

SERVICE MANUAL

Ralex 15-7

SER. NO. HY1570001~

 **HYUNDAI**
HEAVY INDUSTRIES CO.,LTD.

INTRODUCTION

To insure a long life for the machine and the engine and to prevent failure and problems, proper operation, maintenance and repairs are indispensable.

This service manual includes an “outline,” “structure and operation,” “inspection and adjustment,” “disassembly and assembly,” “standard maintenance,” and “repair and replacement of parts” of the machine which are necessary to carry out the inspections and repairs in the repair shop.

We hope that this manual helps you to efficiently and effectively carry out repairs by providing an accurate description of the product and the correct repair techniques.

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1 PRECAUTIONS ON MAINTENANCE

1. Correct operation

Correct operation means to follow the correct “procedure” and “method.”

Procedure focuses on speed and accuracy of each job.

In the method, are addressed what type of facility, tools, instruments, materials, oil should be used, how and which part should be checked, adjusted or disassembled, and what matters to attend to.

2. Precautions on operation

1. Safety check

Check that stoppers and sleepers are correctly installed for the vehicle jack-up operation.

2. Preparation

Prepare all of the tools and inspect and adjust the instruments.

3. For efficiency

1) Understand the state before disassembly.

What is the problem? Is disassembly absolutely necessary?

2) Before disassembly

Determine whether match marks are necessary. For the electrical system, disconnect the cable from the battery terminal.

3) Precautions for disassembly

In stead of checking all of the disassembled parts at once, check each part individually as it is disassembled. When removing the hydraulic unit or the hoses, mount a dust cap on the connection.

4) Repair of disassembled parts

Keep the disassembled parts in order. Clearly distinguish the parts to be replaced with new parts from those to be reused. Packings, seals, rings, split pins must be replaced.

NOTE:

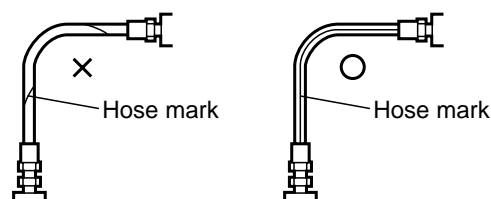
Electrical equipment, rubbers and V belts (which are easily affected by water and oil) must be handled carefully in order to prevent soiling them.

5) Clean disassembled parts

Thoroughly clean the disassembled parts.

6) Assembly

Perform the assembly correctly (tightening torque, application of Three Bond, screw lock, grease, use of seal tape, etc.). Also install the hose correctly.

