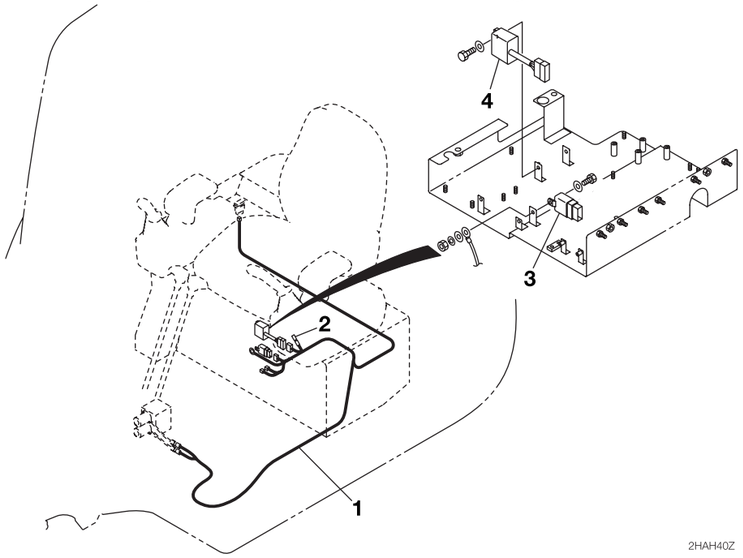
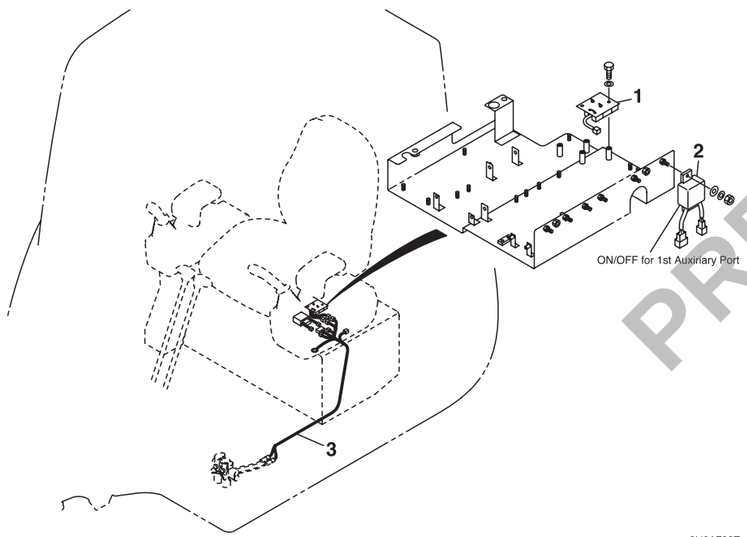
Control unit (second auxiliary hydraulic piping with bucket select switch)



2HAH40Z

1. Wire harness (03570-15570)
2. Diode
3. Relay
4. Flip flop unit

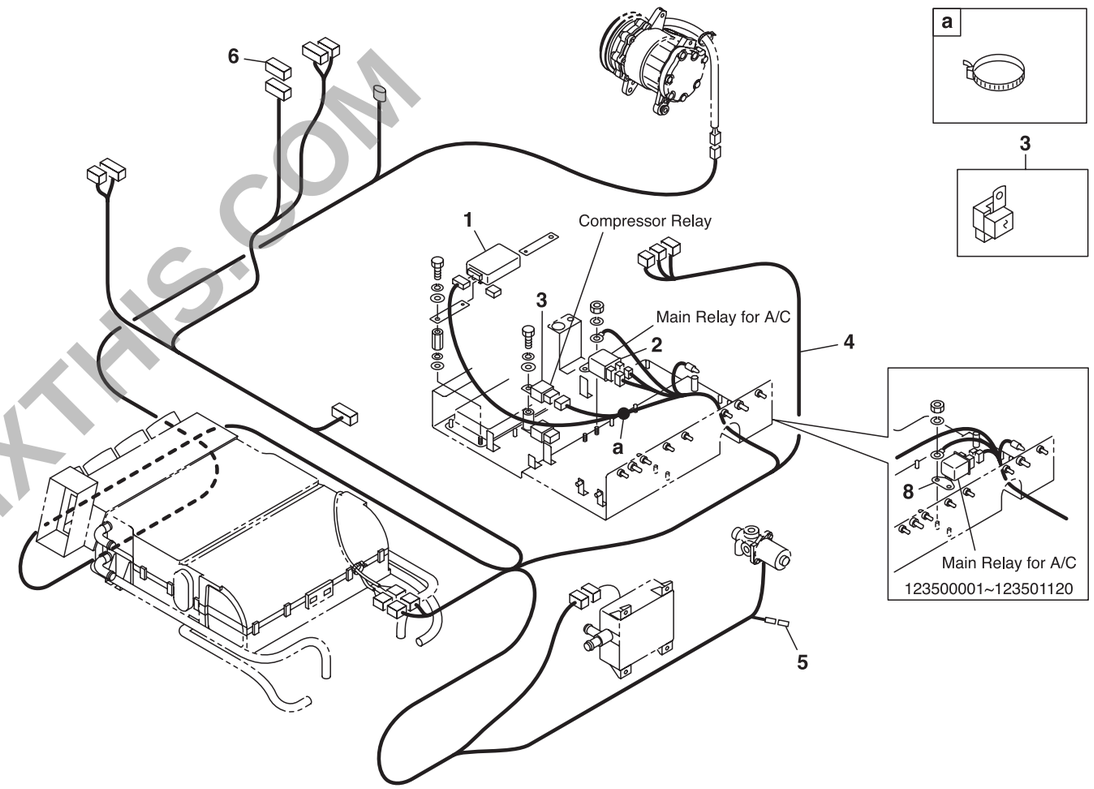
Control unit (first auxiliary hydraulic piping with on/off switch)



2H0AF08Z

1. Resistance
2. Relay
3. Wire harness (03742-16510)

Control unit (Air conditioner)



