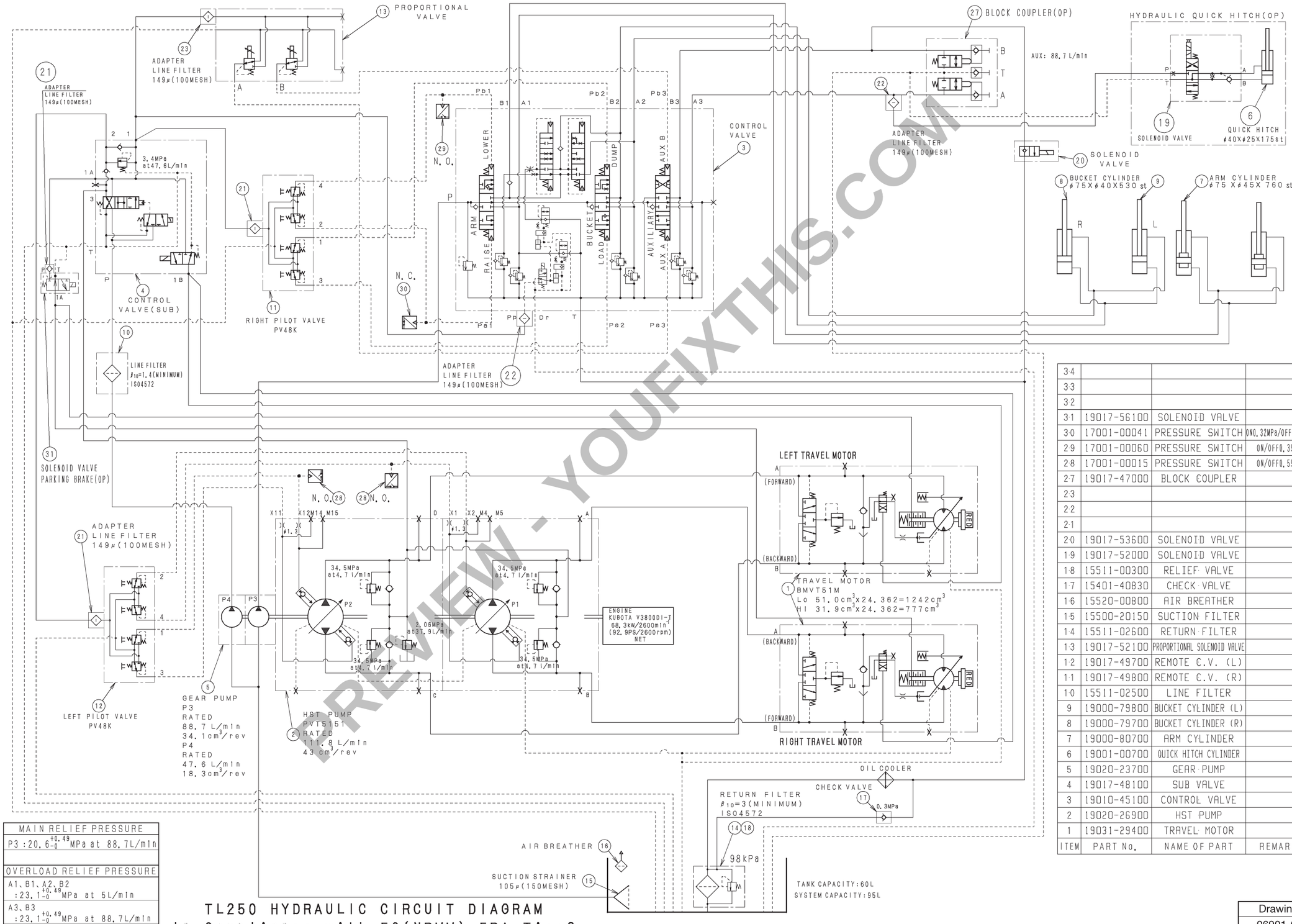
Serial No. 225000665 or later



MAIN RELIEF PRESSURE
P3 : 20.6 $^{+0.49}_{-0}$ MPa at 88.7L/min
OVERLOAD RELIEF PRESSURE
A1、B1、A2、B2 : 23.1 $^{+0.49}_{-0}$ MPa at 5L/min
A3、B3 : 23.1 $^{+0.49}_{-0}$ MPa at 88.7L/min

TL250 HYDRAULIC CIRCUIT DIAGRAM
In Compliance with EC(NRMM) EPA Tier3

ITEM	PART No.	NAME OF PART	REMARKS
34			
33			
32			
31	19017-56100	SOLENOID VALVE	
30	17001-00041	PRESSURE SWITCH	ON0.32MPa/OFF0.36MPa
29	17001-00060	PRESSURE SWITCH	ON/OFF0.39MPa
28	17001-00015	PRESSURE SWITCH	ON/OFF0.59MPa
27	19017-47000	BLOCK COUPLER	
23			
22			
21			
20	19017-53600	SOLENOID VALVE	
19	19017-52000	SOLENOID VALVE	
18	15511-00300	RELIEF VALVE	
17	15401-40830	CHECK VALVE	
16	15520-00800	AIR BREATHER	
15	15500-20150	SUCTION FILTER	
14	15511-02600	RETURN FILTER	
13	19017-52100	PROPORTIONAL SOLENOID VALVE	
12	19017-49700	REMOTE C.V. (L)	
11	19017-49800	REMOTE C.V. (R)	
10	15511-02500	LINE FILTER	
9	19000-79800	BUCKET CYLINDER (L)	
8	19000-79700	BUCKET CYLINDER (R)	
7	19000-80700	ARM CYLINDER	
6	19001-00700	QUICK HITCH CYLINDER	
5	19020-23700	GEAR PUMP	
4	19017-48100	SUB VALVE	
3	19010-45100	CONTROL VALVE	
2	19020-26900	HST PUMP	
1	19031-29400	TRAVEL MOTOR	

