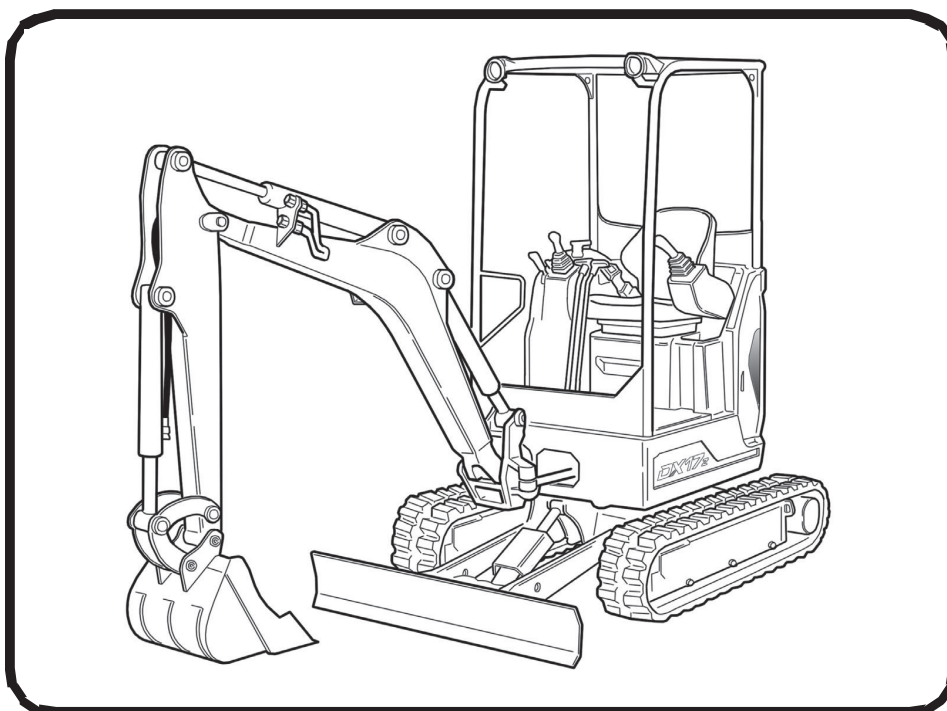


DOOSAN

Operation & Maintenance Manual

DX17Z Compact Excavator

Serial number 11001 and Up



OPERATOR SAFETY WARNING



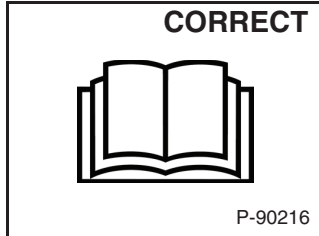
WARNING

Operator must have instructions before operating the machine. Untrained operators can cause injury or death.

W-2001-0502

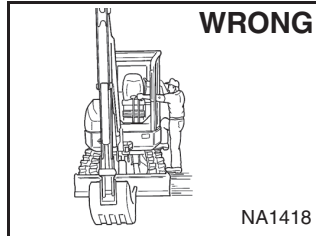


Safety Alert Symbol: This symbol with a warning statement, means: "Warning, be alert! Your safety is involved!" Carefully read the message that follows.



⚠ Never operate without instructions.

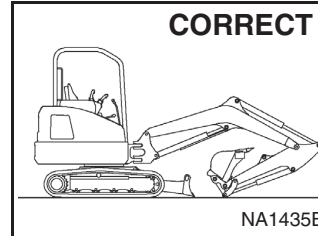
⚠ Read machine signs, and Operation & Maintenance Manual, and Operator's Handbook.



⚠ Do not grasp control handles when entering cab / canopy.

⚠ Be sure controls are in neutral before starting.

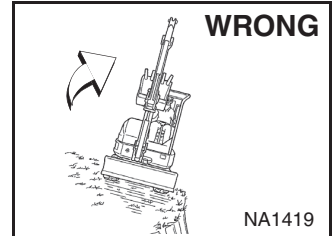
⚠ Sound horn and check behind machine before starting.



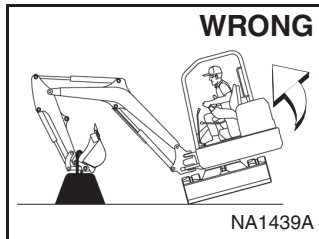
⚠ Never operate without approved cab / canopy.

⚠ Never modify equipment.

⚠ Never use attachments not approved by Doosan Company.

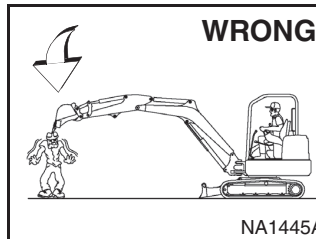


⚠ Avoid steep areas or banks that could break away.



⚠ Use caution to avoid tipping - do not swing heavy load over side of track.

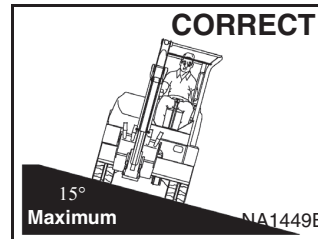
⚠ Operate on flat, level ground.



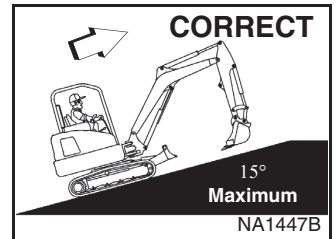
⚠ Keep bystanders out of maximum reach area.

⚠ Do not travel or turn with bucket extended.

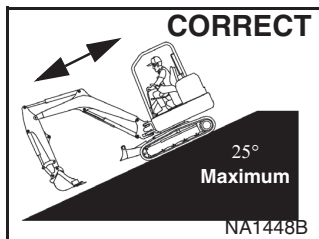
⚠ Never carry riders.



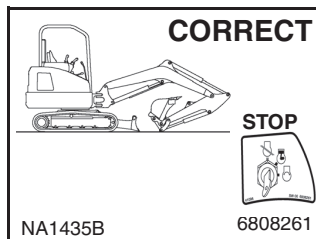
⚠ Never exceed a 15° slope to the side.



⚠ Never travel up a slope that exceeds 15°.

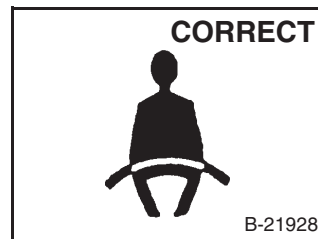


⚠ Never exceed 25° when going down or backing up a slope.



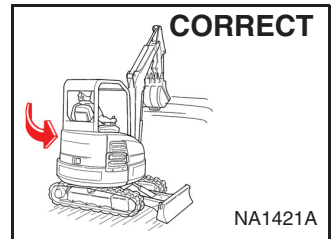
⚠ To leave excavator, lower the work equipment and the blade to the ground.

⚠ Stop the engine.



⚠ Fasten seat belt securely.

⚠ Operate controls only from operator's seat.



⚠ Look in the direction of rotation and make sure no bystanders are in the work area.

SAFETY EQUIPMENT

The excavator must be equipped with safety items necessary for each job. Ask your Doosan dealer for information on the availability and safe use of attachments and accessories.

1. SEAT BELT: Check belt fasteners and check for damaged webbing or buckle.
2. OPERATOR CAB / CANOPY (ROPS and TOPS): Check condition and mounting hardware.
3. OPERATOR'S HANDBOOK: Must be in the cab / canopy.
4. LEFT HAND CONSOLE: When raised must deactivate the travel and hydraulic functions.
5. SAFETY SIGNS (DECALS): Replace if damaged.
6. GRAB HANDLES: Replace if damaged.
7. INTEGRATED SLEW LOCK BRAKE.
8. SAFETY TREAD.: Replace if damaged.

OSW66DH-0317

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REFERENCE INFORMATION

Write the correct information for YOUR Doosan excavator in the spaces below. Always use these numbers when referring to your Doosan excavator.

Excavator Serial
Number

Engine Serial Number

NOTES:

YOUR DOOSAN DEALER:

ADDRESS:

PHONE:



Doosan Infracore Europe B.V.
Wilgenweg 2,
2964AM Groot-Ammers
Netherlands

FOREWORD

This Operation & Maintenance Manual was written to give the owner / operator instructions on the safe operation and maintenance of the Doosan excavator. READ AND UNDERSTAND THIS OPERATION & MAINTENANCE MANUAL BEFORE OPERATING YOUR DOOSAN EXCAVATOR. If you have any questions, see your Doosan dealer. This manual may illustrate options and accessories not installed on your excavator.

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DECLARATION OF CONFORMITY

For Model DX17Z



EC DECLARATION OF CONFORMITY

Doosan Infracore Europe B.V., Wilgenweg 2, 2964AM Groot-Ammers, (Netherlands), certifies that the construction equipment machinery:

Type of Machine:	CRAWLER EXCAVATOR
Manufacturer:	Doosan Infracore Europe B.V., Wilgenweg 2, 2964AM Groot-Ammers, Netherlands
Technical file:	Doosan Infracore Europe B.V., Wilgenweg 2, 2964AM Groot-Ammers, Netherlands
Brand:	Doosan
Model Name:	DX17Z
Serial Number:	
Engine Manufacturer:	Kubota
Engine Type:	D722-E4B-BCZ-7
Net Power:	9,9 kW (13.3 hp) @ 2500 rpm (SAE J1349)
Net Installed Power :	10,2 kW (13.7 hp) @ 2500 RPM (ISO 14396)
Pertinent EC noise emission requirement;	
Has been manufactured in conformity with the provisions of the Directive 2000/14/EC, as stated below;	
Certificate No.:	1020-090-022395
Effective From:	15 Oct 2018
Conformity Assessment Procedure:	2000/14/EC, Annex VIII, Full Quality Assurance
Notified Body:	Technical and test institute for construction Prague 811/76a Prosecka, 190 00 Praha 9 - Prosek (Czech Republic) Notified body 1020
Measured Sound Power Level:	93 dB(A)
Guaranteed Sound Power Level:	93 dB(A)
Equipment conforms to CE Directive(s) listed below:	
2006/42/EC: Machinery Directive, 2014/30/EU: Electromagnetic Compatibility Directive	

2964AM Groot-Ammers

DOOSAN COMPANY IS ISO 9001 CERTIFIED

ISO 9001 is an international standard that specifies requirements for a quality management system that controls the processes and procedures which we use to design, develop, manufacture, and distribute Doosan products.

ISO 9001 means that as a company we say what we do and do what we say. In other words, we have established procedures and policies, and we provide evidence that the procedures and policies are followed.

REGULAR MAINTENANCE ITEMS

	ENGINE OIL FILTER 6671057		BATTERY 7304126
	FUEL FILTER 6667352 FUEL FILTER - Pre-Filter 7247169		HYDRAULIC FILL / BREATHER CAP 6692836
	AIR FILTER, Outer 6673752		RADIATOR CAP 7257434
	AIR FILTER, Inner 6673753		
	PRIMARY HYDRAULIC FILTER 6661248		

NOTE: Always verify Part Numbers with your Doosan dealer.

REGULAR MAINTENANCE ITEMS (CONT'D)

Fluids, Lubricants, And Fuel

The fluids, lubricants, and fuel described below are those used in the factory and apply to operating conditions in European temperate climate areas. Please see your Doosan dealer for requirements in other climate areas.

Read and understand the preventive maintenance required before adding or replacing any fluids or lubricants.

ENGINE SYSTEMS				
Machine Components	Fluids And Lubricants	T° Range	Packaging**	Part Number
Engine	Doosan Engine Power SAE 10W30 CI4 / ACEA E9	-25°C – +30°C	B, C, D	941-00900*
	Doosan Engine Power SAE 15W40 CI4 / ACEA E9	-20°C – +40C	B, C, D	941-00904
Cooling Circuit	Doosan Coolant Concentrate	-36°C	B, C	941-00599*
Fuel Tank	High-quality diesel fuel that meets EN590	-	-	*

HYDRAULIC / HYDROSTATIC SYSTEMS				
Machine Components	Fluids And Lubricants	T° Range	Packaging**	Part Number
Hydraulic Oil Tank	Doosan Hydraulic Oil	-35°C – +50°C	B, C, D	941-00800*

MECHANICAL SYSTEMS				
Machine Components	Fluids And Lubricants	Drop Point	Packaging**	Part Number
All Mechanical Systems	Doosan Multipurpose Grease	From 260°C	-	941-00655*

(*) Factory Filled Fluids And Lubricants

(**) Packaging Available:

A = 5 L Can

B = 25 L Container

C = 209 L Drum

D = 1000 L Tank

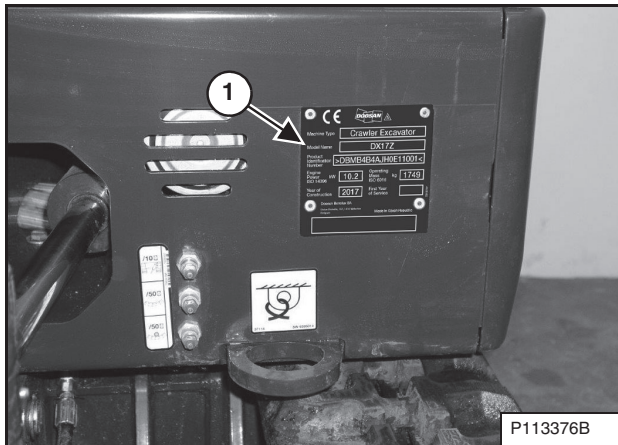
E = 400 g Tube

SERIAL NUMBER LOCATIONS

Always use the serial number of the excavator when requesting service information or when ordering parts. Early or later models (identification made by serial number) may use different parts, or it may be necessary to use a different procedure in doing a specific service operation.

Excavator Serial Number

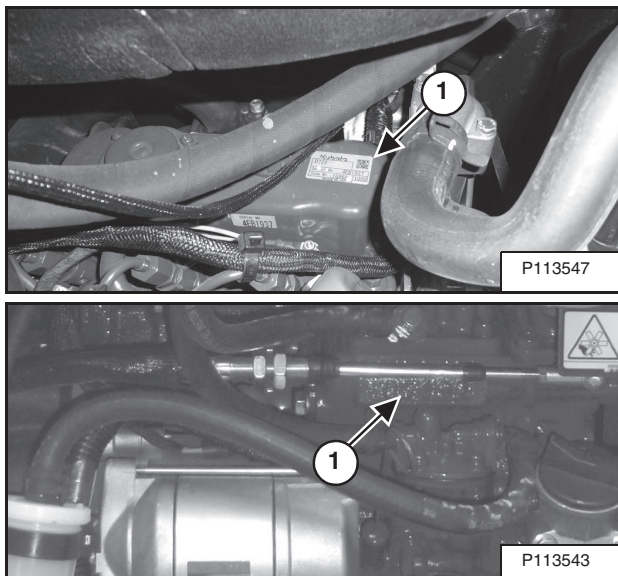
Figure 1



The excavator serial number plate (Item 1) [Figure 1] is located on the frame of the machine in the location shown.

Engine Serial Number

Figure 2



The engine serial number is located on the top cover (Item 1) or on the side of the engine block (Item 2) [Figure 2] above the fuel pump.

DELIVERY REPORT

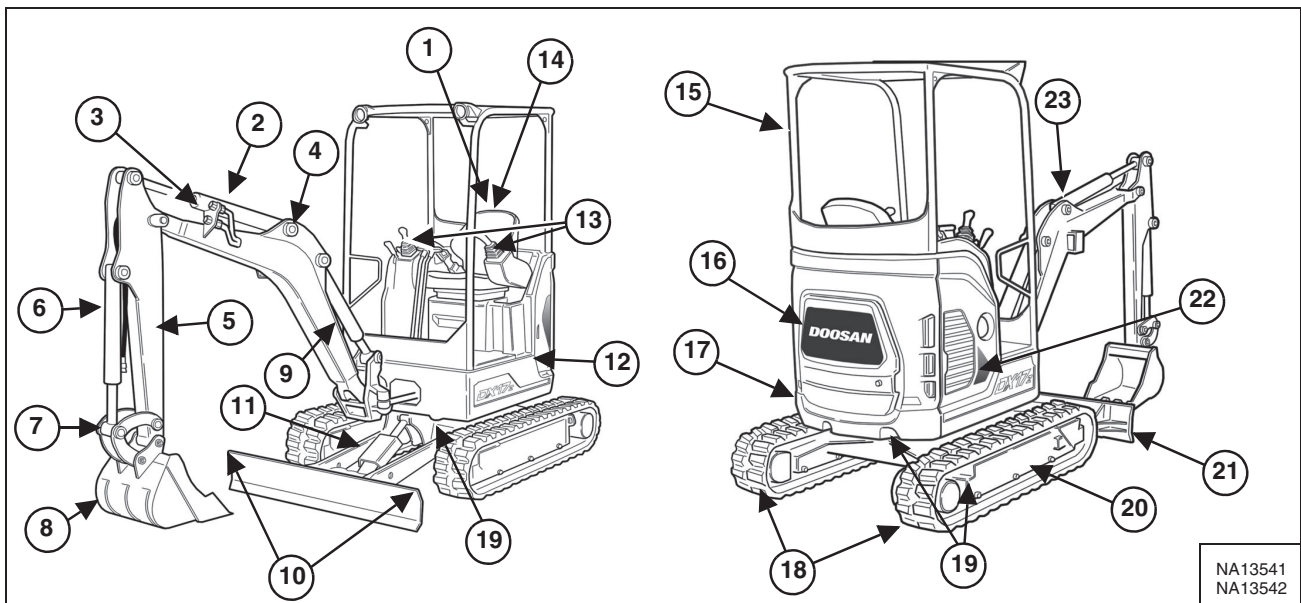
Figure 3

A diagram of a 'DELIVERY REPORT' form. The form is divided into several sections. At the top right is the title 'DELIVERY REPORT'. Below it is a section for 'WARNING' with a bold heading. The form contains numerous lines for text entry. In the bottom right corner, there is a box labeled 'B-16315'.

The delivery report [Figure 3] contains a list of items that must be explained or shown to the owner or operator by the dealer when the Doosan excavator is delivered.

The delivery report must be reviewed and signed by the owner or operator and the dealer.

EXCAVATOR IDENTIFICATION



ITEM	DESCRIPTION	ITEM	DESCRIPTION
1	Operator's Handbook	15	Canopy (ROPS) [B]
2	Arm Cylinder	16	Rear Cover
3	Auxiliary Quick Couplers	17	Counterweight
4	Boom	18	Tracks
5	Arm	19	Tie Downs (Both Sides)
6	Bucket Cylinder	20	Track Frames
7	Bucket Link / Attachment Coupler (If Equipped)	21	Blade
8	Bucket [A]	22	Right Side Cover
9	Boom Cylinder	23	Lift Point
10	Tie Downs / Lift Points		
11	Blade Cylinder		
12	Upperstructure		
13	Control Levers (Joysticks)		
14	Operator's Seat with Seat Belt		

[A] BUCKET - Several different buckets and other attachments are available for the Doosan excavator.

[B] ROPS - (Roll-Over Protective Structure) as standard equipment.
The ROPS meets ISO 12117-2:2008.

FEATURES, ACCESSORIES, AND ATTACHMENTS

Standard Items

Model DX17Z Doosan excavators are equipped with the following standard items:

- Canopy with ROPS Approval
- Rubber Tracks 230 mm (9.0 in)
- Dozer Blade 1354 mm (53.3 in) (Including extensions)
- Auxiliary Hydraulics On Boom (Double Acting)
- Hydraulic Joystick Controls
- Engine Speed Control Lever
- Hydraulic and Travel Control Lockouts
- Hydraulic Retractable Undercarriage (1360 mm to 980 mm)
- Track Retraction - Expansion Valve / Switch
- Engine with Shut Down
- Work Light - Boom Mounted
- Horn
- Stationary Seat
- Retractable Seat Belt
- Spark Arrester Muffler
- Advanced Diagnostics
- Counterweight
- Battery Kill Switch
- Upperstructure with Four Point Tie Down

Options And Accessories

Below is a list of some equipment available from your Doosan excavator dealer as Dealer and / or Factory Installed Accessories and Factory Installed Options. See your Doosan dealer for other available options, accessories and attachments.

- Canopy Mounted Lights - Front / Rear
- Long Dozer Blade
- Top Guard Kit (FOGS)
- Special Application Kit
- Strobe Light
- Side Mirror
- Beacon
- Demolition Kit
- Attachment Quick Coupler, German Style Quick Coupler

Specifications subject to change without notice and standard items can vary.

Attachments

These and other attachments are approved for use on this model Doosan excavator. Do not use unapproved attachments. Attachments not manufactured by Doosan can not be approved.

The versatile Doosan excavator quickly turns into a multi-job machine with a variety of attachments.

See your Doosan dealer for information about approved attachments and attachment Operation & Maintenance Manuals.

- Auger
- Breaker
- Hydraulic Clamp
- Laser Receiver
- Reverse Coupler
- Tilt Bucket

Buckets Available

Increase the versatility of your Doosan excavator with a variety of bucket sizes.

Many bucket styles, widths and different capacities are available for a variety of different applications. They include Trenching, Digging, Grading, Tilt, to name a few. See your Doosan dealer for the correct bucket for your Doosan excavator and application.

SAFETY AND TRAINING RESOURCES

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SAFETY INSTRUCTIONS

Before Operation

Carefully follow the operating and maintenance instructions in this manual.

The Doosan excavator is highly manoeuvrable and compact. It is rugged and useful under a wide variety of conditions. This presents an operator with hazards associated with off motorway, rough terrain applications, common with Doosan excavator usage.

The Doosan excavator has an internal combustion engine with resultant heat and exhaust. All exhaust gases can kill or cause illness so use the excavator with adequate ventilation.

The dealer explains the capabilities and restrictions of the Doosan excavator and attachment for each application. The dealer demonstrates the safe operation according to Doosan instructional materials, which are also available to operators. The dealer can also identify unsafe modifications or use of unapproved attachments. The attachments and buckets are designed for a Rated Lift Capacity. They are designed for secure fastening to the Doosan excavator. The user must check with the dealer, or Doosan literature, to determine safe loads of materials of specified densities for the machine - attachment combination.

The following publications and training materials provide information on the safe use and maintenance of the Doosan machine and attachments:

- The Delivery Report is used to assure that complete instructions have been given to the new owner and that the machine and attachment is in safe operating condition.
- The Operation & Maintenance Manual delivered with the machine or attachment gives operating information as well as routine maintenance and service procedures. It is a part of the machine and can be stored in a container provided on the machine. Replacement Operation & Maintenance Manuals can be ordered from your Doosan dealer.
- Machine signs (decals) instruct on the safe operation and care of your Doosan machine or attachment. The signs and their locations are shown in the Operation & Maintenance Manual. Replacement signs are available from your Doosan dealer.
- An Operator's Handbook is fastened to the operator cab of the excavator. Its brief instructions are convenient to the operator. See your Doosan dealer for more information on translated versions.

The dealer and owner / operator review the recommended uses of the product when delivered. If the owner / operator will be using the machine for a different application(s) he or she must ask the dealer for recommendations on the new use.

SI EXC EMEA DH-0117

SAFETY INSTRUCTIONS (CONT'D)

Safe Operation Is The Operator's Responsibility



Safety Alert Symbol

This symbol with a warning statement means:
"Warning, be alert! Your safety is involved!"
Carefully read the message that follows.



WARNING

Operator must have instructions before operating the machine. Untrained operators can cause injury or death.

W-2001-0502

IMPORTANT

This notice identifies procedures which must be followed to avoid damage to the machine.

I-2019-0284



DANGER

The signal word DANGER on the machine and in the manuals indicates a hazardous situation which, if not avoided, will result in death or serious injury.

D-1002-1107



WARNING

The signal word WARNING on the machine and in the manuals indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

W-2044-1107

The Doosan excavator and attachment must be in good operating condition before use.

Check all of the items on the Doosan Service Schedule Decal under the 8-10 hour column or as shown in the Operation & Maintenance Manual.

Safe Operation Needs A Qualified Operator

For an operator to be qualified, he or she must not use drugs or alcoholic drinks which impair alertness or coordination while working. An operator who is taking prescription drugs must get medical advice to determine if he or she can safely operate a machine.

A Qualified Operator Must Do The Following:

Understand the Written Instructions, Rules and Regulations

- The written instructions from Doosan Company include the Delivery Report, Operation & Maintenance Manual, Operator's Handbook and machine signs (decals).
- Check the rules and regulations at your location. The rules may include an employer's work safety requirements. For driving on public roads, the machine must be equipped as stipulated by the local regulations authorising operation on public roads in your specific country. Regulations may identify a hazard such as a utility line.

Have Training with Actual Operation

- Operator training must consist of a demonstration and verbal instruction. This training is given by your Doosan dealer before the product is delivered.
- The new operator must start in an area without bystanders and use all the controls until he or she can operate the machine and attachment safely under all conditions of the work area. Always fasten seat belt before operating.

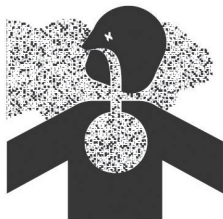
Know the Work Conditions

- Know the weight of the materials being handled. Avoid exceeding the Rated Lift Capacity of the machine. Material which is very dense will be heavier than the same volume of less dense material. Reduce the size of load if handling dense material.
- The operator must know any prohibited uses or work areas, for example, he or she needs to know about excessive slopes.
- Know the location of any underground lines.
- Wear tight fitting clothing. Always wear safety glasses when doing maintenance or service. Safety glasses, respiratory equipment, hearing protection or Special Applications Kits are required for some work. See your Doosan dealer about Doosan Safety Equipment for your model.

SI EXC EMEA DH-0117

SAFETY INSTRUCTIONS (CONT'D)

Avoid Silica Dust



Cutting or drilling concrete containing sand or rock containing quartz may result in exposure to silica dust. Use a respirator, water spray or other means to control dust.

FIRE PREVENTION



Maintenance

The machine and some attachments have components that are at high temperatures under normal operating conditions. The primary source of high temperatures is the engine and exhaust system. The electrical system, if damaged or incorrectly maintained, 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 often to avoid this accumulation. Flammable debris in the engine compartment is a potential fire hazard.

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

All fuels, most lubricants and some coolants mixtures are flammable. Flammable fluids that are leaking or spilled onto hot surfaces or onto electrical components can cause a fire.

Operation

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

Electrical



Check all electrical wiring and connections for damage. Keep the battery terminals clean and tight. Repair or replace any damaged part or wires that are loose or frayed.

Battery gas can explode and cause serious injury. Use the procedure in the Operation & Maintenance Manual for connecting the battery and for jump starting. Do not jump start or charge a frozen or damaged battery. Keep any open flames or sparks away from batteries. Do not smoke in battery charging area.

SI EXC EMEA DH-0117

FIRE PREVENTION (CONT'D)

Hydraulic System

Check hydraulic tubes, hoses, and fittings for damage and leakage. Never use open flame or bare skin to check for leaks. Hydraulic tubes and hoses must be properly routed and have adequate support and secure clamps. Tighten or replace any parts that show leakage.

Always clean fluid spills. Do not use petrol or diesel fuel for cleaning parts. Use commercial non-flammable solvents.

Fueling



Stop the engine and let it cool before adding fuel. No smoking! Do not refuel a machine near open flames or sparks. Fill the fuel tank outdoors.

Ultra Low Sulfur Diesel (ULSD) poses a greater static ignition hazard than earlier diesel formulations with higher Sulfur content. Avoid death or serious injury from fire or explosion. Consult with your fuel or fuel system supplier to ensure the delivery system is in compliance with fueling standards for proper grounding and bonding practices.

Starting

Do not use ether or starting fluids on any engine that has glow plugs. These starting aids can cause explosion and injure you or bystanders.

Use the procedure in the Operation & Maintenance Manual for connecting the battery and for jump starting.

Spark Arrester Exhaust System

The spark arrester exhaust system is designed to control the emission of hot particles from the engine and exhaust system, but the muffler and the exhaust gases are still hot.

Check the spark arrester exhaust system regularly to make sure it is maintained and working properly. Use the procedure in the Operation & Maintenance Manual for cleaning the spark arrester muffler (if equipped).

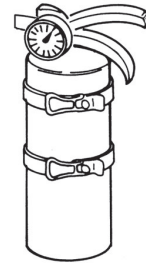
Welding And Grinding

Always clean the machine and attachment, disconnect the battery, and disconnect the wiring from the Doosan controllers before welding. Cover rubber hoses, battery and all other flammable parts. Keep a fire extinguisher near the machine when welding.

Have good ventilation when grinding or welding painted parts. Wear dust mask when grinding painted parts. Toxic dust or gas can be produced.

Dust generated from repairing non-metallic parts such as hoods, fenders or covers can be flammable or explosive. Repair such components in a well ventilated area away from open flames or sparks.

Fire Extinguishers



Know where fire extinguishers and first aid kits are located and how to use them. Inspect the fire extinguisher and service the fire extinguisher regularly. Obey the recommendations on the instructions plate.

SI EXC EMEA DH-0117

PUBLICATIONS AND TRAINING RESOURCES

The following publications are also available for your Doosan excavator. You can order them from your Doosan dealer.

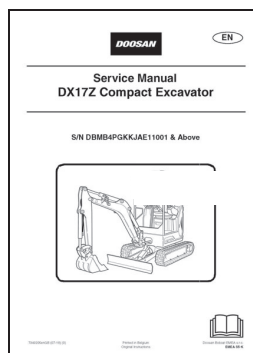
For the latest information on Doosan products and the Doosan Company, visit our Website at www.doosanequipment.com or www.doosan.com.



OPERATION & MAINTENANCE MANUAL

7349205EN

- Complete instructions on the correct operation and the routine maintenance of the Doosan excavator.



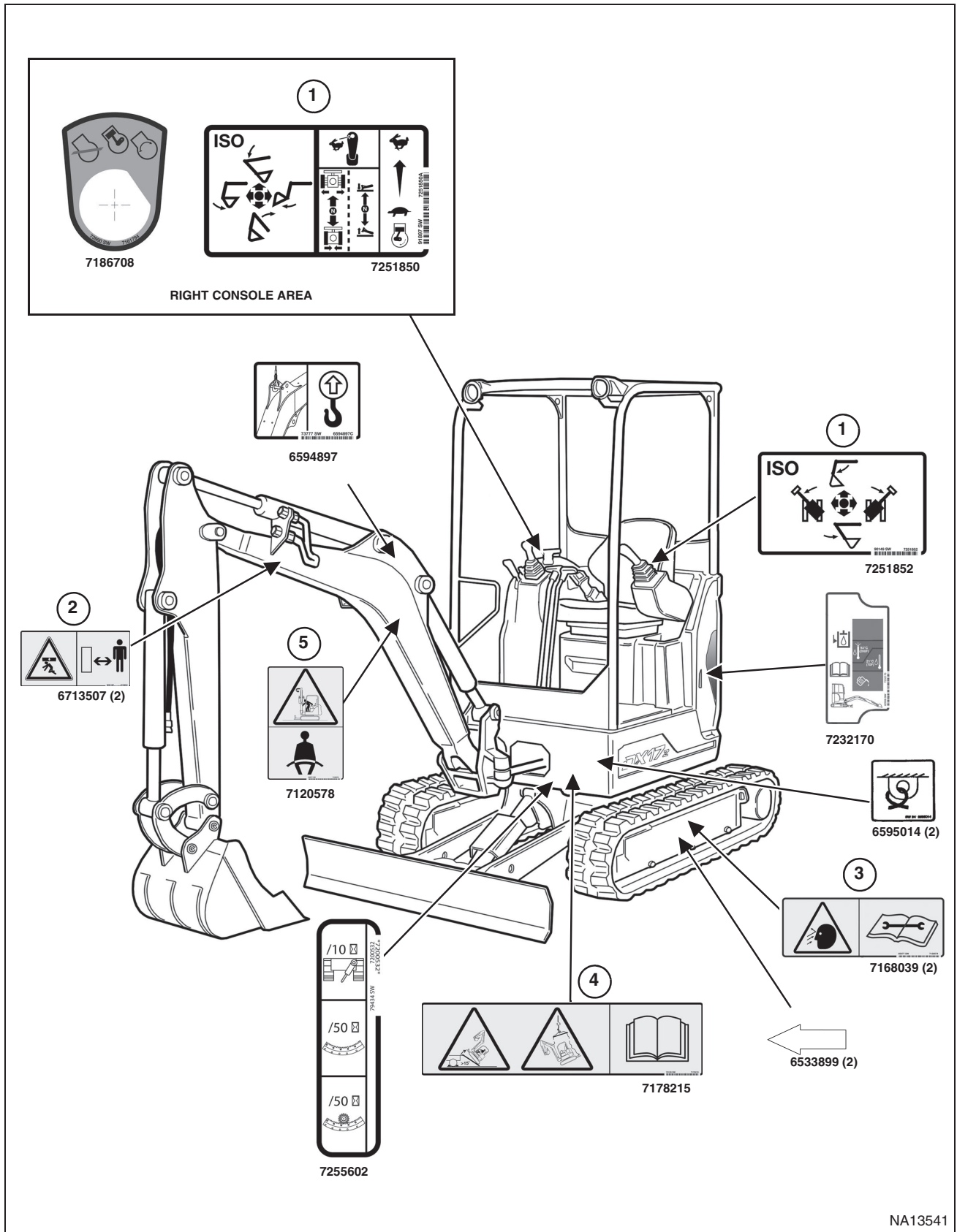
SERVICE MANUAL

7314144enUS

- Complete maintenance instructions for your Doosan excavator.

MACHINE SIGNS (DECALS)

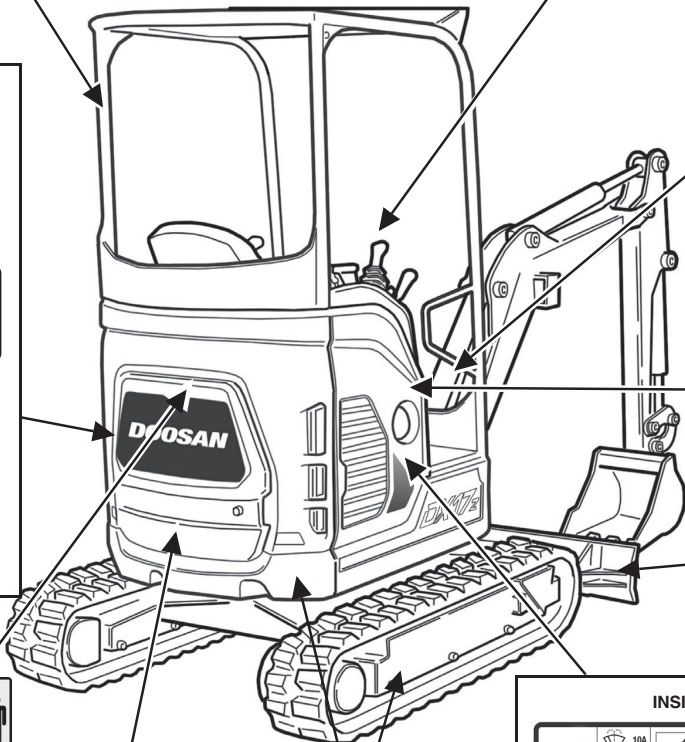
Follow the instructions on all the Machine Signs (Decals) that are on the excavator. Replace any damaged machine signs and be sure they are in the correct locations. Machine signs are available from your Doosan excavator dealer.



NA13541

MACHINE SIGNS (DECALS) (CONT'D)

Follow the instructions on all the Machine Signs (Decals) that are on the excavator. Replace any damaged machine signs and be sure they are in the correct locations. Machine signs are available from your Doosan excavator dealer.



6



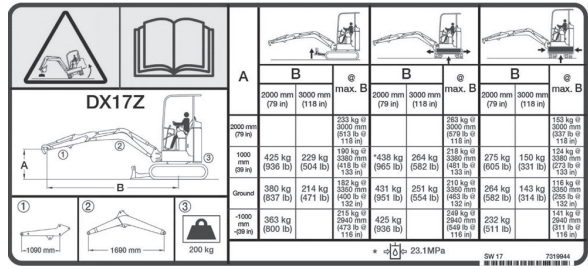
6732148

INSIDE CANOPY



7148158

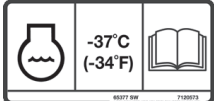
7



7319944 - Canopy and Standard Arm

8

IN ENGINE COMPARTMENT



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7120928



7185935

9



7169009

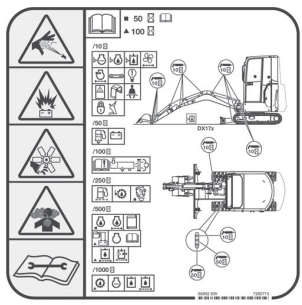
10



7200990

11

INSIDE TAIL GATE



7280713

7135250



7115386

FOR MODELS WITH PEDAL CONTROLS ONLY

7238123



7238123

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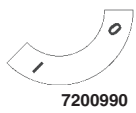
6815993 (2)

INSIDE RIGHT COVER



7237314

7200990



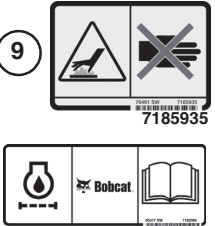
7200990

7315525



7315525

7120569



7120569

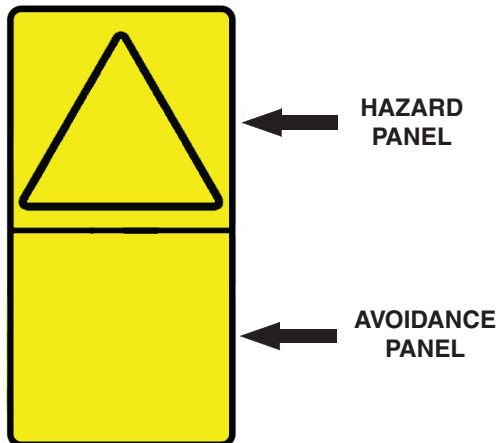
NA13542

MACHINE SIGNS (DECALS) (CONT'D)

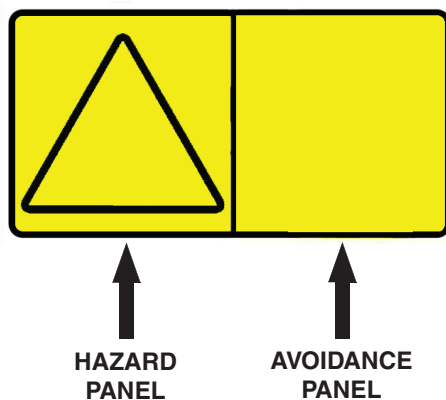
Pictorial Only Safety Signs

Safety signs are used to alert the equipment operator or maintenance person to hazards that may be encountered in the use and maintenance of the equipment. The location and description of the safety signs are detailed in this section. Please become familiarised with all safety signs installed on the excavator.

