A.Developing concept and feature

a. Objective and Concept of Development

1 Objective of Development

Development of products which go ahead of competitive companies in terms of reduced manufacturing costs while reinforcing the performance in horizontal operability, workability, durability, comfort and safety.

2 Product Concept

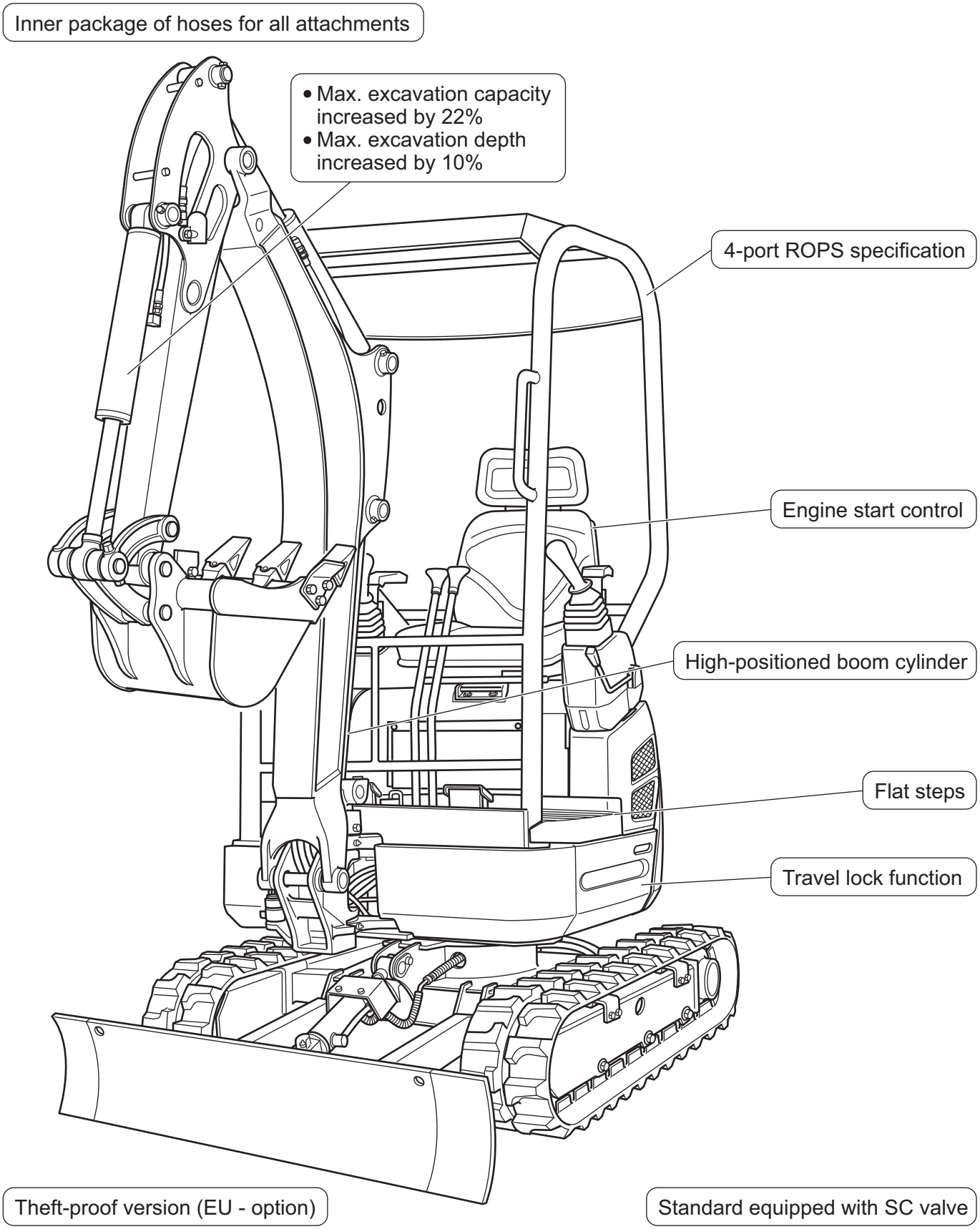
Integration of the world's best actual performance of backhoe and the spirit of innovation.

b. Main Specifications

model			U15-3	U-15
Engine	Brand		KUBOTA	KUBOTA
	Type		D782-EBH-4	D782-BH
	Output	PS/rpm	13/2300	12/2100
		kW/rpm	9.6/2300	8.8/2100
	Displacement	cm^3	778	778
Machine weight		kg	1600	1450
Excavating capacity	Bucket	kN (kgf)	15.2 (1550)	12.5
	Arm	kN (kgf)	8.8 (900)	8.5
Hydraulic pump P1, P2	Relief pressure	kg/cm^2	220	210
	Pump discharge rate	L/min	16.6	15.1
P3	Relief pressure	kg/cm^2	190	210
	Pump discharge rate	L/min	10.4	9.5

