DOOSAN

950106-01571
March 2016

Forestry Machine

Operation & Maintenance Manual

DX380LL-5

Serial Number 10001 and Up

Component Serial Numbers

There are many serial numbers on each traceable component of the machine. Record these numbers and their locations. These will be required whenever warranty service work is requested.

Engine Identification

Engine Data Plate

The engine data plate provides important facts about the engine. The engine serial number (ESN) and control parts list (CPL) provide information for service and ordering parts. The engine data plate must not be changed unless approved by SCANIA.

The data plate is located on the fuel pump side of the engine, on the rocker housing. Have the following engine data available when communicating with a SCANIA Authorized Repair Location. The following information on data plate is mandatory when sourcing service parts:

Reference Number	Description
1	Doosan Engine Plate
2	Scania's Standard Plate

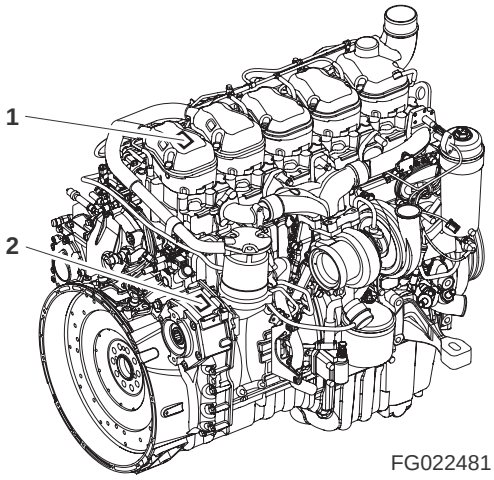


Figure 4

Your Machine Serial Numbers

Product Identification Number (PIN)	
Machine Serial No.	
Engine Serial No.	
Main Pump	
Swing Motor	
Travel Motor	
Main Control Valve	

- Skin contact: Wash with water and soap. Remove contaminated clothes.
- Ingestion: If large amounts have been ingested, drink plenty of water and induce vomiting. Then seek immediate medical attention.

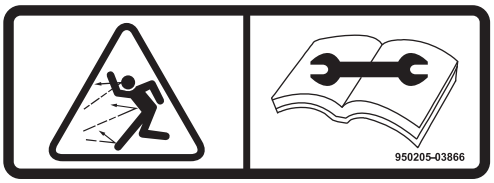
Environmental hazards

- Vanadium pentoxide is toxic to water organisms and can cause detrimental long term effects to water environment.

Environmental protection measures

- The SCR catalytic converter is a manufactured article that contains vanadium pentoxide, a hazardous substance. Before disposing of, or scrapping, a used SCR catalytic converter, it must be tested for any hazardous characteristics (ignitability, corrosiveness, reactivity, acute hazardousness, and toxicity), as those categories are described in 22 CCR 66261.30. If the spent SCR catalytic converter exhibits hazardous characteristics and is being disposed of, it will be considered by the State of California to be a hazardous waste subject to Title 22, California Code of Regulations. Before disposing of hazardous waste, review and follow all pertinent federal and California requirements.
- Vanadium pentoxide is a listed commercial chemical product - P120 - pursuant to 22 CCR 66261.33 (e). According to the State of California, commercial chemical products that are discarded or intended to be discarded are hazardous wastes and are subject to all provisions of Title 22, California Code of Regulations. Before disposing of vanadium pentoxide, review and follow all pertinent federal and California requirements.
- If the SCR catalytic converter is opened for maintenance, any dust spillages from the catalyst must be collected and tested for the presence of vanadium pentoxide before proper disposal. Dust spillages should also be tested for any hazardous characteristics (ignitability, corrosiveness, reactivity, acute hazardousness, and toxicity), as those categories are described in 22 CCR 66261.30, before proper disposal. If the dust contains either vanadium pentoxide or exhibits hazardous characteristics and is being disposed of, it will be considered by the State of California to be a hazardous waste subject to Title 22, California Code of Regulations. Before disposing of hazardous waste, review and follow all pertinent federal and California requirements.
- Do not dispose of the used SCR catalytic converter or its constituent parts into any waterways, storm drains or sanitary sewers.

9. Flying Debris or Objects (950205-03866)



EX1301185

WARNING

HIGH-PRESSURE GREASE CAN CAUSE DEATH OR SERIOUS INJURY

- **Track adjusting systems use grease under high-pressure which can penetrate body if improperly serviced.**
- **NEVER LOOSEN track tension grease valve more than one complete turn from the fully tightened position.**
- **Bleed off pressure slowly and keep body away from grease valve.**
- **Wear eye protection.**
- **Read and follow instructions in Operation & Maintenance Manual for more information on track adjustment.**

10. Crush Hazard (950205-03805)

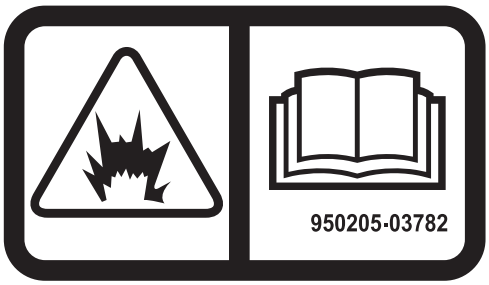
EX1301186

WARNING

AVOID DEATH OR SERIOUS INJURY

Stay clear of the boom, arm, and attachment.

11. Pressurized Gas and Fluid (950205-03782)



EX1301187

WARNING

AVOID DEATH OR SERIOUS INJURY

- **Heat or impact can cause the accumulator to explode.**
- **Keep away from flame.**
- **Do not weld on or drill into accumulator.**

High-pressure oil that is released can cause a hose to whip or oil to spray. Fluid penetration can result in death or serious injury. If fluid enters skin or eyes, get immediate medical attention from a physician familiar with this injury.

Obey all local laws and regulations for disposal of liquids.

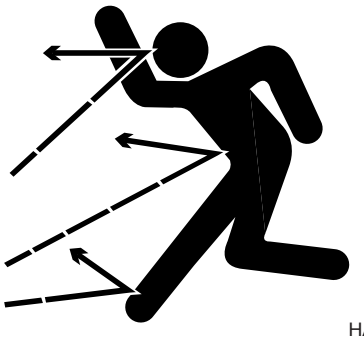
To prevent hot coolant from spraying out, stop engine and wait for coolant to cool. Using gloves, slowly loosen cap to relieve pressure.

Flying or Falling Objects

On work sites where there is a potential hazard that flying or falling objects can hit operator's cabin, select and use a guard to match operating conditions for additional operator protection.

Working in mines, tunnels, deep pits, and loose or wet surfaces, could produce hazard of falling rocks or flying objects. Additional protection for operator's cabin could be required such as an Operator Protection Guard (OPG) or window guards. Contact your DOOSAN distributor for information on available protective guards.

To prevent personnel from being struck by flying objects, keep personnel out of work area.



HAOA110L

Figure 5

HAOA100L

Figure 6

OPERATION

Always make sure that the machine is properly maintained.

Before Engine Starting

Machine Condition

Every day before starting engine for first time, perform the following checks and repair machine before operating, as necessary. If these checks are not properly done death or serious injury could result.

- Check coolant, fuel, and hydraulic tank oil levels, and check for clogged air cleaner and damage to electrical wiring.
- Check operation of gauges, cameras (if equipped) and angle of mirrors, and check that safety lever is in LOCKED position.
- Check that work equipment and travel controls move freely, and work controls return to "NEUTRAL" when released.
- Check that attachment is properly attached and locked.

IMPORTANT

Only use Ultra Low Sulfur Diesel (ULSD) fuel and API CI-4/ ACEA E5, E7 or API CJ-4/ACEA E9 grade engine oil with this machine.

Make sure that the machine is equipped with a lighting system that is adequate for job conditions and lights are working properly.

Before moving machine, check position of undercarriage. The normal travel position is with idler wheels to front under cabin and drive sprockets to rear. When undercarriage is rotated in reversed position, directional or travel controls must be operated in opposite directions.

Before performing checks, move machine to an area where there are no obstructions, and operate slowly. Do not allow personnel near machine.

Know maximum operating dimensions of your machine.

Lifting and Logging

The operator is responsible for any load carried when traveling on public roads and while working with the machine.

- Keep loads secure so they do not fall off while operating.
- Do not exceed maximum load for the machine. Machine operation will be affected when center of gravity changes, caused by extended loads and different attachments.

To lift loads safely the following must be evaluated by the operator and work site crew.

- Condition of ground support.
- Forestry machine configuration and attachments.
- Weight, lifting height and swing radius.
- Safe rigging of load.
- Proper handling of suspended load.

Always watch load. Bring load close to the machine before traveling any distances or swinging load. Logs must be held securely within the grapple. Do not pinch with the grapple tines. It would lead to loss of control and dropped loads.

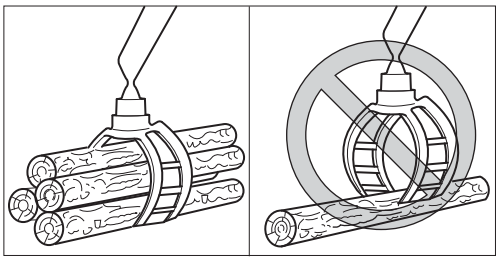
Lifting capacity decreases as load is moved further from the machine.

Set tracks at right angles to road shoulder or drop-off with sprocket at rear when performing operations to make it easier to move away from the work area.

Lifting and handling loads over the front and rear, rather than either side, has better stability of the machine.

Do not suddenly lower, swing, or stop work equipment. Haste can cause loss of stability and control. If tracks leave the ground, immediately lower the load and return the machine slowly to the ground.

