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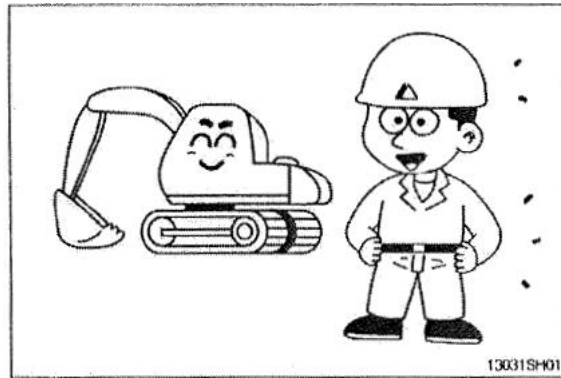
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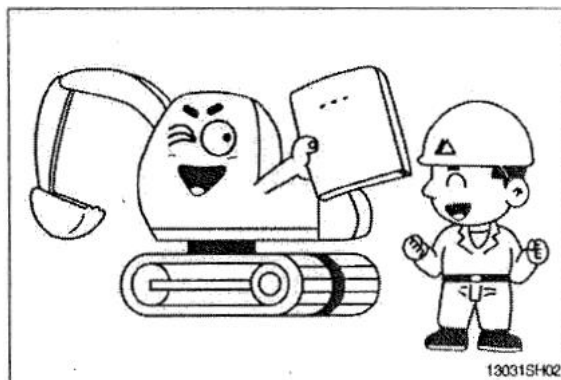
1. Before Operation

Think safety first.

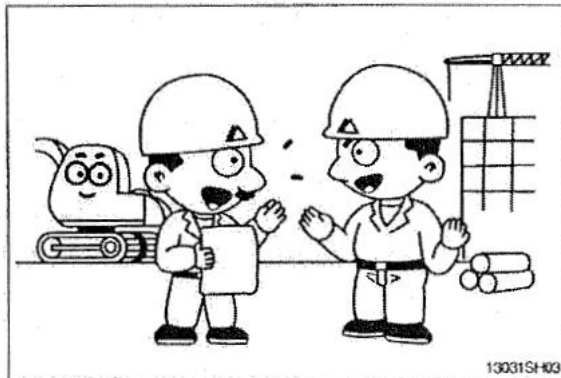
In special situation, wear protective clothing including a safety helmet, safety shoes, gloves, safety glasses and ear protection as required by the job condition. Almost every accident is caused by disregarding the simple and fundamental safety hints.



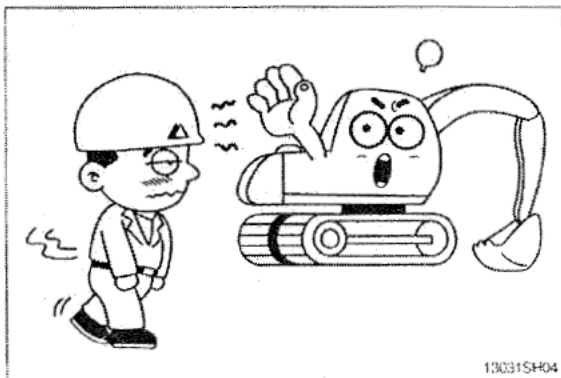
Be sure to understand thoroughly all about the operator's manual before operating the machine.



Fully understand the details and process of the construction before starting the work. If you find anything dangerous on the job, consult with the job supervisor for the preventive measures.



Do not operate when tired or drunk.



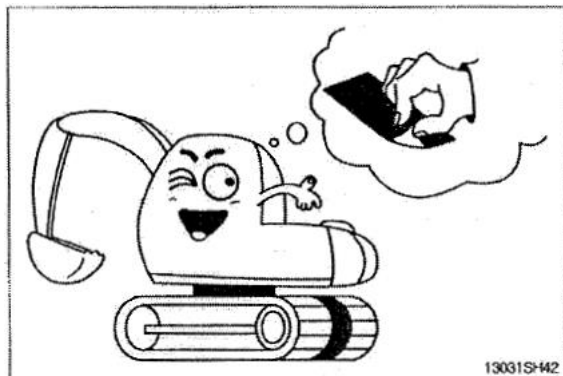
Be careful that the front window may be promptly closed.

