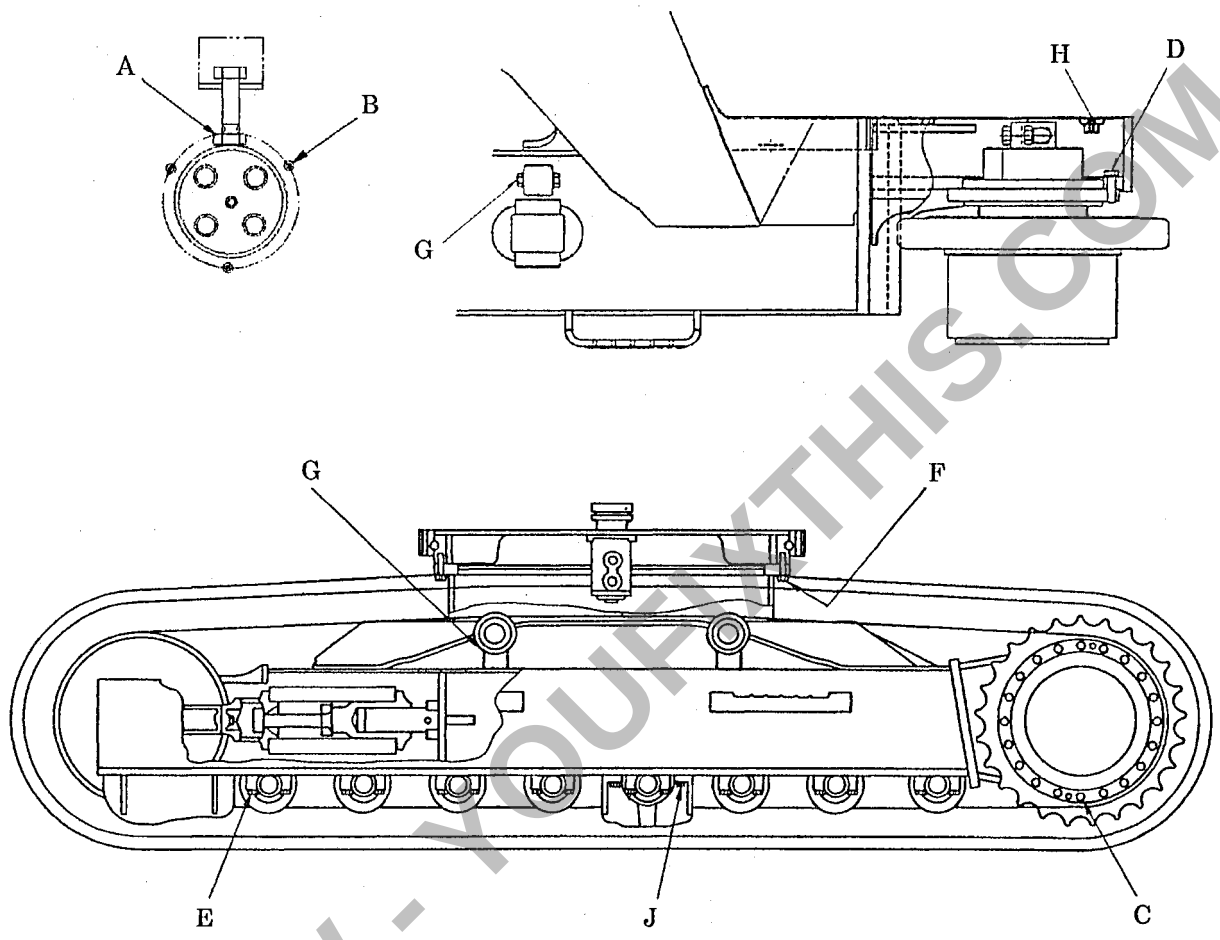


Fig. 83

Table 13 Unit : kgf · m (ft · lbs)