- Do not move work tool over head of other personnel or over the operator's seat of dump trucks or other hauling equipment. The load may spill or work tool can hit dump truck causing property damage or cause death or serious injury.



EX1300849

Figure 27

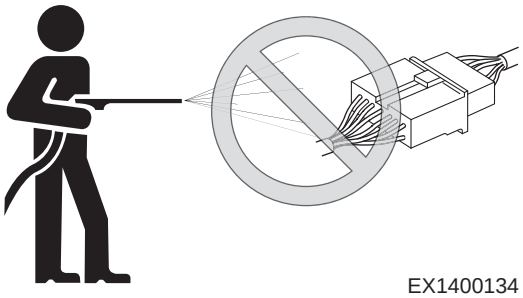
Cleaning

Clean machine before performing inspection and maintenance.

If inspection and maintenance are done when machine is dirty, it will become more difficult to locate problems, and you could slip on steps and work platform areas and injure yourself.

When washing machine, do the following:

- Wear shoes with nonslip soles to prevent slipping and falling.
- Wear safety goggles and protective clothing when washing machine with high-pressure steam or water.
- Do not spray water directly on electrical components (sensors, connectors). If water gets into electrical system, it can cause operation problems.
- Pick up any tools or hammers that are laying in workplace. Wipe up any grease or oil to prevent slippery substances, that can cause tripping or slipping.
- When cleaning cabin top window which is made of polycarbonate material, use tap water. Avoid use of organic solvents for cleaning, such as benzene, toluene or methanol. These solvents can cause a chemical reaction that will dissolve and damage the window.



EX1400134

Figure 36

Proper Tools and Clothing

Only use tools that are intended for the type of service to be done. Metal pieces from low quality or damaged tools, such as chisels or hammers, can break off and hit a service person in the eyes or face causing serious injury.

Disassembling Precautions

When using a hammer to remove pins, pins can fly out or metal particles may break off. Always do the following:

- Hitting hard metal pins or bearings with a hammer, can cause metal pieces to break or fly off resulting in serious injury. Always wear safety goggles and leather gloves. Keep other personnel away.

Use of Lighting

When checking fuel, oil, battery electrolyte, window washer fluid, or coolant, always use proper lighting equipment to prevent arcs or sparks that could cause a fire or explosion resulting in death or serious injury.

High-pressure Lines, Tubes and Hoses

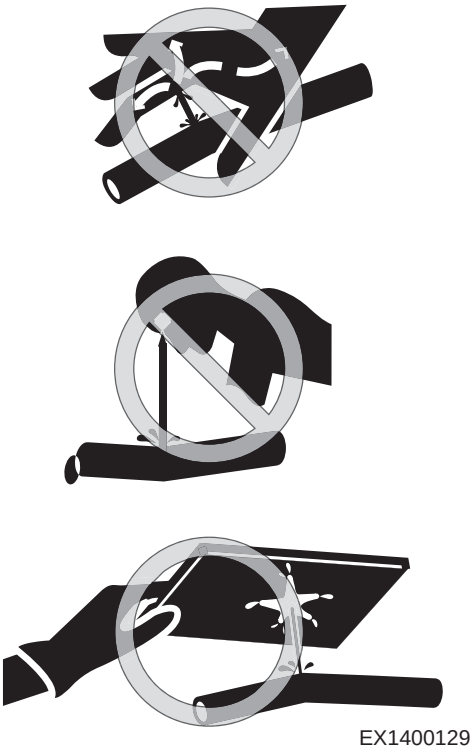
When inspecting or replacing high-pressure piping or hoses, check to verify that pressure has been released from circuit. Failure to release pressure can result in death or serious injury. Release pressure as described in "Handling of Accumulator" on page 4-104.
Always do the following:

- Wear eye protection and leather gloves.
- Fluid leaks from hydraulic hoses or pressurized components can be difficult to see but has enough force to pierce skin and can result in death or serious injury. Always use a piece of wood or cardboard to check for suspected hydraulic leaks. Never use your hands or expose your fingers. Wear safety goggles.
- Do not bend high-pressure lines. Do not strike high-pressure lines. Do not install lines, tubes or hoses that are bent or damaged.
- Make sure that all clamps, guards and heat shields are correctly installed to prevent vibration, rubbing against other parts, and excessive heat during operation.
- Replace hose or components if any of the following problems are found:
  - Damage or leakage from hose end fitting.
  - Wear, damage, cutting of hose covering, or wire braiding is exposed on any hose.
  - Cover portion is swollen in any section.
  - The hose is twisted or crushed.
  - Foreign material is embedded in hose covering.
  - Hose end is deformed.
  - Connection fittings are damaged or leaking.

  NOTE: *Refer to "Hose In-service Lifetime Limit (European Standard ISO 8331 and EN982 (CEN))" on page 4-83, for additional European regulations.*

High-pressure is generated inside engine fuel lines when engine is running. Before performing inspection or maintenance of fuel line system, wait for at least thirty seconds after stopping engine to let internal pressure drop and tip breather cap up to release residual pressure.

Oil or fuel leaks from high-pressure hoses can cause fire or improper operation, which can result in death or serious injury. If any loose bolts are found, stop work and tighten to specified torque. If any damaged hoses are found, stop operations immediately and contact your DOOSAN distributor for replacement parts.



EX1400129

Figure 46

3. Service air cleaner at frequent intervals, check air restriction indicator daily and keep dust cup and dust valve clean. Prevent dust and sand from entering engine parts and compartments as much as possible.
4. Lubricate and perform services outlined on current lubrication chart on machine and "Lubrication and Service Chart" on page 4-16. Clean all lubrication fittings before applying lubricant. Sand mixed with lubricant becomes very abrasive and accelerates wear on parts.
5. Protect machine from dust and sand as much as possible. Park machine under cover to keep dust and sand from damaging unit.

Operation in Rainy or Humid Conditions

Operation under rainy or humid conditions is similar to that as in extreme heat procedures previously listed.

1. Keep all exposed surfaces coated with preservative lubricating oil. Pay particular attention to damaged or unpainted surfaces. Cover all paint cracks and chip marks as soon as possible to prevent corrosive effects.

Operation in Saltwater Areas

Saltwater and saltwater spray is very corrosive. When operating in 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 "Lubrication and Service Chart" on page 4-16, 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.

Reference Number	Description
1	Seat
2	Suspension
3	Arm Rest
4	Left-hand Work Lever (Joystick)
5	Right-hand Work Lever (Joystick)
6	Travel Lever
7	Travel Pedal
8	Footrest
9	Safety Lever
10	Air Conditioner Unit
11	Display Monitor
12	Storage Space (Large)
13	Storage Net
14	Storage Space (Heating and Cooling)
15	Fuse Box
16	Storage Compartment (1)

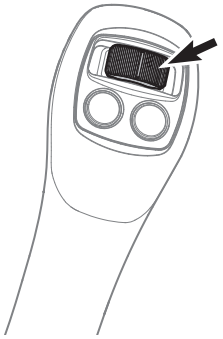
Reference Number	Description
17	Storage Compartment (2)
18	Storage Compartment (3)
19	File Case
20	Cup Holder (PET)
21	Defroster Vent
22	Face Vent
23	Rear Vent
24	Foot Vent
25	Stereo
26	Hour Meter
27	Joystick Height Adjustment Knob
28	Mat
29	Seat Belt
30	Engine Emergency Stop Switch (See page 2-91)
31	Straight Travel Pedal (Optional)

18. Rotating Switch

For a machine equipped with an attachment that rotates, move the thumb wheel switch on top of left-hand work lever (joystick) to rotate the attachment.

Rotating switch "RIGHT" is for "CLOCKWISE ROTATION".

Rotating switch "LEFT" is for "COUNTERCLOCKWISE ROTATION".



DS1601529

Figure 28

CAUTION

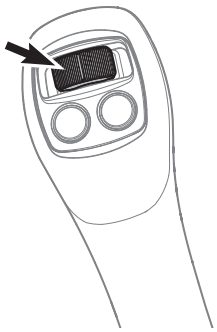
AVOID INJURY

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.

19. Shear Switch

For a machine equipped with a shear, move the thumb wheel switch on top of right-hand work lever (joystick) to open or close the shear. Shear switch "RIGHT" is for "OPENING (DUMP)" and shear switch "LEFT" is for "CLOSING (CROWD)".

NOTE: *This switch also interacts with the jog switch. See "3. Work Mode Selector Button" on page 2-21.*



DS1601530

Figure 29

CAUTION

AVOID 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.

5. Multifunction Gauge and Graphic Information Area

When the engine starter switch is turned to "I" (ON) position, a LOGO will appear on the display screen for about two seconds.

When the LOGO disappears, the multifunction gauge and graphic information screen will appear.

The engine rpm is normally displayed at the bottom of the screen when the starter switch is first turned "ON". A digital clock is located at the top of the display.

By using a combination of the mode selector buttons, information for filters and oils can also be displayed.

The display can also be set for the desired language.

Refer to the "User Menu" on page 2-45 for the language selection and information display sequences.

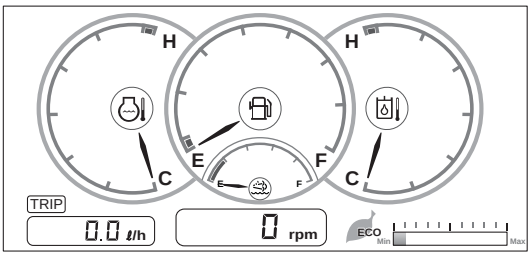


Figure 53 EX1301002

Communication Indicator

Indicates the condition of communication between main controller and display monitor.

