OPERATOR'S MANUAL

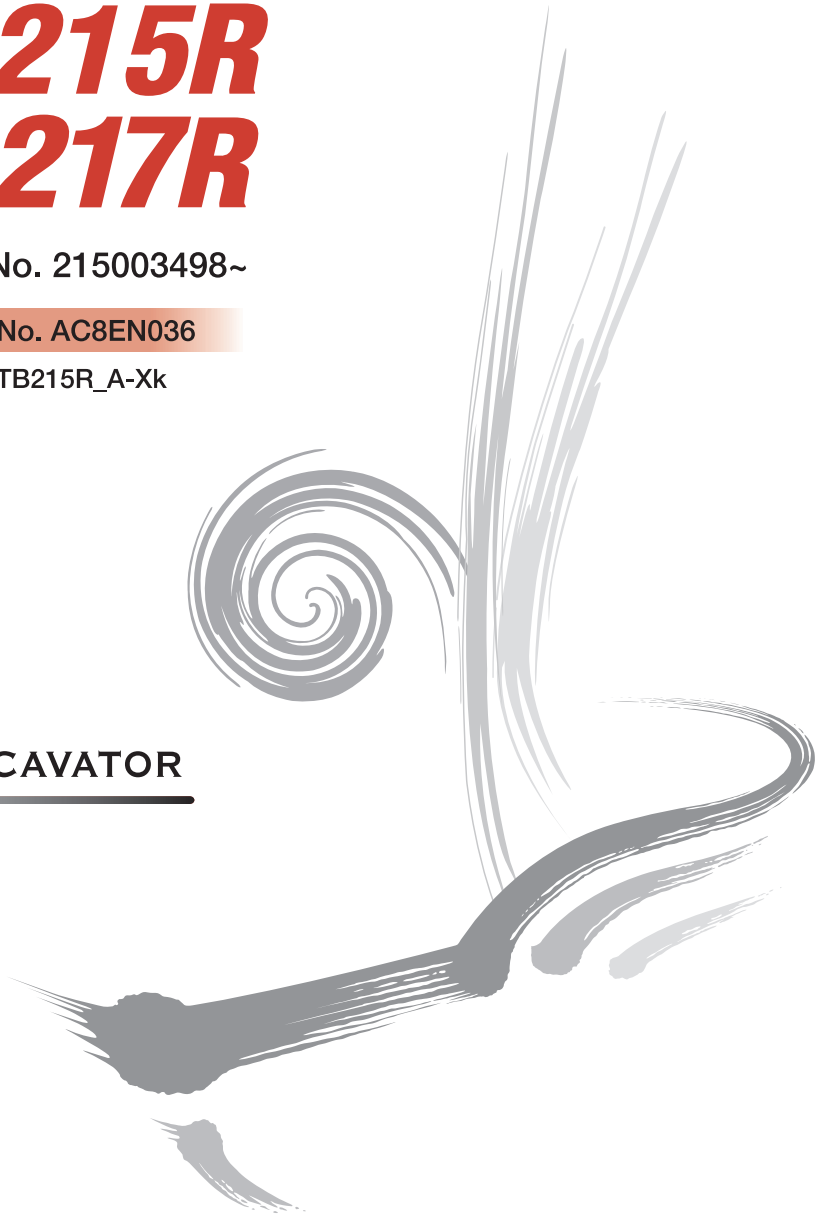
Original instructions

TB215R
TB217R

Serial No. 215003498~

Book No. AC8EN036

OENTB215R_A-Xk



MINI EXCAVATOR

TAKEUCHI

WARNING Read and understand these instructions.
Failure to do so can cause injury or death.

03392-00037

SAFETY ALERT SYMBOL



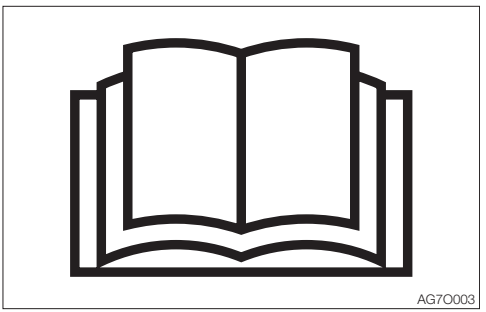
This symbol represents the safety alert. The message that follows the symbol contains important information about safety.
Read and understand the message to avoid personal injury or death.

It is the owner or employer's responsibility to fully instruct each operator in the proper and safe operation of all equipment. All persons using this machine should thoroughly familiarize themselves with the contents of this manual.

All operators must be instructed on the proper functions of the excavator before running the machine.

Learn and practice correct use of the machine controls in a safe, clear area before operating this machine on a job site.

⚠ WARNING



Improper operation, inspection and maintenance of this machine can cause injury or death.
Read and understand this manual before performing any operation, inspection or maintenance on this machine.

Always store this manual near at hand preferably on the machine itself. If it should be lost or damaged, immediately order a new one from your Takeuchi dealer.
When transferring ownership of this machine, be sure to hand this manual to the next owner.

Takeuchi supplies machines complying with the local regulations and standards of the country of export. If your machine has been purchased in another country or from a person or company of another country, it may not have the safety devices or safety standards required for use in your country. Should you have any question about whether your machine complies with the regulations and standards of your country, contact a Takeuchi dealer.

SIGNAL WORDS

Safety messages appearing in this manual and on machine decals are identified by the words “DANGER”, “WARNING” and “CAUTION”. These signal words mean the following:

⚠ DANGER

DANGER indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.

⚠ WARNING

WARNING indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.

⚠ CAUTION

CAUTION indicates a hazard with a low level of risk which, if not avoided, could result in minor moderate injury.

IMPORTANT: The word IMPORTANT is used to alert operators and maintenance personnel about situations which could result in damage to the machine and its components.

It is impossible to foresee every possible circumstance that might involve a potential hazard. The warnings in this manual or on the machine can not cover all possible contingencies. You must exercise all due care and follow normal safety procedures when operating the machine so as to ensure that no damage occurs to the machine, its operators or other persons.

INTRODUCTION

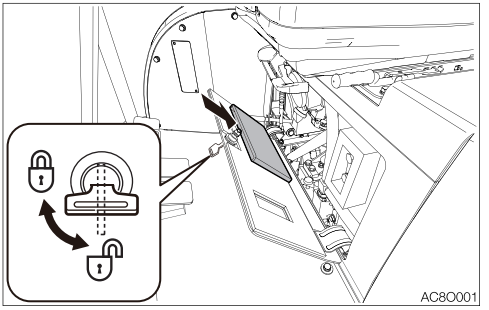
FOREWORD

This manual describes operation, inspection and maintenance of the machine, as well as safety instructions to be heeded during these operations.
If you have any questions about the machine, please contact a Takeuchi sales or service outlet.

- Some details in this manual may differ from those provided in the machine you are using.
- Please note that the information and specifications in this manual are subject to change without prior notice.

MANUAL STORAGE COMPARTMENT

A compartment for storing this manual is provided at the position shown on the diagram below.

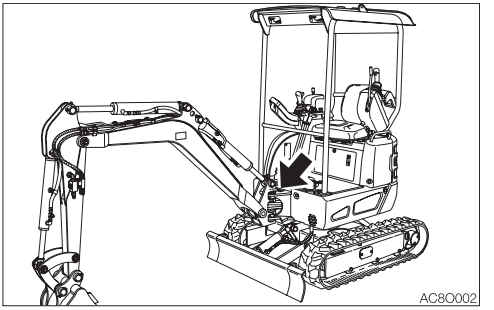


1. Insert the starter key and turn it counterclockwise to open the cover under the seat.
2. After using the manual, place it in the plastic pouch and store it back in the manual storage compartment.

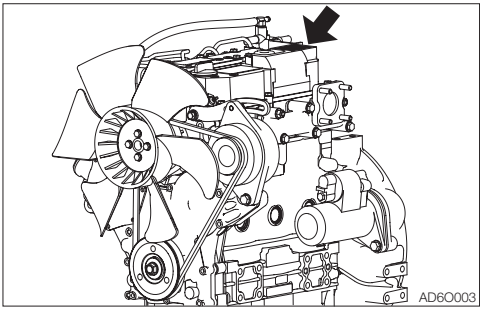
SERIAL NUMBERS

IMPORTANT: Do not remove the machine name plate with the serial number. Check the serial numbers of the machine and engine and write them down in the spaces below.

Machine number:

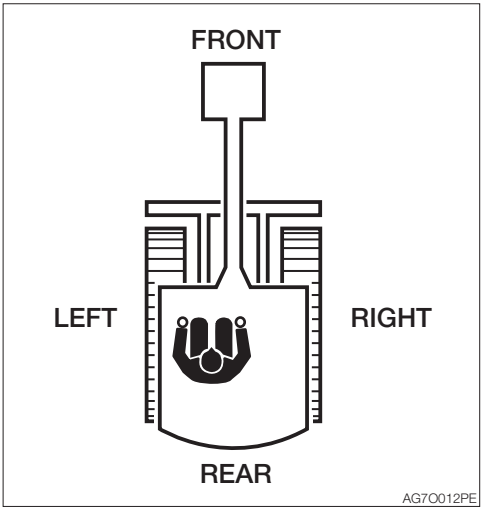


Engine number:



MACHINE DESCRIPTION

FRONT, REAR, LEFT AND RIGHT



This manual refers the front, rear, left and right of the machine as seen when sitting in the operator's seat with the dozer blade visible to the front.

DESIGNATED OPERATIONS

Use this machine primarily for the following operations:
- Excavation
- Digging ditches
- Digging side ditches
- Leveling
- Loading

FEATURES

- "Flexible machine width mechanism" for crawler width
- Low engine noise and exhaust emissions
- Smaller rear slew radius, smaller turns (stability is retained)

BREAK-IN PERIOD

When the machine is new, operate the machine for the first 100 hours (as indicated on the hour meter) by following the instructions below.
Using a new machine without a break-in period will lead to quicker deterioration of machine performance and may shorten the machine's service life.
- Sufficiently warm up the engine and hydraulic oil.
- Avoid heavy loads and rapid operations. Operate with a load of about 80% the maximum load.
- Do not abruptly start up, accelerate, change directions, or stop unless necessary.

NOTES ON READING THIS MANUAL

Please note that the descriptions and diagrams included in this manual may not be applicable to your machine.
The numbers used in the illustration are with circles around them. The same numbers appear between the parentheses in the text.
(Example: ① → (1))

Symbols used in this manual
The symbols used in this manual have the following meanings.
⃠, ✕..... Prohibition
..... Lock
..... Unlock

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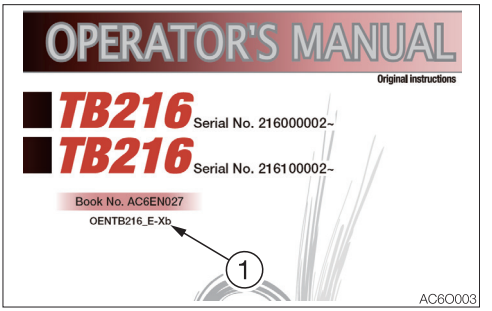
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REVISION HISTORY

When checking the revision history, refer to the book code (1) on the cover page.

Example:
O EN TB216_E-X b

- Revision history (A to Z, a to z)
- Model code
- Language
- Type
  - O: Operator's Manual
  - W: Workshop Manual



Revision history	Date	Description	Importance
f	05/2024	Changed:	
		Precautions on maintenance 1-26	High
		Declaration of Conformity 8-30	High
g	08/2024	Changed:	
		Safety signs (decals) 1-35	High
		Hoisting the machine 4-4	High
		Securing the machine 4-6	High
		Regularly replace the hydraulic oil 5-6	High
		Basic Specifications 7-2	High
		Declaration of Conformity 8-30	High
h	11/2024	Changed:	
		Before starting operation 3-2	High
		Selecting a lever pattern (A-B) 8-6	High
i	04/2025	Changed:	
		Lifting Capacities 7-10	High
j	05/2025	Changed:	
		Lifting Capacities 7-11	High
k	10/2025	Changed:	
		Service data 5-4	High

SAFETY



GENERAL PRECAUTIONS

It is your responsibility to observe all pertinent laws and regulations and to follow the manufacture's instructions on machine operation, inspection and maintenance.

Virtually all accidents occur as the result of a failure to observe basic safety rules and precautions.
Most accidents can be prevented by identifying the potentially hazardous situations beforehand.
Read and understand all safety messages which describe how to prevent accidents.
Do not operate the machine until you are sure that you have gained a proper understanding of its operation, inspection and maintenance.

Observe all safety rules

- Operation, inspection and maintenance of this machine must be performed only by a trained and qualified person.
- All rules, regulations, precautions and safety procedures must be understood and followed when performing operation, inspection and maintenance of this machine.
- Do not perform any operation, inspection and maintenance of this machine when under the adverse influence of alcohol, drugs, medication, fatigue, or insufficient sleep.

When a problem is found on the machine

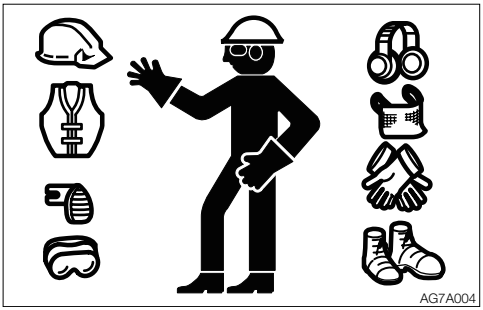
If any problem (noise, vibration, smell, disorder of instrument, smoke, oil leak or wrong indication of alarm and panel, etc.) is detected during the operation or inspection and maintenance of the machine, please inform the administrator and take proper actions. Do not operate the machine until the trouble is cleared.

Operating temperature range

To maintain the performance of machine and to prevent it from early wear, observe the following operating conditions.

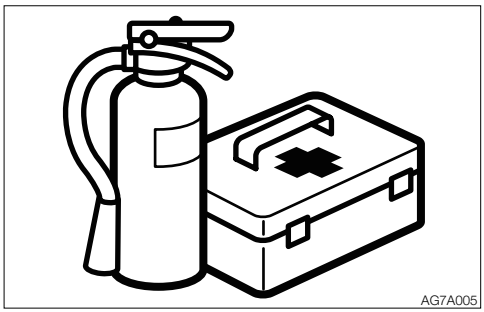
- Do not operate the machine if the ambient temperature is higher than +45°C (+113°F) or lower than –15°C (+5°F).
  - If operated at an ambient temperature of higher than +45°C (+113°F), the engine may overheat and cause the engine oil to degrade. Also, the hydraulic oil may become very hot, causing damage to the hydraulic equipment.
  - If operated at an ambient temperature of lower than –15°C (+5°F), the parts made of rubber such as gaskets may get hardened to cause an early wear or damage to the machine.
  - If the machine is to be used outside the ambient temperature range described above, consult your sales or a service dealer.

Wear appropriate clothing and protective equipment


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- Do not wear loose clothing or any accessory that can catch on controls or in moving parts.
- Do not wear oily or fuel stained clothing that can easily catch fire.
- Wear a hard hat, safety shoes, safety glasses, filter mask, heavy gloves, ear protection and other protective equipment as required by job conditions. Wear required appropriate equipment such as safety glasses and filter mask when using grinders, hammers or compressed air, as metal fragments or other objects can fly and cause serious injury.
- Use hearing protection when operating the machine. Loud prolonged noise can cause hearing impairments, even the total loss of hearing.

Install a fire extinguisher and first aid kit


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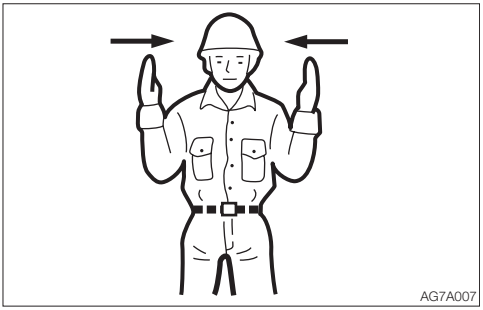
Be prepared for fire and accidents

- Install an extinguisher and a first aid kit, and learn how to use them.
- Lean how to fight a fire and how to deal with accidents.
- Know how to contact emergency assistance and make a list of emergency contacts.

Never remove safety equipment

- Make sure all protective guards, canopies and doors are in place and secured. Repair or replace damaged parts before operating the machine.
- Know how to use the safety lock lever, seat belt and other safety equipment and use them properly.
- Never remove any safety equipment except for servicing. Keep all safety equipment in good operating condition.

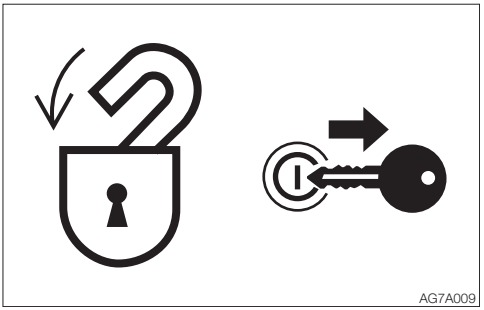
Use a signal person and a flag person



Learn how to use the hand signals required for particular jobs and make sure who has the responsibility for signaling.

- All personnel must fully understand all the signals.
- The operator must respond to signals only from the appointed signal person, but must obey a stop signal at any time from anyone.
- The signal person must stand in a clearly visible location when giving signals.

Cautions when standing up from or leaving the operator's seat



- Before standing up from the operator's seat to, for example, adjust the operator's seat, lower the working equipment to the ground, raise the safety lock lever to the lock position and then stop the engine. If any control is accidentally touched when the safety lock lever is lowered (unlocked), the machine will suddenly move and cause serious injury or death.
- Note that the dozer blade, boom swing and auxiliary hydraulic controls cannot be locked, even when the safety lock lever is set to the locked position.
  Do not carelessly touch these controls.
- Be careful not to touch the operating levers when raising or lowering the safety lock lever.
- Before leaving the operator's seat, lower the working equipment to the ground, raise the safety lock lever to engage the lock and stop the engine. Also, be sure to remove the key, lock the covers, take it with you and store it in a specified place.

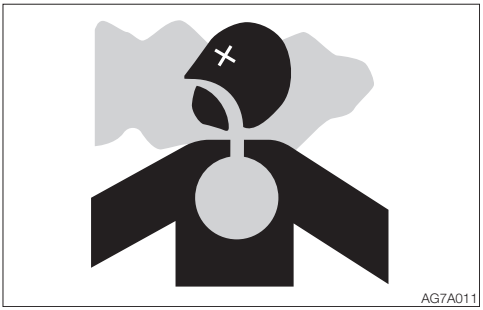
Avoid fire and explosion hazards



Keep flames away from fuel, oil, grease and antifreeze. Fuel is particularly flammable and dangerous.

- When handling these combustible materials, keep lit cigarettes, matches, lighters and other flames or sources of flames away.
- Do not smoke or permit open flames while handling fuel or working on the fuel system.
- Do not leave the location while refilling with fuel or oil.
- Never remove the fuel cap or add fuel when the engine is running or still hot. Also, do not spill the fuel on the hot surface of the machine or the component of the electric system.
- Clean up spilled fuel or oil immediately.
- Check for fuel, oil leak. Stop all leaks and clean the machine before operating.
- When operating with grinder or welding, move inflammables to a safe place.
- Do not cut or weld on pipes or tubes that contain flammable fluids. Clean thoroughly with nonflammable solvent before cutting or welding.
- Remove all trash or debris from the machine. Make sure that oily rags or other flammable material are not stored on the machine.
- Handle all solvents and dry chemicals (foam type fire extinguisher) according to procedures identified on manufacturer's containers. Work in a well-ventilated area.
- Never use fuel for cleaning purposes. Always use a nonflammable solvent.
- When handling the fuel, washing oil or paint, open the door and windows to ventilate thoroughly.
- Store all flammable fluids and materials in a safe and well-ventilated place.
- The short circuit of the electric system may cause the fire. Check for any loosened connections or damage to the wires every day. Retighten the loosened connector and wire clamp. Fix or change the damaged wire.
- Fire from the pipes:
  Make sure that the clamps, guards and cushions of the hoses and tubes are securely fixed. If not, hoses or tubes may be damaged due to vibration or contact with other parts during operation. This can cause the high-pressure oil to spurt out, resulting in the fire or injury.

Exhaust fumes from the engine are poisonous



- Do not operate the engine in an enclosed area without adequate ventilation.
- If natural ventilation is not possible, install ventilators, fans, exhaust extension pipes or other venting devices.

Handling asbestos dust

Inhaling asbestos dust can cause lung cancer. When handling the materials which may contain asbestos, take the following precautions:

- Never use compressed air for cleaning.
- Avoid brushing or grinding parts containing asbestos.
- For clean up, use a vacuum equipped with a high efficiency particulate air filter (HEPA).
- Wear the stipulated respirator if there is no other way to control the dust. When working indoors, install a ventilation system with a macromolecular filter.
- Do not allow unauthorized personnel in the work area while working.
- Follow the rules and environmental standard applicable to the work area.

Be careful not to get crushed or cut



Never put your hands, feet or other parts of your body between the upperstructure and the undercarriage or tracks, between the machine body and working equipment, or between a cylinder and moving part. The sizes of these gaps change when the machine moves, and a person can suffer severe injury or death.

Using optional products

- Consult with Takeuchi before installing optional attachments. Depending on the type of attachments or the combination of them, the attachment may come into contact with the operator's compartment or the other parts of the machine. Make sure that the optional attachment installed is not contacted with other parts before use.
- Do not use attachments that have not been approved by Takeuchi. Doing so may compromise safety or adversely affect the machine's operation or service life.
- Takeuchi will not be held responsible for any injuries, accidents or damage to its products caused by the use by a non-approved attachment.

Never modify the machine

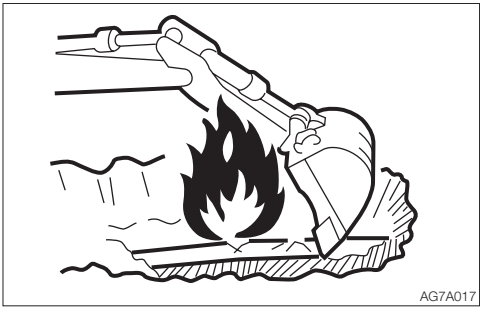
Unauthorized modifications to this machine can cause injury or death. Never make unauthorized modifications to any part of this machine.
If you modify or alter the configuration of the machine in a way which results in a restriction of the operator's field of vision, a new risk assessment will need to be performed. If this becomes necessary, contact your Takeuchi service or sales dealer.

PRECAUTIONS WHEN PREPARING

Know the work area

Before starting operation, know the working area condition to ensure safe operation.

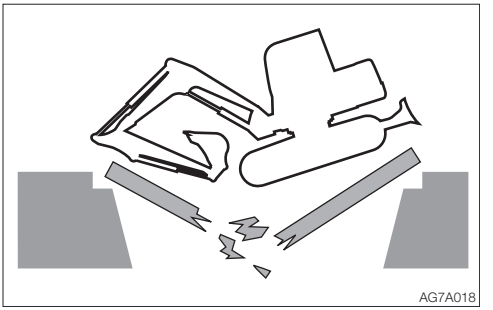
- Inspect the topography and ground condition of the working area, or the structure of the building when working indoors, and take the safety precautions as necessary.
- Be sure to avoid all hazards and obstructions such as ditches, underground lines, trees, cliffs, overhead electrical wires, or places where there is a danger of falling rocks or slides.


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- Check with the administrator for the locations of buried gas pipes, water pipes and power cables. If necessary, determine what specific precautions must be taken to insure safety by consulting with the administrator.
- When working on roads, be sure to consider the safety of pedestrians and vehicles.
  - Use a flag person and/or a signal.
  - Fence off the working area and keep off unauthorized persons.
- When working in water or crossing shallow streams or creeks, check the depth of the water, the solidity of the ground and the water flow speed beforehand.
  Refer to “Cautions on operating” for further instructions.

Check the strength of the bridge

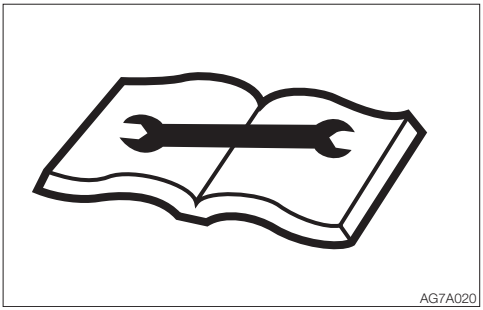
When traveling over a bridge or a structure, check the permissible load. If the strength is insufficient, reinforce the bridge or the structure.


AG7A018

Always keep the machine clean

- Wipe off any oil, grease, mud, snow or ice, to prevent accidents due to slipping.
- Remove all loose objects and unnecessary devices from the machine.
- Remove any dirt, oil or grease from the engine area to prevent fires.
- Clean around the operator’s seat and remove any unnecessary object from the machine.

Perform inspection and maintenance every day



Failure to identify or repair the irregularities or damage on machine can lead to accidents.

- Before operating, perform the specified inspection and make prompt repairs where necessary.
- If a failure occurs and the operation becomes impossible or the engine fails, immediately stop the machine by following the shutdown procedure, and keep machine securely parked until the malfunction is corrected.

