



Porter Equipment Australia Pty Ltd.

ABN No. 94 150 961 934

PROFORMA INVOICE

Phone: +61 (7) 3255 6355

PO Box 1002 , Archerfield , QLD 4108

PH: 13 42 32 | www.portergroup.com.au

Brisbane | Townsville | Sydney | Newcastle | Melbourne | Adelaide | Perth

Email to: accounts.rec@portergroup.com.au

Bill To:

Abergeldie Plant Pty Ltd
5 George Young Cres
Regents Park NSW 2143

Site Address:

Abergeldie Plant Pty Ltd
5 George Young Cres
Regents Park NSW 2143

Date

01/11/2023

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Job Entered by: MEHDI

Job Number

JOB0067755

Purchase Order No: **PO 45369** Customer No: ABERGE Site No: ABERGE Job No.: JOB0067755

Job Logged: 31/10/2023

Item Number	Description	Qty Ordered	Qty Supplied	UOM	Unit	Disc.	Net Price
Equipment - Serial Number:HHKHML03VE0001370 Model: R60CR-9 Hyundai R60CR-9 Mini Excavator							Hours: 1,395
Reported Problem: REPLACE FAILED RUBBER TRACK							
27.10.23 1395hrs Replace snapped left hand rubber track Tension both tracks Test machine LABOUR							
LAB001	Labour Standard	1.50	1.50	HR	145.00	0.00	217.50
LAB009	Labour Travel	1.00	1.00	HR	110.00	0.00	110.00
TRAVEL	Travel Kms	56.00	56.00	km	1.30	0.00	72.80
PARTS							
RB64076DT	RUBBER TRACK 400X72.5X76	1.00	1.00	EACH	1,990.00	0.00	1,990.00
OILS & CONSUMABLES							
ENVLEV	Environmental Levy	1.00	1.00	EA	35.00	0.00	35.00
CONS	Consumables	1.00	1.00	EA	30.00	0.00	30.00

Our Bank Account Details: Porter Equipment Australia Pty Ltd

BSB 014 002

A/C 837417684

All claims for errors or short delivery must be made in writing quoting invoice numbers within seven (7) days.

Goods returned for credit after 7 days will incur a 15% surcharge NB Indent orders are non returnable.

Please note all credit card payments will incur a 1.5% surcharge

Normal Service operating hours are 6.00 am to 4.00 pm Mon-Fri (excluding Public holidays) outside of these hours overtime rates will apply.

Terms 20th of the month following date of invoice unless otherwise stated. Overdue accounts will attract interest. The sale of goods and services (cash or credit) is in accordance with our terms and conditions which is available on our website www.portergroup.com.au

Labour	327.50
Services	137.80
Parts	1,990.00
Sub Total	2,455.30
Less Cover	0.00
GST	245.53
Total Due	2,700.83



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Regents Park NSW 2143

Site Address:

Abergeldie Plant Pty Ltd
5 George Young Cres
Regents Park NSW 2143
JOHN PAYNE 0424 235
010

Date

06/08/2024

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Job Entered by: DAVIDS

Job Number

JOB0074352

Purchase Order No:

Customer No: ABERGE

Site No: ABERGE

Job No.: JOB0074352

Job Logged: 01/08/2024

Item Number	Description	Qty Ordered	Qty Supplied	UOM	Unit	Disc.	Net Price
Equipment - Serial Number:HHKHML03VE0001370 Model: R60CR-9 Hyundai R60CR-9 Mini Excavator							
Reported Problem:							
2.8.24							
1673hrs							
Carry out 500 Hr service as per the Operation and Maintenance Manual. Change applicable fluids and filters and complete necessary machine inspection/operational checks. Dispose of oil/filters and complete paperwork.							
Camera not working							
LABOUR							605.86
PARTS							419.80
OILS & CONSUMABLES							302.93

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BSB 014 002

A/C 837417684

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Labour	591.87
Services	316.92
Parts	419.80
Sub Total	1,328.59
Less Cover	0.00
GST	132.86
Total Due	1,461.45

Charge Auto Group Pty Ltd
15 Louise Avenue
Ingleburn NSW 2565
info@chargeauto.com.au
<http://www.chargeauto.com.au>
ABN 90 664 066 595

Tax Invoice 2796



INVOICE TO

Accounts
Abergeldie Complex
Infrastructure
222 Forrester Rd
St Marys NSW 2760

DATE
12/06/2025

PLEASE PAY
A\$1,480.16

DUE DATE
26/06/2025

DATE	ACTIVITY	DESCRIPTION	GST	QTY	RATE	AMOUNT
27/05/2025	Services	R60CR-9 (A027) - 5" Reverse Camera Install	GST	1	1,345.60	1,345.60

We appreciate your business and look forward to working with
you again.

SUBTOTAL 1,345.60
GST TOTAL 134.56
TOTAL 1,480.16

TOTAL DUE A\$1,480.16

THANK YOU.



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5 George Young Cres
Regents Park NSW 2143

Site Address:

Abergeldie Plant Pty Ltd
5 George Young Cres
Regents Park NSW 2143
JOHN PAYNE 0424 235
010

Date

16/10/2024

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Job Entered by: DAVIDS

Job Number

JOB0075544

Purchase Order No:

Customer No: ABERGE

Site No: ABERGE

Job No.: JOB0075544

Job Logged: 18/09/2024

Item Number	Description	Qty Ordered	Qty Supplied	UOM	Unit	Disc.	Net Price
Equipment - Serial Number:HHKHML03VE0001370 Model: R60CR-9 Hyundai R60CR-9 Mini Excavator Reported Problem: TRACK ISSUE 25.9.24 1714hrs Fit new track to machine, fit new grease nipple, adjust track and test PARTS							
RB64076DT	RUBBER TRACK 400X72.5X76	1.00	1.00	EACH	1,657.00	0.00	1,657.00
CONTRACTOR							
OTH	REPLACE TRACK	1.00	1.00	EA	712.51	0.00	712.51

Our Bank Account Details: Porter Equipment Australia Pty Ltd

BSB 014 002

A/C 837417684

All claims for errors or short delivery must be made in writing quoting invoice numbers within seven (7) days.

Goods returned for credit after 7 days will incur a 15% surcharge NB Indent orders are non returnable.

Please note all credit card payments will incur a 1.5% surcharge

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Labour	0.00
Services	712.51
Parts	1,657.00
Sub Total	2,369.51
Less Cover	0.00
GST	236.95
Total Due	2,606.46

FIELD SERVICE REPORT

JOB NUMBER	JOB0061679	MECHANIC	Troy Jeretzky
CUSTOMER	Abergeidie	CUST O/N	
MAKE/MODEL	Hyundai R60CR-9	SERIAL	1370
STOCK #		HOURS	1153
		LOCATION	Eastern Creek

LABOUR	START	FINISH
31-Jan-2023	10:30	11:30
31-Jan-2023	12:30	18:00

TRAVEL	START	FINISH
31-Jan-2023	09:30	10:30
31-Jan-2023	11:30	12:30
31-Dec-2022	18:00	19:30

TOTAL HOURS
1
5.5

TOTAL HOURS	KMS
1	63
1	55
1.5	62

CONSUMABLES USED		
CODE	QTY	DESCRIPTION
VA112513	12	15W 40 All Fleet E900 Plus
VA100775	3	HP GEAR OIL 85w-140
VA119810	3	GREASE VAL PLEX M

PARTS USED		
PART NUMBER	QTY	DESCRIPTION
	1	1000hr Services Kit

FAULT / JOB DESCRIPTION

Carry out 1000 Hr service as per the Operation and Maintenance Manual. Change applicable fluids and filters and complete necessary machine inspection/operational checks. Dispose of oil/filters and complete paperwork.

Travel to Camden to carry out service on machine could not find machine had to wait to find new location of machine then travel to Eastern Creek to carry out service



JOB PHOTOS



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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 "2006/42/EC".

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.

EC REGULATION APPROVED

- Noise level (EN474-1 : 2006 and 2000/14/EC) are as followings.
LWA : 98 dB (EU only)
LPA : 78 dB
- The value of vibrations transmitted by the operator's seat are lower than standard value of (EN474-1 : 2006 and 2002/44/EC)



EC Declaration of Conformity

1. HYUNDAI CONSTRUCTION EQUIPMENT EUROPE N.V VOSSENDAAL 11, 2440 GEEL (Belgium), as authorized representative in the European Community of HYUNDAI CONSTRUCTION EQUIPMENT Co. Ltd.(Korea)

certifies that the construction equipment machinery.

Machine Type : *****

Brand : HYUNDAI

Model : *****

Serial No : ***

Year of Manufacturing : 20**

2. Manufacturer

Hyundai Construction Equipment Co. Ltd.
12th, Fl., Hyundai Bldg. 75, Yulgok-ro, Jongno-Gu, Seoul,
Republic of Korea

Authorized representative :
Owner of the technical file for
machine production

HYUNDAI CONSTRUCTION EQUIPMENT EUROPE N.V.
VOSSENDAAL 11, 2440 GEEL
BELGIUM

3. Harmonized European directives :

2006/42/EC (Machinery), 97/68/EC (Exhaust Gas Emission),
2004/108/EC (Electromagnetic Compatibility), 200/14/EC (Noise
Emission)

4. Engine Manufacturer :

Engine Type :

Gross Power :

*** kW / **** rpm (SAE J1995)

Net Power :

*** kW / **** rpm (SAE J1349)

5. Noise level (Noise Emission Directive 2000/14/EC)

Certificate No :

Issue Date :

DD/MM/YYYY

Conformity Assessment Procedure :

Notified Body Involved :

Measured Sound Power Level :

** dB(A)

Guaranteed Sound Power Level :

** dB(A)

6. EMC Certification (EMC Directive 2004/108/EC)

Certificate No :

Issued Date :

DD/MM/YYYY

Notified Body Involved :

Standard(s) :

7. Remarks

J. C. JUNG

MANAGING DIRECTOR

Place and date of issue :

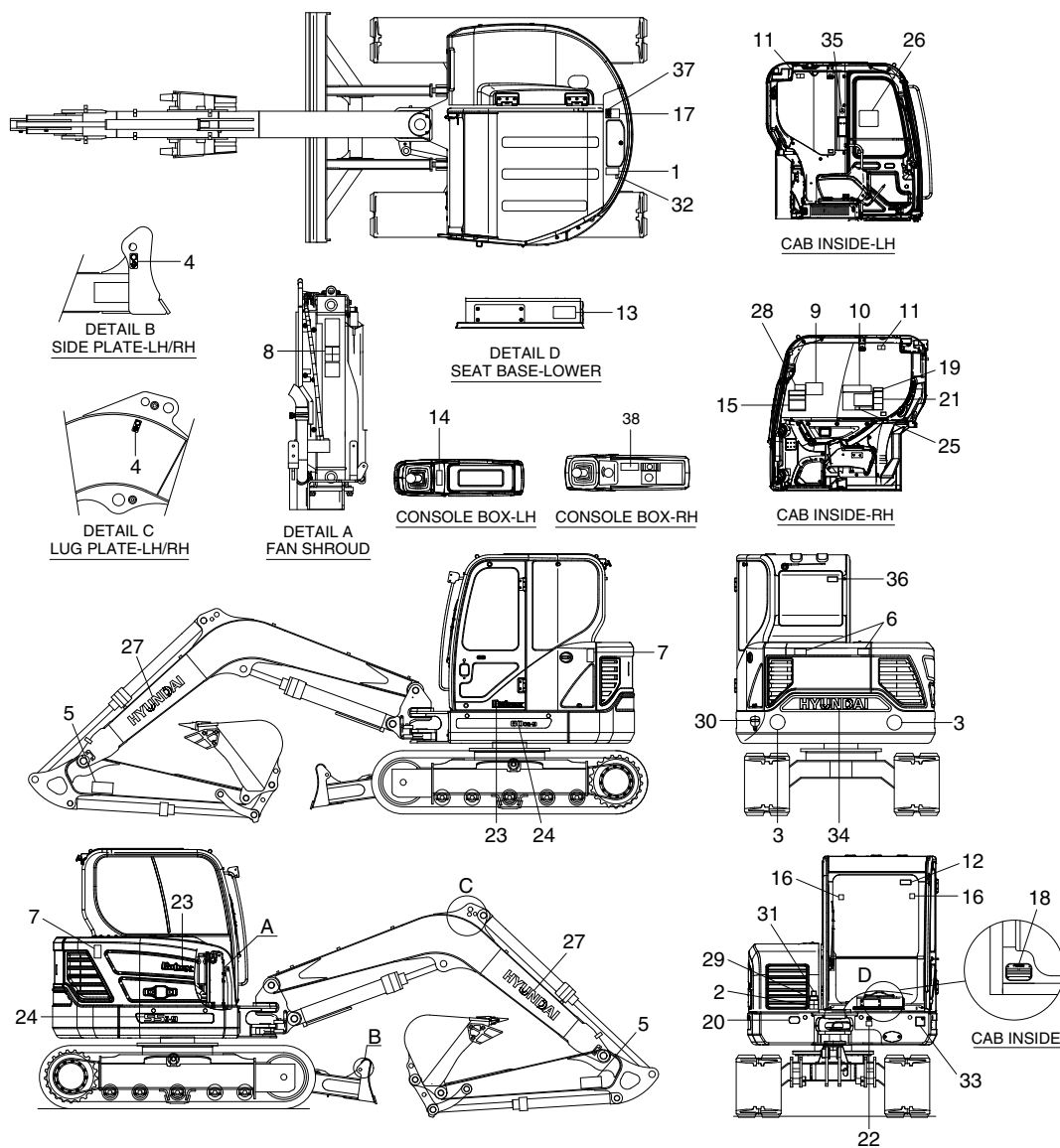
TABLE TO ENTER SERIAL NO. AND DISTRIBUTOR
--

Machine Serial No.	
Engine Serial No.	
Manufacturing year	
Manufacturer Address	Hyundai Construction Equipment co., Ltd. 12th, Fl., Hyundai Bldg. 75, Yulgok-ro, Jongno-Gu, Seoul, 03058, Korea
Distributor for U.S.A Address	Hyundai Construction Equipment U.S.A, Inc 6100 Atlantic Boulevard Norcross GA 30071 U.S.A
Distributor for Europe Address	Hyundai Construction Equipment Europe N. V. Vossendal 11 2240 Geel Belgium
Dealer Address	

SAFETY LABELS

1. LOCATION

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



55Z90FW01A

- | | | |
|----------------------------|------------------------------|---------------------------|
| 1 Fueling | 14 Console tilting | 27 Trade mark-boom |
| 2 Battery-accident | 15 Machine control-cabin | 28 Boom swing lock |
| 3 Reflecting | 16 Stay fix-cabin | 29 ECM connector |
| 4 Lifting point ideogram | 17 Hydraulic oil lubrication | 30 Accumulator |
| 5 Keep clear-boom/arm | 18 ROPS plate | 31 Battery position |
| 6 Keep clear-rear | 19 Water separator | 32 Low sulfur fuel |
| 7 Keep clear-side | 20 PIN plate | 33 Noise level LWA |
| 8 Caution-engine room | 21 General warning-frame | 34 Trade mark-CWT |
| 9 Control ideograms-swivel | 22 Indicate-grease | 35 Hammer |
| 10 General cautions-cabin | 23 Robex | 36 Beacon lamp |
| 11 Safety front window | 24 Model name | 37 Fuel shut-off |
| 12 Warning front window | 25 Service instruction | 38 Control ideogram-dozer |
| 13 Aircon filter | 26 Lifting chart | |

2. DESCRIPTION

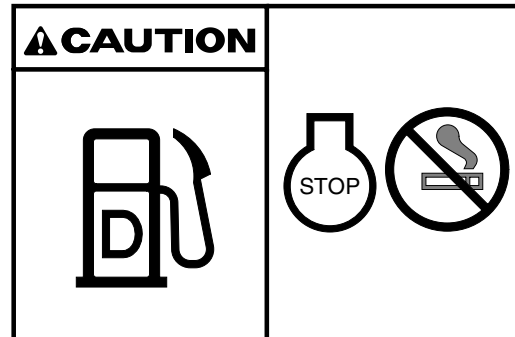
There are several specific warning labels on this machine please become familiarized with all warning labels.

Replace any safety label that is damaged, or missing.

1) FUELING (item 1)

This warning label is positioned on the top side of the engine hood.

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



5591FW02

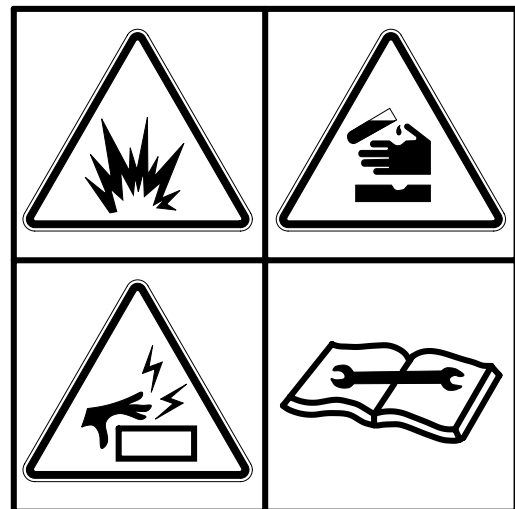
2) BATTERY ACCIDENT (item 2)

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 accumulated in the battery.



36070FW05

- ▲ **Extinguish all smoking materials and open flames before checking the battery.**
- ▲ **Do not use matches, lighters or torches as a light source near the battery for the probable presence of explosive gas.**
- ▲ **Do not allow unauthorized personnel to change the battery or to use booster cables.**
- ▲ **For safety from electric shock, do not touch battery terminals with a wet hand.**

3) KEEP CLEAR-BOOM/ARM (item 5)

This warning label is positioned on both side of the boom.

- ⚠ **Serious injury or death can result from falling of the attachment.**
- ⚠ **To prevent serious injury or death, keep clear the underneath of attachment.**

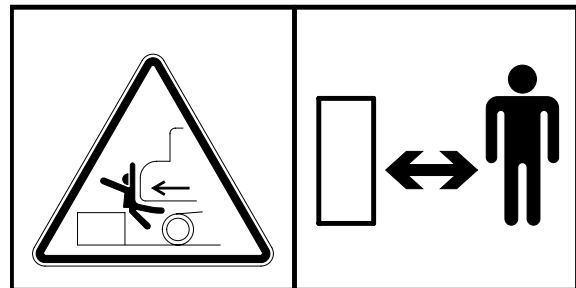


R5570FW31

4) KEEP CLEAR-REAR (item 6)

This warning labels are positioned on the rear of engine hood.

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

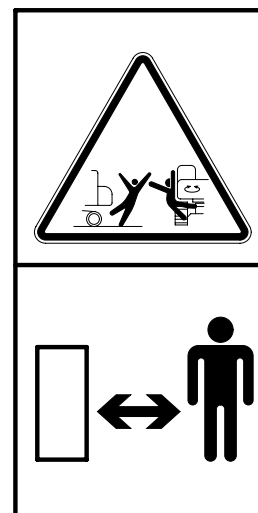


R5570FW09A

5) KEEP CLEAR-SIDE (item 7)

This warning labels are positioned on the both side of engine hood.

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

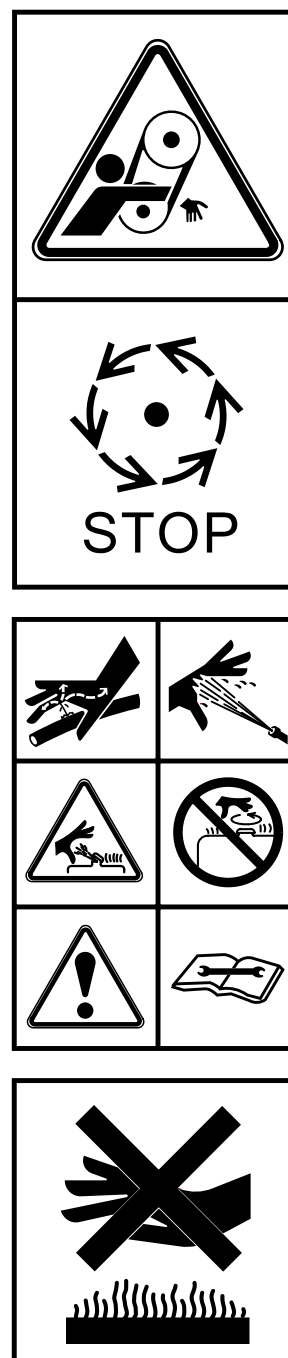


R5570FW13

6) CAUTION-ENGINE ROOM (item 8)

This warning label is positioned on the side of radiator.

- ⚠ Do not open the engine hood during the engine's running.
- ⚠ Escaping fluid under pressure can penetrate the skin causing serious injury.
- ✳ Study the service manual before service job.
- ⚠ Never open the filler cap while engine running or at high coolant oil temperature.
- ⚠ Study the operator's manual before starting and operating machine.
- ⚠ Do not touch exhaust pipe or it may cause severe burn.

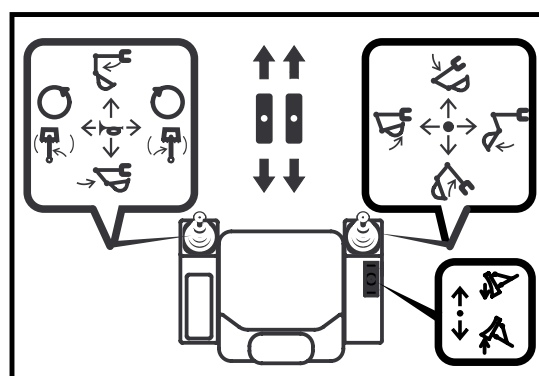


R5570FW14

7) CONTROL IDEOGRAM-SWIVEL (item 9)

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 4-7 for details.



80CR90FW03

8) GENERAL CAUTIONS-CABIN (item 10)

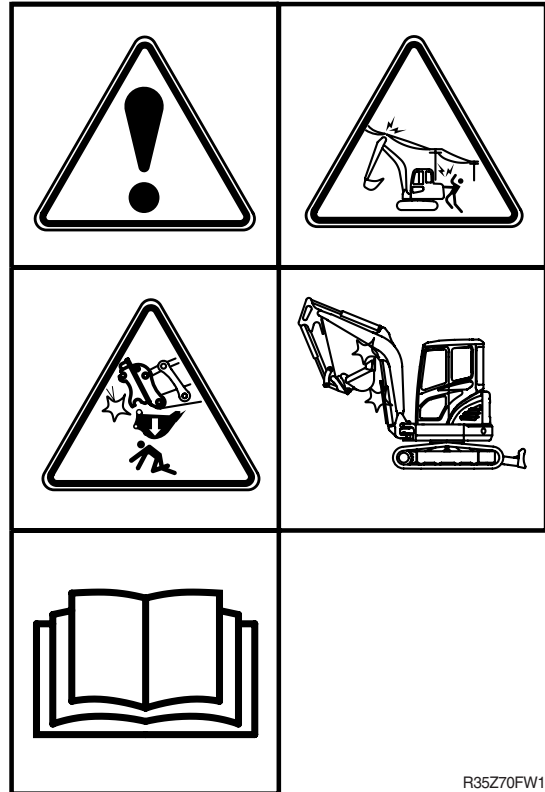
This warning label is positioned on the right side window of the cab.

- ⚠ **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.

- ⚠ **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.**

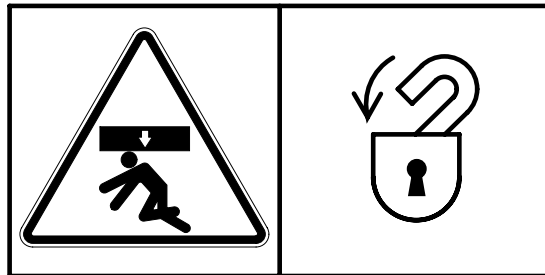


R35Z70FW11

9) SAFETY FRONT WINDOW (item 11)

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

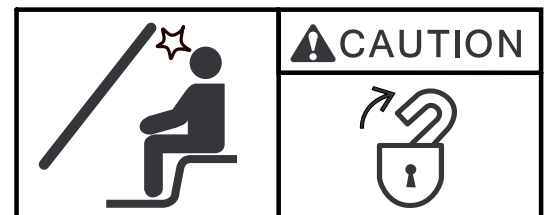
- ⚠ **Be careful that the front window may be promptly closed.**



21070FW24

10) WARNING FRONT WINDOW (item 12)

This warning label is positioned on the front window of the cab.

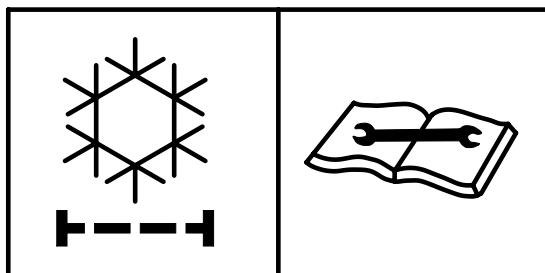


5591FW05

11) DECAL-AIRCON FILTER (item 13)

This warning label is positioned on the lower seat base.

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

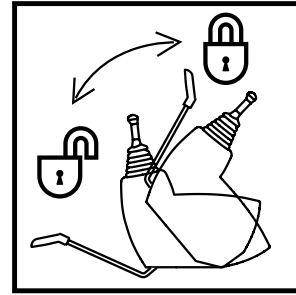


21070FW26

12) DECAL-CONSOLE TILTING (item 14)

This warning label is positioned on the LH console box.

- ※ Before you get off the machine be sure to tilt up the LH console box.

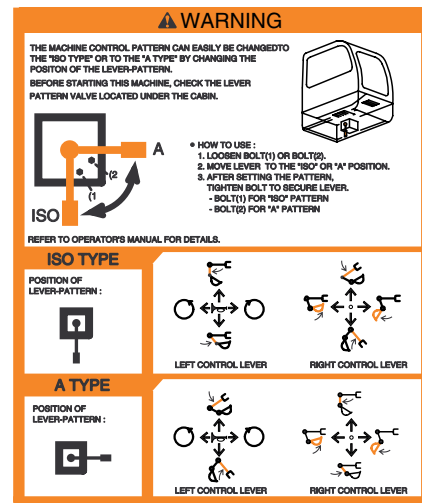


R5570FW17

13) MACHINE CONTROL-CABIN (item 15)

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

- ▲ Check the machine control pattern for conformance to pattern on this label. If it is not, change label to match pattern before operating machine.
- ▲ Failure to do so could result in injury or death.



5591FW07A

14) STAY FIX-CABIN (item 16)

This warning label is positioned on the front window of the cab.

- ▲ Be sure to support the stay when the window needs to be opened.
- ▲ Be careful that the opened window may be closed by the external or natural force.



5591FW06

15) HYDRAULIC OIL LUBRICATION (item 17)

This warning label is positioned on the top side of the engine hood.

- ※ Do not mix with different brand oils.
- ▲ Never open the filler cap while engine running or at high hydraulic oil temperature.
- ▲ Loosen the cap slowly and release internal pressure completely.



21070FW08

16) WATER SEPARATOR (item 19)

This warning label is positioned on the right side of the cabin.

- ※ The operator must drain out water in water separator once in a while to protect of fuel system so that it can be retained good performance of the engine.

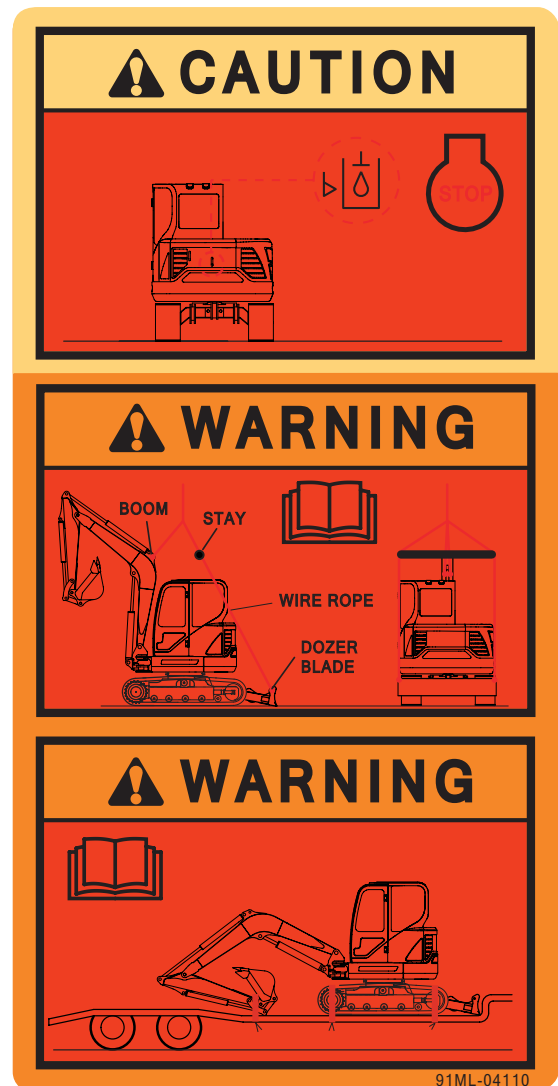


55Z90FW16

17) GENERAL WARNING-FRAME (item 21)

This warning label is positioned right side of the cabin.

- ▲ Make sure wire rope is proper size and keep correct hoisting method.
 - ※ See page 5-7 for details.
 - ▲ 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.
 - ▲ 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.

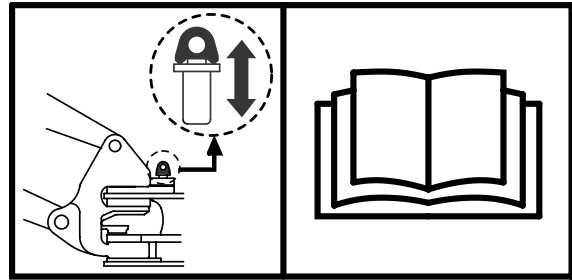


55Z90FW08

18) BOOM SWING LOCK (item 28)

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

- ▲ **Before operating the machine, be sure to release the swing lock device on the swing post of the center frame.**



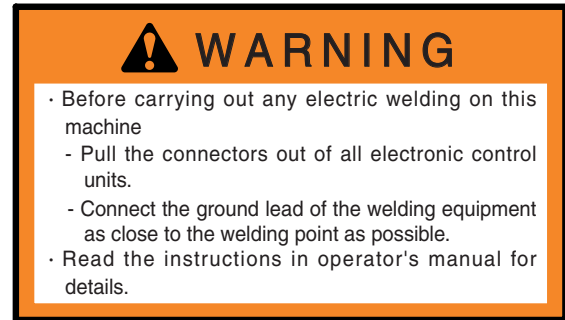
5591FW10

19) ECM CONNECTOR (item 29)

This warning label is positioned on the battery cover.

- ▲ **Before carrying out any electric welding on this machine follow the below procedure.**
 - Pull the connectors out of all electric control units.
 - Connect the ground lead of the welding equipment as close to the welding point as possible.

※ See page 6-38 for detail.



7807AFW20

20) ACCUMULATOR (item 30)

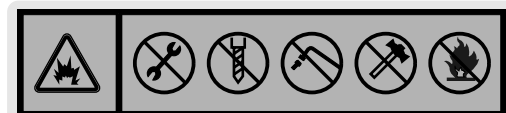
This warning label is positioned on the accumulator of the solenoid valve.

- ※ **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.**

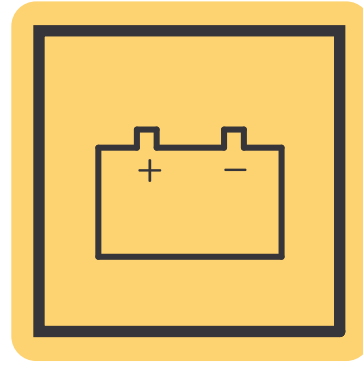
- ※ **When carrying out disassembly or maintenance of the accumulator, or when disposing of the accumulator, it is necessary to release the gas from the accumulator. A special air bleed valve is necessary for this operation, so please contact your Hyundai distributor.**



1107A0FW46

21) BATTERY POSITION (item 31)

This warning label is positioned right side of tool box.

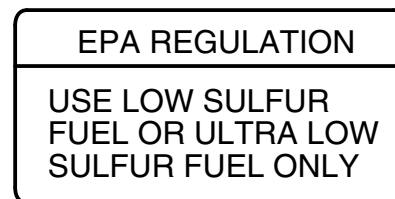


38090FW03

22) LOW SULFUR FUEL (item 32)

This warning label is positioned on the top side of the engine hood.

- ⚠ EPA Regulation use low sulfur fuel or ultra low sulfur fuel only.

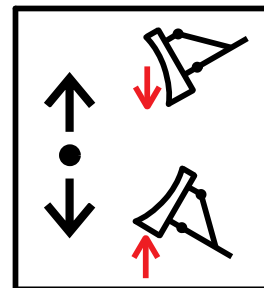


5591FW09

23) CONTROL IDEOGRAM-DOZER (item 38)

This warning label is positioned on the RH console box.

- ※ See page 4-7 for details.
- ※ Guidelines for using the general dozer blade.
 - Be careful not to apply an excessive load when using a blade.
 - Avoid impacts and loads on the bottom due to machine modification or excessive working conditions.
 - Check the BLADE UP status before traveling the machine.
 - Avoid any collision with the upper working device and the blade.
 - Do not move machine in the blade jack up state.
 - When using blade jack up, use it in an environment where the ground is not rough and the machine and ground are same level.



R25Z9A0FW06

MACHINE DATA PLATE



FOR EU ONLY

21090FW10

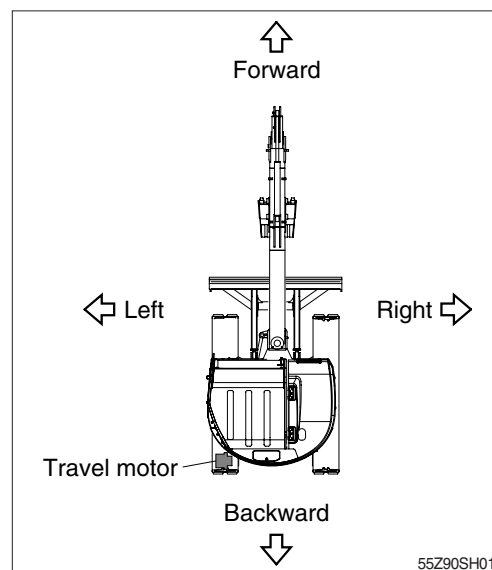
- | | | |
|------------------------|---------------------------------|----------------|
| 1 Machine type / model | 2 Product identification number | 3 Engine power |
| 4 Operating mass | 5 Manufacturing year | |

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

GUIDE

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.

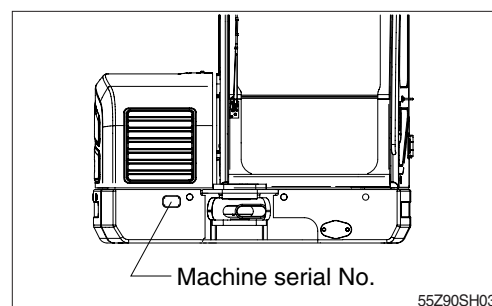


2. SERIAL NUMBER

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

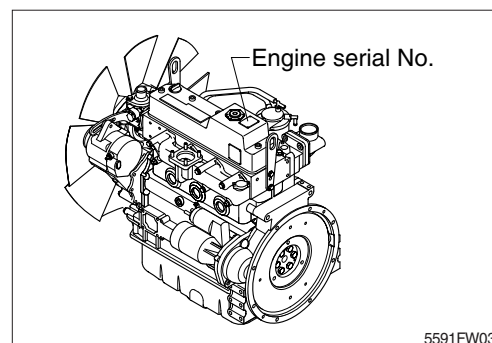
1) MACHINE SERIAL NUMBER

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



2) ENGINE SERIAL NUMBER

The numbers are located on the engine name plate.



3. INTENDED USE

This machine is designed to be used mainly for the following work.

- Digging work
- Loading work
- Smoothing work
- Ditching work

※ Please refer to the section 4 (efficient working method) further details.

4. SYMBOLS

▲ Important safety hint.

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

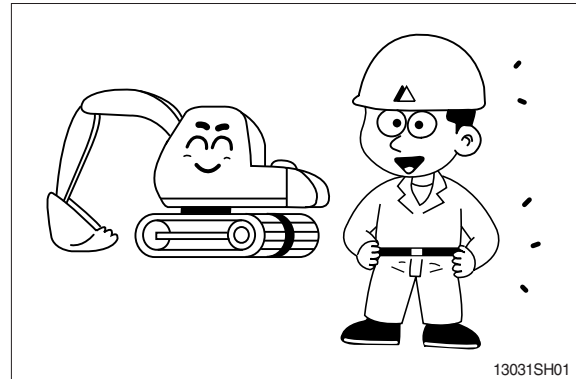
※ It indicates the useful information for operator.

1. BEFORE OPERATING THE MACHINE

Think-safety first.

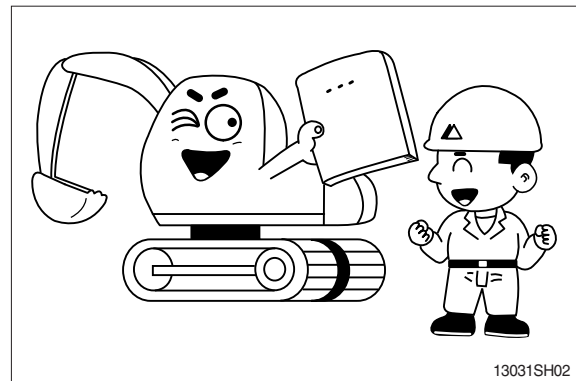
In special situation, wear protective clothing including a safety helmet, safety shoes, gloves, safety glasses and ear protection as required by the job condition.

Almost every accident is caused by disregarding the simple and fundamental safety hints.



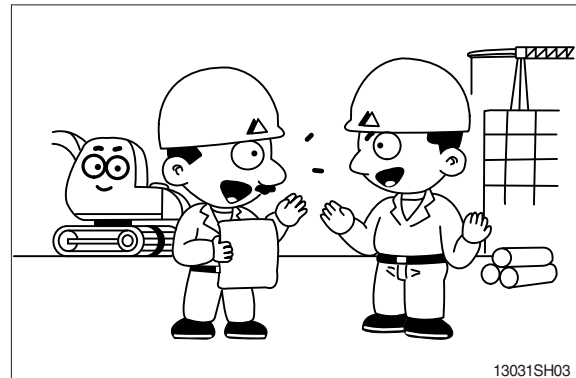
Be sure to understand thoroughly all about the operator's manual before operating the machine.

Proper care is your responsibility.

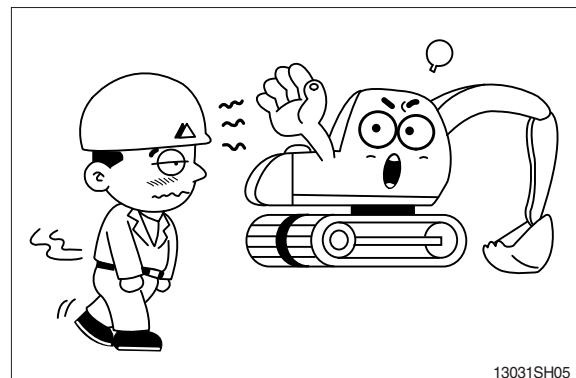


Fully understand the details and process of the construction before starting the work.

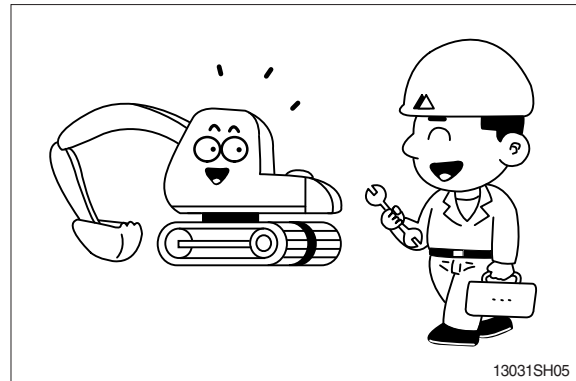
If you find anything dangerous on the job, consult with the job supervisor for the preventive measures before operating the machine.



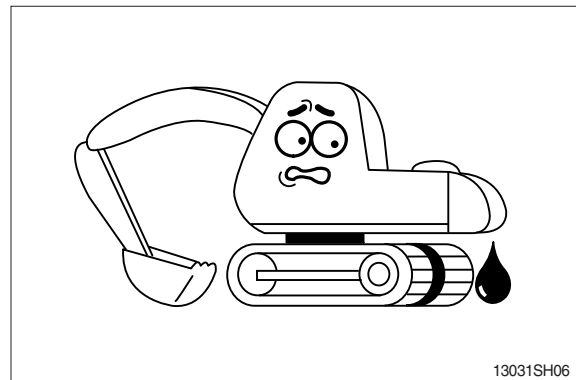
Do not operate when tired, or after drinking alcoholic beverages or any type of drugs.



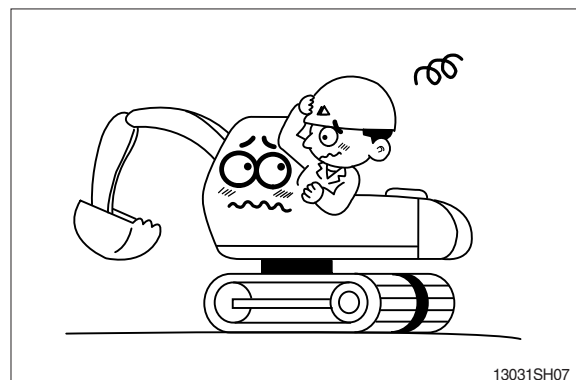
Check daily according to the operation manual.
Repair the damaged parts and tighten the loosened bolts.



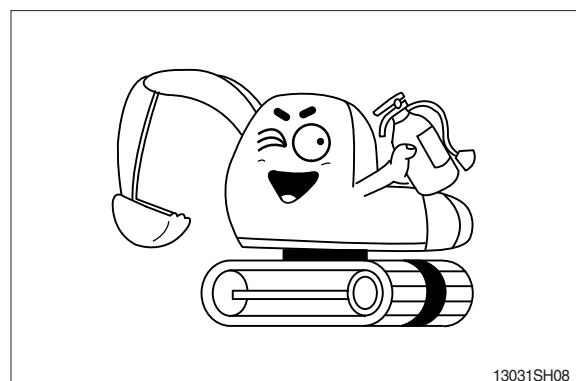
Check for leakage of engine oil, hydraulic oil,
fuel and coolant.
Keep machine clean, clean machine regularly.



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



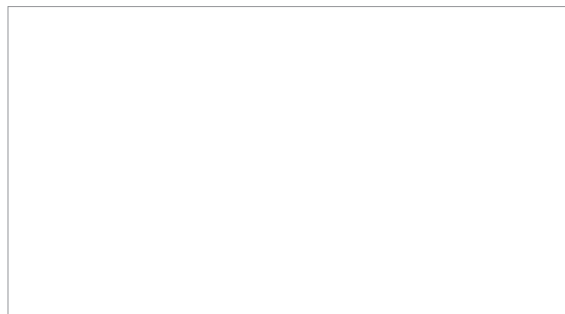
Be prepared if a fire starts.
Keep a fire extinguisher handy and emergency
numbers for a fire department near your
telephone.



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.



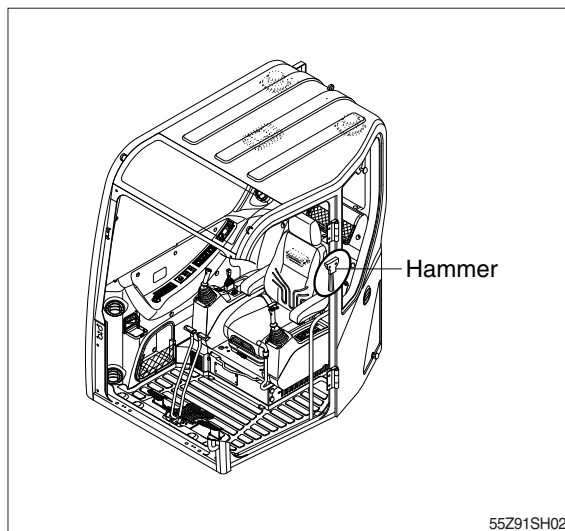
PREPARE FOR EMERGENCY

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

Have a fire extinguisher and first aid kit ready for emergencies such as fires or accidents.

Learn how to use the fire extinguisher.

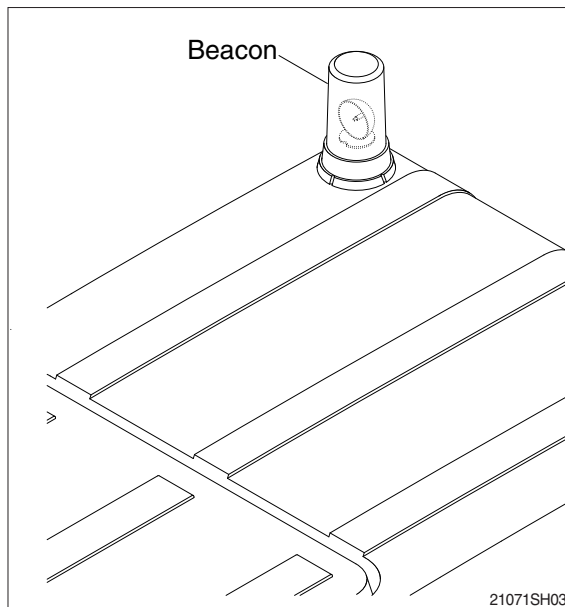
Be sure you know the phone numbers of persons you should contact in case of an emergency.



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.



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.

The stability of this machine is enough to be used for general work. When you operate this machine, allow for the lifting capacity tables. If you want to use other special applications (not covered in this manual), you have to attach additional counterweight or be cautious while running the machine.

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.

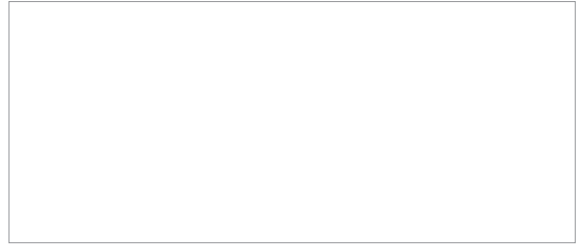
Improper use of safety features could result in serious bodily injury or death.

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.



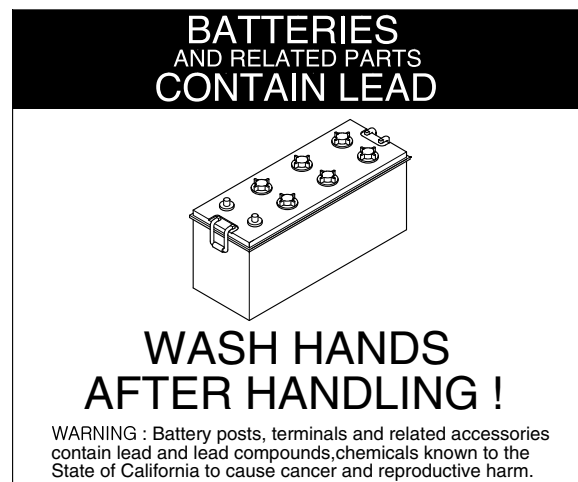
CALIFORNIA PROPOSITION 65

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.

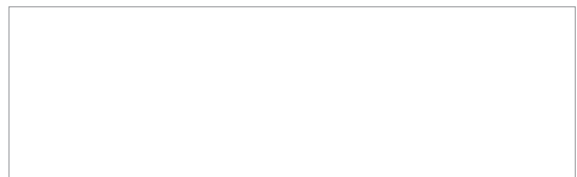
WASH HANDS AFTER HANDLING



13031SH55

Do not load the machine with the lifting eyes on the counterweight.

▲ The wrong loading method can result in serious bodily injury or death.



FIRE PREVENTION AND EXPLOSION PREVENTION

Regeneration

The exhaust gas temperatures during regeneration will be elevated. Follow proper fire prevention instructions and use the disable regeneration function when appropriate.

General

All fuels, most lubricants, and some coolant mixtures are flammable.

To minimize the risk of fire or explosion, the following actions are recommended.

Always perform a Walk-Around Inspection, which may help you identify a fire hazard.

Do not operate a machine when a fire hazard exists. Contact your dealer for service.



3001SH01

Understand the use of the primary exit and alternative exit on the machine.

Do not operate a machine with a fluid leak. Repair leaks and clean up fluids before resuming machine operation. Fluids that are leaking or spilled onto hot surfaces or onto electrical components can cause a fire. A fire may cause personal injury or death.

Do not weld on or drill holes in the engine cover. Flammable material such as leaves, twigs, papers, trash may accumulate in engine compartment.

Remove flammable material such as leaves, twigs, papers, trash and so on. These items may accumulate in the engine compartment or around other hot areas and hot parts on the machine.

Keep the access doors to major machine compartments closed and access doors in working condition in order to permit the use of fire suppression equipment, in case a fire should occur.

Clean all accumulations of flammable materials such as fuel, oil, and debris from the machine.

Do not operate the machine near any flame.

Keep shields in place. Exhaust shields (if equipped) protect hot exhaust components from oil spray or fuel spray in a break in a line, in a hose, or in a seal. Exhaust shields must be installed correctly.

Do not weld or flame cut on tanks or lines that contain flammable fluids or flammable material. Empty and purge the lines and tanks. Then clean the lines and tanks with a nonflammable solvent prior to welding or flame cutting. Ensure that the components are properly grounded in order to avoid unwanted arcs.

Dust that is generated from repairing nonmetallic hoods or fenders may be flammable and/or explosive. Repair such components in a ventilated area away from open flames or sparks. Use suitable Personal Protection Equipment (PPE).

Inspect all lines and hoses for wear or deterioration. Replace damaged lines and hoses. The lines and the hoses should have adequate support and secure clamps. Tighten all connections to the recommended torque. Damage to the protective cover or insulation may provide fuel for fires.

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

Do not load the machine with the lifting eyes on the counterweight.

▲ The wrong loading method can result in serious bodily injury or death.

Store fuels and lubricants in properly marked containers away from unauthorized personnel. Store oily rags and flammable materials in protective containers. Do not smoke in areas that are used for storing flammable materials.



3001SH02

Use caution when you are fueling a machine. Do not smoke while you are fueling a machine. Do not fuel a machine near open flames or sparks. Always stop the engine before fueling. Fill the fuel tank outdoors. Properly clean areas of spillage.



3001SH03

Never store flammable fluids in the operator compartment of the machine.

Battery and battery cables

The following actions are recommended to minimize the risk of fire or an explosion related to the battery.



3001SH04

Do not operate a machine if battery cables or related parts show signs of wear or damage. Contact your dealer for service.

Follow safe procedures for engine starting with jump-start cables. Improper jumper cable connections can cause an explosion that may result in injury.

Do not charge a frozen battery. This action may cause an explosion.

Gases from a battery can explode. Keep any open flames or sparks away from the top of a battery. Do not smoke in battery charging areas.

Never check the battery charge by placing a metal object across the terminal posts. Use a voltmeter in order to check the battery charge.

Daily inspect battery cables that are in areas that are visible. Inspect cables, clips, straps, and other restraint for damage. Replace any damaged parts. Check for signs of the following, which can occur over time due to use and environmental factors :

- Fraying
- Abrasion
- Cracking
- Discoloration
- Cuts on the insulation of the cable
- Fouling
- Corroded terminals, damaged terminals, and loose terminals

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

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

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

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

Wiring

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

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

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

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

Consult your Hyundai dealer for repair or for replacement parts.

Keep wiring and electrical connections free of debris.

Lines, Tubes, and Hoses

Do not bend high-pressure lines. Do not strike high-pressure lines. Do not install any lines that are bent or damaged. Use the appropriate backup wrenches in order to tighten all connections to the recommended torque.

Check lines, tubes, and hoses carefully. Wear Personal Protection Equipment (PPE) in order to check for leaks. Always use a board or cardboard when you check for a leak. Leaking fluid that is under pressure can penetrate body tissue. Fluid penetration can cause serious injury and possible death. A pin hole leak can cause severe injury. If fluid is injected into your skin, you must get treatment immediately. Seek treatment from a doctor that is familiar with this type of injury.

Replace the affected parts if any of the following conditions are present :

- End fittings are damaged or leaking.
- Outer coverings are chafed or cut.
- Wires are exposed.
- Outer coverings are swelling or ballooning.
- Flexible parts of the hoses are kinked.
- Outer covers have exposed embedded armoring.
- End fittings are displaced.

Make sure that all clamps, guards, and heat shields are installed correctly. During machine operation, this action will help to prevent vibration, rubbing against other parts, excessive heat, and failure of lines, tubes, and hoses.

Do not operate a machine when a fire hazard exists. Repair any lines that are corroded, loose, or damaged. Leaks may provide fuel for fires. Consult your Hyundai dealer for repair or for replacement parts.

Ether

Ether (if equipped) is commonly used in cold weather applications. Ether is flammable and poisonous.

Do not spray ether manually into an engine if the machine is equipped with a thermal starting aid for cold weather starting.

Use ether in ventilated areas. Do not smoke while you are replacing an ether cylinder or while you are using an ether spray.

Do not store ether cylinders in living areas or in the operator compartment of a machine. Do not store ether cylinders in direct sunlight or in temperatures above 49°C(120.2 °F). Keep ether cylinders away from unauthorized personnel.

Fire Extinguisher

As an additional safety measure, keep a fire extinguisher on the machine.

Be familiar with the operation of the fire extinguisher. Inspect the fire extinguisher and service the fire extinguisher regularly. Follow the recommendations on the instruction plate.

Consider installation of an aftermarket Fire Suppression System, if the application and working conditions warrant the installation.

Fire Safety

※ **Locate secondary exits and how to use the secondary exits before you operate the machine.**

※ **Locate fire extinguishers and how to use a fire extinguisher before you operate the machine.**

If you find that you are involved in a machine fire, your safety and that of others on site is the top priority. The following actions should only be performed if the actions do not present a danger or risk to you and any nearby people. At all times you should assess the risk of personal injury and move away to a safe distance as soon as you feel unsafe.

Move the machine away from nearby combustible material such as fuel/oil stations, structures, trash, mulch and timber.

Lower any implements and turn off the engine as soon as possible. If you leave the engine running, the engine will continue to feed a fire. The fire will be fed from away damaged hoses that are attached to the engine or pumps.

If possible, turn the battery disconnect switch to the OFF position. Disconnecting the battery will remove the ignition source in the event of an electrical short. Disconnecting the battery will eliminate a second ignition source if electrical wiring is damaged by the fire, resulting in a short circuit.

Notify emergency personnel of the fire and your location.

If your machine is equipped with a fire suppression system, follow the manufacturers procedure for activating the system.

※ **Fire suppression systems need to be regularly inspected by qualified personnel. You must be trained to operate the fire suppression system.**

Use the on-board fire extinguisher and use the following procedure :

1. Pull the pin.
2. Aim the extinguisher or nozzle at the base of the fire.
3. Squeeze the handle and release the extinguishing agent.
4. Sweep the extinguisher from side to side across the base of the fire until the fire is out.

Remember, if you are unable to do anything else, shut off the machine before exiting. By shutting off the machine, fuels will not continue to be pumped into the fire.

If the fire grows out of control, be aware of the following risks :

- Tires on wheeled machines pose a risk of explosion as tires burn. Hot shrapnel and debris can be thrown great distances in an explosion.
- Tanks, accumulators, hoses, and fittings can rupture in a fire, spraying fuels and shrapnel over a large area.

