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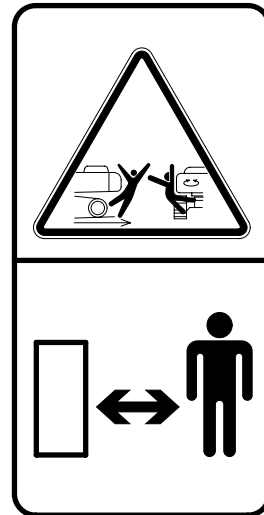
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11) KEEP CLEAR-SIDE (item 13)

This warning label is positioned on the side of LH rear side cover.

- ⚠ To prevent serious personal injury or death keep clear of machine swing radius.
- ⚠ Do not deface or remove this label from the machine.



21070FW13

12) STAY FIX

- ⚠ Be sure to support the stay when the door needs to be opened.
- ⚠ Be careful that the opened door may be closed by the external or natural force like strong wind.

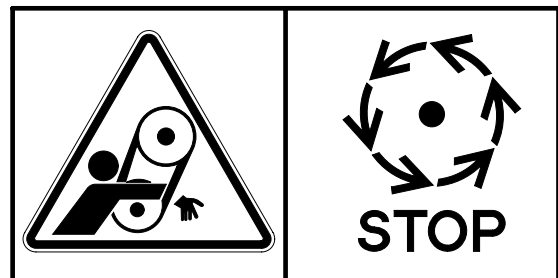


21070FW14

13) SHEARING-ENGINE HOOD (item 15)

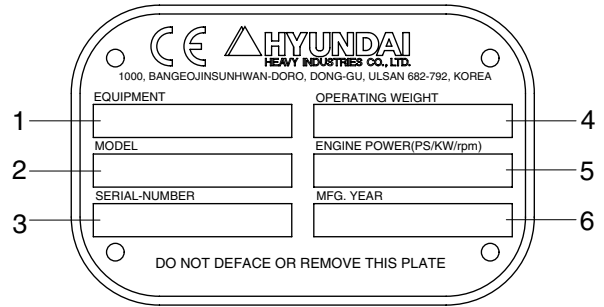
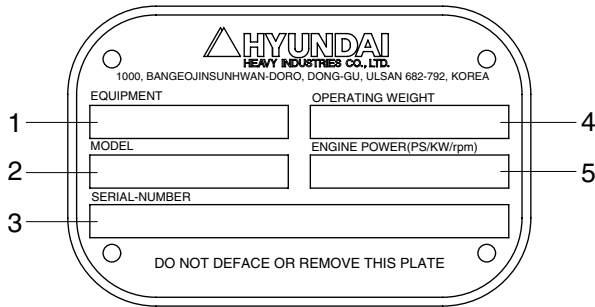
This warning label is positioned on the engine hood.

- ⚠ Do not open the engine hood during the engine's running.
- ⚠ Do not touch exhaust pipe or it may cause severe burn.

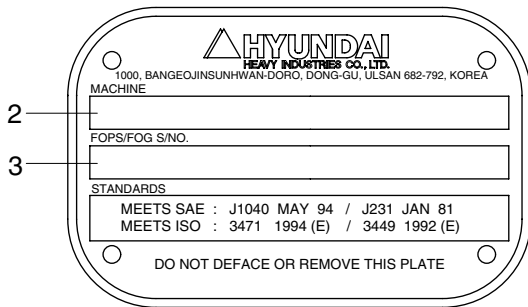


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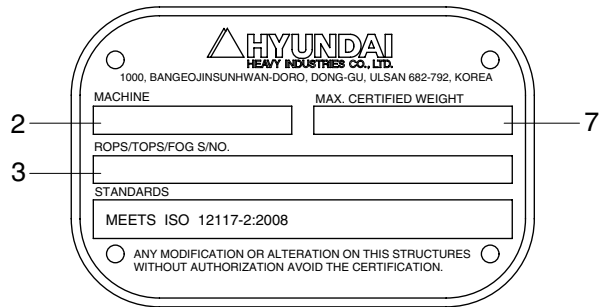
MACHINE DATA PLATE



FOR EU ONLY



FOR FOPS/FOG



ROPS

2609A0FW01

- | | | | | | |
|---|--------------------------|---|--------------|---|--------------------|
| 1 | Equipment | 2 | Model name | 3 | Serial number |
| 4 | Operating weight | 5 | Engine power | 6 | Manufacturing year |
| 7 | Maximum certified weight | | | | |

※ The machine serial number assigned to this particular machine and should be used when requesting information or ordering service parts for this machine from your authorized HYUNDAI dealer. The machine serial number is also stamped on the frame.

Replace damaged battery cable (s) and replace any related parts. Eliminate any fouling, which may have caused insulation failure or related component damage or wear. Ensure that all components are reinstalled correctly.

An exposed wire on the battery cable may cause a short ground if the exposed area comes into contact with a grounded surface. A battery cable short produces heat from the battery current, which may be a fire hazard.

An exposed wire on the ground cable between the battery and the disconnect switch may cause the disconnect switch to be bypassed if the exposed area comes into contact with a grounded surface. This action may result in an unsafe condition for servicing the machine. Repair components or replace components before servicing the machine.

▲ Fire on a machine can result in personal injury or death. Exposed battery cables that come into contact with a grounded connection can result in fires. Replace cables and related parts that show signs of wear or damage. Contact your Hyundai Heavy Industries dealer.

Wiring

Check electrical wires daily. If any of the following conditions exist, replace parts before you operate the machine.

- Fraying
- Signs of abrasion or wear
- Cracking
- Discoloration
- Cuts on insulation
- Other damage

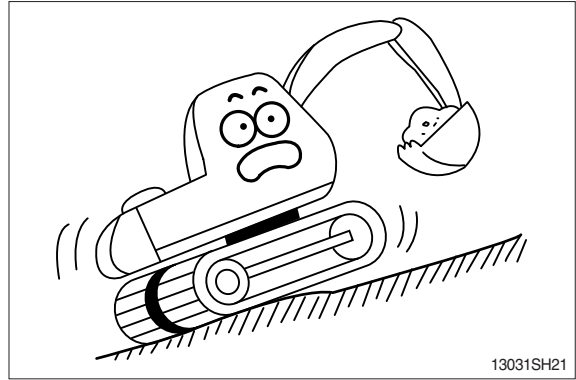
Make sure that all clamps, guards, clips, and straps are reinstalled correctly. This action will help to prevent vibration, rubbing against other parts, and excessive heat during machine operation.

Attaching electrical wiring to hoses and tubes that contain flammable fluids or combustible fluids should be avoided.

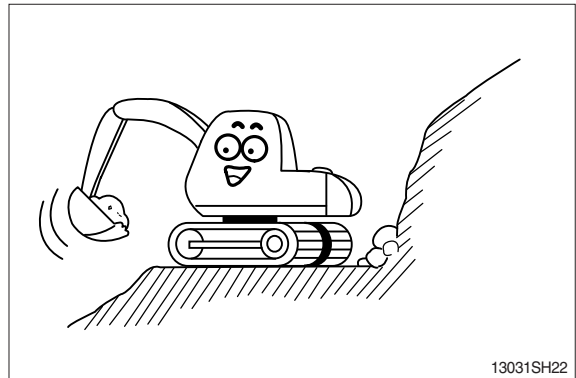
Consult your Hyundai Heavy Industries dealer for repair or for replacement parts.

Keep wiring and electrical connections free of debris.

