CONTENTS

FOREWORD

This manual contains a number of instructions and safety recommendations regarding driving, handling, lubrication, maintenance, inspection and adjustment of the excavator.
The manual is to promote safety maintenance and enhance machine performance.

Keep this manual handy and have all personnel read it periodically.

If you sell the machine, be sure to give this manual to the new owners.

This machine complies with EC directive "98/37/EEC".

1. **Read** and **understand** this manual before operating the machine.

   This operator's manual may contain attachments and optional equipment that are not available in your area. Please consult your local Hyundai distributor for those items you require.

   Improper operation and maintenance of this machine can be hazardous and could result in serious injury or death.

   Some actions involved in operation and maintenance of the machine can cause a serious accident, if they are not done in a manner described in this manual.

   The procedures and precautions given in this manual apply only to intended uses of the machine.
   If you use your machine for any unintended uses that are not specifically prohibited, you must be sure that it is safe for you and others. In no event should you or others engage in prohibited uses of actions as described in this manual.

2. **Inspect** the jobsite and **follow** the safety recommendations in the **safety hints** section before operating the machine.

3. Use **genuine Hyundai spare parts** for the replacement of parts.
   We expressly point out that Hyundai will not accept any responsibility for defects resulting from non-genuine parts or non workmanlike repair.
   In such cases Hyundai cannot assume liability for any damage.

Continuing improvements in the design of this machine can lead to changes in detail which may not be reflected in this manual. Consult Hyundai or your Hyundai distributor for the latest available information for your machine or for questions regarding information in this manual.

BEFORE SERVICING THIS MACHINE

It is the responsibility of the owner and all service and maintenance personnel to avoid accidents and serious injury by keeping this machine properly maintained.

It also is the responsibility of the owner and all service and maintenance personnel to avoid accidents and serious injury while servicing the machine.

No one should service or attempt to repair this machine without proper training and supervision.

All service and maintenance personnel should be thoroughly familiar with the procedures and precautions contained in this manual.

All personnel also must be aware of any federal, state, provincial or local laws or regulations covering the use and service of construction equipment.

The procedures in this manual do not supersede any requirements imposed by federal, state, provincial or local laws.

Hyundai can not anticipate every possible circumstance or environment in which this machine may be used and serviced.

All personnel must remain alert to potential hazards.

Work within your level of training and skill.

Ask your supervisor if you are uncertain about a particular task. Do not try to do too much too fast.

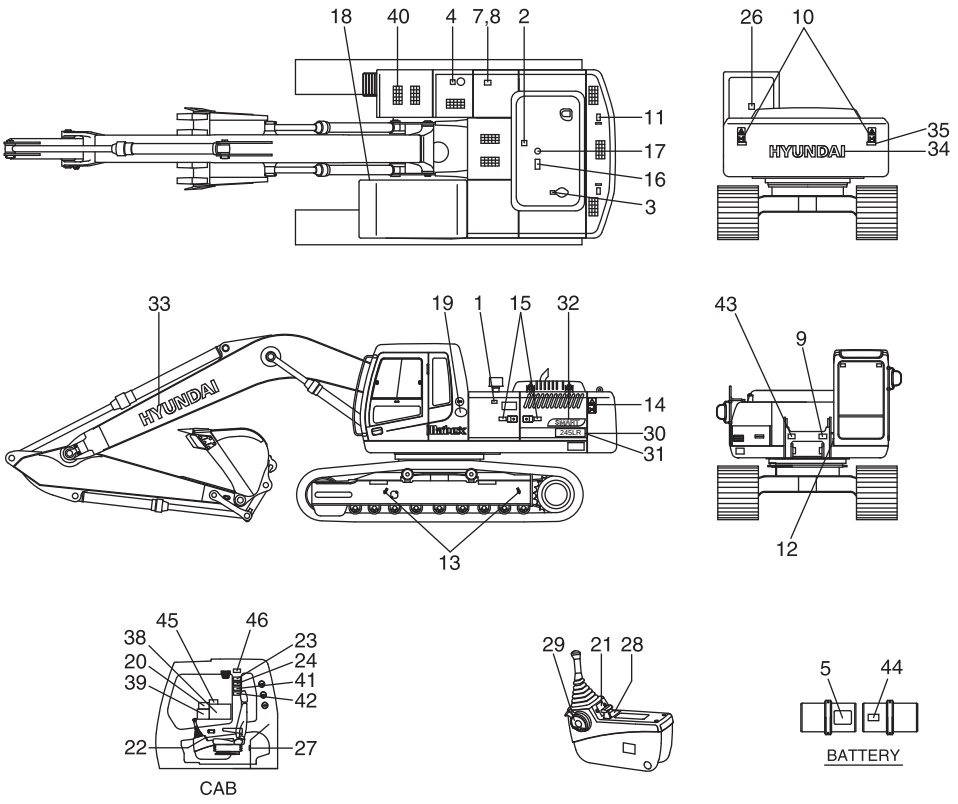
Use your common sense.

TABLE TO ENTER SERIAL NO. AND DISTRIBUTOR

Machine Serial No.	
Engine Serial No.	
Manufacturing year	
Manufacturer Address	Hyundai Construction Equipment India Pvt., Ltd. Plot No. A-2, Chakan industrial area, Vill. Khalumbre, Talut-Khed., Dist. Pune 410 510, India

1. LOCATION

Always keep these labels clean. If they are lost or damage, attach them again or replace them with a new label.



RD22070SL01

1	Air cleaner filter	16	Shearing engine hood	31	Model name(RH)
2	Turbo charger cover	17	No step engine hood	32	Logo(SMART)
3	Radiator cap	18	Transporting	33	Trade mark(Boom)
4	Fueling	19	Low emission engine	34	Trade mark(CWT)
5	Battery accident	20	Control ideogram	35	Reflecting
7	Hydraulic oil level	21	Control ideogram(LH)	38	Service instruction
8	Hydraulic oil lubrication	22	Control ideogram(RH)	39	Lifting chart
9	Reduction gear grease	23	Ref operator manual	40	Step tread
10	Keep clear	24	Max height	41	Interference
11	Lifting eye	26	Alternate exit	42	Locking clamp
12	Name plate	27	Air conditioner filter	43	High pressure hose
13	Slinging ideogram	28	Console box	44	ECU connector
14	Sidekeep clear	29	Safety lever	45	Turbocharger
15	Stay fix	30	Model name(LH)	46	Cabin RH pillar

2. DESCRIPTION

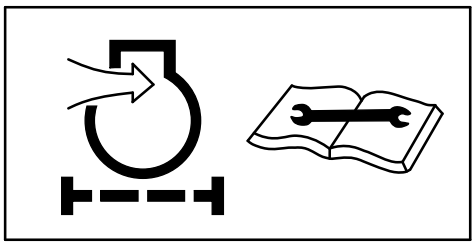
There are several specific warning labels on this machine please become familiarized with all warning labels.

Replace any safety label that is damaged, or missing.

1) AIR CLEANER FILTER(Item 1)

This warning label is positioned on the air cleaner cover.

※ **Periodic and proper inspection, cleaning and change of elements prolong engine life time and maintain the good performance of engine.**



21070FW01

2) TURBOCHARGER COVER(Item 2)

This warning label is positioned on the turbo charger cover.

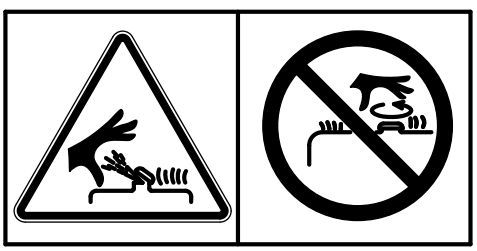
⚠ **Do not touch turbo charger or it may cause severe burn.**

21070FW02

3) RADIATOR CAP(Item 3)

This warning label is positioned on the radiator.

⚠ **Never open the filler cap while engine running or at high coolant temperature.**

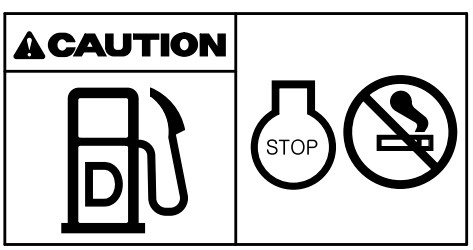


14070FW03

4) FUELING(Item 4)

This warning label is positioned on the right side of fuel filler neck.

⚠ **Stop the engine when refueling. All lights or flames shall be kept at a safe distance while refueling.**



21070FW04

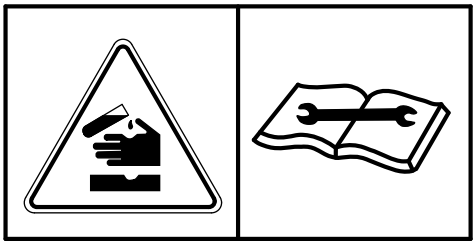
5) BATTERY ACCIDENT(Item 5)

This warning label is positioned on the battery cover.

⚠ **Electrolyte containing sulfuric acid cause severe burns. Avoid being in contact with skin, eyes or clothes. In the event of accident flush with sufficient water, call a physician immediately.**

※ **Maintain the electrolyte at the recommended level. Add distilled water to the battery only when starting up, never when shutting down.**

With electrolyte at proper level, less space may cause the gases to be accmulated in the battery.



21070FW05

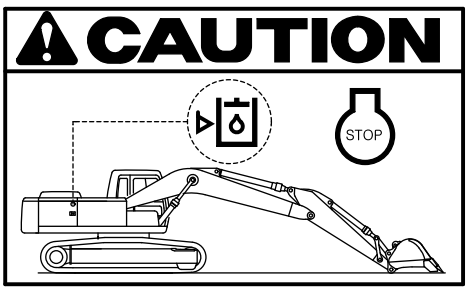
6) HYDRAULIC OIL LEVEL(Item 7)

This warning label is positioned on the left side of hydraulic oil level.

⚠ **Place the bucket on the ground whenever servicing the hydraulic system.**

※ **Check oil level on the level gauge.**

※ **Refill the recommended hydraulic oil up to specified level if necessary.**



21070FW07

7) HYDRAULIC OIL LUBRICATION(Item 8)

This warning label is positioned on the right side of air breather.

※ **Do not mix with different brand oils.**

⚠ **Never open the filler cap while engine running or at high coolant temperature.**

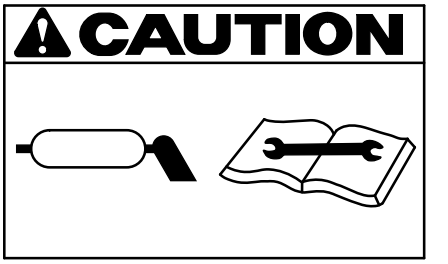
⚠ **Loosen the cap slowly and release internal pressure completely.**

21070FW08

8) REDUCTION GEAR GREASE(Item 9)

This warning label is positioned in the front of upper frame.

⚠ **Grease is under high pressure.**
Grease coming out of the grease plug under pressure can penetrate the body causing injury or death.



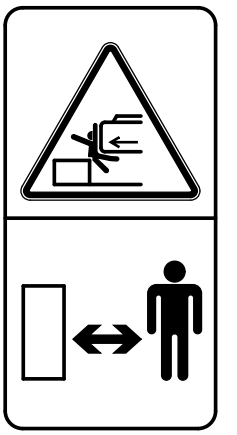
21070FW35

9) KEEP CLEAR(Item 10)

This warning label is positioned on the counterweight.

⚠ **To prevent serious personal injury or death keep clear of machine swing radius.**

⚠ **Do not deface or remove this label from the machine.**



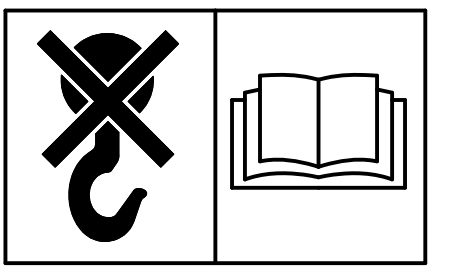
21070FW09

10) LIFTING EYE(Item 11)

This warning label is positioned on the counterweight.

⚠ **Do not lift the machine by using lifting eyes on the counterweight or the lifting eyes may be subject to overload causing its breaking and possible personal injury.**

※ **See page 5-7 for proper lifting method of the machine.**



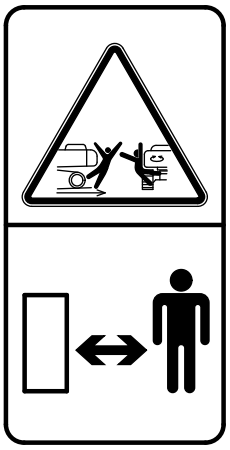
21070FW10

11) SIDE KEEP CLEAR(Item 14)

This warning label is positioned on the side of counterweight.

⚠ **To prevent serious personal injury or death keep clear of machine swing radius.**

⚠ **Do not deface or remove this label from the machine.**



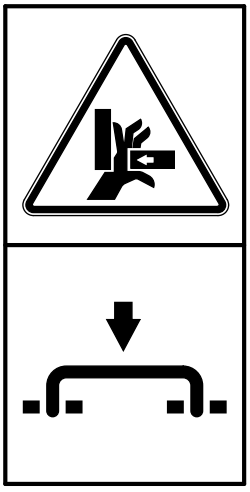
21070FW13

12) STAY FIX(Item 15)

This warning label is positioned on the side cover.

⚠ **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.**



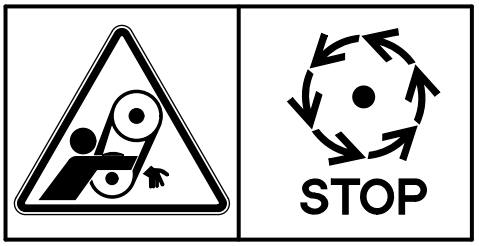
21070FW14

13) SHEARING-ENGINE HOOD(Item 16)

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.**



21070FW15

14) NO STEP-ENGINE HOOD(Item 17)

This warning label is positioned on the engine hood.

△ **Do not step on the engine hood.**

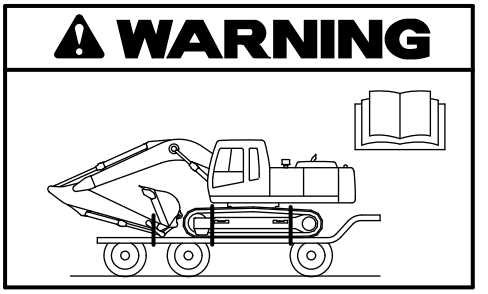
21070FW16

15) TRANSPORTING(Item 18)

This warning label is positioned right side of upper frame.

⚠ **Study the operator's manual before transporting the machine, if provided and tie down arm and track to the carrier with lashing wire.**

※ **See page 5-6 for details.**



14070FW17

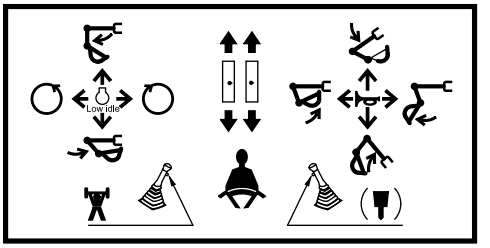
16) CONTROL IDEOGRAM(Item 20)

This warning label is positioned in right window of the cab.

⚠ **Check the machine control pattern for conformance to pattern on this label. If not, change label to match pattern before operating machine.**

⚠ **Failure to do so could result in injury or death.**

※ **See page 4-14 for details.**



36070FW19

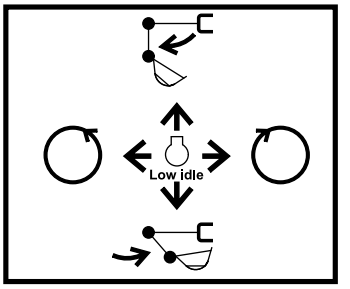
17) CONTROL IDEOGRAM-LH(Item 21)

This warning label is positioned on the LH console box.

⚠ **Check the machine control pattern for conformance to pattern on this label. If not, change label to match pattern before operating machine.**

⚠ **Failure to do so could result in injury or death.**

※ **See page 4-14 for details.**



36070FW20

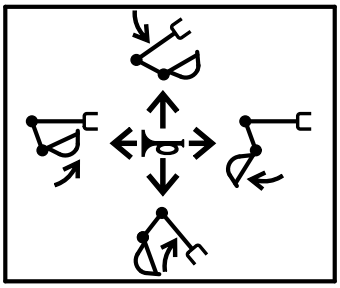
18) CONTROL IDEOGRAM-RH(Item 22)

This warning label is positioned on the RH console box.

⚠ **Check the machine control pattern for conformance to pattern on this label. If not, change label to match pattern before operating machine.**

⚠ **Failure to do so could result in injury or death.**

※ **See page 4-14 for details.**

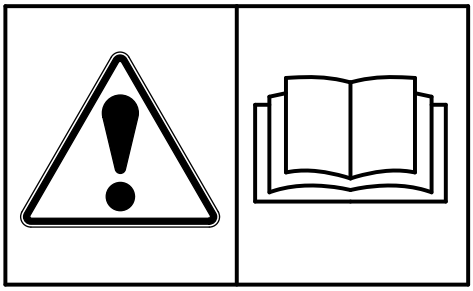


21070FW21

19) REF OPERATOR MANUAL(Item 23)

This warning label is positioned on the right side frame of the cab.

⚠ **Study the operator's manual before starting and operating machine.**



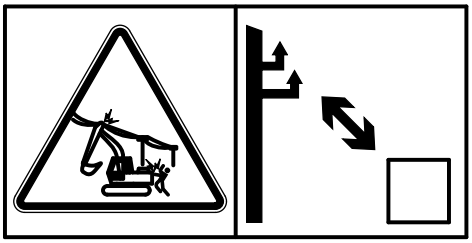
21070FW22

20) MAX HEIGHT(Item 24)

This warning label is positioned on the right side frame of the cab.

⚠ **Serious injury or death can result from contact with electric lines.**

An electric shock being received by merely coming into the vicinity of an electric lines, the minimum distance should be kept considering the supply voltage as page 1-7.



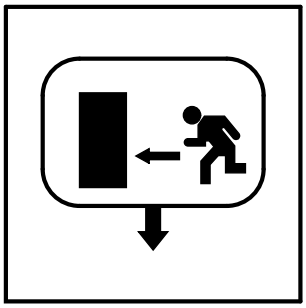
21070FW23

21) ALTERNATE EXIT(Item 26)

This warning label is positioned on the inside of rear window.

※ **The rear window serves us an alternate exit.**

※ **To remove rear window, pull the ring and push out the glass.**

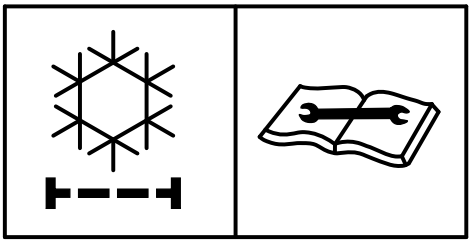


21070FW25

22) AIR CONDITIONER FILTER(Item 27)

This warning label is positioned on the air conditioner cover up.

※ **Periodic and proper inspection, cleaning and change of filter prolong air conditioner life time and maintain good performance.**

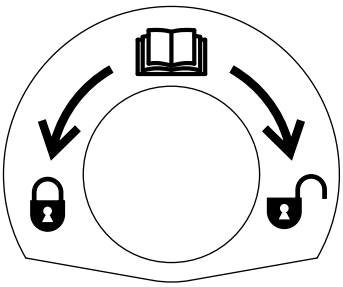


21070FW26

23) SAFETY LEVER(Item 29)

This warning label is positioned on the cover safety.

⚠ **Before you get off the machine be sure to place the safety lever LOCKED psoition.**



21070FW28

24) REFLECTING(Item 35)

This warning label is positioned on the counterweight.

⚠ **To prevent serious personal injury or death keep clear or machine swing radius.**

⚠ **Do not deface or remove this label from the machine.**

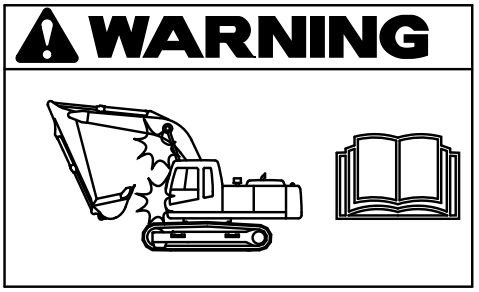
2507A0FW03

25) INTERFERENCE(Item 41)

This warning label is positioned on the right side frame of cab.

⚠ **Be careful to operate machine equipped with quick clamp or extensions.**

⚠ **Bucket may hit cab or boom, boom cylinders when it reached vicinity of them.**



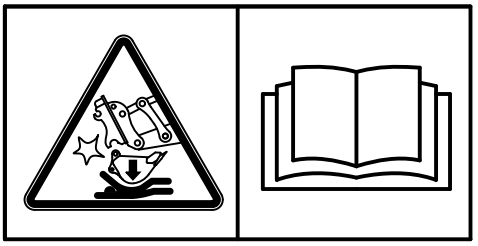
14070FW62

26) CLAMP-LOCKING(Item 42)

This warning label is positioned on the right side window of cab.

⚠ **Serious injury or death can result from dropping bucket.**

⚠ **Operating the machine with quick clamp switch unlocked or without safety pin of moving hook can cause the bucket to drop off.**



14070FW60

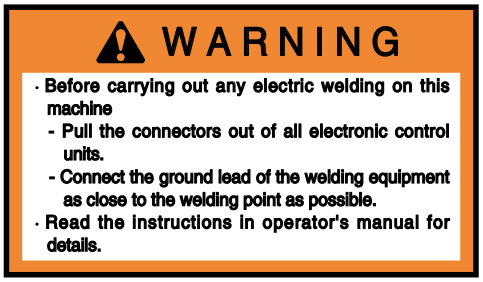
27) ECU CONNECTOR(Item 44)

This warning label is positioned on the battery cover.

⚠ **Before carrying out any electric welding on this machine.**
Pull the connector out of all electric control units.

⚠ **Connector the ground lead of the welding equipment as close to the welding point as possible.**

※ **See page 6-43 for detail.**

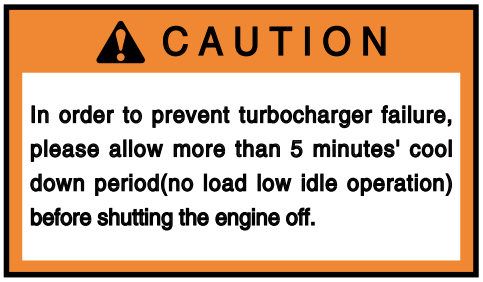


7807AFW20

28) TURBOCHARGER(Item 45)

This warning label is positioned in right window of the cab.

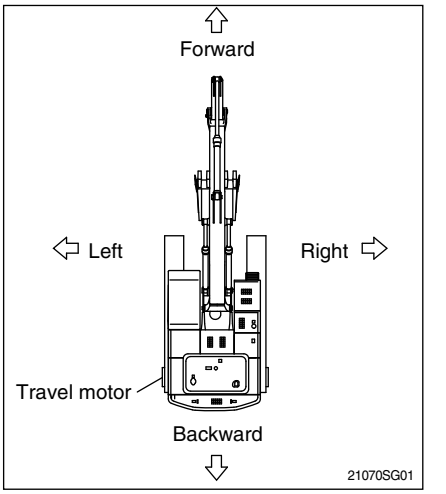
⚠ **In order to prevent turbocharger failure, please allow more than 5 minutes' cool down period(no load low idle operation) before shutting the engine off.**



7807AFW20

1. DIRECTION

The direction of this manual indicate forward, backward, right and left on the standard of operator when the travel motor is in the rear and machine is on the traveling direction.

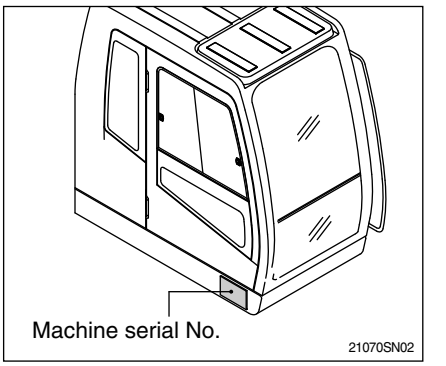


2. SERIAL NUMBER

Inform following when you order parts or the machine is out of order.

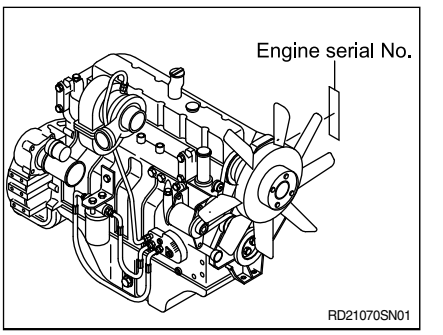
1) MACHINE SERIAL NUMBER

The numbers are located below the right window of the operator's cab.



2) ENGINE SERIAL NUMBER

The numbers are located on the engine name plate.



3. SYMBOLS

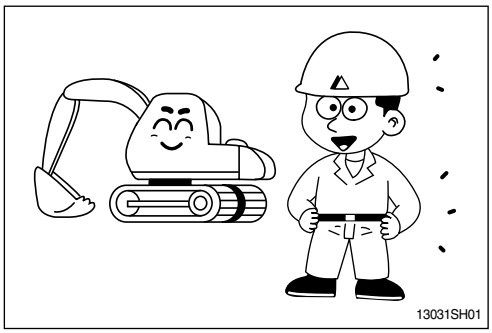
⚠ Important safety hint.

△ It indicates matters which can cause the great loss on the machine or the surroundings.

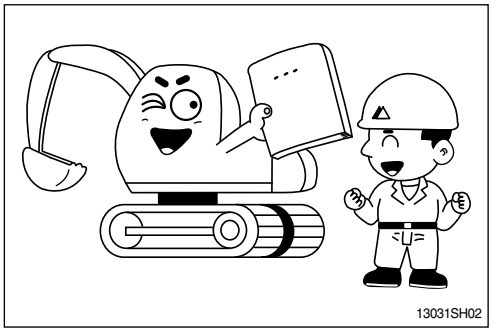
※ It indicates the useful information for operator.

1. BEFORE OPERATING THE MACHINE

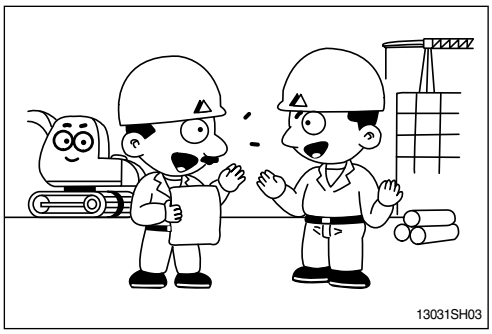
Think-safety first.
In special situation, wear protective clothing including a safety helmet, safety shoes, gloves, safety glasses and ear protection as required by the job condition.
Almost every accident is caused by disregarding the simple and fundamental safety hints.


13031SH01

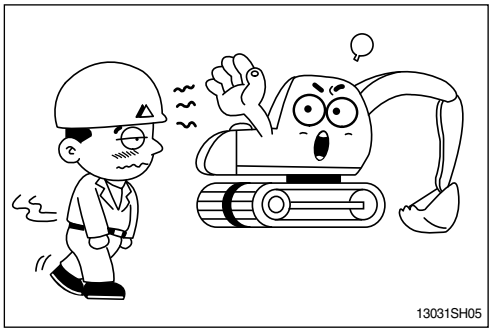
Be sure to understand thoroughly all about the operator's manual before operating the machine.
Proper care is your responsibility.


13031SH02

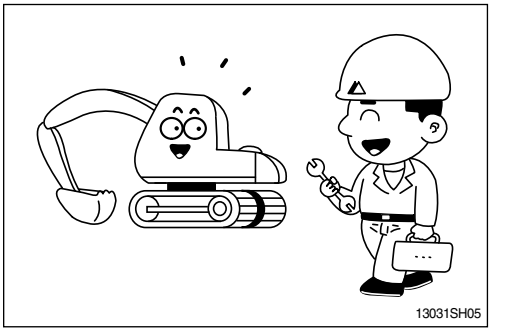
Fully understand the details and process of the construction before starting the work.
If you find anything dangerous on the job, consult with the job supervisor for the preventive measures before operating the machine.


13031SH03

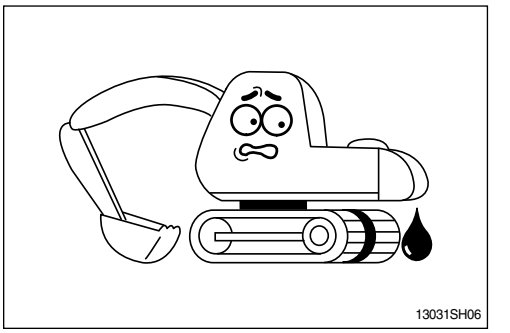
Do not operate when tired, or after drinking alcoholic beverages or any type of drugs.


13031SH05

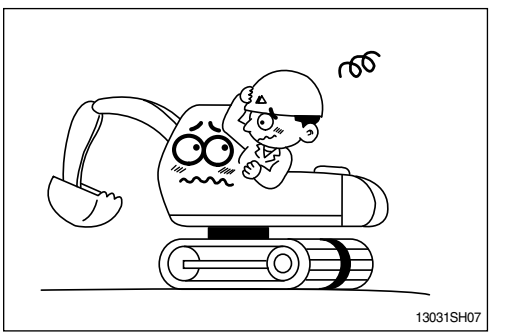
Check daily according to the operation manual.
Repair the damaged parts and tighten the loosened bolts.



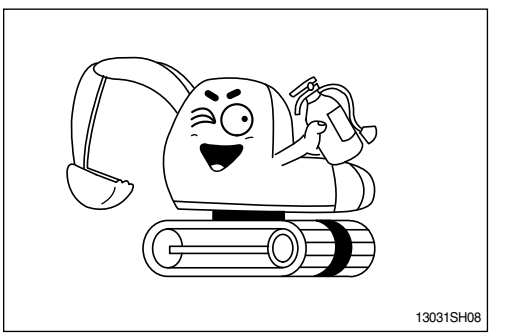
Check for leakage of engine oil, hydraulic oil, fuel and coolant.
Keep machine clean, clean machine regularly.



Do not operate the machine if it requires repairs.
Operate after complete repair.



Be prepared if a fire starts.
Keep a fire extinguisher handy and emergency numbers for a fire department near your telephone.

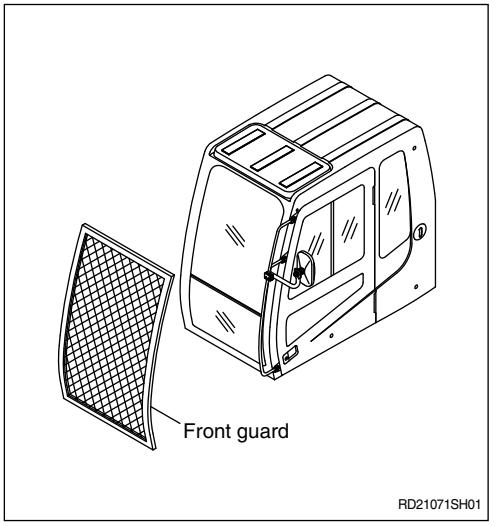


PROTECTION AGAINST FALLING OR FLYING OBJECTS

If there is any danger of falling or flying objects hitting the operator, install protective guards in place to protect the operator as required for each particular situation.

Be sure to close the front window before commencing work.

Make sure to keep all persons other than operator outside the range of falling or flying objects.



UNAUTHORIZED MODIFICATION

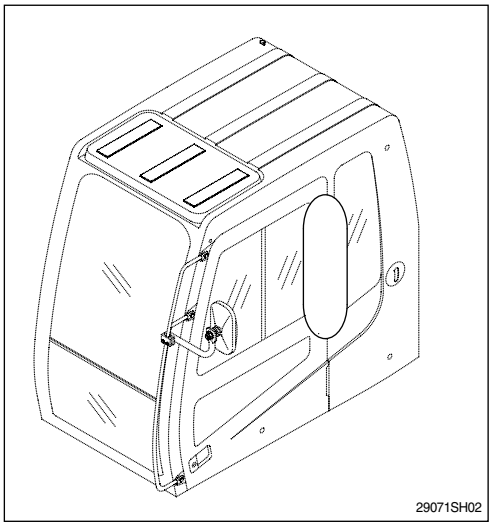
Any modification made without authorization from Hyundai can create hazards.

Before making a modification, consult your Hyundai distributor. Hyundai will not be responsible for any injury or damage caused by any unauthorized modification.

PREPARE FOR EMERGENCY

Only in case of emergency, use the installed hammer for breaking the windshield of the cab, and then exit carefully.

Be sure you know the phone numbers of persons you should contact in case of an emergency.

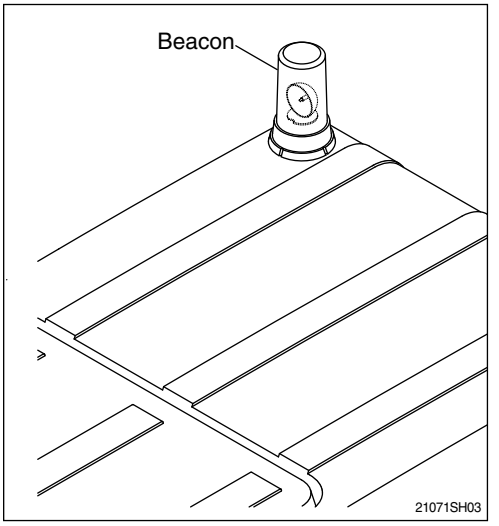


ROTATING BEACON

When you operate a machine on a road or beside a road, a rotating beacon is required to avoid any traffic accident.

Please contact your Hyundai distributor to install it.

Note : Its an option any will be req. for future safety requiremant



PRECAUTIONS FOR ATTACHMENTS

When installing and using an optional attachment, read the instruction manual for the attachment and the information related to attachments in this manual.

Do not use attachments that are not authorized by Hyundai or your Hyundai distributor. Use of unauthorized attachments could create a safety problem and adversely affect the proper operation and useful life of the machine.

Any injuries, accidents, product failures resulting from the use of unauthorized attachments are not the responsibility of Hyundai.

SAFETY RULES

Only trained and authorized personnel can operate and maintain the machine.
Follow all safety rules, precautions and instructions when operating or performing maintenance on the machine.
When working with another operator or a person on worksite traffic duty, be sure all personnel understand all hand signals that are to be used.

SAFETY FEATURES

Be sure all guards and covers are in their proper position. Have guards and covers repaired if damaged.
Use safety features such as safety lock and seat belts properly.
Never remove any safety features. **Always** keep them in good operating condition.
Improper use of safety features could result in serious bodily injury or death.

MACHINE CONTROL PATTERN

Check machine control pattern for conformance to pattern on label in cab.
If not, change label to match pattern before operating machine.
Failure to do so could result in injury.

CALIFORNIA PROPOSITION 65

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

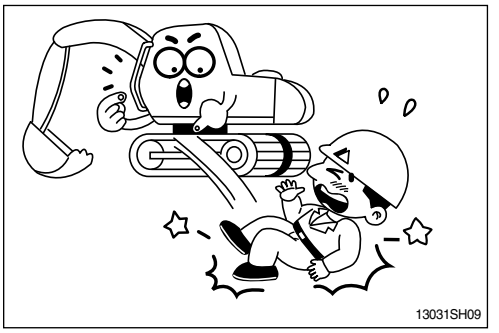
This product contains or emits chemicals known to the State of California to cause cancer or birth defects or other reproductive harm.

Battery posts, terminals and related accessories contain lead and lead compounds.
WASH HANDS AFTER HANDLING

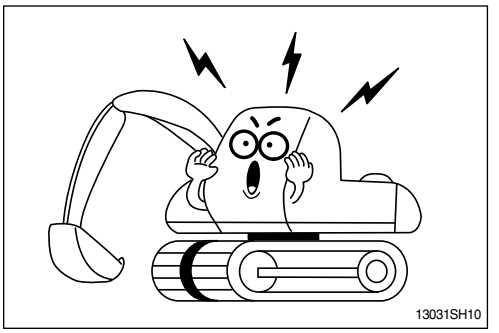
13031SH55

2. DURING OPERATING THE MACHINE

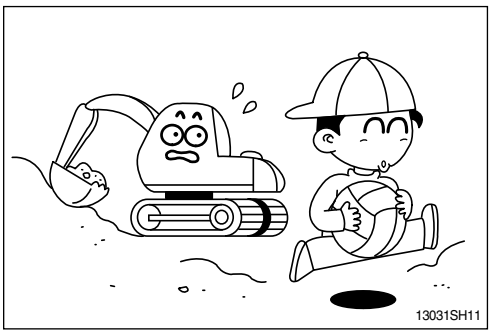
Use the handle and footstep when getting on or off the machine.
Do not jump on or off the machine.



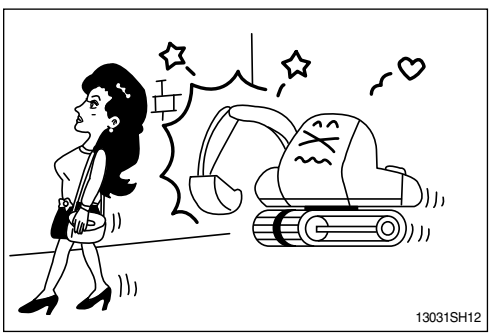
Sound the horn to warn nearby personnel before operating the machine.
Remove all the obstacles like frost on the window before operating the machine for the good visibility.



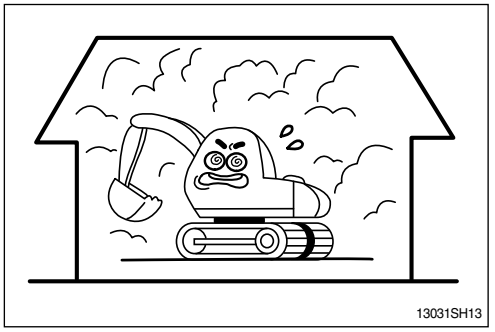
Operate carefully to make sure all personnel or obstacles are clear within the working range of the machine.
Place safety guards if necessary.



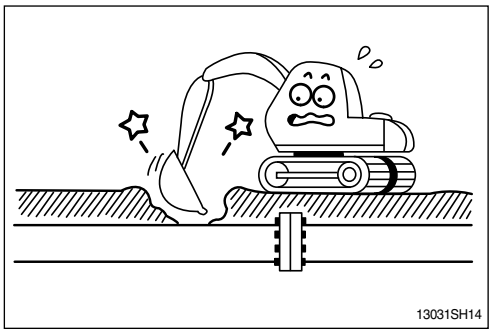
When using the work equipment, pay attention to job site.



Provide proper ventilation when operating engine in a closed area to avoid the danger of exhaust gases.

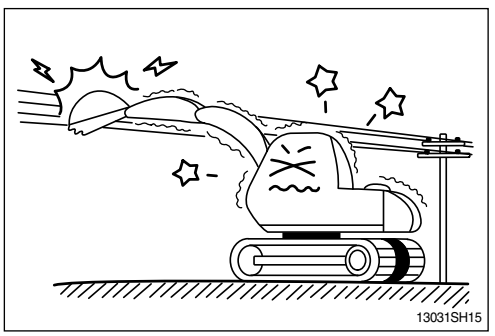


Check the locations of underground gas pipes or water line and secure the safety before operation.

