Doosan Infracore

DX210W

Serial Number 5001 thru 5765

Operation & Maintenance Manual

K1017312E-1
(Equipped with NON-ROPS)
February 2011

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SAFETY ALERT SYMBOL

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

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

Learn the Signal Words Used with the Safety Alert Symbol

The words "CAUTION," "Warning," and "DANGER" used throughout this manual and on decals on the machine indicate degree of risk of hazards or unsafe practices. All three degrees of risk indicate that safety is involved. Observe precautions indicated whenever you see the Safety Alert "Triangle," no matter which signal word appears next to the "Exclamation Point" symbol.

CAUTION!

This word is used on safety messages and safety labels and indicates potential threat of a hazardous situation that, if not avoided, could result in minor or moderate injury. It may also be used to alert against a generally unsafe practice.

WARNING!

This word is used on safety messages and safety labels and indicates potential threat of a hazardous situation that, if not avoided, could result in serious injury or death. It may also be used to alert against highly unsafe practice.

DANGER!

This word is used on safety messages and safety labels and indicates an imminent hazard of a situation that, if not avoided, is very likely to cause death or extremely serious injury. It may also be used to alert against equipment that may detonate or explode if handled or treated carelessly.

SUMMARY OF SAFETY PRECAUTIONS FOR LIFTING IN DIGGING MODE

DANGER!

Unsafe use of the excavator while making rated lifts could cause serious, potentially fatal injuries or extensive damage to the machine or nearby property. Do not let anyone operate the machine unless they've been properly trained and understand the information in the Operation and Maintenance Manual.

To lift safely while in Digging Mode, the following items must be evaluated by the operator and the work site crew.

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

Tag lines on opposite sides of the load can be very helpful in keeping a suspended load secure, if they are anchored safely to control points on the ground.

WARNING!

NEVER wrap a tag line around your hands or body.

NEVER rely on tag lines or make rated lifts when wind gusts are more than 48.3 km/h (30 MPH). Be prepared for any wind gust when working with loads that have a large surface area.

Always engage the "Digging Mode" control on the Instrument Panel before using the excavator for lifting work.

WARNING!

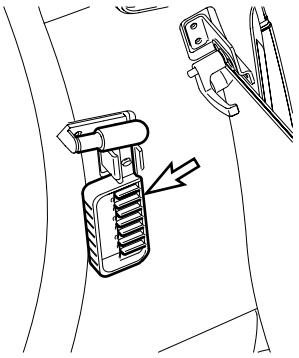
If you need more information or have any questions or concerns about safe operating procedures or working the excavator correctly in a particular application or in the specific conditions of your individual operating environment, please consult your local *DOOSAN* representative.

Emergency Exit

This machine is equipped with a glass breaking tool. It is behind the operator seat in the upper right corner of the cabin. This tool can be used in case of an emergency situation that requires the breaking of glass to exit from the operator's cabin. Grip the handle firmly and use the sharp point to break the glass.

WARNING!

Protect your eyes when breaking the glass.



FG000178

Figure 13

Operate Carefully on Snow, Ice and in Very Cold Temperatures

In icy cold weather avoid sudden travel movements and stay away from even slight slopes. The machine could skid off to one side very easily.

Snow accumulation could hide or obscure potential hazards. Use care while operating or while using the machine to clear snow.

Warming up the engine for a short period may be necessary, to avoid operating with sluggish or reduced working capacity. The jolting shocks and impact loads caused by bumping or bottoming the boom or attachment are more likely to cause severe stress in very cold temperatures. Reducing work cycle rate and workload may be necessary.

When the temperature rises, frozen road surfaces become soft, and machine travel becomes unstable.

In cold weather, do not touch metal surfaces with your bare hands. If you touch a metal surface in extremely cold weather, your skin may freeze to the metal surface.

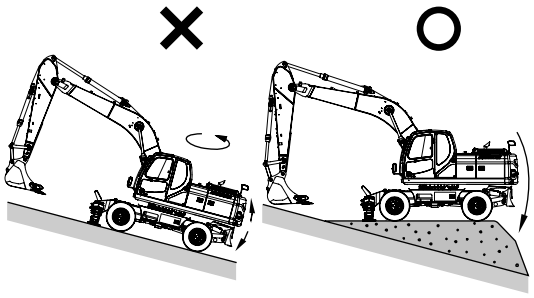
Operations on Slopes

When working on slopes. there is a danger that the machine may lose its balance and turn over, when swinging, or when work equipment is operated. Always carry out these operations carefully.

Do not swing the work equipment from the uphill side to the downhill side when the bucket is loaded. This operation is dangerous.

If the machine has to be used on a slope, pile the soil to make a platform that will keep the machine as horizontal as possible.

In addition, lower the bucket as far as possible, keep it pulled into the front, and keep the swing speed as low as possible.



FG006543

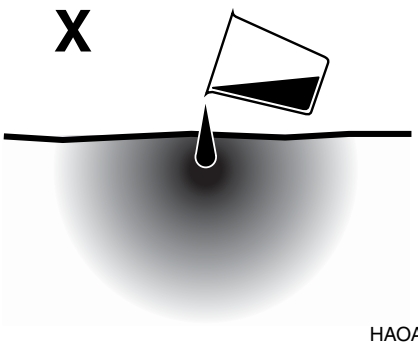
Figure 27

Waste Materials

Physical contact with used motor oil may pose a health risk. Wipe oil from your hands promptly and wash off any remaining residue.

Used motor oil is an environmental contaminant and may only be disposed of at approved collection facilities. To prevent pollution of the environment, always do the following:

- Never dump waste oil in a sewer system, rivers, etc.
- Always put oil drained from your machine in containers. Never drain oil directly onto the ground.
- Obey appropriate laws and regulations when disposing of harmful materials such as oil, fuel, solvent, filters, and batteries.



HAOA470L

Figure 43

FEET (18' 4" One-Piece Boom, 9' 10" Arm)

A (ft) / B (ft)	Chassis Frame Attachment	10		15		20		25		MAX. REACH		
												A (ft)
25	F-Dozer + R-Outrigger									*11.68	*11.68	19.87
	F-Outrigger + R-Outrigger									*11.68	*11.68	19.87
20	F-Dozer + R-Outrigger					*11.50	*11.50			*11.29	*11.29	23.69
	F-Outrigger + R-Outrigger					*11.50	*11.50			*11.29	*11.29	23.69
15	F-Dozer + R-Outrigger			*14.45	*14.45	*12.53	*12.53	*11.55	10.59	*11.45	9.96	25.99
	F-Outrigger + R-Outrigger			*14.45	*14.45	*12.53	*12.53	*11.55	10.68	*11.45	10.06	25.99
10	F-Dozer + R-Outrigger	*19.62	*19.62	*18.12	*18.12	*14.16	*14.16	*12.17	10.43	*11.62	9.21	27.18
	F-Outrigger + R-Outrigger	*19.62	*19.62	*18.12	*18.12	*14.16	*14.16	*12.17	10.53	*11.62	9.29	27.18
5	F-Dozer + R-Outrigger	*5.52	*5.52	*21.33	*21.33	*15.73	14.18	*12.85	10.26	*11.87	8.99	27.4
	F-Outrigger + R-Outrigger	*5.52	*5.52	*21.33	*21.33	*15.73	14.31	*12.85	10.35	*11.87	9.08	27.4
0	F-Dozer + R-Outrigger	*10.83	*10.83	*22.69	21.6	*16.62	13.91	*13.12	10.13	*12.16	9.26	26.67
	F-Outrigger + R-Outrigger	*10.83	*10.83	*22.69	21.8	*16.62	14.04	*13.12	10.22	*12.16	9.35	26.67
-5	F-Dozer + R-Outrigger	*20.06	*20.06	*22.09	21.48	*16.37	13.8			*12.43	10.15	24.92
	F-Outrigger + R-Outrigger	*20.06	*20.06	*22.09	21.68	*16.37	13.93			*12.43	10.24	24.92
-10	F-Dozer + R-Outrigger	*26.93	*26.93	*19.52	*19.52	*14.36	13.89			*12.51	12.24	21.9
	F-Outrigger + R-Outrigger	*26.93	*26.93	*19.52	*19.52	*14.36	14.02			*12.51	12.35	21.9
-15	F-Dozer + R-Outrigger			*13.74	*13.74					*11.69	*11.69	16.9
	F-Outrigger + R-Outrigger			*13.74	*13.74					*11.69	*11.69	16.9

1. Ratings are based on SAE J1097.
2. Load point is the hook on the back of the bucket.
3. * Rated loads are based on hydraulic capacity.
4. Rated loads do not exceed 87% of hydraulic capacity or 75% of tipping capacity.

