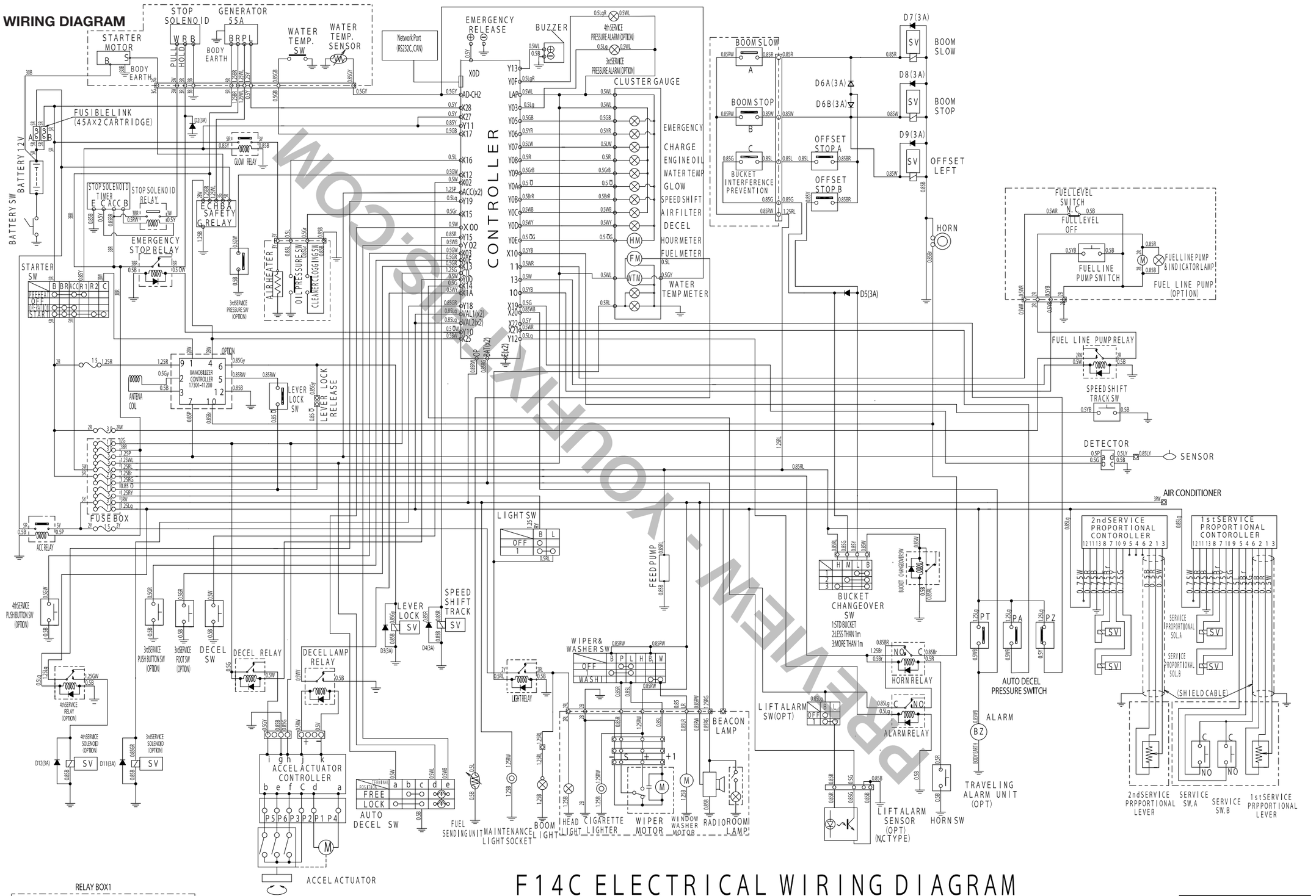
ELECTRICAL SYSTEM

ELECTRICAL WIRING DIAGRAM



F14C ELECTRICAL WIRING DIAGRAM (FOR TNV ENGINE)

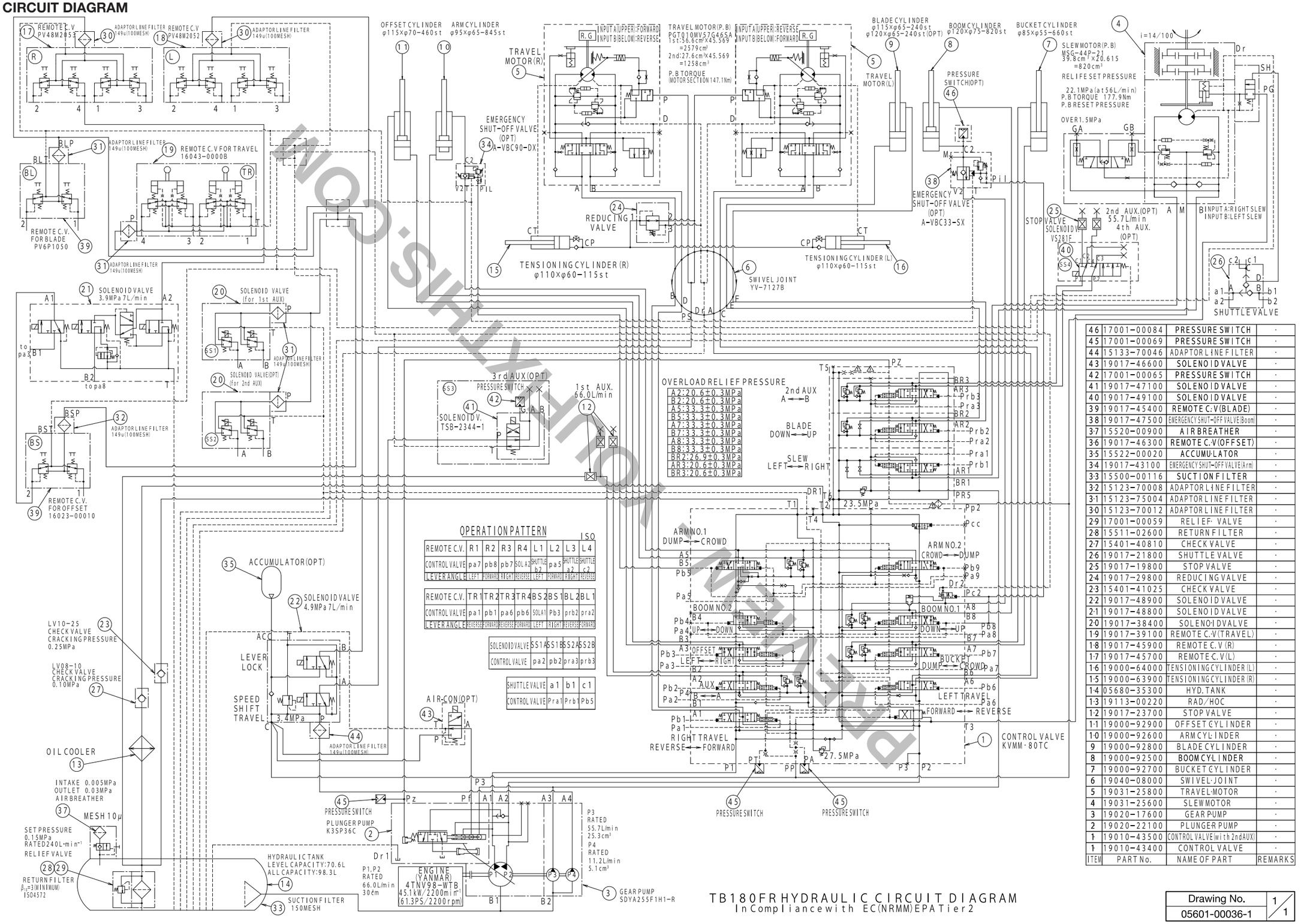
Drawing No.	1L/1
05601-00037-1	

L5C8001

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HYDRAULIC SYSTEM

HYDRAULIC CIRCUIT DIAGRAM



ITEM	PART No.	NAME OF PART	REMARKS
46	17001-00084	PRESSURE SWITCH	·
45	17001-00069	PRESSURE SWITCH	·
44	15133-70046	ADAPTOR LINE FILTER	·
43	19017-46600	SOLENOID VALVE	·
42	17001-00065	PRESSURE SWITCH	·
41	19017-47100	SOLENOID VALVE	·
40	19017-49100	SOLENOID VALVE	·
39	19017-45400	REMOTE C.V(BLADE)	·
38	19017-47500	EMERGENCY SHUT-OFF VALVE(Boom)	·
37	15520-00900	AIR BREATHER	·
36	19017-46300	REMOTE C.V(OFFSET)	·
35	15522-00020	ACCUMULATOR	·
34	19017-43100	EMERGENCY SHUT-OFF VALVE(Arm)	·
33	15500-00116	SUCTION FILTER	·
32	15123-70008	ADAPTOR LINE FILTER	·
31	15123-75004	ADAPTOR LINE FILTER	·
30	15123-70012	ADAPTOR LINE FILTER	·
29	17001-00059	RELIEF VALVE	·
28	15511-02600	RETURN FILTER	·
27	15401-40810	CHECK VALVE	·
26	19017-21800	SHUTTLE VALVE	·
25	19017-19800	STOP VALVE	·
24	19017-29800	REDUCING VALVE	·
23	15401-41025	CHECK VALVE	·
22	19017-48900	SOLENOID VALVE	·
21	19017-48800	SOLENOID VALVE	·
20	19017-38400	SOLENOID VALVE	·
19	19017-39100	REMOTE C.V(TRAVEL)	·
18	19017-45900	REMOTE C.V(R)	·
17	19017-45700	REMOTE C.V(L)	·
16	19000-64000	TENSIONING CYLINDER(L)	·
15	19000-63900	TENSIONING CYLINDER(R)	·
14	05680-35300	HYD. TANK	·
13	19113-00220	RAD/HOC	·
12	19017-23700	STOP VALVE	·
11	19000-92900	OFFSET CYLINDER	·
10	19000-92600	ARM CYLINDER	·
9	19000-92800	BLADE CYLINDER	·
8	19000-92500	BOOM CYLINDER	·
7	19000-92700	BUCKET CYLINDER	·
6	19040-08000	SWIVEL JOINT	·
5	19031-25800	TRAVEL MOTOR	·
4	19031-25600	SLEW MOTOR	·
3	19020-17600	GEAR PUMP	·
2	19020-22100	PLUNGER PUMP	·
1	19010-43500	CONTROL VALVE(with 2nd AUX)	·
1	19010-43400	CONTROL VALVE	·