Symbol	Item	Standard Value	Remedy
A	For swivel joint fastening nut	16±2 (115±14)	Retighten
B	Swivel joint mounting capscrews	11±1 (79±7)	Apply Three Bond 1305 (Loctite #242) and retighten
C	For sprocket mounting capscrews	57.5±5 (415±36)	
D	For reduction unit mounting capsrews	55±5.5 (397±40)	
E	For lower roller mounting capscrews	40.5±4 (292±29)	
F	For bearing mounting capscrews	57.5±5.5 (415±40)	
G	For upper roller mounting capscrews	55±5 (397±36)	
H	For propel brake cover mounting capscrews	11±1 (79±7)	Retighten
J	For crawler track guide mounting capscrews	55±4 (397±29)	Apply Three Bond 1305 and retighten

PREVIEW - YOUFIXTHIS.COM

Download full manual at youfixthis.com

(5) Procedure for setting the engine rotation and high speed positions

1) Manipulation of adjust signals
Draw out the adjusting 1P coupler and insert it again.
The CPU lamp lights and the power supply to the stepping motor is cut off. This frees the stepping motor and now you can turn it by hand.

2) Setting the high speed position of the stepping motor
Lift up the stepping motor lever (8) by hand and press governor lever (7) against high idle set screw (12) of the engine governor.
With the governor lever kept pressed, perform item (6) below:

(6) Procedure for fixing the engine rotation and high speed positions

1) Manipulation of adjust signals
Draw out the 1P coupler and insert it. Then the stepping motor is powered and now it can not be turned by hand. Measure the clearance between the high idle adjust screw and the governor, using a thickness gauge.

2) When the clearance is less than 0.2mm (0.0079in);
The stepping motor turns about 0.04mm (0.0016in) toward the high idle if the auto accel select switch is "ON" and turns about 0.04mm (0.016in) toward the low idle if the auto accel select switch is "OFF", each time the buzzer stop switch is turned "ON". Adjust the clearance, utilizing this function.

(7) Procedure for storing the engine rotation and high speed positions

1) Manipulation of adjust signals
Draw out the 1P coupler and insert it, the same way as above.

2) Racing of the stepping motor
The stepping motor runs and stops while indexing the home position from the high-speed side set bolt position to the engine stop position.

3) Turning the CPU display off
This completes adjustment, whereupon the CPU display goes out and returns to time display.