Cautions in the operator's compartment

- Remove mud and grease from shoe soles before entering the operator's compartment. Pedaling the machine with the shoes with mud and grease will cause a slip accident.
- Do not leave the parts or tools around the operator's seat.
- Do not leave any plastic bottles in the operator's compartment or attach any suction cups on the window glass. The plastic bottle or suction cup act as a lens and can cause fire.
- Do not use the mobile phone during traveling or working.
- Do not bring combustibles or explosives into the operator's compartment.
- Do not leave the cigarette lighter in the operator's compartment. When the room temperature rises, the lighter may explore.

PRECAUTIONS WHEN STARTING

Support your weight in a three point secure stance when getting on/off the machine

- Do not jump on or down from the machine. Never attempt to get on or off the moving machine.


AG7A022

- Climb up/down the steps facing the machine and holding the handrail to support your weight in a three point secure stance (hand and feet).
- Never use the safety lock lever or control levers as hand holds.

Before starting the machine, ask any unauthorized personnel to leave the area

Do not start the engine until you are sure it is safe to start the machine by checking the following items.

- Walk around the machine and warn the person who is servicing the machine or is walking near the machine. Do not start the machine until you are certain that no one is around the machine.

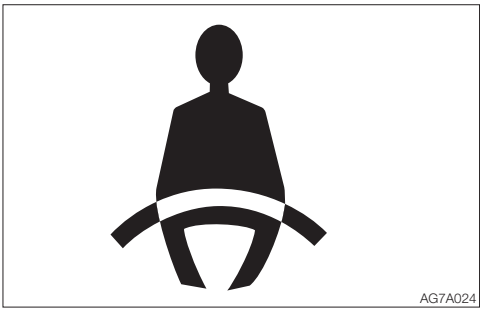


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- Check if there is a “DO NOT OPERATE” alert sign or similar sign is on the cab door, controls or starter switch. If there is one, do not start the engine or touch any levers.
- Sound the horn to warn people around the machine.

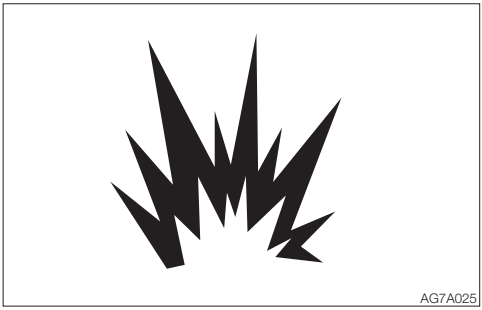
Sit in the operator’s seat and start the engine

- Adjust the seat to securely latch it.


AG7A024

- Fasten the seat belt.
- Check if the parking brake is on and all control levers and pedals are in the neutral position.
- Check if the safety lock lever is in the lock position.
- Make sure that no one is near the machine.
- Start and operate the machine only from the operator’s seat.
- Never attempt to start the engine by shorting across the starter terminals.

Starting with jumper cables



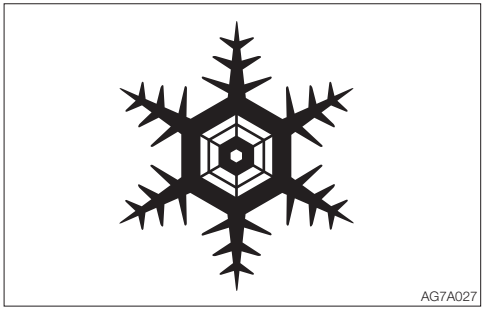
Use jumper cables only in the recommended manner. Improper use of jumper cables can result in battery explosion or unexpected machine motion.
Refer to “If the battery goes dead” for further instructions.

After starting the engine

After starting the engine, perform the operations and checks described below in a safe place with no persons or obstacles in the area. If any malfunction is found, follow the shutdown procedure and report the malfunction.

- Warm up the engine and hydraulic oil.
- Check if all gauges and warning devices are properly working.
- Check for any noises.
- Test the engine speed control.
- Operate each control to ensure they are properly working.

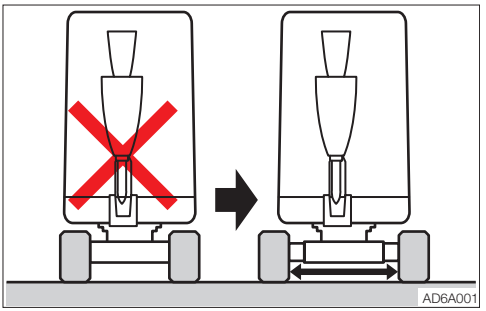
In cold climates



- Be careful of slippery conditions on freezing ground, steps and hand holds.
- In severe cold climates, do not touch any metal parts of the machine with bare hands. The skin will freeze to the metal, resulting in severe injury.
- Do not use ether or starting fluid on this engine. The starting fluids can cause explosion and serious injury or death.
- Warm up the engine and hydraulic oil. If the levers are operated without warming, the machine will not react or move promptly or properly, resulting in accident.

PRECAUTIONS WHEN OPERATING

Operate the machine with the maximum crawler width



- Always operate the machine with the crawler width extended to 1300 mm (51.2 in.) to maximize the machine stability. If the machine is operated with the crawler width narrowed (980 mm, 38.6 in.), the machine may tip over due to its poor stability.
- If the machine must be operated with the narrowed crawler width (980 mm, 38.6 in.), traveling should be done after folding the hoe attachment, lowering the boom to lower the center of gravity and keeping the machine facing forward.

Ensure good visibility

Check the field of view before operating the machine.

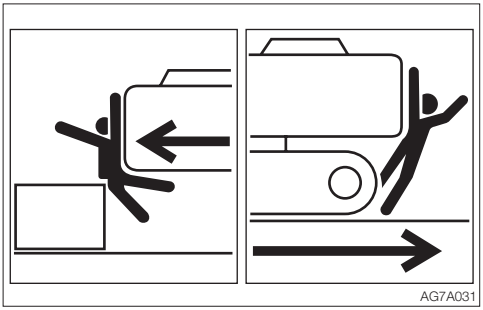
- When working in dark places, turn on the machine's working lights and headlights and additional lighting equipment installed, as necessary.
- When visibility is poor due to bad weather (fog, snow, rain or a cloud of dust), stop operating the machine and wait until visibility improves.
- Clean the windows, mirrors, lights and camera to ensure good visibility. Adjust the mirror and camera to the best positions so that the operator can see the rear view (blind spots) from the operator's seat.
- Unauthorized machine modifications or installation of unapproved attachments could impair the visibility. The operator's field of view must conform to ISO 5006.

Do not permit riders on the machine



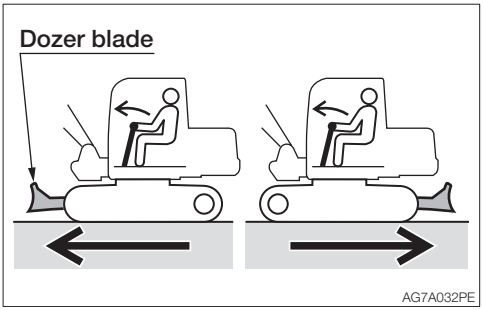
Do not allow anyone to ride on any part of the machine at any time while traveling or operating.

Check if the work area is safe and secure before operation



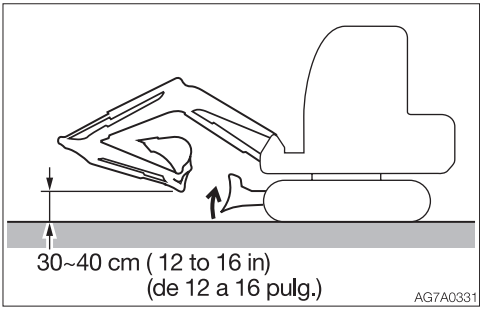
- Confirm the performance limits of the machine.
- Use a signal person at road shoulders, narrow places or where your vision is obstructed.
- Never allow anyone to enter the machine's slewing radius and path.
- Signal your intention to move by sounding the horn.
- There is a blind spot in the rear of the machine. Before traveling in reverse, check that the area is safe and clear.

Check the position of the undercarriage (tracks) before traveling

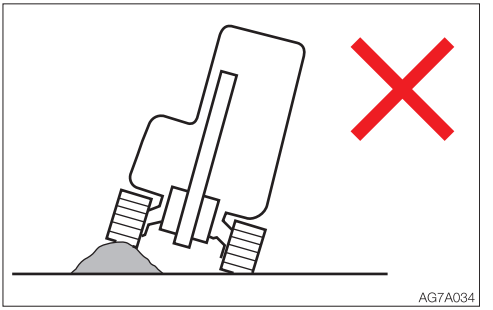


Before operating the travel levers/pedals, make sure that the dozer blade is to the front of the operator's seat. Remember that when the dozer blade is to the rear of the operator's seat, the travel levers/pedals must be operated in the reverse direction from when it is to the front.

Travel safely



- Travel with the dozer blade raised, the hoe attachment folded as shown on the figure above, and the bucket raised 30 to 40 cm (12 to 16 in.) above the ground.
- Do not slew while traveling. If you must operate the hoe attachment while traveling, operate at speeds slow enough so you have complete control at all times.
- When a load greater than a set value is applied during traveling in 2nd (high) speed, the speed will automatically slow down to 1st (low) speed. When the load becomes lighter, the speed will increase and return to 2nd (high) speed. It should be noted that the travel speed changes depending on the load condition (for machines with the automatic travel shift-down system).

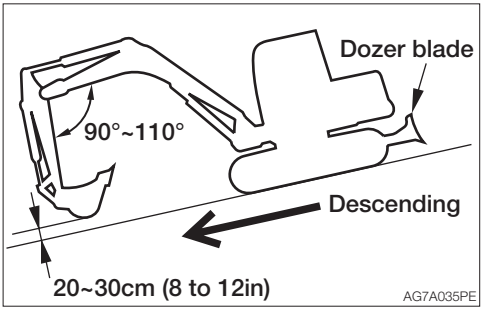


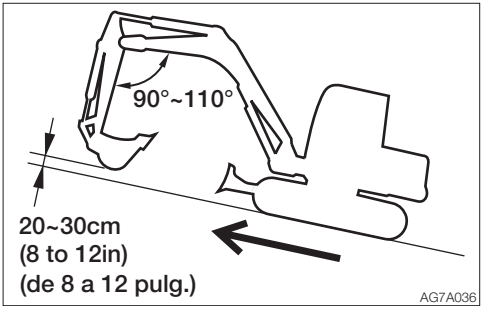
- Avoid crossing over obstacles whenever possible. If you must do so, keep the hoe attachment close to the ground level and travel slowly. Never cross obstacles which will tilt the machine to an angle of 10° or greater.
- On uneven ground, maintain the low speed and avoid starting, stopping or changing directions abruptly. Otherwise, the working equipment may come in contact with the ground, causing the machine to lose its balance and get damaged or to damage the structures in the surrounding area.

Cautions on traveling on slopes

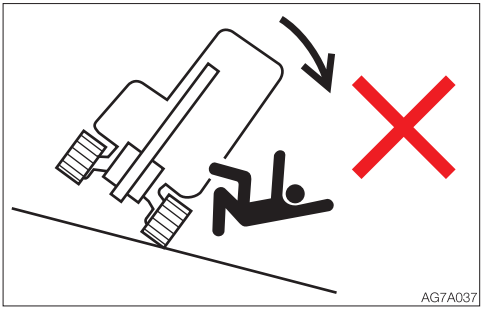
When traveling on slopes or grades, be careful that the machine does not tip (roll) over or slide.

- Never travel on slopes that are too steep for the machine to maintain its stability. Note that in reality, the machine's performance decreases on slopes due to its poor working condition.





- When climbing a hill, keep the operator's seat facing the hillside. When descending a hill, keep the operator's seat facing the downhill direction. In either case, travel must be done while paying attention to the ground in front of the machine.
- When traveling on slopes, lower the bucket to a height of 20 to 30 cm (8 to 12 in.) above the ground. When climbing a steep slope, extend the hoe attachment to the front. In emergencies, lower the bucket to the ground and stop the machine.
- When traveling on slopes or grades, drive slowly in 1st (low) speed. When descending a slope, slow down the engine speed.
- Do not descend slopes in reverse.

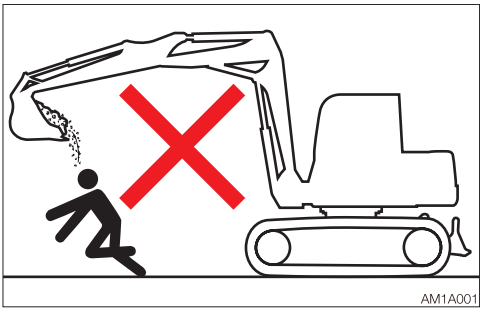


- Do not change directions on slopes or traverse slopes. First return to a flat surface, and then take an alternative path.
- The machine may slip sideways even on a slight slope if the ground is covered with grass or dead leaves, or when traveling on a wet metal plate or frozen surfaces. Make sure the machine is never positioned sideways on slopes.
- If the machine is stalled on the slope, return each operating lever to the neutral position before restarting the engine.

Operate the machine on snow or ice with extra care

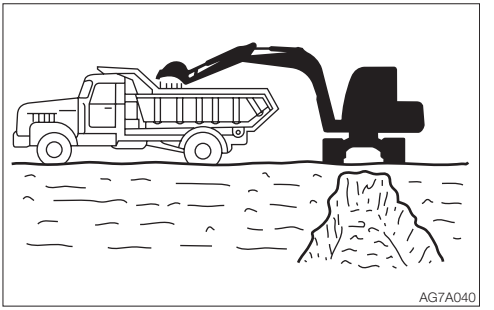
- When traveling on snow or on frozen surfaces, drive at a low speed and avoid starting, stopping or changing directions abruptly.
- In the snowy area, the road shoulder and objects placed beside the road are buried in the snow and cannot be seen. There is a hazard of the machine tipping over or hitting covered objects, so always carry out operations carefully.
- If the machine enters deep snow, there is a hazard that it may tip over or become buried in the snow.
  Be careful not to drive beyond the road shoulder or to get trapped in a snow drift.
- With frozen ground surfaces, the ground becomes soft when the temperature rises, and this may cause the machine to tip over, resulting in an operator trapped inside the machine.
- When parking the machine on an unstable ground, lower the dozer blade.

Do not move the bucket over the heads of people



Moving the bucket over the heads of people entails the danger of the load spilling or the sudden dropping of the bucket.

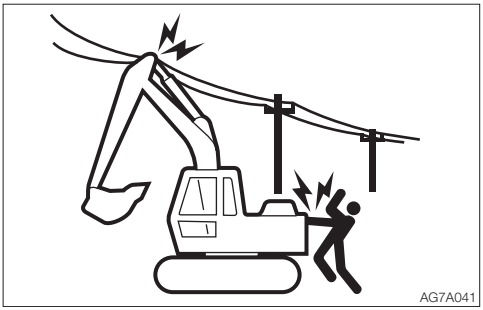
Ensure driver's safety when loading



Do not load a truck unless the truck driver is in a safe place.

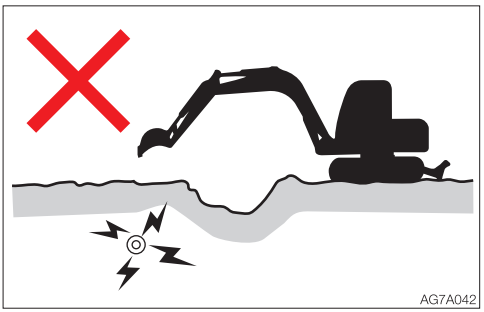
- Never swing or position the bucket over a person or the cab room.
- Load the truck from the rear.

Keep a safe distance from the overhead high-voltage cables



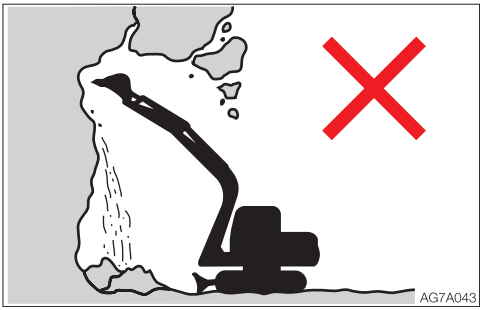
Never bring any part of the machine or loaded material to near to the high voltage cables unless all safety precautions required by the local and national authorities have been installed. If a person comes near to the machine that is discharging sparks or located near to or in contact with the power source, there is a hazard of electric shock and death.

- Always maintain a safe distance between the machine and the high-voltage electric cable.
- Check with the local power company about safe operating procedure before starting operations.
- Consider all cables to be high-voltage cables and treat all cables as energized even though it is known or believed that the power is shut off and the cables are visibly grounded.
- Use a signal person to give warning if the machine approaches too close to the high-voltage electric cables.
- Caution all personnel in the work area not to come close to the machine or the loaded material.

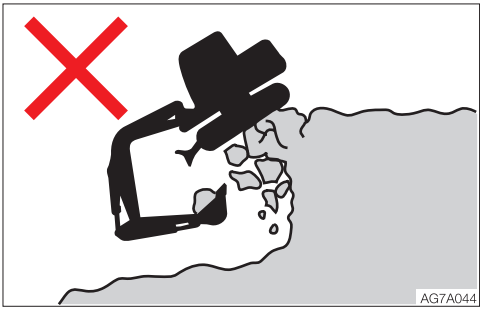


- Pay also careful attention to the high-voltage electric cables buried underground.

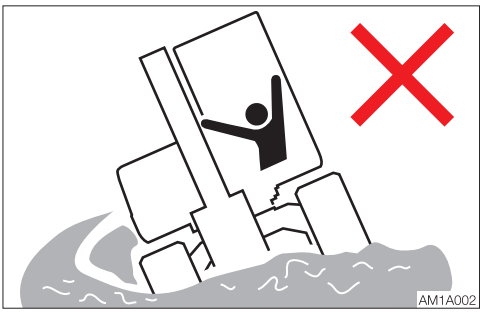
Watch out for hazardous working conditions



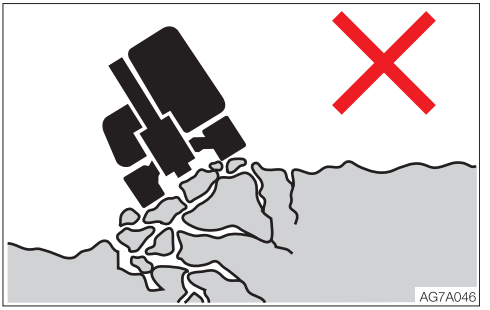
- Never undercut a high bank. Doing so is dangerous as it may cause ground collapse.
- Do not operate in places where there is a danger of falling rocks.



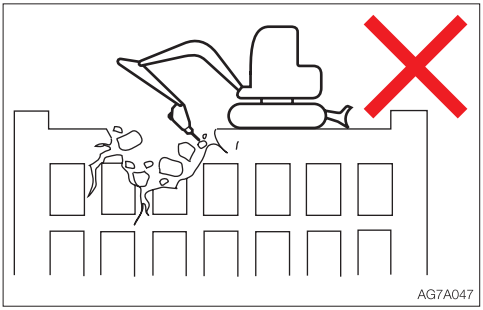
- Maintain a safe distance between the machine and the edge of the digging site. Do not dig the ground under the front of the machine.
- When working close to the cliffs or road shoulders, to make it easier to escape if there is any problem, set the crawlers at right angles to the cliff or road shoulder and the dozer blade to the front when carrying out operations.



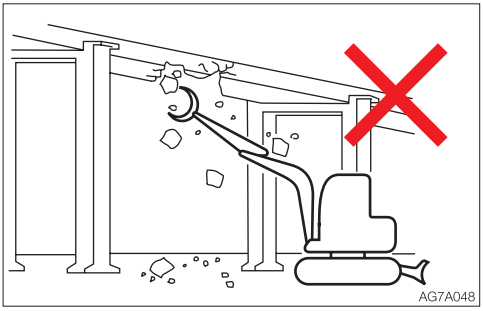
- Do not enter areas where there is soft ground. Doing so could cause the machine to tilt under its own weight, resulting in a machine tipping over or sinking into the ground.



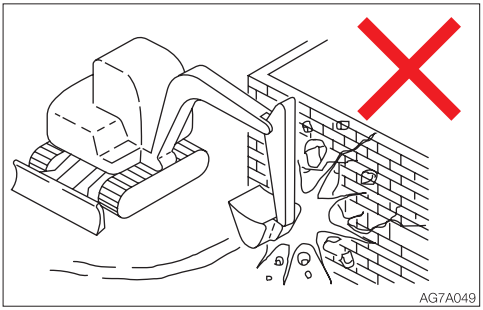
- Do not come close to unstable grounds (cliffs, road shoulders, deep ditches). If the ground should collapse under the weight or vibration of the machine, there is a hazard that the machine may fall or tip over.
  - Remember that the soil after heavy rain or blasting is weak.
  - The ground of top of the embankment and of the circumferences of the excavated ditches are also weak.



- Do not perform demolition work under the machine. There is a hazard that the machine may fall down, because the ground becomes unstable.
- When working on or from the top of buildings or other structures, check the strength and the structure before starting operations. If a building or structure collapses, serious injury or damage will result.



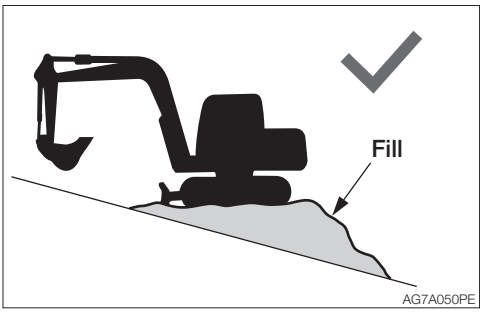
- When doing demolition work, do not perform demolition above your head. There is a hazard of broken parts falling or of the building collapsing and causing serious injury or damage.



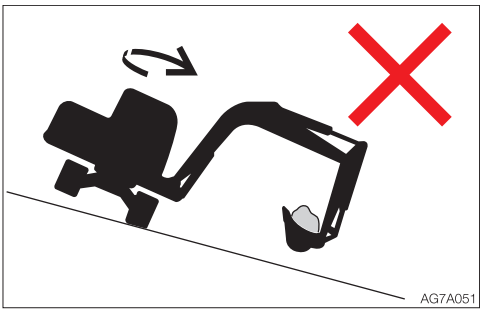
- Do not use the impact force of the hoe attachment for breaking work. There is a hazard of serious injury being caused by flying pieces of broken materials and by the damaged hoe attachment.

Operating on slopes is dangerous

When operating on slopes or grades, slewing or operation of working equipment may cause the machine to lose stability and tip over. Avoid operating on slopes whenever possible.

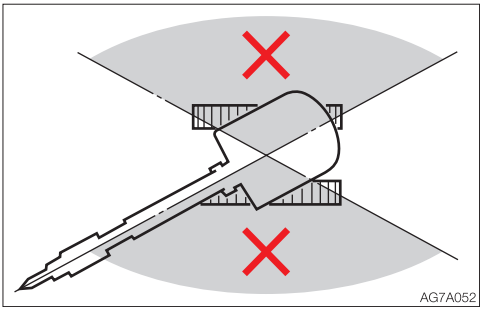


- Level off the work area.



- Avoid slewing to the downhill direction with the bucket full of loaded material. This will reduce the stability of the machine and may result in tipping over.

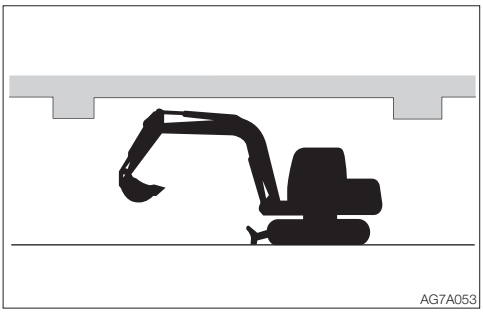
Never slew (swing) sideways with a heavy load



The machine can tip over more easily in the lateral direction than in the longitudinal direction.

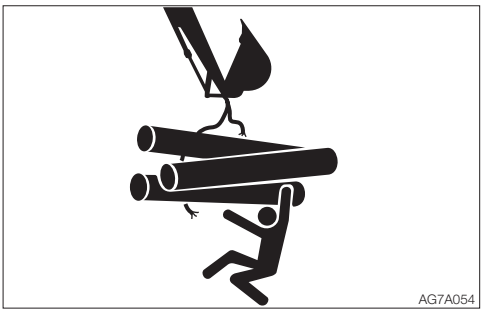
- Do not slew (swing) sideways with a heavy load at the tip of the hoe attachment. In particular, do not slew (swing) sideways on slopes.
- The tip of the attachment is heavier for machines equipped with breakers, crushers or long arms than for machines equipped with the standard bucket. For such machines with heavier tips, do not perform excavation with the digging arm (boom) facing the downhill direction or operate toward sideways.

Be careful with the overhead objects



When operating under bridges, in tunnels, near electric cables or indoors, be careful not to let the boom or arm hit overhead objects.