Remember that nearby all of the fluids on the machine are flammable, including coolant and oils. Additionally, plastics, rubbers, fabrics, and resins in fiberglass panels are also flammable.

Fire extinguisher Location

Make sure that a fire extinguisher is available. Be familiar with the operation of the fire extinguisher. Inspect the fire extinguisher and service the fire extinguisher. Obey the recommendations on the instruction plate.

Mount the fire extinguisher in the accepted location per local regulations.

If your machine is equipped with a ROPS structure, strap the mounting plate to the ROPS in order to mount the fire extinguisher. If the weight of the fire extinguisher exceeds 4.5 kg (10 lb), mount the fire extinguisher near the bottom of the ROPS. Do not mount the fire extinguisher at the upper one-third area on the ROPS.

Do not weld the ROPS structure in order to install the fire extinguisher. Also, do not drill holes in the ROPS structure in order to mount the fire extinguisher on the ROPS.

Consult your Hyundai dealer for the proper procedure for mounting the fire extinguisher.

THE EUROPEAN UNION PHYSICAL AGENTS (VIBRATION) DIRECTIVE 2002/44/EC

Vibration Data for Earth-moving Machines

Information Concerning Hand/Arm Vibration Level

When the machine is operated according to the intended use, the hand/arm vibration of this machine is below 2.5 m/s^2 .

Information Concerning Whole Body Vibration Level

The highest root mean square value of weighted acceleration to which the whole body is subjected, is less than 0.5 m/s^2 .

This section provides vibration data and a method for estimating the vibration level for earth moving machines.

Vibration levels are influenced by many different parameters. Many items are listed below.

- Operator training, behavior, mode and stress
- Job site organization, preparation, environment, weather and material
- Machine type, quality of the seat, quality of the suspension system, attachments and condition of the equipment

It is not possible to get precise vibration levels for this machine. The expected vibration levels can be estimated with the information in below Table in order to calculate the daily vibration exposure. A simple evaluation of the machine application can be used.

Estimate the vibration levels for the three vibration directions. For typical operating conditions, use the average vibration levels as the estimated level. With an experienced operator and smooth terrain, subtract the Scenario Factors from the average vibration level. For aggressive operations and severe terrain, add the Scenario Factors to the average vibration level in order to obtain the estimated vibration level.

※ All vibration levels are in meter per second squared.

ISO Reference Table A – Equivalent vibration levels of whole body vibration emission for earthmoving equipment.

Machine family	Machine kind	Typical operating condition	Vibration Levels			Scenario Factors		
			X axis	Y axis	Z axis	X axis	Y axis	Z axis
Excavator	Compact crawler excavator	Excavating	0.33	0.21	0.19	0.19	0.12	0.10
		Hydraulic breaker app.	0.49	0.28	0.36	0.20	0.13	0.17
		Transfer movement	0.45	0.39	0.62	0.17	0.18	0.28
	Crawler excavator	Excavating	0.44	0.27	0.30	0.24	0.16	0.17
		Hydraulic breaker app.	0.53	0.31	0.55	0.30	0.18	0.28
		Mining application	0.65	0.42	0.61	0.21	0.15	0.32
		Transfer movement	0.48	0.32	0.79	0.19	0.20	0.23
	Wheeled excavator	Excavating	0.52	0.35	0.29	0.26	0.22	0.13
		Transfer movement	0.41	0.53	0.61	0.12	0.20	0.19

ISO Reference Table A – Equivalent vibration levels of whole body vibration emission for earthmoving equipment.

Machine family	Machine kind	Typical operating condition	Vibration Levels			Scenario Factors		
			X axis	Y axis	Z axis	X axis	Y axis	Z axis
Loader	skid steer loader (tracks)	V-shaped motion	1.21	1.00	0.82	0.30	0.84	0.32
	Wheel backhoe loader	Excavating	0.28	0.26	0.20	0.09	0.16	0.06
	Wheel loader	Load and carry motion	0.84	0.81	0.52	0.23	0.20	0.14
		Mining application	1.27	0.97	0.81	0.47	0.31	0.47
		Transfer movement	0.76	0.91	0.49	0.33	0.35	0.17
		V-shape motion	0.99	0.84	0.54	0.29	0.32	0.14

※ Refer to “ISO/TR 25398 Mechanical Vibration-Guideline for the assessment of exposure to whole body vibration of ride on operated earthmoving machines” for more information about vibration. This publication uses data that is measured by international institutes, organizations and manufacturers. This document provides information about the whole body exposure of operators of earthmoving equipment.

Guidelines for Reducing Vibration Levels on Earthmoving Equipment

Properly adjust machines. Properly maintain machines. Operate machines smoothly. Maintain the conditions of the terrain. The following guidelines can help reduce the whole body vibration level :

1. Use the right type and size of machine, equipment, and attachments.
2. Maintain machines according to the manufacturer's recommendations.
 - a. Tire pressures
 - b. Brake and steering systems
 - c. Controls, hydraulic system and linkages
3. Keep the terrain in good condition.
 - a. Remove any large rocks or obstacles.
 - b. Fill any ditches and holes.
 - c. Provide machines and schedule time in order to maintain the conditions of the terrain.
4. Use a seat that meets "ISO 7096". Keep the seat maintained and adjusted.
 - a. Adjust the seat and suspension for the weight and the size of the operator.
 - b. Inspect and maintain the seat suspension and adjustment mechanisms.
5. Perform the following operations smoothly.
 - a. Steer
 - b. Brake
 - c. Accelerate
 - d. Shift the gears.
6. Move the attachments smoothly.
7. Adjust the machine speed and the route in order to minimize the vibration level.
 - a. Drive around obstacles and rough terrain.
 - b. Slow down when it is necessary to go over rough terrain.
8. Minimize vibrations for a long work cycle or a long travel distance.
 - a. Use machines that are equipped with suspension systems.
 - b. Use the ride control system on machines.
 - c. If no ride control system is available, reduce speed in order to prevent bounce.
 - d. Haul the machines between workplaces.
9. Less operator comfort may be caused by other risk factors. The following guidelines can be effective in order to provide better operator comfort:
 - a. Adjust the seat and adjust the controls in order to achieve good posture.
 - b. Adjust the mirrors in order to minimize twisted posture.
 - c. Provide breaks in order to reduce long periods of sitting.
 - d. Avoid jumping from the cab
 - e. Minimize repeated handling of loads and lifting of loads.
 - f. Minimize any shocks and impacts during sports and leisure activities.

Sources

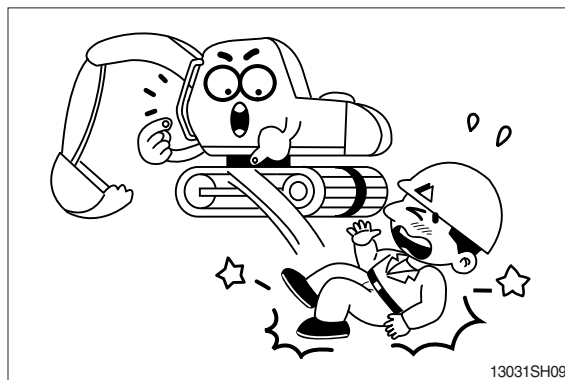
The vibration information and calculation procedure is based on "ISO/TR 25398 Mechanical Vibration-Guideline for whole body vibration exposure of operators of earthmoving equipment. The method is based on measured vibration emission under real working conditions for all machines.

You should check the original directive. This document summarizes part of the content of the applicable law. This document is not meant to substitute the original sources. Other parts of these documents are based on information from the United Kingdom Health and Safety Executive.

2. DURING OPERATING THE MACHINE

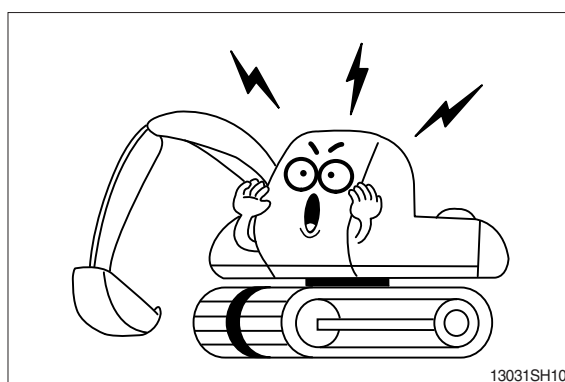
Use the handle and footstep when getting on or off the machine.

Do not jump on or off the machine.



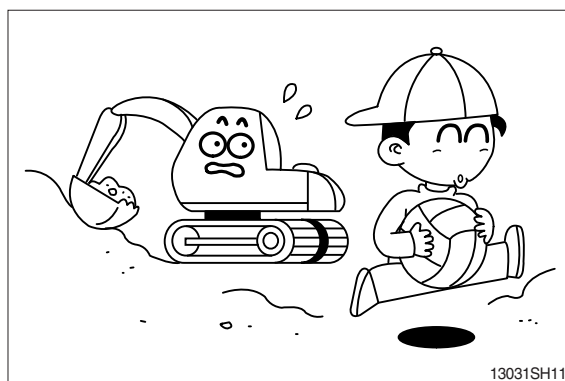
Sound the horn to warn nearby personnel before operating the machine.

Remove all the obstacles like frost on the window before operating the machine for the good visibility.

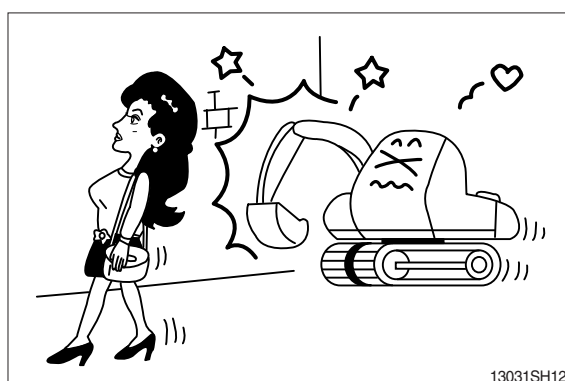


Operate carefully to make sure all personnel or obstacles are clear within the working range of the machine.

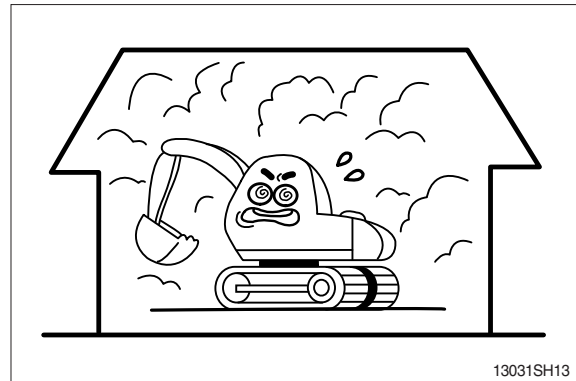
Place safety guards if necessary.



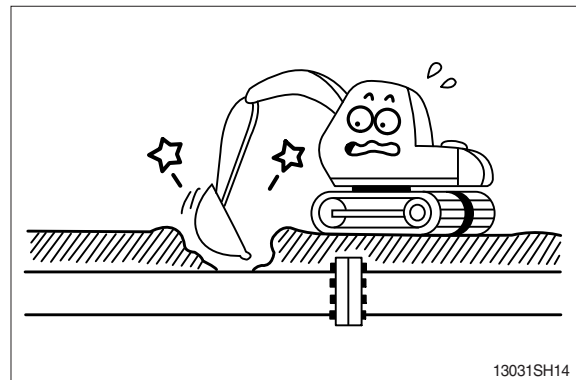
When using the work equipment, pay attention to job site.



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

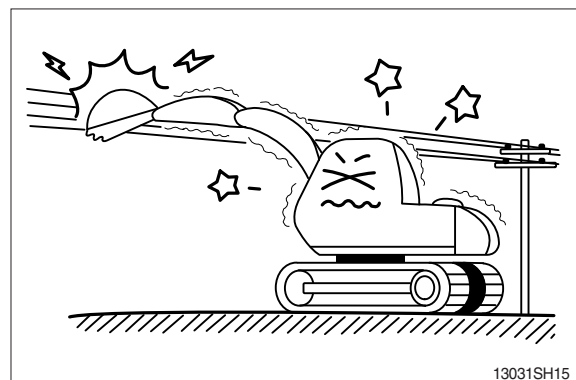


Check the locations of underground gas pipes or water line and secure the safety before operation.

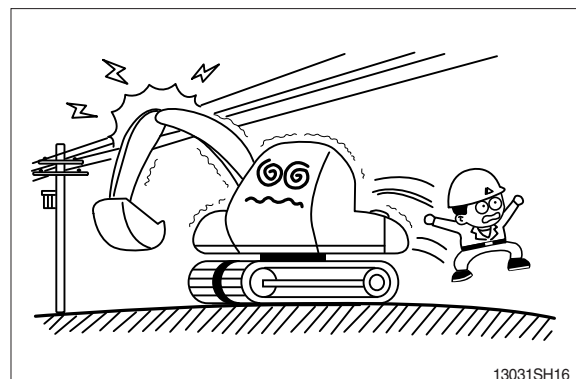


The operating near the electrical lines is very dangerous.
Operate within safe working range permitted as below.

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

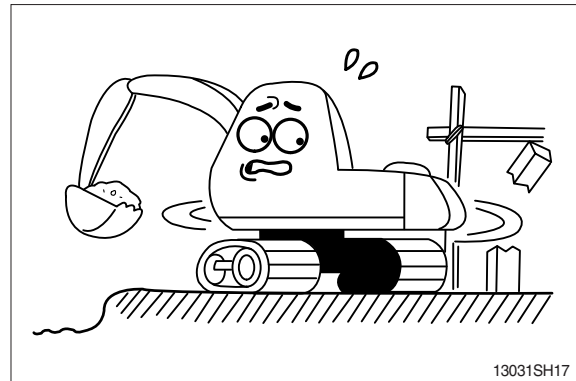


If the machine touches the electric power lines, keep sitting on the operator's seat and make sure the personnel on the ground not to touch the machine until turning off the electric current. Jump off the machine without contacting the machine when you need to get off.

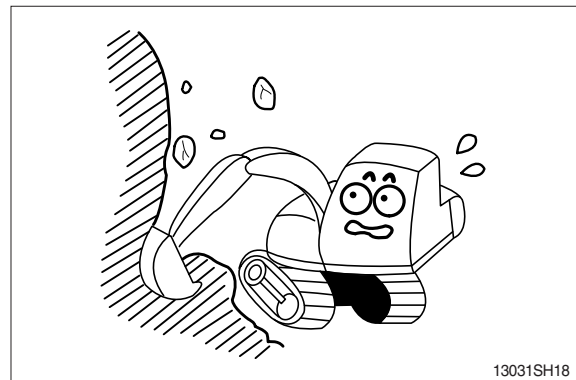


Watch out for obstacles.

Be particularly careful to check the machine clearance during the swing.

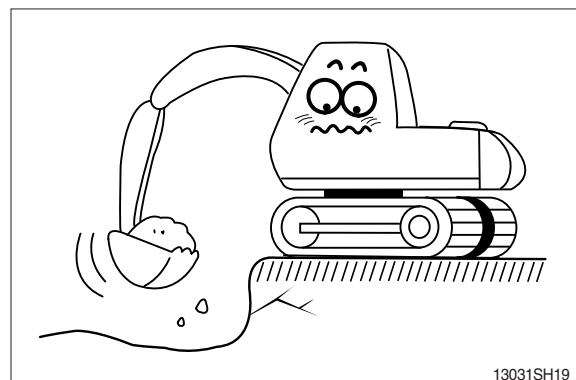


When using the machine as breaker or working in a place where stones may fall down, cab roof guard and head guard should be provided for proper protection.



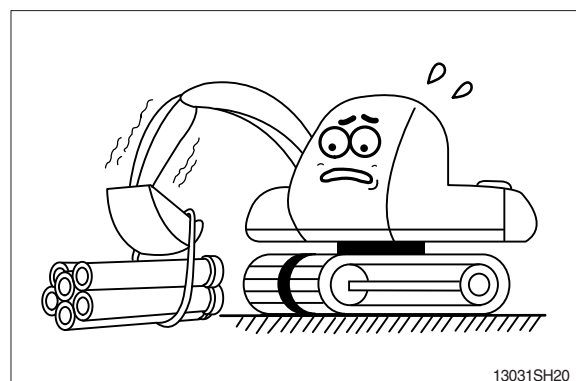
Avoid operating on a cliff or soft ground as there is danger of rolling over.

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.

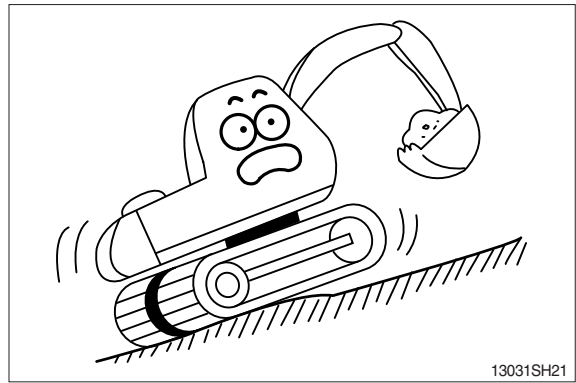


Operate for the lifting work considering the capacity of machine, weight and width of the load.

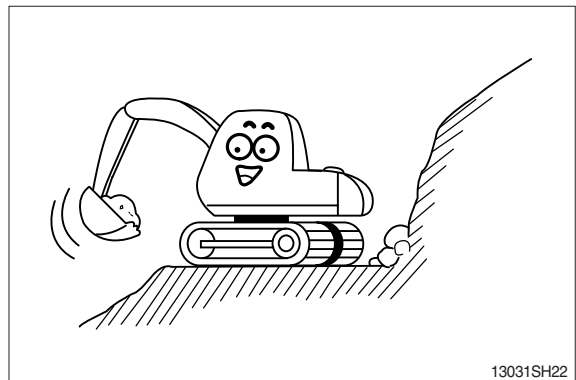
Be careful not to lift exceeding the machine capacity as it can be the cause of machine damage and safety accident.



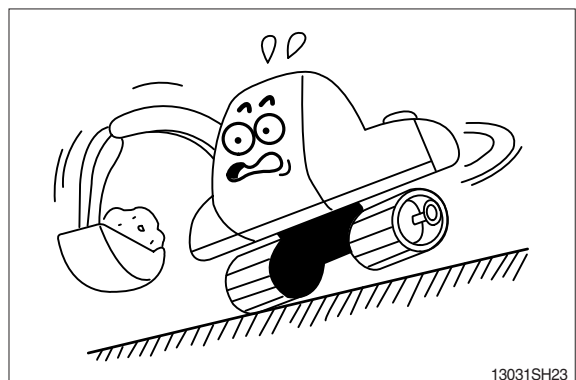
The operation on a slope is dangerous.
Avoid operating the machine on a slope of over
10 degree.



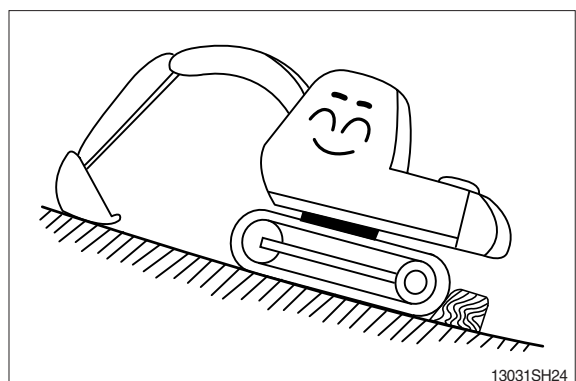
Operate the machine after making ground flat
when operation is required on a slope.



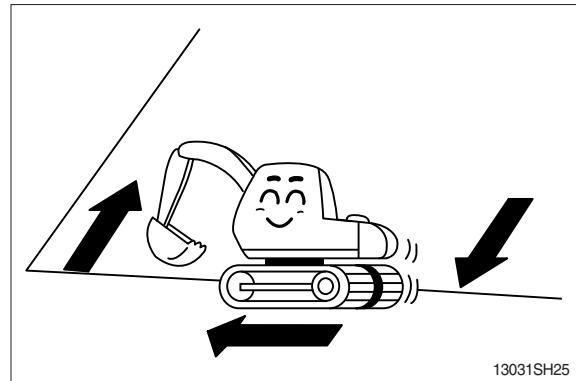
The swing on the slope can be danger of rolling
over.
Do not operate to swing the machine with the
bucket loaded on a slope since the machine
may lose its balance under such an instance.



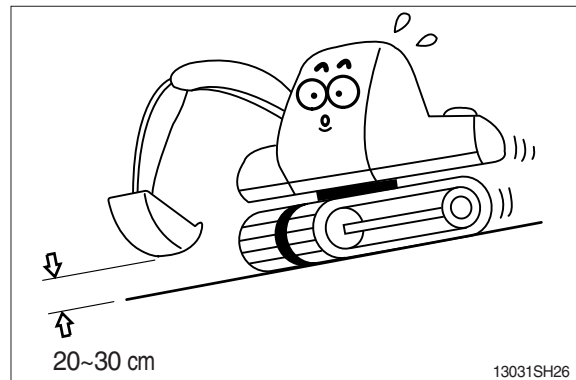
Avoid parking and stopping on a slope.
Lower the bucket to the ground and block the
track when parking.



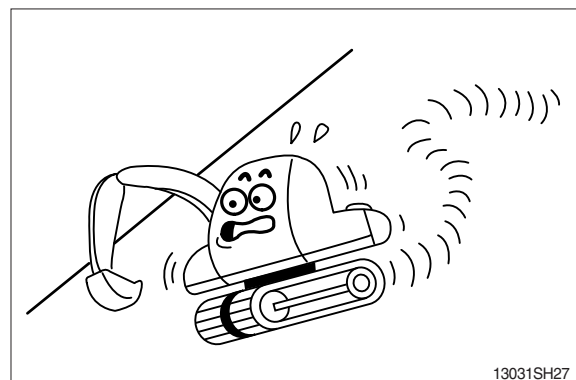
Avoid traveling in a cross direction on a slope as it can cause the danger of rolling over and sliding.



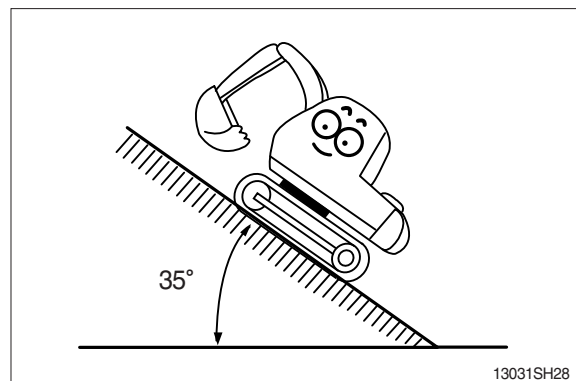
Traveling on a slope is dangerous.
Be sure to operate slowly when traveling down a slope and maintain the bucket at a height of 20~30 cm (1 ft) above the ground so that it can be used as brake in an emergency.



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.

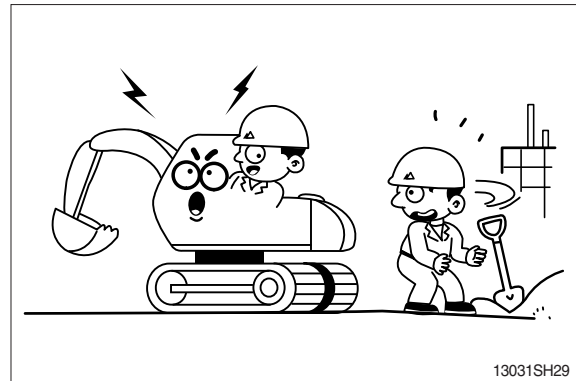


The engine angularity limits are 35 degree.
Do not operate by more than the engine limits in any case.

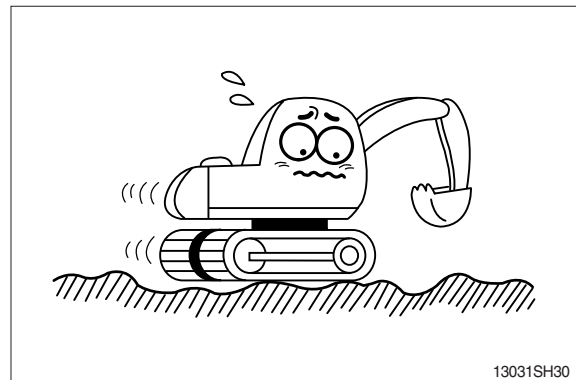


Before traveling the machine, sound the horn to warn nearby personnel.

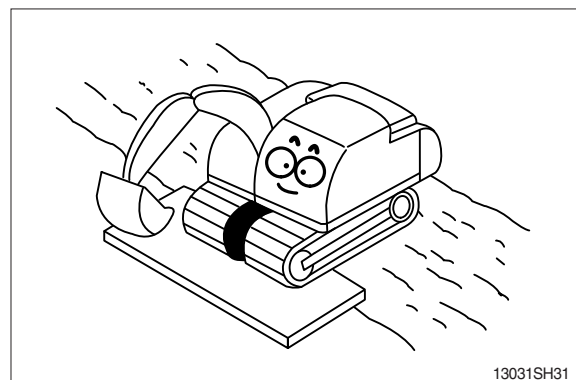
Operate forward and backward correctly with confirming the location of the travel motor.



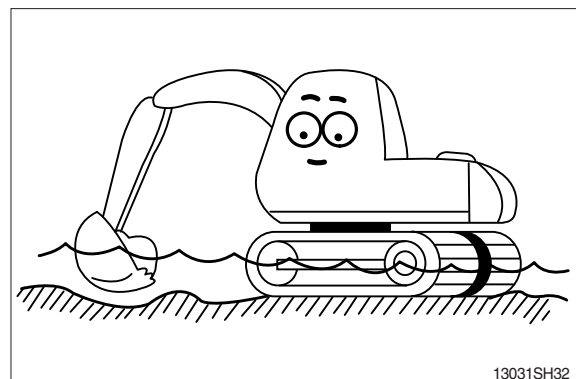
Slow down when traveling through obstacles or uneven ground.



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.

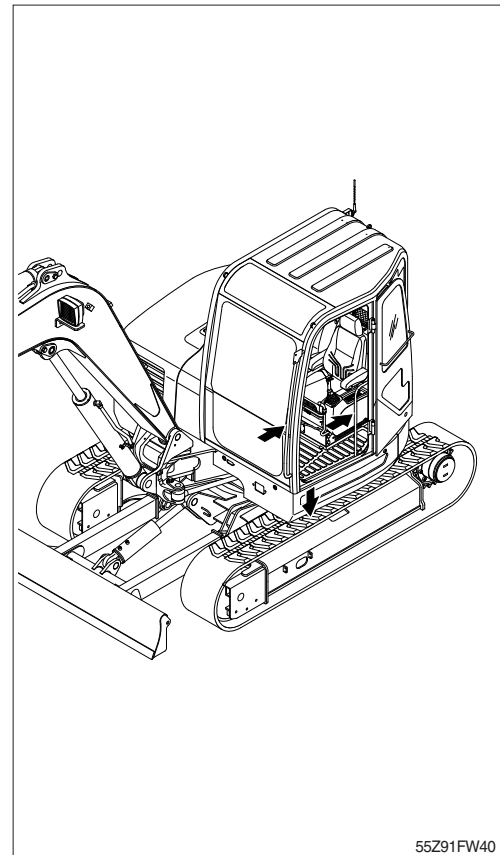
When mounting or dismounting, always face the machine and use the handrails, machine and track shoes.

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, and track shoes.

Always remove any oil or mud from the handrails 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.



55Z91FW40

KEEP RIDERS OFF MACHINE

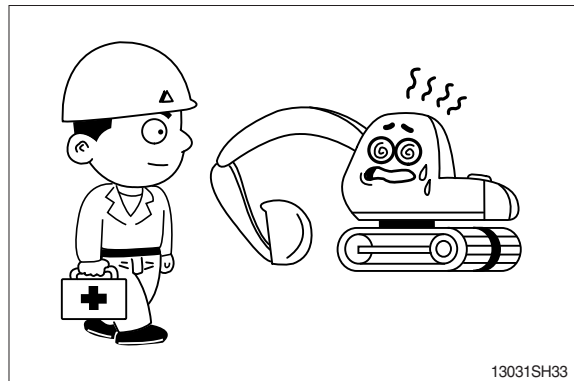
Riders on a machine are subject to injury such as being struck objects and being thrown off the machine.

Only allow the operator on the machine. Keep riders off.

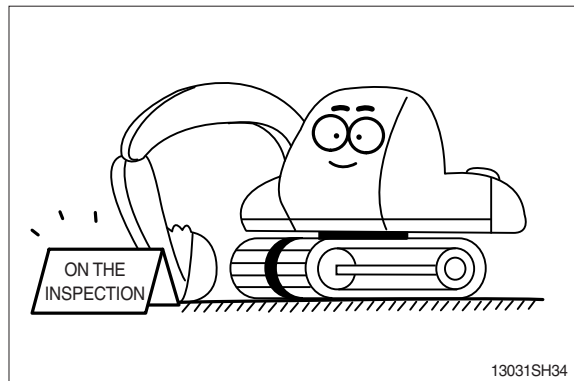
3. DURING MAINTENANCE

Stop the engine immediately when the trouble of the machine is found.

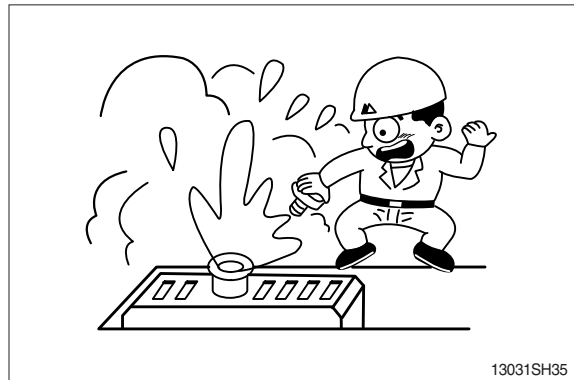
Inspect immediately the cause of trouble such as vibration, overheating and trouble in the cluster then repair.



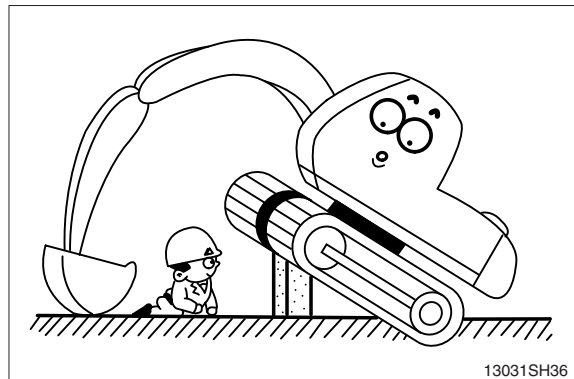
Park on a flat place and stop the engine for inspecting and repairing. Properly TAG machine is not operational. (Remove start key)
Extreme care shall be taken during maintenance work. Parts may require additional safe guard.



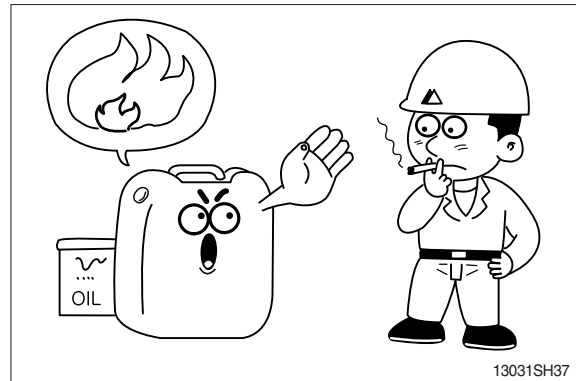
Do not remove the radiator cap from hot engine.
Open the cap after the engine cools, below 50°C (112°F) to prevent personal injury from heated coolant spray or steam.



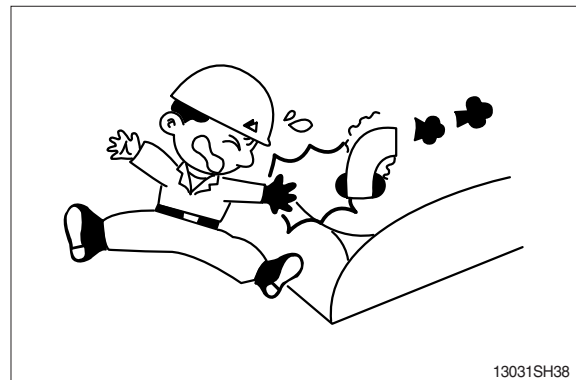
Do not work below the machine.
Be sure to work with proper safety supports.
Do not depend on the hydraulic cylinders to hold up the equipment and attachment.



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



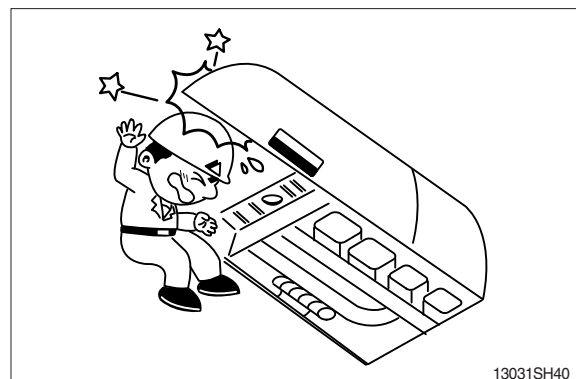
Do not touch exhaust pipe, or may cause severe burn.



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

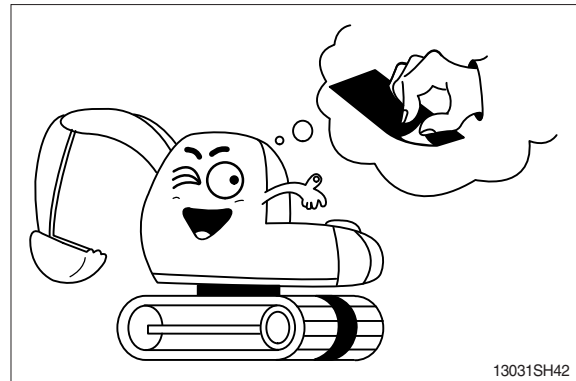


Be careful of not hitting the edges when you service engine.

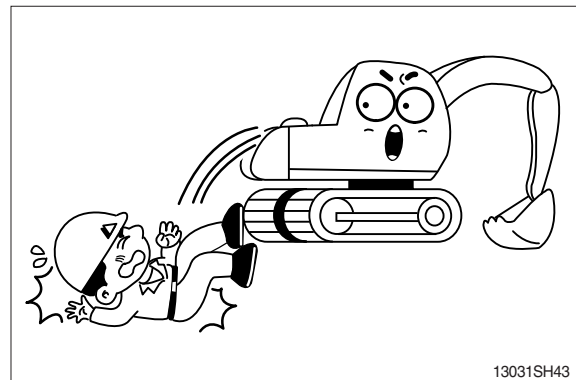


The antislip protection should be replaced if they have become worn or have been printed over.

Be sure to free of oil, water and grease etc.



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

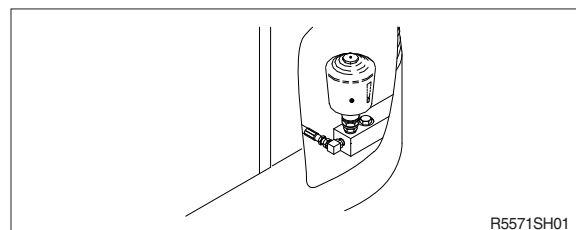


HIGH PRESSURE GAS

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.



LIFT EYES CAN FAIL

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

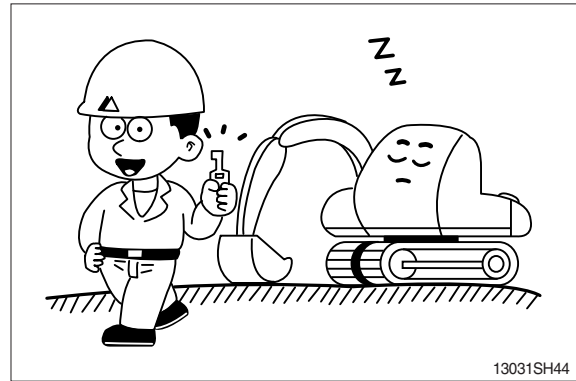
Drain tank of all fluids before lifting.



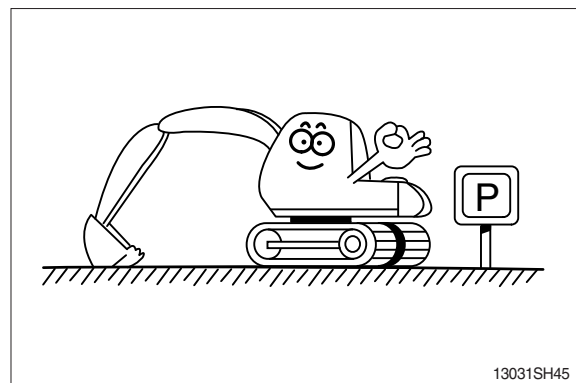
4. PARKING

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.

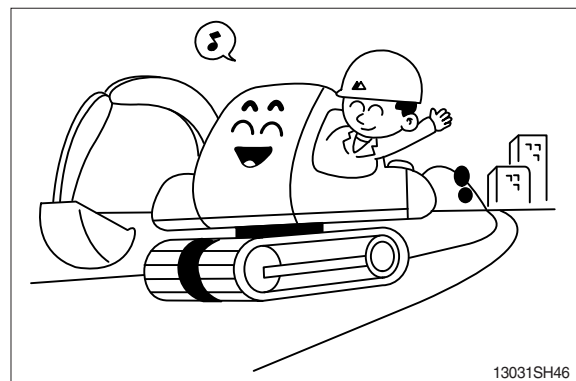


Park the machine in the flat and safe place.



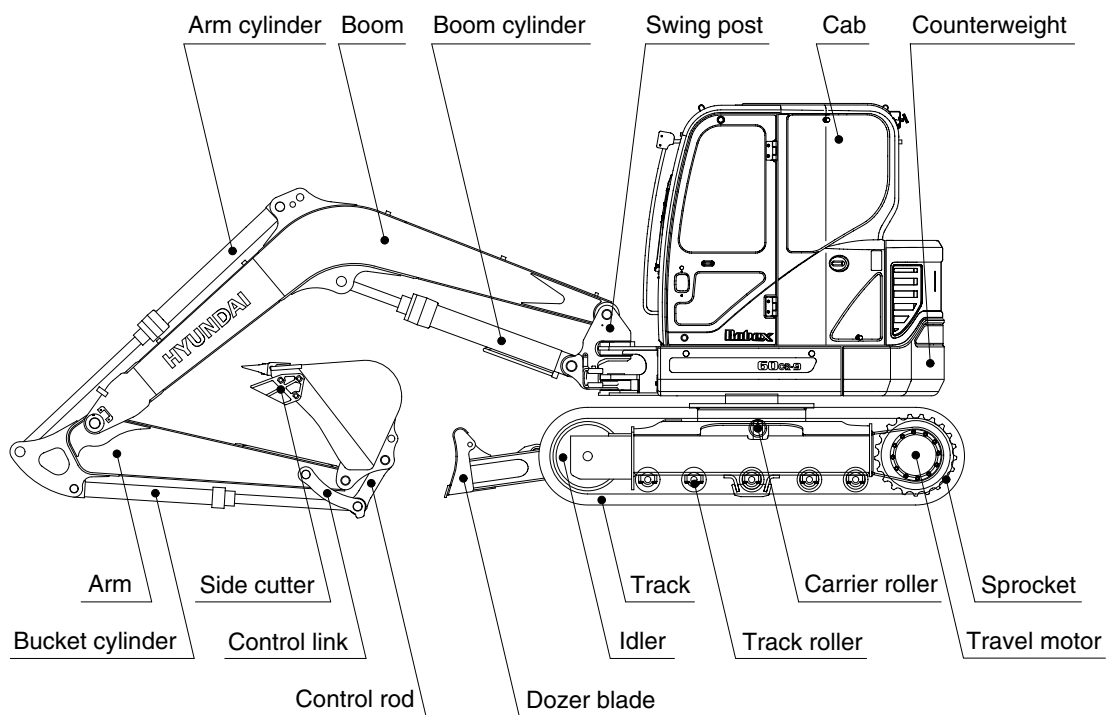
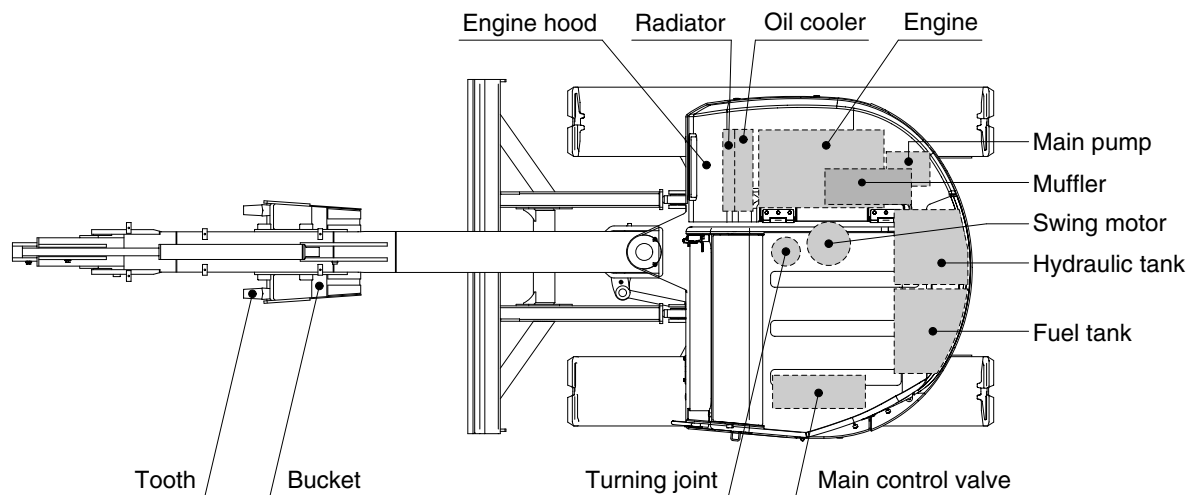
Hope you can work easily and safely observing safety rules.

For safe operation, observe all safety rules.



SPECIFICATIONS

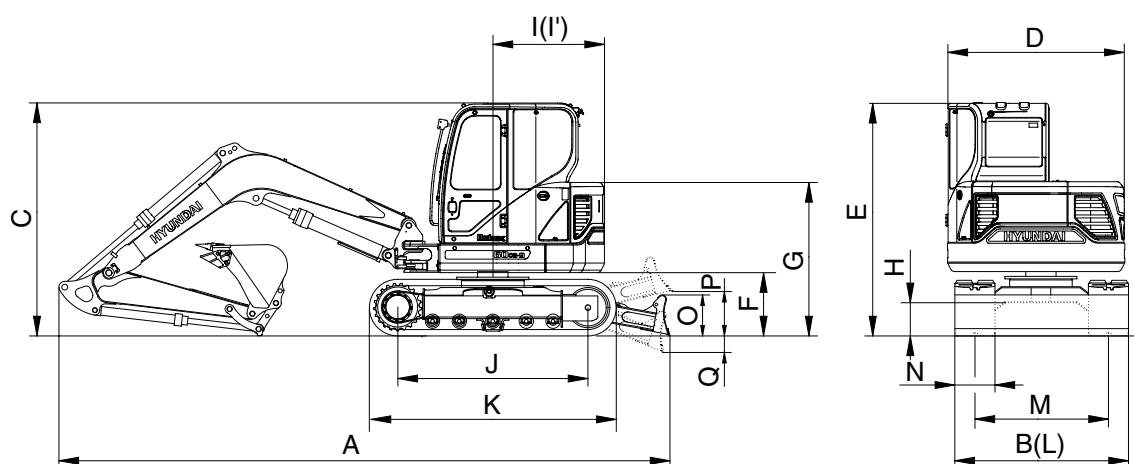
1. MAJOR COMPONENT



55Z9SP01A

2. SPECIFICATIONS

1) 2.9 m (9' 6") MONO BOOM, 1.48 m (4' 10") ARM, WITH BOOM SWING SYSTEM

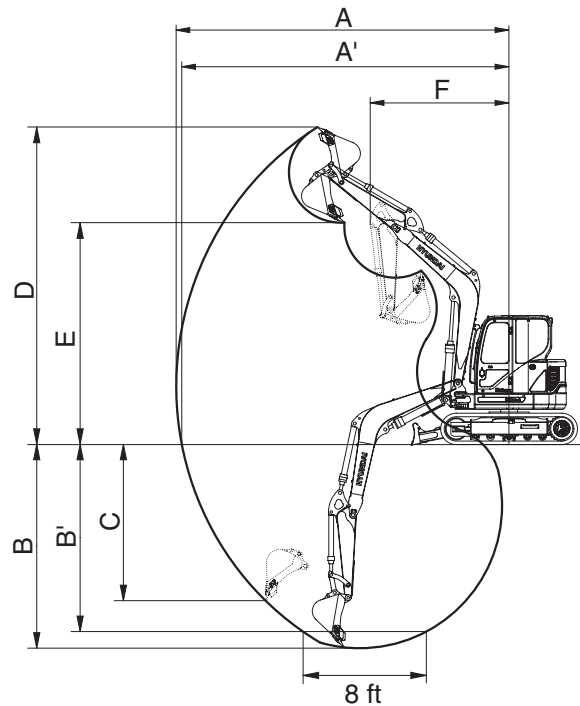


55Z9SP02

Description		Unit	Specification
Operating weight		kg (lb)	5900 (13010)
Bucket capacity (SAE heaped), standard		m ³ (yd ³)	0.18 (0.24)
Overall length	A	mm (ft-in)	5600 (18' 3")
Overall width, with 380 mm shoe	B		2000 (6' 8")
Overall height	C		2550 (8' 4")
Superstructure width	D		1950 (6' 5")
Overall height of cab	E		2550 (8' 4")
Ground clearance of counterweight	F		660 (2' 2")
Engine cover height	G		1670 (5' 6")
Minimum ground clearance	H		380 (1' 3")
Rear-end distance	I		1080 (3' 7")
Rear-end swing radius	I'		1080 (3' 7")
Distance between tumblers	J		1990 (6' 6")
Undercarriage length	K		2530 (8' 4")
Undercarriage width	L		2000 (6' 8")
Track gauge	M		1600 (5' 3")
Track shoe width, standard	N		380 (15")
Height of blade	O		350 (1' 2")
Ground clearance of blade up	P		200 (8")
Depth of blade down	Q		700 (2' 4")
Travel speed (low/high)		km/hr (mph)	2.2/4.0 (1.4/2.5)
Swing speed		rpm	9.3
Gradeability		Degree (%)	35 (70)
Ground pressure (380 mm shoe)		kgf/cm ² (psi)	0.36 (5.12)
Max traction force		kg (lb)	5300 (11680)

3. WORKING RANGE

1) 2.9 m (9' 6") MONO BOOM WITH BOOM SWING SYSTEM



60CR92SP03

Description		1.48 m (4' 10") Arm
Max digging reach	A	6150 mm (25' 5")
Max digging reach on ground	A'	6010 mm (24' 11")
Max digging depth	B	3570 mm (11' 9")
Max digging depth (8ft level)	B'	3160 mm (10' 5")
Max vertical wall digging depth	C	3040 mm (10' 0")
Max digging height	D	5680 mm (18' 8")
Max dumping height	E	3930 mm (12' 10")
Min swing radius	F	2420 mm (7' 11")
Boom swing radius (left/right)		70°/50°
Bucket digging force	SAE	36.6 kN
		3730 kgf
		8220 lbf
	ISO	40.9 kN
		4170 kgf
		9190 lbf
Arm crowd force	SAE	25.6 kN
		2610 kgf
		5750 lbf
	ISO	26.5 kN
		2700 kgf
		5950 lbf

4. WEIGHT

Item	kg	lb
Upperstructure assembly	2895	6380
Main frame weld assembly	570	1260
Engine assembly	280	620
Main pump assembly	30	65
Main control valve assembly	40	90
Swing motor assembly	50	110
Hydraulic oil tank assembly	60	130
Fuel tank assembly	55	120
Boom swing post	135	300
Counterweight	470	1040
Cab assembly	350	770
Lower chassis assembly	2275	5020
Track frame weld assembly	790	1740
Swing bearing	90	200
Travel motor assembly	80 × 2	180 × 2
Turning joint	30	65
Track recoil spring	20	45
Idler & tension body	60	130
Carrier roller	10	20
Track roller	10	20
Sprocket	20	45
Track-chain assembly (380 mm standard triple grouser shoe)	320	710
Dozer blade assembly	210	460
Front attachment assembly (3.0 m boom, 1.6 m arm, 0.18 m ³ SAE heaped bucket)	730	1610
2.9 m boom assembly	240	530
1.48 m arm assembly	120	260
0.18 m ³ SAE heaped bucket	170	370
Boom cylinder assembly	70	150
Arm cylinder assembly	55	120
Bucket cylinder assembly	35	80
Bucket control link assembly	40	90
Dozer cylinder assembly	35	80
Boom swing cylinder assembly	70	150

5. LIFTING CAPACITIES

1) 2.9 m (9' 6") boom, 1.48 m (4' 10") arm equipped with 0.18 m³ (SAE heaped) bucket and 380 mm (15") triple grouser shoe, the dozer blade down with 470 kg (1040 lb) counterweight.

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

Load point height		Load radius								At max. reach		
		2.0 m (7 ft)		3.0 m (10 ft)		4.0 m (13 ft)		5.0 m (16 ft)		Capacity		Reach
												m (ft)
4.0 m (13 ft)	kg					*1120	*1120			*1050	790	4.99
	lb					*2470	*2470			*2310	1740	(16.4)
3.0 m (10 ft)	kg					*1180	*1130			*1080	640	5.56
	lb					*2600	*2490			*2380	1410	(18.2)
2.0 m (7 ft)	kg			*1890	*1710	*1430	1080	*1250	740	*1120	580	5.82
	lb			*4170	*3770	*3150	2380	*2760	1630	*2470	1280	(19.1)
1.0 m (3 ft)	kg			*2670	1580	*1740	1020	*1360	720	*1160	560	5.84
	lb			*5890	3480	*3840	2250	*3000	1590	*2560	1230	(19.2)
Ground Line	kg	*1980	*1980	*3000	1520	*1930	980	*1430	700	*1190	590	5.61
	lb	*4370	*4370	*6610	3350	*4250	2160	*3150	1540	*2620	1300	(18.4)
-1.0 m (-3 ft)	kg	*3230	3030	*2890	1500	*1910	970			*1210	690	5.09
	lb	*7120	6680	*6370	3310	*4210	2140			*2670	1520	(16.7)
-2.0 m (-7 ft)	kg	*3960	3080	*2370	1530					*1110	990	4.12
	lb	*8730	6790	*5220	3370					*2450	2180	(13.5)

- 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.

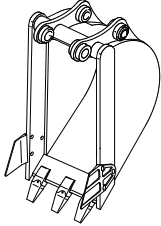
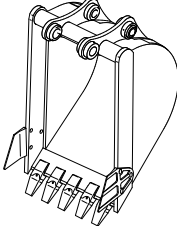
2) 2.9 m (9' 6") boom, 1.48 m (4' 10") arm equipped with 0.18 m³ (SAE heaped) bucket and 380 mm (15") triple grouser shoe, the dozer blade up with 470 kg (1040 lb) counterweight.

•  : Rating over-front

•  : Rating over-side or 360 degree

Load point height		Load radius								At max. reach		
		2.0 m (7.0 ft)		3.0 m (10.0 ft)		4.0 m (13.0 ft)		5.0 m (16.0 ft)		Capacity		Reach
												m (ft)
4.0 m (13.0 ft)	kg					*1120	1070			1040	740	4.99
	lb					*2470	2360			2290	1630	(16.4)
3.0 m (10.0 ft)	kg					*1180	1060			860	600	5.56
	lb					*2600	2340			1900	1320	(18.2)
2.0 m (7.0 ft)	kg			*1890	1600	1430	1010	990	690	780	540	5.82
	lb			*4170	3530	3150	2230	2180	1520	1720	1190	(19.1)
1.0 m (3.0 ft)	kg			2150	1470	1370	960	970	670	770	520	5.84
	lb			4740	3240	3020	2120	2140	1480	1700	1150	(19.2)
Ground Line	kg	*1980	*1980	2080	1410	1330	920	950	650	810	550	5.61
	lb	*4370	*4370	4590	3110	2930	2030	2090	1430	1790	1210	(18.4)
-1.0 m (-3.0 ft)	kg	*3230	2770	2070	1400	1320	900			940	650	5.09
	lb	*7120	6110	4560	3090	2910	1980			2070	1430	(16.7)
-2.0 m (-7.0 ft)	kg	*3960	2820	2090	1420					*1110	920	4.12
	lb	*8730	6220	4610	3130					*2450	2030	(13.5)

6. BUCKET SELECTION GUIDE

	
0.07m³ SAE heaped bucket	0.18 m³ SAE heaped bucket

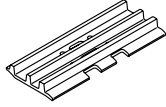
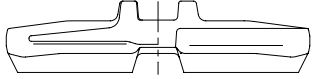
Capacity		Width		Weight	Recommendation
					2.9 m (9' 6") boom
SAE heaped	CECE heaped	Without side cutter	With side cutter		1.48 m (4' 10") arm
0.07 m³ (0.09 yd³)	0.06 m³ (0.08 yd³)	315 mm (12.4")	360 mm (14.2")	115 kg (255 lb)	Applicable for materials with density of 1600 kgf/m³ (2700 lb/yd³) or less
0.18 m³ (0.24 yd³)	0.15 m³ (0.20 yd³)	670 mm (26.4")	740 mm (29.1")	170 kg (375 lb)	
0.18 m³ (0.24 yd³)	0.15 m³ (0.20 yd³)	610 mm (24.0")	665 mm (26.2")	170 kg (375 lb)	

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	Rubber track
				
R60CR-9	Shoe width	mm (in)	380 (15)	400 (16)
	Operating weight	kg (lb)	5900 (13010)	5800 (12790)
	Ground pressure	kgf/cm ² (psi)	0.36 (5.12)	0.34 (4.83)
	Overall width	mm (ft-in)	2000 (6' 7")	2000 (6' 7")

3) NUMBER OF ROLLERS AND SHOES ON EACH SIDE

Item	Quantity
Carrier rollers	1 EA
Track rollers	5 EA
Track shoes	40 EA

8. SPECIFICATIONS FOR MAJOR COMPONENTS

1) ENGINE

Item	Specification
Model	Yanmar 4TNV98-EPHYBU
Type	4-cycle diesel engine, low emission
Cooling method	Water cooling
Number of cylinders and arrangement	4 cylinders, in-line
Firing order	1-3-4-2
Combustion chamber type	Direct injection type
Cylinder borexstroke	98 × 110 mm (3.85" × 4.33")
Piston displacement	3319 cc (203 cu in)
Compression ratio	18.5 : 1
Rated gross horse power (SAE J1995)	57.0 Hp at 2400 rpm (42.5 kW at 2400 rpm)
Maximum torque at 1550 rpm	20.5 kgf · m (148 lbf · ft)
Engine oil quantity	11.6 ℓ (3.1 U.S. gal)
Dry weight	270 kg (595 lb)
High idling speed	2200+50 rpm
Low idling speed	1050 ± 100 rpm
Rated fuel consumption	175.6 g/Hp · hr at 2400 rpm
Starting motor	12 V-3.0 kW
Alternator	12 V-80 A
Battery	1 × 12 V × 100 Ah

2) MAIN PUMP (P1, P2)

Item	Specification
Type	Variable displacement axis piston pumps
Capacity	2 × 27.5 cc/rev
Maximum pressure	220 kgf/cm ² (3130 psi)
Rated oil flow	2 × 57.8 ℓ /min (15.3 U.S. gpm / 12.7 U.K. gpm)
Rated speed	2100 rpm

3) GEAR PUMP (P3, P4)

Item	Specification
Type	Fixed displacement gear pump double stage
Capacity	18.3/4.5 cc/rev
Maximum pressure	220/30 kgf/cm ² (3130/430 psi)
Rated oil flow	38.4/9.5 ℓ /min (10.2/2.5 U.S. gpm / 8.4/2.1 U.K. gpm)

4) MAIN CONTROL VALVE

Item	Specification
Type	Sectional, 9 spools+1 option
Operating method	Hydraulic pilot system+Mechanical control system
Main relief valve pressure	220 kgf/cm ² (3130 psi)
Overload relief valve pressure	240 kgf/cm ² (3410 psi)

[]: Power boost

5) SWING MOTOR

Item	Specification
Type	Fixed displacement axial piston motor
Capacity	31.5 cc/rev
Relief pressure	220 kgf/cm ² (3130 psi)
Braking system	Automatic, spring applied hydraulic released
Braking torque	14.5 kgf · m (105 lbf · ft)
Brake release pressure	12~20 kgf/cm ² (171~284 psi)
Reduction gear type	2 - stage planetary (unseat ~ end piston)

6) TRAVEL MOTOR

Item	Specification
Type	Variable displacement axial piston motor
Relief pressure	220 kgf/cm ² (3130 psi)
Reduction gear type	2-stage planetary
Braking system	Automatic, spring applied hydraulic released
Brake release pressure	9 kgf/cm ² (128 psi)
Braking torque	8.4 kgf · m (61 lbf · ft)

7) CYLINDER

Item		Specification
Boom cylinder	Bore dia × Rod dia × Stroke	ø 110 × ø 65 × 715 mm
	Cushion	Extend only
Arm cylinder	Bore dia × Rod dia × Stroke	ø 85 × ø 55 × 840 mm
	Cushion	Extend and retract
Bucket cylinder	Bore dia × Rod dia × Stroke	ø 80 × ø 50 × 660 mm
	Cushion	Extend only
Dozer blade	Bore dia × Rod dia × Stroke	ø 110 × ø 60 × 224 mm
	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.

