

SUMITOMO

SH145X-6 SH145XU-6

HYDRAULIC EXCAVATOR OPERATOR'S MANUAL

Please keep this manual inside the machine using a manual holder cable to refer to whenever needed. (See the back cover for how to attach the manual to the manual holder cable.)

Serial No.
145N6-1101-

WDL1456D-1W_AU1	001
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1-General Information

Safety Rules and Warnings Definitions

For the Safety of Persons



This is a safety warning symbol.

This symbol warns you of danger of serious injury to yourself and others.

In order to protect against death or serious injury, follow all the safety information described with this symbol.

Throughout this manual, the safety warning symbols with DANGER, WARNING, and CAUTION are used and instructions are given after each symbol.

These caution items are for the operator of this machine and workers.

Before operating or servicing this machine, be sure to read and understand all the information concerning safety.



Danger:

This indicates a state of imminent danger. Failure to follow the instructions that accompany this symbol poses a danger of death or serious injury.



Warning:

This indicates a state of potential danger. Failure to follow the instructions that accompany this symbol poses a danger of death or serious injury.



Caution:

This indicates a state of danger. Failure to follow the instructions that accompany this symbol poses a danger of minor or medium injury.

Failure to follow DANGER, WARNING, and CAUTION messages could result in death or serious injury.

For the Safety of This Machine

NOTICE: Failure to follow the instructions in this safety warning can cause breakage or physical damage to the machine.

Throughout this manual, "Important" is used for safety warnings, followed by instructions for preventing breakage and physical damage to this machine.

"Important" is used to encourage attention to items besides the safety of persons.

Additional Information

NOTE: Note is used for supplemental information that clarifies the work and procedure described in the main text.

Throughout this manual, "Note" is used to provide supplemental information on the procedure and instructions that follow in the main text.

"Note" is used to encourage attention to items concerning the safety of persons and the prevention of physical damage.

To All Users

Thank you for purchasing a "Sumitomo product".

This machine was rigorously inspected before shipment from the plant, but no matter how superior a machine is, if it is operated incorrectly or daily inspections are neglected, it may break down and this may invite personal injury and serious machine damage.

This operator's manual explains the correct handling methods for this machine, the necessary daily inspection, service, and adjustment methods, etc.

This machine has unique mechanisms and handling. We strongly request that even those familiar with construction equipment handling read this manual.

Please understand that due to product improvements, the contents of this manual and the specifications of the actual machine may differ.

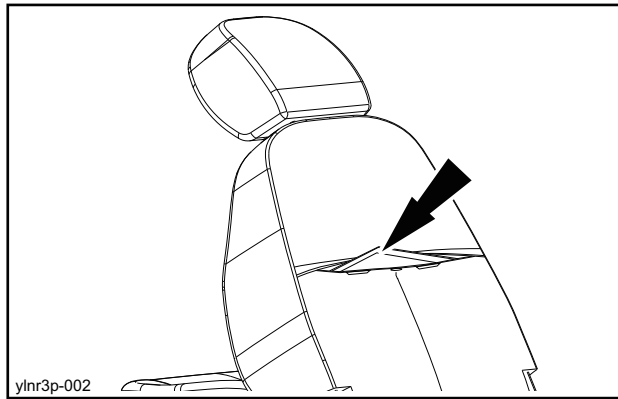
Also, every effort has been made to ensure the accuracy of the contents of this operator's manual, but if you find any points that seem like they might be incorrect, contact our dealer or authorized service shop.

WARNING

- Sections indicated by the  mark are especially important for safety. Read them carefully.
Always keep this operator's manual on hand so it is available to read anytime.
- If this manual is lost or damaged, immediately contact Sumitomo or your local dealer and obtain a replacement.
- For the engine, in addition to the information in this manual, refer to the "Engine Manual".
- The illustrations inserted in this manual do not always show all the information in this manual.
The shape of the machine in this manual and the actual machine differ in some respects.
- Notices relating to operation, service and safety contained in this manual indicate the usage of this product for specified purposes only.
Consideration for safety when using this machine for some purpose not covered in this manual is completely the responsibility of the customer.
However, never carry out any work that is prohibited in this manual.
- This machine is designed and manufactured to meet the regulations and standards of the country of destination.
If this machine is purchased from another country or is to be used in another country, there may be differences in required safety devices or specifications for safety.
For inquiries about whether this machine meets the regulations and standards of the country in which it is to be used, contact our dealer or authorized service shop.

1-General Information

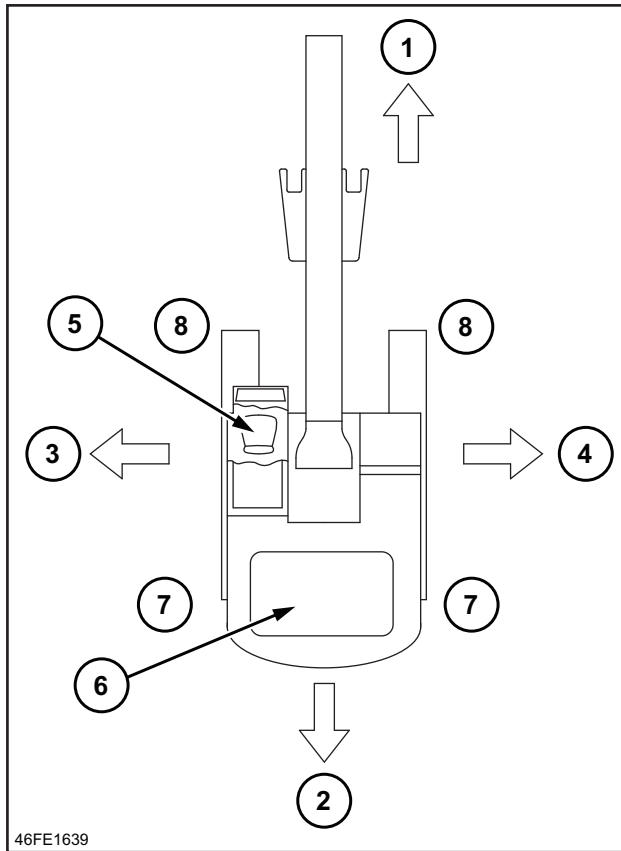
Tie this manual with wire to the document pocket on the rear of the seat.



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About the Front, Rear, Left, and Right of This Machine



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1	Front
2	Rear
3	Left
4	Right
5	Operation section
6	Engine section
7	Travel unit
8	Take-up roller

As the illustration above shows, the directions front, back, left and right are with the engine to the rear and looking forward from the operator's seat toward the front of the machine.

For Safe Operation

Run-in Period

This product was adequately adjusted and inspected before shipment from the plant, but if it is used too severely at the start, its performance will drop rapidly and its service life will be reduced. Therefore, treat the first 100 hours or so (time displayed on the hour meter) as the run-in period. Pay particular attention to the following points during the run-in period.

- After starting the engine, let it idle for 5 minutes to warm up.
- Avoid work with heavy loads or at high speed.
- Avoid sudden starting off, rapid acceleration, unnecessary sudden stops, and severe changes in direction.

Specified Applications

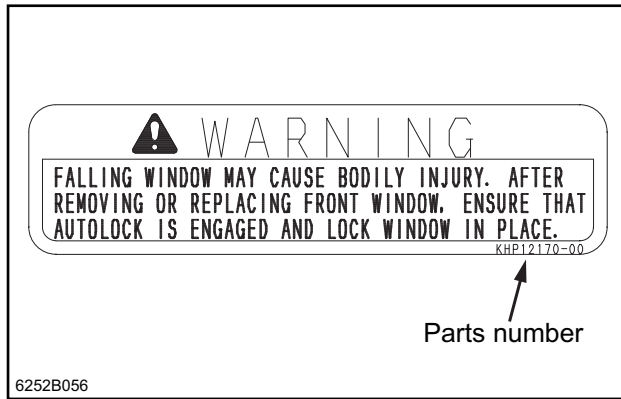
Use this product mainly for the following applications.

- Digging
- Trenching
- Demolition (only machines equipped for demolition)
- Leveling
- Loading

Precaution Identification Plates

Precaution identification plates are attached at the necessary locations on the machine in order to identify hazards for operation and service.

- Examples of precaution identification plates using text



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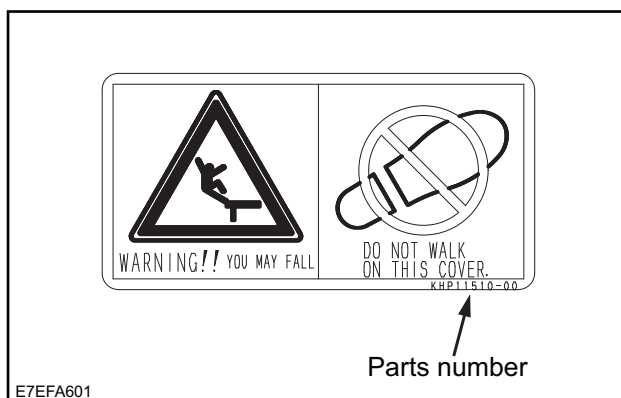
- Examples of precaution identification plates using icons

Precaution identification plates using icons warn about hazards.

On these precaution identification plates, icons are used to have operators and service personnel understand the nature of hazards.

On precaution identification plates using icons, the nature of the hazard is shown on the top or left and the method for avoiding the hazard is shown below or on the right.

Also, the nature of a hazard is shown in Δ and prohibitions are shown in $\odot$.



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1-General Information

Warranty

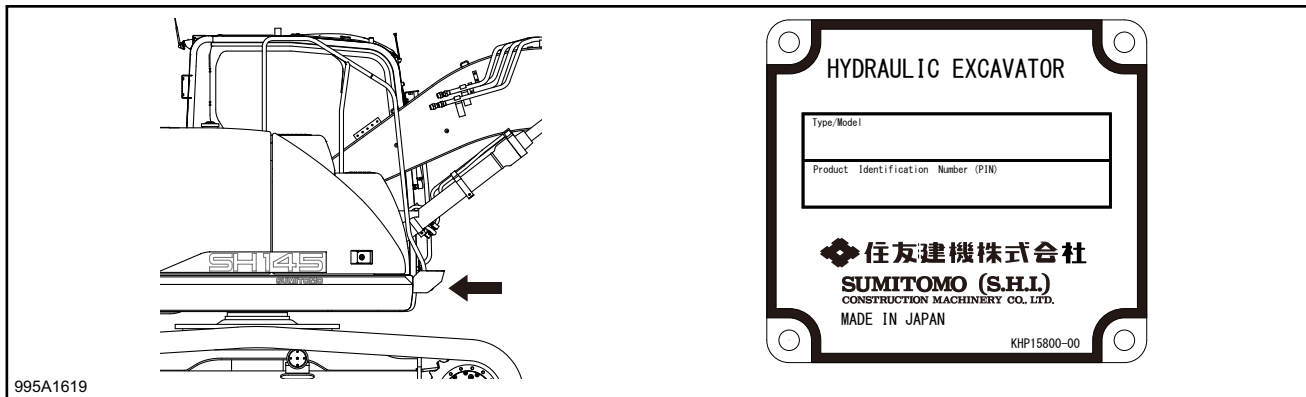
If a breakdown should occur, repairs are warranted within the range stated on the "warranty certificate". However, the engine is warranted by the "warranty certificate" issued by the engine manufacturer.

Contact for Ordering Parts and in Case of Breakdown

When ordering parts or if the machine breaks down, contact us with the serial number and engine number.

Write the following in the spaces below: The model number, serial number and year of manufacture of your machine, accessories and the serial number of the various hydraulic and mechanical components.

Machine



995A1619

Excavator Identification _____

Model Number _____

Serial Number _____

Engine

Make and type _____

Serial number _____

Component serial numbers

Hydraulic pump _____

Swing reduction gear _____

Travel reduction gears _____

Travel control valve _____

Attachment control valve _____

Swing control valve _____

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Explanation of Main Parts

The "SH145X-6/SH145XU-6" are hydraulic excavators.

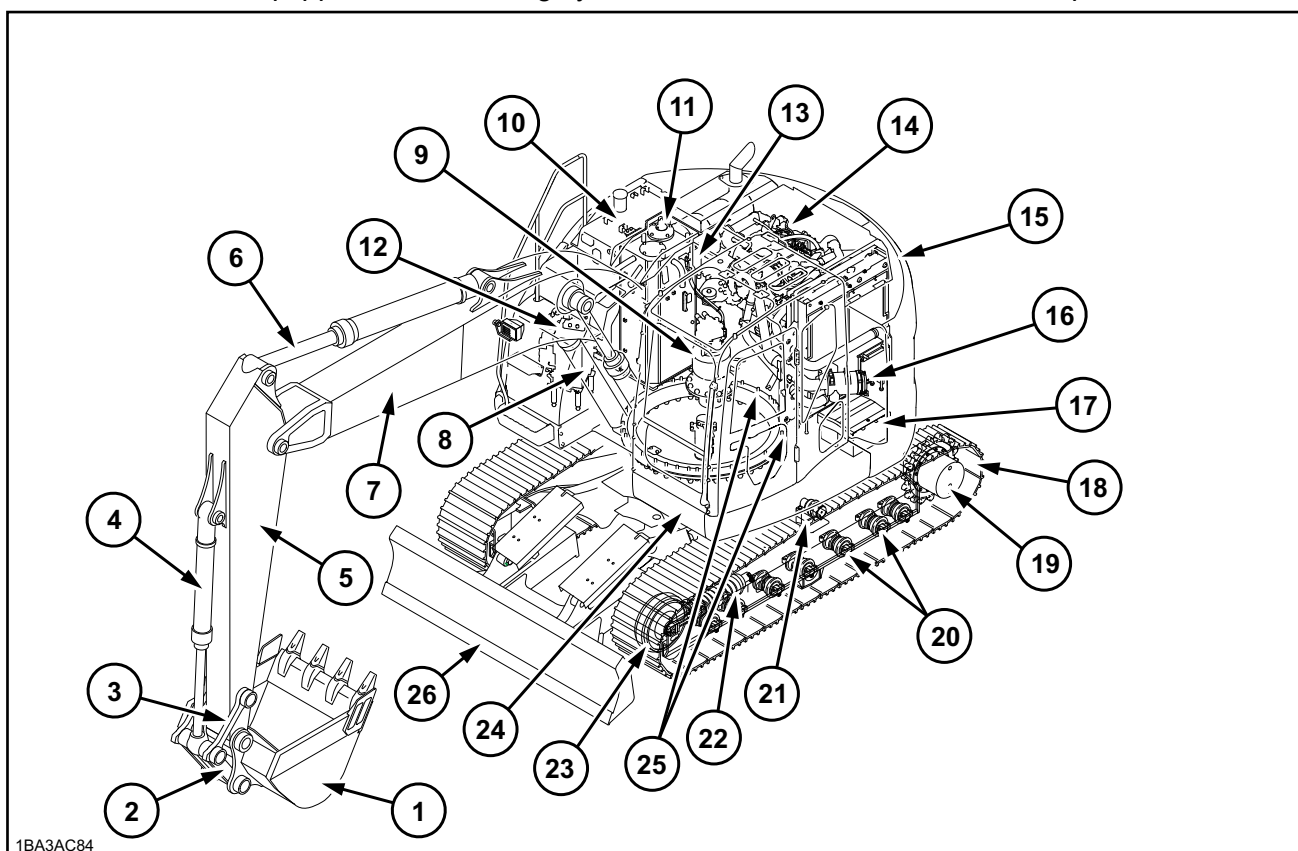
The hydraulic excavator comprises the undercarriage with shoes mounted, the upper swing body, and the turntable bearing that supports the upper swing body.

The upper swing body includes the attachments at the tip of the machine, the engine, the hydraulic equipment, and the cab.

The hydraulic excavator is operated by the fluid sent by the engine drive pump.

The fluid sent to the control valves is distributed by the cylinders and hydraulic motors to operate the attachments.

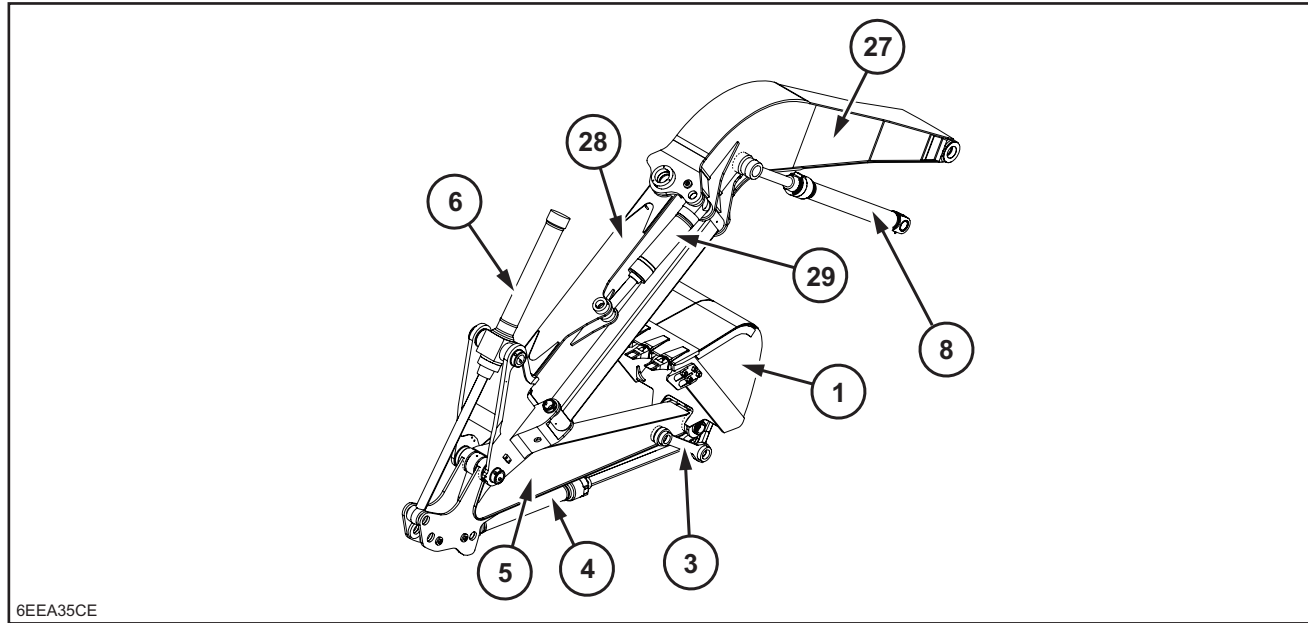
The machine is also equipped with a cooling system to hold the fluid at a certain temperature.



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1-General Information



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1	Backhoe bucket	11	Hydraulic reservoir	21	Upper roller
2	Bucket link	12	Control valve	22	Recoil spring
3	Arm link	13	Hydraulic pump	23	Take-up roller
4	Bucket cylinder	14	Engine compartment	24	Cab
5	Arm	15	Counterweight	25	Turntable bearing
6	Arm cylinder	16	Air cleaner	26	Blade
7	Boom	17	Battery	27	Base boom
8	Boom cylinder	18	Crawlers (shoes)	28	Offset boom
9	Swing reduction gear	19	Travel reduction gears	29	Offset cylinder
10	Fuel reservoir	20	Lower roller		

2-Safety Information

Safety Rules

The operator must pay attention for the sake of their own safety and the safety of those in the area.

Reading and understanding the contents of this manual is indispensable for correctly operating, inspecting, refueling, and servicing this machine.

Read this manual carefully and check the following.

- Understanding of control section symbols and the safety labels and decals used on this machine and in this manual
- Understanding of the speed characteristics, stability characteristics, brake characteristics, and steering characteristics of this machine
If you have any questions, consult our dealer or authorized service shop.

This manual covers the methods for dealing with various conditions that may arise during normal machine operation or service.

Also, warnings concerning specific hazards are posted throughout this manual.

The safety measures taken at the work site must comply with or apply the following items no matter what the work contents and work environment.

- Comply with the laws of the nation
- Be suitable for the contents of the work (digging, quarrying, underground work, etc.)

The instructions concerning safety in this manual are summaries of basic rules that must be complied with at all times.

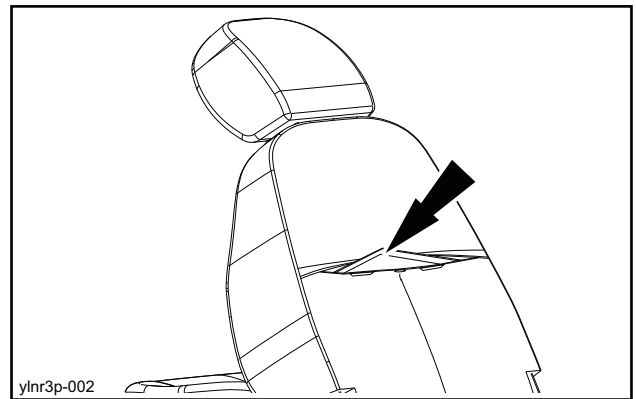
Be aware that these instructions do not exempt one from the obligation to comply with warranty requirements and regulations.

Store this manual in the pocket on the back of the operator's seat so that it can be read whenever necessary.

Do not lose or destroy this manual.

If it is lost or destroyed, consult our dealer or authorized service shop.

If you wish to order additional copies of this manual or want an edition in a language other than those spoken in the nation where your machine is used, consult our dealer or authorized service shop.



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2-Safety Information

Before Work

1. Wear proper clothes and carry your qualification certificate.

Wearing necessary protective gear is fundamental to safety.

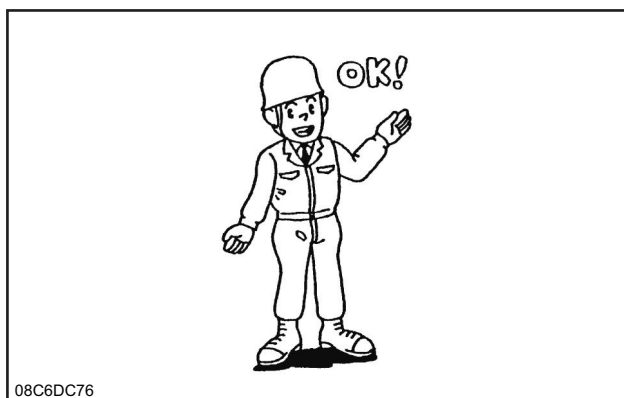
When operating, use:

- Safety helmet
- Safety shoes
- Work clothes that fit you

Use the following, depending on the work:

- Protective eyewear
- Dust mask
- Ear plugs
- Protective gear

etc.



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2. For the sake of safe operation, operation is prohibited if the state of the operator's health is poor.

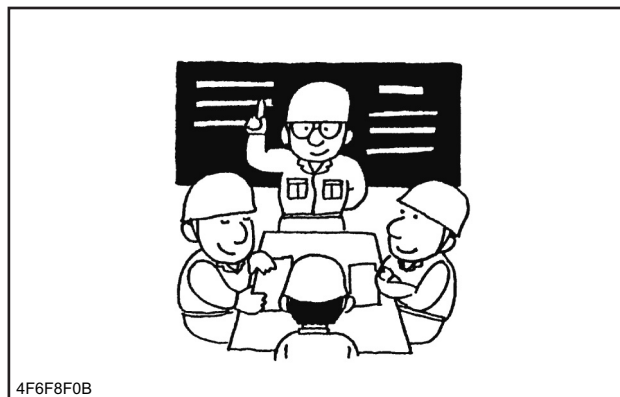
The operator must not operate this machine when they may not be able to operate it normally due to fatigue, sickness, drug side effects, etc.



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3. Discussing work details

Thoroughly discuss work details, and if a signalman is assigned, confirm the signalman and thoroughly review the signals.



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4. Inspections before starting work

- Before operating the machine, thoroughly conduct the start-up inspections (inspections before starting work).

- Check that the working lights and wiper are working correctly.

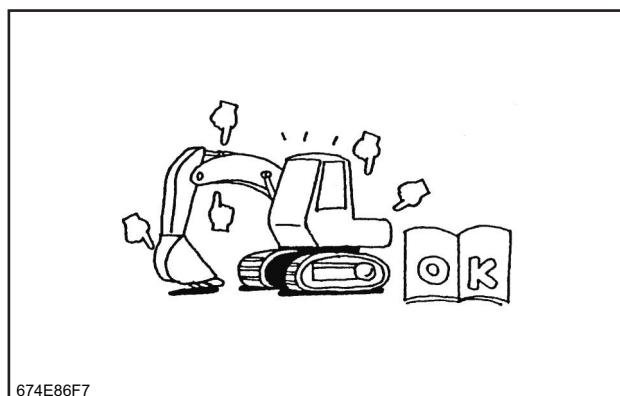
Be sure to check that windows, working lights, mirrors, and the inside of the cab are clean and properly adjusted.

- Adjust the operator's seat and the console for a posture that is easy to work in.

- Before operating, check that the left and right doors, cab door, etc. are locked.

- Correct any abnormality immediately.

Follow the instructions for the start-up inspections in Maintenance.



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2-Safety Information

5. Check on surrounding conditions

- Where the work may pose a risk of falling rocks, install head guards.
- Check the strength of road shoulders and ground.
- When working in the dark, either turn ON the working lights or set up lighting equipment.

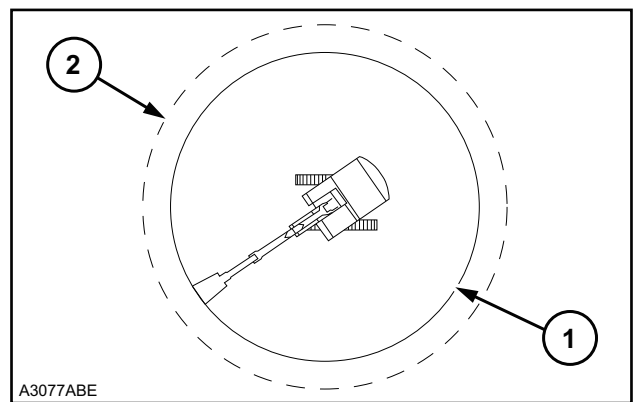
At all dangerous locations, take the measures required for safety.



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6. Entry into work site prohibited (Do not allow people to approach work range.)

- Before working, be sure to check that there are no people or obstacles in the work range.
- Stones or rocks may fly during operation or traveling in the work site. Post "Entry Prohibited" so that no one enters the work site, and take measures so that no one approaches the work site.
- In order to ensure work safety, prohibit entry into a 360° area 2 m out from the work range of this machine.



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1	Work range
2	Entry prohibited range

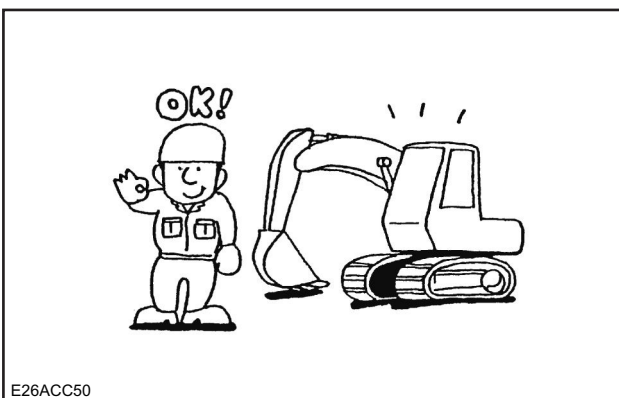
2-Safety Information

7. Taking care of this machine

- Clean the windows to provide good visibility of the surroundings.
If it is damaged, replace it.
- Clean the working lights so that they can be used when working in a dark location.
Check that the working lights light up.
- Clean the rear view mirrors and camera and adjust their positions to provide good visibility of the surroundings.
If it is damaged, replace it.
- Clean inside the cab and straighten up and put away anything not necessary for operation.
- The engine compartment becomes hot.
Remove any dried leaves and combustible material as they could cause a fire.

8. Double check

- Do you fully understand all the operations?
- Do you fully understand all the signals?
- Is it all right and safe around the work area?
- Was anything overlooked while checking the machine?
- Is your health condition and working wear appropriate?



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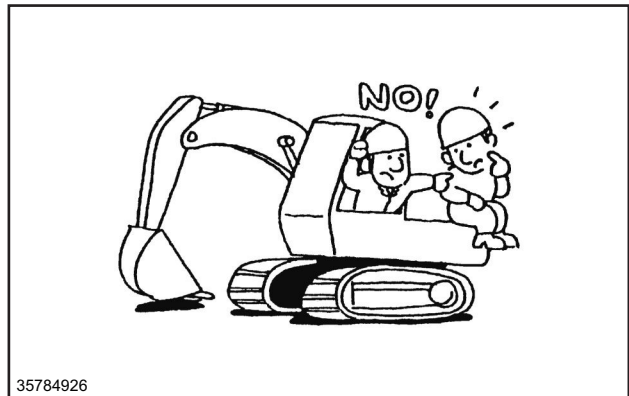
Safety Precautions

1. Anyone other than the operator riding in the machine is prohibited.

- Do not allow anyone other than the operator to ride in the machine.

Sit in the operator's seat while operating the machine.

- Always operate the machine sitting in the operator's seat with your seat belt fastened.



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2. Use for other than the specified applications is prohibited.

- A hydraulic excavator is a machine for digging and loading.

Using it as a personnel elevator or any other purpose other than its specified applications would be dangerous.

Using it for any purpose other than its specified applications leads to personal injury and machine damage.

Never use the machine for any purpose other than its specified applications.



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2-Safety Information

3. Pay attention to the signals and signs.

- Install appropriate signs in any location with a weak road shoulder, incline, or other danger.
- Post a guide at dangerous location.
The operator must pay attention to the signs and follow signals from guides.

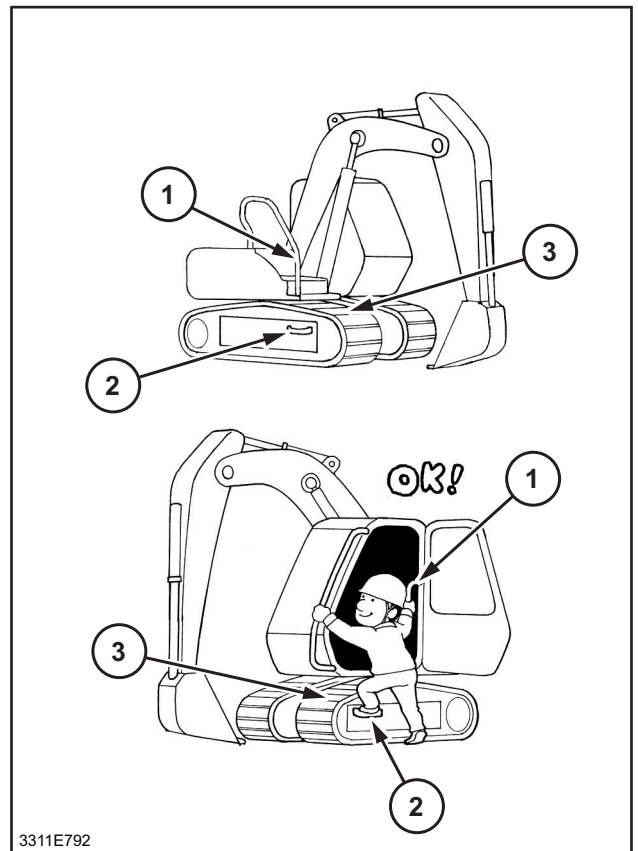


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4. Cautions for entering and leaving this machine

- When entering or leaving this machine, always use the handrails ①, steps ② and shoes ③ to support your body at 3 points and let your body face straight toward the machine.
- When entering or leaving the machine, make sure that the shoes are in parallel position to its cab.
- Do not jump down from the machine.
Jumping down from this machine can cause injuries.
- Do not hold onto the left operation lever or operation lock bar when entering or leaving the machine.
Hold onto the handrail in the cab or on the door with your right hand.
- Remove any oil, grease, mud, or ice from the steps and handrails.



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2-Safety Information

5. Cautions prior to operating the machine, and for starting and operating the machine

- Check the state of the machine, such as operation mode, before operating the machine.

Make sure that all the doors including the operator's cab door, the left and right side doors, and the engine hood, are locked. Adjust the operator's seat and the control levers to fit to your body to ensure safety.

- Always signal by pressing the horn switch to sound the horn before starting, traveling with, or swinging this machine.

Make sure that there is no one around this machine before moving it.

Also, post a guide to check for safety if the field of vision is poor or it is otherwise necessary.



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6. Mounting safety devices

- Mount guards and covers according to the application.
- Incorrect usage of safety devices can lead to personal injury or other serious accidents.
- Thoroughly understand how to use the gate lock lever, seat belt, and other safety devices and use them correctly.
- Never remove safety devices.
Also, take care of the safety devices so that they always operate normally.

7. Modification prohibited

- Modifications also can create safety problems.
- If modifying this machine, always consult our dealer or authorized service shop.
- Sumitomo takes no responsibility for machine breakdown or accidents resulting from modifications made without permission.

8. Cab protective structures ROPS, FOPS, and OPG

ROPS: Roll-over protective structure

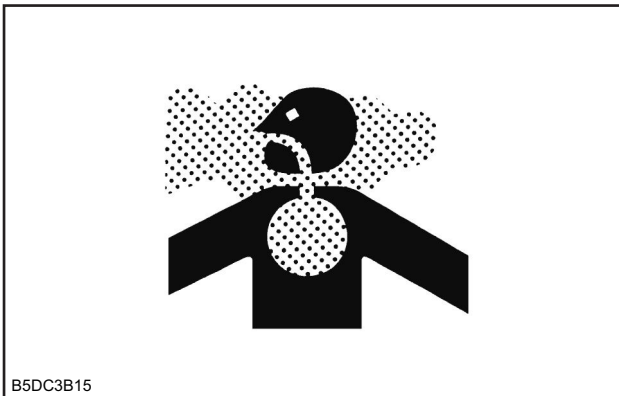
FOPS: Falling object protective structure

OPG : Operator protective guard

- Never weld or deform a protective structure.
- Do not alter a protective structure.
Welding, drilling, cutting, accessory mounting and other alterations and damage due to impact reduce the functioning of protective structures.
If there is an impact on a protective structure and it is damaged, do not repair it. Replace it.
- A protective structure inspection defect or service defect may lead to a serious accident.
Inspect the protective structures described in this manual.
When replacing a protective structure or any of its components, use the genuine part listed in the parts manual for this machine.

9. Asbestos dust hazard

- Inhaling asbestos can cause lung cancer.
No asbestos is used in this machine, but be careful when handling any material that might contain asbestos.
- Do not clean the machine using compressed air.
- Do not polish parts or use a grinder on them.
- Wear a dust mask or other breathing protective gear as necessary.



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10. Mounting optional parts

- When using this machine with an optional attachment, read the operator's manual for the attachment.
- When installing an attachment, always consult our dealer or authorized service shop to avoid safety problems, machine breakdown, and reduced service life.
- Depending on the type of attachment mounted, the degree of stability of the machine may change. Therefore, attention is required when traveling or working.
- Sumitomo takes no responsibility for machine breakdown or accidents resulting from attachments being used without permission.
- Install and remove attachments on flat locations with solid bases.

11. Machines with an accumulator mounted

- With an accumulator mounted, even if the engine is stopped, for a while afterward, if an operation lever is operated the attachment descends from its own weight.
- After stopping the engine, turn the starter switch to the "ACC" or "OFF" position, then set the gate lock lever in the locked position (controls inactive).
- The accumulator contains high-pressure gas sealed inside.
When handling the accumulator, comply with the instructions on the precaution identification plate attached on the accumulator.

2-Safety Information

12. Signals for collaborative work

- At work sites, where two or more construction machines are working together, decide the signals and signalman.



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13. Precautions for work in urban areas

- Establish the "Entry Prohibited" area by installing signs so that no one enters the work site.

When working in a location with a high volume of traffic, post a guide to prevent collisions.

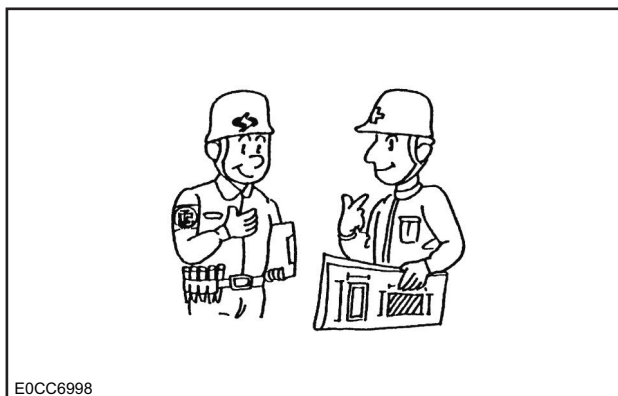


DF609CF2

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14. Precautions for working near power lines

- Implement safety measures such as meeting with the power company in advance and assigning a guide.
- Measure the height of the power lines and of the machine beforehand and make sure that the machine can pass safely.



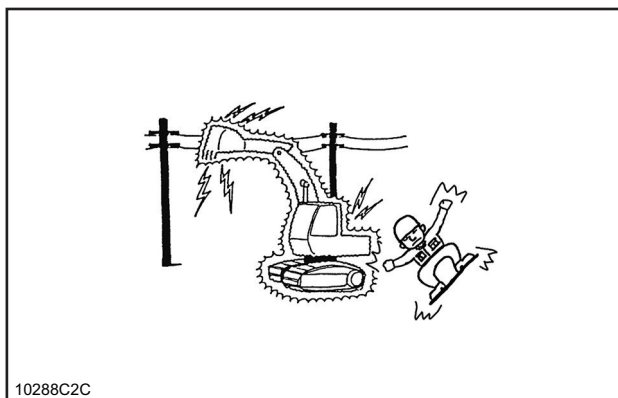
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15. Caution when electrical shock occurs

What to do should the machine contact a power line

- The crucial point is to separate the boom from the power line. It is safer to remain in the operator's compartment until the current has been stopped.
- Warn workers around the machine "absolutely do not touch the excavator".
- When leaving the machine, jump off in one action without using the step, etc.

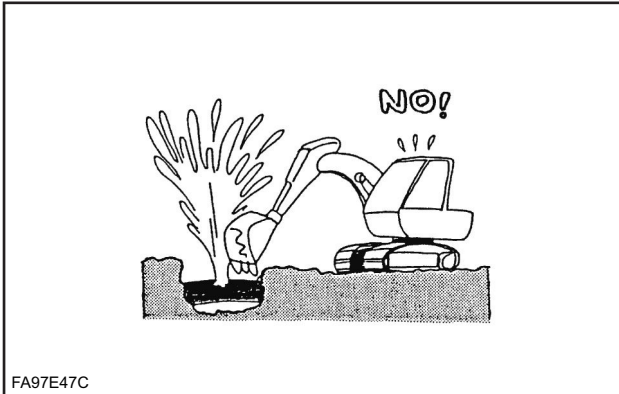


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10288C2C

16. Checking the digging position (pay attention to underground structures.)

- Depending on the site, sewage pipes, water pipes, gas pipes, electrical cables, and other underground structures may be present. Before starting the work, investigate the terrain, mark the digging position, and proceed with the work with all care.



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17. Warming up the machine

- Before starting work, sufficiently warm up the engine and hydraulic oil.
- Check that the instruments are operating properly.



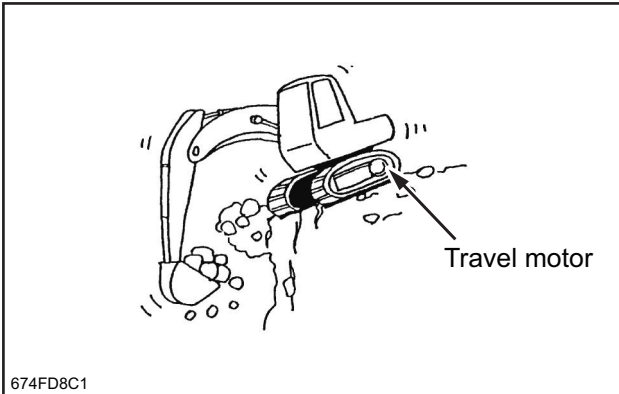
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2-Safety Information

During Work

1. Digging too much right at your feet is dangerous.

Position the machine for easy evacuation in case of an emergency. Do not face the shoes along the direction of the road but at a right angle to the road shoulder and have the travel motor to the rear.



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2. Do not pass over the dump truck operator's seat.

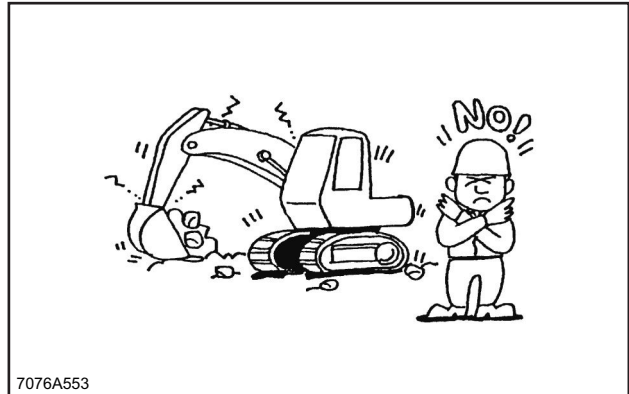
- For the sake of safety, do not pass a bucket full of dirt over the head of any worker or over the dump truck operator's seat.



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3. Stop work immediately if you detect any abnormality in the machine.

- If you sense anything abnormal in the machine during operation, stop work immediately, inspect, and correct the problem.
- Prohibit any use of the machine until the problem has been corrected.



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4. Undermining is dangerous.

Do not dig holes beneath a cliff. This would be dangerous. Such digging can cause cliff and base collapse and falling rocks.



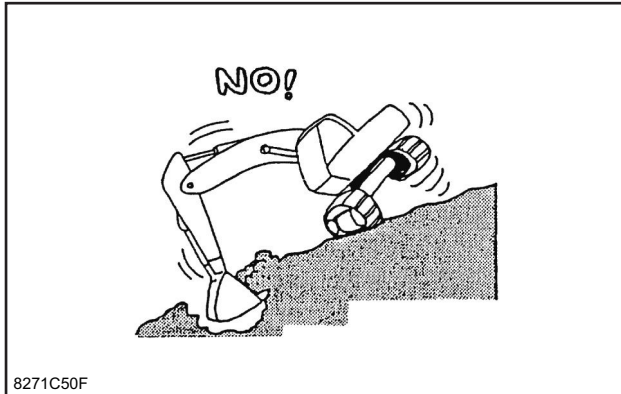
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2-Safety Information

5. Cautions on an incline

- Be particularly careful when working on an incline. The stability of the machine is greatly affected.
- Avoid swinging with the bucket facing downhill more than necessary.

When working on an incline, make the footing of the machine level.



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6. Work beyond the capacity of the machine is prohibited.

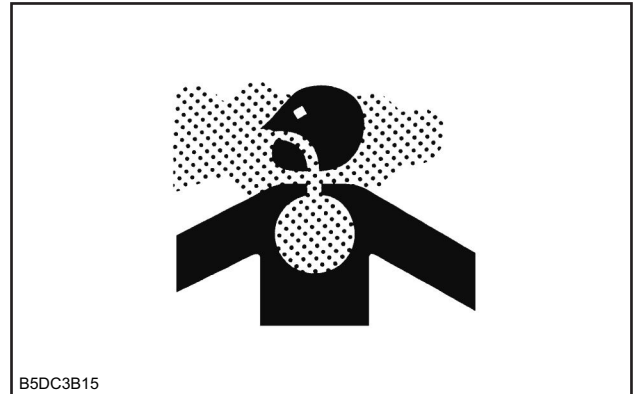
- Work that is beyond the performance range of the machine can damage the machine and endanger the life of the operator and other workers.
- Work within the performance range of the machine.



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7. Cautions concerning ventilation

- Engine exhaust gas is dangerous.
- Before starting the engine in a poorly ventilated area such as indoors, in a tunnel, or underground, take measures to provide ventilation and prevent gas poisoning.



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8. Cautions concerning noise

When the surrounding noise level is high, this can cause hearing loss and deafness.

When exposed to noise for a long period of time, use ear covers or ear plugs.

9. Ground check

- Check for any danger of ground or road collapse due to the machine's weight and vibration.
- Be very careful when the ground is covered with snow and cannot be seen.
- After rain, the ground is soft and this makes areas near cliffs, trenches, and road shoulders dangerous.
The machine's weight and vibration can make the ground collapse. Stay away from such areas as much as possible.
- If the ground is uneven, the machine is unstable. Travel on flat locations as much as possible.

10. When using the breaker

- Breaker work is restricted to those who have taken the vehicle-type construction machine (for demolition) operation skill training course and obtained the certificate of completion.
- When installing the breaker, always consult our dealer or authorized service shop to avoid safety problems, machine breakdown, and reduced service life.
- Set relief pressure and engine speed settings, and reinforce the attachment as necessary.
- Read the breaker operator's manual thoroughly and work being careful not to damage the excavator itself or the breaker.
- Keep your feet off the operation pedals when not operating the breaker.
If you press on one by mistake, the breaker operates, which is dangerous.
- Breaker work at the end of the cylinder stroke causes cylinder and machine damage.
Machine damage poses unforeseen dangers of personal injury.
Do not work at the end of stroke.

During Travel

1.Travel route check

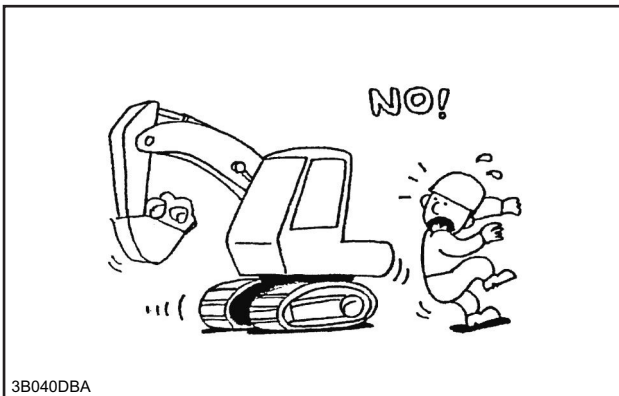
- Investigate the travel route beforehand.
- When moving the machine through a location with poor visibility, post someone to give the operator signals at all times. Carefully check the permitted load on any bridge before traveling over it.



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2.Cautions for starting travel operation

- Check the direction of the undercarriage and the direction of the operator cab before traveling.



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3.Cautions when traveling

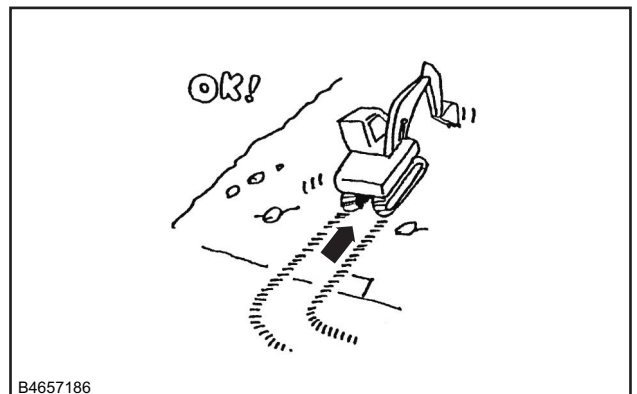
- Select flat roadbeds to travel on as much as possible
- Avoid obstructions, power poles, and buildings.
- When traveling on ice and snow, pay attention to the roadbed strength and try to avoid slipping.



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4.Go straight up and down a slope.

- Travel uphill and downhill along the line of the largest slope. Going diagonally up or down a slope is dangerous.



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2-Safety Information

5. Cautions for changing direction on an incline

- Changing direction on an incline poses the danger of slipping sideways and falling over. If changing direction on a slope cannot be avoided, do so gradually and on solid ground.

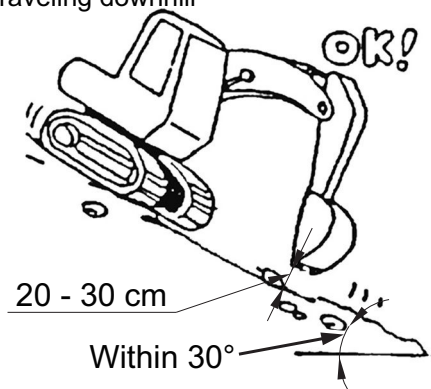


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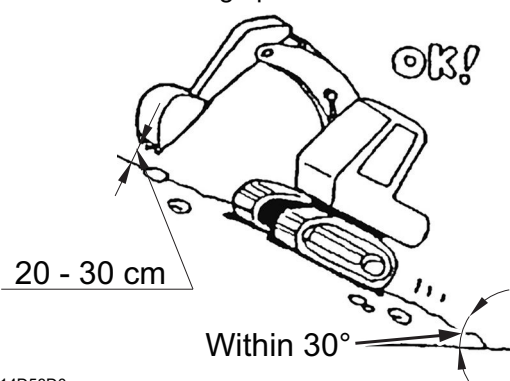
6. Cautions for traveling uphill and downhill (slopes)

- Travel uphill/downhill roads at slow speed, keeping the bucket 20 to 30 cm off the ground.
- If the machine body becomes unstable, lower the bucket to the ground and stop the machine.

Posture for traveling downhill



Posture for traveling uphill



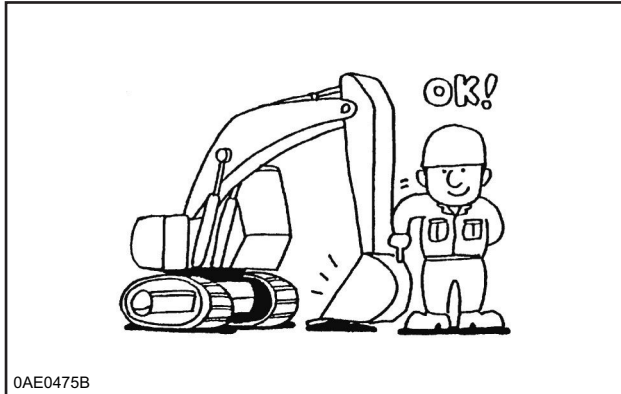
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After Work is Completed

1. When parking the machine

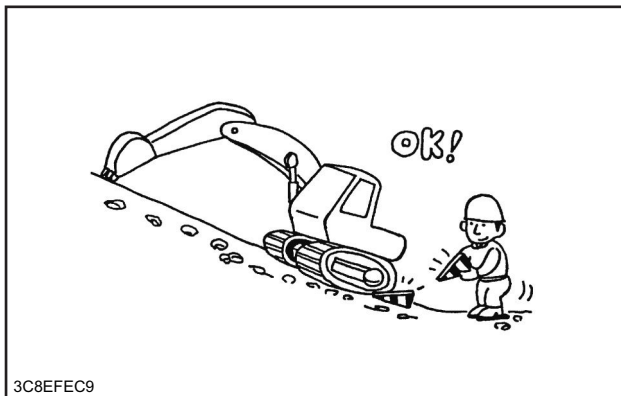
- Park the machine at a safe location on level, solid ground.
- Lower the bucket to the ground and stop the engine.



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2. When parking on a slope

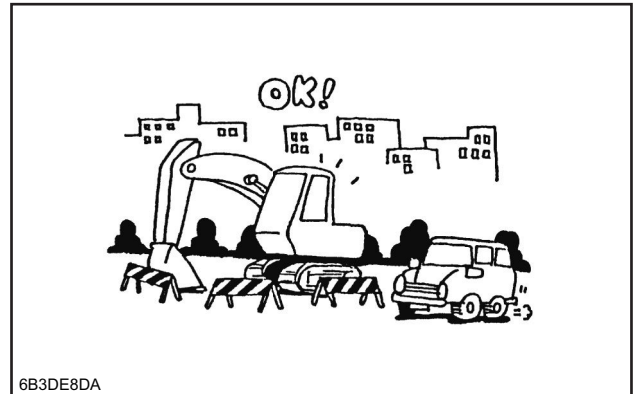
- Lower the bucket to the ground, move the lever to the neutral position, and apply chock blocks behind the downhill sides crawlers (both left and right sides).



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3. When parking on the road

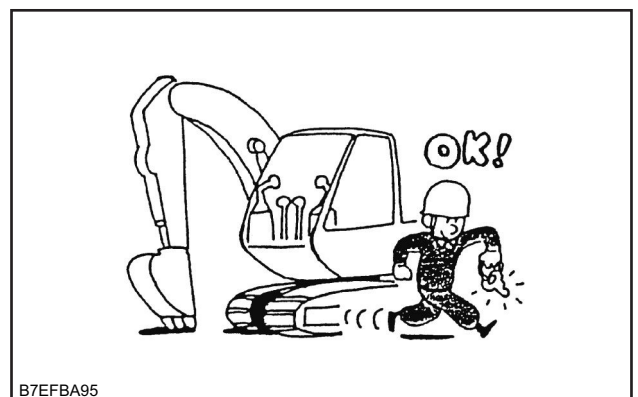
- When parking on the road, install signs, a fence, etc. so that other passing vehicles can clearly recognize the machine even at night. Lower the bucket to the ground and always lock all of the following to prevent someone from operating or tampering with the machine: cab doors, left and right doors on the machine, and engine hood.



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4. When leaving the operator's seat

- [1] Lower the bucket to the ground.
- [2] Move the operation lever to the neutral position.
- [3] Stop the engine.
- [4] Remove the key.
- [5] Pull the gate lock lever.
- [6] Lock the door.



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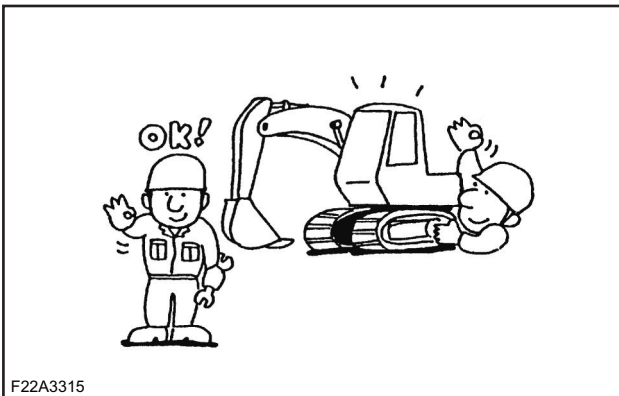
2-Safety Information

5. Inspection after work

After the work is completed, inspect each part of the machine. (Together with washing the machine)

- If any problem is found, repair it immediately.
Do not leave it for the next day.
- Refill the fuel tank after the work each day.

In particular, after working in coastal areas,
after working in a dusty location,
in cold weather or in severe heat,
after working on swampy and soft ground,
service each part.

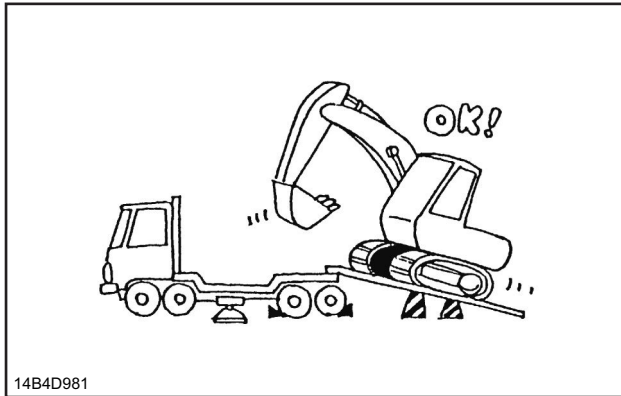


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Transporting

1. Cautions for loading and unloading

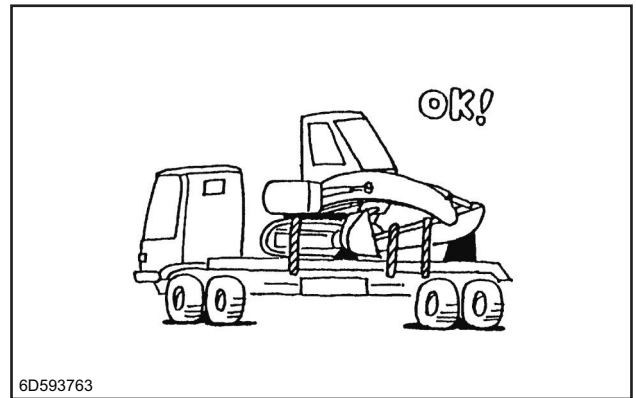
- Use a ramp when loading on or unloading from a trailer or truck.
- Travel the machine on a trailer, track or ramp at safe speed, and load or unload the machine, securing its stability.
- Loading/unloading using a jack is strictly prohibited.



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2. Caution during transport

- Fasten the machine body securely so that it cannot move during transportation.
- Make sure to stop the engine before tying down the machine.
- Remember to check the load weight.
- Doors might open when the machine is being transported. Use a key to lock all the doors such as the operator's cab door and the left and right side doors, and the engine hood, after loading the machine.
- When transporting the machine with an end attachment (such as breaker) mounted, if the outer dimensions are not satisfied with transport regulations, remove the end attachment in advance. Some machines with special specifications may need to be split into pieces.
- Replace or repair a damaged part even if it is not a crucial component part.



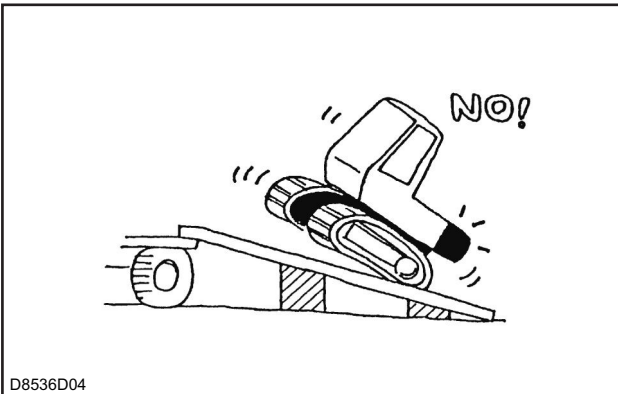
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2-Safety Information

3. Cautions for removing the front attachment

- With the front attachment removed, the position of the center of gravity shifts drastically to the rear.
- Be careful when traveling.

When traveling on a ramp, face the counterweight up slope.



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4. Towing the machine

- When towing, use wire rope strong enough for the weight being towed.
- Do not use any tow wire rope that is kinked, twisted, or damaged.
- When towing, prevent anyone from coming between the towing vehicle and the excavator.
- Absolutely do not tow on a slope. There would be a danger of slide slipping, etc.
- Use a wood protector between the tow wire rope and the excavator to prevent any damage to the rope or the excavator.

When towing, travel slowly at low speed to avoid causing any impact.

Connect the towing vehicle and excavator in a straight line.

2-Safety Information

Before Performing Service

1. Understanding how to perform service

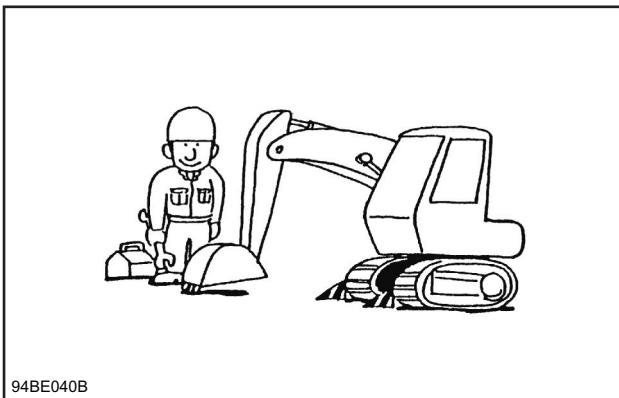
- Before performing service, carefully read and understand [Maintenance].



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2. Perform service on a level surface.

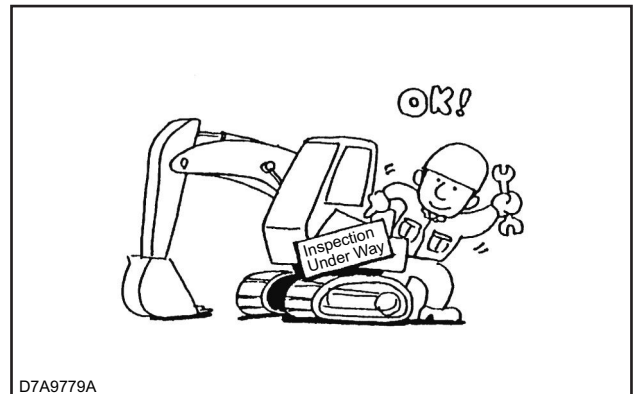
- [1] Select a safe, flat location with sturdy base.
- [2] Lower the bucket to the ground.
- [3] Stop the engine and take out the key.
- [4] Apply the chocks to the shoes.



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3. Display during inspection

- Put a tag indicating "Inspection Under Way" on the door or operation lever.



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4. Important safety-related parts

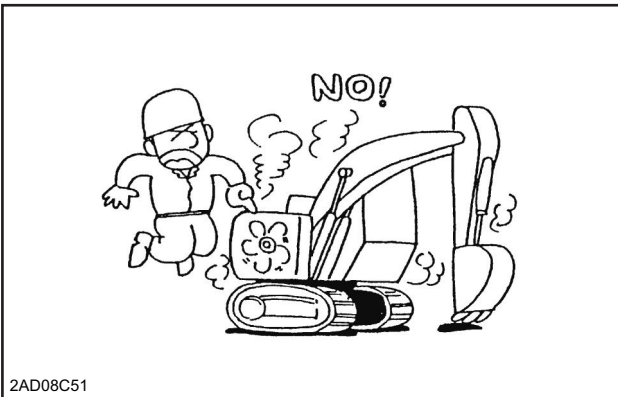
- The parts particularly related to safety and fire prevention are important safety-related parts.
Replace them periodically. (Refer to the page for Important Safety-related Parts Requiring Periodic Replacement. (Page 6-18))
- Important safety-related parts include parts whose service life is difficult to judge from their appearance.
Even if they appear normal, replace them periodically anyway.
- Even if the specified replacement time has not yet arrived, if any abnormality is discovered in an important safety-related part, repair or replace it.

2-Safety Information

Service

1. Servicing a moving machine is prohibited.

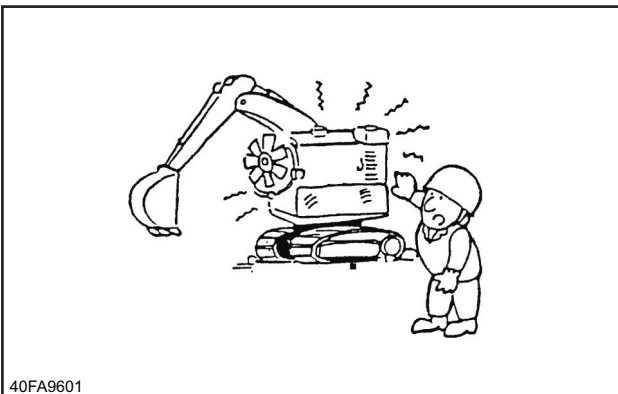
- Avoid servicing a moving machine as much as possible.
- If such work is unavoidable, have the work performed by at least 2 persons communicating and signaling back and forth.
- In particular, be careful not to let your work clothes or anything else get caught in a fan or other rotating part.



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2. The machine is dangerous just after the engine is stopped.

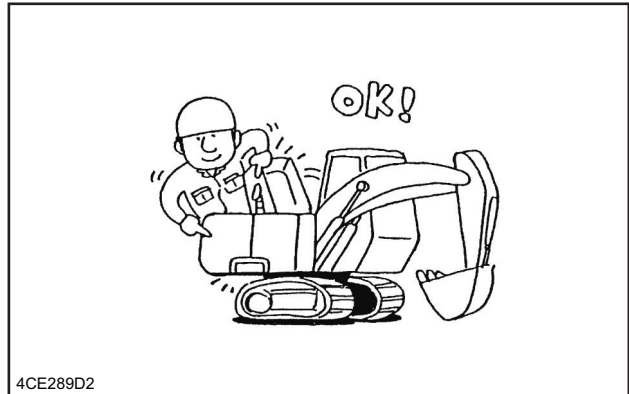
- Parts are hot immediately after the engine is stopped. Touching these parts may result in burns.
- Wait until the parts cool down before starting service.



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3. Cautions when opening the hood or cover

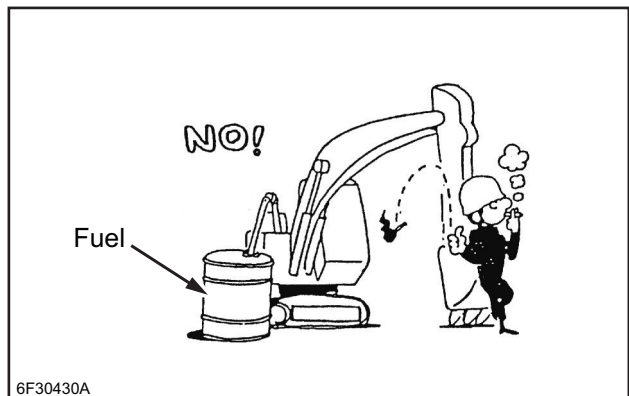
- Do not open the engine hood while the engine is running.
- When opening the engine hood or cover, always lock it.
- Do not open if strong wind is blowing.



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4. Guarding against fires

- Use noncombustible oil to clean components.
- Extinguish any flame that might develop into a fire.
- Prepare an extinguisher.
- Do not smoke during service.

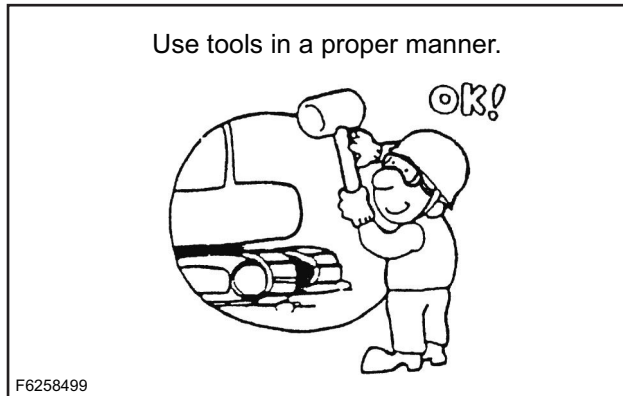


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2-Safety Information

5. Using protective gear

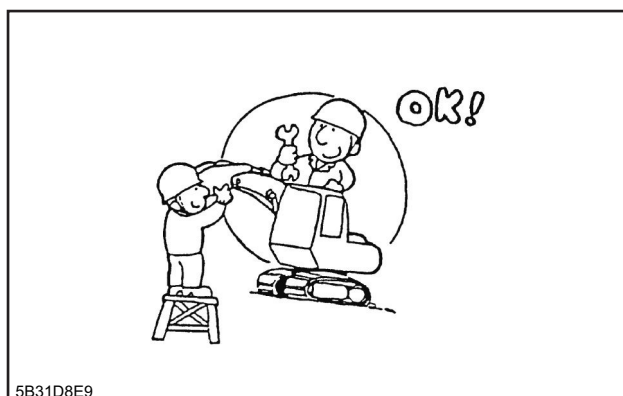
- When performing service, use a protective eyewear, a safety helmet, safety shoes, and gloves, and as required by the work, use dust mask, ear plugs and other protective gear.
- Always wear protective gear when using a grinder or hammer, as metal fillings may fly.



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6. Cautions for servicing in high locations

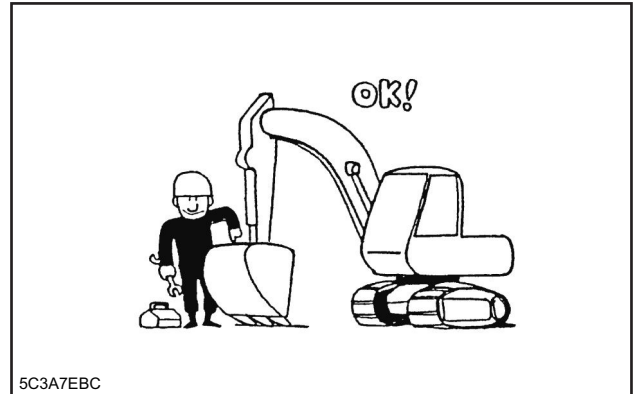
- Keep the footing area neat and clean.
- Do not spill oil or grease or leave tools scattered around.
Be careful not to slip when walking.
- Use step stools and handrails when climbing up to and down from high locations and be careful not to slip.
- Never jump down.
- Determine the signals to use for collaborative work.
- When working collaboratively, follow the instructions of the leader.



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7. Holding attachments

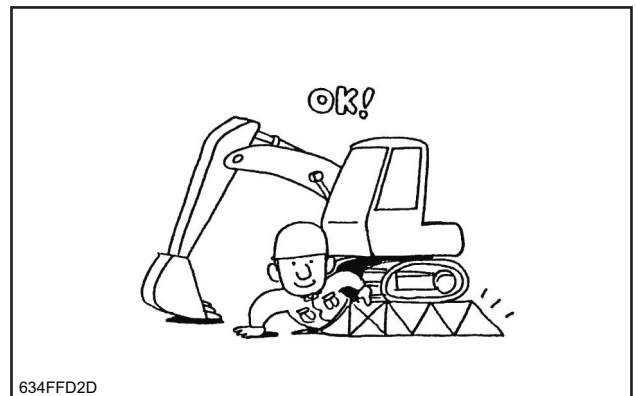
- It is dangerous to replace or repair a joint or hose while the attachment is held in mid-air. Always lower to the ground or a block.



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8. When performing service under a machine

- When working under a machine, use safety supports and safety blocks under the shoes to support the machine securely.

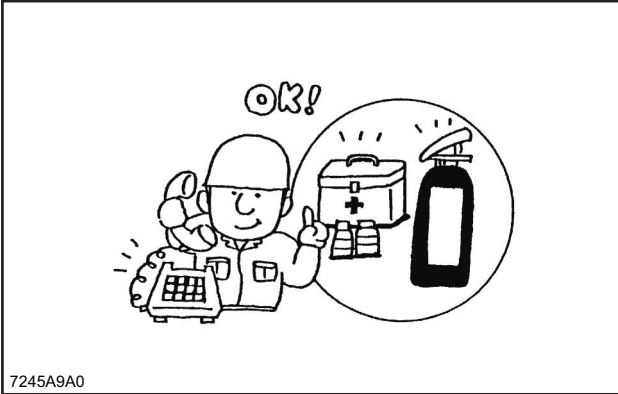


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2-Safety Information

9. Being prepared just in case

- Decide in advance how to report or take action in case of an accident or a fire. Also, find out in advance where the fire extinguisher and first aid box are stored and how to use them.



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10. Preparation before service

- Wait until each part cools down, then drain off any air pressure and hydraulic pressure in circuits before starting service.
- Before servicing electrical systems, cut off electrical circuits by either turning the battery disconnect switch to the "OFF" position or disconnecting the (-) terminal of the battery.



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11. High pressure oil

- It is dangerous to perform service with hydraulic pressure present in excavator lines and equipment lines because oil may blow out. Bleed off the hydraulic pressure before performing service.
- If a high pressure oil leak from a small hole gets on your skin or in your eyes, it can cause skin or eye problems. If any high pressure oil gets on your skin, seek immediate medical attention.
- If the oil is hot, it can also cause burns. Always wear protective eyewear and protective gloves to perform service.



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12.Cautions for high pressure and high voltage when the engine is running

Be careful about the engine's high-pressure fuel.

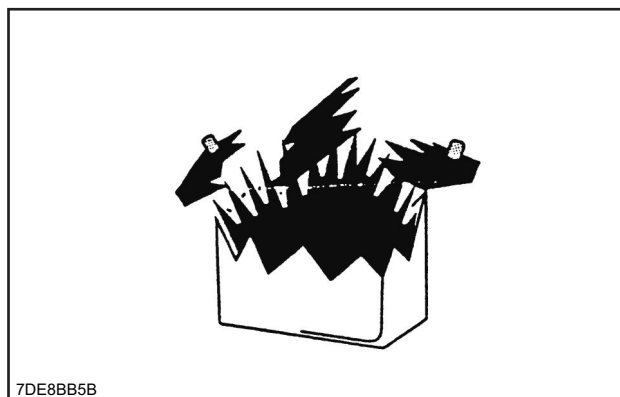
- The fuel line contains high-pressure fuel while the engine is running and immediately after it has stopped. Stop the engine and wait at least 2 minutes for the pressure in the fuel line to decrease before performing service on the fuel line system.

Be careful about the engine's high voltage.

- Built up high-voltage charge is present on the computer and injector while the engine is running and just after it has stopped, and this could cause electrical shock. Do not touch the computer or injector. If they must be touched during service etc., consult your local service dealer.

13.Battery

- The battery generates combustible gas. Keep away from fire.
- Dilute sulfuric acid is used for the battery solution. If any of the battery solution gets on your skin, rinse it off immediately with water, then clean well with soap and water. If any battery solution gets in your eyes, immediately wash it out with a large amount of fresh water, then seek immediate medical attention.
- Make sure to turn OFF the power (turn the starter switch OFF) before inspecting or handling the battery.
- If the battery is the type that requires refilling with water, using or charging the battery while the electrolytic solution is below the lower level marked on the side of the battery may result in damage to the battery (explosion).
- Periodically inspect the battery solution level (for the battery that requires refilling with water) and installation state. Also, inspect the voltage with a tester and measure the specific gravity with a hydrometer (for the maintenance-free battery).

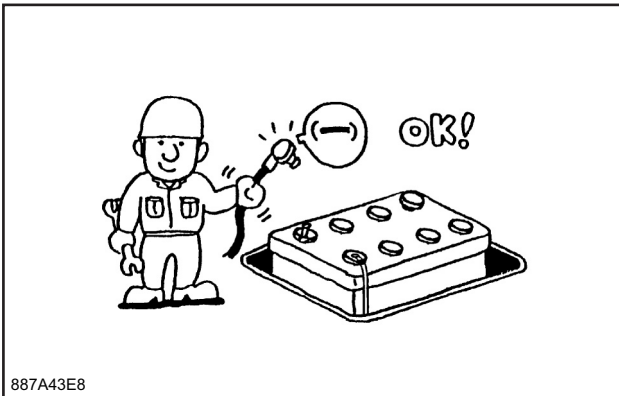


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2-Safety Information

14. Removing the battery

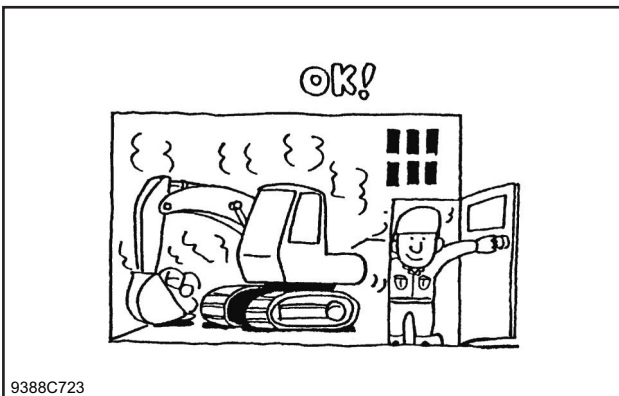
- Before servicing electrical systems, cut off electrical circuits by either turning the battery disconnect switch to the "OFF" position or disconnecting the (-) terminal of the battery.
- Batteries generate flammable gas that can be flammable or explosive.
Also, dilute sulfuric acid is used for the battery solution.
Be careful when handling the battery.



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15. Ventilation cautions

- When performing service in a poorly ventilated area such as indoors, open windows and entrances to provide ventilation and prevent gas poisoning.



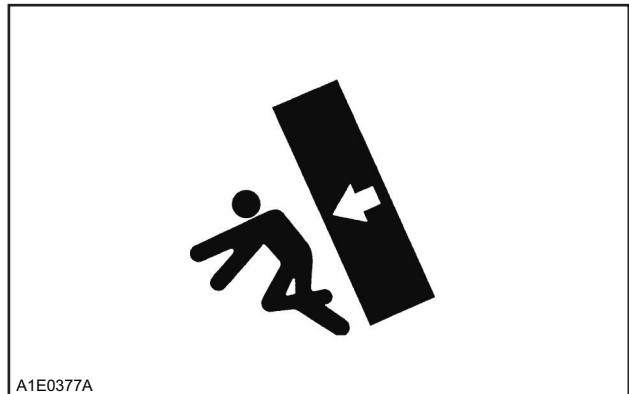
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16. Handling high-pressure hoses

- If a high-pressure hose is bent or torn, it can be damaged.
Do not use a hose that is bent or torn.
- A loose or damaged fuel hose or hydraulic hose can cause an oil leak and fire.
Be sure to repair it.

17. Removed parts

- The removed parts could fall over.
Place them in a stable state.
- Keep children and third parties out of parts storage areas.
- If the base is not solid enough, a part could sink from its own weight and fall over.
Use flat locations with solid base for parts storage.
- If dirt or dust gets into the line of a removed part, this causes machine operation defects and breakdowns.
Use a plug or a cap so that dirt and dust do not get in.



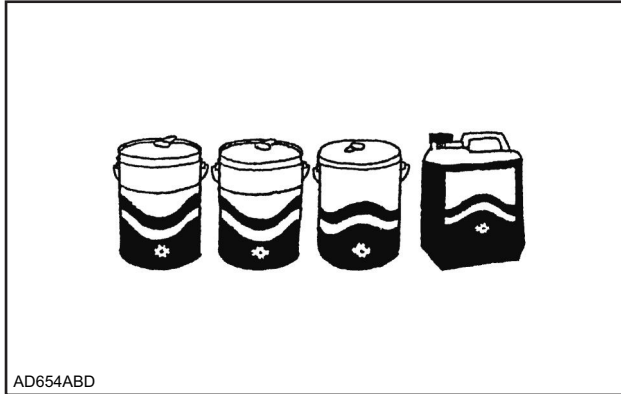
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2-Safety Information

18.Using genuine parts

Always use genuine parts for replacement parts and oils/greases.

Use oils/greases suitable to the temperature. Critical service should be performed by our authorized service shop.

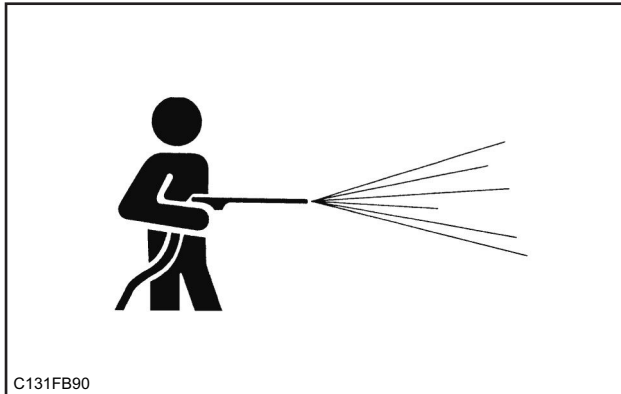


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19.Service after washing machine

Wash the machine to make discovery of problems easier.

The filler holes and oil level gauge sections should be kept clean and free of dirt, etc.



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20.Cautions for washing vehicle

[1]When washing vehicles, be careful not to get any water on electrical equipment.

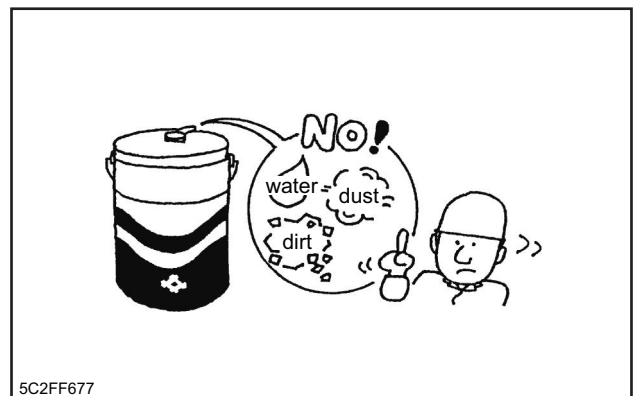
- Monitor sections and electrical equipment inside the operator's cab.
- Do not allow steam to come into direct contact with the battery, connectors or electrical equipment.

[2]Do not allow high pressure washing steam to come into direct contact with the radiator section. (Wash the radiator carefully.)

21.Cautions about keeping out water and dirt

When refilling fuel, hydraulic oil, or engine oil, be careful not to allow any water, dust, or dirt to get in.

Never refill fuel with strainers removed from filler holes.

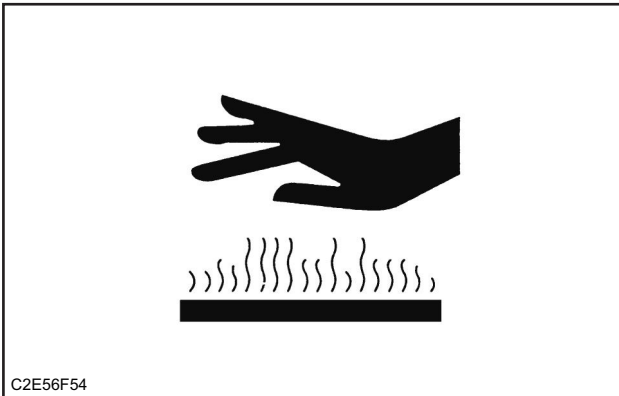


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2-Safety Information

22.Cautions for oil draining and filter replacement

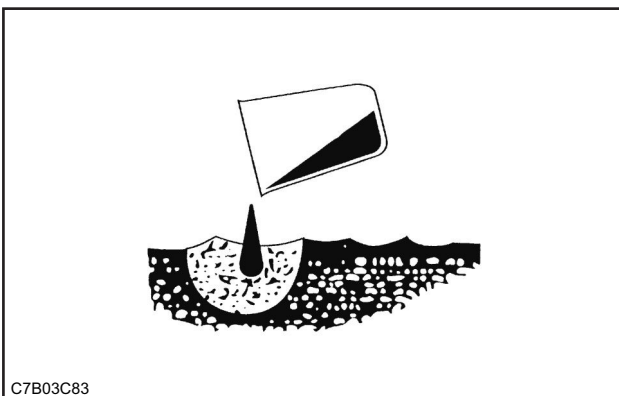
- Draining water or oil, or replacing filters immediately after the engine is stopped is dangerous.
Wait until parts have cooled (to about 20 - 40°C) before beginning work.
- Check drained oil or old filters when replacing oil or filters to see whether or not metal powder and foreign matter are present. If large amounts of metal powder are found, please contact our authorized service shop.



C2E56F54

23.Disposal of waste fluids

- In order to avoid environmental destruction, never dispose of waste fluids onto the ground or into any river, lake, or marsh.
- When disposing of oil, fuel, coolant, solvent, filters, and other toxic items, follow the prescribed rules.



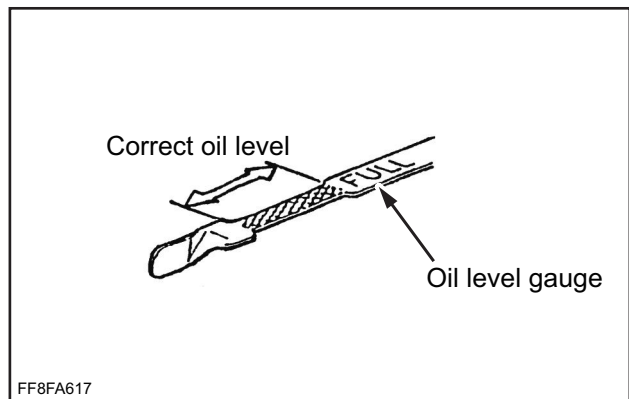
C7B03C83

24.Lubricants

- Only use clean oil and grease and do not allow dirt or other contamination.
- Use clean containers.
- After lubricating, thoroughly wipe off any excess grease or oil from operating sections, rotating sections, etc.

25.Amount of lubricant

- Either excess or insufficient amount of lubricant are not good for the machine. When inspecting and refilling, fill to the appropriate level.



FF8FA617

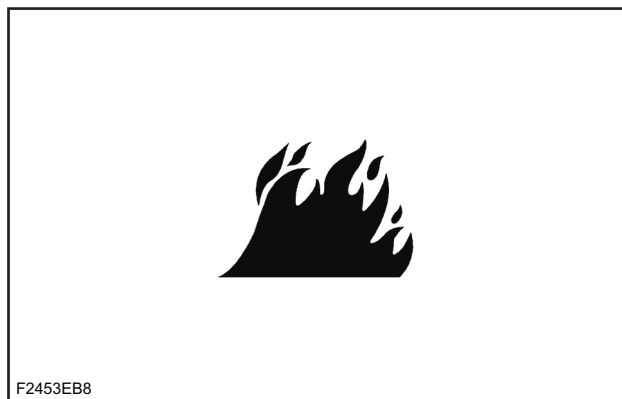
26.Cautions for welding repair

- Make sure to turn OFF the power supply (turn the starter switch OFF) before turning the battery disconnect switch to the "OFF" position (if equipped) or disconnecting the negative (—) terminal of the battery.
- If electronic components (microcomputers) are installed, remove them. [Electronic components such as computers]
- Place a ground no more than 1 m away from the area to be welded.
- Do not use 200 V or higher of power continuously.
- Do not place a seal or bearing between the area to be welded and the ground.
- Before welding or heating a coated area, remove the coating.
Heating a coated area will produce hazardous fumes.
- Heating near hydraulic equipment and lines will produce flammable fumes or mist and may cause a fire.
- Never modify the main unit without permission.
If modifying this machine, always consult our dealer or authorized service shop.
Unauthorized modifications can seriously affect the performance of this machine.



B5DC3B15

B5DC3B15

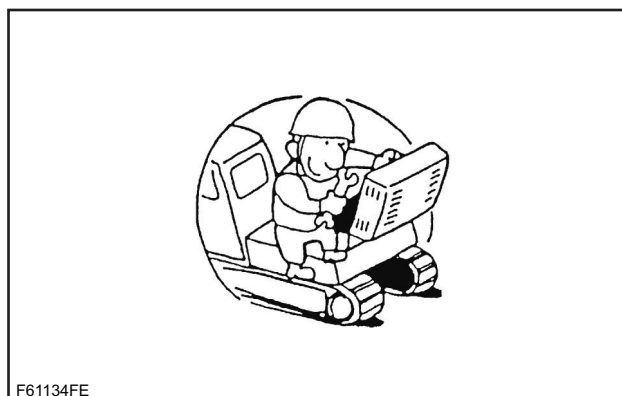


F2453EB8

F2453EB8

27.Do not drop tools or components

- When opening inspection windows and filler holes of the tank for inspection, be careful not to drop bolts, nuts and tools into machine.
- Also, take out parts from inside the pocket in such a way so as not to drop them.



F61134FE

F61134FE

28.Cautions for installation of O-rings.

- Wash installation surfaces when locations with seals of O-rings have been removed.
- When installing O-rings, apply oil so that O-rings are not scratched, then install.

2-Safety Information

29. Cautions after service

[Determine the signals to use for collaborative work.]

[1] After service, run the engine at low idling and check the service locations for any oil or water leaks. (About 5 minutes)

[2] Run each operation slowly and check.

[3] Raise the engine speed and check for oil, water leaks, etc.

[4] Run each operation and check that there are no abnormalities.

30. Service in cold weather

[1] Use fuel and lubricants suitable to the temperature.

[2] Check the battery charging rate.

[3] Use anti-freeze.

[4] Clean off any mud and water from the vehicle body. (Wipe the cylinder rod clean of any water drops.)

31. Service when using machine under special conditions

Use in severe heat

[1] Service the coolant and the radiator.

[2] Adjust the fan belt tension.

Use in rocky areas

[1] Check carefully for undercarriage damage, loose bolts and nuts, cracks, and wear.

[2] Slightly reduce the shoe tension.

Use in coastal areas

[1] Carefully wash the vehicle and remove salt. Take good care of electrical equipment, hydraulic cylinders, and the undercarriage to prevent corrosion.

Use under dusty and sandy environment

[1] Inspect and maintain air cleaner element dust cap as frequently as possible in addition to the normal service due.

[2] Tighten the cap to keep dust and sand out of the hydraulic tank.

32. Use on swampy and soft ground

Grease up more frequently.

In particular, grease up all the pins on the machines soaked in or contacted with in muddy water.

Also, inspect and clean the undercarriage.

33. Inspection and maintenance for recoil spring

Never attempt to disassemble the recoil spring.

Failure to comply with could result in death or serious injury.

Safety Decals

⚠ WARNING

Safety decals are pasted on this machine in order to prevent personal injury accidents. Inspect decals daily to see if they are legible and have no damages. A lack of decals encouraging attention is dangerous because it can lead to personal injury accidents.

⚠ WARNING

Clean off decals periodically.
Replace any missing decals, peeling decals, decals with paint on them, and decals that have become illegible.
When replacing decals, order them from the our dealer or authorized service shop.
If a part being replaced has a decal on it, always paste a new decal on the new part.

NOTICE:

When cleaning decals, use soap and water and a cloth.
Do not use any solvent or gasoline.

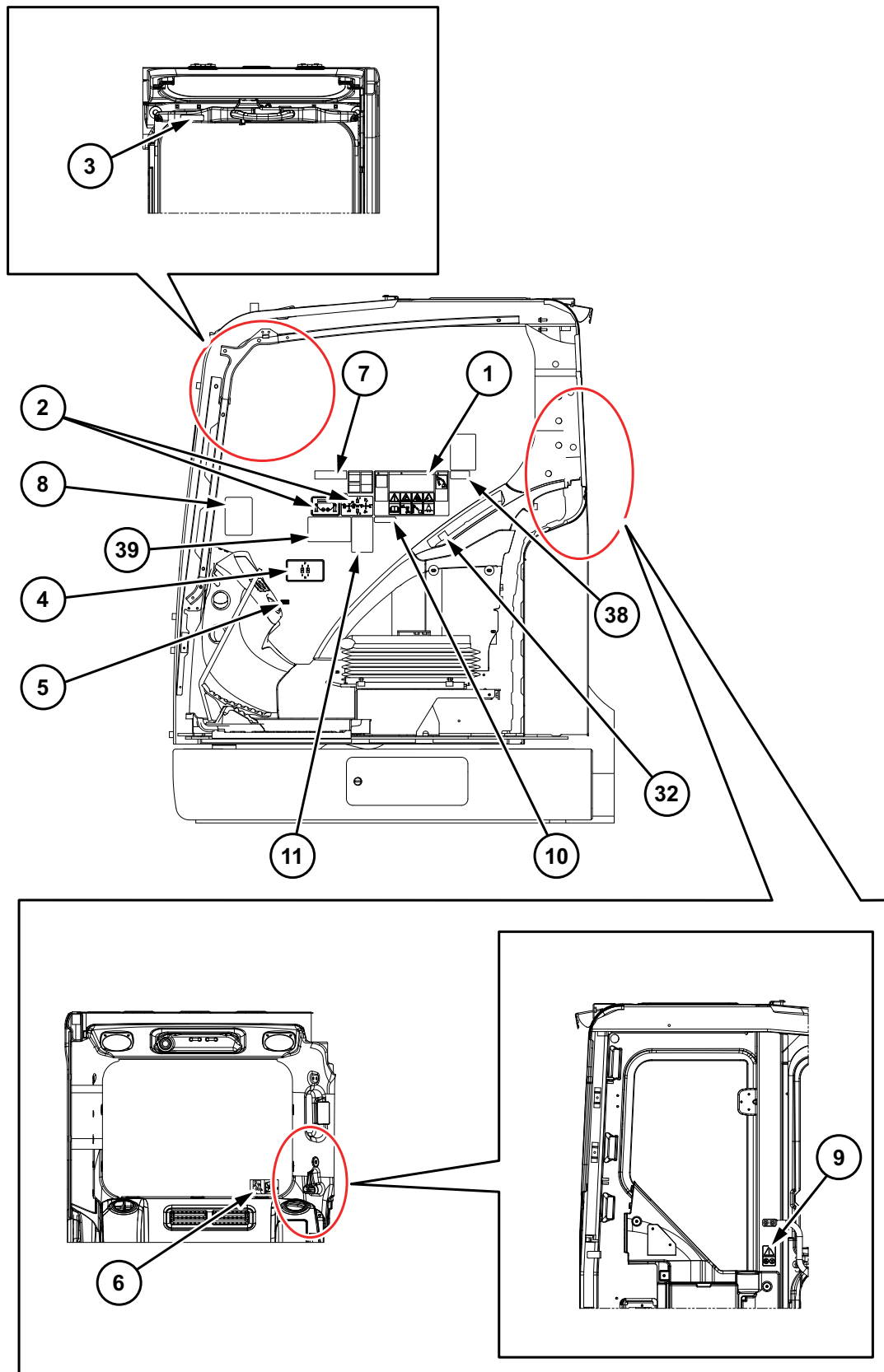
NOTE: This chapter describes decals related to safety and operation and service of this machine.

Position of Decals

Precaution films with the **⚠** mark are attached on the machine in order to prevent personal injury. Understand the contents of precaution films with the **⚠** mark well before starting work. Comprehensively covering all dangers in this manual is difficult. Therefore, the cautions in this manual and the descriptions on the precaution films on the machine do not necessarily cover everything. Please try, by understanding this manual, to always operate the machine and work correctly and by paying close attention to prevent accidents that could result in injury or death and damage to the machine.

2-Safety Information

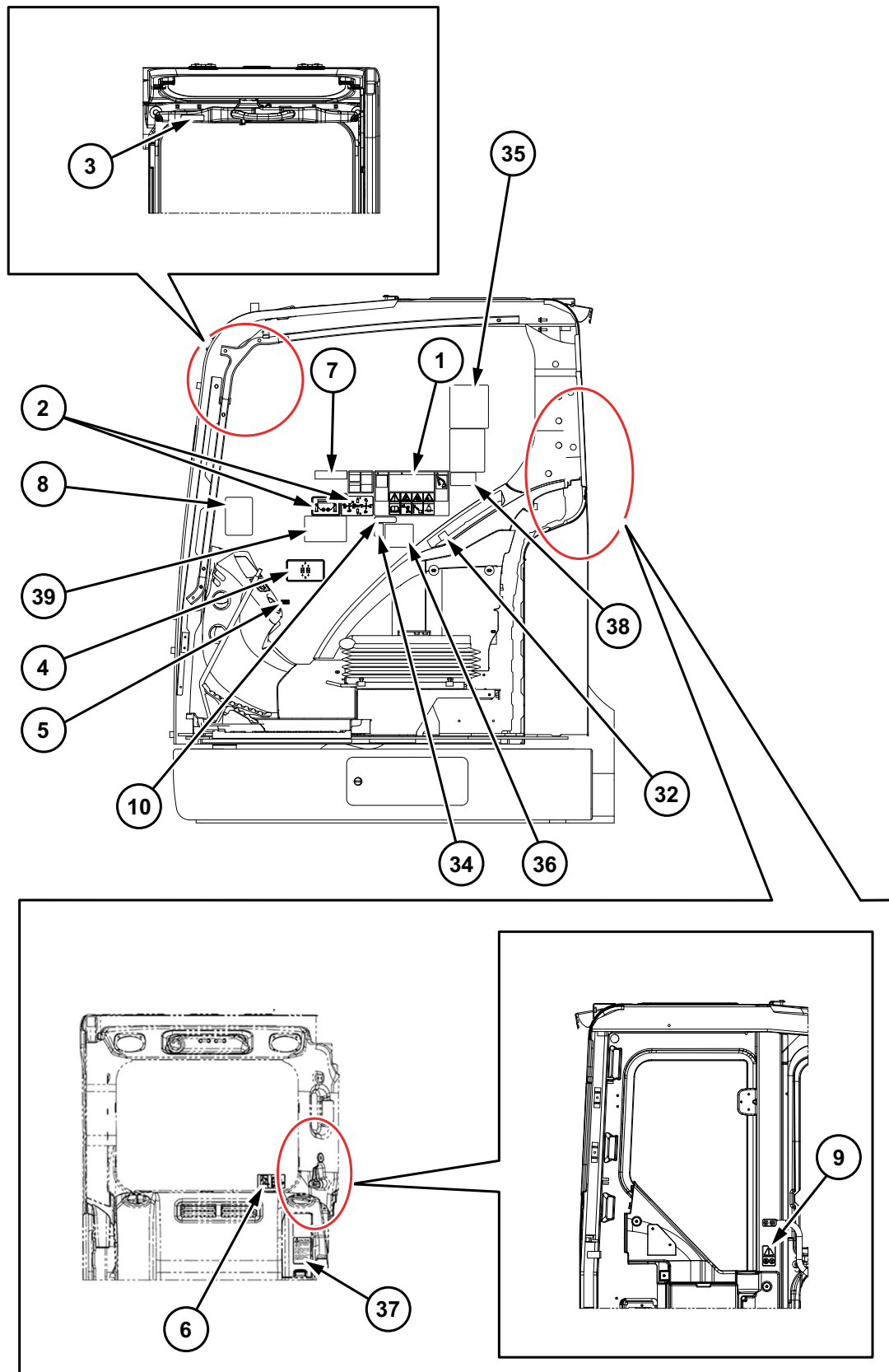
Blade type



CD15A3DA

CD15A3DA

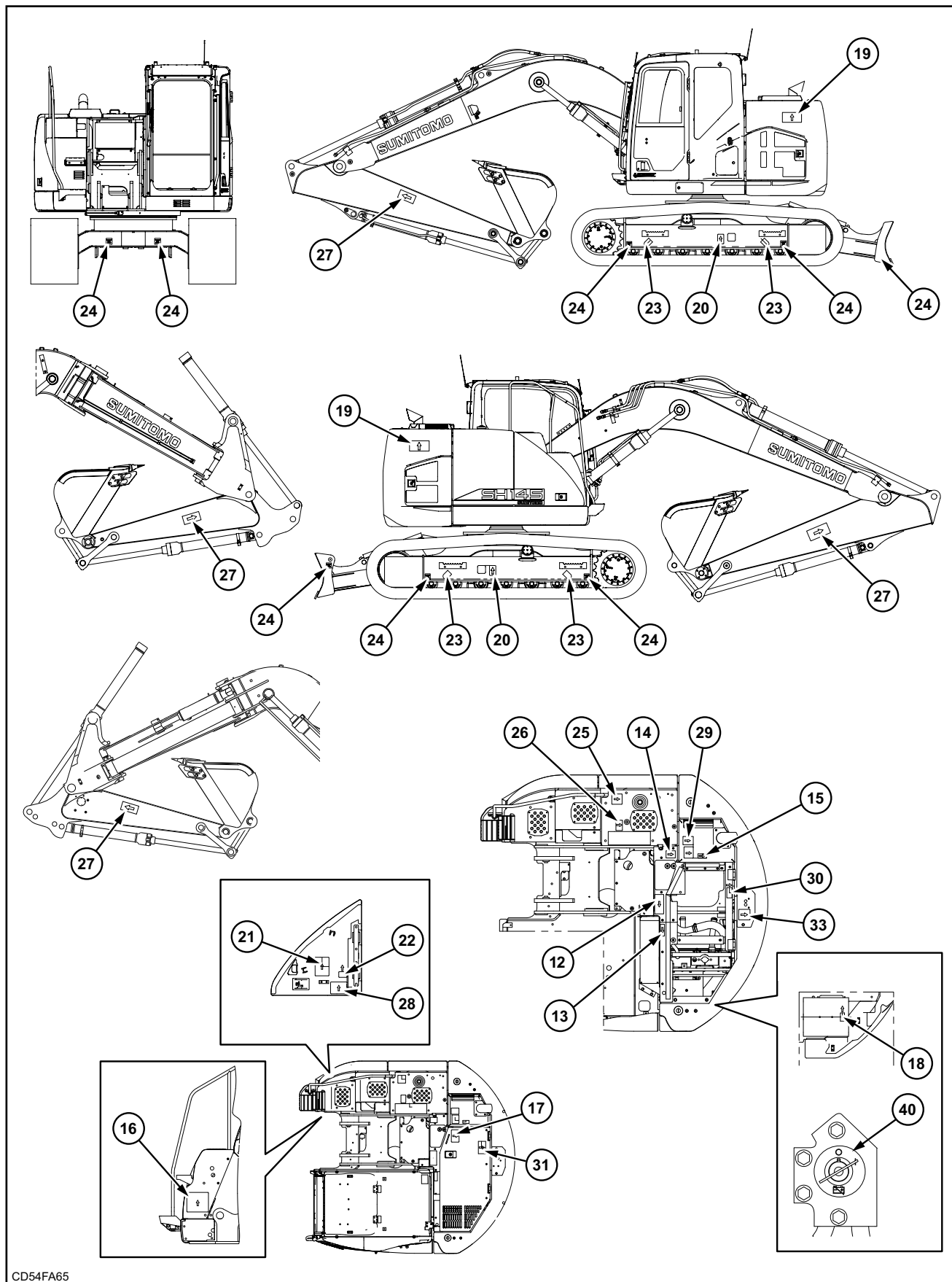
Offset boom type



E4601B70

E4601B70

2-Safety Information



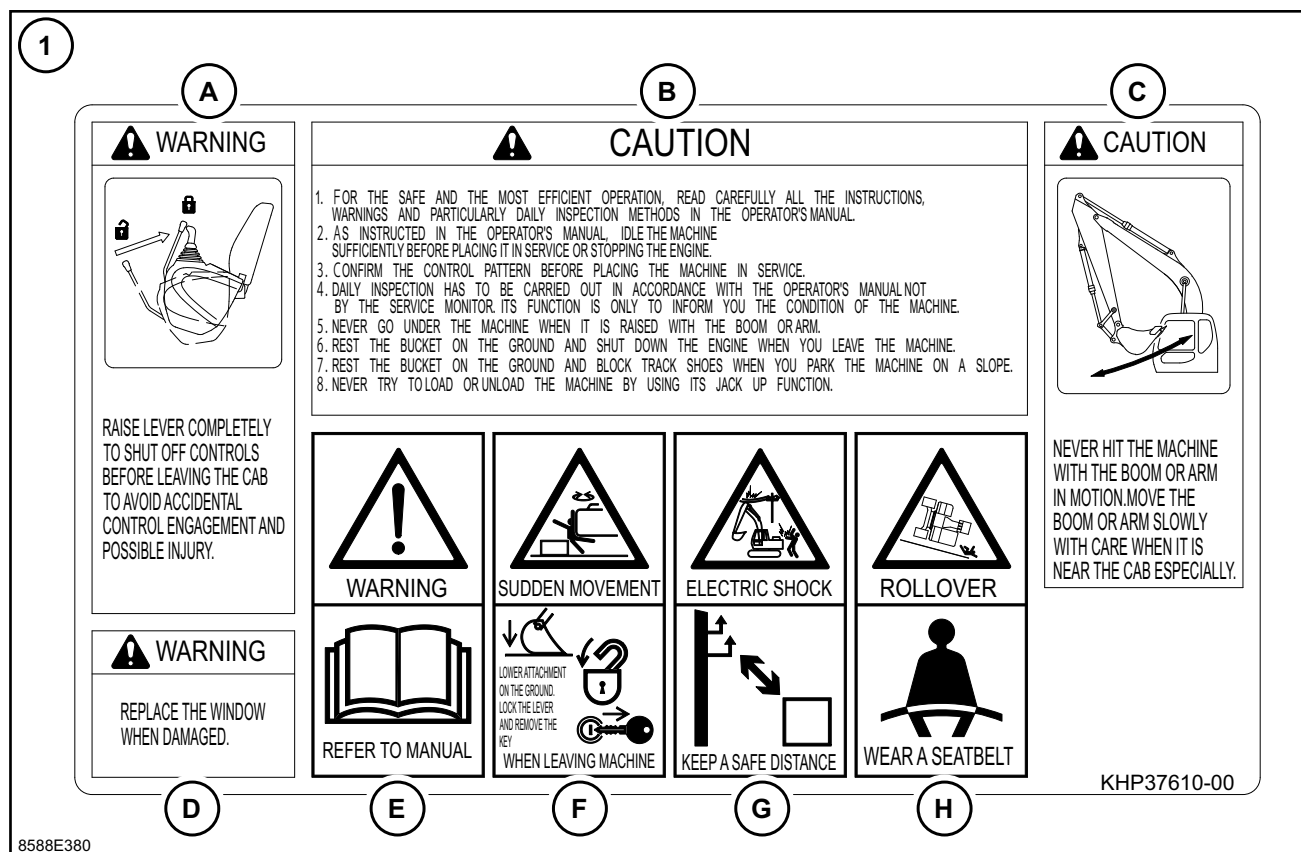
CD54FA65

CD54FA65

Examples of Decals

1. Cautions for Safety

Part number: KHP37610

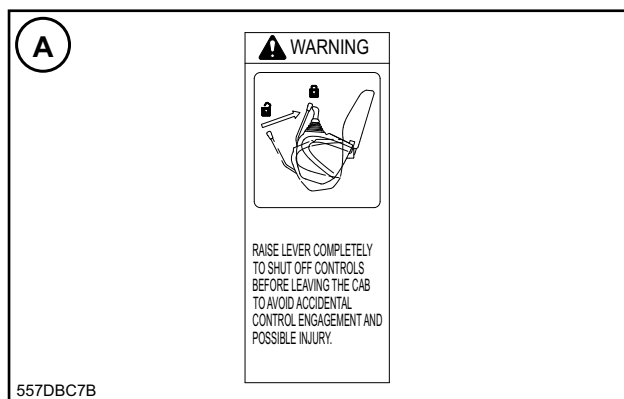


8588E380

A. Raising Gate Lock Lever

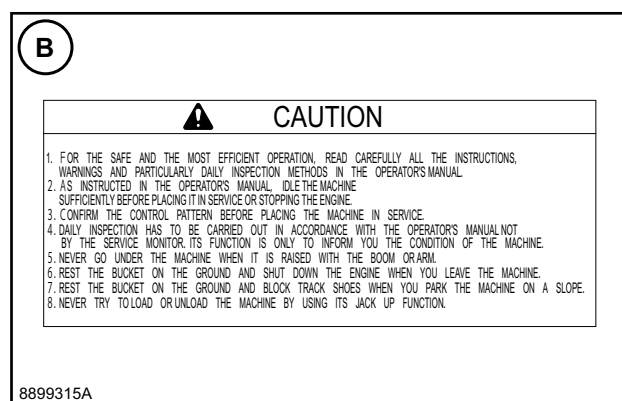
If an operation lever were touched by mistake when you are not operating the machine or entering or leaving the machine, the machine might move, which would be dangerous.

When you are not operating the machine or when entering or leaving the machine, set the gate lock lever in the locked position (controls inactive).



557DBC7B

B. Cautions

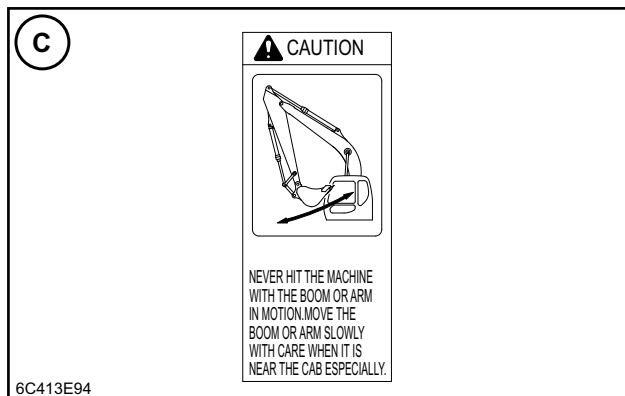


8899315A

2-Safety Information

C. Contact with Special Attachment

This decal shows that there is a danger of contact between the special attachment and the cab. Always maintain at least the minimum safe distance between the special attachment and the cab and pay attention that there is no contact during swinging or accidental movement of this machine.

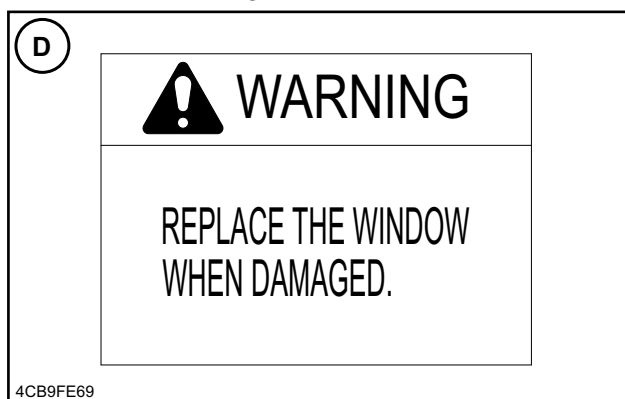


6C413E94

6C413E94

D. Replacing Damaged Windows

If a window is damaged, be sure to repair it.

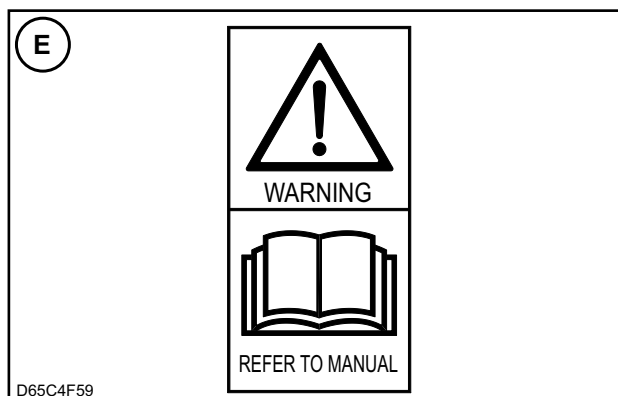


4CB9FE69

4CB9FE69

E. Operator's Manual

Always read the operator's manual before using this machine.



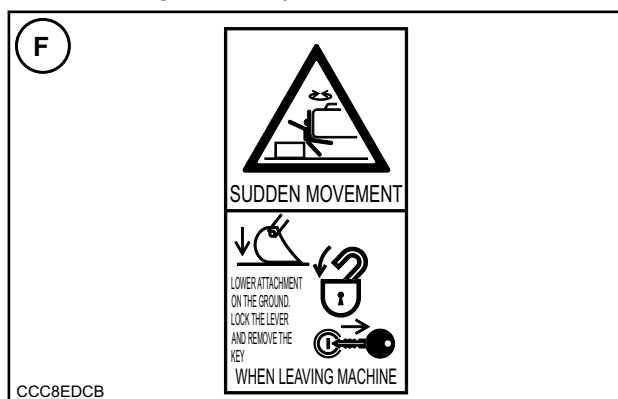
D65C4F59

D65C4F59

F. Cautions When Leaving the Operator's Seat

Unintended movement of this machine while parked poses the danger of trapping or running over someone and injuring them.

When going away from this machine, lower the bucket to the ground, lock the gate lock lever, and take out the ignition key.



CCC8EDCB

CCC8EDCB

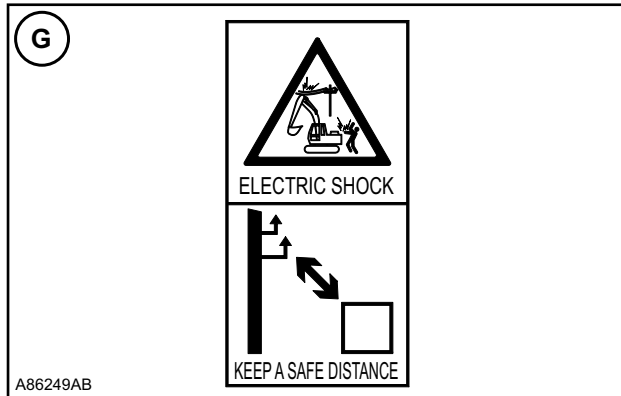
G. Danger of Electric Line

This decal gives a caution for working near high-voltage electric lines.

If this machine comes too close to wires, there is a danger of electrical shock.

When working near high-voltage power transmission lines, always check the specified work range.

Assure a safe distance from power lines.

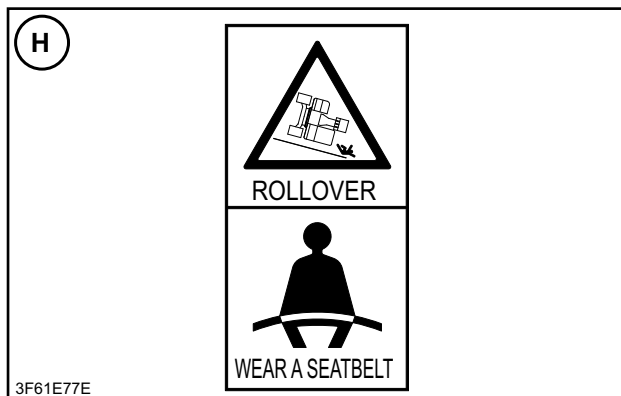


A86249AB

H. Wearing the Seat Belt

If you do not wear the seat belt and this machine falls over, there is a danger that you will be thrown out of the cab.

Always wear the seat belt when operating this machine.



3F61E77E

2-Safety Information

2. Functions of Operation Levers

Part number:

KHP17370 (ISO operating method)

KHP17380 (2-way operating method) (option)

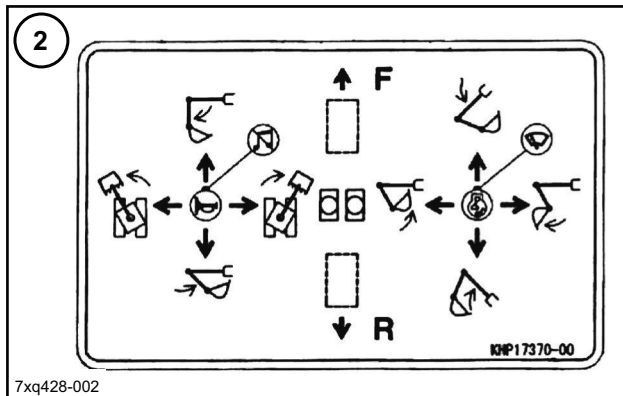
KHP21120 (option)

KHP21150 (option)

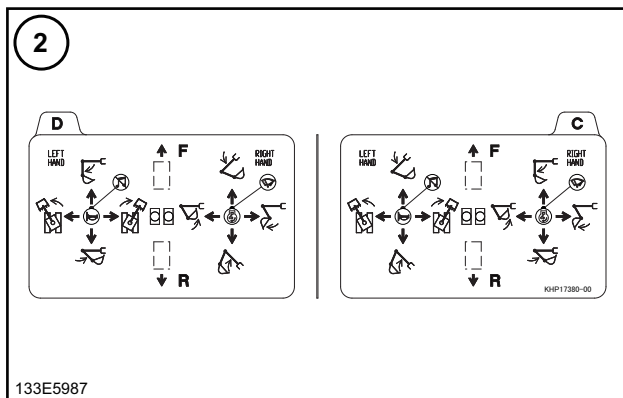
KHP21160 (option)

This decal shows the functions of the operation levers.

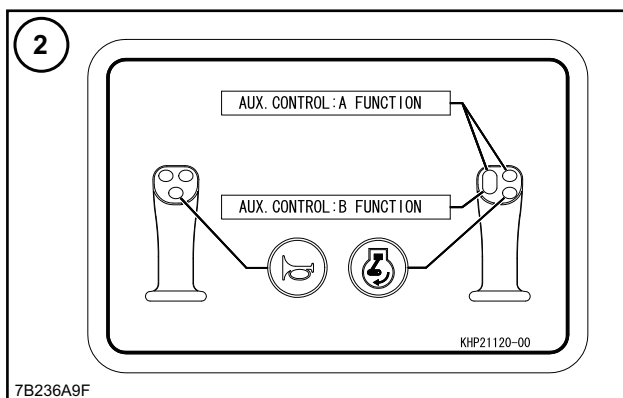
The left-handed type and the right-handed type are explained separately.



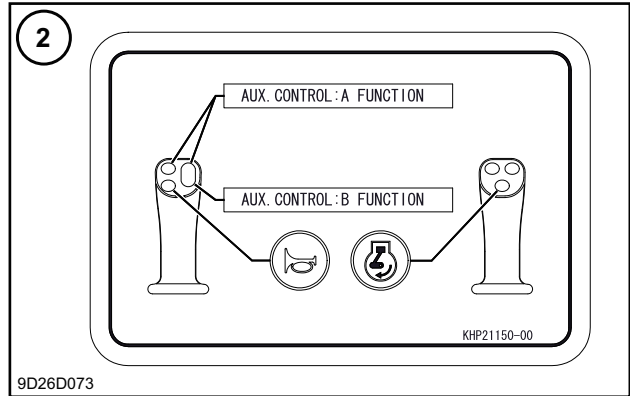
7xq428-002



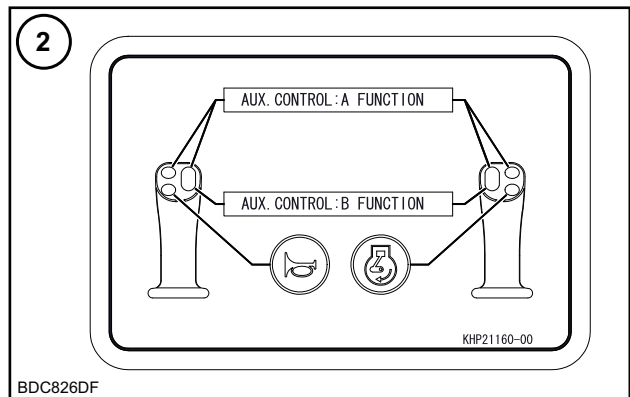
133E5987



7B236A9F



9D26D073



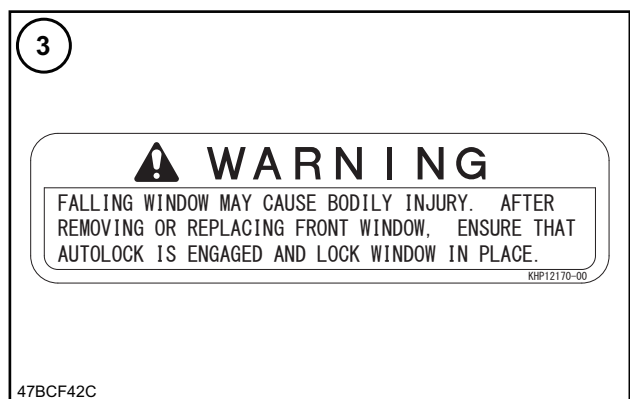
BDC826DF

3. Windshield Locking

Part number: KHP12170

This decal gives a caution to preventing tilting of the windshield.

Lock the windshield appropriately at an open position.