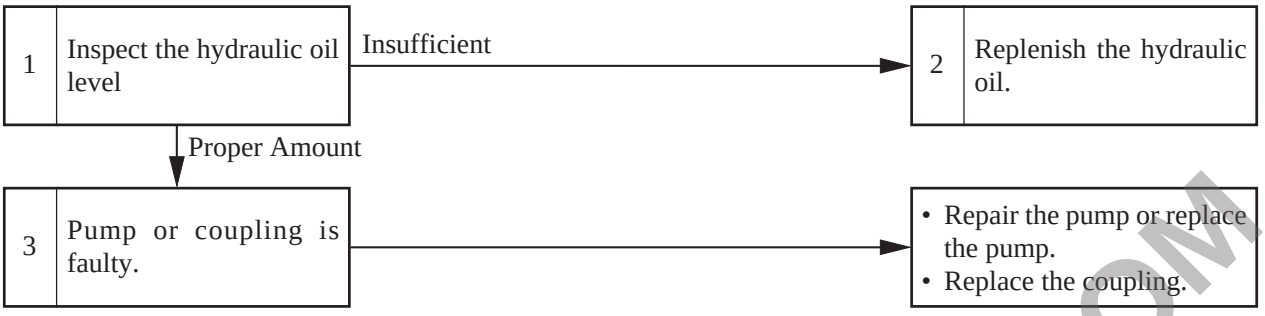
TB180FR HYDRAULIC CIRCUIT DIAGRAM
In Compliance with EC(NRMM) EPA Tier 2

Drawing No.	1/1
05601-00036-1	

L5C7001

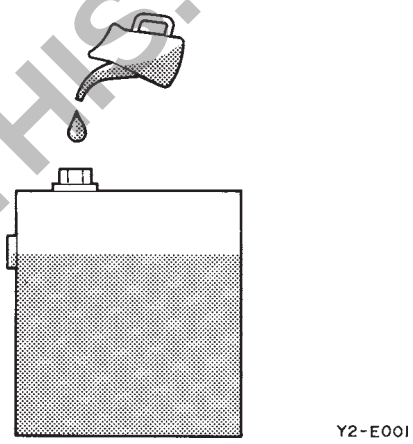
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NO OPERATIONS CAN BE DONE.



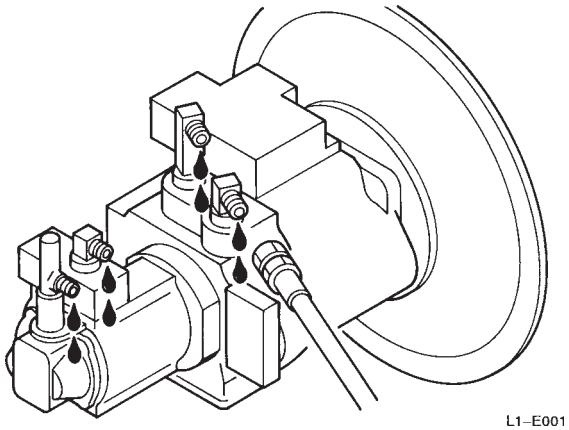
1. Inspect the hydraulic oil level.
   ☞ "III. Machine Configuration, Hydraulic Tank"

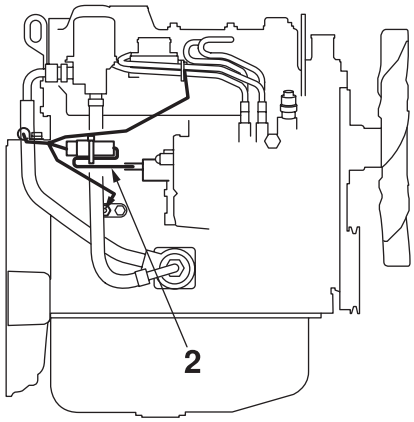
2. Replenish the hydraulic oil.
   Take out the plug and replenish the hydraulic oil.
   - The hydraulic oil supplied should be the same brand as the oil currently in the tank.
     ☞ "II. Specifications, Fluid Capacities"


Y2-E001

3. Pump or coupling is faulty.
   a. Disconnect the discharge hose from the pump side.
      Also fit a plug in the disconnected hose to keep the hydraulic oil from pouring out.
   b. Disconnect the electrical wiring (2) to the engine stop solenoid.
   c. Turn the engine over using the starting motor and inspect if hydraulic oil is discharged by the pump.
      - The throttle lever should be in the engine stop position.

   If the pump is normal, hydraulic oil will be discharged from it. If hydraulic oil is not discharged, the pump or the coupling is faulty.


L1-E001



L5E001

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SPECIFICATION TABLES

SPECIFICATIONS

Serial Number		17830004~	
Machine Type		Standard Arm	Long Arm
Machine Mass (not including operator)			
Rubber Crawler	kg	8325	8350
Steel Crawler	kg	8530	8555
Engine Rated Output	kW/min^{-1}	45.1/2200	
Bucket Capacity (Standard Bucket)			
Rated Capacity	m^3	0.245	
Struck Capacity	m^3	0.165	
Performance			
Slew Speed	min^{-1}	9.9	
Travel Speed: Rubber Crawler 1st/2nd	km/h	2.7/5.4	
Steel Crawler 1st/2nd	km/h	2.5/5.0	
Gradeability	% (degree)	58 (30)	
Ground Pressure: Rubber Crawler	kPa	37.6	37.7
Steel Crawler	kPa	38.5	38.6
Noise Level: Sound-power	dB (A)	LWA 98	
Sound-pressure level	dB (A)	LpA 76	
Auxiliary Hydraulic Flow Rate	L/min	66.0	
Dimensions			
Overall Length in Transport Position	mm	6150	6175
Overall Width	mm	2300	
Overall Height	mm	2720/2765*	
Dimensions of Base Machine			
Tail Swing Radius	mm	1255	
Distance of Rearmost Upper Structure from Axis of Rotation	mm	1255	
Clearance Height under Upper Structure	mm	720	
Crawler base	mm	2210	
Crawler: Overall Length	mm	2855	
Overall Width	mm	2300	
Crawler Shoe Width	mm	450	
Minimum Ground Clearance	mm	345	

*: When equipped with roof guard.

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2. Inspection and adjustment

2.1 Periodic maintenance schedule

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

○: User-maintenance ◎: Parts replacement ●: Shop-inspection

Classification	Item	Daily	Maintenance period				
			Every 50 hours	Every 250 hours or 3 months	Every 500 hours or 6 months	Every 1000 hours or one year	Every 2000 hours or two years
Whole	Visual check around engine	○					
Fuel oil system	Fuel tank level check and fuel supply	○					
	Fuel tank draining		○				
	Water separator (Option) draining		○				
	Bleeding the fuel system		○				
	Water separator cleaning				○		
	Fuel filter element replacement				◎		
Lubricating oil system	Lube oil level check and replenishment	○					
	Lube oil replacement		◎ 1st time	◎ 2nd time and thereafter			
	Lube oil filter replacement						
Cooling water system	Coolant water level check and replenishment	○					
	Radiator fin cleaning			○			
	V-belt tension check		○ 1st time	○ 2nd time and thereafter			
	Coolant water replacement					◎	
	Coolant water path flushing and maintenance						
Rubber house	Fuel pipe and coolant water pipe inspection and maintenance	○					●
Governor	Inspection and adjustment of governor lever and accelerator	○		○			●
Air intake system	Air cleaner cleaning and element replacement			○	◎		
	Diaphragm assy inspection					● (2 years)	
	Turbocharger blower cleaning*					●*	
Electrical system	Warning lamp & instruments function check	○					
	Battery electrolyte level check and battery recharging		○				
Cylinder head	Intake/exhaust valve head clearance adjustment					●	
	Intake/exhaust valve seat lapping						●
Fuel injection pump and nozzle	Fuel injection nozzle pressure inspection					●*	
	Fuel injection timing adjustment Fuel injection pump inspection and adjustment						●*

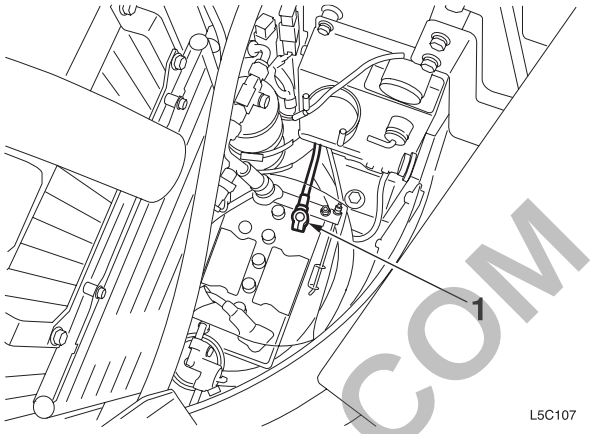
*) EPA allows to maintain the emission related parts every 1,500 or 3,000 hours as shown in 1.6.3 of chapter1.

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DISASSEMBLY AND ASSEMBLY

Removing the Engine

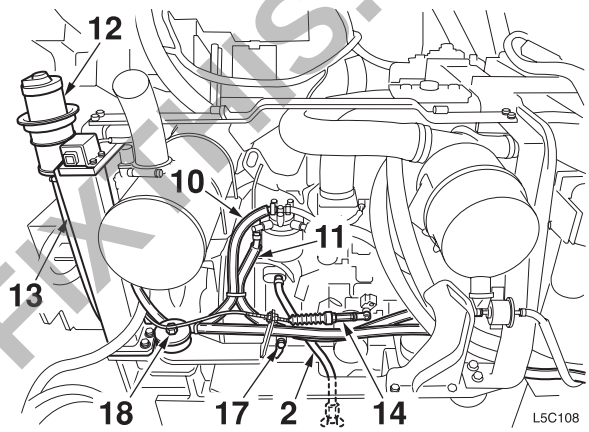
1. Disconnect the battery ground cable (1) from the battery.



2. Remove the engine hood and side cover.
   ☞ "Removing the Covers"

3. Remove the counterweight.
   ☞ "Removing the Upper Frame"

4. Tilt up the floor frame.



5. Remove the radiator and oil cooler.
   ☞ "Removing the Radiator and Oil Cooler"

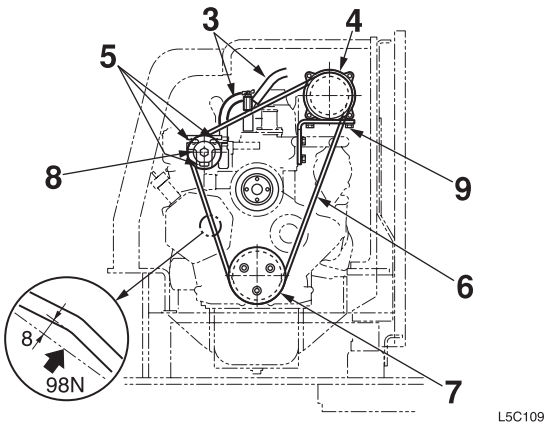
6. Disconnect the coolant drain hose (2).

7. Disconnect two heater hoses (3).

8. <Air Conditioner>
   Remove the compressor (4).
   - Do not loosen the hose to the air conditioner, or the refrigerant gas may leak.

