DOOSAN

01255NATRAV
September 2016

WHEEL LOADER

Operation & Maintenance Manual

DL300-5TRAV (NEW YORK BID-21CT)

Serial Number 10001 and Up

Other Signal Words

In addition to safety signal words, the following signal words are used to indicate proper and effective use of machine.

IMPORTANT

This signal word identifies procedures which must be followed to avoid damage to machine.

NOTE: *The word "NOTE" identifies information for effective use.*

AEM SAFETY MANUAL (NORTH AMERICA ONLY)

The AEM Safety Manual delivered with the machine gives general safety information.

The AEM Safety Manual must be read and understood before beginning operation or maintenance and is not intended to replace the Operation & Maintenance Manual delivered with the machine.

Figure 1

- A P3 type respirator/filter mask or a type FFP3 fine dust musk, protective goggles and gloves must be used for any work where there is a risk of exposure to dust from the SCR catalytic converter.
- Dispose the SCR catalytic converter properly after machining in a disposable container.
- Eating, drinking or smoking while servicing is not permitted.
- Any dust from the SCR catalytic converter must be removed using a vacuum cleaner with microfilter to minimize exposure.
- Make sure that work surface is cleaned after completed work; Vacuum first then swab.
- Make sure you clean your hands after working with SCR catalytic converter to avoid ingestion.
- Work done on the SCR catalytic converter may generate waste considered to be a hazardous waste subject to applicable Code of Regulations. Before disposing of hazardous waste, review and follow all applicable federal and requirements.

Your Warranty Rights and Obligations

New heavy-duty off-road engines are designed, built, and equipped to meet stringent anti-smog standards. Scania CV AB must warrant the emission control system on your engine for the periods of time listed below provided there has been no abuse, neglect or improper maintenance of your engine.

Your emission control system may include parts such as the fuel-injection system and the air induction system. Also included may be hoses, belts, connectors and other emission-related assemblies.

Where a warrantable condition exists, Scania CV AB will repair your heavy-duty off-road engine at no cost to you including diagnosis, parts and labor.

Manufacturer's Warranty Coverage

Engine

The heavy-duty off-road engines are warranted for a period of five years, 100% parts and labor. If any emission-related part on your engine is defective, the part will be repaired or replaced by Scania CV AB.

Transmission

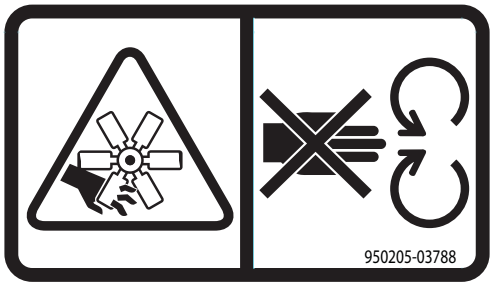
The transmissions are warranted for a period of five years, 100% parts and labor.

12. Rotating Fan (950205-03788)

WARNING

CONTACT WITH ROTATING FAN CAN CAUSE DEATH OR SERIOUS INJURY

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



EX1301182

13. 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.**

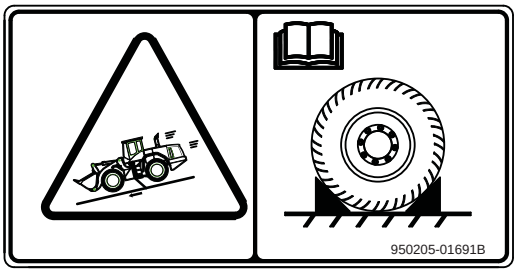
EX1301180

14. Wheel Chock (950205-01691B)

WARNING

ROLL AWAY CAN CAUSE DEATH OR SERIOUS INJURY

- **Before disengaging park brake, block wheels to prevent machine movement.**



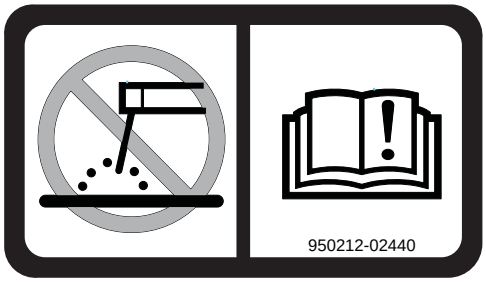
WL1400815

Additional Decal

15. Electric Welding Attention (950212-02440)

IMPORTANT

Electrical welding on the frame can damage the engine's electronic control unit (ECU).



EX1402396

Maintenance

The machine and some attachments have components that reach high temperatures under normal operating conditions. The primary source of high temperatures are the engine and exhaust system. If damaged or incorrectly maintained, the electrical system can be a source of arcs or sparks.

Flammable debris (leaves, straw, etc.) must be removed regularly. If flammable debris is allowed to accumulate, it can cause a fire hazard. Clean machine often to avoid this accumulation. Flammable debris in an engine compartment is a potential fire hazard.

The operator's area, engine compartment and engine cooling system must be inspected every day and cleaned. This is necessary to prevent fire hazards and overheating.

Operation

Do not use machine where exhaust, arcs, sparks or hot components can contact flammable material, explosive dust or gases.

Do not operate machine near any flame.

Exhaust shields (if equipped) protect hot exhaust components from oil spray or fuel spray in case of a break in a line, hose, or seal. Exhaust shields must be correctly installed and maintained properly.

Electrical

Check all electrical wiring and connections for damage daily.

Keep battery terminals clean and tight. Repair or replace any damaged parts or wires that are loose or frayed. Clean all electrical connections and tighten all electrical connections.

Never check battery charge by placing a metal object across terminal posts. Use a voltmeter or a hydrometer.

Battery gas can explode and can result in death or serious injury. Follow procedures in this manual for connecting battery and for jump-starting. Do not jump-start or charge a frozen or damaged battery. Keep all flames and sparks away from batteries. Do not smoke in battery charging area.

Improper jumper cable connections can cause an explosion that can result in death or serious injury. Refer to “Starting Engine With CAM LOK Jumper Cable Adapter or Booster Cable” on page 3-15 in this manual for proper procedure in this manual.

Do not charge a frozen battery. This can cause an explosion.

After market radios or other electric operated equipment in cabin must have a fuse in the electrical circuit.

Visibility Information

A rear view camera (if equipped) and mirrors provide the operator with additional means to see the work area.

NOTE: *These devices may vary from one region to another, depending upon local and regional laws and regulations. If a machine is moved or sold into another region or marketplace, it is the owner's responsibility to make sure it complies with all applicable laws and regulations.*

WARNING

AVOID DEATH OR SERIOUS INJURY

Failure to check for and clear people from the surrounding area of a machine can result in death or serious injury. The operator should make sure that visual aids (mirrors and camera(s)) are in proper working condition.

Your machine may be equipped with visual aids such as mirrors or a rear view camera. Even with these aids, there still may be areas around the machine which cannot be seen from the operator's seat. Always keep bystanders out of the work area. Be careful when operating and always look in direction of travel.

Adjust visual aids for best visibility around machine.

When backing up, press camera button (if equipped) to change display mode on display monitor so you can check rear and side of machine.

Before moving machine, look around work site and use mirrors and display monitor to confirm that no one is in the work area.

While operating or traveling in places with poor visibility it may be impossible to confirm conditions of the work site. Inspect and remove any obstacles around the machine that could be damaged and keep other personnel and bystanders out of the work area.

Inspect equipment and repair immediately if there are problems with visual aids. If machine cannot be fixed immediately, DO NOT use the machine. Contact your DOOSAN distributor and arrange for repairs.

Engine Stop

Turn engine starter switch to "O" (OFF) position and remove engine starter switch key.

Before lowering any equipment with engine stopped, clear area around equipment of all personnel and bystanders. This procedure will cause high-pressure air or hydraulic pressure to be released to lower equipment.

Do not stop engine immediately after the machine has been operated under load. This can cause overheating and accelerated wear of engine components.

After the machine is parked, allow engine to run for at least five (5) minutes before stopping the engine. This allows hot areas of engine to begin to cool gradually.