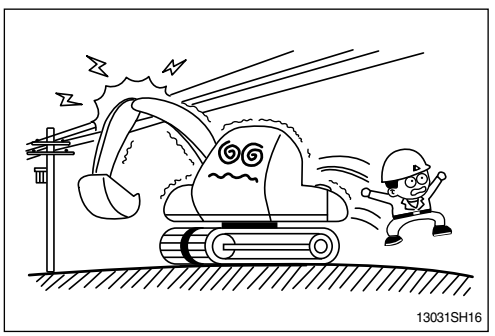


The operating near the electrical lines is very dangerous.
Operate within safe working range permitted as below.

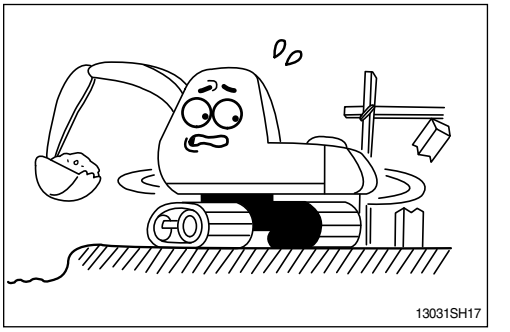
Supply voltage	Min safe separation
6.6kV	3m(10ft)
33.0kV	4m(13ft)
66.0kV	5m(16ft)
154.0kV	8m(26ft)
275.0kV	10m(33ft)



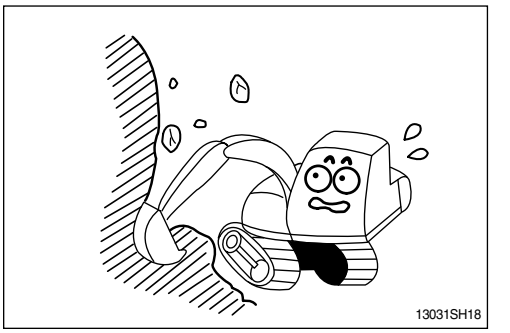
If the machine touches the electric power lines, keep sitting on the operator's seat and make sure the personnel on the ground not to touch the machine until turning off the electric current. Jump off the machine without contacting the machine when you need to get off.



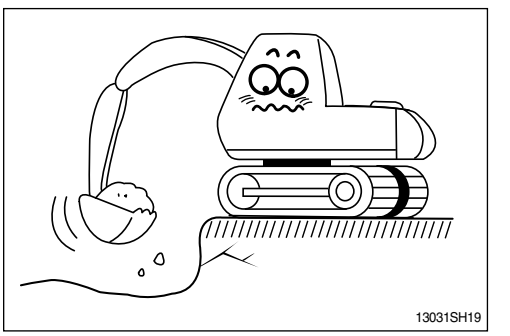
Watch out for obstacles.
Be particularly careful to check the machine clearance during the swing.



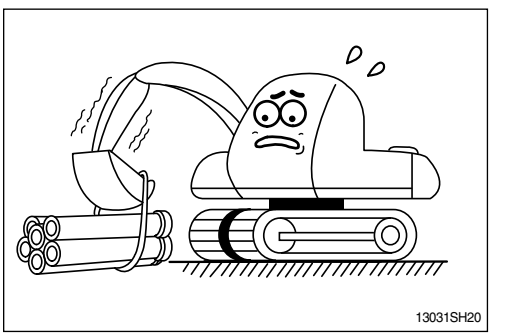
When using the machine as breaker or working in a place where stones may fall down, cab roof guard and head guard should be provided for proper protection.



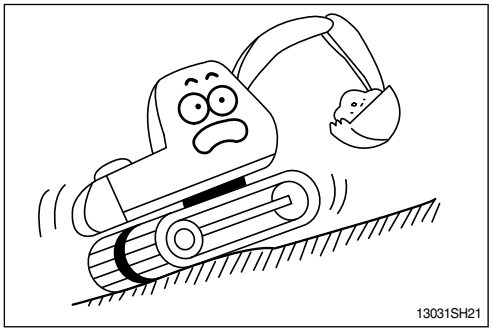
Avoid operating on a cliff or soft ground as there is danger of rolling over.
Make sure to get off easily as keeping the track at a right angle and putting the travel motor into the backward position when working on a cliff or soft ground inevitably.



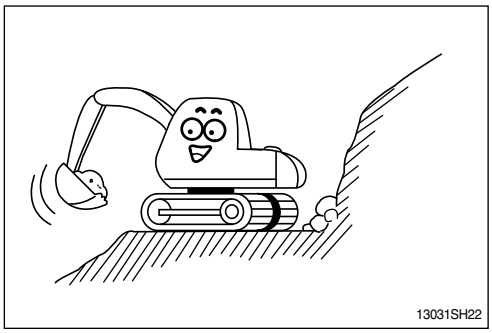
Operate for the lifting work considering the capacity of machine, weight and width of the load.
Be careful not to lift exceeding the machine capacity as it can be the cause of machine damage and safety accident.



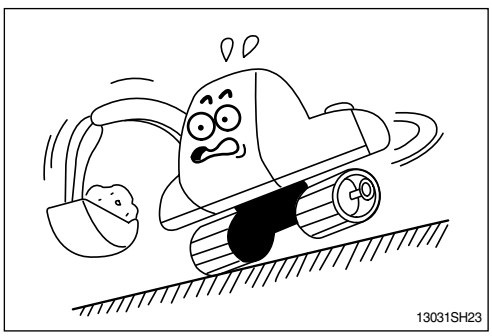
The operation on a slope is dangerous.
Avoid operating the machine on a slope of over 10 degree.



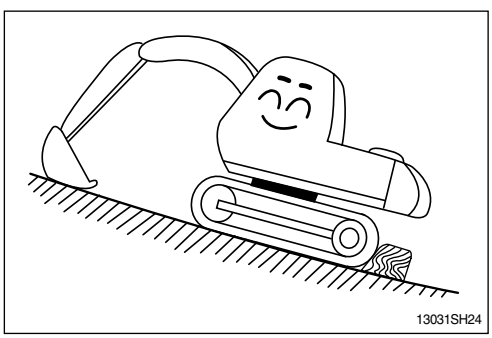
Operate the machine after making ground flat when operation is required on a slope.



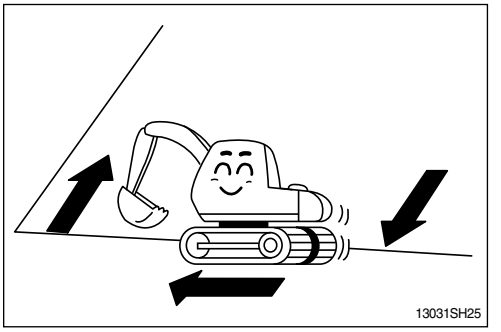
The swing on the slope can be danger of rolling over.
Do not operate to swing the machine with the bucket loaded on a slope since the machine may lose its balance under such an instance.



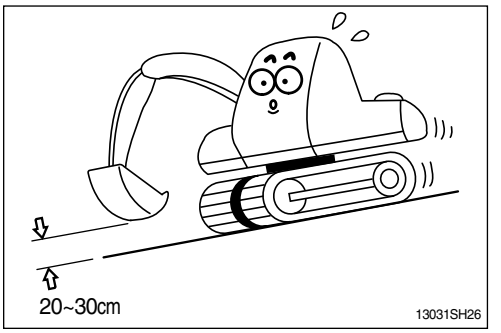
Avoid parking and stopping on a slope.
Lower the bucket to the ground and block the track when parking.



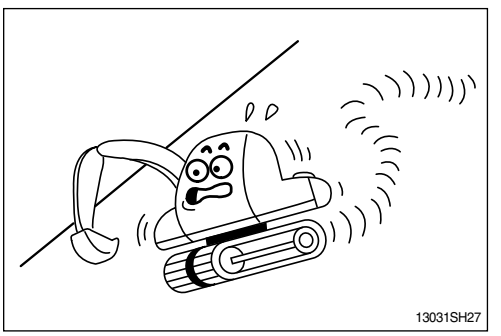
Avoid traveling in a cross direction on a slope as it can cause the danger of rolling over and sliding.



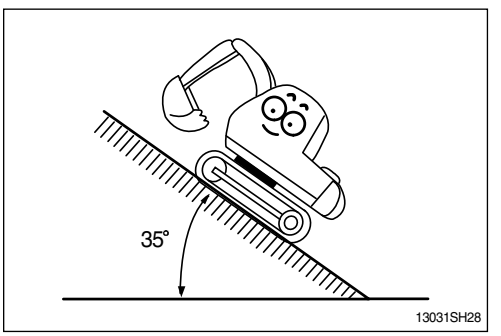
Traveling on a slope is dangerous.
Be sure to operate slowly when traveling down a slope and maintain the bucket at a height of 20~30㎝(1ft) above the ground so that it can be used as brake in an emergency.



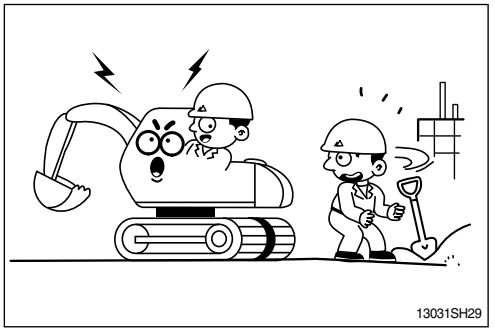
Steering of the machine while traveling on a slope is dangerous.
When an inevitable turning of direction is required, turn on the flat and solid ground.



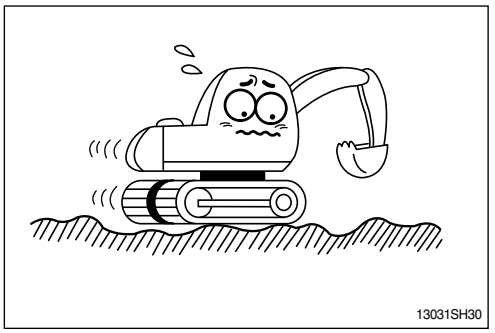
The engine angularity limits are 35 degree.
Do not operate by more than the engine limits in any case.



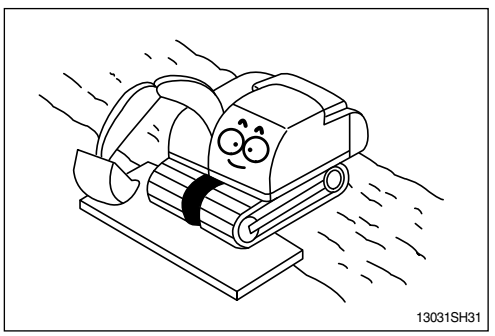
Before traveling the machine, sound the horn to warn nearby personnel.
Operate forward and backward correctly with confirming the location of the travel motor.



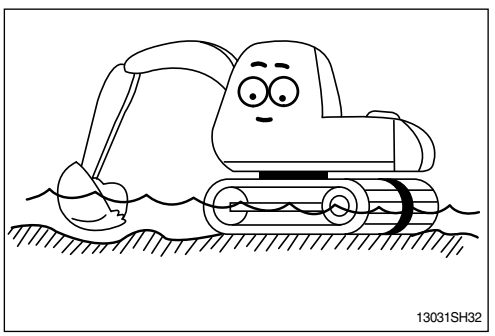
Slow down when traveling through obstacles or uneven ground.



When working on soft ground, place mats or wood boards on the ground to prevent the machine sinking.



When operating in water or when crossing shallow, check the bed soil condition and depth and flow speed of water, then proceed taking care that water is not above carrier roller.



MOUNTING AND DISMOUNTING

Never jump on or off the machine. **Never** get on or off a moving machine.

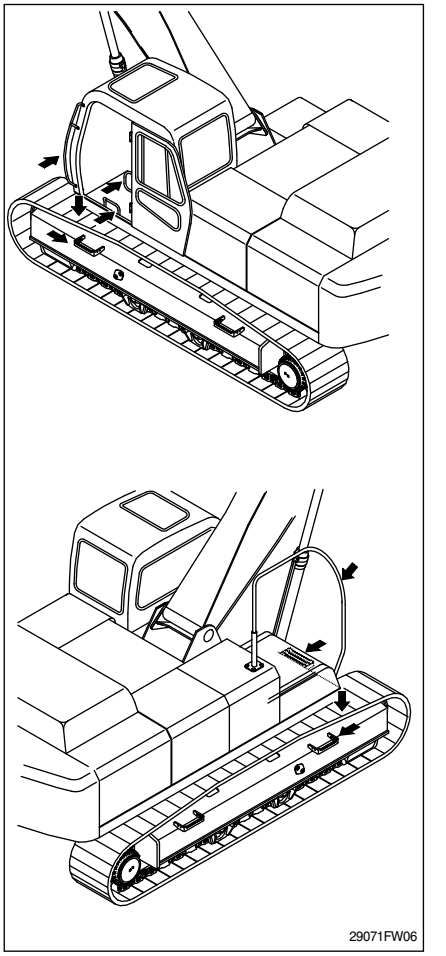
When mounting or dismounting, always face the machine and use the handrails, machine or track frame steps, and track shoes. Additional track frame step can be fitted for wider optional shoe. In this case please contact your Hyundai distributor.

Do not hold any control levers when getting on or off the machine.

Ensure safety by always maintaining at least three-point contact of hands and feet with the handrails, steps or track shoes.

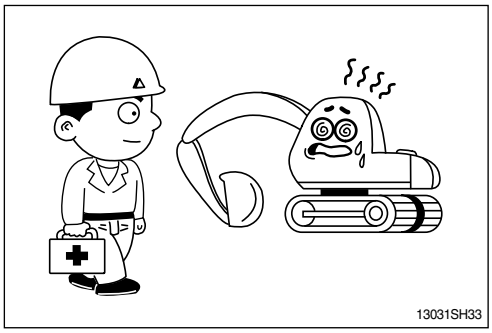
Always remove any oil or mud from the handrails, steps and track shoes. If they are damaged, repair them and tighten any loose bolts.

If grasping the door handrail when mounting or dismounting or moving on the track, open and lock the door securely in the open position. Otherwise, the door may move suddenly, causing you to lose balance and fall.

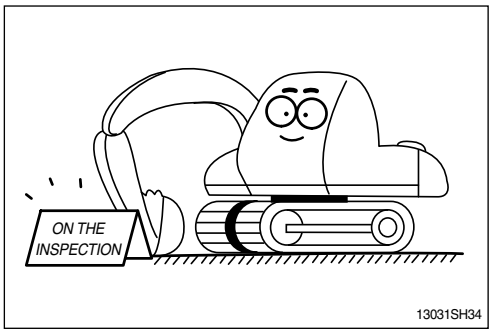


3. DURING MAINTENANCE

Stop the engine immediately when the trouble of the machine is found.
Inspect immediately the cause of trouble such as vibration, overheating and trouble in the cluster then repair.

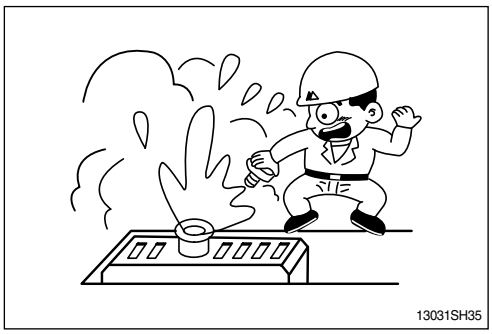

13031SH33

Park on a flat place and stop the engine for inspecting and repairing. Properly TAG machine is not operational. (Remove start key)
Extreme care shall be taken during maintenance work. Parts may require additional safe guard.

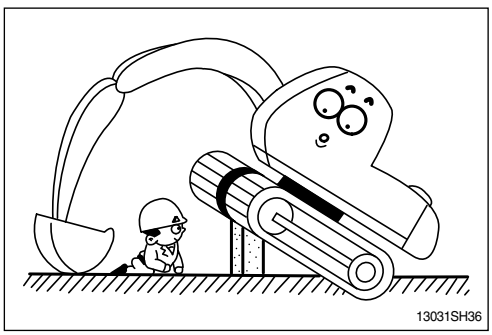


13031SH34

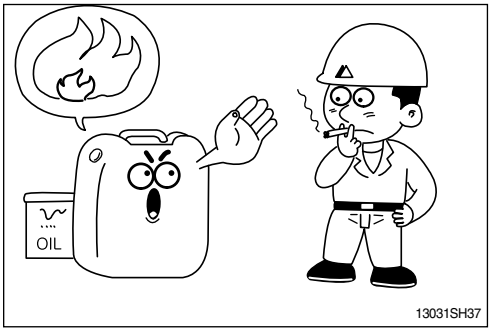
Do not remove the radiator cap from hot engine. Open the cap after the engine cools, below 50° C(122°F) to prevent personal injury from heated coolant spray or steam.


13031SH35

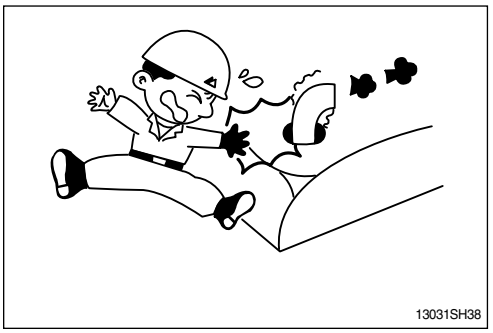
Do not work below the machine.
Be sure to work with proper safety supports.
Do not depend on the hydraulic cylinders to hold up the equipment and attachment.


13031SH36

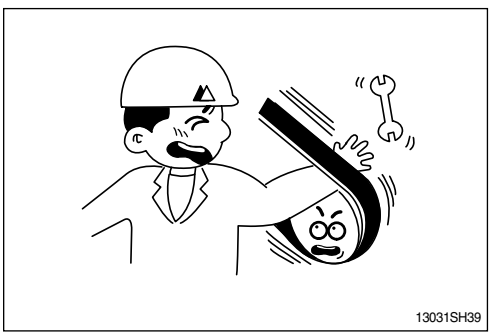
There is the danger of fire in fuel and oil.
Store in cool and dry area, away from any open flames.



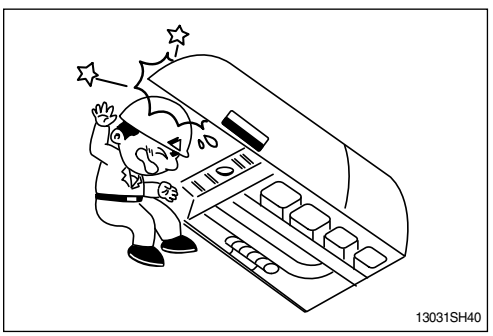
Do not touch exhaust pipe, or may cause severe burn.



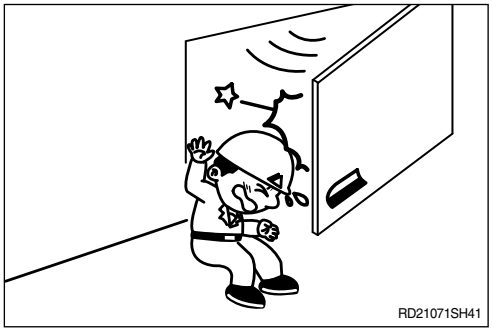
Do not open the engine hood and covers while the engine is running.



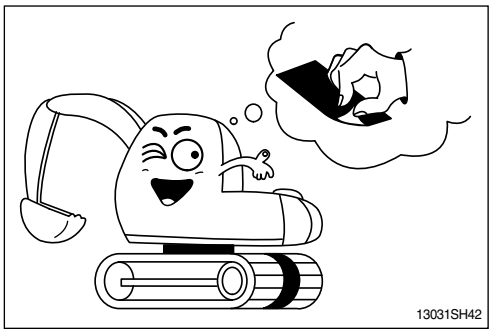
Be careful of not hitting the edges when you service engine.



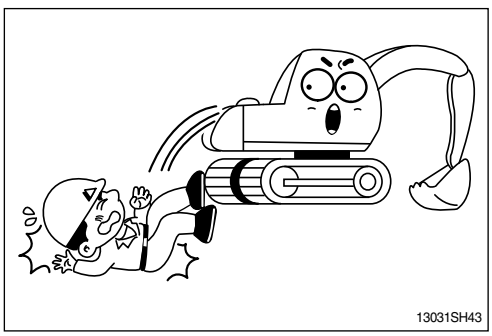
Be careful that the front window may be promptly closed.
Be sure to support stay, when the side door needs to be opened.
Be careful that the open side door may closed by the external or natural force like strong wind.


RD21071SH41

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.

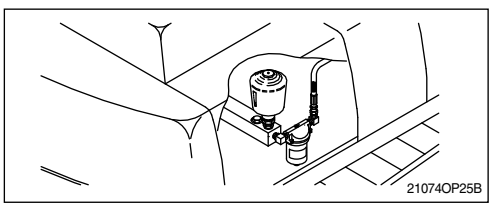

13031SH42

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


13031SH43

HIGH PRESSURE GAS

Contain high pressure gas.
To avoid explosion and personal injury, do not expose to fire, do not weld, do not drill.
Relieve pressure before discharging.

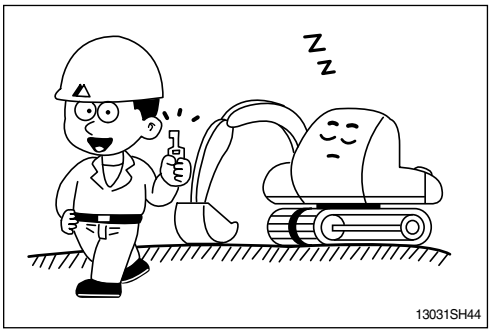

21074OP25B

LIFT EYES CAN FAIL

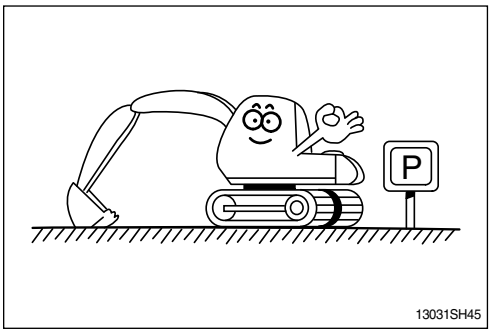
Lift eyes or tank can fail when lifting tank containing fluids resulting in possible personal injury.
Drain tank of all fluids before lifting.

4. PARKING

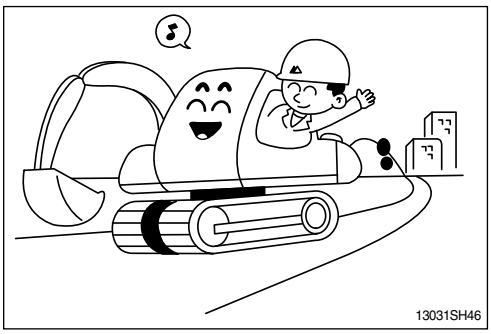
When leaving the machine after parking, lower the bucket to the ground completely and put the safety lever at parking position then remove the key.
Lock the cab door.



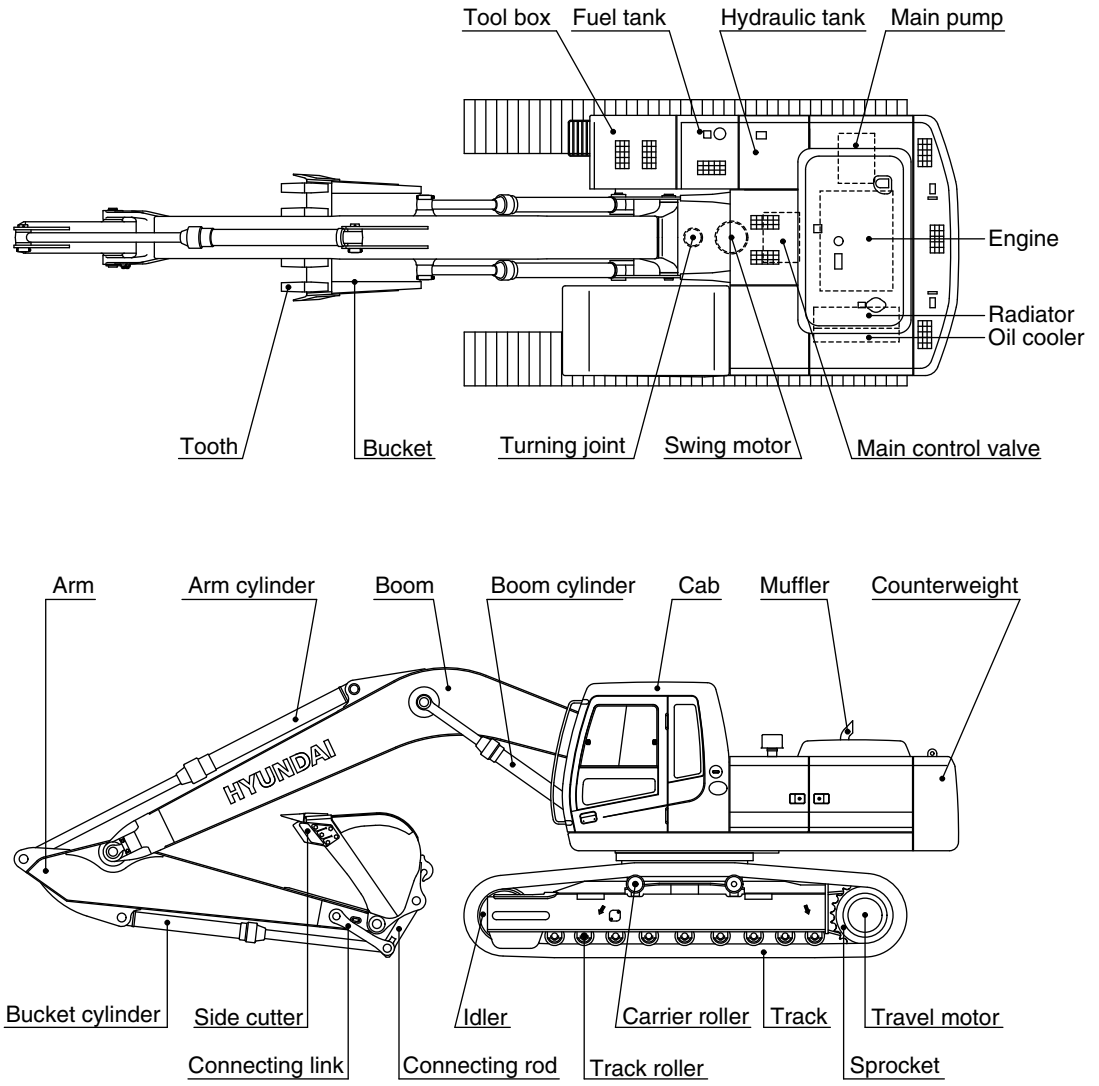
Park the machine in the flat and safe place.



Hope you can work easily and safely observing safety rules.
For safe operation, observe all safety rules.



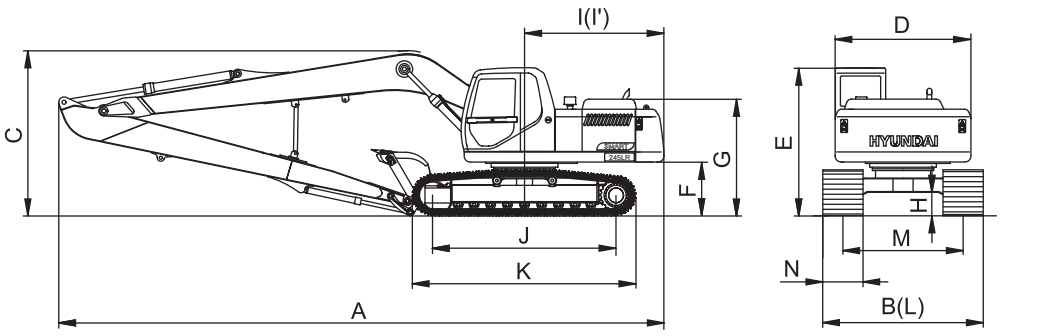
1. MAJOR COMPONENT



RD21072SP01

2. SPECIFICATIONS

1) R245LR LONG REACH

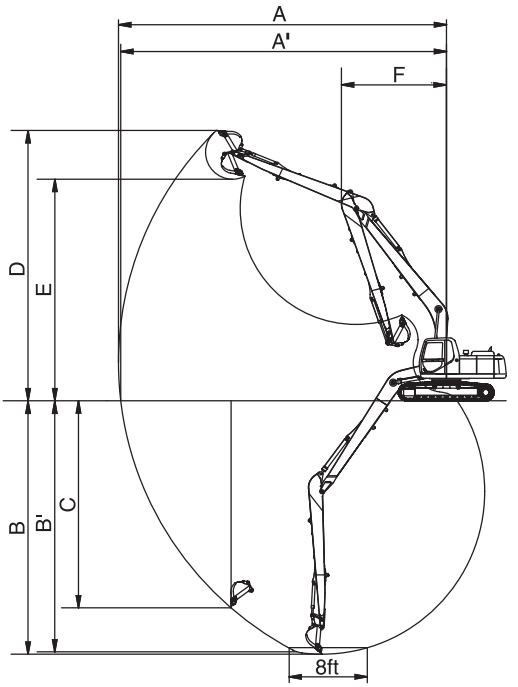


RD22072SP06

Description		Unit	Specification
Operating weight		kg(lb)	24500(54000)
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 800mm shoe	B		3190(10' 6")
Overall height	C		3280(10' 9")
Superstructure width	D		2700(8' 10")
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'		2830(9' 3")
Distance between tumblers	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(31' 5")
Travel speed(Low/high)		km/hr(mph)	3.4/5.3(2.1/3.3)
Swing speed		rpm	13.0
Gradeability		Degree(%)	35(70)
Ground pressure(800mm shoe)		$kgf/cm^2(psi)$	0.39(5.55)

3. WORKING RANGE

1) R245LR LONG REACH [8.2m(26' 11") BOOM]



29072SP08

Description		6.3m(20' 8") Arm
Max digging reach	A	15220(50' 0")
Max digging reach on ground	A'	15120(49' 7")
Max digging depth	B	11760(38' 7")
Max digging depth (8ft level)	B'	11650(38' 3")
Max vertical wall digging depth	C	9610(31' 6")
Max digging height	D	12550(41' 2")
Max dumping height	E	10280(33' 8")
Min swing radius	F	4870(16' 0")
Bucket digging force	SAE	72.6 kN
		7400 kgf
		16310 lbf
	ISO	83.4 kN
		8500 kgf
		18740 lbf
Arm crowd force	SAE	49.0 kN
		5000 kgf
		11020 lbf
	ISO	50.0 kN
		5100 kgf
		11240 lbf

4. WEIGHT

1) R245LR LONG REACH

Item	R245LR LONG REACH	
	kg	lb
Upperstructure assembly	8950	19730
Main frame weld assembly	1720	3790
Engine assembly	530	1170
Main pump assembly	120	265
Main control valve assembly	200	440
Swing motor assembly	190	420
Hydraulic oil tank assembly	240	530
Fuel tank assembly	195	430
Counterweight	5300	11680
Cab assembly	310	680
Lower chassis assembly	8700	19180
Track frame weld assembly	2720	6000
Swing bearing	260	570
Travel motor assembly	305	670
Turning joint	55	120
Track recoil spring	140	310
Idler	170	370
Carrier roller	20	45
Track roller	50	110
Track-chain assembly(800mm standard triple grouser shoe)	1660	3660
Front attachment assembly(8.2m boom, 6.3m arm, 0.52m^3 SAE heaped bucket)	5882	13070
8.2m boom assembly	2124	4720
6.3m arm assembly	1208	2685
0.52m^3 SAE heaped bucket	510	1133
Boom cylinder assembly	180	400
Arm cylinder assembly	270	600
Bucket cylinder assembly	130	290
Bucket control rod assembly	170	370

5. LIFTING CAPACITIES

1) R245LR LONG REACH

(1) 8.2m(26' 11") boom, 6.3m(20' 8") arm equipped with 0.52m³(SAE heaped) bucket, 800mm(32") triple grouser shoe and 5300kg counterweight.

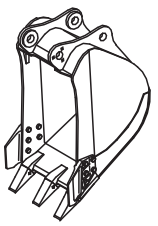
• : Rating over-front • : Rating over-side or 360 degree

Load point height		Load radius								At max. reach		
		3.0m(10ft)		6.0m(20ft)		9.0m(30ft)		12.0m(40ft)		Capacity		Reach
												m(ft)
9.0m (30ft)	kg							*830	*830	*1330	*1330	13.11
	lb							*1830	*1830	*2930	*2930	(43.0)
6.0m (20ft)	kg							*1430	*1430	*1410	1160	14.37
	lb							*3150	*3150	*3110	2560	(47.1)
3.0m (10ft)	kg					*1990	*1990	*1670	1630	*1520	980	14.89
	lb					*4390	*4390	*3680	3590	*3350	2160	(48.9)
Ground Line	kg	*4560	*4560	*4330	*4330	*2650	2430	*1980	1440	*1670	930	14.75
	lb	*10050	*10050	*9550	*9550	*5840	5360	*4370	3170	*3680	2050	(48.4)
-3.0m (-10ft)	kg	*5710	*5710	*5250	3920	*3150	2140	*2220	1310	*1860	1020	13.92
	lb	*12590	*12590	*11570	8640	*6940	4720	*4890	2890	*4100	2250	(45.7)
-6.0m (-20ft)	kg	*7790	*7790	*5370	3840	*3280	2060			*2090	1330	12.25
	lb	*17170	*17170	*11840	8470	*7230	4540			*4610	2930	(40.2)
-9.0m (-30ft)	kg	*8780	*8780	*4510	4110	*2620	2260					
	lb	*19360	*19360	*9940	9060	*5780	4980					

Note 1. Lifting capacity are based on SAE J1097 and ISO 10567.
2. Lifting capacity of the ROBEX series does not exceed 75% of tipping load with the machine on firm, level ground or 87% of full hydraulic capacity.
3. The load point is a hook located on the back of the bucket.
4. *indicates load limited by hydraulic capacity.

6. BUCKET SELECTION GUIDE

1) GENERAL BUCKET



0.52m³ SAE heaped bucket

Capacity		Width		Weight	Recommendation
					8.2m (26' 11") boom
SAE heaped	CECE heaped	Without side cutter	With side cutter		6.3m arm (20' 8")
0.52m³ (0.67yd³)	0.45m³ (0.59yd³)	700mm (27.6")	820mm (32.3")	570kg (1260lb)	

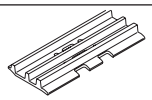
Applicable for materials with density of 2000kgf/m³ (3370lbf/yd³) or less

7. UNDERCARRIAGE

1) TRACKS

X-leg type center frame is integrally welded with reinforced box-section track frames. The design includes dry tracks, lubricated rollers, idlers, sprockets, hydraulic track adjusters with shock absorbing springs and assembled track-type tractor shoes with triple grousers.

2) TYPES OF SHOES

Model	Shapes		Triple grouser			
						
R245LR LONG REACH	Shoe width	mm(in)	-	-	800(32)	-
	Operating weight	kg(lb)	-	-	24500(54000)	-
	Ground pressure	kgf/cm^2(psi)	-	-	0.39(5.55)	-
	Overall width	mm(ft-in)	-	-	3190(10' 6")	-

3) NUMBER OF ROLLERS AND SHOES ON EACH SIDE

Item	Quantity
Carrier rollers	2EA
Track rollers	9EA
Track shoes	49EA

4) SELECTION OF TRACK SHOE

Suitable track shoes should be selected according to operating conditions.

Method of selecting shoes

Confirm the category from the list of applications in **table 2,** then use **table 1** to select the shoe. Wide shoes(Categories B and C) have limitations on applications. Before using wide shoes, check the precautions, then investigate and study the operating conditions to confirm if these shoes are suitable.

Select the narrowest shoe possible to meet the required flotation and ground pressure. Application of wider shoes than recommendations will cause unexpected problem such as bending of shoes, crack of link, breakage of pin, loosening of shoe bolts and the other various problems.

※ **Table 1**

Track shoe	Specification	Category
600mm triple grouser	Standard	A
700mm triple grouser	Option	B
800mm triple grouser	Option	C
900mm triple grouser	Option	C
800mm triple grouser(Long reach)	Standard	C

※ **Table 2**

Category	Applications	Precautions
A	Rocky ground, river beds, normal soil	· Travel at low speed on rough ground with large obstacles such as boulders or fallen trees
B	Normal soil, soft ground	· These shoes cannot be used on rough ground with large obstacles such as boulders or fallen trees · Travel at high speed only on flat ground · Travel slowly at low speed if it is impossible to avoid going over obstacles
C	Extremely soft gound (Swampy ground)	· Use the shoes only in the conditions that the machine sinks and it is impossible to use the shoes of category A or B · These shoes cannot be used on rough ground with large obstacles such as boulders or fallen trees · Travel at high speed only on flat ground · Travel slowly at low speed if it is impossible to avoid going over obstacles

8. SPECIFICATIONS FOR MAJOR COMPONENTS

1) ENGINE

Item	Specification
Model	6BT5.9C
Type	4-cycle turbocharged diesel engine, low emission
Cooling method	Water cooling
Number of cylinders and arrangement	6 cylinders, in-line
Firing order	1-5-3-6-2-4
Combustion chamber type	Direct injection type
Cylinder bore × stroke	102× 120mm(4.02" × 4.72")
Piston displacement	5880cc(359cu in)
Compression ratio	17.3 : 1
Rated gross horse power(SAE J1995)	139Hp at 2000rpm(104kW at 2000rpm)
Maximum torque at 1500rpm	62.6kgf · m(453lbf · ft)
Engine oil quantity	17 ℓ (4.49U.S. gal)
Dry weight	530kg(1168lb)
High idling speed	2180+ 50rpm
Low idling speed	1050± 100rpm
Rated fuel consumption	164.8g/Hp · hr at 1950rpm
Starting motor	(24V-4.5kW)
Alternator	Delco Remy (24V-50A)
Battery	2 × 12V × 100Ah

2) MAIN PUMP

Item	Specification
Type	Variable displacement tandem axis piston pumps
Capacity	2 × 113cc/rev
Maximum pressure	330kgf/cm^2 (4694psi) [360kgf/cm^2 (5120psi)]
Rated oil flow	2 × 220 ℓ /min (58.1U.S. gpm/ 48.4U.K. gpm)
Rated speed	1950rpm

[ ] : Power boost

3) GEAR PUMP

Item	Specification
Type	Fixed displacement gear pump single stage
Capacity	10cc/rev
Maximum pressure	35kgf/cm^2(500psi)
Rated oil flow	19.5 ℓ/min(5.2U.S. gpm/4.3U.K. gpm)

4) MAIN CONTROL VALVE

Item	Specification
Type	9 spools mono-block
Operating method	Hydraulic pilot system
Main relief valve pressure	330kgf/cm^2(4695psi) [360kgf/cm^2(5120psi)]
Overload relief valve pressure	390kgf/cm^2(5550psi)

[ ]: Pooer boost

5) SWING MOTOR

Item	Specification
Type	Two fixed displacement axial piston motor
Capacity	151cc/rev
Relief pressure	240kgf/cm^2(3414psi)
Braking system	Automatic, spring applied hydraulic released
Braking torque	59kgf · m(427lbf · ft)
Brake release pressure	33~50kgf/cm^2(470~711psi)
Reduction gear type	2 - stage planetary
Swing speed	11rpm

6) TRAVEL MOTOR

Item	Specification
Type	Variable displacement axial piston motor
Relief pressure	330kgf/cm^2(4695psi)
Reduction gear type	2-stage planetary
Braking system	Automatic, spring applied hydraulic released
Brake release pressure	11kgf/cm^2(156psi)
Braking torque	49.3kgf · m(357lbf · ft)

7) REMOTE CONTROL VALVE

Item		Specification
Type		Pressure reducing type
Operating pressure	Minimum	6.5kgf/cm²(92psi)
	Maximum	26kgf/cm²(370psi)
Single operation stroke	Lever	61mm(2.4in)
	Pedal	123mm(4.84in)

8) CYLINDER

Item		Specification
Boom cylinder	Bore dia × Rod dia × Stroke	ø 120× ø 85× 1290mm
	Cushion	Extend only
Arm cylinder	Bore dia × Rod dia × Stroke	ø 140× ø 100× 1510mm #ø 140 × ø 95× 1460mm
	Cushion	Extend and retract
Bucket cylinder	Bore dia × Rod dia × Stroke	ø 125× ø 85× 1055mm #ø 100 × ø 70× 870mm
	Cushion	Extend only

※ **Discoloration of cylinder rod can occur when the friction reduction additive of lubrication oil spreads on the rod surface.**

※ **Discoloration does not cause any harmful effect on the cylinder performance.**

: LONG REACH

9) SHOE

Item		Width	Ground pressure	Link quantity	Overall width
R245LR LONG REACH	Standard	800mm(32")	0.42kgf/cm²(5.97psi)	49	3190mm(10' 6")

10) BUCKET

Item		Capacity		Tooth quantity	Width	
		SAE heaped	CECE heaped		Without side cutter	With side cutter
R245LR	STD	0.52m³(0.67yd³)	0.45m³(0.59yd³)	3	700mm(27.6")	820mm(32.3")

9. RECOMMENDED OILS

Use only oils listed below or equivalent.
Do not mix different brand oil.