Vertical Configuration



Horizontal Configuration



The format consists of the hazard panel(s) and the avoidance panel(s):

Hazard panels depict a potential hazard enclosed in a safety alert triangle.

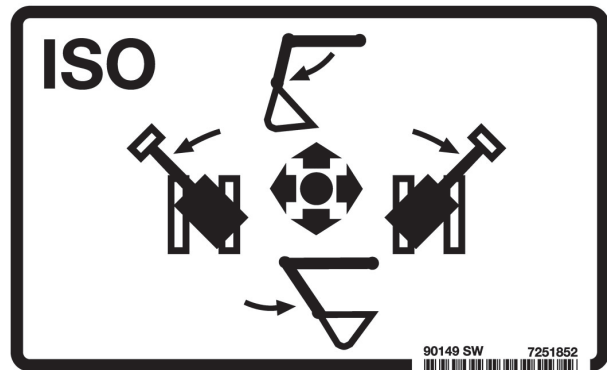
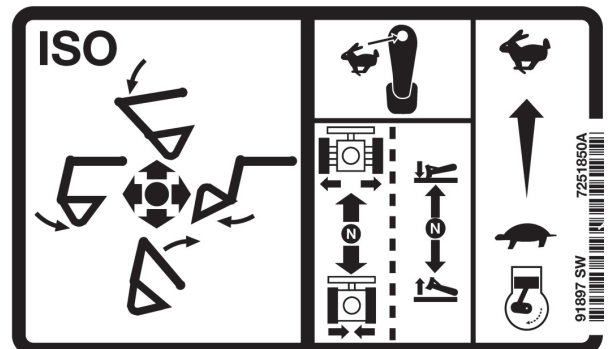
Avoidance panels depict actions required to avoid the hazards.

A safety sign may contain more than one hazard panel and more than one avoidance panel.

NOTE: See the numbered MACHINE SIGNS (DECALS) on Page 15 and Machine Signs (Decals) (Cont'd) on Page 16 for the machine location of each corresponding numbered pictorial only decals as shown below.

1. Control Pattern / Joystick (7251850, 7251852)

This safety signs are located on the left console by the seat and on both consoles by the joysticks.



Know the control pattern before operating.

W-2989-0714

MACHINE SIGNS (DECALS) (CONT'D)

Pictorial Only Safety Signs (Cont'd)

2. Crush Hazard (6713507)

This safety sign is located on both sides of the boom.

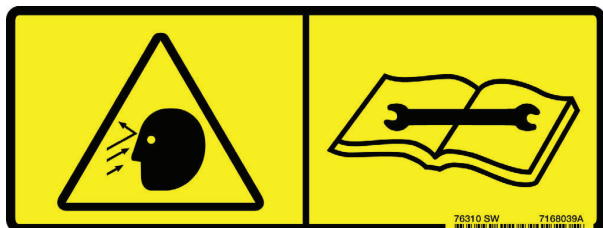


Keep away from the operating machine to avoid serious injury or death.

W-2520-0106

3. Thrown Or Flying Objects (7168039)

This safety sign is located on the outside of both track frame.



High pressure grease can cause serious injury. Do not loosen grease fitting. Do not loosen bleed fitting more than 1 - 1/2 turns.

Read and understand the Operation & Maintenance Manual for more information.

W-2516-0110

4. Transporting And Lifting (7178215)

This safety sign is located on the front of the cab.

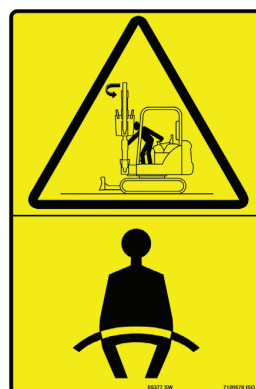


Improper loading, transporting and lifting procedures can cause serious injury or death. Read and understand the Operation & Maintenance Manual prior to transporting or lifting the machine.

W-2517-0110

5. Transporting And Lifting (7120578)

This safety sign is located on the front of the cab.



- Keep out of swing area.
- Keep bystanders away.
- Operate the excavator from the operator's position only.

W-2990-0714

MACHINE SIGNS (DECALS) (CONT'D)

Pictorial Only Safety Signs (Cont'd)

9. Hot Surfaces (7185935)

This safety sign is located in the right cover on the radiator.



AVOID BURNS

Do not remove radiator cap when the engine is hot.
You can be seriously burned.

W-2070-1203

10. Stay Away (7169009)

This safety sign is located on both upper rear corners of the upperstructure.



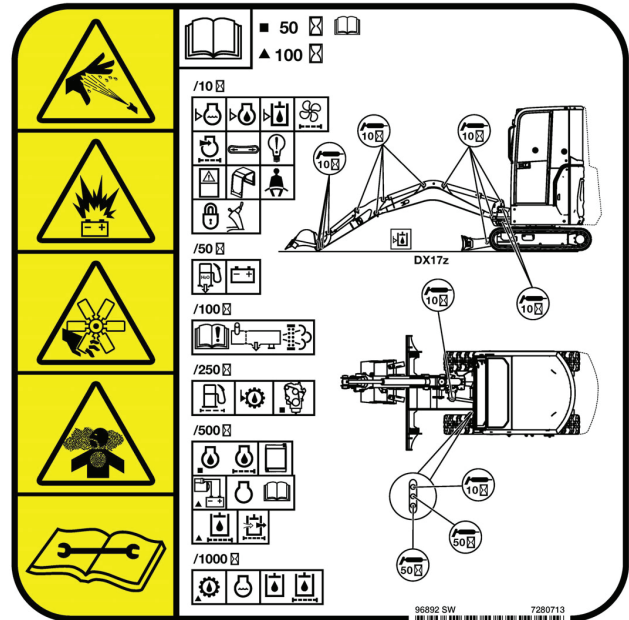
AVOID INJURY OR DEATH

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

W-2775-1208

11. High Pressure, Battery, Rotating Fan, Exhaust Gases and Service Schedule (7280713)

This safety sign is located inside the tailgate.



Leaking fluids under pressure can enter the skin and cause serious injury or death. Immediate medical attention is required. Wear goggles. Use cardboard to check for leaks.

Battery makes flammable and explosive gas. Keep arcs, sparks, flames and lighted tobacco away. Keep away from electrical contacts

Rotating fan can cause serious injury. Keep away from fan and moving parts. Do not operate with guard removed.

All exhaust gases can kill. Always ventilate.

Read and understand the Operation & Maintenance Manual for more information.

W-2522-0110

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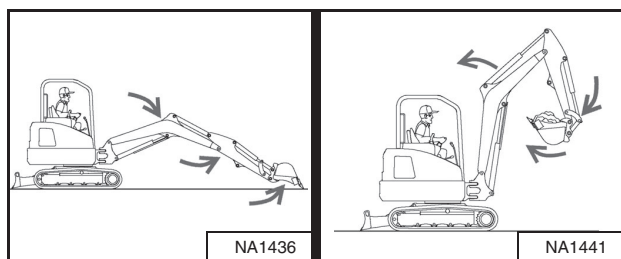
INTENDED USE

This machine is classified as an Excavator as defined in ISO 6165. This machine has tracks and commonly a mounted bucket for the principle intended functions of excavating, loading and backfilling loose materials such as earth, gravel, or crushed rock.

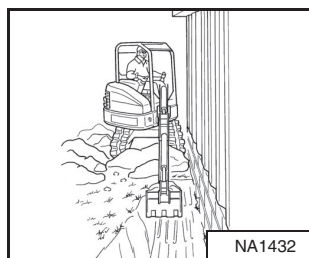
Additional Doosan approved attachments allow this machine to perform other tasks described in the attachment Operation & Maintenance Manuals.

Examples of intended use include:

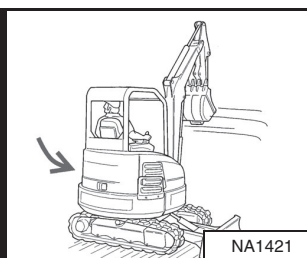
Excavating



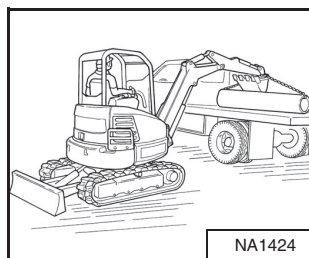
Boom Swing



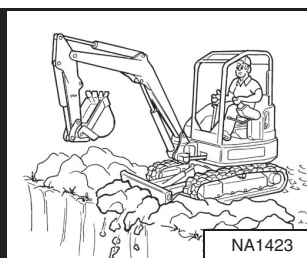
Rotating the Upperstructure



Loading Material



Backfilling



! WARNING

AVOID INJURY OR DEATH

Do not exceed rated lift capacity. Excessive load can cause tipping or loss of control.

W-2374-0500

! WARNING

AVOID INJURY OR DEATH

Check area to be excavated for overhead or underground electrical power lines. Keep a safe distance from electrical power lines.

VOLTAGE	MINIMUM DISTANCE
up to 50 kV	3 m (10 ft)
beyond 50 kV	5 m (17 ft)

W-2757-EN-0513

! WARNING

Keep all bystanders 6 m (20 ft) away from equipment when operating. Contact with moving parts, a trench cave-in or flying objects can cause injury or death.

W-2119-0910

IMPORTANT

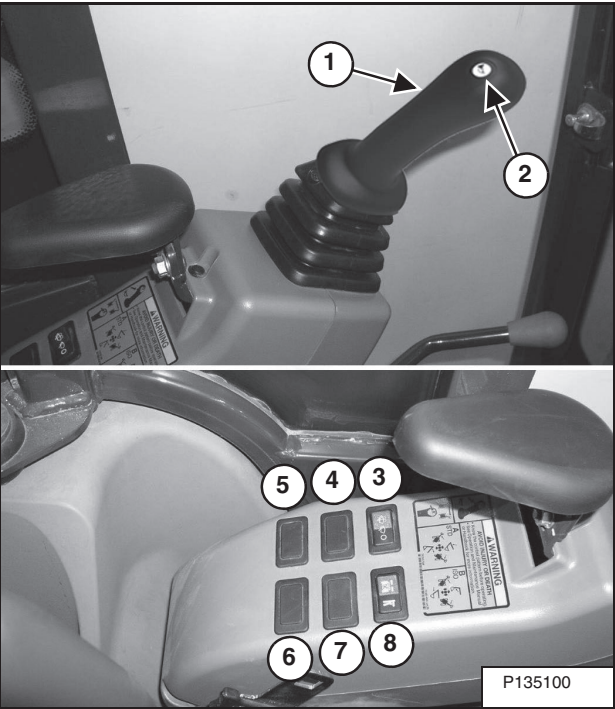
Avoid impacting objects with the blade. Damage to blade and undercarriage components may occur.

I-2256-0507

INSTRUMENTS AND CONSOLES

Left Console

Figure 4



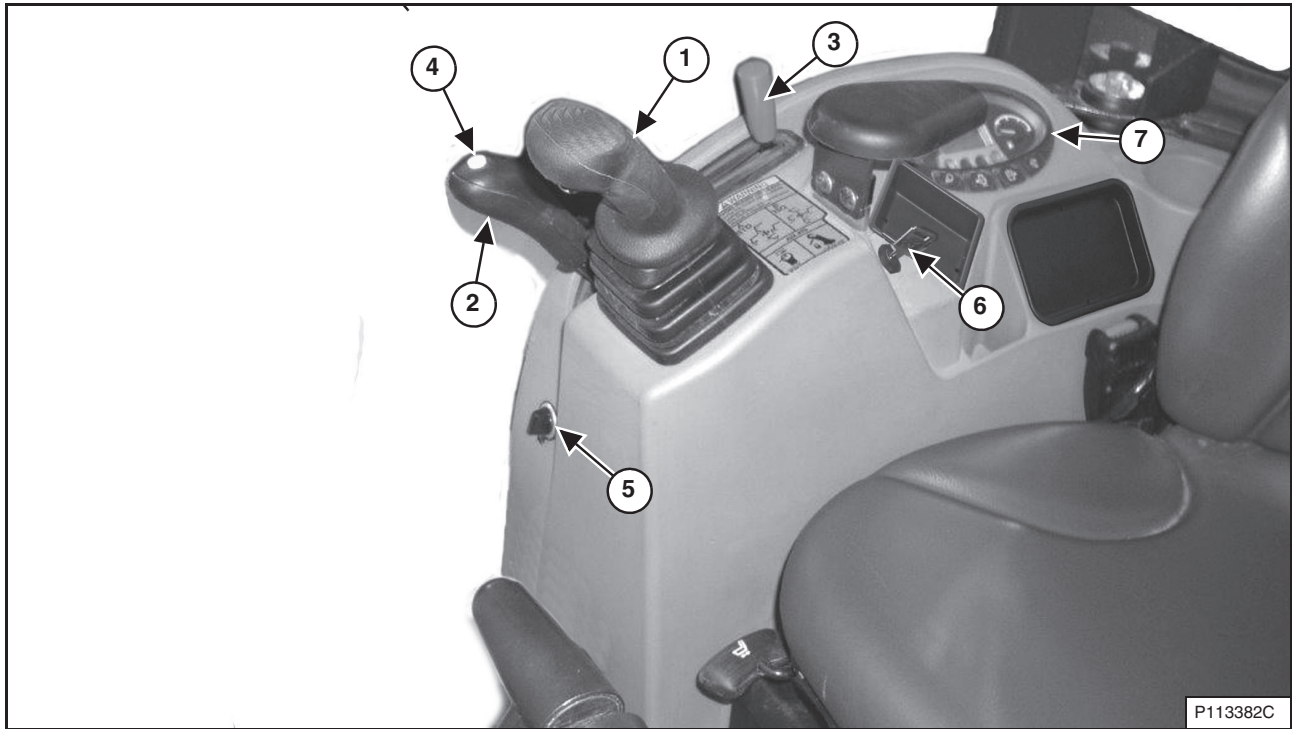
Left Console [Figure 4]

REF. NO	DESCRIPTION	FUNCTION / OPERATION
1	Left Joystick	(See HYDRAULIC CONTROLS on Page 32.)
2	Horn	Press the button on the left joystick to sound horn.
3	Not Used	- - -
4	Not Used	- - -
5	Beacon / Strobe Light (If Equipped)	Press switch to the left to turn ON the beacon / Strobe light. Press the switch to the right to turn OFF.
6	Not Used	- - -
7	Blade / Track Retraction - Expansion Switch	Press the switch to the left to expand / retract the tracks. Press the switch to the right to raise and lower the boom. (See TRACK FRAME RETRACTION - EXPANSION on Page 35.)
8	Not Used	- - -

INSTRUMENTS AND CONSOLES (CONT'D)

Right Console

Figure 5



REF	DESCRIPTION	FUNCTION / OPERATION
1	Right Joystick	(See HYDRAULIC CONTROLS on Page 32.)
2	Blade Control Lever / Track Retraction - Expansion Lever	Controls raising and lowering the blade. (See BLADE CONTROL LEVER on Page 34.) Controls extending and retracting the tracks. (See TRACK FRAME RETRACTION - EXPANSION on Page 35.)
3	Engine Speed Control Lever	Controls rpm of the engine. (See ENGINE SPEED CONTROL on Page 34.)
4	Two-Speed Button	Engages and disengages High Range Travel Speed. (See Two-Speed Travel on Page 29.)
5	Auxiliary Power Outlet	12 volt receptacle for accessories.
6	Key Switch	Always perform the <i>PRE-STARTING PROCEDURE</i> , (See PRE-STARTING PROCEDURE on Page 40.) before starting the engine. (See STARTING THE ENGINE on Page 42.)
7	Instrument Panel	(See Instrument Panel on Page 26.)

NOTE: Always turn key switch and all accessories to OFF position when the engine is stopped, the battery will discharge if the key is left ON.

INSTRUMENTS AND CONSOLES (CONT'D)

Instrument Panel

Figure 6



P-97989A

REF. NO.	DESCRIPTION	FUNCTION / OPERATION
1	Lights	Press once for work lights. (Left green LED illuminates.) Press again to turn all lights off. (Left green LED off.) Press and hold 5 seconds to display software version in display screen.
2		Not used for this model.
3		Not used for this model.
4	Information	Cycles through (after each button press) (The following information is displayed in the Data Display Screen, Item 6): • Hourmeter (On startup) • Job Clock (1 and 2) • Engine rpm • Battery voltage • Maintenance clock (Press and hold 7 seconds when displayed to reset the maintenance clock.) • Service codes*
5	Engine Temperature Gauge	Shows the engine coolant temperature.
6	Data Display Screen	The data display screen shows the Hourmeter at start up and then changes to engine rpm during normal operation of the excavator. When preheat is activated, the display screen will show the remaining preheat time. Can also be used to display Job Clock, Engine rpm, and Selectable Auxiliary Hydraulic Flow. (See Data Display Screen on Page 28.)
7	Fuel Gauge	Shows the amount of fuel in the tank.
8	Seat Belt	Fasten Seat Belt Reminder - Light stays on for 45 seconds to remind operator to fasten seat belt.

INSTRUMENTS AND CONSOLES (CONT'D)

Instrument Panel (Cont'd)

REF. NO.	DESCRIPTION	FUNCTION / OPERATION
9		Not used for this model.
10		Not used for this model.
11	Left Console Lockout	Icon ON when left console is raised. Icon OFF when left console is lowered.
12	General Warning **	Malfunction with one or more machine functions. (See DIAGNOSTIC SERVICE CODES on Page 105.)
13	High Range Engaged ***	Icon is illuminated when two-speed travel is enabled.
14	Engine Coolant Temperature **	Engine coolant temperature high or sensor error.
15	Engine Malfunction **	Engine malfunction or failure.
16	Hydraulic System Malfunction **	Hydraulic system malfunction or failure.
17	Fuel	Fuel level low or sensor error. (Icon is ON when fuel level is low, Icon flashes when fuel sensor fault is activated.)
18		Not used for this model.
19		Not used for this model.
20		Not used for this model.
21		Not used for this model.

* See SYSTEM SETUP AND ANALYSIS for Service Code Description. (See DIAGNOSTIC SERVICE CODES on Page 105.)

** Icons will be ON or flashing when diagnostic system indicates a problem. (See DIAGNOSTIC SERVICE CODES on Page 105.)

*** Icons will be flashing when diagnostic system indicates a problem. (See DIAGNOSTIC SERVICE CODES on Page 105.)

INSTRUMENTS AND CONSOLES (CONT'D)

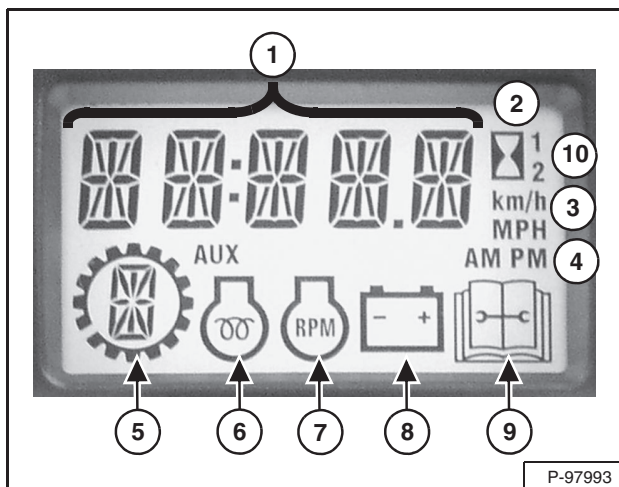
Data Display Screen

Indicator Icons

The display screen can display the following information:

- Operating hours
- Job Clock (1 and 2)
- Engine rpm
- Battery voltage
- Maintenance clock countdown
- Service codes

Figure 7



The display screen is shown in [Figure 7]. The data display will show operating hours upon startup.

1. Data Display
2. Hourmeter
3. Metric / English (Not Used For This Model)
4. Clock (Not Used For This Model)
5. Selectable Auxiliary Flow
6. Engine Preheat
7. Engine RPM
8. Battery / Charging Voltage
9. Service
10. Job Clock (1 and 2)

Raising And Lowering The Console

Raise the console before exiting the cab.

Figure 8



Pull up on the release handle [Figure 8]. The lift spring will assist in raising the console.

Lower the console before operating the excavator.

Push down on the console [Figure 8] until the latch is engaged.

NOTE: When the console is raised, the hydraulic and traction system functions are locked and will not operate.

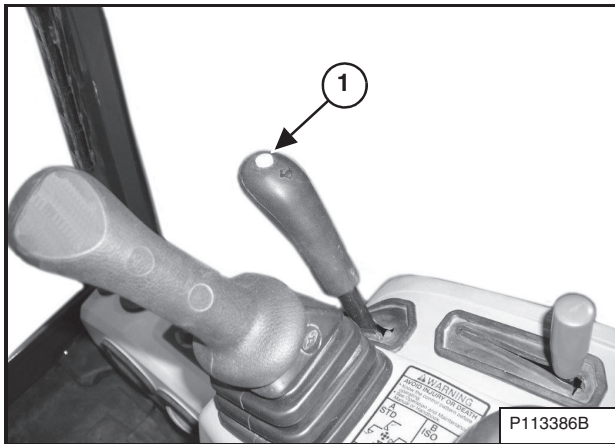
If the engine stops, the boom / bucket (attachments) can be lowered to the ground using hydraulic pressure in the accumulator.

The control console must be in the locked down position, and the key switch in the ON position.

INSTRUMENTS AND CONSOLES (CONT'D)

Two-Speed Travel

Figure 9



Press the button (Item 1) **[Figure 9]** to engage the high range. Press a second time to disengage.

NOTE: When engaging high range, two audible beeps will be heard. When engaging low range, one audible beep will be heard.

Figure 10



When high range is engaged, the two-speed travel icon (Item 1) **[Figure 10]** will illuminate.

Press the button (Item 1) **[Figure 9]** again to disengage.

OPERATOR CANOPY (ROPS)

Description

The Doosan excavator has an operator canopy (ROPS) as standard equipment to protect the operator if the excavator is tipped over. The seat belt must be worn for ROPS protection.

Check the ROPS canopy, mounting, and hardware for damage. Never modify the ROPS canopy. Replace the canopy and hardware if damaged. See your Doosan dealer for parts.

ROPS - Roll-Over Protective Structure per ISO 12117-2:2008.

WARNING

Never modify operator cab by welding, grinding, drilling holes or adding attachments unless instructed to do so by Doosan Company. Changes to the cab can cause loss of operator protection from rollover and falling objects, and result in injury or death.

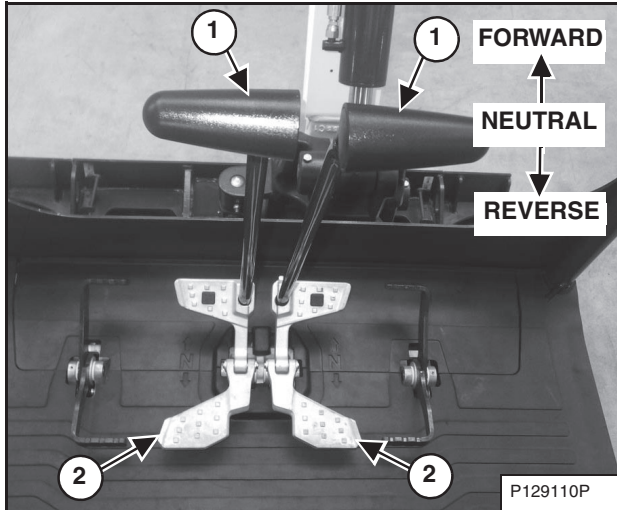
W-2069DH-0117

TRAVEL CONTROLS

Forward And Reverse Travel

NOTE: The following procedures describe forward, reverse, left, and right as seated in the operator's seat.

Figure 11



Put the blade so that it is at the front of the machine (as you sit in the operator's seat). Slowly move both steering levers* (Item 1) [Figure 11] forward for forward travel; backward for reverse travel.

* Travel can also be controlled with foot pedals (Item 2) [Figure 11]. Pivot the heel of the pedals forward for additional space on the floor.

WARNING

AVOID INJURY OR DEATH

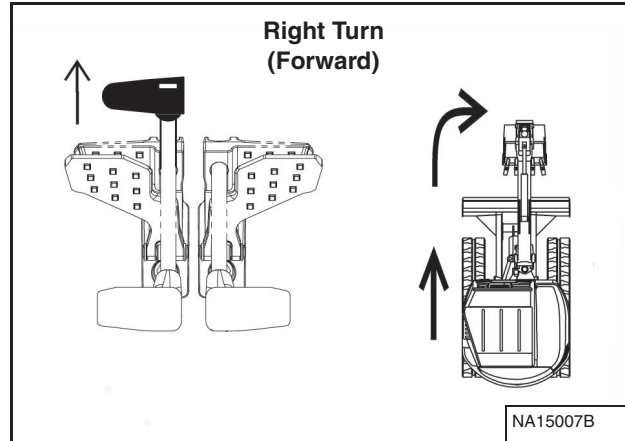
- Check the blade location before travelling. When the blade is to the rear, operate the steering levers / foot pedals in the opposite direction to when the blade is in the front.
- Move the steering levers / foot pedals slowly. Abrupt lever motion will cause the machine to jerk.

W-2235-EN-1009

Turning

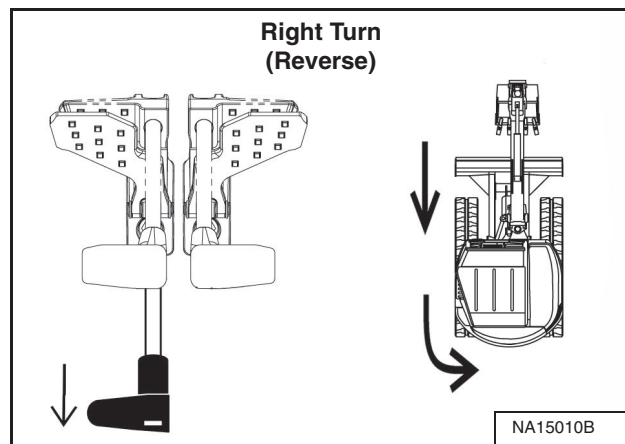
Right Turn

Figure 12



Push the left steering lever forward to turn right [Figure 12] while travelling forward.

Figure 13



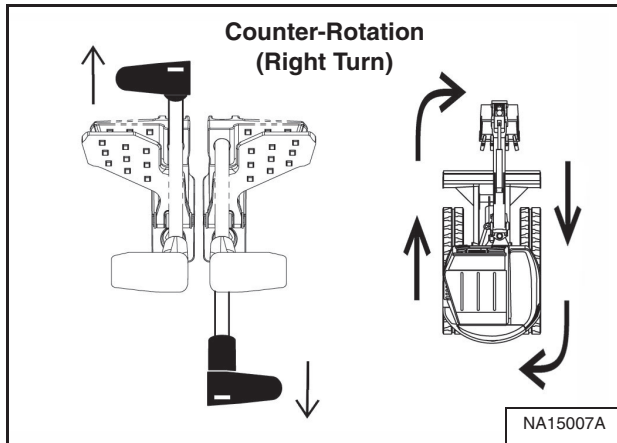
Pull the left steering lever backward to turn right while travelling backward [Figure 13].

TRAVEL CONTROLS (CONT'D)

Turning (Cont'd)

Counter-Rotation Right Turn

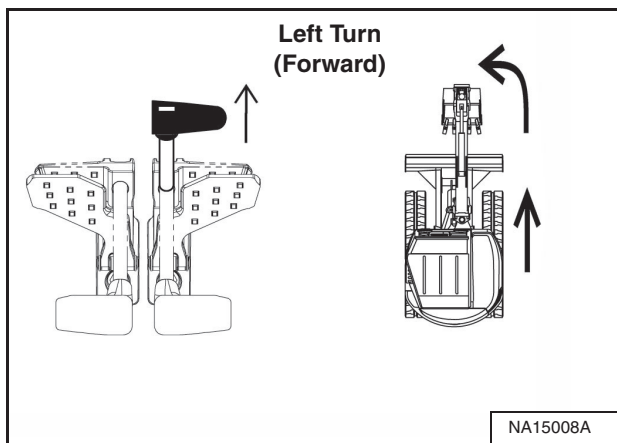
Figure 14



Push the left steering lever forward and pull the right steering lever backward [Figure 14].

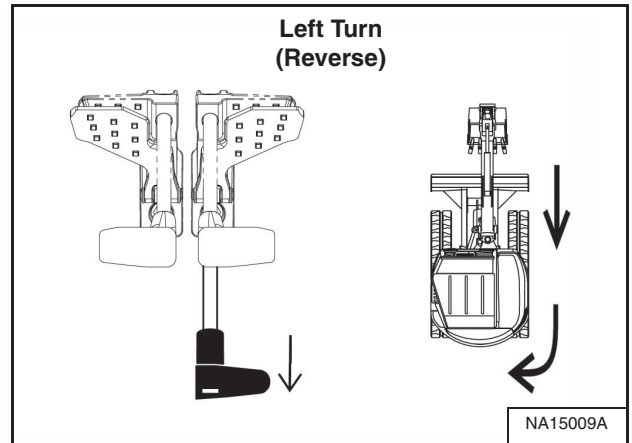
Left Turn

Figure 15



Push the right steering lever forward to turn left while travelling forward [Figure 15].

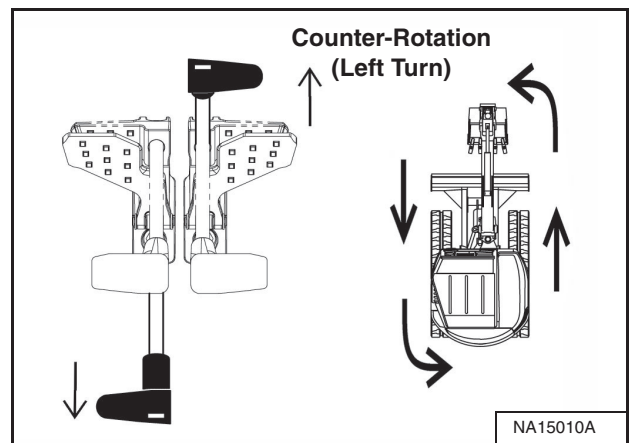
Figure 16



Pull the right steering lever backward to turn left while travelling backward [Figure 16].

Counter-Rotation Left Turn

Figure 17



Push the right steering lever forward and pull the left steering lever backward [Figure 17].

HYDRAULIC CONTROLS

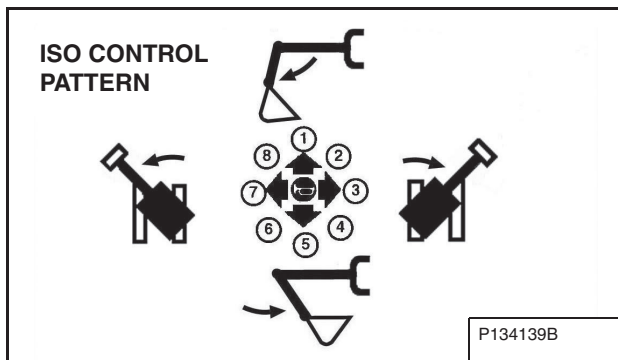
ISO Control Pattern

Left Control Lever (Joystick)

Figure 18



Figure 19



The left lever (joystick) is used to operate the arm and slew the upperstructure [Figure 18].

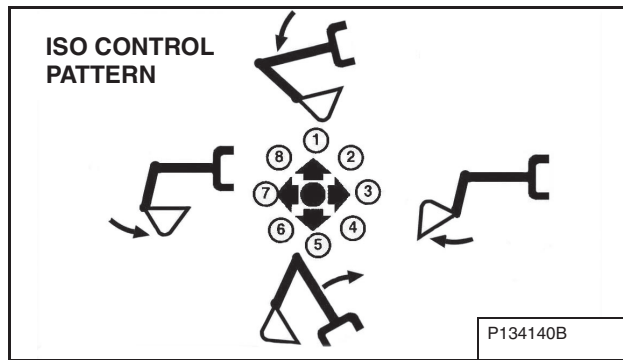
1. Arm out.
2. Arm out and slew right.
3. Slew right.
4. Arm in and slew right.
5. Arm in.
6. Arm in and slew left.
7. Slew left.
8. Arm out and slew left.

Right Control Lever (Joystick)

Figure 20



Figure 21



The right lever (joystick) is used to operate the boom and bucket [Figure 20].

1. Boom lower.
2. Boom lower and bucket dump.
3. Bucket dump.
4. Boom raise and bucket dump.
5. Boom raise.
6. Boom raise and bucket curl.
7. Bucket curl.
8. Boom lower and bucket curl.

WARNING

AVOID INJURY OR DEATH

Before leaving the machine:

- Lower the work equipment to the ground.
- Lower the blade to the ground.
- Stop the engine and remove the key.
- Raise the control console.

W-2780-0109

HYDRAULIC CONTROLS (CONT'D)

Hydraulic Lines

WARNING

AVOID BURNS

Hydraulic fluid, tubes, fittings and quick couplers can get hot when running machine and attachments. Be careful when connecting and disconnecting quick couplers.

W-2220-0396

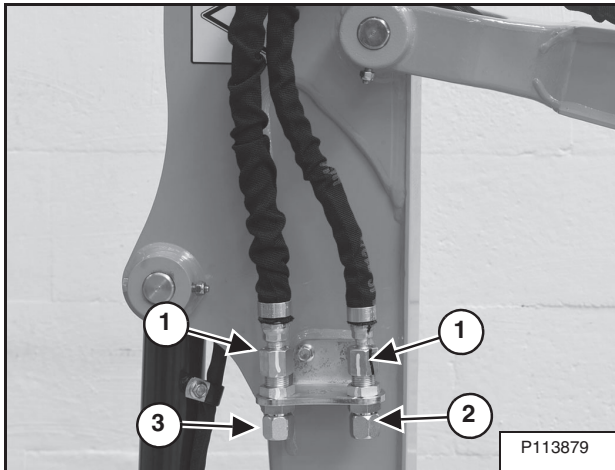
WARNING

AVOID INJURY OR DEATH

Diesel fuel or hydraulic fluid under pressure can penetrate skin or eyes, causing serious injury or death. Fluid leaks under pressure may not be visible. Use a piece of cardboard or wood to find leaks. Do not use your bare hand. Wear safety goggles. If fluid enters skin or eyes, get immediate medical attention from a doctor familiar with this injury.

W-2072-EN-0909

Figure 22

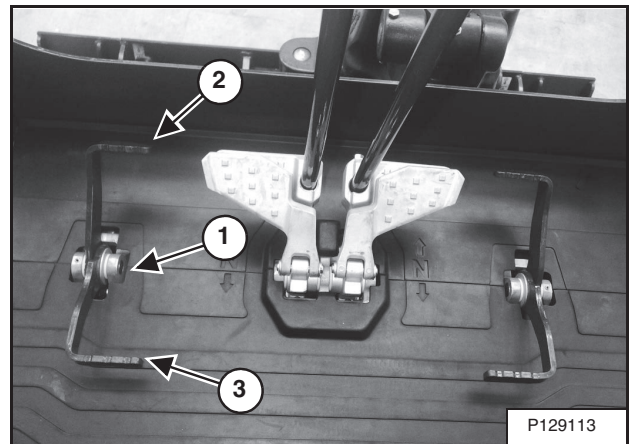


The excavator is supplied with hydraulic lines (Item 1) [Figure 22] that supply the hydraulic fluid for attachments.

Fitting caps (Item 2 and 3) [Figure 22] are on the ends of the lines.

Auxiliary Hydraulics

Figure 23



Press the toe of the pedal (Item 2) [Figure 23] to supply hydraulic flow to the hydraulic line (Item 2) [Figure 22].