c. Major Selling Points and Improvements

1. Quick chart



d. Evaluation of Competitive Power with Competitors

1. Workability

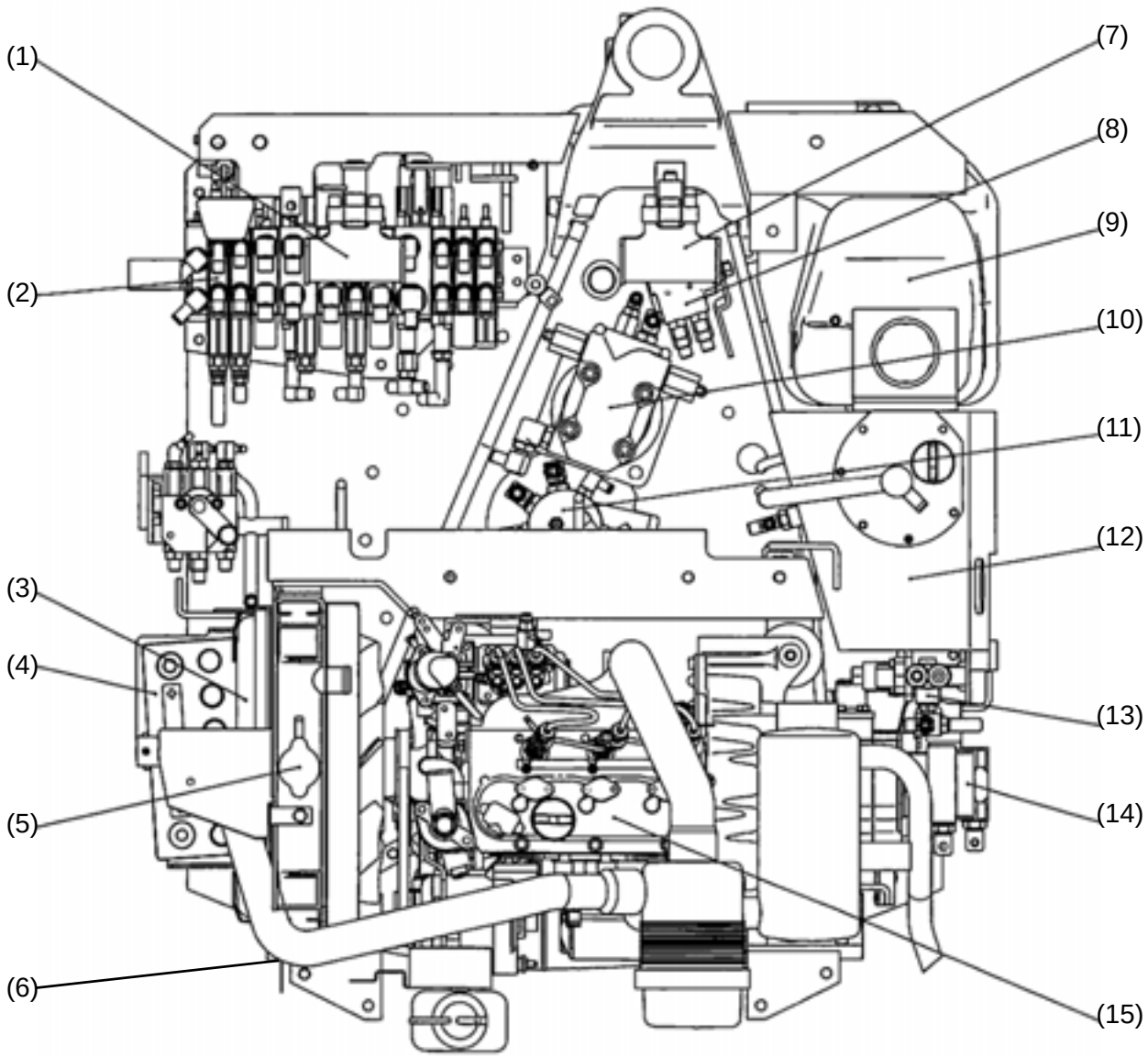
Offence	Defense	Item	U15-3	Current U-15	KOMATSU PC15MR	YANMAR Vio15	SCM 301.5CR	Appealing point in sales
	○	Increase in engine output	**9.6**	8.8	11.2	8.5	11.3	We will appeal such a point that the max. excavation capacity and max. excavation depth which are the basic performances of excavating machine take a lead over those of our existing machines as well as competitive companies' machines.
○		Max. excavation capacity increased by 22%	**15.2**	12.5	14.2	13.7	14.4	
○		Max. excavation depth increased by 10%	**2310**	2100	2155	2100	2170	
○		Max. vertical depth increased by 11%	**1900**	1720	1870	1750	1720	
	○	Max. excavation radius increased by 5%	**3900**	3720	3900	3720	3800	
	○	Travel 2-speed traction force increased by 5%		-	-	-	-	
	○	Travel 2-speed speed increased by 8%	**2.2/4.3**	2.0/4.0	2.3/4.3	2.1/4.3	2.3/4.0	
	○	Swiveling force increased by 12%		-	-	-	-	

2. Durability

Offence	Defense	Item	U15-3	Current U-15	KOMATSU PC15MR	YANMAR Vio15	SCM 301.5CR	Appealing point in sales
○		Boom cylinder Protection of cylinder by high-positioning	○	x	x	x	x	As the greatest differentiation from competitive companies' products, we will appeal such a point that loading work can be performed without hassle. This is because the machine can be brought close to a 2-ton dump truck without damage to the boom cylinder during loading work. Such job is found often with machines of this class. We will also appeal such a point that the machine is equipped with the inner package of hoses for all attachments which gives no damage to cylinder.
○		Protection by inner package of hoses for all attachments	○	Δ	Δ	x	x	
	○	Standard equipped with tension spring	○	x	○	○	○	
	○	Double-grouser type iron crawler <For domestic market only>	○	x	-	-	○	
	○	Introduction of high-back and integrated seat	○	x	○	○	○	
	○	Prevention of water entry by enclosed hydraulic oil tank	○	x	-	-	-	
	○	Equipped with starter automatic release function	○	x	-	-	-	
	○	Boom cast steel members	○	x	○	x	x	
	○	High-tensile brass bush	○	x	○	-	-	

B.Machine body structure and function

a. Overall Arrangement



Vertical Operation

(1) Service port pedal
(2) Control valve
(3) Oil cooler
(4) Battery
(5) Radiator
(6) Suction pipe
(7) Swing pedal
(8) Selector valve
(9) Fuel tank
(10) Swivel motor
(11) Swivel joint
(12) Oil tank
(13) Unloading valve
(14) Pump
(15) Engine

Note : For the export model, the travel Hi - Low control switch is located on the dozer lever grip.

7. Cleaning and greasing the Track Frame Slide Pipes

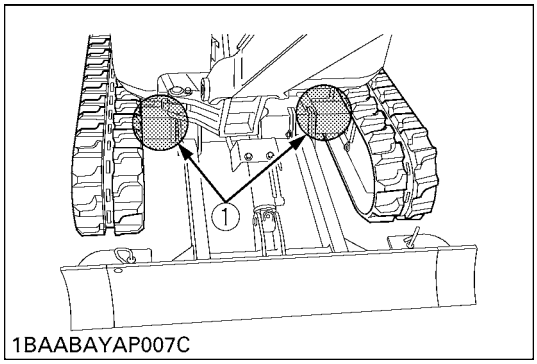
When the slide pipes of the track frame are clogged or adhered with soil or sand, clean the slide pipes in the following manner according to need.

