



WARNING

CALIFORNIA PROPOSITION 65

Breathing diesel engine exhaust exposes you to chemicals known to the State of California to cause cancer and birth defects or other reproductive harm.

- Always start and operate the engine in a well-ventilated area.
- If in an enclosed area, vent the exhaust to the outside.
- Do not modify or tamper with the exhaust system.
- Do not idle the engine except as necessary.

For more information go to www.P65warnings.ca.gov/diesel.

91K4-07310-EN

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※ For more information go to www.P65warnings.ca.gov/diesel.

CONTENTS

| | |
|---|-------|
| EC declaration of conformity | 0-1 |
| Foreword | 0-2 |
| Emission-related components warranty (USA and CANADA only) | 0-2-1 |
| Before servicing this machine | 0-3 |
| Table to enter S/No and distribution | 0-4 |
| EC regulation approved | 0-5 |
| Safety labels | 0-6 |
| Machine data plate | 0-17 |
| Guide (direction, S/No, symbol) | 0-18 |

1. SAFETY HINTS

| | |
|---------------------------------------|------|
| 1. Before operating the machine | 1-1 |
| 2. During operating the machine | 1-15 |
| 3. During maintenance | 1-24 |
| 4. Parking | 1-28 |

2. SPECIFICATIONS

| | |
|---|-----|
| 1. Major components | 2-1 |
| 2. Specifications | 2-2 |
| 3. Weight | 2-6 |
| 4. Specification for major components | 2-7 |

3. CONTROL DEVICES

| | |
|-------------------------------------|------|
| 1. Cab devices | 3-1 |
| 2. Cluster | 3-2 |
| 3. Monitors | 3-13 |
| 4. Switches | 3-44 |
| 5. Control device | 3-49 |
| 6. Air conditioner and heater | 3-53 |
| 7. Others | 3-56 |

4. OPERATION

| | |
|---|------|
| 1. Suggestion for new machine | 4-1 |
| 2. Check before starting the engine | 4-2 |
| 3. Starting and stop the engine | 4-3 |
| 4. Warming-up operation | 4-8 |
| 5. Operation of the working device | 4-9 |
| 6. Traveling of the machine | 4-10 |

| | |
|--|------|
| 7. Efficient working method | 4-15 |
| 8. Adjustment of the work equipment | 4-22 |
| 9. Operation in the special work sites | 4-23 |
| 10. Storage | 4-25 |
| 11. SCR system cleaning | 4-27 |
| 12. Open the engine hood | 4-28 |
| 13. Attachment manually lowering | 4-31 |

5. TRANSPORTATION

| | |
|---|-----|
| 1. Road traveling | 5-1 |
| 2. Preparation for transportation | 5-2 |
| 3. Loading the machine | 5-3 |
| 4. Fixing the machine | 5-4 |
| 5. Loading and unloading by crane | 5-6 |
| 6. Towing the machine | 5-7 |

6. MAINTENANCE

| | |
|---|------|
| 1. Instructions | 6-1 |
| 2. Tightening torque | 6-5 |
| 3. Spec of fuel, coolant and lubricants | 6-8 |
| 4. Maintenance check list | 6-10 |
| 5. Maintenance chart | 6-13 |
| 6. Service instruction | 6-15 |
| 7. Electrical system | 6-46 |
| 8. Air conditioner and heater | 6-49 |

7. TROUBLESHOOTING GUIDE

| | |
|-----------------------------|-----|
| 1. Engine | 7-1 |
| 2. Electrical system | 7-2 |
| 3. Power train system | 7-3 |
| 4. Hydraulic system | 7-4 |

8. OTHERS

| | |
|--|-----|
| 1. Central grease lubrication system | 8-1 |
| 2. Quick coupler | 8-9 |

| | |
|-------------|-----|
| INDEX | 9-1 |
|-------------|-----|

EC Declaration of Conformity

(Original instruction)

This declaration of conformity is issued under the sole responsibility of manufacturer:

HYUNDAI CONSTRUCTION EQUIPMENT CO., LTD.

12th Fl., Hyundai Bldg. 75, Yulgok-ro, Jongno-gu,
Seoul 03058, Korea

Hyundai Construction Equipment Europe N.V located at Hyundailaan 4, 3980 Tessenderlo, Belgium, as authorized representative in the European Community is authorized to compile the technical construction file and declares that the product:

Type: *****
Model: *****
Serial number (PIN): *****

is in conformity with the relevant provisions of the Community harmonization legislation:

2006/42/EC - Machinery directive
2014/30/EU - Electromagnetic compatibility directive
2000/14/EC - Noise emission outdoor equipment directive
2002/44/EU - Exposure of workers to vibration risks directive
their amendments, and other applicable directives.

EMC (2014/30/EU)

Certificate number: *****
Date: DD/MM/YYYY
Notified body: *****

Noise levels (2000/14/EC)

Certificate number: *****
Date: DD/MM/YYYY
Conformity assessment proc.: Annex VIII Full Quality Assurance
Notified body: *****

Measured sound power level: nnn.n dB(A)
Guaranteed sound power level: nnn.n dB(A)

Engine information

Manufacturer : *****
Engine model name: *****
Type-approval number: *****
Stage (Regulation) : STAGE ** (**/**/**)
Gross Power (SAE J1995): ***kW / ****rpm
Net Power (SAE J1349): ***kW / ****rpm

Harmonized standards, other technical standards and specifications applied:

EN 474-1:2006+A*:**** (EMM - Safety - Part 1); EN 474-3:2006+A*:**** (EMM - Safety - Part 3); EN ISO 3471:2008 (EMM - ROPS: Lateral/Vertical/Longitudinal loads); EN ISO 3449:2008 (EMM - FOPS: Level II cabin); ISO 2631-1:1997 & ISO 2631-1:1997/Amd1 :2010 (Whole-body vibration); EN ISO 5349-1:2001 & EN ISO 5349-2:2001 & EN ISO 5349-2:2001/A1:2015 (Hand-arm vibration)

Managing Director
Place, date of issue: Tessenderlo Belgium, DD MM YYYY

FOREWORD

This manual contains a number of instructions and safety recommendations regarding driving, handling, lubrication, maintenance, inspection and adjustment of the machine.

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.

Some illustrations in this manual show details or attachments that can be different from your machine. Covers and guards might have been removed for illustrative purposes.

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.

EMISSION-RELATED COMPONENTS WARRANTY (USA AND CANADA ONLY)

Hyundai shall have obligation under the EPA (Environmental Protection Agency) regulation of warranty about Emission-related components. This warranty shall exist for 3,000 hours or five years, whichever occurs first.

Naturally, this warranty does not cover to damage arising from accident, misuse or negligence, use of non-Hyundai parts, or from alterations not authorized by Hyundai.

※ Emission-related components according to the EPA regulation.

1. Air-induction system.
2. Fuel system.
3. Ignition system.
4. Exhaust gas recirculation systems.
5. After treatment devices.
6. Crankcase ventilation valves.
7. Sensors.
8. Electronic control units.

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.

※ How to adjust the language of monitor

User can select preferable language and all displays are changed the selected language.



※ Please refer to the page 3-34 for the monitor.

| |
|--|
| 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. Hyundailaan 4 3980 Tessenderlo Belgium |
| Dealer Address | |

EC REGULATION APPROVED

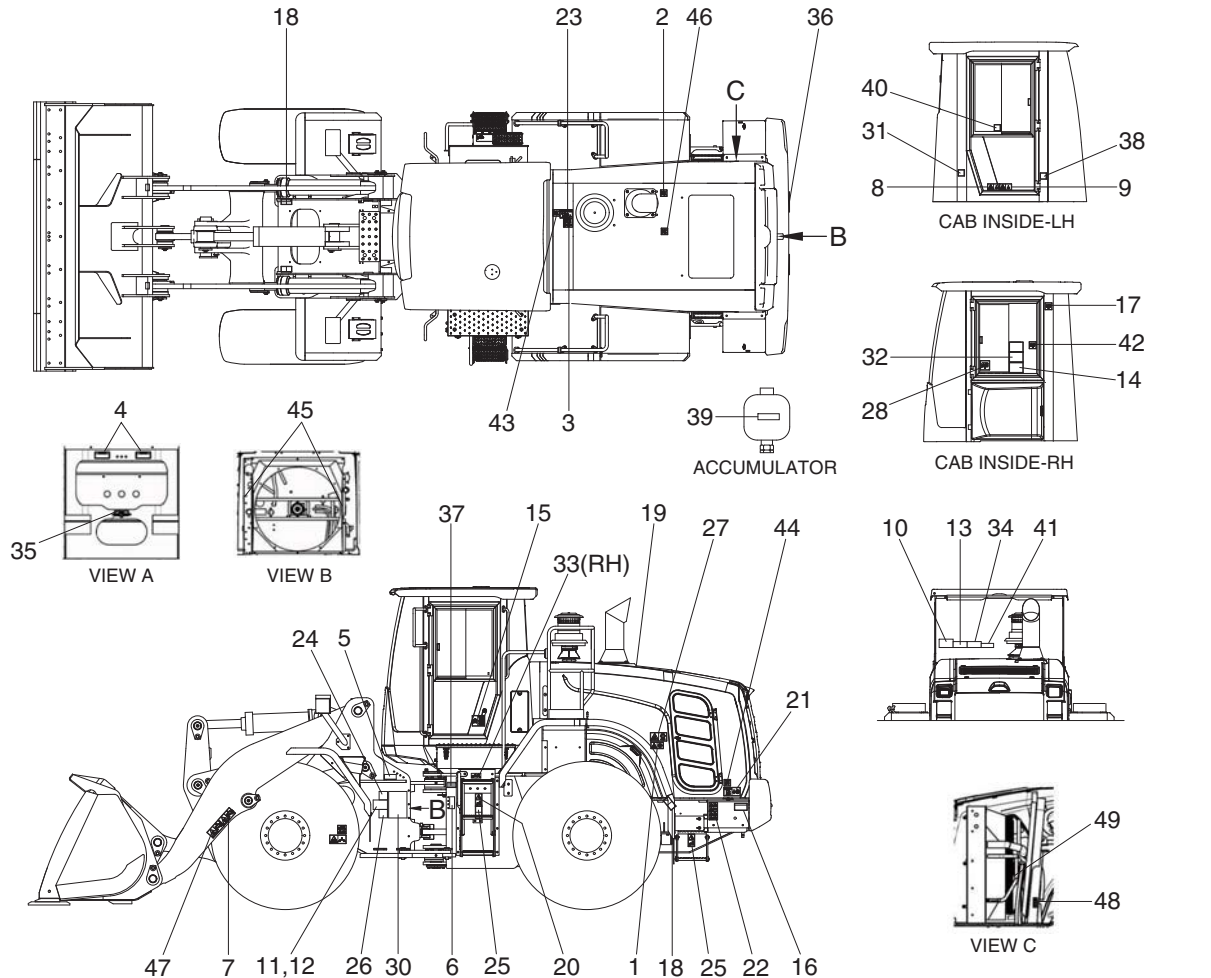
- Noise level (EN474-1 : 2006 and 2000/14/EC) are as followings.
LWA : 104 dB (EU only)
LPA : 69 dB
- The value of vibrations transmitted by the operator's seat are lower than standard value of (EN474-1 : 2006 and 2002/44/EC)



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.



9650FW03

| | | | | | |
|----|------------------------|----|-----------------------|-------|---|
| 1 | Start motor | 17 | Hammer | 34 | Specification sheet |
| 2 | Turbocharger cover | 18 | Lift & tie | 35 | Grease (center) |
| 3 | Hyd oil level | 19 | Air cleaner filter | 36 | Keep clear/Reflect |
| 4 | Ride control (option) | 20 | Pressure check | 37 | Name plate |
| 5 | Grease (A) | 21 | Fueling | 38 | ROPS plate |
| 6 | Grease (B) | 22 | Battery accident | 39 | Accumulator |
| 7 | Bucket stopper | 23 | Hyd oil lub | 40 | Joystick steering (option) |
| 8 | Max h/reach | 24 | High pressure hose | 41 | Caution (water separator, turbocharger) |
| 9 | Roll over | 25 | Falling | 42 | Tilt handle |
| 10 | ROPS cab | 26 | Manual lowering valve | 43 | Fuel cut off |
| 11 | Steering warning-LH | 27 | Engine door shearing | 44 | Ultra low sulfur diesel |
| 12 | Steering warning-RH | 28 | Alternate exit | 45/46 | Emergency fire hole/No step |
| 13 | Engine start caution | 30 | Service instruction | 47 | Quick coupler |
| 14 | Control ideogram | 31 | Fire extinguisher | 48 | Refrigerant |
| 15 | Air conditioner filter | 32 | Start procedure | 49 | Use handrail |
| 16 | Electric welding | 33 | Diesel exhaust fluid | | |

2. DESCRIPTION

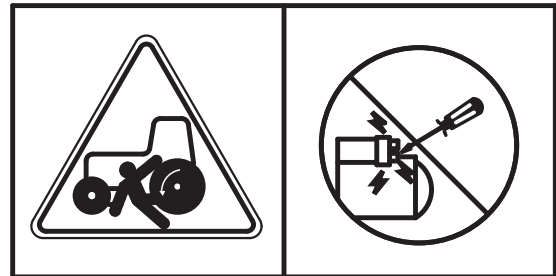
There are several specific warning labels on this machine please become familiarized with all warning labels.

Replace any safety label that is damaged, or missing. If a safety label is attached to a part that is replaced, install a safety label on the replacement part.

1) START MOTOR (item 1)

This warning label is positioned on the left side of the engine side cover.

- ⚠ **Start the engine only from the operator's compartment. Never short across the starter terminals or across the batteries. Shorting could bypass the engine neutral start system. Shorting could also damage the electrical system.**



77070FW05

2) TURBOCHARGER COVER (item 2)

This warning label is positioned on the turbocharger cover.

- ⚠ **Do not touch turbocharger or it may cause severe burn. When the engine is running or immediately after engine shut down.**

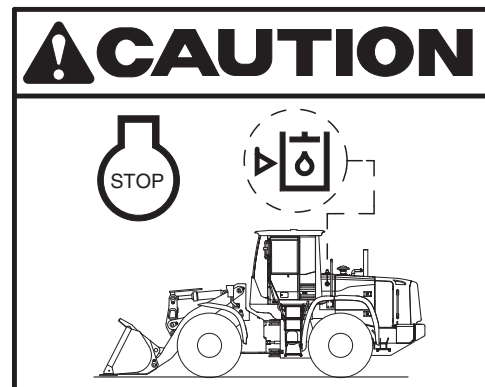


21070FW02

3) HYDRAULIC OIL LEVEL (item 3)

This warning label is positioned on the top of hydraulic oil tank.

- ⚠ **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.**



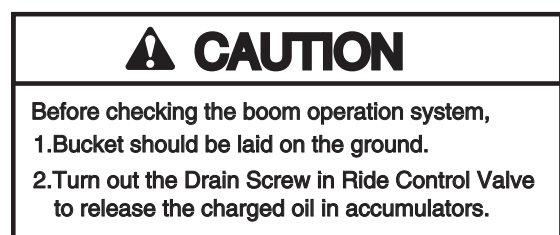
7609A0FW06

4) RIDE CONTROL (item 4)

This warning label is positioned on the front frame.

Before checking the boom operation system,

1. Bucket should be laid on the ground.
2. Turn out the drain screw in ride control valve to release the charged oil in accumulators.

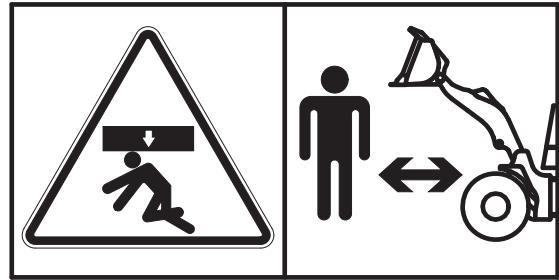


7707A0FW06

5) BUCKET STOPPER (item 7)

This warning label is positioned on the middle of the boom.

- ⚠ **When working under or around the bucket or linkage, with bucket raised, proper support must be provided for the bucket and/or the linkage.**

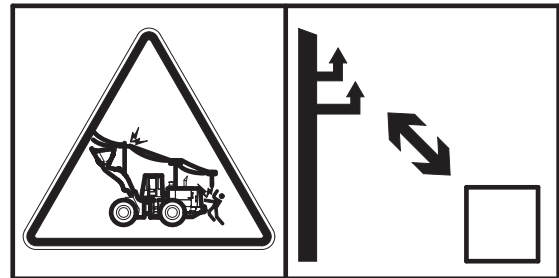


7803AFW05

6) MAX HEIGHT (item 8)

This warning label is positioned on the left 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 1-6.



7803AFW16

7) ROLL OVER (item 9)

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

- ⚠ **Structural damage, an overturn, modification, alternation, or improper repair can impair this structure's protection capability thereby voiding this certification.**
- ⚠ **Always use seat belt when operating your machine. Always check the condition of the seat belt and the condition of the mounting hardware before you operate the machine.**

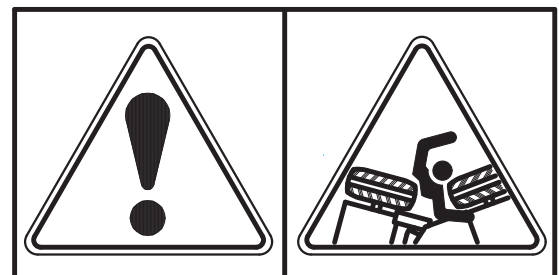


77070FW14

8) STEERING WARNING (item 11, 12)

The warning label is positioned on the both side of the front frame.

- ⚠ **No clearance for person in this area when machine turns.**
- ⚠ **Severe injury or death from crushing could occur.**

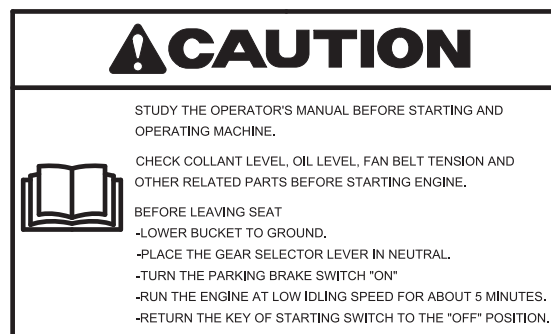


77070FW07

9) ENGINE START CAUTION (item 13)

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

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



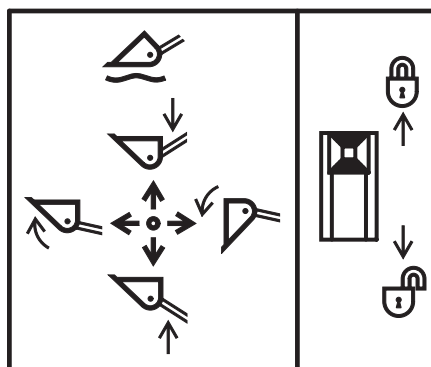
77070FW08

10) CONTROL IDEOGRAM (item 14)

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

- ▲ **Confirm the operation of control lever and working device before operating the machine.**

※ Refer to the page 4-9 for details.

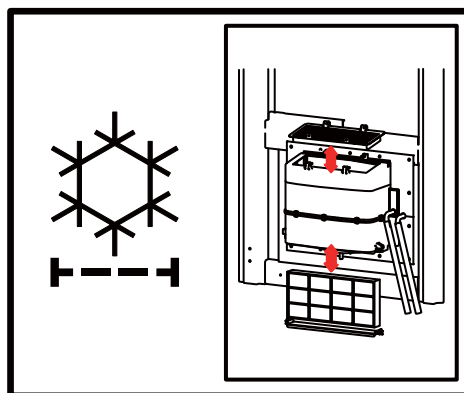


74090FW04

11) AIR CONDITIONER FILTER (item 15)

This warning label is positioned on the air-conditioner filter.

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



760F0FW10

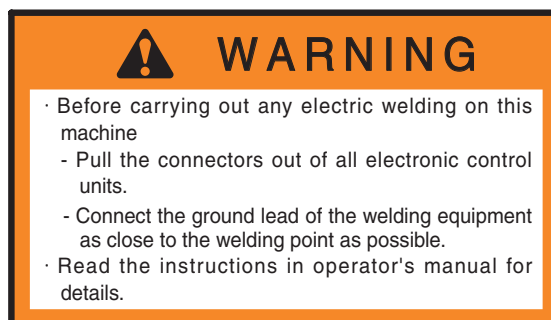
12) ELECTRIC WELDING (item 16)

This warning label is positioned on the side of the battery box.

- ▲ **Before carrying out any electric welding on this machine**

- Pull the connectors out of all electronic control units.
- Connect the ground lead of the welding equipment as close to the welding point as possible.

※ Refer to the page 6-48 for details.



7803AFW20

13) LIFT & TIE (item 18)

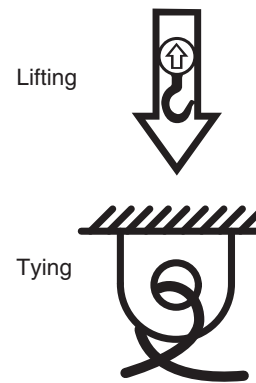
This label is positioned on the both side of the front and rear frame.

- Lifting point

In order to lift the machine, attach the lifting devices to the lifting points.

- Tying point

In order to tie down the machine, attach the tie-downs to the tying points.

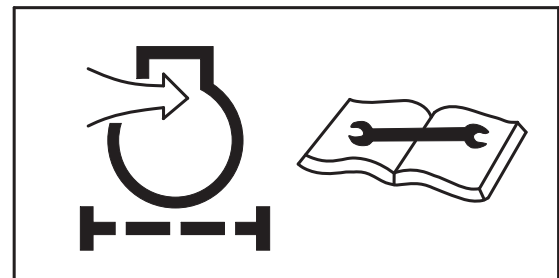


75790FW04

14) AIR CLEANER FILTER (item 19)

The warning label is positioned on the air cleaner.

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

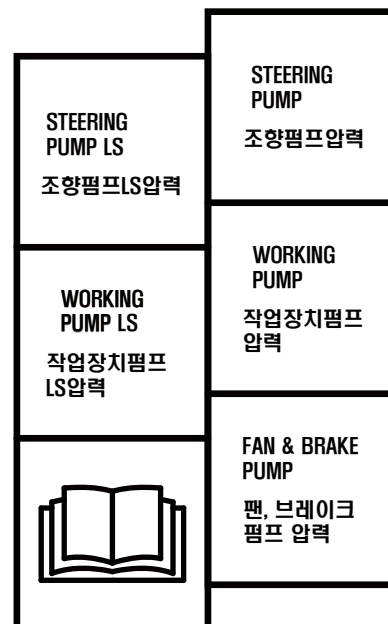


21070FW01

15) PRESSURE CHECK (item 20)

This warning label is positioned on the left side of the rear frame.

- ※ This label indicates pressure check port of hydraulic pumps.
- ※ Make sure to connect the pressure gauge.

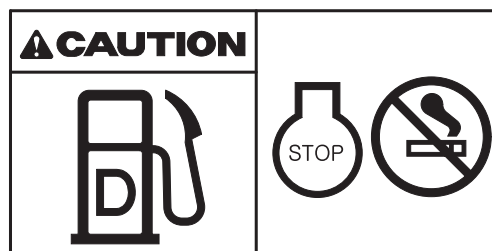


760F0FW11

16) FUELING (item 21)

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

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



21070FW04

17) BATTERY ACCIDENT (item 22)

This warning label is positioned on the battery box.

- ⚠ 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.
- ⚠ 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 battery terminal with a wet hand.



7579A0FW30

18) HYDRAULIC OIL LUB (item 23)

This warning label is positioned on the top of the hydraulic oil tank.

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



14070FW08

19) HIGH PRESSURE HOSE (item 24)

This warning label is positioned on the left side of the front frame.

- ⚠ Escaping fluid under pressure can penetrate the skin causing serious injury.
- ⚠ Avoid the hazard by relieving pressure before disconnecting hydraulic lines or other lines.
- ※ See the maintenance section for details.

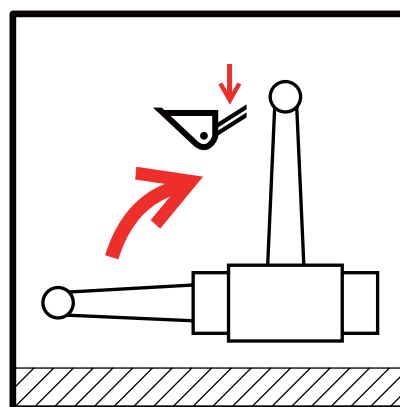


14070FW29

20) MANUAL LOWERING VALVE (item 26)

The warning label is positioned on the left side of the front frame.

- ⚠ Be sure no one is under or near the attachment before lowering the boom.
- ※ Refer to the page 4-30.

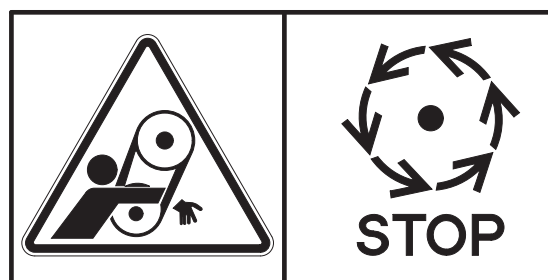


760F0FW12

21) ENGINE DOOR SHEARING (item 27)

This warning label is positioned on the left side of the engine side door.

- ⚠ Don't open the engine door during the engine's running. Stay clear of rotating parts.
- ⚠ Don't touch exhaust pipe or it may cause severe burn.

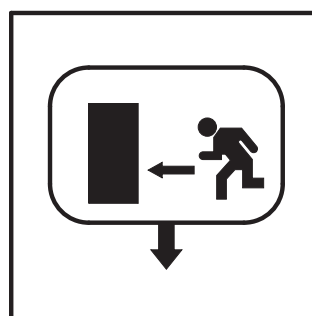


21070FW15

22) ALTERNATE EXIT (item 28)

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

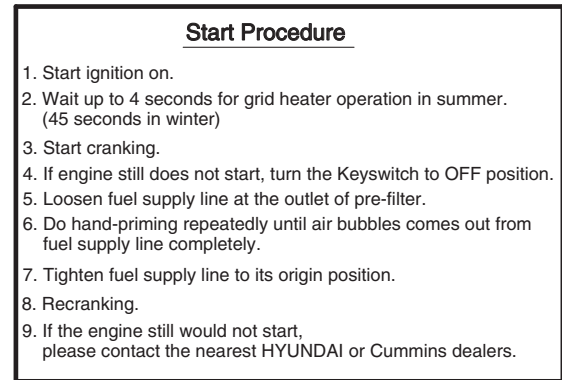
- ※ The right window serve as an alternate exit.
- ※ Refer to the page 3-60.



77070FW12

23) START PROCEDURE (item 32)

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



7609A0FW07

24) DIESEL EXHAUST FLUID (item 33)

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

- ※ Fill only the DEF/AdBlue® (Diesel Exhaust Fluid, standardised as ISO 22241).

Aqueous urea solution made with 32.5% high-purity urea and 67.5% deionized water.

- ※ Do not fill the diesel fuel.



760F0FW13

25) ACCUMULATOR (item 39)

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.

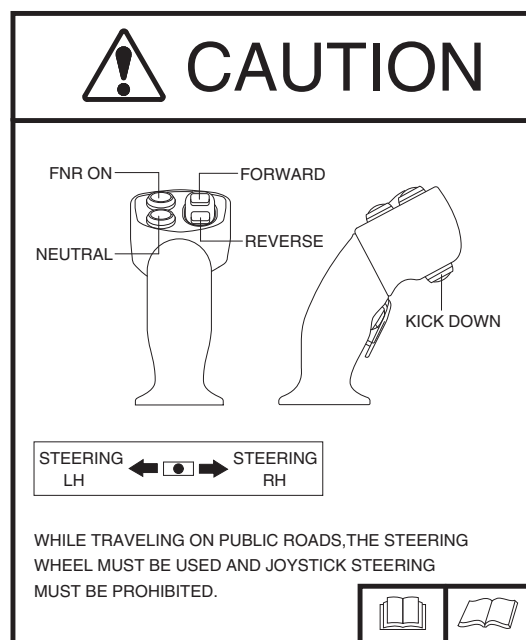


1107A0FW46

26) JOYSTICK STEERING (item 40)

This warning label is positioned on the left side of the cab.

- ※ While traveling on public roads, the steering wheel must be used and joystick steering must be prohibited.
- ※ Please refer to the page 3-51 for details.

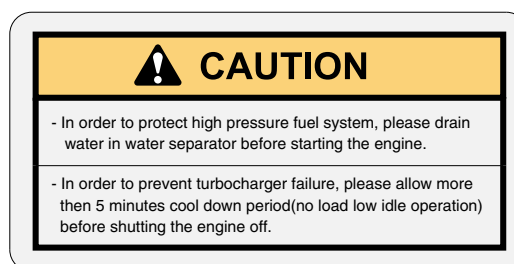


75790FW05

27) CAUTION (WATER SEPARATOR, TURBOCHARGER) (item 41)

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

- ▲ In order to protect high pressure fuel system, please drain water in water separator before starting the engine.
- ▲ In order to prevent turbocharger failure, please allow more than 5 minutes' cool down period (no load low idle operation) before shutting the engine off.

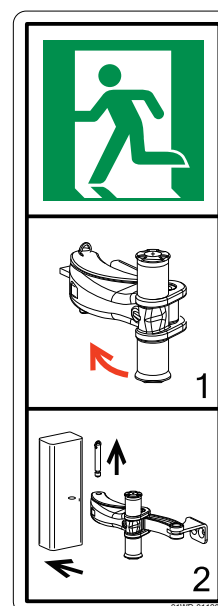


120090SL02

28) TILT HANDLE (item 42)

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

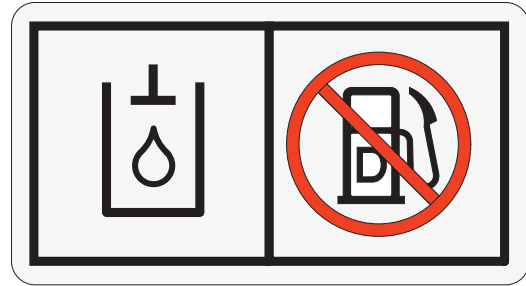
- ※ The right side window can be used as an alternate exit.
- ※ Refer to the page 3-60.



29) FUEL SHUT OFF (item 43)

This warning label is positioned on the hydraulic tank.

- ※ Fill only the hydraulic oil.
- ※ Do not fill the diesel fuel.
- ⚠ Relieve tank pressure with the engine off by removing the cap slowly to prevent burns from hot oil.

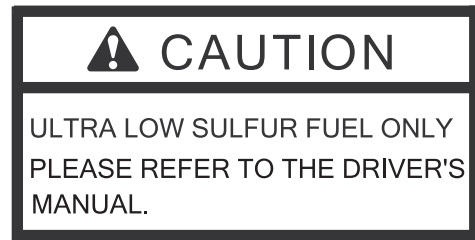


140WH90FW51

30) ULTRA LOW SULFUR DIESEL (item 44)

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

- ※ Use ultra low sulfur fuel only.
- ※ Ultra low sulfur fuel sulfur content ≤ 15 ppm
- ※ If ultra low sulfur diesel is not used, the aftertreatment diesel particulate filter can be damaged.



2609A0SL03

31) EMERGENCY FIRE HOLE (item 45)

This warning label is positioned on the inside of inlet cover.

- ※ Refer to the page 4-29.



955TM0FW20



9800FW08

32) NO STEP (item 46)

This warning label is positioned on the engine hood.

- ⚠ Don't step on the engine hood.

33) QUICK COUPLER (item 47)

This warning label is positioned on the middle of the boom.

- ※ Serious injury or death can result from dropping bucket.
- ※ Operating the machine with attachment switch unlocked or without safety pin of moving hook can cause the bucket to drop off.



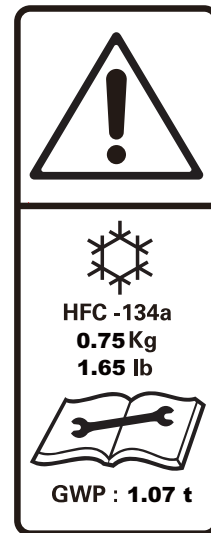
757TM9A0FW30

34) REFRIGERANT (item 48)

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


- ⚠ **Inhaling air conditioner refrigerant gas through a lit cigarette or other smoking method or inhaling fumes released from a flame contacting air conditioner refrigerant gas, can cause bodily harm or death.**

※ Refer to the page 6-50.




9650FW30


MACHINE DATA PLATE

| | |
|---|---|
| DO NOT DEFACE OR REMOVE THIS PLATE 이 명판을 훼손하거나 오손시키지 마시오 | |
| MACHINE TYPE / MODEL | |
| PRODUCT IDENTIFICATION NUMBER | |
| ENGINE POWER | |
| OPERATING MASS | |
|  HD HYUNDAI CONSTRUCTION EQUIPMENT | 477, Bundangseoseo-ro, Bundang-gu, Seongnam-si, Gyeonggi-do, 13553, Korea 91LM-14112 |

For general

| | | |
|---|---|-------------------|
| DO NOT DEFACE OR REMOVE THIS PLATE 이 명판을 훼손하거나 오손시키지 마시오 | | |
| MACHINE TYPE / MODEL | | |
| PRODUCT IDENTIFICATION NUMBER / VEHICLE IDENTIFICATION NUMBER | | |
| ENGINE POWER | MAX. AXLE LOAD (FRONT / REAR) | |
| OPERATING MASS / GROSS VEHICLE WEIGHT | MFG. YEAR | YEAR INTO SERVICE |
|  HD HYUNDAI CONSTRUCTION EQUIPMENT | 477, Bundangseoseo-ro, Bundang-gu, Seongnam-si, Gyeonggi-do, 13553, Korea 91LM-14142 | |

For EU only

| | |
|---|---|
| DO NOT DEFACE OR REMOVE THIS PLATE 이 명판을 훼손하거나 오손시키지 마시오 | |
| MACHINE TYPE | |
| MODEL | |
| MAX. CERTIFIED WEIGHT | |
| STANDARDS | ROPS : ISO 3471 FOPS : ISO 3449 (LEVEL 2) |
|  HD HYUNDAI CONSTRUCTION EQUIPMENT | 477, Bundangseoseo-ro, Bundang-gu, Seongnam-si, Gyeonggi-do, 13553, Korea 91WD-01281 |

For ROPS

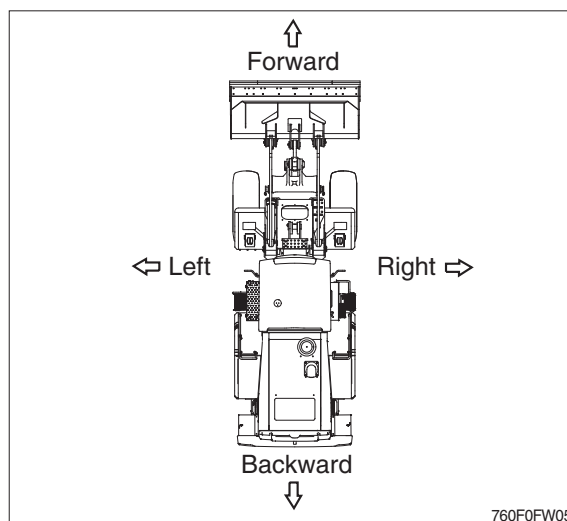
HLOMD01

- ※ The product identification number assigned to this particular machine should be used when requesting information or ordering service parts for this machine from your authorized HD Hyundai Construction Equipment dealer. The product identification number is also stamped on the frame.

GUIDE

1. DIRECTION

The direction of this manual indicate forward, backward, right and left, when machine is on the traveling direction.

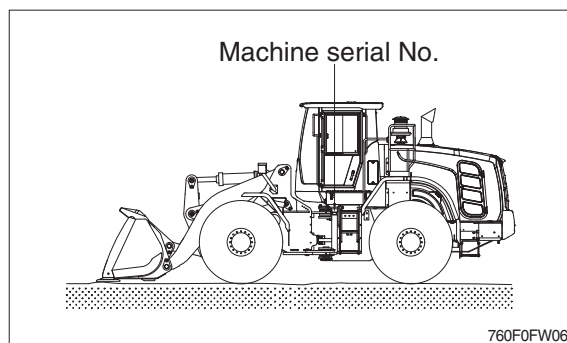


2. SERIAL NUMBER

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

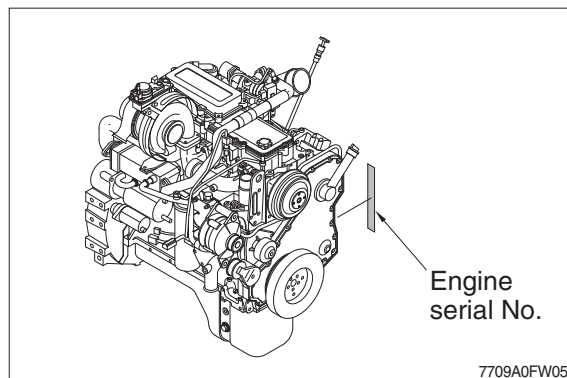
1) MACHINE SERIAL NUMBER

The numbers are located on the left side of the rear frame.



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.

- Excavating work
- Leveling work
- Loading work
- Transporting 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. CALIFORNIA PROPOSITION 65



WARNING

CALIFORNIA PROPOSITION 65

Breathing diesel engine exhaust exposes you to chemicals known to the State of California to cause cancer and birth defects or other reproductive harm.

- Always start and operate the engine in a well-ventilated area.
- If in an enclosed area, vent the exhaust to the outside.
- Do not modify or tamper with the exhaust system.
- Do not idle the engine except as necessary.

For more information go to www.P65warnings.ca.gov/diesel.

2. SAFETY INSTRUCTIONS

Safety Message

Intended Use

Machines should be operated by the procedure the described in the Operator manual.

The products described in the Operator manual are designed and manufactured mainly for the following purposes:

- Loading work
- Leveling work

Do not operate the machine for any purpose other than those stated above or in areas where there are potential risks. Make sure that you comply strictly with the safety regulations at all times. Please contact HD Hyundai Construction Equipment Co., Ltd. or your dealer for more information.

It is strictly prohibited to operate or use the machine in any of the following cases:

- Operation by an unskilled worker
- Lifting a worker up
- Transporting inflammable or dangerous materials
- Driving down or extracting piles with the bucket
- Towing damaged vehicles

Safety guidelines

Most safety accidents related to the operation, maintenance/ inspection, and repair of the machine result from a failure to comply with the safety instructions or to take adequate preventive measures. Safety accidents can be prevented by eliminating potentially hazardous situations. The operator should attend all mandatory training courses on the operation of the machine, and fully understand how to use the tools.

Improper operation, refueling, inspection or repair of this machine may cause serious injury or death.

Do not attempt to operate, refuel, inspect or repair this machine before reading and understanding the product information on such tasks.

This manual describes preventive measures and warnings about the product.

Failure to comply with the warnings about potential risks may result in serious injury or death.

General Safety Information

Unauthorized modification

Any attempt to modify the machine, including the use of unauthorized accessories or spare parts, may have adverse effects on the conditions of the machine and its ability to function as it was designed. Do not attempt to modify the machine in any way without the written consent of the company in advance. The company bears the right to disclaim all quality assurance of a product that is modified without its advance approval.

Never modify the operator's cabin by welding, grinding, drilling holes, or adding attachments unless instructed by HD Hyundai Construction Equipment in writing. Changes to the cabin can cause loss of operator protection from roll-over and falling objects. Can result in death or serious injury.

If the user performs unauthorized modification of the product, the user shall fully be responsible for any damages to the machine resulting from the effects of such modification.

1. The attachment, the accessory, or the spare part has been made or distributed by HD Hyundai Construction Equipment and has been installed according to approved methods described in a publication available from HD Hyundai Construction Equipment.
2. Any modification should be approved by the company in writing.

ROPS/FOPS

The cabin is designed to guarantee sufficient space to minimize impacts according to ISO 3471 of Rollover Protective Structures (ROPS). If any additional devices are installed that exceed the Max. certified weight indicated on the ROPS nameplate, the ROPS certification may be nullified. The protective structure of the cabin should be replaced immediately if it is permanently deformed or damaged.

Machines operated in areas where there is a risk of objects falling onto the cabin are fitted with a Falling Object Protective Structure (FOPS) according to ISO 3449.

Fire and Explosion

Preventing fires

The following actions should be taken to minimize the risk of fire:

- Do a visual inspection before operating the machine to check for any risk of fire.
- Do not operate the machine if there is a risk of fire.
- Be sure to identify the primary exit and alternative exit of the machine, and fully understand how to use the exits in the event of a fire.
- Do not perform any welding or drilling work on the engine cover.
- Keep the engine compartment free from the build-up of flammable materials such as dead leaves, small branches, paper, and other types of trash.
- Keep the covers of the major parts of the machine closed. Make sure that the covers operate normally in order to be able to use firefighting equipment in the event of a fire.
- Be careful when handling fuel. Fuel is a highly flammable.
- Always stop the engine when refueling the machine.
- Refuel outdoors.
- Remove any build-up of flammable materials from the machine.
- Do not operate the machine near a flame.
- All fuels and most lubricant and coolant mixtures are flammable materials, so special care should be exercised when handling such materials to prevent fire and explosion.
- Keep all fuels and lubricant in adequate containers.
- Never smoke in the area where refueling is taking place or in the space for handling battery electrolytes and other flammable materials.
- Oil leaked to a hot surface or electronic component may cause a fire.
- Do not operate the machine if there is an oil leak. Repair the source of the oil leak, and wipe clean any leaked oil before operating the machine.
- Always clean all electrical lines, connectors, and clamps, and check whether they are securely connected on a regular basis.
- If any electrical wire or connector is loose or damaged, repair it immediately.
- Do not weld, cut or use a cutting torch through any tubes or lines in which flammable flows. Check all tubes and lines for signs of abrasion or deterioration and replace if damaged.
- Dust or particles generated when repairing the non-metallic hood or fender are flammable or explosive. Repair such parts in a well ventilated area well away from flames or sparks, and be sure to wear suitable PPE (Personal Protective Equipment).



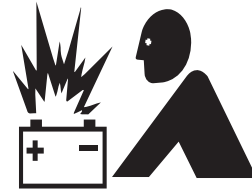
Prevention of explosion

The following actions should be taken to minimize the risk of explosion:

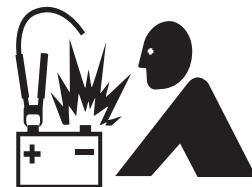
- Preheating function is provided to certain machines that are used in extremely cold environments.
- Never use starting aid fluid in a low-temperature environment as it can harm the engine the engine performance and may cause an explosion.



- Do not attempt to recharge a frozen battery. Forcibly recharging a frozen battery may result in an explosion. Great care should be exercised when handling the batteries. Never let a tool make contact with the positive pole and the frame of the machine simultaneously.
- Sparks maybe generated, resulting in an explosion. The voltage of the battery to be recharged should be identical to the voltage of the recharger.
 - Incorrect voltage may cause overheating and explosion. Do not use or charge the battery if the level of electrolytes in the battery is lower than the minimum level. Regularly check the electrolyte level, and refill the distilled water to the maximum level.



- Do not try to start the engine using an unsuitable booster cable as it may result in an explosion and serious injury. Only use the booster cable to start the engine in a ventilated open space, as starting the engine with a booster cable may generate inflammable gas.
- When hydraulic equipment and piping are overheated, flammable gas or airborne particles may explode. Make sure to protect and insulate such parts to prevent over heating.



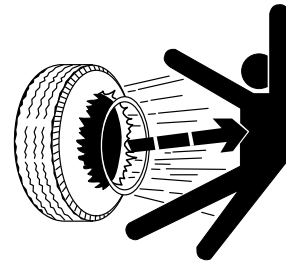
Corrective Actions Before and After a Fire

In the event of a fire in the machine, the top priority should be the safety of the operator and workers in the work area. In the event of a fire at a level that does not endanger the operator or workers, the following actions should be taken:

- Move the machine well away from any inflammable materials (e.g., fuel, engine oil, clothes, and bits of wood) and adjacent buildings.
- If the engine is running, it may cause a persistent fire. Immediately stop the engine.
- In the event of an electric short, disconnect the batteries to eliminate the main ignition source.
In the event of an electricity leak resulting from damage to the power wiring caused by fire, disconnect the batteries to eliminate the secondary ignition source.

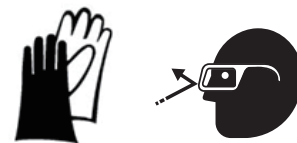
If a fire becomes too large to control, assess the following risks :

- If the machine is equipped with wheels, there is a risk of tire combustion and explosion. If exploded, high-temperature fragments may scatter.
- The tank, accumulator, hose and fitting may burst into flames, splashing fuel and scattering particles throughout the surrounding area.



If you have to handle a machine that has been damaged by fire or one that is exposed to excessively high heat after extinguishing a fire, take the following precautions:

- Wear thick protective gloves and protective goggles.
- Never touch any materials left after combustion with your bare hands.
- Avoid contact with melted polymer materials (e.g., plastics).



Information on fire extinguisher

Fire extinguishers (if equipped) should be kept in a fully operable condition, and be inspected by a qualified person on a regular basis. Workers should complete a training course on the use of fire extinguishers in advance.

Use fire extinguishers in accordance with the following procedures, if required:

- ① Pull the safety pin of the fire extinguisher first.
- ② Extend the nozzle, and stand toward the fire.
- ③ Aim the nozzle at the flames, and firmly press the top and bottom handles.
- ④ Stand in a downwind position, and evenly spray the foam over the flames.

If the weight of the fire extinguisher exceeds 4.5 kg, mount the extinguisher in a location near the bottom of the cabin. Do not mount the fire extinguisher at a level higher than one third of the height of the cabin.

Do not weld or drill ROPS to mount a fire extinguisher. Contact your dealer or distributor for more information about the correct mounting of fire extinguishers.












Health and Safety

Personal protective equipment

The wearing of personal protective gear is mandatory for protecting the human body from hazardous chemicals and hazardous environments.

The wearing of personal protective gear is a means of preventing injury, and should not interfere with the performance of jobs. It is designed to protect the human body from hazardous environments and hazardous materials, and should be kept in an easily accessible place.

List of personal protection gear

| Name | Symbol | Remarks |
|-----------------------|---|---|
| Safety helmet |  | Protects the head from falling objects, and reduces risks when falling down. |
| Dust mask |  | Air-purifying dust mask should not be worn in workplaces with an oxygen concentration of less than 18%. |
| Gas mask |  | Prevents the inhalation of mist, airborne particles, or protects against the spray of hazardous chemicals. |
| Welding helmet |  | Blocks airborne dust and slag, and shields the face from bright light during welding. |
| Protective clothing |  | Blocks dust, mist and hazardous chemicals, and protects against burns. |
| Protective gloves |  | Electric insulation gloves: Should be worn when working in areas with a high risk of electric shock. Chemical protective gloves: Should be worn when working in areas where there is a risk of contact with hazardous chemicals including materials leaked from batteries. |
| Protective goggles |  | Protects the eyes from dust, particles and airborne materials in work areas. |
| Earplugs and earmuffs |  | Wear earplug and earmuffs separately or in combination depending on the level and duration of noise. |
| Safety shoes |  | Protects the feet from falling objects, impacts, and sharp objects. |

Health and safety instructions in hazardous environments

Comply with the following instructions during operation and maintenance of the machine.

When handling oil

Failure to wear personal protection equipment may result in burns caused by contact with a high-temperature liquid. Make sure you wear protective goggles, protective gloves and protective clothing when handling oils such as hydraulic oil and engine oil.

If the eyes come into contact with oil, wash them with a sufficient amount of water for 15 minutes or longer. If the skin comes into contact with oil, take off contaminated clothes and shoes, and wash the skin with soap and water for 15 minutes or longer.

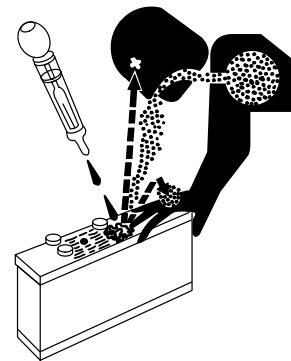


When handling the battery

If battery electrolyte leaks while handling the battery, the sulfuric acid contained in the electrolyte may cause burns. The lead components in battery electrolyte are toxic, so be sure to wear protective gloves and protective clothing. Do not forget to wash your hands after handling the battery.

If a part of your body not protected by personal protective equipment comes into direct contact with battery electrolyte, immediately wash the affected part with flowing water for 20 minutes or more, and then see a doctor without delay.

If you accidentally swallow battery electrolyte, drink lots of water and do not forcibly induce vomiting, and then see a doctor without delay.



When handling refrigerant

Make sure you wear protective goggles, protective gloves and other personal protective equipment when handling refrigerant to prevent direct contact of the skin with the refrigerant. Wear protective gloves made of materials that are resistant to chemicals (such as neoprene and butyl rubber).

Never smoke when handling refrigerant.

If refrigerant comes into direct contact with the skin, wash the skin with warm water immediately.



When handling coolants

After operation of the machine the coolant is of high temperature and high pressure, and is retained inside the engine radiator and the heater line. Direct contact of the skin with the coolant may result in serious burns. Open the cap of the radiator only after the engine has sufficiently cooled and the pressure has reduced to a safe level.

Coolant contains toxic and combustible ethylene glycol, and should be handled in a cool, well-ventilated place only when wearing protective goggles, protective gloves, protective clothing, and a gas mask.

Avoid inhaling airborne particles or spray from coolant. If the substances make contact with skin or eyes that are not protected by personal protection gear, immediately wash the skin and eye with flowing water for 20 minutes or longer.



When working in a place subject to airborne particles and falling objects,

Make sure you wear a safety helmet, protective goggles and safety shoes to prevent injury from such particles and objects. Earplugs or earmuffs may be necessary when working in a noisy place.











When working in places with a high level of noise

When the operator is exposed to the noise exceeding 90 dB (A) for 8 hours or longer, wear earplugs or earmuffs.



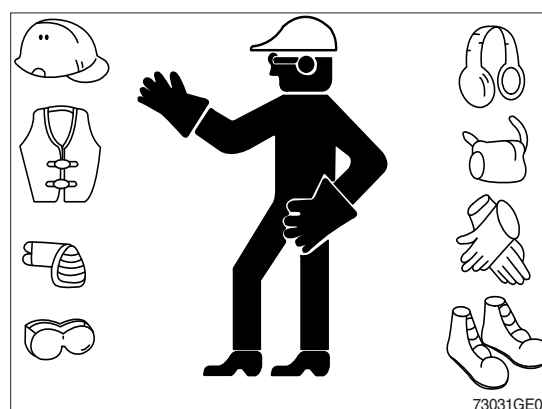
Personal protection gear for various situations

| Situation | Symbol |
|--|--|
| Oil handling |  |
| Battery handling |  |
| Refrigerant handling |  |
| Coolant handling |  |
| Repair by welding |  |
| Working in areas subject to airborne particles and falling objects |  |
| Working in places with a high level of noise |  |
| Handling machines damaged by fire or exposed to excessively high temperature |  |

WEAR PROTECTIVE CLOTHING

Wear close fitting clothing and safety equipment appropriate to the job.

- Do not wear loose clothing and accessories. Secure long hair. These items can snag on controls or on other parts of equipment.
- Do not wear oily clothes. They are highly flammable.
- Wear a hard hat, safety shoes, safety goggles, mask, leather gloves, earplugs and other protective equipment, as required.
- While working on machine, never use inadequate tools. They could break or slip, or they may not adequately perform intended.



73031GE01

Noise and Vibration

Information on vibration

This section describes the vibration data of the machine, and methods of calculating the vibration level.

The vibration level of the machine varies according to any of the following conditions:

- Driving habits of the operator (i.e. aggressive/mild temperament when driving)
- Quality of seat and suspension
- Type of machine, attachments, and conditions of machine
- Conditions of work site, working environment, ground surface conditions, and weather

Vibration also varies according to the duration of operation. Accordingly, it is not possible to precisely calculate the vibration level of the machine; however, it is possible to predict the level.

Physical Agents Directive 2002/44/EC defines the exposure action value as 0.5 m/s^2 , and the exposure limit value as 1.15 m/s^2 . If the predicted value is near the exposure action value or exposure limit value, the predicted value should be assumed to exceed the two latter values, and necessary action should be taken.

As regards the actions to take according to vibrations, refer to the following table :

| Daily vibration exposure ($A(8)$) | Vibration exposure range | Actions to be taken |
|--|---|---|
| $A(8) \leq 0.5 \text{ m/s}^2$ | Exposure action value or lower | When approaching the exposure activity value, reasonable measures should be taken to minimize exposure to vibration. The relevant information and opportunities for training on vibration reduction should be provided to the operator. |
| $0.5 \text{ m/s}^2 < A(8) \leq 1.15 \text{ m/s}^2$ | Exceeding the exposure action value, but not exceeding the exposure limit value | It is required to execute certain measures for reducing exposure to and risks of vibration to the minimum. The health of an operator who has been exposed to excessive vibration should be examined. |
| $1.15 \text{ m/s}^2 < A(8)$ | Exceeding the exposure limit value: | Immediate action is required to reduce the vibration exposure level to below the exposure limit value. |

The vibration level can be predicted based on the information in the following table which is used to calculate the daily level of vibration exposure.

Predict the vibration level in the three vibration directions of axes X, Y, and Z. The mean vibration level should be used under normal operation conditions. Scenario factors from mean vibration level based on operation by skilled operator and on smooth terrain are excluded. Scenario factors are included to obtain the mean vibration level based on aggressive operation and severe terrain to assess the expected vibration level.

※ **All vibration values are indicated in m/s^2 .**

Instructions on mitigating vibration

Machines should be correctly adjusted and maintained to ensure smooth operation. The terrain conditions should be observed. The following instructions will help reduce the whole body vibration level:

- ① Use machines and attachments of the correct types and sizes.
- ② Maintain the machines pursuant to the manufacturer's recommendations.
 - Brake and steering systems
 - Controls, hydraulic system and linkage
 - Tire pressure
- ③ Maintain and provide good terrain conditions.
 - Remove any large rocks or obstacles.
 - Fill gutters or holes.
 - Keep the vibration level minimal by adjusting the speed and driving path
- ④ Use a driver's seat that satisfies ISO 7096.
 - Adjust the driver's seat and suspension for the weight and the size of the operator.
 - Inspect the suspension and adjusting devices of the driver's seat.
- ⑤ Perform the following maneuvers without using excessive force :
 - Steering
 - Braking
 - Accelerating
 - Gear shifting
- ⑥ Move the attachments smoothly.
- ⑦ Adjust the speed and path of machine to keep the vibration level minimal.
 - Operate the machine so as to avoid obstacles and rough terrain.
 - Decelerate the machine when driving on rough terrain.
- ⑧ Keep the level of vibration minimal when working for a long time or driving for a long distance.
 - Use a machine mounted with suspension system.
 - Use the machine's drive control system (optional).
 - If the machine is not fitted with a drive control system, reduce the speed.
 - Transport the machine when moving between worksites; do not drive the machine to get to another worksite.

⑨ The operator's convenience may be reduced by various risk factors. Comply with the following conditions to effectively ensure the operator's comfort and convenience.

- Adjust the driver's seat adjustment device to allow a convenient posture.

Adjust the angles of the mirrors to minimize awkward, compromised posture

- Avoid working for an excessively long time, and take regular breaks.
- Do not jump on or from the cabin.
- Minimize repeated handling of loads and lifting of loads.
- The vibration information and calculation procedures are based on <ISO/TR 25398>, which has been defined according to the emission of vibrations measured under the actual working conditions of the machines.

Information on noise

Noise level (EN 474-1:2018 and 2000/14/EC) are as follows :

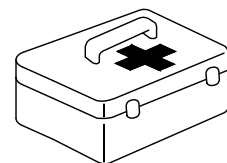
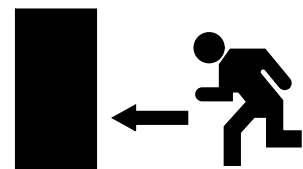
- Sound pressure level (LpA) : See pages 0-3.
- Sound power level (LwA) : See pages 0-3.

Emergency situations

In the event of an emergency situation, use the emergency hammer installed inside the cabin to break the windshield of the cabin, and carefully escape from the cabin. The emergency hammer should always be kept inside the cabin for emergencies, and should not be removed or used for other purposes. If the emergency hammer is lost, replace it immediately.

Keep a first-aid kit inside the cabin or in another place at the worksite for safety accidents.

Keep contact information (e.g., phone number) to request help with an emergency situation or injury.



Safety Information on the Machines and Operation

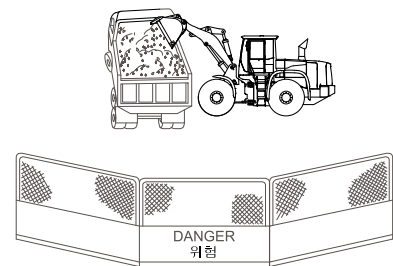
Before Operating the Machine

Visual inspection shall be performed for identifying potential hazards and obstruction of visibility around the machine.

Carefully examine the following conditions and take the necessary actions, if required, to prevent risk factors before operating the machine:

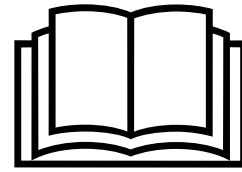
Checking the worksite

- Check the weather condition at the worksite (e.g., fog, rain, etc.). Fog or heavy rain may narrow the operator's field of vision, or render the machine inoperable. In particular, the operator should bring the bucket down to the ground in the event of thunder and lightning, and evacuate to a safe place.
- Check the worksite for obstacles, and avoid collisions with such obstacles during operation. Check the surroundings of the machine for any obstacles that may hinder operation.
- Check the worksite for buried waterlines, telecommunication cables, power cables and oil pipelines in advance, and avoid damaging them.
- If the terrain of the worksite is too rough for normal operation of the machines, flatten the terrain before operating the machines. Make sure that the ground of the worksite is not soft as it may cause hazards during operation.
- If the worksite is a marshy place (e.g., shallow river, large or small lake, swamp, etc), check the conditions and the depth of marshy areas, and the flow rate before driving or operating the machines. Do not operate the machines underwater.
- Do not operate the machines on cliffs or at the end of a road on soft ground as the machine may overturn.
- When operating the machine in areas with pedestrian or vehicle traffic, or in a zone in the vicinity of such an area, appoint workers exclusively responsible for controlling the traffic, or install fences or blocking wall to separate the worksite from the traffic area. Workers responsible for vehicle control in the traffic area or exposed to public vehicular traffic shall be worn with warning vests or clothing made of reflective or high-visibility materials. Prevent unauthorized workers or machines from accessing the worksite.



Operator conditions to be checked before operating the machine

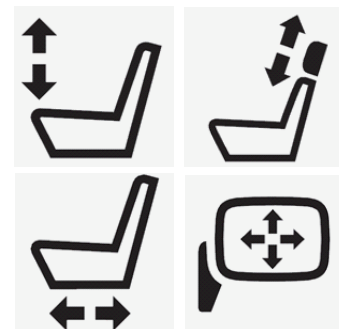
- The machine shall be operated by authorized and skilled operators only.
- The operator should wear clothes and personal protection gear that are appropriate for the work environment.
- The operator should only be permitted to operate the machine under normal conditions after checking the state of the operator. Operator under the influence of alcohol or drugs, or an extremely exhausted operator should not operate the machine.
- The operator should read and fully understand the operator's manual before operating the machine.
- The operator should fully understand the details and procedures of the work to be performed.
- If a risk of a safety accident is suspected, consult sufficiently with the responsible worker, and only perform the work after taking the necessary preventive measures.



Machine conditions to be checked before operating the machine

- When defects make continued operation hazardous to operator and workers around the worksite, the defective items of the machine shall not be operated and placed in a designed area posted for that purpose, or a tag or other effective method of marking the defective items shall be used to prohibit further use until the defects are corrected.
- If damaged windows obscure visibility necessary for safe operation, or create hazard to the equipment operator, the windows shall be replaced or corrected.
- Check the machine for abnormal noise, vibration or heat, and for the leakage of engine oil, hydraulic oil, fuel or refrigerant.
- Remove any substances (e.g., inflammable materials such as wooden chips, dead leaves, and pieces of paper) from the engine and the battery. The buildup of such substances may cause a fire.
- Do not operate a machine that needs repairing without taking actions for repair.
Operate the machine only after making sure that the regular inspection and service recommended in the operator's manual have been executed.

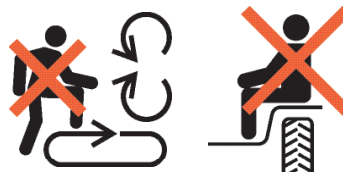
- Adjust the operator's seat to suit the physical condition of the operator. Check the seatbelt for damage, and replace it if damaged. Do not store unnecessary objects or tools in the cabin.
- Keep clean all parts related to the visibility, such as the windshield and rearview mirror. In particular, adjust the rearview mirror to ensure that the operator's field of vision is clear.
- Check the acoustic alarms (e.g., the horn and warning signal when driving backward or moving) for normal operation.



During Operation of the Machine

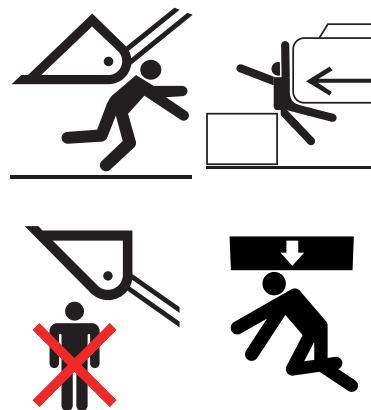
Getting on and off

- Do not jump on or off the machine.
Do not try to get on or off the machine while it is moving.
 - Get on or off the machine using the handrail and step (or stepladder, if any). Always keep the handrail and step clean and free from mud or oil.
 - Wear anti-slip shoes.
 - Comply with the principle of three-point contact* by contacting the machine with either both hands and one foot or vice versa when getting on or off the machine.
 - Do not sit on a seat not suited or intended for sitting.
- ※ **Three-point contact means making contact with the machine with both hands and one foot, or with one hand and both feet.**



During operation

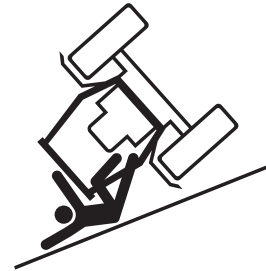
- The operator should start the engine only after sitting on the operator's seat. Make sure that all levers are shifted to the neutral position before starting the engine.
- If there are any obstacles at the worksite, pay attention to prevent collision of the machine with such obstacles, particularly when turning and moving backward. Make sure that there are no obstacles when turning and moving backward.
- When lifting a load, the capacity of the machine and the size and weight of the object to be lifted must be considered. Do not lift a heavy object with slings by suspending the slings on the tooth of the bucket.
- Do not allow any worker to stand under the bucket.



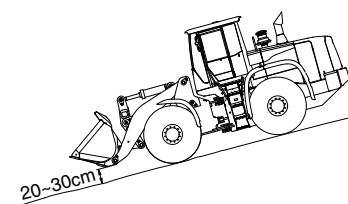
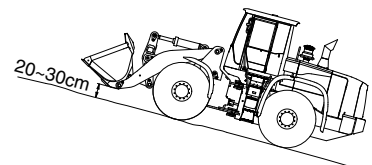
Operation on a slope

Comply with the following conditions when operating the machine on a slope:

- Do not work on slopes of 10° or more.
- The maximum climbing angle of the machine on a slope is 30°. Do not operate the machine at an angle exceeding this value.
- If operation of the machine on a slope is unavoidable, perform the work after flattening the ground.
- When operating the machine laterally on a slope, there is a high risk of machine overturning or slipping. Do not operate the machine in such conditions.
- Do not operate the machine on a slope covered with wet grass or a thick layer of dead leaves, as the machine may slip.
- Do not park or stop the machine on a slope.
If parking or stopping the machine on a slope is unavoidable, bring the bucket down to the ground, and support the wheels with wheel chocks.



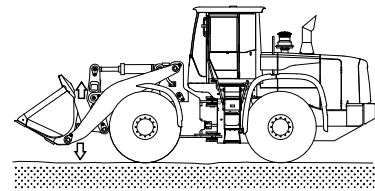
- When traveling up a slope, operate the machine at a slow speed with the attachment extended forward to keep the machine balanced, and with the bucket raised at least 20 ~30 cm from the ground.
- Never travel down a slope in neutral. Keep the bucket 20~30 cm above the ground and use the bucket as a brake in an emergency situation.
- If the engine suddenly stalls, immediately bring the bucket to the ground.
- If the fuel gauge reaches the red zone while operating the machine, immediately refill with fuel. (If the machine operates on a slope under these conditions, air may be introduced into the engine, causing it to stall suddenly.)



Cautions to Be Taken When Driving the Machine

- If you operate the machine with the parking brake on, it may cause serious damage to the parking brake disk.
- Select the appropriate gear for the driving speed.
- Do not change direction when driving the machine at max. speed as this may cause serious damage to the transmission.
- Only drive the machine for short distances on the road.
- Make sure you fully comply with the local road traffic regulations and legislation of your country when driving on the road.
- Please note that the machine is wider and travels at a lower driving speed than other vehicles on the roads.
- Pay attention to any vehicles behind your vehicle, and allow them to overtake your vehicle safely.
- Check the following conditions before driving the machine on the public road :
 - Remove any dirt and sand from the machine.
 - Empty the bucket and move it to the driving position (40~50 cm above the ground) and fix it.
 - Close the windshield. Turn the working light off.
 - Wear the seat belt.
 - Use the lighting devices, such as the headlights, emergency warning light and rotating beacon, pursuant to the local road traffic legislation.
 - Pay attention to people in the vicinity of the machine.
 - Do not operate the machine on roads or bridges where the machine exceeds the weight limit.
 - Familiarize yourself fully with the width, length and height of the machine.
 - Check the tire pressure.
 - When traveling for a long distance, stop the machine after every 40 km or on an hourly basis, and take a break.
 - Check the level of fuel and coolant.
 - Never shift the gear to the neutral position when driving down a slope.
 - Changing direction when operating the machine on a slope is dangerous.
 - Do not drive on a slope of 30° or more.
 - Drive slowly when traveling the machine on rough terrain or moving over obstacles.
 - Install chains on the tires when operating the machine on slippery roads covered with snow or rainwater, and do not attempt to start, stop or turn the machine suddenly.
 - Be sure to avoid any obstacles when traveling the machine on paths.

Driving position

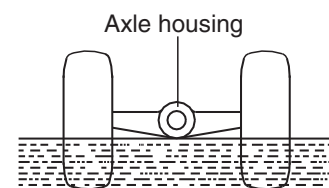
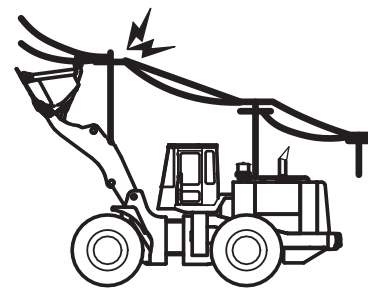
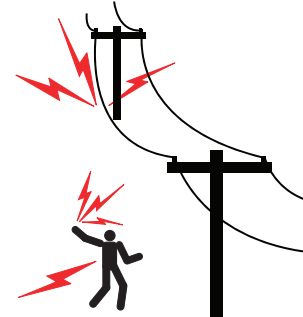


Operations to be avoided or prohibited

- Pay attention when operating the machine in an enclosed space as this may result in the risk of a buildup of hazardous gases.
- If the machine is operated in the vicinity of a high-voltage line, there is a risk of death or serious injury.
- Make sure you are fully aware of the height and working radius of the machine, and maintain the minimum safety distance.

| Voltage | Minimum safety distance |
|----------|-------------------------|
| 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) |

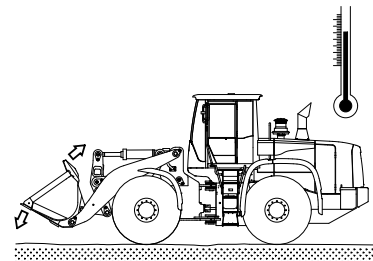
- In the event of contact with a high-voltage line, keep sitting on the operator's seat until the electric current has been shut down.
- Warn any workers on the ground in the vicinity of the machine not to make contact with the machine.
- If leaving the machine is unavoidable, jump down to a place free from any contact with the machine.
- Do not operate the machine too close to the edge of cliffs, overhangs and deep ditches for preventing falling down or tipping over. Avoid operating on loose ground, especially the ground near ditch is likely to collapse. Pay special attention when it is raining as the heavy rainfall may soften the ground.
- Avoid operating the machine on soft ground, a slope or cliff as there is a risk that it may overturn. Pay special attention when it is raining as the rainfall may soften the ground.
- When operating or driving the machine underwater, check the floor conditions, depth of water and flow rate, and make sure that the top roller and axle housing are not immersed in water.
- Do not operate the machine under adverse weather conditions caused by overcast skies, snow, and rainfall.
- Do not turn or travel the machine when the bucket is stuck in the ground.
- Do not excavate too deeply under the front of the machine for preventing from falling or tipping over.



Cautions when operating in specific areas

Operating in extremely cold environments

- Do not attempt to start, stop or turn the machine suddenly as this may cause it to slip. There is potential for the machine to slip.
- Snow-covered or frozen ground may be slippery and dangerous.
- Idle operation of the machine may be required to elevate the engine temperature during startup.
- An impact resulting from a sudden movement of the boom or the attachments at an extremely low temperature may cause serious damage to the machine.
- The working cycle or loading weight might be reduced to lower than those under normal conditions.
- Check the following conditions before operating the machine :
 - Warm up the engine for 3~4 seconds when starting up the engine.
 - Always fully charge the battery. A discharged battery will freeze earlier than a fully charged battery.
 - Use engine oil and fuel that are appropriate for the temperature.
 - Keep the fuel tank full.
 - Remove any moisture from the fuel tank, and change the fuel filter regularly.
 - If the fuel filter is frozen, the flow of fuel may be blocked.
 - Pour the proper volume of antifreeze into the coolant.
 - Wait until the various parts of the machine reach the operating temperature after starting the engine.
 - Make sure that every controller and function of the machine operates normally.
 - Remove any dirt, snow and ice from the machine after completing the operation, and park the machine on a wooden pallet.



Operating in extremely hot environments

- Continuous operation of the machine for a long period of time may cause the machine to overheat. Pay special attention to prevent the overheating of respective parts such as the engine and the hydraulic system, and stop the machine and take a break if necessary.
- Check the following conditions frequently :
- Check the level of the coolant in the radiator.
 - Check the radiator grill for clogging by foreign pollutant, and remove them, if any.
 - Check the level of the battery electrolyte.
 - If the battery will not be used for a long period of time, store it in a cool place.
 - Check the hydraulic system for oil leakage.
 - Check the lubrication oil on the respective parts, and top up the oil if necessary.
 - If the paint coating of any parts has been effaced or damaged, coat the parts with paints or treat them with an anti-rust additive.
 - Do not park the machine under direct light for a long period of time.
 - When parking or storing the machine outdoors, use the proper cover to protect the machine from sunlight and dust.