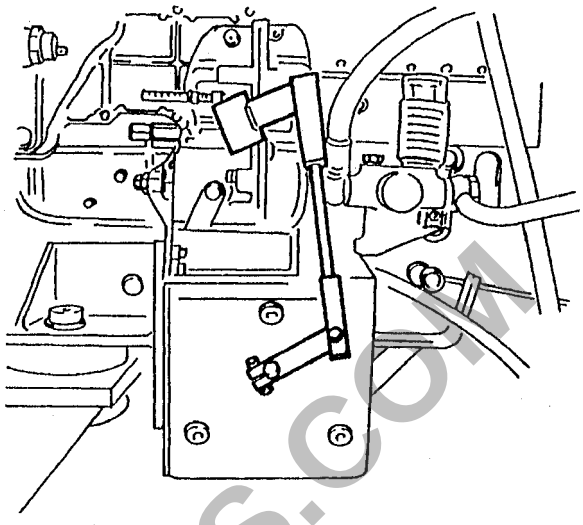


Fig. 14 Setting the engine stop position by adjust rod stroke

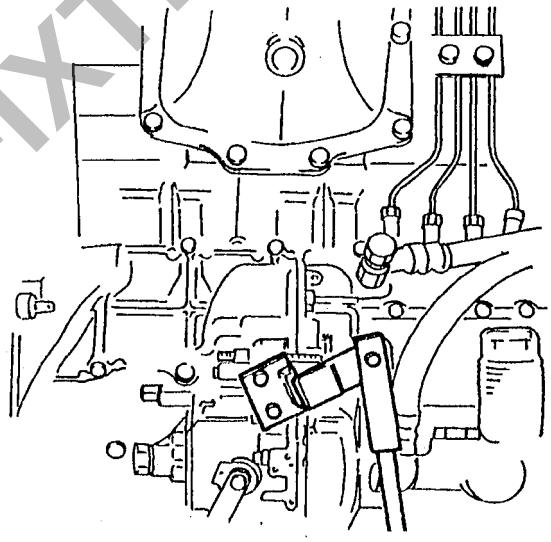
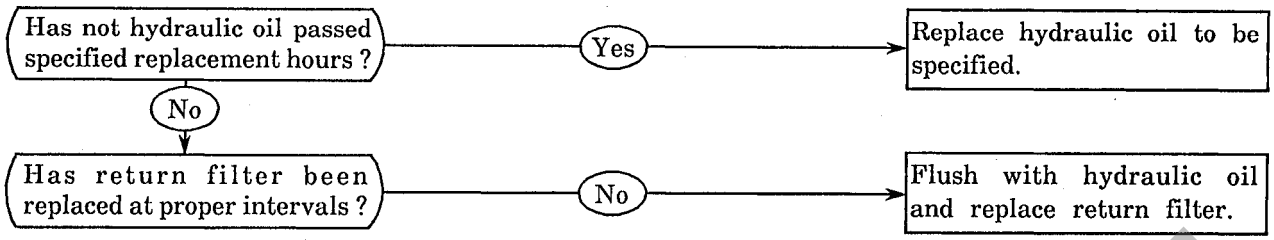