- Do not leave operator's seat when there is a raised load.

Parking Machine

Park machine on firm and level ground away from traffic and away from high walls, drop-offs and any area of potential water accumulation or runoff. If parking on an incline is unavoidable, block wheels to prevent movement. Lower bucket or other working attachment completely to ground, or to a support saddle, to prevent unintended or accidental movement.

When parking on public roads, provide fences barricades, signs, flags, or lights, and put up any other necessary signs to ensure that passing traffic can see machine clearly. Park the machine so the machine, flags, signs and fences do not obstruct traffic.

After front attachment has been lowered to an overnight storage position and all switches and operating controls are in "OFF" position and place the pilot cutoff switch to "O" (OFF) position. This will disable all pilot control functions.

Always close door of operator's cabin and lock all equipment to prevent any unauthorized person from operating the machine.

The hydraulic system remains pressurized, provided that accumulator, is charged even when engine is not running. Accumulator pressure should decrease in a short time (approximately one minute). While hydraulic system maintains a charge, hydraulic work tools and machine controls remain functional.

Machine movement will occur if any controls are moved. This can result in death or serious injury.

Always move hydraulic lockout control to "LOCK" position before stopping the engine or immediately after engine stops running.

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 "O" (OFF) position (Figure 39).

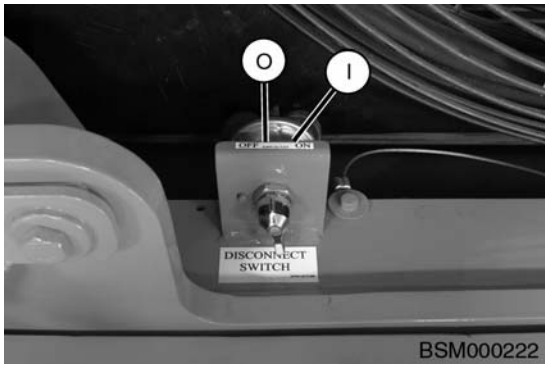


Figure 39

2. Disconnect the connector between ECU and machine, and the connector between ECU and engine (Figure 40).

Figure 40

3. Disconnect the negative (-) battery cables (Figure 41).
4. Proceed with welding.
5. After welding, connect the connector between ECU and machine, and the connector between ECU and engine (Figure 40).
6. Clean battery compartments, connect the negative (-) battery cables (Figure 41).
7. Turn battery disconnect switch to "I" (ON) position (Figure 39).

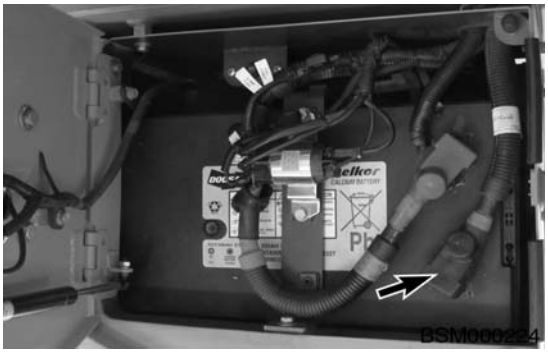


Figure 41

Poor Visibility

For good visibility, always do the following:

- When working in dark areas, attach working lights and front lights to the machine. If necessary, set up additional lighting at work site.
- Stop operations when visibility is poor, such as in fog, mist, snow, and rain. Wait for visibility to improve before starting operation.

To avoid hitting work equipment and damaging other property, always do the following:

- When working in tunnels, on bridges, under electrical wires, or when parking the machine or performing other operations in places with limited height, be careful not to hit and damage other equipment or property.
- To prevent hitting objects, operate machine at a slow speed when working in confined spaces, indoors, or in crowded areas.
- Do not move bucket over the top of personnel or bystander or over operator's cabin of dump truck or other machines.

Loose or Soft Ground

Do not operate on soft ground or near edge of drop-offs, overhangs, or deep ditches. The ground can collapse because of the weight of the machine, causing the machine to fall or rollover.

Check ground conditions before beginning work with the machine. If ground is soft, reposition the machine before operating.

The excavated material must not be dumped too close to edge. The distance from an edge of an excavation where the excavated material must be dumped depends on soil type and moisture content. If loose clay is being excavated, place it at least 5 m (16 ft) away from edge.

If excavated material is dumped too close to edge, its weight can cause a landslide.

Thawing of frozen ground, rain, traffic, piling and blasting are other factors which increase risk of landslide. The risk also increases on sloping ground. If it is not possible to dig a trench and adequately slope its sides, always install shoring equipment.

Loose ground may easily give way under weight of the machine.

When working on loose or unstable ground, it is important not to dig too deep and to carefully reposition the machine. Do not panic and do not raise bucket, if ground should begin to collapse. Lower work equipment to improve stability of machine.

Never dig under machine, if there is a potential of causing a landslide.

Sound Information

Sound Level Information: Hearing protection may be needed when machine is operated with an open operator station for extended periods or in a noisy environment.

Sound pressure level (LpA) at operator position (Measurement according to ISO 6396)	72 dB(A)
Sound power level (LwA) around the machine (Measurement according to 2000/14/EC with applicable appendices and measuring method according to ISO 6395)	103 dB(A)

Vibration Information

NOTE: *The level of vibration is influenced by many different parameters such as operator training, work site organization, weather, material, environment, machine type, machine and seat suspension system, attachments, and condition of the machine.*

Measurements are obtained on a representative machine, using measuring procedures as described in the following standards: ISO 2631/1, ISO 5349, and SAE J1166.

Vibration levels were given consideration according to uncertainty (K) determined to manufacturer.

Hand/Arm Vibration Level

The vibration total value to which the hand-arm system is subjected, is less than 2.5 m/s^2.

Whole Body Vibration Level

The highest root mean square value of weighted acceleration to which the whole body is subjected, is more than 0.5 m/s^2 (less than 1.15 m/s^2).

Guidelines for Use and Working Conditions of Earth-moving Machinery to Reduce Vibration Levels (ISO/TR 25398 Annex E)

Properly adjusting and maintaining machines, operating machines smoothly, and maintaining the terrain conditions can reduce whole-body vibrations. The following can help the users of earth-moving machinery reduce whole-body vibration levels.

1. Use the right type and size of machine, equipment, and attachments.
2. Maintain machines according to the manufacturer's recommendations:
    - Tire pressure;
    - Brake and steering systems;
    - Controls, hydraulic system and linkages.

3. Accelerator Pedal

Controls the travel speed of loader and working speed of load handling system.

IMPORTANT

The further the pedal is pressed, the more the engine speed will increases. However, do not press the pedal more than necessary otherwise, it will increase fuel consumption.

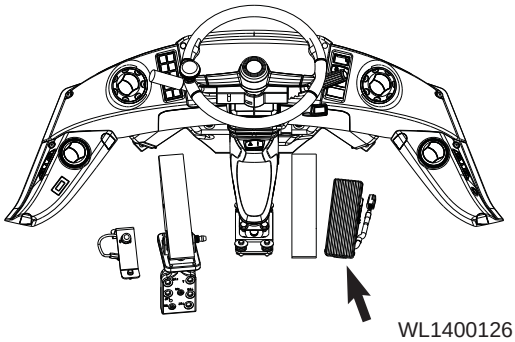


Figure 10

4. Steering Wheel Adjustment Lever

Control lever (1, Figure 11) is used allow wheel to be moved to the most convenient position for the operator.

Adjusting Steering Wheel Tilt

Push lever (1, Figure 12) downward and move wheel (2, Figure 12) to desired position. Tilt angle is 15° to window side, 24° to driver side.

Adjusting Steering Wheel Telescopic

Pull lever (1, Figure 12) upward and move wheel (2, Figure 12) to desired position. Telescopic stroke is 85 mm.