WARNING

To avoid the personal injury or death:

- Place the machine on even ground when cleaning the track frame slide pipes.

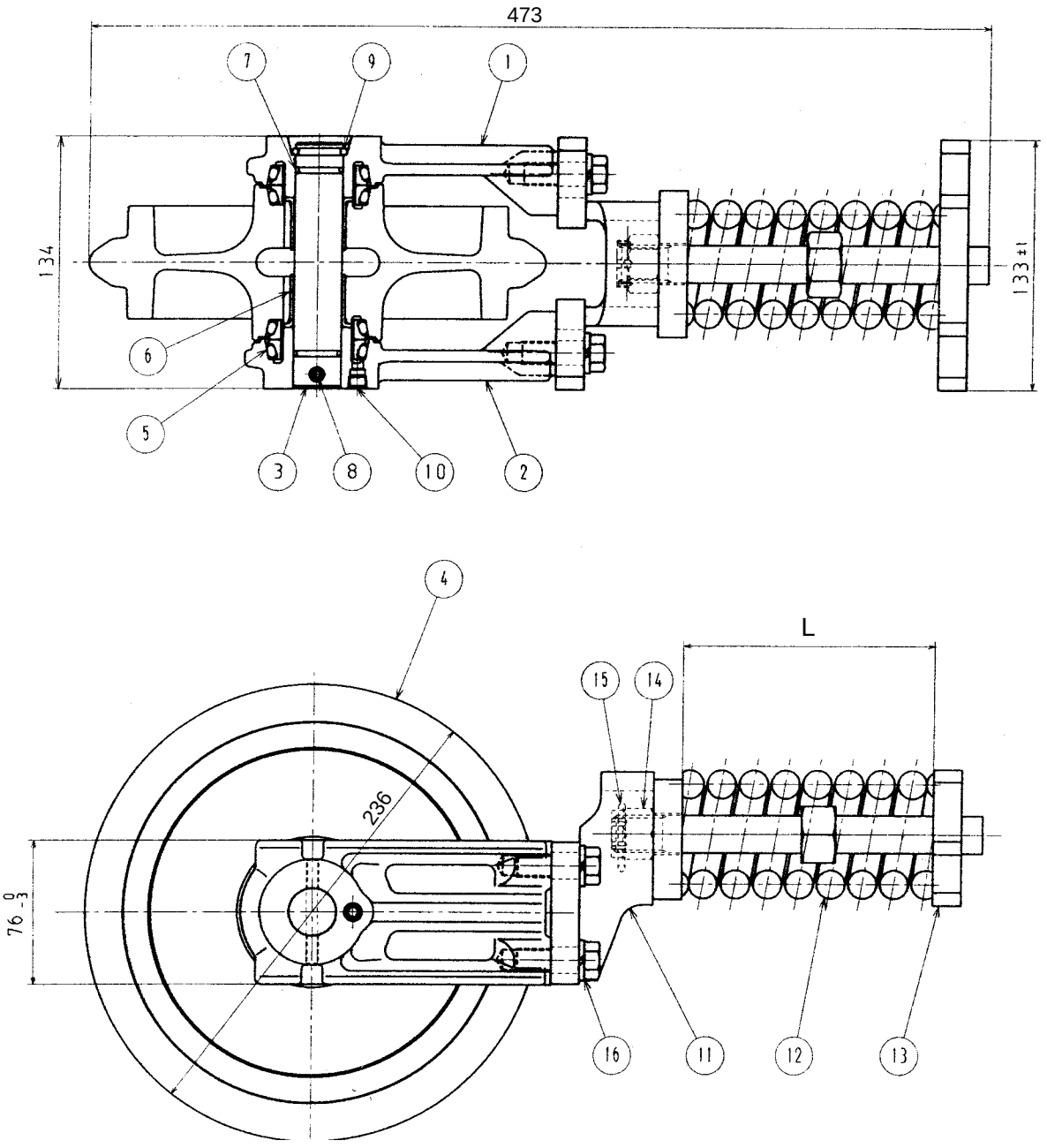
1. First lift the machine off the ground using the dozer blade and boom functions.
2. Switch the track width change / dozer select lever to the “Track width change” position.
3. Push the control lever forward, and expand the track width to 1240 mm.
4. Remove soil and sand adhered to the slide pipes, then put grease evenly around the pipes. Make sure all 4 slide pipes are greased.
5. Retract and expand the track width repeatedly for a few times by moving the control lever, so that the grease is spread adequately.
6. Switch the track width change / dozer select lever to the “Dozer” position.
7. Place the machine down on the ground carefully by moving the dozer blade and the boom.



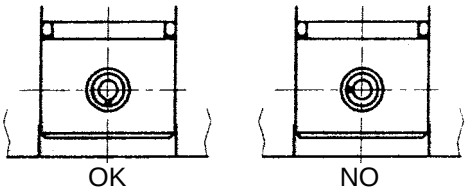
(1) Track frame slide pipes

5. Idler and tension spring

[mm]



(1) Support 1	(5) Floating seal	(9) Wire	(13) Retainer
(2) Support 2	(6) Bushing	(10) Plug, R 1/8	(14) Nut
(3) shaft	(7) O-ring	(11) Yoke	(15) Split pin
(4) Idler	(8) Spring pin	(12) Spring	(16) Bolt



(Spring roll pin direction)