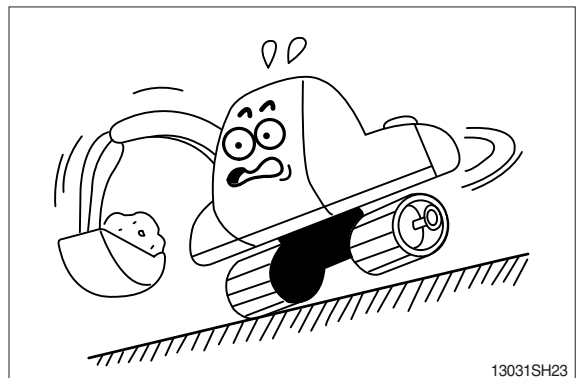
The operation on a slope is dangerous.
Avoid operating the machine on a slope of over 10 degree.



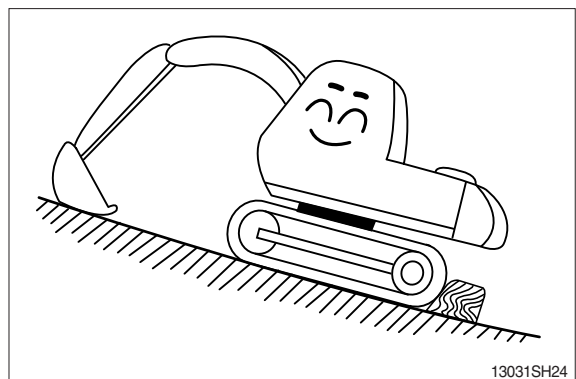
Operate the machine after making ground flat when operation is required on a slope.



The swing on the slope can be danger of rolling over.
Do not operate to swing the machine with the bucket loaded on a slope since the machine may lose its balance under such an instance.

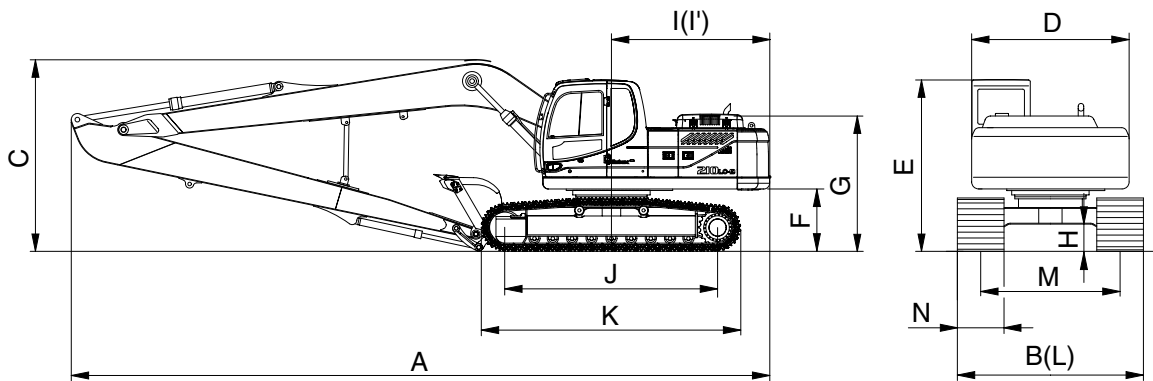


Avoid parking and stopping on a slope.
Lower the bucket to the ground and block the track when parking.



2) R220LC-9A LONG REACH

- 8.2 m (26' 11") BOOM and 6.3 m (20' 8") ARM



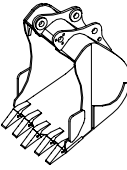
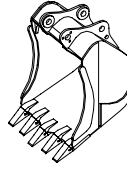
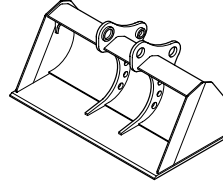
21092SP06

Description		Unit	Specification
Operating weight		kg (lb)	24360 (53700)
Bucket capacity (SAE heaped), standard		m ³ (yd ³)	0.52 (0.68)
Overall length	A	mm (ft-in)	12030 (39' 6")
Overall width, with 800 mm shoe	B		3190 (10' 6")
Overall height	C		3280 (10' 9")
Superstructure width	D		2740 (9' 0")
Overall height of cab	E		2920 (9' 7")
Ground clearance of counterweight	F		1060 (3' 6")
Engine cover height	G		2320 (7' 7")
Minimum ground clearance	H		480 (1' 7")
Rear-end distance	I		2770 (9' 1")
Rear-end swing radius	I'		2840 (9' 4")
Distance between tumbler	J		3650 (12' 0")
Undercarriage length	K		4440 (14' 7")
Undercarriage width	L		3190 (10' 6")
Track gauge	M		2390 (7' 10")
Track shoe width, standard	N		800 (32")
Travel speed (low/high)			km/hr (mph)
Swing speed		rpm	12.0
Gradeability		Degree (%)	35 (70)
Ground pressure (800 mm shoe)		kgf/cm ² (psi)	0.42 (5.97)
Max traction force		kg (lb)	21100 (46500)

4) R220LC-9A AMPHIBIOUS

Item	R220LC-9A AMPHIBIOUS	
	kg	lb
Upperstructure assembly	9400	20720
Main frame weld assembly	1920	4230
Engine assembly	520	1150
Main pump assembly	140	310
Main control valve assembly	220	485
Swing motor assembly	240	530
Hydraulic oil tank assembly	240	530
Fuel tank assembly	195	430
Counterweight	5300	11680
Cab assembly	500	1100
Undercarriage assembly	21130	46580
Swing bearing	290	640
Travel motor assembly	300	660
Turning joint	55	120
Front attachment assembly (8.2 m boom, 6.3 m arm, 0.52 m ³ SAE heaped bucket)	4600	10140
8.2 m boom assembly	2105	4640
6.3 m arm assembly	1100	2430
0.52 m ³ SAE heaped bucket	465	1030
Boom cylinder assembly	180	400
Arm cylinder assembly	270	600
Bucket cylinder assembly	130	290
Bucket control linkage assembly	170	370

2) HEAVY DUTY, ROCK AND SLOPE FINISHING BUCKET

		
◆ 0.74, 0.90, 1.05 m ³ SAE heaped bucket	◎ 0.87, 1.20 m ³ SAE heaped bucket	■ 0.75 m ³ SAE heaped bucket

Capacity		Width		Weight	Recommendation			
SAE heaped	CECE heaped	Without side cutter	With side cutter		5.68 m (18' 8") boom			
					2.0 m arm (6' 7")	2.4 m arm (7' 10")	2.92 m arm (9' 7")	3.90 m arm (12' 10")
◆0.74 m ³ (0.97 yd ³)	0.65 m ³ (0.85 yd ³)	985 mm (38.8")	-	770 kg (1700 lb)				
◆0.90 m ³ (1.18 yd ³)	0.80 m ³ (1.05 yd ³)	1070 mm (42.0")	-	810 kg (1790 lb)				
◆1.05 m ³ (1.37 yd ³)	0.92 m ³ (1.20 yd ³)	1290 mm (50.8")	-	890 kg (1960 lb)				
◎0.87 m ³ (1.14 yd ³)	0.75 m ³ (0.98 yd ³)	1140 mm (44.9")	-	900 kg (1980 lb)				
◎1.20 m ³ (1.57 yd ³)	1.00 m ³ (1.31 yd ³)	1410 mm (55.5")	-	1030 kg (2270 lb)				
■0.75 m ³ (0.98 yd ³)	0.65 m ³ (0.85 yd ³)	1790 mm (70.5")	-	880 kg (1940 lb)				

◆ : Heavy duty bucket ◎ : Rock bucket (heavy) ■ : Slope finishing bucket

 Applicable for materials with density of 2000 kgf/m³ (3370 lbf/yd³) or less

 Applicable for materials with density of 1600 kgf/m³ (2700 lbf/yd³) or less

 Applicable for materials with density of 1100 kgf/m³ (1850 lbf/yd³) or less

2) GAUGE

(1) Operation screen

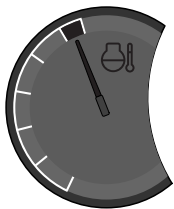
When you first turn starting switch ON, the operation screen will appear.