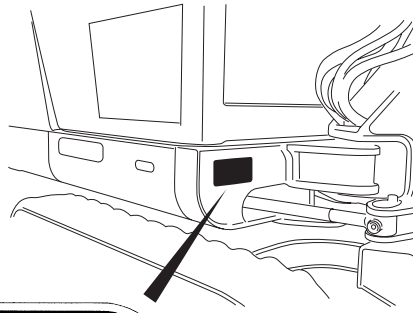


2 OUTLINE

CONTENTS

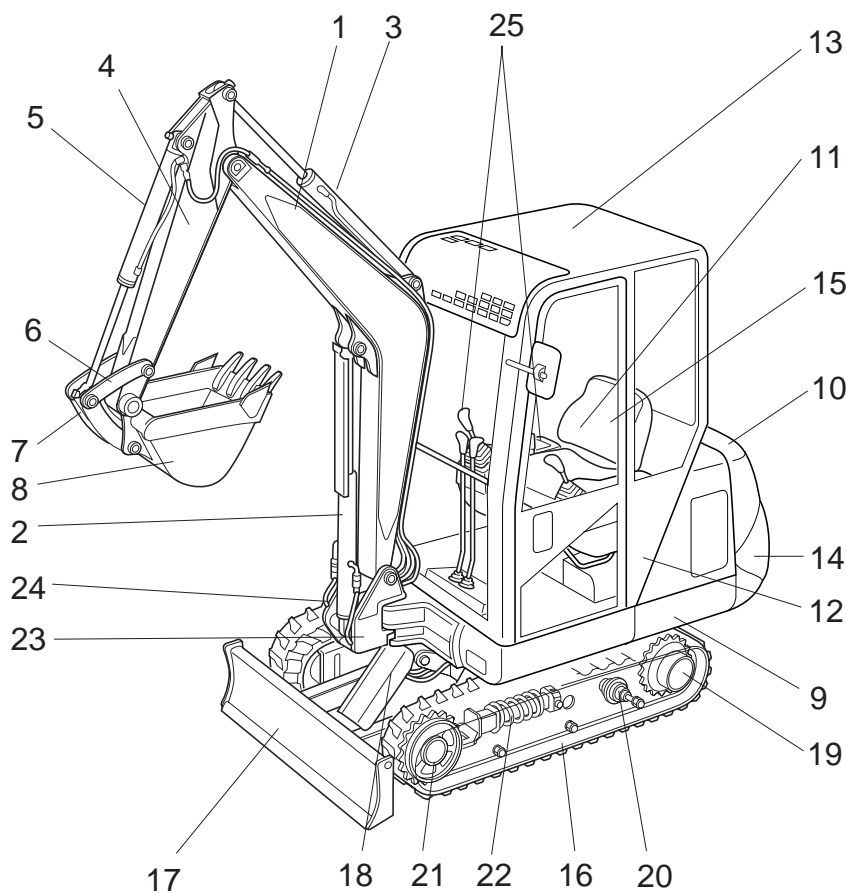
- 2-1 Location of serial No.
- 2-2 Name of each part
- 2-3 Dimensions and specification
- 2-4 Weight list
- 2-5 Oil and grease supply points
- 2-6 List of supply oil and grease
- 2-7 When to repair
- 2-8 Hydraulic circuit diagram

2-1 Location of Serial Number

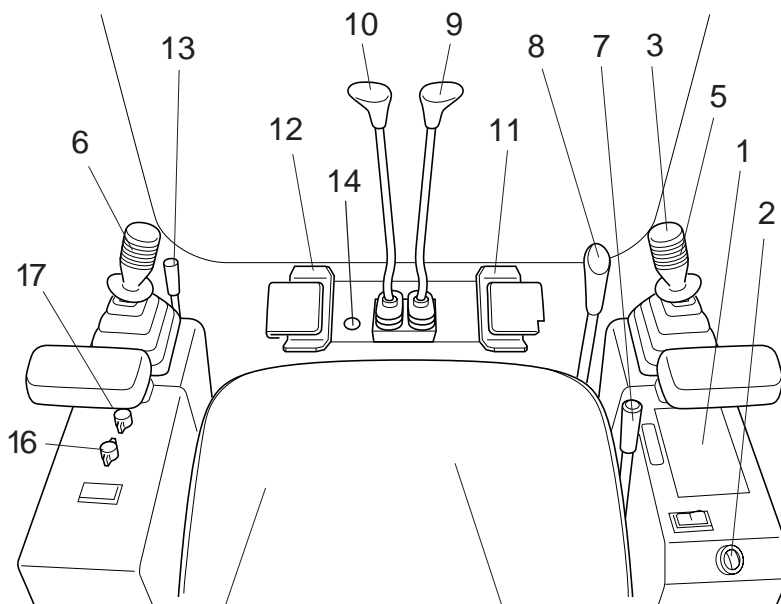


CE HYUNDAI HEAVY INDUSTRIES CO., LTD UOSAN, KOREA	
EQUIPMENT	OPERATING WEIGHT
MODEL	ENGINE POWER (PS/KW(hp))
SERIAL-NUMBER	MFG. YEAR
DO NOT DEFACE OR REMOVE THIS PLATE	

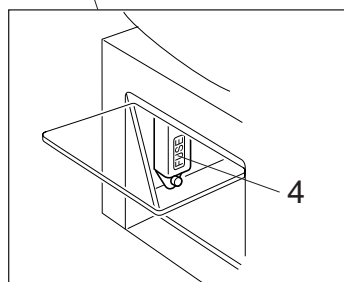
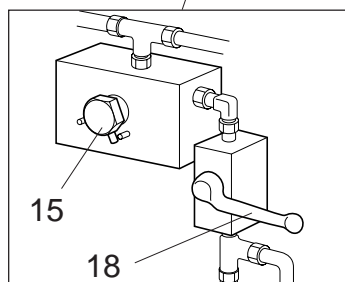
2-2 Name of each part