Operating in dusty or sandy environments

- Check the radiator grill for clogging by pollutant, and remove them, if any.
- Check the fuel system, and protect it from dust or sand when refueling.
- Inspect the air cleaner regularly, and replace it if necessary.
- If the gauge lamp on the dashboard lights up and the buzzer sounds at the same time, clean or replace the air cleaner independently of the usual inspection cycle.
- Frequently check consumables such as hydraulic oil and lubrication oil, and change them if necessary. Pay attention care to prevent the introduction of dust or sand when changing the consumables.
- Check the air-conditioner and the heater filters regularly, and clean or replace them if necessary.
- When parking or storing the machine outdoors, use the proper cover to protect the machine from dust and sand.

Operating in rainy or humid environments

- Do not operate the machine in areas where there is heavy rainfall or thick fog.
- If operating the machine in such areas is unavoidable, perform operation after ensuring sufficient field of vision.
 - Use lighting devices such as the head lamp and working light.
 - Warn any workers within the radius of operation of the machine.
- Pay attention when operating the machine on smooth ground as there is a risk of it overturning.
- If the paint coating on any parts has been effaced or damaged, coat the parts with paints or treat them with an anti-rust additive.

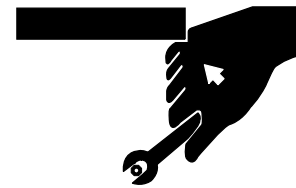
Operating the machine in coastal areas

- Special care should be taken when operating the machine in coastal areas as exposed parts may be corroded easily.
- If the paint coating on any parts has been effaced or damaged, coat the parts with paints or treat them with an anti-rust additive.
- Perform inspection and maintenance of the parts promptly.

Cautions during maintenance

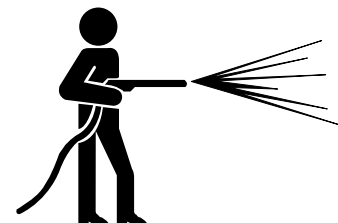
Tools

- Use the correct tools for each type of work.
- Using improper tools may damage the machine and its parts.
- Using deteriorated or damaged tools may result in bodily injury.



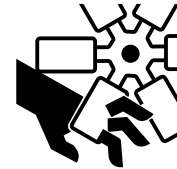
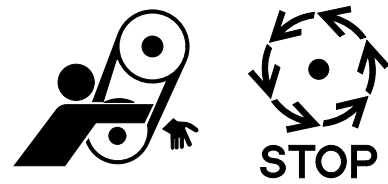
Inspection and servicing

- Prevent access to the machine by all unauthorized workers (other than those authorized during operation of the machine).
- In the event of an inspection park the machine in a flat area and attach it with an 'Under Inspection' sign.
- Clean the machine before inspection or maintenance.
 - When performing inspection or maintenance on a dirty machine, it may be difficult to diagnosis or detect the cause of a problem with the machine, if any.
 - Dust or dirt accumulated on the machine may cause a worker to slip or fall.
 - Wear protective goggles and protective clothes when cleaning the machine using a compressed water jet.
 - Do not spray water directly on sensors or electric connectors (sensors or electrical connection units, etc.). If water gets into the electrical system, it can cause operational problems.
- Use proper lighting devices when operating the machine in a dark area.
- Use lighting devices that satisfy the explosion-proof requirements when handling inflammable materials such as fuel and hydraulic oil.
- Never attempt to use a direct flame such as a cigarette lighter in lieu of the lighting device.
- Check the level of the cooling water after stopping and sufficiently cooling down the engine.
- Sufficiently relieve the inside pressure before opening the cooling water cap.
- The cooling system contains basic components. Pay attention to prevent the skin or eyes coming into contact with the basic components.
- Pay attention to protect the body from contact with hot fluid or parts.
- Replace the filters only after stopping off and sufficiently cooling down the engine.
- Slowly remove the hydraulic oil filter plug to relieve the inside pressure.
- Relieve the pressure from the hydraulic system before disconnecting the lines and fittings.



Collision or cutting

- Never open or remove the engine hood while the machine is in operation.
- Two workers should perform the job while the engine is running:
- One worker should be ready to operate the machine or to turn the engine off from the cabin.
- Keep areas in the vicinity of rotating or moving parts clean.
- Keep articles in the vicinity of the fan clean.
 - Wear safety gloves when handling the wire cables.
 - Wear protective goggles and protective clothes, if required.



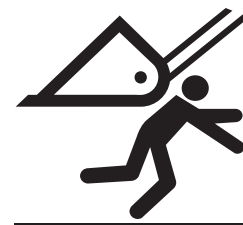
Preventing fire and explosion

- All fuels and most lubrication oils and coolant mixtures are inflammable materials, so special care should be exercised when handling such materials to prevent fire and explosion.
- Oil that leaks on to a hot surface or electronic components may cause a fire.
- Keep all fuels and lubrication oils in adequate containers.
- Do not smoke while refueling fuels, or at the refueling point.
- Do not smoke in a space where battery electrolyte and other inflammable materials are handled.
- Always keep all electrical lines, connectors, and clamps clean, and check whether they are securely connected on a regular basis.
- If any electrical wire or connector is loose or damaged, repair it immediately.
- Do not weld or cut with gas cutter pipes or tubes that contains flammable fluids.



Cautions on decoupling the attachments

- Do not allow unauthorized workers to access the machine.
- Place the operating machine in a safe position.
- Install safety fences around the operating machine.



Repair by welding

- Perform repairs by welding in an area where adequate facilities for welding are available.
- Welding work may be subject to risks of gas leak, flame and electric shock.
Welding should be performed only by a qualified welder.
- Take the following precautions when welding:
 - Separate and remove the battery to prevent battery explosion.
 - Perform direct heating in a place free from the risk of explosion.
 - Cover parts such as rubber hoses subject to damage by welding with flame-resistant materials.
 - Wear a welding helmet, protective clothes, protective gloves, and safety shoes.
 - Perform welding work in a well-ventilated place.
 - Remove all inflammable materials from areas in the vicinity of welding work.
 - Provide fire extinguishers.



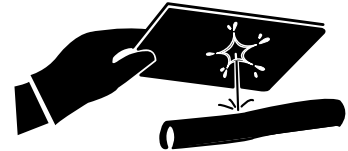
Precautions to take when working on the machine

- There is a risk of falling when working on the machine.
- Keep the area around the workers' feet clean and tidy.
- Do not spill oil or grease.
- Do not leave tools lying on the floor.
- Be careful on the floor when moving.
- Never jump from the machine.
- When getting off the machine, use the step or handrail and get off the machine while keeping to the principle of three-point contact.
- Wear protective clothes if necessary.
- Do not perform maintenance work in an area where no anti-slipping pads have been installed.
- Replace anti-slipping pads and step treads with new ones if they have deteriorated or no longer function.



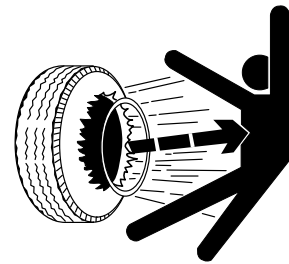
Cautions when working with the high-pressure line or hose

- Make sure that the internal pressure is released before replacing or checking the high-pressure line or hose.
- If the internal pressure is not released, serious injury may result.
- Be careful in the following conditions:
 - Provide fire extinguishers.
 - Leaked oil may penetrate the skin or cause serious injury.
 - Never check for oil leaks with your bare hands.
 - Check an oil leak using a wooden plate or cardboard.
 - Never bend or hit the high-pressure line hard.
 - Do not install a bent or damaged line or hose.
 - Make sure that all of the clamps and protective devices are properly installed.
- Check the pipes and hoses regularly and replace any damaged parts if necessary.



Cautions on inspecting the tire

- Always keep the tires inflated to the proper pressure.
- Overheating or rupture of the tires may result in serious injury.
- Repairing or changing the tires requires exclusive facilities and expertise. Please contact a professional tire repair shop if repairs are necessary.



Cautions on inspecting the counterweight

- Never stand beneath the counterweight when installing or removing it.
- Make sure that the status and conditions of the lifting device are normal.



Battery

- The battery contains flammable materials.
- Never smoke in the vicinity of the battery.
- The battery electrolyte is strong acid. Pay attention to prevent the skin and eyes from coming into contact with the electrolyte.
- If the battery electrolyte accidentally comes into contact with the body or clothes, immediately wash off the electrolyte with water.
- If the battery electrolyte is frozen, do not use other devices to start the engine up.
- Always wear protective goggles and protective gloves when working on the battery.
- Always keep the switch in the 'OFF' position when working on the battery.
- Securely fasten the battery cap.
- Always disconnect the battery from the machine before charging the battery.
- Disconnect the cathode (-) first when removing the battery.
- Connect the anode (+) first when connecting the battery.
- Follow the safety procedures when jump starting or charging the battery. Improper connection of the cable may result in an explosion and serious injury.
- Use a voltmeter when inspecting the charging system.
- Regularly inspect the battery cable, and replace it if damaged.
- A battery cable with exposed wires may cause a short if it comes into contact with the grounding surface.
- A short circuit of the battery cable may cause heat from the battery current and result in a fire.
- If the wires of the ground cable are exposed between the battery and the master switch, the exposed wires make contact with the grounding surface and the current may bypass to the master switch. This may destabilize the machine operation.

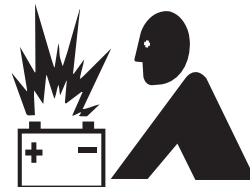
Repair or replace the part before operating the machine.

Battery disconnection switch

- Do not turn off the battery disconnect switch while engine is running. There is a risk of damaging electrical system.
- The battery disconnect switch can be found under the left-hand door of the machine.
- Make sure to turn off the battery disconnect switch when welding or servicing electrical systems, and before clocking out.

Switchboard

- The relay and fuse can be found on the switchboard at the rear of the cab.
- Do not use the fuse that has a higher amperage than indicated on the decal. There is a risk of damaging electric circuits or catching fire.



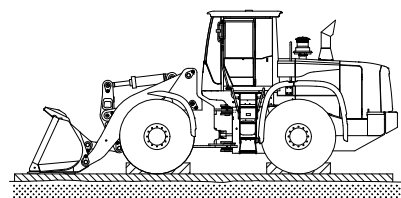
Parking and Storage

Cautions on parking

- Park the machine on the flat ground as possible.
- If parking the machine on a slope is unavoidable, use wheel chocks to prevent the machine from moving.
- Bring the bucket right down to the ground.
- Make sure that all of the switches are turned to the 'OFF' position.
- Make sure that all of the controllers are turned to the neutral position.
- Activate the parking brake.
- Stop the engine, and withdraw the ignition key.
- Close and lock the windshield, door and cover completely.
- Install fences around the machine when parking it on a public road, and put up a warning sign.

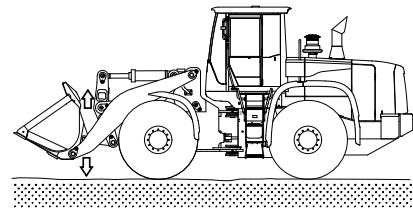
Cautions on storage for a long period of time

- Park the machine in accordance with the cautions for parking.
- When storing the machine for a month or longer, pay attention the following conditions to prevent deterioration of the machine performance :
 - Thoroughly clean the machine before storing.
 - Inject sufficient lubrication oil and grease into the injection ports.
 - If the lubrication oil is deficient, top it up. If the oil is contaminated, change it.
 - The lubrication oil may deteriorate during storage. Pay special attention to reusing the oil.
 - The density of the oil may drop during storage.
 - Apply an anti-rust additive to the exposed area of the piston rod of the cylinder in areas where it is likely to rust quickly.
 - Keep the master switch mounted in the power box (or the toolbox on the left of the rear frame of the machine) turned 'OFF'.
 - Top up the antifreeze in the radiator.
 - Keep the machine in a dry indoor environment.
If storing the machine outdoors is unavoidable, store it on a wooden pallet.
 - Keep the exposed area of the piston rod of the cylinder covered.
 - Bring the attachments right down to the ground, and keep the wheels and the track immobile by placing wheel chocks.



Regular lubrication (during storage)

- Breaking the lubrication film on parts may cause abnormal abrasion during the next operation.
- Start up the engine once a month, perform all of the functions, and apply lubrication oil to every part.
- Check the level of the engine oil and coolant when starting the engine up, and top them up if necessary.
- Thoroughly wipe off any rust-proofing oil from the cylinder and piston rod.
- Sufficiently warm up the engine after starting the engine and repeat the operation of the attachments several times to wear in the parts sufficiently.
- Fully charge and store the battery.
- Store the battery separately for a long period of time under extremely cold weather conditions.
- Check the tire pressure.
- The machine shall not be lubricated manually while it is in motion where application of the lubricant may expose persons to injury.



Visibility

Before you start the machine, perform a walk-around inspection in order to ensure that there are no hazards around the machine.

While the machine is in operation, constantly survey the area around the machine in order to identify potential hazards as hazards become visible around the machine.

Your machine may be equipped with visual aids. Some examples of visual aids are Closed Circuit Television(CCTV), AAVM(Advanced Around View Monitoring) and mirrors. Before operating the machine, ensure that the visual aids are in proper working condition and that the visual aids are clean.

If may not be possible to provide direct visibility on large machines to all areas around the machine, appropriate job site organization is required in order to minimize hazards that are caused by restricted visibility. Job site organization is a collection of rules and procedures that coordinates machines and people that work together in the same area.

Examples of job site organization include the following:

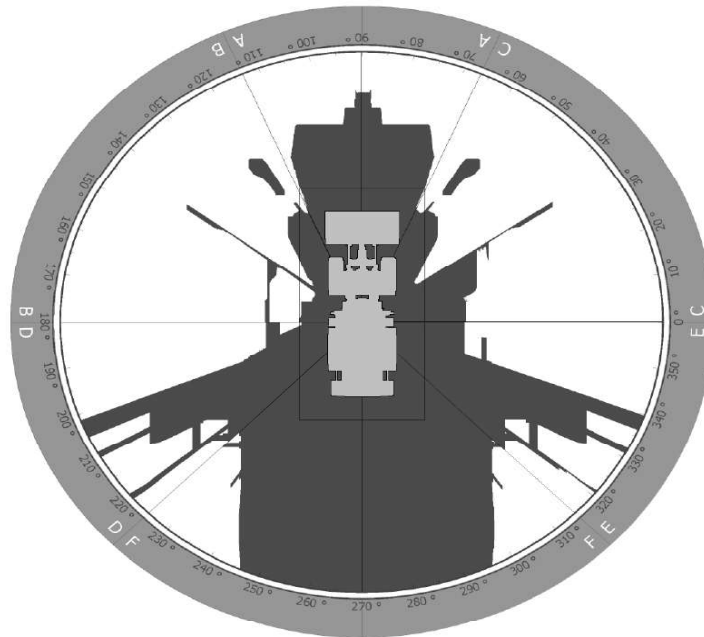
- Safety instructions
- Controlled patterns of machine movement and vehicle movement
- Workers that direct traffic to move when it is safe
- Restricted areas
- Operator training
- Warning symbols or warning signs on machines or on vehicles
- A system of communication
- Communication between workers and operators prior to approaching the machine

Modifications of the machine configuration by the user could result in a restriction of the machine visibility. In this case, a new risk assessment shall be performed according to ISO 5006:2017.

Restricted Visibility

The size and the configuration of this machine may result in areas that can not be seen when the operator is seated. The following illustration of visual map provides an approximate visual indication of areas of significant restricted visibility. This illustration indicates restricted visibility areas at ground level inside a radius of 12.00m (40 ft) from the operator on a machine only with the use of right side mirror and left side mirror installed. (without the use of optional visual aids.) This illustration provide areas of restricted visibility for distances outside a radius of 12.00m (40 ft).

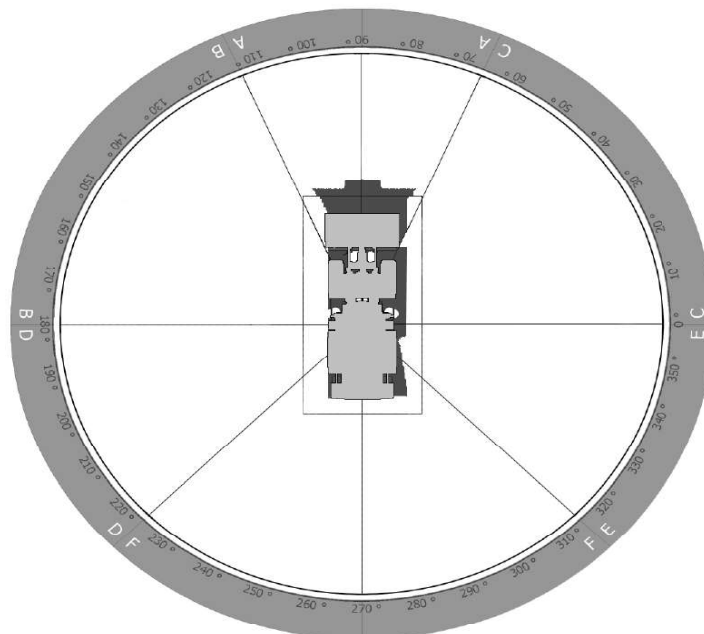
This machine may be equipped with optional visual aids (CCTV or AAVM) that may provide visibility to some of the restricted visibility areas. For areas that are not covered by the optional visual aids, the job site organization must be utilized to minimize hazards of this restricted visibility.



< Top view of the machine at ground level visibility without use of optional visual aids >

- ✱ The shaded areas indicate the approximate location of areas with significant restricted visibility.
(Radius = 12 m / 34 ft)

There is restricted visibility to the area directly behind the machine with no optional visual aids. Failure to make sure the area is clear could result in serious injury or death. Make sure that the area is clear with the other person on the ground before you start the reverse movement.

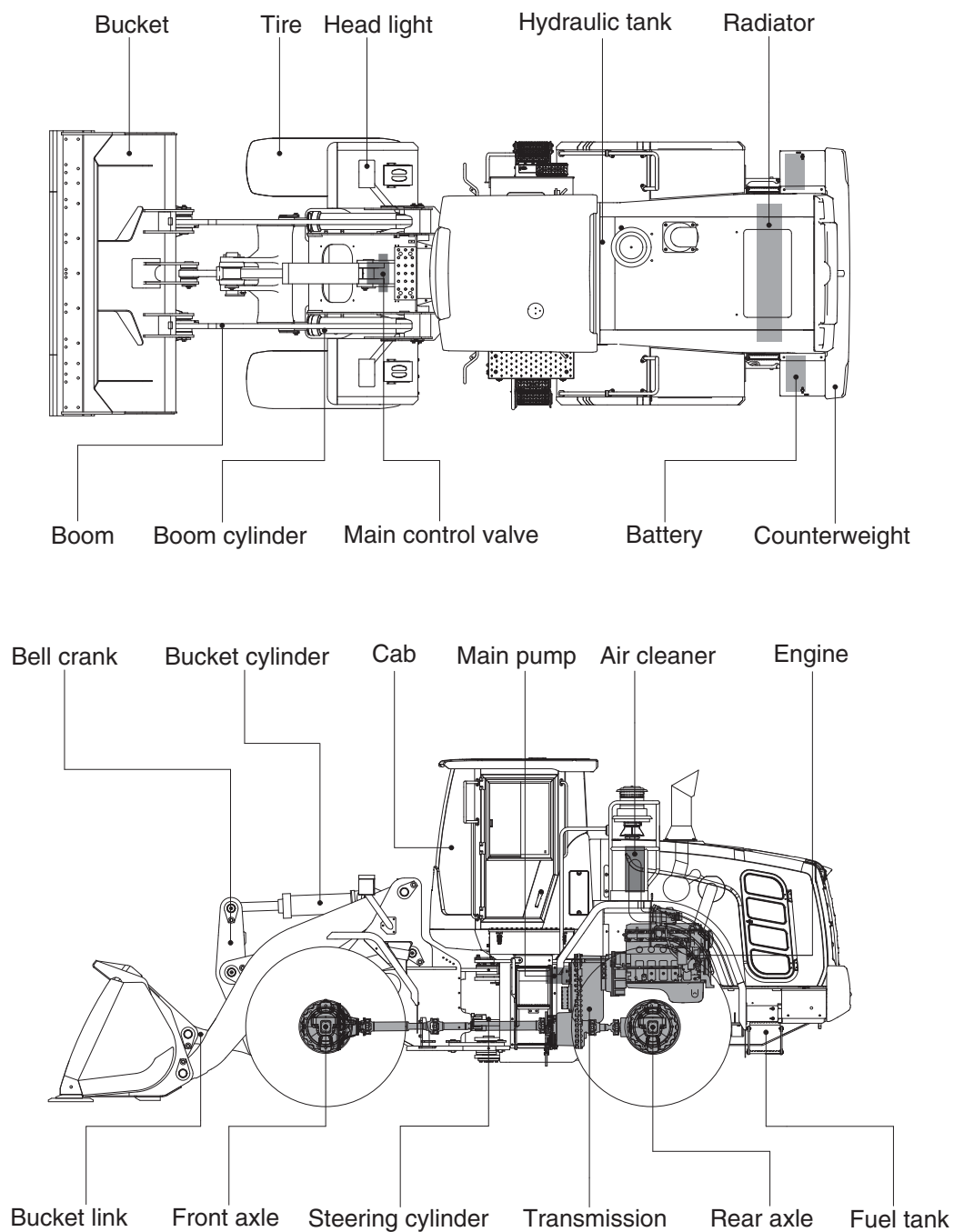


< Top view of the machine at ground level visibility with use of optional visual aids >

- ✱ The shaded areas indicate the approximate location of areas with significant restricted visibility.
(Radius = 12 m / 34 ft)

2. SPECIFICATIONS

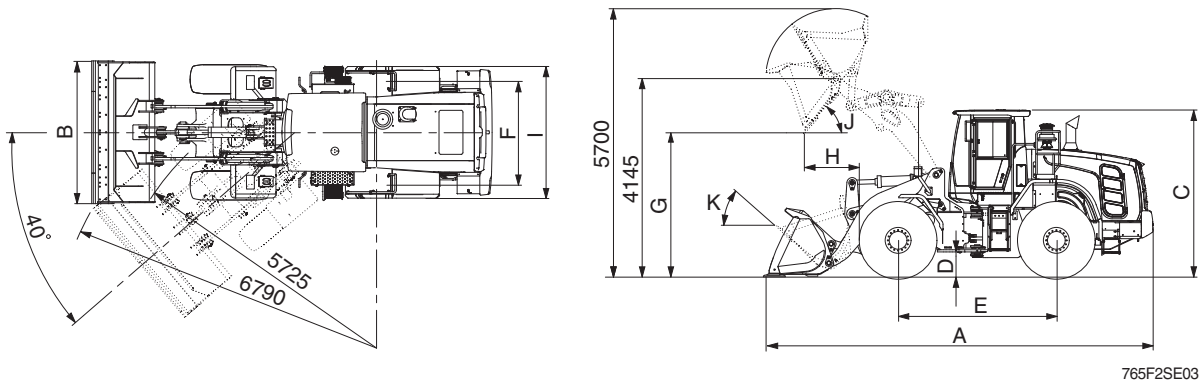
1. MAJOR COMPONENTS



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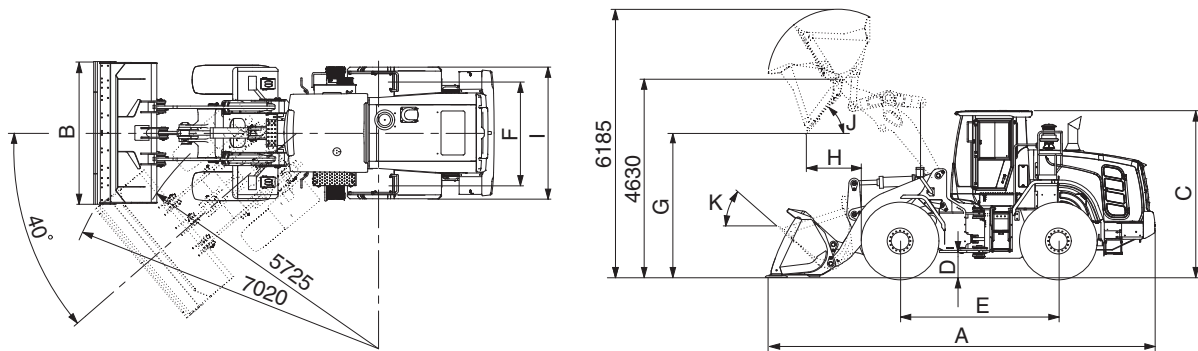
2. SPECIFICATIONS

1) WITH BOLT-ON CUTTING EDGE TYPE BUCKET (HL965)



| Description | | | Unit | Specification |
|---|------------------|-------------|-------------|----------------|
| Operating weight | | | kg (lb) | 20100 (44315) |
| Bucket capacity | Struck | | m³ (yd³) | 3.1 (4.05) |
| | Heaped | | | 3.6 (4.71) |
| Overall length | A | | mm (ft-in) | 8280 (27' 2") |
| Overall width | B | | | 3000 (9' 10") |
| Overall height | C | | | 3450 (11' 4") |
| Ground clearance | D | | | 410 (1' 4") |
| Wheelbase | E | | | 3300 (10' 10") |
| Tread | F | | | 2160 (7' 1") |
| Dump clearance at 45° | G | | | 2955 (9' 8") |
| Dump reach (full lift) | H | | | 1400 (4' 7") |
| Width over tires | I | | | 2770 (9' 1") |
| Dump angle | J | | degree (°) | 50 |
| Roll back angle (carry position) | K | | | 47 |
| Cycle time | Lift (with load) | | sec | 5.8 |
| | Dump (with load) | | | 1.4 |
| | Lower (empty) | | | 3.1 |
| Maximum travel speed | | | km/hr (mph) | 37.4 (23.2) |
| Braking distance | | | m (ft-in) | 11.6 (38' 1") |
| Minimum turning radius (center of outside tire) | | | | 5.725 (17' 9") |
| Gradeability | | | degree (°) | 30 |
| Breakout force | | | kg (lb) | 17400 (38360) |
| Travel speed | Forward | First gear | km/hr (mph) | 6.0 (3.7) |
| | | Second gear | | 11.4 (7.1) |
| | | Third gear | | 22.9 (14.2) |
| | | Fourth gear | | 37.4 (23.2) |
| | Reverse | First gear | | 6.3 (3.9) |
| | | Second gear | | 12.0 (7.4) |
| | | Third gear | | 24.2 (15.0) |

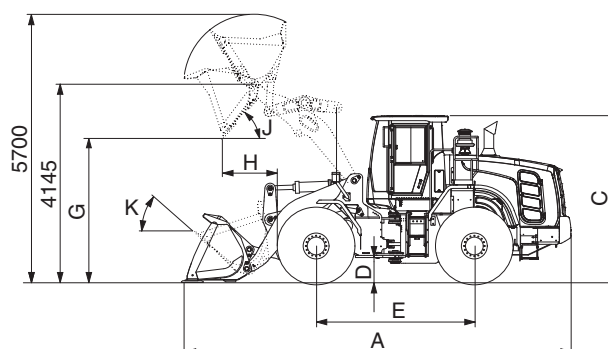
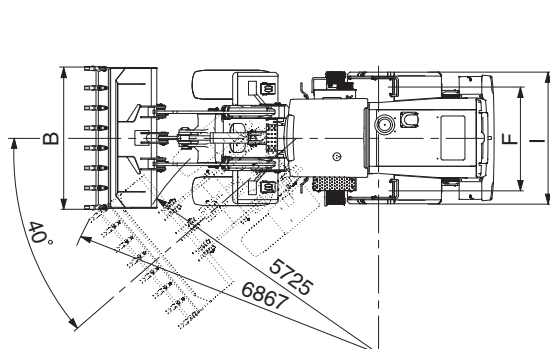
WITH BOLT-ON CUTTING EDGE TYPE BUCKET (HL965 XT)



9652SE03-1

| Description | | | Unit | Specification |
|---|------------------|-------------|-------------|----------------|
| Operating weight | | | kg (lb) | 20960 (46210) |
| Bucket capacity | Struck | | m³ (yd³) | 3.1 (4.05) |
| | Heaped | | | 3.6 (4.71) |
| Overall length | A | | mm (ft-in) | 8850 (29' 0") |
| Overall width | B | | | 3000 (9' 10") |
| Overall height | C | | | 3450 (11' 4") |
| Ground clearance | D | | | 410 (1' 4") |
| Wheelbase | E | | | 3300 (10' 10") |
| Tread | F | | | 2160 (7' 1") |
| Dump clearance at 45° | G | | | 3440 (11' 3") |
| Dump reach (full lift) | H | | | 1455 (4' 9") |
| Width over tires | I | | | 2770 (9' 1") |
| Dump angle | J | | | degree (°) |
| Roll back angle (carry position) | K | | 49 | |
| Cycle time | Lift (with load) | | sec | 5.8 |
| | Dump (with load) | | | 1.4 |
| | Lower (empty) | | | 3.1 |
| Maximum travel speed | | | km/hr (mph) | 37.4 (23.2) |
| Braking distance | | | m (ft-in) | 11.6 (38' 1") |
| Minimum turning radius (center of outside tire) | | | | 5.725 (17' 9") |
| Gradeability | | | degree (°) | 30 |
| Breakout force | | | kg (lb) | 17265 (38060) |
| Travel speed | Forward | First gear | km/hr (mph) | 6.0 (3.7) |
| | | Second gear | | 11.4 (7.1) |
| | | Third gear | | 22.9 (14.2) |
| | | Fourth gear | | 37.4 (23.2) |
| | Reverse | First gear | | 6.3 (3.9) |
| | | Second gear | | 12.0 (7.4) |
| | | Third gear | | 24.2 (15.0) |

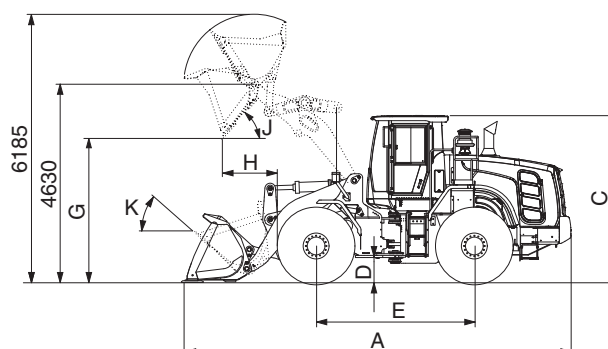
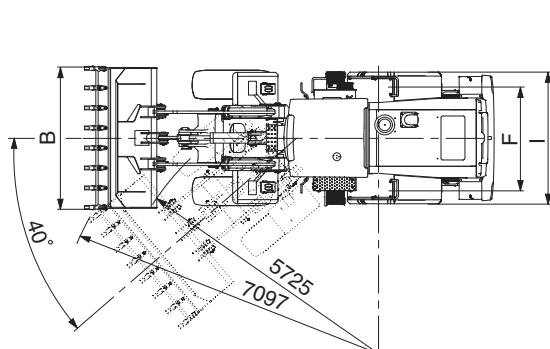
2) WITH TOOTH TYPE BUCKET (HL965)



9652SE02

| Description | | | Unit | Specification |
|---|------------------|-------------|-------------|----------------|
| Operating weight | | | kg (lb) | 20015 (44125) |
| Bucket capacity | Struck | | m³ (yd³) | 2.9 (3.8) |
| | Heaped | | | 3.4 (4.45) |
| Overall length | A | | mm (ft-in) | 8430 (27' 7") |
| Overall width | B | | | 3050 (10' 0") |
| Overall height | C | | | 3450 (11' 4") |
| Ground clearance | D | | | 410 (1' 4") |
| Wheelbase | E | | | 3300 (10' 10") |
| Tread | F | | | 2160 (7' 1") |
| Dump clearance at 45° | G | | | 2830 (9' 3") |
| Dump reach (full lift) | H | | | 1485 (4' 10") |
| Width over tires | I | | | 2770 (9' 1") |
| Dump angle | J | | | degree (°) |
| Roll back angle (carry position) | K | | 47 | |
| Cycle time | Lift (with load) | | sec | 5.8 |
| | Dump (with load) | | | 1.4 |
| | Lower (empty) | | | 3.1 |
| Maximum travel speed | | | km/hr (mph) | 37.4 (23.2) |
| Braking distance | | | m (ft-in) | 11.6 (38' 1") |
| Minimum turning radius (center of outside tire) | | | | 5.725 (17' 9") |
| Gradeability | | | degree (°) | 30 |
| Breakout force | | | kg (lb) | 18465 (40710) |
| Travel speed | Forward | First gear | km/hr (mph) | 6.0 (3.7) |
| | | Second gear | | 11.4 (7.1) |
| | | Third gear | | 22.9 (14.2) |
| | | Fourth gear | | 37.4 (23.2) |
| | Reverse | First gear | | 6.3 (3.9) |
| | | Second gear | | 12.0 (7.4) |
| | | Third gear | | 24.2 (15.0) |

WITH TOOTH TYPE BUCKET (HL965 XT)



9652SE02-1

| Description | | | Unit | Specification |
|---|------------------|-------------|-------------|----------------|
| Operating weight | | | kg (lb) | 20875 (46020) |
| Bucket capacity | Struck | | m³ (yd³) | 2.9 (3.8) |
| | Heaped | | | 3.4 (4.45) |
| Overall length | A | | mm (ft-in) | 9000 (29' 6") |
| Overall width | B | | | 3050 (10' 0") |
| Overall height | C | | | 3450 (11' 4") |
| Ground clearance | D | | | 410 (1' 4") |
| Wheelbase | E | | | 3300 (10' 10") |
| Tread | F | | | 2160 (7' 1") |
| Dump clearance at 45° | G | | | 3315 (10' 10") |
| Dump reach (full lift) | H | | | 1540 (5' 1") |
| Width over tires | I | | | 2770 (9' 1") |
| Dump angle | J | | | degree (°) |
| Roll back angle (carry position) | K | | 49 | |
| Cycle time | Lift (with load) | | sec | 5.8 |
| | Dump (with load) | | | 1.4 |
| | Lower (empty) | | | 3.1 |
| Maximum travel speed | | | km/hr (mph) | 37.4 (23.2) |
| Braking distance | | | m (ft-in) | 11.6 (38' 1") |
| Minimum turning radius (center of outside tire) | | | | 5.725 (17' 9") |
| Gradeability | | | degree (°) | 30 |
| Breakout force | | | kg (lb) | 18330 (40410) |
| Travel speed | Forward | First gear | km/hr (mph) | 6.0 (3.7) |
| | | Second gear | | 11.4 (7.1) |
| | | Third gear | | 22.9 (14.2) |
| | | Fourth gear | | 37.4 (23.2) |
| | Reverse | First gear | | 6.3 (3.9) |
| | | Second gear | | 12.0 (7.4) |
| | | Third gear | | 24.2 (15.0) |

3. WEIGHT

| Item | | kg | lb |
|--|----------|---------|-----------|
| Front frame assembly | | 1650 | 3640 |
| Rear frame assembly | | 2010 | 4430 |
| Front fender (LH & RH) | | 64 | 143 |
| Counterweight | HL965 | 1075 | 2370 |
| | HL965 XT | 1705 | 3759 |
| Cab assembly | | 1070 | 2360 |
| Engine assembly | | 708 | 1561 |
| Transmission assembly (4-speed/5-speed) | | 535/560 | 1180/1230 |
| Drive shaft (front) | | 28 | 61 |
| Drive shaft (center) | | 23 | 51 |
| Drive shaft (rear) | | 17 | 37 |
| Front axle (include differential) | | 1200 | 2650 |
| Rear axle (include differential) | | 1090 | 2400 |
| Tire (23.5 R25, ★ L3) | | 330 | 728 |
| Hydraulic tank assembly | | 166 | 366 |
| Fuel tank assembly | | 365 | 805 |
| Main pump assembly | | 68 | 150 |
| Brake pump assembly | | 12 | 26 |
| Main control valve (2/3 spool) | | 68/81 | 150/179 |
| Steering valve (EHPS) | | 10 | 22 |
| Boom assembly | HL965 | 1275 | 2810 |
| | HL965 XT | 1495 | 3295 |
| Bell crank assembly | | 365 | 805 |
| Bucket link | | 63 | 140 |
| 3.6 m³ bucket, with bolt on cutting edge | | 1895 | 4180 |
| 3.4 m³ bucket, with tooth | | 1810 | 3990 |
| Boom cylinder assembly | | 171 | 377 |
| Bucket cylinder assembly (HL965) | | 163 | 359 |
| Bucket cylinder assembly (HL965 XT) | | 181 | 399 |
| Steering cylinder assembly | | 29 | 64 |
| Seat | | 80 | 176 |
| Battery | | 44 | 97 |

4. SPECIFICATION FOR MAJOR COMPONENTS

1) ENGINE

| Item | Specification |
|-------------------------------------|---|
| Model | Cummins QSL9 |
| Type | 4-cycle turbocharged, charge air cooled diesel engine |
| Control type | Electronic control |
| Cooling method | Water cooling |
| Number of cylinders and arrangement | 6 cylinders, in-line |
| Firing order | 1-5-3-6-2-4 |
| Combustion chamber type | Direct injection type |
| Cylinder bore × stroke | 114 × 145 mm (4.5" × 5.7") |
| Piston displacement | 8900 cc (543 cu in) |
| Compression ratio | 17.8 : 1 |
| Rated horse power (Gross) | 272 hp at 2100 rpm |
| Maximum torque (1400 rpm) | 148 kgf · m (1070 lbf · ft) |
| Engine oil quantity | 19 l (5.0 U.S. gal) |
| Wet weight | 708 kg (1560 lb) |
| High idling speed | 2130 ± 50 rpm |
| Low idling speed | 800 ± 25 rpm |
| Rated fuel consumption (at rated) | 226 g/kW · hr |
| Starting motor | Denso PA90L (24V-7.8kW) |
| Alternator | Denso, 24V-95Amp |
| Battery | 2 × 12V × 200Ah |

2) MAIN PUMP

| Item | Specification | |
|----------------------------|------------------------------------|---------------------------|
| | Steering | Loader |
| Type | Variable piston pump | |
| Capacity | 60 cc/rev | 70 cc/rev |
| Maximum operating pressure | 280 kgf/cm ² (3980 psi) | |
| Rated oil quantity | 115 l /min (30.4 U.S.gpm) | 134 l /min (35.4 U.S.gpm) |
| Maximum speed | 2130 rpm | |

3) FAN AND BRAKE PUMP

| Item | Specification |
|----------------------------|------------------------------------|
| Type | Variable piston pump |
| Capacity | 28 cc/rev |
| Maximum operating pressure | 250 kgf/cm ² (3560 psi) |
| Rated oil quantity | 54 l /min (14.3 U.S.gpm) |
| Maximum speed | 2130 rpm |

4) MAIN CONTROL VALVE

| Item | Specification |
|--------------------------------|--|
| Type | 2 spool |
| Operating method | Hydraulic pilot assist |
| System pressure | 280 kgf/cm ² (3980 psi) |
| Overload relief valve pressure | 340 kgf/cm ² (4840 psi) / *300 kgf/cm ² (4270 psi) |

* : Bucket dump

5) ELECTRO-HYDRAULIC BLOCK

| Item | Specification |
|-----------------|--------------------------------------|
| Type | Proportional pressure reducing valve |
| Control current | 0~950 mA |
| Resistance | 10.5 Ω |
| Normal flow | 12 l /min (3.17 U.S.gpm) |

6) REMOTE CONTROL VALVE (EH TYPE)

| Item | Specification |
|-------------------|---|
| Type | Fingertip |
| Axle | Single axle for boom, bucket, auxiliary |
| Operating voltage | 4.5~5.5 V |
| Output signal | 0.5~4.5 V (neutral 2.5 V) |

7) REMOTE CONTROL VALVE (FNR TYPE)

| Item | Specification |
|----------------|---|
| Type | Joystick |
| Axle | Two axle for boom, bucket, roller for auxiliary |
| Operating type | CAN J1939 |
| Baud rate | 500 Kbps |

8) CYLINDER

| Item | Specification |
|-------------------|--|
| Boom cylinder | Bore dia × Rod dia × Stroke ø 140 × ø 80 × 785 mm |
| Bucket cylinder | Bore dia × Rod dia × Stroke ø 160 × ø 85 × 560 mm |
| Steering cylinder | Bore dia × Rod dia × Stroke ø 75 × ø 45 × 424 mm |

9) DYNAMIC POWER TRANSMISSION DEVICES

| Item | | | Specification |
|----------------------------|-----------------|-------------------|--|
| 4-speed transmission (std) | Model | | ZF 4WG 210 |
| | Type | Converter | Single-stage, single-phase |
| | | Transmission | Full-automatic power shift |
| | Gear shift | | Forward fourth gear, reverse third gear |
| | Control | | Electrical single lever type, kick-down system |
| | Travel speed | | See the page 2-2. |
| 5-speed transmission (opt) | Model | | ZF 5WG210 |
| | Type | Converter | Single-stage, double-phase (with lock up clutch) |
| | | Transmission | Full-automatic power shift |
| | Gear shift | | Forward fifth gear, reverse third gear |
| | Control | | Electrical single lever type, kick-down system |
| | Travel speed | Forward 1/2/3/4/5 | 6.3 / 11.1 / 17.1 / 26.6 / 40.0 km/hr |
| | | Reverse 1/2/3 | 6.7 / 11.7 / 28.0 km/hr |
| Axle | Drive devices | | 4-wheel drive |
| | Front | | Front fixed location |
| | Rear | | Oscillation ± 12° of center pin-loaded |
| Wheels | Tires | | 23.5 R25, ★(L3) |
| Brakes | Travel | | Four-wheel, wet-disc type, full hydraulic |
| | Parking | | Spring applied, hydraulic released brake on transmission |
| Steering | Type | | Full hydraulic, articulated |
| | Steering angle | | 40° to both right and left angle, respectively |
| | Relief pressure | | 235 kgf/cm² (3340 psi) |

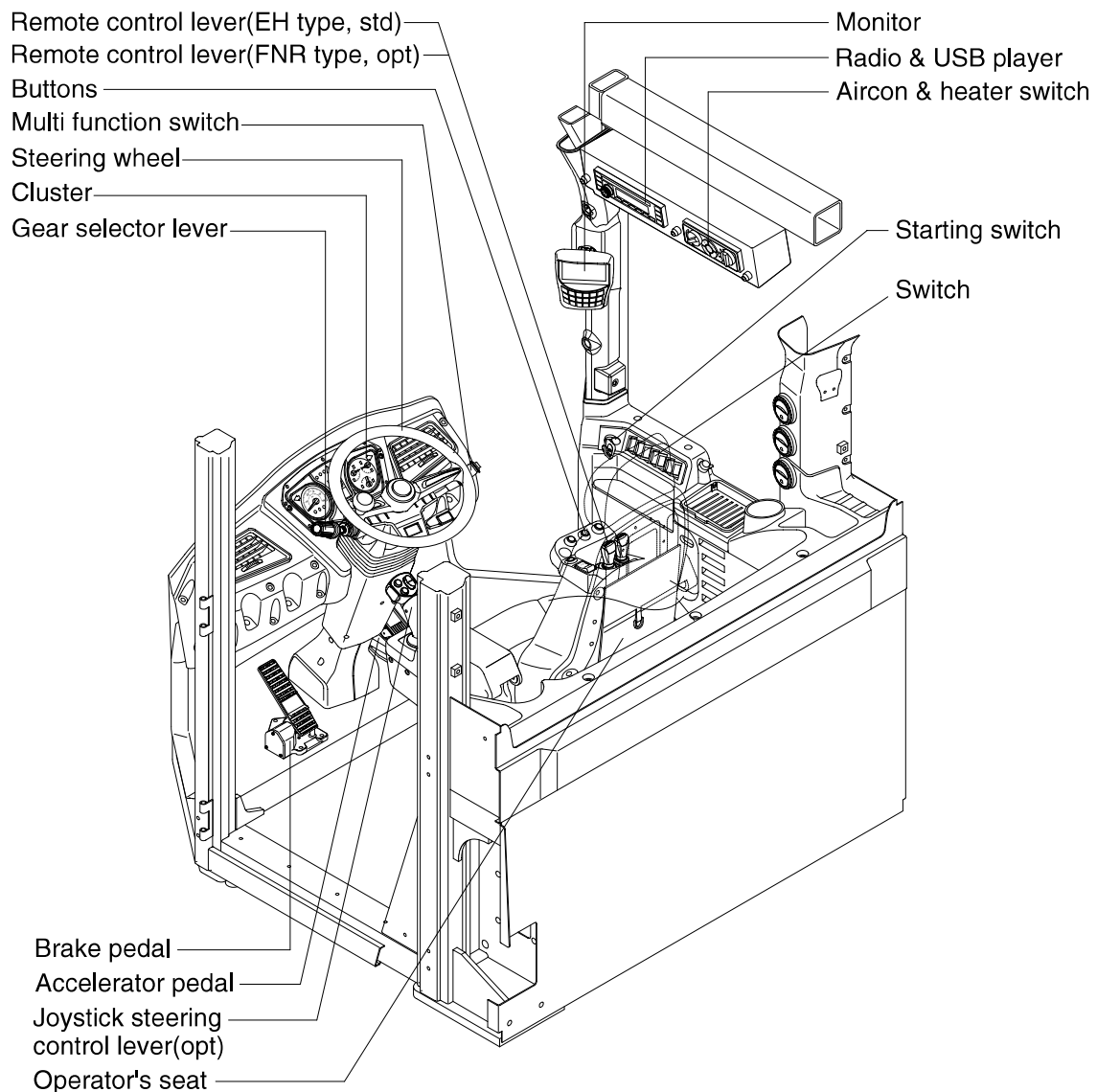
3. CONTROL DEVICES

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.



760F3CD01

2. CLUSTER

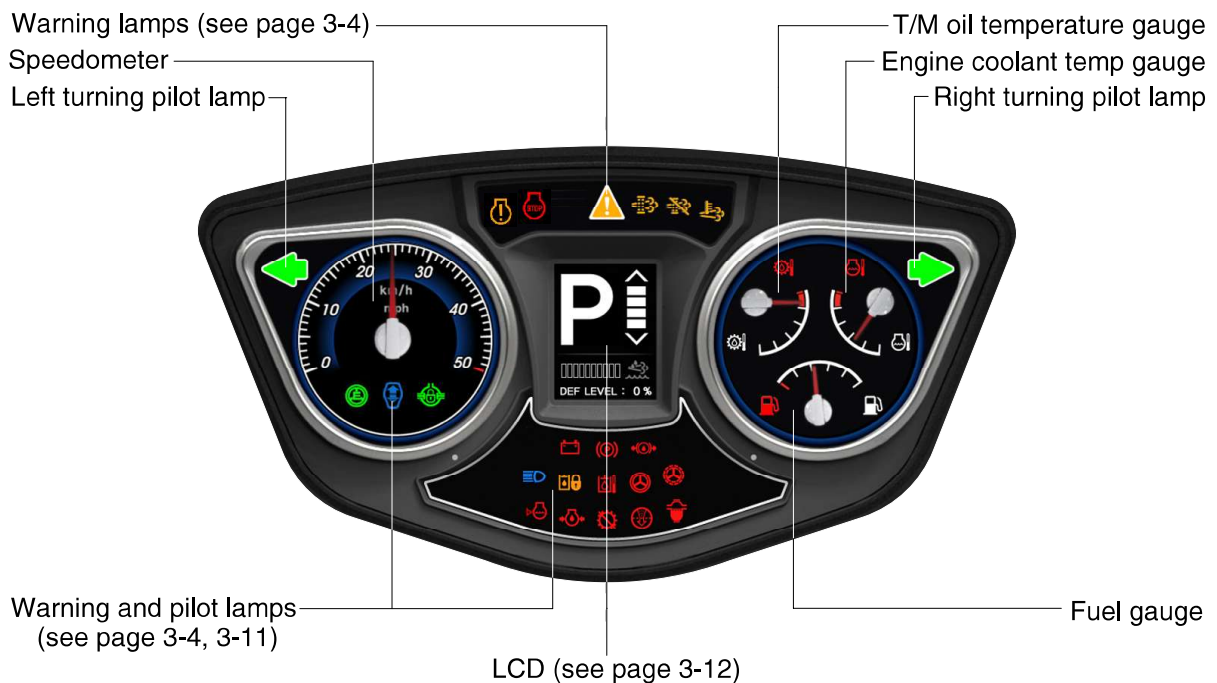
1) STRUCTURE

The cluster consists of gauges, lamps and LCD 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 lamps : Indicate abnormality of the machine.
- Pilot lamps : Indicate operating status of the machine.
- LCD : Indicates selected the driving speed and direction.

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

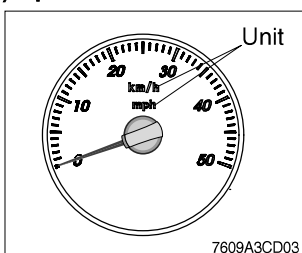
※ When the cluster provides a warning immediately check the problem, and perform the required action.



760F3CD02

2) GAUGE

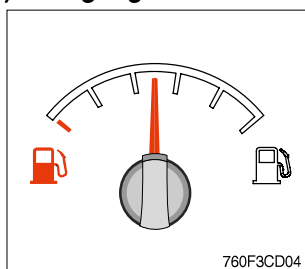
(1) Speedometer




① The speedometer displays the speed of machine in mph and km/h.

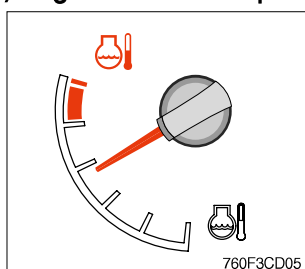
※ The unit (km/h or mph) can be set by the display set up menu of the monitor and selected unit is displayed.
Refer to page 3-33.


(2) Fuel gauge



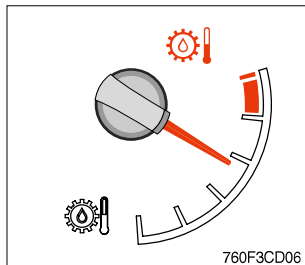
- ① This gauge indicates the amount of fuel in the fuel tank.
- ② Fill the fuel when the indicator moves red range or  lamp blinks in red, refuel as soon as possible to avoid running out of fuel.
- ※ If the gauge indicates red range even though the machine is on the normal condition, check the electric device as that can be caused by the poor connection of electricity or sensor.


(3) Engine coolant temperature gauge



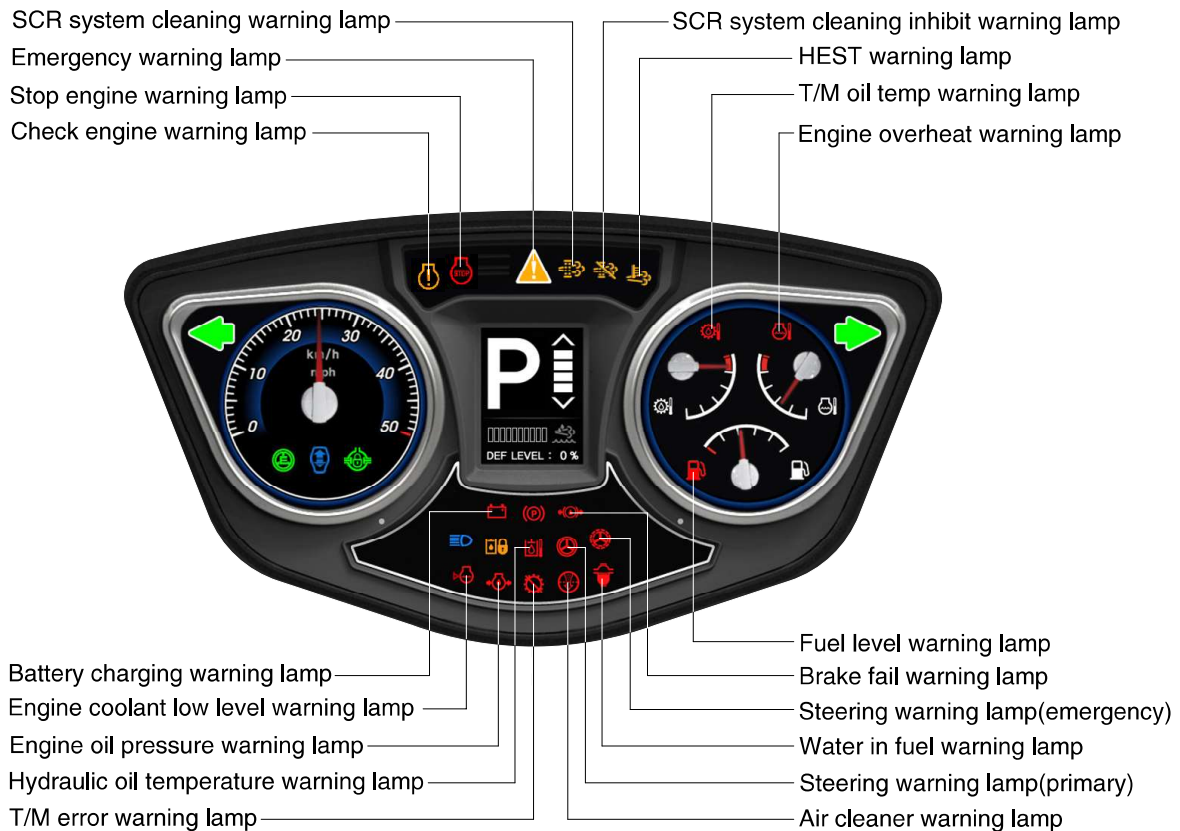
- ① This gauge indicates the temperature of coolant.
 - White range : 40~105°C (104~221°F)
 - Red range : Above 105°C (221°F)
- ② If the indicator is in the red range or  lamp blinks in red, turn OFF the engine and check the radiator and engine.
- ※ If the gauge indicates red range even though the machine is on the normal condition, check the electric device as that can be caused by the poor connection of electricity or sensor.

(4) Transmission oil temperature gauge



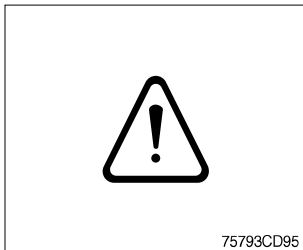
- ① This gauge indicates the temperature of transmission oil.
 - White range : 40~107°C (104~225°F)
 - Red range : Above 107°C (225°F)
- ② If the indicator is in the red range or  lamp blinks in red, it means the transmission is overheated. Be careful that the indicator does not move into the red range.
- ※ If the gauge indicates red range 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) WARNING LAMPS



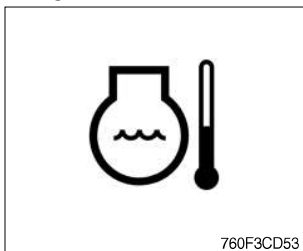
760F3CD09

(1) Emergency warning lamp



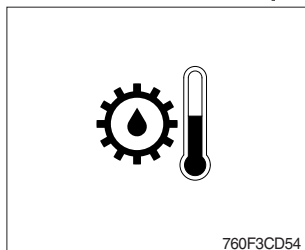
- ① This lamp blinks when each of the below warnings is happened.
 - Warning lamps light ON
 - MCU input voltage abnormal
 - Monitor communication data error
 - Engine ECM and TCU communication data error
- ② When this warning lamp blinks, machine must be checked and service immediately.

(2) Engine overheat warning lamp



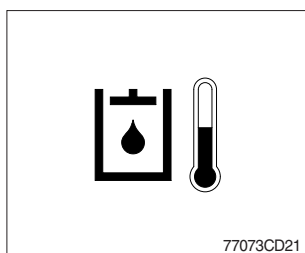
- ① This lamp is turned ON when the temperature of coolant is over the normal temperature (105°C, 221°F).
- ② Check the cooling system when the lamp is ON.


(3) Transmission oil temperature warning lamp



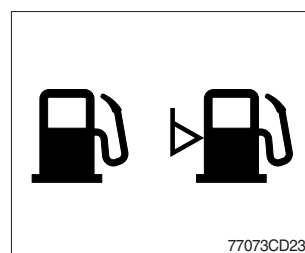
- ① This lamp is turned ON when the temperature of transmission oil is over the normal temperature (107°C, 225°F).
- ② When this lamp lights up during operation, stop the engine and check the machine.

(4) Hydraulic oil temperature warning lamp



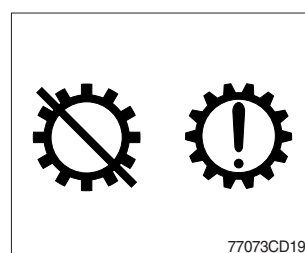
- ① This warning lamp operates and the buzzer sounds when the temperature of hydraulic oil is over 106°C (223°F).
 - ② Check the hydraulic oil level when the lamp is turned ON and the buzzer sounds.
 - ③ Check for debris between oil cooler and radiator.
- ※ If you want to stop buzzer sound, just touch the  icon.

(5) Fuel level warning lamp



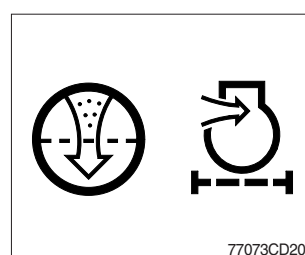
- ① This warning lamp lights ON when the fuel level is low. Refuel the machine as soon as possible.


(6) Transmission error warning lamp



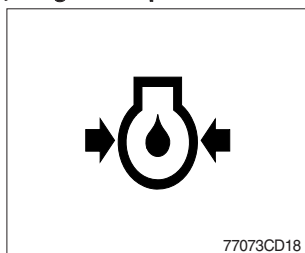
- ① This lamp lights ON and the LCD display show the error codes when an error occurs in the transmission.
 - ② Immediately pull the machine to a convenient stop. Stop the engine. Investigate the cause.
- ※ Consult a HYUNDAI dealer to investigate the cause.
- ※ Do not operate until the cause has been corrected.


(7) Air cleaner warning lamp



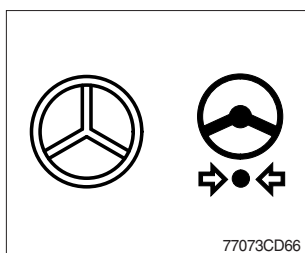
- ① This lamp lights ON and the buzzer sounds when the filter of air cleaner is clogged.
 - ② When the air cleaner warning lamp is ON and the buzzer sounds, check and clean the primary element.
- ※ If you want to stop buzzer sound, just touch the  icon.
- ※ The primary element should be replaced if the warning lamp is ON after installation of a clean primary element.
- ※ Replace the primary element after 4 times cleanings.

(8) Engine oil pressure warning lamp




- ① This lamp is comes ON and the buzzer sounds after starting the engine because of the low engine oil pressure.
- ② If the lamp comes ON and the buzzer sounds during engine operation, shut OFF engine immediately. Check engine oil level.
- ※ If you want to stop buzzer sound, just touch the  icon.

(9) Steering warning lamp



① Primary

This lamp indicates that the primary steering has failed. When the indicator comes ON and the action alarm sounds, steer the machine immediately to a convenient location and stop the machine. Stop the engine and investigate the cause.

- ※ If you want to stop buzzer sound, just touch the  icon.
- ※ Do not operate the machine until the cause has been corrected.

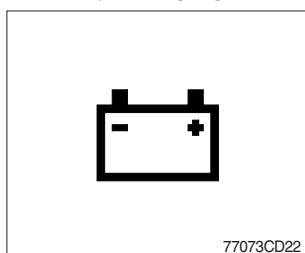



② Emergency

This lamp indicates the emergency steering system is active.

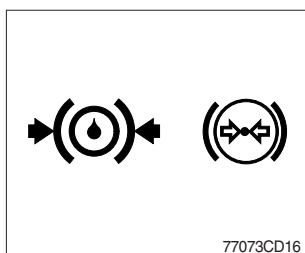
- ※ Immediately pull the machine to a convenient stop and stop the engine.
- ※ The emergency steering system can be manually tested. Refer to page 3-45.


(10) Battery charging warning lamp



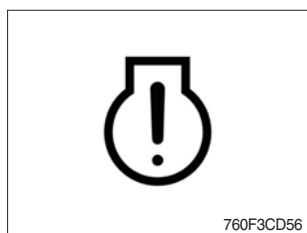
- ① This lamp is ON and the buzzer sounds when key ON, it is turned OFF after starting the engine.
- ② Check the battery charging circuit when this lamp comes ON and the buzzer sounds, during engine operation.
- ※ If you want to stop buzzer sound, just touch the  icon.

(11) Brake fail warning lamp



- ① The lamp lights ON and the buzzer sounds when the oil pressure of service brake drops below the normal range.
- ② When the lamp is ON and the buzzer sounds, stop the engine and check for its cause.
- ※ If you want to stop buzzer sound, just touch the  icon.
- ※ Do not operate until any problems are corrected.

(12) Check engine warning lamp



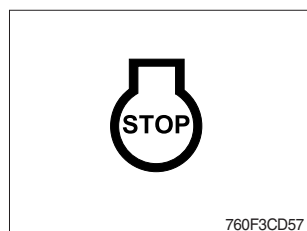
① This lamp lights ON and the buzzer sounds when the communication between MCU and engine ECM on the engine is abnormal, or if the cluster received specific fault code from engine ECM.

② Check the communication line between them.

If the communication line is OK, then check the fault codes on the monitor.

※ If you want to stop buzzer sound, just touch the  icon.

(13) Stop engine warning lamp



① This lamp lights ON when 30 minutes elapsed with empty condition of the DEF/AdBlue® tank, stop the engine immediately and check the DEF/AdBlue® tank.

② Fill the DEF/AdBlue® immediately in the DEF/AdBlue® tank.

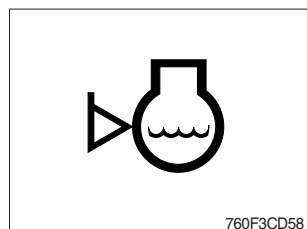
※ Refer to page 3-10.

③ This lamp lights ON when the stationary SCR system cleaning is not performed.

※ Refer to page 3-8.

※ Please contact your Hyundai service center or local dealer.

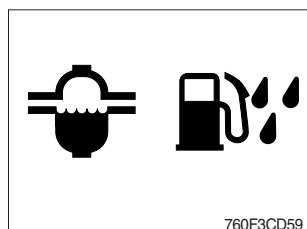
(14) Engine coolant low level warning lamp



① This warning lamp lights ON when the level of coolant is low.

② Fill the coolant immediately when the lamp is ON.

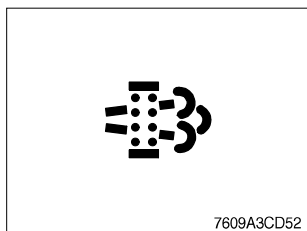
(15) Water in fuel warning lamp



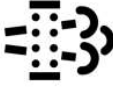


① This warning lamp lights ON when the water separator is full of water or malfunctioning.

※ When this lamp lights ON, stop the machine and spill water out of the separator.

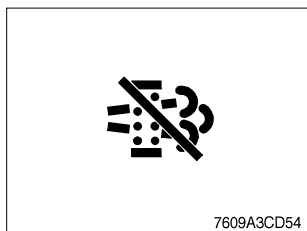
(16) SCR (selective catalytic reduction) system cleaning warning lamp



① This warning lamp lights ON or blinks when the SCR system cleaning is needed as table below.

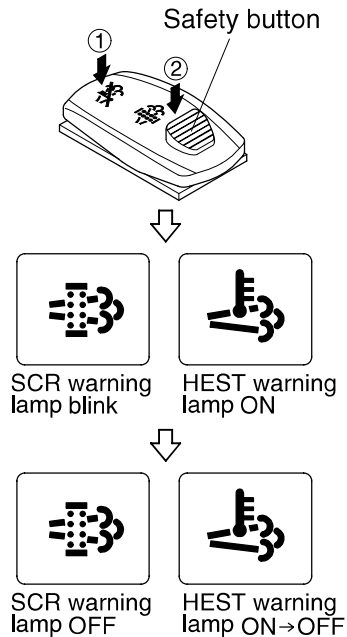
| Warning lamp | | | Description |
|---|---|---|--|
| SCR | Check engine | Stop engine | |
|  |  |  | |
| Off | Off | Off | · Automatic SCR system cleaning |
| Blink | Off | Off | · The status of a manual (stationary) SCR system cleaning when the SCR system cleaning switch has been activated. ※ Refer to page 3-9. |
| On | On | Off | · The aftertreatment SCR system needs to be cleaned immediately. · Engine power will be reduced automatically if action is not taken. ※ The SCR system cleaning can be accomplished by : - Changing to more challenge duty cycle. - Performing a manual SCR system cleaning. |
| On | On | On | · These lamps will be ON when a stationary (manual) SCR system cleaning is not performed. · Stop the engine immediately. · Please contact your Hyundai service center or local dealer. |

(17) SCR system cleaning inhibit warning lamp



① This warning lamp indicates, when illuminated, the SCR system cleaning switch is pushed inhibit position, therefore automatic and manual SCR system cleaning can not occur.
※ Refer to the page 3-46 for the SCR system cleaning switch.

※ Manual SCR system cleaning



760F3CD129

※ Manual SCR system cleaning applies if the machine is in a fireproof area.

※ To stop a manual SCR system cleaning before it has completed, set to the SCR system cleaning switch to the inhibit position or turn OFF the engine.

① Stop and park the machine.

② Pull the safety button and push the switch to position ② to initiate the manual SCR system cleaning.

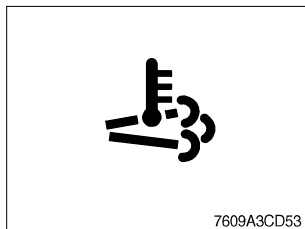
※ Refer to the page 3-46 for the SCR system cleaning switch operation.

※ The engine speed may increase to 950~1050 rpm and SCR system cleaning begins and it will take approximately 20~60 minutes.

③ The SCR system cleaning warning lamp will blink and HEST warning lamp will light ON during the SCR system cleaning is operating.

④ The SCR system cleaning and/or HEST warning lamp will light OFF when the SCR system cleaning is completed.

(18) HEST (High exhaust system temperature) warning lamp



① This warning lamp indicates, when illuminated, that exhaust temperatures are high due to SCR system cleaning.

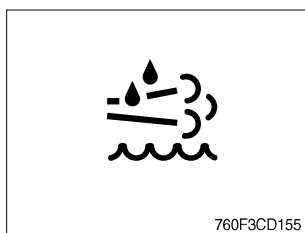
② The lamp will also illuminate during a manual SCR system cleaning.

③ When this lamp is illuminated, be sure the exhaust pipe outlet is not directed at any surface or material that can melt, burn, or explode.

⚠ When this lamp is illuminated, the exhaust gas temperature could reach 800°C [1500°F], which is hot enough to ignite or melt common materials, and to burn people.

※ The lamp does not signify the need for any kind of equipment or engine service; It merely alerts the equipment operator to high exhaust temperatures. It will be common for the lamp to illuminate on and off during normal equipment operation as the engine completes SCR system cleaning.

(19) DEF/AdBlue® level warning lamp

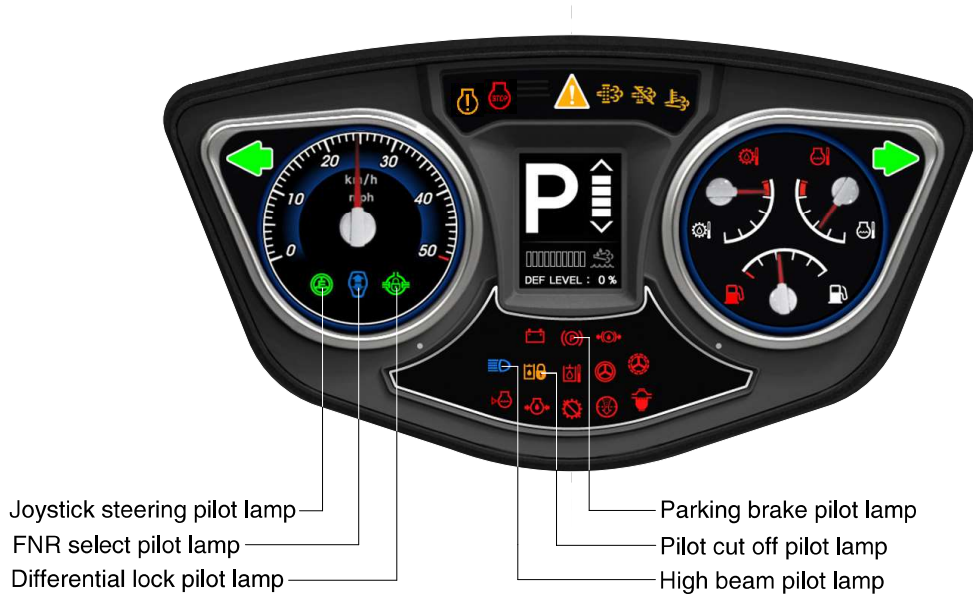


① This warning lamp indicates when ON or blinking, that the DEF/AdBlue® level is low as table below.

※ It is recommended that the DEF/AdBlue® tank be filled completely full of the DEF/AdBlue® in order to correct any fault conditions.

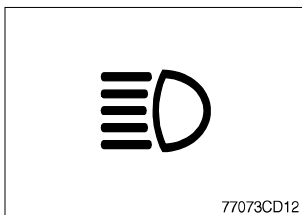
| Warning lamp | | | Description |
|-------------------|--------------|-------------|--|
| DEF/AdBlue® level | Check engine | Stop engine | |
| | | | |
| On | Off | Off | <ul style="list-style-type: none"> The DEF/AdBlue® level has fallen below the initial warning level (10%). |
| Blink | Off | Off | <ul style="list-style-type: none"> The DEF/AdBlue® level has fallen below the critical warning level (5%). |
| Blink | On | Off | <ul style="list-style-type: none"> The DEF/AdBlue® level has fallen below the initial derate level (2.5%). The engine power will be limited automatically. |
| Blink | On | On | <ul style="list-style-type: none"> This is happened when 30 minutes elapsed with empty conditions (0%) of the DEF/AdBlue® tank. The engine will enter the final derate level which may include low idle lock or engine shutdown with restart limitations. In order to remove the final derate, the DEF/AdBlue® tank must be filled to above 10 percent gauge reading. |

4) PILOT LAMPS



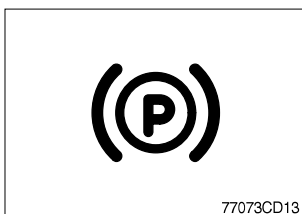
760F3CD10

(1) High beam pilot lamp



- ① This lamp works when the illuminating direction is upward.
- ② This lamp comes ON when the dimmer switch is operated, e.g., when passing another vehicle.

(2) Parking brake pilot lamp



- ① When the parking brake is actuated, the lamp lights ON.
- ※ Check the lamp is OFF before driving.

(3) FNR select pilot lamp (option)



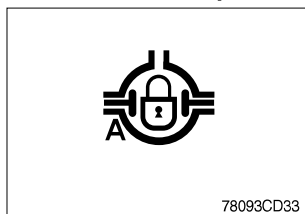
- ① The lamp comes ON when FNR select button on the optional FNR remote control lever is pressed.
- ※ Refer to page 3-47.

(4) Joystick steering pilot lamp (option)



- ① This lamp lights ON when joystick steering is activated. It is then possible to steer the machine and select gears from the armrest to the left of the operator's seat.
- ※ Refer to page 3-51.

