

MODEL 1600
SERIES QUANTUM SERIES
BOOK NO. 852
SERIAL NO. _____

CALIFORNIA

Proposition 65 Warning

Diesel engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects, and other reproductive harm.

MACHINE SERIAL NUMBER

The machine serial number is stamped on the serial number plate which is located inside the Operator's Cab, to the right of the operator. The serial number is the only means the distributor or factory has of ensuring that the correct parts will be furnished.

In the event that the serial number plate is lost, there is another number stamped on the right hand boom foot mounting lug on the upper revolving frame. On hydraulic cranes and excavators, the number is stamped between and below the boom hoist cylinder mounting lugs. This number, A, B, C, etc., _____ should then be furnished, as this will enable us to determine the machine serial number.

WDL0620-0E

Printed in Japan

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SAFETY **Warning Signs and Labels**

Always keep the warning signs and labels in readable condition.

[If they get dirty]

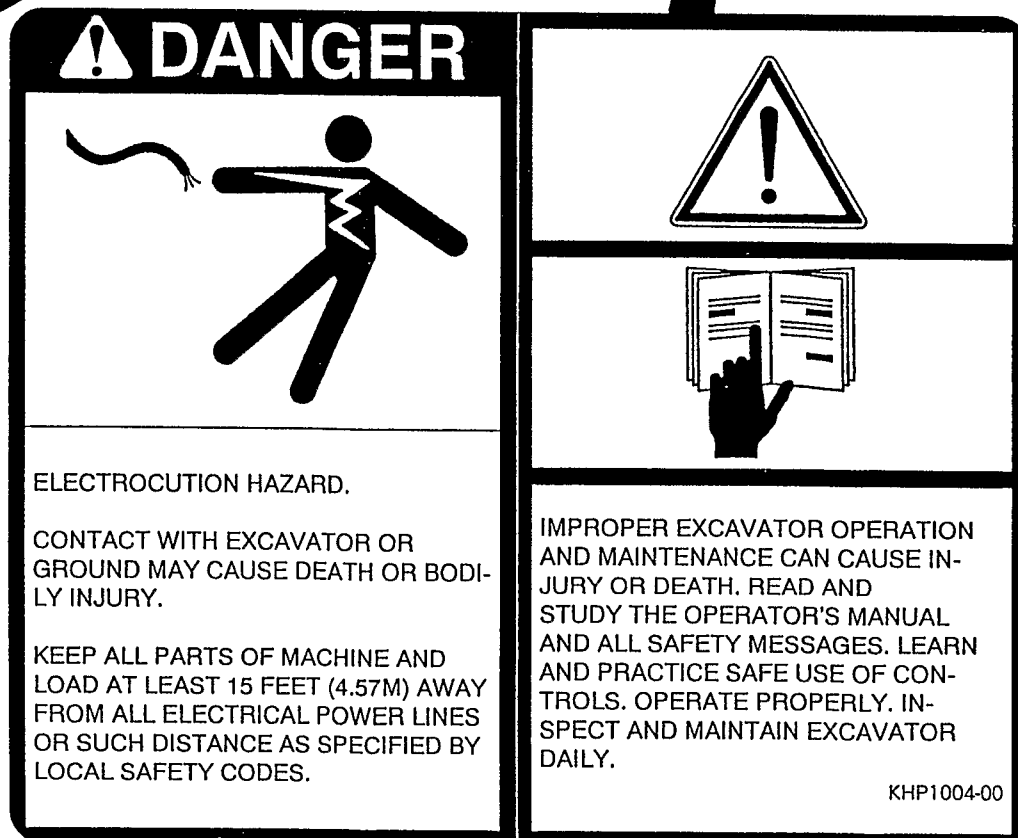
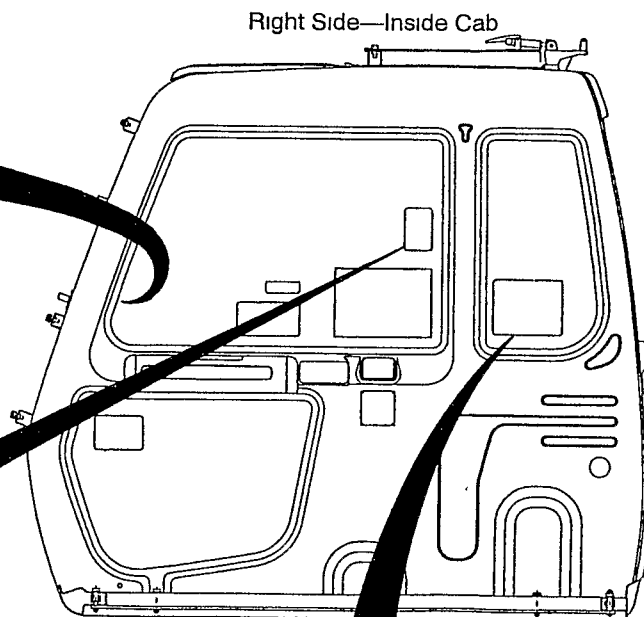
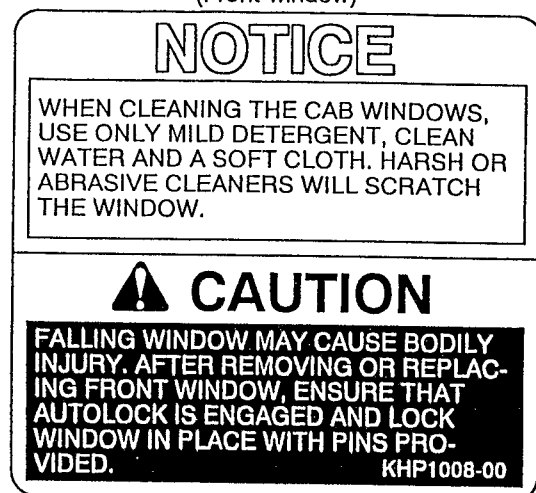
Use water or detergent and remove the dirt. Do not use gasoline or organic solvents. If the dirt cannot be removed, replace the label.

When replacing, check to see that the new one is the same as the one being replaced.