8) SHOE

Item	Width	Ground pressure	Link quantity	Overall width
R60CR-9	380 mm (15")	0.36 kgf/cm ² (5.12 psi)	40	2000 mm (6' 7")

9) BUCKET

Item		Capacity		Tooth quantity	Width	
		SAE heaped	CECE heaped		Without side cutter	With side cutter
R60CR-9	STD	0.18 m ³ (0.24 yd ³)	0.15 m ³ (0.20 yd ³)	5	610 mm (24")	665 mm (26.2")
	OPT	0.07 m ³ (0.09 yd ³)	0.06 m ³ (0.08 yd ³)	3	315 mm (12.4")	360 mm (14.2")

9. RECOMMENDED OILS

HYUNDAI genuine lubricating oils have been developed to offer the best performance and service life for your equipment. These oils have been tested according to the specifications of HYUNDAI and, therefore, will meet the highest safety and quality requirements.

We recommend that you use only HYUNDAI genuine lubricating oils and grease officially approved by HYUNDAI.

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	11.6 (3.1)				SAE 30			
			SAE 10W						
			SAE 10W-30						
				SAE 15W-40					
Final drive	Gear oil	1.2×2 (0.3×2)		SAE 80W-90					
Hydraulic tank	Hydraulic oil	Tank: 60 (15.9) System: 110 (29.1)	ISO VG 32						
				ISO VG 46, HBHO VG 46★ ²					
				ISO VG 68					
Fuel tank	Diesel fuel	82 (21.7)	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★ ¹	9.5 (2.5)		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 : Soft water

- City water or distilled water

★² : Hyundai Bio Hydraulic Oil

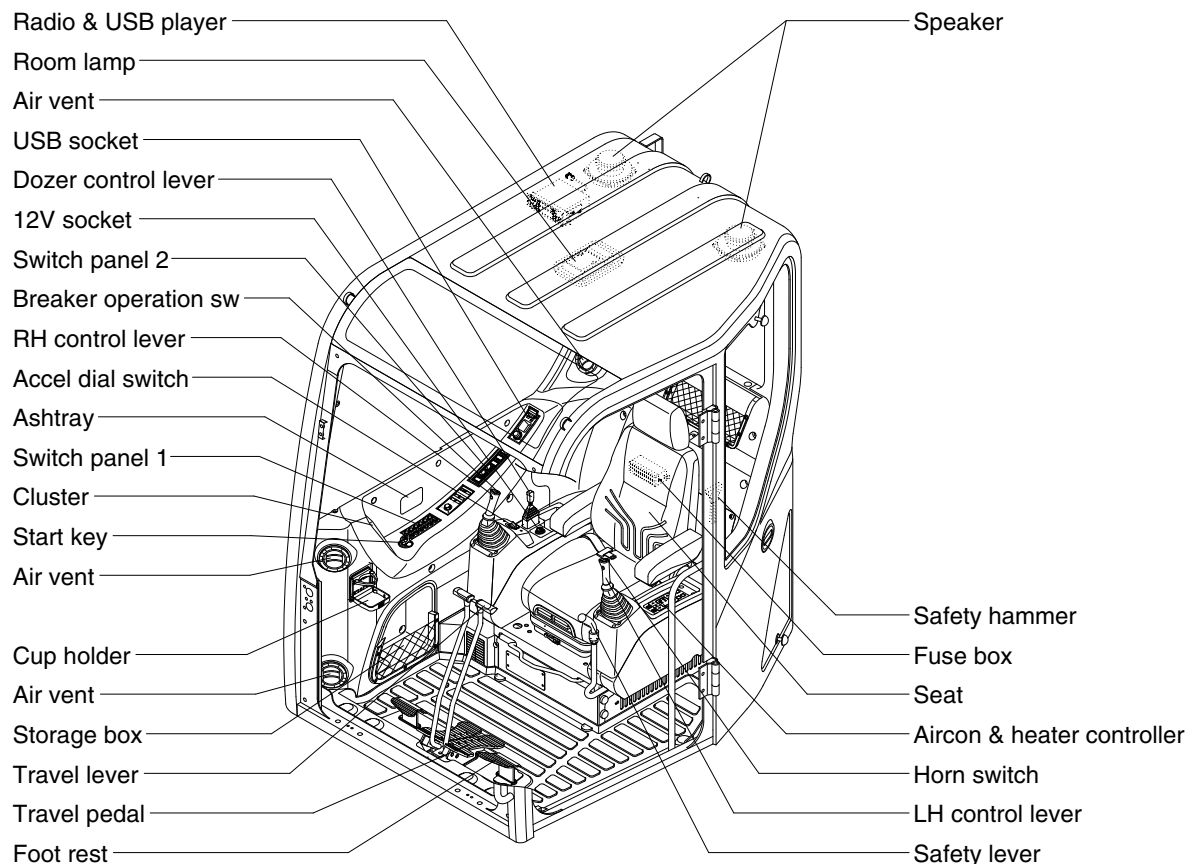
- ※ Using any lubricating oils other than HYUNDAI genuine products may lead to a deterioration of performance and cause damage to major components.
- ※ Do not mix HYUNDAI genuine oil with any other lubricating oil as it may result in damage to the systems of major components.
- ※ Do not use any engine oil other than that specified above, as it may clog the diesel particulate filter(DPF).
- ※ For HYUNDAI genuine lubricating oils and grease for use in regions with extremely low temperatures, please contact HYUNDAI dealers.

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.

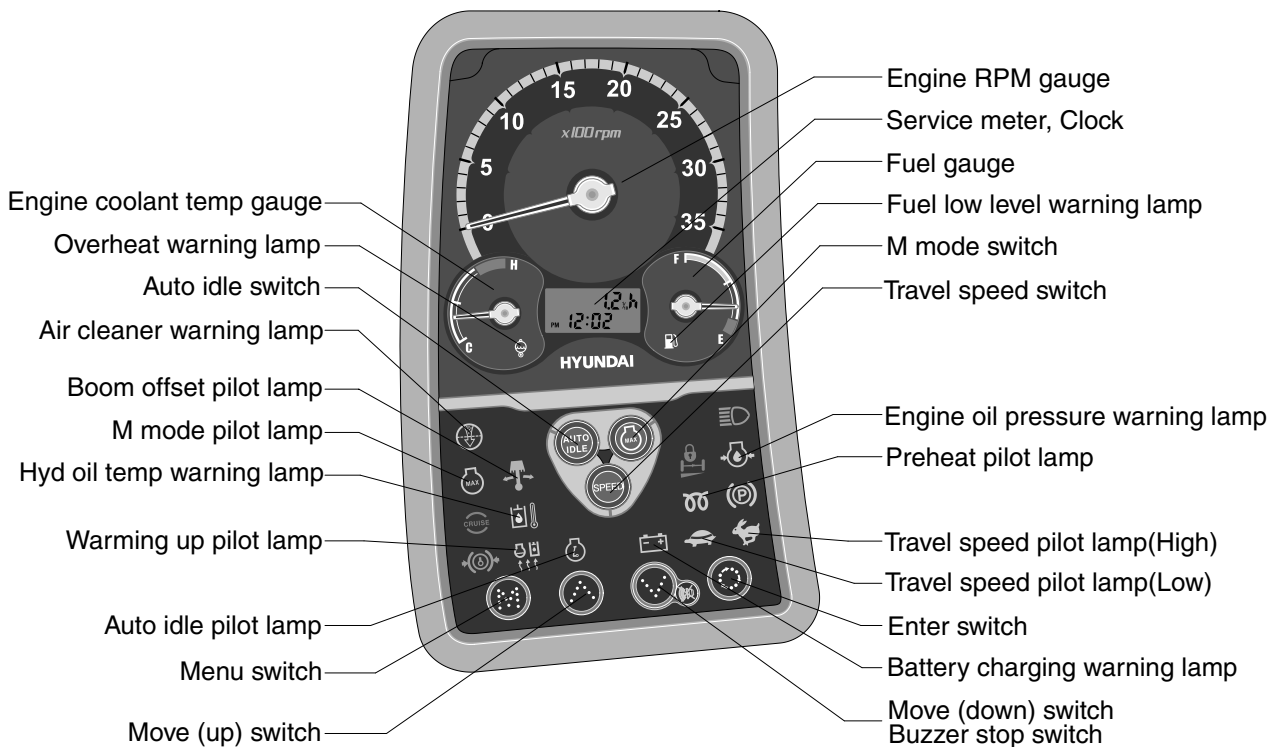


55Z93CD01

2. CLUSTER

The cluster 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.
- ※ **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.**

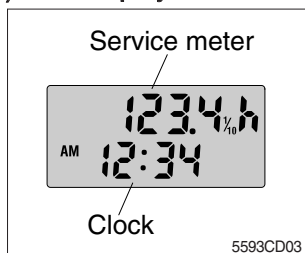


5593CD02

- ※ **The warning 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 warning lamp lights until the problem is cleared.**

1) GAUGES AND DISPLAYS

(1) LCD display



① **Service meter** : This meter shows the total operation hours of the machine.

※ Always ensure the operating condition of the meter during the machine operation.

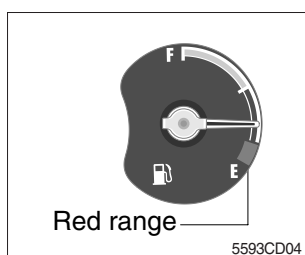
※ The last unit $\frac{4}{10}$ indicates 1/10 of 4 hours.

(for example : $\frac{1}{10}$ indicates 6 minutes)

② **Clock** : This displays the current time.

※ Refer to the "menu switch" for the setting time/ESL switch.

(2) Fuel gauge

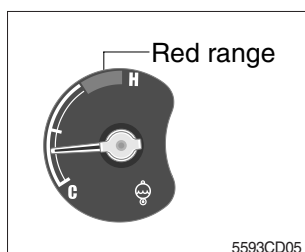


① This gauge indicates the amount of fuel in the fuel tank.

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

※ **If the gauge indicate the red range or warning lamp  ON. 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) Engine coolant temperature gauge



① This indicates the temperature of coolant.

② When the red range pointed or warning lamp  blinks, engine do not abruptly stop but run it at medium speed to allow it to cool gradually, then stop it.

Check the radiator and engine.

※ **If the engine is stopped without cooled down running, the temperature of engine parts will rise suddenly, this could cause severe engine trouble.**

(4) Engine rpm gauge



① This gauge displays the number of engine revolutions per minute.

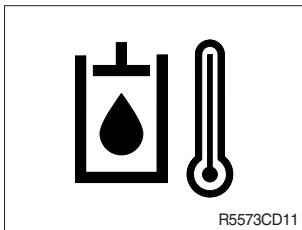
2) WARNING AND PILOT LAMPS

(1) Fuel low level warning lamp



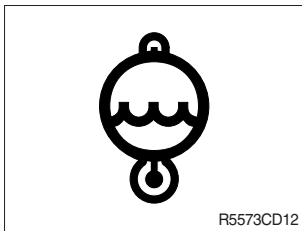
- ① This lamp blinks and the buzzer sounds when the level of fuel is below 18 l (4.8 U.S. gal).
- ② Fill the fuel immediately when the lamp blinks.

(2) Hydraulic oil temperature warning lamp



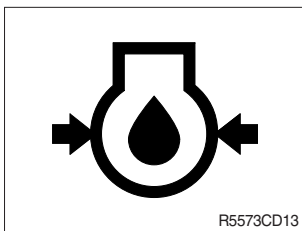
- ① This warning lamp operates and the buzzer sounds when the temperature of hydraulic oil is over 105°C (221°F) .
- ② Check the hydraulic oil level when the lamp blinks.
- ③ Check for debris between oil cooler and radiator.

(3) Overheat warning lamp



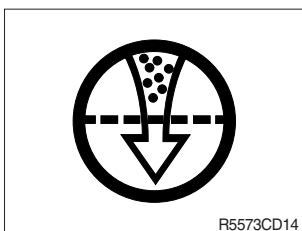
- ① This lamp blinks and the buzzer sounds when the temperature of coolant is over the normal temperature 110°C (230°F) .
- ② Check the cooling system when the lamp blinks.

(4) Engine oil pressure warning lamp



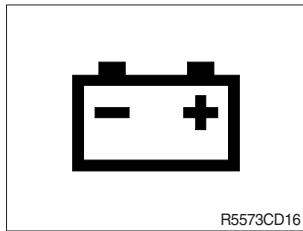
- ① This lamp blinks and the buzzer sounds after starting the engine because of the low oil pressure.
- ② If the lamp blinks during engine operation, shut OFF engine immediately. Check oil level.

(5) Air cleaner warning lamp



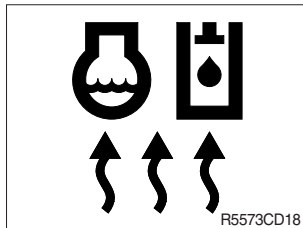
- ① This lamp blinks and the buzzer sounds when the filter of air cleaner is clogged.
- ② Check the filter and clean or replace it.

(6) Battery charging warning lamp



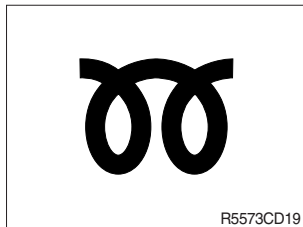
- ① This lamp blinks and the buzzer sounds when the starting switch is ON, it is turned OFF after starting the engine.
- ② Check the battery charging circuit when this lamp blinks during engine operation.

(7) Warming up pilot lamp



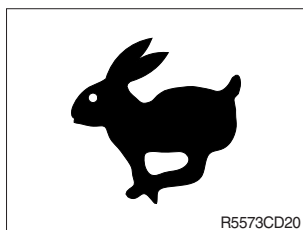
- ① This lamp is turned ON when the coolant temperature is below 30°C (86°F).
- ② The automatic warming up is cancelled when the engine coolant temperature is above 30°C, or when 10 minutes have passed since starting.

(8) Preheat pilot lamp



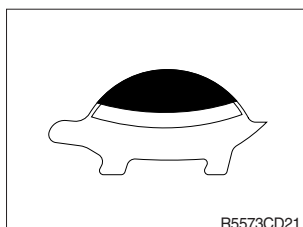
- ① When engine preheating switch is turned ON, pilot lamp comes ON.
- ② Refer to the preheating switch for details.

(9) Travel speed pilot lamp (high)



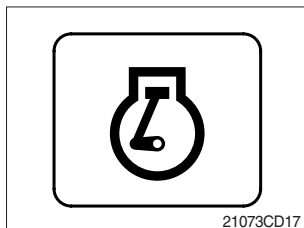
- ① When this lamp turned ON, the machine travel high speed.
- ② Refer to the travel speed select switch for details.

(10) Travel speed pilot lamp (low)



- ① When this lamp turned ON, the machine travel low speed.
- ② Refer to the travel speed select switch for details.

(11) Auto idel pilot lamp



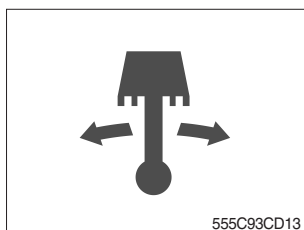
- ① If the control lever and pedal are not moved for several seconds with auto idle switch pressed, the indicator illuminates and engine speed is decelerated.
- ② If the auto idle switch is pressed once more or the control lever or pedal is moved, the indicator turns off and the number of engine revolution is turned to the previous condition.

(12) M mode pilot lamp



- ① This lamp is ON when the M mode switch is pressed.
- ② Engine is operated with a maximum speed.

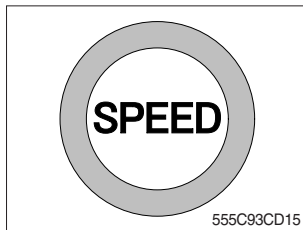
(13) Boom offset pilot lamp



- ① This lamp is ON when the boom offset switch is pressed.

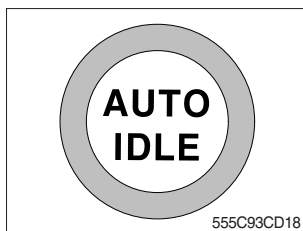
3) SWITCHES

(1) Travel speed control switch



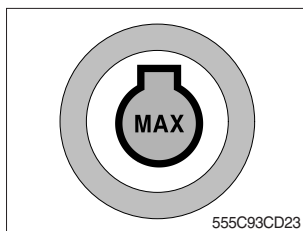
- ① This switch is to control the travel speed which is changed to high speed (rabbit mark) by pressing the switch and low speed (turtle mark) by pressing it again.

(2) Auto idle switch



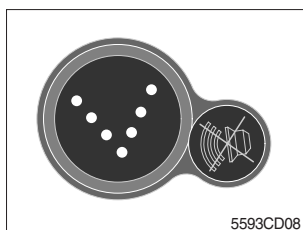
- ① This switch is used to actuate or cancel the auto idle function.
- ② When the switch actuated and all control levers and pedals are at neutral position, engine speed will be lowered automatically to save fuel consumption.

(3) M mode switch



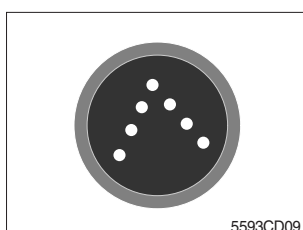
- ① This switch is used to maximum power.
- ② When this switch is pressed, the M mode pilot lamp is ON or OFF.

(4) Move (down) & buzzer stop switch



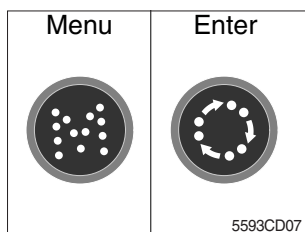
- ① When the starting switch is turned ON first, normally the alarm buzzer sounds for 6 seconds during lamp check operation.
- ② The lamp lights ON and the buzzer sounds when the machine has a problem.
In this case, press this switch and buzzer stops, but the lamp lights until the problem is cleared.
- ③ This switch is used to move down or decrease input value.
※ Refer to page 3-8.

(5) Move (up) switch



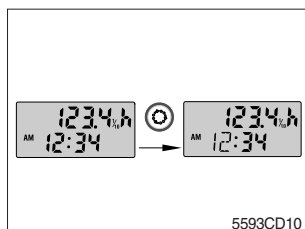
- ① This switch is used to move up or increase input value.
※ Refer to page 3-8.

(6) Menu and enter switch



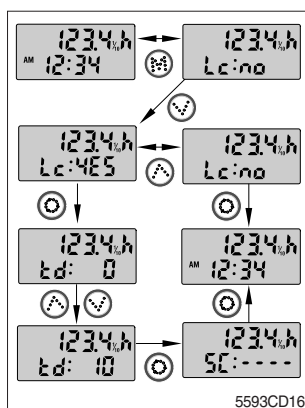
① These switches are used to set time or set ESL (Engine Start Limit) function.

- The Enter button (⊙) is used to select a function.
- The Menu button (⊞) is used to select a menu or return to the time display menu.



② Setting time

- Press Enter button (⊙) to set time, then the screen will be changed to a display for time setting as a following picture and time cipher will blink.
- Set hours** : When the cipher for hour blinks, press up (⬆) or down (⬇) button and set the hour.
- Set minutes**: When the cipher for minute blinks, press up (⬆) or down (⬇) button and set the minute.



③ Set ESL (Engine Start Limit) function

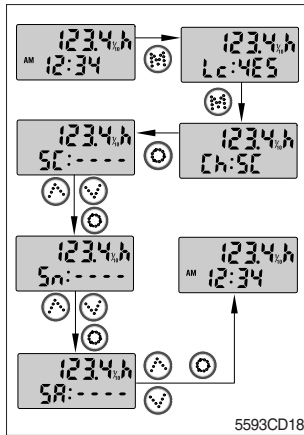
- Press Menu button (⊞), the display is changed from the time display menu to ESL function menu.
- Select YES or NO by Move button (⬆, ⬇) and set the ESL function by the Enter button (⊙).
 - YES : ESL function is activated.
 - NO : ESL function is cancelled.

④ Set the interval time

- Select ESL function to YES and press the Enter button (⊙), then the display is changed to the interval time set menu.
- Set the interval time by move button (⬆, ⬇) and press the Enter button (⊙).
- You can finish setting the interval time by inputting the password and pressing the Enter button (⊙) once more.
- Interval times : 5 kinds (0, 10, 30, 60 minutes, 1day)

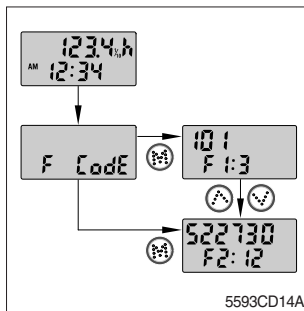
※ If the ESL function is set to YES, the password is required when a operator starting engine first.

But the operator can restart the engine within the interval time period without inputting the password.



⑤ Change password

- Select ESL function to YES and press the Menu button (Ⓜ), the display is shifted to the password change menu.
- Input a new password (Sn : - - - -) after enter the current password successfully (SC : - - - -).
- Push enter (Ⓢ) button for a second to finish the setting after the new password is entered once again (SA : - - - -).
- When the setting is done, the display will blink 3 times and return to the time display screen.



⑥ Check machine and engine diagnostic codes

- If the F : Code is displayed on the LCD display, you can check faults of the machine and/or engine.
- The machine fault code is displayed by pressing the Menu button (Ⓜ) and the engine fault code is displayed by pressing the Menu button (Ⓜ) once more.
- Other fault codes can be displayed by using the Move up / down button (Ⓢ, Ⓡ).

※ Refer to the following pages for the fault codes.

⑦ Machine fault code

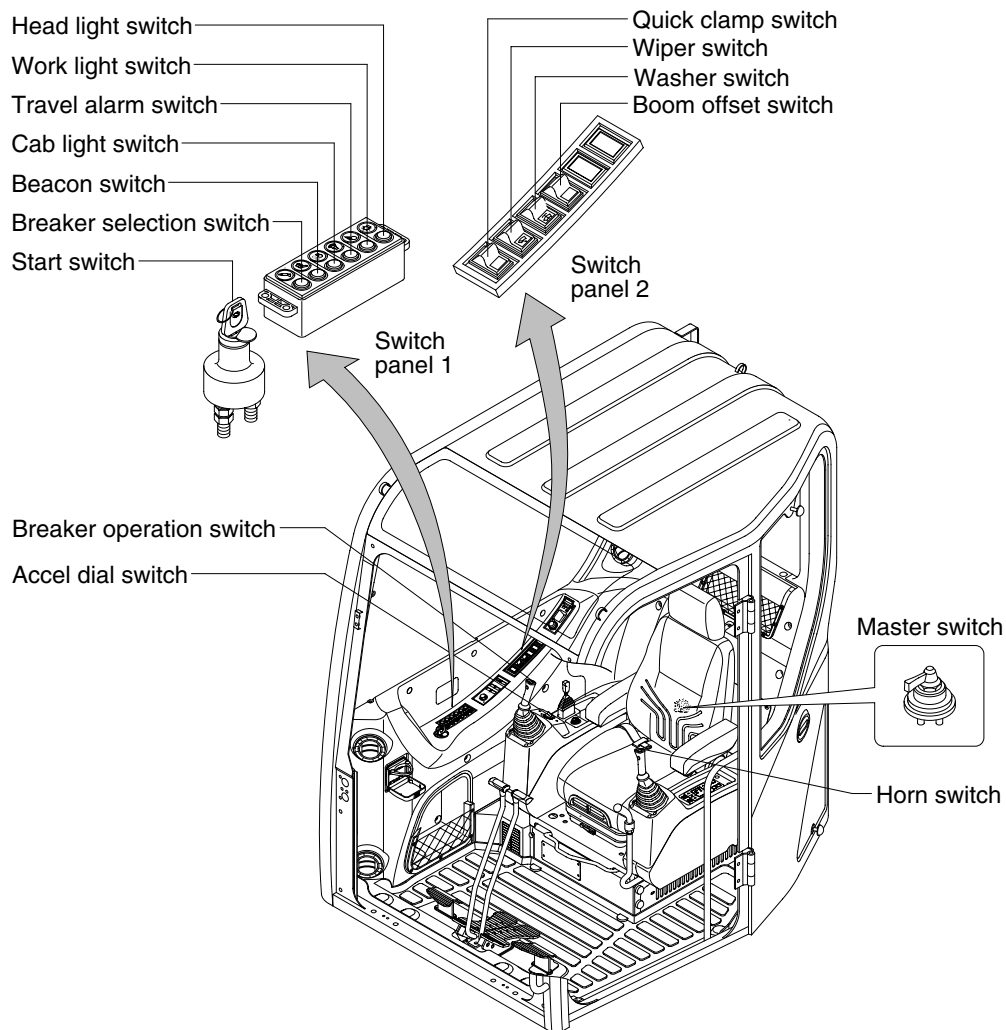
Fault code		Description
HCESPN	FMI	
105	0	Working pressure sensor data above normal range (or open circuit)
	1	Working pressure sensor data below normal range
	2	Working pressure sensor data error
	4	Working pressure sensor circuit - voltage below normal, or shorted to low source
	14	Working pressure sensor circuit - special instructions
	16	Working pressure sensor circuit - voltage valid but above normal operational range
	18	Working pressure sensor circuit - voltage valid but below normal operational range
167	4	Travel speed solenoid circuit - voltage below normal, or shorted to low source (or open circuit)
	6	Travel speed solenoid circuit - current above normal
503	0	Brake pressure sensor data above normal range (or open circuit)
	1	Brake pressure sensor data below normal range
	2	Brake pressure sensor data error
	4	Brake pressure sensor data - voltage below normal, or shorted to low source
	16	Brake pressure sensor data - voltage valid but above normal operational range
	18	Brake pressure sensor data - voltage valid but below normal operational range
505	0	Working brake pressure sensor data above normal range (or open circuit)
	1	Working brake pressure sensor data below normal range
	2	Working brake pressure sensor data error
	4	Working brake pressure sensor circuit - voltage below normal, or shorted to low source
	16	Working brake pressure sensor circuit - voltage valid but above normal operational range
	18	Working brake pressure sensor circuit - voltage valid but below normal operational range
525	4	Ram lock solenoid circuit - voltage below normal, or shorted to low source (or open circuit)
	6	Ram lock solenoid circuit - current above normal
530	0	Travel fwd pilot pressure sensor data above normal range (or open circuit)
	1	Travel fwd pilot pressure sensor data below normal range
	2	Travel fwd pilot pressure sensor data error
	4	Travel fwd pilot pressure sensor circuit - voltage below normal, or shorted to low source
	14	Travel fwd pilot pressure sensor circuit - special instructions
	16	Travel fwd pilot pressure sensor circuit - voltage valid but above normal operational range
	18	Travel fwd pilot pressure sensor circuit - voltage valid but below normal operational range
701	4	Hour meter circuit - voltage below normal, or shorted to low source
705	0	MCU input voltage high
	1	MCU input voltage low
707	1	Alternator node I voltage low (or open circuit)
714	3	Acc. dial circuit - voltage above normal, or shorted to high source (or open circuit)
	4	Acc. dial circuit - voltage below normal, or shorted to low source
830	12	MCU internal memory error
840	2	Cluster communication data error
841	2	ECM communication data error
850	2	RMCU communication data error

⑧ Engine fault code

Fault code		Description
YANMAR SPN	FMI	
1210	4	Engine fuel rack position sensor : shorted to low source
	3	Engine fuel rack position sensor : shorted to high source
91	4	Accelerator pedal position sensor "A" : shorted to low source
	3	Accelerator pedal position sensor "A" : shorted to high source
	2	Accelerator pedal position sensor "A" : intermittent fault
	1	Accelerator pedal position sensor "A" : below normal operational range (SAE J1843)
	0	Accelerator pedal position sensor "A" : above normal operational range (SAE J1843)
	15	Accelerator pedal position sensor "A" : not available (SAE J1843)
29	4	Accelerator pedal position sensor "B" : shorted to low source
	3	Accelerator pedal position sensor "B" : shorted to high source
	2	Accelerator pedal position sensor "B" : intermittent fault
	1	Accelerator pedal position sensor "B" : below normal operational range (SAE J1843)
	0	Accelerator pedal position sensor "B" : above normal operational range (SAE J1843)
	8	Accelerator pedal position sensor "B" : communication fault
	15	Accelerator pedal position sensor "B" : not available (SAE J1843)
108	4	Barometric pressure sensor : shorted to low source
	3	Barometric pressure sensor : shorted to high source
	2	Barometric pressure sensor : intermittent fault
1136	4	E-ECU internal temperature sensor : shorted to low source
	3	E-ECU internal temperature sensor : shorted to high source
	2	E-ECU internal temperature sensor : intermittent fault
	0	E-ECU internal temperature : too high
110	4	Engine coolant temperature sensor : shorted to low source
	3	Engine coolant temperature sensor : shorted to high source
	2	Engine coolant temperature sensor : intermittent fault
	0	Engine coolant temperature : too high
1079	4	Sensor 5V : shorted to low source
	3	Sensor 5V : shorted to high source
	2	Sensor 5V : intermittent fault
158	1	E-ECU system voltage : too low
	0	E-ECU system voltage : too high
1078	4	Engine fuel injection pump speed sensor : shorted to low source
522402	4	Auxiliary speed sensor : shorted to low source
522241	4	Engine fuel rack actuator relay : open circuit
	3	Engine fuel rack actuator relay : short circuit
	7	Engine fuel rack actuator relay : mechanical malfunction
	2	Engine fuel rack actuator relay : intermittent fault
522243	4	Air heater relay : open circuit
	3	Air heater relay : short circuit
	2	Air heater relay : intermittent fault

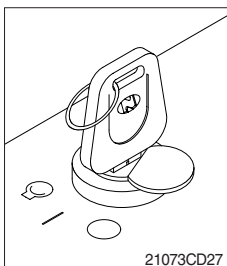
Fault code		Description
YANMAR SPN	FMI	
522242	4	Cold start device : open circuit
	3	Cold start device : short circuit
	2	Cold start device : intermittent fault
522251	4	EGR stepping motor "A" : open circuit
	3	EGR stepping motor "A" : short circuit
522252	4	EGR stepping motor "B" : open circuit
	3	EGR stepping motor "B" : short circuit
522253	4	EGR stepping motor "C" : open circuit
	3	EGR stepping motor "C" : short circuit
522254	4	EGR stepping motor "D" : open circuit
	3	EGR stepping motor "D" : short circuit
100	4	Oil pressure switch : shorted to low source
	1	Oil pressure : too low
167	4	Battery charge switch : shorted to low source
	1	Battery charge : charge warning
522314	0	Engine coolant temperature : abnormal temperature
522323	0	Air cleaner : mechanical malfunction
522329	0	Oily water separator : mechanical malfunction
190	0	Engine speed : over speed condition
638	4	Engine fuel rack actuator : shorted to low source
	3	Engine fuel rack actuator : shorted to high source
	7	Engine fuel rack actuator : mechanical malfunction
639	12	High speed CAN communication : communication fault
630	2	E-ECU internal fault : EEPROM check sum error (data set 2)
	12	E-ECU internal fault : EEPROM error
628	12	E-ECU internal fault : flashROM check sum error (main software)
	2	E-ECU internal fault : flashROM check sum error (data set 1)
	2	E-ECU internal fault : flashROM check sum error (data set 2)
1485	4	E-ECU main relay : shorted to low source
522727	12	E-ECU internal fault : cyclic redundancy check of sub-CPU error
	12	E-ECU internal fault : acknowledgement of sub-CPU error
	12	E-ECU internal fault : communication with sub-CPU error
522728	12	E-ECU internal fault : engine map data version error
522730	12	Immobilizer : CAN communication fault
	8	Immobilizer : pulse communication fault
1202	2	Immobilizer : system fault

3. SWITCHES



80CR93CD02

1) STARTING SWITCH

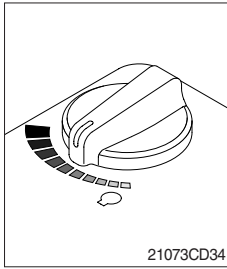


(1) There are three positions, OFF, ON and START.

- ○ (OFF) : None of electrical circuits activate.
- | (ON) : All the systems of machine operate.
- ⦿ (START) : Use when starting the engine. Release key immediately after starting.

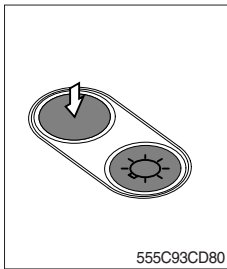
※ **Key must be in the ON position with engine running to maintain electrical and hydraulic function and prevent serious machine damage.**

2) ACCEL DIAL



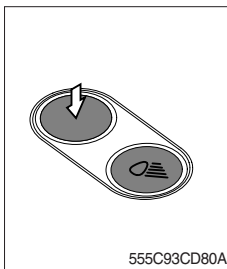
- (1) There are 10 dial setting.
- (2) Setting 1 is low idle and setting 10 is high idle.
 - By rotating the accel dial to right : Engine speed increased.
 - By rotating the accel dial to left : Engine speed decreased.

3) HEAD LIGHT SWITCH



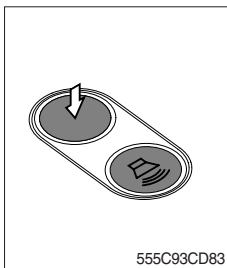
- (1) This switch is used to operate the head light.
 - Press the switch once, the head light comes ON and the pilot lamp ON.
 - Press the switch once more, the head light and pilot lamp turn off.

4) WORK LIGHT



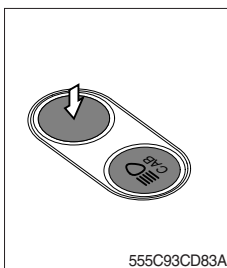
- (1) This switch is used to operate the work light.
 - Press the switch once, the work light comes ON and the pilot lamp ON.
 - Press the switch once more, the work light and pilot lamp turn off.

5) TRAVEL ALARM SWITCH



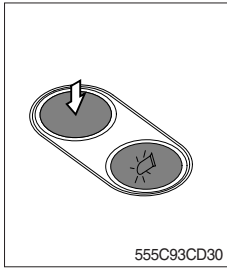
- (1) This switch is used to alarm surroundings when the machine travels to forward and backward.
- (2) On pressing this switch, the alarm operates only when the machine is traveling.

6) CAB LIGHT SWITCH



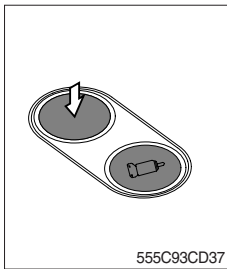
- (1) This switch turns on the cab light on the cab.

7) BEACON SWITCH (option)



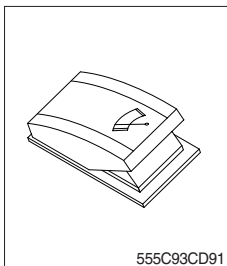
- (1) This switch turns ON the rotary light on the cab.
- (2) The below indicator lamp is turned ON when operating this switch.

8) BREAKER SELECTION SWITCH (option)



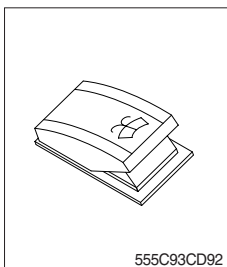
- (1) This switch is used to operate breaker.
- ※ **The breaker operates only when this switch is pressed.**

9) WIPER SWITCH



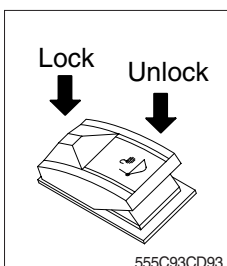
- (1) This switch is used to operate the wiper.
The wiper operates.
- ※ **If wiper does not operate with the switch in the ON position, turn the switch off immediately. Check the cause. If the switch remains ON, motor failure can result.**
- ※ **Do not operate the wiper while the upper windshield is opening. Refer to page 3-29.**

10) WASHER SWITCH



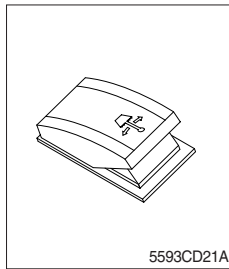
- (1) This switch is used to operate the washer.
 - The washer liquid is sprayed and the wiper is operated only while pressing this switch. If release the switch, return to the first position.

11) QUICK CLAMP SWITCH (option)



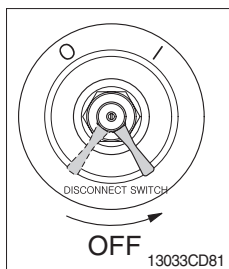
- (1) This switch is used to engage or disengage the moving hook on quick clamp.
- ※ **Refer to the page 8-6 for details.**

12) BOOM OFFSET SWITCH



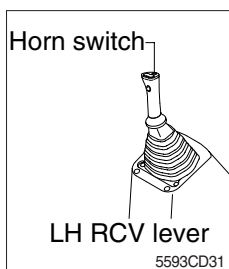
- (1) This switch is used to swing the boom to the right or left direction.
- (2) The indicator lamp turned ON when selected this switch.
- ※ **Refer to the page 4-7 for the operation.**

13) MASTER SWITCH



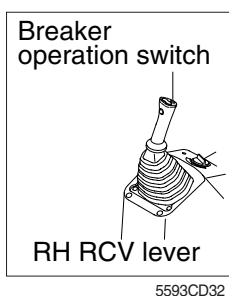
- (1) This switch is used to shut off the entire electrical system.
- (2) I : The battery remains connected to the electrical system.
O : The battery is disconnected to the electrical system.
- ※ **Never turn the master switch to O (OFF) with the engine running. It could result in engine and electrical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

14) HORN SWITCH



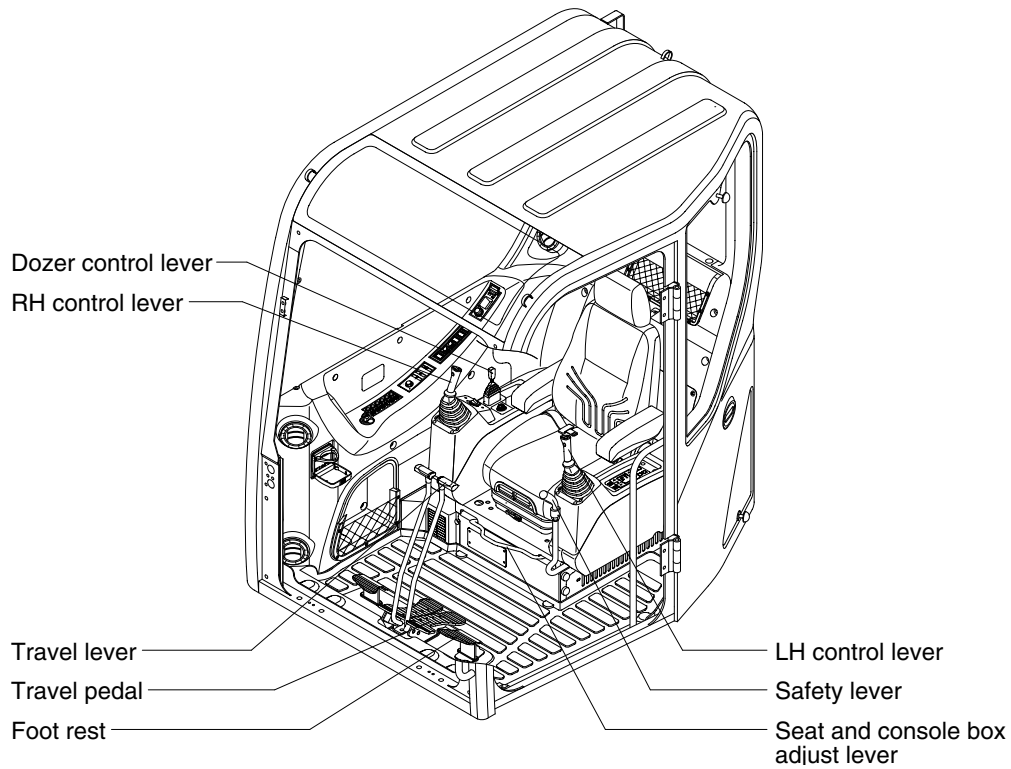
- (1) This switch is at the top of left side control lever.
On pressing, the horn sounds.

15) BREAKER OPERATION SWITCH



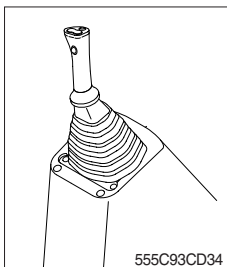
- (1) On pressing this switch, the breaker operates only when the breaker selection switch on the switch panel is selected.

4. LEVERS AND PEDALS



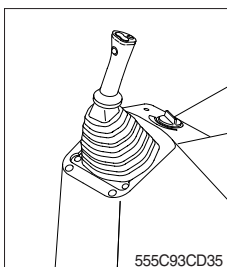
55Z93CD22A

1) LH CONTROL LEVER



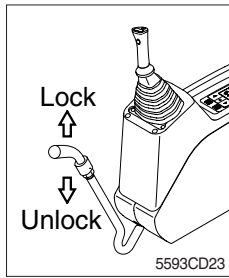
- (1) This joystick is used to control the swing and the arm.
- (2) Refer to **operation of working device** in chapter 4 for details.

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) SAFETY LEVER



(1) LH, RH control levers and dozer control lever are disabled from operation by locating the lever to lock position as shown.

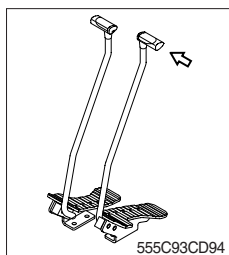
※ **Be sure to raise the lever to LOCK position when leaving from operator's seat.**

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

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

▲ **The machine is able to travel even when the safety lever is in the LOCK position.**

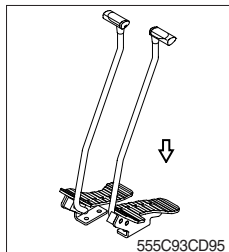
4) TRAVEL LEVER



(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.

5) TRAVEL PEDAL



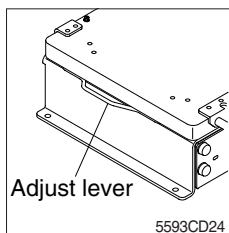
(1) This pedal is used to move the machine forward or backward.

(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.

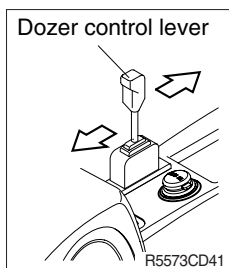
6) SEAT AND CONSOLE BOX ADJUST LEVER



(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 60mm(2.4").

7) DOZER CONTROL LEVER



(1) This lever is used to operate the dozer blade.

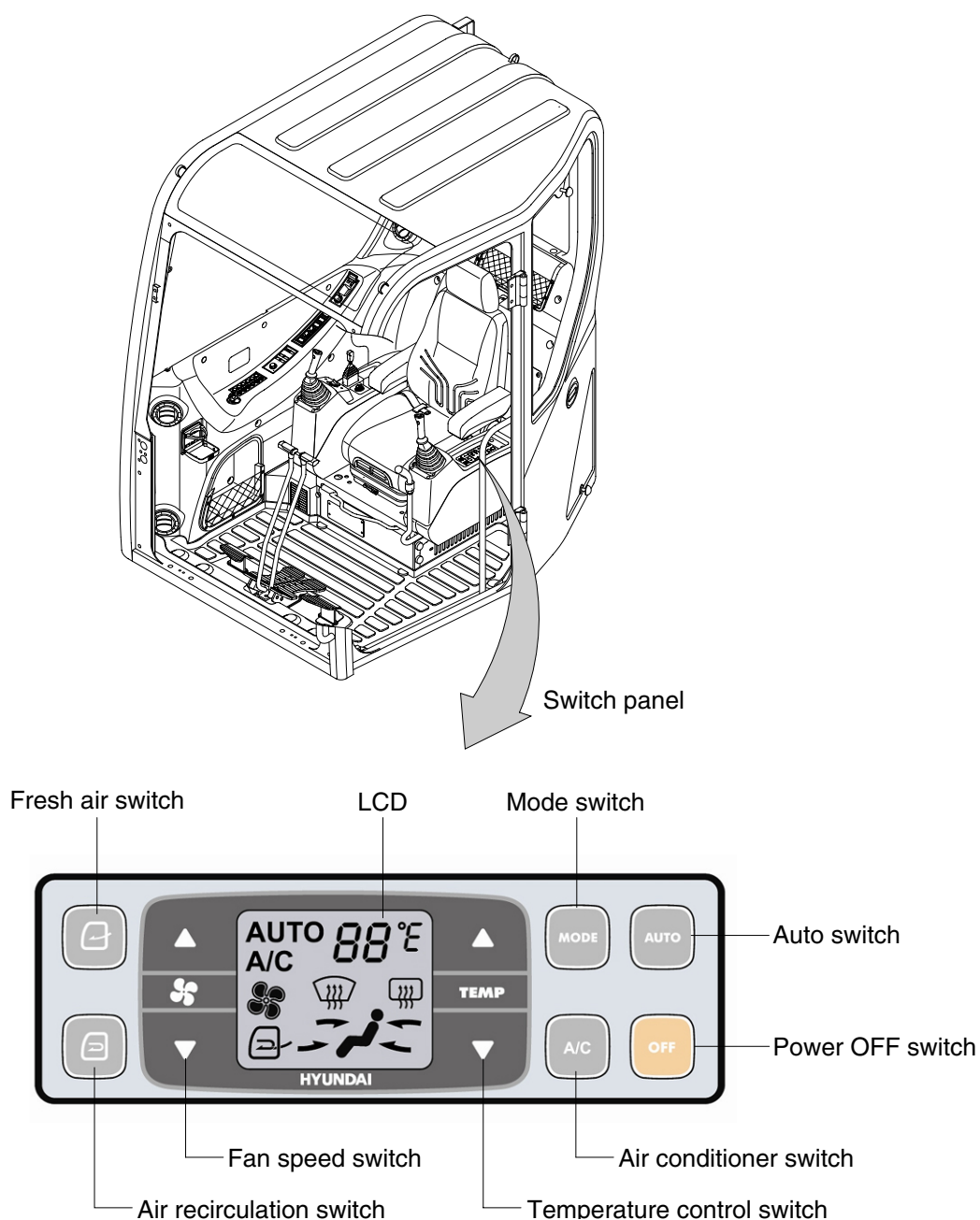
(2) If the lever is pushed forward, the dozer blade will be going down.

If the lever is pulled back, the dozer blade will be going up.

5. FULL AUTO AIR CONDITIONER AND HEATER

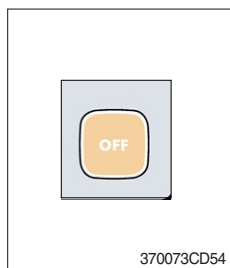
Full auto air conditioner and heater system automatically keeps the optimum condition in accordance with operator's temperature configuration sensing ambient and cabin inside temperature.

- Location of air flow ducts



55Z93CD27

1) POWER OFF SWITCH

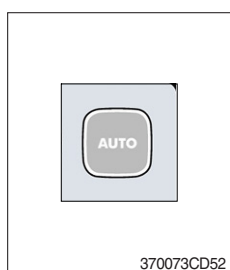


- (1) This switch makes the system and the LED OFF.
Just before the power OFF, set values are stored.

(2) Default setting values

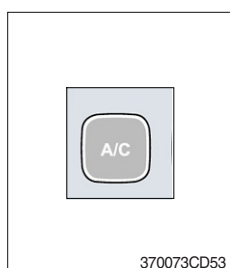
Function	Air conditioner	In/outlet	LCD	Temperature	Mode
Value	OFF	Inlet	OFF	Previous sw OFF	Previous sw OFF

2) AUTO SWITCH



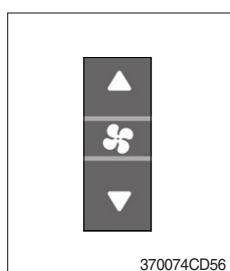
- (1) Turn the starting switch to ON position, LCD lights ON.
Auto air conditioner and heater system automatically keeps the optimum condition in accordance with operator's temperature configuration sensing ambient and cabin inside temperature.
- (2) This switch can restart system after system OFF.

3) AIR CONDITIONER SWITCH (compressor switch)



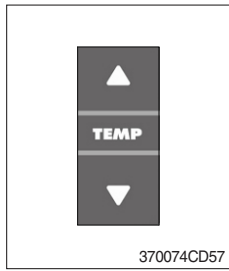
- (1) This switch turns the compressor and the LCD ON.
- (2) In accordance with the temperature sensed by duct (evaporator) sensor, compressor turns ON or OFF automatically.
- ※ **Air conditioner operates to remove vapor and drains water through a drain hose. Water can be sprayed into the cab in case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

4) FAN SPEED SWITCH



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

5) TEMPERATURE CONTROL SWITCH

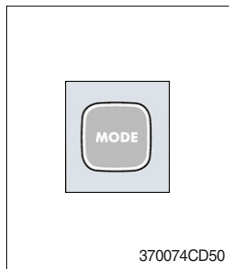


- (1) Setting temperature indication (17~32°C, scale : 1°C)
- (2) Max cool and max warm beeps 5 times.
- (3) The max cool or the max warm position operates as following table.

Temperature	Compressor	Fan speed	In/Outlet	Mode
Max cool	ON	Max (Hi)	Recirculation	Vent
Max warm	OFF	Max (Hi)	Fresh	Foot

- (4) Temperature unit can be changed between celsius (°C) and fahrenheit (°F)
 - ① Default status (°C)
 - ② Push Up/Down temperature control switch simultaneously more than 5 second displayed temperature unit change (°C → °F)

6) MODE SWITCH

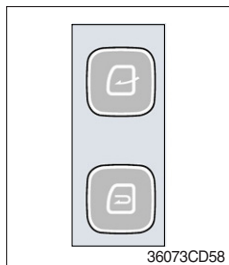


- (1) Operating this switch, it beeps and displays symbol of each mode in order. (Vent → Vent/Foot → Foot → Foot/Def → Vent)

Mode switch		Vent	Vent/Foot	Foot	Foot/Def
Outlet	A	●	●		
	B		●	●	●
	C				●

- (2) When defroster switch operating, FRESH AIR/AIR RECIRCULATION switch turns to FRESH AIR mode and air conditioner switch turns ON.
- (3) When this switch ON, the system operates with previous configuration.

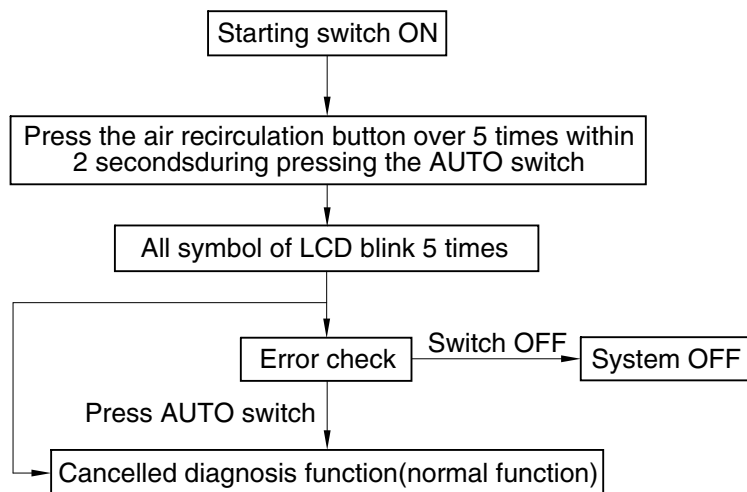
7) FRESH AIR/AIR RECIRCULATION SWITCH



- (1) It is possible to change the air-inlet method.
 - ① **Fresh air** ()
Inhaling air from the outside.
※ **Check out the fresh air filter periodically to keep a good efficiency.**
 - ② **Air recirculation** ()
It recycles the heated or cooled air to increase the energy efficiency.
※ **Change air occasionally when using recirculation for a long time.**
※ **Check out the recirculation filter periodically to keep a good efficiency.**

8) SELF DIAGNOSIS FUNCTION

(1) Procedure



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(2) Error check

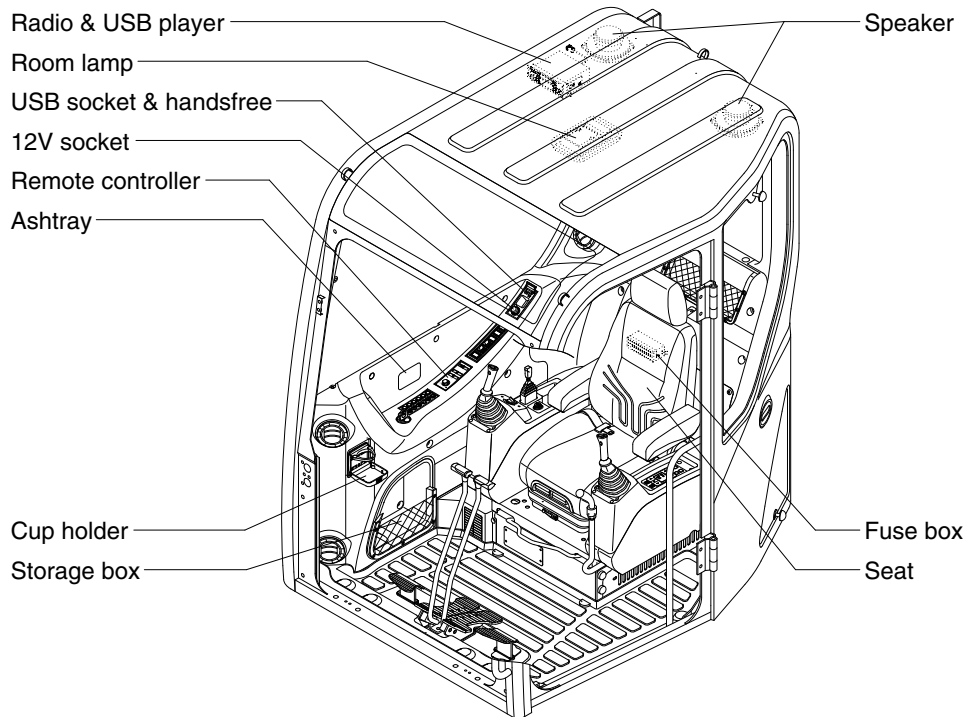
- The corresponding error code flickers on the setup temperature display panel, the other symbol will turn OFF.
- Error code flickers every 0.5 second.
- If error code is more than two, each code flickers 2 times in sequence.
- Error code

Error code	Description	Error code	Description
11	Cabin inside sensor	16	Mode actuator 1
12	Ambient sensor	17	Mode actuator 2
14	Duct (evaporator) sensor	18	Intake actuator
15	Temp actuator	-	-

(3) Fail safe function

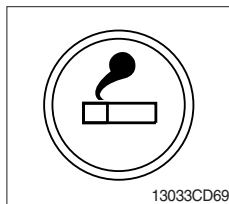
Error description	Fail safe function
Cabin inside sensor (11)	25°C alternate value control
Ambient sensor (12)	20°C alternate value control
Duct (evaporator) sensor (14)	1°C alternate value control
Temp actuator (15)	If opening amount is 0 %, the alternate value is 0 %
	If not, the alternate value is 100 %
Mode actuator 1, 2 (16, 17)	The alternate value is Vent

6. OTHERS



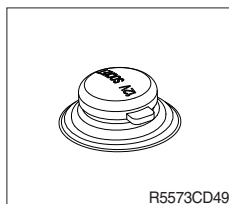
55Z93CD28

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 12V, 120W.