FEET (17' 9" Two-Piece Boom, 6' 7" Arm)

A (ft) / B (ft)	Chassis Frame Attachment	15		20		MAX. REACH		
								A (ft)
25	F-Dozer + R-Outrigger	*12.20	*12.20			*12.85	*12.85	15.89
	F-Outrigger + R-Outrigger	*12.20	*12.20			*12.85	*12.85	15.89
20	F-Dozer + R-Outrigger	*11.68	*11.68	*12.01	*12.01	*12.33	*12.33	20.48
	F-Outrigger + R-Outrigger	*11.68	*11.68	*12.01	*12.01	*12.33	*12.33	20.48
15	F-Dozer + R-Outrigger	*14.04	*14.04	*12.31	*12.31	*11.77	11.74	23.11
	F-Outrigger + R-Outrigger	*14.04	*14.04	*12.31	*12.31	*11.77	*11.77	23.11
10	F-Dozer + R-Outrigger	*17.84	*17.84	*13.84	*13.84	*11.70	10.71	24.44
	F-Outrigger + R-Outrigger	*17.84	*17.84	*13.84	*13.84	*11.70	10.8	24.44
5	F-Dozer + R-Outrigger			*15.52	14.2	*12.09	10.48	24.69
	F-Outrigger + R-Outrigger			*15.52	14.33	*12.09	10.58	24.69
0	F-Dozer + R-Outrigger	*22.79	21.85	*16.66	14.06	*13.04	10.96	23.88
	F-Outrigger + R-Outrigger	*22.79	22.05	*16.66	14.18	*13.04	11.06	23.88
-5	F-Dozer + R-Outrigger	*22.65	21.91	*16.64	14.09	*14.63	12.45	21.9
	F-Outrigger + R-Outrigger	*22.65	22.11	*16.64	14.22	*14.63	12.56	21.9
-10	F-Dozer + R-Outrigger	*27.40	*27.40	*19.05	*19.05	*13.84	12.82	
	F-Outrigger + R-Outrigger	*27.40	*27.40	*19.05	*19.05	*13.84	12.82	

1. Ratings are based on SAE J1097.
2. Load point is the hook on the back of the bucket.
3. * Rated loads are based on hydraulic capacity.
4. Rated loads do not exceed 87% of hydraulic capacity or 75% of tipping capacity.

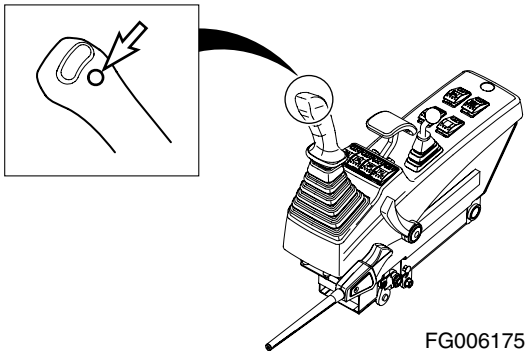
Reference Number	Description
1	Starter Switch
2	Engine Speed Control Dial
3	Quick Clamp Switch (Optional)
4	Auxiliary Mode Switch
5	Emergency Stop Switch
6	Audio Control Panel
7	Ram Lock Switch
8	Light Switch
9	Work Light Switch
10	Breaker / Booster / Shear Selector Switch
11	Parking Brake Switch
12	Cabin Work Light Switch (Optional)
13	Lower Wiper Switch (Optional)
14	Heater and Air Conditional Control Panel

Reference Number	Description
15	Cigar Lighter
16	Power Socket For 12V
17	Warning Light Switch (Optional)
18	Overload Warning Switch (Optional)
19	Fuel Heater Switch (Optional)
20	Seat Warmer Switch (Optional)
21	Outrigger Selector Switch
22	Steering Console
23	Horn Button
24	Rotating Switch
25	Breaker/Booster Switch
26	Shear Switch
27	Instrument Panel
28	Safety Lever
29	Photo Sensor

23. Horn Button (Left-hand Work Lever)

Press the lower button on the top of the left-hand work lever (joystick) to sound horn.

NOTE: *The starter switch must be "ON."*



FG006175

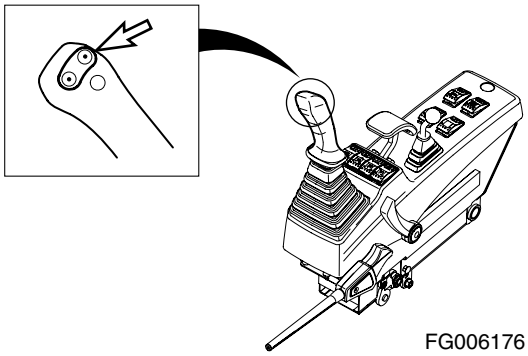
Figure 30

24. Rotating Buttons

For a machine equipped with an attachment that rotates, press the upper two buttons on the top of the left-hand work lever (joystick) to rotate the attachment clockwise or counterclockwise. Left button is for counterclockwise and the right one is for clockwise.

WARNING!

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



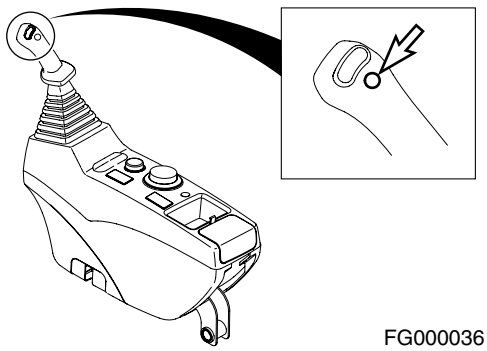
FG006176

Figure 31

25. Booster Button (Right-hand Work Lever)

Press the lower button on the top of the right-hand work lever (joystick) to boost the hydraulic pressure. Refer to the “Boost Mode” on page 3-28.

NOTE: *This button works with the breaker/boost/shear selector switch. See “10. Breaker / Boost / Shear Selector Switch” on page 2-14.*



FG000036

Figure 32

2. Engine Coolant Temperature Gauge

The colored bands indicate the temperature of the engine coolant.

WHITE ZONE (▭) - Indicates temperature is lower than the normal operating temperature.

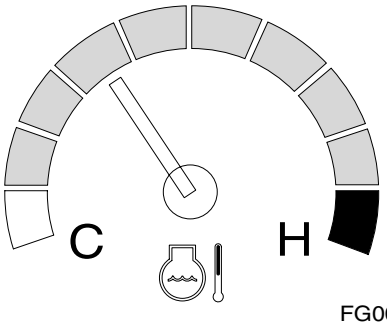
BLUE ZONE (▭) - Indicates temperature is within the normal operating range.

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

During operation, the pointer must be in the blue zone.

If the gauge pointer moves into the red zone, the engine coolant temperature warning light will turn "ON," a warning buzzer will sound, and the engine speed will be automatically reduced. Allow the engine to run at low idle speed until the temperature gauge registers in the blue zone again. When the blue zone is reached, allow the engine to idle for an additional three - five minutes before shutting down the engine. If not allowed to idle, heat surge may develop which will damage the engine. Allowing the engine to idle will dissipate heat. Check the coolant level, look for a loose fan belt, inspect for debris around radiator, and so on.

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



FG000041

Figure 50

3. Hydraulic Oil Temperature Gauge

The colored bands indicate the temperature of the hydraulic oil

WHITE ZONE (▭) - Indicates temperature is lower than the normal operating temperature.

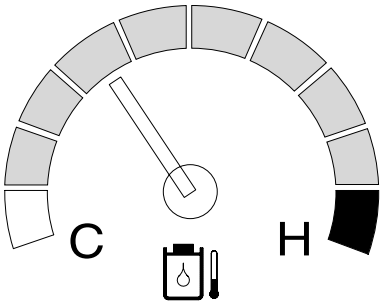
BLUE ZONE (▭) - Indicates temperature is within the normal operating range.

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

During operation, the pointer must be in the blue zone.

If the gauge pointer moves into the red zone, the hydraulic oil temperature symbol will turn "ON," and be display in the screen. Allow the engine to run at low idle speed until the temperature gauge registers in the blue zone again.