Service point	Kind of fluid	Capacity ℓ (U.S. gal)	Ambient temperature ℃ (℉) -20 (-4) / -10 (14) / 0 (32) / 10 (50) / 20 (68) / 30 (86) / 40 (104)
Engine oil pan	Engine oil	17.0(4.49)	SAE 30 SAE 10W SAE 10W-30 SAE 15W-40
Swing drive	Gear oil	5.0(1.3)	SAE 85W-140
Final drive		5.8 × 2 (1.5 × 2)	
Hydraulic tank	Hydraulic oil	Tank; 180(48) System; 290(77)	ISO VG 32 ISO VG 46 ISO VG 68 LF
Fuel tank	Diesel fuel	340(90)	ASTM D975 NO.1 ASTM D975 NO.2
Fitting (Grease nipple)	Grease	As required	NLGI NO.1 NLGI NO.2
Radiator (Reservoir tank)	Mixture of antifreeze and water 50 : 50	35(9.2)	Ethylene glycol base permanent type

SAE : Society of Automotive Engineers
API : American Petroleum Institute
ISO : International Organization for Standardization
NLGI : National Lubricating Grease Institute
ASTM : American Society of Testing and Material

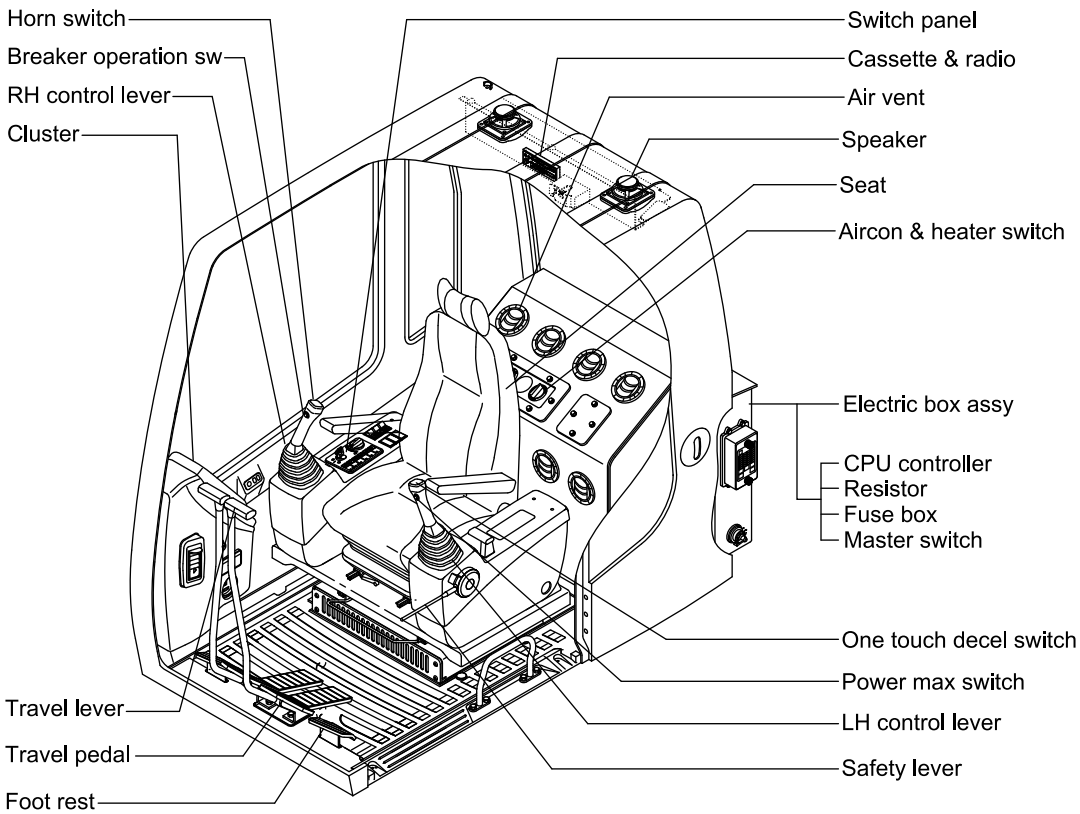
1. CAB DEVICES

1) The ergonomically designed console box and suspension type seat provide the operator with comfort.

2) ELECTRONIC MONITOR SYSTEM

(1) The centralized electronic monitor system allows the status and conditions of the machine to be monitored at a glance.

(2) It is equipped with a safety warning system for early detection of machine malfunction.



RD22073CD01

2. CLUSTER

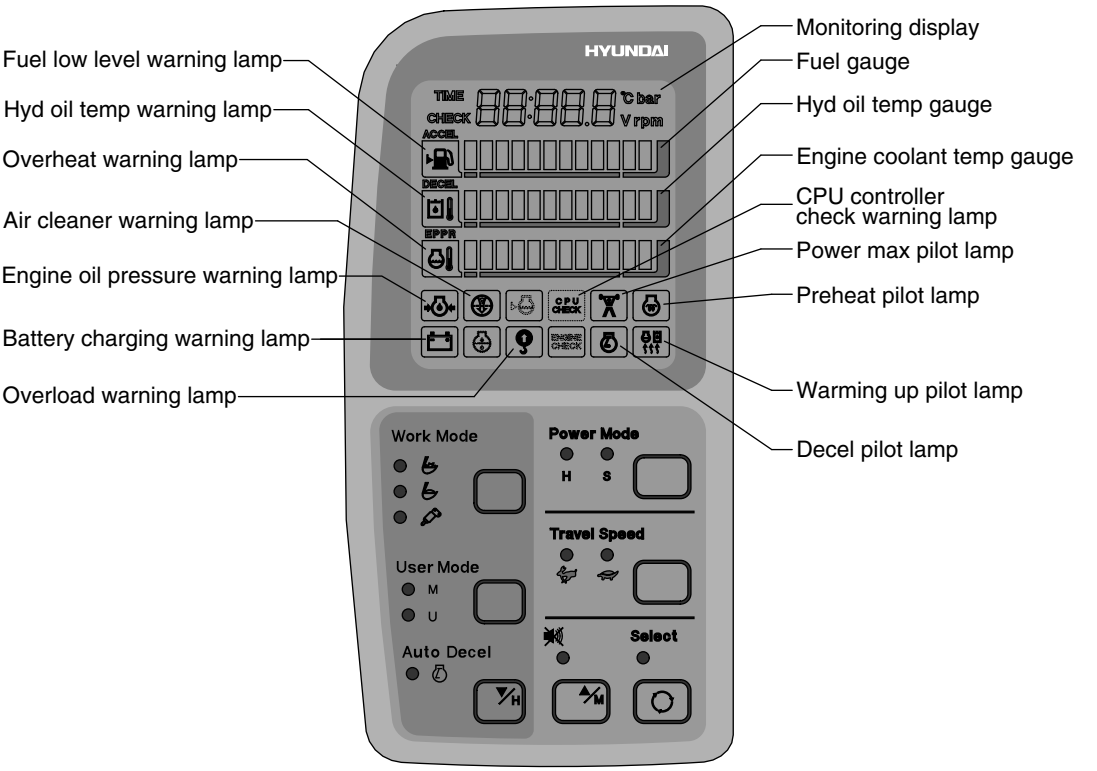
1) MONITOR PANEL

The monitor panel consists of gauges and lamps as shown below, to warn the operator in case of abnormal machine operation or conditions for the appropriate operation and inspection.

- Gauges : Indicate operating status of the machine.
- Warning lamp : Indicate abnormality of the machine(Red).
- Pilot lamp : Indicate operating status of the machine(Amber).

※ **The monitor installed on this machine does not entirely guarantee the condition of the machine. Daily inspection should be performed according to chapter 6, Maintenance.**

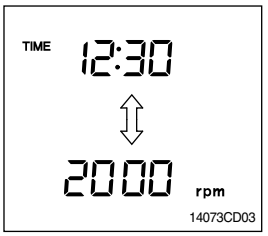
※ **When the monitor provides a warning immediately check the problem, and perform the required action.**



RD22073CD02

※ **The warming lamp lights ON and the buzzer sounds when the machine has a problem. In this case, press the buzzer stop switch and buzzer stop, but the warming lamp lights until the problem is cleared.**

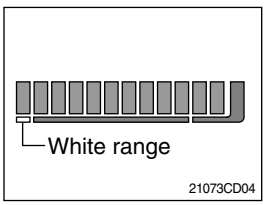
(1) Monitoring display



① This displays the current time and machine information such as engine rpm, coolant/hydraulic oil temperature, hydraulic oil pressure and also error codes.

※ **Refer to the page 4-11 for details.**

(2) Fuel gauge

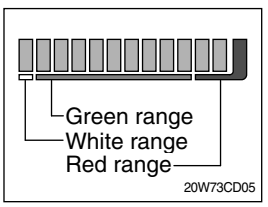


① This gauge indicates the amount of fuel in the fuel tank.

② Fill the fuel when the white range or warning lamp blinks.

※ **If the gauge illuminates the white range or warning lamp blinks 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



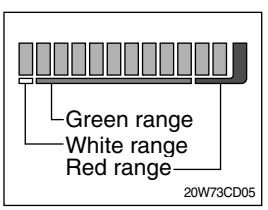
① This indicates the temperature of coolant.
- White range : Below 30℃(86℉)
- Green range : 30-105 ℃(86-221℉)
- Red range : Above 105℃(221℉)

② The green range illuminates when operating.

③ Keep idling engine at low speed until the green range illuminates before operation of machine.

④ When the red range illuminates, reduce the load on the system. If the gauge stays in the red range, stop the machine and check the cause of the problem.

(4) Engine coolant temperature gauge



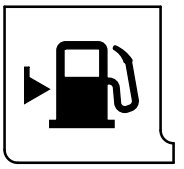
① This indicates the temperature of coolant.
- White range : Below 30℃(86℉)
- Green range : 30-105 ℃(86-221℉)
- Red range : Above 105℃(221℉)

② The green range illuminates when operating.

③ Keep idling engine at low speed until the green range illuminates before operation of machine.

④ When the red range illuminates, turn OFF the engine, check the radiator and engine.

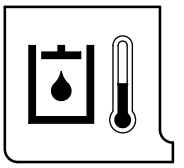
(5) Fuel low level warning lamp



21073CD04A

① This lamp blinks and the buzzer sounds when the level of fuel is below 31 ℓ (8.2U.S. gal).
② Fill the fuel immediately when the lamp blinks.

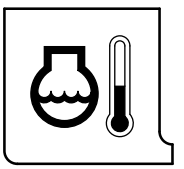
(6) Hydraulic oil temperature warning lamp



21073CD05A

① This warning lamp operates and the buzzer sounds when the temperature of hydraulic oil is over 105 °C(221 °F) .
② Check the hydraulic oil level when the lamp blinks.
③ Check for debris between oil cooler and radiator.

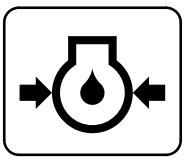
(7) Overheat warning lamp



21073CD06A

① This lamp blinks and the buzzer sounds when the temperature of coolant is over the normal temperature 110°C(230°F) .
② Check the cooling system when the lamp blinks.

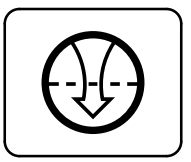
(8) Engine oil pressure warning lamp



21073CD07

① This lamp blinks and the buzzer sounds after starting the engine because of the low oil pressure.
② If the lamp blinks during engine operation, shut OFF engine immediately. Check oil level.

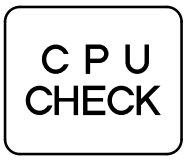
(9) Air cleaner warning lamp



21073CD08

① This lamp blinks and the buzzer sounds when the filter of air cleaner is clogged.
② Check the filter and clean or replace it.

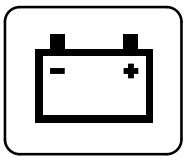
(10) CPU controller check warning lamp



21073CD10

① Communication problem between CPU controller and cluster makes the lamp blinks and the buzzer sounds.
② Check if any fuse for CPU burnt off.
③ If not check the communication line between them.

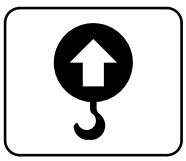
(11) Battery charging warning lamp



21073CD13

① This lamp blinks and the buzzer sounds when the starting switch is ON, it is turned OFF after starting the engine.
② Check the battery charging circuit when this lamp blinks during engine operation.

(12) Overload warning lamp



21073CD15

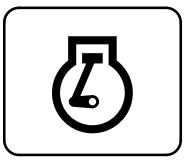
① When the machine is overload, the overload warning lamp blinks during the overload switch is ON.

(13) Power max pilot lamp

21073CD11

① The lamp will be ON when pushing power max switch on the LH RCV lever.

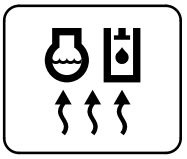
(14) Decel pilot lamp



21073CD17

① Operating auto decel or one touch decel makes the lamp ON.
② The lamp will be ON when pushing one touch decel switch on the LH RCV lever.

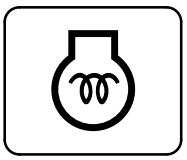
(15) Warming up pilot lamp



21073CD18

① This lamp is turned ON when the coolant temperature is below 30°C(86 °F).
② The automatic warming up is cancelled when the engine coolant temperature is above 30 °C, or when 10 minutes have passed since starting.

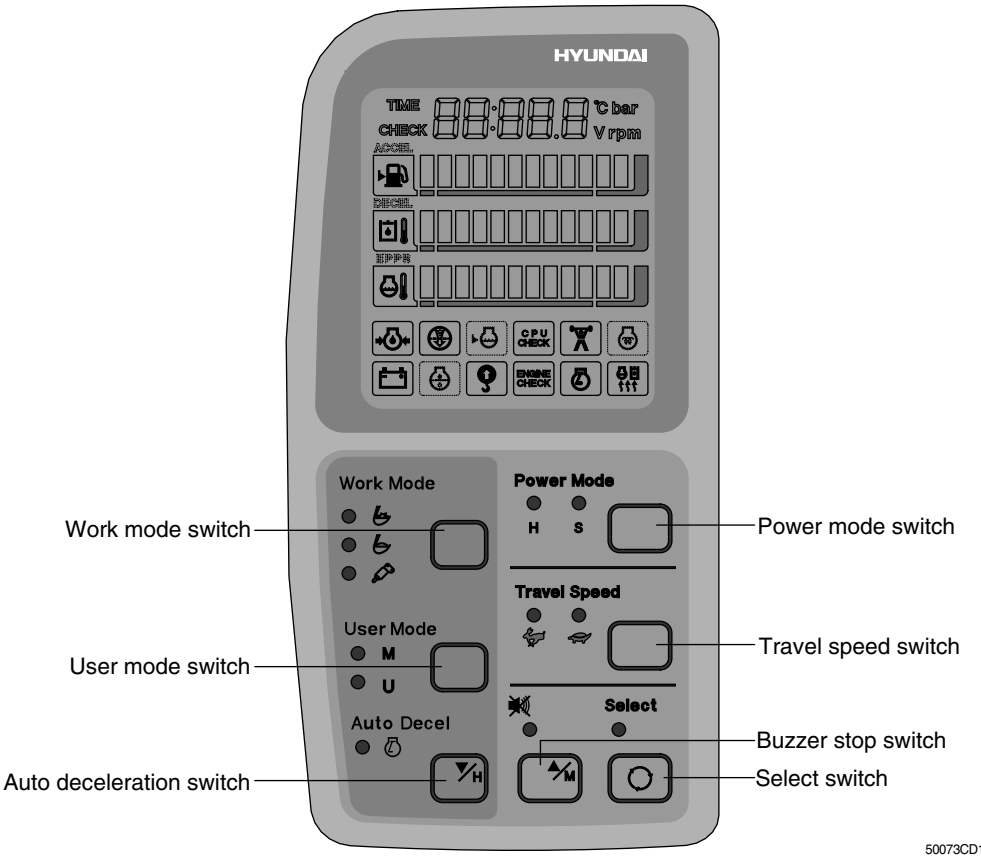
(16) Preheat pilot lamp



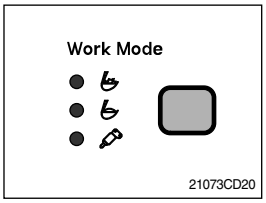
21073CD12

① Turning the start key switch ON position starts preheating in cold weather.
② Start the engine as this lamp is OFF.

2) SWITCH PANEL



(1) Work mode switch

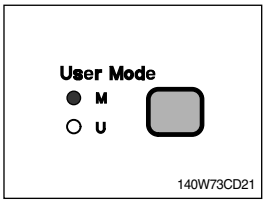


① This switch is to select the machine operation mode, which shifts from general operation mode to heavy operation mode and breaker mode in a raw by pressing the switch.

- : Heavy duty work mode
- : General work mode
- : Breaker operation mode

※ **Refer to the page 4-7 for details.**

(2) User mode switch

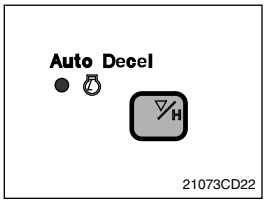


① This switch is to select the maximum power or user mode.

- M : Maximum power
- U : Memorizing operators preferable power setting

※ **Refer to the page 4-7 for details.**

(3) Auto deceleration switch



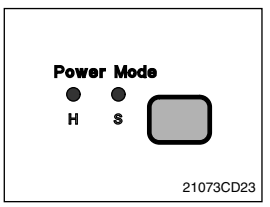
① This switch is used to actuate or cancel the auto deceleration function.

② When the switch actuated and all control levers and pedals are at neutral position, engine speed will be lowered automatically to save fuel consumption.

- Light ON : Auto deceleration function is selected.
- Light OFF : Auto deceleration function is cancelled so that the engine speed increased to previous setting value.

③ Operating the auto deceleration function makes the decel indicating lamp on the LCD panel ON.

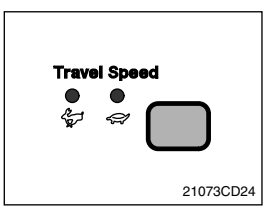
(4) Power mode switch



① The lamp of selected mode is turned ON by pressing the switch(▭).

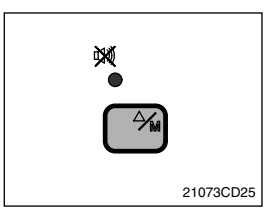
- H : High power work.
- S : Standard power work.

(5) Travel speed control switch



① This switch is to control the travel speed which is changed to high speed(Rabbit mark) by pressing the switch and low speed(Turtle mark) by pressing it again.

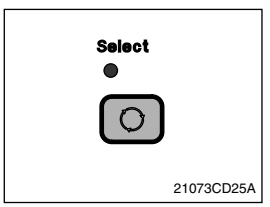
(6) Buzzer stop switch



① When the starting switch is turned ON first, normally the alarm buzzer sounds for 2 seconds during lamp check operation.

② The red lamp lights ON and the buzzer sounds when the machine has a problem.
In this case, press this switch and buzzer stops, but the red lamp lights until the problem is cleared.

(7) Select switch



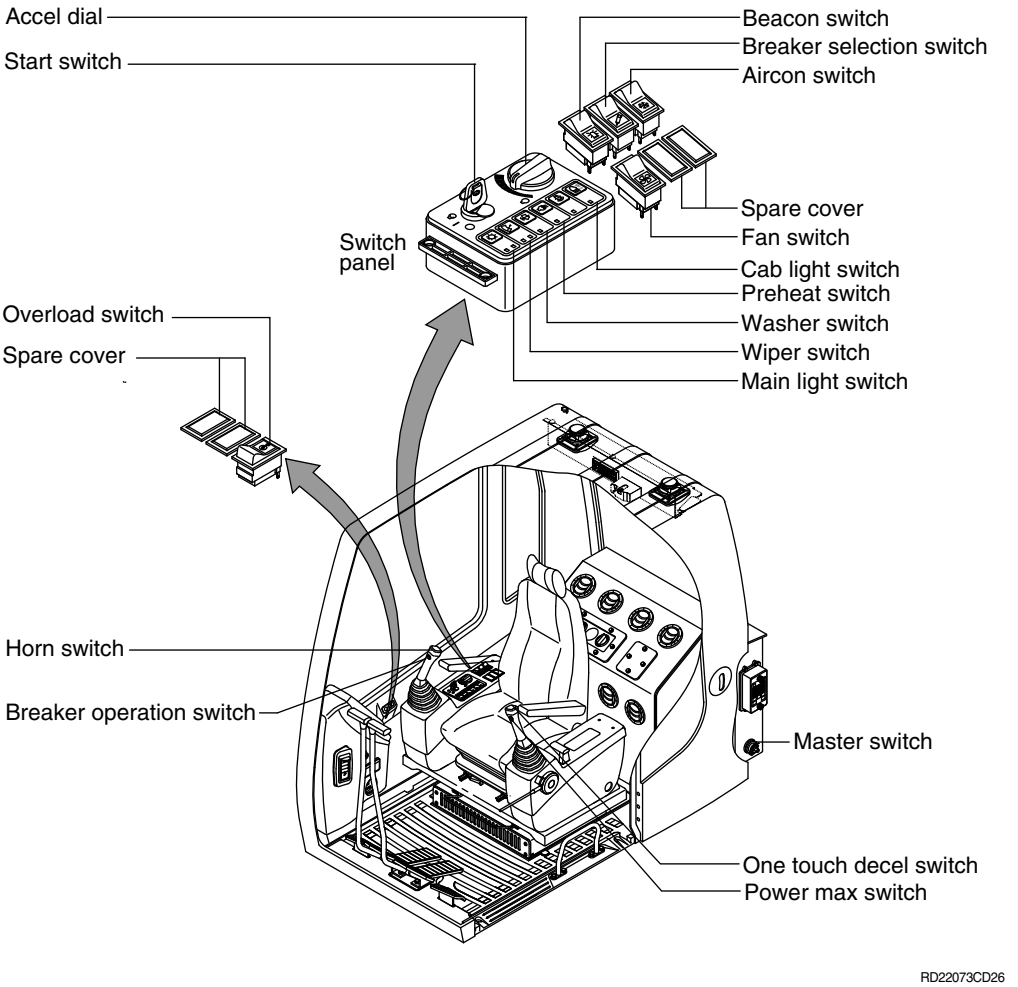
① This switch is used to select the monitor display function.

※ **Refer to the page 4-11 for details.**

② If the switch is pressed for 3 seconds in time display mode, it moves to time adjusting function, and you can adjust the time as below.

- Hour by auto decel(▭)switch
- Minute by buzzer stop(▭) switch.

③ After time set, the switch is pressed, it returns to clock display.

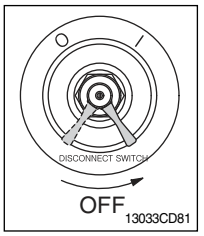


1) STARTING SWITCH

(1) There are three positions, OFF, ON and START.
- ◯ (OFF) : None of electrical circuits activate.
- | (ON) : All the systems of machine operate.
- (START) : Use when starting the engine. Release key immediately after starting.

※ **Key must be in the ON position with engine running to maintain electrical and hydraulic function and prevent serious machine damage.**

2) MASTER SWITCH

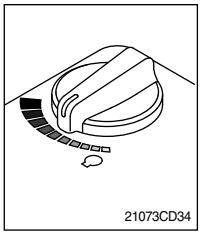


(1) This switch is used to shut off the entire electrical system.

(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 .**

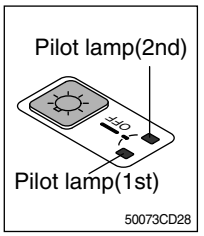
3) ACCEL DIAL SWITCH



(1) There are 10 dial setting.

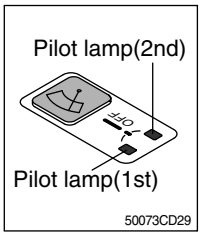
(2) Setting 1 is low idle and setting 10 is high idle.
- By rotating the accel dial to right : Engine speed increases
- By rotating the accel dial to left : Engine speed decreases

4) MAIN LIGHT SWITCH



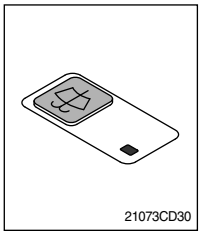
(1) This switch used to operate the head light and work light.
- Press the switch once to head light comes ON.
- Press the switch once more to work light comes ON.
- Press the switch again, return to a first step position.
- Press the switch more than one second to turn off lights.

5) WIPER SWITCH



(1) This switch used to operate wiper.
- Press the switch once to intermittently operate wiper.
- Press the switch once more to operate wiper low speed.
- Press the switch again return to a first step position.
- Press the switch more than one second to turn off wiper.

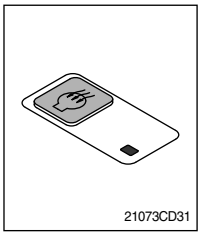
6) WASHER SWITCH



(1) The washer liquid is sprayed and the wiper is operated only while pressing this switch.

(2) The indicator lamp is turned ON when operating this switch.

7) PREHEAT SWITCH

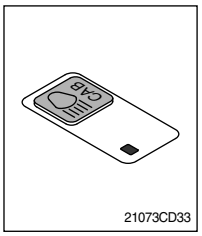


(1) This switch is used for starting the engine in cold weather. If pressed, grid heater is activated to get easier engine starting.

※ **Never hold the push button switch in for more than 30 seconds, as this can damage the grid heater.**

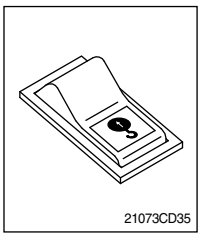
(2) The indicator lamp is turned ON when operating this switch.

8) CAB LIGHT SWITCH(Option)



(1) This switch is used to turns ON the cab light on the cab.

9) OVERLOAD SWITCH



(1) When this switch turned ON, buzzer makes sound and overload warning lamp comes ON in case that the machine is overloaded.

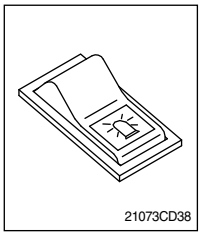
(2) When turned OFF, buzzer stops and warning lamp goes out.

10) BREAKER SELECTION SWITCH(Option)

(1) This switch is used to select breaker.

※ **The breaker operates only when this switch is selected.**

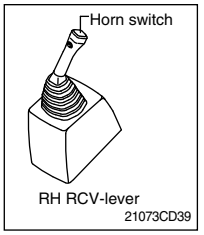
11) BEACON SWITCH(Option)



(1) This switch turns ON the rotary light on the cab.

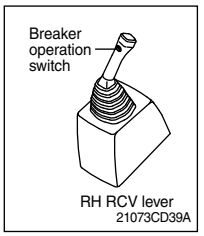
(2) The below indicator lamp is turned ON when operating this switch.

12) HORN SWITCH



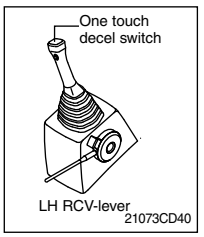
(1) This switch is at the top of right side control lever.
On pressing, the horn sounds.

13) BREAKER OPERATION SWITCH



(1) On pressing this switch, the breaker operates only when the breaker selection switch on the switch panel is selected.

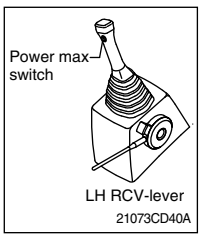
14) ONE TOUCH DECEL SWITCH



(1) This switch is used to actuate the deceleration function quickly.

(2) The engine speed is increased to previous setting value by pressing the switch again.

15) POWER MAX SWITCH



(1) This switch activate power max function.
When this switch is kept pressed, hydraulic power of work equipment will be increased upto 110 percent during 8 seconds.

(2) After 8 seconds, function is cancelled automatically even switch is keep pressed.

※ **Do not use for craning purposes.**

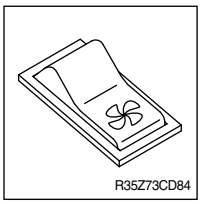
16) AIR CONDITIONER SWITCH(Compressor switch)

(1) This switch turn on air conditioner compressor when the blower switch is act.

(2) In accordance with the evaporator temperature, compressor turns ON or OFF automatically.

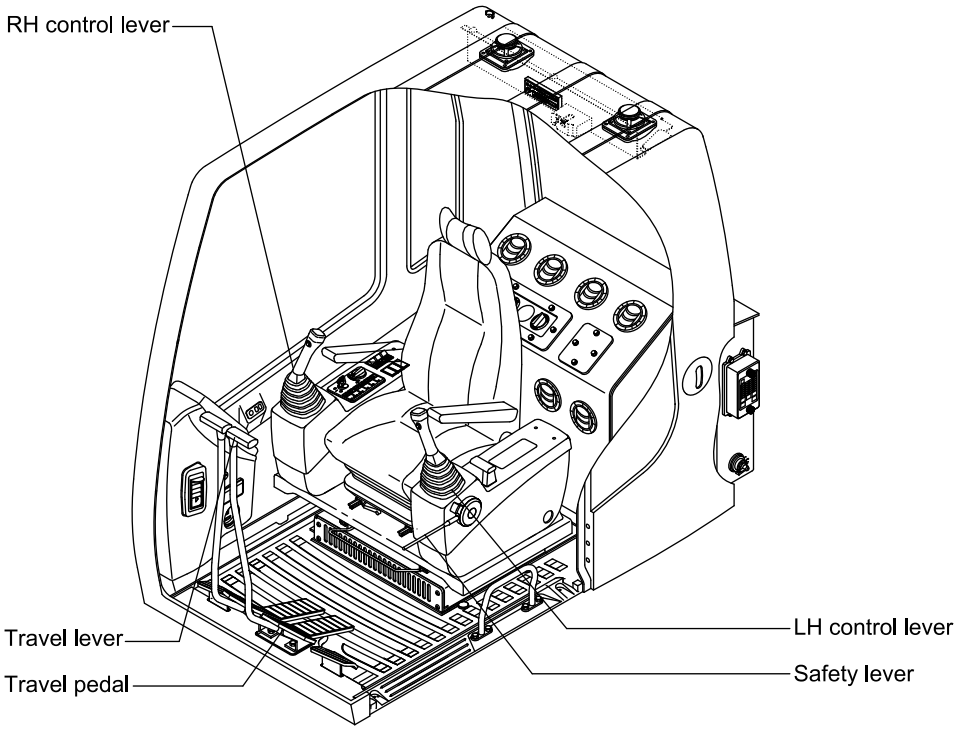
※ **Air conditioner operates to remove vapor and drain water through a drain hose. Water can be sprayed into the cab in case that the vacuum valve of drain hose has a problem.**
In this case, exchange the vacuum valve.

17) FAN SWITCH



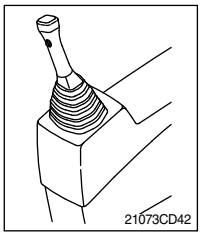
(1) This switch is used to operate fan.

4. LEVERS AND PEDALS



RD22073CD41

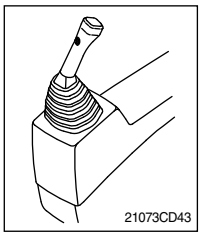
1) LH CONTROL LEVER



(1) This joystick is used to control the swing and the arm.

(2) Refer to **operation of working device** in chapter 4 for details.

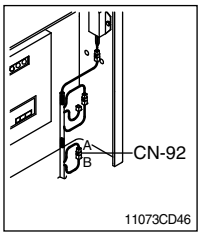
2) RH CONTROL LEVER



(1) This joystick is used to control the boom and the bucket.

(2) Refer to **operation of working device** in chapter 4 for details.

3) EMERGENCY ENGINE STARTING CONNECTOR

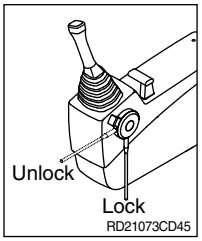


(1) If the CPU controller is removed, the engine does not start.

(2) Before starting the engine, connect the connector CN-92 A with B.

※ **Do not connect these connectors when the CPU is not removed.**

4) SAFETY LEVER



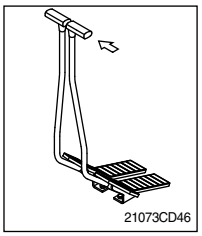
(1) All control levers and pedals are disabled from operation by locating the lever to lock position as shown.

※ **Be sure to lower the lever to LOCK position when leaving from operator's seat.**

(2) By pull lever to UNLOCK position, machine is operational.

※ **Do not use the safety lever for handle when getting on or off the machine.**

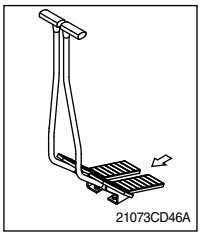
5) TRAVEL LEVER



(1) This lever is mounted on travel pedal and used for traveling by hand. The operation principle is same as the travel pedal.

(2) Refer to **traveling of the machine** in chapter 4 for details.

6) TRAVEL PEDAL

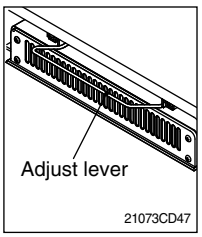


(1) This pedal is used to move the machine forward or backward.

(2) If left side pedal is pressed, left track will move.
If right side pedal is pressed, right track will move.

(3) Refer to **traveling of machine** in chapter 4 for details.

7) SEAT AND CONSOLE BOX ADJUST LEVER



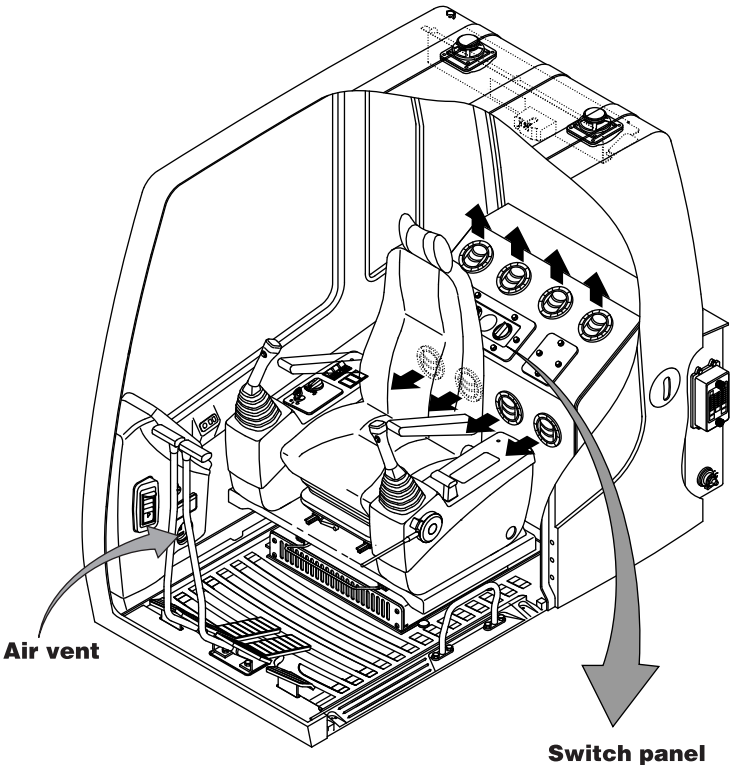
(1) This lever is used to move the seat and console box to fit the contours of the operator's body.

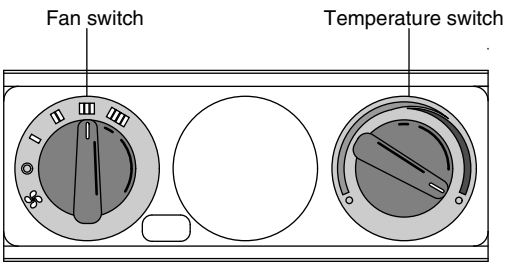
(2) Pull the lever to adjust forward or backward over 170㎜(6.7").

5. AIR CONDITIONER AND HEATER

Air conditioner and heater are equipped for pleasant operation against outside temperature and defrost on window glass.