1. Normal Condition:

   The symbol (Figure 54) will sequentially move like lightening.

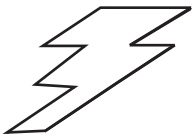


Figure 54 FG000047

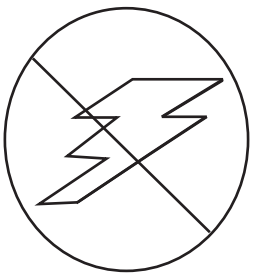
2. Abnormal Condition:

   If a communication error is generated between EPOS controller and display monitor, communication error warning symbol (Figure 55) will be displayed.

   When this symbol is displayed, contact a DOOSAN distributor.

   NOTE: *When starter switch is turned to "I" (ON) position during a state of communication error failure, the EPOS controller will default to the following modes.*

   Power mode: Standard mode
   Working mode: Attachment mode
   Auto idle: "ON" (Selection state)



FG000048

Figure 55

Engine Speed

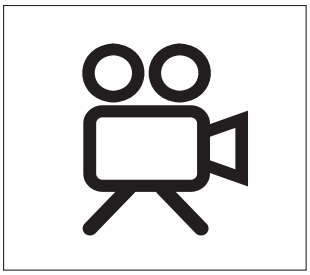
The engine speed is numerically displayed.

EX1301378

Figure 56

6. Camera Mode Selector

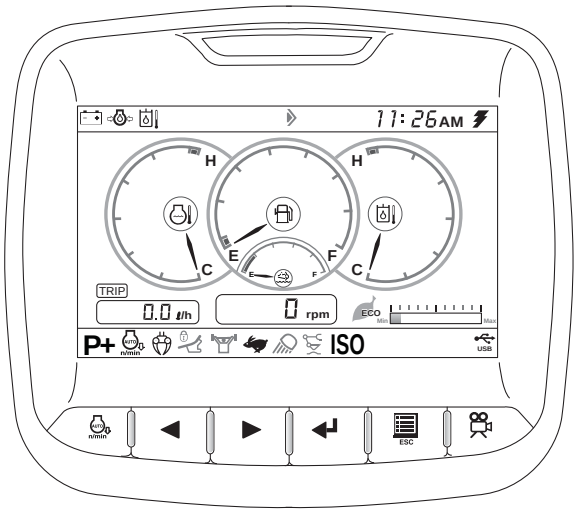
Camera window will appear when the button in the main window is operated.

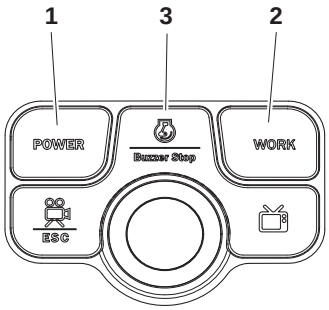


EX1301015

Figure 86

12. Mode Selector Buttons





DS1601533

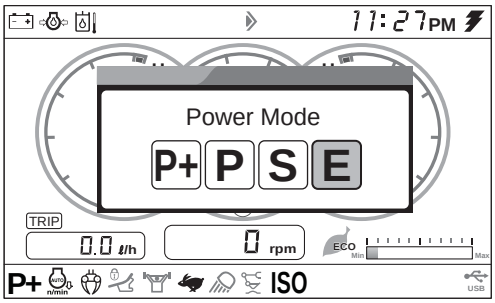
Figure 87

1. Power Mode Selector Button

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

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

Scroll through selection bar by turning jog switch and select mode by pressing jog switch.



DS1601534

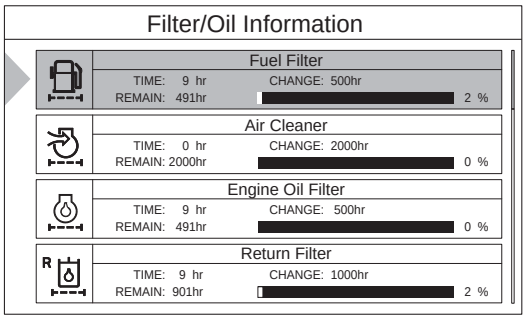
Figure 88

Reset Method/Replacement Period Change Method

Move the cursor over the filter/oil item you wish to change using the jog switch or the ◀ and ▶ buttons on the front of the dashboard and click the jog switch or press the 'Enter' button on the front of the dashboard. A window for resetting/changing the filter/oil time will pop-up.
To reset the use time, move the cursor over 'clear' and click the jog switch or press the 'Enter' button on the front of the dashboard.

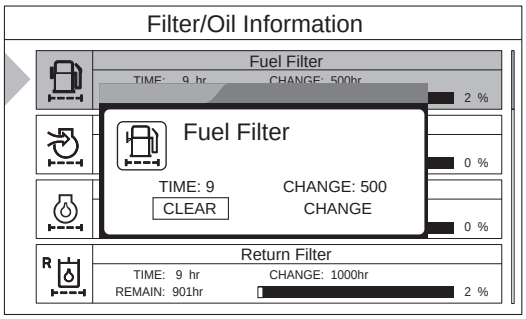
Turn the jog switch to locate it at YES. Then, click on the jog switch to reset the operation hour.

Turn the jog switch to locate it at NO. Then, click on the jog switch to allow the pop-up window to disappear without resetting the operation hour.



DS1601347

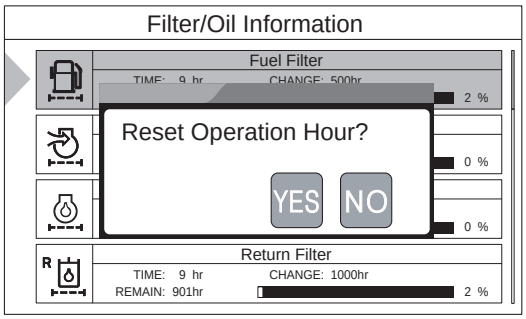
Figure 111



DS1601348

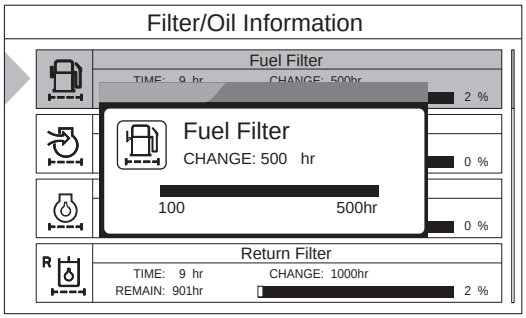
Figure 112

– The filter/oil use time shows the hours of operation after initializing the engine. It begins again with 0 hr after initialization the following the replacement of filter/oil.



DS1601349

Figure 113

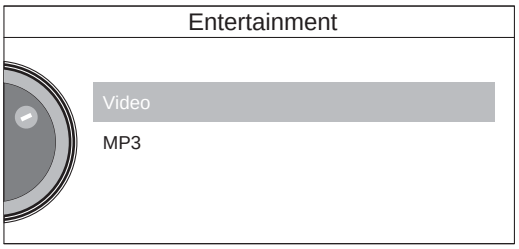


DS1601350

Figure 114

A. Video

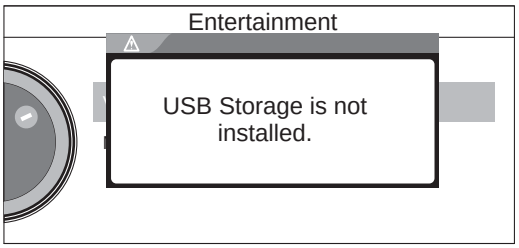
From the entertainment screen, select video to access it.



DS1601368

Figure 144

When there is no USB storage system, a pop-up window is displayed for 3 seconds, saying "USB" Storage is not installed". and the video is not played.

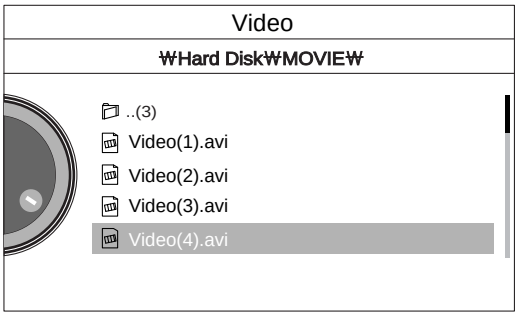


DS1601371

Figure 145

When initially accessing the video player, the USB storage system file tree is displayed on the screen, operate the jog switch clockwise/counterclockwise to select and play a video.

If there is a video file that played last, it will automatically be replayed.



FG018511

Figure 146

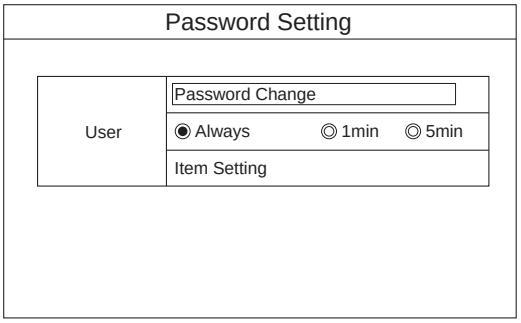
If the format is not supported, a pop-up window is displayed for 3 seconds, saying "This file is not available!" and the video is not played.

EX1301451

Figure 147

3) Structure

User password settings include password change, start-up restriction settings, and function item settings.