Fig. 15 Setting the high speed position by clearance adjustment

PREVIEW - YOUFIXTHIS.COM

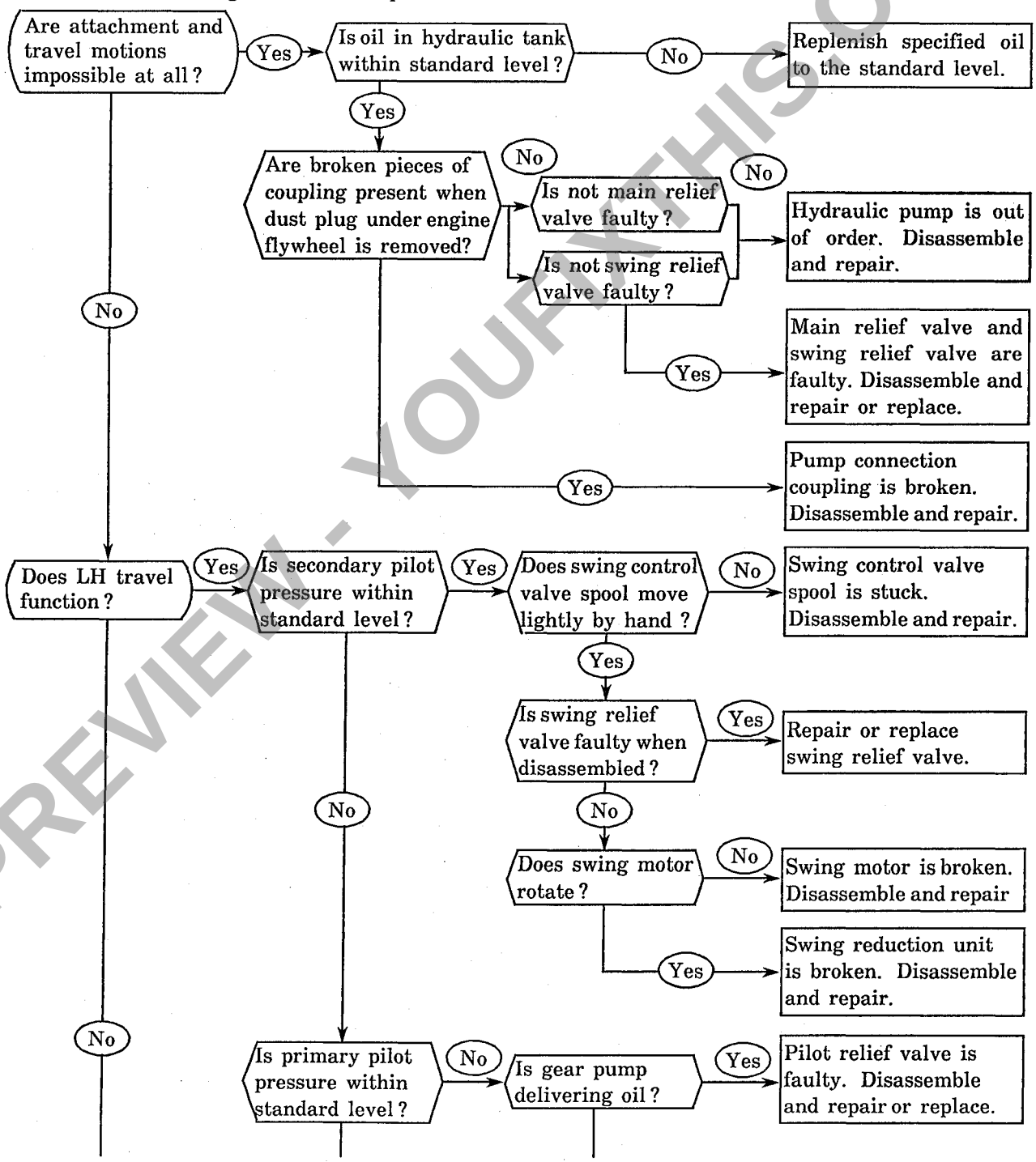
Download full manual at youfixthis.com

(4) Hydraulic oil is contaminated.



4. SWING SYSTEM

(1) Both LH and RH swing actions are impossible.



PREVIEW - YOUFIXTHIS.COM

Download full manual at youfixthis.com

2. MAJOR SPECIFICATIONS

2.1 Major Specifications

Item \ Engine model	6D14	6D14-T (with turbochager)	6D15	6D15-T (with turbocharger)	6D16	6D16-T (with turbocharger)
Type	Diesel, 4-cycle, water-cooled	Diesel, 4-cycle, water-cooled	Diesel, 4-cycle, water-cooled	Diesel, 4-cycle, water-cooled	Diesel, 4-cycle, water-cooled	Diesel, 4-cycle, water-cooled
Combustion method	Direct injection	Direct injection	Direct injection	Direct injection	Direct injection	Direct injection
No. and arrangement of cylinder	6 in-line	6 in-line	6 in-line	6 in-line	6 in-line	6 in-line
Cylinder bore x stroke mm	110 x 115	110 x 115	113 x 115	113 x 115	118 x 115	118 x 115
Total displacmenet cc	6557	6557	6919	6919	7545	7545
Engine dimension (without fan)						
Overall length mm	1209	1209	1209	1209	1209	1209
Overall width mm	752	731	752	731	752	731
Overall height mm	841	833	841	833	841	833
Empty weight kg*	500	510	505	520	520	550

* Empty weight as measured according to Mitsubishi Motors Corporation standard.

2.2 Engine Outputs Classified by Application

Application \ Engine model	6D14	6D14-T (with turbocharger)		6D16	6D16-T (with turbocharger)	
		Middle-speed specification	High-speed specification		Middle-speed specification	High-speed specification
Intermittent rated output kW (HP)/rpm	60 (80)/1500	84 (112)/1500	81 (108)/1500	73 (98)/1500	108 (145)/1500	104 (139)/1500
	72 (96)/1800	100 (134)/1800	97 (130)/1800	87 (116)/1800	125 (168)/1800	123 (166)/1800
	79 (105)/2000	109 (146)/2000	106 (142)/2000	95 (128)/2000	134 (180)/2000	134 (179)/2000
	84 (112)/2200	114 (153)/2200	114 (153)/2200	103 (139)/2200	143 (192)/2200	142 (190)/2200
	90 (121)/2500		122 (163)/2500	113 (152)/2500		150 (201)/2500
	94 (126)/2800		128 (171)/2800	123 (165)/2800		154 (207)/2800
Continuous rated output kW (HP)/rpm	54 (72)/1500	77 (103)/1500	73 (98)/1500	66 (89)/1500	98 (132)/1500	94 (126)/1500
	65 (87)/1800	92 (123)/1800	88 (118)/1800	79 (106)/1800	114 (153)/1800	112 (151)/1800
	71 (95)/2000	98 (131)/2000	96 (128)/2000	87 (116)/2000	122 (164)/2000	121 (163)/2000
	76 (102)/2200	103 (138/2200	103 (149)/2500	94 (126)/2200	130 (174)/2200	129 (173)/2200
	82 (110)/2500		111 (149)/2500	103 (139)/2500		136 (182)/2500
	85 (115)/2800		117 (157)/2800	112 (150)/2800		140 (188)/2800