[If they are damaged or lost]

Obtain a new one from your local distributor.

When replacing, check to see that the new one is the same as the one being replaced.
(Front-window)

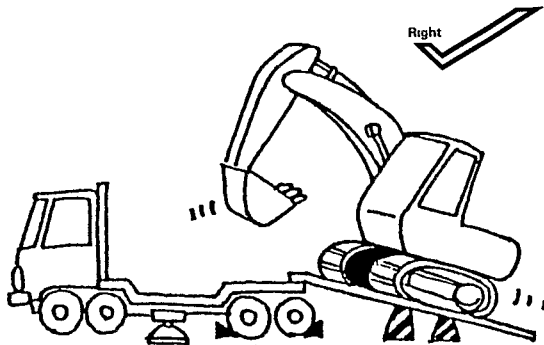




SAFETY During Transportation

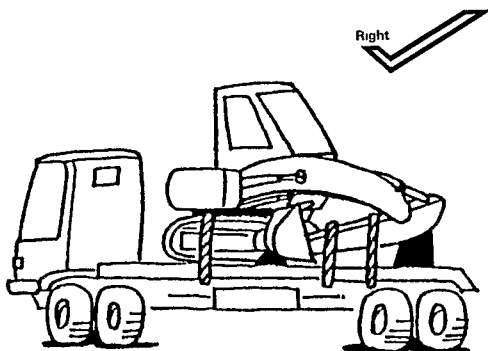
■ Caution during loading and unloading.

- When loading or unloading the machine on the trailer truck, use proper ramps



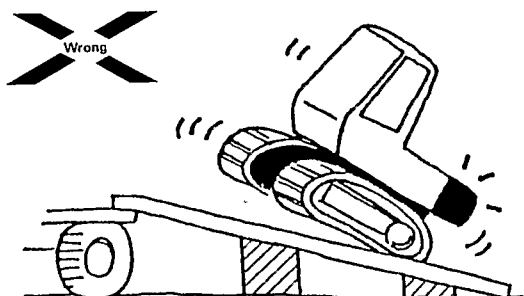
■ Caution during transportation.

- Securely fasten the machine to the trailer to prevent it from moving during transportation



■ Caution during removal of the front attachment.

- The center of gravity will shift to the back when the front attachment is removed
- Take sufficient caution when running the machine

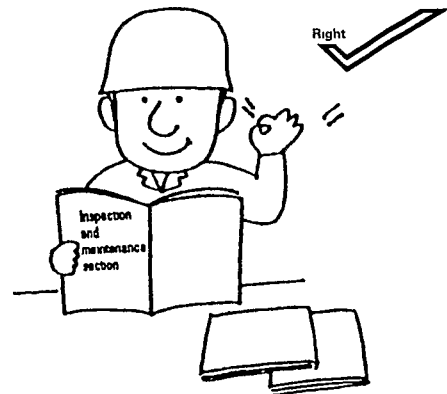


Face the counterweight towards the upper side of the slope when running the machine without the front attachment

Before Inspection and Maintenance

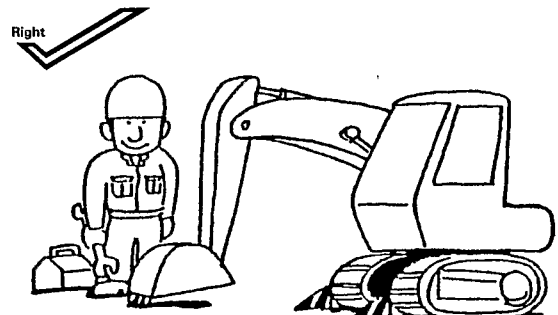
■ Understand the inspection and maintenance method.

- Read and understand the section on Inspection and Maintenance before carrying it out



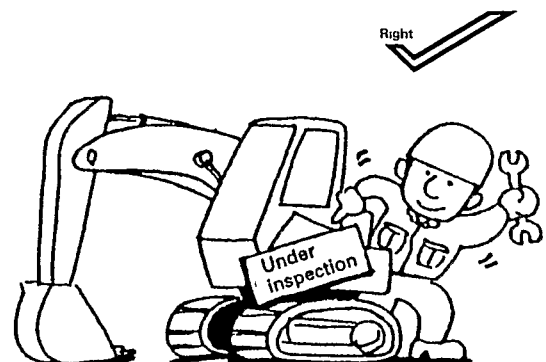
■ Carry out on level ground.

- 1 Select an area which has flat, hard ground and is safe
- 2 Lower the bucket to the ground
- 3 Stop the engine and remove the key
- 4 Block both tracks



■ Put up an "Under Inspection" sign.

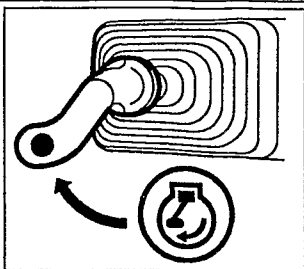
- Hang the "Under Inspection" sign on the cab door or on the operation levers



OPERATION Instruments and Controls

■ Idle Switch (One Touch Idle Switch)

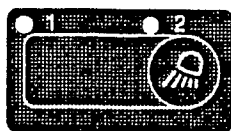
By pressing this switch, the engine r p m can be switched back and forth between low idling and the original r p m amount with each push of the switch. When it is in low idling, the message "ENG IDLING" is indicated.



■ Work Lamp Switch

The switch used to turn the work lamp on and off.

Switch Lamp	Work Lamp
Off	All Off
○ 1 On	House Light On Only
○ 2 On	House and Boom Light On



■ Wiper Switch

The switch that controls the windshield wiper.

Switch Lamp	Wiper Function
Off	Stop
○ INT	Works intermittent
○ CONT	Works continuously



◆ **Using the wipers when the windshield is dry or when it is soiled with dirt or with snow and ice can cause damage to them. Use caution in such cases.**

■ Washer Switch

The switch that controls the spraying of washer fluid. Washer fluid is sprayed and the wipers move as long as the switch is pressed.