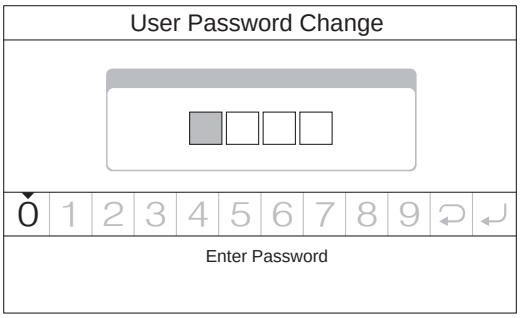


EX1301441

Figure 180

Password change

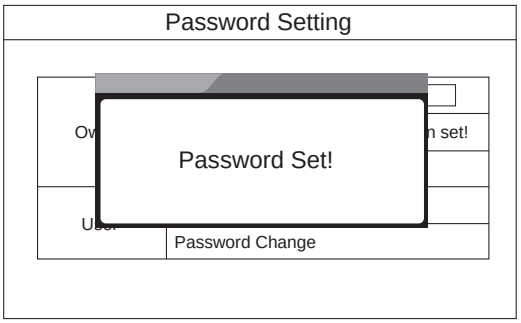
To change the user password, select password change, and change the user password using the jog switch (or keypad).



EX1301442

Figure 181

When the user password is changed,"Password Set!" will pop-up.



EX1301436

Figure 182

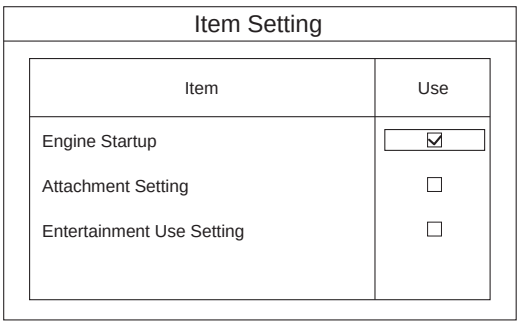
Item setting

Use of engine start-up, attachment setting, and entertainment use setting can be set.

NOTE: *This is only possible when permitted by the owner.*

a) Engine startup
Setting of password input upon operation of equipment.

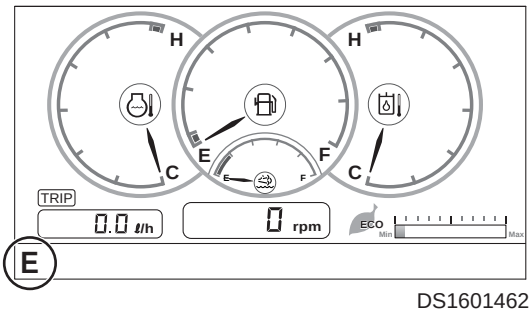
b) Attachment setting
Setting of password input for attachment setting.



EX1301443

Figure 183

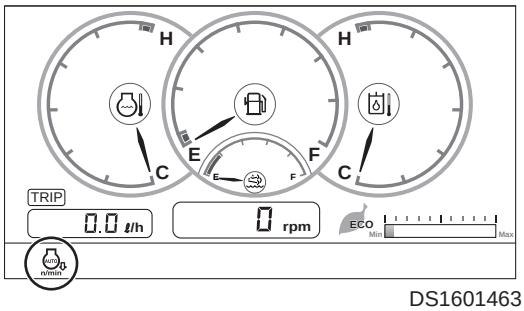
4. Economy Mode Selection



DS1601462

Figure 212

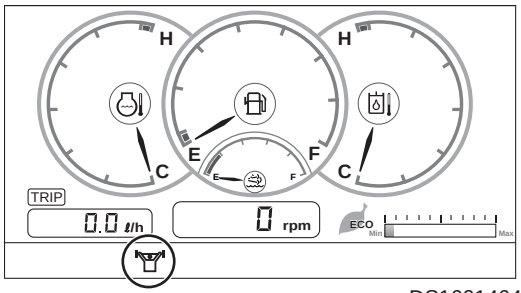
5. Auto Idle Selection



DS1601463

Figure 213

6. Power Boost Selection



DS1601464

Figure 214

SEAT ADJUSTMENT

WARNING

AVOID DEATH OR SERIOUS INJURY

Adjust the seat position before starting operation or after changing the operator.

Do not adjust the seat position while the machine is moving because a loss of control can occur. Always stop the machine, apply the parking brake, and then adjust the seat.

Always fasten your seat belt while operating machine.

Adjust the seat so the control levers and pedals can be operated freely and easily with the operator's back against the backrest.

1. Forward/Backward Adjustment

Holding lever (1, Figure 238), raise it up, move the seat to the desired position. Release lever to lock the seat in the selected position. Adjustment range is 180 mm (7.1 in).

2. Adjusting Height of Seat and Depth of Cushion

Forward Tilt

Press the adjustment lever (3, Figure 238) to adjust the seat cushion angle. (0"/+4"/+8")

Cushion Slide

Press the adjustment lever (4, Figure 238), and adjust the seat cushion forward/backward by max. 50 mm, to fit with the length of the operator's thigh.

Seat Height

It is possible to move the seat up or down by combining adjustments forward and rear tilt. Height adjustment is 60 mm (2.4 in).

Adjust height of seat by moving adjustment lever (2, Figure 238) up or down. Seat height can be adjusted by referring to the weight indication window (A, Figure 238) on the right.

- Green: Standard weight
- Red: Underweight or overweight

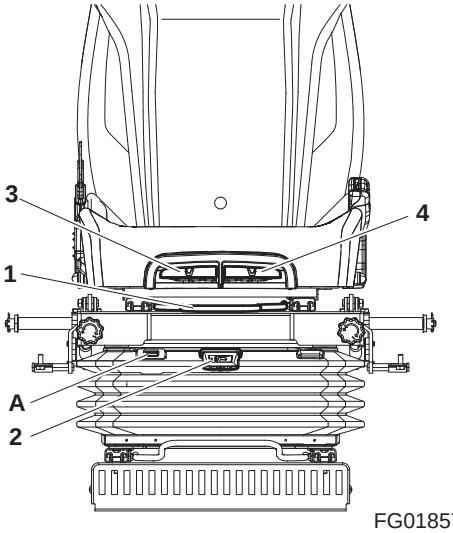


Figure 238

Operation

TO OPERATE A NEW FORESTRY MACHINE

All DOOSAN forestry machines are inspected before leaving the factory. However, it is required that operator follow these steps during the initial break-in period. Failure to follow these steps can result in damage to the equipment or reduced performance.

Hour	Load
For first 50 hours of operation	Maintain about 80% load of full capacity (Engine rpm: 80% of rated rpm)
After first 50 hours of operation	Full load

If machine is used at full load before it is broken in, it could affect the overall performance and service life of the machine.

NOTE:

1. *Check daily for leakage of coolant, fuel, engine oil and hydraulic oil.*
2. *Inspect all lubricants daily and add appropriate lubricants as required.*
3. *During operation, monitor all instruments and gauges from time to time.*
4. *Avoid an extreme engine load.*
5. *Operate unit at 80% load until engine and all other components are at operating temperatures.*
6. *Check that work equipment is operating normally.*
7. *Check machine for loose parts or for damage that may have occurred during shipping.*
8. *Check for loose wiring or terminals, check gauge operation and battery electrolyte level.*

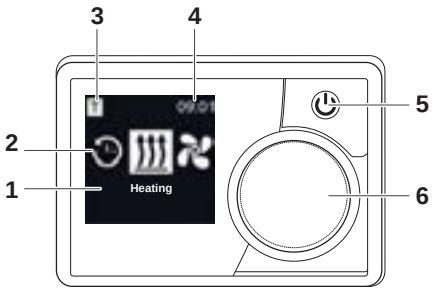
Engine Coolant Heater (Optional)

The engine coolant heater helps start-up and operation of the engine and equipment at temperatures below -20°C (-4°F).

Overview

Control Element and Menu Structure

Reference Number	Description
1	Menu Name
2	Menu Symbol
3	Activated Time Settings
4	Hour
5	Quick Start Button with Status Display
6	Control Knob

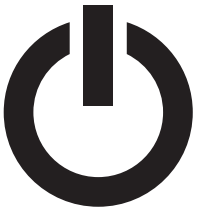


DS1601397

Figure 17

Buttons and Control

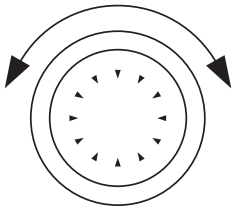
Quick start button with status display. (backlight)



DS1601398

Figure 18

Control knob (turn/push button) for selection and confirmation of the selected functions.



DS1601399

Figure 19

Plug Heater (Optional)

1. Mounting the plug heater

   A. Drain the cooling system.

   B. Remove existing plug. Keep the bolts and lock washers.

   C. Apply teflon tape or thread sealant to heater threads.

IMPORTANT

The element should not touch any cavity walls. Contact with the walls can cause the element to fail during operation.

NOTE: *The plug heater element is formed to fit the water passage without touching the walls.*

   D. Thread the heater into the engine opening and tighten securely.

2. Attaching the cord

   A. Align the cord and element pins on the heater. Press the cord onto the heater using even pressure across the cord cap. Place the clamp around bottom of cord cap and squeeze closed with pliers.

   B. Route the cord to any convenient point and tie cord down to prevent damage and strain. Keep cord away from hot surfaces and moving objects.

3. Testing the plug heater

   A. Refill the coolant system. Run engine until internal thermostat opens and continue running engine for 15 to 20 minutes to eliminate air pockets. Allow engine to cool. Check for leaks and proper coolant level.