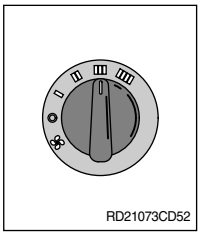
· Location of air flow ducts





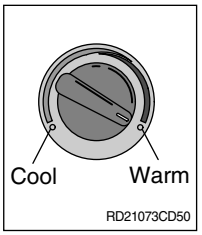
RD21073CD48

1) FAN SWITCH



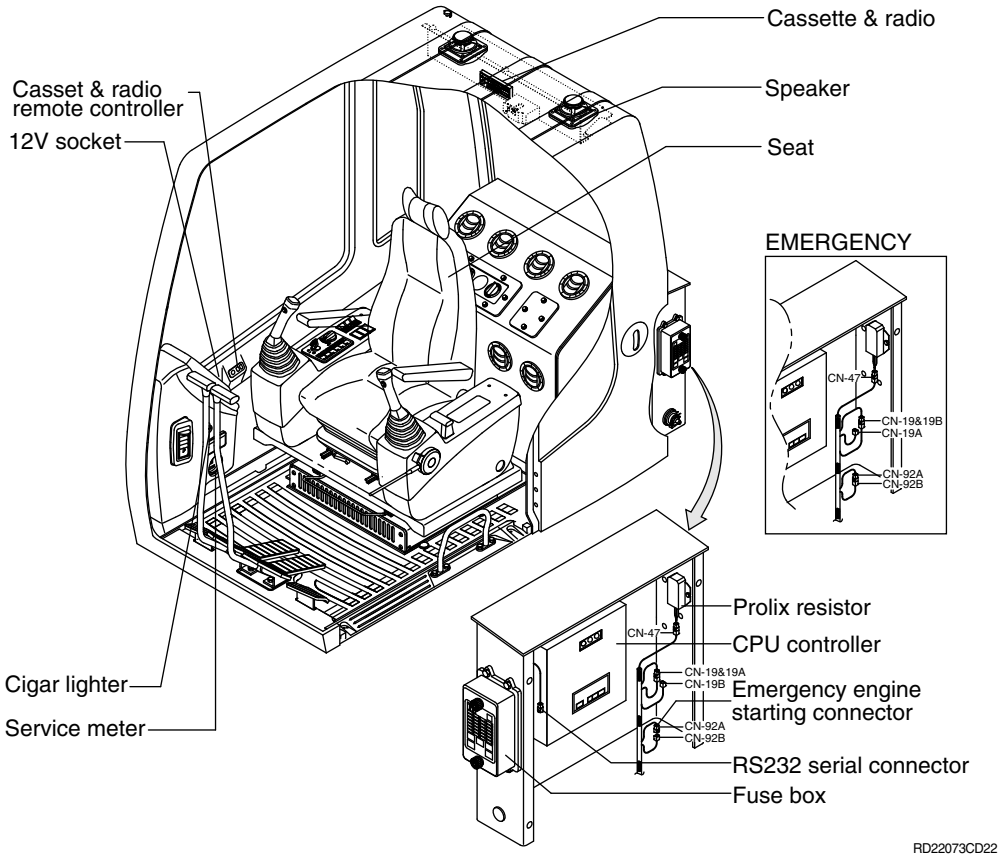
(1) It is possible to control the fan speed as four steps.
- Turn to right : Fan speed increases
- Turn to left : Fan speed decreases

2) TEMPERATURE SWITCH

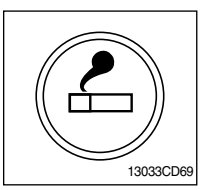


(1) It is possible to control the temperature inside of cab.
- Turn to right : Temperature increases
- Turn to left : Temperature decreases

6. OTHERS



1) CIGAR LIGHTER

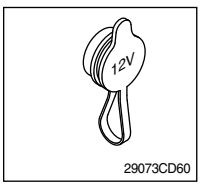


(1) This can be used when the engine starting switch is ON.

(2) The lighter can be used when it springs out in a short while after being pressed down.

※ **Service socket**
Use cigar lighter socket when you need emergency power.
Do not use the lighter exceeding 24V, 100W.

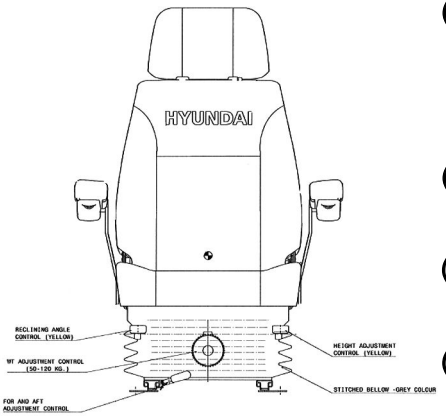
2) 12V SOCKET(Option)



(1) Utilize the power of 12V as your need and do not exceed power of 12V, 30W.

3) SEAT

The seat is adjustable to fit the contours of the operator's body. It will reduce operator fatigue due to long work hours and enhance work efficiency.



(1) Forward/Backward adjustment

① Pull lever A to adjust seat forward or backward.

② The seat can be moved forward and backward over 140mm(5.5") in 7 steps.

(2) Reclining adjustment

Pull lever B to adjust seat back rest.

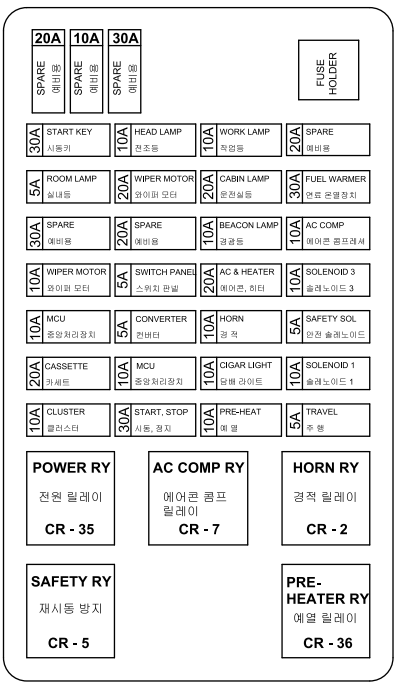
(3) Height adjustment

Height adjustment travels for 60mm distance.

(4) Weight adjustment

Weight adjusts between 50kg - 120kg range.

4) FUSE BOX



RD22073CD55

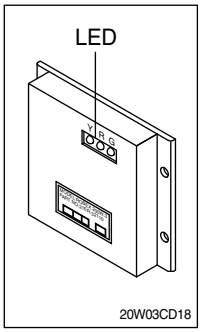
(1) The fuses protect the electrical parts and wiring from burning out.

(2) The fuse box cover indicates the capacity of each fuse and circuit it protects.

※ **Replace a fuse with another of the same capacity.**

⚠ **Before replacing a fuse, be sure to turn OFF the starting switch.**

5) CPU CONTROLLER



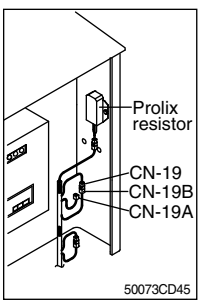
(1) To match the engine torque with the pump absorption torque, CPU controller varies EPPR valve output pressure, which control pump discharge amount whenever feedbacked engine speed drops under the reference rpm of each mode set.

(2) Three LED lamps on the CPU controller display as below.

LED lamp	Trouble	Service
G is turned ON	Normal	-
G and R are turned ON	Trouble on CPU or ROM	· Change the controller
G and Y are turned ON	Trouble on serial communication line	· Check if serial communication lines between controller and cluster are disconnected
Three LED are turned OFF	Trouble on CPU controller power	· Check if the input power wire (24V, GND) of controller is disconnected · Check the fuse

G : green, R : red, Y : yellow

6) PROLIX RESISTOR(Option)

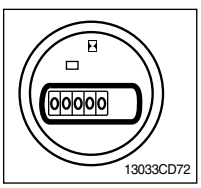


(1) This resistor is used to continuous working in case of malfunction of the CPU controller.

※ **Never connect connector CN-19 with connector CN-19B when CPU controller is in normal operation.**

- **Normal** : CN-19 connect with connector CN-19A
- **Emergency** : CN-19 connect with connector CN-19B

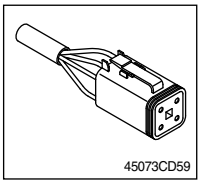
7) SERVICE METER



(1) This meter shows the total operation hours of the machine.

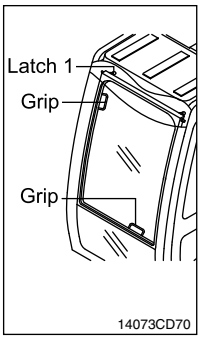
(2) Always ensure the operating condition of the meter during the machine operation. Inspect and service the machine based on hours as indicated in chapter 6, **maintenance.**

8) RS232 SERIAL CONNECTOR



(1) CPU controller communicates the machine data with Lap top computer through RS232 connector.

9) UPPER WINDSHIELD

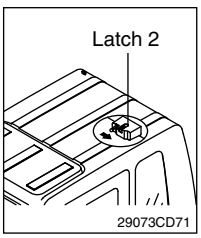


(1) Perform the following procedure in order to open the upper windshield.

① Release both latches(1) in order to release the upper windshield.

② Hold both grips that are located at the bottom of the windshield frame and at the top of the windshield frame push the windshield upward.

③ Hold both grips that are provided on the windshield frame and back into the storage position until auto lock latch(2) is engaged, move the levers of both latches(1) into the locked position. Push the levers toward the rear of the cab in order to hold the windshield in storage position.

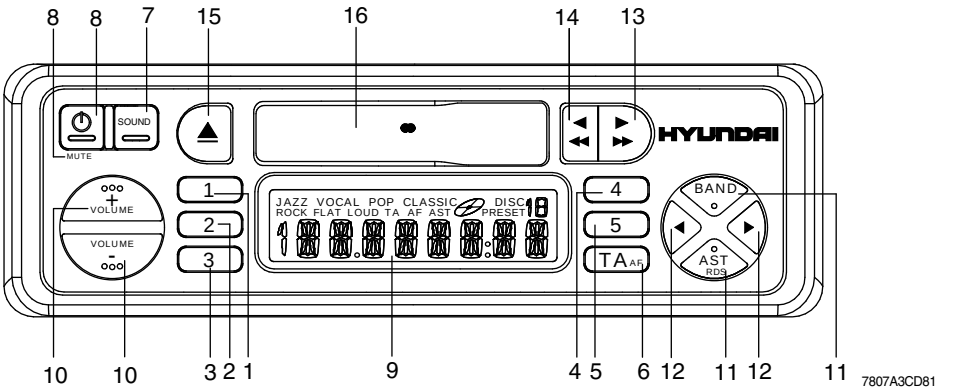


(2) Perform the following procedure in order to close the upper windshield.

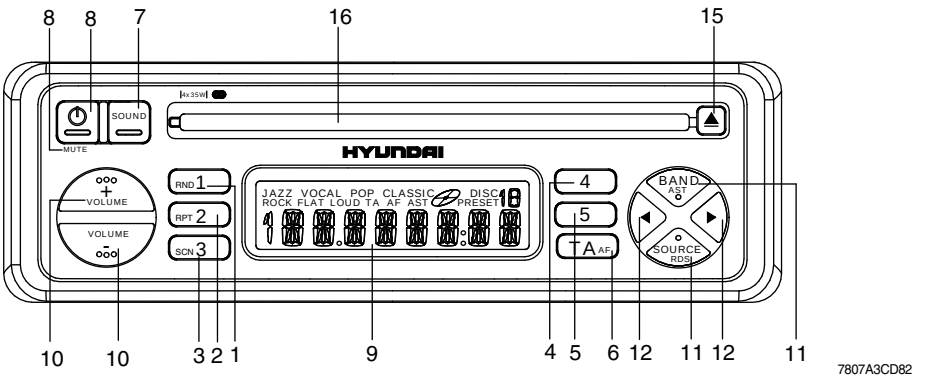
① Move the lever of the auto lock latch(2) in the direction of the arrow in order to release the auto lock latch.

② Reverse step ① through step ③ in order to close the upper windshield.

10) RADIO AND CASSETTE(Option)



RADIO AND CD PLAYER(Option)

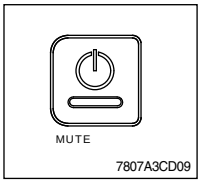


■ FRONT PANEL PRESENTATION

1 **1** ····· Preset button 1
RND ····· CD random playback on/off
2 **2** ····· Preset button 2
RPT ····· CD repeat track on/off
3 **3** ····· Preset button 3
SCN ····· CD's track scan
4 **4** ····· Preset button 4
5 **5** ····· Preset button 5
6 **TA AF** ····· Short press : TA on/off
Long press : AF on/off
7 **SOUND** ····· Select sound/audio styles
8 ⏻ ····· Short press : power on
Long press : power off
MUTE ····· Short press : To mute or cancel mute.
9 ····· Display
10 ····· Volume knob : Press up/down to adjust the volume ; adjust selected audio mode
11 **SOURCE** ·· Short press : Change source(Radio/CD)
RDS ····· Long press : RDS on/off
BAND ····· Short press : To select band
AST ····· Long press : Autostore(CD)
Short press : Autostore(Cassette)
12 ◀ ▶ ····· **Tuner mode**
Short press : Auto search up/down
Long press : Manual search up/down
Cassette mode : No function
CD mode
Short press : Next/previous track
Long press : Fast forward or fast rewind
13 ▶▶ ····· Fast forward(cassette deck)
14 ◀◀ ····· Fast rewind(cassette deck)
15 ▲ ····· Disc eject(CD)
Eject cassette
16 ····· CD opening / Cassette opening

■ AUDIO

(1) Power and mute button



① **POWER ON/OFF**

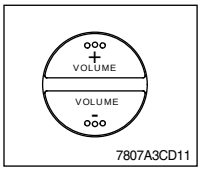
Press ⏻ to switch on the set. Press ⏻ for more than 2 seconds to switch off the set.

② **MUTE**(Silence)

Short press ⏻ key to mute or cancel the mute(silence).

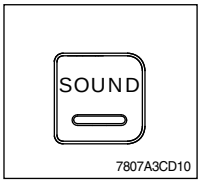
※ The silence period may be interrupted by ALARM announcement or traffic announcement messages(If TA is switched on).

(2) Volume button



① Press the volume button up/down to adjust the volume.
Please make sure you can still hear the traffic(horns, sirens..).

(3) Sound button



① **SOUND**

Whether you listen to Jazz, Vocal, Pop, Classic or Rock music, the SOUND button is the perfect setting for your choice.

· Press SOUND then the sound button to select BASS-Treb for your own sound style, or adjust the settings with the volume up/down buttons to select one of the pre define sound styles:

- BASE -TRE : Your own settings of bass and treble.
- FLAT : Original
- JAZZ : Jazz music
- VOCAL : Speech
- POP : Pop music
- CLASSIC : Classical music
- ROCK : Rock music

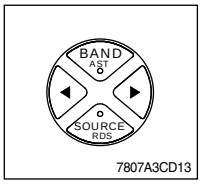
② **AUDIO SETTING**

· Press SOUND to select desired audio mode.
· Adjust the settings with the volume up/down buttons :

- Sound style : BASS-TRE, FLAT, JAZZ, VOCAL, POP, CLASSIC, ROCK
- BASS : Low notes
- TREBLE : High notes
- BALANCE : Left-right
- FADER : Rear-front
- LOUD : OFF, LOW, MID, HIGH

· Press the volume button to adjust the selected audio mode.
After 5 seconds the display goes back to the last mode of operation.
Adjustment of Bass and Treble settings is only possible when BASS-TRE is selected as the sound style.

(4) Source button



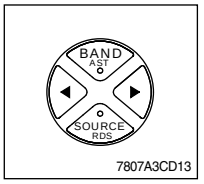
① Press SOURCE to select the desired source :

- TUNER
- CD

※ Products with cassette mechanism will change source to cassette only when a tape is inserted.

■ RADIO

(1) Wave band / Automatic search button



① WAVEBAND

· Press BAND to select the desired band:

FM I → FM II → FM AST → MW I → MWAST(AMAST) → LW → FM I

② AUTOMATIC SEARCH

Use search tuning to automatically search for a station.

· Press ◄ to tune a station of a lower frequency or ► to a higher frequency.

· To search for another station, press the key again.

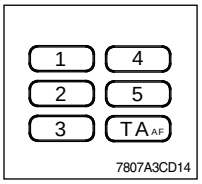
③ MANUAL TUNING(If you know the frequency of the required station)

· **To switch to manual tuning :**
Long press the search button ◄ or ► for more than 2 seconds will switch the tuning to manual tuning.

· Then press ◄ to tune to a station of a lower frequency or ►to a higher frequency.

· When keys are released, a time-out start to count. After 5 seconds time-out, display 'Auto' for one second and return to automatic search.

(2) Preselected button



Preselected stations

① Manually storing stations in a preset

Five stations per band can be stored and recalled using the preset keys(1 to 5).

Tune in to the desired station.

- Press the desired preset key(1 to 5) for more than 2 seconds to
- store the current tuned station.

When storing an FM station, the current program station name and the AF mode are stored on the preset(Some stations use alternating program service name).

② Recalling a preset

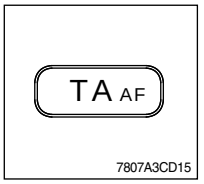
Press the desired preset key(1 to 5) to recall the stored station.

③ Automatically storing stations(AUTO-STORE)

You can automatically store 5 strongest FM stations on the FM AST band or 5 strongest MW(AM) stations on the MW(AM) AST band. When you use Auto store, the new stations replace any stations previously stored in the FM AST band or the MW(AM) AST band.

- Press AST to activate autostore.
- The set gives a beep and then mutes.
- When it has finished, you hear a beep followed by the station stored on preset 1.
- Sometimes it may not be possible to find 5 stations.

■ RADIO DATA SYSTEM(RDS) ON FM



More and more stations broadcasts RDS informations in order to offer you many advantages including:

(1) Program service name(PS)

Allows the radio to display the name of the station instead of its frequency.

(2) Automatic returning(AF)

The set remains tuned to the current station by continually searching the best alternative frequency for best reception.

You can switch AF off.

- Activate/Deactivate AF

This set continuously search for other alternative frequencies for the tuned radio station and automatically selects the best frequency for reception. Long press (TA AF) for more than 2 second to activate/ deactivate AF.

(3) Alarm messages(PTY ALARM)

This set automatically receives emergency messages made by the broadcaster.

- During the messages the display shows 'ALARM' and the station-name alternately.

(4) Traffic announcements(TA)

You can activate the TA modes to give priority so as to hear traffic announcements related to these subjects(even if you play a cassettes/CD or mute the set).

- Activate/Deactivate TA

- Short press BAND to select an FM band.
- Press (TA AF) to activate/deactivate TA.

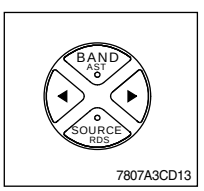
- If you activate TA mode

- You will hear the traffic announcements when broadcast by station(even if you play a cassette/CD or mute the set).
- If the tuned station does not enable the reception of traffic announcements, the display shows 'NO TA'. The radio automatically searches and appropriate station.

- Interrupting traffic announcement mode

If you do not wish to continue listening to a particular traffic announcement

- Short press (TA AF) key to interrupt traffic announcement without switching off the mode
- The set will return to the previous operating mode.

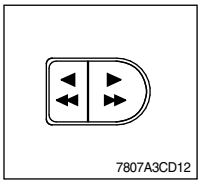


※ **You can switch off RDS features if not required.**

- Long press RDS key to switch off RDS.
- All RDS related features e.g., TA, etc...will be deactivated when RDS is switch off.

■ CASSETTE PLAYER

(1) Winding/Rewinding button



※ Only use good quality cassettes.

※ To avoid possible tape damage always take out the cassette after use. Protect your cassettes. Put them back in their boxes immediately after use.

※ Never expose cassettes to heat or direct sunlight.

① Play back

Slide the cassette, with the open side to the right into the cassette opening. Playback starts.

The direction of playback is shown by indicator ►.

② Stopping playback(▲)

- To stop playback, Press the ▲ button fully home.
- The unit will switch over to radio reception.
- The cassette is partially ejected.

③ Reverse(before the end of the tape)

Press the ◄◄ and ►► buttons at the same time halfway in.

④ Fast rewind / Fast forward(◄◄ or ►►)

The direction of fast winding depends on the direction of play indicated on the display.

Display during playback	Action	Key to press
►	Fast forward	►►
►	Fast rewind	◄◄
◄	Fast forward	◄◄
◄	Fast rewind	►►

During fast forward or rewind the radio resumes. If you continue fast winding until the end of the tape, play back restarts automatically.

⑤ To stop fast winding

To stop fast winding before the end of the tape, press the key which is not pressed(◄◄ or ►►). Playback is then resumed.

⑥ End of the tape

At the end of the tape, playback continues in the revers direction.

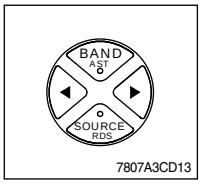
⑦ Maintenance

After extended use of the cassette player, dust, contamination or grime can accumulate on the playback head.

This results in diminishing high-note reproduction. This can be remedied using a cleaning cassette(one or twice a month) and playing it through like an ordinary cassette.

■ CD PLAYER

(1) Winding / Rewinding button



① CD playback

This CD player is suitable only for 12㎝ disc, do not use irregular shaped CD.

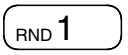
- Slide the disc into the slot with label facing upwards. Playback starts.
- If a disc is already inserted :
  Press SOURCE to select CD as the source.
  Playback starts.

② Previous / Next track(◄ or ►)

- Short press the ◄ or ► button to select the desired track.
- Playback resume with the chosen track.

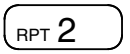
③ Fast rewind / Fast forward(◄ or ►)

- Long press the ◄ or ► button for more than 2 seconds to quickly move rewind or forward through the disc.
- Normal play back resumes when you release the button.



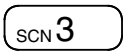
④ Random track playback

- Press **RND** to activate / deactivate random track playback.



⑤ Repeat track

- Press **RPT** to activate / deactivate repeat current track.



⑥ Scan track

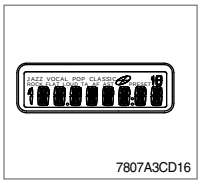
The scan function enables you to listen to the first few seconds of each track.

- Press **SCN** to activate / deactivate scan track.

⑦ Disc eject

- Press ▲ to eject the disc.

■ RADIO SETTING



(1) AMERICA

Press ⏻ , No. 1 and No. 4 buttons at the same time. Set up completes displaying " AMERICA".

(2) SOUTH AMERICA

Press ⏻ , No. 2 and No. 5 buttons at the same time. Set up completes displaying " SOUTH".

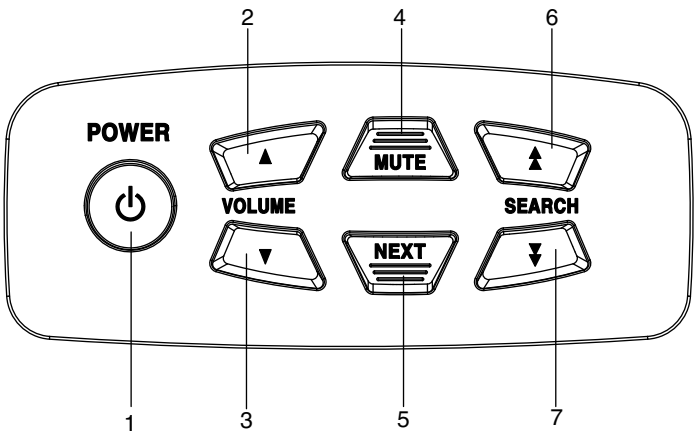
(3) ASIA

Press ⏻ , No. 1 and No. 5 buttons at the same time. Set up completes displaying " ASIA".

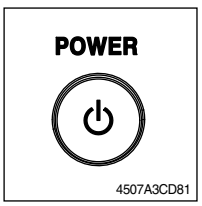
(4) EUROPE

Press power, No. 2 and No. 4 buttons at the same time. Set up completes displaying " EUROP".

14) REMOTE CONTROLLER



(1) Power ON/OFF button



① Press ⏻ to switch ON the set. Press ⏻ for more than 2seconds to switch OFF the set.

(2) Volume button(up)

- Short press : Volume up one step
- Long press : Volume up continuous

(3) Volume button(down)

- Short press : Volume down one step
- Long press : Volume down continuous.

(4) Source & mute button

- Short press : Change source(Radio/CD)
- Long press : To mute or cancel mute.

(5) Next button

① Tuner mode
- Short press : Preset up
- Long press : Band up

② Cassette mode
- Short press : Reverse(before the end of the tape)
- Long press : No function

③ CD mode
- Short press : Track 1
- Long press : Scan track

(6) Search button(up)

① Tuner mode
- Short press : Search up one step
- Long press : Search up continuous

② Cassette & CD mode
- Short press : Next track
- Long press : Fast forward

(7) Search button(down)

① Tuner mode
- Short press : Search down one step
- Long press : Search down continuous

② Cassette & CD mode
- Short press : Previous track
- Long press : Fast rewind

1. SUGGESTION FOR NEW MACHINE

1) It takes about 100 operation hours to enhance its designed performance.

2) Operate according to below three steps and avoid excessive operation for the initial 100 hours.

Service meter	Load
Until 10 hours	About 60%
Until 100 hours	About 80%
After 100 hours	100%

※ **Excessive operation may deteriorate the potential performance of machine and shorten lifetime of the machine.**

3) Be careful during the initial 100 hours operation

(1) Check daily for the level and leakage of coolant, engine oil, hydraulic oil and fuel.

(2) Check regularly the lubrication and fill grease daily all lubrication points.

(3) Tighten bolts.

(4) Warm up the machine fully before operation.

(5) Check the gauges occasionally during the operation.

(6) Check if the machine is operating normally during operation.

4) Replace followings after initial 50 hours of operation

Checking items	Service
Engine oil	Replace
Engine oil filter element	
Hydraulic oil return filter element	
Hydraulic oil tank drain filter cartridge	
Line filter element	
Fuel filter	
Prefilter	

29074OP01

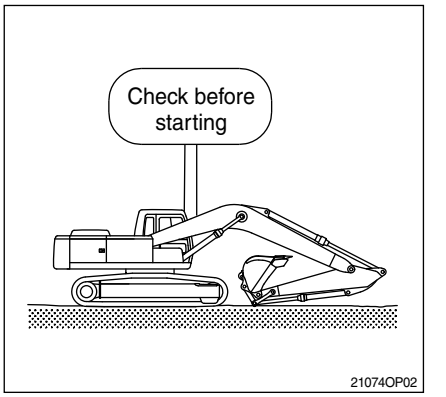
2. CHECK BEFORE STARTING THE ENGINE

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

※ **Refer to the daily check on the chapter 6, maintenance.**

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

3) Adjust the rear view mirror.



3. STARTING AND STOP THE ENGINE

1) CHECK INDICATOR LIGHTS

(1) Check if all the operating lever is on the neutral position.

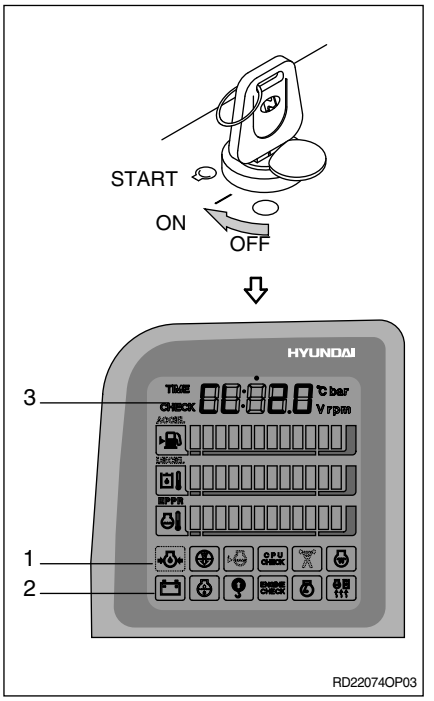
(2) Turn the starting switch to the ON position, and check following.

① If all the lamps light ON and buzzer sounding for 2 seconds.

② After lamp check **CL : 2.0**, the version of cluster program, is displayed on **Monitoring display(3)** for 5 seconds and the cluster returns to default.

③ Only below lamps will light ON and all the other lights will turn OFF after 2 seconds.

- Battery charging warning lamp(2)
- Engine oil pressure warning lamp(1)



RD22074OP03

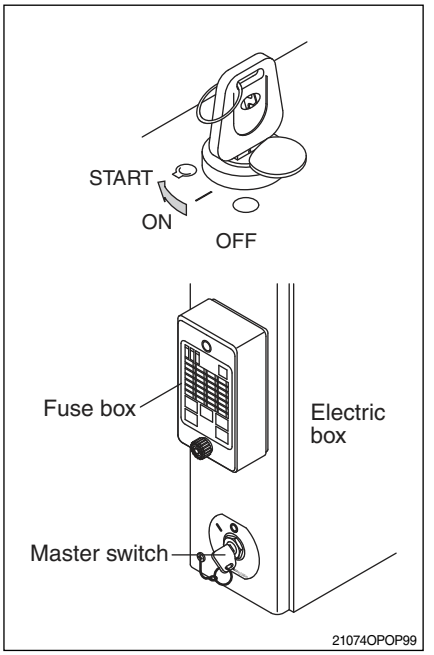
2) STARTING ENGINE IN NORMAL TEMPERATURE

※ **Sound the horn to warn the surroundings after checking if personnel or obstacles are in the area.**

(1) Turn the starting switch to 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.**

(2) Release the starting switch instantly after the engine starts to avoid possible damage to the starting motor.



21074OPOP99

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 2-20.**

※ **Fill the anti-freeze solution to the coolant as required.**

(1) Check if all the levers are on the neutral position.

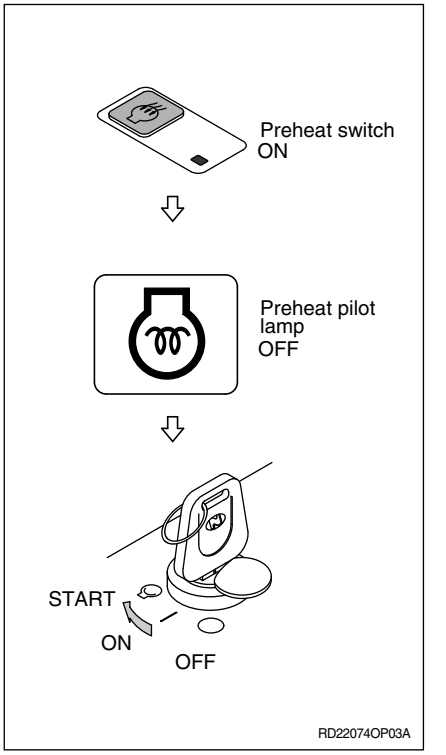
(2) Turn the starting switch to ON position, and wait the preheat pilot lamp OFF.

(3) Start the engine by turning the starting switch to the START position after the preheat pilot lamp OFF.

※ **If the engine does not start, allow the starter to cool for about 2 minutes before attempting to start the engine again.**

(4) Release the starting switch immediately after starting engine.

(5) The operation for the warming up machine is automatic.



4) INSPECTION AFTER ENGINE START

Inspect and confirm the following after engine starts.

(1) Is the level gauge of hydraulic oil tank in the normal level?

(2) Are there leakages of oil or water?

(3) Are all the warning lamps OFF(1-6)?

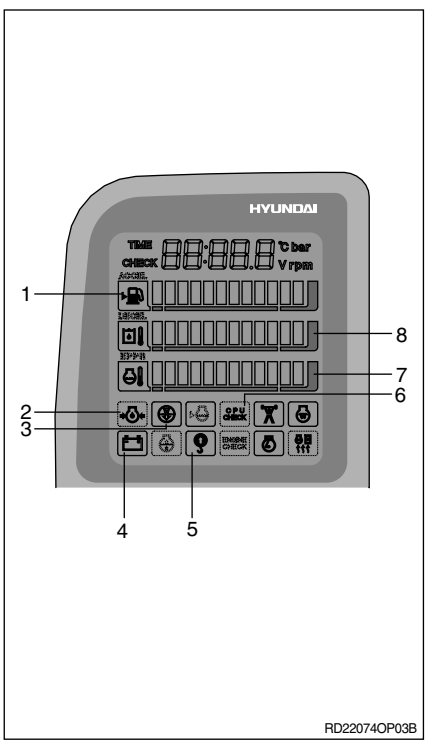
(4) Is the indicator of engine coolant temperature gauge(7) and hydraulic oil temperature gauge(8) in the green zone?

(5) Is the engine sound and the color of exhaust gas normal?

(6) Are the sound and vibration normal?

※ **Do not increase engine speed quickly after starting, it can damage engine or turbocharger.**

※ **If there are problems in the control panel, stop the engine immediately and correct problem as required.**



5) WARMING-UP OPERATION

※ **The most suitable temperature for the hydraulic oil is about 50°C (122°F).**
It can cause serious trouble in the hydraulic system by sudden operation when the hydraulic oil temperature is below 25°C(77°F).
Then temperature must be raised to at least 25°C (77°F) before starting work.

(1) Run the engine at low idling for 5 minutes.

(2) Speed up the idling and run the engine at mid-range speed.

(3) Operate bucket lever for 5 minutes.

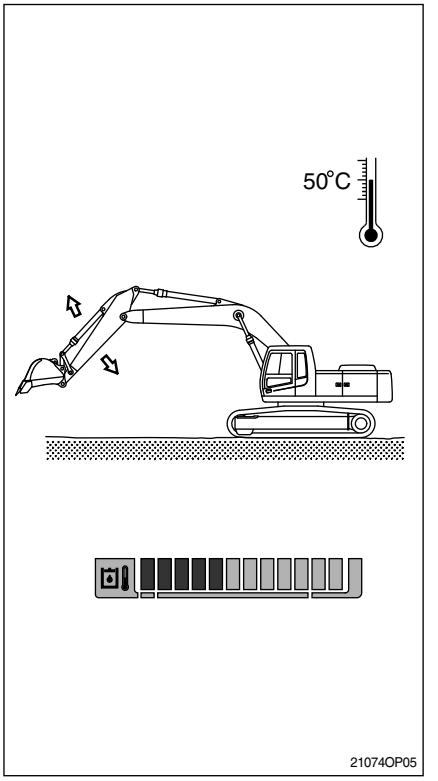
※ **Do not operate anything except bucket lever.**

(4) Run the engine at the high speed and operate the bucket lever and arm lever for 5-10 minutes.

※ **Operate only the bucket lever and arm lever.**

(5) This warming-up operation will be completed by operation of all cylinders several times, and operation of swing and traveling.

※ **Increase the warming-up operation during winter.**



6) TO STOP THE ENGINE

※ **If the engine is abruptly stopped before it has cooled down, engine life may be greatly shortened. Consequently, do not abruptly stop the engine apart from an emergency.**

※ **In particular if the engine has overheated, do not abruptly stop it but run it at medium speed to allow it to cool gradually, then stop it.**

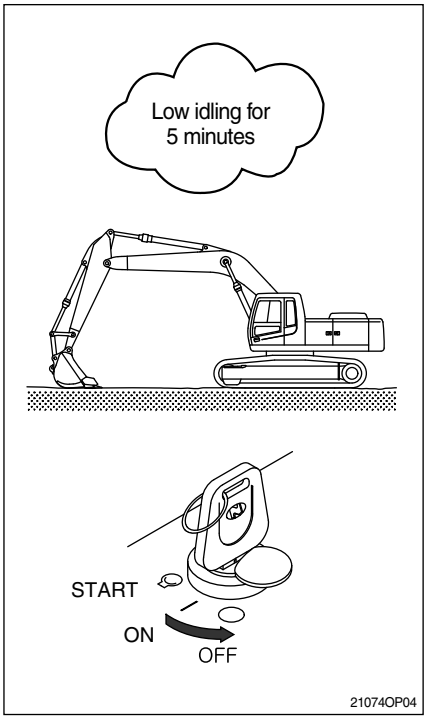
(1) Down the bucket on the ground then put all the levers in the neutral position.

(2) Run the engine at low idling speed for about 5 minutes.

(3) Return the key of starting switch to the OFF position.

(4) Remove the key to prevent other people using the machine and LOCK safety lever.

(5) Lock the cab door.



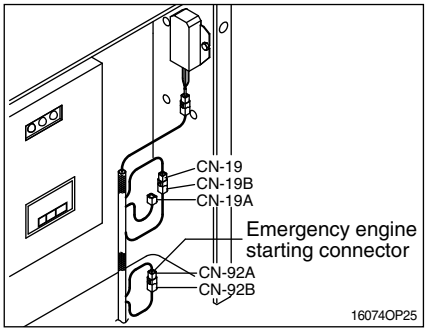
7) OPERATION IN CASE OF MALFUNCTION OF THE CPU CONTROLLER

※ **The following explains the way to start and to control engine speed in case of malfunction of the CPU controller.**

(1) Emergency starting engine

① If the CPU controller is removed, the engine does not start.

② Before starting the engine, connect the connector CN-92 A with B.



(2) Engine speed control

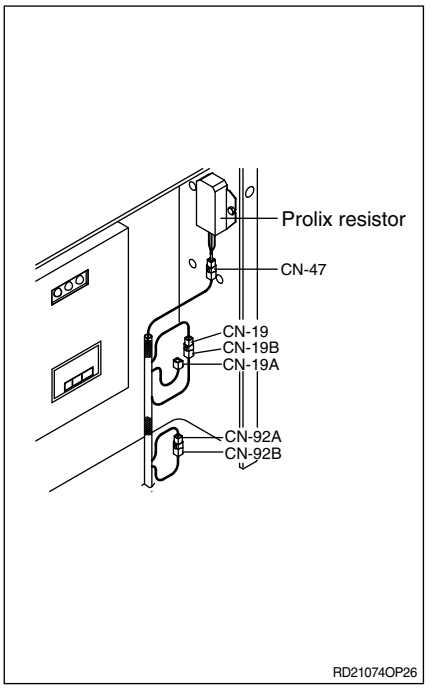
Engine speed can be controlled by rotating accel dial switch.

① Disconnect the CN-19A from CN-19 connector.

② Connect the CN-19 connector to CN-19B.

③ The engine speed can be controlled by rotating accel dial switch.

- Turn to right : Engine speed increases.
- Turn to left : Engine speed decreases.



4. MODE SELECTION SYSTEM

1) STRUCTURE OF CAPO SYSTEM

CAPO, Computer Aided Power Optimization system, is the name of mode selection system developed by Hyundai.

(1) Work mode

3 work modes can be selected for the optimal work speed of the machine operation.

① **Heavy duty work mode**

The boom priority solenoid is activated to make the boom operation speed faster.

② **General work mode**

When key switch is turned ON, this mode is selected automatically and swing operation speed is faster than heavy duty work mode.

③ **Breaker operation mode**

It sets the pump flow to the optimal operation of breaker by activating the max flow cut-off solenoid.

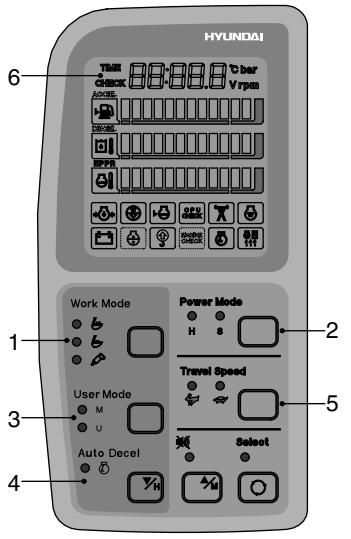
(2) Power mode

Power mode designed for various work loads maintains high performance and reduces fuel consumption.

- H mode : High power
- S mode : Standard power

(3) User mode

- M : Maximum power
- U : You can change the engine and pump power and memorize it for your preference.

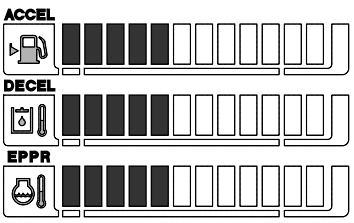


220074OP06

1 Work mode
2 Power mode
3 User mode
4 Auto decel mode
5 Travel mode
6 Monitoring display

How to modulate the memory set

① Each memory mode has a initial set which are mid-range of max engine speed, auto decel rpm, and EPPR valve input current.
When you select U, cluster LCD displays.