Cautions when lifting loads



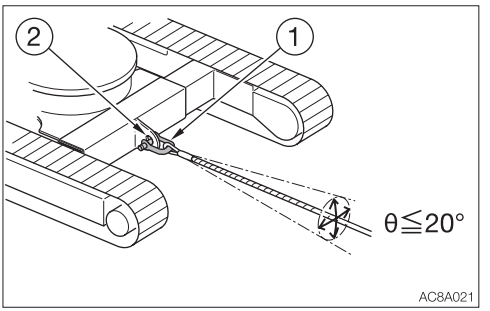
If the machine is used for lifting, it must be equipped with an emergency shut-off valve on the arm and the boom, respectively. Extreme caution should be paid if the excavator is used for lifting.

- Never lift loads in excess of capacity. Overload will cause the machine to roll and can result in serious injury or death.
- All rated lift capacities are determined by using a machine placed on a stable and flat ground. For a safe lifting work, the user is expected to make due allowance for the particular job conditions. They include, soft or uneven ground, non-level condition, side loads, dynamic or jerked loads, hazardous conditions, and experience of personnel. The operator and other personnel should fully acquaint themselves with the operator's manual before operating this machine, and rules for safe operation of equipment shall be adhered to at all times.
- The bucket linkage or lifting device may fail if chains or lifting device are incorrectly attached, resulting in serious injury or death.
- Do not attempt to pull stumps out of the ground when using the machine as a crane. The loads imposed on the machine under this use are completely unknown.
- Do not allow anyone to stand on or under the lifted loads or come close to the work area.

Be careful with flying objects

This machine is not equipped with protective equipment to protect the operator from flying objects. Do not use this machine in places where there are risks of the operator being hit by flying objects.

Cautions when towing



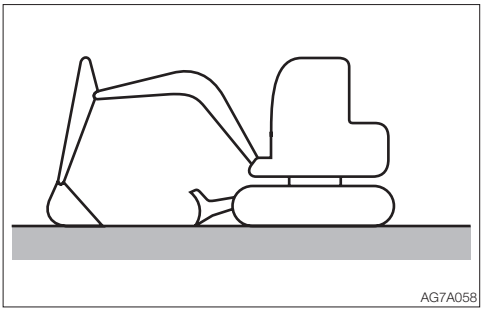
When towing, serious injury or death could result, if performed incorrectly or the wire rope being used is inappropriate or not properly inspected.

- It becomes dangerous if the wire rope breaks or becomes disengaged. Use a wire rope appropriate for the required tractive force.
- Do not use a wire rope that is kinked, twisted or otherwise damaged.
- Do not apply heavy loads abruptly to the wire rope.
- Wear safety gloves when handling the wire rope.
- Make sure there is an operator on the machine being towed as well as on the machine that is towing.
- Never tow on slopes.
- Do not let anyone come near to the wire rope while towing.

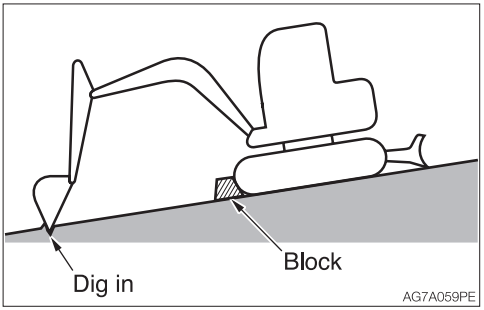
Refer to “Towing” for further instructions.

PRECAUTIONS WHEN STOPPING

Park safely

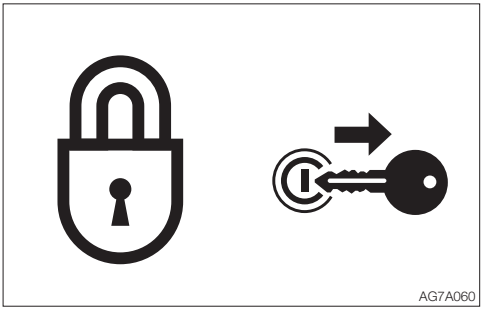


- Park the machine on a flat, rigid and safe ground. Set the parking brake.



If you must park on a slope or incline, park the machine securely and block the movement of the machine.

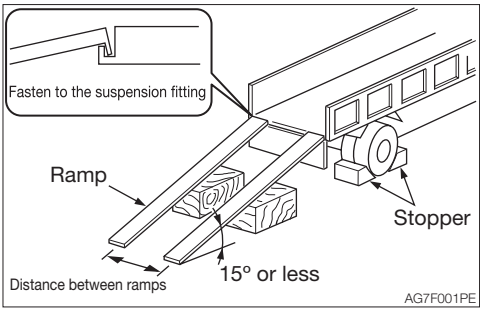
- When parking on a street, use barriers, caution signs, lights, etc., so that the machine can easily be seen even at night to avoid collision with other vehicles.



- Before leaving the machine, do the followings:
  1. Lower the bucket and the dozer blade to the ground.
  2. Raise the safety lock lever to the locked position.
  3. Stop the engine and remove the starter key.
  4. Lock the covers and take the key with you.

PRECAUTIONS WHEN TRANSPORTING

Load/unload the machine safely



The machine may roll or tip over or fall while being loaded or unloaded. Take the following precautions:

- Select a firm, level surface and keep sufficient distance from road shoulders.
- Secure the ramps of adequate strength and size to the truck bed. The slope of the ramps must not exceed 15°. If the rumps are bowed down too low, support them with poles or blocks.
- Never use the working equipment to load or unload the machine. Doing so may result in tipping over or falling down of the machine.
- Keep the truck bed and loading ramps clean of oil, soil, ice, snow, and other materials to prevent the machine from sliding sideways. Clean the crawlers.
- Chock the transporter wheels to prevent movement.
- When being loaded or unloaded, travel slowly in 1st (low) gear by following the signal from the signal person.
- Never change courses on the ramps.
- Do not slew/swing on the ramps. The machine may tip over.
- When slewing/swinging on the truck bed, do it slowly as the footing should be unstable.
- Chock the tracks and secure the machine to the truck bed with wire rope or chain.

Hoist the machine safely

- Know and use correct crane signals.
- Check the hoisting equipment for damaged or missing parts on a daily basis and replace as necessary.
- When hoisting, use a wire rope capable of lifting the machine mass.
- Hoist the machine in such a manner described in the procedure below. Do not do it in any other manner, as it may result in the machine losing its balance.
  Refer to “Hoisting the machine” for further instructions.
- Do not hoist the machine with an operator on it.
- When hoisting, hoist slowly so that the machine does not tip.
- Keep everyone out of the area when hoisting. Do not move the machine over the heads of the persons.

Transport the machine safely

- Know and follow the applicable safety rules, vehicle code and traffic laws when transporting the machine.
- Select the best transport route by considering the length, width, height and weight of the truck with the machine loaded on it.
- Never abruptly start or stop or run at a high speed at the sharp curves during transport. Doing so will move or lose the balance of the loaded machine.

PRECAUTIONS ON MAINTENANCE

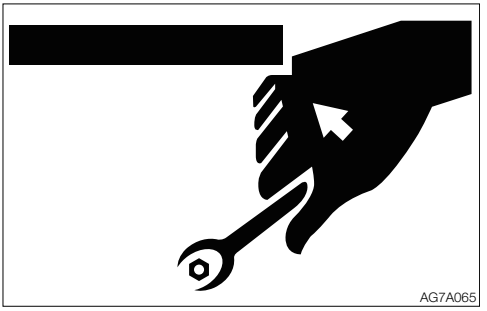
Display a “DO NOT OPERATE” alert sign

Severe injury could result if an unauthorized person should start the engine or touch controls during inspection or maintenance.
- Before performing maintenance, stop the engine, remove the key and take it with you.



- Display a “DO NOT OPERATE” alert sign on easy-to-see locations such as on the starter switch or on control levers.

Use the correct tools



Do not use damaged or weakened tools or tools designed for other purposes. Use tools appropriate for the work involved.

Replace safety-critical parts periodically

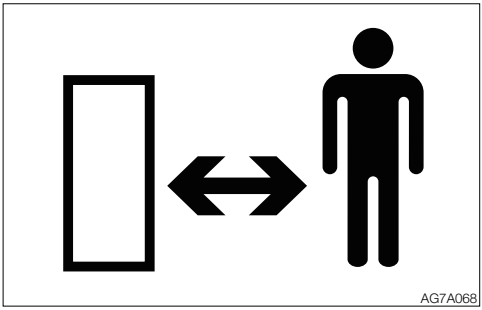
- Replace fuel hoses periodically. Fuel hoses wear out over time, even if they do not show any symptom of wear.
- Regardless of the replacement schedule, replace immediately if a symptom of wear is found.
  Refer to “List of safety-critical parts” for further details.

Explosionproof lighting



To prevent an ignition or explosion, use explosion-proof lights when inspecting fuel, oil, coolant or battery fluid. Otherwise, explosion could result causing serious injury or death.

Prohibit access by unauthorized persons

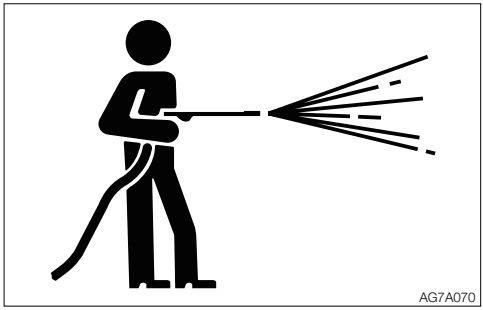


Do not allow unauthorized personnel in the work area while working. Be careful when grinding, welding or using a hammer. You could be injured by flying debris from the machine.

Prepare work area

- Select a firm, level work area. Make sure there is adequate light and, if indoors, ventilation.
- Clear obstacles and dangerous objects. Eliminate slippery areas.

Always keep the machine clean

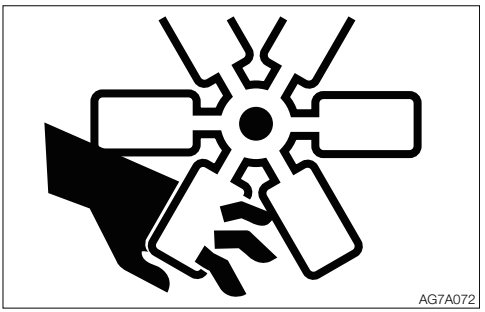


- Clean the machine before performing maintenance.
- Stop the engine before washing the machine. Cover the electrical parts so that water cannot enter. Water on electrical parts could cause short-circuits or malfunctions. Do not use water or steam to wash the battery, electronic control components, sensors, connectors or the operator's compartment.

Stop the engine before performing maintenance

- Avoid lubrication or mechanical adjustments while the machine is moving or while the engine is running when the machine is not moving.
- If maintenance must be performed with the engine running, always work as a two person team communicating each other.
  - One person must sit in the operator's seat so that he/she can immediately stop the engine when necessary. He/she must take care not to touch the lever or pedal unless necessary.
  - The one who performs maintenance must make sure to keep his/her body or clothing away from the moving part of the machine.

Stay clear of the moving parts


AG7A072

- Stay clear of all rotating and moving parts. If a hand or tool becomes trapped in the rotating or moving part, serious injury or death could result.
- If a tool or other objects is dropped or inserted in the fan or fan belt, it will be flown or cut in pieces. Do not drop or insert anything in the fan or fan belt.

Firmly secure the machine or any component that may fall


AG7A073

- Before performing maintenance or repairs under the machine, lower all moveable working equipment to the ground or in the lowermost position.
- Chock the tracks.
- If you must work beneath the raised machine or equipment, always use wood blocks, jack-stands or other rigid and stable supports. Never get under the machine or working equipment if they are not sufficiently supported. This procedure is especially important when working on hydraulic cylinders.

Secure the working equipment

To prevent unexpected movement, firmly secure the working equipment when repairing or replacing the bucket teeth or side cutter.

Secure the engine hood or cover when opened

Be sure to secure the engine hood or cover before working the inside. Do not keep the hood or cover open on a windy day or if the machine is parked on a slope.

Place heavy objects in a stable position


AG7A078

When it is necessary to temporally place a heavy object or an attachment on the ground during removal or installation, be sure to place it in a stable position. Keep unauthorized persons from the storage place for such object.

Cautions when refueling



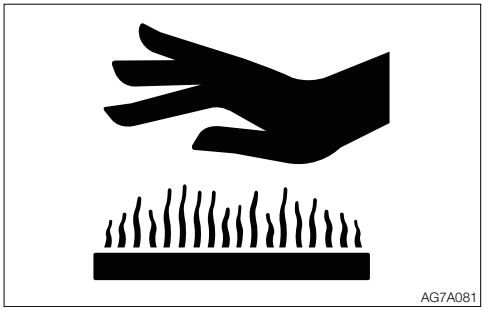
- Do not smoke or permit open flames while fueling or near fueling operations.
- Never remove the fuel cap or add fuel when the engine is running or still hot. Do not spill fuel on the hot surface of the machine.
- Fill the fuel tank in a well ventilated place.
- Do not fill the fuel tank to capacity. Allow room for oil expansion.
- Clean up spilled fuel immediately.
- Securely tighten the fuel filler cap. If the fuel cap is lost, replace it only with the genuine cap. Use of a non-approved cap without proper venting may result in pressurization of the tank.
- Never use fuel for cleaning.
- Use the correct grade of fuel for the operating season.

Handling of hoses

Oil leak or fuel leak can cause a fire.

- Do not twist, bend or hit the hoses.
- Never use twisted, bent or cracked pipes, tubes or hoses; otherwise, they may burst.
- Retighten loose connection.

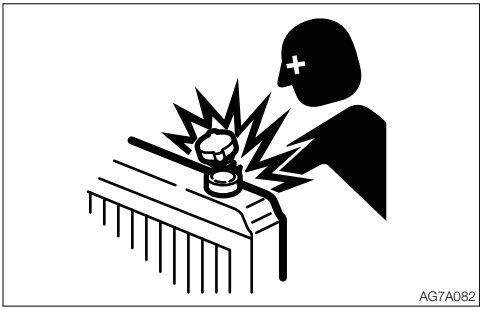
Be careful with hot and pressurized components



Stop the engine and allow the machine to cool down before performing maintenance.

- The engine, muffler, radiator, hydraulic lines, sliding parts and many other parts of the machine are hot immediately after the engine is stopped. Touching these parts will cause burns.
- The engine coolant, hydraulic oil and other oils are also hot and under high pressure. Be careful not to touch the hydraulic oil when loosening the cap or plug. Working on the machine under these conditions could result in burns or injuries due to the hot oil spurting out.

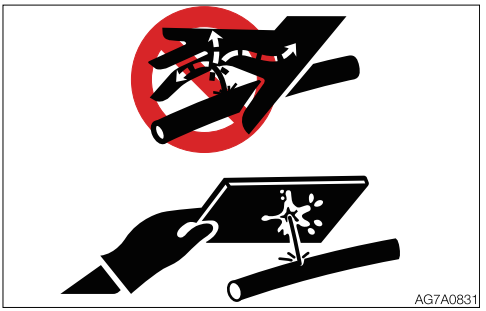
Be careful with hot cooling systems



Do not remove the radiator cap or the drain plug when the cooling water is hot. Stop the engine and wait until the engine and the cooling water cool. Then, slowly loosen the radiator cap to release the internal pressure and remove it.

Be careful with oil internal pressure

Pressure is maintained in the hydraulic circuit long after the engine has been shut down.
- Completely relieve the internal pressure before performing maintenance work.



- The hydraulic oil is high enough pressure to penetrate the skin or eyes and cause serious injury, blindness or death. Remember that the hydraulic oil escaping from a small hole is almost invisible. When checking for leaks, wear protective goggle and thick gloves, and use a paperboard or plywood to keep your skin from oil spurting.
  If oil penetrates the skin, it must be surgically removed within a few hours by a doctor familiar with this type of injury.

Release pressure before working on the hydraulic system

Oil may spurt out if caps or filters are removed or pipes are disconnected before releasing the pressure in the hydraulic system.
- Gradually loosen the vent plug to relieve tank pressure.
- When removing plugs or screws, or when disconnecting hoses, stand to the side and loosen them slowly to gradually release the internal pressure before removing.
- Oil or plug may spurt out according to the pressure in the travel motor case. Loosen the plug slowly and release the internal pressure.

Be careful with debris when the hammer is being used

When using a hammer, pins may fly out or metal particles may be scattered. This may lead to serious injury.
- If hard metal parts such as pins, bucket teeth, side cutter or bearings are hit with a hammer, wear protective gear such as safety goggles and gloves.
- When hitting pins or bucket teeth, always check that there is no one in the surrounding area.

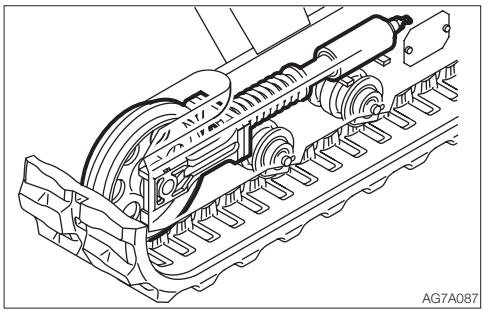
Be careful with the high-pressure grease



In the track adjuster, the grease has been injected under high pressure. If the tension is adjusted without following the prescribed procedure, the grease discharge valve may fly off, resulting in injury.

- Never loosen the grease fitting.
- Loosen the grease discharge valve slowly. Do not turn it more than one turns.
- Do not put your face, arms, legs or body in front of the grease discharge valve.
- If grease does not come out when the grease discharge valve is loosened, the valve is faulty. Ask a Takeuchi service agent for repair.

Never disassemble the track adjuster



There is a very strong spring contained in the track adjuster. If the track adjuster is accidentally disassembled, the spring can pop out, resulting in serious injury Never disassemble the track adjuster.

Handling of the accumulator



Be sure to handle the high-pressure nitrogen gas enclosed in the accumulator with care. If handled incorrectly, it could explode and cause serious injury. Strictly observe the following precautions:

- Do not disassemble.
- Do not allow flame near or throw it into a fire.
- Do not drill, weld or fuse.
- Do not subject it to physical shock such as hitting, rolling or dropping.
- Before disposing of the unit, the sealed gas must be drained. Contact a Takeuchi service agent for help.

Disconnect the battery wiring



Disconnect the battery wiring before working on the electrical system or doing electric welding. Disconnect the negative (–) battery cable first. When reconnecting, connect the negative (–) battery cable last.

Use caution when handling batteries

- Do not allow persons (such as children) to come into contact with the product unless they fully understand the handling methods and risks.
- Batteries contain sulfuric acid which will damage the eyes or skin in case of contact.
  - · If eye contact occurs, flush immediately with clean water and get prompt medical attention.
  - · If accidentally swallowed, drink large quantities of water or milk and call a physician immediately.
  - · If acid contacts skin or clothing, wash off immediately with a lot of water.
- Wear protective goggle and gloves when working with batteries.
- Batteries generate flammable hydrogen gas which may explode. Keep away from flame, sparks, fire or lighted cigarettes.
- When checking the level of the battery fluid, use a flashlight.
- Be sure to stop the engine by turning off the starter switch before inspecting or handling the battery.
- Be careful not to let metal tools or any metal objects come into contact with the battery terminals and cause a short circuit.
- Loose battery terminals may result in sparks. Be sure to fasten terminals tightly.
- Make sure the battery caps are tightened securely.
- Do not charge a battery or jump-start the engine if the battery is frozen; otherwise it may explode. Warm the frozen battery to 15°C (60°F) before use.
- Do not use the battery when the fluid level is below the lower level limit. Doing so will hasten the deterioration of the internal portions of the battery and shorten the battery life. It also can cause rupturing (explosion).
- Do not add the distilled water above the upper level limit. Doing so could cause the fluid to leak. This fluid can cause skin damage if contacted, or can cause the machine components to corrode.
- Use a dampened cloth to clean around the fluid level line and check the fluid level. Do not clean with a dry cloth; otherwise it could cause static electricity to build up, resulting in ignition or explosion.

Periodically replace the safety-critical parts

- To use the machine safely for a longer period, periodically add oil and perform inspection and maintenance. To improving the safely, replace the safety-critical parts like hoses and seat belts periodically. Refer to “Safety-critical parts to be replaced periodically” for further details.
- The “Safety-critical parts to be replaced periodically” are the parts which deteriorate, wear and fatigue after repeated use and whose properties change over time. While these characters of these parts could cause serious physical or personal damage, judging the remaining life of these part are difficult from external inspection or the feeling when operating.
- Replace the “Safety-critical parts to be replaced periodically” if any defect is found from external inspection, even when they have not reached the time specified interval.

Jump starting with booster cables

- When starting the engine using the booster cables, be sure to connect the cables in the proper order described below. Wrongly connected cables can result in sparking and battery explosion.
  - Do not allow the “machine in trouble” and “rescue machine” to touch each other.
  - Do not allow the positive (+) and negative (–) clips of the booster cables to touch each other or to come in contact with the machine.
  - When connecting, attach the positive booster cable to the positive (+) terminals first. When disconnecting, remove the negative cable from the negative (–) terminal (ground) first.
  - Be sure to connect the clips securely.
  - Connect the last clip of the booster cable to a point as far away from the battery as possible.
- Always wear the protective goggle and gloves when starting the engine by using the booster cables.
- Use the booster cables and clips of a size suited to the capacity of battery. Do not use damaged or corroded booster cables and clips.
- Be sure that the battery of the “rescue machine” has the same capacity as the battery of the “machine in trouble”.

Have a Takeuchi service agent repair welding

If welding must be performed, make sure that it is done by a qualified person in a properly equipped workplace. To prevent any part from breaking down or being damaged due to overcurrent or sparks, observe the following.

- Disconnect the wiring from the battery before doing electric welding.
- Do not continuously apply 200 V or more.
- The earth ground must be connected within one meter from the welding section. Do not connect the earth ground near to an electronically controlled device/ instrument or connectors.
- Make sure that there are no seals or bearings between the welding section and the earth ground.
- Do not connect the earth ground around the pins for the working equipment or hydraulic cylinders.
- When welding is to be done on the machine body, disconnect the connectors for the electronically controlled devices before working.

Vibrations operators are subject to

According to the results of the tests conducted to determine the vibrations transmitted to the operator by the machine, the upper limbs are subjected to vibrations lower than 2.5 m/s^2 (8.2 ft/s^2) while the seated part of the body is subjected to vibrations lower than 0.5 m/s^2 (1.64 ft/s^2).

Checks after maintenance

- Gradually increase the engine speed from a low idle to maximum speed and check that there is no oil or water leaking from the serviced parts.
- Operate each control lever and check that the machine is operating properly.

Disposing of wastes



- Always collect oil that is drained from the machine in containers. Improperly disposed waste oil can cause environmental harm.
- Follow appropriate laws and regulations when disposing of harmful objects such as oil, fuel, coolant, solvent, filters and batteries.
- When disposing of a machine that is no longer usable, dispose of it in accordance with the latest national and local regulations applicable at the time.

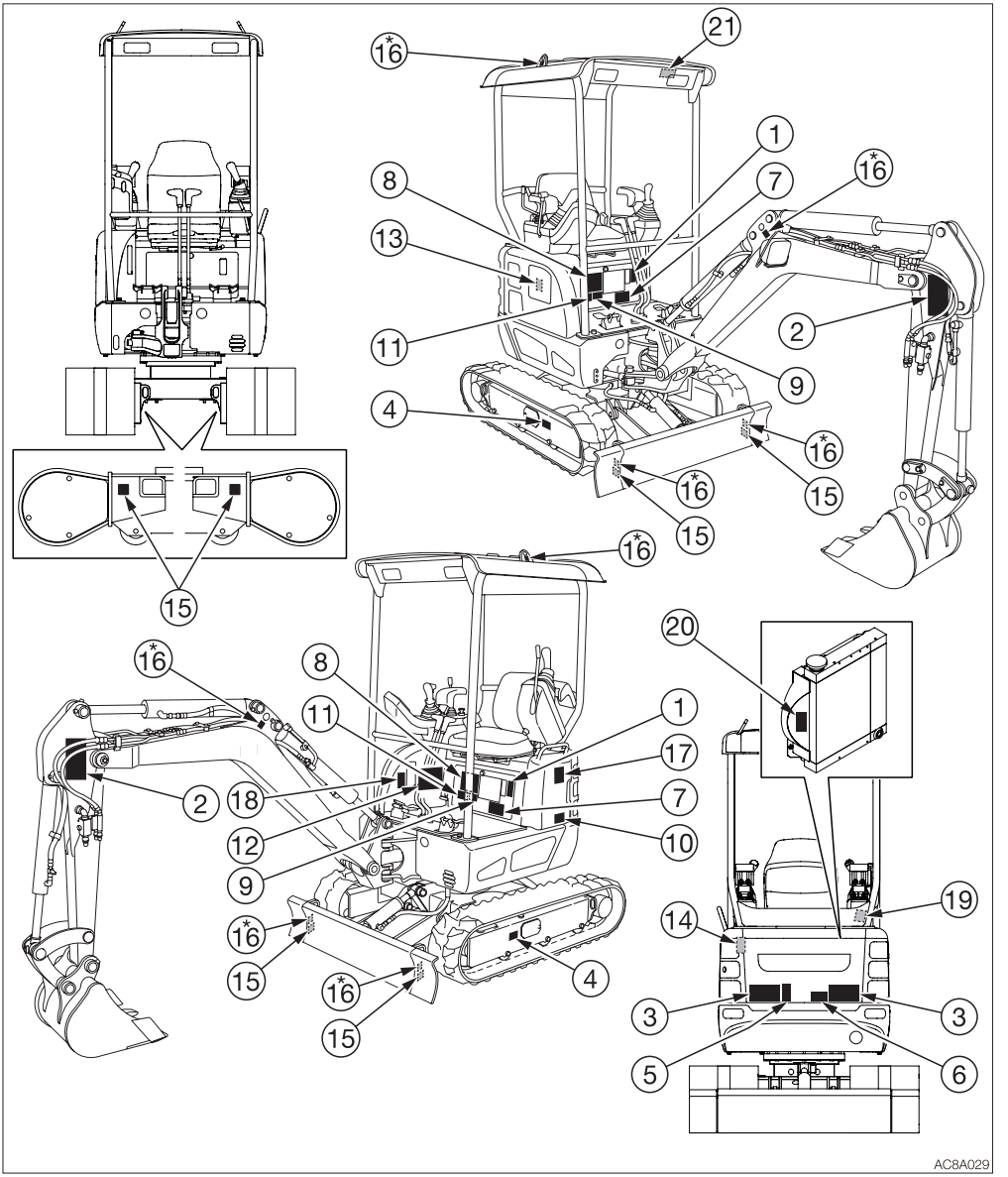
Handling of poisonous chemicals

Poisonous chemicals will cause serious injury if directly contacted.
Poisonous chemistry used in this machine includes grease, battery solution, coolant, paint and adhesive agent.
Handle the poisonous chemicals properly with care.