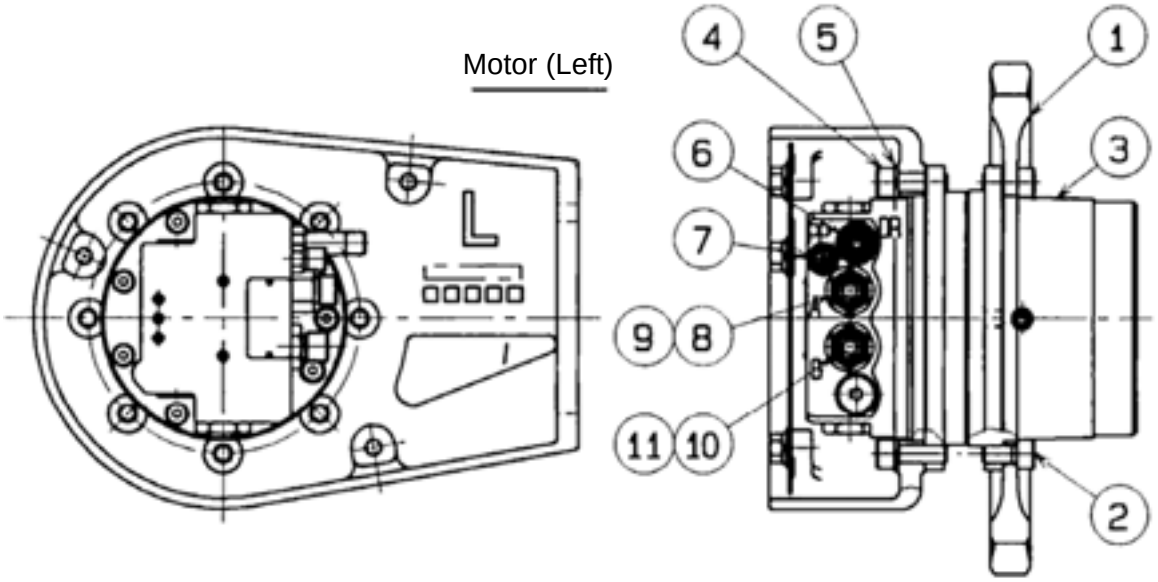
1) Pre-set length of spring : L=130 mm (5.12 inch)
2) Bolt(16) tightening torque : 77.5 ~ 90.2 N·m
   (7.9 ~ 9.2 kgf·m)
3) Lub oil : Engine oil SAE30 CD. Apply screw lock agent.
   (Locktite 271).
   30cc

2. Radiator specifications

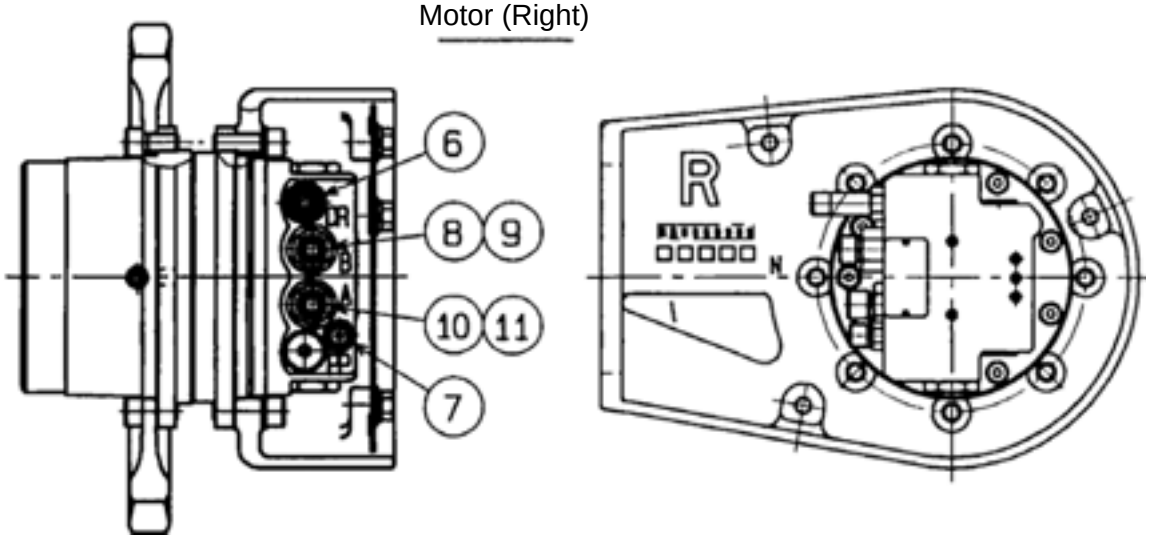
Diy	Heading		Unit	(Conventional unit)
Performance specifications	Condition	Air flow	m/s	8
		Vater flow	L/min	40
		Temp difference	°C	60
	Radiator capacity		kW	20.7 (17853 kcal/h)
	Air resisyance		Pa	132.3 (13.5 mmAg)
	Water resistance		kPa	(mmHg)
	Valve opening pressure	Press	kPa	147 (1.5 kgf/cm^2)
		Vacuum	kPa	
	Test pressure		kPa	147 (1.5 kgf/cm^2)
	Vibration durability	Acceleration		6 G
		Direct		Up/down
		Cycle		22.3 Hz
		Cycle		10°
Structural specifications	Core type			CF29-2
	Core size	Wide	mm	351
		Height	mm	325
		Thickness	mm	36
	Fin pitch		mm	4.5/2
	Radiation area	Fin	m^2	3.78
		Tube	m^2	0.89
		Total	m^2	4.67
	Front area		m^2	0.132
	Water passage area		cm^2	12.7
	Water duantity		L	1.3
	Dry weight		kar	2.4
	Surface treatment			
Remarks	Louver-less			

3. Piston motor installation

Motor (Left)



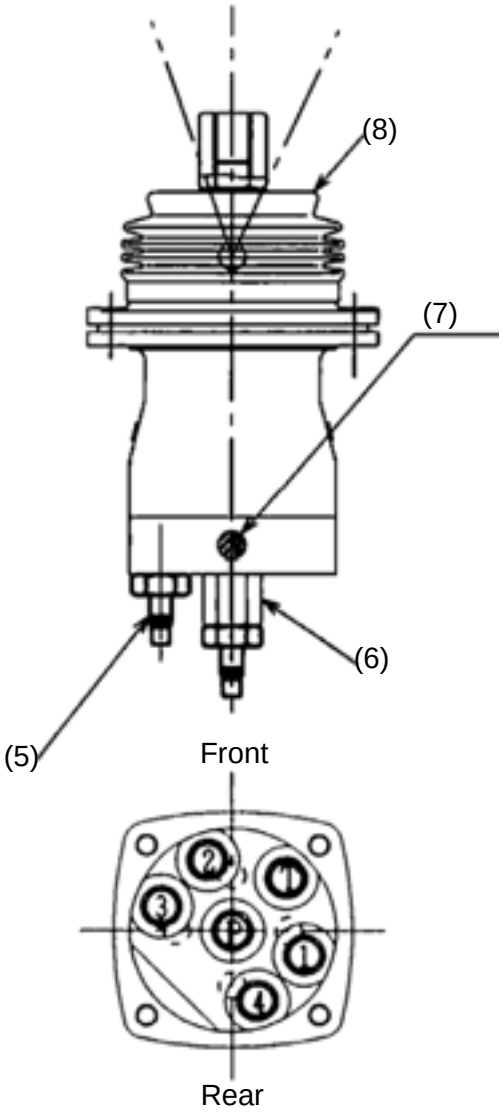
Motor (Right)



