DOOSAN

950106-00365ANA
July 2014

EXCAVATOR

Operation & Maintenance Manual

DX225LC-3

Serial Number 1001 and Up

Serial Number 50001 and Up (Europe Only)

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Component Model and Serial Numbers

There are model and serial numbers on each traceable component of machine. For example, the engine serial number is stamped on rear left side of the engine block, above the starter. Additional engine information is described on a label (Figure 3) on head cover.

Record these numbers and their locations. These will be required whenever warranty or service work is requested.

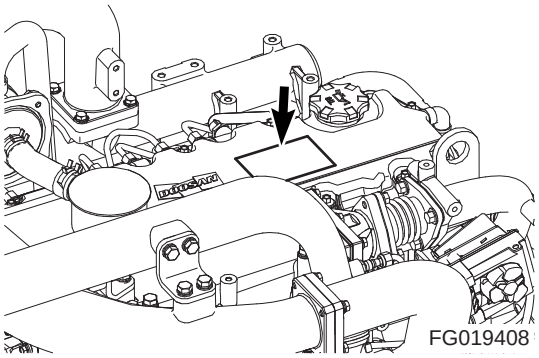


Figure 3

Safety Messages

Safety messages and safety decals included in this manual and on the machine provide instructions how to operate, service and maintain the machine. Safety messages and safety decals indicate potential hazards and describe safety precautions required to avoid hazards. Operator and maintenance personnel should read and understand these safety messages and decals before beginning operation or maintenance.

SAFETY ALERT SYMBOL

Be Prepared - Get to Know All Operating and Safety Instructions.

This is a Safety Alert Symbol. Wherever it appears in this manual or on safety decals on the machine, you must be alert to the potential for personal injury or accidents. Always observe safety precautions and follow recommended procedures.

Signal Words

The signal words "DANGER", "WARNING", "CAUTION" are used throughout safety messages and safety decals in this manual or on the machine. They indicate an existence of, and the relative seriousness of, a hazard. All three indicate that a safety risk is involved. Observe the precautions indicated whenever a Safety Alert Symbol is present, no matter which signal word appears next to it.

DANGER

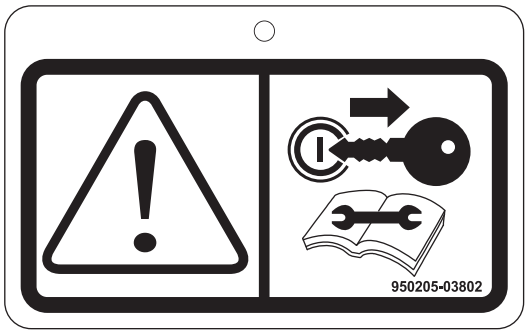
DANGER - This signal word is used on safety messages and safety labels and indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

2. **Warning Tag - "Do Not Operate" (950205-03802)**

WARNING

AVOID DEATH OR SERIOUS INJURY

- **Stop engine and remove key.**
- **Attach "DO NOT OPERATE" warning tag to the controls before servicing the machine.**
- **Do not operate when performing inspection or maintenance.**



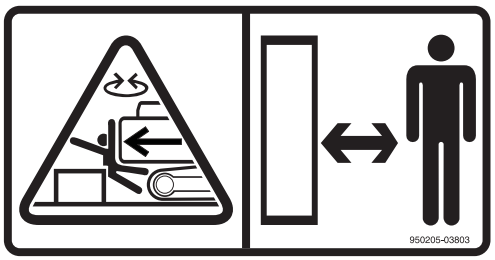
EX1301177

3. **Keep Bystanders Away (950205-03803)**

WARNING

AVOID DEATH OR SERIOUS INJURY

- **Keep out of swing area and travel path.**
- **Always look in the travel direction.**
- **Make sure swing area is clear of bystanders and objects.**



EX1301178

4. **Hot Pressurized Fluid (950205-03781)**

WARNING

HOT PRESSURIZED FLUID CAN CAUSE SERIOUS BURNS

- **Do not loosen or open cap when hot.**
- **Before opening:**
  1) **Turn engine off.**
  2) **Allow machine to cool.**
  3) **Tip cap and open slowly to relieve pressure.**



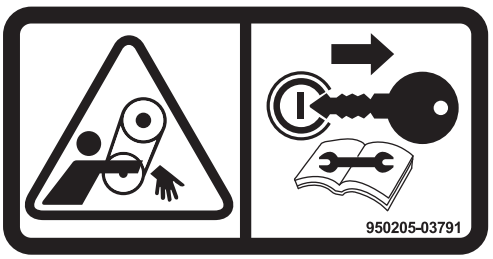
EX1301180

5. **Entanglement in Rotating Parts (950205-03791)**

WARNING

ROTATING PARTS CAN CAUSE DEATH OR SERIOUS INJURY

Keep away from belt and rotating parts. Stop engine before servicing.



EX1301181

Proper Work Tools and Attachments

Only use work tools and attachments that are recommended by DOOSAN for use on DOOSAN machines. When installing and using optional attachments, read instruction manual for attachment, and general information related to attachments in this manual. Because DOOSAN cannot anticipate, identify or test all attachments that owners may want to install on their machines, contact DOOSAN for written authorization and approval of attachments, and their compatibility with optional kits.

Attachments and attachment control systems that are compatible with the machine are required for safe and reliable machine operation. Do not exceed maximum operating weight (machine weight plus attachment) that is listed on ROPS certification plate.

Make sure that all guards and shields are in place on machine and on work tool. Depending on type or combination of work equipment, there is a potential that work equipment could interfere with the cabin or other parts of machine. Before using unfamiliar work equipment, check if there is any potential of interference, and operate with caution.

While you are performing any maintenance, testing, or adjustments to attachments, stay clear of the following areas: cutting edges, pinch points, and crushing surfaces.

Never use attachment as a work platform or manlift.

Contact your DOOSAN distributor about auxiliary hydraulic kits for attachments installation. If you are in doubt about compatibility of a particular attachment with a machine, consult your DOOSAN distributor.

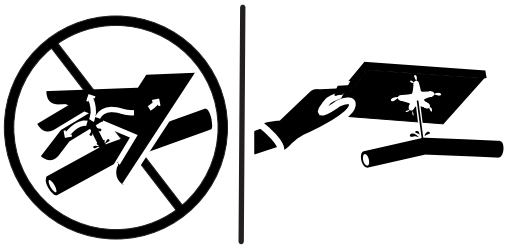
Pressurized Fluids

Pressurized air or fluids can cause debris and/or fluids to be blown out. This could result in death or serious injury.

Immediately after operations are stopped, coolant, engine oil, and hydraulic oil are at their highest temperatures and the radiator and hydraulic tank are still under pressure. Always wait for temperature to cool down. Follow specified procedures when attempting to remove caps, drain oil or coolant, or replacing filters. Always wait for temperature to cool down, and follow specified procedures when performing these operations. Failure to do so can result in death or serious injury.

When pressurized air and/or pressurized water is used for cleaning, wear protective clothing, protective shoes, and eye protection. Eye protection includes goggles or a protective face shield.

Pressure can be trapped in a hydraulic system and must be relieved before maintenance is started.



FG018457

Figure 4

Protecting Cabin from Flying or Falling Objects (Optional)

In a work site where additional operator protection is necessary from falling or flying objects, install adequate protective guards on the cabin.

For breaker operation, install a front guard (1, Figure 20) and apply a laminated coating sheet to front glass. Contact your DOOSAN distributor for recommendations.

When performing demolition or cutting operation, install a front guard and top guard.

Apply a protective laminated coating sheet to outside of front window. This will prevent glass from being scratched by dust when cleaning it or running wipers.

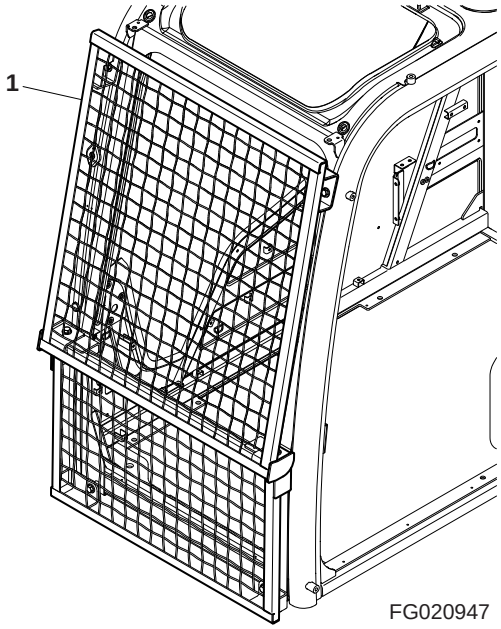


Figure 20

When working in mines, quarries or other work sites where there is a hazard of falling rocks, install Operator Protection Guard (OPG) (2, Figure 21) and apply a laminated coating sheet to front glass.

When OPG is installed, and front window needs to be cleaned, loosen bolts marked with arrows (Figure 21). Be sure to tighten bolts when done.

Never attempt to alter or modify any protective structure reinforcement system, by drilling holes, welding, remounting or relocating fasteners. Any serious impact or damage to system requires a complete inspection of the structure. Reinstallation, recertification and/or replacement of system may be necessary.

Contact your DOOSAN distributor for available safety guards and/or recommendations to protect against objects that could strike operator's cabin. Make sure that all other work site crew members are kept away from excavator when operating.

If any glass on machine is broken, replace it with new glass immediately.

NOTE: *The preceding instructions assume that conditions are for standard operations, but it may be necessary to add additional guards depending on operating conditions or local rules or regulations for the work site. Always contact your DOOSAN distributor for advice.*

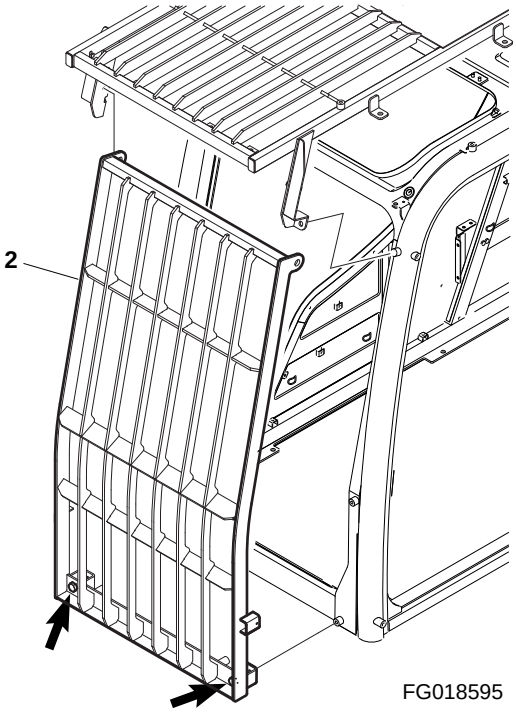


Figure 21

- Check mirrors and rear view camera (if equipped) on machine before starting operations. Clean off any dirt and adjust view for good visibility.