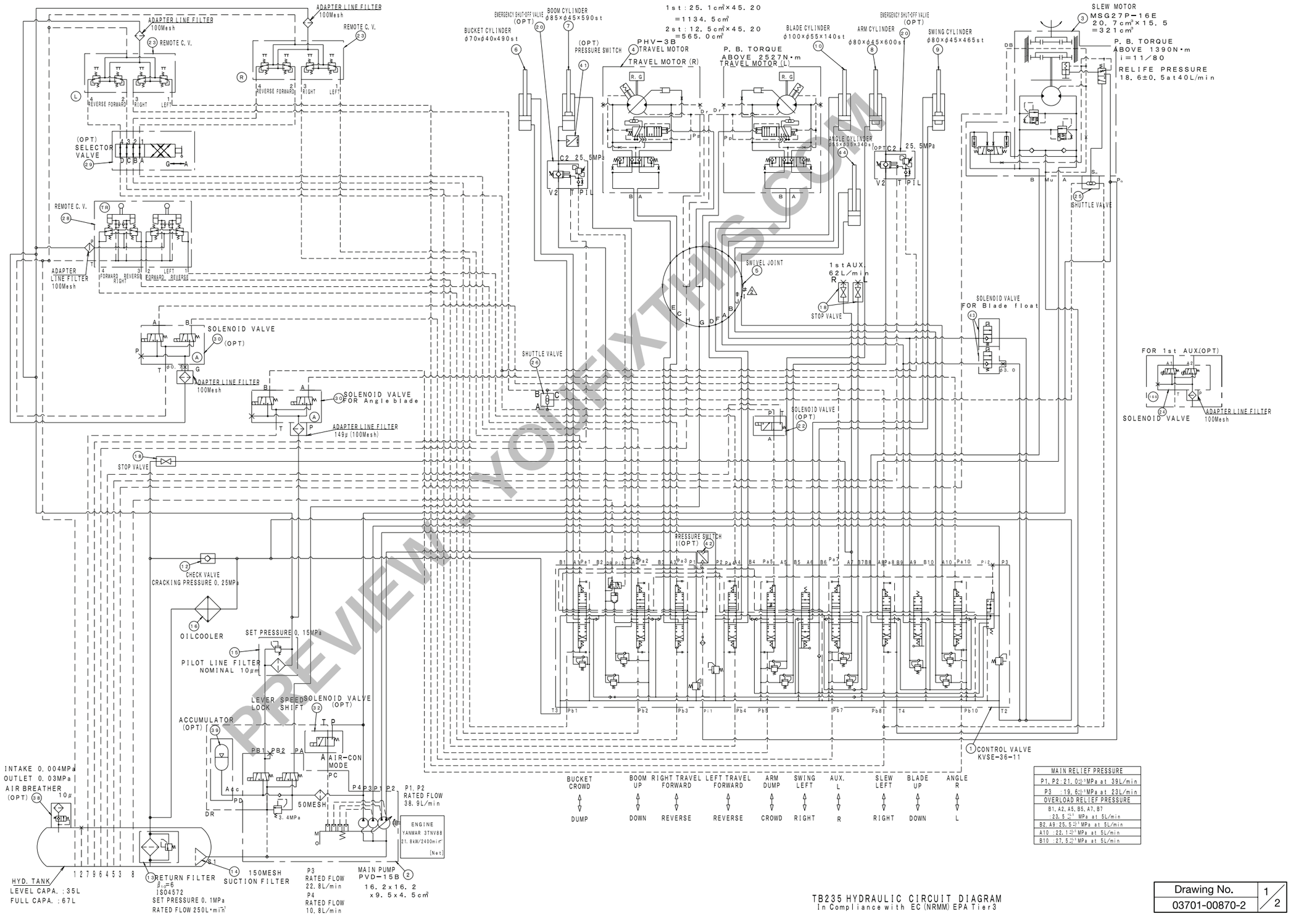
2H0AF09Z

1. Control amplifier
2. Relay
3. Relay
4. Wire harness (03746-04920) (Serial No. 123500001 to 123501126)
   Wire harness (03746-04930) (Serial No. 123501127 or later)
5. Diode
6. Short connector

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Equipped with angle blade 1/2



TB235 HYDRAULIC CIRCUIT DIAGRAM
In Compliance with EC (NRMM) EPA Tier3

Drawing No.	1/2
03701-00870-2	

2F0AF05Z

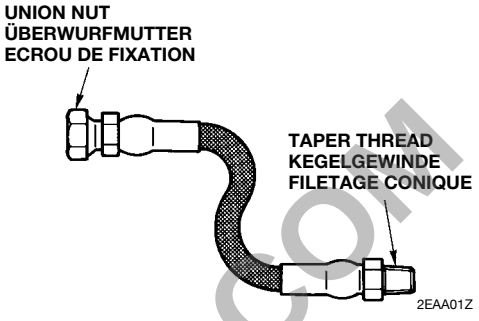
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TIGHTENING TORQUE

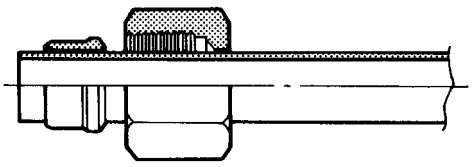
Hydraulic hose

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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Removing the engine

1. Disconnect the battery ground cable 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 (14).

5. Remove the air cleaner (14).

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

7. Remove the drain hose.
   ☞ "Removing the radiator"

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

9. Disconnect the fuel hoses.
   ☞ "Removing the fuel tank"

10. Disconnect the battery cable and the electrical wirings from the engine side.
    • Attach an identification label to each wiring.