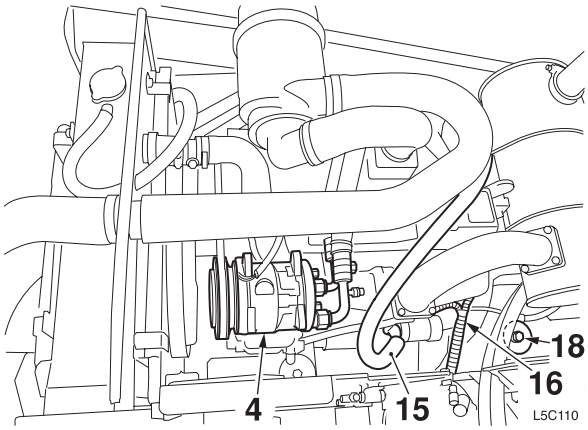
   a. Loosen the bolts (5) to release the V-belt (6) tension.
      - When re-assembling, press the midpoint between the crankshaft pulley (7) and the idle pulley (8) with the force of 98 N, and the bolts (5) to produce a slack of approximately 8 mm.

   b. Remove the two installation bolts (9) from the compressor (4), and detach the compressor (4) from the engine.



9. Disconnect the fuel hoses (10) and (11) from the engine.

10. Remove the filler cap (12) from the bracket (13).
    - Remove the filler cap with hose attached and put it on the fuel tank.



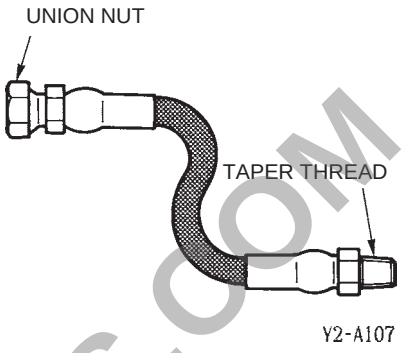
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TIGHTENING TORQUES

Hydraulic Hoses

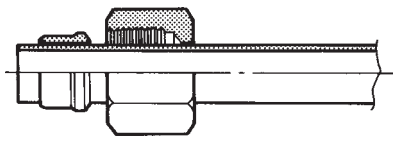
Hose Fitting Size	Torque			
	Union Nut (G)		Taper Thread (R)	
	N·m	ft-lb	N·m	ft-lb
1/8	$9.8\ ^{+4.9}_{0}$	$7.3\ ^{+3.5}_{0}$	11.8 ±1.2	8.7 ±0.8
1/4	$24.5\ ^{+4.9}_{0}$	$18.1\ ^{+3.5}_{0}$	29.4 ±2.9	21.7 ±2.1
3/8	$49\ ^{+4.9}_{0}$	$36.2\ ^{+3.5}_{0}$	53.9 ±5.4	39.8 ±3.9
1/2	$58.8\ ^{+4.9}_{0}$	$43.4\ ^{+3.5}_{0}$	88.3 ±8.8	65.1 ±6.4
3/4	$117.7\ ^{+4.9}_{0}$	$86.8\ ^{+3.5}_{0}$	147.1 ±14.7	108.5 ±10.7
1	$137.3\ ^{+4.9}_{0}$	$101.3\ ^{+3.5}_{0}$	196.1 ±19.6	144.7 ±14.3



Y2-A107

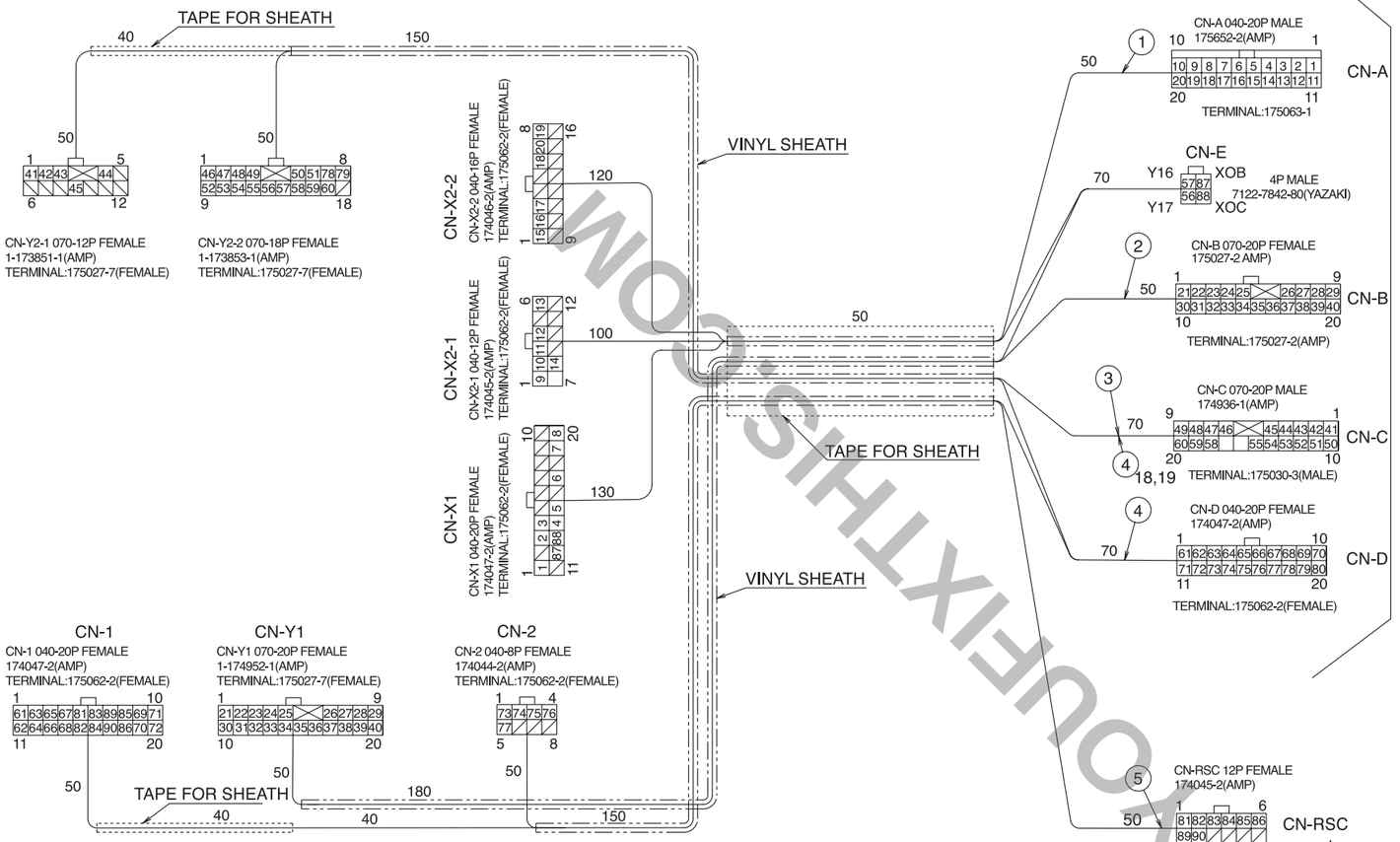
Bite Type Pipe Fitting for Steel Pipe

Pipe Outer Diameter (mm)	Torque	
	N·m	ft-lb
8	34.3 ±4.9	25.3 ±3.5
10	41.7 ±2.5	30.7 ±1.7
12	58.8 ±4.9	43.4 ±3.5
15	88.3 ±4.9	65.1 ±3.5
16	93.2 ±4.9	68.7 ±3.5
18	132.4 ±4.9	97.6 ±3.5
22	205.9 ±9.8	151.8 ±7.2
27.2	245.2 ±9.8	181.0 ±7.2
28	313.8 ±19.6	231.4 ±14.3
32	313.8 ±19.6	231.4 ±14.3
35	411.9 ±19.6	303.7 ±14.3


Y2-A108

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CONNECTOR FOR THE MAINTENANCE.
PERSONAL COMPUTER, RS232C/CAN: FOR COMMUNICATION

MAIN HARNESS SIDE.

③ 3RX,0.87mm² (AWG18)x20WICK

NO.	INSULATOR NO.	CONNECTIONS	CONNECTIONS	WIRE NO.
41	9	CN-C 1	CN-Y2-2 4	BAT
42	8	CN-C 2	3	BAT
43	7	CN-C 3	2	CTL
44	6	CN-C 4	1	CTL
45	5	CN-C 5	CN-Y2-1 9	P1
46	4	CN-C 6	4	Y13
47	3	CN-C 7	3	Y12
48	2	CN-C 8	2	Y11
49	1	CN-C 9	1	Y10
50	20	CN-C 10	CN-Y2-2 17	Y19
51	19	CN-C 11	16	Y18
52	18	CN-C 12	15	VAL2
53	17	CN-C 13	14	VAL2
54	16	CN-C 14	13	VAL1
55	15	CN-C 15	12	VAL1
56	14	CN-E	11	Y17
57	13	CN-E	10	Y16
58	12	CN-C 18	9	Y15
59	11	CN-C 19	6	Acc
60	10	CN-C 20	5	Acc
*1	18	CN-D 18	7	E
*2	19	CN-D 19	8	E

① 3RX,0.54mm² (AWG20)x20WICK

NO.	INSULATOR NO.	CONNECTIONS	CONNECTIONS	WIRE NO.
1	10	CN-A 1	CN-X2-1 2	X15
2	9	2	CN-X2-1 1	X14
3	8	3	CN-X1 20	X13
4	7	4	CN-X1 19	X12
5	6	5	CN-X1 17	X10
6	5	6	CN-X1 15	X0E
7	4	7	CN-X1 14	X0D
8	3	8	CN-X1 4	X03
9	2	9	CN-X1 3	X02
10	1	10	CN-X1 1	X00
11	14	11	CN-X2-1 8	X1B
12	19	12	CN-X2-2 8	X27
13	18	13	CN-X2-2 6	X25
14	17	14	CN-X2-2 3	X22
15	16	15	CN-X2-2 2	X21
16	15	16	CN-X2-2 1	X20
17	20	17	CN-X2-2 7	X28
18	13	18	CN-X2-1 6	X19
19	12	19	CN-X2-1 4	X17
20	11	20	CN-X2-1 3	X16

78 AND CONNECTION.
79 AND CONNECTION.

④ 3RX,0.54mm² (AWG20)x20WICK

NO.	INSULATOR NO.	CONNECTIONS	CONNECTIONS	WIRE NO.
61	1	CN-D 1	CN-1 1	AD-CH1
62	2	2	11	AD-CH2
63	3	3	2	AD-CH3
64	4	4	12	AD-CH4
65	5	5	3	AGND
66	6	6	13	AGND
67	7	7	4	DA-CH1
68	8	8	14	DA-CH2
69	9	9	9	SGGND
70	10	10	19	SGGND
71	11	11	10	DGGND
72	12	12	20	DGGND
73	13	13	CN-2 1	BAT
74	14	14	2	10
75	15	15	3	11
76	16	16	4	12
77	17	17	5	13
78	18	18	CN-Y2-2 -7	E
79	19	19	CN-Y2-2 -8	E
80				