SAFETY SIGNS (DECALS)

For the safety of the operator and the personnel working around the site, safety signs (decals) are placed at certain locations on the machine as shown below. Walk around the machine with this manual, and check the content and location of these safety signs. Review these signs and the operating instructions in this manual with your machine operators.

- Keep the signs clean and legible. If any of the safety labels is peeling or damaged and becomes difficult to read, replace it with a new one. Please include your product serial number when ordering a new sign from the Takeuchi service agent.
- When a part/unit to which a safety sign is attached is replenished, a new sign must be attached to the new part/unit.



*: If equipped

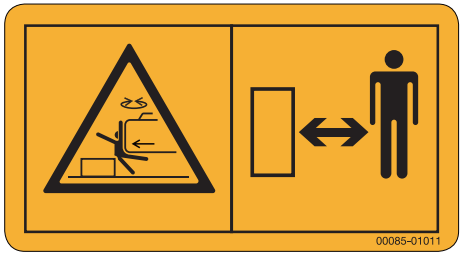
1. No.08810-31556
   Warning
   Read and understand this manual before performing any operation, inspection or maintenance on this machine.



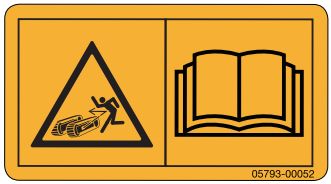
2. No.05793-00049
   Safety Distance
   Hazard of being hit by the working device of the machine.
   Keep away from machine during operation.



3. No.00085-01011
   Safety Distance
   Do not get near or stand within the machine working area.



4. No.05793-00052
   Hazard of a flying plug from track adjuster
   Read manual before adjusting track for safe and proper handing.



5. No.05793-03630
   Sign indicates a burn hazard from touching heated parts, such as engine, pump, or muffler during or right after operation.
   Never touch when hot.

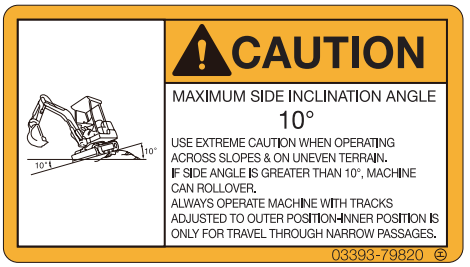


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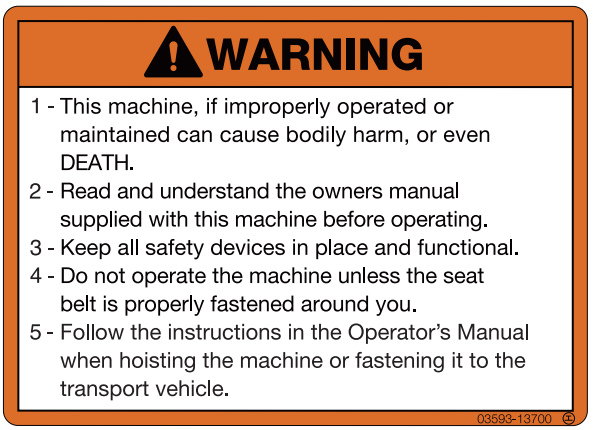
6. No.03793-66006
Hazard of rotating parts
Turn off before inspection and maintenance.



7. No.03393-79820



8. No.03593-13700



9. No.03393-75040



10. No.03393-75050



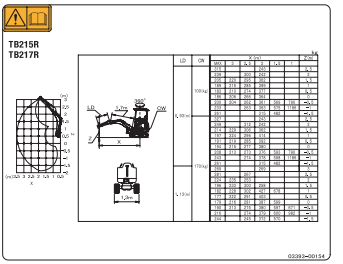
11. No.03593-47020 (If equipped)



11. No.03293-00066 (If equipped)
When a bucket wider than a standard one is installed, the cab (canopy) may be damaged if the bucket is fully offset to the left.



12. No.03393-00154 (If equipped)



AC8A026EN

13. No.03593-06600
Diesel fuel



14. No.03593-06700
Hydraulic oil



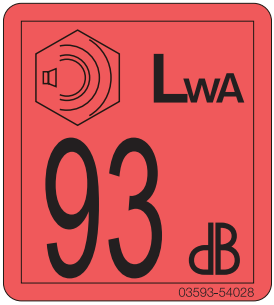
15. No.08810-31549
Tie down point



16. No.03393-00295
Position of hoisting



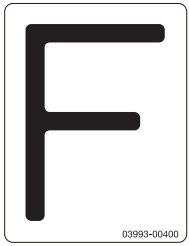
17. No.03593-54028 (If equipped)
This value indicates the noise level outside the machine and refers to the noise perceived by the persons who are in the vicinity of the work area.



18. No.03393-00070
Keep the boom and blade separated
Be careful not to let the boom come in contact with the blade when the boom is lowered.



<Applicable machine models
215001850 or later>
19. No.03993-00400
For EU
Position of Fire extinguisher



20. No.03393-50070



Sign indicates a burn hazard from spurting hot water or oil if radiator or hydraulic tank is uncapped while hot.
Allow radiator or hydraulic tank to cool before removing cap.

21. No.03593-32300 (If equipped)

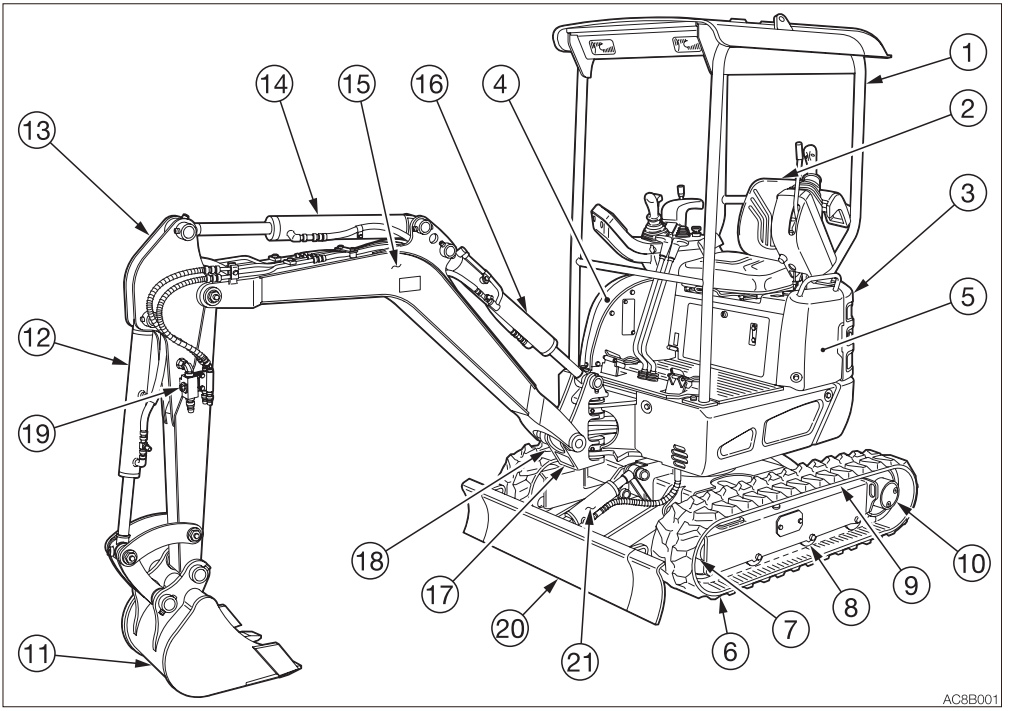


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CONTROLS



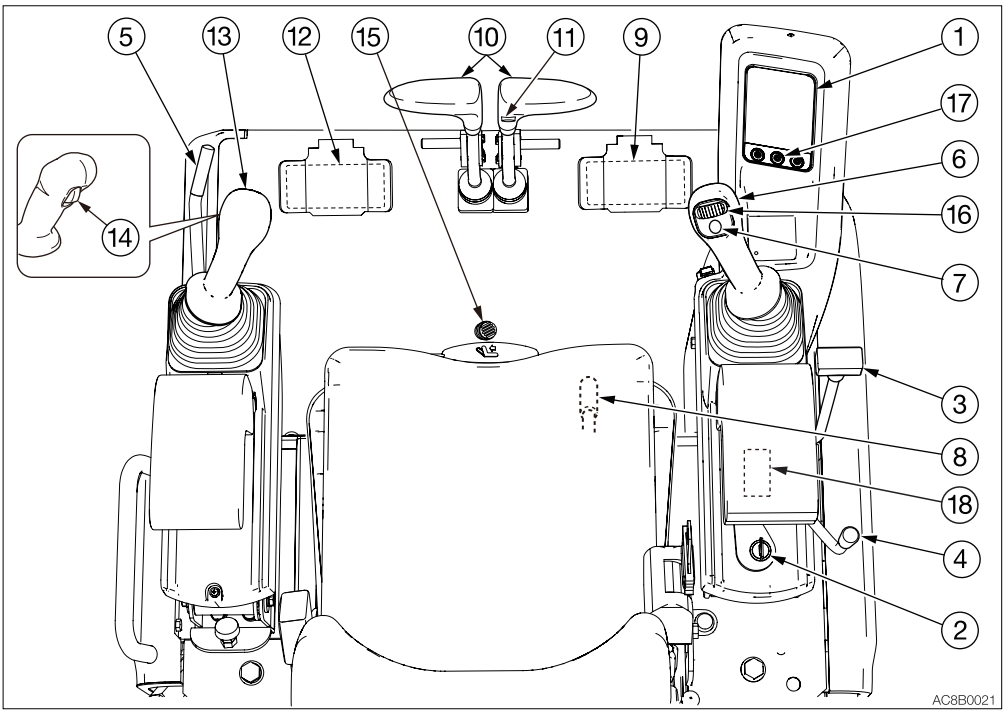
NAMES OF COMPONENTS



Upperstructure
1. Canopy
2. Seat
3. Engine hood
4. Fuel tank
5. Hydraulic oil tank

Undercarriage
6. Crawler belt
7. Idler
8. Track roller
9. Shoe slide
10. Travel motor

Working equipment
11. Bucket
12. Bucket cylinder
13. Arm
14. Arm cylinder
15. Boom
16. Boom cylinder
17. Boom bracket
18. Swing cylinder
19. Auxiliary hydraulic lines
20. Dozer blade
21. Blade cylinder

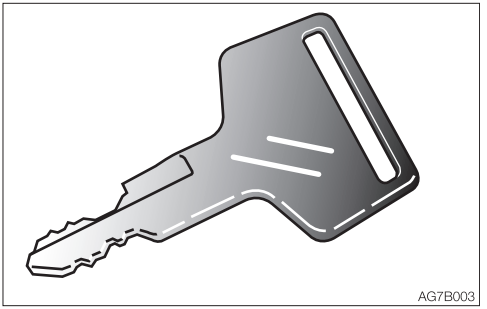


1. Instrument cluster
2. Starter switch
3. Blade lever
4. Throttle lever
5. Safety lock lever
6. Right operating lever
7. Horn button
8. Selector lever
9. Boom swing pedal
10. Travel levers/Pedals
11. Travel speed switch
12. Auxiliary hydraulic pedal
13. Left operating lever
14. Third auxiliary hydraulic botton*
15. Third auxiliary hydraulic switch*
16. Auxiliary 2nd switch*
17. Light switch
18. Lift overload warning switch*

*: Subject to the specifications or optional products selected

COVERS

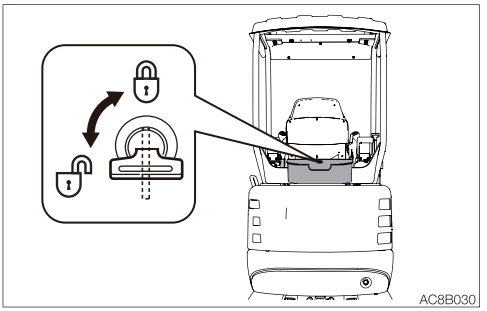
STARTER KEY



The starter key is used to start and stop the engine, as well as to lock and unlock the following components:

- Fuel lid
- Manual storage compartment
- Engine hood
- Covers

TOOL CASE

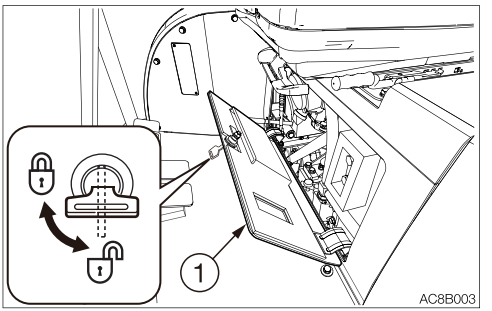


1. Insert the starter key and turn it counterclockwise to unlock the box.

MAINTENANCE COVER A

Open this cover to perform a maintenance operation of the engine or to switch the selector valve.

Opening

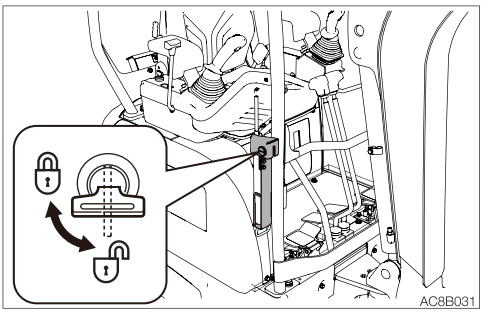


1. Insert the starter key and turn it counterclockwise to unlock the maintenance cover A (1).

Closing

1. Close the maintenance cover A (1).
2. Insert the starter key and turn it clockwise to lock the maintenance cover A (1).

GREASE GUN HOLDER



1. Insert the starter key and turn it counterclockwise to unlock the box.

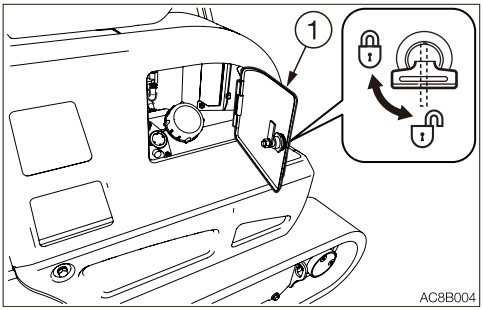
FUEL LID

⚠ CAUTION

When opening and closing the fuel lid, be careful not to get your hands caught by the lid.

For adding fuel, open this cover.

Opening



1. Insert the starter key and turn it counterclockwise to unlock the fuel lid (1).

Closing

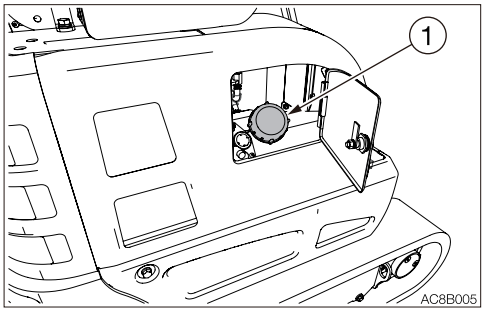
1. Close the fuel lid (1).
2. Insert the starter key and turn it clockwise to lock the fuel lid (1).

FUEL FILLER PORT

⚠ WARNING

- **Do not smoke and keep away from heat or flame while filling the fuel tank.**
- **Fill the fuel tank in a well ventilated place, with the engine turned off.**
- **Clean up spilled fuel immediately.**
- **Do not fill the fuel tank to capacity. Allow room for oil expansion.**
- **Securely tighten the fuel filler cap.**

Opening



1. Open the fuel lid.
2. Turn the fuel cap (1) counterclockwise and remove it.

Closing

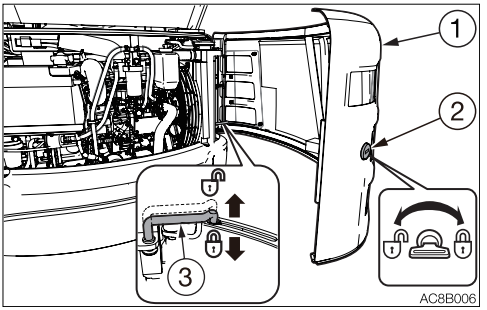
1. Turn the fuel cap (1) it clockwise and close it.
2. Close the fuel lid and lock it.

ENGINE HOOD

⚠ WARNING

- **Before opening the engine hood, be sure to stop the engine. If a hand or tool becomes trapped in the rotating or moving part, serious injury could result.**
- **When opening or closing the engine hood, be careful not to get your hands or other parts of your body caught by it.**

Opening



1. Insert the starter key and turn it counterclockwise to unlock the engine hood (1).
2. Push in the key hole (2) with your thumb and open the engine hood (1).
3. Open the engine hood (1) all the way until it is fastened. (It is fastened automatically.)

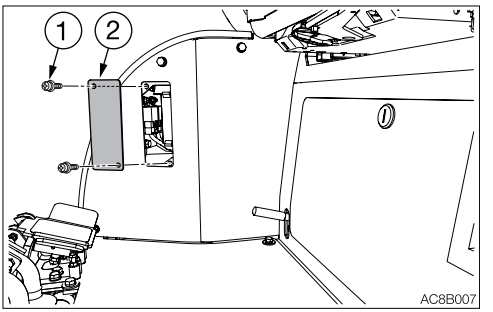
Closing

1. Support the engine hood (1) by hand them pull up the stay (3) to release the engine hood (1).
2. Close the engine hood (1).
3. Insert the starter key and turn it clockwise to lock the engine hood (1).

MAINTENANCE COVER B

For inspection and maintenance of the fuse, open this cover.

Opening



1. Remove the screws (1).
2. Remove the maintenance cover B (2).

Closing

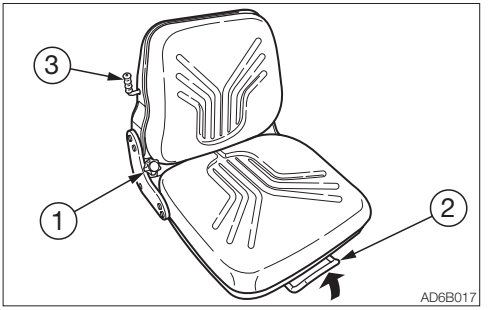
1. Install the maintenance cover B (2) and secure it with the screws (1).

SEAT AND SEAT BELT

SEAT (IF EQUIPPED)

⚠ WARNING

Adjust and secure the seat.



(A) Adjusting the backrest angle

1. Sit up and sit back in the seat.
2. Set the backrest to the desired angle by turning the handle (1).

(B) Fore-and-aft adjustment

1. Pull up the lever (2) and slide the seat backward or forward to the desired position for operation of machine.
2. Release the lever (2) at the desired position to secure the seat.
   Adjustment range: 10 positions, in 150 mm (5.9 in.)

(C) Adjusting according to operator's weight

1. Move the lever (3) to set it according to the weight of operator.

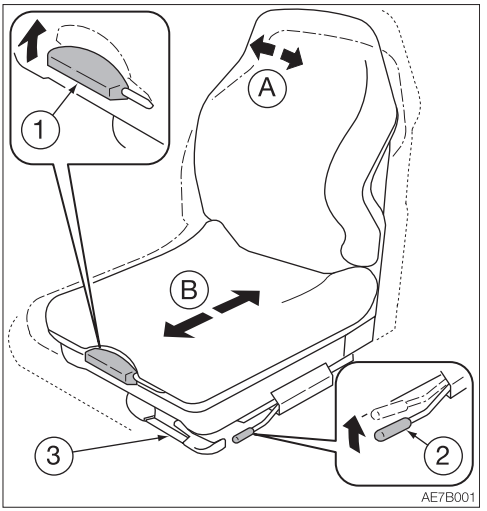
Position of the lever (3)

Upper..... Light weight operator
Middle ..... Medium weight operator
Lower..... Heavy weight operator

HIGH-BACK SEAT (IF EQUIPPED)

⚠ WARNING

Adjust and secure the seat.

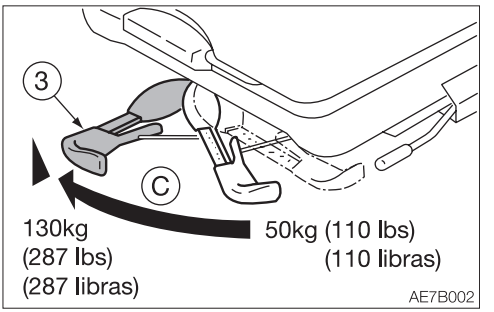


(A) Adjusting the backrest

1. Sit up and sit back in the seat.
2. Pull up the lever (1), recline the backrest by using the spring force. Release the lever (1) at the desired angle to secure the backrest.

(B) Fore-and-aft adjustment

1. Pull up the lever (2) and slide the seat backward or forward to the desired position for operation of machine.
2. Release the lever (2) at the desired position to secure the seat.
   Adjustment range: 10 positions, in 150mm (5.9in.)



(C) Adjusting according to operator's weight

1. Turn the handle (3) until the display indicates the weight of operator.
   Adjustment range: 50 to 130 kg (110 to 287 lbs)
2. When adjusting for a weight lower than the currently set weight, first turn the handle (3) as far as it goes to cancel the setting, then readjust.

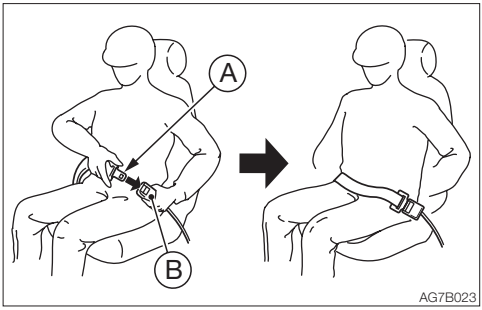
SEAT BELT

⚠ WARNING

Be sure to fasten the seat belt securely before starting the engine.

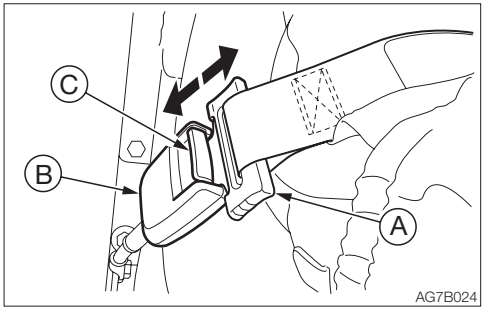
Fastening the seat belt

1. Adjust the seat to the desired position for operation, sit up and sit back in the chair.
2. Pull the seat belt to the desired length.



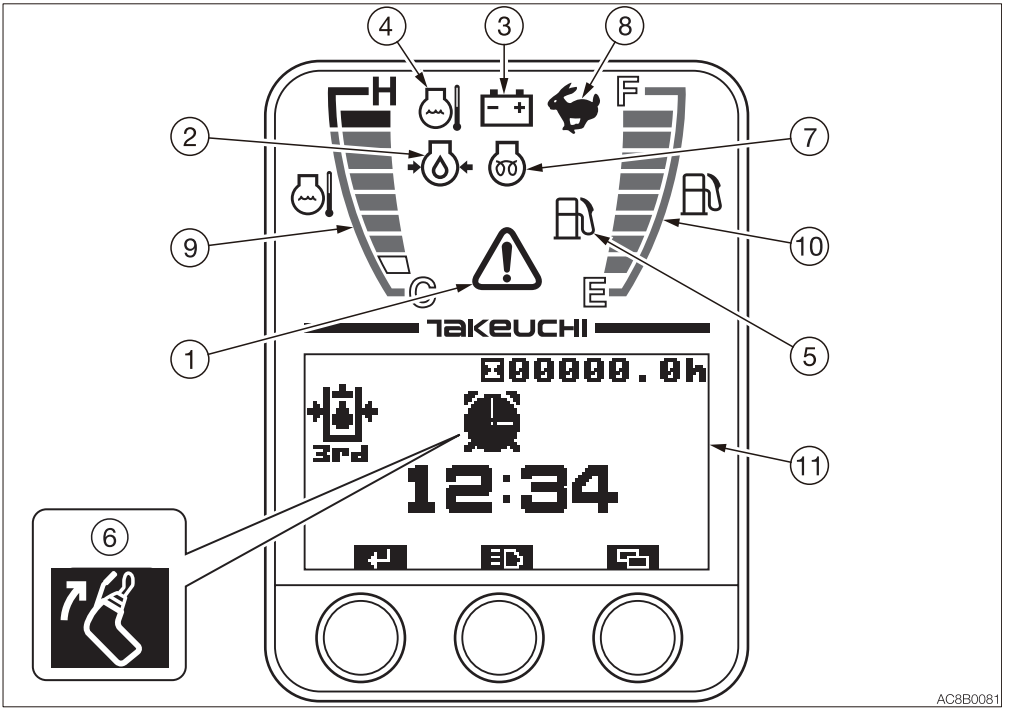
3. Make sure that the belt is not twisted and then insert the tongue plate (A) into the buckle (B) of the seat belt until you hear a clicking sound as it locks in place.
4. Check if the belt is securely locked by pulling it, and arrange the belt around your waist.