NOTE: *See "Abnormal State Warning Symbols" on page 2-36, for location of this warning symbol and others.*

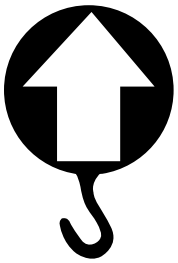


FG000042

Figure 51

6. Overload Warning (Optional)

If the overload warning switch is turned "ON," and this symbol appears on the screen and the warning buzzer sounds, that indicates that overloaded condition is occurring. Immediately reduce the load.



FG000253

Figure 75

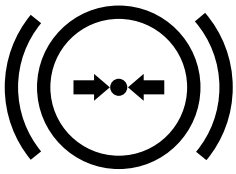
WARNING!

If this warning appears on the screen and a warning buzzer sound, reduce the load immediately.

If you continue to work, the machine can be turned over or damage to hydraulic components and structural parts could occur.

7. Brake Oil Pressure Warning

This symbol indicates when the hydraulic pressure drops brake oil circuit when the symbol indicates and alarm also sounds.



BCS0800L

Figure 76

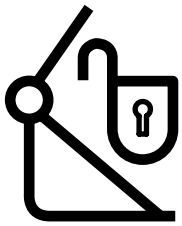
WARNING!

Never operate or travel machine when this light is turned "ON" or when alarm is sounding.

Always investigate cause of the drop in brake oil pressure, and repair problem before operating or driving machine.

8. Quick Clamp Released Warning

If the quick clamp switch is "UNLOCKED," and this symbol appears on the screen and the warning buzzer sound.



FG002195

Figure 77

WARNING!

When the attachment is still connected to the machine, while the switch is "I"( ) position, do not operate the machine or the attachment might fall to the ground. It would cause personnel injuries.

Set Password (Lock and Unlock)

Use extreme care when setting the password for starting the engine. If a mistake is made when entering the number, and the number is excepted by the system, as being correct, that number will be the only one that will allow the security system to be activated or deactivated.

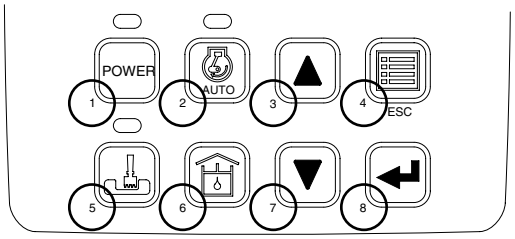
Write your password down and keep it in a safe location.

Password numbers can only use numbers between 1 and 8. The small number to the lower left of each button on the instrument panel, indicates the number that will be entered when that button is pressed. Numbers "0" and "9" are invalid choices.

Example:

2785 is acceptable.

9024 is not acceptable.

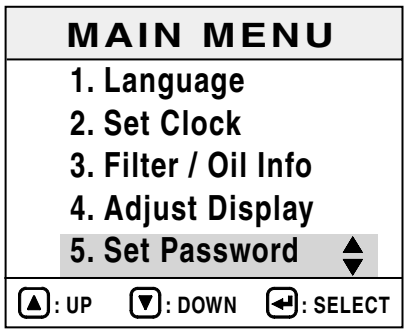


HAAE2010

Figure 102

When the cursor is on "Set Password" press the "SELECT" (↵) button. The set password submenu will appear.

NOTE: *The screen can be returned to the main menu by pressing the "ESC"(▤) button (3, Figure 84).*



FG000227

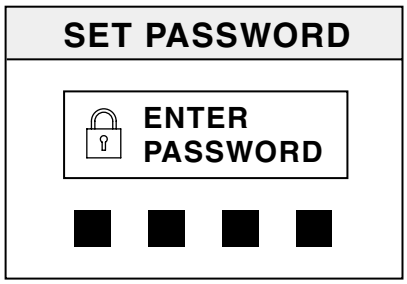
Figure 103

Password inquiry menu will be displayed.

NOTE: *The initial password is "1111."*

The password can be changed within ten minutes while the starter switch is in "I" (ON) position.

After changing password, be sure to use the changed password.



FG000228

Figure 104

CAUTION!

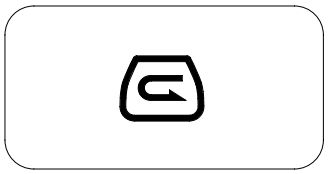
Failure to enter correct password three times, will return normal display screen, and another attempt will not be possible for ten minutes.

A three item menu will be displayed. The items are "LOCK," "UNLOCK," and "CHANGE PASSWORD." An item can be selected by using the "UP" (▲) or "DOWN" (▼) buttons, and then selected by pressing the "SELECT" (↵) button.

6. Air Inlet Selector Button

This button is used to select fresh air from outside the cabin, or recirculate air within the cabin.

Pressing this switch enables the choice between fresh air and recirculating air within the operator's cabin. The select mode is displayed on the LCD.

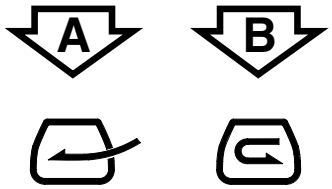


FG000101

Figure 128

A. "A" Symbol - Draws fresh air into operator's cabin. Used to exchange air within the operator's cabin with fresh air. Used to remove condensation or ice on window (Winter / Rainy Season).

B. "B" Symbol - Recirculates air within the operator's cabin. Used to quickly warm or cool the operator's cabin.



FG000102

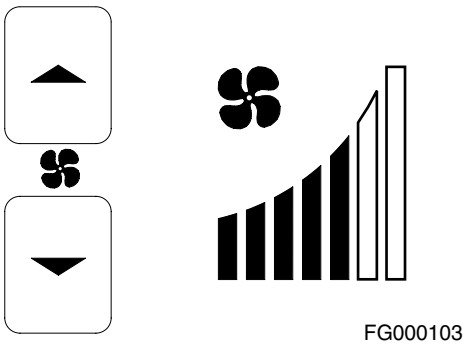
Figure 129

7. Fan Speed Selector Buttons

These buttons are used to control the speed of the blower fan.

Momentarily, pressing a button, changes the speed one stage.

Continuously pressing and holding a button, repeatedly changes the speed.



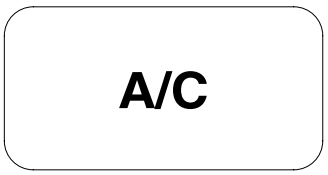
FG000103

Figure 130

8. Air Conditioner Button

This button is used to turn the air conditioner "ON" or "OFF."

When this function is activated, an "A/C" is displayed in the upper left corner of the LCD.



FG000105

Figure 131

CEILING COVER

NOTE: *If the machine is equipped with the optional transparent ceiling cover never use any chemical cleaners on its surface. Only use warm water to wash dust and dirt from its surfaces, and after that, dry it with a soft fabric towel.*

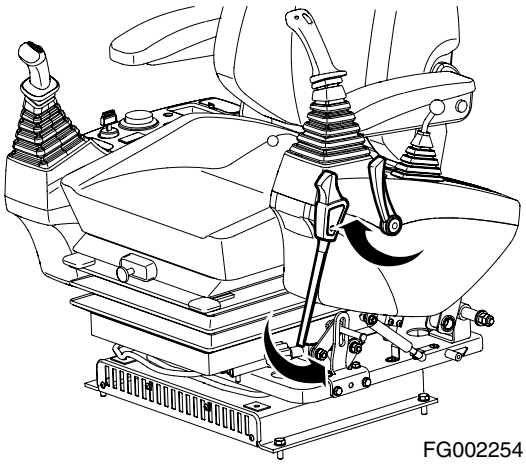


Figure 148

Opening the Ceiling Cover

1. Lower bucket to ground.
2. Set safety lever (Figure 148) on "LOCK."
3. Pull the lock (1, Figure 149) in front center of ceiling cover and push it up with handle.

Closing the Ceiling Cover

1. Lower bucket to ground.
2. Set safety lever (Figure 148) on "LOCK."
3. Pull down cover with the handle (Figure 149) so the lock (1) can be locked in the bracket in the ceiling frame.

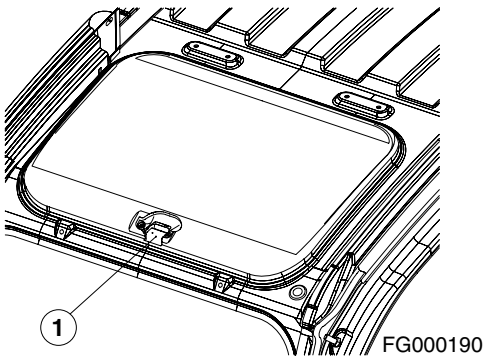


Figure 149

Operation

TO HANDLE A NEW EXCAVATOR

All *DOOSAN* excavators are inspected and adjusted before leaving the factory. However, it is required that the operator follow these steps during the initial break-in period. Failure to follow these steps may 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 may affect the life cycle and safe running operations. This could lead to problems later.