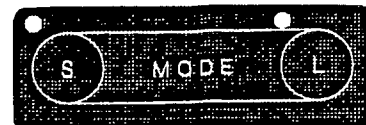


◆ **Do not press when there is no washer fluid or the motor may seize.**

- The washer fluid tank is located in the tool box in front of the fuel tank.

■ (Work) Mode Selection Switch

The switch to choose the movement and strength of the machine to match the work being performed. The mode chosen is indicated.



- When the engine is started, the standard mode is indicated.

S: STANDARD MODE

For standard digging and loading work.

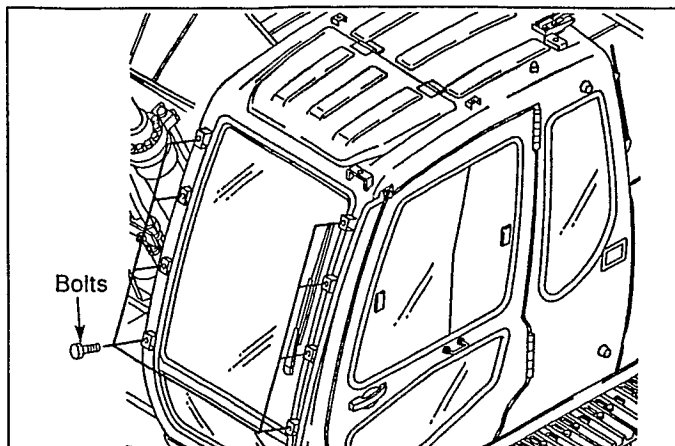
L: LIGHT MODE

For accurate and safe lifting work rather than greater speeds.

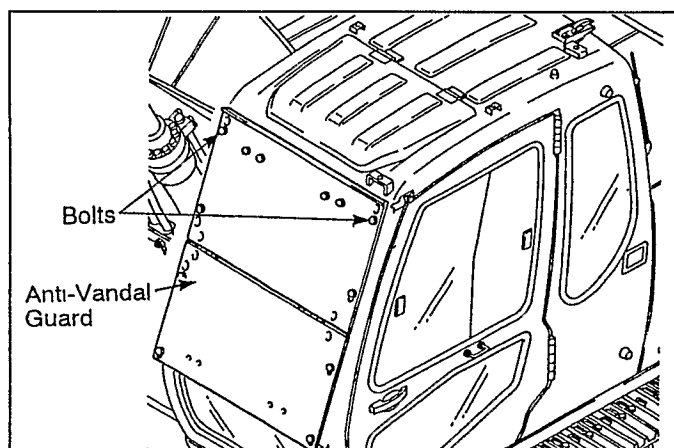
ANTI-VANDAL GUARD

To Install

1. Remove the bolts from the front of the cab

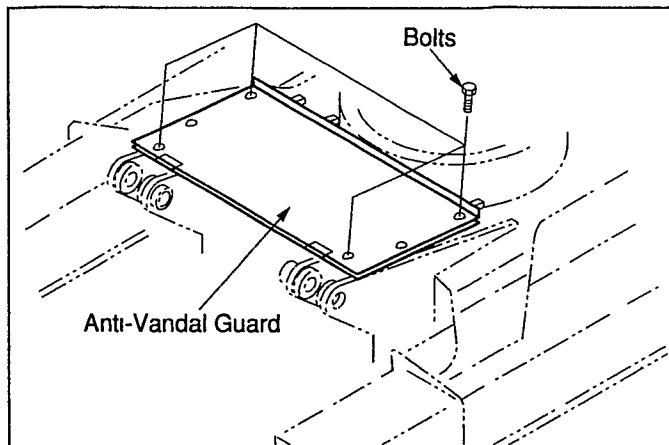


2. Lower and secure the front window.
3. Install the anti-vandal guard.
4. Install the bolts in the front of the cab.



To Remove and Store

1. Remove the bolts from the front of the cab
2. Remove the anti-vandal guard, fold, and store on the front of the lower frame.
3. Fasten with the bolts.

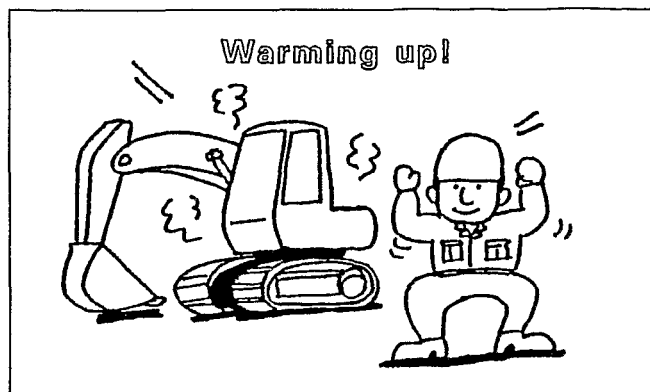


Check After Starting the Engine

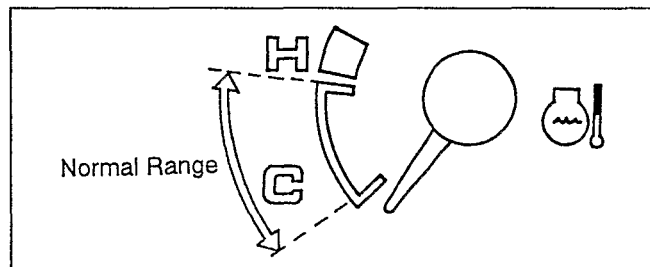
Basic operation after starting the engine

After starting the engine, check and verify the following items during warm up

- 1 Engine running, exhaust color and abnormal noise



- 2 Operation and noise in the hydraulic devices
- 3 Coolant and oil leakage in any part
- 4 Check the horn, buzzer, working lamp and monitor
- 5 Check that the water temperature indicates within the normal values (Within the green area)



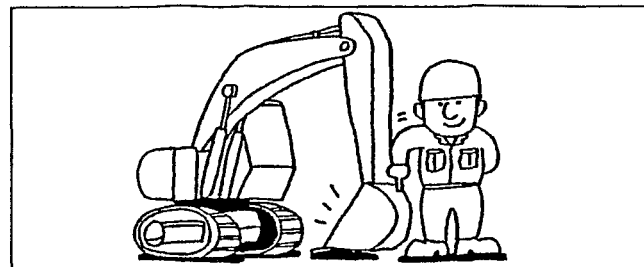
- 6 Check that each operation (travel, swing and attachment) is normal

WARNING

If any problem is found, immediately stop the engine, isolate the cause and correct it immediately.