47BCF42C

2-Safety Information

4. Lever and Pedal Functions

Part number:

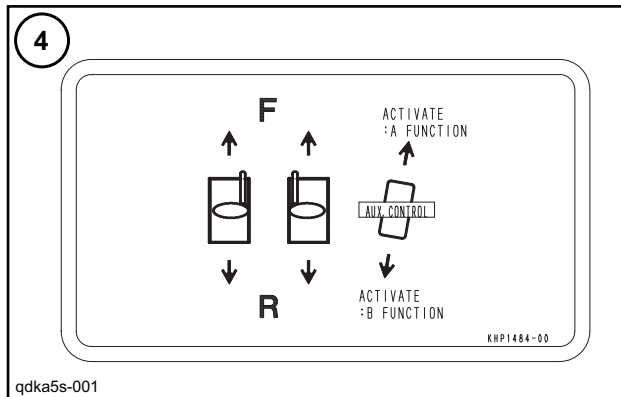
KHP1484 (option)

KHP1511 (option)

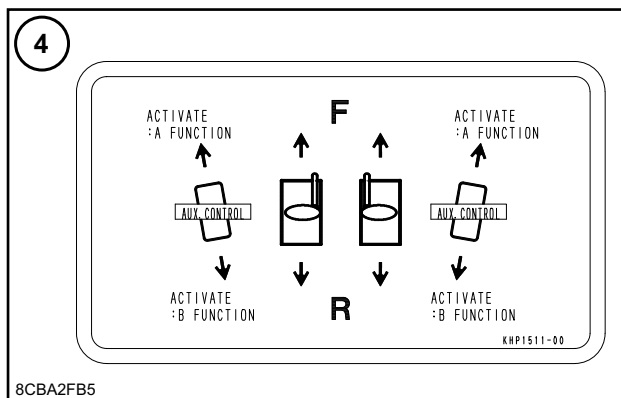
KHP20950 (foot control) (offset boom)

KHP20960 (foot control) (offset boom; option)

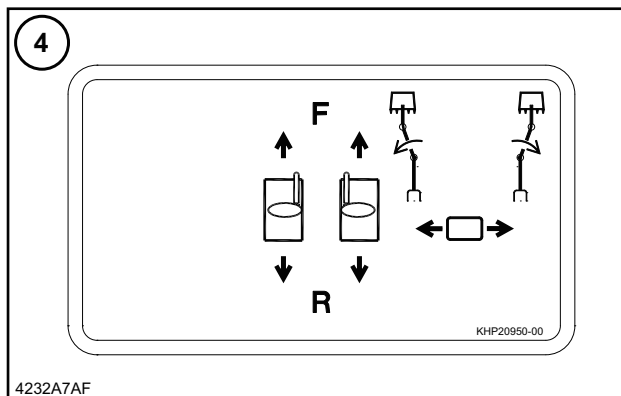
This decal shows the functions of the travel levers and pedals.



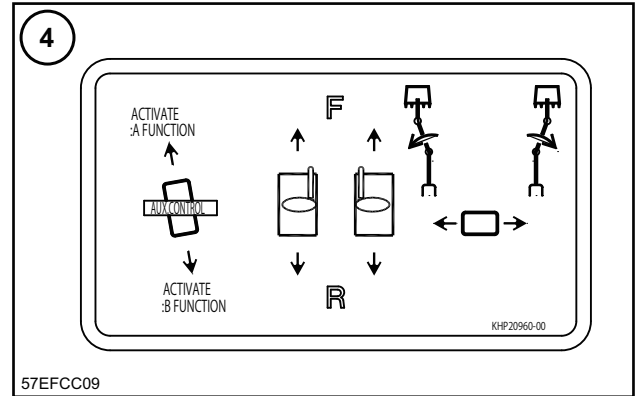
qdk5s-001



8CBA2FB5



4232A7AF



57EFCC09

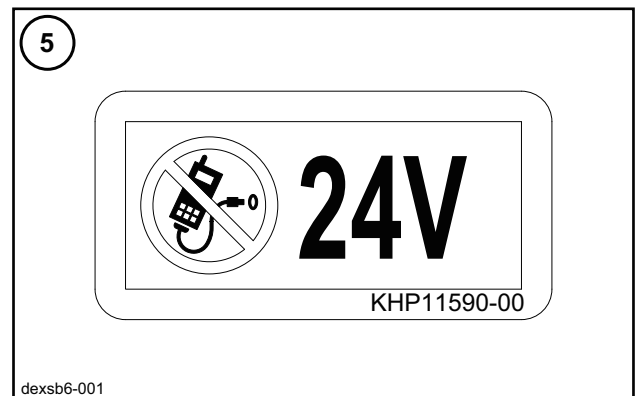
5. Cigarette Lighter Socket (24 VDC)

Part number: KHP11590

This decal shows the voltage of the cigarette lighter socket.

Do not connect anything other than a 24 VDC device (mobile telephone charger etc.).

It can cause breakdown.

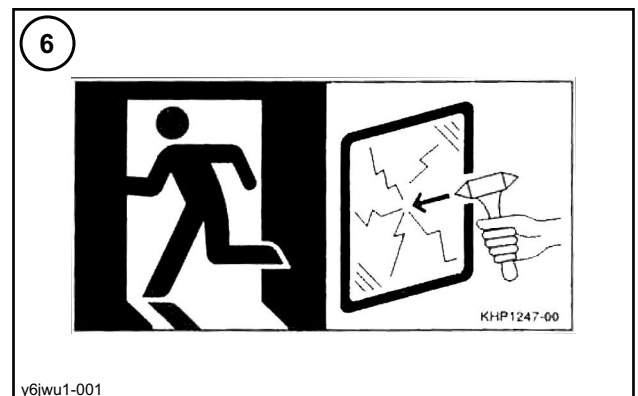


dexsb6-001

6. Emergency Exit

Part number: KHP1247

When escaping in an emergency, you can use the hammer mounted in the operator's compartment to break the rear window to escape.



y6jwu1-001

2-Safety Information

7. Switching Control Functions

Part number: KHP1587

This decal shows a caution for the operation type selector.

Do not operate until the control type card in the holder matches the selector valve position on this machine.

Failure to observe this caution may cause breakdown of this machine and a personal injury.

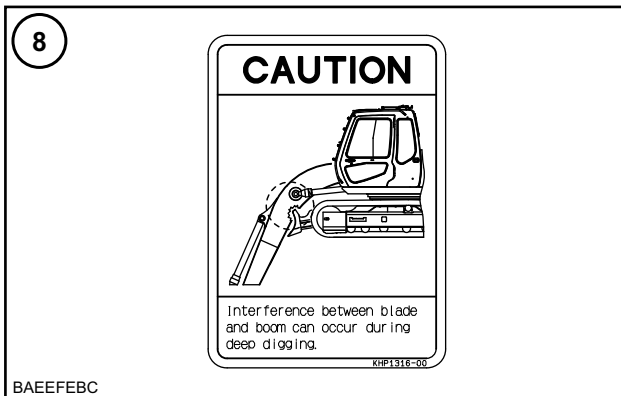


nzu4zu-001

8. Cautions for Blades

Part number: KHP1316

When operating, ensure there is no interference between the blade and attachment.



BAEEFEBC

9. Cautions for Handling Cab

Part number: KHP35810

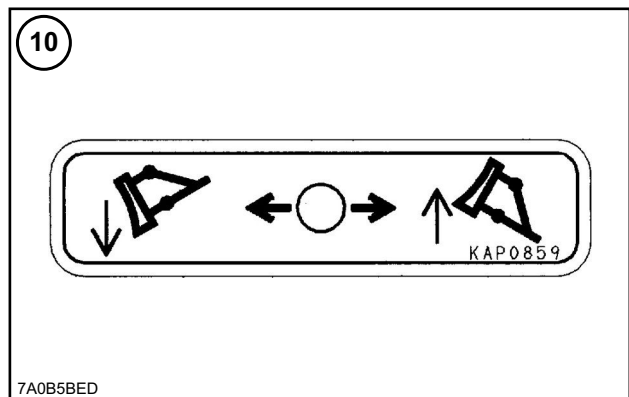
Welding or altering the cab affects its strength. Never weld or alter the cab.



10. Blade operation (blade type)

Part number: KAP0859

This decal shows the blade operation.



7A0B5BED

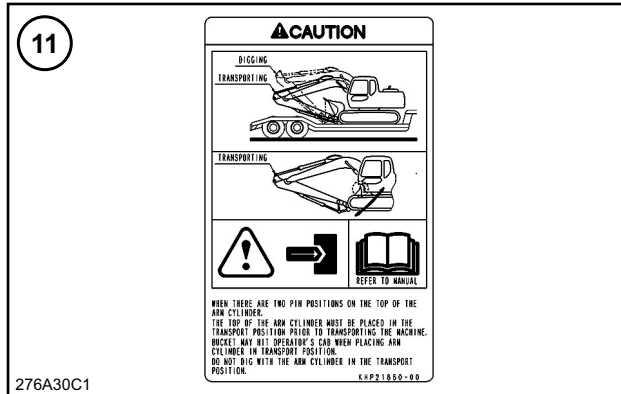
2-Safety Information

11. Cautions for Transporting Position (blade type)

Part number: KHP21860

Transport the machine in the correct position.

For transporting, read this manual carefully.



276A30C1

276A30C1

12. Radiator Cap

Part number: KHP11450

This decal shows information on handling the radiator cap.

If the radiator cap is opened when the coolant temperature is high, there is a danger of hot coolant spraying out and injuring someone.

Never open the radiator cap when the radiator coolant temperature is high.



C1C4E591

C1C4E591

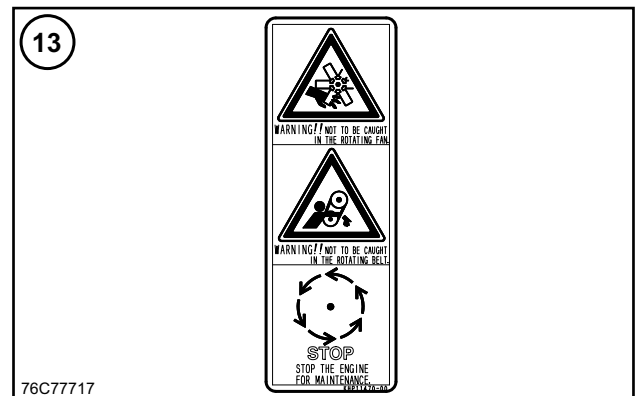
13. Fan and Belt

Part number: KHP11470

There is a danger of someone becoming entangled in the rotating sections of the fan and being injured.

There is a danger of someone becoming entangled in the rotating sections of the belt and being injured.

Stop the engine to stop fan and belt rotation before opening the hood to service on this machine.



76C77717

76C77717

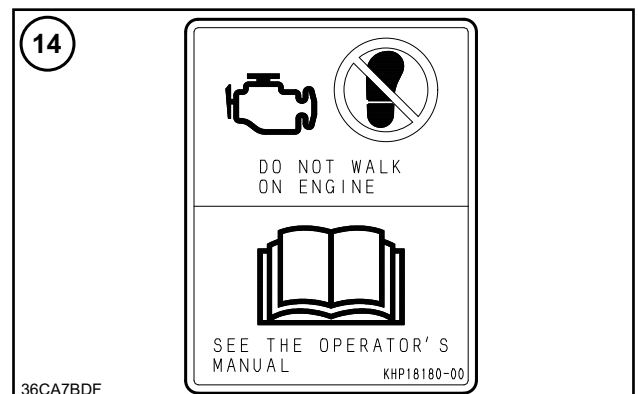
14. Caution Decal for Engine Service

Part number: KHP18180

This decal indicates that climbing onto the engine is prohibited.

It also warns to read this manual carefully before servicing on the engine.

For details, refer to "Service specifications" (6-43) in [Maintenance].



36CA7BDF

36CA7BDF

2-Safety Information

15. Touching Hot Surfaces

Part number: KHP11490

While the engine is running and immediately after it stops, do not touch the exhaust system.



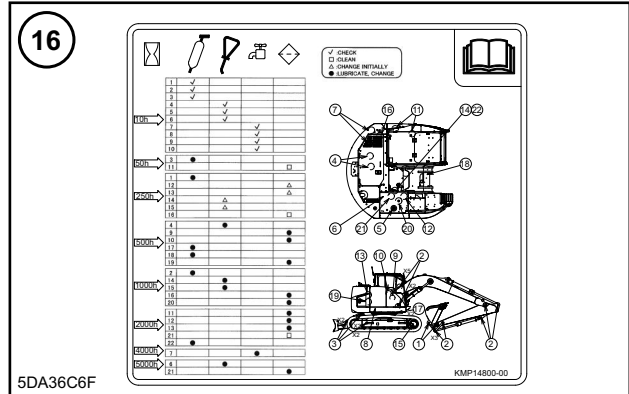
4730BC03

16. Lubrication chart

Blade Type

Part number: KMP14800

This decal explains service locations and intervals.

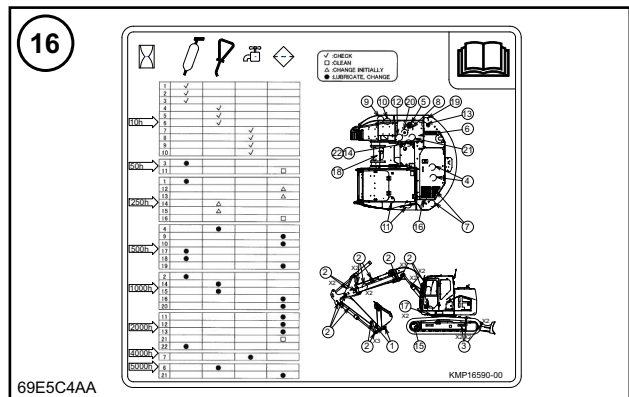


5DA36C6F

Offset Boom Type

Part number: KMP16590

This decal explains service locations and intervals.



69E5C4AA

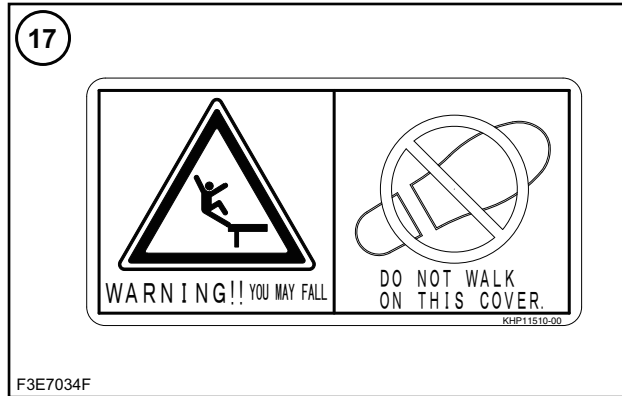
2-Safety Information

17. Slipping on the Engine Hood

Part number: KHP11510

Do not climb onto the engine hood.

There is a danger of falling.



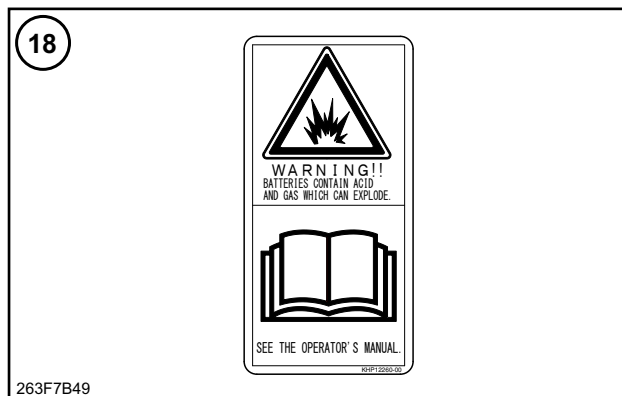
F3E7034F

18. Battery

Part number: KHP12260

If the battery is used incorrectly, there is a danger of it exploding.

Be sure to read this manual before handling the battery.



263F7B49

19. Entry into Swing Area Prohibited

Part number: RAP0144

There would be a danger of becoming entangled in the top of the main unit when this machine swings.

Do not let anyone enter the swing range.



5A81392B

20. Cautions for Shoe (crawler track) Tension

Part number: KHP1014

This label cautions the operator about the valve flying out when the check valve on the recoil spring is loosened.

It also cautions the operator to read the operator's manual first to ensure you loosen the check valve correctly.



C7C547CE

2-Safety Information

21. Switching Operation Types

Part number:

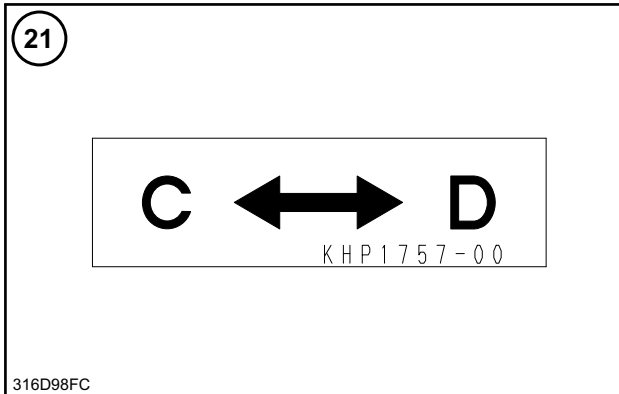
KHP1757 (option)

KHP12300 (option)

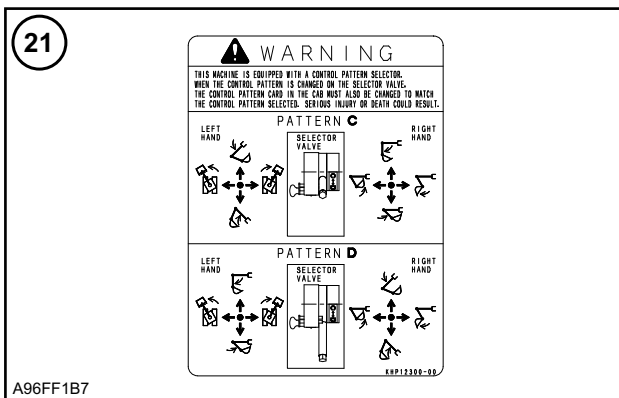
This decal shows a caution for the operation type selector.

Do not operate until the control type card in the holder matches the selector valve position on this machine.

Failure to observe this caution may cause breakdown of this machine and a personal injury.



316D98FC



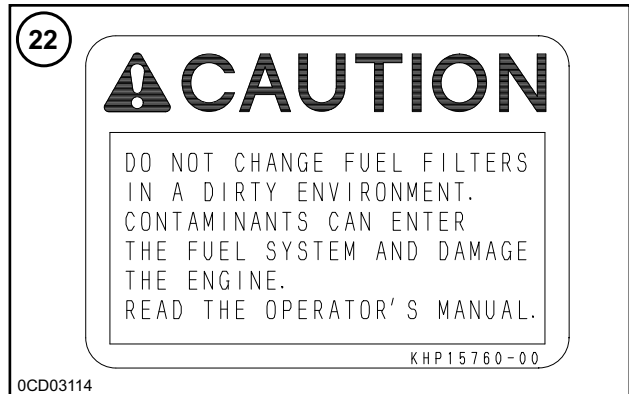
A96FF1B7

22. Fuel Filter Replacement

Part number: KHP15760

This decal gives a caution to use the correct procedure when replacing the fuel filter.

For the replacement procedure, read this manual.



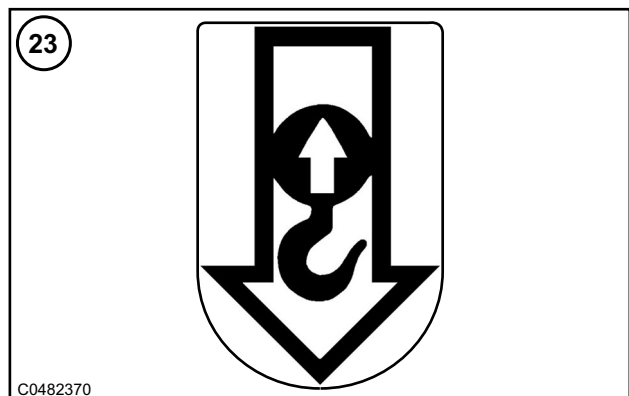
0CD03114

23. Slinging Point

Part number: KHP12192

This decal shows where to attach slings when lifting up the excavator.

Never use any other slinging points other than the ones shown on this decal.



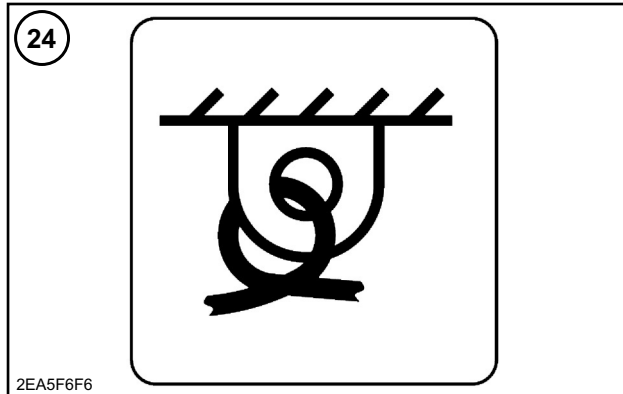
C0482370

2-Safety Information

24. Tie-down Point

Part number: KHP15191

This decal shows the tie-down points for transporting this machine.

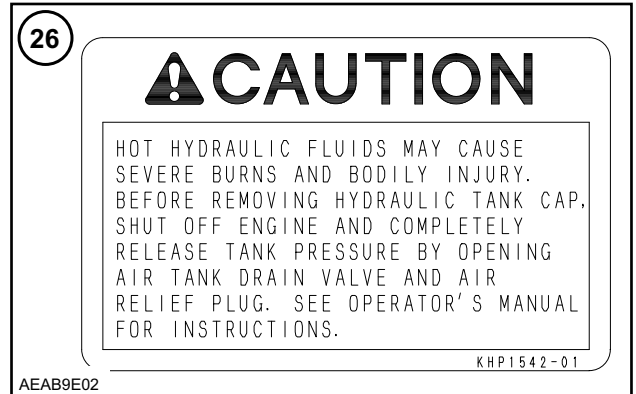


2EA5F6F6

26. Hydraulic Reservoir

Part number: KHP1542

Bleed off the pressure in the reservoir before removing the cap from the reservoir.

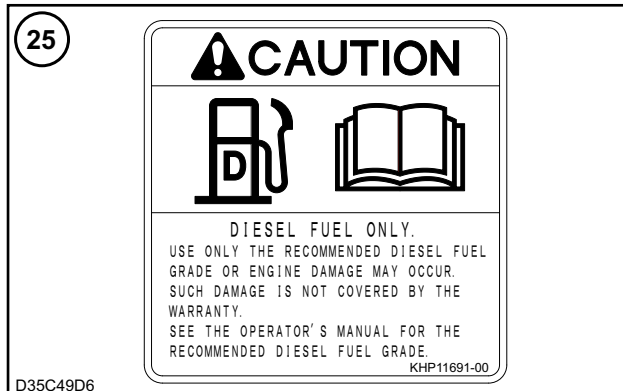


AEAB9E02

25. Cautions for Fuel to be Used

Part number: KHP11691

Use diesel fuel for general diesel vehicles. If any fuel other than diesel fuel is used, full engine function and performance cannot be obtained. Other fuel can also cause engine trouble or accidents. Absolutely never use any other fuel. Any troubles resulting from the use of any fuel other than the diesel fuels specified above are not covered by the warranty.

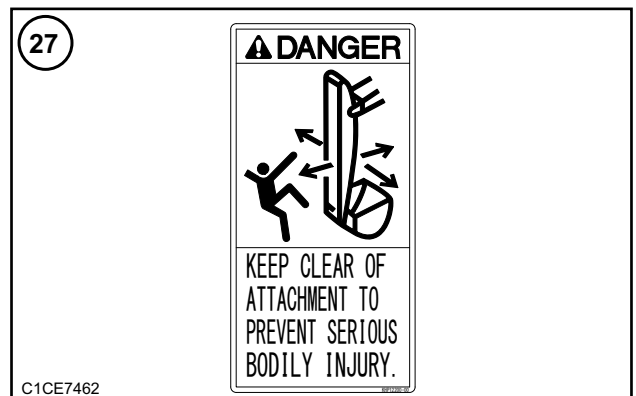


D35C49D6

27. Avoid getting knocked over

Part number: KHP12200

When operating the attachment, the attachment can knock someone over and injure them. Do not let anyone enter the machine's operation range.



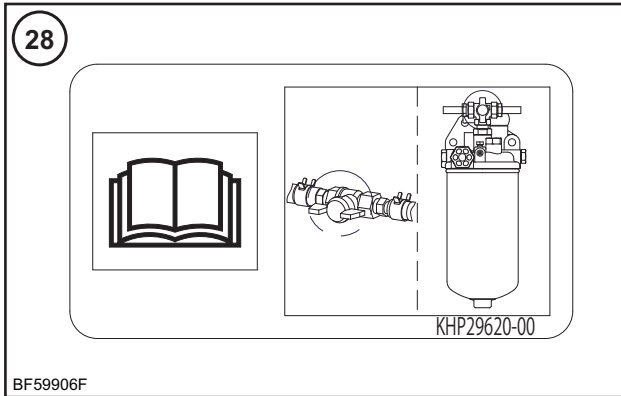
C1CE7462

2-Safety Information

28. Fuel Line Valve

Part number: KHP29620

For the usage of valve, refer to the "Main Filter Element Replacement" (6-53) in [Maintenance].



BF59906F

29. Cautions for Burns and Slipping

Part number: KHP18160

High temperature. Do not touch.

Slipping hazard. Do not climb on.



F0131D03

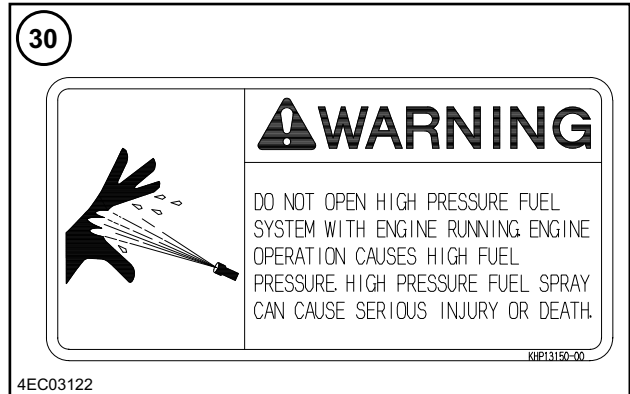
F0131D03

30. Warning Decal for High-pressure Common Rail

Part number: KHP13150

Do not loosen the common rail high-pressure valve while the engine is running.

Because the engine fuel system is at high pressure, there is a danger of fuel spraying out.



4EC03122

4EC03122

31. Danger of Falling

Part number: KHP11540

When working on this machine, there is a danger of falling.

When working on this machine, stay away from the edges of the machine.



D9325BEE

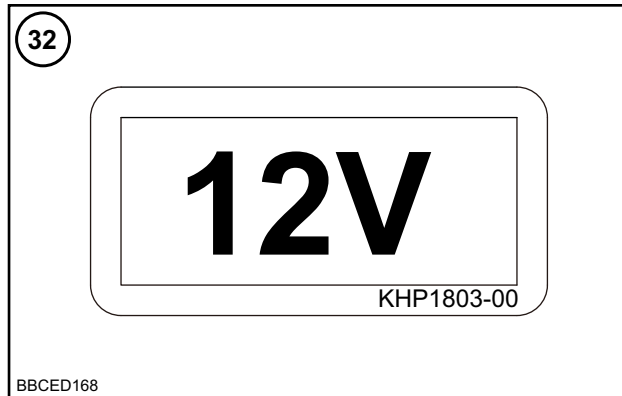
D9325BEE

2-Safety Information

32. Power Socket

Part number: KHP1803

This power supply socket is only for 12 VDC.
Do not use as a power supply for 24 VDC equipment.

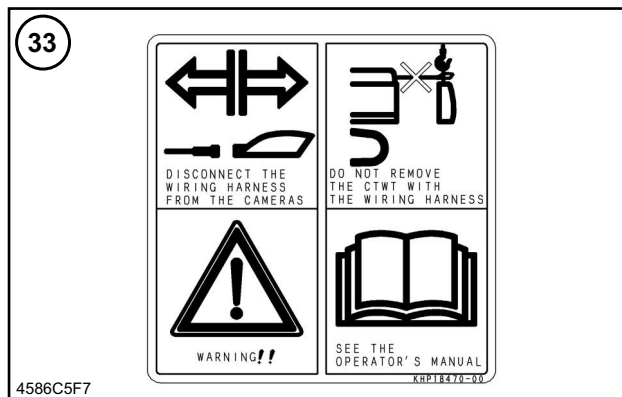


BBCED168

33. Cautions for Camera Wiring

Part number: KHP18470

Disconnect the camera wiring before removing the counterweight.



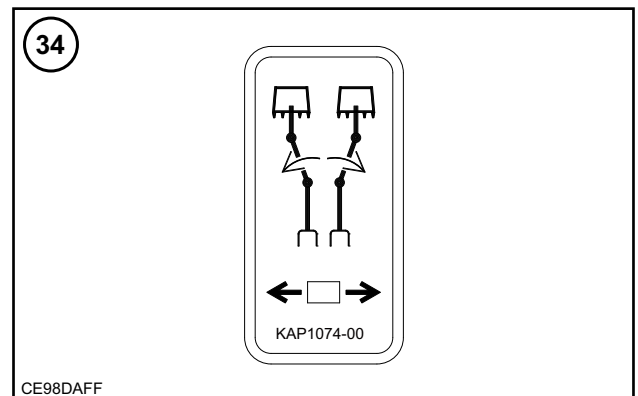
4586C5F7

4586C5F7

34. Offset Boom Operation

Part number: KAP1074

This label describes the offset boom operation.

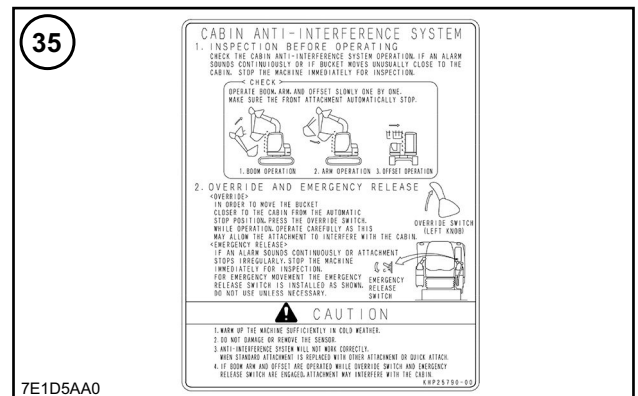


CE98DAFF

CE98DAFF

35. Handling of Anti-interference System

Part number: KHP25790

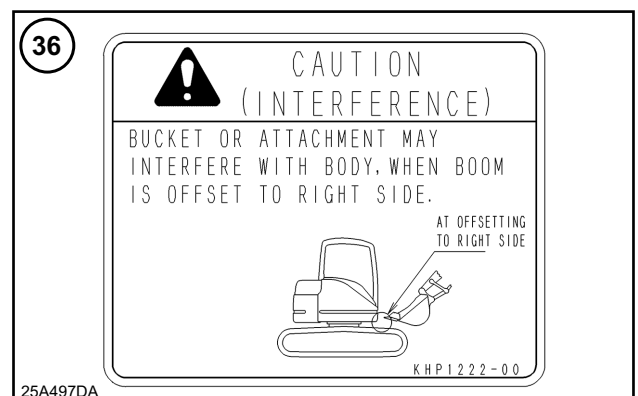


7E1D5AA0

7E1D5AA0

36. Cautions against Interference

Part number: KHP1222



25A497DA

25A497DA

2-Safety Information

37. Anti-interference Emergency Release Switch

Part number: KHP25770



7470F705

7470F705

38. RemoteCARE

Part number: KHP35680

This decal warns that the two-way radio communication equipment of RemoteCARE maybe in danger of causing accidental blast in a vicinity of a blast site. Keep a safety distance from a blast site or a remote controlled explosive device.



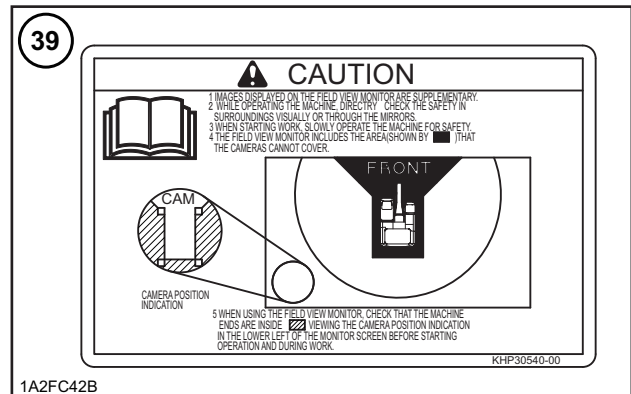
85145AC3

85145AC3

39. Safety of Surroundings (option)

Part number: KHP30540

This label shows the FVM blind angle.



1A2FC42B

1A2FC42B

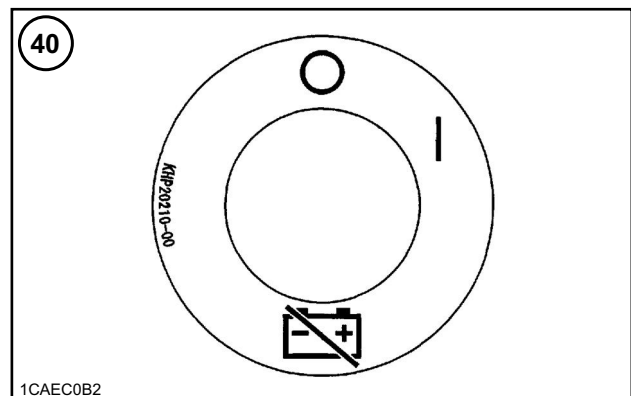
40. Battery Disconnect Switch

Part number: KHP20210

Turn the switch to the OFF position to cut off the battery.

For the detailed procedures, refer to the operator's manual.

The use of this switch is limited to the service operations such as welding and electrical repairs.



1CAEC0B2

1CAEC0B2

Examples of Part Precaution Identification Plates

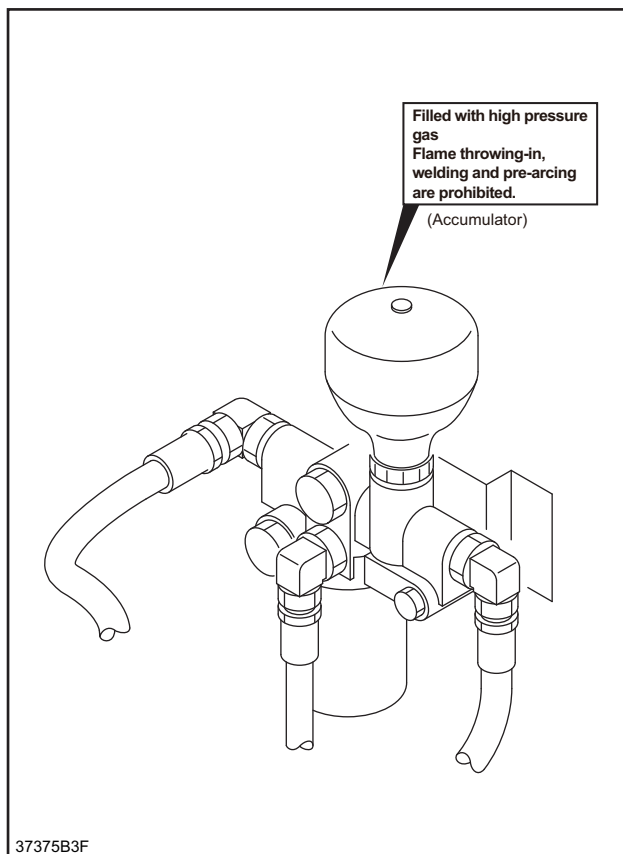
Battery

This decal is on the batteries and draws attention to the risks and precautions to be taken when handling batteries.



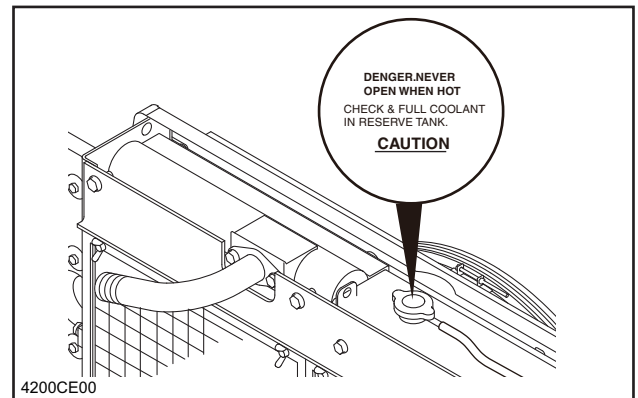
1B6E7F19

Accumulator



37375B3F

Radiator cap



4200CE00

3-Description of Handling Entering and Leaving the Cab

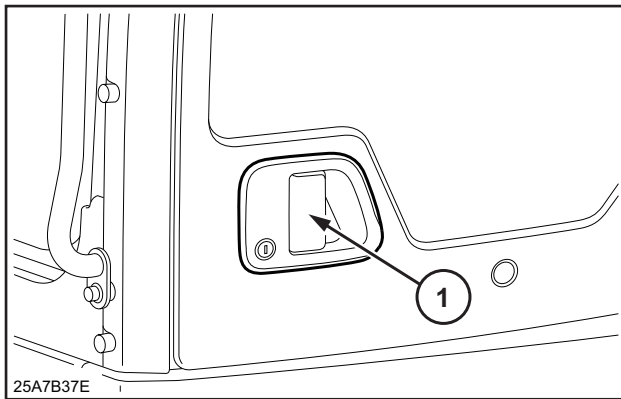
Cab Door

⚠ CAUTION

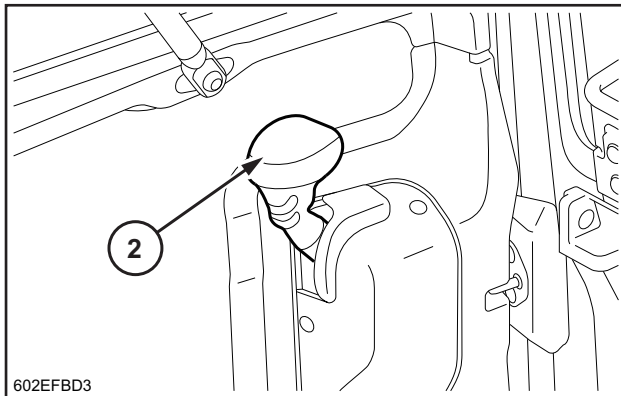
When closing the door, be careful not to catch a hand, your clothes, or anything else in the door. Failure to do so could result in injury.

When opening the door from the outside, use the handle (1).

When opening the door from the inside, use the handle (2).



25A7B37E



602EFBD3

The door can be locked fully open.

To unlock the door, push down the lever (3).

NOTICE:

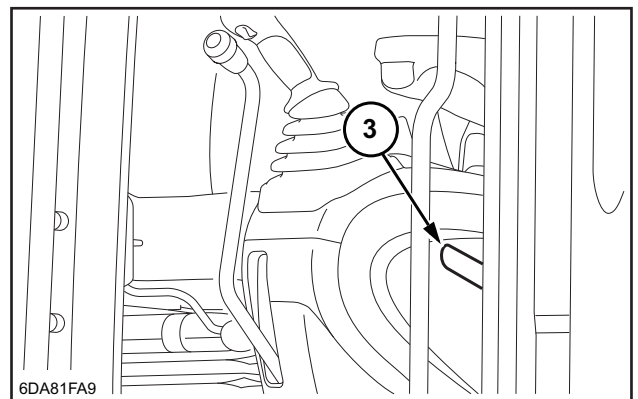
Do not leave the door half open.

Fasten the door in the locked position.

NOTICE:

Be careful not to operate the left side control lever if you unlock the door while still sitting in the operator's seat with the engine running.

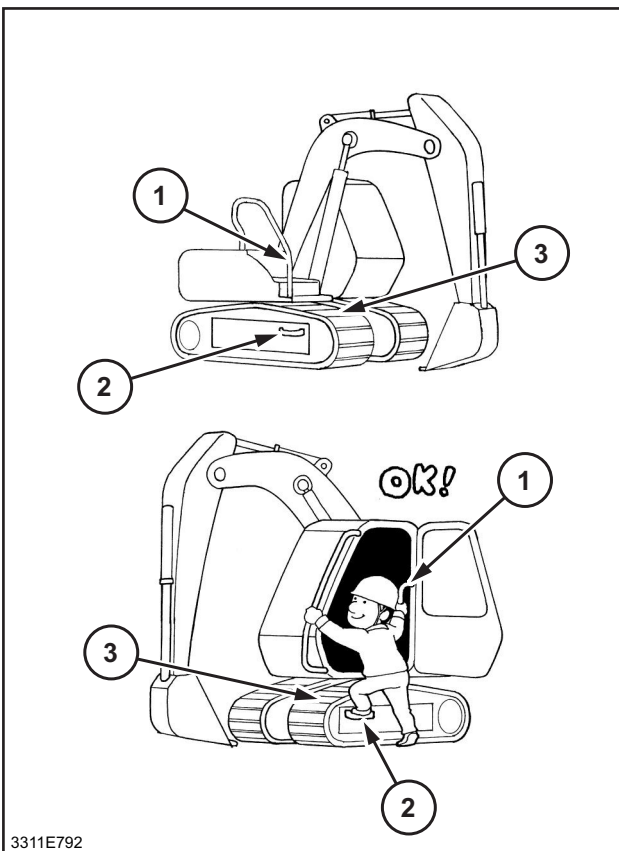
In order to prevent accidents, raise the gate lock lever (safety bar) so that the attachment does not operate or the machine does not travel. For details, refer to "Gate Lock Lever (safety bar)" (3-53).



6DA81FA9

Entering and Leaving the Machine

- When entering or leaving this machine, face straight toward the machine, always use the handrails ①, steps ② and shoes ③ to support your body at 3 points or more.
- Stop the machine with the operator's compartment and shoes parallel for entering and leaving the machine.
- Jumping down from the machine can cause broken bones and other injuries.
Do not jump down from the machine.
- Do not hold onto the left operation lever or operation lock bar when entering or leaving the machine.
Hold onto the handrail in the operator's compartment or on the door with your right hand.
- Remove any grease, oil, mud, and snow (in winter) from the steps and handrails to prevent slippage.



3311E792

3311E792

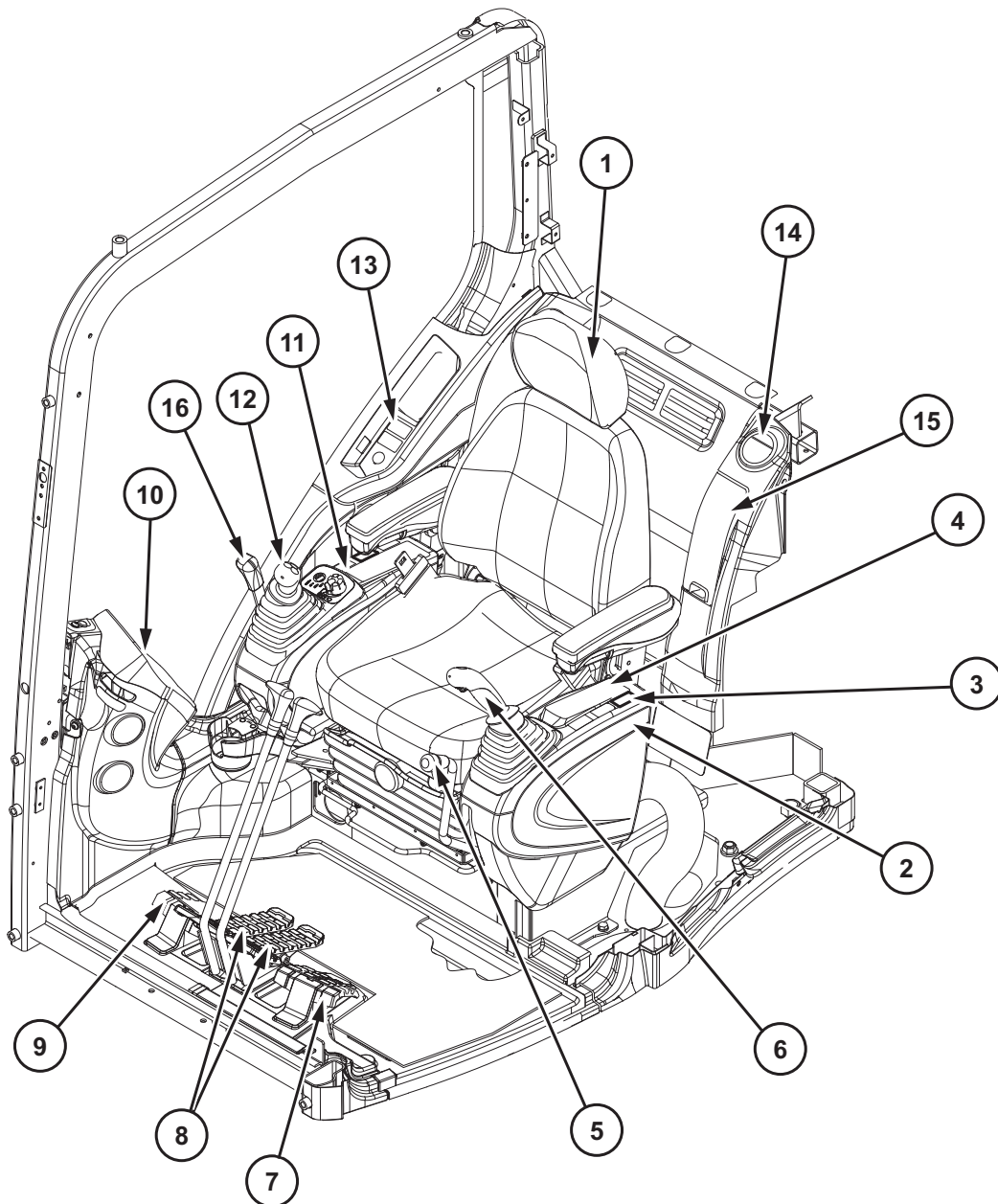
3-Description of Handling

Positions of Control Sections and Accessories within Cab

⚠ WARNING

Before starting the engine, familiarize yourself fully with the positions and functions of all control sections.

Failure to do so could cause death or serious injury.



96B5C1C9

96B5C1C9

3-Description of Handling

1	Operator's seat	7	Footrest or option pedal	13	Option switch
2	Left side console	8	Travel control lever and pedal	14	Air vent
3	Engine emergency stop switch	9	Footrest or option pedal	15	Fuse box
4	Air conditioner control switch	10	Right side front console monitor display	16	Blade control lever
5	Gate lock lever	11	Option switch		
6	Left control lever, arm and upper swing body swing control section	12	Right control lever, boom and bucket control section		

Operator's seat

Suspension Seat Adjustment

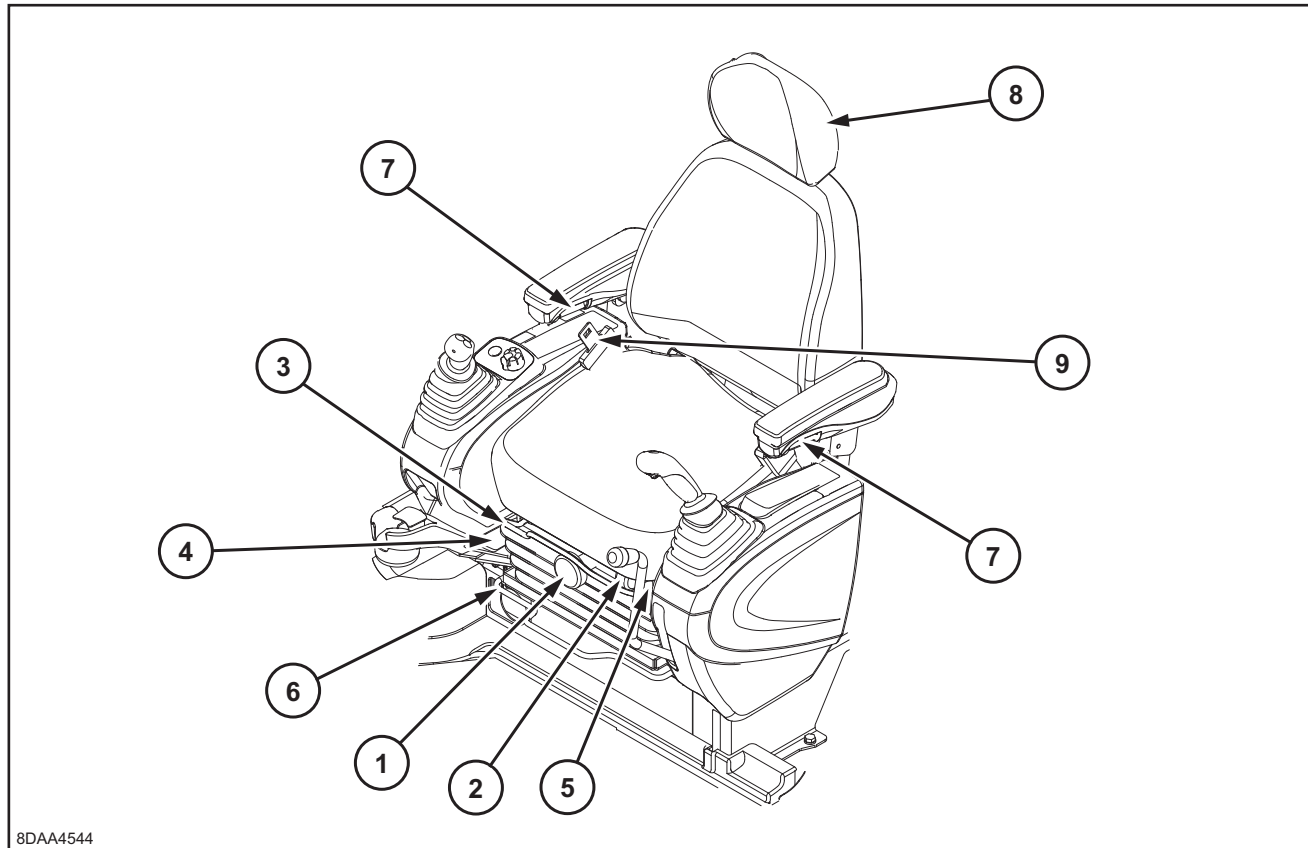
⚠ WARNING

Perform the following operations before adjusting the operator's seat.

1. Sit in the seat and stop the engine.
2. Turn the starter switch key to the ON position (accessory power), then raise the gate lock lever (safety bar).

Failure to perform this operation can cause dangerous unintended operation of this machine.

Mechanical suspension

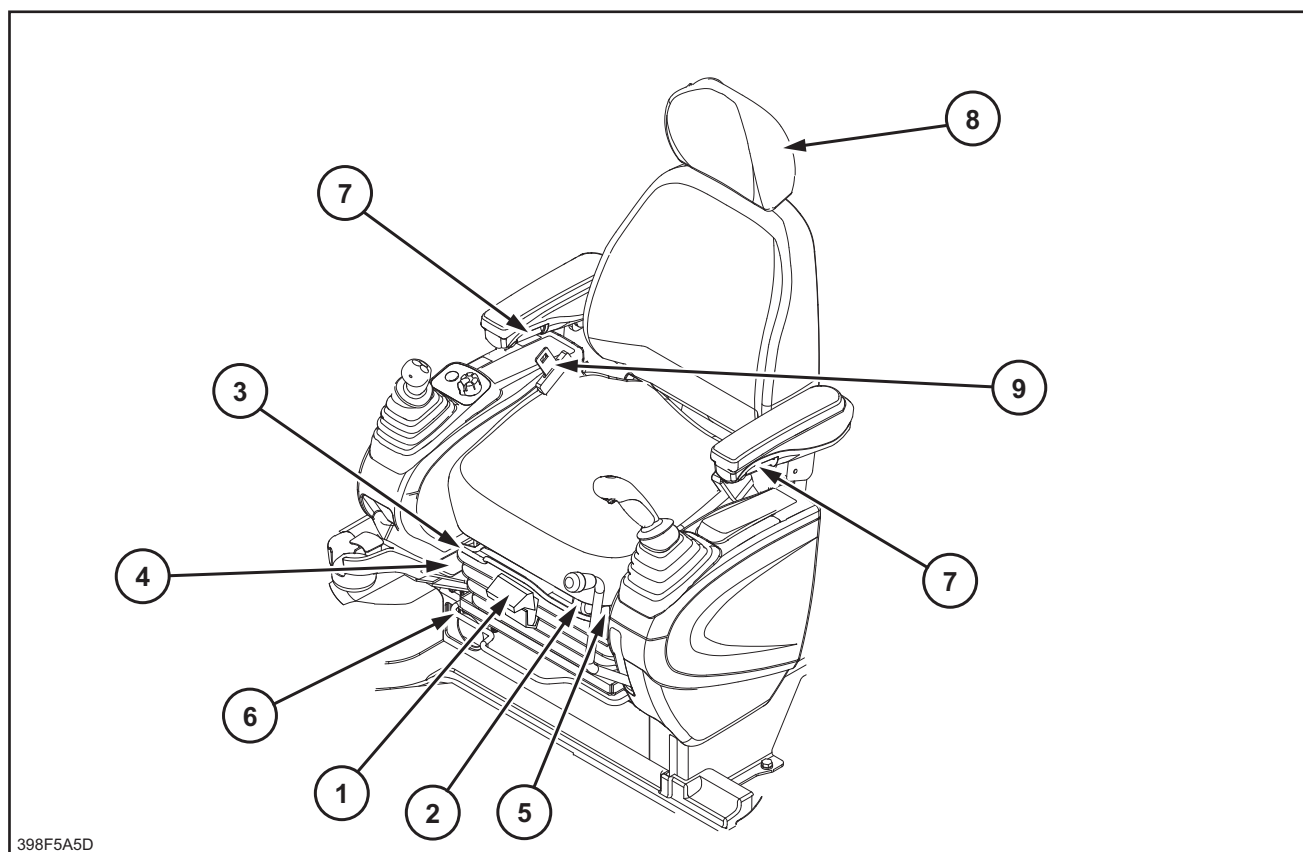


8DAA4544

8DAA4544

3-Description of Handling

Air suspension (option)



398F5A5D

398F5A5D

1	Height adjustment section	4	Seatback angle adjustment section	7	Armrest angle adjustment section
2	Body weight adjustment indicator	5	Lumbar support adjustment section	8	Headrest adjustment section
3	Forward-back position adjustment section	6	Console/seat forward-back adjustment section	9	Seat belt

Adjust the seat to match the weight and size of the operator's body. Making the operator comfortable improve their work efficiency and lets them operate this machine correctly.

3-Description of Handling

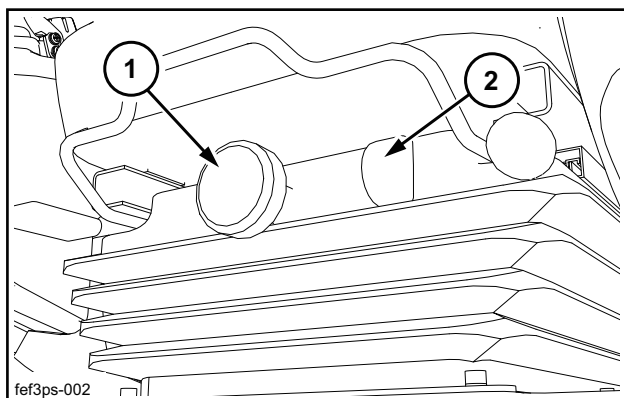
Height Adjustment Section

- Mechanical suspension type

Turning the knob (1) clockwise raises the seat.

Turning the knob (1) counter-clockwise lowers the seat.

When the operator is sitting on the seat, the indicator (2) lights up green.



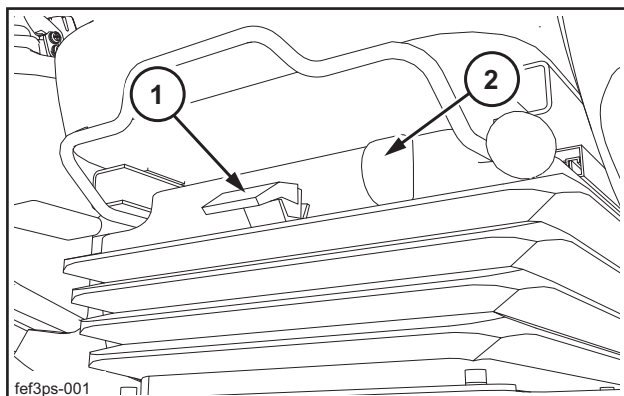
fef3ps-002

- Air suspension type

Raising the lever (1) raises the seat.

Lowering the lever (1) lowers the seat.

When the operator is sitting on the seat, the indicator (2) lights up green.

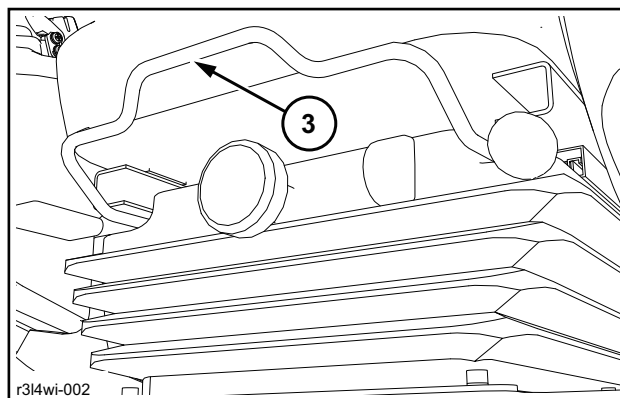


fef3ps-001

Forward-back Position Adjustment Section

1. With the slide lever (3) pulled up, move the seat forward and back.

2. When the seat reaches the desired position, release the slide lever (3).

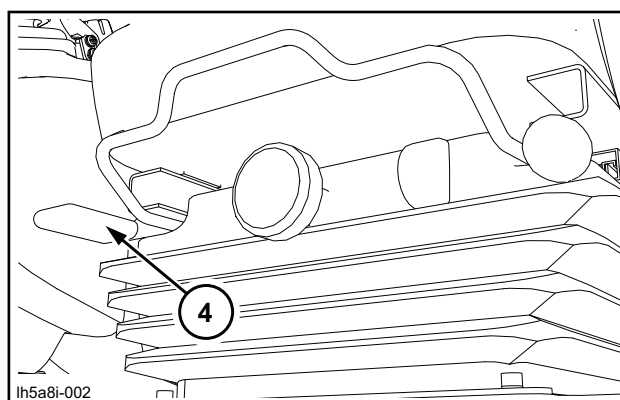


r3l4wi-002

Seatback Angle Adjustment Section

1. Pull up the lever (4).

2. Move the backrest to the desired position, then release the lever (4).

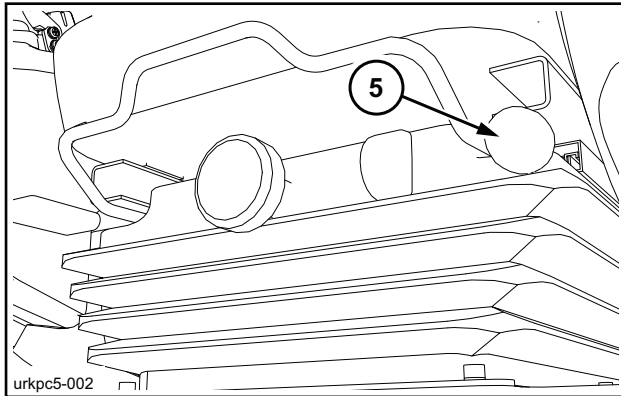


lh5a8i-002

Lumbar Support Adjustment Section

When you press the expansion valve (5), the lumbar support swells up.

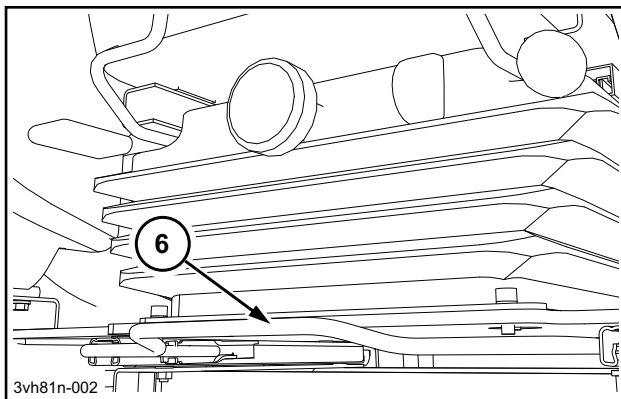
When you press the button at the root of the expansion valve (5), the lumbar support returns to its original state.



urkpc5-002

Console/seat Forward-back Adjustment Section

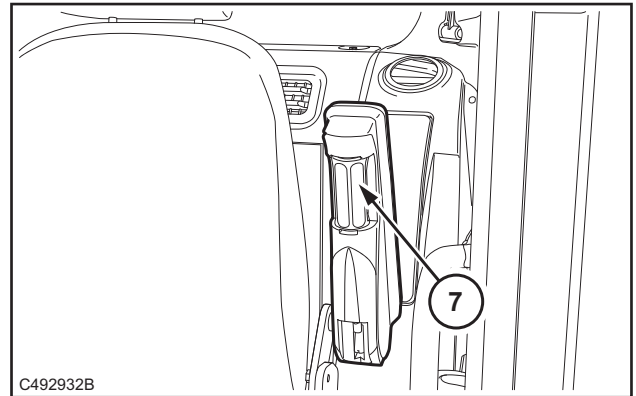
- 1.Pull up the slide lever (6).
- 2.Move the seat and the control arm to the desired position, then release the slide lever (6) to fasten them in place.



3vh81n-002

Armrest Angle Adjustment Section

- 1.Raise the armrest.
- 2.Turn the knob (7) to adjust the angle.
- 3.Lower the armrest.



C492932B

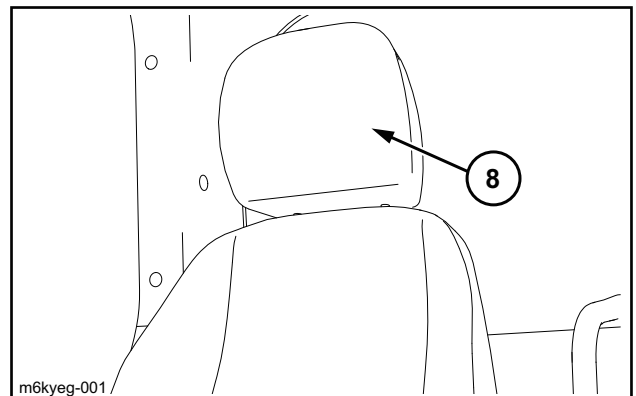
Headrest Adjustment Section

The headrest (8) can be adjusted up and down and forward and back.

To adjust the headrest up or down, hold it with both hands and gently move it up or down.

To adjust the headrest forward or back, hold it with both hands and move it to the desired position.

NOTE: To return the headrest to its original position (back), tilt the headrest all the way forward.



m6kyeg-001

3-Description of Handling

Seat Belt

Sit on the operator's seat in a comfortable posture, pull out the seatbelt, then insert it into the buckle (9).

NOTE: If the seatbelt is too short when you pull it out, let the seatbelt go. After the belt is rewound, pull it out again.

To undo the seatbelt, press the release lever on the buckle (9).

WARNING

Always securely fasten the seatbelt before operating this machine.

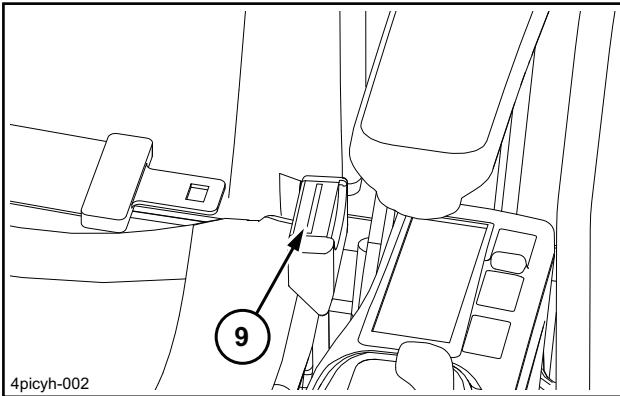
Inspect each part of the seatbelt for wear and damage.

Check that all the installation screws are securely tightened and replace any parts with problems.

If the seatbelt is damaged, replace any parts with problems before operating this machine.

Always keep the seatbelt clean.

Use only soap and water to clean the seatbelt. Do not use bleach or dye.



4picyh-002

Swing/Attachment Operation

Hand control levers and pedals

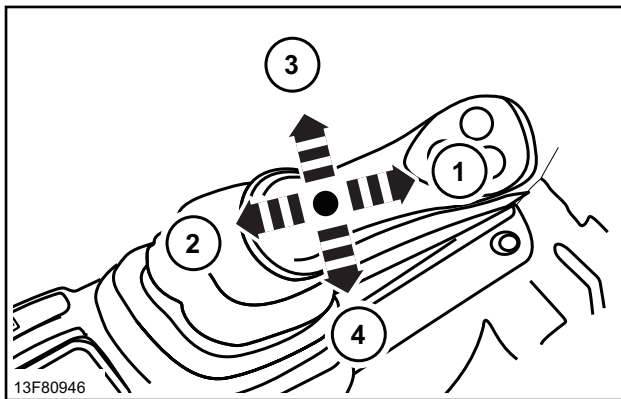
Left Control Lever

The tilt angle of this control lever determines the swing speed for the arm or upper swing body. In the neutral position, 2 operations can be performed at the same time.

NOTE:

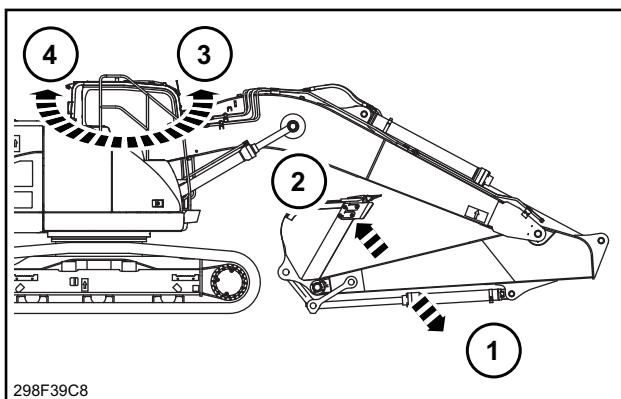
If you release the control lever during the swing operation, inertia may keep the upper swing body swinging.

Release the control lever a little early, taking the inertia into account.



13F80946

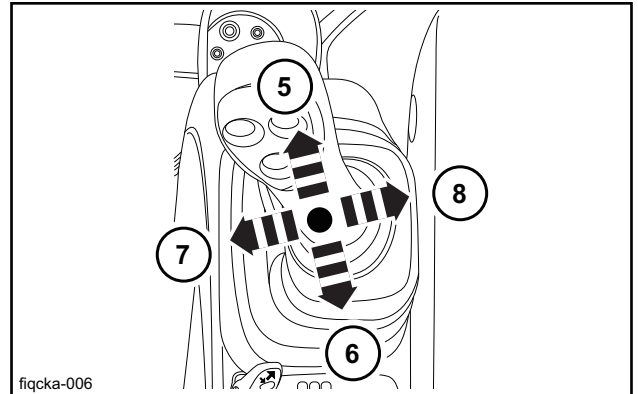
1. Extend the arm.
2. Retract the arm.
3. Swing the upper swing body to the left.
4. Swing the upper swing body to the right.



298F39C8

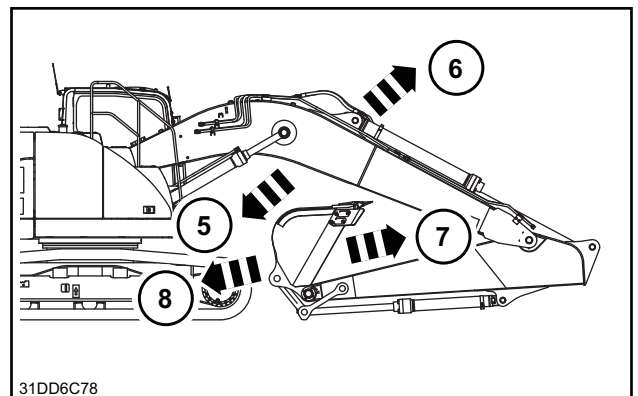
Right Control Lever

The tilt angle of this control lever determines the movement speed for the boom or bucket. In the neutral position, 2 operations can be performed at the same time.



fiqcka-006

5. The boom descends.
6. The boom rises.
7. Close the bucket (loading).
8. Open the bucket (releasing the dirt).



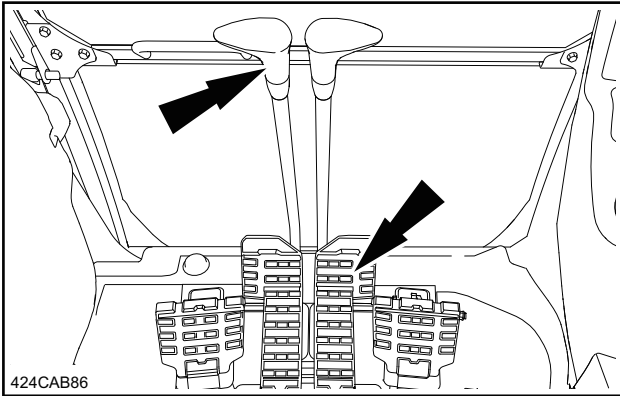
31DD6C78

3-Description of Handling

Travel Levers and Pedals

The travel levers and pedals are used for making this machine travel. For details, refer to "Travel Operation" (4-18) in [Operation Explanations].

NOTE:The position of the travel speed selector adjusts the advance travel speed or retreat travel speed. For details, refer to "Monitor Switch" (3-33).

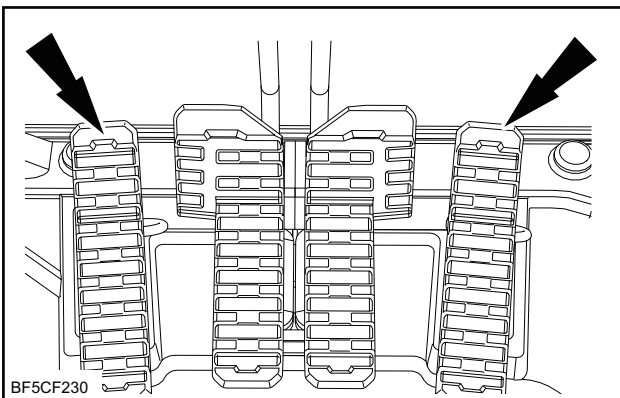


424CAB86

Option Pedal (if equipped)

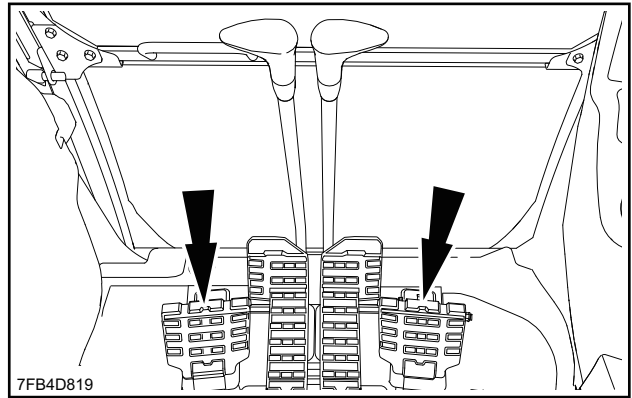
This pedal controls the hydraulic breaker (if equipped) and other optional accessories. For details, refer to "Special Attachments" (4-33) in [Operation Explanations].

NOTE:Consult your dealer and the certified service plant before installing any optional attachment.



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Footrest

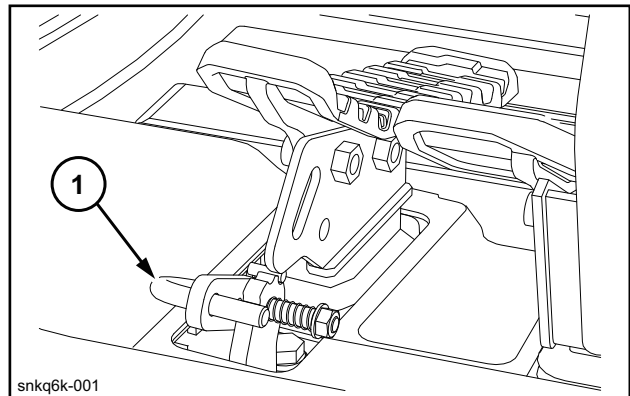


7FB4D819

Option Pedal Adjustment and Fastening (if equipped)

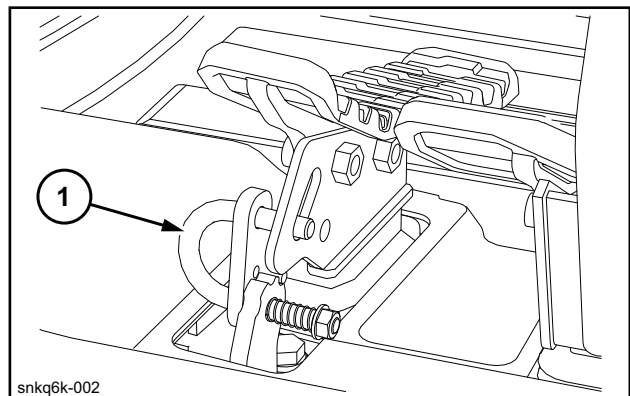
The option pedal is used to operate special attachments.

To perform breaker operations or other compound operations, release the locking pin (1).



snkq6k-001

To perform crusher operations or other independent operations, fasten the locking pin (1).



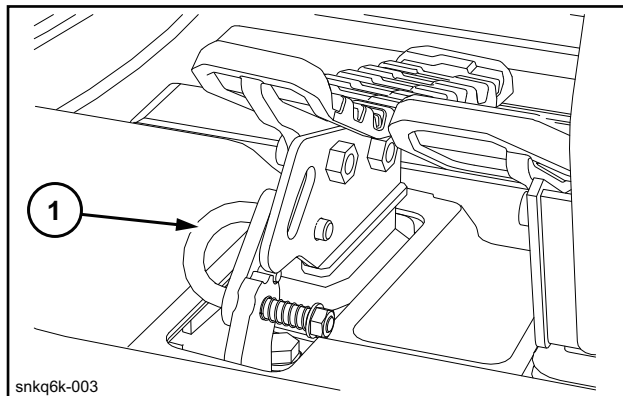
snkq6k-002

3-Description of Handling

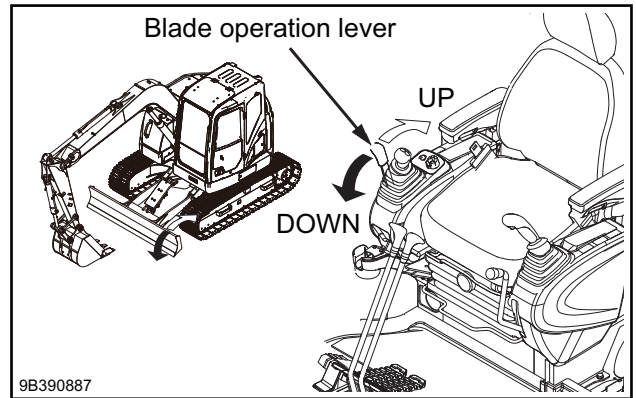
If the end attachment is removed, this pedal is locked. Fasten the locking pin (1).

⚠ WARNING

Stop the engine before releasing or fastening the locking pin.
Failure to do so could allow the machine to move unexpectedly, which could cause death or serious injury.



snkq6k-003



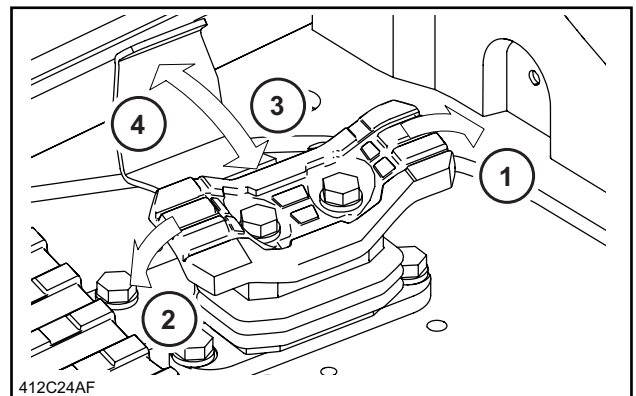
9B390887

Offset Pedal Operation (offset boom type)

- 1.Moves the boom to the right.
- 2.Moves the boom to the left.
- 3.Locks the pedal.
- 4.Release the pedal lock.

⚠ CAUTION

Always lock the offset pedal when not in use.



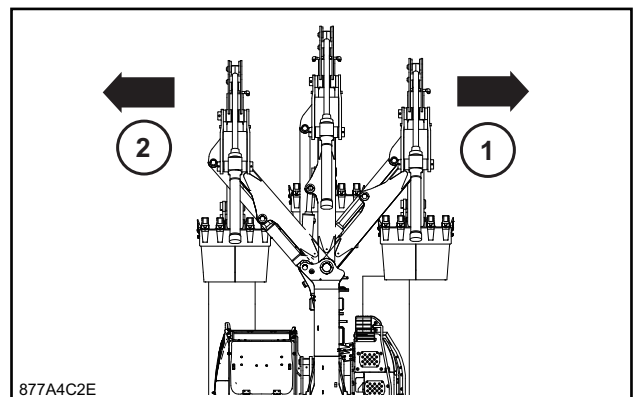
412C24AF

Blade Operation

⚠ CAUTION

Use the blade only for the light applications such as dozing soft dirt or mud.

- Do not press the blade down too hard. Doing so could damage the blade.
- Do not apply lateral load to the blade. Doing so could damage the blade.
- When you use the blade to support the front section of the main unit while operating an attachment etc., make sure that the main unit is supported by the full length of the blade.
This prevents damages to the blade.



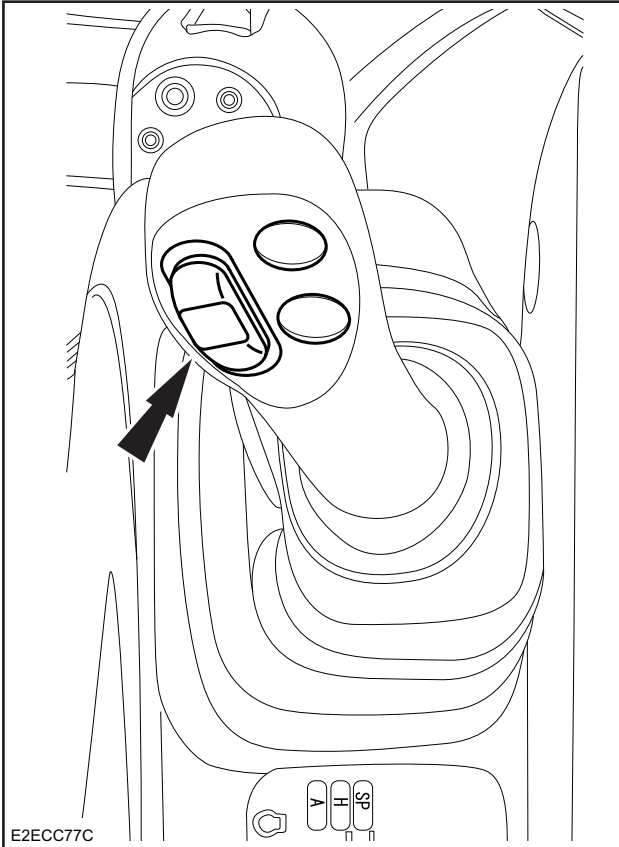
877A4C2E

3-Description of Handling

Proportional switch (if equipped)

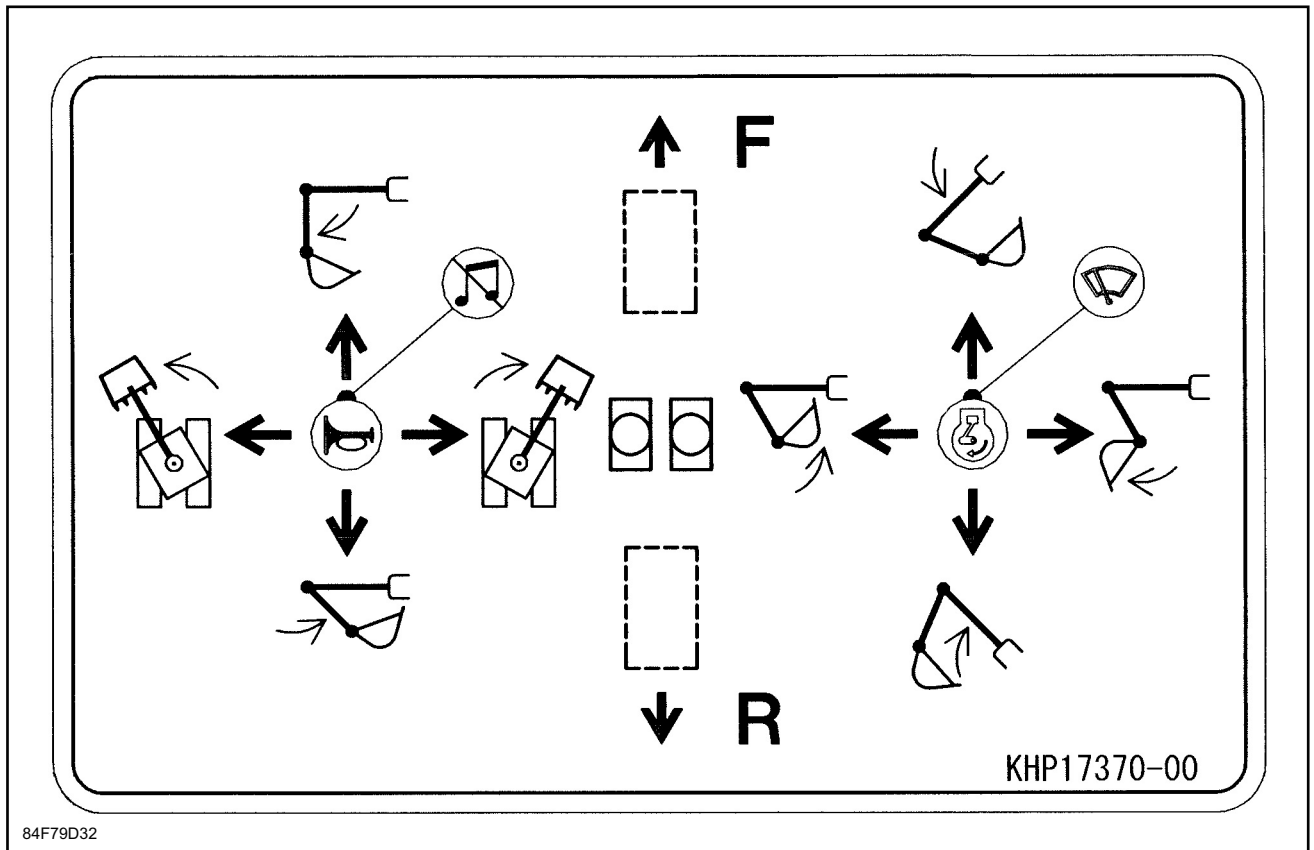
This switch controls the hydraulic breaker (if equipped) and other optional accessories.

NOTE: Please contact your local dealer before installing any optional tool.



E2ECC77C

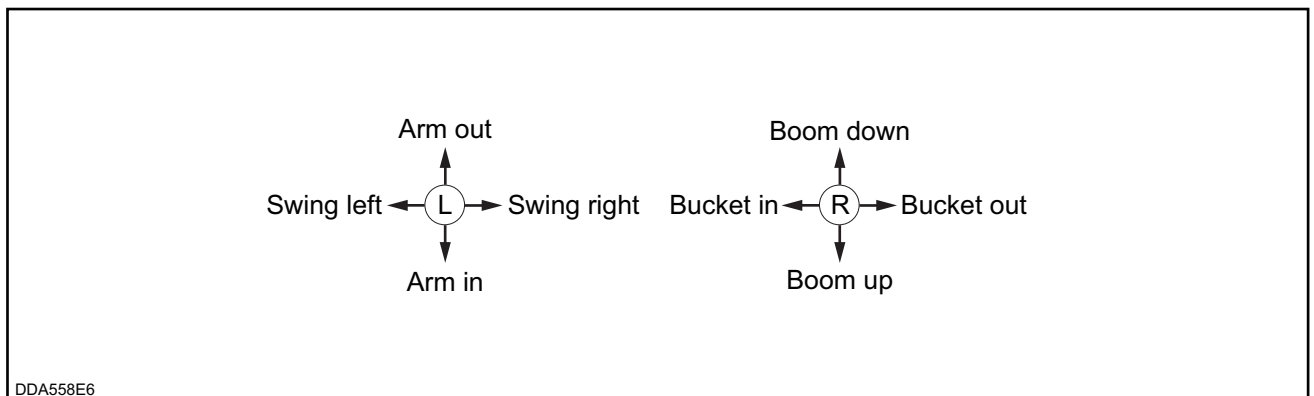
Operation Plate



This machine uses ISO operating methods.

⚠ WARNING

- Check that the operating methods on the operation plate match the machine's actual operations before operating this machine.
- Perform each operation slowly when checking operating methods.
- The operating method may vary with the specifications.
- If the operating methods on the operation plate and the machine operations do not match, change how the lines are connected so that the operations match the operation plate or replace the operation plate to match the machine operations.



3-Description of Handling

Selector Valve (option)

Selector Valve (2 operations)

If the machine is equipped with a selector valve, the operating type of the left operation lever can be changed by switching the valve.

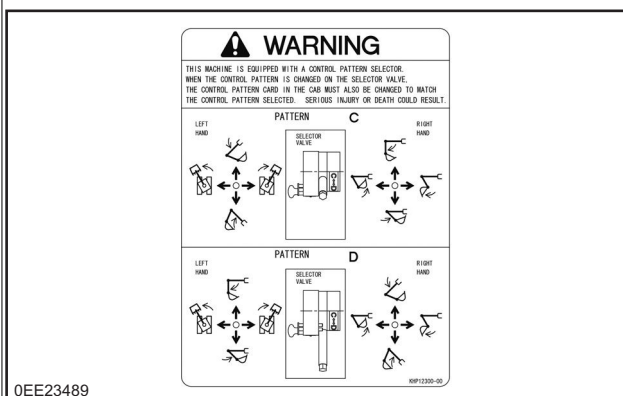
⚠ WARNING

Failure to check the operating method before operating the machine could cause incorrect operation and would be extremely dangerous. In order to prevent accidents due to incorrect operations, always check that the machine's operations actually match the operation plates in the cab before operating the machine.

If they are different, replace the operation plates before operating the machine.

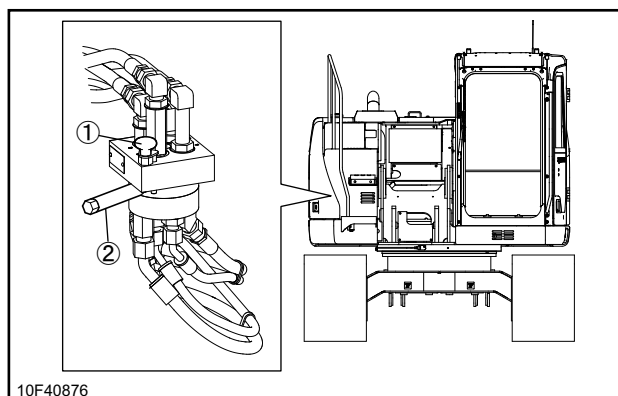
Or change the operating method to match the operation plates.

Always stop the engine before changing the operating method.



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4. Pull the knob ① to move the lever ② and line it up with the desired operating type.



10F40876

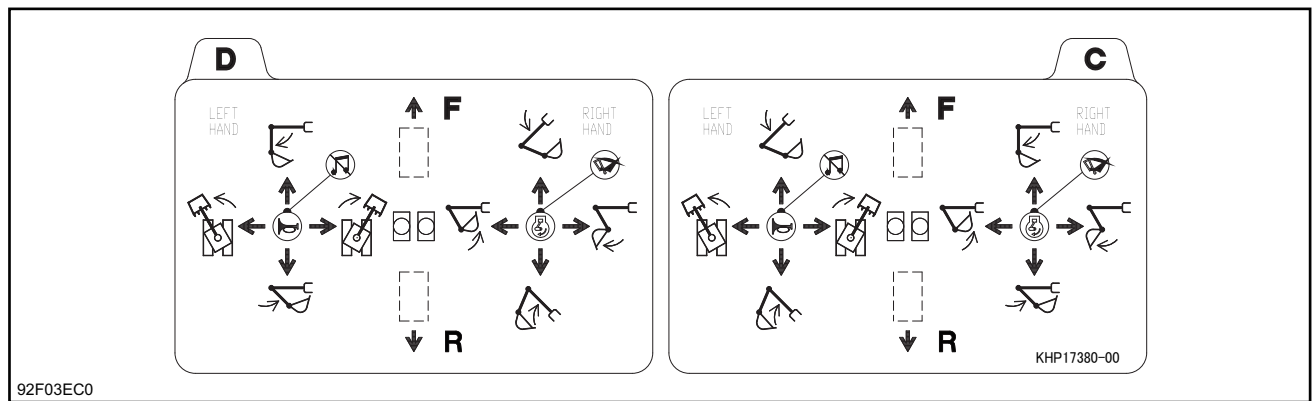
5. Install the removed cover.
6. Close the front-right cover of the house.
7. Replace the operation plate in the operator's compartment with the operation plate with the changed symbol.
8. Start the engine, then always check that the plate and the operating method match.

How to switch the operating method.

1. Place the bucket on the ground and stop the engine.
2. Open the front-right cover of the house.
3. Remove the cover for the selector valve.

3-Description of Handling

Selector Valve Operation Plate (2 operations)



92F03EC0

3-Description of Handling

Anti-interference System (offset boom type)

Cabin Anti-interference System

This system automatically stops the attachment in order to prevent interference between the bucket and the cab.

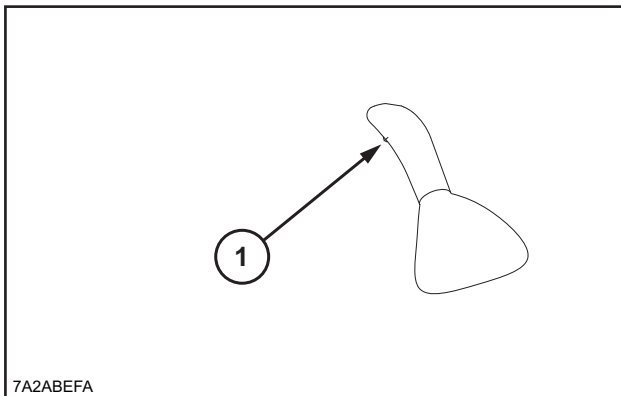
If the bucket comes too close to the cab either when the boom and arm are retracted with an offset to the left or when an offset operation is performed to the left with the boom and arm retracted, the buzzer sounds and the operation is stopped to prevent contact.

⚠ CAUTION

This system is an emergency stop device. Operating all the time depending on this system would invite danger. Operate being careful not to bring the bucket too close to the cab. Always check the operation of this system before starting work. (See the item in the start-up inspection.) Also, operate being careful not to bring the attachment too close to any obstructions.

Anti-Interference Override switch

If you want to move the attachment closer to the operator's cab in the auto stop mode, operate the lever while holding down the Anti-Interference Override switch on the left operation knob. The machine can be operated within the stop range.

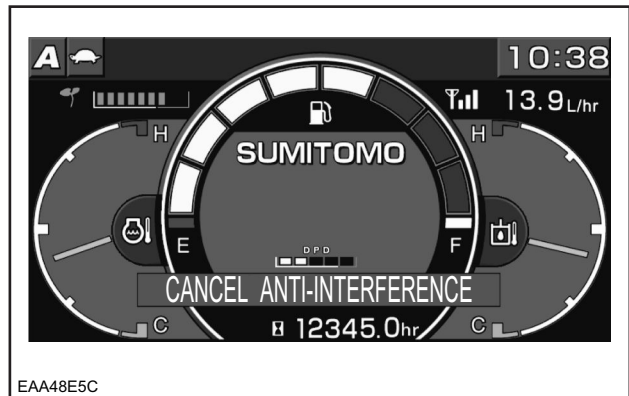


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7A2ABEFA

1 Anti-Interference Override switch (left operation knob)

A buzzer will sound intermittently and the message "CANCEL ANTI-INTERFERENCE" will appear on the monitor.



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EAA48E5C

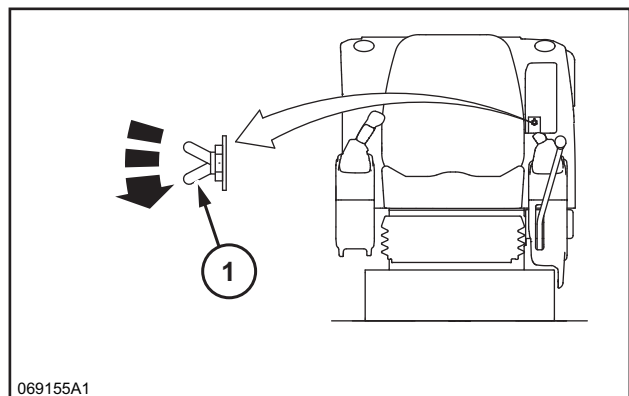
Release the Anti-Interference Override switch in the stop range, and the operation will be aborted. In this case, press the Anti-Interference Override switch once again to return the machine to a safe area.

⚠ CAUTION

Auto stop is disabled while the Anti-Interference Override switch is held down, so the bucket may contact the cab. Exercise due caution because the deceleration function does not work.

Emergency Release Switch

Should the anti-interference system fail and attachment do not function, and you must operate the attachment for emergency evacuation, press the emergency release switch at the bottom of the fuse box, and you can operate the attachment.



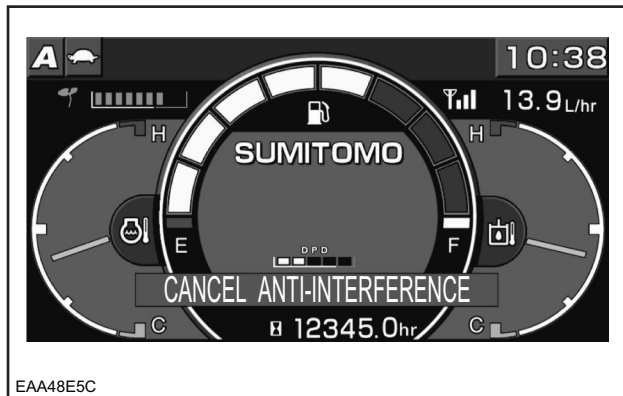
069155A1

069155A1

1 Emergency release switch

3-Description of Handling

A buzzer will sound continuously and the message "CANCEL ANTI-INTERFERENCE" will appear on the monitor.



EAA48E5C



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The emergency release switches are located at the rear trim cover and at the bottom section of the fuse box.

CAUTION

Pressing the emergency release switch does not actuate the anti-interference system and does not effect auto stop, so the bucket may contact the cab.

Exercise due caution when operating the machine.

Do not use the emergency release switch except in emergency because it is provided as an emergency function.

3-Description of Handling

Handling of Anti-interference System (KHP25790)

Offset Boom Type Machine

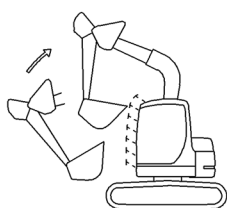
CABIN ANTI-INTERFERENCE SYSTEM

1. INSPECTION BEFORE OPERATING

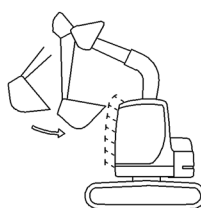
CHECK THE CABIN ANTI-INTERFERENCE SYSTEM OPERATION. IF AN ALARM SOUNDS CONTINUOUSLY OR IF BUCKET MOVES UNUSUALLY CLOSE TO THE CABIN, STOP THE MACHINE IMMEDIATELY FOR INSPECTION.

< CHECK >

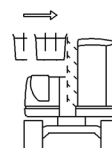
OPERATE BOOM, ARM, AND OFFSET SLOWLY ONE BY ONE.
MAKE SURE THE FRONT ATTACHMENT AUTOMATICALLY STOP.



1. BOOM OPERATION



2. ARM OPERATION



3. OFFSET OPERATION

2. OVERRIDE AND EMERGENCY RELEASE

<OVERRIDE>

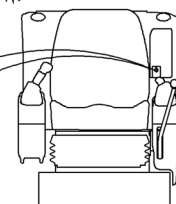
IN ORDER TO MOVE THE BUCKET CLOSER TO THE CABIN FROM THE AUTOMATIC STOP POSITION, PRESS THE OVERRIDE SWITCH. WHILE OPERATION, OPERATE CAREFULLY AS THIS MAY ALLOW THE ATTACHMENT TO INTERFERE WITH THE CABIN.



OVERRIDE SWITCH (LEFT KNOB)

<EMERGENCY RELEASE>

IF AN ALARM SOUNDS CONTINUOUSLY OR ATTACHMENT STOPS IRREGULARLY, STOP THE MACHINE IMMEDIATELY FOR INSPECTION. FOR EMERGENCY MOVEMENT THE EMERGENCY RELEASE SWITCH IS INSTALLED AS SHOWN. DO NOT USE UNLESS NECESSARY.



EMERGENCY RELEASE SWITCH



CAUTION

1. WARM UP THE MACHINE SUFFICIENTLY IN COLD WEATHER.
2. DO NOT DAMAGE OR REMOVE THE SENSOR.
3. ANTI-INTERFERENCE SYSTEM WILL NOT WORK CORRECTLY, WHEN STANDARD ATTACHMENT IS REPLACED WITH OTHER ATTACHMENT OR QUICK ATTACH.
4. IF BOOM ARM AND OFFSET ARE OPERATED WHILE OVERRIDE SWITCH AND EMERGENCY RELEASE SWITCH ARE ENGAGED, ATTACHMENT MAY INTERFERE WITH THE CABIN.

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Actuation of Anti-interference System (offset boom type)

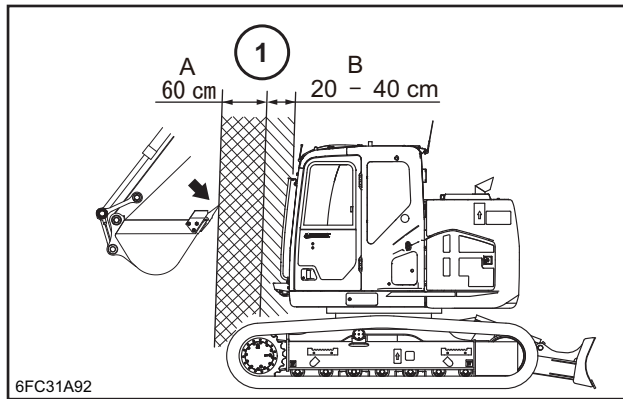
Actuation of Anti-interference System

1. Deceleration range (A area)

Operate the work machine to bring the bucket closer to the cab. Once the bucket enters area A (as shown in the figure below), the attachment speed will slow down.

This is to prevent the dropping of scraps, etc., due to an impact that would otherwise occur when the attachment stops.

If the long arm is installed, a wider deceleration range has been set.



1 Anti-interference forward operation range

⚠ WARNING

When you have switched from the standard arm to the long arm or from the long arm to the standard arm, it is necessary to change the anti-interference system. Consult one of authorized service shops.

⚠ CAUTION

In the transport posture, the bucket is in the auto stop range (B area) and the attachment may not be operated.

In such a case, the Anti-Interference Override switch need to be pressed to enable operation, but this means that the anti-interference system is disabled. Watch out for interference.

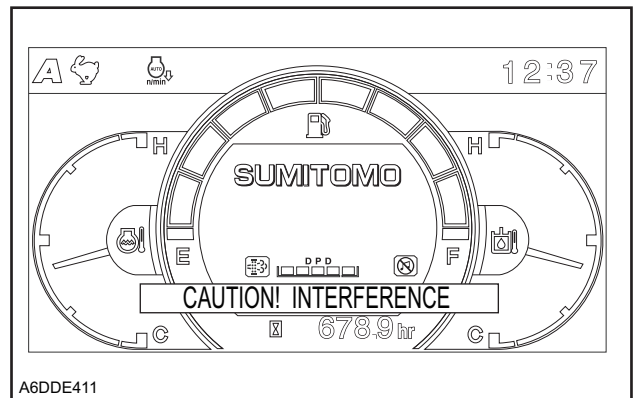
2. Auto stop range (B area)

When the attachment further approaches the cab and the bucket enters area B (as shown in the figure above), the attachment will stop and a warning buzzer will sound.

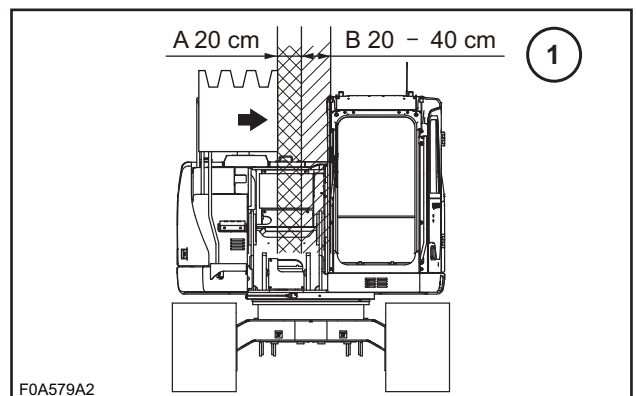
- Once an auto stop is actuated, you can no longer raise the boom, pull in the arm or operate the offset to the left. Other operations are still permitted. Carry out the work by making sure the bucket is a sufficient distance from the cab.

- If you are operating an attachment in the B area while holding down the Anti-Interference Override switch, releasing the Anti-Interference Override switch with the attachment still in the B area stops the machine completely.

A buzzer will sound intermittently and the message "CAUTION! INTERFERENCE" will appear on the monitor (as shown in the figure below).



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1 Anti-interference lateral operation range

Cautions for Handling Anti-interference System (offset boom type)

Actuation of Anti-interference System

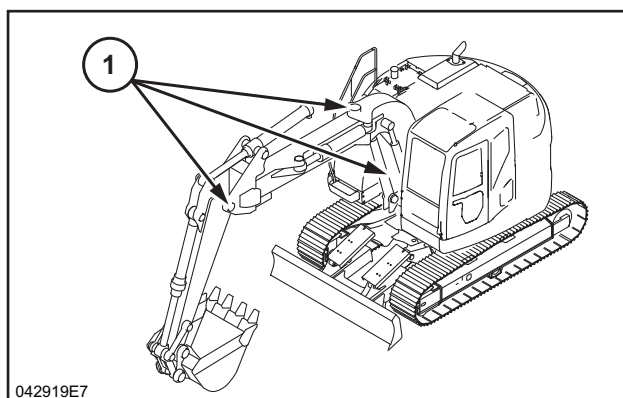
WARNING

Be sure to heed the precautions listed below so that the anti-interference system will actuate properly.

1. Do not remove and reinstall or disassemble/repair the sensor or computer of the anti-interference system.
Doing so may lead to system abnormality.
Be sure to contact our authorized service shop for inspection/repair.
2. If the sensor was bumped against something or any exterior damage is found on the sensor inspect the actuation condition of auto stop.
If any abnormality is found, be sure to contact our authorized service shop for inspection/repair.
3. Do not work in a manner allowing the sensor to submerge in water.
Should the sensor submerge in water, inspect the actuation condition of auto stop.
If any abnormality is found, be sure to contact our authorized service shop for inspection/repair.
4. Do not use the emergency release switch except when moving the machine to a safe place in case of system abnormality.
5. The anti-interference system will not actuate properly if any unauthorized attachment is installed or the arm is changed to a different type.
When using any unauthorized attachment or changing the arm to a different type, consult your authorized service shop.
6. If the machine is left unattended with the bucket suspended in air, the bucket may drop due to gravity and contact the cab.
Be sure to lower the bucket onto the ground while the attachment is not operated.
7. Exercise due caution when operating the machine with a bucket other than our authorized standard bucket installed, because the bucket may contact the cab.
When mounting a standard bucket specified by Sumitomo, consult the certified service plant.

3-Description of Handling

- Should the sensor or proportional valve fail, a buzzer will sound continuously (the buzzer will stop if the engine is stopped). Immediately contact your authorized service shop for inspection/repair.
- The computer of the anti-interference system may malfunction due to interference caused by radio frequencies from external equipment, so consult your authorized service shop when installing a two-way radio, etc., on the machine.

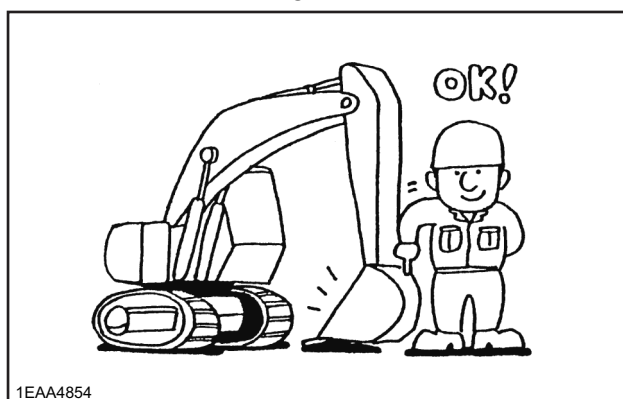


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1	Sensor position
---	-----------------

When the attachment is not operated, always lower the bucket to the ground.



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3-Description of Handling

Windshield

⚠ WARNING

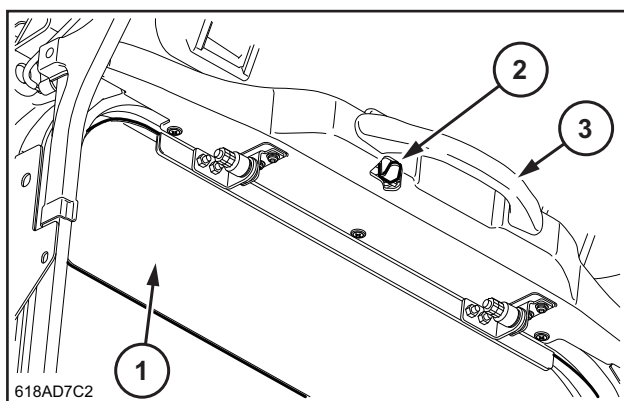
Always lock with the gate lock lever.

⚠ CAUTION

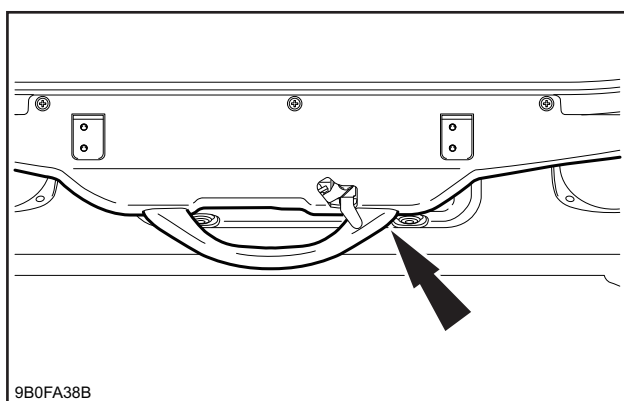
Always follow the instructions in this manual when handling the windshield. Incorrect handling can allow the windshield to slip and cause injury.

Opening

1. Fold the sun shield (1) toward the windshield and slide the lever (2).
2. Hold the up/down handle (3) and carefully lift up the windshield.



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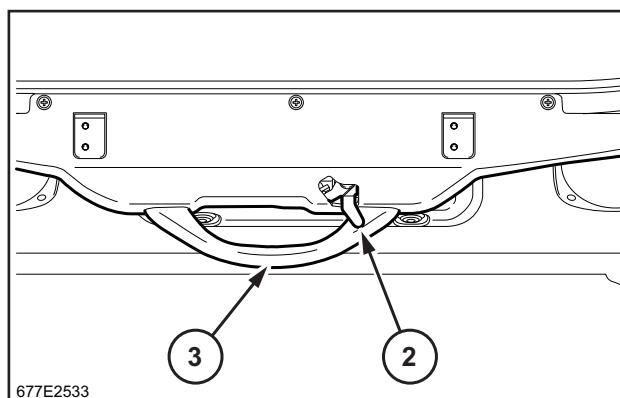


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3. Pull the windshield to the rear until it completely meshes with the rear section of the cab.

Closing

1. Slide the lever (2) to release the windshield.
2. Hold the up/down handle (3) and carefully lower the windshield.
Check that the window is completely open.
3. Check that the top of the windshield is correctly fastened to the window lock.

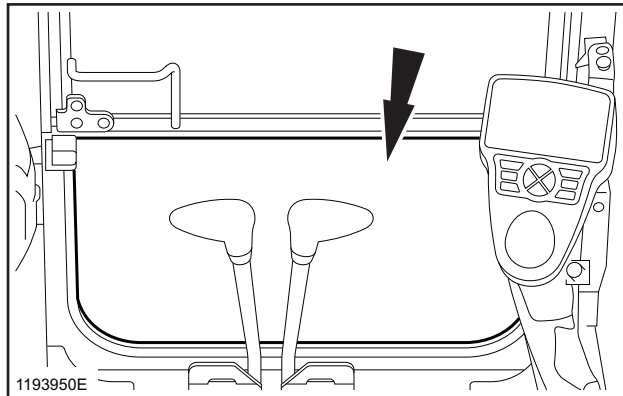


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Front Lower Window

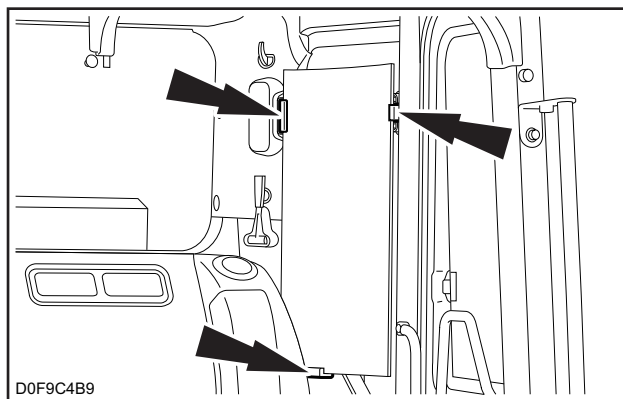
The front lower window can only be removed when the windshield is open.

1. Slide the window up and remove it from its housing.



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2. Store the window in the storage position on the left side of the operator's seat and mesh it correctly.



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3-Description of Handling

Front Right Console

1.Solar radiation sensor

If you place anything on top of the solar radiation sensor (on the console at the front right of the operator's seat), accurate measurement of the temperature inside the operator's compartment becomes impossible. Do not place anything on the solar radiation sensor.

2.Monitor display

Displays the clock, fuel meter, coolant solution thermometer, and hydraulic oil thermometer. Displays the function selection status. Displays the status of the machine. Displays the back monitor. Displays the service status of the machine.

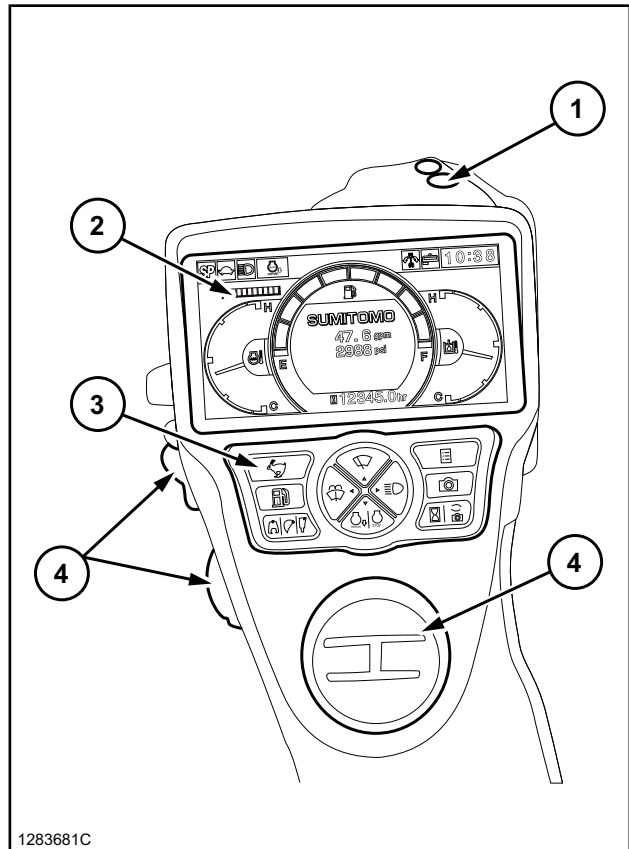
3.Monitor switch

Selects the status of the machine. Switches the monitor display.

4.Air conditioner vent

The air conditioner vents control the air flow circulation and direction. The air conditioner vents are opened and controlled manually.

NOTICE:While the air conditioner is being used, the air vents must be left open.



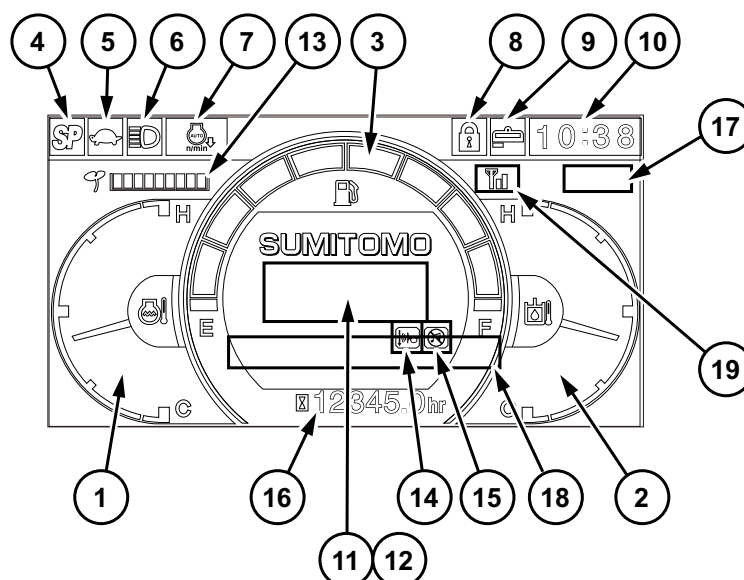
1283681C

1	Solar radiation sensor
2	Monitor display
3	Monitor switch
4	Air conditioner vent

System Display and Function Control Panel

⚠ WARNING

- The monitor displays the status of the machine during operation. If any abnormality occurs, it notifies the operator immediately with a message and the buzzer.
It is not used in start-up inspections and service.
- For details on start-up inspections, refer to "Start-up Inspections (inspections before starting work)" (4-2) in [Operation Explanation].
- Moisture is bad for the monitor display.
Be careful not to let any water get on the monitor.

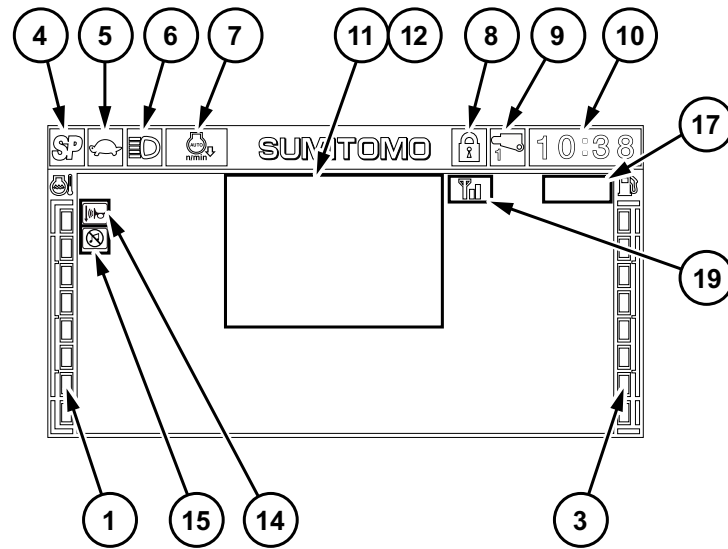


Vehicle information display screen

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3-Description of Handling



Camera image display screen

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7FD9D91F

1.Engine coolant temperature gauge

Displays the engine coolant temperature.

When the meter is at the bottom, this shows that the engine coolant temperature is low. When the meter reaches the top, an alarm sounds and "OVER HEAT" is displayed on the message screen ⑮.

If "OVER HEAT" is displayed, reduce the engine speed.

If the temperature does not fall, stop the engine, remove the key from the starter switch, and investigate the cause.

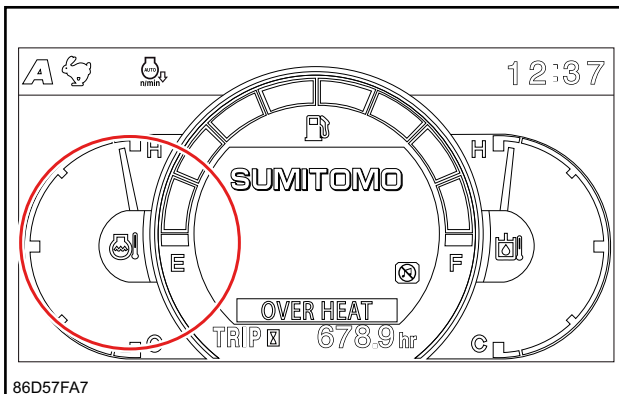
2.Hydraulic oil temperature gauge

Displays the hydraulic oil temperature.

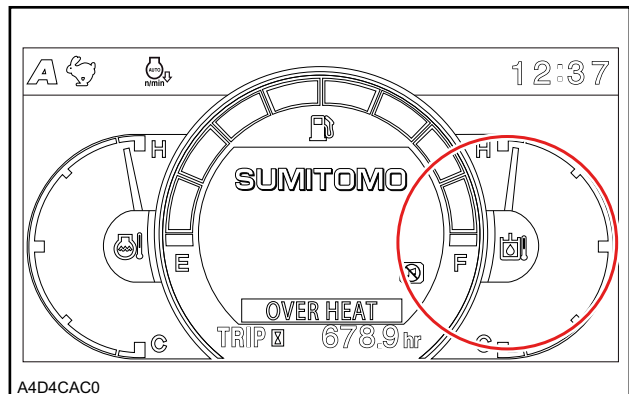
When the meter is at the bottom, this shows that the hydraulic oil temperature is low. When the meter reaches the top, an alarm sounds and "OVER HEAT" is displayed on the message screen ⑮.

If "OVER HEAT" is displayed, reduce the engine speed.

If the temperature does not fall, stop the engine, remove the key from the starter switch, and investigate the cause.



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3-Description of Handling

3. Fuel gauge

The number of segments lit up shows the amount of fuel remaining.

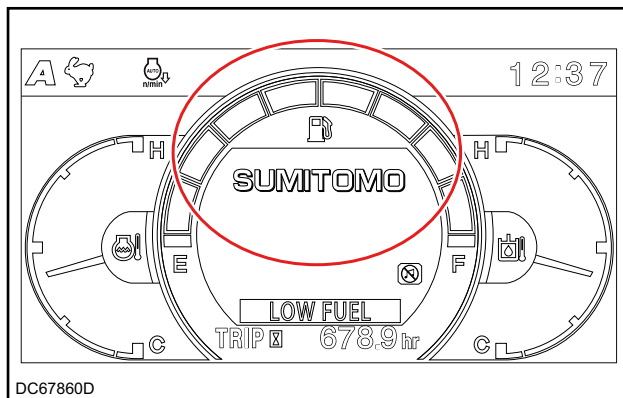
When all the segments are lit up, the fuel tank is full.

When only 1 segment is lit up, an alarm sounds and "LOW FUEL" is displayed on the message screen ⑩.

NOTE:

It is not necessary to wait until the fuel tank is empty to refuel.

If the tank does become empty, it is necessary to bleed out the air from the fuel system.