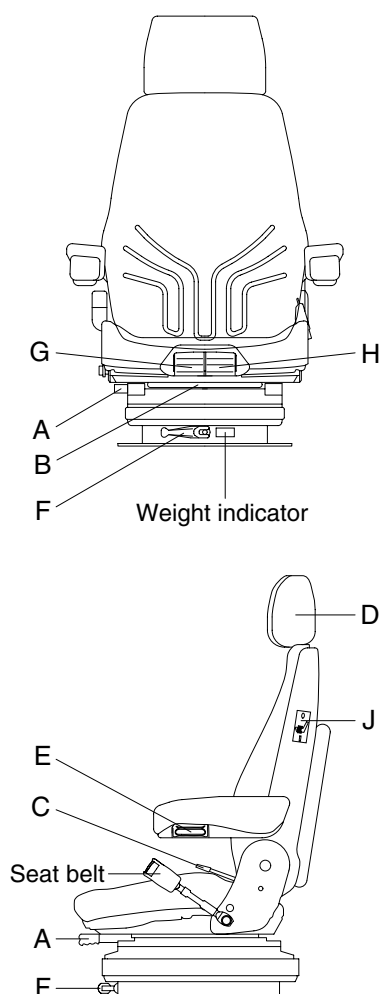
2) 12V SOCKET (option)



- (1) Utilize the power of 12V as your need and do not exceed power of 12V, 120W.

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.



140Z93CD55

(1) Forward/Backward adjustment (A)

- ① Pull lever A to adjust seat forward or backward.
- ② The seat can be moved forward and backward over 130 mm (5.1") in 13 steps.

▲ Do not lift the locking lever with you leg or calf.

(2) Upward/Downward adjustment (B)

- ① Pull lever B to adjust seat upward or downward over 60 mm (2.4").
- ② Forward or backward side adjustment only can be made, tilting to one side, by moving lever B respectively.

(3) Reclining adjustment (C)

Pull lever C to adjust seat back rest.

(4) Armrest adjustment (E)

This can be adjusted by pushing the button E to right and left.

(5) Headrest adjustment (D)

This is adjustable vertically and forward or rearward to fit operator's requirements.

(6) Weight adjustment (F)

Adjust the lever with the seat empty to the operator's weight.

(7) Seat depth adjustment (G)

- ① The depth of the seat pan can be individually adjusted.
- ② To adjust the depth of the seat cushion, pull the right handle upward. By moving the seat cushion backwards or forwards the desired seating position can be reached.

(8) Seat pan angle adjustment (H)

- ① The angle of the seat pan can be individually adjusted.
- ② To adjust the angle of the seat pan, pull the left handle upwards. By exerting pressure on or off the front or rear part of the seat pan it can be moved to the desired position.

(9) Seat heater (J)

The seat heater can be turned on/off by pressing the switch.

0 = Seat heater OFF

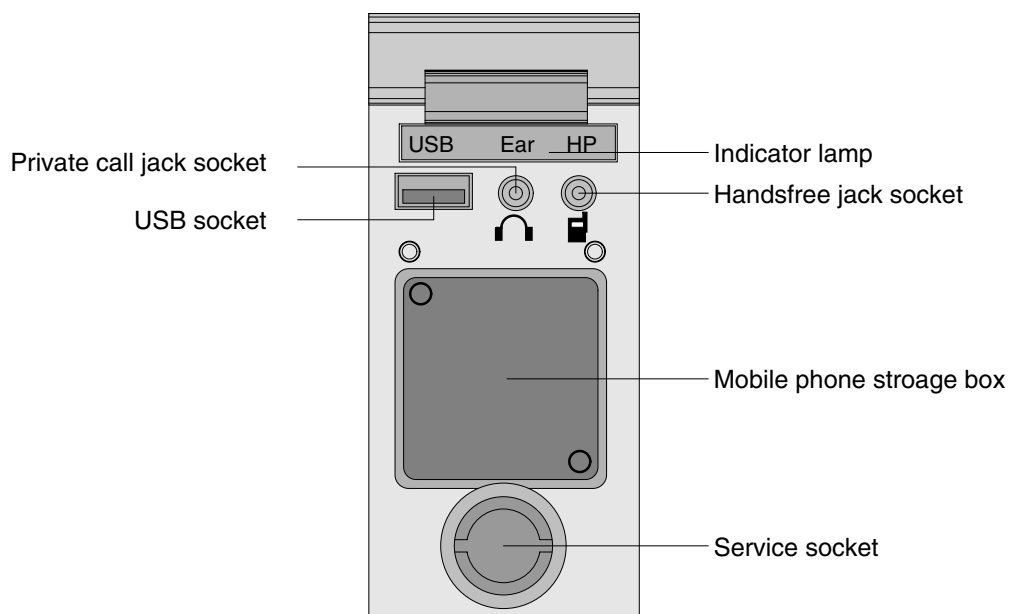
I = Seat heater ON

▲ Always check the condition of the seat belt and mounting hardware before operating the machine.

▲ Replace the seat belt at least once every three years, regardless of appearance.

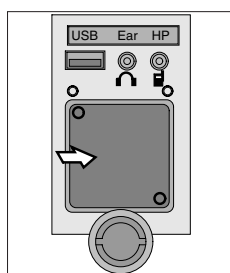
4) HANDSFREE

Allow you to dial a call or to have a conversation without holding your handset. Use the remote controller when making and answering a calls or ring off.



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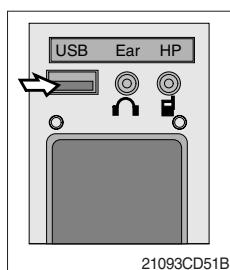
(1) Mobile phone storage box



21093CD51A

- ① Mobile phone can be stored when call by handsfree.

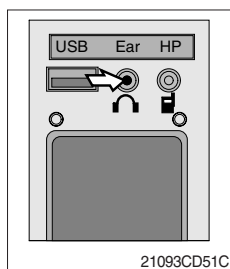
(2) USB socket



21093CD51B

- ① This socket is used to charging the mobile phone.

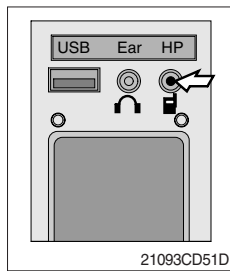
(3) Private call jack socket



21093CD51C

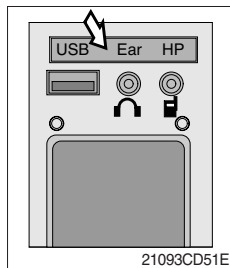
- ① This can be used protect you privacy calling by using ear phone.
- ② The mobile phone must be connected handsfree jack socket.

(4) Handsfree jack socket



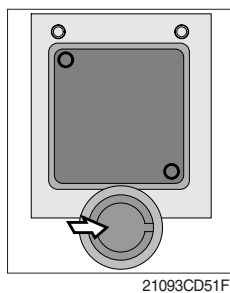
- ① Connect the jack cable when call by handsfree.
- ② Use the special adapter when jack cable is not interchangeable.
- ③ Check the jack type of mobile phone before use.

(5) Indicator lamp



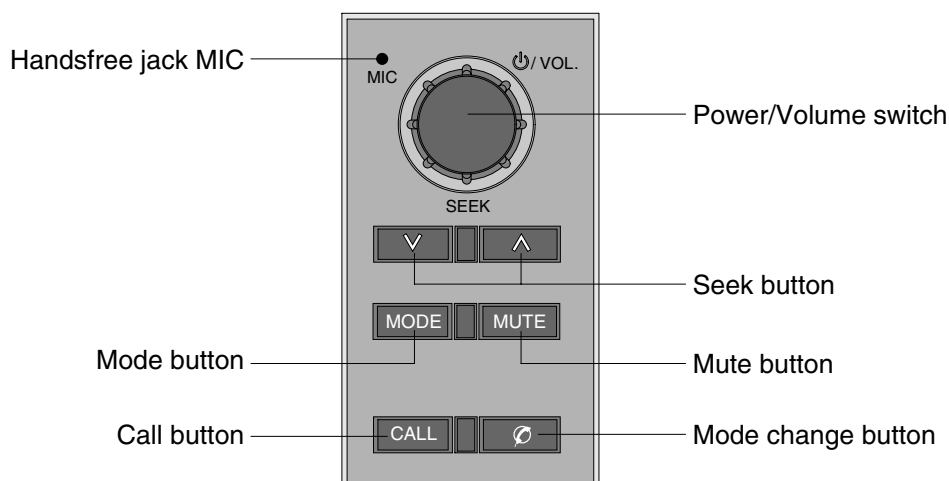
- ① This lamp is turned ON when the handsfree mode selected.

(6) Service socket



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

5) REMOTE CONTROLLER



21093CD52

(1) Power and volume switch



21093CD52A

- ① This switch is used to turn the audio or handsfree ON or OFF.
 - ② This switch is turned to right, the handsfree volume is increased over 7 steps.
 - ③ If it is turned to left, volume will be decreased.
- ※ This switch adjust the audio volume when selected audio mode.

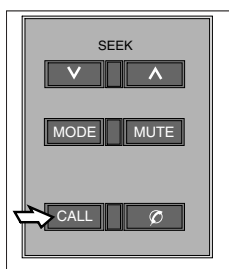
(2) Mode change button



21093CD52B

- ① This button is to select the handsfree mode or audio mode.
 - Lamp ON : Handsfree mode ("TEL MUTE" displayed ON audio LCD)
 - Lamp OFF : Audio mode

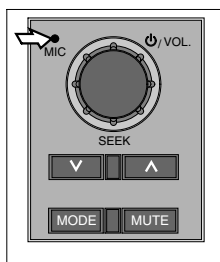
(3) Call button



21093CD52C

- ① This button is used answer a call, last number redial, ring off.
 - ② For calling, press the button over 0.5sec within 3 seconds until the beep sounds.
- ※ This can be used when the starting switch is ON.

(4) Handsfree MIC



21093CD52D

- ① This MIC transfers user voice to receiver of the call when making a call by handsfree.

(5) Seek button



21093CD52E

- ① If this button pressed, the radio automatically stops at the next frequency of broadcasting for your listening.
- ② Press  to turn a station of a higher frequency or  to a lower frequency.

(6) Mute button



21093CD52G

- ① Short press this button to mute or cancel the mute (silence) while broadcasting.

(7) Mode button



21093CD52F

- ① Press the mode button to select the desired mode.
 - ② FM1 → FM2 → AM → CD → FM1
- ※ The LCD displayed each mode.

(8) Wireless handsfree

- ① To activate a wireless handsfree call using bluetooth of the mobile phone, you need to perform pairing first. For pairing, set the bluetooth activating mode of your mobile phone.
 - a. When you complete the setting of the bluetooth mode of the mobile phone, press the CALL button for more than six seconds. At this time, you can hear beep sounds three times.
 - b. Next, the mobile phone finds bluetooth named "HYUNDAI".
Select "HYUNDAI" and set "Connect with bluetooth on the mobile phone".
For the connection, the password is, by default, set as "0000".
 - c. Normal bluetooth pairing once the mobile phone is displayed in the menu.
- ② Making and answering calls follows the same steps of the calling procedures for the wired handsfree system. While you are using the wireless handsfree, you may receive another call. In this case, beep sounds are heard.

③ Cautions related to pairing

You need to set pairing only once when the mobile phone and the integrated remote control is initially used. They will be automatically connected from then.

Meanwhile, if the excavator turns on back with the pairing activated, the connection may require 20 seconds or longer.

④ To deactivate the pairing function

When you want to deactivate the pairing, press and hold the CALL button for more than three seconds. Then, you can hear beep sounds twice and the function will be deactivate.

6) FUSE BOX

WORK LAMP	10A	START KEY	30A
FUEL PUMP HORN	20A	CASSETTE CLUSTER	20A
CIGAR LIGHT WIPER MOTOR	10A	AIRCON HEATER ROOM LAMP	30A
AIR-CON HEATER	5A	CONTROLLER	10A
SOLENOID	20A	CASSETTE RADIO	10A
ALT START	10A	CLUSTER SWITCH PANEL	20A
SAFETY SOL	20A	CONTROLLER	10A
ROTARY LAMP	10A	FUEL CUT	30A
PRE-HEAT	10A	AIRCON FAN	20A
FEED P/P	10A	HEAD LAMP	20A
FUSE HOLDER		SPARE	10A
		SPARE	20A

5593CD29

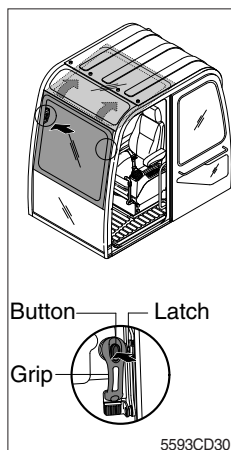
(1) The fuses protect the electrical parts and wiring from burning out.

(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.**

7) UPPER WINDSHIELD



5593CD30

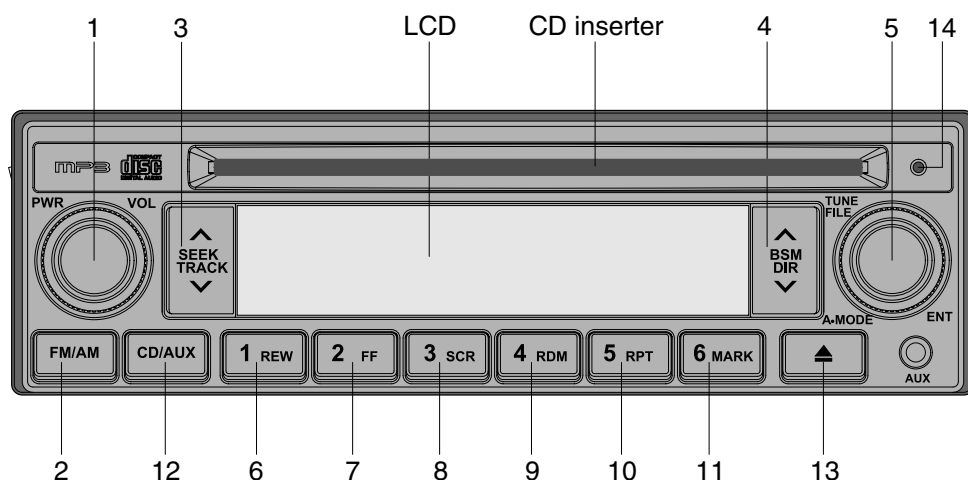
(1) Perform the following procedure in order to open the upper windshield.

- ① Release both latches in order to release the upper windshield.
- ② Hold both grips that are located at both side 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 is engaged.

▲ **When working, without having locked the windshield by the auto lock (by pushing the windshield to the rear until it's completely fixed), please be careful as it can cause personal injury if the windshield is not fixed or falls off.**

(2) Perform the following procedure in order to close the upper windshield.
Reverse step ① through step ③ in order to close the upper windshield.

8) RADIO AND CD/MP3 PLAYER (machine serial NO. : -#0007)



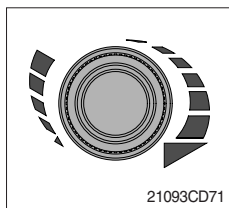
21093CD70

■ FRONT PANEL PRESENTATION

- | | |
|---|---|
| <p>1  Power and volume switch</p> <p>PWR Press to power on/off</p> <p>VOL Turn right/left to adjust the volume</p> <p>2  AM/FM button (radio)</p> <p>3  Seek mode (radio)
Auto search up/down
..... Track mode(CD)
Short press : Next/previous track
Long press : Fast forward or rewind
Memory file search up/down (MP3)</p> <p>4  BSM mode (radio)
6 best station automatic memory
..... DIR mode (MP3)
Select the desired folder (MP3)
Long press : Fast forward or rewind</p> <p>5  Manual frequency search (radio)
Turn right/left to adjust the frequency</p> <p>FILE Search for desired file (CD/MP3)
Turn right/left to adjust the track no</p> <p>A · MODE ... Select bass/middle/treble (radio)</p> <p>ENT Select the desired track (CD/MP3)</p> | <p>6  Preset memory button 1
REW Fast rewind (CD)</p> <p>7  Preset memory button 2
FF Fast forward (CD)</p> <p>8  Preset memory button 3
SCR Scroll button (CD-MP3)</p> <p>9  Preset memory button 4
RDM CD random playback on/off</p> <p>10  Preset memory button 5
RPT CD repeat track on/off</p> <p>11  Preset memory button 6
MARK Long press : MP3 file memory/deletion
Short press : Memory file playback</p> <p>12  CD playback button
Press to CD insert</p> <p>13  Disc eject (CD)</p> <p>14 CD indicator lamp</p> |
|---|---|

■ RADIO

(1) Power and volume switch



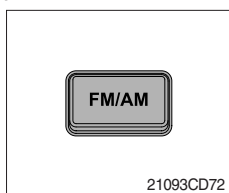
① Power ON/OFF

This switch is used to turn the audio ON or OFF.

② Volume

This switch turned to right or left, the sound is increased or decreased.

(2) FM/AM button



① You can broadcasting on AM or FM band by pressing this band selection button.

② The bands are changed in the following order.

FM1 → FM2 → AM → FM1

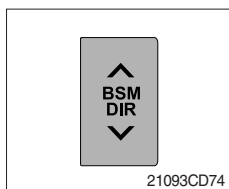
(3) Seek button



① If this button pressed, the radio automatically stops at the next frequency of broadcasting for your listening.

② Press  to turn a station of a higher frequency or  to a lower frequency.

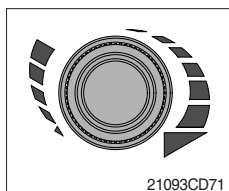
(4) BSM (best station memory) button



① You can automatically memory 6 strongest FM stations on the FM BSM band or 6 strongest AM stations on the AM BSM band.

- Press BSM to active best station memory.
- The set gives a beep and then mutes.
- When it has finished, you heard a beep followed by the station memoried on preset 1.
- Sometimes it may not be possible to find 6 stations.

(5) Manual tuning/audio mode button



① It is possible to change manual tuning while broadcasting.

- Turned to right or left, the frequency is increased or decreased.

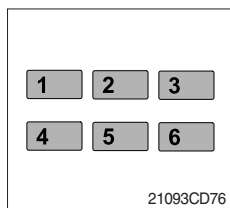
② Audio mode (Bass/Middle/Treble)

- Press this button to select desired audio mode.
- Adjust the settings with the volume button right/left.
 - BASS : Press the button once
 - MIDDLE : Press the button twice
 - TREBLE : Press the button three times

③ If it is pressed four times, BALANCE will be selected.

- Turned to clockwise, the LH speaker volume is decreased and counterclockwise, the RH speaker volume is decreased.

(6) Preset memory button



① Manually storing stations in a preset

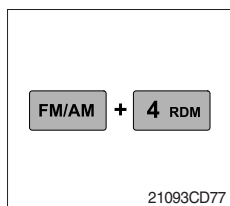
Six stations per band can be stored and recalled using the preset keys (1 to 6).

- Tune in to the desired station.
- Press the desired preset key (1 to 6) for more than 0.8 seconds to store the current tuned station.

② Recalling a preset

Press the desired preset key (1 to 6) to recall the stored station.

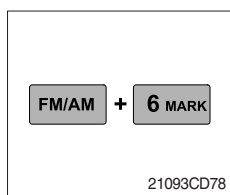
(7) Frequency band setting



- ① America : Press **FM/AM** and **4 RDM** button at the same time. "nA" will be displayed on the LCD for one second.

AM : Frequency changes in 10kHz between 530 to 1710kHz.

FM : Frequency changes in 0.2MHz between 87.7 to 107.9MHz.

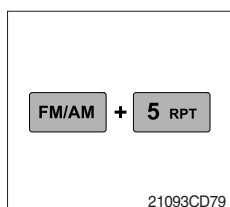


- ① EUROPE : Press **FM/AM** and **6 MARK** button at the same time. "Eu" will be displayed on the LCD for one second.

LW : Frequency changes in 9kHz between 153 to 279kHz.

MW : Frequency changes in 9kHz between 531 to 1620kHz.

FM : Frequency changes in 0.05MHz between 87.5 to 108.0MHz.



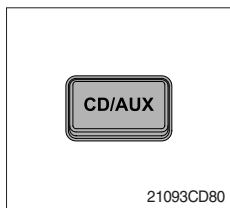
- ① General : Press **FM/AM** and **5 RPT** button at the same time. "inT" will be displayed on the LCD for one second.

AM : Frequency changes in 9kHz between 531 to 1602kHz.

FM : Frequency changes in 0.1MHz between 87.5 to 108.0MHz.

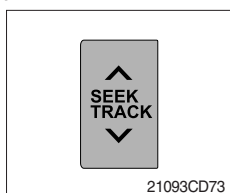
■ CD/MP3 PLAYER

(1) CD playback button



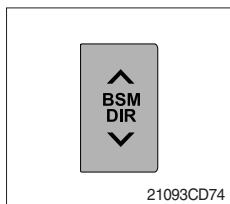
- ① It is possible to change CD playback during broadcasting.
- ② If there was no CD on audio, "NO DISC" displays on LCD during 5 seconds.

(2) Track button



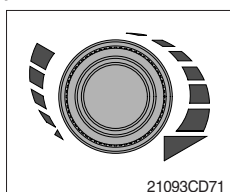
- ① **CD player**
 - Short press : Select the next/previous track
 - Long press : Select the fast forward or rewind
- ② **MP3 player**
 - Memory file search up/down

(3) DiR mode button (MP3)



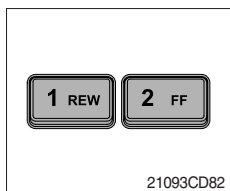
- ① You can find the desired mp3 folder up/down.
- ② If you find desired folder, press the file search button to playback the first file in the folder.
- ※ **If a file is not selected until 5 seconds after search folder, the function will be terminated.**

(4) File search button



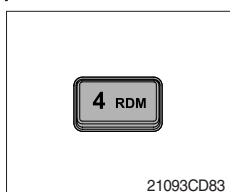
- ① It is possible to search the desired CD track or mp3 file.
 - Turned to clockwise, the CD track or mp3 file number is increased.
 - If it is turned to counterclockwise, CD track or mp3 file number is decreased.
- ※ **If a file or track is not selected until 5 seconds, function will be terminated.**

(5) Fast rewind/Fast forward button (CD)



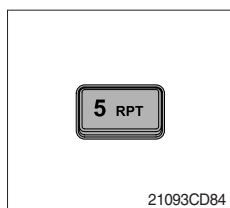
- ① Continually press these button to quickly move rewind or forward through the disc.
- ※ **The CD player sound level is lower while press this button.**
- ② Normal playback resumes when you release the button.

(6) Random track button (CD)



- ① Press this button to activate random track playback.
- ※ **The LCD displays "RDM".**
- ② It is canceled press one more this button.

(7) Repeat track button (CD)

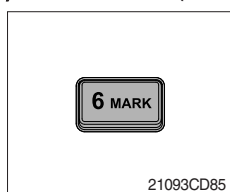


① Press this button to activate repeat current track playback.

※ The LCD displays "RPT".

② It is canceled press one more this button.

(8) Mark button (MP3)



① Memory

- Press over 0.8 second, the current file memorized with a beep (max 100 tune memory).

※ The LCD displays "M" and "Marked number" for 3 seconds.

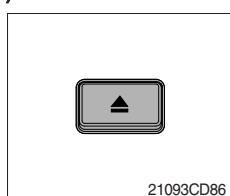
② Memory file playback

- Press within 0.8 second, the marked file playback.

③ Deletion

- Press over 0.8 second, the marked file will be deleted with a beep.

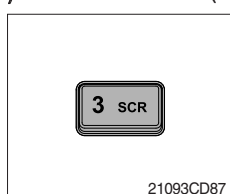
(9) CD EJECT BUTTON



① Press this button to eject the disc.

※ If there is no disc in the audio, the LCD displays "NO disc" for 5 seconds.

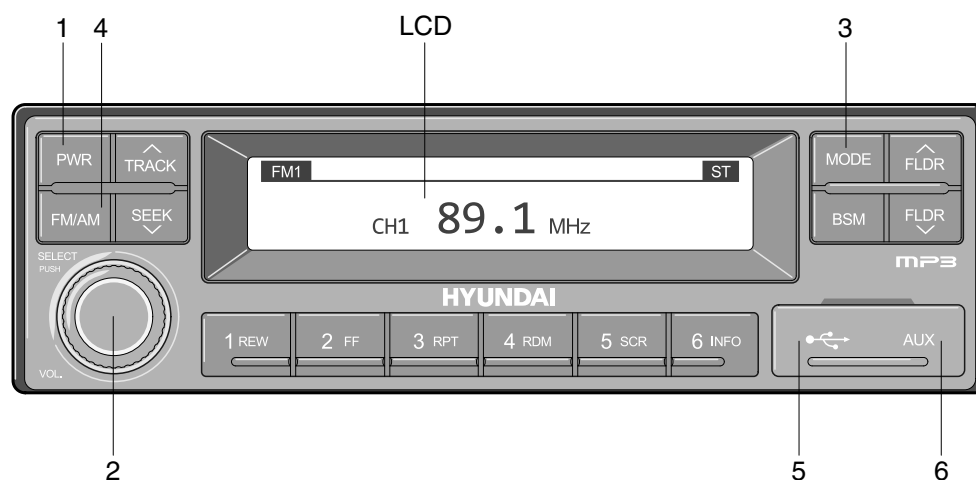
(10) SCR BUTTON (MP3)



① This button to confirm the long file name on LCD.

RADIO AND USB PLAYER (machine serial No. : #0008-#1194)

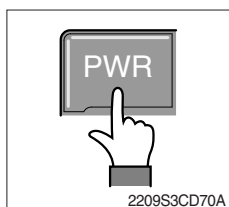
■BASIC FUNCTIONS



2209S3CD70

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

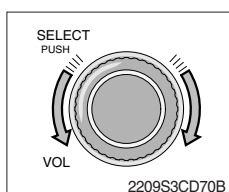
(1) Power (PWR) button



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

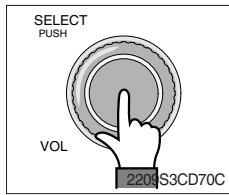
(2) Volume/Sound setting button

· Volume (VOL) button



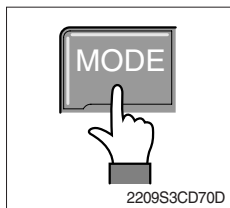
- ① Turn the VOL button clockwise to increase the volume and counter-clockwise to decrease the volume.

• Sound setting



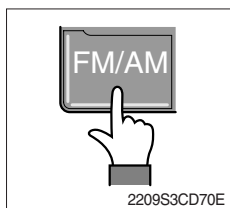
- ① Press the SELECT button to conduct sound setting.
Each press of the button will change the sound setting in the following order.
BASS → MIDDLE → TREBLE → BALANCE → EQ → BEEP
- ② After selecting the desired setting, turn the SELECT button clockwise/counter-clockwise to adjust the sound setting value.
- ③ **BASS adjustment**
Turn the SELECT button clockwise to increase the bass and counter-clockwise to decrease the bass. BASS can be adjusted from max +10/min -10. If there are no adjustments for 3 seconds, the changes will be saved and the previous mode will be restored.
- ④ **MIDDLE adjustment**
Turn the SELECT button clockwise to increase the middle and counter-clockwise to decrease the middle. MIDDLE can be adjusted from max +10/min -10. If there are no adjustments for 3 seconds, the changes will be saved and the previous mode will be restored.
- ⑤ **TREBLE adjustment**
Turn the SELECT button clockwise to increase the treble and counter-clockwise to decrease the treble. TREBLE can be adjusted from max +10/min -10. If there are no adjustments for 3 seconds, the changes will be saved and the previous mode will be restored.
- ⑥ **Left/Right BALANCE adjustment**
Turn the SELECT button clockwise to increase the right-side speaker volume and counter-clockwise to increase the left-side speaker volume. BALANCE can be adjusted from 10L/10R. If there are no adjustments for 3 seconds, the changes will be saved and the previous mode will be restored.
- ⑦ **EQ (EQUALIZER) adjustment**
Turn the SELECT button clockwise/counter-clockwise to select the desired EQ. EQ settings are as shown below.
Cls (classic) → Pop → Rock → Jazz → off
If there are no adjustments for 3 seconds, the changes will be saved and the previous mode will be restored.
※ **Upon selecting EQ, the BASS, MIDDLE and TREBLE values will be turned off.**
The BASS, MIDDLE, TREBLE values can be set only when EQ Off is selected.
- ⑧ **BEEP sound adjustment**
Turn the SELECT button clockwise/counter-clockwise to the beep sound ON/OFF. If there are no adjustments for 3 seconds, the changes will be saved and the previous mode will be restored.

(3) MODE selection button



- ① Press the MODE button to change to RADIO/USB/AUX/iPod modes. However, the mode can be selected only when the respective media is connected.
 - ② If iPod is connected to the audio, the mode will change in the following order.
RADIO → iPod → USB (handfree)
 - ③ If USB, AUX is connected to the audio, the mode will change in the following order.
RADIO → USB(front) → USB(handfree) → AUX
- ※ **USB and AUX mode will operate only when corresponding devices are connected.**
 - ※ **When connecting iPod, AUX and front USB cannot be connected.**
 - ※ **The iPod is connected to the USB in the machine handfree.**

(4) Radio (FM/AM) selection button



- ① Each press of the FM/AM button will change the radio mode in the following order.
FM1 → FM2 → FM3 → AM
- ② Preset memory of up to FM : 18 stations, AM : 6 stations

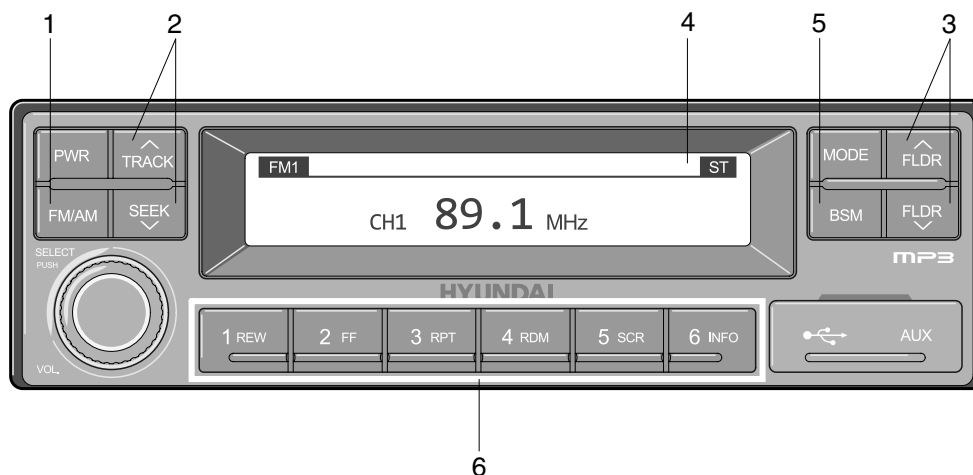
(5) USB slot

Connects USB to play USB music files.

(6) AUX terminal

Connects AUX cable to play AUX music files.

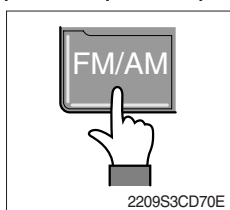
■ RADIO



2209S3CD71

- | | |
|---|--|
| 1 Radio (FM/AM) selection button | 4 LCD display |
| 2 TRACK/SEEK button | 5 BSM (Best Station Memory) button |
| 3 Broadcast manual search (FLDR) button | 6 Saving broadcast frequencies to PRESET numbers |

(1) Radio (FM/AM) selection button



- ① Each press of the FM/AM button will change the radio mode in the following order.

FM1 → FM2 → FM3 → AM

- ② In addition, pressing the FM/AM button when the starting switch is in ON state will turn the power on and activate the radio.

③ Setting regional Radio Frequency

► North America Frequency

Press the FM/AM and Preset 1 button simultaneously to set frequency in accordance to the North America Frequency settings. "nA" will become displayed on the LCD for one second.

FM : 87.7 ~ 107.9 MHz (200 KHz)

AM : 530 ~ 1710 KHz (10 KHz)

► Local/Middle East/Asia Frequency

Press the FM/AM and Preset 2 button simultaneously to set frequency in accordance to the Local/Middle East/Asia Frequency settings. "InT" will become displayed on the LCD for one second.

FM: 87.5 ~ 108 MHz (100 KHz)

AM: 531 ~ 1602 KHz (9 KHz)

► Europe Frequency

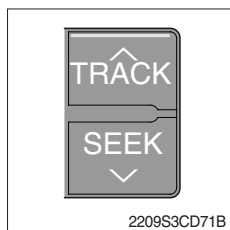
Press the FM/AM and Preset 3 button simultaneously to set frequency in accordance to the North America Frequency settings. "Eu" will become displayed on the LCD for one second.

FM: 87.5 ~ 108 MHz (50 KHz)

MW: 531 ~ 1602 KHz (9 KHz)

LW: 153 ~ 279 KHz (1 KHz)

(2) TRACK/SEEK button



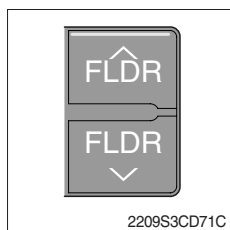
- ① As buttons used to automatically search broadcasts, pressing the button will automatically search and stop at a frequency with superior reception.

TRACK $\wedge$: Searches frequencies higher than current frequency

SEEK $\vee$: Searches frequencies lower than current frequency

※ **When frequencies cannot be properly found due to weak broadcast reception, try using manual FLDR button. (Refer to manual FLDR button explanation below)**

(3) Broadcast manual search (FLDR) button



- ① As button used to search frequencies manually, a press of the SEEK step (refer to note below) will change the frequency.

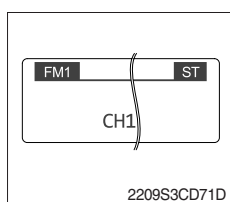
Pressing and holding the button will continue changing the frequency. Releasing the button will stop the search at the current frequency.

FLDR $\wedge$: Searches frequencies higher than current frequency

FLDR $\vee$: Searches frequencies lower than current frequency

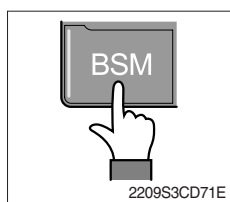
※ **SEEK STEP : FM-100KHz, AM-9KHz**

(4) LCD display



- ① The currently received broadcast frequency info and status are displayed.

(5) BSM (Best Station Memory) button

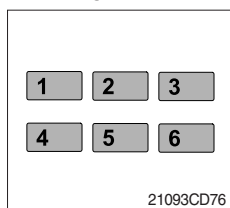


- ① Press and hold the BSM button to listen to the presets saved in FM BAND FM1, FM2, and FM3 or AM BAND AM for 5 seconds each.

When you find a station you wish to listen to, press the BSM button again to receive the selected broadcast.

- ② Shortly press the BSM button to automatically save frequencies with superior reception in presets (1REW~6INFO). The BSM feature will save AM frequencies in AM mode and FM frequencies in FM mode.

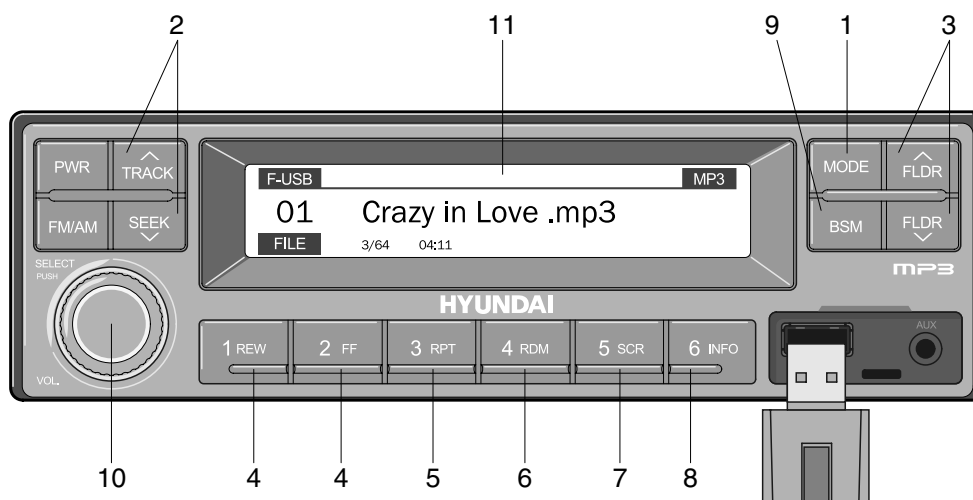
(6) Saving broadcast frequencies to PRESET numbers



Up to 18 FM broadcasts and 6 AM broadcasts can be saved.

- ① Use the auto/manual search buttons to find the desired frequency.
 - ② Select the preset button (1REW~ 6INFO) to which you wish to save the selected frequency. Press and hold the preset button.
 - ③ The frequency will be saved to the preset button to a sound of a beep. The saved frequency number will be displayed on the LCD DISPLAY. (However, the beep will not sound if the beep function has been turned off in sound setting.)
 - ④ After saving is complete, pressing the preset button will play the corresponding broadcast frequency.
- ※ No beep sound signifies that the preset has not been saved. In this case, try again from the first step. (However, the beep will not sound if the beep function has been turned off in sound setting.)

■ USB CONNECTION

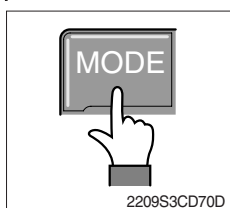


2209S3CD72

- | | |
|-----------------------------|---|
| 1 USB selection button | 7 Scroll (SCR) button |
| 2 TRACK UP/SEEK DOWN button | 8 View music info (INFO) button |
| 3 FLDR UP/DOWN button | 9 Scan button (BSM) |
| 4 FF/REW button | 10 Finding and playing file (SELECT) button |
| 5 RPT/FOLDER RPT button | 11 LCD display |
| 6 RDM/FOLDER RDM button | |

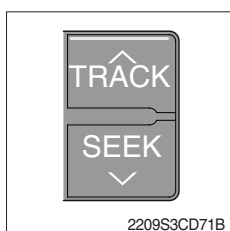
- Operates only when a USB is connected. Connecting a USB to the audio will automatically convert to USB mode.
- Connecting the USB when the starting switch is in ON state will turn the power on and automatically play the songs within the USB.

(1) USB selection button



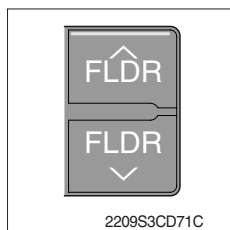
- ① While playing a different mode, press the MODE button to convert to USB mode. Connecting a USB to the audio will automatically convert to USB mode even if another mode is playing and automatically play the songs within the USB.
- ② If the USB is connected to both the front USB and handfree, then MODE is converted in the following order.
RADIO → USB(front) → USB(handfree)

(2) TRACK UP/SEEK DOWN button



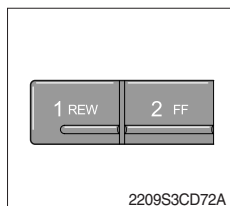
- ① While playing USB, press the TRACK ^ button to play the beginning of the next song.
Press the SEEK v button to return to the beginning of the current song. Press the button again to play the beginning of the previous song.

(3) FLDR UP/DOWN button



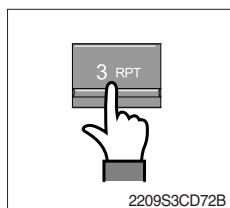
- ① If there are more than 2 folders in the USB, pressing the FLDR UP/DOWN button will move to the previous or next folder.
- ② If there are no folders in the USB, then pressing the button will move up/down within the folder in 10 file increments.

(4) FF/REW button



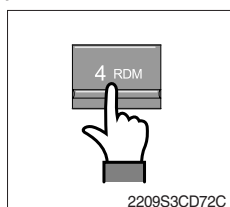
- ① While a USB is operating, press and hold the FF button to fast-forward the song. When fast-forward is complete, the next song will properly play from the beginning even if you continue holding the button. Press and hold the REW button to rewind the song. When rewind is complete, the current song will properly play from the beginning even if you continue holding the button. Shortly pressing the buttons will not operate the FF/REW.

(5) RPT/FOLDER RPT button



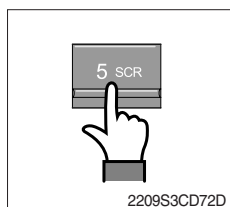
- ① While music is playing, shortly press the RPT button to repeat the currently playing song.
- ② (RPT function) Press and hold the RTP button to sequentially repeat all songs within the current folder. (FOLDER RPT, however, music files in the USB must be saved in folder format.)

(6) RDM/FOLDER RDM button



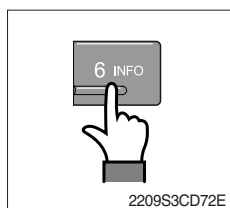
- ① While music is playing, shortly press the RDM button to randomly play the songs in the current folder. (RDM)
- ② While music is playing, press and hold the RDM button to randomly play the songs in the current folder. (FOLDER RDM, however, music files in the USB must be saved in folder format.)

(7) Scroll (SCR) button



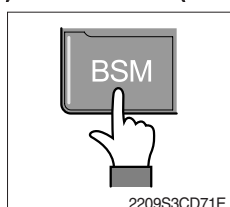
- ① Press the SCR button to turn ON/OFF the scroll function which scrolls the file name of the currently playing song on the LCD from right to left.

(8) View music info (INFO) button



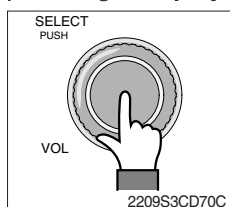
- ① Each time the INFO button is pressed, the info on the currently playing song will be displayed in the following order.
FILE NAME → TITLE → ARTIST → ALBUM → DIR

(9) Scan button (BSM)



- ① While music is playing, shortly press the BSM button to scan each song within the USB for 10 seconds in sequential order. (SCN)
- ② Press and hold the BSM button to scan each song within the current folder for 10 seconds in sequential order. (FOLDER SCN, however, music files in the USB must be saved in folder format.)

(10) Finding and playing file (SELECT) button



- ① While USB is playing, press and hold the SELECT button for over 3 seconds to enter FILE BROWSER mode and search for desired files.

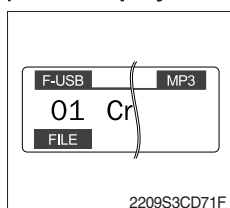
After entering FILE BROWSER mode, turn the SELECT button left/

- ② right to find the desired folder. After finding the folder, press the SELECT button to select the folder. Turn the SELECT button left/right to find the desired song and press the SELECT button to play.

If there are no adjustments for 3 seconds after pressing the

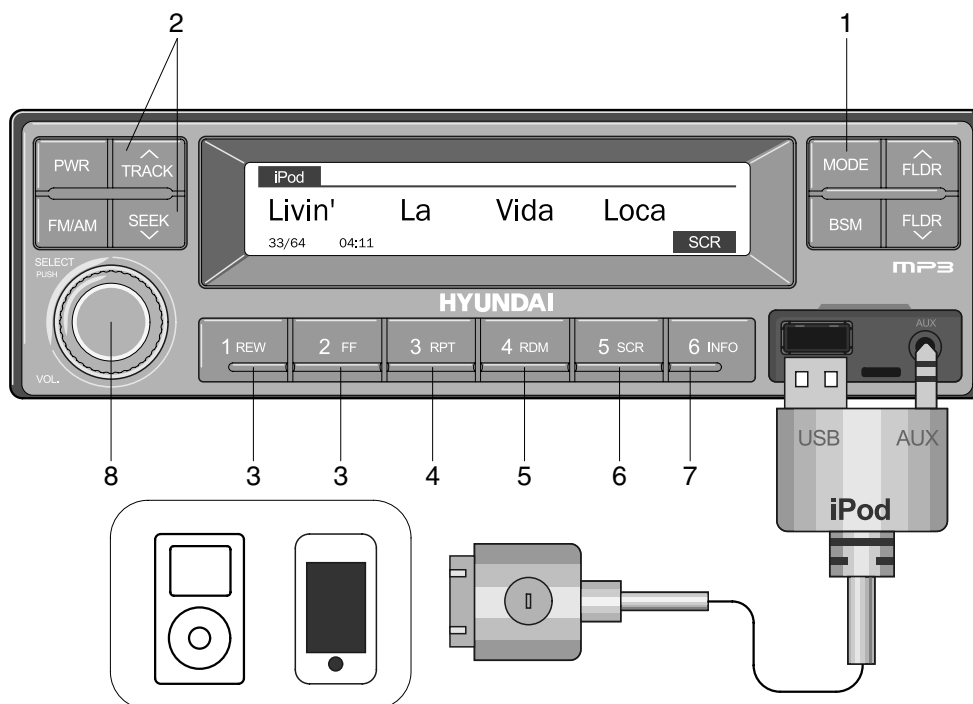
- ③ SELECT button, the function will be turned off and the USB play screen will be displayed.

(11) LCD display



- ① Displays the info of the currently playing song.
 - F-USB : Displays USB is connected to the Audio Front
 - R-USB : Displays USB is connected to the handfree
 - RPT : Displays that repeat function is turned on
 - 📁 RPT : Displays that folder repeat function is turned on
 - RDM : Displays that random play is turned on
 - 📁 RDM : Displays that folder random play is turned on
 - SCR : Displays that SCROLL is turned on

■ IPOD CONNECTION

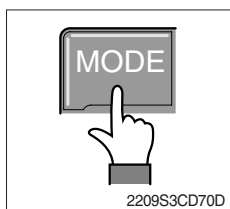


2209S3CD73

- | | |
|-----------------------------|--|
| 1 iPod selection button | 5 Random play (RDM) button |
| 2 TRACK UP/SEEK DOWN button | 6 Scroll (SCR) button |
| 3 FF/REW button | 7 View music info (INFO) button |
| 4 Repeat (RPT) button | 8 Finding and playing file (SELECT) button |

- Operates only when an iPod is connected. Connecting an iPod to the audio will automatically convert to iPod mode. Connecting the USB when the starting switch is in ON state will turn the power on and automatically play the songs within the iPod.
- The iPod cable is supplied separately.

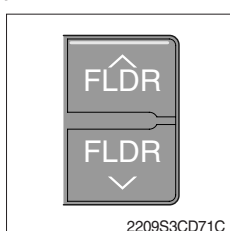
(1) iPod selection button



2209S3CD70D

- ① While playing a different mode, press the MODE button to convert to iPod mode. Connecting an iPod to the audio will automatically convert to iPod mode even if another mode is playing and automatically play the songs within the iPod.

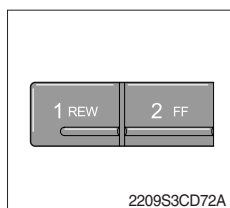
(2) TRACK UP/SEEK DOWN button



2209S3CD71C

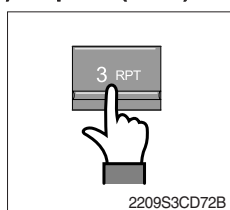
- ① While playing music, press the TRACK^ button to play the beginning of the next song. Press the SEEK^ button to return to the beginning of the current song. Press the button again to play the beginning of the previous song.

(3) FF/REW button



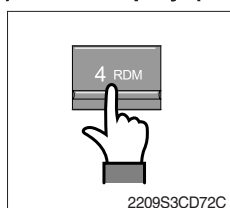
- ① While an iPod is operating, press and hold the FF button to fast-forward the song.
- ② When fast-forward is complete, the next song will properly play from the beginning even if you continue holding the button. Press and hold the REW button to rewind the song.
- ③ When rewind is complete, the current song will properly play from the beginning even if you continue holding the button.
- ④ Shortly pressing the buttons will not operate the FF/REW.

(4) Repeat (RPT) button



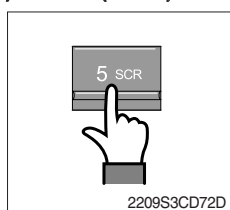
- ① While music is playing, press the RPT button to repeat the currently playing song.

(5) Random play (RDM) button



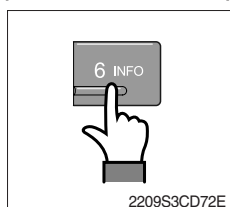
- ① While music is playing, press the RDM button to randomly play the songs.

(6) Scroll (SCR) button



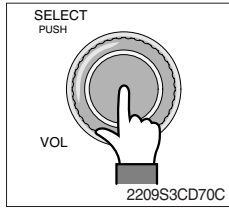
- ① Displays the file name of the currently playing song on the LCD. Here, the SCR button turns the file name SCROLL ON/OFF.

(7) View music info (INFO) button



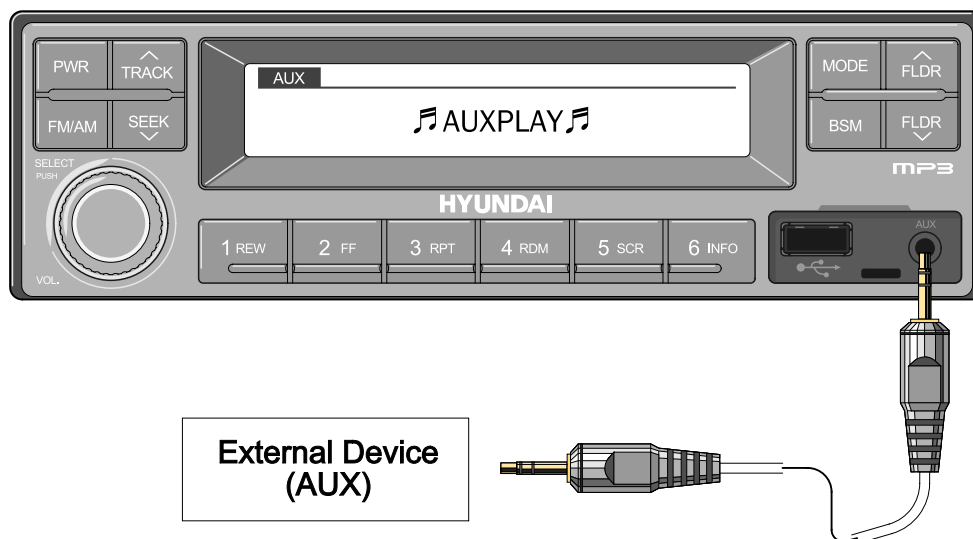
- ① Each time the INFO button is pressed, the info on the currently playing song will be displayed in order of ARTIST → ALBUM → TITLE.

(8) Finding and playing file (SELECT) button



- ① While iPod is playing, press and hold the SELECT button for over 3 seconds to enter CATEGORY mode and search for desired files.
- ② After entering CATEGORY mode, turn the SELECT button left/right to find the desired category.
- ③ Category will be displayed in the following order.
PLAYLISTS → ARTISTS → ALBUMS → GENRES → SONGS → COMPOSERS → AUDIOBOOKS → PODCASTS
- ④ After finding the category, press the SELECT button to select the category. Turn the SELECT button left/right to find the desired song and press the SELECT button to play.
- ⑤ If there are no adjustments for 3 seconds after pressing the SELECT button, the function will be turned off and the iPod play screen will be displayed.

■ AUX connection



2209S3CD74

- Operates only when an external device is connected to AUX. Connecting an AUX device to the audio using the AUX cable will automatically convert to AUX mode.
- When an external device is connected, only the PWR, FM/AM, MODE, and VOL buttons can be operated.
- Settings can be made only through the external device connected to AUX.
- The AUX cable is supplied separately.

(1) Connecting an external device using the AUX cable

- ① While playing a different mode, press the MODE button to convert to AUX mode.
- ② If an external device is connected to the Audio through the AUX terminal, AUX mode will automatically be converted and play music from AUX. Connecting the AUX when the starting switch is in ON state will turn the power on and automatically play the songs within the AUX.

RADIO AND USB PLAYER (MACHINE SERIAL NO.: #1195~)



9403CD101

■ FRONT PANEL PRESENTATION

- | | |
|--|---|
| <p>1  Power ON/OFF,
Volume UP/DOWN button</p> <p>2  Manual UP/DOWN Tuning,
File search, SEL button</p> <p>3  Mode button,
Audio mute button</p> <p>4  Radio seek up button</p> <p>5  Radio seek down button</p> <p>6  Station preset 1
DIS Display button</p> <p>7  Station preset 2</p> <p>8  Station preset 3
RPT Repeat play button</p> <p>9  Station preset 4
RDM Random play button</p> | <p>10  Station preset 5
DIR- Directory down button</p> <p>11  Station preset 6
DIR+ Directory up button</p> <p>12  Scan play button (SCAN)
Best station memory (BSM) button</p> <p>13  Track up button</p> <p>14  Track down button</p> <p>15  USB connector</p> <p>16  AUX IN Jack</p> |
|--|---|

■ GENERAL

(1) Power and volume button



① Power ON / OFF button

Press power button (1) to turn the unit on or off.

② Volume UP/DOWN control knob

Turn VOL knob (1) right to increase the volume level.

Turn VOL knob (1) left to decrease the volume.

After 5 seconds the display will return to the previous display mode.

③ Initial volume level set up

I-VOL is the volume level the unit will play at when next turned on.