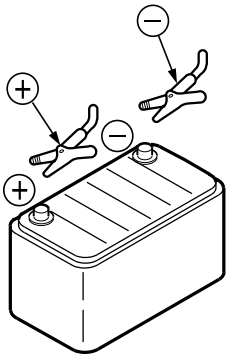
When operating or traveling during poor visibility conditions, follow the preceding work site rules.

It may not be possible to adjust all visual aids to see all the way around the machine. Therefore, additional precautions such as flagman, barricades, etc., must be taken to keep other personnel out of the work area.

Boost Starting or Charging Engine Batteries

Follow these instructions to prevent an explosion or fire when connecting booster cables to batteries:

- Turn "OFF" all electric equipment before connecting leads to battery. This includes electric switches on battery charger or battery booster equipment.
- When boost starting from another machine or vehicle do not allow two machines to touch. Wear safety goggles and gloves while battery connections are made.
- 24 volt battery units consisting of two series connected 12 volt batteries have a cable connecting one positive (+) terminal on one of the 12 volt batteries to a negative (-) terminal on the other battery. Booster or charger cable connections must be made between the non series connected positive (+) terminals and between the negative (-) terminal of the booster battery and metal frame of the machine being boosted or charged. The final booster cable connection, at metal frame of the machine being charged or boost started, must be as far away from the batteries as possible. Refer to “Starting Engine With a Booster Cable” on page 3-11, for proper procedure in this manual.
- Connect positive (+) cable first when installing cables and disconnect negative (-) cable first when removing them.



HAOA310L

Figure 27

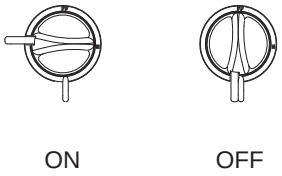
Check After Long-term Parking

- All oil and fluid levels.
- Tension of all belts.
- Air pressure.
- Air cleaner.
- Batteries and electrical connections.
- Lubricate all greasing points.
- Wipe off grease from piston rods.
- Inspect for signs of nests (i.e. birds, rodents, etc.)

Preparation for Electrical Welding On Body Structure

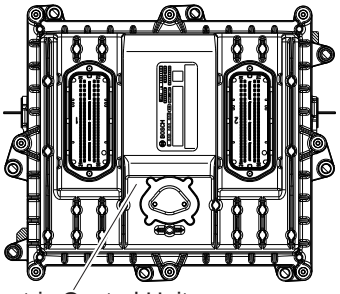
To prevent damage to ECU by electrical welding, observe the following procedures:

1. Turn battery disconnect switch to "OFF" position.
2. Disconnect the connector between ECU and machine, and the connector between ECU and engine.
3. Proceed with welding.
4. After welding, connect the connector between ECU and machine, and the connector between ECU and engine.
5. Clean battery compartment.
6. Turn battery disconnect switch to "ON" position.
7. Close battery compartment door.



FG020630

Figure 43



FG020631

Figure 44

Warning for Counterweight and Front Attachment Removal

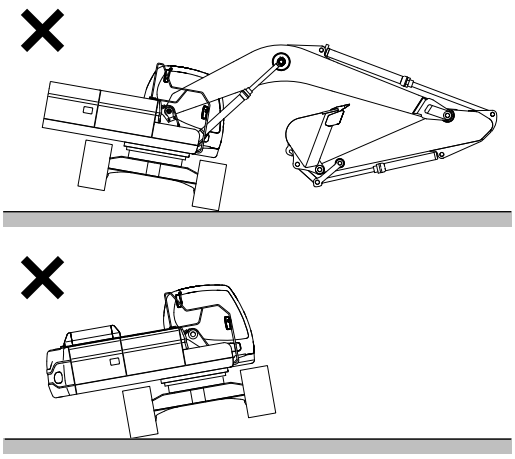
WARNING

AVOID DEATH OR SERIOUS INJURY

Removal of the machine counterweight, front attachment or any other part can affect the stability of the machine. This could cause unexpected movement, and result in death or serious injury.

Never remove counterweight or front attachment unless the upper structure is in-line with the lower structure.

Never rotate the upper structure once the counterweight or front attachment has been removed.



FG018594

Figure 45

Underground Operation

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

Special equipment and engines may be required in some countries. Contact your DOOSAN distributor for more information..

Check that there is sufficient compartment for machine and load.

Move slowly.

Make sure that authorities or companies responsible for underground cables, utilities, and electrical lines have been contacted and that their instructions are followed. Also check which rules apply to ground personnel regarding exposing cables, utilities and electrical lines.

Consider all electrical cables as live.

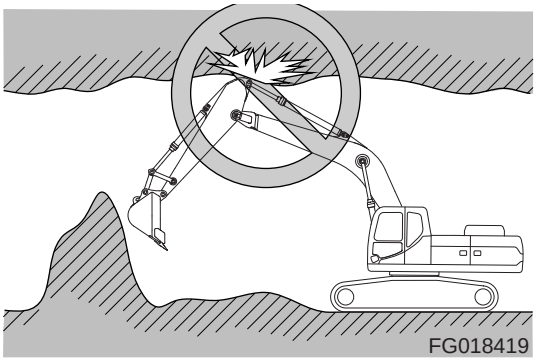


Figure 55

Working in Water

IMPORTANT

Do not exceed maximum permissible water depth. The water level must not reach higher than centerline of upper track roller(s) (1, Figure 56).

After working in water, lubricate all lubrication points on undercarriage, which have been underwater so water is removed. Check that no water has entered travel gearboxes and undercarriage components.

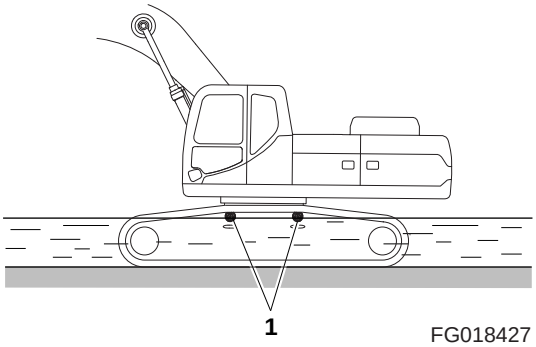


Figure 56

Working in Contaminated Environment

When working within area which is contaminated or where there is a health risk, check local regulations and contact your DOOSAN distributor for assistance with identifying what additional safety precautions need to be taken.

Operating Controls

The "Operating Controls" section consists of the following groups:

1. “Component Locations” on page 2-2
2. “Operator's Area” on page 2-4
3. “Operational Controls and Panels” on page 2-6
4. “Display Monitor” on page 2-24
5. “User Menu” on page 2-43
6. “Heater and Air Conditioner Control Panel” on page 2-74
7. “Stereo” on page 2-80
8. “Miscellaneous Electrical Devices” on page 2-81
9. “Seat Adjustment” on page 2-83
10. “Ceiling Cover” on page 2-87
11. “Front Windows” on page 2-88
12. “Door Side Latch” on page 2-90
13. “Cabin Storage Compartments” on page 2-91
14. “Sunglass Case” on page 2-91
15. “Sun Visor” on page 2-92
16. “Hanger” on page 2-93
17. “Cup Holder” on page 2-93
18. “Emergency Exit Glass Breaking Tool” on page 2-93
19. “Miscellaneous Access Covers and Doors” on page 2-94
20. “Air Gun and Compressor (Optional)” on page 2-95

Each group is explained with a point location drawing or photo and a brief description of each control, switch, gauge or valve.

Indicator symbols work besides the gauges on the display monitor. The operator should monitor machine pressure on the display monitor with indicator symbols. These symbols will only show there is a problem.

IMPORTANT

When any one or more of the warning symbols on the control console comes "ON", immediately stop operation. Investigate and correct the problem before proceeding with operation.

9. Intelligent Floating Boom Switch (Optional)

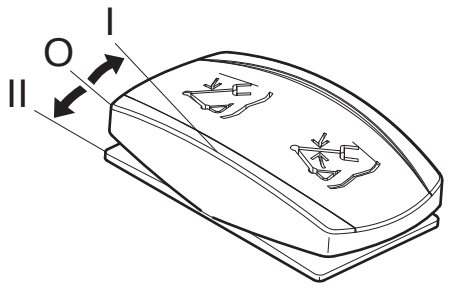
This switch is used to control the Intelligent Floating Boom function.

O. In this position, "NORMAL MODE" is selected.

I. In this position, "INTELLIGENT FLOATING BOOM MODE" is selected. The boom can move freely "UP" and "DOWN".

II. In this position, "BREAKER MODE" is selected.

NOTE: *See "Intelligent Floating Boom Control (Optional)" on page 3-38 for further information.*



FG018272

Figure 12

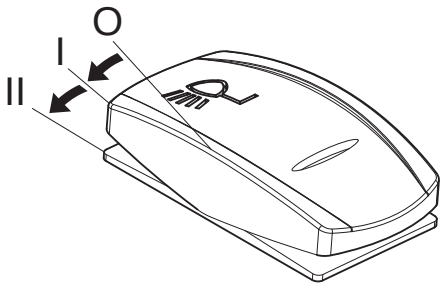
10. Cabin Work Light Switch (Optional)

This switch is used to control the cabin work lights, if unit is equipped with them.

O. In this position, all cabin work lights are turned "OFF".

I. In this position, the front cabin work lights on the front top of cabin will turn "ON".

II. In this position, the front cabin work lights on the front top of cabin and rear cabin work lights on rear top of cabin will turn "ON".

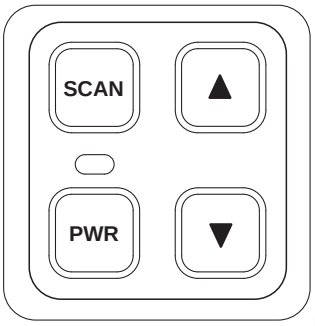


FG016019

Figure 13

11. Audio Control Panel

The audio system can be remotely controlled using this panel.