CAUTION

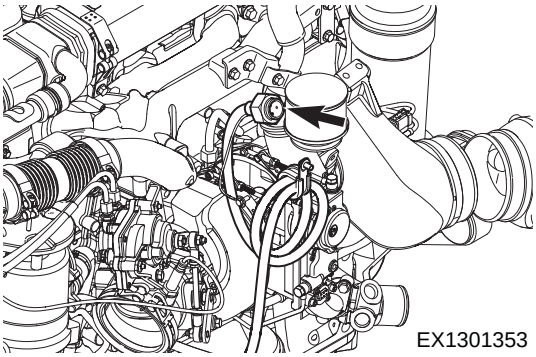
AVOID INJURY

Do not connect plug heater to power supply before installation.

Handling the plug heater while connected to a power supply could cause burns.

   B. Connect plug heater to power supply and test for proper operation. The block near the heater should get hot.

NOTE: *Do not test plug heater before installation. This will cause the heater to fail and void the warranty.*



EX1301353

Figure 53

5. On rough, frozen, or uneven terrain, travel slowly.

WARNING

AVOID DEATH OR SERIOUS INJURY

When traveling, keep attachment raised from 20 - 30 cm (8 - 12 in) above the ground. Fasten your seat belt.

Operator should pay attention when traveling backward on a slope.

Never turn or travel across a slope.

Travel straight up or down the slope.

Choose a safe alternate route before climbing a slope.

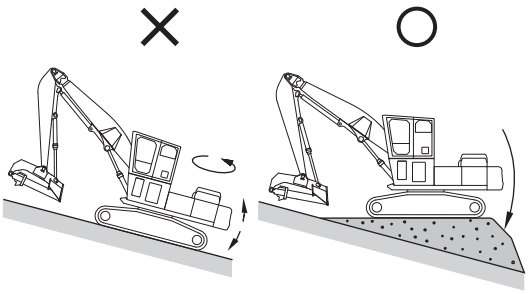
If forestry machine starts to slip or becomes unstable, lower the work tool immediately into the ground, using it as a brake.

Avoid working on slopes, because there is a risk of roll-over while swinging and performing front attachment operations.

Do not swing towards bottom of slope with a loaded work tool.

In unavoidable cases, level the slope with fill soil to make the machine as horizontal as possible.
See Figure 77.

Do not travel on slopes more than 30° because of risk of roll-over.



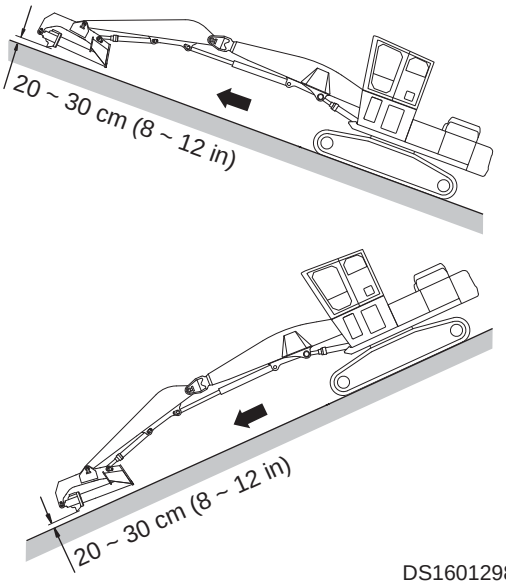
DS1601300

Figure 77

6. Travel straight up or down slopes, never diagonally across the slope. See Figure 78. Extend the arm and lower the boom to keep the heel about 20 - 30 cm (8 - 12 in) off the ground. If the machine starts to slide or becomes unstable, lower the work tool to regain control. If the engine stalls, lower the work tool, make sure that all controls are in the "NEUTRAL" position and restart the engine.

   NOTE: *Even though engine stops on a slope, do not operate swing control. The hydraulic accumulators can cause the unit to swing.*

   NOTE: *Do not open or close operator's door on a slope. Make sure door is latched.*



DS1601298

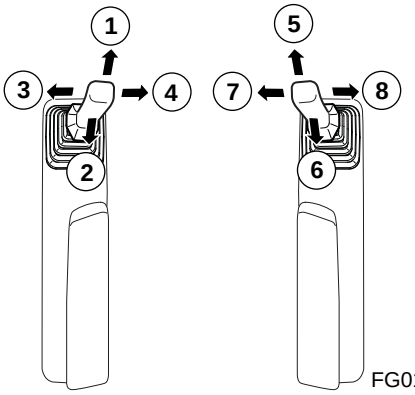
Figure 78

Change Machine Control Pattern By Selector Valve (If Equipped)

WARNING

AVOID DEATH OR SERIOUS INJURY

Check surrounding area before swinging. When operating a lever while in auto idle, proceed with caution because the engine speed will increase rapidly. Keep bystanders away.



FG018404

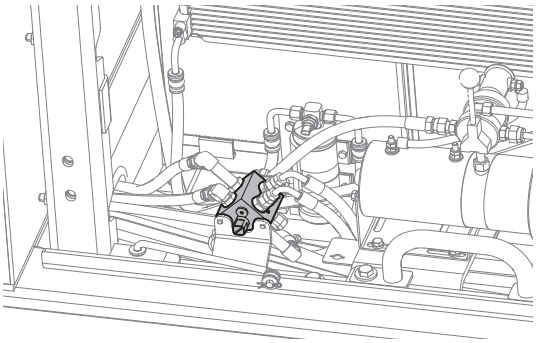
Figure 97

NOTE: *When starting work, move work levers (joysticks) slowly and check movement of swing and front attachment.*

The machine control pattern can easily be changed to the ISO pattern or to the BHL pattern by changing the position of the selector valve (if equipped). Use the following procedure to change the position of the select valve.

The selector valve is located in the rear of the cabin.

1. Rotate spool to the ISO position or to BHL position.
2. A control pattern symbol shows on the display screen.

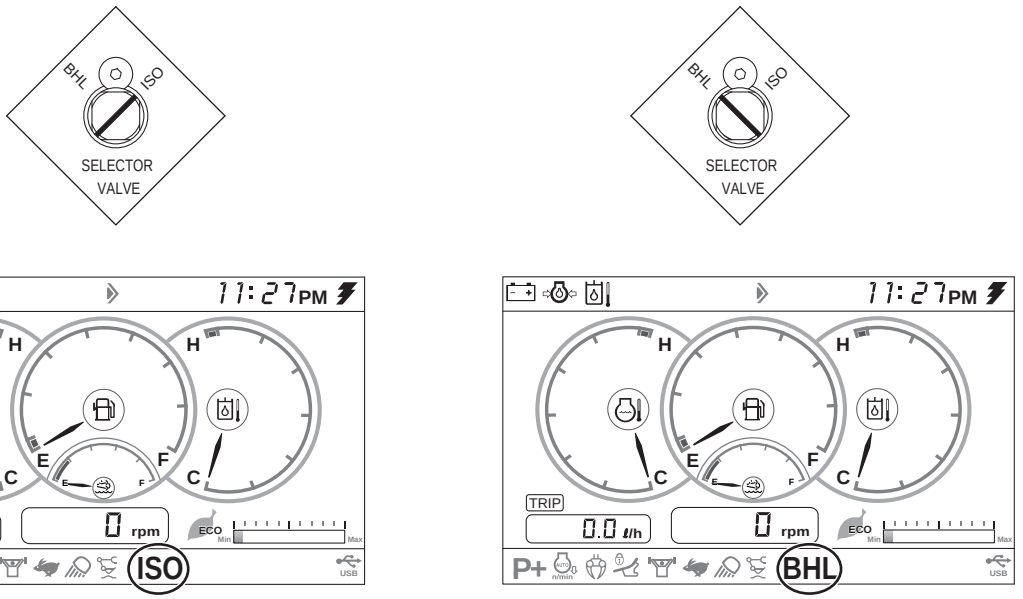


DS1601456

Figure 98

<ISO Pattern>

<BHL Pattern>



DS1601551

Figure 99

2. Check level of battery electrolyte daily. Keep electrolyte above plates to prevent damage to batteries. Use a slightly weaker electrolyte solution in hot climates. Batteries self-discharge at a higher rate if left standing for long periods at high temperatures. If machine is to stand for several days, remove batteries and store in a cool place.

IMPORTANT

Do not store acid type storage batteries near stacks of tires. Acid fumes can damage rubber.

3. Service fuel system as directed in "Check Fuel Level" on page 4-27 and "Check for Leaks in Fuel System" on page 4-27, of this manual. Check for water content before filling fuel tank. High temperatures and cooling off cause condensation in storage drums.
4. Lubricate as specified in "Lubrication and Service Chart" on page 4-16, in this manual or Lubrication Decal on machine.
5. Do not park machine in sun for long periods of time. If possible, park machine under cover to protect it from sun, dirt and dust.
   A. Cover machine if no suitable shelter is available. Protect engine compartment and hydraulics from dirt and debris.
   B. In hot, damp climates, corrosion will occur on all parts of machine and will be accelerated during rainy season. Rust and paint blisters will appear on metal surfaces and fungus growth on other surfaces.
   C. Protect all unfinished, exposed surfaces with a film of preservative lubricating oil. Protect cables and terminals with ignition insulation compound. Apply paint or suitable rust preventive to damaged surfaces to protect them from rust and corrosion.

CAUTION

AVOID INJURY

Switch off the power supply before starting filling.

CAUTION

AVOID INJURY

Risk of bursting if the reservoir is overfilled.

When filling the reservoir using pumps with a large delivery volume do not exceed the maximum filling mark.

Figure 123

Filler Coupling

As an alternative or addition to a conical head nipple (1, Figure 124), the unit can also be equipped with a filler socket (2) to fill using a filling pump. A corresponding coupling socket (3) must be mounted on the filling pump. The cap on the filler socket must be removed before filling.