11. Disconnect the engine ground cable (8).

12. Disconnect the accelerator wire from the engine, and remove it together with the bracket.
    ☞ "Adjusting the engine throttle lever"

13. Remove the bolts, and then detach the cushion rubbers.
    Bolt: ThreeBond #1324
    Bolt: 102 N·m

14. Suspend the engine.
    : 155 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.

1	Check the hydraulic oil level	Insufficient →	Add hydraulic oil.
	↓ Sufficient		
2	Check the hydraulic pump	Faulty →	• Repair or replace the hydraulic pump. • Replace the coupling.

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 (piston pumps).

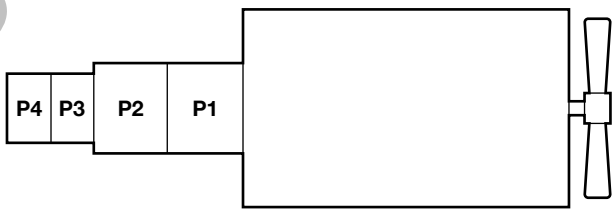
☞ "2. Service data, Performance criteria"

☞ "5. Troubleshooting, Piston pump"

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

☞ "2. Service data, Performance criteria"

☞ "5. Troubleshooting, Piston pump"



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SPECIFICATIONS TABLES

Operating mass	Cab	kg	3605
	Canopy	kg	3465
Engine output	Net (ISO 14396) kW/min^{-1}		22.0/2400
	Net (ISO 9249/SAEJ1349) kW/min^{-1}		21.5/2400
Bucket capacity	Heaped capacity	m^3	0.105
	Struck capacity	m^3	0.078

Performance

Standard loading mass		kg	141
Slew speed		min^{-1}	10
Travel speed	1st	km/h	2.6
	2nd	km/h	5.0
Maximum tractive force		kN	39.5
Gradeability		%	58
		Degree	30
Ground Pressure	Cab	kPa	27.9
	Canopy	kPa	26.8
Noise Level	Sound-power level	dB(A)	LWA 95
	Sound-pressure level	dB(A)	LPA 75

Machine dimensions

Overall length in transport condition		mm	4950
Overall width		mm	1630
Overall width	Track retracted	mm	—
Overall working equipment height in transept position	Cab	mm	2450
	Canopy	mm	2450

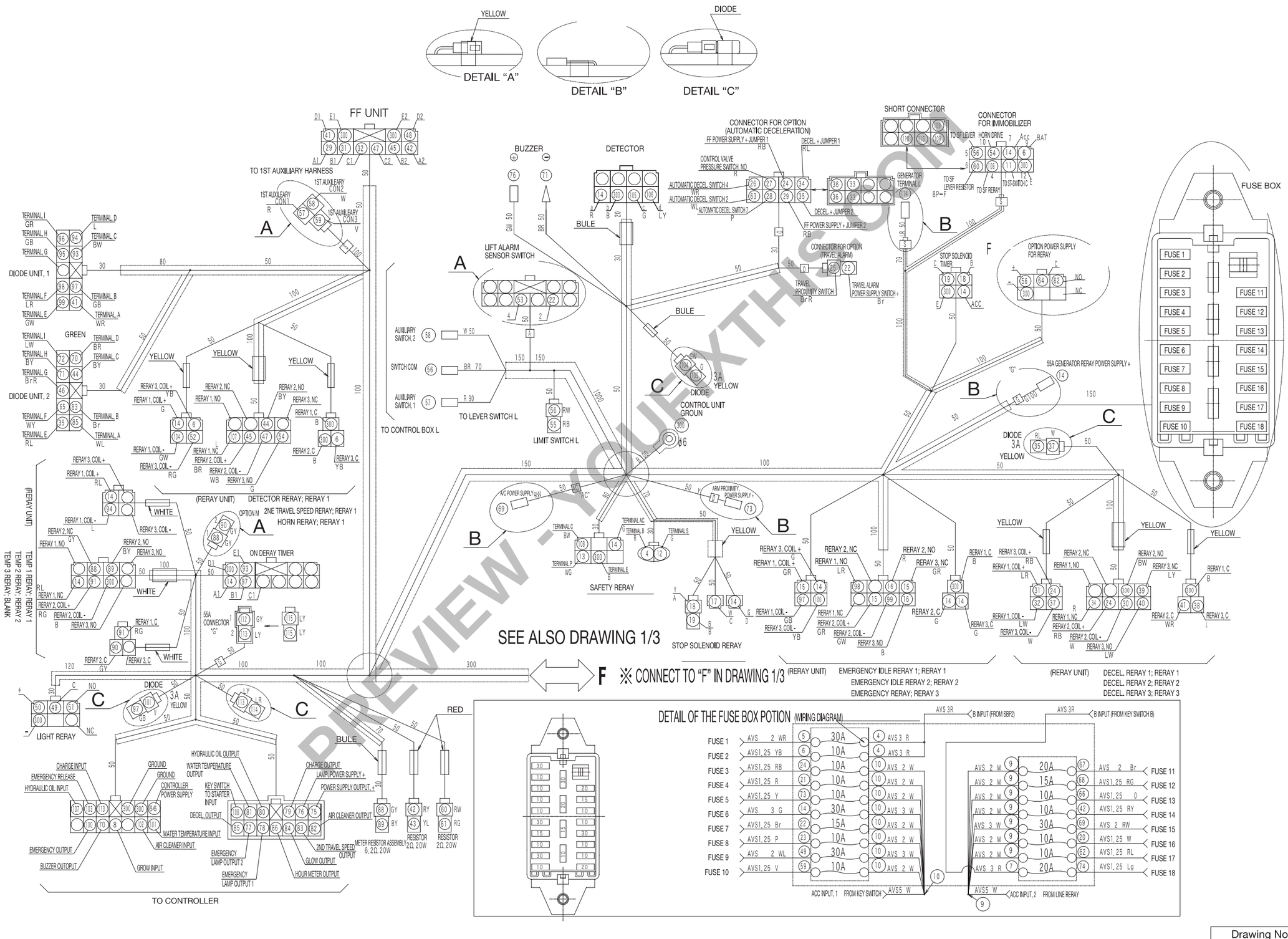
Dimensions of base machine

Overall length of base machine		mm	2710
Overall width of base machine		mm	1630
Overall width of base machine	Track retracted	mm	—
Upper structure overall width		mm	1470
Upper structure overall width	Left	mm	735
	Right	mm	735
Cab overall length		mm	1030
Overall height of base machine		mm	—
Slew radius		mm	1395
Upper structure rearmost distance from axis of rotation		mm	1395
Clearance height under upper structure		mm	570
Crawler base		mm	1655
Crawler overall length		mm	2110
Undercarriage overall width		mm	1630
Undercarriage overall width	Track retracted	mm	—
Track gauge		mm	1280
Track gauge	Track retracted	mm	—
Track shoe width		mm	350
Ground clearance of undercarriage		mm	295