Press the heel of the pedal (Item 3) [Figure 23] to supply hydraulic flow to the hydraulic line (Item 3) [Figure 22].

Relieve Hydraulic Pressure (Excavator And Attachment)

Put the attachment flat on the ground.

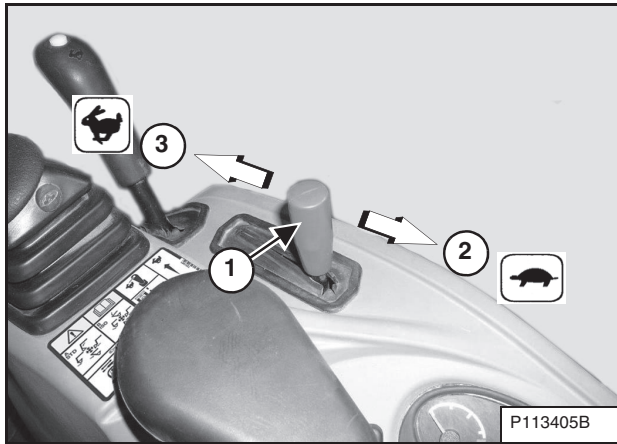
Stop the engine.

With the engine off, move the pedal (Item 1) [Figure 23] in both directions several times.

ENGINE SPEED CONTROL

Setting Engine Speed (RPM)

Figure 24



The engine speed control lever (Item 1) [Figure 24] controls engine rpm.

Move the engine speed control lever back (Item 2) to reduce engine rpm. Move the engine speed control dial forward (Item 3) [Figure 24] to increase engine rpm.

BLADE CONTROL LEVER

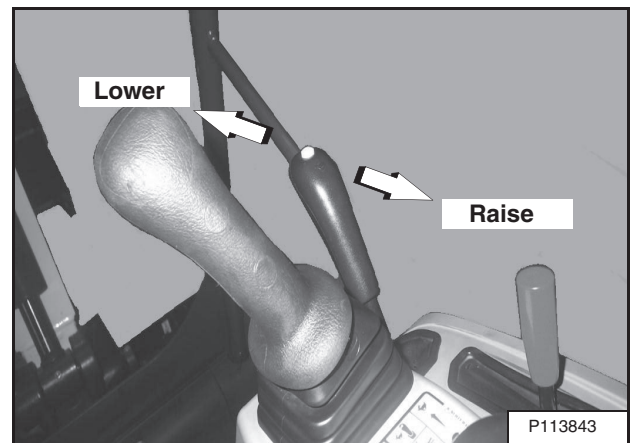
Raising And Lowering Blade

Figure 25



Push the Blade / Track Retraction - Expansion Switch (Item 1) [Figure 25] to the Blade position.

Figure 26



Move the Blade / Track Retraction - Expansion Lever forward to lower the blade [Figure 26].

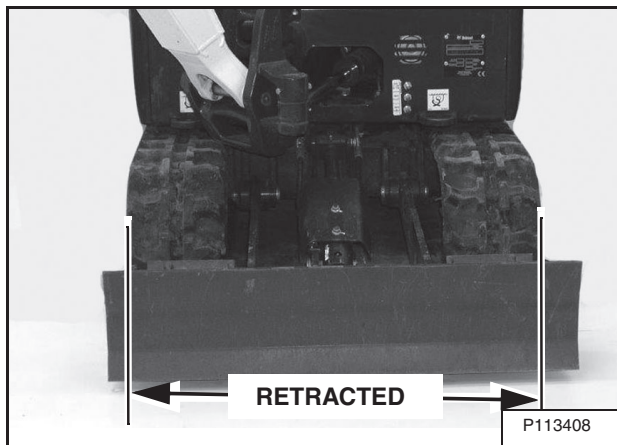
Move the Blade / Track Retraction - Expansion Lever backward to raise the blade [Figure 26].

NOTE: Keep blade lowered for increased digging performance.

TRACK FRAME RETRACTION - EXPANSION

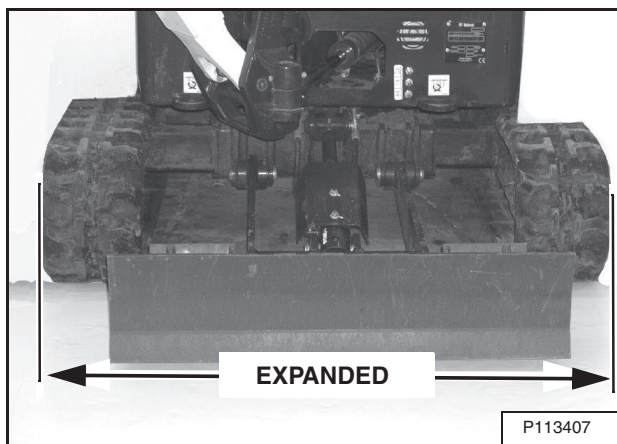
Operation

Figure 27



The excavator can be operated with the track frame retracted for transportation on a trailer or to access narrow areas [Figure 27].

Figure 28



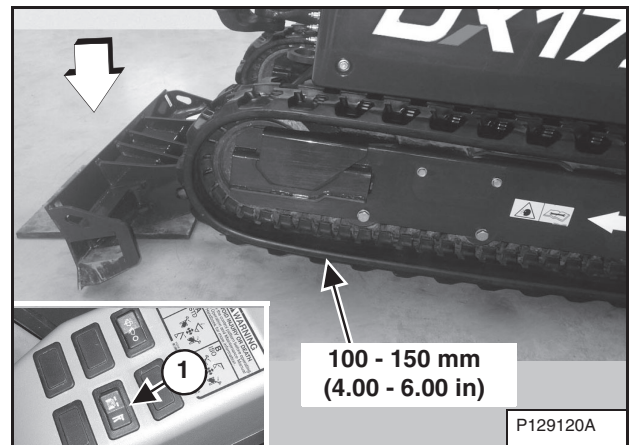
Expand the track frame for increased digging performance [Figure 28].

IMPORTANT

To prevent wear and damage to the track, always lift the excavator before expanding or retracting the track frame.

I-2193-0599

Figure 29

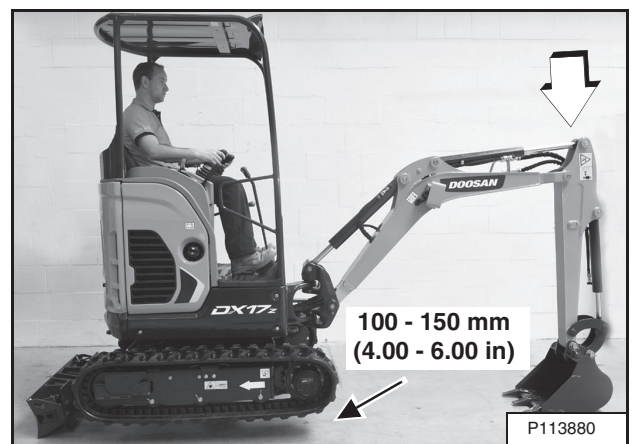


Push the Blade / Track Retraction - Expansion Switch (Item 1) [Figure 29] to the right in the Blade position.

With the boom and arm positioned over the blade, lower the blade until the track is raised 100 – 150 mm (4.00 – 6.00 in) off the ground [Figure 29].

Rotate the upperstructure 180 degrees.

Figure 30

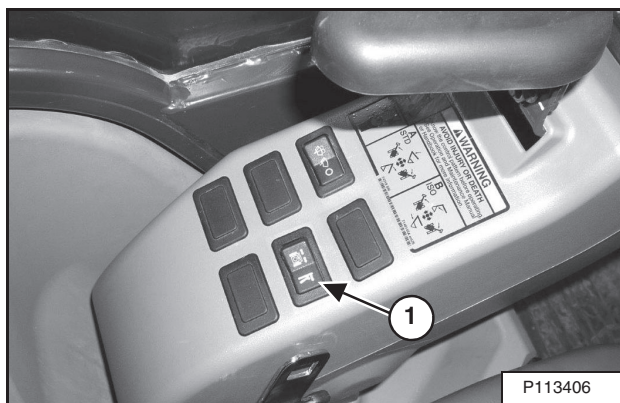


Lower the boom and arm to raise the excavator until the track is 100 – 150 mm (4.00 – 6.00 in) off the ground [Figure 30].

TRACK FRAME RETRACTION - EXPANSION (CONT'D)

Operation (Cont'd)

Figure 31



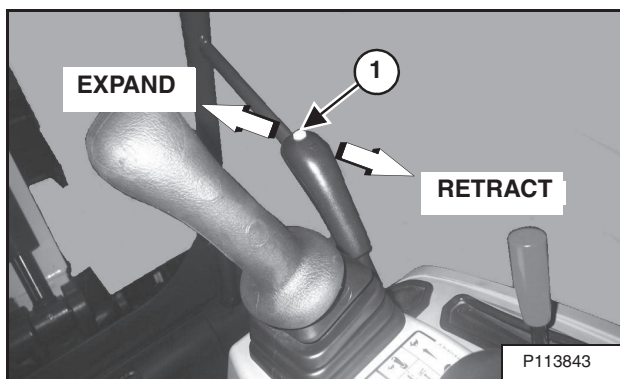
Push the Blade / Track Retraction - Expansion Switch (Item 1) [Figure 31] to the Track Retraction - Expansion position.

IMPORTANT

To prevent wear and damage to the track, always lift the excavator before expanding or retracting the track frame.

I-2193-0599

Figure 32

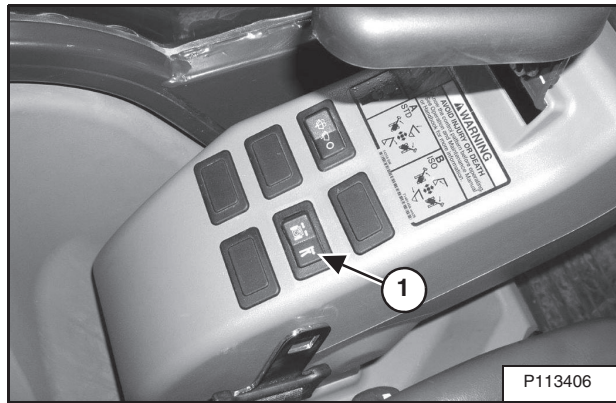


Push the Blade / Track Retraction - Expansion Lever (Item 1) [Figure 32] forward to expand the track frame. Hold the lever forward until the track frame is fully expanded.

Pull the Blade / Track Retraction - Expansion Lever [Figure 32] back to retract the track frame. Hold the lever back until the track frame is fully retracted.

The track frame must be either in the fully expanded or fully retracted position when in use.

Figure 33



NOTE: Always return the Blade / Track Retraction - Expansion Switch (Item 1) [Figure 33] to the Blade position during operation so that the track does not move when using the Blade / Track Retract - Expansion Lever.

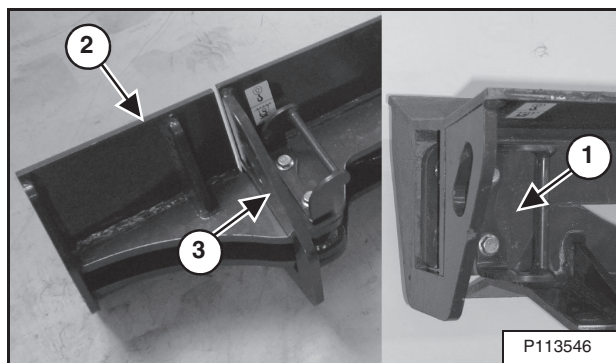
Raise the boom and arm to lower the rear of the excavator to the ground.

Rotate the upperstructure 180 degrees.

Raise the blade until the tracks are on the ground.

Blade Expansion

Figure 34



Raise the blade slightly and place a block under the blade. Lower the blade fully.

Remove the blade retainer pin assembly (Item 1) [Figure 34].

Remove and reposition the blade extension (Item 2) [Figure 34] to the outside blade position.

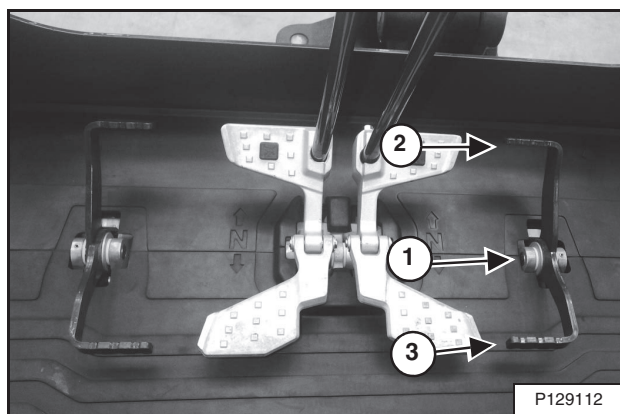
Reinstall the blade retainer pin assembly (Item 3) [Figure 34].

NOTE: Always operate the machine with the tracks fully expanded or fully retracted.

BOOM SWING

Operation

Figure 35



The boom swing pedal (Item 1) controls boom swing. Press the toe (Item 2) of the pedal to swing the boom to the right. Press the heel (Item 3) of the pedal to swing the boom to the left.

Figure 36



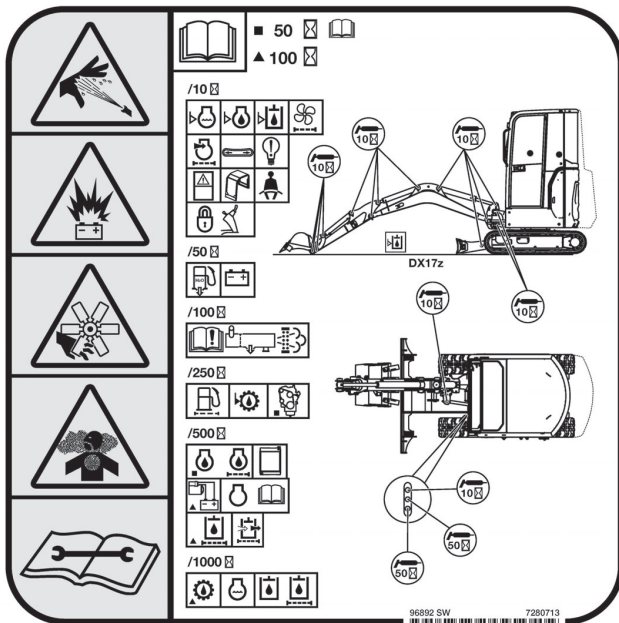
NOTE: The purpose of the boom swing is to offset the boom with respect to the upperstructure for digging close to a structure [Figure 36].

DAILY INSPECTION

Daily Inspection And Maintenance

Maintenance work must be done at regular intervals. Failure to do so will result in excessive wear and early failures. The service schedule is a guide for correct maintenance of the Doosan excavator.

Figure 37



The Service Schedule decal [Figure 37] is located on the inside of the tailgate. A complete list of scheduled maintenance tasks is also located in the Service Schedule (See SERVICE SCHEDULE on Page 66.)

! WARNING

Operator must have instructions before operating the machine. Untrained operators can cause injury or death.

W-2001-0502

NOTE: Fluids such as engine oil, hydraulic fluid, coolant, etc. must be disposed of in an environmentally safe manner. Some regulations require that certain spills and leaks on the ground must be cleaned in a specific manner. See local, state and federal regulations for correct disposal.

! WARNING

AVOID INJURY OR DEATH

Instructions are necessary before operating or servicing machine. Read and understand the Operation & Maintenance Manual, Operator's Handbook 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 injury or death.

W-2003-0807

IMPORTANT

This machine is factory equipped with a spark arrester exhaust system.

The spark arrester muffler, if equipped, must be cleaned to keep it in working condition. The spark arrester muffler must be serviced by dumping the spark chamber every 100 hours of operation.

On some models, the turbocharger functions as the spark arrester and must operate correctly for proper spark arrester function.

If this machine is operated on flammable forest, brush, or grass covered land, a spark arrester attached to the exhaust system may be required and must be maintained in working order. Refer to local laws and regulations for spark arrester requirements.

I-2284-EN-0909

DAILY INSPECTION (CONT'D)

Daily Inspection and Maintenance (Cont'd)

Check the following items before each day of operation:

- Operator Canopy (ROPS) and mounting hardware.
- Check seat belt and mounting hardware. Replace seat belt if damaged.
- Check for damaged decals, replace as needed.
- Check control console lockouts.
- Check the Attachment Mounting System (if equipped) for damaged or loose parts.
- Check air cleaner and intake hoses / clamps.
- Drain water from fuel filter.
- Check engine oil level and engine for leaks.
- Check engine coolant level (in both the coolant recovery tank and in the radiator) and system for leaks.
- Check engine area for flammable materials.
- Check hydraulic fluid level and system for leaks.
- Check indicator lights for correct operation.
- Grease all pivot points.
- Check cylinder and attachment pivot points.
- Check the track tension.
- Repair broken and loose parts.
- Check front horn and motion alarm (if equipped) for proper function.



WARNING

AVOID INJURY OR DEATH

- Keep door / cover closed except for service.
- Keep engine clean of flammable material.
- Keep body, loose objects and clothing away from electrical contacts, moving parts, hot parts and exhaust.
- Do not use the machine in space with explosive dusts or gases or with flammable material near exhaust.
- Never use ether or starting fluid on diesel engine with glow plugs or air intake heater. Use only starting aids as approved by engine manufacturer.
- Leaking fluids under pressure can enter skin and cause serious injury.
- Battery acid causes severe burns; wear goggles. If acid contacts eyes, skin, or clothing, flush with water. For contact with eyes, flush and get medical attention.
- Battery makes flammable and explosive gas. Keep arcs, sparks, flames and lighted tobacco away.
- For jump start, connect negative cable to the machine engine last (never at the battery). After jump start, remove negative connection at the engine first.
- Exhaust gases can kill. Always ventilate.

W-2782-0409

IMPORTANT

PRESSURE WASHING DECALS

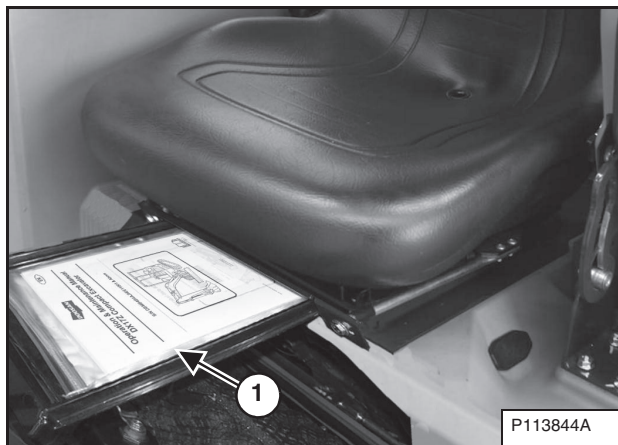
- Never direct the stream at a low angle toward the decal that could damage the decal causing it to peel from the surface.
- Direct the stream at a 90 degree angle and at least 300 mm (12 in) from the decal. Wash from the center of the decal toward the edges.

I-2226-0910

PRE-STARTING PROCEDURE

Operation & Maintenance Manual And Operator's Handbook Locations

Figure 38



Read and understand the Operation & Maintenance Manual (Item 1) [Figure 38] (located inside the storage box below the operator's seat) before operating.

Entering The Excavator

Figure 39



Use the grab handles and tracks to enter the canopy / cab [Figure 39].

WARNING

AVOID INJURY OR DEATH

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 injury or death.

W-2003-EN-0614

PRE-STARTING PROCEDURE (CONT'D)

Seat Adjustment

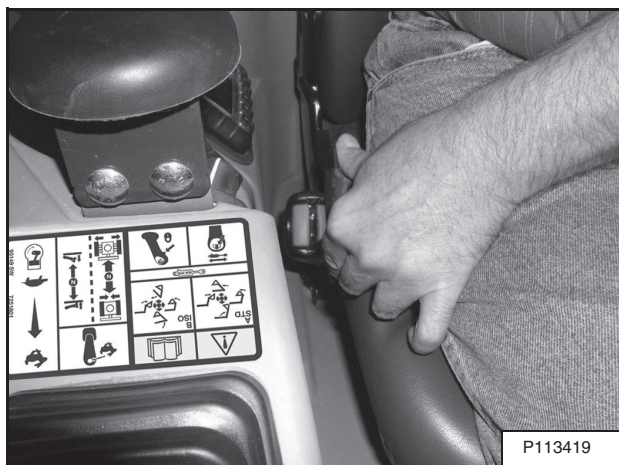
Figure 40



The seat has no adjustments [Figure 40].

Seat Belt

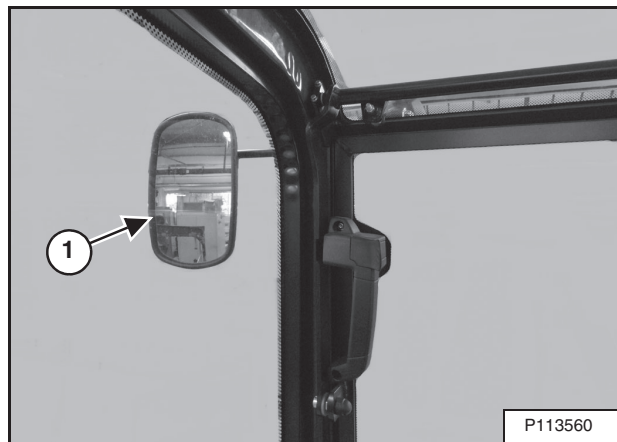
Figure 41



Fasten the seat belt [Figure 41].

Mirror Adjustment

Figure 42



Adjust mirror(s) (Item 1) [Figure 42] (if equipped).

STARTING THE ENGINE

Key Switch

! WARNING

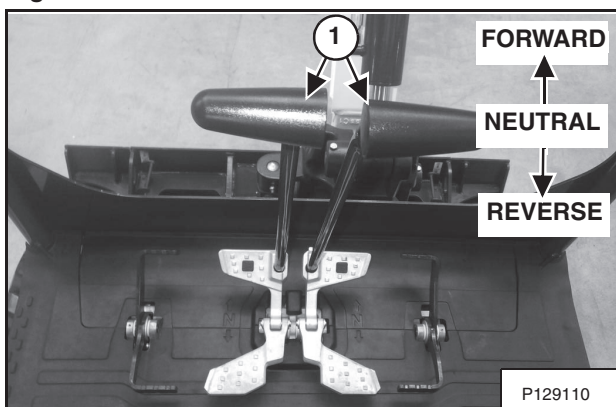
AVOID INJURY OR DEATH

- Fasten seat belt, start and operate only from the operator's seat.
- Never wear loose clothing when working near machine.

W-2135-1108

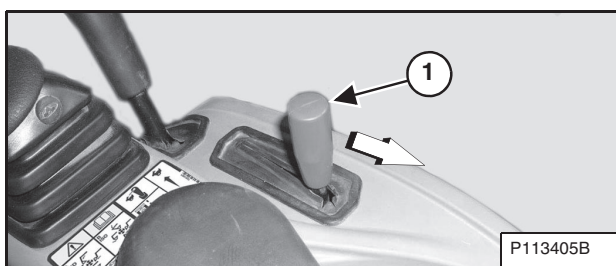
Perform the PRE-STARTING PROCEDURE. (See PRE-STARTING PROCEDURE on Page 40.)

Figure 43



Put control levers (Item 1) [Figure 43] in the NEUTRAL position.

Figure 44



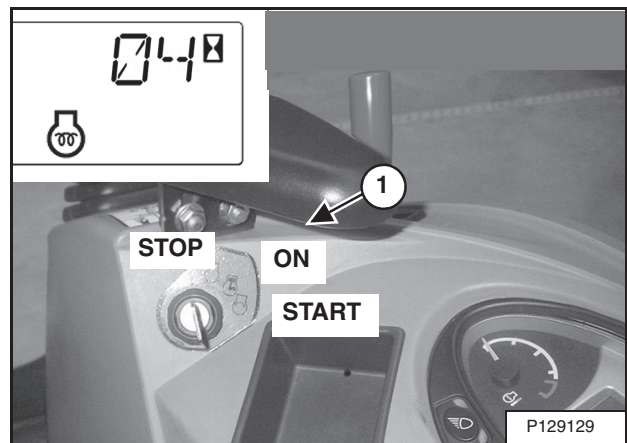
Move the engine speed control lever (Item 1) [Figure 44] back to low idle.

IMPORTANT

Do not engage the starter for longer than 15 seconds at a time. Longer use can damage the starter by overheating. Allow starter to cool for one minute before using starter again.

I-2034-0700

Figure 45



Turn the key (Item 1) [Figure 45] to the ON position. If preheating is required, the glow plugs will automatically cycle and the remaining preheat time (in seconds) will show in the data display screen (see inset). (Preheat icon will be ON).

NOTE: It is recommended in cold weather to cycle the glow plugs twice before attempting to start the engine. This will allow for additional heating time for cold weather starting.

Turn the key to START and release the key when the engine starts. It will return to the ON position [Figure 45].

Stop the engine if the warning lights and alarm do not go OFF. Check for the cause before starting the engine again.

Turn the key switch OFF to stop the engine.

! WARNING

AVOID INJURY OR DEATH

When an engine is running in an enclosed area, fresh air must be added to avoid concentration of exhaust fumes. If the engine is stationary, vent the exhaust outside. Exhaust fumes contain odorless, invisible gases which can kill without warning.

W-2050-0807

! WARNING

AVOID SERIOUS INJURY OR DEATH

- Engines can have hot parts and hot exhaust gas. Keep flammable material away.
- Do not use machines in atmosphere containing explosive dust or gases.

W-2051-0212

STARTING THE ENGINE (CONT'D)

Lowering The Control Console

Figure 46



Lower the control console [Figure 46].

NOTE: There is a control lock sensor in the left console which deactivates the hydraulic control levers (joysticks) and the traction drive system when the control console is raised. The console must be in the locked down position for the hydraulic control levers (joysticks) and traction system to operate.

NOTE: If the control lock sensor does not deactivate the control levers and traction system when console is raised, see your Doosan dealer for service.

Warming The Hydraulic System

IMPORTANT

When the temperature is below -30°C (-20°F), hydrostatic oil must be warmed before starting. The hydrostatic system will not get enough oil at low temperatures and will be damaged. Park the machine in an area where the temperature will be above -18°C (0°F) if possible.

I-2007-0910

Let the engine run at least 5 minutes to warm the engine and hydraulic fluid before operating the excavator.

Cold Temperature Starting

! WARNING

EXPLOSION CAN CAUSE SERIOUS INJURY, DEATH OR SEVERE ENGINE DAMAGE
DO NOT use ether or starting fluid with glow plug or air intake heater systems.

W-2071-0415

If the temperature is below freezing, perform the following to make starting the engine easier:

- Replace the engine oil with the correct type and viscosity for the anticipated starting temperature. (See Engine Oil Chart on Page 78.)
- Make sure the battery is fully charged.
- Install an engine heater.

NOTE: If the battery is discharged (but not frozen) a booster battery can be used to jump start the excavator. (See Using A Booster Battery (Jump Starting) on Page 88.)

NOTE: The display screen on the instrument panel may not be at full intensity when the temperature is below -26°C (-15°F). The display screen may take 30 seconds to several minutes to warm up. All systems remain monitored even when the display screen is off.

MONITORING THE DISPLAY PANELS

Instrument Panel

Figure 47



Frequently monitor the temperature and fuel gauges [Figure 47].

After the engine is running, frequently monitor the instrument panel [Figure 47] for machine condition.

The associated icon is displayed if there is an error condition.

EXAMPLE: Engine Coolant Temperature is High.

The Engine Coolant Temperature icon (Item 1) [Figure 47] is ON.

Press the Information button (Item 2) [Figure 47] repeatedly to cycle the data display until the service code screen is displayed. One of the following SERVICE CODES is displayed.

- [M0810] Engine Coolant Temperature Too High
- [M0811] Engine Coolant Temperature Extremely High

Find the cause of the service code and correct before operating the excavator again. (See DIAGNOSTIC SERVICE CODES on Page 105.)

Warning And Shutdown

When a WARNING condition exists; the associated icon light is ON and the alarm sounds 3 beeps. If this condition is allowed to continue, there may be damage to the engine or hydraulic systems.

When a SHUTDOWN condition exists; the associated icon light is ON and the alarm sounds continuously. The monitoring system will automatically stop the engine in 15 seconds. The engine can be restarted to move or relocate the excavator.

The SHUTDOWN feature is associated with the following icons:

General Warning
Engine Malfunction
Engine Coolant Temperature

STOPPING THE ENGINE AND LEAVING THE EXCAVATOR

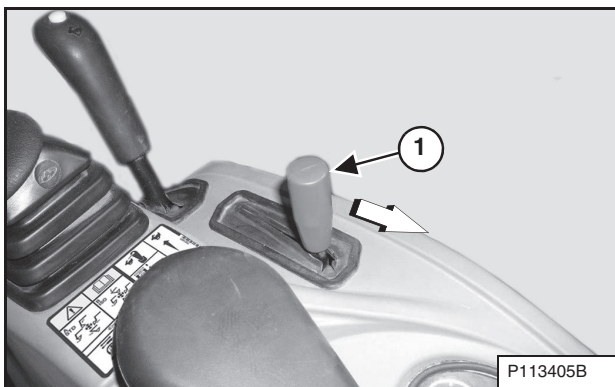
Procedure

Figure 48



Expand the tracks fully. Stop the machine on level ground. Lower the work equipment and the blade to the ground [Figure 48].

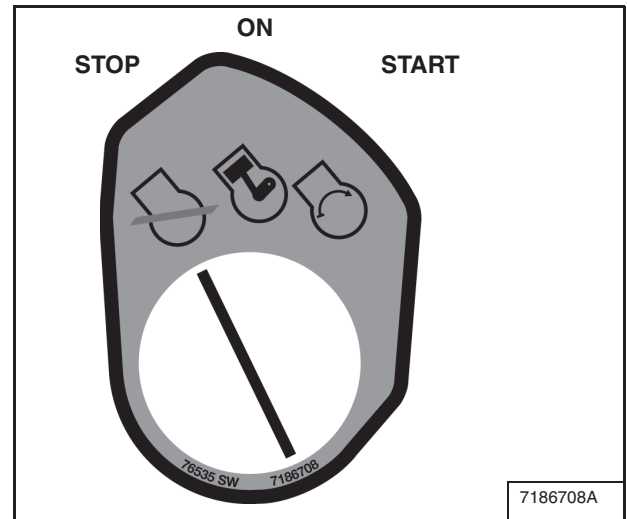
Figure 49



Move the engine speed control lever (Item 1) [Figure 49] back to low idle.

Run the engine at idle speed for about 5 minutes to allow it to cool.

Figure 50



Turn the switch to STOP [Figure 50].

Disconnect the seat belt. Remove the key from the switch (if equipped) to prevent operation of machine by unauthorised personnel. Raise the control console and exit the machine.

ATTACHMENTS

Installing And Removing The Attachment (Pin-On Attachment)

Installation

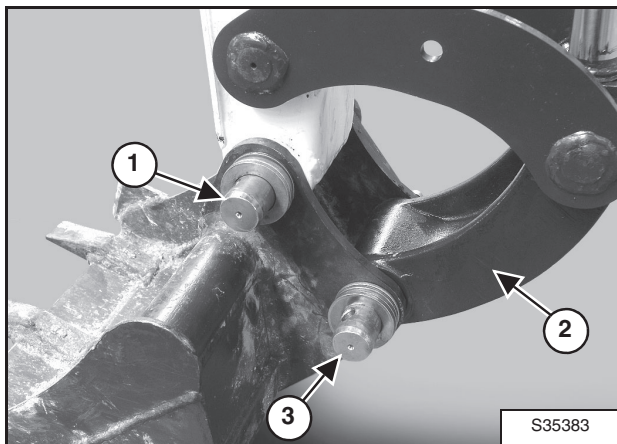
WARNING

AVOID INJURY OR DEATH

Stop the machine on a firm flat surface. When removing or installing attachments (such as a bucket), always have a second person in the operator's seat, give clear signals and work carefully.

W-2140-0189

Figure 51

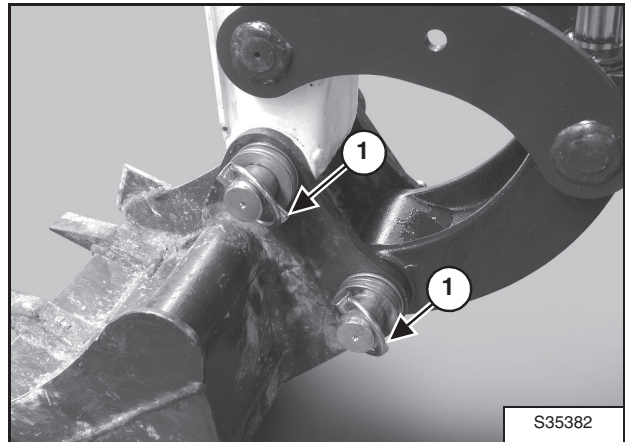


Install the arm into the bucket and align the mounting hole.

Install the pin (Item 1) [Figure 51] and washers.

Install the link (Item 2) in the bucket and align the mounting hole. Install the pin (Item 3) [Figure 51] and washers.

Figure 52



Install the two retainer pins (Item 1) [Figure 52]. Install grease in the grease fittings.

Removal

Park the excavator on a flat surface and lower the bucket fully.

Remove the two retainer pins (Item 1) [Figure 52].

Remove the washers and pins (Items 1 and 3) [Figure 51].

Do not damage the dust seals in the arm.

WARNING

AVOID INJURY OR DEATH

Never use attachments or buckets which are not approved by Doosan Company. Buckets and attachments for safe loads of specified densities are approved for each model. Unapproved attachments can cause injury or death.

W-2052-0117

ATTACHMENTS (CONT'D)

Installing And Removing The Attachment (German Style Coupler)

The type of quick coupler installed on the excavator may influence the excavator's rated lift capacity and the availability of attachments.

To determine the lift capacity changes, (See Lift Capacity on Page 53.).

For the rated lift capacity charts, (See Rated Lift Capacity - With Standard Arm and Canopy on Page 112.).

See your Doosan dealer for a list of approved attachments for the type of quick coupler installed on the machine.

NOTE: Coupler equipped with the lifting device can only be used on machines where the overload warning device and the boom and arm load holding valves are installed. See your Doosan dealer for available kits.

Installation

NOTE: Installation and removal of the bucket is shown. The procedure is the same for other attachments. Disconnect any hydraulic lines that are operated by hydraulic power before removing any attachments (breaker, auger, etc.).



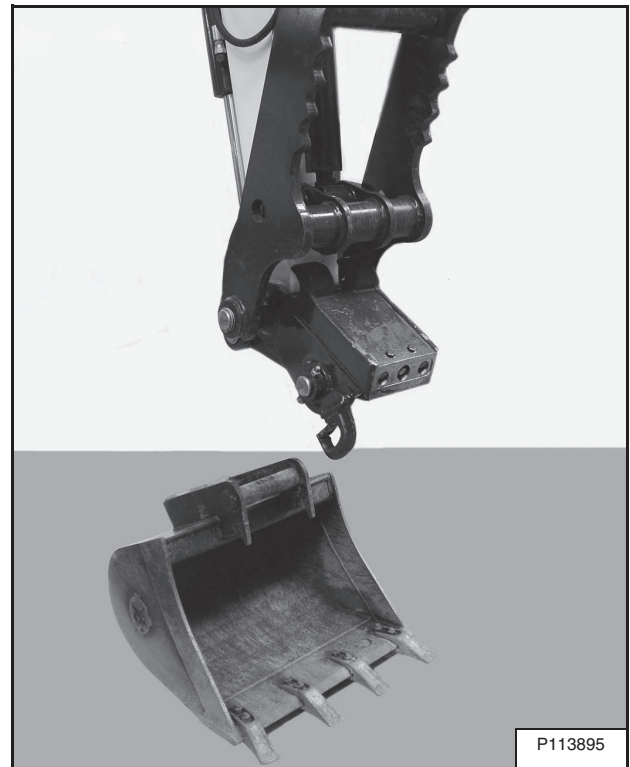
WARNING

AVOID INJURY OR DEATH

Never use attachments or buckets which are not approved by Doosan Company. Buckets and attachments for safe loads of specified densities are approved for each model. Unapproved attachments can cause injury or death.

W-2052-0117

Figure 53



Position the arm and quick coupler to the attachment [Figure 53].

NOTE: If equipped with a hydraulic clamp, fully retract the hydraulic clamp cylinder so the clamp is out of the way for installing the attachment.