NOTE:

1. **The output (SAE, gross) is corrected to standard ambient conditions based on SAE J1349.**
2. **The continuous rated output allows 10% (one hour) overload operation.**

PREVIEW - YOUFIXTHIS.COM

Download full manual at youfixthis.com

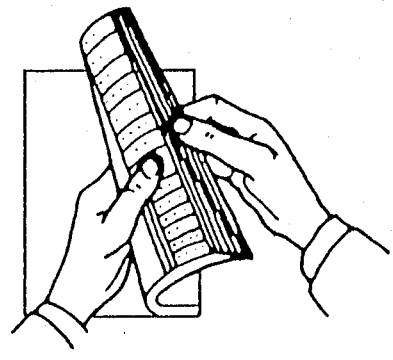
SHOP MANUAL

model SK220 SK220LC

TABLE OF CONTENTS

1. SPECIFICATION LQ01
2. OPERATION AND CONTROLS (Refer to Operators Manual)
3. LOCATION AND WEIGHT OF COMPONENTS LQ03
4. MAINTENANCE STANDARDS AND TEST PROCEDURES LQ04
5. TROUBLESHOOTING LQ05
6. PREVENTIVE MAINTENANCE (Refer to Operators Manual)
7. WORKING STANDARDS LQ07

○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

PREVIEW - YOUFIXTHIS.COM

Download full manual at youfixthis.com

⚠ WARNING

SAFETY

⚠ WARNING

The proper and safe lubrication and maintenance for this machine, recommended by KOBELCO are outlined in the OPERATION & MAINTENANCE GUIDE for this machine.

Improper performance of lubrication or maintenance procedures is dangerous and could result in injury or death. Read and understand the OPERATION & MAINTENANCE GUIDE before performing any lubrication or maintenance.

The serviceman or mechanic may be unfamiliar with many of the systems on this machine. This makes it important to use caution when performing service work. A knowledge of the system and or components is important before the removal or disassembly of any component.

Because of the size of some of the machine components, the serviceman or mechanic should check the weights noted in this Manual. Use proper lifting procedures when removing any components.

Following is a list of basic precautions that should always be observed.

1. Read and understand all Warning plates and decals on the machine before operating, lubricating or repairing this product.

2. Always wear protective glasses and protective shoes when working around machines. In particular, wear protective glasses when pounding on any part of the machine or its attachments with a hammer or sledge. Use welders gloves, hood/goggles, apron and other protective clothing appropriate to the welding job being performed. Do not wear loose-fitting or torn clothing. Remove all rings from fingers when working on machinery.

3. Disconnect battery and discharge any capacitors before starting to work on machine. Hang "Do Not Operate" tag in the Operator's Compartment.

4. If possible, make all repairs with the machine parked on a level, hard surface. Block machine so it does not roll while working on or under machine.

5. Do not work on any machine that is supported only by lift jacks or a hoist. Always use blocks or jack stands to support the machine before performing any disassembly.

⚠ WARNING

Do not operate this machine unless you have read and understand the instructions in the OPERATOR'S MANUAL. Improper machine operation is dangerous and could result in injury or death.

---

6. Relieve all pressure in air, oil or water systems before any lines, fittings or related items are disconnected or removed. Always make sure all raised components are blocked correctly and be alert for possible pressure when disconnecting any device from a system that utilizes pressure.

7. Lower the bucket, blade, ripper or other implements to the ground before performing any work on the machine. If this cannot be done, make sure the bucket, blade, ripper or other implement is blocked correctly to prevent it from dropping unexpectedly.

8. Use steps and grab handles when mounting or dismounting a machine. Clean any mud or debris from steps, walkways or work platforms before using. Always face machine when using steps, ladders and walkways. When it is not possible to use the designed access system, provide ladders, scaffolds, or work platforms to perform safe repair operations.