To adjust the I-VOL level, press and hold VOL button (1) for longer than 2 seconds. The current volume level displays on the display panel.

Then turn button (1) right or left to set the volume level as the I-VOL level.

④ Clock ON/OFF control

The CLOCK was default at off status. To turn CLOCK ON, press and hold VOL button (1) for longer than 2 seconds to display I-VOL, then short press VOL again, turn VOL knob while CLOCK OFF display, then the CLOCK ON will be displayed.

※ Due to time tolerance, the clock display on the Audio unit might have little difference.

⑤ Clock adjustment

With CLOCK ON selected, press VOL knob again after CLOCK ON display, the hour will blink, turn VOL knob right or left to adjust hour.

Simply press VOL again, the minute will blink, turn VOL knob to adjust minute. Then press VOL again to confirm the clock once finished.

(2) Menu Selection



- ① This button can adjust the sound effect and other things.

Each time you press this button (2), LCD displays as follows :

BAS → TREB → BAL L=R → FAD F=R → EQ → LOUD ON → BEEP 2ND

On each setting, the level can be controlled by turning TUNE knob (2). When the last adjustment is made, after 5 seconds, the display will automatically return to the previous display mode.

② Bass control

To adjust the bass tone level, first select the bass mode by pressing SEL button (2) repeatedly until BASS appears on the display panel. Then turn knob (2) right or left within 5 seconds to adjust the bass level as desired. The bass level will be shown on the display panel from a minimum of BASS-7 to a maximum of BASS+7.

③ Treble control

To adjust the treble tone level, first select the treble mode by pressing SEL button (2) repeatedly until TREB appears on the display panel. Then turn knob (2) right or left within 5 seconds to adjust the treble level as desired. The treble level will be shown on the display panel from a minimum of TREB -7 to a maximum of TREB +7.

④ Balance control

To adjust the left-right speaker balance, first select the balance mode by pressing SEL button (2) repeatedly until BAL indication appears on the display panel. Then turn knob (2) right or left within 5 seconds to adjust the balance as desired. The balance position will be shown by the bars on the display panel from BAL 10R (full right) to BAL 10L (full left).

⑤ Fader control

To adjust the front-rear speaker balance, first select the fader mode by pressing SEL button (2) repeatedly until FADER indication appears on the display panel. Then turn knob (2) right or left within 5 seconds to adjust the front-rear speaker level as desired. The fader position will be shown by the bars on the display panel from FAD 10F (full front) to FAD 10R (full rear).

⑥ EQ control

You can select an equalizer curve for 4 music types (CLASSIC, POP, ROCK, JAZZ). Press button (2) until EQ is displayed, then turn knob (2) right or left to select the desired equalizer curve. Each time you turn the knob, LCD displays as follows :

EQ OFF → CLASSIC → POP → ROCK → JAZZ

※ When the EQ mode is activated, the BASS and TREBLE modes are not displayed.

⑦ Loud control

When listening to music at low volume levels, this feature will boost the bass and treble response. This action will compensate for the reduction in bass and treble performance experienced at low volume.

To select the loudness feature, press button (2) until LOUD is displayed, then turn knob (2) right or left to activate or deactivate loudness.

⑧ Beep control

To adjust the BEEP mode, first select the BEEP mode by pressing button (2) repeatedly until BEEP indication appears on the display panel. Then turn knob (2) left or right within 5 seconds to select BEEP 2ND, BEEP OFF or BEEP ON.

- BEEP 2ND : You will only hear the beep sound when the buttons are held down for more than 2 seconds.
- BEEP OFF : You can not hear the sound beep when you press the buttons.
- BEEP ON : You can hear the beep sound each time you press the buttons.

(3) Mute control

- ① Press and hold MUTE button (3) for over 2 seconds to mute sound output and MUTE ON will blink on the LCD. Press the button again to cancel MUTE function and resume to normal playing mode.

(4) Mode selection

- ① Repeat press MODE button (3) to switch between FM1, FM2, AM, USB, AUX, BT MUSIC.
- ※ If there is no USB, AUX, Bluetooth Phone connected, it would not display USB, AUX, BT when you press button (3).

■ RADIO

(1) Mode button



- ① Repeat press MODE button to select FM1, FM2 or AM.

(2) Manual tuning button



- ① To manually tune to a radio station, simply turn encoder TUNE (2) left or right to increase or decrease the radio frequency.

(3) Auto tuning button



- ① To automatically select a radio station, simply press Seek up or Track down button.

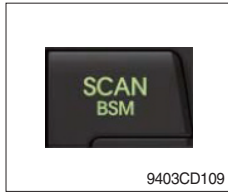


(4) Station preset button



- ① In radio mode, pressing buttons (6) to (11) will recall the radio stations that are memorized. To store desired stations into any of the 6 preset memories, in either the AM or FM bands, use the following procedure :
 - a. Select the desired station.
 - b. Press and hold one of the preset buttons for more than 2 seconds to store the current station into preset memory. Six stations can be memorized on each of FM1, FM2, and AM.

(5) Preset scan (PS) / Best station memory (BSM) button



① Press BSM button (12) momentarily to scan the 6 preset stations stored in the selected band. When you hear your desired station, press it again to listen to it.

Press BSM button (12) for longer than 2 seconds to activate the Best Station Memory feature which will automatically scan and enter each station into memory.

※ **If you have already set the preset memories to your favorite stations, activating the BSM tuning feature will erase those stations and enter into the new ones. This BSM feature is most useful when travelling in a new area where you are not familiar with the local stations.**

■ USB PLAYER

(1) USB playback



- ① The unit was equipped with a front USB jack and also a rear USB Jack.

With a USB device plugged in the front USB jack, it will be detected as front USB mode. And with a USB device plugged in the rear USB jack, it will be detected as rear USB. To get to a USB mode, press MODE (3) button momentarily or insert the USB device in front or rear USB jack.

※ If no mp3 or wma files in USB device, it will convert to the previous mode after display NO FILE.

(2) Track Up / Down button



- ① Press SEEK up (13) or TRACK down (14) to select the next or previous track. Press and hold the buttons to advance the track rapidly in the forward or backward direction.



(3) MP3 directory / File searching



- ① Button (2) is used to select a particular directory and file in the device. Turn button (2) right or left to display the available directories. Press button (2) momentarily when the desired directory is displayed, then turn button (2) right or left again to display the tracks in that directory. Press button (2) to begin playback when the desired file is displayed.

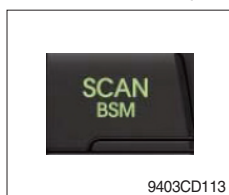
(4) Directory Up / Down button



- ① During MP3/WMA playback, simply press DIR- button (10) to select the previous directory (if available in the device); simply press DIR+ button (11) to select the next directory (if available in the device).

※ If the USB device does not contain directories, it would play MP3/WMA tracks at 10- file when you press DIR- button (10), and play MP3/WMA tracks at 10+ file when you press DIR+ (11) button.

(5) Track Scan Play (SCAN) button



- SCAN playback : Simply press SCAN (12) button to play the first 10 seconds of each track.
- SCAN folder : Press and hold SCAN button for longer than 2 seconds to scan play the tracks in current folder.
- SCAN off : Simply press it again to cancel SCAN feature.

(6) Track Repeat Play (RPT) button



- REPEAT playback : Simply press RPT (8) button to play current track repeatedly.
- REPEAT folder : Press and hold RPT for longer than 2 seconds to repeat play the tracks in current folder.
- REPEAT off : Simply press it again to cancel REPEAT feature.

(7) Track Random Play (RDM) button



- RANDOM playback : Simply press RDM (9) button to play the tracks in the device in a random sequence.
- RANDOM folder : Press and hold RDM button for longer than 2 seconds to random play the tracks in current folder.
- RANDOM off : Simply press it again to cancel RANDOM feature.

(8) ID3 v2 (DISP)



- ① While a MP3 file is playing, press DISP button (6) to display ID3 information. Repeat push DISP button (6) to show directory name / file name and album name / performer / title.

※ **If the MP3 disc does not have any ID3 information, it will show NO ID3.**

* USB Information and Notice

- Playback FILE SYSTEM and condition allowance.
 - FAT, FAT12, FAT16 and FAT32 in the file system.
 - V1.1, V2.2 and V2.3 in the TAG (ID3) version.
- Display up to 32 characters in the LCD display.
- No support any of MULTI-CAED Reader.
- No high speed playback but only playing with normal full speed.

※ **DRM files in the USB may cause malfunction to playback in the radio unit.**

※ **The temperature below -10 Celsius, the audio unit with USB hook up would be affected to play well.**

■ AUX OPERATION

It is possible to connect your portable media player to the audio system for playback of the audio tracks via the cab speakers.

To get the best results when connecting the portable media to the audio system, follow these steps :

- Use a 3.5 mm stereo plug cable to connect the media player headphone socket at each end as follows.
 - Adjust the portable media player to approximately 3/4 volume and start playback.
 - Press the MODE button (3) on the audio unit to change into AUX mode.
 - The volume and tone can now be adjusted on the audio unit to the desired level.
- ※ The audio quality of your media player and the audio tracks on it may not be of the same sound quality as the audio system is CD Player.
 - ※ If the sound of the media player is too low compared with the radio or CD, increase the volume of the player.
 - ※ If the sound of the media player is too loud and/or distorted, decrease the volume of the player.
 - ※ When in AUX mode, only the Volume, Bass, Treble, EQ and Mode functions of the audio unit can be used.

■ RESET AND PRECAUTIONS

(1) Reset function

Interfering noise or abnormal compressed files in the MP3 disc or USB instrument may cause intermittent operation (or unit frozen/locking up). It is strongly recommended to use appropriate USB storage to not cause any malfunction to the audio unit. In the unlikely event that the player fails to operate correctly, try to reset unit by any of following two methods.

① press and hold   simultaneously for about 5 seconds. (without Bluetooth)

② Take out the fuse for the audio system in the vehicle once and then plug it back in.

※ It will be necessary to re-enter the radio preset memories as these will have been erased when the microprocessor was reset.

※ After resetting the player, ensure all functions are operating correctly.

(2) Precautions

When the inside of the cab is very cold and the player is used shortly after switching on the heater, moisture may form on the disc or the optical parts of the player and proper playback may not be possible.

If moisture forms on the optical parts of the player, do not use the player for about one hour. The condensation will disappear naturally allowing normal operation.

① Operation voltage : 9~32 volts DC, negative

② Output power : 40 watts maximum (20 watts x 2 channels)

③ Tuning range

Area	Band	Frequency range	Step
USA	FM	87.5~107.9 MHZ	200K
	AM	530~1710 KHZ	10K
EUROPE	FM	87.5~108.0 MHZ	50K
	AM	522~1620 KHZ	9K
ASIA	FM	87.5~108.0 MHZ	100K
	AM	531~1602 KHZ	9K
LATIN	FM	87.5~107.9 MHZ	100K
	AM	530~1710 KHZ	10K

● AREA Selection :

- To select an area, press and hold related buttons at FM1 band for about 3 seconds.
- USA Area: Press and hold mode + 1DIS buttons for 3 seconds
- EUROPE Area: Press and hold mode + 2 buttons for 3 seconds
- ASIA Area: Press and hold mode + 3RPT buttons for 3 seconds
- LATIN Area: Press and hold mode + 4RDM buttons for 3 seconds.

④ USB version : USB 1.1

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%

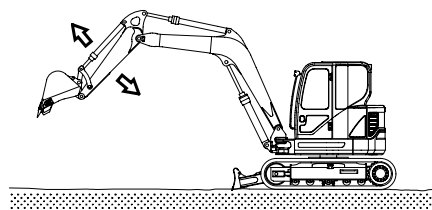
※ Excessive operation may deteriorate the potential performance of machine and shorten lifetime of the machine.

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 operation hours.

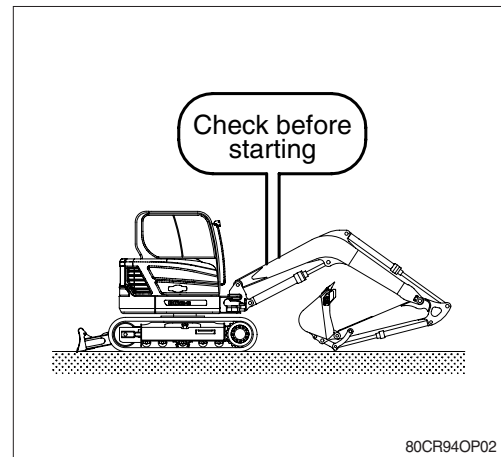
Checking items	Hours
Engine oil	50
Engine oil filter element	
Fuel filter	
Hydraulic oil return filter element	250
Line filter element	



60CR94OP01

2. CHECK BEFORE STARTING THE ENGINE

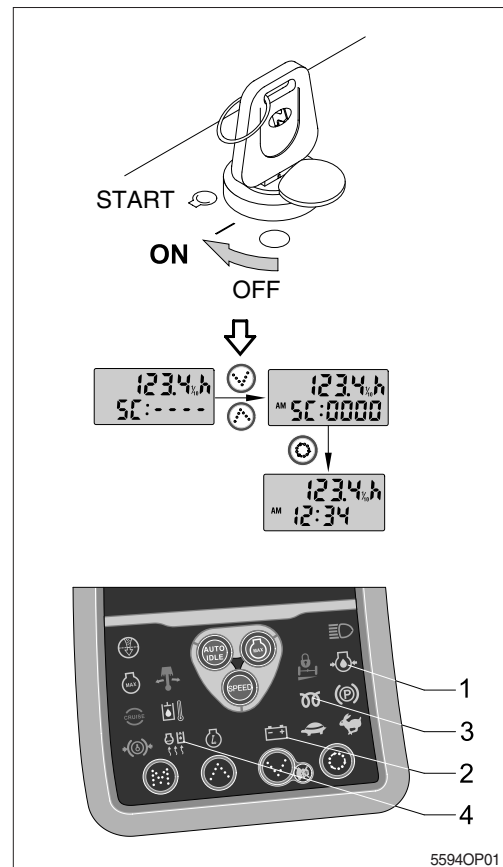
- 1) Look around the machine and under the machine to check for loosen nut or bolts, collection of dirt, or leakage of oil, fuel or coolant and check the condition of the work equipment and hydraulic system. Check also loosen wiring, and collection of dust at places which reach high temperature.
※ **Refer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

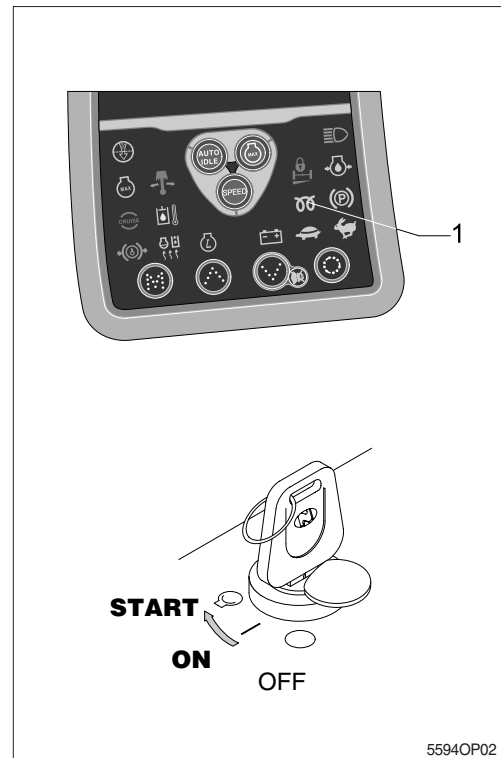
- (1) Check if all the operating lever is on the neutral position.
 - (2) Turn the starting switch to the ON position, and check following.
 - ① If all the lamps light ON and buzzer sounding for 6 seconds.
 - ② Only below lamps will light ON and all the other lights will turn OFF after 2 seconds.
 - Battery charging warning lamp (2)
 - Engine oil pressure warning lamp (1)
 - ③ The preheat pilot lamp (3) will light ON when the coolant temperature is below 10°C .
 - ④ The warming up pilot lamp (4) will light ON when the coolant temperature is below 30°C .
- ※ If the ESL function is set to the YES, enter the password to start engine.
- ※ If the password has failed 5 times, please wait 30 minutes before re-attempting to enter the password.
- ※ Refer to page 3-8 for the ESL function.



2) STARTING ENGINE

- ※ 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 2-12.
- ※ Fill anti-freeze solution to the coolant as required.

- (1) Check if all levers are on the neutral position.
- (2) Turn the starting switch to ON position.
- (3) Check if the preheat pilot lamp (1) is turned ON.
 - ※ **When the preheat pilot lamp is turned ON, the preheating function is actuated within 15 seconds.**
 - ※ **After the preheat pilot lamp is turned OFF, engine start within 10 seconds.**
- (4) Start engine by turning the starting switch to the START position.
- (5) Release the starting switch immediately after starting engine to avoid possible damage to the starting motor.
 - ※ **If the engine is started before the preheat pilot lamp goes OFF, it keeps the lamp ON within 15 seconds even after the engine is started.**
 - ※ **Be aware that battery can be easily discharged after long time with head light, work lamp and air-conditioner turned on together under the condition of the low engine rpm.**



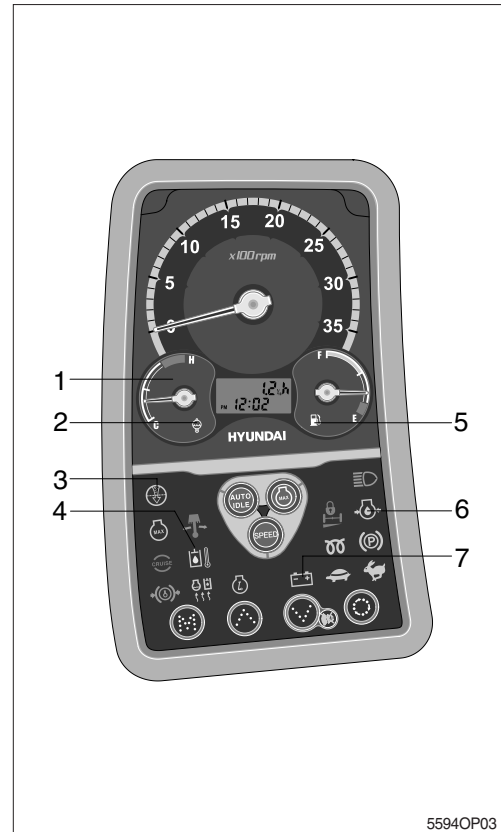
5594OP02

3) 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 (2~7)?
- (4) Is the indicator of engine coolant temperature gauge (1) in the normal zone?
- (5) Is the engine sound and the color of exhaust gas normal?
- (6) Are the sound and vibration normal?

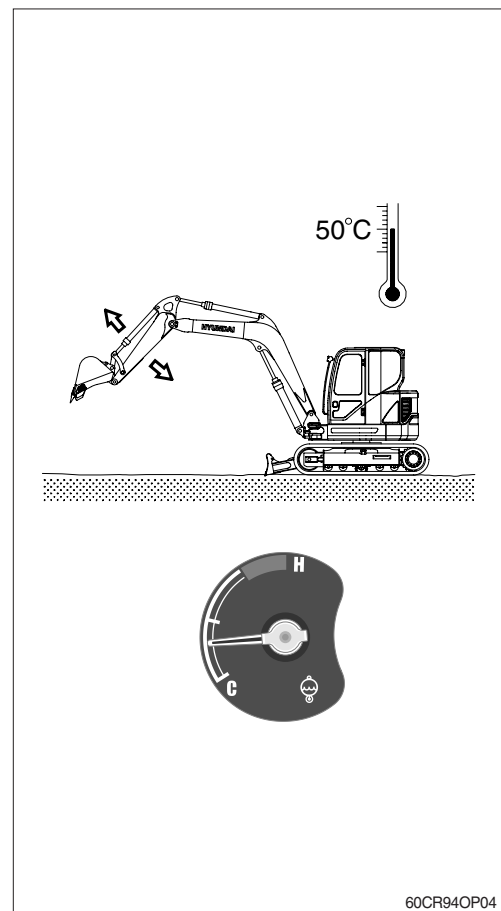
- ※ **Do not increase engine speed quickly after starting, it can damage engine or turbocharger.**
- ※ **If there are problems in the control panel, stop the engine immediately and correct problem as required.**



4) 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.

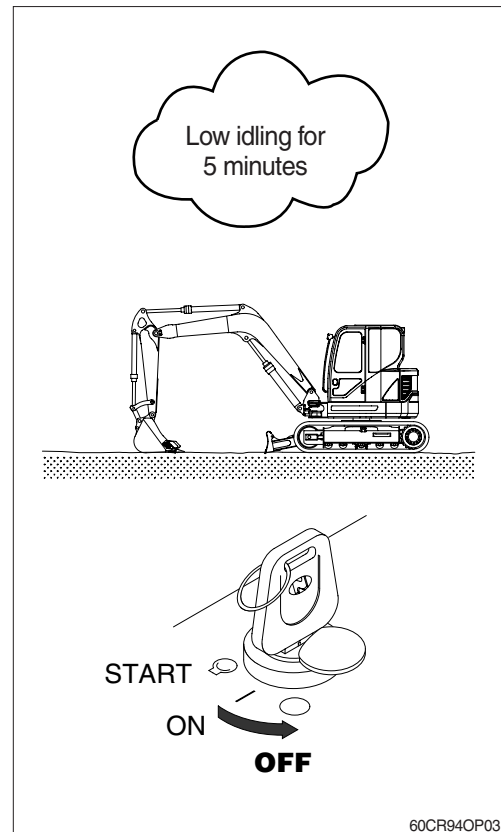
- (1) Run the engine at low idling for 5 minutes.
 - (2) Speed up the idling and run the engine at mid-range speed.
 - (3) Operate bucket lever for 5 minutes.
 - ※ **Do not operate anything except bucket lever.**
 - (4) Run the engine at the high speed and operate the bucket lever and arm lever for 5-10 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.**



5) 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.

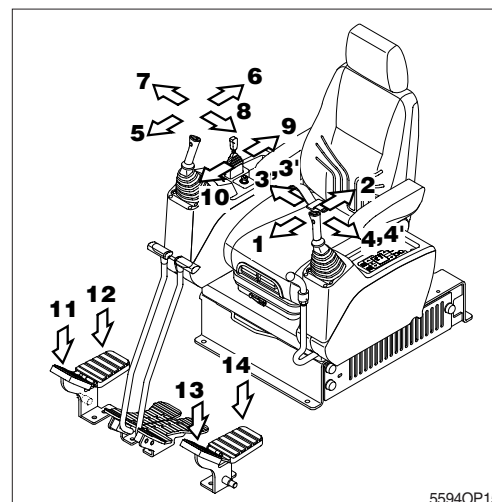


4. OPERATION OF WORKING DEVICE

※ **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.**

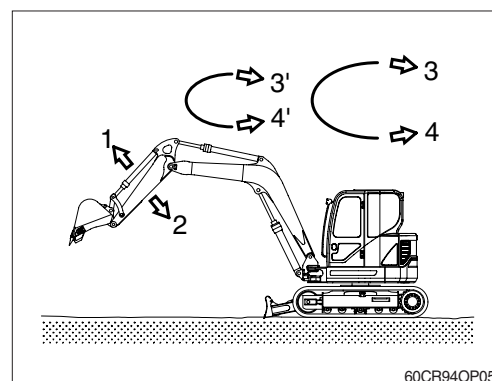


5594OP15

※ **Left control lever**

- 1 Arm roll-out
- 2 Arm roll-in
- 3 Swing right
- 3' Boom right (boom offset switch selected)
- 4 Swing left
- 4' Boom left (boom offset switch selected)

※ **Refer to page 3-13 for boom offset switch.**



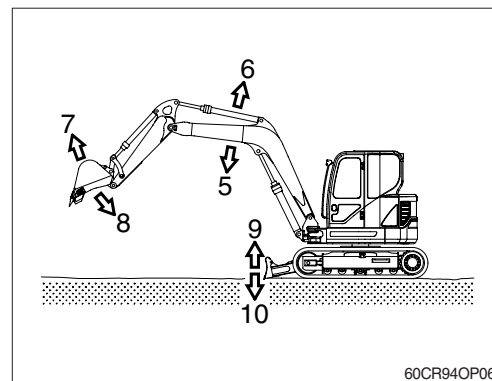
60CR94OP05

※ **Right control lever**

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

※ **Dozer control lever**

- 9 Dozer blade up
- 10 Dozer blade down



60CR94OP06

5. 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.

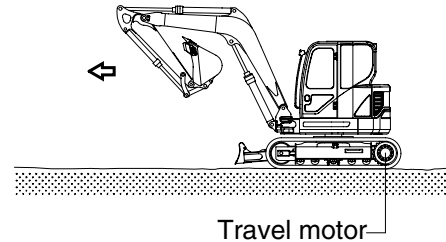
- ▲ **Be careful as the traveling direction will be reversed when the whole machine is swung 180° degree.**

(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.**

Traveling position

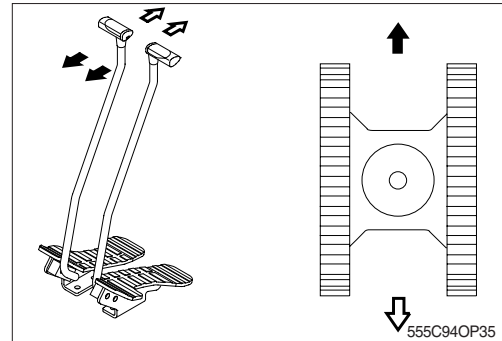


60CR94OP07

(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.

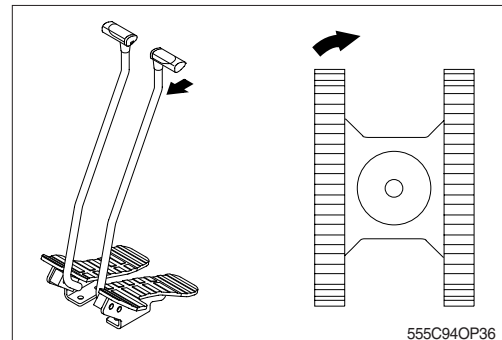
- ※ The speed can be controlled by the operation stroke of lever or pedal and change of direction will be controlled by difference of the left and right stroke.



555C94OP35

(4) Pivot turning

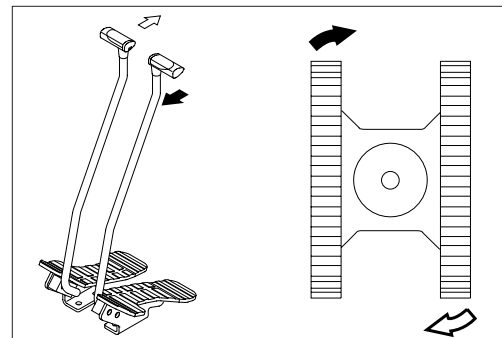
Operating only one side of lever or pedal make the change of direction possible by moving only one track.



555C94OP36

(5) Counter rotation

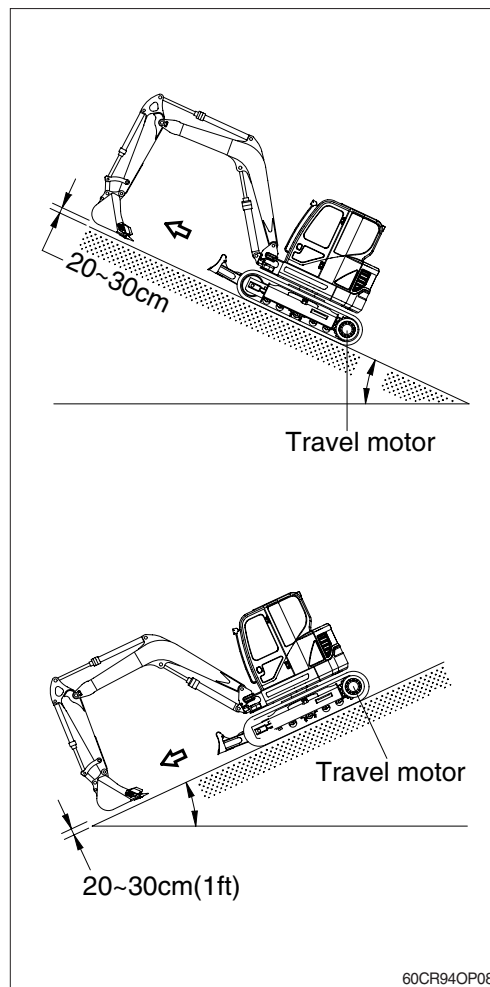
It is to change the direction at the original place by moving the right and left track. Both side of lever or pedal are operated to the other way at the same time.



555C94OP37

2) TRAVELING ON A SLOPE

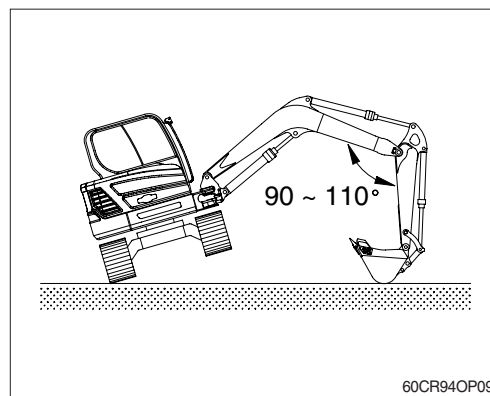
- (1) Make sure that the travel lever is properly maneuvered by confirming the travel motor is in the right location.
 - (2) Lower the bucket 20 to 30 cm (1 ft) to the ground so that it can be used as a brake in an emergency.
 - (3) If the machine starts to slide or loses stability, lower the bucket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



3) TRAVELING ON SOFT GROUND

※ If possible, avoid to operate on soft ground.

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



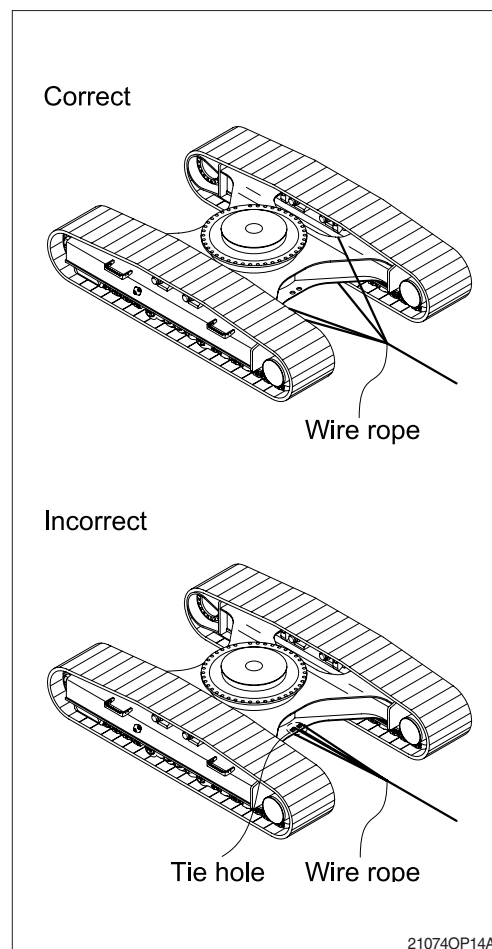
4) TOWING THE MACHINE

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.**

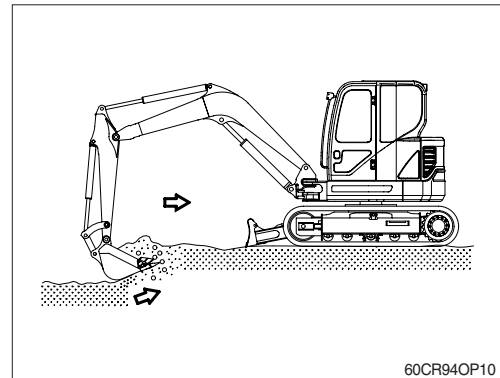
▲ **Make sure no personnel are standing close to the tow rope.**



6. EFFICIENT WORKING METHOD

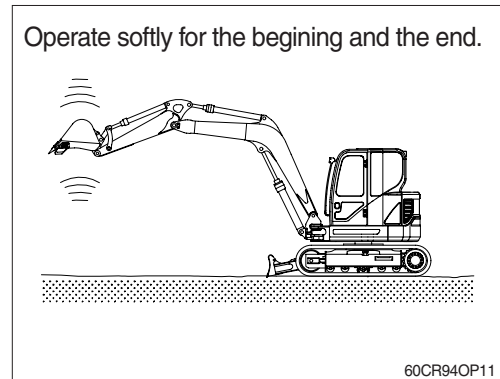
1) Do the digging work by arm.

Use the pulling force of arm for digging and use together with the digging force of the bucket if necessary.

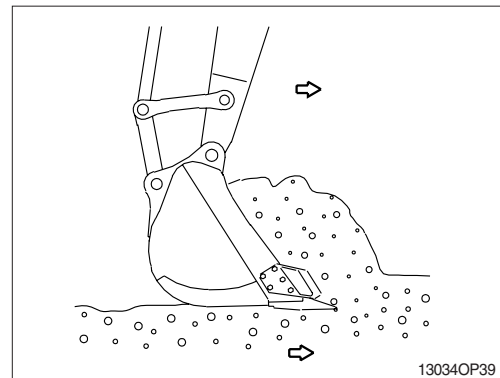


2) When lowering and raising the boom operate softly for the beginning and the end.

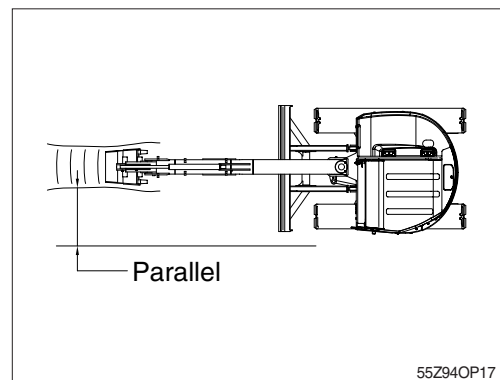
In particularly, sudden stops while lowering the boom may cause damage to the machine.



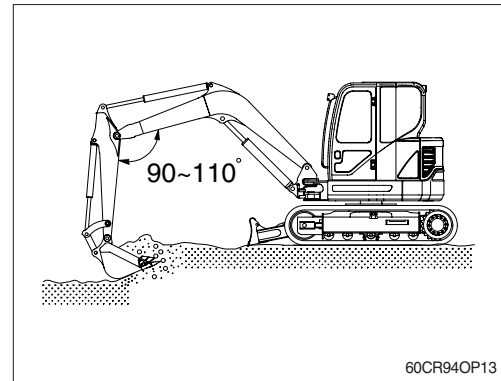
3) The digging resistance and wearing of tooth can be reduced by putting the end of bucket tooth to the digging direction.



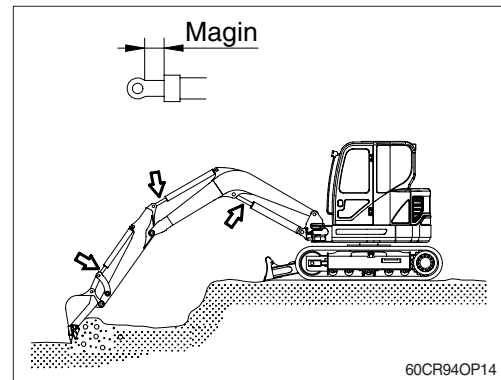
4) Set the tracks parallel to the line of the ditch to be excavated when digging ditch. Do not swing while digging.



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



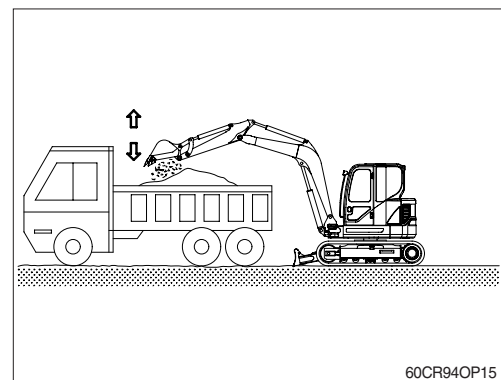
- 6) Operate leaving a small safety margin of cylinder stroke to prevent damage of cylinder when working with the machine.



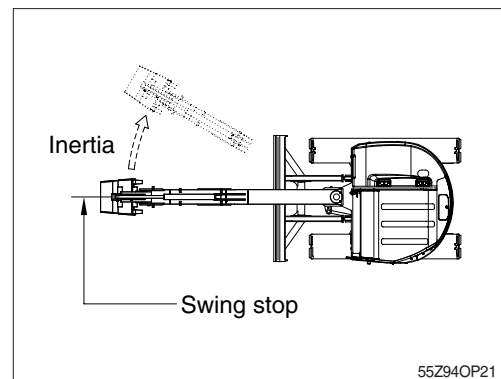
- 7) Keep the bucket to the dumping position and the arm horizontal when dumping the soil from the bucket.

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

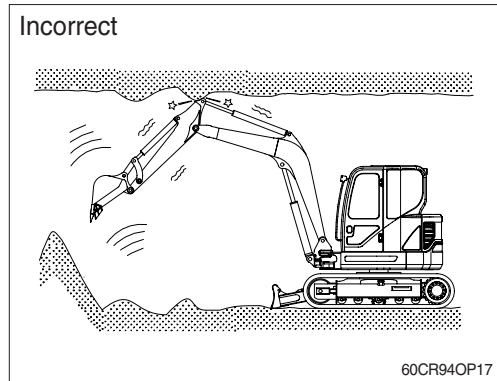
- ※ Do not use the impact of bucket tooth when dumping.



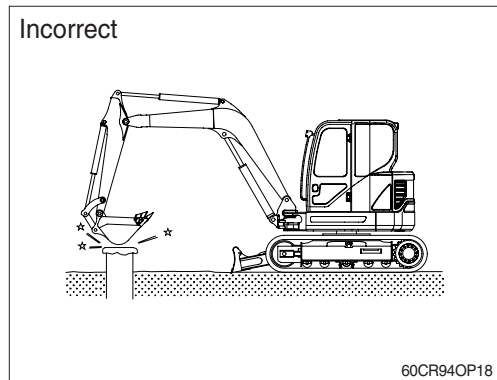
- 8) Operate stop of swing considering the swing slip distance is created by inertia after neutralizing the swing lever.



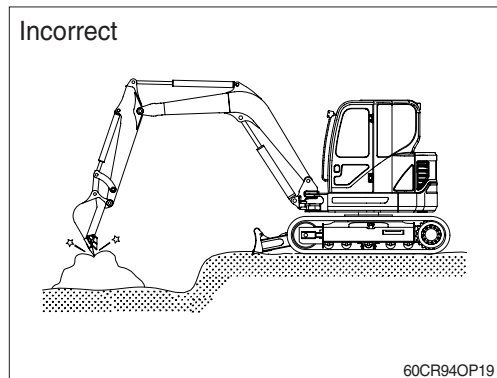
- 9) If the excavation is in an underground location or in a building, make sure that there is adequate overhead clearance and that there is adequate ventilation.



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



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



12) NEVER CARRY OUT EXCESSIVE OPERATIONS

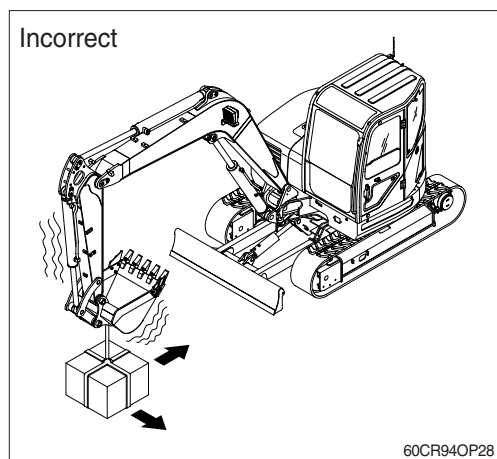
Operation exceeding machine performance may result in accident or failure.

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.



13) 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.

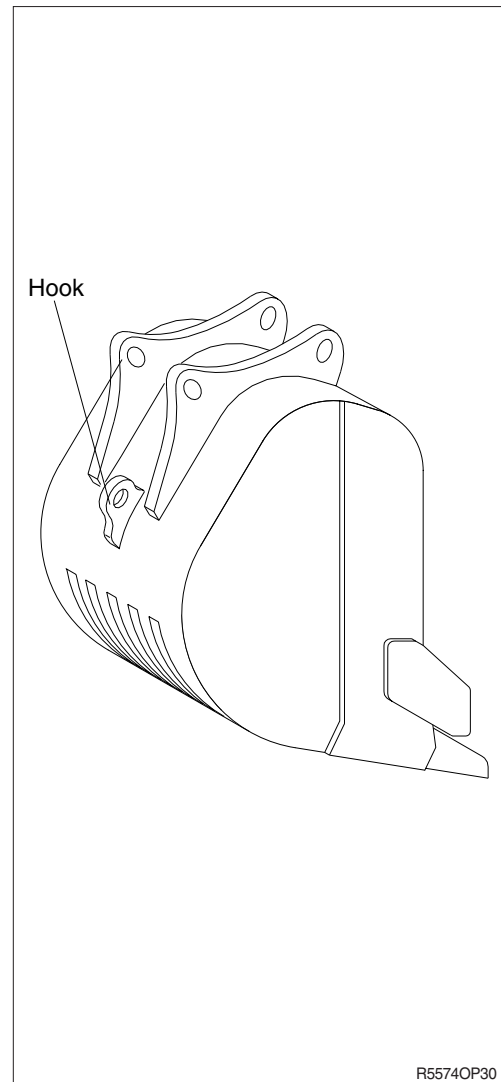
Due to the possible danger of the load falling or of collision with the load, no persons shall be allowed in the working area.

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.

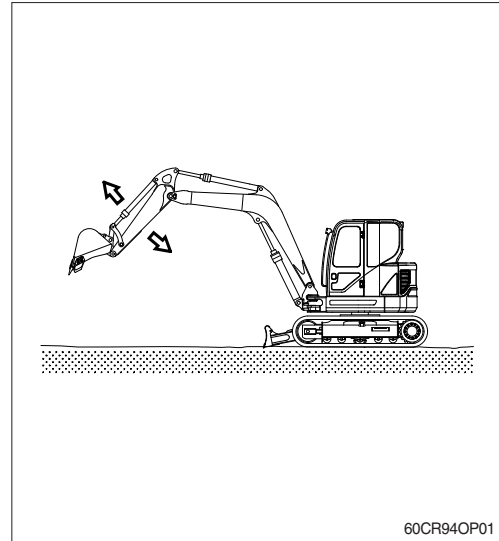
Never leave the operator's seat while lifting a load.



7. 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 4 times of cleaning.**
- (2) Inspect radiator, oil cooler and condenser 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 and track tension cylinder 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.

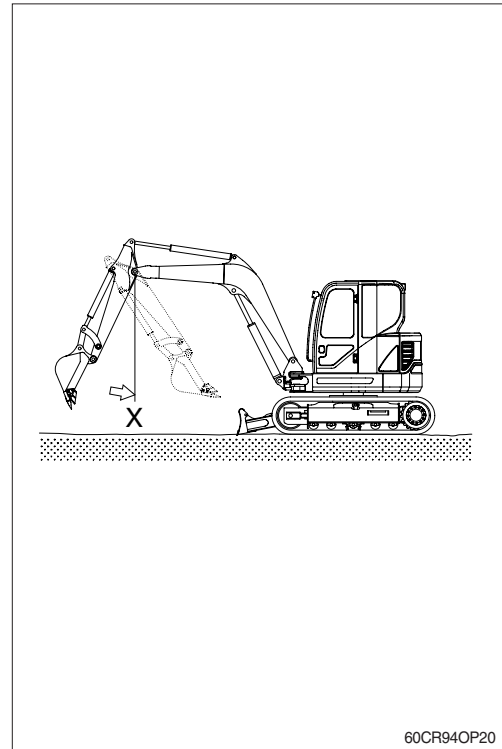
5) OPERATION IN ROCKY WORK SITES

- (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.

8. 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.



9. 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.

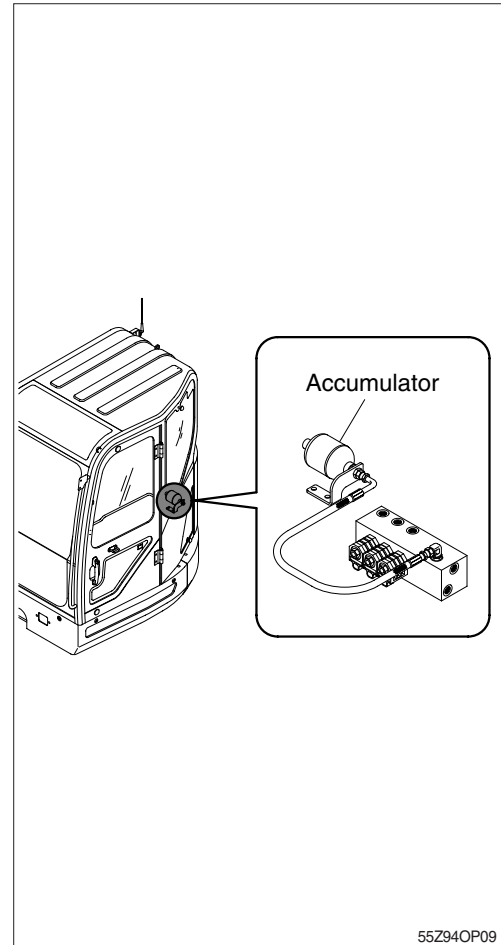
▲ Be sure no one is under or near the attachment before lowering the boom.

- 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.



10. 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.

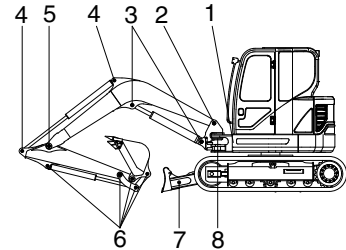
(2) Lubrication position of each part

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.



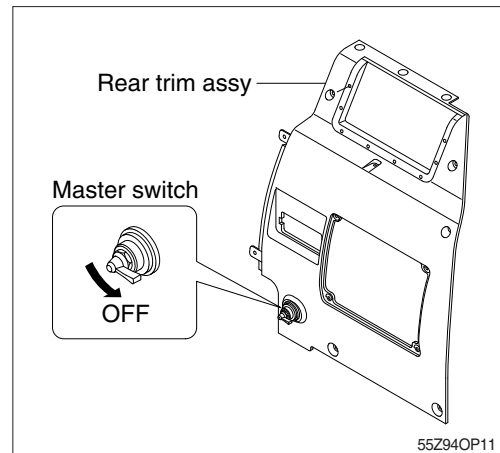
- 1 Lubricating manifold (4EA)
- 2 Boom connection pin (2EA)
- 3 Boom cylinder pin (2EA)
- 4 Arm cylinder pin (2EA)
- 5 Boom and arm connection pin (1EA)
- 6 Arm and bucket (5EA)
- 7 Dozer blade and cylinder (4EA)
- 8 Boom swing post (2EA)

60CR94OP21

(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.



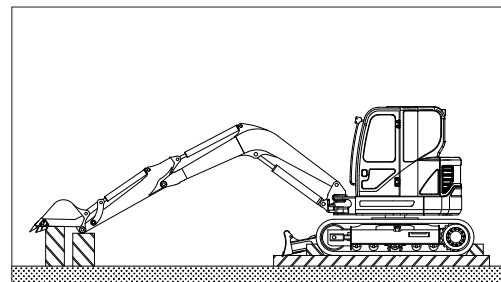
55Z94OP11

(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.**

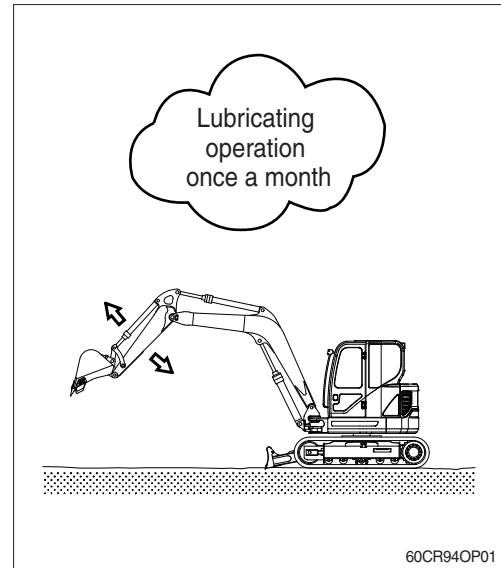


60CR94OP22

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.



※ BATTERY

- ① Once a month, start the engine for 15 minutes (or use a charger) to charge the battery.
- ② Every 2 months, check the battery voltage and keep battery voltage over 12.54V.
- ③ If the machine stock period is over 6 months, disconnect the battery negative (-) terminal.

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.

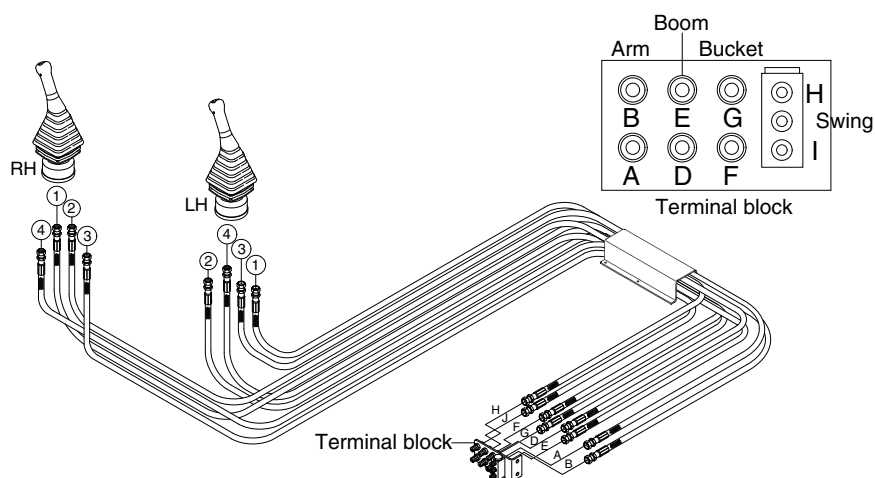
(3) When storage period is 6 months over

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.

11. RCV LEVER OPERATING PATTERN

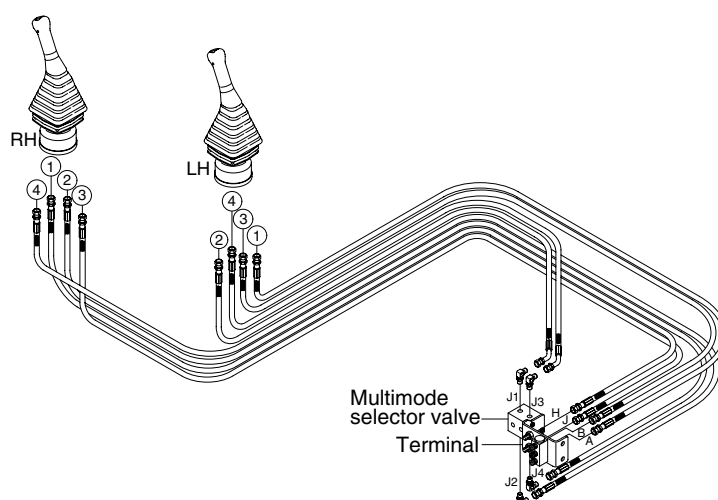


※ Whenever a change is made to the machine control pattern also exchange the pattern label in the cab to match the new pattern.

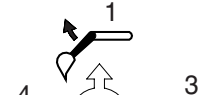
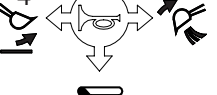
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Pattern	Operation		Control function	Hose connection (port)			
	Left	Right		RCV lever	Change of Terminal block		
					From	To	
ISO Type			Left	1 Arm out	②	B	-
Hyundai				2 Arm in	④	A	-
				3 Swing right	③	I	-
				4 Swing left	①	H	-
			Right	5 Boom lower	④	E	-
6 Boom raise	②	D		-			
7 Bucket out	①	F		-			
8 Bucket in	③	G		-			
A Type			Left	1 Boom lower	②	B	E
		2 Boom raise		④	A	D	
		3 Swing right		③	I	-	
		4 Swing left		①	H	-	
		Right	5 Arm out	④	E	B	
6 Arm in	②		D	A			
7 Bucket out	①		F	-			
8 Bucket in	③		G	-			
B Type			Left	1 Boom lower	②	B	E
		2 Boom raise		④	A	D	
		3 Bucket in		③	I	G	
		4 Bucket out		①	H	F	
		Right	5 Arm out	④	E	B	
6 Arm in	②		D	A			
7 Swing right	①		F	I			
8 Swing left	③		G	H			
C Type			Left	1 Swing right	②	B	I
		2 Swing left		④	A	H	
		3 Arm in		③	I	A	
		4 Arm out		①	H	B	
		Right	Same as ISO type				

RCV LEVER OPERATING PATTERN(option, A type)

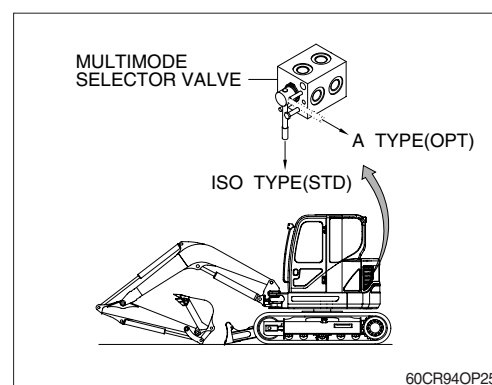


55940P14

Pattern	Operation		Control function	Hose connection (port)		
	Left	Right		RCV lever	MCV port	
A ype			Left	1 Boom lower	②	J1
				2 Boom raise	④	J3
				3 Bucket out	③	B
				4 Bucket in	①	A
			Right	5 Arm out	④	J2
				6 Arm in	②	J4
				7 Swing right	①	H
				8 Swing left	③	J

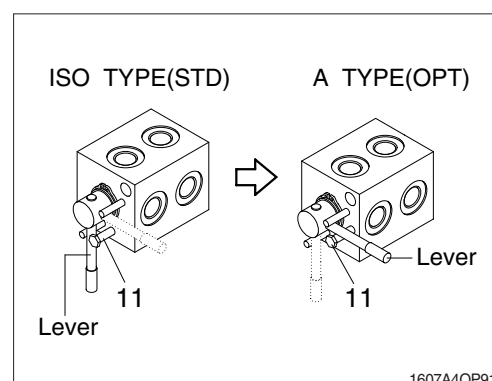
1) The machine control pattern can easily be changed from the "ISO" type to the "A" type by changing the position of the lever.

⚠ Before starting the machine, check the lever position of multimode selector valve and actual operating of attachment.



2) Change of operating pattern (ISO → A type)

- (1) Loosen bolt (11).
- (2) Move lever from the "ISO" type to "A" type position.
- (3) After setting the lever, tighten bolt to secure lever.



12. HANDLING THE RUBBER TRACKS

1) USING THE RUBBER TRACKS PROPERLY

Rubber tracks have some advantages over steel tracks.

However, you cannot take full advantage of them if you use them in the same manner as steel ones. Use care in operating with rubber tracks in accord with the conditions of the work site and the type of work.

Comparison table of rubber and steel tracks

	Rubber	Steel
Low vibration	Excellent	Ordinary
Smooth travel	Excellent	Good
Silent travel	Excellent	Ordinary
Less damage to paved roads	Excellent	Ordinary
Simple handling	Excellent	Ordinary
Susceptibility to damage (strength)	Ordinary	Excellent
Drawbar full	Excellent	Excellent

Rubber tracks have many advantages inherent in the unique properties of the material. On the other hand, however, they are low in strength. It is essential that you fully understand the properties of rubber tracks, and observe the precautions for operating and handling them to prolong their life and get the most out of them. Be sure to read this section for using the rubber tracks before using them.