NOTE:

1. *Check daily for leakage of coolant, fuel, engine oil and hydraulic oil.*
2. *Inspect all lubricants daily, 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 temperature.*
6. *Check that work equipment is operating normally during operation.*
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.*

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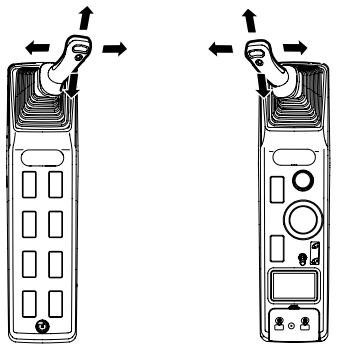
3. Slowly cycle boom, arm and bucket cylinders about five times without a load to circulate the oil through the system. Do this for five minutes.
4. Check for clearance and fully raise the front attachment. Swing clockwise 3 revolutions. Swing counterclockwise 3 revolutions.
5. Travel forward and reverse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

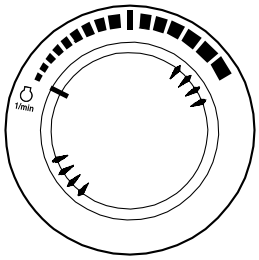


FG000380

Figure 18

Hydraulic System Warm-up – Cold Weather

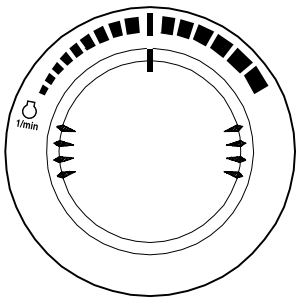
1. Run engine at "LOW IDLE" (no load) for five minutes (Figure 19).



HAOB290L

Figure 19

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



HAOB410L

Figure 20

Parking

1. Slowly release the pressure on the accelerator pedal.

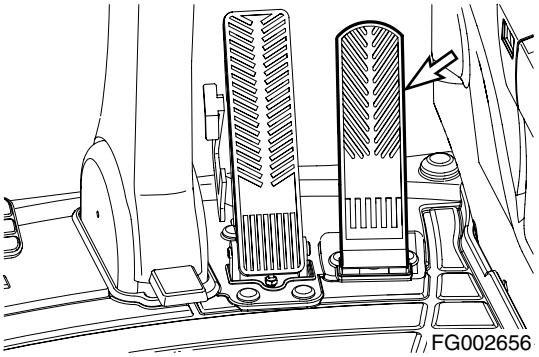


Figure 35

2. Step on the brake to fully stop the machine.

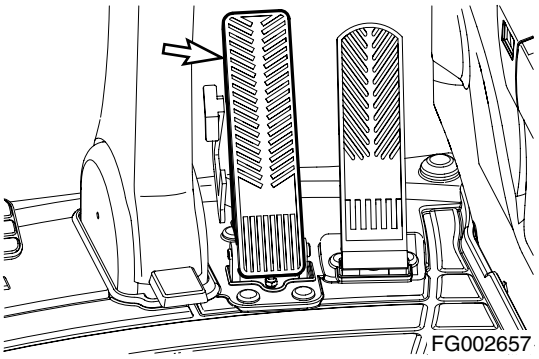


Figure 36

3. Be certain to set the work levers (joysticks) and transmission select lever to "NEUTRAL."

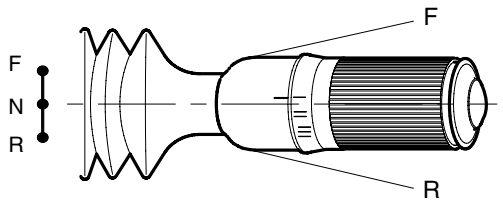


Figure 37

4. If you are using the manual speed control dial, reduce the engine speed to "LOW IDLE."

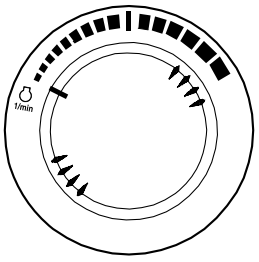


Figure 38

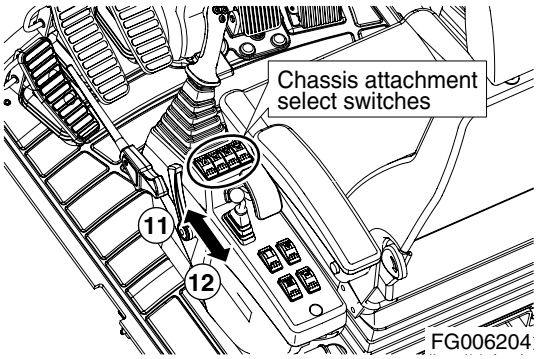


Figure 58

Articulated Boom (Optional)

13. Articulated Upper Boom Up
14. Articulated Upper Boom Down

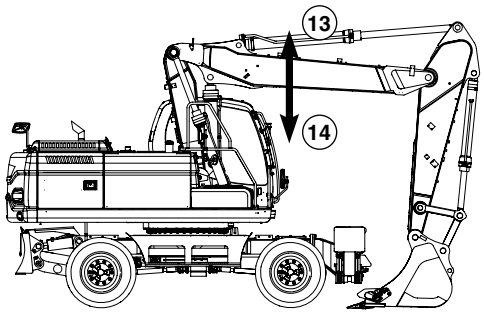


Figure 59

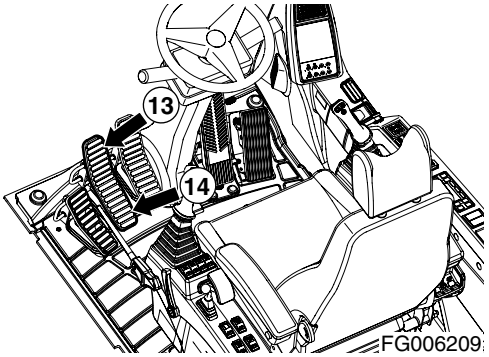
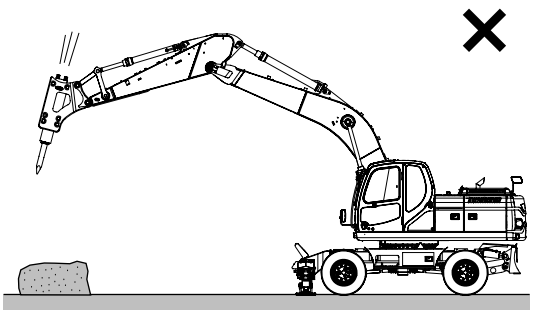


Figure 60

3. Do not use the breaker as a hammer. (Figure 82.)

   Do not drop breaker from extreme heights.

   The breaker is relatively heavy and drops fast. Do not drop breaker from extreme heights or damage to upper structure may result

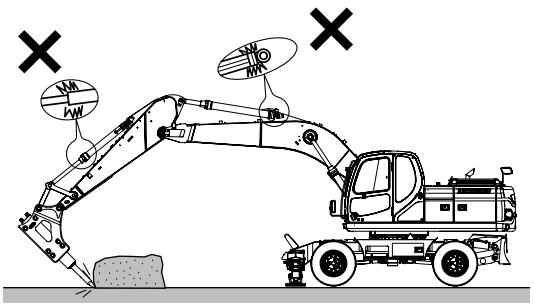


FG006582

Figure 82

4. Do not operate the breaker with the boom or arm cylinders fully extended (bottomed out). (Figure 83.)

   Leave over 100 mm (4 in) of clearance between rod end of cylinder and cylinder head. This will help prevent damage to cylinders during breaker operation.



FG006583

Figure 83

5. Do not use the breaker if the hydraulic hoses vibrate excessively. (Figure 84.) Check the breaker's hydraulic accumulator for damage and repair as required. If excavator is operated under this condition, structural and hydraulic components can become damaged.