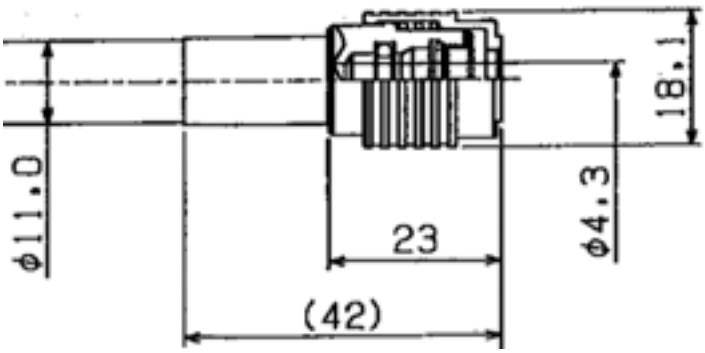
No.	Part Name	Q'ty
(1)	Drive Sprocket	2
(2)	Hex socket bolt	18
(3)	Motor, assembly (Wheel)	2
(4)	Hex socket bolt	16
(5)	Spring washer	16
(6)	Pipe joint (S, G1/4-G1/4)	2
(7)	Pipe joint (S, G1/8-G1/4)	2
(8)	Adaptor	2
(9)	O-ring	2
(10)	Straight pipe joint	2
(11)	O-ring	2

3. Adaptors

P/V (both right and left)



(Quick coupler)



Left pilot valve

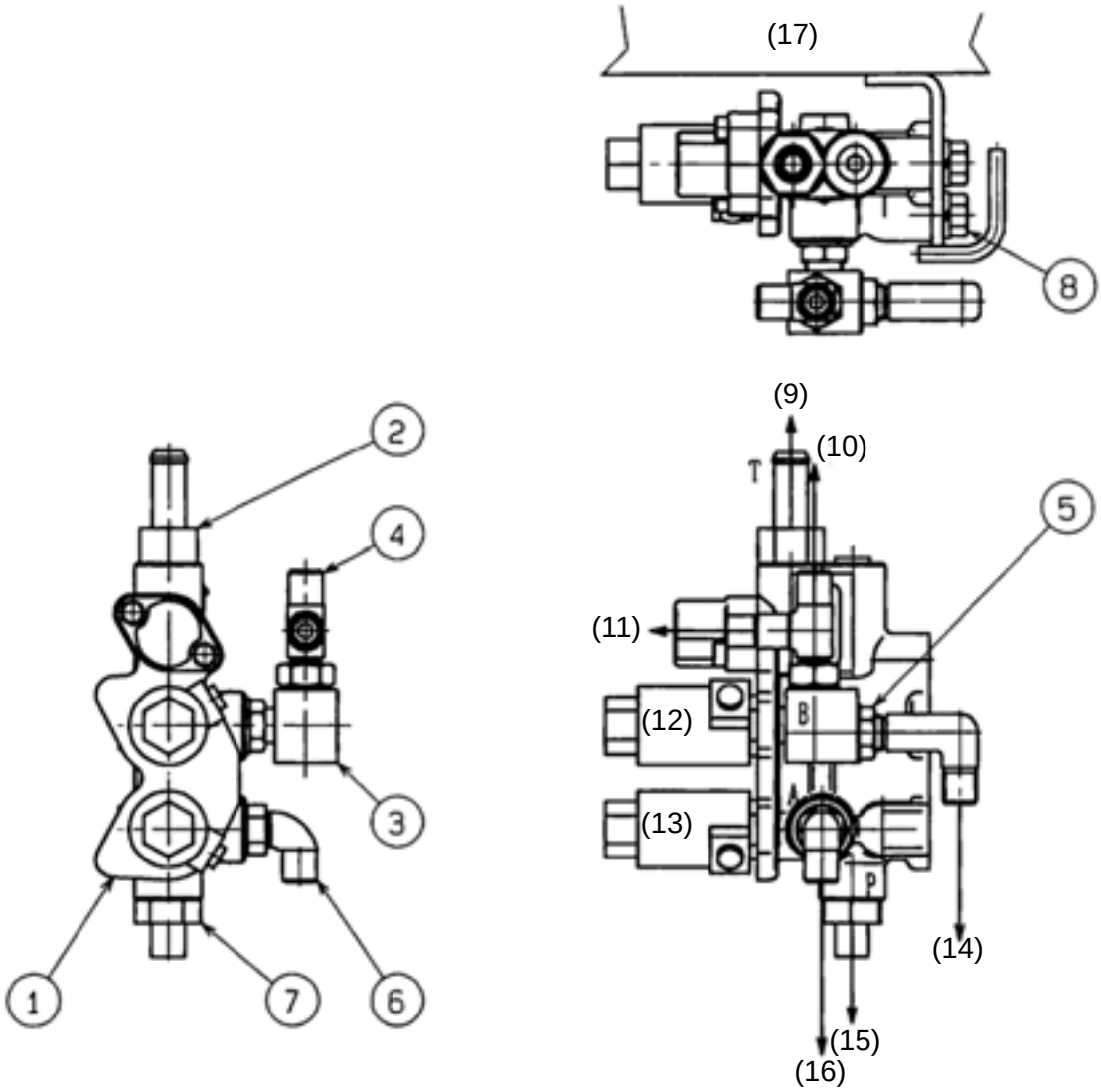
No.	Position for use	Color of hose tape
(1)	Swivel Left	Red
(2)	Arm dumping	Blue
(3)	Swivel Right	Yellow
(4)	Arm raking	Green
P	P-port	White
T	T-port	None

Right pilot valve

No.	Position for use	Color of hose tape
(1)	Bucket raking	Pink
(2)	Boom lowering	Light blue
(3)	Bucket dumping	Brown
(4)	Boom raising	Gray
P	P-port	White
T	T-port	None