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Wire harness (03742-17120) 2/4



Drawing No.	2/4
03742-17120	

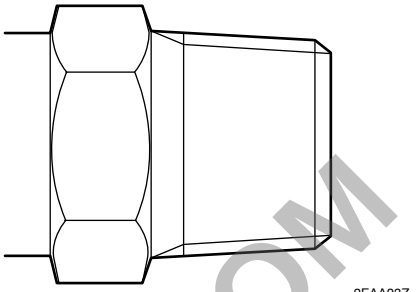
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Joint for piping

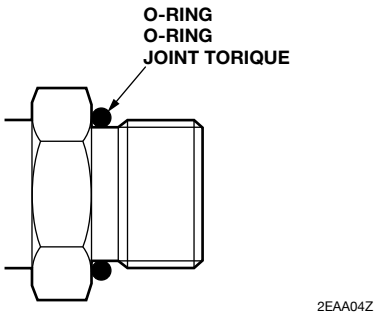
Nominal thread diameter	Tightening torque	
	Steel	Cast steel
	N·m	N·m
1/8	11.8 ±1.2	10.8 ±1.1
1/4	29.4 ±2.9	24.5 ±2.5
3/8	53.9 ±5.4	49.0 ±4.9
1/2	88.3 ±8.8	73.5 ±7.4
3/4	147.1 ±14.7	127.5 ±12.7
1	196.1 ±19.2	171.6 ±17.2


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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Removing the radiator

1. Loosen the radiator cap to let engine coolant drain from the drain valve.
   - Engine coolant volume: 8.7 L
2. Disconnect the drain hoses.
3. Disconnect the radiator hoses (7) and (9) and the hose (8).
4. Remove the fan guard (3).
5. Remove the nut fixing the cushion rubber.
6. Lift the radiator assembly (9) together with the radiator bracket and remove it.
   - Lift it slowly, sliding it out forward so that the shroud does not come in contact with the cooling fan.
7. Disconnect the oil cooler hoses.
   - Prepare a plate to catch any hydraulic oil coming out of the hose.
8. Remove the radiator assembly (20).
   kg : 25 kg

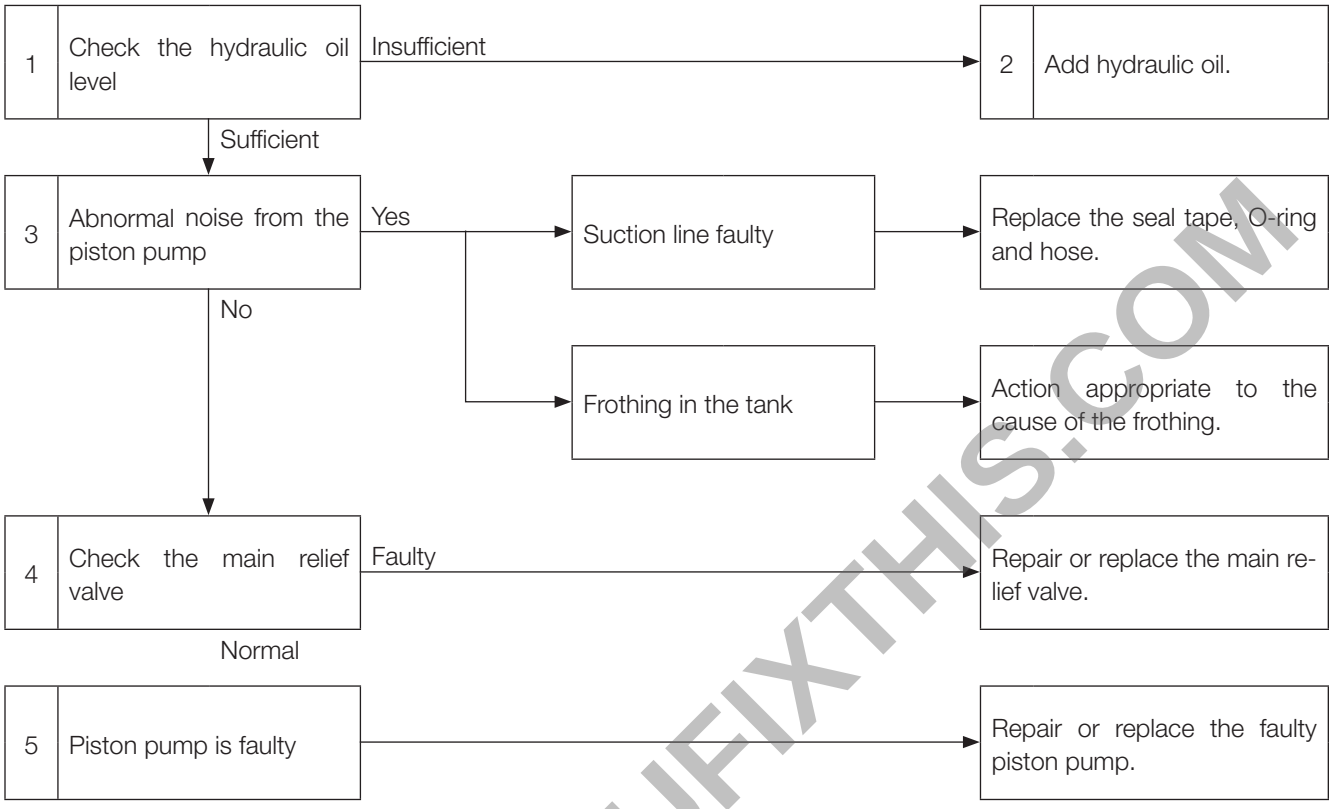
Installing the radiator

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

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All systems working, but insufficient force.