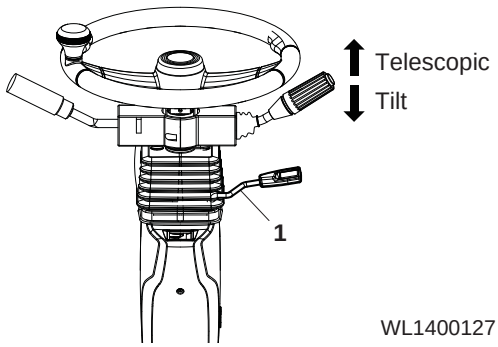


Figure 11

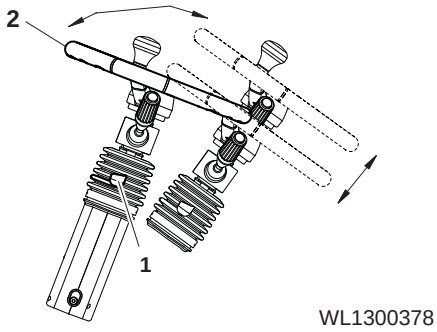


Figure 12

4. Hour Meter

The hour meter is used to indicate total number of operating hours on engine. The meter will flash every 4 seconds when engine is running to indicate that it is functioning properly.

Figure 28

1. Fuel Gauge

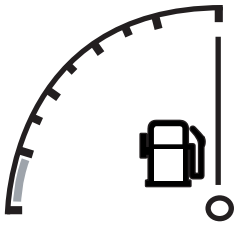
Shows remaining fuel quantity in tank.

WHITE ZONE (□) - Indicates a normal fuel quantity.

RED ZONE (■) - Indicates that fuel level is low.

If gauge pointer moves into red zone, fuel level symbol will turn "ON" and be displayed on screen. Stop operation and immediately add fuel.

Check fuel level on firm and level ground.



FG019109

Figure 48

2. Engine Coolant Temperature Gauge

The colored bands indicate temperature of engine coolant.

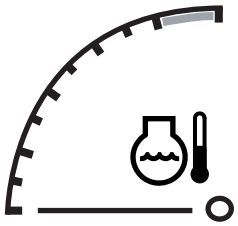
WHITE ZONE (□) - Indicates temperature is within normal operating range.

RED ZONE (■) - Indicates temperature is too high.

During operation, pointer must be in white zone.

If gauge pointer moves into red zone, engine coolant temperature warning light will turn "ON" and engine speed will be automatically reduced. Allow engine to run at "LOW IDLE" until temperature gauge registers in white zone again. When white zone is reached, allow engine to idle for an additional three - five (3-5) minutes before stopping engine. If not allowed to idle, heat surge may develop which will damage engine. Allowing engine to idle will dissipate heat. Check coolant level, look for a loose fan belt, inspect for debris around radiator, etc. before continuing to operate.

When temperature reaches normal range, engine speed will automatically recover.



FG019110

Figure 49

3. Transmission Oil Temperature Gauge

The colored bands indicate temperature of transmission oil.

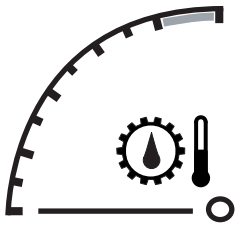
WHITE ZONE (□) - Indicates temperature is within normal operating range.

RED ZONE (■) - Indicates temperature is too high.

During operation, pointer must be in white zone.

If gauge pointer moves into red zone, transmission oil temperature symbol will turn "ON" and be displayed on the in screen. Allow engine to run at "LOW IDLE" until temperature gauge registers in white zone again.

NOTE: *See "10. Display Warning Symbols" on page 2-33, for location of this warning symbol and others.*

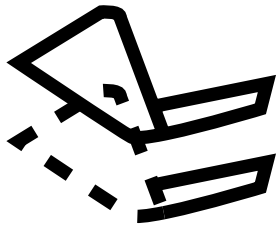


FG019111

Figure 50

I. Load Isolation System (LIS)

When LIS is operating, symbol is shown on lower part of screen.



FG019136

Figure 78

J. Torque Converter Lockup

When torque converter lockup is selected, symbol is shown on lower part of screen.

FG019137

Figure 79

K. Electric Steering

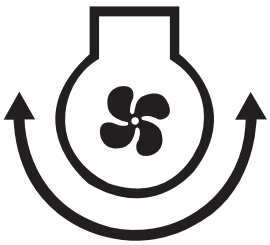
When electric steering is selected, symbol is shown on lower part of screen.

FG004186

Figure 80

L. Reverse Fan

When reverse fan is operating, symbol is shown on lower part of screen.

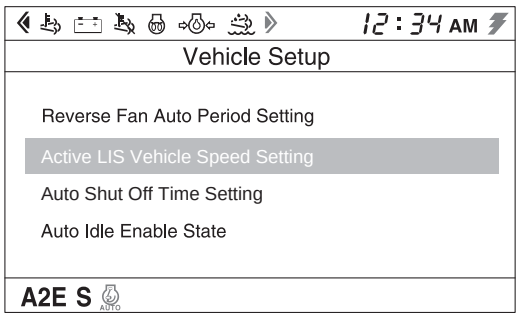


FG004185

Figure 81

B. Active LIS Vehicle Speed Setting

"Active LIS Vehicle Speed Setting" is used to set up a vehicle speed for LIS function active. In "Vehicle Setup" window, with cursor on "Active LIS Vehicle Speed Setting" menu, press SELECTION (↵) button to enter "Active LIS Vehicle Speed Setting" window.

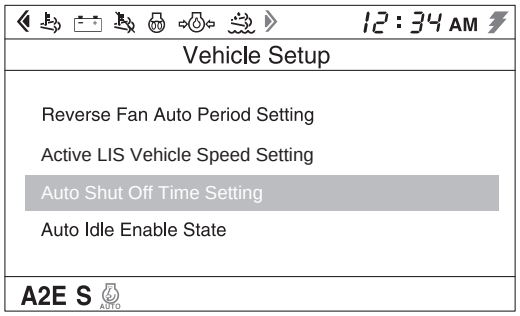


WL1300759

Figure 108

C. Auto Shut Off Time Setting

" Auto Shut Off Time Setting" is used to set up a time for auto shut off function. In " Vehicle Setup" window, with cursor on " Auto Shut Off Time Setting" menu, press SELECTION (↵) button to enter "Auto Shut Off Time Setting" window.



WL1300760

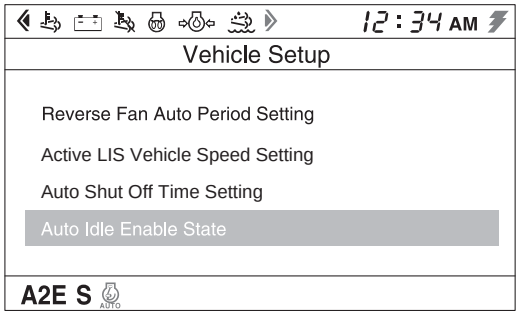
Figure 109

D. Auto Idle Enable/Disable State

"Auto Idle" window is used to "ENABLE" or "DISABLE" auto idle function.

In "Vehicle Setup" window, with cursor on "Auto Idle Enable or Disable" menu, press SELECTION (↵) button to go to "Auto Idle Enable or Disable" window.

Press ESC button to return to previous window.



WL1300761

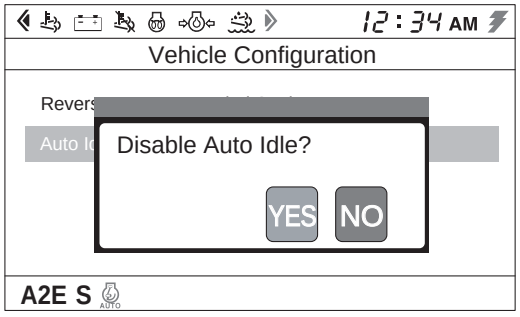
Figure 110

Auto Idle Setting Procedure:

– With cursor on "Auto Idle" setting menu, press SELECTION (↵) button. A pop-up window asking "Disable Auto Idle?" will appear. The user can change setting using UP (▲) or DOWN (▼) button and make selection with SELECTION (↵) button.