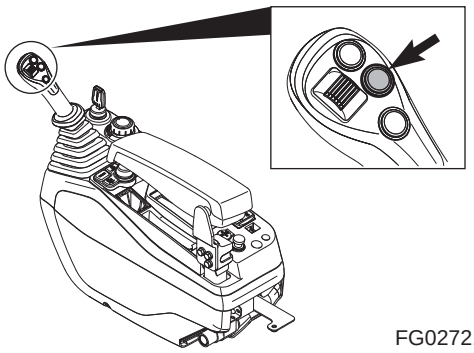


FG000018

Figure 14

32. Intelligent Floating Boom Temporary Reset Button

After selecting Intelligent Floating Boom function, while the boom operating joystick is being held in boom lowering direction, pressing the Intelligent Floating Boom temporary reset button (on the right-hand joystick) will temporarily reset the Intelligent Floating Boom function back to normal operation.

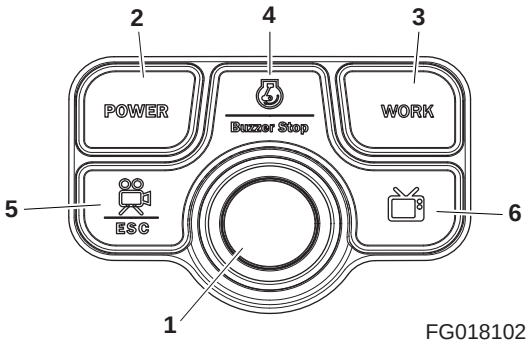


FG027214

Figure 42

33. Jog Switch Control Panel

Reference Number	Description
1	Jog Switch
2	Power Mode Selector Button
3	Work Mode Selector Button
4	Auto Idle Selector/ Buzzer Stop Button
5	Camera Mode Selector/ Escape (ESC) Button
6	Multimedia Button



FG018102

Figure 43

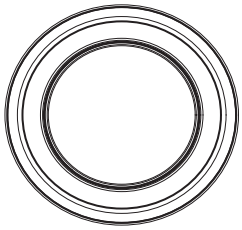
1. Jog Switch

Press or turn the switch to select the menu or to change figures.

Engine speed can be changed according to the setting on the display monitor.

When a pop-up occurs, press the jog switch to remove it.

If this switch is pressed while on the camera screen, the screen will be divided into the windows according to the number of cameras. (Optional)



FG018103

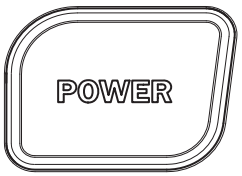
Figure 44

2. Power Mode Selector Button

Used for selecting the power plus mode, power mode, standard mode, or the economy mode.

Pressing the power mode selector button will display the available modes on the main window.

Place the selection bar by turning the jog switch and select the mode by pressing the jog switch.



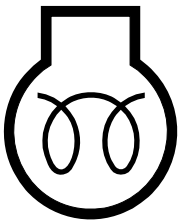
FG018104

Figure 45

4. Preheating Indicator Symbol

In cold weather this symbol indicates that engine preheat function is operating.

When this indicator symbol turns "OFF", it means that engine preheat cycle has been completed.



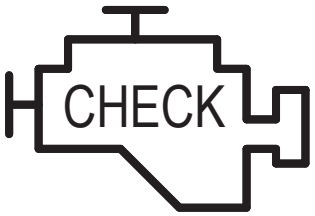
HAAE2000

Figure 68

5. Engine Check Warning Symbol

This symbol indicates when the engine needs to be check.

NOTE: *If this symbol turns "ON" stop the machine and repair the cause of the fault.*

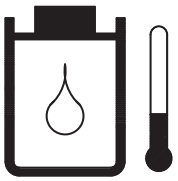


FG000045

Figure 69

6. Hydraulic Oil Overheat Warning Symbol

If the hydraulic oil temperature is too high, this symbol appears on the screen.



FG000056

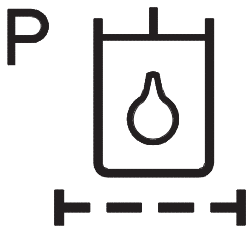
Figure 70

7. Pilot Filter Clogged Warning Symbol

This symbol indicates when the pilot filter clogged.

If this symbol is displayed, immediately stop operation and replace the pilot filter.

After the pilot filter has been serviced, restart machine operation to remove warning symbol.

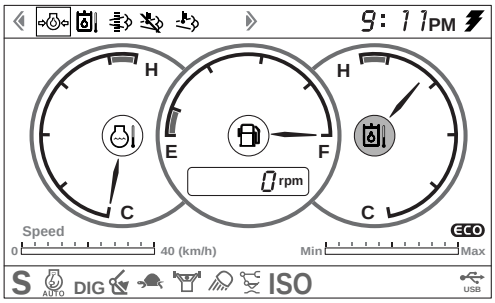


FG000055

Figure 71

2. Enter Checking Mode

Enter individual symbol checking mode by pressing the jog switch.

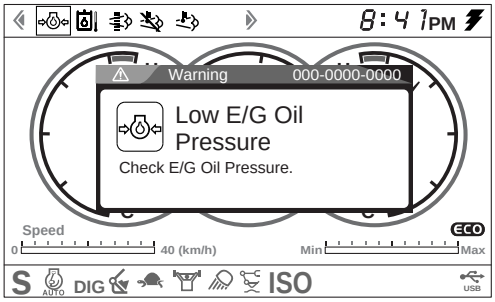


FG018715

Figure 92

3. Read Warning Message

Select the warning symbol by rotating the jog switch and press the jog switch to read the warning message.

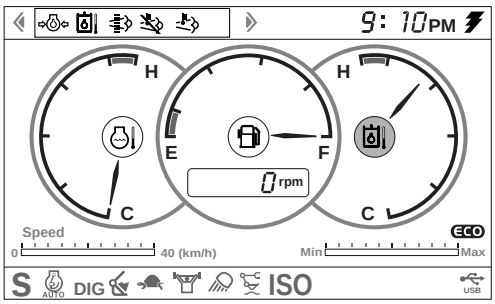


FG018519

Figure 93

4. Delete Warning Pop-up

Press escape or jog switch to delete the warning pop-up window.



FG018714

Figure 94

Max Flow (ATT)/Min Flow (ATT)

The max flow (ATT) /min flow (ATT) can be set up as the max/min flow rate value of the attachment by the user according to the attachment's specifications.

For instance, if the relevant attachment's use capacity is 90 - 120 lpm (23.8 - 31.7 gpm), the user can set up 120 lpm (31.7 gpm) for the max. flow rate, and 90 lpm (23.8 gpm) for the min. flow rate.

The setup method is the same as the above max. engine limit setup method. The change value by stage in the jog switch operation is 10 lpm (2.6 gpm).

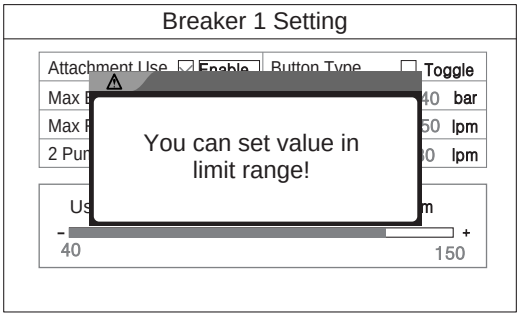
User Setting Max Flow

The user setting max flow is designed to set up the flow rate segment of the attachment to be used by the user.

Within the above setup max. flow rate (pump), max. flow rate (ATT), and min. flow rate (ATT) scope, the user can set up the max. flow rate value of the attachment to be used.

The setup method is the same as the above max. engine limit setup method. The change value by stage in the jog switch operation is 10 lpm (2.6 gpm).

When setting up all above items, the setup limits are outlined as follows. If these limits are exceeded, a pop-up window is displayed for 3 seconds, saying "You can set value in limit range!".



FG018498

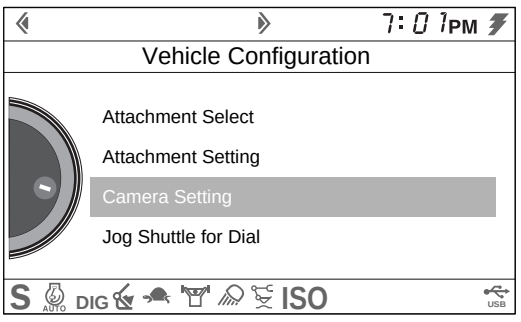
Figure 120

	Max. Limit	Min. Limit
Max E/G Limit	1,500 rpm	1,000 rpm
Max Flow (Pump)	Conforms to the max. engine limit	Conforms to the max. engine limit
Max Flow (ATT)	1,000 lpm (264.2 gpm)	Min. flow rate (ATT) + 10 lpm (2.6 gpm)
Min Flow (ATT)	40 lpm (10.6 gpm)	Of the max. flow rate (pump/ATT), the smaller value - 10 lpm (2.6 gpm)

C. Camera Setting

The camera setting screen is designed to set up various cameras "ON/OFF" and normal/mirror.

From the vehicle configuration, select camera setting to access the camera setting list screen.



FG018499

Figure 121

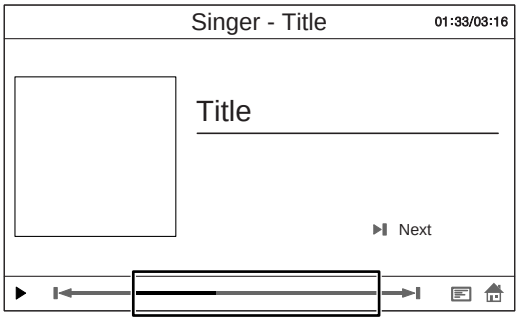
Fast Winding/Rewinding

Locate the cursor at the video progress bar and click on the jog switch to convert into the fast winding/ rewinding mode.

On the fast winding/rewinding mode, operate the jog switch clockwise/counterclockwise to conduct fast winding/rewinding.

Fast winding/rewinding can be conducted at an interval of 30 seconds per click during which the jog switch is turned.

On the fast winding/rewinding mode, press the ESC button to disable the fast winding/rewinding mode.

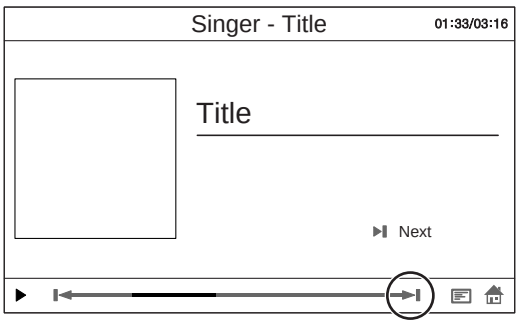


FG020127

Figure 155

Replay the Next File

Locate the cursor at the replay the previous file symbol and click on the jog switch to replay the next file.