② 3RX,0.87mm² (AWG18)x20WICK

NO.	INSULATOR NO.	CONNECTIONS	CONNECTIONS	WIRE NO.
21	1	CN-B 1	CN-Y1 1	Y00
22	2	2	2	Y01
23	3	3	3	Y02
24	4	4	4	Y03
25	5	5	5	Y04
26	6	6	6	Y05
27	7	7	7	Y06
28	8	8	8	Y07
29	9	9	9	Y08
30	10	10	10	Y09
31	11	11	11	Y0A
32	12	12	12	Y0B
33	13	13	13	Y0C
34	14	14	14	Y0D
35	15	15	15	Y0E
36	16	16	16	Y0F
37	17	17	17	LAP
38	18	18	18	OP
39	19	19	19	E
40	20	20	20	E

⑥ CAVS 0.5mm² SINGLE WIRE

NO.	WIRING COLOUR	CONNECTIONS	CONNECTIONS	WIRE NO.
87	R	CN-X1	CN-E	XOB
88	W	CN-X1	CN-E	XOC

⑤ 3RX,0.54mm² (AWG20)x10WICK

NO.	INSULATOR NO.	CONNECTIONS	CONNECTIONS	WIRE NO.
81	1	CN-RSC	CN-1 5	232TX
82	2		15	232RX
83	3		6	232SG
84	4		16	232CTL
85	5		8	CAN-H
86	6		18	CAN-L
89	7		7	YOBI
90	8		17	+12V
	9		*	
	10		*	

Drawing No.	1/1
05642-43520	

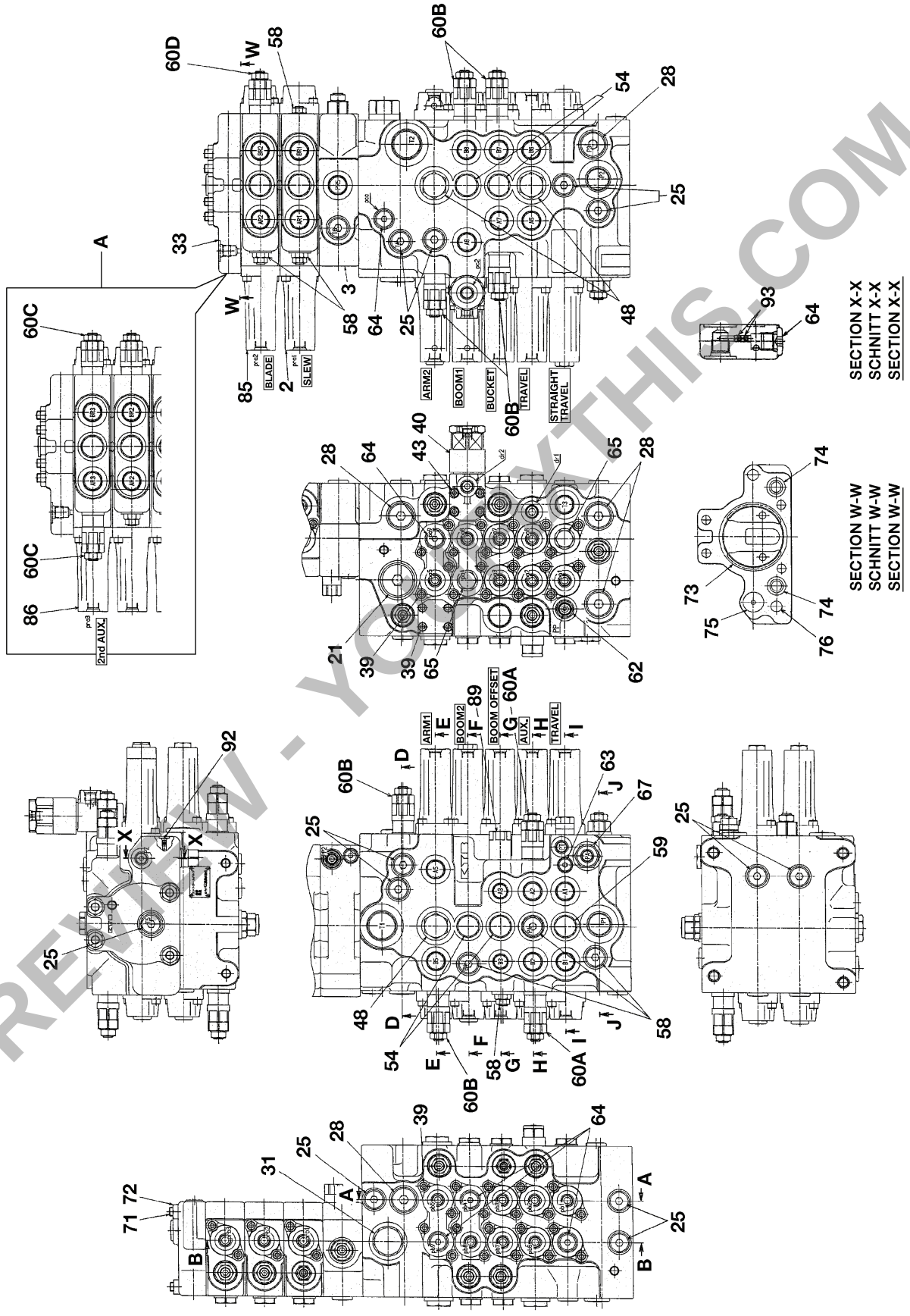
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CONTROL VALVE (MONO-BLOCK)

CONSTRUCTION



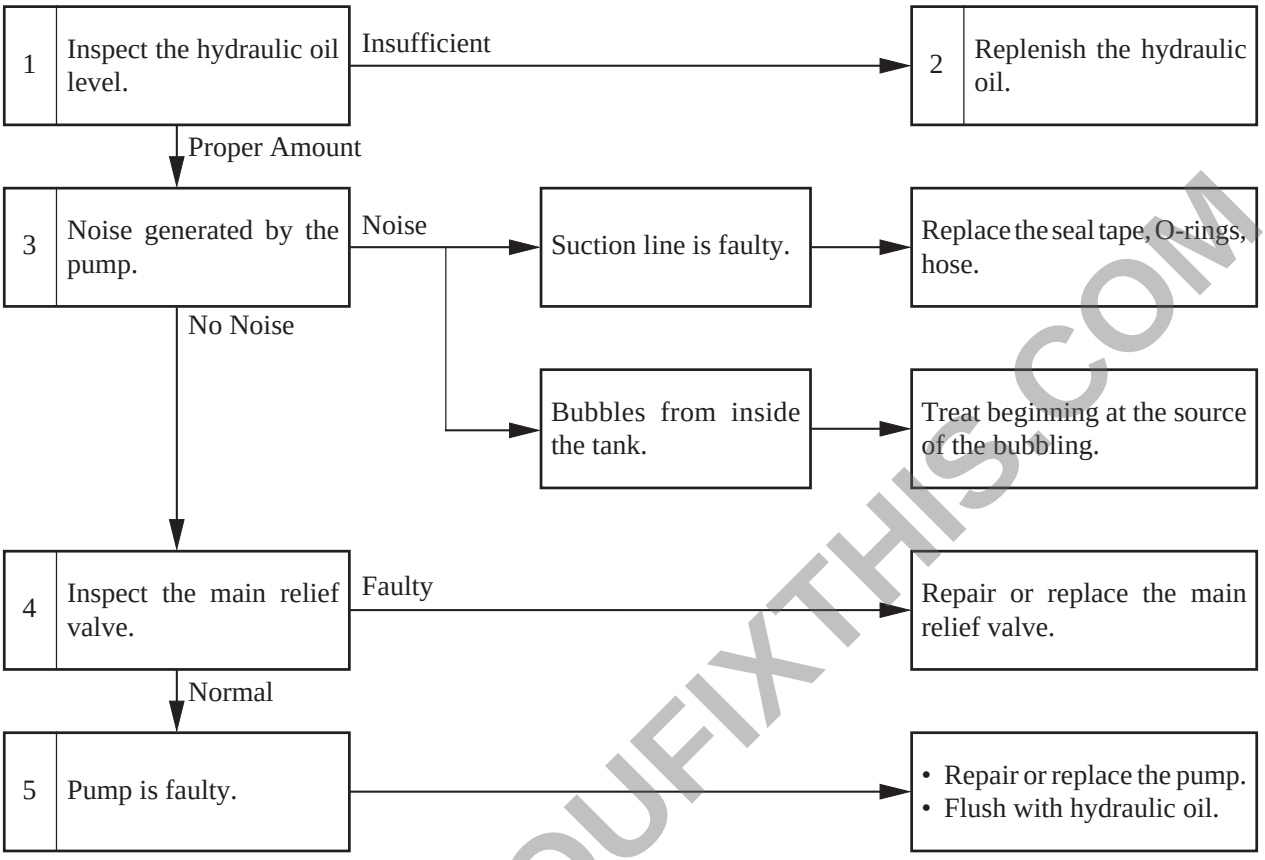
A: With 2nd Auxiliary

L8D2001

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ALL OPERATIONS CAN BE DONE, BUT THERE IS NO POWER.



1. Inspect the hydraulic oil level.
   ☞ "III. Machine Configuration, Hydraulic Tank"

2. Replenish the hydraulic oil.
   ☞ "V-4"

3. Noise generated by the pump.
   A faulty suction line can make it easy for cavitation to occur in the pump and for noise to be generated. Carry out the following inspect.
   a. Inspect the piping used for suction of hydraulic oil.
      • Apply grease or oil to the part which appears to be making the noise and inspect if there is any change. (Inspect if it is sucking in air or not.)
   b. Inspect for clogging of the suction filter.

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SPECIFICATIONS OF DEVICE

Engine		
Model		Yanmar 4TNV98-STB1
Type		4-Cycle, vertical, water-cooled, in-line, 4-cylinder diesel engine
Number of Cylinders-Bore × Stroke	mm	4-98 × 110
Total Displacement	mL	3318
Compression Ratio		18.5 : 1
Performance		
Rated Output	kW/min^{-1}	45.14/2200
Maximum Torque	N·m/min^{-1}	229.3~249.6/1320
Maximum No-load R.P.M.	min^{-1}	2400 ±25
Minimum No-load R.P.M.	min^{-1}	1100 ±25
Specific Fuel Consumption	g/kW·h	≦234
Starter	V–kW	12–3.0
Generator	V–kW	12–0.66
Battery	V–A·h	12–64
Hydraulic Pump		
Model		K3SP36C
Type		Variable displacement type double axial piston
Delivery: P1	L/min	66.0
P2	L/min	66.0
Gear Pump		
Model		SDYA255F1H1-R
Type		Tandem gear
Delivery: P3	L/min	55.7
P4	L/min	11.2
Control Valve		
Model		KVMM-80-TC
Number of Circuits		13
Main Relief Valve Pressure Setting	MPa	27.5
	MPa	23.5
Port Relief Valve Pressure Setting	MPa	33.3
	MPa	26.9
	MPa	20.6

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2.2 Periodic inspection and maintenance procedure

2.2.1 Check before daily operation

Be sure to check the following points before starting an engine every day.