– Auto idle disable can be changed with same method described above.

– Pressing ESC button cancels change and removes pop-up window.



WL1300779

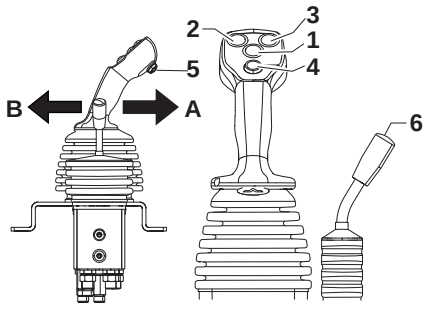
Figure 111

1. FNR Lever (Standard)

If machine is equipped with log forks this lever controls boom, bucket and log forks.

This lever is used to position bucket and boom. This lever is capable of raising or lowering boom, and crowding or dumping bucket. When machine is being driven,, lever (joystick) can be "LOCKED" out, to prevent any movement of bucket or boom. To "LOCK" out lever (joystick), place pilot cutoff switch in "LOCKED" position.

Pilot control valve lever (joystick) operating pattern and description of operation.



FG019207

Figure 136

HC. Hold lever in Bucket Crowd

C. Bucket Crowd

HL. Hold lever in Lower Mode

L. Lower

N. Neutral

R. Raise

HR. Hold lever in Raise Mode

D. Bucket Dump

FG021590

Figure 137

The buttons on this lever (Figure 136) are capable of controlling the following functions:

1. Neutral Button

   When this button is pressed, 2nd gear function will be operational, and 2nd gear indicator light turns "ON".

   When this button is pressed again, 2nd gear function is turned "OFF", and machine is returned to "NEUTRAL".

2. Forward Button

   When this button is pressed for forward travel at same time as "KD" (5, Figure 136) button is pressed, machine can travel forward. When machine is driven, it can change travel direction without pressing "KD" (5, Figure 136) button.

3. Reverse Button

   When this button is pressed for reverse travel at same time as "KD" (5, Figure 136) button is pressed, machine can travel in reverse. When machine is driven, it can change travel direction without pressing "KD" (5, Figure 136) button.

4. Horn Button

   (See page 2-61)

5. Kick-down Button

   (See page 2-60)

VARIOUS CABIN LOCATIONS

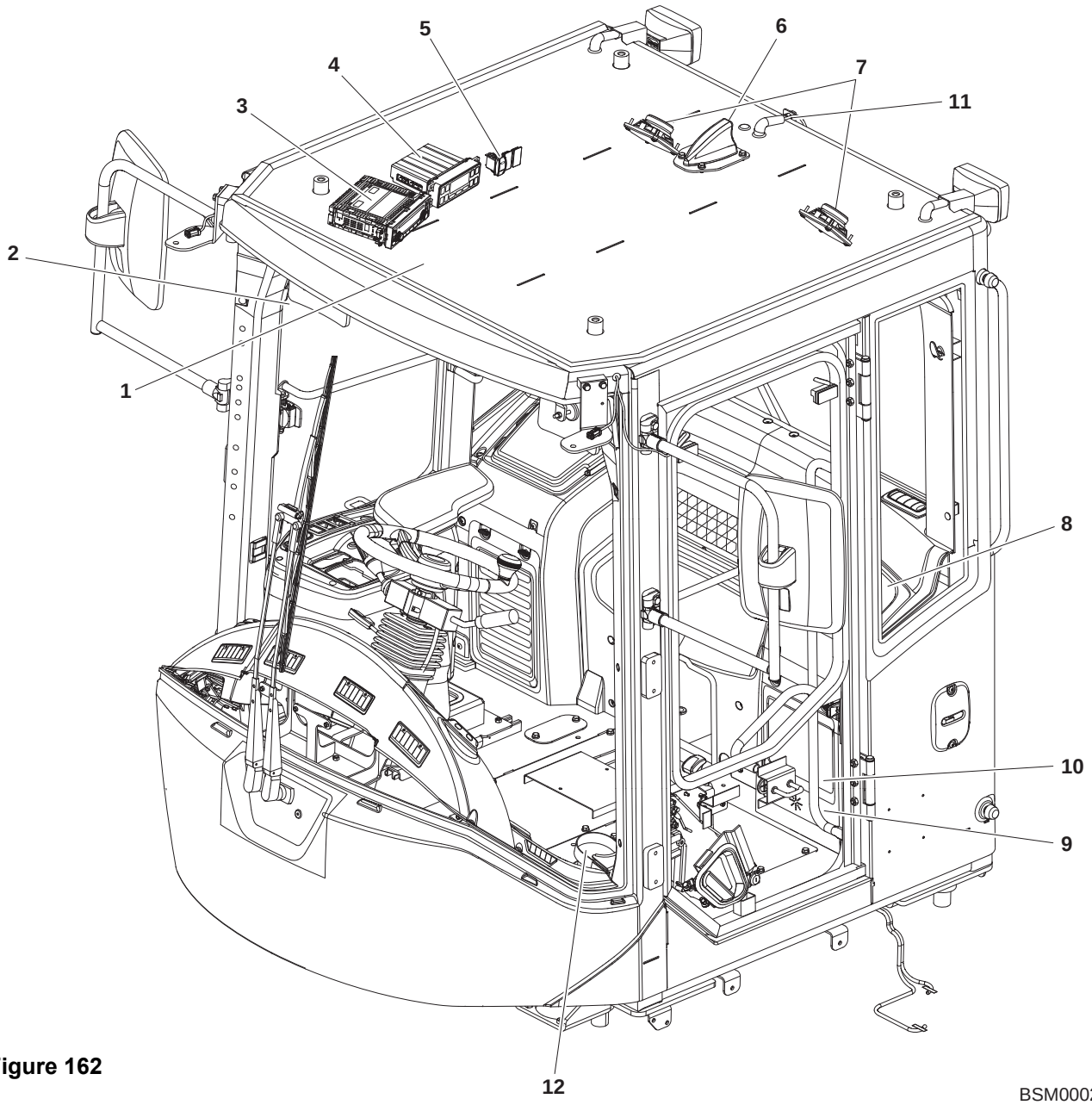


Figure 162

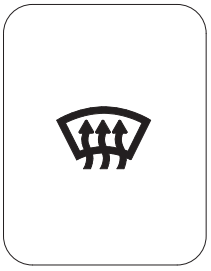
BSM000213

Reference Number	Description
1	Cabin Light
2	Cabin Fan
3	Stereo/CD Player (Optional)
4	Heater and Air Conditioner Control Panel
5	Quick Coupler Switch and Key
6	Unified Antenna

Reference Number	Description
7	Speakers
8	Storage Compartments
9	Electrical Box
10	Emergency Starter Switch
11	Rotating Beacon Light
12	Fire Extinguisher

9. Defroster Button

Used to direct airflow to front window.

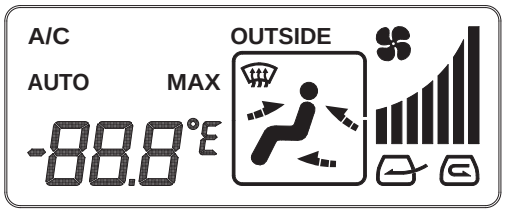


FG000106

Figure 191

10. LCD Display

This display shows the current setting.



FG000107

Figure 192

Memory Function

The air conditioner panel has a memory function. When the starter switch is turned "OFF", the settings for the panel, will be stored. When the machine is started, the last stored setting will be used.

Additional Operating Instructions

A proper indoor temperature in summer is 5 - 6°C (10 - 12°F) lower than the outdoor temperature.

Operate the air conditioner for twenty - thirty (20 - 30) minutes a week to circulate the refrigerant in the system.

NOTE: *The blower button must be on "three bars".*

If operating the air conditioner or heater for a long time, operate the air inlet selector button and, when smoking, vent the air to the outside to prevent irritation to eyes.