140W74OP03G

② To change the engine high idle speed, press the USER mode switch and SELECT switch at the same time and then ACCEL blinks at 0.5 seconds interval.
- By pressing ▲ or ▼ switch, ▮ will increase or decrease.

③ To change DECEL rpm, press the USER mode switch and SELECT switch once more and then DECEL blinks at 0.5 seconds interval.
- By pressing ▲ or ▼ switch, ▮ will increase or decrease.

④ To change EPPR current, press the USER mode switch and SELECT switch one more and then EPPR blinks at 0.5 seconds interval.
- By pressing ▲ or ▼ switch, ▮ will increase or decrease.

· LCD segment vs parameter setting

Segment (▮)	ACCEL (rpm)	DECEL (rpm)	EPPR (mA)
1	1250	Low idle(1050)	150
2	1350	1100	200
3	1450	1150	250
4	1550	1200	300
5	1650	Decel rpm(1200)	350
6	1750	1300	400
7	1850	1350	450
8	1950	1400	500
9	2050	1450	550
10	2150	1500	600

⑤ To memorize the final setting, press the USER mode switch and SELECT switch one more time.

(4) Auto decel mode

Engine quick deceleration.

(5) Travel mode

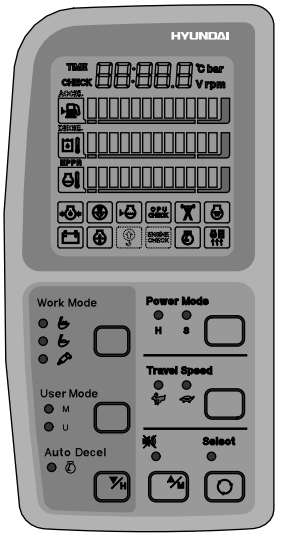
: Low speed traveling.

: High speed traveling.

(6) Monitoring system

Information of machine performance as monitored by the CPU controller can be displayed on the **monitoring display**.

※ **Refer to 4-12 page for details.**



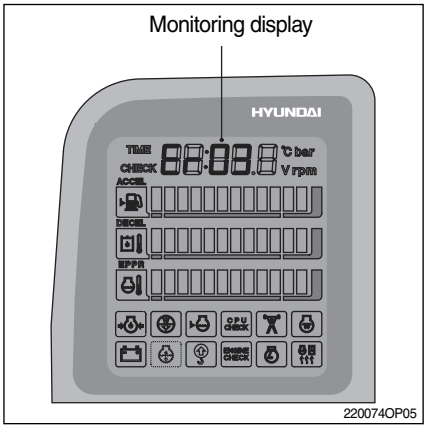
140W74OP03H

(7) Self diagnostic system

The CPU controller diagnoses problems in the CAPO system caused by electric parts' malfunction and by open or short circuit, which are displayed on the **monitoring display** as error codes.

(8) Anti-restart system

The system protects the starter from inadvertent restarting after the engine is already operational.



2) HOW TO OPERATE MODE SELECTION SYSTEM

(1) When start key is turned ON

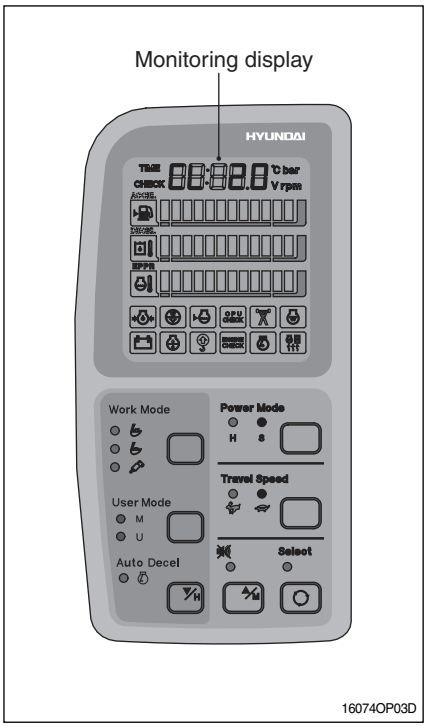
① When start key is turned ON, all illumination lamps are ON and all lamps are OFF automatically after 5 seconds. But a battery charging warning lamp and an engine oil pressure warning lamp keep turned ON until engine starting.

② After lamp check **CL : 2.0**, the version of cluster program, is displayed on **Monitoring display** for 2 seconds.

③ After the version of program is displayed, the cluster returns to default. Exactly engine rpm, battery charging warning lamp and engine oil pressure warning lamp are turned ON and S mode, auto decel, low travel speed(Turtle mark) are displayed.

④ In default condition self-diagnostic function including trouble detecting of electric system can be carried out.

※ **Refer to 4-12 page for details.**



(2) After engine start

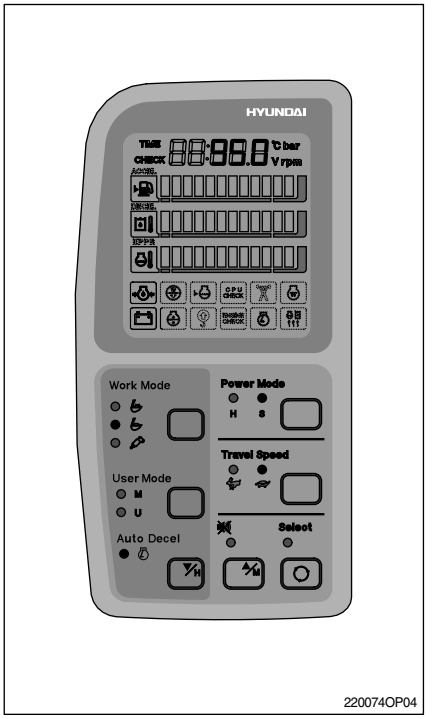
① When the engine is started, three lamps are ON as below.

Mode		Status
Work mode		ON
Power mode	S	ON
Travel mode	Low( )	ON
Auto decel mode		ON

- In this condition, tachometer indicates low idle, 1000±100rpm.
- If coolant temperature is below 30°C, after 10 seconds the engine speed increases to 1200 ±100rpm automatically to warm up the machine.
- After 2-3 minutes, you can select any mode depending on job requirement.

② Self-diagnostic function can be carried out the same as start key is ON.

※ **Refer to 4-12 page for details.**



220074OP04

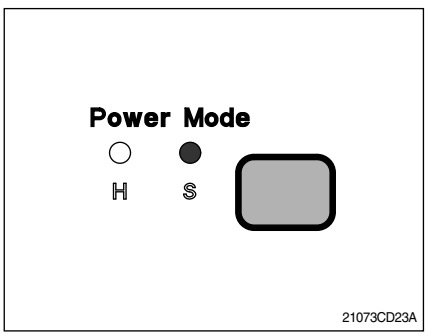
3) SELECTION OF POWER MODE

(1) S mode

When the accel dial is at setting 10 and auto decel mode is cancelled and S mode is selected.

Engine rpm	Effect
1750 ± 50	Same power as **non** mode type machine.

※ **When the accel dial is located below 9 the engine speed decreases about 50~100rpm per dial set.**



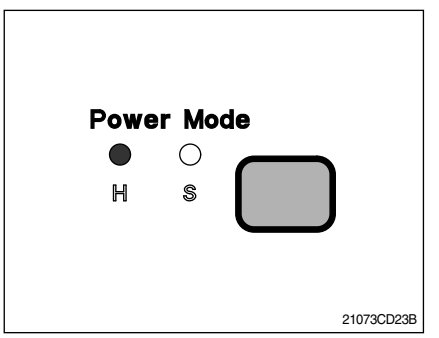
21073CD23A

(2) H mode

When the accel dial is at setting 10 and auto decel mode is cancelled and H mode is selected.

Engine rpm	Effect
1900± 50	Approximately 110% of power and speed available than **non** mode type machine or **S** mode.

※ **When the accel dial is located below 9 the engine speed decreases about 50~100rpm per dial set.**



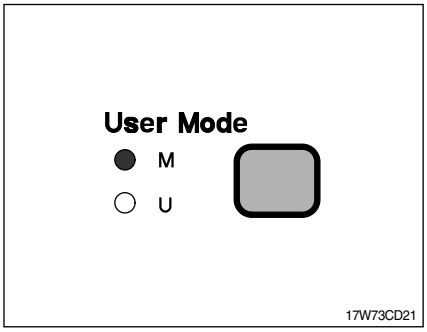
21073CD23B

(3) M mode

When the accel dial is at setting 10 and auto decel mode is cancelled and M mode is selected.

Engine rpm	Effect
2050 ± 50	Approximately 130% of power and speed available than **non** mode type machine or **S** mode.

※ **When the accel dial is located below 9 the engine speed decreases about 50~100rpm per dial set.**



4) MONITORING DISPLAY

Information of machine performance as monitored by the CPU controller can be displayed on the cluster when the operator selects a display mode by touching **SELECT** switch alone or with **BUZZER STOP** switch on the cluster as below.

Display group	How to select display mode			Name	Display on the cluster
	Group selection	Display mode selection			
Group 0 (Default)	Way 1 Key switch **ON** or **START** Way 2 Touch **AUTO DECEL** switch while pressing **BUZZER STOP** at group 1~4.	Initial		Engine rpm	1050 rpm
		Touch **SELECT** 1 time		Time	TIME 12:30
		Touch **SECLET** 2 times		Power shift pressure (EPPR valve)	EP: 10 bar
		Touch **SELECT** 3 times		CPU model & version	21C5.1
		Touch **SELECT** 4 times	Option (Only when a pressure sensor is installed)	Front pump pressure	P1:100 bar
		Touch **SELECT** 5 times		Rear pump pressure	P2:200 bar
		Touch **SELECT** 6 times		Pilot pressure	P3:30 bar
Group 1 (Volt, temp, EPPR press, version)	Touch **SELECT** switch **once** while pressing **BUZZER STOP.** In this group **SELECT** LED **ON**	Default		Battery voltage(V)	b:24.8v
		Touch **SELECT** 1 time		Potentiometer voltage(V)	Po: 2.5v
		Touch **SELECT** 2 times		Accel dial voltage(V)	dL: 3.8v
		Touch **SELECT** 3 times		Hydraulic oil temperature(℃)	Hd: 50℃
		Touch **SELECT** 4 times		Coolant temperature(℃)	Ct: 85℃
Group 2 (Error code)	Touch **SELECT** switch **twice** while pressing **BUZZER STOP.** In this group **BUZZER STOP** LED blinks	Default		Current error	CHECK Er: 03
		Touch **SELECT** 1 time		Recorded error (Only key switch ON)	TIME Er: 03
		Press down(▼) & **SELECT** at the same time		Recorded error deletion (Only key switch ON)	TIME Er: 00
Group 3 (Switch input)	Touch **SELECT** switch **3 times** while pressing **BUZZER STOP.** In this group **SELECT** LED blinks at 0.5sec interval	Default		Pump prolix switch	PP:on or oFF
		Touch **SELECT** 1 time		Auto decel pressure switch	dP:on or oFF
		Touch **SELECT** 2 times		Power boost switch	Pb:on or oFF
		Touch **SELECT** 3 times		Travel oil pressure switch	oP:on or oFF
		Touch **SELECT** 4 times		One touch decel switch	od:on or oFF
		Touch **SELECT** 5 times		Preheat switch	PH:on or oFF

Display group	How to select display mode		Name	Display on the cluster
	Group selection	Display mode selection		
Group 4 (Output)	Touch **SELECT** switch **4 times** while pressing **BUZZER STOP.** In this group **SELECT** LED blinks at 1sec interval	Default	Hourmeter	Ho:on or oFF
		Touch **SELECT** 1 time	Neutral relay (Anti-restart relay)	nr:on or oFF
		Touch **SELECT** 2 times	Travel speed solenoid	tS:on or oFF
		Touch **SELECT** 3 times	Power boost solenoid (2-stage relief solenoid)	PS:on or oFF
		Touch **SELECT** 4 times	Boom priority solenoid	bS:on or oFF
		Touch **SELECT** 5 times	Max flow cut off solenoid	FS:on or oFF
		Touch **SELECT** 6 times	Preheat relay	PA:on or oFF

※ By touching **SELECT** switch once while pressing **BUZZER STOP**, display group shifts.
Example : Group 0 → 1 → 2 → 3 → 4 → 0

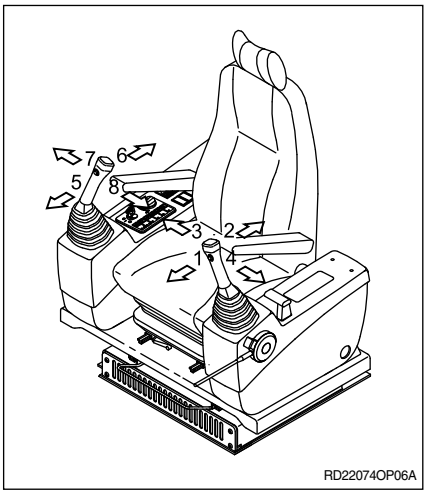
※ **Confirm the operation of control lever and working device.**

1) Left control lever controls arm and swing.

2) Right control lever controls boom and bucket.

3) When you release the control lever, control lever returns to neutral position automatically.

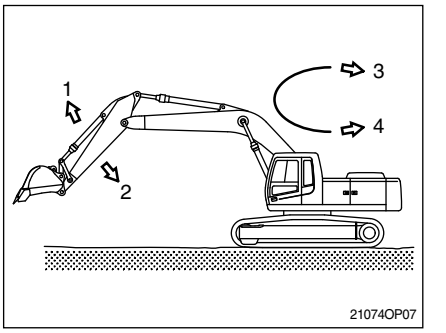
※ **When operating swing, consider the swing distance by inertia.**



RD22074OP06A

※ **Left control lever**

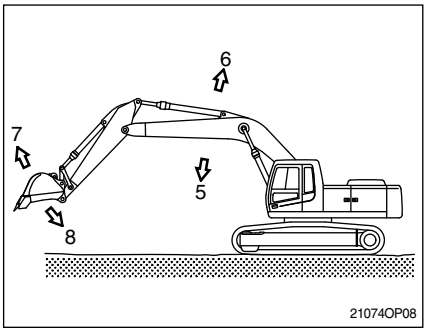
1 Arm roll-out
2 Arm roll-in
3 Swing right
4 Swing left



21074OP07

※ **Right control lever**

5 Boom lower
6 Boom raise
7 Bucket roll-out
8 Bucket roll-in



21074OP08

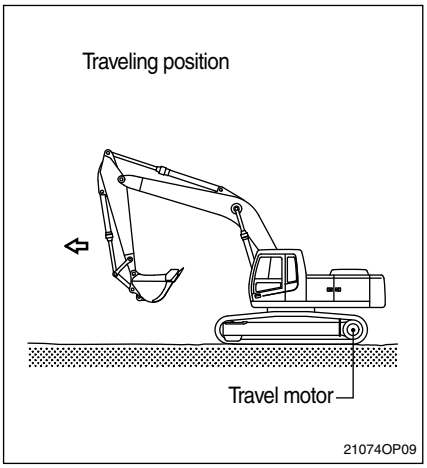
6. TRAVELING OF THE MACHINE

1) BASIC OPERATION

(1) Traveling position

It is the position which the traveling motor is in the rear and the working device is forward.

⚠ **Be careful as the traveling direction will be reversed when the whole machine is swinged 180 degree.**



(2) Traveling operation

It is possible to travel by either travel lever or pedal.

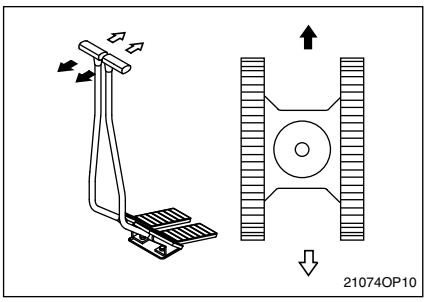
※ **Do not travel continuously for a long time.**

※ **Reduce the engine speed and travel at a low speed when traveling on uneven ground.**

(3) Forward and backward traveling

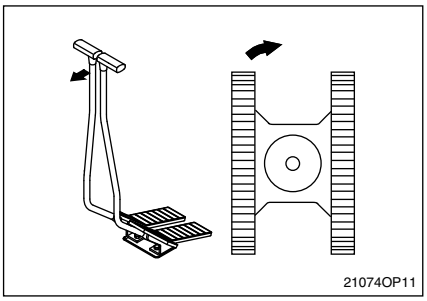
When the left and right travel lever or pedal are pushed at the same time, the machine will travel forward or backward.

※ **The speed can be controlled by the operation stroke of lever or pedal and change of direction will be controlled by difference of the left and right stroke.**



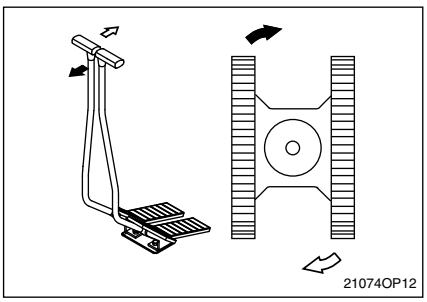
(4) Pivot turning

Operating only one side of lever or pedal make the change of direction possible by moving only one track.



(5) Counter rotation

It is to change the direction at the original place by moving the right and left track. Both side of lever or pedal are operated to the other way at the same time.



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 30cm(1ft) to the ground so that it can be used as a brake in an emergency.

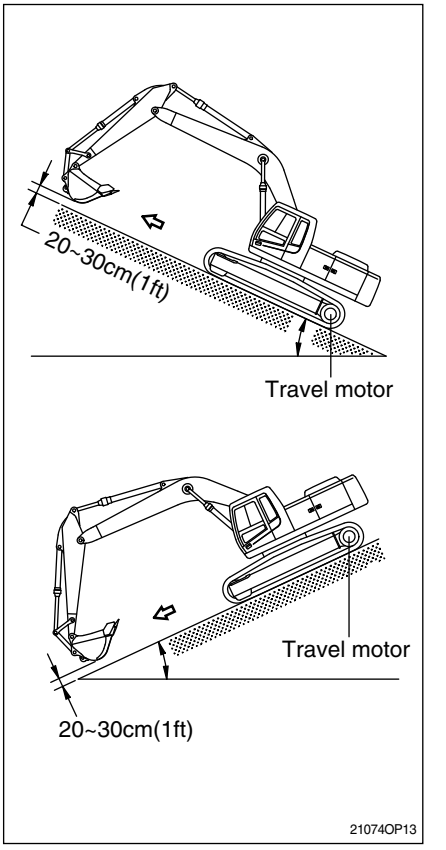
(3) If the machine starts to slide or loses stability, lower the bucket immediately and brake the machine.

(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.**



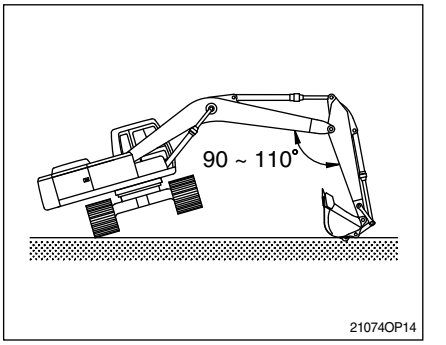
3) TRAVELING ON SOFT GROUND

※ **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.



4) TOWING THE MACHINE

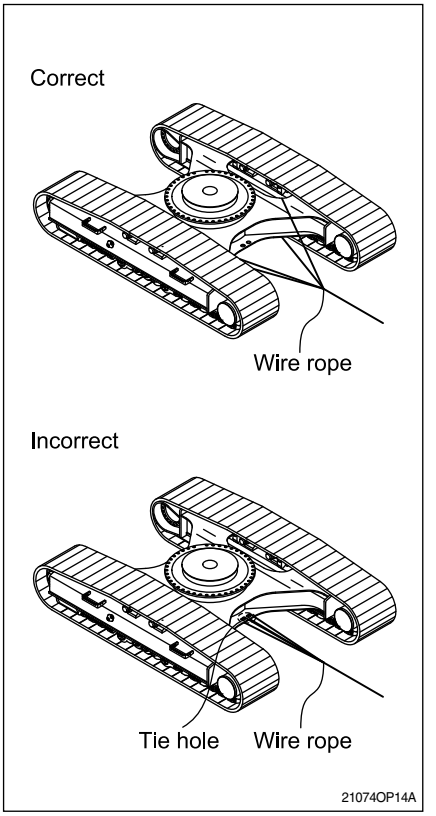
Tow the machine as follows when it can not move on it's own.

(1) Tow the machine by other machine after hook the wire rope to the frame as shown in picture at right.

(2) Hook the wire rope to the frame and put a support under each part of wire rope to prevent damage.

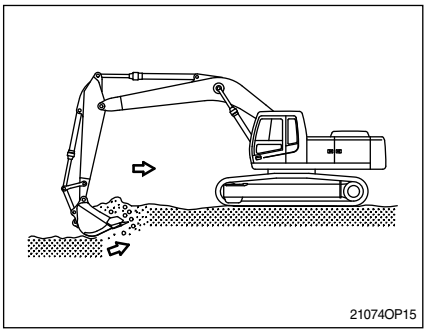
※ **Never tow the machine using only the tie hole, because this may break.**

⚠ **Make sure no personnel are standing close to the tow rope.**

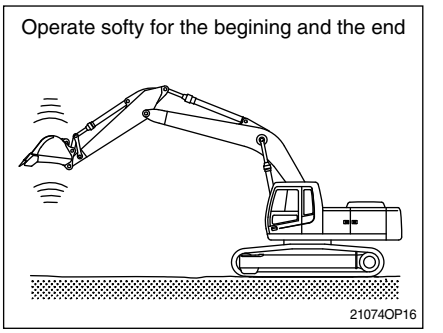


7. EFFICIENT WORKING METHOD

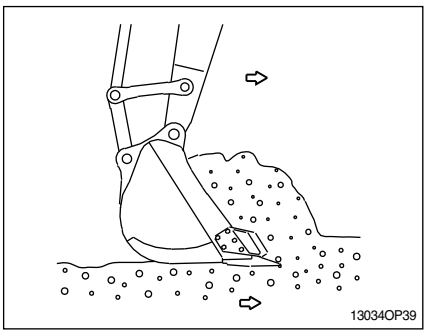
1) Do the digging work by arm.
   Use the pulling force of arm for digging and use together with the digging force of the bucket if necessary.



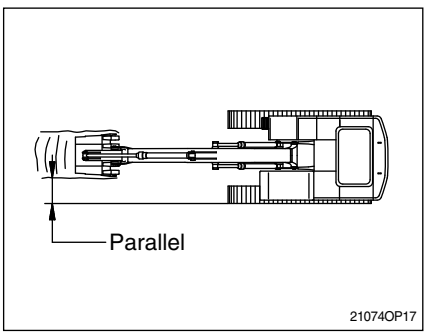
2) When lowering and raising the boom operate softly for the beginning and the end.
   In particularly, sudden stops while lowering the boom may cause damage to the machine.



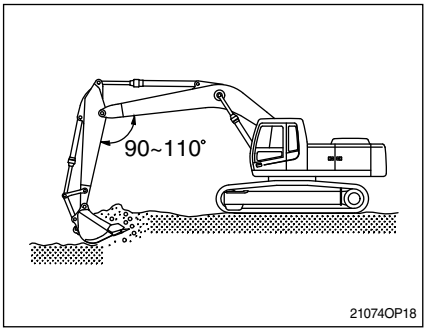
3) The digging resistance and wearing of tooth can be reduced by putting the end of bucket tooth to the digging direction.



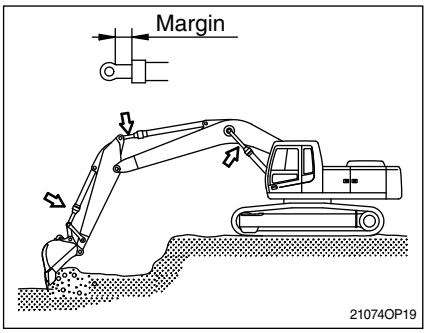
4) Set the tracks parallel to the line of the ditch to be excavated when digging ditch. Do not swing while digging.



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

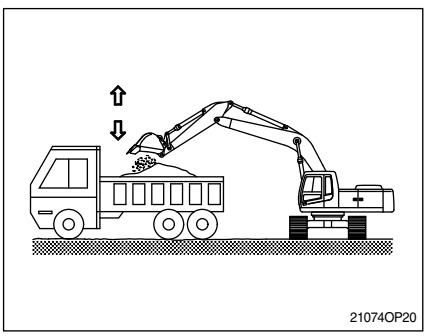


6) Operate leaving a small safety margin of cylinder stroke to prevent damage of cylinder when working with the machine.

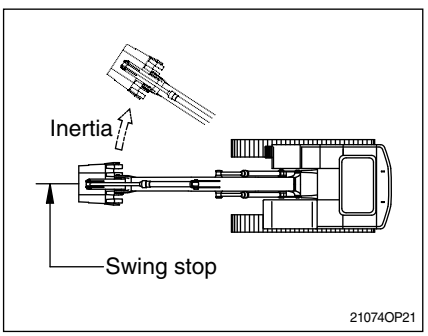


7) Keep the bucket to the dumping position and the arm horizontal when dumping the soil from the bucket.
Operate bucket lever 2 or 3 times when hard to dump.

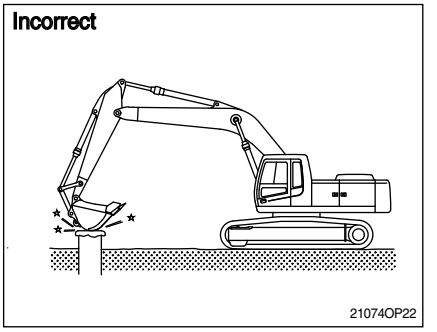
※ **Do not use the impact of bucket tooth when dumping.**



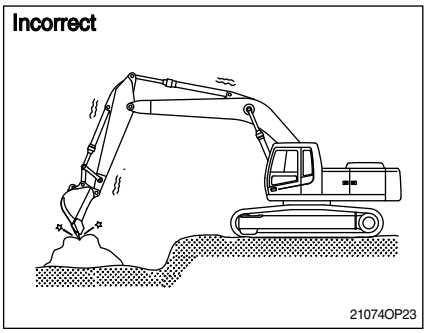
8) Operate stop of swing considering the swing slip distance is created by inertia after neutralizing the swing lever.



9) Do not use the dropping force of the work equipment for digging.
The machine can be damaged by the impact.

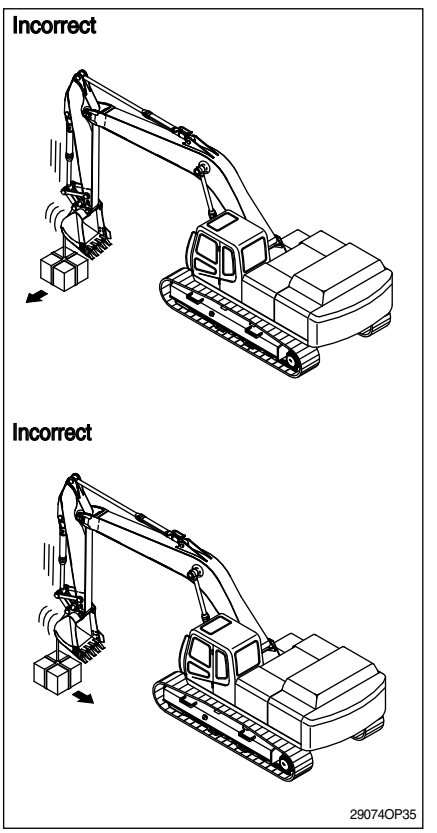


10) Do not use the bucket to crack hard objects like concrete or rocks.
This may break a tooth or pin, or bend boom.



11) NEVER CARRY OUT EXCESSIVE OPERATIONS

Operation exceeding machine performance may result in accident or failure.
Carry out lifting operation within specified load limit.
Never carry out operations which may damage the machine such as overload or over-impact-load.
Never travel while carrying a load.
In case you need installing over load warning device for object handling procedure, please contact Hyundai distributor.



12) BUCKET WITH HOOK

When carrying out lifting work, the special lifting hook is necessary.

The following operations are prohibited.

- Lifting loads with a wire rope fitted around the bucket teeth.
- Lifting loads with the wire rope wrapped directly around the boom or arm.

When performing lifting operation, securely hook the wire rope onto the special lifting hook.

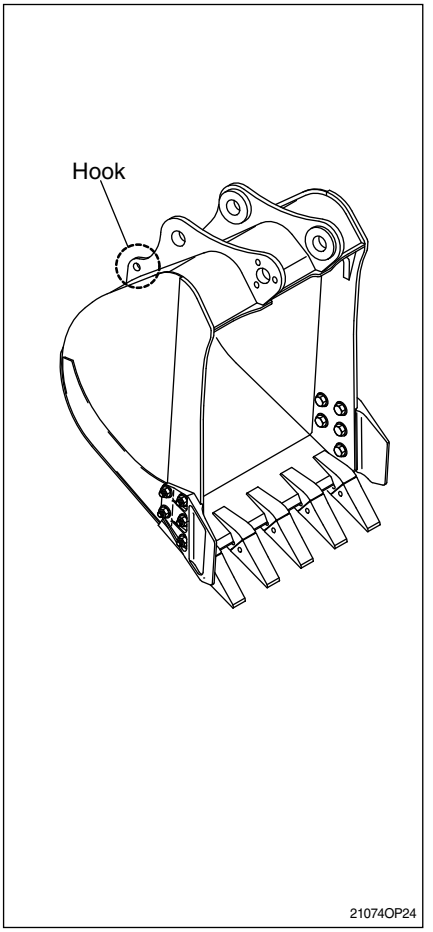
When performing lifting operation, never raise or lower a person.

Due to the possible danger of the load falling or of collision with the load, no persons shall be allowed in the working area.

Before performing lifting operation, designate an operation supervisor.
Always execute operation according to his instructions.

- Execute operating methods and procedures under his direction.
- Select a person responsible for signaling. Operate only on signals given by such person.

Never leave the operator's seat while lifting a load.



8. OPERATION IN THE SPECIAL WORK SITES

1) OPERATION THE MACHINE IN A COLD WEATHER

(1) Use proper engine oil and fuel for the weather.

(2) Fill the required amount of antifreeze in the coolant.

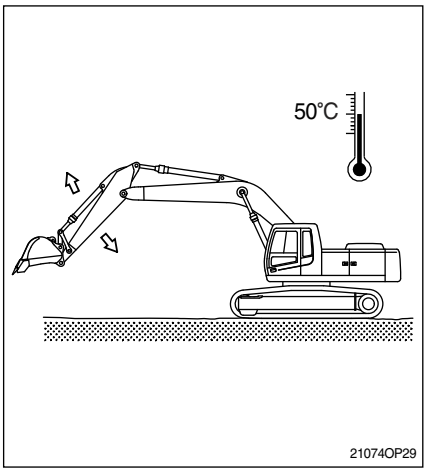
(3) Refer to the starting engine in cold weather. Start the engine and extend the warming up operation.

(4) Be sure to open the heater cock when using the heater.

(5) Always keep the battery completely charged.

※ **Discharged batteries will freeze more easily than fully charged.**

(6) Clean the machine and park on the wood plates.



2) OPERATION IN SANDY OR DUSTY WORK SITES

(1) Inspect air cleaner element frequently. Clean or replace element more frequently, if warning lamp comes ON and buzzer sounds simultaneously, regardless of inspection period.

※ **Replace the inner and outer element after 6 times of cleaning.**

(2) Inspect radiator frequently, and keep cooling fins clean.

(3) Prevent sand or dust from getting into fuel tank and hydraulic tank during refilling.

(4) Prevent sand or dust from penetrating into hydraulic circuit by tightly closing breather cap of hydraulic oil tank. Replace hydraulic oil filter and air breather element frequently. Also, replace the fuel filter frequently.

(5) Keep all lubricated part, such as pins and bushings, clean at all times.

(6) If the air conditioner and heater filters clogged, the heating or cooling capacity will drop. Clean or replace the filter element more frequently.

(7) Clean electrical components, especially the starting motor and alternator to avoid accumulation of dust.

3) SEA SHORE OPERATION

(1) Prevent ingress of salt by securely tightening plugs, cocks and bolts of each part.

(2) Wash machine after operation to remove salt residue.
Pay special attention to electrical parts and hydraulic cylinders to prevent corrosion.

(3) Inspection and lubrication must be carried out more frequently.
Supply sufficient grease to replace all old grease in bearings which have been submerged in water for a long time.

4) OPERATION IN MUD, WATER OR RAIN WORK SITES

(1) Perform a walk around inspection to check for any loose fittings, obvious damage to the machine or any fluid leakage.

(2) After completing operations, clean mud, rocks or debris from the machine. Inspect for damage, cracked welds or loosened parts.

(3) Perform all daily lubrication and service.

(4) If the operations were in salt water or other corrosive materials, make sure to flush the affected equipment with fresh water.

5) OPERATION IN ROCKY WORK SITES

(1) Check for damage to the undercarriage and for looseness, flaws, wear and damage in bolts and nut.

(2) Loosen the track tension a little when working in such areas.

(3) Do not turn the undercarriage directly over the sharp edge rock.

9. NORMAL OPERATION OF EXCAVATOR

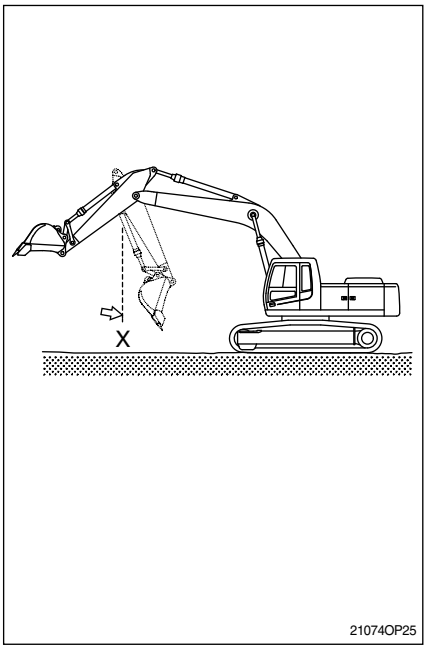
Followings may occur during operation due to the nature of a hydraulic excavator.

1) When rolling in the arm, the roll-in movement stop momentary at point **X** in the picture shown, then recovers speed again after passing point **X**.
   The reason for this phenomenon is that movement by the arm weight is faster than the speed of oil flow into the cylinder.

2) When lowering the boom, one may hear continuous sound.
   This is caused by oil flow in the valve.

3) Overloaded movement will produce sound caused by the relief valves, which are for the protection of the hydraulic systems.

4) When the machine is started swing or stopped, a noise near the swing motor may be heard. The noise is generated when the brake valve relieves.



21074OP25

10. ATTACHMENT LOWERING(When engine is stopped)

1) On machines equipped with an accumulator, for a short time(within 2 minutes) after the engine is stopped, the attachment will lower under its own weight when the attachment control lever is shifted to LOWER. That is happen only starting switch ON position and safety lever UNLOCK position. After the engine is stopped, set the safety lever to the LOCK position.

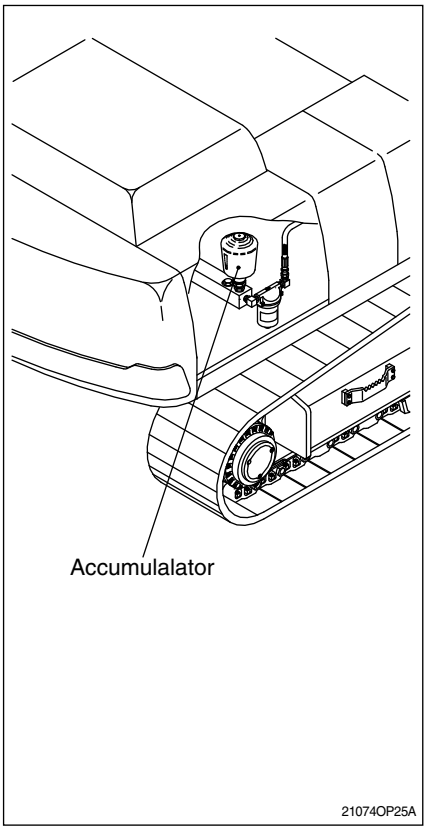
⚠ **Be sure no one is under or near the attachment before lowering the boom.**

2) The accumulator is filled with high-pressure nitrogen gas, and it is extremely dangerous if it is handled in the wrong way. Always observe the following precautions.

⚠ **Never make any hole in the accumulator expose it to flame or fire.**

⚠ **Do not weld anything to the accumulator.**

※ **When carrying out disassembly or maintenance of the accumulator, or when disposing of the accumulator, it is necessary to release the gas from the accumulator. A special air bleed valve is necessary for this operation, so please contact your Hyundai distributor.**



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

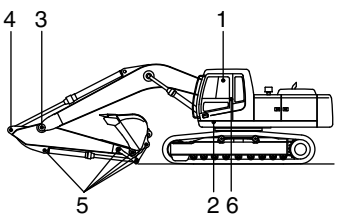
(1) CLEANING THE MACHINE

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.



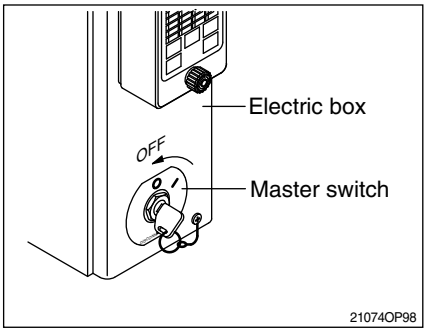
1 Lubricating manifold(5EA)
2 Boom cylinder pin(2EA)
3 Boom and arm connection pin(1EA)
4 Arm cylinder pin(rod side, 1EA)
5 Arm and bucket(6EA)

21074OP26

(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.

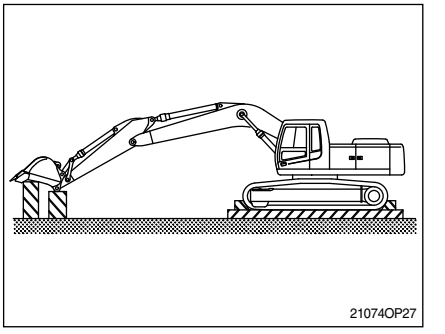


21074OP98

(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.**



21074OP27

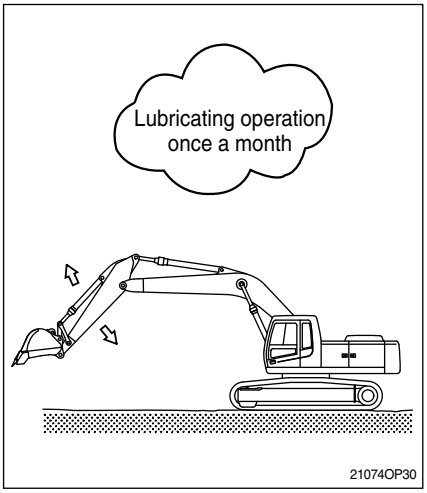
2) DURING STORAGE

Start engine and move the machine and work equipment once a month and apply lubrication to each part.