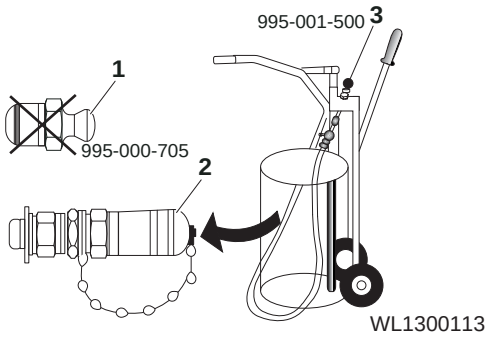


Figure 124

CAUTION

AVOID INJURY

Clean filler coupling regularly and check it for cracks. If any cracks exist, replace the filler coupling.

Filling Cylinder (Optional)

The pump unit can also be filled through one of the lubricant outlets using a filling cylinder (1, Figure 125). To do this, remove M20x1.5 screw plug (2) in the lubricant outlet and replace it with a filler socket (3). The caps (4) on the socket and filling cylinder must be removed before filling.

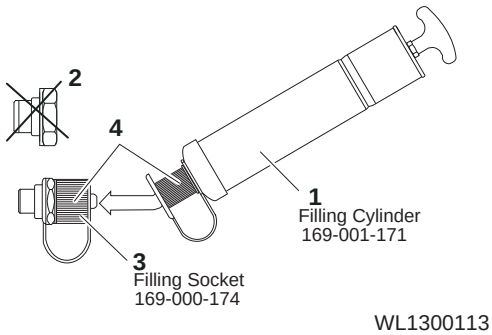
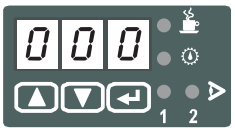
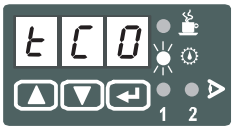
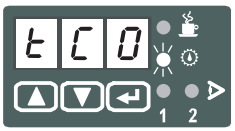


Figure 125

Change Operating Modes

A change of operation mode means changing to timer operation, counter operation or special applications.

Please refer to Pump Display Mode for further information.

Step	Key	Display
1	↵ Press for more than 2s	 Display flashes (000 = factory setting)
2	↵ Press briefly (confirm code)	 Automatic display of first parameter: "pause in timer operation" "PAUSE" LED flashes
3	▲	 Change from interval time to counter operation (only possible with external electrical pulse generator) Values in pulses
4	↵ Press briefly to confirm counter operation	 Display pump cycle time in timer operation
5	▲	 Change from pump cycle time to counter operation, special application
6	↵ Press briefly	Confirm new setting
7	↵ Press for more than 2s	New settings are written to memory and the display clears

Fault	Category	Possible Cause	Rectification
Pressure regulating valve on pump opens and lubricant discharges.	Malfunctions	• System pressure is over 200/300 bar, e.g., because of feeder blockage or blocked lubrication point.	• Check system and repair/rework the system so the maximum system pressure at 20°C is 200 bar.
		• Valve is damaged or contaminated, so it does not close properly.	• Replace pressure regulating valve.

- Always use fuel specified for temperature given in this manual.
  - If fuel is used at temperatures lower than specified temperature (particularly at temperatures below -15°C (5°F), the fuel will gel-up and solidify.
  - If fuel is used at temperatures higher than specified temperature, the viscosity will drop, and this can cause performance problems.
- Before starting engine, or when 10 minutes have passed after adding fuel, drain sediment and water from fuel tank.
- If engine runs out of fuel, or if filters have been replaced, it is necessary to bleed air from circuit.
- If there is any foreign material in fuel tank, wash tank and fuel system.

IMPORTANT

Ultra Low Sulfur Diesel (ULSD) fuel 0.0015 percent (S ≤ 15 ppm (mg/kg)) sulfur is required by regulation for use in engines certified to nonroad Tier 4 standards (U.S. EPA Tier 4 certified) and that are equipped with exhaust aftertreatment systems.

European ULSD 0.0010 percent (≤ 10 ppm (mg/kg)) sulfur fuel is required by regulation for use in engines certified to European Nonroad Stage IIIB and newer standards and are equipped with exhaust aftertreatment systems.

Using fuels of higher sulfur level can have the following negative effects:

- Shorten the time interval between aftertreatment device service intervals (cause the need for more frequent service intervals)
- Adversely impact the performance and life of aftertreatment devices (cause loss of performance)
- Reduce regeneration intervals of aftertreatment devices
- Reduce engine efficient and durability
- Increase the wear.
- Increase the corrosion.
- Increase the deposits.
- Lower fuel economy.
- Shorten the time period between Oil drain intervals (more frequent oil drain intervals)
- Increase overall operating costs.

Failures that result from use of improper fuels are not DOOSAN factory defects. Therefore the cost of repairs would not be covered by a DOOSAN warranty.

FLUID CAPACITIES

Component		Capacity
Engine	Oil Pan with Filter	38 L (10 U.S. gal.)
	Cooling System	46.7 L (12.3 U.S. gal.)
Fuel Tank		600 L (158.5 U.S. gal.)
DEF (AdBlue) Tank		70 L (18.5 U.S. gal.)
Hydraulic Oil	Tank Level	240 L (63.4 U.S. gal.)
	Full	380 L (100.4 U.S. gal.)
	System	450 L (118.9 U.S. gal.)
Travel Reduction Gear (Each)		10 L (2.6 U.S. gal.)
Swing Reduction Gear (Each)		5 L (1.3 U.S. gal.)

Check DEF (AdBlue) Tank

1. At end of each workday, fill DEF (AdBlue) tank. Add the DEF (AdBlue) through DEF (AdBlue) fill cap (1, Figure 19).

IMPORTANT

Do not let impurities get in when storing or adding DEF (AdBlue).

If impurities get in the tank, drain the whole DEF (AdBlue) through the drain hole (2, Figure 20).

2. Securely tighten cap after filling.

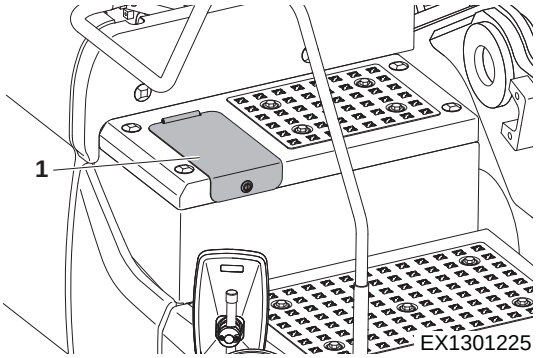


Figure 19

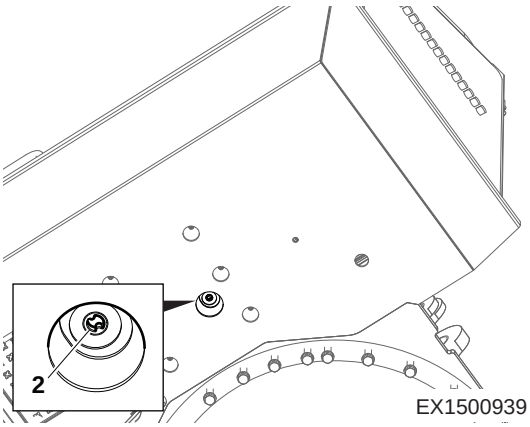
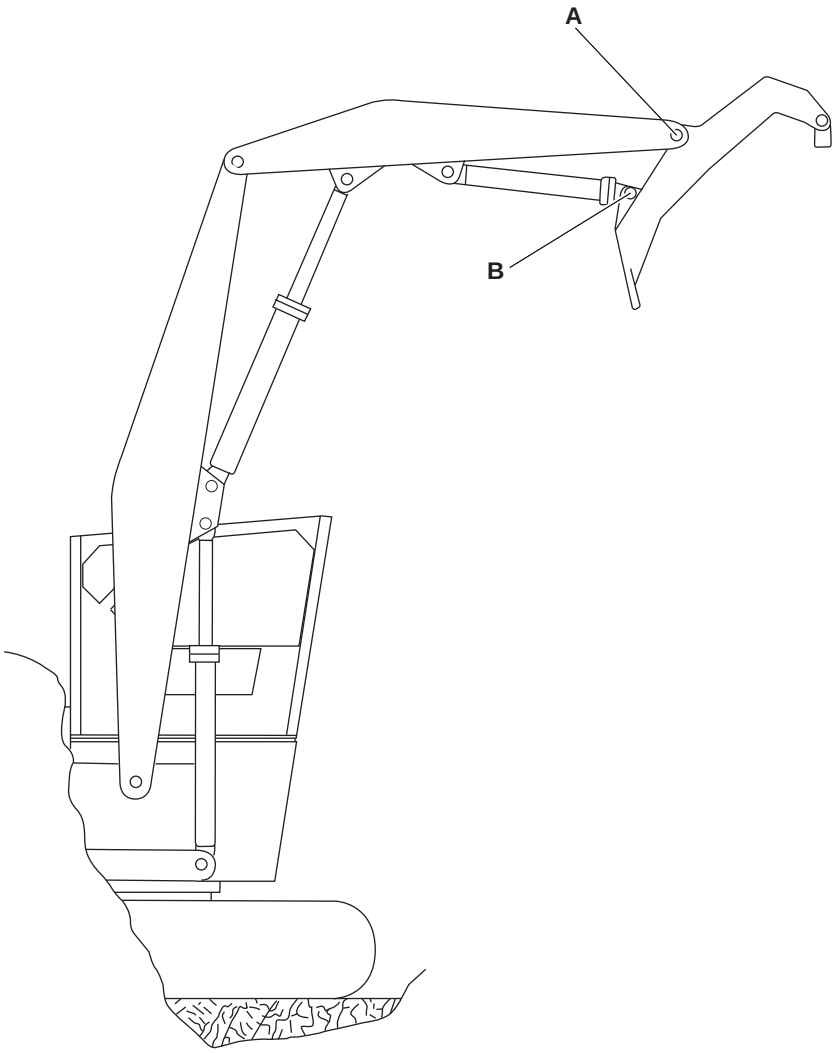


Figure 20



DS1601468

Figure 35

Reference Number	Description
A	Arm Heel Joint Pin (2 Point)

Reference Number	Description
B	Heel Cylinder Rod Pin (1 Point)

Clean Air-conditioning Outer Filter

The machine is equipped with an air filtration system which filters out dirt and dust particles from air being circulated into operator's cabin. This filter must be cleaned out.