Releasing the seat belt



1. Grasp the tongue plate (A) and press the button (C) on the buckle (B).
   The seat belt retracts back into its original position.

INSTRUMENT CLUSTER



Once the starter switch is turned to ON, all lamps on the instrument cluster light up and the alarm sounds.
Then, the battery charge warning lamp (3) and the engine oil pressure warning lamp (2) start flashing and an alarm sounds. The machine system is normal if the lamps turn off after the engine is started.
If any lamp is not lit when the starter switch is turned to ON, there is something wrong in the machine. Consult your sales or service dealer.

WARNING LAMPS

IMPORTANT: If a warning lamp flashes and an alarm is sounded, immediately stop all operations and check the corresponding component.
Refer to "If a warning lamp flashes" on page 6-9.

1. **Engine emergency lamp**
   This lamp flashes and an alarm sounds if there is a problem with the engine or charging system.

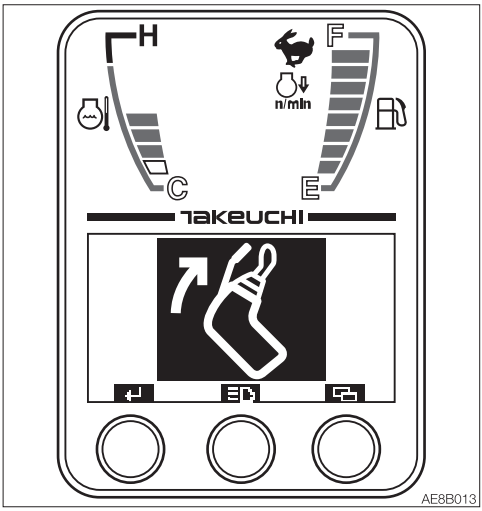
2. **Engine oil pressure warning lamp**
   This lamp flashes and an alarm is sounded if the lubricant oil pressure abnormally low while the engine is running.

3. **Battery charge warning lamp**
   This lamp flashes and an alarm is sounded if a problem rises in the charging system while the engine is running.

4. Coolant temperature warning lamp
This lamp flashes and an alarm is sounded if the engine coolant temperature becomes abnormally high while the engine is running.

5. Fuel level warning lamp
This lamp turns on if the fuel level becomes low while the starter switch is in the ON position.

6. Safety start warning lamp



This lamp appears enlarged on the display and the buzzer sounds if the engine is started when the safety lock lever is in the unlock position. The engine cannot be started. First, set the safety lock lever to the lock position, and then start the engine.

INDICATORS

7. Glow lamp
This lamp goes out when the engine preheating is completed.

8. Travel speed lamp
This lamp turns on when the travel speed button is set to the 2nd (high) speed.

METERS

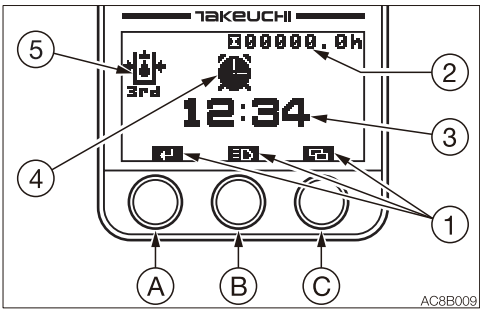
9. Water temperature gauge
Indicates the temperature of the engine coolant water.
The LED should be within the green range during machine operation.
The red range indicates overheating.

10. Fuel Gauge
Indicates the amount of fuel in the tank. Be sure to top off the tank before running out of fuel.

MULTI-DATA DISPLAY

11. LCD (liquid crystal display)
It displays various data on hour meter, trip meter and the machine.

Home screen



1. Key function display
The key function display changes depending on the screens (Home, Menu and each setting)
For actual operation, use the buttons, “A”, “B” and “C”, located beneath each symbol. Refer to “Operating each key” on page 2-12 to 2-17.

2. Hour meter/Trip meter

- Hour meter
  Displays the total engine running time in hours.
  The rightmost digit indicates tenths of hours (6 minutes).
  Set the inspection and maintenance intervals according to the time displayed on the hour meter.

- Trip meter
  Three patterns of desired operating hours can be displayed.
  Refer to “B. Work light/meter switching” on page 2-13.

3. Time display
Displays the time set.
Refer to “Time setting” on page 2-16.

4. Alarm indicator lamp
The clock symbol appears when the alarm function is turned on.
Refer to “Alarm setting” on page 2-16.

5. Auxiliary 3rd hydraulic pressure warning lamp (If equipped)
This lamp lights up and an alarm sounds if the fixed side (left “e”) pressure of the auxiliary 3rd drops abnormally while the engine is running or if the quick-hitch is being removed or installed.

FUNCTION OF EACH KEY

The functions are as below in the Home screen. The different functions appear in the other screens.

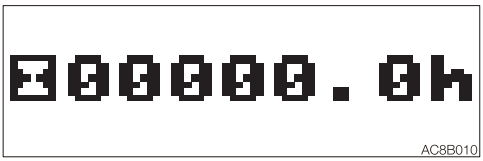
A. Stopping alarm

Pressing the (A) key stops alarm.

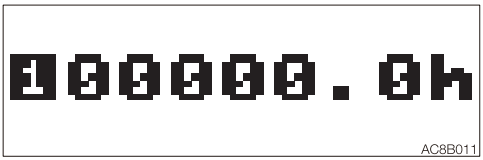
B. Work light/meter switching

- Pressing the (B) key turns on or off the work light.
- Pressing and holding the (B) key for two seconds or more each time the display changes as follows:

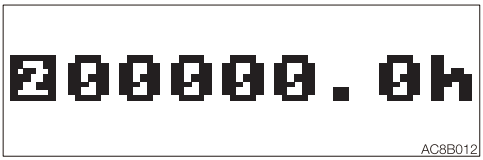
1. Hour meter



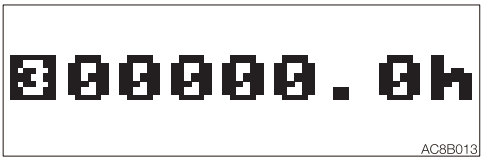
2. Trip meter 1



3. Trip meter 2



4. Trip meter 3

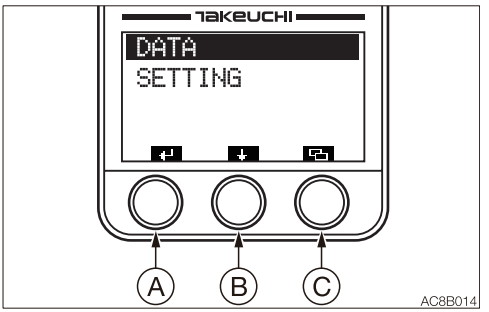


5. Returns to the hour meter

C. Menu/trip meter reset

- Pressing the (C) key switches to the Menu screen.
- Pressing and holding the (C) key for three seconds or more while the trip meter is displayed returns the trip meter to “0”.

MENU SCREEN

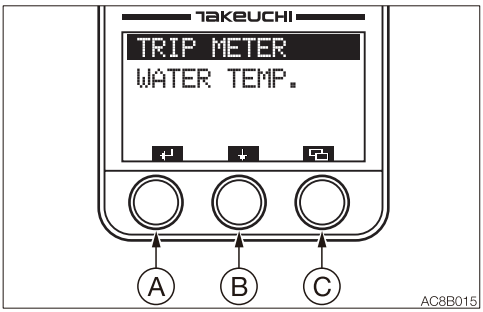


Press the (A) key to proceed to the screen selected by the bar.
Press the (B) key to move the selection bar.
Press the (C) key to return to the Home screen.

- **DATA**
  Shows the coolant temperature and the trip meter for inspection and maintenance.
  Unlike the trip meter displayed on the Home screen, data items on the engine oil, hydraulic oil and coolant are included so that you can use them as a guideline for replacement.

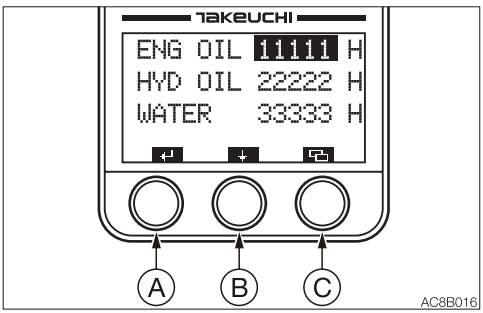
- **SETTING**
  Time, alarm and contrast can be set.

DATA SCREEN (DATA)



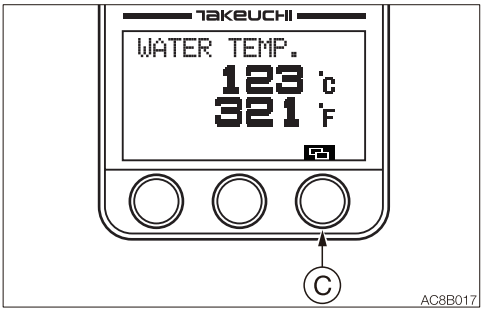
Press the (A) key to proceed to the screen selected by the bar.
Press the (B) key to move the selection bar.
Press the (C) key to return to the Menu screen.

- **Trip meter (TRIP METER) for maintenance**
  The trip meters for the engine oil, hydraulic oil or coolant are displayed.



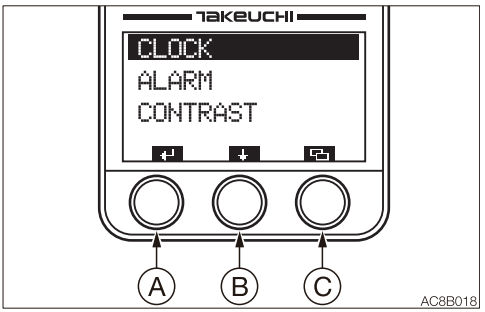
Press and hold the (A) key for at least five seconds resets the selected trip meter to "0".
Press the (B) key to move the selection bar.
Press the (C) key to return to the DATA screen.

- **Coolant temperature (WATER TEMP)**
  Displays the coolant temperature in Celsius °C or Fahrenheit °F.



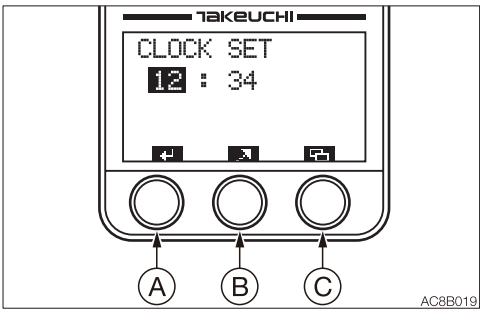
Press the (C) key to return to the Data screen.

SETTING SELECTION SCREEN (SETTING)



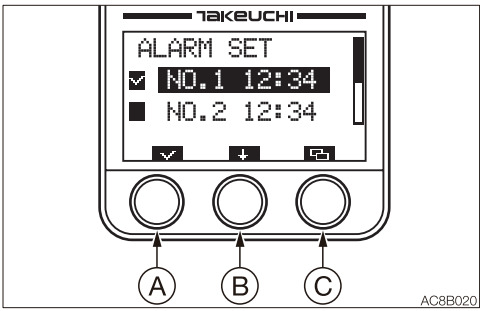
Press the (A) key to proceed to the screen selected by the bar.
Press the key (B) to move the selection bar.
Press the (C) key to return to the Menu screen.

- **Time setting (CLOCK)**
  The time to be displayed on the Home screen can be set here.



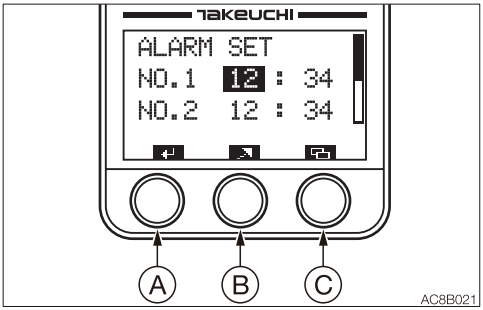
a. When the selection bar is at CLOCK, press the (A) key to proceed to the time setting screen (CLOCK SET).
b. Pressing the (A) key in this screen moves the selection bar and flashes the figures on the bar.
   Setting range: hours, 1 to 24; minutes, 00 to 59
c. Press the (B) key to increase the number value selected.
   Press and hold the (B) key to rapidly increase the number value selected.
d. Press and hold the (A) key for at least two seconds to complete the setting and to return to the Setting Selection screen.
e. Press the (C) key cancels editing and to return to the Setting Selection screen.

- **Alarm setting (ALARM)**
  Five patterns of alarm setting are available.
  Alarm function can be set to on or off within the five patterns.



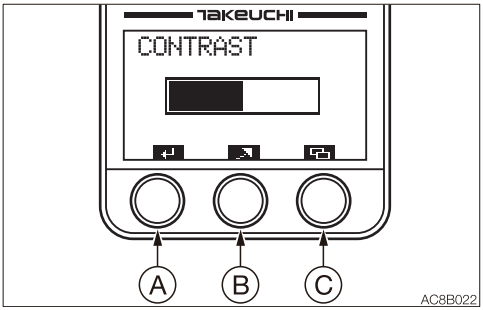
a. When the selection bar is at ALARM, press the (A) key to proceed to the alarm setting screen (ALARM SET).
b. Press the (A) key in this screen to place a checkmark in the box at the left of the setting bar. Press the (A) key again to remove the checkmark.
   The alarm setting cannot be changed only by placing or removing a checkmark.
c. Press and hold the (A) key for at least two seconds to complete the setting and to return to the Setting Selection screen.
   Be sure to perform the above operation when you wish to set the alarm.
   A clock symbol is displayed on the Home screen.
d. Press the (B) key to move the selection bar.
e. Press and hold the (B) key for at least three seconds to enter the alarm time setting mode.
f. Press the (C) key to cancel editing and to return to the Setting Selection screen.
   Checked ..... On
   Unchecked .. Off

• **Alarm time setting mode**
Sets the time for alarm.



a. Select the item to be set in the alarm setting screen (ALARM SET).
b. Press and hold the (B) key for at least three seconds to enter the alarm time setting mode.
c. Press the (A) key in this screen to move the selection bar and to flash the figures on the bar.
Setting range: hours, 1 to 24; minutes, 00 to 59
d. Press the (B) key to increase the number value selected.
Press and hold the (B) key to rapidly increase the number value selected.
e. Press and hold the (A) key for at least two seconds to complete the setting and to return to the Setting Selection screen.
f. Press the (C) key to cancel editing and to return to the Setting Selection screen.

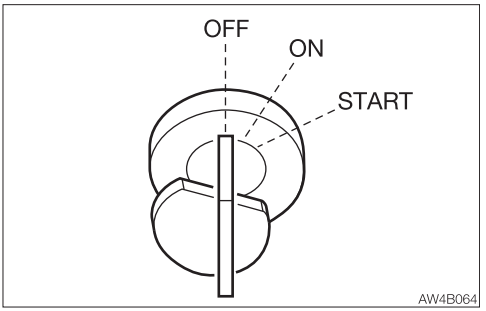
• **Contrast setting (CONTRAST)**
Adjust the LCD contrast.



a. When the selection bar is at CONTRAST, press the (A) key to proceed to the contrast setting screen (CONTRAST).
b. To increase contrast, press the (B) key. The bar advances to the right.
Press and hold the (B) key to rapidly advance the bar.
Once the bar reaches the right end (highest contrast), it returns to the left end (lowest contrast).
c. Press and hold the (A) key for at least three seconds to complete the setting and to return to the Setting Selection screen.
d. Press the (C) key to cancel editing and to return to the Setting Selection screen. The changes made to the setting are reflected, but they will be removed when the starter switch is turned off.

SWITCHES

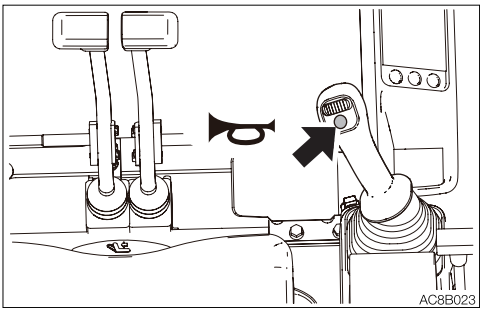
STARTER SWITCH



IMPORTANT: Do not repeatedly switch the key from OFF to ON and ON to OFF over a short period. Doing so will cause engine breakdown.

OFF ..... Position for stopping the engine and inserting or removing the key.
ON ..... Position in which the engine is running. At this position, all the electrical equipment is functional. When the coolant temperature is too low, the engine is automatically preheated.
START ..... Position for starting the engine. When the key is released, the switch automatically returns to the ON position.

HORN BUTTON

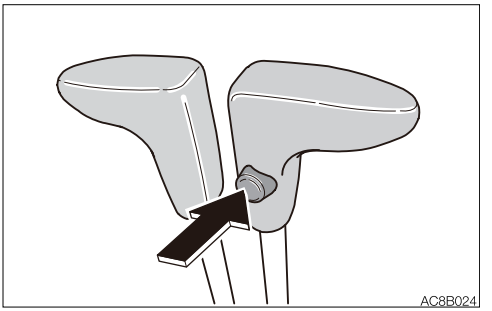


Press the button situated on the right operating lever to blow the horn.

TRAVEL SPEED SWITCH

⚠ WARNING

When a load greater than a set value is applied during traveling in 2nd (high) speed, the speed will automatically slow down to 1st (low) speed. When the load becomes lighter, the speed will increase and return to 2nd (high) speed. It should be noted that the travel speed changes depending on the load condition (for machines with the automatic travel shift-down system).



Press this switch to set the travel speed to 2nd (high) speed. Press it again to return to 1st (low) speed.

SECOND AUXILIARY HYDRAULIC SWITCH

Refer to “Second auxiliary hydraulic switch” on page 2-29.

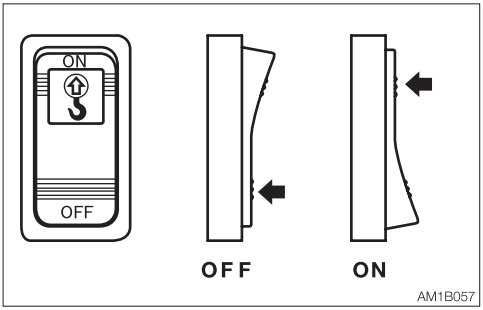
THIRD AUXILIARY HYDRAULIC SWITCH AND BUTTON

Refer to “Third auxiliary hydraulic switch and button” on page 2-29.

LIFT OVERLOAD WARNING SWITCH (IF EQUIPPED)

⚠ WARNING

If the overload is not removed after the overload warning horn is sounded, the machine may tip over. If the horn starts sounding, stop operating the machine and lighten the load.



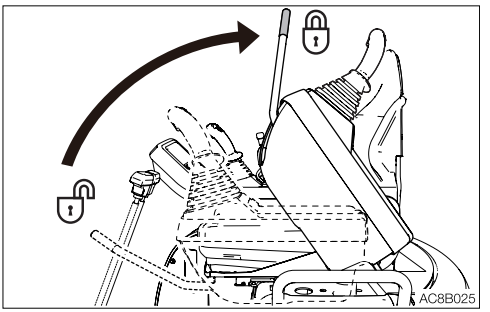
If a weight greater than the lifting capacity is applied or lifted, the overload warning device is activated and the horn sounds. (When the lift overload warning switch is turned on.)
OFF ..... Off
ON ..... On

LEVERS AND PEDALS

SAFETY LOCK LEVER

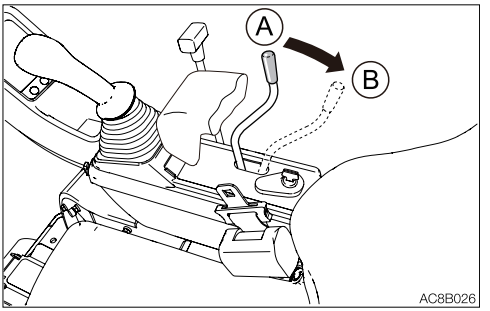
⚠ WARNING

- **Before standing up from the operator's seat to, for example, adjust the operator's seat, lower the working equipment to the ground, raise the safety lock lever to the lock position and then stop the engine. If any control is accidentally touched when the safety lock lever is lowered (unlocked), the machine will suddenly move and cause serious injury or death.**
- **Note that the dozer blade, boom swing and auxiliary hydraulic controls cannot be locked, even when the safety lock lever is set to the locked position. Do not carelessly touch these controls.**
- **Be careful not to touch the operating levers when raising or lowering the safety lock lever.**
- **Before leaving the operator's seat, lower the working equipment to the ground, raise the safety lock lever to engage the lock and stop the engine. Also, be sure to remove the key, lock the door and covers, take it with you and store it in a specified place.**



This device is for locking the hoe attachment, slewing and traveling.
When the lever is raised, the lever stand springs up and the controls are locked.
Note:
When the lever is in the unlock position, the engine cannot be started.

THROTTLE LEVER

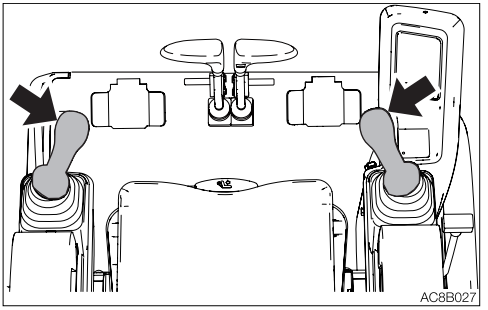


This controls the engine speed.
(A).....Low idling
(B) .....Maximum speed

OPERATING LEVERS

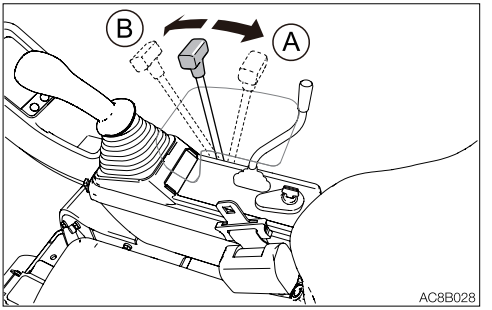
⚠ WARNING

- **Before starting operation, carefully check which lever pattern you are going to use.**
- **It is described using the ISO pattern in this manual.**



Use these levers to operate the boom, arm, bucket and upperstructure.
Refer to “Lever pattern” on pages 3-6 to 3-8.
Refer to “Operating the working equipment” on page 3-18 and 3-19.

BLADE LEVER

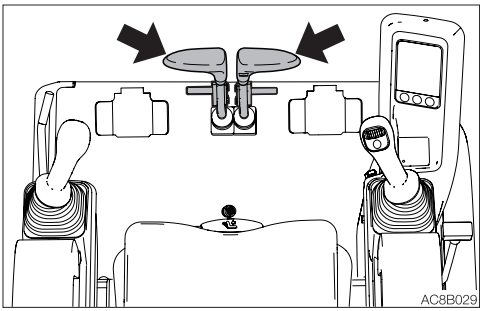


Use this lever to operate the dozer blade.
(A).....Blade up
(B) .....Blade down
Refer to “Operating the dozer blade” on page 3-19.

TRAVEL LEVERS/PEDALS

⚠ WARNING

- **Before operating the travel levers/pedals, make sure that the dozer blade is to the front of the operator's seat. Remember that when the dozer blade is to the rear of the operator's seat, the travel levers/pedals must be operated in the reverse direction from when it is to the front.**
- **Do not rest your foot on the pedal unless operating it for traveling. If the pedal is accidentally stepped while working, the machine may suddenly move and cause serious injury or death.**

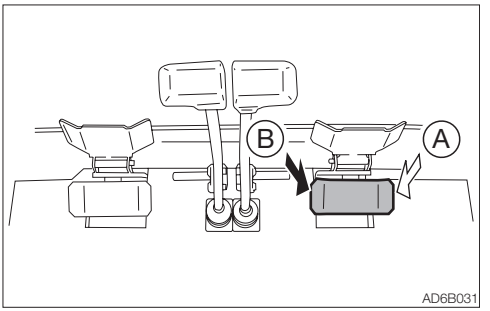


Use these levers/pedals to move forward or backward and to change directions. Fold the pedals when not being used.
Refer to "Operating the travel levers/pedals" on page 3-14.