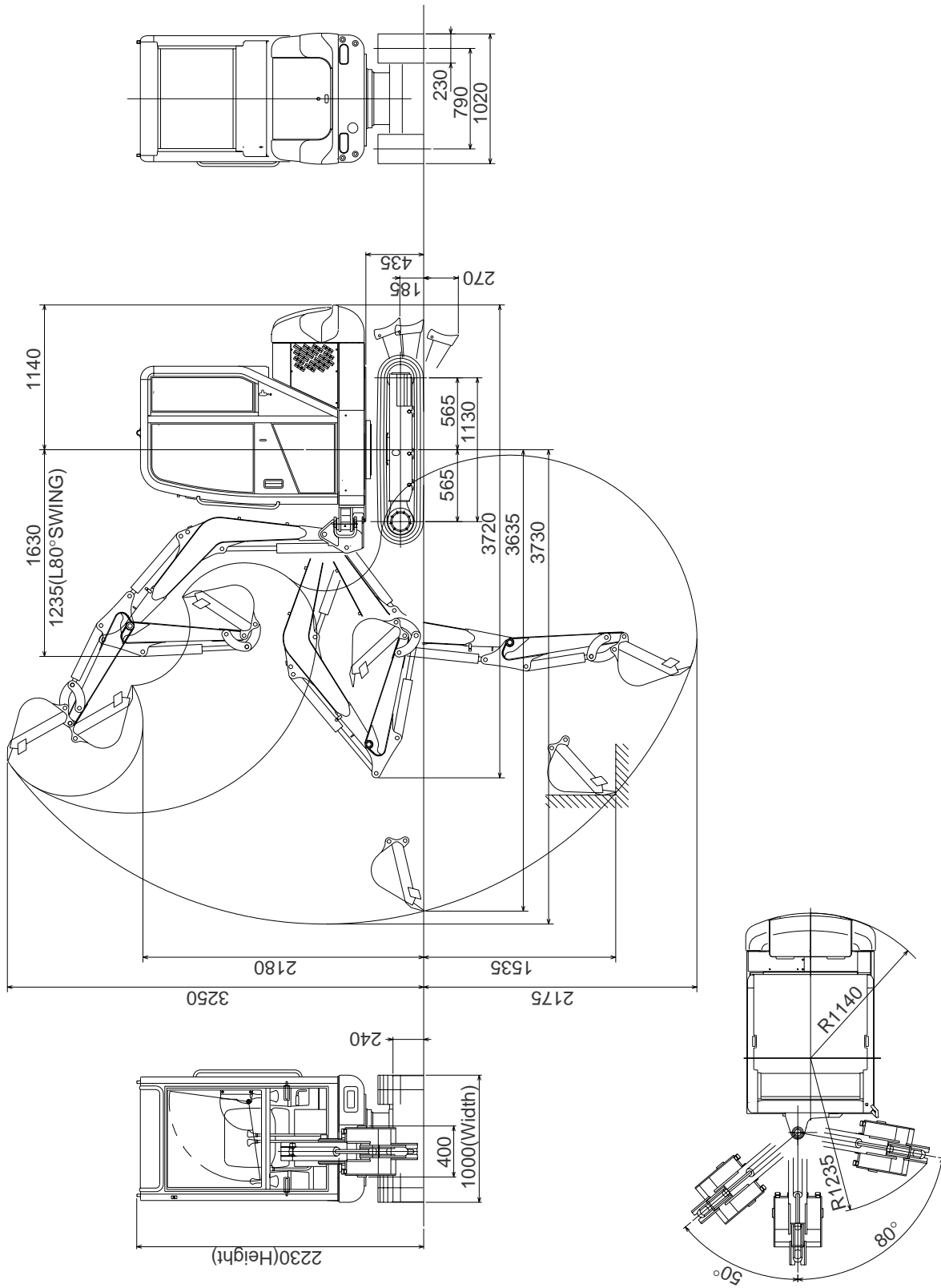
1. Boom
2. Boom cylinder
3. Arm cylinder
4. Arm
5. Bucket cylinder
6. Bucket links
7. Dump link
8. Bucket
9. Swing frame
10. Engine cover
11. Fuel tank
12. Hydraulic tank
13. Roof
14. Counter weight
15. Operator's seat
16. Crawler
17. Dozer blade
18. Dozer cylinder
19. Drive/Track motor
20. Track roller
21. Front idler
22. Grease cylinder
23. Swing post
24. Swing cylinder
25. Operation levers