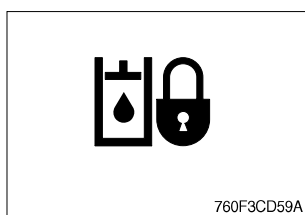
(5) Differential lock pilot lamp (option)



① This lamp lights ON when the differential lock function is operating.

※ Refer to page 3-45.

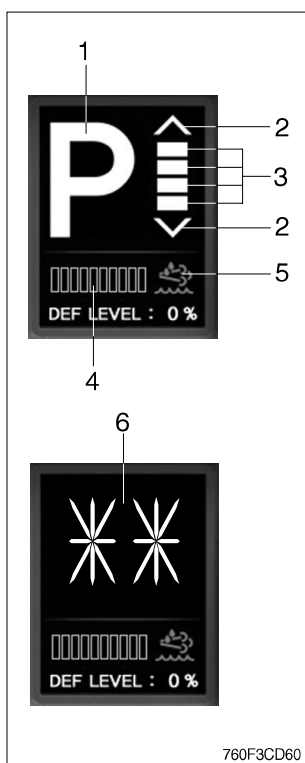
(6) Pilot cut off pilot lamp



① This lamp lights ON when the pilot cut off switch is pressed.

※ Refer to page 3-45.

5) LCD



(1) The LCD can be used with the gear selector.

It indicates speed, driving direction, DEF/AdBlue® level and transmission warning.

| No | Symbol | Meaning | Remark |
|----|---------------|--|---|
| 1 | △, ▽, N | Actual gear display | Forward, reverse, neutral |
| | 1, 2, 3, 4, 5 | | Actual gear |
| | P | | Parking brake mode active |
| 2 | ^, v | Forward, reverse | <div> <div>^</div> <div>FWD 1</div> </div> <div> <div>▽</div> <div>REV 1</div> </div> |
| 3 | ≡ | Gear range display | <div> <div>≡</div> <div>FWD 5</div> </div> <div> <div>≡</div> <div>REV 5</div> </div> |
| 4 | | DEF/AdBlue® level | Display the amount of liquid in the DEF/AdBlue® tank |
| 5 | ⚠ | DEF/AdBlue® level warning lamp | Fill the DEF/AdBlue® when the lamp ON or blinks in red. - ON : DEF/AdBlue® level 5~10% - Blink : DEF/AdBlue® level below 5% ※ If the lamp ON or blinks in red even though the machine is on the normal condition, check the electric device as that can be caused by the poor connection of electricity or sensor. |
| 6 | LF, LR | Limp home gear | - |
| | ** | Oil temperature too low, no gear available | Warm up engine/transmission |
| | WS | Warning sump temperature | Alternate between WS and actual gear / direction while driving, in neutral only displayed WS if no fault is detected ※ Cool down transmission |
| | WT | Warning torque converter temperature | Alternate between WS and actual gear / direction while driving, in neutral only displayed WS if no fault is detected ※ Cool down transmission |

3. MONITOR (7 inch touch screen)

- The monitor is adjustable.
- Vertical : 30°
- Horizontal : 15°



760F3CD20-1

1) MAIN DISPLAY

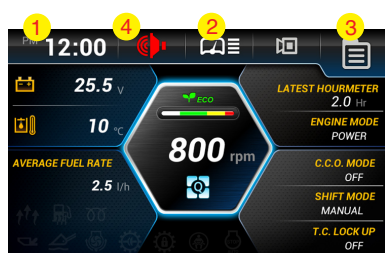
- ※ You can select or set the menu by the switches or touch screen.
- ※ Please refer to switch, page 3-39 for selection and change of menu and input value.
- ※ Display type can be changed by operator. See page 3-34 for details.



760F3CD11-1

- | | | |
|-----------------|---------------------------------|---------------|
| 1 Clock | 6 Machine monitoring | 11 Engine rpm |
| 2 Buzzer | 7 Fuel rate | 12 Quick menu |
| 3 Wiper speed | 8 Engine mode/Operation history | 13 10 lamps |
| 4 Camera screen | 9 Transmission mode | |
| 5 Menu | 10 ECO gauge | |

(1) Menu bar



760F3CD07-1

※ In main display, you can move to right side menu by touching each icon.

① Clock setting

Set the time (hour, minute and AM or PM)

② Wiper speed

Set the wiper speed (slow, normal, fast and very fast)

③ Menu

Move to main menu.

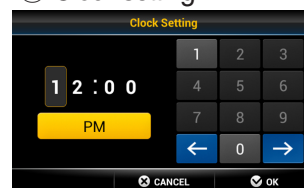
④ Buzzer stop

If you want to stop buzzer sound, just touch the



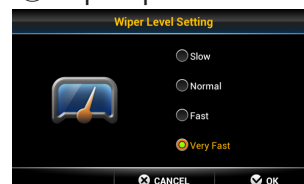
icon.

① Clock setting



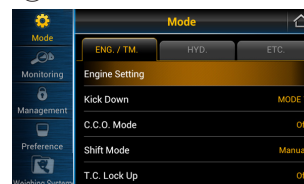
760F3CD07A-1

② Wiper speed



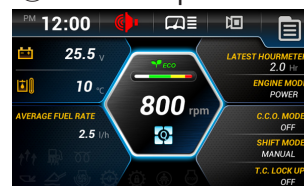
760F3CD07B-1

③ Menu



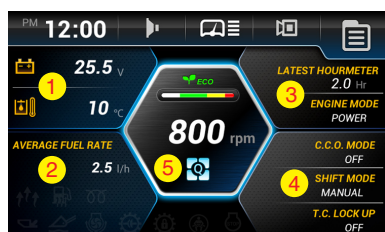
760F3CD07C-1

④ Buzzer stop



760F3CD07E-1

(2) Change display information



760F3CD08-1

※ In main display, you can check the data and setup what you want by touching each window area or icon.

① Machine monitoring

To display the item in main display, select two items of them.

※ Priority in the machine monitoring display

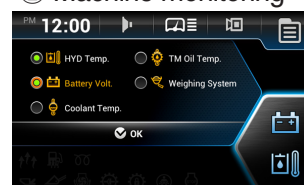
The priority of the weighing system is the highest.

If the weighing system is selected, the other items are not available.

To display the other items, the weighing system should not be selected.

※ **Weighing system** : see page 3-22.

① Machine monitoring

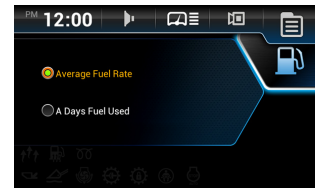


760F3CD08A-1

② Fuel rate

- Set average fuel rate or a days fuel used on main display screen.
- Refer to page 3-29.

② Fuel rate

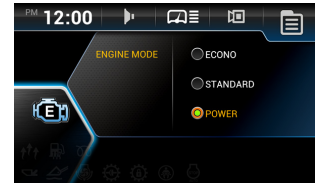


760F3CD08B-1

③ Engine mode and operation history

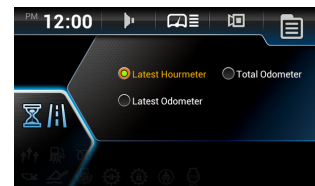
- Set the engine mode (A).
- Refer to page 3-19.
- Set Hour meter / ODO meter (B).
- Refer to page 3-28.

③ Engine mode



A

760F3CD08D-1



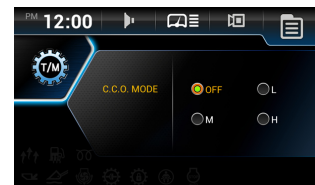
B

760F3CD08K-1

④ Transmission mode

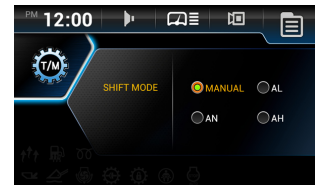
- Set the clutch cut off (A), shift (B) and torque converter lock up mode (C).
- Refer to page 3-20.

④ Transmission mode



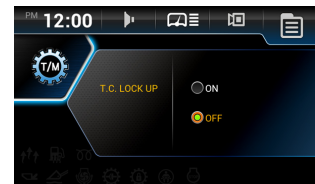
A

760F3CD08C-1



B

760F3CD08L-1




C

760F3CD08M-1

⑤ Quick menu



※ Move the quick menu screen by touching .

a) User switching

- When multiple users share a machine, it allows users to switch user settings of machine.
- User can apply or save the setting of monitor easily.

b) Active fault

- Display the fault code of MCU/ECU/TCU/EHCU.
- Refer to page 3-28.

c) Maintenance

- Elapsed time, change or replace cycle can be changed.
- Refer to page 3-31.

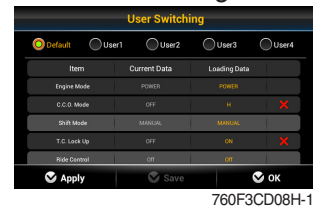
d) Help

- Read the monitor manual as a PDF file on the monitor.

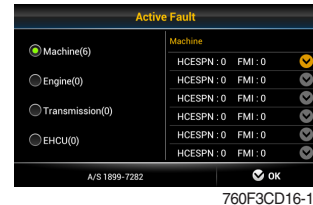
※ Smart terminal

- The menu features a smartphone and operates the miracast.

a) User switching



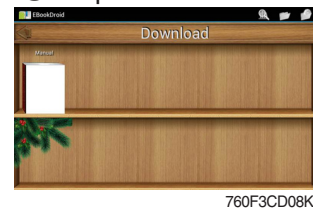
b) Active fault




c) Maintenance



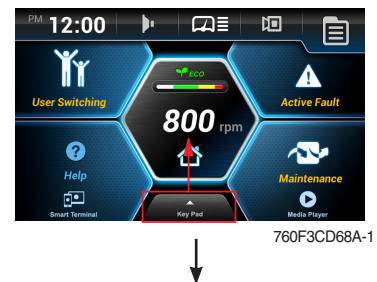
d) Help



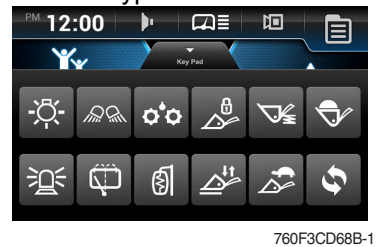
e) Virtual keypad

To display the virtual keypad, drag the button () to top of the screen.

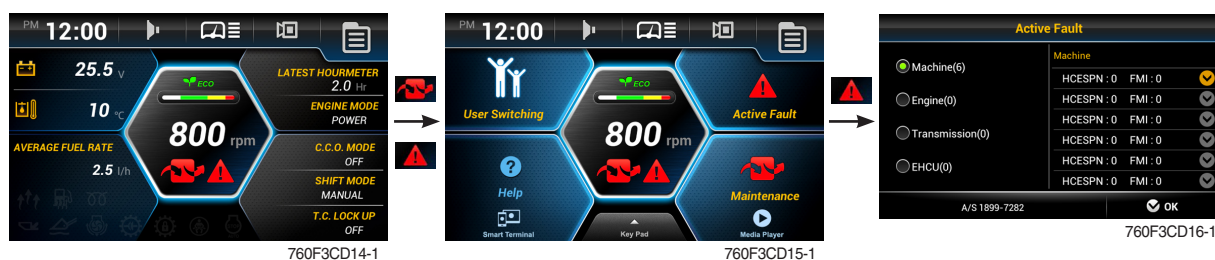
※ Refer to the page 3-39 for details.



Virtual keypad



(3) Fault and maintenance warning



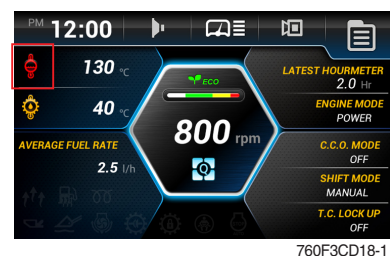
- ① If you touch the warning sign (red icon), move to the quick menu.
- ② You can check the fault message and move the maintenance screen by touching relevant area.



(4) Machine monitoring warning

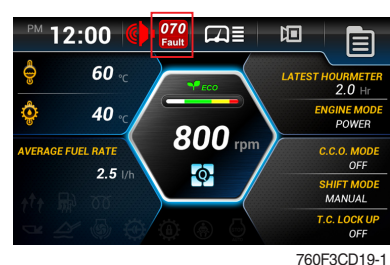
- ① Warning sign (red icon) will be shown when the temperature of hydraulic oil, cooling water, transmission oil or battery voltage is not normal state.
- ② Case of warning sign

| Icon | Description |
|------|---|
| | Above 106°C of hydraulic oil temperature |
| | Above 105°C of cooling water temperature |
| | Above 107°C of transmission oil temperature |
| | Below 24.5 voltage of battery (for 3 minutes) |



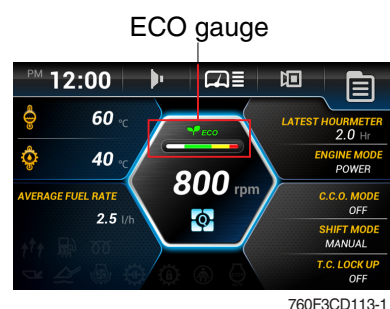
(5) Communication error

- ① MCU could not communicate with monitor over 10 seconds, error message will be show on the screen.







(6) Eco gauge

- ① This gauge indicates the fuel consumption rate and machine load status. So that operators can be careful with fuel economy.
- ② The fuel consumption rate or machine load is high, the segment is increased.
- ③ The color of Eco gauge indicates operation status.
 - White : Idle operation
 - Green : Economy operation
 - Yellow : Non-economy operation at a medium level.
 - Red : Non-economy operation at a high level.



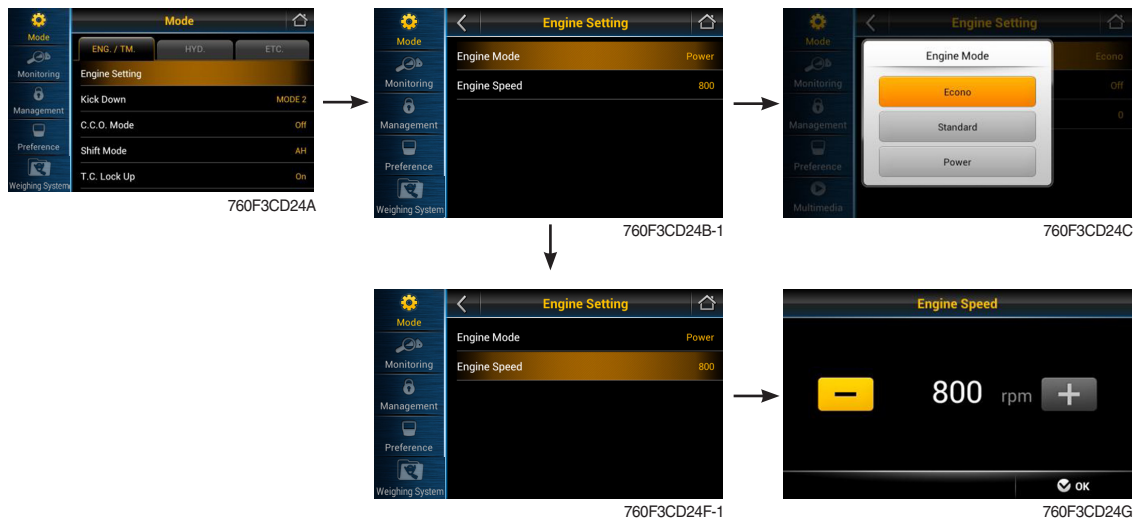
2) MAIN AND SUB MENU

(1) Structure

| No | Main menu | Sub menu | Description |
|----|---|--|--|
| 1 | <p>Mode</p>  <p>760F3CD25A</p> | <p>Engine setting</p> <p>Kick down</p> <p>C.C.O mode</p> <p>Shift mode</p> <p>T.C. lock up</p> <p>Work load</p> <p>Boom/bucket detent mode</p> <p>Bucket priority</p> <p>Auxiliary attach max flow level</p> <p>Soft end stop</p> <p>Speedometer frequency setting</p> <p>Cooling fan reverse mode</p> <p>Wiper level setting</p> <p>Calibration</p> <p>Engine auto shutdown</p> | <p>Engine mode, Engine speed</p> <p>Mode 1 (down/up), Mode 2 (down only)</p> <p>Clutch cut off mode (Off, L, M, H)</p> <p>Transmission shift mode (manual, AL, AN, AH)</p> <p>Torque converter lock up ON/OFF</p> <p>Weighing system, Weighing display, Error detection</p> <p>Boom/bucket detent ON/OFF, Save position</p> <p>Bucket priority ON/OFF</p> <p>Oil flow level setting</p> <p>Boom up/down, Bucket in/dump ON/OFF</p> <p>Speedometer setting</p> <p>Off, Manual, Automatic</p> <p>Slow, Normal, Fast, Very fast</p> <p>Boom/bucket angle, Boom pressure, Brake pedal sensor, AEB</p> <p>Once, Always, Disable, ESL system setting</p> |
| 2 | <p>Monitoring</p>  <p>760F3CD25B</p> | <p>Machine monitoring</p> <p>Operation history</p> <p>Fault history</p> <p>Fuel consumption history</p> <p>Machine information</p> | <p>Hyd, Coolant and T/M oil temp, Battery voltage</p> <p>Hour meter, ODO meter</p> <p>Active/Logged fault (MCU, ECU, TCU, EHCUC)</p> <p>General record, Hourly record, Daily record, Mode record</p> <p>TCU, ECU, MCU, RMCUC, EHCUC, Monitor, Cluster</p> |
| 3 | <p>Management</p>  <p>760F3CD25C</p> | <p>Machine security</p> <p>Maintenance</p> <p>Service menu</p> <p>Change A/S phone number</p> <p>Software update</p> | <p>ESL system setting, Change password, Smart key</p> <p>Elapsed time, Cycle, Maintenance history</p> <p>Sensor monitoring, Speed limit setting, Weighing system compensation, EHCUC I/O information</p> <p>Check and change of contact information</p> <p>Update file in USB memory</p> |
| 4 | <p>Preference</p>  <p>760F3CD25D</p> | <p>Brightness setting</p> <p>Clock setting</p> <p>Unit setting</p> <p>Display style/Language</p> <p>Sound output setting</p> <p>Camera setting</p> | <p>Manual, Automatic</p> <p>Clock setting</p> <p>Temp (°F/°C), Speed (km/h, mph), Weight (ton, lb), Pressure (bar, Mpa, kgf/m², psi)</p> <p>Type A, Type B, 13 multiple language</p> <p>Internal speaker, External speaker (Aux)</p> <p>Active camera, Display order, Reverse mode, AAVM (option)</p> |

(2) Mode

① Engine setting mode



- **Engine mode**

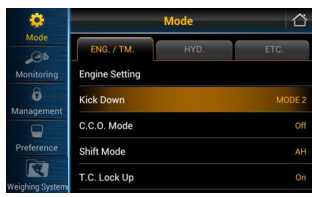
The operator can adjust the machine's performance.

- Econo : Maximum fuel efficiency for general loading.
- Standard : General digging and loading operation.
- Power : Maximum power output for hard digging operation or hill climb.

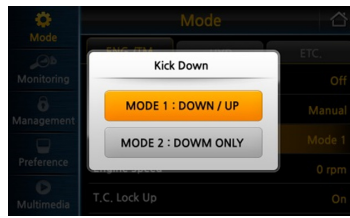
- **Engine speed**

Setting engine low idle rpm.

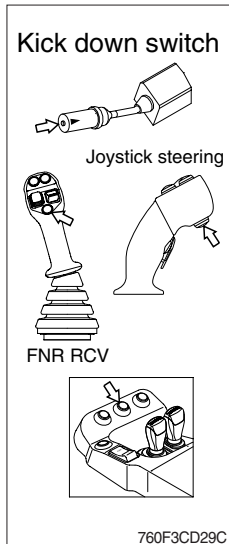
② Kick down mode



760F3CD29A



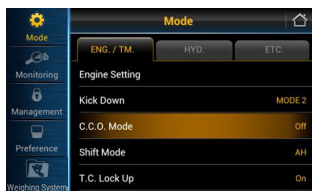
760F3CD29B



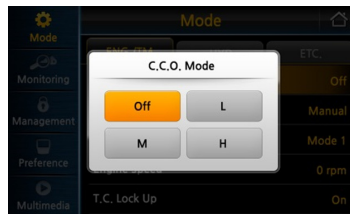
760F3CD29C

- **Manual mode** (shift mode : manual)
It is effective 2nd speed to 1st speed only and recover to 2nd speed quickly when push the switch one more time.
- **Automatic mode** (shift mode : AL, AN, AH)
 - **Mode 1** (down/up)
It shifts down quickly from current gear to one step lower speed by pushing the switch and recover to current speed quickly when push the switch one more time.
 - **Mode 2** (down only)
It shifts down from current gear to one step lower speed when push the switch every time.
The kick down function is released in only 1st speed.
- ※ **The normal autoshift function continues after the kick down switch is released.**

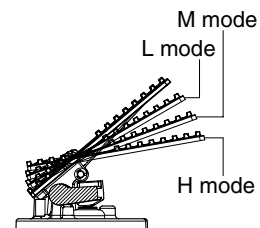
③ Clutch cut off (C.C.O) mode



760F3CD26A



760F3CD26B



Left brake pedal

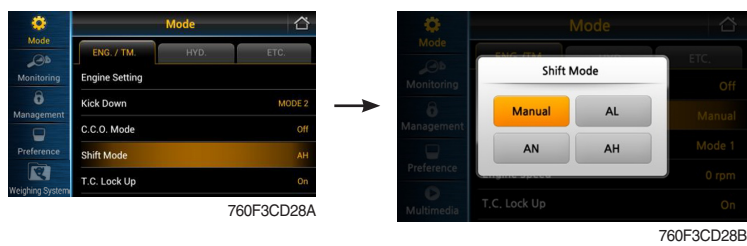
760F3CD27

- Four modes are available for operator's preference and job condition.
 - OFF : The clutch cut off function is disable.
 - L (Low) : The clutch is disengaged early for short-distance and rapid loading.
 - M (Medium) : The clutch is disengaged normally for general digging and loading operation.
 - H (High) : The clutch cut off function is automatically adjusted depending on slope angle or machine load and inching fuction becomes possible by using the brake pedal.

The clutch cut off functions of the left brake pedal depend on the position of the left brake pedal and the setting of the clutch cut off mode.

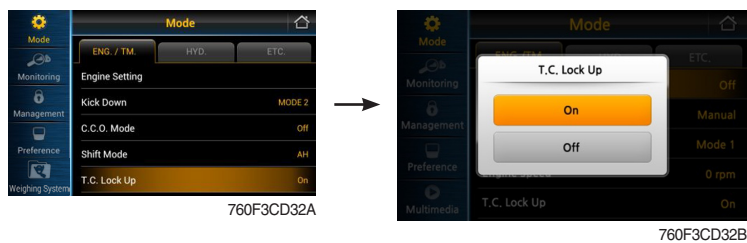
| Positions for clutch cut off function | | | |
|---------------------------------------|------|---|---|
| Clutch cut off mode | L | M | H |
| Left brake pedal | L, M | M | H |

④ Shift mode



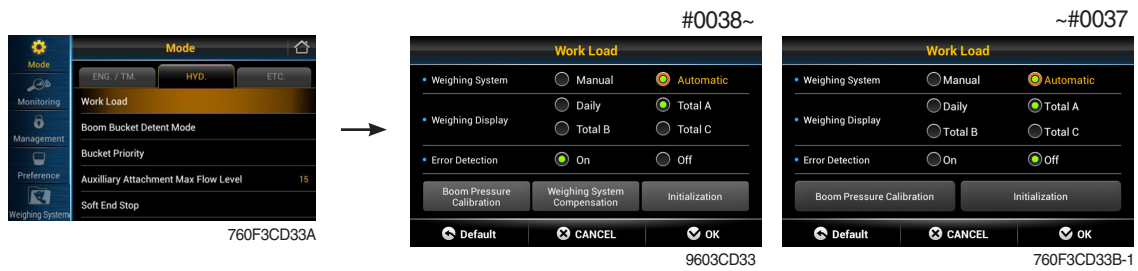
- Four modes are available for operator's preference and job condition.
 - Manual : Machine is operated by selected gear on lever.
 - AL (Auto Light) : Automatic shifting point is fast for long-distance transportation and fuel efficiency.
 - AN (Auto Normal) : Automatic shifting point is normal without automatic kick-down to 1st gear for general digging and loading operation.
 - AH (Auto Heavy) : Automatic shifting point is normal with automatic kick-down to 1st gear for more powerful operation.

⑤ Torque converter (T.C.) lock up mode (5-speed transmission)

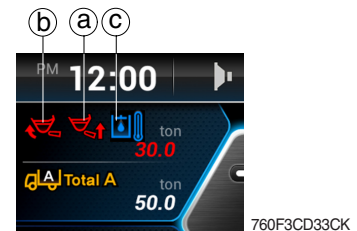


- If you select ON, the lock-up clutch on the torque converter will automatically activate according to load.
- Lock-up clutch function (option)**
To prevent power loss in the torque converter, the pump rotor and turbine rotor on the torque converter lock together through a direct lock-up clutch.

⑥ Work load mode

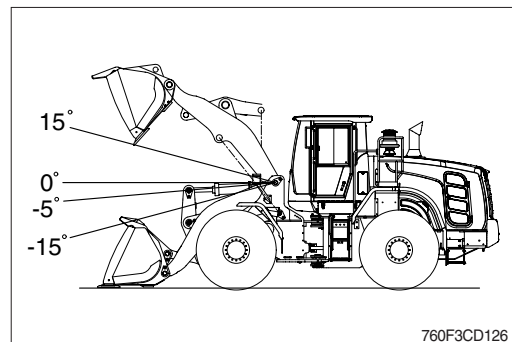


- Weighing system : Set the workload measurements.
- Weighing display : Set the display on main display screen.
- Initialization : Workload initialization.
- Error detection : Set error detection ON/OFF.
 - OFF : Errors are not displayed.
 - ON : ①, ② and ③ are displayed on main display screen.
 - ① The boom lift was performed too fast.
 - ② The bucket was not in the fully tilted back position while bucket was in the weigh range.
 - ③ The hydraulic temperature is low (below 40 °C).
- Boom pressure calibration : See the page 3-26 for details.
- Weighing system compensation (#0038~)
 - Calibration workload depending on work tool.
 - ※ **Only for the service person. Do not adjust arbitrary.**
- ※ **Refer to page 3-42 for details.**



※ Weighing system

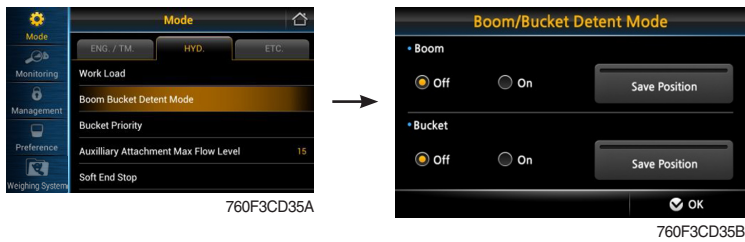
- The weight indication in bucket is calculated by measuring boom position and boom pressure.
- ① The weight is '0.0 ton' when the boom is placed at below -15°.
- ② The weight is indicated when the boom is placed at the range (-5°→15°).
- ③ The weight is calculated when the boom is placed at above -5° and boom is lowered below -15° after dumping operation.



In order to recheck weight, go to the ② after changing boom position (below -15°).

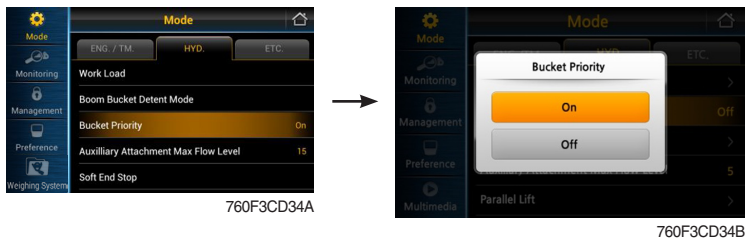
- Dump operation : It is checked by bucket cylinder's stroke change (below 250 mm).
- ※ The temperature for the hydraulic oil must be raised to at least 40 °C (104 °F) before operation.

⑦ Boom/bucket detent mode



- OFF : Detent functions are not operated.
- ON : Boom or bucket detent functions are operated.
- Save position : Refer to page 4-22.

⑧ Bucket priority mode (option)



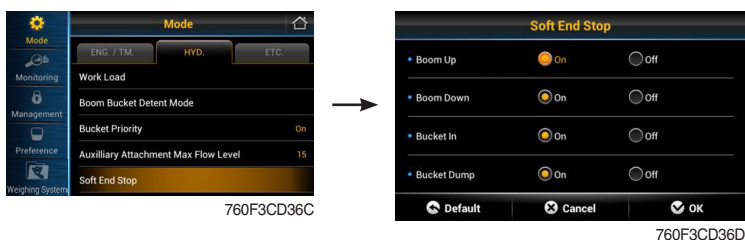
- Bucket priority function is to be more convenient for operator to load materials. Bucket-in (roll back) operation takes priority over the boom-up (raise) operation in case of using both operations at the same time and therefore boom (raise) operation is stopped and only bucket (roll back) is operated.
- Set the bucket priority function ON/OFF.

⑨ Auxiliary attachment max flow level mode (option)



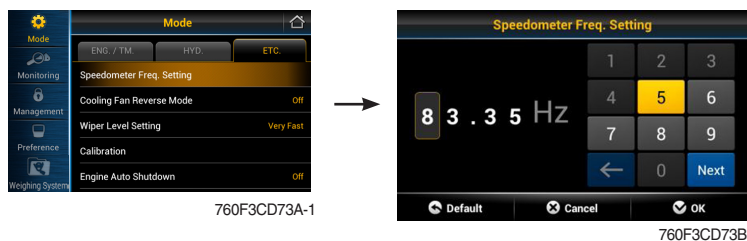
- If the machine is equipped with auxiliary attachment, auxiliary attachment flow can be easily adjusted and controlled.
- Set the oil flow level from 0 to 15 level by using +/- button.



⑩ Soft end stop mode (option)



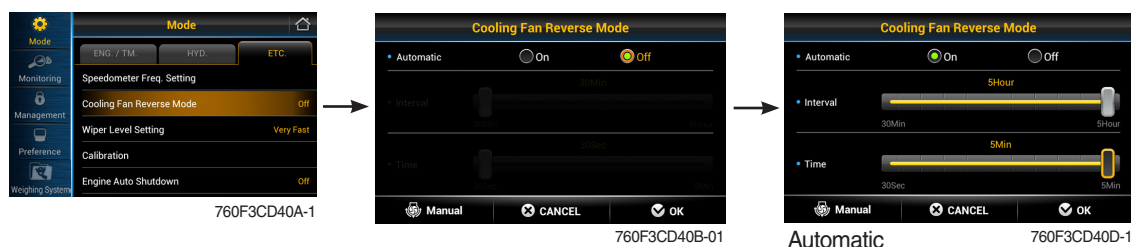
- This function gives shock free operation by reducing the speed of attachment near the end stroke.
- Set the soft end stop function ON/OFF.

⑪ Speedometer frequency setting mode

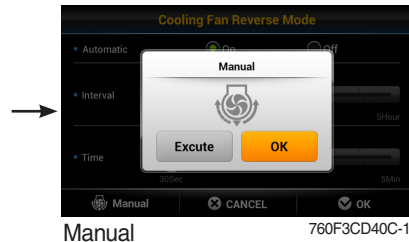


- Press speedometer setting bar (or ) for 3 seconds.
- ※ **Only for the service person. Do not adjust arbitrary.**
- ※ **Using button**
 - To change the pulse value, press ◀ or ▶.
 - To change the position, press .

⑫ Cooling fan reverse mode



- **Manual** : Rotate the fan with reverse direction while pressing the button "Excute".
- **Automatic** : Rotate the fan with reverse direction by preset cycle.
 - Interval : 30 min ~ 5 hrs
 - Time : 30 sec ~ 5 min
- ※ **Default : Interval (60 min), time (120 sec)**

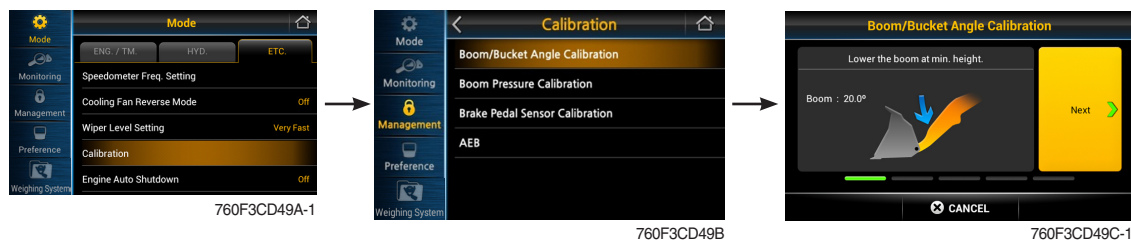


⑬ Wiper level setting mode



- Setting wiper speed (slow, normal, fast and very fast).

14 Calibration



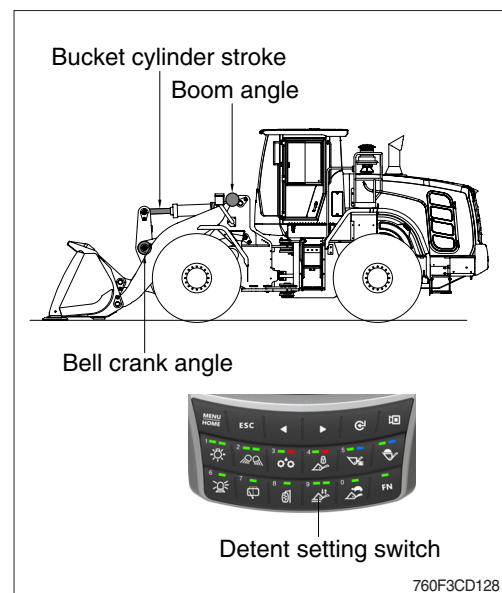
- Press NEXT button after following the instruction at each step.
- If correction is right, NEXT button will be activated, then go to next stage.
- After following each step correctly, the message "Calibration is done" will be shown. Press complete button, then process be ended.

※ Using switch






- Using  instead of NEXT, complete button.

· Boom / Bucket angle calibration

- MCU get sensing signal from boom angle and bell crank angle and calculate bucket cylinder stroke and boom link position angle from ground real time basis.
- Boom angle position and bucket cylinder stroke is set by detent setting switch on monitor.
- Individual setting position is done by lever (detent, release operation).
- Angle sensor calibration is basically carried out before delivery of the machine.
When angle sensor is replaced or actual value is different compared to setting value, this function can be done.

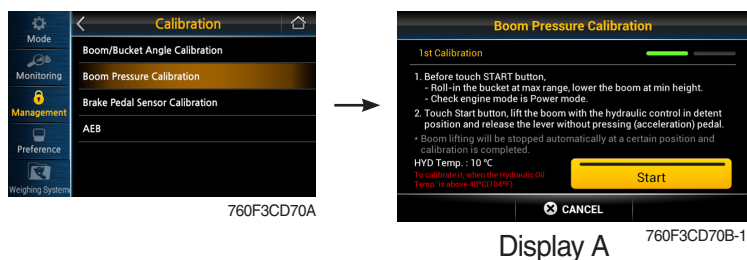


- The calibration must be carried out as follows :

- ① Lower the boom at maximum low position and press NEXT button or  (bucket must be max tilting position).
- ② Raise boom at maximum high position and press NEXT button (or ).
- ③ Position boom at -5° and press NEXT button (or ).
- ④ Retract bucket cylinder length (to minimum position) at -5° boom position and press NEXT button (or ).
- ⑤ Extend bucket cylinder length (to maximum position) at -5° boom position and press NEXT button (or ).
- ⑥ In case above steps are carried normally, "Calibration is done" message is shown. Then angle sensor calibration is finished.

※ **Boom down / boom up / bucket position setting : Refer to page 4-22.**

· Boom pressure calibration




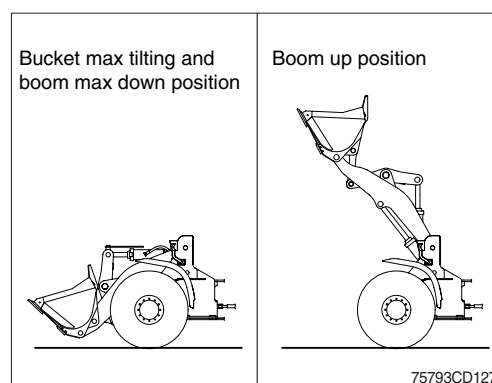
- Press START button after following the instruction.
- After a few minutes, "Calibration fail" or "Calibration success" message will be shown. Press complete button then process be ended.

※ Using button

- Using  instead of NEXT, complete button.

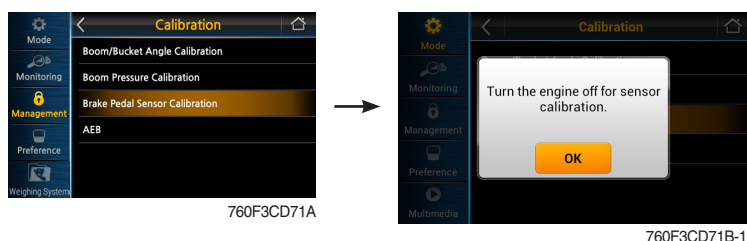
· Boom pressure calibration



- It is used when bucket weight is changed or measured weight is inaccurate.
- The calibration must be carried out as follows :
 - ① Increase hydraulic temperature (about 40~60°C).
 - ② Select "Boom-pressure".
 - ③ Roll-in the bucket at maximum range and lower the boom at minimum height.
 - ④ Press START button.
 - ⑤ Raise boom to maximum position. Boom up must be finished before stepping advance in "display A".
 - ⑥ If it show "Calibration success" message in a moment, press complete button (or ).



- ※ **Raise hydraulic temperature enough when checking work load / boom pressure sensor calibration (recommendation : about 40 ~ 60°C).**
- ※ **Check if pressure sensor or angle sensor is in normal condition for accurate work load algorism or pressure sensor calibration [pressure sensors at boom cylinder head area and rod area, boom angle sensor (CD-80), bell crank angle sensor (CD-81)].**
- ※ **Sensor error message during pressure sensor calibration : sensor need to be checked.**

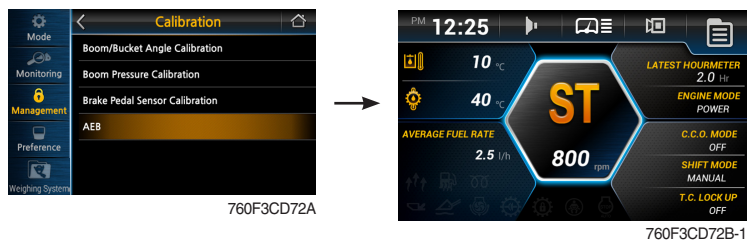
· Brake pedal sensor calibration






- Turn the engine OFF and turn the starting switch ON position.
- Press OK button, then calibration will be started.
- When display "IP  " on main display, press slowly the brake pedal completely.
- Release the brake pedal when display "IP  " on main display.
- For cancel, press MENU/HOME switch.

- ※ When the brake pedal or sensor is replaced, **brake pedal sensor calibration must be performed.**

· AEB

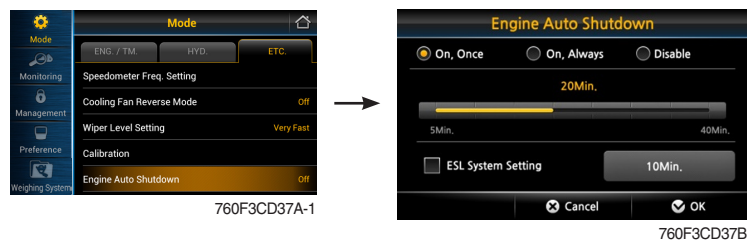


- AEB mode controls the disk clearance of the transmission, automatically.
- To start AEB setting, press AEB bar (or ) for 3 seconds.
- To cancel AEB setting, press .
- If "OK" in actual gear window, press  to complete AEB setting.
- **Display during AEB mode**

| Symbol | Meaning |
|-----------------|---|
| ST | Start AEB |
| K1~K4, KV, KR | Calibrating clutch K1~K4, KV or KR respectively |
| OK* | Calibration for all clutches finished |
| Spanner and Kx* | Kx couldn't be calibrated, AEB finished |
| △E | Engine speed too low - Raise engine speed |
| ▽E | Engine speed too high - Lower engine speed |
| △T | Transmission oil temperature too low - Heat up transmission |
| ▽T | Transmission oil temperature too high - Cool down transmission |
| FO* | Output speed not zero |
| FN* | Shift lever not in neutral position |
| FP* | Parking brake not applied |

* : Transmission stays in neutral, you have to restart the TCU (starting switch off/on).

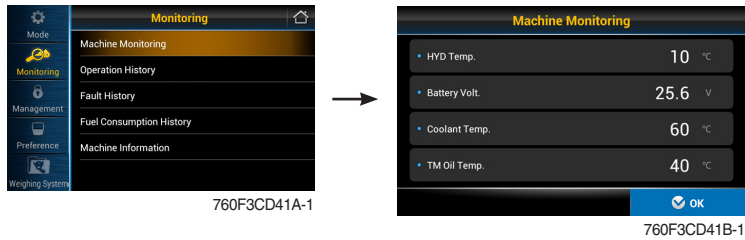
⑮ Engine auto shutdown mode



- The engine auto shutdown function can be activated or cancelled.
- Engine runs for the setting time (2~40 minutes) and then shuts down.

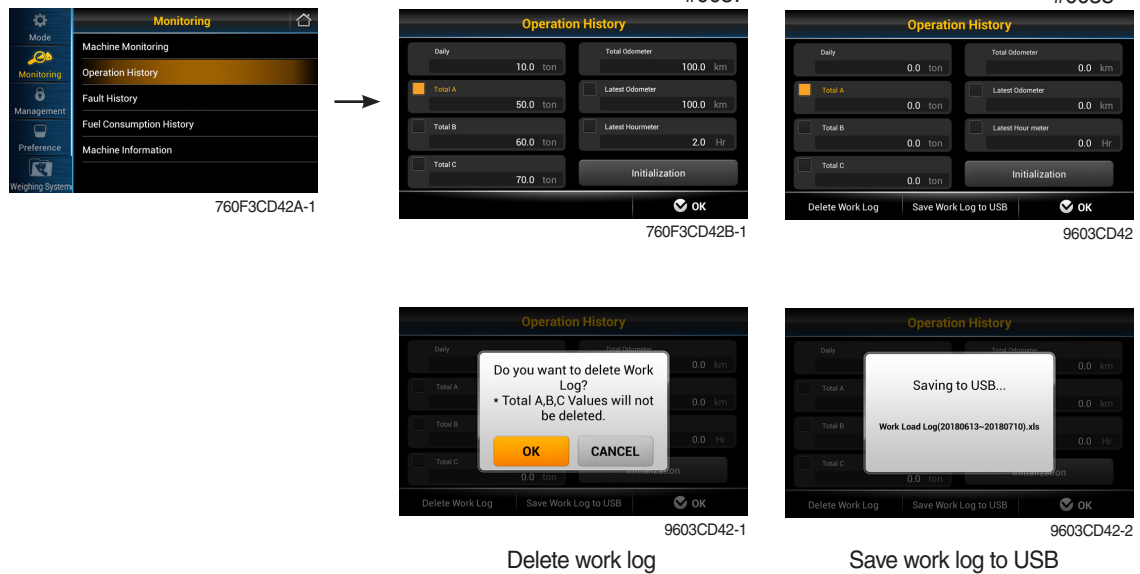
(3) Monitoring

① Machine monitoring



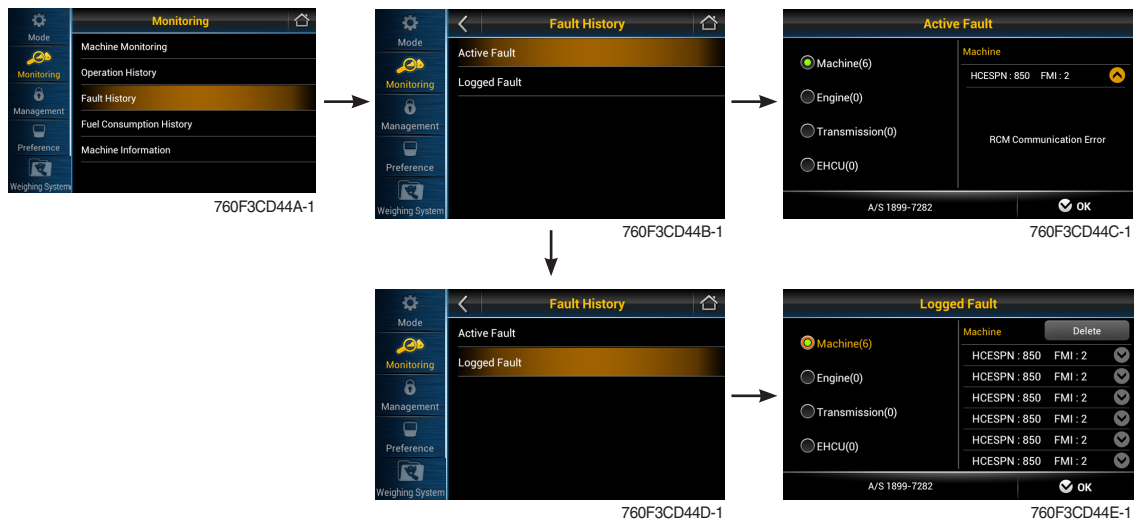
- Monitor the status of the machine.

② Operation history



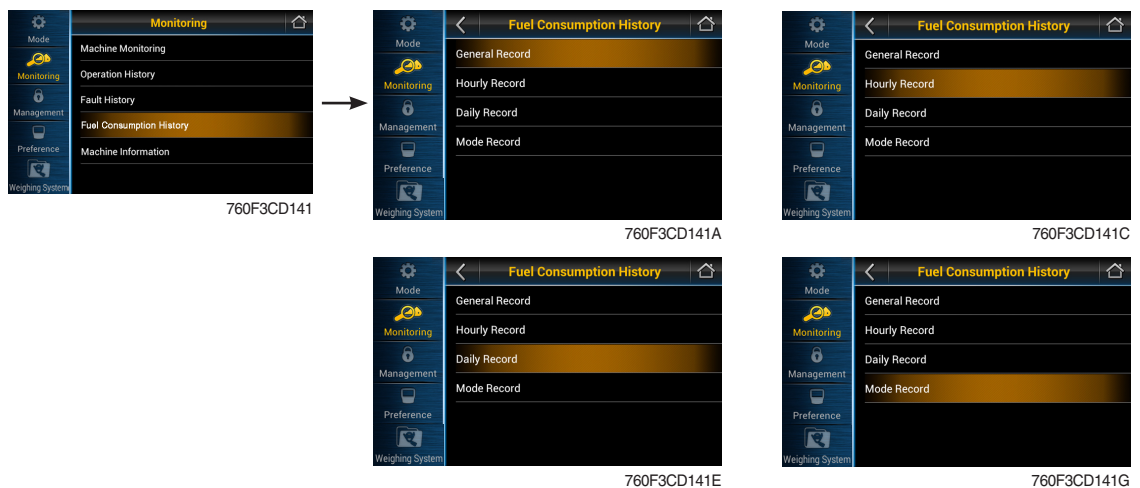
- **Hour meter / ODO meter**
- **Total**
 - Total distance (this item cannot be initialized).
 - Total working hour can check on service meter. See page 3-59.
- **Latest**
 - Working hour/distance after reset.
 - If you select **Initialization**, working hour/distance start zero.
- To display the item in main display, select the item in main display. See the page 3-13.
- **Delete work log / Save work log to USB (#0038~)**
 - Delete work load log and save work load log to USB.
 - USB memory recognize only FAT32 format.

③ Fault history



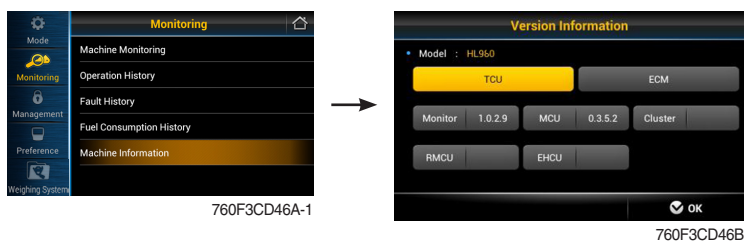
- Display the fault code of MCU/ECU/TCU/EHCU and delete logged fault.
- ※ Refer to service manual for HCESPN/FMI of engine and transmission.
- ※ Not define will be indicated in case of that there's no fault.
- ※ EHC : Electro Hydraulic Control Unit.

④ Fuel consumption history



- Display the fuel consumption history.
- General record (average fuel rate and a days fuel used)
- Hourly record
- Daily record
- Mode record

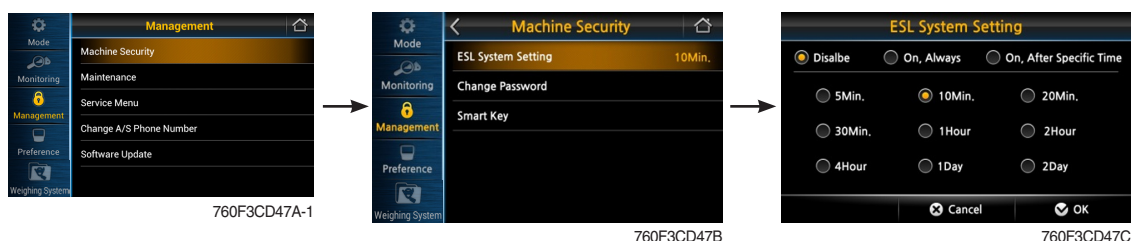
⑤ Machine information



- Software versions of MCU, ECU, TCU, EHC, Cluster and monitor can be checked.

(4) Management

① Machine security



· ESL system setting

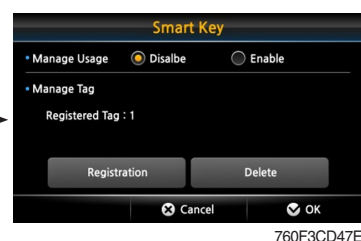
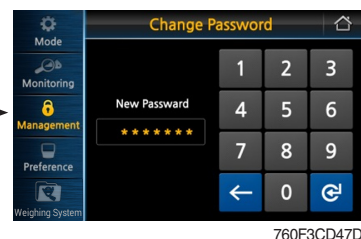
- ESL : Engine Starting Limit
- ESL mode is designed to be a theft deterrent or will prevent the unauthorized operation of the machine.
- If the ESL mode was selected ON, the password will be required when the start switch is turned ON.

- **Disable** : Not used ESL function

ON, Always : The password is required whenever the operator start engine.

ON, After specific time : The password is required when the operator start engine first. But the operator can restart the engine within the specific time without inputting the password.

The specific time can be set maximum 2 days.



· Specific time

- If set specific time to 5 minutes, ESL system is activated after 5 minutes. Therefore, the password does not need to restart engine within 5 minutes.

※ Default password : 00000

· Change password

- Input 5 to 10 digits.

· Smart key (opt)

- Manage usage : Set the using or not of smart key.
If you using smart key, ESL function always be activated.
- Manage tag : Register or delete user tag and display registered user tag.
When delete user tag, all user tag will be deleted.

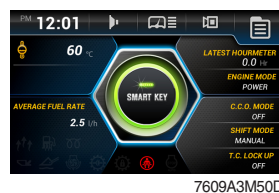
※ Using smart key

- Verification success

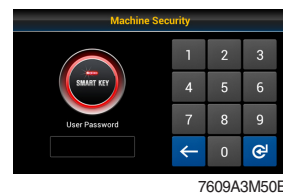
Green smart key icon is displayed on the main display screen.

Verification failure

- Red smart key icon and password input screen is displayed.



Verification success



Verification failure

· Engine Starting Condition

| Case | ESL Mode | Smart Key | Condition |
|------|----------|-----------|---|
| 1 | Disable | Disable | - With registered tag : Engine can be started without password input. - Without registered tag : Engine can be started without password input. |
| 2 | Disable | Enable | If Smart Key is enabled, ESL Mode is automatically enabled. This Case 2 work the same as the Case 4. |
| 3 | Enable | Disable | - With registered tag : Engine can be started with password input. - Without registered tag : Engine can be started with password input. |
| 4 | Enable | Enable | - With registered tag : Engine can be started without password input. - Without registered tag : Engine can be started with password input. |

② Maintenance



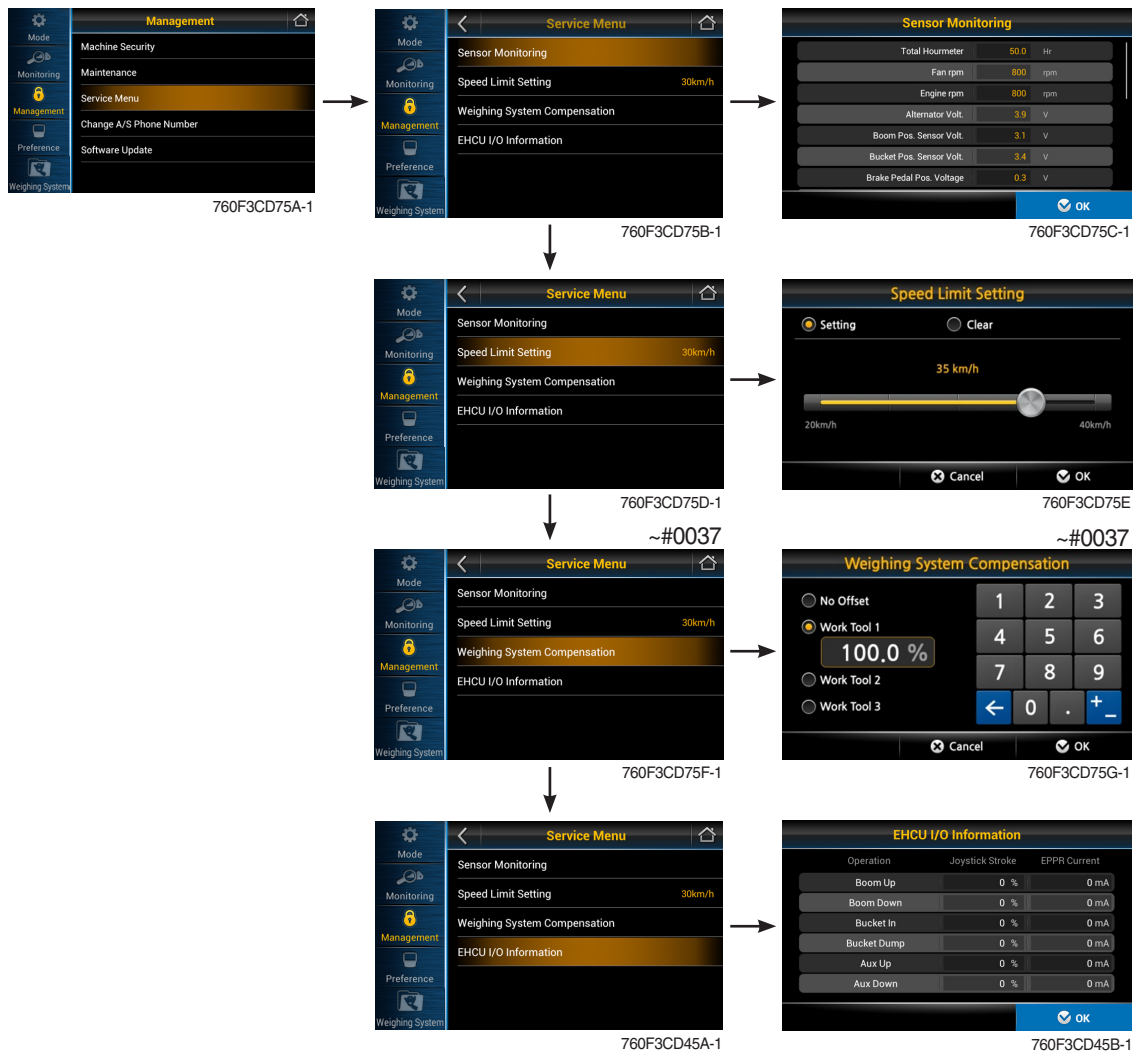
- Replacement : The elapsed time will be reset to zero (0).
Change cycle : The change or replace cycle can be changed in the unit of 50 hours.
- Show the maintenance history below 10.
When history have more than 10, delete the old item.
- **Change or replace interval**

| No | Item | Interval |
|----|----------------------------------|--|
| 1 | Engine oil | 500 |
| 2 | Hydraulic oil | ★ ¹ 2000 ★ ² 5000 |
| 3 | Pilot line filter element | 1000 |
| 4 | Hydraulic oil return filter | 1000 |
| 5 | Engine oil filter | 500 |
| 6 | Fuel filter element | 500 |
| 7 | Fuel pre-filter | 500 |
| 8 | Hydraulic tank air breather | 1000 |
| 9 | Radiator coolant | ★ ¹ 2000 ★ ² 6000 |
| 10 | Transmission oil and filter | 1000 |
| 11 | Axle oil (front and rear) | 1500 |
| 12 | Aircon & heater outer filter | 1000 |
| 13 | Crankcase Breather Filter | 2000 |
| 14 | DEF/AdBlue® supply module filter | 4500 |
| 15 | DEF/AdBlue® tank filter | 4000 |

★¹ : Conventional

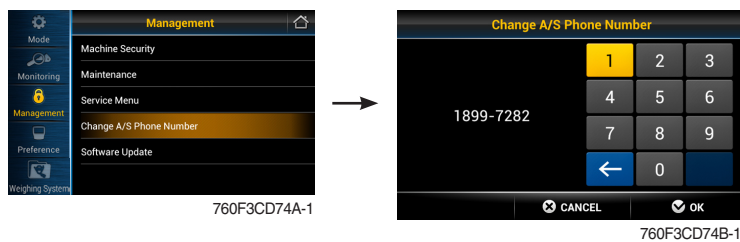
★² : HD Hyundai Construction Equipment genuine long life

③ Service menu



- **Sensor monitoring** : Display information of each sensors.
- **Speed limit setting** : 20~40 km/h (5 km/h intervals)
- **Weighing system compensation (~#0037)**
 - Calibration workload depending on work tool.
 - ※ **Only for the service person. Do not adjust arbitrary.**
- **EHCUI/O information**
 - Real time monitoring (joystick stroke, EPPR current).

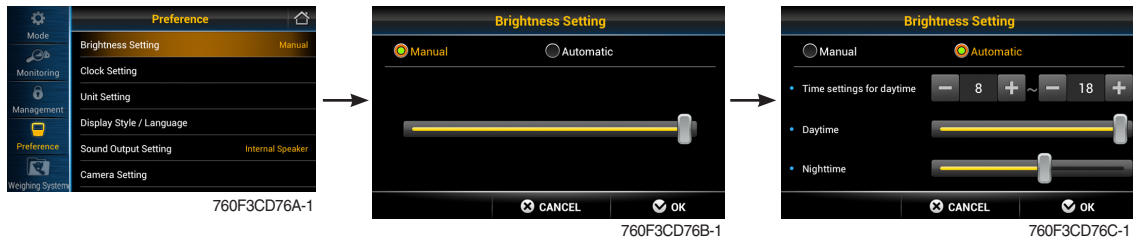
④ Change A/S phone number and software update



- **Change A/S phone number** : Check and change of contact information for customer service.
- **Software update** : Update file in USB memory.

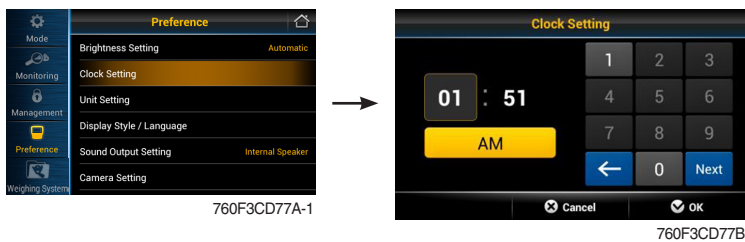
(5) Preference

① Brightness setting



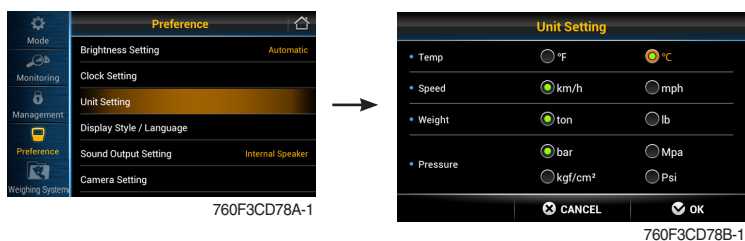
- **Manual**
 - Manual setting for LCD brightness.
- **Automatic**
 - Automatic control of LCD brightness as set level of day/night.
- **Setting day time**
 - Set the time for daylight.
 - If you set the time for daylight, the rest time will be night.
- ※ **Using button**
 - Changing brightness by ◀ or ▶, input data by ↻.

② Clock setting



- Set the time (hour, minute and AM or PM)

③ Unit setting



- Temperature : °C ↔ °F
- Speed : km/h ↔ mph
- Weight : ton ↔ lb
- Pressure : bar ↔ Mpa ↔ kgf/m² ↔ psi

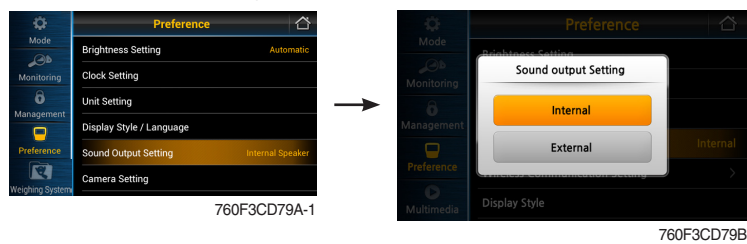
- ※ **Using button**
 - Move to other item by ↻.

④ Display style/ Language



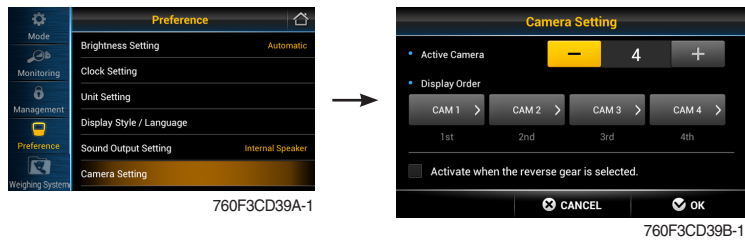
- Set the display type A or B.
- User can select preferable language and all display are changed the selected language.
- 13 multiple language available.

⑤ Sound output setting



- Internal
 - Use speaker of monitor.
- External
 - Use cab speaker. User should put radio mode into Aux mode.

⑥ Camera setting



- **Active camera**
 - Four cameras can be installed on the machine.
- **Display order**
 - Set the channel sequence of each camera.
- **Active when the reverse gear is selected**
 - If transmission engages the reverse gear (R1~R3), the camera mode is displayed automatically in main display.
- If the camera was not equipped, this menu is not useful.
- In main display, if the is touched (or switch is pushed), the first ordered display camera will be viewed.

⑦ AAVM (All Around View Monitoring, option)

- The AAVM switches of the cluster consist of Camera, ESC and Buzzer stop.



- **Camera switch**
 - It will enter into the AAVM mode from the main display if the AAVM is installed.
 - While in the AAVM mode, select the ESC switch to return to the main display.



- **Buzzer stop switch**
 - In AAVM mode, it detects surrounding pedestrians or objects and the warning buzzer sounds.
 - User can turn OFF the warning sound by pressing buzzer stop switch.



290F3CD246

- When the worker or pedestrian go to the blue line (radius 5 m), an external danger area of equipping on the main display, the warning buzzer sounds and it displays the blue rectangular box for the recognition of the worker and pedestrian.

At this time, the operator should stop work immediately, and stop the buzzer by pressing the buzzer stop switch. And then, please work after you check whether the danger factors are solved.

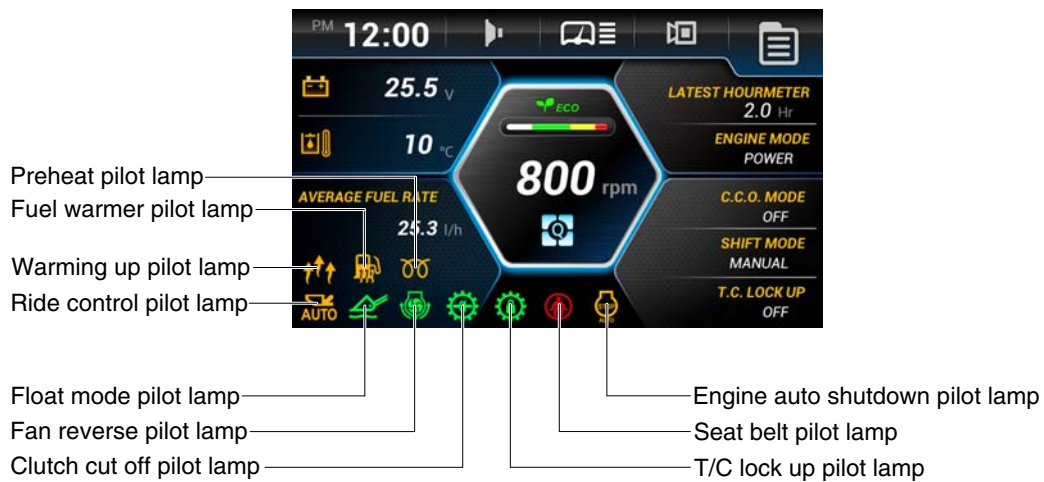


290F3CD247

- When the worker or pedestrian go inside of red line (radius 3 m), an internal danger area of equipping on the main display, the warning buzzer sounds and it displays the red rectangular box for the recognition of the worker and pedestrian.

At this time, the operator should stop work immediately, and stop the buzzer by pressing the buzzer stop switch. And then, please work after you check whether the danger factors are solved.

3) PILOT LAMPS



760F3CD90-1

(1) Warming up pilot lamp



- ① This lamp lights 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 the engine.

(2) Seat belt pilot lamp



- ① This lamp lights ON for the first five seconds after starting the engine.

(3) Preheat pilot lamp



- ① This lamp lights ON when start switch is turned clockwise to the ON position. Light will turn off after approximately 5~45 seconds, depending on engine temperature, indicating that preheating is completed.
- ② When the lamp goes out the operator should start cranking the engine.

※ Refer to page 4-5.

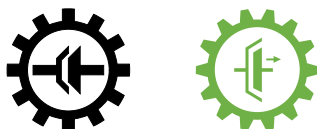
(4) Engine auto shutdown pilot lamp



① This lamp lights ON when the engine auto shutdown function is activated.

※ Refer to page 3-27.

(5) Clutch cut off pilot lamp



① This lamp lights ON when clutch cut off mode is set L, M, H.

※ Refer to page 3-20.

(6) Float mode pilot lamp



① This lamp lights ON when the boom float is activated.

※ Refer to page 4-9.

(7) Ride control pilot lamp (option)



① Auto ride control

This lamp lights ON when the automatic ride control function is activated (ON, Conditional speed setting).

※ Refer to page 3-41.



② Manual ride control

This lamp lights ON when the manual ride control function is activated (ON, Always setting).

※ Refer to page 3-41.

(8) Fan reverse pilot lamp



- ① This lamp lights ON when the cooling fan reverse mode is activated

※ Refer to page 3-24.

(9) Torque converter lock up pilot lamp (option)



- ① This lamp lights ON when the torque converter lock up function is operating.

※ Refer to page 3-21.

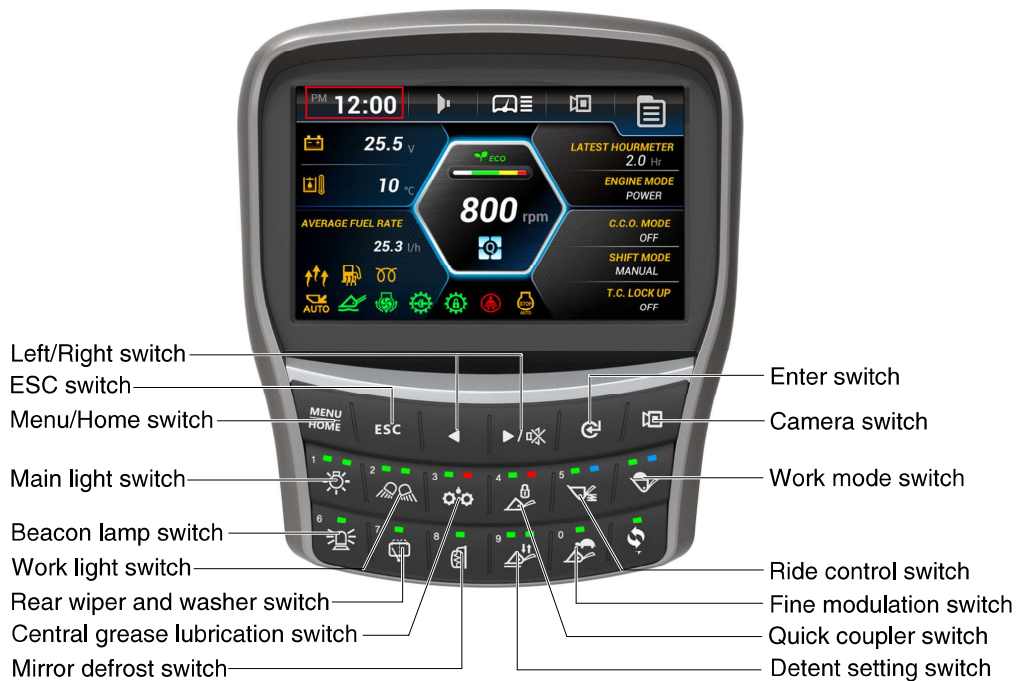
(10) Fuel warmer pilot lamp



- ① This lamp is turned ON when the coolant temperature is below 10°C (50°F) or the hydraulic oil temperature 20°C (68°F).

- ② The automatic fuel warming is cancelled when the engine coolant temperature is above 60°C and the hydraulic oil temperature is above 45°C since the start switch was ON position.

3) SWITCHES



760F3CD95-1

※ If you push left or right switch (◀ ▶) on main display, show the select box on current time.
Move to next item in order by using left / right button.

① Time → ② Buzzer → ③ Wiper → ④ Camera → ⑤ Menu → ⑥ Machine monitoring →
⑦ Fuel rate → ⑧ Engine mode/Operation history → ⑨ Transmission mode → ⑩ Quick menu)

※ Move to selected setting screen by using enter switch (⏎).

※ When keypad is not pressed for 3 seconds, convert screen to main display.

※ If you push left and right switch (◀ ▶) at the same time, move language settings.

(1) Menu / Home switch



① Main display to main menu, main menu to main display.

(2) ESC switch



① For other menu, this is used for cancellation (move to previous menu).
② AEB cancel or finish button in AEB.

(3) Left / Right move switch



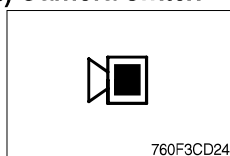
- ① Move in menu (left, up / right, down).
- ② Decrease / Increase input value.
- ③ Stop buzzer sound when sound is on.

(4) Enter switch



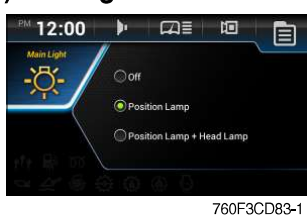
- ① Select menu (enter).