NOTE: *If the unit is being operated in a dusty environment, the cleaning and replacement must be performed more frequently. If filter is damaged, replace damaged filter with a new one.*

WARNING

AVOID DEATH OR SERIOUS INJURY

All service and inspection of air-conditioning system must be performed with the starter switch in the "O" (OFF) position.

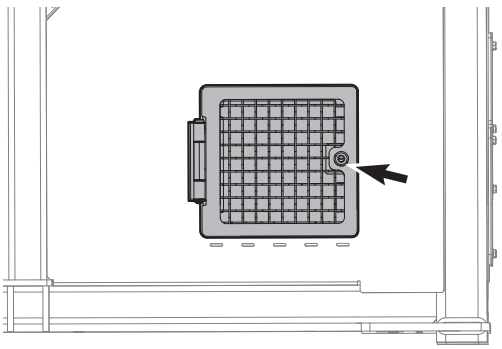
WARNING

AVOID DEATH OR SERIOUS INJURY

If using compressed air to clean the element, make sure that proper eye protection is worn.

NOTE: *All right and left call outs are based on the operator being seated in the operator's seat facing the front.*

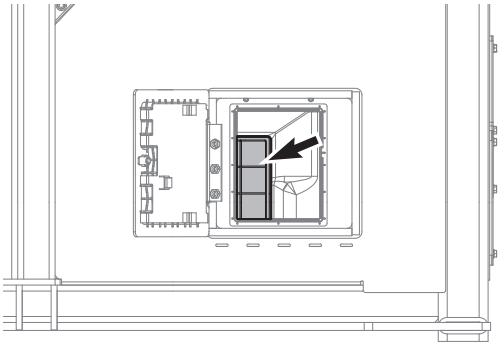
1. Open the cover by using the starter KEY in the left side of the cabin.



DS1601476

Figure 50

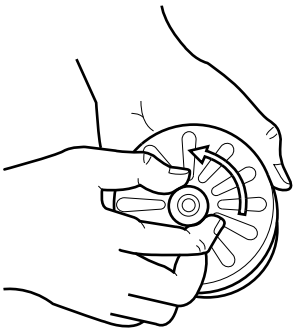
2. Remove filter (Figure 51) and inspect for any damage.
3. Use compressed air to clean filter. If filter is still dirty, then replace filter.
4. Reassemble in reverse order.



DS1601477

Figure 51

5. Lift out the rotor. Wipe off the outside of the rotor.
   Unscrew the rotor cover nut about one and a half turns.



FG019027

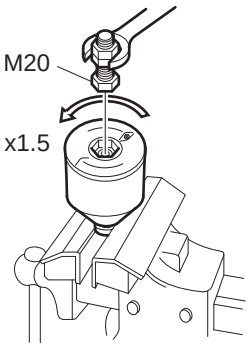
Figure 76

6. If the rotor nut is jammed: Turn the rotor upside down and fasten the nut in a vice.

   Turn the rotor approximately one and a half turns counterclockwise by hand or use an M20 screw as Figure 76.

IMPORTANT

The rotor must not be put in a vice. This can cause damage resulting in rotor imbalance.



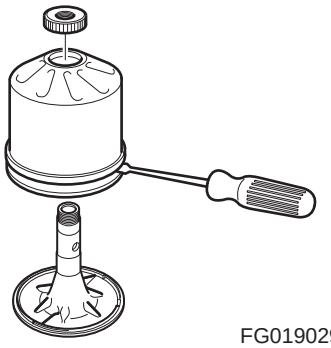
FG019028

Figure 77

7. Hold the rotor and tap lightly on the rotor nut with a plastic mallet or against the workbench, so rotor cover comes loose from the bottom plate.

IMPORTANT

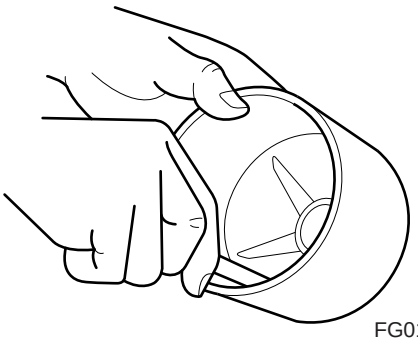
Never strike on the rotor directly as this can damage the bearings.



FG019029

Figure 78

8. Remove strainer from the rotor cover.
   If the strainer is stuck, insert a screwdriver between the rotor cover and strainer and carefully pry them apart.
9. Scrape away the deposits inside the rotor cover with a knife. If there are no deposits, the centrifugal oil cleaner is not working. Clean more often if deposits are thicker than 28 mm (1.1 in).
10. Wash the parts in diesel. Inspect the two nozzles on the rotor. Ensure that they are not blocked or damaged. Renew any damaged nozzles.
11. Check the bearings to ensure that they are not damaged.



FG019030

Figure 79

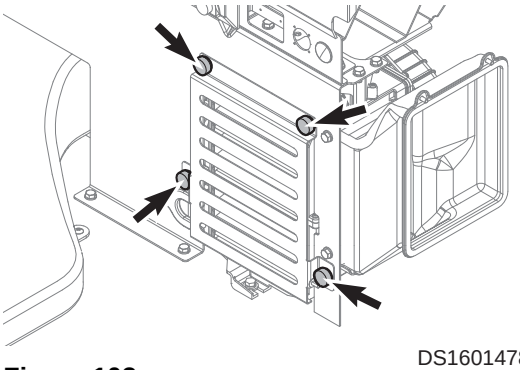
Change Air-conditioning Inner Filter

WARNING

AVOID DEATH OR SERIOUS INJURY

All service and inspection of air-conditioning system must be performed with the starter switch in the "O" (OFF) position.

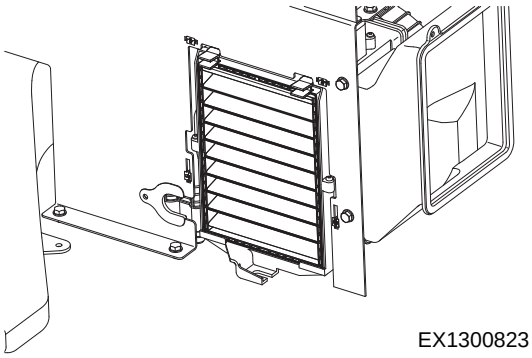
1. Loosen the bolts (Figure 102) and remove cover.



DS1601478

Figure 103

2. Remove inner filter by pulling knob outward while pressing the upperpart and lower part of the filter handle.
3. Replace with new one.
4. Reassemble filter in reverse order.



EX1300823

Figure 104

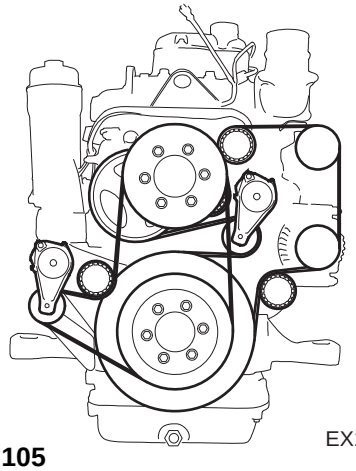
Check Drive Belt

NOTE: *Check drive belt after first 50 hours of operation or rebuild, and every 1,000 hours thereafter.*

WARNING

AVOID DEATH OR SERIOUS INJURY

Keep clear of engine fan and fan drive belts when the engine is running. Contact with rotating belt can cause injury.



EX1302165

Figure 105

WARNING

AVOID DEATH OR SERIOUS INJURY

When checking, adjusting, or replacing drive belts, precautions must be taken to prevent accidental cranking of the engine. Be sure the starter switch is in the "OFF" position and the controls are tagged.

Hydraulic Oil Exchange and Suction Strainer Cleaning

WARNING

AVOID DEATH OR SERIOUS INJURY

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

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

IMPORTANT

Make sure to clean any dirt or water from the top of the hydraulic tank, especially around the fill port and filter ports.

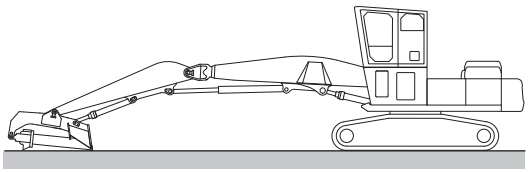
Hydraulic oil change interval is 4,000 hours only when DOOSAN Genuine Oil is used. If another brand of oil is used, a change interval of 2,000 hours is necessary.

NOTE: *Based on the type of working being completed, the working conditions (extremely hot or dusty) and the extra front end attachments being used, the hydraulic fluid will need to be changed more frequently.*

1. Park machine on firm and level ground. Swing upper structure parallel to tracks. Lower boom and position work tool on ground as shown in Figure 125.
2. Move safety lever to "LOCK" position.
3. Stop engine.
4. Release pressurized air from hydraulic tank by tip breather cap up (1, Figure 128).