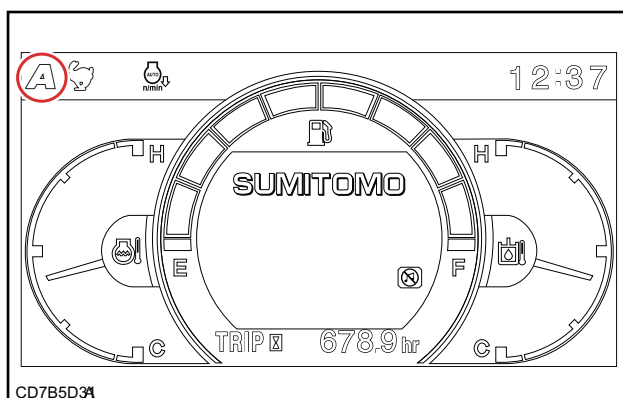
DC67860D

4. Work mode display

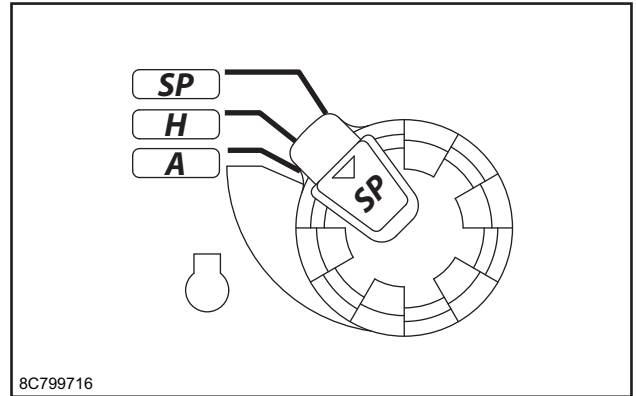
SPHA

Shows the initial work mode, and the engine speed selected by the engine throttle switch and work mode selector.

For details on the engine throttle switch and work mode selector, refer to "Right-hand console" (3-55).



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5. Travel mode display



Displayed during low-speed traveling.



Displayed during high-speed traveling.

6. Working lights



Displayed when the light is lit up.

7. Auto idle and idle shutdown select display



Displayed when auto idle is selected.



Displayed when idle shutdown is selected.



Displayed when auto idle and idle shutdown are selected.

8. Anti-theft function

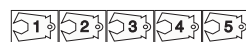


Displayed when the anti-theft function is ON.

9. Selected attachments display



Hydraulic breaker



Crusher

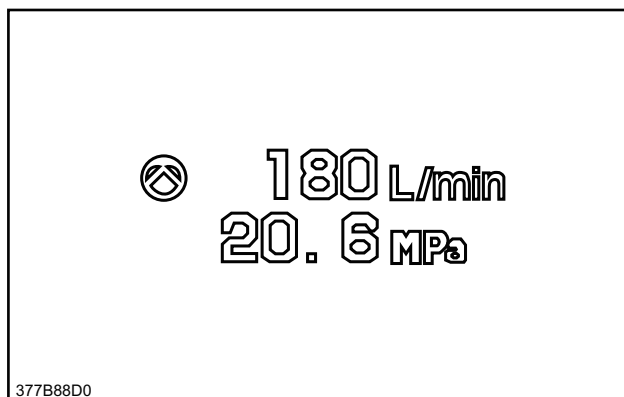
10. Clock display

For details on the setting method, refer to "CLOCK ADJUST" (3-41).

3-Description of Handling

11.Option select display (option)

Displays the flow amount and pressure for the selected option when the attachment select switch is pressed.



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12.Icon display (Displayed at center of the screen.)

- Engine preheat (glow)



This display appears during preheating for starting the engine in cold weather.

13.Eco gauge

Shows the energy saving operation status. When the operation status is energy saving, the number of indicators on the gauge increases.

For high-load operation, the number of indicators on the gauge decreases.

- Even if the number of indicators on the gauge decreases, this is not a breakdown of the machine.

However, as long as energy saving operations do not interfere with work, use energy saving operation within the green range for the sake of the environment.

- Key points for energy saving operation
- Use H mode or A mode instead of SP mode.
- Do not move the lever too quickly.
- Do not operate with high loads and do not perform relief operations.
- Use auto idle and one-touch idle.

Also, use idle shutdown to stop unnecessary idling.

NOTE:Ask your local dealer or the certified service plant how to switch the eco gauge display on and off.

14.Auto pressure boost display



Shows that the pressure in the hydraulic circuits is boosted.

15.Mute display



Displayed when the radio volume is muted.

16.Hour meter

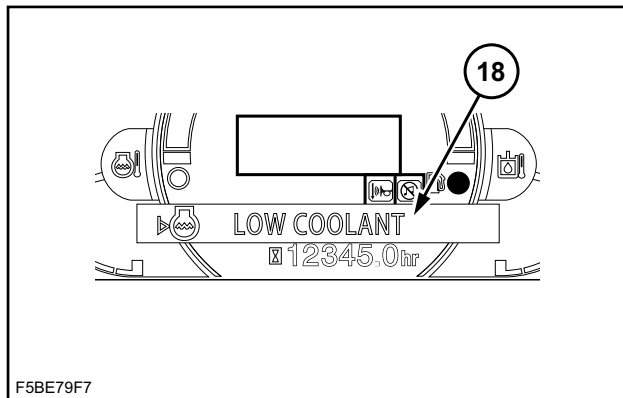
The hour meter displays the duration that the engine has operated in units of 0.1 hour (6 minutes).

17.Fuel economy display

Displays the instantaneous time/fuel consumption L/hr.

If an error code has been generated, it is displayed alternating with the fuel economy.

18.Message screen



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The message screen displays information icons and messages that vary according to the application set for the machine.

Some messages cause an alarm to be sounded when they are displayed.

This section explains icons, messages, and solutions.

NOTICE:When a message is displayed, perform the service work requested by the message.

NOTE:If the message is still displayed after this service has been performed, consult your local dealer or the certified service plant.

NOTE:The language used for message display can be changed. For details on how to change it, consult your local dealer or the certified service plant.

• LOW OIL PRESS.



This shows that the engine oil level has dropped.

An alarm sounds.

Stop the engine, remove the key from the starter switch, then inspect the oil level.

NOTE:

If this message is displayed, immediately take the above measures.

The engine is stopped automatically.

• OVER HEAT



This shows that the engine coolant temperature is high or the hydraulic oil temperature is too high.



An alarm sounds.

Reduce the engine speed.

If the engine temperature does not decrease, the engine stops automatically. Wait for the cooling system temperature to fall, then inspect the level of coolant in the reserve tank and the radiator.

Check the radiator and oil cooler.

For details on the inspection method, refer to "General Information" (6-1) in [Maintenance].

• BOOST TEMP. HIGH



This shows that the temperature of the air the turbocharger is feeding the engine is abnormally high.

An alarm sounds.

As a preventive measure, the engine is put into idle mode automatically.

Stop the work, run the engine at idling speed, and wait for the message to go out. If the turbocharger air temperature on the display screen remains high, the engine stops automatically.

Consult your local dealer or the certified service plant.

• ALTERNATOR



This shows that there is trouble with the battery or the alternator.

An alarm sounds.

Stop the engine, remove the key from the starter switch, then inspect the battery.

Consult your local dealer or the certified service plant.

• CHECK ENGINE



This shows that there is an engine electrical system short, disconnection, or other trouble.

An alarm sounds.

Stop the engine, remove the key from the starter switch, then inspect the electrical system.

Consult your local dealer or the certified service plant.

• ELEC. PROBLEM



This shows that there is trouble in the electrical system.

An alarm sounds.

In this case, stop the engine, remove the key from the starter switch, then investigate the cause or consult your local dealer or the certified service plant.

3-Description of Handling

● ENGINE STOP



This shows that the emergency stop switch was operated.
An alarm sounds.
The switch must be released before the engine can be started again.

● IMPROPER SHUT DOWN



Let the engine run in low idle for at least 5 minutes before stopping it.

● CHECK CAMERA (option)



This shows that there is a short, disconnection, or other trouble in the monitor camera connections.

● HOT EXHAUST



This shows that the exhaust temperature is high.
Check the condition of the surroundings.

● LOW COOLANT



This shows that the coolant level is too low.
An alarm sounds.
Stop the engine, then remove the key from the starter switch.
Wait for the cooling system temperature to fall, then inspect the level of coolant in the reserve tank and the radiator.
For details, refer to "Cooling system" (6-46) in [Maintenance].

● AIR FILTER



Service the air cleaner.

● LOW FUEL



The fuel in the fuel tank is running low.
Refill the fuel tank.

● HYD. OIL FILTER



It is necessary to replace the hydraulic oil filter.
An alarm sounds.
Inspect the hydraulic oil filter. If it is clogged, replace it.
For details, refer to "Return filter replacement" (6-63) in [Maintenance].

● CHECK FLOW RATE (option)



Check if the flow to the attachment is appropriate.

● AUXILIARY SET-UP REQUIRED (option)



This is displayed if the correct option line mode is not selected when operating the option line.

● SERVICE DUE



This is displayed when it is time for service.
For details, refer to "MAINTENANCE INFORMATION" in the menu.

● ENG. IDLING



This shows that engine idling is selected and the engine is idling.

● AUTO WARM UP



This shows that auto warm-up is underway.

● ENGINE SHUT DOWN



This is displayed before the engine is stopped by the engine idle shutdown function.

19. Antenna sensitivity display

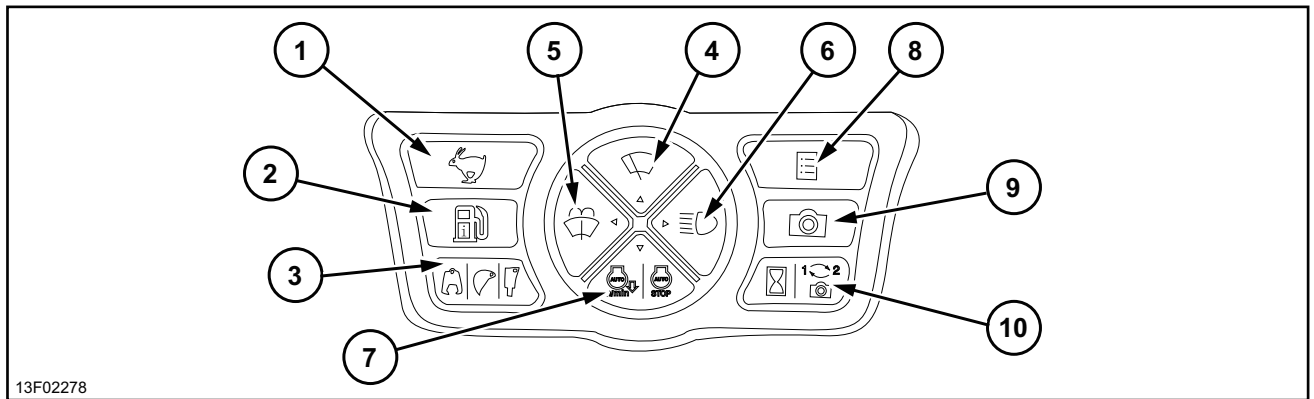
Displays the status of communication sensitivity.



This shows the antenna sensitivity.

Antenna display	Signal strength
None	Outside service area
0 bars	In service area
1 bar	Weak
2 bars	Medium
3 bars	Strong

Monitor Switch



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13F02278

1. Travel mode select switch

Switches between low speed (I) "Turtle" and high speed (II) "Rabbit".

"Turtle" or "Rabbit" is displayed on the monitor screen.

⚠ WARNING

Traveling direction may be diverted if the travel mode is changed while traveling.
Stop traveling before switching the travel mode.



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1FD12A05

Low speed (I) "Turtle": 0 km/h - 3.4 km/h

Use this mode when traveling on an incline, uneven ground, or soft ground.

High speed (II) "Rabbit": 0 km/h - 5.6 km/h

Use this mode when traveling on hard, level, maintained ground.

NOTE:When the engine is started, low speed is selected automatically.

NOTE:When high speed is selected on the machine, if the load increases, for example when going uphill, the machine switches to low speed automatically and when the load drops, it returns to high speed automatically.

3-Description of Handling

2. Fuel consumption indicator switch

Switches the cumulative average fuel consumption and cumulative fuel consumption amount.

Each time the fuel consumption indicator switch is pressed, the contents displayed are switched alternately.

- Cumulative average fuel consumption
Cumulative average fuel consumption is displayed in L/hr.

- Cumulative fuel consumption amount
Cumulative fuel consumption amount is displayed in L.

When the fuel consumption indicator switch is held down for 3 seconds, the cumulative average fuel consumption and cumulative fuel consumption amount are reset.



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NOTICE:

When working with the breaker or crusher mounted, always check on the monitor that the correct work mode and pump flow are selected. If the selection is incorrect, press the switch to set the work mode and pump flow according to the special attachment to use.

If the work mode and flow selection is incorrect, this causes machine operation defects and breakdowns and damage to the special attachment.



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3. Attachment select switch

When using a breaker, crusher, or other optional attachment, this switches to the appropriate flow and pressure.

Pressing this switch switches to a registered pattern. Refer to "Option Hydraulic Circuits (option)" (4-33) in [Operation Explanations].

The selected attachment is displayed on the monitor screen.

⚠ CAUTION

If you press an operation pedal without switching the work, only the minimum flow occurs. Select the special attachment and flow to be used before working.

3-Description of Handling

4.Front wiper switch

Switches among intermittent "I",
continuous "II", and stop "OFF".

When this switch is pressed, the wipers
operate intermittently and "I" is displayed
on the monitor.

When this switch is pressed again, the wipers
operate continuously and "II" is displayed
on the monitor.

When this switch is pressed once more, the
wipers stop and stop "OFF" is displayed on
the monitor.

NOTICE:

Do not operate the wipers when the windshield is
dry.

Doing so could crack the wipers.



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NOTICE:Working with mud or snow on the front
wipers can damage them.

5.Windshield washer switch

Pressing and holding down this switch
operates the windshield washer and wipers.

When you let go of the switch, they stop.

NOTICE:

Do not operate the washer if the washer tank is
empty.

This could break the electric pump.



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6.Working light switch

Switches the working lights "ON"/"OFF".

When you press this switch, the indicator and
the working light light up.

When you press this switch again, they go out.
When the working light is lit, the "working light"
icon is displayed on the monitor.

When the key switch is turned "ON", the
working light starts out "OFF".

When the working light is switched "ON", the
monitor brightness is automatically adjusted.
For details, refer to "Menu Screen Display".



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3-Description of Handling

7.Auto idle/idle shutdown switchover

This machine has operation modes that reduce fuel consumption by idling or stopping the engine according to the machine status.

Auto idle ⇒ Idle shutdown ⇒ Auto idle + Idle shutdown ⇒ OFF

When the mode is switched, the icon for the selected mode is displayed in the center of the screen for 2 seconds.



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- Auto idle

If 5 seconds have passed without operating the lever and option pedal, the machine automatically reduces the engine speed to reduce fuel consumption.

Once the lever and option pedal are operated, the set engine speed is recovered. Also, when the engine speed is set using the throttle in the auto idle mode, the auto idle mode is canceled and the set engine speed is applied.

- Idle shutdown

If 3 minutes have passed at low engine speed (1200 rpm or lower) with the gate lock lever locked (non-operation) while taking a break etc., the machine automatically stops the engine to reduce fuel consumption. A message "ENGINE SHUT DOWN" is displayed in the center of the screen and an alarm sounds 10 seconds before the engine stops.

If the throttle is operated during this operation, the idle shutdown will not be activated.

- Auto idle + idle shutdown

Both of the above 2 operation modes can be set at the same time.

Operations are the same as for each of the operation modes.

NOTICE: To protect the engine, at least 3 minutes of idling are required.

NOTE:

After the engine was stopped with the idle shutdown, the starter switch is in the "ON" position.

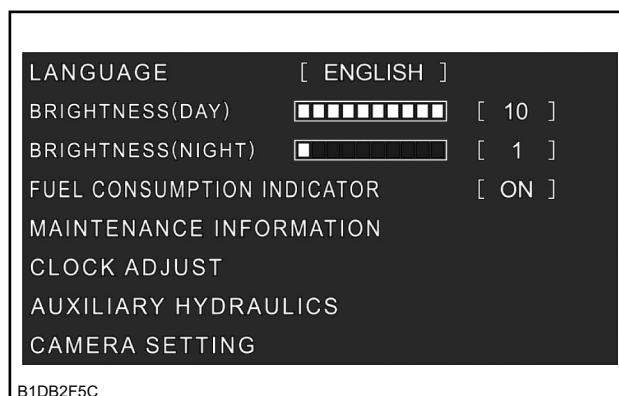
To restart the engine, turn the starter switch "OFF" and then ON again.

8.Menu screen display switch

When this switch is pressed, the menu screen is displayed.

The menu items are as follows.

- LANGUAGE
- BRIGHTNESS (DAY)
- BRIGHTNESS (NIGHT)
- FUEL CONSUMPTION INDICATOR
- MAINTENANCE INFORMATION
- CLOCK ADJUST
- AUXILIARY HYDRAULICS
- CAMERA SETTING



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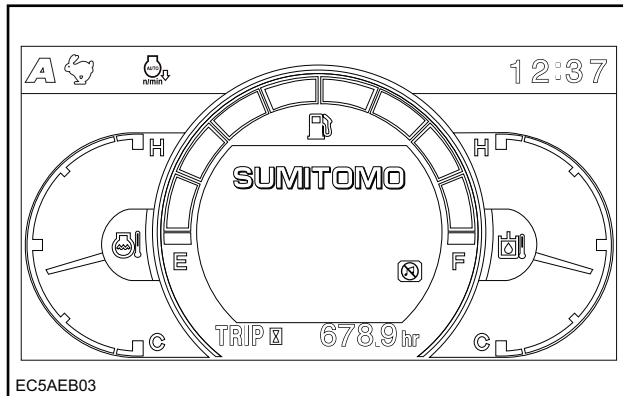
Menu items can be selected or changed by pressing the monitor switches. For details, refer to "Menu Screen Display" (3-38).

3-Description of Handling

9.Camera display switch

Pressing this switch switches the camera display to one of the mode 1 - 3 screens below.

- Mode 1: Normal screen
Displays information on the machine.



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Vehicle information screen

- Mode 2: Camera screen
Displays information on the machine and the camera image together.



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- Mode 3: Camera screen (indicators not displayed)
Displays only the camera image, travel mode, clock, and warnings.



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10.Hour meter/camera select switch

When this switch is pressed while the information screen is displayed on the monitor, the hour meter display switches to the trip indication.

If the trip indication is left as is, after about a minute, the trip indication goes out and the screen returns to the normal hour meter display.

During trip indication, holding down this switch sets the trip time display to 0.

NOTE:

Turning the starter switch key to "OFF" position ends the hour meter count.

If the hour meter button ⑩ is pressed after the key is turned to "OFF" position, only the hour meter will be displayed for 20 seconds.

NOTE:When this switch is pressed while the camera image is displayed, the camera image switches. Refer to "Camera Mode Switch" (3-46).

3-Description of Handling

Menu Screen Display

Menu Display

Press the button ①.

The menu screen is displayed.



B01E3884

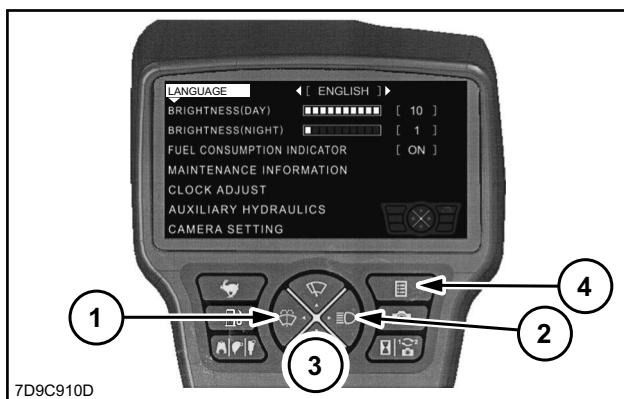
LANGUAGE

1. Select "LANGUAGE" on the menu screen.

2. Press the button ① or ② to select "ENGLISH" or another language.

3. If continuing with other settings, press the button ③.

- To return to the original screen (main screen), press the button ④.



7D9C910D

BRIGHTNESS (DAY)

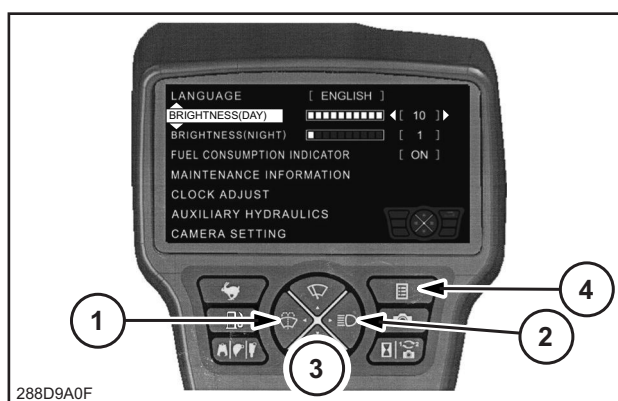
1. Select "BRIGHTNESS (DAY)" on the menu screen.

2. Press the button ① or ② to adjust the screen brightness.

- Pressing the button ① decreases the screen brightness 1 level.
- Pressing the button ② increases the screen brightness 1 level.

3. If continuing with other settings, press the button ③.

- To return to the original screen (main screen), press the button ④.



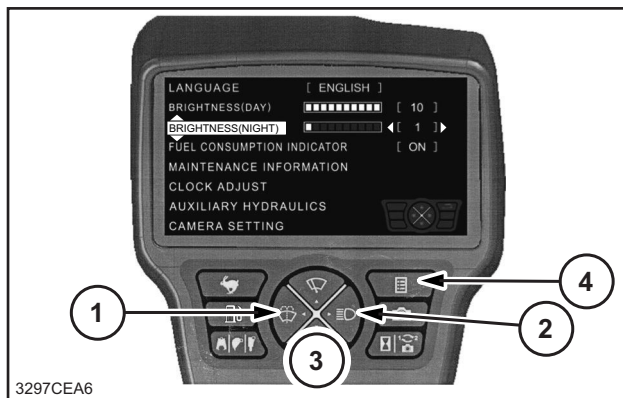
288D9A0F

BRIGHTNESS (NIGHT)

1. Select "BRIGHTNESS (NIGHT)" on the menu screen.

When the working light is switched "ON", the monitor brightness is automatically reduced.

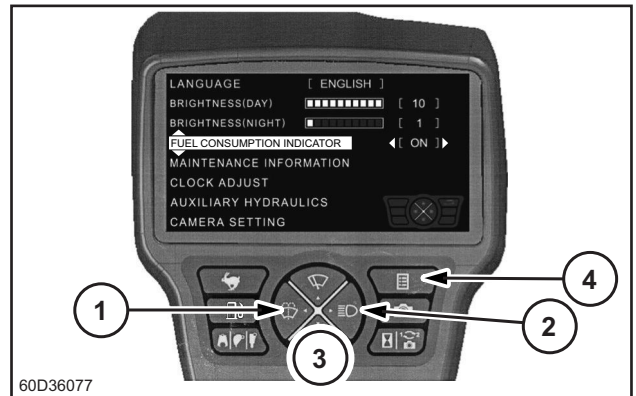
2. Press the button ① or ② to adjust the screen brightness.
 - Pressing the button ① decreases the screen brightness 1 level.
 - Pressing the button ② increases the screen brightness 1 level.
3. If continuing with other settings, press the button ③.
 - To return to the original screen (main screen), press the button ④.



3297CEA6

FUEL CONSUMPTION INDICATOR

1. Select "FUEL CONSUMPTION INDICATOR" on the menu screen.
2. Press the button ① or ② to select "ON" or "OFF".
3. If continuing with other settings, press the button ③.
 - To return to the original screen (main screen), press the button ④.



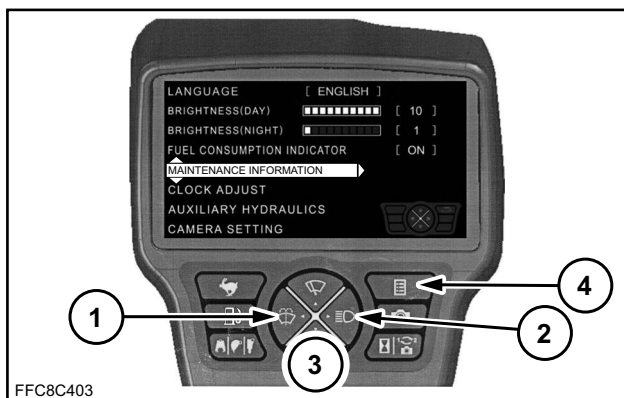
60D36077

3-Description of Handling

Service Information

MAINTENANCE INFORMATION

1. On the menu screen, press the button ③ or ④ to select "MAINTENANCE INFORMATION".
2. Press the button ②.
3. Press the button ① or ② to select Page 1, Page 2, or Page 3.



FFC8C403

Service Time Reset

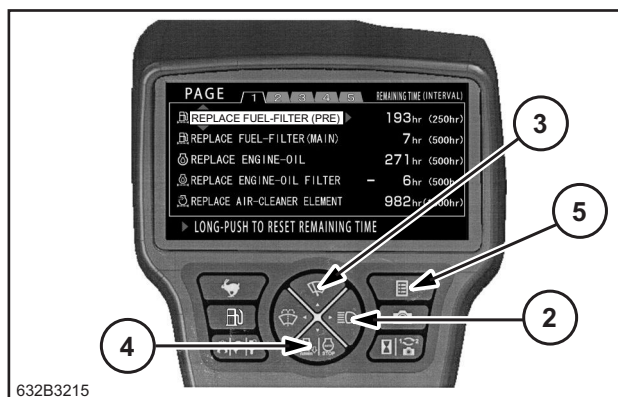
1. Press the button ③ or ④ to select the item to reset.
2. Hold down the button ② to reset the time remaining.

NOTE:

When the time for service approaches, the remaining time is displayed in yellow.

When the time for service is past, the remaining time is displayed in red.

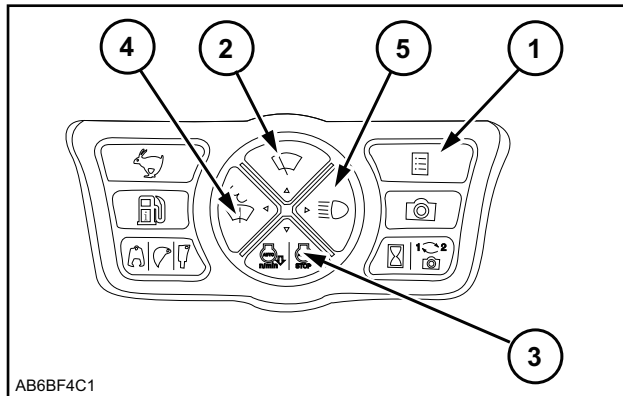
3. Press the button ⑤ to return to the menu screen.
 4. If continuing with other settings, press the button ③.
- To return to the original screen (main screen), press the button ④.



632B3215

CLOCK ADJUST

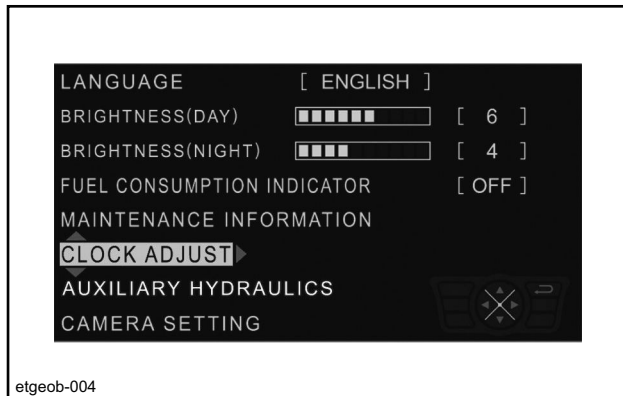
1. Press the button ① to display the menu screen.



AB6BF4C1

2. Press the button ② or ③ to select "CLOCK ADJUST" on the menu screen.

3. Press the button ⑤.

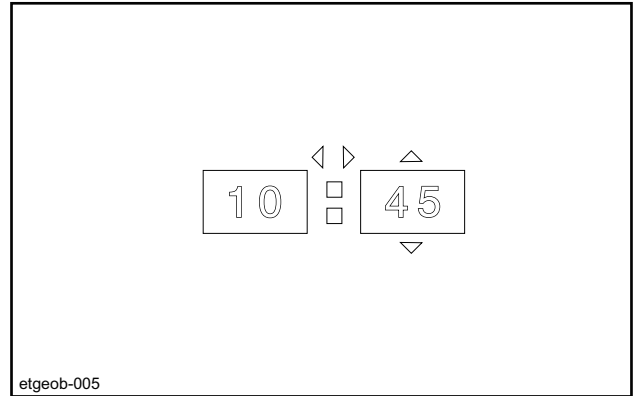


etgeob-004

4. Press buttons to set the time.

- Pressing the button ② or ③ switches to the hours or minutes.
- Pressing the button ④ or ⑤ increases or decreases the number.

5. Press the button ① to return to the menu screen.



etgeob-005

Option Line Setting (option)

With the specifications of the main unit, for a machine equipped with an option (breaker, crusher), the hydraulic oil flow and pressure can be set on the screen according to the specifications of the front attachment used. Up to 5 patterns can be preset into memory. You can select the appropriate setting for the front attachment to be used by just pressing the option select switch.

Type 1

There are the following 2 types of patterns for displaying the option line setting screen.

1. Press the button ① to display the menu screen.



129CB773

3-Description of Handling

2. Press the button ② or ③ to select "AUXILIARY HYDRAULICS" on the menu screen.



1CD5087D

3. Press the button ④.
The option line setting screen is displayed.



36469268

NOTE:The following item is only displayed when the machine has an electromagnetic proportional relief valve for pressure adjustment.

- ADJUST PRESSURE



AE42D100

Type 2

1. Press the button ① for 3 seconds.
The option line setting screen is displayed.



37604704

3-Description of Handling

Breaker or Crusher Selection

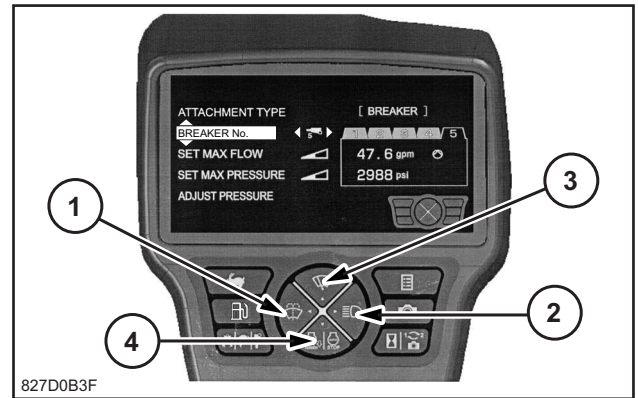
1. Press the button ③ or ④ to select "ATTACHMENT TYPE" on the option line setting screen.
2. Press the button ① or ② to select "BREAKER" or "CRUSHER".

NOTE:

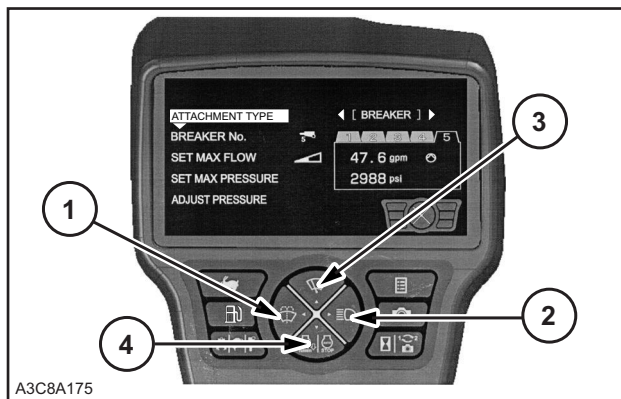
For breaker types, the "CRUSHER" cannot be selected (displayed).

For multi-purpose types, either setting can be selected.

*When changing the main unit types, consult the certified service plant.



827D0B3F



A3C8A175

Breaker Number or Crusher Number Selection

1. Press the button ③ or ④ to select "BREAKER No." or "CRUSHER No." on the option line setting screen.
2. Press the button ① or ② to select the breaker or crusher number.
 - Pressing the button ① decreases the number.
 - Pressing the button ② increases the number.

3-Description of Handling

SET MAX FLOW

1. Press the button ③ or ④ to select "SET MAX FLOW" on the option line setting screen.
2. Press the button ① or ② to set the maximum flow value.
 - Pressing the button ① decreases the value.
 - Pressing the button ② increases the value.

Select the flow from the settings in the table below.

1 pump flow		2 pumps flow	
Lv.	L/min	Lv.	L/min
1	34	11	160
2	38	12	164
3	51	13	176
4	62	14	188
5	73	15	199
6	85	16	210
7	97	17	223
8	108	18	234
9	117	19	242
10	126	20	252

The factory settings are as follows:

For breaker types

[BREAKER 1]: 108 L/min

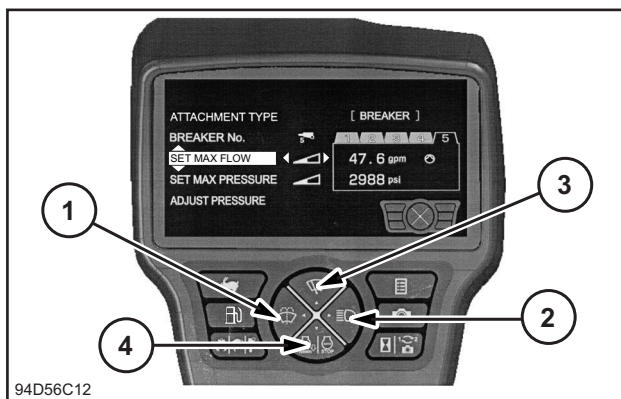
For double-acting types

[CRUSHER 1]: 108 L/min

For multi-purpose types

[BREAKER 1]: 108 L/min

[CRUSHER 1]: 234 L/min

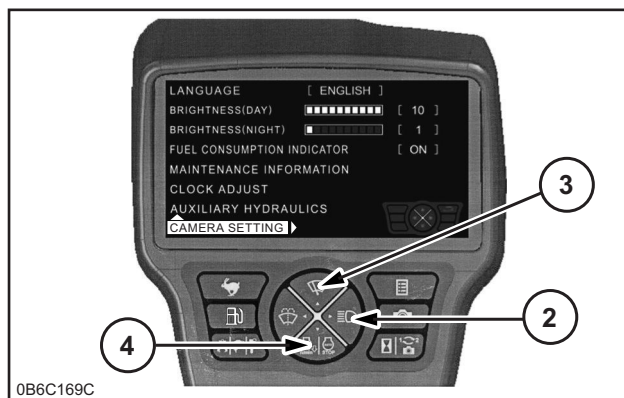


94D56C12

Camera Settings

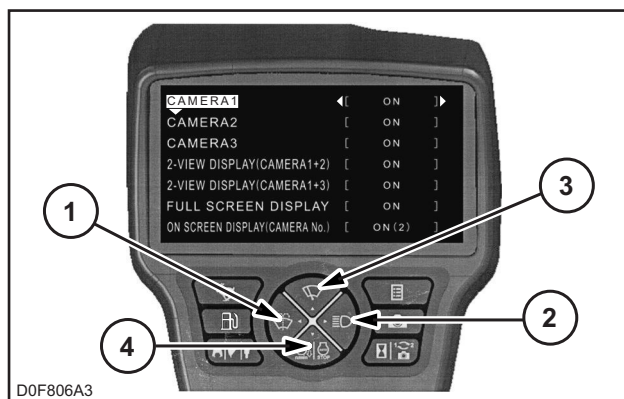
Menu Display/Camera Settings

1. Press the button ③ or ④ to select "CAMERA SETTING" on the menu screen.
2. Press the button ②.



• Camera 1

- Press the button ③ or ④ to select "CAMERA1".
- Press the button ① or ② to select "ON", "ON: MIRROR VIEW", or "OFF".



• Camera 2

- Press the button ③ or ④ to select "CAMERA2".
- Press the button ① or ② to select "ON", "ON: MIRROR VIEW", or "OFF".

• Camera 3

- Press the button ③ or ④ to select "CAMERA3".
- Press the button ① or ② to select "ON", "ON: MIRROR VIEW", or "OFF".

• 2-view display (cameras 1 and 2)

- Press the button ③ or ④ to select "2-VIEW DISPLAY(CAMERA 1+2)".
- Press the button ① or ② to select "ON" or "OFF".

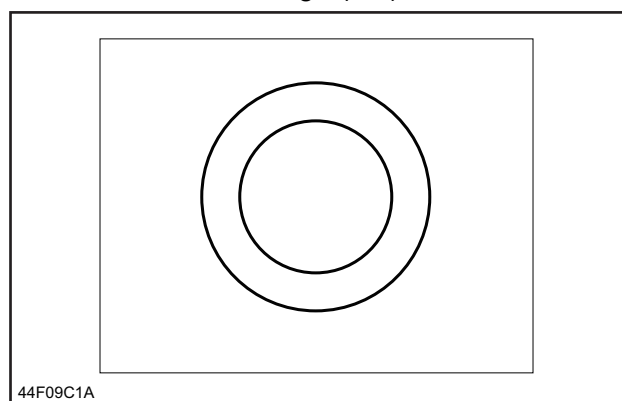
• 2-view display (cameras 1 and 3)

- Press the button ③ or ④ to select "2-VIEW DISPLAY(CAMERA 1+3)".
- Press the button ① or ② to select "ON" or "OFF".

• Full screen display

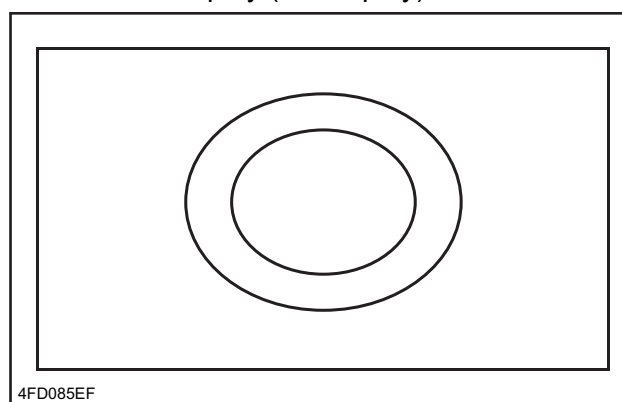
- Press the button ③ or ④ to select "FULL SCREEN DISPLAY".
- Press the button ① or ② to select "ON" or "OFF".

OFF: Camera image (4:3)



44F09C1A

ON: Full screen display
Monitor display (full display)



4FD085EF

3-Description of Handling

- Display on screen (camera number)
 - Press the button ③ or ④ to select "ON SCREEN DISPLAY (CAMERA No.)".
 - Press the button ① or ② to select "ON(1)", "ON(2)", "ON(3)", "ON(4)", "ON(5)" or "OFF".

The screen display contents are as follows.

ON(1): 1/2/3 (camera number display)

ON(2): REAR/SIDE/OPT (camera position display)

ON(3): REAR/UNDER/OPT (camera position display)

ON(4): REAR/SIDE/FVM (camera position display)

ON(5): REAR/UNDER/FVM (camera position display)

OFF: No display

⚠ WARNING

- The ON SCREEN DISPLAY setting is only required when the camera position is changed. If this setting is incorrect, the screen display and the camera position (display image) are different, which could cause a serious accident. Do not change the setting unless necessary.
- When multiple cameras are mounted, do not switch OFF the ON SCREEN DISPLAY setting. If on-screen display is set to OFF, it becomes impossible to know the camera position (display image), which could cause a serious accident.

Camera Mode Switch

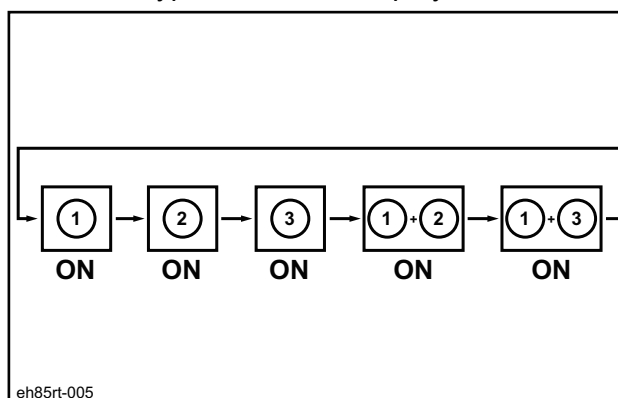
Each time the camera mode switch ① is pressed, the screen display switches.



36A72796

36A72796

There are 5 types of screen display.



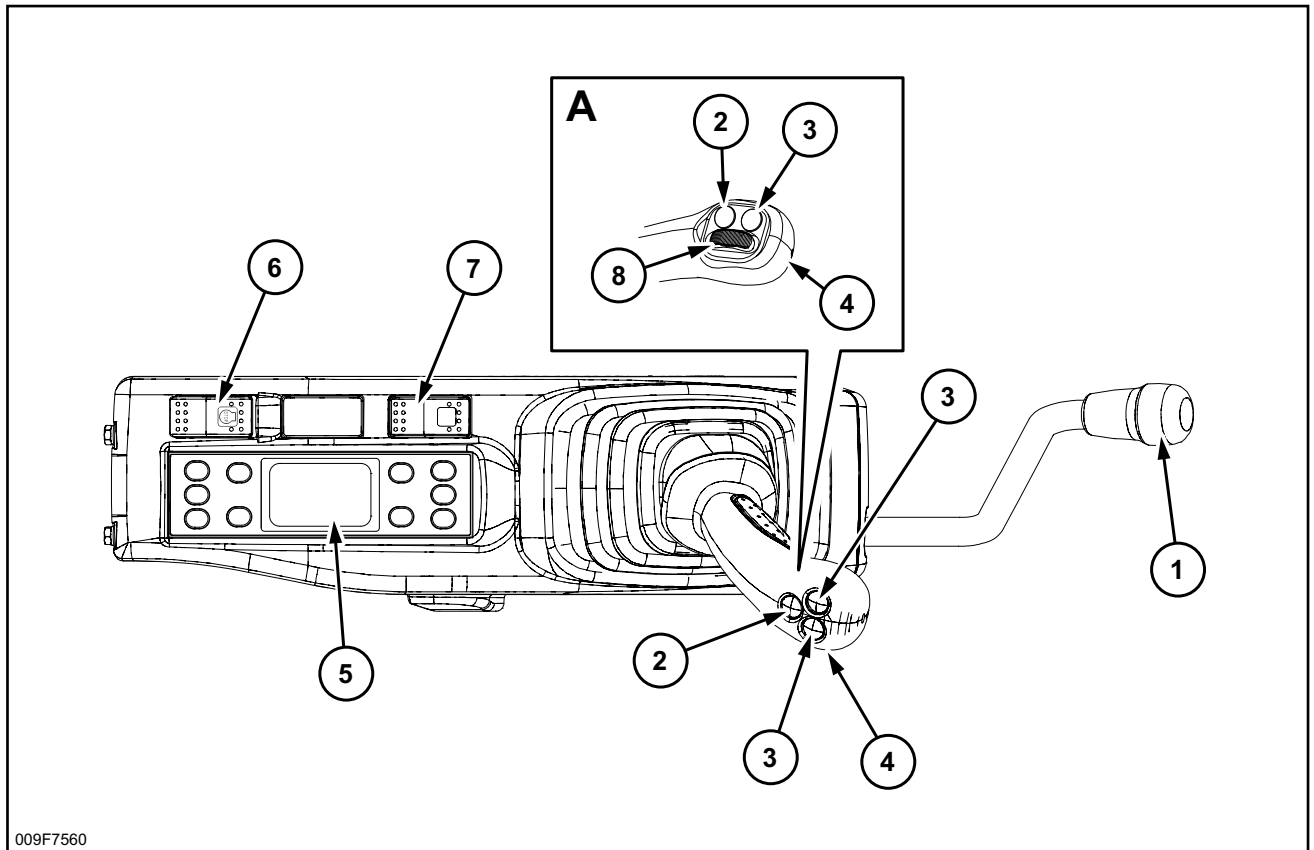
eh85rt-005

eh85rt-005

1	Camera 1
2	Camera 2
3	Camera 3

Left-hand side controls

Left Side Console



009F7560

009F7560

1. Gate lock lever (safety bar)

The gate lock lever (safety bar) prevents the operator from leaving the operator's compartment without operating the gate lock lever (safety bar) (1). (Refer to Page 3-53.)

2. Horn

To sound the horn, press the tip of the left side control lever.

NOTICE: Always sound the horn before operating the machine.

3. Option control (if equipped)

4. Vehicle radio mute control (if equipped)

The control under the operation levers can be used to mute the sound volume without directly operating the vehicle radio.

To mute the sound volume, press the control. When you press this control again, it returns to the original volume.

NOTE: If the engine is stopped with the volume muted, the volume stay muted when the engine is restarted.

Anti-Interference Device override switch (If equipped with Anti-Interference Device)

3-Description of Handling

This switch is for overriding Anti-Interference Device and allowing the bucket to move closer to the cab from the automatic stop position.

The automatic stop is canceled only while the switch is pressed.

DANGER

- Be careful when operating the machine with the automatic stop canceled and avoid sudden console operation.

The bucket may contact the cab and cause the damage to the machine and the operator.

- Use this switch only when necessary such as transportation.

8. Proportional switch (option)

Sliding the proportional switch rotates the end attachment.

The rotation speed can be adjusted according to the sliding amount.

For details, refer to "Operation of Proportional Switch" in [Options].

NOTICE: The radio mute is not available for the machine with Anti-Interference Device.

5. Heating, ventilation or air conditioner control (Refer to Page 3-49.)

6. Engine emergency stop switch

In an emergency or if the machine cannot be stopped with the starter switch key, this control can be used to stop the engine.

Pressing the front section of the control stops the engine. An alarm sounds, the control indicator lights up, and the message "ENGINE STOP" is displayed. Refer to "Message screen".

To restart the engine, press the rear section of the control again, then turn the starter switch key to start the engine.

NOTICE: Only use this switch in an emergency.

7. Overload indicator switch

This control is to be used during load handling.

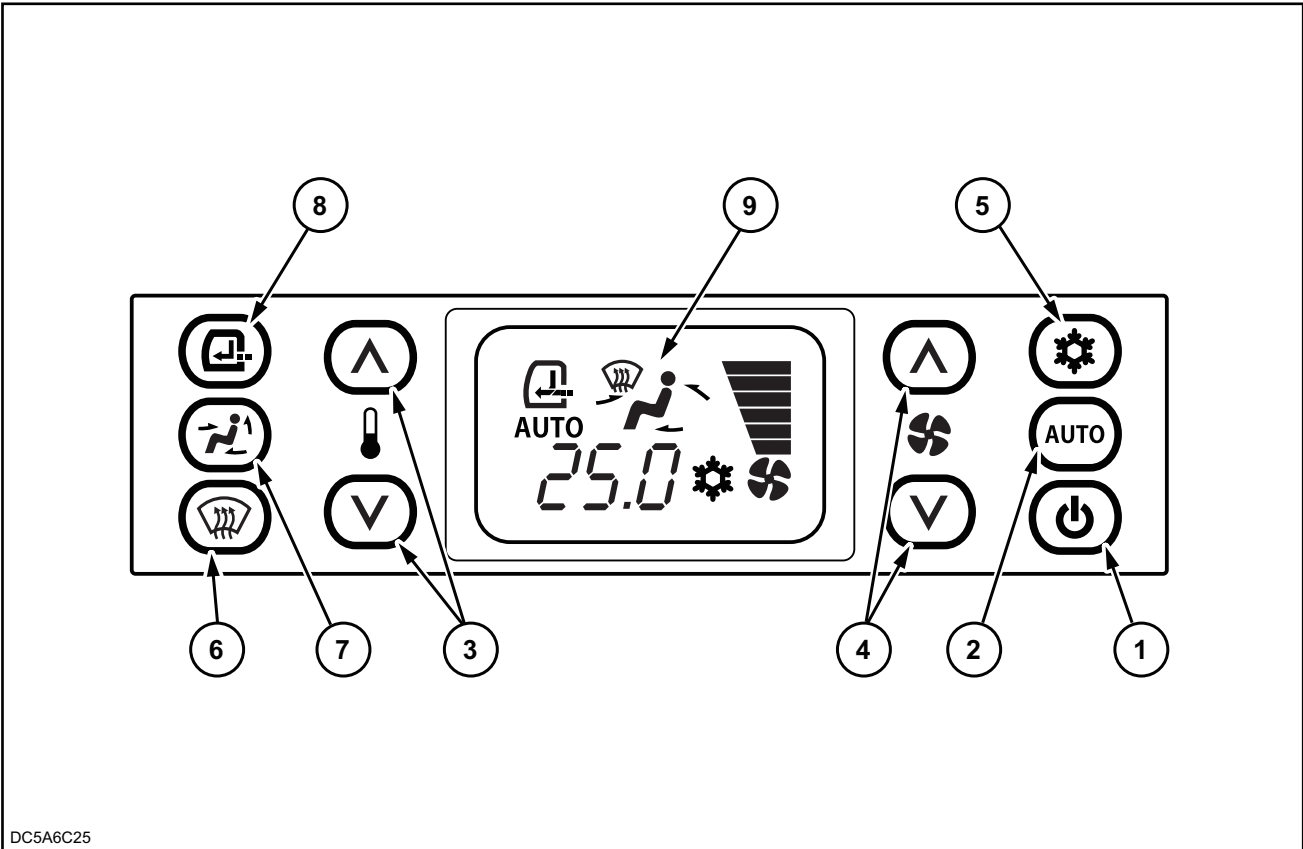
Place the switch in the "ON" position.

If the load to be lifted exceeds the authorized limit, the audible alarm will sound.

In the "OFF" position the switch is non-operational.

NOTICE: Before undertaking any load handling operations, place the switch in the "ON" position.

Air Conditioner Control



DC5A6C25

1	ON/OFF	4	Air flow	7	Air flow direction
2	Auto	5	Air conditioner	8	Air circulation
3	Temperature	6	Windshield defroster	9	Display screen

ON/OFF

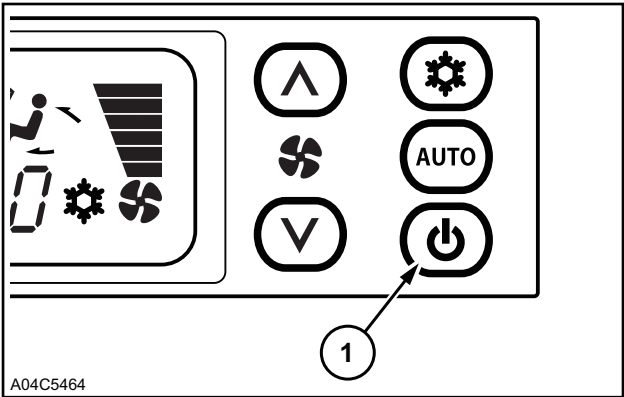
Press the button ① to switch the air conditioner "ON" or "OFF".

NOTICE:When the air conditioner is turned "ON" with this button, it will operates at the same setting as the one selected previously.

Air Flow

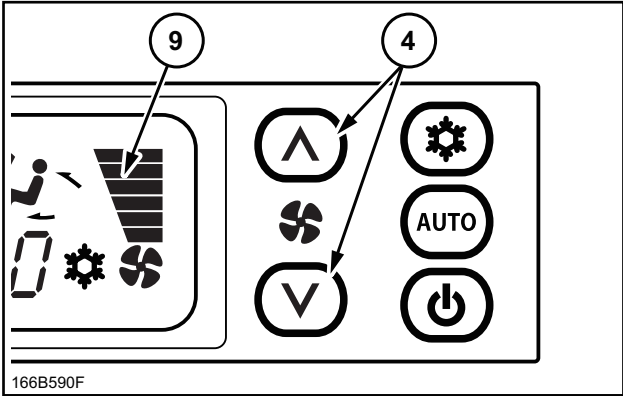
The strength of the air flow can be adjusted by pressing the 2 buttons ④.

Pressing the upper button increases the air flow. Pressing the lower button decreases the air flow. The selected air flow is displayed on the display screen ⑨.



A04C5464

A04C5464



166B590F

166B590F

3-Description of Handling

Temperature

The temperature can be set from 18°C to 32°C by using the 2 buttons ③.

Pressing the upper button raises the set temperature.

Pressing the lower button lowers the set temperature.

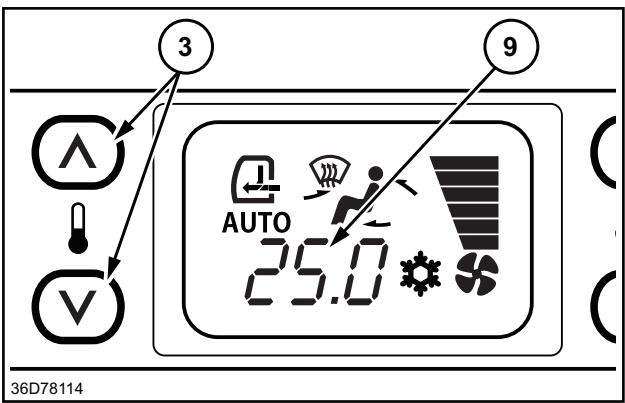
The set temperature is displayed on the display screen ⑨.

NOTICE:

The temperature can be displayed in Celsius or Fahrenheit.

To change this display, hold down the 2 buttons ③ at the same time for 5 to 10 seconds.

For Fahrenheit temperatures, F is displayed after the temperature.



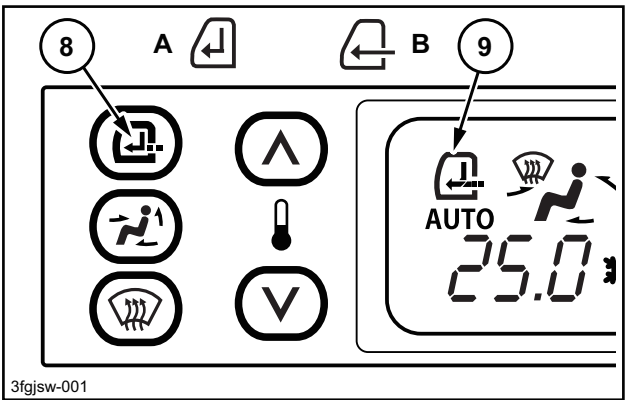
36D78114

Air Circulation

By pressing the button ⑧, either of 2 types of air circulation can be selected, refresh or recirculate.

The air circulation type toggles between these 2 each time you press the button.

The selected air circulation type is displayed on the display screen ⑨.



3fgjsw-001

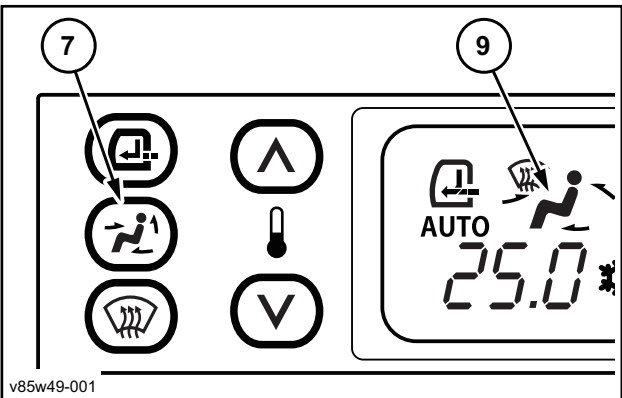
A	Recirculate
B	Refresh

Air Flow Direction

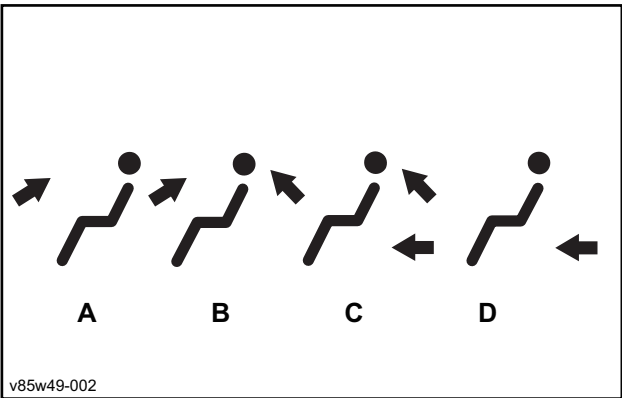
By pressing the button (7), any of 4 air flow directions can be selected.

The air flow direction type changes each time this button is pressed.

The selected direction type is displayed on the display screen (9).



v85w49-001



v85w49-002

A	Front of upper half of body
B	Front and back of upper half of body
C	Back of upper half of body and feet
D	Feet and windshield

3-Description of Handling

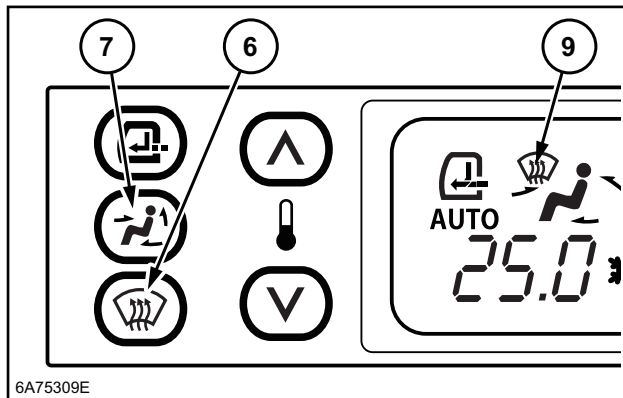
Windshield Defroster

Pressing the push-button ⑥ operates the defroster and clears fogging from the windshield.

When the defroster is operating, the icon is displayed on the display screen ⑨.

To turn OFF the defroster, press the push-button again. The icon on the display screen goes out.

NOTICE: Using this button deactivates the air flow direction control ⑦.



6A75309E

Air Conditioner

NOTE:

When using the air conditioner, close all the cab windows, the windshield, and the cab door. Put the air vents in the open position.

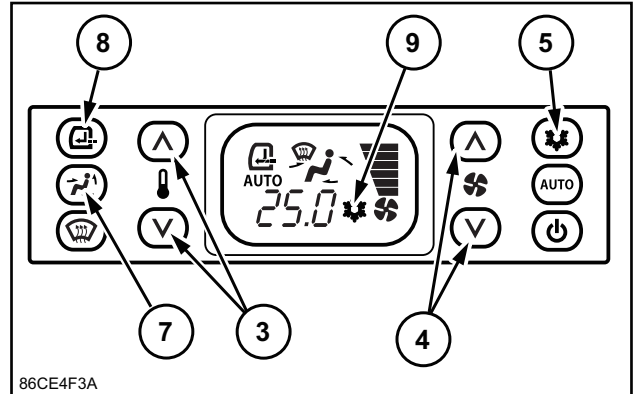
The air conditioner has 2 modes: manual and automatic.

Manual

Press the button ⑤ to switch the air conditioner "ON" and "OFF".

When the air conditioner is operating, its operating state is displayed on the display screen ⑨.

For manual operation, the air conditioner can be adjusted with controls ③, ④, ⑦, and ⑧.



86CE4F3A

Auto

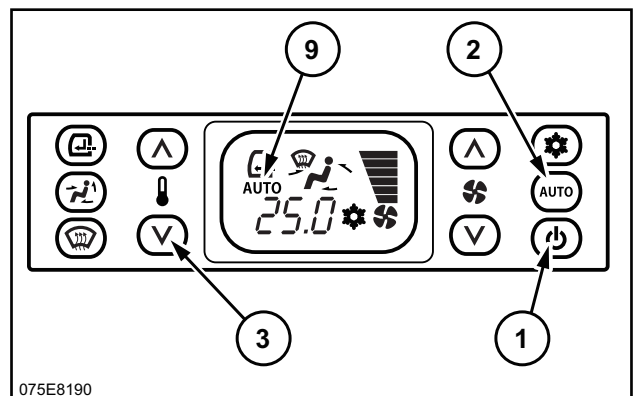
Pressing the button ② automatically adjusts the air flow volume and air flow direction.

"AUTO" is shown on the display screen ⑨.

In auto mode, only the temperature setting ③ can be adjusted manually.

If any control other than that for the temperature setting is operated, the auto mode is canceled and the "AUTO" on the display screen ⑨ disappears.

To cancel auto mode, press the push-button ① or ②.



075E8190

3-Description of Handling

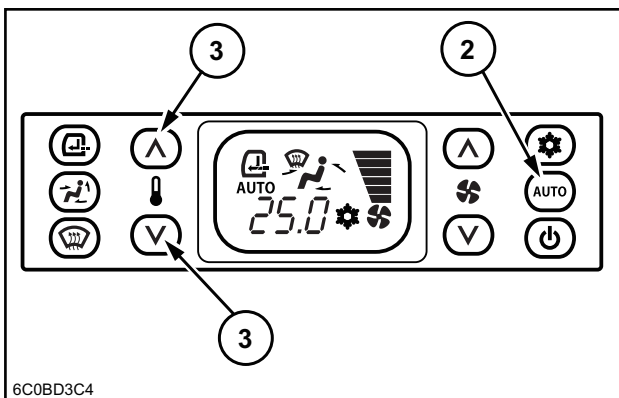
To cool or heat quickly

Quick cooling: Press the button ② to cancel auto mode, then press the button ③ (▼) to lower the setting to the minimum temperature of 18°C. The air flow becomes the maximum and cool air blows out from the front.

Quick heating: Press the button ② to cancel auto mode, then press the button ③ (▲) to raise the setting to the maximum temperature of 32°C. The air flow becomes the maximum and warm air blows from near the operator's feet.

NOTE:

Run the air conditioner at least once a week in order for it to function efficiently and effectively. For information on air conditioner maintenance, refer to "Air conditioning" (6-88) in [Maintenance].



6C0BD3C4

Gate Lock Lever (safety bar)

⚠ WARNING

- When not operating, set the gate lock lever in the ② position, then check that the machine is locked (controls inactive).
- When the gate lock lever is in the ① position, the lever is unlocked. If you touch an operation lever, the controls become active.

If an operation lever were touched by mistake when you are not operating the machine or entering or leaving the machine, the gate lock lever would prevent incorrect operation of the machine.

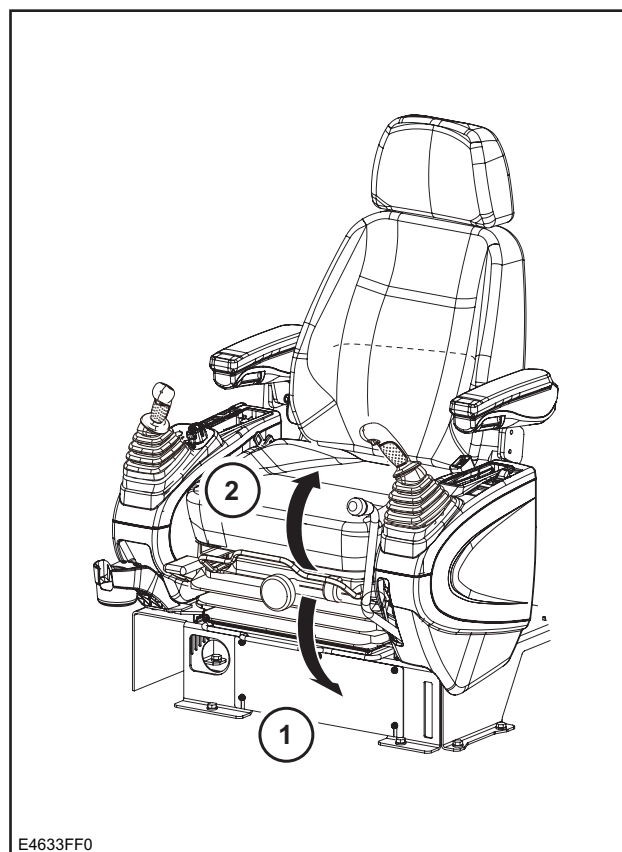
Gate lock lever position ① [operation position]

When operating, lower the gate lock lever to put the machine in the unlocked (controls active) state.

Also, at this position, the engine cannot be started for the sake of safety.

Gate lock lever position ② [locked position]

When not operating, raise the gate lock lever to put the machine in the locked (controls inactive) state.



E4633FF0

3-Description of Handling

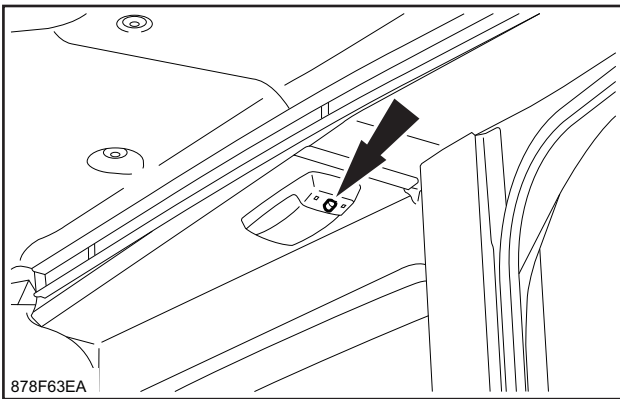
Cab Interior Lightning

The cab interior lightning is at the top left inside the cab. It is operated with the 3-position switch in the lamp base.

Position: "ON" (always on), "OFF" (off) and "neutral position" (the light goes out 30 seconds after the door is closed.)

NOTE:After using the cab interior lightning, always turn it off. Leaving the machine with the light ON can run down the battery.

NOTE:For details on replacing the light bulb, refer to "Replacing the Light Bulb" (6-100) in [Maintenance].



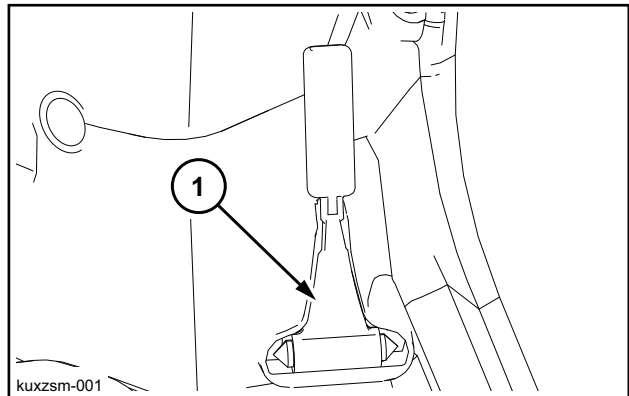
878F63EA

Emergency Exit Hammer

⚠ CAUTION

- Never place anything in the operator's compartment or at the rear window that could impede escape.
- When breaking the window, be careful not to injure yourself with any pieces of glass.

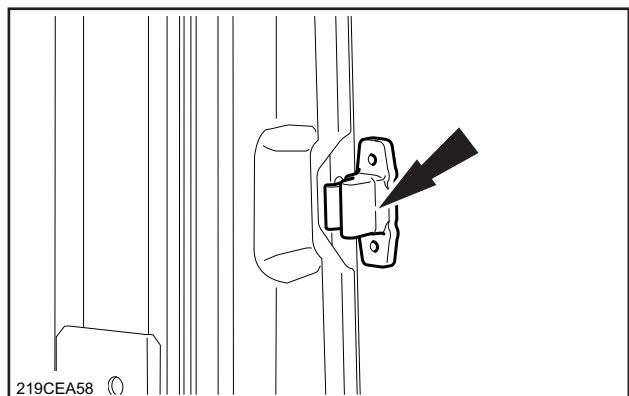
If it should become impossible to open the cab door, use the rear window as an emergency exit. Use the emergency escape hammer mounted in the rear left of the cab to break the rear window and escape.



kuxzsm-001

Opening and Closing the Windows on Doors

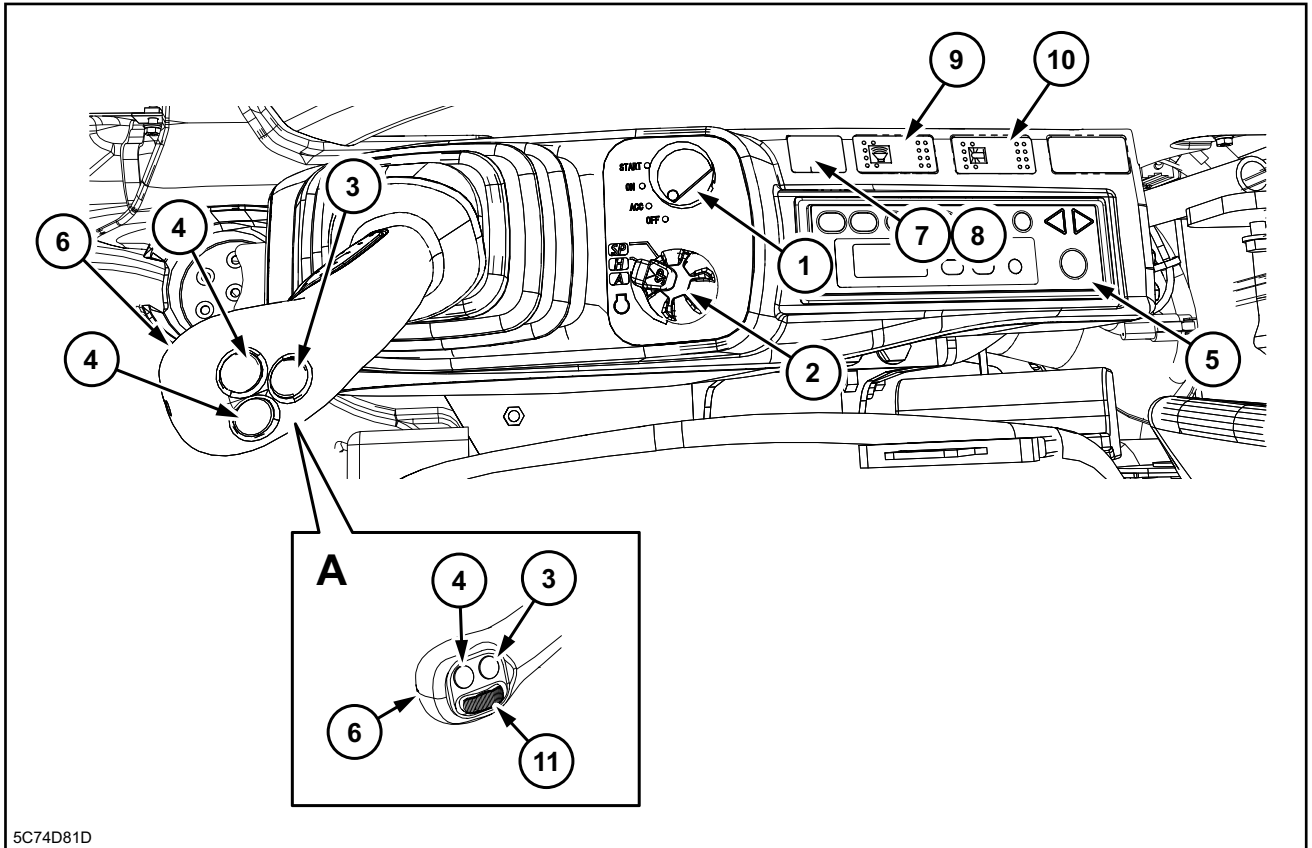
To open or close a window, unlock the lock. The window can be opened and closed by sliding it left and right.



219CEA58

Right Side Control

Right-hand console



5C74D81D

5C74D81D

1. STARTER SWITCH

This switch has four positions, " ON" (contact), " START" (engine ignition), " OFF" (engine shut-down) and " ACC" (accessory current supply).

NOTICE:

When the starter switch key is in " ON" (contact) position, if the anti-theft protection has been programmed, then it will be necessary to enter the code.

The message "PASSWORD" will be displayed.
(Refer to page 4-6)

NOTE: This key is also used to lock the cab door, the engine hood, the front storage compartment, the side doors and the fuel tank cap.

2. THROTTLE VOLUME AND WORKING MODE SELECTOR

This button enables an increase or reduction in the engine speed.

This button is coupled with the three working mode selector.

Mode " A" when the energy output has priority. In this mode, the balance between the speed and energy output is controlled for each movement of the controls.

Mode " H" for difficult excavation work or if the load increases, and mode " SP" when the output has priority.

Each selected mode (A, H or SP) is displayed on the screen.

NOTE: To select the " SP" mode, operate the indexing pin while rotating the acceleration button to the right.

NOTE: If there is no change in engine speed, press and release the auto idle switch.

3-Description of Handling

3.AUTO IDLE SWITCH

This control enables automatic engine idle without operating the throttle button.

Press and release the control for the engine to automatically reduce to the idle speed to the set idle speed. The "ENGINE IDLING" icon will appear on the message screen.

When the control is pressed and released once more the engine will revert to its original speed and the icon on the systems display panel will disappear.

The open/close speed can be adjusted according to the sliding amount.

For details, refer to "Operation of Proportional Switch" in [Options].

4.OPTION CONTROL (if equipped)

5.CAB RADIO COMPARTMENT

This pre-equipped compartment is provided for installing a 24 volts car radio.

6.WIPER SWITCH

When the switch is pressed, the wiper moves.

7.AUX external input

An input terminal for MP3 players is standard equipment.

8.USB external input

An input terminal for USB memory is standard equipment.

9.Travel caution alarm switch

With the switch in the "CONT" position, an alarm sounds when the travel control is operated.

With the switch in the "AUTO OFF" position, an alarm sounds for 10 seconds when the travel control is operated.

10.Rotating warning light control (if equipped)

This control is used to turn the rotating warning light on or off.

When you press ON (operate), the rotating warning light and the indicator lamp on the switch light up.

When you press OFF (stop), the rotating warning light goes out.

11.Proportional switch (option)

Sliding the proportional switch opens or closes the end attachment.

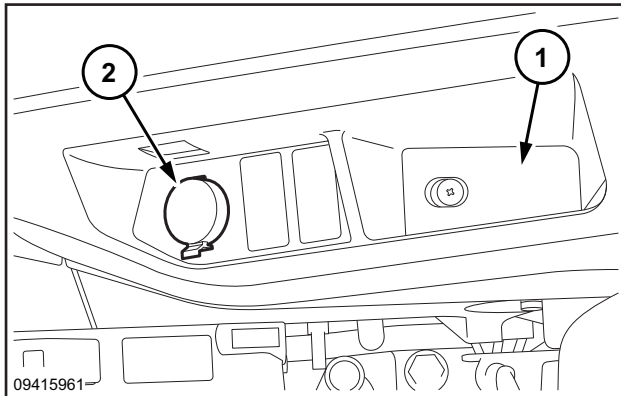
Right Console

1.Storage tray

2.Auxiliary 12 VDC socket

This socket can be used as a 12 VDC power supply socket.

NOTICE:Do not connect anything other than a 12 VDC device.



09415961

3.Cigarette lighter or power supply socket (24 VDC)

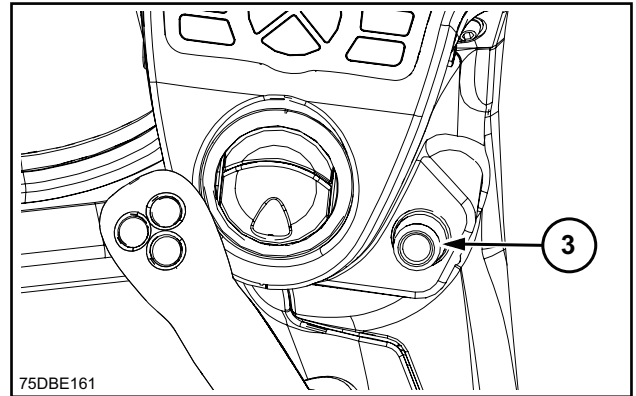
This can be used when the starter switch key is in the "ON" position. Press the cigarette lighter, then immediately release it.

NOTICE:Do not hold in the cigarette lighter. Doing so would damage parts.

NOTICE:After the cigarette lighter has been pressed, if it does not return to its original position within 30 seconds, the electrical circuits could be damaged. Pull it out manually and consult your local dealer or certified service plant.

NOTE:When the cigarette lighter is removed from the socket, the socket can be used as a 24 VDC power supply socket

NOTICE:Do not connect a 24 VDC device, such as a mobile telephone charger or the like.



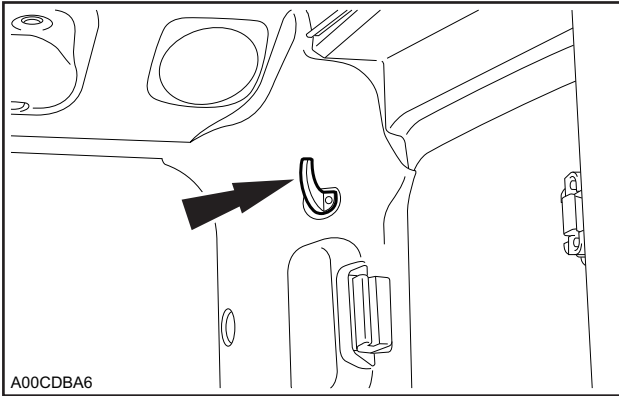
75DBE161

3-Description of Handling

Coat Hanger Hook

The hook is at the top right at the rear inside the cab.

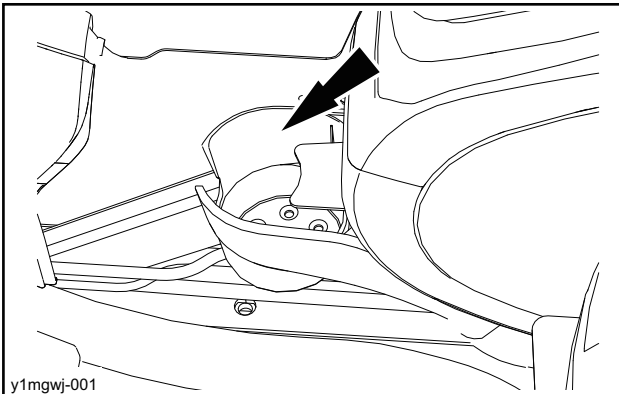
NOTICE: Be careful not to block your view with clothes.



A00CDBA6

Drink Holder

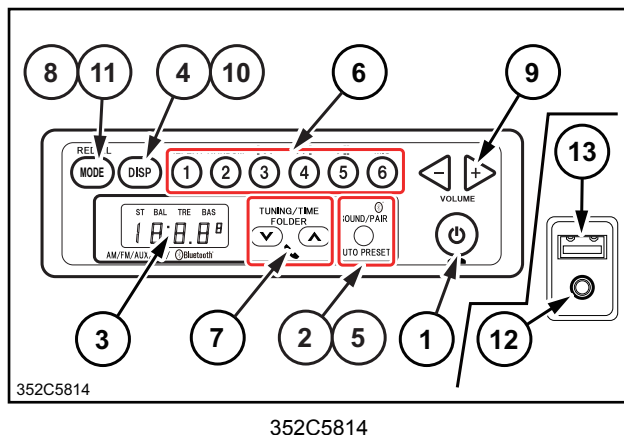
This is on the right front of the operator's seat. Put a drink container here.



y1mgwj-001

Radio

Names of the Sections



NOTICE:

- If water gets into a speaker case or the radio, it can cause an unexpected breakdown. Do not let water get on or in them.
In particular, keep the window closed when it rains and when washing the machine.
- Do not use benzene, paint thinner, or any other solvent to clean the display.
- Wipe it off with a soft, dry cloth.
- Do not try to disassemble the radio.

1.Power button (POWER)

Pressing the "POWER" button turns ON the power.

The band is displayed, then the frequency is displayed.

Pressing again turns OFF the power.

The clock is displayed.

2.Sound adjustment (SOUND)

Pressing the button switches BAL → TRE → BAS.

Pressing the button in the BAS state ends the sound adjustment.

- You can adjust the balance by pressing the tuning button in the BAL state.
Pressing the UP ▲ button increases the right speaker output; pressing the DOWN ▼ button increases the left speaker output.
(Both the left and right can be raised to a maximum of 7.)

- You can adjust the treble by pressing the tuning button in the TRE state.
Pressing the UP ▲ button raises the treble 1 step.
Pressing the DOWN ▼ button lowers the treble 1 step.
(The treble can be moved UP or DOWN a maximum of 7.)
- You can adjust the bass by pressing the tuning button in the BAS state.
Pressing the UP ▲ button raises the bass 1 step.
Pressing the DOWN ▼ button lowers the bass 1 step.

3.Display unit

The clock, radio frequency band name, and operation mode are displayed.

4.Clock/frequency switch button (DISP)

Pressing the button switches the display "Frequency" → "Clock" → "Band name".
If you leave the display alone, it returns to the frequency display after 1 second.

5.Auto preset (SOUND/AUTO PRESET)

By holding down this button, receivable stations for preset buttons 1 through 6 can be registered.

6.Preset buttons 1 through 6 (PRESET STATION)

One station each for FM1, FM2, and AM can be preset for each button.

To preset a station, select its frequency, then hold down the desired preset button. (For information on automatic preset, refer to "Auto Preset".)

3-Description of Handling

7. Tuning button (TUNE)
If you hold down the "TUNE" button, the radio begins to search automatically for a station and stops at the frequency where it finds a station.
To stop this search midway, press the button again.
Pressing the "TUNE ▲" button raises the frequency; pressing the "TUNE ▼" button lowers the frequency.
Holding down either button changes the frequency continuously.
8. Mode switch button (MODE)
Pressing this button switches AM → FM1 → FM2 → AUX → USB → BT.
The reception band is shown on the display.
9. Volume adjustment buttons (VOL ◀, VOL ▶)
Pressing the "VOL ◀" button lowers the volume; pressing the "VOL ▶" button raises the volume.
Holding down either button changes the volume continuously.
10. Clock adjustment (DISP)
When the clock is shown on the display, holding down the DISP button starts the clock adjustment.
Pressing the DISP button shifts from hour to minute adjustment.
Pressing this button again ends the clock adjustment.
- Hour adjustment
While the hour display is flashing, you can adjust the hour by pressing the tuning button.
Pressing the UP ▲ button moves the minute forward.
Pressing the DOWN ▼ button moves the minute back.
 - Minute adjustment
While the minute display is flashing, you can adjust the minute by pressing the tuning button.
- Pressing the UP ▲ button moves the minute forward.
Pressing the DOWN ▼ button moves the minute back.
11. REDIAL
Regardless of the current band, if you hold down the MODE button, "RE" is displayed for 3 seconds and redialing is performed. After redialing, "DL" flashes and ring sounds are output from the speaker.
Even when the radio unit power is OFF, if you hold down the MODE button, the power is automatically turned ON and redialing is started.
12. External input terminal (AUX IN); Vehicle body side
When using this terminal, use any commercially-available stereo mini-plug cord (3.5 dia.) to plug into the headphone terminal of your portable audio device or the like.
13. External input terminal (USB); Vehicle body side
When using this terminal, connect a commercially-available USB memory.
- To Listen to Radio**
1. Turn the starter switch key to "ACC" or "ON", then press the power button to turn the radio power "ON".
 2. With the band button, select either "MW (AM)" or "FM".
 3. Select a station with a preset buttons or with the tuning buttons.
 4. Adjust the volume with the volume adjustment buttons.
 5. To switch "OFF" the radio, press the power button.
- Manual Tuning**
Pressing the "TUNE▲" button once raises the reception frequency one step.
Pressing the "TUNE▼" button once lowers the reception frequency one step.

Automatic Station Selection (Seek)

Holding down the "TUNE ▲" button increases frequency automatically. Holding down the "TUNE ▼" button decreases frequency automatically. When a receivable broadcasting station is found, searching stops at that frequency and it is received.

Setting the Preset Buttons

1. Press the MODE button to select "MW (AM)" or "FM" and then press the tuning buttons to select a broadcasting station.
2. Hold down the desired numbered preset button until the preset button number flashes three times on the display. The preset button is now set to the selected station.
3. Repeat steps 1 and 2 to preset other broadcasting stations.

Auto Preset

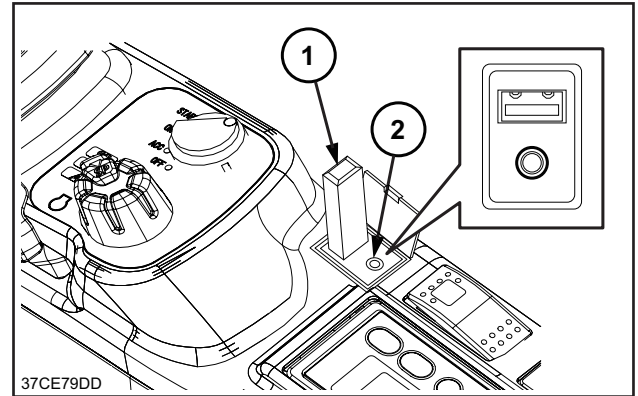
- By holding down the auto preset button, frequencies with good reception are detected and registered on the preset memories 1 to 6 automatically.

NOTE:

When the auto preset function is used, the registered broadcasting stations will be eliminated. To register them on the desired buttons, use the preset function.

External Input

- Audio can be output from the speakers on the machine by connecting a commercially-available portable audio device.
- Always keep appropriate volume for the portable audio device.



1	USB memory
2	AUX input terminal

AUX

- Press the MODE button to switch the audio source and check that "AUX" is shown on the display.
- Connect from the headphone terminal of your portable audio device using a commercially-available cord (without resistance).
- Use any commercially-available stereo mini-plug cord (D3.5) for external input terminal side.
Do not use a connection cord with the wrong size or wrong shape jack.
- The volume also can be adjusted with the volume buttons on the radio unit.

3-Description of Handling

USB

- Files in MP3/WMA/AAC formats are supported.
- Press the MODE button to switch the audio source and check that "USB" is shown on the display.
- Connect a USB memory to the USB input terminal.
Playable data stored in the memory is played automatically.

Button operations for when USB is selected as an audio source

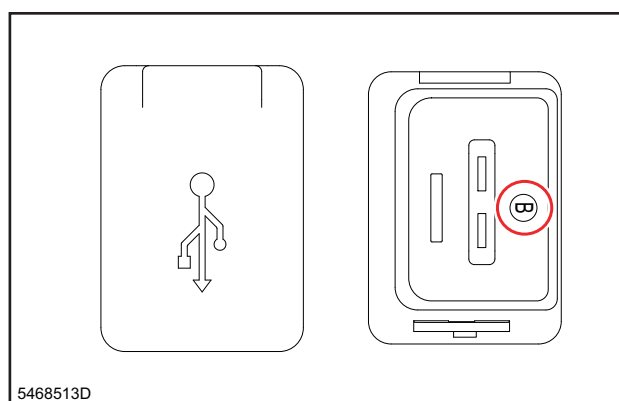
Button operations		Function
UP/DOWN		Folder up/down
PRESET1		REPEAT
PRESET2		RANDOM
PRESET3	Short press	Track down
	Long press	Fast forward (while being pressed)
PRESET4	Short press	Track up
	Long press	Rewind (while being pressed)
PRESET5		PLAY/PAUSE
Volume adjustment button +		Volume up
Volume adjustment button -		Volume down

• Display

Charging mode OFF	Charging mode ON

*When ⑥ is indicated on the rear side of the USB port protective cover, the radio is equipped with a charging function.

*When ⑥ is not indicated, your radio is not equipped with a charging function.



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USB Charging

- USB devices (mobile phones or audio devices) can be charged by connecting to the USB port.
- The normal mode and charging mode are available for USB charging. USB communications are not available in the charging mode.
- Audio playback is not available in the charging mode.

- When the radio power is OFF

Button operations	Function
PRESET 6	Charging mode ON/OFF

Bluetooth

- Can be used when a Bluetooth unit is connected.
- Press the MODE button to switch the audio source and check that "BT" is shown on the display.
- To use the Bluetooth function, perform pairing of the devices to be connected with a wireless connection.
For details on pairing, refer to "Bluetooth Pairing" (3-63).
- For details on how to use a mobile phone connected via Bluetooth, refer to "Use of Cellular Phone Connected via Bluetooth" (3-63).

Button operations for when Bluetooth is selected as an audio source

Button operations		Function
UP/DOWN		-
PRESET1		-
PRESET2		-
PRESET3	Short press	Track down
	Long press	-
PRESET4	Short press	Track up
	Long press	-
PRESET5		PLAY/PAUSE
Volume adjustment button +		Volume up
Volume adjustment button -		Volume down

Bluetooth Pairing

NOTICE: To use Bluetooth audio devices, the devices to be connected with a wireless connection must be registered in advance. This registration is called pairing. If a device has never been paired, pairing must be performed.

1. With "BT" shown on the display, if you hold down the AUTO PRESET button, "WA" is shown on the display and the unit proceeds to pairing preparation.

2. When pairing preparation is complete, "PA" is shown on the display and the unit enters pairing standby status. Search the device you wish to connect with a wireless connection such as a mobile phone and a portable audio device, then perform pairing.
3. When pairing is completed successfully, "P○" is shown on the display. When pairing is not completed within a time limit (180 seconds) or an error occurs, "P×" is shown on the display. If pairing failed, repeat from step 1 to perform pairing.

Use of Cellular Phone Connected via Bluetooth

- When the paired cellular phone gets a call, "CL" will blink on the display and the speaker will output the ringtone.
Even if power to the radio is OFF, its power will turn ON automatically and "CL" will appear when it gets a call.
- You can start talking by pressing any button other than the power and the volume adjustment button when it gets a call.
- To reject a call, press the power button. The call will be interrupted, and the band will be restored to its original state.
- While talking, you can adjust the speaker volume by using the volume adjustment button. The preset button 6 allows you to turn ON/OFF the microphone function. With the microphone OFF, audio input from here will be stopped.
- To finish talking, press the power button. The band will be restored to its original state.
- By holding down the mode selector button, "RE" will appear on the display for 3 seconds. After redialing, "DL" will appear, and the speaker will output the ringing tone.

3-Description of Handling

Memory Erasure

If the battery disconnect switch is turned to the "OFF" position or the battery connection is cut off, for example for machine service or radio removal, the memory for the preset buttons will be lost. If this happens, set the preset stations again.

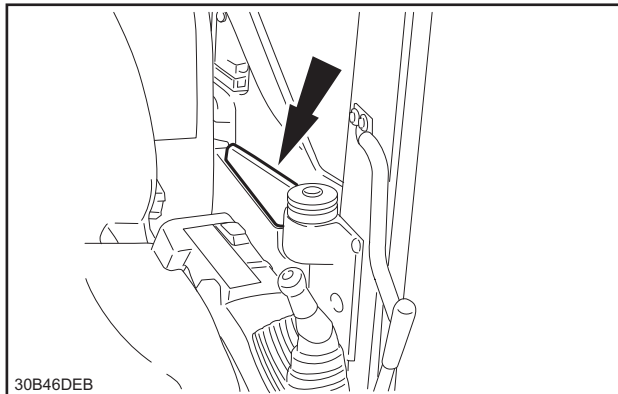
Time Adjustment

1. Clock adjustment mode is established by holding down the clock/frequency selector button when a clock is displayed.
2. By pressing the clock/frequency selector button after step 1, the adjustment target can be changed: hour -> minute.
3. With the adjustment target blinking, press the tuning buttons to adjust time.
4. When the clock/frequency selector button is pressed in minute adjustment mode, clock adjustment will be quit.

REARWARD CONTROLS

Magazine Rack

The magazine rack is located on the right rear side of the operator's seat.



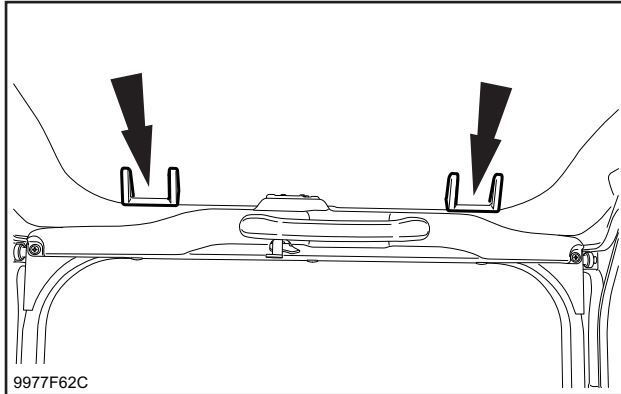
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OVERHEAD CONTROLS

Roof Curtain

To open the curtain, hold the handles with both hands and slide to the rear.

To close the curtain, slide it to the front.



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Roof Hatch

To open the roof hatch, use the following procedure.

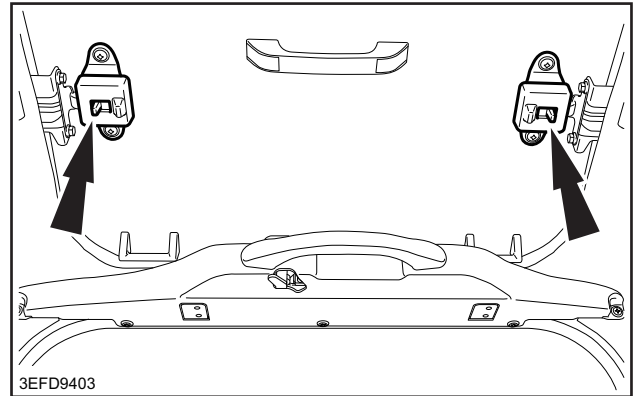
1. Open the roof curtain.
2. Hold the handle and push the lock up. This unlocks the lock.
3. Push up the roof hatch to open it.

When closing the roof hatch, slowly pull down the handle until the roof hatch is locked.

NOTICE: The roof hatch is supported by two gas struts. Do not apply excessive force to force the hatch closed.

⚠ CAUTION

Open and close the roof hatch slowly. There is a danger of injury from catching a hand or finger in the roof hatch.



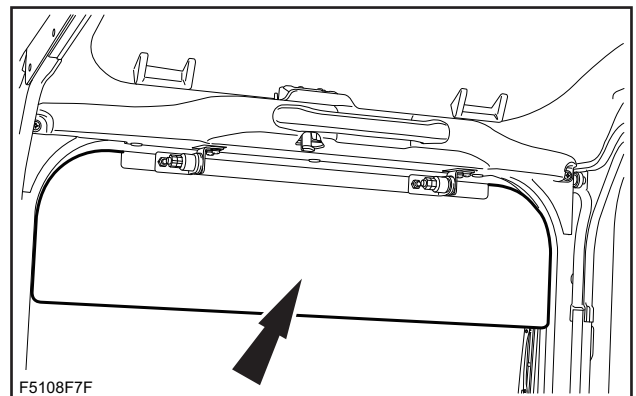
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Sun Shield (option)

The sun shield is fixed to the windshield. Move its position as necessary.

⚠ CAUTION

When moving it, be careful not to catch a hand, finger, or anything else in the sun shield.



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3-Description of Handling

Outside Control

Fuel tank

The fuel tank capacity is: 200 l.

Use suitable fuel, refer to page 6-12.

NOTICE: Do not put a moisture elimination product (water draining agent) in the fuel tank. (It may damage the engine).

NOTE: Clean around the fuel cap before refuelling and do not remove the filter located in the filler orifice. (Refer to page 6-78)

NOTE: In cold weather, use fuel corresponding to the ambient temperature. (Refer to page 6-9)

NOTE: In cold weather, fill the fuel tank after each working day to prevent the formation of condensation.

WARNING

Fire hazard!

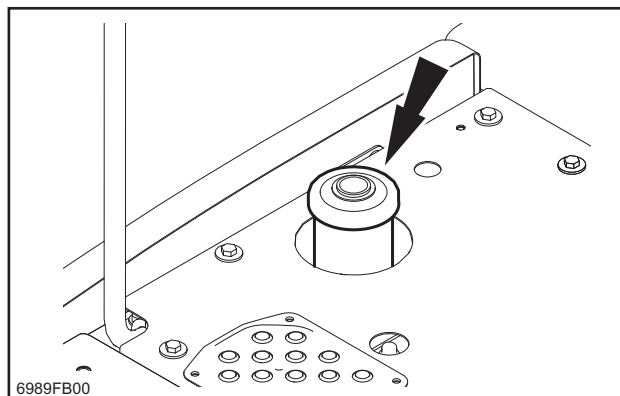
When handling diesel fuel, observe the following precautions:

1. Do not smoke.
2. Never fill the tank when the engine is running.
3. Wipe up spilled fuel immediately.
Failure to comply could result in death or serious injury.

When installing the fuel cap, make sure that it is correctly placed in the notches and then lock it by turning it up against the stop.

NOTE: Use the starter switch key to lock the fuel cap.

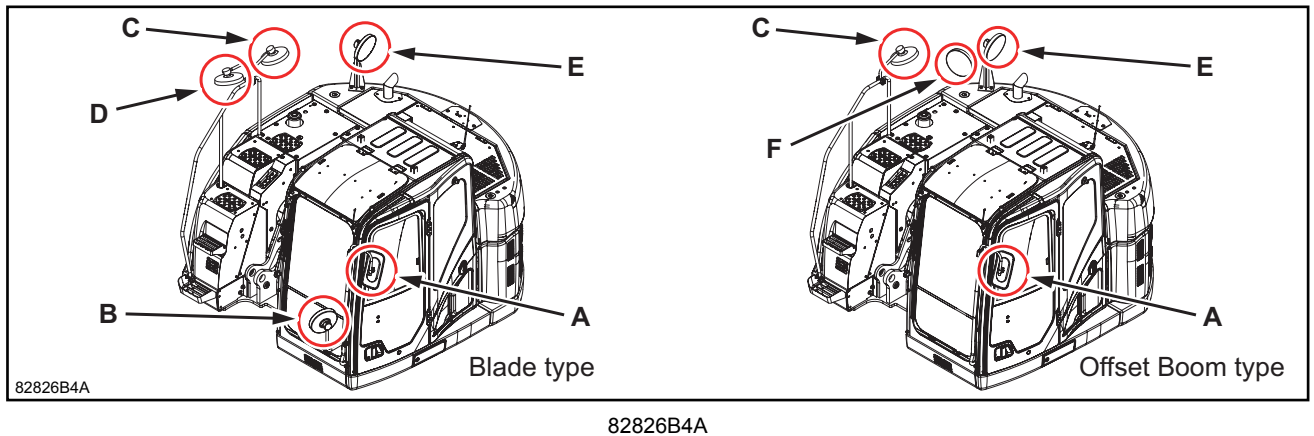
The fuel cap is equipped with a max level visual gauge.



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Rear View Mirror

Mirror Installation Position

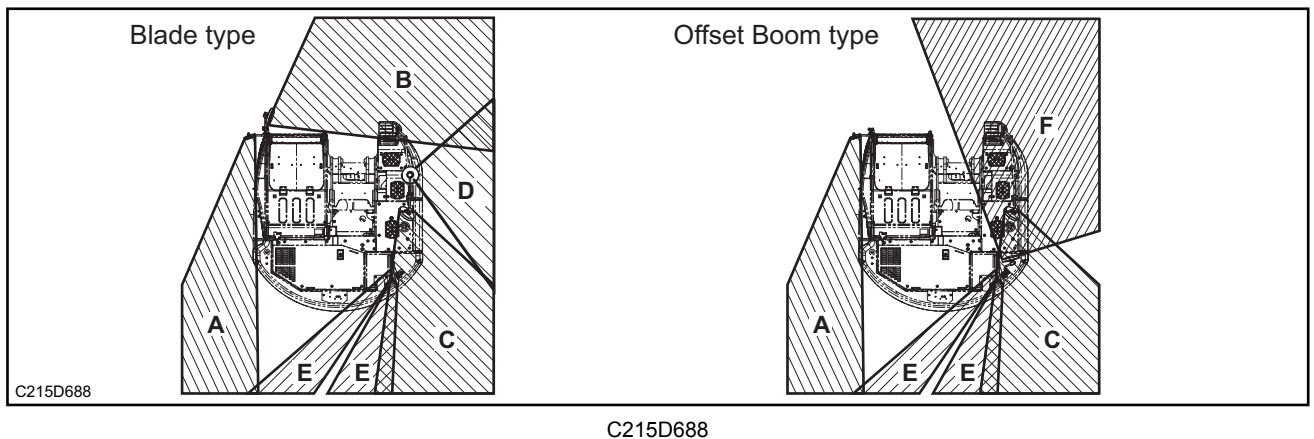


Mirror Adjustment

⚠ WARNING

Before starting work, adjust the mirror to ensure the visibility.
If mirrors are poorly adjusted, the proper field of vision cannot be secured and this can lead to a serious personal injury.

 shows the range reflected in each mirror.



3-Description of Handling

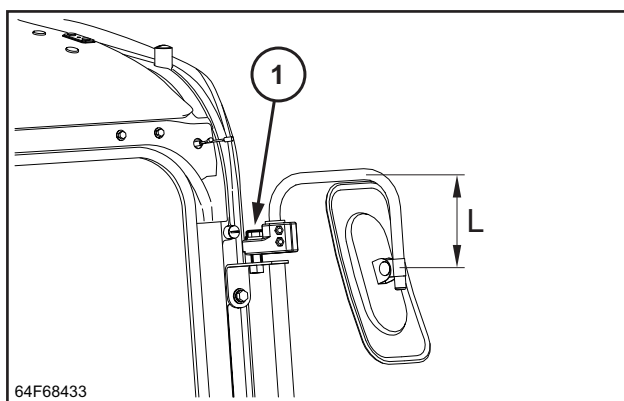
Mirror A (Cab handrail)

Adjust the mirror to see the left rear edge of the machine by sight.

Tightening torque of bolt (1): 71.6 - 91.2 N · m

- Install the mirror in the position in the right illustration.

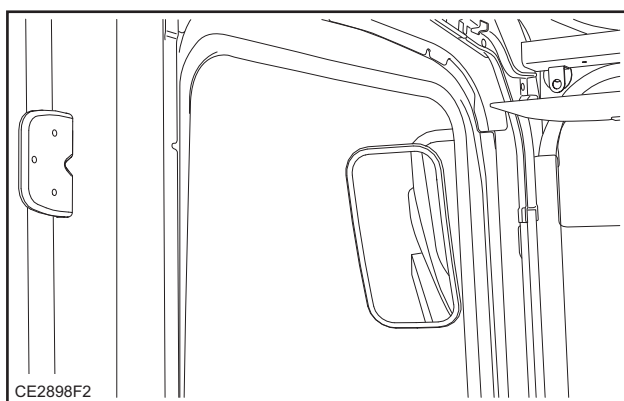
L:165 mm



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- As shown in the right illustration, adjust the mirror to see the side of the machine in the mirror.

Tightening torque: bolt to tight the body of the mirror: 4.5 - 5.5 N · m



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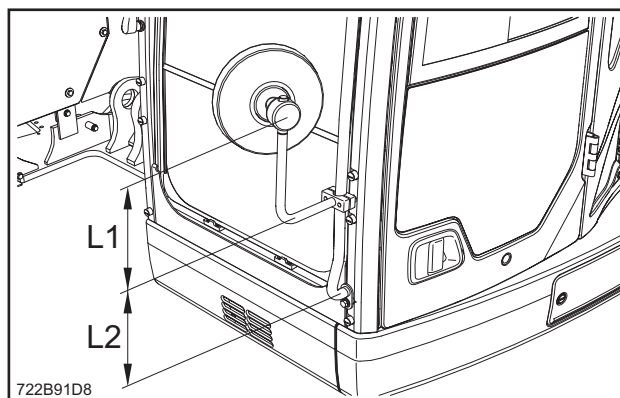
Mirror B (cab bottom) (blade type)

When installing this mirror, adjust it so that the right front end of the machine can be seen from the operator's seat.

- Install the mirrors at the positions in the figure on the right.

L1: 280 mm

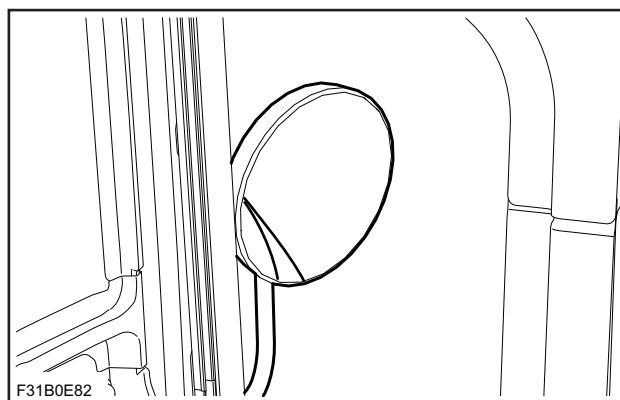
L2: 260 mm



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- Adjust this mirror so that the right front section of the machine (crawler section) reflects in the mirror as in the figure on the right.

Tightening torque: Tightening bolts on the mirror: 4.5 - 5.5 N·m



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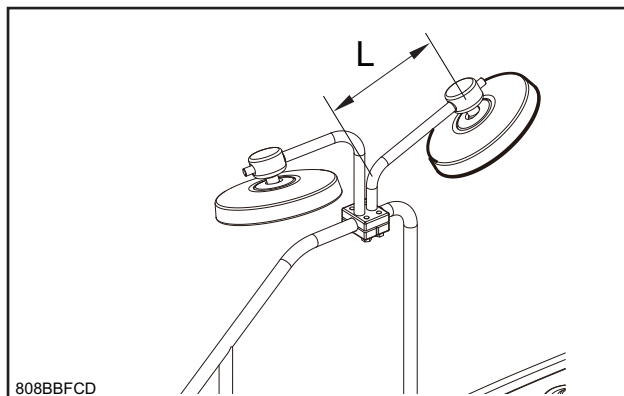
3-Description of Handling

Mirror C (front right housing)

When installing this mirror, adjust it so that the right rear end is visible from the operator's seat.

- Install the mirrors at the positions in the figure on the right.

L: 260 mm



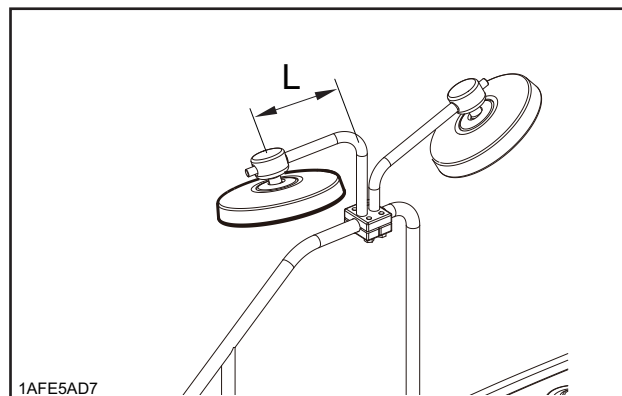
808BBFCD

- Adjust this mirror so that the side of the machine is reflected.
Tightening torque: bolt to tight the body of the mirror: 4.5 - 5.5 N·m

Mirror D (front right housing) (Blade Type)

When installing this mirror, adjust it so that the right side section of the machine can be checked from the operator's seat.

- L: 210 mm



1AFE5AD7

- Adjust this mirror so that the side of the machine is reflected.
Tightening torque: bolt to tight the body of the mirror: 4.5 - 5.5 N·m

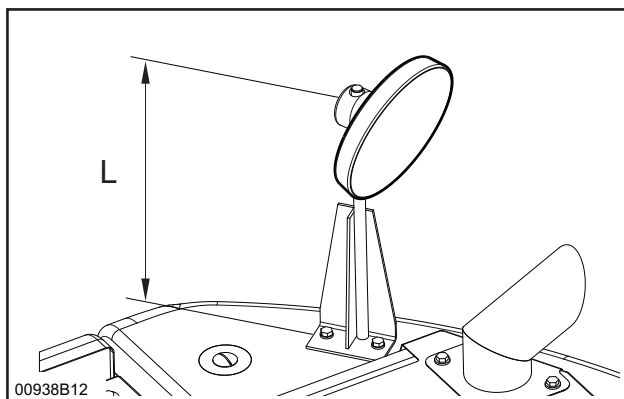
3-Description of Handling

Mirror E (counterweight rear right)

When installing this mirror, adjust it so that the rear section of the machine is visible from the operator's seat.

- Install the mirrors at the positions in the figure on the right.

L: 455 mm



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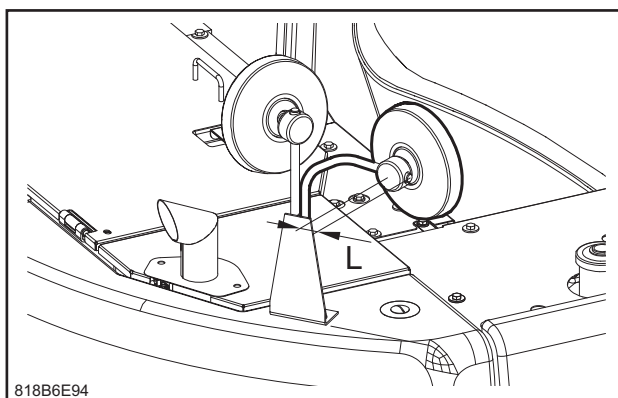
- Adjust this mirror so that the side of the machine is reflected.
Tightening torque: bolt to tight the body of the mirror: 4.5 - 5.5 N·m

Mirror F (counterweight rear right) (offset boom type)

When installing this mirror, adjust it so that the top surface is visible from the operator's seat.

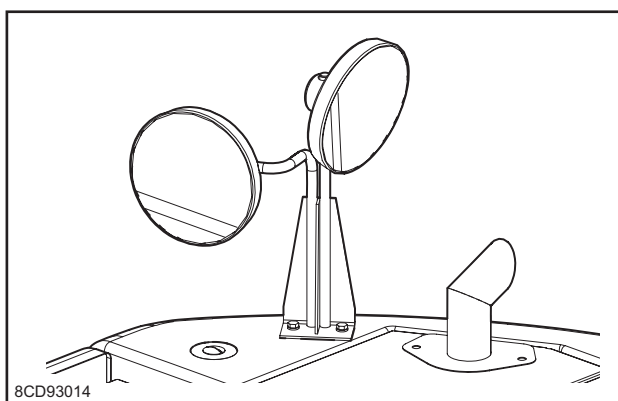
- Install the mirrors at the positions in the figure on the right.

L: 40 mm



818B6E94

- Adjust this mirror so that the rear of the machine reflects in the mirror as in the figure on the right.
Tightening torque: Tightening bolts on the mirror: 4.5 - 5.5 N·m



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Rear View Camera/Side Camera (option)/FVM (option)

⚠ WARNING

The images on the monitor screen (rear view camera, side camera, FVM) are auxiliary. Never operate the machine just watching the images on the monitor screen.

The images and actual conditions can be different. You could collide with something and cause an unexpected accident.

When operating the machine, always check the safety of surroundings with your own eyes and the mirrors, and use the horn to signal.

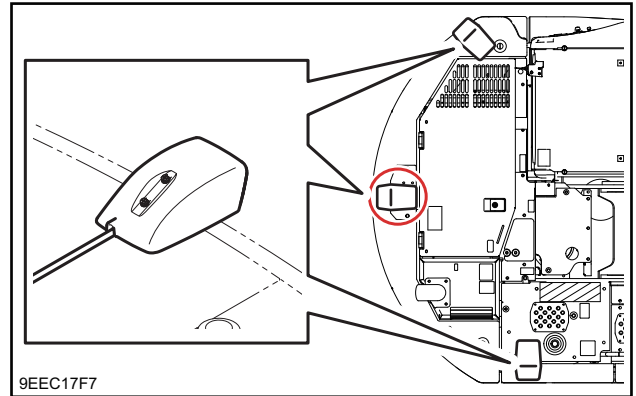
Also, for the sake of safety, avoid sudden operations when starting swing or travel operations.

NOTICE:

- If mud, raindrops, snow, etc. get on the camera lens section, the images on the monitor display deteriorate. Use a soft damp cloth to wipe the lens clean, then dry it with a soft dry cloth.
- Do not scratch the camera section. This can affect the images on the monitor screen.
- If there is any abnormality on the field view monitor (FVM) image, use input 1 (rear view only) or input 2 (right side only).

⚠ CAUTION

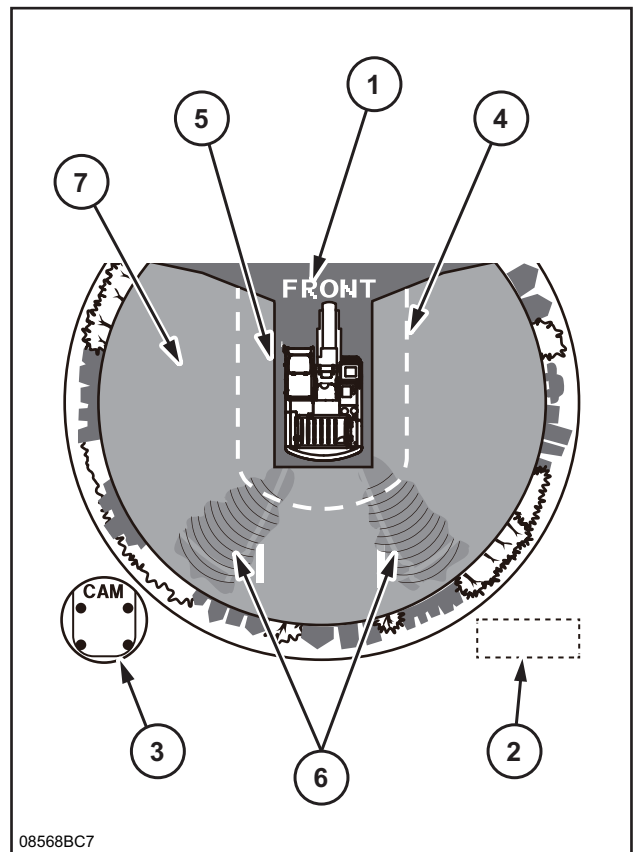
Clean off the camera lens to make the images clear.



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Field View Monitor

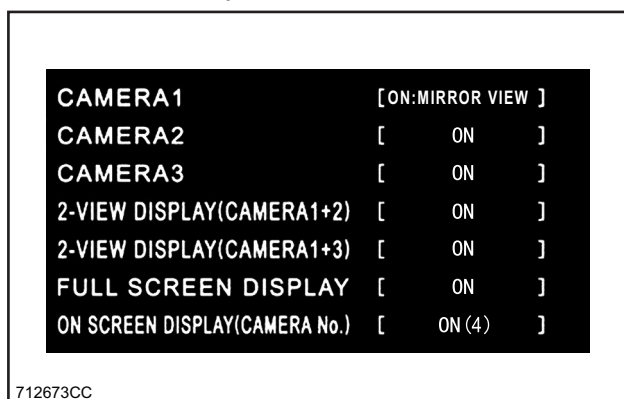
Monitor screen description



08568BC7

3-Description of Handling

1.FRONT display



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Before operation, check that the settings are as follows.

When "FRONT" is displayed, normal images are output.

If "FRONT" is displayed, set the Camera 3 to [ON].

CAMERA1: [ON:MIRROR VIEW]

CAMERA2: [ON]

CAMERA3: [ON]

ON SCREEN DISPLAY(CAMERA No.):
[ON(4)]

4.Machine surrounding (reference line) display

The reference line displays the distance (about 3.0 meters) from the swing center.

5.About 30 cm around the machine are not displayed.

6.The images for the rear left and rear right of the machine look disrupted as they are processed to join together, but this is not malfunction.

7.The view about 5 meters from the center of the machine is shown on the high-angle image display.

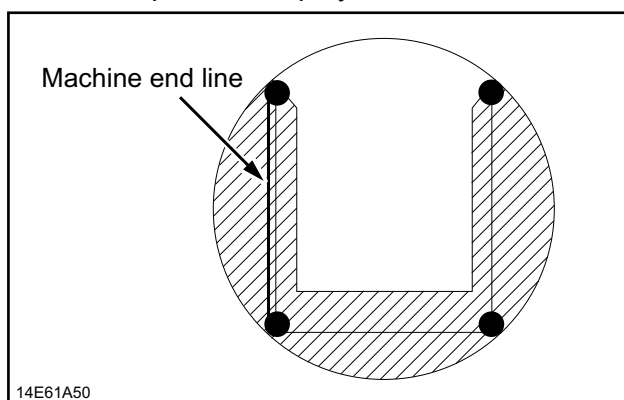
Farther than about 5 meters from the center of the machine is panorama display images.

2.Model name display

The model name of the machine is displayed.

If the model name displayed is not the name of the model you are using, contact your local service dealer.

3.Camera position display



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If the line for the edge of the machine is not displayed in the shaded section, the camera is misaligned. Contact your local service dealer.

3-Description of Handling

Difference of the image from the actual ground surface

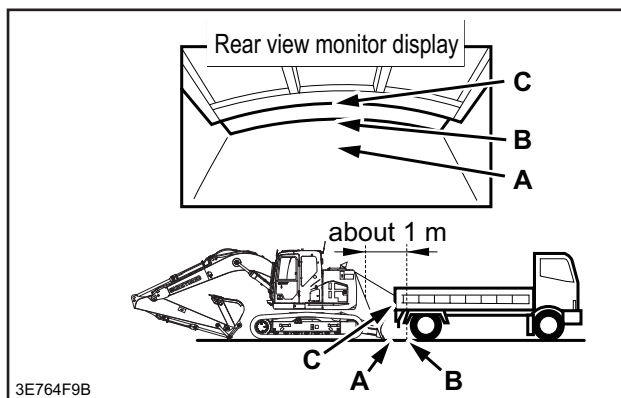
In the following cases, the screen image differs from the actual ground surface conditions (distance, route, etc.)

When a solid object is nearby

The distance reference line targets flat objects (ground surface, etc.).

Therefore, if a solid object that bulges out is nearby, the display may differ from the actual distance.

Example

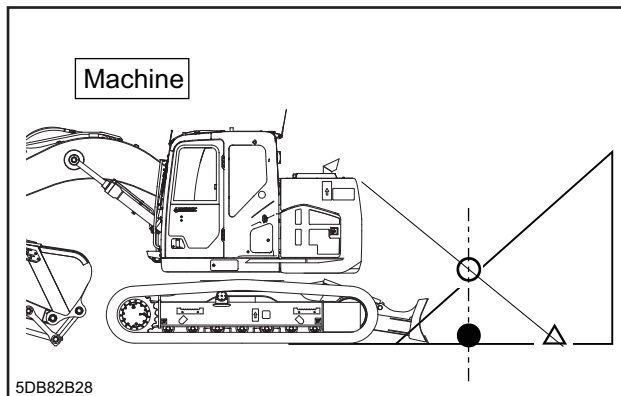


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Position C looks farther away than Position B, but actually it is the same distance as Position A.

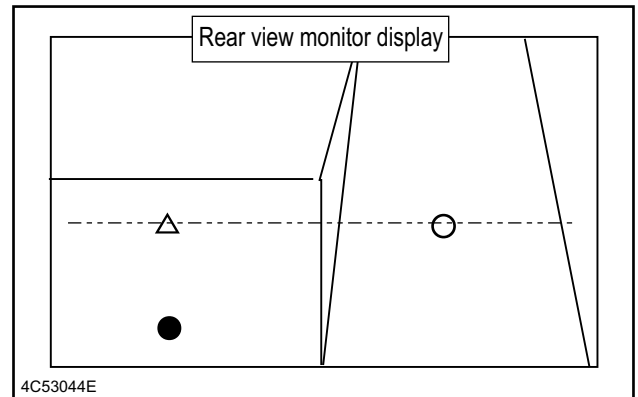
Therefore, if you lower the machine to Position A, you may bump into the truck.

When there is a steep uphill to the rear
If there is an uphill slope to the rear, objects are displayed farther to the rear than they really are.