※ Operation screen type can be set by the screen type menu of the display.

Refer to page 3-22 for details.


(2) Engine coolant temperature gauge




2609A3CD14

① This gauge indicates the temperature of coolant.

- White range : 40-107°C (104-225°F)
- Red range : Above 107°C (225°F)

② If the indicator is in the red range or  lamp blinks in red, turn OFF the engine and check the engine cooling system.

※ If the gauge indicates the red range or  lamp blinks in red even though the machine is on the normal condition, check the electric device as that can be caused by the poor connection of electricity or sensor.


(3) Hydraulic oil temperature gauge




2609A3CD15

① This gauge indicates the temperature of hydraulic oil.

- White range : 40-105°C(104-221°F)
- Red range : Above 105°C(221°F)

② If the indicator is in the red range or  lamp blinks is red, reduce the load on the system. If the gauge stays in the red range, stop the machine and check the cause of the problem.

※ If the gauge indicates the red range or  lamp blinks in red even though the machine is on the normal condition, check the electric device as that can be caused by the poor connection of electricity or sensor.


(4) Fuel level gauge



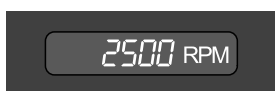
2609A3CD16

① This gauge indicates the amount of fuel in the fuel tank.

② Fill the fuel when the red range, or  lamp blinks in red.

※ If the gauge indicates the red range or  lamp blinks in red even though the machine is on the normal condition, check the electric device as that can be caused by the poor connection of electricity or sensor.

(5) RPM / Tripmeter display



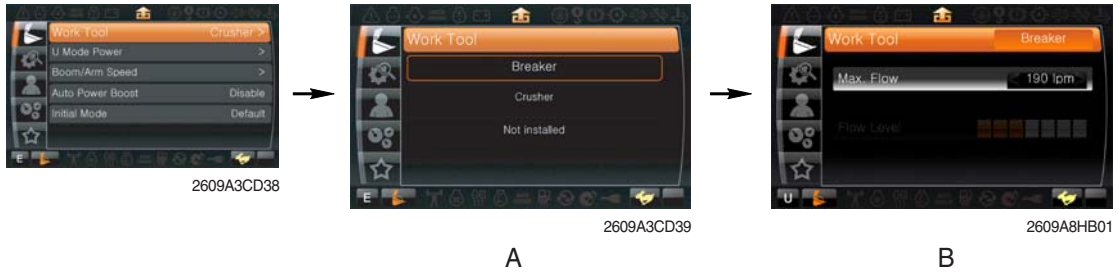
2609A3CD17

① This displays the engine speed or the tripmeter.

※ Refer to page 3-21,23 for details.

(2) Mode setup

① Work tool



- A : Select one installed optional attachment.
- B : Max flow - Set the maximum flow for the attachment.
 Flow level - Reduce the operating flow from maximum flow.
 Breaker - Max 7 steps, Reduced 10 lpm each step.
 Crusher - Max 4 steps, Reduced 20 lpm each step.

※ The flow level is displayed with the work mode pilot lamp.

② U mode power



- Engine high idle rpm, auto idle rpm and pump torque (power shift) can be modulated and memorized separately in U-mode.
- U-mode can be activated by user mode switch.

Step (■)	Engine speed (rpm)	Idle speed (rpm)	Power shift (bar)
1	1300	750	0
2	1400	800	3
3	1500	850	6
4	1600	900	9
5	1700	950	12
6	1800	1000 (auto decel)	16
7	1850	1050	20
8	1900	1100	26
9	1950	1150	32
10	2000	1200	38

※ One touch decel & low idle : 850 rpm

③ Boom/Arm speed



- **Boom speed**
 - Control type
 Manual - Boom up speed is fixed as set steps.
 Auto - Boom up speed is automatically adjusted as working conditions by the MCU.
 - Speed setting - Boom up speed is increased as much as activated steps.
- **Arm speed**
 - Regeneration - Arm regeneration function can be activated or cancelled.
 Enable - Arm in speed is up.
 Disable - Fine operation.

② Tripmeter



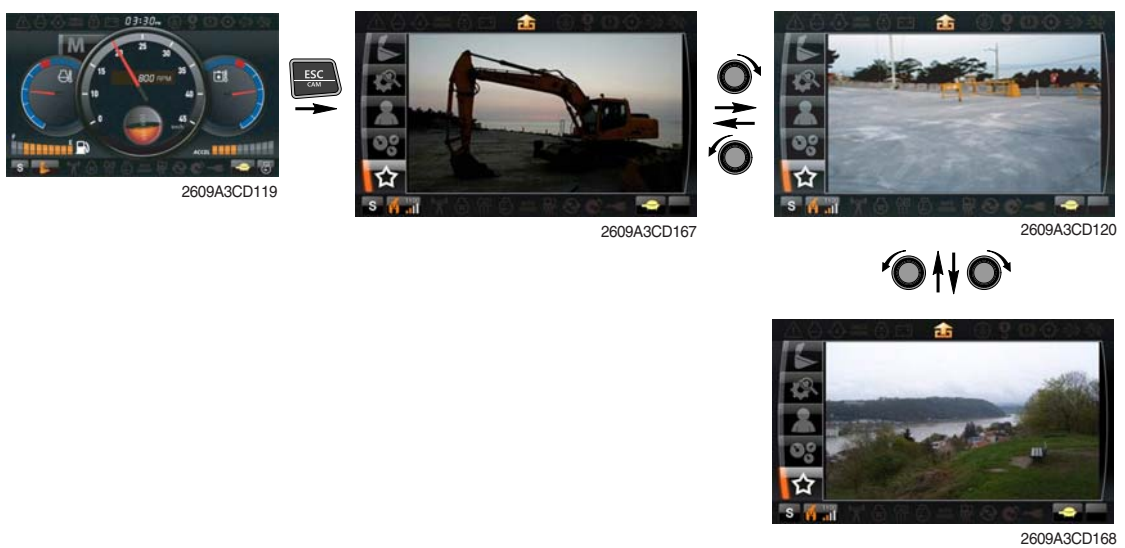
- Maximum 3 kinds of tripmeters can be used at the same time.
- Each tripmeter can be turned on by choosing "Start" while it also can be turned off by choosing "Stop".
- If the tripmeter icon is activated in the operation screen, it can be controlled directly there.

③ Camera setting

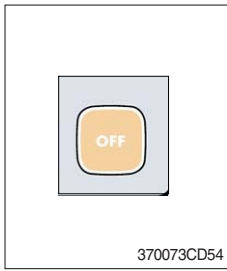
- Three cameras can be installed on the machine and the display order can be set by this menu.
- If the camera was not equipped, this menu is not useful.



- Turning the select switch in clockwise direction, the next ordered will be shown and in counter-clockwise direction, the previously ordered will be shown.
- Push the select switch, the displayed screen will be enlargement.



1) POWER OFF SWITCH

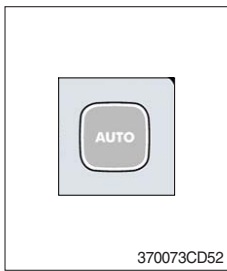


- (1) This switch makes the system and the LED OFF.
Just before the power OFF, set values are stored.

(2) Default setting values

Function	Air conditioner	In/outlet	LCD	Temperature	Mode
Value	OFF	Inlet	OFF	Previous sw OFF	Previous sw OFF

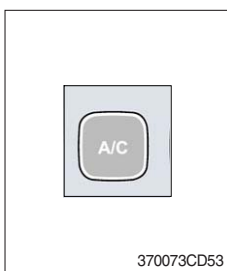
2) AUTO SWITCH



- (1) Turn the starting switch to ON position, LCD lights ON.
Auto air conditioner and heater system automatically keeps the optimum condition in accordance with operator's temperature configuration sensing ambient and cabin inside temperature.