No.	Part Name	Q'ty	Remarks
(5)	Pipe joint (S, G1/4-8.6)	5	Other than P-port
(6)	Filter	1	P-port only
	Pipe joint (S, G1/4-8.4)	1	
(7)	Valve, assembly (Pilot)	1	
(8)	Yellow paint	1	

3. Adaptor installation

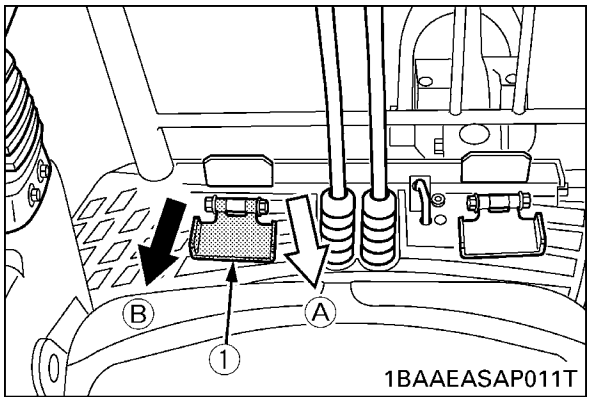


No.	Part Name	Q'ty	Remarks	No.	Part Name
(1)	Valve, assembly (Unloading)	1		(9)	Tank cover
(2)	Straight pipe joint (Drain)	1	T	(10)	PV · Right side P
	O-ring	1	For G3/8 P	(11)	PV · Left side P
(3)	Pipe joint (L. G1/4-G1/4)	1	B	(12)	Unloading
(4)	T-pipe joint (F2)	1	B	(13)	2-speed
(5)	Shouldered elbow	1	B	(14)	CV · Pp
	O-ring	1	For G1/4 A	(15)	Pump · P4
(6)	Pipe joint (L. G1/4-G1/4)	1	A	(16)	Swivel joint · 2-speed signal (G)
(7)	Straight pipe joint	1	P	(17)	Hydraulic oil tank
	O-ring	1			
(8)	Bolt	2	M10 x 1.5 7T		

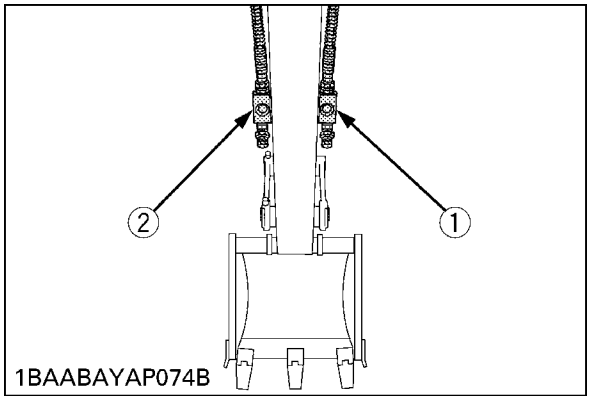
I. Service port system

1. Component layout

This pedal is used to operate attachments such as breakers.



(1) Service port pedal
(A) Sends oil to the port (A)
(B) Sends oil to the port (B)



(1) Port (A)
(2) Port (B)

- Push the right part of the pedal (⇩) to send oil to the port (A).
- Push the left part of the pedal (⬇) to send oil to the port (B).

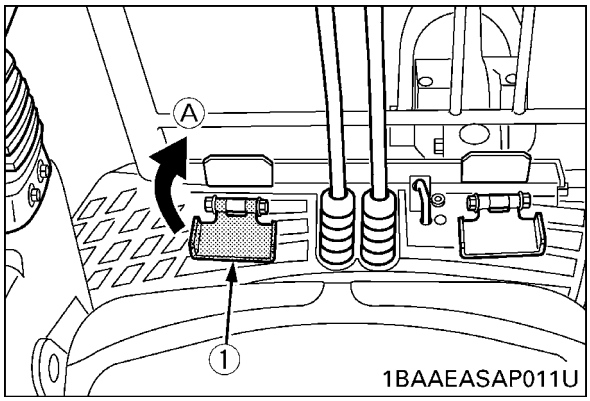
Max. Flow Volume Theoretical L min.	27.0
Max. Pressure MPa (kgf/cm2)	18.6 (190)

IMPORTANT:

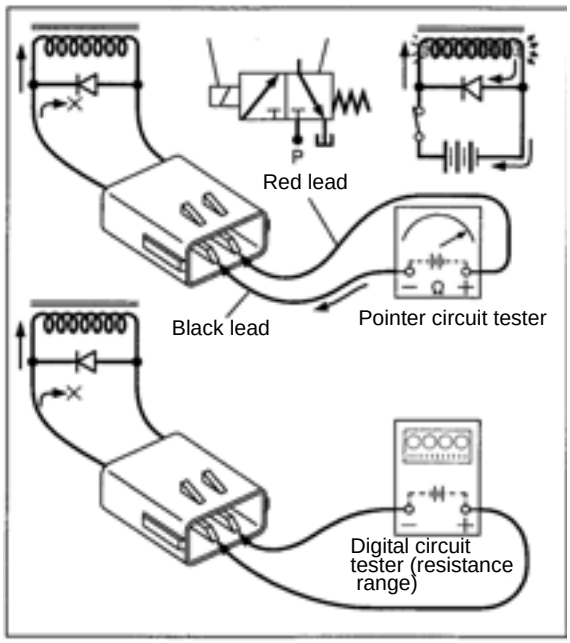
- When the service port is not used for a long period, dirt particles can settle in the lower part of the service port lines.
  When the plugs on the service port lines are removed to connect attachments, drain approx. 100 cc of oil per side.
  Concerning the choice of a breaker, contact your dealer.

NOTE:

- When the service port is not in use, fold the service port pedal forward. The pedal gets fixed and can be used as footrest.