Lock the side door securely if it is open.

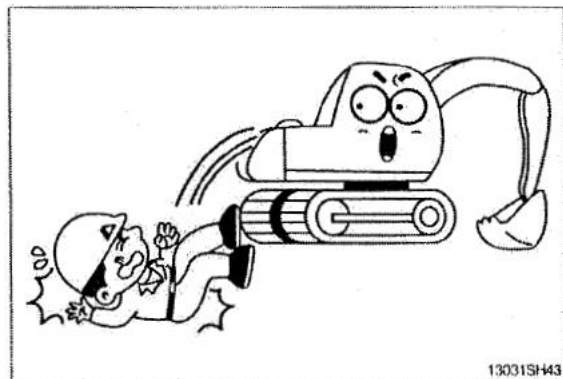
Be careful that the open side door may be closed under external forces or natural forces such as strong winds.



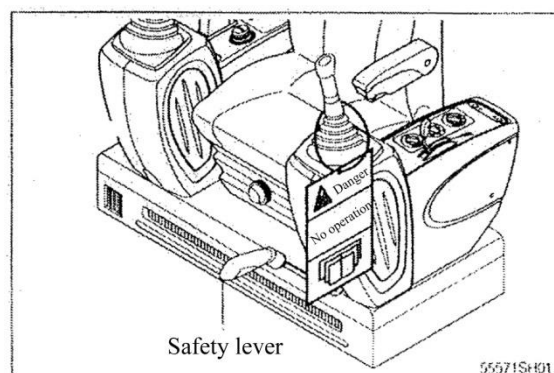
The antislip protection should be replaced if they have become worn or have been printed over. Be sure to free of oil, water and grease etc.



Be careful of not touching slip, fall down etc., when you work at the upper frame to service engine and/or other component.



Before servicing, hang the “Prohibition” sign on the control lever to avoid accidents. Check whether the safety lever is in the LOCK position.



8. Specifications for Major Components

1) Engine

Item	Specification
Model	XSNSRE/4TNV94L-ZXSHYB/4TNV94L-ZXSHYBC
Type	4-cycle diesel engine, low emission
Cooling method	Water cooling
Number of cylinders and arrangement	4 cylinders, in-line
Firing order	1-3-4-2
Combustion chamber type	Direct injection type
Cylinder bore × stroke	94 × 110 mm
Piston displacement	3,053 cc
Compression ratio	19:1
Rated gross horse power (SAE J1995)	36.2/2,200 (KW/rpm)
Maximum torque at 1,400 rpm	201.1N•m
Engine oil quantity	11.6L
Net weight of engine	260 kg
High idling speed	2,200+50 rpm
Low idling speed	1,050 ±100 rpm
Starting motor	12 V-3.0 kW
Alternator	12 V-80 A
Battery	1×12 V×100 Ah

2) Main pump

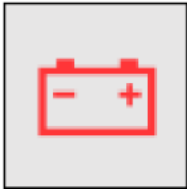
Item	Specification
Type	Variable-displacement axial piston pump
Capacity	63 cc/rev
Maximum pressure	240 kgf/cm ²
Rated oil flow	138 L/min
Rated speed	2,200 rpm

(5) Air cleaner warning lamp



- ① This lamp is ON and the buzzer sounds when the filter of the air cleaner is clogged.
- ② If this lamp is ON, check the filter and clean or replace it.

(6) Battery charging warning lamp



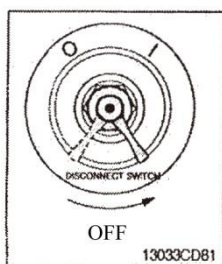
- ① Check whether the charging indicator is ON before starting the engine. If the warning lamp is ON and the buzzer sounds, ignition must not be performed.
- ② If the starting switch is made ON, the warning lamp will be ON and the buzzer will sound. After the engine is started, the warning lamp will be OFF. Check the battery charging line if the warning lamp is ON during engine operation.

(7) Engine check



- ① If the communication between the MCU and engine ECM is abnormal and the engine ECM sends a fault code to the cluster.
- ② Check the communication line. If communication is in good conditions, check the fault code on the cluster.