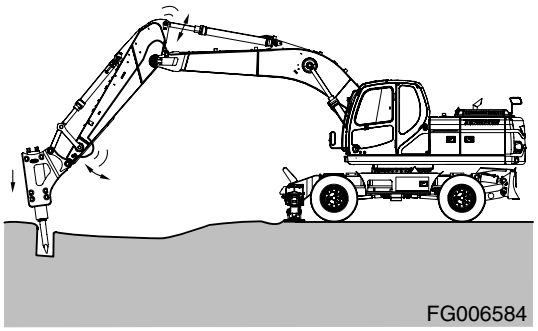


Figure 84

6. Do not allow the breaker body to go into water if not equipped for underwater operation. The breaker seal can be damaged and allow rust, foreign material or water to enter the hydraulic system and cause damage. Only insert the breaker tool into water. (Figure 85.)

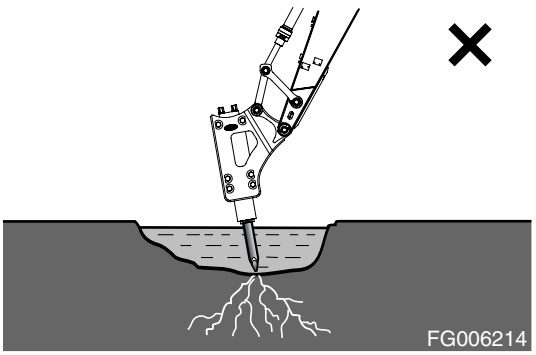


Figure 85

9. If cold weather starting aid must be used, see "Engine Starting" COLD WEATHER START portion of this manual.

10. Clean off all mud, snow and ice to prevent freezing. Cover machine with tarpaulin if possible, keep ends of tarpaulin from freezing to ground.

Operation in Extreme Heat

Continuous operation of the machine in high temperatures may cause the machine to overheat. Monitor engine and transmission temperatures and stop machine for a cooling-off period whenever necessary.

1. Make frequent inspections and services of the fan and radiator. Check coolant level in radiator. Check grills and radiator fins for accumulation of dust, sand and insects which could block the cooling passages.

    A. Formation of scale and rust in cooling system occurs more rapidly in extremely high temperatures. Change antifreeze each year to keep corrosion inhibitor at full strength.

    B. If necessary, flush cooling system periodically to keep passage clear. Avoid use of water with a high alkali content which increases scale and rust formation.

2. Check level of battery electrolyte daily. Keep electrolyte above plates preventing damage to batteries. Use a slightly weaker electrolyte solution in hot climates. Dilute 1.28 specific gravity electrolyte as issued to 1.20 - 1.24 specific gravity readings at full charge. Recharge batteries whenever they reach a 1.16 specific gravity reading. 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.

WARNING!

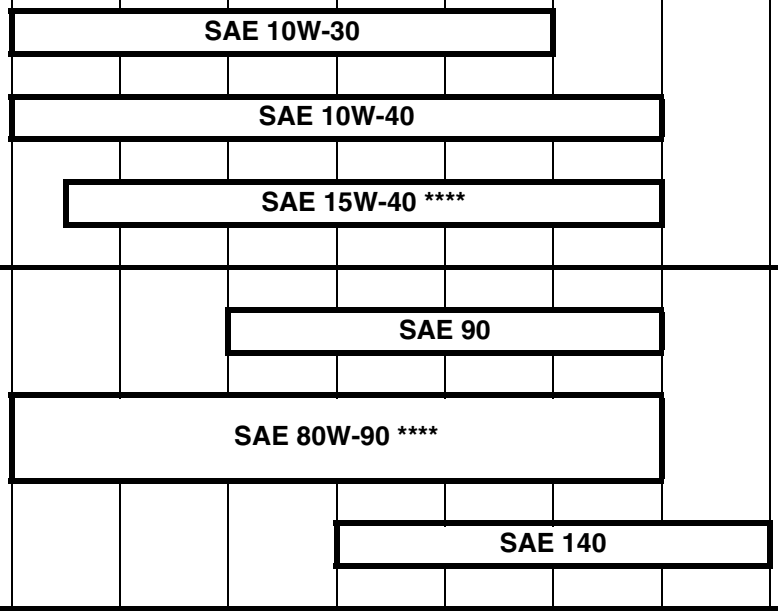
Do not store acid type storage batteries near stacks of tires; the acid fumes have a harmful affect on rubber.

3. Service fuel system as directed in "Engine Fuel System" Section 5, 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" Section 4, in this manual or Lubrication Decal on the machine.

5. Do not park machine in sun for long periods of time. When practical park machine under cover to protect it from sun, dirt and dust.

Reservoir	Kind of Fluid	Ambient Temperature								
		-22	-4	14	32	50	68	86	104	122 °F
		-30	-20	-10	0	10	20	30	40	50 °C
Transmission	Multipurpose Oil									
Axle Hub and Differential	Gear Oil									



*	Installed at factory.
**	Engine oil must meet ACEA-E5 or API-CI-4.
***	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.
****	Approved for the powershift transmission is oils according to the ZF list of lubricants TE-ML 07 and oils according to the ZF list of lubricants TE-ML 05 are permitted for axles.

API: American Petroleum Institute.

ACEA: Association des Constructeurs Europens d'Automobiles.

ASTM: American Society of Testing and Material.

ISO: International Standardization Organization.

NLGI: National Lubricating Grease Institute.

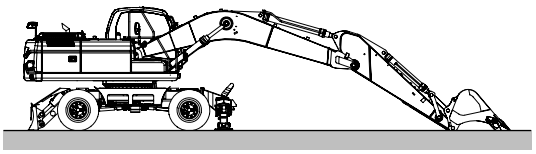
SAE: Society of Automotive Engineers.

IMPORTANT

Do not mix oils from different manufacturers. *DOOSAN* does not endorse specific brands but does suggest that owners select quality oils whose suppliers provide assurance that required standards will always be met or exceeded.

Fluctuating daily or weekly extremes of temperature, or operation in subzero freezing weather may make it impractical to use straight weight lubricants. Use good judgment in selecting lubricant types that are appropriate for climate conditions.

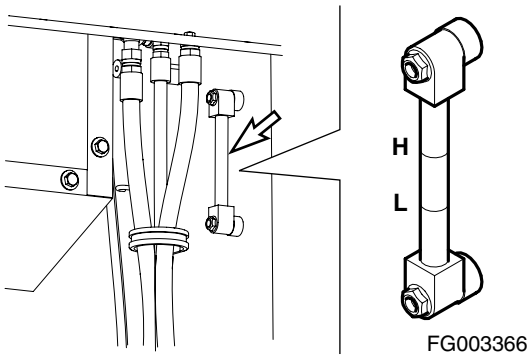
1. Park machine on firm, level ground. Lower boom and position bucket on ground as shown in Figure 16.
2. Set engine speed to "LOW IDLE."
3. Set safety lever to "LOCK" position.



FG006594

Figure 16

4. Check level gauge by opening right access door. Oil level must be between marks on sight gauge.



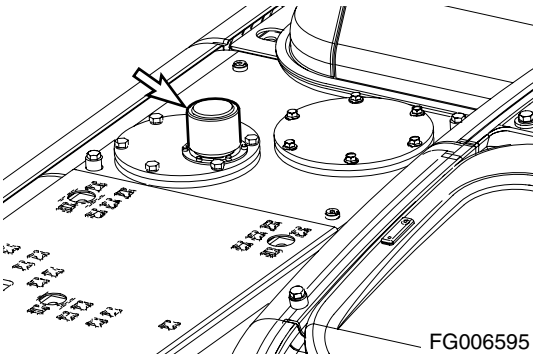
FG003366

Figure 17

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

IMPORTANT

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

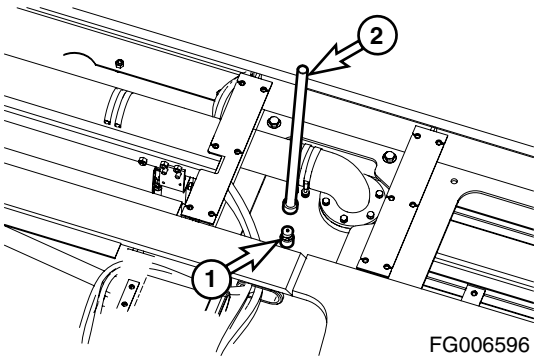


FG006595

Figure 18

6. If oil level is above the "H" mark drain oil.
   A. Shut down engine and wait for the hydraulic oil to cool down.
   B. Drain the excess oil from drain valve (Figure 19) at the bottom of tank into a suitable container, using a hose connected to the valve.