1. Check the hydraulic oil level.
☞ "4. Disassembly and assembly, Hydraulic oil tank"

2. Add hydraulic oil.
☞ "5-3"

3. Abnormal noise from the piston pump.
The noise is likely to be caused by cavitation in the pump, due to a faulty suction line. Check the following.
a. The line for sucking the hydraulic oil
- Apply grease or oil on the suspected faulty sections and check for a change (check if air is being sucked).

b. Clogging in the suction filter
c. Pressurize the hydraulic tank.
☞ "4. Disassembly and assembly, Hydraulic tank"

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Engine

Model			YANMAR 3TNV88
Type			4-cycle, vertical, water-cooled, in-line, 3-cylinder diesel engine
Number of cylinders -bore×stroke		mm	3–88×90
Total displacement		mL	1642
Maximum torque		N·m	98.6 to 107.4
		min^{-1}	1440
Specific fuel consumption (at rated output)		g/kW·h	250
Fuel/air washer			Centrifugal, filter paper
Cooling system type	Fan		Suction type
	Radiator		Pressure type
Starter motor	Voltage	V	12
	Output	kw	1.7
Generator	Voltage	V	12
	Output	kw	0.48
Battery	Voltage	V	12
	Capacity	A·h	64
	Qty.		1

Hydraulic system

Hydraulic pump drive system			Engine direct coupling
Hydraulic pump	Type		Variable displacement type double axial piston plus double gear
	Qty.		1
	Delivery	L/min	38.9×2+22.8+10.8
	Hydraulic pump control system		All engine output control
Main relief valve pressure setting		MPa	21.0×2+19.6+3.4
Hydraulic tank pressure			Pressure tank
Control valve	Type		Directional control valve, 10 valves in series (standard spec.)
	Operation type		—
Hydraulic oil filter	Type		Glass fiber filter type
	Filter precision		BETA10=6
	Installing position		Return circuit (in hydraulic tank)
Hydraulic oil cooler	Cooling system type		Air cooling
	Radiation of heat area	m^2	10.6

Operating equipment

Cab	Position		Left side
	Construction		Suspension seat, adjustable
Cab or canopy	Construction		Steel enclosed cabin with tempered glass windows and door
Operating levers and pedals	Shifting operation		Second travel speed switch
	Travel operation		Pilot operated (2 levers)
	Slew operation		Pilot operated
	Arm operation		Pilot operated
	Bucket operation		Pilot operated
	Boom operation		Pilot operated
	Boom swing operation		Mechanical, pedal
	Others		Auxiliary hydraulics operating: Pilot operated and pedal
Instrument, switches	Cluster gauge		Water temperature gauge, Fuel gauge, Hour meter, Charge, Oil, Water temperature, Decel, Air cleaner, 2nd-speed pilot
Lighting installation	Head ligh	V-W	12V-55W H3-Halogen
	Boom light	V-W	12V-55W H3-Halogen
Warning, safety device			12V,110dB(A)
Others			Cab: Wiper, Heater, Defroster

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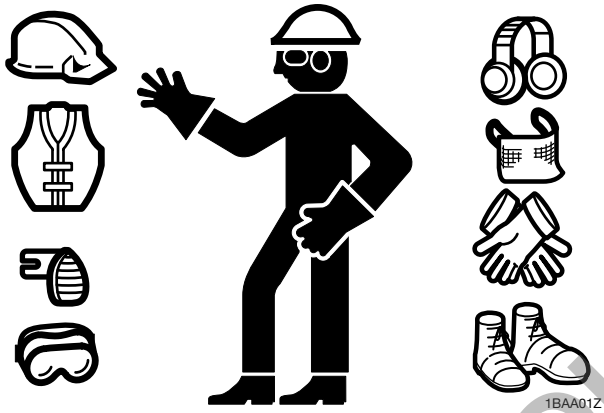
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SAFETY PRECAUTIONS

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 or maintenance of this machine when under the influence of alcohol, drugs, medication, fatigue or insufficient sleep.

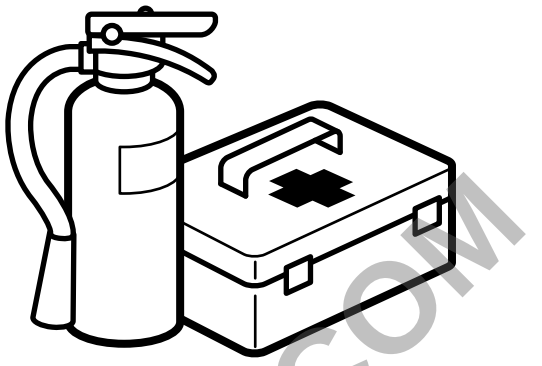
Wear safe clothing and protective gear



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- Do not wear loose clothing or any accessory that can catch on the controls or the moving parts of the machine.
- Do not wear clothing stained with oil or grease that can easily catch fire.
- Wear protective gear such as helmet, safety shoes, protective goggles, respirator, gloves and earmuffs, as appropriate, depending on the work involved. Especially make sure to wear protective eye-wear and mask when working with a grinding/polishing/sanding machine, hammer or compressed air, as metal fragments or other objects could scatter in such an environment.
- Wear hearing protectors when operating the machine. Loud and prolonged noise can damage or destroy your hearing.