BOOM SWING PEDAL

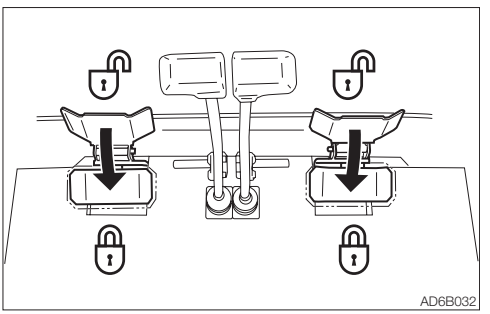
⚠ WARNING

Keep the pedal cover to the locked position when not using the pedal. Stepping on a pedal accidentally when it is not locked may cause accidents.



Use this pedal to operate the boom swing.
(A).....Boom swing right
(B) .....Boom swing left
Refer to "Operating the boom swing" on page 3-19.

Pedal lock

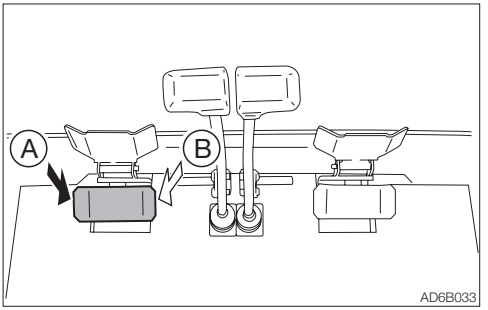


Set the pedal cover over the pedal to lock it. Open the pedal cover from the pedal to unlock it.

AUXILIARY HYDRAULIC PEDAL

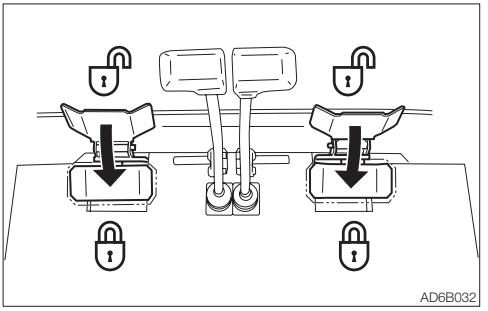
⚠ WARNING

Keep the pedal cover to the locked position when not using the pedal. Stepping on a pedal accidentally when it is not locked may cause accidents.



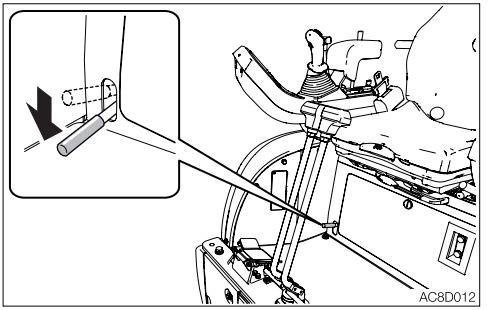
This pedal controls the flow of the oil in the auxiliary hydraulic circuit.
(A).....Hydraulic oil flows to left auxiliary hose.
(B) .....Hydraulic oil flows to right auxiliary hose.
Refer to “Auxiliary hydraulic lines” on page 2-26.

Pedal lock



Set the pedal cover over the pedal to lock it. Open the pedal cover from the pedal to unlock it.

SELECTOR LEVER



This lever is used to change the crawler width. The operation of the dozer blade cylinder and the span cylinder is switched with this lever.
1. Change the crawler width by moving the blade lever while depressing this lever.

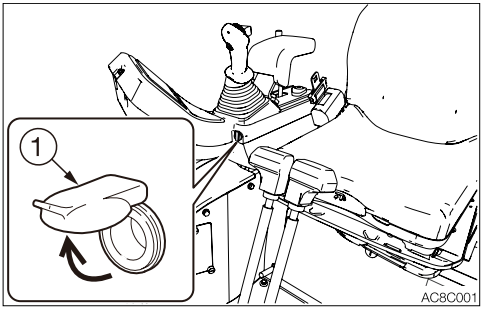
MEMO

ACCESSORIES

POWER SOCKETS

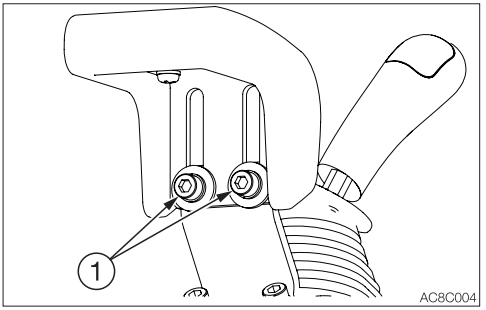
⚠ WARNING

Use only those electric products which comply with the specifications of this socket.



This socket is used to supply power. Be sure to use this socket for devices which require power supply voltage/current less than 12V/5A.
To use, open the cap (1).

ARMREST

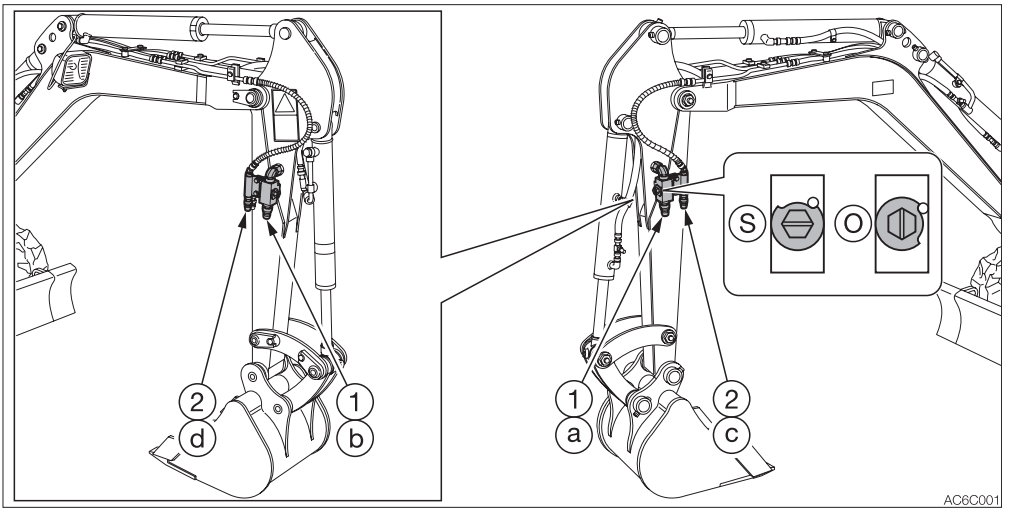


Adjusting the height

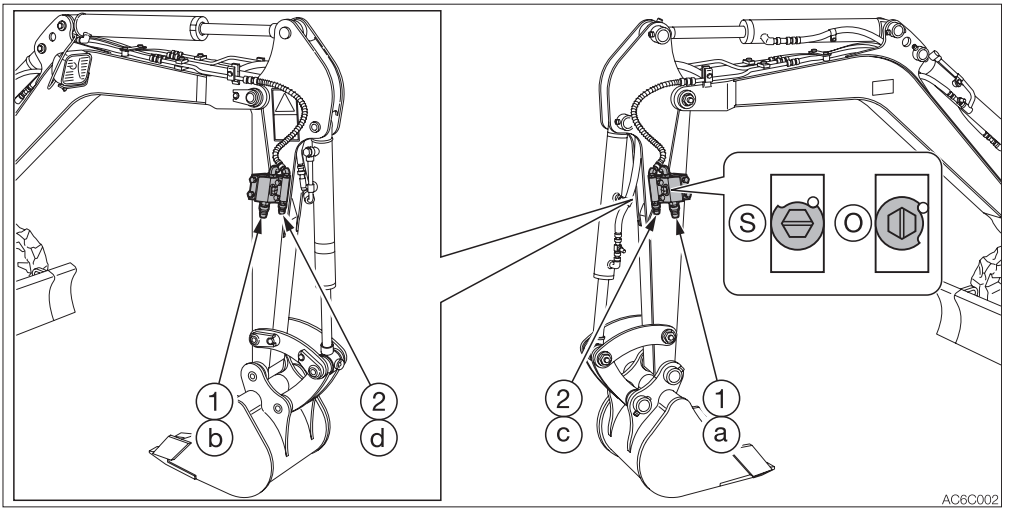
1. Loosen the lock by turning the bolts (1) counterclockwise.
2. Set the armrest to your desired position, and turn the bolts (1) clockwise to lock the armrest.

AUXILIARY HYDRAULIC LINES (IF EQUIPPED)

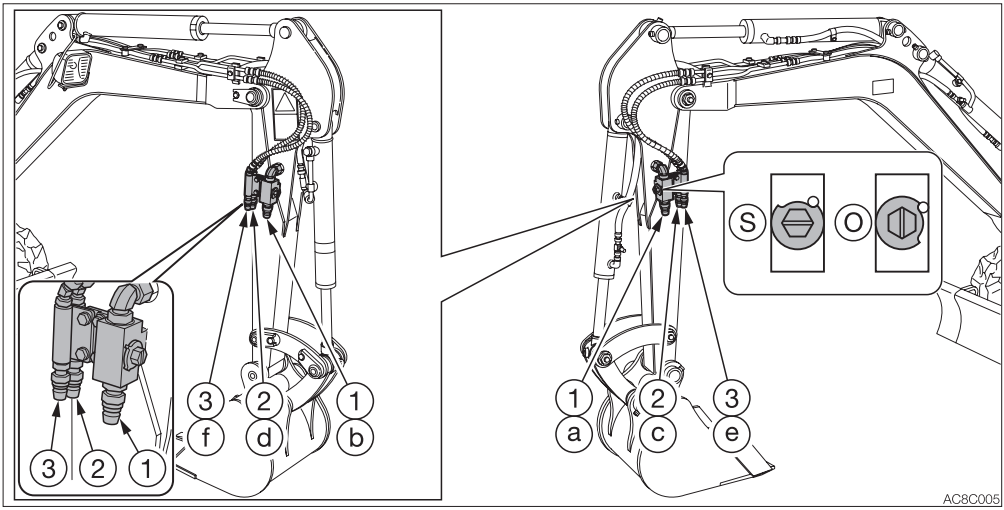
First / second auxiliary hydraulic line 1



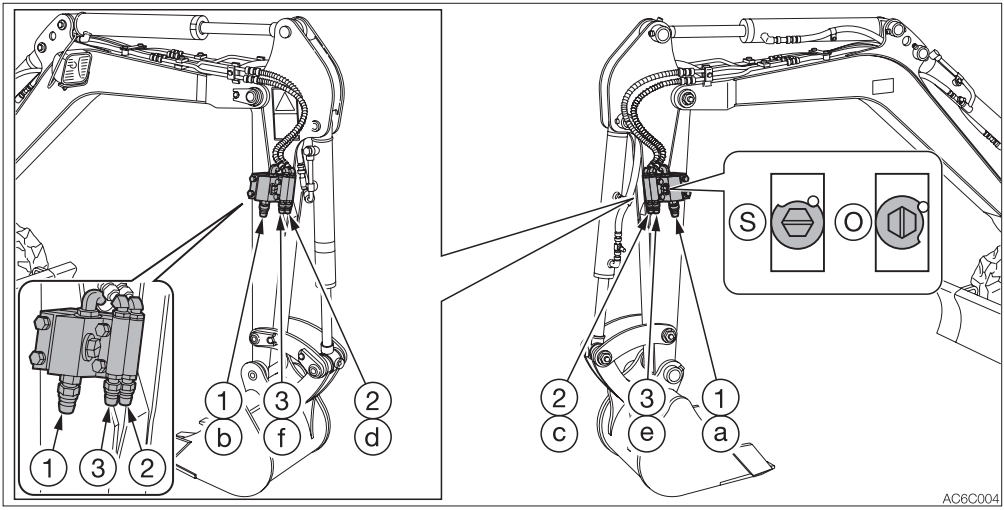
First / second auxiliary hydraulic line 2



Third auxiliary hydraulic line 1



Third auxiliary hydraulic line 2



⚠ WARNING

Oil may spurt out if pipes disconnected before releasing the pressure in the hydraulic system.

- Immediately after the engine is stopped, press each auxiliary hydraulic pedal and second auxiliary switch several times to release the pressure from the auxiliary hydraulic circuit.
- Slowly loosen the air bleeding plug to relieve the internal pressure of the hydraulic oil tank.
- When disconnecting hoses, stand to the side and loosen them slowly to gradually release the internal pressure before removing.

These lines deliver the hydraulic oil necessary for operating a hydraulic breaker, crusher or other attachments.

(1).....First auxiliary hydraulic lines
(2).....Second auxiliary hydraulic lines
(3).....Third auxiliary hydraulic lines

Stop valve
(S) : Close
(O) : Open

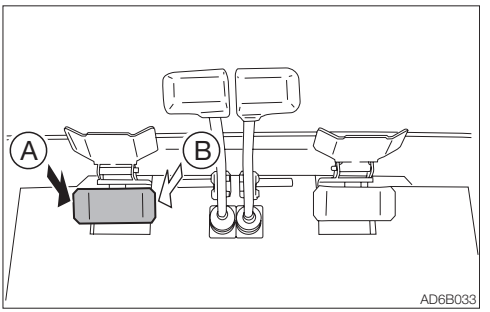
Connecting the hydraulic circuits
To connect the attachment hydraulic lines, observe the following procedures:
1. Release the pressure remaining in the lines, and then close the stop valve. Refer to “Releasing the residual pressure” on page 2-31.
2. Remove the plugs.
3. Connect the attachment hydraulic lines to ports (a/c) and (b/d). When installing a hydraulic breaker, connect the supply circuit to the port (a) and the return circuit to port (b).
4. Open the stop valves. When installing a hydraulic breaker, open the selector valve (1). Refer to “Selector valve” on page 2-29.
5. When connecting is complete, purge air from the hydraulic lines.
   a. Start the engine and run it at a low idle speed with no load for 10 minutes.
   b. With the engine running in low idle, operate the auxiliary hydraulic pedal or switches repeatedly (approx. 10 times) to purge air from the hydraulic lines.
   c. Stop the engine and wait for at least 5 minutes until bubbles escape from the hydraulic oil in the tank.

IMPORTANT: Follow the procedures for purging air as instructed by the attachment manufacturer, if applicable.

6. Check for oil leaks.

Disconnecting the hydraulic circuits
1. Release the pressure remaining in the lines, and then close the stop valve. Refer to “Releasing the residual pressure” on page 2-31.
2. Disconnect the lines from the ports (a/c) and (b/d).
3. Install the plugs.

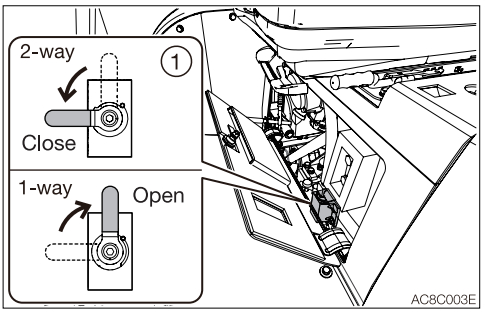
Operating



Press this pedal to control the flow of the oil in the auxiliary hydraulic lines.
(A).....Hydraulic oil flows to left auxiliary line (a).
(B) .....Hydraulic oil flows to right auxiliary line (b).

Releasing the residual pressure
After the auxiliary hydraulic circuits have been used, pressure remains in the circuits. This is called the residual pressure. Release this residual pressure before disconnecting the lines.
1. When the engine is stopped, depress the auxiliary hydraulic pedals from side to side several times.

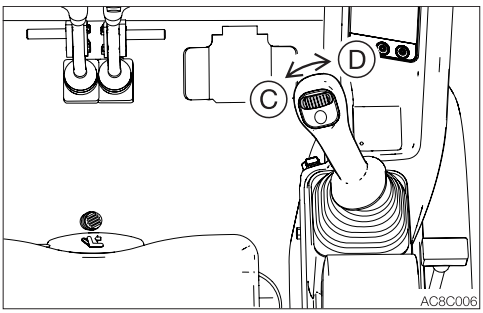
Selector valve (Option)



Open ..... When using a hydraulic breaker (1-way flow)
Close..... When using a reversible attachment (2-way flow)
Change the direction of the hydraulic oil flow by opening or closing the selector valve (1) on the machine body.

Second auxiliary hydraulic switch

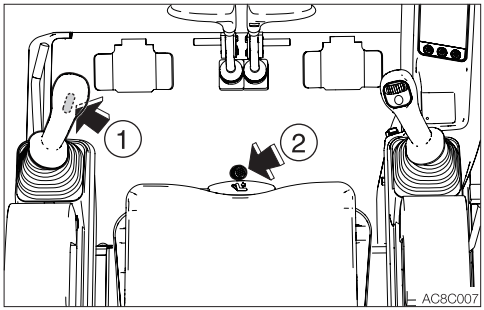
Slider switch
(Proportional control)
Proportional control allows for slow-to-fast/ fast-to-slow movement of attachment. Example: If you move the slider switch half way, the attachment will move at approximately one-half the speed.



Move this switch to control the flow of the oil in the second auxiliary hydraulic lines.
(C): .... Hydraulic oil flows to the left auxiliary line (c).
(D): .... Hydraulic oil flows to the right auxiliary line (d).

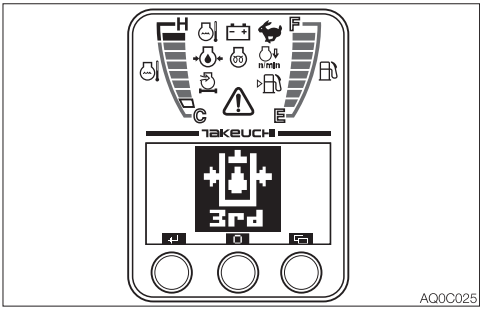
Releasing the residual pressure
Refer to “Accumulator” on page 2-31.

Third auxiliary hydraulic switch and button



The third auxiliary hydraulic lines are normally used to control the “quick attachment” installed to connect/disconnect the bucket. When the safety lock lever is released after the engine is started, hydraulic oil flows into the pipe (e). This allows the pressure in the (e) side to increase and to prevent the pin inserted on the bucket from coming out. If the pressure in the (e) side drops, the alert that the bucket may come out is indicated by the warning lamp and the alarm. For a safety reason, the bucket can be disconnected only when the button (1) and the switch (2) are pressed at the same time. When they are pressed, the hydraulic oil flows into the line (f) to increase the pressure there. As the result, the pin on the bucket comes out and the bucket is removed from the machine.

Third auxiliary hydraulic warning lamp

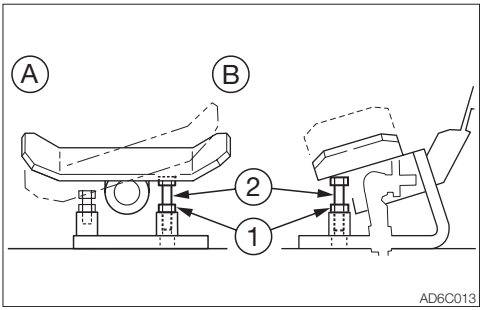


This lamp illuminates and an alarm sounds if the auxiliary 3rd hydraulic pressure drops abnormally while the engine is running

Adjusting the stroke of auxiliary hydraulic pedal

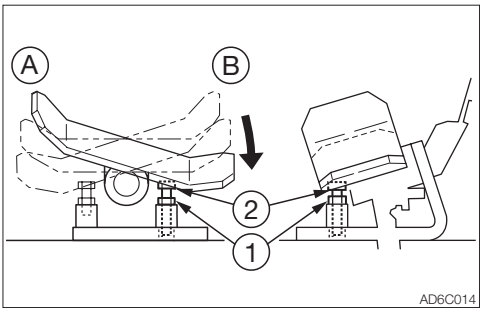
When a breaker is used, the pedal stroke must be adjusted so as not to activate the right auxiliary hydraulic line even if the B side of the pedal is accidentally depressed. When a general attachment is used, the pedal stroke must be readjusted. Adjust it so that the right auxiliary hydraulic line is activated when the B side of the pedal is depressed.

When using a hydraulic breaker (1-way flow)



1. Make sure that the auxiliary hydraulic pedal is in the neutral position.
2. Loosen the lock nut (1).
3. Loosen the adjustment bolt (2) until it touches the pedal.
4. Fasten the lock nut (1) to secure the adjustment bolt (2).

When using a reversible attachment (2-way flow)



1. Loosen the lock nut (1) and screw in the adjustment bolt (2) to the end.
2. Depress the B side of the auxiliary hydraulic pedal to the stroke end and hold its position.
3. Loosen the adjustment bolt (2) until it touches the pedal.
4. Fasten the lock nut (1) to secure the adjustment bolt (2).

ACCUMULATOR (IF EQUIPPED)

Operating the machine with an accumulator

⚠ WARNING

Be sure to handle the high-pressure nitrogen gas enclosed in the accumulator with care. If handled incorrectly, it could explode and cause serious injury. Strictly observe the following precautions:

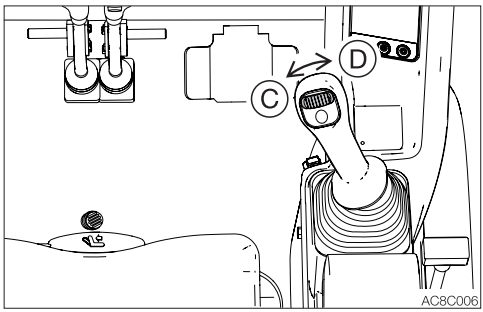
- **Do not disassemble.**
- **Do not allow flame near or throw it into a fire.**
- **Do not drill, weld or fuse.**
- **Do not subject it to physical shock such as hitting, rolling or dropping.**
- **Before disposing of the unit, the sealed gas must be drained. Contact a Takeuchi service agent for help.**

For a machine with an accumulator, the residual pressure in the auxiliary hydraulic circuit or the working equipment circuit can be released even after the engine is stopped.

Releasing the residual pressure

Residual pressure refers to the pressure that remains in the hydraulic circuit after the operation. Release the residual pressure as necessary by using the following steps. Perform the residual pressure releasing within 10 minutes after the engine stopping.

1. Return the throttle lever to idle the engine at low speed.
2. Lower the bucket and dozer blade to the ground.
3. Check that the safety lock lever is in the released position.
4. Stop the engine.
5. Turn the starter switch to the ON position.



6. Move the auxiliary 2nd switch several times to release the residual pressure in the circuitry. (If equipped)
7. Move all the control levers and pedals several times in all directions to release the pressure from the working equipment circuitry.
8. Raise the safety lock lever to engage the lock.

Lowering the boom when the engine has stopped

Perform this operation within 10 minutes after the engine stopping.

1. Check that the safety lock lever is in the released position.
2. Check that the starter switch is in the ON position.
3. Slowly push the operating lever forward to lower the boom.

OPERATION

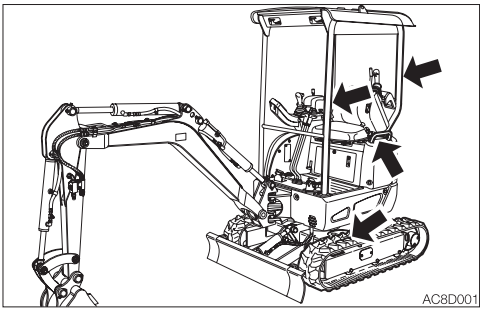


BEFORE STARTING OPERATION

GETTING ON OR OFF THE MACHINE

⚠ WARNING

- **Do not jump on or down from the machine. Never attempt to get on or off the moving machine.**



- **Climb up/down the steps holding the handrail to support your weight in a three point secure stance (hand and feet).**
- **Never use the safety lock lever or control levers as hand holds.**

WALK-AROUND INSPECTION

Perform the walk-around inspections once a day before starting the engine for the first time that day.
Refer to “MAINTENANCE, Walk-around inspection”, on pages 5-16 and 5-17.

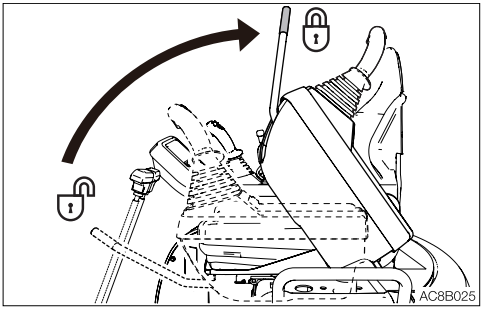
DAILY INSPECTION

Perform the daily inspections once a day before starting the engine for the first time.
Refer to “MAINTENANCE, Daily inspection”, on pages 5-18 to 5-23.

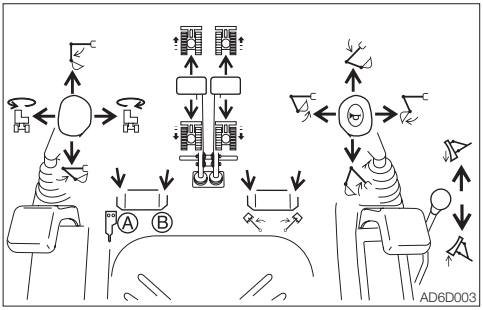
STARTING AND STOPPING THE ENGINE

BEFORE STARTING THE ENGINE

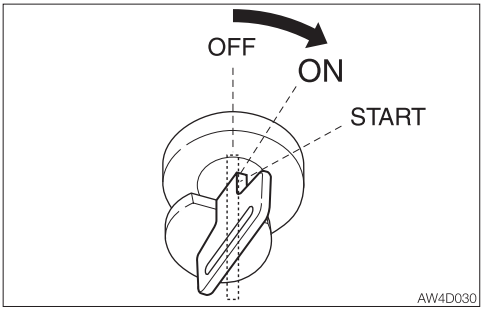
1. Adjust the seat for a comfortable operating position.
2. Fasten the seat belt.