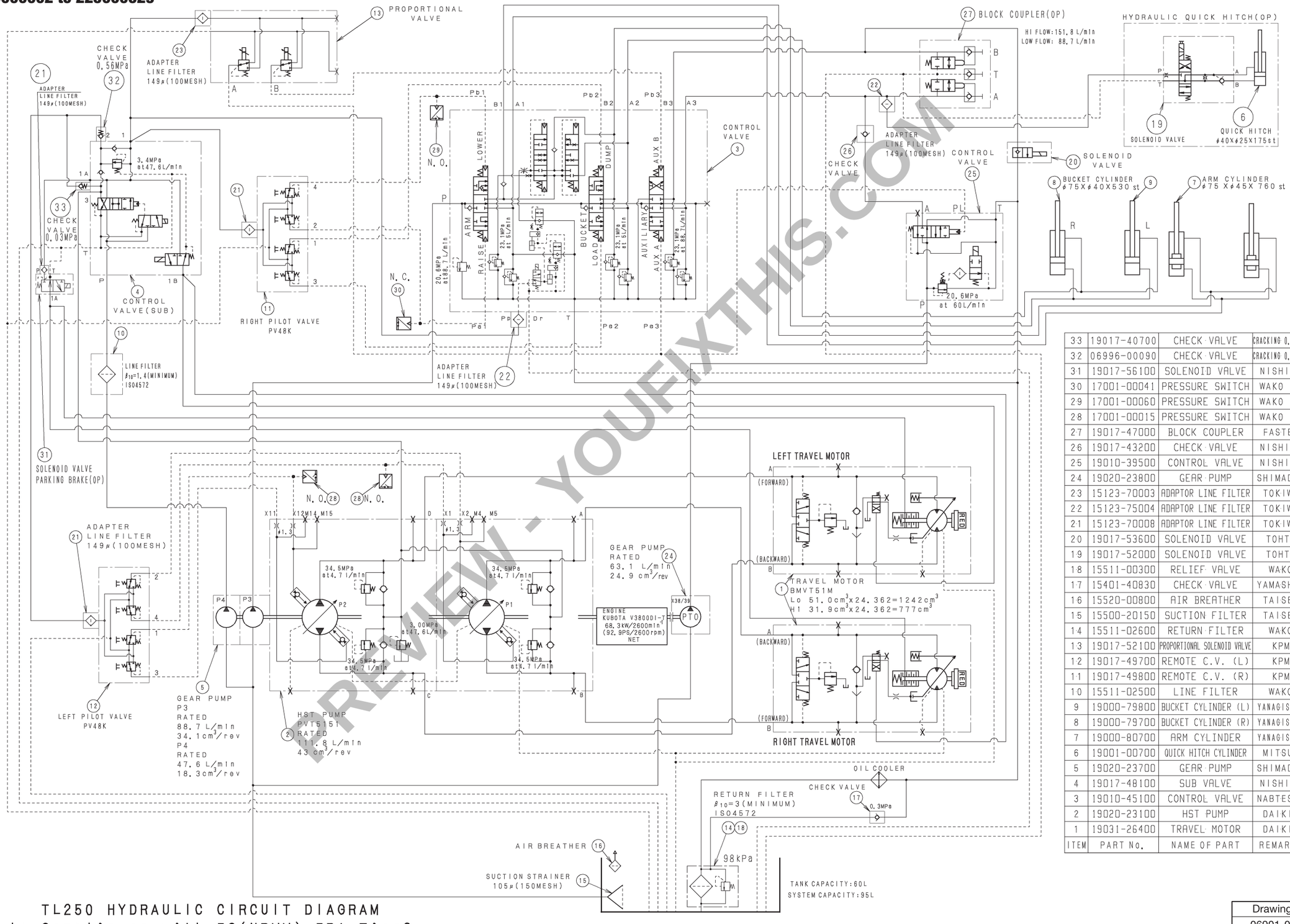
Drawing No.	1/1
06901-00230	

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High Flow
Serial No. 225000002 to 225000629



ITEM	PART No.	NAME OF PART	REMARKS
33	19017-40700	CHECK VALVE	CRACKING 0.03MPa
32	06996-00090	CHECK VALVE	CRACKING 0.56MPa
31	19017-56100	SOLENOID VALVE	NISHINA
30	17001-00041	PRESSURE SWITCH	WAKO E.
29	17001-00060	PRESSURE SWITCH	WAKO E.
28	17001-00015	PRESSURE SWITCH	WAKO E.
27	19017-47000	BLOCK COUPLER	FASTER
26	19017-43200	CHECK VALVE	NISHINA
25	19010-39500	CONTROL VALVE	NISHINA
24	19020-23800	GEAR PUMP	SHIMADZU
23	15123-70003	ADAPTOR LINE FILTER	TOKIWA
22	15123-75004	ADAPTOR LINE FILTER	TOKIWA
21	15123-70008	ADAPTOR LINE FILTER	TOKIWA
20	19017-53600	SOLENOID VALVE	TOHTO
19	19017-52000	SOLENOID VALVE	TOHTO
18	15511-00300	RELIEF VALVE	WAKO
17	15401-40830	CHECK VALVE	YAMASHIN
16	15520-00800	AIR BREATHER	TAISEI
15	15500-20150	SUCTION FILTER	TAISEI
14	15511-02600	RETURN FILTER	WAKO
13	19017-52100	PROPORTIONAL SOLENOID VALVE	KPM
12	19017-49700	REMOTE C.V. (L)	KPM
11	19017-49800	REMOTE C.V. (R)	KPM
10	15511-02500	LINE FILTER	WAKO
9	19000-79800	BUCKET CYLINDER (L)	YANAGISAWA
8	19000-79700	BUCKET CYLINDER (R)	YANAGISAWA
7	19000-80700	ARM CYLINDER	YANAGISAWA
6	19001-00700	QUICK HITCH CYLINDER	MITSUO
5	19020-23700	GEAR PUMP	SHIMADZU
4	19017-48100	SUB VALVE	NISHINA
3	19010-45100	CONTROL VALVE	NABTESCO
2	19020-23100	HST PUMP	DAIKIN
1	19031-26400	TRAVEL MOTOR	DAIKIN

TL250 HYDRAULIC CIRCUIT DIAGRAM
In Compliance with EC(NRMM) EPA Tier3

Drawing No. 06901-00210 1/1

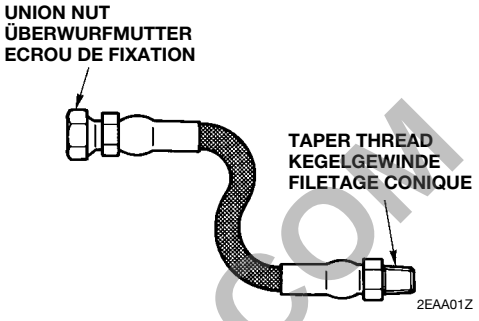
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TIGHTENING TORQUE

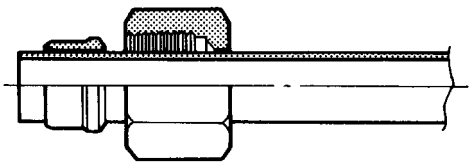
Hydraulic hose

Hose fitting size	Tightening torque	
	Union nut (G)	Taper thread (R)
	N·m	N·m
1/8	$9.8^{+4.9}_{0}$	11.8 ±1.2
1/4	$24.5^{+4.9}_{0}$	29.4 ±2.9
3/8	$49.0^{+4.9}_{0}$	53.9 ±5.4
1/2	$58.8^{+4.9}_{0}$	88.3 ±8.8
3/4	$117.7^{+4.9}_{0}$	147.1 ±14.7
1	$137.3^{+4.9}_{0}$	196.1 ±19.6



Bite-type pipe fitting for steel pipe

Pipe outer diameter (mm)	Tightening torque
	N·m
8	34.3 ±4.9
10	41.7 ±2.5
12	58.8 ±4.9
15	88.3 ±4.9
16	93.2 ±4.9
18	132.4 ±4.9
22	205.9 ±9.8
27.2	245.2 ±9.8
28	313.8 ±19.6
32	313.8 ±19.6
35	411.9 ±19.6



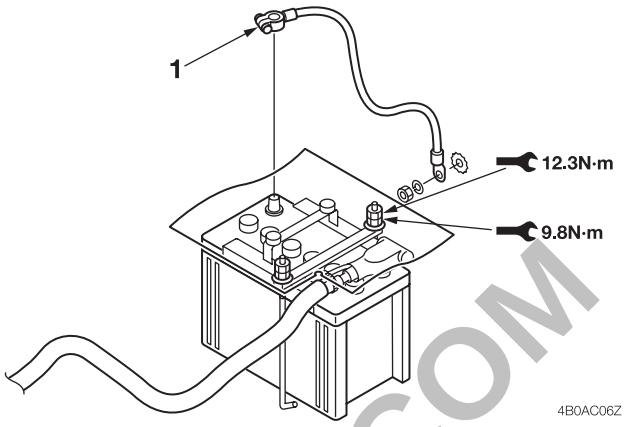
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DRIVE SYSTEM

Removing the engine

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



2. Remove the canopy.
   ☞ "Removing the canopy"

3. Remove the floor frame.
   ☞ "Removing the floor frame"

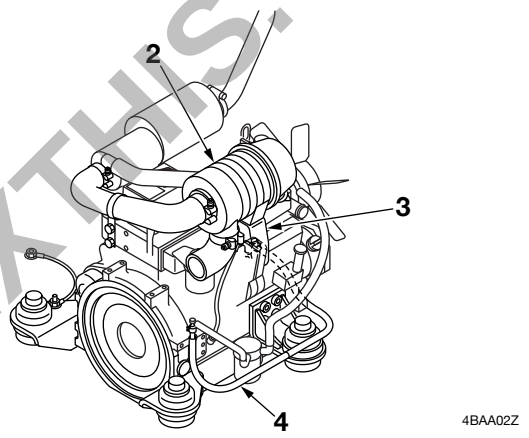
4. Disconnect the electrical wiring to the air cleaner (2).