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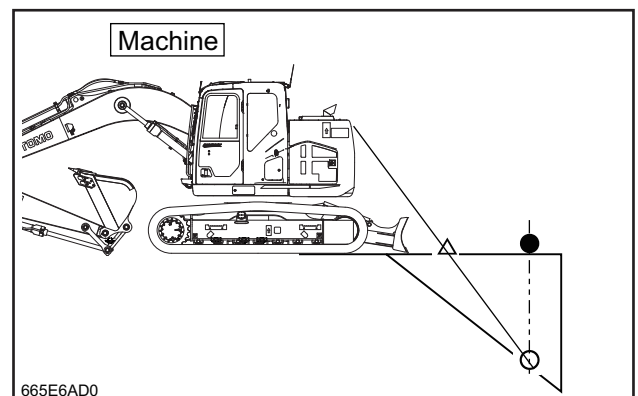
○	Obstruction on uphill
●	Obstruction at the same distance as ○ on plane
△	Obstruction farther than ○ on plane



4C53044E

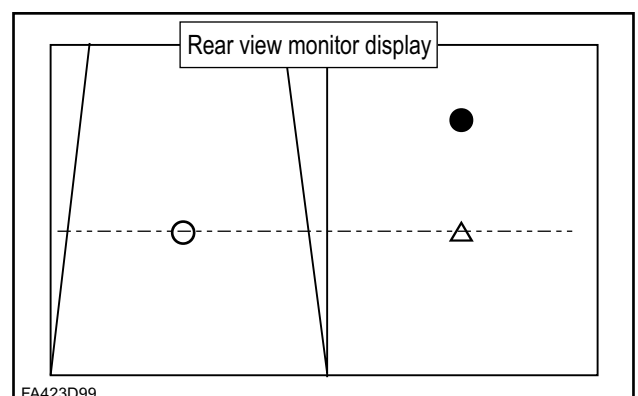
- If there is an obstruction on an uphill, the obstruction looks farther away than it really is.

When there is a steep downhill to the rear
If there is a downhill to the rear, objects are displayed closer than they really are.



665E6AD0

○	Obstruction on downhill
●	Obstruction at the same distance as ○ on plane
△	Obstruction closer than ○ on plane



FA423D99

3-Description of Handling

- If there is an obstruction on a downhill, the obstruction looks closer than it really is.

Safety

Camera	On-screen display
Camera 1 (rear view camera)	Rear
Camera 2 (right rear view camera)	Side
Camera 3 (FVM)	FVM

*The left rear view camera image cannot be displayed alone.

- Check the on-screen display on the monitor and check which camera's images are being displayed.
- When multiple cameras are mounted, do not switch OFF the on-screen display (OSD) setting.

⚠ WARNING

- The on-screen display (OSD) setting is only required when the camera position is changed.

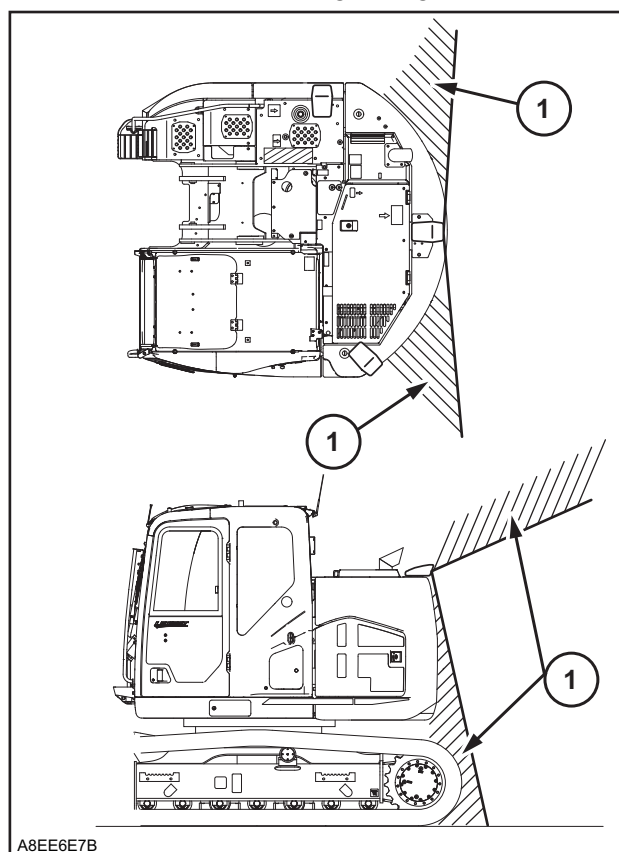
If this setting is incorrect, the screen display and the camera position (display image) are different, which could cause a serious accident. Do not change the setting unless necessary.

- When multiple cameras are mounted, do not switch OFF the on-screen display (OSD) setting.

If on-screen display is set to OFF, it becomes impossible to know the camera position (display image), which could cause a serious accident.

NOTE: There are ranges (blind spots) ① within the camera system for which there is no image.

Rear view camera image range



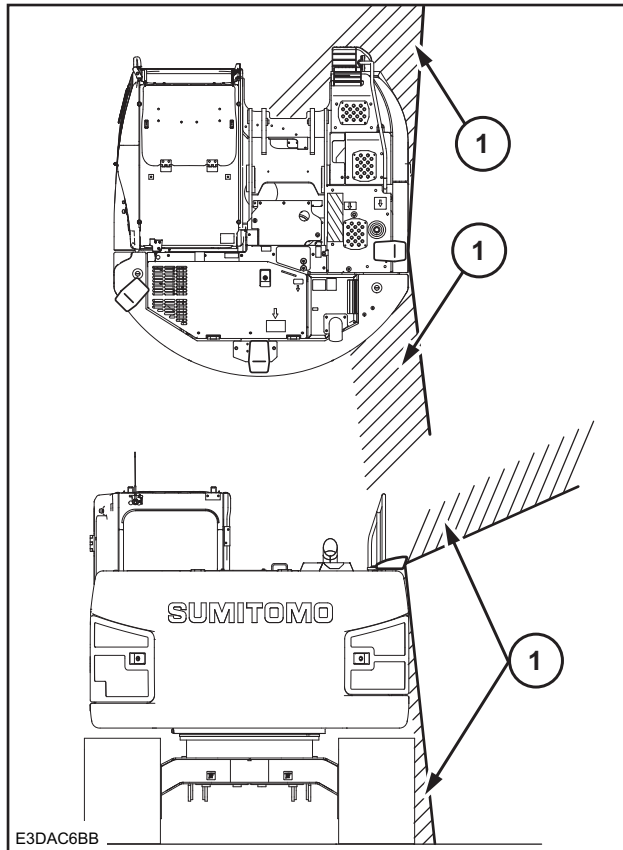
A8EE6E7B

A8EE6E7B

1	Blind spot
---	------------

3-Description of Handling

Right rear view camera image range

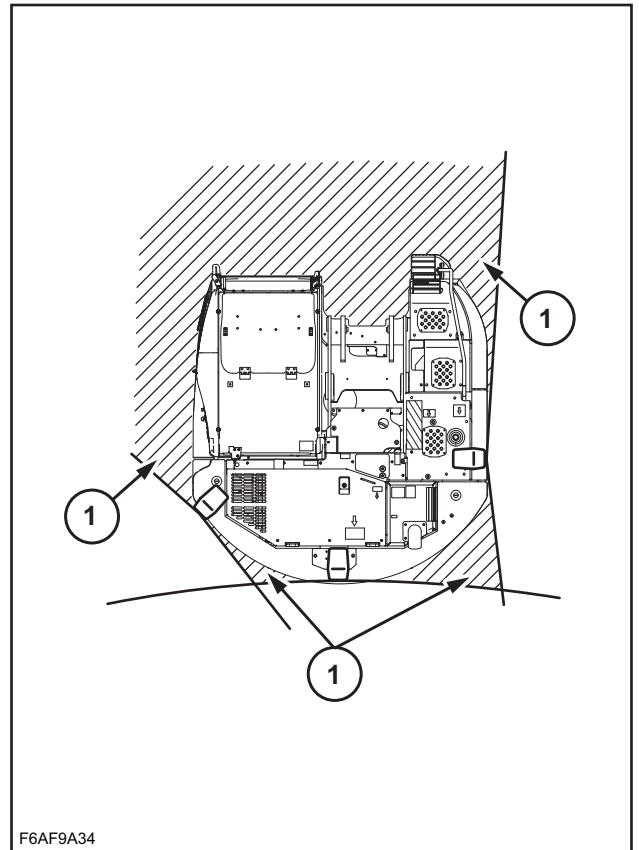


E3DAC6BB

E3DAC6BB

1	Blind spot
---	------------

Field view monitor (FVM) image range



F6AF9A34

F6AF9A34

1	Blind spot
---	------------

3-Description of Handling

Side Door

When you pull the handle, the door opens.

To leave the door open, remove the brace from its storage position and insert it into the hole to support the door.

To close the door, return the brace to its storage position.

The side door can be locked with the starter switch key.

WARNING

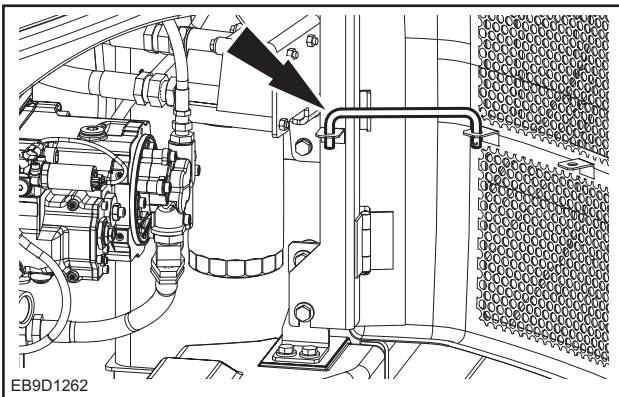
Moving parts!

Make sure all entry and mechanical access doors are properly closed before operating the machine.

Failure to comply could result in death or serious injury.

Right-hand door

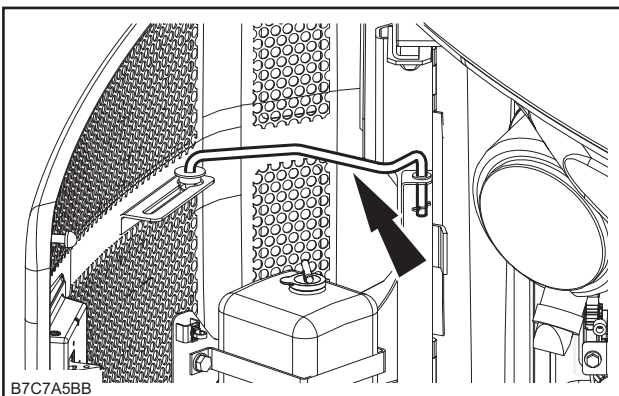
The right-hand door gives access to certain hydraulic components (pump, filter, etc.) and also to the engine fuel and oil filters.



EB9D1262

Left-hand doors

The left-hand doors are mainly for obtaining access to the batteries, windshield washer tank, air filter, radiator, oil cooler, etc.



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NOTICE: Always install the struts when the doors are open.

NOTE: Never leave tools or other objects behind the side doors.

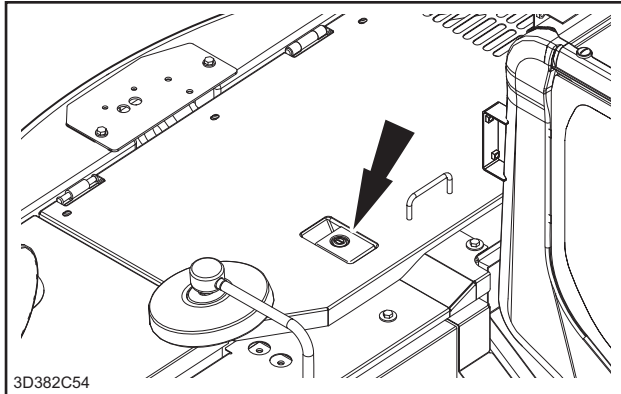
3-Description of Handling

Engine hood

Opening

Release the tailpieces then lift the hood to the maximum so that it gets automatically locked with the support strut.

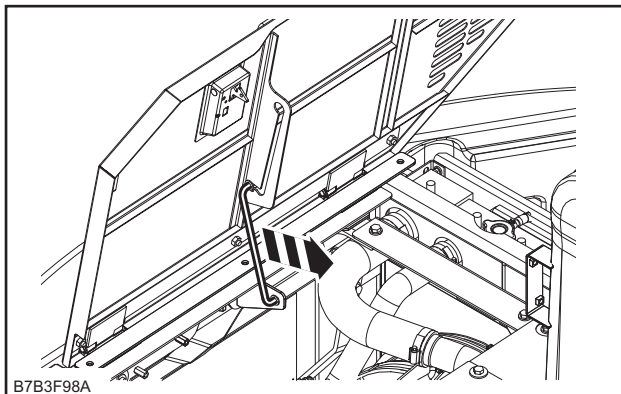
NOTICE: Once the hood is completely opened, make sure the locking system is correctly engaged.



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Closing

Lift the hood slightly, pull the support strut back lower the hood, and lock it using the tail preces.



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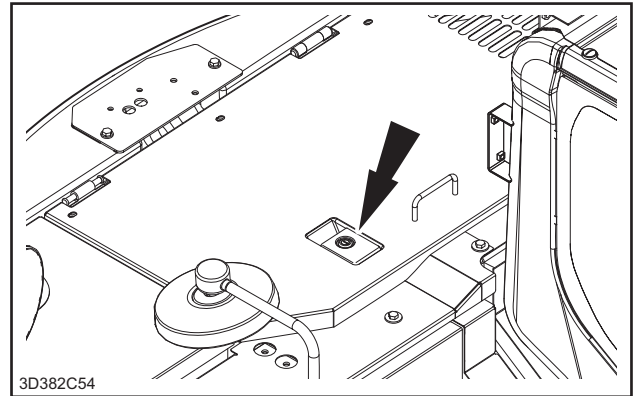
To lock the hood, secure the front tailpiece using the starter switch key.

⚠ WARNING

Moving parts!

Make sure the hood is closed properly before driving the machine.

Failure to comply could result in death or serious injury.



3D382C54

Under covers

Located under the upperstructure frame, these panels provide access to certain machine components.

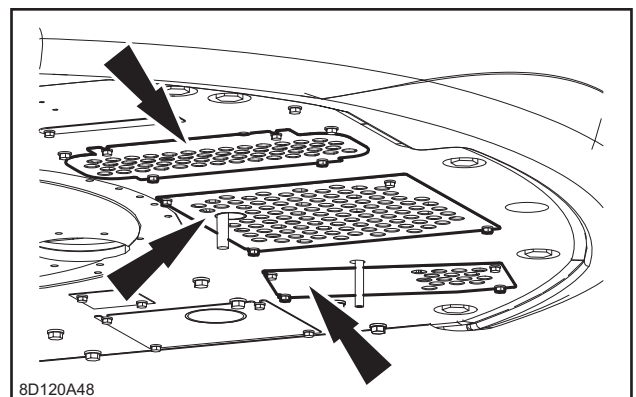
NOTE: Do not run the machine with the panels removed.

⚠ WARNING

Moving parts!

Make sure the lower panels are properly closed before driving the machine.

Failure to comply could result in death or serious injury.

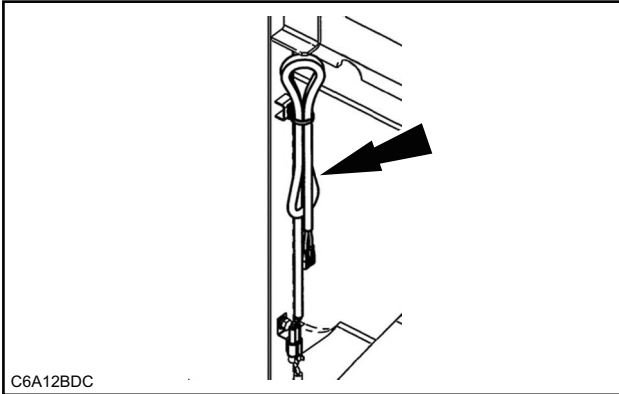


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3-Description of Handling

Beacon Cable (option)

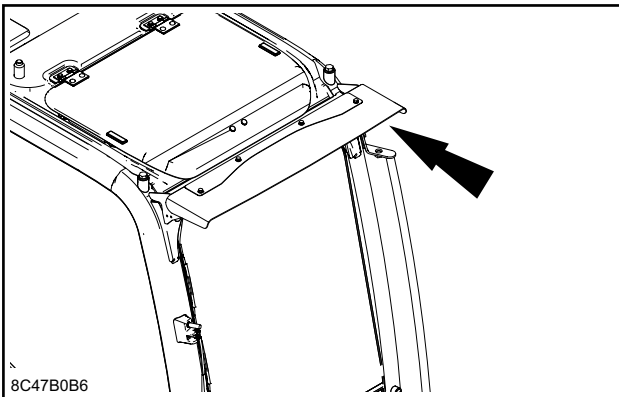
This cable is on the right rear side of the cab and can be used to connect a 24 V beacon.



C6A12BDC

Rain Deflector (option)

Reduces the amount of rain on the upper part of the cab light and windshield.



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Front Guard (option)

⚠ CAUTION

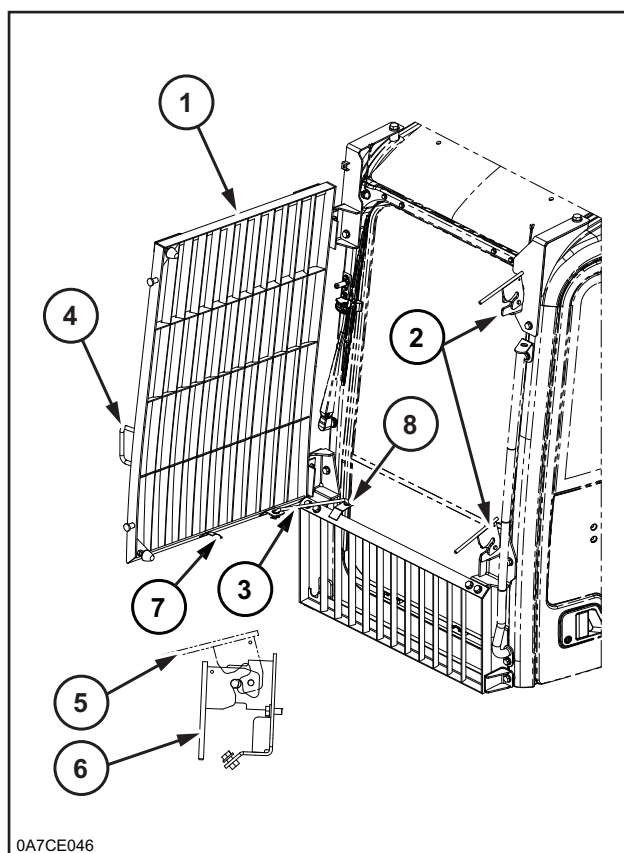
Depending on the type of attachment and the combination of the cab and cab accessories (head guard, front guard, rain deflector, cab top light), the attachment may interfere with the cab or cab accessories.

To open

Hold the front guard ① handle ④.
Move the 2 guard locks ② to the open position ⑤, then slowly open the front guard ①.
Put the lock stay ③ in the locked position ⑧.

To close

Hold the front guard ① handle ④.
Put the lock stay ③ in the retracted position ⑦.
Slowly close the front guard ①.
Put the 2 guard locks ② in the locked position ⑥.



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Windshield washer reservoir

This reservoir, located in the rear left-hand compartment, is equipped with an electric pump which is operated from the control panel, (refer to page 3-33)

NOTICE:

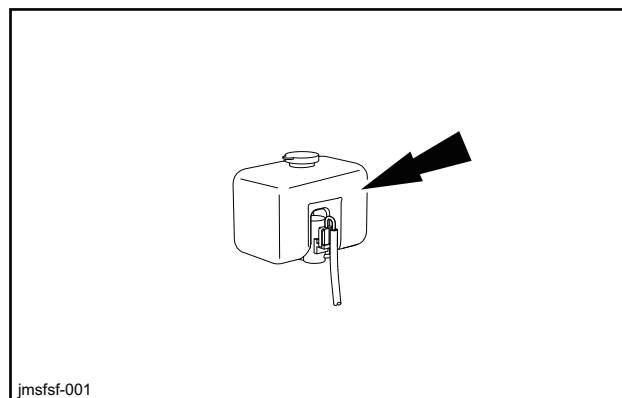
Never operate the windshield washer control when the reservoir is empty.

This could cause damage to the electric pump.

Remove the cap to add windshield washing fluid.

NOTE: In cold weather, add anti-freeze to the windshield washer water.

The reservoir can be lifted out of its support.



jmsfsf-001

3-Description of Handling

Cab Protection (ROPS and FOPS)

This machine is equipped with ROPS (roll-over operator protective structure) and FOPS (falling object protective structure) on the cab.

This machine's protective structures, their fitting supports, and their fastening elements are crucial parts of the structure.

If fire, corrosion, collision, or the like occurs, it is necessary to have a qualified expert evaluate the cab protective structures for damage.

Replace all damaged parts with genuine replacement parts to return the machine to its original state, in which it can be used safely. For information on evaluating cab structural functions or replacing part of or an entire structure, consult your dealer and the certified service plant.

⚠ DANGER

Do not modify the ROPS (roll-over operator protective structure).

Welding, drilling, cutting, or making any other changes without permission reduces the ROPS function so that the protective structure does not work normally.

If the ROPS is damaged, request your dealer or the specified service plant for replacement of the ROPS.

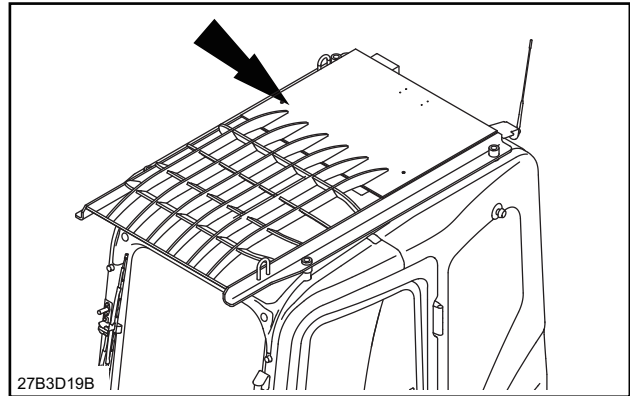
Do not attempt to repair the ROPS.

Otherwise, the protective structure does not function, which is dangerous.

⚠ WARNING

If an accident, fire, sideways fall-over, or roll-over occurs to the machine, before returning the machine to the site or operating it at the work site, have the ROPS (roll-over operator protective structure) evaluated by a qualified expert and replace all damaged parts with genuine parts.

Otherwise, the protective structure does not function, which can lead to an accident.



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⚠ DANGER

If the cab's ROPS guaranteed high-strength member is damaged, replace the cab.

When replacing the cab, check the parts manual for the part number of the appropriate cab for the model.

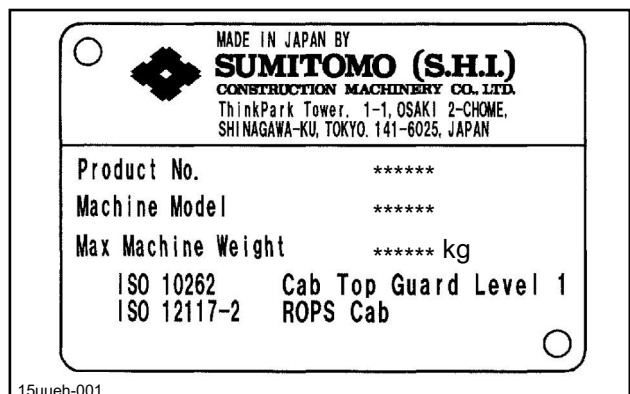
If the wrong cab is mounted, the cab could be damaged if the machine rolls over, which could result in death or serious injury to the operator or damage to the machine.

In order to assure strength, the addition of any parts other than genuine parts and modification of the cab itself are prohibited.

NOTICE:

Reference the part number.

Do not modify.



15uueh-001

4-Operation Explanations Cautions for Operating This Machine

⚠ WARNING

- Repair immediately if you detect any abnormality in the machine.
Do not operate the machine until it has been serviced.
- Before starting work, check the conditions of the surroundings at the work site and take measures so that the work can be performed in safety.
- At all dangerous locations, take the required measures.
- Take measures so that no one enters the work site.

All operators must pay attention to safety at all times and operate in such a way that there are no injuries or machine damage.

Handling a New Machine

Cautions for Using a New Machine

The new machine is well adjusted and inspected before it is shipped from the plant, but if the machine is subject to too much stress while it is still new, the performance of the machine will drop rapidly and the service life will be shortened.

NOTICE:

The first 50 to 100 hours (the time shown on the hour meter) should be treated as the run-in period. Be careful not to apply a full load before each part of the machine has been run in. Doing so may cause scorching, seizing, or the like significantly reducing the service life of the machine.

Run-in Period (50 to 100 hours)

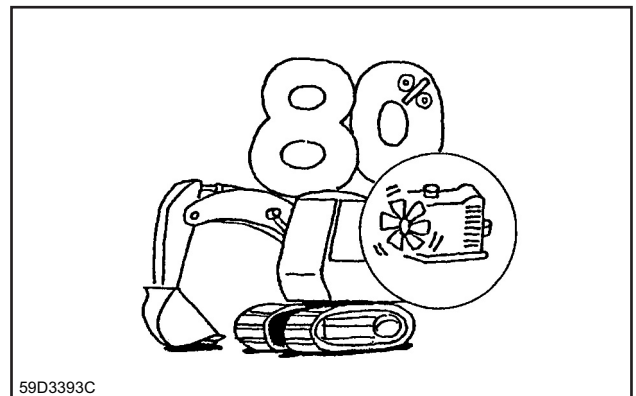
1. Perform the start-up inspections and inspect each part for oil, fuel, and coolant leaks.

2. Always warm up the engine adequately.



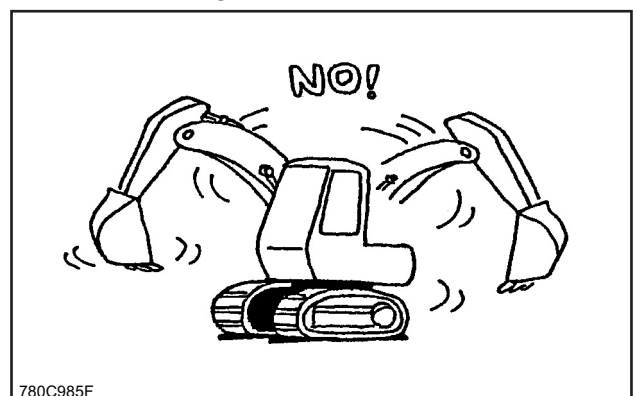
D029AE6D

3. Hold the engine speed down to about 80 % of the maximum speed.



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4. While it is running, check if the machine is operating normally.
5. Avoid starting out or swinging suddenly.
6. Do not subject the machine to severe mechanical shocks, such as sudden stops when lowering the boom.

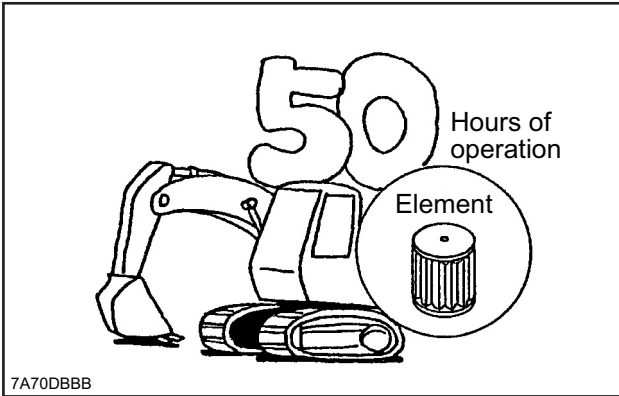


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7. Perform the new machine 50-hour service.

4-Operation Explanations

8. Grease up the front pins daily. [For greasing type machine]



7A70DBBB

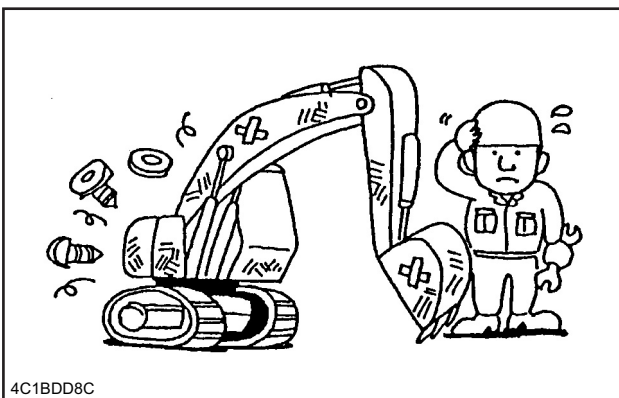
Start-up Inspections (inspections before starting work)

For the sake of the safety of all operators and long machine service life, perform the start-up inspections.

⚠ WARNING

If inspection finds any abnormality, promptly investigate the cause, adjust and service as necessary, and head off breakdowns before they can occur.

Operating the machine while it is still abnormal can cause even more severe breakdown and can cause serious accidents.



4C1BDD8C

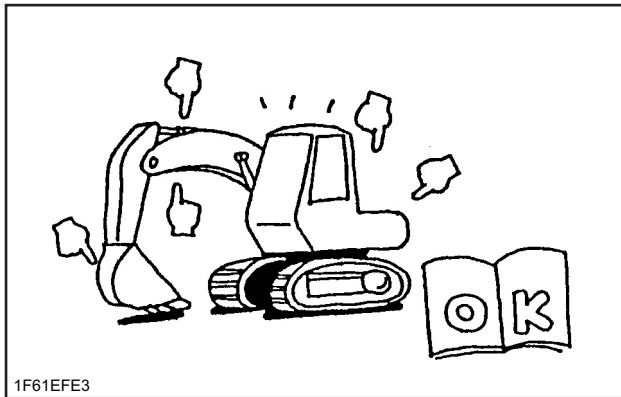
How to Perform Start-up Inspections Machine Walk Around Checks

Perform the checks before starting the engine. Visually inspect well around the machine and underneath

1. Inspect each part for oil, fuel, and coolant leaks.
2. Inspect each part for loose bolts and nuts.
3. Inspect for disconnections and shorts in the electrical wiring and for battery terminal looseness.
4. Inspect each part for oil soiling.
5. Inspect for dust build-up.

Inspections after Starting Engine

1. Inspect the horn and instrument operations.
2. Inspect the engine startup performance and exhaust gas color and inspect for abnormal noise.
3. Inspect each part for oil, fuel, and coolant leaks.



1F61EFE3

4-Operation Explanations

Start-up Inspection Items

	Equipment	Action	Item	Solution	Lubricants (replacement parts)	Reference item
Inspections before engine start	Overall	Inspection and service	1. Inspection for water and oil leak			
			2. Inspection for loose bolt and nut	Tightening		Bolt
			3. Cleaning off dust build-up (particularly around engine and in operator's compartment)	Cleaning		
			4. Inspection for damage to appearance, deformation			
			5. Cleaning inside of operator's compartment and cleaning windows			
	Engine		1. Engine oil level and cleanness inspection	Refilling, changing	Engine oil	Engine
			2. Coolant level inspection	Refilling	Soft water	Engine
			3. Inspection for radiator, oil cooler, intercooler, and fuel cooler damage and clog	Repair, cleaning		Engine
			4. Fan belt tension inspection			Engine
			5. Air cleaner cover installation state inspection			
			6. Inspection for oil and water leaks in each part and damaged hoses and lines			
			7. Fuel filter (main, pre) water draining and sediment removal			Fuel
	Swing body		1. Fuel tank level inspection	Refilling	Diesel fuel	Fuel
			2. Hydraulic tank level inspection	Refilling	Hydraulic oil	Hydraulic oil
			3. Hydraulic oil cleanness inspection			
			4. Inspection for oil and water leaks in each part and damaged hoses and lines			
			5. Inspection for deformation and damage in each part			
			6. Inspection for disconnections and shorts in the electrical wiring and for terminal looseness			
			7. Rear view mirror adjustment			
			8. Inspection for handrails and step abnormalities and loose bolts			
			9. Inspection for deformation and damage of cab and cab guard			
	Undercarriage		1. Inspection for shoe (crawler track) looseness, wear, damage			
			2. Inspection for oil leaks and wear in the upper and lower rollers, idler, and travel unit			Travel unit
			3. Inspection for loose and fallen out installation bolts			Travel unit

4-Operation Explanations

	Equipment	Action	Item	Solution	Lubricants (replacement parts)	Reference item
Inspections before engine start	Work unit	Inspection and service	1. Inspection for oil leaks and damage of cylinder and hose line			
			2. Inspection for bucket wear and damage			
			3. Inspection for bucket tooth looseness, wear, and for missing tooth			Bucket
			4. Front area greasing status inspection		Extreme pressure grease	Bucket
			5. Inspection for loose and fallen out installation bolts			
						Attachments
Inspections after Starting Engine	Overall	Inspection and service	1. Engine startability and exhaust gas color inspection and inspection for abnormal noise			
			2. Hydraulic equipment operation inspection and inspection for abnormal noise			
			3. Inspection for oil and water leaks in each part			
			4. Horn, buzzer, working light, wipers, monitor, and FVM operations inspection			
			5. Operation inspections (travel, swing, attachments)			
			6. Swing brake operation inspection			

For details, refer to "Maintenance".

Anti-theft

Anti-theft Function

In order to prevent theft of this hydraulic excavator, a password can be registered. If the password entered when starting the engine does not match the registered password, the anti-theft function is triggered.

Anti-theft Function Setting

Have this work done by our dealer or authorized service shop.

Anti-theft Function

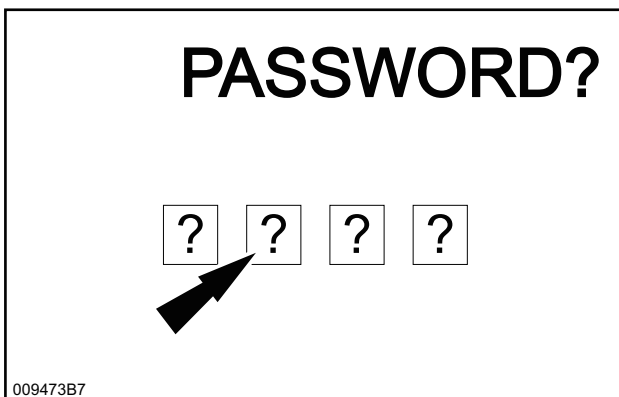
With the anti-theft function is enabled, if the password entered before starting the engine does not match the registered password, the machine goes into the following state.

- Engine idling state
- The travel alarm sounds.
- If the machine is operated, the engine stops.

Password Registration

The first time that the machine power is turned ON after the anti-theft function is set, the password is registered.

1. When you turn the starter switch to the ON position, the password registration screen appears on the liquid crystal monitor.



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2. Operate the switches as follows to enter the password.

[1]Washer switch:

Moves the cursor to the left.

[2]Working light switch:

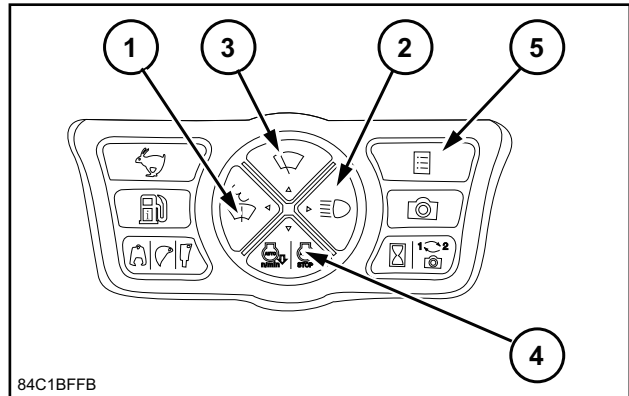
Moves the cursor to the right.

[3]Wiper switch:

Raises the number.

[4]Auto idle/idle stop switch:

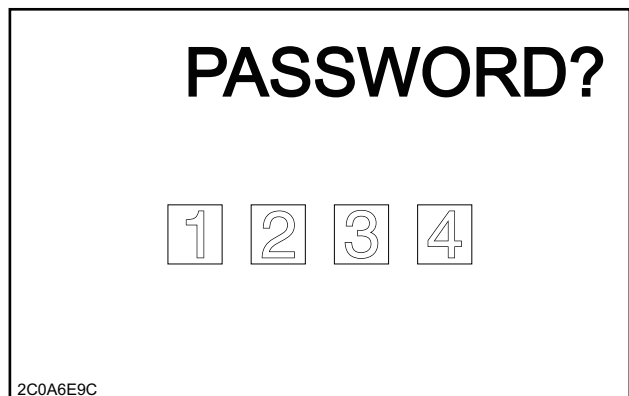
Lowers the number.



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3. When the password has been entered, press menu switch ⑤.

The password is registered for the machine and the display returns to the normal screen.



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Password Change

Have this work done by our dealer or authorized service shop.

NOTICE:

If the number entered does not match the registered password, the excavator does not move.

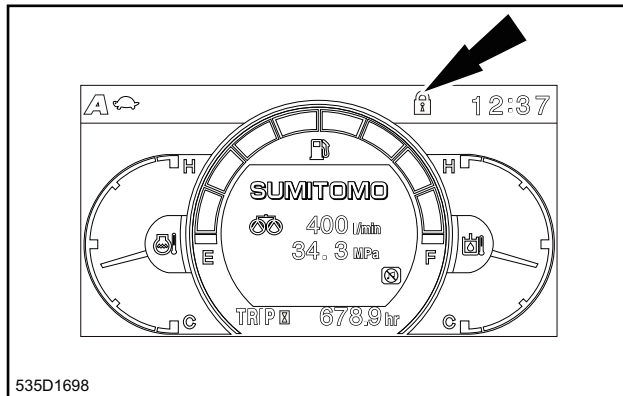
Be sure to write down the password.

How to Use Anti-theft Function

1. Enabling the anti-theft function

[1] Within 2 seconds after stopping the engine, turn the starter switch ON → OFF → ON → OFF.

[2] The buzzer sounds and the key icon is displayed on the monitor.



535D1698

2. Disabling the anti-theft function

[1] When stopping the engine, turn OFF the starter switch to stop the engine.
The anti-theft function is disabled.

NOTICE:

The anti-theft function can be enabled when stopping the engine.

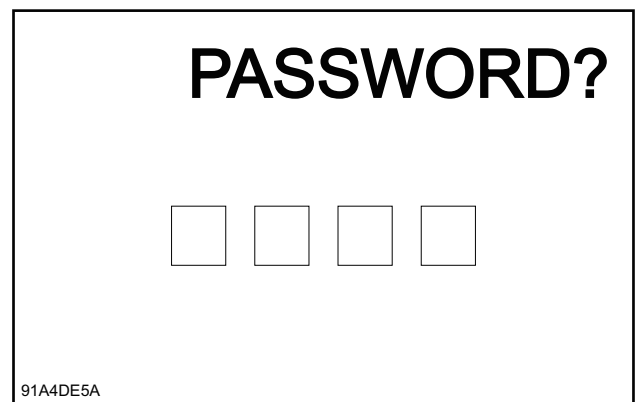
If it is too much trouble to enter the password each time you start the excavator engine, if you stop the engine by just switching the starter switch OFF, you will be able to use the excavator the next time without entering the password.

1. Entering the password (before starting the engine)

[1] When you turn the starter switch to the ON position before starting the engine, the password entry screen appears on the liquid crystal monitor.

⚠ CAUTION

Enter the password before starting the engine. If the password is entered after starting the engine, the system might judge that the machine has been stolen.



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91A4DE5A

2. Operate the switches as follows to enter the password.

[1] Washer switch:

Moves the cursor to the left.

[2] Working light switch:

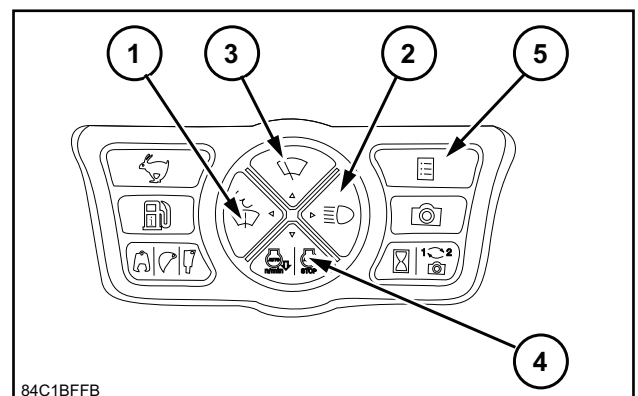
Moves the cursor to the right.

[3] Wiper switch:

Raises the number.

[4] Auto idle/idle stop switch:

Lowers the number.



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84C1BFFB

3. When the password has been entered, press menu switch ⑤ to complete the entry. When the entry is complete, the display returns to the normal screen.

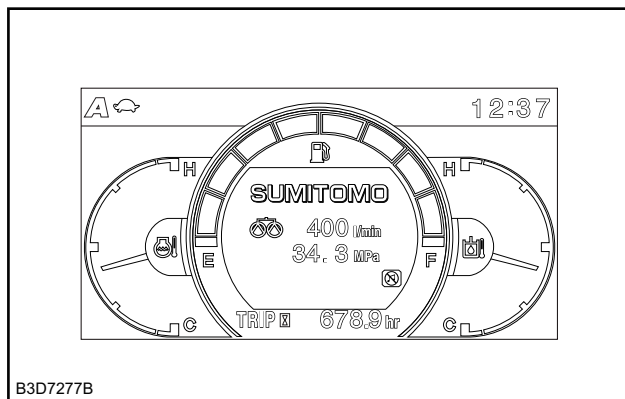


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If the password entered is different from the registered password, ERROR is displayed on the monitor.

The engine can be started, but if any operation is attempted, the engine stops.

If the password entered matches the registered password, the monitor goes to the normal display and the anti-theft function is disabled. The excavator can be operated normally after the engine starts.

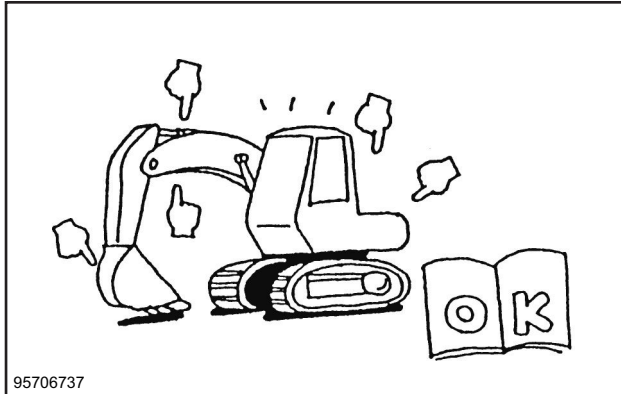


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Starting and Stopping the Engine Before Starting the Engine

NOTE:If this machine has not been used for 1 month or more, refer to "After Storage (when using again)" (4-54).

Before starting the engine, perform "Start-up Inspections (inspections before starting work)" (4-2).



95706737

Basic Operations before Starting the Engine

⚠ WARNING

Check that the gate lock lever is in the locked position (controls inactive) or the sprung up position.

Be careful not to accidentally touch an operation lever or operation pedal as you start the engine. Doing so could make the machine move unexpectedly and cause a serious personal injury.

1. Check for any machine abnormalities and check the conditions of the surroundings. Check that the engine hood and side door are closed and locked.
2. Sit correctly in the operator's seat and fasten the seat belt tight.
3. Set the gate lock lever in the locked position (controls inactive) or sprung up position.
4. Adjust the operator's seat so that you can operate the operation pedals and levers without strain.

5. Move all operation levers to the neutral position.

Cautions for Starting the Engine

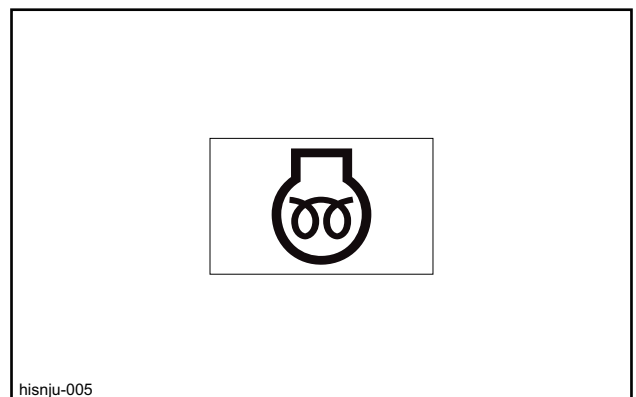
1. In cold weather, the oil viscosity rises and the battery performance drops, making the engine start difficult.
Do what you can so that the engine can start on the first try.
2. Sound the horn to warn the surroundings, take a breath, then start the engine.

NOTICE:

Starting in cold weather

Before the engine is started in winter or in cold weather, the "ENG. PRE HEAT" icon is displayed on the monitor and the engine is automatically preheated.

When the icon goes out, start the engine.



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3. After starting the engine, always inspect it and let it warm up.

NOTE:When the engine is run at low speed, resonance can cause vibration. If that happens, raising the engine speed slightly reduces the vibration.

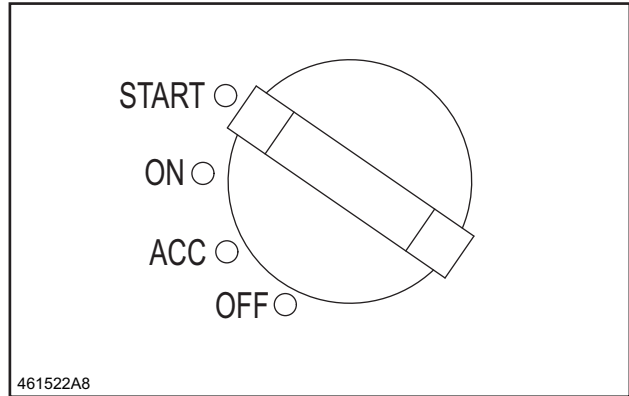
4-Operation Explanations

Starting the Engine

Complete the basic operations for before starting the engine in the previous section, then start the engine.

Basic Operations for Starting the Engine

1. Set the gate lock lever in the locked position (controls inactive).
2. Insert the key in the starter switch, turn the key to the "ON" position, then check for any abnormalities on the monitor.
When the engine starts, it starts at idle speed regardless of the engine throttle switch position.
After that, when the lever or the throttle switch is operated, the engine speed becomes that of the throttle position.



461522A8

5. After starting the engine, let it warm up.

NOTICE:

- The engine cannot be started with the gate lock lever in the unlocked position (controls active).
3. Press the horn switch (left operation lever top section) to sound the horn and signal (warn) the surroundings.
 4. Turn the key from the "ON" position to the "START" position.
The cell motor turns and the engine starts.
When the engine has started, release the key.
The key automatically returns to the ON position. (Because this engine has technology for controlling exhaust gases, the starter must run longer than for conventional engines in order to get the engine to catch.)

NOTICE:

Do not run the starter for more than 10 seconds.
If the engine does not start the first time, return the key to the OFF position, wait for at least 30 seconds, then try again.
Failure to perform this operation correctly may damage the starter and run down the battery.

Inspection after Starting the Engine

⚠ WARNING

If you recognize any abnormality, stop the engine promptly, investigate the cause, and repair immediately.

NOTICE:

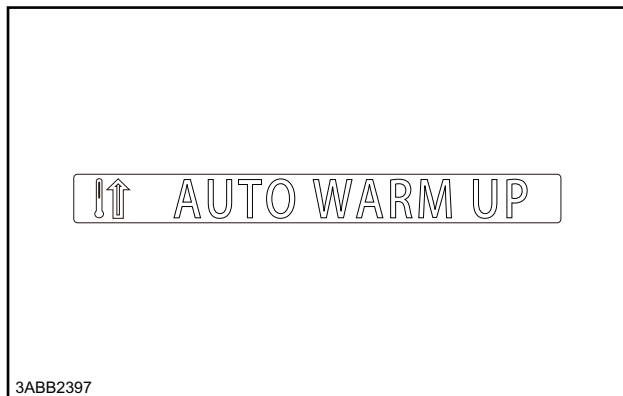
This machine is equipped with engine auto warm-up function.

During auto warm-up, the "AUTO WARM UP" icon is displayed on the system display panel.

During auto warm-up operation, the engine speed rises and falls. This is normal.

When auto warm-up operation is complete, the engine goes to idle speed regardless of the engine throttle switch position.

After that, when the lever or the throttle switch is operated, the engine speed becomes that of the throttle position.



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Basic Operations after Starting the Engine

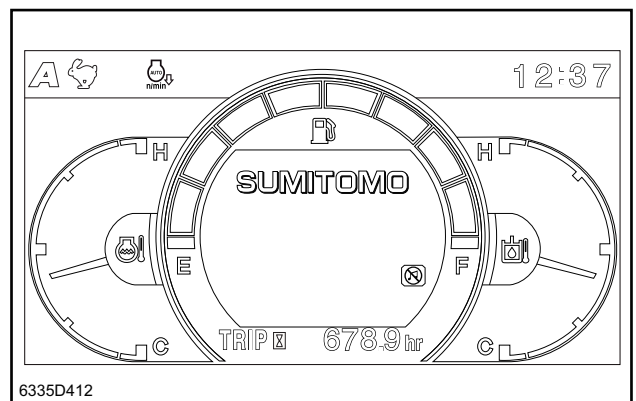
After starting the engine, carry out the following inspections and checks while letting the engine warm up.

For details, refer to "Warm-up Operation" (4-14).



D029AE6D

- 1.Engine startability, exhaust gas color, and abnormal noise
- 2.Hydraulic equipment operation and abnormal noise
- 3.Water and oil leaks in each part
- 4.Horn, buzzer, working light, and monitor inspection
- 5.Are the coolant temperature gauge and hydraulic oil temperature gauge normal?



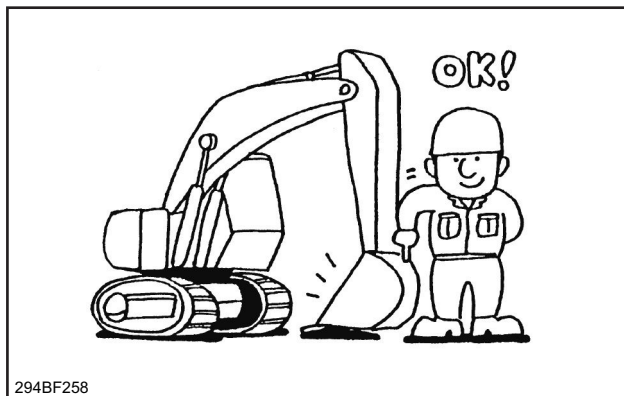
6335D412

- 6.Check operations (travel, swing, attachments) for abnormalities.

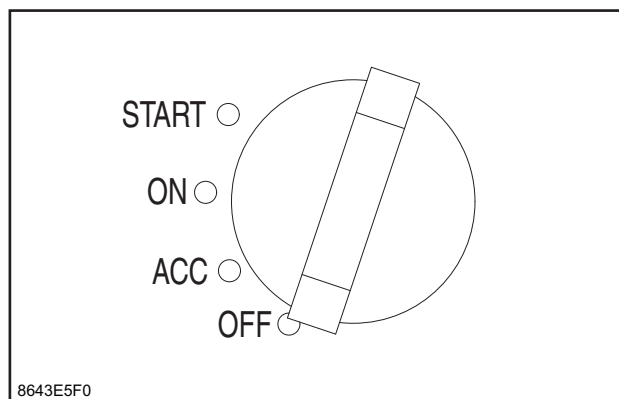
4-Operation Explanations

Stopping the Engine (normal)

1. Stop the machine on a flat location with solid ground and lower the bucket to the ground.



294BF258

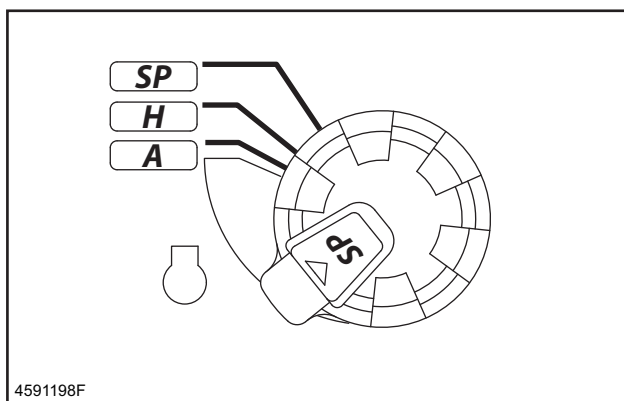


8643E5F0

2. "Let the engine run in low idle for at least 3 minutes" until the turbocharger cools off before stopping the engine.

⚠ CAUTION

If an engine with a turbocharger is stopped suddenly, the lubricated section of the turbocharger main unit dries out due to high heat, which can cause turbocharger breakdown.



4591198F

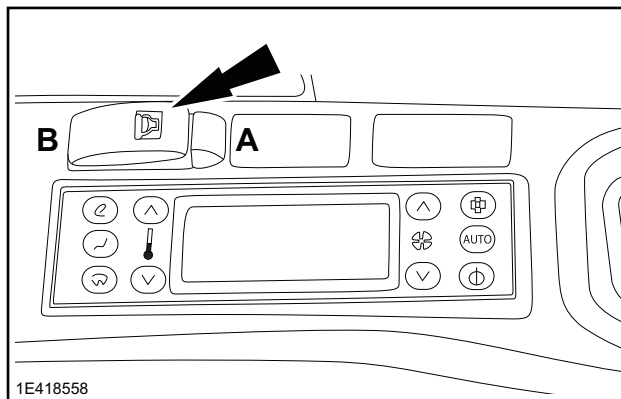
3. Turn the starter switch key to the "OFF" position and stop the engine.
Remove the key.

Engine Emergency Stop (safety device)

If the emergency stop switch is pressed, the engine stops.

NOTICE:

- Turning the switch to the B position cancels the emergency stop.
- Switching the starter key ON → OFF → ON does not cancel the engine emergency stop.



1E418558

A position	Activates emergency stop
B position	Cancels emergency stop

Warm-up Operation

Warm-up Operation

⚠ WARNING

If warm-up operation is not performed, delays can occur in starting and stopping operations.

⚠ CAUTION

- Be sure to perform warm-up operation as it not only prevents damage to the hydraulic equipment but is also necessary for safety.
- After the warm-up operation, before operating the machine, always check that the boom, arm, bucket, swing, and travel operations are all normal.
- Perform thorough warm-up operation in winter or in cold climate.

The normal hydraulic oil temperature is 50 to 80 °C. If this machine is operated suddenly with the hydraulic oil at 20 °C (the hydraulic oil temperature gauge needle at the position above C) or lower, hydraulic equipment may break down.

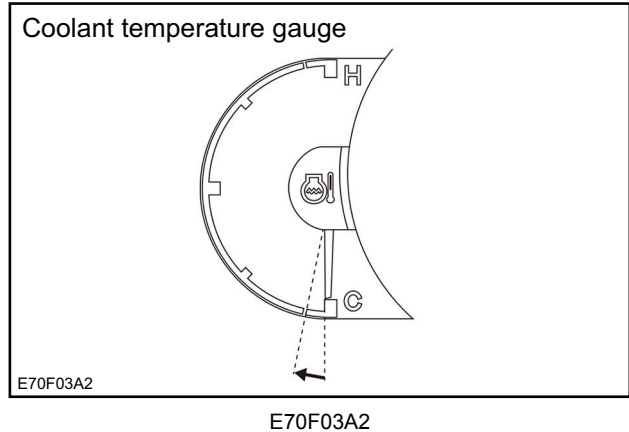
After starting the engine, warm up adequately using the following procedure so that the hydraulic oil is warmed to about 20 °C (the hydraulic oil temperature gauge needle at the position above C).

Warm-up Operation Procedure

1. Warm up the engine.

[1] Auto warm-up operation

After the engine starts up, if the engine coolant temperature is low, the engine goes into auto warm-up and the engine is warmed up for 10 - 15 minutes raising the engine speed in steps.



NOTICE:

To cancel auto warm-up, operate the engine throttle switch or an operation lever.

The yardstick for engine warm-up is that the needle on the coolant temperature gauge points to C or higher.

[2] Manual warm-up

Run for 5 - 10 minutes with the engine throttle switch in the low to medium speed position.

4-Operation Explanations

2. Warm up the hydraulic equipment.

⚠ CAUTION

- Do not let the attachment run into the machine body or the ground while operating.
- Always check the operating method as operating.
- During warm-up, do not operate anything other than the bucket.
- If the bucket cylinder is extended/retracted to the end of its stroke, relieve it within 30 seconds.

[1]After warming up the engine, set the engine throttle switch to the medium speed position.

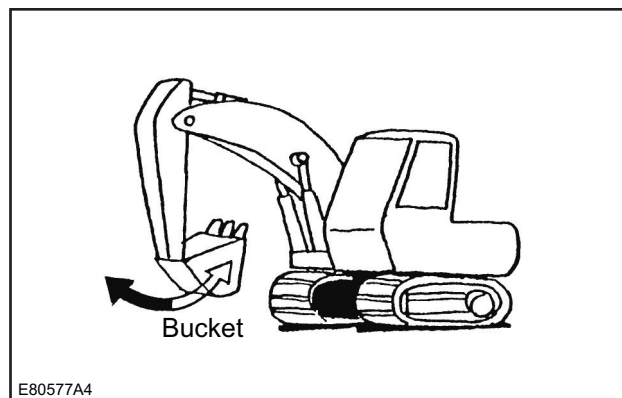
[2]Set the gate lock lever in the unlocked position (controls active).

[3]Slowly operate the bucket with the right operation lever and extend the bucket cylinder all the way to the end of its stroke.

[4]Release the right operation lever within 30 seconds.

[5]Slowly operate the bucket with the right operation lever and retract the bucket cylinder all the way to the end of its stroke.

[6]Release the right operation lever within 30 seconds.



E80577A4

[7]Repeat Steps [3] through [6] above to warm up the hydraulic equipment for about 10 minutes.

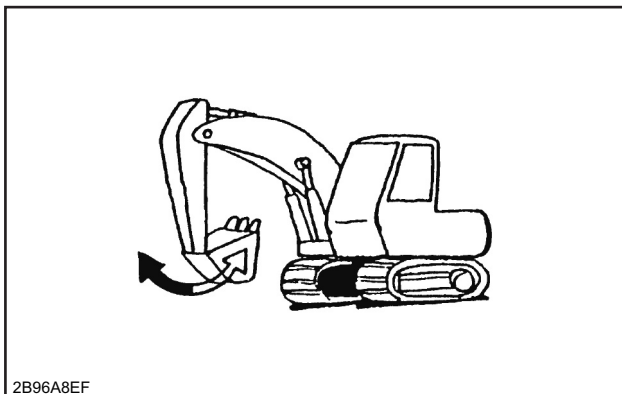
4-Operation Explanations

3. Check that each operation is performed normally.

[1] Slowly repeat operations below 3 - 5 times to check that each operation is performed normally.

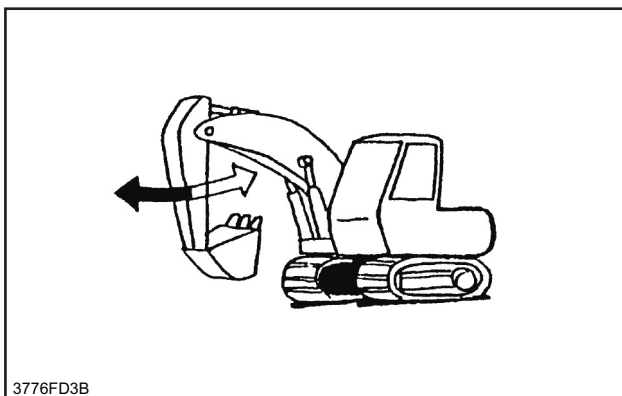
If you sense any delayed response or any other abnormality in any operation, warm up the hydraulic equipment again as in 2.

- Bucket operation



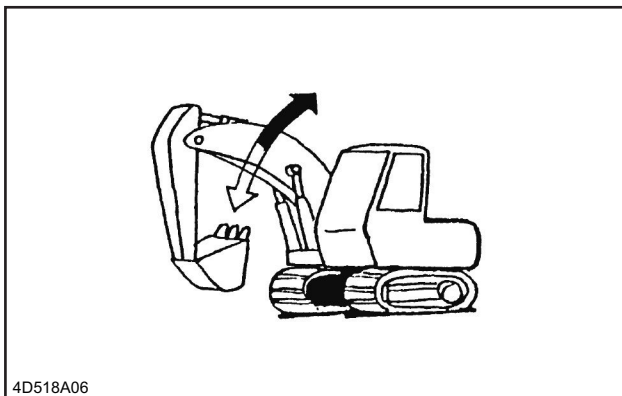
2B96A8EF

- Arm operation



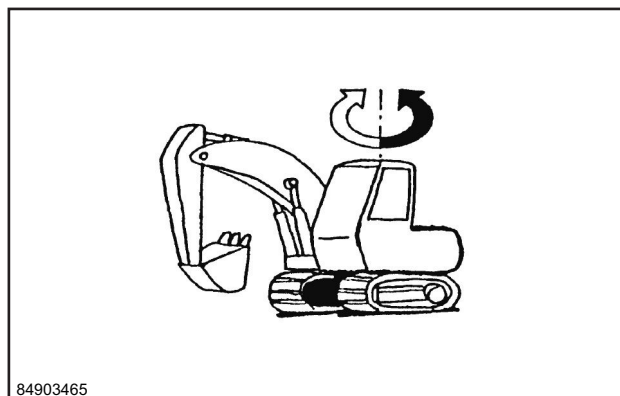
3776FD3B

- Boom operation



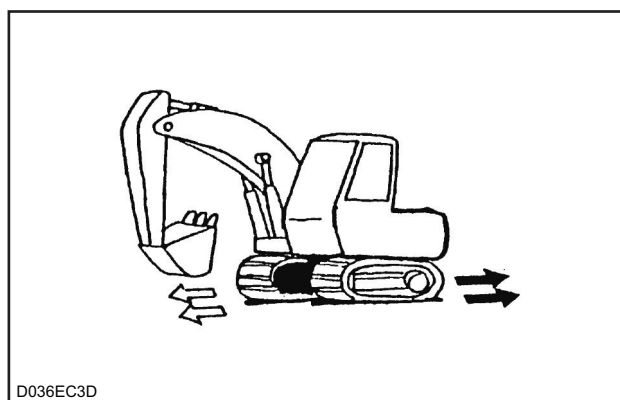
4D518A06

- Swing operation



84903465

- Travel operation



D036EC3D

Anti-interference System Start-up Inspection (offset boom type)

Checking the Actuation of Anti-interference System

⚠ WARNING

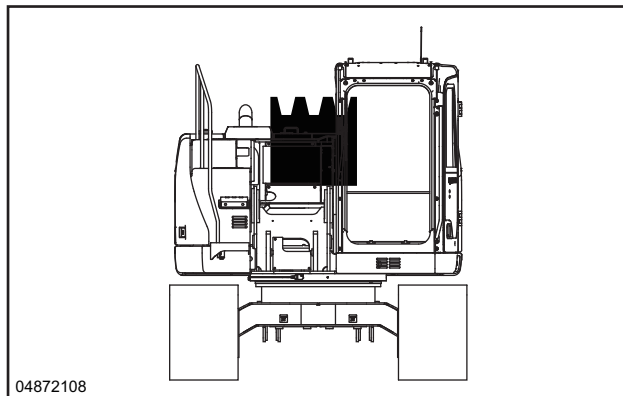
Before checking the actuation of the anti-interference system, be sure to perform warm-up operation to let the temperature of the hydraulic oil rise to approximately 20°C. (The coolant temperature gauge should be indicating a point above "C.")

While checking the actuation of the anti-interference system, set the engine throttle switch to the low-speed position and operate the machine slowly.

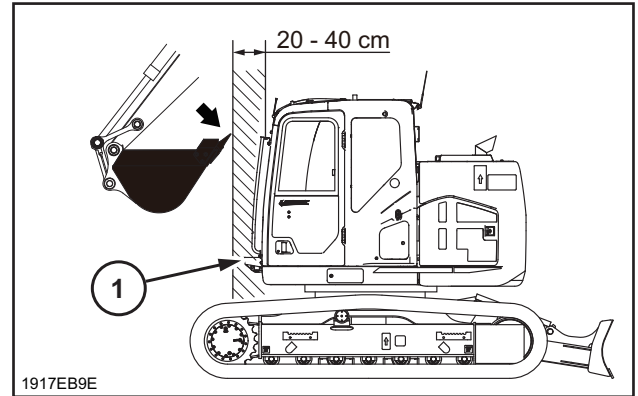
1. Forward auto stop check

With the attachment set as shown in the figure, slowly move the bucket closer to the cab to confirm that the attachment stops completely within the auto stop range.

If it does stop, move the attachment forward to separate the bucket from the cab and cancel the auto stop.



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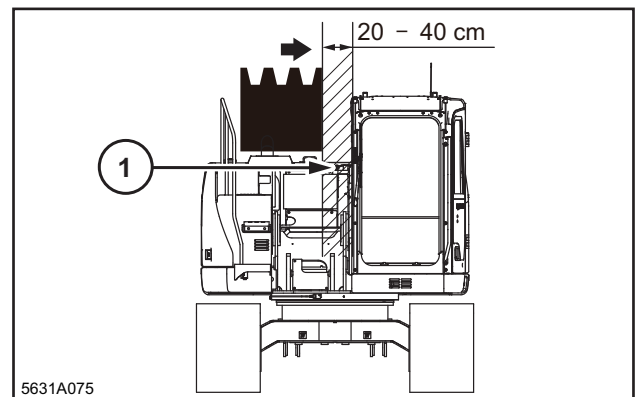
1917EB9E

1 Cab forward auto stop range

2. Lateral auto stop check

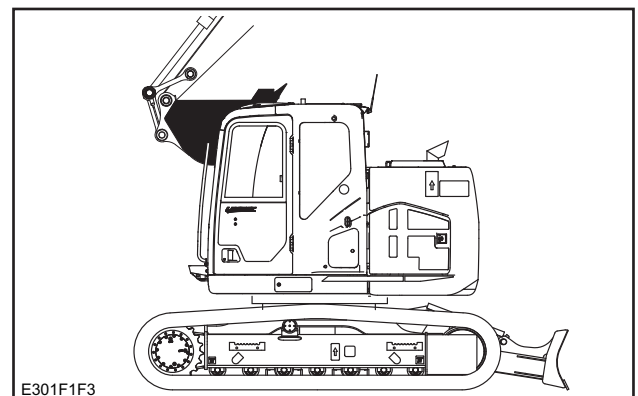
With the work machine set as shown in the figure, perform the left offset operation to slowly move the bucket closer to the cab and confirm that the machine stops completely within the auto stop range.

If it does stop, perform the right offset operation to separate the bucket from the cab and cancel the auto stop.



5631A075

1 Cab lateral auto stop range



E301F1F3

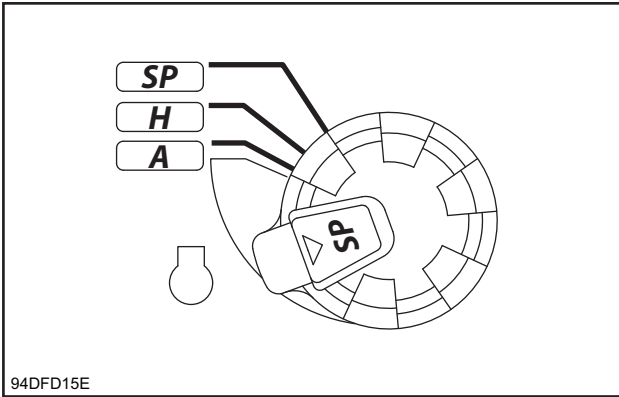
4-Operation Explanations

Travel Operation

This section explains the operation procedure from starting out the machine until stopping.

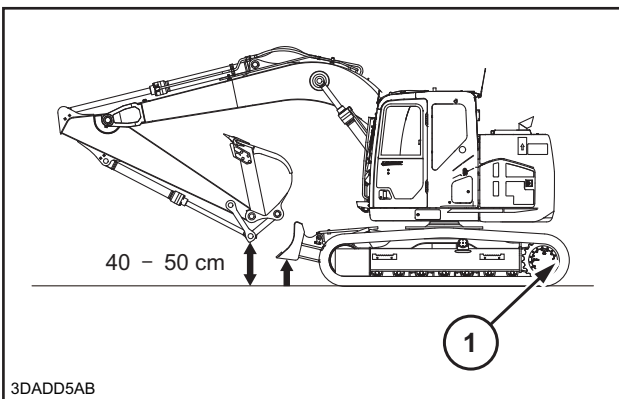
Starting Out

1. Turn the engine throttle switch to raise the engine speed.



94DFD15E

2. Fold the attachment and raise it 40 to 50 cm off the ground, and raise the blade.



3DADD5AB

⚠ CAUTION

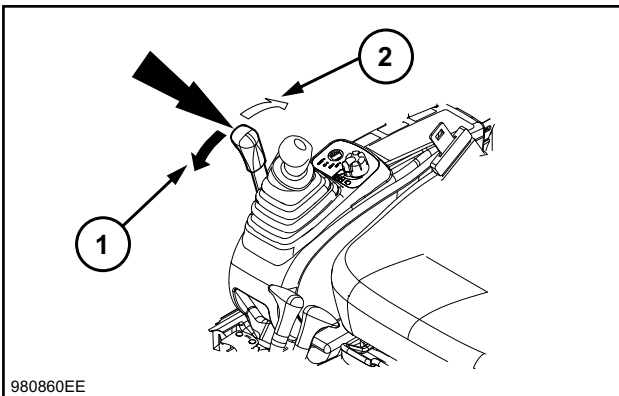
- Check the safety in the work range before operating the blade.
- Raise the blade before traveling.
- While working in locations with many rocks, be careful not to break the blade.
- Do not perform work that applies a load to one side of the blade. This could break the blade.
- When parking, lower the blade.
- Check safety during operation. Also, be very careful when operating levers.

3. Check the direction of the undercarriage.

⚠ CAUTION

If the travel unit is at the rear, pushing the travel lever forward moves the machine forward and pulling the lever toward you moves the machine back.

1	Travel unit
---	-------------



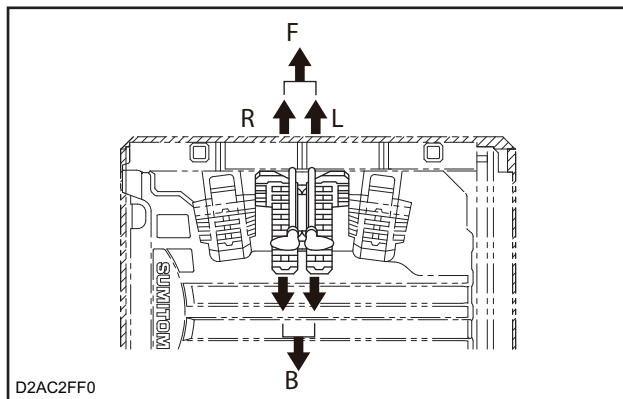
980860EE

1	Lower the blade
2	Raise the blade

4. Check the safety of the machine surroundings, sound the horn to signal (warn) the surroundings, and slowly either press the left and right travel levers forward or pull them to you to make the machine travel.

⚠ WARNING

Note that if you set the engine throttle switch to high speed and operate the travel lever suddenly, the machine will start out suddenly.



D2AC2FF0

F	Forward
R	Right turn
L	Left turn
B	Backward

Travel Alarm

With the travel alarm select switch in the "CONT" position, an alarm during traveling stays on.

With the switch in the "AUTO OFF" position, an alarm during traveling stops after 10 seconds.

For details, refer to "Right-hand console" (3-55).

4-Operation Explanations

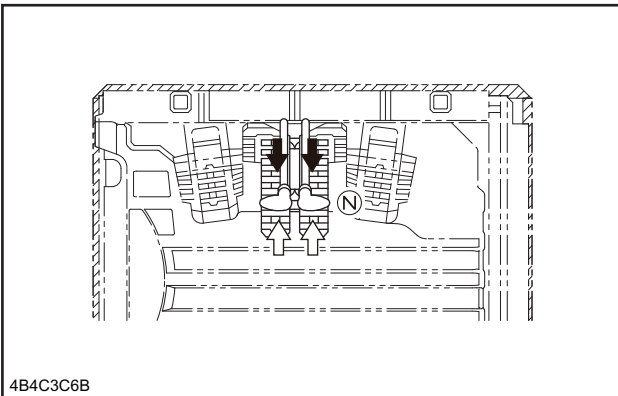
Stopping

⚠ CAUTION

- As much as possible, stop the machine with leeway.
- Avoid sudden stops.
- Park and stop the machine at a safe location on level, solid ground.
If the machine must be parked or stopped on an incline, take safety measures, such as digging the bucket into the ground and applying chock blocks behind the downhill side crawlers (both left and right sides).

NOTICE:For information on stopping the engine, refer to "Starting and Stopping the Engine".

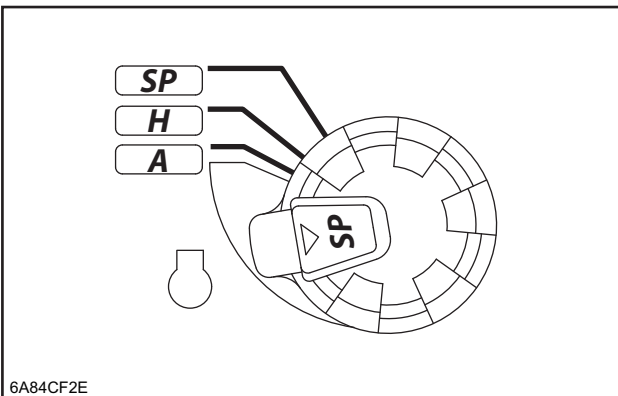
1. Move the travel levers to the neutral position.



4B4C3C6B

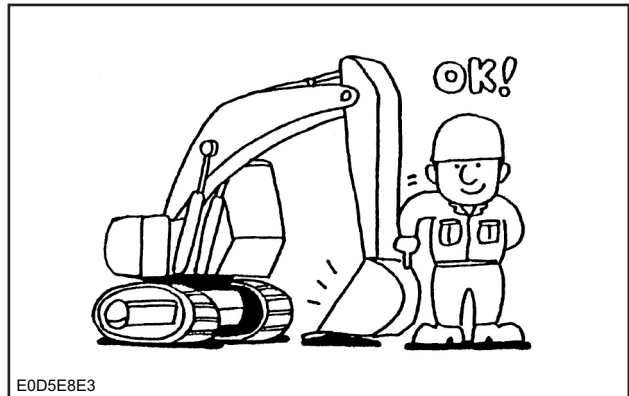
N	Neutral
---	---------

2. Turn the engine throttle switch to lower the engine speed.



6A84CF2E

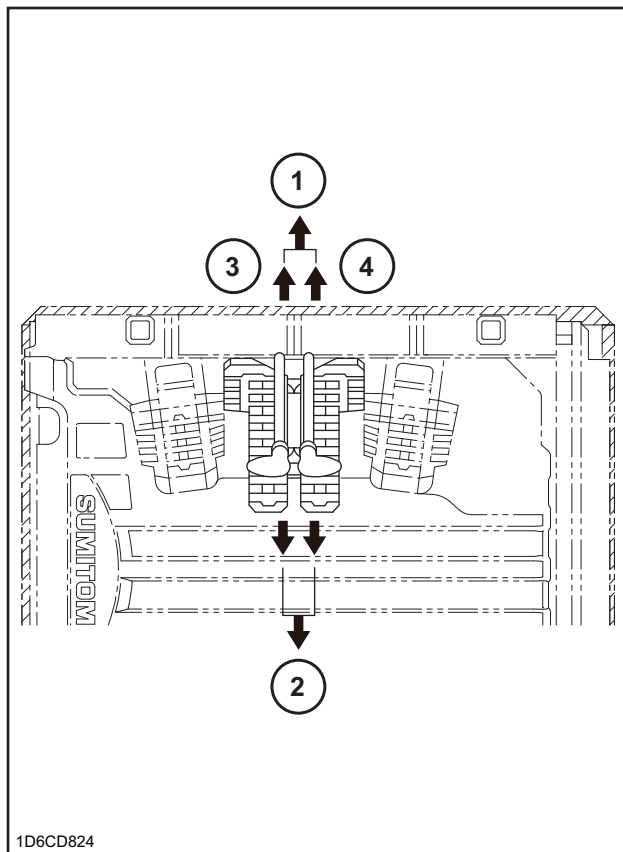
3. Lower the bucket to the ground.



E0D5E8E3

Travel Levers

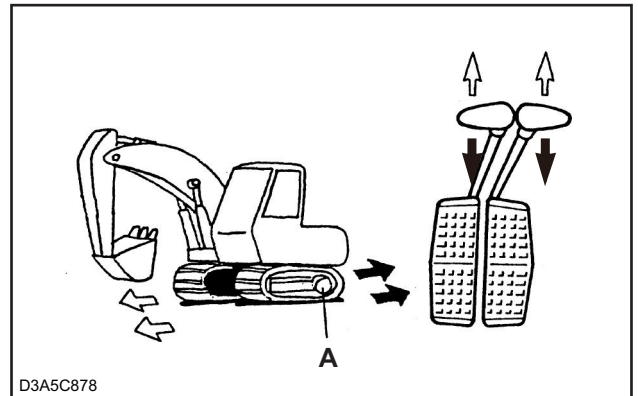
1. Pushing the left and right travel levers at the same time moves the machine forward.
 2. Pulling the left and right travel levers at the same time moves the machine back.
 3. Pushing the left travel lever turns the machine to the right.
 4. Pushing the right travel lever turns the machine to the left.
- If you operate the left and right levers at the same time in opposite directions, the machine turns on the spot.
..... Spin turn



1D6CD824

⚠ WARNING

- Check the direction of the undercarriage before operating travel levers.
If the travel unit is at the rear, pushing the travel lever forward moves the machine forward and pulling the lever toward you moves the machine back.
- Keep your feet off the travel pedals when not performing travel operations.



D3A5C878

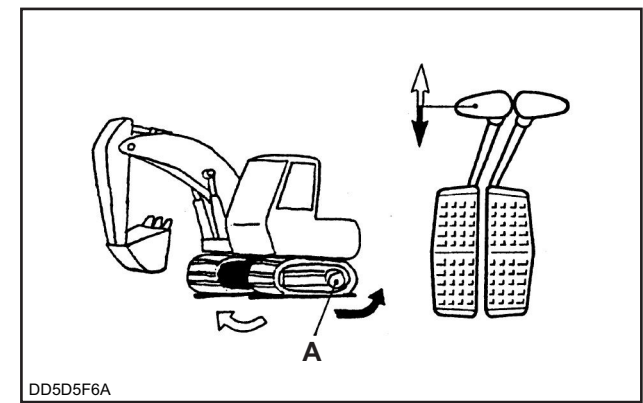
⇒	Forward
⇐	Backward
A	Travel unit

⚠ CAUTION

- As much as possible, avoid sudden changes in direction.
In particular when making a spin turn, bring this machine to a full stop before making the spin turn.
- When traveling on rough ground, the machine is subject to excessive force and stress. Reduce the engine speed and travel at lower speed.

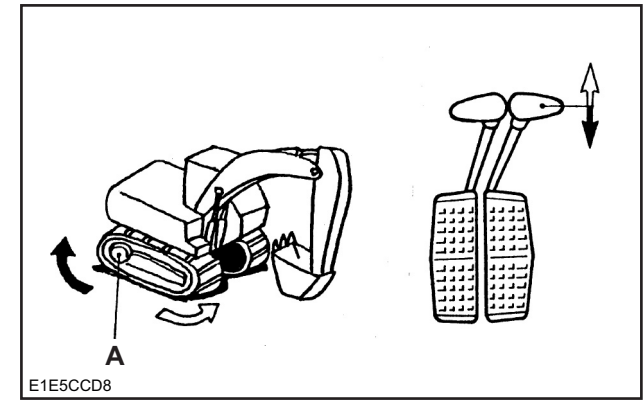
4-Operation Explanations

Pivot turn



DD5D5F6A

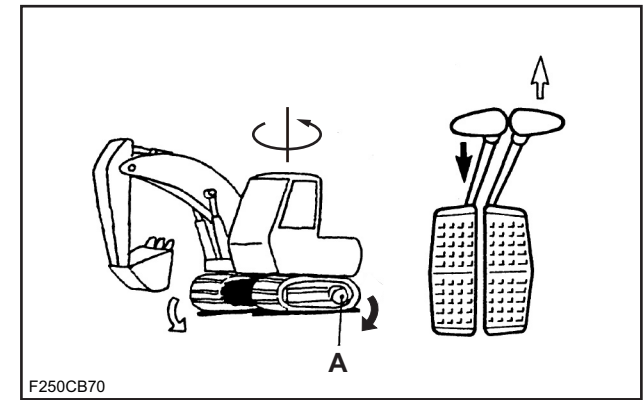
⇨	Right pivot turn (forward)
⇨	Left pivot turn (backward)
A	Travel unit



E1E5CCD8

⇨	Left pivot turn (forward)
⇨	Right pivot turn (backward)
A	Travel unit

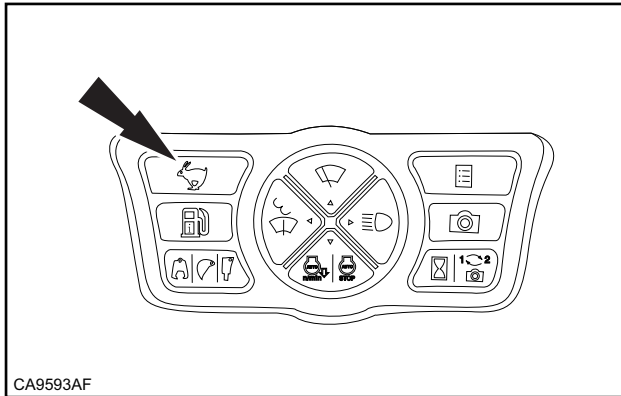
Spin turn



F250CB70

⇨	Forward
⇨	Backward
A	Travel unit

Travel Speed Selection



CA9593AF

CA9593AF

Travel speed	Travel mode icon	Description
High speed		<p>Use when traveling on flat ground with good footing.</p> <ul style="list-style-type: none"> If the load increases, for example when going uphill, the machine switches to low speed automatically and when the load drops, it returns to high speed automatically.
Low speed		<p>Use when traveling uphill or downhill and on bad footing.</p>

⚠ CAUTION

Stop travel, then switch the switch.

Cautions When Traveling

⚠ WARNING

In any dangerous location, take safety measures such as setting up signs or assigning a guide.

1. Check the position of the travel unit before starting travel operations.
2. As much as possible, travel on flat, solid ground.

3. Avoid obstructions.

NOTICE:

Particularly, a machine with wide shoes should avoid traveling on rough ground. Wide shoes are more easily deformed or cracked.

4. Travel at slower speed when traveling on rough ground.
5. When changing the direction, make as a wide an arc as possible and avoid sudden pivot turns and spin turns.



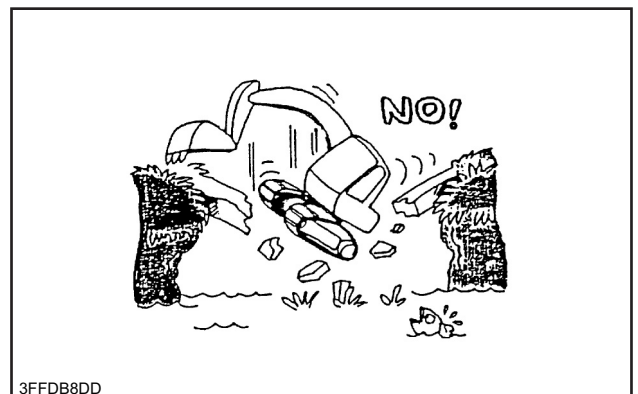
22D1C653

22D1C653

6. Check the travel route.

- Investigate the travel route beforehand.

7. When moving the machine through a location with poor visibility, post someone to give the operator signals at all times. Carefully check the permitted load on any bridge before traveling over it.



3FFDB8DD

3FFDB8DD

8. When traveling on paved road, use plates etc., to avoid damaging the pavement.

4-Operation Explanations

9. When traveling on a location with significant amounts of gravel or stones, reduce the travel speed and travel with the track shoe tension reduced.

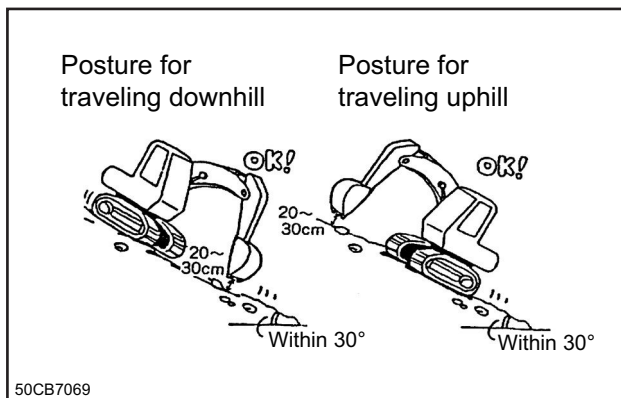
Cautions for Traveling Uphill and Downhill (slopes)

⚠ WARNING

Traveling uphill or downhill with the attachment raised poses the danger of falling over.

When traveling on an incline (up to 30°);

- Travel at low speed holding the bucket 20 cm - 30 cm off the ground.
- If the machine body becomes unstable, lower the bucket to the ground and stop the machine.



50CB7069

1. Go straight up and down a slope. (Going diagonally up or down a slope poses the danger of falling over or slipping sideways.)
2. Set the travel mode to low speed.
3. Changing direction or swing operations on an incline are dangerous.
Swinging to the valley side with the bucket loaded with dirt is especially dangerous. (This poses a danger of falling over or slipping sideways.)
4. Before traveling on uphill/downhill roads, take measures to prevent slipping, such as cleaning away anything clogging the shoes.

5. The maximum grade ability of this machine is 35° (70 %).

This value varies depending on the shoe type and state of the road. Do not travel forward or backward with this machine on a slope of over 30°.

⚠ CAUTION

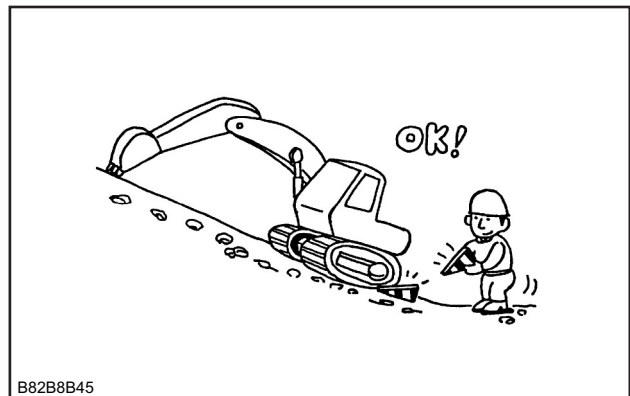
Do not operate the engine on a slope of 35° or more.

Doing so could damage the engine and hydraulic equipment.

6. Parking or stopping on an incline is dangerous.

Do not park or stop on an incline.

If the machine must be parked or stopped on an incline, dig the bucket into the ground, put the levers in the neutral position, and apply chock blocks behind the downhill side shoes (both left and right sides).



B82B8B45

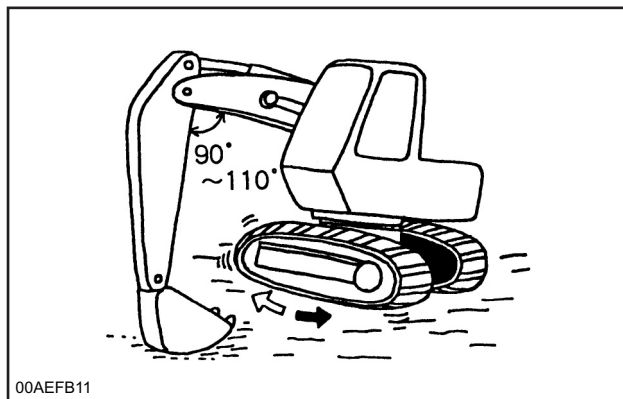
Escaping from Weak Ground

Be careful not to get stuck in weak ground while operating.

If the machine bottoms out in weak ground or mud and gravel clog up the undercarriage and the machine cannot travel, extend the boom and arm, lift up one shoe at a time and raise the machine body, then rotate the shoes alternating forward and backward to drop off the mud and gravel. When using the boom and arm to raise the machine body, press the bucket bottom against the ground.

At this time, make the boom and arm angle 90° to 110° .

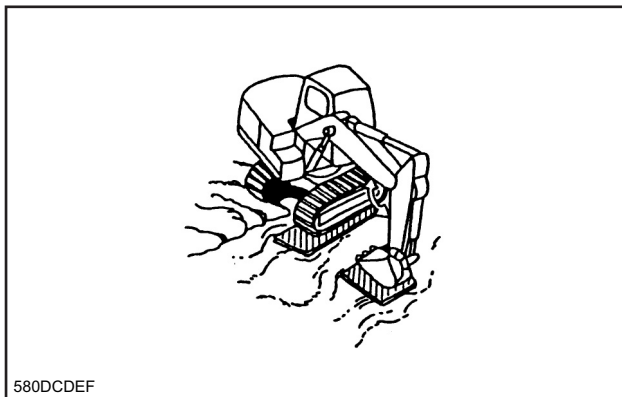
The same is true for an inverted excavator.



00AEFB11

1. When one side sinks into weak ground

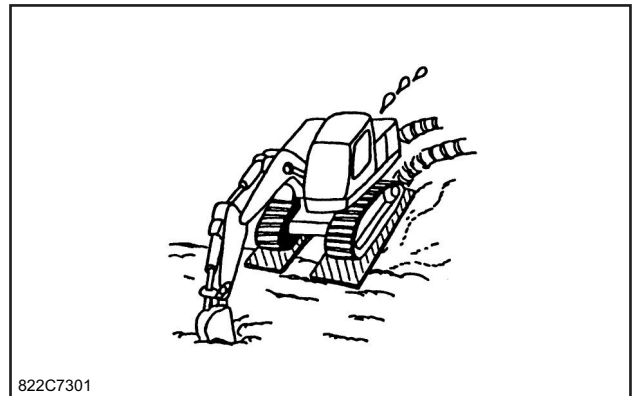
If only one side sinks into weak ground, raise up the shoe on the side where the bucket fell in, then lay logs or wood planks under the shoe to let the machine escape.



580DCDEF

2. When both sides sink into weak ground

If both sides sink into weak ground, lay logs or wood planks under the shoes on both sides according to the procedure above, then dig the bucket into the ground in front, fold the arm with the same procedure as for digging, then move the travel levers forward to pull the main unit out.

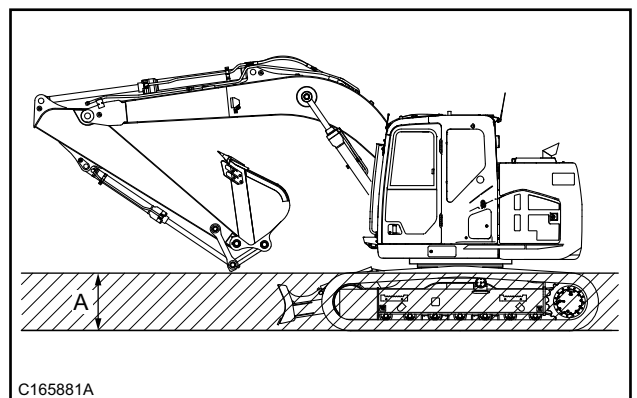


822C7301

Cautions for Use in Permitted Water Depth and on Weak Ground

1. When working with the machine in water, check the depth of the water before moving the machine into the water.

"The permitted water depth is to the upper rollers."



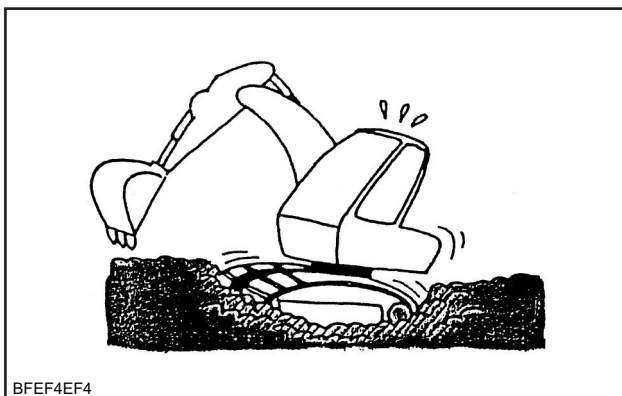
C165881A

A	Permitted water depth
---	-----------------------

4-Operation Explanations

2. When you work on weak ground, the machine may sink in bit by bit.

Work paying attention to the undercarriage.



BFEF4EF4

3. If you make the mistake of letting water and sand get on the machine as far as the swing body, it will be necessary to change the grease or perform service.

Stop the operation and contact your nearest service plant in our area.

4. After using in water or on weak ground, grease up the attachment and the turntable bearings. Also, inspect and clean the undercarriage.

Towing the Machine

⚠ WARNING

Using inappropriate wire rope or incorrect towing methods can cause a serious personal injury.

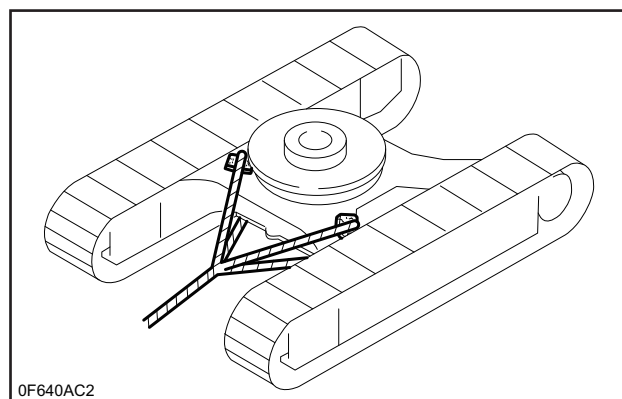
- When towing, use wire rope strong enough for the weight being towed.
- Do not use any tow wire rope that is kinked, twisted, or damaged.
- When towing, prevent anyone from coming between the towing vehicle and the excavator.
- Absolutely do not tow on a slope. There would be a danger of slide slipping, etc.
- Take the measure of using a wood protector between the tow wire rope and the excavator to prevent any damage to the rope or the excavator.
- When towing, travel slowly at low speed to avoid causing any impact.
- Connect the towing vehicle and excavator in a straight line.

⚠ CAUTION

When towing, travel slowly at low speed to avoid causing any impact.
Any impact can cause damage to the lower frame and accidents.

1. Towing the main unit or other heavy object when the machine cannot escape weak ground on its own power

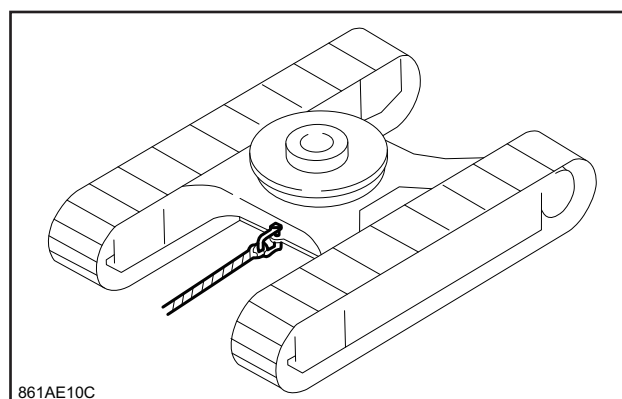
- [1] Attach wire rope to the lower frame.
- [2] Always put something between the wire rope and any corner sections to prevent damage to the wire rope.
- [3] When towing, travel slowly at low speed to avoid causing any impact.



0F640AC2

2. Towing light objects [7 tons or less]

- [1] Use a shackle to install the wire rope on the towing hole on the lower frame.
- [2] Orient the rope straight to the lower frame.
- [3] When towing, travel slowly at low speed to avoid causing any impact.



861AE10C

Swing Operation

⚠ WARNING

- Check the operating method before operating.
- Take measures so that no one enters the swing work range.
- Check the safety of the surroundings before performing swing operations.
- When a long arm or heavy attachment is installed, inertia may delay the stopping of swing motion.
- Swinging on an incline reduces stability and poses the danger of falling over.
- Avoid swinging on an incline. This would pose the danger of falling over or slipping sideways.
Swinging to the downward side of an incline with the bucket loaded with dirt allows inertia to work and is dangerous.

Entry into swing range prohibited

When the machine swings, the upper swing body can trap someone.

Do not let anyone enter the swing range.



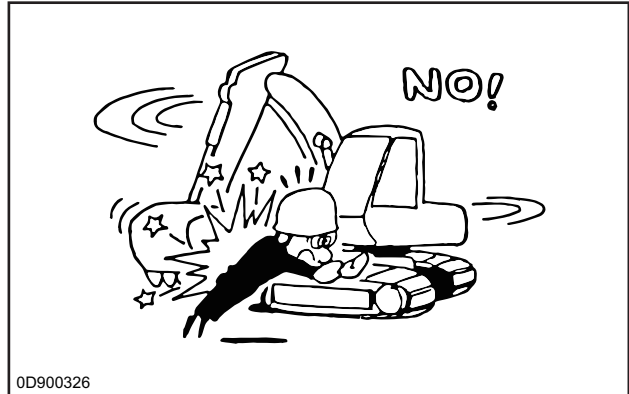
B5945885

Swing Operation Procedure

1. Set the gate lock lever in the locked position (controls inactive).
2. Press the horn switch on top of the left operation lever to warn the surroundings.
3. Check the safety of the surroundings, then operate the operation lever to swing.

4. When stopping the swing, even after the lever is returned to neutral, inertia makes the swing continue, so take this distance into account and perform the swing stop operation just earlier enough to compensate for this.

Entry into swing area prohibited

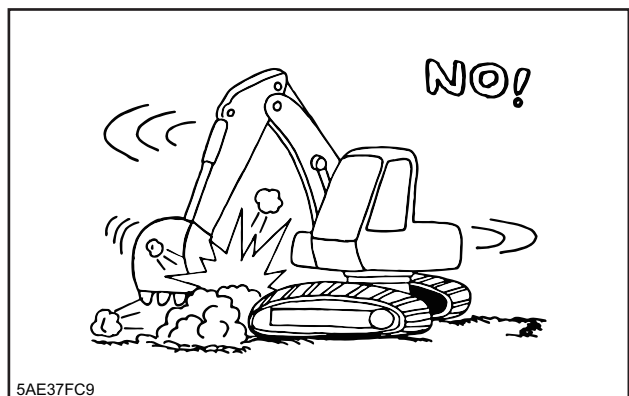


0D900326

Doing work with swinging force prohibited

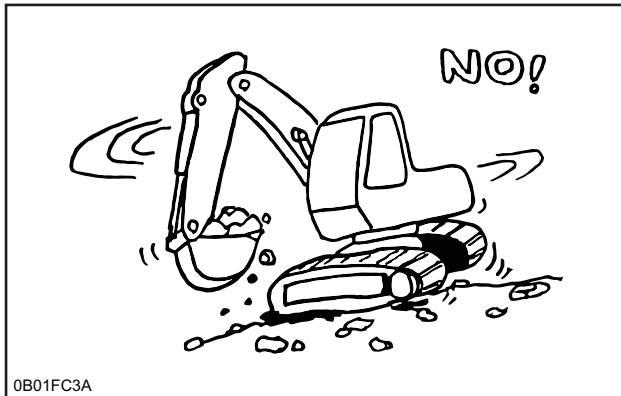
⚠ CAUTION

- Using the swinging force for sideways sweeps to grade the ground or to sweep away rocks puts stress on the boom and arm. This could destroy the machine.
- Never dig the bucket teeth into the ground while swinging.
- When working on an incline, first make the footing of the machine level, then do the work.



5AE37FC9

Swinging on an incline is dangerous.



0B01FC3A

4-Operation Explanations

Attachment Operations

⚠ WARNING

Always check the operating method.

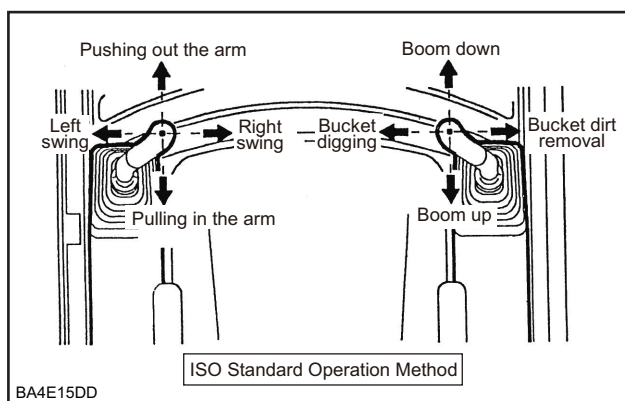
The machine is operated with the right operation lever and the left operation lever.

ISO (JIS) operating method

Right operation lever ... Operates the boom and bucket.

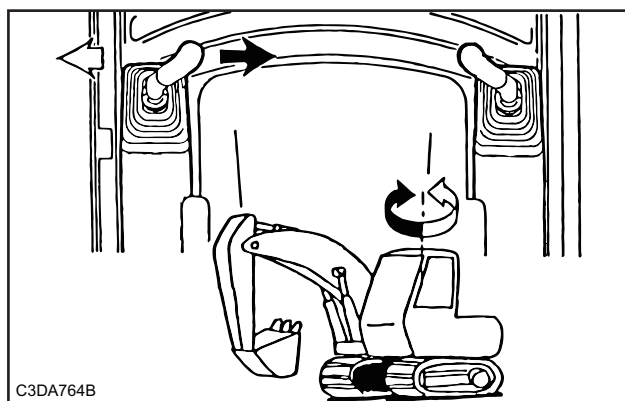
Left operation lever ... Operates the arm and performs swing operations.

When you release an operation lever, it returns to the neutral position and the machine is held where it is.



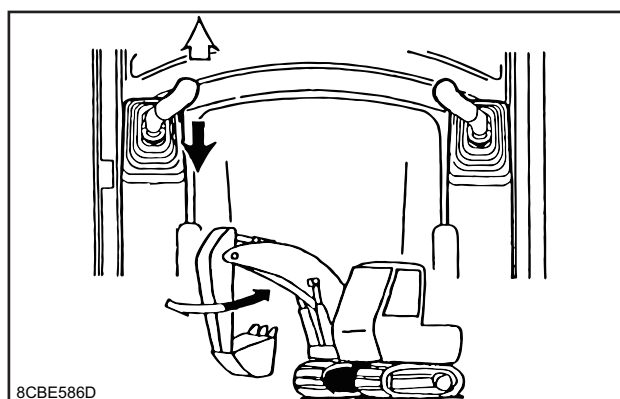
BA4E15DD

Swing operation



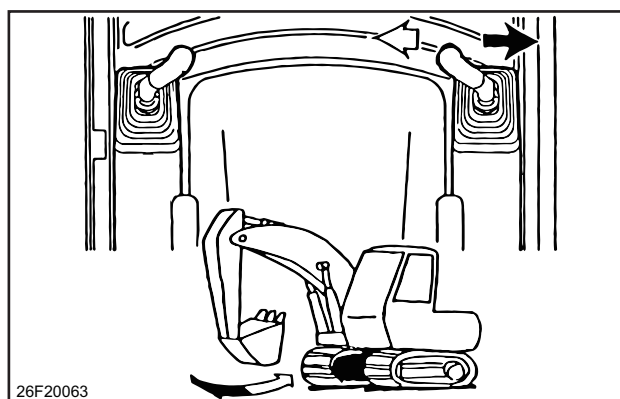
C3DA764B

Arm operation



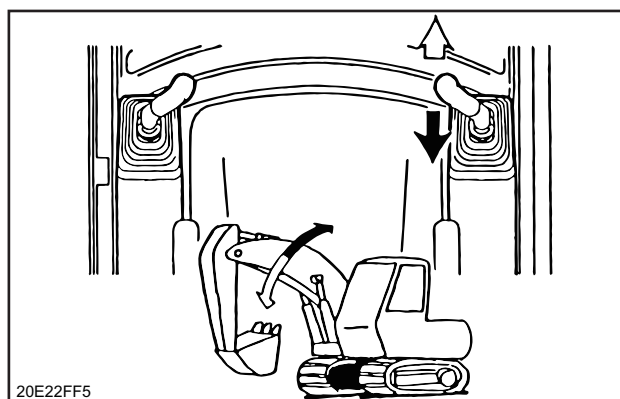
8CBE586D

Bucket operation



26F20063

Boom operation



20E22FF5

Machine Operations

Phenomena Unique to Hydraulic Excavator

The following phenomena are normal.

- When the arm or bucket is being operated in the air, sometimes it pauses for a moment. This is because the amount discharged from the pump could not keep up with the movement of the cylinder due to the weight of the arm or bucket.
- When swinging or traveling, sometimes the hydraulic circuits make a sound during starting or stopping. This is the sound of the brake valve.
- The reasons that the swing does not stop right away even if you return the swing lever back to neutral are to protect the machine from excess stress and to reduce operator fatigue.
- When the boom is lowered, it may make a sound. This is just the sound of the hydraulic oil flowing in the valve.

Cautions when Operating

1. Pay attention to abnormal noise from the engine, hydraulic equipment, reduction gear, travel section, and front section.
 - [1] Creaking sounds from parts
 - [2] Friction sounds
 - [3] Vibration sounds
 - [4] Hitting sound at a certain interval
 - [5] Variable sounds from hydraulic equipment
2. If "OVER HEAT" is displayed on the monitor, lower the work load to lower the temperature. Inspect the coolant and the radiator.

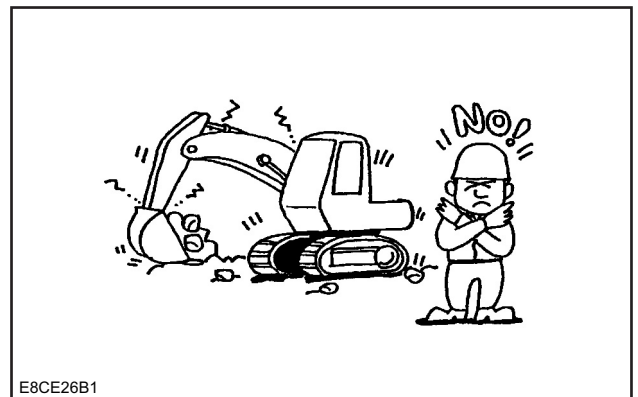
3. If you find any water leak, oil leak, or instrument, monitor, or operation lever abnormality, stop work, inspect, and repair.

⚠ WARNING

Stop work immediately if you detect any abnormality in the machine.

If you sense anything abnormal in the machine during operation, stop work immediately, inspect, and correct the problem.

Prohibit any use of the machine until the problem has been corrected.



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E8CE26B1

4-Operation Explanations

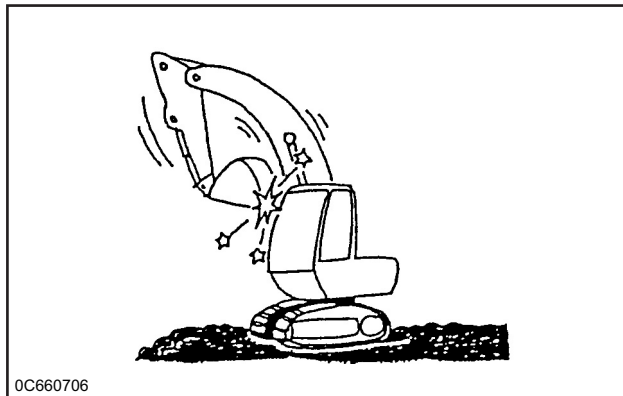
Cautions against Interference

Watch out for interference with the cab.

⚠ WARNING

Depending on the attachment mounted, the cab may interfere with the bucket teeth tips. Be careful when operating the bucket near the cab.

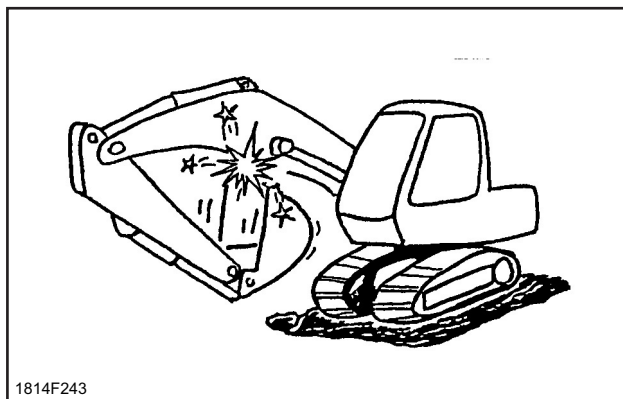
- Be particularly careful when working with the bucket inverted or with a flat plate installed on the bucket teeth tips.



0C660706

Watch out for interference with the boom.

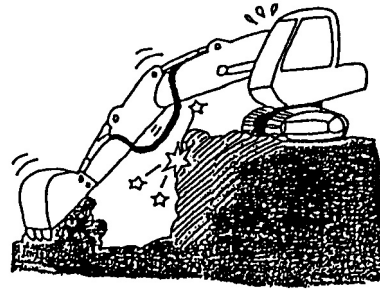
- Depending on the arm, with the arm folded in, the bucket can strike the boom.



1814F243

Watch out for interference in deep digging work.

- Watch out for the boom belly, bucket cylinder hoses, etc., interference with the ground.



88B87117

88B87117

Watch out for undercarriage interference.

- If you dig perpendicular or at a slant to the undercarriage, the attachment interferes with a shoe.



B3197430

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Special Attachments

Option Hydraulic Circuits (option)

⚠ CAUTION

- When a hydraulic breaker, crusher, etc., is mounted, it is necessary to select an attachment with specifications that match the excavator main unit.
When selecting a special attachment, consult our dealer or authorized service shop.
- When using a special attachment, carefully read the operator's manual for the special attachment and work safely being careful not to damage the excavator itself or the special attachment.
- A special attachment is heavier than the standard bucket. Do not operate at the end of the hydraulic cylinder stroke.
If you use a special attachment at the stroke end for a long time, the boom or other part may fall.

Hydraulic Breaker or Crusher Hydraulic Circuit (option)

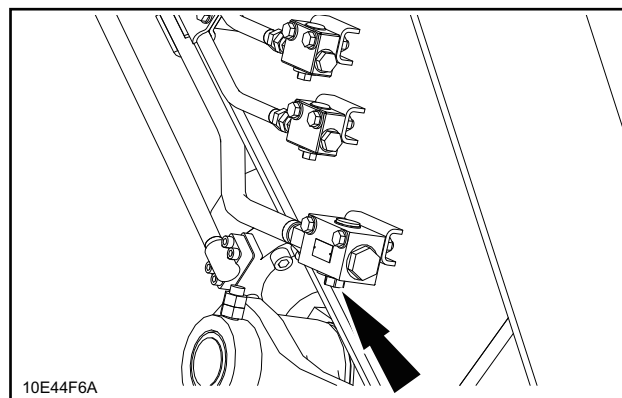
The machine is equipped with 2 hydraulic circuits for options.

The first circuit is for a single-flow unit, such as a hydraulic breaker or 1-pump crusher.

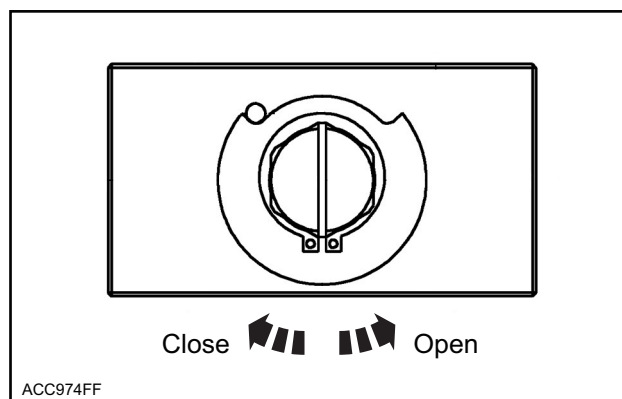
The second circuit can be used with continuous single flow or multiple flows or can be used with multiple flows, such as for a 2-pump crusher.

Pedal type

1. Connect the necessary front attachment, then use a wrench or box wrench (27 mm) to open the stop valves on the arm tip, left side, and right side.



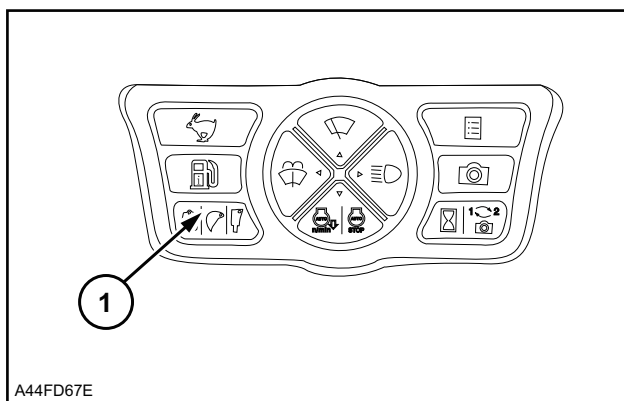
10E44F6A



ACC974FF

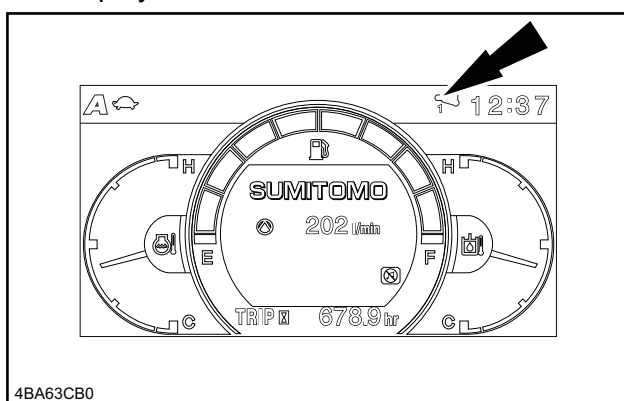
2. The switch ① is on the front right console corresponding to the hydraulic breaker. Press the switch ① and select the pump flow pattern.
For details on the flow setting method, refer to "Option Line Setting (option)" (3-41) in [Description of Handling].

4-Operation Explanations



A44FD67E

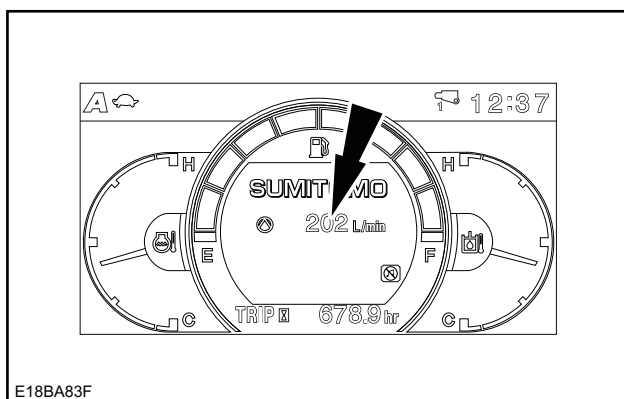
The icon for the set front attachment is displayed on the screen.



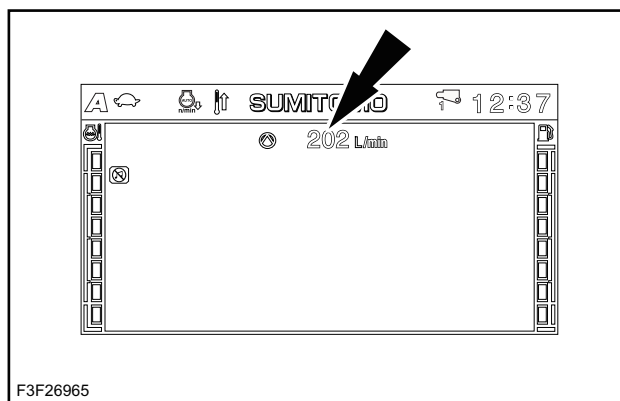
4BA63CB0

3. After switch ① has been operated, the set flow will be displayed for a certain amount of time.

NOTICE: In order to prevent breakdown of and damage to the front attachment, always select the circuit configuration and flow that are correct for the front attachment.



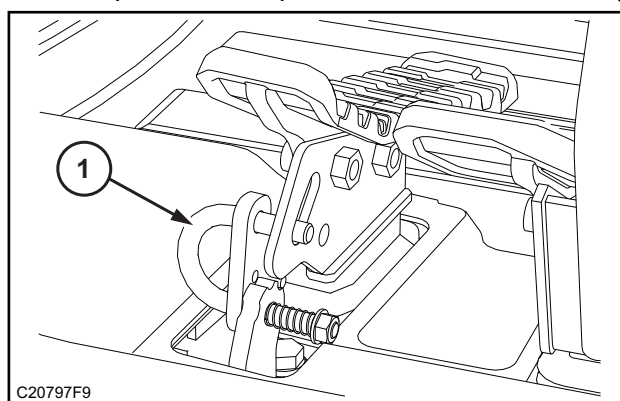
E18BA83F



F3F26965

4. Unlock the pedal and fit the locking pin ① in the elongate hole.

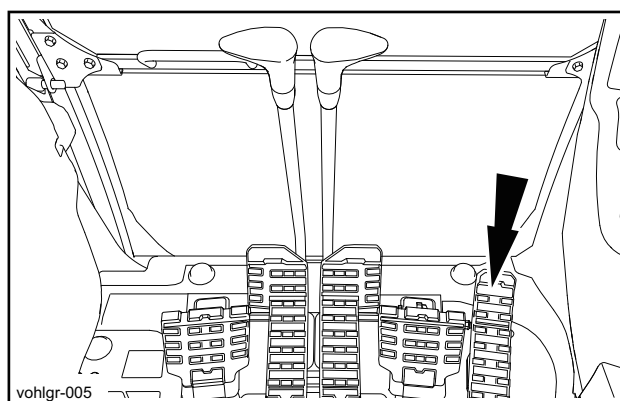
At the half lock position (breaker operation), it is possible to operate in one direction only.



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5. Use the control pedals to operate the hydraulic breaker.

NOTICE: In Bucket mode, do not carry out operation using auxiliary line.

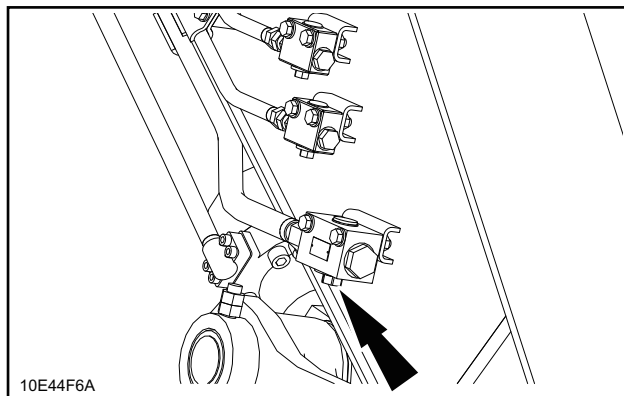


vohlgr-005

4-Operation Explanations

Proportional switch type

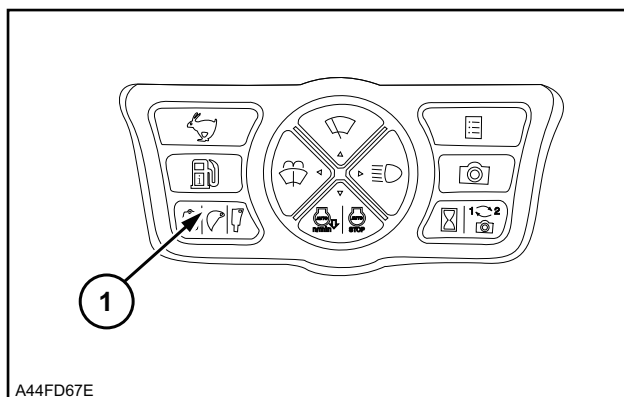
1. Connect the necessary front attachment, then use a wrench or box wrench (27 mm) to open the stop valves on the arm tip, left side, and right side.