2) Master switch



- (1) This switch is used to shut off the entire electrical system.
 - (2) I: The battery remains connected to the electrical system.
O: The battery is disconnected to the electrical system.
- ※ Never turn the master switch to O (OFF) with the engine running. It could result in engine and electrical system damage.

3) Main light switch



- (1) This switch has two modes for operation of the head light and work light.

- Mode 1: The beacons of the head light and instrument are ON.
- Mode 2: The work light and the beacon below it are ON.

4) Wiper and washer switch



- (1) This switch has two modes for operation of the wiper and washer.
- Mode 1: the wiper can be operated.
 - Mode 2: If this switch is turned to the mode 2, washing fluid will be sprayed and the wiper will work. If this switch is released, the mode 1 will be enabled.

5) Travel alarm switch (optional)



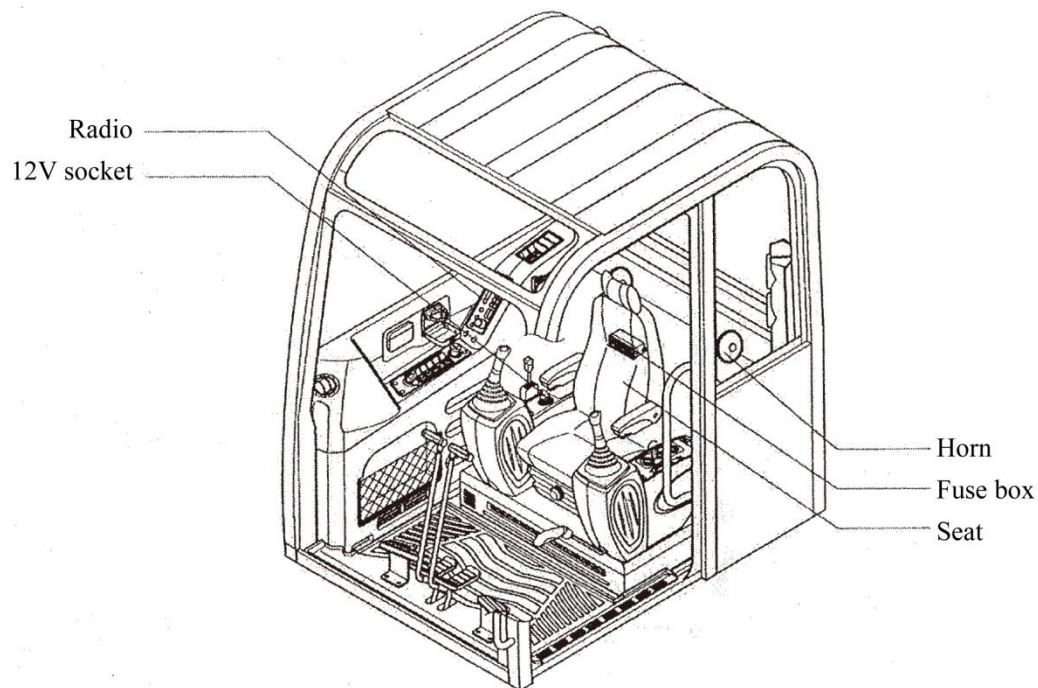
- (1) This switch is used to alarm surroundings when the machine travels to forward and backward.
- (2) On pressing this switch, the alarm operates only when the machine is traveling.

6) Air conditioner switch



- (1) This switch is used to operate the air conditioner.
- (2) See the air conditioner and heater instructions for details.

6. Others



1) Radio

A high-performance sound can make work pleasant. (The radio model may change without prior notice.)