- (2) This switch can restart system after system OFF.

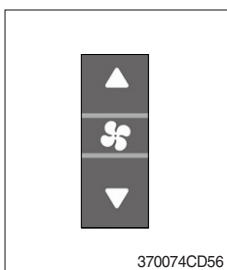
3) AIR CONDITIONER SWITCH (compressor switch)



- (1) This switch turns the compressor and the LCD ON.
- (2) In accordance with the temperature sensed by duct (evaporator) sensor, compressor turns ON or OFF automatically.
- ※ **Air conditioner operates to remove vapor and drains water through a drain hose. Water can be sprayed into the cab in case that the drain cock at the ending point of drain hose has a problem.**

In this case, exchange the drain cock.

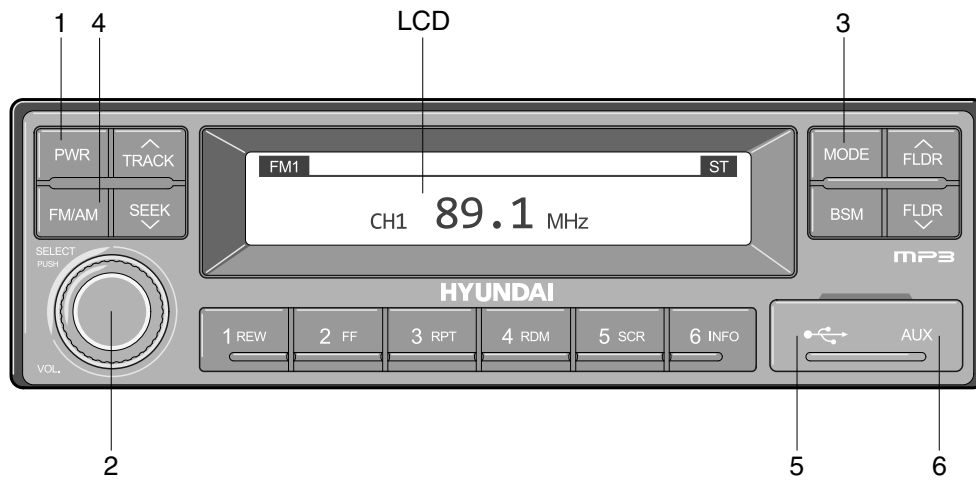
4) FAN SPEED SWITCH



- (1) Fan speed is controlled automatically by set temperature.
- (2) This switch controls fan speed manually.
- There are 8 up/down steps to control fan speed.
 - The maximum step or the minimum step beeps 5 times.
- (3) This switch makes the system ON.

4) RADIO AND USB PLAYER

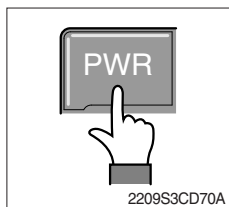
■ BASIC FUNCTIONS



2209S3CD70

- | | |
|-------------------------------|----------------------------------|
| 1 Power (PWR) button | 4 Radio (FM/AM) selection button |
| 2 Volume/Sound setting button | 5 USB slot |
| 3 Mode selection button | 6 AUX terminal |

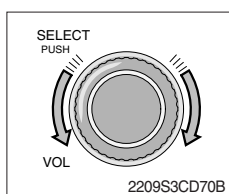
(1) Power (PWR) button



- ① Press the PWR button to turn on the audio. While the audio is operating, press the button to turn the power off.

(2) Volume/Sound setting button

· Volume (VOL) button



- ① Turn the VOL button clockwise to increase the volume and counter-clockwise to decrease the volume.

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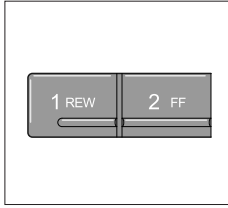
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(3) FF/REW button



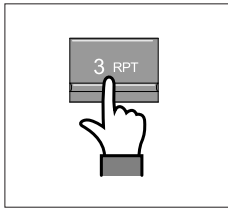
While an iPod is operating, press and hold the FF button to fast-forward the song.

When fast-forward is complete, the next song will properly play from the beginning even if you continue holding the button. Press and hold the REW button to rewind the song.

When rewind is complete, the current song will properly play from the beginning even if you continue holding the button.

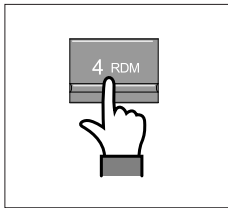
Shortly pressing the buttons will not operate the FF/REW.

(4) Repeat (RPT) button



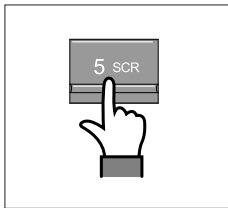
While music is playing, press the RPT button to repeat the currently playing song.

(5) Random play (RDM) button



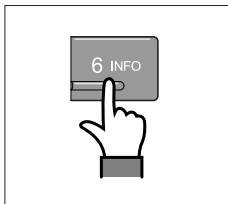
While music is playing, press the RDM button to randomly play the songs.

(6) Scroll (SCR) button



Displays the file name of the currently playing song on the LCD. Here, the SCR button turns the file name SCROLL ON/OFF.

(7) View music info (INFO) button

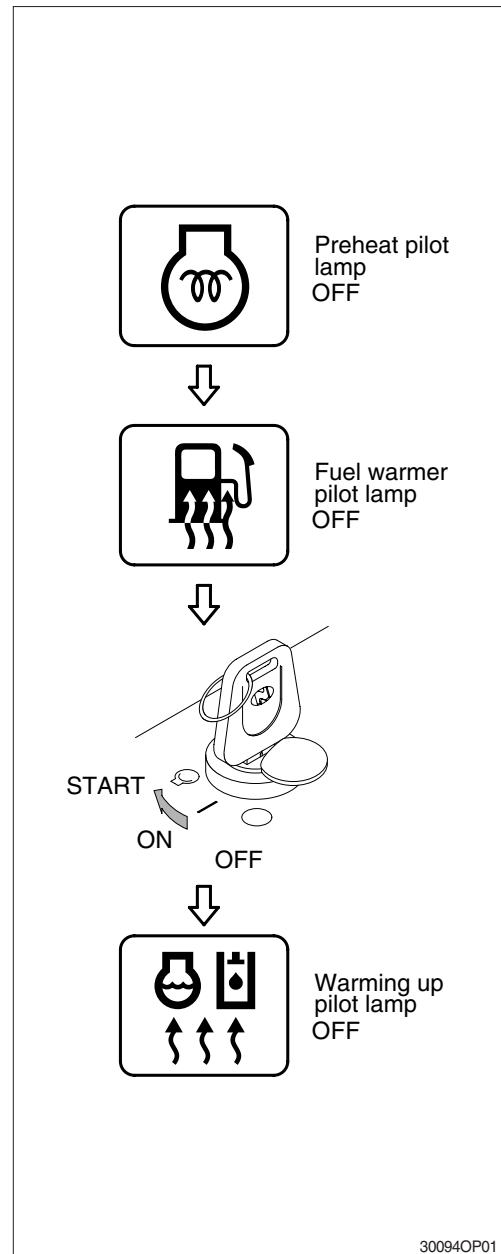


Each time the INFO button is pressed, the info on the currently playing song will be displayed in order of ARTIST → ALBUM → TITLE.