5. Remove the bracket (3) together with the air cleaner (2).

6. Remove the radiator.
   ☞ "Removing the radiator"

7. Remove the drain hose (4).

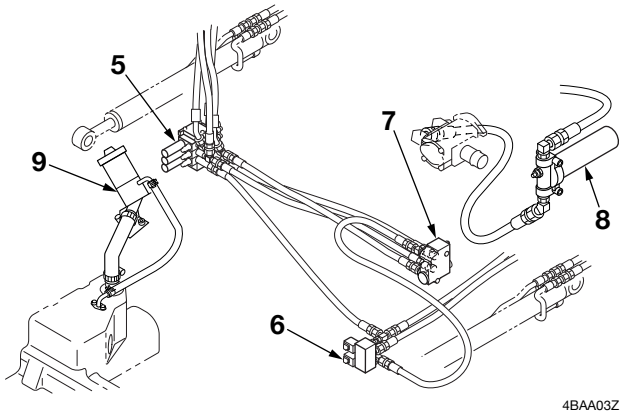
8. Remove the hydraulic pump.
   ☞ "Removing the hydraulic pump"



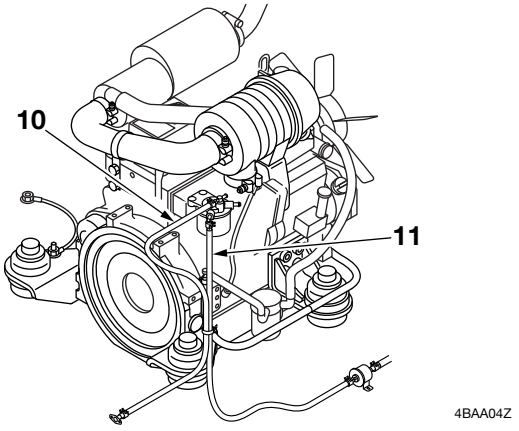
9. Remove the control valve (5), the solenoid valve (6) and the sub valve (7).

10. Remove the line filter (8).

11. Remove the filler opening (9).



12. Disconnect the fuel hoses (10) and (11).



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TROUBLESHOOTING 5

Overall machine 5-3
No operation is possible. 5-3
All systems working, but insufficient power. 5-6
Lift arm and bucket fail to move or are too slow. 5-8
Traveling 5-9
Traveling fails. 5-9
Right or left travel speed decelerates and the machine veers to one side. 5-11
Operating temperature of the travel system is too high. 5-12
2nd speed travel is not possible. 5-14
Lift arm 5-16
Arm cylinder fails. 5-16
Arm cylinder is slow or the power is insufficient. 5-18
When the control lever is pulled slowly, the lift arm drops once. 5-20
Spontaneous drop of the lift arm is too large. 5-21
Bucket 5-22
Bucket cylinder fails to move. 5-22
Bucket cylinder is slow or the power is insufficient. 5-24
Spontaneous drop of the bucket is too large. 5-26
Auxiliary hydraulics 5-27
Proportional control is not possible 5-27
HST pump 5-33
Gear pump 5-35
Control valve 5-36
SUB valve 5-38
Pilot valve 5-39
Proportional control solenoid valve 5-40
Cylinders 5-41
Travel motor 5-42
Air conditioner 5-44

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SPECIFICATIONS TABLES

Performance

Bucket type			Standard bucket
Bucket capacity		m^3	0.579
Tipping load		kg	3400
Rated loading mass		kg	1190
Breakout force		kN	38.5
Raising time (load)		s	4.6
Lowering time		s	2.8
Bucket forward tilting time		s	3.1
Travel speed	Forward 1st	km/h	7.8
	Forward 2nd	km/h	12.0
	Reverse 1st	km/h	7.8
	Reverse 2nd	km/h	12.0
Maximum tractive force		kN	61.2
Gradeability		degree (°)	30
Minimum turning radius	Bucket outside	m	2.435

Dimensions

Overall length in transport condition	Without teeth		mm	3985
	With teeth		mm	—
Overall width (body)			mm	1860
Bucket width			mm	1960
Overall height	Bucket on ground	Canopy	mm	2320
		Cab	mm	2215
	Max. raised height of bucket		mm	4245
Crawler bearing length			mm	1595
Track gauge			mm	1410
Shoe width			mm	450
Crawler bearing area			m^2	1.269
Ground clearance of undercarriage			mm	345
Bucket hinge pin height			mm	3205
Dumping clearance (at 45-degree forward tipping)	Without teeth		mm	2430
	With teeth		mm	—
Dumping reach (at 45-degree forward tipping)	Without teeth		mm	985
	With teeth		mm	—
Bucket roll back angle	On ground		degree (°)	31.4
Bucket dumping angle	Maximum height position		degree (°)	38.7
Maximum digging depth			mm	0

Mass

Gross machine mass	Canopy	kg	6120
	Cab	kg	6230
Operating mass	Canopy	kg	5200
	Cab	kg	5300
Machine mass	Canopy	kg	5120
	Cab	kg	5230
Shipping mass	Canopy	kg	5040
	Cab	kg	5150

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LUBRICANT AND FUEL CHART

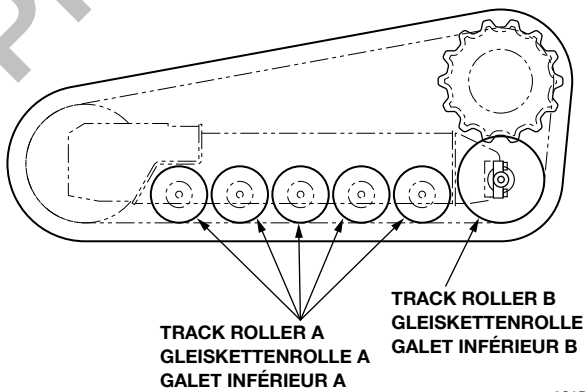
Select the appropriate fuel, lubricant and grease according to the temperature by referring to the table below.

- Regardless of the specified time, change the oil if it becomes too dirty or degraded.
- When refilling, never mix oils of different brands. If a brand is to be changed, replace the whole fuel/oil.

Part	Type	Type by air temperature -30 -20 -10 0 10 20 30 40°C	When to change/ replenish	Capacity
Engine oil pan	Diesel engine oil API: CF class or more	SAE 10W-30 SAE 15W-40	Every 250 hrs after the first 50 hrs	Upper limit 13.2 L
Hydraulic oil tank	Diesel engine oil API: CD class	SAE 10W-30 SAE 10W-40	Every 1000 hrs	Total amount of oil: 95 L Tank capacity: 60 L
Engine cooling system	**Cooling water (water + coolant)	Mixture of 50% coolant Mixture of 30% coolant	Every 1000 hrs	16.5 L
Travel reduction gear	Gear oil API: GL-4	SAE 90	Every 500 hrs after the first 250* hrs	1.6 L
Track roller A	Diesel engine oil API: CD class	SAE 30	—	0.18 L
Track roller B	Mobilgear SHC680	—	—	0.17 L
Idler	Diesel engine oil API: CD class	SAE 30	—	0.17 L
Working equipment	Lithium grease EP-2 NLGI No.2	—	Daily or every 10 hrs	As required
Lever/pedal			When required	

* If the ratio of traveling time to total operating time is high, replace the gear oil earlier than the specified time.

** For water, use tap water (soft). Do not use well or river water.
When the ambient temperature drops below 0°C, add coolant (antifreeze). Follow the coolant manufacturer's instructions to determine the mixture ratio.