Install an extinguisher and a first aid kit



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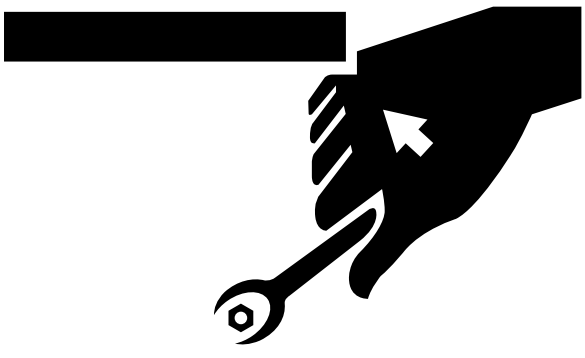
- Install an extinguisher to fight a fire, and learn how to use it.
- Prepare a first aid kit and keep it at a designated place.
- Decide on the procedures to be used in case of fire or other hazards.
- Decide on and take note of the contact(s) in case of emergency.

Place a “Do not operate” alert sign

Serious injury or death may result if an unauthorized person starts the engine or touches the controls during inspection or maintenance.

- Before performing maintenance, stop the engine, remove the key and store it in a safe place.
- Prominently display a “Do not operate” alert sign on places such as the starter switch and the control lever. Place another sign outside of the machine as necessary.

Use the correct tools



1BAA03Z

Do not use damaged or weakened tools or tools designed for other purposes. Use only the correct tools for the work involved.

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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.

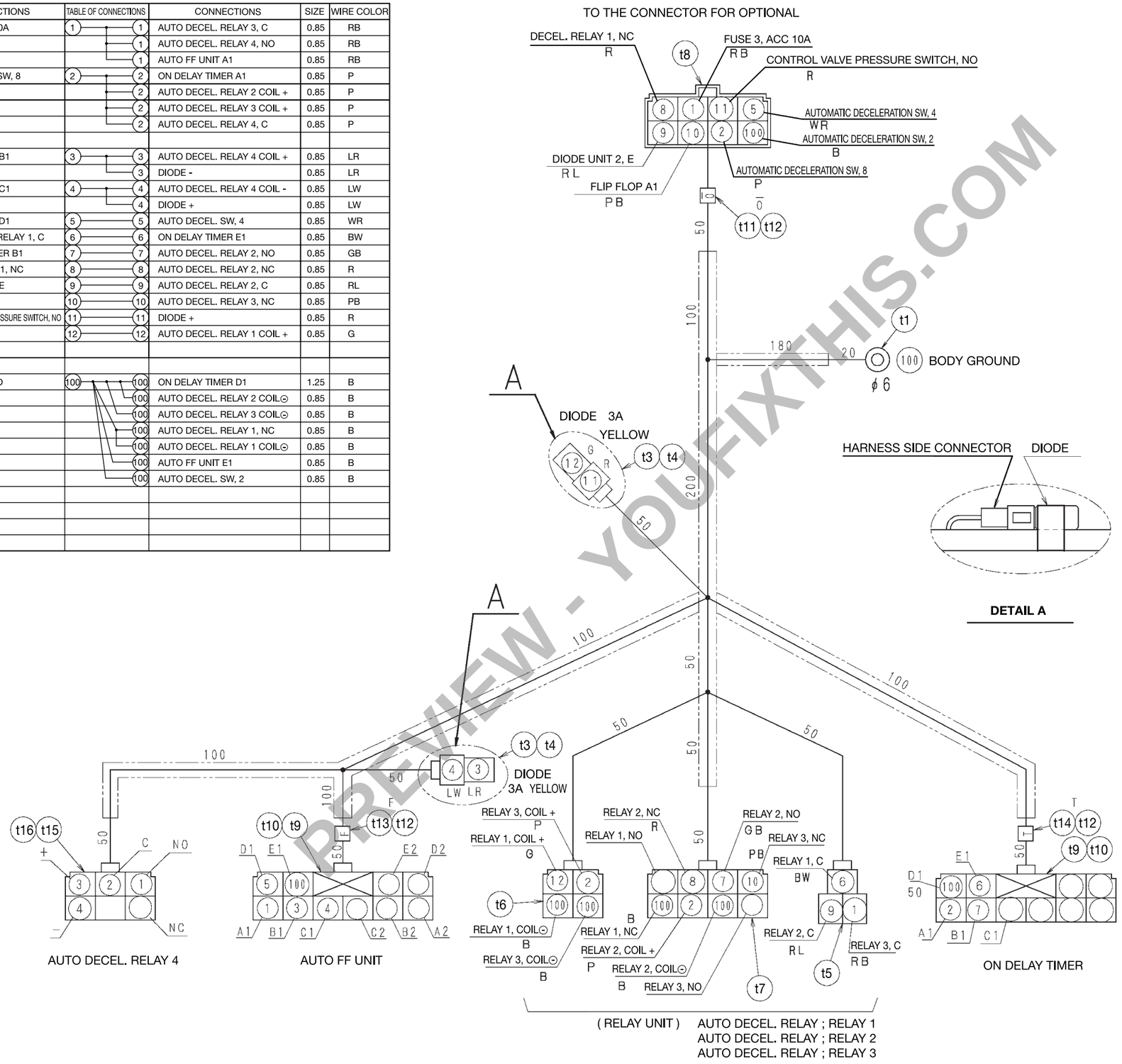
This manual is intended for trained and qualified personnel only. Warnings or cautions described in this manual do not necessarily cover all safety measures. It is also impossible to cover all hazards and risks which may be associated with the maintenance of the machine in every environment. For maintenance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

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Wire harness (03742-17710)