1. Meter unit
2. Starter switch
3. Horn switch
4. Fuse box
5. Right operation lever
6. Left operation lever
7. Accelerator lever
8. Dozer operation lever
9. Right travelling lever
10. Left travelling lever
11. Swing pedal
12. P.T.O. pedal
13. Safety lock lever
14. Swing lock pin
15. P.T.O. select lever
16. Heater switch(for Cabin)
17. Wiper switch(for Cabin)
18. Manual boom lowering lever



2-3 Dimensions and Specifications



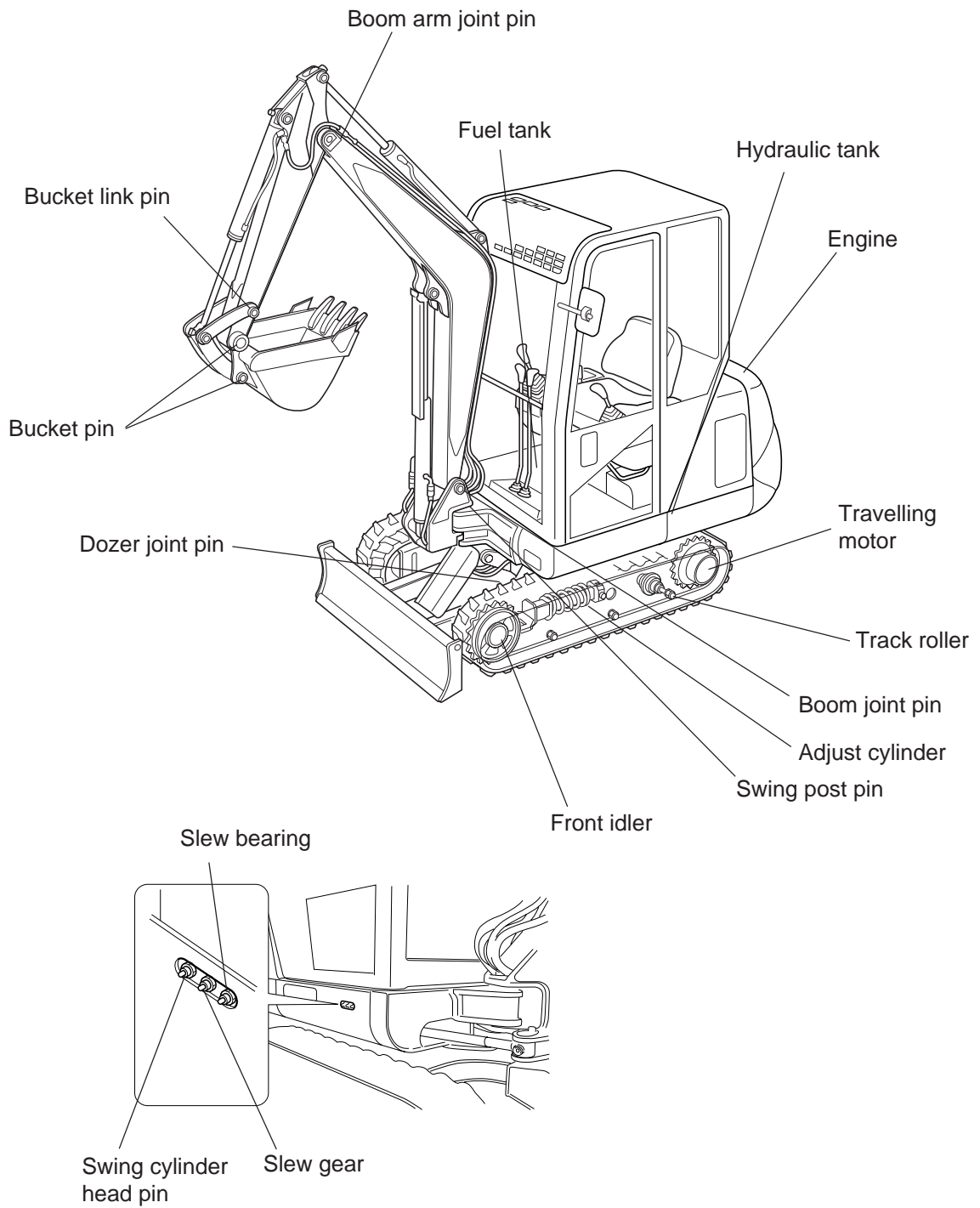
Description			Unit	Robex15-7
Machine weight	Canopy	Rubber shoe	Kg	1460
		Steel shoe		1510
	Cabin	Rubber shoe		1570
		Steel shoe		1620
Standard bucket	Capacity		m ³	0.04
	Width		mm	400
Engine	Maker, model			MITSUBISHI L3E
	Rated power		kW(ps)/min ⁻¹	12.5(17)/2400
	Displacement		cc	952
Working range	Max.digging depth		mm	2175
	Max.vertical digging depth			1535
	Max.digging height			3250
	Max.dumping height			2180
	Max.digging reach			3730
	Min.swing radius	Front		1630