Stopping the Engine (Normal Operation)

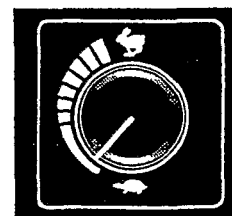
- 1 Park the machine on flat, solid ground and lower the bucket to the ground



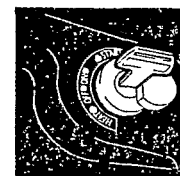
- 2 Press the CONTROL LOCK switch so that the  mark is displayed on the monitor
- 3 When stopping the engine, bring it into low idling mode for about 5 minutes to lower the water temperature.



- Stopping the engine suddenly without cooling it off can cause damage to the engine parts.

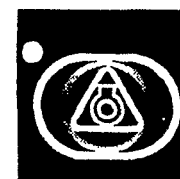


- 4 Turn the key in the starter switch to "OFF" position to stop the engine
- 5 Pull out the key



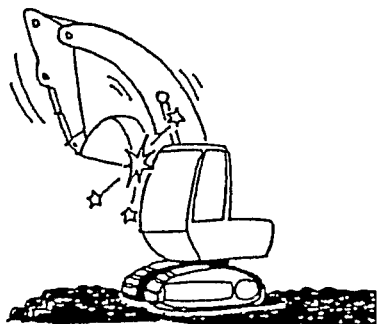
Stopping the Engine (Emergency Stop)

- 1 Press the emergency stop switch and the engine will shutdown. The switch lamp is lit.
- 2 To release the emergency stop switch, press the switch again

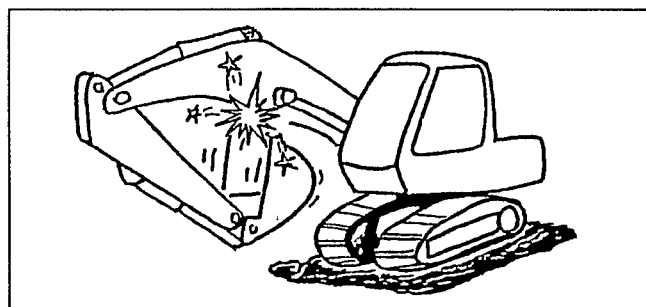


⚠ CAUTION for Interference**⚠ Be careful of interference with the cab.****⚠ WARNING**

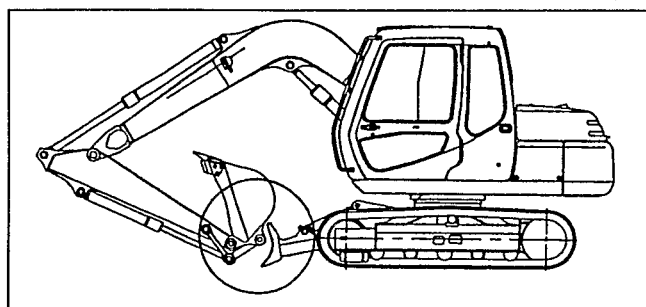
Exercise care when operating a bucket near the cab, as the bucket may hit the cab depending on the type of attachment.



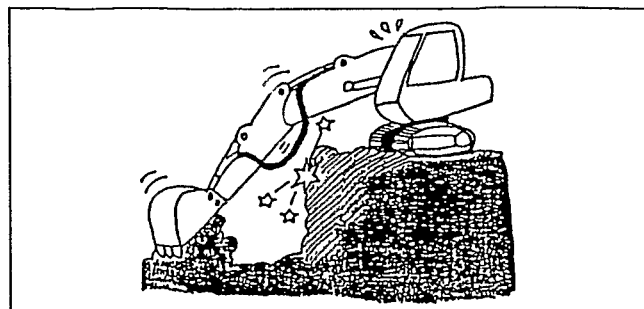
- ◆ When reversing the bucket or when a plate is attached to the bucket teeth, special care is necessary.

⚠ Be careful of interference with the boom

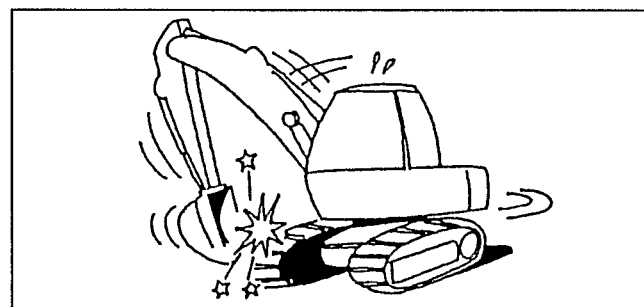
- ◆ Depending on the arm, the bucket may hit boom when the arm is folded under the boom, so be careful.

⚠ Be careful of interference with the blade

- ◆ Take care when digging and folding the attachment for traveling or transporting because the bucket may hit the blade.
- ◆ Swing the upper 180° and place the attachment opposite the blade when transporting a machine with a long arm attachment.

⚠ Be careful of interference when digging deep.

- ◆ Take special care that the bottom of the boom, bucket cylinder hoses, etc. do not hit the ground.
- ◆ Take special care that the boom does not hit the blade.

⚠ Be careful of interference with the tracks.

- ◆ Take care when digging at right angles or diagonal to the crawler because the attachment may hit the tracks.
- ◆ Take care that the bucket does not hit the blade.

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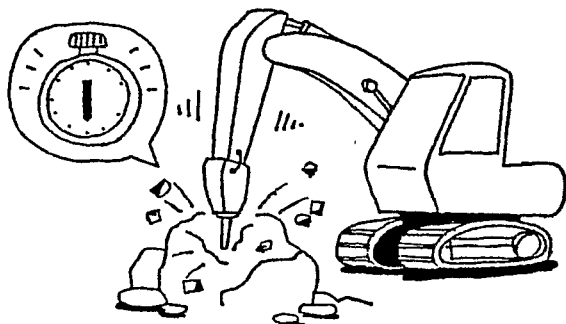
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⚠ Caution for using the hydraulic breaker

⚠ Keep continuous stroking under one minute!