10E44F6A

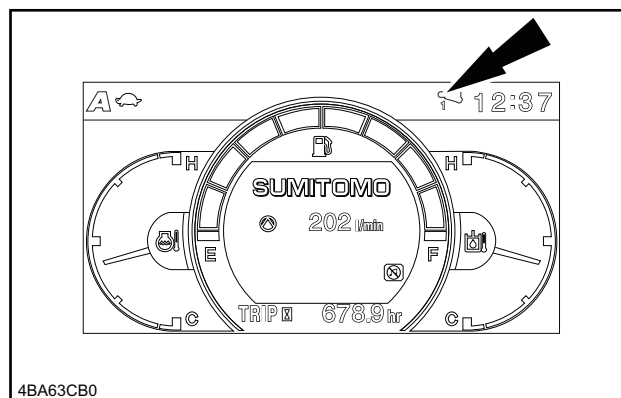
2. The switch ① is on the front right console corresponding to the hydraulic breaker. Press the switch ① and select the pump flow pattern.

For details on the flow setting method, refer to "Option Line Setting (option)" (3-41) in [Description of Handling].



A44FD67E

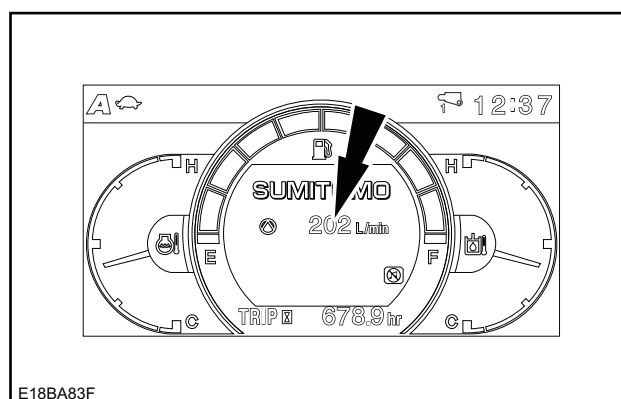
The icon for the set front attachment is displayed on the screen.



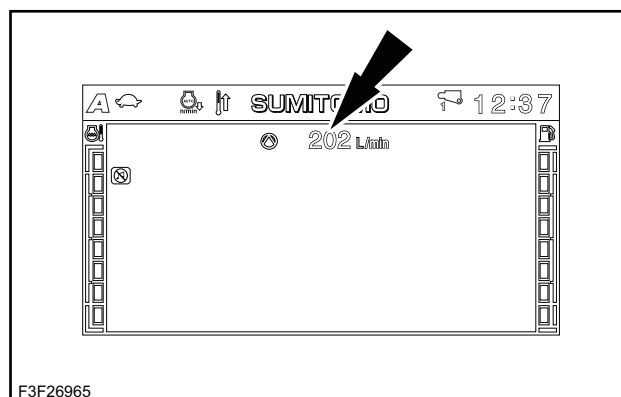
4BA63CB0

3. After switch ① has been operated, the set flow will be displayed for a certain amount of time.

NOTICE: In order to prevent breakdown of and damage to the front attachment, always select the circuit configuration and flow that are correct for the front attachment.



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4-Operation Explanations

4. Proportional switch

Item 1: Proportional switch (Option operation switch)

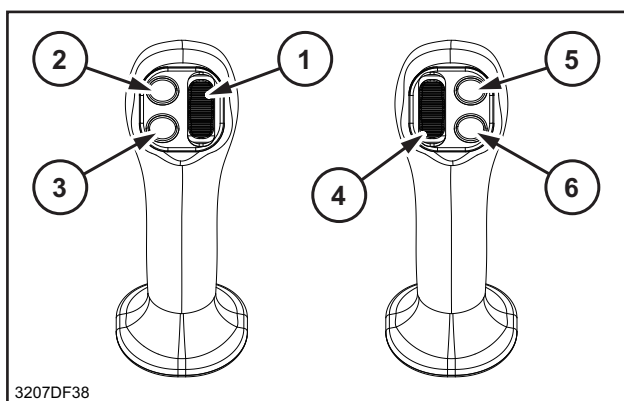
Item 2: Option operation switch

Item 3: Horn switch

Item 4: Proportional switch (Option operation switch)

Item 5: Option operation switch

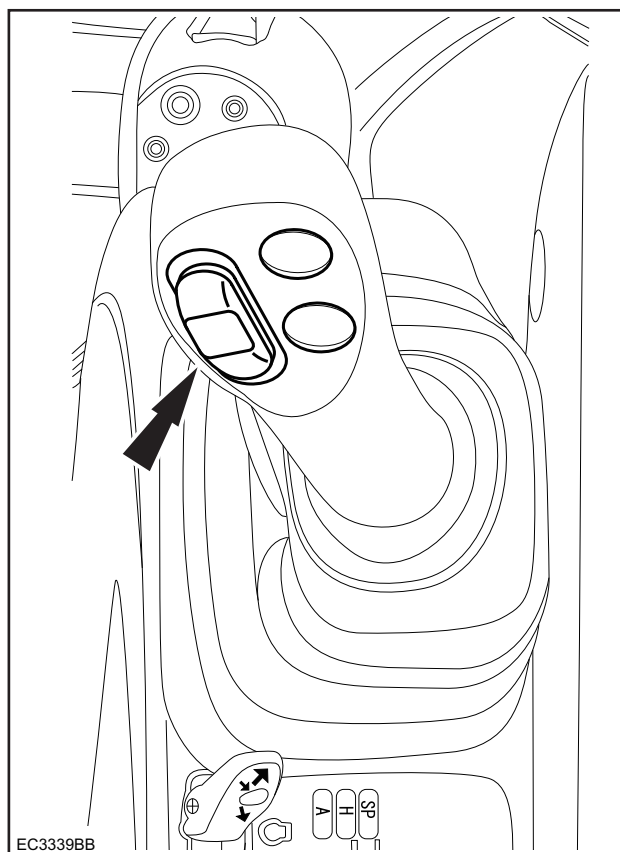
Item 6: One-touch idle switch



3207DF38

5. Use the proportional switch to operate the hydraulic breaker.

NOTICE: In Bucket mode, do not carry out operation using auxiliary line.



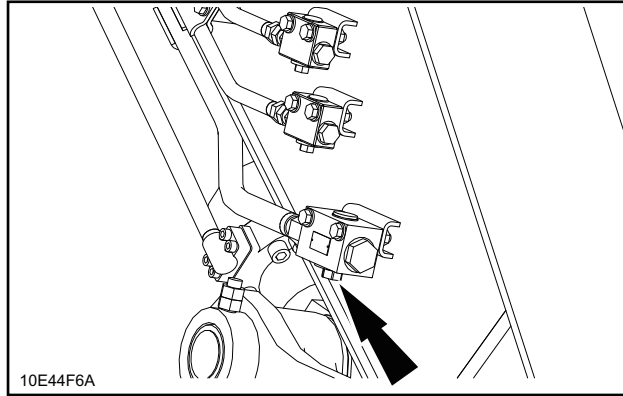
EC3339BB

4-Operation Explanations

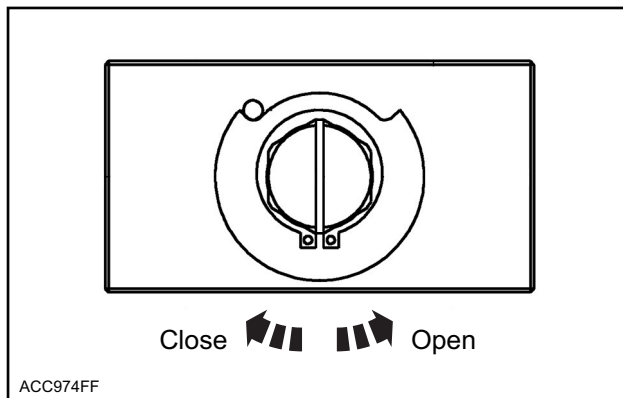
Multi-purpose Circuit with Pressure Adjuster (option)

Pedal type

1. Connect the necessary front attachment, then use a wrench or box wrench (27 mm) to open the stop valves on the arm end.

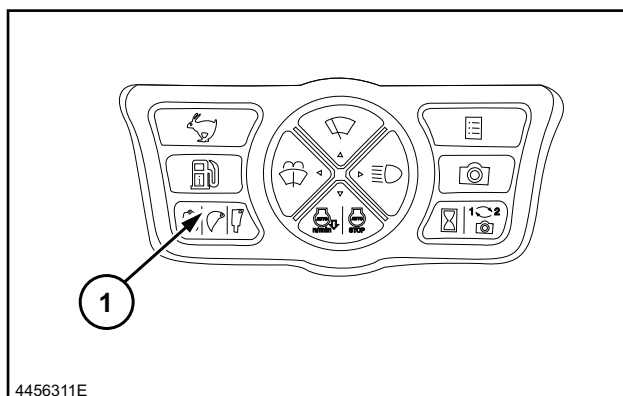


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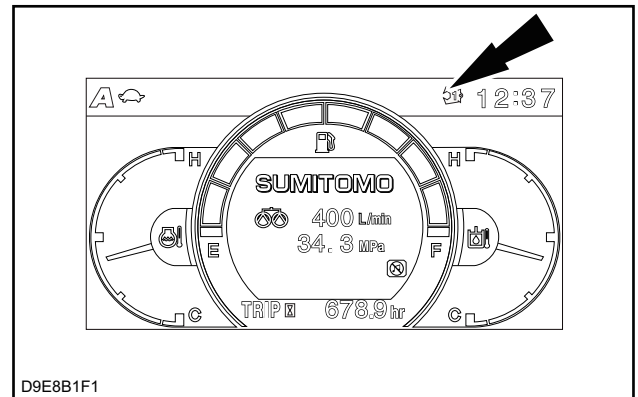
ACC974FF

2. The switch ① is on the right console corresponding to the 2-pump crusher. Press the switch ① and select the pump flow pattern. For details on the flow and pressure setting method, refer to "Option Line Setting (option)" (3-41) in [Description of Handling].



4456311E

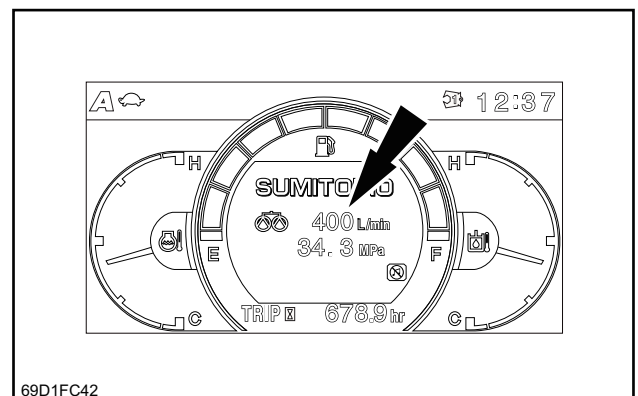
The icon for the set front attachment is displayed on the screen.



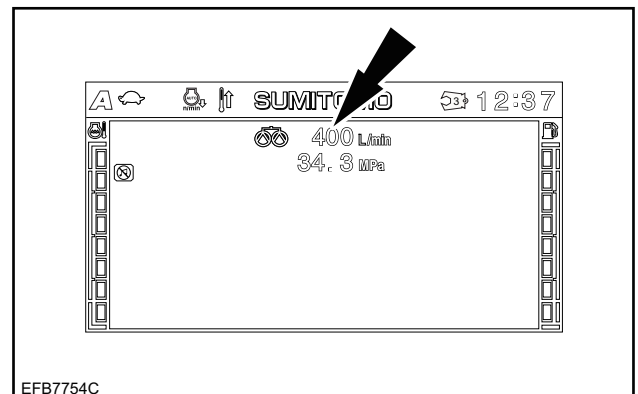
D9E8B1F1

3. After the switch ① is operated, the set flow and pressure are displayed for a certain amount of time.

NOTICE: In order to prevent breakdown of and damage to the front attachment, always select the circuit configuration, flow, and pressure that are correct for the front attachment.



69D1FC42

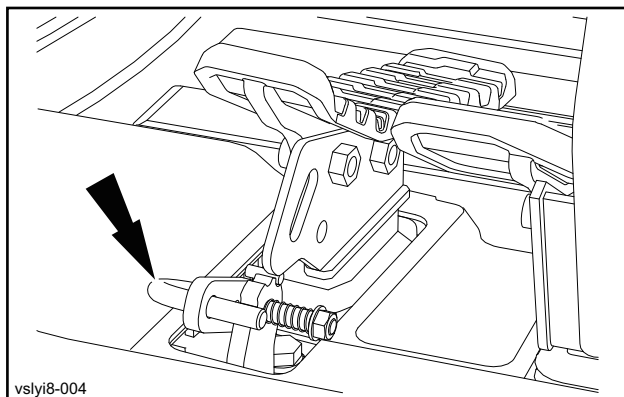


EFB7754C

4-Operation Explanations

4.Release the pedal lock.

At the free position (for crusher operations), the pedal can be operated in both forward and backward directions.

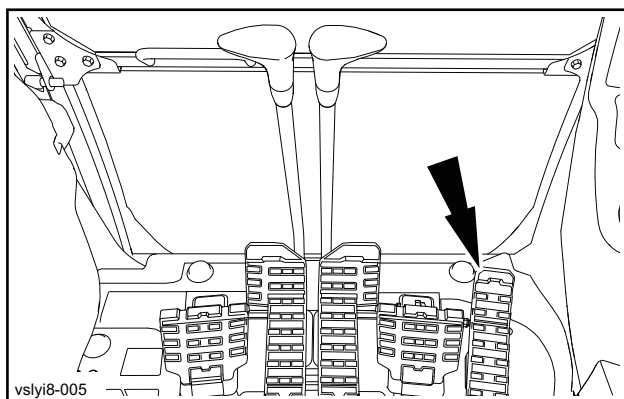


vslyi8-004

vslyi8-004

5.Use the control pedals to operate the crusher.

NOTICE:In the bucket mode, do not use the auxiliary line to operate the machine.

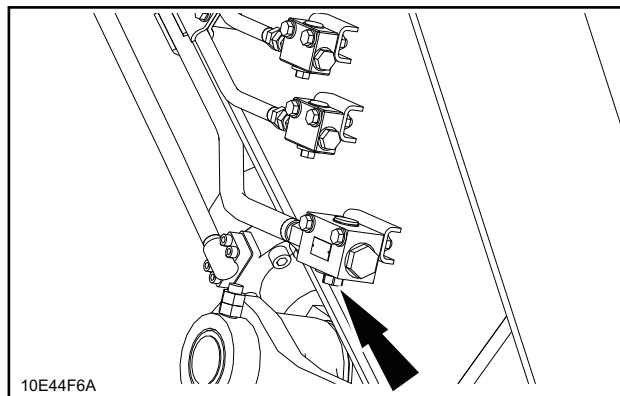


vslyi8-005

vslyi8-005

Proportional switch type

1.Connect the necessary front attachment, then use a wrench or box wrench (27 mm) to open the stop valves on the arm end, left side, and right side.

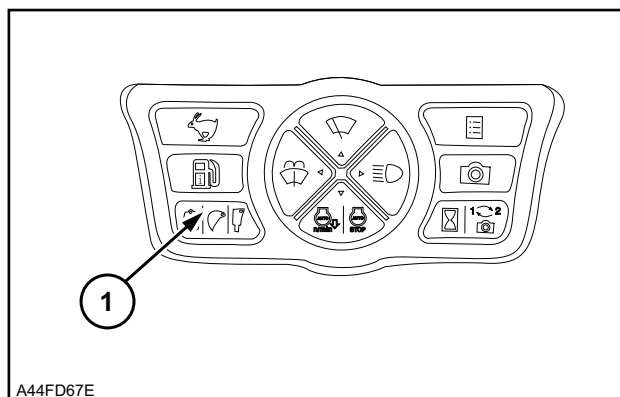


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10E44F6A

2.The switch ① is on the front right console corresponding to the 2-pump crusher. Press the switch ① and select the pump flow pattern.

For details on the flow setting method, refer to "Option Line Setting (option)" (3-41) in [Description of Handling].

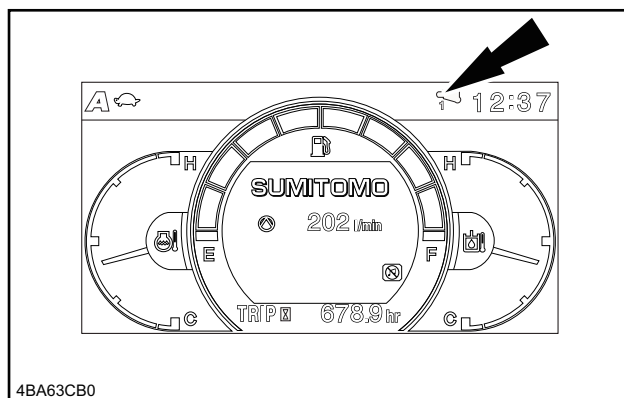


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4-Operation Explanations

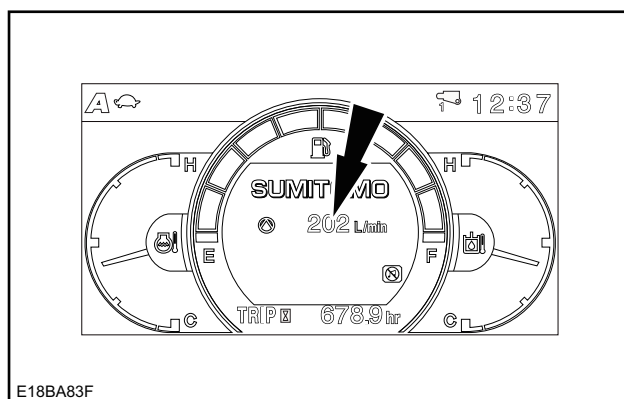
The icon for the set front attachment is displayed on the screen.



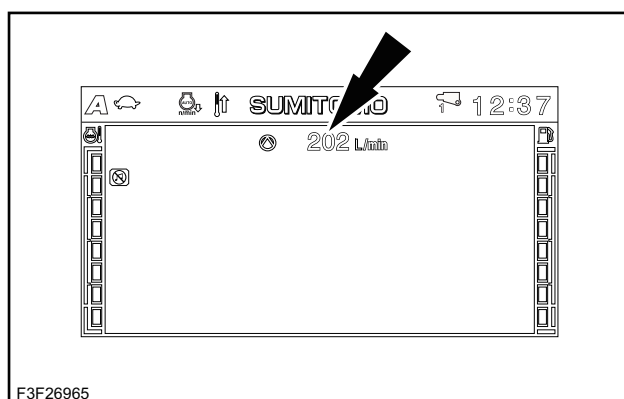
4BA63CB0

3. After the switch ① is operated, the set flow is displayed for a certain amount of time.

NOTICE: In order to prevent breakdown of and damage to the front attachment, always select the circuit configuration and flow that are correct for the front attachment.



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4. Proportional switch

Item 1: Proportional switch (optional operation switch)

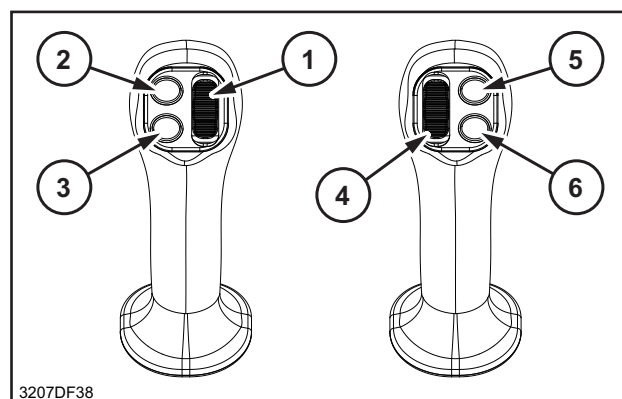
Item 2: Optional operation switch

Item 3: Horn switch

Item 4: Proportional switch (optional operation switch)

Item 5: Optional operation switch

Item 6: One-touch idle switch

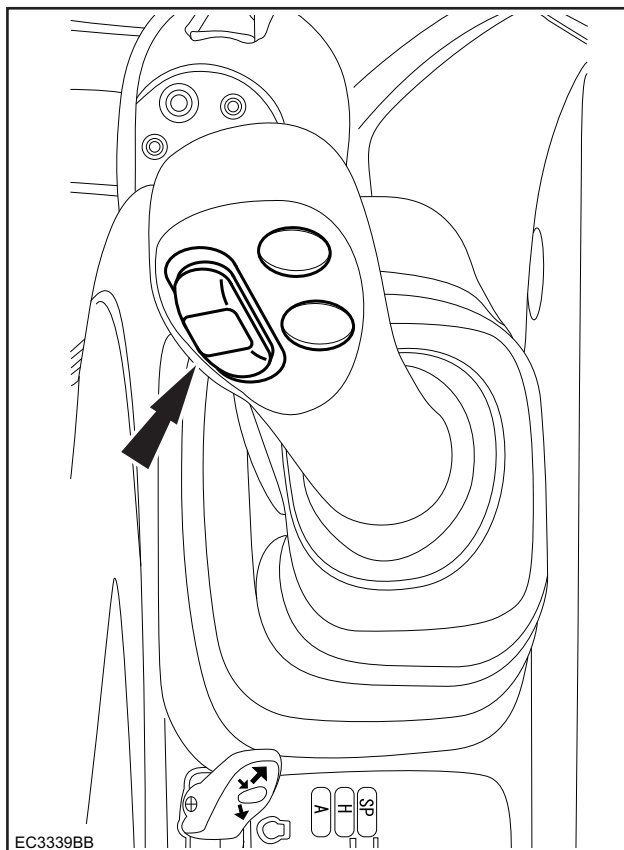


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4-Operation Explanations

5. Use the proportional switch to operate the crusher.

NOTICE: In the bucket mode, do not use the auxiliary line to operate the machine.



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Option Hydraulic Circuit Flow Patterns

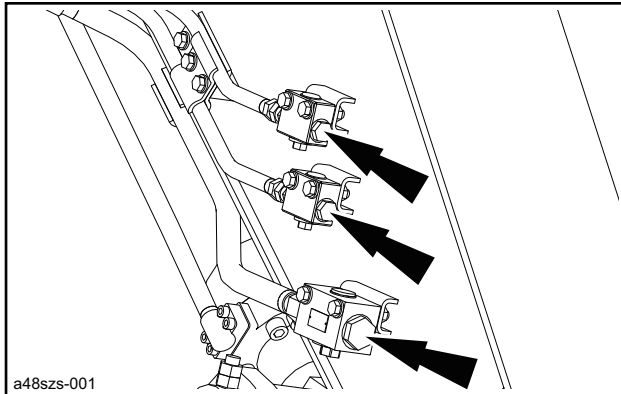
Select from the following 20 flow patterns.

NOTE: Up to 5 patterns can be set.

1 pump flow		2 pumps flow	
Lv.	L/min	Lv.	L/min
1	34	11	160
2	38	12	164
3	51	13	176
4	62	14	188
5	73	15	199
6	85	16	210
7	97	17	223
8	108	18	234
9	117	19	242
10	126	20	252

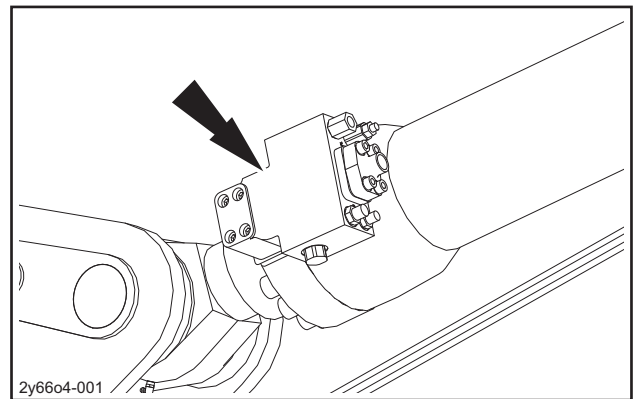
Stop valves (optional)

Located on each side of the end of the arm, these valves are used to ensure oil supply to optional attachments, for example, hydraulic breakers, etc. These valves have two positions, open/closed.



a48szs-001

On arm cylinder



2y66o4-001

Safety valves (optional)

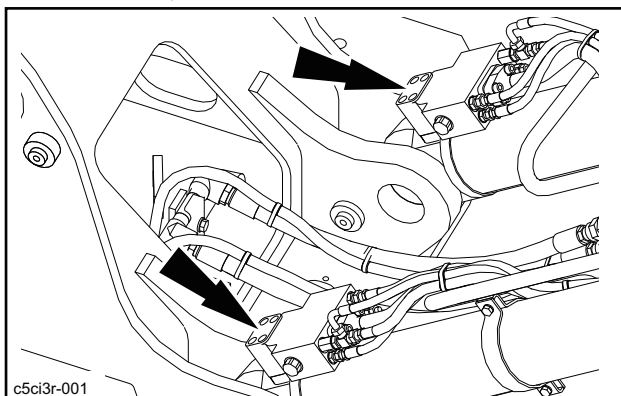
Service Specifications

Check by your nearest dealer or certified service plant: Every 6 months

The role of the safety valve is to stop the attachment from dropping due to valve spool leakage in neutral position or in the event of a line or hose accidentally breaking.

In the latter event, they also ensure that the attachment may be lowered gently to the ground.

On boom cylinder



c5ci3r-001

Cautions When Operating Machine

Cautions for Operations

1. Using the machine for other than the specified applications is prohibited!!

A hydraulic excavator is a machine for digging and loading.

Use of a vehicle-type construction machine for other than the specified applications is prohibited.

2. Rough operation is prohibited!!

All operators must pay attention to safety at all times and operate in such a way that there are no injuries or machine damage.

3. Undermining is dangerous!!

Do not dig holes beneath a cliff. This would be dangerous.

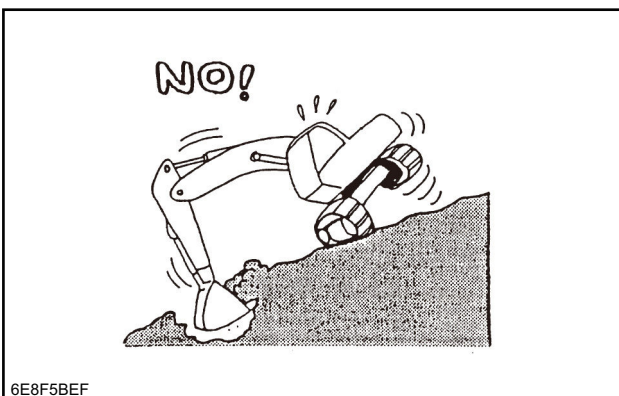


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4. Digging too much right at your feet is dangerous!!

Cautions for Working on an Incline

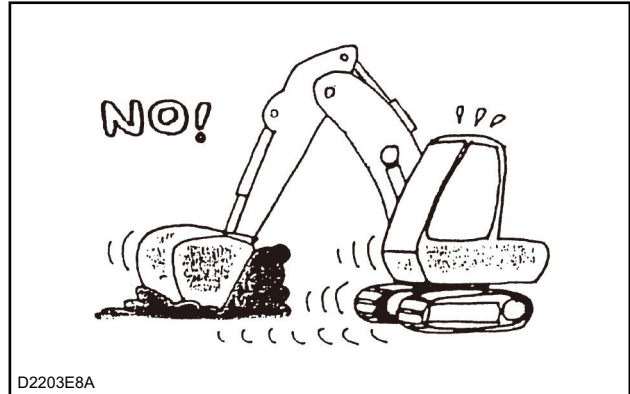
When working on sloped ground, make the footing of the machine level.



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Travel with the Bucket Dug into the Ground Prohibited

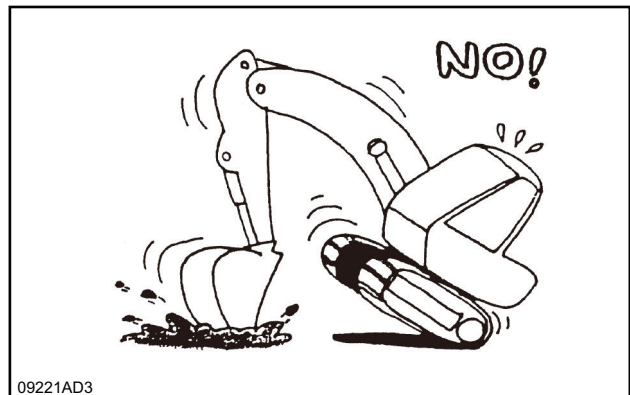
Traveling with the bucket dug into the ground or using the force of the main unit dropping to dig puts stress on various parts of the main unit and can damage the excavator.



D2203E8A

Pounding the Bucket to Force it into the Ground Prohibited

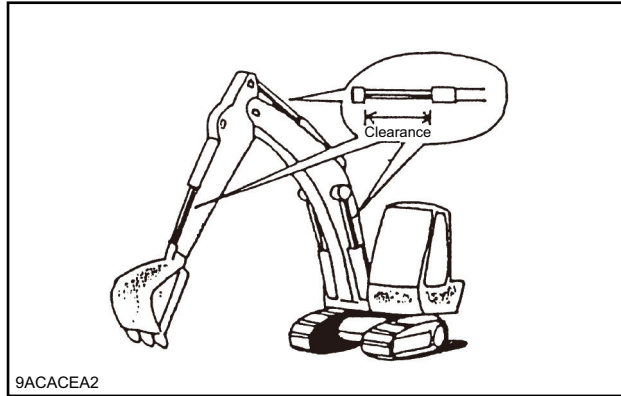
Never use the bucket as a hammer.
This would damage the main unit.



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Caution for Working at End of the Hydraulic Cylinder Stroke

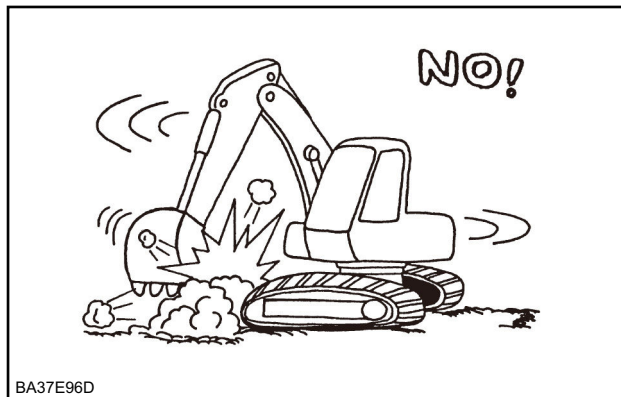
During work, do not operate the cylinder to the end of its stroke. Operate with some margin. Use at the end of its stroke can damage a cylinder.



9ACACEA2

Using the Swinging Force to Do the Work Prohibited

This would apply stress to attachment parts and the main unit and damage the machine.



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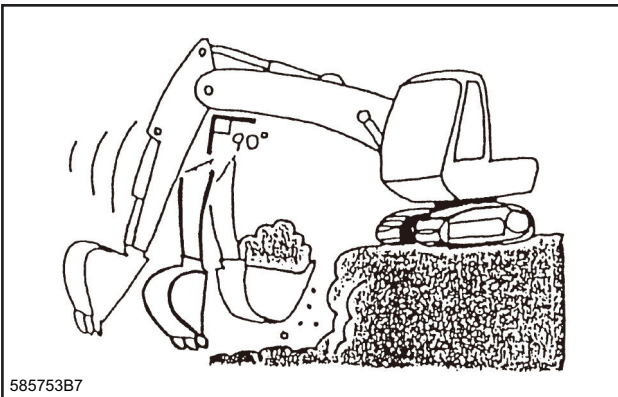
Machine Operation Procedure

Digging

With the backhoe work section, put the bucket on the target location with the boom and arm, dig mainly with the arm, and operate so that dirt is scooped into the bucket as fast as possible.

Digging is done mainly with the arm.

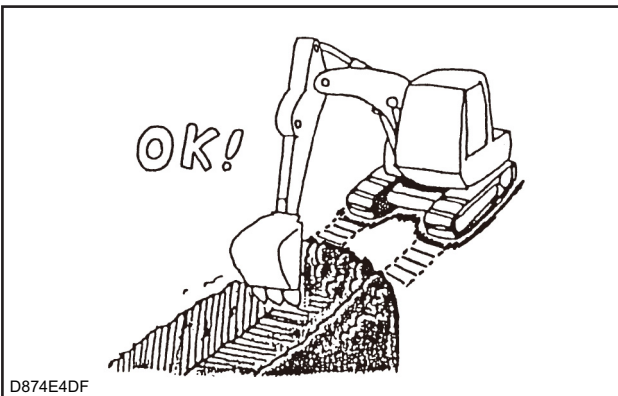
The digging range in which the arm is most efficient is with the arm at 90° and between 45° forward and 30° toward the operator. As much as possible, face the bucket teeth tips in the direction of digging and dig shallowly with full strokes.



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For trenching, align the direction of travel of the machine body with the direction of the trench, and as the digging proceeds, move the machine body to the rear.

When digging a wide trench, the fundamental is to dig both sides first, then dig the center.



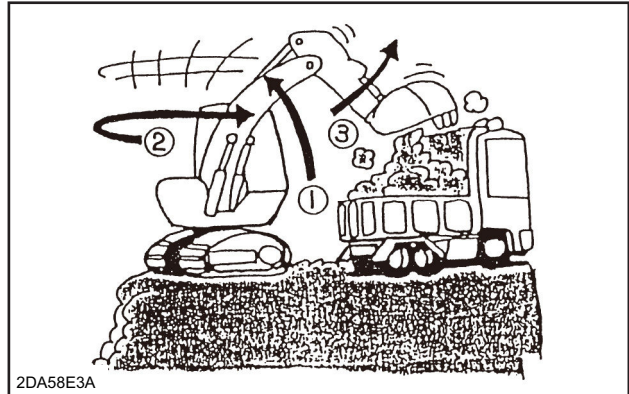
D874E4DF

Loading

After digging, when lifting up the boom and swinging, first lift up the boom, then swing. Just before returning the swing lever to neutral, push out the arm.

About half of dump work is the time required for swing operations.

Making the swing angle as small as possible for the terrain makes the work more efficient.



2DA58E3A

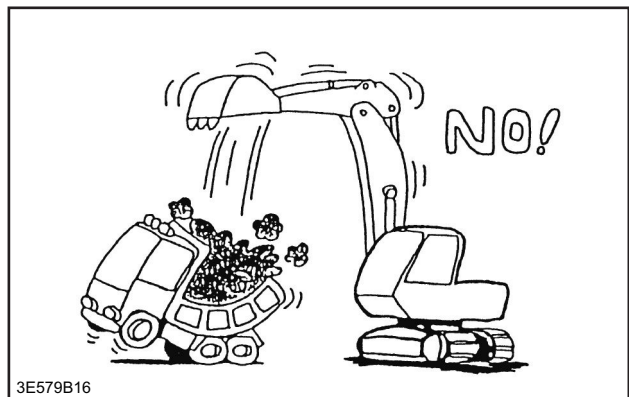
When loading dirt onto a truck, do not drop the dirt from higher than is necessary.

When loading, put the truck at a position that will minimize the swing and the reach for loading.

Set the machine along the lengthwise direction of the truck so that it loads from the front of the truck. Working this way speeds up loading work.

When loading the truck, drop the dirt evenly so that it does not put too much load on the rear wheels of the truck.

If dirt will not come out of the bucket, move the bucket lever 2 - 3 times to drop the dirt. (Avoid using shock to the end of the bucket to drop the dirt out.)

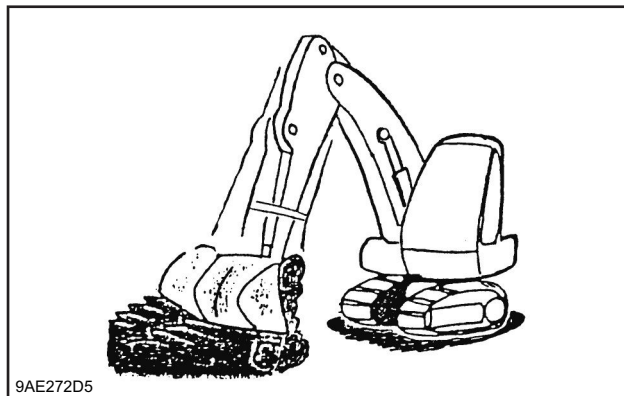


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Backfilling

For backfilling and leveling work after digging, move the bucket horizontally forward and back. When leveling from in front toward you, pull the arm gently toward you, raise the boom slightly, and when the arm is slightly past the vertical position, gently lower the boom so that the bucket moves horizontally.

You can also add in movement of the bucket.



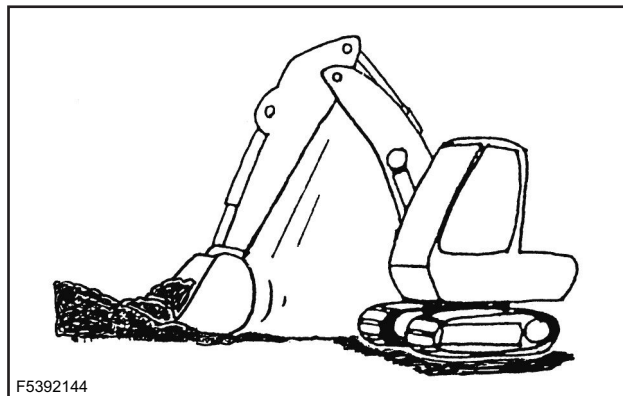
9AE272D5

Excavating

The procedure for excavating work (with bucket inverted) is different from backhoe digging. Bucket operations is opposite as the bucket is inverted.

Dig mainly by scraping off with the arm cylinder. Watch out for interference with the cab.

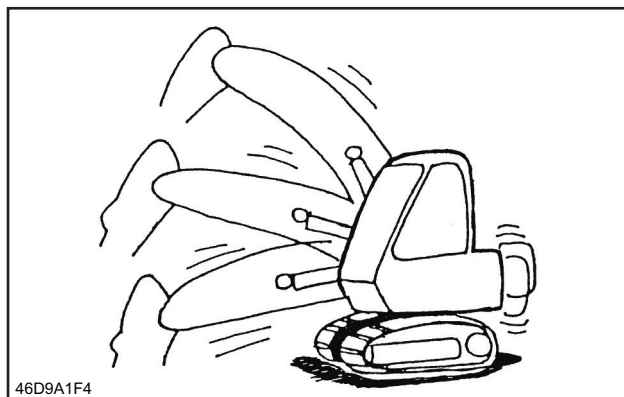
The digging force is slightly less than for backhoe digging.



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Boom Operation

When lowering the boom, suddenly stopping it midway can cause extreme stress to the machine body. Lower the boom smoothly as much as possible.



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Bucket Inversion and Replacement

Bucket Inversion and Replacement

⚠ CAUTION

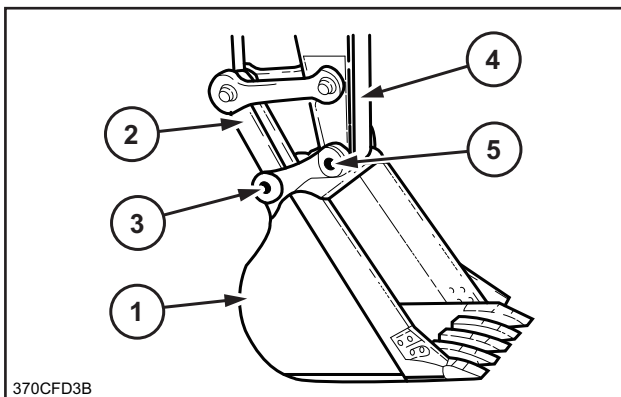
- Stop the machine on a flat location with good footing. When working together with others, always be sure to exchange signals and pay thorough attention to safety. Always wear protective gear (protective eyewear and safety shoes, etc.) when working with a hammer.
- After inverting or replacing the bucket, adjust the bucket backlash and check bucket operation before use.

Removal

1. Place the back of the bucket ① parallel to the ground.
2. Remove the bucket link ② side locking pin ③ and take out the pin.
3. Remove the arm ④ side locking pin ⑤ and take out the pin.

NOTICE:

- If a pin is hard to remove, there is a load on the pin.
- When removing the pins, be careful not to damage the attached O-rings or dust seals.



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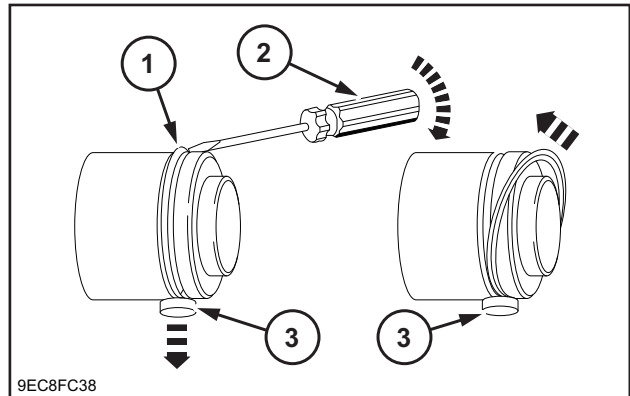
4. Keep dirt and mud off the removed pins.

[1]Removal

Remove the ring ① with a screwdriver ②, then take out the locking pin ③.

[2]Installation

Insert the locking pin ③, then lock the ring ①.

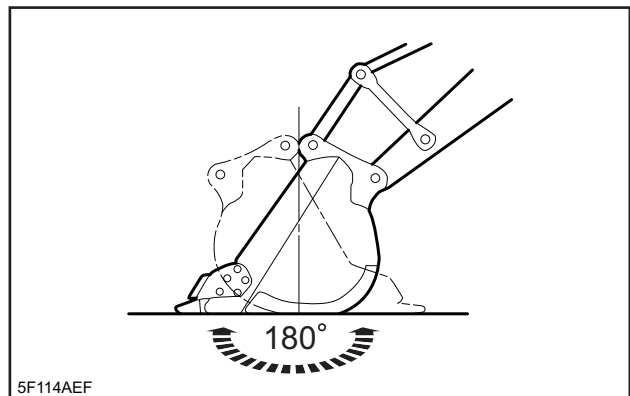


9EC8FC38 Locking pin removal and installation procedures

Bucket Inversion

1. Remove the bucket.
2. Raise the arm slightly and with the bucket in the same attitude, invert it 180°.
3. Install the bucket.

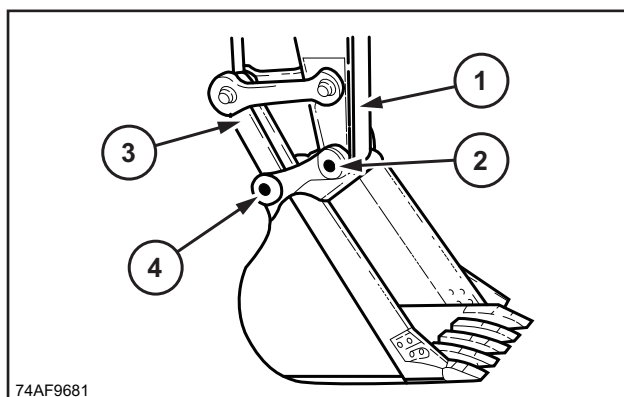
NOTICE: After inverting the bucket, the machine can work as an excavator, but only the bucket lever operating directions (for digging and dirt removal) are the opposite of those for a backhoe.



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Bucket Installation

1. Clean the pins and pin holes in each section and thoroughly grease them.
2. Replace O-rings, dust seals, etc.
3. Align the arm ① side holes and insert the pin ②.
4. Align the bucket link ③ side holes and insert the pin ④.
5. Install the locking pins and lubricate the pins. [EMS type must be lubricated as well.]



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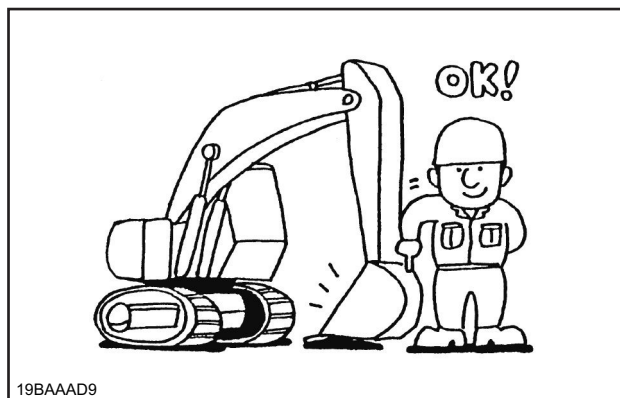
When Work is Completed

Parking the Machine

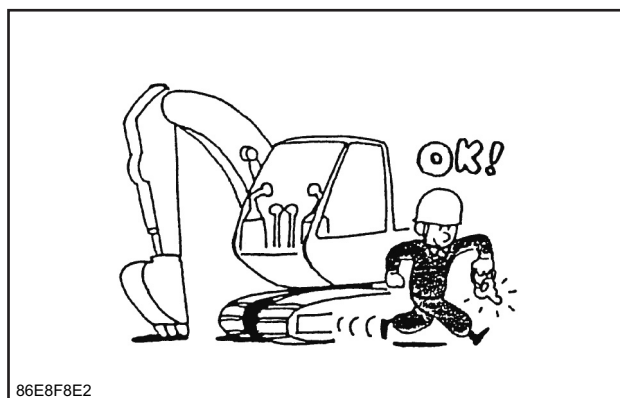
1. Stop the machine at a safe location on level, solid ground free from danger of falling rocks, rising water, etc.
2. Stand the arm vertical and lower the bucket to the ground.
3. Pull the gate lock lever to set it in the locked position (controls inactive).
4. Let the engine run in low idle for about 5 minutes to cool it off.
5. Stop the engine and take out the key.
6. Close the window of the machine, pull the left console's gate lock lever all the way in to spring up the left console.
7. Lock the cab door to prevent anyone from operating machine without permission.

⚠ CAUTION

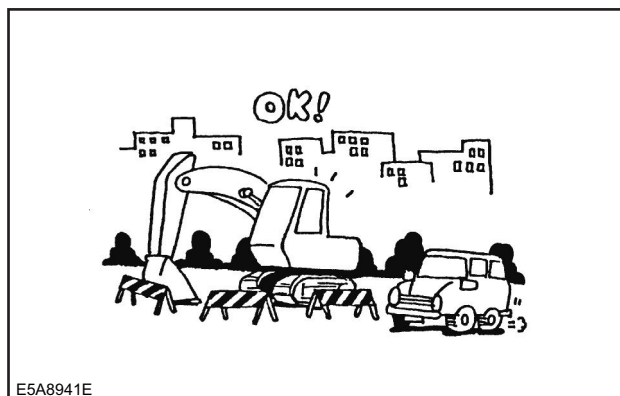
When parking on the road, install signs, a fence, etc. so that other passing vehicles can clearly recognize the machine even at night.



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Inspection after Work

1. Machine cleaning and parts inspection

Inspect the parts for oil and water leaks and inspect the parts for damage.

Along with the inspection, also wash the machine.

In particular, knock any dirt off the undercarriage. (When washing the machine, be careful not to get any water on electrical components.)

WARNING

Keep fire away when refueling.

2. Refueling

Stop the engine and refill the fuel.

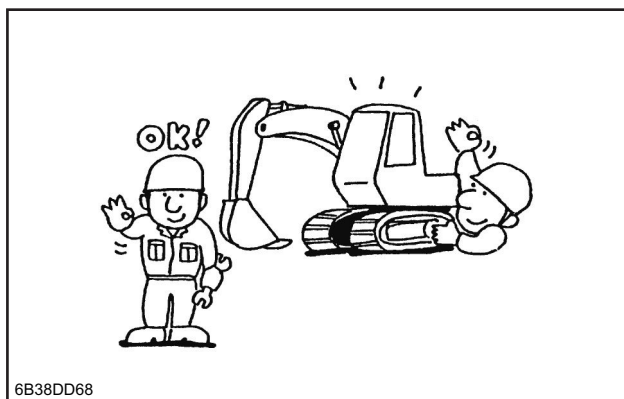
Be careful not to let any dirt or water get in during refueling.

- In cold weather (outside air temperature 0°C or lower), drain any water built up in the fuel system (fuel tank and fuel filter) to prevent water from freezing overnight. If any fuel spills, wipe it up.

After the work is completed, inspect each part of the machine. (Together with washing the machine)

- If any problem is found, repair it.
- Refill the fuel tank after the work each day.

In particular, after working in coastal areas, dusty location, cold or severe heat, or on swampy or soft ground, inspect and service each part.



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Cold Weather Arrangements

Cold Weather

When the air temperature drops, arrangements such as the following for handling low temperatures must be made because startup problems, coolant freezing, etc. occur.

Fuel and Lubricants

Replace the lubricants for each unit with ones that are less viscous.

For information on the specified viscosity, refer to Usage of Fuels and Lubricants According to Temperature.

When the ambient temperature is lower than -7°C, temporarily mix the fuel No. 1-D (S15) and No. 2-D (S15).

Battery

WARNING

Batteries generate combustible gas. Keep flames away from them.

Battery solution is hazardous.

Avoid contact with eyes and skin. If it comes into contact with the eyes and/or skin, wash the affected area thoroughly with plenty of water and seek medical attention.

If the temperature drops, battery capability decreases. The battery solution may freeze if the charging rate is low.

Try to maintain the battery charging rate as close to 100 % as possible and try to keep the battery warm for startup on the next day.

Maintenance-free batteries (installed on new machines)

- Check the hydrometer.
For details, refer to "Batteries" [Maintenance].

Water refill type batteries

- The battery charging rate is determined by measuring the specific gravity of the battery solution (see table below).

Charging rate	Solution temperature			
	20 °C	0 °C	-10 °C	-20 °C
100 %	1.28	1.29	1.30	1.31
90 %	1.26	1.27	1.28	1.29
80 %	1.24	1.25	1.26	1.27
75 %	1.23	1.24	1.25	1.26

- When replenishing distilled water, replenish before beginning operation on the next day to prevent freezing.

Mixing Anti-freeze

This machine is shipped from the factory with anti-freeze (long-life coolant: Sumitomo genuine anti-freeze clean coolant) mixed in the coolant. There is no need to adjust the concentration of anti-freeze during cold weather.

CAUTION

Cautions for using anti-freeze

- Use anti-freeze within a 55 to 60 % concentration range.
If the concentration is too low, the rust-prevention effect is weakened but if the concentration is too high, overheating is more likely.
- Replenish anti-freeze at a concentration of about 55 % when compensating for natural water loss.
- For anti-freeze, use Sumitomo genuine anti-freeze clean coolant. Do not mix with other brands.
- Anti-freeze is flammable. Keep it away from fire.
- Always use soft water for the coolant.

When the Cold-weather Season is Over

...

When the season changes and the temperature goes up

- Replace the lubricants in each unit with ones of the specified viscosity.
- Completely drain out the anti-freeze (only when AF type permanent anti-freeze is used), clean out the inside of the cooling system well, then pour in clean soft water (tap water).

Handling under Special Conditions

For information on the types of fuels and lubricants, refer to Usage of Fuels and Lubricants According to Temperature and use the appropriate ones.

Operating in Cold Weather (when the outside air temperature is 0°C or lower)

1. Perform thorough warm-up operation in winter or in cold climate.

Take such measures as making the warm-up period longer as well as covering the front of the radiator and oil cooler.

Remove those covers when the warm-up operation is complete.

2. In particular, perform absolutely no drastic swing or travel motor operations until the machine is thoroughly warmed up.

Performing drastic operations before the machine is fully warmed up can damage hydraulic equipment.

3. After the warm-up operation, before operating the machine, always check that the boom, arm, bucket, swing, and travel operations are all normal.

4. In winter or in cold climate, when you move an operation lever, the start of the actual operation may be delayed.

If this happens, it means that the hydraulic oil is not warm enough yet. Warm up the engine more thoroughly.

5. When stopping the machine outdoors in freezing conditions for an entire night or longer, remove the battery and store it somewhere warm.

6. Drain any water that has built up in the fuel system to prevent it from freezing overnight.

7. After the work, clean the shoes and put the machine up on crossties to prevent the shoes from freezing.

Minimize exposure of the cylinder rod.

Also, wipe the exposed parts of cylinder rods clean of any water drops.

Operating in Severe Heat (when the outside air temperature is 35°C or higher)

1. Always maintain the specified level of coolant, inspect the cooling system to make sure there are no leaks, replace the coolant from time to time, and keep the cooling system clean to prevent the build-up of scale and rust.

2. Keep the radiator's cooling fins clean.

3. Keep the tension of the water pump fan belt correctly adjusted at all times.

4. Inspect the electrolyte level in the battery frequently and refill the battery solution as necessary.

5. During operation, pay particular attention to the coolant temperature gauge and the hydraulic oil temperature gauge.

Operating in Dusty and Sandy Locations

1. Air cleaner inspection

Inspect the air cleaner element frequently and clean or replace the element and dust cap regardless of the normal service timing.

2. Tighten the hydraulic tank breather cap firmly to keep dust and sand out of the hydraulic circuits.

3. Keep all pins, bushings, and other lubricated sections clean at all times and always clean grease fittings thoroughly before lubricating.

4. Clean the radiator fins, oil cooler fins, and radiator net.

Operating in Coastal Areas

1. Inspect the tightness of all plugs, cocks, bolts, etc. and ensure that salt does not get in.

2. After work, carefully wash the machine to remove any salt. In particular, take good care of electrical equipment and hydraulic cylinders to prevent corrosion.

Operating in High Humidity and on Soft Ground

Humidity and muddy water cause deterioration and corrosion of paint, wiring, and metal parts.

After using a machine in such locations, wash off dirt, wipe off water, let it dry, then apply sufficient grease.

Operating with a Danger of Falling Rocks

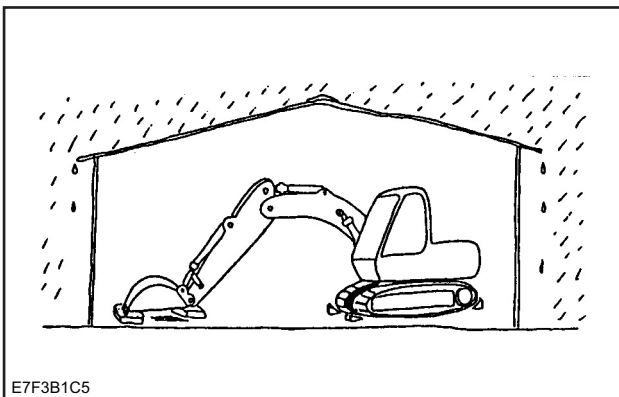
1. Install the head guards on the cab.

Long-term Storage

When not using the machine for a long period of time (one month or more), to prevent reduced functionality when the machine is used again, store it paying attention to the points below.

Before Storage

1. Wash the machine thoroughly.
Especially the undercarriage
2. Lubricate all necessary sections.
 - Grease up the attachment, turntable bearing, etc.
3. Check the amount of lubricant and their cleanness.
 - Replenish if necessary.
 - Replace if very dirty.
4. Follow the storage procedure in the attached Engine Manual to deal with engine.
If there is a possibility of coolant freezing during the storage period, mix anti-freeze with the coolant or completely drain off the coolant.
5. After cleaning and washing all machine sections, store the machine in a dry, indoor storage.
In order to prevent the hydraulic cylinders from rusting, set the machine in the posture shown in the figure.
If outdoor storage is unavoidable, store on wood planks on flat ground and cover with plastic sheets.



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(When storing outdoors)

- [1] Select a location with good drainage, low humidity, and good ventilation.

- [2] Store either on a floor made level by laying some kind of aggregate, such as concrete, crushed rock, or gravel or store out of direct contact with the floor by putting appropriate plates under the shoes.

- [3] After taking the measures below (6 - 9), cover with sheets so that rainwater cannot get into the housing and to prevent rusting.

6. Always lower the bucket to the ground and use chocks on the tracks.
7. Thoroughly apply an antirust oil to exposed piston rods of hydraulic cylinders.
8. Move all the operation levers to neutral.
9. For the battery, either remove and fully charge it to store, or disconnect it at one terminal (side terminal).

During Storage

When storing for 1 month or longer, carry out some operations once a month to prevent rusting. This is to prevent engine rusting, seal deterioration and hydraulic component rusting. Make sure the radiator is filled with coolant when carrying out these operations.

- When operating the machine, wipe off the applied antirust oil from the hydraulic cylinder rods.
- Run the engine at low speed and perform slow attachment operations, swing operations, and travel operations.
- Be sure to move the machine and charge the battery once a month.

⚠ WARNING

If the machine has to be run to prevent rusting while in the indoor storage, be sure to open windows and doors to ventilate the storage and prevent the buildup of poisonous gas.

After Storage (when using again)

1. Check all oil and water levels and replenish if necessary.
Especially, pay attention to the coolant level.
Take full precautions when using the machine again because lubricants may have deteriorated while the machine was in storage.
2. Thoroughly wipe away the antirust oil.
3. After starting the engine, let it run to warm up well, then repeat travel, swing, and digging operations to run-in all the parts.



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- If the once-per month operation to prevent rusting has not been done, when using this machine again, consult Sumitomo or one of our specified service plants.

5-Transporting This Machine Transporting This Machine

NOTE: If this machine is transported with the attachment removed, it is necessary to remove the counterweight too. consult our dealer or authorized service shop.

Cautions When Loading and Unloading

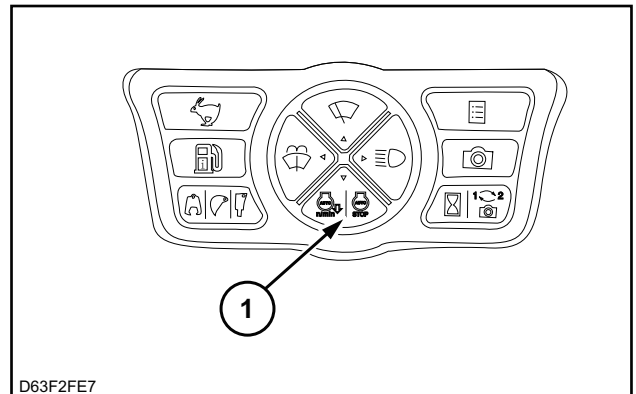
⚠ WARNING

1. For loading and unloading, decide on a work leader and work under the direction of that leader.
2. In principle, load and unload on flat, solid ground far enough away from the road shoulder.
Always apply the parking brake to the vehicle and chock the tires.
3. Truck ramps for loading onto or unloading from the platform of a vehicle must be strong enough to withstand the weight of a construction machine.
Also, use ramps with claws so that they cannot detach from the platform.
4. When loading or unloading during rain or snow, take measures to prevent slipping.

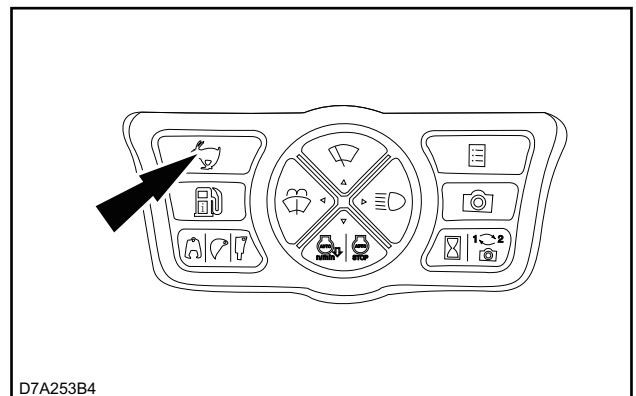
Switch Settings for Loading and Unloading

⚠ WARNING

1. Switch "OFF" the auto idle and idle shutdown switch ①. [In auto mode, the engine speed may vary and the engine may stop.]
2. Set the travel mode to low speed.
"Turtle" is displayed on the monitor display. [In high speed, the travel speed is greater and mechanical shock occurs, which is dangerous for loading and unloading.]
3. Do not operate the idle switch for any operation lever. [Operating the idle switch would change the engine speed.]
4. On the truck ramps, do not operate any lever other than the travel levers.



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5-Transporting This Machine

Caution during Transport

⚠ CAUTION

Investigate beforehand the road widths, bridges, road surface conditions, traffic volumes, etc. for the planned route.

Loading and Unloading

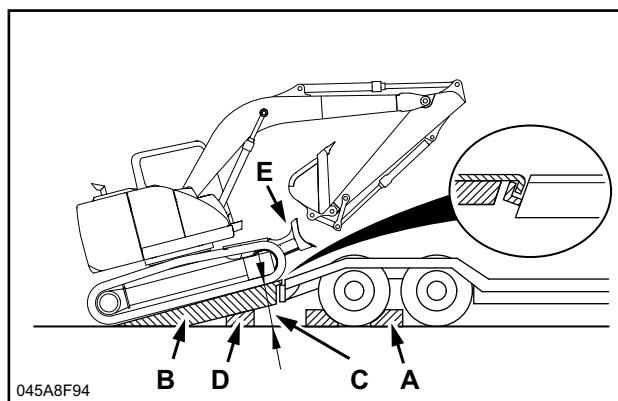
⚠ WARNING

- Loading/unloading using the boom to jack up is prohibited, no matter how low the floor of the trailer or truck is.
- Remove any mud or dirt from the shoes so that the machine does not slide sideways on the truck ramps.
- When traveling on the truck ramps with just the front attachment removed, climb with the counterweight facing uphill.

NOTICE:When unloading or loading in cold weather, always thoroughly warm up the machine beforehand.

Installing truck ramps

1. Securely apply the trailer brakes and use blocks at the tires so that the trailer cannot move.
2. Securely fasten the truck ramps so that the centers of the trailer and of the machine are aligned with each other.
 - Use truck ramps with enough width, length, and thickness on which the machine can be loaded and unloaded safely.
 - If the truck ramps deflect much, reinforce them with something such as blocks.

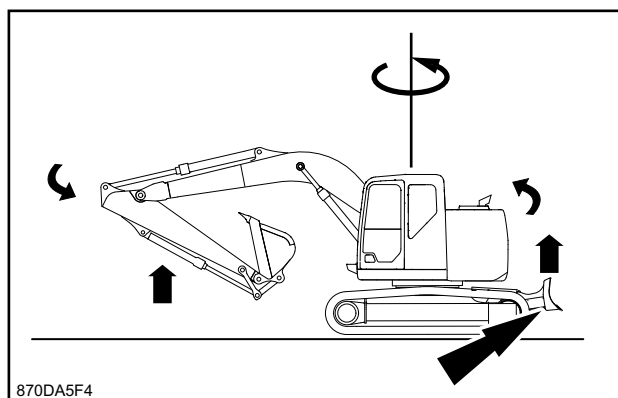


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A	Block
B	Truck ramps
C	15° or lower
D	Reinforcement
E	Raise the blade

Loading

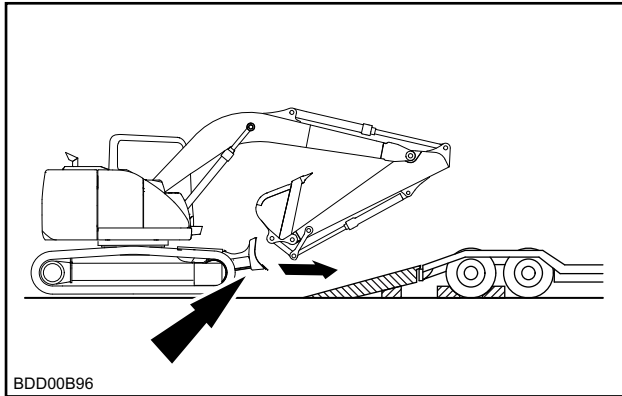
1. Raise the attachment and blade.
Swing the upper swing body so that the attachment faces toward the blade unit.



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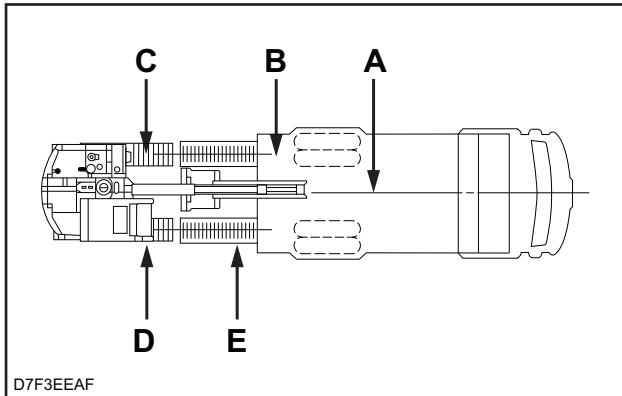
5-Transporting This Machine

2. With the blade unit facing toward the truck ramps, move the machine toward the trailer.



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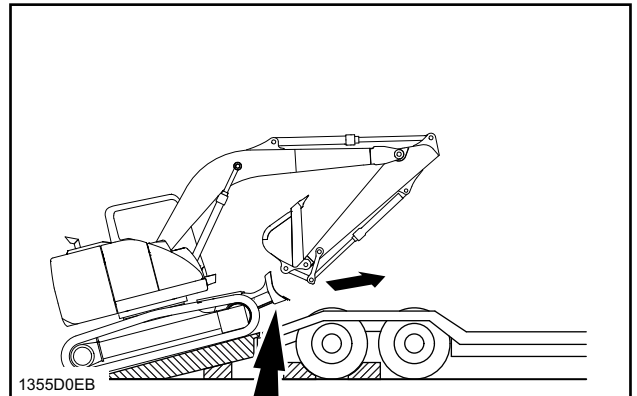
Align the centers of the construction machine being loaded and the trailer platform and the centers of the truck ramps and the shoes.



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A	Centers of machine being loaded and trailer platform
B	Trailer platform
C	Ramp and shoe centers
D	Crawler track
E	Truck ramps

3. Climb up the truck ramps at low speed without stopping. Do not steer while on the truck ramps.



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⚠ WARNING

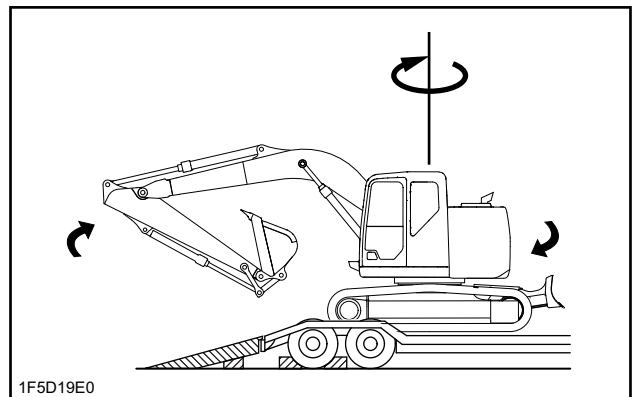
Absolutely do not change direction on the truck ramps.

To change direction, come down off the truck ramps, then change direction.

⚠ CAUTION

Note that the center of gravity moves suddenly and the machine can become unstable when the machine reaches the top of the truck ramps and comes in contact with the floor of the trailer.

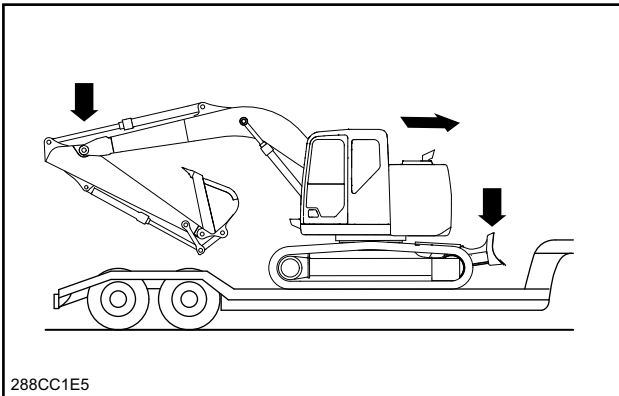
4. After the machine is completely loaded onto the trailer, swing the upper swing body so that the attachment faces toward the truck ramps.



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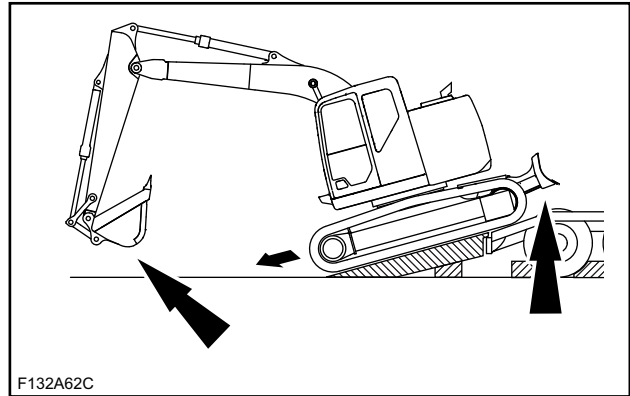
5-Transporting This Machine

5. Move the machine to the front of the trailer and lower the attachment and blade to the trailer bed.



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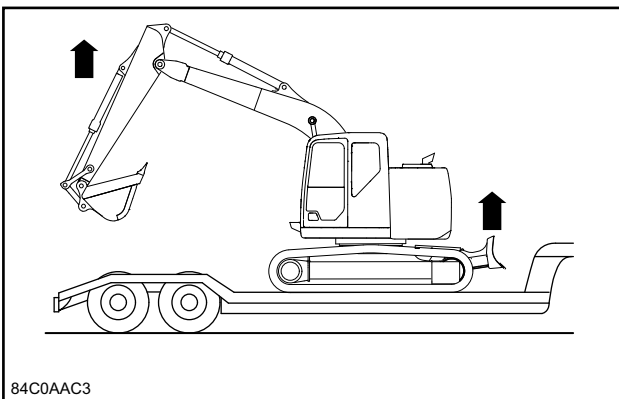
2. Travel forward at low speeds to move down the truck ramps.



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Unloading

1. Lift the attachment and blade off the trailer bed.



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CAUTION

When moving down the truck ramps, be careful not to let the attachment and blade contact the ground.

NOTICE:

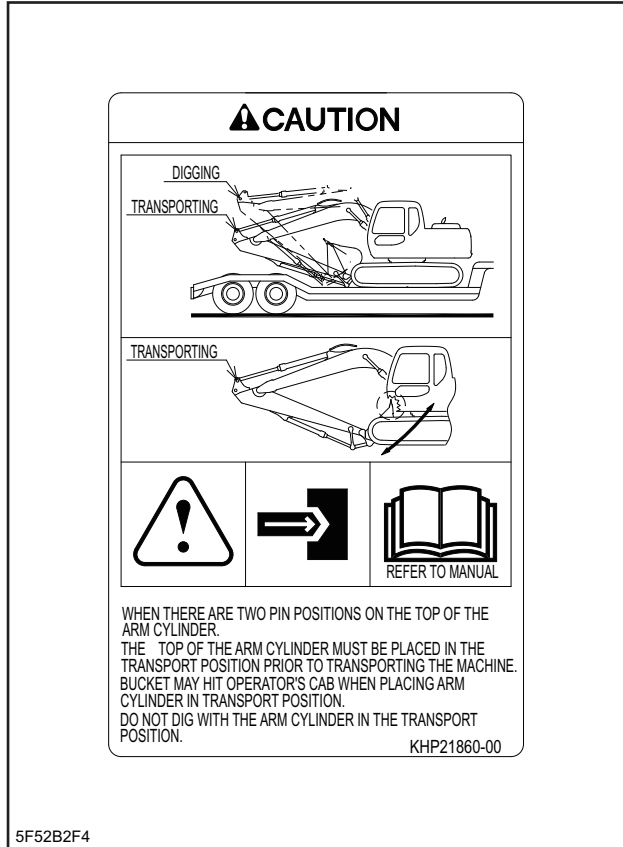
- When the attachment is installed, bleed air out of the hydraulic circuit and check that the equipment operates correctly.
- Check the oil level.

5-Transporting This Machine

Cautions for Transporting Position (with long arm attached)

⚠ CAUTION

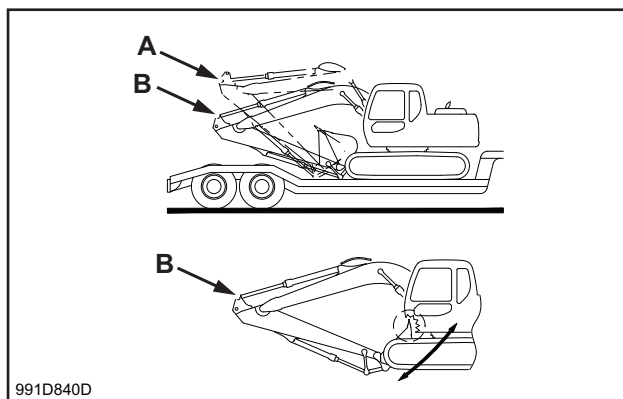
If the bucket is not folded in first, the teeth tips may interfere with the cab.



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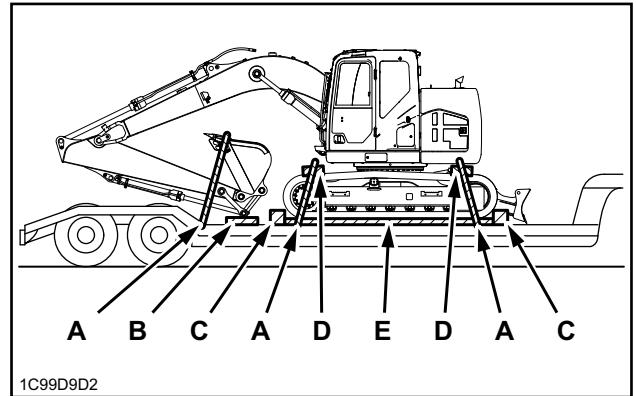
Connect the arm to point B to lower the machine height for transporting position.

Connect the arm to point A when doing the digging work.



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Fixing



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A	Rope or chain
B	Block
C	Stop block
D	Padding
E	Rubber mat

1. Check if the machine is correctly loaded on the trailer, etc., at the specified position, or if the trailer, etc., is not tilted.
2. Curl the bucket and then retract the arm. Place block B on the trailer floor, and finally, lower the boom slowly. Adjust the position of block B so that the bucket and arm are on block B, and let the machine rest on the floor.
3. Lower the blade.
4. Stop the engine.
 - Adjust the mirrors so that they will not bump against the surrounding structures and objects during transport.
5. Lock the doors (operator's station, housing door, engine hood).
6. After confirming absence of abnormality in the trailer, etc., secure the machine onto the trailer, etc., using stop block C, rope or chain A, etc., to prevent the machine from swaying (oscillation) during transport.

5-Transporting This Machine

7. Finally, check if the machine has been loaded and secured completely.

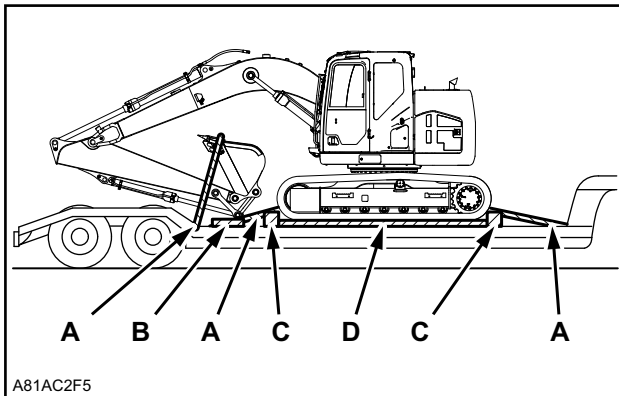
⚠ CAUTION

It will be dangerous if the machine moves during transport.

Firmly secure the machine using rope or chain etc., to prevent it from swaying.

Fixing - Supporting at Four Points

Pattern A

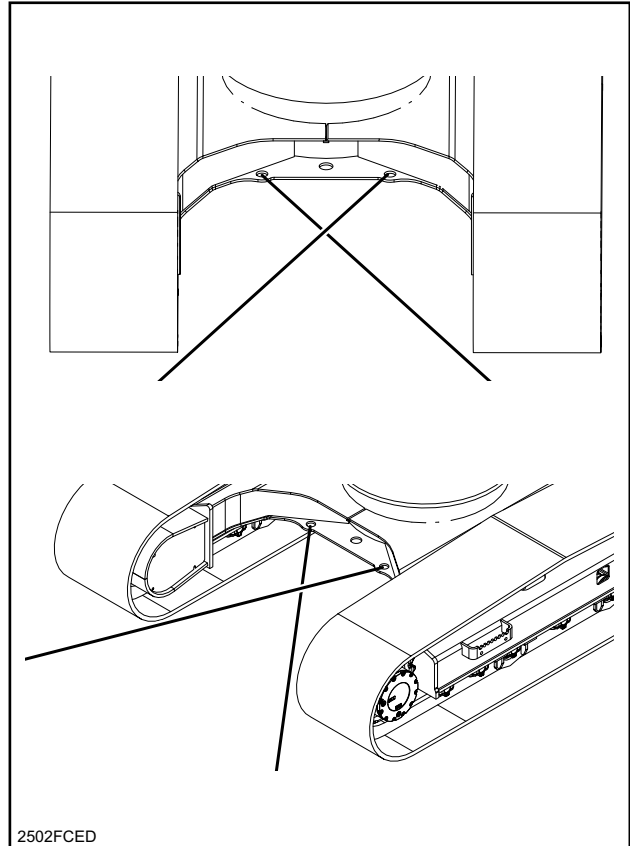


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A	Rope or chain
B	Block
C	Stop block
D	Rubber mat

1. Check if the machine is correctly loaded on the trailer, etc., at the specified position, or if the trailer, etc., is not tilted.
2. Curl the bucket and then retract the arm. Place block B on the trailer floor, and finally, lower the boom slowly. Adjust the position of block B so that the bucket and arm are on block B, and let the machine rest on the floor.
3. Stop the engine.
 - Adjust the mirrors so that they will not bump against the surrounding structures and objects during transport.
4. Lock the doors (operator's station, both sides of the housing).
5. After confirming absence of abnormality in the trailer, etc., secure the machine onto the trailer, etc., using stop block C, rope or chain A, etc., to prevent the machine from swaying (oscillation) during transport.

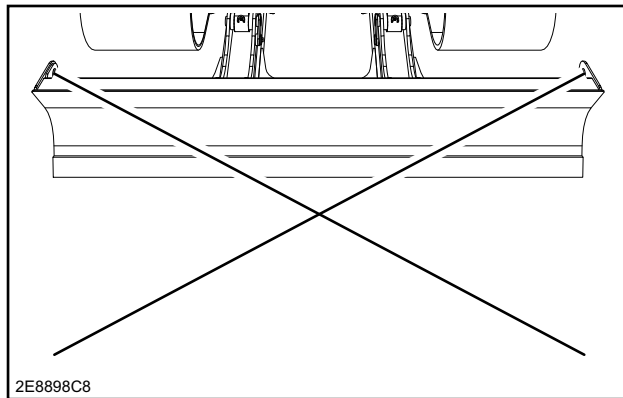
6. Secure the machine to the trailer by passing the rope or chain A through the securing hole of lower frame and tensioning the rope or chain A in an X shape. Secure both the front and rear of the lower frame in the same manner using rope or chain A.



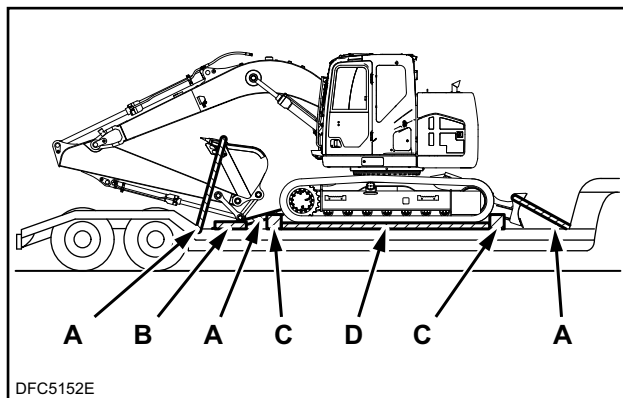
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5-Transporting This Machine

7. Secure the blade specification model to the trailer by passing rope or chain A through the securing holes of the blade and tensioning the rope or chain A in an X shape.



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A	Rope or chain
B	Block
C	Stop block
D	Rubber mat

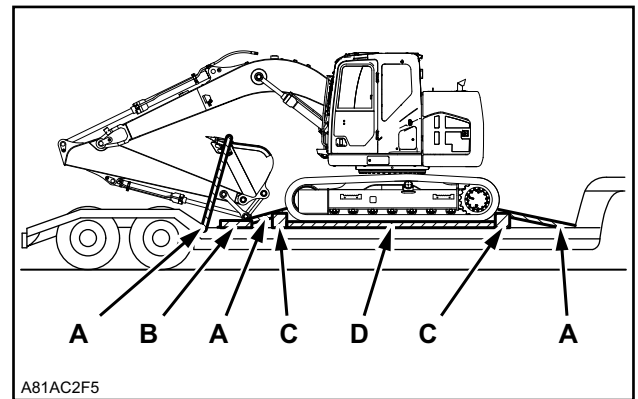
8. Finally, check if the machine has been loaded and secured completely.

⚠ CAUTION

It will be dangerous if the machine moves during transport.

Firmly secure the machine using rope or chain etc., to prevent it from swaying.

Pattern B



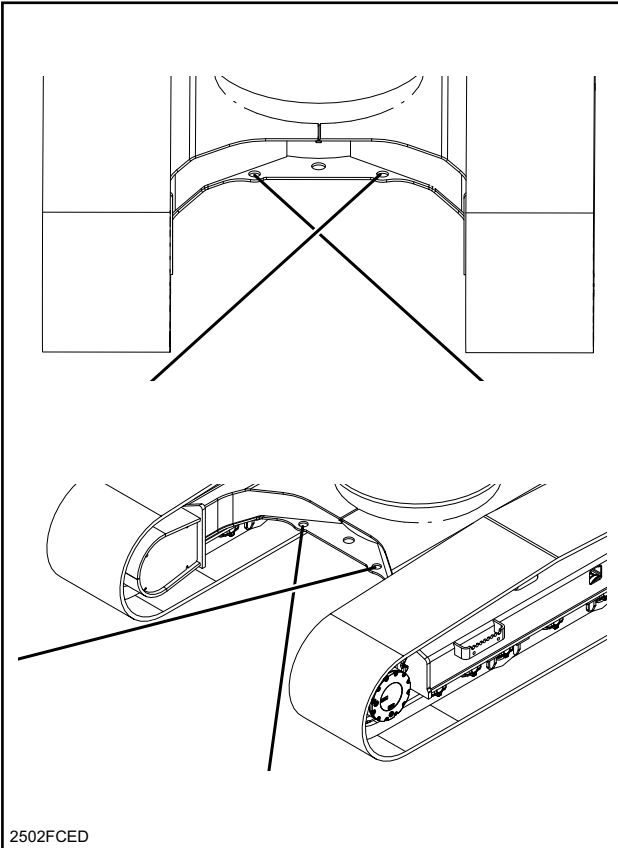
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A	Rope or chain
B	Block
C	Stop block
D	Rubber mat

1. Check if the machine is correctly loaded on the trailer, etc., at the specified position, or if the trailer, etc., is not tilted.
2. Curl the bucket and then retract the arm. Place block B on the trailer floor, and finally, lower the boom slowly. Adjust the position of block B so that the bucket and arm are on block B, and let the machine rest on the floor.
3. Stop the engine.
 - Adjust the mirrors so that they will not bump against the surrounding structures and objects during transport.
4. Lock the doors (operator's station, both sides of the housing).
5. After confirming absence of abnormality in the trailer, etc., secure the machine onto the trailer, etc., using stop block C, rope or chain A, etc., to prevent the machine from swaying (oscillation) during transport.

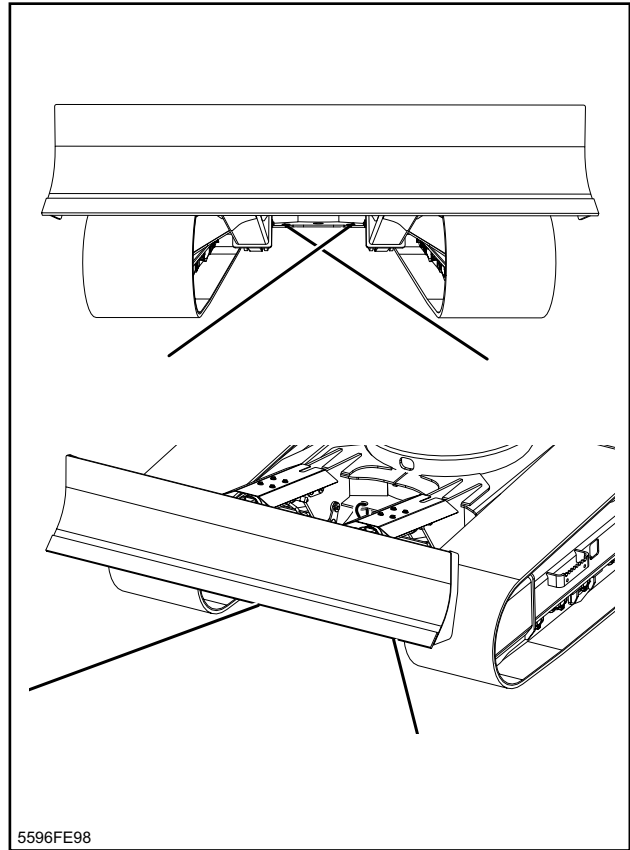
5-Transporting This Machine

6. Secure the machine to the trailer by passing the rope or chain A through the securing hole of lower frame and tensioning the rope or chain A in an X shape. Secure both the front and rear of the lower frame in the same manner using rope or chain A.



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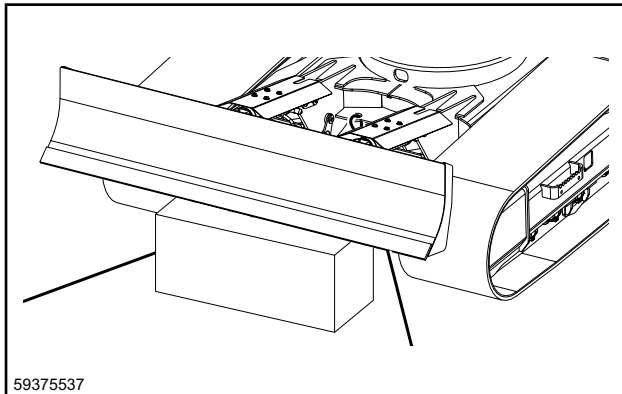
7. For the blade specification model, pass the rope or chain A in the securing hole of the lower frame and raise the blade. Pass the rope or chain A under the blade and create tension to the rope or chain A in an X shape to secure the trailer.



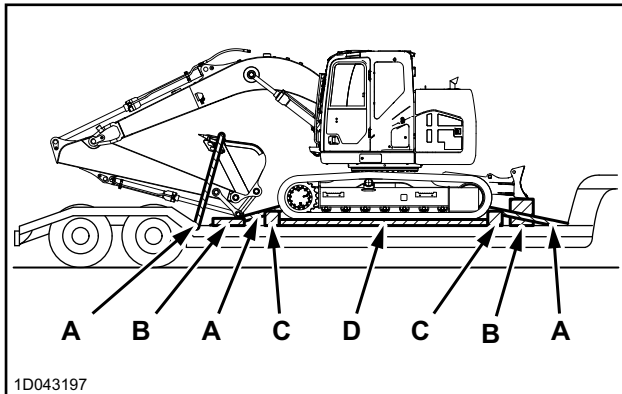
5596FE98

5-Transporting This Machine

8. Lower the blade to the position where it does not touch the rope or chain A, and place the block and fix the blade.



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A	Rope or chain
B	Block
C	Stop block
D	Rubber mat

9. Finally, check if the machine has been loaded and secured completely.

⚠ CAUTION

It will be dangerous if the machine moves during transport.

Firmly secure the machine using rope or chain etc., to prevent it from swaying.

5-Transporting This Machine

Lifting the Machine

⚠ WARNING

- Stop the engine when lifting up the machine.
- For lifting, use wire rope etc., that is strong enough.
- Do not apply abrupt loads to wire rope, lifting gear, etc.
- Absolutely do not let anyone go under or near the lifted up machine.
- Remove any special attachment before lifting work.
A special attachment could imbalance the machine, which is dangerous.
- Perform lifting work on a flat location.

1. Extend the bucket and arm cylinders all the way, then gently lower the boom.

2. Stop the engine and exit the machine.

3. Use wire rope ② and a support bar ③ of the correct length.

During lifting, the wire rope may interfere with the machine.

Protect the machine with wooden blocks, cloths, etc.

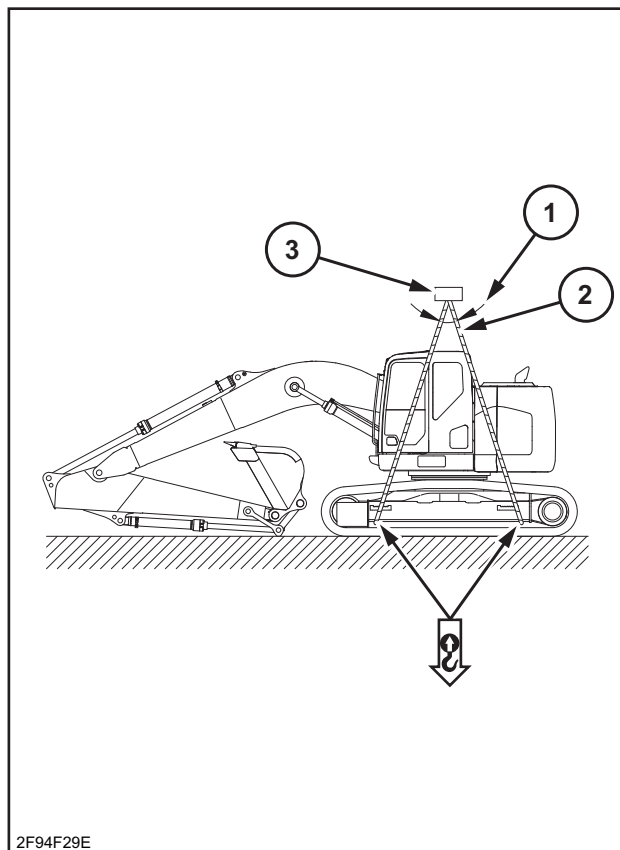
4. Pass the wire rope through to the shoe frame on both sides and slowly lift up.

Make the hanging angle ① 30 degrees to 40 degrees.

During lifting, the wire rope may interfere with the machine and may slip out of place.

Use wooden blocks, cloths, rubber, auxiliary ropes, etc. to thoroughly protect and fasten in order to protect the machine and wire rope from damage and to prevent the wire rope from slipping out of place.

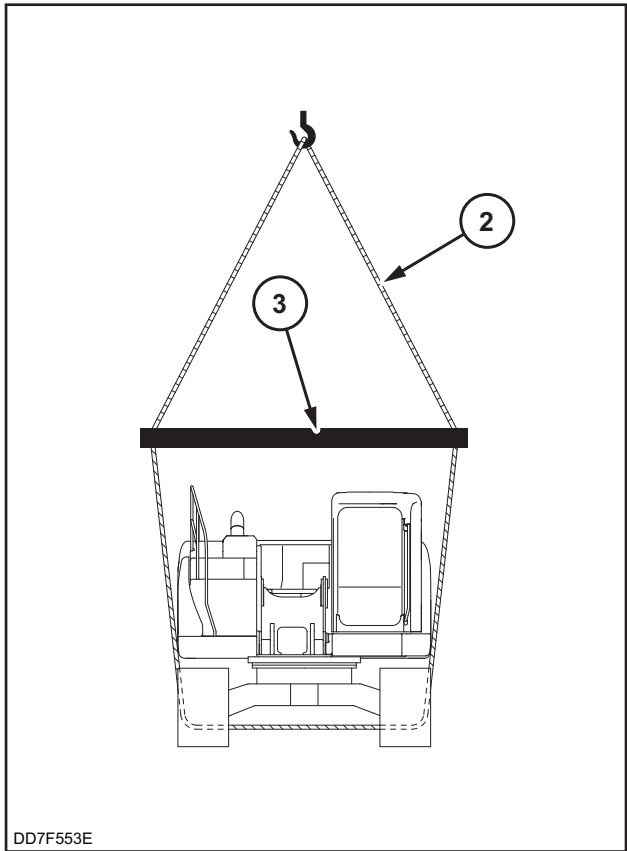
Set the liftcrane in the appropriate position.



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5-Transporting This Machine

5. Once the machine is clear of the ground, while monitoring the state of the hook and the hanging attitude, slowly lift up.



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2	Wire rope
3	Support bar

6-Maintenance

General Information

General Cautions for Service

Read thoroughly and understand the contents of [Maintenance] beforehand to perform correct service on the machine.

For information on the engine, also refer to the "Engine Manual" published by the engine manufacturer.

Safety

⚠ WARNING

Sections indicated by the ⚠ mark are especially important for safety. Read them carefully.

Service Schedule

The intervals for periodic service are based on the time shown by the service meter (hour meter) in the operator cab.

The service intervals are set based on the normal working conditions. When working in a poor work environment due to work contents, size of the load, bad weather etc. or working under severe conditions, service appropriately sooner than the specified.

Service according to the operation hours or time passed, whichever comes sooner.

General Cautions for Service

Critical service (such as adjusting or servicing hydraulic equipment or electronic components) should be performed by our authorized service shop.

⚠ WARNING

Be sure to release the hydraulic pressure in the circuits before servicing.

Bleed off the pressure in the hydraulic circuits before starting service.

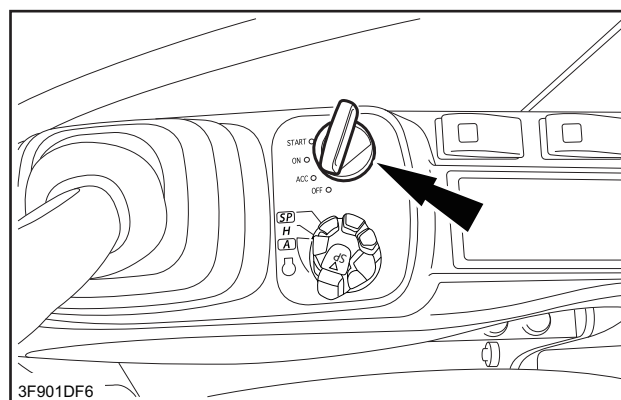


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Releasing pressure in the hydraulic system

NOTE: Before carrying out any work on the hydraulic system, there should be no pressure in any of the circuits.

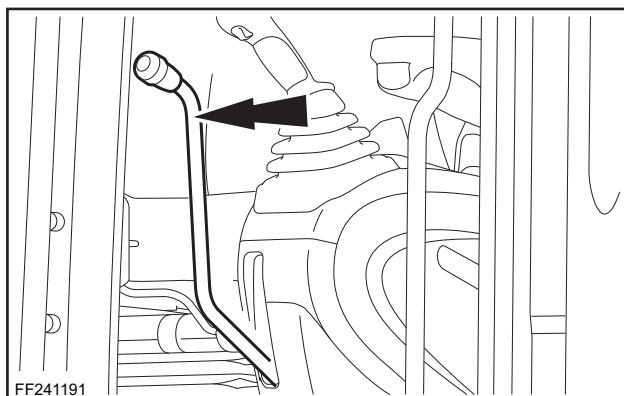
1. Place the machine on flat, level ground, lower the attachment to the ground and stop the engine.
2. Turn the starter switch key to the " ON" position.



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6-Maintenance

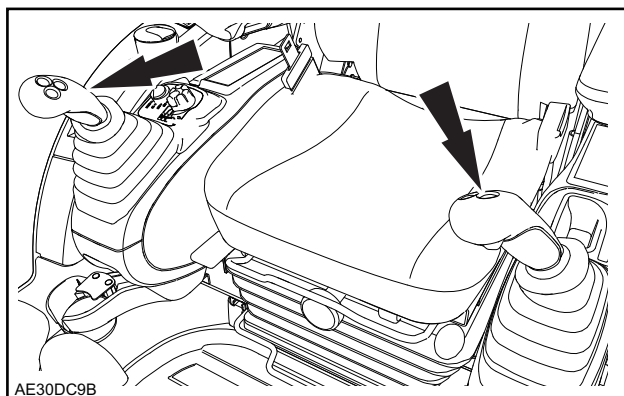
3. Push the gate lock lever (safety bar) forward.



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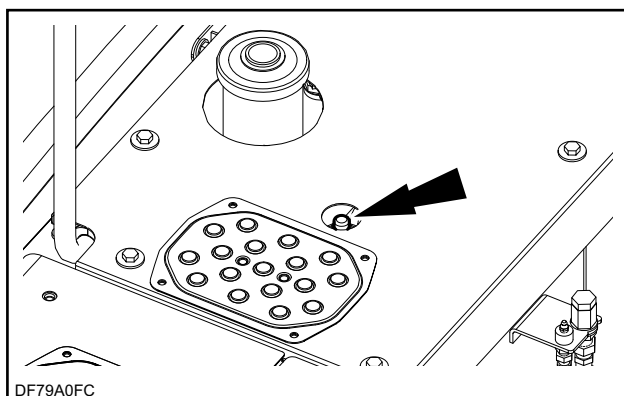
4. Operate the control levers from right to left and front to rear a dozen times approximately.

5. Turn the starter switch key to the " OFF" position (shut down).



AE30DC9B

6. Press the button on top of the breather on the hydraulic tank to release any residual pressure.



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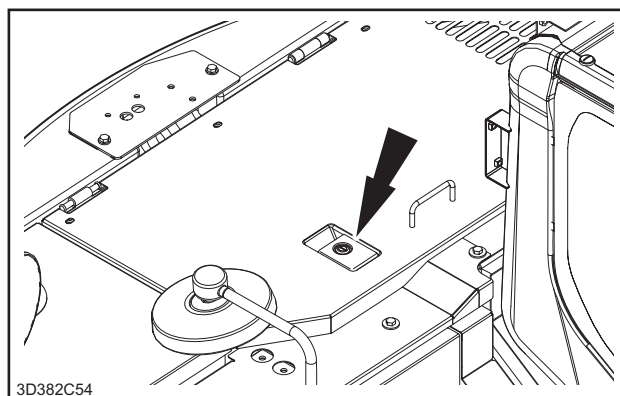
Engine Hood

Always lock the engine hood when opening it to inspect.

Opening

Release the tailpieces then lift the hood to the maximum so that it gets automatically locked with the support strut.

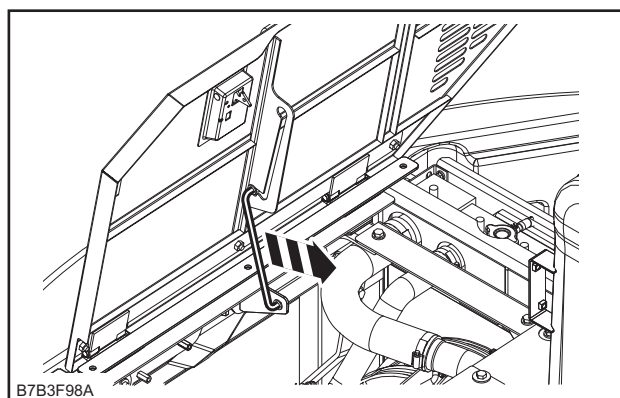
NOTICE: Once the hood is completely opened, make sure the locking system is correctly engaged.



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Closing

Lift the hood slightly, pull the support strut back lower the hood, and lock it using the tail pieces.



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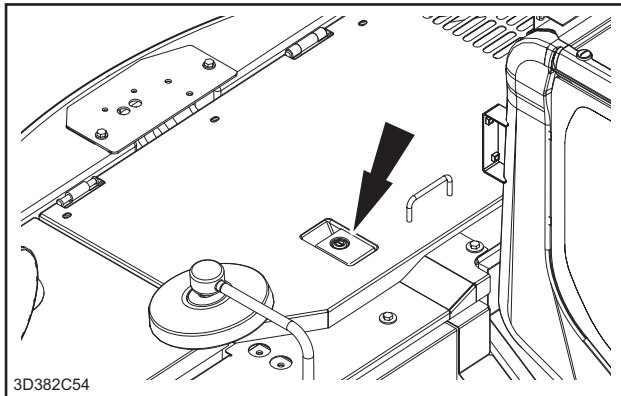
To lock the hood, secure the front tailpiece using the starter switch key.

⚠ WARNING

Moving parts!

Make sure the hood is closed properly before driving the machine.

Failure to comply could result in death or serious injury.

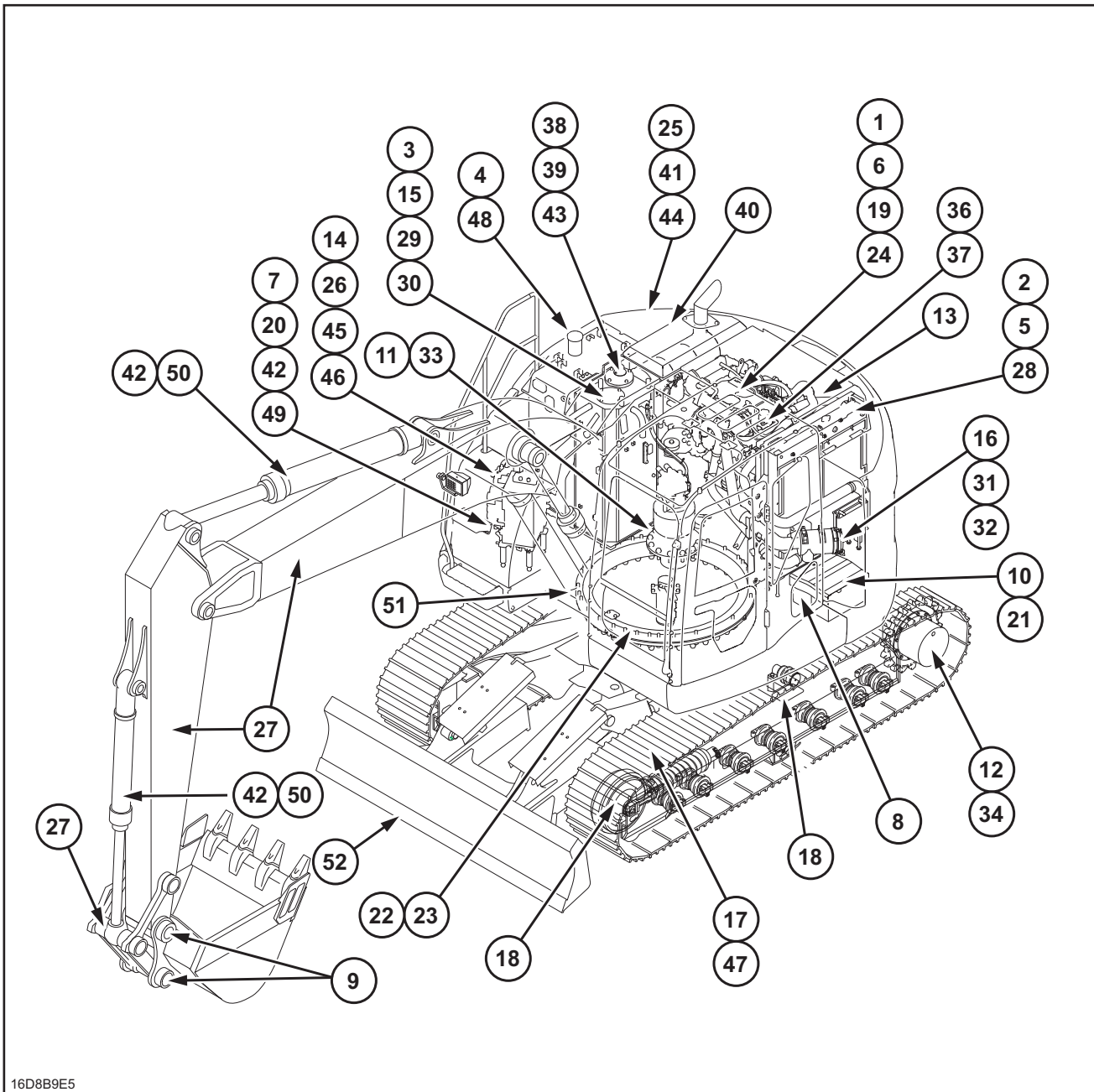


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Service Chart

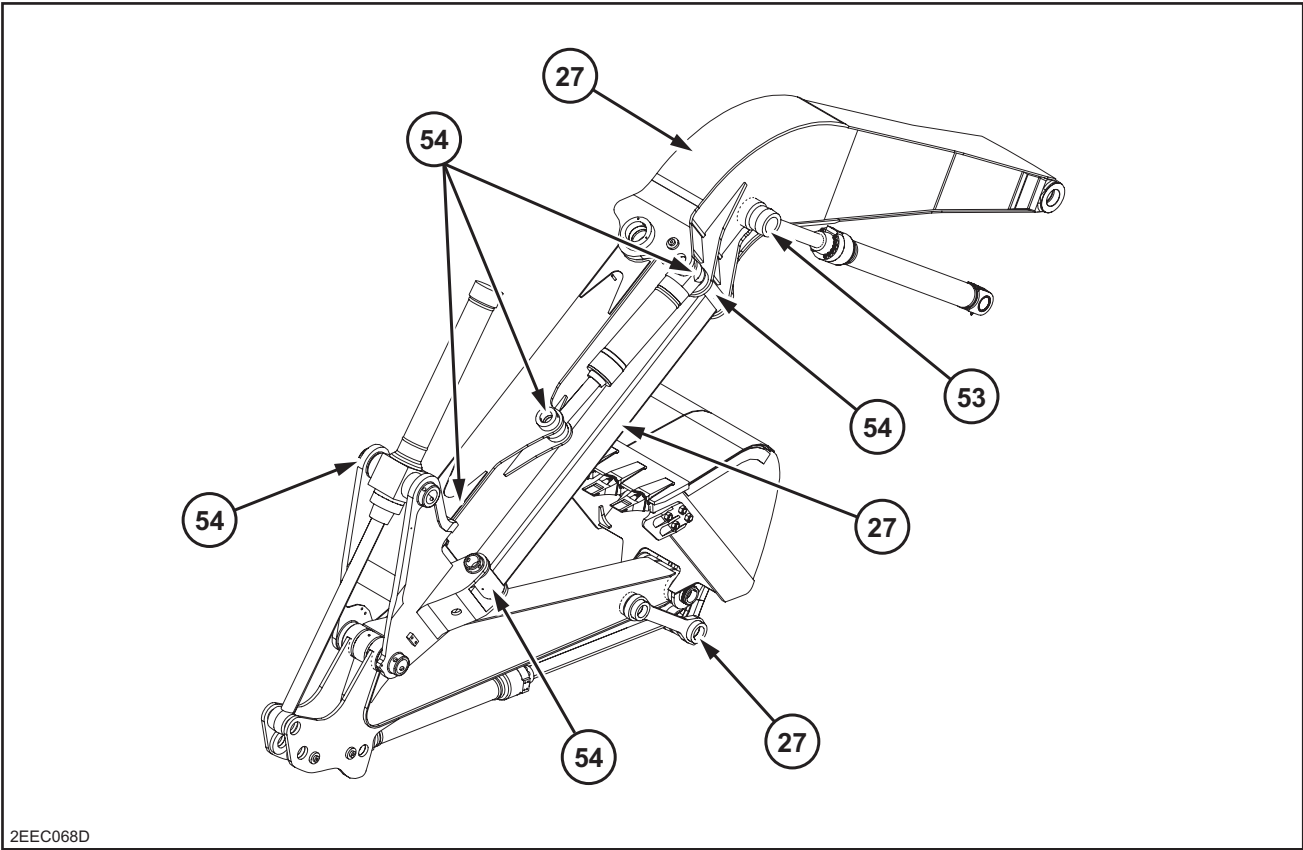
Service Chart

Service Point



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16D8B9E5



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For details on service points and for their intervals, refer to the following.

6-Maintenance

Servicing Intervals

Legend						
						
Interval (hours)	Clean	Replace	Perform initial replacement	Check	Grease	Drain/bleed

	Note	Item	Service point	Number	Action	Reference page
10	(A)	(1)	Engine oil level	1		6-43
		(2)	Coolant solution level	1		6-46
		(3)	Hydraulic reservoir level	1		6-59
		(4)	Draining residual fuel in the fuel reservoir	1		6-49
		(5)	Radiator and oil cooler	2		6-75
		(6)	Fan/alternator belt tension	1		6-77
50	(B)	(7)	Hydraulic system lines	-		6-59
		(8)	Air conditioner	1		6-88
		(52)	Blade (blade type)	6		6-35
		(53)	Boom cylinder top pin	2		6-37
		(54)	Offset boom pin	10		6-37
250	(C)	(9)	Bucket linkages	2		6-33
		(10)	Battery electrolyte level	2		6-96
		(11)	Swing reduction gear level	1		6-65
		(12)	Travel reduction gear level	2		6-72
	(D)	(13)	Clamp and radiator hose tightening	-		6-46
		(39)	Return filter	1		6-59
		(40)	Pilot filter	1		6-59
		(11)	Swing unit reduction gear oil	1		6-70
		(12)	Travel unit reduction gear oil	2		6-72
	(E)	(15)	Draining residual oil in the hydraulic reservoir	1		6-59
		(16)	Primary air filter element	1		6-72
	(F)	(17)	Pad screw torque	-		6-73
		(18)	Idler wheel and rollers	-		6-75
		(19)	Fan/alternator belt tension	1		6-77
		(20)	Screw and nut tightening torque	-		6-24
	(F)	-	Cab protection	1		3-80
		(21)	Battery	2		6-96

6-Maintenance

	Note	Item	Service point	Number	Action	Reference page
500		(5)	Radiator and oil cooler	2		6-75
		(14)	Fuel pre-filter element	1		6-49
		(22)	Turntable bearing	2		6-33
		(23)	Turntable bearing teeth	1		6-33
		(24)	Engine oil draining	1		6-43
		(25)	Engine oil filter	1		6-43
		(26)	Fuel filter filter element	1		6-49
1000	(G)	(27)	Attachment (except bucket linkage)	15		6-33
	(H)	(28)	Draining coolant solution from cooling system	1		6-46
	(*)	(29)	Hydraulic fluid condition	1		6-59
		(30)	Hydraulic reservoir breather	1		6-59
	(I)	(31)	Primary air filter element	1		6-72
	(J)	(32)	Secondary air filter element	1		6-72
	(K)	(33)	Swing reduction gear draining	1		6-65
		(34)	Travel reduction gear draining	2		6-72
	(L)	(36)	Alternator	1		6-99
		(37)	Starter motor	1		6-99
		(53)	Boom cylinder top pin	2		6-37
		(54)	Offset boom pin	10		6-37
2000	(*)	(38)	Suction filter	1		6-59
	(M) (N) (*)	(39)	Return circuit filter	1		6-59
	(M) (*)	(40)	Pilot filter	1		6-59
		(51)	Swing reduction gear	1		6-35
4000	(O)	(41)	Main pump output hydraulic hose	-		6-59
		(42)	Boom, arm, and bucket cylinder hydraulic hoses	-		6-59
5000		(8)	Air conditioner	1		6-88
	(*)	(38)	Suction filter	1		6-59
	(P) (*)	(43)	Fluid	1		6-9
	(R)	(44)	Fuel pre-filter air bleeding	1		6-49
		(45)	Fuel filter air bleeding	1		6-49
	(S)	(46)	Fuel supply pump filter	1		6-49
		(47)	Track	2	 	6-73

6-Maintenance

	Note	Item	Service point	Number	Action	Reference page
	(S)	(48)	Fuel reservoir filter	1		6-78
	(Q)	(49)	Machine settings	-		6-81
	(S)	(50)	Cylinder leak	-		6-82
	(T)	-	Fire extinguisher	1		6-78
	(S)	-	Machine inspection	-	 	6-81

- (A) Or every day
- (B) Inspect every 6 months by a specialist.
- (C) If these linkage points are not equipped with genuine parts, grease every 10 hours.
- (D) Or every 6 months
- (E) Or when "AIR FILTER" is displayed on the message screen.
- (F) Inspect after 50 hours during the run-in period.
- (G) If these linkage points are not equipped with genuine parts, grease every 50 hours.
- (H) Or every 2 years or twice a year (spring/autumn) if anti-freeze is used
- (I) Or after cleaning 6 times
- (J) Or the primary filter has been cleaned 3 times
- (K) Drain after the first 250 hours during the run-in period
- (L) Ask the Sumitomo dealer to perform this inspection
- (M) Replace after the first 250 hours during the run-in period
- (N) When using biodegradable fluid, shorten the servicing intervals to 1000 hours.
- (O) Or every 2 years, whichever comes first
- (P) When using biodegradable fluid, shorten the servicing intervals to 2000 hours.
- (Q) Ask the Sumitomo dealer to perform this inspection
- (R) When the float reaches the level line (A)
- (S) Periodically
- (T) Monthly check and inspection by specialist every 6 months
- (U) Inspection weekly and when quick coupler installed
- (*) If the machine is equipped with a hydraulic breaker, the servicing intervals must be shortened. Refer to Page 6-59.

NOTE:When the machine has been operated 500 hours (then 1000 hours, 1500 hours...), the "SERVICE DUE" message is displayed on the screen. Refer to "System Display and Function Control Panel" (3-27) in [Description of Handling]. (This interval can be extended. Consult your Sumitomo dealer.)

Hydraulic Fluids, Fuels, and Lubricants

Use lubricants suitable for the locations where it is applied.

NOTICE: Be sure to comply with the usage conditions for hydraulic fluids and lubricants.

Hydraulic Oil

ISO VG46

The type of hydraulic oil to be used depends on the ambient temperature.

Temperate Climates

-20°C - 40°C

Hot Climates

0°C - 50°C

Consult our dealer or authorized service shop when using the machine in a hot region.

Cold Climates

Cold weather

When the air temperature drops, arrangements such as the following for handling low temperatures must be made because startup problems, coolant freezing, etc. occur.

Fuel and Lubricants

Replace the lubricants for each unit with ones that are less viscous.

For information on the specified viscosity, refer to "6-9" (Hydraulic Fluids, Fuels, and Lubricants).

When the ambient temperature is lower than -7°C, temporarily mix the fuel No. 1-D (S15) and No. 2-D (S15).

Battery

WARNING

Batteries generate combustible gas. Keep flames away from them.

Battery solution is hazardous.

Avoid contact with eyes and skin. If it comes into contact with the eyes and/or skin, wash the affected area thoroughly with plenty of water and seek medical attention.

If the temperature drops, battery capability decreases. The battery solution may freeze if the charging rate is low.

Try to maintain the battery charging rate as close to 100 % as possible and try to keep the battery warm for startup on the next day.

Maintenance-free batteries (installed on new machines)

- Check the hydrometer. (Refer to "Batteries" (6-96) in [Maintenance].)

Water Refill Type Batteries

- The battery charging rate is determined by measuring the specific gravity of the battery solution (see table below).

Charging rate	Solution temperature			
	20 °C	0 °C	-10 °C	-20 °C
100 %	1.28	1.29	1.30	1.31
90 %	1.26	1.27	1.28	1.29
80 %	1.24	1.25	1.26	1.27
75 %	1.23	1.24	1.25	1.26

- When replenishing distilled water, replenish before beginning operation on the next day to prevent freezing.

Mixing Anti-freeze

The machine is shipped from the factory with 55 % anti-freeze (long-life coolant: Sumitomo genuine anti-freeze clean coolant) mixed in the coolant. There is no need to adjust the concentration of anti-freeze during cold weather.

CAUTION

Cautions for using anti-freeze

- Use anti-freeze within a 55 to 60 % concentration range.
If the concentration is too low, the rust-prevention effect is weakened but if the concentration is too high, overheating is more likely.
- Replenish anti-freeze at a concentration of about 55 % when compensating for natural water loss.
- For anti-freeze, use Sumitomo genuine anti-freeze clean coolant. Do not mix with other brands.
- Anti-freeze is flammable. Keep it away from fire.
- Always use soft water for the coolant.

Transmission Component Oil

This is extreme pressure oil used for enclosed transmission components.

Travel reduction gear: Oil gear API GL-4

Swing reduction gear: Oil gear API GL-4

Grease

Swing reduction gear: Grease (Lithium-series, consistency number: 2)

Swing ring gear, attachment, grease cylinder:

Grease (extreme pressure No. 2)

This is multipurpose grease for "extreme pressure" and that uses lithium soap and calcium.

Engine Oil

Use CD class or higher of API classification.

When the Cold-weather Season is Over ...

When the season changes and the temperature goes up

- Replace the lubricants in each unit with ones of the specified viscosity.
- Completely drain out the anti-freeze (only when AF type permanent anti-freeze is used), clean out the inside of the cooling system well, then pour in clean soft water (tap water).

Usage of Fuels and Lubricants According to Temperature

NOTICE:When using the machine in special environments (outside temperatures below -20°C or above 40°C), contact your local dealer or our service center for the type of lubricants to use.

Fuel and oil

Use the products shown in the table according to temperature.

For details on the oil level, refer to "Hydraulic Oil Capacities and Lubricant Specifications" (6-16).

Where to refill	Type of oil	What to use according to different temperature settings						
		-20	-10	0	+10	+20	+30	°C +40
Engine oil pan	Engine oil			SAE 30 CD				
				SAE 10W-30 CD				
				SAE 15W-40 CD				
Swing reduction gear	Gear oil							
Travel reduction gear								
Hydraulic oil tank	Hydraulic oil							
Fuel tank	Diesel fuel			JIS No.2				
				JIS No.3				
				JIS Special No.3				

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Fuel

⚠ WARNING

- Thorough care is required when performing service on the fuel system.
- Especially, be careful about fire. (Do not smoke during work.)
- Diesel fuel spilled during refueling and service can cause a fire. Wipe it away thoroughly.
- Fuel leaking from the fuel hose, injection pump, fuel filter or connections may result in a fire.
If any fuel leakage is found, repair the area immediately.
- Do not use any substitute fuel. It could result in reduced performance or cause a fire.



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NOTICE:

If any fuel other than diesel fuel is used, full engine function and performance cannot be obtained. Other fuel can also cause engine breakdown or accidents. Absolutely never use any other fuel. Any troubles resulting from the use of any fuel other than the diesel fuels specified above are not covered by the warranty.

Engine Fuel and Filter Maintenance

In order to meet exhaust gas regulations, the engine components have been made precisely and they are to be used under high-pressure conditions.

Therefore, the specified fuel must be used for the engine.

Use of any other fuel is, of course, not covered by the warranty, and can cause severe breakdown. In addition, since suitable specifications for the fuel filter elements have been established for this engine, use of the genuine filter is essential.

Fuel Used

1. Fuel selection

The following conditions must be met for the diesel engine fuel.

- [1] The fuel must not contain any fine dust.
- [2] The viscosity must be appropriate.
- [3] The cetane number must be high.
- [4] The flow properties at lower temperature must be good.
- [5] The sulfur content must be low.
- [6] There must be minimal residual carbon.

2. Recommended conditions for diesel fuel

- ASTM (AMERICAN SOCIETY FOR TESTING AND MATERIALS): D975 No. 1-D S15, No. 2-D S15
- JIS: K2204
- DIN (German Industrial Standard): EN590
- BS (British Standards): EN590
- CGSB (Canadian General Standards Board): CGSB-3.517
- GB (Chinese National Standards): GB252-2011
- Or fuel specified by the countries using these standards and in which the machine is used.

NOTICE: EPA (Environmental Protection Agency) regulation requires ultra-low sulfur fuel only.