		Swing		1235
	Rear end radius			1140
Boom swing angle		deg	Left80/Right50	
Dimension	Overall length		mm	3720
	Overall width			1000
	Overall height			2260
	Dozer(width × height)			1000×240
Performance	Travel speed		km/hr	2.1/3.9
	Swing speed		min ⁻¹	11.5
	Gradeability		deg(%)	25(47)
	Max.digging force	Bucket	kN(kgf)	14.4(1470)
		Arm		9.0(920)
Max. drawbar pull			12.6(1290)	
Under-carriage	Ground pressure	Canopy&rubber shoe	kpa(kgf/cm ²)	26(0.27)
		Cabin&rubber shoe		28(0.29)
	Tumbler distance × track gauge		mm	1130×770
	Track shoe width			230
	Type of travelling motor			Piston shoe-in type
Crawler tension system			Grease cylinder	
Hydraulic	Type of hydraulic pump			Gear×3
	Pump oil flow		ℓ /min	3×15.7
	Auxiliary circuit oil flow			31.4
	Relief valve setting pressure		MPa(kgf/cm ²)	18.6(190)
Capacity	Hydraulic oil tank		ℓ	24
	Engine oil			3.5
	Fuel tank			20
	Cooling water			5.6
Noise	Noise level(LwA/LpA)		dB	95/84