(5) Camera switch



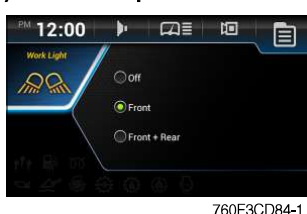
- ① Enter rear camera mode in main display.

(6) Main light switch



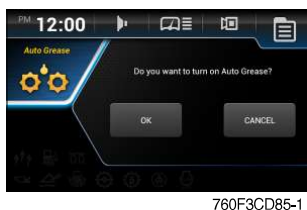
- ① This switch use to operates the clearance lamp and head light.
 - **Position lamp** : Clearance lamp and cluster illumination lamp come ON. The green pilot lamp is turned ON.
 - **Head lamp + Position lamp** : Clearance lamp, cluster illumination lamp and head light come ON. The green pilot lamp is turned ON.

(7) Work lamp switch



- ① This switch use to operates the front and rear work lamps.
 - **Front** : Front work lamp located on the cab comes ON. The green pilot lamp is turned ON.
 - **Front + Rear** : Front work lamp located on the cab and rear work lamp located on the cowl come ON. The green pilot lamp is turned ON.

(8) Central grease lubrication switch (option)



- ① This switch is used to operate the central grease lubrication system.
 - ② The central grease lubrication system is operated for set period. The green pilot lamp is turned ON.
- ※ **When malfunction occur in grease lubrication system, the red pilot lamp is turned ON.**
- ※ **Refer to page 8-1.**

(9) Quick coupler switch (option)



① Locking attachment

- The quick coupler pins move in the engaged position and buzzer sounds. Refer to the page 8-9.
- The green pilot lamp is turned ON.

※ Check for engagement as followings.

- Put down pressure on the attachment.
- Back up the machine and make sure that there is no movement between the quick coupler and attachment.

② Unlocking attachment

- The quick coupler pins move in the disengaged position and buzzer sounds. Refer to the page 8-9.
- The red pilot lamp is turned ON.

⚠ Always check that the attachment is properly secured to the attachment quick coupler by pressing the front part of the attachment against the ground.

⚠ Never use an attachment before you have checked its mounting.

(10) Ride control switch (option)



① ON, Conditional speed

- Select **ON, conditional speed** in order to turn on the automatic ride control. The automatic ride control automatically turns on when the travel speed exceeds a preset speed. (forward / backward 1~15 km/h)
- The blue pilot lamp is turned ON.

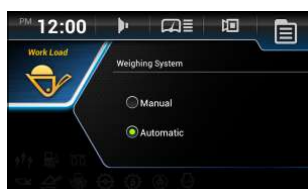
② ON, Always

- Select **ON, Always** in order to turn on the system for ride control regardless speed. The ride control will smooth the ride of the machine during travel.
- The green pilot lamp is turned ON.

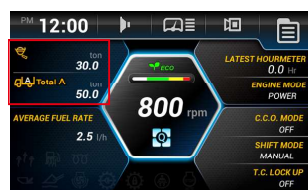
③ OFF

Select **OFF** in order to turn off the system for the ride control.

(11) Work mode switch



760F3CD115B-1



760F3CD115E-1



760F3CD115D-1

① Weighing system

- Manual

Accumulate the weight in memory A, B, C manually.

The green pilot lamp is turned ON.

※ Refer to the page 3-48 for workload button.

- Automatic

Accumulate the weight in memory A, B, C automatically.

The blue pilot lamp is turned ON.

※ Refer to the page 3-22 for weighing system.

※ Refer to the page 3-26 for boom pressure calibration.

② Weighing display

Selected item is shown in main display.

| | |
|--|--|
| | Work weight (today) |
| | Work weight (previous day) |
| | Total weight accumulated in memory A, B, C individually regardless of date |
| | Current weight |

※ Initialization daily, total A, B, C

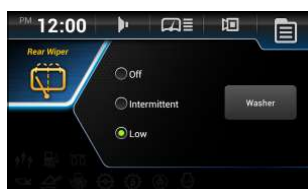
Initialize accumulated value at memory daily, A, B and C.

③ Error detection

Set error detection ON/OFF.

※ Refer to the page 3-22 for details.

(12) Rear wiper and washer switch



760F3CD89-1

① This switch use to operates the rear wiper and washer.

When pressing the switch, the mode is changed sequence base.
(OFF → intermittent → Low → OFF)

· **Intermittent** : The rear wiper operates intermittently.

· **Low** : The rear wiper is operated lower speed.

· **Washer** : The washer liquid is sprayed while long pressing the button.

② The green pilot lamp is turned ON.

(13) Beacon lamp switch (option)



760F3CD88

- ① This switch turns ON the rotary light on the cab.
- ② The green pilot lamp is turned ON.

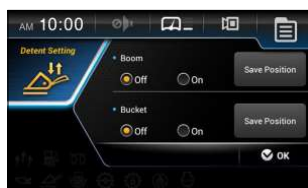
(14) Mirror defrost switch (option)



760F3CD65

- ① **ON**
 - In condition of ON, it operates for 15 minutes. After 15 minutes, the defrost function stops automatically.
 - The green pilot lamp is turned ON.
- ② **OFF**
 - Stops defrost function.

(15) Detent setting switch



760F3CD66

- ① **Boom and bucket**
 - Set the boom and bucket detent function ON/OFF.
- ② **Save position**
 - Set the boom kickout and bucket leveler.
 - Refer to page 4-22.

※ **The green pilot lamps are turned ON.**

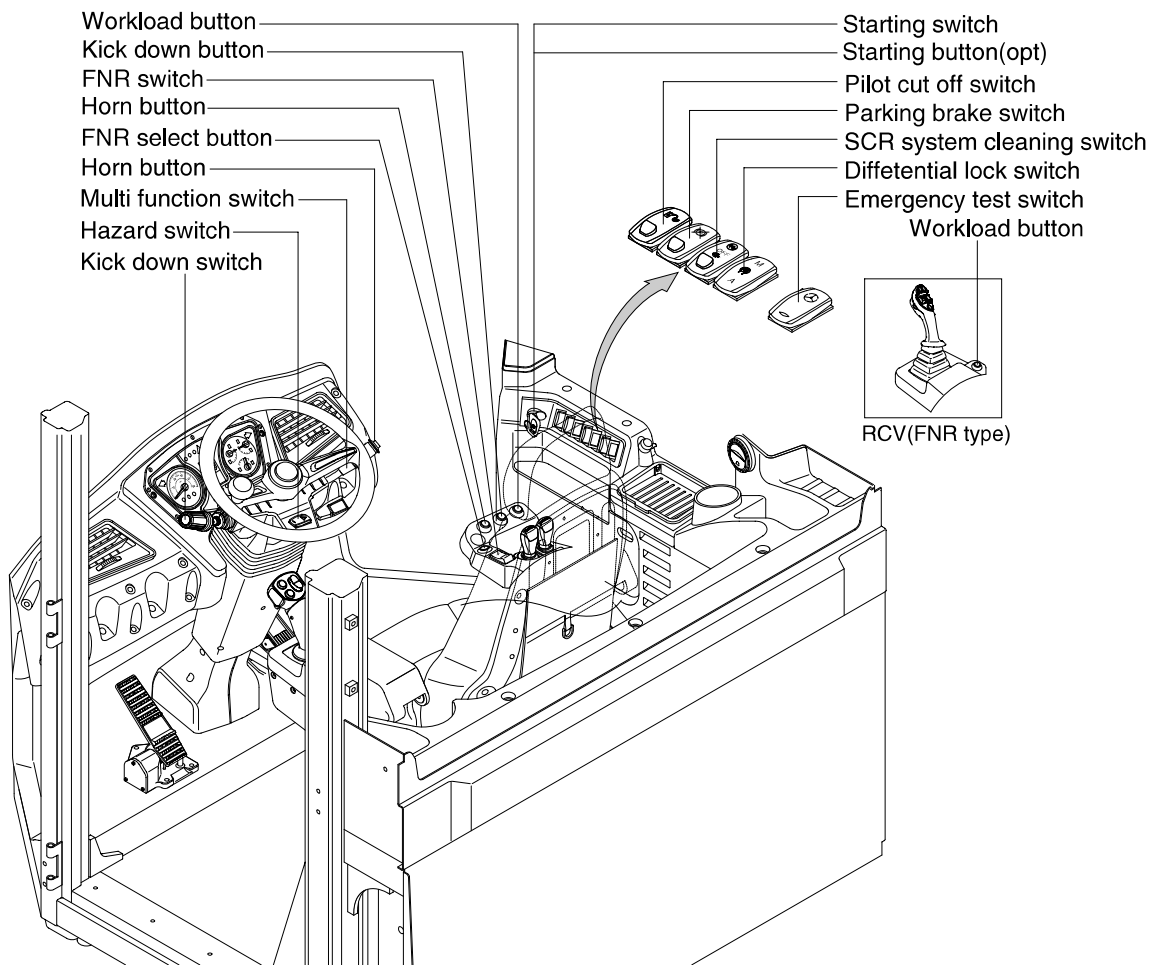
(16) Fine modulation switch



760F3CD67

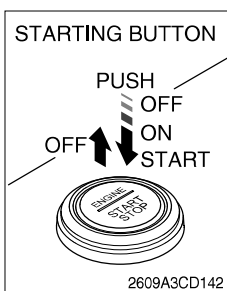
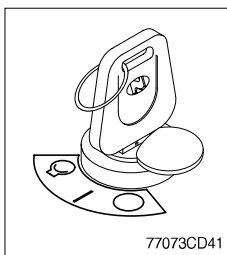
- ① **ON**
 - Remote control lever provide the operator with precise control of the work equipment (bucket and boom cylinders can be controlled precisely).
 - The green pilot lamp is turned ON.
- ② **OFF**
 - Turn off the function.

4. SWITCHES



760F3CD29

1) STARTING SWITCH & STARTING BUTTON (OPT)



Starting button with smart key tag (opt)

(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.

※ If you turn ON the starting switch in cold weather, the fuel warmer is automatically operated to heat the fuel by sensing the coolant temperature. Start the engine in 1~2 minutes after turning ON the starting switch. More time may take according to ambient temperature.

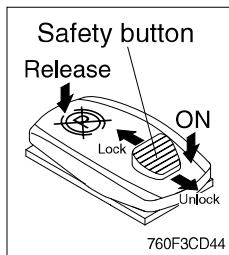
※ Key must be in the ON position with engine running maintain electrical and hydraulic function and prevent serious machine damage.

2) PILOT CUT OFF SWITCH



- (1) When the switch is pressed to OFF position, the hydraulic pilot line will be cut off, so the work equipment will not operate.
 - (2) Press the ON position in order to unlock the hydraulic pilot line.
- ※ This switch can be set to ON or OFF position only when the safety button is pulled to the unlock position.

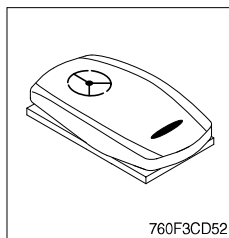
3) PARKING BRAKE SWITCH



- (1) When the switch is pressed to ON position, the parking brake will start to operate and the cluster warning lamp will come ON.
 - (2) Press the release position in order to disengage the parking brake.
- ※ When operating the gear selector lever, be sure to release the parking brake. If the machine is operated with the parking brake engaged, the brake will overheat and may cause the brake system to go out of order.

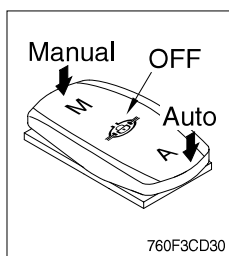
※ This switch can be set to ON or Release position only when the safety button is pulled to the unlock position.

4) EMERGENCY TEST SWITCH (option)



- (1) The emergency steering system can be manually tested. Push the switch in order to determine if the emergency steering and the emergency steering lamp are functional.
- (2) When the switch is pressed, the emergency steering pump motor will run. The emergency steering lamp will light. If the emergency steering lamp does not light, do not operate the machine.

5) DIFFERENTIAL LOCK SWITCH (option)



- (1) This switch is used to apply differential lock. The differential lock gives equal power to both front wheels and is used in conditions when traction is poor.

(2) Manual mode

Press the **M** of the switch for the manual mode of the differential lock function. You press the switch, the differential lock will engage immediately and differential lock pilot lamp lights ON (buzzer sounds). Manual mode is temporarily engaged as long as the operator pushes the switch. When the switch is released, differential lock function is disengaged and the switch returns to OFF position.

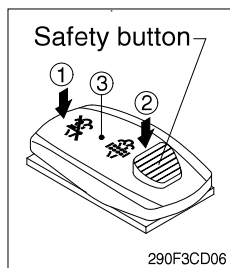
(3) Auto mode

Press the **A** of the switch for auto mode of the differential lock function. If you press the switch, the axle differential lock will automatically engage when the differential function is used.

※ While the axle differential lock function is operating, the differential lock pilot lamp lights ON.

※ Refer to page 3-12 and 3-52 (diff lock foot switch).

6) SCR (selective catalytic reduction) SYSTEM CLEANING SWITCH



(1) This switch is used to select the SCR system cleaning.

(2) Inhibit position (①)

- ① The inhibit position disallows any automatic or manual SCR system cleaning.
- ② This may be used by operator to prevent SCR system cleaning when the machine is operating in a hazardous environment is concerned about high temperature.
- ③ It is strongly recommended that this position is only activated when high temperatures may cause a hazardous condition.

(3) Automatic SCR system cleaning position (③)

This position will initiate a automatic SCR system cleaning.

(4) Manual SCR system cleaning position (②)

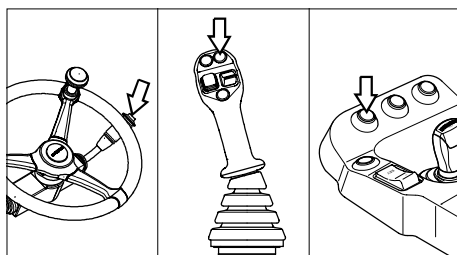
- ① This position will only initiate a manual SCR system cleaning when the machine is in non-mission condition, engine must run at low idle speed and SCR system levels are high enough to allow cleaning.
- ② HEST lamp will be illuminated during the entire SCR system cleaning.

※ Refer to the page 3-9 for details.

※ This switch can be move to the SCR system cleaning position (②) only when the safety button is pulled to backward.

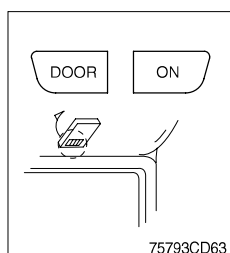
※ Also, this switch return to the OFF position when released the manual SCR system cleaning position (②).

7) HORN BUTTON



(1) If you press the button, the horn will sound.

8) CAB LAMP SWITCH



(1) This switch turns ON the cab room lamp.

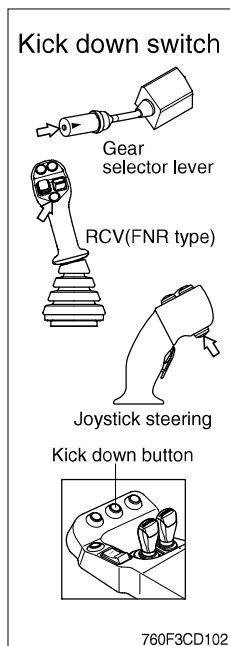
① DOOR

The lamp comes ON when the door is opened.
When the door is closed the lamp is OFF.

② ON

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

9) KICK DOWN SWITCH



(1) Manual mode

It is effective 2nd speed to 1st speed only and recover to 2nd speed quickly when push the switch one more time.

(2) Automatic mode

① Mode 1 (down/up)

It shifts down quickly from current gear to one step lower speed by pushing the switch and recover to current speed quickly when push the switch one more time.

② Mode 2 (down)

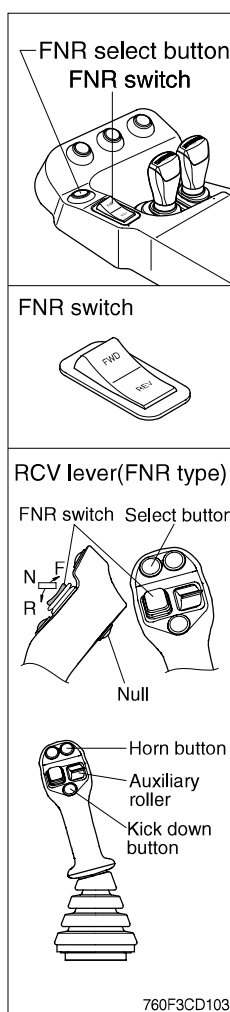
It shifts down from current gear to one step lower speed when push the switch every time.

The kick down function is released in only 1st speed.

※ Refer to page 3-20 for the kick down mode.

※ The normal autoshift function continues after the kick down switch is released.

10) FNR SELECT BUTTON AND SWITCH



(1) These button and switch are used for forward and backward drive.

※ Gear range can be selected by gear selector lever.

(2) FNR select button

① If the select button is pressed, the indication lamp on the cluster will be ON and this FNR switch will start to operate.

※ When the engine is running, the machine is on standstill (0 speed), parking brake is released, gear selector lever is in the neutral position, you can use this function after pressing the select button.

(3) FNR switch

- F : Forward drive
- N : Neutral
- R : Reverse drive

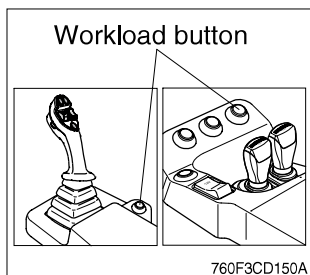
① If the upper side (F, FWD) of this switch is pushed, the machine moves forward.

② If the down side (R, REV) of this switch is pushed, the machine moves backward.

③ This function is automatically released when the engine is stopped, parking brake is ON or gear selector lever is out of neutral.

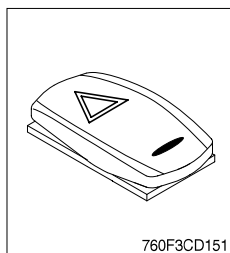
(4) Auxiliary roller : If the machine is equipped with auxiliary hydraulics, this roller is used for the attachments.

11) WORKLOAD BUTTON



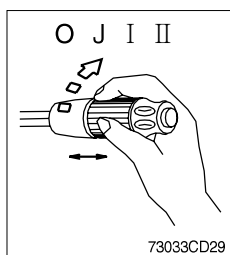
- (1) This button is used to calculate the weight manually.
If the button is not pushed, the weight of the weighing system is not calculated.
 - (2) This button is pushed for one second more, calculated weight will be accumulated.
- ※ **Refer to the page 3-22, weighing system.**

12) HAZARD SWITCH



- (1) Use for parking or loading the machine.
 - (2) Both turn signal lights will flash simultaneously.
- ※ **If the switch is left ON for a long time, the battery may be discharged.**

13) MULTI FUNCTION SWITCH

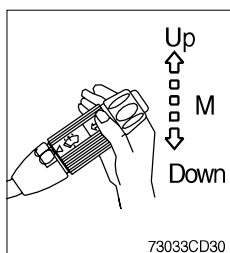


(1) Front wiper and washer switch

- ① When the switch is in J position, the wiper moves intermittently.
- ② When placed in I or II position, the wiper moves continuously.
- ③ If you push the grip of the lever, washer liquid will be sprayed and the wiper will be activated 2-3 times.

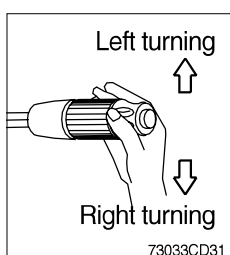
※ **Check the quantity of washer liquid in the tank. If the level of the washer liquid is LOW, add the washer liquid (in cold, winter days) or water. The capacity of the tank is 1 liter.**

※ **If the wiper does not operate with the switch in ON (J, I, II) position, turn the switch OFF (O) immediately and check the cause. If the switch remains ON, motor failure can result.**



(2) Dimmer switch

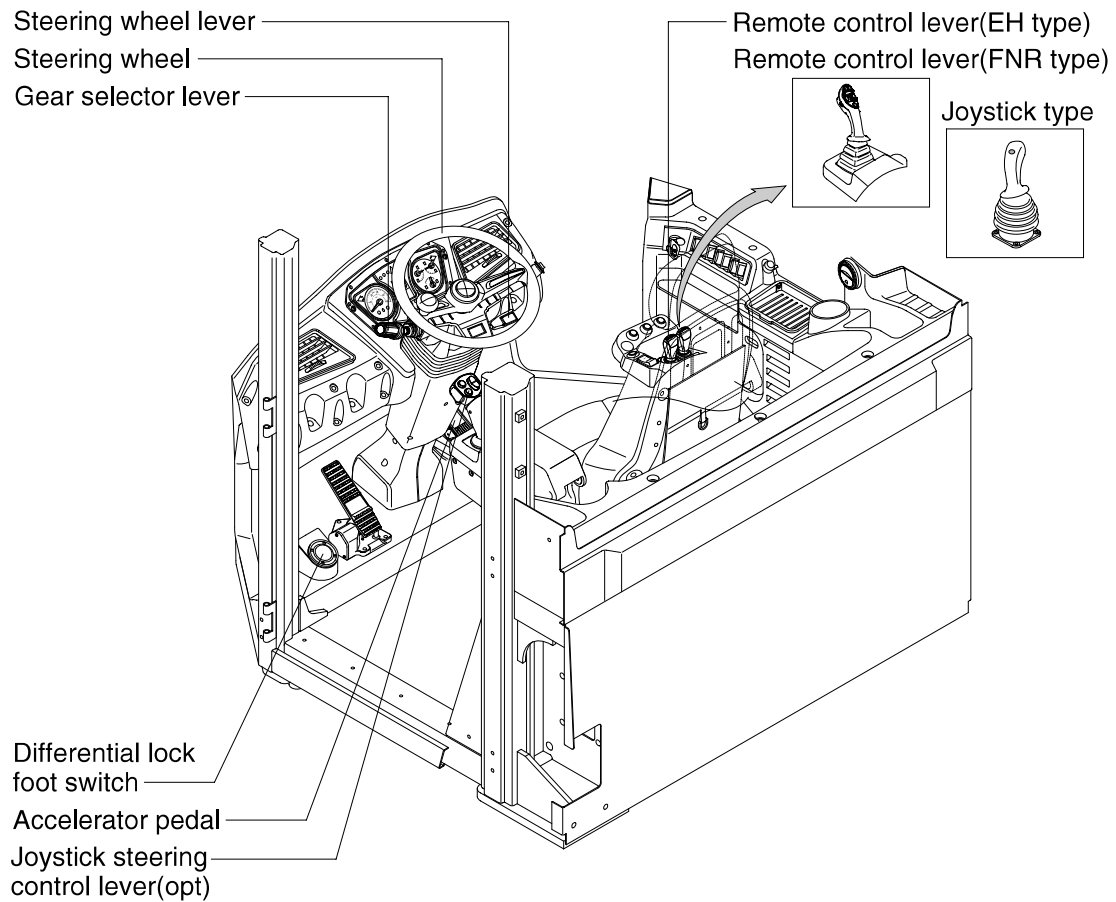
- ① This switch is used to turn the head lights direction.
- ② Switch positions
 - Up : To flash for passing
 - Middle : Head lights low beam ON
 - Down : Head lights high beam ON
- ③ If you release the switch when it's in up position, the switch will return to middle.



(3) Turning switch

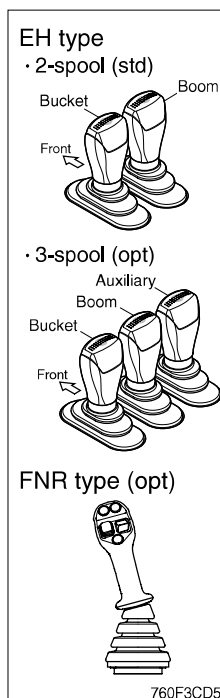
- ① This switch is used to warn or signal the turning direction of the machine to other vehicles or equipment.
- ② Push the lever up for turning left, pull the lever down for turning right.

5. CONTROL DEVICE



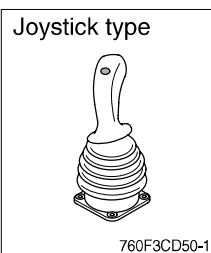
760F3CD28-1

1) REMOTE CONTROL LEVER

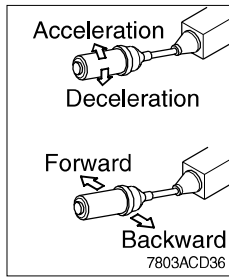


- (1) These levers are used to control the boom and the bucket.
- (2) Refer to operation of working device in chapter 4 at page 4-9.

※ EH : Electro-hydraulic
FNR : Forward - Neutral - Reverse

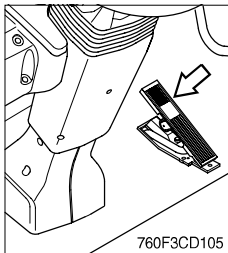


2) GEAR SELECTOR LEVER



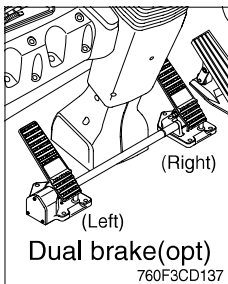
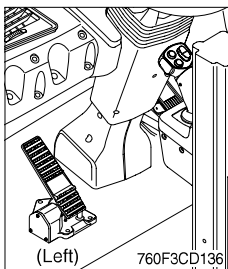
- (1) This lever is used for gear selection, forward 4 stages and reverse 3 stages.
- (2) If you push the gear selector lever, the machine moves forward, but if you pull the gear selector lever, the machine moves backward.
- (3) If you turn the gear selector lever forward, the machine increases the speed, but if you turn the gear selector lever backward, the machine reduces the speed.

3) ACCELERATOR PEDAL



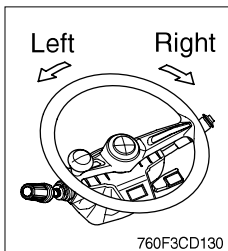
- (1) This pedal controls the engine speed. The engine speed will increase in proportion to the degree of force applied to this pedal.
- (2) Unless this pedal is pressed, the machine will run at low idling.

4) BRAKE PEDAL



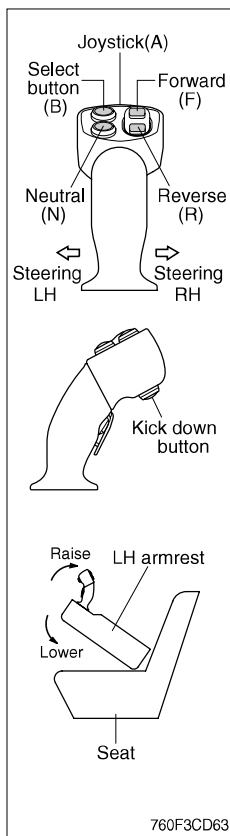
- (1) **Left brake pedal** (service brake + clutch cut off function)
 - ① If the pedal is pushed down, this will generate braking force and bring the machine to a stop.
 - ② If the power train operation is to be cut off, set the clutch cut off mode to ON (L, M, H) and press the pedal.
 - ⚠ **Even if the brake is applied while clutch cut off mode is OFF, power train will not cut off.**
 - ※ **Do not operate the machine with foot the brake pedal unnecessarily, or bring premature wear of brake disc.**
 - ③ Clutch cut off function : Refer to page 3-20.
- (2) **Right brake pedal** (service brake function only)
This pedal functions as service brake only.

5) STEERING WHEEL



- (1) Two multi-motion cylinders in the center of the machine will operate the steering function.
- (2) If the steering wheel is turned to left, the machine will move to the left and turn it to the right, the machine will move to the right.

6) JOYSTICK STEERING CONTROL LEVER (option)



- (1) The system has the following functions concentrated to a collapsible arm rest : steering, forward /reverse drive and kickdown function.
- (2) This means that during normal loading work, the operator does not need to touch the steering wheel.

- (3) The joystick steering pilot lamp on the cluster will be ON when the lever steering is activated.


▲ When operating on a public road, the steering wheel should always be used and the joystick steering be disconnected. Also when operating at high speeds (above 20 km/h) on a work site, always use the steering wheel.

(4) Joystick (A)

- ① Joystick steering can be enabled after following conditions have been satisfied.

- Engine is running. - Operator is seat on the seat.
- LH armrest is placed to the lowered position.
- Gear selector lever is in neutral.
- RCV is deactivated. - Joystick (A) is placed in normal position.
- Parking brake is disengaged, but the machine speed is zero.

- ② After above conditions are met, press the select button (B).

Then joystick steering pilot lamp  on the cluster will be ON and joystick steering can be activated.

- ③ Steering will remain enabled until machine speed is zero and one of the following conditions is met.

- LH armrest is raised. - Parking brake is engaged.
- Gear selector lever is in forward or backward position.
- Operator is not seated on the seat. - Press the select button (B).

※ The steering wheel works as usual, even if the joystick steering is activated.

(5) Forward/reverse selection button

F : Forward drive

N : Neutral

R : Reverse drive

- ① To be able to operate the forward /reverse drive, the system must first be activated using select button (B).

※ **The ordinary gear selector control should be in neutral.**

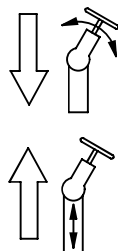
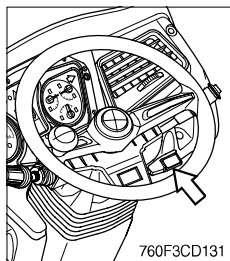
- ② When this function is engaged, it is possible to operate the forward -reverse drive. If the ordinary gear selector control is activated at the same time as the joystick steering is activated, the ordinary gear selector control overrides any selection made by the joystick steering.

To reactivate the joystick steering, the ordinary gear selector control must first be moved to neutral and the system again be activated.

- ③ The FNR select pilot lamp  on the cluster will be ON when the forward / reverse selection is activated.

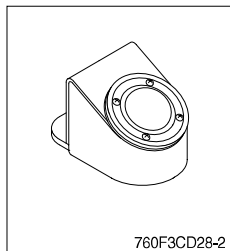
(6) Kick-down button : Refer to page 3-47.

7) STEERING WHEEL LEVER



- (1) By pulling down the lever, the wheel is adjustable to tilt.
 - Tilting : 40°
- (2) By pulling up the lever, the wheel is adjustable to telescope.
 - Telescoping : 80 mm

8) DIFFERENTIAL LOCK FOOT SWITCH



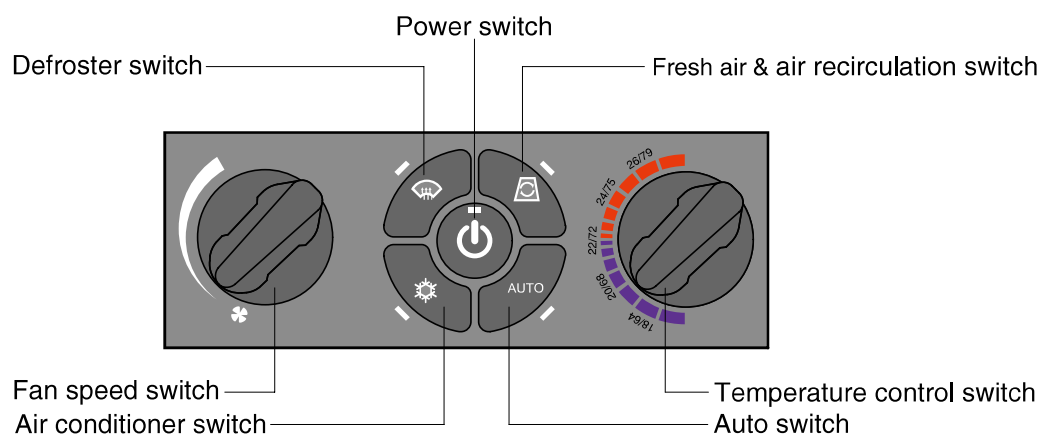
- (1) Press the foot switch for the differential lock function.

You press the foot switch, the differential lock will engage immediately and differential lock pilot lamp lights ON (buzzer sounds).
- (2) Differential lock function is temporarily engaged as long as the operator press the foot switch. When the foot switch is released, differential lock function is disengaged.

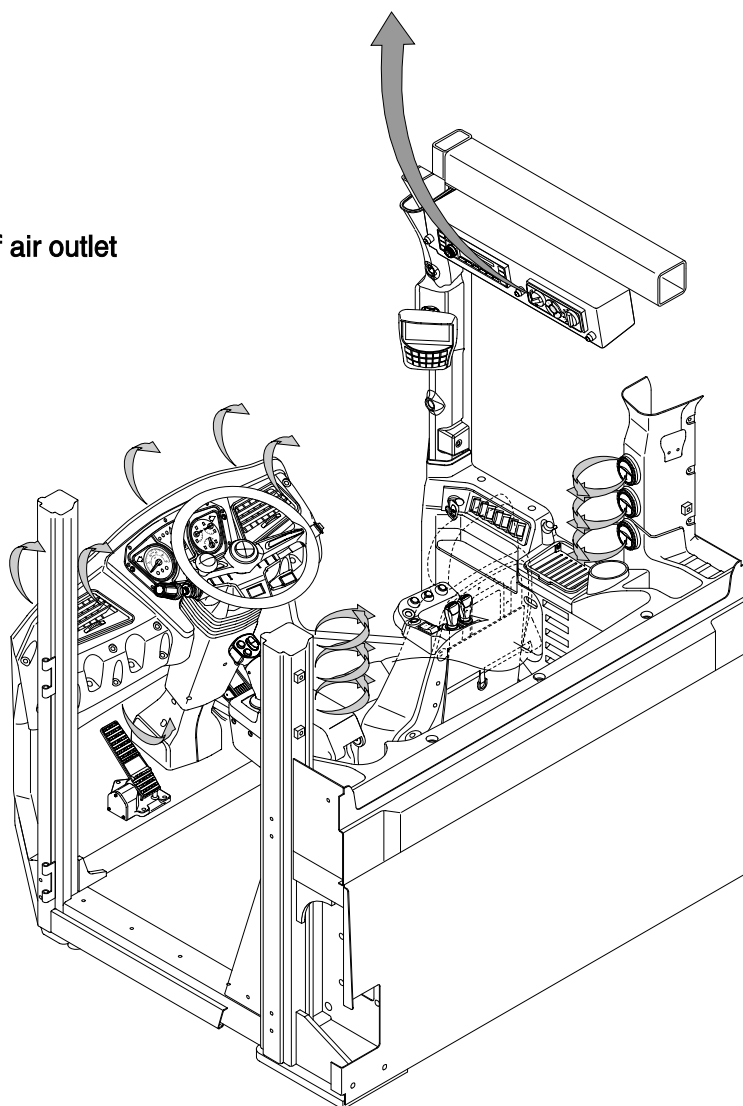
6. AIR CONDITIONER AND HEATER

■ FULL AUTO AIR CONDITIONER AND HEATER

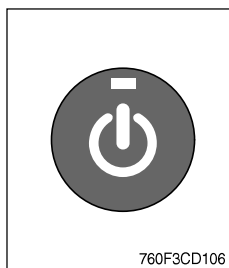
Full auto air conditioner and heater system automatically keeps the optimum condition in accordance with operator's temperature configuration sensing ambient and cabin inside temperature.



· Location of air outlet



1) POWER SWITCH



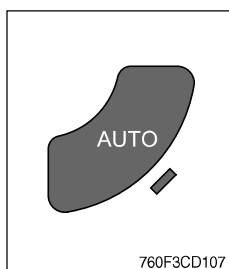
- (1) This switch makes the system ON or OFF.
Just before the power OFF, set values are stored.

(2) Default setting values

| Function | Air conditioner | In/outlet | Temperature |
|----------|-----------------|-----------|-----------------|
| Value | OFF | Inlet | Previous sw OFF |

※ The green pilot lamp is turned ON.

2) AUTO SWITCH

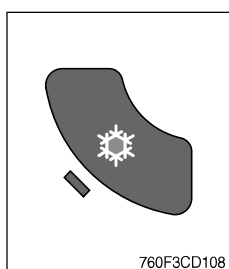


- (1) This switch sets the air conditioner and heater system to automatic temperature control.

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

※ The green pilot lamp is turned ON.

3) AIR CONDITIONER SWITCH (compressor switch)



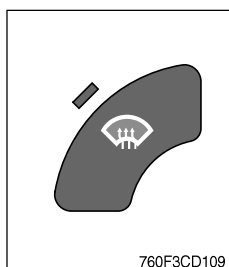
- (1) This switch turns the compressor for the air conditioning.
(2) In accordance with the temperature sensed by duct (evaporator) sensor, compressor turns ON or OFF automatically.

※ **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.

※ The green pilot lamp is turned ON.

4) DEFROSTER SWITCH



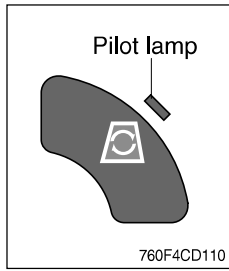
- (1) Defroster and ventilation nozzles at window open and directed toward the windows.

(2) Default setting values

| Function | Air conditioner | In/outlet | Blower |
|----------|-----------------|-----------|--------------------|
| Value | ON | Outlet | Max for 15 minutes |

※ The green pilot lamp is turned ON.

5) FRESH AIR/AIR RECIRCULATION SWITCH



(1) It is possible to change the air-inlet method.

① Fresh air (pilot lamp OFF)

Inhaling air from the outside.

※ **Check out the fresh air filter periodically to keep a good efficiency.**

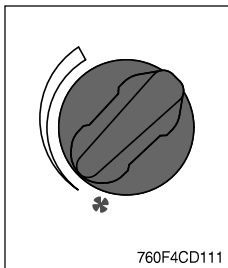
② Air recirculation (pilot lamp ON)

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.**

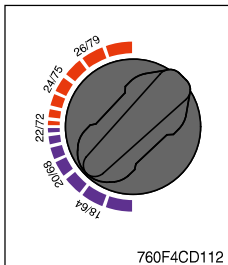
6) FAN SPEED KNOB



(1) This knob controls fan speed manually.

There are 9 steps to control fan speed.

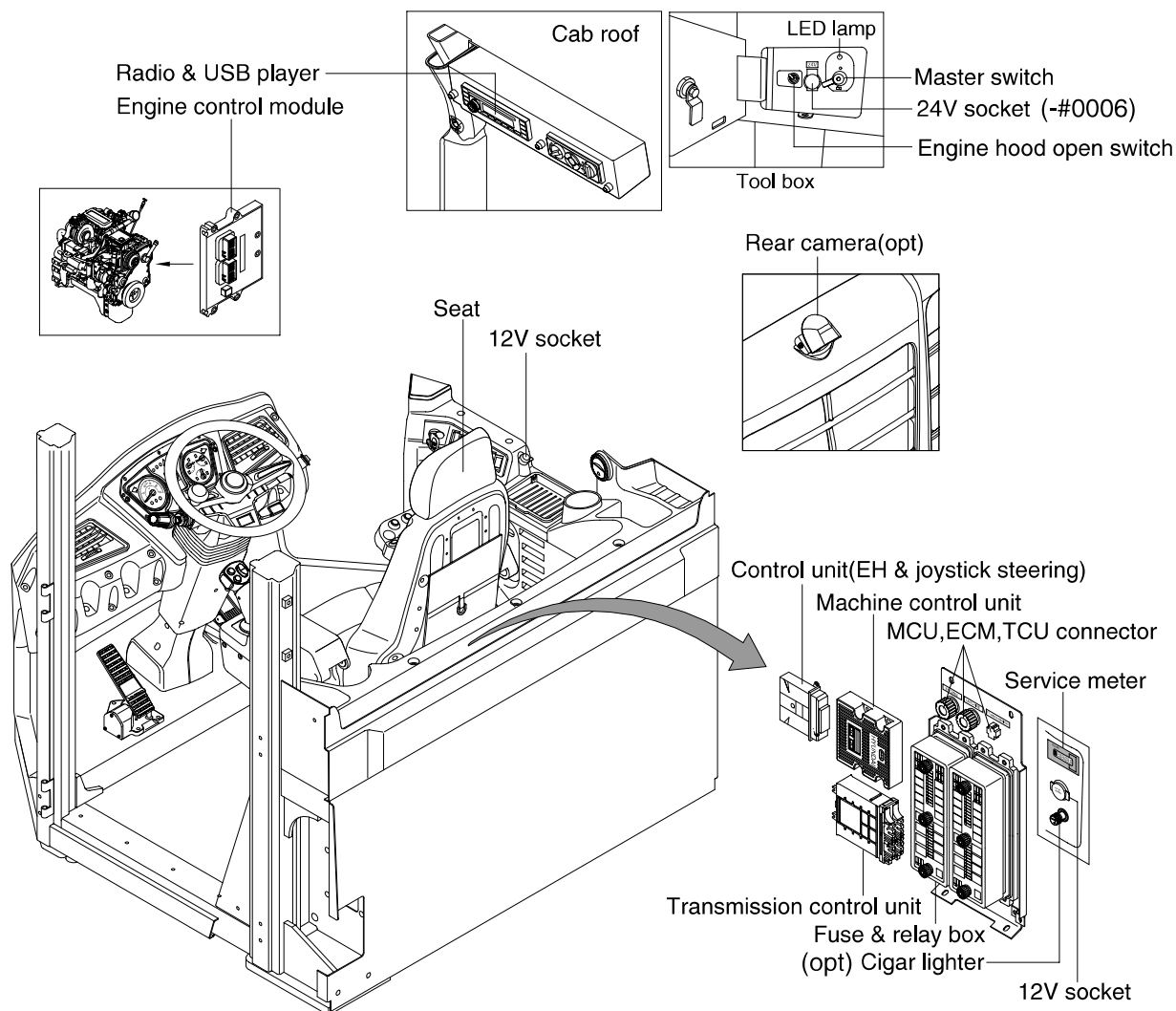
7) TEMPERATURE CONTROL KNOB



(1) This knob controls the position of the water valve when the air conditioner switch is ON or OFF.

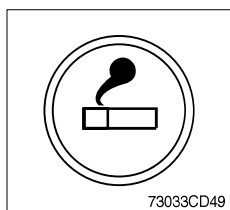
(2) When the AUTO switch is ON, the temperature control knob determines the desired cab temperature. The temperature range is 18°C (64°F) in the full cold position and 26°C (79°F) in the full hot position.

7. OTHERS



9653CD38

1) CIGAR LIGHTER



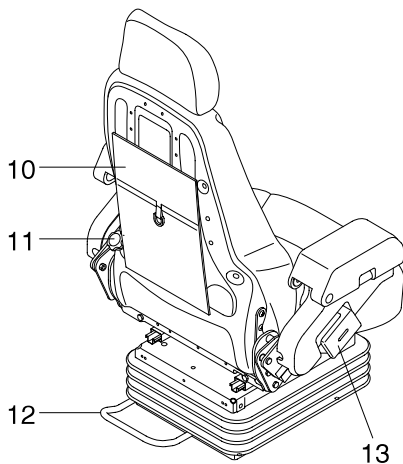
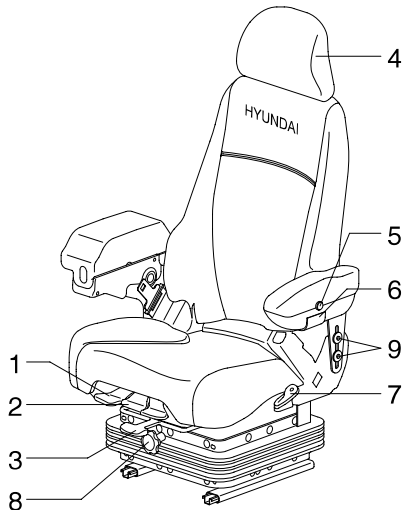
- (1) This can be used when the engine starting switch is ON.
- (2) The lighter can be used when it springs out in a short while after being pressed down.

※ Service socket

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

2) 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.



760F3CD132

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

⚠ Fail to wear a seat belt during the machine operation may result in serious injury or death in the event of an accident or machine overturn.

(1) Cushion thigh extension

- ① Extends seat cushion fore and aft.
- ② Pull up & hold to adjust cushion +/- 30 mm.
- ③ Release to stop cushion.

(2) Cushion thigh tilt

- ① Tilts Seat cushion up and down.
- ② Pull up on knob & hold cushion to adjust + 4 degrees.
- ③ Pull up on knob & push down on cushion to adjust - 4 degrees.
- ④ Release knob to stop cushion.

(3) Slide release lever

- ① Moves the seat top fore/aft.
- ② Pull, hold & slide forward or rearward maximum 100 mm (10 mm increments).
- ③ Release to stop slide.

(4) Headrest

- ① Adjusts height & tilt for head.
- ② Hold & pull up for higher adjustment.
- ③ Hold & push down for lower adjustment.
- ④ Hold and rotate down 10 degrees (1st position).
- ⑤ Hold and rotate down 20 degrees (2nd position).
- ⑥ Hold and rotate down 30 degrees (3rd position).
- ⑦ Hold and rotate down to return head rest to 0 degree position.

(5) Heater switch (option)

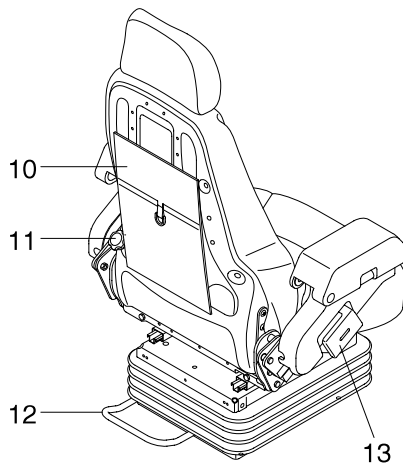
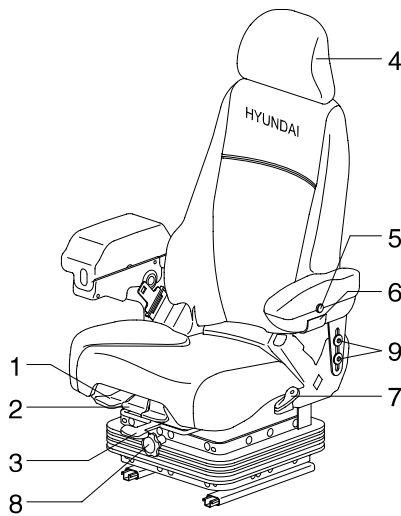
- ① Turns ON/OFF cushion heaters.
- ② Push switch upward to turn on.
- ③ Push switch downward to turn off.

(6) Armrest tilt knob

- ① Tilts armrests.
- ② Roll towards operator to tilt down maximum 15 degrees.
- ③ Roll away from operator to tilt up maximum 15 degrees.

(7) Recliner knob

- ① Angles back rest cushion.
- ② Pull up & hold to adjust angle of back rest.
- ③ Release to stop recline of back rest.
- ④ Maximum recline : 20 degrees.



760F3CD132

(8) Ride firmness/height adjust knob

- ① Adjusts suspension ride.
- ② Turn clockwise for a firmer/higher ride.
- ③ Turn counter-clockwise for a softer/lower ride.

(9) Armrest height

- ① Adjusts height of armrests.
- ② Loosen bolts & move armrests up or down.
- ③ Hold & tighten after adjustment.
- ④ Maximum travel : 27.5 mm.

(10) Document pouch

- ① Holds various manuals.
- ② Pull on hook & loop fastened flap to open.
- ③ Push on hook & loop fastened flap to close.

(11) Lumbar knob

- ① Adjusts curvature of lumbar.
- ② Rotate towards operator for more curve.
- ③ Rotate away from operator for less curve.

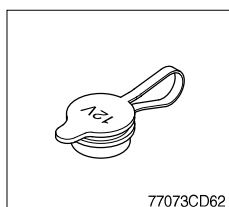
(12) Service slide release lever

- ① Moves the seat top & suspension fore/aft (for use of service & maintenance in back of cab only).
- ② Pull, hold & slide forward.
- ③ Release to stop slide.
- ④ Maximum travel : 100 mm forward.

(13) ECA slide knob

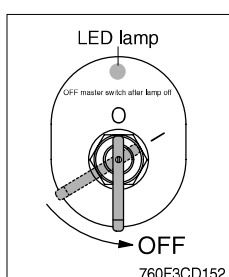
- ① Adjusts height & length of armrest.
- ② Pull, hold & slide forward or rearward.
- ③ Release knob to stop arm rest.
- ④ Fore adjustment : + 76 mm.
- ⑤ Aft adjustment : - 64 mm.
- ⑥ 12.7 mm increments (on 25 degree fixed tilt).

3) 12V SOCKET (option)



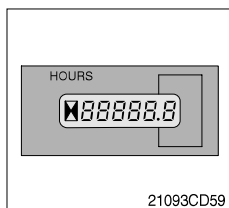
- (1) Utilize the power of 12 V as your need and do not exceed power of 12 V, 30 W.

4) MASTER SWITCH



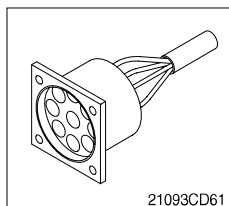
- (1) This switch is used to shut off the entire electrical system.
 - (2) I : The battery remains connected to the electrical system.
O : The battery is disconnected to the electrical system.
- ※ OFF master switch after LED lamp off.
- ※ Never turn the master switch to O (OFF) with the engine running.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

5) SERVICE METER



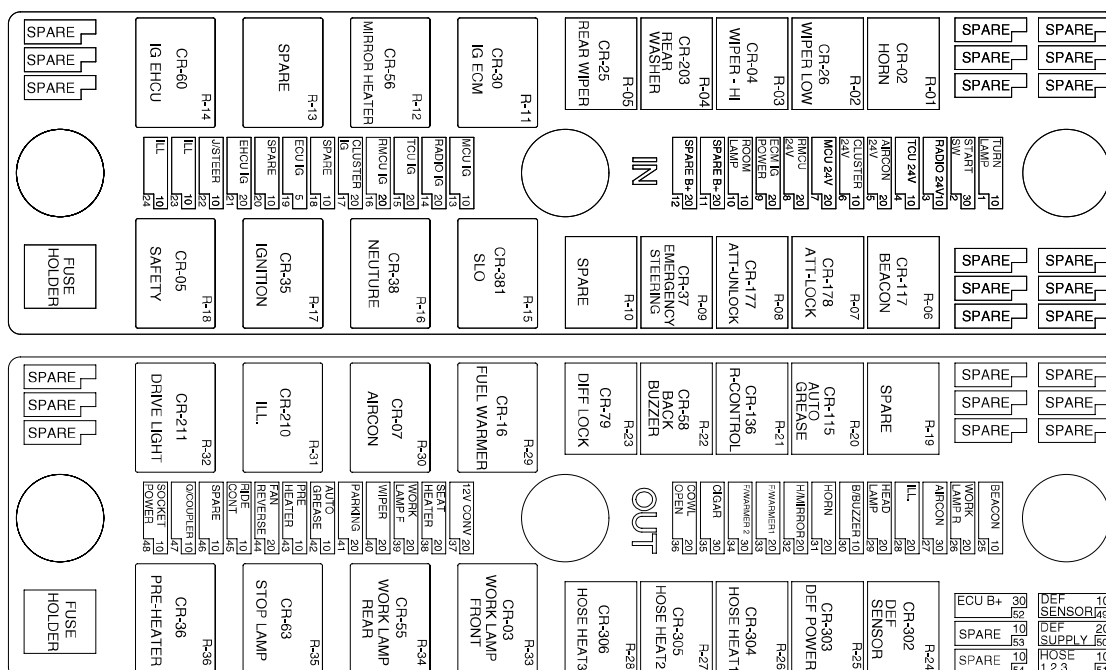
- (1) This meter shows the total operation hours of the machine.
- (2) Always ensure the operating condition of the meter during the machine operation. Inspect and service the machine based on hours as indicated in chapter 6, maintenance.

6) MCU/ECM/TCU CONNECTOR



- (1) MCU communicates the machine data with Laptop computer through RS232 service socket.
- (2) ECM communicates the engine data with cummins INSITE adapter through J1939 service socket.
 - ① ECM fault code check
 - ② ECM program change
 - ③ Engine data monitoring & test
- (3) TCU communicates the transmission data with adapter cable.

7) FUSE & RELAY BOX



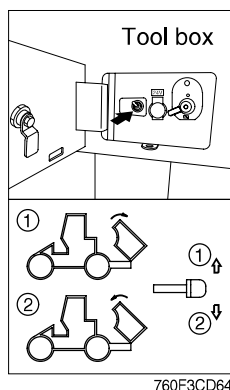
760F3CD55

- (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.

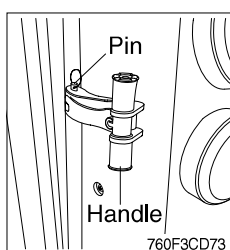
8) ENGINE HOOD OPEN TOGGLE SWITCH



- (1) Move the toggle switch up to position ① in order to open the hood.
- (2) Move the toggle switch down to position ② in order to close the hood.
- (3) Hold the switch until the hood is fully opened or closed. Release the switch. The switch will return to the middle position.

※ Refer to the page 4-28.

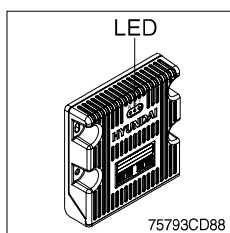
9) TILT HANDLE (FOR RIGHT SIDE WINDOW)



- (1) Pull handle backward and push the handle outward in order to open the window to the partial open position. Remove pin from the handle. Push the window to the fully open position.

※ Open the window periodically in order to ensure proper operation. Lubricate or repair the window as necessary.

10) MACHINE CONTROL UNIT (MCU)



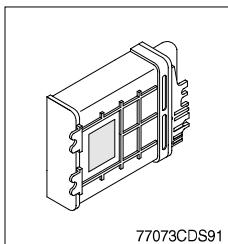
- (1) It consists of electronic parts and controls all lamps and buzzers on cluster in accordance with signals transmitted from the switches, the ECM, TCU, the engine and the hydraulic pressure sensors.

- (2) Three LED lamps on the MCU display as below.

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

G : green, R : red, Y : yellow

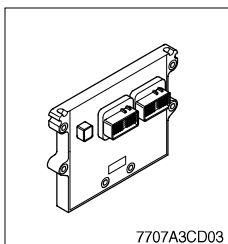
11) TRANSMISSION CONTROL UNIT (TCU)



(1) The control unit is shifting the required speeds fully-automatically under consideration of the following criteria.

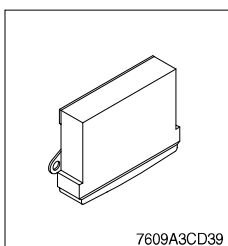
- Gear selector lever position
- Driving speed
- Load level

12) ENGINE CONTROL MODULE (ECM)



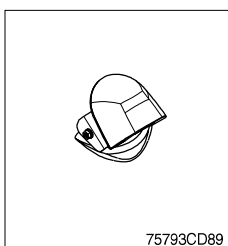
(1) The engine control module (ECM) is the control center of the engine system.

13) CONTROL UNIT (electro hydraulic & joystick steering, EHCU)



(1) The control unit is the control center of the EH control lever and joystick steering system.

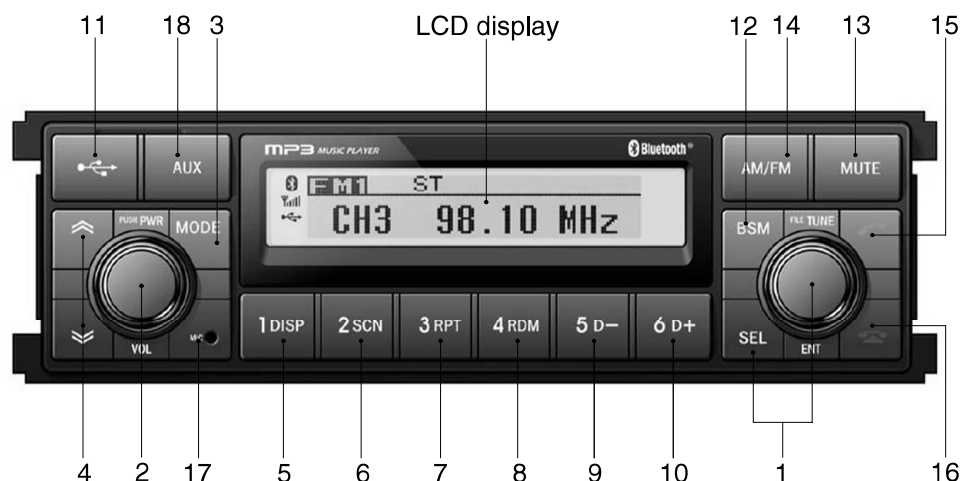
14) REAR CAMERA (option)



(1) The rear camera is available as a option.

※ Refer to page 3-35.

15) RADIO AND USB PLAYER (WITH BLUETOOTH) : MACHINE SERIAL NO.: ~#0004



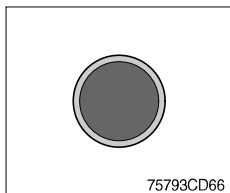
75793CD62-2

■FRONT PANEL PRESENTATION

- | | | | | | |
|---|--|--|----|--|---|
| 1 | | Audio selection button | 10 | | Preset memory button 6 D+ Directory up |
| | | Audio selection knob | 11 | | Aux function |
| 2 | | Power and volume button | 12 | | Preset scan (PS) Best station memory (BSM) |
| 3 | | Mode button (select RADIO / USB / AUX) | 13 | | Audio mute button |
| 4 | | UP / DOWN tuning button | 14 | | AM / FM button (radio) |
| 5 | | Preset memory button 1 DISP ID3 v2 display | 15 | | Send |
| 6 | | Preset memory button 2 SCN File scan | 16 | | End |
| 7 | | Preset memory button 3 RPT Repeat play selector | 17 | | MIC (microphone) |
| 8 | | Preset memory button 4 RDM Random play selector | 18 | | Aux connector |
| 9 | | Preset memory button 5 D- Directory down | | | |

■GENERAL

(1) Power and volume button



① Power ON/OFF button

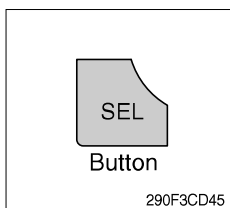
Press power button to turn the unit ON or OFF shortly.

When the power is ON, the previous mode (last memory) will appear.

② Volume up / down control

Turn volume up / down button right to increase the volume level. The level will be shown in VOLUME xx on the LCD display. Turn it left to decrease the volume level. After 5 seconds of volume indication, display will return to the previous mode.

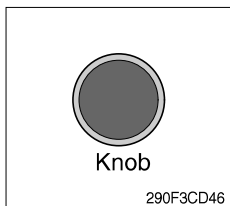
(2) Sound function selection button/knob (audio selection)



① This button is to adjust the sound. Each time you press SEL button shortly, LCD displays each mode as follows :

BASS → TREBLE → BAL → LOUD → EQ → BASS

※ When this button is pressed, LCD display shows selected function for 5 seconds and then returns back to the previous mode. On selected function, level can be controlled by turning this button. The display will automatically return to normal indication in 5 seconds after the last adjustment is made or when another function is activated.



② Bass control

To adjust the bass level, first select the bass mode by pressing the SEL button until BASS indication appears on the LCD display. Within 5 seconds of choosing the bass mode, turn selection knob right / left to adjust the bass level as desired.

The bass level will be shown on the LCD display from a minimum of BASS -10 to a maximum of BASS +10.

The display will automatically return to the normal indication in 5 seconds after the last adjustment or when another function is activated.

③ Treble control

To adjust the treble level, first select the treble mode by pressing the SEL button until TREBLE indication appears on the LCD display. Within 5 seconds of choosing the treble mode, turn selection knob right / left to adjust the treble level as desired.

The treble level will be shown on the LCD display from a minimum of TREBLE -10 to a maximum of TREBLE +10.

The display will automatically return to the normal indication in 5 seconds after the last adjustment or when another function is activated.

④ Balance control

To adjust the left-right speaker balance, first select the balance mode by pressing the SEL button until the BAL indication appears on the LCD display.

Within 5 seconds of choosing the balance mode, turn selection knob right / left to adjust the balance as desired.

The balance position will be shown on the LCD display from BAL 10L (full left) to BAL 10R (full right).

When the volume level between the left and right speakers is equal, BAL L=R will be shown on the LCD display panel.

The display will automatically return to the normal indication in 5 seconds after the last adjustment or when another function is activated.

⑤ 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.

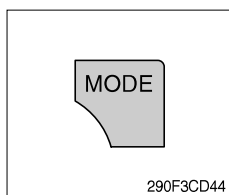
To select the loudness feature, press SEL button until LOUD ON or LOUD OFF is displayed, then turn selection knob left or right to activate or deactivate loudness.

⑥ Equalizer (EQ)

You can select an equalizer curve designed for 4 music types (POP, ROCK, CLASSIC, JAZZ).

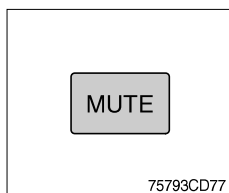
To select the desired curve, first select the EQ mode by pressing SEL button until the "EQ OFF" indication appears on the display panel. Within 5 seconds of choosing the EQ mode, turn selection knob to select an equalizer curve as desired.

(3) Mode button



- ① Press mode button to select RADIO / USB / AUX / BT audio.

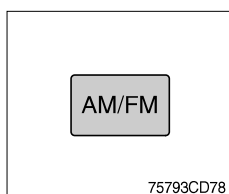
(4) Audio mute button



- ① Press mute button momentarily to mute volume and MUTE mark will blink on the LCD display. Press the button again to return to the mode in use before the mute mode was activated.

■RADIO

(1) AM / FM / LW band selector

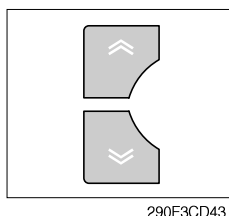




- ① Each time this button is pressed, the radio button is changed. Each time this button is pressed, LCD displays each band as follows :

FM1 → FM2 → FM3 → AM → LW → FM1

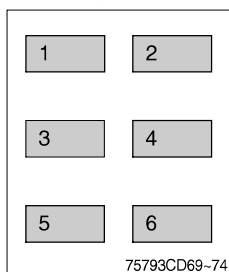
※ LW band is only available for Europe.

(2) Up / down tuning



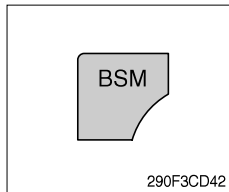
- ① To automatically select a radio station, momentarily press the up tune seek button  or down tune seek button  for less than 3 seconds to search for the closest radio station. To manually select a radio station, press the up tuning & down tuning button for longer than 3 seconds. The radio frequency will move up or down step by step each time you press button.

(3) Station pre-set button



- ① Pressing these buttons shortly will recall your favorite pre-set radio stations. To store your favorite stations into any of the 6 pre-set memories in each band (AM/FM/LW), use the following procedure :
 - a. Turn the radio ON and select the desired band.
 - b. Select the first station to be pre-set using the manual up/down or automatic seek tuning control button.
 - c. Press the chosen pre-set button to store your selected station into and continue to hold it in. The beep sound will be momentarily heard and the pre-set number will appear on the LCD display indicating that the station is now set into that pre-set memory position and can be recalled at any time, by pressing that pre-set button.

(4) Pre-set scan (PS) / Best station memory (BSM) button



① Pre-set scan (PS)

Press BSM button shortly to scan the 6 pre-set station stored the memories on each band (AM/FM/LW).

The unit will stop at each pre-set station (the pre-set number on the LCD display will flash during pre-set scan operation) and remain on the selected frequency. Press the button momentarily again to remain on the station currently being heard.

② Best station memory (BSM)

Pressing BSM button for longer than 2 seconds will activate the BSM tuning feature which will automatically scan and enter each station into memory.

If you have already set the pre-set memories to your favorite stations, activating the BSM tuning feature will erase those stations and enter the new ones.

This BSM feature is most useful when traveling in a new area where you are not familiar with the local stations.

■ USB PLAYER



75793CD81-1

(1) USB function

① Connect a USB device if you want to listen to MP3 file in a USB device.

② It will automatically play MP3 file in the USB device and the LCD display will show "READING USB".

※ If there are no files on USB device, playback will revert back to the previous mode after displaying "NO FILE".

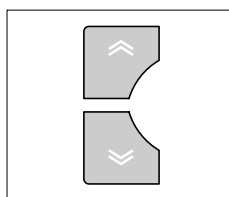
(2) AUX function

① If you want to listen to music of a external audio device, connect a external audio device through AUX cable.

② Change AUX mode by pressing MODE button.

If audio file of Audio device is playing, you can listen to music through speaker.

(3) File selection & cue / review button



290F3CD43

① File selection function

This button is used to select file up / down.

Each time the forward file select ⏮ is pressed, file number is increased.

Each time the backward file select ⏭ is pressed, file number is decreased.

② Cue / review functions

High-speed audible search of file on a USB can be made by this button (the cue and review functions).

Press and hold the cue button ⏮ to advance rapidly in the forward direction or the review button ⏭ to advance rapidly in the backward direction.

(4) MP3 directory / file searching

① The D-, D+ button is used to select a particular directory and file.

Press and hold for more than 3 seconds while playing MP3 file.

Turn right / left the selection knob to search the directory. Press the button when you find the wanted directory.

For example, the directory search generally changes in two methods depending on the order of writing as follows.

·Method 1 : ROOT → Dir01 → Dir02 → Dir03 → Dir04 → Dir05 → Dir06 → Dir07 → ROOT

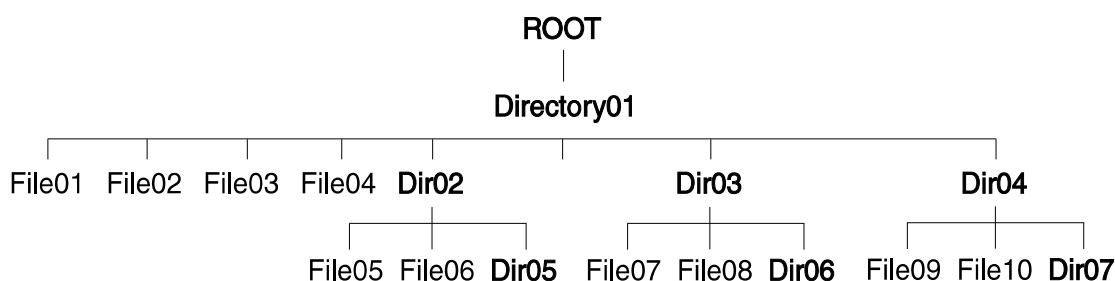
·Method 2 : ROOT → Dir01 → Dir02 → Dir05 → Dir03 → Dir06 → Dir04 → Dir07 → ROOT

If you want to search the file in the located directory, turn right / left the selection knob consecutively. Press the button when you find the wanted file. The unit will then play the selected file.

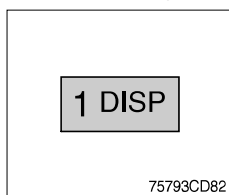
For instance, the file search changes in Dir01 as follows.

File01 → File02 → File03 → File04 → File01

※ MP3 directory / file configuration



(5) ID3 v2 display



- ① Disp button is used to change the display information.
While playing an MP3 file, you can change the file information shown on the LCD display.
Each time you press DISP (display), the display changes to show the following.
- ※ If the MP3 disc does not have any ID3 information, the display will show NO ID3 on LCD display.

Directory name / file name (normal mode)



Album name / performer / title

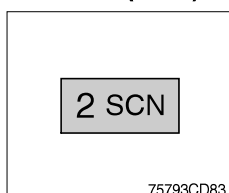


File number / elapsed time



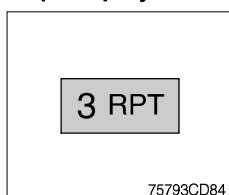
Directory name / file name (normal mode)

(6) File scan (SCN)



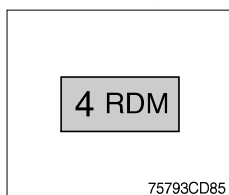
- ① During USB play, press SCN button to play the first 10 seconds of each file on the whole file on the USB (SCN mark will appear on the LCD display).
When a desired file is reached, press the SCN button again to cancel the function.
The unit will then play the selected file.
- ※ In case of playing MP3 file, when the SCN (scan) button is pressed and held for longer than 2 seconds, the SCN mark will blink on the LCD display and all files in the selected directory will be introduced until the file scan mode is cancelled by pressing the SCN button again or by activating the random or repeat functions.

(7) Repeat play selector (RPT)



- ① During USB play, press RPT button to play the selected file repeatedly (RPT will appear on the LCD display).
Play of the file will continue to repeat until this button is pressed again and the RPT disappears from the LCD display.
- ※ In case of playing MP3 file, when the RPT button is pressed and held longer than 2 seconds, the RPT mark will blink on the LCD display and play all files in the selected directory and will be repeated until the directory repeat mode is cancelled by pressing the repeat button again or by activating the scan or random functions (RPT mark will disappear from LCD display).

(8) Random play selector (RDM)

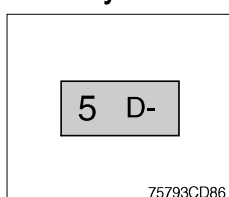


- ① During USB play, press RDM button to play the files on the USB in a random shuffled order (RDM will appear on the LCD display). The file select function will also select file in the random order instead of the normal process.

The random play mode can be cancelled by this button again.

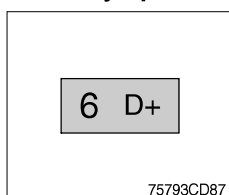
- ※ In case of MP3 file, when the random button is pressed and held longer than 2 seconds, the RDM mark will blink on the LCD display and play all files in directory randomly until the directory random mode is cancelled by pressing the random button again or by activating the scan or repeat functions (RDM mark will disappear from LCD display).

(9) Directory down



- ① Press D- button briefly while playing MP3. The previous directory is located each time you press this button.

(10) Directory up



- ① Press D+ button briefly while playing MP3 . The next directory is located each time you press this button.
- ※ If the MP3 file does not have a directory, the unit play MP3 at 10-file intervals.
 - ※ If any MP3 file does not exist in USB, this button can not operate.

■BLUETOOTH

(1) Introduce

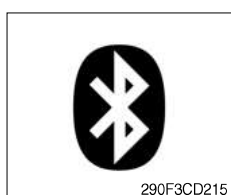
The bluetooth radio supports bluetooth wireless technology. Bluetooth technology provides a wireless link between a bluetooth mobile phone or bluetooth music player and the hyundai bluetooth radio.

The bluetooth radio features a hands-free system so that you may talk on the telephone without taking your eyes off the road or your hands off the wheel. A microphone built into the front of the radio receives your voice and the calling party can be heard through the speakers.

Additionally, a bluetooth music player can be wirelessly connected to be the bluetooth radio and playback music tracks in high quality sound through the speakers. Many bluetooth mobile phones include a music player and can provide both hands-free calling and music playback.

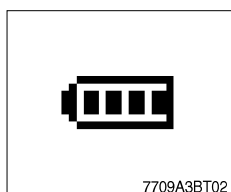
Check your mobile phone owner's manual for details.