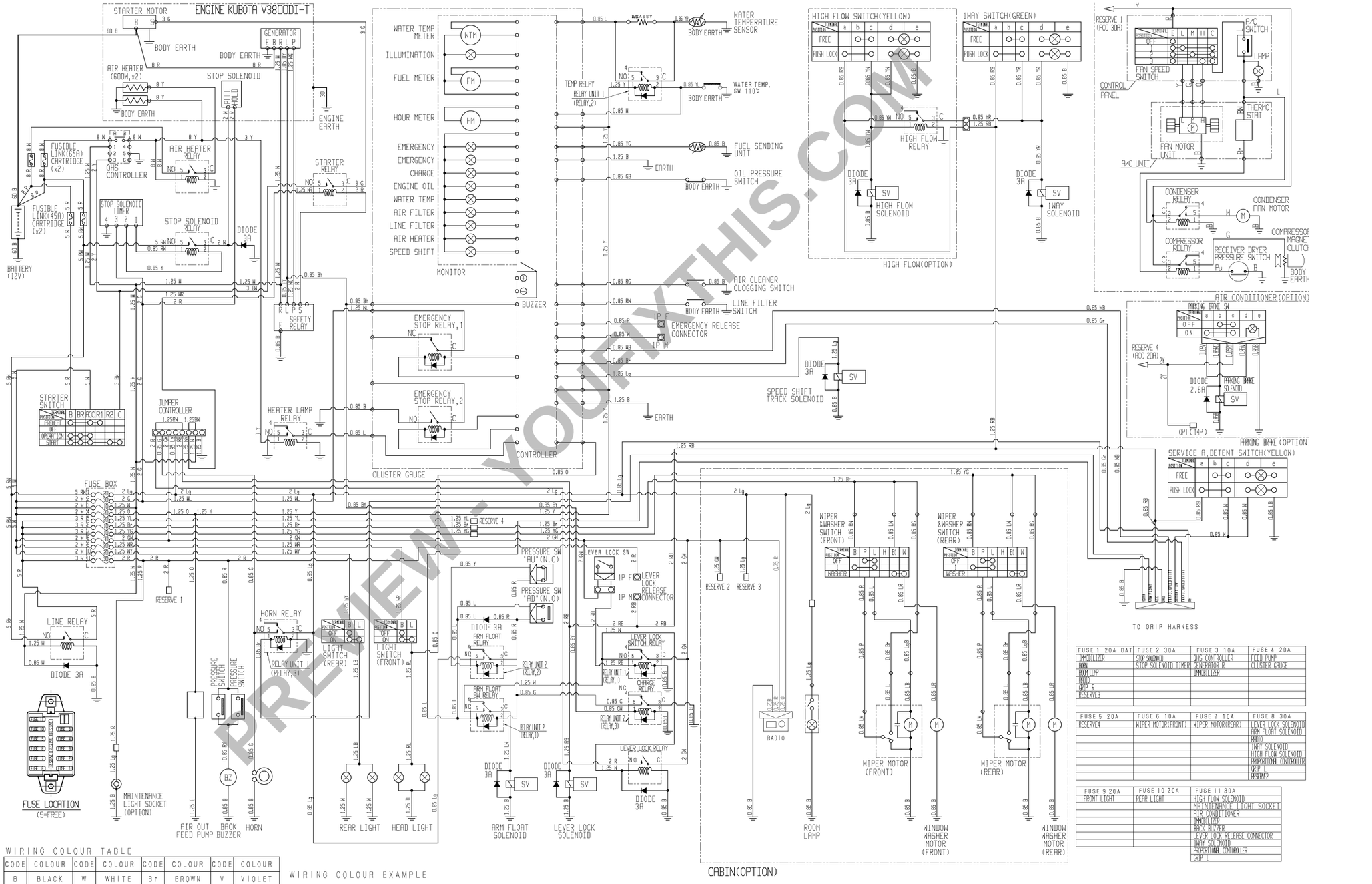


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Serial No. 225000609 or later



FUSE 1 20A BAT	FUSE 2 30A	FUSE 3 10A	FUSE 4 20A
IMMOBILIZER	STOP SOLENOID	QHS CONTROLLER	FEED PUMP
HORN	STOP SOLENOID TIMER	GENERATOR R	CLUSTER GAUGE
ROOM LAMP		IMMOBILIZER	
RADIO			
CIGAR R			
RESERVE3			

FUSE 5 20A	FUSE 6 10A	FUSE 7 10A	FUSE 8 30A
RESERVE4	WIPER MOTOR(FRONT)	WIPER MOTOR(REAR)	LEVER LOCK SOLENOID
			ARM FLOAT SOLENOID
			RADIO
			1WAY SOLENOID
			HIGH FLOW SOLENOID
			PROPORTIONAL CONTROLLER
			GRIP L
			RESERVE2

FUSE 9 20A	FUSE 10 20A	FUSE 11 30A
FRONT LIGHT	REAR LIGHT	HIGH FLOW SOLENOID
		MAINTENANCE LIGHT SOCKET
		AIR CONDITIONER
		IMMOBILIZER
		BACK BUZZER
		LEVER LOCK RELEASE CONNECTOR
		1WAY SOLENOID
		PROPORTIONAL CONTROLLER
		GRIP L

WIRING COLOUR TABLE

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

WIRING COLOUR EXAMPLE

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

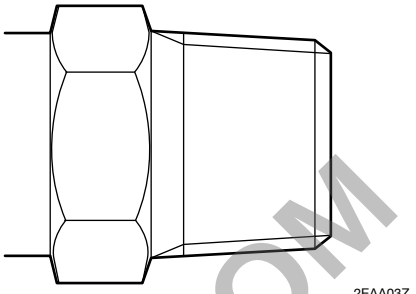
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Joint for piping

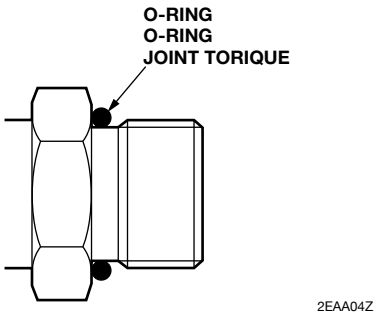
Nominal thread diameter	Tightening torque	
	Steel	Cast steel
	N·m	N·m
1/8	11.8 ±1.2	10.8 ±1.1
1/4	29.4 ±2.9	24.5 ±2.5
3/8	53.9 ±5.4	49.0 ±4.9
1/2	88.3 ±8.8	73.5 ±7.4
3/4	147.1 ±14.7	127.5 ±12.7
1	196.1 ±19.2	171.6 ±17.2


2EAA03Z

Joint for piping (O-ring seal type)

Nominal thread diameter (G)	Tightening torque
	N·m
1/8	19.6 ±2.0
1/4	34.3 ±4.9
3/8	53.9 ±4.9
1/2	63.7 ±4.9
3/4	93.2 ±4.9
1	107.9 ±9.8
1-1/4	117.7 ±9.8
1-1/2	137.3 ±9.8

Nominal thread diameter (UNF)	Tightening torque
	N·m
7/19-20	16.7 ±2.0
1/2-20	22.6 ±2.0
9/16-18	31.4 ±2.9
3/4-16	59.8 ±4.9
1-1/16-12	102.0 ±5.9
1-5/16-12	135.3 ±7.8
1-5/8-20	181.4 ±9.8



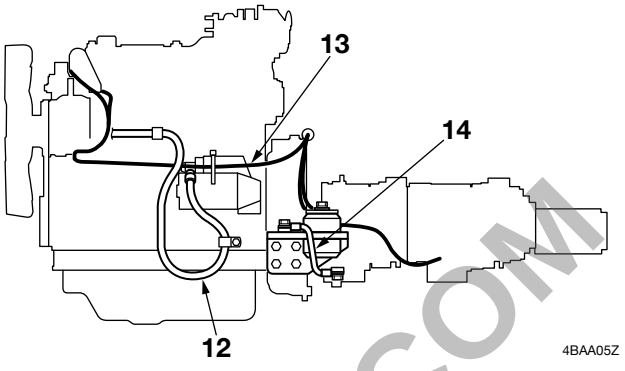
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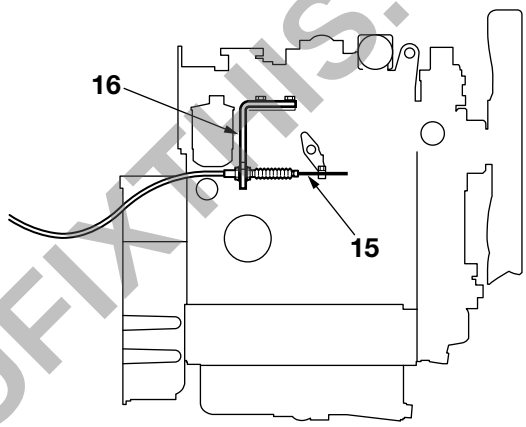
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13. Disconnect the battery cable (12) and the electrical wirings (13) from the engine side.
    - Attach an identification label to each wiring.