No.	Inspection Item
(1)	Visual check around engine
(2)	Fuel tank level check and fuel supply
(3)	Lube oil level check and replenishment
(4)	Coolant water level check and replenishment
(5)	Fuel pipe and coolant water pipe inspection and maintenance
(6)	Inspection and adjustment of governor lever and accelerator
(7)	Warning lamp & instruments function check

(1) Visual check around engine

If any problem is found, do not use before the engine repairs have been completed.

- Oil leak from the lubrication system
- Fuel leak from the fuel system
- Coolant water leak from the cooling water system
- Damaged parts
- Loosened or lost bolts
- Fuel, radiator rubber hoses, V belt cracked, loosened clamp

(2) Fuel tank level check and fuel supply

Check the remaining fuel oil level in the fuel tank and refuel the recommended fuel if necessary. (Refer to 1.3.(1))

(3) Lube oil level check and replenishment

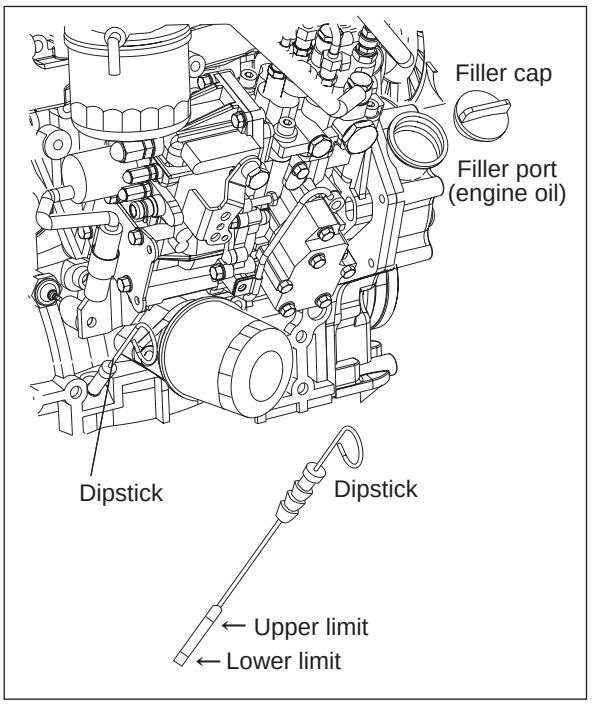
(a)Checking oil level

Check the lube oil level with the dipstick, after adjusting the posture of the machine unit so that an engine may become a horizontality. Insert the dipstick fully and check the oil level. The oil shall not be contaminated heavily and have appropriate viscosity. No coolant water or diesel fuel shall be mixed.

When lube oil is supplied after the engine running, check the lube oil level after about 10 minutes pass after the engine shutdown so that the lube oil inside may be retuned the oil pan.

Standard

The level shall be between the upper and lower limit lines on the dipstick.



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Removing the Radiator with Oil Cooler

1. Remove the engine hood, and side cover.
   ☞ "Removing the Covers"

2. Remove the counterweight.
   ☞ "Removing the Upper Frame"

3. Tilt up the floor frame.

4. Loosen the drain valve (1) to drain the engine coolant.
   • Coolant volume: Approx. 9.5 L

5. Disconnect the coolant drain hose (2).

6. Disconnect the air hose (3).

7. Remove the bracket (4).

8. Disconnect the electric wiring to the feed pump (5).

9. Remove the feed pump (5) together with the bracket (6).

10. Disconnect the fuel hoses (7) and (8) from the water separator (9).

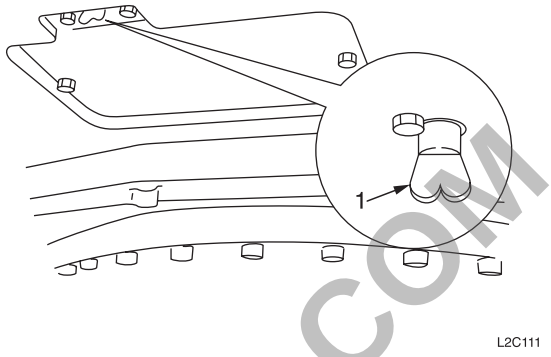
11. <Air Conditioner>
    Remove the condenser (10) and receiver-dryer (11).
    • Do not loosen the hoses.

12. Disconnect the radiator hoses (12) and (13).

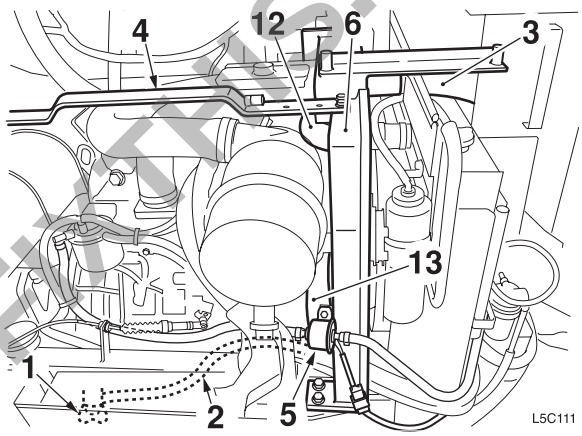
13. Disconnect the 2 oil cooler hoses (14).
    • Prepare a plate to catch drips of the hydraulic oil.

14. Remove the bracket fixing bolts (15).

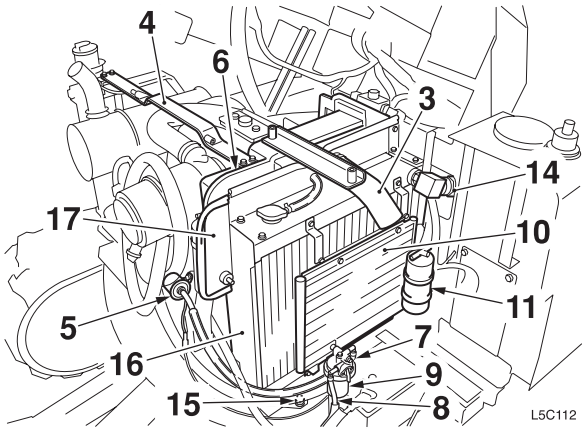
15. Suspend the radiator (16) together with the bracket (17), and remove them carefully without touching other parts.
    • Slide them to the front to prevent the shroud from hitting the cooling fan.



L2C111



L5C111

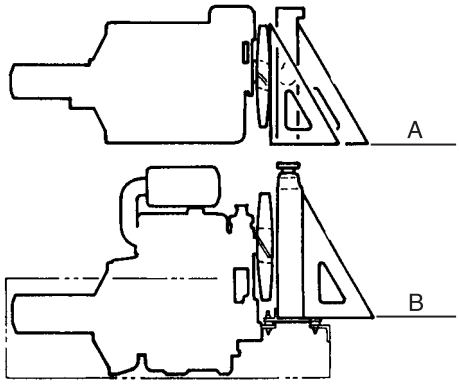


L5C112

Installing the Radiator with Oil Cooler

Follow the same procedure as for removal in the reverse order.

• The radiator should be mounted at right angles to the main body frame and parallel to the cooling fan.
  A: parallel
  B: right angle

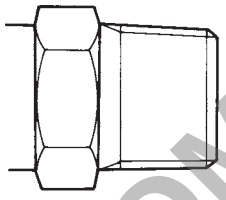


L2C114

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Joints for Piping

Nominal Thread Diameter (R)	Torque			
	Steel		Cast Steel	
	N·m	ft-lb	N·m	ft-lb
1/8	11.8 ±1.2	8.7 ±0.8	10.8 ±1.1	8.0 ±0.7
1/4	29.4 ±2.9	21.7 ±2.1	24.5 ±2.5	18.1 ±1.7
3/8	53.9 ±5.4	39.8 ±3.9	49 ±4.9	36.2 ±3.5
1/2	88.3 ±8.8	65.1 ±6.4	73.5 ±7.4	54.3 ±5.3
3/4	147.1 ±14.7	108.5 ±10.7	127.5 ±12.7	94.1 ±9.3
1	196.1 ±19.2	144.7 ±14.3	171.6 ±17.2	126.6 ±12.5

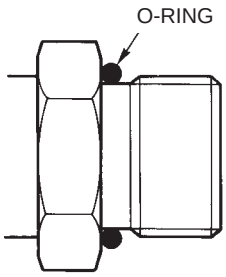


Y2-A109

Joints for Piping (O-ring Seal Type)

Nominal Thread Diameter (G)	Torque	
	N·m	ft-lb
1/8	19.6 ±2.0	14.5 ±1.4
1/4	34.3 ±4.9	25.3 ±3.5
3/8	53.9 ±4.9	39.8 ±3.5
1/2	63.7 ±4.9	47.0 ±3.5
3/4	93.2 ±4.9	68.7 ±3.5
1	107.9 ±9.8	79.5 ±7.2
1-1/4	117.7 ±9.8	86.8 ±7.2
1-1/2	137.3 ±9.8	101.2 ±7.2

Nominal Thread Diameter (UNF)	Torque	
	N·m	ft-lb
7/16–20	16.7 ±2.0	12.3 ±1.4
1/2–20	22.6 ±2.0	16.6 ±1.4
9/16–18	31.4 ±2.9	23.1 ±2.1
3/4–16	59.8 ±4.9	44.1 ±3.5
1-1/16–12	102.0 ±5.9	75.2 ±4.4
1-5/16–12	135.3 ±7.8	99.8 ±5.8
1-5/8–12	181.4 ±9.8	133.8 ±7.2