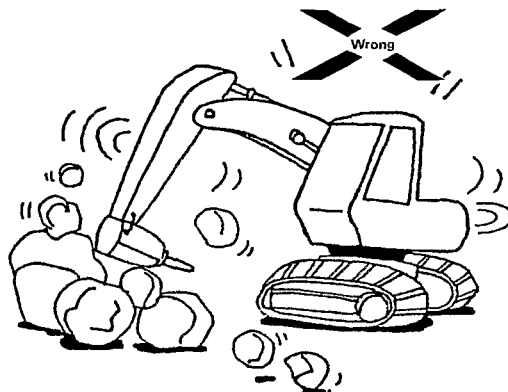
If one place cannot be broken within one minute of continuous stroking, change the stroking area

⚠ Be careful of flying fragments during breaker operations. If necessary, attach a guard



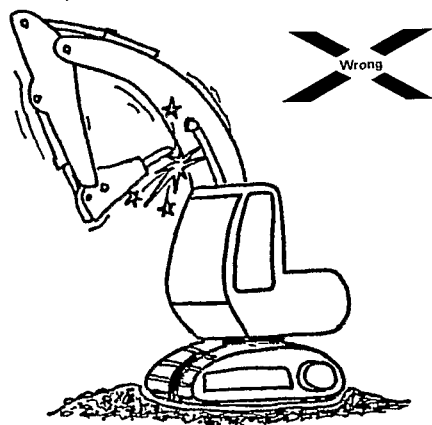
⚠ Prohibition of work using swing force.

Work using swing force leads to damage of the swing unit, breaker, arm or boom



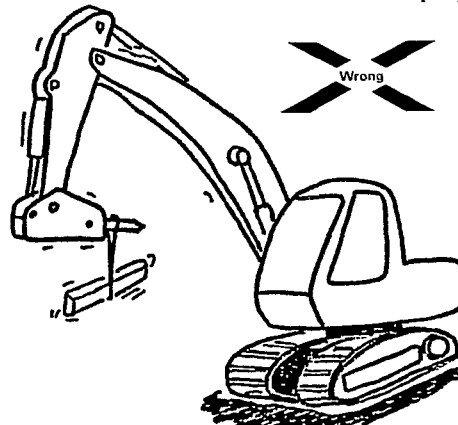
⚠ Caution about the tool interfering with the boom.

Be especially careful when tool is folded in for transportation, etc



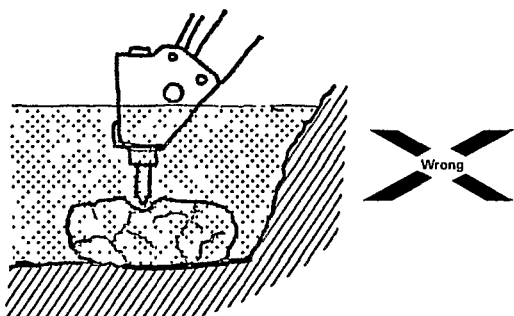
⚠ Prohibition of lifting work with the breaker.

Lifting work with the breaker leads to damage of the breaker. Use of the breaker for its intended purpose only



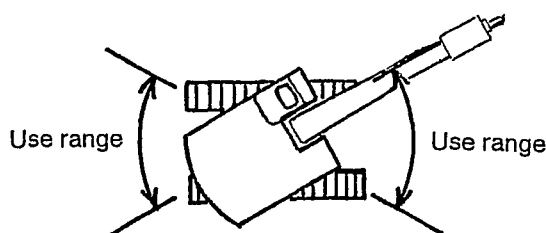
⚠ Caution about under water work!

Underwater work with the standard hydraulic breaker can lead to damage to the hydraulic devices of the machine. Don't use the hammer under water



⚠ Use the breaker in front or in back of the machine.

Use of the breaker at the side leads to a decrease in life of the crawler. Use the breaker over the ends



OPERATING INSTRUCTIONS **Storage**

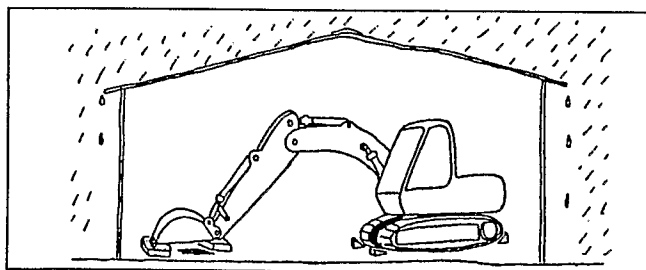
Before storing the machine for a month or more, perform the following to prevent decrease in machine performance the next time it is operated.

■ Before Storage

1. Sufficiently wash the machine, especially the crawler.
2. Lubricate each part.
 - Grease the attachment and turntable bearing.
3. Check the lubricant amount and cleanliness.
 - Refill if low.
 - Replace when excessively dirty.
4. Refer to the storage instructions in the Operator's Manual for the engine. If the temperature is low with the possibility that the coolant may freeze, mix it with anti-freeze or drain it completely.
5. After cleaning and washing, store the machine in a dry, indoor site. If it must be stored outdoors, lay timber on the ground under the machine and cover the machine with protective covers.

(Outdoor storage)

- 1) Select a well drained, ventilated area.
 - 2) The area should be of level concrete, broken rocks or gravel or place suitable blocking under the tracks to prevent the machine from being in direct contact with the ground.
6. Lower the bucket to the ground and block the tracks.
 7. Coat the exposed area of the piston rod of all hydraulic cylinders with anti-rust coating.



8. Bring all the operation levers into neutral.
9. Remove the battery, completely charge it and store it or remove one terminal (⊖ terminal).
10. Cover the machine to prevent rain from entering the house. This will help prevent rust.