ARO1760L

Figure 125



DS1601302

Figure 126

11. Mounting bolt for swing motor.

    - Tool: 10 mm ( )
    - Torque: 98 N.m (10 kg.m, 72 ft lb)

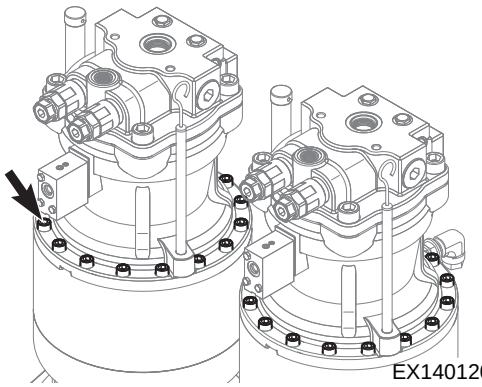

EX1401202

Figure 142

12. Mounting bolt for battery.

    - Tool: 17 mm ( )
    - Torque: 49 N.m (5 kg.m, 36 ft lb)

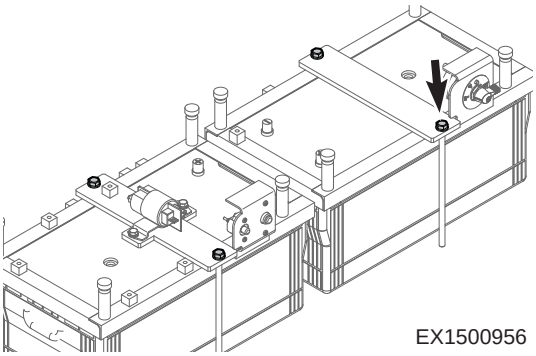

EX1500956

Figure 143

13. Joint bolt with cabin mounting rubber and cabin riser.

    - Tool: 17 mm ( )
    - Torque: 64 N.m (6.5 kg.m, 47 ft lb)

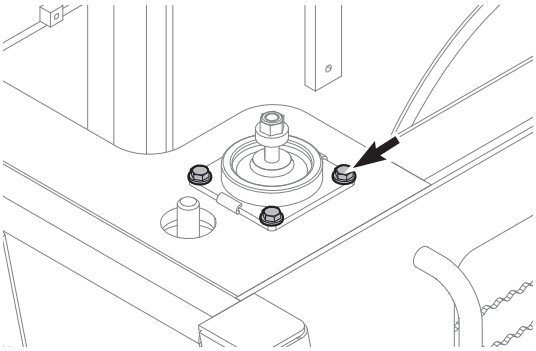

DS1601519

Figure 144

Joint nut with cabin mounting rubber and cabin.

- Tool: 24 mm ( )
- Torque: 206 N.m (21 kg.m, 152 ft lb)

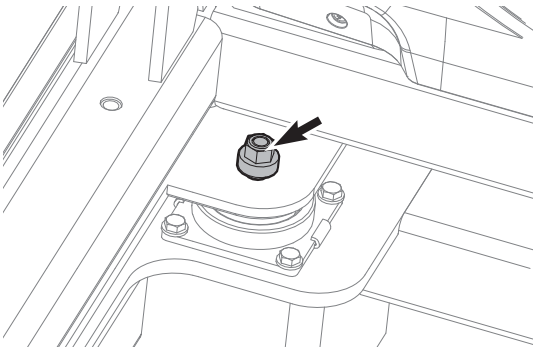

DS1601520

Figure 145

Types of Antifreeze

Ethylene Glycol - DOOSAN Genuine Antifreeze Solution
(for all seasons)

Ethylene glycol is a very hazardous material to human beings, animals and environment. Drain of coolant must be disposed of by an authorized waste material treatment service provider.

The color does not provide a standard. Unauthorized coolant may have the same color. Please check the label on the container. Use genuine product.

IMPORTANT

Do not mix solutions from different manufacturers. Otherwise, the performance may be deteriorated. It is recommended to use the standard product from DOOSAN.

In extreme temperatures, the performance of the coolant must be checked frequently and the coolant change cycle adjusted as necessary.

Engine parts that are made of aluminum are quickly worn out by nitrite, and therefore you should make sure to use nitrite-free coolant.

MAINTENANCE IN SPECIAL CONDITIONS

NOTE: *See "Operation Under Abnormal Conditions" on page 3-49 for other recommendations.*

Conditions	Maintenance Required
Operating in mud, water or rain.	Perform a walk around inspection to check for any loose fittings, obvious damage to the machine or any fluid leakage.
	After completing operations, clean mud, rocks or debris from the machine. Inspect for damage, cracked welds or loosened parts.
	Perform all daily lubrication and service.
	If the operations were in salt water or other corrosive materials, make sure to flush the affected equipment with fresh water and check that all control systems operate properly.
Operating in an extremely dusty or hot environment.	Clean the air intake filters on a more frequent basis.
	Clean the radiator and oil cooler fins to remove embedded dirt and dust.
	Clean the fuel system intake strainer and fuel filter more frequently.
	Inspect and clean as required the starter and alternator.
Operating in rocky terrain.	Check the undercarriage and track assemblies for damage or excessive wear.
	Inspect for loose or damaged fittings or bolts.
	Relax track tension.
	On a more frequent basis, inspect the front end attachments for damage or excessive wear.
	Install a top guard and front guard as required for protection against falling rock.
Operating in extreme cold.	Use the proper fuel for the temperature conditions.
	Using a hydrometer, check the antifreeze to make sure that it is providing the proper cold weather freeze protection.
	Verify the condition of the batteries. In extreme cold weather, remove batteries at night and store them in a warmer area.
	Remove mud buildup as soon as possible to prevent it from freezing to the undercarriage and causing damage.

LIFTING MACHINE

WARNING

AVOID DEATH OR SERIOUS INJURY

Never lift the machine with a person in the cabin or on the machine.

Never enter the area under or around a raised machine.

Improper lifting can allow load to shift and cause death or serious injury or property damage.

When lifting, move the safety lever to "LOCK" position to prevent the machine from moving unexpectedly.

Use only properly rated cables and slings.

Never go in the area under or around the machine when it is raised.

Always use the posture given in the procedure below and use the proper lifting equipment to lift the machine.

1. Refer to "Specification" section of this manual for weight and dimensional information.
2. Lower the work equipment to the ground as shown in the diagram on the right.
3. Lower the dozer blade to the ground. (if equipped)
4. Move safety lever to "LOCK" position. Stop engine.
5. Ensure there is nothing around the operator's compartment, close the cabin door and front glass securely.
6. Bind wire ropes between the 1st and 2nd track rollers from the front and between the 1st and 2nd track rollers from the rear.
7. Use spreader bars between the wire rope and the machine to prevent damage to the rope or machine. Set the lifting angle (1, Figure 18) of the wire rope to 30 - 40°.
8. After the machine comes off the ground, check the hook condition and the lifting posture, and then lift slowly.

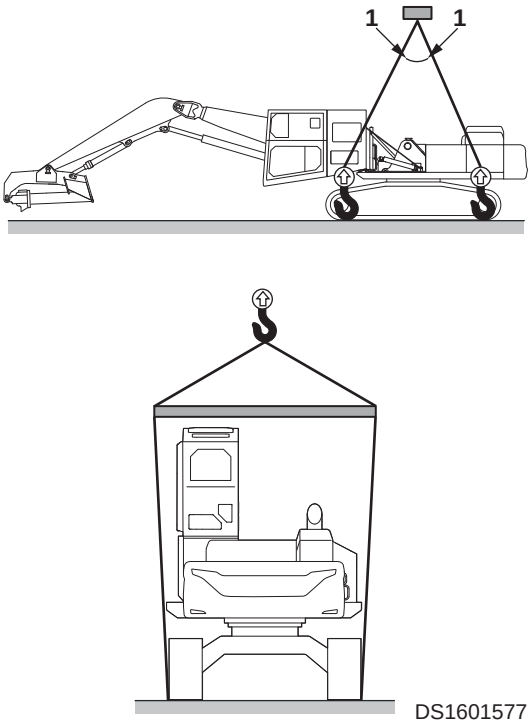


Figure 18

SWING SYSTEM

Problem	Cause	Correction
No swinging motion.	Swing brake valve faulty.	Replace brake valve.
	Hydraulic timer faulty.	Replace timer.
	Low brake release pressure.	Adjust pressures.
	Swing motor failed.	Replace swing motor.
	Remote control valve failed.	Replace control valve.
	Wrong pilot line connection.	Reconnect pilot lines.
Swing motion jerky.	Swing gear worn.	Replace swing gear.
	Swing bearing damaged.	Replace bearing.
	Improper lubrication.	Add grease.

TRAVEL SYSTEM

Problem	Cause	Correction
Travel motion does not function.	Center joint leaking.	Repair or replace as required.
	Parking brake will not release.	Repair parking brake.
	Travel motor failed.	Repair or replace as required.
	Remote control valve failed.	Repair or replace as required.
	Wrong pilot line connection.	Reconnect pilot lines.
Travel speed is too low.	Track tension too high or too low.	Adjust tension.
	Damaged rollers or idlers.	Repair or replace as required.
	Track frame damaged.	Repair as required.
	Parking brake will not release.	Repair parking brake.

Dimension	Measurement
Max Working Reach	13,474 mm (44' 2")
Max Working Reach at Ground	13,212 mm (43' 3")
Max Working Depth	4,157 mm (13' 6")
Max Working Height	14,974 mm (49' 1")
Max Log Level Height	11,729 mm (38' 5")
Min Swing Radius	4,750 mm (15' 6")