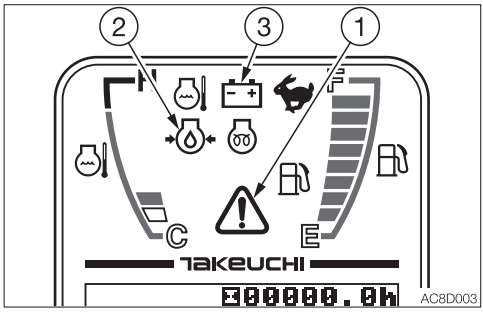
3. Check that the safety lock lever is in the locked position.



4. Check that all levers and pedals are in the neutral position.



5. Insert the key into the starter switch, turn it to the ON position, then perform the following inspections:



- All warning lamps flash for one second and an alarm is sounded for ten seconds. The meters also start functioning. After two seconds, only the battery charge warning lamp (3), the engine oil pressure warning lamp (2) and the engine emergency lamp (1) start flashing, and the other lamps turn off.
- Press the light switch to check that the boom light, front light and meter lights turn on.

If a lamp does not light or the alarm is not sounded, the bulb may be burnt out or a wire may be damaged. Ask a Takeuchi service agent for repair.

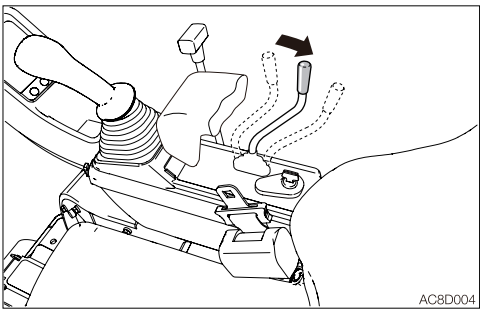
STARTING THE ENGINE

⚠ WARNING

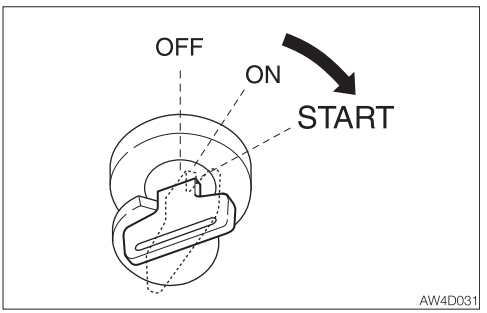
- **Clear all personnel from the work area.**
- **Sound the horn to warn people around the machine.**

IMPORTANT: Do not run the starter motor for more than 15 consecutive seconds. If the engine fails to start, wait for 30 seconds, and then try again to start the engine.
IMPORTANT: If the engine stalls due to fuel shortage, add fuel, turn the key to the ON position for 60 seconds, and then turn it to the START position. Running the starter for a long time before there is enough fuel is going through can cause the starter to fail.

Normal starting



1. Pull the throttle lever to the middle position.



2. Turn the starter key to the START position and start the engine.

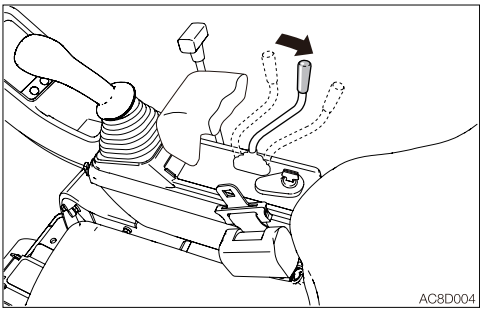
Note:
The engine does not start unless the safety lock lever is in the locked position at this point.

3. Once the engine starts, release the key. The key automatically returns to the ON position.
4. Check that the warning lamps are off.
5. Return the throttle lever and warm up the engine.
   Refer to “Warming up the engine” on page 3-5.

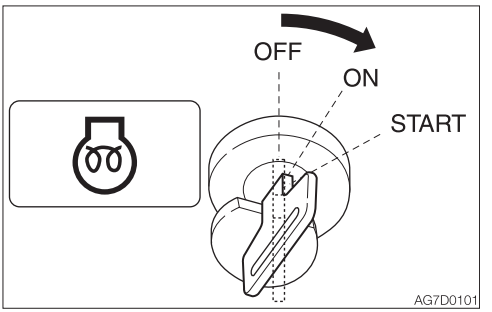
Starting in cold climates

⚠ WARNING

Never use starting fluid on this engine, as the starting fluid could cause an explosion.



1. Pull the throttle lever to the middle position.



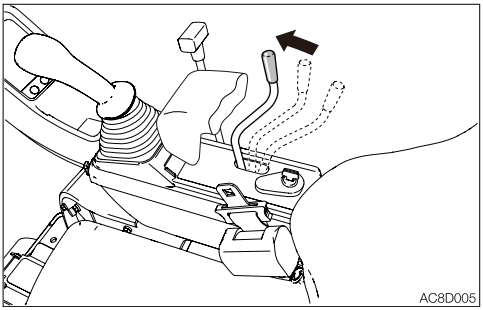
2. Turn the starter key to the ON position, and confirm that the glow lamp is on. (The glow lamp stays lit for up to three seconds when the coolant temperature is 5°C (41°F).)
3. After the glow lamp goes out, turn the key to the START position to start the engine.

Note:
The engine does not start unless the safety lock lever is in the locked position at this point.

4. Once the engine starts, release the key. The key automatically returns to the ON position.
5. Check that the warning lamps are off.
6. Return the throttle lever and warm up the engine.
   Refer to “Warming up the engine”.

WARMING UP THE ENGINE

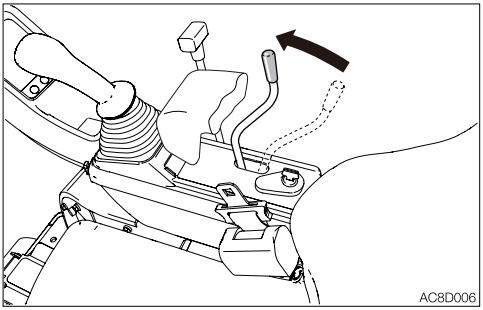
IMPORTANT: Do not accelerate the engine and run it without load until the engine warm up is complete.
Do not warm up the engine for a long time (20 minutes or more). When idling is required, occasionally place a load or run the engine at medium speed.



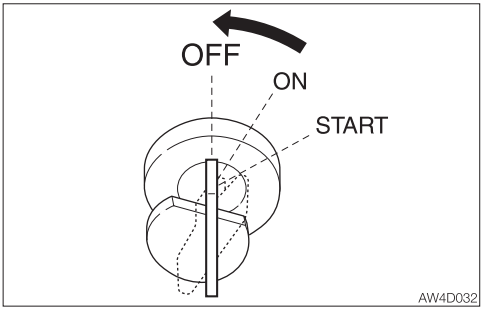
1. Return the throttle lever, then run the engine at a low idle speed with no load for 5 minutes.

STOPPING THE ENGINE

IMPORTANT: Do not stop the engine suddenly when operating with heavy loads or at the maximum speed. Doing so may cause the engine to overheat or seize. Never stop running the engine suddenly except in emergency.



1. Return the throttle lever.
2. Idle the engine for about 5 minutes to gradually let it cool.



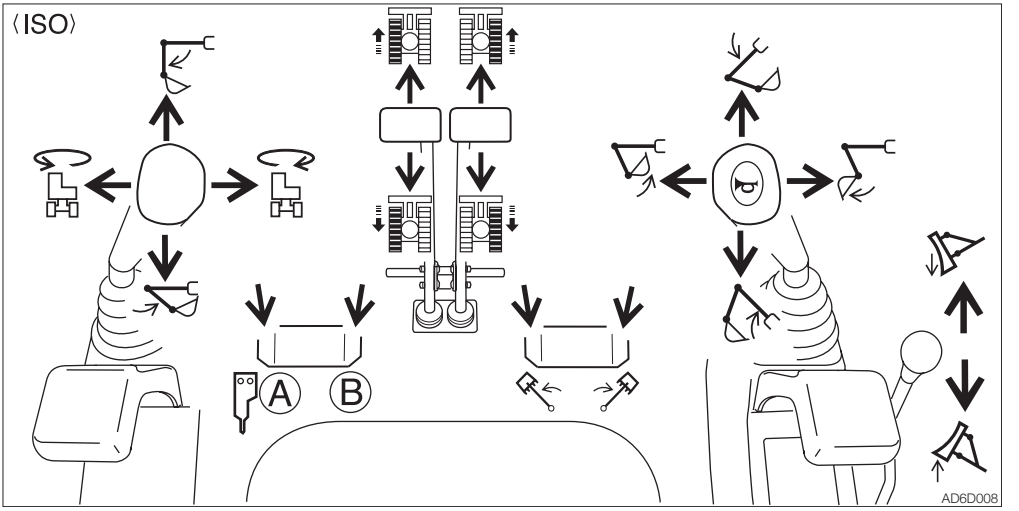
3. Turn the starter key to the OFF position to stop the engine.

OPERATING THE MACHINE

LEVER PATTERN (ISO PATTERN)

⚠ WARNING

- Before starting operation, carefully check which lever pattern you are going to use.
- It is described using the ISO pattern in this manual.

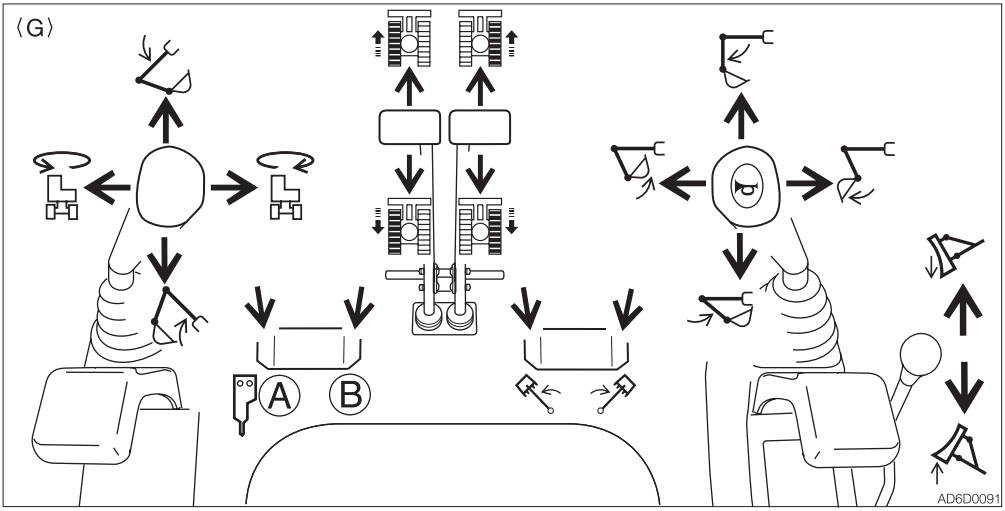


	Left crawler forward		Right crawler forward
	Left crawler reverse		Right crawler reverse
	Arm out		Boom lower
	Arm in		Boom raise
	Upperstructure slew left		Bucket load
	Upperstructure slew right		Bucket dump
	Boom swing left		Dozer blade lower
	Boom swing right		Dozer blade raise

LEVER PATTERN (G PATTERN) (IF EQUIPPED)

⚠ WARNING

- **Before starting operation, carefully check which lever pattern you are going to use.**
- **It is described using the ISO pattern in this manual.**



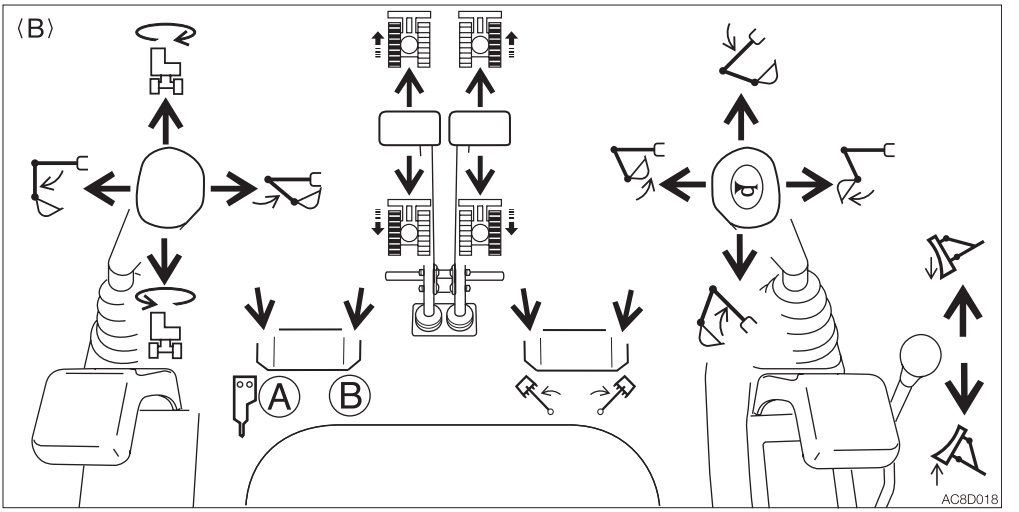
	Left crawler forward		Right crawler forward
	Left crawler reverse		Right crawler reverse
	Boom lower		Arm out
	Boom raise		Arm in
	Upperstructure slew left		Bucket load
	Upperstructure slew right		Bucket dump
	Boom swing left		Dozer blade lower
	Boom swing right		Dozer blade raise

Refer to “Selecting a lever pattern” on page 8-5.

LEVER PATTERN (B PATTERN) (IF EQUIPPED)

⚠ WARNING

- Before starting operation, carefully check which lever pattern you are going to use.
- It is described using the ISO pattern in this manual.



	Left crawler forward		Right crawler forward
	Left crawler reverse		Right crawler reverse
	Upperstructure slew right		Boom lower
	Upperstructure slew left		Boom raise
	Arm out		Bucket load
	Arm in		Bucket dump
	Boom swing left		Dozer blade lower
	Boom swing right		Dozer blade raise

Refer to “Selecting a lever pattern” on page 8-6.

MEMO

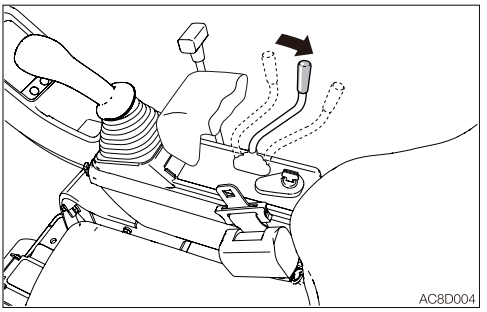
WARMING UP THE MACHINE (HYDRAULIC OIL)

⚠ WARNING

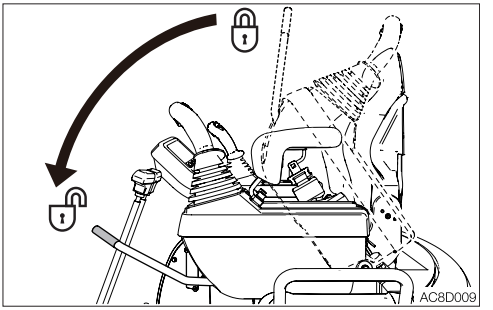
Operating the working equipment without warming up the machine (hydraulic oil) is dangerous, as the working equipment cannot response to controls quickly or may move in unexpected ways, and the safety devices may not operate properly. Be sure to sufficiently warm up the machine.

IMPORTANT: Do not operate the levers too quickly when the hydraulic oil temperature is below 20°C (68°F). The proper hydraulic oil temperature during operation is 50 to 80°C (122 to 176°F). If operations must be performed at lower temperatures, heat up the hydraulic oil to at least 20°C (68°F).

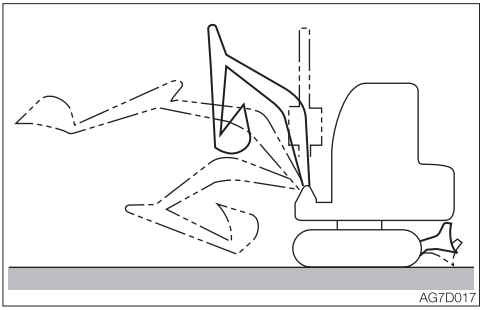
Normal warm-up



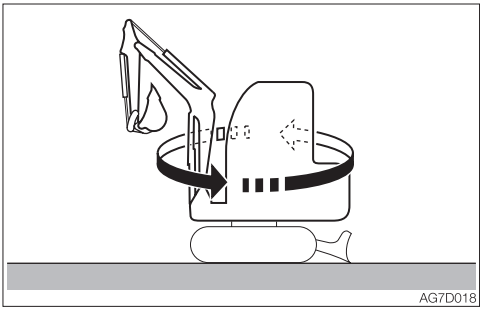
1. Pull the throttle lever to the middle position, then run the engine at medium speed for about 5 minutes with no load.



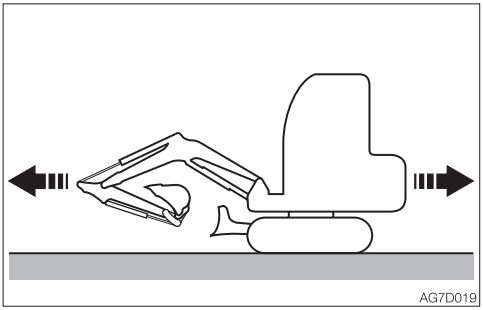
2. Fully lower the safety lock lever to disengage the lock and lift the bucket from the ground.



3. Extend and retract each of the cylinders slowly several times with no load.



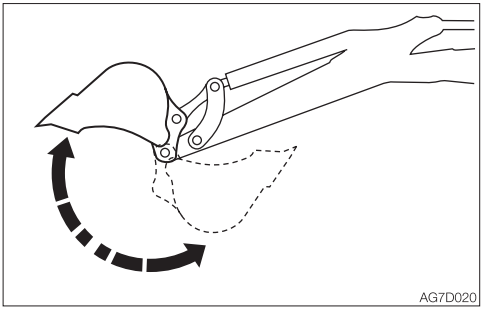
4. Slew slowly to the left and the right several times.



5. Travel slowly forward and in reverse several times.

Warm-up in cold climates

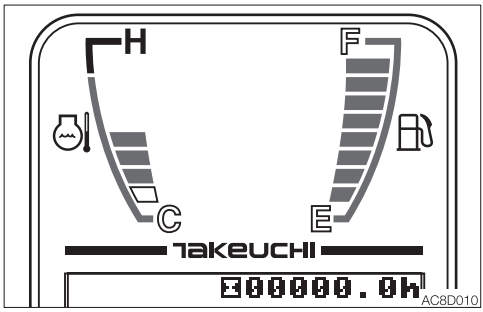
1. Perform the normal warm-up procedure.



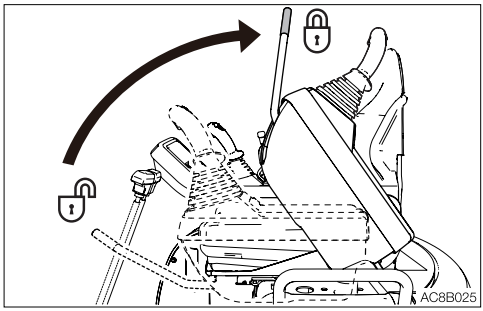
2. Set the bucket cylinder at the stroke end and keep it there.
   Do not keep this condition for more than 30 seconds.
3. Repeat Step 2 until the bucket operating speed becomes normal.

INSPECTION AFTER WARM-UP

After warming up the engine and machine (hydraulic oil), perform the checks and inspections described below, and repair if necessary.



1. Check that the warning lamps and meters are as follows:
   · Are all warning lamps off?
   · Is the LED on water temperature gauge seen within the green range?
2. Check that there are no irregularities in the exhaust color, sound and vibrations.



3. Raise the safety lock lever to the locked position, and then check that the operating and travel levers are locked.

CRAWLER WIDTH SWITCHING

⚠ WARNING

Operate the machine with the maximum crawler width

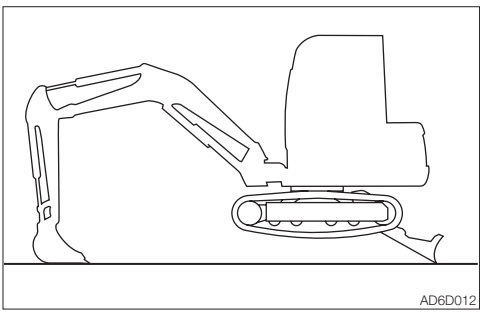
- **Always operate the machine with the crawler width extended to 1300 mm (51.2 in.) to maximize the machine stability. If the machine is operated with the crawler width narrowed (980 mm, 38.6 in.), the machine may tip over due to its poor stability.**
- **If the machine must be operated with the narrowed crawler width (980 mm, 38.6 in.), traveling should be done after folding the hoe attachment, lowering the boom to lower the center of gravity and keeping the machine facing forward.**

IMPORTANT: All debris, mud, soil, stones, etc. must be removed from the track frame before switching the crawler width. Do it in a safe manner and do not work under the machine.

This machine is able to change the crawler width. Normally, it is best to operate with the crawler width extended for machine's stability.

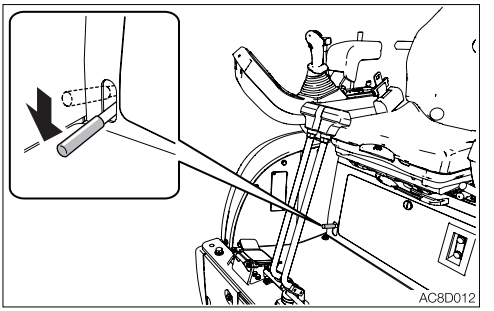
Switching the crawler width

Perform the operation on a flat and rigid ground where no obstacles around.

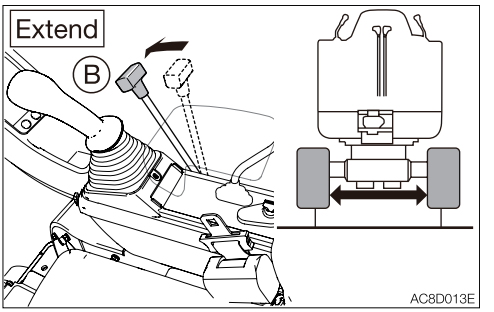


1. Raise the machine body by using the hoe attachment and the dozer blade.

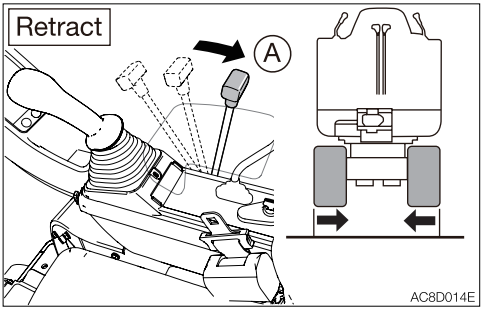
IMPORTANT: Be sure to raise the machine body before switching the crawler width. If the operation is attempted when the crawler is rested on the ground, the travel frame or span cylinder may be damaged.



2. Depress the selector lever.

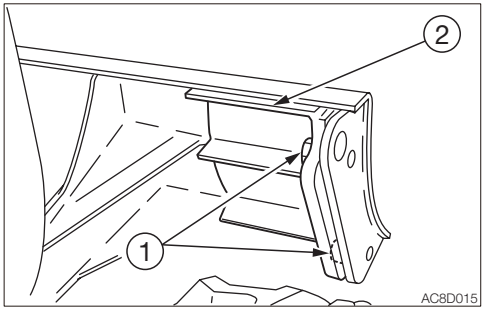


3. Push the blade lever forward (B) to increase the crawler width (1300 mm or 51.2 in.).
   If necessary, extend the blade width by changing the plate (2).
   Refer to "Switching the blade width" on page 3-13.