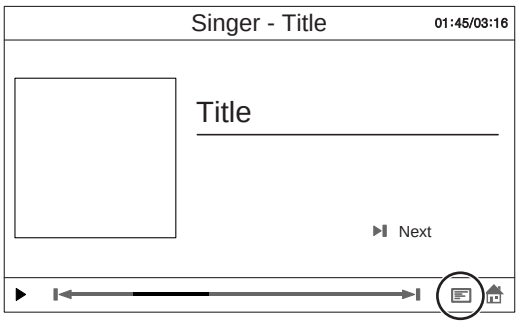


FG020128

Figure 156

MP3 Files List

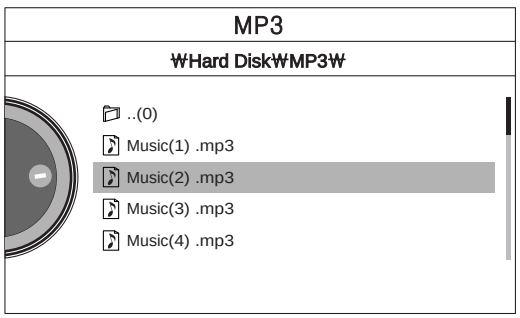
Locate the cursor at the MP3 files list symbol and click on the jog to move to the file list screen.



FG020129

Figure 157

Select a file and replay the MP3.



FG018560

Figure 158

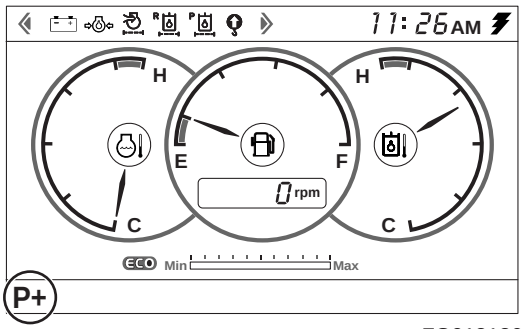
Switch Operation Indication

Enable

During the operation of switches for pressure increase, breaker, shear, travel, working light, parking, ram lock and quick coupler, this function indicates a relevant switch symbol at the left top or bottom. It displays the operation state on the screen.

Operation Indication Examples

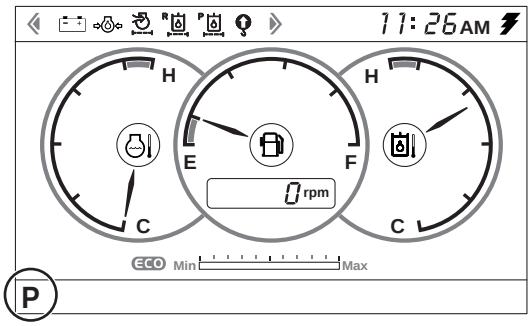
1. Power Plus Mode Selection



FG018136

Figure 191

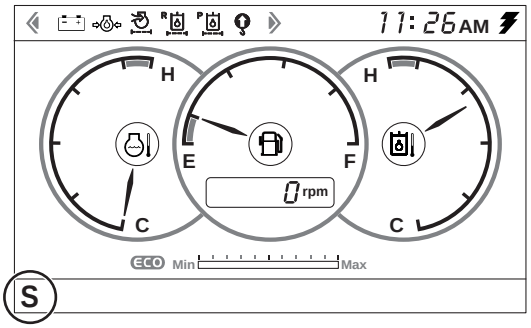
2. Power Mode Selection



FG018137

Figure 192

3. Standard Mode Selection



FG018138

Figure 193

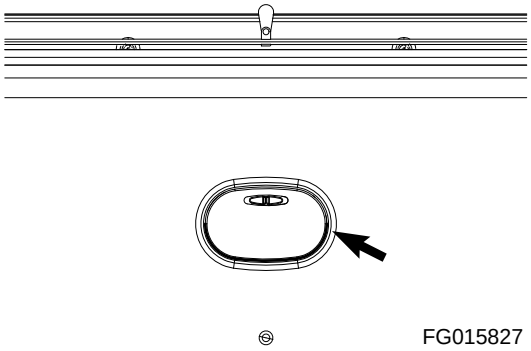
MISCELLANEOUS ELECTRICAL DEVICES

Cabin Light

A light is installed on the top of the operator's cabin.

The light will work despite starter switch position.

NOTE: *If light is left "ON" for a long time while the engine is not running, the battery will be discharged.*

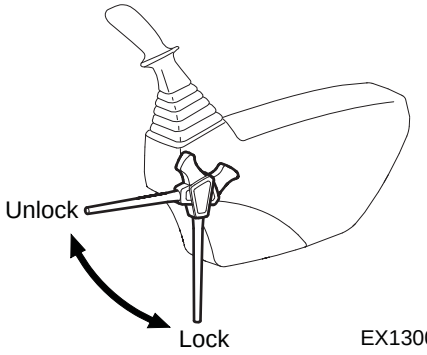


FG015827

Figure 221

Pilot Cutoff Switch

When the safety lever is moved into "LOCK" position, the switch deactivates the work and travel levers. With the work and travel levers deactivated, no digging/operational work can be done.



EX1300566

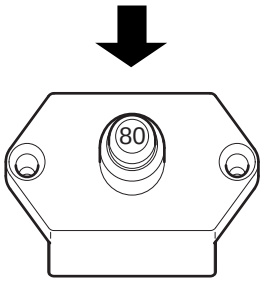
Figure 222

Circuit Breaker

A main circuit breaker is in the battery box. It will automatically cut off in case of an electrical short circuit or overload. This will prevent the electrical wiring and components from being burned or damaged.

If the circuit breaker is cut off, check all related circuits. This means something is wrong in the electrical circuit and it needs to be repaired.

After maintenance, press the red button for normal operation of circuit breaker.



FG018291

Figure 223

CABIN STORAGE COMPARTMENTS

There are three storage compartments behind the operator's seat.

The large compartment (1, Figure 243) is for storing nonperishable items.

The covered other one (2, Figure 243) is interconnected with the air conditioner. It can be supplied with either warm or cool air when air conditioner is turned "ON". The small compartment (3, Figure 243) is for storing small items. A net storage bag (4, Figure 243) is added.

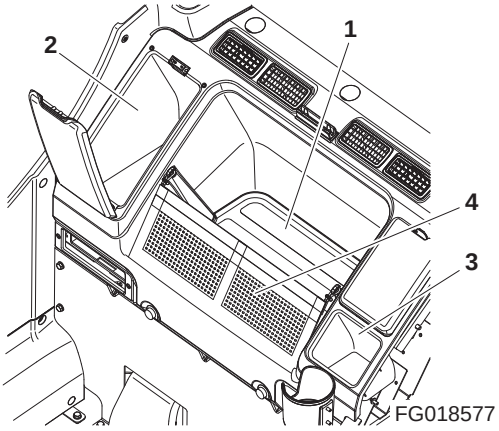


Figure 243

There is a separate small tray on right side (5, Figure 244) of operator's seat.

A document storage case (6, Figure 244) which can store up to A4-size documents is prepared.

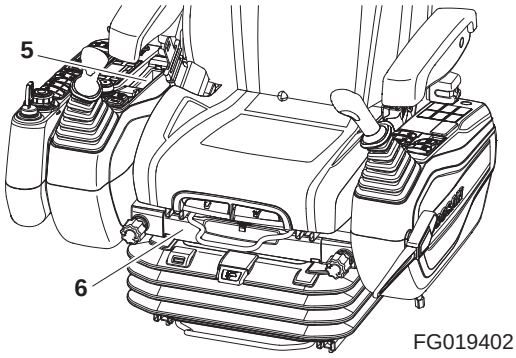


Figure 244

SUNGLASS CASE

The sunglass storage case (1, Figure 245) is on the center top of the rear wall of the operator cabin.

Keep this case lid closed before and after use.

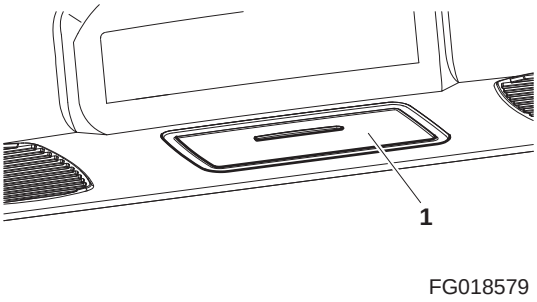


Figure 245

2. Cleaning
    - Remove dirt and debris from around engine, radiator, oil cooler and battery.
    - Check and remove flammable material around muffler, turbocharger, battery or other high temperature components.
    - Clean and inspect fins of radiator, oil cooler, CAC (Charged Air Cooler), fuel cooler and condenser.
3. Engine system
    - Check for coolant and oil leakage around the engine and cooling system.
4. Fuel system
    - Drain water and sediment from fuel tank and water separator.
    - Check for fuel leakage in fuel system.
5. Hydraulic system
    - Check for hydraulic oil leaks, damaged tubing and hoses and interference points of components.
6. Electric system
    - Check for damaged electrical cables and loose or missing connectors.
7. Lubrication
    - Perform all daily and periodic maintenance services. Perform services according to reading shown on hour meter.
8. Safety
    - Perform a machine walk-around. Make sure that no one is under the machine or performing any maintenance on it before starting engine.
9. After starting machine
    - Check that all operational controls and components are in proper operating condition and are functioning correctly. Stop operation and correct any problems before continuing work.

Checks Before Starting Engine

Before starting engine, inspect the following items. If any problem is found, repair it before machine operation. If the oil, fuel or coolant level are below the "LOW" mark, add it. For detail method, see “10 Hour / Daily Service” on page 4-24.

1. Grease boom, arm and front attachment pins.
2. Check engine oil level.
3. Check level of hydraulic oil tank.
4. Check fuel level.

2. Move safety lever (Figure 17) to "UNLOCK" position.

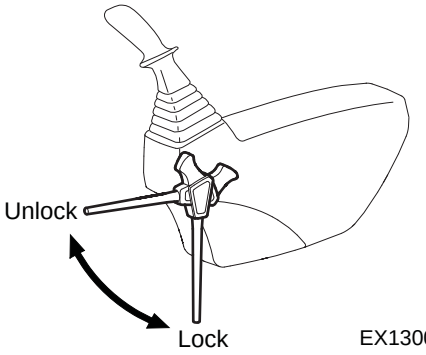


Figure 17

3. Slowly cycle boom, arm and bucket cylinders about five times without a load to circulate the oil through the system. Do this for five (5) minutes.
4. Check for clearance and fully raise the front attachment. Swing clockwise three (3) revolutions.
   Swing counterclockwise three (3) revolutions.
5. Travel forward and reverse at low speed for two (2) revolutions of the drive sprocket.