   NOTE: *Dispose of drained fluids according to local regulations.*



FG006596

Figure 19

Grease Dozer Blade Pin

NOTE: *Grease it per 10 hours during initial period of 100 hours after buying your new vehicle, after which period grease it per 50 hours.*

NOTE: *In case of performing work underwater, grease it per 10 hours irrespective of elapsed period.*

1. Remove chain connecting between dozer cylinder protective cover and chassis frame out of this chassis frame.
2. Completely open the dozer cylinder protective cover.
3. Inject grease at total 10 points by 5 points per dozer cylinder using grease gun.
4. Neatly remove old grease that has leaked out after greasing.
5. Shut dozer cylinder protective cover after finishing greasing and then connect the chain to the chassis frame.

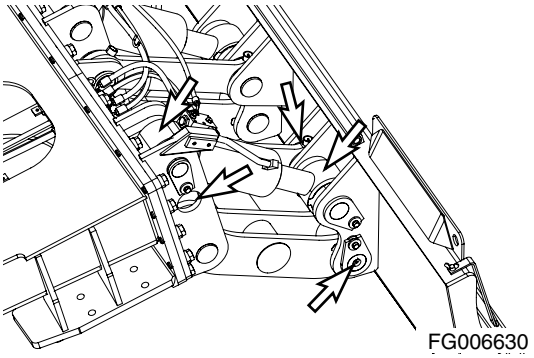


Figure 38

CAUTION!

To avoid malfunction when opening dozer cylinder protective cover, you must work it after fixing the facilities on a level ground and then putting down the dozer blade. When opening dozer cylinder protective cover, take heed so the cover would not be shut off by external shock etc.

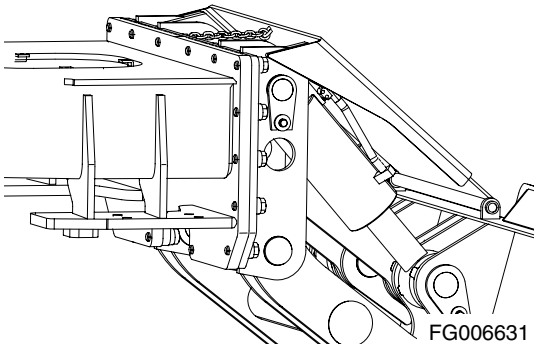


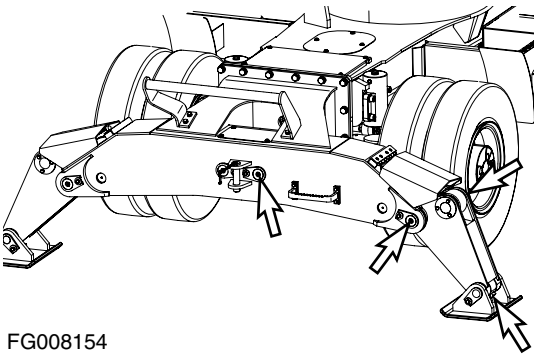
Figure 39

Grease Outrigger Pins

Grease every 10 hours for first 100 hours and every 50 hours thereafter.

NOTE: *If the unit has been running or working in water the outrigger should be greased on a 10 hour/daily basis.*

- Position machine as shown Figure 40 and lower the outrigger leg to the ground and shut down engine.
- Press the grease fitting and inject grease with the grease gun on the marked points.
- There are a total of 8 grease points, 4 on each cylinder of the outrigger.
- After injection, clean off the old grease that has been purged.



FG008154

Figure 40

Clean Air-Conditioning Outer Filter

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

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

⚠ WARNING!

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

⚠ WARNING!

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 door in the left of the machine.

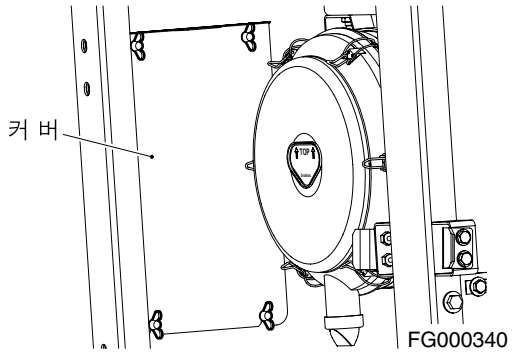


Figure 57

2. Open the cover by turning the knob (1, Figure 58) in the rear of the cabin.

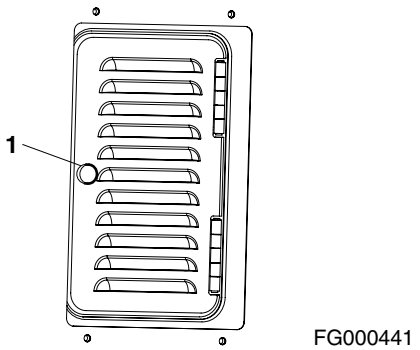
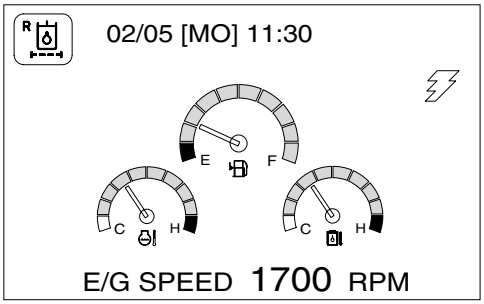


Figure 58

Change Hydraulic Oil Return Filter

NOTE: *Change hydraulic oil return filter after first 250 hours of operation or rebuild, and every 1,000 hours thereafter.*

NOTE: *If return filter clogged warning light (Figure 83) on instrument panel comes "ON" the return filter must be serviced.*



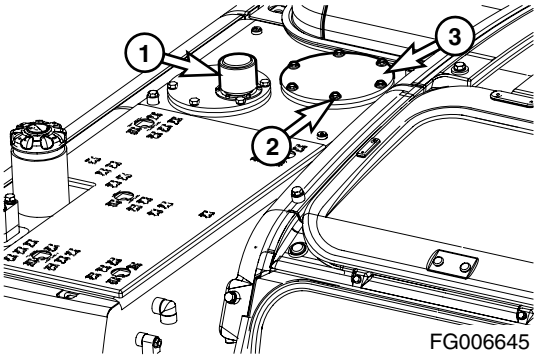
FG000760

Figure 83

⚠ WARNING!

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

The hydraulic tank is pressurized. Loosen the hydraulic breather cap slightly to allow the pressurized air to vent. After the pressure has been released, it is safe to remove either the breather cap or service covers or drain water from the tank.



FG006645

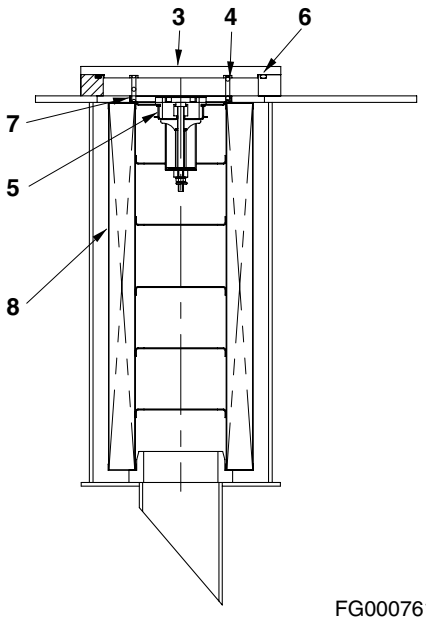
Figure 84

IMPORTANT

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

1. Park machine on firm, level ground. Lower the front attachment to the ground and shut down engine.
2. Loosen the breather cap (1, Figure 84) slightly to release the internal pressure.
3. Remove bolts (2, Figure 84) and service cover (3). Remove spring (4), valve (5) O-ring (6), and bypass strainer (7), and then filter (8).
4. Remove filter and discard.

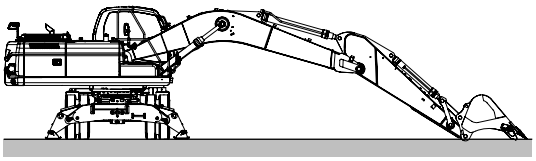
   NOTE: *Used filter should always be disposed of according to local regulations.*
5. Install new filter and a new O-ring. Install bypass strainer, valve and spring. Install service cover plate.
6. Tighten the breather cap (1, Figure 84).
7. Run engine for ten minutes at low idle to purge air from circuit.
8. Check level in hydraulic oil tank (See page 4-16). Add oil if necessary.



FG000761

Figure 85

1. Park machine on firm, level ground. Swing upper structure perpendicular (90°) to wheels. Lower boom and position bucket on ground as shown in Figure 106.
2. Set safety lever and stand on "LOCK" position.
3. Shut down engine.
4. Release pressurized air from hydraulic tank by rotating breather cap (1, Figure 109).