14. Disconnect the engine ground cable (14).

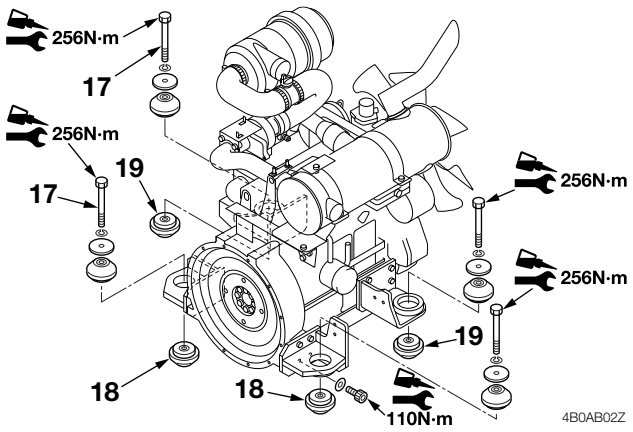


15. Disconnect the accelerator wire (15) from the engine, and then remove the bracket (16) with the wire.



16. Remove the bolts (17) and the cushion rubbers (18) {engraved, white in color} and (19).
    - Bolt: ThreeBond #1324
    - Bolt: 256 N·m

17. Suspend the engine (20).
    - : 305 kg



Installing the engine

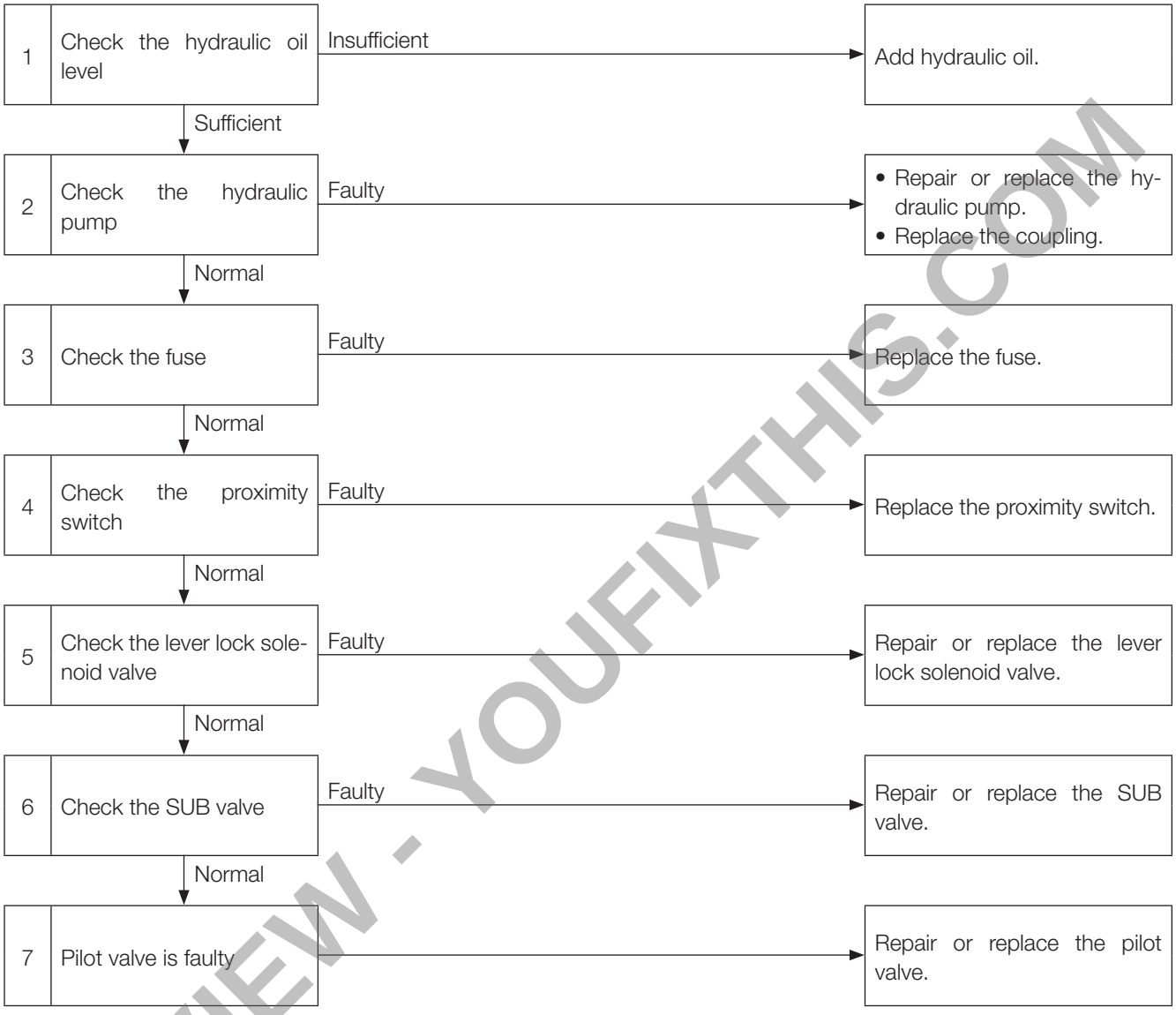
For installation of the engine, follow the same procedure as for removal in the reverse order.

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OVERALL MACHINE

No operation is possible.



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Engine

Model			Kubota V3800DI-T
Type			4-cycle, vertical, water-cooled, in-line, 4-cylinder, direct-injection
Number of cylinders – Internal diameter x stroke			4 – 110 × 120
Total displacement		L	3.769
Performance	Rated engine speed	min^{-1}	2600
	Rated horsepower	kW	68.3
	Maximum torque	N·m	313.7/1600 min^{-1}
	Specific fuel consumption (at rated output)	g/kW·h	254 (187)
Fuel system	Speed governor		Built with a fuel injection pump, all-speed mechanical type
Lubrication system	Type		Trochoid pump
	Filter system		Filter paper
	Cooling system		Water cooling
Air cleaner			Centrifugal, Filter paper
Cooling system	Fan		Pusher type
	Radiator		Pressurized
Generator	AC/DC		Three-phase alternating current, self-rectifying
	Voltage	V	12
	Output	kW	0.96
Starting system	Voltage	V	12
	Output	kW	3
Battery	Type		130E41R
	Voltage	V	12
	Capacity	A·h	92
	Quantity		1

Hydraulic drive system

Pump	Model		Sauer-Danfoss-Daikin PVT5151
	Type		Variable displacement piston
	Displacement	cm^3/rev	0 to 43
	Quantity		2
Travel motor	Model		Sauer-Danfoss-Daikin BMVT51M
	Type		Variable displacement piston
	Motor displacement	cm^3/rev	31.9/51.0
	Quantity		2
Set pressure	Effective differential pressure	MPa	34.5
Reduction gears			Epicycle reduction gear

Brake device

Parking brake	Spring-loaded, wet type disc brake

Undercarriage

Suspension system			Rigid type
Roller, Idler	Seal system		Floating seal
	Carrier roller (one side)	Q'ty	—
	Track roller (one side)	Q'ty	6
Crawler	Track adjuster		By injecting grease
	Type		One-piece design, single groucer, rubber crawler
	Grouser height	mm	35
	Number of shoes (one side)	Q'ty	50 (lugs)
	Pitch	mm	100
	Shoe width	mm	450

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Figure 7-9 Preventive Maintenance Schedule.

PREVENTIVE MAINTENANCE SCHEDULE FOR AIR CONDITIONING SYSTEMS

NOTE: Typical Maintenance Schedule: 3 months or 15,000 miles, 6 Months or 30,000 miles, 12 Months or 60,000 miles

Installation Date: _____ Mileage: _____

Last Maintenance Check: _____ Mileage: _____

Checked by _____ Mileage: _____

COMPONENT	MAINTENANCE INTERVAL (months) 3*	6*	12*	DONE
1. COMPRESSOR				
Check noise level	•			❑
Check clutch pulley	•			❑
Check oil level	•			❑
Run system 5 minutes	•			❑
Check belts for tension (120 lb max.)	•			❑
Inspect shaft seal (leakage)		•		❑
Check mounting bracket (tighten bolts)		•		❑
Check alignment to clutch w/crankshaft drive pulley		•		❑
Perform manifold gauge check			•	❑
Verify clutch is engaging			•	❑
CONDENSER				
2. Clean dirt/bugs/leaves from coils (w/compressed air)	•			❑
Check inlet/outlet for obstructions/damage	•			❑
RECEIVER-DRIER				
3. Check inlet line from condenser (hot to touch)	•			❑
Check sight glass (streaks or cloudiness)	•			❑
Replace if system is opened			•	❑