NOTE:

If a serious problem occurs due to using fuel other than those specified here, the warranty is invalidated.

Using a non-recommended fuel may lead to damage of the fuel injection pump, injector, and other fuel supply systems or to the engine.

Sumitomo bears no responsibility whatsoever for any such damage.

Be aware that the warranty does not cover such damage.

Keep the following in mind in order to prevent damage to the engine fuel supply systems.

- Some fuel suppliers mix used engine oil and diesel fuel.

Never use diesel fuel polluted with used engine oil in the machine.

Not only can this fuel damage the engine, it can also reduce the exhaust gas purification functions. Before using any diesel fuel, confirm with the supplier whether the fuel complies with the above specifications.

NOTICE:For information on the correct use of fuel additives, consult your fuel supplier, our dealer or authorized service shop.

NOTE:In order to prevent condensation during cold weather, fill the fuel tank to full after work is complete.

Fuel Storage

If fuel is stored for a long time, impurities may accumulate and the fuel may condensate. Water in the fuel can cause engine breakdown. Put the fuel storage reservoir outdoors and keep the fuel at as low a temperature as possible. Periodically drain off water and impurities.

Biodiesel Fuel

Biodiesel fuel consists of a family of fuels derived from vegetable oils with methyl esters.

NOTE:Biodiesel fuel blends are approved for your engine only if they comply with EN14214 Specification Standards or ASTM D 6751.

NOTE:

Always check with your dealer or the certified service plant about which blend is approved for your engine.

Be aware that the use of biodiesel fuel that does not meet the above standards may cause serious damage to the engine and fuel system of the machine.

If fuel that is not permitted is used, the Sumitomo warranty may be invalidated.

Biodiesel Fuel Usage Conditions

NOTE:Biodiesel fuel must meet the above fuel specifications.

Biodiesel fuel must be purchased only from a trusted supplier that understands the product and maintains good fuel quality.

Biodiesel fuel must be pre-blended by the supplier. Mixing biodiesel fuels on-site can result in incorrect mixture that can lead to problems with both the engine and the fuel system.

Engine performance may be affected by the use of biodiesel fuel.

NOTE:Never modify the engine and/or the injection pump settings in order to recover the reduced performance.

When using biodiesel fuel blends, some reduction in digging performance is unavoidable. Some modification may be required to use biodiesel fuel in the engine.

For information on modification, consult your local dealer or the certified service plant.

Biodiesel fuel has a higher cloud point than diesel fuel.

NOTE:The use of high biodiesel fuel blends is not recommended in cold weather conditions.

When using biodiesel fuel, it may be necessary to change the engine oil, engine oil filter, and fuel filter elements more frequently than when using diesel fuel.

Biodiesel fuel can remove the rust and particles normally stuck to the side of a tank from inside the on-site fuel storage tank.

Like particles deposits that commonly occur with diesel fuel, these particles can become trapped by the machine fuel filters, causing blockage and shorting filter life.

In cold weather, this is more likely to happen.

For information on cold weather operation and proper servicing intervals when using a biodiesel fuel blend, consult your local dealer or the certified service plant.

When handling biodiesel fuel, be careful that no water enters the fuel system.

Biodiesel fuel attracts moisture from the atmosphere.

In order to limit the amount of air and water vapors in the fuel tank, keep the tank as full as possible. It is necessary to drain water frequently from the fuel filter's water supply plug.

Biodiesel fuel has the properties of oxidizing and becoming unstable.

These properties can affect fuel stored in the machine.

NOTE:Do not leave a biodiesel fuel blend stored in the fuel system for longer than 3 months.

When it is necessary to store the machine for a long time, it is necessary to drain the biodiesel fuel from the engine fuel system.

Before storing the machine, run the engine on diesel fuel for 20 hours.

NOTE:Do not store biodiesel fuel longer than 3 months in any on-site storage tank.

If biodiesel fuel is spilled, it must be cleaned up immediately.

Otherwise, it could damage the environment and harm the paint on the machine.

Before using a biodiesel fuel blend, ask your local dealer or the certified service plant for information about blends approved for the machine and about detailed usage conditions.

NOTE: Be aware that failure to meet the requirements and conditions for the proper use of biodiesel fuel invalidates the machine's warranty from Sumitomo.

Anti-freeze/Anti-corrosion

Use anti-freeze and anti-corrosion in all seasons to protect the cooling system from corrosion and all risks of freezing.

Clean coolant (long-life coolant) JIS type II (LLC)
In regions where the temperature falls to -38°C , mix so that the proportion of water is 55%.

NOTE:

Do not mix different products.

When topping up the fuel system, always use the same product.

Environment and Ecology

Always consider the environment before servicing on this machine and before disposing of used fluids or lubricants.

Never dispose of oil or fluids on the ground or put them in any leaking container.

Consult your local ecological center or your dealer and the certified service plant to obtain information on the correct method of disposing of these lubricants.

Soil, air, and water are generally vital factors of life.

When legislation does not yet rule the treatment of some of the substances which are required by advanced technology, sound judgment should govern the use and disposal of products of a chemical and petrochemical nature.

NOTICE: The following are recommendations which may be of assistance.

- Become acquainted with and ensure that you understand the relative legislation applicable to your country.
- If no legislation exists, obtain information from suppliers of oil, filters, batteries, fuel, anti-freeze, cleaning agents, etc. about the impact of these substances on man and nature, and about how to safely use, and dispose of them.
- Local environmental agency will, in many cases, be able to help you as well.

6-Maintenance

Hydraulic Oil Capacities and Lubricant Specifications

Part	Hydraulic oil/Lubricant type	Capacity
Engine	Engine oil	17.0 L
Cooling system	Anti-freeze	15.3 L
Fuel system	JIS No. 2 diesel fuel, JIS No. 3 diesel fuel, JIS Special No. 3 diesel fuel	Capacity 200 L
Hydraulic system	Hydraulic ISO 46	Total system 158 L
		Container 75 L
Travel unit	Gear oil API GL-4	Reduction gear 4.2 L
Swing unit	Gear oil API GL-4	1.8 L
	Grease (Lithium-series, consistency number: 2)	0.5 kg
Turntable bearing	Grease (extreme pressure No. 2)	9.9 kg

Genuine Sumitomo Product

Genuine Sumitomo product is a high-grade oil guaranteed by Sumitomo for use in heavy-duty work. Always use genuine Sumitomo oil to get machine's optimal performance.

NOTICE:

When refilling hydraulic oil, please use the same hydraulic oil (same manufacturer and same product) as that already in the machine.

Mixing with another oil will reduce hydraulic oil performance and may cause damage to hydraulic equipment.

Oil type	Sumitomo genuine oil name	Remarks	Part No.
Engine oil	Clean Dash (for general purpose)	API-CD SAE 30 (20 L)	WEB0005
	Clean Dash (for cold weather)	API-CD SAE 10W-30 (20 L)	WEB0071
		API-CD SAE 15W-40 (20 L)	WEB1022
Gear oil	Clean Elite	API-GL-4 SAE 90 (20 L)	WEB0009
		API-GL-5 SAE 80W-90 (20 L)	WEB0075
	(Idemitsu) Apolloil Gear HE-90S	API-GL-5 SAE 90 (20 L)	WEB01011
Hydraulic oil	Clean Red ECO10000	ISO-VG46 (20 L)	WEB0150
Extreme pressure grease	Clean Cassette	Extreme-pressure lithium grease No. 2 (400 g)	WEB0012
Lubricant	Clean Gold Spray	Molybdenum lubricant spray type (330 g)	WEB0001
	Clean Gold Grease	Molybdenum lubricant grease (2.5 kg)	WEB0002
Anti-freeze	Clean Coolant	Long-life coolant JIS type II (LLC) (4 L x 6)	WEB1182

Consumable Parts

Replace consumable parts such as filter elements and bucket teeth during periodic service or before they reach their wear limit.

When replacing parts, use high-quality genuine Sumitomo products.

Make sure to replace the consumable parts and use the machine more efficiently.

Parts in which () appears in the quantity column of the consumable parts list are parts that should be replaced all at the same time.

Consumable part name			Q'ty	Replacement intervals
Engine oil filter			1	Every 500 hours
Fuel filter element	Main		1	Every 500 hours
	Pre		1	Every 500 hours
Pilot oil filter element			1	Every 2000 hours
Return filter element			1	Every 2000 hours
Air filter element	Double type	Outer element	1	Every 1000 hours
		Inner element	(1)	Every 1000 hours
Air breather element			1	Every 1000 hours
	Packing		1	-
Suction filter element			1	Every 5000 hours
Bucket	Point (standard type)		5	-
	(locking pin)		(5)	-
	(rubber locking pin)		(5)	-
	Side cutter (right)		1	-
	Side cutter (left)		1	-
	High-strength bolt (for standard type)		8	-
Air conditioner	High-strength nut		8	-
	Inside air circulation filter		1	Every 2000 hours
	Outside air intake filter		1	Every 2000 hours

Important Safety-related Parts Requiring Periodic Replacement

⚠ CAUTION

We particularly request periodic replacement of the parts in the following important safety-related parts list related to safety and fire.

For these parts, it is difficult to judge the end of the service life from appearance inspections or the feel during operation. Replace them periodically according to the replacement intervals listed on the important safety-related parts list.

Important safety-related parts list

• Fuel-related

Important safety-related parts requiring periodic replacement	Replacement intervals
Fuel hose (fuel tank to engine)	Every 2 years or every 4000 hours whichever comes first
Fuel hose (fuel filter to injection pump)	

• Hydraulic-related

Important safety-related parts requiring periodic replacement	Replacement intervals
Pump outlet hose (pump to operation valves)	Every 2 years or every 4000 hours whichever comes first

Important safety-related parts requiring periodic replacement	Replacement intervals
Boom cylinder and line hose	Every 2 years or every 4000 hours whichever comes first
Arm cylinder and line hose	
Bucket cylinder and line hose	

If any abnormality is discovered in these parts, they still need to be repaired or replaced even if the specified replacement time has not yet arrived.

For hose sections, if hose clamp deformation, cracks, or any other deterioration is recognized, also replace the clamp at the same time.

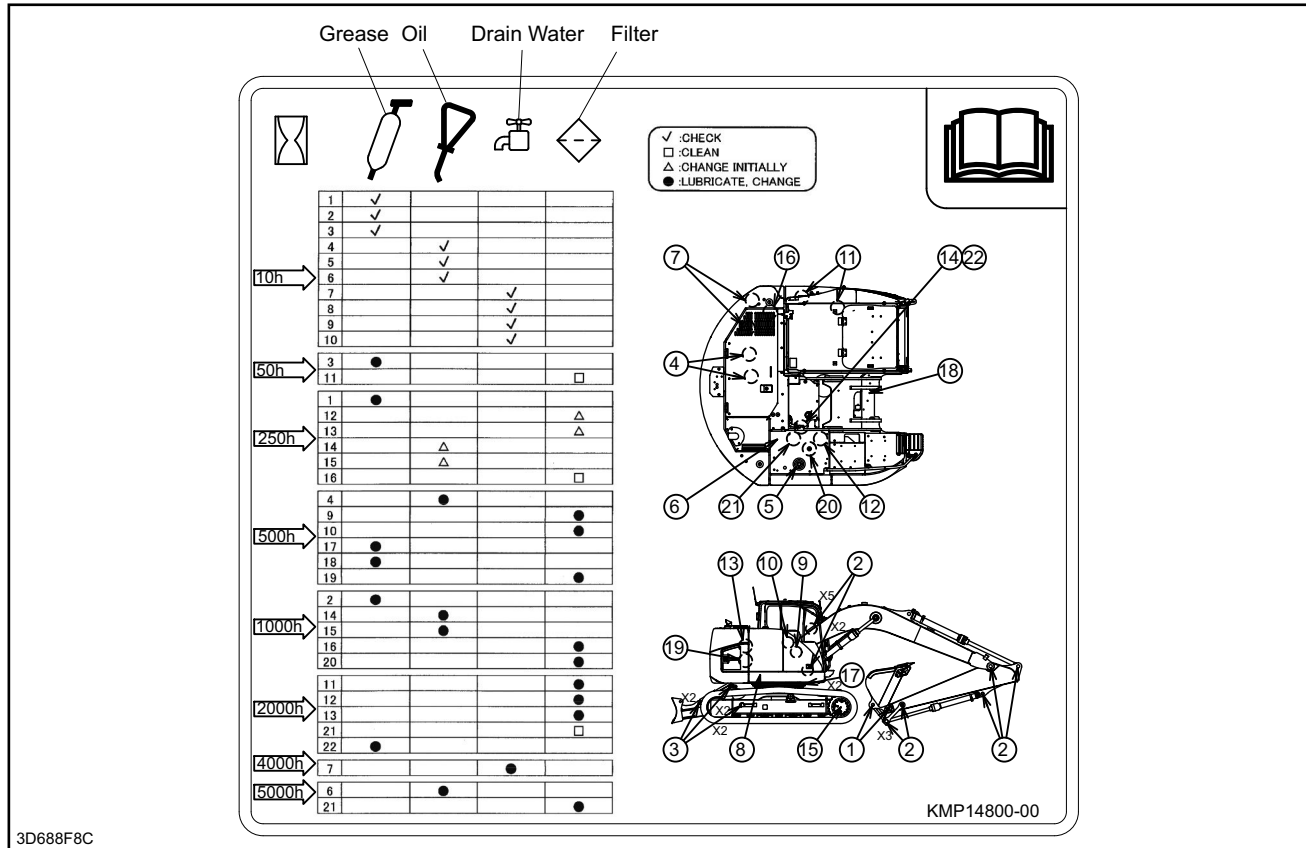
Perform the following inspections on the hydraulic hoses other than ones to be replaced periodically, then retighten or replace if any abnormality is recognized.

- When replacing a hose, also replace O-rings or gaskets at the same time.
- When replacing a safety-related part, ask your local dealer or the certified service plant.
- During the periodic inspections below, also inspect hydraulic hoses and fuel hoses.

Inspection classification	Inspection item
Start-up inspection	<ul style="list-style-type: none"> • Oil leaks from fuel and hydraulic hose connectors and caulking sections
Designated self-inspection (monthly inspection)	<ul style="list-style-type: none"> • Oil leaks from fuel and hydraulic hose connectors and caulking sections • Damage in fuel and hydraulic hoses (cracks, abrasion, gouging)
Designated self-inspection (annual inspection)	<ul style="list-style-type: none"> • Oil leaks from fuel and hydraulic hose connectors and caulking sections • Fuel and hydraulic hoses interference, crushing, deterioration, twisting, damage (cracks, abrasion, gouging)

Lubrication and Element

SH145X-6



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CAUTION

- After digging in water, grease up pins that went into the water.
- When working with an attachment other than a genuine Sumitomo bucket (breaker, crusher, or other machine), grease up the machine attachment pins every 10 hours.
- For the recommended lubricants, refer to "Usage of Fuels and Lubricants According to Temperature" (6-11) and "Genuine Sumitomo Product" (6-16).
- This table takes priority over the Engine Manual.
- Lubricate at whichever interval is shorter in the list below.

50 hours	(or every week)	1000 hours	(or every half year)	5000 hours	(or every 2.5 years)
250 hours	(or every month)	2000 hours	(or every year)	10000 hours	(or every 5 years)
500 hours	(or every 3 months)	4000 hours	(or every 2 years)		

6-Maintenance

Code	Lubrication point (parts to be replaced)		Q'ty/oil level	Oil and grease (replacement parts)
1	Front attachment pin		2	Extreme pressure grease No. 2
2	(EM system type)		14	Extreme pressure grease No. 2
3	Blade		6	Extreme pressure grease No. 2
4	Engine oil pan		17 L	Engine oil
5	Fuel tank		200 L	Diesel fuel
6	Hydraulic tank		75 L	Hydraulic oil
7	Radiator		15.3 L	Soft water (long-life coolant)
8	Fuel tank water draining		-	-
9	Fuel filter (pre)		1	Element
10	Fuel filter (main)		1	Element
11	Air conditioner filter	Outer	1	Element
		Inner	1	Element
12	Return filter		1	Element
13	Pilot oil filter		1	Element
14	Swing reduction gear (oil)		1.8 L	Gear oil
15	Travel reduction gear		2.1 L x 2	Gear oil
16	Air cleaner	Outer	1	Element
		Inner	1	Element
17	Turntable bearing		2	Extreme pressure grease No. 2
18	Swing ring gear		9.9 kg	Extreme pressure grease No. 2
19	Engine oil filter		1	Element
20	Air breather		1	Element
21	Suction filter		1	Element
22	Swing reduction gear (grease)		0.5 kg	Lithium-series, consistency number: 2

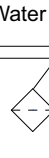
6-Maintenance

SH145XU-6

 Grease

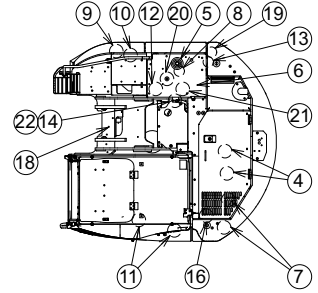
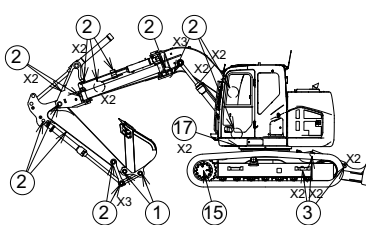
 Oil

 Drain Water

 Filter

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	
10h	✓	✓																					
	✓																						
					✓																		
					✓																		
					✓																		
50h																							
250h																							
500h																							
1000h																							
2000h																							
4000h																							
5000h																							

✓ :CHECK
 □ :CLEAN
 △ :CHANGE INITIALLY
 ● :LUBRICATE, CHANGE

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34717A84

⚠ CAUTION

1. After digging in water, grease up pins that went into the water.
2. When working with an attachment other than a genuine Sumitomo bucket (breaker, crusher, or other machine), grease up the machine attachment pins every 10 hours.
3. For the recommended lubricants, refer to "Usage of Fuels and Lubricants According to Temperature" (6-11) and "Genuine Sumitomo Product" (6-16).
4. This table takes priority over the Engine Manual.
5. Lubricate at whichever interval is shorter in the list below.

50 hours	(or every week)	1000 hours	(or every half year)	5000 hours	(or every 2.5 years)
250 hours	(or every month)	2000 hours	(or every year)	10000 hours	(or every 5 years)
500 hours	(or every 3 months)	4000 hours	(or every 2 years)		

6-Maintenance

Code	Lubrication point (parts to be replaced)		Q'ty/oil level	Oil and grease (replacement parts)
1	Front attachment pin		2	Extreme pressure grease No. 2
2	(EM system type)		23	Extreme pressure grease No. 2
3	Blade		6	Extreme pressure grease No. 2
4	Engine oil pan		17 L	Engine oil
5	Fuel tank		200 L	Diesel fuel
6	Hydraulic tank		75 L	Hydraulic oil
7	Radiator		15.3 L	Soft water (long-life coolant)
8	Fuel tank water draining		-	-
9	Fuel filter (pre)		1	Element
10	Fuel filter (main)		1	Element
11	Air conditioner filter	Outer	1	Element
		Inner	1	Element
12	Return filter		1	Element
13	Pilot oil filter		1	Element
14	Swing reduction gear (oil)		1.8 L	Gear oil
15	Travel reduction gear		2.1 L x 2	Gear oil
16	Air cleaner	Outer	1	Element
		Inner	1	Element
17	Turntable bearing		2	Extreme pressure grease No. 2
18	Swing ring gear		9.9 kg	Extreme pressure grease No. 2
19	Engine oil filter		1	Element
20	Air breather		1	Element
21	Suction filter		1	Element
22	Swing reduction gear (grease)		0.5 kg	Lithium-series, consistency number: 2

6-Maintenance

Retightening Bolts, Nuts, and Hose Fittings

Service Specifications

Inspection: Every 250 hours (after 50 hours during the run-in period)

After regular work is done, check the tightening of all installation nuts and screws and tighten any that are loose.

Check that no fitting is lost.

Replace it as required.

Tightening Torque for Each Component

Component		Screw	Wrench	Torque setting
		mm	mm	N·m
1	Travel unit (*)	M16	24	267 - 312
2	Drive sprocket (*)	M16	24	267 - 312
3	Take-up roller (*)	M16	24	267 - 312
4	Upper roller (*)	M16	24	267 - 312
5	Lower roller (*)	M16	24	267 - 312
6	Shoe bolt [500 mm grouser shoe]	M16	24	373 - 451
7	Counterweight	M30	46	1435 - 1650
8	Turntable	M16	24	280 - 312
9	Swing unit (*)	M16	24	280 - 312
10	Engine (bracket) (*)	M12	19	109.0 - 127.0
11	Engine mount (*)	M16	24	264.9 - 313.9
12	Radiator	M12	19	63.8 - 73.6
13	Hydraulic pump (*)	M10	17	63.7 - 72.6
		M16	Hexagon wrench	223 - 247
14	Hydraulic tank (*)	M16	24	232.4 - 276.0
15	Fuel tank (*)	M16	24	232.4 - 276.0
16	Control valve (*)	M16	24	267 - 312
17	Center joint (*)	M12	19	109 - 127
18	Center joint (*)	M12	19	88.3 - 107
19	Cab	M16	24	149 - 173

NOTE:Use Loctite 262 or equivalent for the screws marked with (*).

6-Maintenance

Tighten the bolts and nuts for which the values are not specified in the table above as follows.

Bolt nominal diameter (size)		M6	M8	M10	M12	M14	M16	M18	M20
Hexagon bolt	Wrench (mm)	10	13	17	19	22	24	27	30
	Tightening torque (N·m)	6.9	19.6	39.2	58.8	98.1	157.0	196.0	294.0
Hexagon socket head bolt	Wrench (mm)	5	6	8	10	12	14	14	17
	Tightening torque (N·m)	8.8	21.6	42.1	78.4	117.6	176.4	245.0	343.0

Hydraulic hose mouthpiece

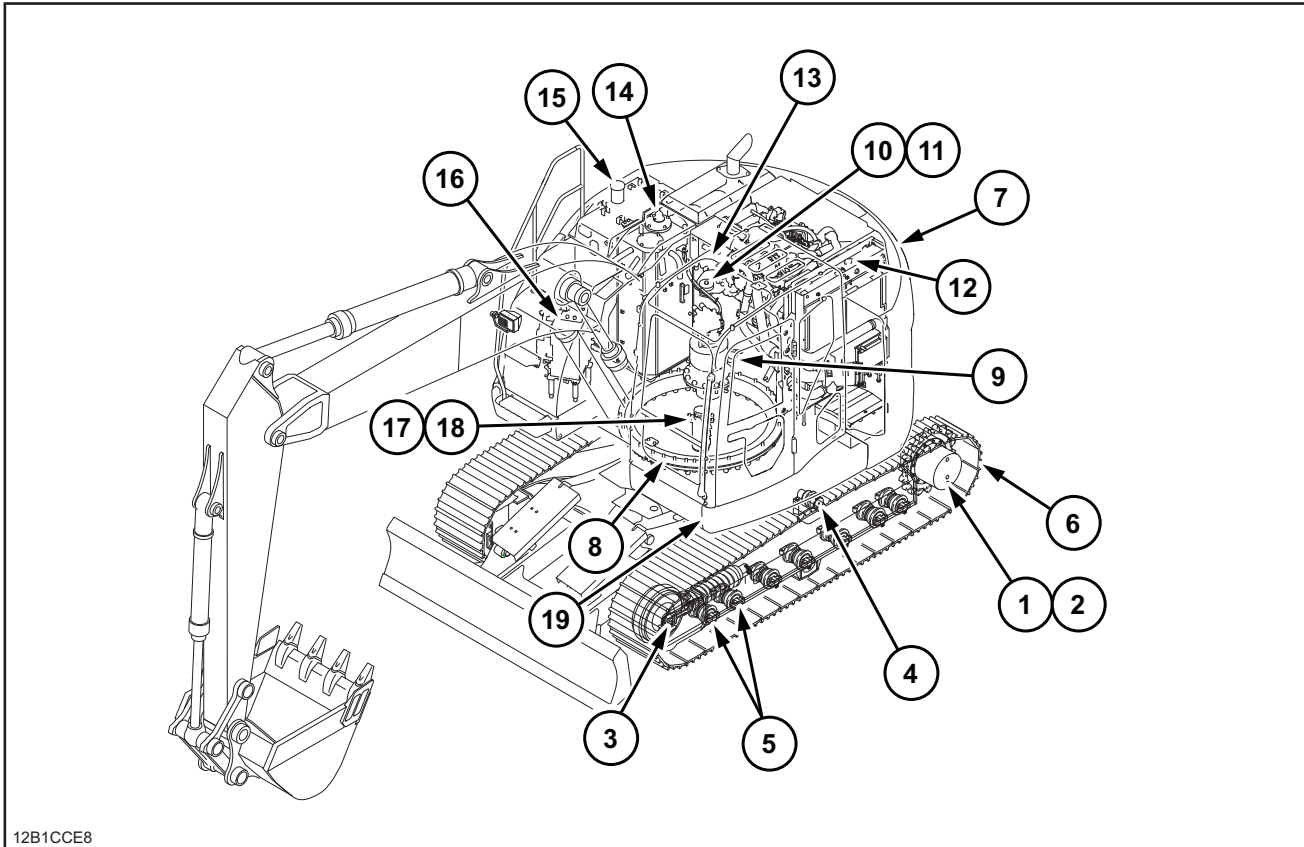
Screw size	1/4	3/8	1/2	3/4	1"
Bolt width (mm)	19	22	27	36	41
Tightening torque (N·m)	28.4±3	49.0±5	68.6±7	137±14	157±16

ORS mouthpiece

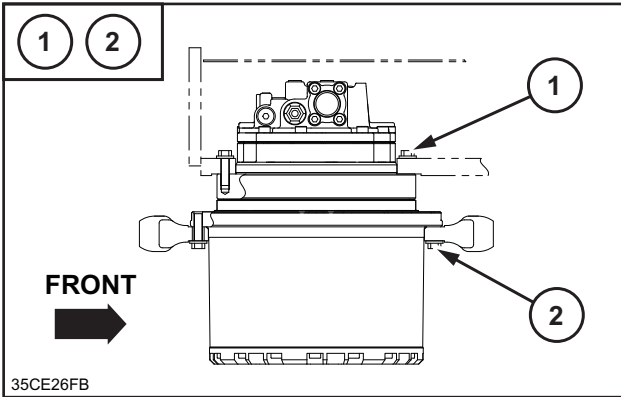
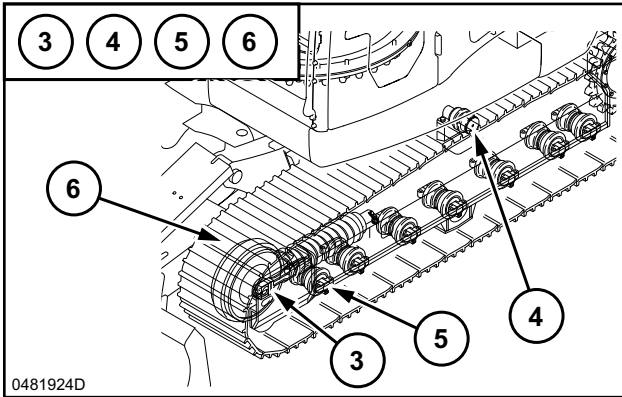
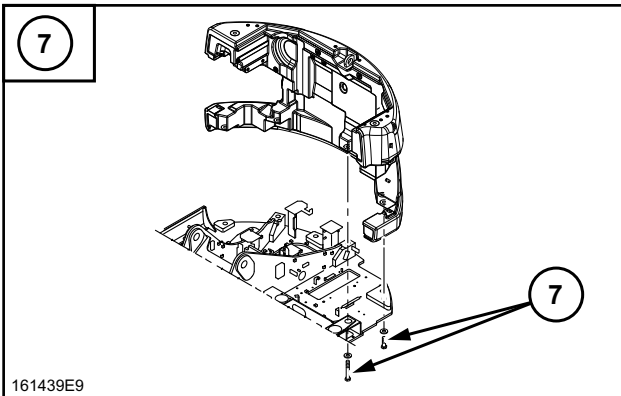
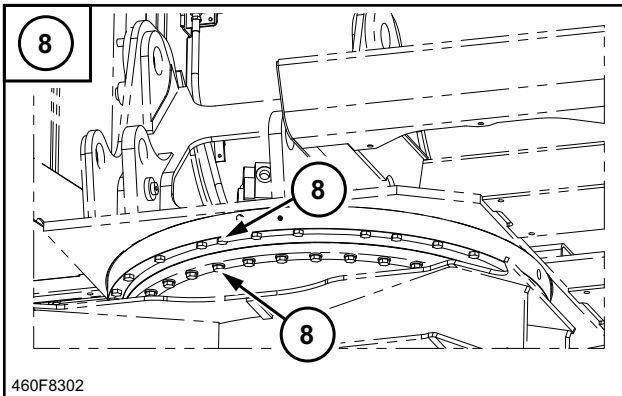
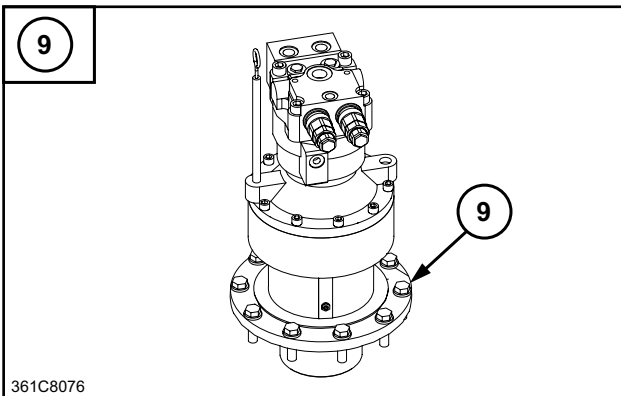
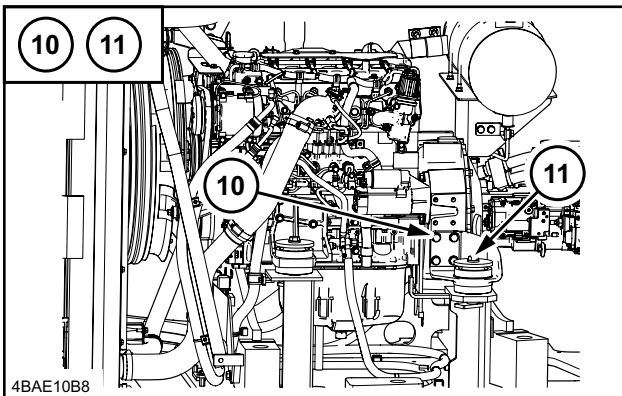
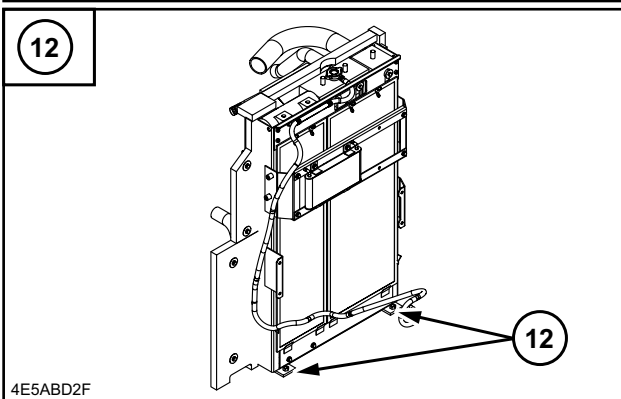
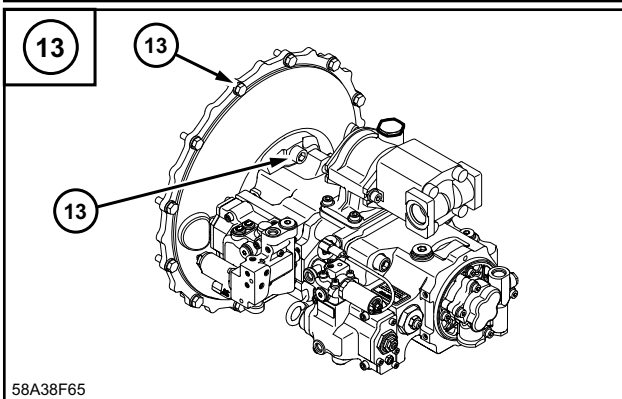
Hose size	1/2	3/4	1"
Screw size	13/16-16	1-3/16-12	1-7/16-12
Bolt width (mm)	27	36	41
Tightening torque (N·m)	93±9	180±18	270±27

Split flange

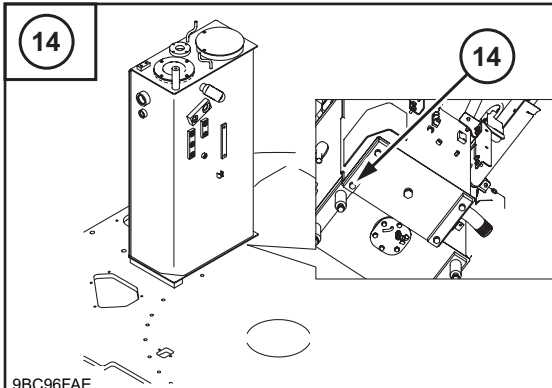
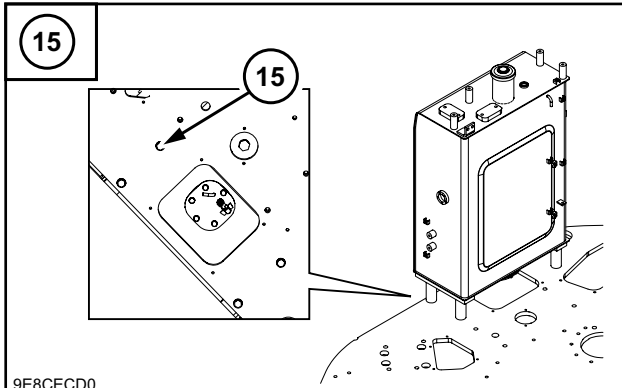
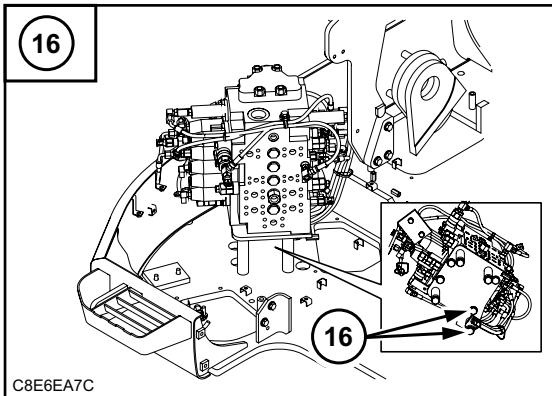
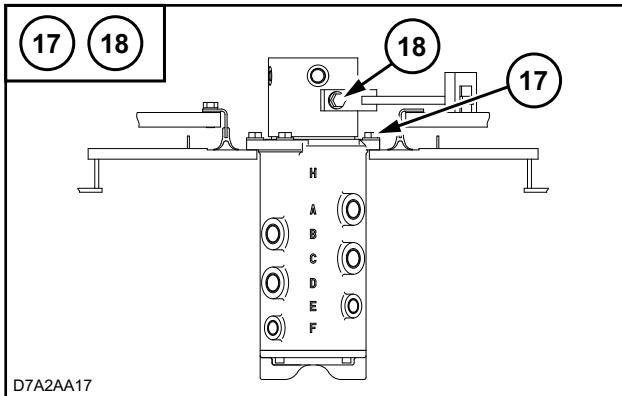
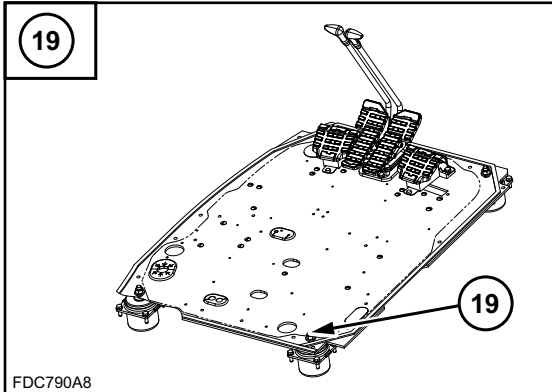
Bolt size	M8	M10	M12	M14	M16
Tightening torque (N·m)	21.6±2	42.2±5	61.8±6	93.2±8	169.7±12



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6-Maintenance

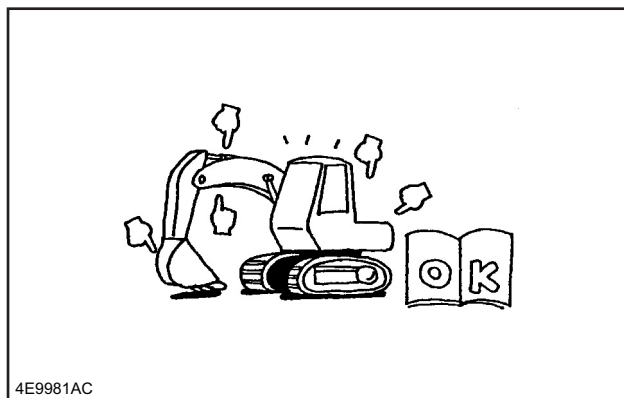


Start-up Inspection

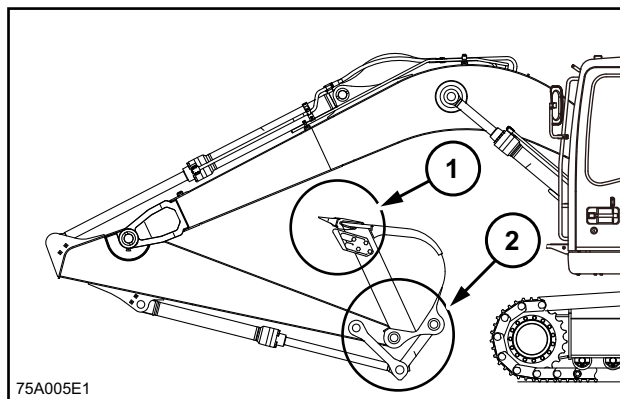
Machine Walk Around Checks

Perform the checks before starting the engine. Visually inspect well around the machine and underneath

1. Inspect each part for oil, fuel, and coolant leaks.
2. Inspect each part for loose bolts and nuts.
3. Inspect for open lines and shorts in the electrical wiring and for battery terminal looseness.
4. Inspect each part for oil soiling.
5. Clean off dust build-up.



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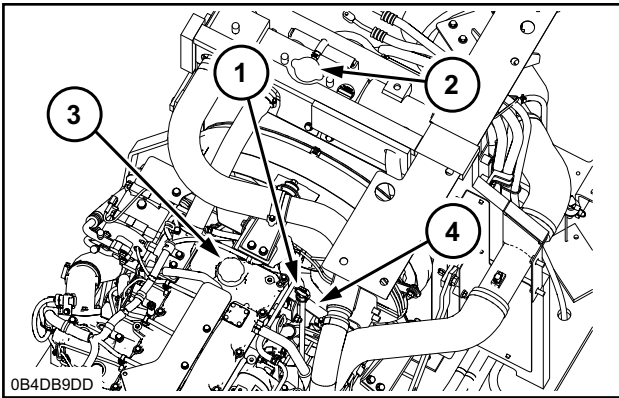
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Attachment (work unit)

1. Inspect high-pressure hoses and joints and hydraulic cylinders for oil leaks.
2. Around bucket
 - [1] Inspect bucket teeth and side cutter for looseness, wear, and missing parts.
 - [2] Inspect the greasing status around links.
Inspect if the amount of bucket backlash is normal. (For "Adjustment of Bucket Backlash" (6-85), refer to the bucket item.)

Inspections before Engine Start

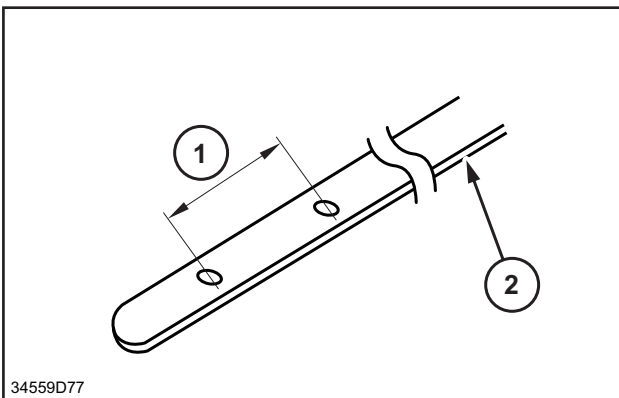
1.Engine oil level inspection, refilling



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1	Oil gauge
2	Radiator cap
3	Oil feed port
4	Fan belt

- Inspect the oil level before starting the engine or at least 30 minutes after stopping the engine.
Use the oil gauge to inspect whether the oil level is correct.
If the oil is too low, refill engine oil from the feed port.
10 - 15 minutes after refilling, inspect the oil level again.



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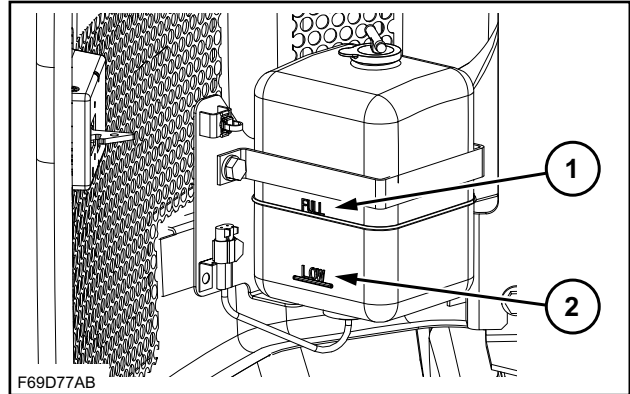
1	Correct oil volume
2	Oil gauge

2.Coolant level inspection and refill

Inspect the coolant level in the reserve tank. If the coolant is too low, remove the cap and refill with coolant.

If the reserve tank is empty, there may be a water leak.

After the inspection, if any abnormality is found, repair it.



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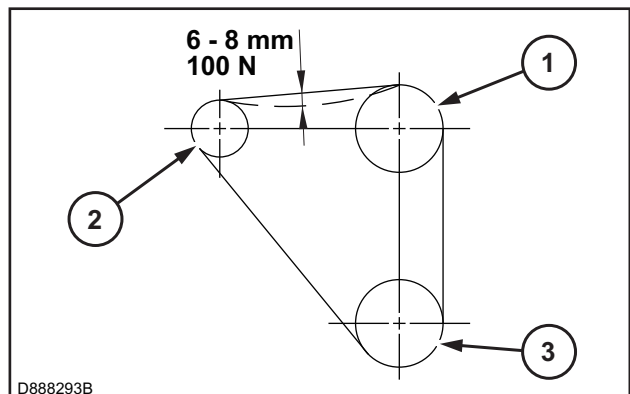
1	Full
2	Low

⚠ WARNING

Do not remove the radiator cap when the radiator coolant temperature is high. Otherwise, hot liquid could spray out.

3.Fan belt tension inspection

The standard is that when you press the fan belt midway between the generator (alternator) pulley ② and the fan pulley ① with a finger (about 100 N), the fan belt deflects 6 - 8 mm. If this standard is not met, adjust as in "Fan Belt and Alternator Belt" (6-77).



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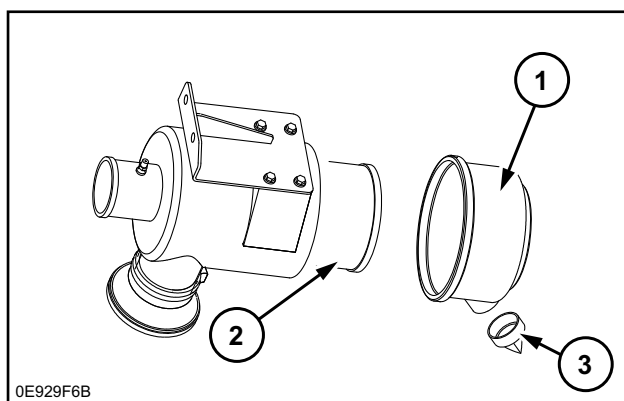
1	Fan pulley
2	Generator pulley
3	Crank pulley

4. Air cleaner inspection

Check the air cleaner cover installation state.
If the "AIR FILTER" message appears on the monitor, clean the air cleaner.

⚠ WARNING

Do not remove the inner element.



1	Cover
2	Element
3	Vacuator valve

5. Swing body

[1] Fuel level check

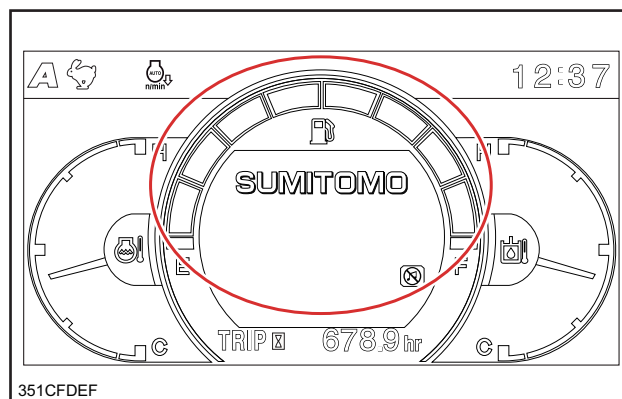
⚠ WARNING

Do not fill fuel beyond the necessary level (top of tank).

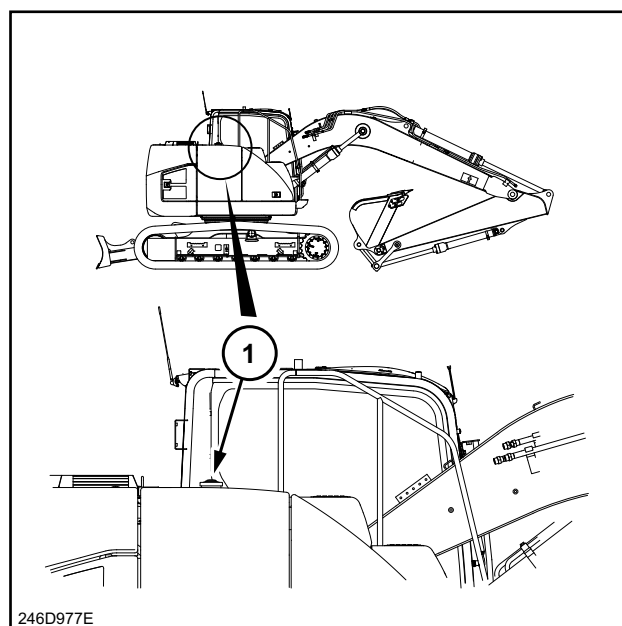
Check using the fuel consumption indicator on the monitor or the fuel level gauge ③ on the front side of the fuel tank.

If the fuel level is too low, refill from the fuel feed port.

After work, refill the fuel tank from the feed port all the way.



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246D977E Correct position for inspecting the hydraulic oil

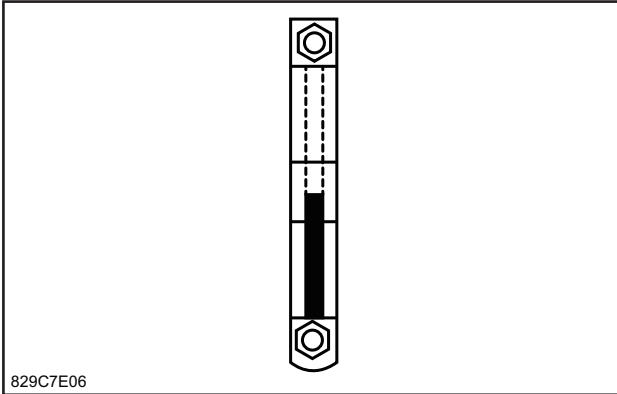
1	Fuel feed port
---	----------------

[2] Inspection of the oil level in the hydraulic tank and refilling

When inspecting the oil level in the hydraulic tank, place the machine body level and put the machine in the correct position for inspecting the hydraulic oil.

- Inspect to see if the hydraulic oil is near the middle of the level gauge.
If the hydraulic oil level is low, refill the hydraulic oil according to "Hydraulic Oil" (6-9).

6-Maintenance



829C7E06 Level gauge

[3]Inspect the fuel tank and hydraulic tank for loose installation bolts and inspect for fuel and hydraulic oil leaks.

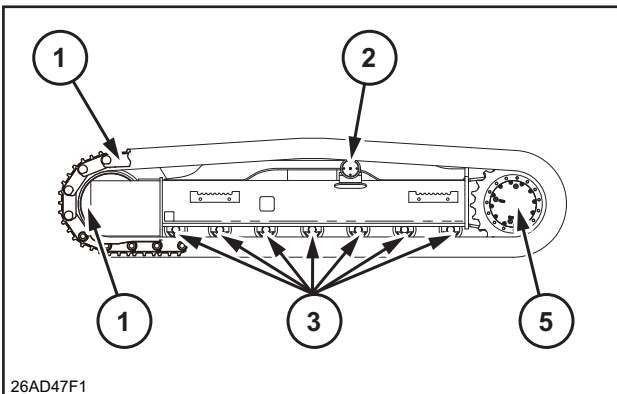
[4]Inspect the electrical component and battery for loose installation bolts and inspect for disconnections.

6. Undercarriage

[1]Inspect the shoes (crawler tracks) for looseness, wear, and damage.

[2]Inspect the travel unit, upper and lower rollers, take-up roller for oil leaks and wear.

[3]Inspect each part for loose and fallen out installation bolts.



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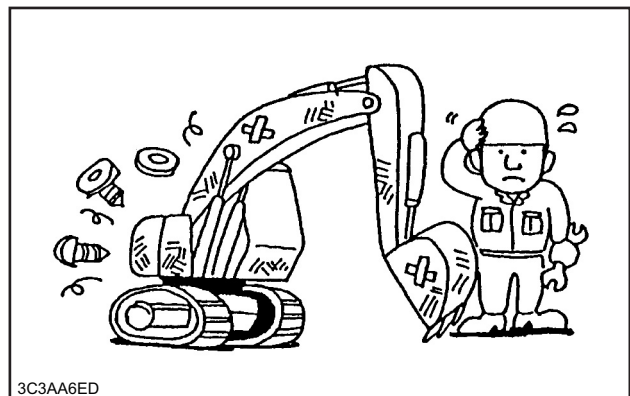
1	Take-up roller
2	Upper roller
3	Lower roller
4	Shoe
5	Travel unit

3. Inspect each part for oil, fuel, and coolant leaks.

⚠ WARNING

If inspection finds any abnormality, promptly investigate the cause, adjust and service as necessary, and head off breakdowns before they can occur.

Operating the machine while it is still abnormal can cause even more severe breakdown and can cause serious accidents.



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Inspections after Starting Engine

1. Inspect the horn and instrument operations.

2. Inspect the engine startup performance and exhaust color and inspect for abnormal noise.

Grease Points

⚠ CAUTION

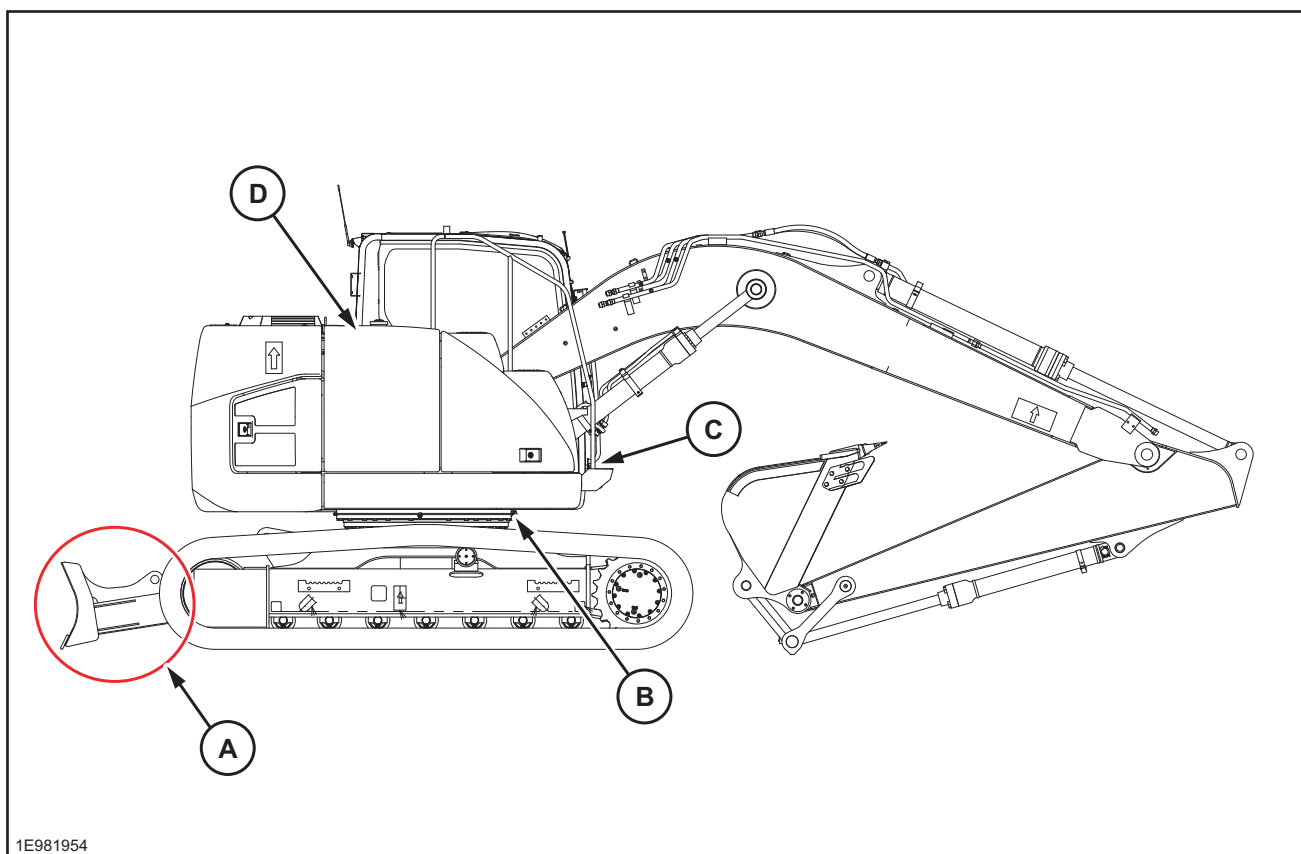
- After carrying out an operation such as digging in water, be sure to lubricate. (especially, around bucket pins) Use extreme pressure grease No. 2.
- When working with an attachment other than a genuine Sumitomo bucket (breaker, crusher, or other machine), grease up the machine attachment pins every 10 hours.

For details on grease types, refer to "Hydraulic Fluids, Fuels, and Lubricants" (6-9).

NOTE: The numbers in parentheses in the description and the arrows in the figures indicate lubrication points.

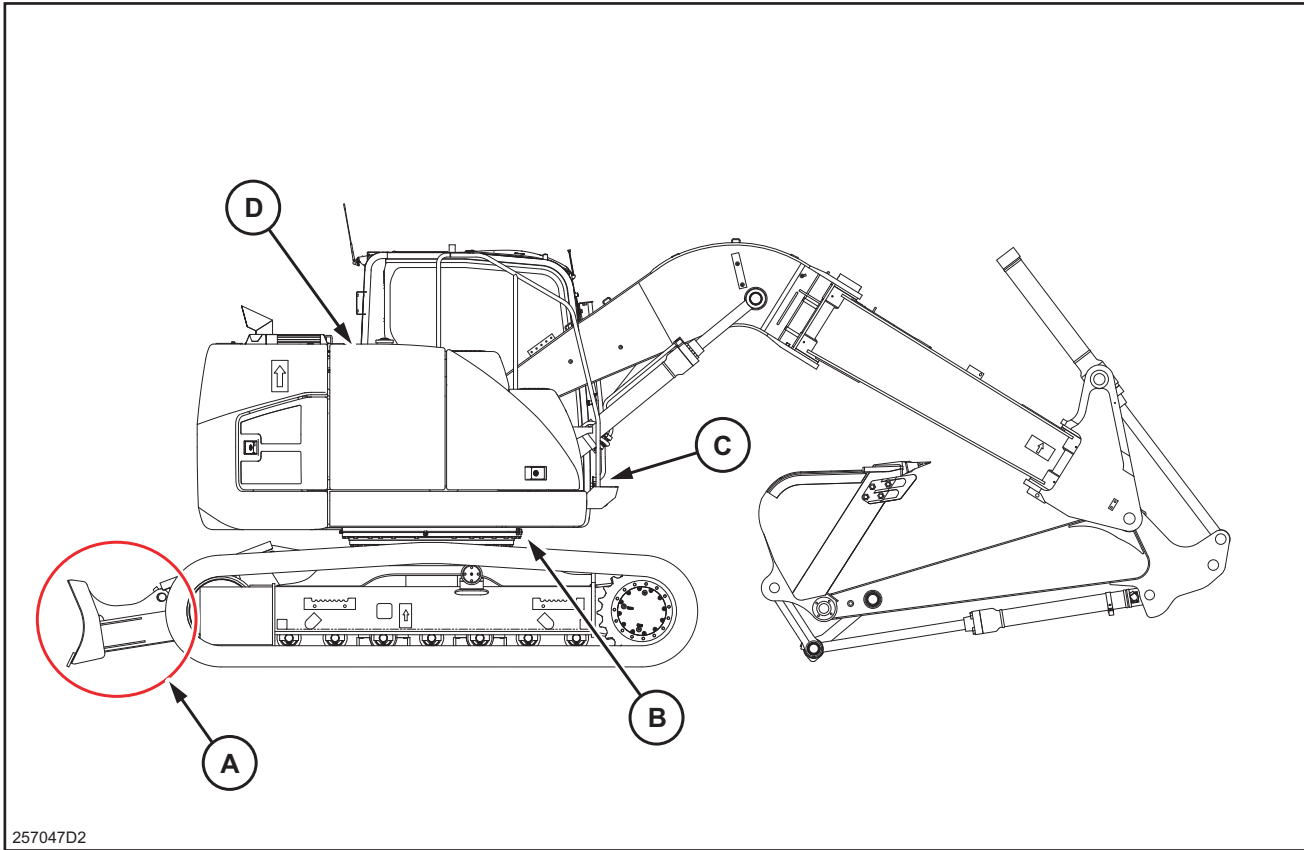
NOTE: After lubricating, re-install the protective plastic cap indicated on the grease fitting.

Machine



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6-Maintenance

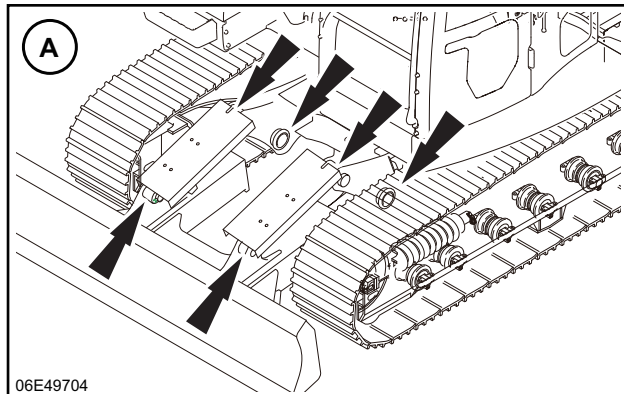
Every 50 Hours

Blade: (6)

Blade (2)

Blade cylinder (foot pin) (2)

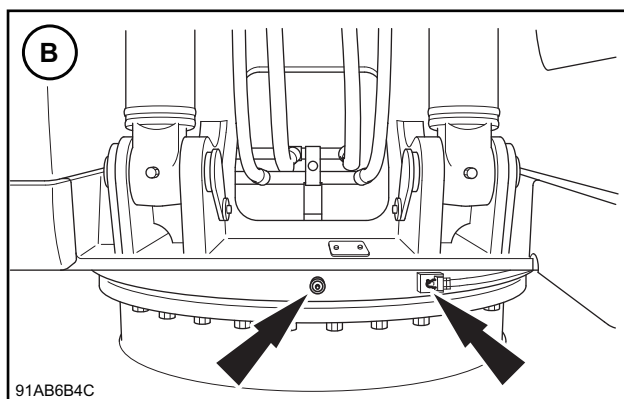
Blade cylinder (top pin) (2)



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Every 500 Hours

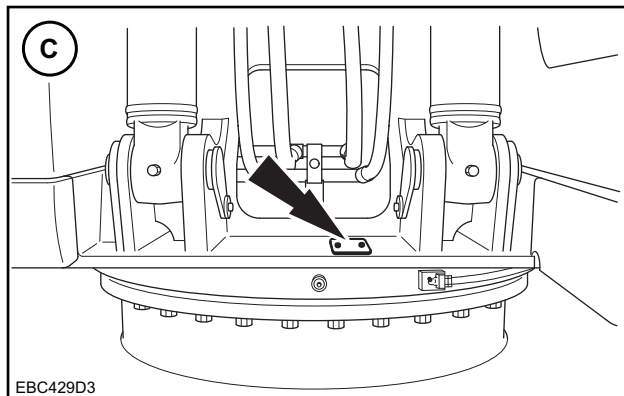
Turntable: (2)



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Turntable bearing: (1)

Refer to "Lubricating the Turntable Bearing" (6-40).



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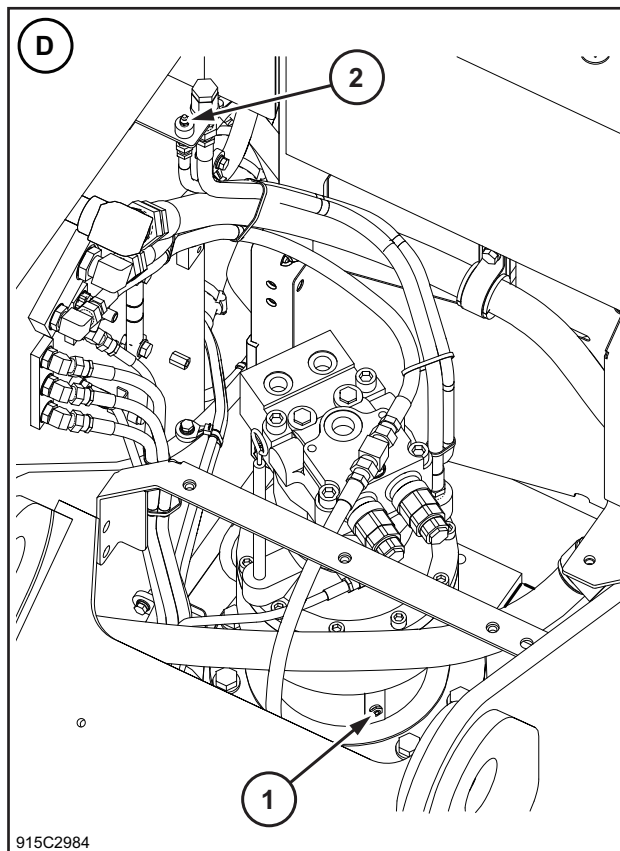
Every 2000 Hours

⚠ CAUTION

Injecting grease without the air bleed plug removed will damage the inner seal.

Remove the grease air bleed plug (1), inject the extreme pressure grease No. 2 into the grease injection port (2).

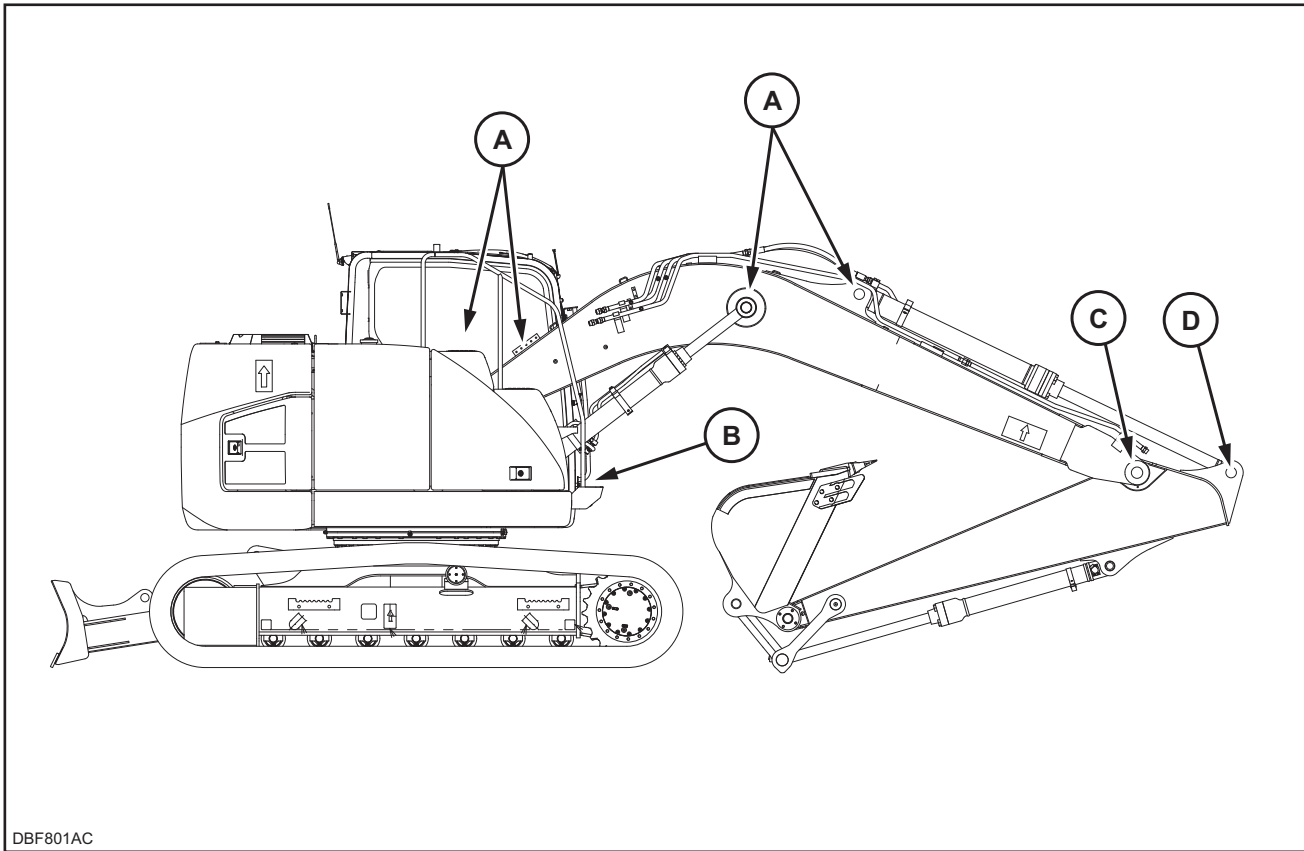
The appropriate injection amount is an initial sealed amount of 0.5 kg or the amount that overflows the air bleed hole.



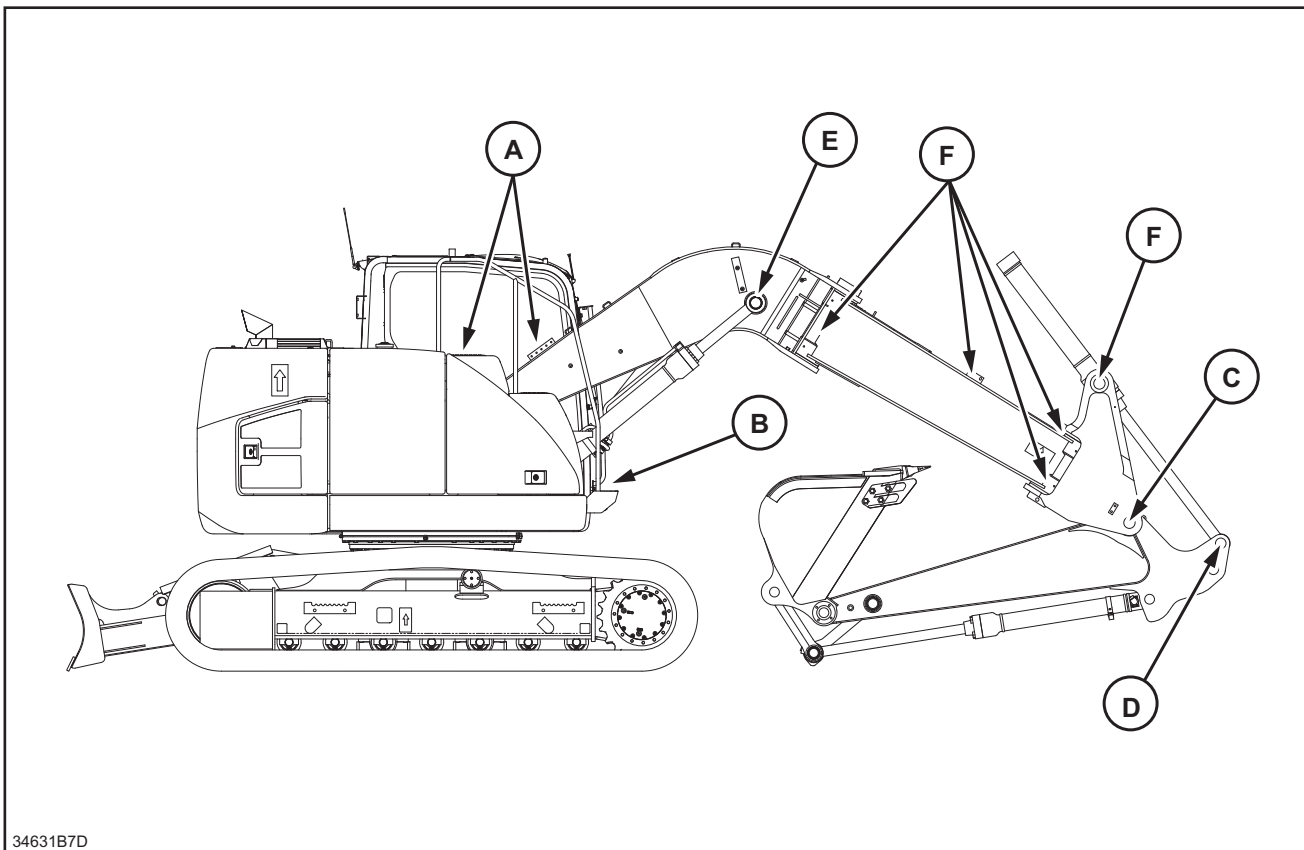
915C2984

Attachment

One-Piece Cast Boom/Arm



DBF801AC

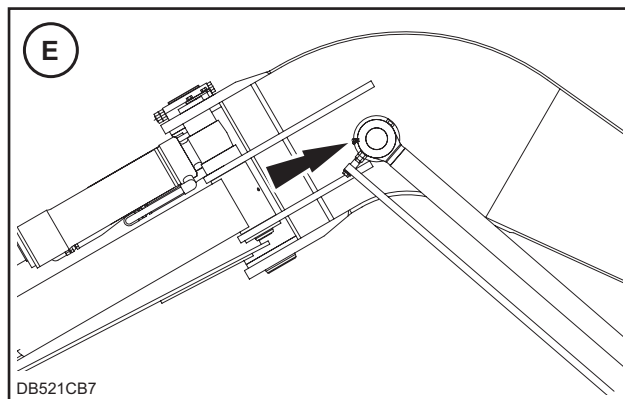


34631B7D

NOTE: If the original parts are not installed in the following linkage locations, these locations must be lubricated every 50 hours.

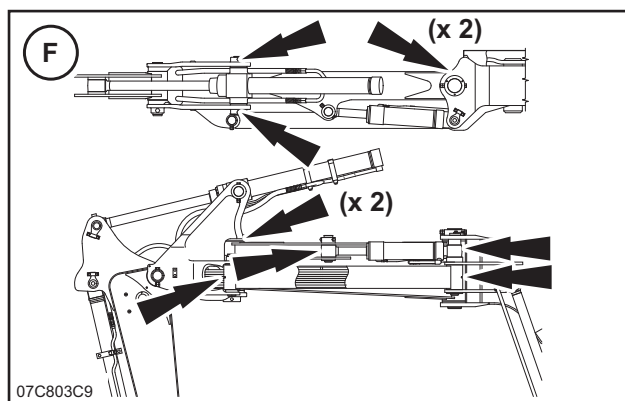
Every 50 Hours

Boom cylinder top pin: 2 locations



DB521CB7

Offset boom pin: 10 locations



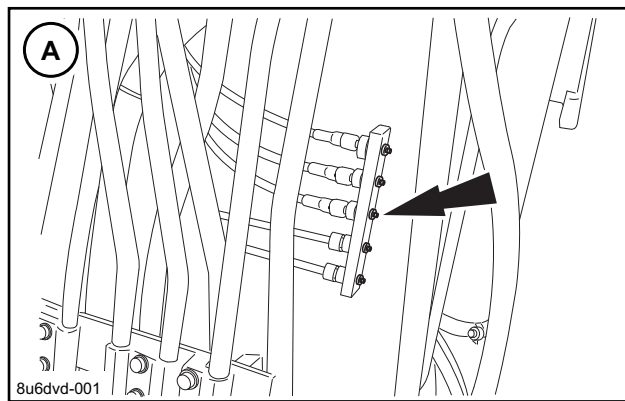
07C803C9

Every 1000 Hours

Boom bottom pin: (2)

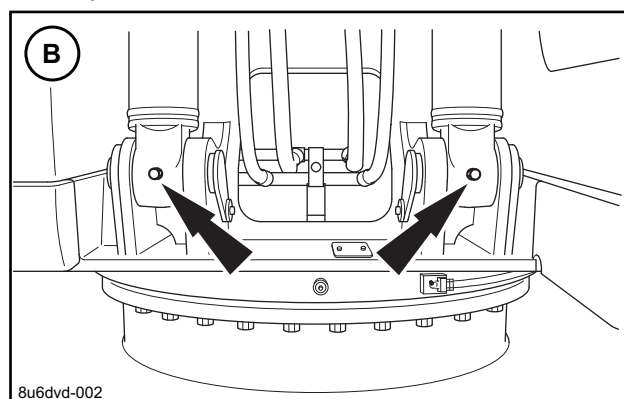
Boom cylinder top pin: 2 locations

Arm cylinder bottom pin: (1)



8u6dvd-001

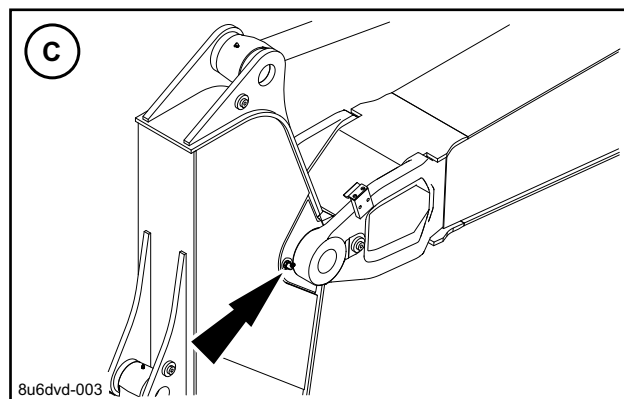
Boom cylinder bottom pin: 2 locations



8u6dvd-002

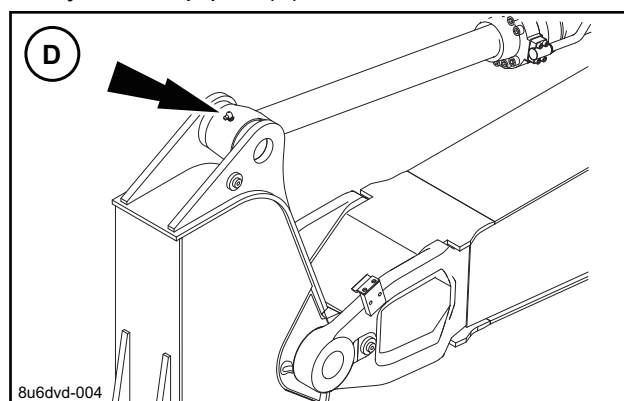
Boom/arm linkage: 2 locations

Boom/arm linkage: 3 locations (offset boom type)



8u6dvd-003

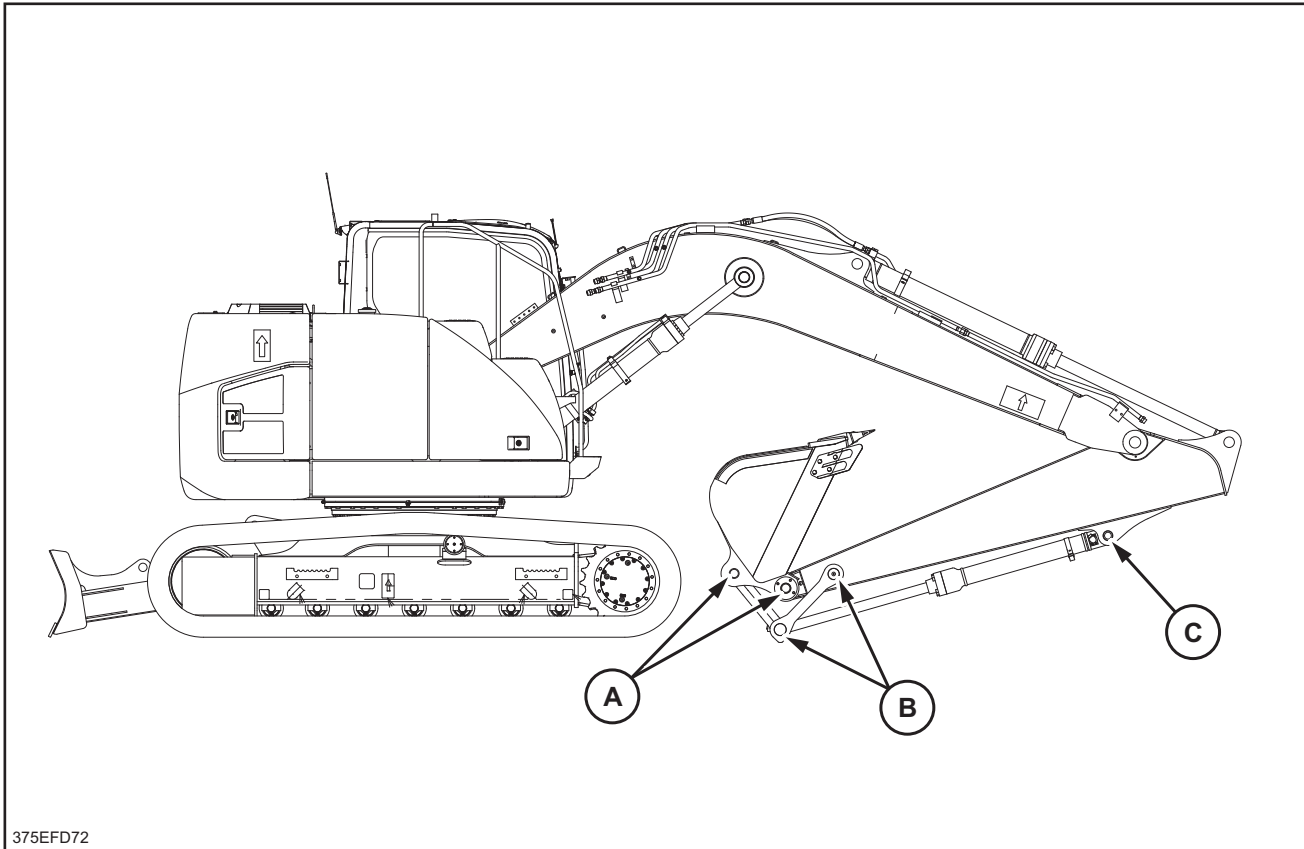
Arm cylinder top pin: (1)



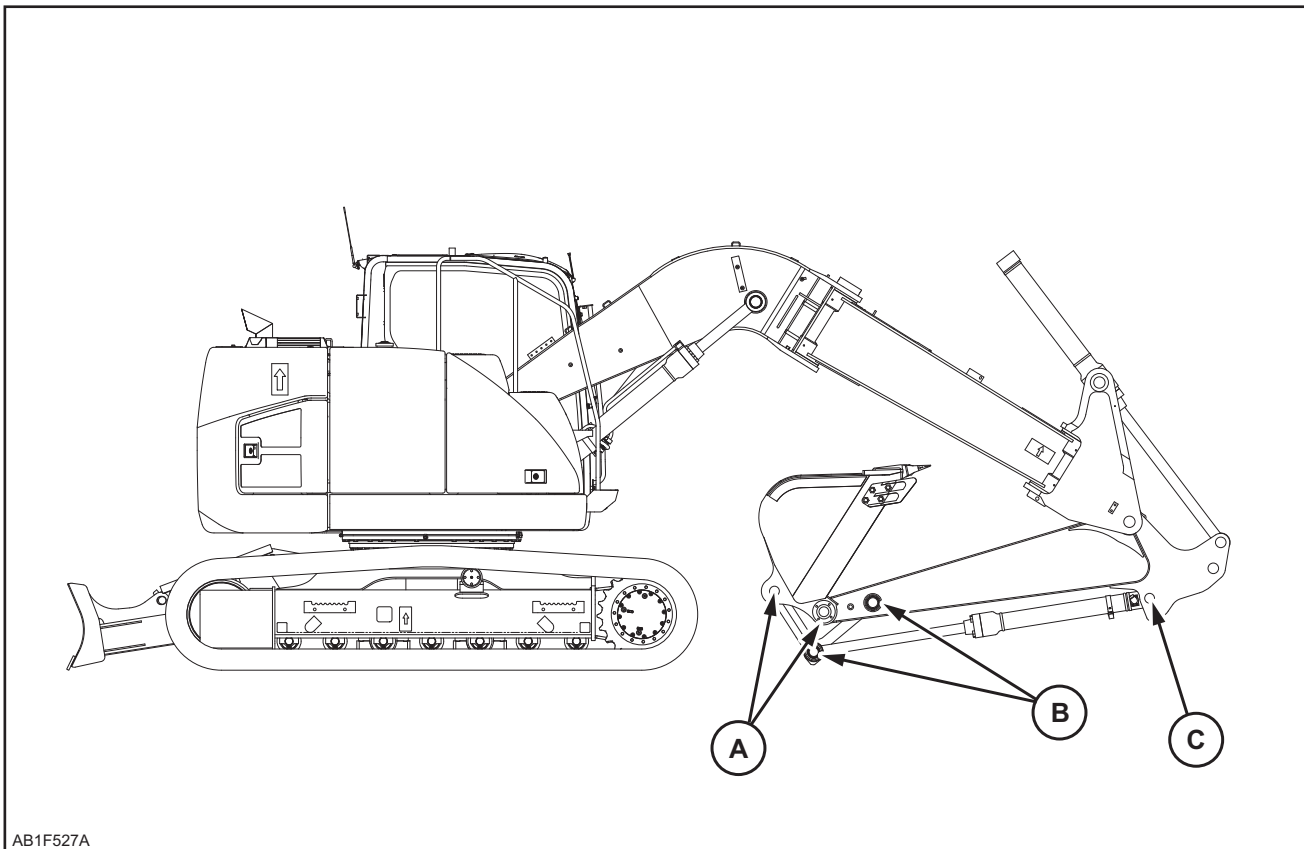
8u6dvd-004

6-Maintenance

Arm/Backhoe Bucket



375EFD72



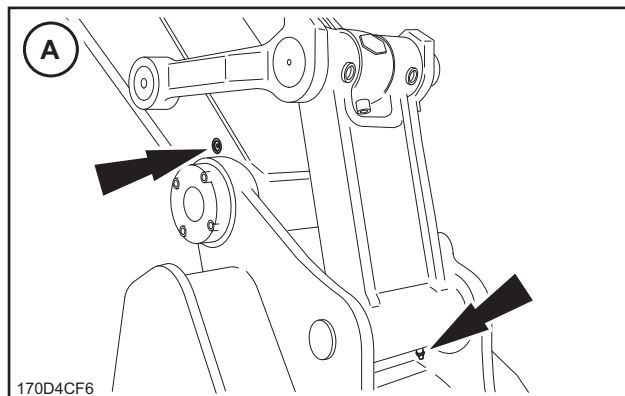
AB1F527A

NOTE:If the original parts are not installed in the following linkage locations, these locations must be lubricated every 10 hours.

Every 250 Hours

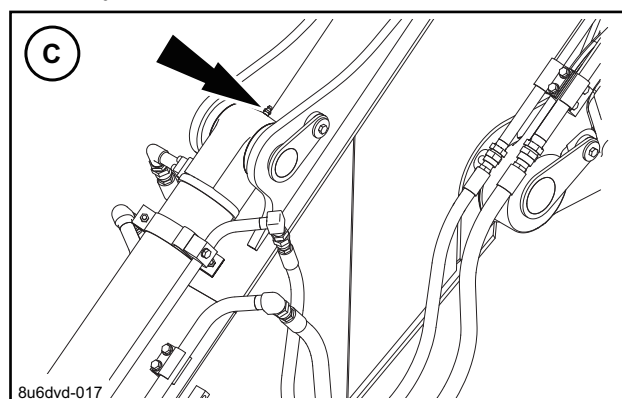
Bucket linkage: (2)

NOTE:If an accessory other than the bucket is installed (hydraulic hammer etc.), these points must be lubricated every 10 hours.



170D4CF6

Bucket cylinder bottom pin: (1)



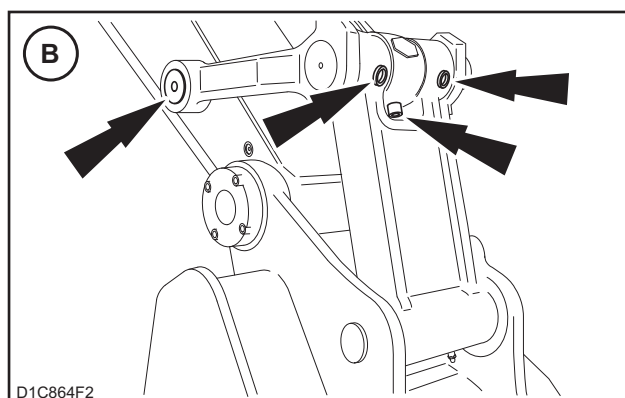
8u6dvd-017

Every 1000 Hours

NOTE:If genuine parts are not installed in the linkage points, these points must be lubricated every 50 hours.

Arm link/bucket link: (4)

NOTE:If an accessory other than the bucket is installed (hydraulic hammer etc.), these points must be lubricated every 10 hours.



D1C864F2

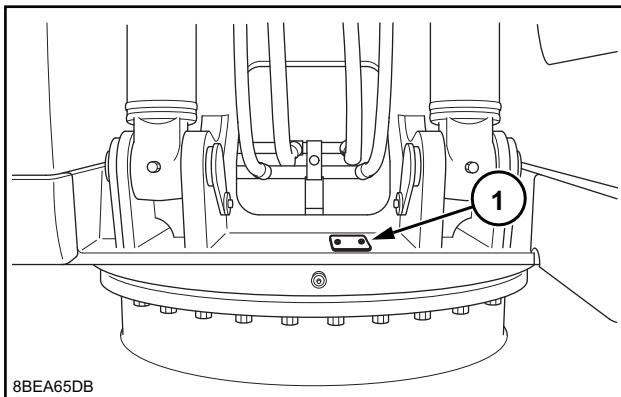
Lubricating the Turntable Bearing

Grease capacity: 9.9 kg

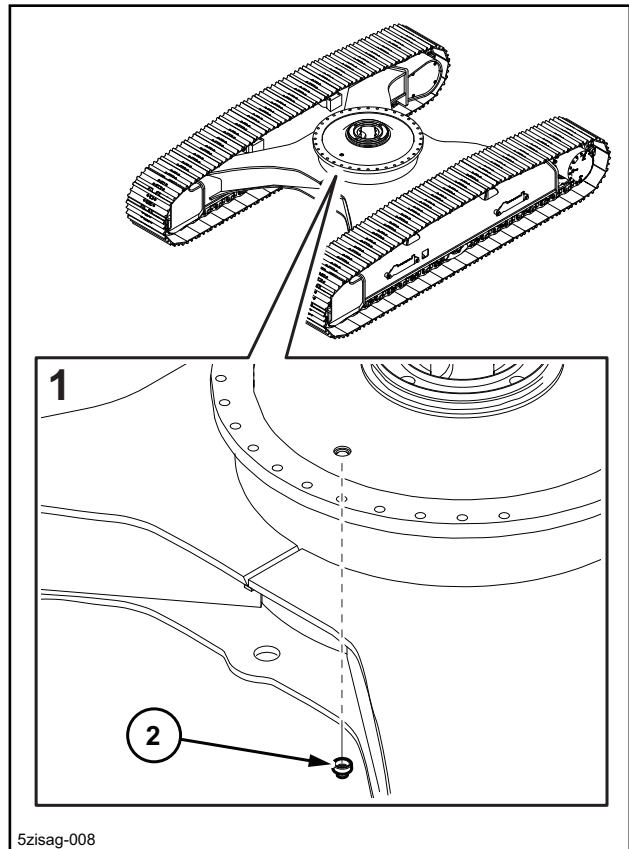
Grease type: Refer to 6-9.

Every 500 Hours

- 1.Remove the inspection cover (1).
- 2.Visually check the condition of the gear surface for any damage.
- 3.If the gear surface is not well greased, add grease.
- 4.If water has built up, remove the plug (2) with the following procedure and drain the water and contaminated grease.
 - [1]Remove the lower under cover from the bottom center.
 - [2]Remove the plug (2).
 - [3]Drain the water and dirty grease.
 - [4]Install the plug (2).
 - [5]Inject new grease into the port, and install the inspection cover (1).



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5zisag-008

Level

For details on the types of fluids and lubricants, refer to "Hydraulic Fluids, Fuels, and Lubricants" (6-9).

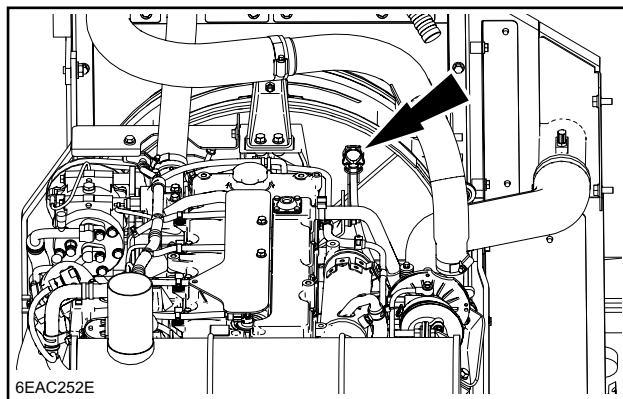
NOTE:

The numbers within parenthesis mentioned on the right if the description indicates the number of levels.

The arrow in the figure shows the position of the level.

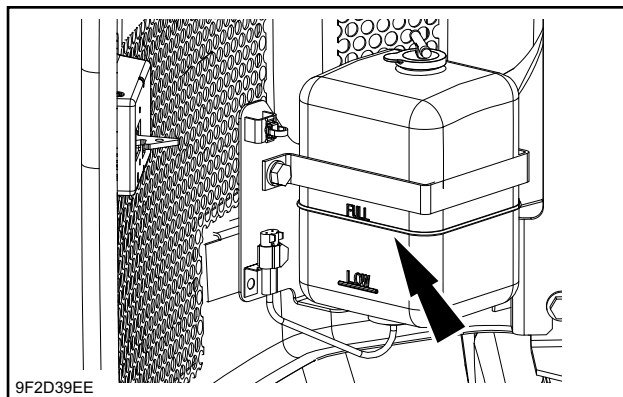
Every 10 Hours

Engine oil: (1)



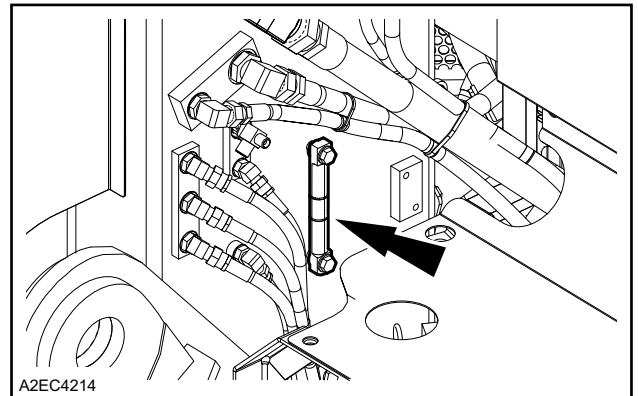
6EAC252E

Coolant solution expansion reservoir: (1)



9F2D39EE

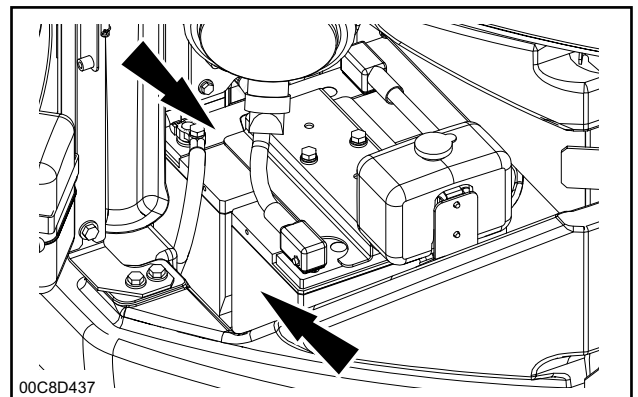
Hydraulic reservoir: (1)



A2EC4214

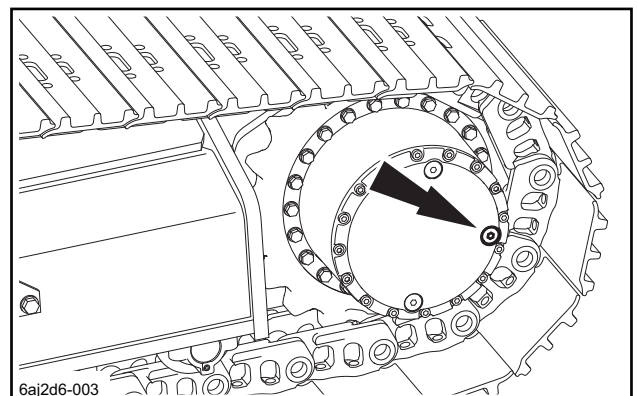
Every 250 Hours

Batteries: (2)



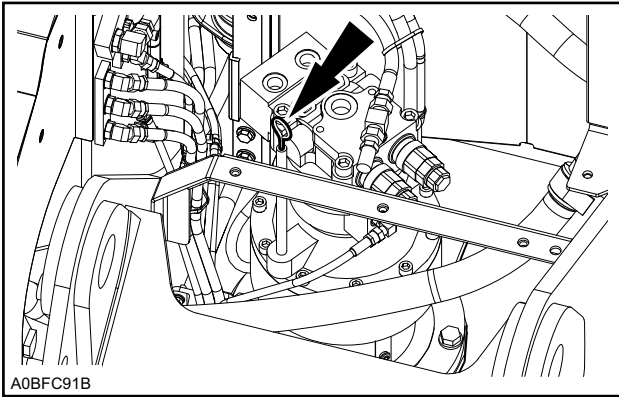
00C8D437

Travel reduction gears: (2)



6aj2d6-003

Swing reduction gears: (1)



A0BFC91B

Engine

Service specifications

Engine oil level check: Every 10 hours or every day

Oil change: Every 500 hours

Oil filter replacement: Every 500 hours

Oil capacity: 17.0 l

Type of oil: Refer to page 6-9

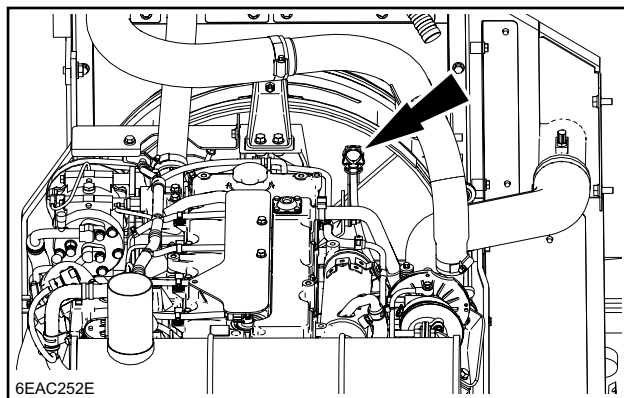
NOTICE:

Do not step on the engine during engine maintenance.

Engine oil leaking may cause damage to the engine.

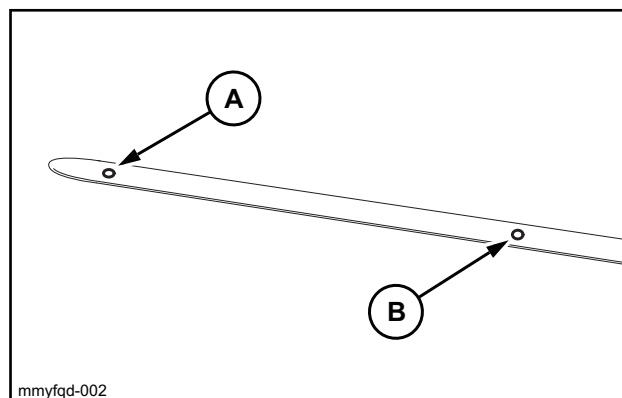
Level

1. Park the machine on flat, horizontal ground.
Stop the engine, remove the starter switch key.
2. When the engine has been stopped for 10 - 20 minutes, raise and lock the engine hood, remove the dipstick, wipe it with a clean cloth and insert it back in the guide tube as far as it will go.
Then take it out again.



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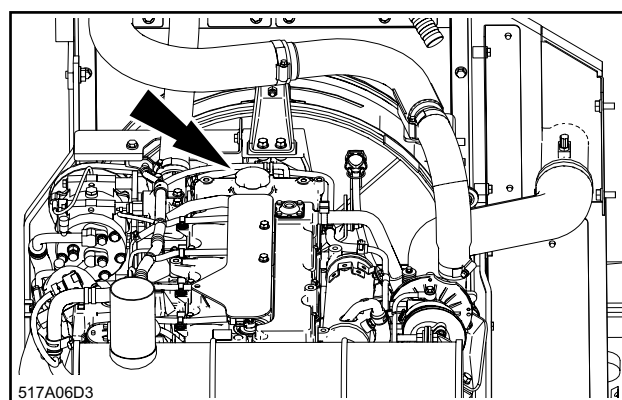
3. If the level is situated between the marks (A) and (B) on the dipstick, the level is correct.



mmyfqd-002

4. If the oil level is at mark (A) (min) or below, remove the filling plug and add oil up to mark (B) (max) of the dipstick, install the plug.

NOTICE: The level should not be higher than the mark (B) (maximum on the dipstick).



517A06D3

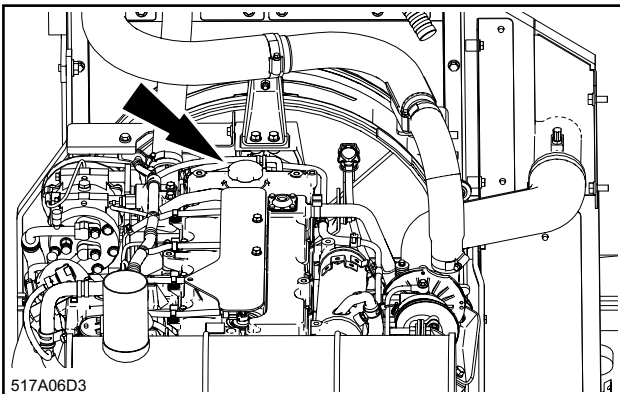
Draining, changing the oil filter and filling

NOTE:

Change the oil while the engine is still warm.
The oil will flow more easily.

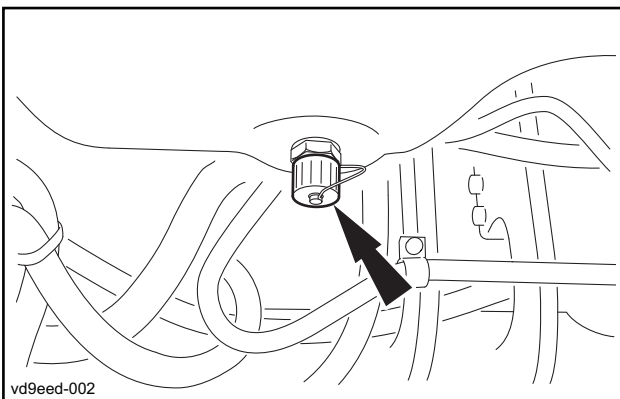
Use the extension drain hose from the front boot.

1. Place the machine on flat, level ground.
Stop the engine, remove the starter switch key then open the hatch under the engine.
2. Raise and lock the engine hood, remove the filling plug.



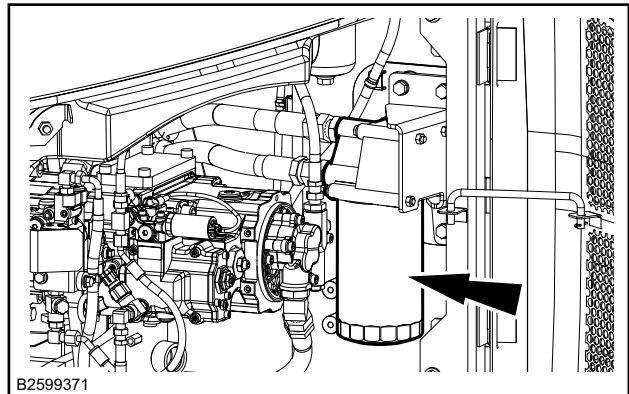
517A06D3

3. Remove the protective cap from the engine housing drain valve.
4. Screw the end of the extension drain hose onto the drain plug, place the other end in a container of suitable capacity and allow the oil to flow out.
5. Remove the extension drain hose and install the protective cap on the housing check valve. Place the extension drain hose in the front storage compartment.



vd9eed-002

6. Clean the area around the filter located in the rear right-hand compartment, remove it using a filter wrench.

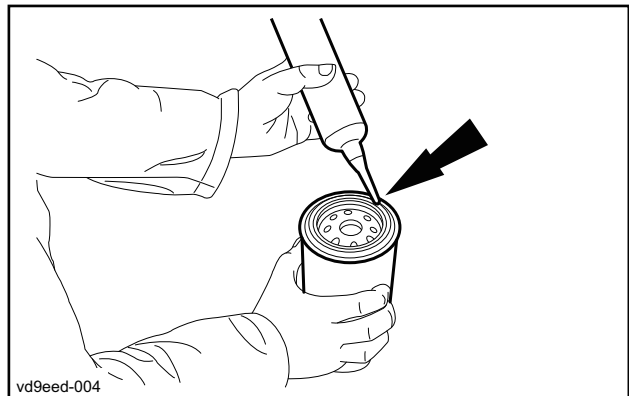


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7. Coat the seal of the new filter with a fine film of oil.
8. Install the new filter.
Turn the filter until the seal comes into contact with the filter head then tighten an extra half turn by hand.

NOTE:

Do not use a filter wrench to tighten the filter.
Excessive tightening can damage the filter and their seals.



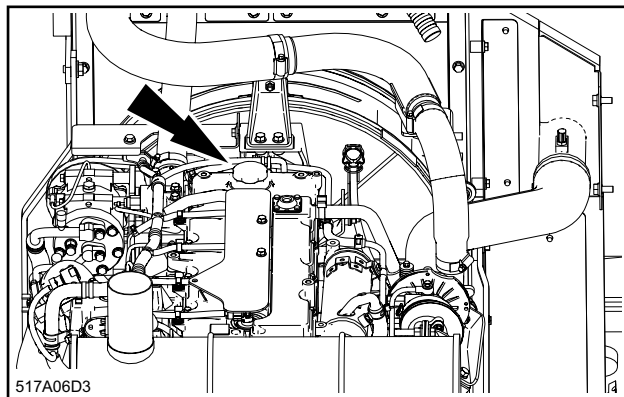
vd9eed-004

9. Fill the engine with new engine oil.
Install the filling plug.

10. Run the engine for a few minutes and check that there are no leaks.

Check the level again and top up if necessary.

NOTICE: Always wait fifteen minutes to allow the oil to return to the sump before checking the oil level.



517A06D3

Cooling system

Service specifications

Expansion reservoir level check: Every 10 hours or every day

Checking the tightening of clamps, of radiator hoses: Every 250 hours or every 6 months

Draining the system (long duration): Every 1000 hours or every 2 years

Draining the system (with anti-freeze) (spring and autumn): Twice a year

System capacity: 15.3 l

Type of coolant: Refer to page 6-9

⚠ CAUTION

Burn hazard!

Take care if removing the filler cap while the system is hot.

Before removing the cap: completely cover the cap using a thick cloth, and slowly open the filler cap to allow the pressure to escape.

Do not add cold water to a hot coolant reservoir.

Failure to comply could result in minor or moderate injury.

⚠ WARNING

Hazardous chemicals! Coolant can be toxic.

Avoid contact with skin, eyes, and clothing.

Antidotes: EXTERNAL - Rinse thoroughly with water.

Remove soiled clothing.

INTERNAL - Rinse the mouth with water.

DO NOT induce vomiting.

Seek immediate medical attention.

EYES - Flush with water.

Seek immediate medical attention.

Failure to comply could result in death or serious injury.

In order to prevent leaks, use only high-quality ethylene glycol with no additives that has a high boiling point.

Use only approved anti-rust additives.

Anti-rust additives and ethylene glycol mix together and cause reactions.

This can reduce the anti-corrosion protection, forming deposits the cooling system, and causing damage to the cooling system and radiator.

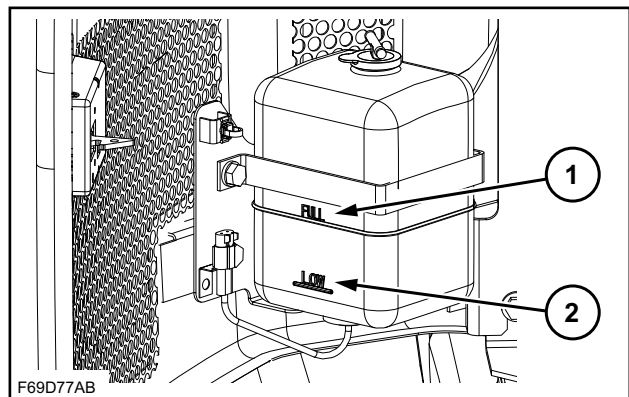
To obtain appropriate coolant solution, consult your dealer and the certified service plant.

Level

The level of coolant solution should be checked when the engine is cold.

On flat, level ground, before using the machine (while the engine is still cold), the level in the expansion reservoir should be between the " Full" (1) and " Low" (2) marks.

If not, see "Filling".



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NOTICE: Check and service the cooling system according to the instructions given in this manual.

Coolant Solution

Use only ethylene glycol coolant solution in the cooling system.

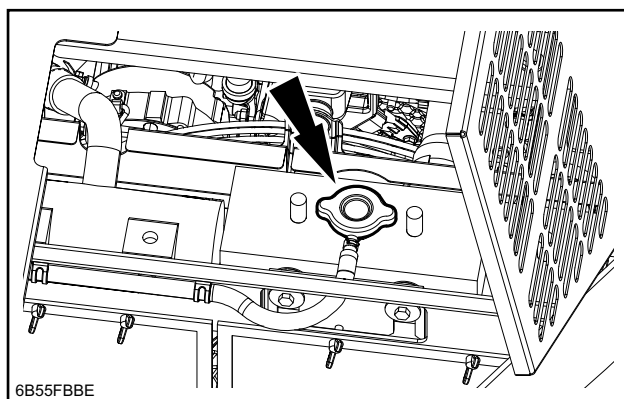
Draining

1. Remove the radiator plug.

⚠ CAUTION

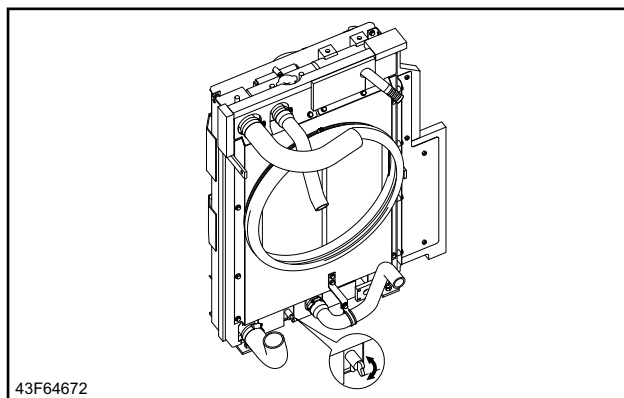
Burn hazard! Hot coolant can spray out if you remove the filler cap while the system is hot. After the system has cooled, turn the filler cap to the first notch and wait for all pressure to release before proceeding.

Failure to comply could result in minor or moderate injury.



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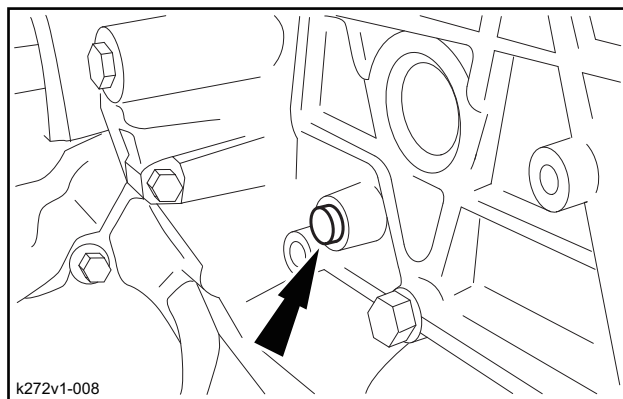
2. Place a waste container underneath the drain hose.
Open the radiator drain valve on the engine side of the radiator.



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3. Open the drain plug located on the engine block.

NOTE: Have a receptacle of a suitable capacity ready.



k272v1-008

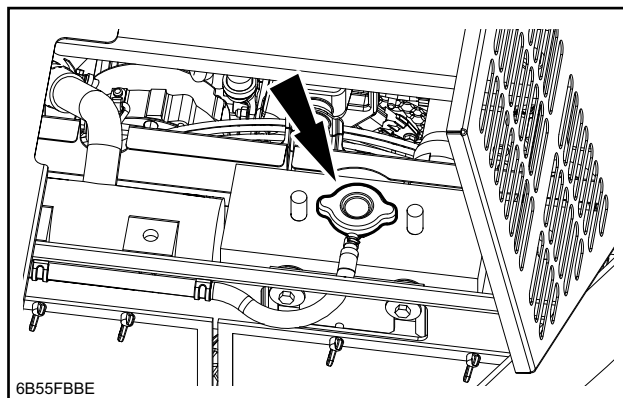
k272v1-008

Rinsing

1. When the radiator is completely empty, close the drain valve.
Close the plug on the engine block.
2. Fill the system with clean water.
Install the radiator cap.
3. Start the engine.
Run the engine for 10 minutes just slightly higher than idling to raise the engine temperature to 80°C.
4. Stop the engine, then remove the key from the starter switch.
5. Drain the system again.
6. Repeat steps 1 to 5 until the water drained is clear.

Filling

1. Fill with coolant solution via the radiator until overflowing and install the radiator cap.

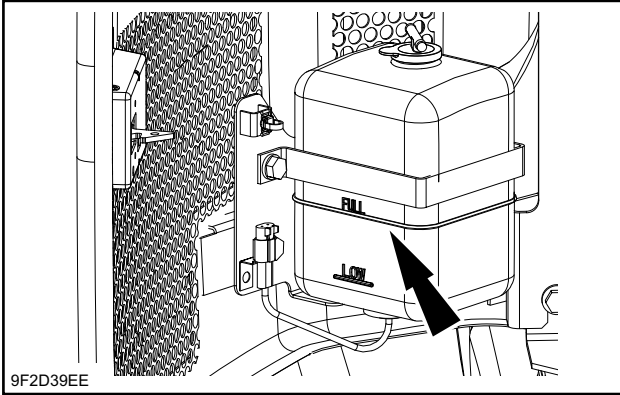


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6B55FBBE

2. Fill the expansion reservoir to the " Full" mark and install the cap.

NOTE: Use the correct coolant solution.



9F2D39EE

3. Run the engine at idle speed for about five minutes.

Add coolant solution if the level in the expansion reservoir drops.

NOTE: Do not fill the expansion reservoir above the " Full" mark.

Fuel system

Service specifications

Fuel reservoir bleeding: Every 10 hours or every day

Pre-filter bleeding: When the float reaches the level (A)

Change the pre-filter element: Every 500 hours

Change the filter element: Every 500 hours

Fuel supply pump filter cleaning: Periodically

Fuel tank capacity: 200 L

Type of fuel: Refer to page 6-9

NOTE: Take all necessary precautions during the following operations; no foreign matter must enter the fuel system.

NOTICE:

Do not work in any environment in which anything other than fuel will get into fuel lines. (Sites with strong wind, blowing dust, etc.).

Wash hands before operations.

Do not use gloves.

Do not open the packaging for the filter kit until you start the installation work.

Do not reuse any fuel remaining within the cover.

For persistent dirt within the cover, wipe it off with a clean rag, then clean with clean diesel fuel.

Do not use parts cleaner because it could affect the case cover.

Do not touch the inside of the element.

Completely wipe off any spilt fuel after changing a filter element or bleeding the system.

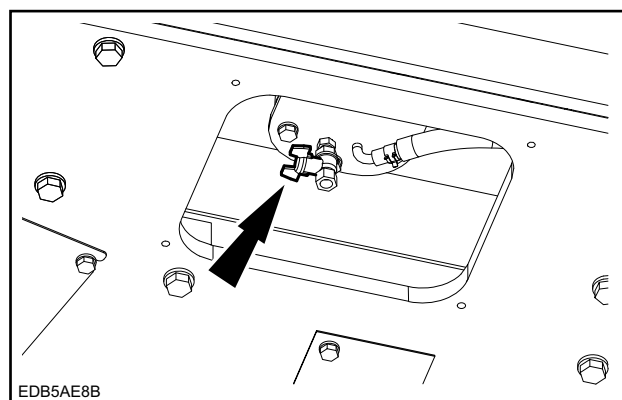
⚠ CAUTION

When you deal with fuel, please do not bring fire close.

After exchange of a filter and the scupper of fuel should wipe off the fuel which fell.

Draining the fuel tank

1. Place a receptacle of a suitable capacity under the drain plug.
2. Open the drain valve located at the bottom of the tank and drain the accumulated sediment and water.
3. After draining, close the drain valve.



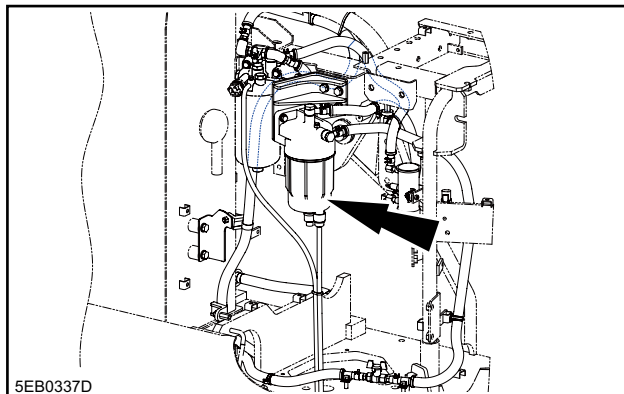
EDB5AE8B

Fuel Pre-filter Inspection

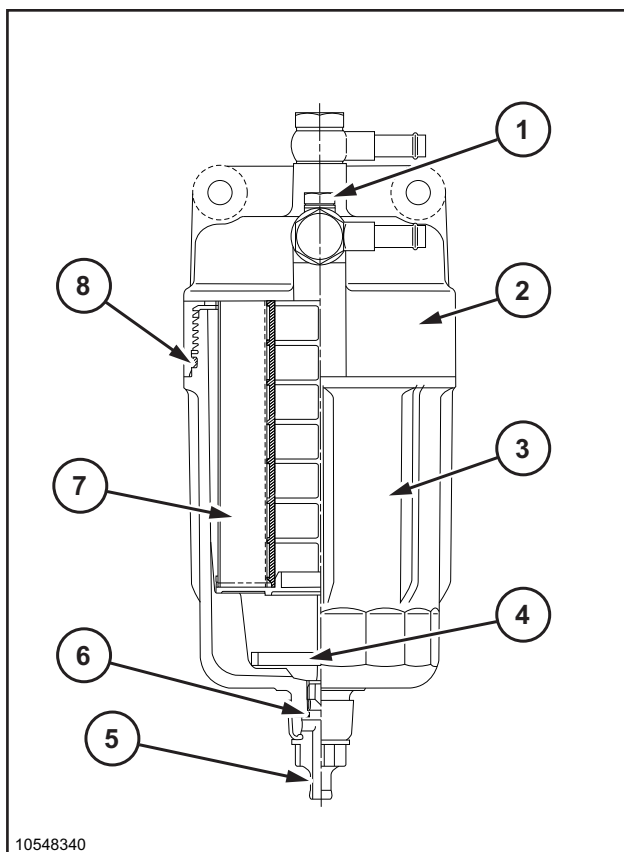
[Every 10 hours or in start-up inspection]

When the float ④ reaches the bottom of the element ⑦ and when the message "FUEL FILTER" is displayed on the monitor

1. Loosen the air bleed plug ① and the drain plug ⑤ to drain off any water and sediment.



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1	Air bleed plug
2	Head
3	Case
4	Float
5	Drain plug
6	O-ring
7	Element
8	O-ring

2. When the water and sediment have come out, tighten the air bleed plug ① and the drain plug ⑤.

Air bleed plug tightening torque: 8 - 12 N·m

In cold weather, water might be frozen.

Drain water after ice is completely melted.

3. Make sure that there are no fuel leaks.

⚠ WARNING

Spilled diesel fuel can cause a fire. Wipe it off completely.

⚠ CAUTION

Do not tighten the air bleed plug more than its specified torque. Doing so might damage the O-rings.

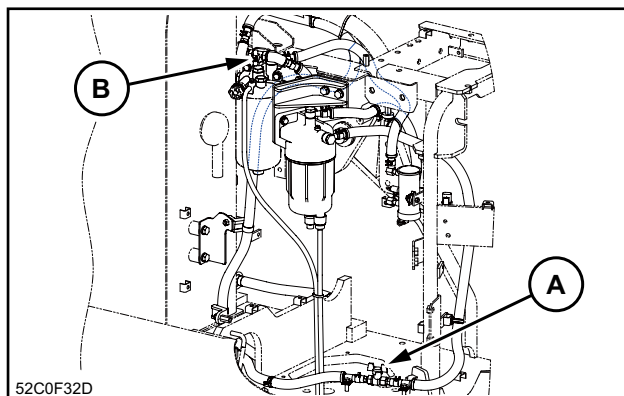
Pre-filter Element Replacement

[Service every 500 hours]

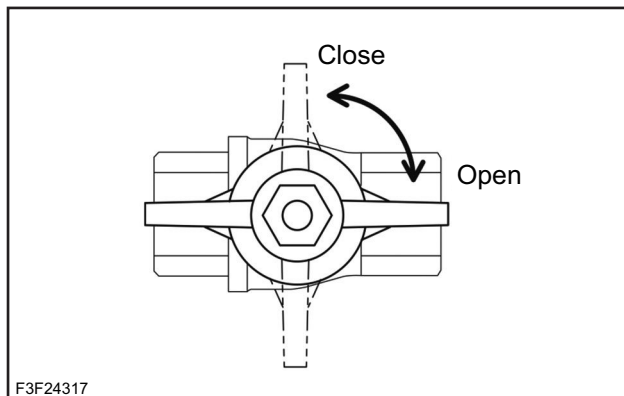
⚠ WARNING

After replacing the element or bleeding out the air, thoroughly wipe off any spilled diesel fuel.