ELECTRICAL SYSTEM MASTER SWITCH

An electrical system master switch is located in the battery box. This switch turns "I" (ON) and "O" (OFF) all the electrical power for the loader.

When the switch is "OFF" it provides additional theft protection, by not allowing the starter switch to function.

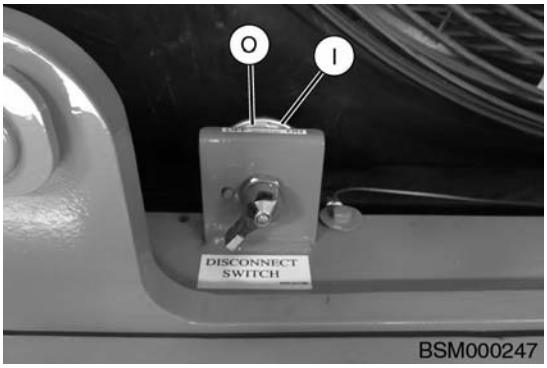


Figure 209

ENGINE BLOCK HEATER

An engine block heater is provided to warm the engine in cold weather.

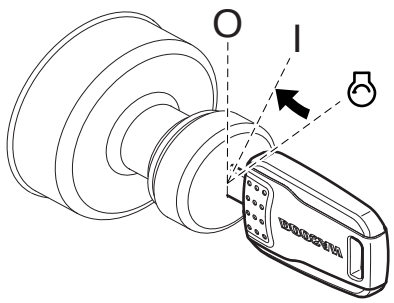
NOTE: *If cold weather or temperatures are going to be cold while the machine is parked over night, it is recommended to plug the engine block heater in during inactivity.*

Figure 210

Figure 211

12. After engine has started, release key. Key will return to "I" (ON) position (Figure 12).

13. Follow procedures in “Automatic Warming Up Operation” on page 3-10.



FG019173

Figure 12

14. After warming-up the machine, check all operating indicators to make sure that all engine systems (oil pressure, coolant, etc.) are in the normal operating range. If any problems are found, stop engine and correct the problem.

    Normal indicators are:

Instrument Panel Light or Gauge	Indicator Reading
Fuel Gauge	White Range
DEF (AdBlue®) Gauge	
Engine Coolant Temperature Gauge	
Transmission Oil Temperature Gauge	
Engine Oil Pressure Warning Light	OFF
Charging Warning Light	
Brake Oil Pressure Warning Light	
Parking Brake Light	ON

    NOTE: *Parking brake indicator light turns "ON" or "OFF" according to parking brake operation, regardless of engine starting.*

15. Check color of exhaust smoke:

    - No color or light blue - Engine is running in good condition.
    - Black - Incomplete combustion. Check cause.
    - White or dark blue - Engine is burning engine oil. Check cause.

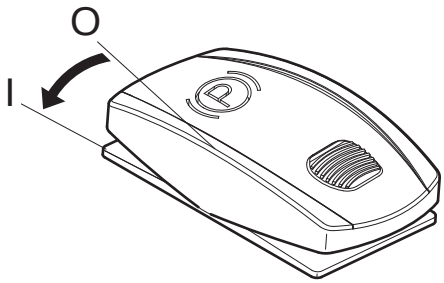
16. Check for usual engine vibration and noises. If any are heard or felt, investigate cause.

    NOTE: *If engine coolant temperature gauge pointer moves into the red zone, the engine coolant temperature warning light will turn "ON". Take the following action: Discontinue work and allow the engine to run at low idle speed until temperature gauge registers in the green zone again. When the green zone is reached, allow the engine to idle for an additional 3 - 5 minutes before stopping the engine. If not allowed to idle, heat surge may develop which will damage the engine. Allowing the engine to idle will dissipate heat. After engine has cooled, check coolant level, look for signs of leaks, clogged or dirty radiator fins (radiator core), and fan belt tension.*

3. Make sure transmission neutral lock is in the "N" (NEUTRAL LOCK) position.

Figure 27

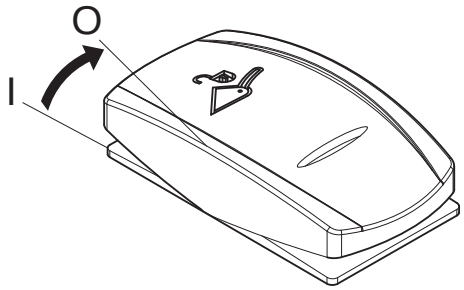
4. Set parking brake switch to "I" (ENGAGED) position. This will ensure that parking brake is "ENGAGED".



WL1300285

Figure 28

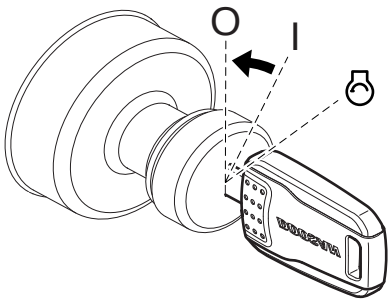
5. Lower bucket or work tool to the ground.
6. Put pilot cutoff switch to "O" (LOCK) position. This will "LOCK" pilot control valve lever (joystick).
7. Allow engine to idle for 3 - 5 minutes to cool down.



FG019178

Figure 29

8. Rotate starter key to "O" (OFF) position and stop engine. Remove key.



FG018156

Figure 30

6. Pull back the pilot control valve (joystick) to "RAISED" position allowing the pilot oil to shift the main control valve spool.

Figure 50

7. With another machine, lift the lift arms and bucket high enough to engage the lift arm support. (Both sides of machine.)
8. Release the pilot control valve lever (joystick).

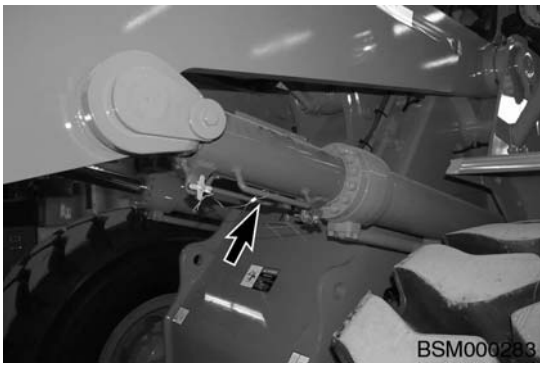


Figure 51

Release Parking Brake

1. Turn starter switch to "I" (ON) position but do not start the engine. The Parking Brake switch is not activated.

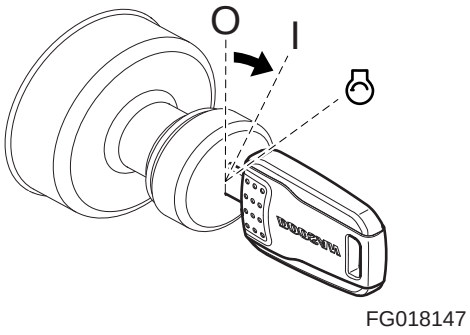


Figure 52

2. The Parking Brake dash light will be turned "ON".

Figure 53

IMPORTANT

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

3. Service fuel system as directed in “Fill Fuel Tank” on page 4-40 and “Check for Leaks in Fuel System” on page 4-40 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 Periodic Service Chart and Table in Section 4, in this manual or on the 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.

Operation in Dusty and Sandy Areas

Operation of machine can cause dust in almost any area. However, when in predominantly dusty or sandy areas, additional precautions must be taken.

1. Keep cooling system fins and cooling areas clean. Blow out with compressed air, if possible, as often as necessary.

WARNING

AVOID DEATH OR SERIOUS INJURY

Wear goggles when using compressed air to prevent face or eye injury.