- ※ When the starting switch is in the ON position, the bluetooth radio is on standby to connect with your mobile phone even if the radio is switched off. The machine battery may therefore become drained if the ignition switch remains in the ON position for an extended period of time.
- ※ Bluetooth technology uses low power radio transmission to connect to your bluetooth mobile phone or bluetooth music player. As radio signal strength reduces over distance, the quality of sound performance during phone calls and music playback may become poor if the distance between the radio and device widens. It is recommended that the mobile phone or music player is kept inside the cab for best results.
- ※ As a bluetooth wireless connection can extend to 10 meters, your bluetooth device may automatically connect to the bluetooth radio even if the device is not in the machine.
- ※ The bluetooth radio uses the latest digital noise & echo suppression system to provide the best sound clarity with little or no distortion, but in some conditions there may be some echo and noise experienced. It is recommended to keep the car windows closed during hands-free calls for best results.



① Bluetooth indicator

The bluetooth logo is displayed when a bluetooth device is connected, and not displayed, when no bluetooth device is connected. If the bluetooth mobile phone is connected but the connection is not of satisfactory quality, the bluetooth logo is not displayed.



② Battery strength indicator

This is an indication of your mobile phone battery condition. If your mobile phone is unable to transmit battery condition level, the indicator is not displayed.



③ Single level indicator

This is an indication of the mobile phone network signal strength in your current location. If your mobile phone is not able to transmit signal level, the indicator is not displayed.

(2) Bluetooth function

① Pairing a bluetooth mobile phone or music player

A bluetooth connection must first be established between your bluetooth mobile phone or bluetooth music player and the bluetooth radio. The first step to connecting the bluetooth radio and bluetooth device is to introduce or "Pair" the bluetooth radio and bluetooth device together.

It is recommended that you have the instruction manual for your bluetooth mobile phone or music player with you during the pairing process described below to understand how to set your device to pair with the bluetooth radio.

※ It is recommended that all other bluetooth devices other than mobile phones are switched off during the registration or pairing process.

a. Connection method

- a) Press SEND button for 2 seconds in any mode, **PAIRING** appears on the bluetooth radio display.
- b) Browse your mobile phone or music player menu to find the **SETTINGS** or **CONNECTIVITY** section to find the bluetooth connection section.
- c) Find the command that may be called search for bluetooth device or discovery mode so that your bluetooth device can locate all the bluetooth devices within range that may be connected.
- d) After the search is complete, **HFI AUDIO** should appear on your mobile phone or music player screen.
- e) Select **CONNECT** or **SELECT** on your mobile phone or music player.
- f) The mobile phone or music player should now prompt you to enter a PIN code. Enter 0000 into your bluetooth device and select OK.
- g) The mobile phone or music player should confirm that it has established a new paired connection with the bluetooth radio.
- h) The connecting process is now complete.
- i) If the connecting process is successful, the bluetooth logo appears on the radio display and paired phone name (e.g. Samsung or LG) and **CONNECTED** appear on the display for 2 seconds.
- j) Your bluetooth device is now ready for use with the bluetooth radio.
- k) If the pairing failed, **FAIL** appears on the bluetooth radio display.

※ (a) The bluetooth radio allows a maximum of 6 bluetooth devices to be paired.

(b) Bluetooth technology only allows one phone to be connected to your bluetooth radio at one time.

(c) If a bluetooth music player is to be connected together with a mobile phone, refer to the page 3-74, PLAYING MUSIC USING BLUETOOTH AUDIO.

(d) Bluetooth connection with a mobile phone is normally established using the Hands-Free Profile (HFP). However, in some cases, the connection may use Head Set Profile (HSP) and some functions may not be available.

(e) As each mobile phone or music player brand and model has a different menu structure and control names, you may need to refer to the user manual of your bluetooth device for the correct procedure to connect to another bluetooth device.

(f) Once the bluetooth pairing is complete, automatic connection between mobile phone and the bluetooth radio is possible whenever the starting switch is switched ON.

The mobile phone must be set to automatically connect to the bluetooth radio to allow this automatic connection.

- (g) The bluetooth radio will give connection priority to the last connected mobile phone.
- (h) It is recommended that all other bluetooth devices other than mobile phones are switched off during the registration or pairing process.

② Disconnecting a bluetooth device

If you need to disconnect your bluetooth mobile phone or music player with the bluetooth radio, follow the steps below.

- a. Press END button for 2 seconds in any mode.
- b. When the bluetooth connection is lost, bluetooth logo disappears and the previously connected device name (e.g. Samsung or LG) and **DISCONNECTED** appear on the display.

③ Select a bluetooth device

The bluetooth radio can pair up to 6 bluetooth devices. A previously paired mobile phone or music player can be selected for connection using the method described below. Refer to the table 2-1 for examples.


| Preset No. | Bluetooth device name (for example) |
|------------|-------------------------------------|
| 1 | Samsung |
| 2 | LG |
| 3 | Apple |
| 4 | Motorola |
| 5 | EMPTY |
| 6 | EMPTY |

Table 2-1

- a. Press SEND button, to select **BLUETOOTH** mode.
- b. Press SEL button. **SELECT PHONE** will appear on the display.
- c. Turn selection knob, until **SELECT PHONE** is displayed.
- d. When **SELECT PHONE** appears on the display, press SEL button.
- e. Press the preset button to display the name of the bluetooth device name of the mobile phones or music players previously paired. You may also turn selection knob to display the paired devices.

· Each time you turn or selection knob, the LCD displays as follows :

SAMSUNG → LG → APPLE → MOTOROLA → BACK → SAMSUNG

- f. If the bluetooth mobile phone name is Samsung as in the example of table 2-1, then **Samsung** appears on the display. When preset button  is pressed or selection knob is turned 1 click to the right.
- g. Once the name of the bluetooth device you wish to connect is displayed, in this example **Samsung**, press SEL button to have the Samsung device connected.
- h. If the connection is successful, the bluetooth logo appears on the display and paired phone name **Samsung** and **CONNECTED** appears on the display for 2 seconds.

④ Deleting a previously paired bluetooth device

If you no longer need to use a paired bluetooth device with the bluetooth radio, it can be deleted.

It is from the registration assignment for another mobile phone.

Refer to the example of paired devices shown table 2-1.

- a. Press SEND button, to select **BLUETOOTH** mode.
- b. Press SEL button and **SELECT PHONE** appears on the display.
- c. Turn selection knob, until **DELETE PHONE** is displayed.
- d. When **DELETE PHONE** appears on the display, press SEL button.
- e. Press the preset button to display the name of the bluetooth device name of the mobile phones or music players previously paired. You may also turn selection knob to display the paired devices.
- f. Once the name of the bluetooth device you wish to delete is displayed, in this example **Samsung**, press SEL button to have the Samsung device deleted.
- g. The display will then show **DELETE NO** or if selection knob is turned, **DELETE OK** on the display.
- h. To confirm your wish to delete the selected device, when **DELETE OK** appears on the display press SEL button.
- i. If the bluetooth device being deleted (in this example) was connected, the display will show previous paired phone name "Samsung" and DISCONNECTED.
- j. In the example above, the number of paired devices is now reduced to 3, leaving 3 vacant memory locations for additional devices. Table 2-2 shows the example.

| Preset No. | Bluetooth device name (for example) |
|------------|-------------------------------------|
| 1 | LG |
| 2 | Apple |
| 3 | Motorola |
| 4 | EMPTY |
| 5 | EMPTY |
| 6 | EMPTY |

Table 2-2

⑤ Basic telephone operation

a. Using the bluetooth radio for hands-free calls

- a) When an **INCOMING** call arrives at the bluetooth radio via your connected bluetooth mobile phone, **INCOMING CALL** appears on the display for 3 seconds then the calling telephone number is shown.
 - b) Press SEND button to answer the **INCOMING** call. **HANDSFREE** appears on the display.
 - c) To end the call, press END button and the call will end and **END CALL** is displayed.
 - d) If you wish to reject an **INCOMING** call, press END button.
 - e) To make an **OUTGOING** call use the keypad of the connected bluetooth mobile phone to enter a number and press the **OFF-HOOK** (SEND) button on your mobile phone.
 - f) **OUTGOING CALL** is displayed on the bluetooth radio and the call continues in hands-free mode.
 - g) The call can be ended by pressing END button the **ON-HOOK** (END) button of the connected mobile phone.
- ※ Some mobile phones may not reject an **INCOMING** call using the action of d) above. In this case, press the **ON-HOOK** button on the connected mobile phone to reject.

b. Last call number redials

Select **BLUETOOTH** mode by pressing SEND button. To making a call to the last dialed number, press SEND button again. **OUTGOING CALL** appears on the radio display for 1 second.

- ※ Some mobile phones may require an additional press of SEND button to start the last number redial call.

c. Switching to private (headset) mode during a call

During an INCOMING or OUTGOING call started in hands-free mode, it is possible to switch to the private call mode using the mobile phone handset to speak and to hear the calling party in private.

- a) Press SEND button during the conversation ; **PRIVATE** appears on the display.
- b) To switch back to hands-free mode using the bluetooth radio, press SEND button again during the private conversation ; **HANDSFREE** is shown on the display and hands-free call operation continues.

- ※ The above switching function may cause disconnection of the bluetooth link between the bluetooth radio and some mobile phones.

If SEND button is pressed during the private conversation, the bluetooth connection will return automatically.

(3) Function of bluetooth audio player

① Playing music using bluetooth audio

The bluetooth radio supports the bluetooth profile Audio Advanced Distribution Profile (A2DP). If your mobile phone or music player supports this profile then it is possible to listen to music tracks located on your bluetooth device through the bluetooth radio and speakers.

Additionally, the bluetooth radio supports the Audio Video Remote Control Profile (AVRCP).

If your bluetooth mobile phone or music player supports this profile then it is possible to advance to the next track or replay previous tracks on using the buttons on the front of the bluetooth radio your machine.

- a. Press MODE button until **BT AUDIO** is displayed.
- b. When **BT AUDIO** appears on the display, select the music player feature on your bluetooth device. And then bluetooth device play automatically to begin playback.
- c. To pauses the bluetooth audio playback, press SEL button for 2 seconds. Press the knob again for 2 seconds to resume playback.
- d. Press buttons (⏮, ⏭) advance to the next or previous music track.

- ※ (a) Check your bluetooth device owner's manual for details of how to play music tracks via an external bluetooth audio system such as the bluetooth radio.
- (b) Some bluetooth mobile phones cannot play music at all or may play music tracks in low-quality audio through the bluetooth radio.
- (c) Some mobile phones require additional pairing to allow bluetooth audio playback.
- (d) Information about songs (ID3) (e.g. the elapsed playing time, song titles, song index, etc.) playing using bluetooth audio profile cannot be displayed on this bluetooth radio.

② Connecting a bluetooth music player and mobile phone simultaneously

It is possible to connect a bluetooth mobile phone and a separate bluetooth music player to the bluetooth radio at the same time. Phone calls can be sent and received using the hands-free feature while music is playing using the bluetooth audio feature.

(4) Bluetooth setting

① Setting the automatic call answer feature

If this function is selected, the bluetooth radio automatically answers all INCOMING calls.

This feature enhances safety as the driver does not need to take their hands from the steering wheel to accept an INCOMING call.

Note that this feature cannot be set at different settings for each of the paired mobile phones.

- a. Press SEND button to select BLUETOOTH mode.
- b. Turn selection knob until **SETTINGS** is displayed.
- c. Press SEL button until **AUTO ANSWERING** is displayed.
- d. Press SEL button and turn selection knob. The LCD then displays as follows :

ANSWER OFF → ANSWER 5 SEC → ANSWER 10 SEC → RETURN → ANSWER OFF

- ANSWER OFF = Automatic answer function is not active.
- ANSWER 5 SEC = Automatic answers all INCOMING calls after a 5 second delay.
- ANSWER 10 SEC = Automatic answers all INCOMING calls after a 10 second delay.
- RETURN = Return to previous menu.

- e. After making your selection, press SEL button to store the selection.
- f. **SETTINGS** is then displayed for adjustment if required.
- g. If you do not wish to adjust any further bluetooth settings, press END button to return to the last selected mode.

② Setting calling voice volume

This function is to set the level of the mobile phone's calling voice volume to be heard through the bluetooth radio and speakers.

- a. Follow steps a. to c. of above setting below ①.
- b. When **VOICE VOLUME** appears on the display, press SEL button to display the current level of the calling voice. Turn selection knob right or left to adjust the calling voice volume as desired. This is the level the calling voice volume will be set to each time the bluetooth radio is used after the stating switch is turned off and then on again.
- c. After making your selection, press SEL button to store the selection.
- d. **SETTINGS** is then displayed for adjustment if required.
- e. If you do not wish to adjust any further bluetooth settings, press END button to return to the last selected mode.

③ Setting the ring volume

This function is to set the level of the mobile phones ring tone volume to be heard through the bluetooth radio and speakers.


















- a. After making your selection, press SEL button to store the selection.
- b. When **RING VOLUME** appears on the display, press the SEL button to display the current level of the ring tone. Turn selection knob right or left to adjust the ring tone volume as desired. This is the level the ringer volume will be set to each time the bluetooth radio is used after the starting switch is turned off and then on again.
- c. After making your selection, press SEL button to store the selection.
- d. The press END button to return to the last selected mode.

RADIO AND USB PLAYER (WITH BLUETOOTH) : MACHINE SERIAL NO.: #0005~



9403CD100

■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  Call & Pair button</p> <p>5  Call end 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  Auto tune up, Seek up button</p> <p>14  Auto tune down, Track down button</p> <p>15  USB connector</p> <p>16  AUX IN Jack</p> <p>17  MIC hole</p> |
|---|---|

RADIO AND USB PLAYER (WITHOUT BLUETOOTH): MACHINE SERIAL NO.: #0005~



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

- a. 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.
- b. Display up to 32 characters in the LCD display.
- c. No support any of MULTI-CAED Reader.
- d. 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 :

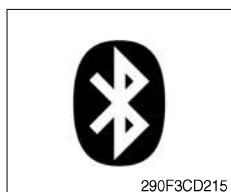
- Use a 3.5 mm stereo plug cable to connect the media player headphone socket at each end as follows.
- Adjust the portable media player to approximately 3/4 volume and start playback.
- Press the MODE button (3) on the audio unit to change into AUX mode.
- The volume and tone can now be adjusted on 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.**

■BLUETOOTH (if equipped)

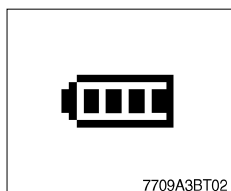
1) Using a bluetooth wireless connection

- (1) Your audio unit supports bluetooth wireless technology. You can set up a wireless link with bluetooth cellular phone.
 - (2) Keep PAIRING the cellular phone with audio unit in a few minutes as the phone are being switched on well enough.
- ※ Since this audio unit is on standby to connect with your cellular phone via bluetooth wireless technology, using this audio unit without running the engine can result battery drainage.
 - ※ This audio unit phone call reception is on standby when ignition switch is set to ACC OFF or ON.
 - ※ The line-of-sight distance between this audio unit and your cellular phone must be 10 meters or less for sending and receiving voice and data via bluetooth wireless technology. However the transmission distance may become shorter than the estimated distance depending on the environment in use.
 - ※ Digital Noise & Echo suppression system provides the best sound clarity with little or no distortion (Echo & side tone will happen depending on cellular phone or service network).
 - ※ To ensure the quality of calling, you should select a proper bluetooth VR level. This audio unit has already set with the best bluetooth VR level.



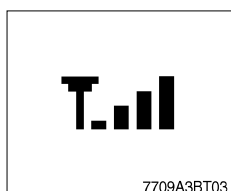
① Bluetooth icon

It will blink while establishing the bluetooth pairing.
It will light after a bluetooth device connected.



② Battery icon

It indicates the battery status of the connected bluetooth device.



③ Single strength icon

It indicates the signal strength of the connected bluetooth device.

2) Pairing in hands free modes



- (1) Press and hold CALL button (4) for 2 seconds until you hear beep sound, then appears PAIR STR on the display.
- (2) For the next procedure, go to cellular phone pairing mode.
- (3) If it is in pairing status with audio unit and cellular phone, PAIRING will show on the display.
- (4) If you want to exit pairing mode, press CALL END button (5) briefly while pairing, then it will show PAIR CLR on the display.
- (5) Bluetooth Icon and PAIR OK appear on the display when pairing is successful.

3) Cellular phone pairing mode

- (1) Browse your cellular phone menu and find the connectivity or bluetooth connection section.
 - (2) Select search for a new handsfree device function and allow the phone to find the mobile.
 - (3) HYUNDAI should appear on your cellular phone screen.
 - (4) Press connect menu among the handsfree option on your cellular phone.
 - (5) The cellular phone should prompt for a pin code. Insert the pin code 1234.
 - (6) The cellular phone should confirm that it has established a new paired connection.
 - (7) Close the menu. The pairing is now completed. It appears PAIR FAIL on the display for 3 seconds.
- ※ Each cellular phone type has distinct phone menu so you may need to refer to your manufactures instruction for the correct procedure on how to connect a new bluetooth device.
 - ※ Please retry to the pairing instruction if HYUNDAI does not appear on the cellular phone screen.
 - ※ Please select authorized, if there is authorized menu in the menu of bluetooth connection in your cellular phone.
 - ※ Once the bluetooth pairing is completed between your cellular pone and this audio unit, the both units will be automatically recognized on its paring and when you turn on the key in your car even though this audio unit is turned off.
 - ※ This audio unit can store up to 6 phones pairings. If the memory is full, the first stored paired phone will be deleted.
 - ※ The connecting priority will be given to the last connected cellular phone.
 - ※ If you want to change the connecting priority, try to connect this audio unit from the cellular phone.

4) Bluetooth connection and disconnection

- (1) When established bluetooth connection between this audio unit and the cellular phone, bluetooth icon on the display appears and then the display shows HF/AV CONN when handsfree & AV profile connected.



- (2) To disconnect bluetooth link
Press and hold CALL END button (4) for 2 seconds, it shows DIS CON and disappears bluetooth icon on the display.



- (3) To disconnect bluetooth link
Press CALL button (3) briefly, it blinks bluetooth icon on the display while bluetooth is being connected. If the connection is completed, it appears bluetooth icon on the display.

- ※ When your cellular phone battery is at low charge, the bluetooth connection may occasionally be lost. To maintain good connectivity ensure that your phone battery is adequately charged.
- ※ In case of failure of bluetooth pairing :
 - Delete item in paired list on your phone.
 - Reset both phone by power off/on and the audio unit by ACC off/on.
- ※ Connecting priority of handsfree profile is higher than headset profile.
- ※ The headset mode does not support caller ID, reject call and call Transfer.

5) Using the audio unit as a handsfree device

- (1) When the audio unit is ringing, it shows CALL and follows with the phone number ***** on the display.



- (2) To accept call
Press CALL button (4), it appears ANSWER CALL and follows TALKING on the display.
- (3) To end call
To end call, press CALL END button (5), it appears REJECT on the display.
- ※ If reject call is activated in your phone, then your cellular phone does not support reject call function.

6) Audio transfer between the audio unit and phone

The audio transfer function is for switching the call from the audio unit to the cellular phone for private conversation.



- (1) Press CALL button (4) briefly during conversation, it appears CALL TRANS on the display. To switch back to the audio unit, press button (4) briefly during private conversation, then it appears CALL TRANS on the display again.

※ **This function will be a cause of disconnection of bluetooth link in some nokia phones, but you do not worry just press button (4) during private conversation, then switch back to the audio unit automatically.**

※ **The quality of calling between cellular phone and audio unit is better than calling between one audio unit and another one.**

7) Last call number dialing



- (1) Press CALL button (4) briefly, it appears CALL TO, then simply press CALL button once again, it would make the last call with phone number display on LCD.

If Reject call is activated in your phone, then your cellular phone does not support Reject Call function.

※ **If you are using SAMSUNG phone, then you may need to press once more send button. First press button shows phone contact list in your phone, then second press make the last call.**

8) To make a call by cellular phone

The audio transfer function is for switching the call from the audio unit to the cellular phone for private conversation.

- (1) The audio unit activated automatically when you make a call by cellular phone.
- (2) When you make a call processing by cellular phone, it shows CALLING on the display.
- (3) When you receive a call, the phone number ***** appears on the display.

9) Using the audio unit as bluetooth music



The audio unit supports A2DP (Audio Advanced Distribution Profile) and AVRCP (Audio Video Remote Control Profile), and both profiles are available to listen music at the audio unit via cellular phone which is supporting the two profiles above.

- (1) To play music, search the menu on your cellular phone as below :
i.e : Menu → File manager → Music → Option → Play via bluetooth.
It appears BT MP3 on the display.
 - (2) During BT MP3 playing, you could select the previous or next track by pressing SEEK up or TRACK down button on audio unit or operate via your cellular phone.
 - (3) To stop music, press button (5) briefly and it will automatically switch into the previous mode.
 - (4) To resume music playing, press the play button on your cellular phone.
- ※ This function maybe different depends on cellular phone. Please follow the cellular phone menu. Some kinds of phone need to pair once more for bluetooth MP3 connection.
 - ※ This function will be caused to disconnect A2DP, AVRCP depends on cellular phone.
 - ※ Information about songs (e.g.: the elapsed playing time, song title, song index, etc.) cannot be displayed on this audio unit.

■ RESET AND PRECAUTIONS

1) Reset function

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

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

Press and hold   simultaneously for about 5 seconds. (with Bluetooth)

- (2) Take out the fuse for the audio system in the vehicle once and then plug again.

※ 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 operation correctly.

2) Precautions

When the inside of the car is very cold and the player is used soon 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

- (5) Bluetooth version : V2.1

- (6) Bluetooth supported profile :

- A2DP : Advanced Audio Distribution Profile
- AVRCP : Audio/Video Remote Control Profile
- HFP : Hands-Free Profile

4. OPERATION

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.

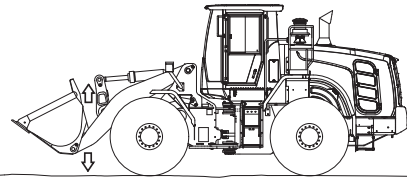
| Service meter | Load |
|-----------------|-----------|
| Until 10 hours | About 60% |
| Until 100 hours | About 80% |
| After 100 hours | 100% |

※ **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 during operation.
 - (6) Check if the machine is operating normally during operation.
- 4) Replace followings after initial operation hours.

| Checking items | Hours |
|-----------------------------|-------|
| Engine oil and filter | 250 |
| Fuel filter element | |
| Fuel pre-filter | |
| Transmission oil and filter | |
| Axle oil (front and rear) | |
| Hydraulic oil return filter | |
| Pilot line filter element | |

Avoid excessive
operation for
initial 100 hours



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2. CHECK BEFORE STARTING THE ENGINE

- 1) Make sure that the steering frame lock bar is stored in the unlocked position.

▲ The steering frame lock bar must be removed in order to steer the machine.

- 2) Look around the machine and under the machine to check for loose 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 loose wiring, and collection of dust at places which reach high temperature.

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

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

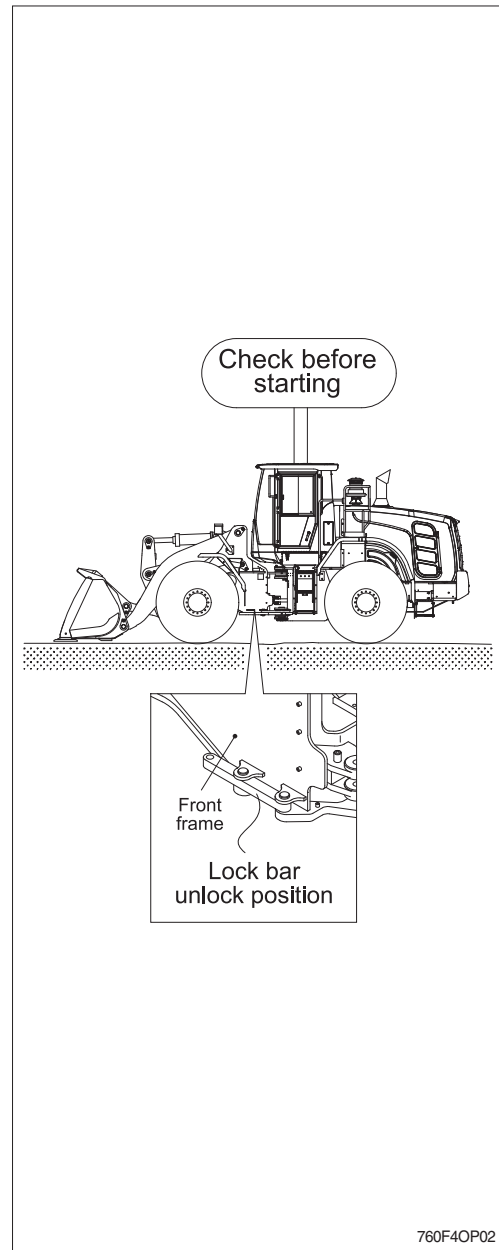
- 4) Make sure that the machine is equipped with a lighting system that is adequate for the job conditions. Ensure that all lights are in proper working condition.

- 5) Adjust the rear view mirror.

- 6) Make sure that there are no personnel in the area before you start the engine. Make sure that there are no personnel in area before you move the machine. Make sure that there are no personnel on the machine, underneath the machine, or around the machine.

※ **Secure the engine hood in the fully closed position prior to starting the engine.**

▲ If a warning tag is attached to the starting switch or to the controls, do not start the engine. Also, do not move any controls.



3. STARTING AND STOPPING THE ENGINE

1) CHECK INDICATOR LIGHTS

- (1) Check if the parking brake switch is ON.
- (2) Check if the gear selector lever is in neutral position.
- (3) Check if the pilot cut off switch is OFF.

- (4) Turn the key to the ON position, and check followings.

· Cluster

- ① If all the lamps light ON after sounding buzzer for 3 seconds.

※ If the lamps do not light or the buzzer is not sounded, check disconnection of wire.

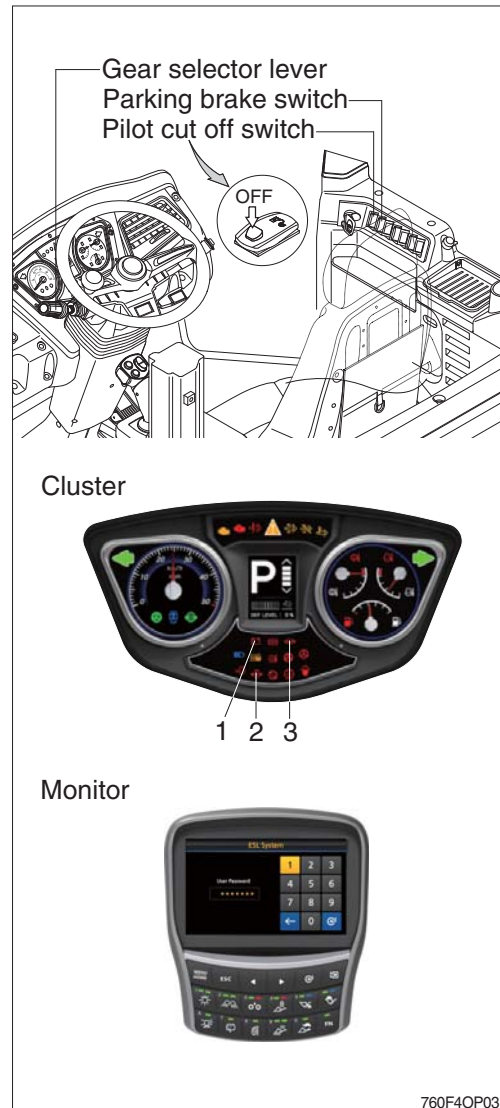
- ② Only below lamps will light ON and all the other light will be turn OFF after 3 seconds.

- Charging warning lamp (1)
- Engine oil pressure warning lamp (2)
- Brake fail warning lamp (3)

· Monitor

- ① The buzzer sounds for 3 seconds with HYUNDAI logo on monitor.
- ② If the ESL mode is set to the enable, enter the password to start engine.
- ③ If the password has failed 5 times, please wait 30 minutes before re-attempting to enter the password.

※ Refer to page 3-30 for ESL system setting.



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2) STARTING ENGINE IN NORMAL TEMPERATURE

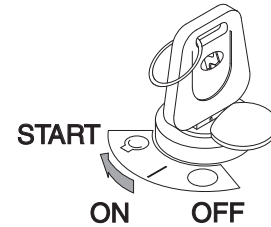
※ **Sound the horn to warn the surroundings after checking if personnel or obstacles are in the area.**

- (1) Check if the parking brake is locked (with the parking switch ON).
- (2) Check if the gear selector lever is in the neutral position.
- (3) Check if the pilot cut off switch is locked (with the switch OFF)
- (4) Turn the starting switch to START position to start the engine.

※ **Do not crank the engine for more than 20 seconds. If the engine does not start, allow the starter to cool for about 2 minutes before attempting to start the engine again.**

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

※ **Refer to the START PROCEDURE on the page 0-13.**



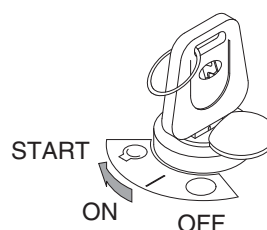
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3) STARTING ENGINE IN A COLD WEATHER

- ※ Sound horn to warn surroundings after checking if there are obstacles in the area.
- ※ Replace the engine oil, coolant and fuel referring to recommended oils at page 6-9.
- ※ Fill the anti-freeze solution to the coolant as required.
- ※ If you turn ON the starting switch, the fuel warmer is automatically operated to heat the fuel by sensing the coolant temperature.

- (1) Check if the parking brake is locked (with the parking switch ON).
- (2) Check if the gear selector lever is in the neutral position.
- (3) Check if the pilot cut off switch is locked (with the switch OFF)
- (4) Turn the starting switch to ON position, and wait 1~2 minutes. More time may take according to ambient temperature.
- (5) Start the engine by turning the starting switch to START position after the preheater pilot lamp and fuel warmer pilot lamp OFF.

- ※ If the engine does not start, allow the starter to cool for about 2 minutes before attempting to start the engine again.
- (6) Release starting switch immediately after starting engine. The starting switch will automatically return to the ON position.
- ※ After engine started, the preheating function is actuated to reduce the white smoke.
- ※ Before the warming-up operation is completed, do not operate the equipment.
- ※ Operate machine at less than normal loads and at slow idle speed, right after engine warming-up.
- ※ Run the engine for 10~15 minutes at low idle when the ambient temperature is below -15°C.

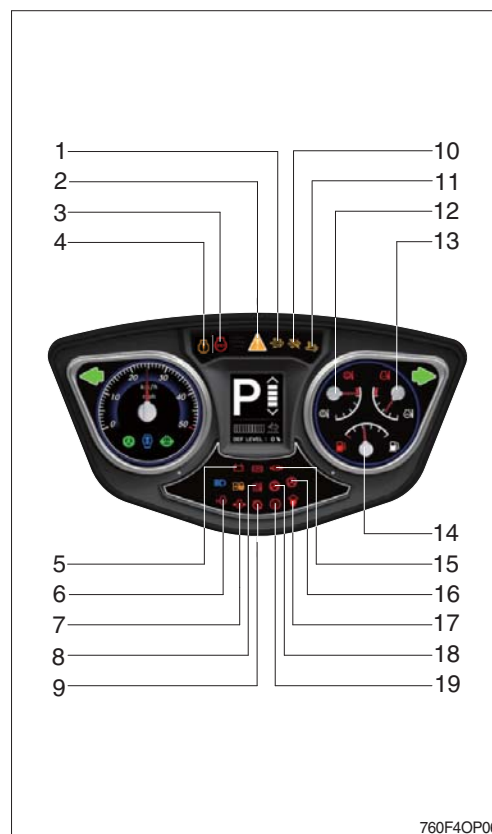


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4) INSPECTION AFTER ENGINE START

Inspect and confirm the following after engine starts.

- (1) Is the level gauge of hydraulic oil tank in the normal level?
 - (2) Are there leakages of oil or water?
 - (3) Are all the warning lamps (1-19) OFF?
 - (4) Check the following after warming up operation.
 - ① Is the indicator of water temperature gauge (14) in the operating range?
 - ② Is the indicator of transmission oil temperature gauge (13) in the operating range?
 - ③ Is the engine sound and the color of exhaust gas normal?
 - ④ Are the sound and vibration normal?
- ※ **Do not increase engine speed quickly after starting, it can make damage engine or turbocharger.**
- ※ **If there are problems in the control panel, stop the engine immediately and correct problem as required.**



5) TRANSMISSION COLD STARTING

- (1) At an oil temperature in the shifting circuit $< -12^{\circ}\text{C}$, the transmission must be warmed-up for some minutes.
- (2) This must be carried out in neutral with an increased engine speed.
- (3) Until this oil temperature is reached, the electronics remains in neutral, and the symbol of the cold start phase will be indicated on the display.
 - Indication on the display : ※ ※
- (4) After the indication on the display is extinguished, the full driving program can be utilized out of NEUTRAL.

※ Transmission warning

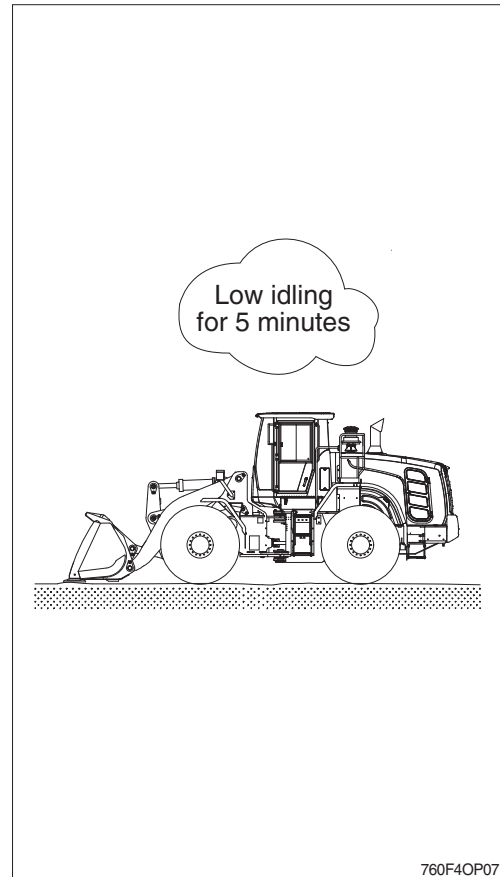


| Symbol | Meaning | Remarks |
|--------|--|--|
| LF, LR | Limp home gear | - |
| ※ ※ | Oil temperature too low, no gear available | Warm up engine/transmission |
| WS | Warning sump temperature | Alternate between WS and actual gear / direction while driving, in neutral only displayed WS if no fault is detected ※ Cool down transmission |
| WT | Warning torque converter temperature | Alternate between WS and actual gear / direction while driving, in neutral only displayed WS if no fault is detected ※ Cool down transmission |

6) TO STOP THE ENGINE

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

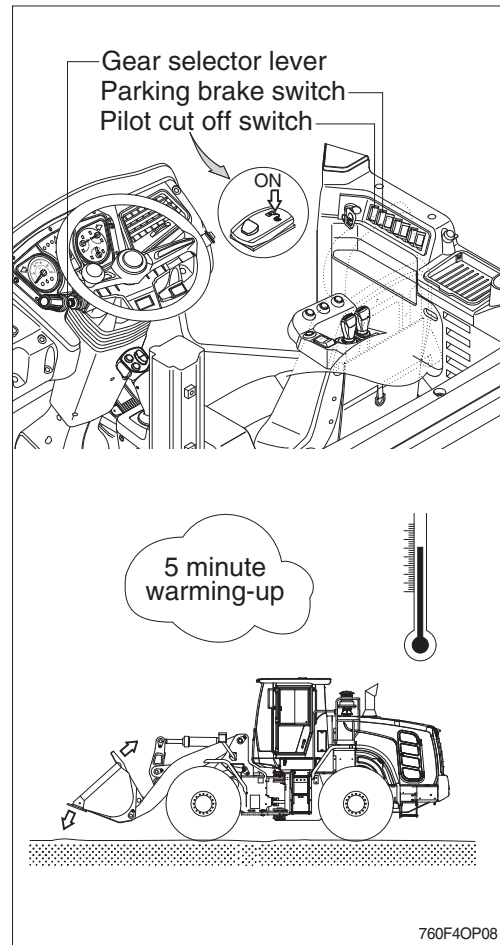
- (1) Place the gear selector lever in neutral.
- (2) Push the parking brake switch to the ON position.
- (3) Run the engine for five minutes at low idle with no load.
- (4) Return the key of starting switch to the OFF position.
- (5) Remove the key to prevent other people using the machine.
- (6) Push the pilot cut off switch to the OFF position.
- (7) Lock the cab door.



4. WARMING-UP OPERATION

※ The most suitable temperature for the hydraulic oil is about 50°C (112°F). It can cause serious trouble in the hydraulic system by sudden operation when the hydraulic oil temperature is below 25°C (77°F). The 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) Push the pilot cut off switch to the ON position.
 - 4) Lift the boom slightly and extend the bucket cylinder to the stroke end to relieve hydraulic pressure.
- ※ **Do not leave hydraulic pressure relieved for more than 30 seconds.**
- 5) Shorten the bucket cylinder to the stroke end to relieve hydraulic pressure.
- ※ **Do not leave hydraulic pressure relieved for more than 30 seconds.**
- 6) Repeat the procedure 4) - 5) several times until warm-up operation is completed.



5. OPERATION OF THE WORKING DEVICE

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

- 1) Control lever operates the boom and the bucket.
- 2) When you release the control lever, control lever returns to neutral position automatically.
- 3) When the control lever operates to the position of boom float, boom kick out and bucket leveler ; these function is completed, then the control lever returns to the neutral position.

※ **Control lever**



Boom lower (1)

Push the control lever forward in order to lower the boom.



Boom raise (2)

Pull the control lever backward in order to raise the boom.



Bucket roll back (3)

Move the control lever toward the left in order to tilt the bucket backward.



Bucket dump (4)

Move the control lever toward the right in order to dump a load from the bucket.

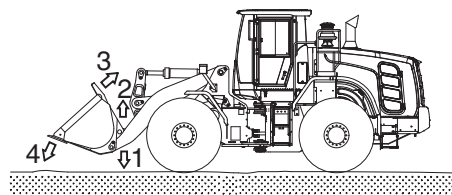
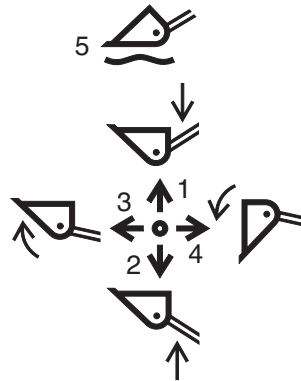
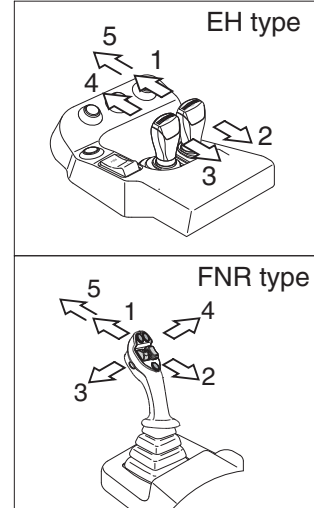


Boom float (5)

Push the control lever forward into the detent.

The boom will lower to the ground. The boom will float along the contour of the ground.

RCV lever



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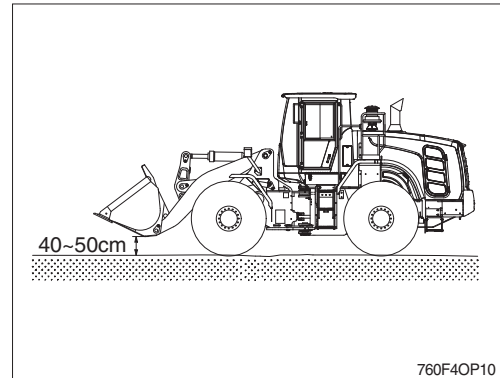
6. TRAVELING OF THE MACHINE

1) BASIC OPERATION

- ※ Secure the engine hood in the fully closed position prior to traveling the machine.

(1) Traveling posture

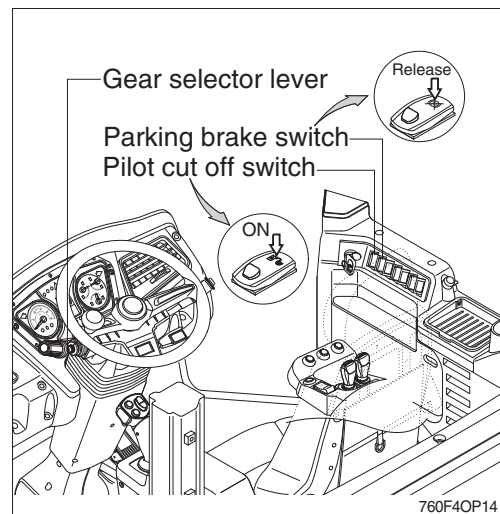
Lift the boom so that the bucket is placed 40-50cm above the ground.



(2) Traveling operation

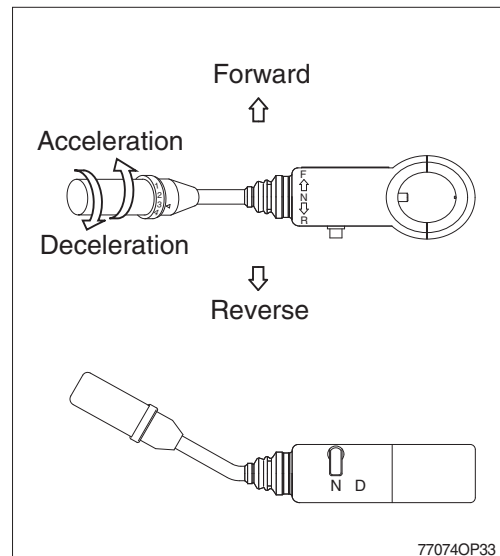
When warm-up operation is completed after the engine is started, move the machine according to the following procedure.

- ① Push the pilot cut off switch to the ON position.
- ② Release the parking brake.
- ③ Put the gear selector lever in the 1st stage of forward or backward direction and press gently the accelerator pedal to move the machine.



(3) Changing direction and speed

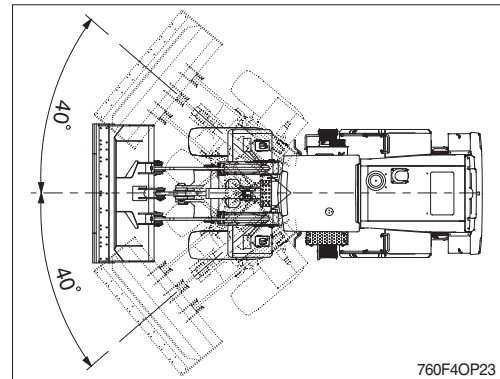
- ① The gear selector is designed for the mounting on the left side of the steering column.
- ② The positions (speeds) 1 to 4 are selected by a rotary motion, the driving direction Forward (F)-Neutral (N)-Reverse (R) by tilting the gear selector lever.
- ③ A neutral lock is installed as protection against inadvertent drive off.
 - Position N - Gear selector lever blocked in this position
 - Position D - Driving
- ④ When doing digging or dumping work, run the machine in the 1st or 2nd speed.



- ※ When traveling at high speed, do not abruptly decelerate by using the transmission lever, to slow down instead press the brake pedal.
- ※ When changing direction, check beforehand there is no obstacle in the direction you will be headed.
- ※ Avoid changing direction at high speed.

(4) Turning the machine

- ① Turn the machine by moving the steering wheel into the desired direction.
 - ② You can turn the machine to the left or right by 40 degree.
- ※ Do not turn the machine abruptly when traveling at high speed and avoid turn on a slope.
- ▲ Steering does not function with engine OFF.

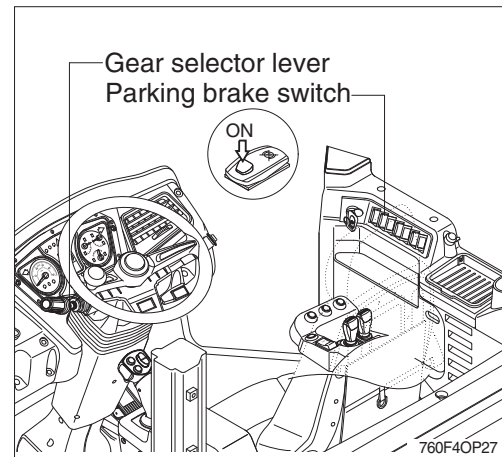


(5) Precautions when driving

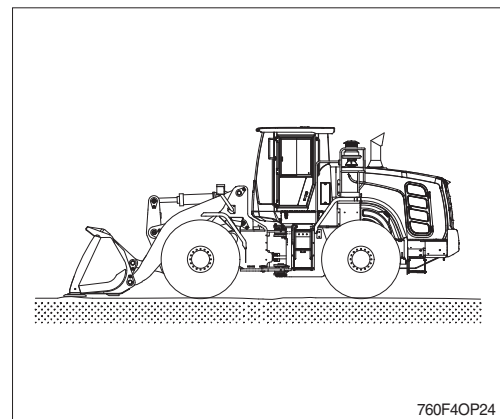
- ① If the monitor warning lamp lights up, put the gear selector lever in the neutral position and stop the machine. Stop the engine after running it at low idling. Then resolve any problems regarding operation of the machine.
- ② When operating the machine, if the load is lightened rapidly, the speed of the machine will increase. So, be careful.
- ③ When the machine travels on uneven ground, keep the machine traveling at low speed.

(6) Stopping the machine

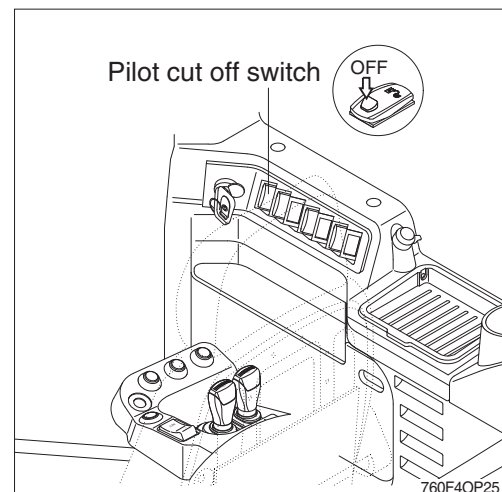
- ① Press the brake pedal to stop the machine.
- ② Put the gear selector lever in the neutral position.
- ③ Push the parking brake switch to the ON position.



- ④ Lower the bucket to the ground.



- ⑤ Push the pilot cut off switch to the OFF position.
- ※ When parking on a slope, block the tires.



(7) Stopping engine

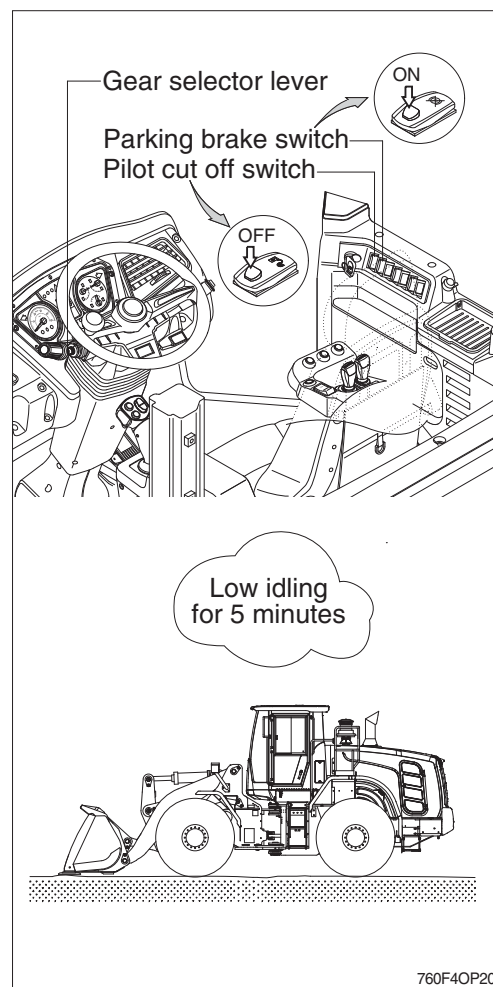
※ If the engine is abruptly stopped before it has cooled down, its service life may be shortened. Avoid sudden stop except an emergency.

※ When the engine is overheated, do not stop immediately. Run the engine at a mid range speed to allow it to cool down, then stop it.

- ① Check if the parking brake switch is ON.
- ② Check if the gear selector lever is in the neutral position.
- ③ Check if the pilot cut off switch is OFF.
- ④ Run the engine at low speed without operating the equipment for about 5 minutes.
Turn the starting key to the OFF position and remove the key.

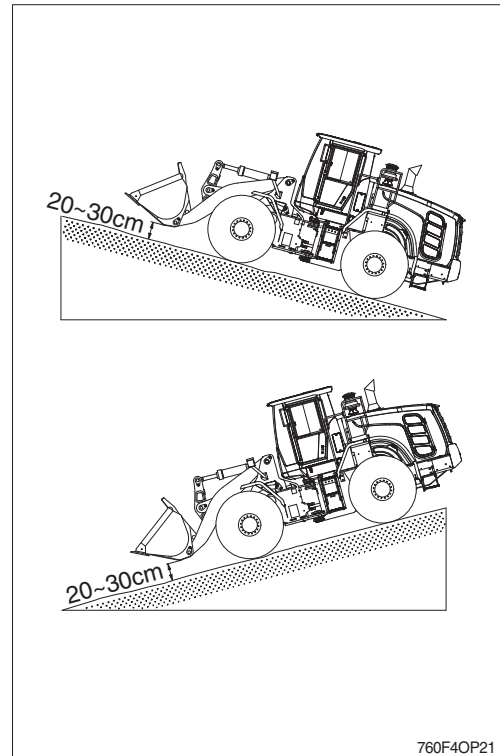
(8) Checks after the engine stopped

- ① Check the leakage of oil and water, the work equipment and the exterior of the machine.
- ② Refill the fuel tank.
- ③ Remove any debris inside of the engine room and attached to the machine.



2) TRAVELING ON A SLOPE

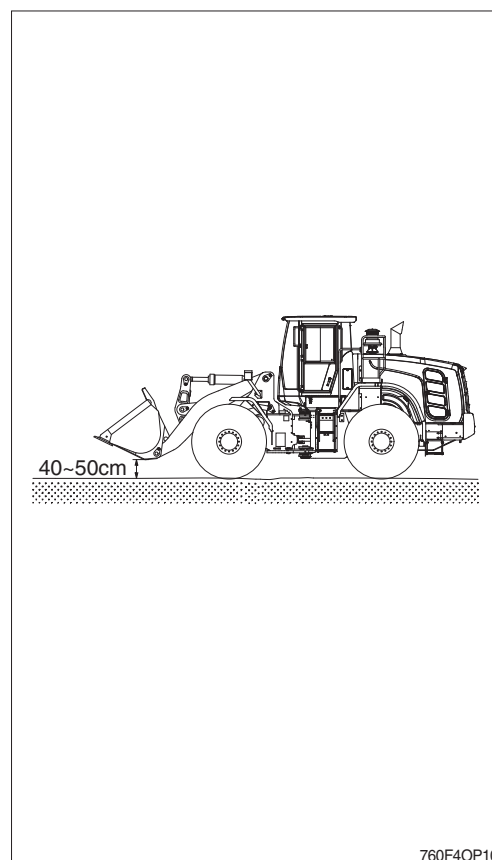
- (1) Never travel down a slope in neutral.
 - (2) Lower the bucket 20-30 cm (1 ft) to the ground so that it can be used as a brake in an emergency.
 - (3) If the machine starts to slide or loses stability, lower the bucket immediately and brake the machine.
 - (4) When parking on a slope, use the bucket as a brake and place blocks behind the tires 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.**



7. EFFICIENT WORKING METHOD

1) GENERAL

- (1) Lift the bucket about 40-50 cm (2 ft) above the ground to ensure safety and to gain a good range of view.
- (2) Clear the jobsite and level the ground.
- (3) Be careful that excessive force is not applied to the bucket.
- (4) When handling hard materials, use bucket teeth or bolt on cutting edge.
- (5) When doing dumping work, put the control lever in the DUMP position, then return it to a former state. Repeat this procedure until the work is finished.
- (6) Position the machine with its back against the wind so that dust does not get into the engine.
- (7) Check if the proper bucket is used for the work.
If the capacity of the bucket exceeds that of the machine, the machine's service life may be shortened.

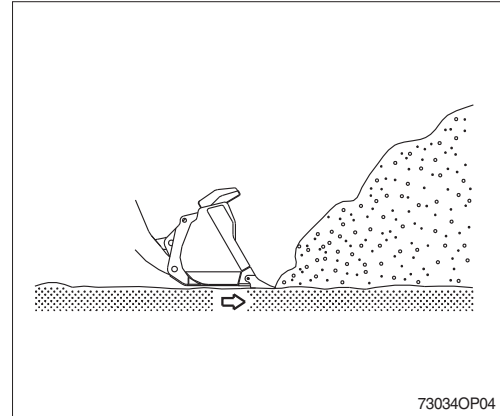


2) EXCAVATION WORK

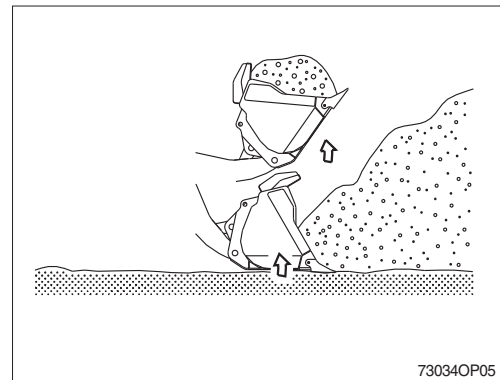
(1) Shovel work

As the machine loads on the bucket with traveling, tires may start to slip because of heavy load. Then lift the bucket slightly to reduce load.

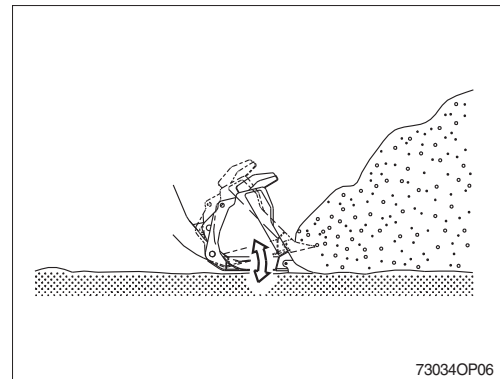
- ① Keep the bucket shovel parallel to the ground (If the bucket is pushed in a non-horizontal position, power may be reduced, and the bucket cannot dig deeply into the heap of soil).



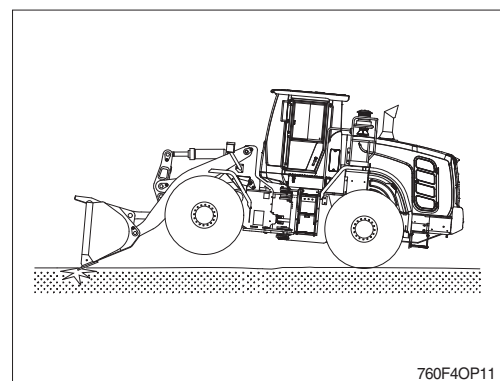
- ② When the bucket is sufficiently deep into the pile, advance the machine with the control lever pulled down. And by placing the control lever in the bucket roll-back position, fill the bucket with soil.



- ③ When it is difficult to dig into the soil, move the bucket control lever forward and backward to move the bucket teeth up and down.



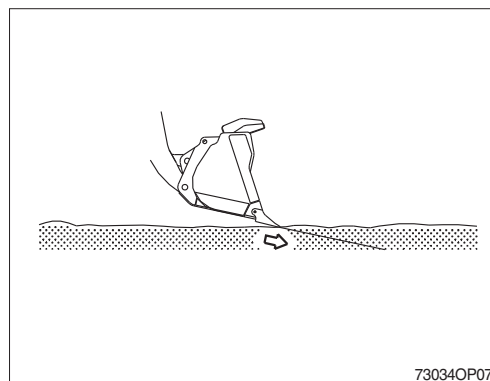
- ※ If the machine operates with its front tires lifted, its driving force will deteriorate and excessive force will be applied to the rear tires. Avoid operating in that posture.



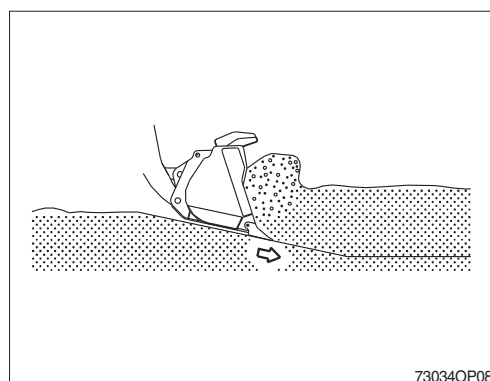
(2) Excavation on level ground

Advance the machine with the bucket lowered slightly and make sure that the bucket is evenly loaded on both sides.

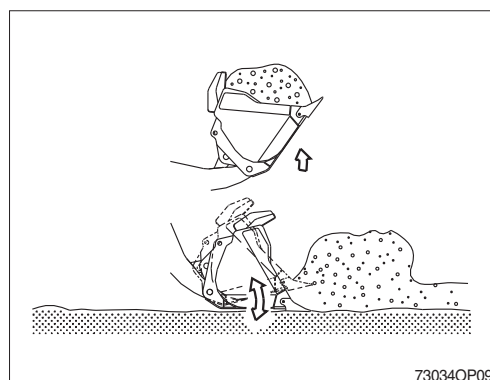
- ① Lower the bucket edge slightly.



- ② Advance the machine and lift the bucket using the bucket control lever to dig out the soil.



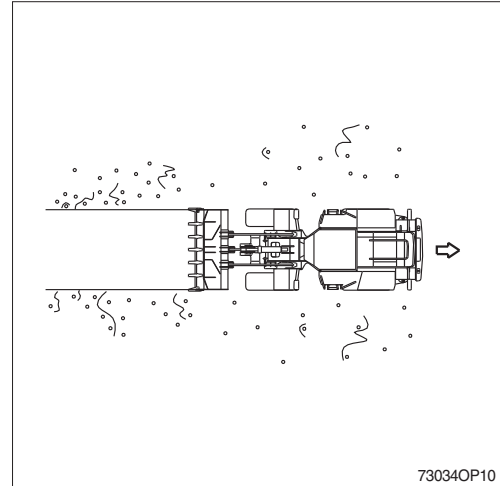
- ③ Advance the machine while controlling the depth of digging with the control lever.
 - ※ **Do not press the bucket heavily into the ground.** It may damage its driving force.
 - ※ **Use the bucket suitable to the working condition.**
 - ※ **When excavating, prevent the excavation force from applying only one side of the bucket.**



3) LEVELING

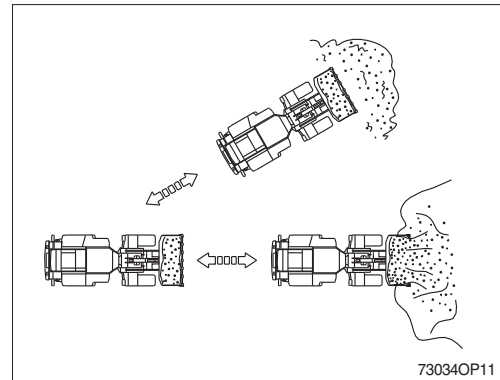
- (1) Load the bucket with soil and dump gradually the soil while driving backward.
- (2) After dumping the soil, move backward with the bucket lowered to the ground to level the ground.
- (3) Load the bucket with soil and place the bucket in the horizontal position. Then put the control lever in the BOOM FLOAT position and move backward.

※ **Make sure that the machine moves always backward when doing leveling work.**



4) TRANSPORTATION

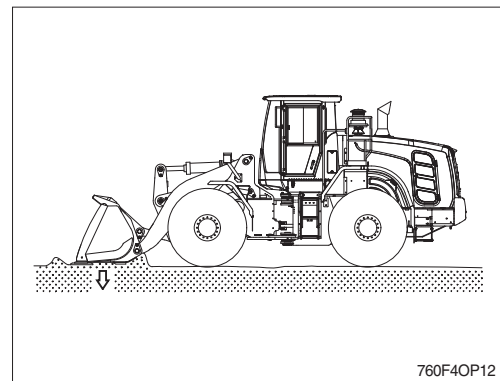
- ※ **Make sure that the traveling path is always cleared.**
- ※ **When transporting material, lift the bucket 40-50 cm above the ground.**



5) COMPACTION

When operating, keep the bottom of the bucket horizontal to the ground.

- ※ **Do not work with the bucket set in the DUMP position.**

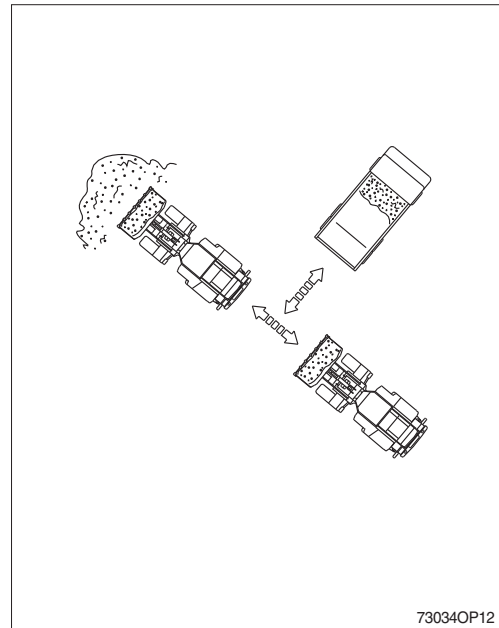


6) LOADING

Maximum efficiency can be attained by carrying out work in such a way that the swinging angle and the traveling distance are kept as small and short as possible in accordance with the terrain.

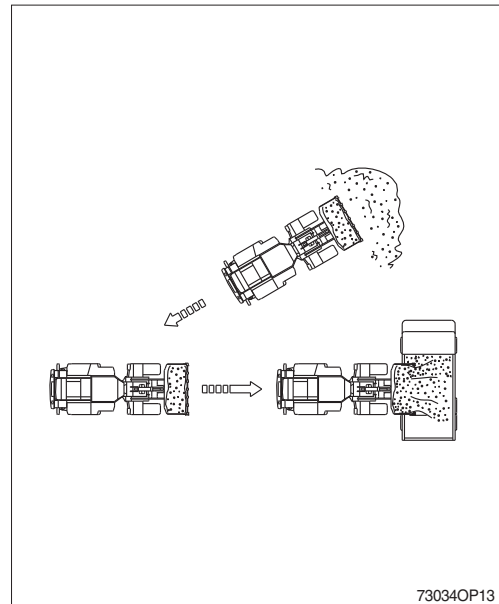
(1) I method

- ① After digging out the soil, move backward and position the dump truck between the heap of soil and the machine to load the soil into the truck.
 - ② This is the fastest and most efficient way to load material.
- ※ The ground of the jobsite should be always level and do not swing or step on a brake pedal abruptly with the boom raised.

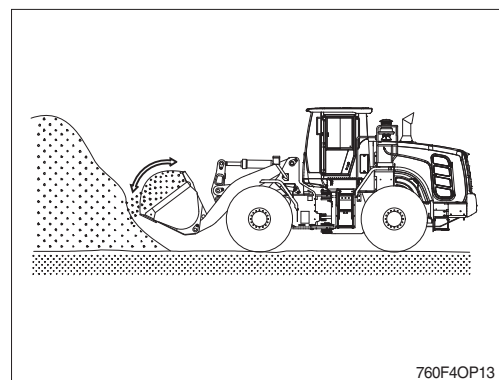


(2) V method

- ① Park the truck at an angle of 60 degrees toward the machine. After digging out, drive backward and position the machine at a right angle with the truck and load the truck with the soil.
- ② Position the machine so that the soil can be dumped in the center of the truck.
If the length of the truck is more than double the width of the bucket, perform the dumping work from forward to backward.
- ③ Move the control lever to the right and dump the bucket.
- ④ Shake the bucket to throw off the soil stuck inside. Move the bucket control lever to the left and right and attach the bucket to the stopper.



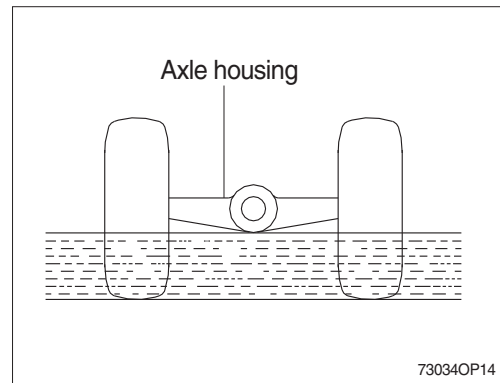
- ⑤ Shake the bucket before setting it to the DUMP position so that loaded materials are evenly distributed inside the bucket. This will prevent materials from slipping back when the bucket is placed in the DUMP position.



7) PRECAUTIONS DURING OPERATION

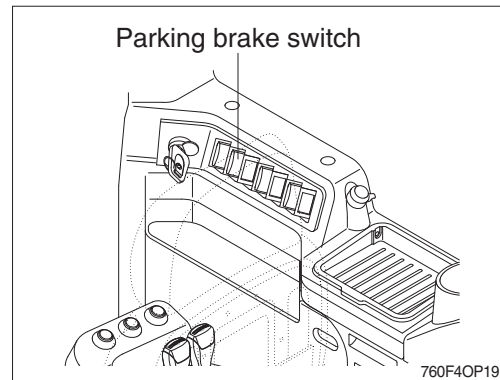
(1) Permissible water level

- ① Do not work in water or damp ground deeper than the permissible depth (Up to lower part of the axle housing).
- ② After the work is completed, grease parts which has been immersed in water.



(2) When the brake does not operate

- ① If the machine does not stop even though the brake pedal is applied, use the parking brake.
- ※ After using the parking brake as an emergency brake, ask Hyundai dealer to check complete brake system.



(3) Precautions when driving on a slope

- ① When turn on a slope, lower the work equipment to lower its center of gravity. Avoid turn on a slope if possible.

② When traveling down a slope

- a. If the main brake is used too often when traveling down a slope, it may be overheated and damaged. So put the transmission lever in the low speed position and use the engine as a brake.
- b. If there is a mismatch of speed, torque converter oil temperature may be overheated. Set the speed in 1st speed position to allow the temperature to drop.
- c. When the gauge does not move into the green range at the 1st speed, stop the machine and put it in neutral. Run the engine at a mid range speed until the gauge moves into the green range.

③ When the engine stops

If the engine stops on a slope, press the parking brake switch immediately and lower the work equipment to stop the machine.

(4) Precautions when traveling

Do not travel a long distance at high speed. It may overheat tires and cause premature damage. If it is necessary to travel a long distance at high speed, observe the following.

- ① Comply with the regulations concerning this machine to ensure safety.
- ② Do the pre-inspection before starting off.
- ③ As the optimum air pressure of tire and optimum driving speed is different according to the kinds of tires and road conditions, consult Hyundai dealer or tire distributor.
- ④ Check the air pressure of tire before driving.
- ⑤ After 1 hour driving, stop for 30 minutes to check any abnormality of tires and other parts, and level of oil and coolant.
- ⑥ Travel with the bucket empty.


8. ADJUSTMENT OF THE WORK EQUIPMENT

The bucket can be adjusted to a height desired by using the boom kick-out device.


- ▲ Park the machine on level ground and block the tires to prevent sudden movement of the machine.
- ▲ Press the parking brake switch.
- ▲ Fix the front and rear frames by using the safety lock bar.
- ▲ Do not work underneath the work equipment.

1) ADJUSTMENT OF THE BOOM KICKOUT AND BUCKET LEVELER


(1) Lift kickout position

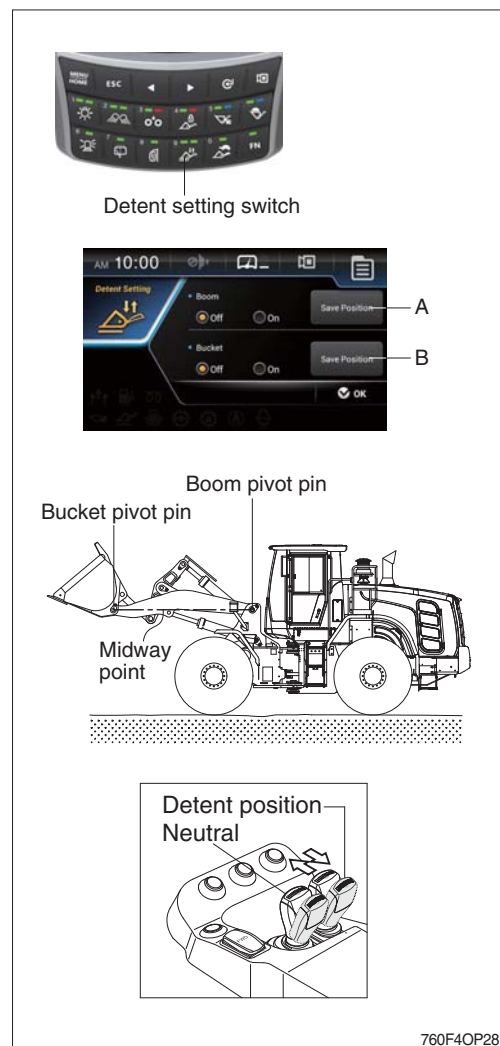
To set the lift kickout, raise the bucket to the desired position above the midway point. Then push icon ( , A) for 2~3 seconds. The boom will return to the programmed position when the raise detent is activated and the boom is below the kickout position.

(2) Lower kickout position

To set the lower kickout, lower the bucket to the desired position below the midway point. Then push icon ( , A) for 2~3 seconds. The boom will return to the programmed position when the float detent is activated and the boom is at least a foot above the kickout position.

(3) Bucket leveler position

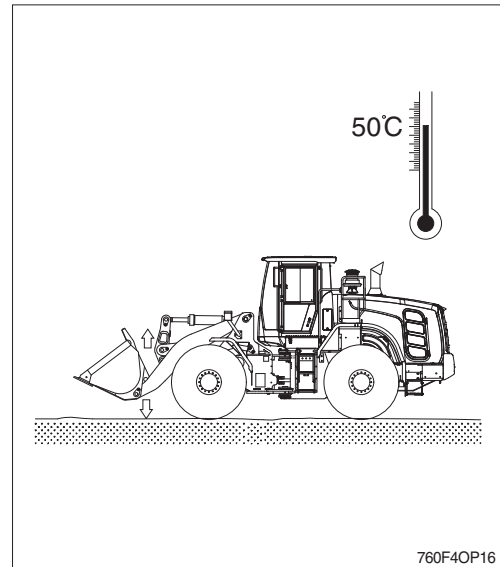
To set the bucket leveler, roll back the bucket to the desired position. Then push icon ( , B) for 2~3 seconds. The bucket will return to the programmed position when the roll back detent is activated and the bucket is below the leveler position.



9. OPERATION IN THE SPECIAL WORK SITES

1) OPERATION THE MACHINE 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.
- (2) Inspect radiator frequently, and keep cooling fins clean.
- (3) Prevent sand or dust from getting into fuel tank and hydraulic tank during refilling.
- (4) Prevent sand or dust from penetrating into hydraulic circuit by tightly closing breather cap of hydraulic oil tank. Replace hydraulic oil filter 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 filters more frequently.