ATTACHMENTS (CONT'D)

Installing And Removing The Attachment (German Style Coupler) (Cont'd)

Installation (Cont'd)

Figure 54

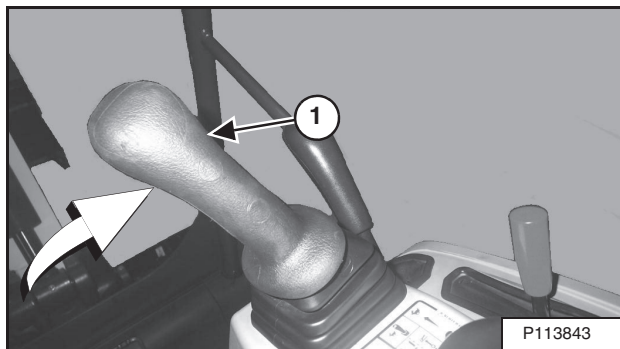
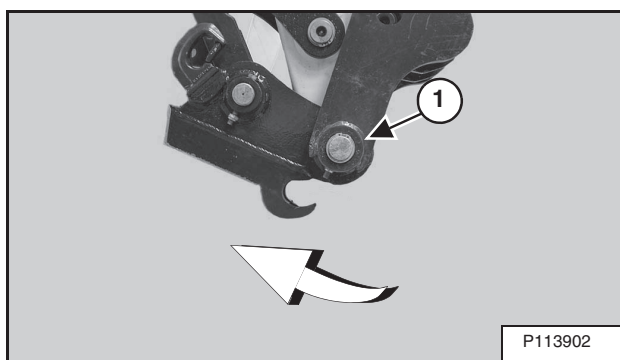


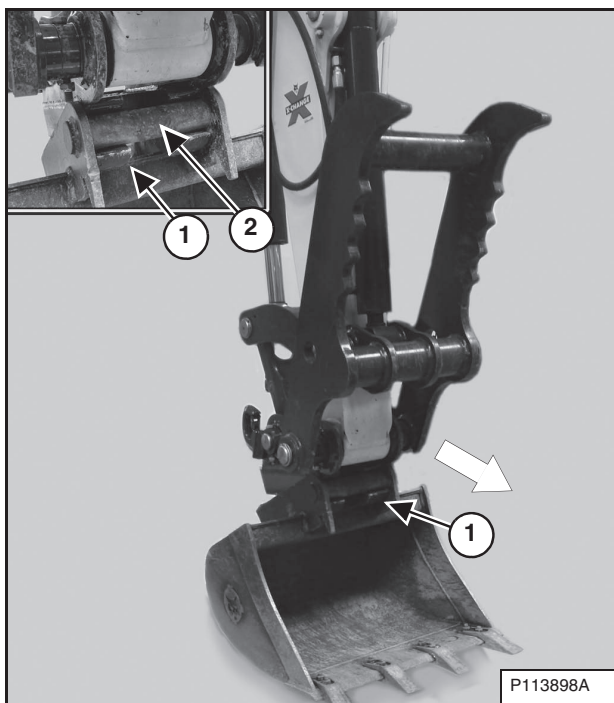
Figure 55



Move the right joystick (Item 1) [Figure 54] to the right (OUT) and curl the coupler (Item 1) [Figure 55] back away from the cab fully.

Lower the coupler onto the attachment.

Figure 56



Engage the coupler hooks (Item 1) onto the attachment shaft (Item 2) [Figure 56].

Figure 57



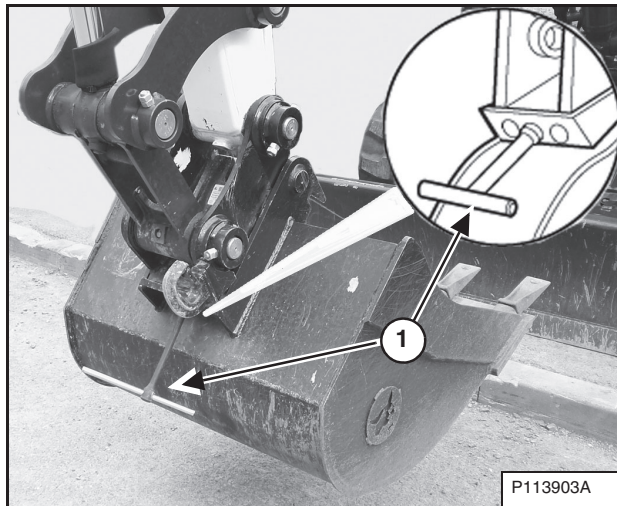
Move the right joystick (Item 1) [Figure 54] to the left (IN) and curl the coupler (Item 1) [Figure 57] toward the cab fully.

ATTACHMENTS (CONT'D)

Installing And Removing The Attachment (German Style Coupler) (Cont'd)

Installation (Cont'd)

Figure 58



Stop the engine and leave the machine. (See STOPPING THE ENGINE AND LEAVING THE EXCAVATOR on Page 45.)

Use the supplied wrench (Item 1) [Figure 58] and turn the wrench clockwise until the locking pins fully engaged.

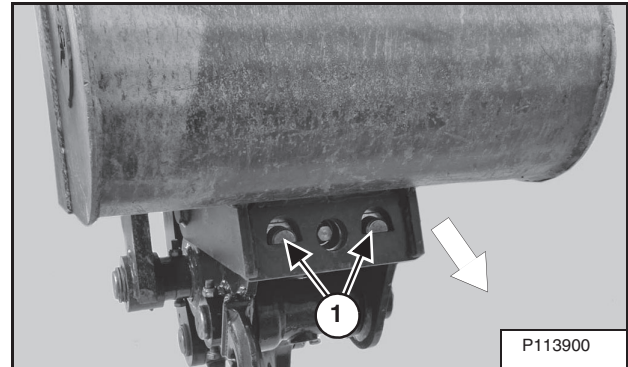
WARNING

AVOID INJURY OR DEATH

The quick coupler locking pins must be fully engaged and locked to the attachment pins. Failure to fully engage the locking pins can allow attachment to come off.

W-3023-0417

Figure 59



Visually check that the locking pins (Item 1) [Figure 59] are extended through the holes in the attachment mounting frame, securely fastening the attachment to the coupler.

If both locking pins do not engage in the locked position, see your Doosan dealer for service.

WARNING

Keep all bystanders 6 m (20 ft) away from equipment when operating. Contact with moving parts, a trench cave-in or flying objects can cause injury or death.

W-2119-0910

Enter the excavator, fasten the seat belt and start the engine. (See STARTING THE ENGINE on Page 42.)

With the attachment as low to the ground as possible, curl the attachment out and in several times to ensure the attachment is secured to the coupler.

Lower the attachment flat to the ground.

Park the excavator on a level surface.

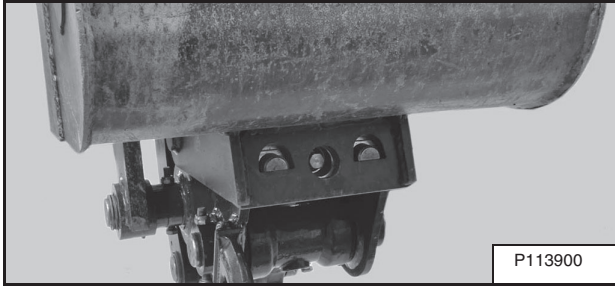
ATTACHMENTS (CONT'D)

Installing And Removing The Attachment (German Style Coupler) (Cont'd)

Removal

Enter the excavator, fasten the seat belt and start the engine. (See PRE-STARTING PROCEDURE on Page 40.)

Figure 60

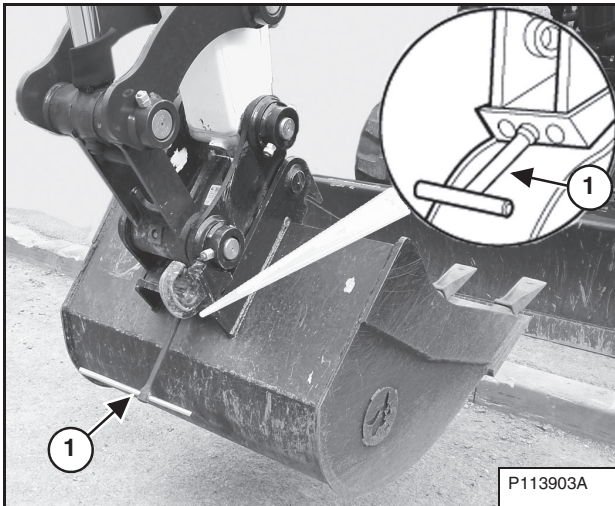


Raise the boom.

Move the right joystick (Item 1) **[Figure 54]** to the left (IN) and curl the coupler (Item 1) **[Figure 60]** toward the cab fully.

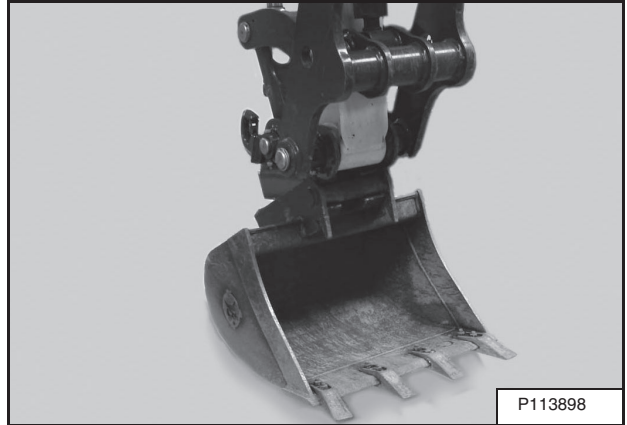
Stop the engine and exit the excavator. (See STOPPING THE ENGINE AND LEAVING THE EXCAVATOR on Page 45.)

Figure 61



Use the supplied wrench (Item 1) **[Figure 61]** and turn the wrench anticlockwise until the locking pins are fully disengaged.

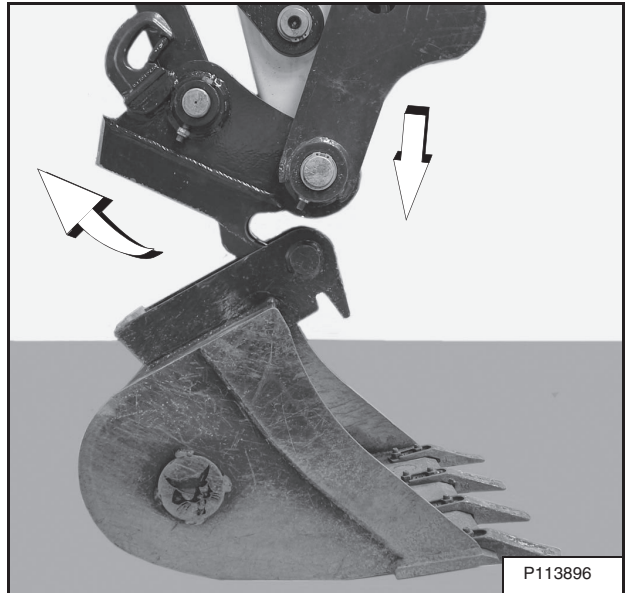
Figure 62



Enter the excavator, fasten the seat belt, and start the engine. (See PRE-STARTING PROCEDURE on Page 40.)

With the attachment slightly off of the ground, roll the quick coupler back until the coupler starts to disengage from the attachment pins **[Figure 62]**.

Figure 63



Roll the quick coupler back fully and lower the boom and arm until the attachment is on the ground and the quick coupler is disengaged from the attachment pins **[Figure 63]**.

Move the arm away from the attachment.

OPERATING PROCEDURE

Inspect The Work Area

Before beginning operation, inspect the work area for unsafe conditions.

Look for sharp drop-offs or rough terrain. Have underground utility lines (gas, water, sewer, irrigation, etc.) located and marked. Work slowly in areas of underground utilities.

Remove objects or other construction material that could damage the excavator or cause personal injury.

Always check ground conditions before starting your work:

- Inspect for signs of instability such as cracks or settlement.
- Be aware of weather conditions that can affect ground stability.
- Check for adequate traction if working on a slope.

Basic Operating Instructions

When operating on a public road or motorway, always follow local regulations. For example: A slow moving vehicle (SMV) sign, or direction signals can be required.

Run the engine at low idle speed to warm the engine and hydraulic system before operating the excavator.

IMPORTANT

Machines warmed up with moderate engine speed and light load have longer life.

I-2015-0284

New operators must operate the excavator in an open area without bystanders. Operate the controls until the excavator can be handled at an efficient and safe rate for all conditions of the work area.

Operating Near An Edge Or Water

Keep the excavator as far back from the edge as possible and the excavator tracks perpendicular to the edge so that if part of the edge collapses, the excavator can be moved back.

Always move the excavator back at any indication the edge may be unstable.

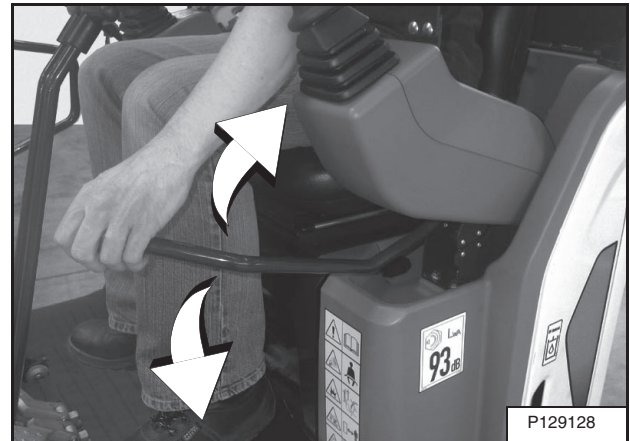
Lowering The Work Equipment (Engine STOPPED)

The hydraulic control levers control the movement of the boom, arm, bucket and upperstructure slew functions.

The console must be in the locked down position, and the key switch in the ON position.

Use the control lever to lower the boom.

Figure 64



The joystick lock switch disengages the hydraulic control functions from the joysticks when the console are raised [Figure 64].

NOTE: If the engine stops, the boom / bucket (attachments) can be lowered to the ground using hydraulic pressure in the accumulator.

The control console must be in the locked down position, and the key switch in the ON position.

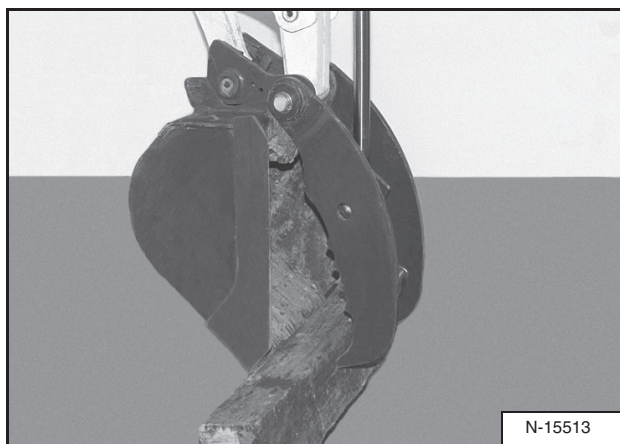
Use the control lever to lower the boom.

Lower the control console to engage the hydraulic control functions of the joysticks [Figure 64].

OPERATING PROCEDURE (CONT'D)

Using The Clamp

Figure 65

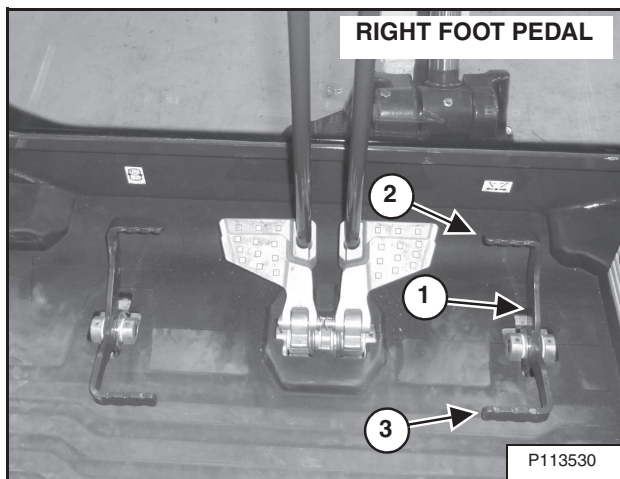


The optional lifting clamp attachment gives the excavator a wider range of use and mobility for debris removal [Figure 65].

The lifting clamp cylinder must be fully retracted when the machine is being used for excavating.

The lift capacities are reduced by 32 kg (71 lb) if the excavator is equipped with the optional lifting clamp.

Figure 66



The auxiliary hydraulic pedal (Item 1) controls the hydraulic clamp. Press the toe (Item 2) of the auxiliary hydraulic pedal to open the clamp. Press the heel (Item 3) [Figure 66] of the pedal to close the clamp.

OPERATING PROCEDURE (CONT'D)

Lift Capacity

The lifting capacities were calculated with a Standard Configuration Machine (machine equipped with pin-on interface and no attachment). The weight of the attachment, hydraulic clamp (if equipped) and different interface (if equipped) must be subtracted from the lift capacity, to obtain the actual lift capacity.



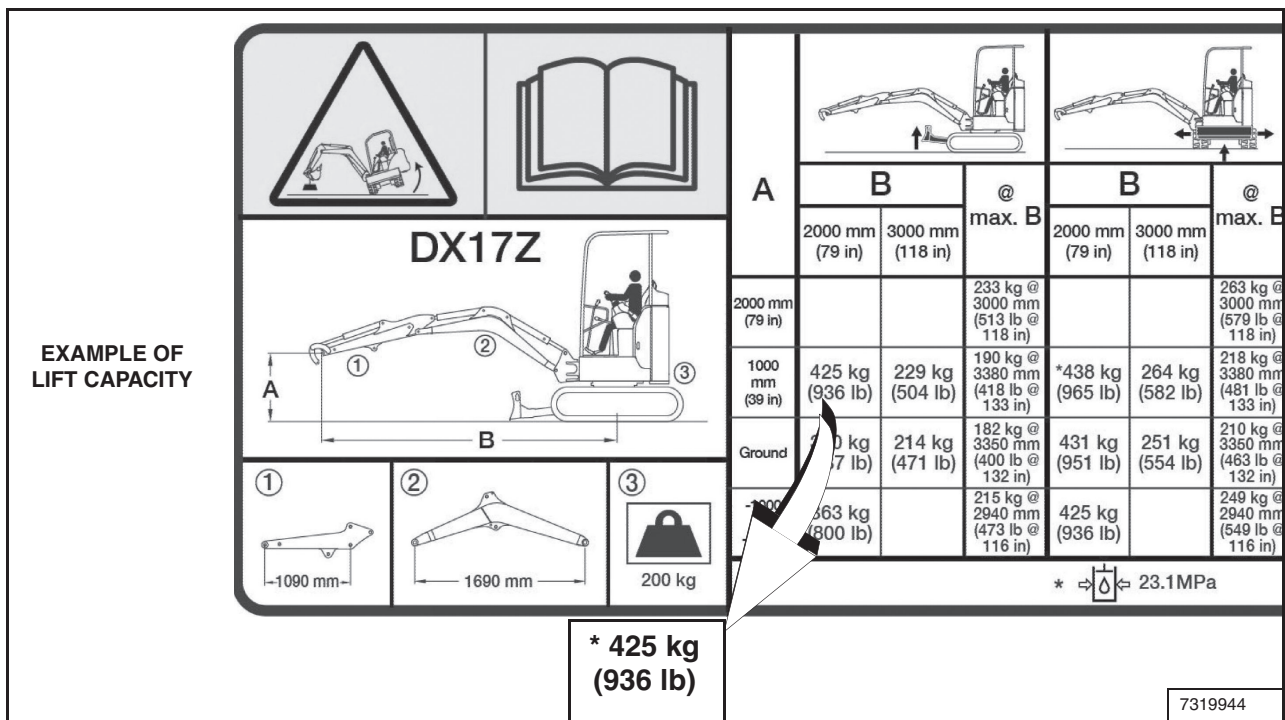
WARNING

AVOID INJURY OR DEATH

Do not exceed rated lift capacity. Excessive load can cause tipping or loss of control.

W-2374-0500

Figure 67



Detailed information about Quick Coupler and hydraulic clamp weights can be found in documentation including its serial number plates. The following lists examples of the optional quick couplers and hydraulic clamp weights:

- German Style Quick Coupler = 18 kg (40 lb)
- Optional Buckets and Attachments (See **NOTE** below)

NOTE: For bucket weights, see your Doosan dealer. For attachment weights, see the attachment Operation & Maintenance Manual.

The following example will show how to calculate the lift capacity differences between the lift capacity charts with standard equipment and when using optional equipment.

OPERATING PROCEDURE (CONT'D)

Lift Capacity (Cont'd)

The following is an example for determining the actual lift capacity using the sample chart shown above **[Figure 67]**.

- Machine Position: Over Blade, Tracks Expanded, Blade Down
- Lift Radius: 2000 mm (79 in)
- Lift Point Height: 1000 mm (39 in)
- Standard Bucket
- Attachment Coupler System

1. Obtain Lift Capacity from Chart: 425 kg (936 lb)

2. Obtain the weights of optional equipments that reduce the lift capacity of the machine (attachment, attachment coupler system).

Optional Equipment Weights: Standard Bucket 42 kg (92 lb), attachment coupler system 18 kg (40 lb)

3. Calculate the actual lift capacity by subtracting the weight of optional equipments from the lift capacity of standard configuration.

425 kg (936 lb) - 42 kg (92 lb) (standard bucket) - 18 kg (40 lb) (attachment coupler system) = 365 kg (804 lb)

** The lift capacity charts (decals) are based off of ISO 10567: 2007. The lifting capacities are defined as the lower value of 75% of tipping load or 87% of the hydraulic lift capacity.*

OPERATING PROCEDURE (CONT'D)

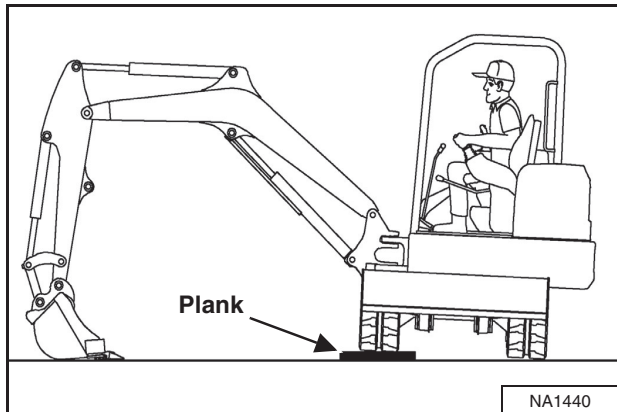
Driving The Excavator

When operating on uneven ground, operate as slow as possible and avoid sudden changes in direction.

Avoid travelling over objects such as rocks, trees, stumps, etc.

When working on wet or soft ground, put planks on the ground to provide a solid base to travel on and prevent the excavator from getting stuck.

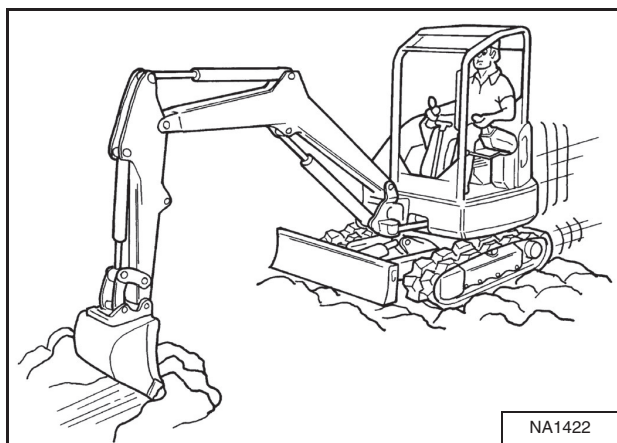
Figure 68



If one or both tracks have become stuck in soft or wet ground, raise one track at a time by turning the upperstructure and pushing the bucket against the ground [Figure 68].

Put planks under the tracks and drive the excavator to dry ground.

Figure 69



The bucket can also be used to pull the excavator. Raise the blade, extend the arm and lower the boom. Operate the boom and arm in a digging manner [Figure 69].

OPERATING PROCEDURE (CONT'D)

Operating On Slopes

WARNING

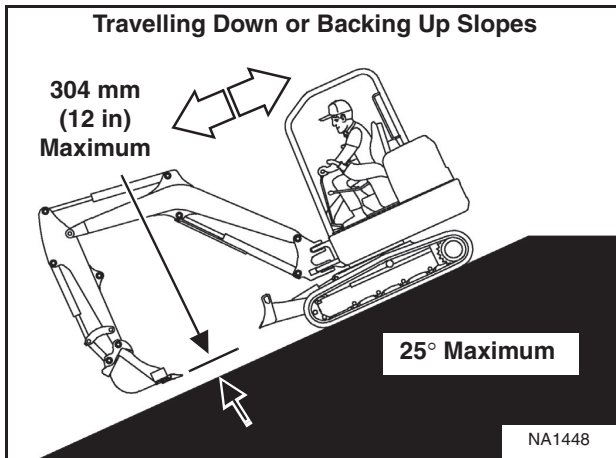
AVOID INJURY OR DEATH

- Do not travel across or up slopes that are over 15 degrees.
- Do not travel down or back up slopes that exceed 25 degrees.
- Look in the direction of travel.

W-2497-0304

When going down a slope, control the speed with the steering levers and the speed control dial gauge.

Figure 70



When going down grades that exceed 15 degrees, put the machine in the position shown, and run the engine slowly [Figure 70].

Operate as slow as possible and avoid sudden changes in lever direction.

Avoid travelling over objects such as rocks, trees, stumps, etc.

Stop the machine before moving the upper equipment controls. Never allow the blade to strike a solid object. Damage to the blade or hydraulic cylinder can result.

WARNING

AVOID INJURY OR DEATH

- Avoid steep areas or banks that could break away.
- Keep boom centred and attachments as low as possible when travelling on slopes or in rough conditions. Look in the direction of travel.
- Always fasten seat belt.

W-2498-EN-1009

Figure 71

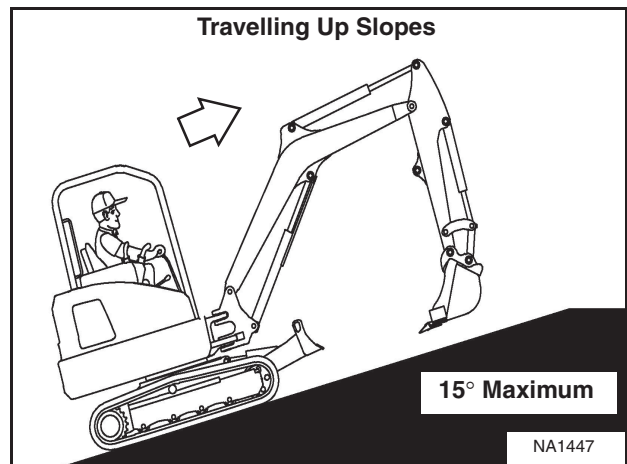
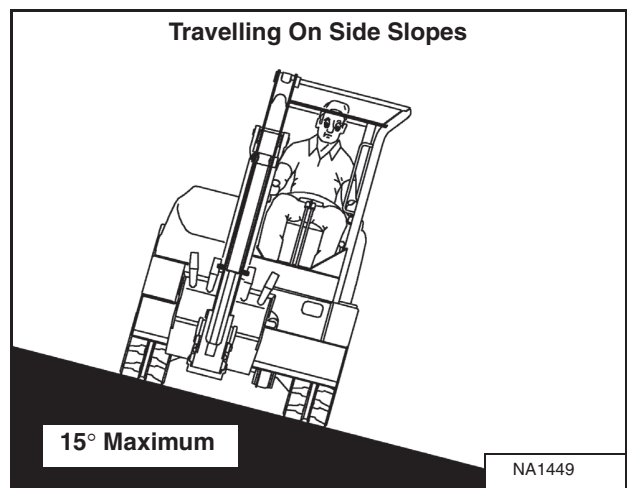


Figure 72

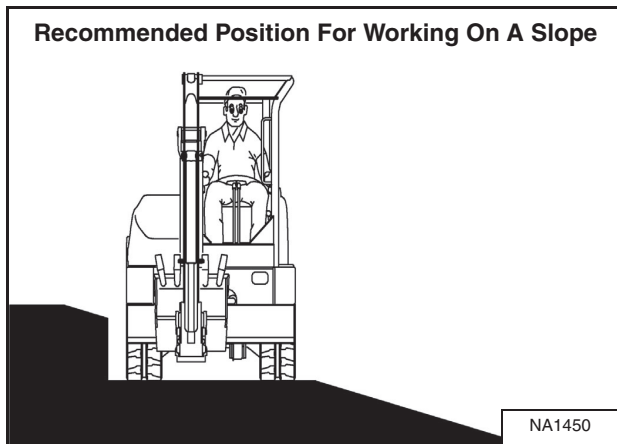


When travelling up slopes or on side slopes that are 15 degrees or less, position the machine as shown and run the engine slow [Figure 71] and [Figure 72].

OPERATING PROCEDURE (CONT'D)

Operating On Slopes (Cont'd)

Figure 73



When operating on a slope, level the work area before beginning [Figure 73].

If this is not possible, the following procedures should be used:

Do not work on slopes which are over 15 degrees.

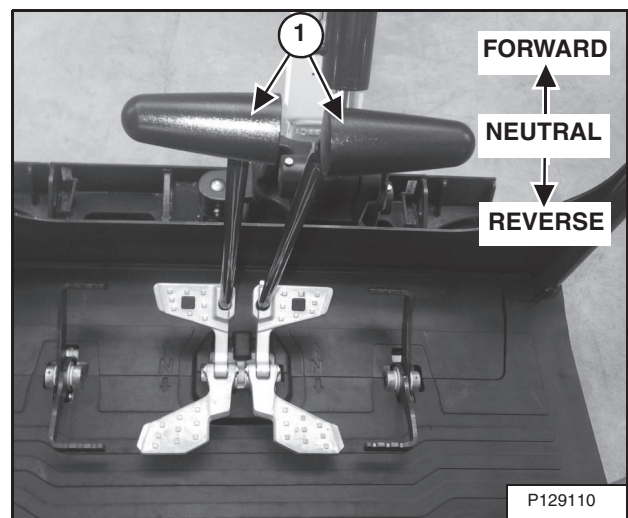
Use a slow work cycle.

Avoid working with the tracks across the slope. This will reduce stability and increase the tendency for the machine to slide. Position the excavator with the blade downhill and lowered.

Avoid swinging or extending the bucket more than necessary in a down hill direction. When you must swing the bucket downhill, keep the arm low and skid the bucket downhill.

When working with the bucket on the uphill side, keep the bucket as close to the ground as possible. Dump the spoil far enough away from the trench or hole to prevent the possibility of a cave in.

Figure 74



To brake the machine when going down a slope, move the steering levers (Item 1) [Figure 74] to the NEUTRAL position. This will engage the hydrostatic braking.

When the engine stops on a slope, move the steering levers to the NEUTRAL position. Lower the boom / bucket to the ground.

NOTE: If the engine stops, the boom / bucket (attachments) can be lowered to the ground using hydraulic pressure which is stored in the accumulator.

The console must be in the locked down position, and the key switch in the ON position.

Use the control lever to lower the boom.

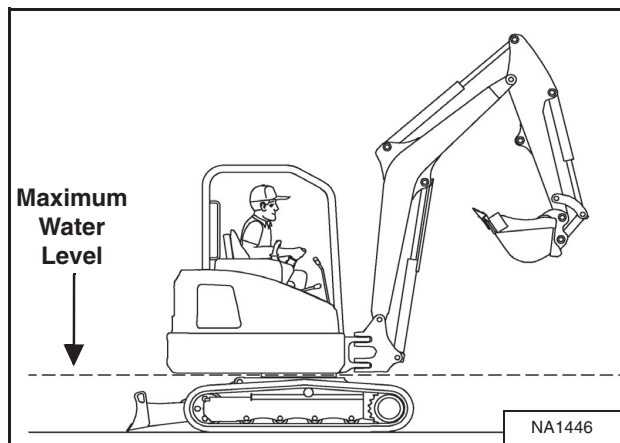
Start the engine and resume operation.

OPERATING PROCEDURE (CONT'D)

Operating In Water

Mud and water should be removed from the machine before parking. In freezing temperatures, park the machine on boards or concrete to prevent the track or undercarriage from freezing to the ground and preventing machine movement.

Figure 75



Do not operate or immerse the excavator in water higher than the bottom of the slew bearing **[Figure 75]**.

Grease the excavator when it has been operated or immersed in water for a period of time. Greasing forces the water out of the lubrication areas.

Water must be removed from the cylinder rods. If water freezes to the cylinder rod, the cylinder seals can be damaged when the rod is retracted.

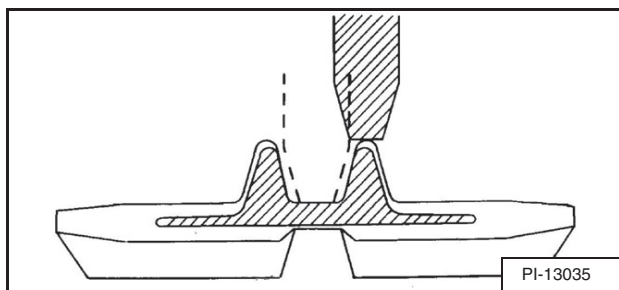
OPERATING PROCEDURE (CONT'D)

Avoiding Track Damage

Mud and water should be removed from the machine before parking. In freezing temperatures, park the machine on boards or concrete to prevent the track or undercarriage from freezing to the ground and preventing machine movement.

Some Causes Of Track Damage:

Figure 76

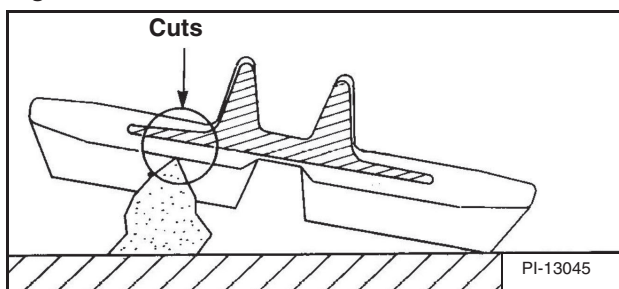


Incorrect track tension: When the rubber track is detracting, the idler or sprocket rides on the projections of the embedded metal **[Figure 76]** causing the embedded metal to be exposed to corrosion. (See TRACK TENSION on Page 95.)

If rubber track is clogged with stones or foreign objects, these can get wedged between the sprocket / rollers and cause detracting and track stress.

When moisture invades through cuts on the track, the embedded steel cords will corrode. The deterioration of the design strength can lead to the breaking of the steel cords.

Figure 77

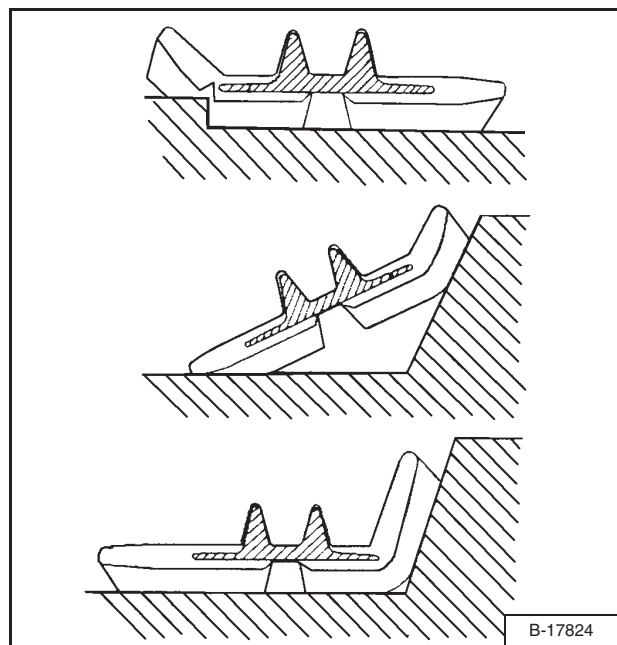


When rubber tracks drive over projections or sharp objects in the field, the concentrated forces applied cause cuts on the lug side rubber surface **[Figure 77]**. In case of making turns on projections, the lug side rubber surface will have an even higher chance to be cut. If the cuts run through the embedded steel cords, it might result in the steel cords' breakage due to their corrosion.

Avoid quick turns on bumpy and rocky fields.

Driving over sharp objects should be avoided. If this is impossible, do not make turns while driving over sharp objects.

Figure 78



When rubber tracks drive over sharp projections, intensive stress is applied to the lug side rubber surface, especially at the edges of embedded metals, causing cracks and cuts in the area around the embedded metals **[Figure 78]**.

Avoid extensive stress applied to the lug root where metals are embedded. Operators should try to avoid driving over stumps and ridges.

TOWING THE EXCAVATOR

Procedure

There is not a recommended towing procedure for the excavators.

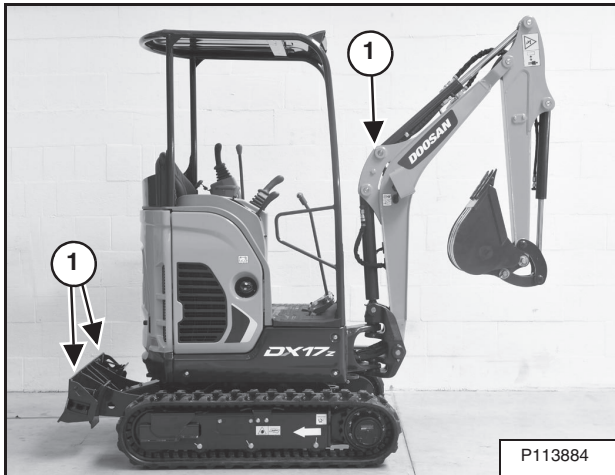
- The excavator can be lifted onto the transport vehicle.
- The excavator can be skidded a short distance for service (EXAMPLE: Move onto a transport vehicle) without damage to the hydraulic system. (The tracks will not turn.) There might be slight wear to the tracks when the excavator is skidded.