2) WARRANTY FOR RUBBER TRACKS

The rubber tracks are not warranted for free repair or replacement if they are damaged because of misuse by the customer, including the failure to comply with the prohibitions and the instructions for safe operation; (for example, the failure to check the tension of the rubber tracks or service the rubber tracks properly, or "using the rubber tracks on surfaces and terrains which could physically damage them".)

3) PROHIBITIONS FOR USING THE RUBBER TRACKS

- (1) Do not operate or turn on surfaces of terrains that have sharp stones, a hard, uneven rock base, or that expose the tracks to steel rods, scrap iron, or edges of iron plates. Failure to observe these prohibitions may damage the rubber tracks.
- (2) Do not operate the machine on a stony surface like a riverbed. Doing this may damage the rubber tracks by catching gravel in the tracks or may cause the tracks to come off. Forcibly pushing obstacles will also shorten the life of the rubber tracks.
- (3) Prevent the rubber tracks from getting exposed to oil, fuel or chemical solvents. If they are exposed, immediately wipe them. Also, do not travel on roads which have oily surfaces.
- (4) When storing the rubber tracks for a long time period (more than three months), avoid placing them in a place subject to direct exposure to sunlight or rain.

- (5) Do not operate the machine when the tracks will be exposed to heat, (i.e., near an open-air fire, on a steel plate that has been exposed to the blazing sun, or on a hot asphalt road.)
- (6) Never run on one rubber track while the other is held above the ground with the implement. Doing this may damage the rubber track or cause it to come off.

4) PRECAUTIONS FOR USING THE RUBBER TRACKS

Observe the following precautions when operating the machine :

- (1) Never spin-turn on concrete or asphalt roads.
- (2) Do not change course suddenly. Doing this will cause the rubber track to wear early or be damaged.
- (3) Do not turn the machine across a large level gap while traveling . Remember that running over a level gap at a right angle will prevent the track from coming off.
- (4) Slowly lower the machine after it has been lifted above the ground with the implement.
- (5) It is not recommended that the machine be used to handle any materials that become oily after being crushed (e.g., soybeans, corn, rapeseed oil seeds, etc.). After unavoidably using the machine to handle such materials, clean the tracks with water.
- (6) It is not recommended that the machine be used to handle materials such as salt, ammonium sulfate, potassium chloride, potassium sulfate, or superphosphate of lime. Handling these materials may affect the core metal adversely. After using the machine to handle such materials, clean the tracks with water.
- (7) Do not operate the machine at the seashore. Doing this may affect the core metal adversely due to the salt content.
- (8) If a rubber track is cracked, it could be easily damaged when exposed to salt, sugar, wheat, or soybeans. Be sure to repair any cracks in the rubber track to prevent rubber chips from getting into the materials being handled.
- (9) Do not allow the rubber track to rub against a concrete wall.
- (10) The rubber tracks are prone to slip on snow or on a frozen road. Be careful of skidding when traveling or operating on a slope in cold weather.
- (11) Operating the machine in extremely cold weather will deteriorate the rubber tracks, shortening their life.
- (12) Use the rubber tracks between -25°C to +55°C (-13°F to +131°F) because of the physical characteristics of rubber.
- (13) Be careful not to damage the rubber tracks with the bucket while operating the machine.

5) BE CAREFUL NOT TO COME OFF THE RUBBER TRACKS

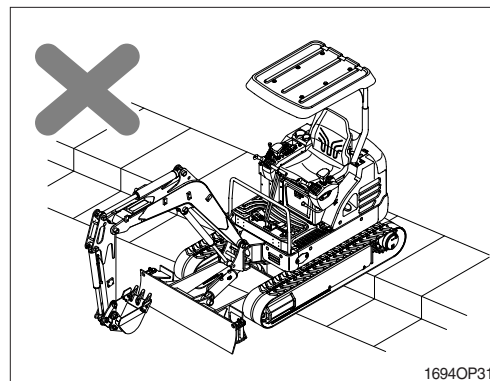
Keep the tracks in appropriate tension to prevent them from coming off.

If the tension is too low, the rubber tracks may come off under the following conditions.

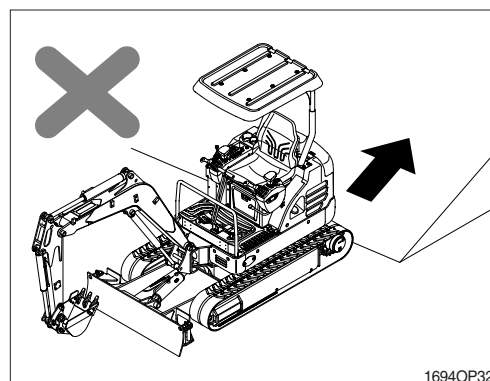
Even if the tension is adequate, take care when operating the tracks under these conditions.

Some illustrations in this section can be different from your machine.

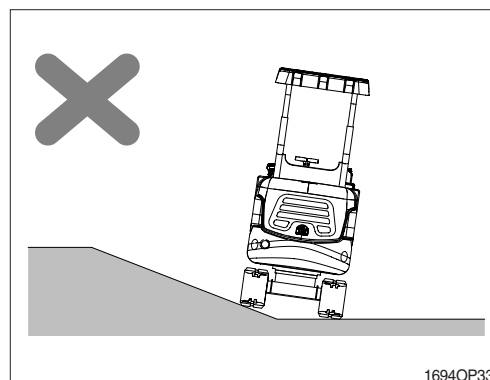
- (1) Do not steer the machine at an angle other than 90 degrees across a large level gap created by a curbstone or a rock [approximately more than 20 cm (8")]. Run over a level gap at a right angle only to prevent the tracks from coming off.



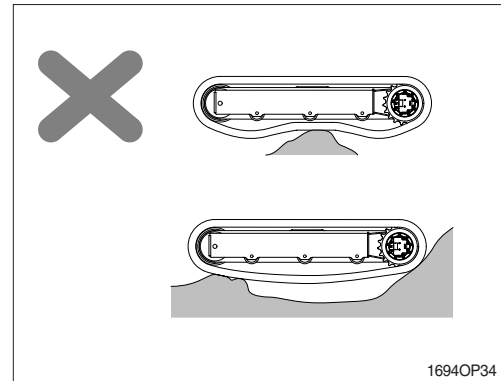
- (2) Do not steer the machine across a boundary between the flat ground and a slope, while moving backwards. If such travel is not avoidable, slow down the speed.



- (3) Do not travel with the track on one side on a slope or on convex ground (causing a machine angle of more than 10 degrees), and with the track on the other side on flat ground, to prevent the rubber track from being damaged. Be sure to travel with the tracks on both sides on the same level surface.

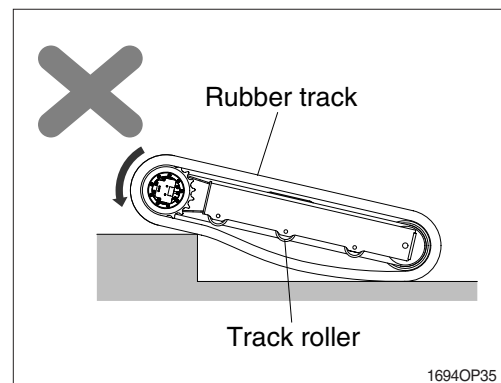


- (4) The three cases illustrated above are those which could cause the rubber tracks to loosen. In addition, do not subject machine to such ground conditions as are illustrated in the figure at the right.

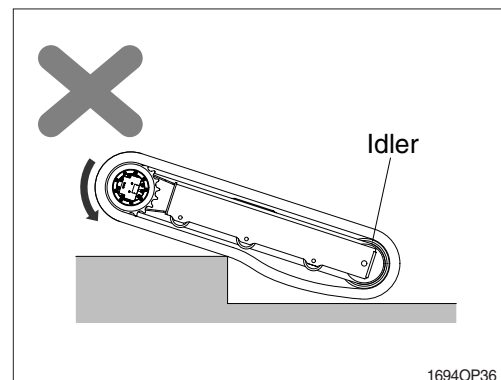


HOW THE RUBBER TRACKS COME OFF

- (5) When running over a level gap, a clearance is created between the tracks and the track rollers. At this point, the tracks tend to come off.

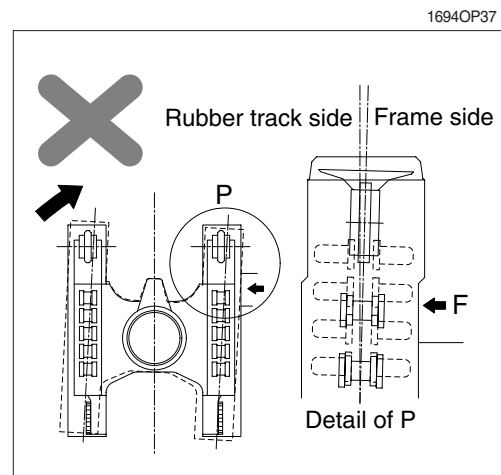


- (6) If the machine is traveling in reverse, clearance may also be created between the track rollers and the rubber tracks, and between the idlers and the rubber tracks, causing the rubber tracks to come off.

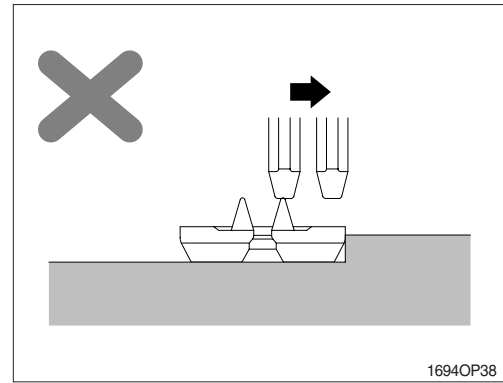


- (7) Other situations to be avoided.

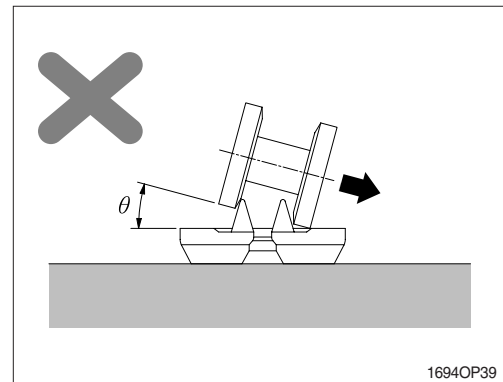
- ① When the machine changes the travel direction while the rubber tracks are blocked sideways by an obstacle or the like.
- ② When the idler and the track rollers are misaligned from the core metal, due to rubber track misalignment.



- ③ Traveling in reverse under the condition illustrated will cause the rubber tracks to come off.



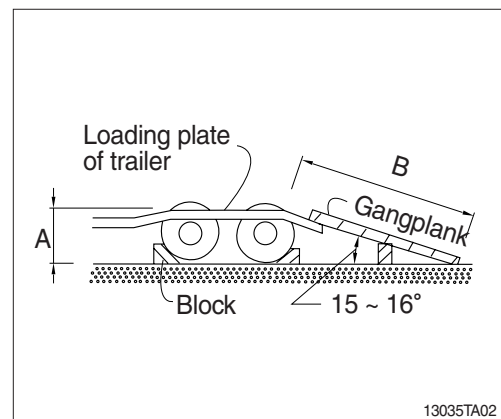
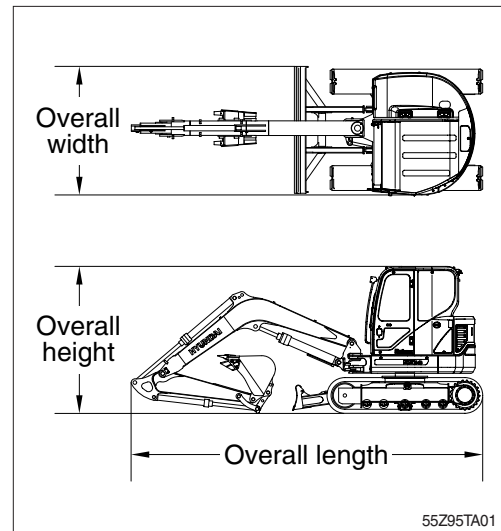
- ④ Changing the travel direction of the machine under the condition illustrated will cause the rubber tracks to come off.



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

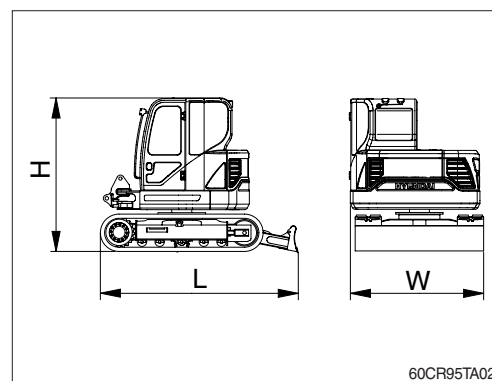


2. DIMENSION AND WEIGHT

1) Base machine

Mark	Description	Unit	Specification
L	Length	mm (ft-in)	3070 (10' 1")
H	Height	mm (ft-in)	2550 (8' 4")
Wd	Width	mm (ft-in)	2000 (6' 7")
Wt	Weight	kg (lb)	5170 (11400)

※ With 380 mm (15") triple grouser shoes and 470 kg (1040 lb) counterweight.

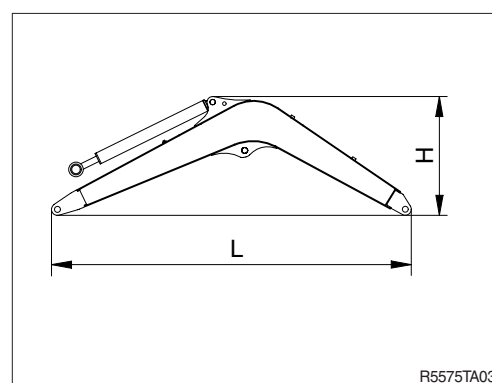


2) Boom assembly

Mark	Description	Unit	Specification
L	Length	mm (ft-in)	3020 (9' 10")
H	Height	mm (ft-in)	1160 (3' 10")
Wd	Width	mm (ft-in)	330 (1' 1")
Wt	Weight	kg (lb)	300 (660)

※ 2.9 m boom with arm cylinder (included piping and pins).

- Arm CYL : 55 kg

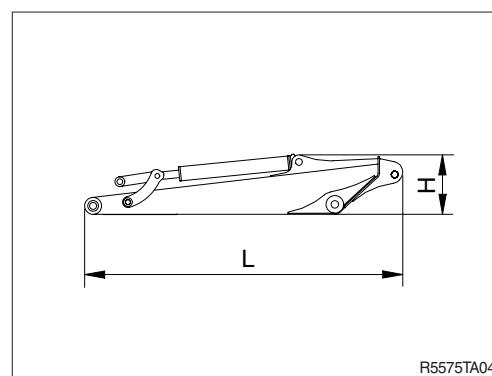


3) Arm assembly

Mark	Description	Unit	Specification
L	Length	mm (ft-in)	2000 (6' 7")
H	Height	mm (ft-in)	510 (1' 8")
Wd	Width	mm (ft-in)	165 (0' 7")
Wt	Weight	kg (lb)	205 (450)

※ 1.48 m (4'10") arm with bucket cylinder (included linkage and pins).

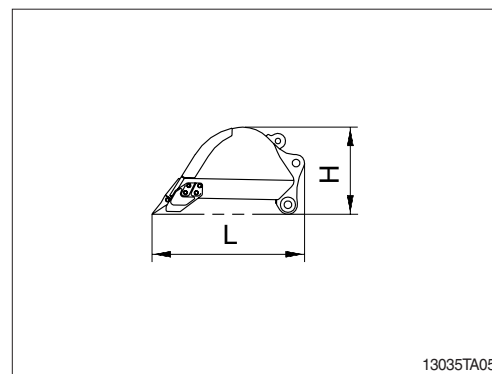
- Bucket CYL : 35 kg



4) Bucket assembly

Mark	Description	Unit	Specification
L	Length	mm (ft-in)	1020 (3' 4")
H	Height	mm (ft-in)	570 (1' 10")
Wd	Width	mm (ft-in)	740 (2' 5")
Wt	Weight	kg (lb)	170 (380)

※ 0.18 m³ (0.24 yd³) SAE heaped bucket (Included tooth and side cutters).

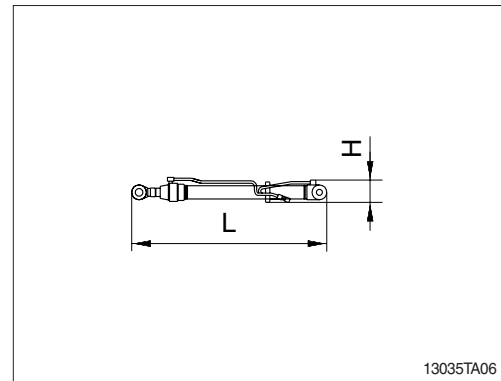


5) Boom cylinder

Mark	Description	Unit	Specification
L	Length	mm (ft-in)	1790 (5' 10")
H	Height	mm (ft-in)	150 (0' 6")
Wd	Width	mm (ft-in)	280 (0' 11")
Wt	Weight	kg (lb)	70 (155)

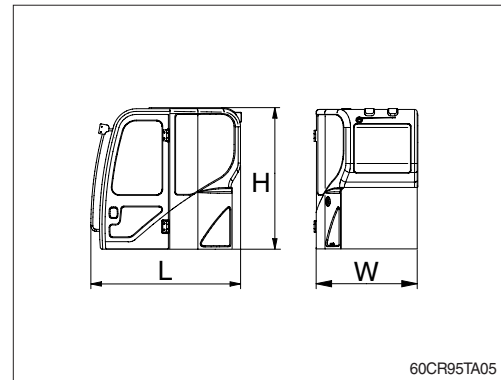
※ Included piping.

- Boom CYL : 70 kg



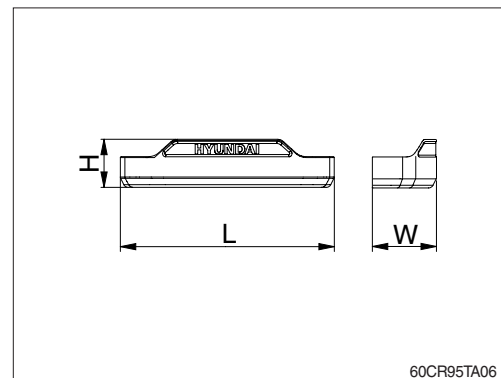
6) Cab assembly

Mark	Description	Unit	Specification
L	Length	mm (ft-in)	1650 (5' 5")
H	Height	mm (ft-in)	1570 (5' 2")
Wd	Width	mm (ft-in)	1130 (3' 9")
Wt	Weight	kg (lb)	350 (770)



7) Counterweight

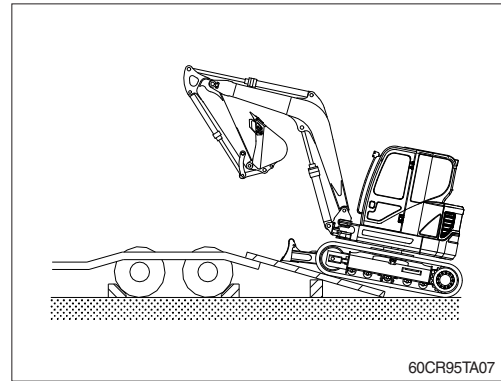
Mark	Description	Unit	Specification
L	Length	mm (ft-in)	1910 (6' 4")
H	Height	mm (ft-in)	500 (1' 8")
Wd	Width	mm (ft-in)	690 (2' 4")
Wt	Weight	kg (lb)	470 (1040)



3. LOADING THE MACHINE

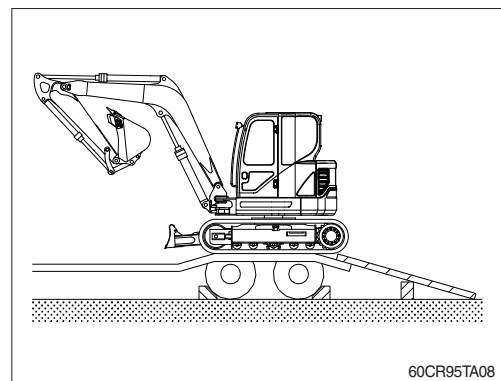
- 1) Load and unload the machine on a flat ground.
- 2) Use the gangplank with sufficient length, width, thickness and gradient.
- 3) Place the safety lever to the LOCK position (if equipped) before fixing the machine at the bed of trailer and confirm if the machine parallels the bed of trailer.

Keep the travel motor in the rear when loading and in the front when unloading.

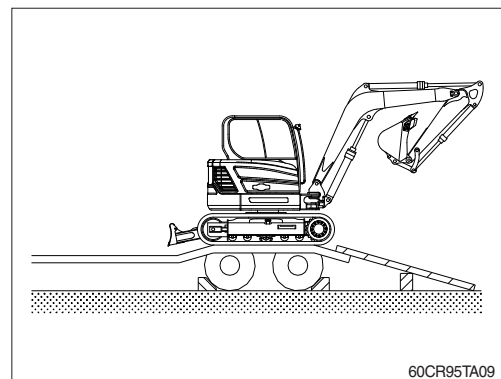


- 4) Do the following after loading the machine to the trailer.

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



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



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

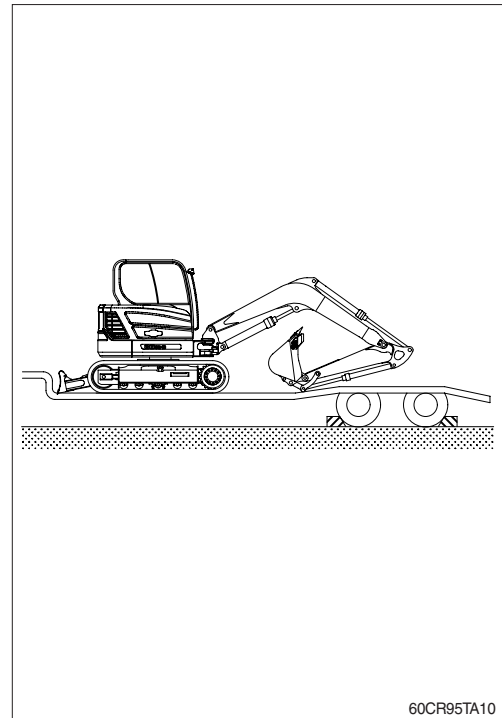
※ **Place rectangular timber under the bucket cylinder to prevent the damage of it during transportation.**

▲ **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.**

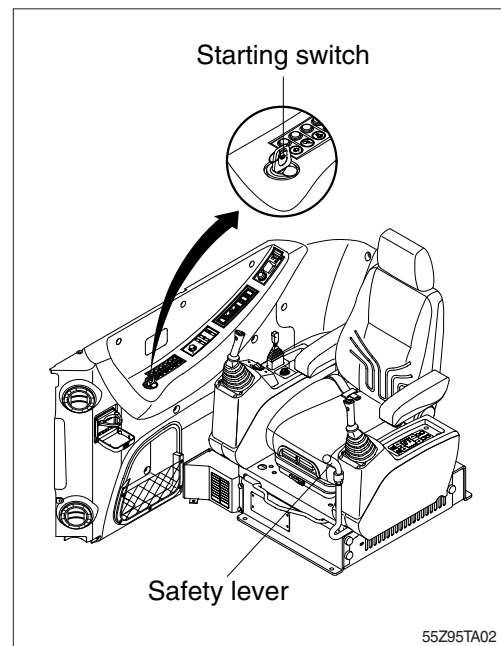
▲ **Do not operate any other device when loading.**

▲ **Be careful on the boundary place of loading plate or trailer as the balance of machine will abruptly be changed on the point.**

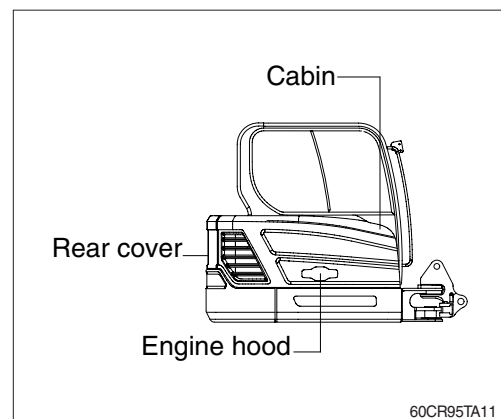


4. FIXING THE MACHINE

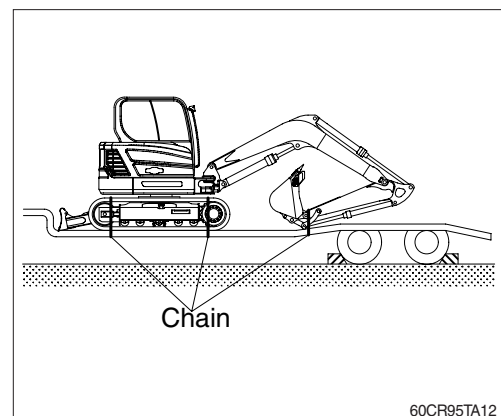
- 1) Lower down the working device on the loading plate of trailer.
- 2) Keep the safety lever on the LOCK position.
- 3) Turn OFF all the switches and remove the key.



- 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.

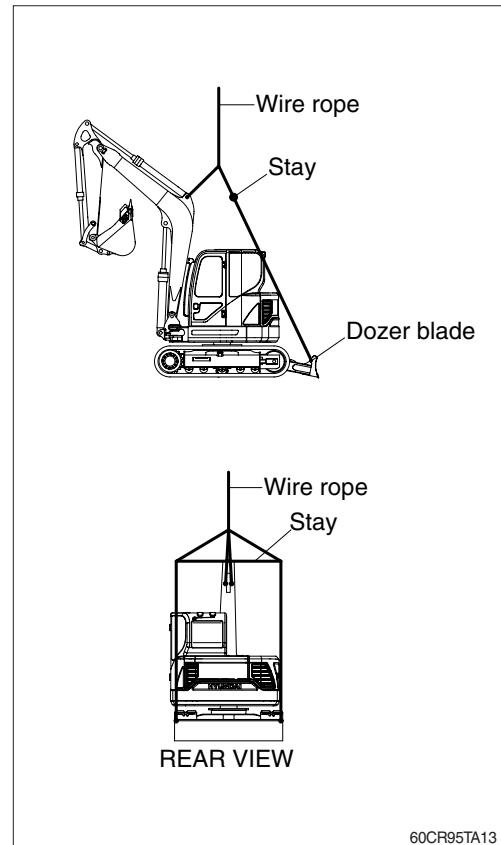
▲ Make sure wire rope is proper size.

▲ Place the 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 cluster.
- (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.



Service meter

5596MA01

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.

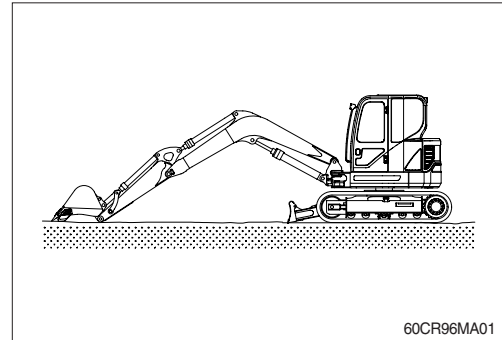
- (2) Use genuine parts.
 - (3) Use the recommended oil.
 - (4) Remove the dust or water around the inlet of oil tank before supplying oil.
 - (5) Drain oil when the temperature of oil is warm.
 - (6) Do not repair anything while operating the engine.
Stop the engine when you fill the oil.
 - (7) Relieve 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.

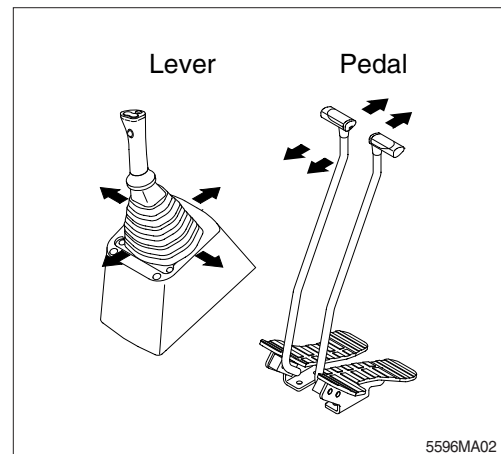
Be sure to relieve the pressure in the system before repairing hydraulic system.

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

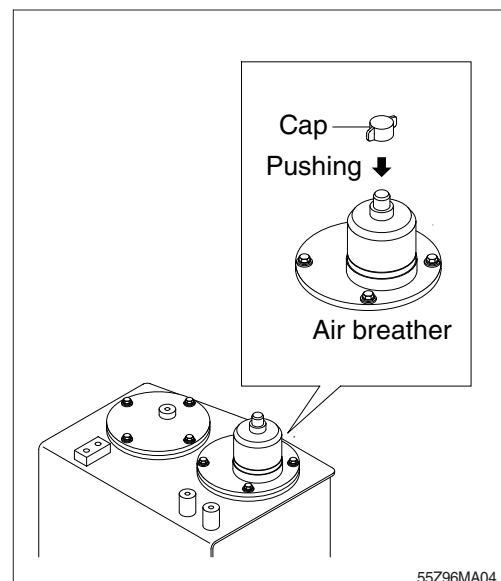


- (2) Set the safety lever completely in the release position and operate the control levers and pedals fully to the front, rear, left and right, to release the pressure in the hydraulic circuit.

- ※ **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.**

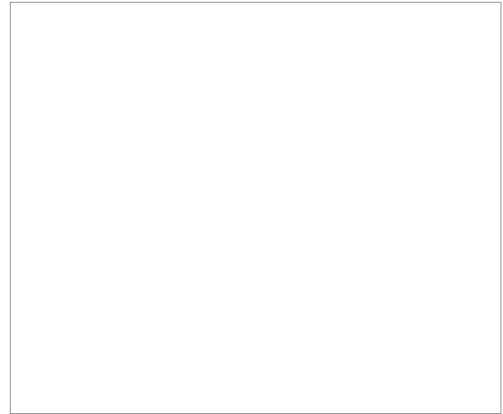


- (3) Loosen the cap and relieve the pressure in the tank by pushing the top of the air breather.



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	
	kg · m	lb · ft	kg · m	lb · ft
M 6 × 1.0	0.85 ~ 1.25	6.15 ~ 9.04	1.14 ~ 1.74	8.2 ~ 12.6
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
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 × 2.5	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	
	kg · m	lb · ft	kg · m	lb · 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
1"	41	21	152
1-1/4"	50	35	253

3) PIPE AND HOSE (ORFS type)

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

4) FITTING

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

4) TIGHTENING TORQUE OF MAJOR COMPONENT

No.	Descriptions		Bolt size	Torque	
				kgf · m	lbf · ft
1	Engine	Engine mounting bolt(Engine-Bracket)	M10 × 1.5	6.9±1.0	50±7.2
2		Engine mounting bolt(Bracket-Frame)	M16 × 2.0	25±2.5	181±18.1
3		Radiator mounting bolt, nut	M12 × 1.75	9.3±1.9	67.3±13.7
4		Coupling mounting socket bolt	M14 × 2.0	14±1.0	101±7.2
		Coupling mounting clamp bolt	M16 × 2.0	11±1.0	79.6±7.2
5	Hydraulic system	Main pump mounting bolt	M12 × 1.75	12.3±3.0	92±22.0
6		Main control valve mounting bolt	M 8 × 1.25	2.5±0.5	18±3.6
7		Fuel tank mounting bolt	M16 × 2.0	29.7±4.5	215±33
8		Hydraulic oil tank mounting bolt	M16 × 2.0	29.7±4.5	215±33
9		Turning joint mounting bolt, nut	M12 × 1.75	12.8±3.0	92±22.0
10	Power train system	Swing motor mounting bolt	M16 × 2.0	29.7±4.5	215±33.0
11		Swing bearing upper mounting bolt	M16 × 2.0	29.7±4.5	215±33.0
12		Swing bearing lower mounting bolt	M16 × 2.0	29.7±4.5	215±33.0
13		Travel motor mounting bolt	M14 × 2.0	19.6±3.2	142±21.0
14		Sprocket mounting bolt	M14 × 2.0	19.6±2.9	142±21.0
15	Under carriage	Carrier roller mounting bolt, nut	M16 × 2.0	29.6±3.2	214±23.1
16		Track roller mounting bolt	M18 × 2.5	41±5.0	297±36.0
17		Track tension cylinder mounting bolt	M12 × 1.75	12.8±3.0	92±22.0
18		Track shoe mounting bolt, nut	1/2-20UNF	19.5±2.0	141±14.5
19		Track guard mounting bolt	M16 × 2.0	29.6±3.2	214±23.0
20	Others	Counter weight mounting bolt	M20 × 2.5	57.9±8.7	418±62.9
21		Cab mounting bolt, nut	M12 × 1.75	12.8±3.0	92±22.0
22		Operator's seat mounting bolt	M 8 × 1.25	3.4±0.7	24.6±5.0

※ 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 10W-30 (API CI-4)
Hydraulic oil	Hyundai genuine long life hydraulic oil (ISO VG 46, VG 68) Conventional hydraulic oil (ISO VG15) Hyundai Bio Hydraulic Oil (HBHO, ISO VG 46)
Travel reduction gear	SAE 80W-90 (API GL-5)
Grease	Lithium base grease NLGI No. 2
Fuel	ASTM D975-No. 2 (low sulfur fuel or ultra low sulfur fuel)
Coolant	Mixture of 50% ethylene glycol base antifreeze and 50% water.

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

· Low sulfur fuel : sulfur content ≤ 500 ppm

· Ultra low sulfur fuel : sulfur content ≤ 15 ppm

2) RECOMMENDED OILS

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

Please use HYUNDAI genuine oil and grease.

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	11.6 (3.1)				SAE 30			
			SAE 10W						
			SAE 10W-30						
				SAE 15W-40					
Final drive	Gear oil	1.2×2 (0.3×2)		SAE 80W-90					
Hydraulic tank	Hydraulic oil	Tank: 60 (15.9) System: 110 (29.1)	ISO VG 32						
				ISO VG 46, HBHO VG 46★ ²					
				ISO VG 68					
Fuel tank	Diesel fuel	82 (21.7)	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★ ¹	9.5 (2.5)							
				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 : Soft water

- City water or distilled water

★² : Hyundai Bio Hydraulic Oil

※ Using any lubricating oils other than HYUNDAI genuine products may lead to a deterioration of performance and cause damage to major components.

※ Do not mix HYUNDAI genuine oil with any other lubricating oil as it may result in damage to the systems of major components.

※ Do not use any engine oil other than that specified above, as it may clog the diesel particulate filter(DPF).

※ For HYUNDAI genuine lubricating oils and grease for use in regions with extremely low temperatures, please contact HYUNDAI dealers.

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	6-27
Engine oil level	Check, Add	6-18
Coolant level	Check, Add	6-20
Control panel & pilot lamp	Check, Clean	6-36
Prefilter	Check, Clean	6-25
Fan belt tension	Check, Adjust	6-23
★ Attachment pin and bushing	Lubricate	6-35
· 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		

★ Lubricate every 10 hours or daily for initial 100 hours.

2) EVERY 50 HOURS SERVICE

Check items	Service	Page
Fuel tank (water, sediment)	Drain	6-25
Track tension	Check, Adjust	6-32
Swing gear & pinion grease	Lubricate	6-30
Bucket linkage & blade pins	Lubricate	6-41
· Bucket cylinder rod end		
· Bucket + Arm connecting		
· Bucket control link + Arm		
· Bucket control rod		
· Boom swing post + Upper frame connecting		
· Boom swing cylinder head and rod		
· Dozer blade + Lower frame connecting		
· Dozer blade cylinder head and rod		

3) INITIAL 50 HOURS SERVICE

Check items	Service	Page
Bolts & Nuts · 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	Check, Tight	6-8

4) INITIAL 250 HOURS SERVICE

Check items	Service	Page
Engine oil	Change	6-18, 19
Engine oil filter	Replace	6-18, 19
Prefilter (water, element)	Replace	6-25
Fuel filter	Replace	6-26
★ Pilot line filter	Replace	6-29
★ Hydraulic return filter	Replace	6-28
Travel reduction gear oil	Change	6-31

★ Replace 2 filters for continuous hydraulic breaker operation only.

5) EVERY 250 HOURS SERVICE

Check items	Service	Page
Battery (voltage)	Check, Clean	6-36
Aircon & heater fresh air filter	Check	6-39
Swing bearing grease	Lubricate	6-30
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		
Attachment pin and bushing	Lubricate	6-35
· 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		

6) 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	6-24
Fuel filter element	Replace	6-26
Prefilter	Replace	6-25

★ 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.

7) EVERY 1000 HOURS SERVICE

Check items	Service	Page
Air breather element	Replace	6-29
Travel motor reduction gear oil	Change	6-31
Hydraulic oil return filter	Replace	6-28
Pilot line filter	Replace	6-29

8) EVERY 2000 HOURS SERVICE

Check items	Service	Page
Coolant	Change	6-20, 21, 22, 23
Hydraulic tank suction strainer	Check, Clean	6-28
★ Hydraulic oil* ¹	Change	6-28
HBHO (Hyundai Bio Hydraulic Oil, ISO VG 46)* ²	Change	6-28
Hoses, fittings, clamps (fuel, coolant, hydraulic)	Check, Retighten, Replace	-

*¹ Conventional hydraulic oil

*² If do not want to change HBHO every 2000 hours, contact HYUNDAI dealer and ask about SAMPLING.

★ Change oil every 600 hours of continuous hydraulic breaker operation.

9) EVERY 5000 HOURS SERVICE

Check items	Service	Page
★ Hydraulic oil* ³	Change	6-28

*³ Hyundai genuine long life hydraulic oil

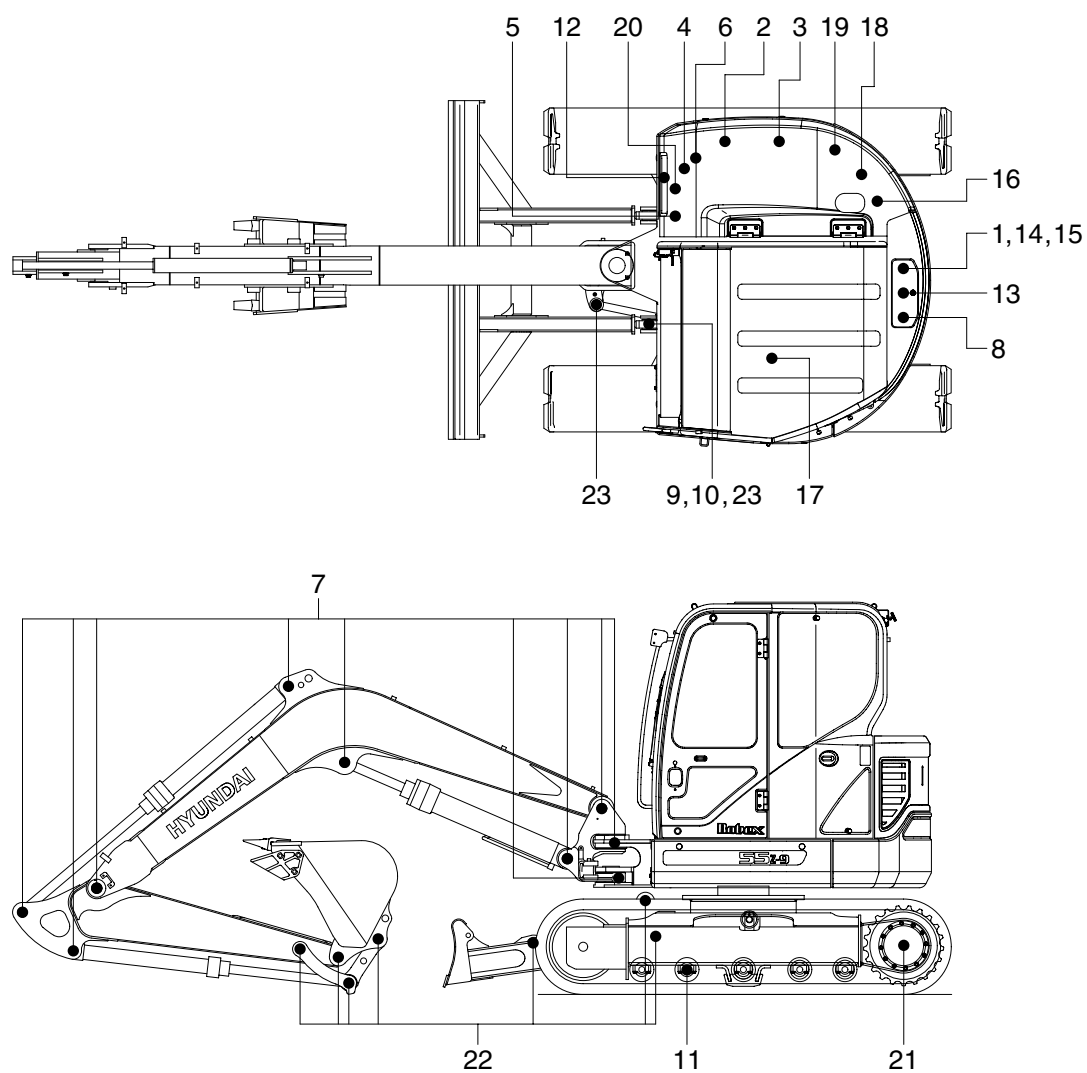
★ Change oil every 1000 hours of continuous hydraulic breaker operation.

10) 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	6-25
· Fuel filter element	Replace	6-26
Engine lubrication system		
· Engine oil	Change	6-18, 19
· Engine oil filter	Replace	6-18, 19
Engine cooling system		
· Coolant	Add or Change	6-20, 21, 22, 23
· Radiator	Clean or Flush	6-20, 21, 22, 23
· Charge air cooler	Check	6-23
Engine air system		
· Air cleaner element	Replace	6-24
Hydraulic system		
· Hydraulic oil	Add or Change	6-27
· Return filter	Replace	6-28
· Pilot line filter	Replace	6-29
· Element of breather	Replace	6-29
· Suction strainer	Clean	6-28
Under carriage		
· Track tension	Check, Adjust	6-32
Bucket		
· Tooth	Replace	6-34
· Side cutter	Replace	6-33
· Linkage	Adjust	6-33
· Bucket assy	Replace	6-33
Air conditioner and heater		
· Fresh air filter	Clean, Replace	6-39
· Recirculation filter	Clean	6-40

5. MAINTENANCE CHART



55Z96MA03

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	1	Hydraulic oil level	Add	HO	60 (15.9)	1
	2	Engine oil level	Add	EO	11.6 (3.1)	1
	4	Radiator coolant	Add	C	9.5 (2.5)	1
	5	Prefilter (water, element)	Clean	-	-	1
	6	Fan belt tension and damage	Clean	-	-	1
50 Hours or weekly	8	Fuel tank (water, sediment)	Clean	-	-	1
	10	Swing gear and pinion	Add	PGL	-	1
	11	Track tension	Adjust	PGL	-	2
	22	Bucket linkage & blade pins	Lubricate	-	-	9
250 Hours	7	Attachment pin	Lubricate	PGL	-	10
	9	Swing bearing	Lubricate	PGL	-	3
	12	Battery (voltage)	Check	-	-	1
	17	Air conditioner filter (outer)	Clean	-	-	1
	23	Boom swing cylinder	Lubricate	PGL	-	2
500 Hours	2	Engine oil	Change	EO	11.6 (3.1)	1
	3	Engine oil filter	Replace	-	-	1
	5	Prefilter (water, element)	Replace	-	-	1
	18	Air cleaner element (primary)	Clean	-	-	1
	19	Fuel filter element	Replace	-	-	1
	20	Radiator, cooler fin and charge air cooler	Clean	-	-	3
1000 Hours	13	Hydraulic oil return filter	Replace	-	-	1
	14	Air breather element	Replace	-	-	1
	16	Pilot line filter	Replace	-	-	1
2000 Hours	1	Hydraulic oil★ ¹	Change	HO	60 (15.9)	1
	1	Hydraulic oil (HBHO★ ²)	Change	-	60 (15.9)	1
	4	Radiator coolant	Change	C	9.5 (2.5)	1
	15	Hydraulic oil suction strainer	Clean	-	-	1
	-	Hoses, fittings, clamps (fuel, coolant, hydraulic)	Check, Retighten, Replace	-	-	-
5000 Hours	1	Hydraulic oil★ ³	Change	HO	60 (15.9)	1
As required	17	Air conditioner filter (outer)	Replace	-	-	1
		Air conditioner filter (inner)	Clean	-	-	1
	18	Air cleaner element (safety)	Replace	-	-	1
		Air cleaner element (primary)	Replace	-	-	1

★¹ : Conventional hydraulic oil

★² : Hyundai Bio Hydraulic Oil

★³ : Hyundai genuine long life hydraulic oil

※ Oil symbol

Please refer to the recommended lubricants for specification.

DF : Diesel fuel

GO : Gear oil

HO : Hydraulic oil

C : Coolant

PGL : Grease

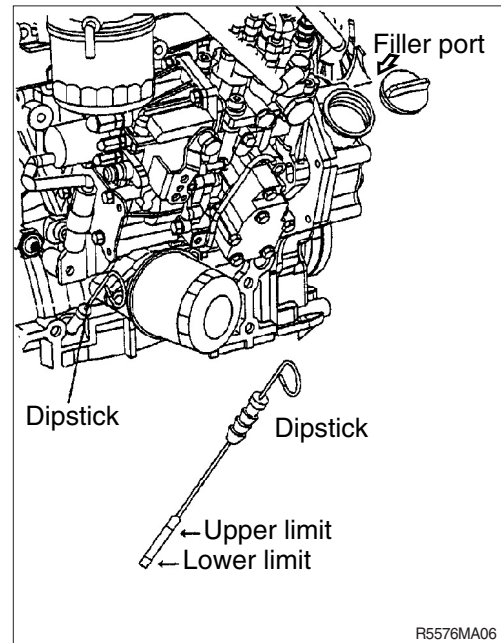
EO : Engine oil

6. SERVICE INSTRUCTION

1) CHECK ENGINE OIL LEVEL

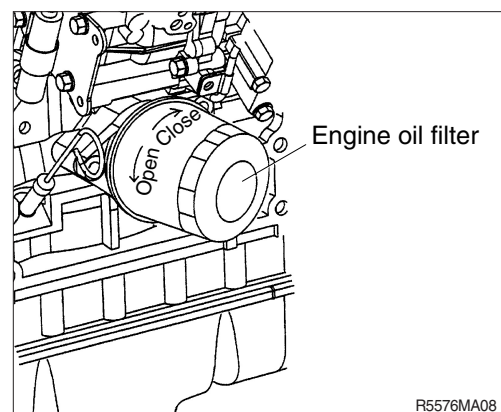
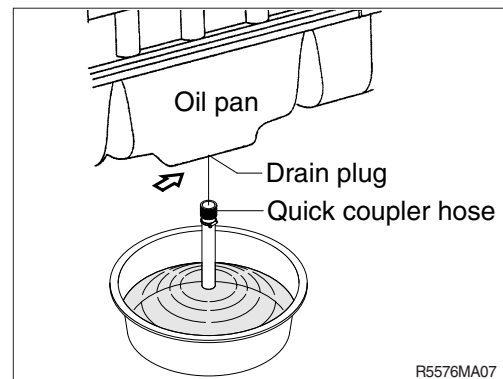
Check the oil level with the machine on a flat ground before starting engine.

- (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.

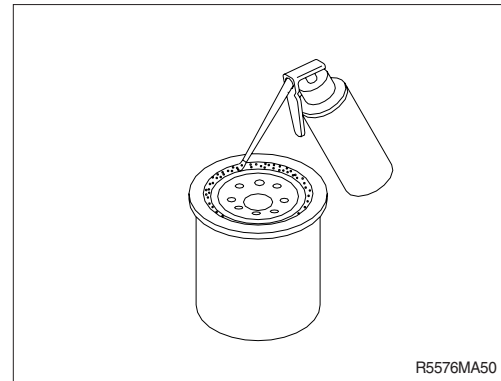


2) REPLACEMENT OF ENGINE OIL AND OIL FILTER

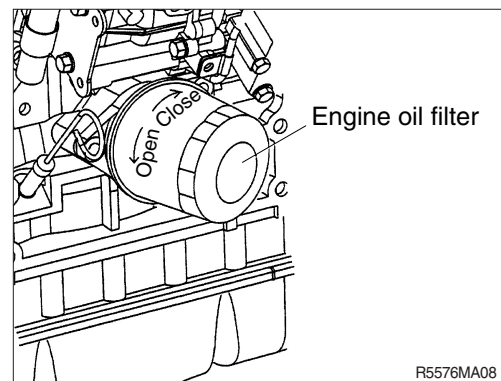
- (1) Warm up the engine.
- (2) Remove the cover of drain plug and connect the quick coupler hose.
 - ※ A drain pan with a capacity of 20 liters (5 U.S. gallons) will be adequate.
- (3) Clean around the filter head, remove the filter with a filter wrench and clean the gasket surface.



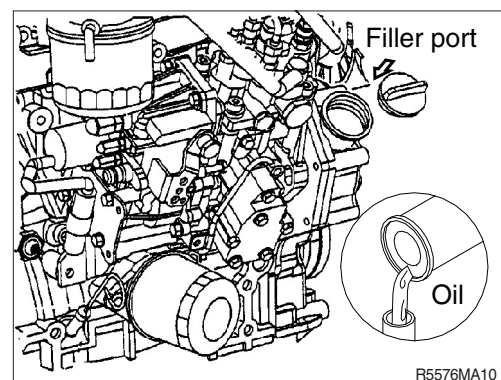
- (4) Apply a light film of lubricating oil to the gasket sealing surface before installing the filters.



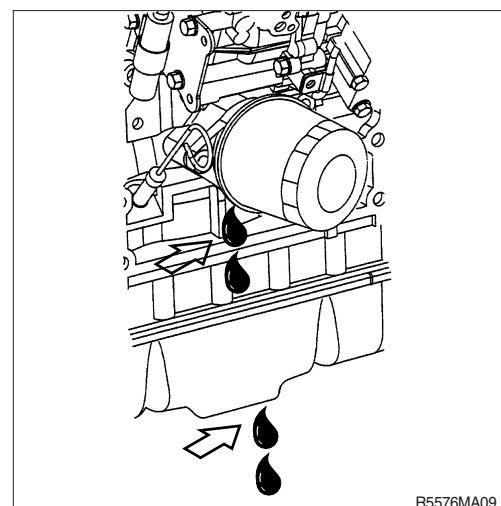
- (5) Install the filter to the filter head.
Remove the quick coupler hose.
- ※ **Mechanical over-tightening may distort the threads or damage the filter element seal.**
- Install the filter as specified by the filter manufacturer.



- (6) Fill the engine with clean oil to the proper level.
- Quantity : 9.2 l (2.4 U.S.gallons)



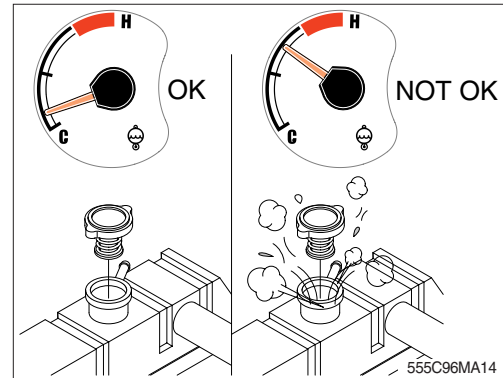
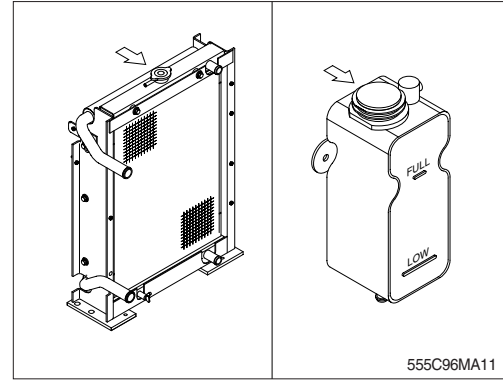
- (7) Operate the engine at low idle and inspect for leaks at the filters and the drain plug.
Shut the engine off and check the oil level with the dipstick. Allow 15minutes for oil to drain down before checking.



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.

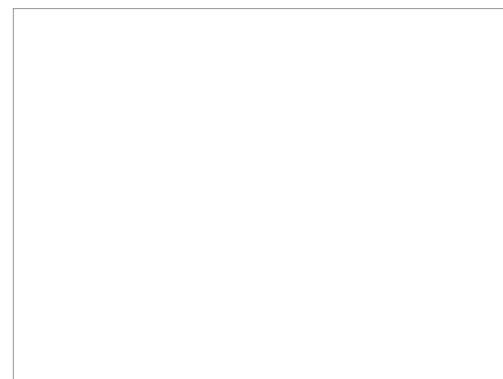
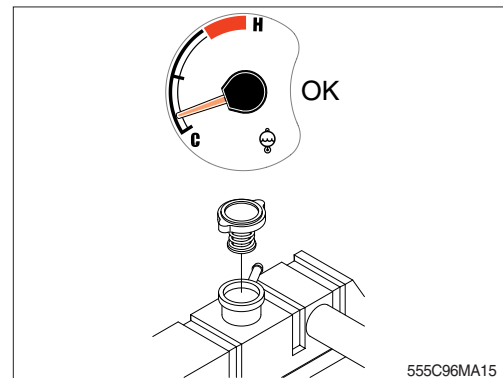
Avoid excessive contact-wash thoroughly after contact.

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.

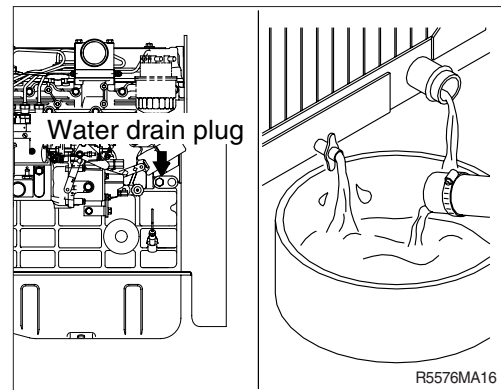
If in doubt, contact your local authorities for guidance as to proper handling of used antifreeze.



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

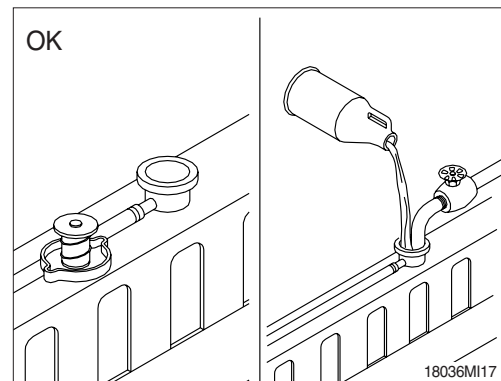
Failure to do so can cause personal injury from heated coolant spray.

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 20 liters (5 U.S.gallons) will be adequate in most applications.