(1) Service port pedal (A) “Fix”

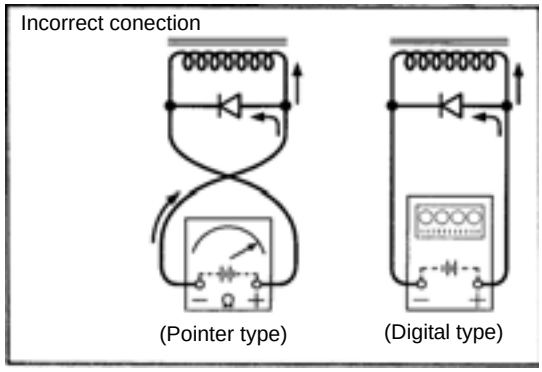


3. Solenoid test method

Solenoid continuity test procedure (In case of diode incorporafed.)

Connect the black and red leads to the positive (+) and negative (-) terminals, respectively, of a circuit tester (pointer type). Make sure the coupler is positioned as shown in the figure. In this state, the coil resistance can be measured properly.

Be careful not to confuse the above connections. If reverse-connected, the measuring current of the circuit tester flows to the diode too and the coil resistance cannot be measured correctly.

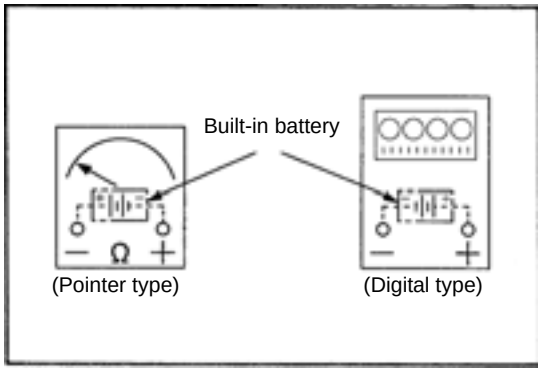


[TIPS]

The circuit tester is battery-powered. The battery voltage is applied across the resistor, by which a current flows and the resistance is measured.

Adjusted

The built-in battery's polarities are different between the pointer type and digital type as illustrated below. In measuring the resistance of a diode-fitted coil, make connection between the positive (+) output terminal of the built-in battery and the cathode of the diode.



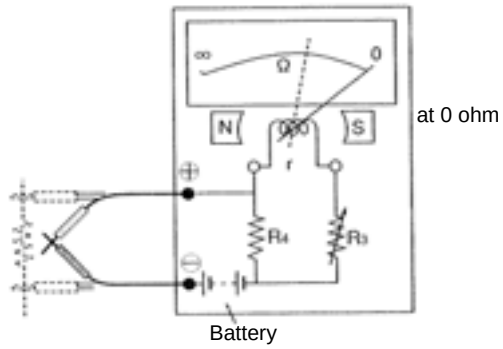


Fig. Ohmmeter principle

1. Construction and principle of circuit tester

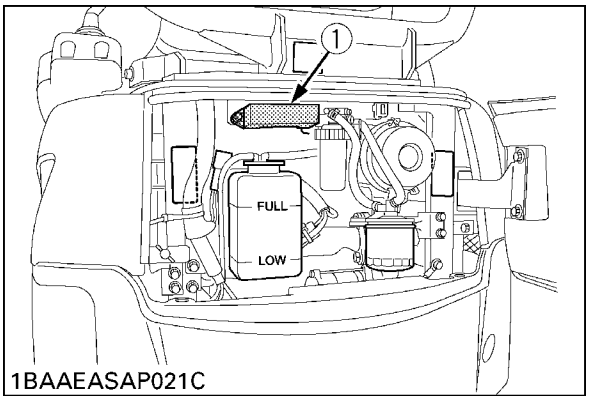
Fig. in the left shows the inside of an ohmmeter. The built-in battery provides current through the circuit and makes the pointer swing accordingly. Before measuring a resistance, it is necessary to make 0-ohm adjustment. Bring the tester probes in contact with each other for short-circuiting. By so doing, the variable resistor R3 will be readjusted so that the pointer should swing full-scale, and also the built-in battery's power will be regulated. It should be noted that the measured resistance and the current flowing in the coil are not in proportion to each other. The scale is irregularly spaced. Changing the resistance of resistor R4 allows to adjust the ohmmeter's measuring range.

h. Fuses

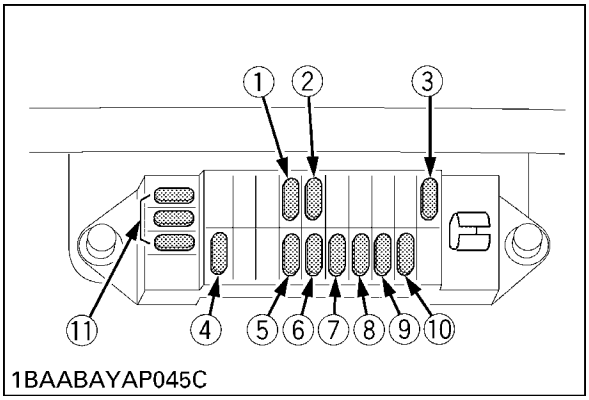
1. Replacing Fuses

1) Remove the cover of the fuse box.
2) Replace the burnt out fuse with a fuse having the same capacity.

2. Fuse Capacities and Circuits



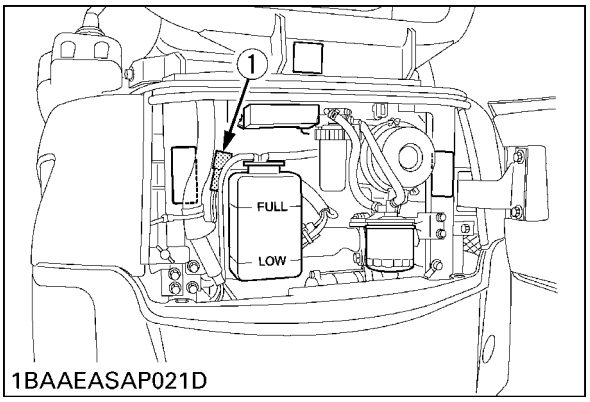
(1) Fuse box



No.	Capacity	Circuit
(1)	5A	Auto glow
(2)	5A	Anti theft main
(3)	15A	Cigarette lighter
(4)	10A	Anti theft sub
(5)	5A	Auto release
(6)	10A	Beacon
(7)	15A	Work light
(8)	10A	Horn
(9)	5A	Lever lock, Travel Hi-Low
(10)	10A	Alternator, Fuel pump, Meter
(11)	5A, 10A, 15A	Spare fuses

3. Slow Blow Fuse

Slow blow fuse is provided to protect the electrical circuits. If the fusible link is blown, check the electrical circuits for trouble and then replace with a new compatible slow blow fuse.