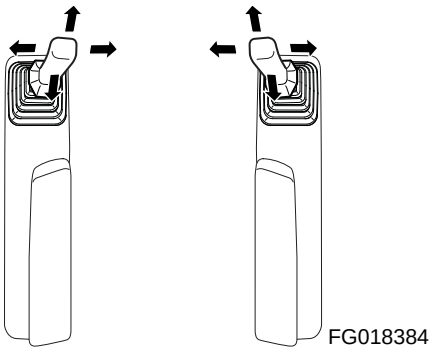


Figure 18

Hydraulic System Warm-up – Cold Weather

1. Run engine at "LOW IDLE" (no load) for five (5) minutes (Figure 19).

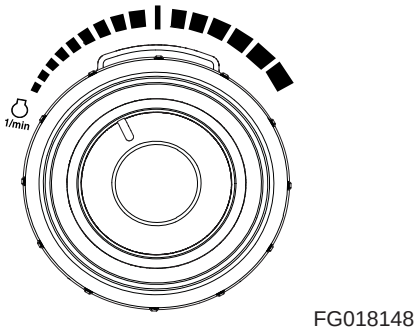


Figure 19

2. Run engine for approximately five (5) minutes set at the middle of the speed range, without a load (Figure 20).

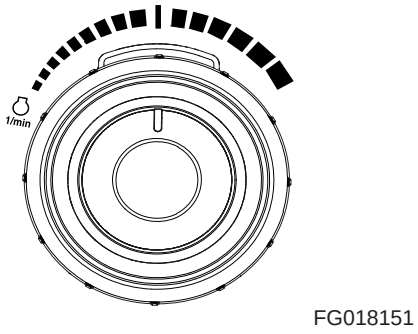


Figure 20

CLICK HERE TO DOWNLOAD THE COMPLETE MANUAL

- Thank you very much for reading the preview of the manual.
- You can download the complete manual from: www.heydownloads.com by clicking the link below

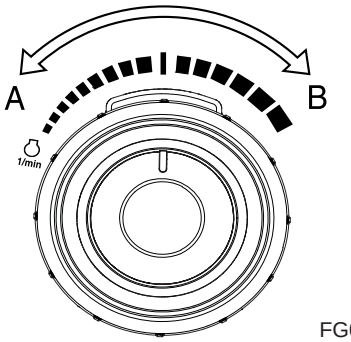


- Please note: If there is no response to CLICKING the link, please download this PDF first and then click on it.

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Engine Speed Control

Engine speed can be manually adjusted using the engine speed control dial. Increase engine speed by rotating the control knob clockwise. Decrease engine speed by rotating the control knob counterclockwise.



FG018094

Figure 45

IMPORTANT

The engine speed control system has been set at the factory and should not require adjustment as part of routine maintenance.

Engine Exhaust Emission Control System

This machine is equipped with an engine exhaust emission control system that meets applicable engine EPA/EU exhaust emission regulations. The owner/operator is responsible for proper operation and maintenance of the emission controls system as provided in this manual and the emissions-related warranty provisions.

The engine exhaust system is equipped with a diesel particulate filter (DPF). The DPF is an emissions reduction device that removes diesel particulate matter or "soot" from the exhaust gases of the diesel engine. The DPF will trap and collect the particulate matter until it is burned off. The process of burning off the collected particulate matter is called "regeneration". After the regeneration process is completed, ash residue will remain and will need to be periodically removed from the DPF. Ultra Low Sulfur Diesel fuel and API-CJ-4/ACEA-E9 grade engine oil must be used with this engine for the emission control system to function properly.

If you have any questions about the operation or maintenance of your emission control system, contact your DOOSAN distributor.

⚠ WARNING

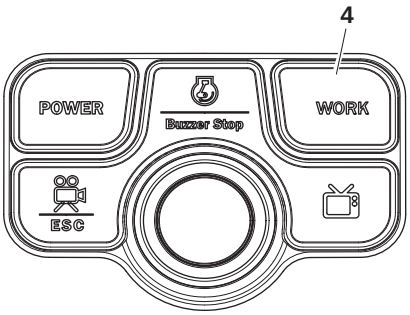
AVOID DEATH OR SERIOUS INJURY

Exhaust gas temperature and exhaust system components are very hot during regeneration. This can cause a fire or burn hazard and result in death or serious injury or property damage. Keep flammable material and explosive gases away from exhaust system during regeneration.

Work Mode

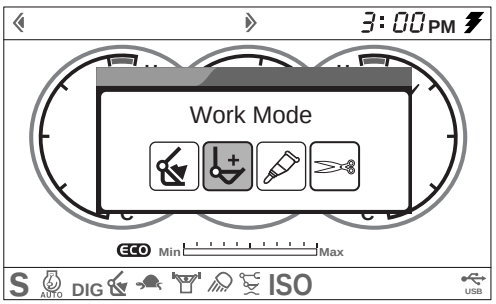
1. When the starter switch is turned "ON" the work mode is automatically defaulted to digging mode.
2. Select a proper work mode using button (4, Figure 58) before starting working.

   (Digging/Lifting/Breaker/Shear Mode)



FG018372

Figure 58

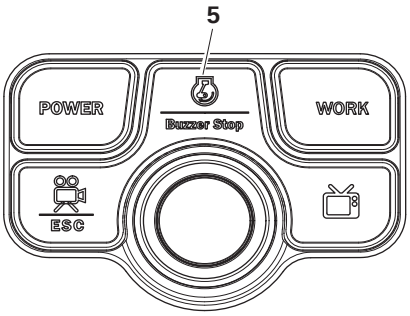


FG018373

Figure 59

Auto Idle Mode

1. The system will automatically reduce engine speed to idle speed approximately four (4) seconds after all the control levers are in the "NEUTRAL" position. When any lever is operated, engine speed is automatically returned to the preselected range.
2. When the starter switch is turned "ON", the work mode is automatically defaulted to "AUTO IDLE".
3. When the symbol is turned "ON", the auto idle function is activated. Deactivate the auto idle function by again pressing the auto idle selector button (5, Figure 60). Now the symbol will be turned "OFF".



FG018440

Figure 60

WARNING

AVOID DEATH OR SERIOUS INJURY

Turn "OFF" auto idle function when performing work in close operating areas, i.e., working in a narrow area and loading/unloading on or off a trailer.

4. When working close to the excavated edge or drop-off, make sure that the machine is sitting on solid ground. Keep the travel motors (1, Figure 83) to the rear. See Figure 83.

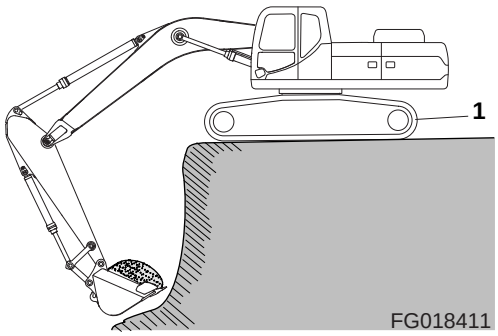


Figure 83

5. Do not allow bottom side of the boom to interfere with or touch the ground or track when digging a deep hole. See Figure 84.

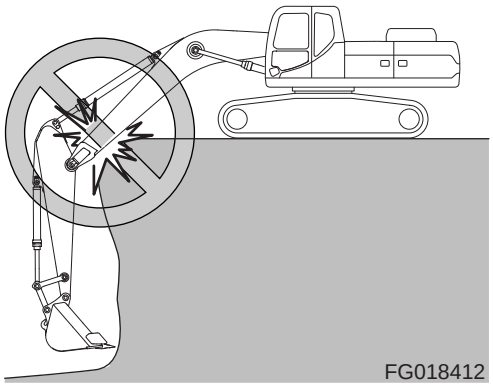


Figure 84

6. When machine is equipped with a leveling blade, and digging a deep hole, operate the machine keeping the leveling blade to the rear. Do not to allow the boom to interfere with the leveling blade. See Figure 85.

   Do not allow bottom side of the boom to interfere with or touch the ground or track blade when digging a deep hole. See Figure 86.

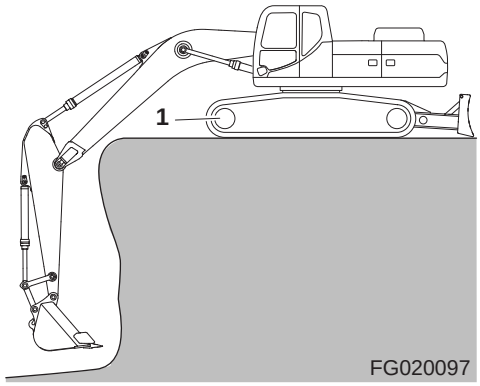


Figure 85

WARNING

AVOID DEATH OR SERIOUS INJURY

When leveling blade is positioned to rear, remember that travel motors (1, Figure 85) are facing edge of drop-off.

- **Check the blade location before traveling. When the blade is to the rear, operate the steering levers/foot pedals in the opposite direction to when the blade is in the front.**
- **Move the steering levers/foot pedals slowly. Abrupt lever motion will cause the machine to jerk.**

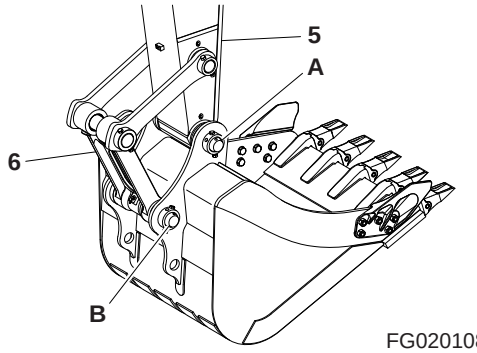
Replacement

1. Place the bucket in contact with a flat surface.

IMPORTANT

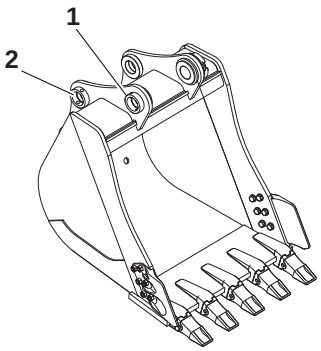
When removing the pins, place the bucket so it is resting slightly on the ground. If down pressure is applied to the bucket, the resistance will be increased and it will be difficult to remove pins. After removing the pins, make sure they are clean and do not allow mud, sand, or other debris to get on them. Dust seals are fitted at both ends of the bushings. Be careful not to damage them.

2. Remove double nut from bolt for arm pin (A, Figure 110) and link pin (B, Figure 110), remove bolt, pull out arm pin (A) and link pin (B, Figure 110), and then remove bucket.
3. Align the arm (5, Figure 110) with holes (1, Figure 111) of the replacement bucket and the link (6, Figure 110) with holes (2, Figure 111), then insert grease coated pins (A, Figure 110) and (B, Figure 110) into hole (1, Figure 111) and hole (2, Figure 111) respectively.