3) SEA SHORE OPERATION

- (1) Prevent ingress of salt by securely tightening plugs, cocks and bolts of each part.
- (2) Wash machine after operation to remove salt residue.
Pay special attention to electrical parts and hydraulic cylinders to prevent corrosion.
- (3) Inspection and lubrication must be carried out more frequently.
Supply sufficient grease to replace all old grease in bearings which have been submerged in water for a long time.

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) CLEANING THE MACHINE

Clean the machine.

Grease each lubrication part.

2) LUBRICATION POSITION OF EACH PART

Change all oil.

※ **Be particularly careful when you reuse the machine.**

As oil can be diluted during storage.

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

3) MASTER SWITCH

Turn OFF the master switch and store the machine.

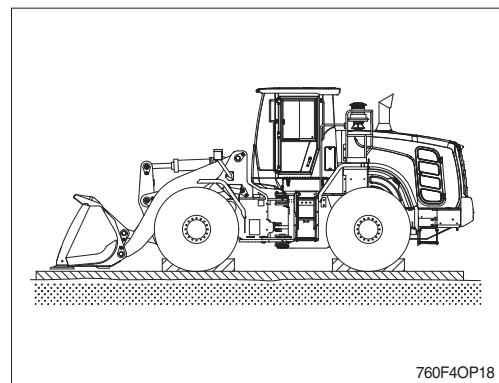
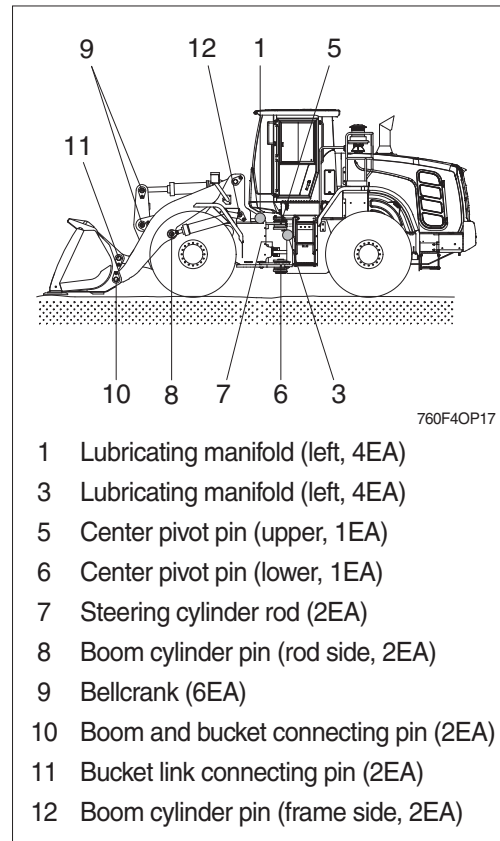
4) Be sure to mix anticorrosive antifreezing solution in the radiator.

5) PREVENTION OF DUST AND MOISTURE

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

※ **Cover exposed part of piston rod of cylinder.**

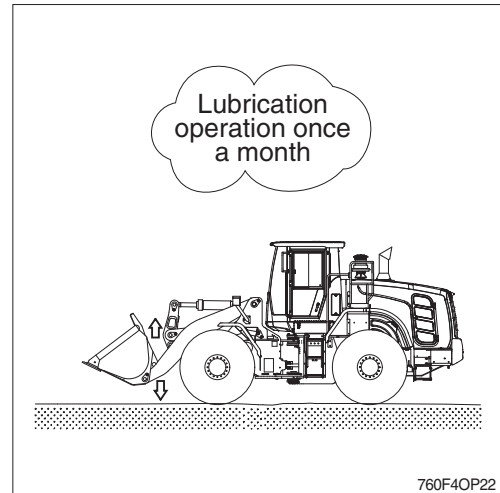
※ **Lower the bucket to the ground and set a support under tires.**



6) DURING STORAGE

Start engine and move the machine and working 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, turning, and work equipment operation to make sure enough lubrication of all functional components.



※ BATTERY

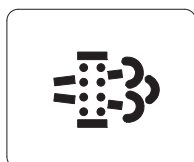
- ① Once a month, start the engine for 15 minutes (or use a charger) to charge the battery.
- ② Every 2 months, check the battery voltage and keep battery voltage over 25.08V.
- ③ If the machine stock period is over 6 months, disconnect the battery negative (-) terminal.

11. SCR SYSTEM CLEANING

SCR system

- ※ The SCR system is used to decrease the mono-nitrogen oxides (NOx) emissions from the machine tailpipe.
- ※ It is unlawful to tamper with, modify, or remove any component of the SCR system.
It is also unlawful to use DEF/AdBlue® that does not meet the specifications provided or to operate the machine with no DEF/AdBlue®.
- ※ The type of SCR system cleaning composes of automatic SCR system cleaning and manual SCR system cleaning.
- ▲ SCR system cleaning generates hot exhaust and causes hot exhaust system components.
- ▲ Exhaust system components get very hot and can cause severe burns. Risk for fire.
- ▲ Do not perform SCR system cleaning in a flammable environment.

(1) SCR system cleaning warning lamp



2609A3CD19

This warning lamp will light ON or blink when the SCR system cleaning is needed or activated.

- ※ Refer to page 3-8 for details.
- ※ The machine must be in a fireproof area during the entire SCR system cleaning process.

(2) SCR system cleaning inhibit warning lamp

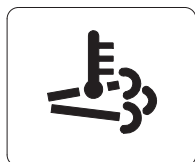


2609A3CD20

This warning lamp will light ON when the SCR system cleaning switch is pushed inhibit position.

- ※ Refer to page 3-8 for details.

(3) HEST (high exhaust system temperature) warning lamp



2609A3CD21

This warning lamp will light ON when the exhaust temperatures are high due to SCR system cleaning.

- ※ Refer to page 3-9 for details.

(4) SCR system cleaning switch



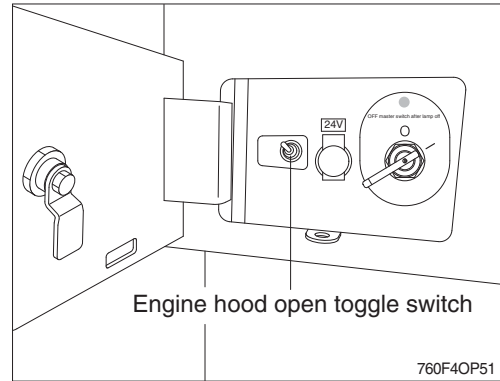
290F40P28

This switch is used to select the SCR system cleaning.

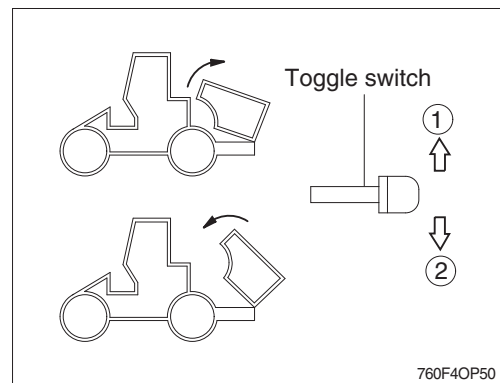
- ※ Refer to page 3-46 for details.
- ※ Manual SCR system cleaning : refer to page 3-9 for details.

12. OPEN THE ENGINE HOOD

- 1) The engine hood open toggle switch controls the engine hood. It is located in tool box on the left side of rear frame.
- 2) Open the access door.



- 3) Move the toggle switch up (①) in order to open the engine hood.
- 4) Move the toggle switch down (②) in order to close the engine hood.
- 5) Hold the toggle switch until the engine hood is fully opened or closed. Release the switch. The switch will return to the middle position.

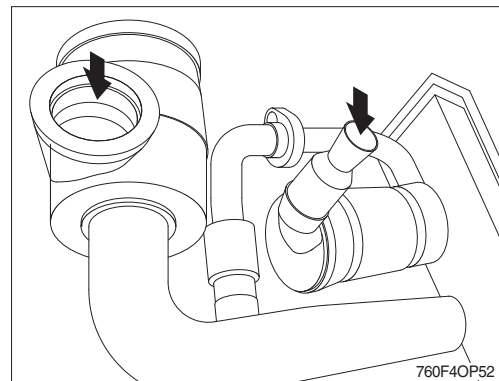


- ※ When opening the engine hood, the counter-weight shelf must be clear of dirt, debris or objects. The rear of the engine hood can be damaged if the engine hood is opened with objects on the shelf.
- ※ Ensure that there are no personnel or equipment around the hood during operation.
- ※ Secure the engine hood in the fully raised position before performing any maintenance work in the engine room.

- 6) When hood is opened, cover the air intake and the aftertreatment device outlet to prevent any water entry.

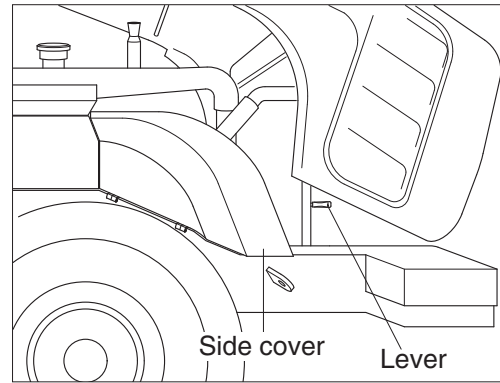
- ※ Secure the hood in the fully close position or the fully open position prior to starting the engine. Operating the machine with the hood partially open can cause the exhaust to damage hood components. Do not allow water to enter the aftertreatment device.

Water will damage the aftertreatment device.



7) If further access is needed, either side cover can be opened. The levers are positioned in the both side of the engine room. Hold the side cover in place, while unlatching the side cover. Lower the side cover to rest on the tire. The side cover can remain in the open position resting on the tire. For better access the side cover can be removed. Push the side cover forward along the hinge to remove the side cover fully.

⚠ Avoid contact with hot surfaces. Exhaust piping and engine components become hot during engine operation and cool slowly after engine shut down. Any contact with hot surfaces can cause severe burns.

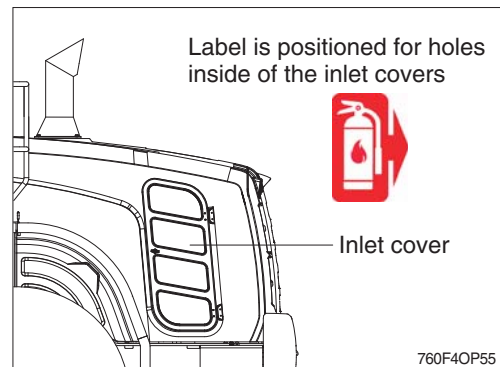


8) EMERGENCY FIRE HOLES

If the engine hood cannot be opened in case of the fire, it is possible to fight the fire manually through two holes on the screen.

Holes for manual firefighting can be accessed by opening the inlet covers on the right and left side. Firefighting can take place using the holes on the screen, which provide access to the engine compartment with, e.g., handheld fire extinguisher.

⚠ The extinguishing agent contains glycol which may cause injuries in case of contact. Avoid contact. In case of contact with the eyes, rinse with water. In case of skin contact, wash with soap and rinse with water. Always contact a doctor after contact with the extinguishing agent.



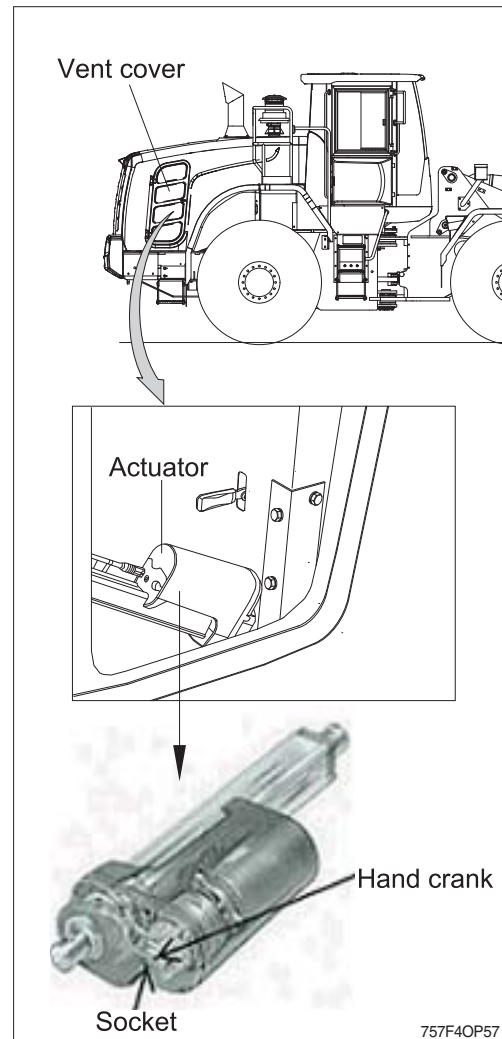
9) MANUAL OPERATION OF ENGINE HOOD

The engine hood can be operated manually.

(1) Open the RH vent cover.

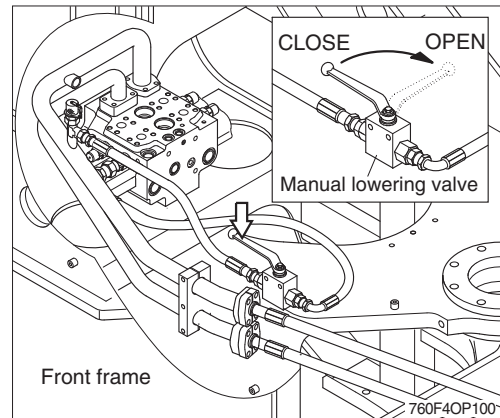
(2) Remove the socket (Keep the socket to reuse) and turn the hand crank (6mm hexagon wrench) to open engine hood.

- ※ When the actuator is operated as a hand crank, it must be operated by hand or carefully by tool otherwise there is a risk of overloading and damage of actuator.
- ※ The master switch has to turn OFF during manual operation.



13. ATTACHMENT MANUALLY LOWERING (ENGINE STOPPED)

- 1) The manual lowering valve on the front frame can be manually lowering the attachment linkage if the engine can't work.
 - 2) Slowly rotate the lowering valve lever to the OPEN position in order to lower the attachment to the ground.
 - 3) After the attachment is resting on the ground, rotate the lowering valve lever to the CLOSE position.
- ⚠ Keep all personnel away from the boom drop area when lowering the boom with the engine stopped.**
- ⚠ Keep all personnel away from the front linkage when lowering the boom.**



5. TRANSPORTATION

1. ROAD TRAVELING

If it is necessary to travel on a road, observe the followings.

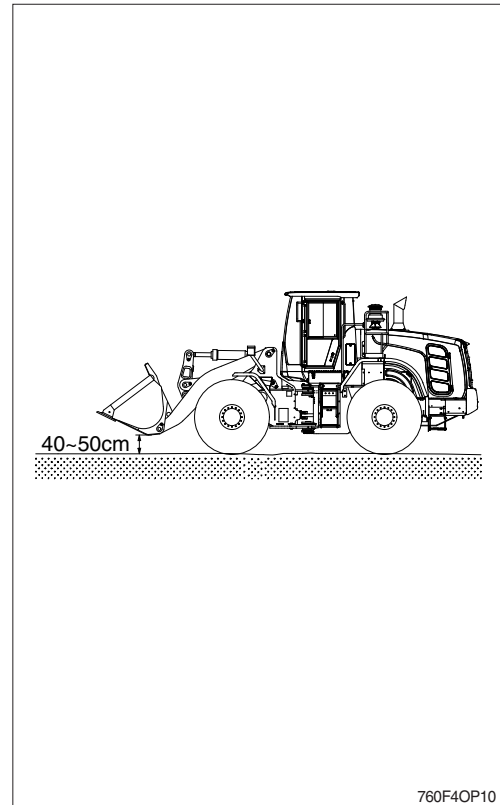
- 1) Comply with regulations regarding this machine for the sake of safety.
- 2) Perform daily inspection before starting the machine.
- 3) Check the air pressure of tires and traveling speed limitations.

· Air pressure

| Size | Pressure | |
|-------------------|----------------------------------|----------------------------------|
| 23.5-25, 20PR, L3 | 3.9 kgf/cm ² (55 psi) | |
| 23.5-25, 20PR, L5 | 3.9 kgf/cm ² (55 psi) | |
| 23.5 R25, XHA, ★ | Front | 5.1 kgf/cm ² (73 psi) |
| 23.5 R25, ★★, L3 | Rear | 4.2 kgf/cm ² (60 psi) |

· Maximum speed : 37.4 km/hr (23.2 mph)

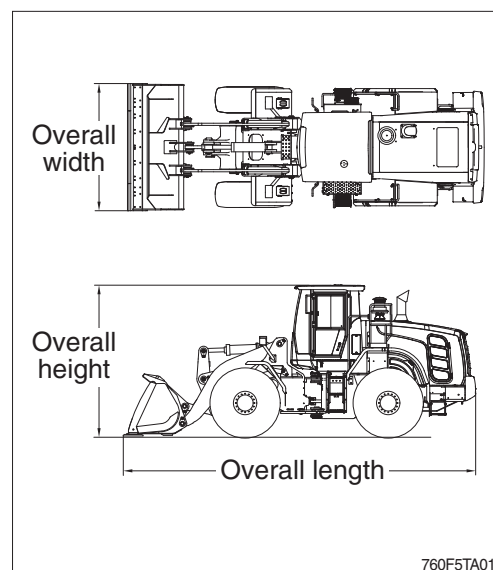
- 4) When traveling for a long distance, stop every hour or every 40 km (25 mile) to allow tires and other components to cool down and check any abnormality.
- 5) Drive with the bucket empty.
- 6) Travel at a mid-range speed and be careful to drive within the limited speed when driving on a public road.



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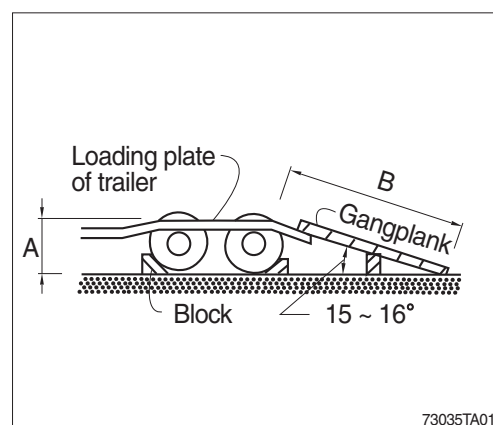
2. PREPARATION FOR TRANSPORTATION

- 1) When transporting the machine, observe the various road rules, road transportation vehicle laws and vehicle limit ordinances, etc.
- 2) Make sure the cooling system has proper anti-freeze if moving machine to a cold climate.
- 3) Select proper trailer after confirming the weight and dimension from the page 2-2~2-5.
- 4) Check the whole route such as the road width, the height of bridge and limit of weight and etc., which will be passed.
- 5) Get the permission from the related authority if necessary.



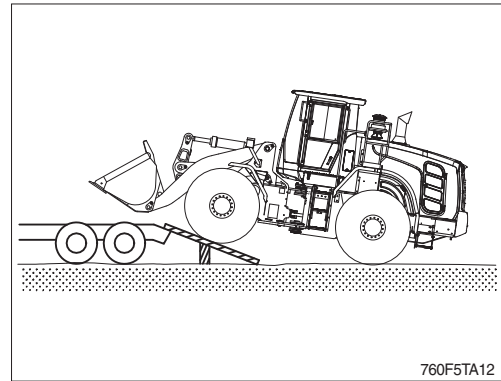
- 6) Prepare gangplank for safe loading referring to the below table and illustration.

| 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 |

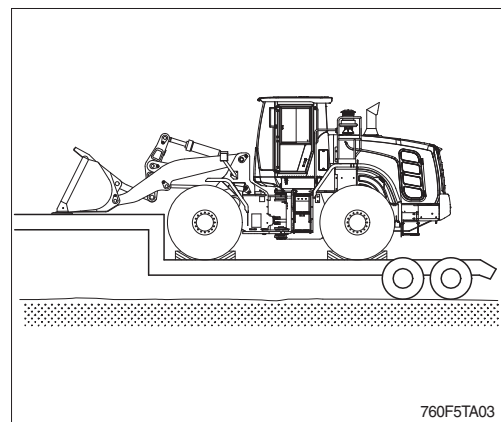


3. LOADING THE MACHINE

- 1) Load and unload the machine on a flat ground.
- 2) Use the gangplank with sufficient length, width, thickness and gradient.
- 3) Move slowly and carefully when the machine is on the gangplank.
Do not change the direction of the machine while it is on the gangplank.

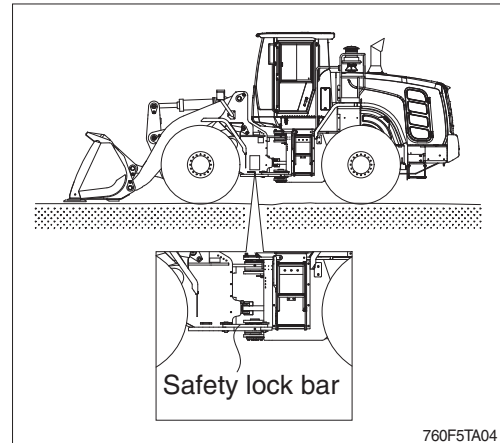


- 4) Do the following after loading the machine to the trailer.
 - (1) Lower the working equipment gently after the location is determined.
 - ※ Place rectangular timber under the bucket cylinder to prevent the damage of it during transportation.
 - ▲ Do not operate any other device when loading.
 - ▲ Balance the load.

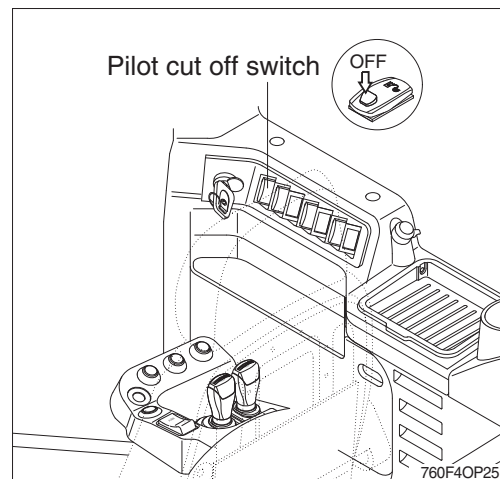


4. FIXING THE MACHINE

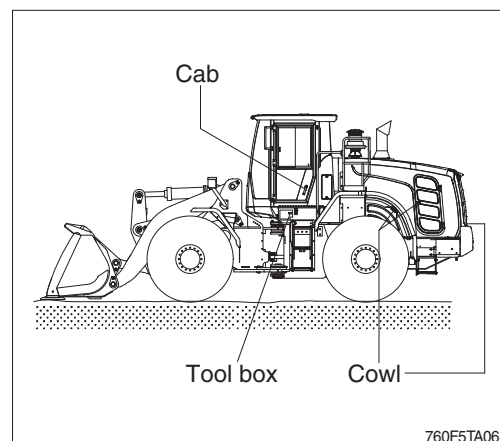
- 1) Fix front and rear frame by linking safety lock bar.
- 2) Push the parking brake switch.



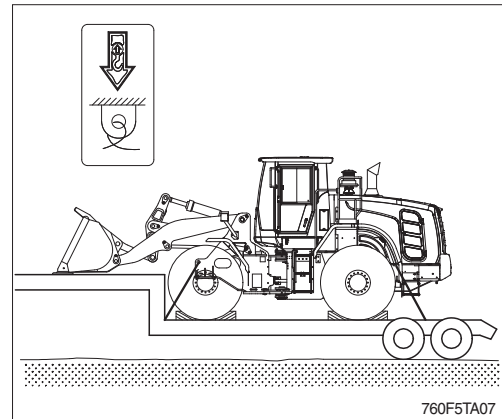
- 3) Push the pilot cut off switch to the OFF position to prevent the hydraulic system from operating.
- 4) Stop the engine, turn the starting switch off and remove the key.



- 5) Secure all locks.



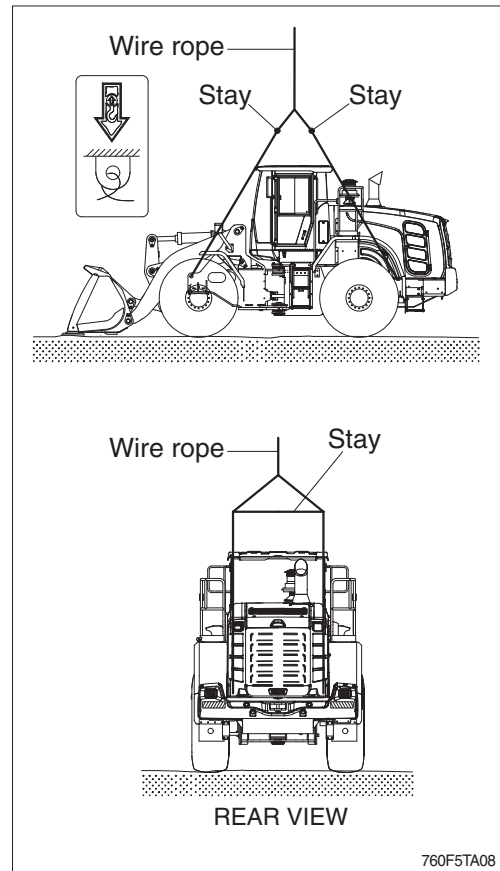
- 6) Block the tires and fix firmly with wire rope or chain to prevent the machine from moving during transportation.



5. LOADING AND UNLOADING BY CRANE

- 1) Check the weight, length, width and height of the machine referring to 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 to touch 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 lock bar and pilot cut off switch to the OFF 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.**
- ⚠ **Attach two wire ropes to the rear of the machine.**
Attach two wire ropes to the front of the machine.
Connect the four wire ropes.



6. TOWING THE MACHINE

⚠ **Personal injury or death could result when towing a disabled machine incorrectly.**

⚠ **Block the machine to prevent movement before releasing the brakes. The machine can roll free if it is not blocked.**

Except for an emergency, do not tow this machine. If it is inevitable to tow this machine, observe the following.

1) GENERAL

(1) Parking brake cylinder of the machine is operated by the spring force and released by hydraulic pressure.

If the engine does not operate, the brake will be operated to stop the machine.

(2) When the machine is towed move it for a repair to nearby place at the speed less than 2 km/hr (1.2 mph). Transport it on a trailer, if it has to be moved for a long distance.

(3) When the steering device and the brake of the machine to be towed can not be operated, transport by trailer.

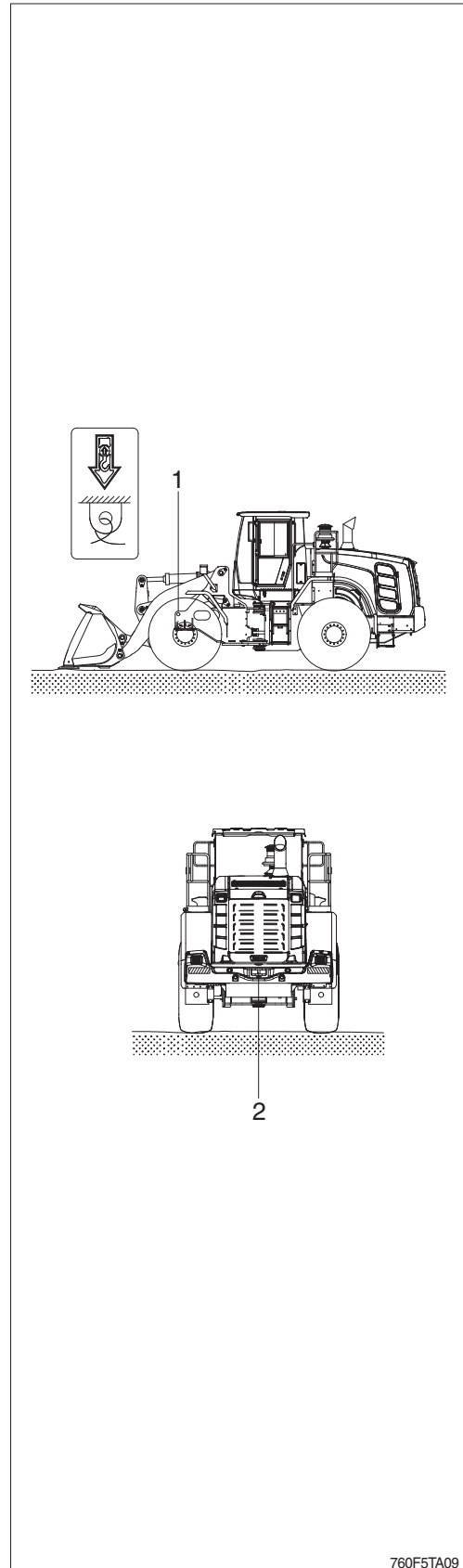
⚠ **Be careful when towing.**

⚠ **Be careful that the brake will not work if there is any disorder in the braking system.**

(4) When you tow the machine from the front, attach the tow line to the tow eyes on the front frame (1).

When you tow the machine from the rear, use the tow rear eyes provided for lift & tie (2).

(5) Do not use a chain for pulling a disabled machine. A chain link can break. This may cause personal injury. Use a wire rope cable with ends that have loops or rings. Place an observer in a safe position in order to watch the pulling procedure. The observer can stop the procedure, if necessary. The procedure should be stopped if the cable starts to break. Also, stop the procedure if the cable starts to unravel. Stop pulling whenever the towing machine moves without moving the towed machine.



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- (6) Keep the tow line angle to a minimum. Do not exceed a 30 degree angle from the straight ahead position.
 - (7) Quick machine movement could overload the tow line or the tow bar. This could cause the tow line or the tow bar to break. Gradual, steady machine movement will be more effective.
 - (8) Normally, the towing machine should be as large as the disabled machine. Make sure that the towing machine has enough brake capacity, enough weight, and enough power. The towing machine must be able to control both machines for the grade that is involved and for the distance that is involved.
 - (9) You must provide sufficient control and sufficient braking when you are moving a disabled machine downhill. This may require a larger towing machine or additional machines that are connected to the rear of the disabled machine. This will prevent the machine from rolling away out of control.
 - (10) All situation requirements cannot be listed. Minimal towing machine capacity is required on smooth, level surfaces. On inclines or on surfaces in poor condition, maximum towing machine capacity is required.
 - (11) When any towed machine is loaded, this machine must be equipped with a brake system that is operable from the operator compartment.
- ※ **Consult your HYUNDAI dealer for the equipment that is necessary for towing a disabled machine.**

2) WHEN THE ENGINE WORKS

- (1) When the transmission system or steering wheel is workable and the engine is running, the machine can be towed only for a short distance.
For example, pull the machine out of mud or pull the machine to side of the road.
- (2) The operator of the towed machine should turn the steering wheel into the direction in which the machine is towed.

3) WHEN THE ENGINE DOES NOT WORK

When towing the machine with the engine stopped, do it in the following order.

- (1) The transmission oil does not lubricate the system, so remove the front and rear drive shafts.

- (2) Loosen the steering cylinder as the steering operation is not workable.

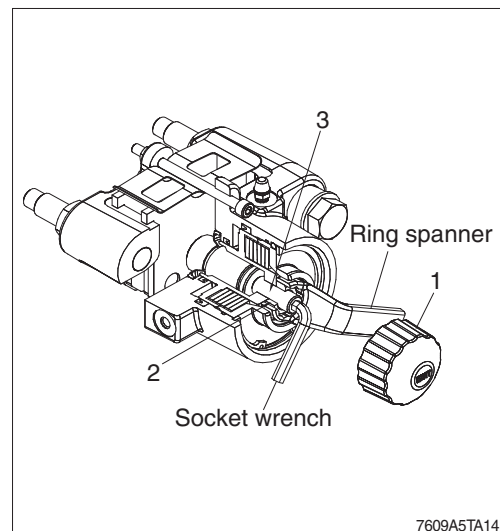
Even if the brake is in good condition, the brakes can only be used a limited number of times.

There is no change in the operating force for the brake pedal, but the braking force is reduced each time the pedal is depressed.

- (3) The parking brake is activated by spring and released by hydraulic pressure. If the engine does not work, the brake will be activated.

- ① Release the screw cap (1) in a counter-clockwise direction and unscrew it.
- ② Release the lock nut (2) and unscrew it back to the end of setting screw (3).
- ③ Rotate the setting screw (3) in a clockwise direction until the brake disc is completely free.

▲ In this condition the machine has no parking brake facility and thus must be protected from rolling away by different means. The brake must be adjusted before recommissioning.



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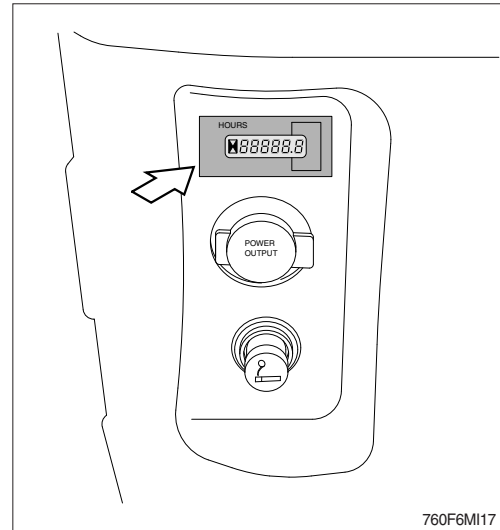
- (4) Connect firmly between the traction machine and the towed machine.

Position each traction machine at the front and rear of the machine to be towed.

1. INSTRUCTIONS

1) INTERVAL OF MAINTENANCE

- (1) You may inspect and service the machine by the period as described at page 6-10 based on service meter of monitor.
- (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 250 hours, carry out all the maintenance 「each 250 hours, each 100 hours and daily service」 at the same time.



2) PRECAUTION

- (1) Start to maintenance after you have the full knowledge of machine.
- (2) The monitor installed on this machine does not entirely guarantee the condition of the machine.
Daily inspection should be performed according to clause 4, maintenance check list.
- (3) Engine and hydraulic components have been preset in the factory.
Do not allow unauthorized personnel to reset them.
- (4) 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.
- ▲ **Hot oil and hot components can cause personal injury. Do not allow hot oil or hot components to contact skin.**
- △ **Accumulated grease and oil on the machine is a fire hazard. Remove this debris with steam cleaning or high pressure water, at least every 1000 hours.**
- △ **Inspect the engine compartment for any trash build up. Remove any trash build up from the engine compartment.**
- (5) Ask to your local dealer or HD Hyundai Construction Equipment for the maintenance advice if unknown.

3) PROPER MAINTENANCE

(1) Replace and repair of parts

It is required to replace the wearable and consumable parts such as bucket tooth, cutting edge, 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 by opening of breather when 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 HD Hyundai Construction Equipment dealer.

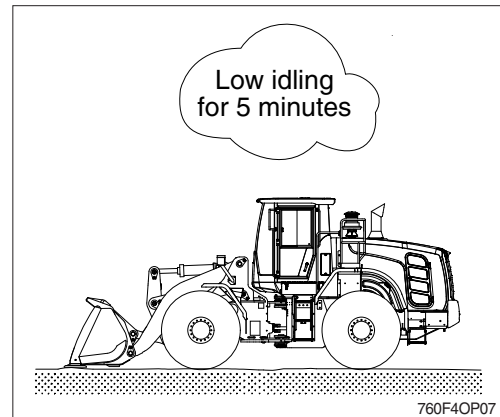
※ **Be sure to start the maintenance after fully understand the chapter 1, Safety hints.**

4) RELIEVING THE PRESSURE IN THE HYDRAULIC SYSTEM

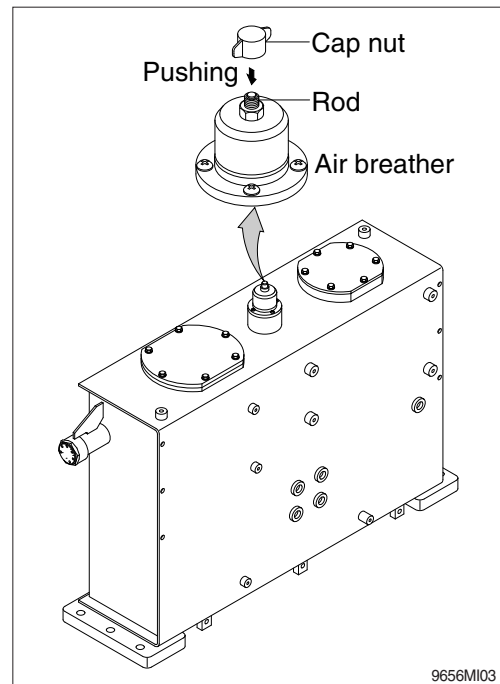
※ Spouting of oil can cause the accident when loosening the cap or hose right after the operating of the machine as the machine or oil is on the high pressure on the condition.

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

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



- (2) Rotate the cap nut counter-clockwise by hand and push the rod to release the air pressure.



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) These are the parts which the operator can not judge the remained lifetime of them by visual inspection.
- (2) Repair or replace if an abnormality of these parts is found even before the recommended replacement interval.

| Periodical replacement of safety parts | Interval |
|--|---------------|
| Fuel hose (engine-tank) | Every 2 years |
| Hose of steering system | |
| Packing, seal and O-ring of steering cylinder | |
| Hose of brake system | |
| Piston seal and packing of boom, bucket cylinder | |

- ※ 1. **Replace the O-ring and gasket at the same time when replace 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 | 8.8T | | 10.9T | | 12.9T | |
|-----------|-------------|-------------|-------------|-------------|-------------|-------------|
| | kgf · m | lbf · ft | kgf · m | lbf · ft | kgf · m | lbf · ft |
| M 6×1.0 | 0.8 ~ 1.2 | 5.8 ~ 8.6 | 1.2 ~ 1.8 | 8.7 ~ 13.0 | 1.5 ~ 2.1 | 10.9 ~ 15.1 |
| M 8×1.25 | 2.0 ~ 3.0 | 14.5 ~ 21.6 | 2.8 ~ 4.2 | 20.3 ~ 30.4 | 3.4 ~ 5.0 | 24.6 ~ 36.1 |
| M10×1.5 | 4.0 ~ 6.0 | 29.0 ~ 43.3 | 5.6 ~ 8.4 | 40.5 ~ 60.8 | 6.8 ~ 10.0 | 49.2 ~ 72.3 |
| M12×1.75 | 6.8 ~ 10.2 | 50.0 ~ 73.7 | 9.6 ~ 14.4 | 69.5 ~ 104 | 12.3 ~ 16.5 | 89.0 ~ 119 |
| M14×2.0 | 10.9 ~ 16.3 | 78.9 ~ 117 | 16.3 ~ 21.9 | 118 ~ 158 | 19.5 ~ 26.3 | 141 ~ 190 |
| M16×2.0 | 17.9 ~ 24.1 | 130 ~ 174 | 25.1 ~ 33.9 | 182 ~ 245 | 30.2 ~ 40.8 | 141 ~ 295 |
| M18×2.5 | 24.8 ~ 33.4 | 180 ~ 241 | 34.8 ~ 47.0 | 252 ~ 340 | 41.8 ~ 56.4 | 302 ~ 407 |
| M20×2.5 | 34.9 ~ 47.1 | 253 ~ 340 | 49.1 ~ 66.3 | 355 ~ 479 | 58.9 ~ 79.5 | 426 ~ 575 |
| M22×2.5 | 46.8 ~ 63.2 | 339 ~ 457 | 65.8 ~ 88.8 | 476 ~ 642 | 78.9 ~ 106 | 570 ~ 766 |
| M24×3.0 | 60.2 ~ 81.4 | 436 ~ 588 | 84.6 ~ 114 | 612 ~ 824 | 102 ~ 137 | 738 ~ 991 |
| M30×3.5 | 120 ~ 161 | 868 ~ 1164 | 168 ~ 227 | 1216 ~ 1641 | 202 ~ 272 | 1461 ~ 1967 |

(2) Fine thread

| Bolt size | 8.8T | | 10.9T | | 12.9T | |
|-----------|-------------|-------------|-------------|-------------|-------------|-------------|
| | kgf · m | lbf · ft | kgf · m | lbf · ft | kgf · m | lbf · ft |
| M 8×1.0 | 2.1 ~ 3.1 | 15.2 ~ 22.4 | 3.0 ~ 4.4 | 21.7 ~ 31.8 | 3.6 ~ 5.4 | 26.1 ~ 39.0 |
| M10×1.25 | 4.2 ~ 6.2 | 30.4 ~ 44.9 | 5.9 ~ 8.7 | 42.7 ~ 62.9 | 7.0 ~ 10.4 | 50.1 ~ 75.2 |
| M12×1.25 | 7.3 ~ 10.9 | 52.8 ~ 78.8 | 10.3 ~ 15.3 | 74.5 ~ 110 | 13.1 ~ 17.7 | 94.8 ~ 128 |
| M14×1.5 | 12.4 ~ 16.6 | 89.7 ~ 120 | 17.4 ~ 23.4 | 126 ~ 169 | 20.8 ~ 28.0 | 151 ~ 202 |
| M16×1.5 | 18.7 ~ 25.3 | 136 ~ 182 | 26.3 ~ 35.5 | 191 ~ 256 | 31.6 ~ 42.6 | 229 ~ 308 |
| M18×1.5 | 27.1 ~ 36.5 | 196 ~ 264 | 38.0 ~ 51.4 | 275 ~ 371 | 45.7 ~ 61.7 | 331 ~ 446 |
| M20×1.5 | 37.7 ~ 50.9 | 273 ~ 368 | 53.1 ~ 71.7 | 384 ~ 518 | 63.6 ~ 86.0 | 460 ~ 622 |
| M22×1.5 | 51.2 ~ 69.2 | 370 ~ 500 | 72.0 ~ 97.2 | 521 ~ 703 | 86.4 ~ 116 | 625 ~ 839 |
| M24×2.0 | 64.1 ~ 86.5 | 464 ~ 625 | 90.1 ~ 121 | 652 ~ 875 | 108 ~ 146 | 782 ~ 1056 |
| M30×2.0 | 129 ~ 174 | 933 ~ 1258 | 181 ~ 245 | 1310 ~ 1772 | 217 ~ 294 | 1570 ~ 2126 |

2) PIPE AND HOSE (FLARE type)

| 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 |

3) PIPE AND HOSE (ORFS type)

| Thread size | 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 |

5) TIGHTENING TORQUE OF MAJOR COMPONENT

| No. | Descriptions | | Bolt size | Torque | |
|-----|--------------------|---|--------------------|----------------------|-------------------------|
| | | | | kgf · m | lbf · ft |
| 1 | Engine | Engine mounting bolt, nut (rubber, 2EA) | M24×3.0 | 76.5 ± 7.7 | 553 ± 55.7 |
| 2 | | Engine mounting bolt (bracket, 8EA) | M12×1.75 | 11 ± 1.8 | 79.6 ± 13.0 |
| 3 | | Engine mounting bolt (T/C housing, 3EA) | M10×1.5 | 4.6 ± 0.9 | 33.3 ± 6.5 |
| 4 | | Engine mounting bolt (adapter-flywheel, 8EA) | M10×1.5 | 6.9 ± 0.6 | 49.9 ± 4.3 |
| 5 | | Fan motor mounting bolt | M12×1.75 | 12.8 ± 3.0 | 92.6 ± 21.7 |
| 6 | | Radiator mounting bolt | M16×2.0 | 29.7 ± 5.9 | 215 ± 42.7 |
| 7 | | Fuel tank mounting bolt, nut | M16×2.0 | 29.7 ± 4.5 | 215 ± 32.5 |
| 8 | Hydraulic system | Main pump housing mounting bolt | M16×2.0 | 29.7 ± 4.5 | 215 ± 32.5 |
| 9 | | Fan & brake pump housing mounting bolt | M10×1.5 | 6.9 ± 1.4 | 50 ± 10.1 |
| 10 | | Main control valve mounting bolt | M12×1.75 | 12.8 ± 3.0 | 92.6 ± 21.7 |
| 11 | | Steering unit mounting bolt | M10×1.5 | 6.9 ± 1.4 | 50 ± 10.1 |
| 12 | | Steering valve (EHPS) mounting bolt | M8×1.25 | 2.5 ± 0.5 | 18.1 ± 3.6 |
| 13 | | Brake valve mounting bolt | M8×1.25 | 2.5 ± 0.5 | 18.1 ± 3.6 |
| 14 | | Cut-off valve mounting bolt | M8×1.25 | 2.5 ± 0.5 | 18.1 ± 3.6 |
| 15 | | EH control block mounting bolt | M8×1.25 | 2.5 ± 0.5 | 18.1 ± 3.6 |
| 16 | | Safety valve | M10×1.5 | 6.9 ± 1.4 | 50 ± 10.1 |
| 17 | | Hydraulic oil tank mounting bolt | M16×2.0 | 29.7 ± 4.5 | 215 ± 32.5 |
| 18 | Power train system | Transmission mounting bolt, nut (rubber, 2EA) | M24×3.0 | 100 ± 15 | 723 ± 108 |
| 19 | | Transmission mounting bolt (bracket, 6EA) | M20×2.5 | 56.9 ± 8.4 | 412 ± 60.8 |
| 20 | | Front axle mounting bolt, nut | M33×2.0 | 225 ± 20 | 1627 ± 145 |
| 21 | | Rear axle support mounting bolt, nut | M36×3.0 | 308 ± 46.2 | 2227 ± 334 |
| 22 | | Tire mounting nut | M22×1.5 | 79 ± 2.5 | 571 ± 18.1 |
| 23 | | Drive shaft joint mounting bolt | 1/2-20UNF | 15 ± 2.0 | 108 ± 14.5 |
| 24 | Others | Counterweight mounting bolt | M30×3.5 M24×3.0 | 199 ± 30 100 ± 15 | 1439 ± 216 723 ± 108 |
| 25 | | Operator's seat mounting bolt | M8×1.25 | 3.4 ± 0.8 | 24.6 ± 5 |
| 26 | | ROPS Cab mounting bolt (4EA) | M30×3.5 | 199 ± 29.9 | 1440 ± 216 |
| | | ROPS Cab mounting nut (4EA) | M16×2.0 | 20.5 ± 4.7 | 148± 34 |

3. SPECIFICATION OF FUEL, COOLANT AND LUBRICANTS

1) NEW MACHINE

New machine used and filled with following lubricants.

| Description | Specification |
|------------------|--|
| Engine oil | SAE 15W-40 (API CJ-4) |
| DEF/AdBlue® | ISO 22241 (32.5% high-purity urea and 67.5 deionized water) |
| Hydraulic oil | HD Hyundai Construction Equipment genuine long life (ISO VG 46, VG 68 only) Conventional (ISO VG15 ^{★2}) HD Hyundai Construction Equipment Bio Hydraulic Oil (HBHO, ISO VG 46) |
| Transmission oil | SAE 15W-40 |
| Axle oil | ★ Refer to below list |
| Grease | Lithium base grease NLGI No. 2 |
| Fuel | ASTM D975-No. 2, ^{★1} Ultra low sulfur diesel |
| Coolant (DCA4) | ASTM D6210 Mixture of 50% ethylene glycol base antifreeze and 50% water Mixture of 60% ethylene glycol base antifreeze and 40% water ^{★2} |

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

DEF : Diesel Exhaust Fluid

DEF compatible with AdBlue®

DCA4 : Brand name of Chemical Additive

manufactured by the Cummins Fleetguard Co

★ Recommended oil list

- BP TERRAC SUPER TRANSMISSION 10W-30

- CASTROL AGRI TRANS PLUS 10W-30

- MOBILFLUID 426

- SHELL DONAX TD 10W-30

- TOTAL DYNATRANS MPV

★¹ Ultra low sulfur diesel

- sulfur content ≤ 15 ppm

★² Cold region

Russia, CIS, Mongolia

2) RECOMMENDED LUBRICANTS

Use only oils listed below or equivalent.

Do not mix different brand oil.

| Do not mix different brand oils | | | Ambient temperature °C(°F) | | | | | | | | | |
|---------------------------------|---|---------------------------------------|--|-------------------------------------|------|------|--------|------|------|------|-------|--|
| Service point | Kind of fluid | Capacity ℓ (U.S. gal) | -50 | -30 | -20 | -10 | 0 | 10 | 20 | 30 | 40 | |
| | | | (-58) | (-22) | (-4) | (14) | (32) | (50) | (68) | (86) | (104) | |
| Engine oil pan | Engine oil | 19 (5.0) | ★ ² SAE 5W-40 | | | | | | | | | |
| | | | | | | | SAE 30 | | | | | |
| | | | | SAE 10W | | | | | | | | |
| | | | SAE 10W-30 | | | | | | | | | |
| | | | | SAE 15W-40 | | | | | | | | |
| DEF/ AdBlue® tank | Mixture of urea and deionized water | 27 (7.1) | ISO 22241, High-purity urea + deionized water (32.5 : 67.5) | | | | | | | | | |
| Transmission | Engine oil | 33 (8.7) | SAE 10W-30 | | | | | | | | | |
| | | | | SAE 15W-40 | | | | | | | | |
| Axle★ ⁴ | UTTO | Front : 42 (11.1) Rear : 40 (10.6) | ★Refer to below list | | | | | | | | | |
| Hydraulic tank | Hydraulic oil | Tank: 115 (30.4) | ★ ² ISO VG 15 | | | | | | | | | |
| | | System: 215 (56.8) | | ISO VG 46, HBHO VG 46★ ⁵ | | | | | | | | |
| | | | | ISO VG 68 | | | | | | | | |
| Fuel tank | Diesel fuel★ ¹ | 300 (79.3) | ★ ² ASTM D975 NO.1 | | | | | | | | | |
| | | | | ASTM D975 NO.2 | | | | | | | | |
| Fitting (grease nipple) | Grease | As required | ★ ² NLGI NO.1 | | | | | | | | | |
| | | | | NLGI NO.2 | | | | | | | | |
| Radiator (reservoir tank) | Mixture of antifreeze and soft water★ ³ | 44 (11.6) | Ethylene glycol base permanent type (50 : 50) | | | | | | | | | |
| | | | ★ ² Ethylene glycol base permanent type (60 : 40) | | | | | | | | | |

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

UTTO : Universal Tractor Transmission Oil

DEF : Diesel Exhaust Fluid

DEF compatible with AdBlue®

*¹ Ultra low sulfur diesel

- sulfur content ≤ 15 ppm

* Recommended oil list

- BP TERRAC SUPER TRANSMISSION 10W-30

- CASTROL AGRI TRANS PLUS 10W-30

- MOBILFLUID 426

- SHELL DONAX TD 10W-30

- TOTAL DYNATRANS MPV

*² Cold region

Russia, CIS, Mongolia

*³ Soft water

City water or distilled water

*⁴ If the machine is equipped with axle oil cooler, refer to page 6-40.

*⁵ HD Hyundai Construction Equipment Bio Hydraulic Oil

4. MAINTENANCE CHECK LIST

Scheduled maintenance is the normal maintenance necessary to provide proper and efficient machine operation. To protect your investment and prolong the service life of your machine, follow the scheduled maintenance list below.

1) EVERY 10 HOURS SERVICE

| Check items | Service | Page |
|---------------------------------|------------|----------|
| Hydraulic oil level | Check, Add | 6-31 |
| Engine oil level | Check, Add | 6-15 |
| Radiator coolant level | Check, Add | 6-17 |
| Belt tension & damage | Check | 6-22, 23 |
| Fuel pre-filter element (water) | Drain | 6-25 |
| DEF/AdBlue® tank | Check, Add | 6-29 |

2) EVERY 50 HOURS SERVICE

| Check items | Service | Page |
|---|------------|------|
| Attachment pins | Lubricate | 6-44 |
| Tire (air) | Check, Add | 6-34 |
| Drive shaft (flange bearing, front, center, rear) | Lubricate | 6-41 |
| Steering cylinder pins | Lubricate | 6-41 |
| Rear axle pivot | Lubricate | 6-41 |
| Fuel tank (water, sediment) | Drain | 6-25 |

3) INITIAL 250 HOURS SERVICE

| Check items | Service | Page |
|---------------------------------------|---------|--------------|
| Engine oil | Change | 6-15, 16, 17 |
| Engine oil filter | Replace | 6-15, 16, 17 |
| Fuel filter element | Replace | 6-26 |
| Fuel pre-filter element | Replace | 6-25 |
| Transmission oil | Change | 6-37, 38 |
| Transmission oil filter | Replace | 6-37, 38 |
| Front and rear axle oil | Change | 6-40 |
| Axle oil filter (option) | Replace | 6-40 |
| Hydraulic oil return filter | Replace | 6-32 |
| Pilot line filter element | Replace | 6-33 |
| Pressure filter element (if equipped) | Replace | 6-33 |

4) EVERY 250 HOURS SERVICE

| Check items | Service | Page |
|---|--------------|----------|
| Wheel nuts | Check, Tight | 6-34, 35 |
| Battery (voltage) | Check | 6-46, 47 |
| Air conditioner and heater filter (inner and outer) | Check, Clean | 6-49 |

5) EVERY 500 HOURS SERVICE

| Check items | Service | Page |
|--|---------------|----------------|
| Engine oil | Change | 6-15, 16, 17 |
| Engine oil filter | Replace | 6-15, 16, 17 |
| Radiator, oil cooler, change air cooler, condenser | Check, Clean | 6-21 |
| Coolant test (DCA4 concentration) | Test, Add | 6-21-1, 2 |
| Fuel filter element | Replace | 6-26 |
| Fuel pre-filter element | Replace | 6-26 |
| Coolant filter | Replace | 6-26-1 |
| Parking brake clearance | Check, Adjust | 6-38-1, 6-38-2 |

6) EVERY 1000 HOURS SERVICE

| Check items | Service | Page |
|---------------------------------------|-----------|----------|
| Air cleaner element (primary) | Clean | 6-24 |
| Hydraulic oil return filter | Replace | 6-32 |
| Pilot line filter element | Replace | 6-33 |
| Hydraulic tank air breather element | Replace | 6-33 |
| Transmission oil | Change | 6-37, 38 |
| Transmission oil filter | Replace | 6-37, 38 |
| Center pivot pin | Lubricate | 6-41 |
| Aircon and heater outer filter | Replace | 6-49 |
| Pressure filter element (if equipped) | Replace | 6-33 |

7) EVERY 1500 HOURS SERVICE

| Check items | Service | Page |
|--------------------------|---------|------|
| Front axle oil | Change | 6-40 |
| Rear axle oil | Change | 6-40 |
| Axle oil filter (option) | Replace | 6-40 |

8) EVERY 2000 HOURS SERVICE

| Check items | Service | Page |
|--|---------------------------|------------------|
| Hydraulic oil★ ¹ | Change | 6-32 |
| HBHO★ ² | Change | 6-32 |
| Radiator coolant★ ¹ | Change | 6-17, 18, 19, 20 |
| Hydraulic oil suction strainer | Check, Clean | 6-32 |
| Crankcase breather filter | Replace | 6-27, 28 |
| Airconditioner and heater inner filter | Replace | 6-49 |
| Hoses, fittings, clamps (fuel, coolant, hydraulic) | Check, Retighten, Replace | - |

★¹ Conventional hydraulic oil

★² If do not want to change HBHO (HD Hyundai Construction Equipment Bio Hydraulic Oil, ISO VG 46) every 2000 hours, contact HD Hyundai Construction Equipment dealer and ask about SAMPLING.

9) EVERY 4000 HOURS SERVICE

| Check items | Service | Page |
|-------------------------|---------|------|
| DEF/AdBlue® tank filter | Replace | 6-29 |

10) EVERY 4500 HOURS SERVICE

| Check items | Service | Page |
|----------------------------------|---------|------|
| DEF/AdBlue® supply module filter | Replace | 6-30 |

11) EVERY 5000 HOURS SERVICE

| Check items | Service | Page |
|-----------------------------|---------|------|
| Hydraulic oil★ ³ | Change | 6-32 |

★³ HD Hyundai Construction Equipment genuine long life

12) EVERY 6000 HOURS SERVICE

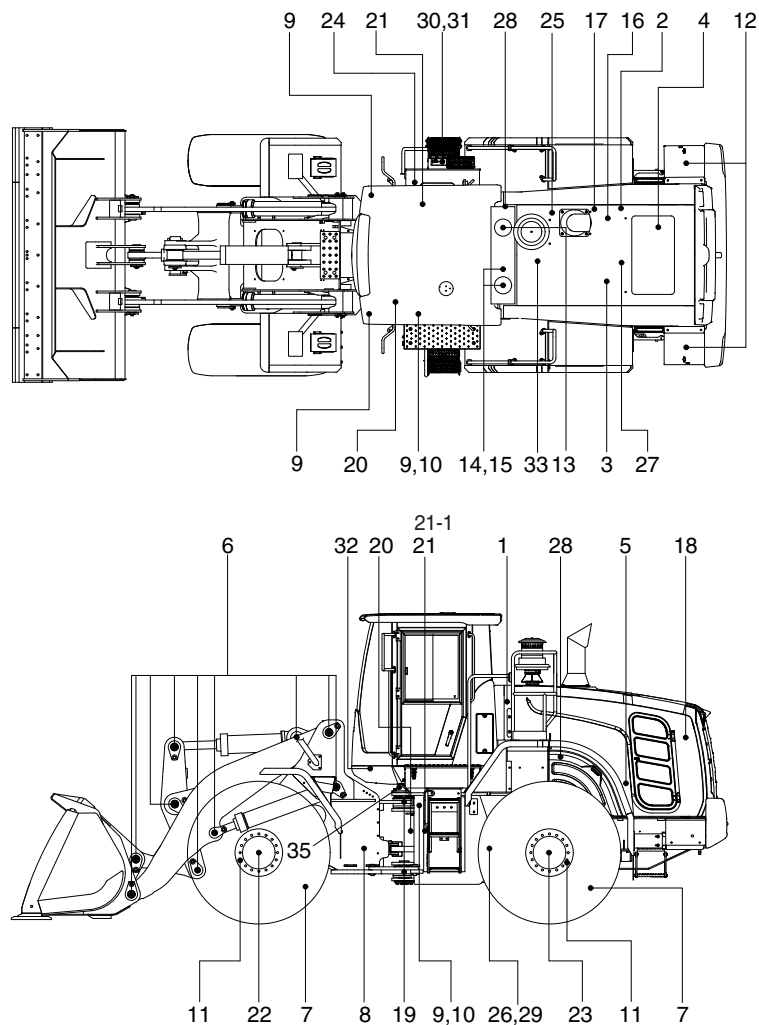
| Check items | Service | Page |
|--------------------------------|---------|------------------|
| Radiator coolant★ ³ | Change | 6-17, 18, 19, 20 |

★³ HD Hyundai Construction Equipment genuine long life

13) WHEN REQUIRED

| Check items | Service | Page |
|----------------------------|----------------|------|
| Air cleaner element | | |
| · Safety | Replace | 6-24 |
| · Primary | Clean, Replace | 6-24 |
| Air conditioner and heater | | |
| · Outer filter | Replace | 6-49 |
| · Inner filter | Clean, Replace | 6-49 |

5. MAINTENANCE CHART



9656M110

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 | Check, Add | HO | 115 (30.4) | 1 |
| | 2 | Engine oil level | Check, Add | EO | 19 (5.0) | 1 |
| | 4 | Radiator coolant level | Check, Add | C | 44 (11.6) | 1 |
| | 5 | Fan belt tension & damage | Check, Adjust | - | - | 1 |
| | 17 | Fuel pre-filter (water) | Drain | - | - | 1 |
| | 30 | DEF/AdBlue® tank | Check, Add | DEF | 27 (7.1) | 1 |
| 50 Hours or weekly | 6 | Attachment pins | Lubricate | PGL | - | 13 |
| | 7 | Tire (air) | Check, Add | - | - | 4 |
| | 8 | Drive shaft (flange bearing) | Lubricate | PGL | - | 1 |
| | 9 | Steering cylinder pin | Lubricate | PGL | - | 4 |
| | 10 | Rear axle pivot | Lubricate | PGL | - | 2 |
| | 26 | Drive shaft sleeve yoke | Lubricate | PGL | - | 2 |
| | 29 | Drive shaft journal bearing assy | Lubricate | PGL | - | 5 |

| Service interval | No. | Description | Service action | Oil symbol | Capacity ℓ (U.S.gal) | Service points No. |
|-------------------|------|--|---------------------------|------------|----------------------|--------------------|
| 250 Hours | 11 | Wheel nuts | Check, Tight | - | - | 80 |
| | 12 | Battery (voltage) | Check, Add | - | - | 2 |
| | 24 | Aircon and heater inner and outer filter | Check, Clean | - | - | 2 |
| Initial 250 Hours | 2 | Engine oil | Change | EO | 19 (5.0) | 1 |
| | 3 | Engine oil filter | Replace | - | - | 1 |
| | 13 | Hydraulic oil return filter | Replace | - | - | 2 |
| | 16 | Fuel filter element | Replace | - | - | 1 |
| | 17 | Fuel pre-filter element | Replace | - | - | 1 |
| | 20 | Transmission oil | Change | EO | 33 (8.7) | 1 |
| | 21 | Transmission oil filter | Replace | - | - | 1 |
| | 22 | Axle oil (front) | Change | UTTO | 42 (11.1) | 3 |
| | 23 | Axle oil (rear) | Change | UTTO | 40 (10.6) | 3 |
| | - | Axle oil filter (option) | Replace | - | See 6-40 | 2 |
| | 32 | Pilot line filter element | Replace | - | - | 1 |
| | 35 | Pressure filter element (if equipped) | Replace | - | - | 1 |
| 500 Hours | 2 | Engine oil | Change | EO | 19 (5.0) | 1 |
| | 3 | Engine oil filter | Replace | - | - | 1 |
| | 16 | Fuel filter element | Replace | - | - | 1 |
| | 17 | Fuel pre-filter element | Replace | - | - | 1 |
| | 18 | Radiator, oil cooler, CAC, condenser | Clean | - | - | 5 |
| | 21-1 | Parking brake clearance | Check, Adjust | - | - | 1 |
| | 33 | Coolant filter | Replace | - | - | 1 |
| | 33 | Coolant test (DCA4 concentration) | Test, Add | DCA4 | - | 1 |
| 1000 Hours | 13 | Hydraulic oil return filter | Replace | - | - | 2 |
| | 14 | Hydraulic tank air breather element | Replace | - | - | 1 |
| | 19 | Center pivot pin | Lubricate | PGL | - | 2 |
| | 20 | Transmission oil | Change | EO | 33 (8.7) | 1 |
| | 21 | Transmission oil filter | Replace | - | - | 1 |
| | 24 | Airconditioner and heater outer filter | Replace | - | - | 1 |
| | 25 | Air cleaner element (primary) | Clean | - | - | 1 |
| | 32 | Pilot line filter element | Replace | - | - | 1 |
| | 35 | Pressure filter element (if equipped) | Replace | - | - | 1 |
| 1500 Hours | 22 | Axle oil (front) | Change | UTTO | 42 (11.1) | 3 |
| | 23 | Axle oil (rear) | Change | UTTO | 40 (10.6) | 3 |
| | - | Axle oil filter (option) | Replace | - | See 6-40 | 2 |
| 2000 Hours | 1 | Hydraulic oil★ ¹ | Change | HO | 115 (30.4) | 1 |
| | 1 | Hydraulic oil (HBHO★ ²) | Change | - | 115 (30.4) | 1 |
| | 4 | Radiator coolant★ ¹ | Change | C | 44 (11.6) | 1 |
| | 15 | Hydraulic oil suction strainer | Check, Clean | - | - | 1 |
| | 24 | Air conditioner and heater inner filter | Replace | - | - | 1 |
| | 27 | Crankcase Breather Filter | Replace | - | - | 1 |
| | - | Hoses, fittings, clamps (fuel, coolant, hydraulic) | Check, Retighten, Replace | - | - | - |
| 4000 Hours | 31 | DEF/AdBlue® tank filter | Replace | - | - | 1 |
| 4500 Hours | 28 | DEF/AdBlue® supply module filter | Replace | - | - | 1 |
| 5000 Hours | 1 | Hydraulic oil★ ³ | Change | HO | 115 (30.4) | 1 |
| 5000 Hours | 4 | Radiator coolant★ ³ | Change | C | 44 (11.6) | 1 |
| When required | 24 | Air conditioner and heater outer filter | Replace | - | - | 1 |
| | | Air conditioner and heater inner filter | Clean, Replace | - | - | 1 |
| | 25 | Air cleaner element (safety) | Replace | - | - | 1 |
| | | Air cleaner element (primary) | Clean, Replace | - | - | 1 |

★¹ Conventional ★² HD Hyundai Construction Equipment Bio Hydraulic Oil

★³ HD Hyundai Construction Equipment genuine long life

※ Oil symbol : Refer the recommended lubricants for specification.

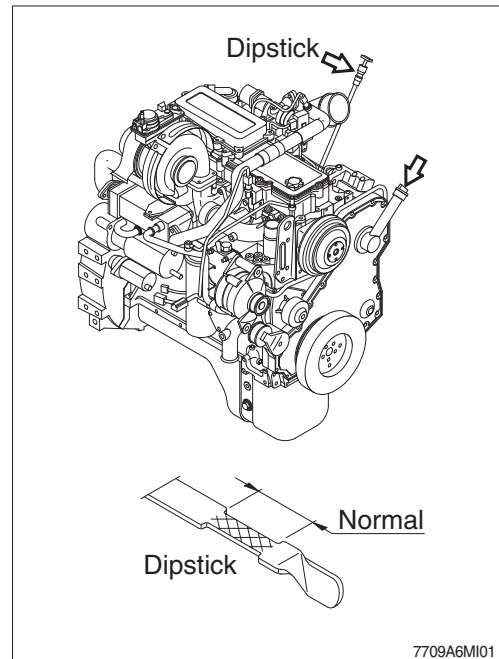
- EO : Engine oil · GO : Gear oil · C : Coolant · DEF : DEF/AdBlue®
- HO : Hydraulic oil · PGL : Grease · UTTO : Refer to page 6-9.

6. SERVICE INSTRUCTION

1) CHECK ENGINE OIL LEVEL

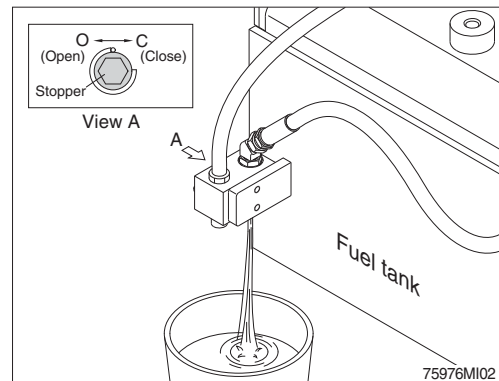
Check the oil level with the machine on a flat ground before starting engine.

- (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.

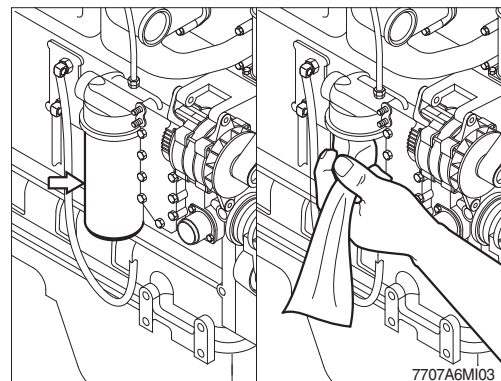


2) REPLACEMENT OF ENGINE OIL AND OIL FILTER

- (1) Operate the engine until the coolant temperature reaches 60°C (140°F). Shut off the engine.
 - (2) Turn the stopper to the open position and allow the oil to drain.
 - Wrench size : 10 mm
- ※ A drain pan with a capacity of 30 liters (6.6 U.S.gallons) will be adequate.

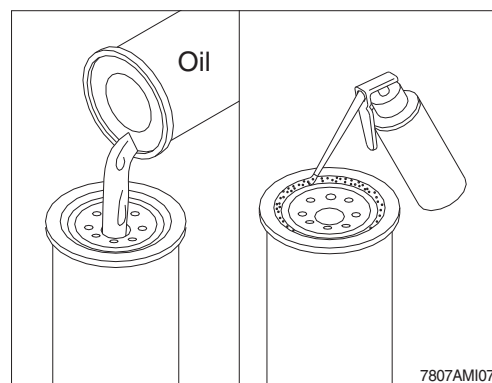


- (3) Clean the area around the oil filter head.
 - (4) Use oil filter wrench to remove the oil filter.
 - (5) Clean the gasket surface of oil filter head.
- ※ The O-ring can stick on the filter head; make sure it is removed.



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

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

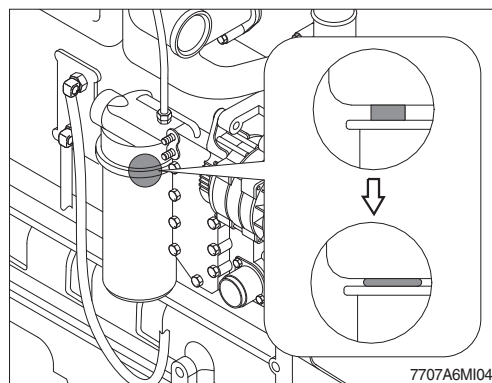


(7) Install the filter to the filter head.

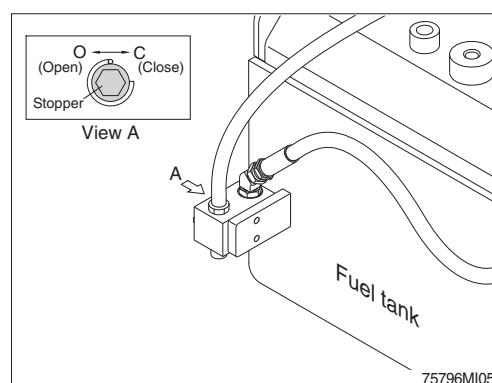
Tighten the filter until the gasket contacts the filter head surface.

Tighten 3/4 to 1 turn after gasket makes contact with the filter head.

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

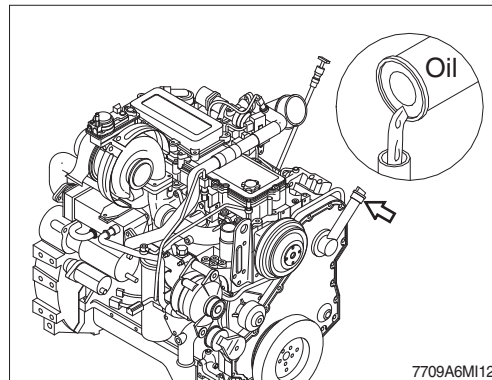


(8) Turn the stopper to the close position.



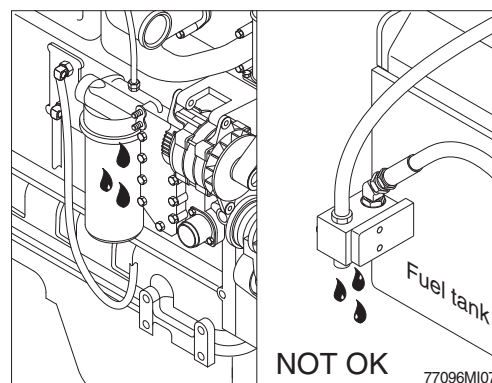
(9) Fill the engine with clean oil to the proper level.