The towing chain (or cable) must be rated at 1.5 times the weight of the excavator. (See Performance on Page 113.)

LIFTING THE EXCAVATOR

Procedure

Figure 79



Fully extend the cylinders of the bucket, arm, and boom so that the excavator is in the position as shown [Figure 79].

Raise the blade all the way.

Put all the control levers in NEUTRAL.

WARNING

AVOID INJURY OR DEATH

- Use chains and lifting equipment with sufficient capacity for the weight of the excavator plus any added attachments.
- Maintain centre of gravity and balance when lifting.
- Do not swing boom or upperstructure.
- Never lift with operator on machine.
- Never lift with the blade angled (if equipped).

W-2800-EN-0210

Figure 80

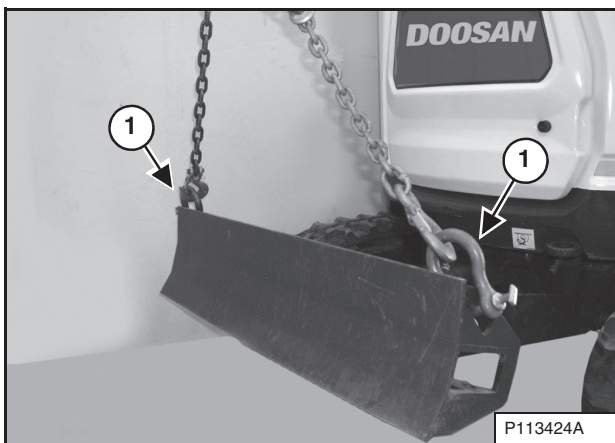
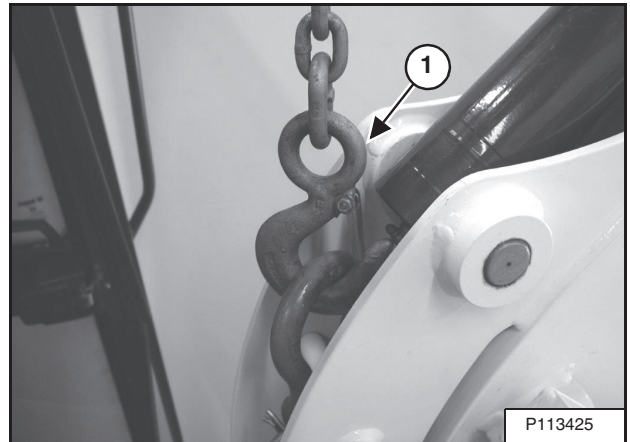
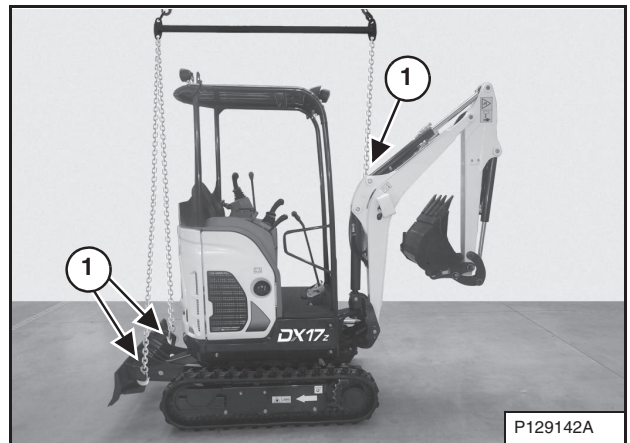


Figure 81



Fasten chains to the ends of the blade (Item 1) [Figure 79], and [Figure 80] and up to a lifting fixture [Figure 82] above the canopy / cab. The lifting fixture must extend over the sides of the canopy / cab to prevent the chains from hitting the ROPS / TOPS.

Figure 82



Fasten a chain (Item 1) [Figure 81] from the boom to the lift fixture [Figure 82].

NOTE: Depending on the type of chain hooks, it may be necessary to install a clevis at the lift points and then hook to the clevis.

TRANSPORTING THE EXCAVATOR ON A TRAILER

Loading And Unloading

When transporting the machine, observe the rules, motor vehicle laws, and vehicle limit ordinances. Use a transport and towing vehicle of adequate length and capacity.

Secure the parking brakes and block the wheels of the transport vehicle.

Align the ramps with the centre of the transport vehicle. Secure the ramps to the truck bed and be sure ramp angle does not exceed 15 degrees.

Use metal loading ramps with a slip resistant surface.

Use ramps that are the correct length and width and can support the weight of the machine.

The rear of the trailer must be blocked or supported when loading or unloading the machine to prevent the front of the transport vehicle from raising.

Determine the direction of the track movement before moving the machine (blade forward).

Disengage the auto idle feature and move the two-speed travel to the low range position.

Figure 83



Move the machine forward onto the transport vehicle [Figure 83].

Do not change direction of the machine while it is on the ramps.

Lower the boom, arm, bucket, and blade to the transport vehicle.

Stop the engine and remove the key (if equipped).

Put blocks at the front and rear of the tracks.

Fastening

Figure 84

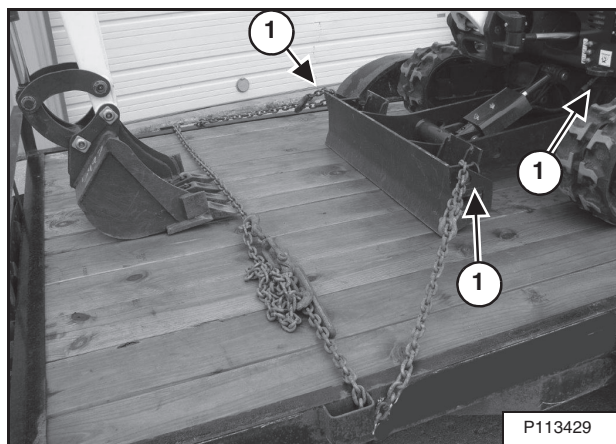
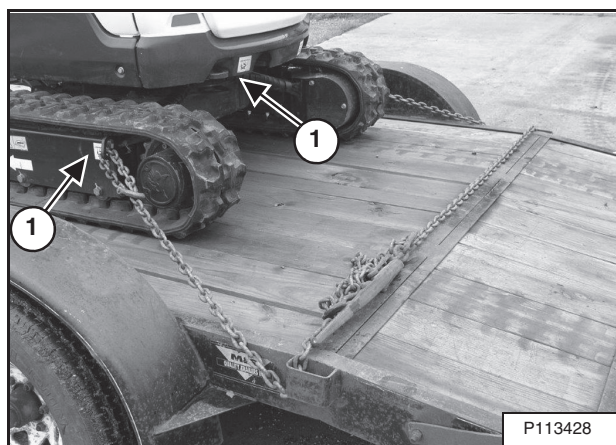


Figure 85



Fasten chains to the front corners of the blade (Item 1) [Figure 84] (or both sides of the front of the upperstructure) and to the tie-down loop at both sides of the track frame (Item 1) [Figure 85] (or the tie-down on the rear of the upperstructure) to prevent it from moving when going up or down slopes or during sudden stops.

Use chain binders to tighten the chains and then safely tie the chain binder levers to prevent loosening.

WARNING

AVOID SERIOUS INJURY OR DEATH
Adequately designed ramps of sufficient strength are needed to support the weight of the machine when loading onto a transport vehicle. Wood ramps can break and cause personal injury.

W-2058-0807

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MAINTENANCE SAFETY



WARNING

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 injury or death.

W-2003-0807



Safety Alert Symbol: This symbol with a warning statement, means: "Warning, be alert! Your safety is involved!" Carefully read the message that follows.

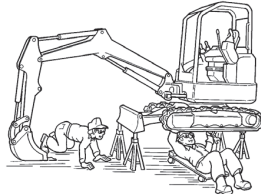
CORRECT



P-90216

- Never service the Doosan Compact Excavator without instructions.

CORRECT



NA1428

- Use the correct procedure to lift and support the excavator.

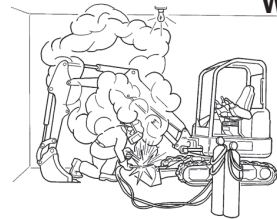
CORRECT



NA1425

- Cleaning and maintenance are required daily.

WRONG



NA1427

- Have good ventilation when welding or grinding painted parts.
- Wear dust mask when grinding painted parts. Toxic dust and gas can be produced.

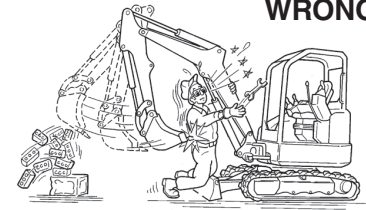
WRONG



NA1426

- Vent exhaust to outside when engine must be run for service.
- Exhaust system must be tightly sealed. Exhaust fumes can kill without warning.

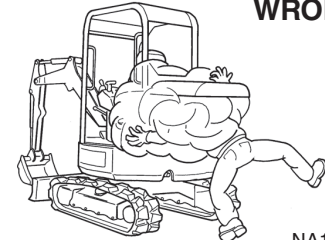
WRONG



NA1429

- Always lower the bucket and blade to the ground before doing any maintenance.
- Never modify equipment or add attachments not approved by Doosan Company.

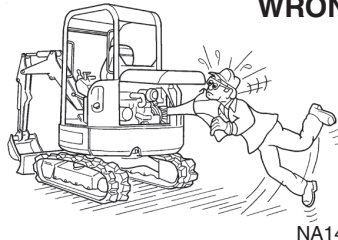
WRONG



NA1430

- Stop, cool and clean engine of flammable materials before checking fluids.
- Never service or adjust machine with the engine running unless instructed to do so in the manual.
- Avoid contact with leaking hydraulic fluid or diesel fuel under pressure. It can penetrate the skin or eyes.
- Never fill fuel tank with engine running, while smoking, or when near open flame.

WRONG



NA1431

- Keep body, jewelry and clothing away from moving parts, electrical contact, hot parts and exhaust.
- Wear eye protection to guard from battery acid, compressed springs, fluids under pressure and flying debris when engines are running or tools are used. Use eye protections approved for type of welding.
- Keep tailgate closed except for service. Close and latch tailgate before operating the excavator.

WRONG



B-19798

- Lead-acid batteries produce flammable and explosive gases.
- Keep arcs, sparks, flames and lighted tobacco away from batteries.
- Batteries contain acid which burns eyes or skin on contact.
- Wear protective clothing. If acid contacts body, flush well with water. For eye contact flush well and get immediate medical attention.

Maintenance procedures which are given in the Operation & Maintenance Manual can be performed by the owner/operator without any specific technical training. Maintenance procedures which are **not** in the Operation & Maintenance Manual must be performed **ONLY BY QUALIFIED DOOSAN SERVICE PERSONNEL**. Always use genuine Doosan replacement parts.

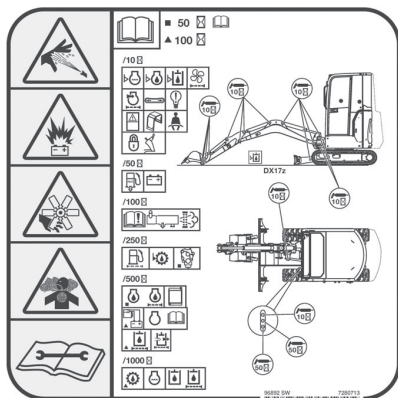
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SERVICE SCHEDULE

Maintenance Intervals

Maintenance work must be done at regular intervals. Failure to do so will result in excessive wear and early failures.

The service schedule is a guide for correct maintenance of the Doosan excavator.



See inside page of the back cover for symbols and identification.

Every 10 Hours (Before Starting The Excavator)

- **Engine Oil** - Check level and add as needed. (See Page 78.)
- **Engine Air Filters and Air System** - Check air clearer condition indicator. Service only when required. Check for leaks and damaged components. (See Page 72.)
- **Engine Cooling System** - Check coolant level COLD and add premixed coolant as needed. (See Page 80.)
- **Fuel Filters** - Check filters for moisture or contamination. Drain and replace as needed. (See Page 76.)
- **Hydraulic Fluid** - Check fluid level and add as needed. (See Page 93.)
- **Seat Belt, Seat Belt Retractors, Seat Belt Mounting hardware** - Check the condition of seat belt and mounting hardware. Clean or replace seat belt retractors as needed. Clean dirt and debris from moving parts. (See Page 41.)
- **Operator Canopy** - Check the canopy condition and mounting hardware. (See Page 29.)
- **Indicators and Lights** - Check for correct operation of all indicators and lights. (See Page 24.)
- **Safety Signs and Safety Tread** - Check for damaged signs (decals). Replace any signs that are damaged. (See Page 15.)
- **Console Lockout** - Check console lockout for proper operation. (See Page 68.)
- **Track Tension** - Check tension and adjust as needed. (See Page 95.)
- **Pivot Points** - Grease all machinery pivot points. Grease track expansion. Grease clamp (if equipped). (See Page 100.)
- **Attachment Coupler** - Check for damage or loose parts (if equipped).

First 50 Hours

- **Drive Belts (Alternator)** - Check condition. Replace as needed. (See Page 98.)
- **Engine Oil and Filter** - Replace oil and filter. (See Page 78.)

Every 50 Hours

- **Swing Bearing** - Grease swing bearing and swing pinion. Service every 10 hours when operating in water. (See Page 100.)
- **Battery** - Check cables, connections, and electrolyte level; add distilled water as needed. (See Page 86.)
- **Fuel Tank** - Drain water and sediment from fuel tank and fuel filter. (See Page 76.)

WARNING

AVOID INJURY OR DEATH

Instructions are necessary before operating or servicing machine. Read and understand the Operation & Maintenance Manual, Operator's Handbook 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 injury or death.

W-2003-0807

SERVICE SCHEDULE (CONT'D)

Maintenance Intervals (Cont'd)

First 100 Hours

- **Alternator and Starter** - Check connections.
- **Travel Motors (Final Drive)** - Replace fluid. (See Page 97.)
- **Hydraulic Filter** - Replace the hydraulic filter. (See Page 92.)

Every 100 Hours

- **Spark Arrester** - Empty spark chamber. (See Page 94.)

Every 250 Hours Or Every 12 Months

- **Fuel Filter** - Replace fuel filter. (See Page 76.)
- **Travel Motors (Final Drive)** - Check fluid level and add as needed. (See Page 97.).
- **Drive Belts (Alternator)** - Check condition. Replace as needed. (See Page 97.)

Every 500 Hours Or Every 12 Months

- **Engine Oil and Filter** - Replace oil and filter. (See Page 79.)
- **Cooling System** - Clean debris from radiator / hydraulic fluid cooler. (See Page 80.)
- **Hydraulic Filter and Hydraulic Reservoir Breather Cap** - Replace the hydraulic filter and the reservoir breather cap. (See Page 92.)
- **Alternator and Starter** - Check connections.
- **Heater** - Clean housing and coils (if equipped).

Every 1000 Hours Or Every 12 Months

- **Hydraulic Fluid and Filters** - Replace hydraulic fluid and filters. (See Page 92.)
- **Engine Valves** - Adjust the engine valve clearance.
- **Travel Motors (Final Drive)** - Replace fluid. (See Page 97.)

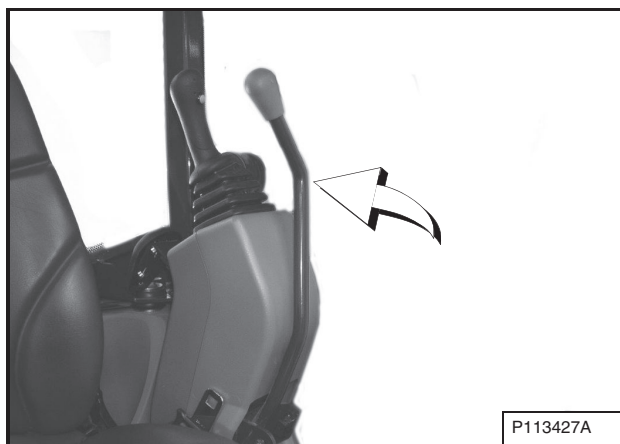
Every 24 Months

- **Coolant** - Replace the coolant. (See Page 80.)

CONTROL CONSOLE LOCKOUTS

Inspection And Maintenance

Figure 86



When the left console is raised **[Figure 86]**, the hydraulic control levers (joysticks) and traction system must not function.

Sit in the operator's seat, fasten the seat belt, and start the engine.

Keep the left console raised **[Figure 86]**.

Move the joystick control levers. There should be no movement of the boom, arm, slew, or bucket.

Move the steering control levers. There should be no movement of the excavator tracks.

Service the system if these controls do not deactivate when the left control console is raised. (See your Doosan dealer for service.)

SEAT BELT

Inspection And Maintenance

WARNING

Failure to properly inspect and maintain the seat belt can cause lack of operator restraint resulting in serious injury or death.

W-2466-0703

Check the seat belt daily for correct function.

Inspect the seat belt system thoroughly at least once each year or more often if the machine is exposed to severe environmental conditions or applications.

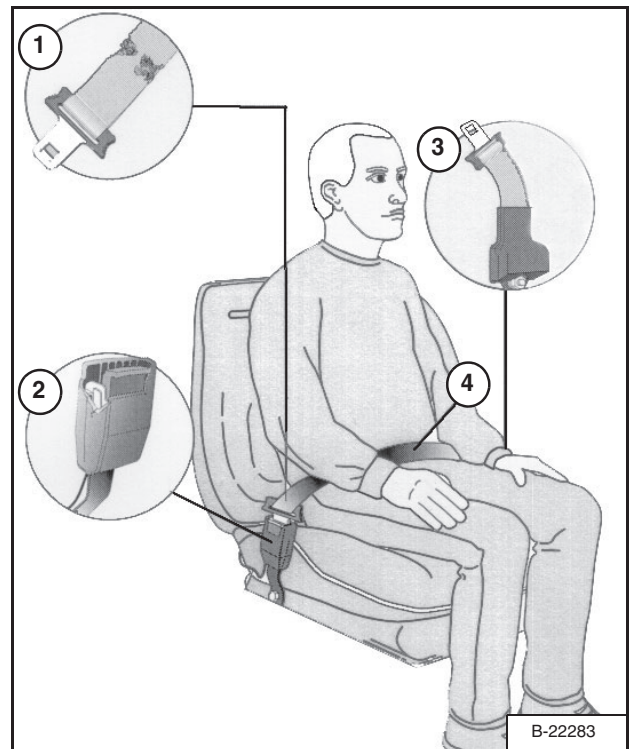
Any seat belt system that shows cuts, fraying, extreme or unusual wear, significant discolourations due to ultraviolet UV exposure, dusty / dirty conditions, abrasion to the seat belt webbing, or damage to the buckle, latch plate, retractor (if equipped), hardware or any other obvious problem should be replaced immediately.

The items below are referenced in **[Figure 87]**.

1. Check the webbing. If the system is equipped with a retractor, pull the webbing completely out and inspect the full length of the webbing. Look for cuts, wear, fraying, dirt, and stiffness.
2. Check the buckle and latch for correct operation. Make sure latch plate is not excessively worn, deformed or buckle is not damaged or casing broken.
3. Check the retractor web storage device (if equipped) by extending webbing to determine if it looks correct and that it spools out and retracts webbing correctly.
4. Check webbing in areas exposed to ultraviolet (UV) rays from the sun or extreme dust or dirt. If the original colour of the webbing in these areas is extremely faded and / or the webbing is packed with dirt, the webbing strength can have deteriorated.

See your Doosan dealer for seat belt system replacement parts for your machine.

Figure 87



TAILGATE

Opening And Closing

WARNING

AVOID INJURY OR DEATH

Never service or adjust the machine when the engine is running unless instructed to do so in the manual.

W-2012-0497

WARNING

Keep the rear door closed when operating the machine. Failure to do so could seriously injure a bystander.

W-2020-1285

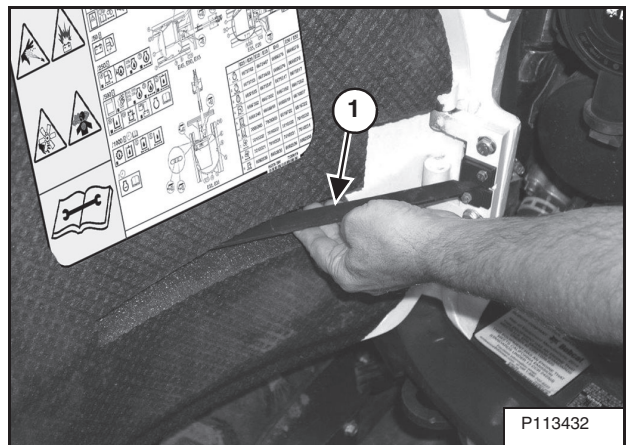
Figure 88



Press the button (Item 1) [Figure 88] and open the tailgate.

Open the tailgate and rotate outward until it is held open by the latch (Item 1) [Figure 89].

Figure 89

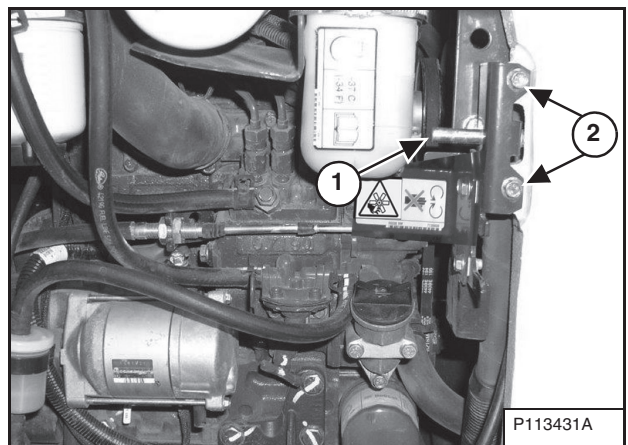


To close the tailgate, lift up on the latch (Item 1) [Figure 89] and slowly start to close the tailgate.

Push firmly to close the tailgate.

Adjusting The Latch

Figure 90



The tailgate latch (Item 1) can be adjusted by loosening the two bolts (Item 2) [Figure 90], moving the latch, and tightening the two bolts.

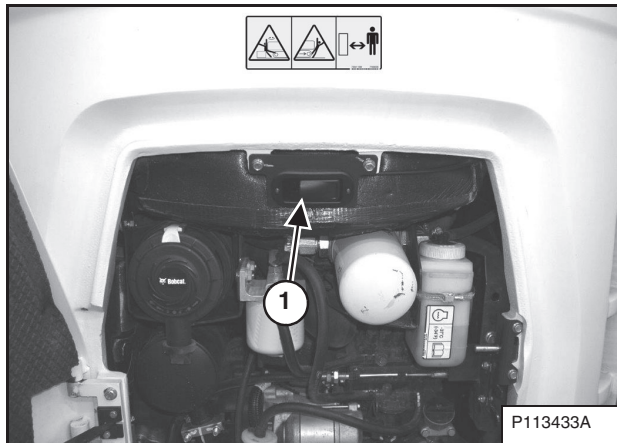
Close the tailgate before operating the excavator.

RIGHT SIDE COVER

Opening And Closing

Right Side

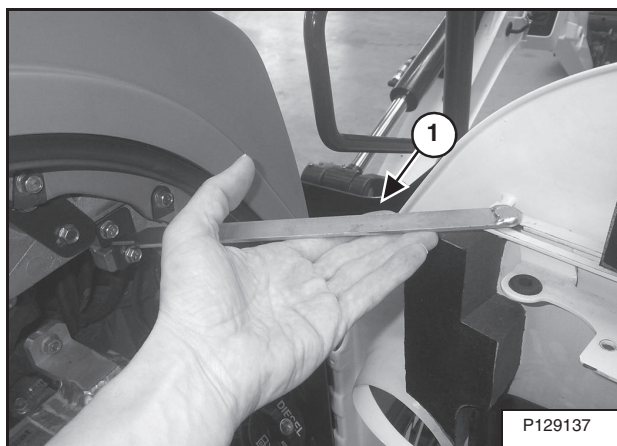
Figure 91



Open the tailgate to access the right side cover latch (Item 1) **[Figure 91]**.

Pull out the lever (Item 1) **[Figure 91]** and open the right side cover.

Figure 92



Open the right side cover and rotate forward until it is held open by the latch (Item 1) **[Figure 92]**.

To close the tailgate, lift up on the latch (Item 1) **[Figure 92]** and slowly start to close the tailgate.

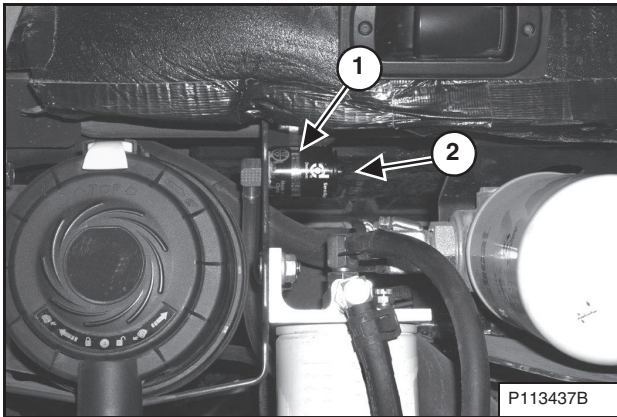
AIR CLEANER SERVICE

See the service schedule for the correct service interval. (See SERVICE SCHEDULE on Page 66.)

Daily Check

The air cleaner is located in the engine compartment. Open the tailgate to access the air cleaner for service. (See TAILGATE on Page 70.)

Figure 93



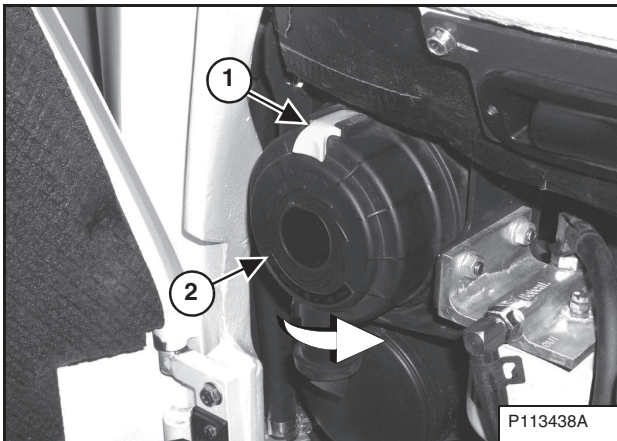
Check the condition indicator (Item 1) **[Figure 93]**. If the red ring shows in the condition indicator, the filter needs to be replaced.

Replace the inner filter every third time the outer filter is replaced or as indicated.

Replacing The Filter Elements

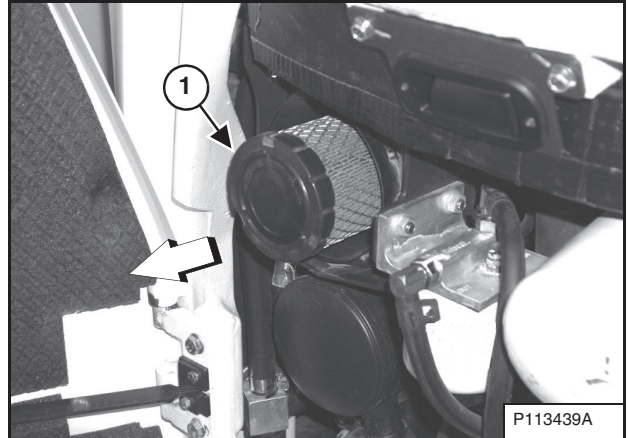
Outer Filter

Figure 94



Pull out on the latches (Item 1). Rotate the cover anticlockwise and remove the dust cover (Item 2) **[Figure 94]**.

Figure 95



Slightly rotate the filter and pull the outer filter (Item 1) **[Figure 95]** from the air cleaner housing.

Check the housing for damage.

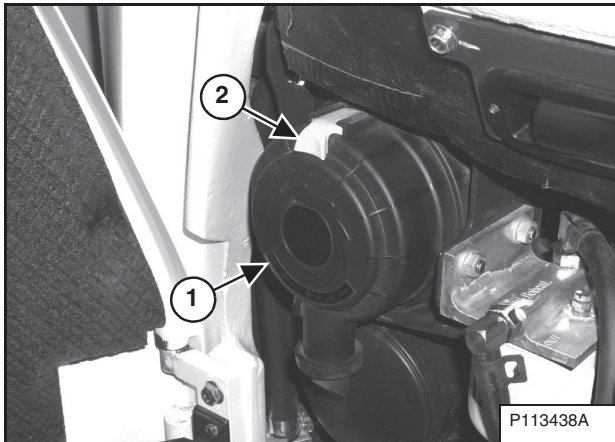
Clean the housing and the seal surface. DO NOT use compressed air.

Install a new filter.

AIR CLEANER SERVICE (CONT'D)

Replacing The Filter Elements (Cont'd)

Figure 96



Position the dust cover (Item 1) **[Figure 96]** to the housing. Rotate the housing clockwise until the latch is at the top as shown.

Secure the dust cover (Item 1) and by pushing in on the latch (Item 2) **[Figure 96]**.

Check the air intake hose and the air cleaner housing for damage. Make sure all connections are tight.

After the outer filter has been replaced, press the button (Item 2) **[Figure 93]** on the end of the condition indicator.

Start the engine. Run at full rpm, then reduce engine speed and stop the engine.

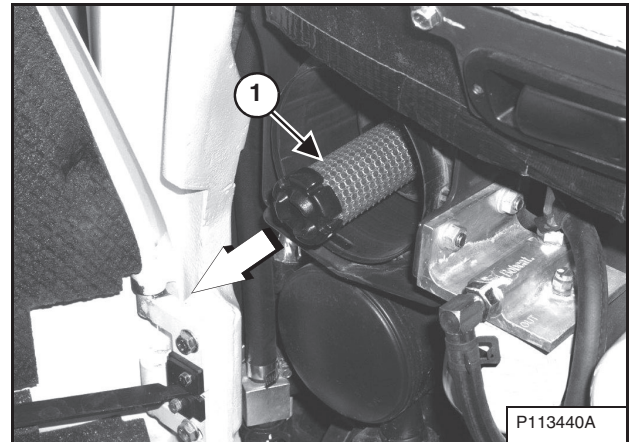
If the red ring (Item 1) **[Figure 93]** shows in the condition indicator, replace the inner filter.

Inner Filter

Only replace the inner filter under the following conditions:

- Replace the inner filter every *third* time the outer filter is replaced.
- After the outer filter has been replaced, press the button (Item 2) **[Figure 93]** on the condition indicator and start the engine. Run at full rpm, then reduce engine speed and stop the engine. If the red ring shows in the condition indicator, replace the inner filter.

Figure 97



Remove the dust cover, outer filter and inner filter (Item 1) **[Figure 97]**.

NOTE: Make sure all sealing surfaces are free of dirt and debris.

Install the new inner filter.

Install the outer filter and the dust cover.

Press the button on the condition indicator to reset the red ring.

FUEL SYSTEM

Fuel Specifications

NOTE: Contact your local fuel supplier to receive recommendations for your region.

U.S. Standard (ASTM D975)

Use only clean, high quality diesel fuel, Grade Number 2-D or Grade Number 1-D.

Ultra low sulfur diesel fuel must be used in this machine. Ultra low sulfur is defined as 15 mg/kg (15 ppm) sulfur maximum.

The following is one suggested blending guideline that should prevent fuel gelling during cold temperatures:

TEMPERATURE	GRADE 2-D	GRADE 1-D
Above -9°C (+15°F)	100%	0%
Down to -21°C (-5°F)	50%	50%
Below -21°C (-5°F)	0%	100%

NOTE: Biodiesel blend fuel may also be used in this machine. Biodiesel blend fuel must contain no more than five percent biodiesel mixed with ultra low sulfur petroleum based diesel. This biodiesel blend fuel is commonly marketed as B5 blended diesel fuel. B5 blended diesel fuel must meet ASTM specifications.

E.U. Standard (EN590)

Use only clean, high quality diesel fuel that meets the EN590 specifications listed below:

- Ultra low sulfur diesel fuel defined as 10 mg/kg (10 ppm) sulfur maximum.
- Diesel fuel with cetane number of 51.0 and above.

NOTE: Biodiesel blend fuel may also be used in this machine. Biodiesel blend fuel must contain no more than seven percent biodiesel mixed with ultra low sulfur petroleum based diesel. This biodiesel blend fuel is commonly marketed as B7 blended diesel fuel. B7 blended diesel fuel must meet EN590 specifications.

Biodiesel Blend Fuel

Biodiesel blend fuel has unique qualities that should be considered before using in this machine:

- Cold weather conditions can lead to plugged fuel system components and hard starting.
- Biodiesel blend fuel is an excellent medium for microbial growth and contamination that can cause corrosion and plugging of fuel system components.
- Use of biodiesel blend fuel may result in premature failure of fuel system components, such as: plugged fuel filters and deteriorated fuel lines.
- Shorter maintenance intervals may be required, such as: cleaning the fuel system and replacing fuel filters and fuel lines.
- Using biodiesel blended fuels containing more than five percent biodiesel can affect engine life and cause deterioration of hoses, tubelines, injectors, injector pump, and seals.

Apply the following guidelines if biodiesel blend fuel is used:

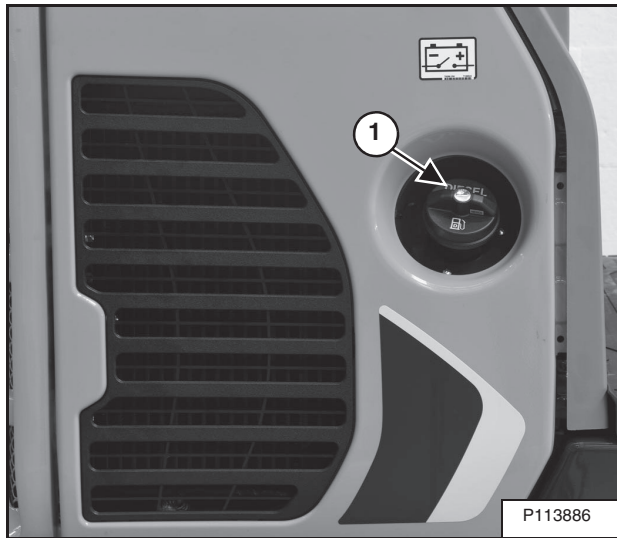
- Ensure the fuel tank is as full as possible at all times to prevent moisture from collecting in the fuel tank.
- Ensure that the fuel tank cap is securely tightened.
- Biodiesel blend fuel can damage painted surfaces, remove all spilled fuel from painted surfaces immediately.
- Drain all water from the fuel filter daily before operating the machine.
- Do not exceed engine oil change interval. Extended oil change intervals can cause engine damage.
- Before machine storage; drain the fuel tank, refill with 100% petroleum diesel fuel, add fuel stabiliser, and operate the engine for at least 30 minutes.

NOTE: Biodiesel blend fuel does not have long-term stability and should not be stored for more than 3 months.

FUEL SYSTEM (CONT'D)

Filling The Fuel Tank

Figure 98



The fuel cap uses the start key to unlock the fuel cap.

Remove the fuel fill cap (Item 1) [Figure 98].

Use a clean, approved safety container to add fuel. Add fuel only in an area that has a free movement of air and no flames or sparks. **NO SMOKING!**

Install and tighten the fuel fill cap.

Clean up any spilled fuel.

See the service schedule for the service interval when to remove water from or replace the fuel filter. (See SERVICE SCHEDULE on Page 66.)

NOTE: When filling the fuel tank, with the left console raised, turn the start switch to the ON position. As fuel is added to the tank, a buzzer will beep and the closer the tank gets to full, the quicker the beeps. When the tank is full, the buzzer will sound continuously. Stop fuelling when buzzer sounds continuously. Turn the start switch OFF.

WARNING

AVOID INJURY OR DEATH

Stop and cool the engine before adding fuel. **NO SMOKING!** Failure to obey warnings can cause an explosion or fire.

W-2063-0807

WARNING

AVOID INJURY OR DEATH

Always clean up spilled fuel or oil. Keep heat, flames, sparks or lighted tobacco away from fuel and oil. Failure to use care around combustibles can cause explosion or fire.

W-2103-0508

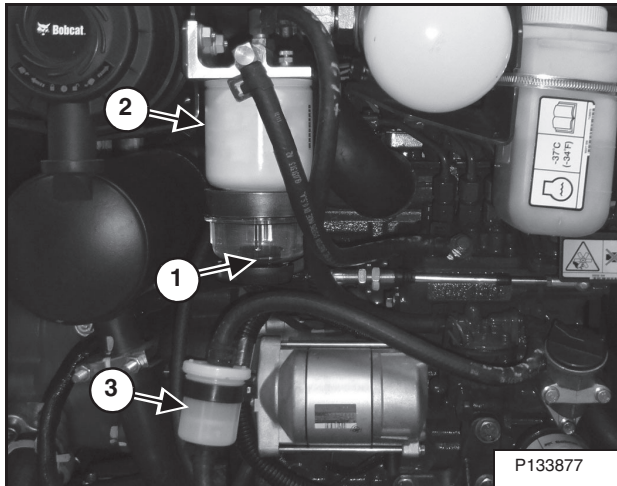
FUEL SYSTEM (CONT'D)

Fuel Filter

Removing Water

Open the tailgate. (See TAILGATE on Page 70.)