FG020108

Figure 110



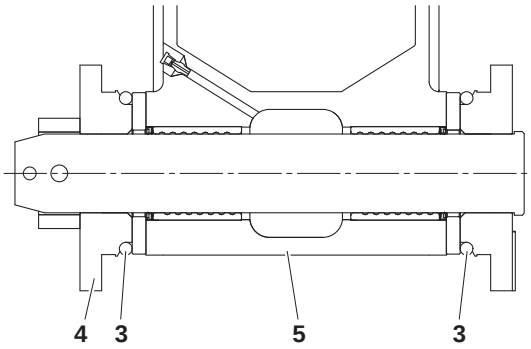
FG018432

Figure 111

4. When installing the bucket, for arm pin portion (A, Figure 110), fit O-rings (3, Figure 112) on bucket (4, Figure 112) in the position shown in the diagram on the right. After inserting the pin, position them in the standard groove.
5. Install the stopper bolts and nuts for each pins.
6. Lubricate with grease thoroughly until grease comes out from the end face.

IMPORTANT

When replacing the bucket, replace the dust seal if it has been damaged. If a damaged seal is used without being replaced, sand and dirt may enter the pin portion and cause abnormal wear of the pin.



FG019639

Figure 112

Rotating Operation (Optional)

For a machine equipped with an attachment that rotates, move the thumb wheel switch on the top of the left-hand work lever (joystick) to rotate the attachment clockwise or counterclockwise. Moving thumb wheel upward is for clockwise rotation and moving thumb wheel downward is for counterclockwise rotation.

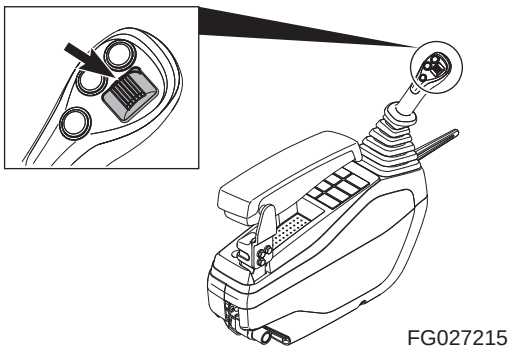


Figure 130

WARNING

AVOID DEATH OR SERIOUS INJURY

Before using any attachment in a work application, be sure to check its functional control. Make sure that desired movement or action is being activated by the control, e.g. opening/closing, clockwise/counterclockwise, crowd/dump, etc.

Operation in Saltwater Areas

Saltwater and saltwater spray is very corrosive. When operating in or around saltwater areas, or in or around snow, observe the following precautions:

1. When exposed to saltwater, dry machine thoroughly and rinse with freshwater as soon as possible.
2. Keep all exposed surfaces coated with preservative lubricating oil. Pay attention to damaged paint surfaces.
3. Keep all painted surfaces in good repair.
4. Lubricate machine as prescribed on lubrication chart on machine or Periodic Service Table and Chart, Section 4, in this manual. Shorten lubricating intervals for parts exposed to salt water.
5. Check operating controls to ensure proper functionality and that they return to "NEUTRAL" when released.

Operation During Electrical Storms

During electrical storms, do not enter or exit machine.

- If you are off machine, keep away from machine until storm passes.
- If you are in cabin, remain seated with machine stationary until storm passes. Do not touch controls or anything metal.

Operation at High Altitudes

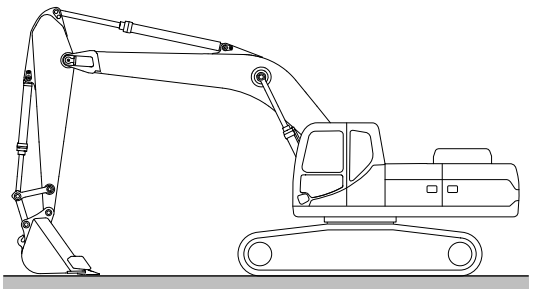
Operation instructions at high altitudes are the same as those provided for extreme cold. Before operating at high altitudes, engine fuel and air mixture may have to be adjusted according to appropriate engine manual.

1. Check engine operating temperature for evidence of overheating. The radiator cap must make a perfect seal to maintain coolant pressure in cooling system.
    - Perform warming-up operation thoroughly. If machine is not thoroughly warmed up before control levers or control pedals are operated, reaction of machine will be slow.
    - If battery electrolyte is frozen, do not charge battery or start engine with a different power source. There is a potential hazard that could cause a battery explosion or fire.
    - Before charging or starting engine with a different power source, thaw battery electrolyte and check for any leakage of electrolyte before starting.

MACHINE SETUP POSITION FOR MAINTENANCE

Before beginning any service work, park the machine using the following procedure (except for service work requiring the machine to be positioned differently).

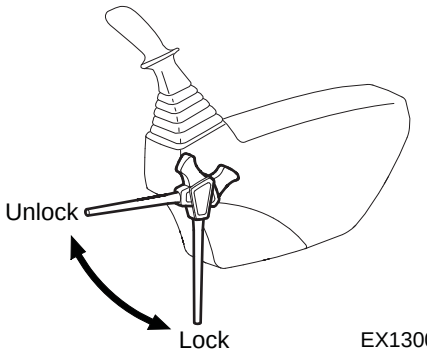
1. Position the machine on even, firm and level ground.
2. Put attachment on ground.



FG018379

Figure 1

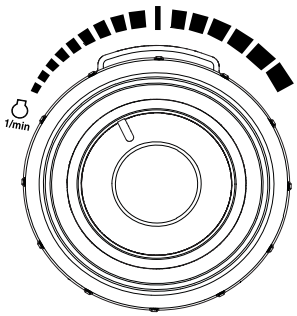
3. Move safety lever to "LOCK" position.



EX1300566

Figure 2

4. Allow engine to run at "LOW IDLE" for a minimum of five minutes to allow engine to cool, If this is not done, heat surge can occur.



FG018148

Figure 3

Symbols for "Lubrication and Service Chart"

The lubrication and service chart is on the inside of the battery box cover. The symbols used in the lubrication and service chart are illustrated in the following table.

Symbol	Description
	Lubrication
	Gear Oil (Swing Device, Travel Device)
	Engine Oil
	Engine Oil Filter
	Hydraulic Oil
	Hydraulic Oil Filter
	Hydraulic Oil Tank Breather

Symbol	Description
	Coolant
	Air Cleaner Filter
	Fuel Filter
	Air Conditioner Filter
	Drain Water
	Fuel Cap Filter
	Diesel Particulate Filter

Check Level of Hydraulic Oil Tank

WARNING

AVOID DEATH OR SERIOUS INJURY

The hydraulic oil will be hot after machine operation. Allow system to cool before attempting to service any hydraulic components.

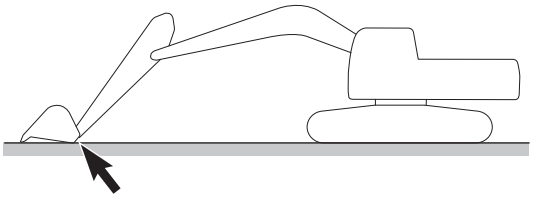
The hydraulic tank is pressurized. Tip breather cap up slowly to allow the pressurized air to vent. After the pressure has been released, remove service covers.



ARO1760L

Figure 14

1. Park machine on firm and level ground. Lower boom and position bucket on ground as shown in Figure 15.
2. Move engine speed to "LOW IDLE".



EX1300541

Figure 15

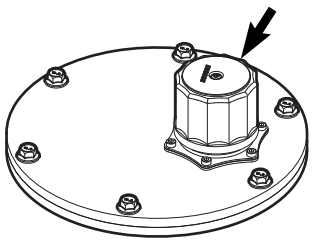
3. Move safety lever to "LOCK" position.
4. Have a second person, check hydraulic oil level gauge by opening right access door. Oil level must be between marks on sight gauge.



FG020182

Figure 16

5. If the level is below "L" mark add oil.
   A. Stop engine.
   B. The hydraulic tank is pressurized. Tip breather cap up slowly to allow the pressurized air to vent.
   C. Remove upper cover of the hydraulic tank and add oil.



FG020183

Figure 17

IMPORTANT

Do not fill above "H" mark on sight gauge. Overfilling can result in damage to equipment and oil leaking from hydraulic tank because of expansion.

Check Operation of All Controls and Linkages

IMPORTANT

Cold weather operation requires that operator fully warm up the hydraulic oil before beginning machine operation. Follow all warm up instructions listed in the Operating Instruction section of this manual. Make sure to cycle oil through all the components, including all cylinders, both travel motors and the swing motor. Cold hydraulic oil in the lines and components needs to be warmed before beginning full operation. If this is not done, damage to the cylinders or hydraulic motors can occur.

1. With the engine at rated speed, operate all the controls.
2. Follow cold weather hydraulic system warm-up procedures.
3. Note any slow operations or unusual movements. Determine the cause and repair before operating.

Replace Hydraulic Oil Return Filter (After First 250 Hours)

NOTE: *Replace hydraulic oil return filter after first 250 hours of operation or rebuild, then every 1,000 hours thereafter (See page 4-58).*

Change Pilot Filter (After First 250 Hours)

NOTE: *Change pilot filter after first 250 hours and every 1,000 hours thereafter (See page 4-59).*

Inspect Pins and Bushings of the Front End Attachments for Signs of Wear

Check Fluid Levels in Batteries

See “Inspection of Battery Electrolyte Level” on page 4-89 for further information.

Inspect for Any Loose or Missing Nuts and Bolts

Inspect Fuel System Hose Clamps

Clean Air Compressor Filter (Optional)

1. Set air compressor operating switch to "I" (OFF) position.
2. Open the door of the battery box on the right side of the machine.
3. Remove filter cap (1, Figure 76) manually, remove air filter (2, Figure 77) in the housing, and clean the cap and inside (3, Figure 76) of the housing.
4. Clean and dry the filter with clean, dry, compressed air (2 kg/cm^2 or lower).
5. After the cleaning, illuminate the inside of the filter and inspect it for is any holes, tears, or other damage. If any, replace the filter.
6. Assemble the filter and filter cap in the reverse order of disassembly.