※ **Check the level of engine oil and coolant and fill if required when starting engine.**

※ **Clean the anticorrosive on the piston rod of cylinder.**

※ **Operate the machine such as traveling, swing and work equipment operation to make sure enough lubrication of all functional components.**



3) AFTER STORAGE

Carry out the following procedure when taking out of a long time storage.

(1) Wipe off the anticorrosive lubricant on the hydraulic piston rod.

(2) Completely fill fuel tank, lubricate and add oil.

(3) When storage period is 6 months over

If the machine stock period is over 6 months, carry out the following procedure.

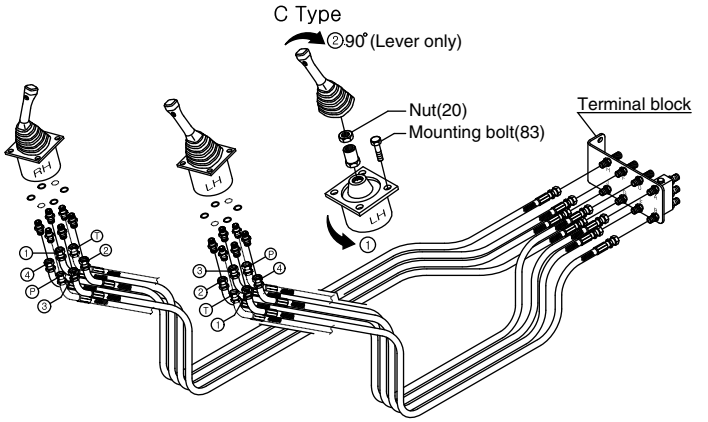
This procedure is to drain condensation water for the **swing reduction gear** durability.

※ **Remove the drain port plug and drain the water until the gear oil comes out and then tighten the drain plug.**

※ **Refer to the service instruction, section 6 for the drain plug location.**

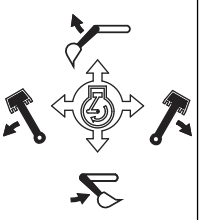
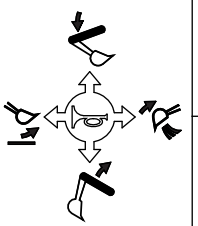
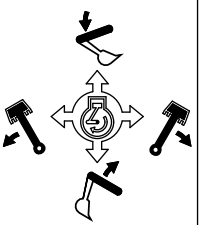
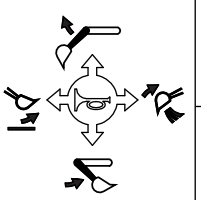
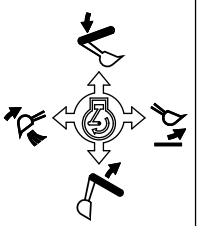
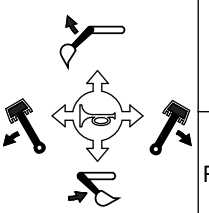
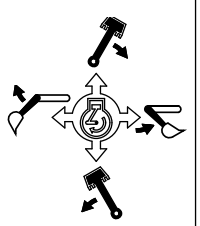
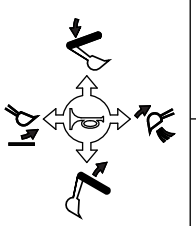
※ **If the machine is stored without carrying out the monthly lubricating operation, consult your Hyundai dealer for service.**

12. RCV LEVER OPERATING PATTERN



※ **Whenever a change is made to the machine control pattern also exchange the pattern label in the cab to match the new pattern.**

21074OP28

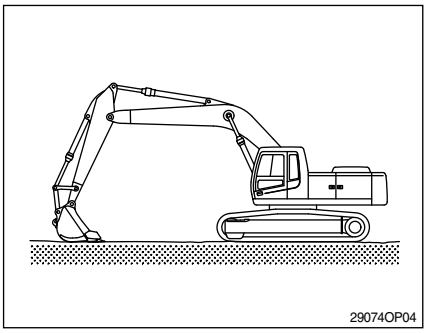
Pattern	Operation		Control function		Hose connection(Port)		
	Left	Right			RCV lever	Change of MCV port	
						From	To
ISO Type Hyundai			Left	Arm out	②	D	-
				Arm in	④	E	-
				Swing right	③	B	-
				Swing left	①	A	-
			Right	Boom lower	④	J	-
				Boom raise	②	H	-
				Bucket out	①	F	-
				Bucket in	③	G	-
A Type			Left	Boom lower	②	D	J
				Boom raise	④	E	H
				Swing right	③	B	-
				Swing left	①	A	-
			Right	Arm out	④	J	D
				Arm in	②	H	E
				Bucket out	①	F	-
				Bucket in	③	G	-
B Type			Left	Boom lower	②	D	J
				Boom raise	④	E	H
				Bucket in	③	B	G
				Bucket out	①	A	F
			Right	Arm out	④	J	D
				Arm in	②	H	E
				Swing right	①	F	B
				Swing left	③	G	A
C Type			Left	① Loosen the RCV lever mounting bolt(83) and rotates lever assy 90° counterclockwise; then install. ② To put lever in correct position, disassemble nut(20) and rotates only lever 90° clockwise.			
			Right	Same as **ISO** type			

13. SWITCHING HYDRAULIC ATTACHMENT CIRCUIT

1) The combined hydraulic attachment circuit is capable of providing single action or double action.

2) The position of 3 way valve selects the single action hydraulic attachment circuit or the double action hydraulic attachment circuit.

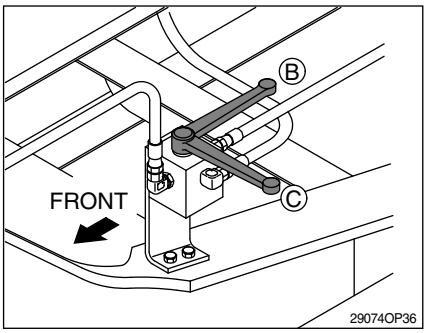
3) Before you change the flow mode of hydraulic attachment circuit, place the machine in the servicing position as shown. Stop the engine.



4) Use the manual lever to turn the 3 way valve. Make sure that you fully turn the valve until the valve stops.

(1) One way flow(Hydraulic breaker)
Position the manual lever parallel to the piping (Ⓑ).

(2) Two way flow(Clamshell or shear)
Position the manual lever perpendicular to the piping(Ⓒ).



1. PREPARATION FOR TRANSPORTATION

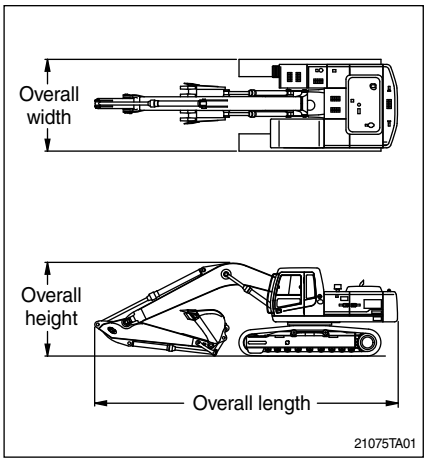
1) When transporting the machine, observe the various road rules, road transportation vehicle laws and vehicle limit ordinances, etc.

2) Select proper trailer after confirming the weight and dimension from the chapter 2, specification.

3) Check the whole route such as the road width, the height of bridge and limit of weight and etc., which will be passed.

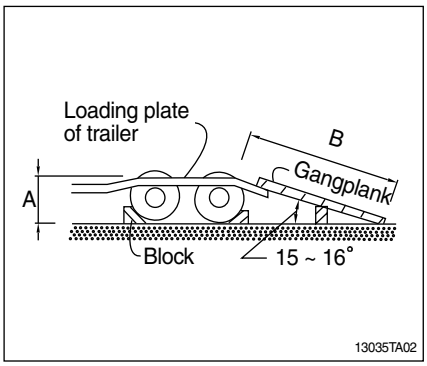
4) Get the permission from the related authority if necessary.

5) Prepare suitable capacity of trailer to support the machine.



6) Prepare gangplank for safe loading referring to the below table and illustration.

A	B
1.0	3.65 ~ 3.85
1.1	4.00 ~ 4.25
1.2	4.35 ~ 4.60
1.3	4.75 ~ 5.00
1.4	5.10 ~ 5.40
1.5	5.50 ~ 5.75



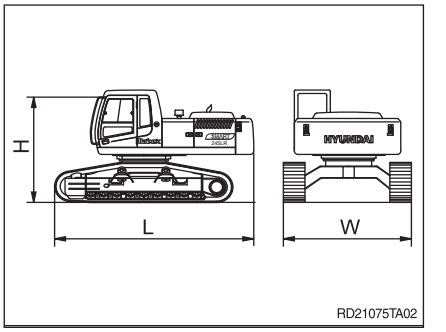
2. DIMENSION AND WEIGHT

1) R245LR

(1) Base machine

Mark	Description	Unit	Specification
L	Length	mm(ft-in)	4990(16' 4")
H	Height	mm(ft-in)	2920(9' 7")
W	Width	mm(ft-in)	2700(8' 10")
Wt	Weight	kg(lb)	17410(38380)

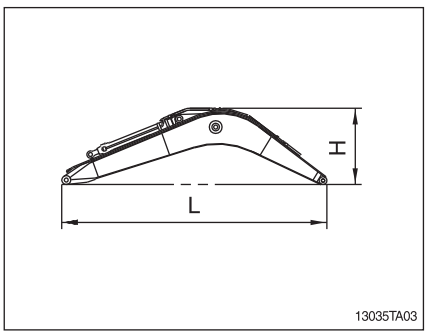
※ With 800mm(32") triple grouser shoes and 3800kg(8380lb) counterweight.



(2) Boom assembly

Mark	Description	Unit	Specification
L	Length	mm(ft-in)	8300(27' 2")
H	Height	mm(ft-in)	1440(4' 7")
W	Width	mm(ft-in)	700(2' 4")
Wt	Weight	kg(lb)	2124(4720)

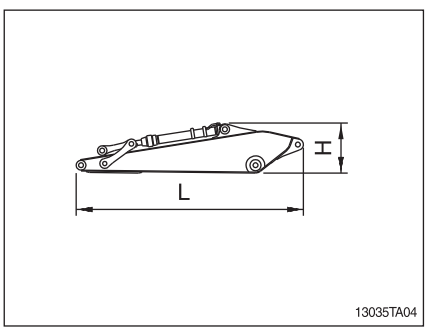
※ 8.2m(26' 11") boom with arm cylinder(Included piping and pins).



(3) Arm assembly

Mark	Description	Unit	Specification
L	Length	mm(ft-in)	7280(23' 9")
H	Height	mm(ft-in)	870(2' 10")
W	Width	mm(ft-in)	350(1' 2")
Wt	Weight	kg(lb)	1208(2685)

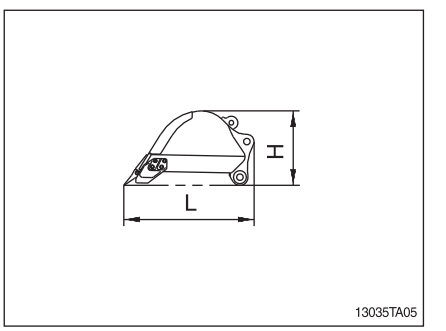
※ 6.3m(20' 8") arm with bucket cylinder(Included linkage and pins).



(4) Bucket assembly

Mark	Description	Unit	Specification
L	Length	mm(ft-in)	1100(3' 6")
H	Height	mm(ft-in)	695(2' 3")
W	Width	mm(ft-in)	900(2' 9")
Wt	Weight	kg(lb)	510(1133)

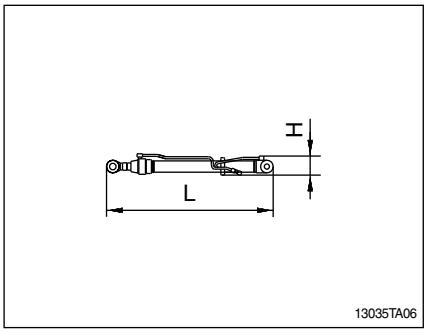
※ 0.52m^3 SAE heaped bucket(Included tooth and side cutters).



(5) Boom cylinder

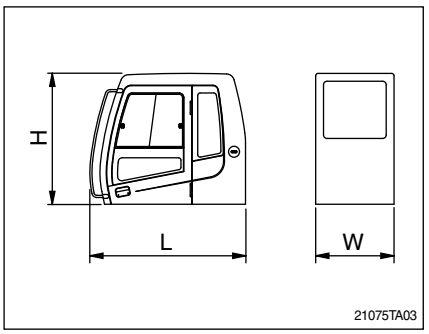
Mark	Description	Unit	Specification
L	Length	mm(ft-in)	1960(6' 5")
H	Height	mm(ft-in)	230(0' 9")
W	Width	mm(ft-in)	330(1' 1")
Wt	Weight	kg(lb)	380(840)

※ Included piping.



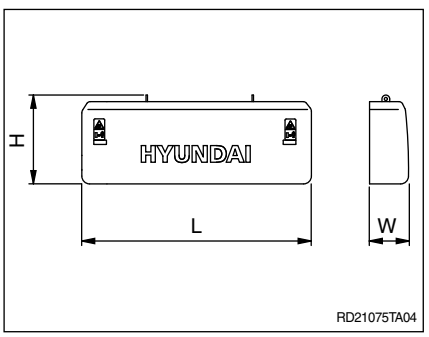
(6) Cab assembly

Mark	Description	Unit	Specification
L	Length	mm(ft-in)	1962(6' 4")
H	Height	mm(ft-in)	1676(5' 5")
W	Width	mm(ft-in)	1288(4' 2")
Wt	Weight	kg(lb)	310(680)



(7) Counterweight

Mark	Description	Unit	Specification
L	Length	mm(ft-in)	2700(8' 10")
H	Height	mm(ft-in)	1050(3' 5")
W	Width	mm(ft-in)	560(1' 10")
Wt	Weight	kg(lb)	3800(8380)

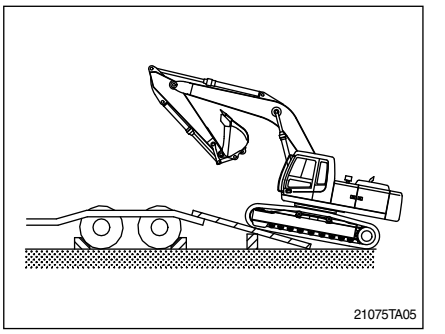


3. LOADING THE MACHINE

1) Load and unload the machine on a flat ground.

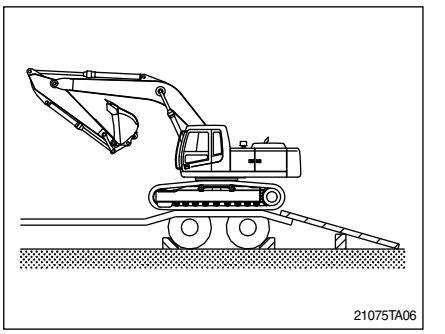
2) Use the gangplank with sufficient length, width, thickness and gradient.

3) Place the swing lock lever to the LOCK position 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.

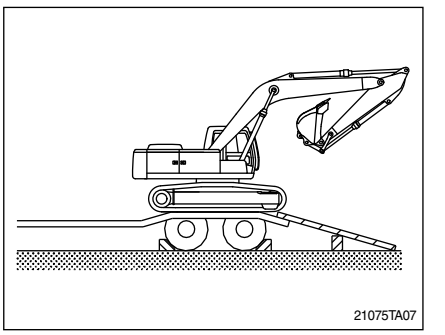


4) Do the following after loading the machine to the trailer.

(1) Stop loading when the machine is located horizontally with the rear wheel of trailer.



(2) Place the swing lock lever to the LOCK position after the swing the machine 180 degree.



(3) Lower the working equipment gently after the location is determined.

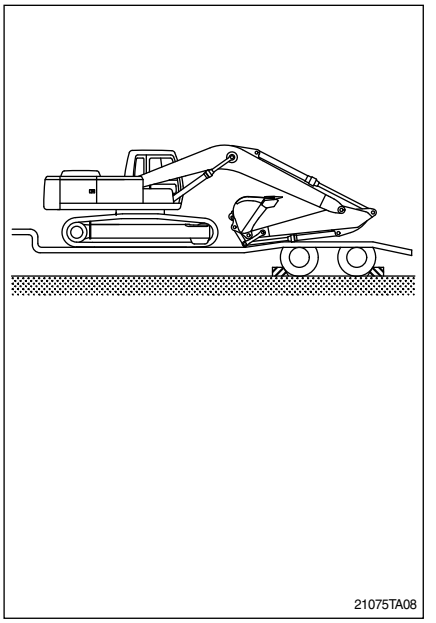
※ **Place rectangular timber under the bucket cylinder to prevent the damage of it during transportation.**

⚠ **Be sure to keep the travel speed switch on the LOW(turtle mark) while loading and unloading the machine.**

⚠ **Avoid using the working equipment for loading and unloading since it will be very dangerous.**

⚠ **Do not operate any other device when loading.**

⚠ **Be careful on the boundary place of loading plate or trailer as the balance of machine will abruptly be changed on the point.**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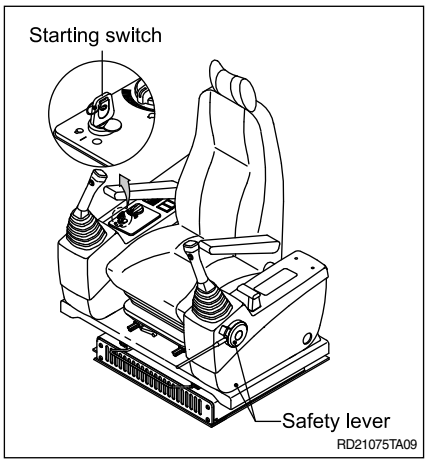
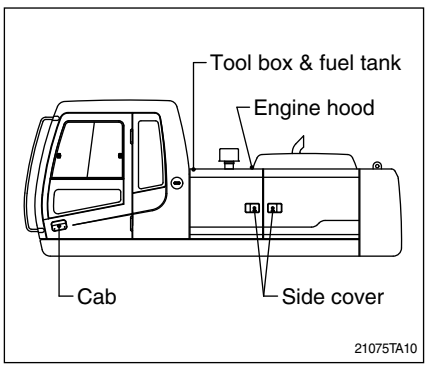
4. FIXING THE MACHINE

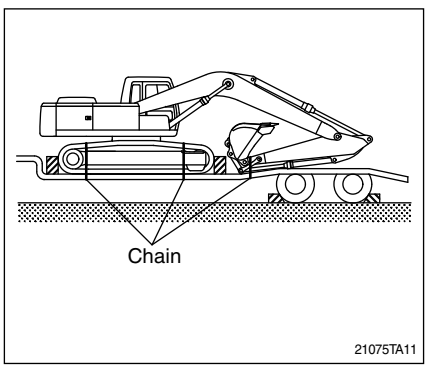
1) Place the swing lock lever on the LOCK position.
2) Lower down the working device on the loading plate of trailer.
3) Keep the safety lever on the LOCK position.
4) Turn OFF all the switches and remove the key.



5) Secure all locks.



6) Place timber underneath of the track and fix firmly with wire rope to prevent the machine from moving forward, backward, right or left.



5. LOADING AND UNLOADING BY CRANE

1) Check the weight, length, width and height of the machine referring to the chapter 2, specification when you are going to hoist the machine.

2) Use long wire rope and stay to keep the distance with the machine as it should avoid touching with the machine.

3) Put a rubber plate contact with wire rope and machine to prevent damage.

4) Place crane on the proper place.

5) Install the wire rope and stay like the illustration.

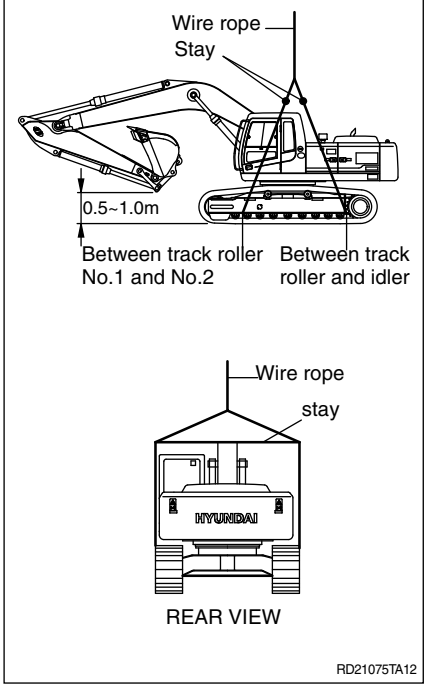
⚠ Make sure wire rope is proper size.

⚠ Place the swing lock lever and safety lever to LOCK position to prevent the machine moving when hoisting the machine.

⚠ The wrong hoisting method or installation of wire rope can cause damage to the machine.

⚠ Do not load abruptly.

⚠ Keep area clear of personnel.



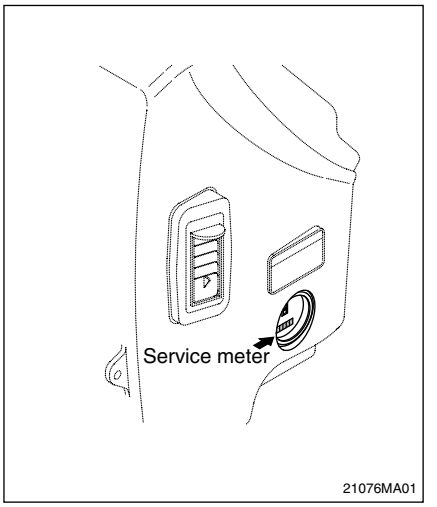
1. INSTRUCTION

1) INTERVAL OF MAINTENANCE

(1) You may inspect and service the machine by the period as described at page 6-11 based on hour meter at control panel.

(2) Shorten the interval of inspect and service depending on site condition.(Such as dusty area, quarry, sea shore and etc.)

(3) Practice the entire related details at the same time when the service interval is doubled.
For example, in case of 100hours, carry out all the maintenance 「Each 100hours, each 50 hours and daily service」 at the same time.



2) PRECAUTION

(1) Start to maintenance after you have the full knowledge of machine.

(2) The monitor installed on this machine does not entirely guarantee the condition of the machine.
Daily inspection should be performed according to clause 4, maintenance check list.

(3) Engine and hydraulic components have been preset in the factory.
Do not allow unauthorized personnel to reset them.

(4) Ask to your local dealer or Hyundai for the maintenance advice if unknown.

(5) Drain the used oil and coolant in a container and handle according to the method of handling for industrial waste to meet with regulations of each province or country.

3) PROPER MAINTENANCE

(1) Replace and repair of parts

It is required to replace the wearable and consumable parts such as bucket tooth, side cutter, filter and etc., regularly.

Replace damaged or worn parts at proper time to keep the performance of machine.

(2) Use genuine parts.

(3) Use the recommended oil.

(4) Remove the dust or water around the inlet of oil tank before supplying oil.

(5) Drain oil when the temperature of oil is warm.

(6) Do not repair anything while operating the engine.

Stop the engine when you fill the oil.

(7) Relieve hydraulic system of the pressure before repairing the hydraulic system.

(8) Confirm if the cluster is in the normal condition after completion of service.

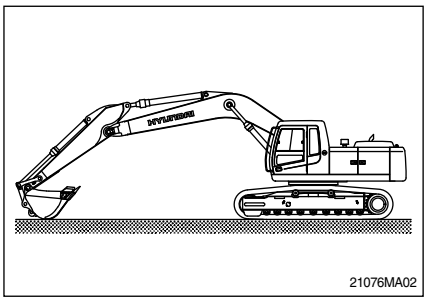
(9) For more detail information of maintenance, please contact local Hyundai dealer.

※ **Be sure to start the maintenance after fully understand the chapter 1, safety hints.**

4) RELIEVING THE PRESSURE IN THE HYDRAULIC SYSTEM

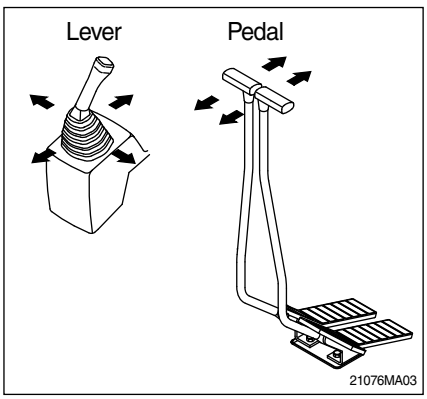
※ **Spouting of oil can cause the accident when loosening the cap or hose right after the operating of machine as the machine or oil is on the high pressure on the condition. Be sure to relieve the pressure in the system before repairing hydraulic system.**

(1) Place machine in parking position, and stop the engine.

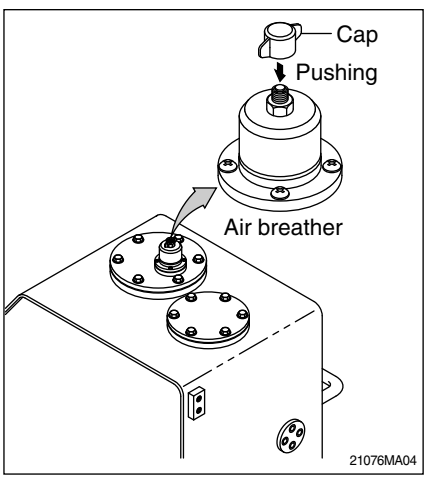


(2) Set the safety lever completely in the release position, operate the control levers and pedals fully to the front, rear, left and right, to release the pressure in the hydraulic circuit.

※ **This does not completely release the pressure, so when serving hydraulic component, loosen the connections slowly and do not stand in the direction where the oil spurt out.**



(3) Loosen the cap and relieve the pressure in the tank by pushing the top of the air breather.



5) PRECAUTION WHEN INSTALLING HYDRAULIC HOSES OR PIPES

(1) Be particularly careful that the joint of hose, pipe and functioning item are not damaged. Avoid contamination.

(2) Assemble after cleaning the hose, pipe and joint of functioning item.

(3) Use genuine parts.

(4) Do not assemble the hose in the condition of twisted or sharp radius.

(5) Keep the specified tighten torque.

6) PERIODICAL REPLACEMENT OF SAFETY PARTS

(1) It is desirable to do periodic maintenance the machine for using the machine safely for a long time.
However, recommend to replace regularly the parts related safety not only safety but maintain satisfied performance.

(2) These parts can cause the disaster of life and material as the quality changes by passing time and it is worn, diluted, and gets fatigued by using repeatedly.
These are the parts which the operator can not judge the remained lifetime of them by visual inspection.

(3) Repair or replace if an abnormality of these parts is found even 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 O-ring and gasket at the same time when replacing the hose.**

2. Replace clamp at the same time if the hose clamp is cracked when checking and replacing the hose.

2. TIGHTENING TORQUE

Use following table for unspecified torque.

1) BOLT AND NUT

(1) Coarse thread

Bolt size	8T		10T	
	kgf · m	lbf · ft	kgf · m	lbf · ft
M 6 × 1.0	0.9 ~ 1.3	6.5 ~ 9.4	1.1 ~ 1.7	8.0 ~ 12.3
M 8 × 1.25	2.0 ~ 3.0	14.5 ~ 21.7	2.7 ~ 4.1	19.5 ~ 29.7
M10 × 1.5	4.0 ~ 6.0	28.9 ~ 43.4	5.5 ~ 8.3	39.8 ~ 60.0
M12 × 1.75	7.4 ~ 11.2	53.5 ~ 81.0	9.8 ~ 15.8	70.9 ~ 114
M14 × 2.0	12.2 ~ 16.6	88.2 ~ 120	16.7 ~ 22.5	121 ~ 163
M16 × 2.0	18.6 ~ 25.2	135 ~ 182	25.2 ~ 34.2	182 ~ 247
M18 × 2.0	25.8 ~ 35.0	187 ~ 253	35.1 ~ 47.5	254 ~ 344
M20 × 2.5	36.2 ~ 49.0	262 ~ 354	49.2 ~ 66.6	356 ~ 482
M22 × 2.5	48.3 ~ 63.3	349 ~ 458	65.8 ~ 98.0	476 ~ 709
M24 × 3.0	62.5 ~ 84.5	452 ~ 611	85.0 ~ 115	615 ~ 832
M30 × 3.0	124 ~ 168	898 ~ 1214	169 ~ 229	1223 ~ 1656
M36 × 4.0	174 ~ 236	1261 ~ 1704	250 ~ 310	1808 ~ 2242

(2) Fine thread

Bolt size	8T		10T	
	kgf · m	lbf · ft	kgf · m	lbf · ft
M 8 × 1.0	2.2 ~ 3.4	15.9 ~ 24.6	3.0 ~ 4.4	21.7 ~ 31.8
M10 × 1.2	4.5 ~ 6.7	32.5 ~ 48.5	5.9 ~ 8.9	42.7 ~ 64.4
M12 × 1.25	7.8 ~ 11.6	56.4 ~ 83.9	10.6 ~ 16.0	76.7 ~ 116
M14 × 1.5	13.3 ~ 18.1	96.2 ~ 131	17.9 ~ 24.1	130 ~ 174
M16 × 1.5	19.9 ~ 26.9	144 ~ 195	26.6 ~ 36.0	192 ~ 260
M18 × 1.5	28.6 ~ 43.6	207 ~ 315	38.4 ~ 52.0	278 ~ 376
M20 × 1.5	40.0 ~ 54.0	289 ~ 391	53.4 ~ 72.2	386 ~ 522
M22 × 1.5	52.7 ~ 71.3	381 ~ 516	70.7 ~ 95.7	511 ~ 692
M24 × 2.0	67.9 ~ 91.9	491 ~ 665	90.9 ~ 123	658 ~ 890
M30 × 2.0	137 ~ 185	990 ~ 1339	182 ~ 248	1314 ~ 1796
M36 × 3.0	192 ~ 260	1390 ~ 1880	262 ~ 354	1894 ~ 2562

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	130.2
1"	41	21	151.9
1-1/4"	50	35	253.2

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	130.2
1-7/16-12	41	21	151.9
1-11/16-12	50	35	253.2

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	130.2
1"	41	21	151.9
1-1/4"	50	35	253.2

4) TIGHTENING TORQUE OF MAJOR COMPONENT

No.	Descriptions		Bolt size	Torque	
				kgf · m	lbf · ft
1	Engine	Engine mounting bolt, nut	M24 × 3.0	90 ± 7.0	651 ± 51
2		Radiator mounting bolt	M12 × 1.75	12.8 ± 3.0	92.6 ± 21.7
3		Coupling mounting socket bolt	M18× 2.5	32 ±1.0	231 ±7.2
4		Main pump housing mounting bolt	M10 × 1.5	4.8 ± 0.3	34.7 ± 2.2
5	Hydraulic system	Main pump mounting socket bolt	M20 × 2.5	42 ± 4.5	304 ± 32.5
6		Main control valve mounting nut	M12 × 1.75	12.2 ± 1.3	88.2 ± 9.4
7		Fuel tank mounting bolt	M20 × 2.5	45 ± 5.1	325 ± 36.9
8		Hydraulic oil tank mounting bolt	M20 × 2.5	45 ± 5.1	325 ± 36.9
9		Turning joint mounting bolt, nut	M12 × 1.75	12 ± 1.3	86.8 ± 9.4
10	Power train system	Swing motor mounting bolt	M20 × 2.5	57.9 ± 8.7	419 ± 62.9
11		Swing bearing upper part mounting bolt	M20 × 2.5	57.8 ± 6.4	418 ± 46.3
12		Swing bearing lower part mounting bolt	M20 × 2.5	57.8 ± 6.4	418 ± 46.3
13		Travel motor mounting bolt	M16 × 2.0	23 ± 2.5	166 ± 18.1
14		Sprocket mounting bolt	M16 × 2.0	26 ± 2.5	188 ± 18.1
15	Under carriage	Carrier roller mounting bolt, nut	M16 × 2.0	29.7 ± 4.4	215 ± 31.8
16		Track roller mounting bolt	M20 × 2.5	54.7 ± 5.0	396 ± 36.2
17		Track tension cylinder mounting bolt	M16 × 2.0	29.7 ± 4.5	215 ± 32.5
18		Track shoe mounting bolt, nut	M20 × 1.5	78 ± 8.0	564 ± 57.9
19		Track guard mounting bolt	M20 × 2.5	57.9 ± 8.7	419 ± 62.9
20	Others	Counter weight mounting bolt	M36 × 3.0	308 ± 46	2228 ± 333
21		Cab mounting bolt	M12 × 1.75	12.8 ± 3.0	92.6 ± 21.7
22		Operator's seat mounting bolt	M 8 × 1.25	4.05 ± 0.8	29.3 ± 5.8

※ For tightening torque of engine and hydraulic components, see engine maintenance guide and service manual.

3. FUEL, COOLANT AND LUBRICANTS

1) NEW MACHINE

New machine used and filled with following lubricants.

Description	Specification
Engine oil	SAE 15W-40(API CI-4)
Hydraulic oil	ISO VG 68 LF
Swing and travel reduction gear	SAE 85W-140(API GL-5)
Grease	Lithium base grease NLGI No. 2
Fuel	ASTM D975-No. 2
Coolant	Hyundai pre mixed coolant

SAE : Society of Automotive Engineers
API : American Petroleum Institute
ISO : International Organization for Standardization
NLGI : National Lubricating Grease Institute
ASTM : American Society of Testing and Material

2) RECOMMENDED OILS

Use only oils listed below or equivalent.

Do not mix different brand oil.

Service point	Kind of fluid	Capacity ℓ (U.S. gal)	Ambient temperature °C (°F)
			-20 (-4) / -10 (14) / 0 (32) / 10 (50) / 20 (68) / 30 (86) / 40 (104)
Engine oil pan	Engine oil	17.0(4.49)	SAE 30 SAE 10W SAE 10W-30 SAE 15W-40
Swing drive	Gear oil	5.0(1.3)	SAE 85W-140
Final drive		5.8×2 (1.5×2)	
Hydraulic tank	Hydraulic oil	Tank; 180(48) System; 290(77)	ISO VG 32 ISO VG 46 ISO VG 68 LF*
Fuel tank	Diesel fuel	320(84.5)	ASTM D975 NO.1 ASTM D975 NO.2
Fitting (Grease nipple)	Grease	As required	NLGI NO.1 NLGI NO.2
Radiator (Reservoir tank)	Mixture of antifreeze and water 50 : 50	35(9.2)	Ethylene glycol base permanent type

* Indian model use oil in given temperature range.

4. MAINTENANCE CHECK LIST

1) DAILY SERVICE BEFORE STARTING

Check items	Service	Page
Visual check		
Fuel tank	Check, Refill	6-25
Hydraulic oil level	Check, Add	6-31
Engine oil level	Check, Add	6-18
Coolant level	Check, Add	6-20
Control panel & pilot lamp	Check, Clean	6-41
Prefilter	Check, Clean	6-26
Fan belt tension	Check, Adjust	6-24

2) EVERY 50 HOURS SERVICE

Check items	Service	Page
Fuel tank(Water sediment)	Drain	6-25
Track tension	Check, Adjust	6-36
Swing bearing grease	Lubricate	6-34
Swing reduction gear oil	Check, Add	6-34
Swing reduction gear grease	Check, Add	6-34
Lubricate pin and bushing	Lubricate	6-40
・Boom cylinder tube end		
・Boom foot		
・Boom cylinder rod end		
・Arm cylinder tube end		
・Arm cylinder rod end		
・Boom + Arm connecting		
・Bucket cylinder tube end		
・Bucket cylinder rod end		
・Arm + Bucket connecting		
・Arm + Link, Bucket control		
・Bucket control rod		

3) INITIAL 50 HOURS SERVICE

Check items	Service	Page
Engine oil	Change	6-18, 19
Engine oil filter	Replace	6-18, 19
Prefilter	Replace	6-26
Fuel filter element	Replace	6-27
Bolts & Nuts	Check, Tight	6-8
· Sprocket mounting bolts		
· Travel motor mounting bolts		
· Swing motor mounting bolts		
· Swing bearing mounting bolts		
· Engine mounting bolts		
· Counterweight mounting bolts		
· Turning joint locating bolts		
· Track shoe mounting bolts and nuts		
· Hydraulic pump mounting bolts		

Service the above items only for the new machine, and thereafter keep the normal service interval.

4) EVERY 200 HOURS SERVICE

Check items	Service	Page
★ Return filter	Replace	6-32
★ Pilot line filter	Replace	6-33
★ Air breather element	Replace	6-33
★ Drain cartridge filter	Replace	6-33

★ Replace 4 filters for continuous hydraulic breaker operation only.

5) INITIAL 250 HOURS SERVICE

Check items	Service	Page
Swing reduction gear oil	Change	6-34

6) EVERY 250 HOURS SERVICE

Check items	Service	Page
Battery electrolyte	Check, Add	6-41
Aircon & heater flesh filter	Check	6-45
Air breather element	Replace	6-33
Bolts & Nuts	Check, Tight	6-8
· Sprocket mounting bolts		
· Travel motor mounting bolts		
· Swing motor mounting bolts		
· Swing bearing mounting bolts		
· Engine mounting bolts		
· Counterweight mounting bolts		
· Turning joint locating bolts		
· Track shoe mounting bolts and nuts		
· Hydraulic pump mounting bolts		

7) INITIAL 500 HOURS SERVICE

Check items	Service	Page
Travel reduction gear oil	Change	6-35

8) EVERY 500 HOURS SERVICE

Check items	Service	Page
★Engine oil	Change	6-18, 19
★Engine oil filter	Replace	6-18, 19
Radiator, cooler fin and charge air cooler	Check, Clean	6-23
☆Air cleaner element(Primary)	Check, Clean	6-25
Fuel filter element	Replace	6-27
Prefilter	Change	6-26

★ If you use high sulfur containing fuel above than 0.5% or use low grade of engine oil reduce change interval.

☆ Clean the primary element only after 500 hours operation or when the air cleaner warning lamp blinks. Replace primary element and safety element after 4 times cleanings of primary element.