2. Use care when servicing fuel system to prevent dust and sand from entering tank.

MACHINE SETUP POSITION FOR MAINTENANCE

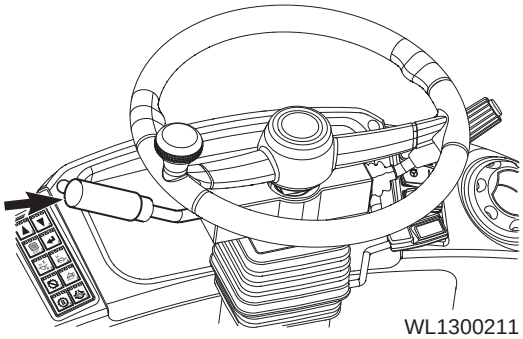
WARNING

AVOID DEATH OR SERIOUS INJURY

If work has to be done on the machine before it has cooled down, be careful with hot liquids and hot parts of the machine to avoid burns.

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

1. Park machine on firm and level ground.
2. Move transmission lever to "NEUTRAL" position.
3. Make sure transmission neutral lock is in the "N" (NEUTRAL LOCK) position.



WL1300211

Figure 1

Figure 2

4. Set parking brake switch to "I" (APPLIED) position. This will ensure that parking brake is "APPLIED".

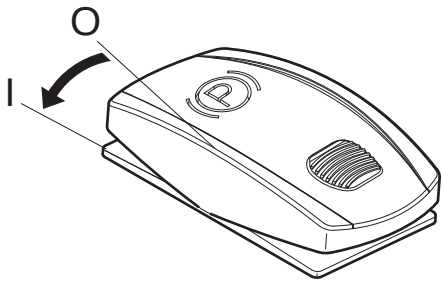


Figure 3 WL1300285

5. Lower bucket or work tool to the ground.
6. Put pilot cutoff switch to "O" (LOCK) position. This will "LOCK" pilot control valve lever (joystick).
7. Allow engine to idle for 3 - 5 minutes to cool down.

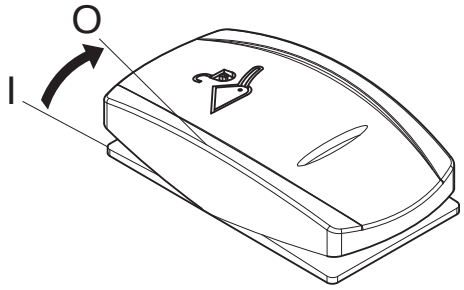


Figure 4 FG019178

RECOMMEND FUEL, COOLANT, AND LUBRICANT

- Lubrication is an important part of preventive maintenance. To keep your machine in optimum condition for long periods of time, it is essential to follow the instructions set forth in this manual.
- Failure to follow these recommendations can result in shortened life or excess wear of the engine, power train, cooling system, and/or other components.
- Commercially available lubricants can cause harm to the machine. Use sparingly. DOOSAN does not recommend any commercially available lubricant additive.
- When starting the engine in temperatures below 0°C (32°F), be sure to use the recommended multigrade oil, even if the ambient temperature may become higher during the course of the day.
- If the machine is operated at temperatures below -20°C (-4°F), a separate device is needed. Discuss with your DOOSAN distributor.
- Only use Ultra Low Sulfur Diesel (ULSD) fuel and API CI-4/ ACEA E5, E7 or API CJ-4/ACEA E9 grade engine oil.
- If ULSD fuels are not available, the sulfur contents of fuel being used must be less than 15 ppm.

Lubrication

Lubrication is an important part of preventive maintenance. If the machine is lubricated in the specified manner, the life of equipment and components can be considerably extended. The “Lubrication and Service Chart” on page 4-30 makes lubrication work easier and reduces the risk of forgetting lubrication intervals.

IMPORTANT

Wipe off grease fittings and grease gun before greasing to prevent sand and dirt particles from penetrating into components.

*	Installed at factory. (Note that mixing ratio is for reference purpose only, and is not an absolute standard.)
**	Engine oil must meet API CI-4/ACEA E5, E7 or API CJ-4/ACEA E9.
***	Hydraulic oil change interval is 2,000 hours, only when DOOSAN Genuine Oil is used. If other brands of oil is used, guaranteed change interval is 1,000 hours.
1)	Recommended for use at extremely low temperature below -20°C.
2)	Filled at factory. DOOSAN genuine engine oil is recommended for use.
3)	DOOSAN genuine engine oil is recommended for use.
API: American Petroleum Institute.	
ACEA: Association des Constructeurs Europens d'Automobiles.	
ASTM: American Society of Testing and Materials.	
ISO: International Organization for Standardization.	
NLGI: National Lubricating Grease Institute.	
SAE: Society of Automotive Engineers.	

Check Operation of All Switches

1. Verify working condition of all switches and control buttons before starting engine.

Check Operation of All Exterior Lights, Horn and Control Console Indicator and Monitor Lights

1. Turn engine starter switch to "I" (ON) position and observe all indicator lights.
2. Restore operation of any light bulbs that do not turn "ON".
3. Sound the horn. Repair or replace if required.
4. Turn "ON" and inspect all exterior work lights. Replace any non-functional monitor lights, burned-out bulbs or cracked or broken housings or lenses.

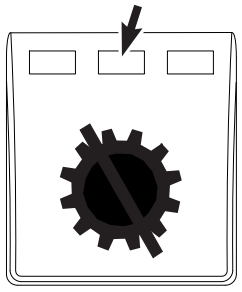
Start Engine, Check Starting Ability, and Observe Exhaust Color at Start-up and at Normal Operating Temperature. Listen for Any Abnormal Sounds.

Check That Back up Alarm and Rear Camera (If Equipped) is Working Properly.

Inspect All Tires for Correct Tire Pressure and Signs of Damage or Abnormal Wear

1. Inflate tires to proper operating pressure for working conditions. See “Tires” on page 4-111.

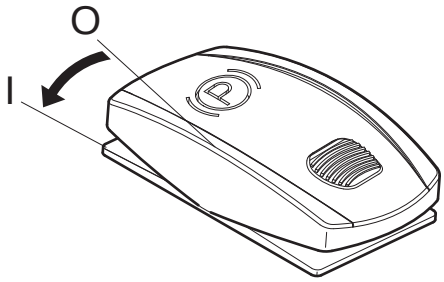
6. Make sure the transmission cutoff switch center LED light is "OFF". (Figure 60)



WL1400682

Figure 60

7. Engage the parking brake. The parking brake indicator light must be illuminated on the dash. (Figure 61)



WL1300285

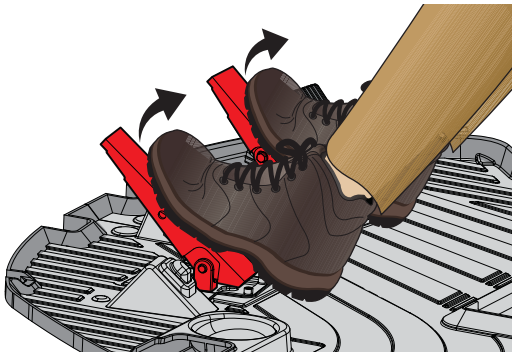
Figure 61

8. Release the service brake. **The machine should not move.** (Figure 62)

WARNING

AVOID DEATH OR SERIOUS INJURY

If the machine begins to move, immediately reapply the service brake.



WL1400679

Figure 62

9. Apply the service brake and release the parking brake. Move the machine to a flat area.
10. Reduce the engine speed to low idle. Move the transmission lever to the neutral position. Engage the parking brake. Lower the work equipment to the ground.
11. Stop engine. Remove key.

If the machine moved during the test, contact your dealer for a brake inspection. Make any necessary repairs before the machine is returned to operation.

Clean Centrifugal Oil Cleaner

WARNING

AVOID DEATH OR SERIOUS INJURY

Carefully remove cover from the centrifugal oil cleaner to avoid burn injuries.