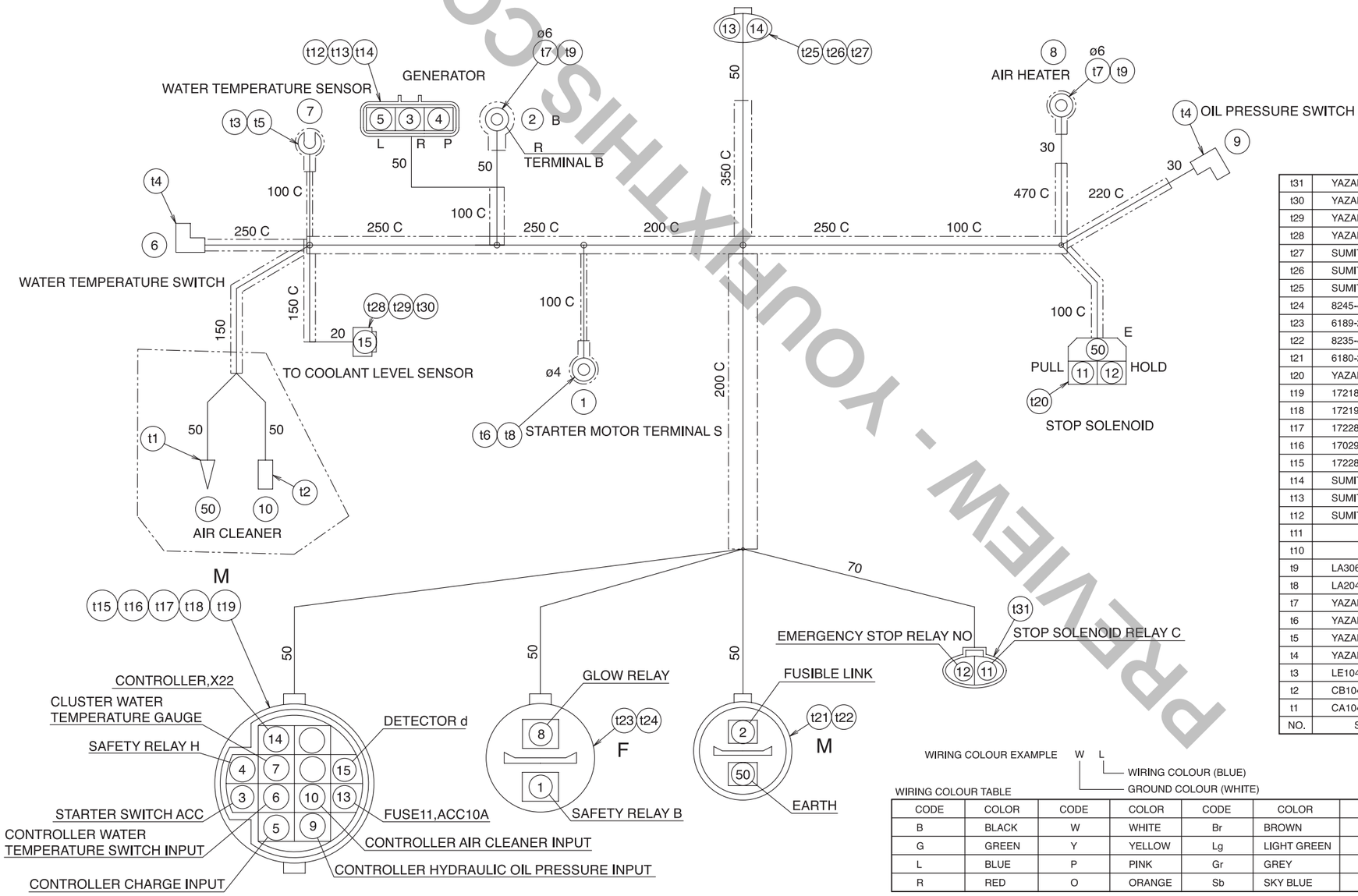
Y2-A110

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NO.	CONNECTIONS	CONNECTIONS	CONNECTIONS	SIZE	WIRE COLOR
1	SAFETY RELAY B	1	STARTER MOTOR S	3	G
2	FUSIBLE LINK	2	GENERATOR B	5	R
3	STARTER SWITCH ACC	3	GENERATOR R	1.25	BR
4	SAFETY RELAY H	4	GENERATOR P	1.25	WG
5	CONTROLLER CHARGE INPUT	5	GENERATOR L	0.85	Y
6	CONTROLLER WATER TEMPERATURE SWITCH INPUT	6	WATER TEMPERATURE SWITCH	0.85	GB
7	CLUSTER WATER TEMPERATURE GAUGE	7	WATER TEMPERATURE SENSOR	0.85	GY
8	GLOW RELAY	8	AIR HEATER	3	O
9	CONTROLLER HYDRAULIC INPUT	9	HYDRAULIC SWITCH	0.85	L
10	CONTROLLER AIR CLEANER INPUT	10	AIR CLEANER SWITCH	0.85	GR
11	STOP SOLENOID RELAY C	11	STOP SOLENOID RELAY W PULL	3	WG
12	EMERGENCY STOP RELAY NO	12	STOP SOLENOID R HOLD	3	RW
13	FUSE11,ACC10A	13	PRESSURE SWITCH,PZ	0.85	Lg
14	CONTROLLER,X22	14	PRESSURE SWITCH,PZ	0.85	Y

NO.	CONNECTIONS	CONNECTIONS	CONNECTIONS	SIZE	WIRE COLOR
15	DETECTOR,d	15	COOLANT LEVEL SENSOR	0.85	LY
16					
17					
18	EARTH	50	STOP SOLENOID EARTH	3	B
19		50	AIR CLEANER EARTH	1.25	B
20					
21					
22					



t31	YAZAKI 7222-6423-30	2P WATER PROOF CONNECTOR M
t30	YAZAKI 7157-7812	WATERPROOF PLUG
t29	YAZAKI 7116-1471	TERMINAL F
t28	YAZAKI 7123-7414-40	1P WATER PROOF CONNECTOR F
t27	SUMITOMO 7160-8234	WIRE SEAL
t26	SUMITOMO 1500-0110	TERMINAL F
t25	SUMITOMO 6180-2321	2P CONNECTOR F
t24	8245-4060	TERMINAL F
t23	6189-2490	2P WATER PROOF CONNECTOR F
t22	8235-4050	TERMINAL M
t21	6180-2480	2P WATER PROOF CONNECTOR M
t20	YAZAKI 7323-6234-40	3P CONNECTOR F
t19	172189-1	PLUG
t18	172190-5	O RING
t17	172282-1	RUBBER PLUG
t16	170292-1	TERMINAL M
t15	172281-1	12P WATER PROOF CONNECTOR M
t14	SUMITOMO 7160-8234	WIRE SEAL
t13	SUMITOMO 8100-0461	TERMINAL F
t12	SUMITOMO 6189-0443	3P CONNECTOR F
t11		
t10		
t9	LA306	TERMINAL
t8	LA204	TERMINAL
t7	YAZAKI 7034-1279	CAP
t6	YAZAKI 7034-1276	CAP
t5	YAZAKI 7034-1272	CAP
t4	YAZAKI 7115-2020	TERMINAL
t3	LE104	TERMINAL
t2	CB104	TERMINAL F
t1	CA104	TERMINAL M
NO.	STANDARD	NAME

WIRING COLOUR EXAMPLE W L
WIRING COLOUR (BLUE)
GROUND COLOUR (WHITE)

WIRING COLOUR TABLE

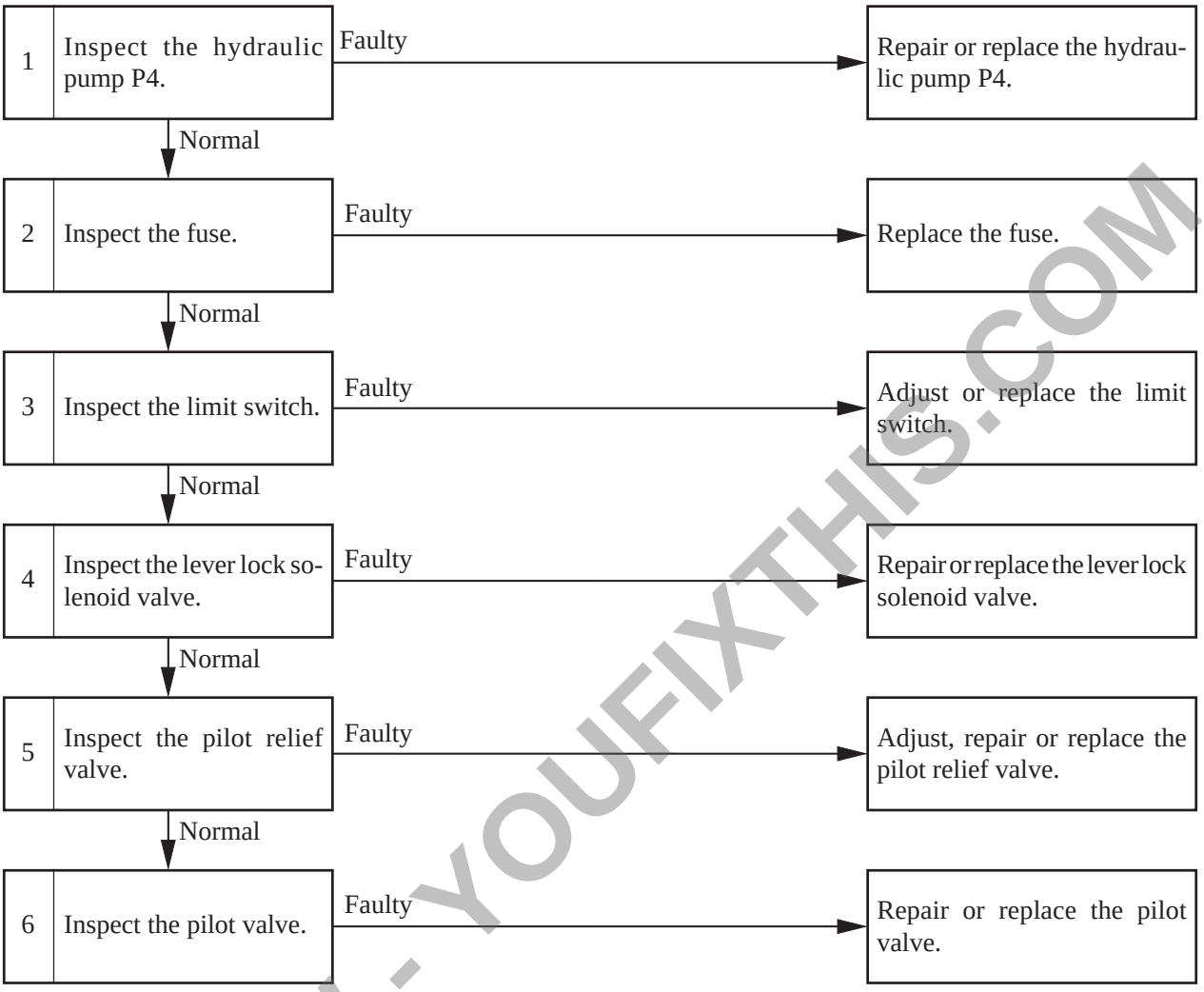
CODE	COLOR	CODE	COLOR	CODE	COLOR	CODE	COLOR
B	BLACK	W	WHITE	Br	BROWN	V	PURPLE
G	GREEN	Y	YELLOW	Lg	LIGHT GREEN	Dg	DARK GREEN
L	BLUE	P	PINK	Gr	GREY	Ch	CHARCOAL BROWN
R	RED	O	ORANGE	Sb	SKY BLUE		

Drawing No. 05642-43530 1/1

L5C804E

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THE BOOM, BUCKET, SLEW AND ARM DO NOT MOVE AT ALL, OR THE SPEED IS LOW.



1. Inspect the hydraulic pump P4.
   Inspect the hydraulic pump P4 which is the source of the hydraulic pressure for the pilot valve.
   ☞ "V-4"
   Since clogging of the line filter can also be considered, inspect and clean the filter.