COMPONENT	MAINTENANCE INTERVAL (months) 3*	6*	12*	DONE
4. EXPANSION VALVE				
Inspect capillary tube (leakage/damage/looseness)			•	❑
5. EVAPORATOR				
Clean dirt/bugs/leaves form fins/tubes (w/compressed air)			•	❑
Check solder joints on inlet/outlet tubes (leakage)			•	❑
Inspect condensate drain (R-12 or oil leak)			•	❑
6. OTHER COMPONENTS				
Check discharge lines (hot to touch)	•			❑
Check suction lines (cold to touch)	•			❑
Inspect fittings/clamps/hoses		•		❑
Check thermostatic switch (proper operation)			•	❑
Outlets in cab (temperature check; 40 to 50°F)		•		❑
Check fan clutch (proper operation)		•		❑
Inspect all wiring connections		•		❑
Operate manual controls through full functions	•			❑

The following require monthly maintenance:

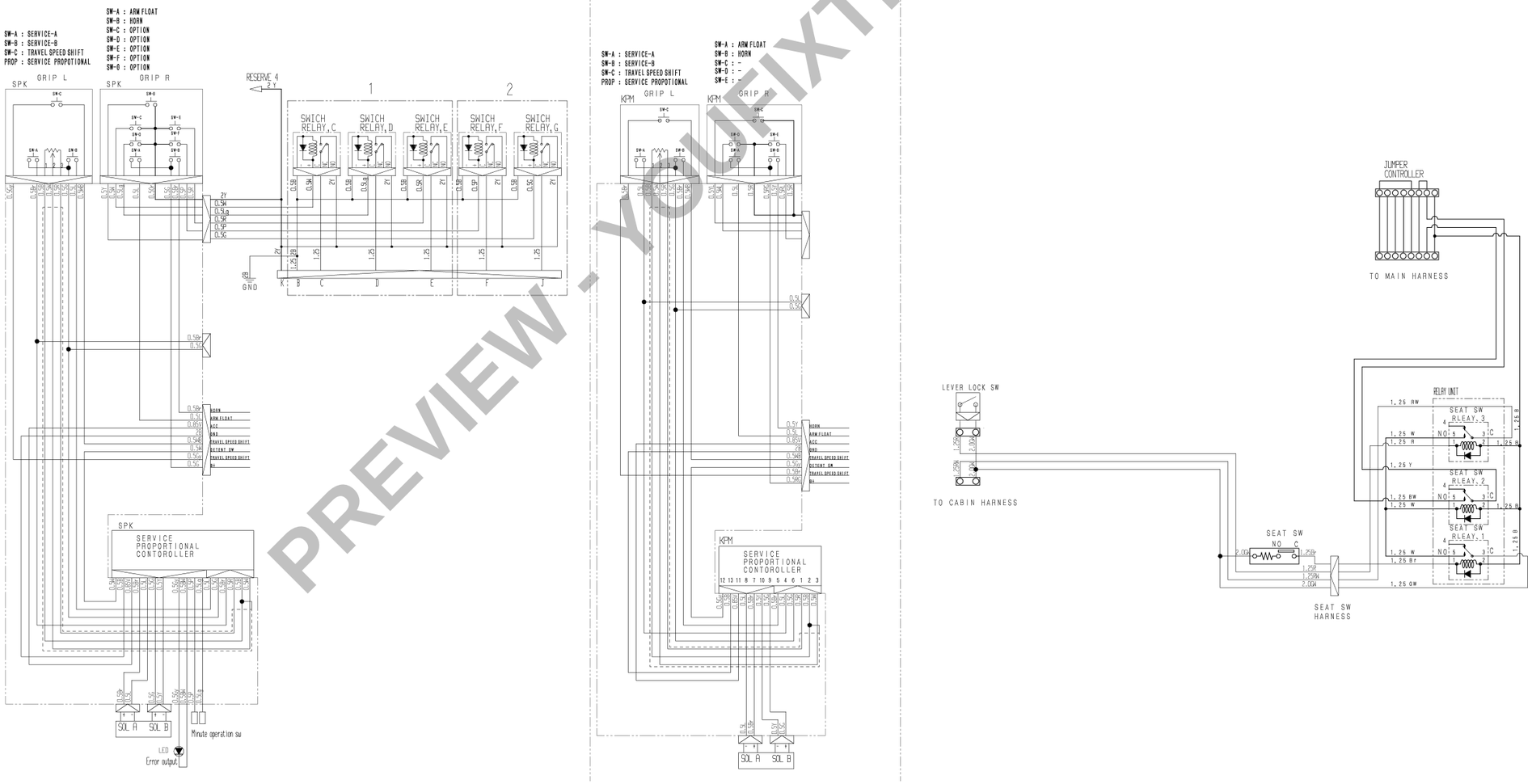
*Compressor – run system at least 5 minutes (40 degrees Fahrenheit minimum outside temp.) in order to circulate oil and lubricate components.

Maintenance notes: _____

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Serial No. 225000609 or later



2GAB03Z

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Bolts and nuts (JIS strength category 10.9)

Thread	Size × pitch	Tightening torque	
		General tightening points	Special tightening points
		N·m	N·m
Coarse	M6 × 1.0	9.8 ±0.5	11.8 ±1.1
	M8 × 1.25	22.6 ±1.1	26.5 ±2.5
	M10 × 1.5	47.1 ±2.4	54.9 ±4.9
	M12 × 1.75	83.4 ±4.1	97.1 ±7.4
	M14 × 2.0	134.4 ±6.7	155.9 ±12.7
	M16 × 2.0	207.9 ±10.4	241.2 ±17.2
	M20 × 2.5	410.9 ±20.5	475.6 ±23.7
Fine	M8 × 1.0	24.5 ±1.2	28.4 ±1.4
	M10 × 1.25	50.0 ±2.5	58.8 ±2.9
	M12 × 1.5	87.3 ±4.3	102.0 ±5.1
	M14 × 1.5	135.3 ±6.8	157.9 ±7.8
	M16 × 1.5	220.6 ±11.0	256.0 ±12.7
	M20 × 1.5	452.1 ±22.6	524.7 ±26.1

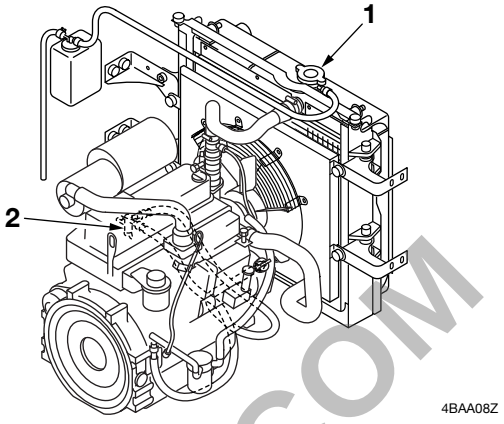
1. General tightening points (non-lubricated)
   All securing points that have no special tightening torque specified in this manual and that are not special tightening points.
2. Special tightening points (grease with molybdenum disulfide applied)
   Points where a specific tightening torque is specified in this manual.
3. Points where thread-locking compound should be applied (ThreeBond #1324).
4. If a tightening torque value is specified in this manual for a point not listed in the table above, follow the specification in the manual.
5. To tighten multiple bolts and nuts evenly, alternately tighten opposite bolts/nuts as a pair.