3) STARTING ENGINE IN COLD WEATHER

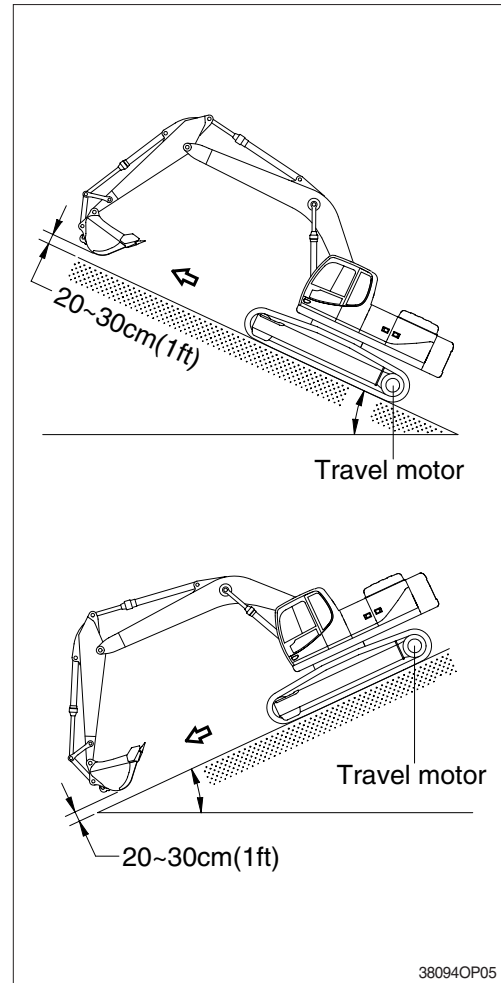
- ※ Sound horn to warn surroundings after checking if there are obstacles in the area.
- ※ Replace the engine oil and fuel referring to recommended oils at page 2-26.
- ※ Fill the anti-freeze solution to the coolant as required.
- ※ If you turn ON the starting switch, the fuel warmer is automatically operated to heat the fuel by sensing the coolant temperature.

- (1) Check if all the levers are in the neutral position.
- (2) Turn the accel dial switch to low idle position.
- (3) Turn the starting switch to the ON position, and wait 1~2 minutes. More time may take according to ambient temperature.
- (4) Wait for five minutes to warm up the engine after the preheating pilot lamp off, and then turn the starting switch to the START position to start the engine.
 - ※ If the engine does not start, allow the starter to cool for about 2 minutes before attempting to start the engine again.
- (5) Release the starting switch immediately after starting engine.
- (6) If the temperature of the coolant is lower than 30°C the warming up automatically starts.
 - ※ Do not operate the working devices, or convert the operation mode into other mode during the warming up.



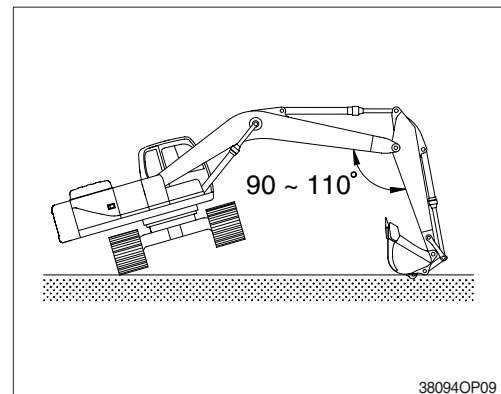
2) TRAVELING ON A SLOPE

- (1) Make sure that the travel lever is properly maneuvered by confirming the travel motor is in the right location.
 - (2) Lower the bucket 20 to 30 cm (1 ft) to the ground so that it can be used as a brake in an emergency.
 - (3) If the machine starts to slide or loses stability, lower the bucket immediately and brake the machine.
 - (4) When parking on a slope, use the bucket as a brake and place blocks behind the tracks to prevent sliding.
- ※ Machine cannot travel effectively on a slope when the oil temperature is low. Do the warming-up operation when it is going to travel on a slope.
- ▲ Be careful when working on slopes. It may cause the machine to lose its balance and turn over.
- ▲ Be sure to keep the travel speed switch on the LOW (turtle mark) while traveling on a slope.



3) TRAVELING ON SOFT GROUND

- ※ If possible, avoid to operate on soft ground.
- (1) Move forward as far as machine can move.
 - (2) Take care not to go beyond the depth where towing is impossible on soft ground.
 - (3) When driving becomes impossible, lower bucket and use boom and arm to pull the machine. Operate boom, arm, and travel lever at the same time to avoid the machine sinking.



11. STORAGE

Maintain the machine taking care of following to prevent the deterioration of machine when storing the machine for a long time, over 1 month.

1) BEFORE STORAGE

(1) Cleaning the machine

Clean the machine. Check and adjust tracks.
Grease each lubrication part.

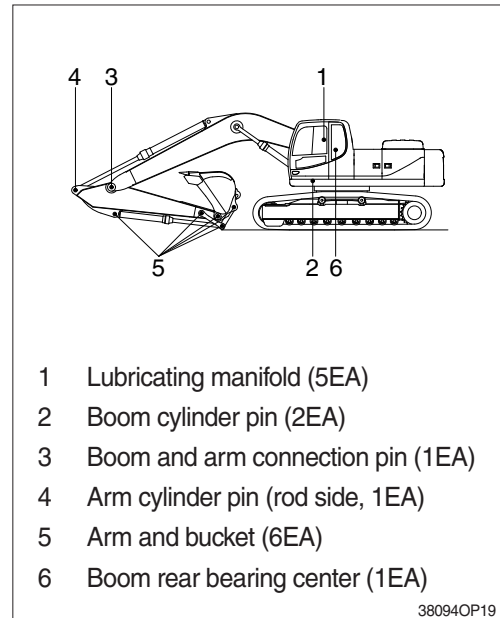
(2) Lubrication position of each part

Change all oil.

※ Be particularly careful when you reuse the machine.

As oil can be diluted during storage.

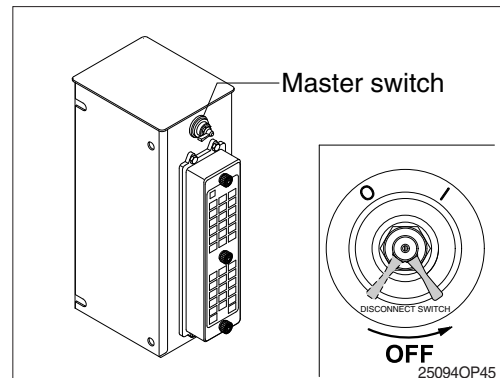
Apply an anticorrosive lubricant on the exposed part of piston rod of cylinder and in places where the machine rusts easily.



(3) Master switch

Turn OFF the master switch mounted electric box and store the machine.

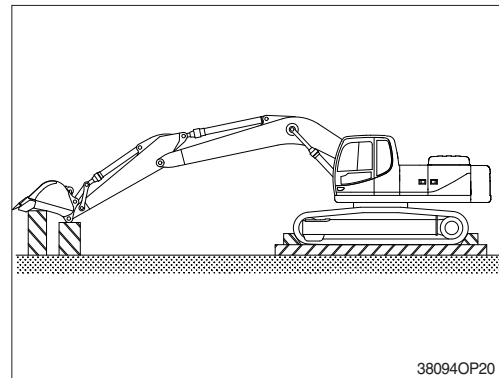
(4) Be sure to mix anticorrosive antifreezing solution in the radiator.



(5) Prevention of dust and moisture

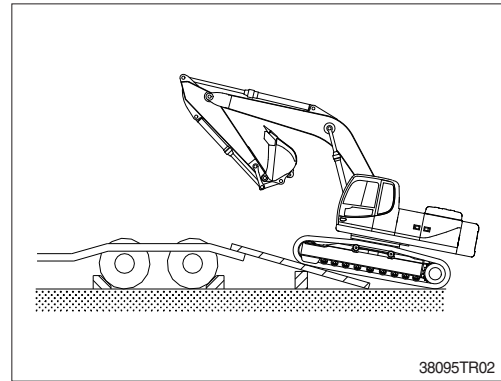
Keep machine dry. Store the machine setting wood on the ground.