NO.	CONNECTIONS	TABLE OF CONNECTIONS	CONNECTIONS	SIZE	WIRE COLOR
1	FUSE 3, ACC 10A	1	AUTO DECEL. RELAY 3, C	0.85	RB
2		1	AUTO DECEL. RELAY 4, NO	0.85	RB
3		1	AUTO FF UNIT A1	0.85	RB
4	AUTO DECEL. SW, 8	2	ON DELAY TIMER A1	0.85	P
5		2	AUTO DECEL. RELAY 2 COIL +	0.85	P
6		2	AUTO DECEL. RELAY 3 COIL +	0.85	P
7		2	AUTO DECEL. RELAY 4, C	0.85	P
8					
9	AUTO FF UNIT B1	3	AUTO DECEL. RELAY 4 COIL +	0.85	LR
10		3	DIODE -	0.85	LR
11	AUTO FF UNIT C1	4	AUTO DECEL. RELAY 4 COIL -	0.85	LW
12		4	DIODE +	0.85	LW
13	AUTO FF UNIT D1	5	AUTO DECEL. SW, 4	0.85	WR
14	AUTO DECEL. RELAY 1, C	6	ON DELAY TIMER E1	0.85	BW
15	ON DELAY TIMER B1	7	AUTO DECEL. RELAY 2, NO	0.85	GB
16	DECEL. RELAY 1, NC	8	AUTO DECEL. RELAY 2, NC	0.85	R
17	DIODE UNIT 2, E	9	AUTO DECEL. RELAY 2, C	0.85	RL
18	FLIP FLOP A1	10	AUTO DECEL. RELAY 3, NC	0.85	PB
19	CONTROL VALVE PRESSURE SWITCH, NO	11	DIODE +	0.85	R
20	DIODE +	12	AUTO DECEL. RELAY 1 COIL +	0.85	G
21					
22					
23	BODY GROUND	100	ON DELAY TIMER D1	1.25	B
24		100	AUTO DECEL. RELAY 2 COIL⊖	0.85	B
25		100	AUTO DECEL. RELAY 3 COIL⊖	0.85	B
26		100	AUTO DECEL. RELAY 1, NC	0.85	B
27		100	AUTO DECEL. RELAY 1 COIL⊖	0.85	B
28		100	AUTO FF UNIT E1	0.85	B
29		100	AUTO DECEL. SW, 2	0.85	B
30					
31					
32					
33					



t16	AMP 170031-1	TERMINAL F
t15	SUMITOMO 6020-6161	6P CONNECTOR F (WITH LOCK)
t14	17202-00220	MARK TUBE " T "
t13	17202-00206	MARK TUBE " F "
t12	16522-01004	BAND
t11	17202-00215	MARK TUBE " Ō "
t10	YAZAKI 7123-8307-30	10P CONNECTOR F (WITH LOCK)
t9	YAZAKI 7116-1473	TERMINAL F
t8	YAZAKI 7322-2186	8P CONNECTOR M (WITH LOCK)
t7	YAZAKI 7323-2186	8P CONNECTOR F (WITH LOCK)
t6	YAZAKI 7323-2446	4P CONNECTOR F (WITH LOCK)
t5	YAZAKI 7323-2237	3P CONNECTOR F (WITH LOCK)
t4	YAZAKI 7321-9362-70	DIODE MOULDING UNIT (3A YELLOW)
t3	YAZAKI 7323-2228	2P CONNECTOR F (WITH LOCK)
t2		
t1	LA106	TERMINAL (WITH INSULATION SLEAVE)
NO.	STANDARD	NAME

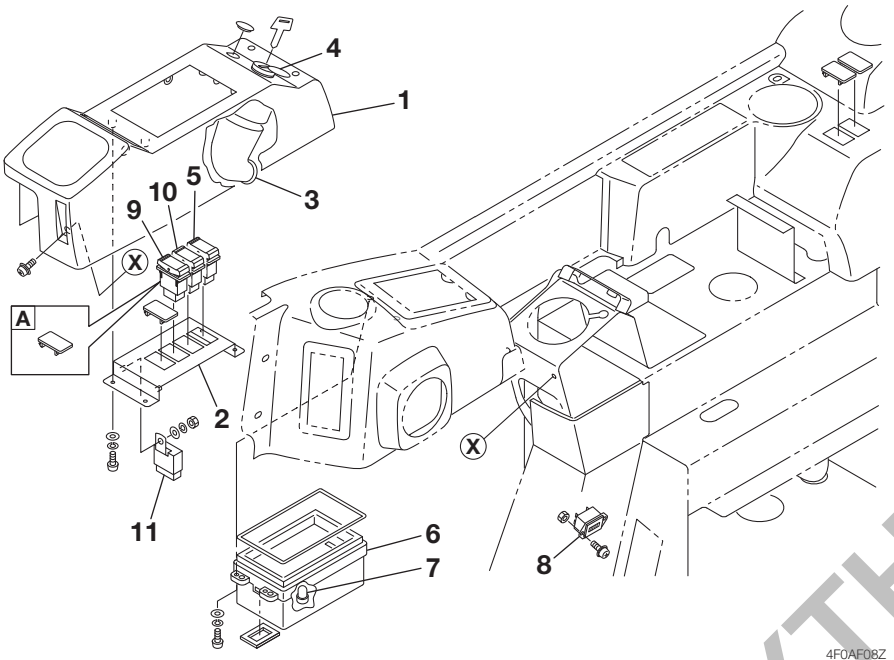
Drawing No.	1/1
03742-17710-0	

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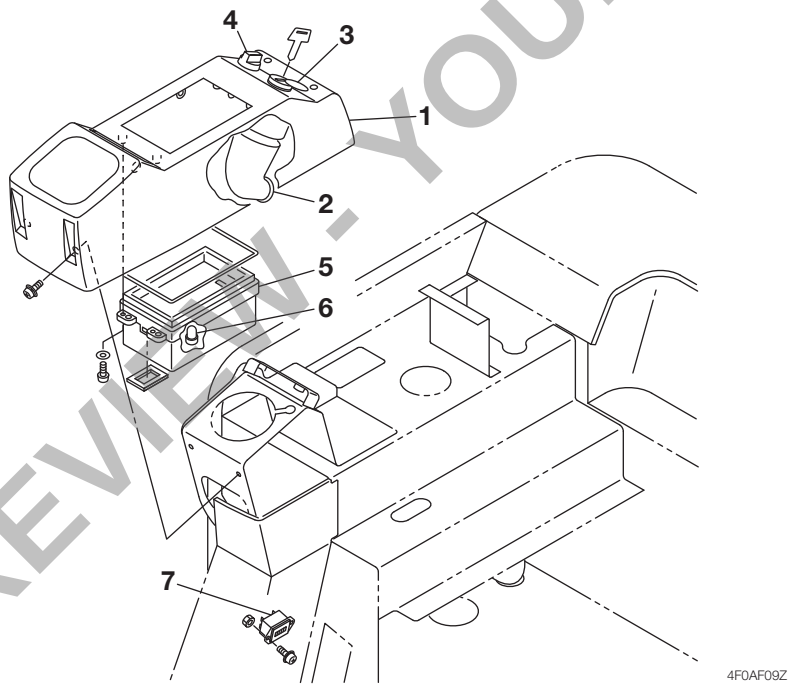
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Control box R (Cab)