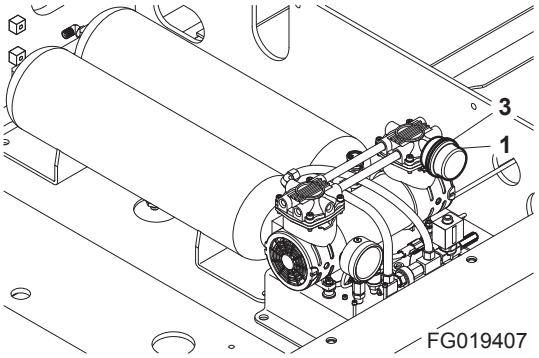


Figure 76

WARNING

AVOID DEATH OR SERIOUS INJURY

Do not clean or replace the filter while the air compressor is running.

Wear safety goggles to protect your eyes from flying dust when cleaning or replacing the filter.

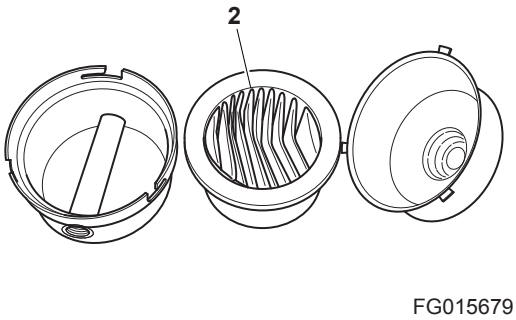
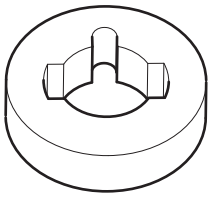


Figure 77

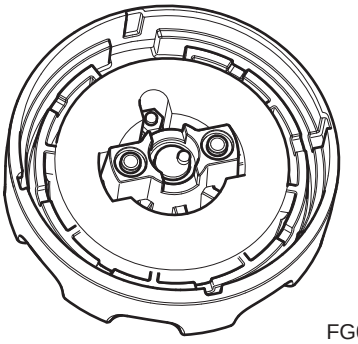
4. After disassembly as shown in (Figure 99), replace filter (Figure 100) with a new one.



FG015687

Figure 100

5. After installing new filter, assemble fill cap in reverse order.



FG015688

Figure 101

Check and Adjust Engine**

Contact your DOOSAN distributor for checking and adjusting the following items:

- Engine Compression Pressure.
- Injection Pressure.
- Injection Timing.

**These checks need to be completed by an authorized DOOSAN distributor.

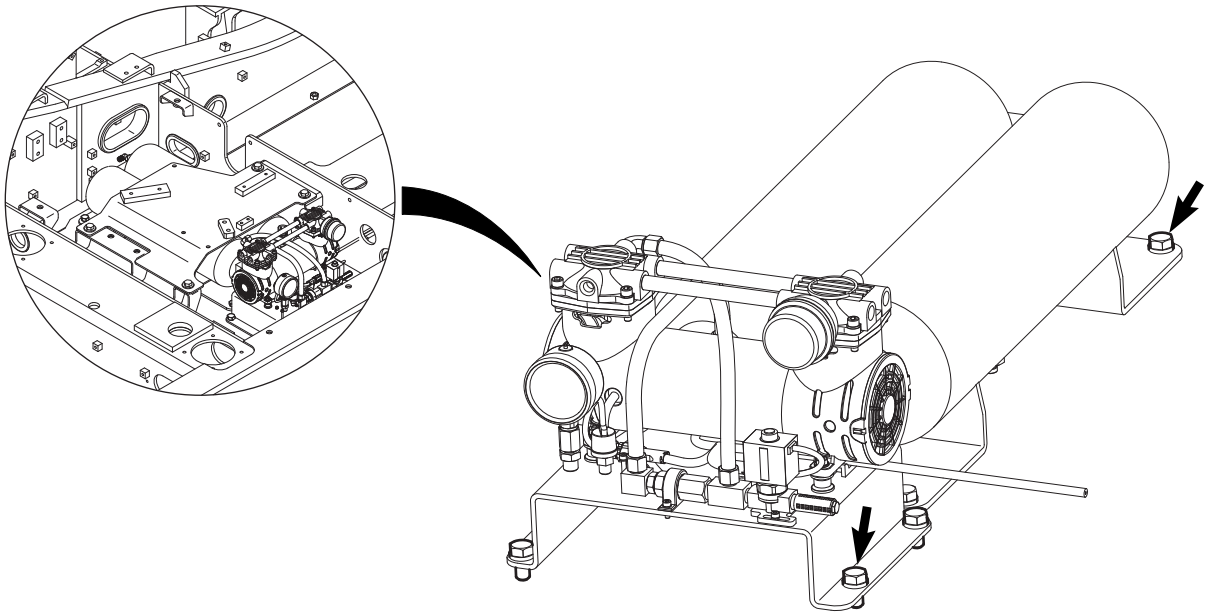
12,000 HOUR / 6 YEAR SERVICE

Hose In-service Lifetime Limit (European Standard ISO 8331 and EN982 (CEN))

European regulations state that in-service life of any hydraulic hose may not exceed six years. DOOSAN recommends the following:

- Hoses at the customer premises cannot be stored more than 2 years before being discarded or installed on a machine.
- In-service lifetime of hoses fitted on a machine can never exceed 6 years, but replace hoses described in “Major Parts - Periodic Replacement” on page 4-73, every 2 years. Always replace hoses having exceeded the allowed in-service lifetime irrespective of the external appearance/ wear.
- Always store hoses in a dark place at a maximum of 65% relative humidity, between 0°C (32°F) and 35°C (95°F) but as close as possible to 15°C (59°F) and away from copper, manganese or tube generating Ozone.

23. Mounting bolt for air compressor.
    - Tool: 19 mm ( )
    - Torque: 11 kg•m (108 Nm, 80 ft lb)



FG020056

Figure 145

Electric Viscous Fan Clutch

The electrically controlled viscous fan clutch provides optimum cooling fan speeds. This also results in lower fan noise and better fuel efficiency. Coolant, hydraulic oil, and cooled charged air temperatures, together with engine speeds, are monitored for optimum fan speeds.

When the electrical wire is broken, the fan speed works at its maximum speed to protect entire cooling system from overheating in any operating condition. The maximum and minimum fan speeds are shown below:

	Minimum Speed	Maximum Speed
Fan Speed (rpm)	600 ±50	1,800 ±50

Removal and Installation of the Cooling Fan Assembly

The the following instruction must be followed when handling the cooling fan assembly.

1. The weight of the cooling fan assembly is approximately 9 kg (20 lb), which is heavier than a cooling fan assembly without electric fan clutch. Remove and handle assembly carefully not to damage cooling fan and radiator.
2. If not correctly secured with a tie strap, the electrical harness can be damaged by the cooling fan during operation. Properly secure the electrical harness to fan guard when assembling.
3. The cooling fan assembly must be assembled with 6 bolts and nuts using torque values shown below.
   A. Before installation, cooling fan subassembly needs to be assembled by using 6 x M8 bolts. (Tightening torque 2.2 kg•m (22 Nm, 16 ft lb))
   B. Use 6 x M10 flange nuts (tightening torque 4.4 kg•m (43 Nm, 32 ft lb)) when installing the cooling fan assembly to the engine.

Torque	Cooling Fan (to Clutch) M8 Bolt	2.2 kg•m (22 Nm, 16 ft lb)
	Clutch (to Engine Pulley) M10 Nut	4.4 kg•m (43 Nm, 32 ft lb)

NOTE: *If electrical wire is not properly connected, the cooling fan will run at maximum fan speed. Check fan speed after assembly.*

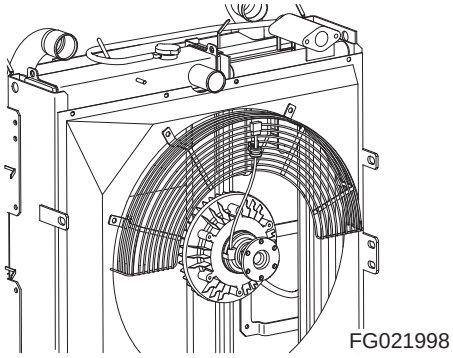

FG021998

Figure 157

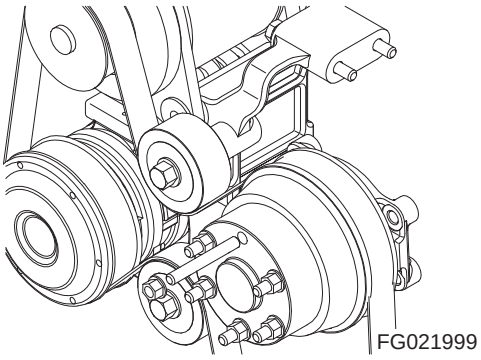

FG021999

Figure 158

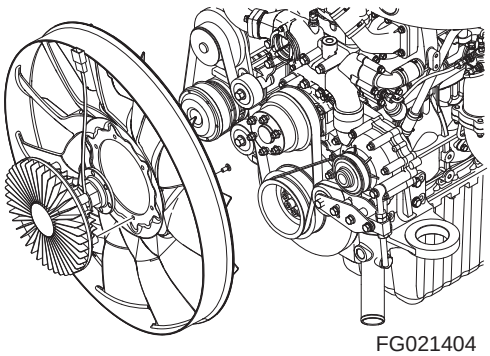

FG021404

Figure 159

Transportation

Check federal, state and local laws and regulations regarding weight, width, and length of a load before making preparations for transporting on public roads or highways.

The hauling vehicle, trailer, and load must comply with all applicable laws and regulations.

Check the intended route for road width, overhead clearances, weight restrictions, and traffic control regulations. Special approval or permits may be required.

LOADING AND UNLOADING

Warning for Counterweight and Front Attachment Removal

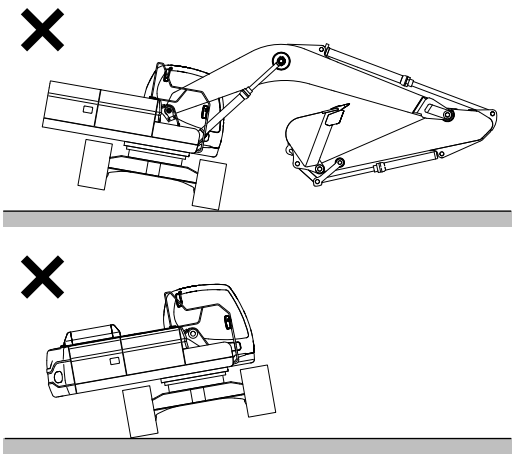
WARNING

AVOID DEATH OR SERIOUS INJURY

DO NOT remove machine counterweight, front attachment or any other part. This could cause tipping or rollover resulting in death or serious injury.

Never remove counterweight or front attachment unless the upper structure is in-line with the lower structure.

Never rotate the upper structure once the counterweight or front attachment has been removed.