· Quantity : 19 ℓ (5.0 U.S.gallons)



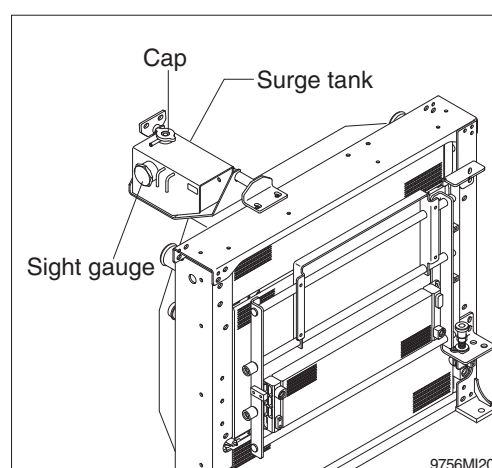
- (10) Operate the engine at low idle and inspect for leaks at the filter and the drain plug.
Shut the engine off and check oil level with dipstick. Allow 15 minutes for oil to drain down before checking.

※ **Do not overfill the engine with oil.**



3) CHECK COOLANT LEVEL

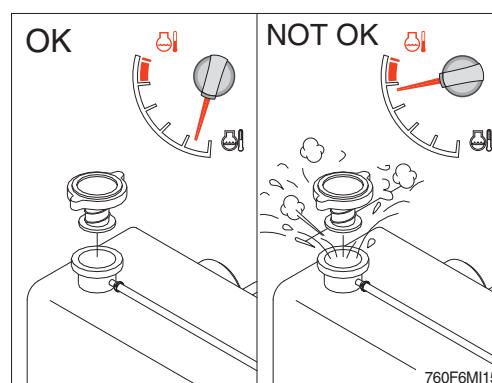
- (1) Check the engine fault code on the monitor.
- (2) If you following fault codes exist, check the coolant level.
- SPN : 111, FMI : 18
 - Coolant level is low.
 - SPN : 111, FMI : 1
 - Coolant level is the most severely low.
- (3) Add the mixture of antifreeze and water after removing the cap of the surge tank if coolant is not sufficient.



- (4) Replace gasket of surge tank cap when it is damaged.

⚠ **Do not remove the surge tank cap from a hot engine. Wait until the coolant temperature is below 50°C (120°F) before removing the cap. Heated coolant spray or steam can cause personal injury.**

※ **Do not add cold coolant to a hot engine ; engine castings can be damaged. Allow the engine to cool to below 50°C (120°F) before adding coolant.**



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.

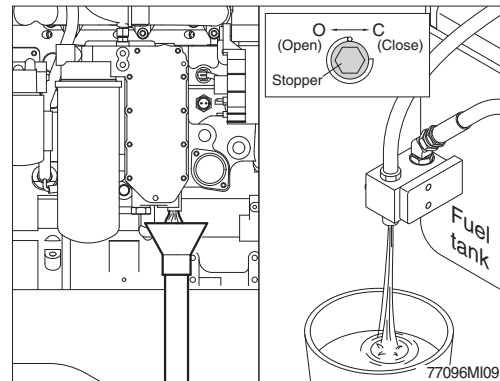
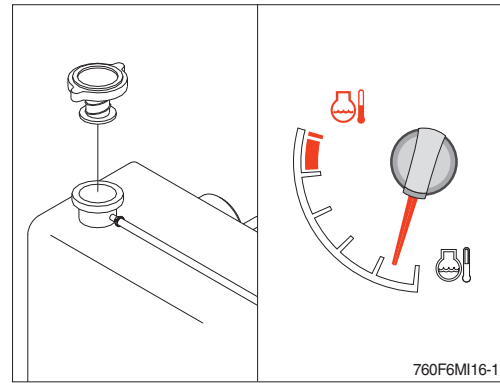
Use authorized waste disposal facilities, including civic amenity sites and garages providing authorized facilities for the receipt of used antifreeze.

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

- ⚠ Wait until the temperature is below 50°C (120°F) before removing the coolant system cap. Failure to do so can cause personal injury from heated coolant spray.

Drain the cooling system by turning the stopper to the open position.

A drain pan with a capacity of 50 liters (13.2 U.S.gallons) will be adequate in most applications.

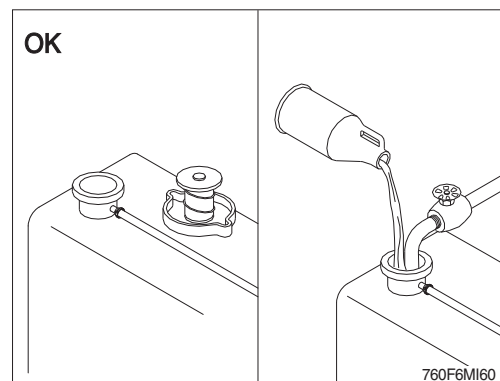


(2) Flushing of cooling system

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

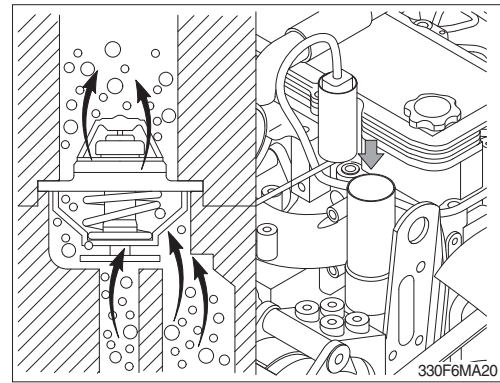
- ※ Use 0.5 kg (1.0 pound) of sodium carbonate for every 23 liters (6.0 U.S. gallons) of water.

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

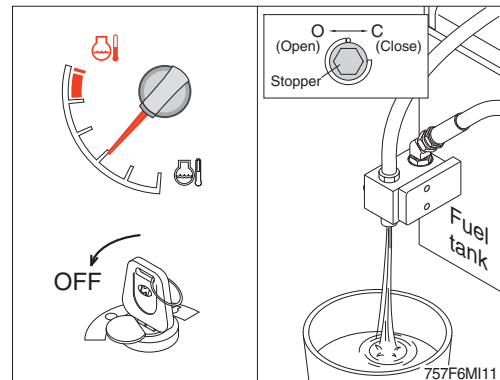


- ※ During filling, air must be vented from the engine coolant passages.

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

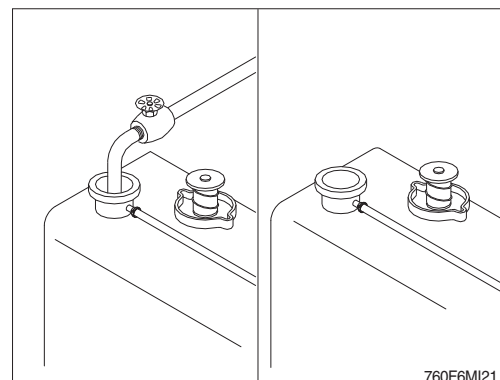


- ② Operate the engine for 5 minutes with the coolant temperature above 80°C (176°F). Shut the engine off, and drain the cooling system.



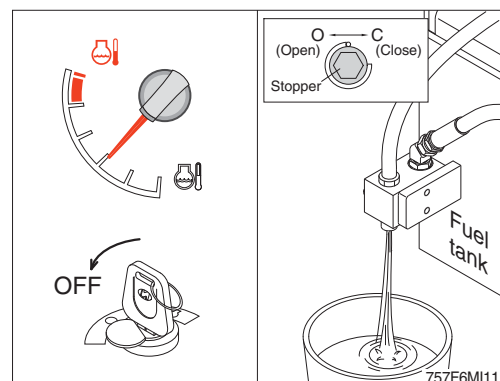
- ③ Fill the cooling system with clean water.

- ※ Be sure to vent the engine and aftercooler for complete filling.
- ※ Do not install the surge tank 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.

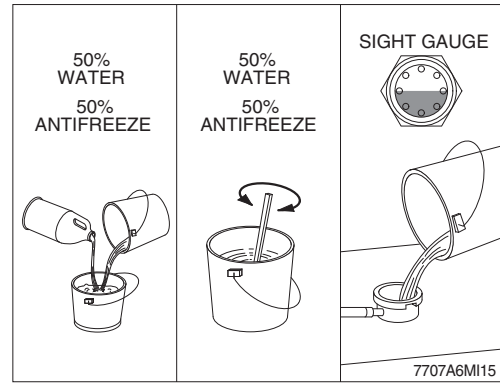
- ※ If the water being drained is still dirty, the system must be flushed again until the water is clean.



(3) Cooling system filling

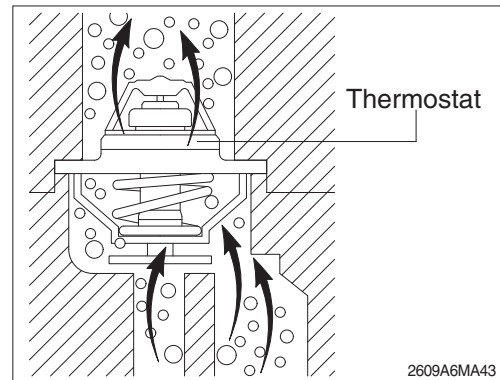
- ① Use a mixture of 50 percent soft water and 50 percent ethylene glycol antifreeze to fill the cooling system. Refer to the page 6-9.

- ※ **Never use water alone for coolant.**
This can result in damage from corrosion.
- ※ **Do not use hard water such as river water or well water.**

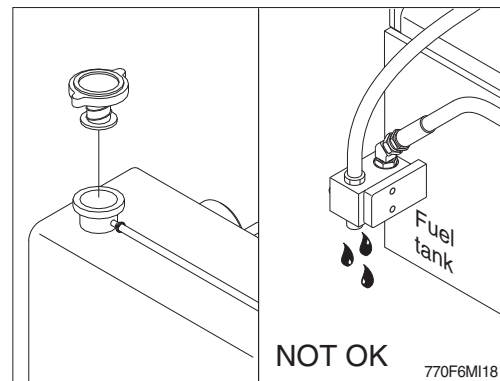


- ② The system has a maximum fill rate of 19 liters (5.0 U.S. gallons) per minute. Do not exceed this fill rate.

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



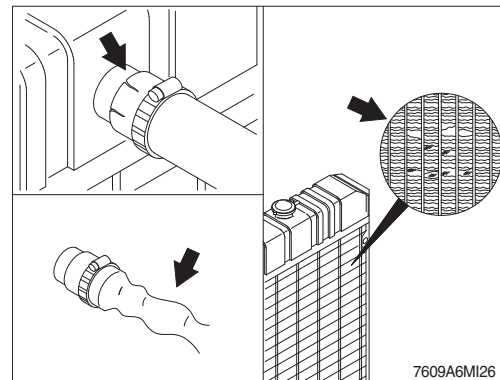
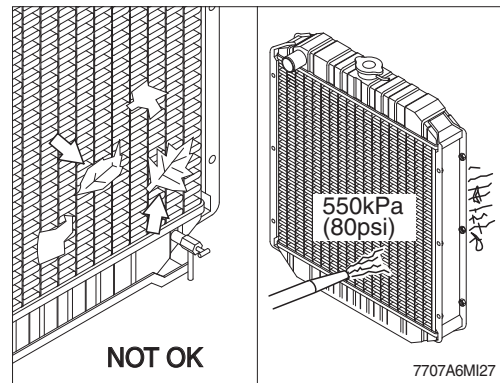
- ③ Install the cap. Operate the engine until it reaches a temperature 80°C (176°F), and check for coolant leaks. Check the coolant level again to make sure the system is full of coolant.



5) CLEAN RADIATOR AND OIL COOLER

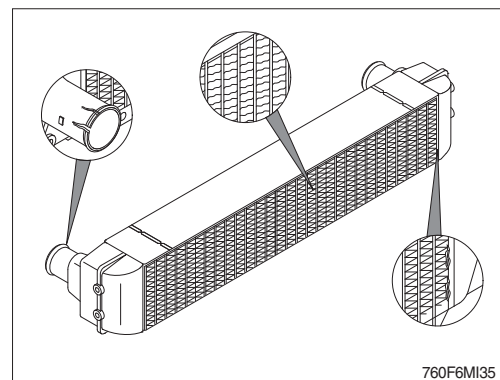
Check, and if necessary, clean and dry outside of radiator and oil cooler. After working in a dusty place, clean radiator more frequently.

- (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) CHECK CHARGE AIR COOLER

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



6-1) COOLANT TEST STRIPS INSTRUCTIONS

(1) Pre-test instruction

Recommended testing frequency - at every coolant filter change interval.

- ① Collect coolant sample from the radiator drain valve.
 - Do not collect from the coolant recovery or overflow system
 - Coolant must be between 10~54°C when tested
 - Room temperature is best.
- ② For accurate results, test must be completed within 75 seconds.
 - Follow recommended test times. Use a stopwatch.
- ③ Record and track results.

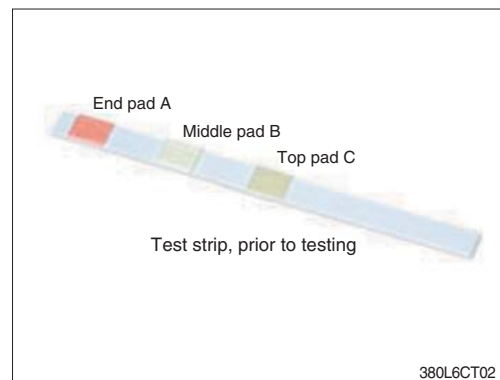


380L6CT01

(2) Test instruction

- ① Remove one strip from bottle and replace cap immediately.

Do not touch the pads on the end of the strip. Discard kit if nitrite test pads of unused strips have turned brown.
- ② Dip strip for 1 second in coolant sample, remove, and shake strip briskly to remove excess liquid.



380L6CT02

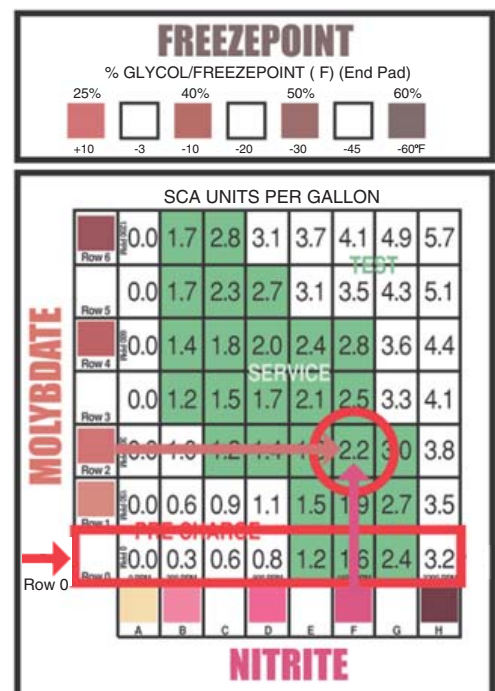
- ③ 45 seconds after dipping strip, compare results to color chart and record in the following order:

for DCA4:



- ④ All three readings must be completed no later than 75 seconds after dipping strip.
- ⑤ If uncertain about the color match, pick the low numbered block.

ex.) If nitrite color is not F, use column E.
- ⑥ Determine where the molybdate level intersect the nitrite level on the chart. The amount of SCA units per gallon in the cooling system is given where the molybdate row intersect the nitrite column.



380L6CT03

(3) Maintenance actions based on results

① Above normal

ABOVE NORMAL

- Do not replace the coolant filter or add DCA4 liquid until additive concentration falls below 3 units per gallon.
- Test at every subsequent coolant filter change interval.

② Normal

NORMAL

- Continue to replace the coolant filter at your normal interval.

③ Below normal

BELOW NORMAL

- Replace the coolant filter and add 1 pint of additive per each 4 gallons of coolant.
- Replace the coolant filter and add 40 cc of additive per each 1 liter of coolant.

※ If you need part number of Test kit or DCA4, please see Parts Manual.

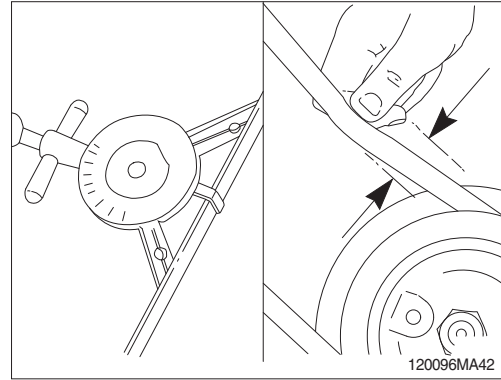
| | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|
| 0.0 | 1.7 | 2.8 | 3.1 | 3.7 | 4.1 | 4.9 | 5.7 |
| 0.0 | 1.7 | 2.3 | 2.7 | 3.1 | 3.5 | 4.3 | 5.1 |
| 0.0 | 1.4 | 1.8 | 2.0 | 2.4 | 2.8 | 3.6 | 4.4 |
| 0.0 | 1.2 | 1.5 | 1.7 | 2.1 | 2.5 | 3.3 | 4.1 |
| 0.0 | 1.0 | 1.2 | 1.4 | 1.8 | 2.2 | 3.0 | 3.8 |
| 0.0 | 0.6 | 0.9 | 1.1 | 1.5 | 1.9 | 2.7 | 3.5 |
| 0.0 | 0.3 | 0.6 | 0.8 | 1.2 | 1.6 | 2.4 | 3.2 |

380L6CT04

7) FAN BELT

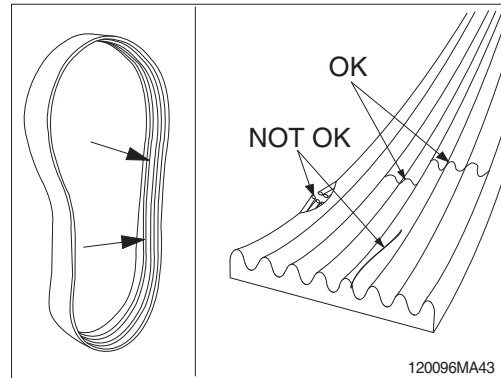
- (1) Use the belt tension gage to measure the belt tension.

· Fan belt tension : 11.3 kg (25 lb)



- (2) Inspect the drive belt for damage.

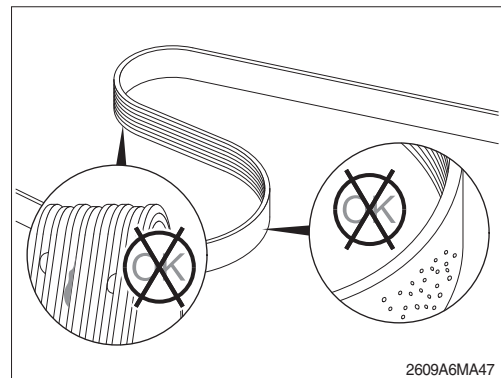
- ① Transverse (across the belt) cracks are acceptable.
- ② Longitudinal (direction of belt ribs) cracks that intersect with transverse cracks are not acceptable.



- ③ Inspect the belt

- Embedded debris
- Uneven/excessive rib wear
- Exposed belt cords
- Glazing (high heat)

※ If any of the above conditions are present, the belt is unacceptable for reuse and must be replaced.



8) INSPECTION OF COOLING FAN

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

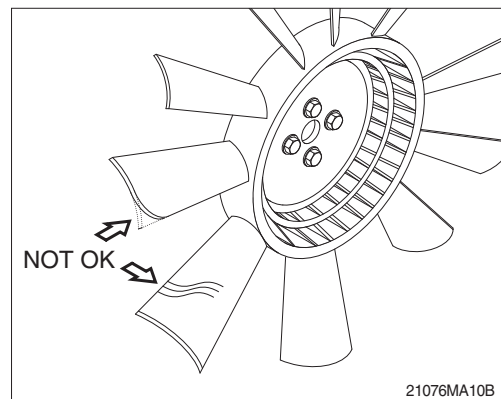
※ Rotate the crankshaft by using the engine barring gear.

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

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

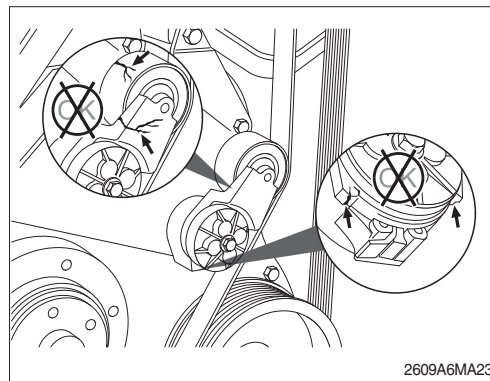
Check the fan to make sure it is securely mounted. Tighten the capscrews if necessary.

Replace any fan that is damaged.



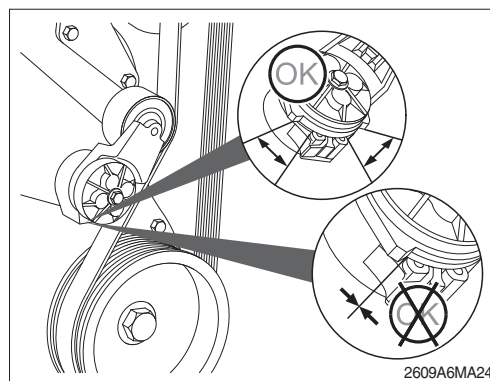
9) FAN BELT TENSIONER

- (1) With the engine stopped, check the tensioner arm, pulley, and stops for cracks. If any cracks are found, the tensioner must be replaced.



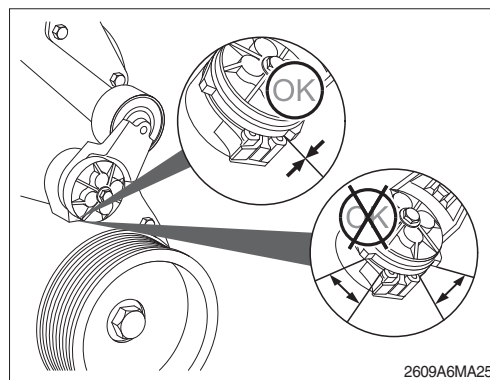
- (2) With the belt installed, verify that neither tensioner arm stop is in contact with the spring case stop.

After replacing the belt, if the tensioner arm stops are still in contact with the spring case stop, replace the tensioner.

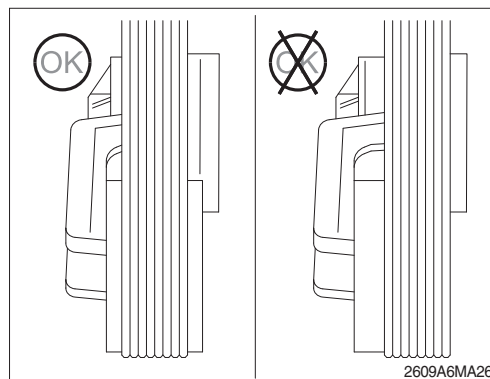


- (3) With the belt removed, verify that the tensioner arm stop is in contact with the spring case stop. If these two are not touching, the tensioner must be replaced.

※ **After replacing the belt, if the tensioner arm stop is still in contact with the spring case stop, the tensioner MUST be replace.**



- (4) Check the location of the drive belt on the belt tensioner pulley. The belt should be centered on, or close to the middle of, the pulley. Misaligned belts, either too far forward or backward, can cause belt wear, belt roll-offs, or increase uneven tensioner bushing wear.



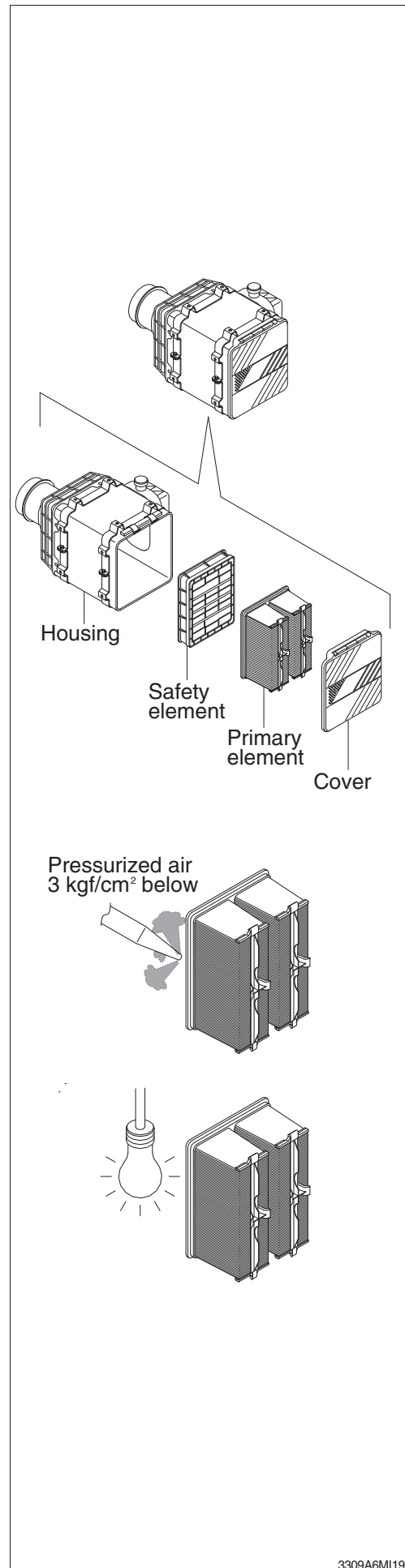
10) CLEANING OF AIR CLEANER

(1) Primary element

- ① Open the cover and remove the element.
- ② Wipe all contaminant and debris from inside the housing body.
- ③ Do not clean the filter element by striking or hitting the filter against any object to shake the debris from the filter element.
- ④ Clean the filter element with compressed air.
 - a. Remove dust from filter element by directing the compressed air into the opening of the air filter element.
 - b. Use 3 kg/cm^2 (40 psi) maximum air pressure and hold the compressed air nozzle at least 2.5 cm (1") away from the pleats while cleaning. Make sure to keep the clean side of air filter free of debris.
- ⑤ Visually inspect for damage to the filter elements and components. Use a light source to help identify any defects in the media. If any defects are observed discard the filter element and replace with a new primary filter element.
 - a. Before any type of cleaning, a visual inspection of the filter is needed. If there is any damage to the filter body, gaskets or endplates, do not clean or reuse; the filter should be discarded. Always clean filters in a clean environment, observe strict inspection procedures and repackage filters immediately after the cleaning process with appropriate materials.
 - b. Use observe proper safety precautions and dispose of waste materials in an environmentally compliant manner.
- ⑥ Re-install filter element into the air housing.
- ⑦ Replace the primary element at the fourth cleaning.

(2) Safety element

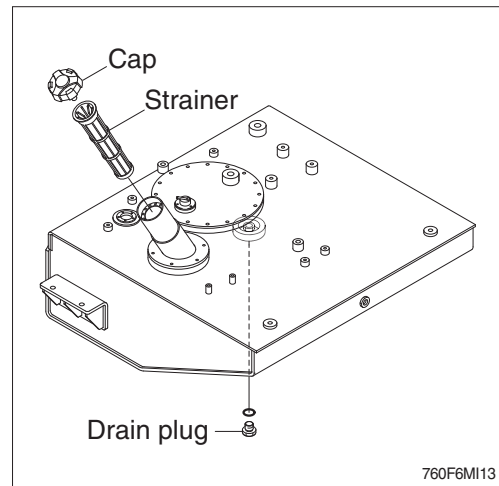
The safety filter element should never be cleaned since the safety filter is the last barrier to contaminant before it reaches engine/equipment. The useful life of the safety filter is equivalent to that of the primary air filter only if the primary filter element is being regularly cleaned. If the primary filter element is not cleaned, the safety filter should be changed at every third primary air filter change or after one year of continuous service, whichever occurs first.



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11) FUEL TANK

- (1) Fill fuel fully when system the operation to minimize water condensation, and check it with fuel gauge before starting the machine.
 - (2) Drain the water and sediment in the fuel tank by opening the drain cock.
 - ※ Be sure to LOCK the cap of fuel tank.
 - ※ Remove the strainer of the fuel tank and clean it if contaminated.
- ▲ **Stop the engine when refueling.**
All lights and flames shall be kept at a safe distance while refueling.

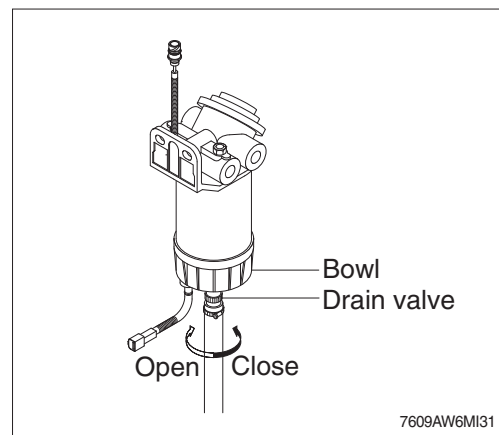


12) PREFILTER

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

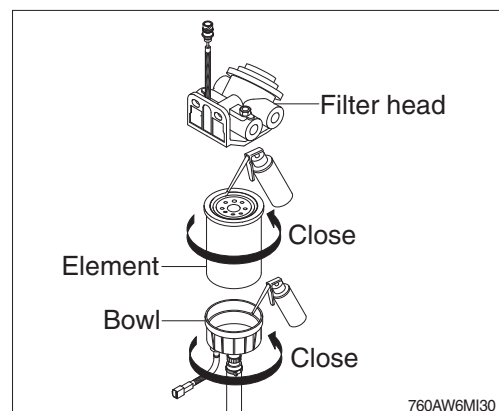
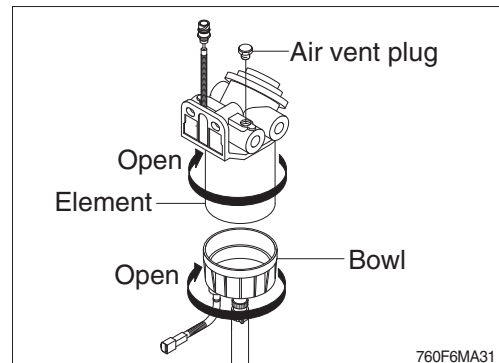
(1) Drain water

- ① Open bowl drain valve to evacuate water.
 - ② Close drain valve.
- ※ **Don't tighten up a drain valve so strong.**
 - ※ **Inspect and drain water frequently for remain water volume to be less than 1/3 volume of a bowl.**



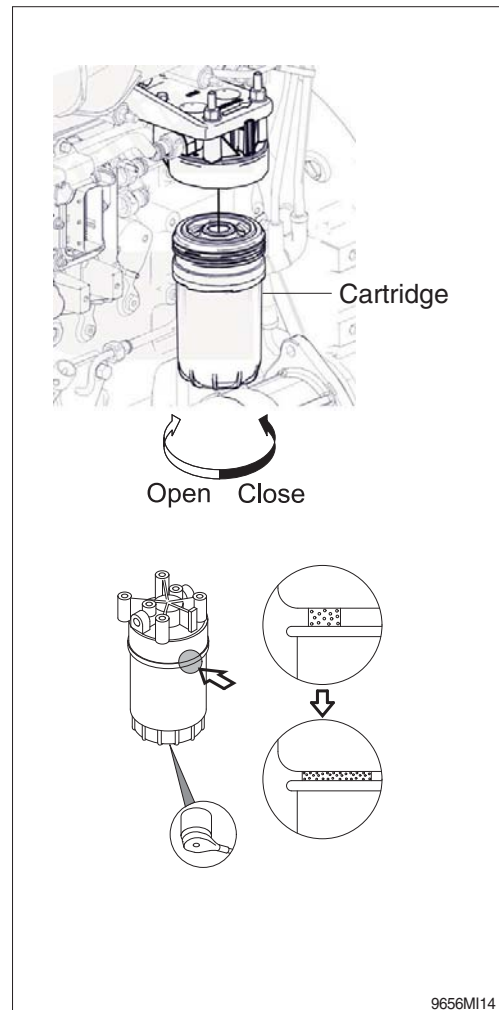
(2) Replace element

- ① Loosen the air vent plug and 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.



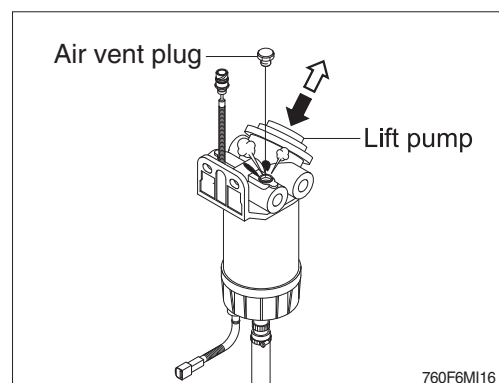
13) REPLACEMENT OF FUEL FILTER

- (1) Use 1" wrench, loosen and remove the fuel filter and clean the gasket surface.
 - ※ **Make sure O-ring does not stick to fuel filter head.**
Remove O-ring with screwdriver, if necessary.
- (2) Lubricate the fuel filter O-ring with clean lubricating oil.
- (3) Install the filter on the filter head. Tighten the filter until the gasket contacts the filter head surface. Tighten the fuel filter an additional 3/4 turn after contact.
 - ※ **Mechanical overtightening can distort the threads or damage the filter element seal.**
- (4) Relieve the air after mounting.
 - ※ **Do not pre-fill an on-engine fuel filter with fuel.**
The system must be primed after the fuel filter is installed. Pre filling the fuel filter can result in debris entering the fuel system and damaging fuel system components.
 - ※ **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.



14) BLEEDING THE FUEL SYSTEM

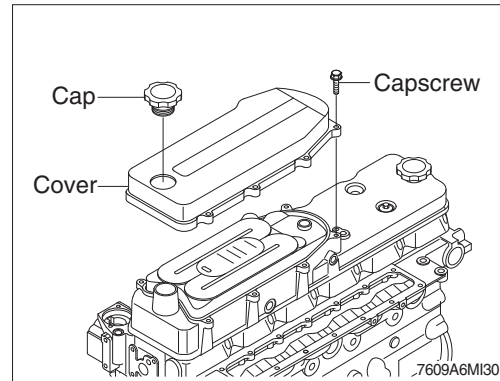
- (1) Loosen fuel supply line plug at the outlet of pre-filter.
 - (2) Do hand-priming the lift pump repeatedly until air bubbles comes out from fuel supply line completely.
 - (3) Tighten fuel supply line to its origin position.
- ▲ **The fuel pump, high-pressure fuel lines, and fuel rail contain very high-pressure fuel. Do not loosen any fittings while the engine is running. Personal injury and property damage can result.**
- Wait at least 10 minutes after shutting down the engine before loosening any fittings in the high-pressure fuel system to allow pressure to do decrease to a lower level.**



15) CRANKCASE VENTILATION FILTER

※ Do not use pneumatic tools to remove the breather cover capscrews. Damage to the rocker cover can result.

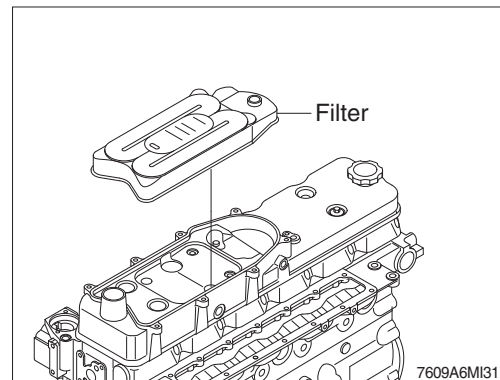
- (1) Remove the oil fill cap.
- (2) Remove the crankcase ventilation filter cover capscrews.
- (3) Remove the filter cover.



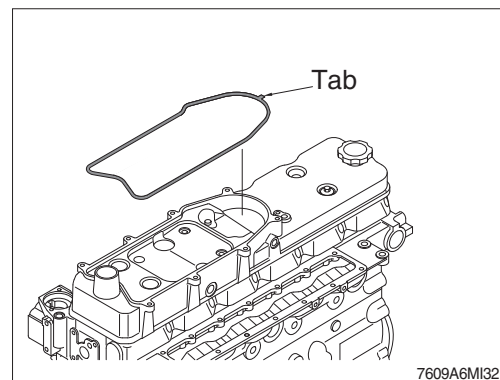
- (4) Remove the crankcase ventilation filter from the rocker lever cover.

※ Do not disturb the crankcase ventilation filter gasket located on the rocker lever cover.

※ Exposure to oil can cause the gasket to swell, which can make it difficult to install the gasket back into groove. If the gasket comes out of the groove, do not attempt to install the gasket. Replace it with a new gasket.



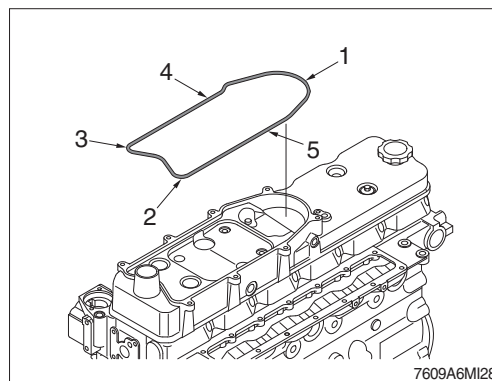
- (5) If the gasket is damaged, remove the gasket by grasping the tab on the gasket and pulling up.
- (6) Clean the crankcase ventilation filter mounting surface and O-ring sealing surfaces on the rocker lever cover.
- (7) Clean the crankcase ventilation filter cover with warm soapy water.
Inspect the cover for cracks.
Replace the cover if damage is found.



- (8) If the gasket was removed, install the gasket into the rocker lever cover groove starting with the tab end first. Then install the corners opposite the gasket tab end. Finish by pushing in the sides (see illustration).

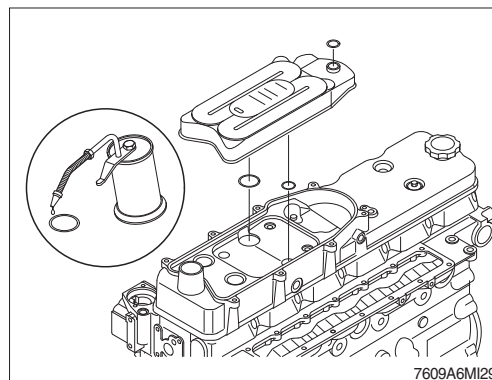
Gently push the gasket down into the groove. Do not use a finger to trace the gasket around into the groove during installation, as this will stretch the gasket, making it difficult to fully seat into the groove.

- ※ **Do not cut the gasket to make it fit into the groove, as this will result in an oil leak. The gasket must be fully seated around the entire perimeter of the rocker lever cover groove.**



- (9) Apply clean engine oil to the O-rings on the crankcase ventilation filter.

Install the filter onto the rocker lever cover.



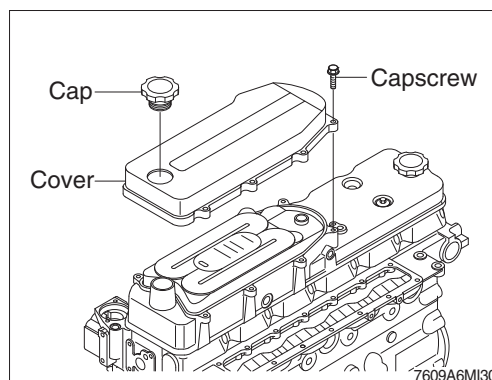
- (10) Install the crankcase ventilation filter cover.

Install the filter cover capscrews.

Tighten the capscrews, starting with the innermost capscrews and working outward in a circular manner.

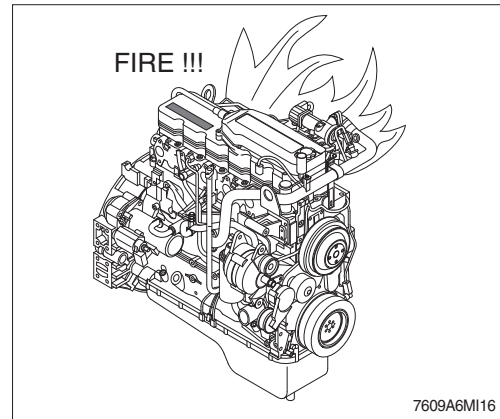
· 0.71 kgf · m (5.16 lbf · ft)

Install the oil fill cap.



16) 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.



17) DEF/AdBlue® TANK

- (1) The DEF/AdBlue® tank level must be checked daily with DEF/AdBlue® level on LCD. Refer to the page 3-12.

- ※ Make sure that the filler filter in cap is clean. If it is dirty, clean the filler filter with clean water and refit it.

- (2) If the DEF/AdBlue® level is found to below, DEF/AdBlue® must be added.

- (3) When fill the tank with DEF/AdBlue®, check the sight gauge and don't fill up "F" level line to prevent overflow.

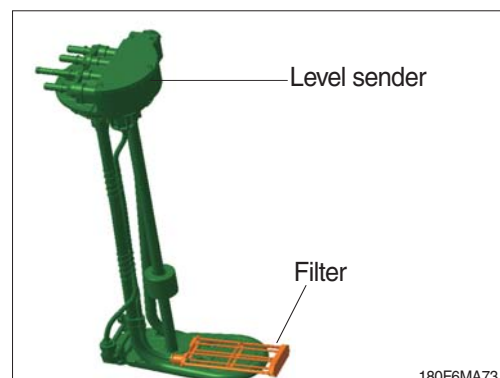
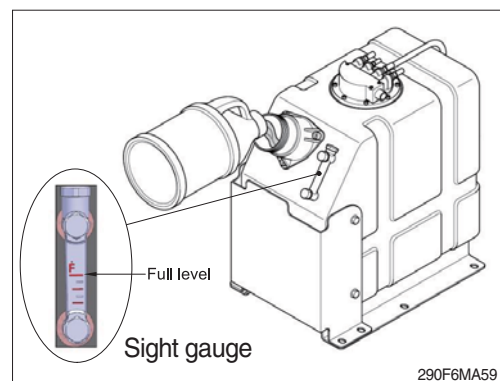
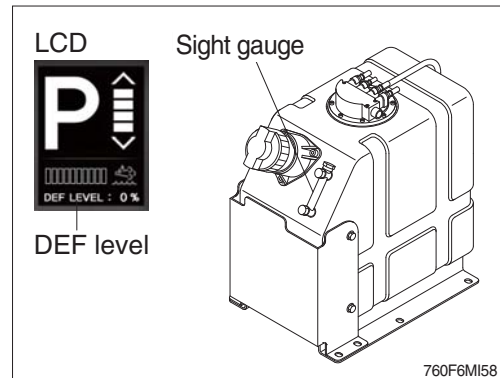
- ⚠ It is unlawful to tamper with or remove any component of the aftertreatment system. It is also unlawful to use a catalyst solution that does not meet the specifications provided or the operate the machine with no catalytic solution.

- ※ Be careful to entering dust, sand or other contamination substance when you refill the DEF/AdBlue® into the tank. Otherwise, fatal problem such as engine idle locking, derating or engine stopping can be happen.

※ DEF/AdBlue® TANK FILTER

DEF/AdBlue® tank filter is mounted on the level sender of DEF/AdBlue® tank.

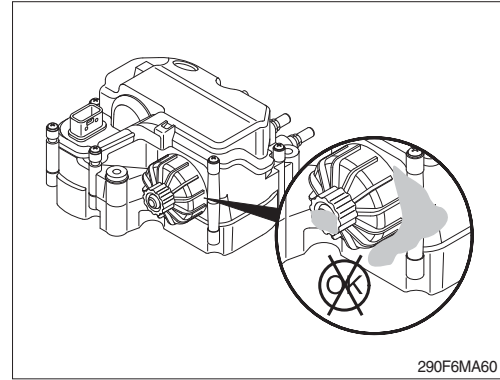
Replace the filter every 4000 hours.



18) DEF/AdBlue® DOSING UNIT FILTER

- (1) Inspect the area around the seal and vent of DEF/AdBlue® dosing unit filter cap for signs of leakage.

※ Turn OFF the master switch.



- (2) Unscrew the DEF/AdBlue® supply module filter cap. A 30 mm wrench can be used on the cap to aid in removal.

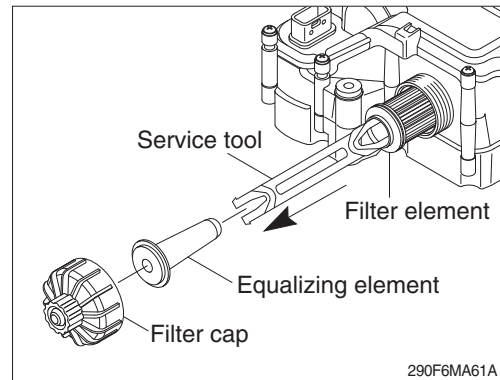
- (3) Remove the filter equalizing element.

- (4) Remove the old filter element.

A disposable service tool is included with the filter to aid in filter removal. Use the appropriate end of the tool, depending on the color of the plastic on the filter.

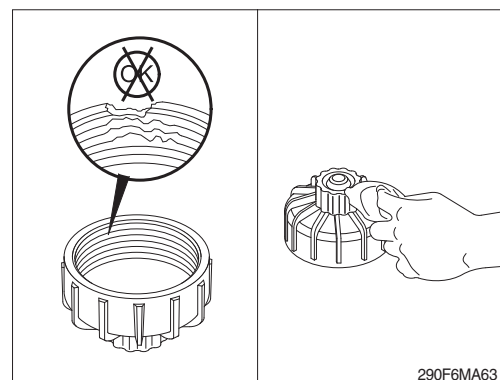
When inserting the tool a "click" sound can be heard which indicates proper engagement with the filter.

※ If the filter element and equalizing element are removed from the aftertreatment DEF/AdBlue® tank, they must be discarded and replaced; regardless of condition.

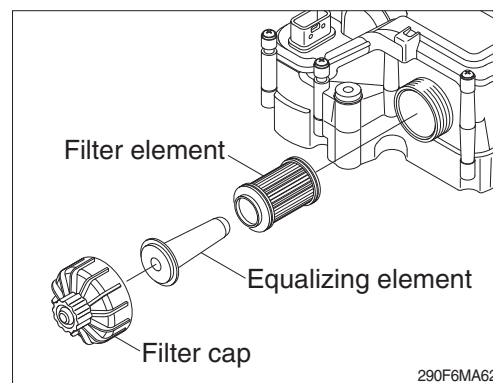


- (5) Clean and inspect the filter cap

- ① Clean the aftertreatment DEF/AdBlue® tank cap and threads on the DEF/AdBlue® tank with warm water and a clean cloth.
- ② Check the condition of the threads on the filter cap, if the threads are damaged, replace the filter cap.



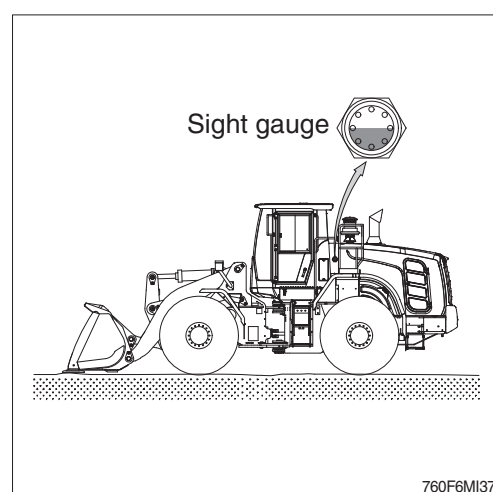
- (6) Slide the filter equalizing element in to the new filter element.
- (7) Insert the assembly into the aftertreatment DEF/ AdBlue® supply module.
- (8) Install and tighten the filter cap.
 - Tightening torque : 2.0 kgf · m (14.5 lbf · ft)



19) HYDRAULIC OIL CHECK

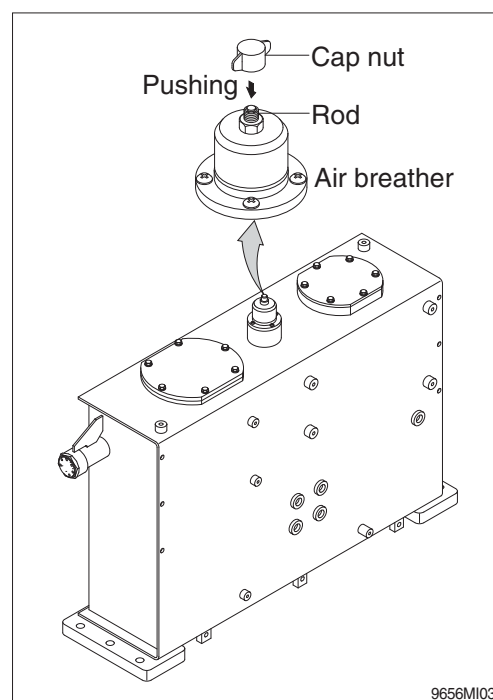
- (1) Lower the bucket on the ground at a flat location as in the illustration.
Stop the engine and then leave for about 5 minutes.
- (2) Check the oil level at the sight gauge. The sight gauge is located on the left side of the hydraulic oil tank.
- (3) The sight gauge should indicate the middle position.

※ **Add hydraulic oil, If necessary.**



20) FILLING HYDRAULIC OIL

- (1) Stop the engine to the position of level check.
- (2) Rotate the cap nut counter-clockwise by hand and push the rod to release the air pressure.
- (3) Remove the breather on the top of oil tank and fill the oil to the specified level.
- (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.



21) CHANGE THE HYDRAULIC OIL

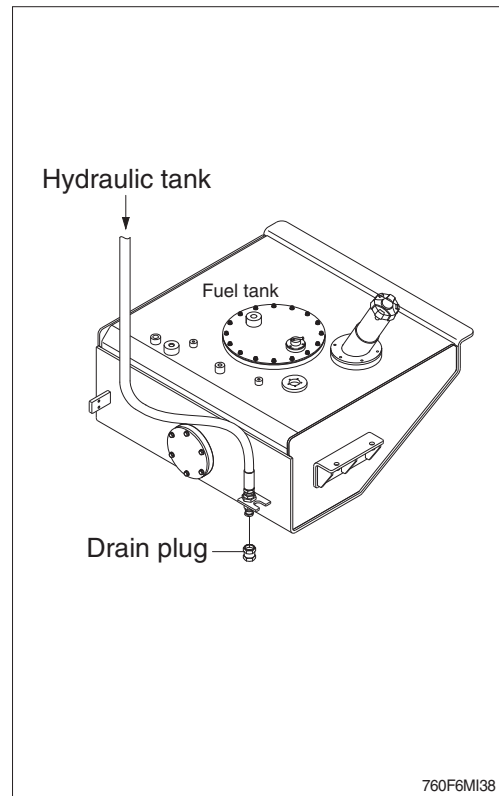
- (1) Lower the bucket on the ground extend the bucket cylinder to the maximum.
- (2) Loosen the cap and relieve the pressure in the tank by pushing the top of the air breather.
- (3) Prepare a suitable container.
- (4) To drain the oil loosen the drain plug at the fuel tank block.
- (5) Tighten the drain plug.
- (6) Fill proper amount of recommended oil.
- (7) Put the breather in the right position.
- (8) Start engine and run continually. Release the air by full stroke of control lever.

※ The oil must be free of bubbles. If bubbles are present in the oil, air is entering the hydraulic system. Inspect the suction hoses and hose clamps.

※ Incase 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.

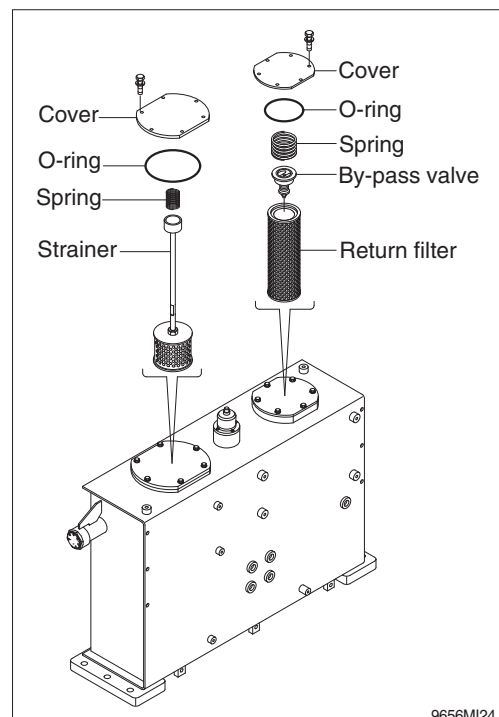


22) CLEANING AND REPLACING RETURN FILTER

Clean and replace the return filter in the following manner.

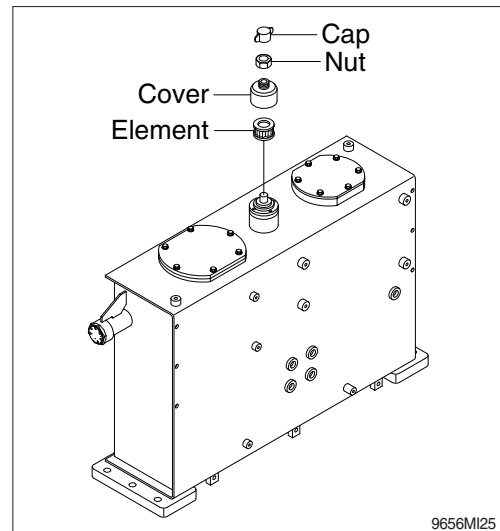
- (1) Remove the cover.
- (2) Remove spring, by-pass valve and return filter from the tank.
- (3) Replace element with new one and assemble spring and by-pass valve after cleaning.
- (4) Install the cover on the tank.

· Tightening torque : $6.9 \pm 1.4 \text{ kgf} \cdot \text{m}$
($50 \pm 10 \text{ lbf} \cdot \text{ft}$)



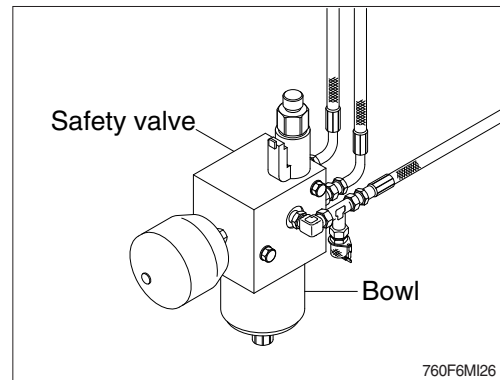
23) REPLACEMENT OF ELEMENT IN HYDRAULIC TANK BREATHER

- (1) Rotate the cap counter-clockwise by hand and push the rod to release the air pressure.
- (2) Loosen the lock nut and remove the cover.
- (3) Pull out the filter element.
- (4) Replace the filter element new one.
- (5) Reassemble by reverse order of disassembly.
 - Nut tightening torque : 0.4~0.5 kgf · m
(2.89~ 3.61 lbf · ft)



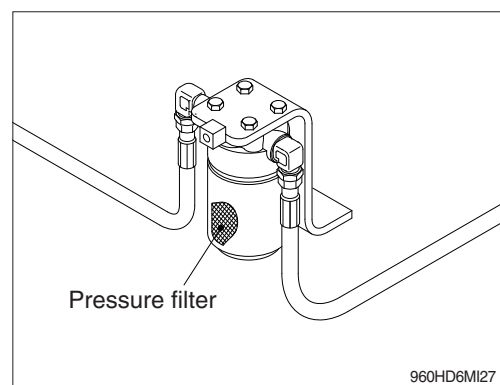
24) REPLACE OF PILOT LINE FILTER

- (1) Loosen the bowl positioned on the safety valve.
- (2) Pull out the filter element and clean the bowl.
- (3) Install the new element and tighten the bowl using spanner.
 - Spanner size : 27 mm



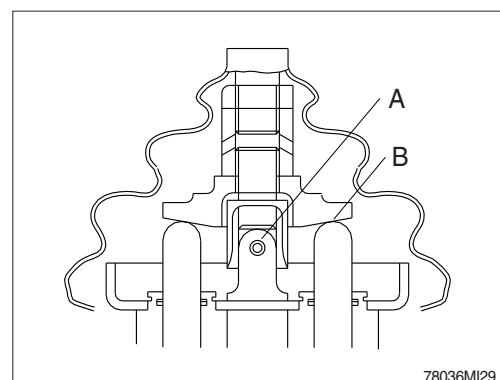
24-1) REPLACE OF PRESSURE FILTER

- (1) Loosen the pressure filter.
 - (2) Install the new filter and tighten.
- ※ The filter is located on the front side of rear frame under the cab.



25) LUBRICATE RCV LEVER

Remove bellows and grease the joint (A) and the sliding parts (B).



26) TIRE PRESSURE

- (1) Inappropriate tire pressure is a primary cause for tire damage. Insufficient tire pressure will damage internal carcass of tire. Repeated excessive bending will damage or break the carcass. Excessive pressure will also cause premature damage of tire.

- (2) Recommended tire pressure (When tire is cooled)

| Size | Pressure |
|-----------------|------------------|
| 23.5 R25, ★(L3) | 4.2 bar (60 psi) |

- (3) Continuous operation will produce heat and increase pressure on tire. But such phenomenon was already taken into account when designing a tire. Do not try to remove normally increased air because tires may be crushed or overinflated.

- (4) The three major causes for excessive heat and pressure of tire are insufficient pressure, excessive load and overspeed. Avoid excessive load and overspeed in order to keep tires in good shape.

- ▲ Do not inflate tires using flammable gases or alcohol injector.

This cause explosion or personal injury.

- ▲ Inflate tires at the pressure level recommended by the manufacturer, and check periodically pressure and wear of tires.

- ▲ When replacing the inflated tire, do not stand near the tire.

- ※ Check the tire when the tire is at normal temperature and the machine is not loaded.

- ▲ Do not use recycled wheel parts.

- ▲ When removing lockering or inflating tire, use safety cable or chain to ensure safety.

- ※ Be sure to bleed air before removing lockering. Never inflate tires unless the lockering is assembled in its place.

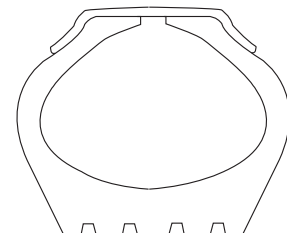
- ① Avoid the followings when traveling.

- ② Rubbing tires against road bank or rack at cargo-unloading spot.

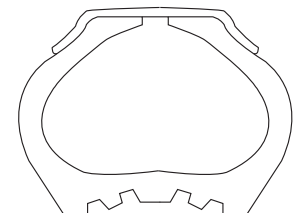
- ③ Tires slippage during working.

- ④ Abrupt starting of machine.

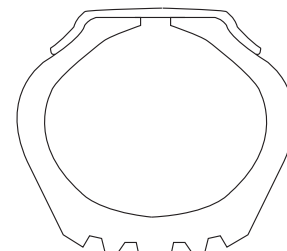
When oil, grease or gasoline smeared on tire, clean those. Otherwise it may cause of permanent deformation.



Normal



Too low pressure



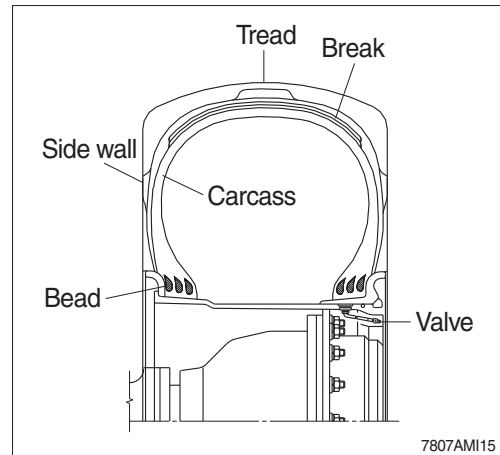
Excess pressure

27) REPLACEMENT OF TIRE

⚠ Disassembly, reassembly, replacement and repair of tire requires special skills and equipment. Contact a tire repair shop.

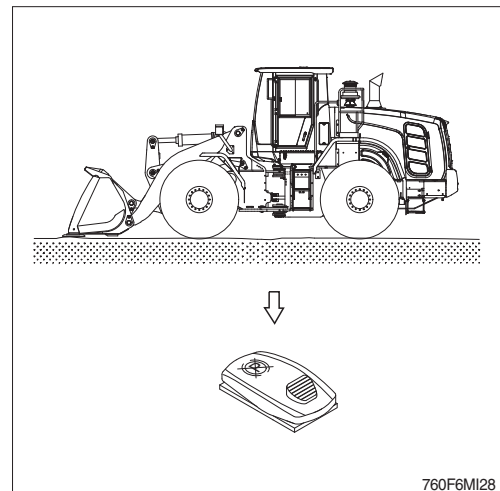
(1) Tires to be replaced

- ① Tires with broken or bent bead wires
- ② Tires exposed more than 1/4 of carcass ply.
- ③ Tires whose carcass is damaged more than 1/3 of the tire width.
- ④ Tires which show fly separation.
- ⑤ Tires which has a radial crack near the carcass.
- ⑥ Tires which are judged to be unsuitable for use because of deformation or damage.

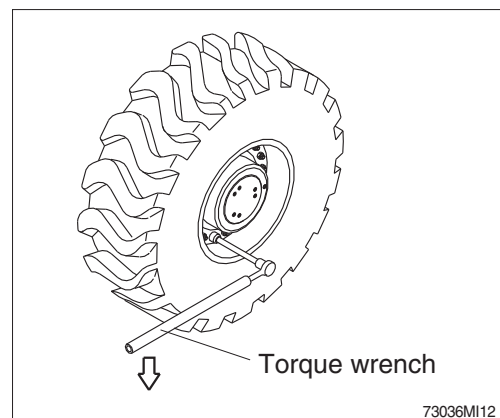


(2) Separation of tire

- ① After moving the machine to flat ground, lower the bucket to the ground and turn the parking brake switch ON.

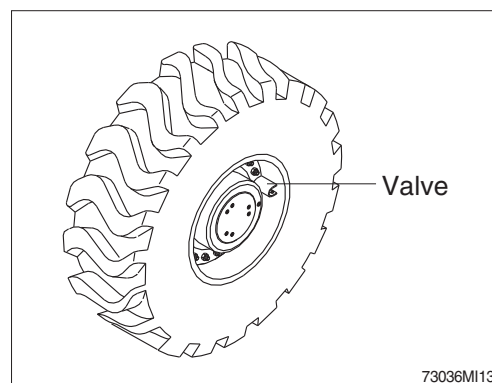


- ② Loosen slightly all wheel mounting.
 - Tools : Socket 32 mm
 - Torque wrench
 - Extension bar
- ③ Lift the machine with a jack.
- ④ Loosen all wheel mounting nuts and replace the tire.



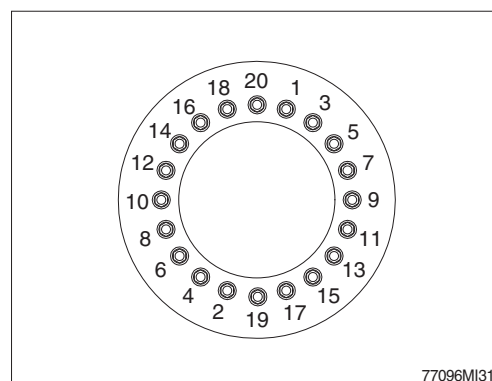
(3) Direction of tire to be installed

- ① Be careful that the valve should be facing the outside.



(4) Mounting of tire

- ① Lightly tighten nuts as shown in the illustration.
- ② Lower the jack after tire is replaced.
- ③ Tighten nuts according to the specified tighten torque.
 - Tightening torque : $79 \pm 2.5 \text{ kgf} \cdot \text{m}$
($571 \pm 18 \text{ lbf} \cdot \text{ft}$)

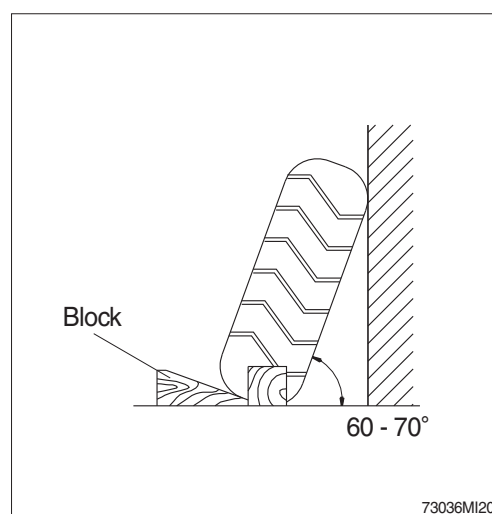


28) STORING TIRES AFTER REMOVAL

As a basic rule, store the tires in a warehouse which unauthorized persons cannot enter. If the tire are stored outside, always erect a fence around the tires and put up "No Entry" and other warning signs that even young children can understand.

Stand the tire on level ground, and block it securely so that it cannot roll or fall over.

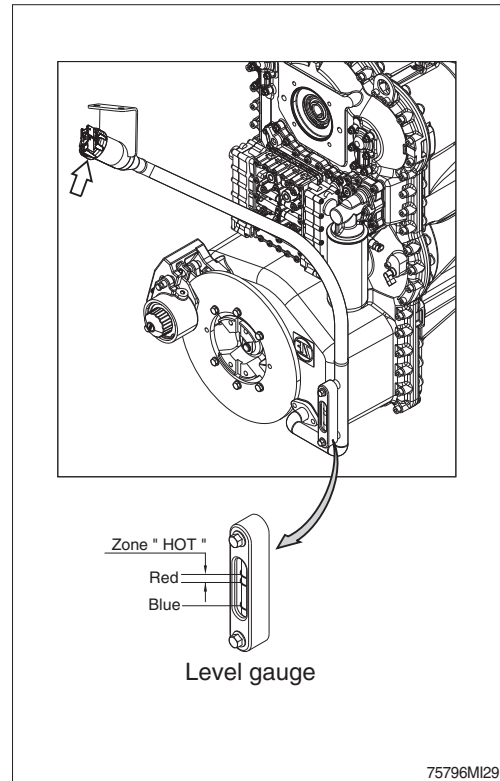
If the tire should fall over, get out of the way quickly. The tires for construction equipment are extremely heavy, so trying to hold the tire may lead to serious injury.



29) CHECK TRANSMISSION OIL LEVEL

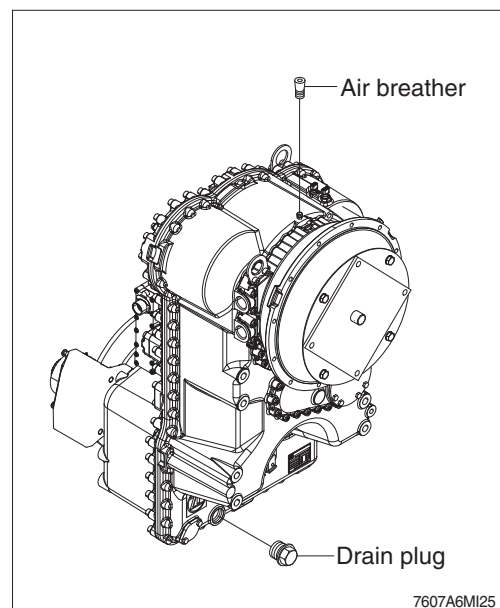
- (1) The oil level check must be carried out as follows;
oil level check (weekly).
- (2) Before the oil level check, transmission must have been running to warm up enough.
- (3) When the oil level is checked, machine must be on flat ground and engine must be at idling speed, transmission must be in neutral position.
- (4) Check the oil level on level (sight) gauge.
- (5) Oil level
 - Operating temperature (about 80~90°C)
:The Oil level must be lying in zone HOT (between two red lines).
 - Cold phase (about 40°C)
:The Oil level must be lying near cold mark (blue line).

▲ When checking, press the parking brake switch and fix the front and rear frames with the safety lock bar.

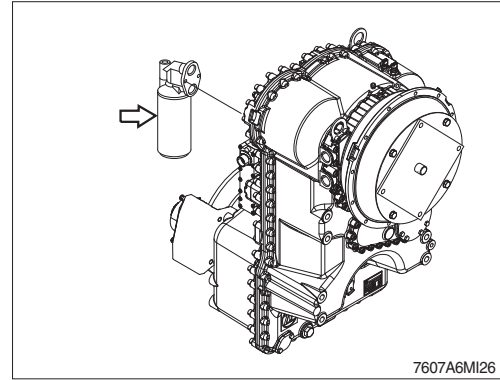


30) REPLACEMENT OF TRANSMISSION OIL AND FILTER ELEMENT

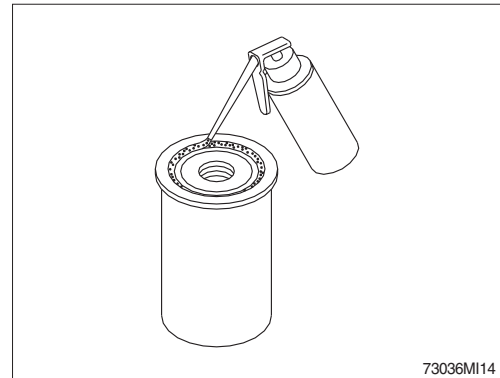
- (1) Operate the machine for a few minutes in order to warm the transmission oil.
- (2) Move the machine to flat ground. Lower the bucket to the ground and slightly apply downward force.
- (3) Press the parking brake switch and stop the engine.
- (4) Open transmission air breather to relieve internal air pressure.
- (5) Remove the transmission drain plug. Allow the transmission oil to drain into a suitable container.



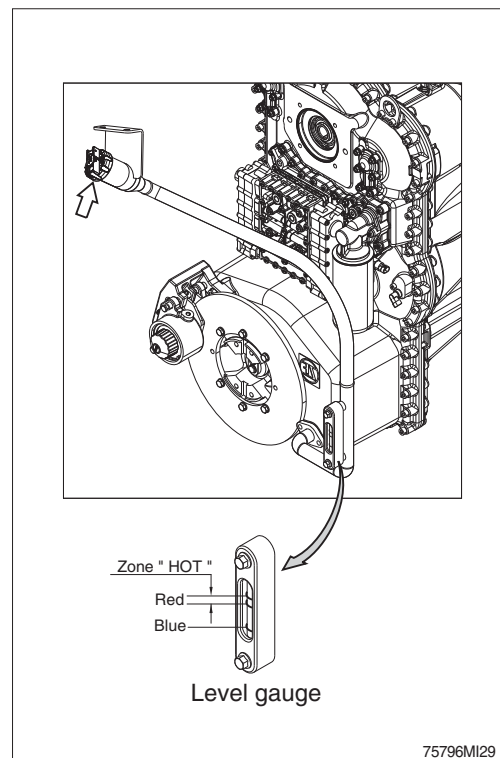
- (6) Remove the transmission oil filter cartridge.
Dispose of the used transmission oil filter cartridge properly.
- (7) Clean the filter cartridge mounting base.
Remove any part of the filter cartridge gasket that remains on the filter cartridge mounting base.



- (8) Apply a light coat of oil to the gasket of a new transmission oil filter cartridge.
- (9) Install the new transmission oil filter cartridge.
Screw the filter in until contacts with the sealing surface is obtained and tighten it now by hand about 1/3 to 1/2 turn.



- (10) Fill the oil through filler cap and check if the oil is at the appropriate level.
 - (11) The proper oil amount is 33 liters. (8.7 U.S. gallons)
- ▲ As the machine is hot after operation wait until the temperature has dropped.
 - ▲ It is imperative to pay attention to absolute cleanliness of oil and filter.
Binding is in any case the marking on the oil level gauge.
 - ※ Prohibition to inject water to filler cap directly when you wash the machine.