RADIO/USBMP3/BASS/CLOCK

- Introduction to Features
- Introduction to Panel
- Operation Instructions
- Operation Guide
- Installation
- Troubleshooting
- Technical Specifications

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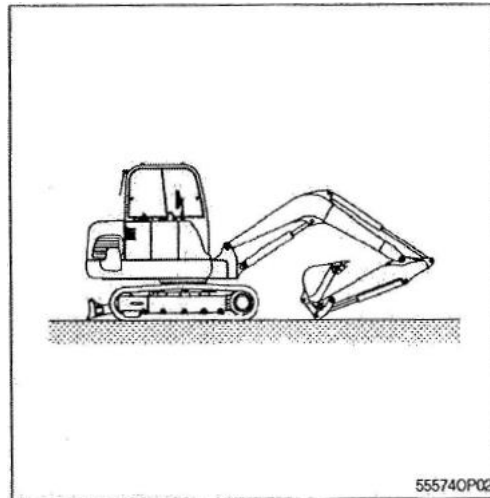
2. Check before Engine Start

1) Look around the machine and under the machine to check for loose nuts or bolts, or leakage of hydraulic oil, fuel or coolant and check the condition of the work equipment and hydraulic system. Check loose wiring, and collection of dust at places which reach high temperature.

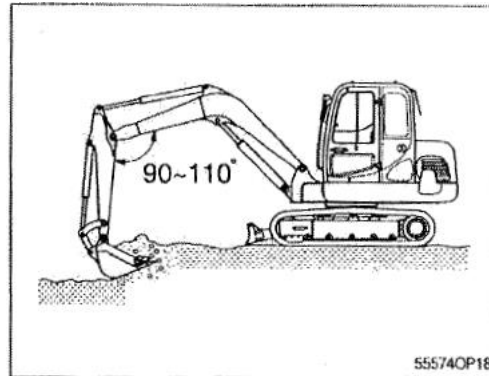
※ Refer to the daily check in Chapter 6 “Maintenance”.

2) Adjust the seat to fit the contours of the operator’s body for the pleasant operation.

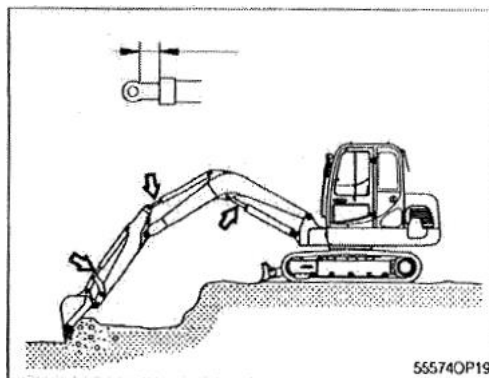
3) Adjust the rear view mirror to avoid impact on the visibility.



5) Dig slowly with keeping the angle of boom and arm within 90-110 degrees when maximum digging force is required.



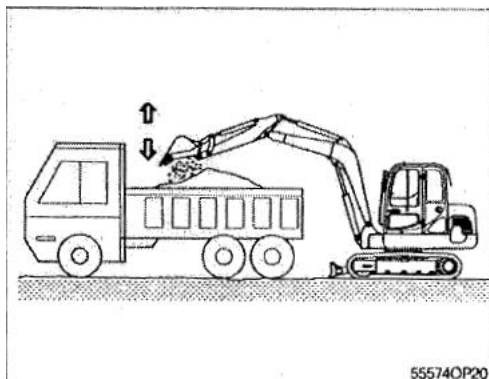
6) Operate with a small safety margin of cylinder stroke to prevent damage to the cylinder when working with the machine.



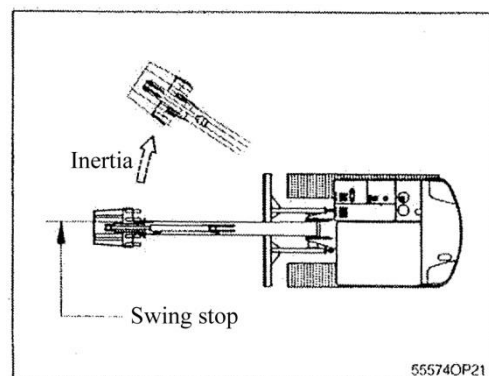
7) Keep the bucket to the dumping position and the arm horizontal when dumping the soil from the bucket.

Operate bucket lever 2 or 3 times when it is hard to dump.

※ Do not use the impact of bucket tooth when dumping.



8) For swing stop, consider that the swing slip distance is created by inertia after neutralizing the swing lever.