FG018594

Figure 1

Problem	Cause	Correction
Engine knocks, runs unevenly or surges.	Low engine oil.	Refill.
	Plugged air intake system.	Clean system and replace filter.
	Injection pump out of adjustment.	Contact your DOOSAN dealer.
	Plugged fuel filter.	Replace fuel filter.
	Water or dirt in fuel system.	Clean system and add new fuel.
	Clogged or dirty fuel injectors.	Clean injectors.
Engine has poor power.	Plugged air intake system.	Clean system and replace filter.
	Clogged or dirty fuel injectors.	Clean injectors.
	Fuel filters plugged.	Replace filters.
	Engine speed control cable out of adjustment.	Readjust.
	Injection pump out of adjustment.	Contact your DOOSAN dealer.
	Valve backlash faulty.	Adjust backlash.
Engine runs hot.	Low coolant level.	Add coolant.
	Thermostat faulty.	Replace thermostat.
	Radiator cap faulty.	Replace radiator cap.
	Radiator core plugged.	Clean radiator.
	Oil cooler core plugged.	Clean oil cooler.
	Fan belt loose or damaged.	Tighten or replace as required.
	Temperature sensor faulty.	Replace sensor.
Starting difficult.		
Starting motor trouble.	Refer to diagnostics.	
Fuel system trouble.	Refer to diagnostics.	
Lack of compression pressure	Valve's poor shut, stem distortion.	Repair or replace.
	Valve spring damage.	Replace valve spring.
	Cylinder head gasket's leak.	Replace gasket.
	Wear of piston, piston ring or liner.	Adjust.
Idle operation abnormal.	Injection timing incorrect.	Check by SCAN-200.
	Air mixing at high-pressure pump.	Remove air.
Engine output insufficient.		
Continuous output insufficient.	Valve clearance incorrect.	Adjust.
	Valve tightness poor.	Repair.
	Cylinder head gasket's leak.	Replace gasket.

Two - Piece Boom

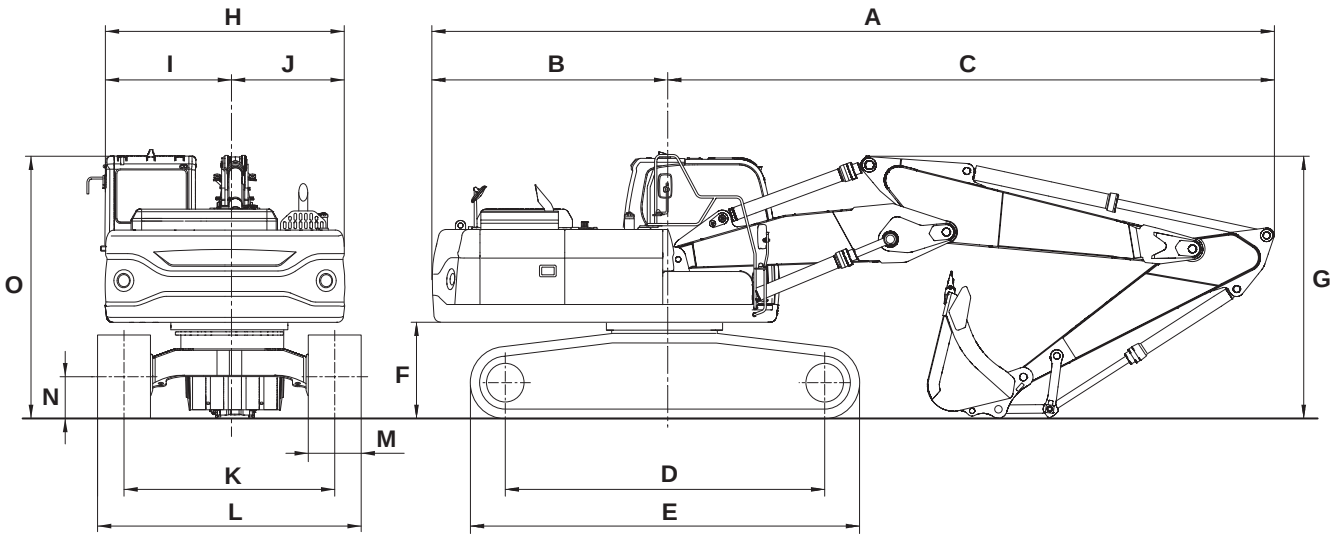
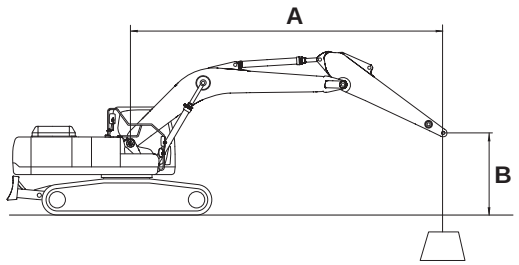


Figure 2

Dimension	5.85 m (19' 2") Boom	
	2.4 m (7' 10") Arm	**2.9 m (9' 6") Arm**
A	9,690 mm (31' 9")	9,680 mm (31' 9")
B	2,790 mm (9' 2")	
C	6,900 mm (22' 8")	6,890 mm (22' 7")
D	3,650 mm (12' 12")	
E	4,445 mm (14' 7")	
F	1,055 mm (3' 6")	
G (Boom)	3,100 mm (10' 2")	3,080 mm (10' 1")
G (Hose)	3,100 mm (10' 2")	3,080 mm (10' 1")
H	2,710 mm (8' 10")	
I	1,400 mm (4' 7")	
J	1,310 mm (4' 4")	
K	2,390 mm (7' 10")	
L	2,990 mm (9' 10")	
M	600 mm (1' 12")	
N	480 mm (1' 7")	
O	2,975 mm (9' 9")	



Track Width : 2.99 m (9' 10") STD Track
Boom : 5.7 m (18' 8")
Arm : 2.9 m (9' 6")
Bucket : Without Bucket
Counterweight : 4,300 kg (9,480 lb)
Shoe : 600 mm (24")
Dozer : Dozer Up (Rear)
: Rating Over Front
: Rating Over Side or 360 degree
Unit : 1,000 kg (1,000 lb)

FG019991

Figure 11

METRIC 1,000 kg

A (m) / B (m)	1.5		3		4.5		6		7.5		MAX. REACH		
													A (m)
7.5							* 4.96	* 4.96			* 4.27	* 4.27	6.22
6							* 5.39	* 5.39			* 3.98	* 3.98	7.32
4.5							* 5.92	5.49	* 5.47	3.87	* 3.92	3.47	8.00
3					* 8.68	7.99	* 6.74	5.24	* 5.81	3.76	* 4.03	3.18	8.35
1.5					* 10.29	7.48	* 7.56	5.00	6.15	3.64	* 4.30	3.08	8.42
0			* 6.15	* 6.15	* 11.05	7.21	* 8.08	4.83	6.05	3.56	* 4.79	3.14	8.22
-1.5	* 6.72	* 6.72	* 10.61	* 10.61	* 10.94	7.14	* 8.11	4.76	6.03	3.54	* 5.68	3.41	7.72
-3	* 11.43	* 11.43	* 13.89	* 13.89	* 9.98	7.21	* 7.41	4.80			* 6.09	4.05	6.86
-4.5			* 10.55	* 10.55	* 7.69	7.45					* 5.92	5.68	5.47

FEET 1,000 lb

A (ft) / B (ft)	5		10		15		20		25		MAX. REACH		
													A (ft)
25							* 9.55	* 9.55			* 9.48	* 9.48	20.06
20							* 11.83	* 11.83			* 8.79	* 8.79	23.85
15							* 12.89	11.84	* 11.81	8.32	* 8.64	7.70	26.16
10					* 18.71	17.25	* 14.63	11.31	* 12.66	8.10	* 8.86	7.03	27.37
5					* 22.23	16.15	* 16.39	10.78	13.24	7.86	* 9.46	6.79	27.63
0			* 14.11	* 14.11	* 23.94	15.54	* 17.51	10.41	13.04	7.68	* 10.56	6.93	26.96
-5	* 15.03	* 15.03	* 24.09	* 24.09	* 23.72	15.38	* 17.56	10.27	13.01	7.64	* 12.56	7.54	25.29
-10	* 25.67	* 25.67	* 30.10	30.04	* 21.57	15.55	* 15.93	10.38			* 13.44	8.99	22.38
-15			* 22.54	* 22.54	* 16.31	16.09					* 12.98	12.83	17.66

1. Load point is the end of the arm.
2. Capacities marked with an asterisk (*) are limited by hydraulic capacities.
3. Lift capacities shown do not exceed 75% of minimum tipping loads or 87% of hydraulic capacities.
4. The least stable position is over the side.
5. The total weight of machine is 22,800 kg (50,300 lb) Included are the; boom 5.7 m (18' 8"), arm 2.9 m (9' 6"), 4,300 kg (9,480 lb) counterweight, without bucket, all operating fluids and a 75 kg (165 lb) operator.
6. Lift capacities are in compliance with ISO 10567.

METRIC 1,000 kg

A (m) / B (m)	9		10.5		12		13.5		MAX. REACH		
											A (m)
12									* 2.06	* 2.06	9.81
10.5			* 2.39	* 2.39					* 1.91	* 1.91	11.17
9			* 2.34	* 2.34	* 2.27	1.98			* 1.83	* 1.83	12.19
7.5			* 2.40	* 2.40	* 2.40	1.98			* 1.79	1.65	12.97
6			* 2.54	2.52	* 2.47	1.94	* 1.84	1.49	* 1.79	1.48	13.52
4.5	* 2.96	* 2.96	* 2.74	2.40	* 2.58	1.87	2.39	1.46	* 1.81	1.36	13.90
3	* 3.31	2.93	* 2.97	2.27	* 2.73	1.78	2.34	1.41	* 1.86	1.28	14.10
1.5	* 3.67	2.72	* 3.21	2.13	2.77	1.69	2.28	1.36	* 1.95	1.23	14.14
0	* 4.00	2.53	3.29	2.01	2.69	1.61	2.23	1.31	* 2.07	1.22	14.02
-1.5	3.97	2.39	3.19	1.91	2.62	1.55	2.20	1.28	2.14	1.24	13.74
-3	3.87	2.29	3.12	1.84	2.58	1.51			2.24	1.30	13.27
-4.5	3.83	2.25	3.09	1.81	2.57	1.50			2.41	1.41	12.62
-6	3.84	2.26	3.11	1.83					2.70	1.59	11.73
-7.5	* 3.87	2.33	* 3.05	1.92					* 3.00	1.91	10.57
-9	* 2.99	2.50							* 2.99	2.50	9.00

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