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(1) 3TNV82A

Engine name		Unit	3TNV82A								
Engine specification class		-	CL	VM							
Type		-	Vertical, in-line, 4-cycle, water-cooled diesel engine								
Combustion chamber		-	Direct injection								
Number of cylinders		-	3								
Cylinder bore × stroke		mm × mm	82 × 84								
Displacement		L	1.331								
Continuous rating	Revolving speed	Min^{-1}	1500	1800	-						
	Output	kW (ps)	9.9 (13.5)	12.0 (16.3)	-						
Rated output	Revolving speed	Min^{-1}	1500	1800	2000	2200	2400	2500	2600	2800	3000
	Output	kW (ps)	11.0 (14.9)	13.2 (17.9)	14.6 (19.9)	16.0 (21.8)	17.5 (23.8)	18.2 (24.8)	19.0 (25.8)	20.4 (27.8)	21.9 (29.8)
Max. no-load speed (± 25)		min^{-1}	1600	1895	2180	2375	2570	2675	2780	2995	3180
Ignition order		-	1-3-2-1 (No.1 cylinder on flywheel side)								
Power take off		-	Flywheel								
Direction of rotation		-	Counterclockwise (viewed from flywheel)								
Cooling system		-	Radiator								
Lubrication system		-	Forced lubrication with trochoid pump								
Starting system		-	Electric								
Applicable fuel		-	Diesel oil-ISO 8217 DMA, BS 2869 A1 or A2 (Cetane No.45 min.)								
Applicable lubricant		-	API grade class CD or CF								
Lubricant capacity (oil pan) *	Total	L	5.5								
	Effective	L	1.9								
Cooling water capacity (engine only)		L	1.8								
Engine Dimensions ** (with flyw Crankshaft V pulley diameter & heel housing) *	Overall length	mm	553	528							
	Overall width	mm	489								
	Overall height	mm	565								
Engine mass (dry) *,** (with flywheel housing)		kg	138	128							
Cooling fan (std.) *		mm	335 mm O/D, 6 blades pusher type F								
Fun V pulley diameter (std.) *		mm	120 × 90	110 × 110							

* Items marked * may differ from the above depending on an engine installed on a machine unit.
** Engine mass and dimensions without radiator

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IMPORTANT:

If the coolant water runs short quickly or when the radiator runs short of water with the Coolant recovery tank level unchanged, water may be leaking or the air tightness may be lost. Increase in the Coolant recovery tank water level during operation is not abnormal.

The increased water in the Coolant recovery tank returns to the radiator when the engine is cooled down.

If the water level is normal in the Coolant recovery tank but low in the radiator, check loosened clamping of the rubber hose between the radiator and Coolant recovery tank or tear in the hose.

Standard

Engine: The radiator shall be filled up.

(Unit: liter)

Model	Coolant water volume In an engine
3TNV82A	1.8
3TNV84 (T) 3TNV88	2.0
4TNV84 (T) 4TNV88	2.7
4TNV94L 4TNV98 (T)	4.2
4TNV106 (T)	6.0

Engine coolant water capacity may differ from the above volume depending on an engine installed on a machine unit.

(5) Fuel pipe and coolant water pipe inspection and maintenance

Check the rubber hoses for fuel and coolant water pipes cracked. If the cracked hose is found, replace it with new one. Check the loosened clamp. If found, tighten it.

(6) Inspection and adjustment of governor lever and accelerator

Make sure the accelerator of the machine unit can be operated smoothly before starting the engine. If it feels heavy to manipulate, lubricate the accelerator cable joints and pivots. Adjust the accelerator cable if there is a dislocation or excessive play between the accelerator and the governor lever. Refer to 3.2.3.

(7) Warning lamp & instruments function check

Before and after starting the engine, check to see that the alarm function normally. Failure of alarm cannot warn the lack of the engine oil or the coolant water. Make it a rule to check the alarm operation before and after starting engine every day. Refer to each manual for machine units in details.

2.2.2 inspection after initial 50 hours operation

Be sure to check the following points after initial 50 hours operation, thereafter every 250 hours or 3 months operation.

No.	Inspection Item
(1)	Lube oil and filter replacement
(2)	V-belt tension check

(1) Lube oil and filter replacement (1st time)

⚠ CAUTION

When an engine is still hot, be careful with a splash of engine oil which may cause burns. Replace engine oil after the engine oil becomes warm. It is most effective to drain the engine oil while the engine is still warm.



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DISASSEMBLY AND ASSEMBLY

Removing the Slew Motor

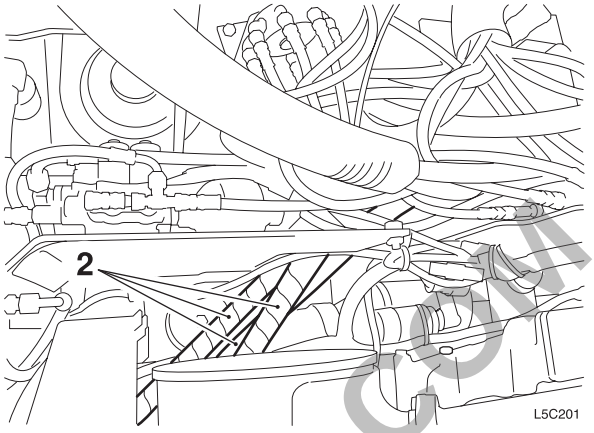
1. Tilt up the floor frame.

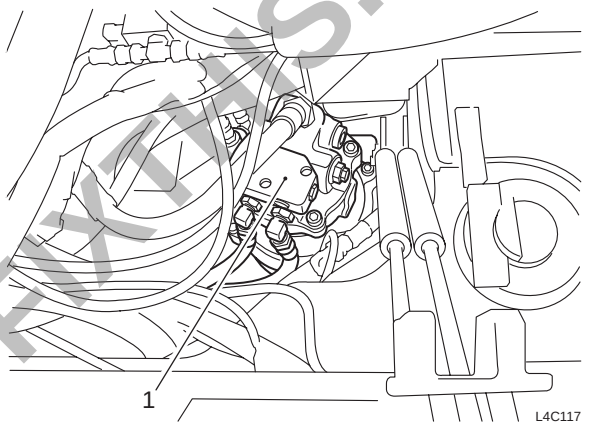
2. Disconnect 3 hydraulic hoses (2) from the hydraulic pump.

3. Disconnect 6 hydraulic hoses from the slew motor (1).
   - Make match marks at the connection positions of the hoses.

4. Remove the slew motor fixing bolts.
   Bolt: 256 N·m
   - Apply thread lock to the bolts.

5. Suspend the slew motor (1) and remove it.
   Slew Motor: 80 kg





Installing the Slew Motor

Follow the same procedure as for removal in the reverse order.

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Bolts and Nuts (for ISO Strength Category 10.9)

Thread	Size × Pitch	Torque					
		General Tightening Points			Special Tightening Points		
		N·m	kgf·m	ft-lb	N·m	kgf·m	ft-lb
Coarse	M 6 × 1.0	9.8 ±0.5	1.0 ±0.05	7.2 ±0.4	11.8 ±0.6	1.2 ±0.06	8.7 ±0.4
	M 8 × 1.25	22.6 ±1.1	2.3 ±0.11	16.6 ±0.8	26.5 ±1.3	2.7 ±0.13	19.5 ±0.9
	M10 × 1.5	47.1 ±2.4	4.8 ±0.24	34.7 ±1.7	54.9 ±2.7	5.6 ±0.28	40.5 ±2.0
	M12 × 1.75	83.4 ±4.1	8.5 ±0.42	61.5 ±3.0	97.1 ±4.8	9.9 ±0.49	71.6 ±3.5
	M14 × 2.0	134.4 ±6.7	13.7 ±0.68	99.1 ±4.9	155.9 ±7.7	15.9 ±0.79	115.0 ±5.7
	M16 × 2.0	207.9 ±10.4	21.2 ±1.06	153.3 ±7.7	241.2 ±12.1	24.6 ±1.23	177.9 ±8.9
	M20 × 2.5	410.9 ±20.5	41.9 ±2.09	303.1 ±15.1	475.6 ±23.7	48.5 ±2.42	350.8 ±17.5
Fine	M 8 × 1.0	24.5 ±1.2	2.5 ±0.12	18.1 ±0.9	28.4 ±1.4	2.9 ±0.14	21.0 ±1.0
	M10 × 1.25	50.0 ±2.5	5.1 ±0.25	36.9 ±1.8	58.8 ±2.9	6.0 ±0.30	43.4 ±2.2
	M12 × 1.5	87.3 ±4.3	8.9 ±0.44	64.4 ±3.2	102.0 ±5.1	10.4 ±0.52	75.2 ±3.8
	M14 × 1.5	135.3 ±6.8	13.8 ±0.69	99.9 ±5.0	157.9 ±7.8	16.1 ±0.80	116.5 ±5.8
	M16 × 1.5	220.6 ±11.0	22.5 ±1.12	162.7 ±8.1	256.0 ±12.7	26.1 ±1.30	188.8 ±9.4
	M20 × 1.5	452.1 ±22.6	46.1 ±2.30	333.4 ±16.6	524.7 ±26.1	53.5 ±2.66	387.0 ±19.2

1. General Tightening Points (Non-lubricated)
   - All securing points other than the special tightening points.

2. Special Tightening Points (Grease with molybdenum disulfide applied.)
   - Points where particularly necessary due to function.
     Special tightening positions and associated instructions are given in the text.

3. Points where thread-locking compound is used (Three Bond #1324 is applied.)
   Thread-locking compound positions and associated instructions are given in the text.

4. If tightening torque values are provided in this manual, then tightening should be done according to those values.
   (This indicates that the tightening torque differs from the values given in this table.)

5. In order to tighten bolts and nuts evenly, they should be tightened alternately top, bottom, left, right.

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Provide a fire extinguisher and first aid kit


E3A080

- Know where a fire extinguisher and first aid kit are located and understand how to use them.
- Know how to contact emergency assistance and first aid help.

Attach a “DO NOT OPERATE” tag

Severe injury could result if an unauthorized person should start the engine or touch controls during inspection or maintenance.

- Stop the engine and remove the key before performing maintenance.
- Attach a “DO NOT OPERATE” tag to the starter switch or control lever.

Use the correct tools


E3A530

Do not use damaged or weakened tools or tools designed for other purposes. Use tools suited for the operation at hand.

Replace important safety parts periodically

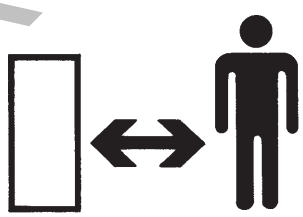
- Replace fuel hoses periodically. Fuel hoses become weaker over time, even if they appear to be in good shape.
- Replace important safety parts whenever an irregularity is found, even if it is before the normal time for replacement.