- ※ Cover exposed part of piston rod of cylinder.
- ※ Lower the bucket to the ground and set a support under track.

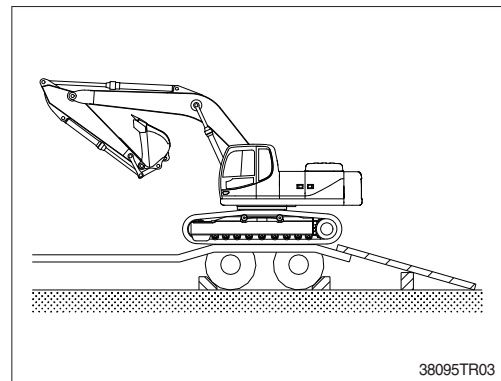


3. LOADING THE MACHINE

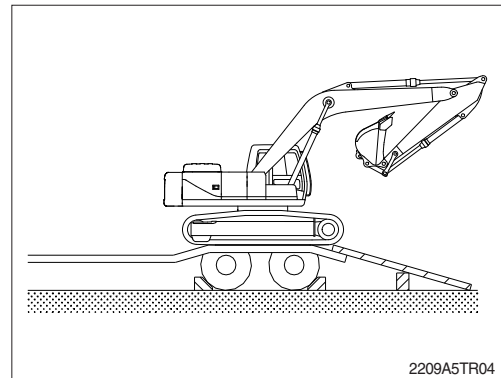
- 1) Load and unload the machine on a flat ground.
- 2) Use the gangplank with sufficient length, width, thickness and gradient.
- 3) Place the safety lever to the LOCK position (if equipped) before fixing the machine at the bed of trailer and confirm if the machine parallels the bed of trailer.
Keep the travel motor in the rear when loading and in the front when unloading.



- 4) Do the following after loading the machine to the trailer.
 - (1) Stop loading when the machine is located horizontally with the rear wheel of trailer.



- (2) Place the safety lever to the LOCK position (if equipped) after the swing the machine 180 degree.



2) PIPE AND HOSE (FLARE type)

Thread size (PF)	Width across flat (mm)	kgf · m	lbf · ft
1/4"	19	4	28.9
3/8"	22	5	36.2
1/2"	27	9.5	68.7
3/4"	36	18	130
1"	41	21	152
1-1/4"	50	35	253

3) PIPE AND HOSE (ORFS type)

Thread size (UNF)	Width across flat (mm)	kgf · m	lbf · ft
9/16-18	19	4	28.9
11/16-16	22	5	36.2
13/16-16	27	9.5	68.7
1-3/16-12	36	18	130
1-7/16-12	41	21	152
1-11/16-12	50	35	253

4) FITTING

Thread size	Width across flat (mm)	kgf · m	lbf · ft
1/4"	19	4	28.9
3/8"	22	5	36.2
1/2"	27	9.5	68.7
3/4"	36	18	130
1"	41	21	152
1-1/4"	50	35	253

Service interval	No.	Description	Service action	Oil symbol	Capacity l (U.S.gal)	Service points No.
10 Hours or daily	1	Hydraulic oil level	Check, Add	HO	160 (42.3)	1
	2	Engine oil level	Check, Add	EO	23.1 (6.1)	1
	4	Radiator coolant	Check, Add	C	40 (10.6)	1
	5	Prefilter (water, element)	Check, Clean	-	-	1
	6	Fan belt tension and damage	Check, Adjust	-	-	1
	9	Fuel tank	Check, Refill	DF	400 (106)	1
50 Hours or weekly	8	Bucket linkage pins	Check, Add	PGL	-	6
	9	Fuel tank (water, sediment)	Check, Clean	-	-	1
	11	Swing reduction gear case	Check, Add	GO	5.0 (1.3)	1
	14	Track tension	Check, Adjust	PGL	-	2
250 Hours	7	Attachment pins & bushing	Check, Add	PGL	-	11
	10	Swing bearing grease	Check, Add	PGL	-	2
	15	Battery (voltage)	Check	-	-	1
	21	Aircon and heater fresh air filter	Check, Clean	-	-	1
500 Hours	2	Engine oil	Change	EO	23.1 (6.1)	1
	3	Engine oil filter	Replace	-	-	1
	5	Prefilter	Replace	-	-	1
	23	Fuel filter element	Replace	-	-	1
	24	Radiator, oil cooler, charge air cooler	Check, Clean	-	-	3
1000 Hours	11	Swing reduction gear case	Change	GO	5.0 (1.3)	1
	12	Swing reduction gear grease	Check, Add	PGL	1.5 (0.4)	1
	13	Swing gear and pinion grease	Change	PGL	7.9 kg (17.5 lb)	1
	16	Hydraulic oil return filter	Replace	-	-	1
	17	Drain filter cartridge	Replace	-	-	1
	18	Air breather element	Replace	-	-	1
	20	Pilot line filter element	Replace	-	-	1
	22	Air cleaner element (primary)	Check, Clean	-	-	1
25	Travel reduction gear case	Change	GO	5.8 (1.5)	2	
2000 Hours	1	Hydraulic oil * ¹	Change	HO	160 (42.3)	1
	4	Radiator coolant	Change	C	40 (10.6)	1
	19	Hydraulic oil suction strainer	Check, Clean	-	-	1
	26	Crankcase breather filter	Replace	-	-	1
	-	Hoses, fittings, clamps (fuel, coolant, hydraulic)	Check, Retighten, Replace	-	-	-
4000 Hours	22	Air cleaner element (primary, safety)	Replace	-	-	2
5000 Hours	1	Hydraulic oil * ²	Change	HO	160 (42.3)	1
As required	21	Aircon & heater fresh filter	Replace	-	-	1
	21	Aircon & heater recirculation filter	Clean, Replace	-	-	1
	22	Air cleaner element (primary)	Clean, Replace	-	-	1
	22	Air cleaner element (safety)	Replace	-	-	1

*¹ Conventional hydraulic oil

*² Hyundai genuine long life hydraulic oil

※ Oil symbol

Please refer to the recommended lubricants for specification.

DF : Diesel fuel

GO : Gear oil

HO : Hydraulic oil

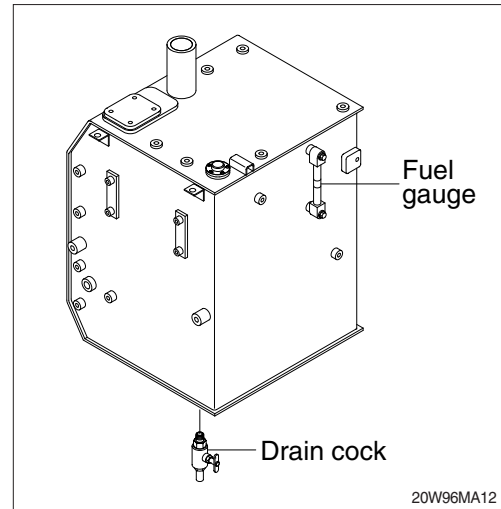
C : Coolant

PGL : Grease

EO : Engine oil

11) FUEL TANK

- (1) Fill fuel fully when system the operation to minimize water condensation, and check it with fuel gauge before starting the machine.
 - (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.**
All lights and flames shall be kept at a safe distance while refueling.

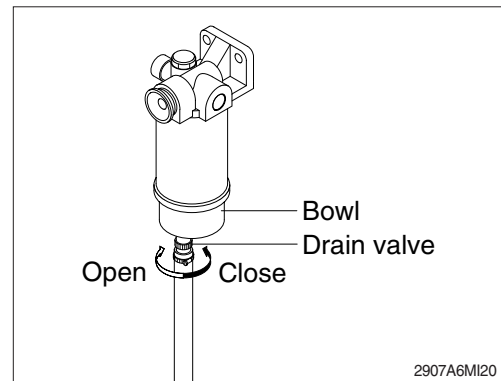


12) PREFILTER

- ※ Inspect or drain the collection bowl of water daily and replace the element every 500hours.