FG008608

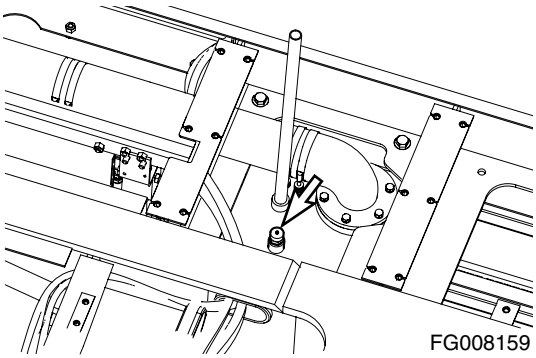
Figure 106

5. Drain hydraulic oil from tank into a container capable of holding 200 liters (53 U.S. gal.). After draining tank, install drain plug.

IMPORTANT

Be careful of squirting oil when removing drain plug.

NOTE: *Used filter and used oil should always be disposed of according to local regulations.*

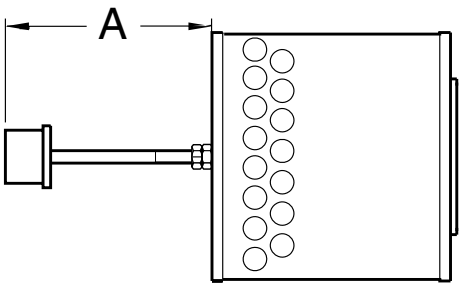


FG008159

Figure 107

6. Carefully remove bolts and cover (2, Figure 109) from top of hydraulic oil tank. There is a spring (3) under the cover that will force the cover up.
7. Remove spring (3, Figure 109) and strainer (5), by pulling on rod (4).
8. Clean inside and outside of strainer. Replace strainer if it is broken.
9. Position strainer (5, Figure 109) on boss portion of suction pipe (6).

   NOTE: *Measurement "A" is 650 mm (25.59 in).*



HAOC411L

Figure 108

3. Radiator Mounting Bolt

   - Tool: 24 mm ( )
   - Torque: 27 kg•m (200 ft lb)
   -

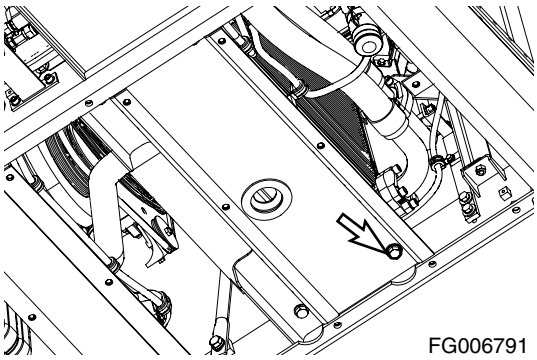


Figure 119

4. Tightening Bolt for Hydraulic Oil Tank

   - Tool: 24 mm ( )
   - Torque: 27 kg•m (200 ft lb)

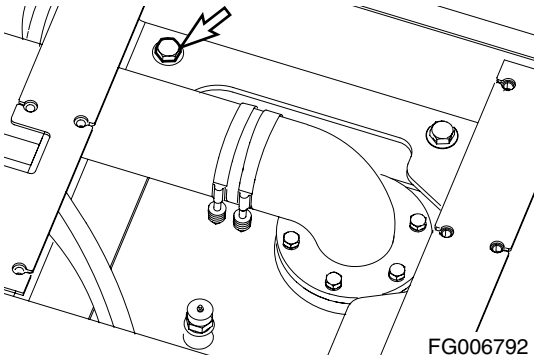


Figure 120

5. Tightening Bolt for Fuel Tank

   - Tool: 24 mm ( )
   - Torque: 27 kg•m (200 ft lb)

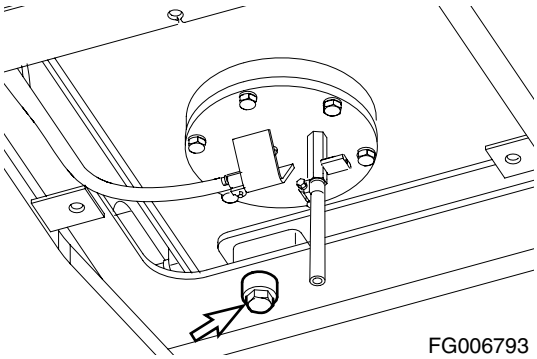


Figure 121

6. Tightening Bolt for Pump

   - Tool: 17 mm ( )
   - Torque: 6.50 kg•m (47 ft lb)

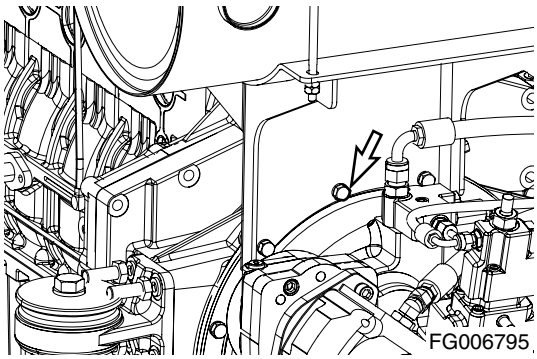
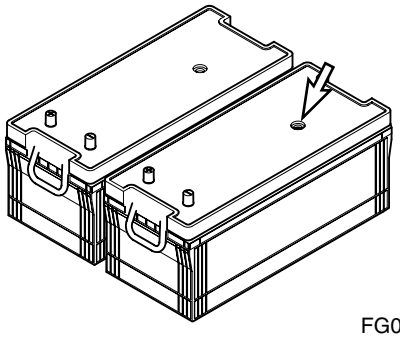


Figure 122

Inspection of Battery Electrolyte Level

This machine has two maintenance free batteries. They never require the addition to water.

When the charge indicator becomes transparency, it means low electrolyte state because of the leakage or charging system error. Determine the cause of problem and replace the batteries immediately.



FG000347

Figure 147

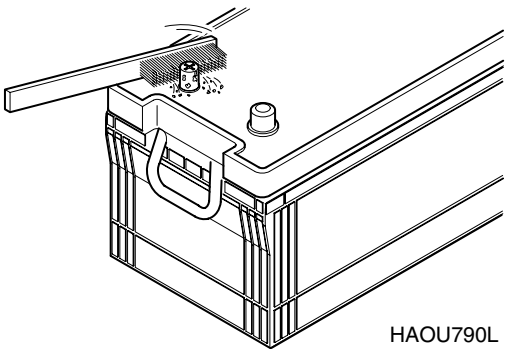
Check Charging State

Check charging state through the charging indicator.

- GREEN: Sufficiently charged.
- BLACK: Insufficient charged.
- TRANSPARENT: Replace battery.

Check the Battery Terminals

Be certain that the battery is held securely in its compartment. Clean the battery terminals and the battery cable connectors. A solution of baking soda and water will neutralize acid on the battery surface, terminals, and cable connectors. Petroleum jelly or grease can be applied to the connectors to help prevent corrosion.



HAOU790L

Figure 148

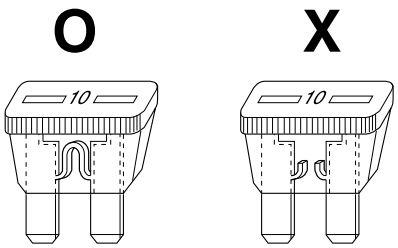
Battery Replacement

When the charging indicator indicates transparency state, replace the 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.

Fuses

1. The fuses in the fuse box are used to protect the various electrical circuits and their components from being damaged. See Figure 149. The fuses used are standard automotive type fuses.
2. The section on “Fuse Identification” on page 4-79, lists the circuits and the fuse amperage required for each circuit. If a fuse blows, determine the cause and repair any faults or failures.
3. Do not insert a higher amperage fuse into a lower amperage slot. Serious damage to the electrical components or fire can result.



HAOC670L

Figure 149

HANDLING OF ACCUMULATOR

WARNING!

Even though the engine or pump is stopped, the hydraulic accumulators for the pilot and brake system are still charged. Do not disconnect any pilot and brake system hoses until accumulator pressure has been released from the circuit. To release pressure, turn the starter switch to the "I" (ON) position and operate all hydraulic control levers and press the service brake pedal. Even though the engine is shutdown hydraulic actuated components may move while releasing pilot pressure and emergency brake is applied during pressing service brake pedal. Keep all personnel away from excavator while performing this operation.