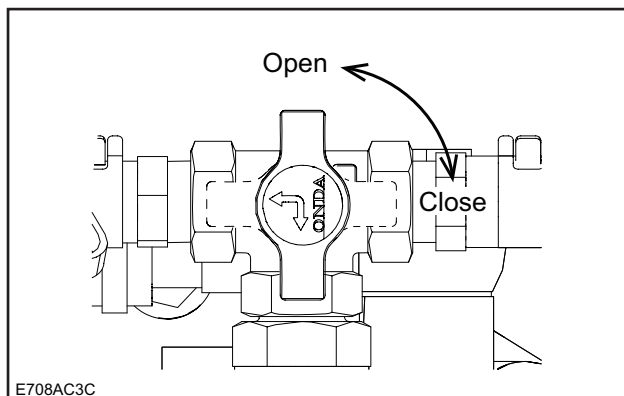
1. Close the fuel cocks A and B.



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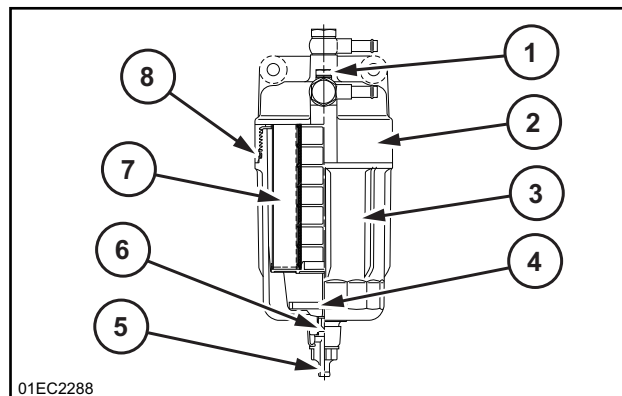


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E708AC3C

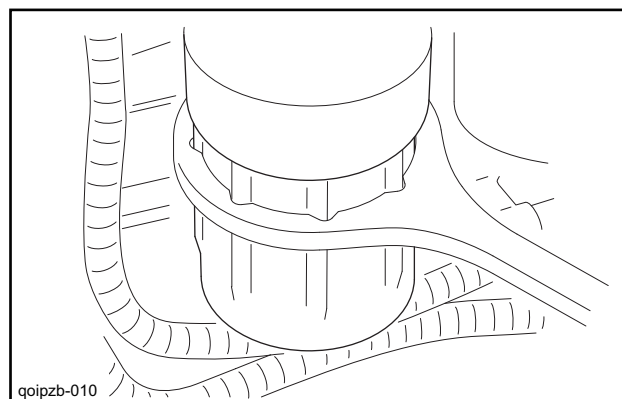
2. Loosen the air bleed plug ① and the drain plug ⑤ on pre-filter to drain off the fuel.



01EC2288

1	Air bleed plug
2	Head
3	Case
4	Float
5	Drain plug
6	O-ring
7	Element
8	O-ring

3. Turn the case ③ left with the special wrench and remove it from the head ②.



qoipzb-010

4. Replace the element ⑦ with a new one.

5. Replace the O-rings ⑥ ⑧ for the case ③ and the drain plug ⑤ with new ones.

6. Clean the head ②, apply a thin layer of fuel to the packing section, and screw onto the head ②.

7. After the packing contacts the seal surface, tighten with the special wrench.

Case tightening torque: 28 - 32 N·m

6-Maintenance

8. Tighten the air bleed plug ① and the drain plug ⑤ on pre-filter.

Air bleed plug tightening torque: 8 - 12 N·m

Drain plug tightening torque: 1.5 - 2.5 N·m

9. Bleed off the air.

⚠ CAUTION

Do not tighten the air bleed plug more than its specified torque. Doing so might damage the O-rings.

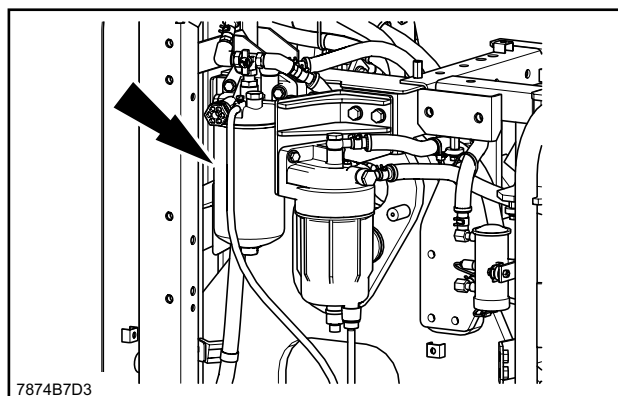
Fuel Main Filter Inspection

[Every 10 hours or during start-up inspection]

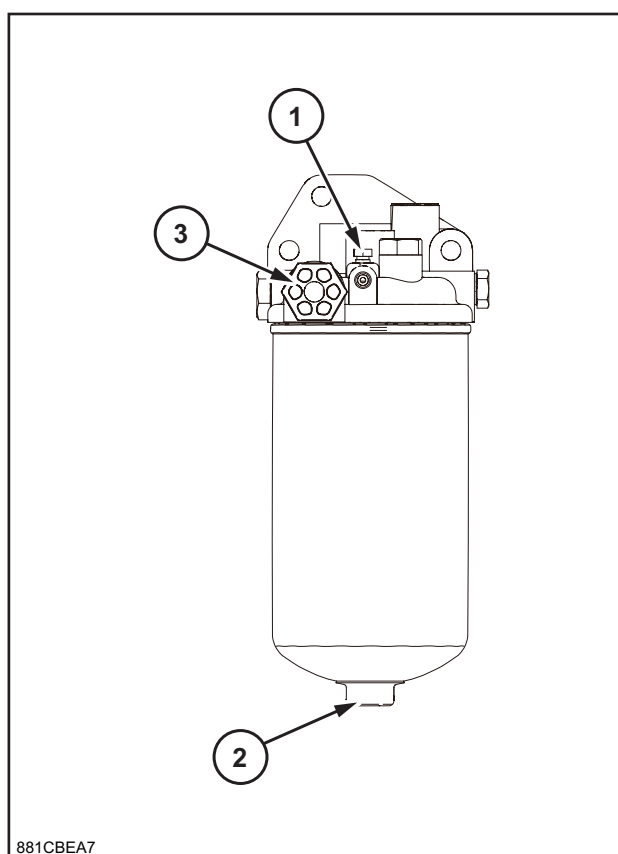
Perform the same procedure as for the pre-filter.

Refer to "Fuel Pre-filter Inspection".

1. Loosen the air bleed plug ① and the drain plug ② to drain any water and sediment.



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881CBEA7

1	Air bleed plug
2	Drain plug
3	Priming pump

Main Filter Element Replacement

[Service every 500 hours]

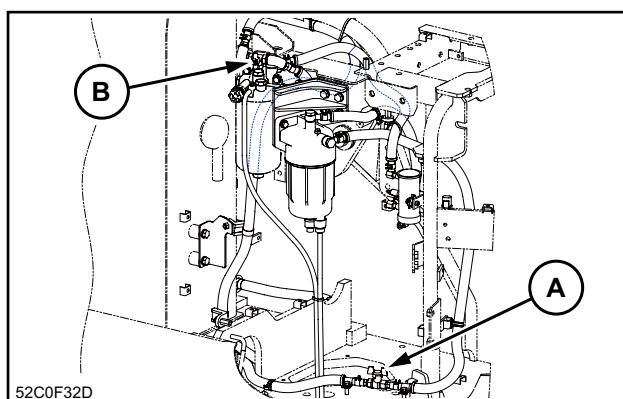
⚠ WARNING

- Keep away from fire.
- After replacing the element or bleeding out the air, thoroughly wipe off any spilled diesel fuel.

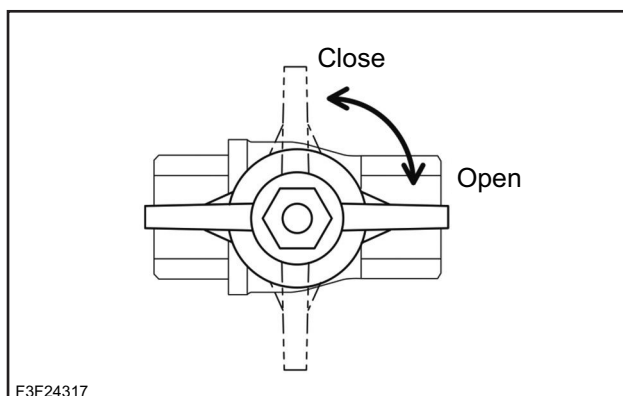
⚠ CAUTION

- When the fuel tank has been emptied, water drained from the fuel, the element or filter replaced, or other such work carried out, always bleed the air.
- Be sure to stop the engine before starting work.

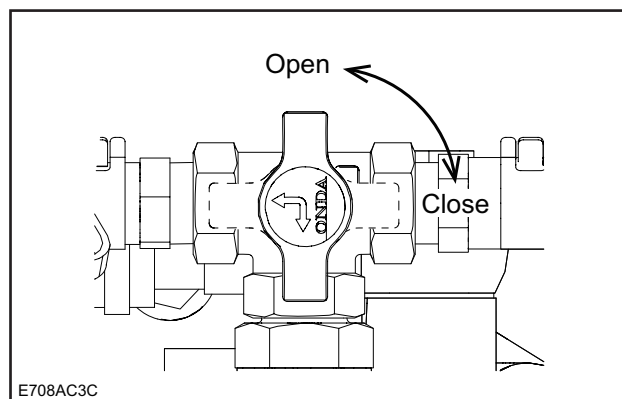
1. Close the fuel cocks A and B.



52C0F32D



F3F24317



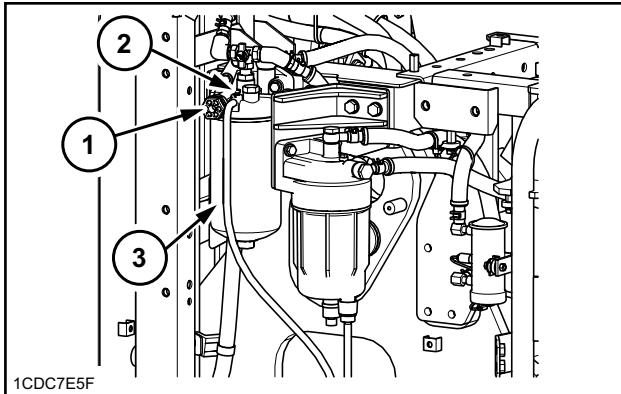
E708AC3C

2. Turn the fuel filter counter-clockwise with the tool (bolt width 29 mm) to remove it. (Replace the entire cartridge.)
3. Install a new filter.
4. When installing, apply a thin layer of engine oil on the packing and tighten to the specified torque.
Cartridge tightening torque: 25.0 N·m
5. Open the fuel cock.

NOTE: System air bleeding is performed automatically when the engine is started.

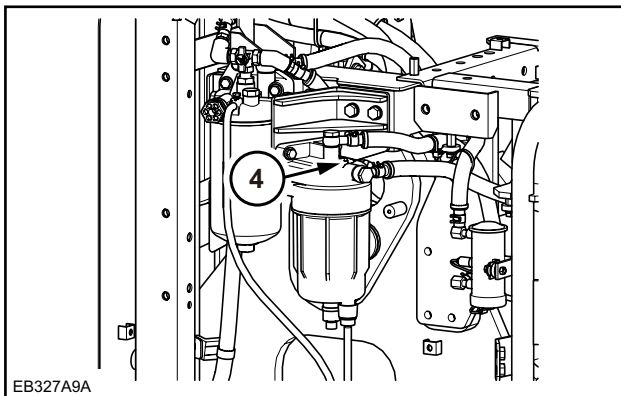
Fuel System Air Bleeding

When the fuel pre-filter or fuel filter ④ is replaced or the fuel tank is emptied by draining the water, air gets into the pipe and prevents fuel flow. Bleed off the air.



1CDC7E5F

1	Priming pump
2	Air bleed plug
3	Fuel filter



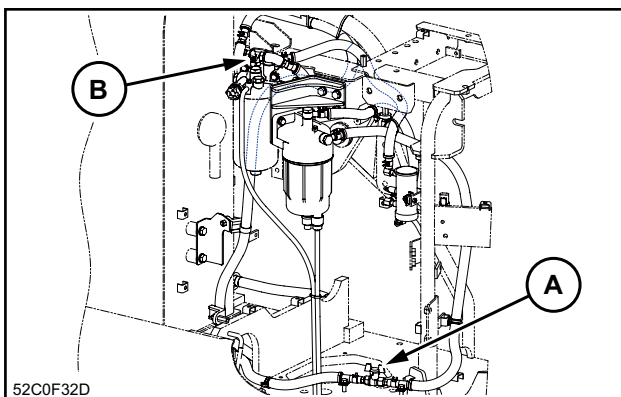
EB327A9A

4	Air bleed plug
---	----------------

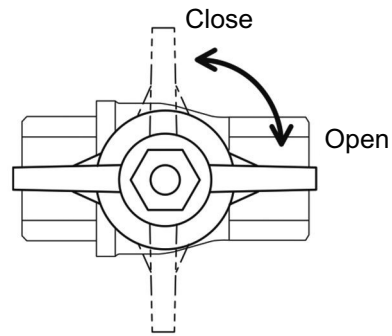
1. Place the cocks A and B in the following positions.

Cock A (fuel tank): Open

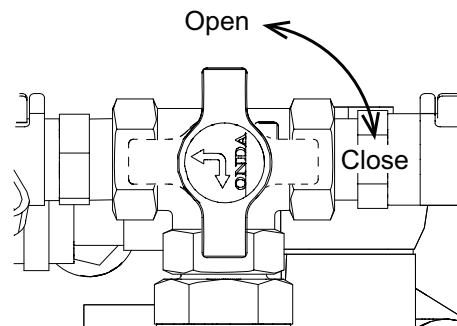
Cock B (engine): Close



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2. Loosen the main filter air bleed plug ②.

Do not loosen the air bleed plugs ④ for the fuel pre-filter.

3. Turn "ON" the starter switch to operate the electromagnetic feed pump.

⚠ CAUTION

During air bleeding, do not leave the starter switch "ON" for longer than 5 minutes. This can damage the electromagnetic feed pump.

4. Turn the priming pump ① counter-clockwise to push out the priming pump ① with its internal spring.

5. By operating the priming pump ①, the fuel that contains bubbles can be drained from the air bleed plug.

Move the priming pump until no air comes out from the air bleed plug ②.

6. Tighten the air bleed plug ②.

Air bleed plug tightening torque: 9.8 N·m

⚠ CAUTION

Do not tighten the air bleed plug more than its specified torque. Doing so might damage the O-rings.

7. Operate the priming pump until the fuel filter is filled with fuel (10 times or more).

8. Wait about 1 minute and loosen the air bleed plug, then bleed the air from the fuel filter.

9. Repeat steps 5. through 8. until no air comes out from the air bleed plug. (at least 3 times)

10. Loosen the air bleed plug ④ for fuel pre-filter. Operate the priming pump ① until no air comes out from the air bleed plug ④.

11. Tighten the air bleed plug ④.

Air bleed plug tightening torque: 8 - 12 N·m

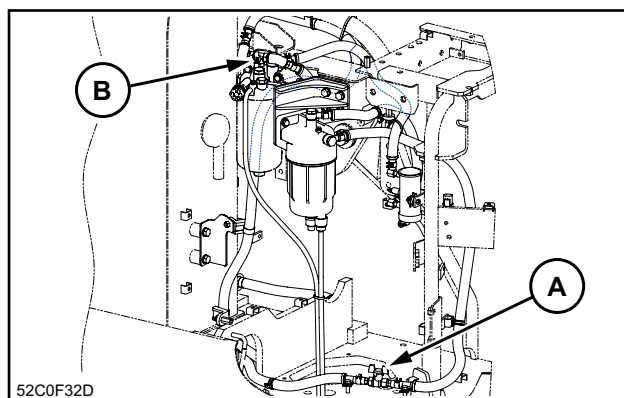
12. Operate the priming pump ①.

13. Tighten the priming pump ① to its original position.

14. Place the cocks A and B in the following positions.

Cock A (fuel tank): Open

Cock B (engine): Open



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15. Completely wipe off any spilled fuel around the air bleed plugs ② ④, start the engine, and check for any fuel leaks.

Start the engine without controlling the engine speed at the machine side.

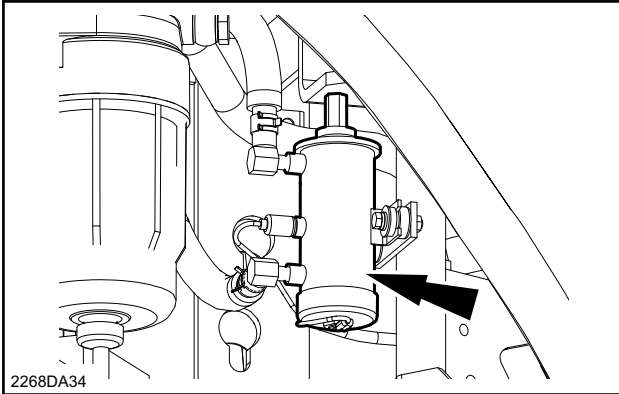
At this time, if the engine does not start, repeat from step 5.

16. After the engine is started, keep the speed at idle for 5 seconds.

17. Slowly increase the engine speed until it reaches the maximum engine speed. Repeat this operation a few times.

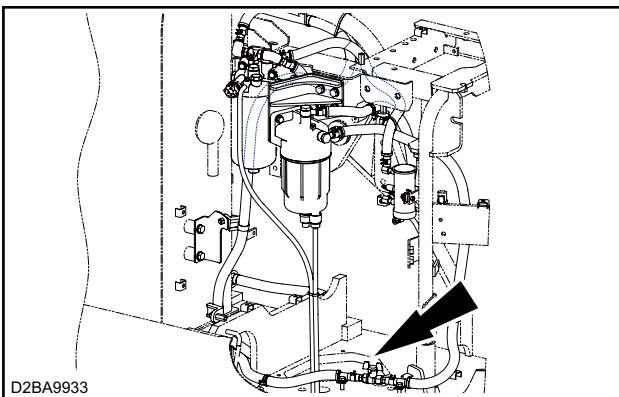
Cleaning the electromagnetic feed pump filter

1. Located near the fuel pre-filter, place a receptacle of suitable capacity under the supply pump.

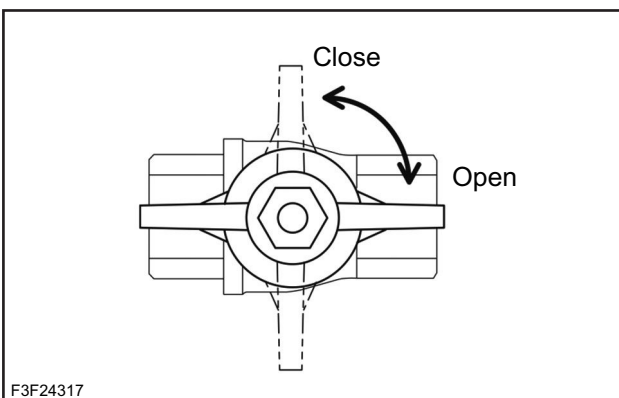


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2. Close the valve on the supply line then remove the electromagnetic feed pump.

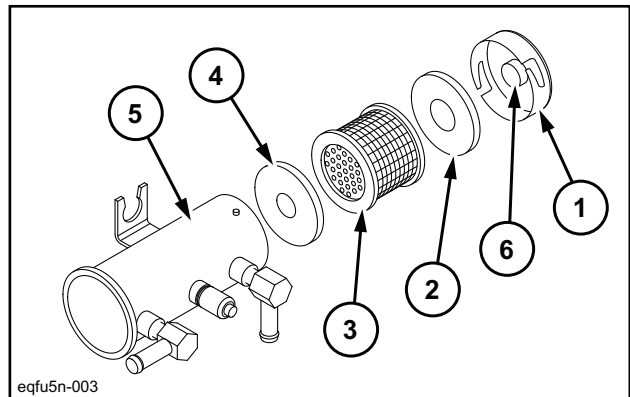


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3. Open the pump body and extract the filter (3) and the seals (2) and (4).

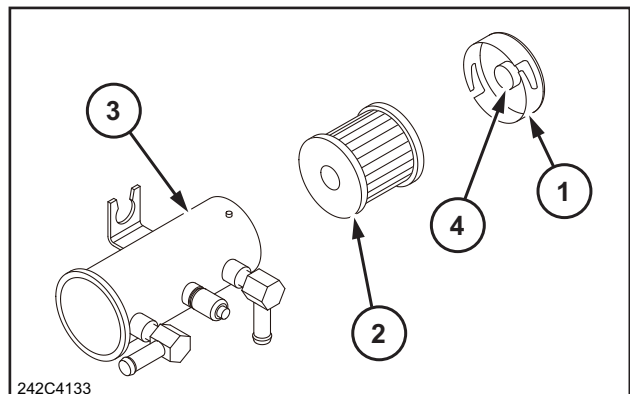


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4. Clean the filter with compressed air. Check the filter and replace it if necessary. Replace the seals with new seals.
5. Carefully clean the body (5) and the cover (1). No dirt must remain in the supply pump.
6. Re-assemble, taking care to install the seals in the correct order then re-install the pump.
7. Open the valve on the supply line.
8. Bleed the system. See "Changing the pre-filter element".

How to Replace Paper Filter

1. Using a wrench with a width across flat of 17 mm, turn the cover (1) to the left.
2. Remove the cover (1) and remove from the main unit (3) as given in the following drawing. To assemble them, please reverse the disassembly procedure.



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Replacement of Paper Filter

If it is found that paper filter (2) is dirty or any damage or problem is found, replace it with a new one.

In the case of disassembly, fully remove the dirt from the cover (1), the magnet (4), the main unit (3), and inside of the main unit and then assemble them.

During cleaning, be sufficiently careful to prevent any entry of dust and dirt into the main unit (3).

After assembling them, please be sure to check for airtightness.

WARNING

Flying debris! Compressed air can propel dirt, rust, etc.
into the air.

Wear eye and face protection when using compressed air.

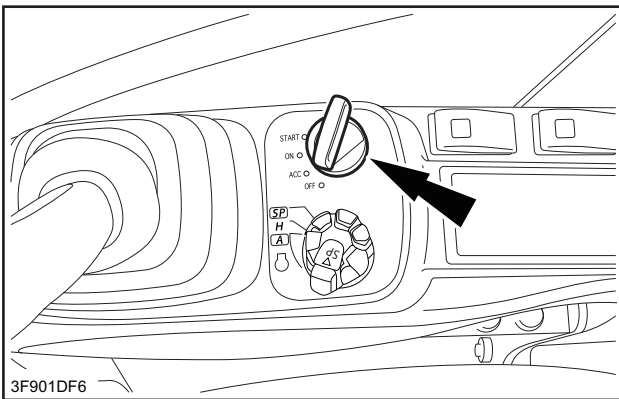
Failure to comply could result in death or serious injury.

6-Maintenance

Releasing pressure in the hydraulic system

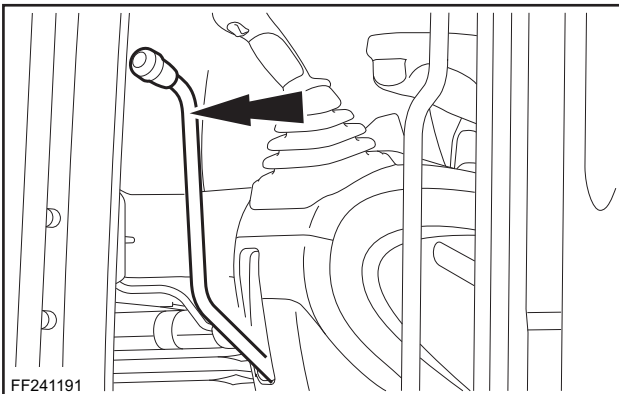
NOTE: Before carrying out any work on the hydraulic system, there should be no pressure in any of the circuits.

1. Place the machine on flat, level ground, lower the attachment to the ground and stop the engine.
2. Turn the starter switch key to the " ON" position.



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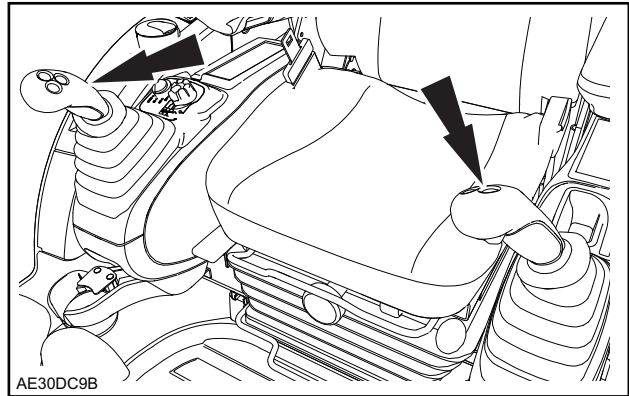
3. Push the gate lock lever (safety bar) forward.



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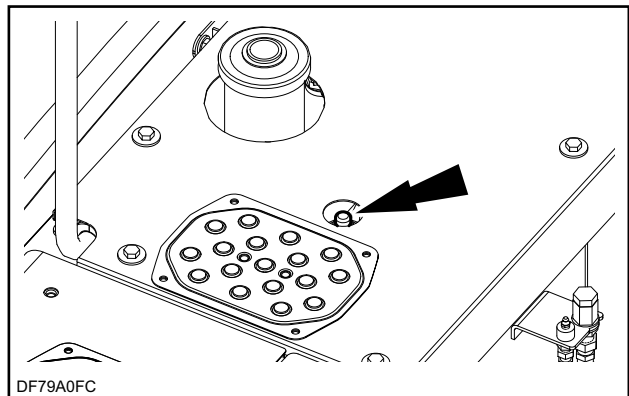
4. Operate the control levers from right to left and front to rear a dozen times approximately.

5. Turn the starter switch key to the " OFF" position (shut down).



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6. Press the button on top of the breather on the hydraulic tank to release any residual pressure.



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Hydraulic circuit

Service specifications

Check the hydraulic tank fluid level: Every 10 hours or each day

Check the lines: Every 50 hours

Draining water and sediment from the hydraulic tank: Every 250 hours

Check the condition of the hydraulic fluid: Every 1000 hours

Change the reservoir breather filter element: Every 1000 hours

Clean the suction filter: Every 2000 hours

Change the return filter: Every 2000 hours (after the first 250 hours during the run-in period)

Change the pilot filter: Every 2000 hours (after the first 250 hours during the run-in period)

Change the main pump outlet hoses: Every 2 years or every 4000 hours (whichever comes first)

Change the boom, arm and bucket cylinder hoses: Every 2 years or every 4000 hours (whichever comes first)

Change the suction filter: Every 5000 hours

Change the hydraulic fluid: Every 5000 hours

Reservoir capacity: 75 l

Total system capacity: 158 l

Type of oil: Refer to page 6-9

NOTE: If biodegradable hydraulic fluid is used, it is essential to reduce the following servicing intervals to the number of hours shown:

Change the return filter: Every 1000 hours (after the first 50 hours during the run-in period)

Change the hydraulic fluid: Every 2000 hours

NOTE:

If the machine is new or if a major component has been overhauled or changed in the hydraulic system, change the pilot filter and return filter after 50 hours of operation.

After that, change these filters at the stipulated interval.

NOTE:

Every 1000 operating hours, it is necessary to have the hydraulic fluid analysed.

Consult your dealer and the certified service plant.

NOTE:

After changing the hydraulic fluid, it is necessary to bleed all air from the hydraulic components.

See "Bleeding air from the hydraulic components".

NOTICE: If metal particles are found in the old filters, consult your dealer and the certified service plant.

⚠ WARNING

Burn hazard! Before performing any service on the hydraulic system, you must allow it to cool. Hydraulic fluid temperature should not exceed 40 °C.

Failure to comply could result in death or serious injury.

⚠ WARNING

Escaping fluid! Hydraulic fluid or diesel fuel leaking under pressure can penetrate the skin and cause infection or other injury.

To prevent personal injury:

Relieve all pressure before disconnecting fluid lines or performing work on the hydraulic system.

Before applying pressure, make sure all connections are tight and all components are in good condition.

Never use your hand to check for suspected leaks under pressure.

Use a piece of cardboard or wood for this purpose.

If injured by leaking fluid, see your doctor immediately.

Failure to comply could result in death or serious injury.

⚠ WARNING

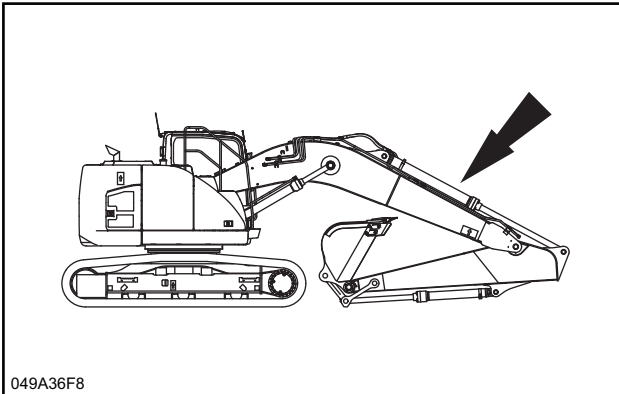
Pressurized system! Never attempt to drain fluids or remove filters when the engine is running.

Turn off the engine and relieve all pressure from pressurized systems before servicing the machine.

Failure to comply could result in death or serious injury.

Level in the hydraulic tank

1. Place the machine on flat, level ground and place the attachment in the position shown. Stop the engine and remove the starter switch key.

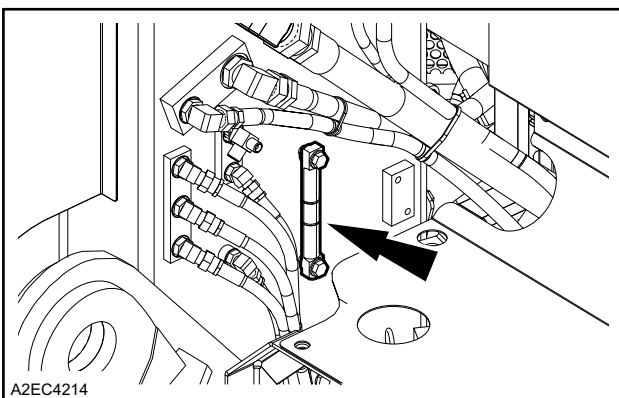


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2. The hydraulic fluid should be in the middle of the indicator.

Add more oil if necessary.

See "Filling the Hydraulic Tank".

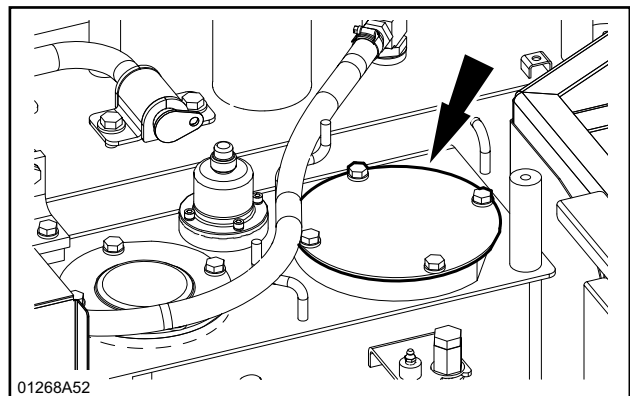


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Filling the Hydraulic Tank

1. Reduce the pressure in the hydraulic tank. Refer to "Releasing pressure in the hydraulic system".
2. Clean the cover plate and the area around the plate. Remove the cover plate and add hydraulic oil to the tank if necessary.
3. Replace the cover plate seal if necessary and install the cover plate.

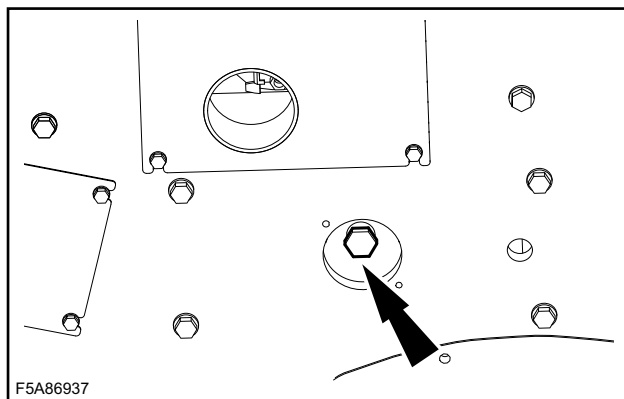
NOTICE: Make sure that no contaminant (water, sand, etc.) enters the reservoir during filling.



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Removing Sediment from the Hydraulic Tank

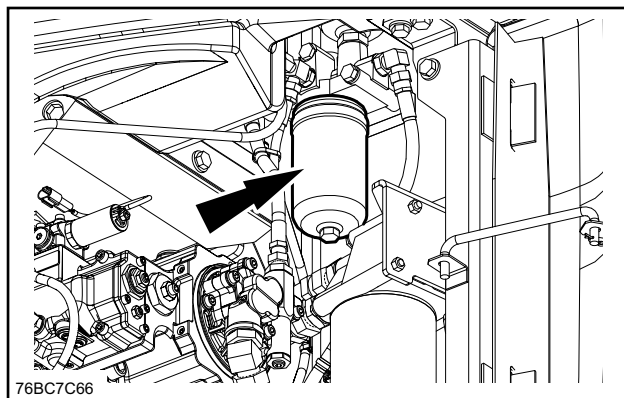
1. Reduce the pressure in the hydraulic tank. Refer to "Releasing pressure in the hydraulic system".
2. Place a container with suitable capacity underneath the drain plug.
3. Open the drain plug at the bottom of the reservoir and drain the sediment and water that has accumulated at the bottom of the reservoir.
4. After draining, close the drain plug.
5. If necessary, refill the hydraulic oil. Refer to "Filling the Hydraulic Tank".



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Pilot filter replacement

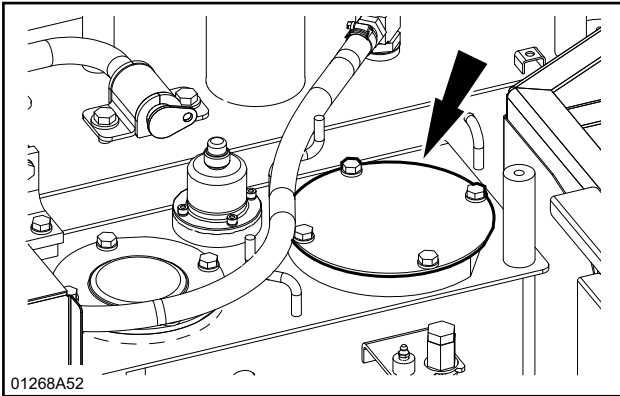
1. Release all pressure in the hydraulic system.
See "Releasing pressure in the hydraulic system".
2. Please attach a wrench on the bottom of a filter and turn it.
3. Coat the seal of the new filter with a fine film of clean oil.
4. Install the new filter.
Turn the filter until the seal comes into contact with the filter head then tighten by an extra third of a turn by hand.



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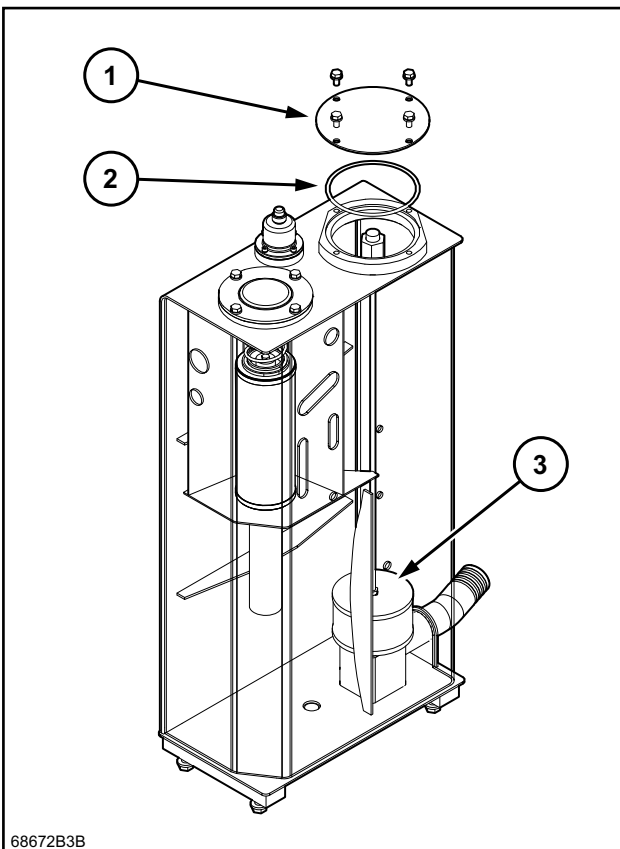
Cleaning and Replacing the Suction Filter

- 1.Reduce the pressure in the hydraulic tank.
Refer to "Releasing pressure in the hydraulic system".
- 2.Clean the top of the hydraulic tank, then clean the suction filter cover.



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- 3.Remove the suction filter rod assembly cover (1) and O-ring (2).



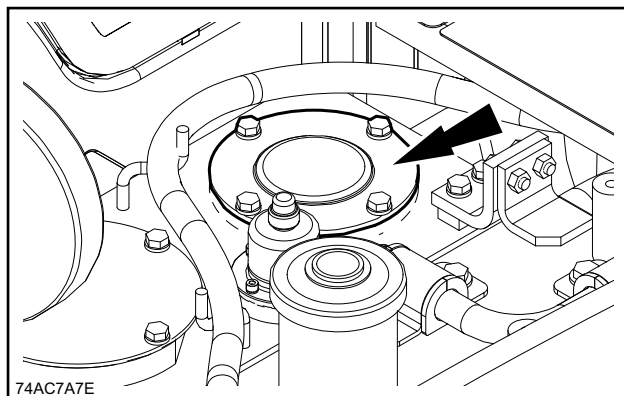
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- 4.Remove the suction filter (3) and clean with solvent.
Dry the filter completely and check that there is no damage.
If there is any damage to the surface, replace it with a new filter.
- 5.Install the new O-ring (2), then install the suction filter (3) and rod assembly.
- 6.Install the cover (1).
- 7.Check the hydraulic oil level and top up as necessary.
Refer to "Filling the Hydraulic Tank".

NOTE: Install a new suction filter every 5000 hours or after replacing the hydraulic oil.

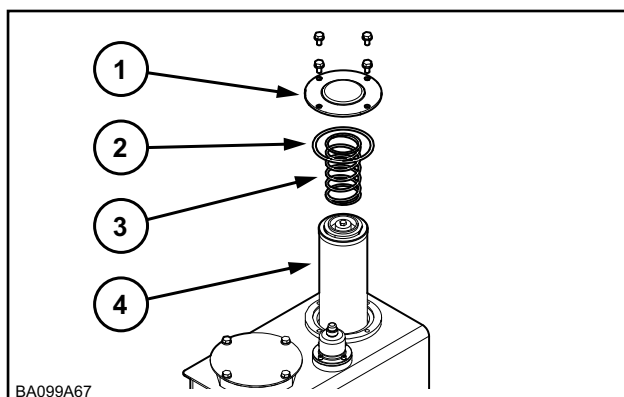
Return filter replacement

1. Release all pressure in the hydraulic tank.
See "Releasing pressure in the hydraulic system".
2. Clean the top of the hydraulic tank and clean the return filter cover.



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3. Remove the cover (1), O-ring (2), and compression spring (3).

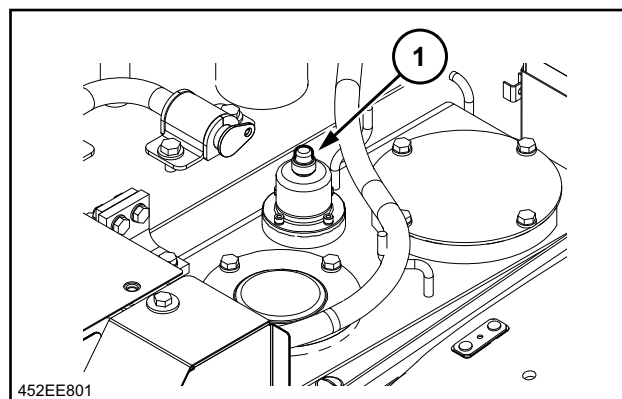


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4. Take out the filter (4).
5. Install a new filter (4).
6. Check O-ring (2) and change it if worn or damaged.
7. Install the compression spring (3) and cover (1).
8. Install the upper plate on the hydraulic tank.
9. Check the level of the hydraulic fluid and add more if necessary.
See "Filling the Hydraulic Tank".

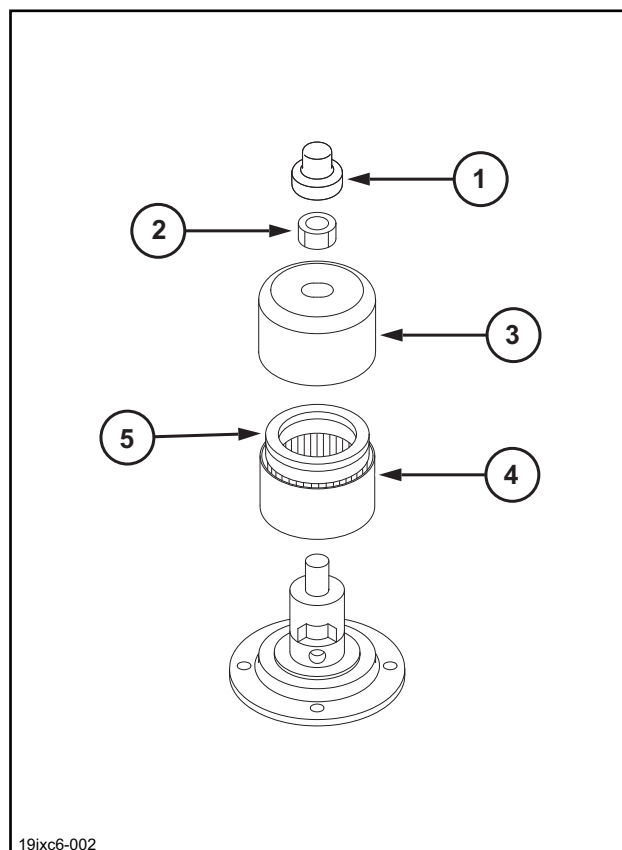
Replacing the reservoir breather filter element

1. Press the button (1) to release all pressure in the hydraulic tank.



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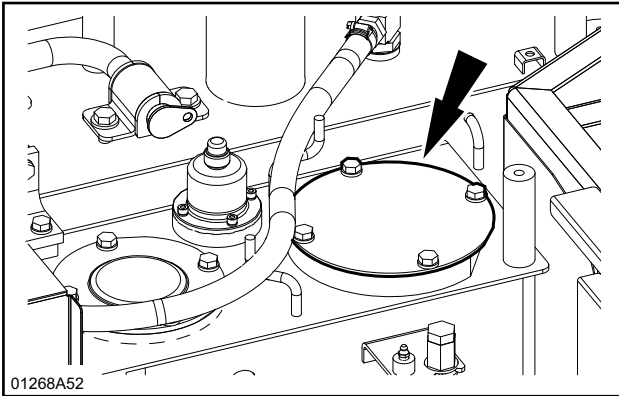
2. Remove the nut (2) and the cover (3) from the breather.
3. Remove and discard the used filter element (4).
4. Install a new element (4), making sure the seal (5) is facing upwards.
5. Install the cover (3) as well as the nut (2).



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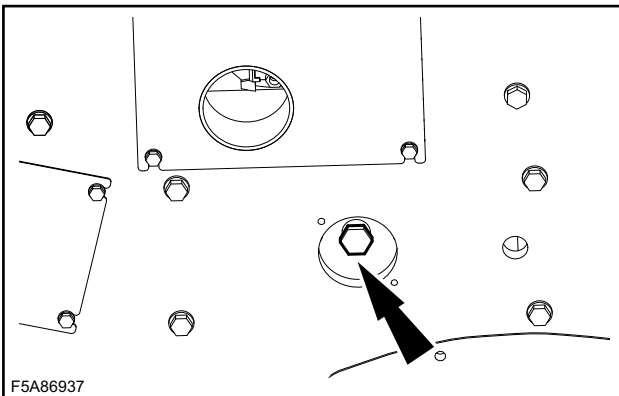
Changing the hydraulic fluid

1. Release all pressure in the hydraulic tank.
See "Releasing pressure in the hydraulic system".



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2. Remove the reservoir cover plate.
3. Using a pump, remove the fluid from the hydraulic tank.
Have a container with a suitable capacity ready.
4. Place a receptacle of a suitable capacity under the reservoir drain plugs, open the reservoir drain plugs and allow the remainder of the fluid to flow out.



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5. Change the suction filter and the return filter.
See "Cleaning and Replacing the Suction Filter" and "Return filter replacement".
6. Close the one reservoir drain plug.
7. Fill the reservoir with new hydraulic fluid.
See "Filling the Hydraulic Tank".

8. Replace the cover plate seal if required and install the cover plate on the reservoir.

NOTE:

Before you start the engine, it is very important that you bleed air from all the hydraulic components.

See "Bleeding air from the hydraulic components".

9. Start and run the engine with no load for approximately five minutes.
10. Move each control several times to remove any air in the system.
11. Swing the upperstructure evenly left to right two complete turns or more.
12. Place the machine in position and then stop the engine.
13. Check the oil level in the hydraulic tank and add oil as required and check that there are no air bubbles in the hydraulic tank.

Bleeding air from the hydraulic components

NOTE:After bleeding air from the components, stop the engine for five minutes and check there are no bubbles at the surface of the hydraulic fluid in the reservoir.

Hydraulic pump

Using a solvent, clean the periphery of the air bleed plug.

Loosen the air bleed plug, remove the plug if the fluid does not flow.

Fill the pump with new clean hydraulic fluid.

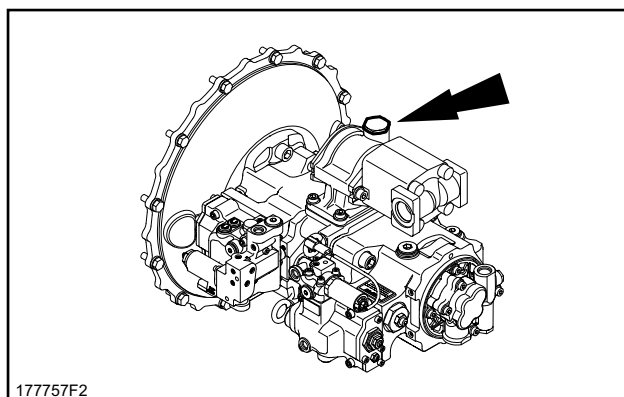
Install and tighten the air bleed plug.

Start the engine and run it at low idle speed.

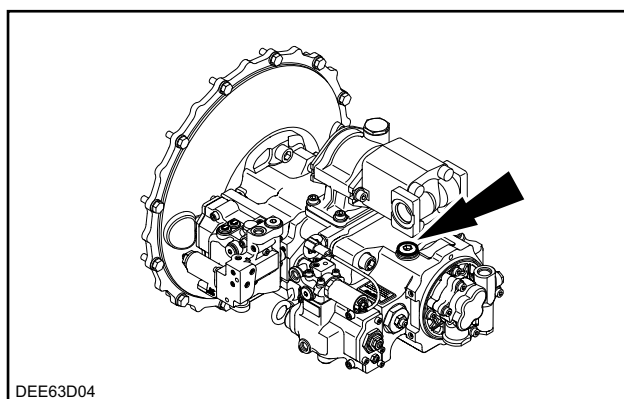
Loosen the air bleed plug on the pump.

Tighten the plug when air free fluid comes out of the bleed plug hole.

Clean the area completely.



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Swing reduction gear

Start the engine and run it at low idle speed.

Loosen the air bleed plug and make sure hydraulic fluid runs out.

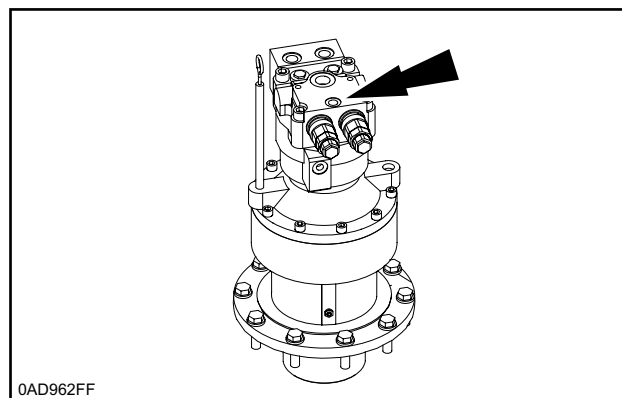
If necessary, stop the engine and add oil via the orifice.

Install the plug without tightening, then start the engine and run it at low idle speed, leaving it to run until oil begins to run from the orifice.

Tighten the air bleed plug completely.

Swing the upperstructure at least twice completely to the right and twice completely to the left.

After complete bleeding, stop the engine for five minutes then check that there are no air bubbles in the hydraulic tank.



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Attachment Cylinders

- 1.Start the engine and run it at low idle speed.
- 2.Extend and retract the attachment cylinder rods 4 - 5 times without bringing them to the end of stroke.
- 3.Extend and retract the attachment cylinder rods 3 - 4 times bringing them to the end of stroke.

Replacing the hydraulic filters and fluid when a hydraulic breaker is used (optional)

Hydraulic fluid

When using the hydraulic breaker, hydraulic fluid deteriorates more quickly than during ordinary digging.

Check the hydraulic fluid level more frequently.

In addition, when changing the filters, also check the condition of the hydraulic fluid.

Using the following graph as a reference, determine the intervals for changing the hydraulic fluid and filters, depending on the frequency of use of the hydraulic breaker.

Percentage of use	100 %			40 %			20 %			10 %		
Interval in hours	10	100	600	10	300	1500	10	600	300	10	800	4000
Service points												
Hydraulic fluid	(1)		(3)	(1)		(3)	(1)		(3)	(1)		(3)
Return circuit filter		(3)			(3)			(3)			(3)	
Suction filter		(2)	(3)		(2)	(3)		(2)	(3)		(2)	(3)
Pilot filter		(3)			(3)			(3)			(3)	
Hydraulic fluid condition	200H			300H			600H			800H		

(1)	Check the level
(2)	Clean or replace
(3)	Replace

Checking the Hydraulic System Lines

Check the following concerning hydraulic system lines.

Check for leaks

- Hoses
- Pipes
- Plugs
- Connection locations
- Fittings

Also, check that all nuts and screws are correctly tightened.

In the event of problem, repair, replace, or tighten the component(s) with problems.

Air filter

Inspection

Periodically check the air cleaner, intake manifold, seals, and hoses.

At the same time, check that the intake manifold bolts and hose clamps are securely tightened. Replace the hoses before they are worn.

Service Specifications

Outer element inspection and cleaning: Every 250 hours or when "AIR FILTER" (air cleaner clogged) is displayed on the message display screen

Inner element replacement: Every 1000 hours or after cleaning 6 times

Inner element replacement: Every 1000 hours

For details on cleaning prohibitions, refer to "Cleaning Outside Element" (6-68).

NOTE:

The outer element can be cleaned.

The inner element cannot be cleaned. Always replace it.

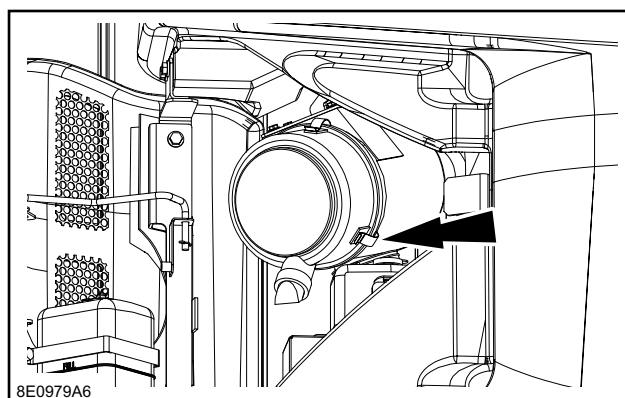
NOTICE:

Observe the intervals for the above air cleaner service.

Using clean filters extends engine life.

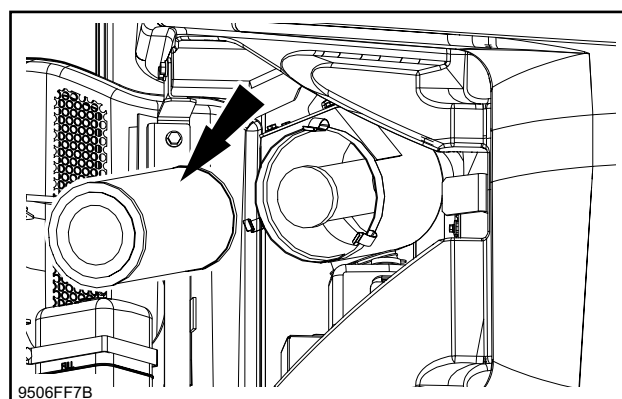
Removing the Elements

1. Release the fastener, then remove the cover.



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2. Remove the outer element.



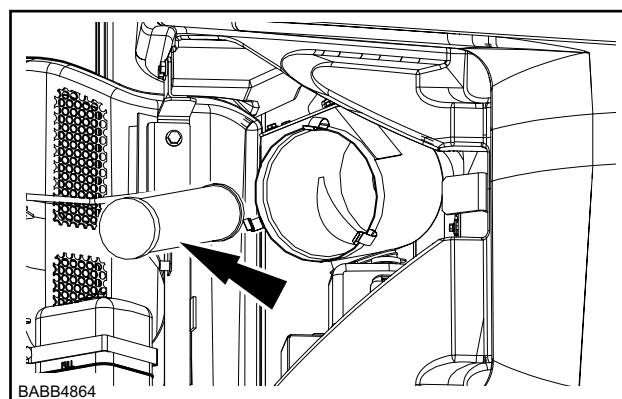
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3. If replacement is necessary, remove the inner element.

NOTE:

Always replace the inner element.

Do not clean it.



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Cleaning Outside Element

WARNING

Compressed air can propel dirt, rust, etc. into the air.

When cleaning, use protective eyewear and a dust mask.

Failure to comply with these precautions can cause accident and injury.

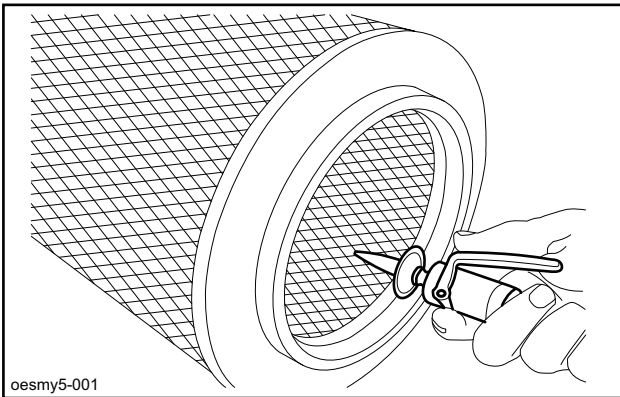
When the outside element is dry:

Blow compressed air from the inside to the outside at very low pressure.

Keep the compressed air nozzle at least 3 cm away from the inside wall of the element.

When no more dust comes out of the outside element, cleaning is complete.

NOTE: Be sure to keep the compressed air pressure below 7 bars.



oesmy5-001

NOTE: Do not use compressed air if there is oil or soot in the element.

If the cartridge is greasy:

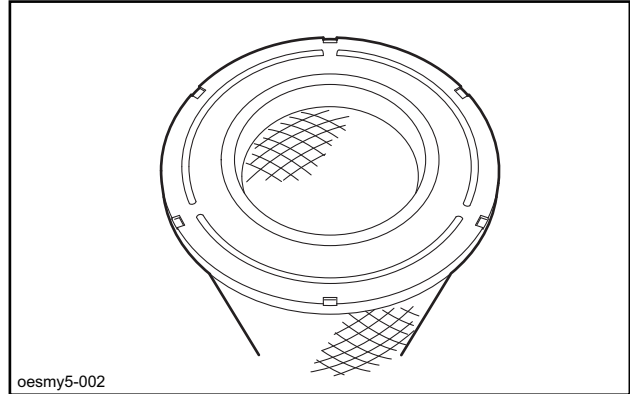
Clean it in water, with suitable detergent. (If the oil cannot be removed, consult your dealer and the certified service plant.)

Instructions for using the detergent are printed on the package.

NOTE:

Dry the element out completely before installing it.

It is advisable to keep a clean spare element ready that can be installed on the air cleaner while the cleaned element is drying.

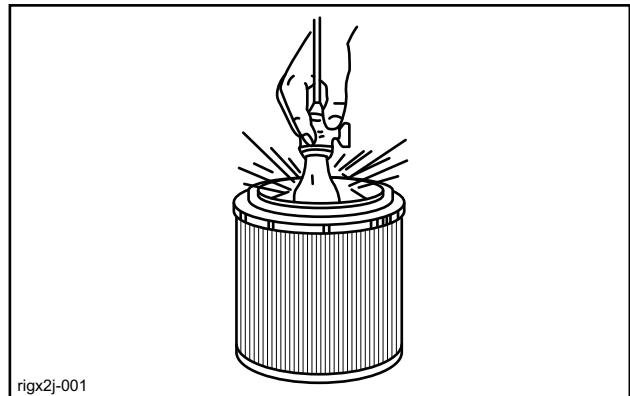


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Inspecting the Element

Place an inspection lamp inside the element and check the element for damage.

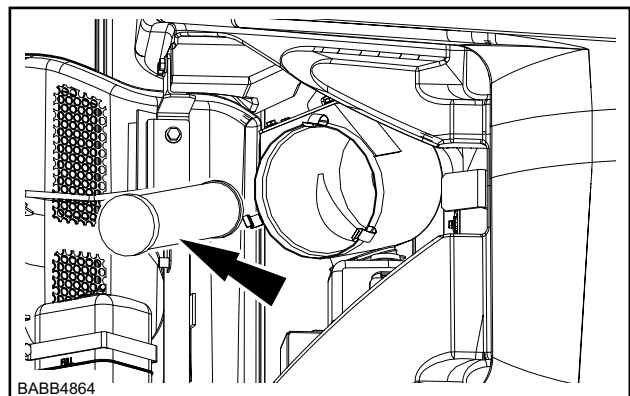
NOTE: If even a small amount of light is leaking from a gap in the element, replace the element.



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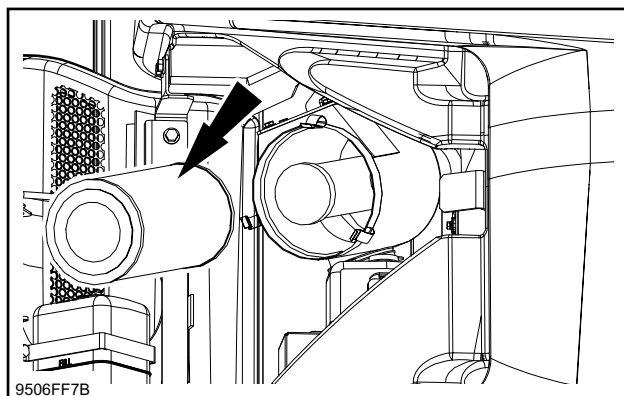
Installing the Element

1. Install the inner element.



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2. Install the outer element.

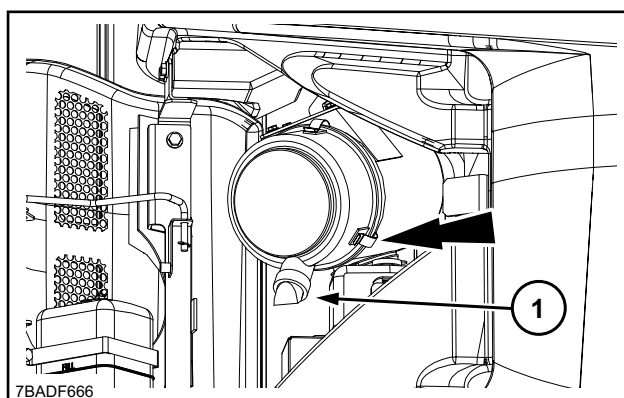


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3. Install the cover with the "TOP" label at the top, then close the fasteners.

4. Check that the valve (1) under the filter is working correctly.

NOTE: After cleaning, if the exhaust smoke is abnormal, be sure to replace the outer element.



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Swing reduction gear

Service specifications

OIL LEVEL CHECK: Every 250 hours

OIL CHANGE: Every 1000 hours (after the first 250 hours during the run-in period)

OIL CAPACITY: 1.8 l

TYPE OF OIL: (Refer to page 6-9)

⚠ WARNING

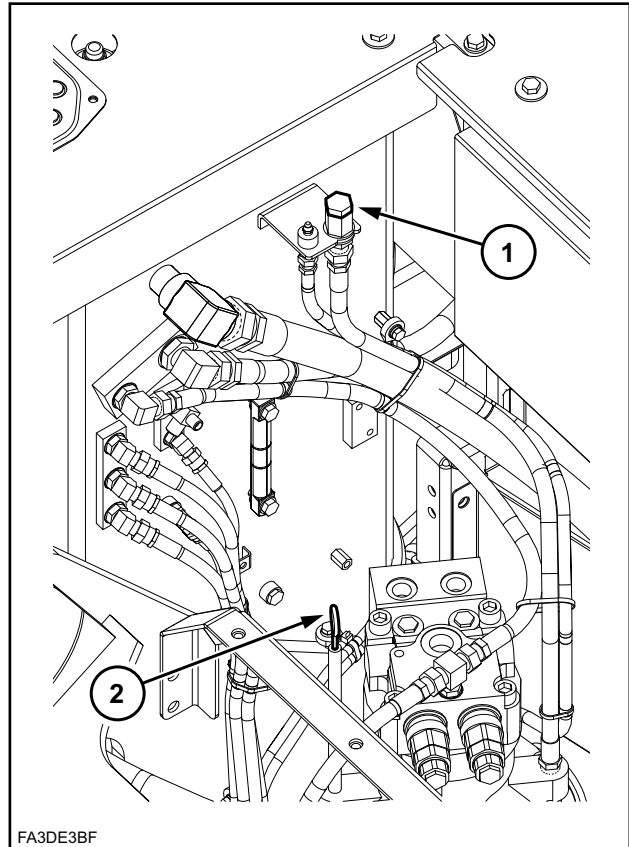
Hot surface possible!

Wait for all components to cool before performing any operation.

Failure to comply could result in death or serious injury.

Level

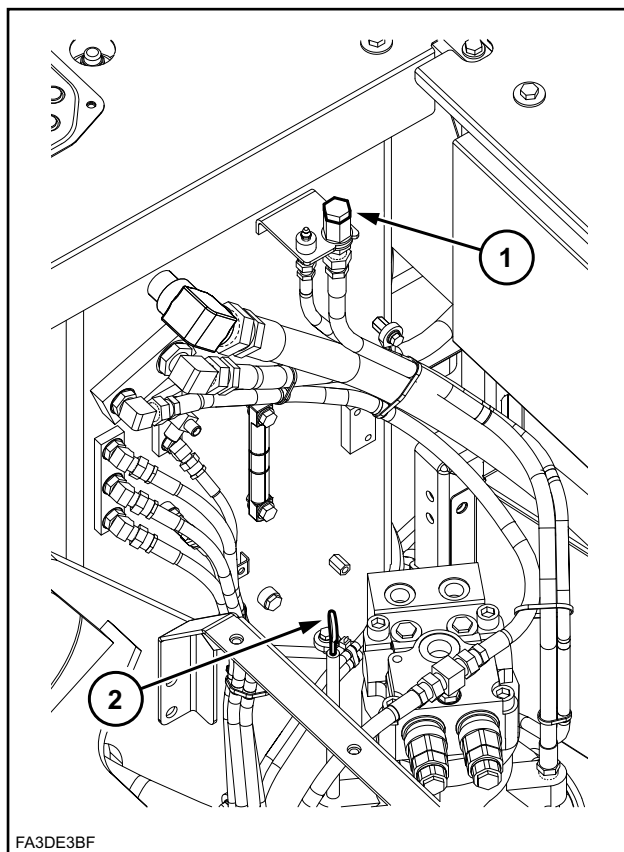
1. Park the machine on flat, horizontal ground.
Stop the engine and remove the starter switch key.
2. Remove the dipstick (2).
The oil should come up to the hatched area.
If necessary, add more oil through the filler hole (1).
3. Install the dipstick.



FA3DE3BF

Draining and Refilling Oil

1. Park this machine on flat, level ground.
2. Stop the engine, then remove the key from the starter switch.
3. Remove the dipstick (2) and the filler plug (1).



FA3DE3BF

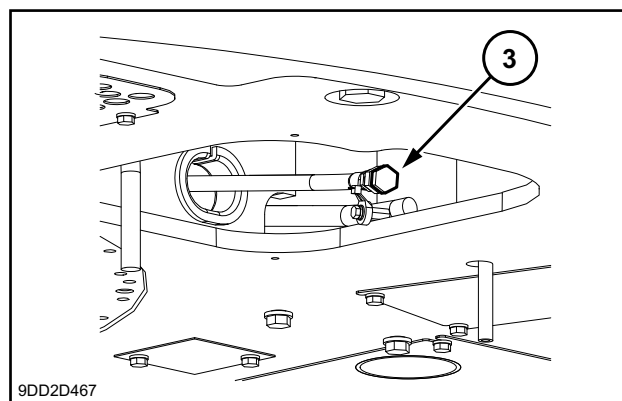
4. Place a container with suitable capacity underneath the upperstructure frame, remove the drain plug (3), and drain the oil.

NOTE: The oil takes relatively long time to drain.

NOTE:

Check the condition of the drained oil.

If the oil contains metal fillings or foreign matter, consult your dealer and the certified service plant.



9DD2D467

5. Install the drain plug (3).
6. Add the appropriate amount of oil through the filler hole (1).
7. Install the dipstick (2) and the filler plug (1).
8. After 10 minutes, remove the dipstick (2) and check the oil level again. Add oil through the filler hole (1) as necessary.

Travel reduction gears

Service Specifications

Oil level check: Every 250 hours

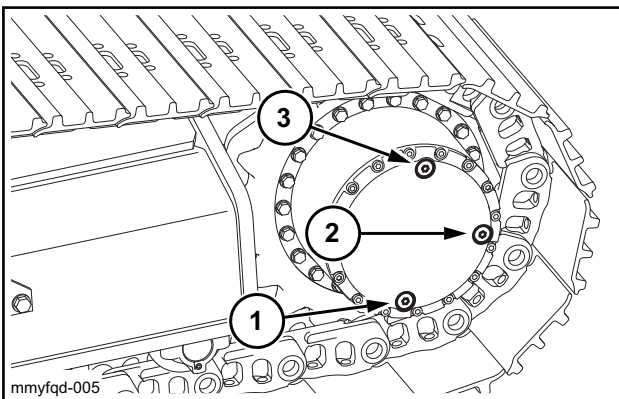
Oil change: Every 1000 hours (after 250 hours during run-in period)

Oil capacity (per reduction gear): 2.1 L

Oil types: Refer to "Hydraulic Fluids, Fuels, and Lubricants" (6-9).

Oil Level Check

1. Move this machine on flat, level ground.
2. Park this machine so that the drain plug (1) is in the lowest possible position.
3. Stop the engine, then remove the key from the starter switch.
4. Slowly loosen the air bleed plug (3) and release any residual pressure.
5. Remove the level plug (2) and check the oil level.
Check that the oil level comes up to the bottom edge of the port (2).
If necessary, remove the air bleed plug (3) and add oil through the port (2) until the oil level comes up to the bottom edge of the port (2).
6. Replace the plugs (2) (3) and the seal for each plug as necessary.
7. Repeat steps 2 to 6 for the other travel unit.
8. Travel slowly with this machine and check that there are no oil leaks.



mmyfqd-005

Draining and Refilling Oil

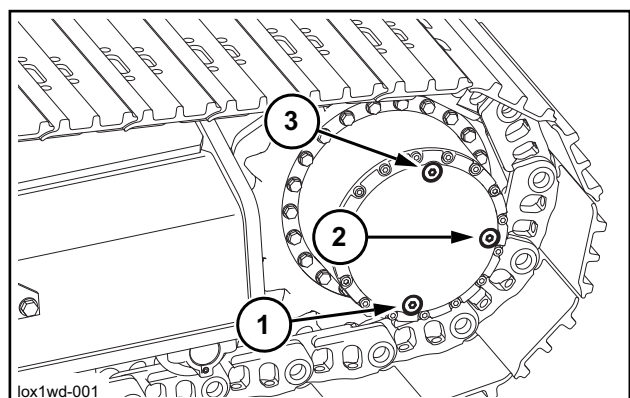
1. Move this machine on flat, level ground.
2. Park this machine so that the drain plug (1) is in the lowest possible position.
3. Stop the engine, then remove the key from the starter switch.
4. Put a container with appropriate capacity underneath the travel unit.
5. Slowly loosen the air bleed plug (3) and release any residual pressure.
6. Remove the drain plug (1), level plug (2), and air bleed plug (3).
7. Drain the oil.

NOTE:

Check the condition of the drained oil.

If the oil contains metal fillings or foreign matter, consult your local dealer or the certified service plant.

8. Replace the plug seals as necessary.
9. Install the plug (1).
10. Fill with oil through the port (3) until the oil comes up to the bottom edge of the port (2).
11. Install the plugs (2) (3).
12. Repeat steps 2 to 11 for the other travel unit.
13. Travel slowly with this machine and check that there are no oil leaks.



lox1wd-001

Shoes

Service Specifications

Cleaning: Clean the shoes periodically. Also, always clean after working in mud.

Tension check: Periodically

Steel shoe bolt torque check: Every 250 hours (after 50 hours during run-in period)

NOTE:

If the shoes are too tight, they wear quickly.

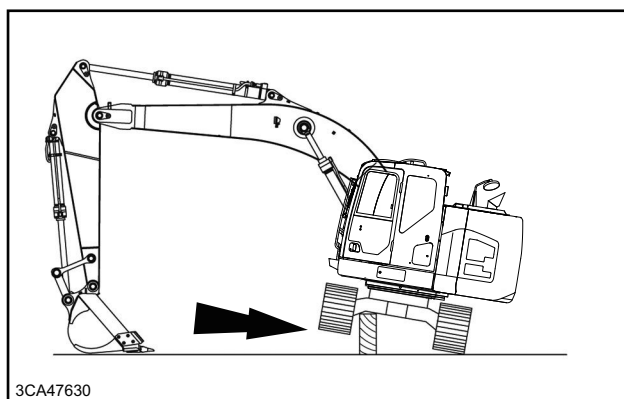
They also wear quickly if the shoes are not tight enough.

The shoes can catch on the link sprocket wheel or slide off the take-up roller or the sprocket wheel. After work, clean the shoes.

Cleaning

If the temperature drops during work in mud, the mud is more likely to harden.

- 1.Swing the upper swing body to a straight angle relative to the undercarriage.
- 2.Lower the attachment to the ground, then lower the boom until the shoe is raised off the ground.
- 3.Place a block under the undercarriage and raise the attachment off the ground.



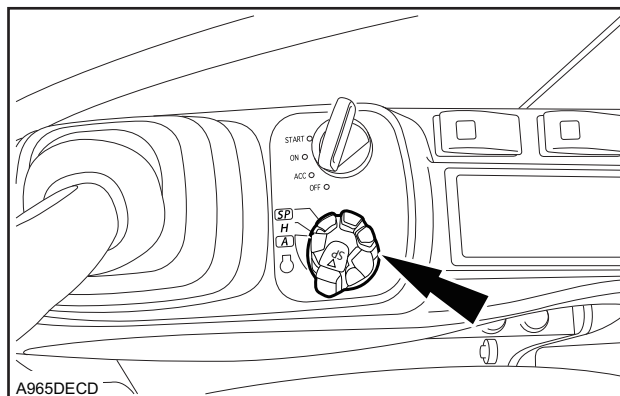
3CA47630

⚠ WARNING

Raise the shoe as little as possible.

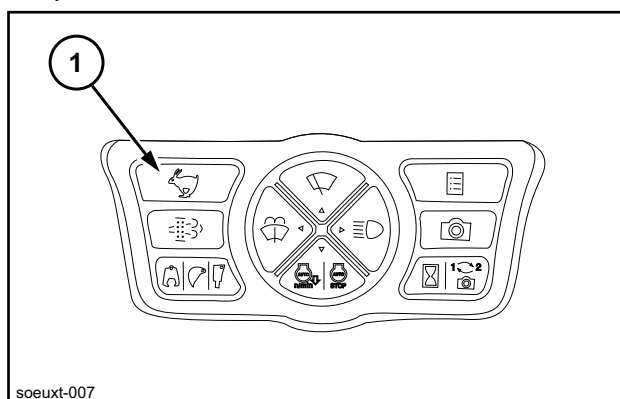
Failure to comply with these precautions can cause this machine to fall over, which will result in accident and injury.

- 4.Turn the engine throttle switch to the maximum speed position.



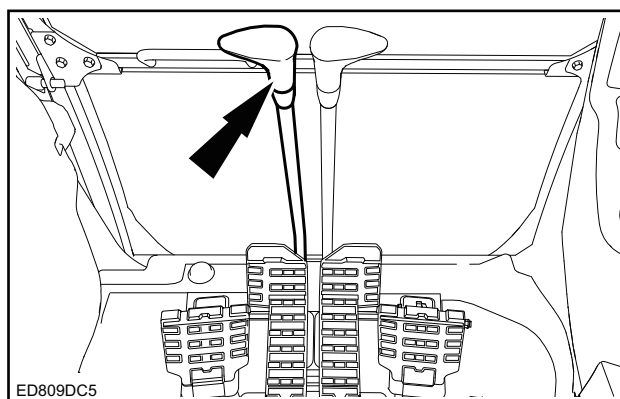
A965DECD

- 5.Set the travel speed selector (1) to "High speed".



soeuxt-007

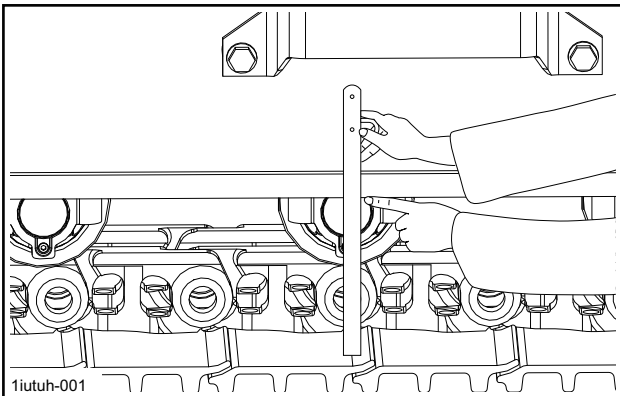
- 6.Operate the travel lever to move the raised shoe forward and backward and remove the mud.
- 7.With the shoe raised, check the shoe tension.
- 8.Repeat steps 1 to 5 for the other shoe.



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Tension Check

- 1.If the shoe is not yet raised, perform the same procedure as for cleaning to put the machine into the required position.
For details, refer to "Cleaning" (6-73).
- 2.Operate the travel lever to move the raised shoe rearward for a while.
- 3.Stop the engine, then remove the key from the starter switch.
- 4.At the center of the shoe, measure the slack between the base of the undercarriage and the pad.
Set the value to within the range 220 - 240 mm.
(When link chain shoes (rubber) are mounted, set the value to be in the range 200 - 220 mm.)
- 5.Adjust the tension if necessary, then lower the shoe to the ground.
- 6.Repeat steps 1 to 5 for the other shoe.



1iutuh-001

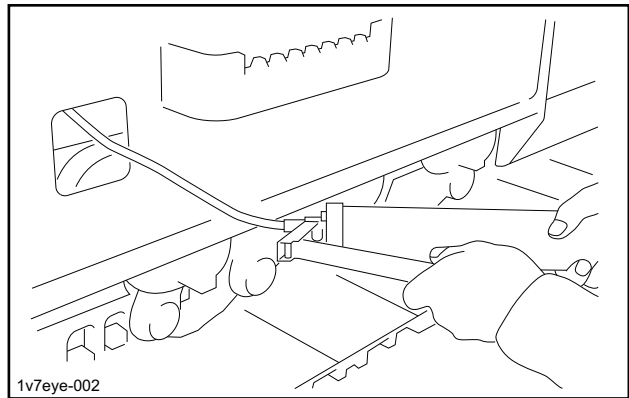
Adjusting the Tension

NOTE:Do this work after the shoe tension has been checked.

To Increase the Tension

- 1.Clean the grease fitting adapter and the grease fitting.
- 2.Connect the grease pump.
Inject the grease to obtain the right amount of shoe tension.
Set the value to within the range 220 - 240 mm.
(When link chain shoes (rubber) are mounted, set the value to be in the range 200 - 220 mm.)

- 3.Remove the grease pump and clean the grease fitting adapter and the grease fitting.
- 4.Repeat steps 1 to 3 for the other shoe.



1v7eye-002

To Reduce the Tension

- 1.Turn the grease fitting adapter 3 times to loosen it and drain grease from the cylinder.

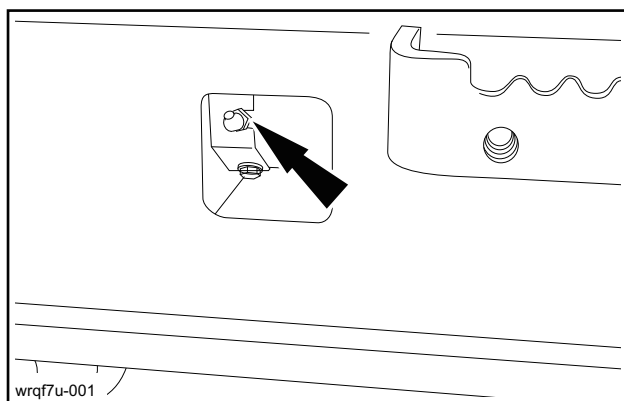
⚠ WARNING

If pressure oil soaks deep into your skin, this can cause serious injury.
The grease inside the cylinder is under high pressure.
Do not attempt to speed up the flow of grease by completely loosening the grease fitting adapter.

- 2.When the shoe tension is correct, tighten the adapter.
Set the value to within the range 220 - 240 mm.
(When link chain shoes (rubber) are mounted, set the value to be in the range 200 - 220 mm.)
- 3.Clean the grease fitting adapter and grease fitting, then lower the shoe to the ground.
- 4.Repeat steps 1 to 3 for the other shoe.

NOTICE:

If the grease fitting adapter is damaged, grease may flow out.
Check the condition of the grease fitting adapter periodically and replace it if necessary.



wrqf7u-001

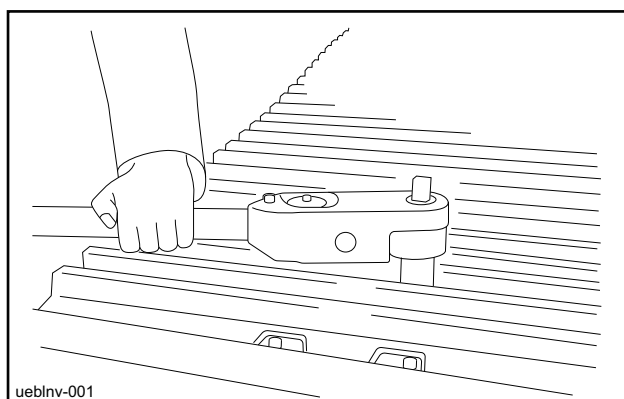
Tightening Torque of the Shoe Bolts

NOTE:

Periodically check the tightening of the shoe bolts. Do not use this machine with the shoe bolts loose. If a shoe bolt comes out, the shoe may be damaged.

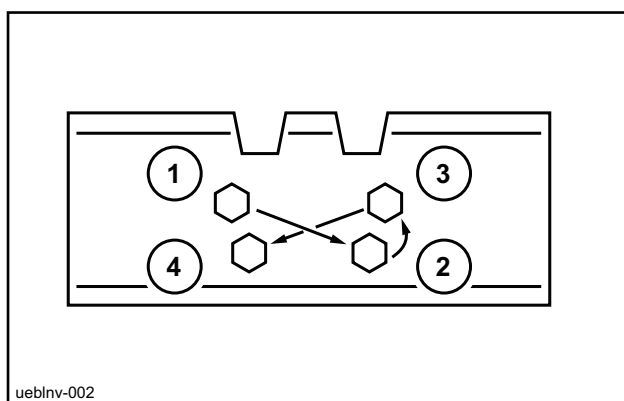
The bolt tightening torque is as follows.

[500 mm shoe] 373 - 451 N·m



ueblnv-001

NOTE: Tighten the bolts according to the orders in the following figure.



ueblnv-002

Shoe Roller and Take-up Roller Service Specifications

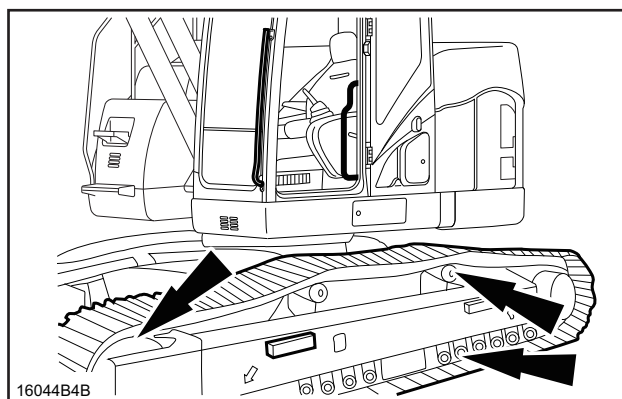
Inspection: Every 250 hours

A floating seal type mechanism is used for the upper and lower rollers and the take-up roller.

The service life is adequate to last until the average overhaul time, but inspect visually for oil leaks before starting work.

If oil leakage is found, it is necessary to replace the component.

Consult your dealer and the certified service plant.



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Radiator and coolers

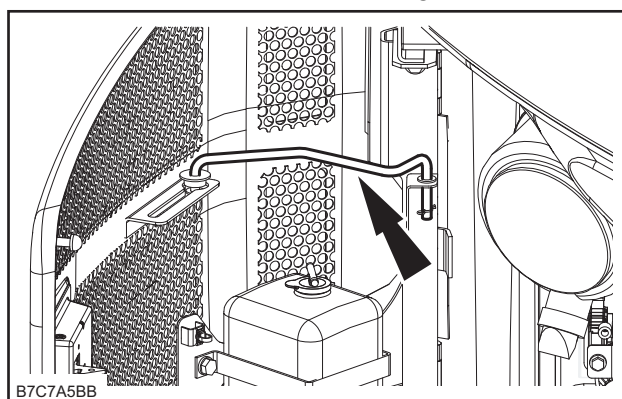
Service Specifications

Leak check: Every 10 hours or during start-up inspection

Cleaning: Service every 500 hours or 3 months

Cleaning

1. Stop the engine, then remove the key from the starter switch.
2. Open the rear left-hand door and block it with the brace. Then, open the engine hood.



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6-Maintenance

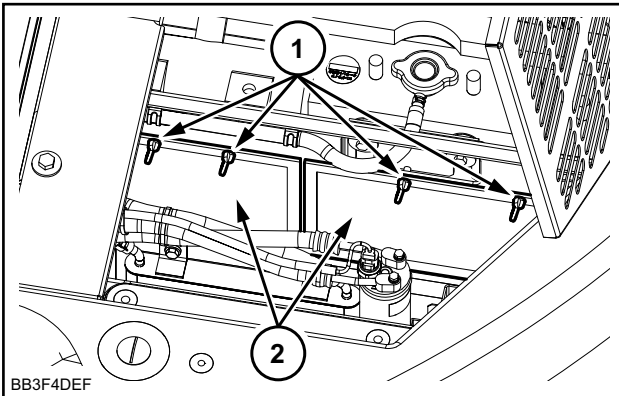
3. Remove the one-touch clips (1) and remove the protective grill (2).

⚠ WARNING

Flying dirt in the air. Compressed air can propel dirt, rust, etc. into the air.

When using compressed air, wear protective eyewear and a dust mask.

Failure to do so could cause death or serious injury.



BB3F4DEF

4. Clean the radiator and oil coolers. Use compressed air on dry dirt.
Clean off mud with a water jet.
For greasy dirt, use tetrachloroethylene.

NOTE: The use of trichloroethylene is strictly forbidden.

5. Install the protective grill (2) and install the one-touch clips (1).

⚠ WARNING

Moving parts

Before operating the machine, check that all entry and mechanical access doors are securely closed.

Failure to do so could cause death or serious injury.

⚠ WARNING

Moving parts

Before operating the machine, check that the hood is securely closed.

Failure to do so could cause death or serious injury.

Fan Belt and Alternator Belt

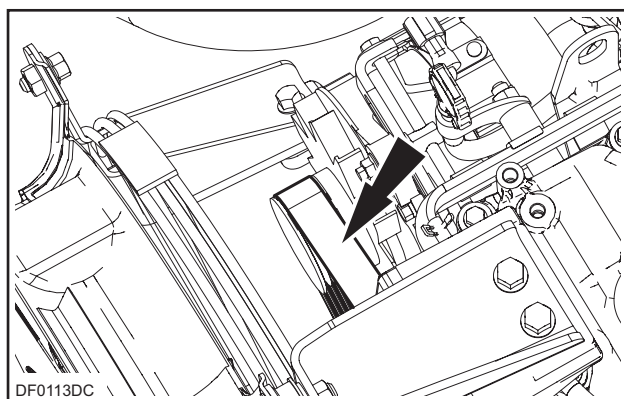
Service Specifications

Visual check: Every 10 hours or every day

Belt tension check: Every 250 hours

Tension Check

NOTICE: If the engine is run with the belt loose, the belt may slip within the housing and the engine may overheat or the battery charging be insufficient.



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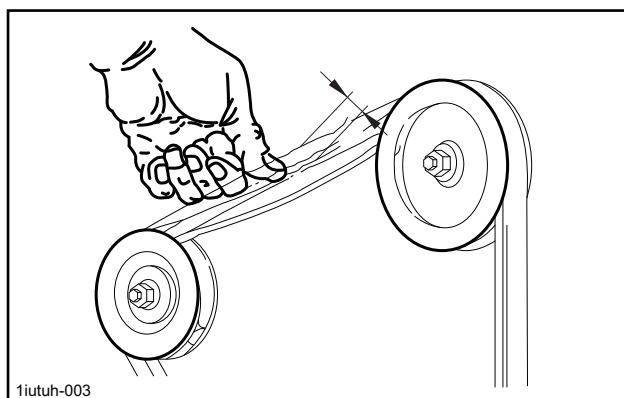
Stop the engine, remove the key from the starter switch, then press the center of the belt with a finger with a pressure of about 10 kg. Adjust the slack to be within the range 6 - 8 mm.

NOTE:

Check that there is no wear or damage on the pulley or the belt.

Check that the belt is positioned correctly in the pulley groove.

Replace the belt if it is stretched, cracked, or frayed.

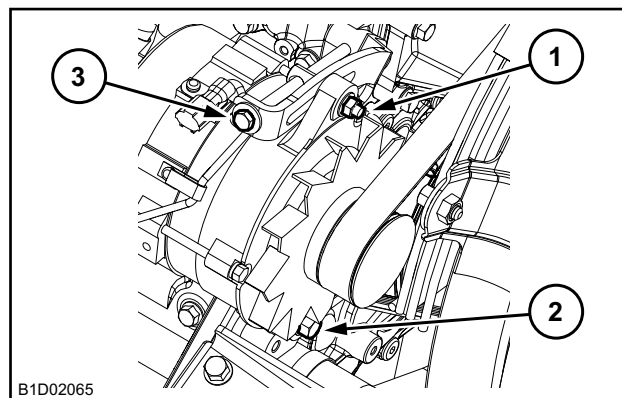


1iutuh-003

Tension Adjustment

1. After loosening the lock nut (1) and mounting bolt (2) of the alternator, turn the adjustment bolt (3) to move and adjust the alternator.

2. After adjustment, tighten the bolts firmly.

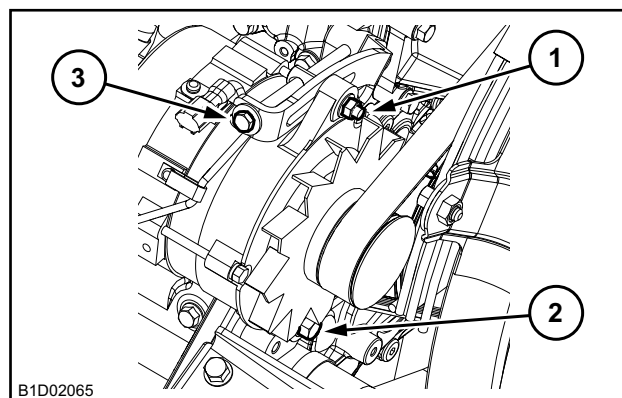


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Replacement of Belt

The message "ALTERNATOR" is displayed on the message screen if the belt is worn out or broken.

1. Stop the engine, remove the starter switch key and then replace the belt.
2. After loosening the lock nut (1) and mounting bolt (2) of the alternator, turn the adjustment bolt (3) to move the alternator inward.
3. Remove the worn out or broken belt.
4. Install the new belt.
5. Turn the adjustment bolt (3) to adjust the tension of the belt. After adjustment, tighten the lock nut (1) and mounting bolt (2) firmly.
6. Operate the engine for approx. 1 hour, and then recheck the tension of the belt.



B1D02065

Adjustment of engine valve rocker clearances

Service Specifications

Inspection: Every 1000 hours

NOTE:Ask your dealer and the certified service plant to perform this inspection.

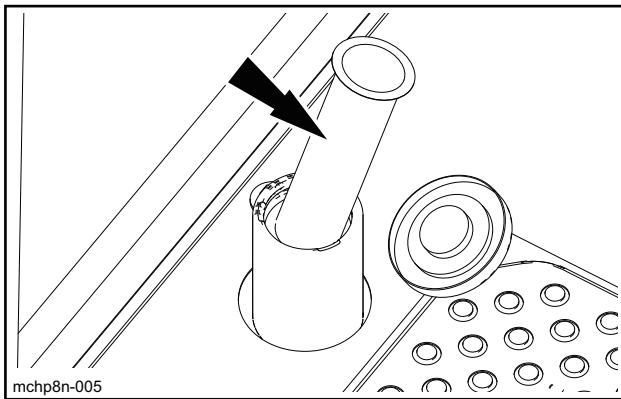
Fuel tank filter

Service Specifications

Filter cleaning: Check periodically.

Remove the filter and clean it with diesel oil.

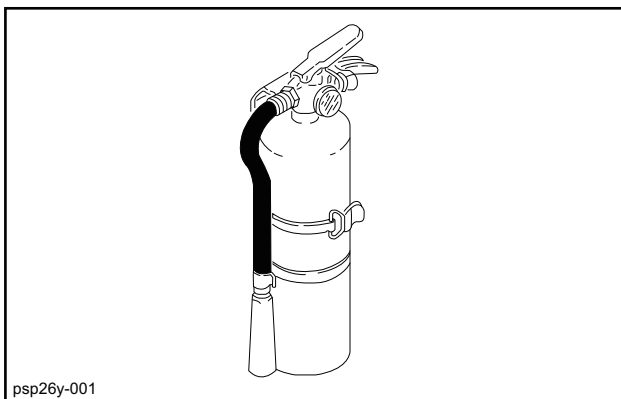
NOTE:Refill the fuel reservoir with the suitable fuel. For details, refer to "Hydraulic Fluids, Fuels, and Lubricants" (6-9).



mchp8n-005

Fire extinguisher (not supplied)

It is strongly recommended to have a fire extinguisher available and to keep it in the front boot.



psp26y-001

Service Specifications

- Every month: Examine the fire extinguisher and check that there is no damage.

- Every 6 months: A qualified specialist empty and refill the powder in the fire extinguisher
- Every year: A qualified specialist examine the fire extinguisher

Electrical/Electronic System Protection during Charging and Welding

⚠ DANGER

Incorrect operation or service of this machine could lead to a serious accident.

Before changing, adding equipment to, or modifying this machine, consult your dealer and the certified service plant.

Never modify this machine without permission.

Unauthorized modifications can seriously affect the performance of this machine.

Always receive permission from the manufacturer before welding on the undercarriage or upper swing body and always follow the manufacturer's instructions.

When working, disconnect the battery and alternator B+ and D+ terminals, then connect the ground cable for the welding equipment to the component being welded.

When welding the upper swing body, never connect the welding equipment to the undercarriage. (or vise-versa)

Never connect the welding equipment earth to a component of the hydraulic system.

Always follow the items below to avoid damage to the electrical/electronic systems.

- 1.Never connect or disconnect the battery or other charging circuits while the engine is running.
- 2.Never connect the charging components to earth.

3. Always set the battery disconnect switch to the "OFF" position "○" or disconnect the ground cable before arc welding on the machine.

- Position the welder earth clamp as close to the welding area as possible.
- When welding near a computer module, remove the computer module from this machine.
- Be careful about the welding cables routing while welding.
Do not lay the welding cable on or near electrical wiring or electronic components.

4. When charging the battery of this machine with a battery charger, always disconnect the battery cable from the negative (-) terminal of the battery.

NOTE:

Disconnect this machine's and the battery's ground cable from the battery before welding on the machine.

Doing welding work with the ground cable connected can damage the controller or the electronic monitoring system.

Disconnect the battery ground cable.
Reconnect this cable when the welding is complete.

⚠ WARNING

Touching battery acid could cause burns.

The battery contains dilute sulfuric acid.

Keep it away from your skin, eyes, and clothes.

If it gets on your skin, clothes, or the like: Rinse out with plenty of water.

If it gets in your eyes: Wash it out with water for 15 minutes, then seek immediate medical attention.

Ingested: Drink large amounts of water.

Do not force vomiting. Seek immediate medical attention.

Cab protection (ROPS and FOPS)

Service Specifications

Inspection: Every 250 hours (after 50 hours during the run-in period)

Services and Checks

Check the retaining hardware and retighten the screws as necessary.

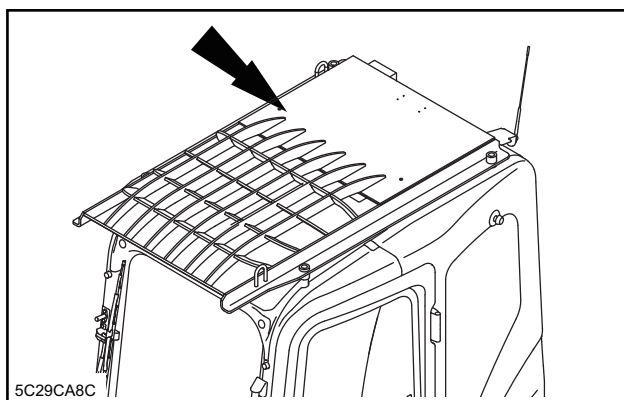
Check the absence of cracks, rust, holes, etc. in the protective structure main unit and the components.

Aging, bad weather and accidents can cause damage.

If there is even the slightest doubt about the condition of the protective structure main unit or the components, contact your dealer and the certified service plant.

If the protection structure has suffered any accident, you must replace any damaged components with new genuine parts so that the protection functions can work normally.

Consult your dealer and the certified service plant.



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Machine inspection and cleaning

Service Inspections

Inspection and cleaning: Periodically

Do this if there is any oil or grease on this machine.

Do not use compressed air if there is oil or soot in the element. At the same time as inspection and cleaning, visually check all the welded components (in case of appearance of cracks).

Also check the following.

- The attachment must be correctly connected.
- The teeth and tooth tips must be held securely.
- There must be no wear of the teeth and tooth tips.
- There must be no leaks from all pipes or hoses.

Checking the Machine Settings

Service Specifications

Inspected by our dealer: every 6 month

Plastic and Resin Parts

Do not use gasoline, kerosene, paint solvents, etc. to clean the plastic windows, the console, the instrument panel, the indicator, etc.

Use only soap, water, and a soft cloth.

Using gasoline, kerosene, paint solvents, etc. can cause discoloration, cracks, and deformation of these parts .

Checking Cylinders for Leaks

A cylinder rod should be slightly oily.

After a certain period of work, check that there are no leaks in the whole hydraulic system at normal operating temperatures.

- 1.Wipe clean the cylinder rod and bearing.
- 2.Operate normally for 5 - 10 minutes.
- 3.Extend the cylinder rod.
- 4.Perform the leak test.

Rod appearance	Test	Results
Dry	A little bit of oil sticks when the rod is wiped 20 cm with paper.	Normal
Slightly greasy	Paper remains stuck to the rod when run over the rod.	Normal
Oily	Paper remains stuck when placed on the rod.	Normal
Very oily or weeping.	A ring of oil can be seen on the cylinder rod every time the rod is extended.	Consult your dealer and the certified service plant.
Leakage	The excess oil drips from the gland each time the rod retract.	

Tooth tip wear limits on the backhoe bucket

The degree to which a tooth tip can be worn can be assessed visually.

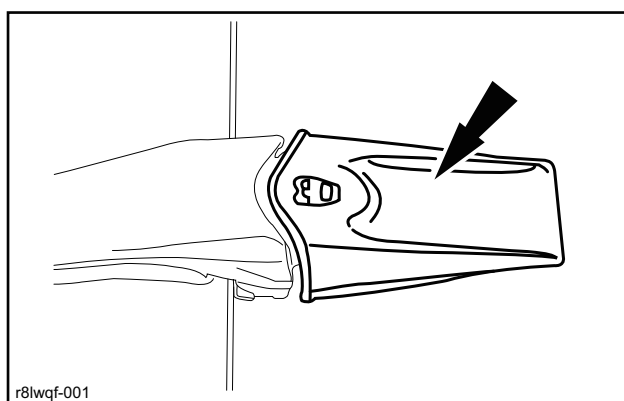
It is possible to extend the life of a tooth tip which is wearing unevenly, in a non-symmetrical fashion.

NOTE: Do not wait for tooth tips to be completely worn through before changing them.

NOTICE:

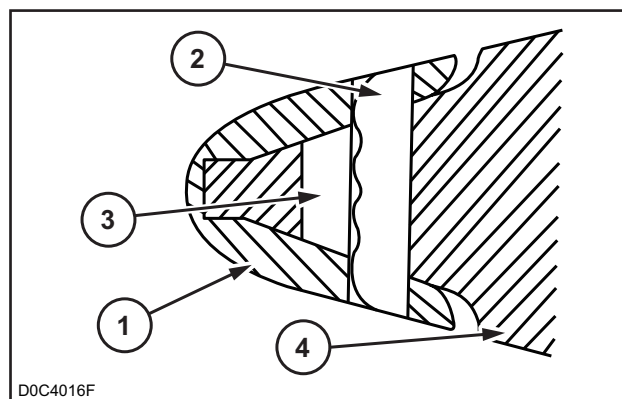
ever try to work with a missing tooth tip or a tooth tip which is worn through.

The adaptor could be seriously damaged.



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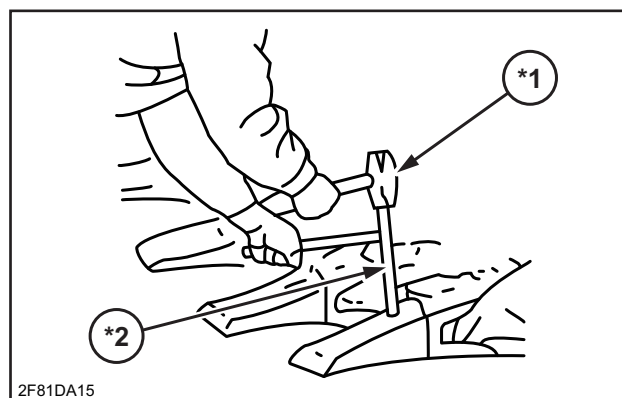


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1. Use a hammer (*1) and punch (*2).

Remove the lock pin (2) attached to the bucket to remove the tooth (1).



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2F81DA15

Replacing Bucket Teeth: Standard type (Length Pin Type)

As necessary

⚠ WARNING

- When installing and removing the bucket teeth and side cutters, place the bucket on the block, to secure it.
- Wear protective equipment (safety goggles, gloves and others) during work.

Removing Bucket Teeth

Inspect the bucket teeth for wear and if there are any holes or cracks, replace them.

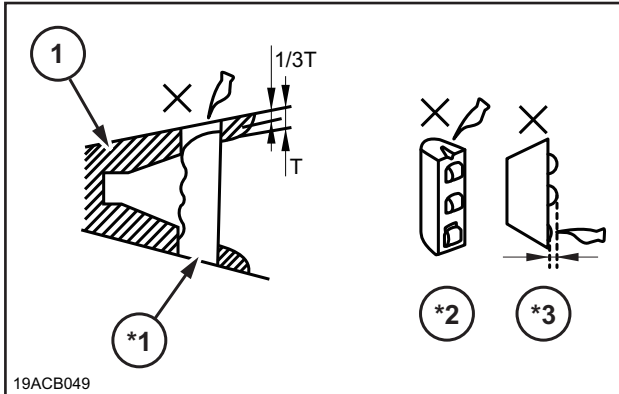
Replace the teeth before they begin to wear down to the adaptor.

6-Maintenance

2. Inspect the removed lock pin (2) and rubber lock pin (3).

Replace any damaged pins (short lock pin (*1) or faulty rubber lock pin (*2), (*3)).

It is recommended that the rubber lock pin should be replaced with a new one each time a tooth is replaced.



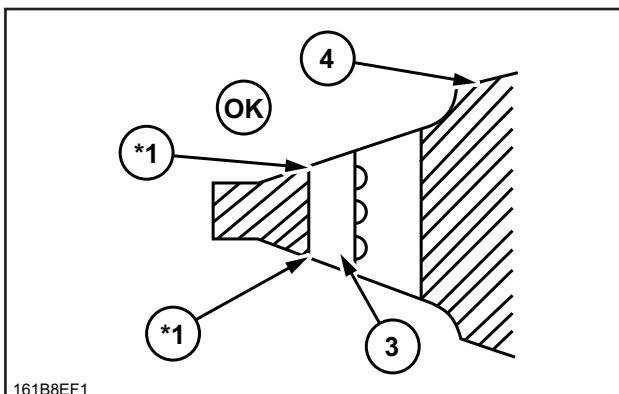
19ACB049

*1	Mutch the surface.Lock pin is too short.
*2	The rubber is cut and the steel projection is about to fall out.
*3	When pushed by hand, the steel projection sinks in.

3. Clean and remove the soil from the adapter (4).

Installing Bucket Teeth

1. Insert the new rubber lock pin (3) into the hole of the adapter (4) by hand or with a hammer. Insert rubber lock pin (3) so that it does not protrude beyond the adapter surface.

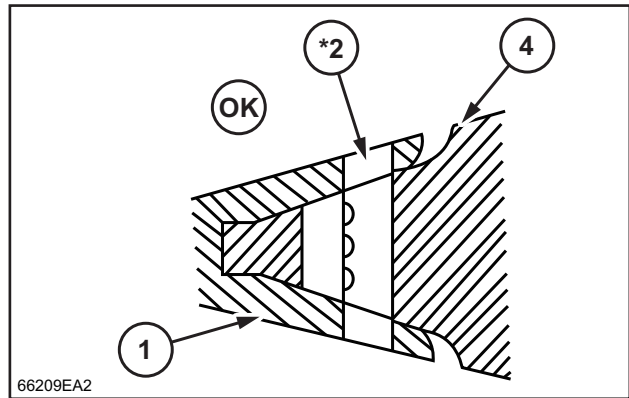


161B8EF1

*1	Make the surfaces even.
----	-------------------------

2. Attach the tooth (1) to the adapter (4).

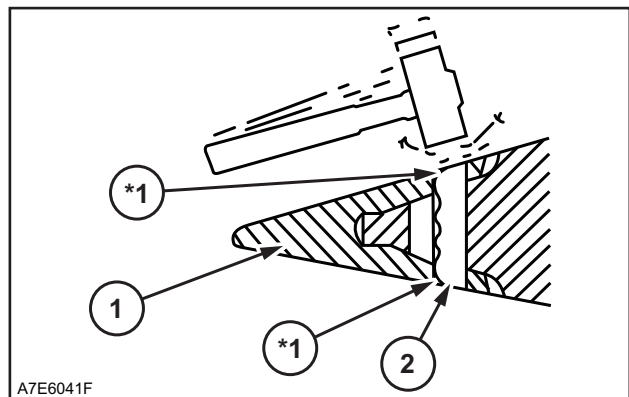
Check that the hole of the tooth (1) and the hole of the adapter (4) match.



66209EA2

*2	The rubber is cut and the steel projection is about to fall out.
----	--

3. Using the hammer, push the lock pin (2) so that it is even with the surface of the tooth (1).



A7E6041F

*1	Make the surfaces even.
----	-------------------------

4. Check that the tooth is securely fastened.

⚠ CAUTION

When there is backlash on teeth, teeth might come off while working.

Check that the tooth is securely fastened.

Adjustment of Bucket Backlash

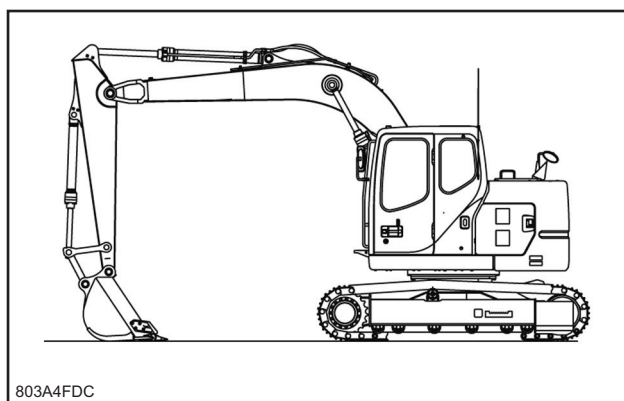
As necessary

WARNING

Stop the engine before adjusting the bucket backlash.

Bucket Backlash Adjustment

The machine is provided with a bucket adjustment mechanism which eliminates the backlash of the bucket-to-arm joining area caused by wear. Due to this mechanism, the sealing condition of the O-rings is kept stable and the wear is delayed. The service life of the bushings and pins thereby increases.



803A4FDC

NOTICE: If the bucket backlash adjustment is not carried out properly, scuffing, unusual noise and backlash will occur, which causes damage to the O-rings.

Adjustment

1. Set the hydraulic bucket as shown in the above figure and have it lightly touch the ground.
2. Turn it slightly to the left and position it so the arm end is pressed to the side which is not to be adjusted. (When the bucket is turned over, turn it to the right.)
3. Stop the engine.
4. Measure the clearance between the bucket and the arm joining portion.
5. If the clearance is more than 2 mm in, remove the shim plate and adjust as follows.

6. Adjusting Method

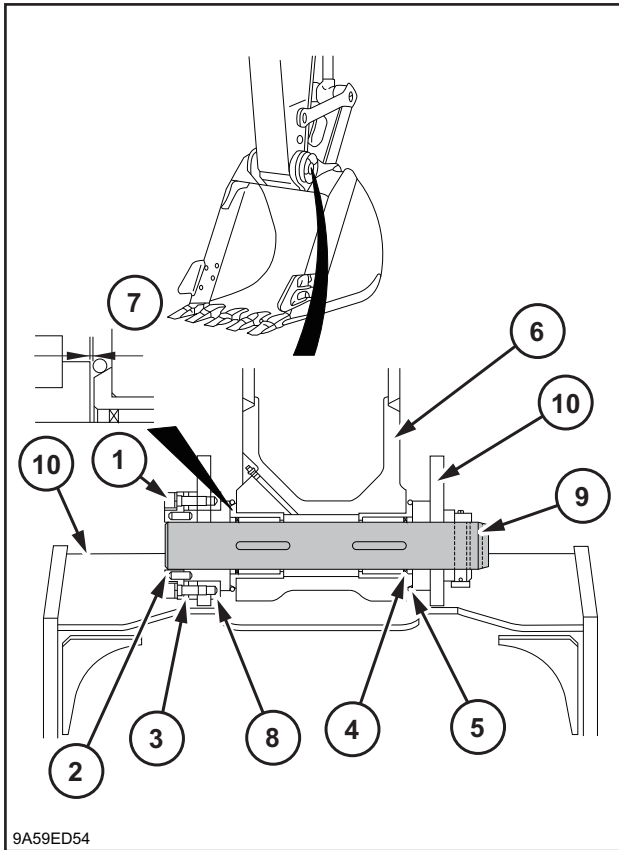
- [1] Loosen the hexagonal socket head bolt (1) to remove the plate (2).
- [2] Remove the shim plates (3) (as required) the amount corresponding to the backlash amount of the joining area (wear amount).
- [3] Install the plate (2) and tighten the hexagonal head socket bolt (1).
- [4] As the hexagonal socket bolt (1) is tightened, the plate (2) will be pressed against the steel bushing to reduce the clearance. Clearance amount of about 1.2 mm in is preferable.

7. Apply grease as necessary.

NOTICE:

Too small amount of clearance may cause scuffing or seizure.

Always check the clearance.



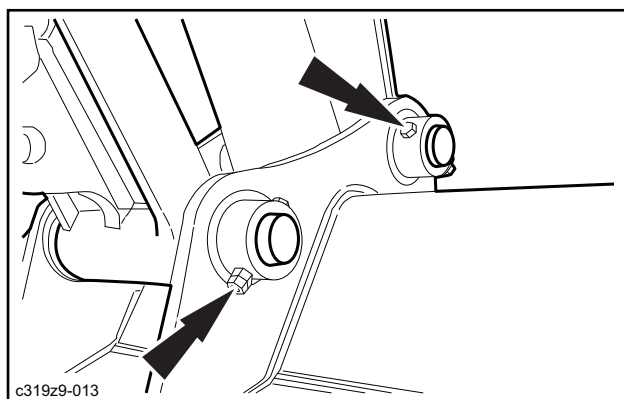
9A59ED54

1	Hexagonal socket head bolt
2	Plate
3	Shim plate
4	Dust seal
5	O-ring
6	Arm
7	Clearance
8	Steel bushing
9	Attachment pin
10	Bucket

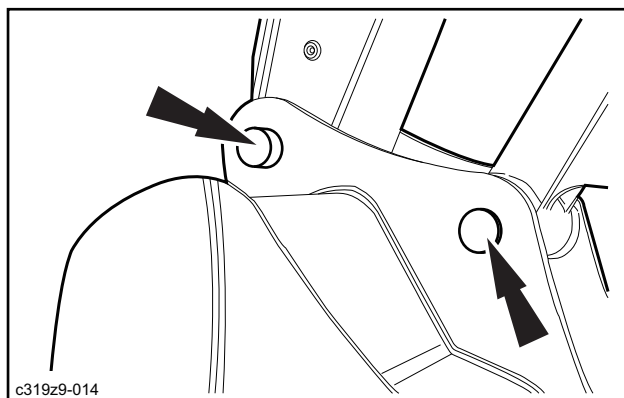
Replacing a backhoe bucket

Removal

1. Place the backhoe bucket on flat, level ground.
Operate the attachment with the control lever so that the arm to bucket linkage pin is not gripped by the weight of the arm.
2. Stop the engine, then remove the key from the starter switch.
3. Remove the pins hardware.



4. Remove the arm to bucket linkage pin.
5. Start the engine and disengage the attachment from the bracket.
Store the linkage seals for reuse.

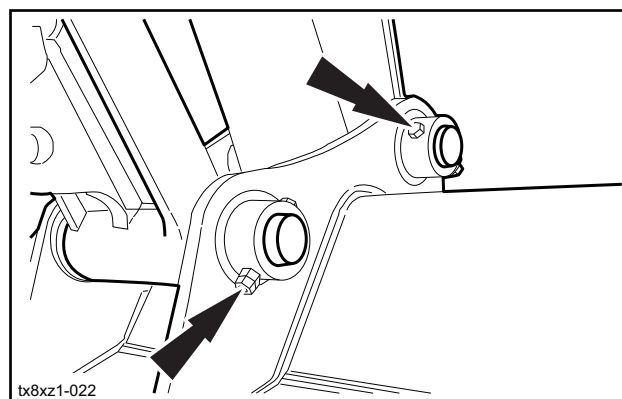


c319z9-014

Installation

1. Check that the bucket is stable.
2. Start the engine.
Store the arm in the bracket.
Stop the engine, then remove the key from the starter switch.
3. Install the linkage seal between the arm and the bucket.
Replace as necessary.

4. Install the arm and bucket attachment pin and the pin fitting.
5. Start the engine.
Store the bucket in the bracket. Stop the engine, then remove the key from the starter switch.
6. Install the linkage seal between the bucket cylinder rod and the bucket.
Replace as necessary.
7. Install the cylinder and bucket attachment pin and the pin fitting.
8. Apply grease to each of the attachment pins.



tx8xz1-022

Air conditioning

Service Specifications

Air circulation filter cleaning: Every 50 hours

Filter replacement: Every 2000 hours

Inspection by specialist: Every 6 months

Periodically service the components of the air conditioner.

Observe the servicing intervals, in order that the air conditioner functions correctly and can control the temperature efficiently.

The air conditioner contains gas which is subject to strict legislation.

Air conditioner defects must be fixed rapidly.

⚠ WARNING

Air conditioner service should never be performed by the user.

Consult your local dealer or the certified service plant.

Air conditioner service performed by the user could lead to a serious accident.

NOTE: Operate the air conditioner at least once a week, if only for a short period of time. For details, refer to "Air Conditioner" (3-51) in [Description of Handling].

Inspection

In order to ensure the air conditioning functions correctly, inspect the air conditioner using the procedure outlined below before starting work.

Dirty Condenser

If the condenser is dirty, it does not release heat the way it should.

Also, clean the condenser periodically with water even if it does not look dirty.

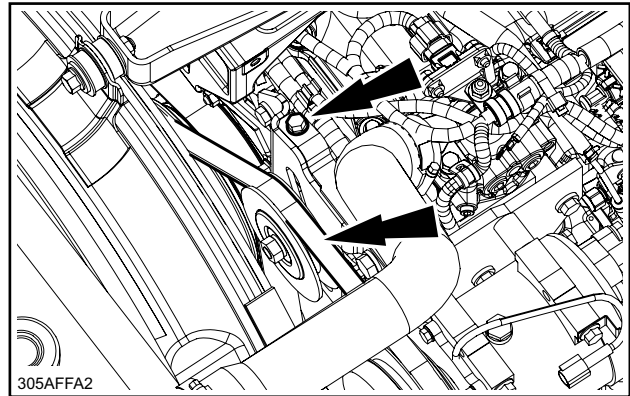
NOTE: Never use high-pressure water to clean the condenser.

Belt Tension Check

Press the center of the drive belt with a finger with a force of about 10 kg.

Set the slack to be in the range 6 - 8 mm.

Adjust the belt tension as necessary.



305AFFA2

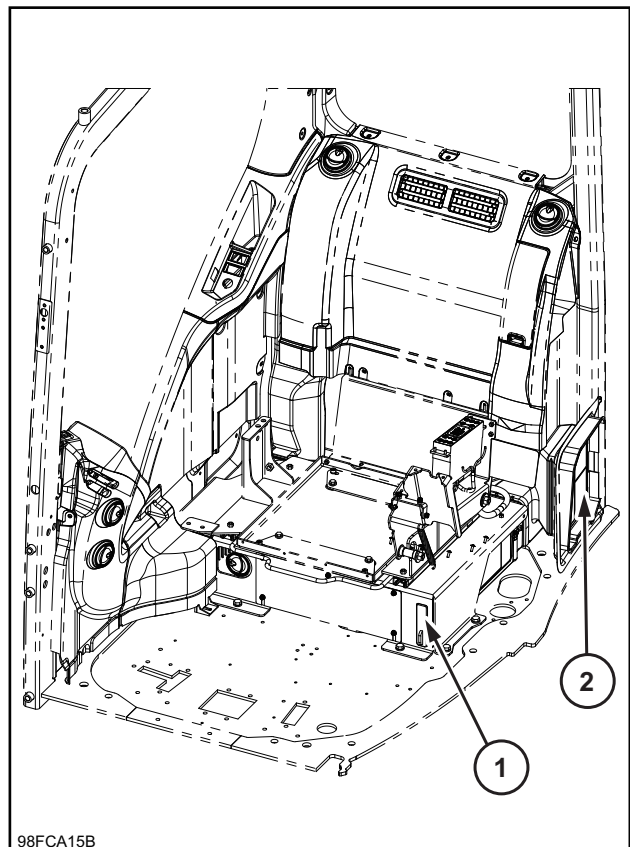
Checking the lines

Make a visual check of the lines and make sure there are no accumulations of dust, grease, etc.

Air Conditioner Service

⚠ WARNING

- Wear protective eyewear when using compressed air.
- Do not wash the inside/outside air filters with water.



98FCA15B

1	Inside air circulation filter
2	Outside air intake filter

Cleaning the inside air circulation filters

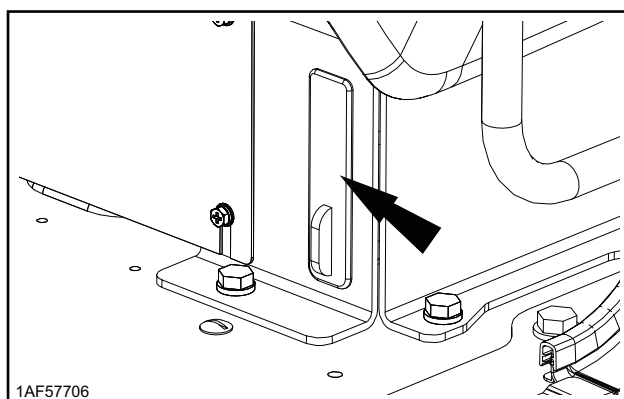
1. Remove the filter and clean it with compressed air.
Replace the filter if it is damaged.

⚠ WARNING

Flying dirt in the air. Compressed air can propel dirt, rust, etc. into the air.

When using compressed air, wear protective eyewear and a dust mask.

Failure to do so could cause death or serious injury.



1AF57706

2. Install the filter.

Outside Air Intake Filter Cleaning

[Cleaning weekly]

1. Open the operator cab outside cover with the key.
2. Remove the filter and clean it with compressed air.
Replace the filter if it is damaged.

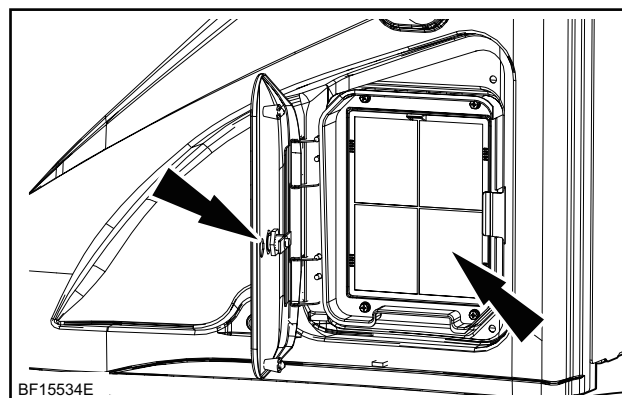
⚠ WARNING

When using compressed air, dust, flecks of rust, etc. may be dispersed into the air.