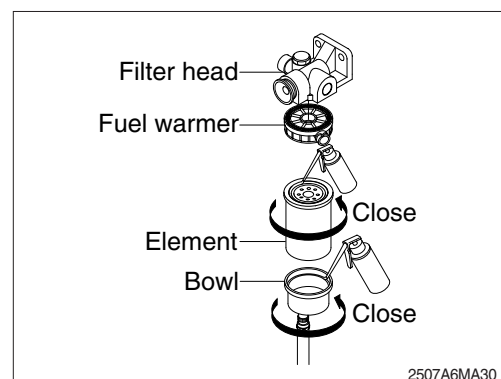
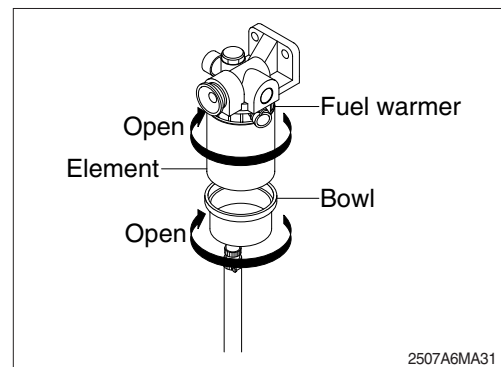
(1) Drain water

- ①
- ②



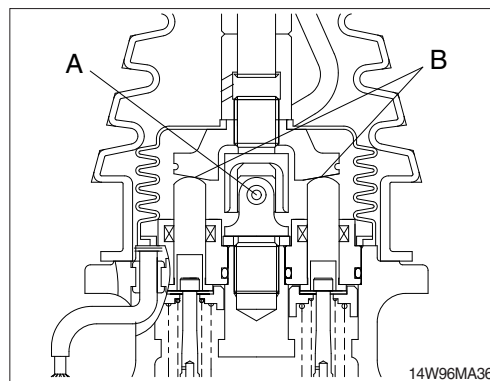
(2) Replace element

- ① Drain the unit of fuel. Follow "Drain water" instructions above.
- ② Remove element, fuel warmer and bowl from filter head.
 - ※ **The bowl is reusable, do not damage or discard.**
- ③ Separate element from bowl. Clean bowl and seal gland.
- ④ Lubricate new bowl seal with clean fuel or motor oil and place in bowl gland.
- ⑤ Attach bowl to new element firmly by hand.
- ⑥ Lubricate new element seal and place in element top gland.
- ⑦ Attach the element, fuel warmer and bowl to the head.



33) LUBRICATE RCV LEVER

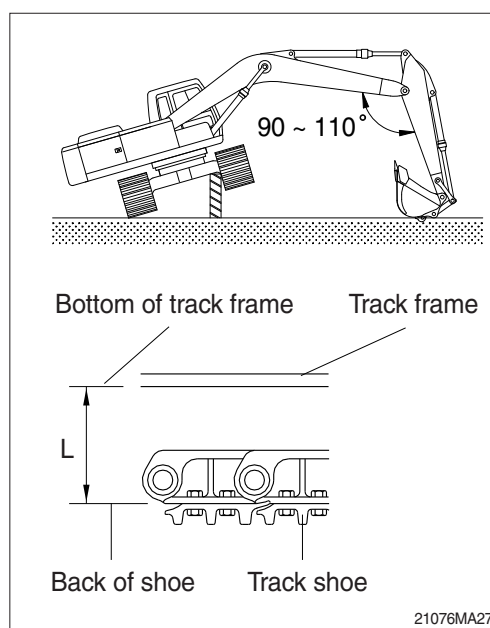
Remove the bellows and with a grease gun grease the joint part (A) and sliding parts (B).



34) ADJUSTMENT OF TRACK TENSION

- ※ It is important to adjust the tension of track properly to extend the lifetime of track and traveling device.
- ※ The wear of pins and bushings on the undercarriage will vary with the working conditions and soil properties.
It is thus necessary to continually inspect the track tension so as to maintain the standard tension on it.

- (1) Raise the chassis with the boom and arm.
- (2) Measure the distance between bottom of track frame on track center and track of shoe.
 - ※ Remove mud with rotating the track before measuring.



- (3) If the tension is tight, drain the grease in the grease nipple and if the tension is loose, charge the grease.

▲ Personal injury or death can result from grease under pressure.

▲ Unscrew the grease nipple after release the tension by pushing the poppet only when necessarily required.

Grease leaking hole is not existing. So, while unscrew the grease nipple, grease is not leaking until the grease nipple is completely coming out. If the tension is not released in advance, the grease nipple can be suddenly popped out by pressurized grease.

- ※ When the grease is drained, move the track to the forward and backward slightly.

If the track tension is loose even after the grease is charged to the maximum, change the pins and bushings as there are worn seriously.

Length (L)	
300~320 mm	11.8~12.6"

TROUBLESHOOTING GUIDE

1. ENGINE

※ This guide is not intended to cover every conditions, however many of the more common possibilities are listed.

Trouble	Service	Remark
The engine oil pressure lamp lights ON when engine speed is raised after completion of warm up.	<ul style="list-style-type: none"> • Add the oil to the specified level. • Replace the oil filter cartridge. • Check oil leakage from the pipe or the joint. • Replace the monitor. 	
Steam is emitted from the top part of the radiator (the pressure valve). Coolant level warning lamp lights ON.	<ul style="list-style-type: none"> • Supply the coolant and check leakage. • Adjust fan belt tension. • Wash out inside of cooling system. • Clean or repair the radiator fin. • Check the thermostat. • Tighten the radiator cap firmly or replace the packing of it. • Replace the monitor. 	
The engine does not start when the starting motor is turned over.	<ul style="list-style-type: none"> • Add fuel. • Repair where air is leaking into fuel system. • Check the injection pump or the nozzle. • Check the valve clearance. • Check engine compression pressure. • In cold weather, check if fuel warmer system is working normal. 	Refer to the pages 3-25 and 4-4.
Exhaust gas is white or blue.	<ul style="list-style-type: none"> • Adjust to specified oil quantity. • Replace with specified fuel. 	
Exhaust gas occasionally turns black.	<ul style="list-style-type: none"> • Clean or replace the air cleaner element. • Check the nozzle. • Check engine compression pressure. • Clean or replace the turbocharger. 	
Combustion noise occasionally changes to breathing sound.	<ul style="list-style-type: none"> • Check the nozzle. 	
Unusual combustion noise or mechanical noise.	<ul style="list-style-type: none"> • Check with specified fuel. • Check over-heating • Replace the muffler. • Adjust valve clearance. 	

AMPHIBIOUS EXCAVATOR SERIES

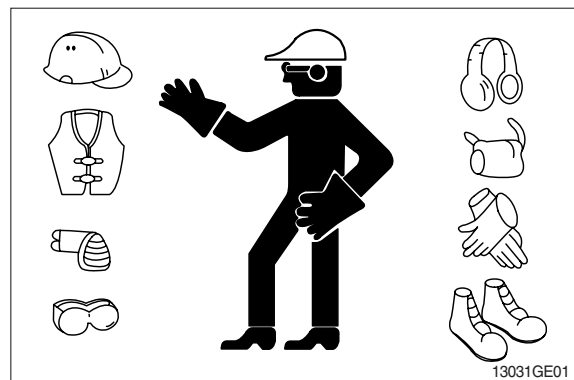
1. SAFETY OPERATION

1) UNDERSTAND MACHINE OPERATION

- (1) Only qualified operator with understanding and experience should operate the amphibious machine. This operation manual must be read carefully and operators must understand all the contents before operate the amphibious machine.
- (2) Operator must hold normal excavator license certified by local government. Training must be conducted to inexperienced operator before operate the machine.
- (3) Learn and remember the location and purpose of all controls, instruments, buttons, indicator lamps and caution signs.