1. Clean the outside of the cover. Unscrew the nut and remove cover.

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

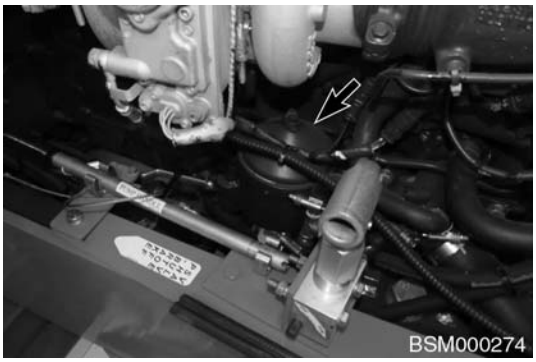


Figure 88

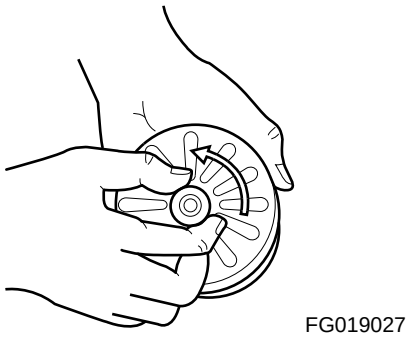


Figure 89

3. 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 bolt shown in Figure 90.

IMPORTANT

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

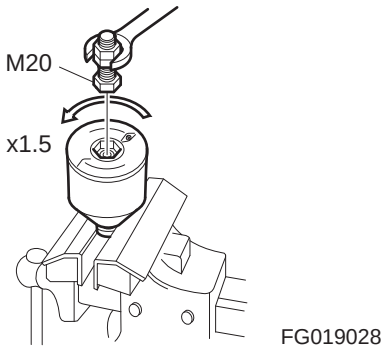


Figure 90

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

IMPORTANT

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

5. 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.

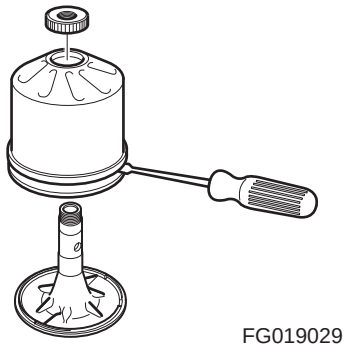
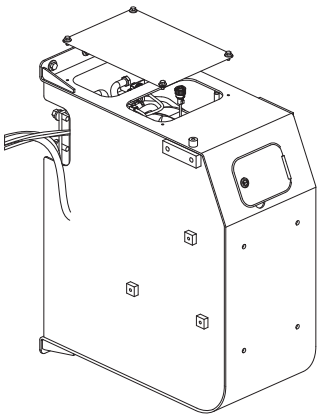


Figure 91

Change DEF (AdBlue®) Breather Filter

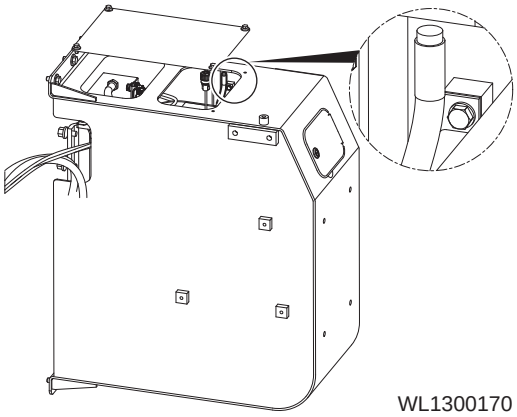
1. Open the DEF tank steel cover.



WL1300169

Figure 111

2. Replace the DEF breather filter.
3. Screw on the DEF tank cover.



WL1300170

Figure 112

1,500 HOUR / 9 MONTH SERVICE

Perform All Daily, 50, 250 and 500 Hour Service Checks

Change Axle Differential and Planetaries Oil

NOTE: *Oil in both front and rear axles must be replaced after first 500 hours of operation to comply with new machine break-in requirements. After that, axle oil check must be done every 500 hours of operation and replacement must be done every 1,500 hours.*

Each axle contains a center differential, and a planetary on each end. The same oil lubricates the center differential and planetaries. These sections of the axle are connected, but the oil flows very slowly between them. When checked, oil must be checked and refilled at the level/fill plug on the differential housing.

To drain and replace oil in an axle, perform the following steps:

1. Position machine on firm and level ground.
2. "ENGAGE" parking brake.
3. Lower bucket or work tool to ground.
4. Move transmission lever to "NEUTRAL" position.
5. Make sure transmission neutral lock is in the "N" (NEUTRAL LOCK) position.
6. Stop engine.
7. Block tires.
8. Clean areas around drain plugs on both ends of axle. Remove plugs and allow oil to drain into a suitable container.

   NOTE: *See “Fluid Capacities” on page 4-29 for capacity.*

   NOTE: *Dispose of drained fluids according to applicable environmental laws and regulations.*

   NOTE: *Plug Size: M24 x 1.5*
   Tightening Torque: 7.1 kg•m (51 ft lb)

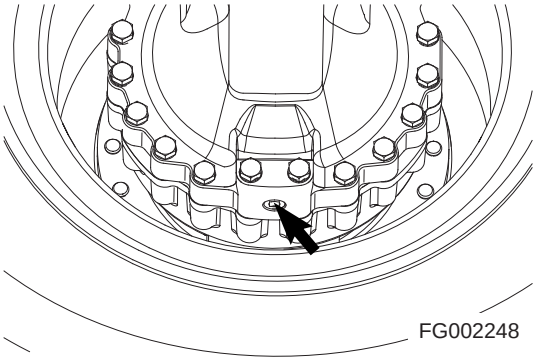


Figure 131

Check Battery Condition

WARNING

AVOID DEATH OR SERIOUS INJURY

Before starting any battery service work, make sure to shut the engine off and turn the starter key to "OFF" position.

The batteries create hydrogen gas. An explosion hazard exists, particularly with a deeply discharged battery. Make sure that open flames, burning objects or sparks are kept away from the battery compartment.

Battery electrolyte is diluted sulfuric acid. Take extreme caution when handling the batteries. The electrolyte can cause severe chemical burns. If any electrolyte gets on your clothing or skin, wash it off immediately with large quantities of water. If the electrolyte gets into your eyes, flush them immediately with a large quantity of water and seek immediate medical attention.

When installing a battery, wear safety goggles always.

When removing a battery, remove negative (-) or ground terminal first, and then the positive (+) terminal. This will prevent sparks or arcing that could cause an explosion. When installing a battery, connect the positive terminal first and then the negative terminal. Make sure to fully tighten the terminal clamps.

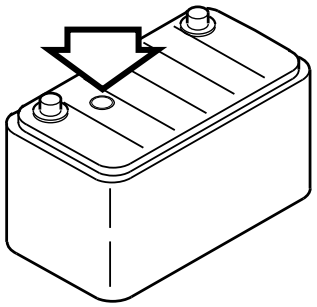
1. In colder weather, a greater drain is placed on the batteries when starting a cold engine. Battery performance decreases as the temperature gets lower.
2. In extremely cold weather, remove batteries at night and move them to a warm location. This will help to keep them at a higher power level.
3. Inspect battery electrolyte level before operation.

   NOTE: *The battery installed at the factory is a Maintenance Free (MF) type. Electrolyte under normal conditions should remain at its proper level.*

4. Inspect charge condition of battery by looking at the indicator light built into battery.
   - GREEN: Normal.
   - BLACK: Insufficient charging - check alternator.
   - TRANSPARENT: Insufficient battery electrolyte - replace with new battery.

   NOTE: *Colors may vary from one battery manufacturer to another. Always refer to instructions on battery.*

   The batteries should always be replaced in pairs. Using an old battery with a new one will shorten the life span of the new battery.