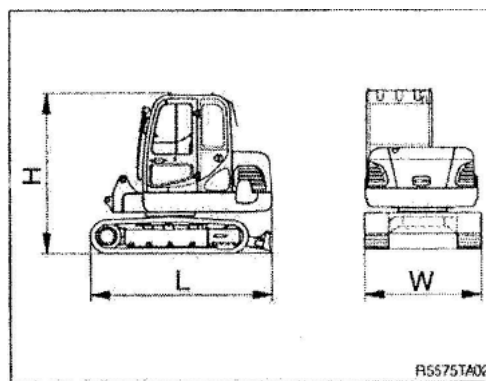
2. Dimension and Weight

1) HX60S/HX60N

(1) Base machine

Mark	Description	Unit	Specification
L	Length	mm	2,900
H	Height	mm	2,550
Wd	Width	mm	1,920
Wt	Weight	kg	4,695

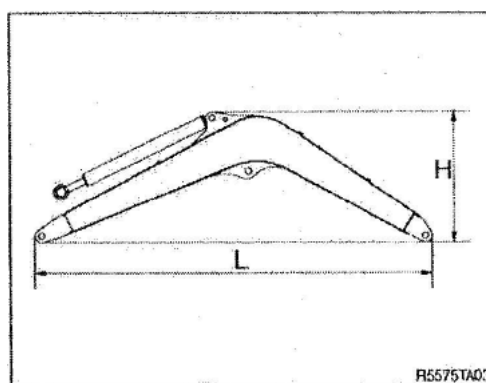
※ With 400 mm (16'') triple grouser shoes and 310 kg counterweight.



(2) Boom assembly

Mark	Description	Unit	Specification
L	Length	mm	3,120
H	Height	mm	1,140
Wd	Width	mm	250
Wt	Weight	kg	336

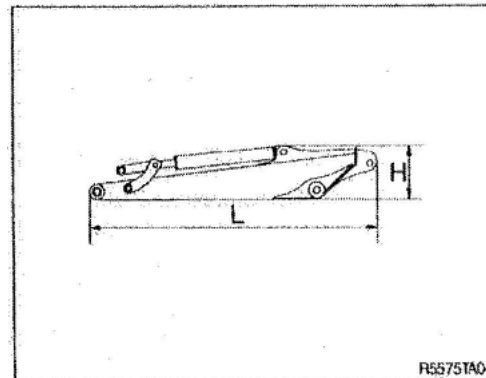
※ 3.0 m (9'10'') boom with arm cylinder (included piping and pins).



(3) Arm assembly

Mark	Description	Unit	Specification
L	Length	mm	2,130
H	Height	mm	450
Wd	Width	mm	170
Wt	Weight	kg	164

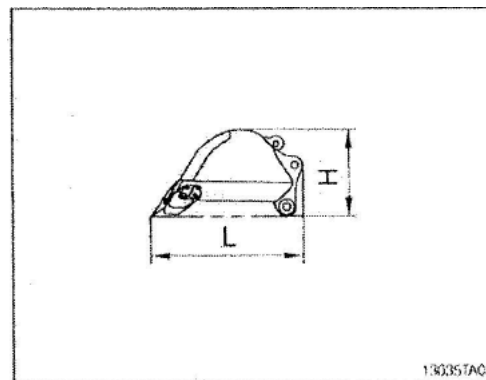
※ 1.6 m (5'3'') arm with bucket cylinder (including linkage and pins).



(4) Bucket assembly

Mark	Description	Unit	Specification
L	Length	mm	1,020
H	Height	mm	570
Wd	Width	mm	770
Wt	Weight	kg	170

※ 0.21 m³ SAE heaped bucket (including tooth and side cutters).



6) Periodical replacement of safety parts

(1) It is desirable to do periodical maintenance the machine for using the machine safely for a long time.

Periodical replacement of safety parts can guarantee not only the safety but also satisfactory performance.

(2) These parts can cause the disaster of life and property as the quality changes by passing time and it is worn, diluted, and gets fatigued due to repeated operations. Thus, the remaining lifetime of such parts cannot be judged by the operator through visual inspection.

(3) Repair or replace these parts if any abnormality is found before the recommended replacement interval.