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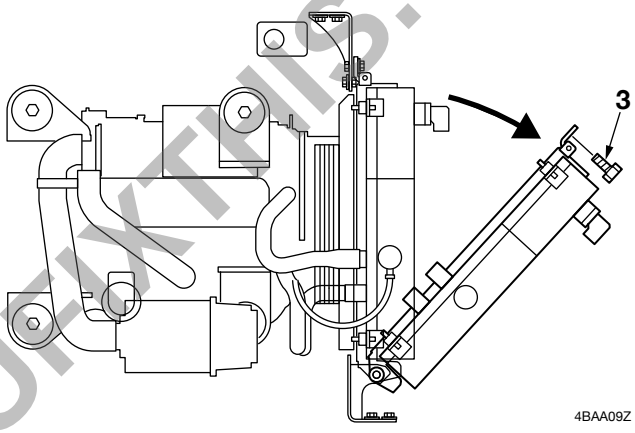
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Removing the radiator

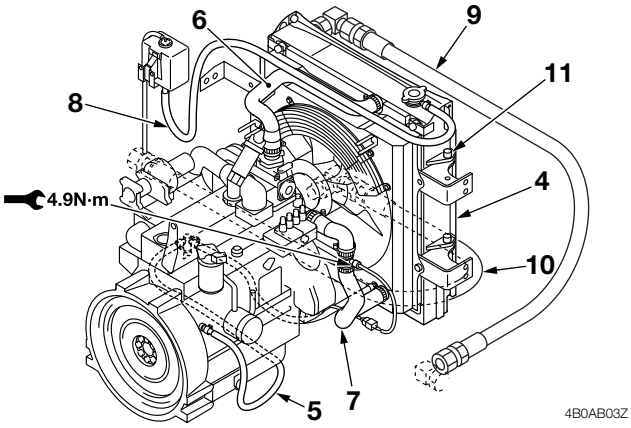
1. Loosen the radiator cap (1), and bleed out the engine coolant from the drain valve (2).
   • Engine coolant volume: 16.5 L



2. Remove the bolts (3) and open the radiator assembly (4).

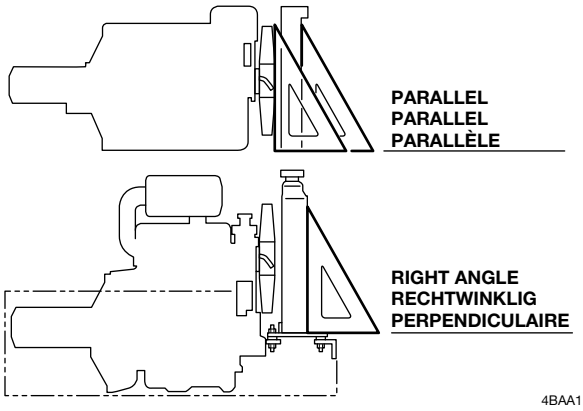


3. Disconnect the drain hose (5).
4. Disconnect the radiator hoses (6) and (7) and the hose (8).
5. Disconnect the oil cooler hoses (9) and (10).
   • Prepare a plate to catch drips of the hydraulic oil.
6. Disconnect the R-pins and remove the pins (11).
7. Remove the radiator assembly (4).
   kg : 61 kg



Installing the radiator

For installation of the radiator, follow the same procedure as for removal in the reverse order.
The radiator must be mounted at right angles to the frame and parallel to the cooling fan.



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1. Check the hydraulic oil level.

Check the hydraulic oil tank level.

☞ "4. Disassembly and assembly, Hydraulic oil tank"

When adding, use the same brand of oil currently being used.

☞ "2. Service data, Fuel and lubricant table"

2. Check the hydraulic pump.

- Check the discharge pressure of the pumps P1 and P2 (HST pumps).

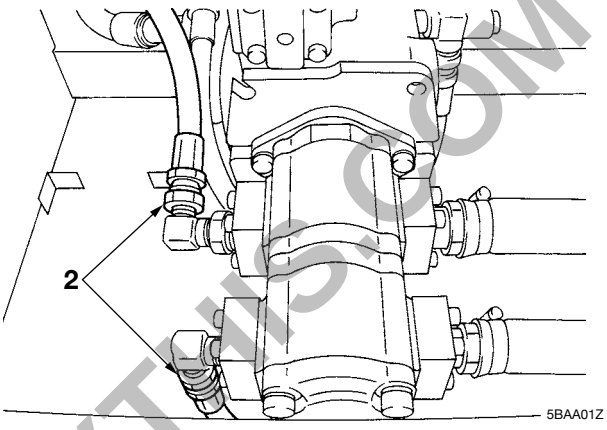
☞ "2. Service data, Performance criteria"

- Check the pumps P3 and P4 (gear pumps).

a. Disconnect the hose (2) of the discharging side from the pump.

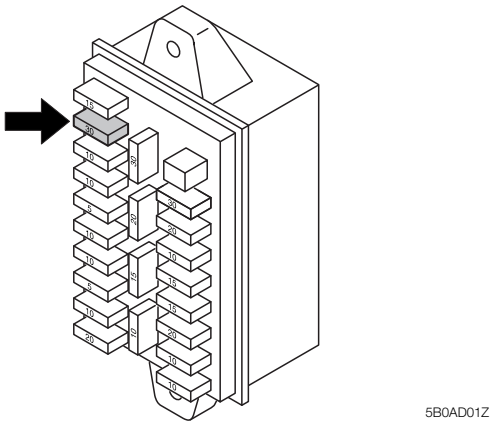
b. Start the engine.

- If the hydraulic oil flows out of the discharge port of the pump, it is normal. The pump will not operate if the pump coupling is faulty.



3. Check the fuse.

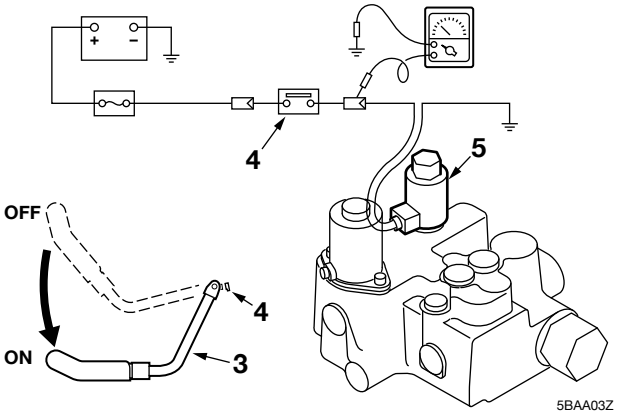
Check the fuse in the circuit that operates the lever lock solenoid valve.



4. Check the proximity switch.

The proximity switch (4) can be switched on by moving the safety bar (3) to the driving position. Use a tester to check if there is voltage in the lever lock solenoid (5).

- If there is voltage, the switch should be working.



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Operating device

Cab/canopy	Location		Center of machine
	Type		ROPS/FOPS canopy & cab
Operator's seat			Suspension seat, adjustable
Control lever and pedal	Lever		Travel, attachments
	Pedal		Accelerator
Instruments			Cluster gauge (12 V): Water temperature gauge, Fuel gauge, Hourmeter, Charge, Oil, Air cleaner, Line filter, Glow, 2nd-speed pilot
Lighting device	Front light		12 V, 55 W x 2
	Rear light		12 V, 55 W x 2
Others	Horn	Q'ty	1
	Back-up buzzer	Q'ty	1
	Inside rear view mirror	Q'ty	2
	Rear view mirror	Q'ty	1

Working equipment

Bucket blade type		Without teeth
Bucket teeth	Type	—
	Quantity	—
Auto adjustment mechanism		Hydraulic leveling device for bucket raising

Hydraulic system

Arm cylinder	Type		Independent piston
	Quantity		2
	Internal diameter	mm	75
	Stroke	mm	760
Bucket cylinder	Type		Independent piston
	Quantity		2
	Internal diameter	mm	75
	Stroke	mm	530
Hydraulic pump	Type		Double gear pump
	Displacement	cm^3/rev	34.1 + 18.3
Control valve	Type		Hydraulic pilot operated
	Set pressure	MPa	3.3

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SERVICE DATA 2

Dimensional drawing 2-2
Specifications tables 2-3
Lubricant and Fuel chart 2-6
Performance criteria 2-8
Tightening torque 2-16
Hydraulic circuit diagram 2-19
Electrical wiring diagram 2-25
Wire harness diagram 2-28

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SAFETY ALERT SYMBOL



This symbol represents the safety alert. The message that follows the symbol contains important information regarding human safety.
Read and understand the message to avoid personal injury or death.

Safety label

Safety labels are used to alert operators or other people exposed to the risks of injury or damage. There are the following three types of labels.
Read the labels carefully as they are important for your safety.

⚠ DANGER

The word "DANGER" indicates an imminently hazardous situation which, if not avoided, is likely to 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.