9. To avoid back injury, use a hoist when lifting components which weigh 23 kg (50 lbs) or more. Make sure all chains, hooks, slings, etc., are in good condition and are in the correct capacity. Be sure hooks are positioned correctly. Lifting eyes are not to be side loaded during a lifting operation.

10. To avoid burns, be alert for hot parts on machines which have just been stopped and hot fluids in lines, tubes and compartments.

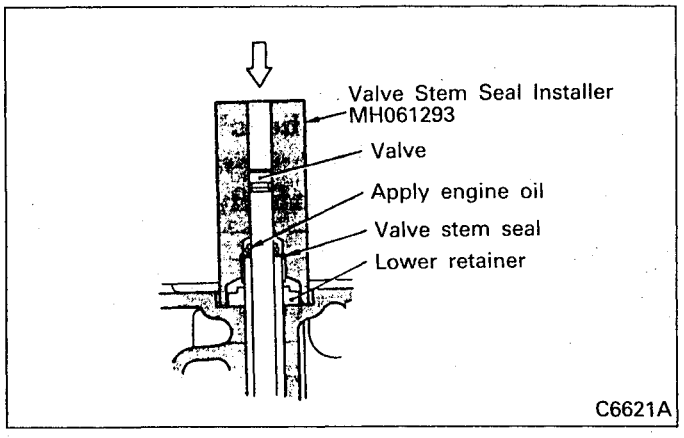
11. Be careful when removing cover plates. Gradually back off the last two bolts or nuts located at opposite ends of the cover or device and pry cover loose to relieve any spring or other pressure, before removing the last two bolts or nuts completely.

12. Be careful when removing filler caps, breathers and plugs on the machine. Hold a rag over the cap or plug to prevent being sprayed or splashed by liquids under pressure. The danger is even greater if the machine has just been stopped because fluids can be hot.

PREVIEW - YOUFIXTHIS.COM

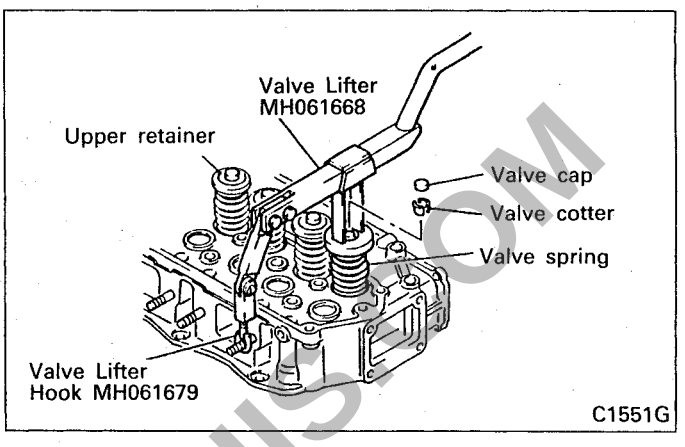
Download full manual at youfixthis.com

2) Installation of valve stem seal



Apply engine oil to the lips of the valve stem seal and strike the special tool, Valve Stem Seal Installer, until it touches the cylinder head.

3) Installation of valve cotter



Install the valve cotter while compressing the valve spring evenly using the special tools, Valve Lifter and Valve Lifter Hook.