Periodical Replacement of Safety Parts			Interval
Engine		Fuel hose(tank-engine)	Every 2 years
		Heater hose (heater-engine)	
Hydraulic system	Main circuit	Pump suction hose	Every 2 years
		Pump delivery hose	
		Swing hose	
	Working device	Boom cylinder line hose	Every 2 years
		Arm cylinder line hose	
		Bucket cylinder line hose	

- ※ 1. Replace the O-ring and gasket at the same time when replacing the hose.
- 2. Replace the clamp at the same time if it is cracked during hose check and replacement.

9) When required

Whenever you have trouble in the machine, you must perform the service of related items.

Check Item	Service	Page
Fuel system		
• Fuel tank	Drain or clean	6-25
• Prefilter	Drain or clean	6-25
• Fuel filter	Replace	6-26
Engine lubrication system		
• Engine oil	Change	6-18, 19
• Engine oil filter	Replace	6-18, 19
Engine cooling system		
• Coolant	Add or change	6-20, 21,22, 23
• Radiator	Clean or flush	6-20, 21, 22, 23
Engine air supply system		
• Air cleaner	Replace	6-24
Hydraulic system		
• Hydraulic oil	Add or change	6-27
• Return filter	Replace	6-29
• Pilot line filter	Replace	6-29
• Air breather element	Replace	6-29
• Suction strainer	Clean	6-28
Undercarriage		
• Track tension	Check and adjust	6-32
Bucket		
• Tooth	Replace	6-34
• Side cutter	Replace	6-33
• Linkage	Adjust	6-33
• Bucket assembly	Replace	6-33
Air conditioner and heater		
• Circulating air filter	Clean and replace	6-39

9) Fuel tank

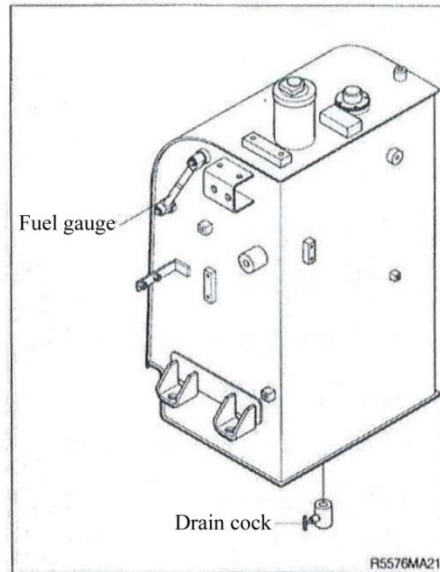
(1) Check the oil level before starting the machine. Fill oil to minimize water condensation.

(2) Drain the water and sediment in the fuel tank by opening the drain cock.

※ Be sure to LOCK the cap of fuel tank.

※ Remove the strainer of the fuel tank and clean it if contaminated.

▲ Stop the engine when refueling.



10) Prefilter

(1) Prepare a waste oil container.

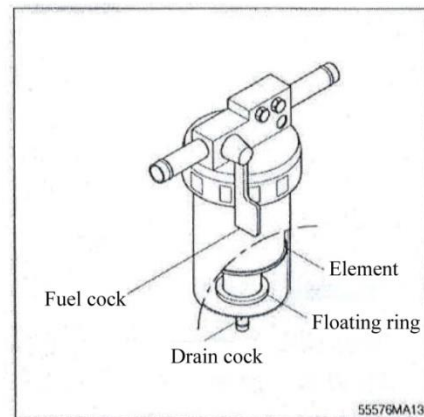
(2) Close the fuel inlet.

(3) Loosen the drain cock at the bottom of the prefilter, and drain any water collected inside.

(4) Drain air inside the fuel system.

※ Use the clean fuel filter and cup.

※ Drain water after the fuel tank is full of fuel.