■ During Storage

When the machine is stored for a month or more, check the operation of each function every month. This will prevent rust in the engine, deterioration at the seals and rusting of hydraulic parts. Check to see if there is any coolant.

★ **Before operating the machine, wipe off the anti-rust oil from the hydraulic cylinder rods.**

⚠ WARNING

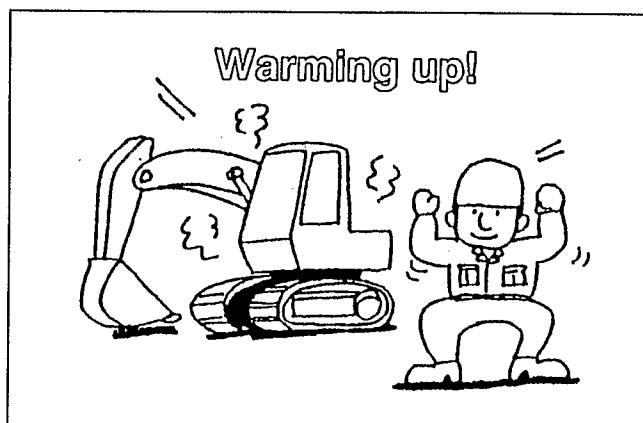
If the rust-preventing operation must be performed indoors, open the windows and doors for ventilation to prevent gas poisoning.

■ After Storage

1. Check the levels of oil and water and refill as necessary. Pay special attention to the coolant.

(Since the lubricants and grease deteriorate during storage, take sufficient care to check them at the time of reuse.)

2. Completely wipe off the anti-rust oil.
3. After starting the engine, sufficiently warm it up and repeat the travel, swing and digging operations several times each.



★ If the machine is stored without performing the monthly rust-prevention operation, contact the nearest distributor for instructions.

Fuel and Lubricants according to Ambient Temperature

**CAUTION**

When operating the machine under special conditions (temperatures other than -5 to $+104^{\circ}\text{F}$ (-20 to $+40^{\circ}\text{C}$), contact your distributor for the recommended fuel and lubricants.

Fuel and oil

Choose from the table to the right according to temperature.

Anti-freeze

Mix anti-freeze into the coolant when the temperature falls below 32°F (0°C). Refer to the section on operating in cold climates for the mixture ratio.

Supply point	Oil type	Use according to ambient temperature							
		$^{\circ}\text{C}$	-20	-10	0	+10	+20	+30	+40
		$^{\circ}\text{F}$	-5	+14	+32	+50	+68	+86	+104
Engine oil pan	Engine oil API-CD class	SAE 20W-20CD							
		SAE 30							
		SAE 10W-30							
		SAE 15W-40CD							
Travel reduction gear	Gear oil API-GL-4 class	SAE 90							
Hydraulic oil tank	Hydraulic oil Anti-wear type	ISO GRADE 46							
		ISO GRADE 32							
Fuel tank	DIESEL FUEL ASTM-D-975	No. 2D							
		No. 1D							
Cooling system	Water with long life coolant ASTM D3306	Add antifreeze solution							
Turntable bearing	E.P. Grease Extreme pres- sure type	EP 1							
		EP 2							

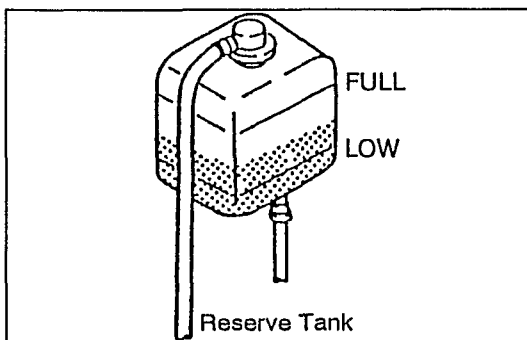
Cooling System

⚠ WARNING

When the radiator coolant temperature is high, do not remove the radiator cap.
Hot coolant may come out forcefully causing severe burns.
Wait until all parts have cooled down before beginning work.

⚠ CAUTION

- ◆ When the overheat warning is displayed on the monitor and the buzzer sounds, check the coolant level, radiator clogging and V-belt tension.
- ◆ Mix the coolant with anti-freeze (long-life coolant) according to the ambient temperature.

**Inspection and Refilling of Coolant 【Before Work Inspection】**

Check the level of coolant in the reserve tank. If low, remove the cap and add coolant (long-life coolant).

(The proper level is between FULL and LOW)

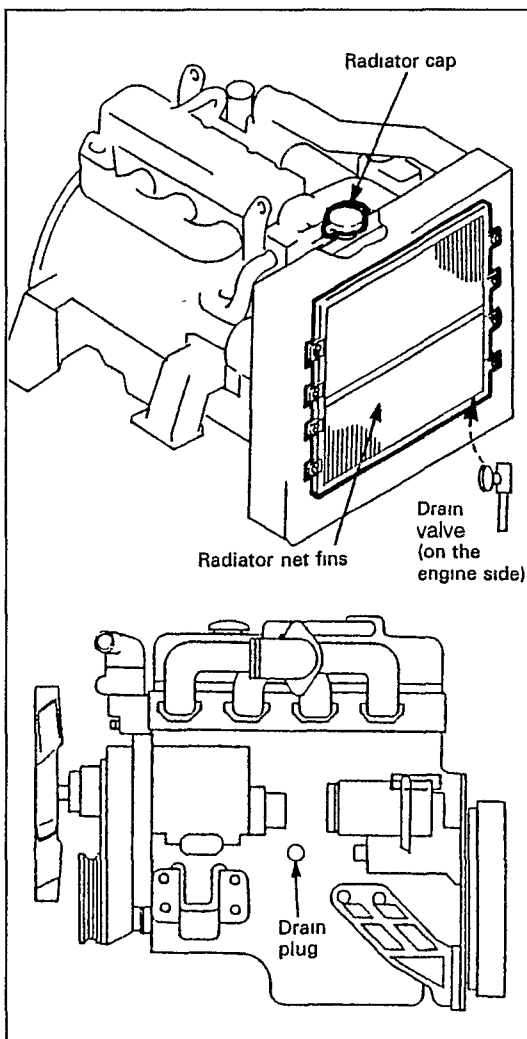
**Replacing the Coolant
【Long-Life Coolant: Every 2 Years】
【Spring and Autumn: Twice a Year When Anti-Freeze is Used】**

(Refer to the Operator's Manual for the engine.)