9) EVERY 1000 HOURS SERVICE

Check items	Service	Page
Travel motor reduction gear oil	Change	6-35
Swing reduction gear oil	Change	6-34
Grease in swing gear and pinion	Change	6-34
Pilot line filter	Replace	6-33
Hydraulic return filter	Replace	6-32
Drain filter cartridge	Replace	6-33

10) EVERY 5000 HOURS SERVICE

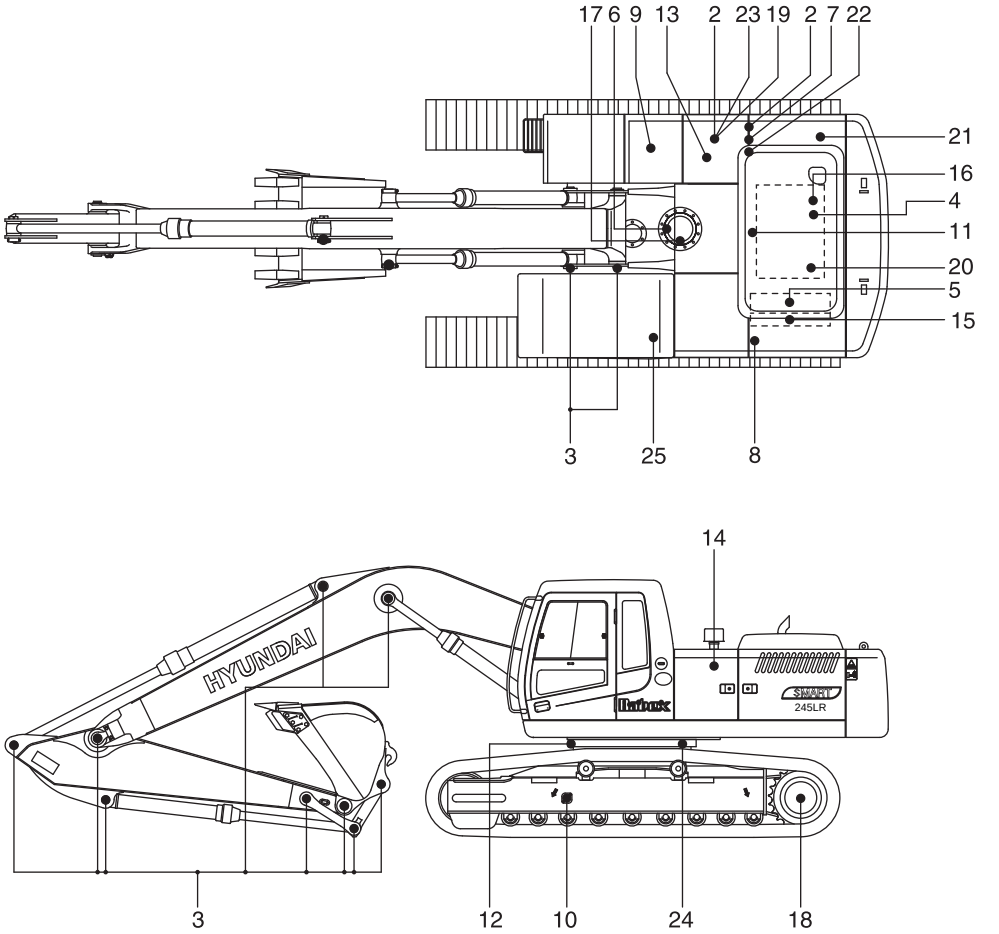
Check items	Service	Page
Hydraulic tank		
★ · Oil	Change	6-32
· Suction strainer	Check, Clean	6-32
Coolant	Change	6-20, 21, 22, 23

★Change oil every 1000 hours of continuous hydraulic breaker operation.

11) WHEN REQUIRED

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

Check items	Service	Page
Fuel system		
· Fuel tank	Drain or Clean	6-25
· Prefilter	Clean or Replace	6-26
· Fuel filter element	Replace	6-27
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
· Charge air cooler	Check	6-23
Engine air system		
· Air cleaner element	Replace	6-25
Hydraulic system		
· Hydraulic oil	Add or Change	6-31
· Return filter	Replace	6-32
· Drain line filter	Replace	6-33
· Pilot line filter	Replace	6-33
· Element of breather	Replace	6-33
· Suction strainer	Clean	6-32
Under carriage		
· Track tension	Check, Adjust	6-36
Bucket		
· Tooth	Replace	6-38
· Side cutter	Replace	6-38
· Linkage	Adjust	6-37
· Bucket assy	Replace	6-37
Air conditioner and heater		
· Fresh filter	Clean, Replace	6-44
· Recirculation filter	Clean	6-45



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Caution

1. Service intervals are based on the hour meter reading.
2. The number of each item shows the lubrication point on the machine.
3. Stop engine while filling oil, and use no open flames.
4. For other details, refer to the service manual.

Service interval	No.	Description	Service action	Oil symbol	Capacity ℓ (U.S.gal)	Service points No.
10 Hours or daily	2	Hydraulic oil level	Check, Add	HO	180(48)	1
	4	Engine oil level	Check, Add	EO	24(6.3)	1
	5	Radiator coolant	Check, Add	C	35(9.2)	1
	7	Prefilter(water,element)	Check, Clean	-	-	2
	20	Fan belt tension and damage	Check, Adjust	-	-	1
50 Hours or weekly	3	Attachment pins & chamber	Check, Add	PGL	-	17
	6	Swing reduction gear grease	Check, Add	PGL	1.1kg(2.4lb)	1
	9	Fuel tank(Water, sediment)	Check, Clean	-	-	1
	10	Track tension	Check, Adjust	PGL	0.3(0.08)	2
	12	Swing bearing grease	Check, Add	PGL	-	3
	17	Swing reduction gear case	Check, Add	GO	5.0(1.3)	1
250 Hours	8	Battery(Voltage)	Check	-	-	2
	13	Hydraulic oil return filter	Replace	-	-	1
	21	Pilot line filter element	Replace	-	-	1
	22	Drain filter cartridge	Replace	-	-	1
	23	Air breather element	Replace	-	-	1
	26	Aircon & heater flesh filter	Check, Replace	-	-	1
500 Hours	4	Engine oil	Change	EO	24(6.3)	1
	7	Prefilter	Replace	-	-	1
	11	Engine oil filter	Replace	-	-	1
	14	Air cleaner element(Primary)	Check, Clean	-	-	1
	15	Radiator, oil cooler, charge air cooler	Check, Clean	-	-	3
	16	Fuel filter element	Replace	-	-	2
1000 Hours	17	Swing reduction gear case	Change	GO	5.0(1.3)	1
	18	Travel reduction gear case	Change	GO	5.8(1.5)	2
	24	Swing gear and pinion	Change	PGL	6.2kg(13.7lb)	1
2000 Hours	2	Hydraulic oil	Change	HO	180(48)	1
	5	Radiator coolant	Change	C	35(9.2)	1
	19	Hydraulic oil suction strainer	Check, Clean	-	-	1
As required	14	Air cleaner element(Primary, safety)	Replace	-	-	2
	25	Aircon & heater fresh filter	Replace	-	-	1
	25	Aircon & heater recirculation filter	Replace	-	-	1

※ **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

1) CHECK ENGINE OIL LEVEL

Check the oil level with the machine on a flat ground before starting engine.

(1) Pull out the dipstick and wipe with a clean cloth.

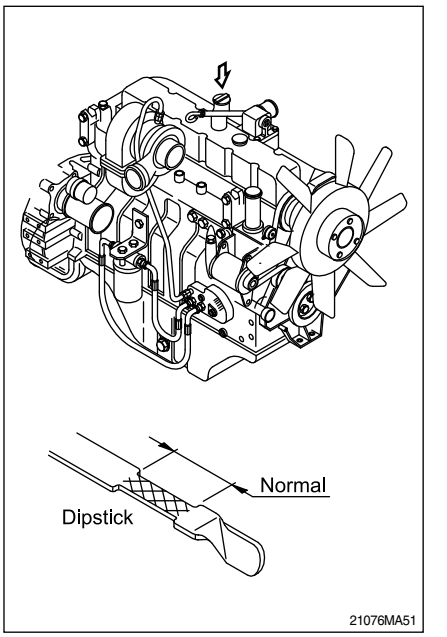
(2) Check the oil level by inserting the dipstick completely into the hole and pulling out again.

(3) If oil level is LOW, add oil and then check again.

※ **If the oil is contaminated or diluted, change the oil regardless of the regular change interval.**

※ **Check oil level after engine has been stopped for 15 minutes.**

⚠ **Do not operate unless the oil level is in the normal range.**

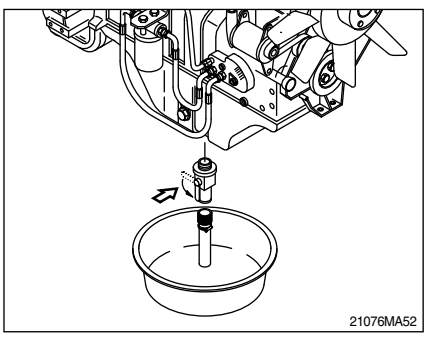


2) REPLACEMENT OF ENGINE OIL AND OIL FILTER

(1) Warm up the engine.

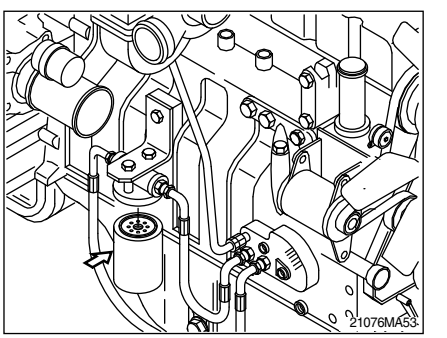
(2) Turn the lever to open position.

※ **A drain pan with a capacity of 24 liters (6.3 U.S. gallons) will be adequate.**



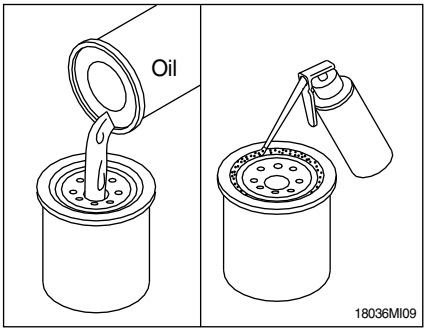
(3) Clean around the filter head, remove the filter and clean the gasket surface.

· Wrench size : 90 ~ 95mm(3.5~3.8in)



(4) Apply a light film of lubricating oil to the gasket sealing surface before installing the filters.

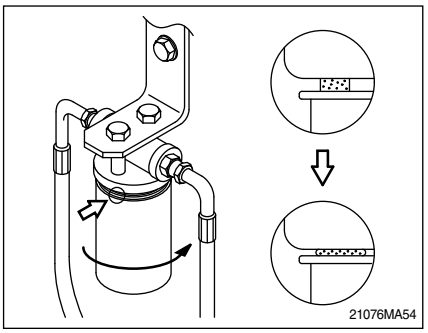
※ **Fill the filters with clean lubricating oil.**



(5) Install the filter to the filter head.

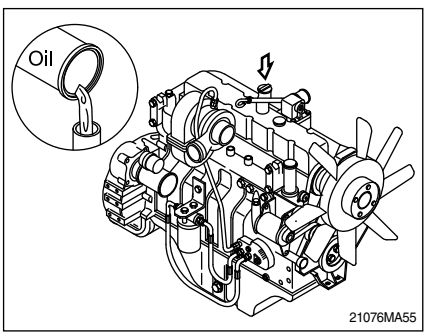
※ **Mechanical over-tightening may distort the threads or damage the filter element seal.**

· Install the filter as specified by the filter manufacturer.

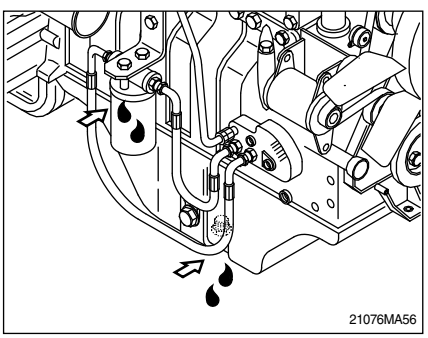


(6) Fill the engine with clean oil to the proper level.

· Quantity : 24 ℓ (6.3U.S.gallons)



(7) Operate the engine at low idle and inspect for leaks at the filters and the drain plug.
Shut the engine off and check the oil level with the dipstick. Allow 15minutes for oil to drain down before checking.



3) CHECK COOLANT

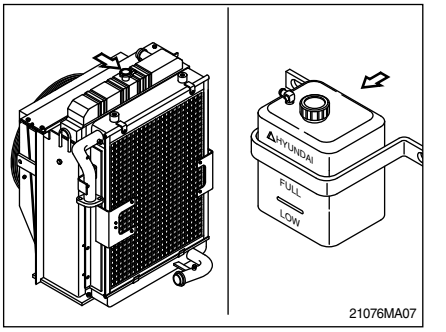
(1) Check if the level of coolant in reservoir tank is between FULL and LOW.

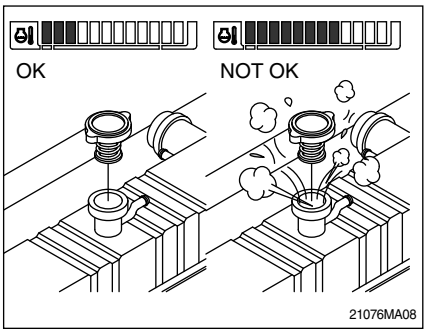
(2) Add the mixture of antifreeze and water after removing the cap of the reservoir tank if coolant is not sufficient.

(3) Be sure to add the coolant by opening the cap of radiator when coolant level is below LOW.

(4) Replace gasket of radiator cap when it is damaged.

⚠ Hot coolant can spray out if radiator cap is removed while engine is hot. Remove the cap after the engine has cooled down.



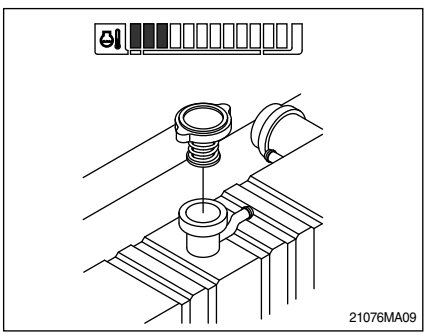


4) FLUSHING AND REFILLING OF RADIATOR

(1) Change coolant

⚠ Avoid prolonged and repeated skin contact with used antifreeze. Such prolonged repeated contact can cause skin disorders or other bodily injury.
Avoid excessive contact-wash thoroughly after contact.
Keep out of reach of children.

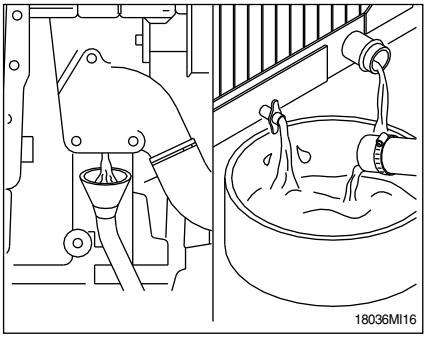
※ Protect the environment : Handling and disposal of used antifreeze can be subject to federal, state, and local law regulation.
Use authorized waste disposal facilities, including civic amenity sites and garages providing authorized facilities for the receipt of used antifreeze.
If in doubt, contact your local authorities for guidance as to proper handling of used antifreeze.



⚠ Wait until the temperature is below 50°C (122°F) before removing the coolant system pressure cap.

Failure to do so can cause personal injury from heated coolant spray.

Drain the cooling system by opening the drain valve on the radiator and removing the plug in the bottom of the water inlet. A drain pan with a capacity of 40 liters(10U.S.gallons) will be adequate in most applications.

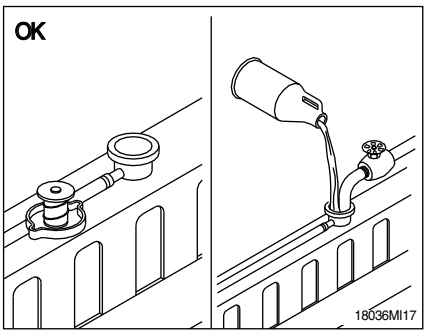


(2) Flushing of cooling system

① Fill the system with a mixture of sodium carbonate and water(or a commercially available equivalent).

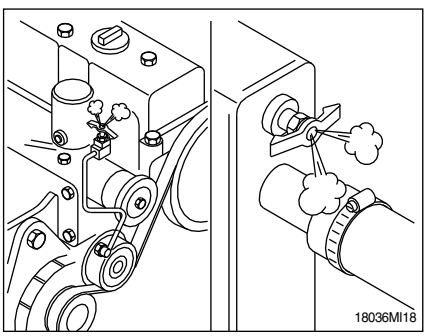
※ **Use 0.5kg(1.0pound) of sodium carbonate for every 23 liters(6.0U.S. gallons) of water.**

※ **Do not install the radiator cap. The engine is to be operated without the cap for this process.**



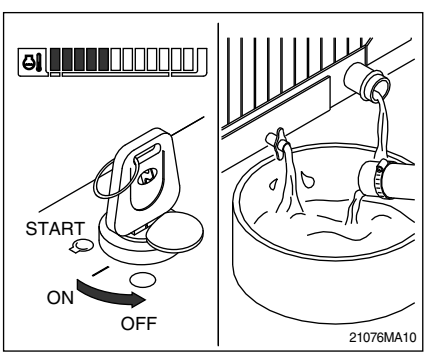
※ **During filling, air must be vented from the engine coolant passages. Open the engine venting petcock.**

The system must be filled slowly to prevent air locks. Wait 2 to 3 minutes to allow air to be vented, then add mixture to bring the level to the top.



② Operate the engine for 5 minutes with the coolant temperature above 80°C(176°F) .

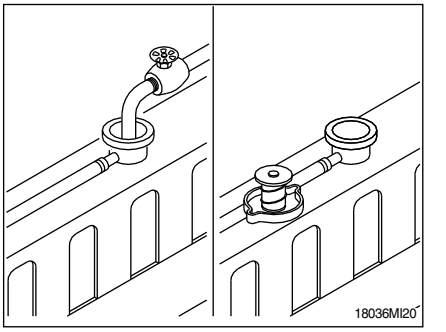
Shut the engine off, and drain the cooling system.



③ Fill the cooling system with clean water.

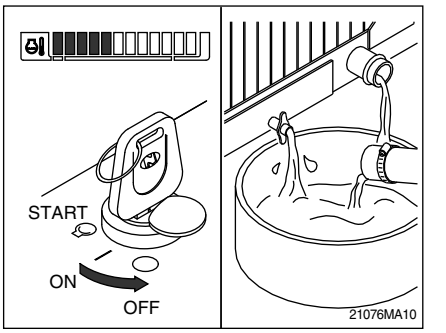
※ **Be sure to vent the engine and aftercooler for complete filling.**

※ **Do not install the radiator cap or the new coolant filter.**



④ Operate the engine for 5 minutes with the coolant temperature above 80°C(176°F) .
Shut the engine off, and drain the cooling system.

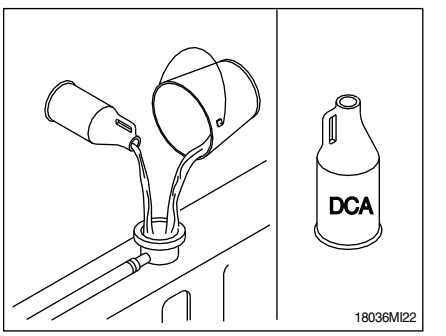
※ **If the water being drained is still dirty, the system must be flushed again until the water is clean.**



(3) Cooling system filling

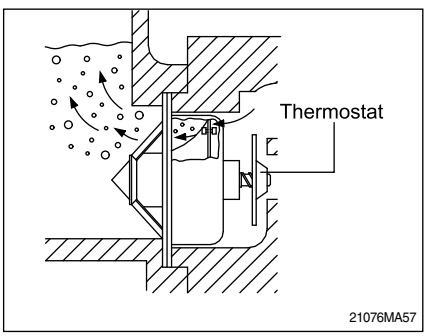
① Use a mixture of 50 percent water and 50 percent ethylene glycol antifreeze to fill the cooling system.
Coolant capacity(engine only) : 9.5 ℓ (2.5U.S. gallons)

※ **Use the correct amount of DCA4 corrosion inhibitor to protect the cooling system.**

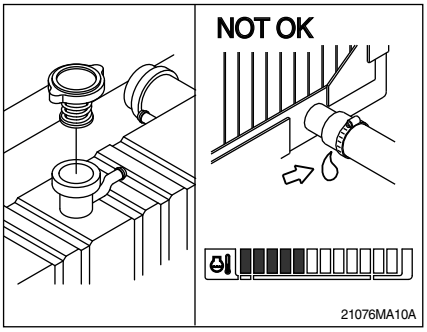


② The system has a maximum fill rate of 14 liters(3.5U.S. gallons) per minute.
Do not exceed this fill rate.

※ **The system must be filled slowly to prevent air locks.**
During filling, air must be vented from the engine coolant passage.



③ Install the pressure cap. Operate the engine until it reaches a temperature 80°C(176°F), and check for coolant leaks.
Check the coolant level again to make sure the system is full of coolant.

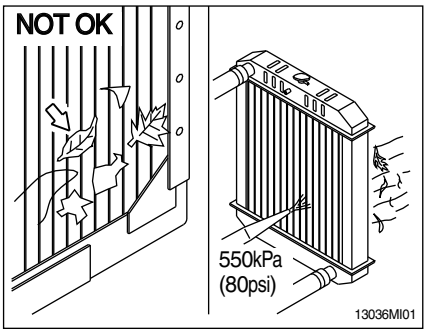


5) CLEAN RADIATOR AND OIL COOLER

Check, and if necessary, clean and dry outside of radiator and oil cooler. After working in a dusty place, clean radiator more frequently.

(1) Visually inspect the radiator for clogged radiator fins.

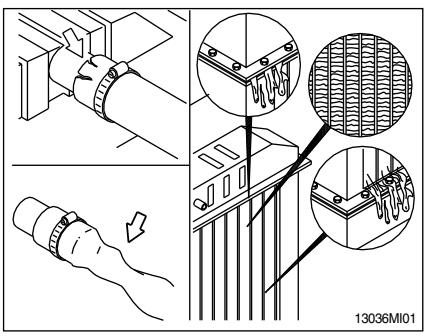
(2) Use 550kPa(80psi) air pressure to blow the dirt and debris from the fins.
Blow the air in the opposite direction of the fan air flow.



(3) Visually inspect the radiator for bent or broken fins.

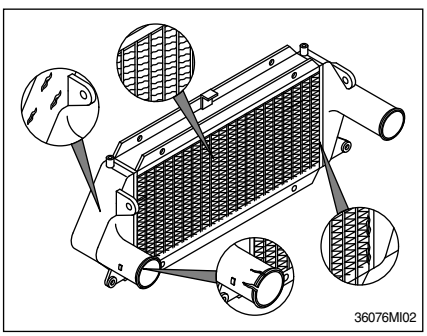
※ **If the radiator must be replaced due to bent or broken fins which can cause the engine to overheat, refer to the manufacturer's replacement procedures.**

(4) Visually inspect the radiator for core and gasket leaks.



6) CHECK CHARGE AIR COOLER

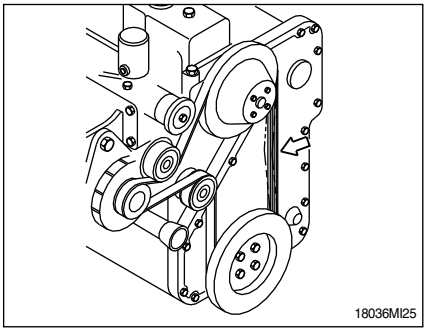
Inspect the charge air cooler for dirt and debris blocking the fins. Check for cracks, holes, or other damage. If damage is found, please contact Hyundai distributor.



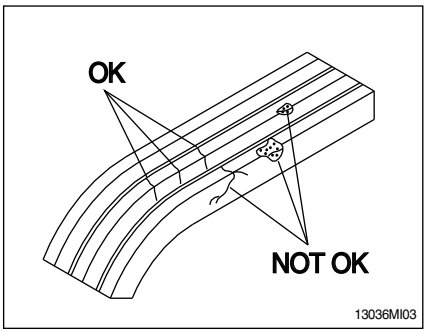
7) FAN BELT TENSION

(1) Measure the belt deflection at the longest span of the belt.

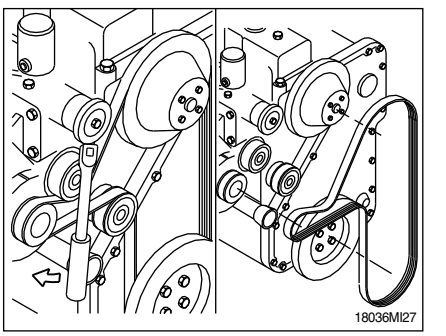
· Maximum deflection : 9.5 - 12.7mm (3/8 to 1/2inch)



(2) Inspect the drive for damage.



(3) Inspect the drive belt, tension bearing and fan hub.



8) INSPECTION OF COOLING FAN

⚠ Personal injury can result from a fan blade failure. Never pull or pry on the fan. This can damage the fan blade and cause fan failure.

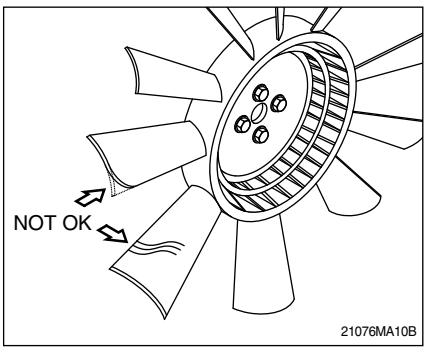
※ Rotate the crankshaft by using the engine barring gear.

※ A visual inspection of the cooling fan is required daily.

Check for cracks, loose rivets, and bent or loose blades.

Check the fan to make sure it is securely mounted. Tighten the capscrews if necessary.

Replace any fan that is damaged.



9) CLEANING OF AIR CLEANER

(1) Primary element

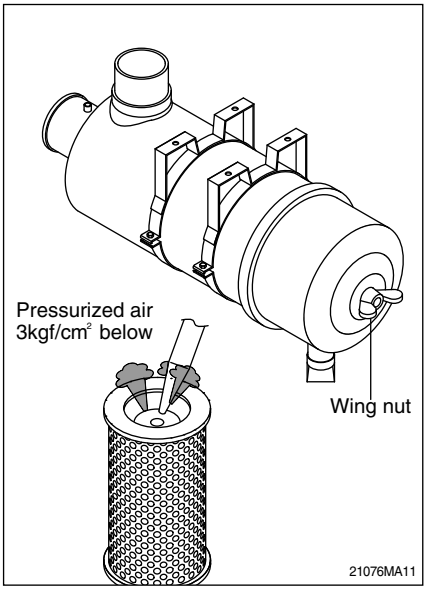
① Loosen the wing nut and remove the element.
② Clean the inside of the body.
③ Clean the element with pressurized air.
- Remove the dust inside of the element by the pressurized air(Below 3kgf/cm², 40psi) forward and backward equally.

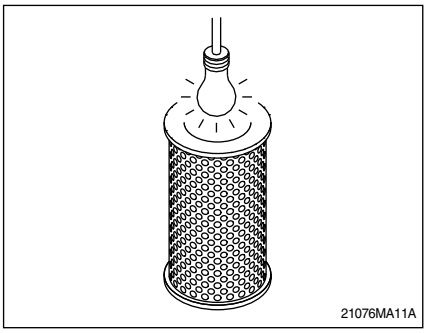
④ Inspect for cracks or damage of element by putting a light bulb inside of the element.
⑤ Insert element and tighten wing nut.

※ **Replace the primary element after 4 times cleanings.**

(2) Safety element

※ **Replace the safety element only when the primary element is cleaned for the 4 times.**
※ **Always replace the safety element. Never attempt to reuse the safety element by cleaning the element.**



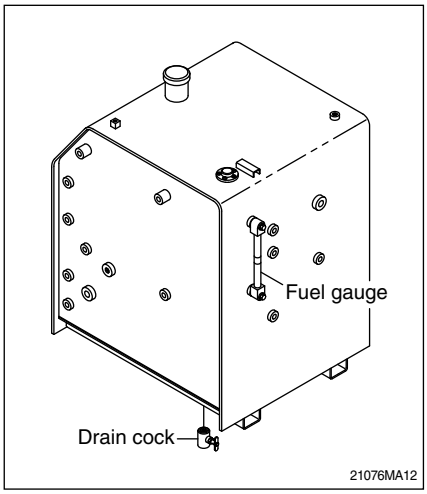


10) FUEL TANK

(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.

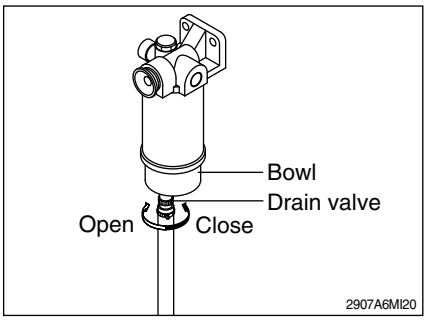


11) PREFILTER

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

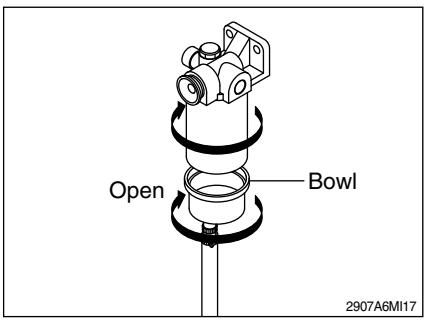
(1) Drain water

① Open bowl drain valve to evacuate water.
② Close drain valve.

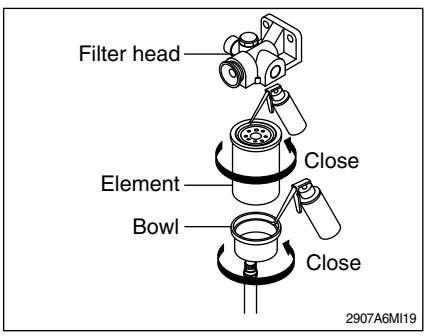


(2) Replace element

① Drain the unit of fuel. Follow "Drain water" instructions above.
② Remove element / 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 and bowl to the head.



12) REPLACEMENT OF FUEL FILTER

(1) Clean around the filter head, remove the filter and clean the gasket surface.
 · Wrench size : 90~95mm(3.5~3.8in)

(2) Replace the O-ring.

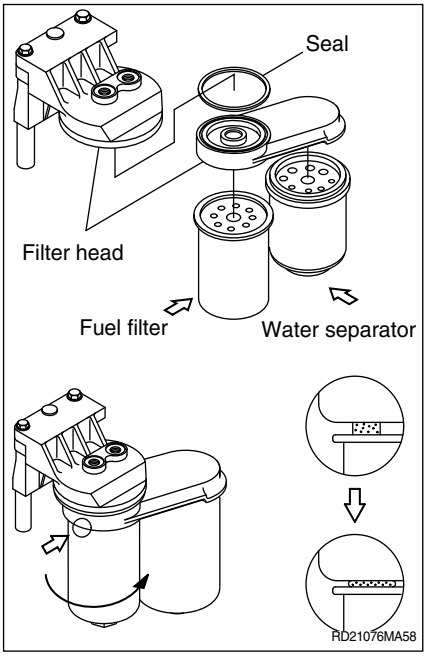
(3) Fully fill fuel in the new filter.

(4) Apply engine oil on the gasket of filter when mounting, and tighten 3/4 to 1 turn more after the gasket touches the filter head.

(5) Relieve the air after mounting.

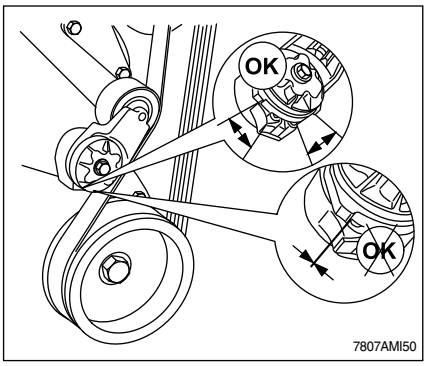
※ **Check for fuel leakage after the engine starts. If air is in the fuel system, the engine will not**

※ **start. Start engine after bleeding the air according to the method of bleeding air.**

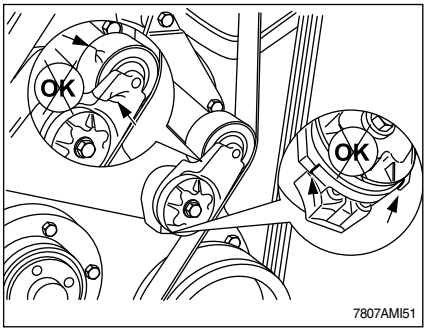


13) BELT TENSIONER, AUTOMATIC ADJUSTMENT

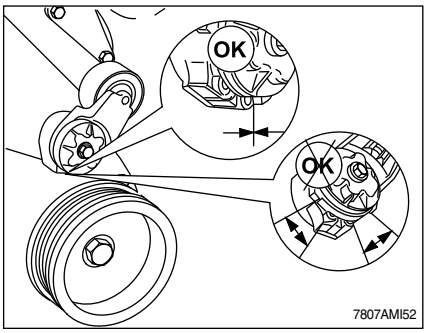
(1) Every 1000hours, or 1 year, whichever occurs first, inspect the automatic belt tensioner.
With the engine turned off, check that neither the top nor bottom tensioner arm stop is touching the cast boss on the tensioner body. If either of the stops is touching a boss, the alternator belt must be replaced. Check to make sure the correct belt part number is being used it either condition exists.



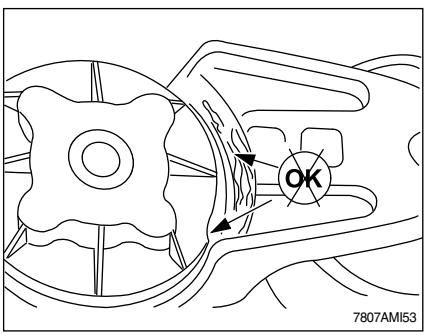
(2) Check the tensioner pulley and body for cracks. If any cracks are noticed, the tensioner must be replaced. Refer to a Cummins Authorized Repair facility. Check the tensioner for dirt buildup. If this condition exists, the tensioner must be removed and steam-cleaned.



(3) Check that the bottom tensioner arm stop is in contact with the bottom tensioner arm stop boss on the tensioner body. If these two are not touching, the tensioner must be replaced.



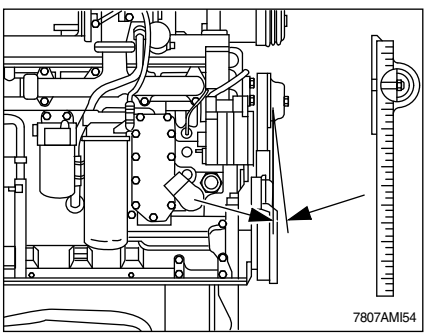
(4) Inspect the tensioner for evidence of the pivoting tensioner arm contacting the stationary circular base. If there is evidence of thess two areas touching, the pivot tube bushing has failed and the tensioner must be replaced.



(5) A worn tensioner that has play in it or a belt that “walks” off its pulley possibly indicates pulley misalignment.

※ **Maximum pulley mislignment is three degrees. This measurement can be taken with a straightedge and an inclinometer.**

(6) Install the belt.

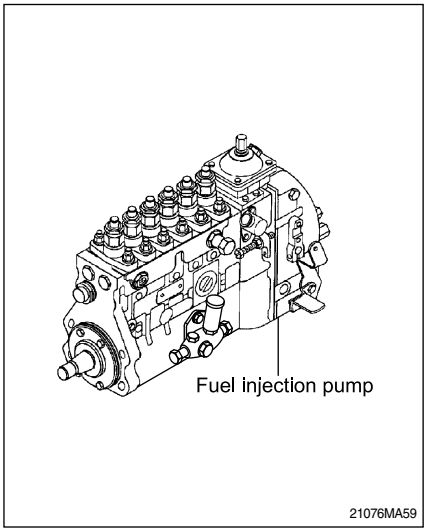


14) BLEEDING THE FUEL SYSTEM

(1) Controlled venting is provided at the injection pump through the fuel drain manifold. Small amounts of air introduced by changing the fuel filters or fuel injection pump supply line will be vented automatically, if the fuel filter is changed in accordance with the instructions.

※ **Manual bleeding is required if :**

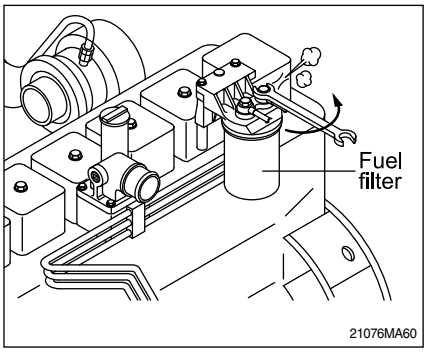
- **The fuel filter is not filled prior to installation.**
- **Fuel injection pump is replaced.**
- **High pressure fuel line connections are loosened or fuel lines replaced.**
- **Initial engine start up or start up after an extended period of no engine operation.**
- **Machine fuel tank has been run until empty.**



(2) Venting the low pressure lines and fuel filter

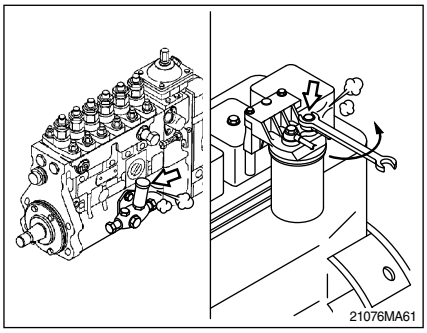
① Open the bleed screw.

- Wrench size : 17mm



② Operate the hand lever until the fuel flowing from the fitting is free of air.
Tighten the bleed screw.

- Torque : 2.45kgf · m(18lbf · ft)



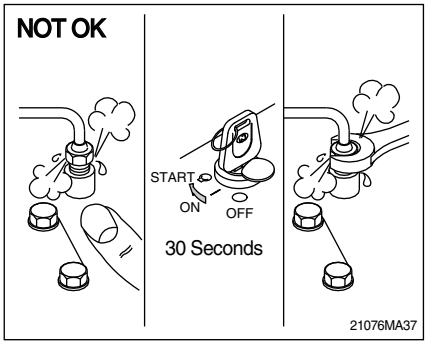
(3) Venting the high pressure lines

⚠ The pressure of the fuel in the line is sufficient to penetrate the skin and cause serious bodily harm.

① Loosen the fittings at the injectors, and crank the engine to allow entrapped air to bleed from the lines. Tighten the fittings.

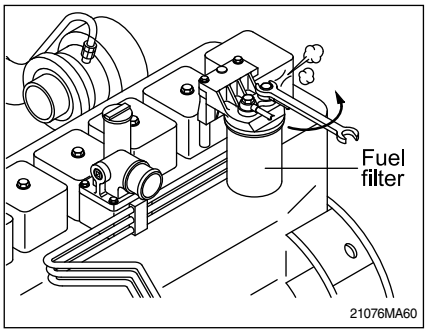
· Wrench size :19㎜

② Start the engine and vent one line at a time until the engine runs smoothly.



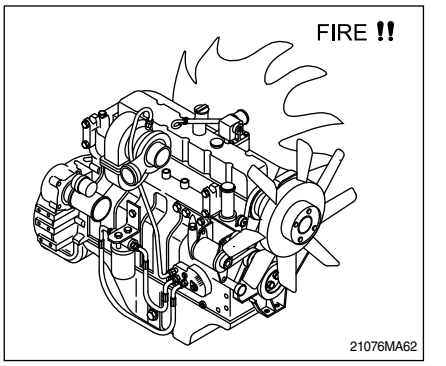
※ Do not engage the starter for more than 30 seconds each time when it is used to vent the system : wait 2 minutes between engagements.

⚠ Do not bleed a hot engine as this could cause fuel to spill onto a hot exhaust manifold creating a danger of fire.