Figure 99



Loosen the drain (Item 1) [Figure 99] at the bottom of the filter to drain water from the filter into a container.

Inspect the fuel pre-filter (Item 3) [Figure 99] daily for moisture and contamination. Replace as necessary.

Clean up any spilled fuel.

Replacing Elements

Remove and replace the fuel pre-filter (Item 3) [Figure 99].

Remove the filter (Item 2) [Figure 99].

Clean the area around the filter housing. Put clean oil on the seal of the new filter. Install the fuel filter and hand tighten.

Remove the air from the fuel system. (See Removing Air From The Fuel System on Page 77.)

WARNING

AVOID INJURY OR DEATH

Diesel fuel or hydraulic fluid under pressure can penetrate skin or eyes, causing serious injury or death. Fluid leaks under pressure may not be visible. Use a piece of cardboard or wood to find leaks. Do not use your bare hand. Wear safety goggles. If fluid enters skin or eyes, get immediate medical attention from a doctor familiar with this injury.

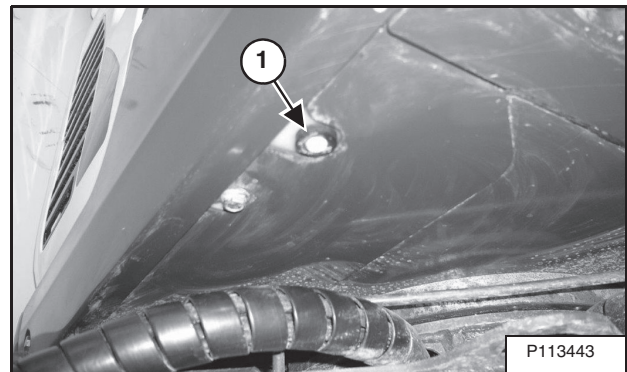
W-2072-EN-0909

Draining The Fuel Tank

See the service schedule for the correct service interval. (See SERVICE SCHEDULE on Page 66.)

The fuel tank can be drained in several ways. See below.

Figure 100



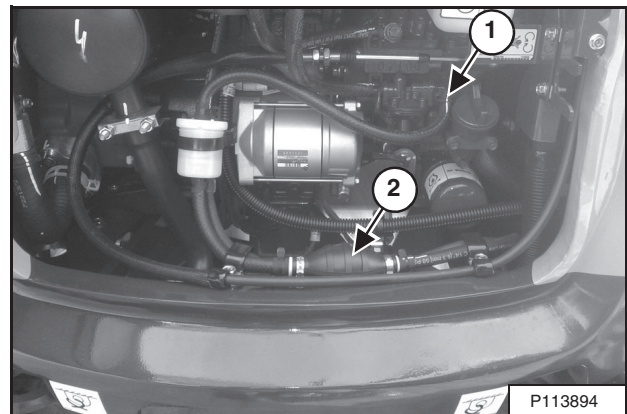
Rotate the upperstructure so the fuel tank drain plug (Item 1) is located between the rear tracks. Remove the drain plug (Item 1) [Figure 100].

Drain the fuel into the container.

Reuse, recycle, or dispose of fuel in an environmentally safe manner.

Reinstall the drain plug.

Figure 101



Second option for draining tank. Remove the fuel hose (Item 1) at the fuel pump. Route the hose out of the engine compartment and into a container. Squeeze the primer bulb (Item 2) [Figure 101] to start a siphon and drain the tank.

Reinstall the fuel hose (Item 1) [Figure 101].

FUEL SYSTEM (CONT'D)

Removing Air From The Fuel System

After replacing the fuel filter or when the fuel tank has run out of fuel, air must be removed from the fuel system before starting the engine.

Open the tailgate. (See Opening And Closing on Page 70.)

Figure 102

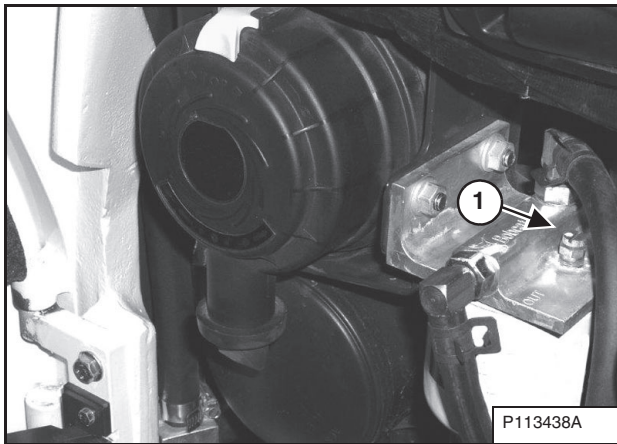
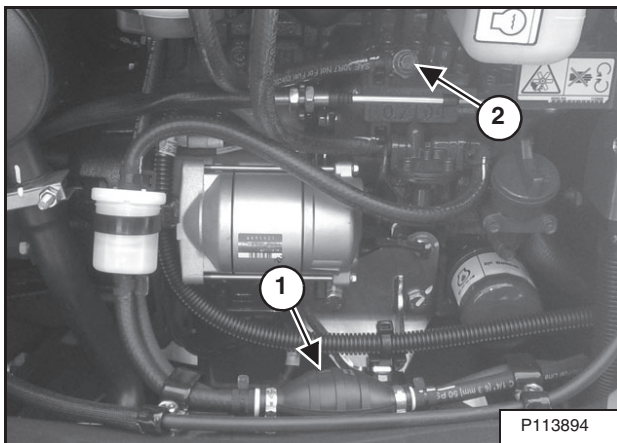


Figure 103



Open the fuel filter vent (Item 1) [Figure 102] and operate the hand pump (priming bulb) (Item 1) [Figure 103] until the fuel flows from the vent (Item 1) [Figure 102] with no air bubbles.

Close the vent (Item 1) [Figure 102].

Start the engine. It may be necessary to open the vent (Item 2) [Figure 103] (at the fuel injection pump) briefly until the engine runs smoothly.

WARNING

AVOID INJURY OR DEATH

Diesel fuel or hydraulic fluid under pressure can penetrate skin or eyes, causing serious injury or death. Fluid leaks under pressure may not be visible. Use a piece of cardboard or wood to find leaks. Do not use your bare hand. Wear safety goggles. If fluid enters skin or eyes, get immediate medical attention from a doctor familiar with this injury.

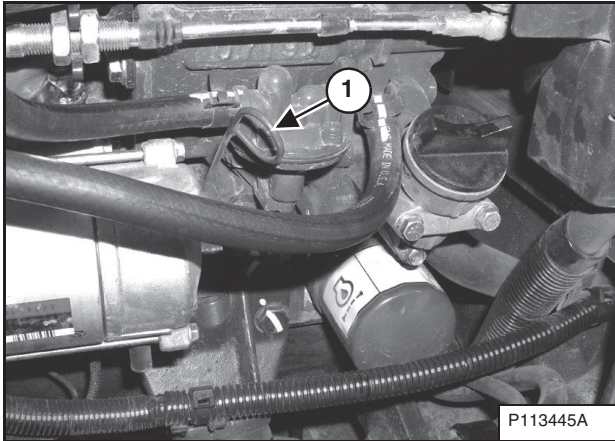
W-2072-EN-0909

ENGINE LUBRICATION SYSTEM

Checking And Adding Engine Oil

Check the engine oil after every 8 - 10 hours of operation and before starting the engine. (See SERVICE SCHEDULE on Page 66.)

Figure 104



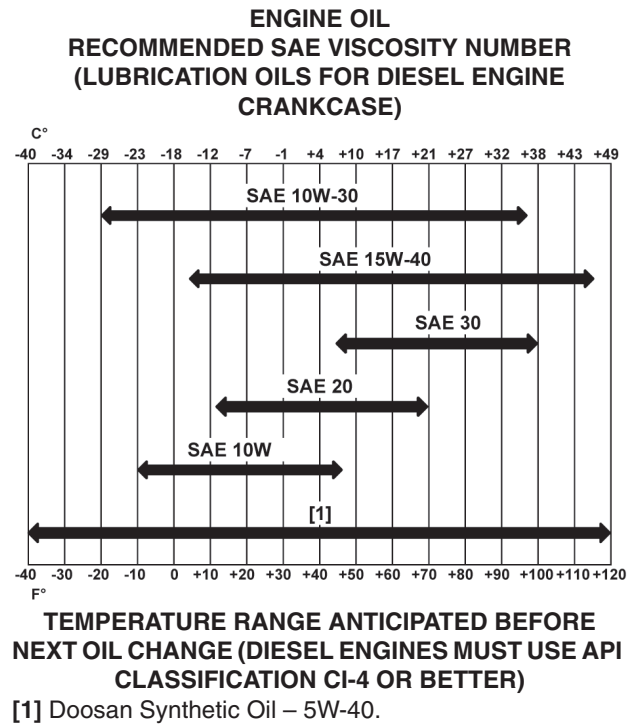
Open the tailgate and remove the dipstick (Item 1) [Figure 104].

Keep the oil level between the marks on the dipstick.

Use a good quality motor oil that meets the correct API Service Classification.

Engine Oil Chart

Figure 105



Doosan engine oils are recommended for use in this machine. If Doosan engine oil is not available, use a good quality engine oil that meets API Service Classification of CJ-4 or better [Figure 105].

WARNING

AVOID INJURY OR DEATH

Always clean up spilled fuel or oil. Keep heat, flames, sparks or lighted tobacco away from fuel and oil. Failure to use care around combustibles can cause explosion or fire.

W-2103-0508

ENGINE LUBRICATION SYSTEM (CONT'D)

Removing And Replacing Oil And Filter

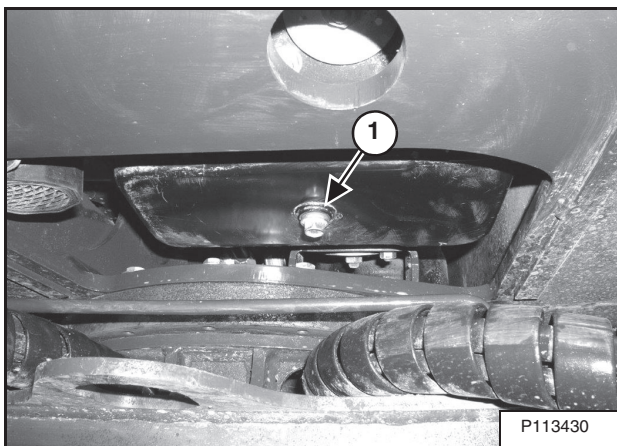
See the service schedule for the service interval for replacing the engine oil and filter. (See SERVICE SCHEDULE on Page 66.)

Rotate upperstructure so that the oil drain plug is between the rear tracks.

Run the engine until it is at operating temperature. Stop the engine.

Open the tailgate. (See Opening And Closing on Page 70.)

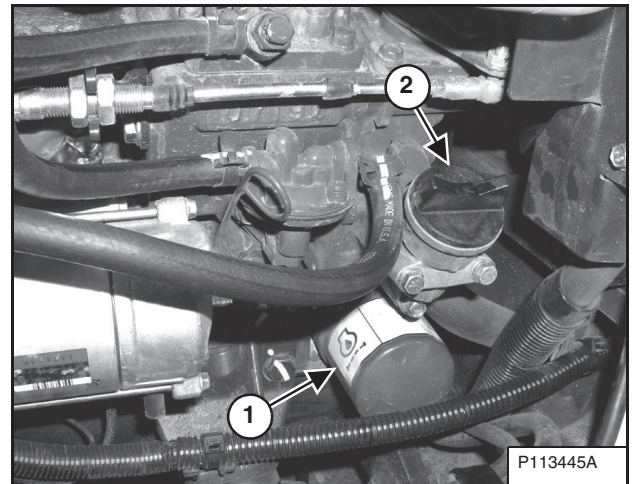
Figure 106



Place a container under the oil pan. Remove the drain plug (Item 1) [Figure 106] from the bottom of the engine oil pan.

Recycle or dispose of used oil in an environmentally safe manner.

Figure 107



Remove the oil filter (Item 1) [Figure 107] and clean the filter housing surface.

Use a genuine Doosan replacement filter. Put clean oil on the filter gasket. Install the filter and hand tighten.

Install and tighten the drain plug (Item 1) [Figure 106].

Remove the fill cap (Item 2) [Figure 107].

Put oil in the engine. (See Checking And Adding Engine Oil on Page 78.)

Install the fill cap (Item 2) [Figure 107].

Start the engine and let it run for several minutes.

Stop the engine. Check for leaks at the oil filter. Check the oil level.

Add oil as needed if it is not at the top mark on the dipstick.

ENGINE COOLING SYSTEM

Check the cooling system every day to prevent overheating, loss of performance or engine damage. (See SERVICE SCHEDULE on Page 66.)

Cleaning

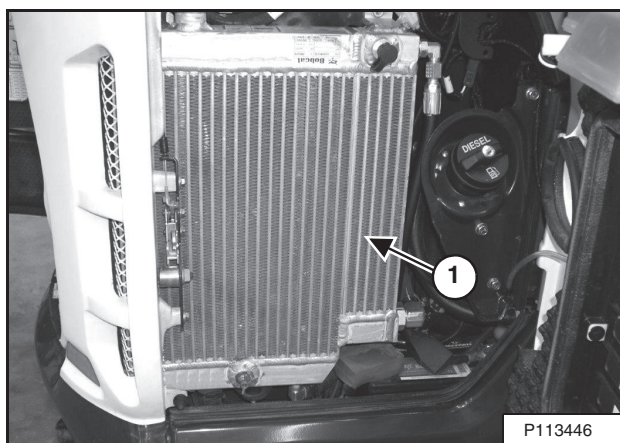
NOTE: This excavator uses a pusher fan so flow through the radiator / oil cooler will be from inside the engine compartment to outside the right cover. When cleaning the radiator, clean both the inside and outside surfaces of the radiator / oil cooler.

Open the tailgate. (See Opening And Closing on Page 70.)

Open the right side cover. (See Opening And Closing on Page 71.)

NOTE: Allow the cooling system and engine to cool before servicing or cleaning the cooling system.

Figure 108



Use air pressure or water pressure to clean the radiator / oil cooler (Item 1) [Figure 108] (both inside and outside surfaces). Be careful not to damage fins when cleaning.

Close the right side cover. (See Opening And Closing on Page 71.)

Close the tailgate. (See Opening And Closing on Page 70.)

ENGINE COOLING SYSTEM (CONT'D)

Checking Level

WARNING

AVOID BURNS

Do not remove radiator cap when the engine is hot. You can be seriously burned.

W-2070-1203

WARNING

AVOID INJURY OR DEATH

Wear safety glasses to prevent eye injury when any of the following conditions exist:

- When fluids are under pressure.
- Flying debris or loose material is present.
- Engine is running.
- Tools are being used.

W-2019-0907

IMPORTANT

AVOID ENGINE DAMAGE

Always use the correct ratio of water to antifreeze.

Too much antifreeze reduces cooling system efficiency and may cause serious premature engine damage.

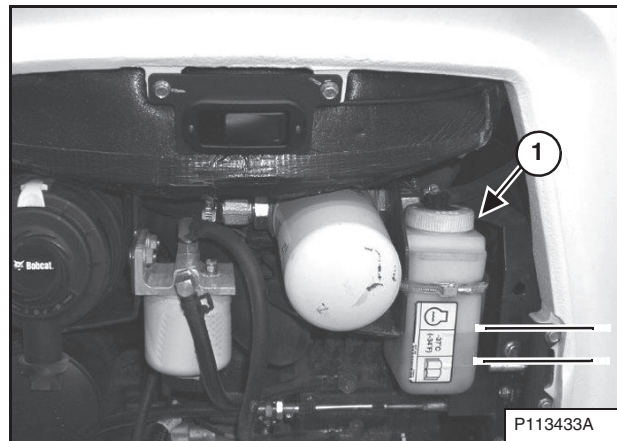
Too little antifreeze reduces the additives which protect the internal engine components; reduces the boiling point and freeze protection of the system.

Always add a premixed solution. Adding full strength concentrated coolant can cause serious premature engine damage.

I-2124-0497

Open the tailgate. (See Opening And Closing on Page 70.)

Figure 109



Check the coolant level in the coolant recovery tank (Item 1) [Figure 109].

The coolant level must be filled so it is within the MAX / MIN line marked on the coolant recovery tank.

NOTE: The cooling system is factory filled with propylene glycol (purple colour). DO NOT mix propylene glycol with ethylene glycol.

ENGINE COOLING SYSTEM (CONT'D)

Removing And Replacing Coolant

See the service schedule for correct service intervals. (See SERVICE SCHEDULE on Page 66.)

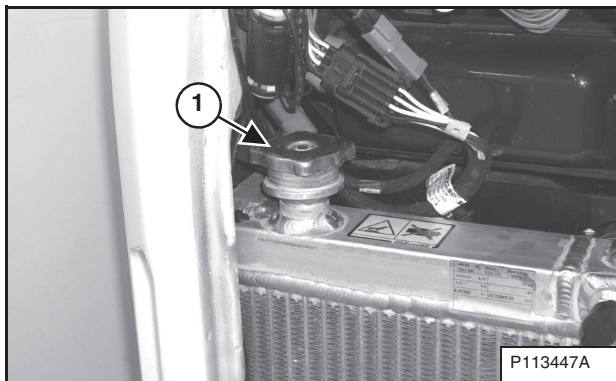
Stop the engine. Open the tight side cover. (See Opening And Closing on Page 71.)

**WARNING**

AVOID BURNS
Do not remove radiator cap when the engine is hot.
You can be seriously burned.

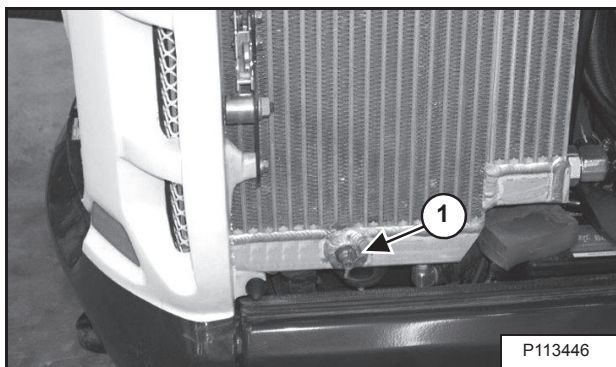
W-2070-1203

Figure 110



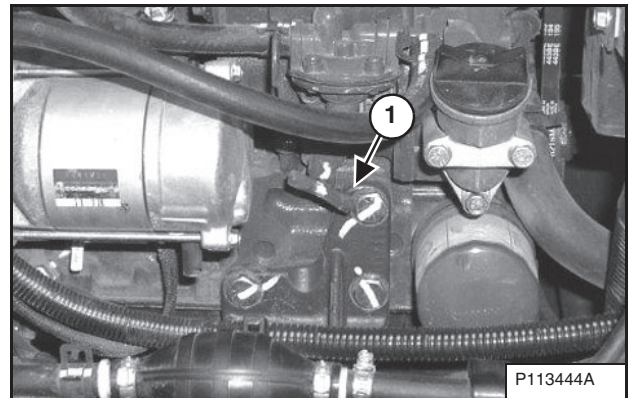
When the engine is cool, loosen and remove the coolant fill cap (Item 1) [Figure 110].

Figure 111



Install a hose on the drain valve at the bottom of the radiator. Open the drain valve (Item 1) [Figure 111] and drain the coolant into a container.

Figure 112



Install a hose on the drain valve located at the engine block by the end of the started. Open the drain valve (Item 1) [Figure 112] and drain the coolant into a container.

After all the coolant is removed, close both drain valves.

Recycle or dispose of the used coolant in an environmentally safe manner.

Mix the coolant in a separate container. (See Capacities on Page 116.)

NOTE: The cooling system is factory filled with propylene glycol (purple colour). DO NOT mix propylene glycol with ethylene glycol.

The correct mixture of coolant to provide a -37°C (-34°F) freeze protection is 5 L propylene glycol mixed with 4,4 L of water **OR** 1 U.S. gal propylene glycol mixed with 3.5 qt of water.

Add premixed coolant, 47% water and 53% propylene glycol, to the coolant tank until the coolant level reaches the lower marker on the tank.

Use a refractometer to check the condition of propylene glycol in your cooling system.

Add premixed coolant until the level is correct. Install the coolant fill cap.

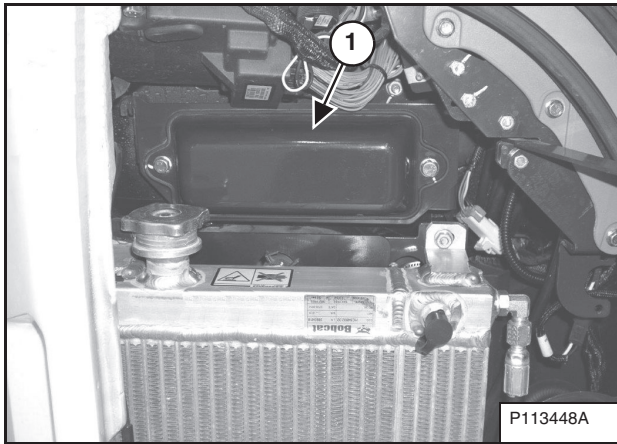
Run the engine until it is at operating temperature. Stop the engine. Check the coolant level when cool. Add coolant as needed. Install the coolant fill cap.

Close the tailgate.

ELECTRICAL SYSTEM

Description

Figure 113



The excavator has a 12 volt, negative earth electrical system. The electrical system is protected by fuses located under the right side cover of the excavator (Item 1) [Figure 113]. The fuses will protect the electrical system when there is an electrical overload. The reason for the overload must be found and corrected before starting the engine again.

The battery cables must be clean and tight. Check the electrolyte level in the battery. Add distilled water as needed. Remove acid or corrosion from the battery and cables with a sodium bicarbonate and water solution.

Put Battery Saver P/N 6664458 or grease on the battery terminals and cable ends to prevent corrosion.

WARNING

AVOID INJURY OR DEATH

Batteries contain acid which burns eyes and skin on contact. Wear goggles, protective clothing and rubber gloves to keep acid off body.

In case of acid contact, wash immediately with water. In case of eye contact get prompt medical attention and wash eye with clean, cool water for at least 15 minutes.

If electrolyte is taken internally drink large quantities of water or milk! DO NOT induce vomiting. Get prompt medical attention.

W-2065-0807

Fuse And Relay Location / Identification

A decal is inside the fuse cover to show location and amp ratings.

Remove the cover to check or replace the fuses and relays.

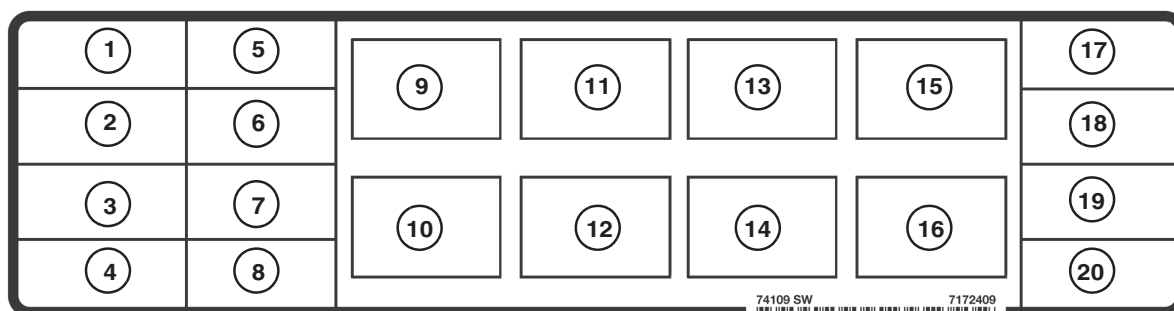
The location and amperage ratings are shown in [Figure 114].

Always replace fuses using the same type and capacity.

ELECTRICAL SYSTEM (CONT'D)

Fuse And Relay Location / Identification (Cont'd)

Figure 114



The location and amperage ratings are shown in the table below and on the decal [Figure 114]. Relays are identified by the letter “R” in the AMP column.

REF	ICON	DESCRIPTION	AMP	REF	ICON	DESCRIPTION	AMP	REF	ICON	DESCRIPTION	AMP
1		NOT USED		9		Switched Power	R	17		Panel / Display Controller	25
2		NOT USED		10		Fuel Shutoff	R	18		ACD Unswitched Power	25
3		Start Key	5	11		Lights	R	19		Lights	25
4		Fuel Shutoff	25	12		Lights	R	20		Power Port	15
5		Wiper / Washer	10	13		Hydraulic By-Pass / Power Beyond	R				
6		Switched Power	20	14		Glow Plugs	R				
7		Alternator Excite / Heater	25	15		NOT USED	R				
8		ACD Switched Power	25	16		Starter	R				

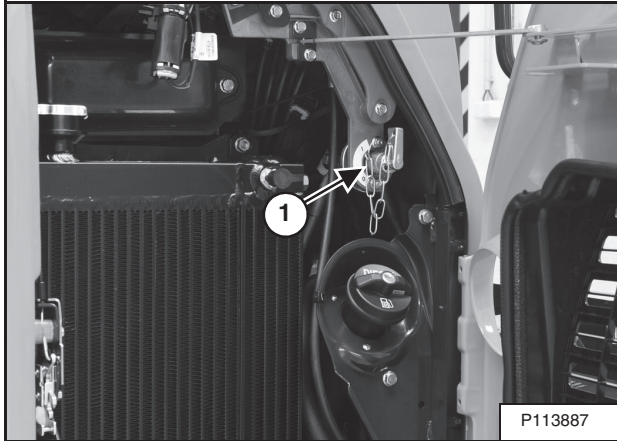
ELECTRICAL SYSTEM (CONT'D)

Battery Disconnect Switch

When disconnecting or connecting the battery cables, turn the disconnect switch to the OFF position first.

Open the right side cover. (See RIGHT SIDE COVER on Page 71.)

Figure 115



The disconnect switch (Item 1) **[Figure 115]** is located under the right side cover, above the fuel fill cap.

Rotate the switch (Item 1) **[Figure 115]** anticlockwise to turn the switch to the OFF position, clockwise to turn to the ON position (shown in ON position).

NOTE: In the OFF position the shut-off switch key can be removed from the switch. The key is secured to the switch mount with a chain.

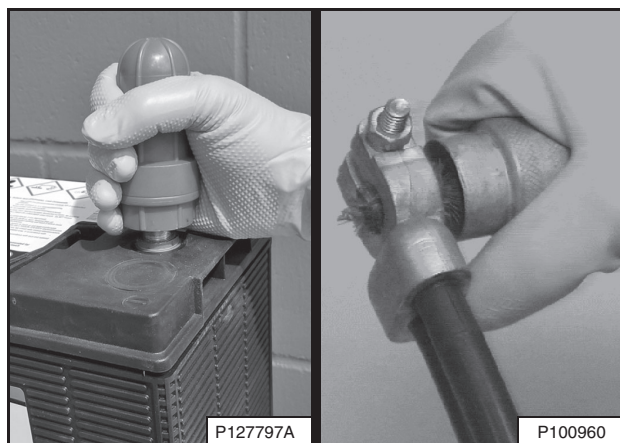
ELECTRICAL SYSTEM (CONT'D)

Battery Maintenance

See the SERVICE SCHEDULE for the correct service interval. (See SERVICE SCHEDULE on Page 66.)

The Doosan brand battery supplied with your machine is sealed and does not require watering. Proper charging and storage are important to maximize the life of all batteries.

Figure 116



Simple steps for reliability and long battery life:

- Keep battery posts and terminals clean **[Figure 116]**.
- Keep terminals tight.
- Remove corrosion from battery and terminals with sodium bicarbonate (baking soda) and water solution.
- Put Doosan Battery Saver or grease on the battery terminals and cable ends to prevent corrosion.
- Operate the machine for at least 15 minutes to recover from the battery drain caused by engine start up whenever practical.
- Maintain the battery charge level. This is a key factor for long battery life.
- Charge a severely discharged battery with a battery charger instead of relying on the machine charging system. (See Battery Charging on Page 87.)
- Check the battery state of charge every 30 days on machines that are not frequently used. (See Battery Testing on Page 87.)

WARNING

AVOID INJURY OR DEATH

Batteries contain acid which burns eyes and skin on contact. Wear goggles, protective clothing and rubber gloves to keep acid off body.

In case of acid contact, wash immediately with water. In case of eye contact get prompt medical attention and wash eye with clean, cool water for at least 15 minutes.

If electrolyte is taken internally drink large quantities of water or milk! DO NOT induce vomiting. Get prompt medical attention.

W-2065-0807

Maintaining Battery Charge Level

All batteries will self-discharge over time. This machine has features that require battery power even when the machine is not being used. Use of a quality battery maintainer is highly recommended to ensure that your machine is ready to start when you need it and avoid costly battery replacement.

Battery Maintainers

Use a good quality battery maintainer to keep the battery above 12.4 volts for machines that are not frequently used. Batteries below 12.4 volts must first be charged using a battery charger. Solar maintainers should have a minimum capacity of 10 watts to be effective.

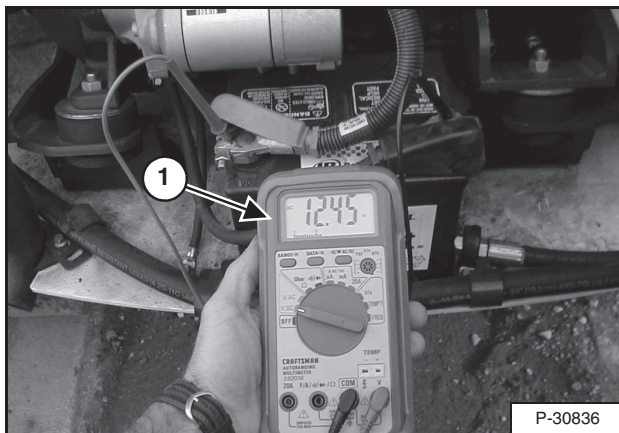
Battery Service During Machine Storage

Remove the battery if storing the machine for an extended period of time. Fully charge the battery. Store the battery in a cool dry place above freezing and boost charge periodically. If battery removal is not desired, a good quality battery maintainer must be used to compensate for battery self-discharge and parasitic loads from machine controllers, accessories, and features such as connected machine intelligence.

ELECTRICAL SYSTEM (CONT'D)

Battery Testing

Figure 117



The simplest and most common check to determine battery state of charge is to use a digital multimeter or voltmeter (Item 1) [Figure 117].

A battery found below 12.4 volts must be charged to 100% charge per the battery charger's recommendation. **Allow at least 60 minutes after operating the machine or charging the battery to get an accurate reading.**

If the reading is less than 12.4 volts after the battery has been charged for several hours, see your Doosan dealer to have a more thorough battery test performed.

The freezing point of battery electrolyte is dependent on the battery state of charge. Keeping the battery voltage above 12.4 volts will help prevent batteries from freezing, even at extremely low temperatures.

If the battery freezes, the internal grid may be damaged and the case will be distorted or cracked. If this happens, dispose of the battery according to local regulations.

Battery Charging

A battery charger designed for 12 volt charging systems is recommended. Follow the battery charger manufacturer's instructions to charge the battery to 12.6 volts (100% charge). Batteries should be charged at room temperature to avoid an undercharge or overcharge condition. Never attempt to charge a frozen battery.

The following table can be used to identify the approximate amount of time required to charge a discharged battery. Allow at least 60 minutes after operating the machine or charging the battery to get an accurate reading.

BATTERY VOLTAGE	STATE OF CHARGE	CHARGER MAXIMUM RATE		
		30 Amps	20 Amps	10 Amps
12.6 V	100%	READY TO USE		
12.4 V	75%	0.9 hr.	1.3 hr.	2.5 hr.
12.2 V	50%	1.9 hr.	2.7 hr.	5.1hr.
12.0 V	25%	2.9 hr.	4.3 hr.	7.8 hr.
11.8 V	0%	4.0 hr.	5.7 hr.	10.7 hr.

NOTE: Use a good quality automatic charger to avoid battery damage from overcharging.

! WARNING

BATTERY GAS CAN EXPLODE AND CAUSE SERIOUS INJURY OR DEATH

Keep arcs, sparks, flames and lighted tobacco away from batteries. When *jumping* from booster battery make final connection (negative) at machine frame.

Do not jump start or charge a frozen or damaged battery. Warm battery to 16°C (60°F) before connecting to a charger. Unplug charger before connecting or disconnecting cables to battery. Never lean over battery while boosting, testing or charging.

W-2066-0910

ELECTRICAL SYSTEM (CONT'D)

Using A Booster Battery (Jump Starting)

IMPORTANT

If jump starting the excavator from a second machine:

When jump starting the excavator from a battery installed in a second machine, make sure the engine is **NOT** running while using the glow plugs. High voltage spikes from a running machine can burn out the glow plugs.

I-2060-0906

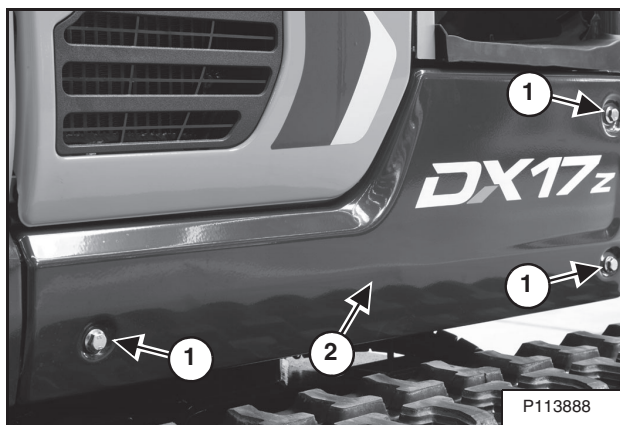
If it is necessary to use a booster battery to start the engine, BE CAREFUL! There must be one person in the operator's seat and one person to connect and disconnect the battery cables.

Be sure the key switch is OFF. The booster battery must be 12 volt.

Open the tailgate. (See Opening And Closing on Page 70.)

NOTE: To access the battery for jump starting, the battery hold-down will need to be removed and the battery moved outward to access the positive battery post.

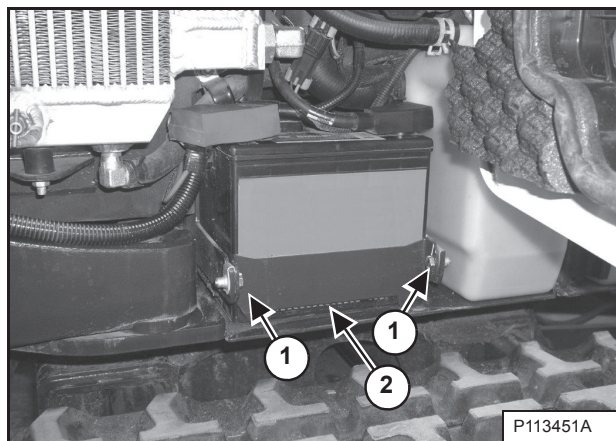
Figure 118



Remove the three bolts (Item 1) and remove the right side lower cover (Item 2) [Figure 118].

Open the right side cover. (See Opening And Closing on Page 71.)

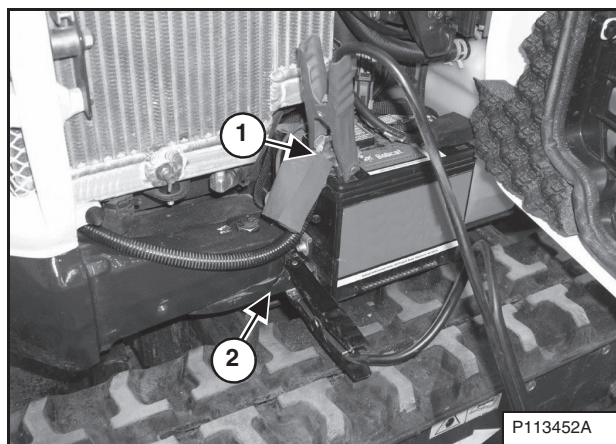
Figure 119



Remove the two bolts (Item 1) and remove the battery hold-down plate (Item 2) [Figure 119].

Slide the battery out slightly to access the battery posts.

Figure 120



Connect one end of the first cable to the positive (+) terminal of the booster battery. Connect the other end of the same cable to the positive (+) terminal (Item 1) [Figure 118] of the excavator battery.

Connect one end of the second cable to the negative (-) terminal of the booster battery. Connect the other end of the same cable to a frame earth point (Item 2) [Figure 120].

Start the engine. After the engine has started, remove the negative (-) cable first (Item 1) [Figure 120].

Disconnect the cable from the excavator starter (Item 1) [Figure 118].

Replace the positive battery cable cover and push the battery in fully. Reinstall the battery hold-down plate (Item 2) and the two bolts (Item 1) [Figure 119].

ELECTRICAL SYSTEM (CONT'D)

Using A Booster Battery (Jump Starting) (Cont'd)

Reinstall the lower right side cover [Figure 118].

NOTE: (See Cold Temperature Starting on Page 43.)