2) WEAR PROTECTIVE CLOTHING

- (1) Wear protective clothing and other safety equipment during machine installation, operation and maintenance.



- (2) Prepare lifebelt inside the operator cabin before operate the machine in open water. Safety life jacket must be worn for safety reason.



3) GREASING

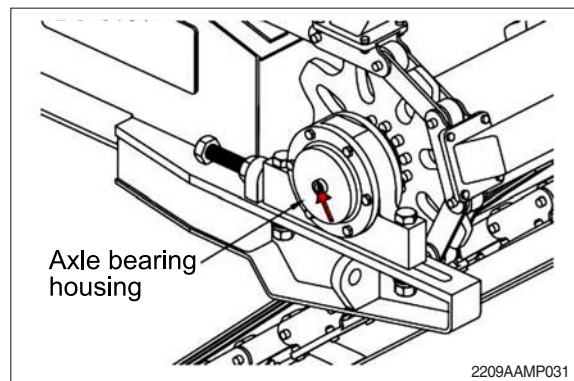
Greasing is very important for the frictional components such as bearing, pin and bushing or gear mechanism. The purpose of greasing is not only limited to reduce the friction between two or more contact parts but also as an additional protection from corrosion. The next figures show the most important components/parts on the amphibious undercarriage that must be regularly greased in order to slow down the wear rate, corrosion and hence longer the components life.

- ※ Before apply greasing; please refer to your local environment laws & regulations. Grease may pollutes the environment especially water, plants and animals.

(1) Axle Bearing

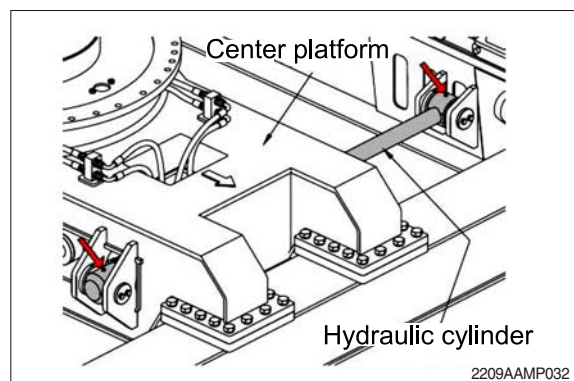
Spherical roller bearing is sealed inside the bearing housing at each axle on each pontoon. These bearings must be greased for every 50 hours (refer to figure 031).

- ※ Some models of Amphibious Undercarriage do not have axle bearing.
- ※ Grease must be pumped into each axle bearing housing until it is full.

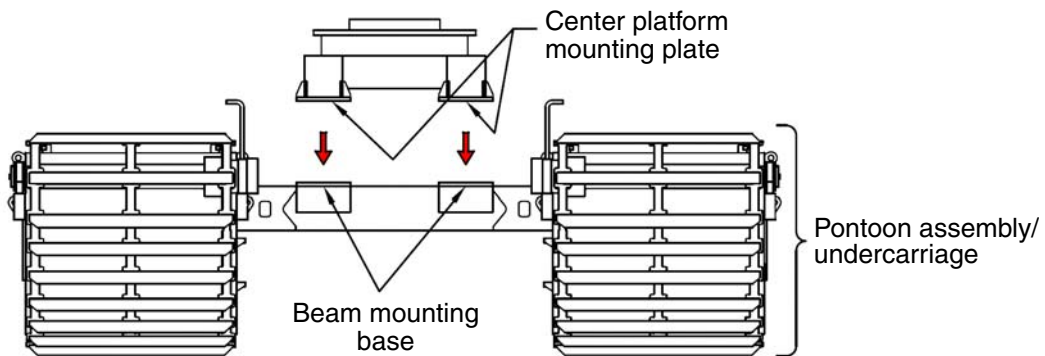


(2) Pin & Bushing

The application of pin and bushing on Amphibious Undercarriage is limited at extendable model only. These pin and bushing must be greased for every 50 hours.

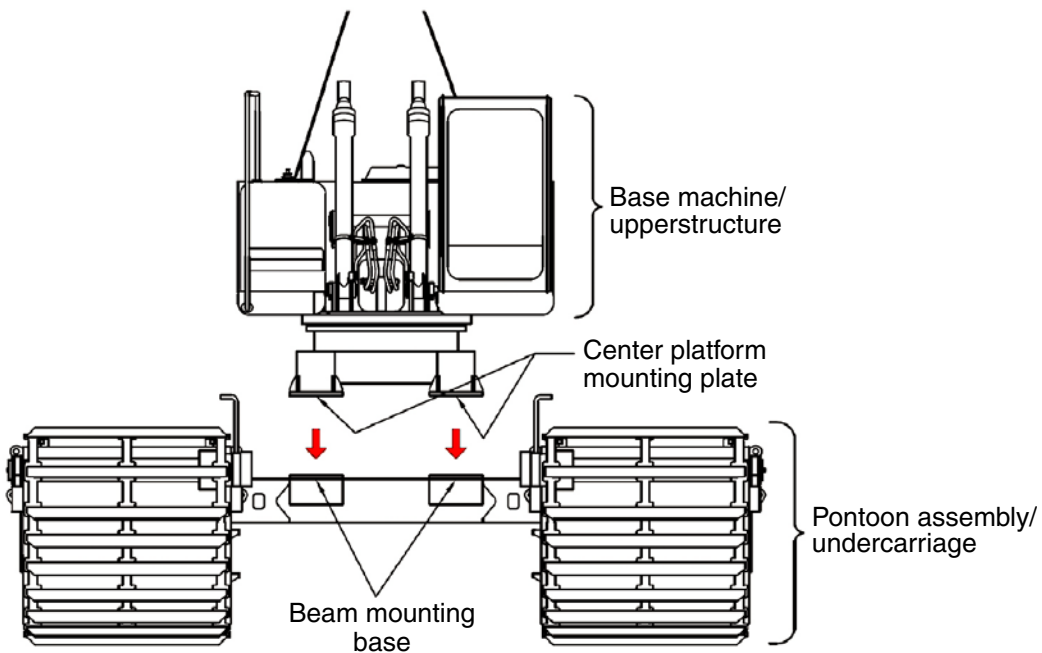


- (6) Lift and place the center platform onto the pontoon assembly carefully. Align the center platform mounting plate with beam mounting base on the beams as shown in figure 111.



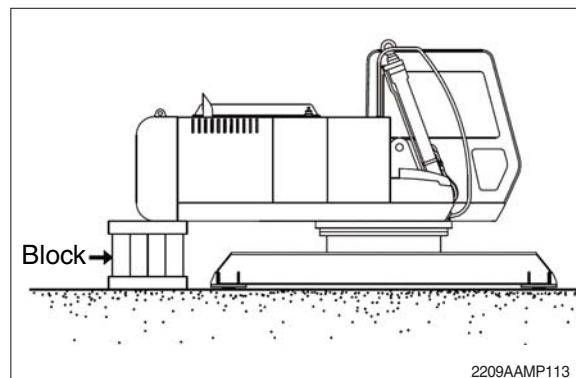
2209AAMP111

- ※ In other case, the center platform has been mounted together with the base machine due to shipping requirement. So, both of center platform and base machine need to be lifted together without dismantle them as per figure 112.



2209AAMP112

- ▲ If the center platform has been mounted together with the base machine, a block must be placed under the rear tip of the base machine to avoid tipping during the evacuation process.



2209AAMP113

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