- **Set safety lever and stand on "LOCK" position after stopping engine.**
- **DO NOT mishandle accumulator (s). They are very dangerous because they contain high-pressure nitrogen gas.**
- **DO NOT punch a hole or apply heat or fire to an accumulator.**
- **DO NOT weld on accumulator, or try attaching anything to it.**
- **When replacing an accumulator, contact a *DOOSAN* distributor or sales agency so the gas can be properly released.**
- **Wear safety goggles and protective gloves when working on an accumulator. Hydraulic oil under pressure can penetrate the skin and cause serious injuries.**

Pilot Accumulator

Release pilot accumulator pressure using the following procedure:

1. Park machine on firm, level ground. Lower the front attachment to the ground and shut down engine.
2. Set safety lever and stand on "RELEASED" position.
3. Turn starter switch to the "I" (ON) position.
4. Fully stroke work in all directions.
5. Set safety lever and stand on "LOCK" position.
6. Turn key to "O" (OFF) position and remove from starter switch.
7. Remove accumulator by unscrewing it slowly.

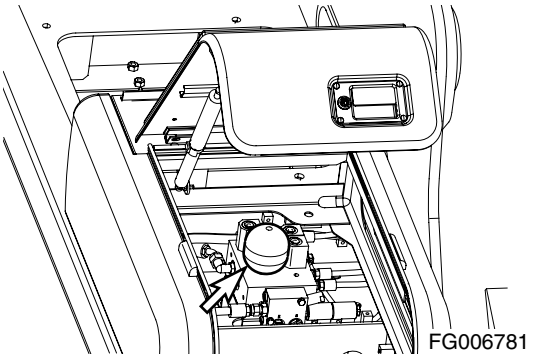


Figure 154

MAINTENANCE IN SPECIAL CONDITIONS

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.
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 extremely cold weather remove the 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.

HYDRAULIC SYSTEM

Problem	Cause	Remedy
None of the controls function (loud noise from pumps)	Hydraulic pump failure.	Contact your *DOOSAN* dealer.
	Low hydraulic oil level.	Add hydraulic oil as required.
	Suction line clogged or damaged.	Clean or replace as required.
None of the controls function (no noise from pumps)	Pilot pump failure.	Contact your *DOOSAN* dealer.
	Cut off solenoid valve failure.	Replace solenoid.
	Safety limit switch is "ON."	Adjust limit switch clearance.
	"WORK/TRAVEL" selector switch is "TRAVEL" mode.	Select "Work Mode."
All actuators have low power	Low hydraulic oil level.	Add hydraulic oil as required.
	Suction filter clogged.	Clean filter.
	Hydraulic pumps faulty.	Contact your *DOOSAN* dealer.
	Main relief pressure too low.	Contact your *DOOSAN* dealer.
	Hydraulic pumps excavating.	Bleed air from hydraulic pumps.
Only one or two actions have little or no power	Overload relief pressure too low.	Reset pressure.
	Makeup check valve leaking.	Clean or replace as required.
	Control valve spool faulty.	Replace valve spool.
	Dirt in valve spool.	Clean or replace as required.
	Actuator failure.	Repair or replace as required.
	Cylinder seal failure.	Repair or replace as required.
	Cylinder rod damaged.	Repair or replace as required.
	Remote control valve failure.	Replace control valve.
	Wrong pilot line connection.	Reconnect pilot lines.
Oil temperature too high	Oil cooler faulty.	Contact your *DOOSAN* dealer.
	Fan belt loose.	Tighten fan belting as required.

WORKING RANGE

One-Piece Boom

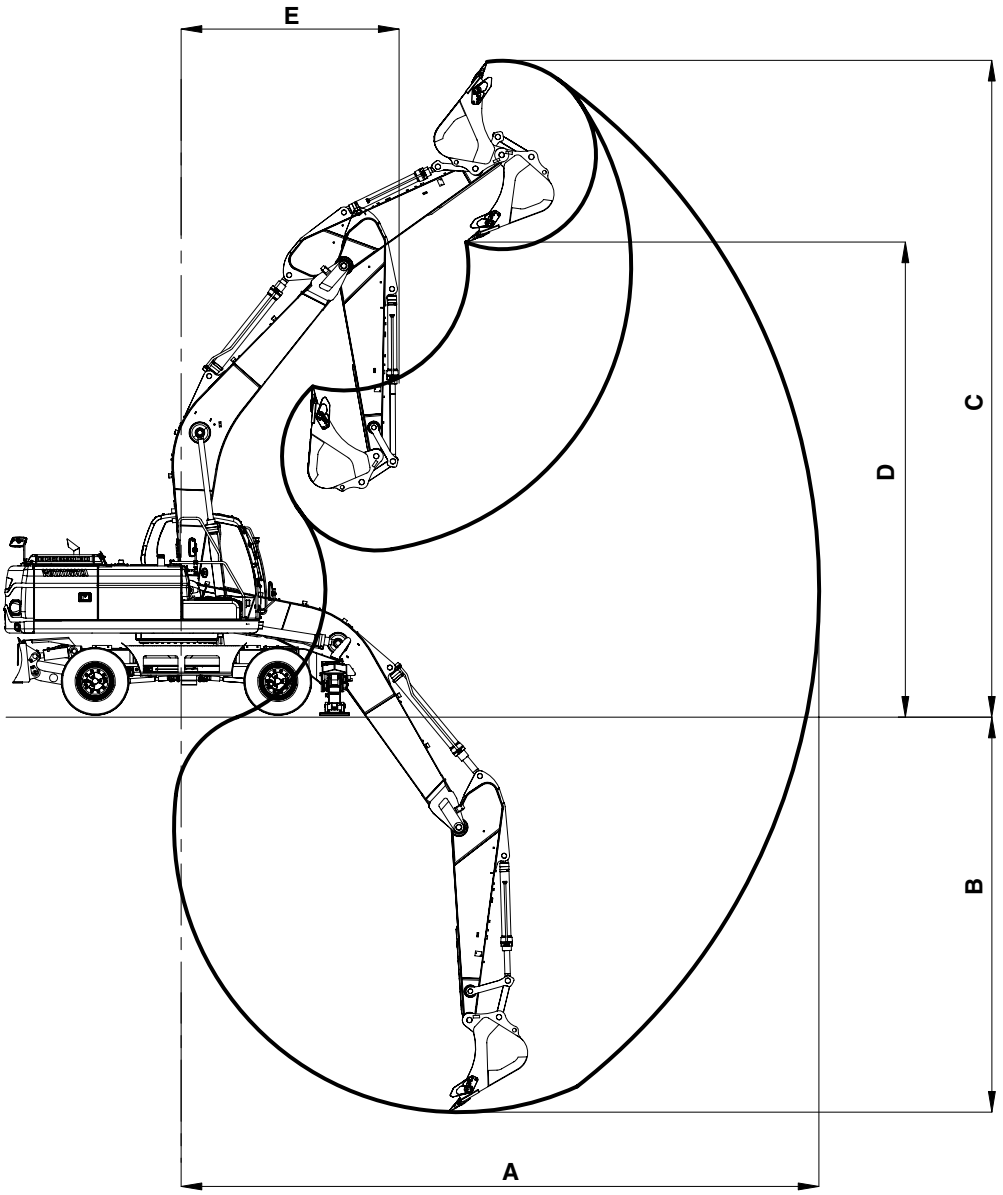


Figure 3

No.	Description	Dimension			
		5.6 m (18' 4") One-Piece Boom			
		3.0 m (9' 10") Arm	2.75 m (9') Arm	2.4 m (7' 10") Arm	2.0 m (6' 7") Arm
A	Max. Digging Reach	10,000 mm (32' 10")	9,730 mm (31' 11")	9,430 mm (30' 11")	9,050 mm (29' 8")
B	Max. Digging Depth	6,260 mm (20' 6")	6,010 mm (19' 9")	5,655 mm (18' 7")	5,255 mm (17' 3")
C	Max. Digging Height	10,050 mm (32' 12")	9,800 mm (32' 2")	9,690 mm (31' 9")	9,435 mm (30' 11")
D	Max. Loading Height	7,250 mm (23' 9")	7,020 mm (23' 0")	6,890 mm (22' 7")	6,650 mm (21' 10")
E	Min. Swing Radius	3,440 mm (11' 3")	3,375 mm (11' 1")	3,385 mm (11' 1")	3,680 mm (12' 1")

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