15) LEAKAGE OF FUEL

⚠ Be careful and clean the fuel hose, injection pump, fuel filter and other connections as the leakage from these part can cause fire.

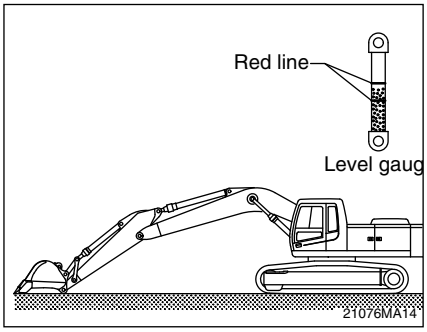


14) HYDRAULIC OIL CHECK

(1) Stop the engine after retract the arm and bucket cylinders, then lower the boom and set the bucket on the ground at a flat location as in the illustration.

(2) Check the oil level at the level gauge of hydraulic oil tank.

(3) The oil level is normal if between the red lines.



15) FILLING HYDRAULIC OIL

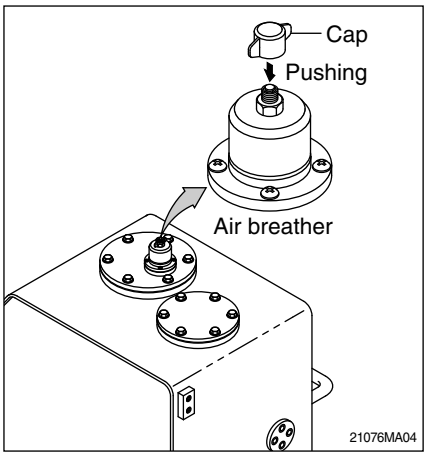
(1) Stop the engine to the position of level check.

(2) Loosen the cap and relieve the pressure in the tank by pushing the top of the air breather.

(3) Remove the breather on the top of oil tank and fill the oil to the specified level.
- Tightening torque : 1.44±0.3kgf · m
  (10.4±2.1lbf · ft)

(4) Start engine after filling and operate the work equipment several times.

(5) Check the oil level at the level check position after engine stops.



16) CHANGE HYDRAULIC OIL

(1) Lower the bucket on the ground pulling the arm and bucket cylinder to the maximum.

(2) Loosen the cap and relieve the pressure in the tank by pushing the top of the air breather.

(3) Remove the cover.
- Tightening torque : 6.9±1.4kgf · m
  (50±10lbf · ft)

(4) Prepare a suitable container.

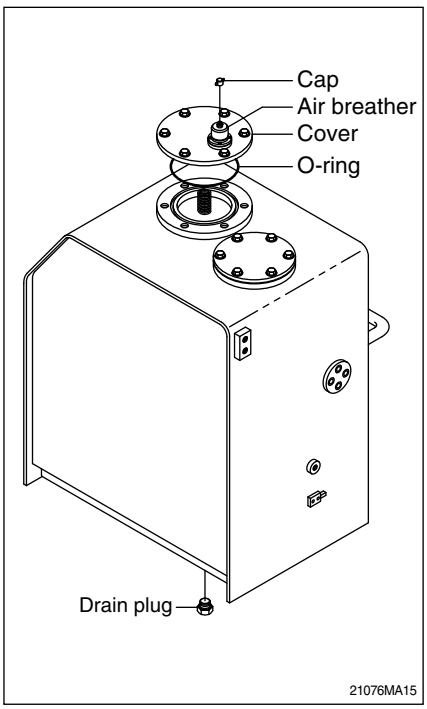
(5) To drain the oil loosen the drain plug at the bottom of the oil tank.

(6) Fill proper amount of recommended oil.

(7) Put the breather in the right position.

(8) Bleed air hydraulic pump loosen the air breather at top of hydraulic pump assembly.

(9) Start engine and run continually. Release the air by full stroke of each control lever.



17) CLEAN SUCTION STRAINER

Clean suction strainer as follows paying attention to the cause to be kept during oil filling.

(1) Remove the cover on the top of the oil tank.
- Tightening torque : 6.9±1.4kgf · m (50±10lbf · ft)

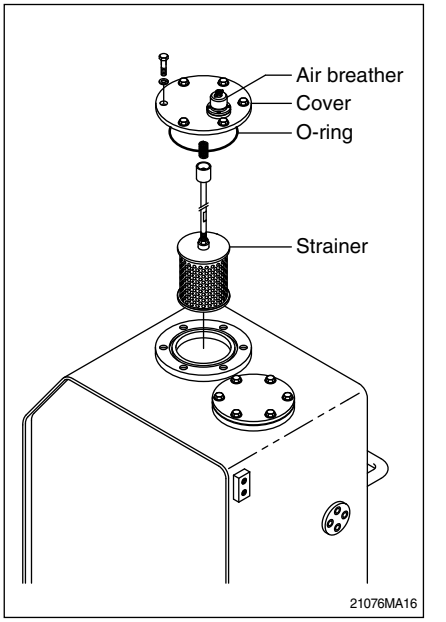
(2) Pull out the strainer in the tank.

(3) Wash the foreign material on the suction strainer with gasoline or cleaning oil.

(4) Replace the suction strainer if it is damaged.

(5) Assemble with reverse order of disassembly. Be sure to install a new O-ring and reinsert in the oil tank.

※ **Loosen the bolt slowly at the cover can be spring out by the spring when removing it.**



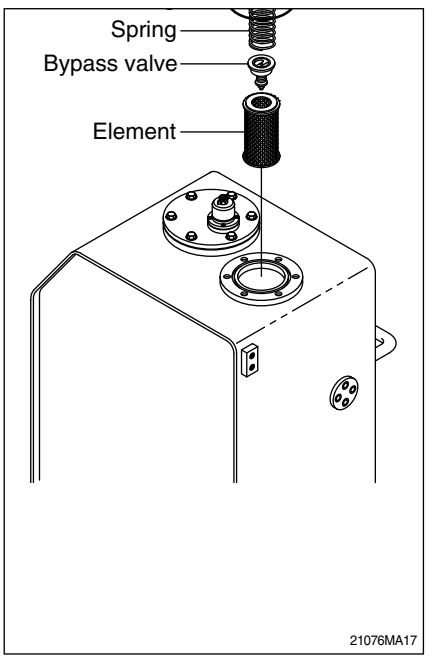
18) REPLACEMENT OF RETURN FILTER

Replace as follows paying attention to the cause to be kept during the replacement.

(1) Remove the cover.
- Tightening torque : 6.9±1.4kgf · m (50±10lbf · ft)

(2) Remove the spring, by-pass valve, and return filter in the tank.

(3) Replace the element with new one.



19) REPLACEMENT OF ELEMENT IN HYDRAULIC TANK BREATHER

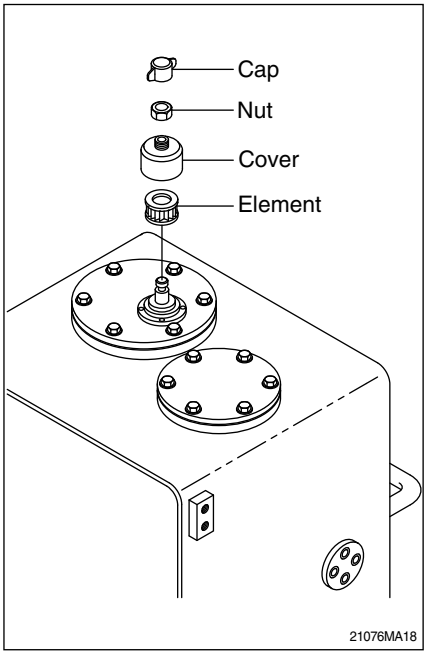
(1) Loosen the cap and relieve the pressure in the tank by pushing the top of the air breather.

(2) Loosen the lock nut and remove the cover.

(3) Pull out the filter element.

(4) Replace the filter element new one.

(5) Apply oil on the O-ring and reassemble by reverse order of disassembly.
- Tightening torque : 0.2~0.3kgf · m (1.4~2.1lbf · ft)

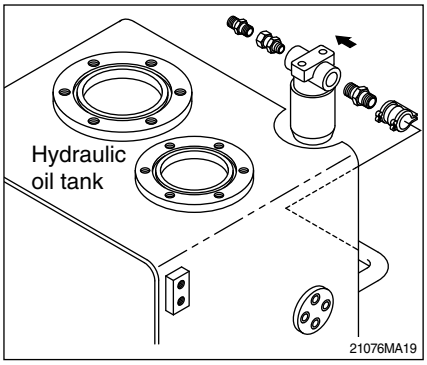


20) REPLACE OF DRAIN FILTER CARTRIDGE

Clean the dust around filter and replace with new one after removing the cartridge.

※ **Tighten about 2/3 turn more after the gasket of cartridge contacts seal side of filter body for mounting.**

※ **Change cartridge after initial 50 hours of operation. Thereafter, change cartridge every 250 hours.**



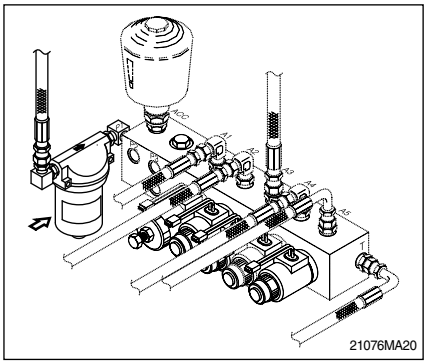
21) REPLACE OF PILOT LINE FILTER

(1) Loosen the nut positioned on the filter body.

(2) Pull out the filter element and clean filter housing.

(3) Install the new element and tighten using specified torque.

※ **Change cartridge after initial 50 hours of operation. Thereafter, change cartridge every 250 hours.**

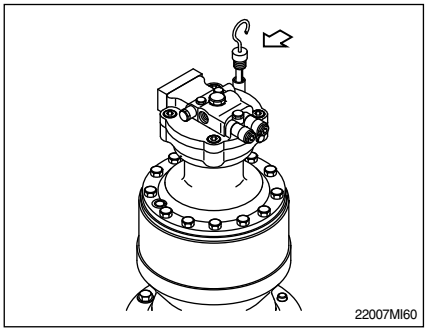


22) CHECK THE SWING REDUCTION GEAR OIL

(1) Pull out the dipstick and clean it.

(2) Insert it again.

(3) Pull out one more time to check the oil level and fill the oil if the level is not sufficient.



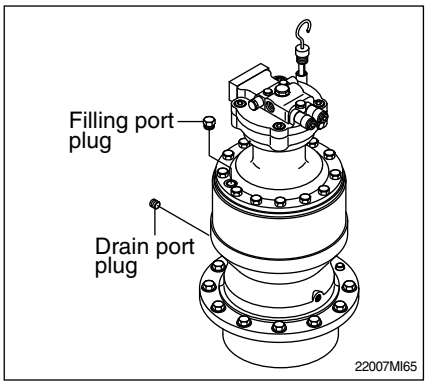
23) CHANGE SWING REDUCTION GEAR OIL

(1) Raise the temperature of oil by swinging the machine before replace the oil and park the machine on the flat ground.

(2) Loosen the plug of the drain port.

(3) Drain into a proper container.

(4) Wash the drain plug and reinstall it with sealing tape.
Fill proper amount of recommended oil.
· Amount of oil : 5.0 ℓ (1.3U.S.gal)

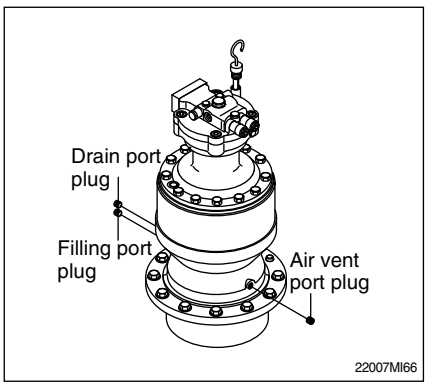


24) LUBRICATE BEARING OF OUTPUT SHAFT IN REDUCTION GEAR

(1) Remove air vent plug.

(2) Remove grease fill plug and install grease fitting at that place.

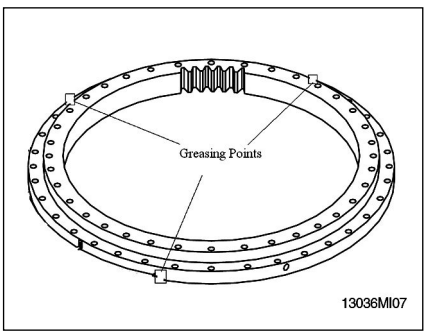
(3) Lubricate NLGI No.2 with grease gun until comes out new grease from air vent port.
· Amount of oil : 1.1kg(2.4lb)



25) LUBRICATE SWING BEARING

(1) Grease at 3 fitting.

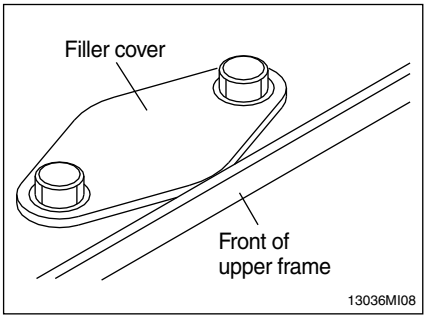
※ **Lubricate every 50 hours.**



26) SWING GEAR AND PINION

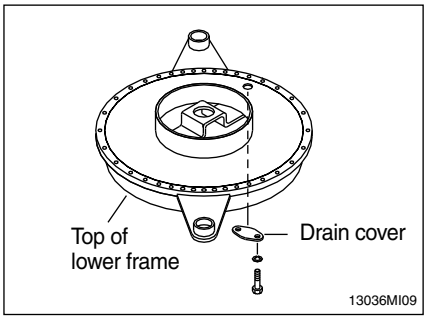
(1) Drain old grease

① Remove under cover of lower frame.
② Remove drain cover of lower frame.
③ Remove filler cover of upper frame.
④ Operate full turn(360°) of swing several times.



(2) Refill new grease

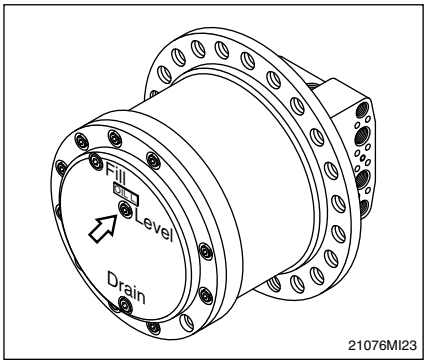
① Install drain cover.
② Fill with new grease.
③ Install filler cover.
· Capacity : 6.2kg(13.7lb)



27) CHECK THE TRAVEL REDUCTION GEAR OIL

(1) Operate the machine to the position of drain plug down to the flat ground.

(2) Loosen the level plug and check the oil level. If the level is at the hole of the plug, it is normal. Fill the oil if it is not sufficient.



28) CHANGE OF THE TRAVEL REDUCTION GEAR OIL

(1) Raise the temperature of the oil by traveling machine first.

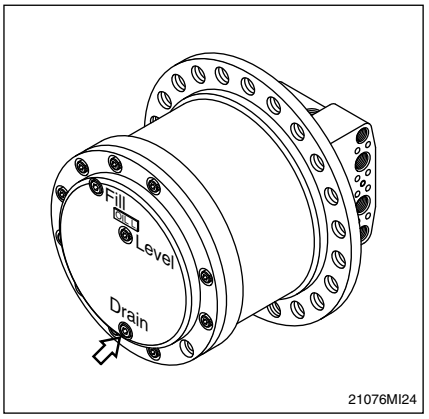
(2) Stop when the position of the drain plug is down.

(3) Loosen the level plug and then the drain plug.

(4) Drain the oil to adequate container.

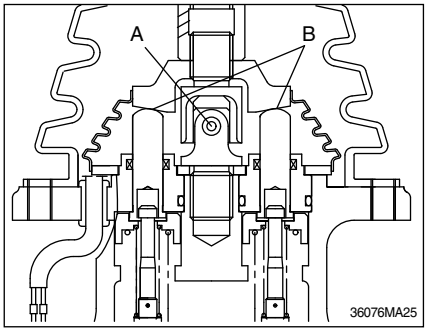
(5) Tighten the drain plug and fill specified amount of oil at filling port.

(6) Tighten the level plug and travel slowly to check if there is any leakage of oil.



29) LUBRICATE RCV LEVER

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



30) ADJUSTMENT OF TRACK TENSION

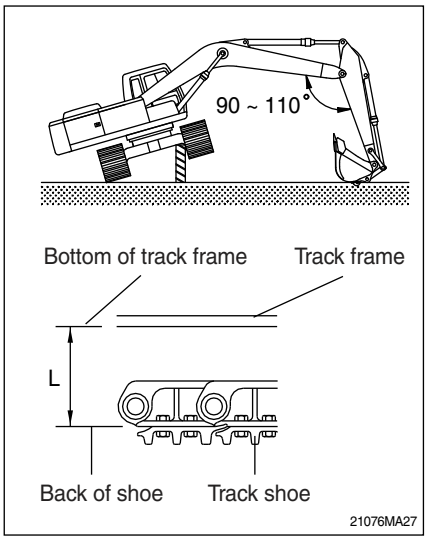
※ **It is important to adjust the tension of track properly to extend the lifetime of track and traveling device.**

※ **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.**

⚠ **When loosening the grease nipple, do not loosen more than one turn as there is a danger of a spring coming out of the nipple because of the high pressure inside.**

※ **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)	
300~330mm	11.8~13"

31) REPLACEMENT OF BUCKET

⚠ **When knocking the pin in with a hammer, metal particles may fly and cause serious injury, particularly if they get into your eyes. When carrying out this operation, always wear goggles, helmet, gloves, and other protective equipment.**

※ **When the bucket is removed, place it in a stable condition.**

※ **When performing joint work, make sure signals to each other and work carefully for safety's sake.**

(1) Lower the bucket on the ground as the picture shown in the right.

(2) Lock the safety lever to the LOCK position and stop the engine.

(3) Remove the stopper bolts(1) and nuts(2), then remove pins(3, 4) and remove the bucket.

※ **When removing the pins, place the bucket so that it is in light contact with the ground.**

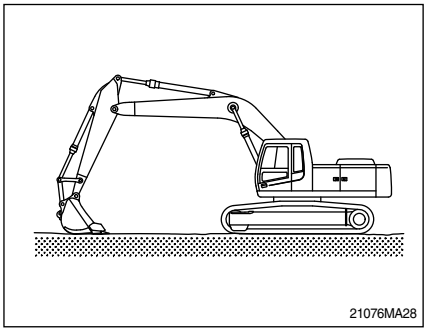
※ **If the bucket is lowered strongly to the ground, the resistance will be increased and it will be difficult to remove the pins.**

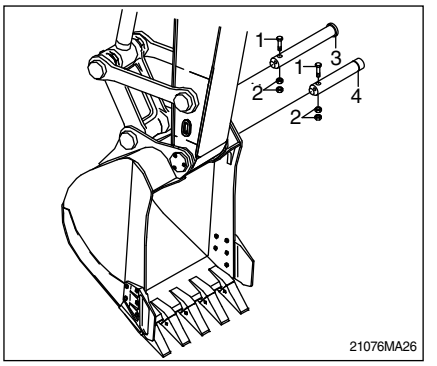
※ **After remove the pins, make sure that they do not become contaminated with sand or mud and that the seals of bushing on both sides do not become damaged.**

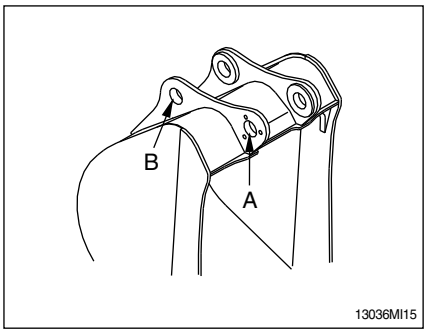
(4) Align the arm with holes(A) and the link with holes(B), then coat with grease and install pins(3, 4)

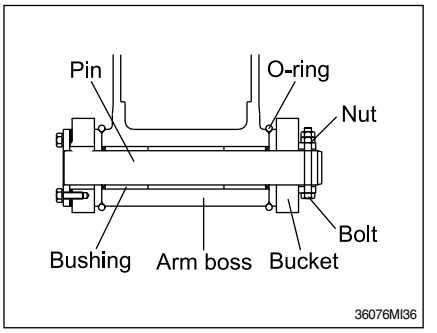
※ **When installing the bucket, the O-rings are easily damaged, so fit the O-rings on the boss of the bucket as shown in the picture. After knocking the pin, move the O-ring down to the regular groove.**

(5) Install the stopper bolt(1) and nuts(2) for each pin, then grease the pin.







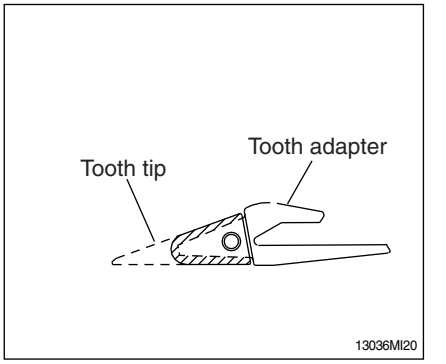


32) REPLACEMENT OF BUCKET TOOTH

(1) Timing of replacement

① Check wearing condition as shown in the illustration and replace tooth tip before adapter starts to wear.

② If excessive use, tooth adapter has worn out, replacement may become impossible.



(2) Instructions for replacement

① Pull out pin by striking pin with punch or hammer, avoiding damage to locking washer.

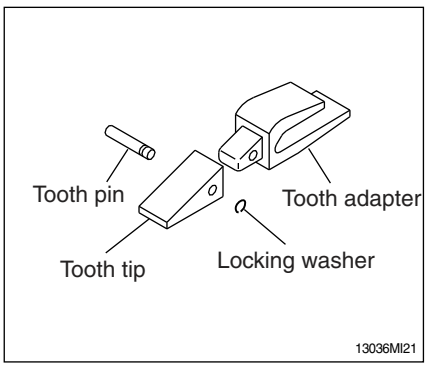
② Remove dust and mud from surface of tooth adapter by using knife.

③ Place locking washer in its proper place, and fit tooth tip to adapter.

④ Insert pin until locking washer is positioned at tooth pin groove.

⚠ Personal injury can result from bucket falling.

⚠ Block the bucket before changing tooth tips or side cutters.



33) ADJUSTMENT OF BUCKET CLEARANCE

(1) Lower the bucket on the ground as the picture shown in the right.

(2) Swing to the left and keep the arm boss to be contact to the bucket left.

(3) Lock the safety lever to the LOCK position and stop the engine.

(4) Measure the clearance(A) between bucket and arm boss. This is the total clearance.

(5) Adjusting

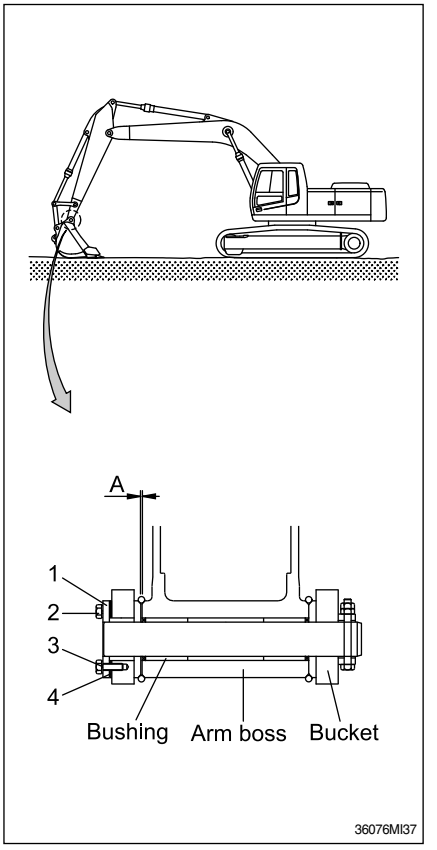
① Loosen bolt(2), and remove washer(3), plate(1) and shim(4).

② Remove the shim equivalent value with measuring value.

③ Assemble the parts in the reverse order of removal.

- Tightening torque : 29.6±3.2kgf · m (214.0±23.1lbf · ft)
- Normal clearance : 0.5 ~ 1.0mm (0.02 ~ 0.04in)

※ **If the bucket is not adjusted correctly, noise and vibration created during operation, and damaged O-ring, pin and bushing quickly.**



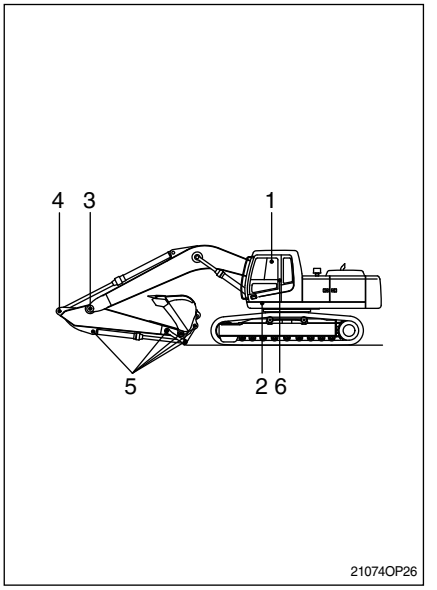
34) LUBRICATE PIN AND BUSHING

(1) Lubricate to each pin of working device

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

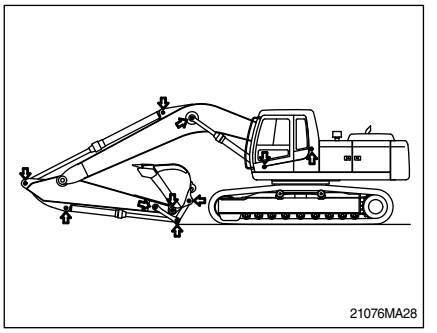
No.	Description	Qty
1	Lubrication manifold at boom	5
2	Boom cylinder pin	2
3	Boom and arm connection pin	1
4	Arm cylinder pin(Rod side)	1
5	Bucket cylinder pin(Head, rod)	2
	Bucket link(Control rod)	3
	Arm and bucket connection pin	1
	Arm and control link connection pin	1

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



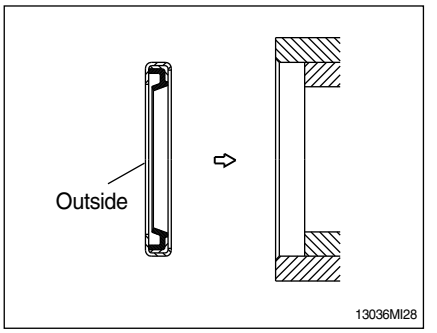
(2) Dust seals are mounted on the rotating part of working device to extend the lubricating interval.

※ **Mount the lip to be faced outside when replace the dust seal.**



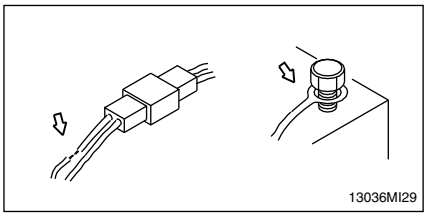
※ **If it is assembled in wrong direction, it will cause fast wear of pin and bushing, and create noise and vibration during operation.**

※ **Assemble the seal same direction with picture and use with plastic hammer when replace.**



1) WIRING, GAUGES

Check regularly and repair loose or malfunctioning gauges when found.



2) BATTERY

(1) Clean

① Wash the terminal with hot water if it is contaminated, and apply grease to the terminals after washing.

⚠ **Battery gas can explode. Keep sparks and flames away from batteries.**

⚠ **Always wear protecxtive glasses when working with batteries.**

⚠ **Do not stain clothes or skin with electrolyte as it is acid.**
Be careful not to get the electrolyte in eyes.

※ **Wash with clean water and go to the doctor if it enters the eys.**

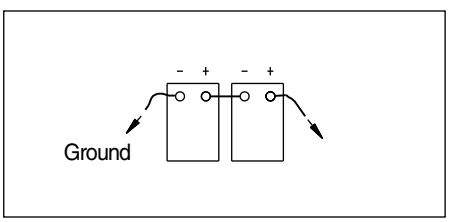
(2) Recycle

Never discard a battery.
Always return used batteries to one of the follwing locations.

- A battery supplier
- An authorized battery collection facility
- Recycling facility

(3) Method of removing the battery cable

Remove the cable from the ground first(⊖ connection terminal side) and reconnect it last when reassembling.



3) STARTING THE ENGINE WITH A BOOSTER CABLE

Keep following order when you are going to start engine using booster cable.

(1) Connection of booster cable

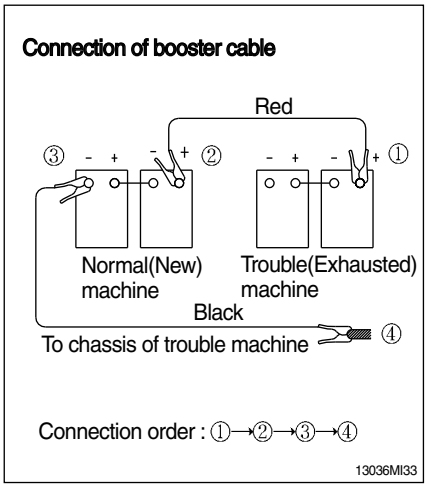
※ **Use the same capacity of battery for starting.**

① Make sure that the starting switches of the normal machine and trouble machine are both at the OFF position.

② Connect the red terminal of booster cable to the battery (+) terminal between exhausted and new battery.

③ Connect the black terminal of the booster cable between new battery (-) terminal and chassis of trouble machine.

※ **Keep firmly all connection, the spark will be caused when connecting finally.**

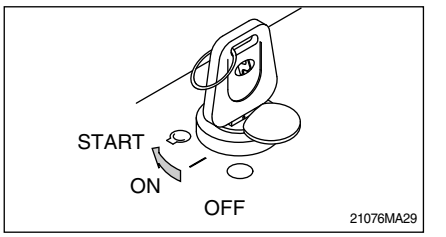


(2) Starting the engine

① Starting the engine of the normal machine and keep it to run at high idle.

② Start engine of the trouble machine with starting switch.

③ If you can not start it by one time, restart the engine after 2 minutes.



(3) Taking off the booster cable

① Take off the booster cable(black).

② Take off the booster cable(red) connected to the (+) terminal.

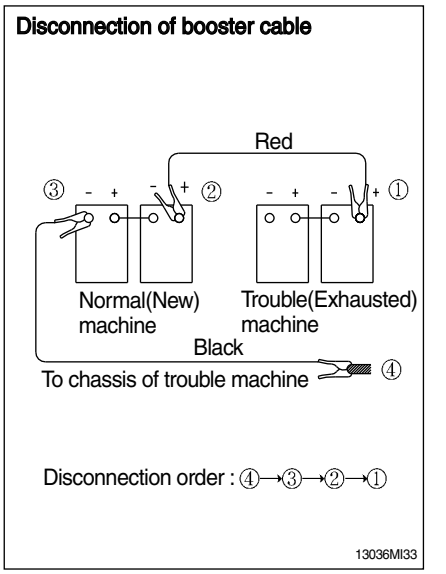
③ Run engine with high idle until charging the exhausted battery by alternator, fully.

⚠ **Explosive gas is generated while using the battery or charging it. Keep away flame and be careful not to cause the spark.**

※ **Charge the battery in the well ventilated place.**

※ **Place the machine on the earth or concrete. Avoid charging the machine on the steel plate.**

※ **Do not connect (+) terminal and (-) terminal when connecting booster cable because it will be shorted.**



(4) Welding repair

Before start to welding, follow the below procedure.

① Shut off the engine and remove the starting switch.

② Disconnect ground cable from battery by master switch.

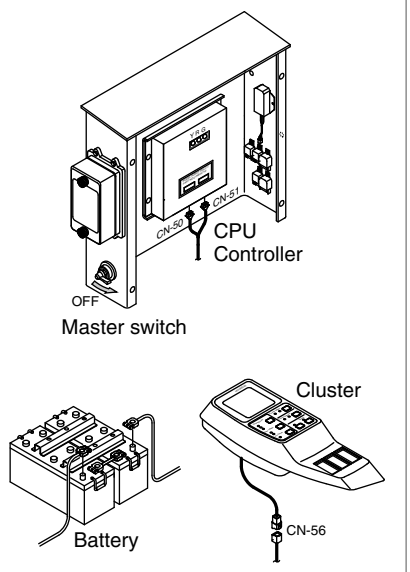
③ Before carrying out any electric welding on the machine, the battery cables should be disconnected and the connectors pulled out of the electronic control units(CPU, cluster etc).

④ Connect the earth(ground) lead of the welding equipment as close to the welding point as possible.

※ **Do not weld or flame cut on pipes or tubes that contain flammable fluids. Clean them thoroughly with nonflammable solvent before welding or flame cutting on them.**

⚠ **Do not attempt to welding work before carry out the above.**

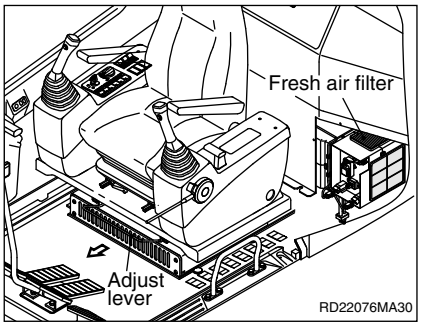
If not, it will caused serious damage at electric CAPO system.



1) CLEAN AND REPLACE OF OUTER FILTER

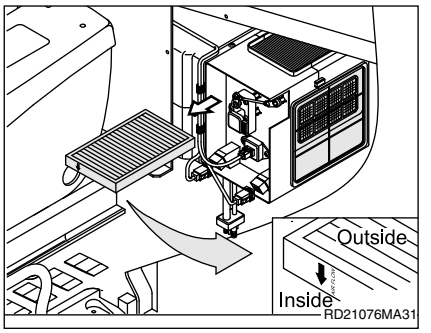
※ **Always stop the engine before servicing.**

(1) Move seat and console box to arrow direction using the adjust lever.



(1) Remove the outer filter.

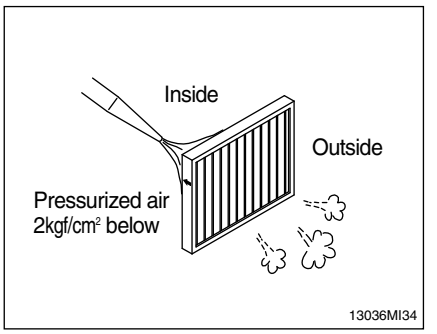
※ **When installing a filter, be careful not to change the filter direction.**



(3) Clean the filter using a pressurized air(Below 2kgf/cm^2, 28psi).

△ **When using pressurized air, be sure to wear safety glasses.**

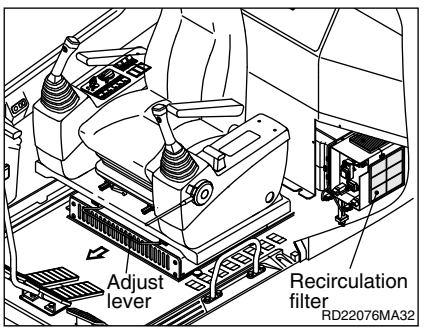
(4) Inspect the filter after cleaning. If it is damaged or badly contaminated, use a new filter.



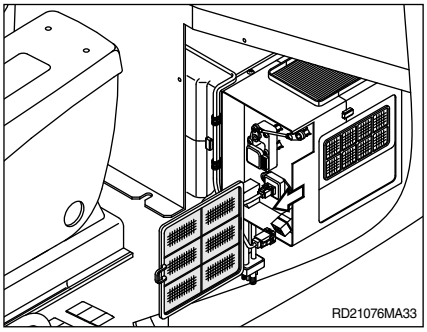
2) CLEAN AND REPLACE OF INNER FILTER

※ **Always stop the engine before servicing.**

(1) Move seat and console box to arrow direction using the adjust lever.



(2) Remove recirculation filter.

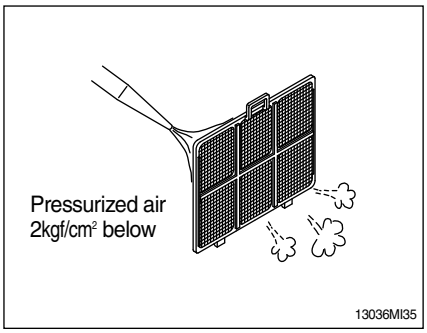


(3) Clean the recirculation filter using a pressurized air(Below 2kgf/cm², 28psi) or washing with water.

△ **When using pressurized air, be sure to wear safety glasses.**

※ **Dry off after washing with water.**

(4) Inspect the filter after cleaning. If it is damaged or badly contaminated, use a new filter.



3) PRECAUTIONS FOR USING AIR CONDITIONER

(1) When using the air conditioner for a long time, open the window once every one hour.

(2) Be careful not to overcool the cab.

(3) The cab is properly cooled if the operator feels cool when entering there from outside (About 5°C lower than the outside temperature).

(4) When cooling, change air occasionally.

4) CHECK DURING SEASON

Ask the service center for replenishment of refrigerant or other maintenance service so that the cooling performance is not damaged.

5) CHECK DURING OFF-SEASON

Operate the air conditioner 2 or 3 times a month(Each for a few minutes) to avoid loss of oil film in the compressor.

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.	· 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.	· 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.	· 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.	
Exhaust gas is white or blue.	· Adjust to specified oil quantity. · Replace with specified fuel.	
Exhaust gas occasionally turns black.	· 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.	· Check the nozzle.	
Unusual combustion noise or mechanical noise.	· Check with specified fuel. · Check over-heating · Replace the muffler. · Adjust valve clearance.	

2. ELECTRICAL SYSTEM

Trouble	Service	Remark
Lamp does not glow brightly even when engine runs at high speed. Lamp flickers while engine runs.	· Check for loose terminals and open-circuit wiring. · Adjust belt tension.	
Battery charging lamp does not go out even when engine runs at high speed.	· Check the alternator. · Check and repair wiring.	
Unusual noise is emitted from the alternator.	· Check the alternator.	
Starting motor does not turn when starting switch is turned ON.	· Check and repair the wiring. · Charge the battery. · Check the starting motor. · Check the safety relay.	
The pinion of the starting motor keeps going in and out.	· Charge the battery. · Check the safety relay.	
Starting motor turns the engine sluggishly.	· Charge the battery. · Check the starting motor.	
The starting motor disengages before the engine starts up.	· Check and repair the wiring. · Charge the battery.	
The engine warming up lamp does not go ON.	· Check and repair wiring. · Check the monitor.	
The engine oil pressure lamp does not light up when engine is stationary(When the starting switch is in ON position.)	· Check the monitor. · Check the caution lamp switch.	
Battery charging lamp does not light up when the engine is stationary. (When the starting switch is in ON position.)	· Check the monitor. · Check and repair the wiring.	

3. OTHERS

Trouble	Service	Remark
Track slip out of place. Excessive wear of the sprocket.	· Adjust tension of track.	
Bucket either rises slowly or not at all.	· Add oil to specified level.	
Slow speed of travel, swing, boom, arm and bucket.	· Add oil to specified level.	
Unusual noise emitted from pump.	· Clean the hydraulic tank strainer.	
Excessive oil temperature rise of hydraulic oil.	· Clean the oil cooler. · Adjust fan belt tension. · Add oil to specified level.	

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