1. Cover R
2. Cover
3. Starter switch
4. Light switch
5. Cluster gauge
6. Valve
7. Hour meter

Control box R (Canopy)



1. Cover R
2. Plate
3. Cover
4. Starter switch
5. Light switch
6. Cluster gauge
7. Valve
8. Hour meter
9. Heater switch
10. Wiper switch
11. Wiper relay

A: With air conditioner

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5. Install the O-rings in the casing.


4K5AF29Z

6. Secure the upper casing in a vise and install the balls.


4K5AF30Z

7. Install the spring seats with tweezers or the like in the casing.
   - Install the spring seats in the positions they were in before disassembly.


4K5AF31Z

8. Install the damping springs in the casing.
   - Install the damping springs in the positions they were in before disassembly.
   - Take care not to allow the damping spring to rest on the spring seat.


4K5AF32Z

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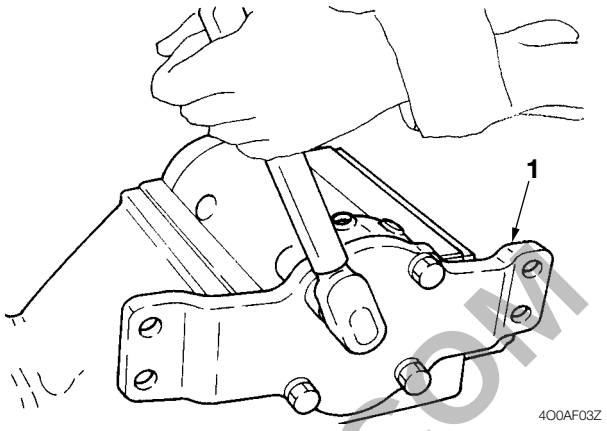
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For disassembly of the swivel joint, follow the procedure below. For assembly of the swivel joint, follow the same procedure as for disassembly in the reverse order.

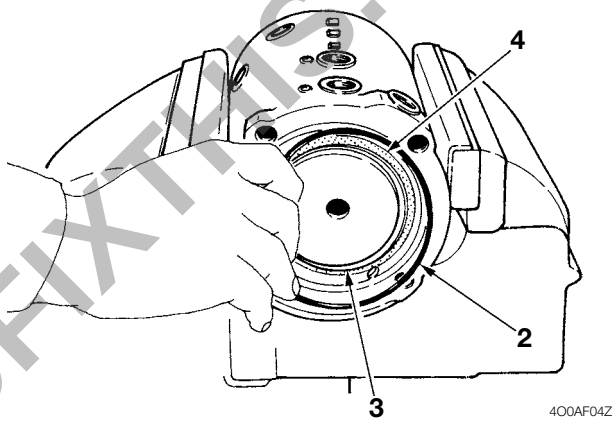
Disassembly

1. Take out the bolts and remove the hub from the flange (1).
   - Secure the hub in a vise.
   - When assembling, place a pipe on the stopper pin of the shaft and check if the shaft smoothly rotates.

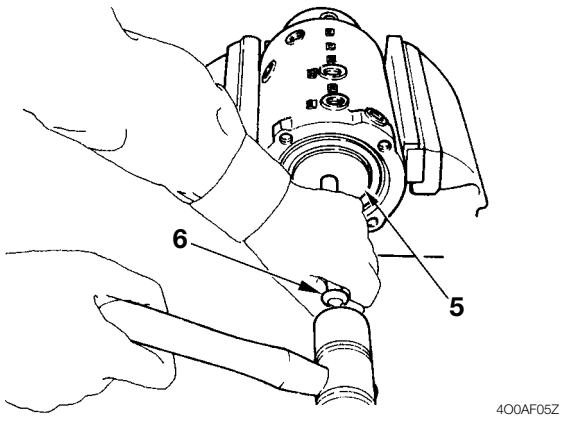
   Bolt: 24.5 to 27.4 N·m



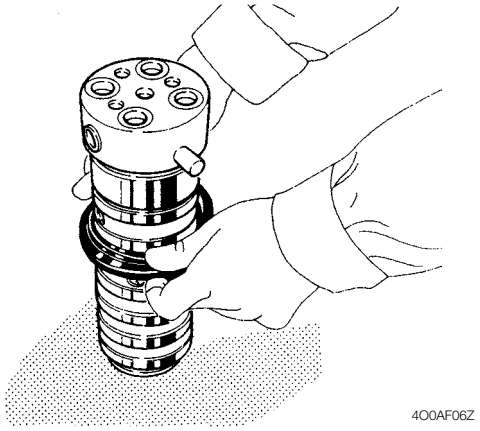
2. Remove the O-ring (2), snap ring (3) and thrust ring (4).
   - When assembling, make sure the snap ring rests securely in the groove.



3. Remove the shaft (5) from the hub.
   - Place a knock pin (6) against the shaft end and tap with a hammer.
   - Select a knock pin made of copper, plastic, etc.
   - When assembling, apply a thin coat of hydraulic oil to the outer circumference of the shaft.



4. Remove the dust seal from the shaft.



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