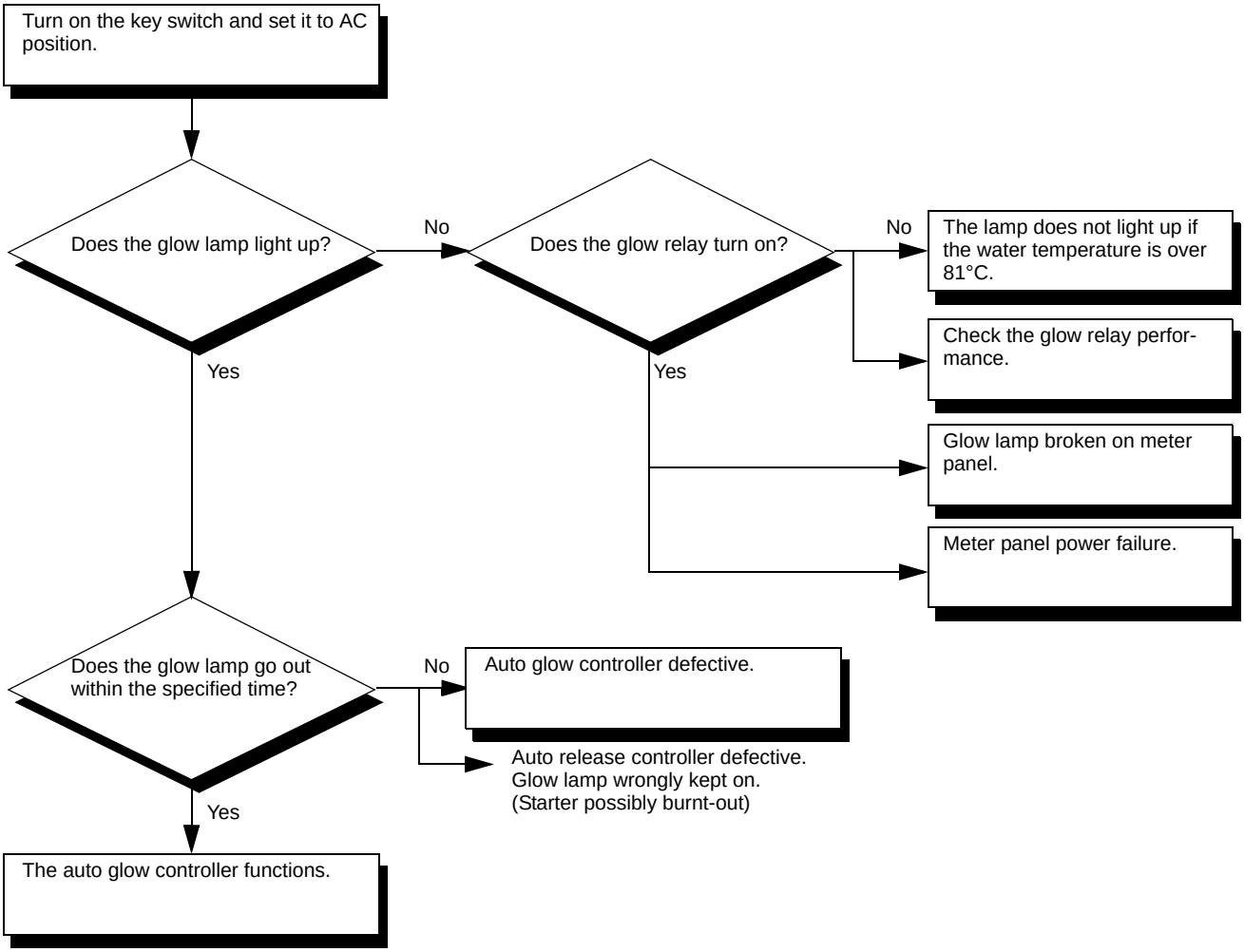
(1) Slow blow fuse

Capacity of the slow blow fuse : 50 A
(2 pieces)

5) Practical inspection

Checking the auto glow controller on actual machines

1. Set the key switch to AC position.
2. Make sure the glow lamp lights up.



q. Engine electrical system

1. Engine oil pressure failure

1) Check engine oil pressure lamp.

Engine Condition	Lamp condition		
	Normal	Trouble case (1)	Trouble case (2)
Before engine starts	ON	ON	OFF
After engine starts	OFF	ON	OFF

Trouble case (1) :Engine oil pressure is low or oil switch fails.
Trouble case (2) :Wire harness is cut or oil switch fails.

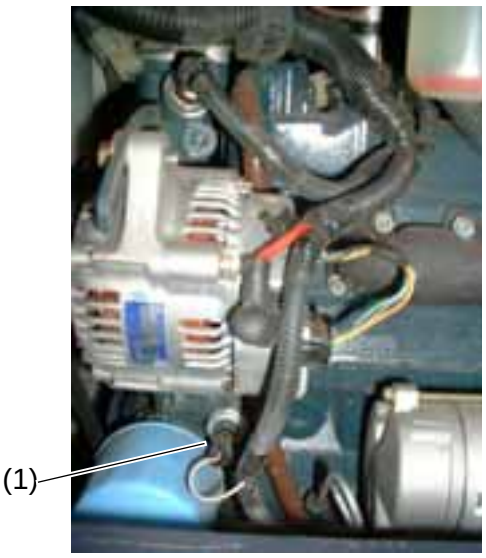
2) Check oil amount and replenish if nessesary.

3) Pull the harness to see if the oil switch coupler is not out of position. Be sure that the coupler harness is tightly connected. (Pull by a 3 kg or less force.)
   • If out of position, attach the coupler tightly and check the meter reading again.

4) Check battery valtage at (+).
Terminal of wireharness coupler. If no battery voltage, check the fuse and continuity of wireharness.

5) Check continuity of oil switch between switch terminal and body earth.

Engine condition	Continuity of oil switch
Engine stop	Yes
Engine starts	No
Engine oil switch is NC (Normal close) type.	



(1) Engine oil pressure sensor (NC)