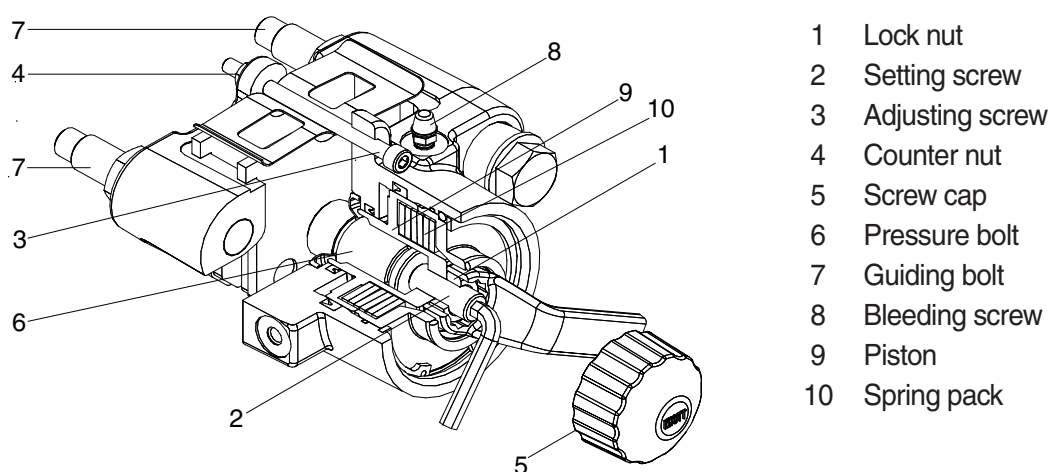


34-1) PARKING BRAKE CLEARANCE

(1) Safety instruction

- ① Park the machine on level ground, lower equipment to the ground.
- ② Insert wheel chocks.
- ③ Insert steering lock.
- ④ Leave the engine running.
- ※ **Isolate the machine from driving.**
- ⑤ Release the parking brake.
- ⑥ Check clearance and adjust accordingly.

(2) Check and adjusting instruction



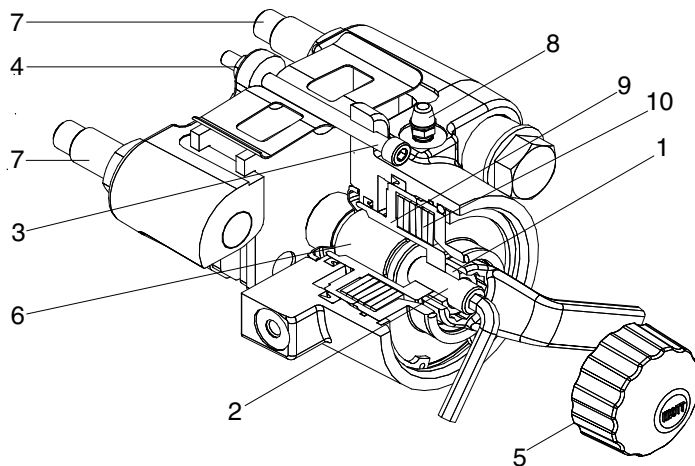
- ① Place the machine on flat ground and secure against rolling away.
- ② Start the engine and run at low idle. Release the parking brake by releasing the parking brake switch in the cabin.
- ③ Check the parking brake clearance with inserting a setting gauge on both sides between the brake lining carrier and brake disc.

※ **If the thickness of lining carriers are too thin (1.0 mm ~1.5 mm), then replace the lining carrier first referring to the service manual page 4-22.**

| Clearance | | Setting gauge |
|-------------------|--------|---------------|
| Min. | 0.5 mm | 0.25 mm |
| Nominal clearance | 1.0 mm | 0.50 mm |
| Max. | 1.5 mm | 0.75 mm |

If the clearance is out of specification, adjust the clearance as follows.

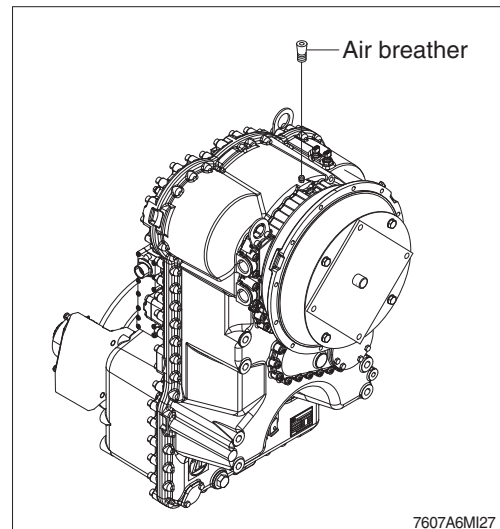
- ④ Rotate the screw cap (5) in a counter-clockwise direction and unscrew it.
- ⑤ Release the lock nut (1) of the setting screw (2).
- ⑥ Insert a setting gauge on both sides between the brake lining carrier and brake disc and hold them in position.
- ⑦ Turn the setting screw (2) in a clockwise direction until the two setting gauges are clamped between the brake lining carriers and the brake disc.
- ※ **The application pressure for clamping the setting gauges must be selected so that both gauges can be removed using a small amount of force after locking in position.**
- ⑧ Apply the lock nut (1) to the setting screw (2).
 - Tightening torque for the lock nut (1) : 6.1 kgf · m (44.3 lbf · ft)
- ⑨ Release the counter nut (4) and then turn the adjusting screw (3) in a clockwise direction until the end surface of the adjusting screw (3) is in contact with the surface provided for setting.
- ⑩ Hold the adjusting screw (3) in position and lock using the counter nut (4).
 - Tightening torque for the counter nut (4) : 2.3 kgf · m (17 lbf · ft)
- ⑪ Remove the setting gauge from both sides of the brake disc.
- ※ **The adjustment of the desired air gap is now complete. The brake is ready for use.**
- ⑫ Turn the screw cap (5) in a clockwise direction and tighten hand-tight.
- ※ **Check if the parking brake is working properly with operating the parking brake switch on and off.**



- 1 Lock nut
- 2 Setting screw
- 3 Adjusting screw
- 4 Counter nut
- 5 Screw cap
- 6 Pressure bolt
- 7 Guiding bolt
- 8 Bleeding screw
- 9 Piston
- 10 Spring pack

31) CLEANING TRANSMISSION AIR BREATHER

- (1) Remove dust or debris around the air breather.
- (2) Remove the air breather and wash it with cleaning oil.



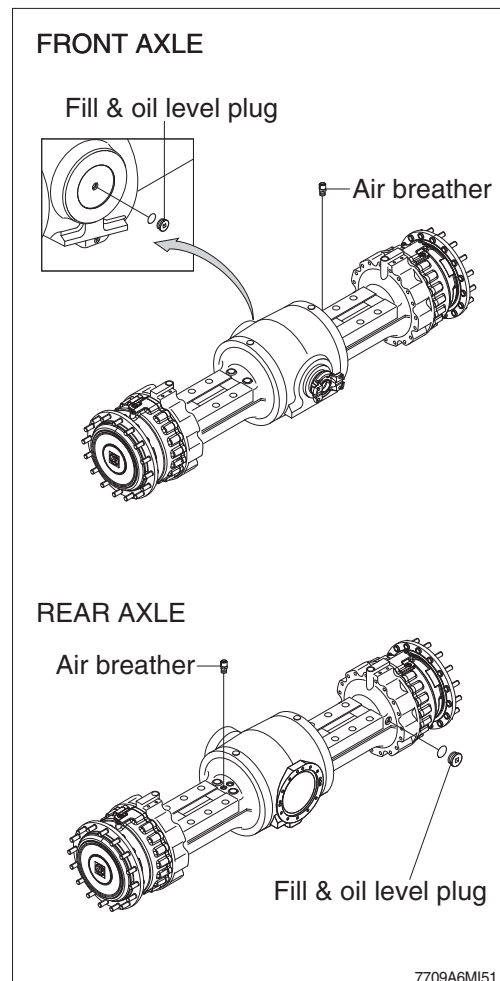
32) CHECK AND SUPPLYING AXLE OIL

- (1) Move the machine to flat ground.
- (2) Open the axle air breather to relieve internal air pressure.
- (3) Remove the plug and check the oil amount.
If the oil level is at the hole of the plug, it is normal.

※ Provide fill & level plug with O-ring and install it.

▲ When checking the oil level, press the parking brake switch and fix front and rear frames using the safety lock bar.

▲ As the machine is hot after operation, wait until the temperature has dropped.
Set the plug of planetary gear in parallel to the ground.



33) CHANGE THE AXLE OIL

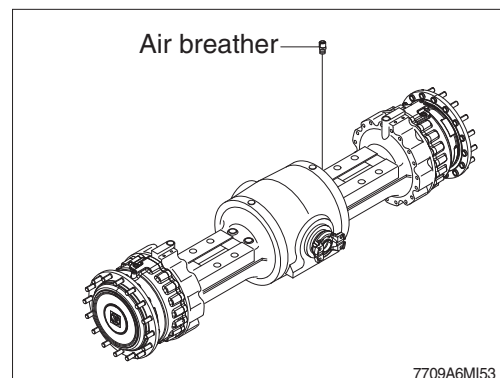
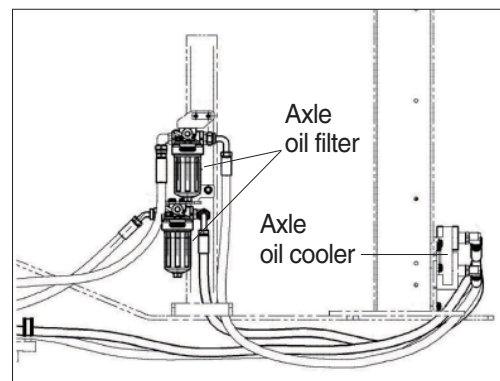
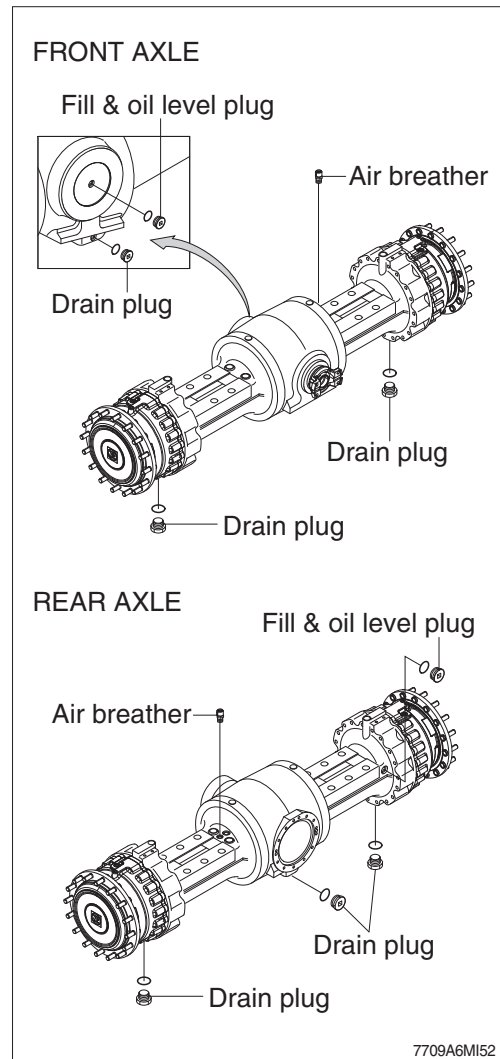
- (1) Place a case under drain plug to catch oil.
- (2) Remove the air breather to relieve internal pressure.
- (3) The basic condition for a correct oil change of the axle is horizontal plane of installation in every direction.
Place machine in a horizontal position
- (4) All plugs must be cleaned carefully before opening.
- (5) Loosen drain plugs and drain oil.
- (6) Provide drain plugs with new O-ring and install them.
- (7) Fill up oil to the overflow on fill & level plug.
 - Oil amount
 - Front axle : 42 ℓ (11.1 U.S. gal)
 - Rear axle : 40 ℓ (10.6 U.S. gal)
 - If equipped with axle oil cooler (option)
- (8) Replace two axle oil filters (front and rear).
- (9) Run the engine for five minutes at low idle on flat ground.
- (10) Fill up oil to the overflow on fill & level plug at low idle and install plugs.
 - Oil amount
 - Front : 48 ℓ (axle only 42 ℓ)
 - Rear : 45 ℓ (axle only 40 ℓ)

▲ As the machine is hot after operation, wait until the temperature has dropped.

※ If a work requires frequent use of brake, replace it earlier than normal change interval.

34) CLEANING AXLE BREATHER

- (1) Remove dust or debris around the breather.
- (2) Remove the breather and wash it with cleaning oil.



35) LUBRICATION

(1) Supply grease through the grease nipple, using grease gun.

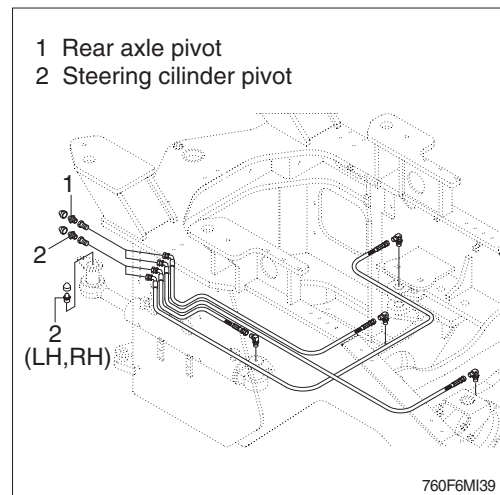
(2) After lubricating, clean off spilled grease.

▲ Press the parking brake switch and fix front and rear frames using the safety lock bar.

▲ Set the work equipment in a stable position and push the pilot cut off switch to the OFF position.

(3) Rear axle pivot : 2EA

(4) Steering cylinder pin : 4EA



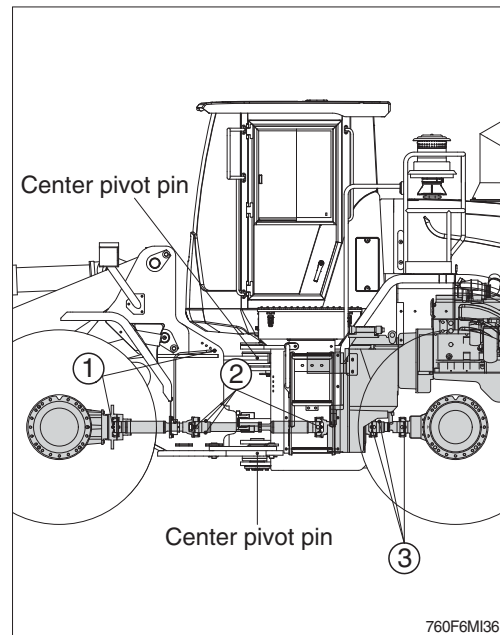
(5) Center pivot pin : 2EA

(6) Drive shaft

① Front (flange bearing, journal bearing) : 2EA

② Center (sleeve yoke, journal bearing) : 4EA

③ Rear (sleeve yoke, journal bearing) : 3EA



36) REPLACEMENT OF BOLT ON CUTTING EDGE

(1) Replacement time

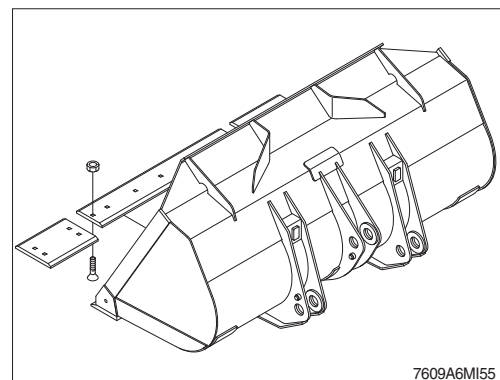
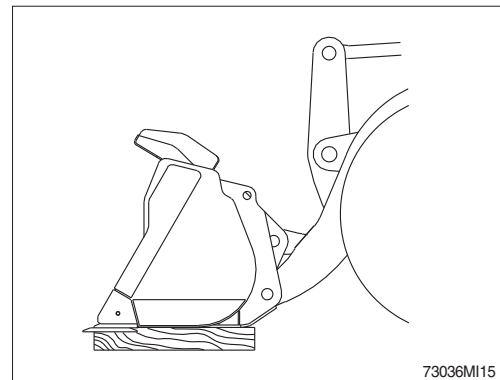
Replace the cutting edge before it has worn out to the end of bucket.

(2) Replacement method

▲ Make sure the work equipment does not move when replacing the cutting edge.

Set the work equipment in a stable position, put the pilot cut off switch in the OFF position.

- ① Lift the bucket to a proper height and insert blocks so that the bucket does not fall down.
- ② Loosen bolts and nuts, and remove the cutting edge.
- ③ Clean the contacted surface.
- ④ Turn the cutting edge and install on the bucket.
- ※ **If both sides have worn out, replace it with new ones.**
- ※ **If the contacted face of cutting edge has worn out, repair the contacted face of it.**
- ⑤ Tighten evenly bolts and nuts to remove the clearance between bucket and cutting edge.
 - Tightening torque : $83.2 \pm 12.5 \text{ kgf} \cdot \text{m}$
($602 \pm 90.4 \text{ lbf} \cdot \text{ft}$)
- ⑥ After a few hours of operation, retighten bolts.



37) REPLACEMENT OF BUCKET TOOTH

(1) Replacement time

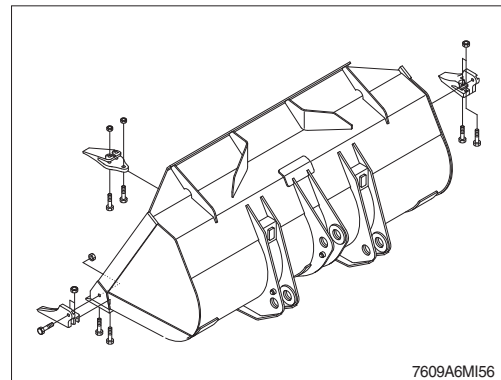
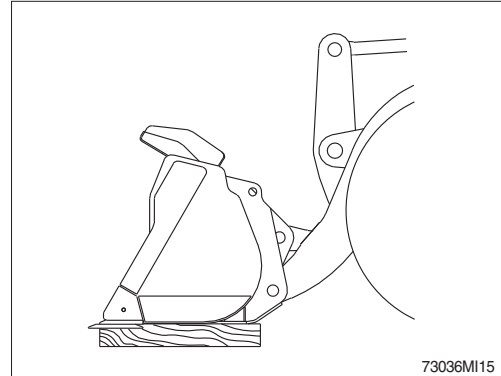
Replace the bucket tooth before it has worn out to the end of the bucket.

(2) Replacement method

▲ Make sure the work equipment does not move when replacing the bucket tooth.

Set the work equipment in a stable position, put the pilot cut off switch in the OFF position and stop the engine.

- ① Lift the bucket to a proper height and insert blocks so that the bucket does not fall down.
- ② Loosen bolts and nuts, and remove bucket tooth.
- ③ Clean the contacted surface.
- ※ **If the contacted face of bucket tooth has worn out, repair the contacted face of it.**
- ④ Install new bucket tooth on the bucket, and tighten bolts and nuts.
 - Tightening torque : $83.2 \pm 12.5 \text{ kgf} \cdot \text{m}$
($602 \pm 90.4 \text{ lbf} \cdot \text{ft}$)
- ⑤ After a few hours of operation, retighten bolts.

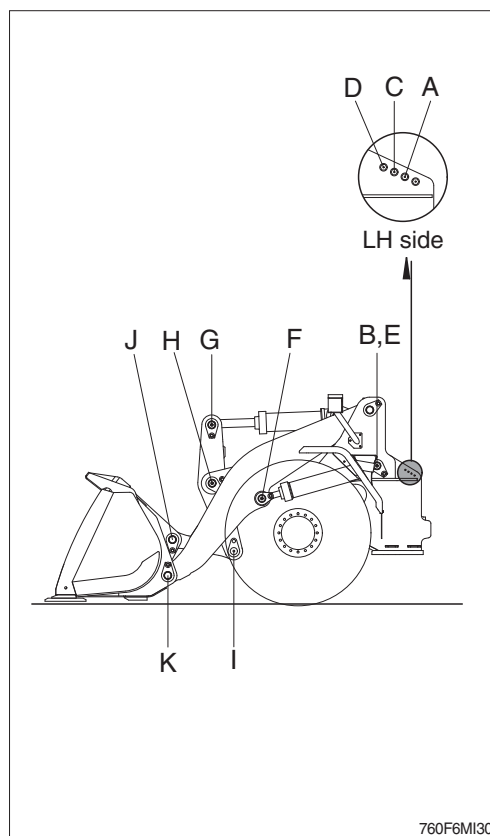


38) MAINTENANCE OF WORK EQUIPMENT

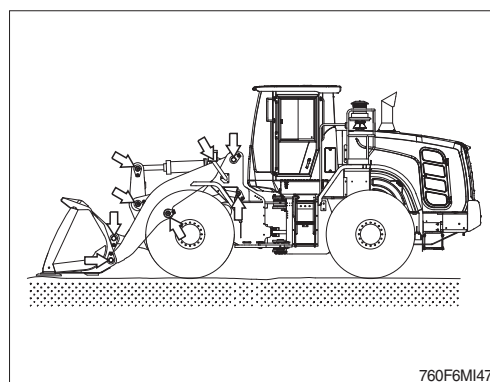
- (1) Lubricate to each pin of working device.
Lubricate the grease to grease nipple in accordance with lubrication intervals.

| No. | Description | Qty |
|-----|--|-----|
| A | Bucket cylinder (front frame side) pin | 1 |
| B | Boom cylinder (front frame side) right pin | 1 |
| C | Boom-front frame right connection pin | 1 |
| D | Boom-front frame left connection pin | 1 |
| E | Boom cylinder (front frame side) left pin | 1 |
| F | Boom cylinder-boom connection pin | 2 |
| G | Bucket cylinder-bell crank connection pin | 1 |
| H | Boom-bell crank connection pin | 1 |
| I | Bell crank-bucket link connection pin | 1 |
| J | Bucket-Bucket link connection pin | 2 |
| K | Bucket-boom connection pin | 2 |

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

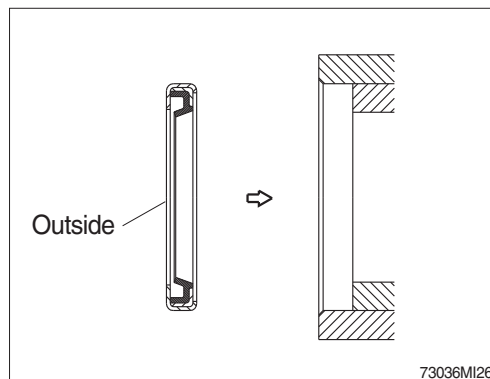


- (2) Check for wear and tear of work equipment pins and bushings.
(3) Check for damage of boom and bell crank.



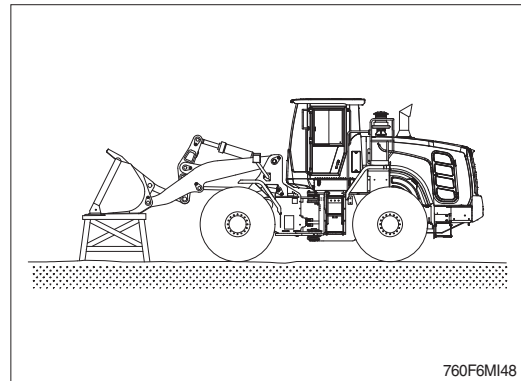
- (4) Dust seal are mounted on the rotating part of working device to extend the lubricating interval.

- ※ **Mount the lip to be faced out side 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.**
- ※ **Make sure the seals are not damaged or deformed.**



39) WORK EQUIPMENT SUPPORT

When carrying out inspection and maintenance with the equipment raised, fit a stand under the lift arm securely to prevent the work equipment from coming down. In addition, set the work equipment control levers to the Hold position and put the pilot cut off switch to the OFF position.



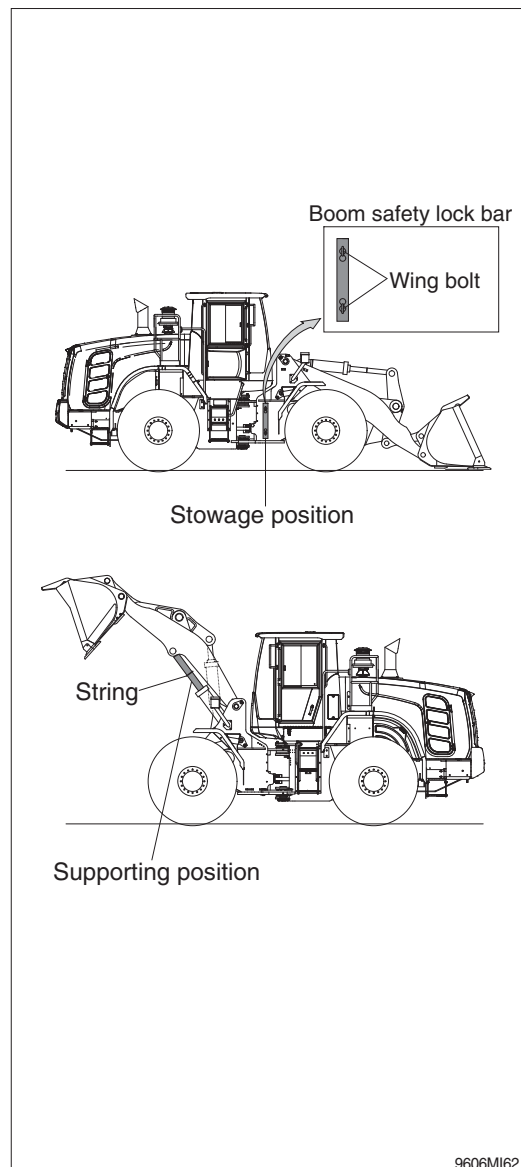
40) BOOM SAFETY LOCK BAR (option)

(1) Supporting

▲ If it is necessary to carry out any maintenance operation or to stop the machine with raised boom, always use the boom safety lock bar and put the pilot cut off switch to the OFF position.

※ The attachment should be empty.

- ① Raise the boom fully.
 - ② Stop the engine and remove the starter key.
 - ③ Loosen the two wing bolts and remove safety lock bar from its stowage position.
 - ④ Place the safety lock bar onto the boom cylinder and secure the safety lock bar by tying the string shown as figure.
 - ⑤ Slowly lower the boom to fix the safety lock bar.
- ※ When lowering the boom, operate the control lever very slowly.



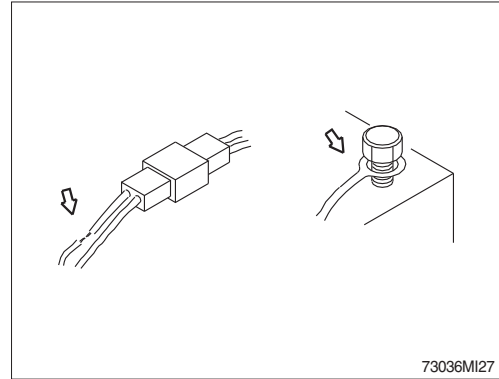
(2) Lowering

- ① Raise the boom to take the weight off the safety lock bar.
- ② Stop the engine and remove the starter key.
- ③ Loosen the string and remove the safety lock bar carefully.
- ④ Reinstall the safety lock bar onto its stowage position using the wing bolts.
 - Tightening torque : $5.6 \pm 0.8 \text{ kgf} \cdot \text{m}$
($40.5 \pm 5.9 \text{ lbf} \cdot \text{ft}$)

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.

⚠ Avoid short-circuiting the battery terminals through accidental contact with metallic objects, such as tools, across the terminals.

⚠ Do not store tools, bucket tooth and other flammable things in battery box. They could cause a fire.

⚠ Tighten the battery terminals securely.

Loosened terminals can generate sparks and lead to explosion.

⚠ Make sure that the battery terminal's caps always are installed.



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(2) Recycle

Never discard a battery.

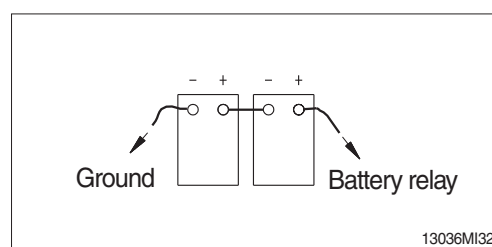
Always return used batteries to one of the following locations.

- 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.

※ Pay attention to the correct polarity.



3) STARTING THE ENGINE WITH A BOOSTER CABLE

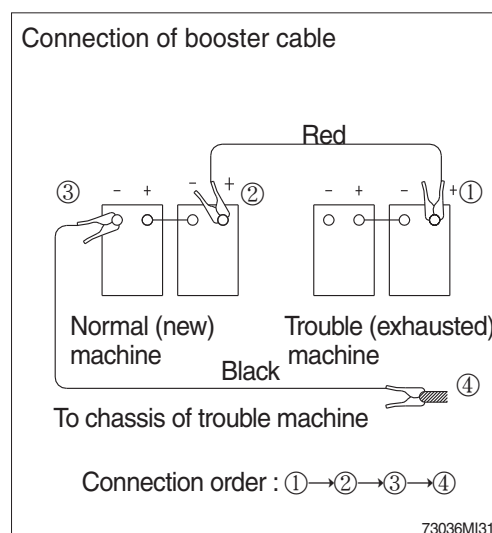
Keep following order when you are going to start engine using booster cable.

(1) Connection of booster cable

※ Use the same capacity of battery for starting

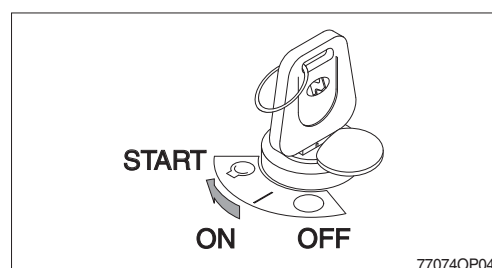
- ① Connect the red terminal of booster cable to the battery(+) terminal between exhausted and new battery.
- ② Connect the black terminal of the booster cable to the battery (-) terminal between exhausted and new battery.

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



(2) Starting the engine

- ① Start engine with starting key.
- ② 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.

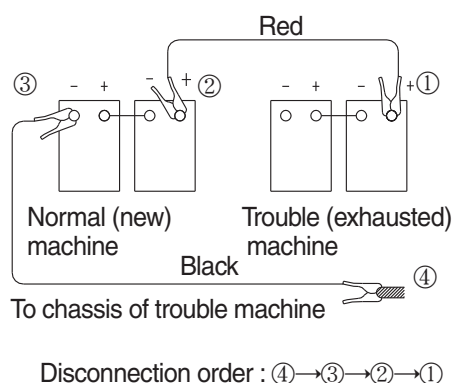
▲ Explosive gas is generated while using the battery or charging it. Keep away flame and be careful not to cause the spark.

※ Charge the battery in the well ventilated place.

※ Place the machine on the earth or concrete. Avoid to charge the machine on the steel plate.

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

Disconnection of booster cable



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4) Welding repair

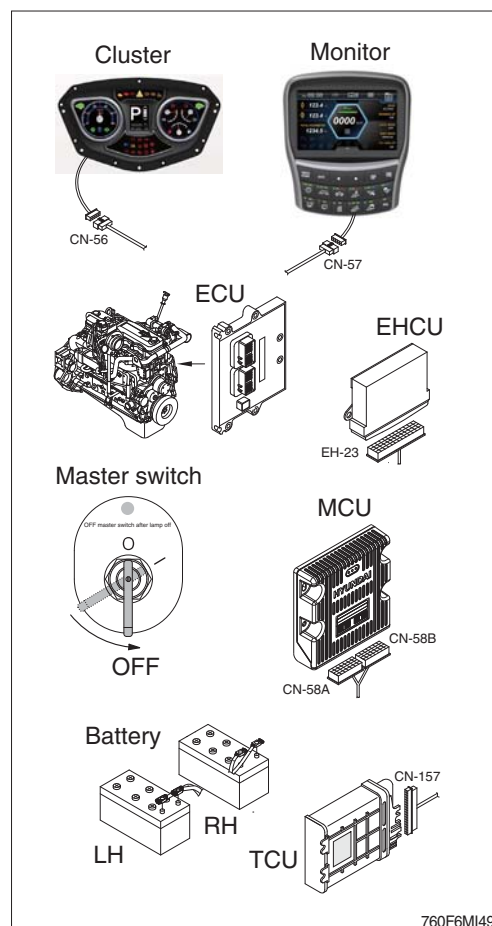
Before start to welding, follow the below procedure.

- (1) Shut off the engine and remove the starting switch.
- (2) Disconnect ground cable from battery by master switch.
- (3) Before carrying out any electric welding on the machine, the battery cables should be disconnected and the connectors pulled out of the electronic control units (MCU, TCU, ECU, EHC, cluster, monitor etc).
- (4) Connect the earth (ground) lead of the welding equipment as close to the welding points as possible.

※ Do not weld or flame cut on pipes or tubes that contain flammable fluids. Clean them thoroughly with nonflammable solvent before welding or flame cutting on them.

▲ Do not attempt to welding work before carry out the above.

If not, it will caused serious damage at electric system.



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8. AIR CONDITIONER AND HEATER

1) CLEAN AND REPLACE OF INNER AND OUTER FILTER

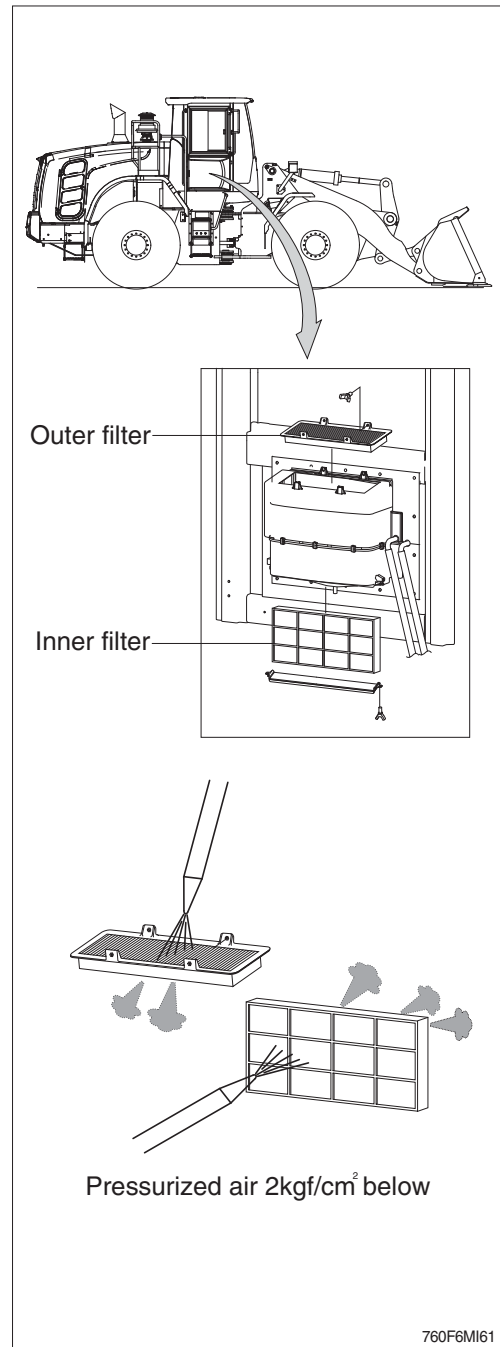
※ **Always stop the engine before servicing.**

(1) Open the air conditioner cover, loosen the wing bolt and remove the inner and outer filter.

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

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

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



2) 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.

3) CHECK DURING SEASON

Ask the service center for replenishment of refrigerant or other maintenance service so that the cooling performance is not damaged.

4) 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.

5) REFRIGERANT

(1) Equipment contains fluorinated greenhouse gas.

| Model | Type | Quantity | GWP |
|-------|----------|-------------------|--------------------------|
| HL965 | HFC-134a | 0.75 kg (1.65 lb) | 1073 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 |
|---|--|-------------------------|
| Engine oil pressure lamp fails to go off immediately after the engine is started. | <ul style="list-style-type: none"> · Add the oil to the specified level. · Replace the oil filter. · Check oil leakage from the tube or the joint. | |
| Steam is emitted from the top part of the radiator (The pressure valve). Engine coolant temperature gauge indicates red range. | <ul style="list-style-type: none"> · Supply the cooling water and check leakage. · Adjust fan belt tension. · Wash out inside of cooling system. · Clean or repair the radiator fin. · Check the thermostat. · Check the engine coolant temperature gauge. · Tighten the radiator cap firmly or replace the gasket of it. | |
| Engine does not start when the starting motor is turned over. | <ul style="list-style-type: none"> · Add fuel · Repair where air is inhaled into fuel system. · Check the injection pump or the nozzle. · In cold weather, check if fuel warmer system is working normal. · Check the valve clearance. | Refer to the pages 4-5. |
| Exhaust gas is white or blue. | <ul style="list-style-type: none"> · Adjust to specified oil quantity. · Replace with specified fuel. | |
| Exhaust gas occasionally turns black. | <ul style="list-style-type: none"> · Clean or replace the air cleaner element. · Check the nozzle. · Check engine compression pressure. · Check or replace the turbocharger. | |
| Combustion noise occasionally changes to breathing sound. | <ul style="list-style-type: none"> · Check the nozzle. · Check the injection pump. | |
| Unusual combustion noise or mechanical noise. | <ul style="list-style-type: none"> · Check with specified fuel. · Check overheating. · Check the muffler. · Adjust valve clearance. | |

2. ELECTRICAL SYSTEM

| Trouble | Service | Remark |
|--|---|--------|
| Voltmeter fluctuates largely even with the engine running at a constant speed. Lamp does not glow brightly even when engine runs at high speed. Lamp flickers while engine runs. | <ul style="list-style-type: none"> · Check for loose terminals open-circuit wiring. · Adjust belt tension. | |
| Voltmeter does not fluctuate even with an increase in the engine speed. | <ul style="list-style-type: none"> · Check the alternator. · Inspect and repair wiring. | |
| Starting motor does not turn when starting switch is turned on. | <ul style="list-style-type: none"> · Inspect and repair the wiring. · Charge the battery. · Check starting switch. · Check battery relay switch. · Place the gear selector lever in the neutral. | |
| Starting motor turns the engine sluggishly. | <ul style="list-style-type: none"> · Charge the battery. · Check the starting motor. | |
| Starting motor disengages before the engine starts up. | <ul style="list-style-type: none"> · Check and repair the wiring. · Charge the battery. | |
| Engine oil pressure lamp does not light up when engine is stationary (When the starting switch is in ON position). | <ul style="list-style-type: none"> · Check the lamp. · Check the oil pressure switch. | |
| Charge lamp does not light up when the engine is stationary. (When the starting switch is in ON position.) | <ul style="list-style-type: none"> · Check the lamp. · Check and repair the wiring. | |

3. POWER TRAIN SYSTEM

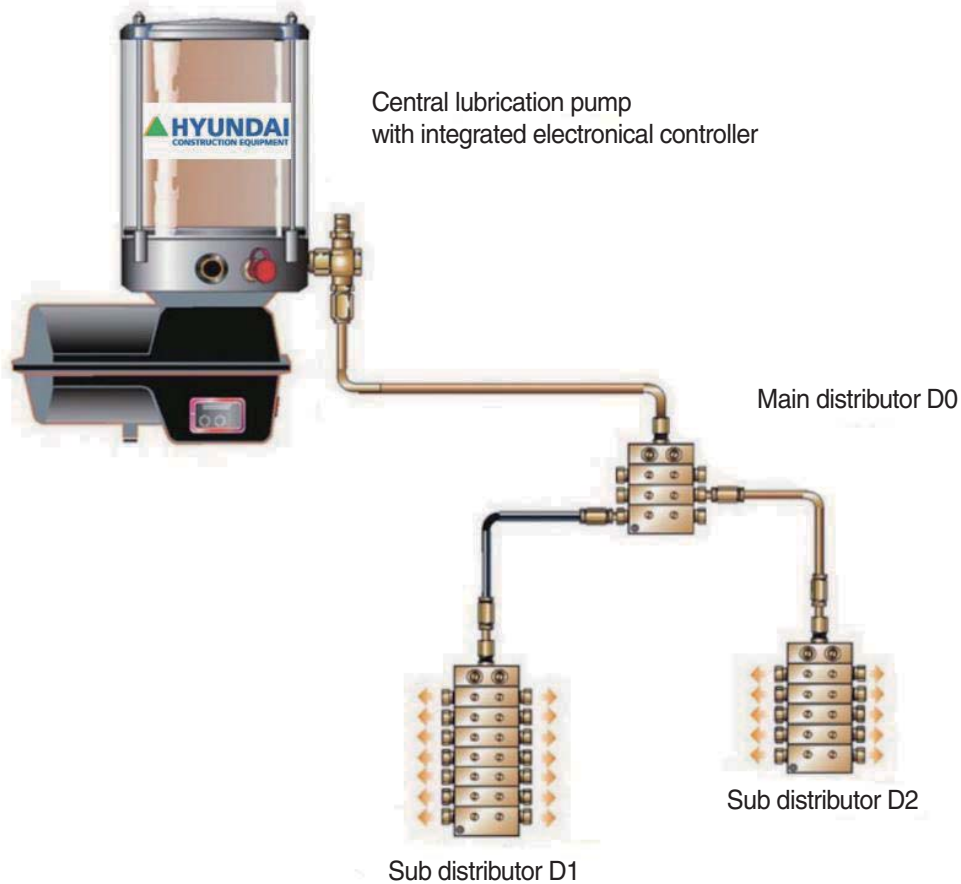
| Trouble | Service | Remark |
|--|---|--------|
| Engine is running but machine will not move. | <ul style="list-style-type: none"> · Release parking brake. · Put gear selector lever in position properly. · Add oil to transmission case to the specified level. | |
| Even at full throttle, machine moves slowly and lacks power. | <ul style="list-style-type: none"> · Add oil to transmission case to the specified level. · Disassemble transmission strainer and clean. | |
| Transmission oil overheats. | <ul style="list-style-type: none"> · Add oil to transmission case to the specified level or drain oil. · Use a suitable gear speed. · Reduce time using torque converter at stall speed. Check engine. | |
| Abnormal noise is produced. | <ul style="list-style-type: none"> · Add oil to transmission case to the specified level. · Add oil to axle case to the specified level. | |
| Brake does not work when pedal is depressed. | <ul style="list-style-type: none"> · Raise hydraulic oil pressure to specified level. · Add brake oil. · Bleed hydraulic oil from brake system. | |
| Brake drags or stay when applied. | <ul style="list-style-type: none"> · Clean breather and bleed air from brake system. | |
| Brake slips. | <ul style="list-style-type: none"> · Raise hydraulic oil pressure to the specified level. | |
| Brake does not work properly. | <ul style="list-style-type: none"> · Adjust linkage. · Clean brake pad. · Replace spring in hydraulic oil cylinder. · Adjust or replace brake pad. | |
| Steering wheel is heavy. | <ul style="list-style-type: none"> · Repair or replace the pump. · Repair, clean and reset the relief valve. · Coat a grease to connections and bearings of steering gear. · Check the mounting of the steering column. | |
| Steering wheel turning by itself. | <ul style="list-style-type: none"> · Replace leaf springs. | |
| Slow steering. | <ul style="list-style-type: none"> · Clean spool and sleeve. · Replace leaf springs. | |
| Impossible to turn the steering wheel into neutral position. | <ul style="list-style-type: none"> · Check the monitor. · Check and repair the wiring. | |

4. HYDRAULIC SYSTEM

| Trouble | Service | Remark |
|--|---|--------|
| Bucket lacks lifting power. Bucket lifting speed is slow. | <ul style="list-style-type: none">· Check the hydraulic oil level and add if necessary.· Replace filter in hydraulic tank. | |
| Bubbles in oil. | <ul style="list-style-type: none">· Replace with specified oil.· Add oil if needed. | |
| Oil pressure is too low. | <ul style="list-style-type: none">· Bleed air from oil line.· Add oil and bleed air. | |
| Cylinder vibrates when operating. | <ul style="list-style-type: none">· Add oil. | |

1. CENTRAL GREASE LUBRICATION SYSTEM

1) MAJOR COMPONENT



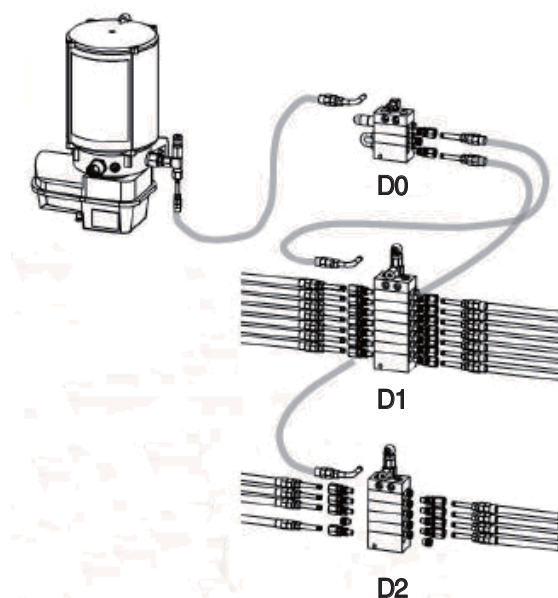
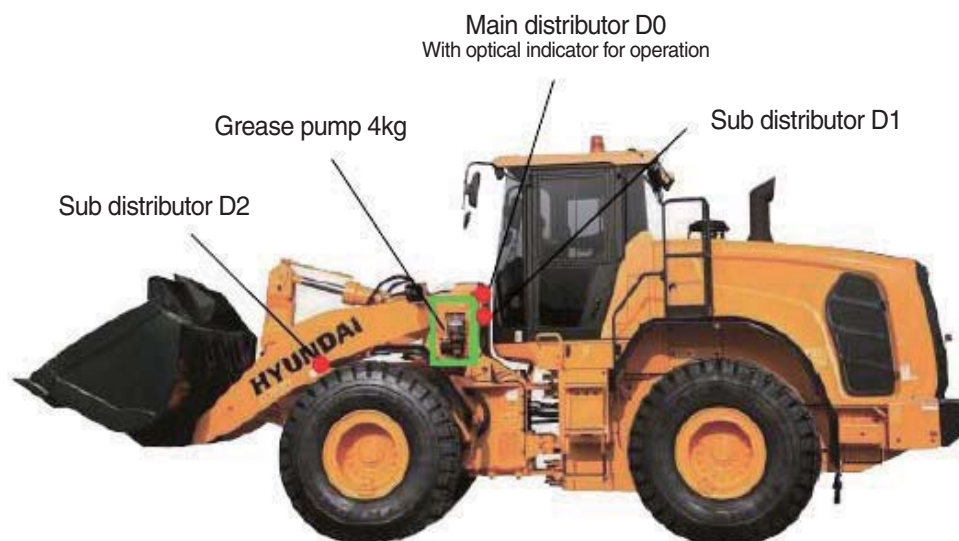
The progressive system supplies the lubrication points in a fixed order.

The progressive distributor works consecutively (progressive). Only after the first lube point has received the right lubricant quantity, the distributor continues running and delivers the next one.

The progressive system can be monitored easily and offers various extension possibilities.

The distributors distinguish themselves by modular flexibility instead of rigid block design.

2) LAYOUT



※ Refer to the CENTRAL GREASE LUB SYSTEM of parts manual for detail.

3) SWITCH



(1) The switch is integrated in monitor.

In the cab, a operator can reset and check the lubrication system.

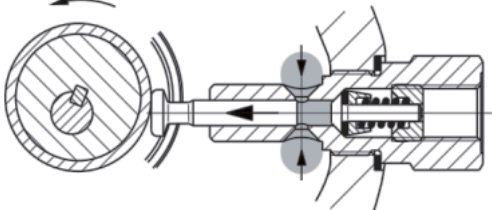
※ Refer to page 3-40.

4) GREASE PUMP

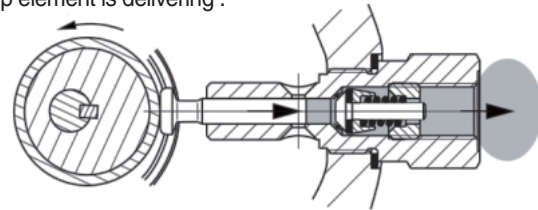


| | |
|--|----------------|
| Operating voltage | 24 V/DC |
| Maximum operating pressure | 280 bar |
| Permissible operating temperature (depending on the grease type) | -35°C to +70°C |
| Reservoir size | 4 kg |

Pump element is drawing in :



Pump element is delivering :



(1) Desmodromic actuation of the pumping elements

The pumping elements are not driven by a simple return spring but have a desmodromic push-pull actuation. This guarantees a reliable functioning of the pump even by the use of rigid grease (up to NLGI 2) and very low ambient temperatures.

5) INTEGRATED ELECTRONICAL CONTROLLER

When the central lubrication processor is time controlled, the cycle duration and the lubrication time can be adjusted. Cycle duration means the period from the beginning of one lubrication process to the beginning of another lubrication process.

Diagram of cycle sequence :

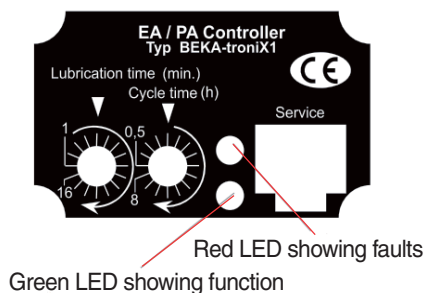
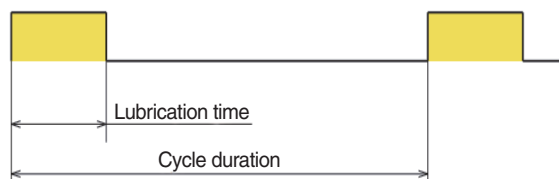


Diagram of cycle sequence :



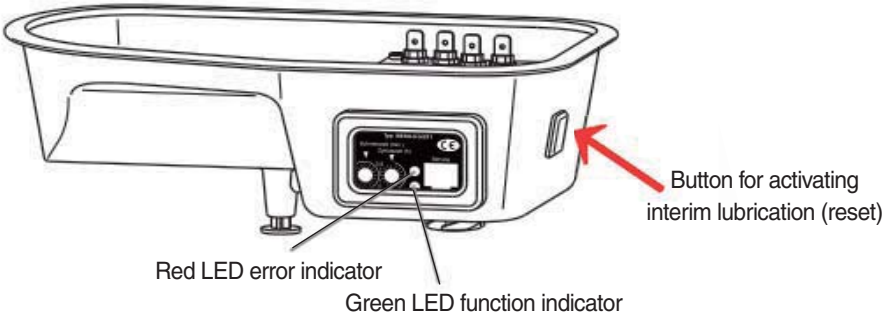
(1) Adjusting the parameters

The lubrication time can be set by means of graduating switches in the controller's sight glass. To adjust the time setting, remove the red frame on the pump's motor housing using a flat screwdriver, loosen the four screws and remove the transparent protective cover. The lubrication time can be adjusted using a flat screwdriver. If the cover plate is not replaced properly, water may enter the controller and damage it. In this case, the guarantee is no longer valid.

| Lubrication times | Cycle duration |
|--|--|
| 1 to 16 minutes (16 grades every 1 minute) | 0.5 to 8 hours (16 grades every 0.5 hours) |

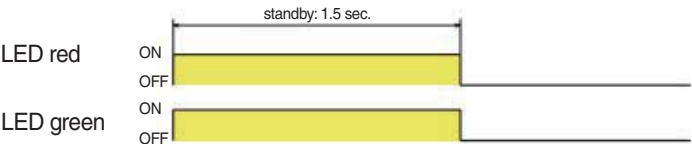
(2) Summary of signal Indicators

The pump's function are indicated via two control LEDs (green/red) in the display on the pump's motor casing, where the red LED always indicates an error in the program sequence. These control LED functions may be indicated in the cab via monitor.



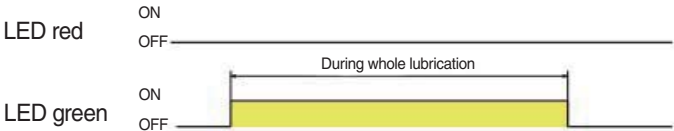
① Standby

Standby indicator :



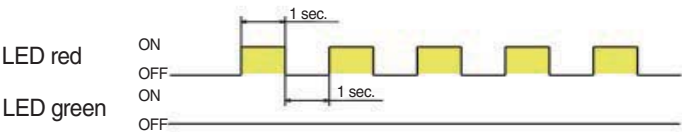
② Lubrication activated

Lubrication sequence :



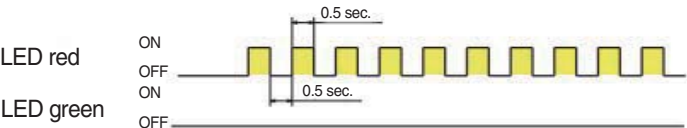
③ Revolution and engine driver error

Revolution error in pump engine

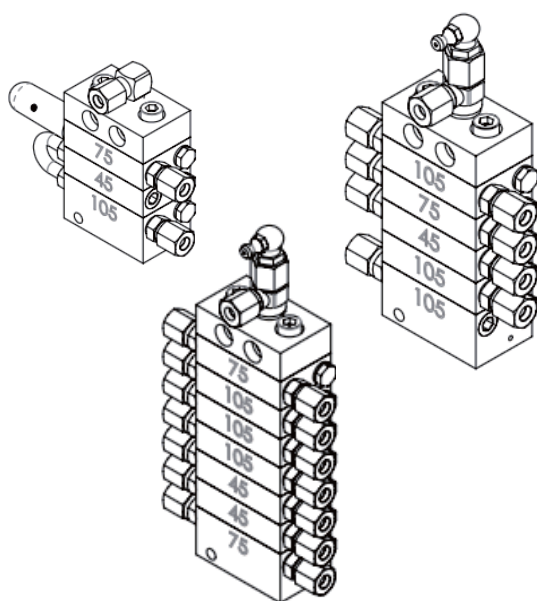


④ Memory error

Memory error :

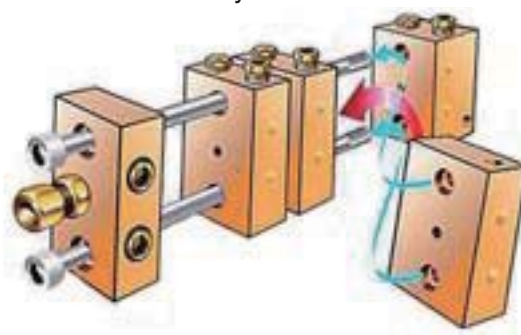


6) DISTRIBUTOR



| Operating pressure-Inlet | Temperature range |
|--------------------------|-------------------|
| maximum 300 bar | -35°C to +80°C |

- Modular designed distributor system for optimum lubricant feed rates
 - Flexible extension possibilities
 - Highest precision
 - Comprehensive program of distributor types
 - Optionally with monitoring and blockade control
- Optimized distributor combination through field test at HCE durability test site



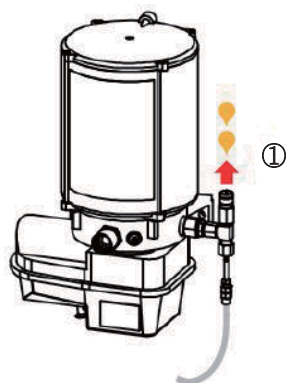
7) INSTRUCTIONS FOR REPAIR IN CASE OF BLOCKAGE OF A PROGRESSIVE LUBRICATION SYSTEM

(1) Reason of system blockage

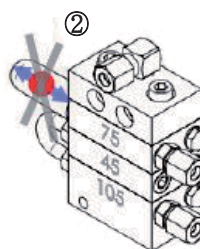
- A creased or clogged lubrication pipe
- A bearing overfilled or clogged by lubricant
- Lubricant not suitable for central lubrication system
- Distributor outlet closed
- Blocked distributor

(2) Message signaling a blockade

If the system pressure should exceed the rated service pressure, a blockage may exist in the system and will be signaled by ① grease exhaustion at pressure relief valve and ② D0 optical display pin doesn't move.



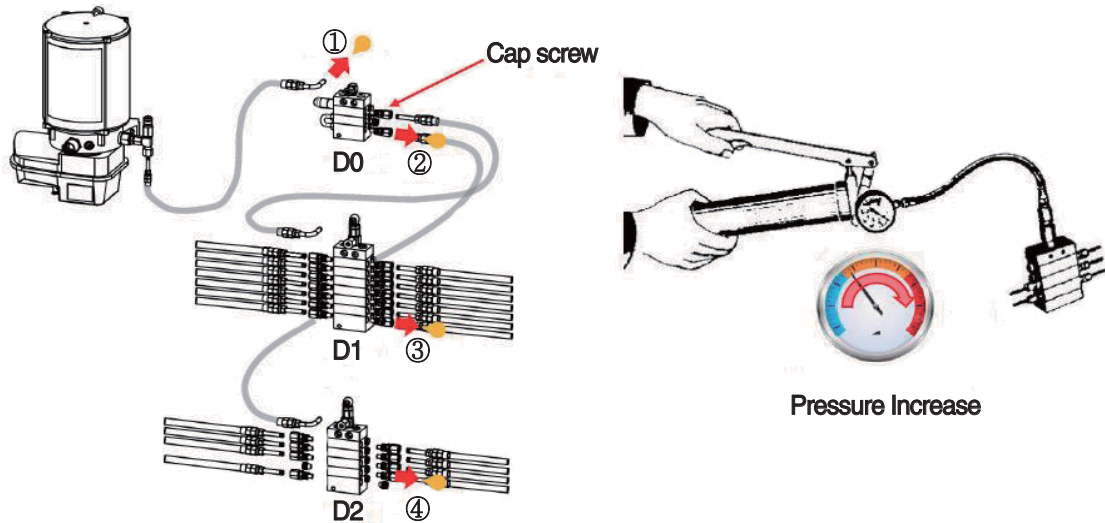
Grease exhaustion at pressure relief valve



D0 optical display pin

8) IDENTIFICATION OF A POINT OF BLOCKAGE

- (1) Disconnect the main grease hose line from D0 (master) distributor. Actuate the pump and check ① if lubricant supply is effected in correct manner.
- (2) Re-connect the main grease hose line to the D0 distributor. ② Remove the cap screws of the D0 distributor outlet one after another and actuate the pump at each of those steps. The grease lines, pipe or point of lubrication being blocked is in that pipe where pressure is increasing or the optical manual leveling grease gun (XKCE-01419) can't be actuated. After the D0 distributor has been checked and the point of blockage has been detected, the pertaining D1, D2 (secondary) distributor has to be checked up to the point of lubrication, by the same principle of work ③, ④.



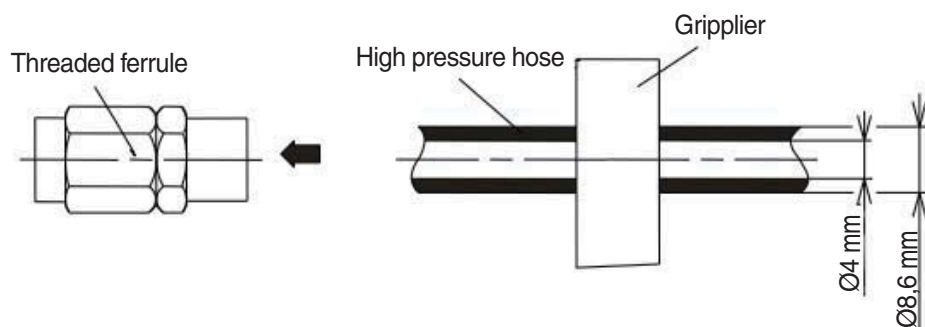
9) HIGH PRESSURE HOSE

| Bursting pressure (EN ISO 1402, pressurization : 60s) | | Allowed bending radius at 20 °C | Operating pressure reference | |
|--|----------|------------------------------------|------------------------------|-----------------|
| 20 °C | 60 °C | | Statistically | Dynamically |
| >840 bar | >450 bar | >20 mm | Maximum 280 bar | Maximum 210 bar |

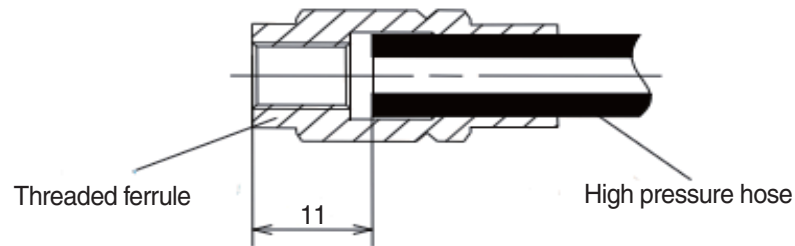
(1) Assembly of the high pressure hose

For connecting the high pressure hose with the distributor, you need a threaded ferrule and a ferrule insert on each side of the high pressure hose.

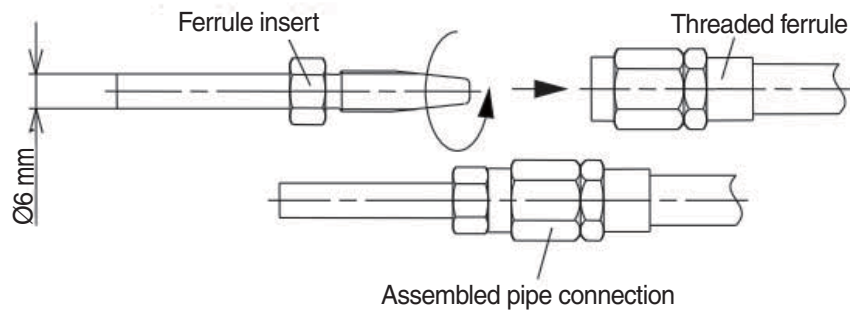
- ① Assembly the high pressure hose with the threaded ferrule



- ② Stick on the high pressure hose with a grippier and grease or oil the end of this very good.
The threaded ferrule turn on the hose left-turning up to the dimension in the sketch (11 mm).



- ③ Assembly the ferrule insert with the threaded ferrule and the high pressur hose :
Grease or oil on thread of the ferrule and the conical end of the ferrule insert good and screw the ferrule insert in the assembled ferrule.



- ※ The dimensions of the hoses are able to differ in a slight range. If the diameter are smaller as standard, the ferrule can be push on the hose without power and without rotary motion.

Remedy :

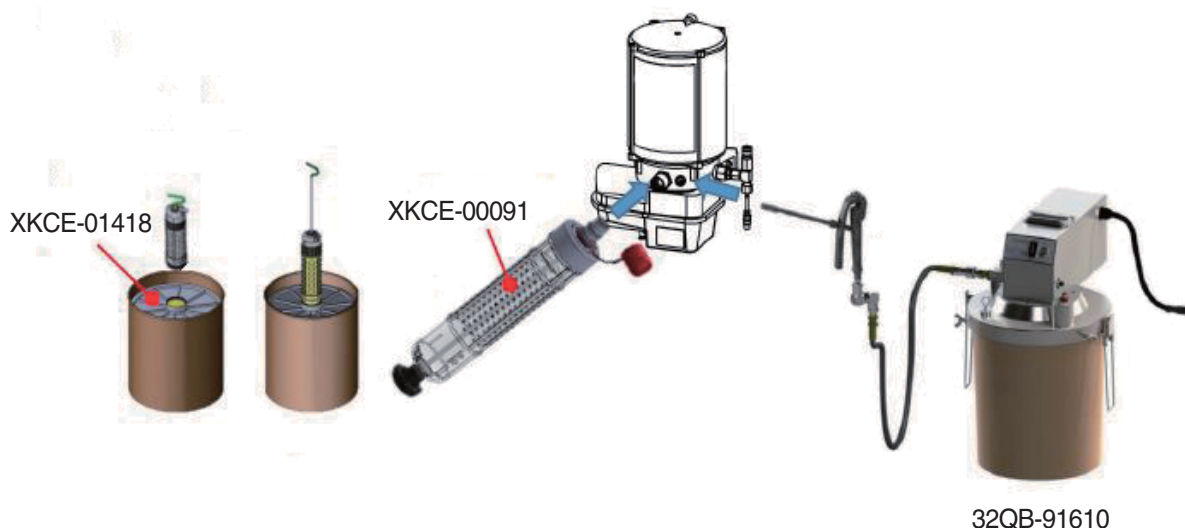
Press the ferrule on the end for put in the hose in aoval form, about 1 up to 2 mm, with that the hose by screw in the pipe connector not be push out of the ferrule.

10) TROUBLESHOOTING

| Category | Applications | Service |
|---|---|---|
| Pump does not work | Defective electronic control unit Electric cable is broken Pump is defective | Replace the control unit Renew the electric cable Replace the pump |
| Pump is working, but does not supply of lubrication | Air in the feed piston filling Grease level dropped below minimum level Defective pump element | Bleed the pump Refill the grease tank Replace the pump element |
| No grease at all points of lubrication | Pump does not work. Inoperative time is too long or period of lubrication is too short. System is blocked. | Refer to "Pump does not work". Reduce the inoperative time or increase the period of lubrication. Refer to "Excessive pressure (above 265 kgf/cm ²) of the pressure indicator". |
| No grease at some points of lubrication | Some pipes are burst or leakage Leakage at screwed unions | Renew the pipes Retighten or renew the screwed union |
| No grease at one point of lubrication | The lubrication pipe is burst or leakage Leakage at screwed unions | Renew the pipe Retighten or renew the screwed union |
| Reduced pump speed | High pressure in the system Low ambient temperature | Check the system / bearing points Not a defective (1 or 2 intermediate lubrication cycles may be useful) |
| Excessive pressure (above 265 kgf/cm ²) of the pressure indicator | Excessive pressure in the system Progressive distributor is blocked System is blocked Defective valve spring | Check the system Replace the distributor Repair clogged / seized greasing points Replace the pressure relief valve |
| Signal of the LED | The LED of control unit is light up continuously | Check electrical system and control unit |

11) REFILL GREASE

Use transparent filling press or external grease filling pump



2. QUICK COUPLER

- ▲ Always check that the attachment is properly secured to the quick coupler by pressing the front part of the attachment against the ground.
- ▲ Never use an attachment before you have checked its mounting.
- ※ If you are uncertain if the attachment is securely locked, you must visually check that the lock pins of the quick coupler are in the lock position.

- (1) Operate the quick coupler switch on the monitor.
- (2) Switch to the quick coupler function screen and touch the 'Disengage Quick Coupler' button on the screen to release the quick coupler.



- ※ A warning pop-up message appears on the monitor screen, "Disengaging Quick Coupler" and the warning buzzer rings.
- ※ The buzzer warning rings until the quick coupler release and lock are complete.
- ※ During release, the red lamp of the quick coupler switch turns ON.



- (3) Loosen the coupling between the hook of the bucket and quick coupler through the bucket dump action.
- (4) Move the machine backward to separate the quick coupler and the bucket.



- (5) Tilt quick coupler forward and align the upper attaching points of the quick coupler with upper attaching points on the bucket.
- (6) Raise the boom until the bucket rests in the quick coupler and tilt the quick coupler rearward until the bucket is level.



- (7) Touch the 'Engage Quick Coupler' button on the monitor screen to lock the quick coupler.



- ※ A warning pop-up message of "Engaging Quick Coupler" appears on the monitor screen and the warning buzzer rings.
- ※ During locking, the green lamp of the quick coupler switch turns ON.



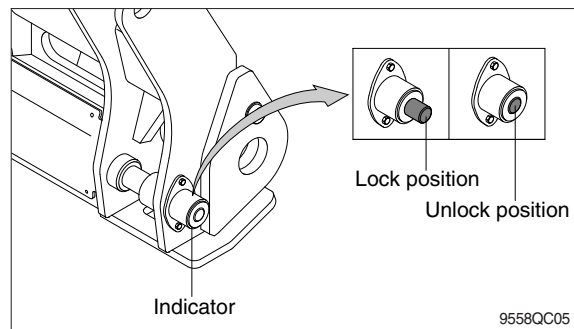
- (8) Check whether the quick coupler is locked and touch the 'Complete' button on the monitor screen.



※ **Check for engagement as followings.**

- a. Put down pressure on the attachment.
- b. Back up the machine and make sure that there is no movement between the quick coupler and attachment.

※ **Check that the indicator is lock position.**



(9) PRECAUTION OF USING QUICK COUPLER

- ⚠ When operating the machine with quick coupler, confirm that the quick coupler is lock position.

Operating the machine with quick coupler unlock position can cause the bucket to drop off and bring about the accident.

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

A

| | |
|--------------------------------|------|
| Air cleaner | 6-24 |
| Air conditioner & heater | 3-53 |
| Air conditioner filter | 6-49 |
| Axle oil | 6-39 |

B

| | |
|------------------------------|------|
| Battery | 6-46 |
| Before starting engine | 4-2 |
| Belt tensioner | 6-23 |
| Boom kick out | 4-22 |
| Bucket leveler | 4-22 |

C

| | |
|------------------------------------|------|
| Cab device | 3-1 |
| Camera | 3-61 |
| Charge air cooler | 6-21 |
| Cigar lighter | 3-56 |
| Cluster | 3-2 |
| Control device | 3-49 |
| Coolant level | 6-17 |
| Crankcase ventilation filter | 6-28 |

D

| | |
|------------------------|------|
| DEF/AdBlue® tank | 6-29 |
|------------------------|------|

E

| | |
|-----------------------------------|------|
| Engine control module (ECM) | 3-61 |
| Engine oil filter | 6-15 |
| Engine oil level | 6-15 |

F

| | |
|--------------------------------|------|
| Fan belt | 6-22 |
| FNR remote control lever | 3-47 |
| Fuel filter | 6-26 |
| Fuel prefilter | 6-25 |
| Fuse box | 3-59 |

G

| | |
|---------------------------|------|
| Gear selector lever | 3-50 |
|---------------------------|------|

H

| | |
|------------------------------|------|
| Hydraulic oil changing | 6-32 |
| Hydraulic oil filling | 6-31 |
| Hydraulic oil level | 6-31 |

J

| | |
|---------------------------------------|------|
| Joystick steering control lever | 3-51 |
|---------------------------------------|------|

L

| | |
|-----------------------------|------|
| LCD | 3-12 |
| Loading and unloading | 5-6 |
| Lubrication | 6-44 |

M

| | |
|----------------------------------|------|
| Machine control unit (MCU) | 3-60 |
| Maintenance chart | 6-13 |
| Maintenance check list | 6-10 |
| Major components | 2-1 |
| Master switch | 3-58 |
| Monitor | 3-13 |

P

| | |
|----------------------------|------|
| Pilot cut off switch | 3-45 |
| Pilot line filter | 6-33 |

R

| | |
|-------------------------------|------|
| Radiator and oil cooler | 6-21 |
| Radio and USB player | 3-62 |
| Recommended lubricants | 6-9 |
| Return filter | 6-32 |

S

| | |
|---------------------------|------|
| Safety hints | 1-1 |
| Safety labels | 0-6 |
| Seat | 3-58 |
| SCR system cleaning | 4-27 |
| Specifications | 2-2 |
| Storage | 4-25 |
| Switches | 3-44 |

T

| | |
|---------------------------------------|------|
| Tightening torque | 6-5 |
| Tire | 6-34 |
| Towing the machine | 5-7 |
| Transmission cold starting | 4-6 |
| Transmission control unit (TCU) | 3-61 |
| Transmission oil filter | 6-37 |
| Transmission oil level | 6-37 |
| Transportation | 5-1 |
| Travelling machine | 4-10 |
| Troubleshooting guide | 7-1 |

W

| | |
|----------------------------|------|
| Warming up operation | 4-8 |
| Weight | 2-6 |
| Working method | 4-15 |