2-4 Weight list

Unit: kg

Part name		Part name	
Boom	58	Slew bearing	17.7
Arm	24.5	Track frame	101
Bucket	32.3	Dozer	36.5
Dump link	3.6	Crawler(steel)	74×2
Bucket link(R)	1.6	Crawler(rubber)	51×2
Bucket link(L)	1.9	Idler	8×2
Boom joint pin	1.8	Adjust cylinder	10.6×2
Arm joint pin	1.9	Track roller	2.9×6
Bucket pin	0.8×2	Sprocket	4×2
Swing post	24.5	Slew motor	23
Swing post pin	3.2	Turning motor	14×2
Swing frame	162	Joystick	3.5×2
Hydraulic oil tank	29	Console box	9.6×2
Fuel tank	16	Engine	94
Engine cover(A)	17.6	Radiator	6.9
Engine cover(B)	2.7	Battery	12.5
Counter weight	83	Seat plate	12
Operator cabin	200	Swivel joint	8
Boom cylinder	12.5	Pump	5.4
Arm cylinder	12	Control valve	24
Bucket cylinder	12	Tops roof	85
Swing cylinder	12.5	Cabin	200
Dozer cylinder	8.5		

2-5 Oil and grease supply points



2-6 List of lubrication

Name	Quantity of oil/water	Type of oil according to ambient condition	
		-10°C~40°C	-20°C~0°C
Engine cooling water	5.6 ℓ	Soft water (antifreeze is mixed in water)	
Fuel tank (effective capacity)	20 ℓ	Diesel fuel with freezing point below -7°C	
Engine lubricating oil	3.5 ℓ	SAE10W-30	
Travelling motor (reduction gear)	0.25 ℓ	SAE 30-CD	
Hydraulic tank	24 ℓ	ISO VG 46	
Track roller (1 piece)	22cm ³	SAE 30-CD	
Front idler (1 piece)	40cm ³	SAE 30-CD	

Genuine oil

Be sure to use Castrol Hyspin 46.

Table of recommended Lubricants

No.	LUBRICANT	SHELL	MOBIL
1	Engine Oil	Myrina oil 10W-30	Delvac Super10W-30
2	Gear Oil	Spirax Heavy Duty 140	Mobilub HD 85W-140
3	Hydraulic Oil	ISO VG 46 (equivalent)	ISO VG46 (equivalent)
4	Cup Grease	Alvinia 2	Mobilux 2
5	Anti Freeze	Anti Freeze	Anti Freeze
6	Diesel Fuel	—	—

*The engine oil SAE-CD 10W-30 or equivalent at the time of shipment is used for the lubricating oil for slewing and travelling speed reducer.

Cooling water (antifreeze)

*To prevent the cooling system from freezing, add antifreeze to the cooling water. Replace the cooling water after 1 year from its delivery, because the effect will decrease.

*Use "Long-life coolant" for the antifreeze.

*Mixing ratio of antifreeze.

Temperature	-5°C	-10°C	-15°C	-20°C	-25°C	-30°C
Injection rate	1.1ℓ	1.4ℓ	1.7ℓ	2.0ℓ	2.4ℓ	2.8ℓ

Engine inside capacity	Radiator capacity	Reserve tank capacity	Total
1.7ℓ	3.5ℓ	0.4ℓ	5.6ℓ

2-7 When to repair

It is difficult to judge when to perform periodic inspections, maintenance and repairs. Although the wearing rate of each component differs depending on the grade of daily inspection, the skill in machine operation, the working conditions, the quality of used lubricating oil, the frequency of oil replacement, the quality of land to be dug, the digging rate, the schedule for maintenance and repairs should be decided considering the state of engine, the indication of the hour meter, the degree of wear in each part, the state of hydraulic system, your experience and data.

2.7.1 Category of maintenance

Prestart-up inspection	Execute every day before beginning operation
Maintenance after the first 25 service hours	Execute every 25 hours by the hour meter
Maintenance after the first 50 service hours	Execute once a week (every 50 hours by the hour meter)
Maintenance after the first 100 service hours	Execute every 100 hours by the hour meter
Maintenance after the first 250 service hours	Execute every 250 hours by the hour meter
Maintenance after the first 300 service hours	Execute every 300 hours by the hour meter
Maintenance after the first 500 service hours	Execute every 500 hours by the hour meter
Maintenance after the first 1,000 service hours	Execute every 1,000 hours by the hour meter
Maintenance after the first 2,000 service hours	Execute every 2,000 hours by the hour meter

2-7-2 Maintenance procedure

	Inspection and maintenance item	Inspection and maintenance interval (hours)					
		7	50	100	250	500	1,000
1	Engine oil pan	Check oil level	Replace the engine oil (New machine only)		Replace the engine oil		Clean
	Engine oil filter		Replace the cartridge (New machine only)		Replace the cartridge		
2	Fuel filter			Check and clean		Replace the element	
3	Engine valve clearance		Inspect and adjust (New machine only)			Inspect and adjust	
4	Fan belt	Check and adjust					
5	Fuel tank	Check oil level	Drain water and sediment, clean strainer				
6	Radiator (sub-tank)	Check water level				Replace and clean	
	Radiator fin		Check and clean				
7	Air cleaner			Check and clean		Replace the element	
8	Hydraulic oil tank	Check oil level			Drain water and sediment		Replace oil
9	Hydraulic line filter			Replace the cartridge (New machine only)		Replace the cartridge	
10	Hydraulic suction filter			Clean the element (New machine only)		Replace the element	
11	Bucket teeth and others	Inspect					
12	Slew bearing		Inspect and grease				
13	Inspect crawler tension (grease cylinder) and grease the crawler	Check and adjust					
14	Battery liquid amount and specific gravity		Inspect, clean and supply distilled water				
15	Inspect each body part for loosening and damage	Check and tighten					
16	Each lever and instrument	Inspect					
17	Lubricating oil of slew/travelling reduction gear					Replace oil (after the first 500 service hours only for a new machine)	Replace oil
18	Electrical wiring	Inspect					
19	Water and oil leakage in each body part	Inspect					
20	Inspect and grease attachment	Inspect attachment					