HJB5002L

Figure 147

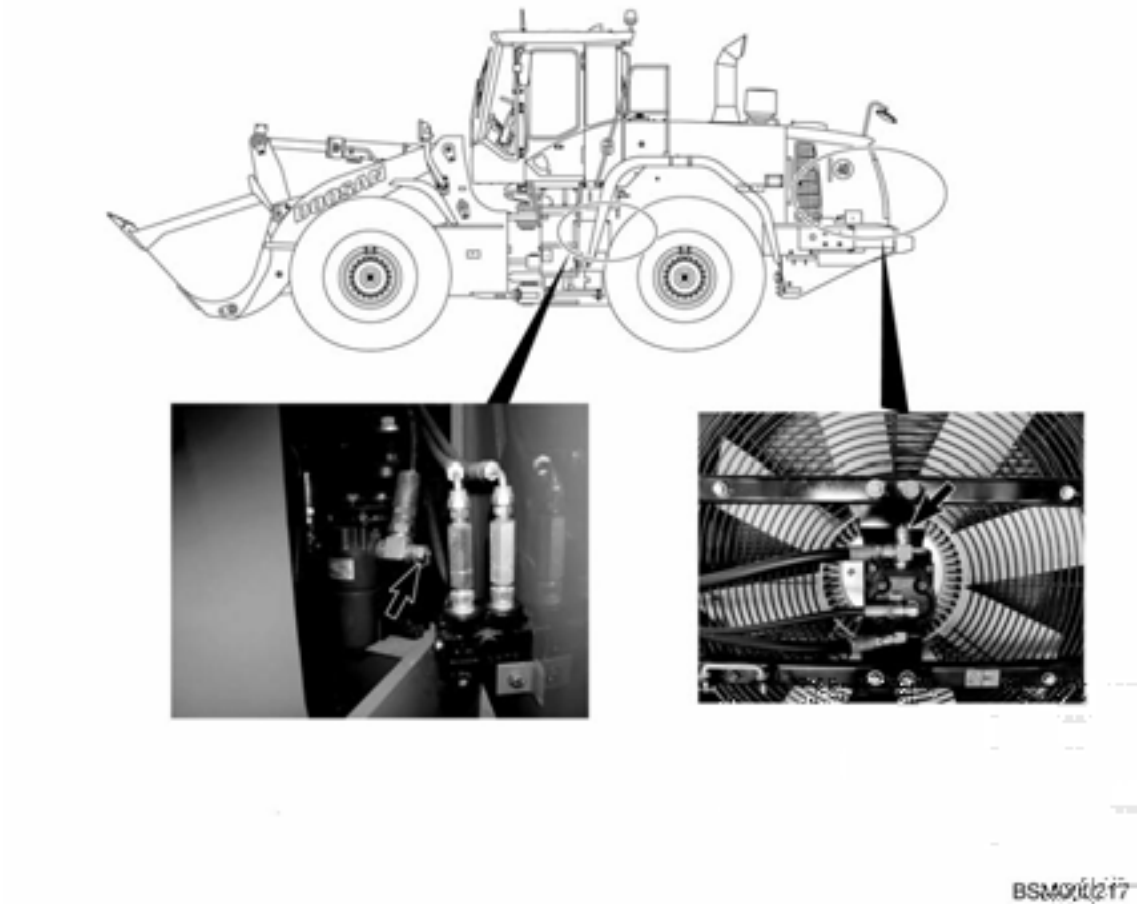


Figure 161

Checking Maximum Fan Speed, Checking

Open the radiator side grille to connect the pressure gauge.

Connect the pressure gauge to the pressure port shown in Figure 161.

Check the maximum pressure by pressing accelerator pedal to "HIGH IDLE", and reading the pressure on gauge.

NOTE: *Maximum fan motor pressure: 145 ±10 kg/cm^2 (142 ±10 bar (2,062 ±142 psi)) (The fan speed is approximately 1,400 ±50 rpm at this pressure)*

If fan speed requires adjusting, adjust control current by DMS.

TRANSMISSION RECALIBRATION

NOTE: *The transmission must be recalibrated after every oil change. This is to ensure that clutch packs are engaging properly.*

The recalibration of the transmission clutches and the electronics of the transmission must be performed at specific times.

It is recommended that AEB Setting be run when:

1. Oil is changed in the transmission per operator's manual.
2. Replacement of the Transmission Control Unit (TCU).
3. Replacement of the transmission.
4. If there is a problem with the shifting quality of the transmission.

The AEB Setting has the task to compensate tolerances (plate clearance and pressure levels) which are influencing the filling procedure of the clutches. For each clutch, the correct filling parameters are determined in one cycle for:

1. Period of the quick-filling time.
2. Level of the filling compensating pressure.

The filling parameters are stored, with the AEB Program and the driving program, in the Transmission Control Unit (TCU). Since the TCU is a separate component, the AEB-cycle must be started only after the installation of transmission and TCU in the machine, thus insuring the correct programing between the transmission and the electronics. Call the nearest DOOSAN distributor to ask about correct AEB setting.

AEB Setting

The AEB setting menu enables the user to perform transmission AEB (Automatic Filling Parameter Adjustment) conveniently.

Please perform AEB periodically (every 6 months) to keep the best equipment performance.

1. Start engine and warm transmission to normal operating temperature by driving.
2. Set the transmission gearshift to Neutral (N), and parking brake "ON".
3. Set engine to 1100 rpm.

Figure 171

Troubleshooting

Whenever an operating problem with the machine occurs, take corrective action immediately by checking for the cause of the problem.

If the cause of the operating problem cannot be determined, contact your DOOSAN distributor. Never perform an adjustment or the disassembly of the hydraulic, electrical or electronic components without first contacting a DOOSAN distributor.

WARNING

AVOID DEATH OR SERIOUS INJURY

Instructions are necessary before operating or servicing machine. Read and understand the Operation & Maintenance Manual and signs (decals) on machine. Follow warnings and instructions in the manuals when making repairs, adjustments or servicing. Check for correct function after adjustments, repairs or service. Untrained operators and failure to follow instructions can cause death or serious injury.

BRAKING

Problem	Cause	Remedy
Reduced brake action.	Low secondary pressure in brake valve.	Repair or replace brake valve.
	Worn brake disks.	Replace brake disks.
	Damaged brake disks.	Replace brake disks.
	Damaged brake valve block.	Replace valve.
	Air in brake hydraulics because of leak in brake hose.	Repair leak, bleed system.
After bleeding brakes, brakes are not fully released.	Damaged brake disks.	Replace disks.
	Damaged brake disk return spring.	Replace return springs.

Specification

E

F

ACS INDUSTRIES, INC.

GENERAL INFORMATION

Before installing your ACS Pro Series 2000 Male Master Coupler System, please read and familiarize yourself with this entire manual. Short cuts, lack of proper care, or deviations from instructions may damage the coupler and cause it to malfunction.

The installation sections will explain the procedures necessary to completely install the coupler. Please study the drawings contained within: they will be helpful not only during installation, but also when ordering replacement parts. Also included are sections on operation, maintenance, and trouble shooting. Keep this manual for future reference.

If you experience problems during installation, do not hesitate to call ACS Industries, Inc. at **(330) 678-2511.** Problems can usually be resolved quickly with assistance from the factory. Also, solutions are usually easier when a problem is detected early.

PRE-INSPECTION

Immediately upon receipt of your Pro Series 2000 coupler, inspect it for possible damage resulting from shipment. Give special attention to the following:

1.) Check all bolts, nuts, and pins for tightness.

2.) Check for cylinder and/or plumbing damage.

3.) Check the coupler weldment for damage or misalignment of components.

4.) Check the parts list to verify that it is complete.

5.) Check the hydraulic kit components for any damage from shipment.

6.) ***IF DUMP AND/OR ROLLBACK STOPS ARE SHIPPED LOOSE,*** they must be properly installed on the coupler/male master before use of the coupler system. Check to be sure that the appropriate stops are provided for your loader. (You can compare with the loader's original equipment manufacturer's bucket, or check the vehicle owner's manual.)

If you have any questions, concerns, and/or problems, please contact ACS Industries, Inc. at:
(330) 678-2511

APPENDIX B - ACS GENERAL-PURPOSE BUCKET

This supplier has provided the following supplemental pages.

APPENDIX C - ACS STANDARD CONSTRUCTION DUTY FORK

This supplier has provided the following supplemental pages.