Use protective eyewear and a dust mask.

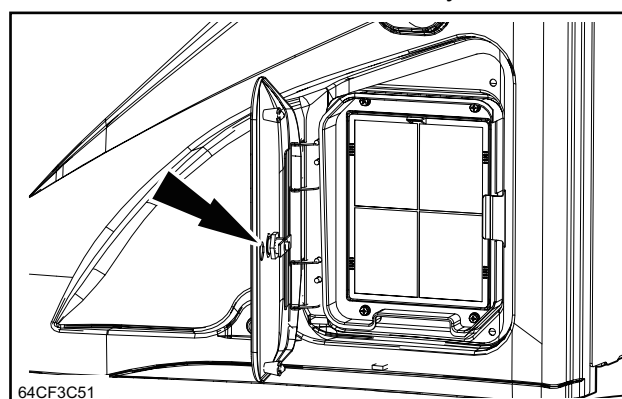
Otherwise, dust or rust could get into the body.

Do not wash with water.



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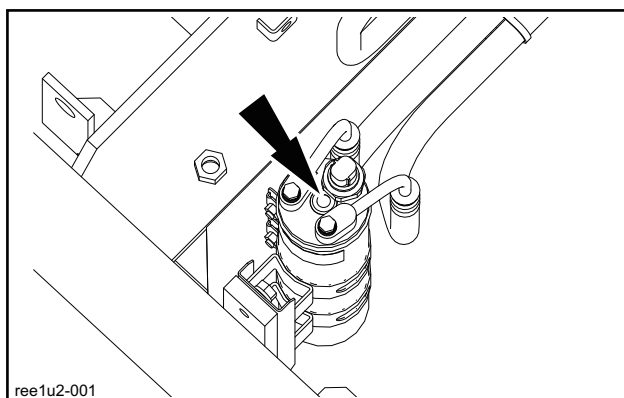
3. Install the filter.
4. Close the cover and use the key to lock it.



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Air Conditioner Charging Check

1. Turn ON the air conditioner and set the engine speed to 1400 - 1600 min⁻¹.



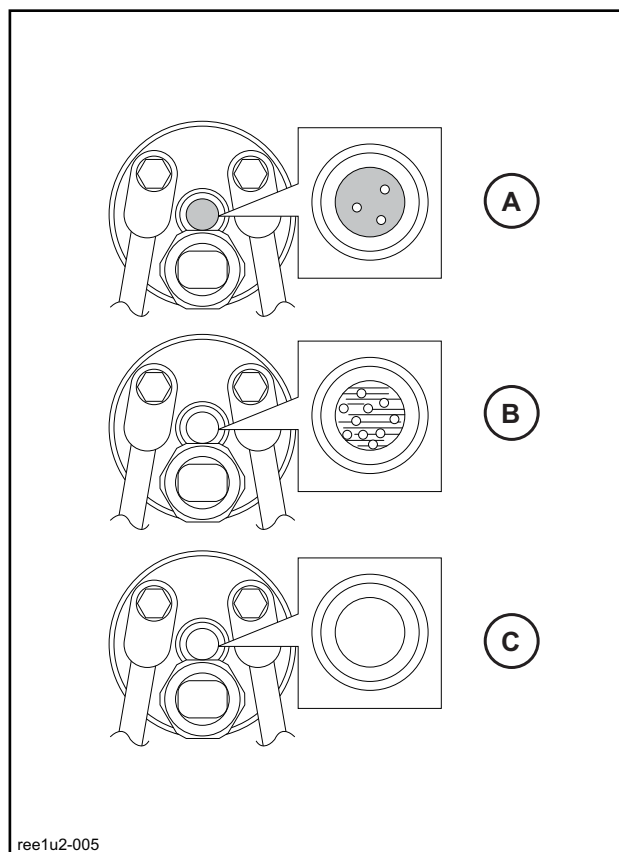
ree1u2-001

2. Turn ON the air conditioner, then after about 1 minute, check if there are air bubbles from the sight glass.

(A) There are almost no air bubbles. At first, it is transparent, then it turns whitish. : "Normal"

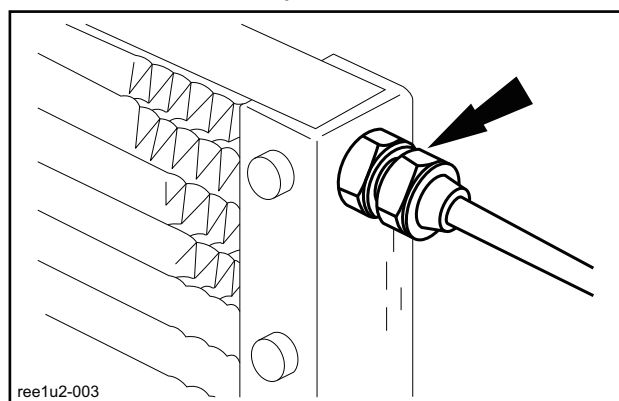
(B) There are many air bubbles.: Check the union and consult your dealer and the certified service plant.

(C) There are no air bubbles.: Check the union and consult your dealer and the certified service plant.



ree1u2-005

3. Check whether air conditioner lines or hose connectors are dirty or dusty.
Clean as necessary.



ree1u2-003

Gas Spring Inspection

⚠ WARNING

Explosive gas

The gas struts have high-pressure nitrogen gas sealed inside.

Incorrect handling could cause the gas to erupt out and explode.

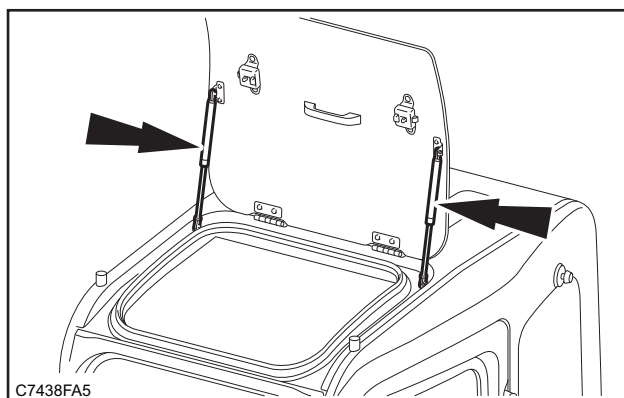
- Do not disassemble.
- Keep away from fire.
- Do not weld or melt the struts. Also, do not drill holes into them.
- Do not expose to shock by striking or turning.
- When disposing of them, remove the gas they are charged with.

Consult your dealer and the certified service plant.

Gas springs are installed on the cab sunroof (2, left and right).

In the following cases, ask your dealer and the certified service plant to service, or replace.

- The cab sunroof does not open easily.
- The cab sunroof does not stay open.
- There is an oil leak or gas leak from a gas spring.



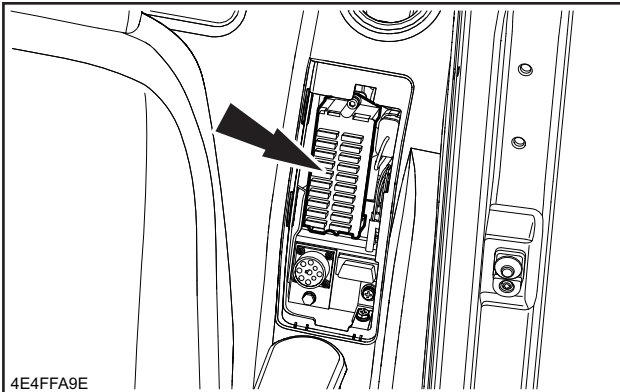
C7438FA5

Fuse

NOTE:When replacing a fuse or relay, turn the starter switch key to "OFF" before starting the work.

NOTE:Be sure to always replace a fuse with a fuse of the same amperage.

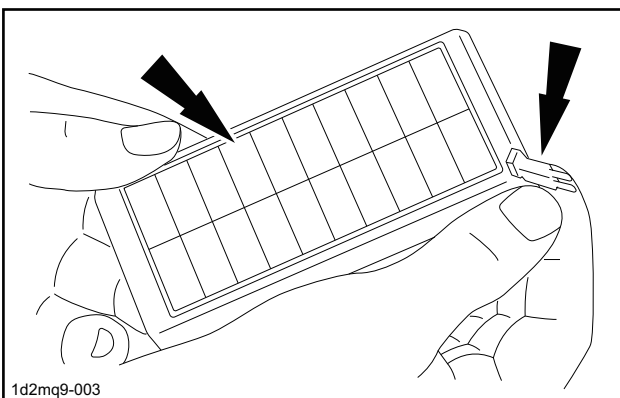
The fuse box is behind the cover on the rear of the operator's seat.



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The fuses are behind the fuse box cover. The function of each fuse and its amperage are listed on the cover.

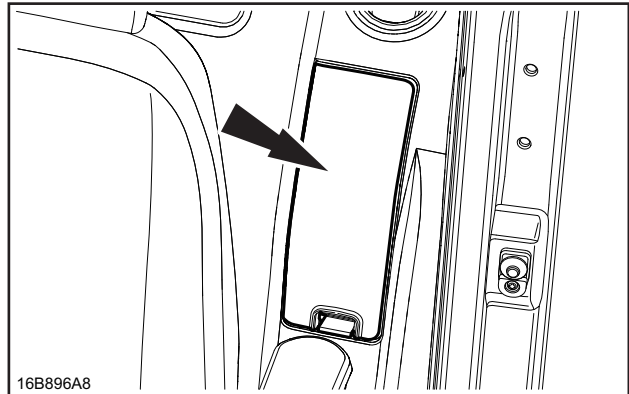
NOTE:Use the notch at the top right corner of the cover for installing and removing fuses.



1d2mq9-003

Fuse box

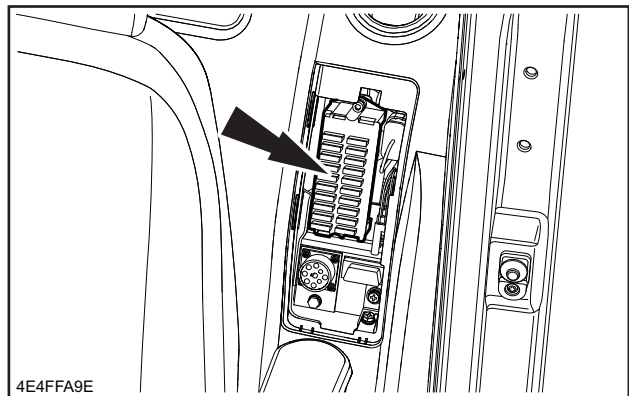
Located on the left-hand side, behind the operator's seat.



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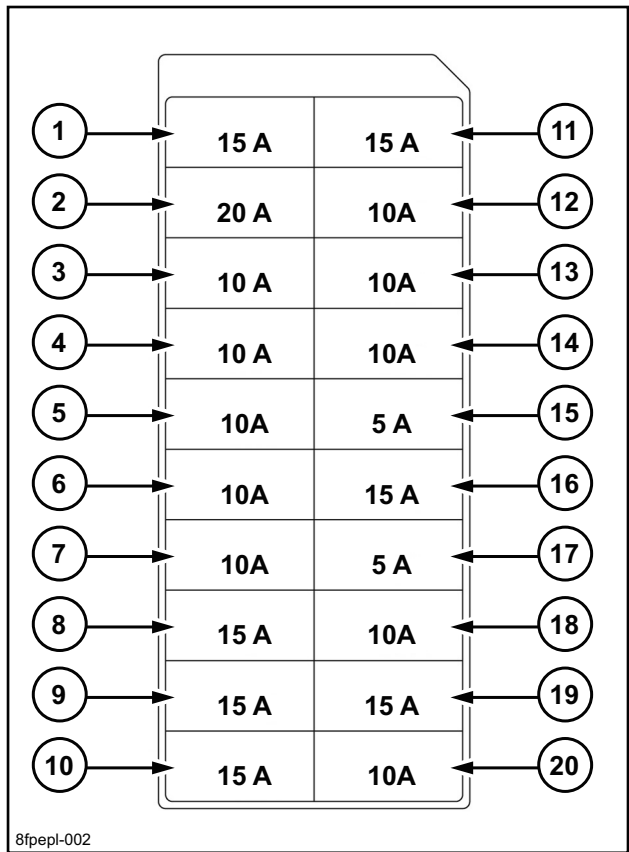
Remove the cover of the fuse box.

To replace a fuse, refer to page 6-92.



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Fuse Functions

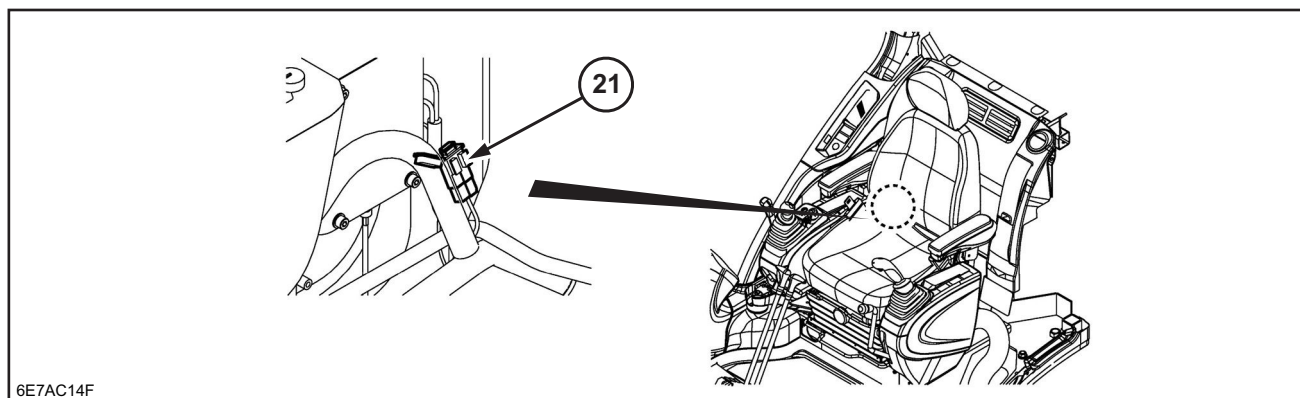


8fpepl-002

1	Key switch	(15 A)
2	Engine computer	(20 A)
3	GPS computer	(10 A)
4	Backup (radio, room lamp)	(10 A)
5	Gate lock lever	(10 A)
6	Solenoid	(10 A)
7	Horn	(10 A)
8	Cab top light	(15 A)
9	Boom, house light	(15 A)
10	Option power supply	(15 A)
11	Wiper, washer	(15 A)
12	Travel alarm, signal lamp	(10 A)
13	Cigar lighter, seat suspension	(10 A)
14	DC converter	(10 A)
15	Air conditioner unit	(5 A)
16	Air conditioner blower motor	(15 A)
17	Air conditioner compressor	(5 A)
18	Option power supply	(10 A)
19	Feed pump	(15 A)
20	Option line solenoid	(10 A)

6-Maintenance

NOTE: There is a 10 A fuse under the right rear of the operator's seat. It is used for the cab lights and cab radio.



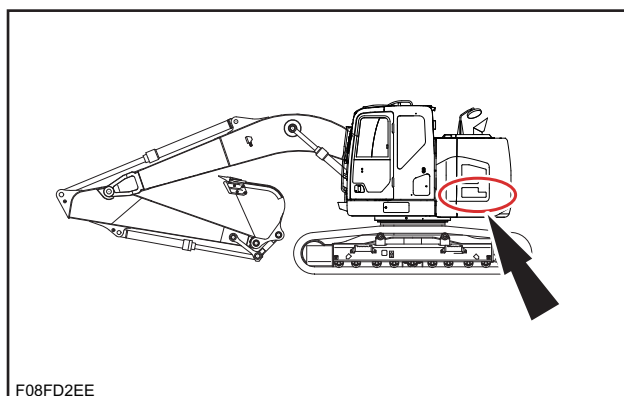
6E7AC14F

6E7AC14F

21	Cab interior lighting, radio	(10 A)
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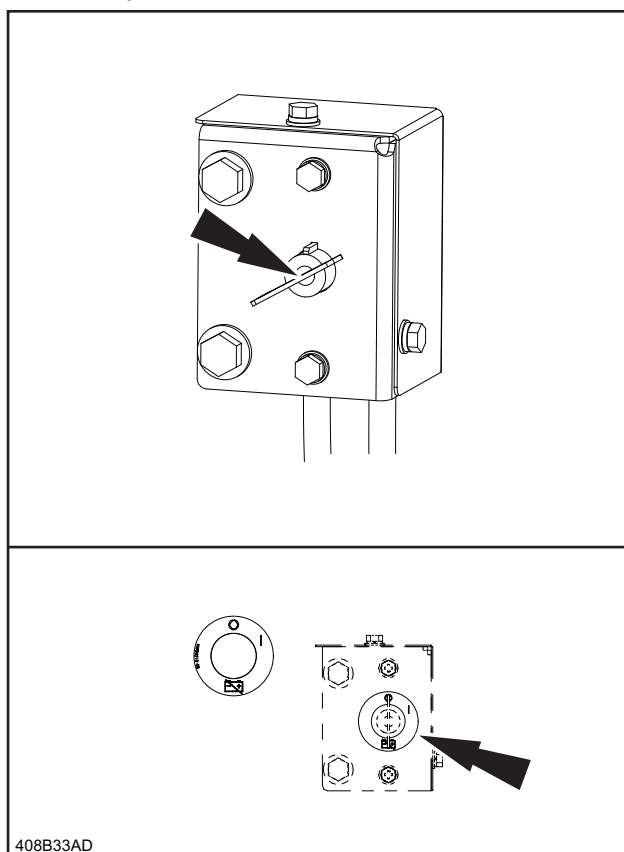
Battery disconnect switch

This switch is located near the battery behind the left side door.



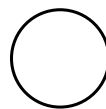
F08FD2EE

Make sure that the switch is set in " | " (ON position) other than for storing the machine for a long period or for performing maintenance for the electrical systems.



408B33AD

NOTE:When the switch is turned to "○" (OFF position), all the electric circuits are cut off and the stations stored on the radio presets and the time set for the clock will be all cleared.



(ON) : When the key is inserted and turned in the clockwise direction, the electric circuits are connected. Make sure that the switch is set in " | " (ON position) before starting the engine.

(OFF) : When the key is turned in the anti-clockwise direction, the electric circuits are cut off. Before storing the machine for a long period or performing maintenance for the electrical systems, always turn the switch to "○" (OFF position) and then remove the key.

⚠ CAUTION

- Never turn the battery connect switch to "○" (OFF position) when the engine is running. The electrical systems can be damaged.
- Do not set the battery switch in "○" (OFF position) in 1 minute after turning the starter switch key to OFF. Otherwise the computer program of the hydraulic will not exit successfully.

Batteries

Service Specifications

Charge state check: Every 250 hours

Battery solution level check: Every 250 hours

⚠ WARNING

Incorrect operation or service of this machine could lead to a serious accident.

Turn the starter switch key to "OFF" before working on any part connected to an electrical circuit.

When disconnecting the battery, disconnect the negative (-) side cable first.

When reconnecting the battery, connect the negative (-) side cable last.

⚠ WARNING

Touching battery acid could cause burns.

The battery contains dilute sulfuric acid.

Keep it away from your skin, eyes, and clothes.

If it gets on your skin, clothes, or the like: Rinse out with plenty of water.

If it gets in your eyes: Wash it out with water for 15 minutes, then seek immediate medical attention.

Ingested: Drink large amounts of water.

Do not force vomiting.

Seek immediate medical attention.

⚠ WARNING

Batteries generate flammable hydrogen gas.

Please be careful about the following.

1. Disconnect the negative (-) side cable first.
2. Connect the negative (-) side cable last.
3. Keep metal parts away from the battery terminals. Otherwise, there is a possibility of shorts.
4. Do not do welding work or grinding or polishing work around the battery. Do not smoke either.
These are dangerously flammable or explosive.

⚠ WARNING

The battery generates flammable gas and gas mixtures while being charged.

Provide good ventilation during charging.

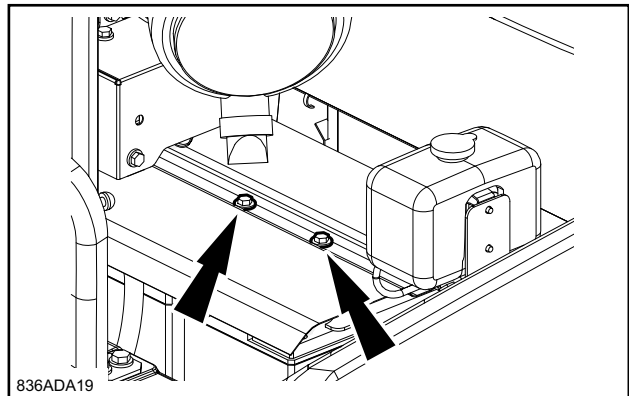
Do not use matches, cigarettes, or other open flames and do not allow sparks near the battery.

Never try to charge a frozen battery.

These are dangerously flammable or explosive.

NOTE:For information on starting the engine with a booster battery, refer to "Connecting a Booster Battery" (6-98).

Reach the battery by opening the door on the left rear of this machine and removing the skid plate there.



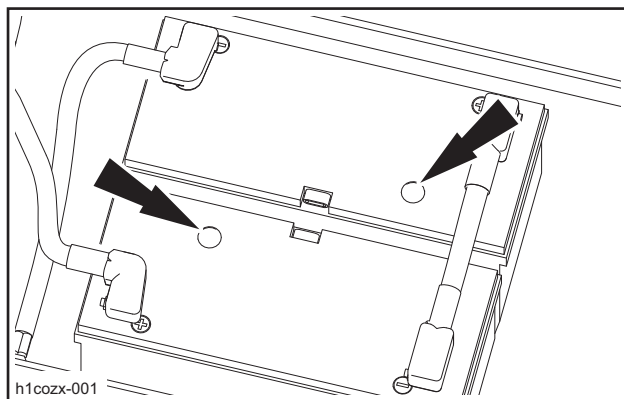
836ADA19

Checking the Charge State of a Maintenance-Free Battery

You can check the battery charge state on the battery charge indicator.

Charge indicator color

- Green: Good charge state
- Black: Charge defect
Charge until the indicator lights up green.
- Transparent (colorless): Replace the battery soon.



h1cozx-001

Checking the Battery Level of a Maintenance Type Battery

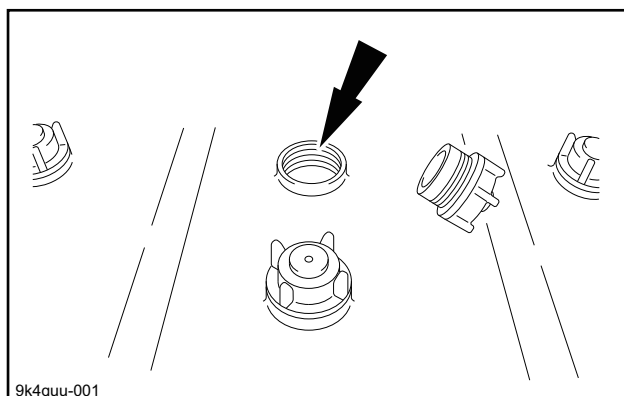
Remove the cell caps and check the level in each battery cell.

Top up with distilled water or commercially-available battery solution until the battery level is 10 - 15 mm above the plate.

Top up with distilled water as necessary, then re-install the cell caps.

NOTE:When topping up with distilled water in temperatures below 0°C, charge the battery for about 2 hours or run the engine to make sure that the distilled water and battery solution are well mixed.

NOTE:Check that the battery terminals are clean and properly greased and that the cables are securely tightened.



9k4quu-001

Battery Replacement

- 1.Remove the terminal protection cap, then disconnect the cable from the negative (-) terminal.

- 2.Disconnect the cable from the positive (+) terminal.
- 3.Remove the sulfurization prevention pellet, then remove the battery clips.
- 4.Install the new battery, then re-install the clips in their original positions.
- 5.Clean the cables and battery terminals and apply grease.
- 6.Install the new sulfurization prevention pellet, then connect the positive cable (+) to the positive terminal (+) of the battery and the negative cable (-) to the negative terminal (-) of the battery.
Install the terminal protection caps.

⚠ WARNING

Do not connect the battery terminals reversed. This would be dangerous and could cause electrical shock.

Connect the positive cable (+) to the positive terminal (+) of the battery and the negative cable (-) to the negative terminal (-) of the battery.

- 7.Install the skid plate.

⚠ WARNING

Store the battery in a safe location. Otherwise, it may create danger for third parties.
Store in a safe location out of the reach of children and non-necessary personnel.

⚠ WARNING

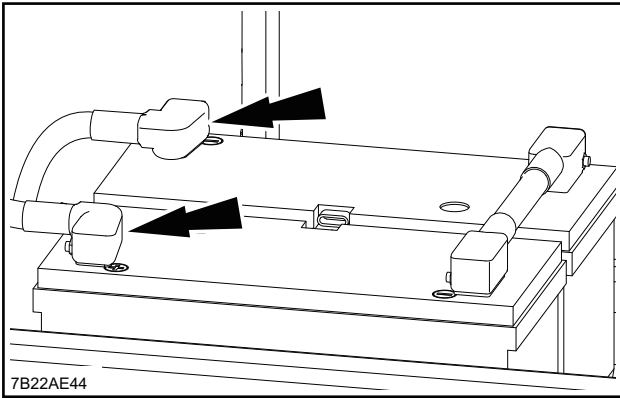
Batteries and battery electrolyte contain dilute sulfuric acid.

Touching battery acid could cause burns.

Always wear protective eyewear and protective clothes (gloves, apron).

After handling a battery or battery acid, wash your hands.

If any battery acid gets on your skin or in your eyes, it can cause inflammation, burns, or even more severe injury.



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Connecting a Booster Battery

⚠ WARNING

Connect the starter assist cable according to the instructions in this manual.

Connecting the starter assist cable incorrectly or shorting between the battery terminals is dangerous and can lead to an accident.

Check that the booster battery voltage is the same as the voltage of this machine's electrical system (24 VDC).

1. Remove the terminal sleeves.
2. Connect the positive cable (+) to the positive terminal (+) of the battery.
3. Connect the negative cable (-) to the negative terminal (-) of the battery.
4. Start the engine.
5. Disconnect the negative cable (-) for the booster battery, then disconnect the positive cable (+).
6. Install the terminal sleeves.

Alternator

Service Specifications

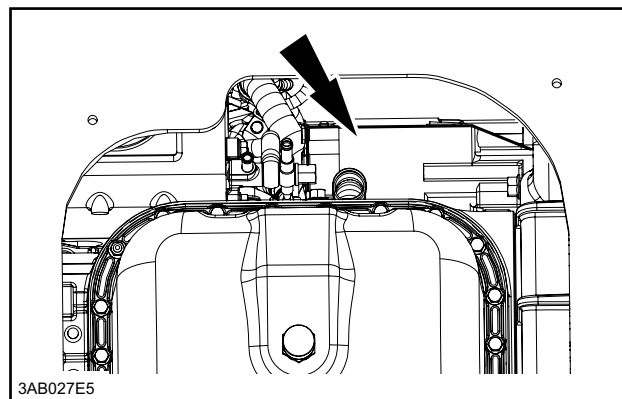
Inspection: Every 1000 hours

⚠ WARNING

Sparks from welding can cause battery gas to explode.

Disconnect the B+ and D+ cables from the alternator before welding this machine.

Carefully check the marks on the cable before reconnecting them to be sure to reconnect them correctly.



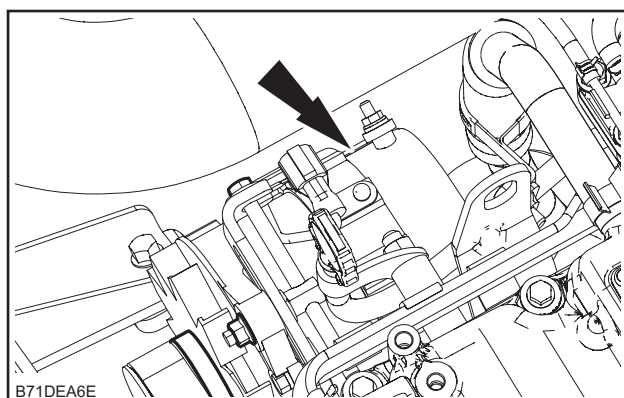
3AB027E5

NOTE:

Do not use a steam cleaning machine or solvent to clean the alternator.

Ask your dealer and the certified service plant to inspect the alternator.

NOTE: Check that the terminal protectors are correctly installed.



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Starter motor

Service Specifications

Inspection: Every 1000 hours

Ask your dealer and the certified service plant to inspect the starter motor.

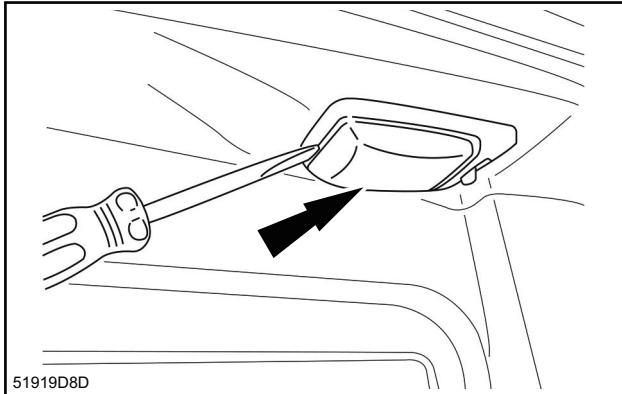
NOTE: Check that the terminal protectors are correctly installed.

6-Maintenance

Replacing the Light Bulb

Lighting in the Operator's Compartment

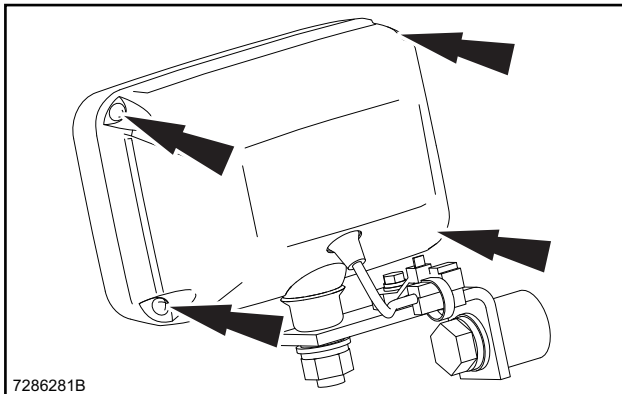
1. Remove the cover.
2. Remove the light bulb, then install a new light bulb of the same wattage (10 W).
3. Install the cover.



51919D8D

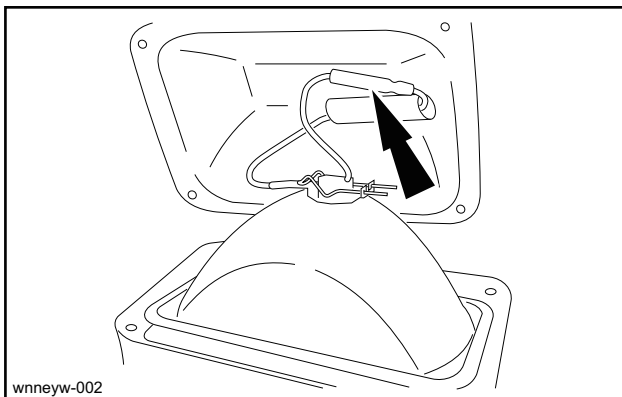
Boom Working Light

1. Remove the 4 locking screws.



7286281B

2. Remove the working light.
3. Tilt the working light and disconnect the plug.

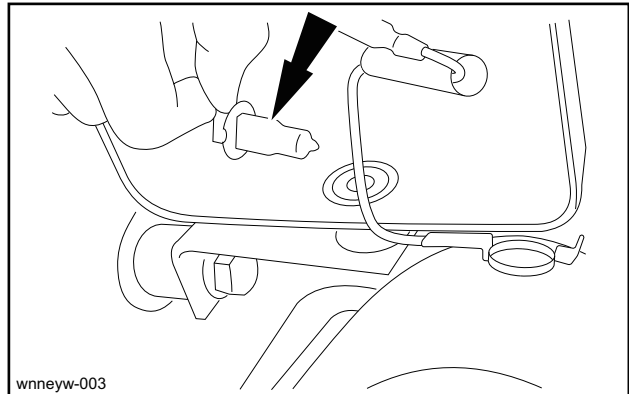


wnneyw-002

4. Pull the clip to the outside and remove the light bulb. Install a new light bulb of the same wattage (70 W).

NOTE: Do not directly touch a halogen (tungsten iodine) light bulb.

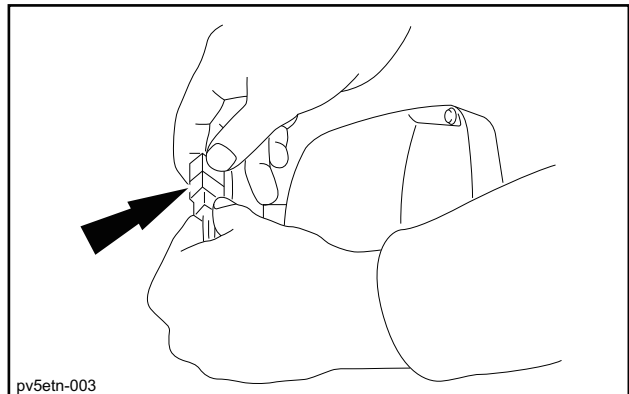
5. Install the clip, then connect the plug.
6. Install the working light back in its original position with the installation screws.



wnneyw-003

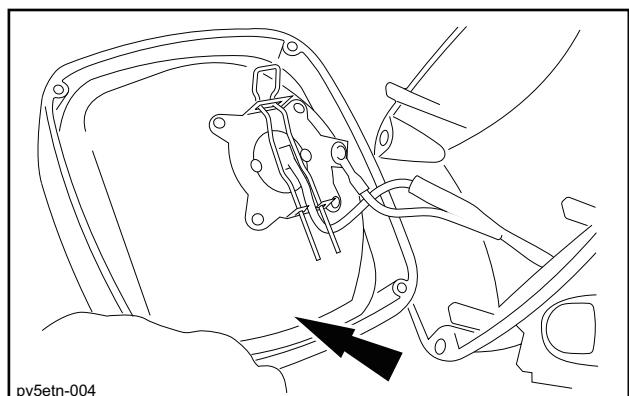
Cab Headlight

1. Disconnect the plug.



pv5etn-003

2. Remove the 4 screws and tilt the headlight.



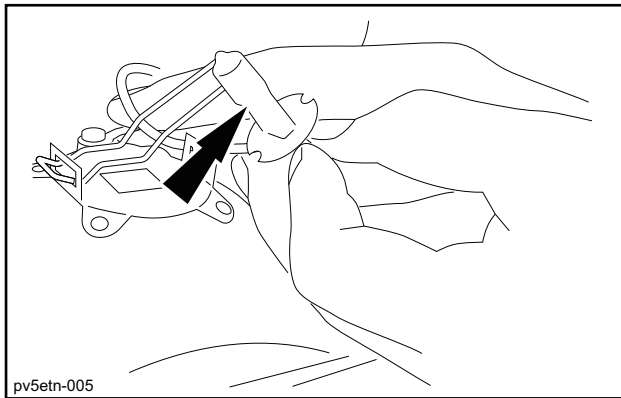
pv5etn-004

3. Pull the clip to the outside and remove the light bulb. Install a new light bulb of the same wattage (70 W).

NOTE: Do not directly touch a halogen (tungsten iodine) light bulb.

4. Install the clip and screws, connect the plug, then re-install the headlight in its original position.

5. Install the switch bracket.



pv5etn-005

Trouble Notification

The supply period for repair parts of this product is 10 years after the end of production.

Even within this supply period, however, there may be negotiation concerning delivery timing, etc.

Additionally, if repair parts need to be ordered for a product for which the supply period has already ended, the order will be accepted after the delivery timing and price have been negotiated.

For parts numbers, see the parts manual.

7-Troubleshooting

In order to extend the service life of the machine and raise its operation rate, it is necessary to perform daily inspections and lubrication and also to pay attention to machine abnormalities and to immediately find the cause and take corrective action.

Continuing to run a machine with an abnormality can cause a more severe problem or even a major accident.

If a breakdown occurs, investigate the following items to find the cause and take the necessary actions such as adjusting and repairing.

If you cannot find the cause, please contact our dealer or authorized service shop.

7-Troubleshooting

Engine-related

Also refer to the "Engine Manual".

Symptom	Cause	Countermeasure
The engine does not start.	Defective starter switch (starter does not run)	Repair the connections and contact locations (battery terminal contact defect).
	Defective rotation of starter (starter rotates slowly)	Discharge the battery completely, replace the starter motor, clean or replace the power distribution connectors.
	Wrong engine oil viscosity	Investigate and replace.
	Engine too cold (cold weather)	Preheat (glow) the engine.
		Warm up the coolant. (Pour in warm water.)
	Operation section about to seize up	* Repair.
	Incomplete air bleeding of fuel system	Bleed out any air in the system.
	No fuel in fuel tank	Refill.
	Wrong fuel quality	Investigate and replace.
	Clogged fuel filter	Drain or replace element.
	Insufficient compression pressure	* Repair.
	Defective fuel junction pump	* Repair.
Engine stopped during operation on its own.	No fuel in fuel tank	Refill.
	Clogged fuel filter	Drain or replace element.
	Air in the fuel system	Retighten fuel line connectors.
Incorrect oil pressure (engine oil pressure)	Defective oil	Refill.
	Defective oil pressure switch	* Replace.
	Oil filter clogged	Replace element.
	Low oil viscosity	Change to oil with a viscosity appropriate for the temperature.
	Oil pump operation defect	* Adjust, clean, replace.
	Oil leakage from connections	Repair.
Engine exhaust is white or blue	Excessive oil	Drain oil to proper level.
	Low oil viscosity	Change to oil with a viscosity appropriate for the temperature.
	Excessive cooling by radiator	Cover radiator or replace parts.
	Incorrect injection timing	* Adjust.
	Insufficient compression pressure	* Disassemble, repair, and replace parts.
Engine exhaust is black or dark gray	Incorrect fuel	Change to good fuel.
	Incorrect valve clearance	Adjust.
	Defective injection pump function	* Adjust and replace if necessary.
	Insufficient compression pressure	* Disassemble, repair, and replace parts.
	Insufficient intake air (air cleaner clogged)	Clean or replace element.
Excessive fuel consumption	Defective injection pump function	* Adjust and replace if necessary.

7-Troubleshooting

Symptom	Cause	Countermeasure
Excessive fuel consumption	Defective injection nozzle	* Adjust and replace if necessary.
	Incorrect injection timing	* Adjust, repair or replace.
	Incorrect fuel	Change to good fuel.
	Insufficient compression pressure	* Disassemble, repair, and replace parts.
	Insufficient intake air	Clean or replace element.
Excessive engine oil consumption	Excessive oil	Drain oil to proper level.
	Low oil viscosity	Change to oil with a viscosity appropriate for the temperature.
	Oil leakage	Retighten and replace if necessary.
	Worn cylinder piston ring	* Disassemble, repair, and replace parts.
Unusual noise (fuel or mechanical)	Use of poor quality fuel	Replace.
	Damage inside muffler	Replace.

Symptom	Cause	Countermeasure
Engine overheating (coolant temperature gauge too high)	Insufficient coolant	Refill.
	Water leaks from some parts	Repair.
	Stretched belt, oil on the belt	Clean or replace.
	Defective radiator	* Repair or replace.
	Broken fan	* Replace.
	Anti-freeze concentration too high	Replace.
	Defective thermostat	* Replace.
	Defective water pump	* Replace.
	Defective coolant temperature gauge	* Replace.
Insufficient charge	Inspect the belt tension.	Adjust.
	Electrical wiring problem	Repair.
	Defective battery	Replace.
	Defective regulator	* Replace.
	Defective alternator	* Repair or replace.

For items marked with *, consult our authorized service shop.

7-Troubleshooting

Monitor Display

Have repair of electronic components (computer, etc.) done by our authorized service shop.

Symptom	Cause	Countermeasure
OVER HEAT	Water leaks from some parts	Repair.
	Stretched belt, oil on the belt	Clean or replace.
	Defective radiator	* Repair or replace.
	Excessive relief operations	Reduce relief operations.
	Broken fan	* Replace.
	Anti-freeze concentration too high	Replace.
	Defective thermostat	* Replace.
	Defective water pump	* Replace.
	Oil cooler soiling (clogging)	Clean.
	Radiator soiling (clogging)	Clean.
	Defective dust net (clogging)	Clean.
	Defective monitor	* Replace.
LOW OIL PRESS.	Insufficient engine oil	Refill.
	Oil leakage from connections	Repair.
	Defective engine oil pressure switch	* Replace.
	Low engine oil viscosity	Change to oil with a viscosity appropriate for the temperature.
	Engine oil pump operation defect	* Adjust, clean, replace.
	Defective monitor	* Replace.
	Engine oil filter clogged	Replace engine oil and oil filter.
	Defective sensor	* Replace.
LOW FUEL	Incorrect fuel	Refill.
	Defective sensor	* Replace.
ALTERNATOR	Inspect the belt tension.	Adjust.
	Electrical wiring problem	Repair.
	Defective battery	Replace.
	Defective regulator	* Replace.
	Defective alternator	* Repair or replace.
LOW COOLANT	Defective coolant	* Replace.
	Defective sensor	* Inspect and repair.
ELEC. PROBLEM	Short or other abnormality	* Inspect and repair.
AIR FILTER	Oil filter element clogged	Clean and replace.
	Intake air system clogged, foreign objects getting in	* Inspect and clean.
CHECK ENGINE	Defective engine electrical system	* Inspect and repair.
	Defective sensor	* Replace.
BOOST TEMP. HIGH	Intercooler abnormality	Clean and inspect.
	Overload work	Run at low idle for a while.
HYD. OIL FILTER	Return filter element clogged	Replace filter.
Fuel filter	Water accumulation in fuel pre-filter	Drain fuel pre-filter.
CHECK CAMERA	Camera connection abnormality	* Inspect, repair, or replace.

7-Troubleshooting

For items marked with *, consult our authorized service shop.

Operation

Symptom	Cause	Countermeasure
Operations are heavy.	Foreign objects caught in an operation valve spool	* Clean operation valve.
	Stuck valve	* Repair, replace valve assembly.
	Insufficient lever link lubrication	Grease up.
	Lever link seizing	Grease up.

For items marked with *, consult our authorized service shop.

Hydraulic Pump

Symptom	Cause	Countermeasure
No oil from hydraulic pump	Insufficient hydraulic oil	Feed oil.
	Suction filter clogged	Replace the filter. If the hydraulic oil is dirty, replace it.
Hydraulic pump pressure does not rise.	Hydraulic pump internal oil leak	* Replace hydraulic pump.
	Hydraulic pump air intake	Feed oil or inspect intake side hose.
	Main relief valve set pressure drop	* Adjust pressure.
Abnormal noise from hydraulic pump	Intake side hose deformation or suction filter clog is causing cavitation.	Replace the filter. If the hydraulic oil is dirty, replace it.
	The intake side joint is loose or air is being taken in due to a lack of hydraulic oil.	Retighten the joint section or refill the hydraulic oil.
		Check to see if inside the casing is full of oil and refill the oil if necessary.
	The hydraulic oil viscosity is too high and this is causing cavitation.	Replace with hydraulic oil with the correct viscosity.
Oil leak to the outside from the hydraulic pump	Defective hydraulic pump seal	Replace seal or replace hydraulic pump.

For items marked with *, consult our authorized service shop.

7-Troubleshooting

Machine

Symptom	Cause	Countermeasure
Actuating force is reduced.	Insufficient engine output	Refer to the Engine Manual.
	Decreased function due to hydraulic pump wear	* Replace hydraulic pump.
	Defective main relief valve	* Adjust pressure or replace the valve.
	Insufficient hydraulic oil level	Feed oil.
	The viscosity of the hydraulic oil is wrong.	Replace with hydraulic oil with the correct viscosity.
	Suction filter clogged	Replace the suction filter.
Operation defect	Hydraulic pump breakdown	* Replace hydraulic pump.
	Insufficient hydraulic oil level	Feed oil.
Insufficient machine power	Main or port relief valve set pressure drop or defect	* Adjust pressure or replace the relief valve.
	Damaged hydraulic cylinder packing	Replace the hydraulic cylinder packing.
	Damaged hydraulic cylinder piston and cylinder	* Replace hydraulic cylinder piston and cylinder or assembly.
Machine drifts down.	Damaged hydraulic cylinder packing	Replace the hydraulic cylinder packing.
	Damaged hydraulic cylinder piston and cylinder	* Replace hydraulic cylinder piston and cylinder or assembly.
	Operation valve internal oil leak	* Repair, replace valve assembly.
	Hold valve internal oil leak	* Repair, replace valve assembly.
Abnormal noise from machine link section	Insufficient lubrication	Grease up.
	Connecting pin seizing	Replace the bushing or pin.

For items marked with *, consult our authorized service shop.

Travel

Symptom	Cause	Countermeasure
Insufficient traveling force	Main relief valve set pressure drop	* Adjust pressure.
	Defective counter balance valve	* Replace the counter balance valve.
	Travel motor performance drop	* Replace the travel motor.
	Damaged swivel joint packing	* Replace the swivel joint packing.
	Hydraulic pump performance drop	* Replace hydraulic pump.
Travel not smooth	Crawler tension too high	Adjust to appropriate level.
	Rocks or foreign objects caught	Take out rocks or foreign objects.
	Defective valve	* Repair or replace the valve.
	Travel motor performance drop	* Replace the travel motor.
	Travel motor air intake	Feed oil.
Not traveling in straight line	Left and right side crawler tension different	Bleed the air on the left and right and adjust the left and right crawler tension to be the same.
	Hydraulic pump performance drop	* Replace hydraulic pump.
	Travel motor performance drop	* Replace the travel motor.

7-Troubleshooting

Symptom	Cause	Countermeasure
Not traveling in straight line	Operation valve internal oil leak	* Replace the valve housing assembly.
	Damaged swivel joint packing	* Replace the swivel joint packing.
	Loose lever link	Adjust.

For items marked with *, consult our authorized service shop.

Swing

Symptom	Cause	Countermeasure
Insufficient swinging force	Swing motor performance drop	Replace the swing motor.
	Swing wheel seizing	Grease up or replace the swing wheel.
Overrun when swing brake engaged	Brake valve set pressure drop	* Adjust pressure.
	Valve clogged with debris	* Clean the valve.
	Swing motor performance drop	* Replace the swing motor.
	Operation valve internal oil leak	* Repair, replace valve assembly.
Overrun when stopping swing	Port relief valve or brake valve set pressure drop	* Adjust pressure.
	Valve clogged with debris	* Clean the valve.
	Swing motor performance drop	* Replace the swing motor.
	Operation valve internal oil leak	* Repair, replace valve assembly.
Abnormal noise during swinging	Swing motor air intake	Feed oil.
	Insufficient swing bearing lubricant	Grease up.

For items marked with *, consult our authorized service shop.

Hydraulic Cylinder

Symptom	Cause	Countermeasure
Insufficient hydraulic cylinder power	Relief valve set pressure drop	* Adjust pressure.
	Hydraulic cylinder internal oil leak	* Replace the cylinder packing.
	Damaged hydraulic cylinder piston or rod	* Replace the hydraulic cylinder piston or rod.
	Operation valve internal oil leak	* Repair, replace valve assembly.
Hydraulic cylinder external oil leak	Defective hydraulic cylinder packing	* Replace the hydraulic cylinder packing.
	Damaged hydraulic cylinder rod	* Replace the hydraulic cylinder rod.

For items marked with *, consult our authorized service shop.

8-Specification

Main Specifications

		SH145X-6	SH145XU-6
Basic	Standard bucket capacity (ISO heaped)	0.50 m ³	0.45 m ³
	Operating weight	14500 kg	15300 kg
	Engine model	ISUZU GJ-4JJ1X	
	Rated output	70.9 kW/2000 min ⁻¹	
	Displacement	2999 ml	
Dimension	Overall length for transport	7880 mm (standard)	7540 mm (standard)
	Overall width for transport	2490 mm	2490 mm
	Overall height for transport	2790 mm (standard)	2770 mm (standard)
	Overall track length	3500 mm	3500 mm
	Overall track width	2490 mm	2490 mm
	Standard shoe width	500 mm	
Performance	Travel speed: High-speed/low-speed	5.6 km/h/3.4 km/h	
	Grade ability	70 % (35°)	
	Swing speed	11.2 min ⁻¹	
	Bucket digging force: Normal/boosted	90 kN/95 kN (standard)	89.3 kN (standard)
	Arm digging force: Normal/boosted	62 kN/66 kN (standard)	59.5 kN (standard)
Hydraulic equipment	Pump type	Double variable displacement piston pump + gear pump	
	Maximum pressure: Normal/boosted	34.3 MPa/36.3 MPa	34.3 MPa (standard)
	Traction motor type	Variable displacement piston motor	
	Parking brake type	Mechanical lock	
	Swing motor type	Fixed displacement piston motor	
Capacity	Fuel tank capacity	200 L	
	Hydraulic tank specified capacity	75 L	
	Hydraulic oil capacity	158 L	

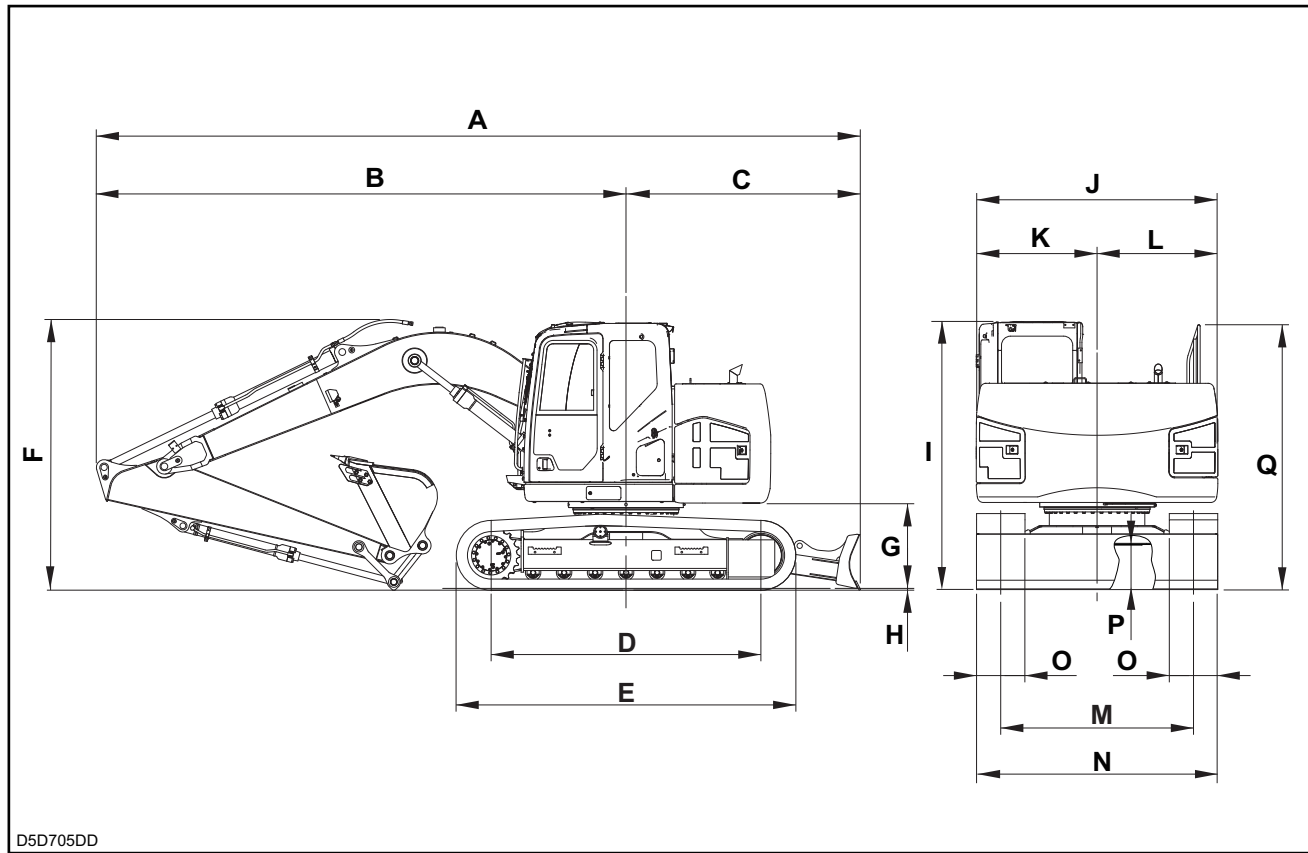
* The units shown are international SI units.

8-Specification

Dimension

Outer Dimensions

(SH145X-6)



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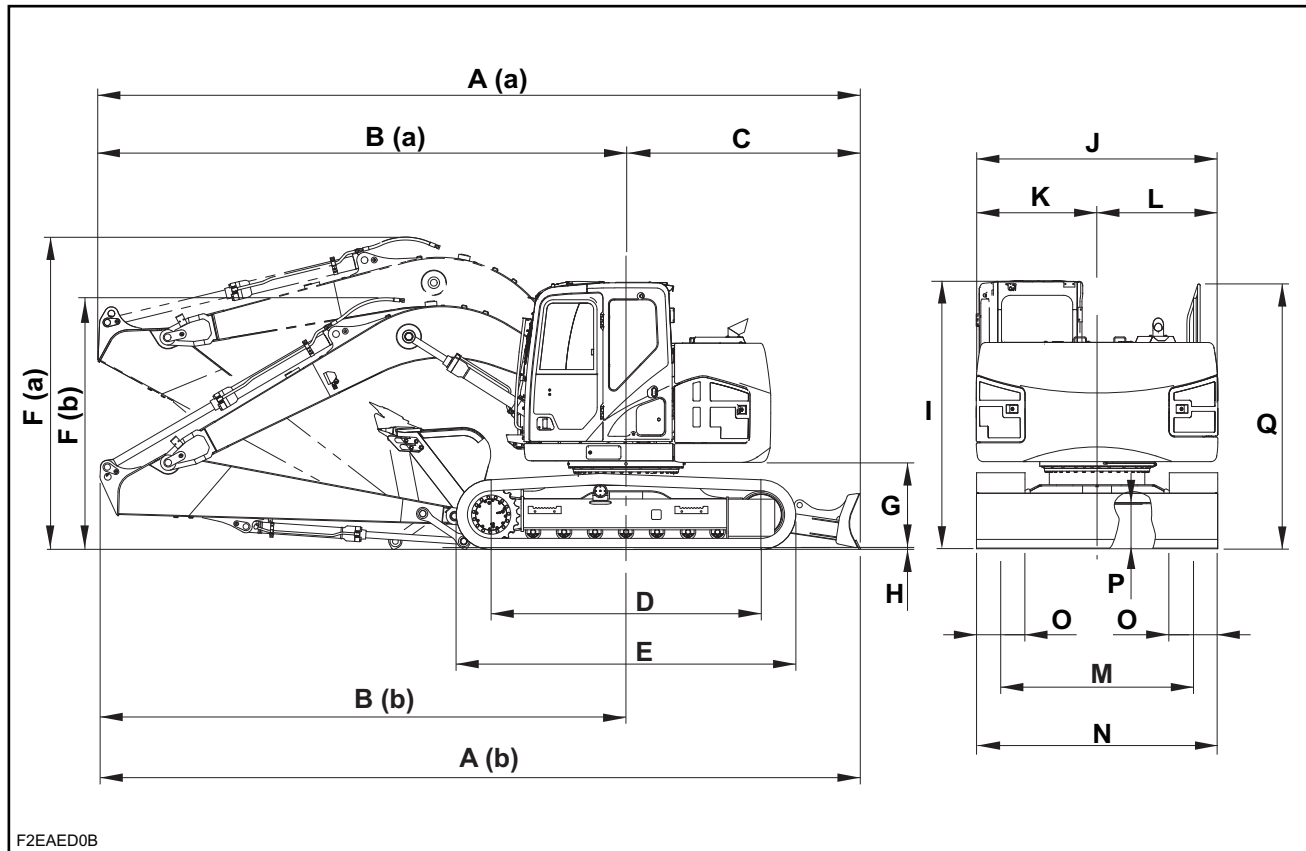
8-Specification

Arm	2.11 m	2.50 m
(A)	7870 mm	7880 mm
(B)	5460 mm	5470 mm
(C)	2410 mm	2410 mm
(D)	2790 mm	2790 mm
(E)	3500 mm	3500 mm
(F)	2720 mm	2790 mm
(G)	880 mm	880 mm
(H)	20 mm	20 mm
(I)	2770 mm	2770 mm
(J)	2490 mm	2490 mm
(K)	1240 mm	1240 mm
(L)	1250 mm	1250 mm
(M)	1990 mm	1990 mm
(N)	2490 mm	2490 mm
(O) (Standard shoe width)	500 mm	500 mm
(P)	425 mm	425 mm
(Q)	2730 mm	2730 mm

8-Specification

Positioning during transportation

When equipped with two pin position arm. (Long Arm [3.01 m])



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8-Specification

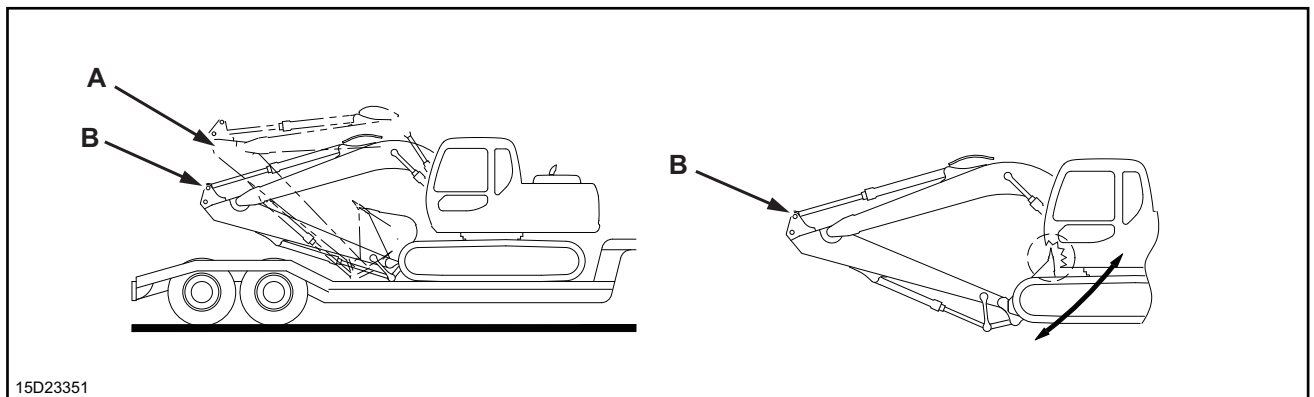
Arm	3.01 m	
(A)	a: 7860 mm	b: 7840 mm
(B)	a: 5450 mm	b: 5430 mm
(C)	2410 mm	
(D)	2790 mm	
(E)	3500 mm	
(F)	a: 3230 mm	b: 2600 mm
(G)	880 mm	
(H)	20 mm	
(I)	2770 mm	
(J)	2490 mm	
(K)	1240 mm	
(L)	1250 mm	
(M)	1990 mm	
(N)	2490 mm	
(O) (Standard shoe width)	500 mm	
(P)	425 mm	
(Q)	2730 mm	
a: for operation b: for transport		

When there are two pin positions on the top of the arm cylinder.

The top of the arm cylinder must be placed in the transport position prior to transporting the machine.

Bucket may hit operator's cab when placing arm cylinder in transport position.

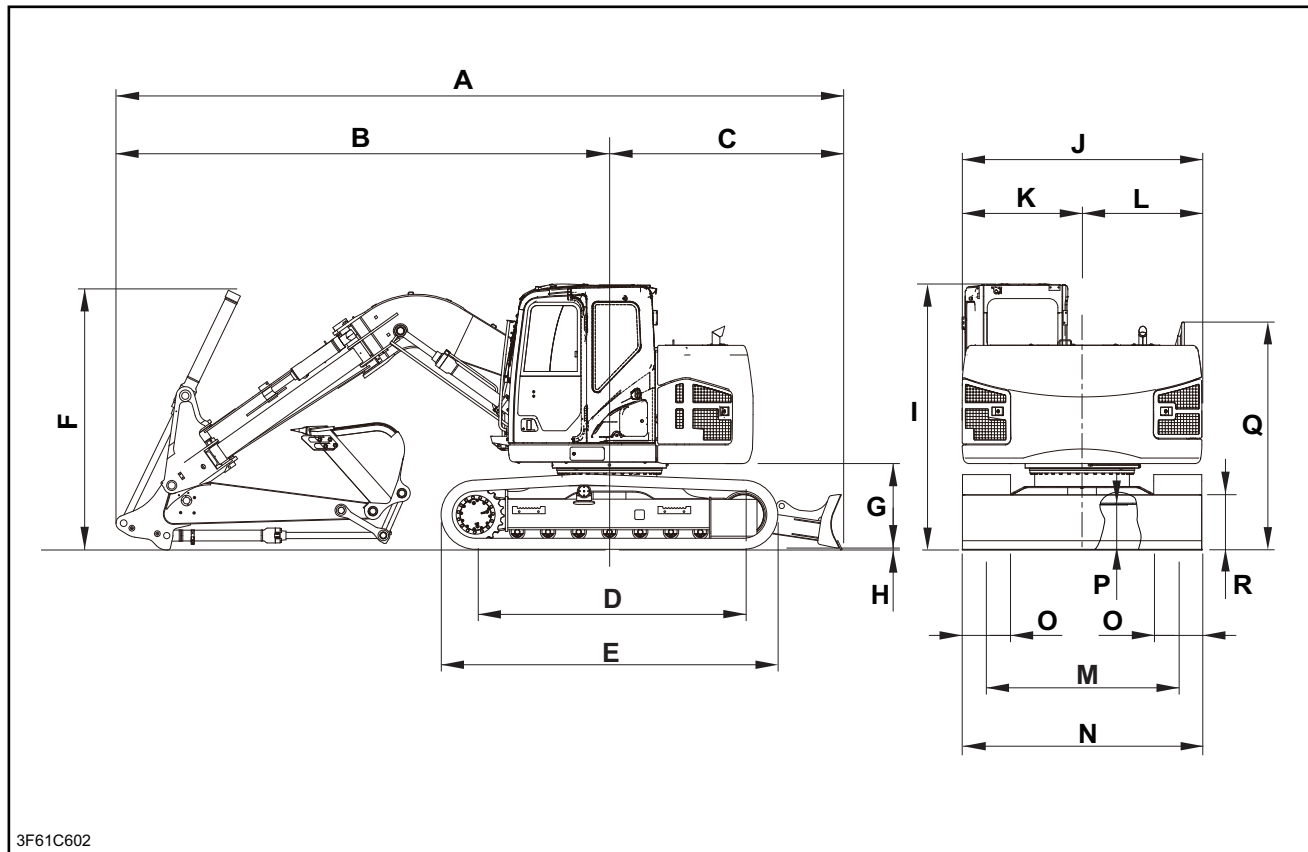
Do not dig with the arm cylinder in the transport position.



A	Digging
B	Transporting

8-Specification

(SH145XU-6)



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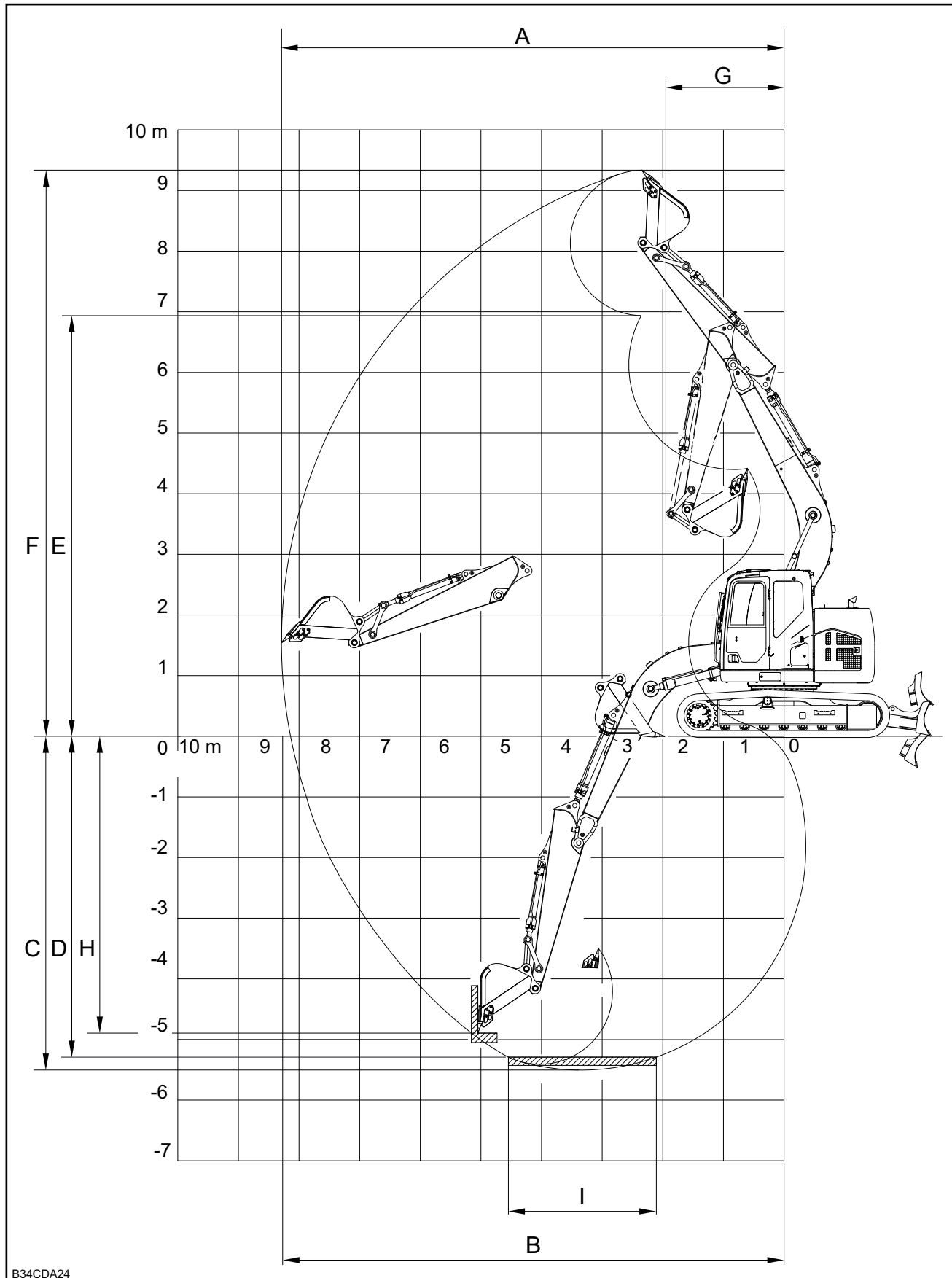
8-Specification

Arm	2.11 m	2.41 m
(A)	7540 mm	7610 mm
(B)	5130 mm	5200 mm
(C)	2410 mm	2410 mm
(D)	2790 mm	2790 mm
(E)	3500 mm	3500 mm
(F)	2700 mm	2700 mm
(G)	880 mm	880 mm
(H)	20 mm	20 mm
(I)	2770 mm	2770 mm
(J)	2490 mm	2490 mm
(K)	1240 mm	1240 mm
(L)	1250 mm	1250 mm
(M)	1990 mm	1990 mm
(N)	2490 mm	2490 mm
(O) (Standard shoe width)	500 mm	500 mm
(P)	425 mm	425 mm
(Q)	2360 mm	2360 mm
(R)	570 mm	570 mm

8-Specification

Work Range

(SH145X-6)



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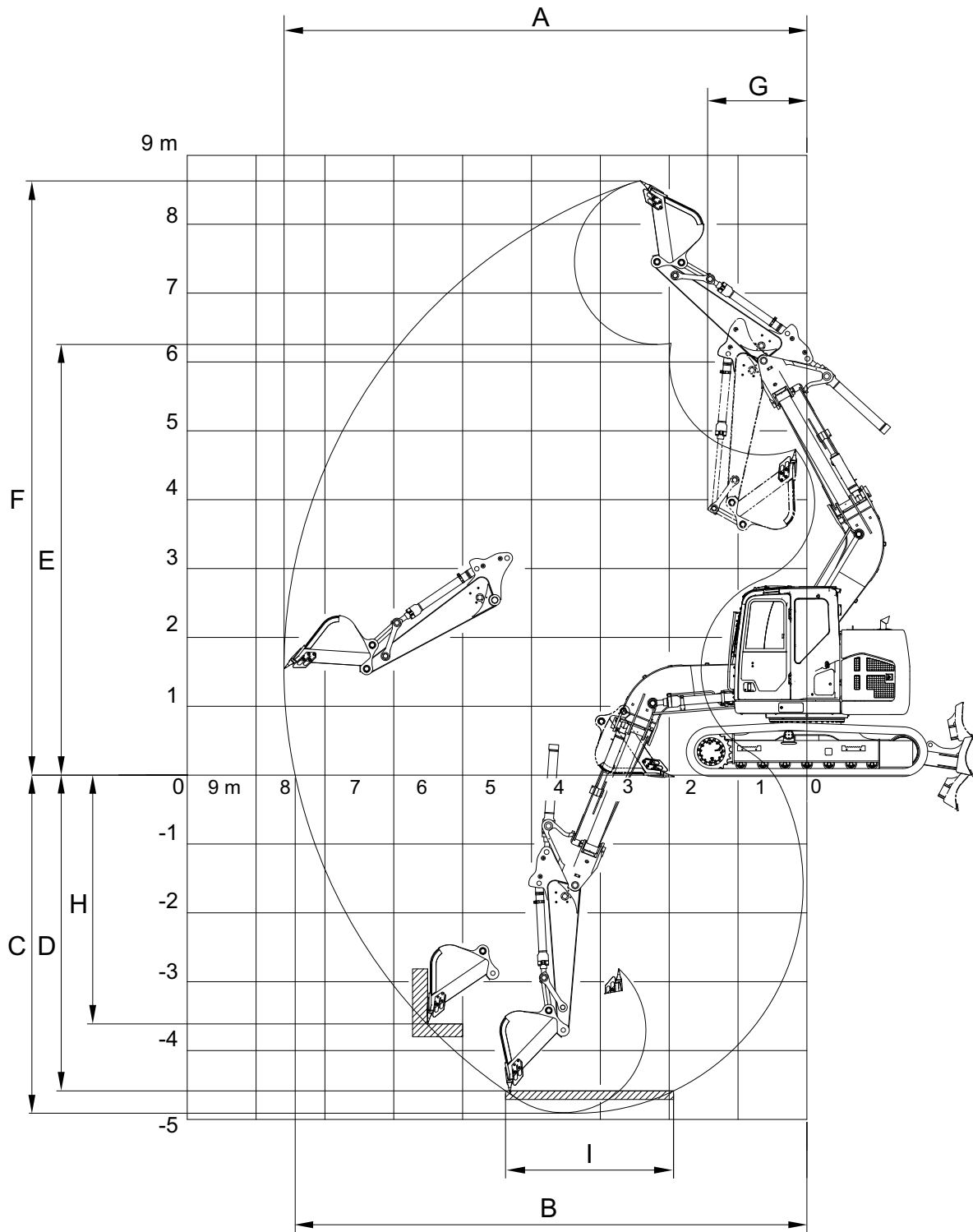
8-Specification

Arm	2.11 m	2.50 m	3.01 m
(A) (Maximum digging radius)	7940 mm	8290 mm	8740 mm
(B) (Maximum digging radius on surface)	7780 mm	8140 mm	8600 mm
(C) (Maximum digging depth)	5110 mm	5510 mm	6010 mm
(D) (Maximum digging depth for length of 2.44 m)	4870 mm	5290 mm	5830 mm
(E) (Maximum dump height)	6660 mm	6940 mm	7290 mm
(F) (Maximum work height)	9060 mm	9340 mm	9690 mm
(G) (Minimum swing radius for attachments)	1890 mm	1950 mm	2330 mm
(H) (Maximum digging depth for vertical surface)	4560 mm	4900 mm	5280 mm
(I) (Maximum digging length for flat-bottom ditch)	2440 mm	2440 mm	2440 mm

8-Specification

(SH145XU-6)

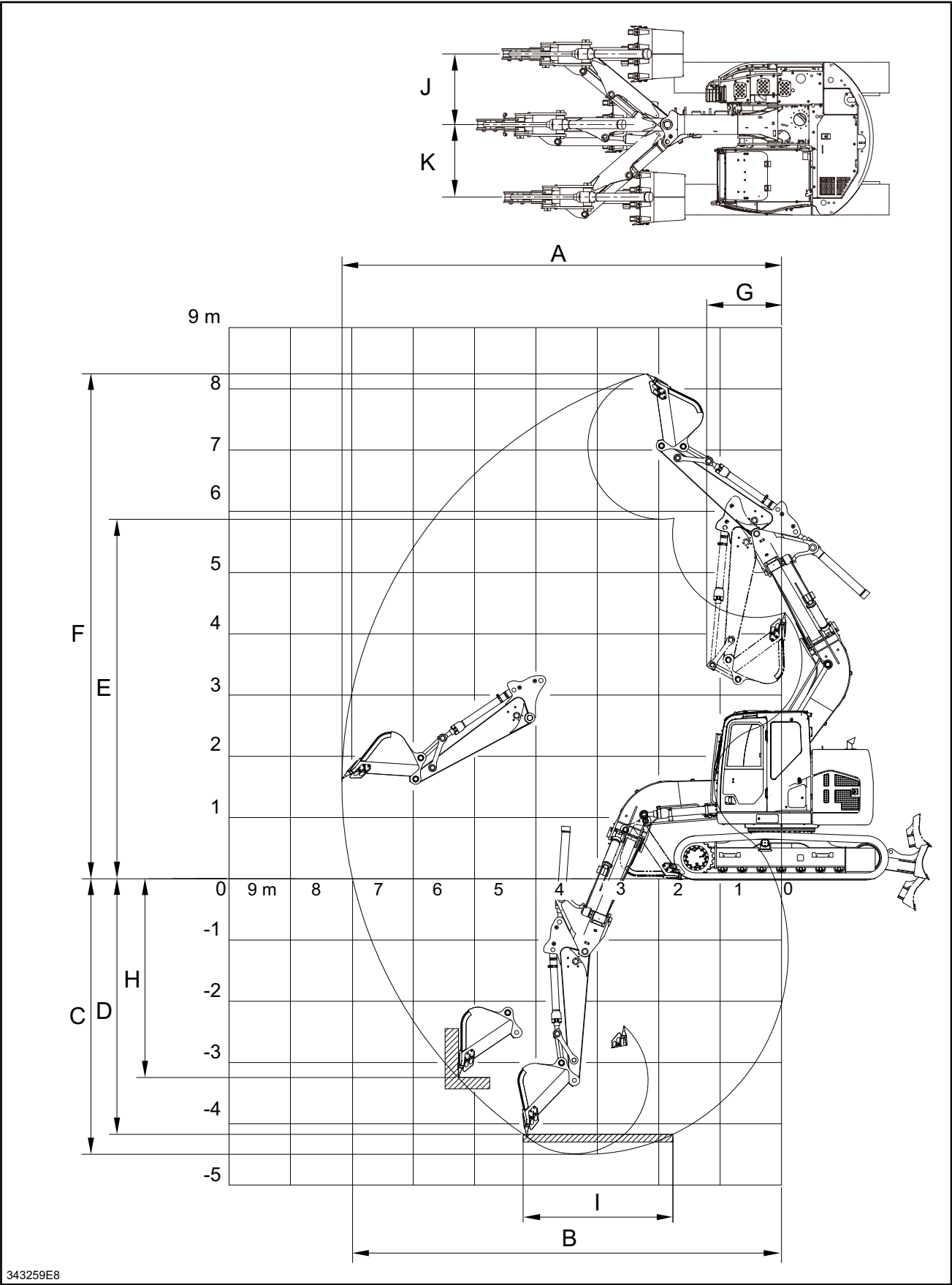
Offset 0



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Offset Maximum (left)



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8-Specification

8-Specification

Arm	2.11 m	
	Offset 0	Offset Maximum (left)
(A) (Maximum digging radius)	7590 mm	7160 mm
(B) (Maximum digging radius on surface)	7430 mm	6990 mm
(C) (Maximum digging depth)	4910 mm	4500 mm
(D) (Maximum digging depth for length of 2.44 m)	4590 mm	4170 mm
(E) (Maximum dump height)	6250 mm	5870 mm
(F) (Maximum work height)	8630 mm	8250 mm
(G) (Minimum swing radius for attachments)	1430 mm	1210 mm
(H) (Maximum digging depth for vertical surface)	3610 mm	3250 mm
(I) (Maximum digging length for flat-bottom ditch)	2440 mm	2440 mm
(J) (Offset right)		1150 mm
(K) (Offset left)		1180 mm

Arm	2.41 m	
	Offset 0	Offset Maximum (left)
(A) (Maximum digging radius)	7840 mm	7410 mm
(B) (Maximum digging radius on surface)	7690 mm	7240 mm
(C) (Maximum digging depth)	5210 mm	4800 mm
(D) (Maximum digging depth for length of 2.44 m)	4900 mm	4490 mm
(E) (Maximum dump height)	6430 mm	6050 mm
(F) (Maximum work height)	8810 mm	8420 mm
(G) (Minimum swing radius for attachments)	1590 mm	1370 mm
(H) (Maximum digging depth for vertical surface)	3910 mm	3540 mm
(I) (Maximum digging length for flat-bottom ditch)	2440 mm	2440 mm
(J) (Offset right)		1150 mm
(K) (Offset left)		1180 mm

8-Specification

Bucket and Arm Types

- : Standard bucket
- ◎ : General digging (can be used with dirt with specific gravity of 1.8 ton/m³ max.)
- : Light digging (can be used with dirt with specific gravity of 1.6 ton/m³ max.)
- △ : Loading (can be used with dirt with specific gravity of 1.2 ton/m³ max.)
- x : Cannot be used (not covered by warranty)

SH145X-6							
Bucket capacity (m ³) ISO heaped	0.37	0.45	0.45 HD	0.50	0.50 HD	0.55	0.65
Number of teeth	4	4	4	5	5	5	5
Teeth	Vertical pin	Vertical pin	Vertical pin	Vertical pin	Vertical pin	Vertical pin	Vertical pin
Width (mm)	772 (698)	907 (833)	913 (839)	972 (898)	972 (898)	1057 (983)	1192 (1118)
●Specified arm							
Standard arm (2.50 m)	◎	◎	◎	●	●	○	△
Short arm (2.11 m)	◎	◎	◎	◎	◎	●	○
Long arm (3.01 m)	●	○	○	△	x	x	x

SH145XU-6				
Bucket capacity (m ³) ISO heaped	0.30	0.37	0.45	0.45 HD
Number of teeth	4	4	4	4
Teeth	Vertical pin	Vertical pin	Vertical pin	Vertical pin
Width (mm)	692 (618)	772 (698)	907 (833)	913 (839)
●Specified arm				
Standard arm (2.11 m)	◎	◎	●	●
Long arm (2.41 m)	◎	●	x	x

The figures in () are dimensions excluding the side cutters.

8-Specification

Shoe Type

SH145X-6				
Shoe width and namae	500 mm grouser	500 mm link chain	600 mm grouser	700 mm grouser
Ground pressure	47 kPa	47 kPa	40 kPa	35 kPa
Ground pressure	2490 mm	2490 mm	2590 mm	2690 mm

SH145XU-6				
Shoe width and namae	500 mm grouser	500 mm link chain	600 mm grouser	700 mm grouser
Ground pressure	50 kPa	50 kPa	42 kPa	37 kPa
Ground pressure	2490 mm	2490 mm	2590 mm	2690 mm

Function

Main Supplied Equipment

[Hydraulic system]

- SIH: S+ hydraulic system
- Work modes (SP mode, H mode, and A mode)
- Automatic travel 2nd speed
- Automatic digging power-up mechanism
- Arm/boom anti-drift valve
- Arm/boom/bucket regenerative circuit
- Swing lever interlocking brake system
- Option valve
- High-performance return filter

[Safety devices]

- ROPS cab
- Top guard OPG level 1 (in cab structure)
- Head guard (FOPS Level 2) (option)
- Rear view mirrors (cab left + housing front right)
- FVM (Field View Monitor) (option)
- Emergency exit hammer
- Retractable seat belt
- Gate lock lever
- Travel alarm
- Anti-theft system
- Engine compartment firewall
- Fan guard
- Engine emergency stop switch
- Engine neutral start function

[Equipment in cab]

- Fluid mount
- Full color LCD monitor
- Tilt type console structure
- Outside air intake type pressurized fully automatic air conditioner
- Defroster
- Operator's seat

- Seat suspension
 - Rise-up wiper (with intermittent wipe function)
 - Cup holder
 - AM/FM radio (with mute function, AUX terminal, USB terminal)
 - Clock
 - Magazine rack
 - Glove box
 - Floor mat
 - Armrest and headrest
 - Ashtray and cigar lighter
 - Room lamp (auto OFF function)
 - Coat hook
 - Operation lever with one-touch wiper switch
 - Operation lever with radio mute switch
- ##### [Others]
- Auto/one-touch idle
 - New EMS
 - Idle shutdown function
 - Long-life hydraulic oil
 - 2 lights (main unit, boom left)
 - Fuel filter (with water separator)
 - Fuel pre-filter (with water separator)
 - Double element air cleaner
 - Grease sealed link
 - Bucket backlash adjustment mechanism
 - Large tool box
 - One set of tools

9-Options Breaker

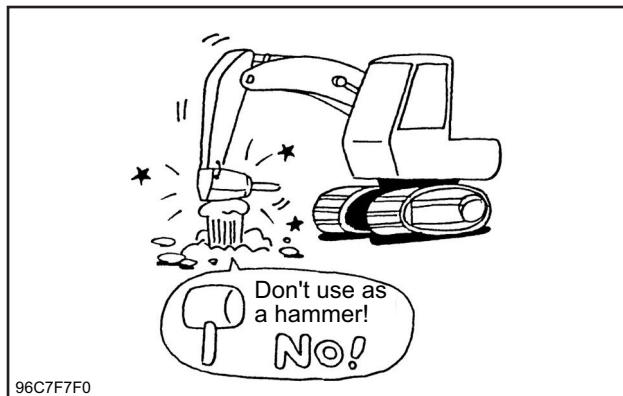
NOTICE: Do not use ultra-long reach machines to perform breaker operations.

Breaker Handling (attachment)

⚠ CAUTION

1. Cautions for mounting hydraulic breaker
When mounting a hydraulic breaker, it is necessary to select a breaker with specifications that match the excavator main unit.
When selecting a hydraulic breaker, consult your nearest branch or sales office.
2. Cautions for using hydraulic breaker
Read the breaker operator's manual thoroughly and work safely being careful not to damage the hydraulic excavator or the breaker.

1. Using the breaker for other than the main applications prohibited
The main applications for the breaker are rock crushing, building demolition, and boulder quarrying.

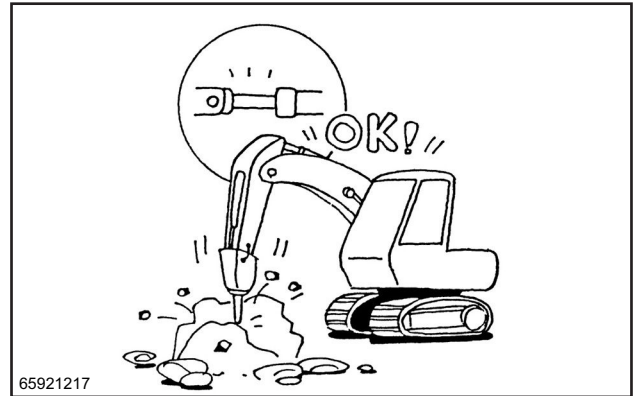


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2. Working at end of the hydraulic cylinder stroke prohibited
This could cause cylinder and excavator main body damage.
During work, do not operate the cylinder to the end of its stroke. Operate with some margin.

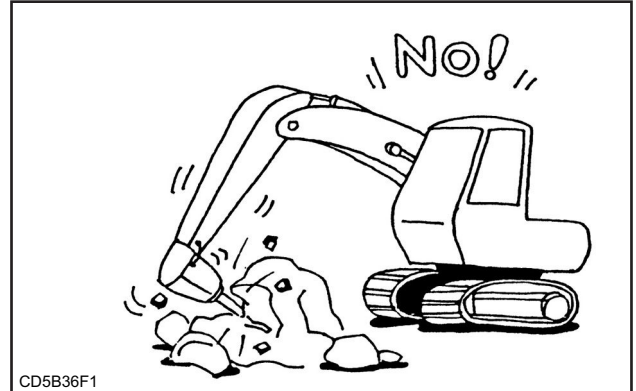
Also, when swinging the arm down, if you go to the end of the stroke, the excess stress could damage the arm cylinder.

Operate so that you do not go to the stroke end of any of the cylinders.



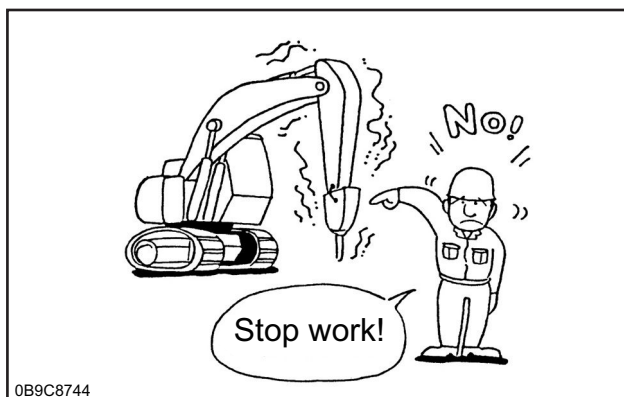
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3. Gouging work with the chisel prohibited
Gouging work puts excess stress on the breaker main body, the excavator, the cylinders, etc. and can cause machine damage and accidents.

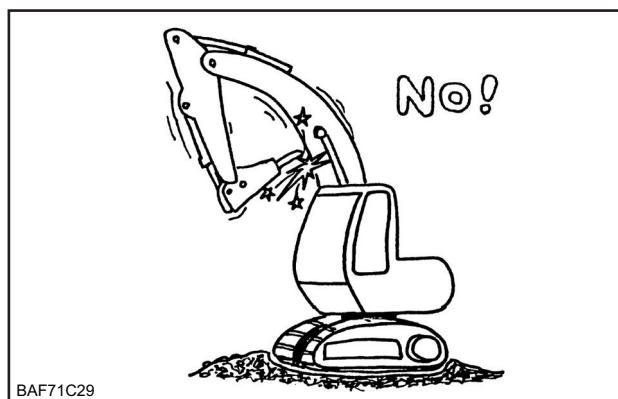


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4. Stop work, if the hydraulic hoses vibrate abnormally.
Continuing to work may cause excess stress, breakdown, etc.



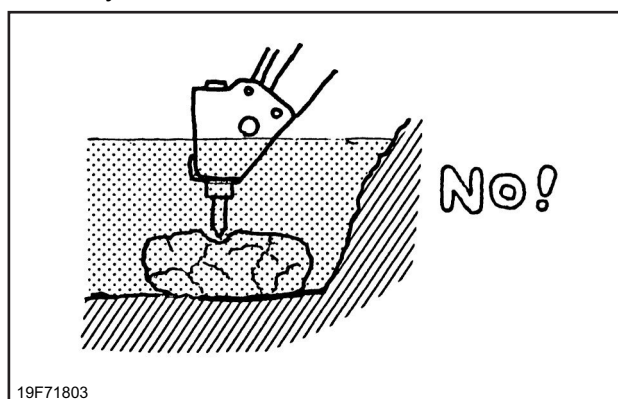
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3. Cautions for work in water

Work in water with the standard hydraulic breaker will damage hydraulic equipment on the hydraulic excavator. Do not work in water.



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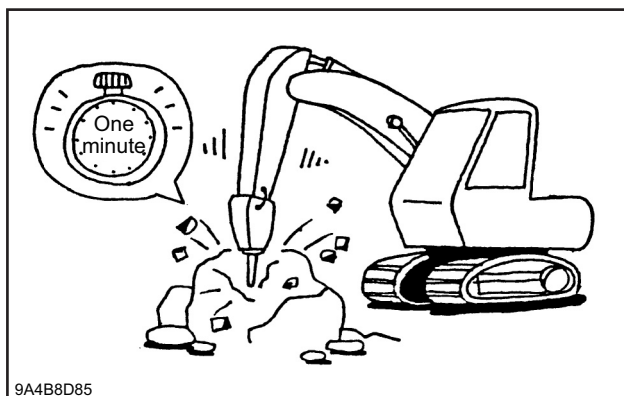
Cautions for Using Hydraulic Breaker

1. Striking continuously within 1 minute

If you cannot break a rock within 1 minute of striking at the same place, change the surface you strike.

Watch out for objects flying off during breaker striking work.

Install guards as necessary.

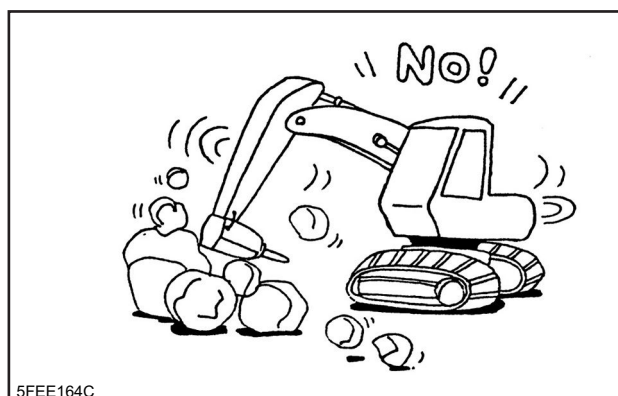


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2. Watching out for interference between the chisel and the boom

Be particularly careful with the machine folded in, for example for transporting it.

4. Doing work with swinging force prohibited
Doing so could damage the swing unit, breaker, arm, and boom.

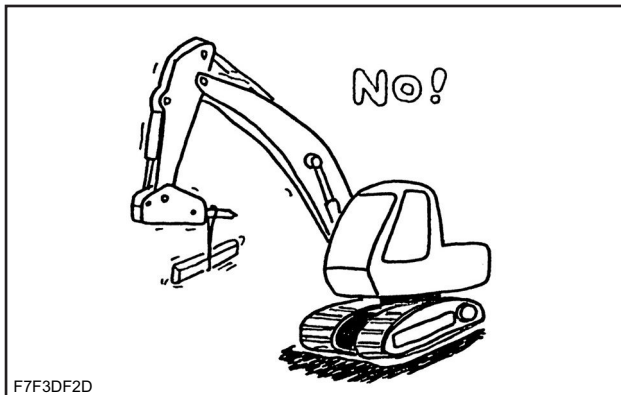


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5. Do not perform lifting work with the breaker.

This would cause breaker damage.

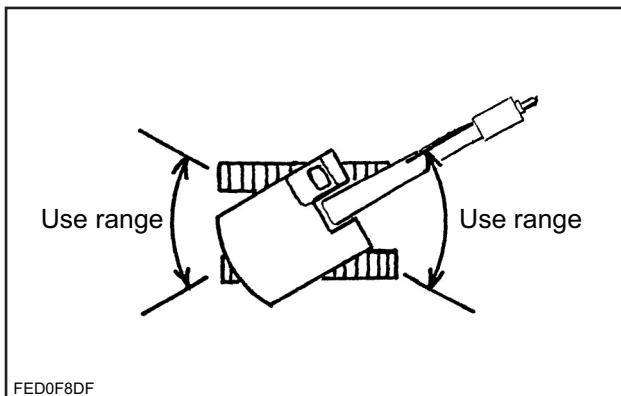
Also, use for any other than the main applications is dangerous.



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6. Using the breaker in front of the machine or behind the machine

Using the breaker to the side of the machine causes reduced service life for the undercarriage.



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Crusher

NOTICE: Do not use ultra-long reach machines to perform crusher operations.

Crusher Handling (attachment)

⚠ CAUTION

1. Cautions for mounting crusher

When mounting a crusher, it is necessary to select a crusher with specifications that match the excavator main unit.

A crusher is heavier than the bucket.

Operate it very carefully to prevent falling over accidents etc.

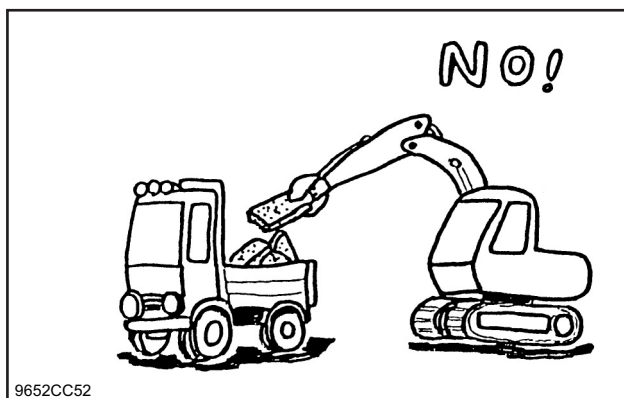
2. Cautions for using crusher

Read the crusher operator's manual thoroughly and work safely being careful not to damage the machine, have a falling over accident, etc.

1. Using the breaker for other than the main applications prohibited

The main applications for the crusher are demolition and rock breaking.

Do not use the crusher for loading or moving the crushed rocks.



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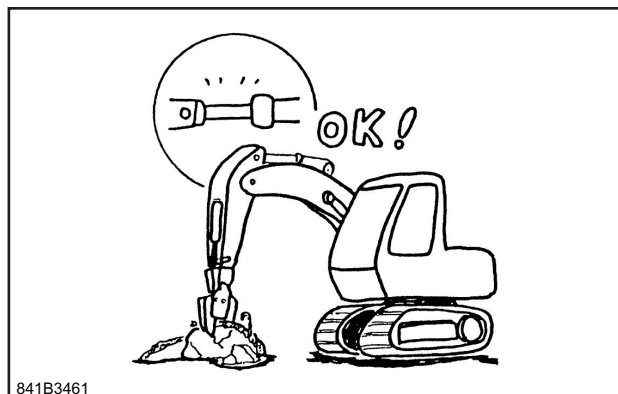
2. Working at end of the hydraulic cylinder stroke prohibited

This could cause cylinder and excavator main body damage.

During work, do not operate the cylinder to the end of its stroke. Operate with some margin.

Also, when swinging the arm down, if you go to the end of the stroke, the excess stress could damage the arm cylinder.

Operate so that you do not go to the stroke end of any of the cylinders.

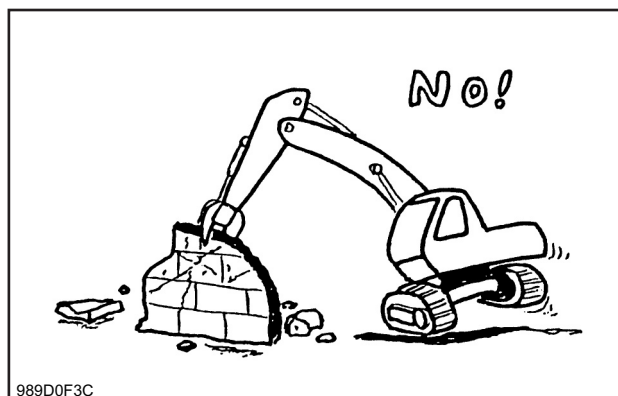


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3. Working with the shoes facing in the front-rear direction

Work with the excavator on a flat, stabilized footing.

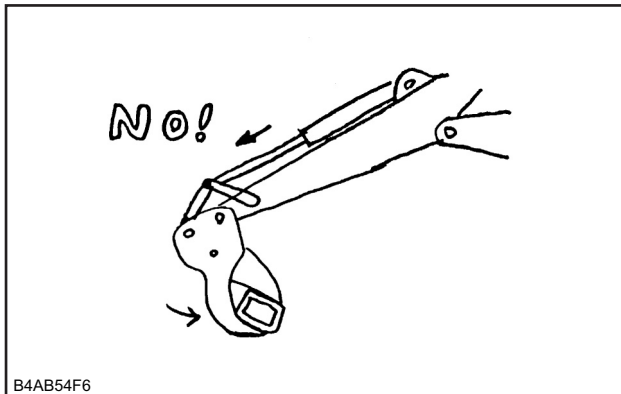
Working with the shoes facing sideways reduces the stability and poses the danger of falling over.



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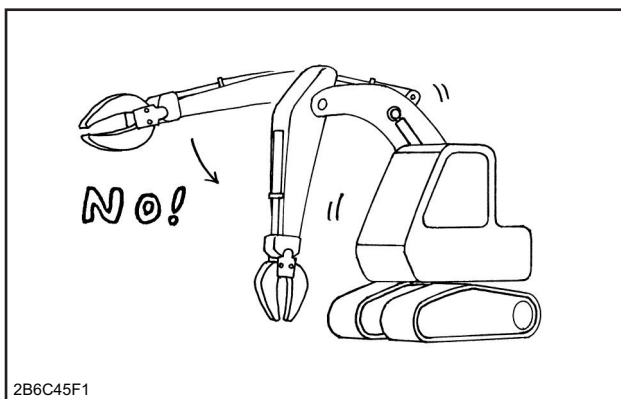
■ Working at end of the cylinder stroke prohibited

When destroying a steel frame or something similar with the crusher, if you pull in toward you with the bucket cylinder, sometimes the steel frame breaks down suddenly and the cylinder comes to its stroke end. This also causes excess stress. When working, check the cylinder stroke so that the cylinder will not rush to its stroke end even if the load is removed.



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When swinging the arm down, if you go to the end of the stroke, the excess stress could damage the arm cylinder. Also, jacking up with the arm at its stroke end applies excess stress on the arm cylinder. Do not work at the end of the stroke.

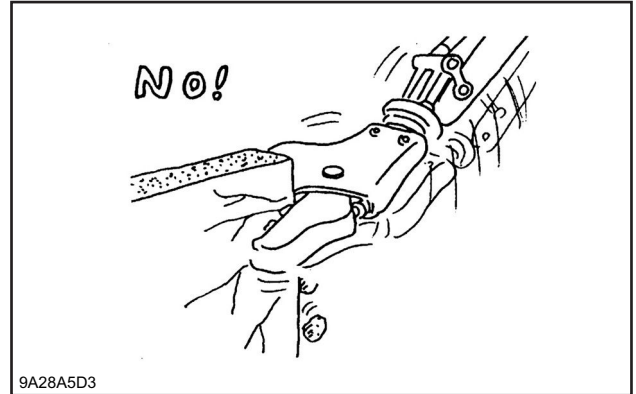


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■ Gouging work prohibited

Gouging work with the crusher on posts, beams, etc. puts excess stress on the crusher itself and the hydraulic excavator arm, boom, cylinders, etc. and can cause accidents and crusher damage.

Absolutely never do gouging work.

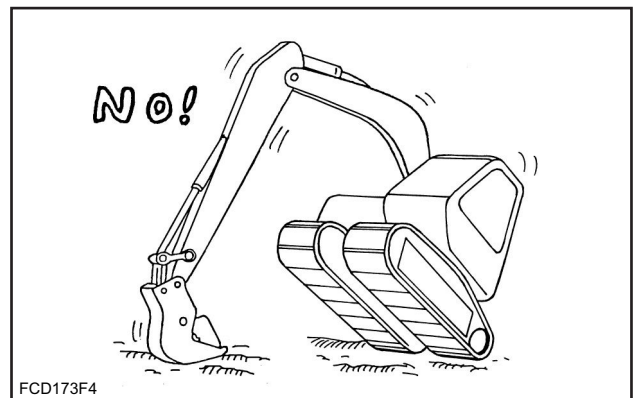


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■ Jacking-up prohibited

Pressing the crusher against the ground and jacking up and turning the hydraulic excavator not only applies excess stress to the crusher but only applies excess torsion to the hydraulic excavator arm and boom and can cause breakdowns and accidents.

Absolutely never jack up the excavator.



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Special Attachments

CAUTION

- When a hydraulic breaker is mounted, it is necessary to select an attachment with specifications that match the excavator main unit.
When selecting a special attachment, consult your nearest branch or sales office.
- When using a special attachment, carefully read the operator's manual for the special attachment and work safely being careful not to damage the excavator itself or the special attachment.
- A special attachment is heavier than the standard bucket. Do not operate at the end of the hydraulic cylinder stroke.
If you use a special attachment at the stroke end for a long time, the boom or other part may fall.

NOTICE:

When working with the breaker mounted, always check on the monitor that the correct work mode and pump flow are selected.

If the selection is incorrect, press the rocker switch to change to the special attachment, work mode, and pump flow to be used.

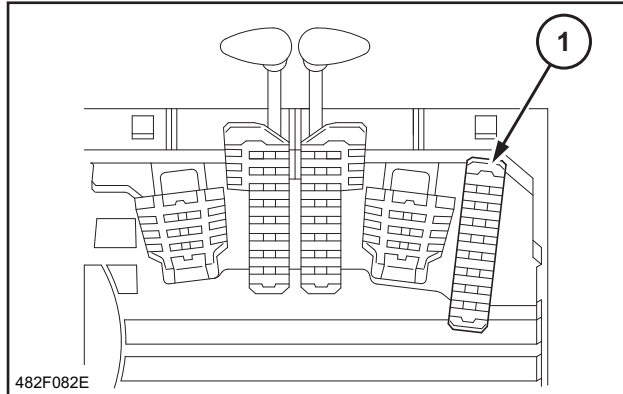
If the work mode and flow selection is incorrect, this causes machine operation defects and breakdowns and damage to the special attachment.

Operation Pedal Position

⚠ CAUTION

- Always lock the pedal when not in use.
- Stop the engine before switching the pedal.

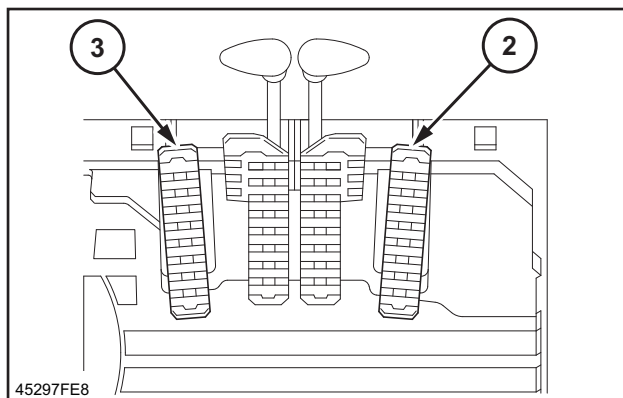
① Breaker type or multi-purpose type



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Set of ②③

- ② Breaker type + ③ 2nd option
- ② Multi-purpose model + ③ 2nd option

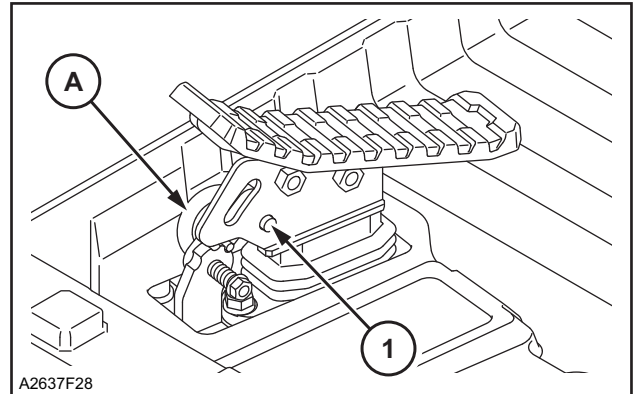


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Handling of Pedal

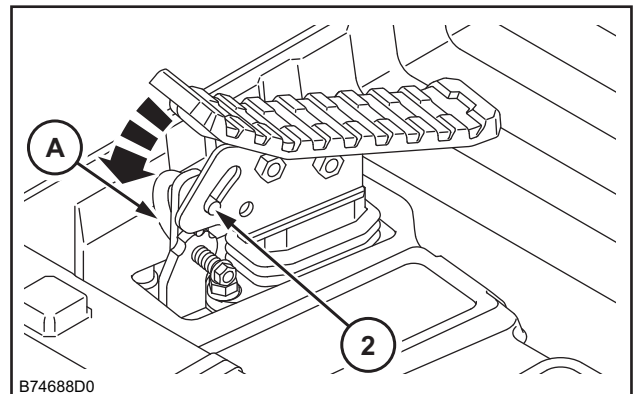
When not operating the pedal, put it in the locked ① position.

At the lock position ① and



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half lock position ② (for breaker operations), the pedal can be operated in one direction only.

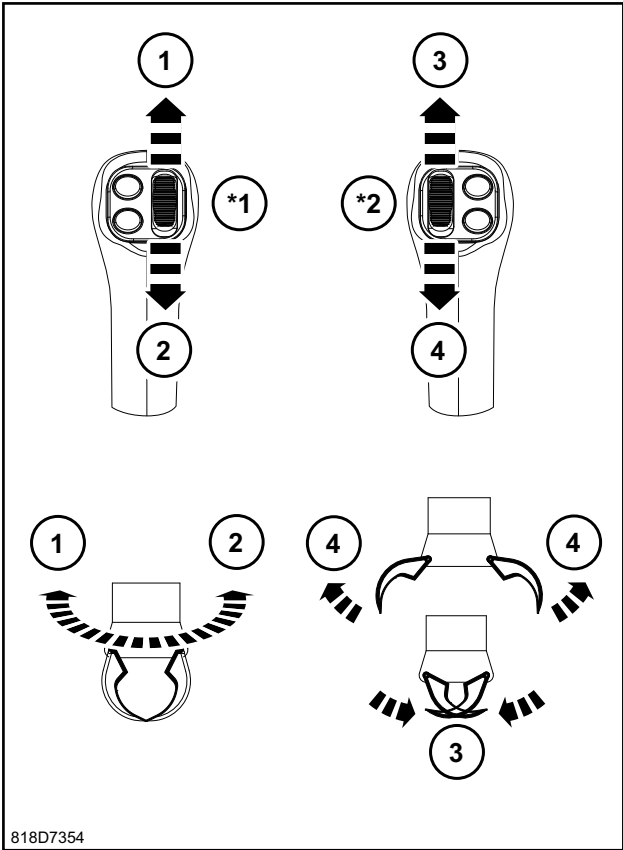


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To switch the pedal operation, pull the lock lever A and change the operation position.

Operation of Proportional Switch

When the machine is equipped with levers with proportional switch, the operating speed of the end attachment can be adjusted by operating the proportional switch.



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1	Rotates attachment clockwise
2	Rotates attachment counter-clockwise
3	Closes attachment
4	Opens attachment

*1	The rotation speed can be adjusted according to the sliding amount.
*2	The open/close speed can be adjusted according to the sliding amount.

Breaker Operation

Service when breaker is used: It is recommended that hydraulic oil management (sampling) be performed by a specialist.

Breaker operations are harder on the hydraulic excavator than digging operations and contamination and deterioration of hydraulic oil occurs rapidly.

If you continue to use the machine with hydraulic oil that has deteriorated and is contaminated, this will cause control valve operation defect, rapid wear of hydraulic pumps, and overall trouble in hydraulic circuits.

Service hydraulic oil at the time intervals listed below.

Service intervals for hydraulic oil and filters according to breaker use frequency													
Recommended hydraulic oil management interval Servicing locations	Use frequency	100 %			40 %			20 %			10 %		
	Hours	10	100	600	10	300	1500	10	600	3000	10	800	4000
Hydraulic oil		○		◎	○		◎	○		◎	○		◎
Return filter			◎			◎			◎			◎	
Suction filter			◇	◎		◇	◎		◇	◎		◇	◎
Pilot filter			◎			◎			◎			◎	
Hydraulic oil contamination measurement		Every 200 hours			Every 300 hours			Every 600 hours			Every 800 hours		
○ Inspect/refill ◎Replace ◇Clean or replace													

CAUTION

- When CHECK HYD. OIL FILTER message appears on the monitor, replace the return filter.
- Replace elements at each point that 100-hour is exceeded on the hour meter while breaker operations are being carried out continuously in a short periods of time.

Fuel Tank Feed Pump

Fuel Tank Feed Pump (if equipped)

⚠ WARNING

Observe the following cautions concerning the handling of diesel fuel.

- Do not smoke.
- Never refuel with the engine running.
- If any fuel spills, wipe it up immediately.

Failure to do so could lead to a fire and a serious accident.

NOTICE:

Do not put a separating agent (water removal agent) in the fuel tank.

It could damage the engine.

NOTE:

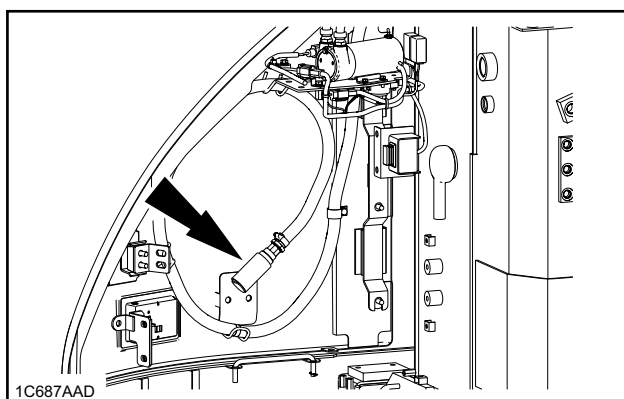
This pump is in the front storage box.

Use it only for fuel.

Use appropriate fuel.

For details, refer to "Hydraulic Fluids, Fuels, and Lubricants" (6-9) in [Maintenance].

1. Stop the machine on flat, level ground.
2. Stop the engine, then turn the starter switch key to the "ON" (ready) position.
3. Take out the inlet hose from the front storage box.



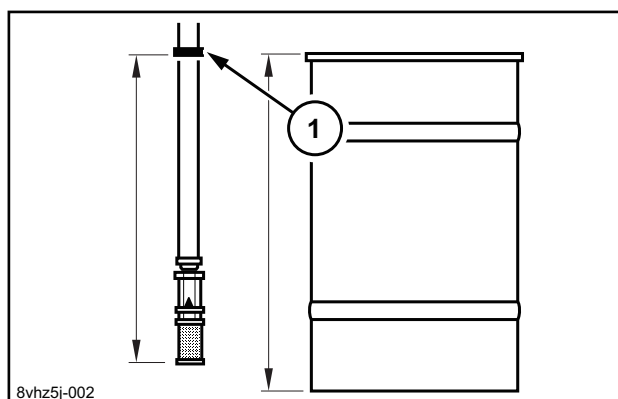
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4. Measure the height of the drum can and install the inlet hose ID clamp ① slightly lower than the drum height.

5. Check that the inlet hose valve is securely mounted.

6. Insert the inlet hose into the drum can.



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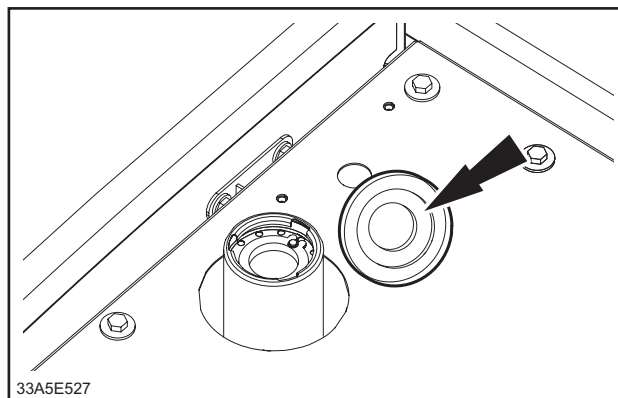
7. Remove the feed cap.

⚠ WARNING

If you use the feed pump with the feed cap still in place, when the fuel cap is removed after fueling, fuel may spray out.

Always remove the feed cap before fueling with the feed pump.

Otherwise, fuel may spray out and ignite and lead to a serious accident.

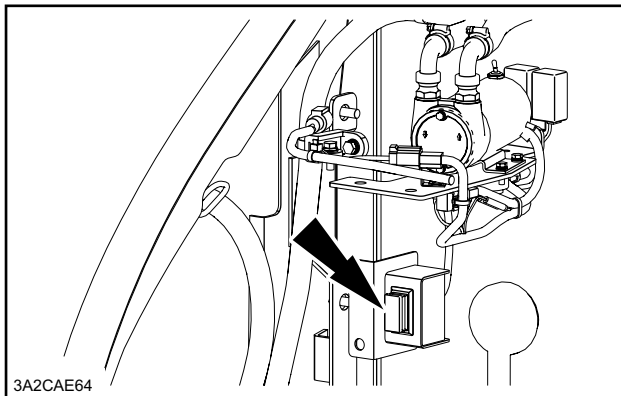


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8. Select the fueling mode with the selector switch on the right side of the feed pump.

- "AUTO": When the fuel tank becomes full, the feed pump automatically stops feeding and announces this with the alarm. Turn the switch "OFF".
- "MANUAL": Check the fuel level with the fuel gauge and feed fuel. When you let go of the switch, it returns to "OFF".



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NOTE: Fueling can be stopped at any time by turning the switch to the "OFF" (stop) position.

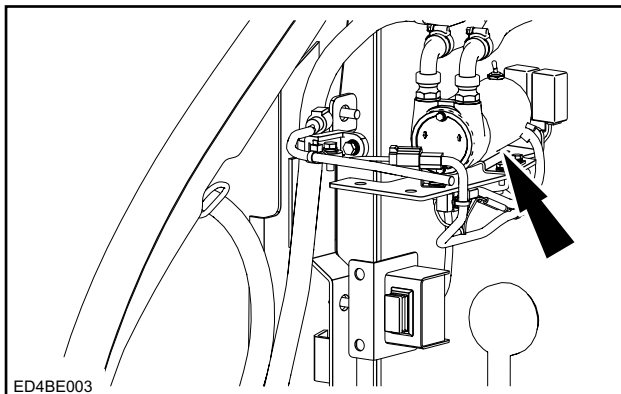
9. Run the pump for a while to empty the fuel from the inlet hose.

Clean the hose and return it to the front storage box.

10. Install the feed cap.

11. Turn the starter switch key to the "OFF" position.

NOTE: The pump is equipped with a 10 A fuse.



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Load Handling

WARNING

Danger of crush. When handling loads, it is very important to comply with the instructions in this manual and regional ordinances.

Failure to do so could cause death or serious injury.

The machine that lifts loads (tubes, concrete pipe connections, pillars, etc.) must be equipped with safety valves, overload indicators, load fastening points, and load handling charts appropriate to the machine model and its attachments.

NOTE:When handling loads, substitutes for safety valves cannot be used.

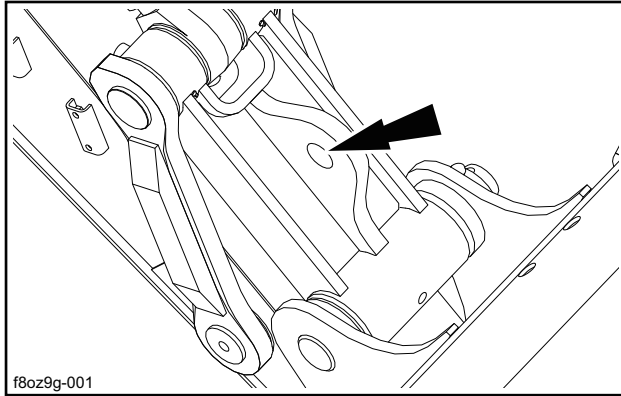
Always do the following when handling loads.

- Park the machine on flat, level, solid ground.
 - Fasten the load to the load fastening points (load handling eyes) on the bucket control rod.
Never weld a hook or lug to the bottom plate of the bucket.
 - Use slings and chains with enough durability for load being lifted, together with a safety hook with lock.
 - Check that the safety valve is operating correctly.
In accordance with current regulations and/or manufacturer's instructions, the pressure setting must be checked every 6 months.
Contact our dealer or Service Shop.
 - Check that the load handling chart is on the specially equipped dust jacket. Check that the chart matches the machine model and the attachment mounted on it.
 - Forcibly switch the overload indicator switch to the "ON" position.
 - Select work mode "H". (Refer to Page 3-47.)
 - Do not exceed the values in the load handling chart.
To obtain the load handling chart, consult our dealer or Service Shop.
You can obtain detailed information on the model number, counterweight weight, and boom and arm length and type.
 - Prohibit anyone from entering the work radius of this machine.
 - Operate the controls smoothly and operate the machine and its attachments correctly.
 - Stabilize the load a few centimeters above the ground and check that it is well balanced before moving it.
 - All operations must be carried out reliably and smoothly.
A quick movement and a rough movement are not the same.
- Always check the following items when traveling with loads. Face the upper structure in the same direction as the undercarriage.
- Hold the load as low as possible and close to the undercarriage and ground.
 - Always travel with low speed.

NOTE:Handling of machine loads complies with Directive 2006/42/EC related standard EN 474-1 and standard EN 474-5.

Load Handling Eye

When lifting a load, a sling and a chain must be attached to the load handling eye on the bucket control rod.



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OPERATOR'S MANUAL SH145X-6/SH145XU-6

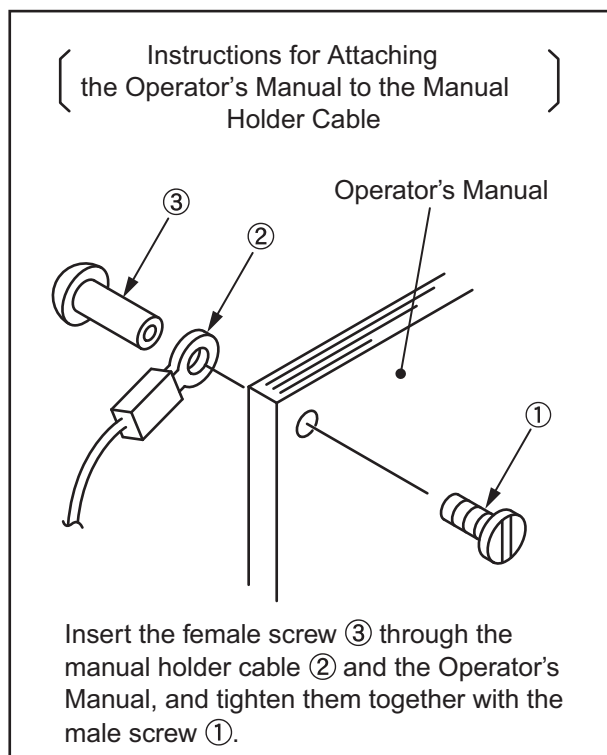
[Issuance History]

Revision	Date issued	Library reference number
1st edition	June 8, 2018	WDL1456D-0W AU0
2nd edition	January 25, 2019	WDL1456D-1W AU1

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Published by: SUMITOMO (S.H.I.) CONSTRUCTION MACHINERY CO., LTD.
Think Park Tower, 1-1 Osaki 2-Chome,
Shinagawa-ku, Tokyo, 141-6025 Japan
Telephone: 81-(0)3-6737-2600
Facsimile: 81-(0)3-6866-5112
Web Site Address: <http://www.sumitomokenki.co.jp>

SUMITOMO



Printed in Japan

**SUMITOMO (S.H.I.)
CONSTRUCTION MACHINERY CO., LTD.**

D19 • 1 ②
KMP16621