2-7-3 Prestart inspections

(1)Prestart inspections

	Item	Content	Remarks
1	Engine oil pan	Check oil level	Before starting operation
2	Fuel tank	Check fuel level	Check that the fuel level is above the center of level gauge.
3	Radiator	Check water level	Check that the amount of water in sub-tank is within a specified level.
4	Each oil/grease supply point	Oil and grease	Refer to page 2-6
5	Inspect each body part for looseness and damage	Looseness, removal, water and oil leakage	Refer to tightening torque list.
6	Each lever and instrument	Operation check	Whether abnormal operation exists or not
7	Hydraulic oil tank	Check oil level	Add oil if its level falls below the specified level. (Be careful of the position of machine.)
8	Bucket teeth and others	Wear	Check whether the replacement of parts is necessary or not.
9	Electrical wiring	Looseness and tears	Loosened terminal, torn covering, etc.
10	Fan belt	Check and adjust	10 to 12 mm sag at the center

(2)Post operation inspections

	Item	Content	Remarks
1	Each body part	Clean, check for water and oil leaks. Looseness, failure, etc.	Treatment of the part where cleaning was not sufficient such as dirt sticking to the body or muddy water remaining on the body.
2	Fuel tank	Fuel supply	Add fuel
3	Cooling water	Drain	Only when the danger of freezing exists

Tightening torque list:

In the present inspection, always check for loosened bolts or nuts and correctly tighten them according to the following tightening torque list.

Tightening torque of bolts and nuts (main machine)

Material Size	8.8	10.9	12.9
M6	12.5 N-m	16 N-m	20 N-m
M8	30 N-m	39 N-m	45 N-m
M10	62 N-m	72 N-m	80 N-m
M12	100 N-m	120 N-m	130 N-m
M14	160 N-m	195 N-m	228 N-m
M16	250 N-m	305 N-m	340 N-m

Tightening torque for hose fitting

PF screw

Torque Size	N-m
$\frac{1}{4}$	27~30
$\frac{3}{8}$	47~52
$\frac{1}{2}$	57~63
$\frac{3}{4}$	108~120
1	126~140

PT screw

Torque Size	N-m
$\frac{1}{4}$	36
$\frac{3}{8}$	55
$\frac{1}{2}$	86
$\frac{3}{4}$	130
1	195
$1\frac{1}{4}$	300
$1\frac{1}{4}$	400

2-7-4 Maintenance every 50 service hours

	Item	Content	Remarks
1	Engine oil pan	Replace engine oil and filter	Only for a new machine. After this, every 250 service hours
3	Engine valve clearance	Inspect and adjust	Only for a new machine. After this, every 500 service hours
5	Fuel tank	Drain sediment and water	Remove the drain plug on the lower part of the tank
		Clean the strainer	Wash strainer with diesel fuel
	Radiator fin	Clean the fins	Dust sticking to the fin affects the cooling effect and causes overheating
6	Slew bearing	Inspect and grease	Always grease the machine after it is used in water
12	Battery	Liquid quantity	Whether the liquid level is proper or not. If short, add distilled water
14	Battery	Specific gravity	1.26 when fully charged; 1.20 when discharged (Recharge the battery when 1.20.)
		Clean	Clean each part, brush and connect terminal and apply grease
20	Each oil/grease supply point	Oil and grease	Refer to page 2-6

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