- 1) Remove access panel
- 2) Remove the radiator cap, loosen the drain valves on the engine and radiator and drain the coolant
- 3) Flush the cooling system. Close the drain valves, fill the radiator with tap water, run the engine at slightly higher than idling speed for about 10 minutes raising the temperature to about 170°F (about 80°C) and then drain

⚠ WARNING

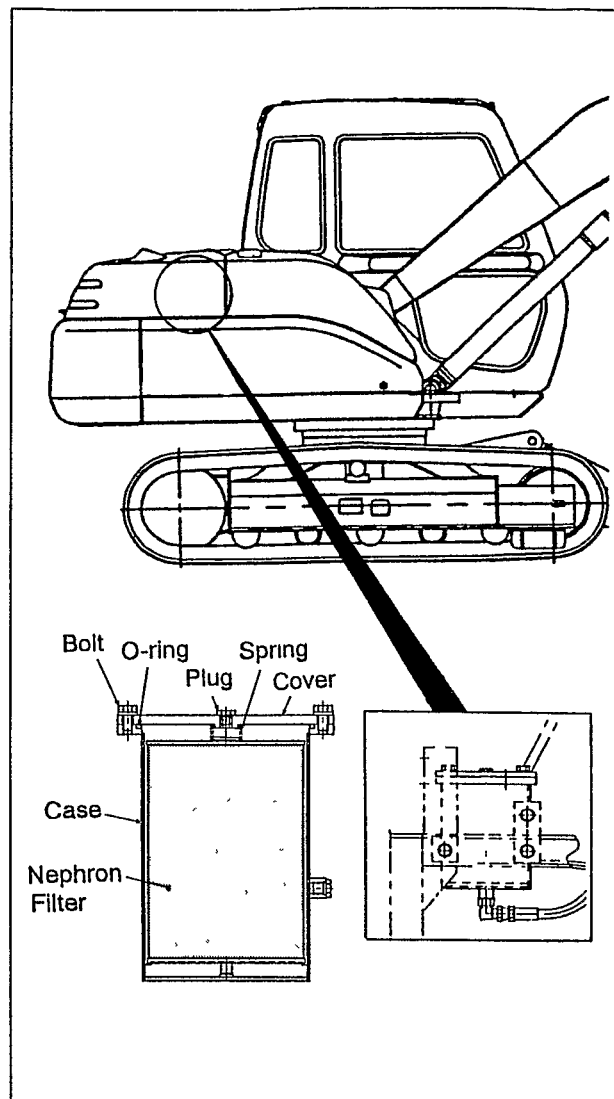
Be careful not to get burned when draining the hot coolant.



Repeat the radiator cleaning until the drained water is clear

- 4) Fill the radiator to the radiator cap with coolant water (long-life coolant), run the engine for about 10 minutes and sufficiently expel air from the cooling system
 - 5) Stop the engine and check the coolant level. Refill if low
- For the mixture ratio of the long-life coolant, refer to section on operating in cold climates

Replacing The Nephron Filter 【Maintenance Interval: Every 1000 hours】



⚠ WARNING

The hydraulic oil is hot right after stopping the engine. Wait until it has cooled down (less than 100°F (40°C)) before beginning work.

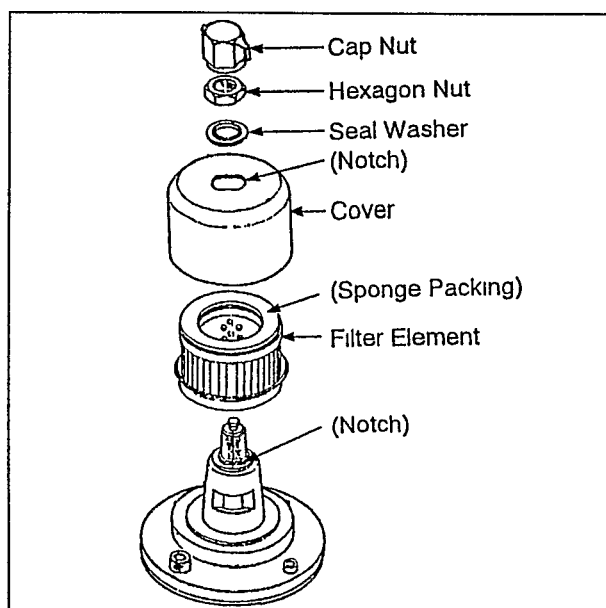
Release the internal pressure of the tank before beginning work.

- 1) Open the engine hood
- 2) Remove the cover and remove the o-ring and spring
- 3) Lift the filter out slowly (so as not to drop any contaminants from the filter)
- 4) Peel off the 4 foil seals of the new filter (one on lower side, two on the sides and one on the upper side)

Note: If the foil is not removed, the filter will not function properly.

- 5) Carefully install the new filter.
- 6) Install the spring, o-ring and cover
- 7) Start the engine and set in low idling. Loosen the plug and after the air is released, tighten the plug (When hydraulic oil comes out of the plug, air bleeding is completed)
- 8) Check the hydraulic oil level and refill if low.
- 9) Wipe off any spilled oil.