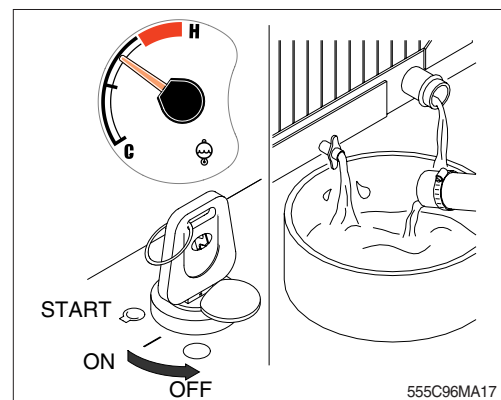


(2) Flushing of cooling system

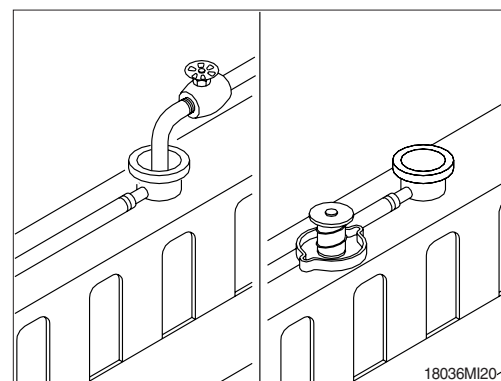
- ① Fill the system with a mixture of sodium carbonate and water(or a commercially available equivalent).
 - ※ Use 0.5 kg (1.0 pound) of sodium carbonate for every 23 liters (6.0 U.S.gallons) of water.
 - ※ Do not install the radiator cap. The engine is to be operated without the cap for this process.



- 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.

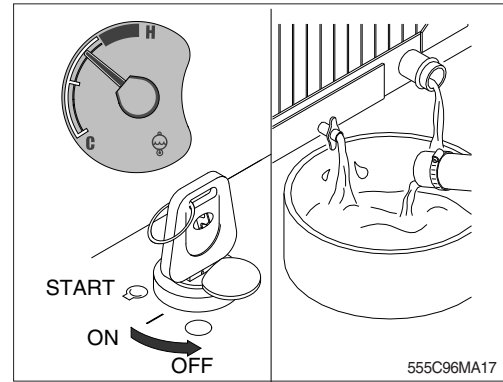


- ③ Fill the cooling system with clean water.
 - ※ Be sure to vent the engine and aftercooler for complete filling.
 - ※ Do not install the radiator cap or the new coolant filter.



- 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.

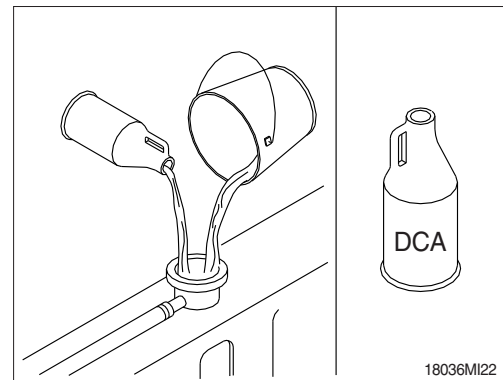
※ **If the water being drained is still dirty, the system must be flushed again until the water is clean.**



(3) Cooling system filling

- ① Use a mixture of 50 percent water and 50 percent ethylene glycol antifreeze to fill the cooling system.

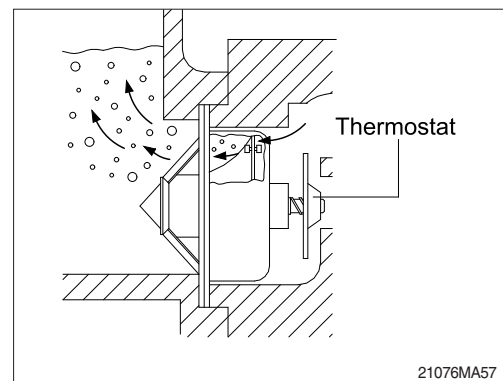
Coolant capacity (engine only) : 10 l (2.6 U.S. gallons)



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

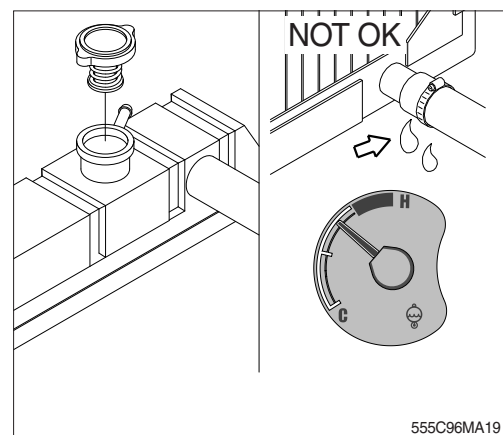
※ **The system must be filled slowly to prevent air locks.**

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.

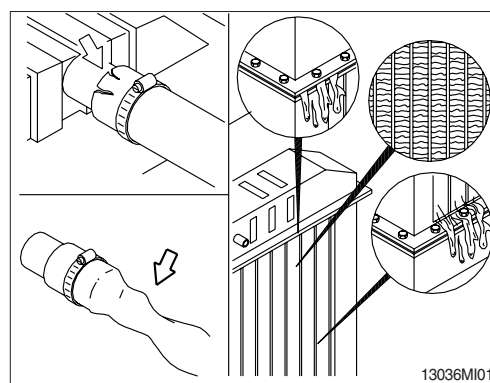
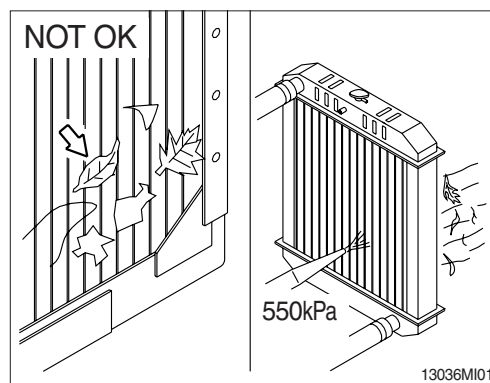
Check the coolant level again to make sure the system is full of coolant.



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.

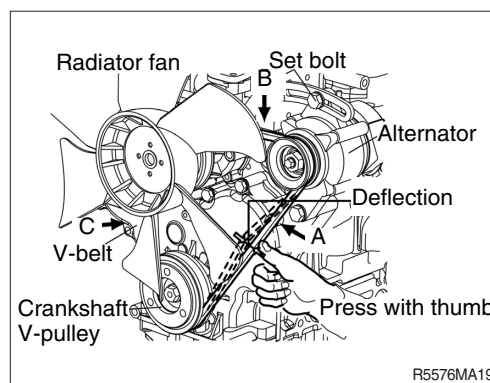
- (1) Visually inspect the radiator for clogged radiator fins.
- (2) Use 550 kPa (80 psi) air pressure to blow the dirt and debris from the fins.
Blow the air in the opposite direction of the fan air flow.
- (3) Visually inspect the radiator for bent or broken fins.
- ※ If the radiator must be replaced 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.



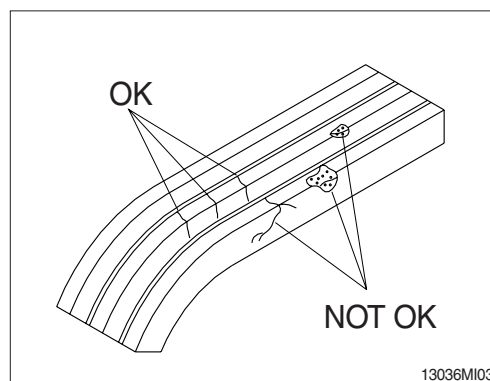
6) FAN BELT TENSION

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

	A	B	C
Used belt	10~14	7~10	9~13
New belt	8~12	5~8	7~11



- (2) Inspect the drive for damage.



7) 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.

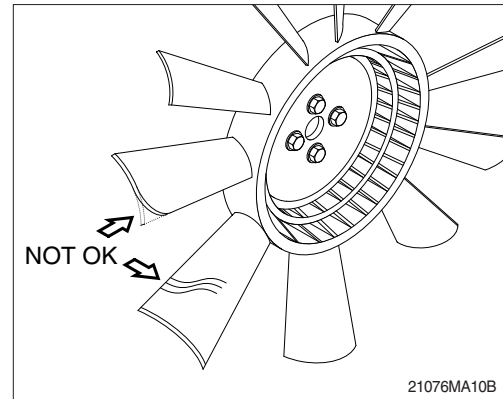
※ Rotate the crankshaft by using the engine barring gear.

※ 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.



8) CLEANING OF AIR CLEANER

(1) Primary element

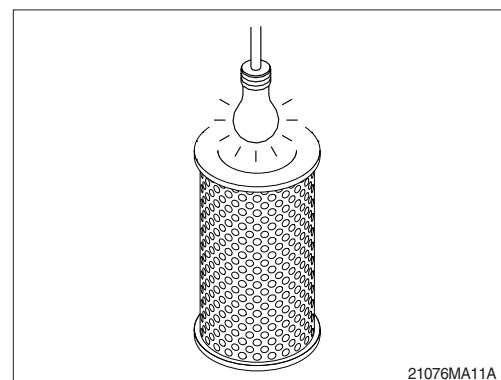
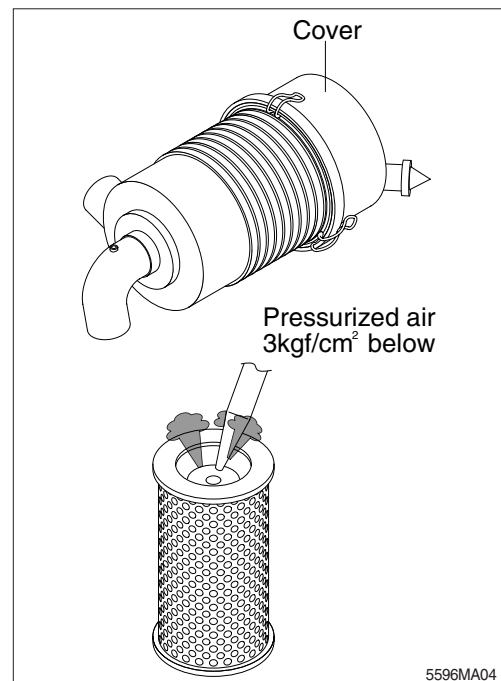
- ① Open cover and remove the element.
- ② Clean the inside of the body.
- ③ Clean the element with pressurized air.
 - Remove the dust inside of the element by the pressurized air (below 3 kgf/cm², 40 psi) forward and backward equally.
- ④ Inspect for cracks or damage of element by putting a light bulb inside of the element.
- ⑤ Insert element and close cover.

※ Replace the primary element after 4 times cleanings.

(2) Safety element

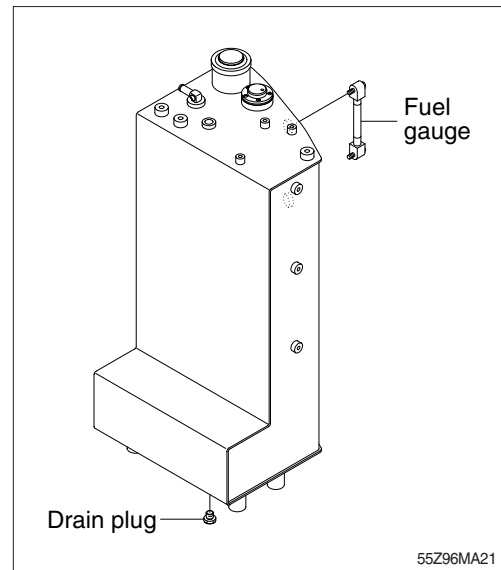
※ Replace the safety element only when the primary element is cleaned for the 4 times.

※ Always replace the safety element. Never attempt to reuse the safety element by cleaning the element.



9) 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.

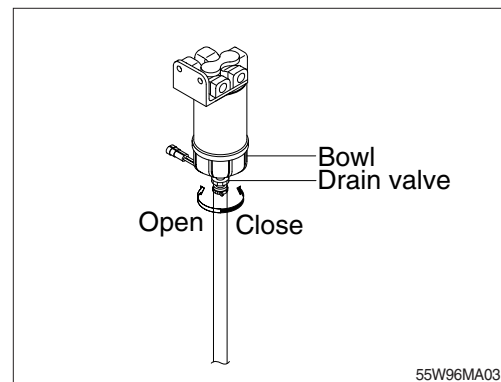


10) Prefilter

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

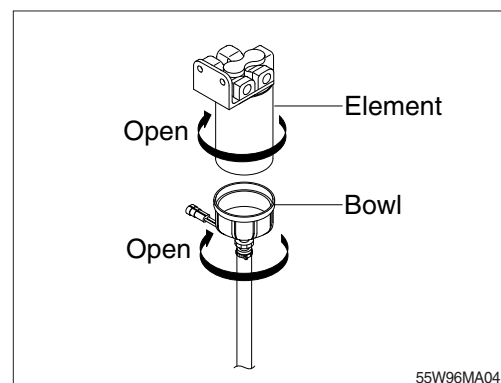
(1) Drain water

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

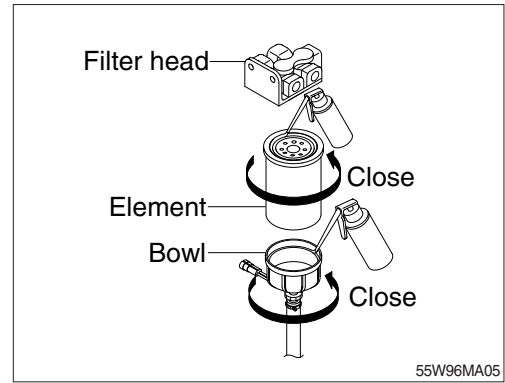


(2) Replace element

- ① Drain the unit of fuel. Follow "Drain water" instructions above.
- ② Remove element and bowl from filter head.
 - ※ **The bowl is reusable, do not damage or discard.**
- ③ Separate element from bowl. Clean bowl and seal gland.

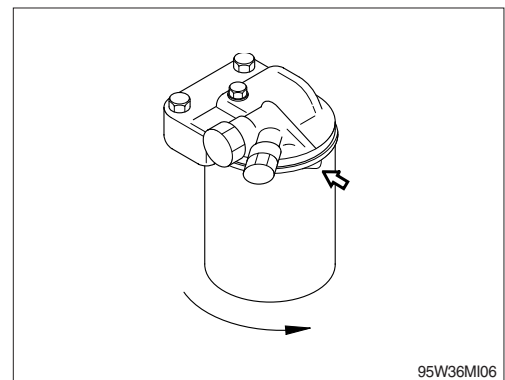
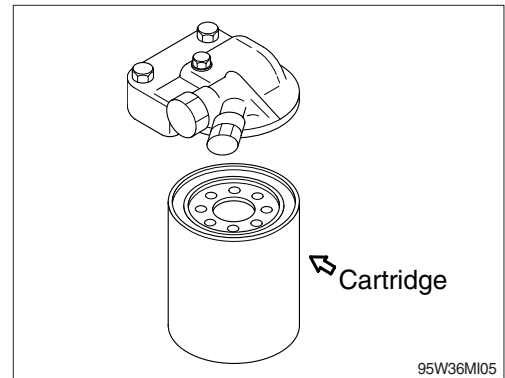


- ④ Lubricate new bowl seal with clean fuel or motor oil and place in bowl gland.
- ⑤ Attach bowl to new element firmly by hand.
- ⑥ Lubricate new element seal and place in element top gland.
- ⑦ Attach the element and bowl to the head.



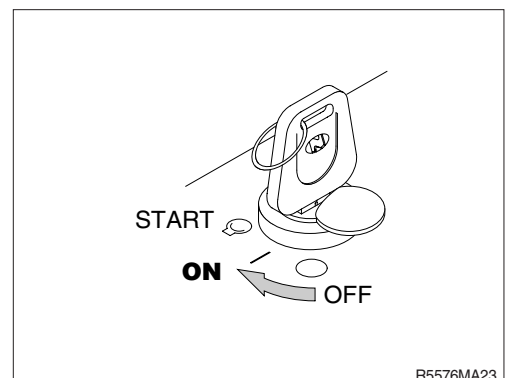
11) REPLACEMENT OF FUEL FILTER

- (1) Clean around the filter head, remove the filter with a filter wrench and clean the gasket surface.
- (2) Apply a small amount of fuel to the O-ring of new cartridge.
- (3) Install new cartridge by hand.
 - ※ **Do not add fuel to the new cartridge. Invisible particles of dirt which might get inside the injection pump can damage its finely finished parts.**
- (4) 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.**



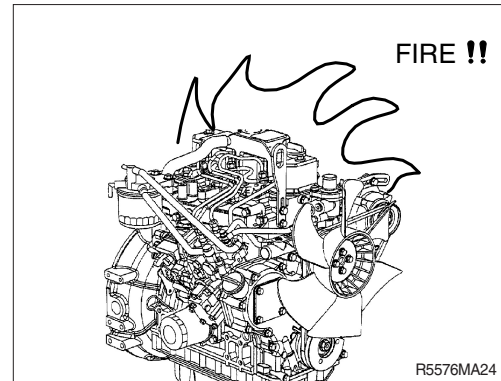
12) BLEEDING THE FUEL SYSTEM

- (1) Turn the start switch to the ON position and hold it in the position for 10~15 seconds to operate the fuel feed pump.



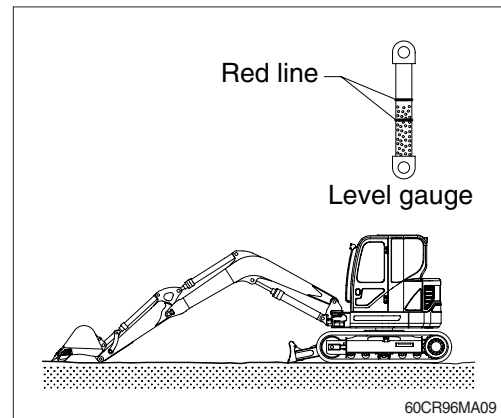
13) LEAKAGE OF FUEL

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



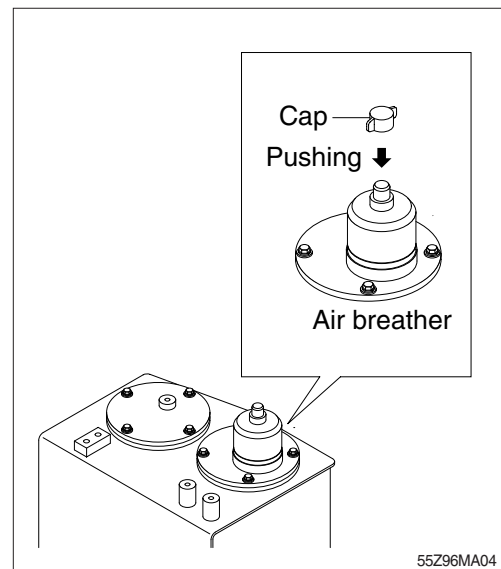
14) HYDRAULIC OIL CHECK

- (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 : $1.44 \pm 0.3 \text{ kgf} \cdot \text{m}$
($10.4 \pm 2.1 \text{ lbf} \cdot \text{ft}$)
- (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.



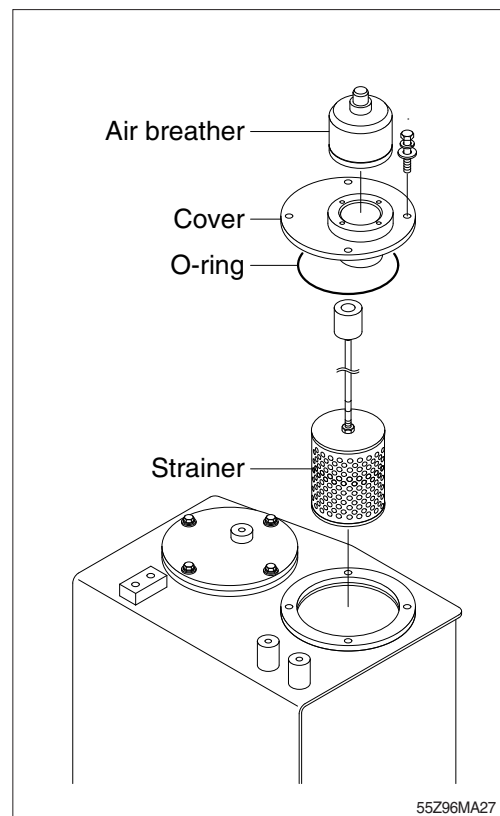
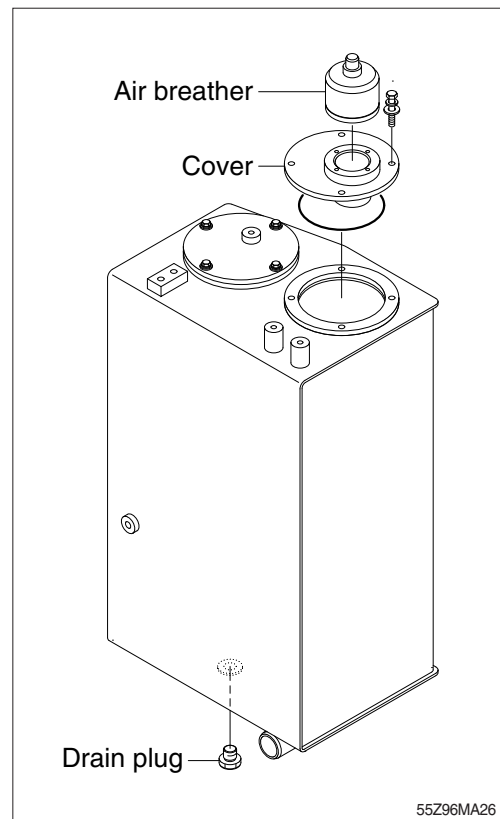
16) CHANGE HYDRAULIC OIL

- (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 : $6.9 \pm 1.4 \text{ kgf} \cdot \text{m}$
($50 \pm 10 \text{ lbf} \cdot \text{ft}$)
 - (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.
- ※ Increase of injecting HBHO (Hyundai Bio Hydraulic Oil) to machines that have formerly used different hydraulic oil, the proportion of residual oil must not exceed 2 %
- ※ Do not mix any other Bio oil, use only HBHO as bio oil.
- If changing to Bio oil, contact HYUNDAI dealer.

17) CLEAN SUCTION STRAINER

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

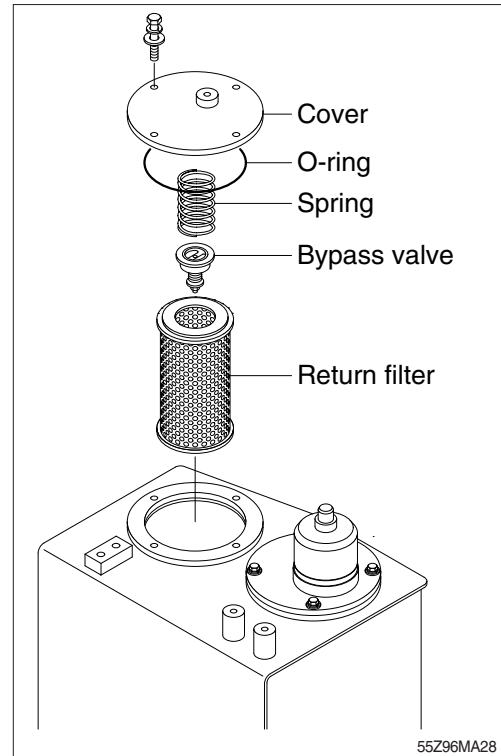
- (1) Remove the cover on the top of the oil tank.
 - Tightening torque : $6.9 \pm 1.4 \text{ kgf} \cdot \text{m}$
($50 \pm 10 \text{ lbf} \cdot \text{ft}$)
 - (2) Pull out the strainer in the tank.
 - (3) Wash the foreign material on the suction strainer with gasoline or cleaning oil.
 - (4) Replace 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

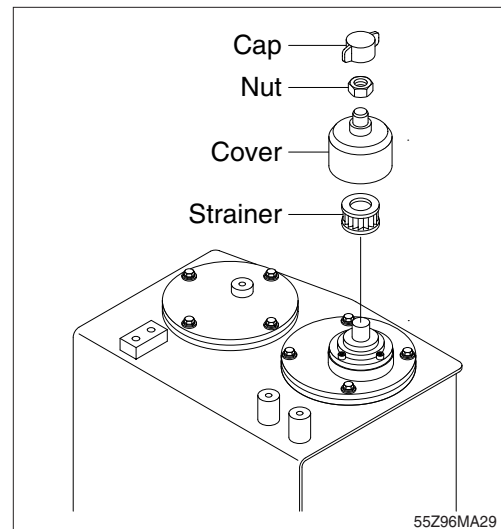
Replace as follows paying attention to the cause to be kept during the replacement.

- (1) Remove the cover.
 - Tightening torque : $6.9 \pm 1.4 \text{ kgf} \cdot \text{m}$
($50 \pm 10 \text{ lbf} \cdot \text{ft}$)
- (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

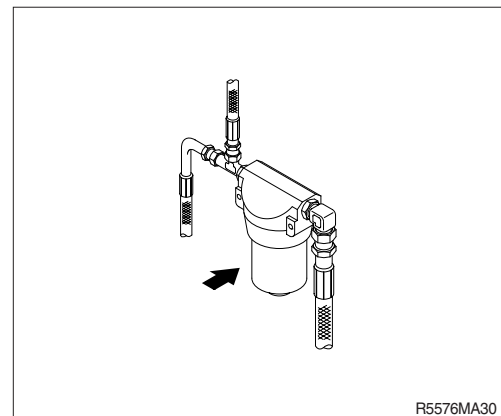
- (1) Loosen the cap and relieve the pressure in the tank by pushing the top of the air breather.
- (2) Loosen the lock nut and remove the cover.
- (3) Pull out the filter element.
- (4) Replace the filter element with new one.
- (5) Reassemble by reverse order of disassembly.
 - Tightening torque : $0.04 \sim 0.05 \text{ kgf} \cdot \text{m}$
($0.29 \sim 0.36 \text{ lbf} \cdot \text{ft}$)



20) 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.
 - Tightening torque : $2.6 \pm 3.5 \text{ kgf} \cdot \text{m}$
($18.9 \sim 25.3 \text{ lbf} \cdot \text{ft}$)

※ **Change cartridge after initial 250 hours of operation. Thereafter, change cartridge every 1000 hours.**



22) MANIFOLD

(1) Swing bearing

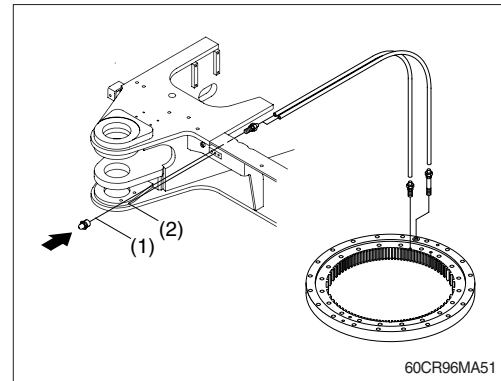
Grease at 1 fitting.

※ Lubricate every 250 hours.

(2) Swing ring gear

Grease at 1 fitting.

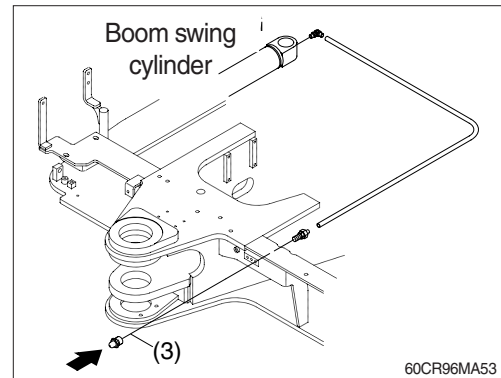
※ Lubricate every 50 hours.



(3) Boom swing cylinder

Grease at fitting.

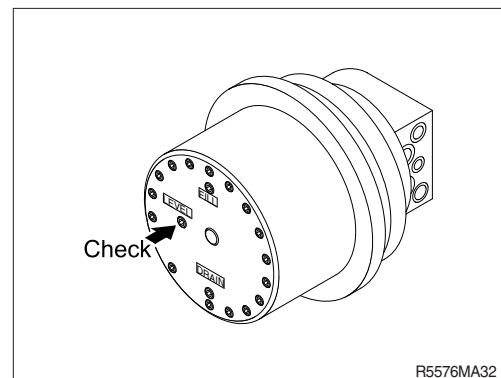
※ Lubricate every 50 hours.



23) CHECK THE TRAVEL REDUCTION GEAR OIL

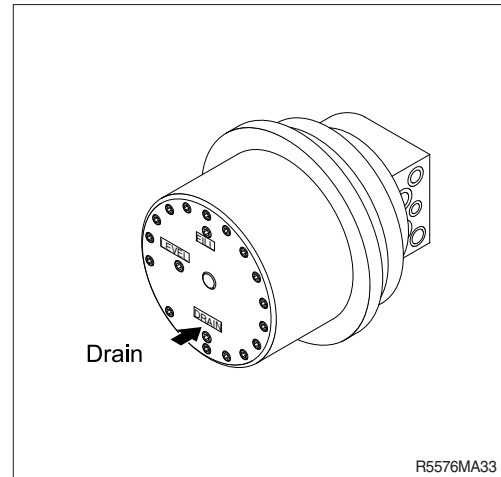
(1) Operate the machine to the position of drain plug down to the flat ground.

(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.
Amount of oil : 1.2 l (0.3 U.S.gal)



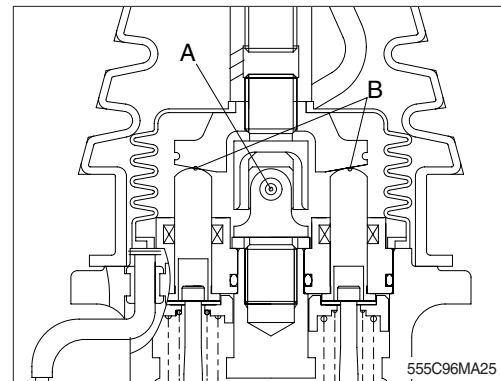
24) CHANGE OF THE TRAVEL REDUCTION GEAR OIL

- (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.



25) LUBRICATE RCV LEVER

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



26) ADJUSTMENT OF TRACK TENSION

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

※ The wear of pins and bushings on the undercarriage will vary with the working conditions and soil properties.

It is thus necessary to continually inspect the track tension so as to maintain the standard tension on it.

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

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

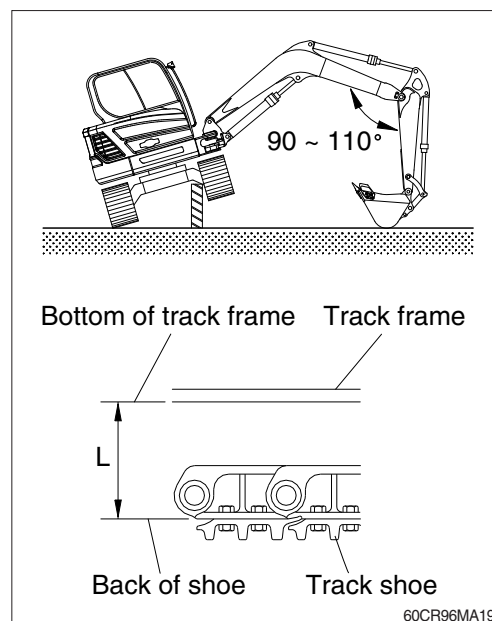
▲ Personal injury or death can result from grease under pressure.

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

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

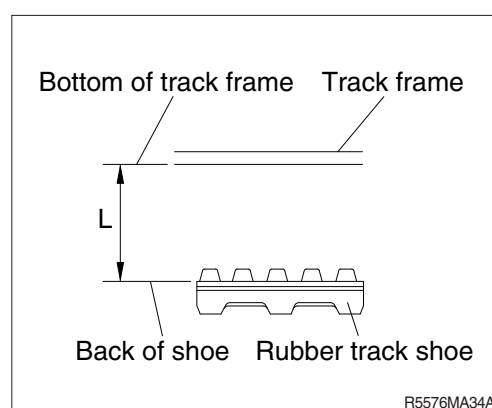
※ When the grease is drained, move the track to the forward and backward slightly.

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



Steel track

Length (L)	
130~150 mm	5.1~5.9"



Rubber track

Length (L)	
39~44 mm	1.5~1.7"

27) 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.

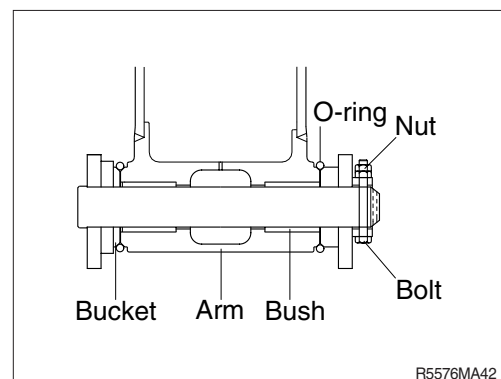
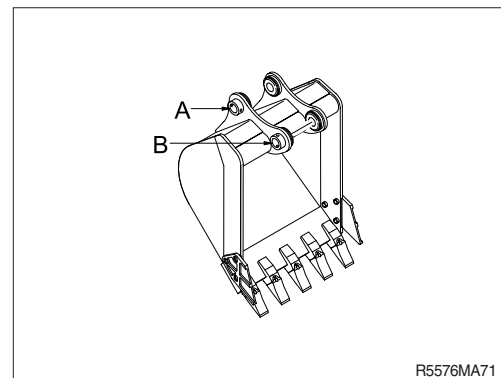
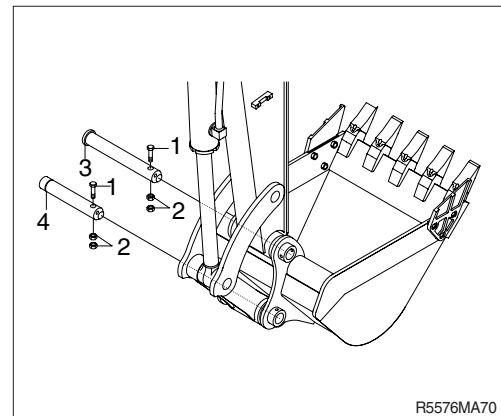
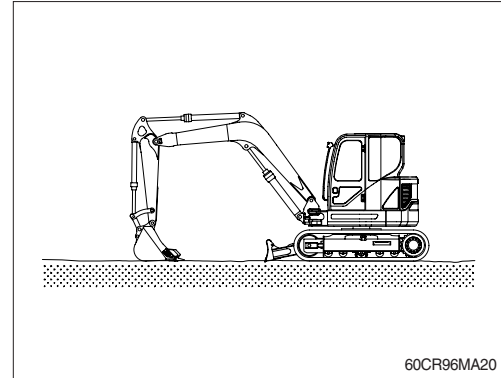
※ If the bucket is lowered strongly to the ground, the resistance will be increased and it will be difficult to remove the pins.

※ After removing 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.

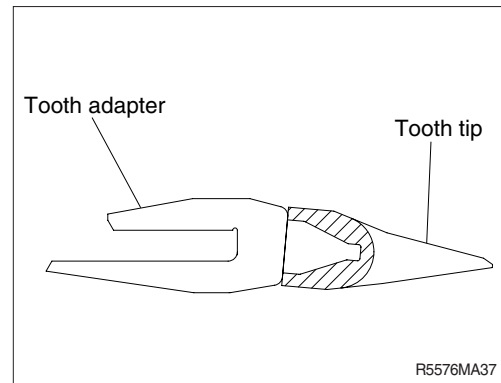
(5) Install the stopper bolt (1) and nuts (2) for each pin, then grease the pin.



28) 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.

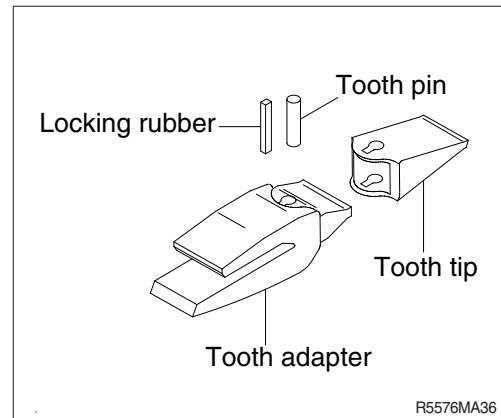


(2) Instructions for replacement

- ① Pull out pin by striking pin with punch or hammer avoiding damage to locking rubber.
- ② Remove dust and mud from surface of tooth adapter by using knife.
- ③ Place locking rubber in its proper place, and fit tooth tip to adapter.
- ④ Insert pin until locking rubber is positioned at tooth pin groove.

▲ Personal injury can result from bucket falling.

▲ Block the bucket before changing tooth tips or side cutters.



29) LUBRICATION PIN AND BUSHING

- (1) Lubricate to each pin of working device
Lubricate the grease to the grease nipple according to the lubricating interval.

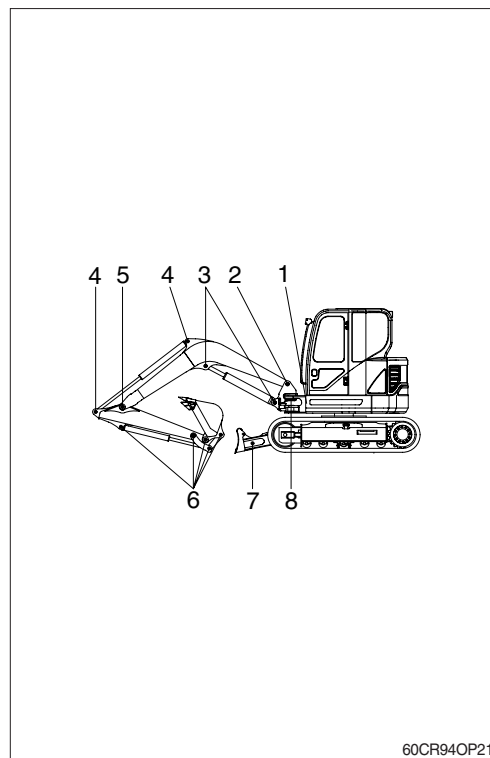
No.	Description	Qty
1	Lubrication manifold at upper frame	4
2	Boom connection pin	2
3	Boom cylinder (head and rod side)	2
4	Arm cylinder pin (head and rod side)	2
5	Boom and arm connection pin	1
6	Bucket cylinder pin (Head and rod)	2
	Bucket link (Control rod)	1
	Arm and bucket connection pin	1
	Arm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

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

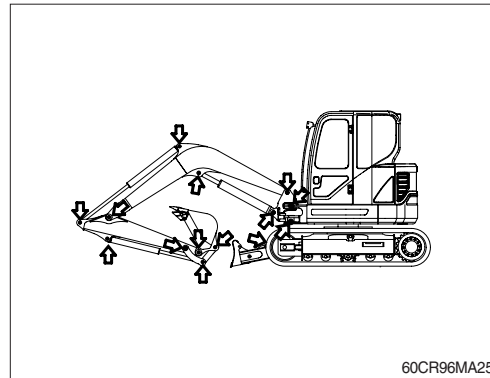
- (2) Dust seals are mounted on the rotating part of working device to extend the lubricating interval.

※ Mount the lip to be faced outside when replace the dust seal.

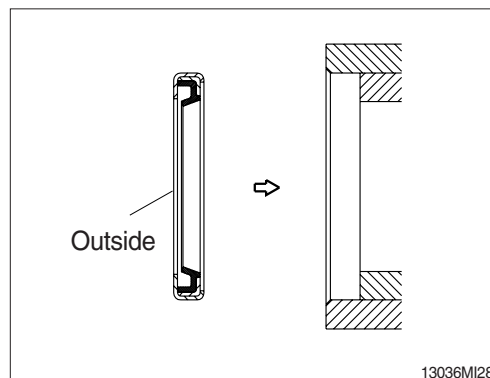
- ※ If it is assembled in wrong direction, it will cause fast wear of pin and bushing, and create noise and vibration during operation.
- ※ Assemble the seal same direction with picture and use with plastic hammer when replacing it.



60CR94OP21



60CR96MA25



13036MI28

30) TILTING CAB

⚠ Keep clearance of people except the operator before tilting the cab.

※ By tilting the cab, service of hydraulic and electric system such as hydraulic components, hydraulic pipings, electric components, and electric wirings can be easily performed. It is recommended that the service requiring tilting cab must be carefully performed with a skilled service man.

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

(2) Turn the start switch to OFF position.

(3) Remove the cab mounting nuts(1), plain washers(2), rebound washers(3), bolt(4) and pipe(5).

※ The cab tilting lever is located upper frame.

(4) Remove the cab tilting cover by removing the mounting bolts.

(5) Turn the lever to adjust the cab to the maximum tilt position.

※ Do not use machine and air tools.

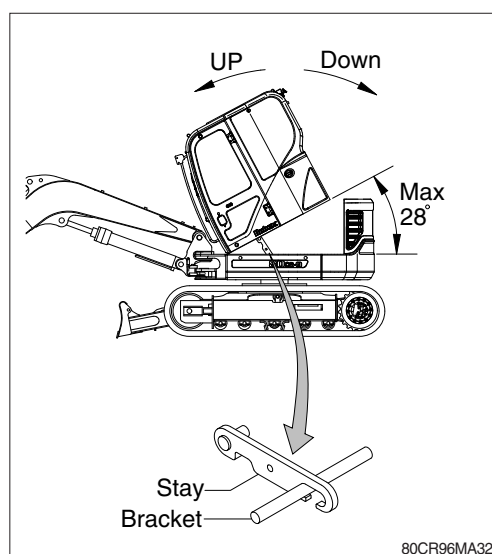
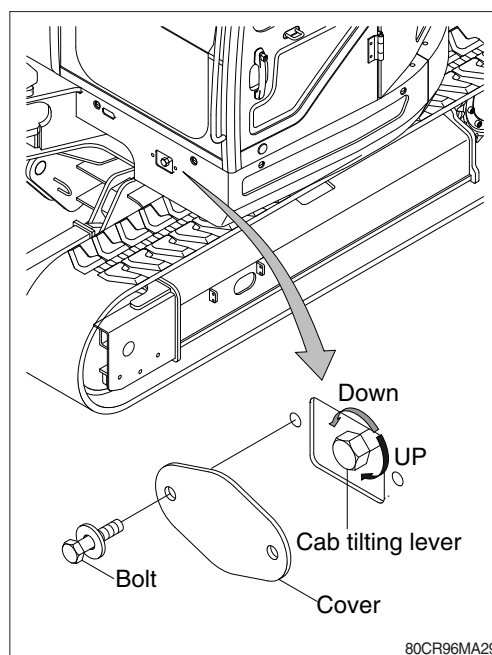
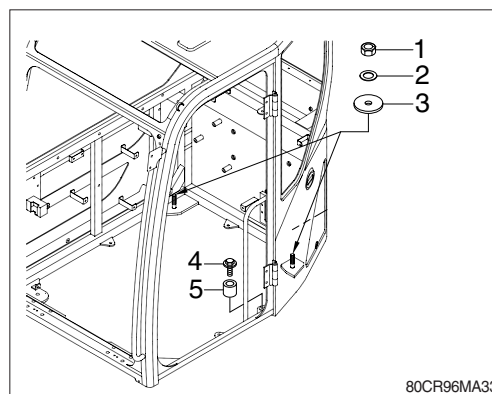
Use only hand tools.

· Tightening torque : below 30 kgf · m (217 lbf · ft)

(6) Fix the stay to the stay bracket.

⚠ Do not operate cab tilting function while the power is ON or engine is running.

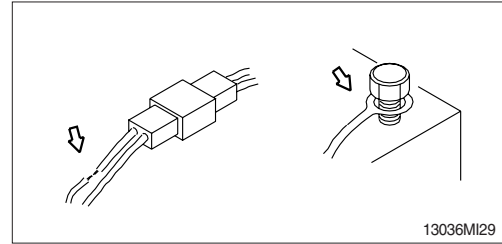
⚠ Do not operate the any control parts while servicing under the tilted cab. It can cause severe injury or death.



7. ELECTRICAL SYSTEM

1) WIRING, GAUGES

Check regularly and repair loose or malfunctioning gauges when found.



2) BATTERY

(1) Clean

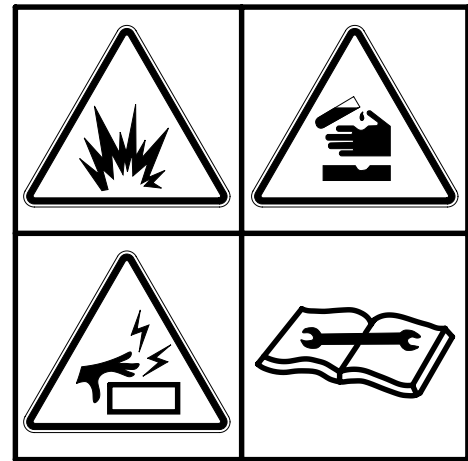
- ① Wash the terminal with hot water if it is contaminated, and apply grease to the terminals after washing.

⚠ **Battery gas can explode. Keep sparks and flames away from batteries.**

⚠ **Always wear protective 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 eyes.



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(2) Recycle

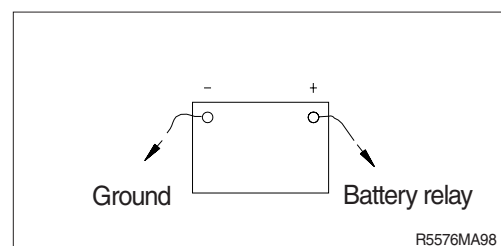
Never discard a battery.

Always return used batteries to one of the following locations.

- A battery supplier
- An authorized battery collection facility
- Recycling facility

(3) Method of removing the battery cable

Remove the cable from the ground connection first (⊖ terminal side) and reconnect it last when reassembling.



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3) STARTING THE ENGINE WITH A BOOSTER CABLE

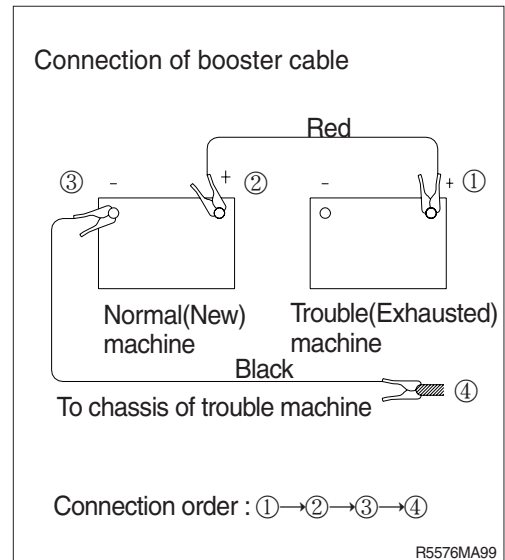
Keep following order when you are going to start engine using booster cable.

(1) Connection of booster cable

※ **Use the same capacity of battery for starting.**

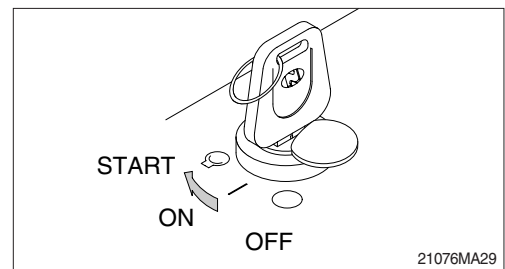
- ① Make sure that the starting switches of the normal machine and trouble machine are both at the OFF position.
- ② Connect the red terminal of booster cable to the battery (+) terminal between exhausted and new battery.
- ③ Connect the black terminal of the booster cable between new battery (-) terminal and chassis of trouble machine.

※ **Keep firmly all connection, the spark will be caused when connecting finally.**



(2) Starting the engine

- ① Start 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

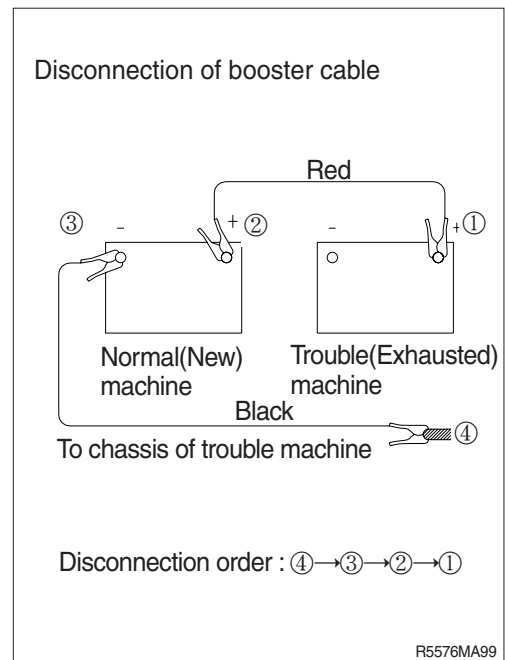
- ① Take off the booster cable (black).
- ② Take off the booster cable (red) connected to the (+) terminal.
- ③ Run engine with high idle until charging the exhausted battery by alternator, fully.

▲ **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.**

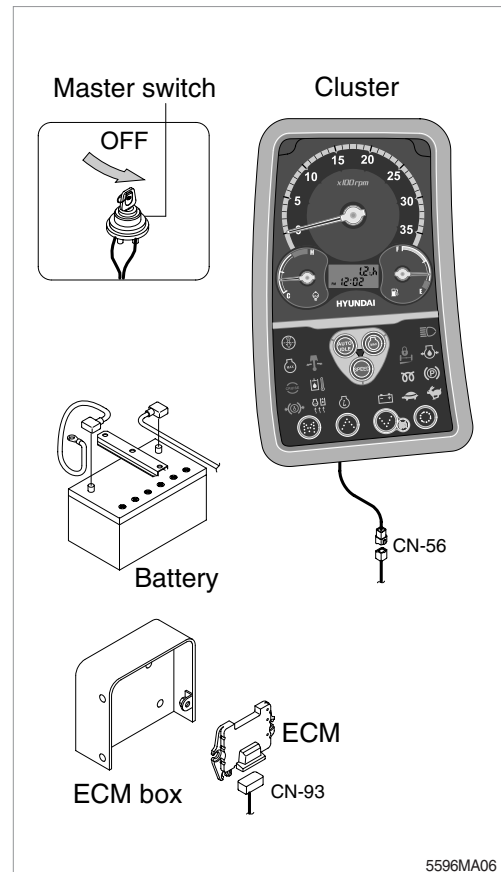
※ **Do not connect (+) terminal and (-) terminal when connecting booster cable because it will be shorted.**



(4) Welding repair

Before starting 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 (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 carrying out the above.
If not, it will caused serious damage at electric system.

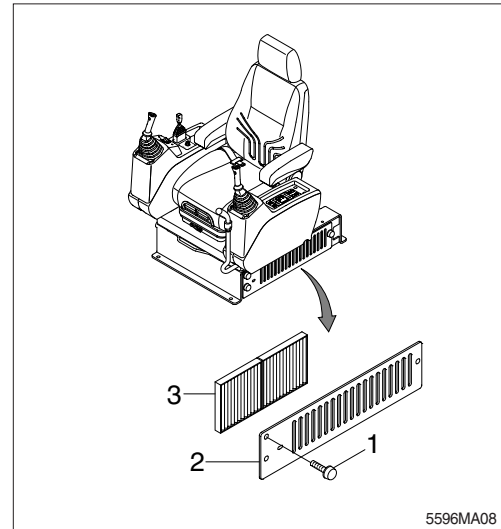


8. AIR CONDITIONER AND HEATER

1) CLEAN AND REPLACE OF THE CIRCULATION FILTER

※ **Always stop the engine before servicing.**

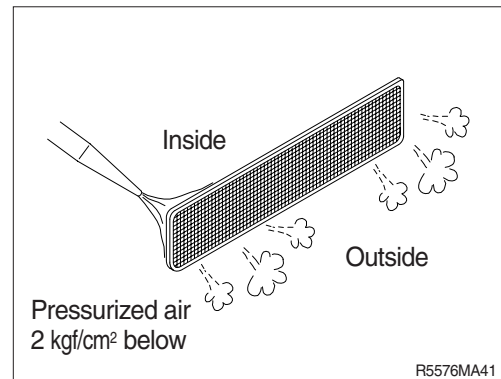
- (1) Remove the screw (1) and cover (2) on the seat base.
- (2) Remove the circulation filter (3).



- (4) Clean the filter using a pressurized air (Below 2 kgf/cm², 28psi).

△ **When using pressurized air, be sure to wear safety glasses.**

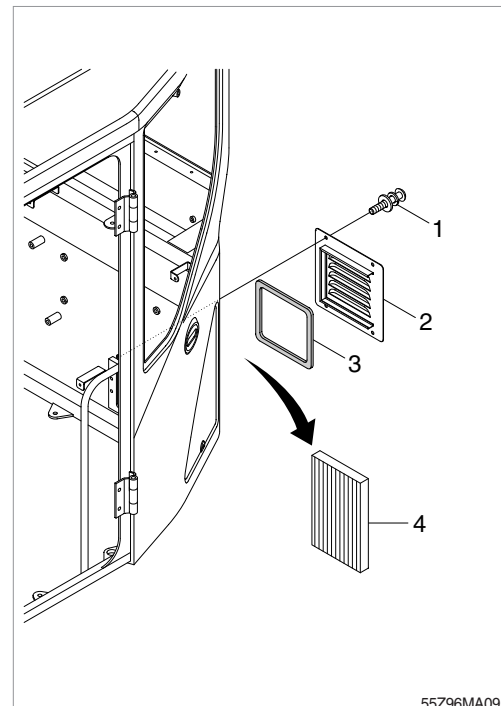
- (5) Inspect the filter after cleaning. If it is damaged or badly contaminated, use a new filter.



2) CLEAN AND REPLACE OF THE RECIRCULATION FILTER

※ **Always stop the engine before servicing.**

- (1) Remove the screw (1), cover (2) and pad (3).
- (2) Remove the recirculation filter (4).

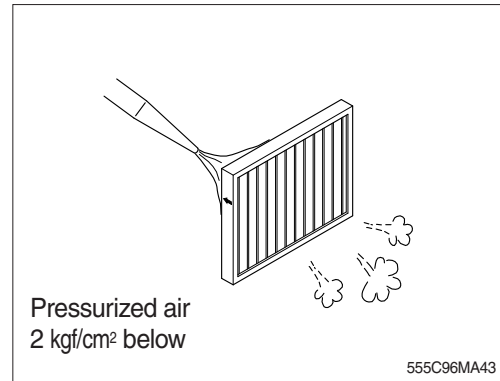


- (3) Clean the recirculation filter using a pressurizes are (Below 2 kgf/cm², 28psi) or washing with water.



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.



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.

6) REFRIGERANT

(1) Equipment contains fluorinated greenhouse gas.

Model	Type	Quantity	GWP
R60CR-9	HFC-134a	0.95 kg (2.09 lb)	1359 CO ₂ eq.

※ GWP

Global warming potential (GWP) is a measure of how much heat a gas traps in the atmosphere relative to that of carbon dioxide (CO₂). GWP is calculated in terms of the 100-year warming potential of 1 kg of a greenhouse gas relative to 1 kg of CO₂.

(2) Environmental precautions

The air conditioning system of the machine is filled with HFC-134a refrigerant at the factory.

HFC-134a refrigerant is a fluorinated greenhouse gas and contributes to global warming.

Do not release refrigerant into the environment.

(3) Safety precautions

Work on the air conditioning system must only be performed by a qualified service technician.

Do not attempt to perform work on the air conditioning system.

Wear safety goggles, chemical resistant gloves and appropriate personal protective equipment to protect bare skin when there is a risk of contact with refrigerant.