Anti-explosive lighting


E3A550

Use anti-explosive electrical fixtures and lights when inspecting fuel, oil, coolant, battery fluid, etc. If lighting that is not anti-explosive should break, the substance could ignite, resulting in serious injury or death.

Do not allow unauthorized personnel in the work area


E3A140

Do not allow unauthorized personnel in the work area. Chips or other debris can fly off machine parts when grinding, welding or using a hammer.

Prepare the work area

- Select a firm, level work area. Make sure there is adequate light and, if indoors, ventilation.
- Clear obstacles and dangerous objects. Eliminate slippery areas.

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SAFETY PRECAUTIONS

SAFETY ALERT SYMBOL

This symbol means Attention! Be Alert! Your Safety Is Involved.
The message that follows the symbol contains important information about safety.
Read and understand the message to avoid personal injury or death.

■ SIGNAL WORDS

Safety messages appearing in this manual and on machine decals are identified by the words "DANGER", "WARNING" and "CAUTION". These signal words mean the following:

⚠ DANGER
The word "DANGER" indicates an imminently hazardous situation which, if not avoided, can result in serious injury or death.

⚠ WARNING
The word "WARNING" indicates a potentially hazardous situation which, if not avoided, could result in serious injury or death.

⚠ CAUTION
The word "CAUTION" indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

IMPORTANT: The word "IMPORTANT" is used to alert against operators and maintenance personnel about situations which can result in possible damage to the machine and its components.

This manual is intended for trained and qualified personnel only. Warnings or cautions described in this manual do not necessarily cover all safety measures. For maintenance work, each person must take adequate safety precautions against possible hazards present in the respective working environment.

Observe all safety rules

- Operation, inspection and maintenance of this machine must be performed only by a trained and qualified person.
- All rules, regulations, precautions and safety procedures must be understood and followed when performing operation, inspection and maintenance of this machine.
- Do not perform any operation, inspection and maintenance of this machine when under the adverse influence of alcohol, drugs, medication, fatigue, or insufficient sleep.

Wear appropriate clothing and personal protective equipment

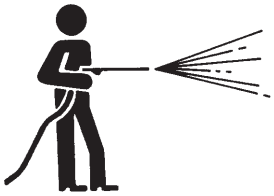
- Do not wear loose clothing or any accessory that can catch on controls or in moving parts.
- Do not wear oily or fuel stained clothing that can catch fire.


E3A040

- Wear a hard hat, safety shoes, safety glasses, filter mask, heavy gloves, ear protection and other protective equipment as required by job conditions. Wear required appropriate equipment such as safety glasses and filter mask when using grinders, hammers or compressed air, as metal fragments or other objects can fly and cause serious personal injury.
- Use hearing protection when operating the machine. Loud prolonged noise can cause hearing impairments, even the total loss of hearing.

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Always clean the machine



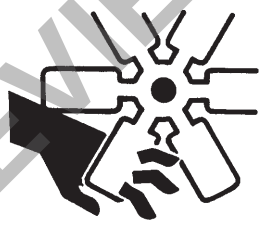
E3A580

- Clean the machine before performing maintenance.
- Cover electrical parts when washing the machine. Water on electrical parts could cause short-circuits or malfunctions.
  Do not use water or steam to wash the battery, sensors, connectors or the operator's seat area.

Stop the engine before performing maintenance

- Avoid lubrication or mechanical adjustments with the machine in motion or with the engine running while stationary.
- If maintenance must be performed with the engine running, always work as a 2-person team with one person sitting in the operator's seat while the other works on the machine.
  - When performing maintenance, be sure to keep your body and clothing away from moving parts.

Stay clear of moving parts



E3A630

- Stay clear of all rotating and moving parts. Wrapping or entanglement may result in serious injury or death.
- Keep hands, clothing and tools away from the rotating fan and running fan belts.

Securely block the machine or any component that may fall



E3A570

- Before performing maintenance or repairs under the machine, set all working equipment against the ground or in the lowermost position.
- Securely block the tracks.
- If you must work beneath the raised machine or equipment, always use wood blocks, jack-stands or other rigid and stable supports. Never get under the machine or working equipment if they are not sufficiently supported. This procedure is especially important when working on hydraulic cylinders.

Securely block the working equipment

To prevent unexpected movement, securely block the working equipment when repairing or replacing the cutting edges or bucket teeth.

Secure the engine hood or cover when opened

Be sure to secure the engine hood or cover when opening it. Do not open the engine hood or cover on slopes or in strong wind.

Cautions on tilting up the platform

- Raising or lowering the platform while the engine is running may cause the machine to move, and cause serious injury or death.
  Stop the engine before raising or lowering the platform.
- When the floor is tilted up, support it firmly with the stopper to prevent it from falling.

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TROUBLESHOOTING

The following items are a list of all the problems that might occur individually, but in actual practice, 2 or 3 of these problems might occur simultaneously to compound the trouble. It is therefore desirable to proceed so that the causes can be eliminated one at a time.

Symptom	Probable Causes	Remedy
Oil leaks from spool seal.	• Seal is scratched or the seal lip is worn due to long use.	• Replace with a new part.
	• Spool's seal sliding portion was damaged by some external cause (bruise, scratch, etc.).	• Repair or replace the spool.
	• Seal bulged out and the cover was installed in a warped state.	• Return to the correct shape and check for eccentric wear of the seal lip.
	• Paint adhered to the sliding portion of the spool's seal portion during painting.	• Remove paint with paint thinner or remove it mechanically. However, at this time, be careful not to damage the spool surface or the seal lip.
	• Tank circuit's pressure became high and exceeded the pressure level that the seal was capable of withstanding.	• Eliminate the factors causing excessive flow resistance.
Spool's sliding is not smooth.	• Foreign matter is biting into the spool's sliding surface.	• Overhaul and repair or replace.
	• Oil film between the spool and body disappears due to abnormally high oil temperature.	• Use some method to lower the oil temperature or if the relief valve is operating frequently, investigate the cause and reduce the frequency.
	• Lubrication is improper due to deteriorating oil.	• This could be alleviated by simply replacing the hydraulic oil, or it could require an overhaul of the circuit.
	• Spool is worn from long use or due to pressure bearing on one side only.	• Check the spool's diameter and consider the necessity of replacement.
	• Spool is bent from externally applied pressure.	• Check the spool's straightness and other factors, then repair or replace.
	• Entire valve is strained due to strain in the installation face.	• Loosen the installation bolts, then cut the installation face and edge and check.
	• Valve was used at a pressure or a flow volume which was out of specification.	• In the case of pressure, check with a pressure gauge. In the case of flow volume, check by the actuator's speed of movement and the capacity.
	• Bolts used to assemble the valve were tightened excessively.	• Check if the assembly bolts are tightened to the specified torque. If the torque deviates markedly from the specified torque, tighten them again.
	• Oil is accumulating in the cover (the side with a spring or a detent) opposite the side where the spool operates.	• The spool is leaking oil, so when the spool moves, oil leaks from the cover. After confirming this, replace the seal.
Cylinder drops while shifting to a lift operation.	• Foreign matter is biting into the load check valve seat or large scratches were made by foreign matter biting into the valve's seat previously.	• Disassemble and check, then overhaul or replace.

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The adjustment of fuel injection angle θ_i

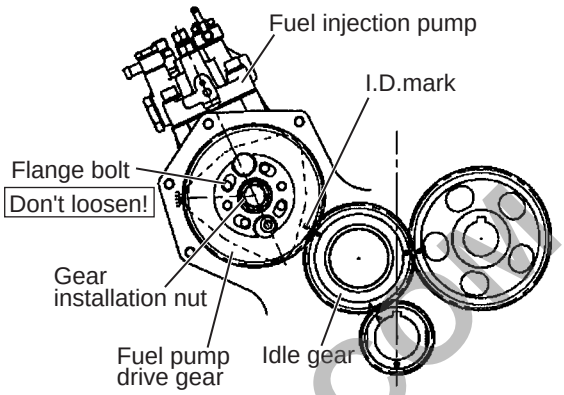
In case that the fuel pump are removed, and reassembled, the procedure of fuel injection angle adjustment is as follows. (As for the disassembly of a fuel injection pump, refer to 7.2.3 in chapter 7.)

[NOTICE]

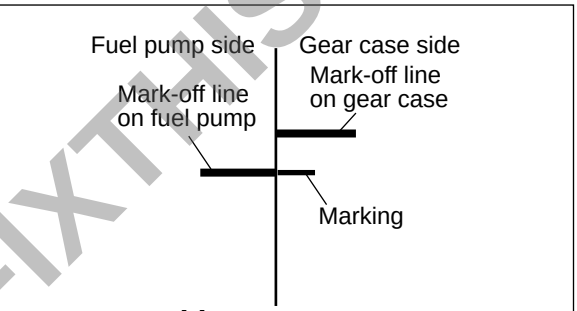
Never loosen four flange bolts, which fasten a pump flange and a fuel pump drive gear at the time of the removal of the fuel pump. When it is loosened, the adjustment of the fuel injection timing becomes very difficult.

1)Before removing a fuel pump drive gear, make ID marks on the gearing part of the pump drive gear and the idle gear with paint and so on.

2)Make the mark-off line to the gear case precisely in accordance with the position of mark-off line of the fuel pump.

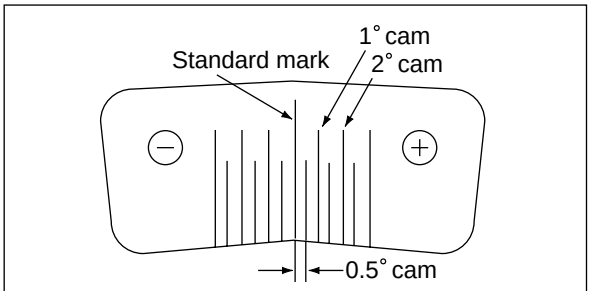


Fuel pump installation angle

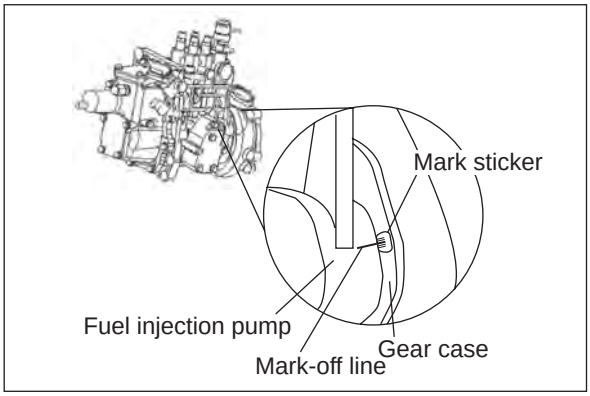


Marking on gear case

3)Before removing a fuel pump, put the standard mark of a sticker for fuel injection angle adjustment in accordance with the mark-off line of the fuel pump and paste it on the gear case.



Sticker for adjusting injection angle



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