Replacing The Air Breather Element 【Maintenance Interval: Every 1000 hours】



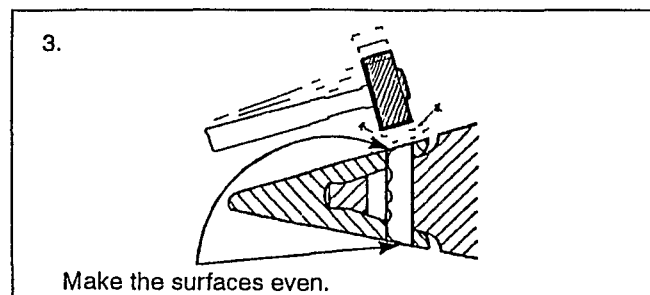
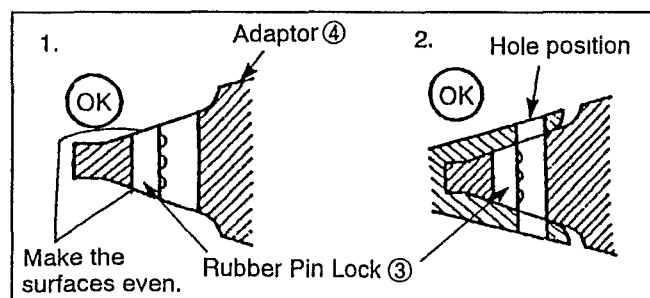
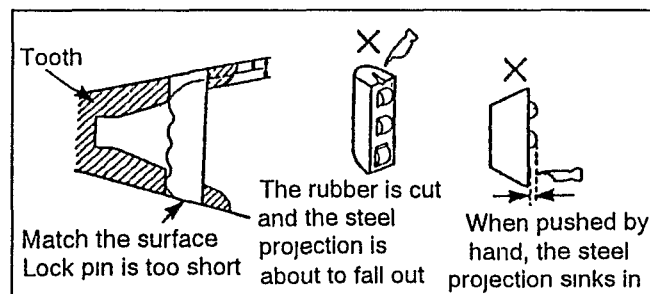
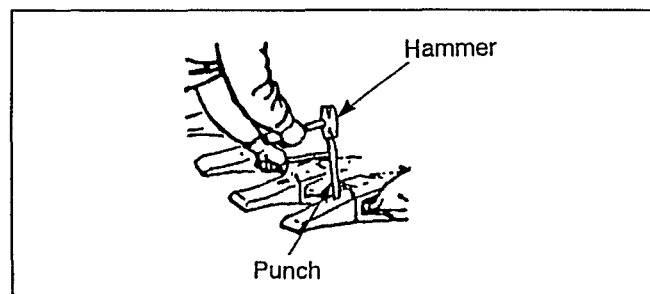
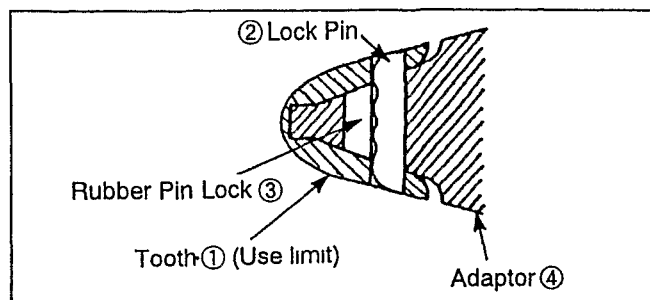
⚠ WARNING

The hydraulic oil is hot right after stopping the engine. Wait until the oil cools (less than 100°F (40°C)) before beginning work.

1. Remove the cap nut of the air breather on top of the hydraulic oil tank.
2. Remove in the following order: hexagonal nut → seal washer → cover
3. Replace the old filter element with a new one. When installing the new filter element, put the sponge packing on top
4. Adjust the notch portion and install the cover and the following in this order: seal washer → hexagonal nut → cap nut.

⚠ WARNING

- ◆ When installing and removing the bucket teeth and side cutters, place the bucket so it won't turn over or fall.
- ◆ Wear protective equipment (safety goggles, gloves, etc.) during work.

Replacement of Bucket Teeth 【As necessary】[Standard type]**■ Removing the Bucket Teeth**

Inspect the bucket teeth for wear and if there are any holes or cracks, replace them

Replace the teeth before they begin to wear down to the adaptor

1. Use a hammer and punch. Remove the lock pin ② attached to the bucket and remove the tooth ①.

2. Inspect the removed lock pin ② and rubber pin lock ③
Replace any damaged pins

[It is recommended to replace the rubber pin lock with a new one each time a tooth is replaced]

- 3 Clean the adaptor

■ Bucket Teeth Installation

- 1 Insert the new rubber pin lock ③ into the adaptor ④.

Insert it so that it does not extend beyond the adaptor surface.

2. Attach the tooth ① to the adaptor ④.

Check to see that the hole of the tooth ① and the hole of the adaptor ④ match

3. Using the hammer, install the lock pin ② so that it is even with the surface of the tooth ①.

4. Check to see that the tooth is securely fastened

【SPECIFICATIONS】

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SPECIFICATIONS

SPECIFICATIONS Pressure Measurement and Adjustment

PRESSURE MEASUREMENT

(a) Standard Condition

Condition \ Model	1600Q
Work mode	S mode
Hydraulic oil temperature	115 to 130°F (45 to 55 °C)
Engine revolutions	No load maximum revolutions

(b) Standard Value

The pressure values are designed values (The exact values may be different.)

Part name		Set pressure	Measurement method
Main relief / Travel		4100 ± 50 PSI (290 ⁺⁰ ₋₅ kgf/cm ²)	Arm relief
Boom port relief	Up	4500 ± 50 PSI (310 ⁺¹⁰ ₋₀ kgf/cm ²)	See note) Boom up relief
	Down	3800 ± 50 PSI (260 ⁺¹⁰ ₋₀ kgf/cm ²)	Boom down relief
Bucket port relief	Out, In	4500 ± 50 PSI (310 ⁺¹⁰ ₋₀ kgf/cm ²)	See note) Bucket relief
Arm port relief	Out, In	4500 ± 50 PSI (310 ⁺¹⁰ ₋₀ kgf/cm ²)	See note) Arm relief
Swing port relief	Left, Right	3000 ± 50 PSI (210 ± 5kgf/cm ²)	Swing relief
Blade main relief		3300 ± 50 PSI (230 ± 5kgf/cm ²)	Blade up
Blade port relief	Up, Down	3800 ± 50 PSI (260 ± 5kgf/cm ²)	See note) Blade relief
Pilot relief		600 ± 50 PSI (40 ± 5kgf/cm ²)	Lever neutral

Note) Tighten the main relief 180° and measure each actuator pressure

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