10-1) Prefilter

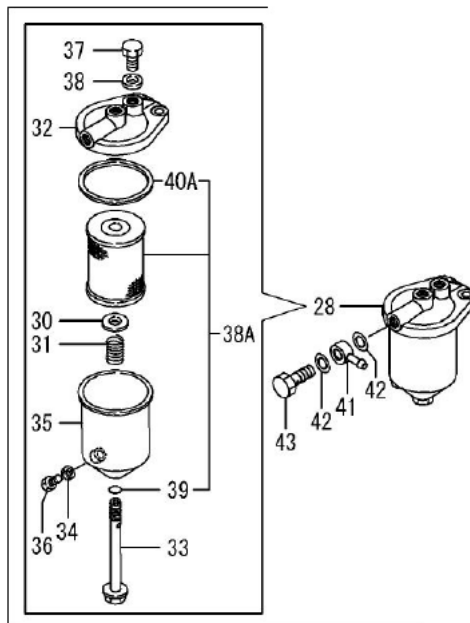
(1) Clean around the filter cover and loosen #33 bolt.

(2) Replace the spare parts (#39 and #40A) and element.

(3) Release air after installation is completed.

※ Check fuel for leakage after starting the engine.

※ The engine cannot be started if there is air inside the fuel system. Drain air by the corresponding method before starting the engine.

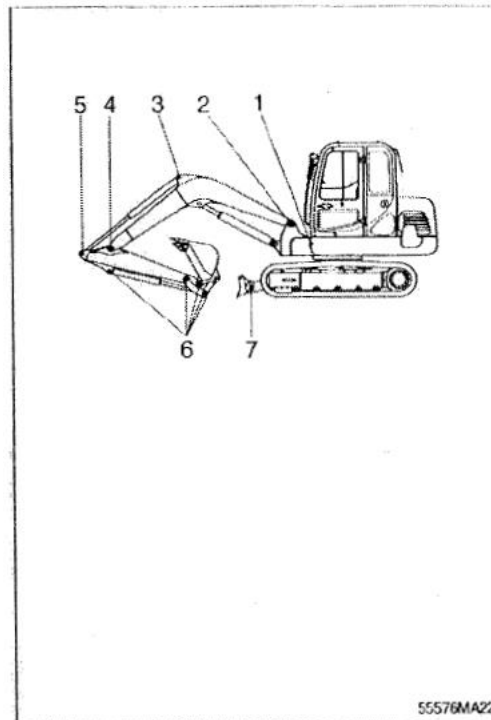


31) Lubrication of pin and bushing

(1) Lubricate each pin of the working device.

Apply grease to the grease nipple according to the lubricating interval.

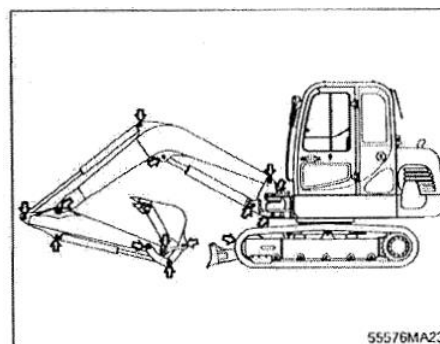
No.	Description	Qty
1	Lubrication manifold at upper frame	4
2	Boom connection pin	2
3	Boom cylinder (head and rod side)	2
4	Arm cylinder pin (head and rod side)	2
5	Boom and arm connection pin	1
6	Bucket cylinder pin (head and rod)	2
	Bucket rod (control rod)	1
	Arm and bucket connection pin	1
	Arm and control rod connection pin	1
7	Dozer connection pin	2
	Dozer cylinder pin	2



※ Shorten the lubrication interval when working in the water or dusty place.

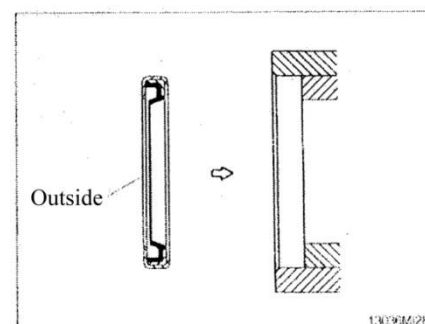
(2) Dust seals are mounted on the rotating part of the working device to extend the lubrication interval.

※ Mount the lip to face outside when replacing the dust seal.



※ If it is assembled in a wrong direction, it will cause fast wear of the pin and bushing, and create noise and vibration during operation.

※ Assemble the seal in the same direction, as shown in the picture. Use a plastic hammer during assembly.



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