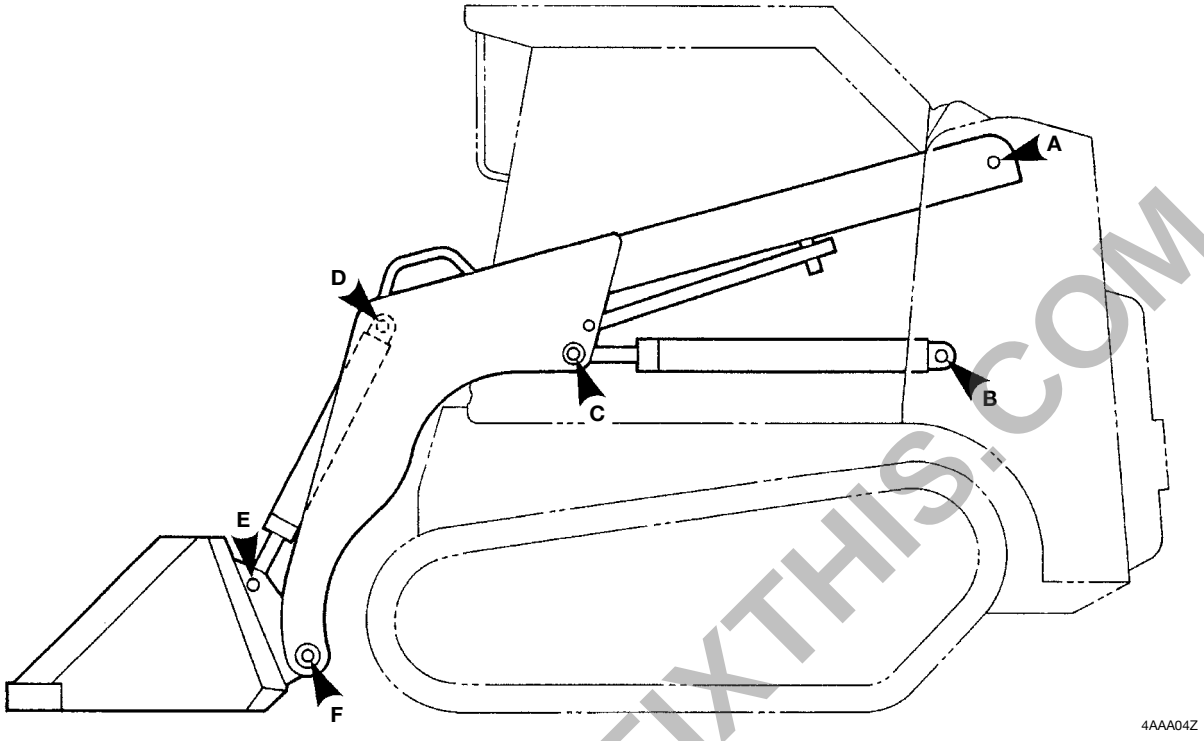
IMPORTANT: The word "IMPORTANT" is used to alert operators and maintenance personnel about situations which could result in damage to the machine and its components.

This manual is intended for trained and qualified personnel only. Warnings or cautions described in this manual do not necessarily cover all safety measures. It is also impossible to cover all hazards and risks which may be associated with the maintenance of the machine in every environment. For maintenance work, each person must take adequate safety precautions against possible hazards in the respective working environment.

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Clearance for pin and bushing



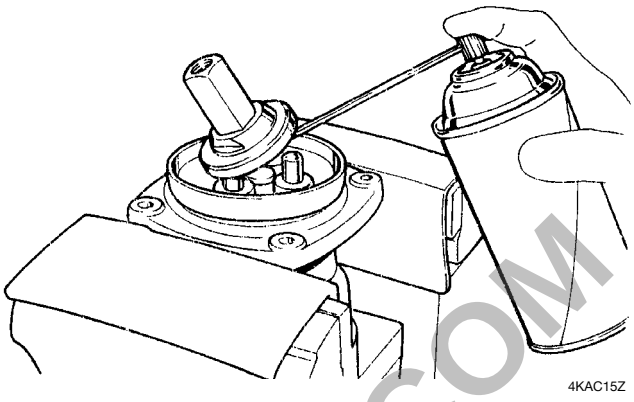
Unit: mm

Code	Item	Criteria					Action
		Standard dimension	Tolerance		Standard clearance	Allowable clearance	
			Axis	Hole			
A	Lift arm & frame	45	-0.02 -0.05	+0.17 +0.12	0.45 to 0.170	1.0	Replace
B	Arm cylinder & frame	45	-0.02 -0.05	+0.20 +0.05	0.07 to 0.25	1.0	
C	Arm cylinder & lift arm	45	-0.02 -0.05	+0.20 +0.05	0.07 to 0.25	1.0	
D	Bucket cylinder & lift Arm	45	-0.02 -0.05	+0.20 +0.05	0.07 to 0.25	1.0	
E	Bucket cylinder & quick attachment	45	-0.02 -0.05	+0.20 +0.05	0.07 to 0.25	1.0	
F	Lift arm & quick attachment	45	-0.02 -0.05	+0.20 +0.05	0.07 to 0.25	1.0	

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☞ Grease the rotating part of the joint and its contact surfaces with the disc and the push rod.


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Note: See the Thermostat section in *Chapter 10*. Fan clutch, radiator shutter, condenser, compressor, and the newer air and water valve control systems are covered in *Chapter 10*.

Review of Frequent Problem Areas

In HVAC systems a limited number of things can go wrong. Moving parts of the compressor, clutch, and expansion valve or refrigerant metering device can malfunction or break down from metal fatigue, contamination, abnormal pressure or lack of lubrication. Electrical connections may corrode, become disconnected or break. Fuses blow from shorts or overload. Belts slip or break.

Vibration from the engine or road surface can work bolts and air or vacuum lines loose, or rub and break or wear parts out. Motors may burn out. The inside of the system can become contaminated from moisture, air or desiccant material breakdown. Refrigerant may leak out of the system quickly or very slowly. Moisture in the system can combine with refrigerant to form acid and attack (corrode) metal parts from the inside. Moisture and refrigeration oil can combine to form sludge that may block refrigerant flow.

The following problems are discussed in more detail in this section:

1. Belts and Compressor Clutch
2. Condenser
3. Refrigerant Lines, Hoses, and Fittings
4. Refrigerant Metering Valves
5. Other Problems

1. Belts and Compressor Clutch

Let's review problem areas listed at the beginning of *Chapter 7*. The most frequent repairs are replacing belts and servicing or replacing the compressor or clutch. Heavy duty vehicle operation puts a lot of stress on these parts. There are several main reasons.

There is often continuous operation for long periods of time. There may be frequent sudden RPM variations when shifting gears up or down. For this reason the AC clutches used in heavy duty systems usually have double row ball bearings. Vibration and road shock contribute to loose or broken mounting brackets, electrical connections and fittings. Belts, bearings and compressor reed valves wear out.

Various compressor clutch cutout switches are used because the AC designers know about compressor operating conditions. System leaks, high operating pressures, malfunctioning engine cooling system components—all cause compressor problems and failures. When refrigerant and refrigeration oil leaks out of a system or there is contamination blocking oil flow, the compressor will be starved for oil and seize.

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ENGINE BODY (Continued)

Item		Factory Specification	Allowable Limit
Valve Seat **[V3600-E3B, V3600-T-E3B, V3600-E3CB, V3600-T-E3CB, V3300-E3BG, V3600-T-E3BG]**	Angle (Intake)	1.0 rad 60 °	–
	Angle (Exhaust)	0.79 rad 45 °	–
	Width	2.12 mm 0.0835 in.	–
[V3800DI-T-E3B, V3800DI-T-E3CB, V3800DI-T-E3BG]	Angle (Intake)	1.0 rad 60 °	–
	Angle (Exhaust)	0.79 rad 45 °	–
	Width (Intake)	1.6 to 2.0 mm 0.063 to 0.078 in.	–
	Width (Exhaust)	2.3 to 2.6 mm 0.091 to 0.10 in.	–
Valve Face	Angle (Intake)	1.0 rad 60 °	–
	Angle (Exhaust)	0.79 rad 45 °	–
Valve Recessing **[V3600-E3B, V3600-T-E3B, V3600-E3CB, V3600-T-E3CB, V3300-E3BG, V3600-T-E3BG]**	Intake	–0.2 to 0 mm –0.007 to 0 in.	0.4 mm 0.02 in.
	Exhaust	–0.050 to 0.15 mm –0.0019 to 0.0059 in.	0.4 mm 0.02 in.
[V3800DI-T-E3B, V3800DI-T-E3CB, V3800DI-T-E3BG]	Intake	0.60 to 0.80 mm 0.024 to 0.031 in.	1.2 mm 0.047 in.
	Exhaust	0.850 to 1.05 mm 0.0335 to 0.0413 in.	1.2 mm 0.047 in.

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