(4) Action in case of exposure

① Eye contact / Limited skin contact

Rinse with warm water and apply a light bandage. Seek medical attention immediately.

② Extensive skin contact

Rinse with warm water and carefully heat the area with warm water or warm clothing.

Seek medical attention immediately.

③ Inhalation

Leave the area and find fresh air. Seek medical attention immediately.

TROUBLESHOOTING GUIDE

1. ENGINE

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

Trouble	Service	Remark
The engine oil pressure lamp lights ON when engine speed is raised after completion of warm up.	· 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.	

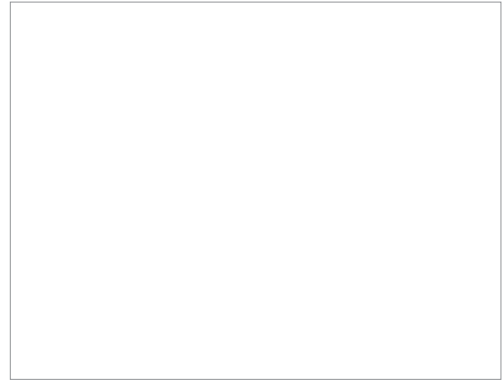
3. OTHERS

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.	

HYDRAULIC BREAKER AND QUICK CLAMP

1. SELECTING HYDRAULIC BREAKER

- 1) Become familiar with the manual and select breakers suitable to machine specifications.
- 2) Make careful selection in consideration of oil quantity, pressure and striking force, to enable satisfied performance.
- 3) When apply a breaker to the machine, consult your local dealer of Hyundai for further explanation.



2. CIRCUIT CONFIGURATION

- 1) As for breaker oil pressure line, use extra spool of main control valve.
- 2) Set proper breaker pressure on load relief valve.
- 3) The pressure of the ROBEX60CR-9 system is 220 kgf/cm² (3130 psi).
- 4) The accumulator should be used to the breaker charging and return line.
If the accumulator is not used, it will be damage as the input wave is delivered.
※ **Keep the pressure pulsation of pump below 60 kgf/cm² (853 psi) by installing the accumulator.**
- 5) Do not connect the breaker return line to the main control, but connect to the return line front of the cooler.
- 6) Do not connect the breaker return line to drain lines, such as of swing motor, travel motor or pump, otherwise they should be damaged.
- 7) One of spool of the main control valve should be connected to the tank.
- 8) Select the size of pipe laying considering the back pressure.
- 9) Shimless tube should be used for the piping. The hose and seal should be used Hyundai genuine parts.
- 10) Weld the bracket for pipe clamp to prevent damage caused by vibration.

3. MAINTENANCE

1) MAINTENANCE OF HYDRAULIC OIL AND FILTER

- (1) As machine with an hydraulic breaker provides the hydraulic oil becomes severely contaminated.
- (2) So, unless frequently maintained, the machine may easily go out of order.
- (3) Inspect and maintain hydraulic oil and 3 kinds of filter elements in particular, in order to prolong machine life.
- (4) Replace when the breaker work is used for short time according to the standard of right graph.

2) RELEASE THE PRESSURE IN BREAKER CIRCUIT

When breaker operating is finished, stop engine and push pedal or switch for breaker to release pressure in breaker circuit.

If pressure still remains, the lifetime of the diaphragm in the accumulator will be shortened.

- 3) Be careful to prevent contamination by dust, sand and etc.
If such pollution become mixed into the oil, the pump moving parts will wear abnormally, shorten lifetime and become damaged.
- 4) When operating breaker, bolts and nuts of main equipment may be loosened by vibration. So, it must be inspected periodically.

Service interval unit : hours

Attachment	Operating rate	Hydraulic oil	Filter element
Breaker	100 %	600 ^{*1}	250
		1000 ^{*2}	

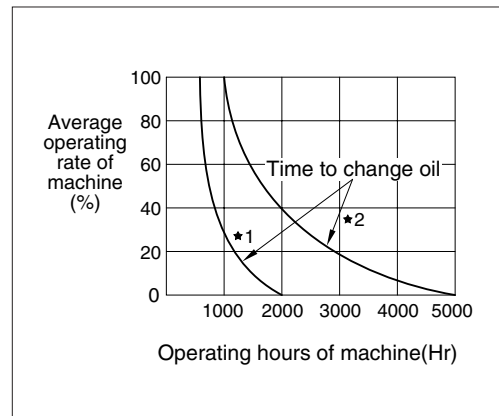
^{*1}: Conventional hydraulic oil

^{*2}: Hyundai genuine long life hydraulic oil

● Replace following filter same time

- Hydraulic return filter : 1 EA
- Pilot line filter : 1 EA
- Element in hydraulic tank breather : 1 EA

Hyd oil change guide for hydraulic breaker



^{*1}: Conventional hydraulic oil

^{*2}: Hyundai genuine long life hydraulic oil

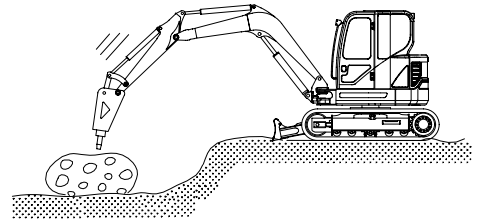
4. PRECAUTIONS WHILE OPERATING THE BREAKER

1) DO NOT BREAK ROCK WHILE LOWERING

As the breaker is heavy in comparison with bucket, it must be operated slowly.

If breaker is rapidly pushed down, working device may be damaged.

Incorrect

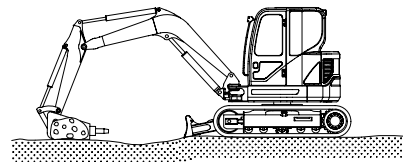


60CR980A01

2) DO NOT USE BREAKER TO CARRY BROKEN STONE OR ROCK BY SWING OPERATING

This may damage the operation device and swing system.

Incorrect

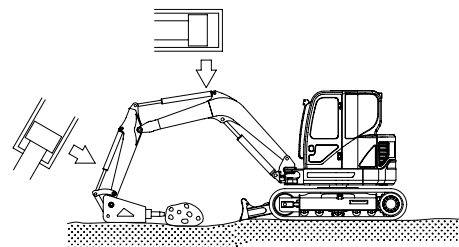


60CR980A02

3) OPERATE BREAKER WITH A GAP IN EXCESS OF 100 mm (4 inches) FROM THE END OF THE STROKE TIP

If breaker is operated with the end tip, the cylinder may be damaged.

Incorrect

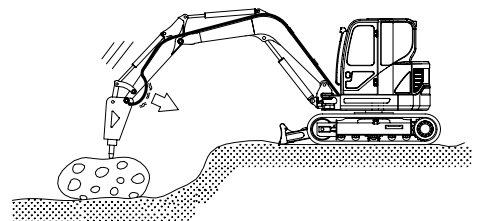


60CR980A03

4) IF THE HYDRAULIC HOSES VIBRATE EXCESSIVELY

If the machine used in this condition continuously this will effect badly on the machine such as loosening bolt, oil leakage, damage of pump pipe and etc.

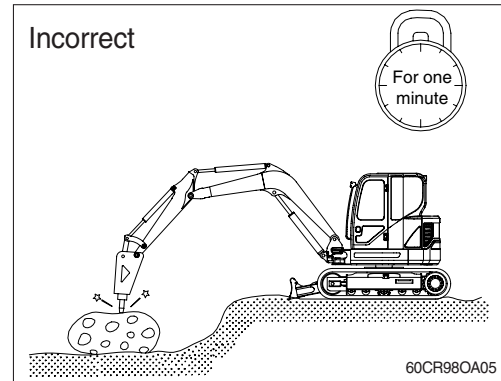
Incorrect



60CR980A04

5) DO NOT CONTINUE TO WORKING OVER ONE MINUTE AT SAME POSITION OF BOOM AND ARM

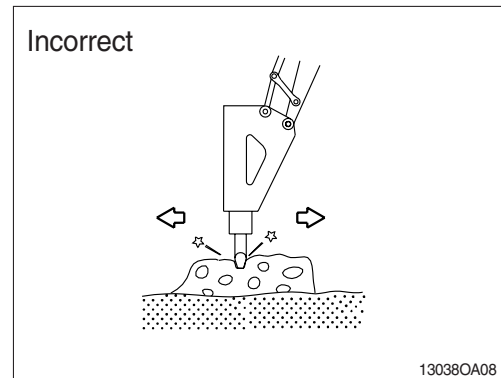
This will increase the temperature of the oil, and cause problem in the accumulator and seals.



6) DO NOT MOVE MACHINE OR BREAKER WHILE STRIKING

Do not move hammer while striking.

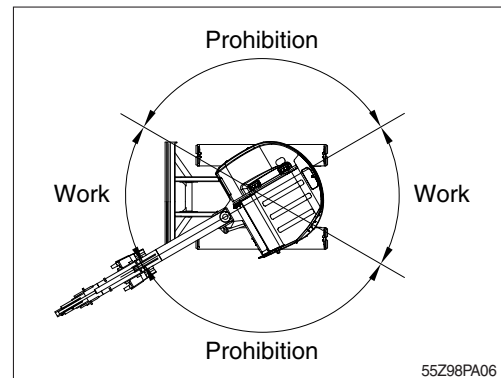
This will cause damage to the working device and the swing system.



7) DO NOT WORK WHILE SWING STATE

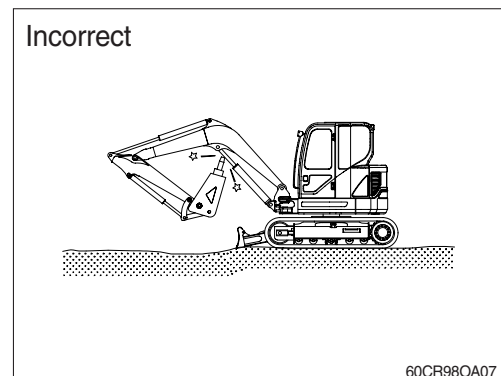
Do not work while swing position of superstructure.

It cause the band of track shoe, oil leakage of roller.



8) TAKE CARE OF CHISEL AND BOOM INTERFACE

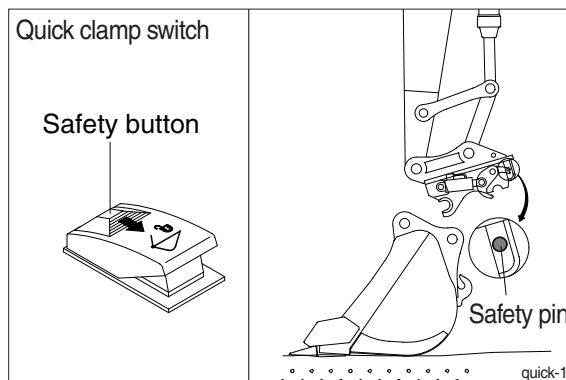
Make sure of the arm and bucket control lever operation.



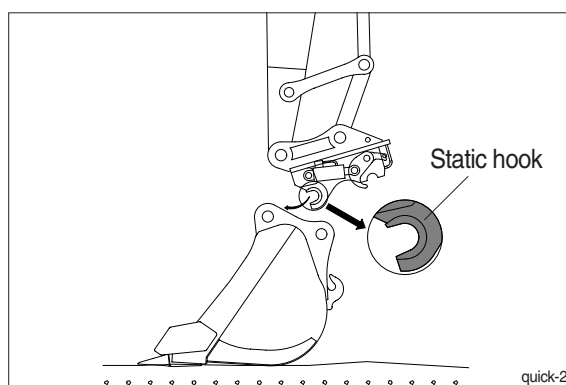
5. QUICK CLAMP

1) FIXING BUCKET WITH QUICK CLAMP

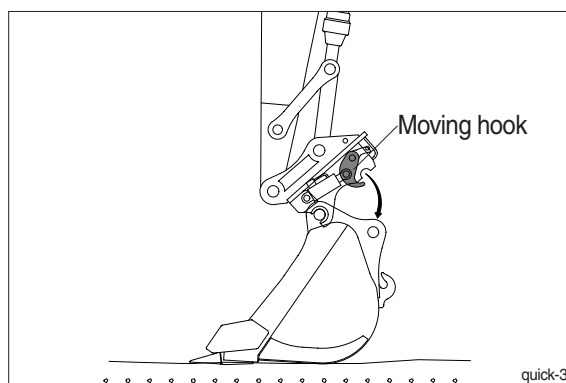
- (1) Before fixing bucket, remove safety pin of the moving hook.
- (2) Pulling safety button, press the quick clamp switch to unlock position. Then, the moving hook is placed on release position.



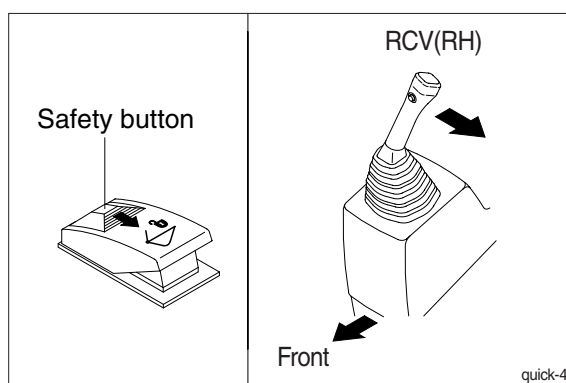
- (3) Aligning the arm and bucket, insert static hook of quick clamp to the bucket pin.



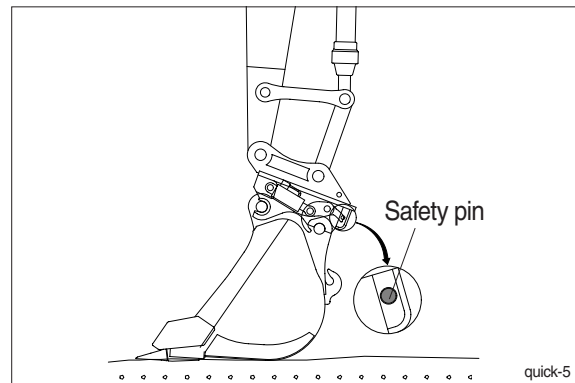
- (4) Operate RCV lever to bucket-in position. Then, the moving hook is coupled with the bucket link pin. Make sure that the moving hook is completely contacted with bucket link pin.



- (5) Press quick clamp switch to lock position. Operate RCV lever to bucket-in position.
- ※ **Be sure to check connection status between bucket pins and hooks of quick clamp**



- (6) After checking the connection status between bucket pins and hooks of quick clamp, insert safety pin of moving hook to lock position.



2) REMOVE BUCKET FROM QUICK CLAMP

Removing procedure is reverse of fixing.

3) PRE-CAUTION OF USING QUICK CLAMP

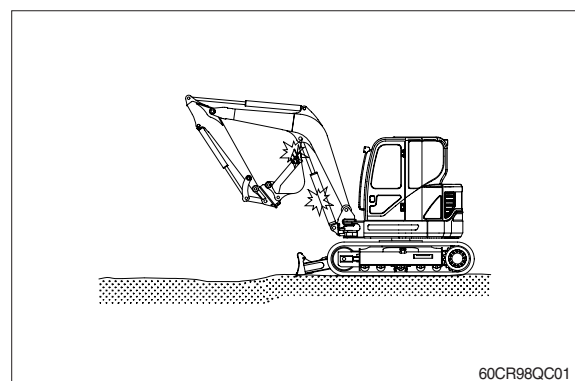
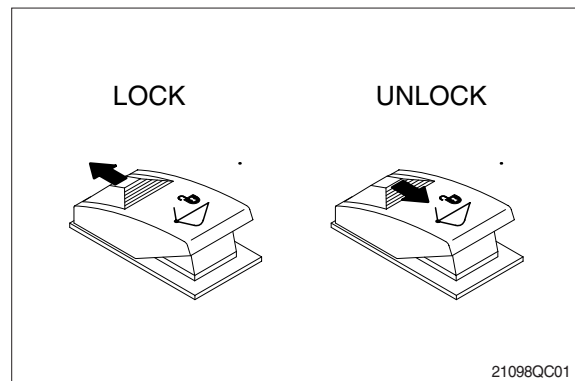
- ⚠ When operating the machine with quick clamp, confirm that the quick clamp switch is lock position and safety pin of moving hook is inserted.

Operating the machine with quick clamp switch unlocked and without safety pin of moving hook can cause the bucket to drop off and bring about the accident.

- ⚠ Serious injury or death can result from this accident.

- ⚠ Be careful to operate the machine equipped with quick clamp. The bucket may hit cab, boom and boom cylinders when it reaches vicinity of them.

- ※ HYUNDAI will not be responsible for any injury or damage in case that safety pin is not installed properly.



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TYPE	Excavator - Small (0 - 9.9 Tonne)
MAKE	Hyundai
MODEL	R60CR-9
ASSET NUMBER	A027
CHASSIS / VIN	HHKHML03VE0001370

Report Number	ABER 20210528-1023
Date	28-May-2021
Created By	Adam Weeks
Assessor	Adam Weeks
Assist. Assessor(s)	Rick Szabo
Completed By	Adam Weeks
Owner	Abergeldie
Assessment Purpose	Plant in use
State	NSW



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IMPORTANT INFORMATION

Contains information outlining the scope and any limitations applicable to this Risk Management Report

SECTION 2

MACHINE DETAILS

Contains standard machine specifications and details of any extras fitted

SECTION 3

RISK ANALYSIS, RISK EVALUATION & RISK TREATMENT

Contains details of the technique used to calculate risk ratings, time frame and risk treatments. Please refer to this information when reviewing and interpreting the information in section 4 & 5

SECTION 4

RISK TREATMENTS REQUIRED

Contains detailed information regarding the risk treatments to be implemented including hazard, risk rating, time frame, relevant standards & legislative references

SECTION 5

RISK TREATMENTS IN PLACE

Contains detailed information regarding the risk treatments in place including hazard, risk rating, relevant standards & legislative references

SECTION 6

IMAGES AND NOTES

Contains images & any relevant information entered by the assessor

SECTION 1 IMPORTANT INFORMATION

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All operators of this item of plant must read and understand this report prior to operating this item of plant. This report pertains to this item of plant as it appeared on the day of inspection.

The safety hazards associated with the operating and maintaining of this item of plant have been identified as far as practical by visual inspection. The condition of this item of plant will change with use. No physical testing has been conducted (eg. Wire rope tests, stress tests, structural/non-destructive tests, noise tests, vibration tests, brake tests, insulation tests etc.) unless stated otherwise in the notes.

Controls outlined in both section 4 & 5 of this report must be maintained at all times whilst this item of plant is in operation. Any information contained in the notes section of this report shall be read in conjunction with section 3. Any information relating to the standard features have been supplied via the manufacturer and shall be used as a guide only until verified.

Additional Risk Assessment may be required, specific to the operating environment, for this item of plant.
All operators and maintenance personnel must be appropriately trained in the use & maintenance of this item of plant.

For further information regarding this report contact Online Safety Systems on 1300 72 88 52

SECTION 2 MACHINE DETAILS

MACHINE DETAILS	- NOISE TEST RESULTS	1. Manufacturers specified noise level dBA	78
		2. Ambient noise level dBA	
		3. Noise level - Operator position (high idle) dBA	
		4. Noise level - Operator position (low idle) dBA	
		5. Noise level LHS dBA @ m (high idle)	
		6. Noise level Front dBA @ m (high idle)	
		7. Noise level RHS dBA @ m (high idle)	
		8. Noise level Rear dBA @ m (high idle)	
MACHINE DETAILS	BUCKET	Standard bucket capacity, SAE rated (m3)	.07m3
		Standard bucket width (mm)	315mm
MACHINE DETAILS	CAPACITIES	Fuel Tank Capacity (Litres)	82
		Hydraulic Oil Tank Capacity (Litres)	60
MACHINE DETAILS	DIMENSIONS/WEIGHTS	Dig depth to cut 2.44 m level bottom (mm)	3160
		Digging depth (mm)	3570
		Dump height (mm)	3930
		Ground clearance (mm)	380
		Max depth of vertical wall (mm)	3680
		Operating weight (kg)	5900
		Tailswing radius (mm)	1080
		Transport Height (mm)	2550
		Transport Length (mm)	5600
		Width (mm)	1950
MACHINE DETAILS	ENGINE	Engine Displacement (Litres)	3.319
		Engine Hours	
		Engine Make & Model	Yanmar 4TNV98-EPHYBU1
		Engine Number	171060
		Engine Power (kW@rpm)	42.5 @ 2400
		Number of Cylinders	4
MACHINE DETAILS	EXTRAS	Spare spool for attachments? Yes/No	No
MACHINE DETAILS	HITCH	Quick Hitch Make	
		Quick Hitch Model	
		Quick Hitch Serial No.	
MACHINE DETAILS	HYDRAULICS	Flow of main pumps (L/Min)	2 x 57.8
		Pump Types	Variable Displacement Axis Piston Pumps
		Relief valve pressure, main pumps (Bar)	220
MACHINE DETAILS	PLANT CLASSIFICATIONS	Class	
		Year	

SAFETY STRUCTURES	FOPS Compliance No.	ISO 10262 LEVEL 1
	FOPS Serial No.	
	ROPS Compliance No.	ISO 12117-2
	ROPS Serial No.	
TRACKS	Track length on ground (mm)	2000
	Track pad width (mm)	380
TRANSMISSION	Speed (km/h)	2.2/4
WORK CAPABILITIES	Arm breakout (kgf)	2700
	Bucket breakout (kgf)	4170
	Gradeability - Degrees/(%)	35
	Reach @ ground level (mm)	6010
EXTRAS	Air Conditioning	Factory Fit
	Bucket - 1200mm	
	Bucket - 300mm	
	Bucket - 450mm	
	FOPS	
	Front grader blade	
	Hitch - Quick	
	Ripper	
	ROPS - Cabin	

SECTION 3 RISK ANALYSIS / RISK EVALUATION

RISK ANALYSIS

		CONSEQUENCE				
LIKELIHOOD		1. INSIGNIFICANT Dealt with by in house first aid	2. MINOR Treated by medical professionals, hospital out patients	3. MODERATE Significant non permanent injury overnight hospital stay	4. MAJOR Extensive permanent injury eg. Loss of fingers, extended hospital stay	5. CATASTROPHIC Death, permanent disabling injury eg. Loss of hand, quadriplegia
	A. Almost certain to occur in most circumstances	MEDIUM 8	HIGH 16	HIGH 18	CRITICAL 23	CRITICAL 25
	B. Likely to occur frequently	MEDIUM 7	MEDIUM 10	HIGH 17	HIGH 20	CRITICAL 24
	C. Possibly and likely to occur at sometime	LOW 3	MEDIUM 9	MEDIUM 12	HIGH 19	HIGH 22
	D. Unlikely to occur but could happen	LOW 2	LOW 5	MEDIUM 11	MEDIUM 14	HIGH 21
	E. May occur but only in rare circumstances	LOW 1	LOW 4	LOW 6	MEDIUM 13	MEDIUM 15

RISK EVALUATION	CRITICAL	Act immediately to mitigate risk. Implement risk treatment(s) in accordance with the risk treatment table below.
	HIGH	Act immediately to mitigate risk. Implement risk treatment(s) in accordance with the risk treatment table below. If the appropriate risk treatments are not immediately accessible establish interim risk treatment strategies. Permanent risk treatments must be implemented within one week.
	MEDIUM	Take reasonable steps to mitigate and monitor the risk. Implement risk treatment(s) in accordance with the risk treatment table below. Permanent risk treatments must be implemented within one month.
	LOW	Take reasonable steps to mitigate and monitor the risk. Implement risk treatment(s) in accordance with the risk treatment table below. Permanent risk treatments must be implemented within three months.

RISK TREATMENT	Selecting the most appropriate risk treatment option involves balancing the costs and efforts of implementation against the benefits derived, with regard to legal, regulatory and other requirements. (source AS/NZS ISO 31000:2009)	
	Eliminate	Eliminate the risk source.
	Substitute	Provide an alternative that is capable of performing the same task which is safer.
	Engineering	Provide or construct a physical barrier or guard.
	Administration	Develop policies, procedures, practices and guidelines in consultation with employees to mitigate the risk. Provide training, instruction and supervision about the risk source.
	Personal protective	Provide personal protective equipment to protect the individual from the risk source.

SECTION 4 RISK TREATMENTS REQUIRED

This section of the report pertains to hazards created by use of this item of plant which currently do not have risk treatments in place. The risk treatments recommended in this section have been developed based on relevant Australian Standards, health & safety legislation, the hierarchy of risk treatment in accordance with the guidelines set forth in AS/NZS ISO 31000 – Risk Management and various other sources. The recommended risk treatment measures must be developed, implemented and validated as effective prior to the operation, maintenance or testing of this item of plant. Treatments applied must be dated and initialled adjacent the recommendations. All operators must read and understand the entire contents of this section prior to operating this item of plant.

HAZARD(S)	Prelim. Risk Rating	Residual Risk Rating	Time Frame	Due Date	Date Rectified	Initial
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SECTION 5 RISK TREATMENTS IN PLACE

This section of the report pertains to risk treatments currently in place on this item of plant. This section must be read in conjunction with the safety section of the manufacturers handbook. All operators must read and understand the entire contents of this section prior to operating this item of plant. These treatments or equivalent must remain in place at all times whilst this item of plant is in operation.

	HAZARD(S)	Prelim. Risk Rating	Residual Risk Rating
DELIVERY	 CRUSHING Risk Treatments in Place: SWMS Loading/Unloading Ensure that all operators follow approved SWMS/SOP when loading and unloading this machine to and from a flat top truck or trailer, low loader or tilt tray. References: Work Health & Safety Act & Regulations- , Occupational Health & Safety Act & Regulations	HIGH 22	MEDIUM 15
	 CRUSHING Risk Treatments in Place: SWMS Load Restraint Ensure that all operators follow the approved SWMS/SOP when restraining this machine for transport. References: Work Health & Safety Act & Regulations- , Occupational Health & Safety Act & Regulations	HIGH 22	MEDIUM 15
OPERATION	 INCORRECT OPERATION Risk Treatments in Place: Operator Competency Only persons who are qualified, trained and experienced and/or hold the relevant certification/license can operate this item of plant. If there is not a competent/licensed person available for operation of this item of plant then only persons who are supervised by a competent/licensed person can operate this item of plant. References: Work Health & Safety Act & Regulations- , Occupational Health & Safety Act & Regulations	CRITICAL 24	MEDIUM 15
	 CRUSHING Risk Treatments in Place: Fully Automatic Quick Hitch - Swing Risk This item of plant was fitted with a fully automatic quick hitch prior to December 31st 2015. This type of hitch allows for uncontrolled movement of the attachment in the event of a failure of the primary retention system. This hitch must be replaced prior to December 31st 2022. Ensure that all operators are familiar with the safe use of this hitch. References: SafeWork NSW- Position Paper	CRITICAL 24	MEDIUM 15

HAZARD(S)		Prelim. Risk Rating	Residual Risk Rating
 INCORRECT OPERATION		HIGH 22	MEDIUM 15
Risk Treatments in Place: Operation Handbook The manufacturer's operation handbook has been supplied for this item of plant. This handbook must be available at all times to all potential operators and supervisory staff. All potential operators must read and be familiar with this handbook prior to operating. A complete risk assessment/Job Safety Analysis must be undertaken covering all operating processes and environments associated with this item of plant. SWMS should be produced for specific tasks associated with use of this item of plant.			
References: Work Health & Safety Act & Regulations- , Occupational Health & Safety Act & Regulations			
 INCORRECT OPERATION		HIGH 22	MEDIUM 15
Risk Treatments in Place: Pre-op Checklist Excavator A pre-operation checklist is available for this Excavator. This checklist must be completed by all operators prior to operating this Excavator.			
References: Work Health & Safety Act & Regulations- , Occupational Health & Safety Act & Regulations			
 INCORRECT OPERATION		HIGH 22	MEDIUM 15
Risk Treatments in Place: SOP Excavator Safe Operation Procedures are available for this Excavator. The information in the Safe Operation Procedures must be followed at all times whilst operating this Excavator.			
References: Work Health & Safety Act & Regulations- , Occupational Health & Safety Act & Regulations			
 INCORRECT OPERATION		HIGH 22	MEDIUM 15
Risk Treatments in Place: Control Labels All controls including all levers, buttons, pedals, switches etc. are clearly labelled as to their purpose and method of operation. These labels must be maintained in a clean and serviceable condition at all times.			
References: AS/NZS4024.1905			
 CRUSHING, FALLING		HIGH 22	MEDIUM 15
Risk Treatments in Place: Passenger Seat Label This item of plant is fitted with a clear hazard warning label re: Operator only, No passengers. Passengers must not be carried at anytime. This label must be clear and legible at all times whilst this item of plant is in operation. Legislation: State Health & Safety Legislation & Regulation			
References: AS1319-			
 CRUSHING		HIGH 22	MEDIUM 15
Risk Treatments in Place: ROPS seat belt label This item of plant is fitted with a ROPS and has an advisory label stating that "seatbelts must be worn". This label must be present, clean and legible at all times. All operators and passengers must wear seatbelts whilst on this item of plant.			
References: AS2294, ISO3471			
 CRUSHING, INCORRECT OPERATION		HIGH 22	HIGH 21
Risk Treatments in Place: Boom Rated Capacity Label This item of plant has a rated capacity label fitted to each side of the boom. Ensure that these labels are clear and legible at all times whilst this item of plant is in operation. Operators must not exceed this rated capacity at any time during operation.			
References: AS1418.8			

HAZARD(S)		Prelim. Risk Rating	Residual Risk Rating
	ELECTROCUTION	HIGH 22	MEDIUM 15
Risk Treatments in Place: Electrical Approach Distances This item of plant has a hazard warning label re: overhead electrical hazards and minimum approach distances fitted. These distances must be adhered to strictly. These labels and tables must be present, clear and legible at all times. Spotters are required when working within 5 metres of the minimum approach distance of any live electrical apparatus. Any encroach within the minimum approach distances must only occur if the following provisions have been met - 1. The machine is designed to work within the minimum approach distances 2. Permission has been granted by the electricity company and 3. Safe systems of work have been documented and approved. References: ISO31000			
	ELECTROCUTION, EXPLOSION	HIGH 22	MEDIUM 15
Risk Treatments in Place: Dial Before You Dig (AUS) This item of plant is fitted with a clear hazard warning label re: underground services and advice to "Dial 1100 Before You Dig" to the operator work area. This advice must be adhered to strictly. Digging into an electricity cable or gas pipe can cause serious injury or death. Damaging a pipe or cable may also lead to isolating a community from emergency services such as fire, police or ambulance. This label must be present, clear and legible at all times. References: ISO31000			
	COLLISION	HIGH 22	MEDIUM 15
Risk Treatments in Place: Phone Use label This item of plant is fitted with an instruction label advising that mobile phones must not be used whilst operating this machine. Accordingly all operators must not use a mobile phone at any time whilst operating machine. If phone use is necessary then operator must place machine in park configuration in a safe position prior to phone use. Operators MUST adhere to this advice at all times. This label must be clear and legible at all times whilst this item of plant is in operation. References: AS1319- , ISO31000			
	POISONING, EXPLOSION, BURNS	HIGH 22	MEDIUM 15
Risk Treatments in Place: Tank ID Label The tank(s) on this item of plant have clear, legible label(s) identifying their contents, and if appropriate any necessary controls re: the contents. These must be present, clear and legible at all times. (this includes radiator, hydraulic and petrol/diesel tanks) References: Work Health & Safety Act & Regulations- , Occupational Health & Safety Act & Regulations			
	FIRE	HIGH 21	MEDIUM 15
Risk Treatments in Place: Fire Extinguisher This item of plant is fitted with an approved and maintained fire extinguisher. Fire extinguisher(s) must be present and fully functional at all times. They must be readily accessible to the operator. Regular inspections must also be carried out in accordance with the manufacturer's requirements and AS 1851 – 1995			
	CRUSHING, INCORRECT OPERATION	HIGH 21	MEDIUM 15
Risk Treatments in Place: Quick Hitch Information This hydraulic quick hitch has the following information marked upon it - 1. A unique identification mark (serial number) 2. The manufacturer's name and model clearly and durably marked upon it 3. The maximum rated capacity clearly and durably marked upon it 4. The mass of the hitch clearly and durably marked upon it 5. The lift point capacity (kg) clearly and durably marked upon it This information must be considered by all operators when assessing the suitability of the hitch for any task. Failure to consider and or comply with this information could lead to serious injury or death. References: AS4772			

HAZARD(S)		Prelim. Risk Rating	Residual Risk Rating
	CRUSHING, PINCHING	HIGH 21	MEDIUM 15
Risk Treatments in Place: Swing Boom Crush Label This item of plant has clear hazard warning labels re: pinch point/crush zone, keep clear, that are attached to each side of the boom swing/pivot point. These must be present, clear and legible at all times whilst this item of plant is in operation.			
References: AS/NZS4024.1201, AS1319-			
	CRUSHING, STRIKING, COLLISION	HIGH 19	MEDIUM 14
Risk Treatments in Place: Tail Swing Label The rear of this item of plant has a hazard warning label re: general plant movement, tail swing, keep clear. It must be present and fully functional and serviceable at all times.			
References: ISO20474-			
	CRUSHING	MEDIUM 15	MEDIUM 15
Risk Treatments in Place: ROPS Label The warning label stating that the ROPS must not be damaged at any time (including cuts, drill holes and welds) must be present, clean and legible at all times.			
References: ISO3471			
	CRUSHING	MEDIUM 14	MEDIUM 13
Risk Treatments in Place: Front Grader Blade Label The front blade on this item of plant is fitted with a hazard warning label re: crush zone, keep clear. This label must be present and fully functional and serviceable at all times.			
References: AS1319- , ISO20474-			
	ENTANGLEMENT, SHEARING, BURNS	MEDIUM 14	MEDIUM 13
Risk Treatments in Place: Engine Guard Label The engine fan and alternator belts, pulleys and gears are guarded. These guards have clear legible hazard warning labels re do not open or remove guards while engine is running. These labels must be present, legible and easily seen at all times whilst this item of plant is in operation.			
References: AS/NZS4024.1201, AS1319-			
	CRUSHING, COLLISION	MEDIUM 12	LOW 6
Risk Treatments in Place: Warning Device (horn) This item of plant is fitted with a fully functional audible warning device such as a horn. This must be easily accessed by the operator, and easily identifiable by nearby pedestrians. All operators should ensure the warning devices are functional at the start of each shift, by completing pre-start checklists. Warning devices should operate automatically where appropriate (eg reversing)			
References: ISO7731, ISO9533			
	COLLISION	MEDIUM 9	LOW 5
Risk Treatments in Place: Recovery Point Label This item of plant is fitted with a hazard warning label adjacent the recovery tow point which states "Recovery tow point – Read manufacturer's towing instructions before towing". Failure to do so could result in DEATH or SERIOUS INJURY. This label must be clear and legible at all times whilst this item of plant is in operation.			
References: ISO31000			

HAZARD(S)		Prelim. Risk Rating	Residual Risk Rating
	CRUSHING	CRITICAL 24	LOW 1
Risk Treatments in Place: Closed Eye Lifting Point The lifting point fitted to this item of plant is the closed eye type. Hooks with or without latching devices must not be used as a lifting point at any time. References: AS1418.8			
	STRIKING, BURNS	HIGH 22	MEDIUM 15
Risk Treatments in Place: Hydraulic Hoses This item of plant has hydraulic hoses. These hoses must be inspected each day or before each use for wear and tear. If there are visible signs of wear immediate action must be taken to control the risk arising from this wear. These inspections must be documented. Hydraulic fluid at high pressure can penetrate the skin, never use any part of your body to check for leaks. If oil penetrates the skin seek medical advice immediately. Always use a piece of cardboard or similar to check for suspected leaks. Hydraulic pressure can be stored and is a hazard. Before disconnection or connection of hydraulic hoses complete the following steps - 1. Stop engine 2. Keep all bystanders clear of the work area 3. Refer to operators manual as to methods to release pressure 4. Wait 5 minutes References: AS4024, AS2671			
	CRUSHING, COLLISION	HIGH 22	MEDIUM 15
Risk Treatments in Place: Loose Items - Operator Work Area All items that could cause harm to the operator in the event of a collision or rollover are securely restrained. References: ISO31000			
	CRUSHING, NON COMPLIANCE	HIGH 22	MEDIUM 15
Risk Treatments in Place: Control Lock out The primary operator controls are fitted with an isolation device which meets the following requirements - a) Must be engaged to allow entry & exit of the machine b) Is not easily bypassed. This device deactivates the primary operator controls. This must be employed during entry, exit and while performing maintenance on this item of plant. This device must be fully functional at all times whilst this item of plant is in operation. References: ISO10968			
	CRUSHING, ENTANGLEMENT, STRIKING, COLLISION	HIGH 22	MEDIUM 15
Risk Treatments in Place: Neutral Start This item of plant has neutral start control in place. It must be fully functional and serviceable at all times whilst this item of plant is in operation. References: AS4024.1603			
	CRUSHING	HIGH 22	MEDIUM 15
Risk Treatments in Place: Quick Hitch Controls The quick hitch operation control fitted with a device/method to prevent accidental operation. This device must be fully functional at all times whilst this item of plant is in operation. References: AS4772, AS/NZS4024.1906			
	CRUSHING	HIGH 22	MEDIUM 15
Risk Treatments in Place: Seat Belt This item of plant is fitted with an operator seat belt. This seat belt must be free from damage, and permanently and sturdily attached at all times whilst this item of plant is in operation. Operators must use this seat belt at all times during operation. References: ISO6683			

HAZARD(S)		Prelim. Risk Rating	Residual Risk Rating
	CRUSHING	HIGH 22	MEDIUM 15
Risk Treatments in Place: Quick Hitch Operation Alarm This item of plant is fitted with a quick hitch with a fully functional audible alarm fitted to the operator work area to alert the operator that the host machine is in the mode that allows for the controls to be operated to engage or disengage attachments. This alarm must be fully functional at all times whilst this item of plant is in operation. References: AS4772, ISO7731			
	CRUSHING	HIGH 22	MEDIUM 15
Risk Treatments in Place: Movement Awareness Alarm An automatic movement awareness alarm is fitted to this item of plant. This alarm is automatically activated when travel in any direction occurs. It must be fully functional and serviceable at all times whilst this item of plant is in operation. References: ISO7731, ISO9533			
	CRUSHING	HIGH 22	MEDIUM 15
Risk Treatments in Place: Quick Hitch - Fully Automatic This item of plant is fitted with a fully automatic hydraulic (quick) hitch (i.e. has hydraulically operated latch as primary retention device and remotely controlled safety device as back up) between the excavator arm and attachments. This safety device must meet all of the following criteria at all times prior and during operation - 1. Is a mechanical device i.e. not just an indicating system/device 2. Must be intentionally disengaged to remove attachments 3. Is not the primary source of retention of attachments 4. Has means of verifying engagement of the primary retention device from the operator position and 5. Has means of verifying engagement of safety system from operator position If any of these criteria are not met at any time then operation must cease. References: AS4772			
	CRUSHING, ENTANGLEMENT, SHEARING, BURNS, PINCHING	HIGH 22	MEDIUM 15
Risk Treatments in Place: Safe Operator Location This machine is designed so that the operator is isolated from all danger zones whilst at the operator position. This condition must exist at all times whilst this item of plant is in operation. References: AS/NZS4024.1201			
	POOR VISIBILITY, COLLISION	HIGH 22	MEDIUM 15
Risk Treatments in Place: Machine Lights This item of plant is fitted with self contained lighting. All of these lights must be fully functional and serviceable whilst this item of plant is in operation in areas of reduced light. If any of these lights stop working the operation must cease immediately and the faulty light be repaired before operation can continue in the areas of reduced light. References: ISO20474-			
	ENTANGLEMENT	HIGH 22	MEDIUM 15
Risk Treatments in Place: Engine Guards The engine fan and alternator belts, pulleys and gears are guarded. These guards must be present and fully functional and serviceable at all times whilst this item of plant is in operation. References: AS/NZS4024.1601			

HAZARD(S)		Prelim. Risk Rating	Residual Risk Rating
	INSTABILITY, CRUSHING, TIP OVER	HIGH 22	MEDIUM 15
Risk Treatments in Place: Levelness Device This item of plant is fitted with a level indicator. This device indicates the "levelness" of the machine chassis. During operation operators must ensure the machine is within the manufacturers guidelines for levelness. The rated capacity chart fitted for lifting operations has a maximum level angle which must never be exceeded during lifting operations. This level indicator must be present and fully functional at all times whilst this item of plant is in operation.			
References: AS1418.8			
	COLLISION	HIGH 22	MEDIUM 15
Risk Treatments in Place: Beacon This item of plant is fitted with a safety beacon. This beacon must meet the following criteria at all times whilst this item of plant fitted is in operation - - Is visible up to 200m in all directions (allowing for intermittent obstruction from the plant structure whilst the plant is in operation) - Is fitted in the most appropriate location on machine to maximise visibility without risking continual damage NOTE: more than one beacon may be fitted to meet these criteria.			
References: ISO20474-			
	OPERATIONAL MALFUNCTION	HIGH 22	LOW 2
Risk Treatments in Place: Plant Modification The plant is in original condition.			
References: ISO31000			
	ENTRAPMENT	HIGH 21	MEDIUM 15
Risk Treatments in Place: Two Operator Exits The operator cabin/work area on this item of plant has a minimum of two (2) possible exits. These must be functional and accessible at all times whenever the item of plant is manned, whether during operation or maintenance activities.			
References: AS5327			
	POOR VISIBILITY	HIGH 21	MEDIUM 15
Risk Treatments in Place: Windscreen Wipers The windscreen wipers and washers fitted to this item of plant must be fully functional at all times.			
References: AS/NZS4024.1201			
	CRUSHING	HIGH 21	MEDIUM 15
Risk Treatments in Place: ROPS A Roll Over Protective Structure (ROPS) to ISO 3471, ISO 12117.1 or 2, AS 2294 or AS 4987 is fitted to this item of plant. A permanent label stating this standard must be attached to the structure at all times. This structure provides a safety envelope during a rollover. A warning label re: wearing of seat belts at all times whilst this item of plant is in operation and accordingly seat belts must be worn at all times during operation.			
References: AS4987, AS2294, ISO3471			
	INCORRECT OPERATION	HIGH 20	MEDIUM 14
Risk Treatments in Place: Intuitive Controls The controls fitted to this item of plant are orientated so that the movement of the control is consistent with the action of the machine e.g. moving a control lever to the left results in the machine turning to the left. This design feature must be maintained at all times whilst this item of plant is in operation.			
References: AS/NZS4024.1906			
	STRAINS	HIGH 19	LOW 5
Risk Treatments in Place: Controls Ergonomics All controls including all levers, buttons, pedals, switches etc, are placed near the operator work position and are easy to reach and operate during the execution of the operator's normal duties. This applies for all persons within the 95th percentile of the normal population distribution.			
References: AS/NZS4024.1901			

HAZARD(S)		Prelim. Risk Rating	Residual Risk Rating
	STRIKING, BURNS	HIGH 19	LOW 5
Risk Treatments in Place: Hydraulic Hose Failure Shield This item of plant is fitted with a sturdy, permanent shield(s) between the hydraulic hoses and any body parts of the operator to provide protection during a hose or component failure. This shield(s) must be present and fully functional at all times whilst this item of plant is in operation.			
References: AS4024, ISO4413, AS2671			
	INCORRECT OPERATION, SLIPPING	HIGH 17	LOW 6
Risk Treatments in Place: Control Levers/Pedals/Buttons All controls including all levers, buttons, pedals, switches etc. must be kept non-slip and free from damage at all times.			
References: AS/NZS4024.1901			
	SLIPPING	MEDIUM 12	LOW 6
Risk Treatments in Place: Operator Work Area Access/Egress Safe access and egress to the cabin/work area(s) must be maintained at all times whilst this item of plant is in operation. It must be non slip, free from damage, located at a height so as to not cause undue body stresses and strains with three points of contact available to personnel at all times. All personnel must - 1. Always face the item of plant during access and egress. 2. Always maintain three points of contact during access and egress. 3. Never carry an object(s) in his/her hand(s) during access and egress. 4. Never jump off machine.			
References: AS5327			
	FALLING, SLIPPING	MEDIUM 12	LOW 6
Risk Treatments in Place: Access/Egress Instruction Label An instruction label is fitted adjacent access/egress areas to advise all personnel of the following - 1. Always face the item of plant during access and egress. 2. Always maintain three points of contact during access and egress. 3. Ensure the steps are clean. 4. Never jump off machine. This label must be clear and legible at all times whilst this item of plant is in operation.			
References: ISO31000			
	POOR VISIBILITY, COLLISION	MEDIUM 12	MEDIUM 11
Risk Treatments in Place: Operator Mirror This item of plant is fitted with at least one rear vision mirror. This mirror must be fully functional and clean at all times whilst this item of plant is in operation.			
References: ISO5006			
	ELECTRIC SHOCK, BURNS	MEDIUM 12	LOW 6
Risk Treatments in Place: Battery Cover All batteries fitted to this item of plant are constrained to prevent displacement & fitted with a permanent sturdy cover which allows for ventilation. The constraint and cover must be present and fully functional and serviceable at all times whilst this item of plant is in operation.			
References: AS/NZS4024.1201			
	INCORRECT OPERATION, SLIPPING	MEDIUM 9	LOW 4
Risk Treatments in Place: Operator Floor All work area floors are non-slip and free from damage & debris. Floor area must remain non-slip and free from damage & debris, including rubbish, tools and other items, at all times whilst this item of plant is in use.			
References: AS/NZS4024.1201, ISO20474-			

HAZARD(S)		Prelim. Risk Rating	Residual Risk Rating
	STRAINS	MEDIUM 9	LOW 1
Risk Treatments in Place: Operator Seat The operator seat fitted to this item of plant must remain free from damage and tears, and be permanently and securely fitted at all times.			
References: AS/NZS4024.1401 , ISO20474-			
	HEAT STROKE, DEHYDRATION	MEDIUM 9	LOW 4
Risk Treatments in Place: Air Conditioning This item of plant is fitted with an air conditioned cabin. This air conditioned cabin helps control the air quality and temperature for the operator and also provides shade from the sun. The air conditioner must be fully functional and serviceable at all times whilst this item of plant is in operation.			
References: ISO31000			
	BURNS	MEDIUM 9	LOW 5
Risk Treatments in Place: Exhaust The engine exhaust on this item of plant is fitted with a guard to prevent injury to any person and control the risk of initiating a fire. It must be present and fully functional and serviceable at all times whilst this item of plant is in operation.			
References: AS/NZS4024.1201			
	CURRENT OR PREVIOUS STRUCTURAL DAMAGE	CRITICAL 25	MEDIUM 15
Risk Treatments in Place: Structural Integrity Regular checks for structural damage must be undertaken. Look for cracks in frames/chassis (current or repaired), bends or damage to structural components, etc.			
References: ISO31000			
	INCORRECT OPERATION	HIGH 22	MEDIUM 15
Risk Treatments in Place: Maintenance Manual The manufacturer's maintenance manual(s) has been supplied for this item of plant These manual(s) must be available at all times to all users and maintenance staff of this item of plant. All users and maintenance staff must read and be familiar with these handbook(s) prior to maintaining or repairing this item of plant. A complete risk assessment/JSEA must be undertaken covering all inspection, maintenance, servicing and transportation requirements of this piece of plant prior to use. A full assessment of the competence of people using the book(s) must also be undertaken			
References: Work Health & Safety Act & Regulations- , Occupational Health & Safety Act & Regulations			
	STRIKING, BURNS	HIGH 22	MEDIUM 15
Risk Treatments in Place: Hydraulic Damage The hydraulic hoses to this item of plant are free from damage and protected against damage arising from contact with the plant structure. Ensure that hoses are free from damage and that protection is in place at all times whilst this item of plant is in operation. Inspection of the hydraulic hoses and protection system should be conducted regularly and documented as part of your plant safety programme.			
References: AS4024, ISO4413, AS2671			
	CRUSHING	HIGH 22	MEDIUM 15
Risk Treatments in Place: ROPS Damage The Roll Over Protective Structure (ROPS) fitted to this item of plant must remain free from damage at all times whilst this item of plant is in operation.			
References: AS2294, ISO3471			

HAZARD(S)		Prelim. Risk Rating	Residual Risk Rating
	OPERATIONAL MALFUNCTION	HIGH 22	LOW 2
Risk Treatments in Place: Major Fluid Leaks This item of plant must remain free from leaks at all times whilst in operation (this includes engine, transmission, cooling system, air, fuel, drive line, wheel hubs, steering and hydraulics). Development of a major leak will require this item of plant to be stood-down until repaired. Minor leaks detected must be repaired within 1-14 days.			
References: ISO31000			
	OPERATIONAL MALFUNCTION	HIGH 21	MEDIUM 15
Risk Treatments in Place: Service Records Service and maintenance records are available for this item of plant. These records must continue to be maintained and stored in a secure area as part of your plant safety management programme. This programme includes the undertaking of regular inspections concerning the general condition of the item of plant including (but not limited to) tyre condition, oil levels and wear and tear on critical items such as brakes and steering, etc. All OEM prescribed, scheduled and non scheduled maintenance must also be documented as part of these records and attended to within a risk management framework.			
References: Work Health & Safety Act & Regulations- , Occupational Health & Safety Act & Regulations			
	POOR VISIBILITY	MEDIUM 9	LOW 4
Risk Treatments in Place: Windows & Screens Ensure the cabin/work area safety glass windows and screens are kept clean and free from cracks and other damage at all times whilst this item of plant is in use.			
References: AS/NZS4024.1201, ISO20474-			
	INSTABILITY, COLLISION	MEDIUM 9	LOW 4
Risk Treatments in Place: Tracks The tracks and track components must be inspected as part of a "pre start" checklist. These inspections must be documented as part of your plant safety programme.			
References: ISO20474-			

SECTION 6 IMAGES AND NOTES

IMAGES

- No Images Available -

NOTES

- No Notes Available -

RISK MANAGEMENT REPORT

TYPE	Excavator - Small (0 - 9.9 Tonne)	Report Number	ABER 20210528-1023
MAKE	Hyundai	Date	28-May-2021
MODEL	R60CR-9	Created By	Adam Weeks
ASSET NUMBER	A027	Assessor	Adam Weeks
CHASSIS / VIN	HHKHML03VE0001370	Assist. Assessor(s)	Rick Szabo
		Owner	Abergeldie
		Assessment Purpose	Plant in use
		State	NSW

OPERATOR ACKNOWLEDGEMENT

I the undersigned acknowledge that I have read and understand the risk management report described above.

I also acknowledge that I have received a copy of this risk management report.

<u>DATE</u>	<u>NAME</u>	<u>COMPANY/POSITION</u>	<u>SIGNATURE</u>



Porter Equipment Australia Pty Ltd.

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Bill To:

Abergeldie Complex
Infrastructures
5 George Young Cres
Regents Park NSW 2143

Site Address:

Abergeldie
5 George Young Cres
Regents Park NSW 2143

Date

22/02/2022

Page

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Job Entered by: COPU

Invoice Number

INV0053658

Purchase Order No: 17380

Customer No: ABERGE

Site No: ABERGE

Job No.: JOB0056477

Job Logged: 25/01/2022

Item Number	Description	Qty Ordered	Qty Supplied	UOM	Unit	Disc.	Net Price
Equipment - Serial Number:HHKHML03VE0001370 Model: R60CR-9 Hyundai R60CR-9 Mini Excavator							Hours: 615
Reported Problem: CARRY OUT 500HR SERV SPEEDWAY (CAR PARK A ZONE 1) FERRERS ROAD EASTER CREEK MITCH 0402 599 508							
615 hrs 1,3/2/22 pick up parts, oils & waste. Carry out 500 hrs service. Grease machine. Replace drive oils. top up hydraulic oil.							
LABOUR							662.50
PARTS							
OILS & CONS							240.94

Our Bank Account Details: Porter Equipment Australia Pty Ltd

BSB 014 002

A/C 837417684

All claims for errors or short delivery must be made in writing quoting invoice numbers within seven (7) days.

Goods returned for credit after 7 days will incur a 15% surcharge NB Indent orders are non returnable.

Please note all credit card payments will incur a 1.5% surcharge

Normal Service operating hours are 6.00 am to 4.00 pm Mon-Fri (excluding Public holidays) outside of these hours overtime rates will apply.

Labour	591.74
Services	311.70
Parts	425.15
Sub Total	1,328.59
Less Cover	0.00
GST	132.86
Total Due	1,461.45

Safe Operating Procedures

Make: Hyundai
Model: R60CR-9
Type: Excavator - Small (0 - 9.9 Tonne)
Asset Number: A027
Chassis / VIN: HHKHML03VE0001370



Recommended PPE - Subject to Company & Site Policy



SOP Excavator

GENERAL & START UP

Read and understand manufacturer's operational manual

Complete pre-operational checklist (never use faulty or defective machinery)

All operators must be free from the direct and after effects of drugs and alcohol

Never operate in a poorly ventilated area, carbon monoxide is colourless, odourless and poisonous

Ensure work area is clear of bystanders and hazards prior to starting engine and operating machine

Once engine is started confirm control pattern, travel direction and machine function

Ensure that you are familiar with all attachments and the clearance distances between attachments and any other part of machine

! ALWAYS OPERATE MACHINE IN A MANNER TO REDUCE THE RISK OF UNINTENTIONAL CONTACT BETWEEN THE MACHINE AND ANY ATTACHMENTS OR LOADS

TRAVEL & OPERATION

! ALWAYS WEAR YOUR SEAT BELT

! NEVER CARRY PASSENGERS

Ensure work area is clear of all bystanders

When travelling always keep dipper arm perpendicular to ground and attachments low to ground ensuring maximum stability and operator visibility

Always consider ground type prior to travelling machine, use extreme caution on slippery surfaces such as metal, ice etc.

Never travel across slopes, travel up and down slopes only

Ensure front and rear swing area is clear of bystanders and objects

Refer to power line approach distance label re safety around power lines

Confirm location of any underground services prior to digging in any area, use extreme caution if services are present, always hand excavate in close proximity to services taking material to be excavated into consideration

Position machine on solid ground, (lower blade if fitted)

! ALWAYS POSITION MACHINE AS LEVEL AS POSSIBLE - this may require building a level surface prior to operation

! NEVER POSITION MACHINE OVER "SHELF" ADJACENT EXCAVATION

! NEVER POSITION MACHINE UNDER PRECIPICE OR OVERHEAD OBSTRUCTIONS

! NEVER WORK ACROSS SLOPES, WORK UP AND DOWN BUILDING LEVEL WORK AREA AS NECESSARY

! NEVER EXCAVATE UNDER MACHINE

LIFTING

This machine is an excavator, any lifting must be in accordance with the crane requirements, as a minimum observe the following:

- Never exceed machines capacity as per load chart
- Never lift anything using bucket teeth
- Always use approved closed eye lifting point (must not be attached to bucket)
- Use only approved chains, slings and fittings appropriately rated for task
- Remove buckets and other attachments prior to lifting
- Never lift anything over people
- Never lift people

REFUELLING

NEVER refuel unless the engine is stopped and ignition turned off

Safe Operating Procedures

ALWAYS loosen fuel cap slowly to relieve pressure

NEVER smoke during refuelling

ALWAYS stand on firm ground or designated platform when refuelling

NEVER undertake other tasks while refueling

ALWAYS refuel in a well ventilated area. Do not breathe fuel vapour

Be aware of hot surfaces on engine and other components when refuelling

Ensure fuel hose is removed and fuel cap is replaced prior to restarting machine

Operator Signature:

Name: _____ Date: _____ Signature: _____