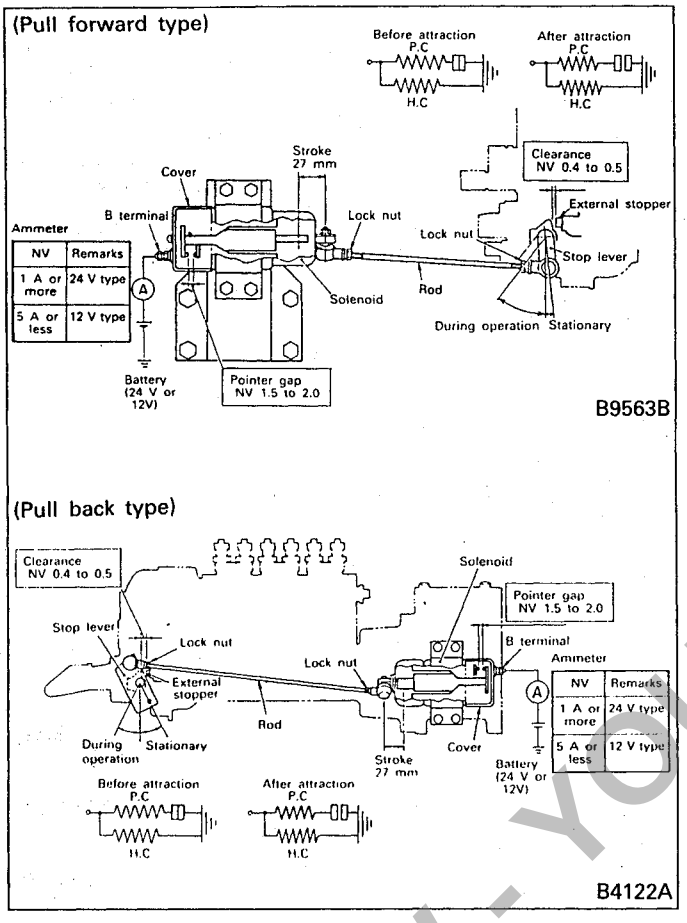
NOTE:
When compressing the valve spring, do not allow the upper retainer to contact the valve stem seal.

PREVIEW - YOUFIXTHIS.COM

Download full manual at youfixthis.com

4.11.2 Energize-to-run type

(1) Stop solenoid



(a) Connect the stop lever and solenoid using the rod and remove the solenoid cover.

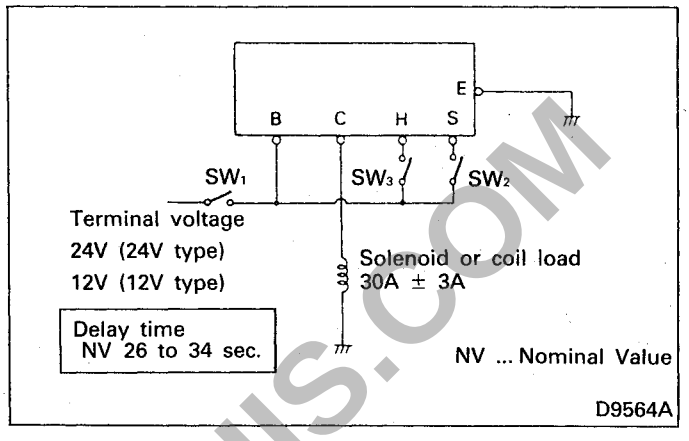
(b) Push manually the stop lever to the operation position and adjust the rod so that the solenoid pointer gap becomes as specified. In this state, also check that the stop lever to external stopper clearance is as specified.

(c) In the state of (b) above, apply specified voltage to solenoid "B" terminal and check that the pointer gap and ammeter reading are as specified. (Stop lever operation side).

(d) Tighten the lock nut of the rod.

(e) Check that the solenoid pointer color has not changed and then install the cover.

(2) Solenoid relay



Wire as shown and check the following.

(a) Relay operation and delay time

1) Check if the solenoid is energized when switches SW_1 and SW_2 are turned ON.
2) Using a stop watch, measure the time required for the solenoid to return after switch SW_2 is turned OFF.

(b) Relay holding

1) Turn ON switches SW_1 and SW_2 and, after the solenoid is activated, turn ON the switch SW_3.
2) Turn OFF the switch SW_2 and make sure that the solenoid remains activated for more than 34 seconds.
3) After verifying 2) above, turn OFF the switch SW_3 to ensure that the solenoid returns.

PREVIEW - YOUFIXTHIS.COM

Download full manual at youfixthis.com

PREVIEW ONLY

You're viewing 24 of 912 pages

The full manual includes:

- All 912 pages, complete
- Searchable PDF (find any keyword)
- No watermarks
- Instant download
- Print-ready quality

GET FULL MANUAL NOW

Kobelco SK220, SK220LC Shop Manual

Scan or click anywhere
youfixthis.com

Click anywhere on this page to get the full manual