IMPORTANT

Damage to the alternator can occur if:

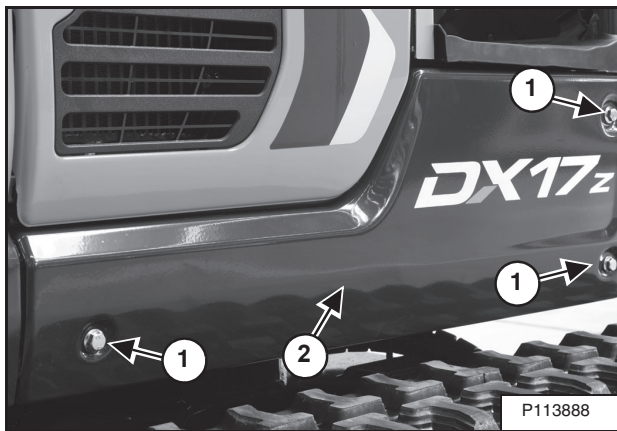
- Engine is operated with battery cables disconnected.
- Battery cables are connected when using a fast charger or when welding on the excavator. (Remove both cables from the battery.)
- Extra battery cables (booster cables) are connected wrong.

I-2223-0903

ELECTRICAL SYSTEM (CONT'D)

Removing And Installing The Battery

Figure 121

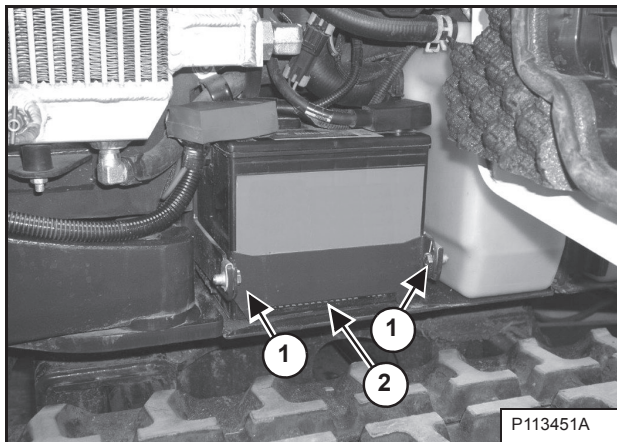


Remove the three bolts (Item 1) and remove the right side lower cover (Item 2) [Figure 121].

Open the right side cover. (See Opening And Closing on Page 71.)

Turn the battery disconnect switch to the OFF position. (See Battery Disconnect Switch on Page 85.)

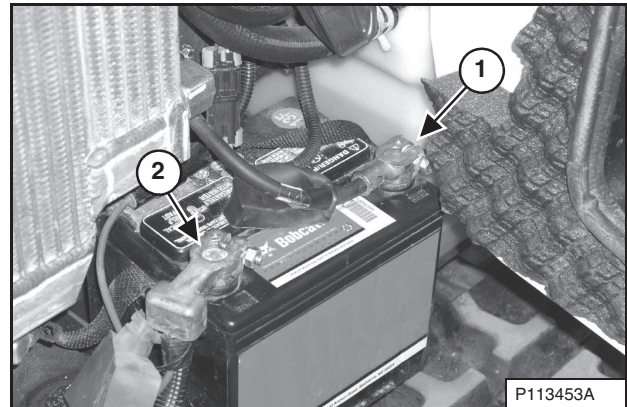
Figure 122



Remove the two bolts (Item 1) and remove the battery hold-down plate (Item 2) [Figure 122].

Slide the battery to the right to access the battery cables.

Figure 123



Disconnect the negative (-) cable (Item 1) [Figure 123] first.

Disconnect the positive (+) cable (Item 2) [Figure 123].

Remove the battery.

Always clean the terminals and the cable ends, even when installing a new battery.

Position the battery into the battery box.

Connect the battery cables. Connect the negative (-) cable (Item 1) [Figure 123] last to prevent sparks. Reinstall the battery post covers and slide the battery in fully.

Tighten the terminal clamp nuts to 7 N•m (5 ft-lb) torque.

Install the hold-down plate (Item 2) and the two bolts (Item 1) [Figure 118]. Reinstall the lower cover [Figure 121].

Turn the battery disconnect switch to the ON position. (See Battery Disconnect Switch on Page 85.)

WARNING

AVOID INJURY OR DEATH

Batteries contain acid which burns eyes and skin on contact. Wear goggles, protective clothing and rubber gloves to keep acid off body.

In case of acid contact, wash immediately with water. In case of eye contact get prompt medical attention and wash eye with clean, cool water for at least 15 minutes.

If electrolyte is taken internally drink large quantities of water or milk! DO NOT induce vomiting. Get prompt medical attention.

W-2065-0807

HYDRAULIC SYSTEM

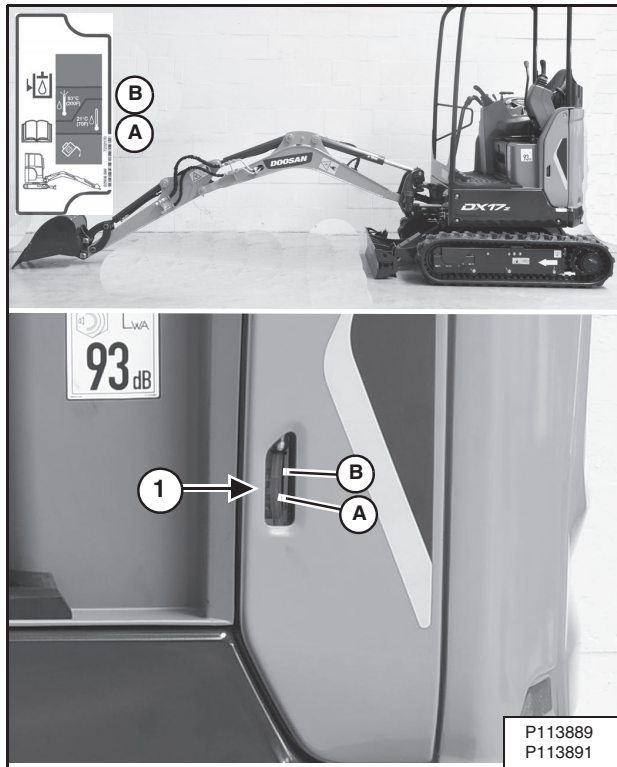
Checking And Adding Hydraulic Fluid

Put the machine on a flat level surface.

Retract the arm and bucket cylinders, put the bucket on the ground and lower the blade. Stop the engine.

Open the right side cover. (See Opening And Closing on Page 71.)

Figure 124



Park the machine in the position shown [Figure 124]. (The preferred method is to check the hydraulic fluid when it is cold.)

Check the hydraulic fluid level, it must be visible in the sight gauge (Item 1) [Figure 124]. The decal on the hydraulic tank shows the correct fill level.

- A - Correct Oil Level COLD (Preferred)
- B - Correct Oil Level HOT (Optional)



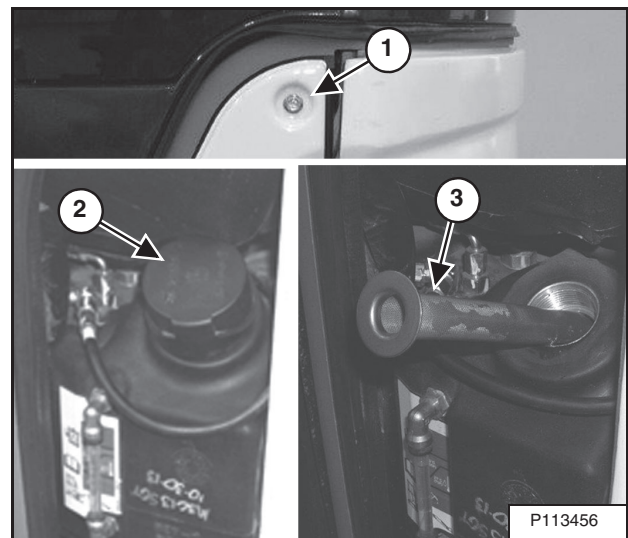
WARNING

AVOID INJURY OR DEATH

Always clean up spilled fuel or oil. Keep heat, flames, sparks or lighted tobacco away from fuel and oil. Failure to use care around combustibles can cause explosion or fire.

W-2103-0508

Figure 125



Remove screw (Item 1) [Figure 125] from the top of the cover and remove the left side cover.

Clean the surface around the reservoir cap and remove the cap from the reservoir (Item 2) [Figure 125].

Check the condition of the fill strainer screen (Item 3) [Figure 125]. Clean or replace as necessary.

Be sure the screen is installed before adding fluid.

Add the correct fluid to the reservoir until it is visible in the sight gauge.

Check the cap and clean as necessary. Replace the cap if damaged.

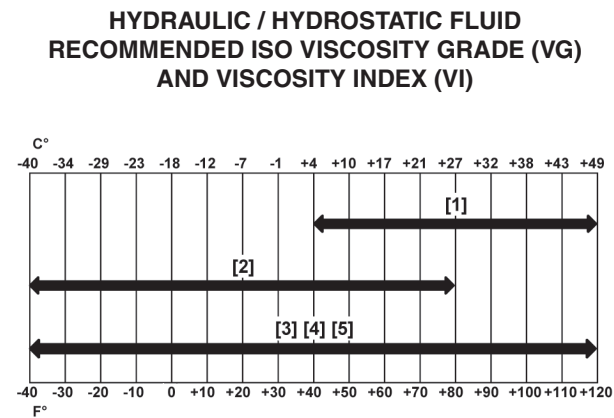
Install the cap.

Close the right side cover and tailgate.

HYDRAULIC SYSTEM (CONT'D)

Hydraulic / Hydrostatic Fluid Chart

Figure 126



TEMPERATURE RANGE ANTICIPATED DURING MACHINE USE

- [1] VG 100; Minimum VI 130
- [2] VG 46; Minimum VI 150
- [3] Doosan All-Season Fluid
- [4] Doosan Synthetic Fluid
- [5] Doosan Biodegradable Hydraulic / Hydrostatic Fluid (Unlike biodegradable fluids that are vegetable based, Doosan biodegradable fluid is formulated to prevent oxidation and thermal breakdown at operating temperatures.)

Install the oil fill cap.

Removing And Replacing The Hydraulic Filters

WARNING

AVOID INJURY OR DEATH

Always clean up spilled fuel or oil. Keep heat, flames, sparks or lighted tobacco away from fuel and oil. Failure to use care around combustibles can cause explosion or fire.

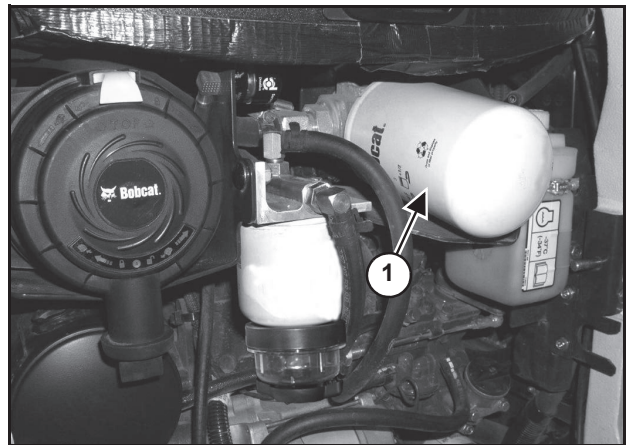
W-2103-0508

Hydraulic Filter

See the service schedule for the correct service interval. (See SERVICE SCHEDULE on Page 66.)

Open the tailgate. (See Opening And Closing on Page 70.)

Figure 127



Remove the hydraulic filter (Item 1) [Figure 127].

Clean the housing where the filter gasket makes contact.

Put clean hydraulic fluid on the gasket. Install the new filter and hand tighten only. Use a genuine Doosan replacement filter.

WARNING

AVOID INJURY OR DEATH

Always clean up spilled fuel or oil. Keep heat, flames, sparks or lighted tobacco away from fuel and oil. Failure to use care around combustibles can cause explosion or fire.

W-2103-0508

HYDRAULIC SYSTEM (CONT'D)

Removing And Replacing The Hydraulic Fluid

See the service schedule for the correct service interval. (See SERVICE SCHEDULE on Page 66.)

WARNING

AVOID INJURY OR DEATH

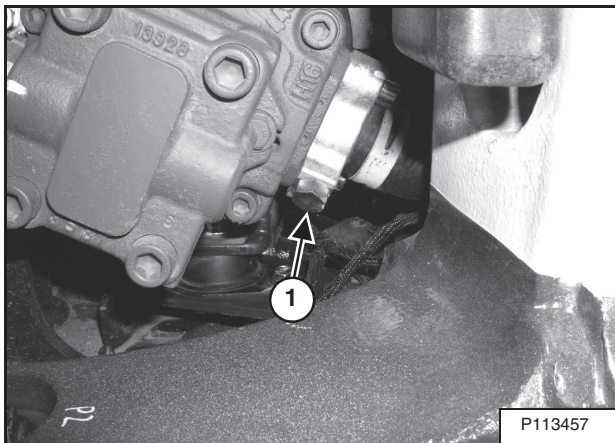
Diesel fuel or hydraulic fluid under pressure can penetrate skin or eyes, causing serious injury or death. Fluid leaks under pressure may not be visible. Use a piece of cardboard or wood to find leaks. Do not use your bare hand. Wear safety goggles. If fluid enters skin or eyes, get immediate medical attention from a doctor familiar with this injury.

W-2072-EN-0909

Retract the arm and bucket cylinders, lower the bucket to the ground. Stop the engine.

Open the tailgate. (See Opening And Closing on Page 70.)

Figure 128



The hydraulic fluid drain plug (Item 1) [Figure 128] is located on the hydraulic pump inlet fitting.

Remove the plug (Item 1) [Figure 128].

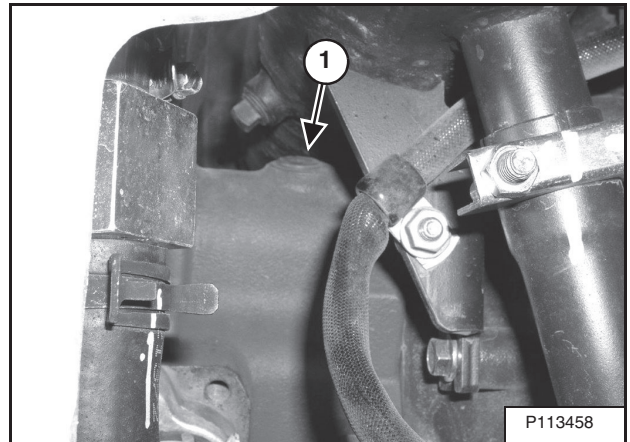
Drain the fluid into a container.

Recycle or dispose of the fluid in an environmentally safe manner.

Install the plug (Item 1) [Figure 128].

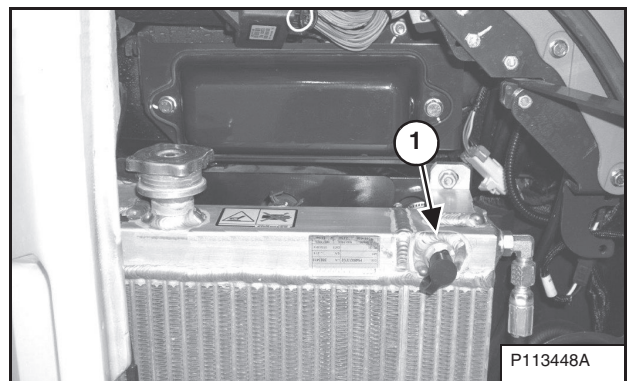
Add fluid to the reservoir. (See Checking And Adding Hydraulic Fluid on Page 91.)

Figure 129



With the engine OFF, loosen the plug (Item 1) [Figure 129] on the hydraulic pump. Tighten the plug after a steady stream of hydraulic fluid, free of any air bubbles, drains from the plug. **DO NOT RUN THE MACHINE WITH THE PLUG OPEN.** Tighten the plug to 30 – 34 N•m (22 – 25 ft-lb) torque.

Figure 130



There is also a port (Item 1) [Figure 130] on the hydraulic cooler for bleeding air. Install a diagnostic coupler and hose on this fitting to allow air to be bled from the hydraulic system after the hydraulic fluid has been replaced. Remove the hose and coupler before starting the engine.

Start the engine and operate the machine through the hydraulic functions. Stop the engine. Check the fluid level and add as needed.

SPARK ARRESTER MUFFLER

Cleaning Procedure

See the SERVICE SCHEDULE for the correct service interval. (See SERVICE SCHEDULE on Page 66.)

WARNING

AVOID INJURY OR DEATH

When an engine is running in an enclosed area, fresh air must be added to avoid concentration of exhaust fumes. If the engine is stationary, vent the exhaust outside. Exhaust fumes contain odorless, invisible gases which can kill without warning.

W-2050-0807

WARNING

Stop engine and allow the muffler to cool before cleaning the spark chamber. Wear safety goggles. Failure to obey can cause serious injury.

W-2011-1285

IMPORTANT

This machine is factory equipped with a spark arrester exhaust system.

The spark arrester muffler, if equipped, must be cleaned to keep it in working condition. The spark arrester muffler must be serviced by dumping the spark chamber every 100 hours of operation.

On some models, the turbocharger functions as the spark arrester and must operate correctly for proper spark arrester function.

If this machine is operated on flammable forest, brush, or grass covered land, a spark arrester attached to the exhaust system may be required and must be maintained in working order. Refer to local laws and regulations for spark arrester requirements.

I-2284-EN-0909

WARNING

When the engine is running during service, the steering levers must be in neutral.

Failure to do so can cause injury or death.

W-2203-0595

WARNING

Never use machine in atmosphere with explosive dust or gases or where exhaust can contact flammable material. Failure to obey warnings can cause injury or death.

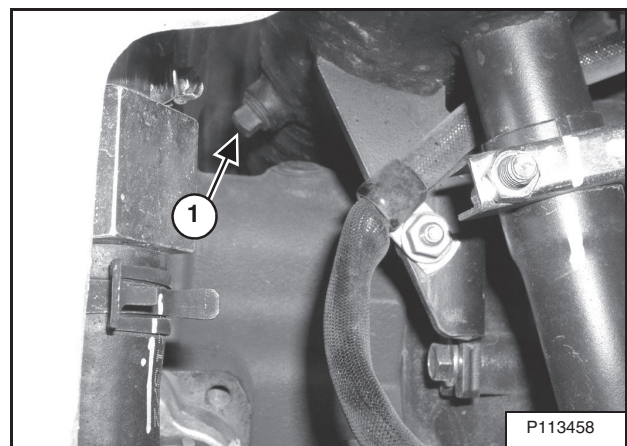
W-2068-1285

Do not operate the excavator with a defective exhaust system.

Stop the engine. Open the tailgate. (See TAILGATE on Page 70.)

Remove the left side cover.

Figure 131



Remove the plug (Item 1) [Figure 131] from the bottom of the muffler.

Start the engine and run for about 10 seconds while a second person, wearing safety glasses, holds a piece of wood over the outlet of the muffler. The carbon deposits will be forced out of the muffler plug hole (Item 1) [Figure 131].

Stop the engine. Install and tighten the plug.

Close the tailgate.

TRACK TENSION

Checking Tension

NOTE: The wear of the pins and bushings on the undercarriage vary with the working conditions and the different types of soil conditions. It is necessary to inspect track tension and maintain the correct tension. See service schedule for the correct service interval. (See **SERVICE SCHEDULE** on Page 66.)

Raise the side of the machine (approximately 102 mm [4 in]) using the boom and arm.

Figure 132

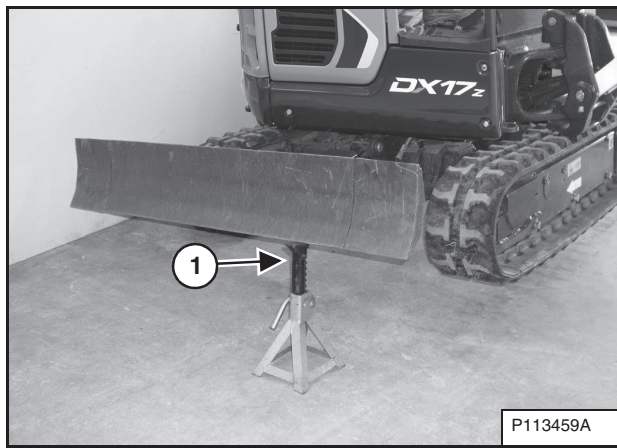
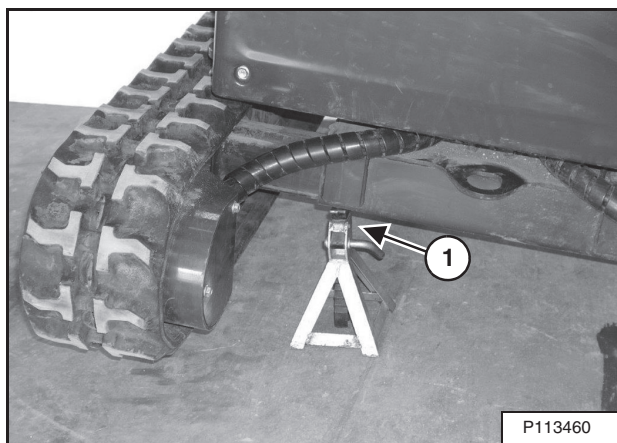


Figure 133



Raise the blade fully and install jackstands under the blade and track frame (Item 1) **[Figure 132]** and **[Figure 133]**. Raise the boom until all machine weight is on the jackstands.

Stop the engine.



WARNING

AVOID INJURY

Keep fingers and hands out of pinch points when checking the track tension.

W-2142-0903

Track Clearance

Figure 134

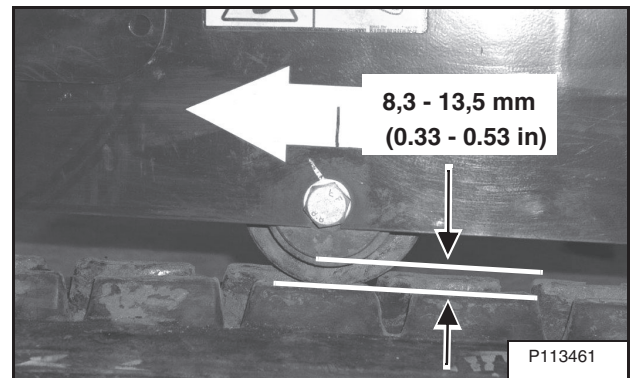
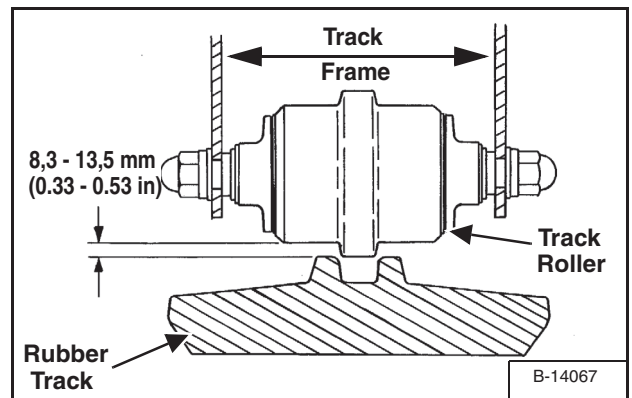


Figure 135



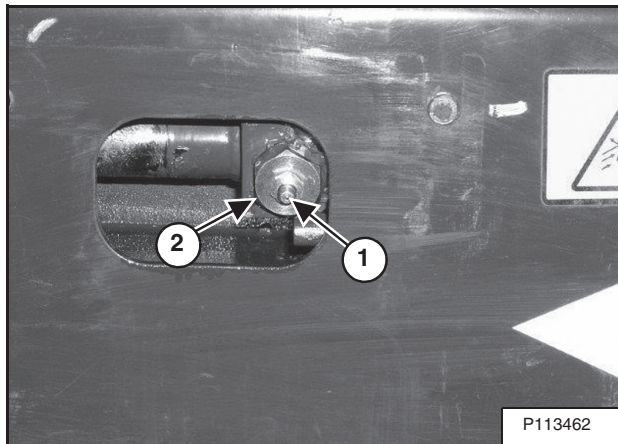
Measure the clearance at either middle track roller. Do not get fingers into pinch points between the track and the track roller. Use a bolt or a dowel of the appropriate size to check the gap between the contact edge of the roller and the top edge of the track guide **[Figure 134]** and **[Figure 135]**.

Track Clearance	8,3 – 13,5 mm (0.33 – 0.53 in)
-----------------	-----------------------------------

TRACK TENSION (CONT'D)

Adjusting Tension

Figure 136



Loosen the access cover bolts and pivot the access cover open [Figure 136].

Increase Track Tension

Add grease to the fitting (Item 1) [Figure 136] until the track tension is correct.

Decrease Track Tension

WARNING

AVOID INJURY OR DEATH

If grease fitting is removed before pressure is released, the fitting can come off with great force and cause serious injury or death.

W-2490-0104

Pressure must be released from the grease cylinder to decrease track tension.

Loosen the bleed fitting (NOT the grease fitting) (Item 2) [Figure 136] and release pressure until the track tension is correct.

NOTE: DO NOT loosen the bleed fitting (Item 2) [Figure 136] for more than eight turns.

Tighten the bleed fitting to 80 – 100 N•m (59 – 74 ft-lb) torque.

Pivot the access cover closed and tighten the access cover bolts.

Raise the machine and remove the jackstands.

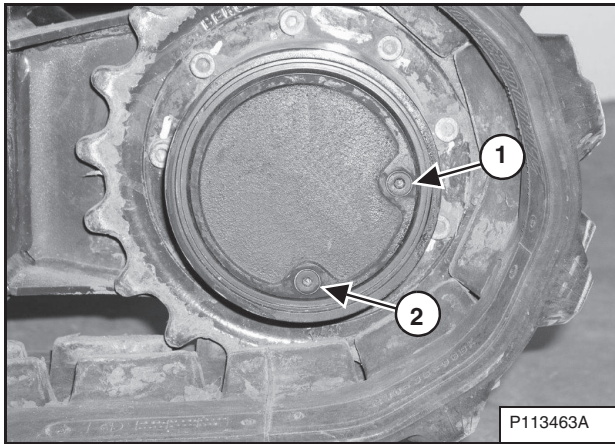
Repeat the procedure for the other side.

Dispose of grease in an environmentally safe manner.

TRAVEL MOTOR

Checking And Adding Oil

Figure 137



Park the excavator on a level surface with the plugs (Items 1 and 2) **[Figure 137]** in the position as shown.

Remove the plug (Item 1) **[Figure 137]**. The fluid level must be at the bottom edge of the hole.

Add lubricant (SAE 80W90) through the hole if the fluid level is low.

Removing And Replacing Oil

See the service schedule for the correct service interval. (See SERVICE SCHEDULE on Page 66.)

Park the excavator on a level surface with plugs (Items 1 and 2) **[Figure 137]** in the position shown. Remove both plugs and drain the lubricant into a container.

WARNING

AVOID INJURY OR DEATH

Always clean up spilled fuel or oil. Keep heat, flames, sparks or lighted tobacco away from fuel and oil. Failure to use care around combustibles can cause explosion or fire.

W-2103-0508

Install the bottom plug (Item 2) **[Figure 137]**. Add fluid through the centre plug hole until the fluid level is at the bottom edge of the hole.

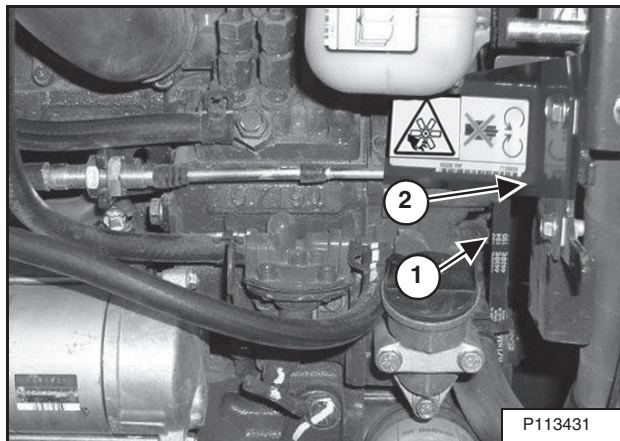
Install the plug (Item 1) **[Figure 137]**.

ALTERNATOR AND FAN BELT

Belt Adjustment

Stop the engine and open the tailgate. (See Opening And Closing on Page 70.)

Figure 138

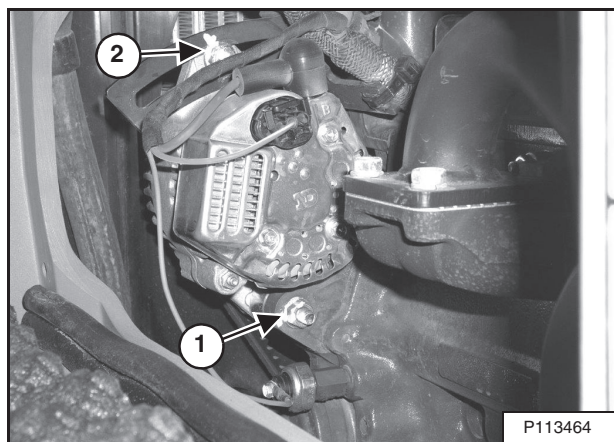


Measure the belt (Item 1) **[Figure 138]** tension at the middle of the belt span.

If a belt tension tool is available, move the alternator until the belt has (new belt = 272 - 292 N [61 - 65 lbf] or used belt = 233 - 252 N [53 - 57 lbf]) tension.

If a belt tension tool is not available, move the alternator until the belt has 8,0 mm (5/16 in) movement at the middle of the belt span with 66 N (15 lbf) of force.

Figure 139



NOTE: The seat is shown removed for photo clarity. The alternator adjusting bolts can be accessed by removing the belt guard (Item 2) **[Figure 138]** and reaching around the engine.

If the belt tension is not correct, loosen the bolt and nut (Item 1) and the bolt (Item 2) **[Figure 139]** until the alternator can be moved toward the engine.

Adjust belt tension to correct specifications **[Figure 138]**.

Tighten the mounting and adjustment bolts.

Close the tailgate.

Belt Replacement

Loosen the bolt and nut (Item 1) and the bolt (Item 2) **[Figure 139]** until the alternator can be moved toward the engine.

Remove the old belt and install a new belt.

Adjust belt tension to correct specifications **[Figure 138]**.

Tighten the mounting and adjustment bolts.

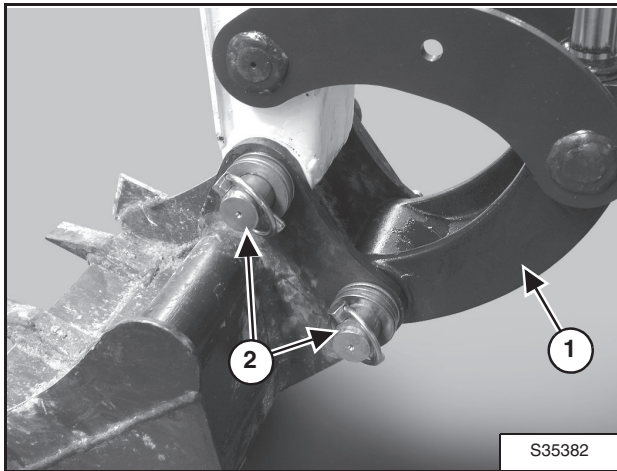
Reinstall the belt guard (Item 2) **[Figure 138]**.

Close the tailgate.

QUICK COUPLER

Bucket Link And Attachment Coupler Inspection And Maintenance

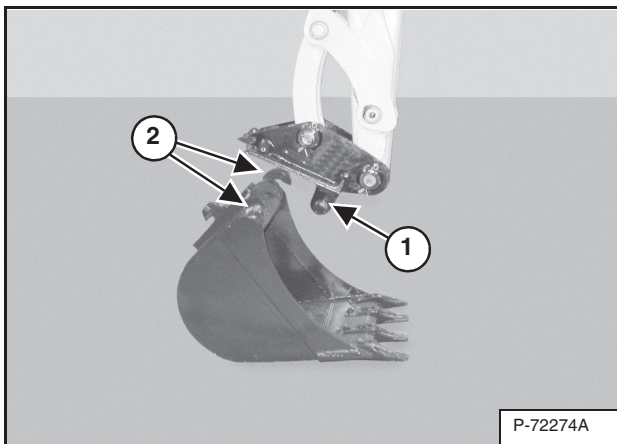
Figure 140



Inspect the bucket link (Item 1) for wear or damage. Inspect the attachment pins (Item 2) [Figure 140] for wear or damage.

Repair or replace damaged parts.

Figure 141



Inspect the quick coupler for wear or damage. Inspect the quick coupler pins (Item 1) and the hooks (Item 2) [Figure 141] (on the attachment) for wear or damage

Repair or replace damaged parts.

TRACK ROLLER AND IDLER LUBRICATION

Procedure

The track rollers and idlers require no maintenance. The bearings are a sealed design.

LUBRICATION OF THE HYDRAULIC EXCAVATOR

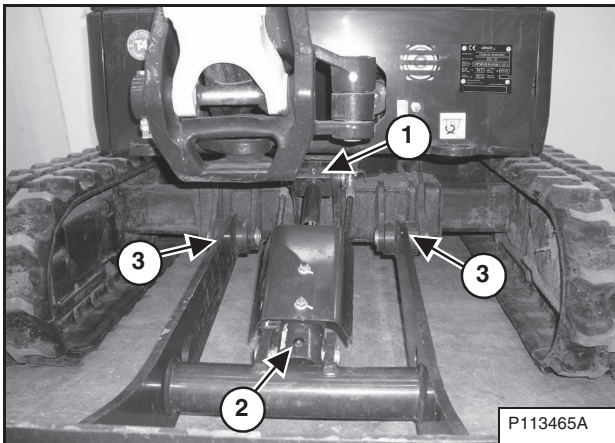
Lubrication Locations

Lubricate the excavator as specified in the service schedule for the best performance of the machine. (See SERVICE SCHEDULE on Page 66.)

Always use a good quality lithium based multipurpose grease when lubricating the machine. Apply the lubricant until extra grease shows.

Lubricate the following locations on the excavator **EVERY 8 – 10 HOURS**:

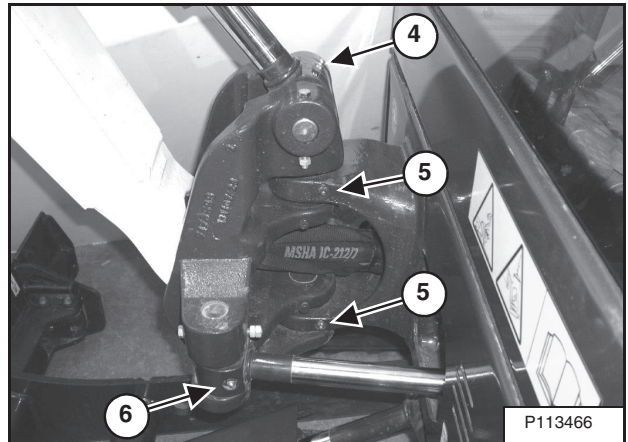
Figure 142



Ref Description (# of Fittings)

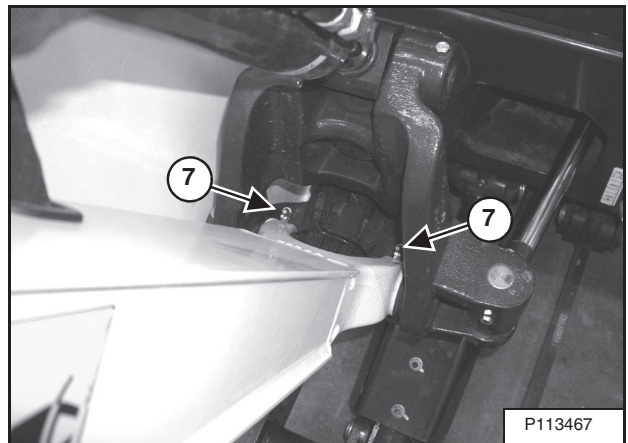
1. Blade Cylinder Rod End (1) [Figure 142]
2. Blade Cylinder Base End (1) [Figure 142]
3. Blade Pivots (2) [Figure 142]

Figure 143



4. Boom Cylinder Rod End (1) [Figure 143]
5. Boom Swing Pivot (3) [Figure 143]
6. Boom Swing Cylinder Rod End (1) [Figure 143]

Figure 144

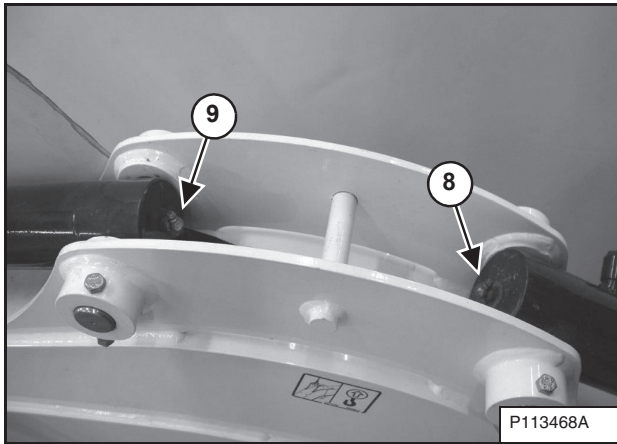


7. Boom Pivot (2) [Figure 144]

LUBRICATION OF THE HYDRAULIC EXCAVATOR (CONT'D)

Lubrication Locations (Cont'd)

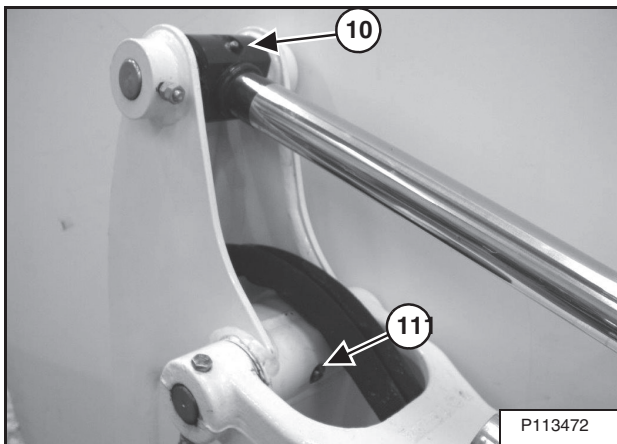
Figure 145



8. Boom Cylinder Base End (1) [Figure 145]

9. Arm Cylinder Base End (1) [Figure 145]

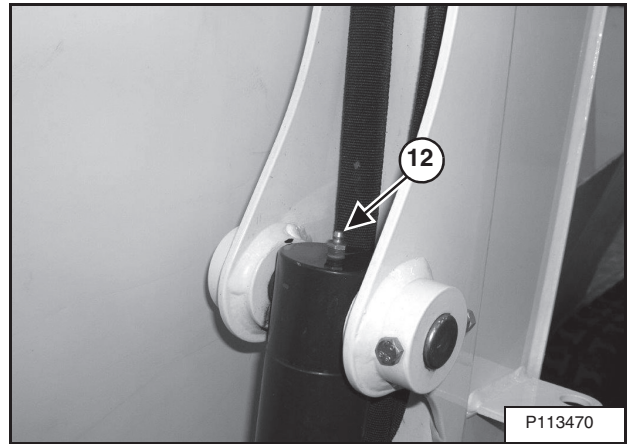
Figure 146



10. Arm Cylinder Rod End (1) [Figure 146]

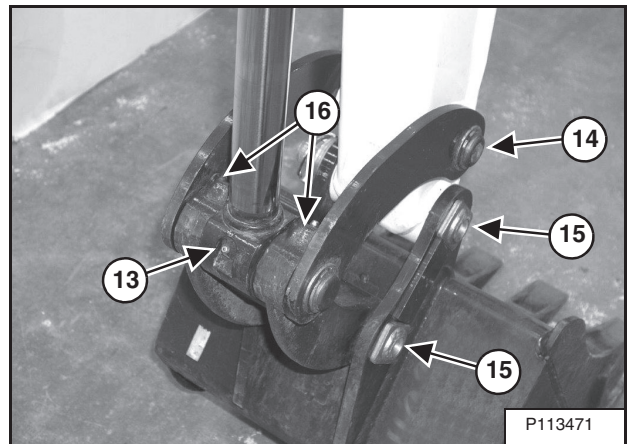
11. Arm Pivot (1) [Figure 146]

Figure 147



12. Bucket Cylinder Base End (1) [Figure 147]

Figure 148



13. Bucket Cylinder Rod End (1) [Figure 148]

14. Bucket Link Pin (1) [Figure 148]

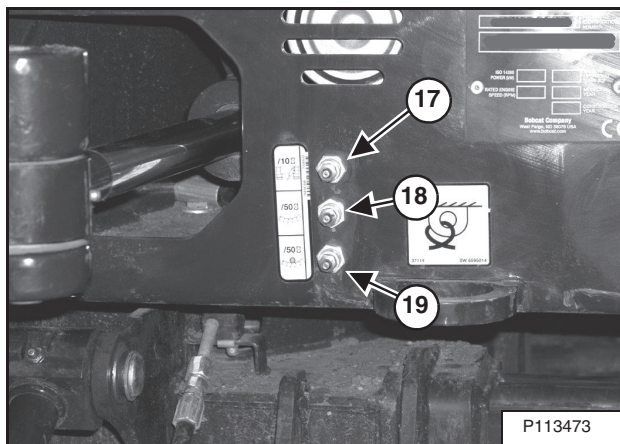
15. Bucket Pivot (2) [Figure 148]

16. Bucket Link (2) [Figure 148]

LUBRICATION OF THE HYDRAULIC EXCAVATOR (CONT'D)

Lubrication Locations (Cont'd)

Figure 149



17. Boom Swing Cylinder Base (1) [Figure 149]

Lubricate the following locations on the hydraulic excavator **EVERY 50 HOURS**:

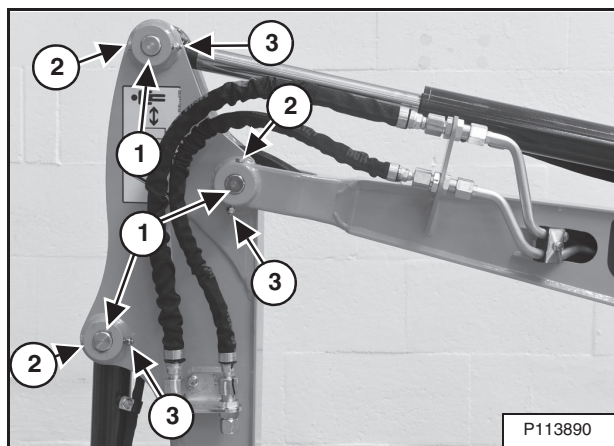
18. Slew Circle (1) [Figure 149]

19. Slew Pinion (1) [Figure 149]. (Install three to four pumps of grease then rotate the upperstructure 90°. Install three to four pumps of grease and again rotate the upperstructure 90°. Repeat this until the slew pinion has been greased at four positions.)

PIVOT PINS

Inspection And Maintenance

Figure 150



The pivots and cylinders (Item 1) have a large pin held in position with a bolt (Item 2) and a nut (Item 3) [Figure 150] securing the pin.

After the nut (Item 3) and bolt (Item 2) are tightened together, the bolt (Item 2) [Figure 150] should be free to spin. See your Doosan dealer for replacement parts.

EXCAVATOR STORAGE AND RETURN TO SERVICE

Storage

Sometimes it can be necessary to store your Doosan excavator for an extend period of time. Below is a list of items to perform before storage.

- Thoroughly clean the excavator including the engine compartment.
- Lubricate the excavator.
- Replace worn or damaged parts.
- Drive the excavator onto planks in a dry protected shelter.
- Lower the boom fully with the bucket flat on the ground.
- Put grease on any exposed cylinder rods.
- Put fuel stabiliser in the fuel tank and run the engine a few minutes to circulate the stabiliser to the pump and fuel injectors.
- Drain and flush the cooling system. Refill with premixed coolant.
- Replace all fluids and filters (engine, hydraulic).
- Replace all filters (For example: air cleaner, heater, etc.).
- Put all controls in NEUTRAL position.
- Remove the battery. Be sure the electrolyte level is correct then charge the battery. Store it in a cool dry place above freezing temperatures and charge it periodically during storage.
- Cover the exhaust pipe opening.
- Tag the machine to indicate that it is in storage condition.

Return To Service

After the Doosan excavator has been in storage, it is necessary to follow a list of items to return the excavator to service.

- Check the engine and hydraulic fluid levels; check coolant level.
- Install a fully charged battery.
- Remove grease from exposed cylinder rods.
- Check all belt tensions.
- Be sure all shields and guards are in place.
- Lubricate the excavator.
- Remove cover from exhaust pipe opening.
- Start the engine and let run for a few minutes while observing the instrument panels and systems for correct operation.
- Drive the excavator off of the planks.
- Operate machine, check for correct function.
- Stop the engine and check for leaks. Repair as needed.

SYSTEM SETUP AND ANALYSIS

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DIAGNOSTIC SERVICE CODES

Viewing Service Codes

The Service Codes will aid your dealer in diagnosing conditions that can damage your machine.

Standard Instrument Panel

Figure 151



Press the Information button (Item 2) to cycle the data display (Item 1) **[Figure 151]** until the service code screen is displayed. If more than one service code is present, the codes will scroll on the data display.

When no service code is present, **[NONE]** is displayed **[Figure 151]**.

NOTE: Corroded or loose earth can cause multiple service codes and / or abnormal symptoms. All instrument panel lights flashing, alarm sounding, headlights and taillights flashing, can indicate a bad earth. The same symptoms can apply if the voltage is low, such as loose or corroded battery cables. If you observe these symptoms, check earth and positive leads first.

DIAGNOSTIC SERVICE CODES (CONT'D)

Number Codes List

CODE		CODE	
L0102	Lights Button Error On	M1402	Fuel Pull Solenoid Error On
L0202	Auto Idle Button Error On	M1403	Fuel Pull Solenoid Error Off
L0302	Auxiliary Button Error On	M1407	Fuel Pull Solenoid Open Circuit
L0402	Information Button Error On		
L7404	Gateway Controller No Communication	M1605	Hydraulics Bypass Solenoid Short to Battery
L7672	Display Panel Programming Error	M1606	Hydraulics Bypass Solenoid Short to Ground
		M1607	Hydraulics Bypass Solenoid Open Circuit
M0216	Hydraulic Filter Not Connected	M1632	Hydraulics Bypass Solenoid Overcurrent
M0217	Hydraulic Filter Plugged		
		M1705	Hydraulics Enable Solenoid Short to Battery
M0309	Battery Voltage Low	M1706	Hydraulics Enable Solenoid Short to Ground
M0310	Battery Voltage High	M1707	Hydraulics Enable Solenoid Open Circuit
M0311	Battery Voltage Extremely High	M1732	Hydraulics Enable Solenoid Overcurrent
M0314	Battery Voltage Extremely Low		
M0322	Battery Voltage Out of Range Low	M1802	Power Beyond Relay Error On
		M1803	Power Beyond Relay Error Off
M0414	Engine Oil Pressure Extremely Low	M1807	Power Beyond Output Open Circuit
M0415	Engine Oil Pressure in Shutdown		
		M1902	PB Valve Relay Error On
M0610	Engine Speed High	M1903	PB Valve Relay Error Off
M0611	Engine Speed Extremely High		
M0613	Engine Speed No Signal	M2005	Two Speed Solenoid Short to Battery
M0615	Engine Speed Shutdown	M2006	Two Speed Solenoid Short to Ground
M0618	Engine Speed Out of Range	M2007	Two Speed Solenoid Open Circuit
M0810	Engine Coolant Temperature High	M2102	Glow Plug Output Error On
M0811	Engine Coolant Temperature Extremely High	M2103	Glow Plug Output Error Off
M0815	Engine Coolant Temperature Shutdown	M2107	Glow Plug Output Open Circuit
M0821	Engine Coolant Temperature Out of Range High	M2128	Glow Plug Output Failure
M0822	Engine Coolant Temperature Out of Range Low		
		M2202	Starter Output Error On
M0909	Fuel Level Low	M2203	Starter Output Error Off
M0921	Fuel Level Out of Range High	M2207	Starter Output Open Circuit
M0922	Fuel Level Out of Range Low		
		M2302	Starter Relay Error On
M1121	Console Sensor Out of Range High	M2303	Starter Relay Error Off
M1122	Console Sensor Out of Range Low		
M1128	Console Sensor Failure	M2402	Fuel Pull Relay Error On
		M2403	Fuel Pull Relay Error Off
M1305	Fuel Hold Solenoid Short to Battery		
M1306	Fuel Hold Solenoid Short to Ground	M2521	Load Sense Sensor Out of Range High
M1307	Fuel Hold Solenoid Open Circuit	M2522	Load Sense Sensor Out of Range Low

DIAGNOSTICS SERVICE CODE (CONT'D)

Number Codes List (Cont'd)

CODE		CODE	
M2521	Load Sense Sensor Out of Range High	M5605	Auxiliary Rod Solenoid Short to Battery
M2522	Load Sense Sensor Out of Range Low	M5606	Auxiliary Rod Solenoid Short to Ground
		M5607	Auxiliary Rod Solenoid Open Circuit
M2602	Glow Plug Relay Error On	M5632	Auxiliary Rod Solenoid Overcurrent
M2603	Glow Plug Relay Error Off		
		M5721	Auxiliary Control Switch Out of Range High
M3128	Interrupted Power Failure	M5722	Auxiliary Control Switch Out of Range Low
		M5724	Auxiliary Control Switch Out of Neutral
M4109	Alternator Low		
M4110	Alternator High	M6204	Load Moment Sensor In Error
		M6221	Load Moment Sensor Out of Range High
M4304	Keyless Start Panel No Communication	M6222	Load Moment Sensor Out of Range Low
M4404	Secondary Controller No Communication	M6402	Switched Power Relay Error On
		M6403	Switched Power Relay Error Off
M4621	5V Sensor Supply Out of Range High	M6407	Switched Power Relay Open Circuit
M4622	5V Sensor Supply Out of Range Low		
		M7002	Switched Power Output Error On
M4721	8V Sensor Supply Out of Range High	M7003	Switched Power Output Error Off
M4722	8V Sensor Supply Out of Range Low	M7007	Switched Power Output Open Circuit
		M7028	Switched Power Output Failure
M5002	Light Output Error On		
M5003	Light Output Error Off	M7423	Main Controller Not Programmed
		M7497	Main Controller Software Updated
M5205	Offset Base Solenoid Short to Battery		
M5206	Offset Base Solenoid Short to Ground	M7604	Standard Display Panel No Communication
M5207	Offset Base Solenoid Open Circuit		
M5232	Offset Base Solenoid Overcurrent	M7748	Key Switch Multiple
M5305	Offset Rod Solenoid Error On	M7839	Hourmeter Changed
M5306	Offset Rod Solenoid Short to Ground		
M5307	Offset Rod Solenoid Open Circuit	R7404	No Communication To Main Controller
M5332	Offset Rod Solenoid Overcurrent		
M5421	Offset Control Switch Out of Range High		
M5422	Offset Control Switch Out of Range Low		
M5424	Offset Control Switch Out of Neutral		
M5505	Auxiliary Base Solenoid Short to Battery		
M5506	Auxiliary Base Solenoid Short to Ground		
M5507	Auxiliary Base Solenoid Open Circuit		
M5532	Auxiliary Base Solenoid Overcurrent		

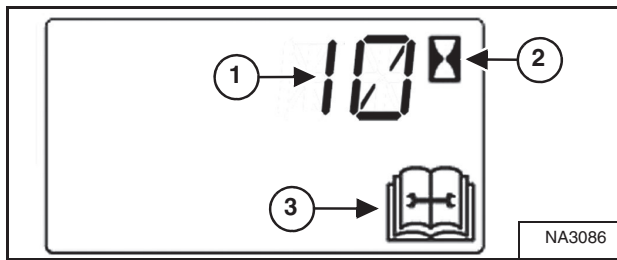
MAINTENANCE CLOCK

Description

The Maintenance Clock alerts the operator when the next service interval is due. *EXAMPLE:* The maintenance clock can be set to a 500 hour interval as a reminder for the next 500 hour planned maintenance.

Standard Instrument Panel

Figure 152



During machine operation, a 2 beep alarm will sound when there are less than 10 hours until the next planned maintenance.

The remaining hours before maintenance is required (Item 1) will appear in the data display for 5 seconds while the service icon (Item 3) and the hourmeter icon (Item 2) [Figure 152] flash.

NOTE: The display will show negative numbers after counting down to zero.

The display will revert to the previous display and will appear for 5 seconds every time the machine is started until the maintenance clock is reset.

Setup

See your Doosan dealer about installation of this feature.

Reset

Figure 153



Press the Information button (Item 2) [Figure 153] until the display screen shows the maintenance clock.

Press and hold the Information button (Item 2) for 7 seconds until **[RESET]** (Item 1) [Figure 153] appears in the display screen.

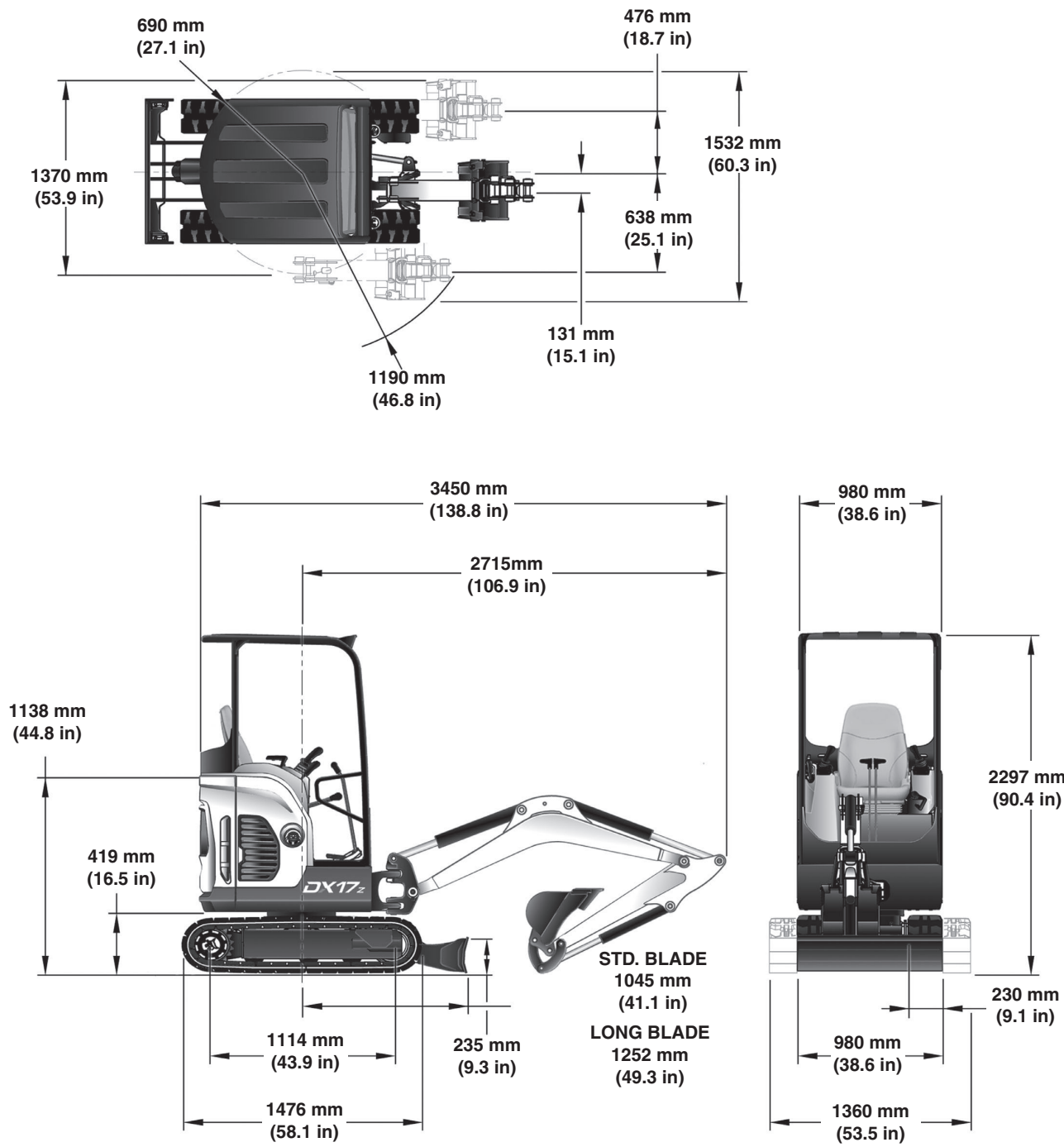
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EXCAVATOR SPECIFICATIONS

Machine Dimensions

- Where applicable, specification conform to SAE or ISO standards and are subject to change without notice.

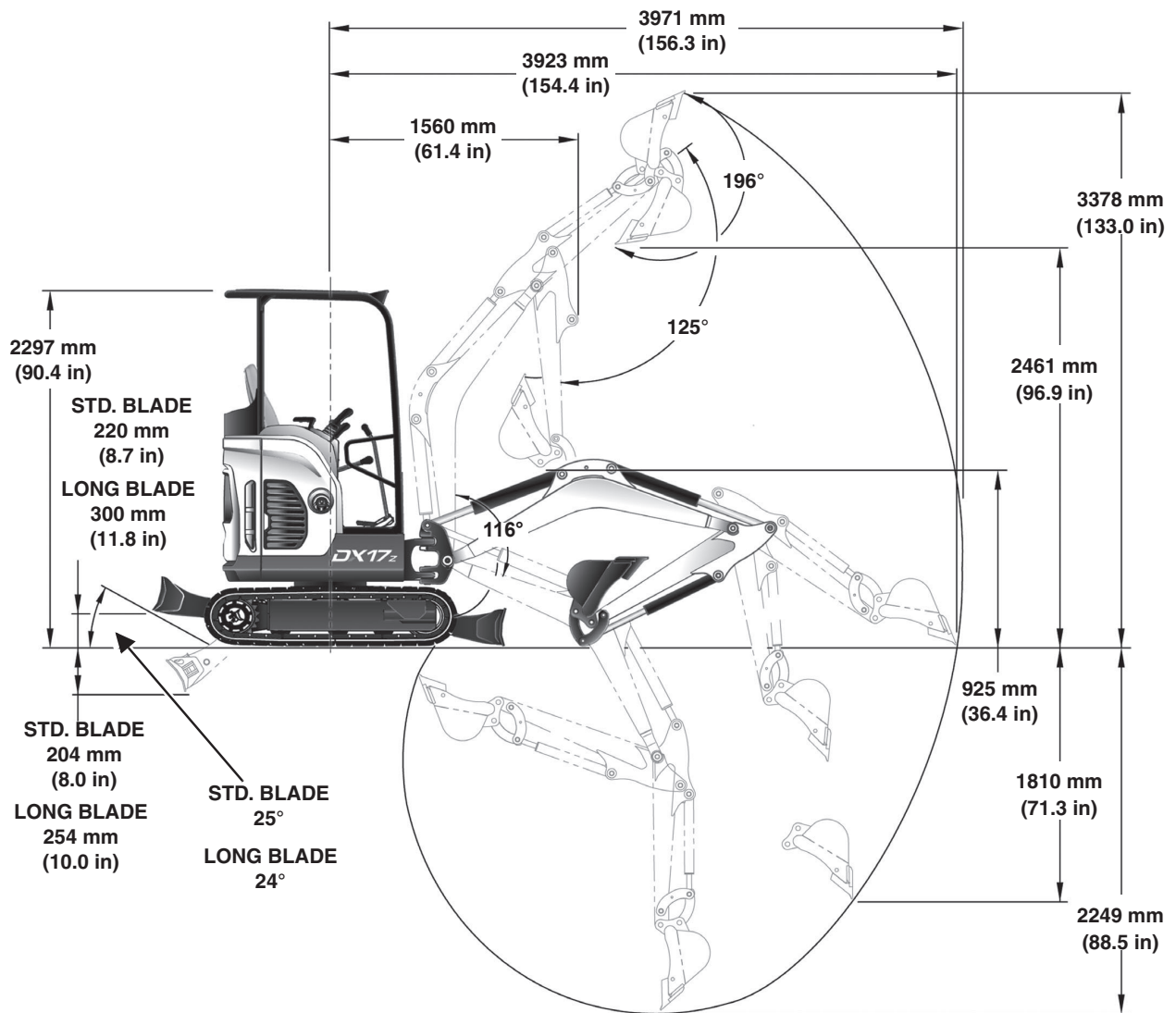


NA13559

EXCAVATOR SPECIFICATIONS (CONT'D)

Machine Dimensions (Standard Arm)

- Where applicable, specification conform to SAE or ISO standards and are subject to change without notice.



NA13560

EXCAVATOR SPECIFICATIONS (CONT'D)

Rated Lift Capacity - With Standard Arm and Canopy

- Where applicable, specification conform to SAE or ISO standards and are subject to change without notice.

DX17Z

①

②

③

200 kg

A

B

@

max. B

2000 mm
(79 in)

3000 mm
(118 in)

@

max. B

2000 mm
(79 in)

3000 mm
(118 in)

@

max. B

2000 mm
(79 in)

1000 mm
(39 in)

425 kg
(936 lb)

229 kg
(504 lb)

190 kg @
3380 mm
(418 lb @
133 in)

233 kg @
3000 mm
(513 lb @
118 in)

263 kg @
3000 mm
(579 lb @
118 in)

218 kg @
3380 mm
(481 lb @
133 in)

124 kg @
3380 mm
(273 lb @
133 in)

153 kg @
3000 mm
(337 lb @
118 in)

Ground

380 kg
(837 lb)

214 kg
(471 lb)

182 kg @
3350 mm
(400 lb @
132 in)

210 kg @
3350 mm
(463 lb @
132 in)

251 kg
(554 lb)

264 kg
(582 lb)

143 kg
(314 lb)

116 kg @
3350 mm
(255 lb @
132 in)

141 kg @
2940 mm
(311 lb @
116 in)

-1000 mm
(-39 in)

363 kg
(800 lb)

215 kg @
2940 mm
(473 lb @
116 in)

425 kg
(936 lb)

249 kg @
2940 mm
(549 lb @
116 in)

232 kg
(511 lb)

224 kg
(494 lb)

116 kg @
3350 mm
(255 lb @
132 in)

141 kg @
2940 mm
(311 lb @
116 in)

* ⇨ ⇩ ⇨ 23.1MPa

SW 17

7319944

EXCAVATOR SPECIFICATIONS (CONT'D)

Performance

Operating weight (canopy, standard arm, standard blade, basic seat, standard bucket and 75 kg operator)	1749 kg (3856lb)
If equipped with the following, add:	Long Blade, add 9 kg (20 lb)
Maximum Approved Attachment Weight	425 kg (937 lb)
Travel Speed (Low / High)	2,7 km/h / 4,3 km/h (1.7 mph / 2.7 mph)
Digging Force (per ISO 6015)	Arm - 9108 N (2048 lb) Bucket - 16177 N (3637 lb)

Controls

Steering	Two hand levers (optional foot pedals)
Hydraulics	Two hand operated levers (joysticks) control boom, bucket, arm and upperstructure slew
Blade	Hand lever
Boom Swing	Right foot pedal
Auxiliary Hydraulics	Left foot pedal
Auxiliary Pressure Release	Left foot pedal
Engine	Engine speed control lever, key type start switch
Starting Aid	Glow Plugs - activated by key switch
Brakes	
Travel	
Service and Parking	Hydraulic lock in motor circuit
Slew	
Service	Hydraulic lock on motor
Holding	Spring applied - hydraulic release

Engine

Make / Model	Kubota D722-E4B-BCZ-7 Stage 5
Fuel / Cooling	Diesel NO.2-D / Liquid
Horsepower:	
– Gross power (ISO 14396)	10,2 kW (13.7 hp) @ 2500 rpm
– Gross power (SAE J1995)	10,4 kW (13.9 hp) @ 2500 rpm
– Net power (SAE J1349)	9,9 kW (13.3 hp) @ 2500 rpm
Torque:	
– Gross torque (SAE J1995)	43,5 N•m (32.1 lb-ft) @ 2000 rpm
– Net torque (SAE J1349)	42,3 N•m (31.9 lb-ft) @ 2000 rpm
Number Of Cylinders	3
Displacement	0,719 L (43.9 in³)
Bore / Stroke	67 x 68 mm (2.64 x 2.68 in)
Lubrication	Forced Lubrication / Cartridge type
Crankcase Ventilation	Closed breathing
Air Cleaner	Dual dry replacement paper elements
Ignition	Diesel-Compression
Low Idle Speed	1200 ± 50 rpm
High Idle Speed	2650 ± 20 rpm
Engine Coolant	Propylene Glycol / water mixture (53% PG / 47% water)

EXCAVATOR SPECIFICATIONS (CONT'D)

Hydraulic System

Pump Type	Engine driven, dual outlet, variable displacement, piston pump with gear pump
Pump Capacity Piston Pump Gear Pump	2 x 15 L/min (2 x 4.0 U.S. gpm) 11,3 L/min (3.0 U.S. gpm)
Auxiliary Flow Standard Flow	30,0 L/min (7.9 U.S. gpm)
Hydraulic Filter	Full flow replaceable, 3 micron synthetic media element
Control Valve	9 spool, parallel series type, open centre.
System Relief Pressure Blade	20600 kPa (206 bar) (2987 psi)
Slew Relief Pressure	16900 kPa (169 bar) (2451 psi)
Boom Swing, Boom Arm, Bucket, and Travel	23100 kPa (231 bar) (3350 psi)
Joystick Control Pressure	3103 kPa (31 bar) (450 psi)
Auxiliary Relief	18000 kPa (180 bar) (2610 psi)
Arm Port Relief Base And Rod End	25000 kPa (250 bar) (3625 psi)
Boom Port Relief Base End, Boom Port Relief Rod End	21000 kPa (210 bar) (3046 psi) 25000 kPa (250 bar) (3625 psi)
Bucket Port Relief Base And Rod End	25000 kPa (250 bar) (3625 psi)
Blade Port Relief Base End and Track Expansion Port Relief Base End	29000 kPa (290 bar) (4206 psi)
Main Hydraulic Filter Bypass	340 kPa (3,4 bar) (50 psi)

Hydraulic Cylinders

Cylinder	Bore	Rod	Stroke
Boom (cushion up)	63,5 mm (2.50 in)	38,1 mm (1.50 in)	438,9 mm (17.28 in)
Arm (cushion retract / extend)	57,2 mm (2.25 in)	38,1 mm (1.50 in)	419,9 mm (16.63 in)
Bucket	50,8 mm (2.00 in)	31,8 mm (1.25 in)	385,1 mm (15.16 in)
Boom Swing	60,3 mm (2.38 in)	31,8 mm (1.25 in)	411,2 mm (16.19 in)
Blade	57,3 mm (2.25 in)	31,8 mm (1.25 in)	107,9 mm (4.25 in)
Track Expansion	44,5 mm (1.75 in)	25,4 mm (1.00 in)	385,0 mm (15.16 in)

EXCAVATOR SPECIFICATIONS (CONT'D)

Hydraulic Cycle Times

Bucket Curl	1,70 seconds
Bucket Dump	1,10 seconds
Arm Retract	2,20 seconds
Arm Extend	1,60 seconds
Boom Raise	2,20 seconds
Boom Lower	1,50 seconds
Boom Swing Left (80°)	3,70 seconds
Boom Swing Right (60°)	3,00 seconds
Blade Raise	2,60 seconds
Blade Lower	2,60 seconds
Track Expand	4,10 seconds
Track Retract	3,50 seconds

Electrical

Starting Aid	Glow Plugs
Alternator	12 volt, 40 Amp open frame w/ internal regulator
Battery	12 volt - 500 CCA @ -18°C (0°F)
Starter	12 volt; gear reduction 1,4 kW (1.4 hp)
Instrumentation	Fuel gauge, audible alarm, visual warning for engine functions and hourmeter
Lights Work Lights Boom Light (If Equipped)	65 watt (2) 35 watt

Drive System

Final Drive	Each track is driven by hydrostatic axial piston motor
Drive Reduction	29,83:1 two stage planetary
Gradeability	30°
Brakes	Hydraulic lock on motor
Maximum Drawbar Pull	19302 N (4339 lbf)

Slew System

Slew Drive	Orbital motor, direct drive
Slew Circle	Single row shear type ball bearings with internal gear
Brake	Spring applied, pressure released
Slew Speed	10,1 rpm

EXCAVATOR SPECIFICATIONS (CONT'D)

Undercarriage

Crawler Track Design With Expandable Undercarriage	Sealed track rollers with boxed section track roller frame, grease type track adjuster with shock absorbing recoil spring
Width of crawler - Retracted	980 mm (38.6 in)
Width of crawler - Expanded	1360 mm (53.5 in)

Capacities

Fuel Tank	19,0 L (5.0 U.S. gal)
Hydraulic Reservoir Only (Centre of Sight Glass)	Tank Cap. 14,3 L (3.8 U.S. gal)
Hydraulic System (with Reservoir)	19,0 L (5.0 U.S. gal)
Cooling System	3,3 L (0.87 U.S. gal)
Engine Oil and Filter	3,3 L (3.5 qt)
Final Drive (each)	0,4 L (0.11 U.S. gal)

Tracks

Type	Rubber
Width	230 mm (9.0 in)
Number Of Shoes	Single Assembly
Number of Track Rollers (per side)	3

Ground Pressure

Rubber Tracks	30,1 kPa (0,301 bar) (4.36 psi)
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Environmental

DECLARED SINGLE-NUMBER NOISE EMISSION VALUES In accordance with ISO 4871	
Noise level per Directive 2000/14/EC – L_{WA}	93 dB
Operator noise level per Directive 2006/42/EC – L_{pA}	81 dB

DECLARED VIBRATION EMISSION VALUES In accordance with EN 12096	
Whole-body vibration per ISO 2631-1	0,14 m/s ² (0.46 ft/s ²)
Hand-arm vibration per ISO 5349-1	0,49 m/s ² (1.61 ft/s ²)

ENGINE CO ₂ EMISSION VALUES	
CO ₂ emission	1019,8 g/kWh
This CO ₂ measurement results from testing over a fixed test cycle under laboratory conditions a(n) (parent) engine representative of the engine type (engine family) and shall not imply or express any guarantee of the performance of a particular engine.	

Temperature Range

Operation and storage	-17° – +43°C (-1.3° – +109.4°F)
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WARRANTY

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WARRANTY

DOOSAN CRAWLER MINI EXCAVATORS

Doosan Infracore Europe B.V. ("Doosan") warrants to its authorized dealers who in turn warrants to the customer that each new Doosan Crawler Mini Excavator will be free from defects in material and workmanship for 24 months from the date of delivery to the customer or 2,000 hours of machine usage, whichever occurs first. During the warranty period, the authorised Doosan dealer shall repair or replace, at Doosan's option, without charge for parts, labour and travel of technicians, any part of the Doosan product which fails because of defects in material or workmanship. The customer shall provide the authorised Doosan dealer with prompt written notice of the defect and allow reasonable time for replacement or repair. Doosan may, at its option, request failed parts to be returned to the factory or to any other designated location. Transport of the Doosan product to the authorised Doosan dealer for warranty work is not the responsibility of Doosan. Service schedules must adhere to prescribed intervals and Doosan genuine parts / lubricants must be used. For coverage on engines, consult your Doosan Dealer. For non-covered items, the customer shall refer solely to the warranty, if any, of the respective manufacturers thereof, in accordance with the respective manufacturers warranty statement. Some Doosan parts are covered pro-rata depending on the expected lifetime of the part. Coverage for batteries, air-conditioning refill, couplers and ignition system parts (glow plugs, fuel injection pumps, injectors) is limited as failures generally originate from factors not under Doosan's control, such as, but not limited to, prolonged storage, abuse or fuel quality. The warranty does not cover: (i) Oils and lubricants, coolant fluids, filter elements, brake linings, tune-up parts, bulbs, fuses, alternator fan belts, drive belts, pins, bushings and other high-wear items. (ii) Damages resulting from abuse, accidents, alterations, use of the product with any bucket or attachment not approved by Doosan, air flow obstructions, or failure to maintain or use the Doosan product according to the instructions applicable to it. (iii) Ground engaging parts such as bucket teeth and cutting edges. (iv) Fuel or hydraulic system cleaning, engine tune-up, brake inspection or adjustment. (v) Adjustments or slight defects which generally do not affect the stability or reliability of the machine. Without prejudice to the rights of the customer in the products, customer agrees that Doosan and the retailing dealer, without further notice to customer, have the right to: (a) Access, use, collect and disclose any data generated by, collected by, or stored in, products or any hardware or devices interfacing with products; (b) access machine data directly through data management systems integrated within, or attached to, products, including Telematics; (c) update the data management system software from time to time; and (d) transfer data out of the country where is generated.

Doosan excludes other conditions, warranties or representations of all kinds, expressed or implied, statutory or otherwise (except that of title), including all implied warranties and conditions relating to merchantability, satisfactory quality and fitness for a particular purpose. Corrections by Doosan of non-conformities whether patent or latent, in the manner and for the time period provided above, shall constitute fulfillment of all liabilities of Doosan for such non-conformities, whether based on contract, warranty, tort, negligence, indemnity, strict liability or otherwise, with respect to or arising out of such product. The remedies of the end-user / owner set forth under the provisions of the warranty outlined above are exclusive and the total liability of Doosan including any holding, subsidiary, associated or affiliated company or distributor with respect to this sale or the product and service furnished hereunder in connection with the performance or breach thereof, or from delivery, installation, repair or technical direction covered by or furnished under this sale, whether based on contract, warranty, tort, negligence, indemnity, strict liability or otherwise, shall not exceed the purchase price of the product on which such liability is based. Doosan, including any holding, subsidiary, associated or affiliated company and distributor, shall in no event be liable to the end-user / owner, any successors in interest or any beneficiary or assignee relating to this sale for any consequential, incidental, indirect, special or punitive damages arising out of this sale or from any breach thereof, or any defect in, or failure of, or malfunction of the product under this sale, whether based on loss of use, lost profits or revenue, interest, lost goodwill, work stoppage, impairment of other goods, loss by reason of shut-down or non-operation, increased expenses of operation or claims of user or customers of the user for service interruption whether or not such loss or damage is based on contract, warranty, tort, negligence, indemnity, strict liability or otherwise.

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