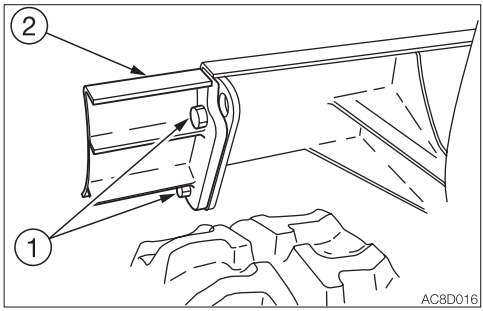


4. Pull the blade lever toward you (A) to decrease the crawler width (980 mm or 38.6 in.).

SWITCHING THE BLADE WIDTH



1. Loosen bolts (1) and remove plate (2).

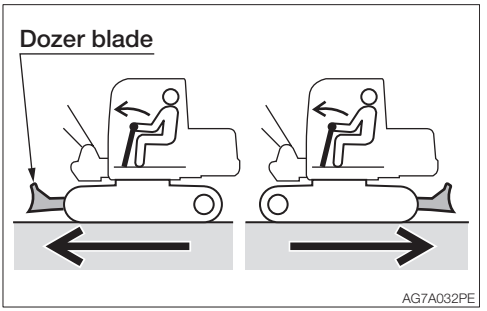


2. Attach the right plate (2) to the left, the left plate (2) to the right.
3. Tighten the plate (2) with bolts (1).

OPERATING THE TRAVEL LEVERS/ PEDALS

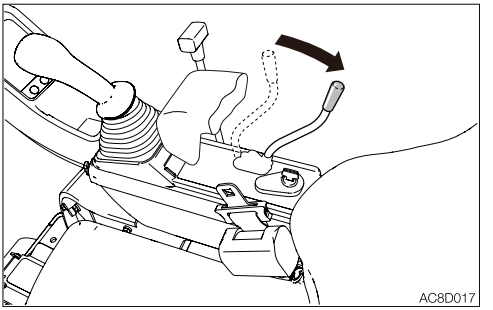
⚠ WARNING

- Never allow anyone to enter the machine's slewing radius and path.
- Signal your intention to move by sounding the horn.
- There is a blind spot in the rear of the machine. Before traveling in reverse, as necessary, swing the cab around in reverse to check that the area is safe and clear.

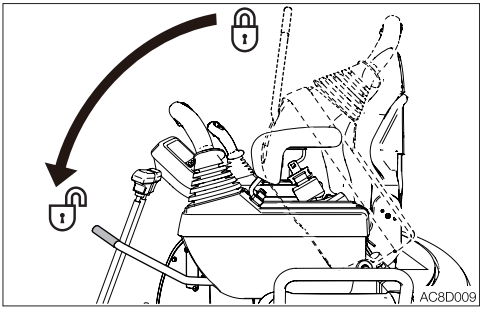


- Before operating the travel levers/ pedals, make sure that the dozer blade is to the front of the operator's seat. Remember that when the dozer blade is to the rear of the operator's seat, the travel levers/pedals must be operated in the reverse direction from when it is to the front.
- Clear all obstacles from the path of the machine.

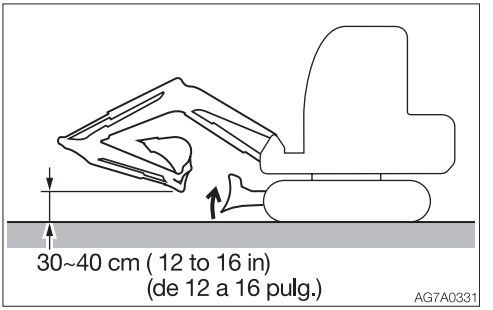
Moving the machine forward and backward



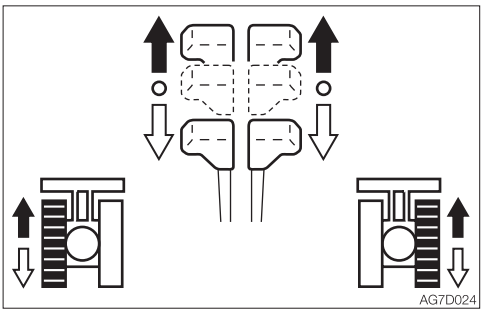
1. Pull the throttle lever and increase the engine speed.



2. Fully lower the safety lock lever to disengage the lock.



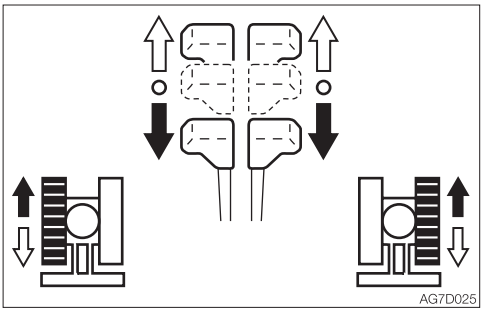
3. Fold the hoe attachment and lower it 30 to 40 cm (12 to 16 in.) above the ground.
4. Lift the dozer blade.
5. Operate the left and right travel levers as below.



When the dozer blade is in front of the operator's seat:

➡ To move forward:
Tilt the levers forward.

⇨ To move backward:
Tilt the levers backward.



When the dozer blade is behind the operator's seat:

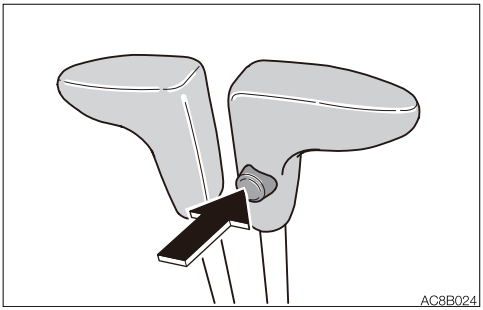
➡ To move forward:
Tilt the levers backward.

⇨ To move backward:
Tilt the levers forward.

Traveling in 2nd (High) speed

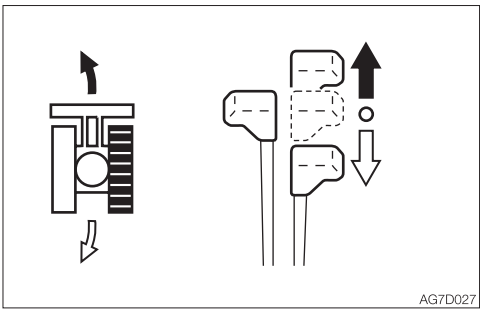
⚠ WARNING

When a load greater than a set value is applied during traveling in 2nd (high) speed, the speed will automatically slow down to 1st (low) speed. When the load becomes lighter, the speed will increase and return to 2nd (high) speed. It should be noted that the travel speed changes depending on the load condition (for machines with the automatic travel shift-down system).



Press the travel speed switch on the right travel lever to switch to 2nd (high) speed, and press it again to return to 1st (low) speed.

Pivot turn

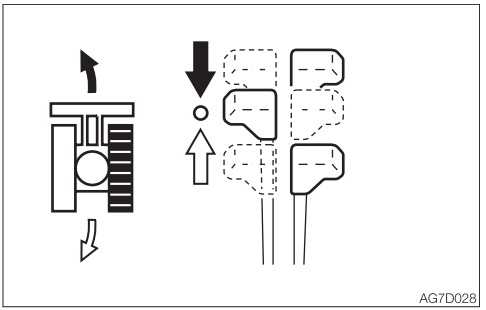


Turning to the left when stopped:

➡ To turn forward to the left:
Tilt the right lever forward.

⇨ To turn backward to the left:
Tilt the right lever backward.

To turn to the right, operate the left lever in the same way as for the right lever.



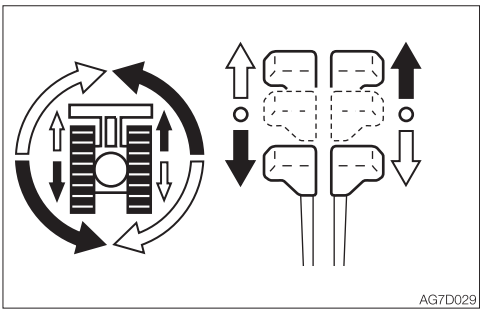
Turning to the left while traveling:

➡ To turn left while traveling forward:
Set the left lever to neutral.

⇨ To turn left while traveling backward:
Set the left lever to neutral.

To turn to the right while traveling, operate the right lever in the same way as for the left lever.

Spin turn



➡ To spin left:
Tilt the left lever backward and the right lever forward.

⇨ To spin right:
Tilt the right lever backward and the left lever forward.

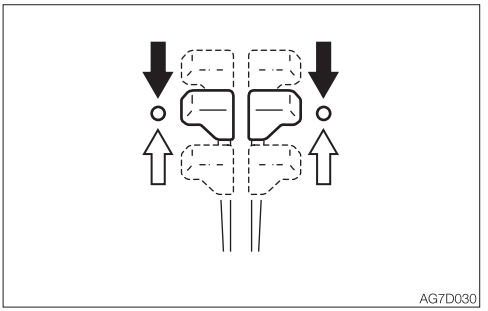
STOPPING TRAVEL

⚠ WARNING

- Park the machine on a flat, rigid and safe ground. Set the parking brake. If you must park on a slope, chock the tracks to block the machine.
- If any control is accidentally touched when the safety lock lever is not locked, the machine may suddenly move and cause serious injury or death.
- Note that the dozer blade, boom swing and auxiliary hydraulic controls cannot be locked, even when the safety lock lever is set to the locked position. Do not carelessly touch these controls.

⚠ CAUTION

Never stop running the machine suddenly except in emergency. Stop in good time, if possible.

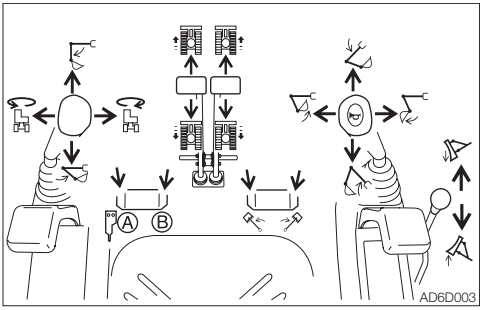


1. Set the left and right travel levers slowly to the neutral position. The machine stops.

OPERATING THE WORKING EQUIPMENT

⚠ WARNING

- **Before starting operation, carefully check which lever pattern you are going to use.**
- **It is described using the ISO pattern in this manual.**



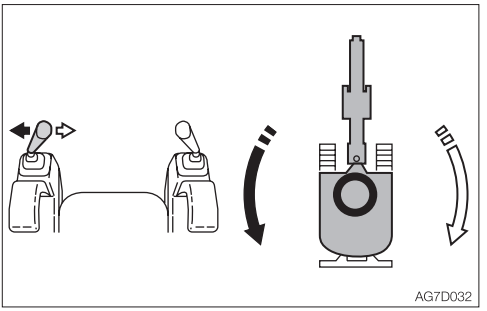
Use the right operating lever to operate the boom and bucket.
Use the left operating lever to operate the arm and slewing.
Return the operating levers to the neutral position to stop the hoe attachments.

1. Lower the safety lock lever to the unlocked position.
2. Set the pedal cover to the unlocked position.

Slewing

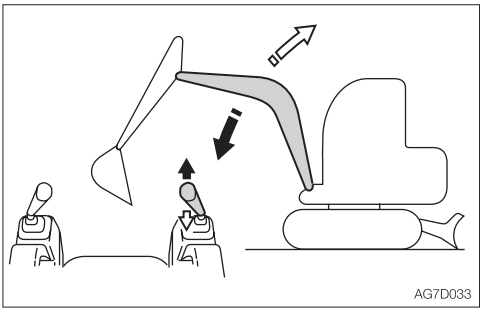
⚠ WARNING

Check the surrounding area for safety before slewing.



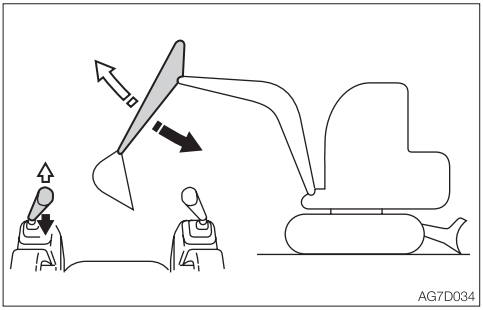
➡ Upperstructure slew left:
Tilt the left operating lever to the left.
⇨ Upperstructure slew right:
Tilt the left operating lever to the right.

Operating the boom



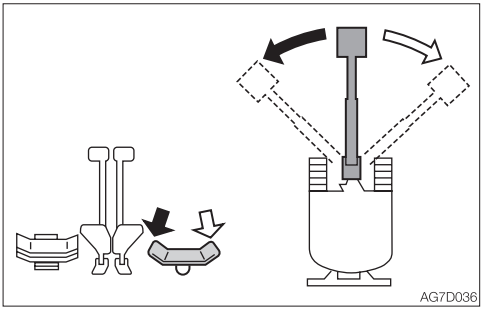
➡ Boom lower:
Tilt the right operating lever forward.
⇨ Boom raise:
Tilt the right operating lever backward.

Operating the arm



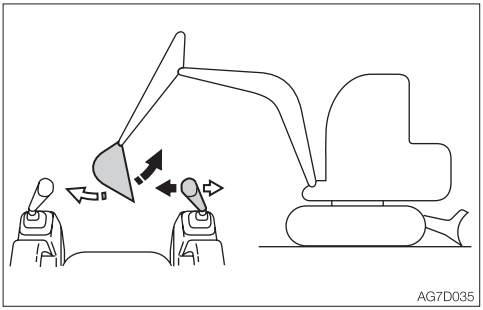
➡ Arm in:
Tilt the left operating lever backward.
⇨ Arm out:
Tilt the left operating lever forward.

Operating the boom swing



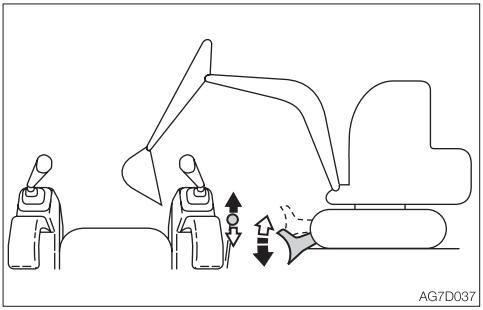
➡ Boom swing left:
Step on the left side of the pedal.
⇨ Boom swing right:
Step on the right side of the pedal.

Operating the bucket



➡ Bucket load:
Tilt the right operating lever to the left.
⇨ Bucket dump:
Tilt the right operating lever to the right.

Operating the dozer blade



➡ Dozer blade lower:
Tilt the lever forward.
⇨ Dozer blade raise:
Tilt the lever backward.

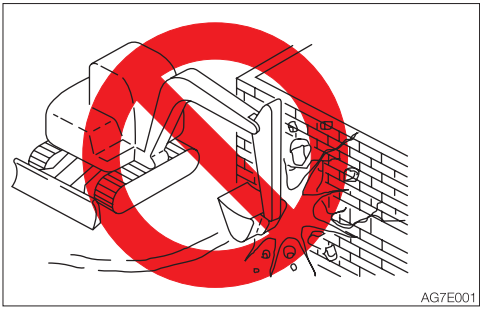
OPERATING PROCEDURES

PROHIBITED OPERATIONS

⚠ WARNING

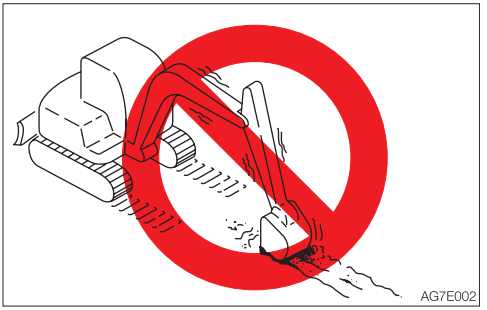
- **Do not operate on bedrock (hard or soft).**
- **Do not slew/swing while traveling. If you must operate the hoe attachment while traveling, operate at speeds slow enough so you have complete control at all times.**

Do not perform demolition or leveling using slew force



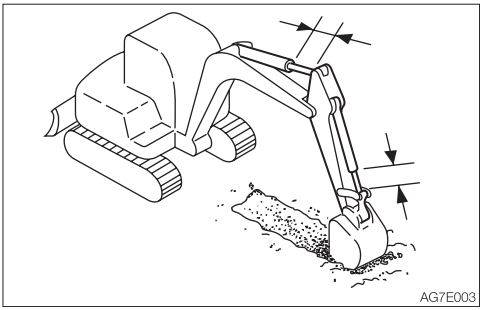
Do not demolish walls or level ground using slew force. Also, do not dig the bucket teeth into the ground during slewing. Doing so will damage the hoe attachment.

Do not dig while traveling

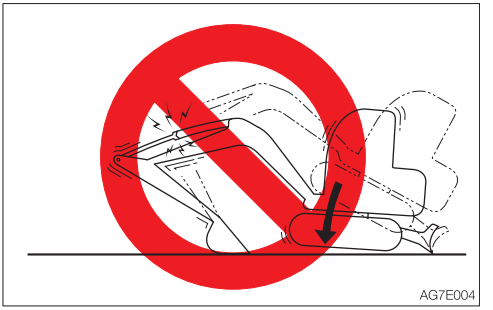


Do not dig the bucket into the ground and use the traveling force to dig.

Be gentle when using the hydraulic cylinder

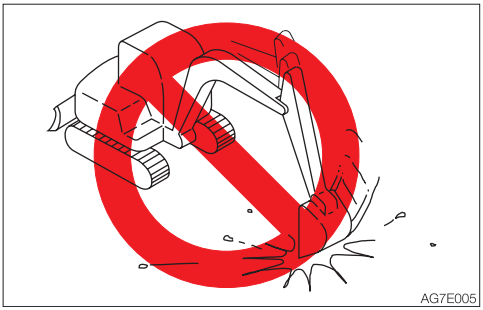


Do not extend the hydraulic cylinders to the stroke ends. Operate them with leeway.



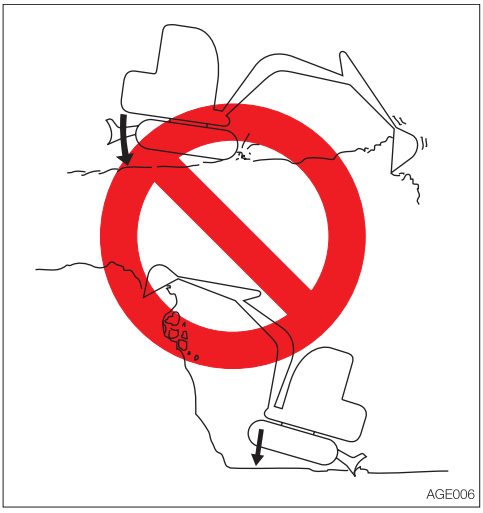
Do not support the machine body with the hoe attachment when the body is lowering with the arm cylinder fully extended. Doing so concentrates the load on the arm cylinder and could damage the arm cylinder.

Do not drive piles with the bucket or dig by banging the bucket



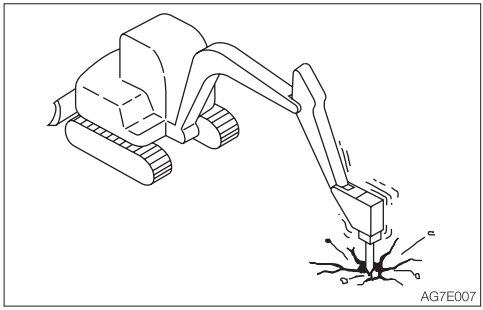
Doing so will shorten the service life of the hoe attachment. Use the hydraulic force to dig.

Do not perform operations using the machine's dropping force



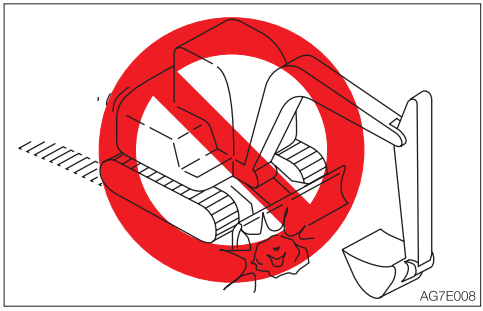
Putting excessive strain on the machine will shorten its service life. When digging, use the hydraulic force of the cylinders and the shallow and long strokes.

Digging bedrock



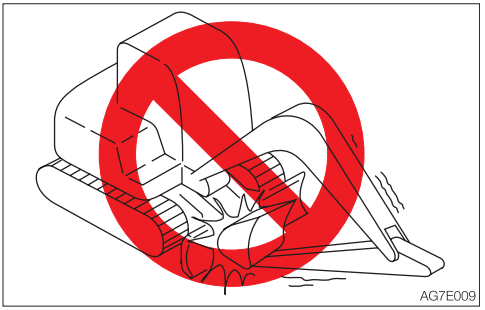
For hard base rock, break the rock up into small pieces with a breaker, etc., before digging. This prevents damage to the machine and is thus more economical in the end.

Caution on exposing the dozer blade to shocks



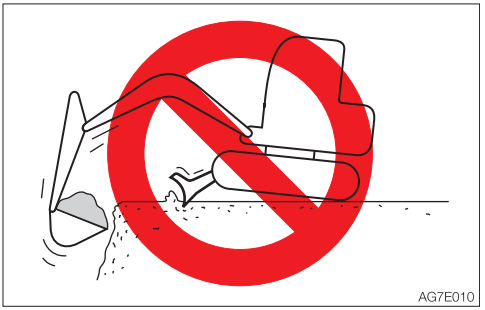
Hitting the dozer blade against rocks, etc., could damage the dozer blade or the blade cylinder.

Caution on folding the hoe attachment

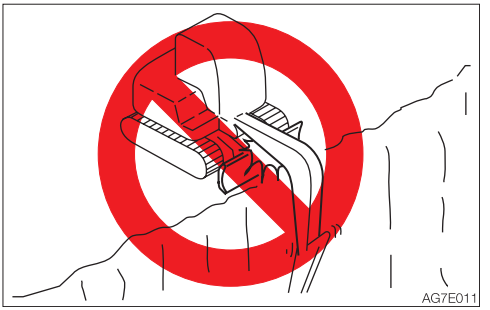


Be careful not to let the bucket to hit the dozer blade when the hoe attachment is being folded.

Do not use the dozer blade as an outrigger

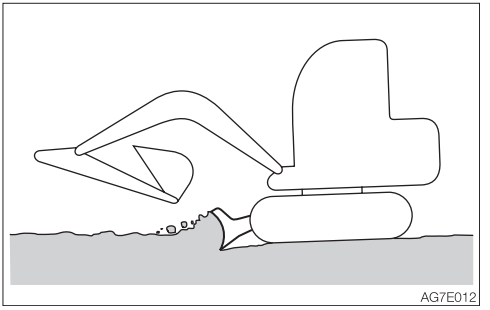


Pay attention to the dozer blade when digging



When digging deeply with the dozer blade positioned at the front, be careful that the boom and bucket do not hit the dozer blade. Operate with the dozer blade at the rear whenever possible.

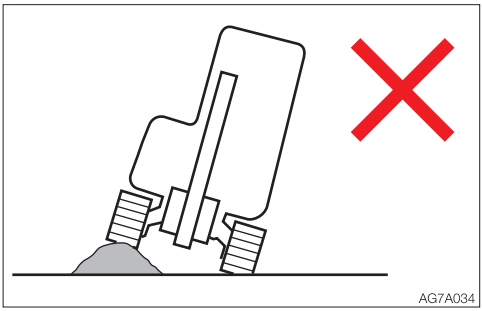
Caution on digging down with the dozer blade



This dozer blade is designed for simple earth pushing. Do not dig down deeply with the dozer blade. Doing so could damage the dozer blade and undercarriage.

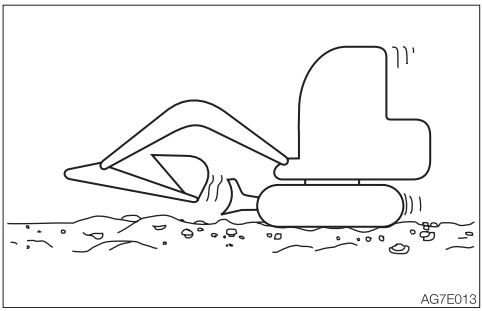
CAUTIONS ON OPERATING

Cautions on traveling



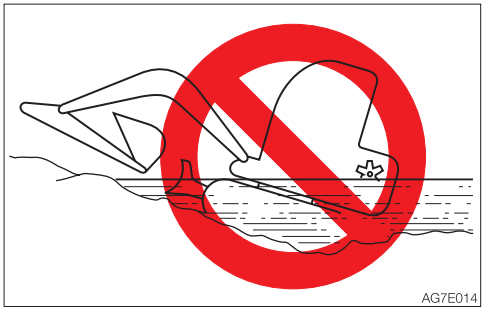
Traveling over obstacles (rocks, stumps, etc.) may put a great load on the machine body and may cause damage to it. Avoid crossing over obstacles whenever possible. If you must do so, keep the hoe attachment near the ground, travel at a low speed, and go over the obstacle at the center of the crawler.

Cautions on traveling in 2nd (High) speed

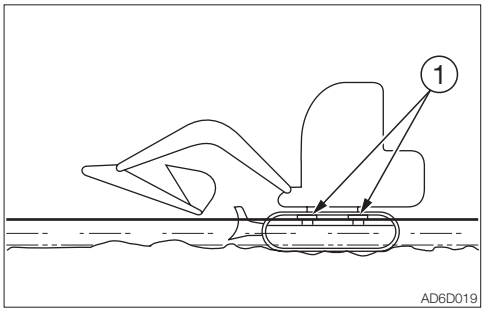


- On uneven ground, maintain the low speed and avoid starting, stopping or changing directions abruptly.
- When a load greater than a set value is applied during traveling in 2nd (high) speed, the speed will automatically slow down to 1st (low) speed. When the load becomes lighter, the speed will increase and return to 2nd (high) speed. It should be noted that the travel speed changes depending on the load condition (for machines with the automatic travel shift-down system).
- When traveling in 2nd speed, do so with the dozer blade at the front.

Cautions on using machine in water



If the rear of the machine is submerged in water as shown in the figure above, it causes the radiator fan to turn in water, resulting in damage to the fan. The rear of the machine must not be submerged.

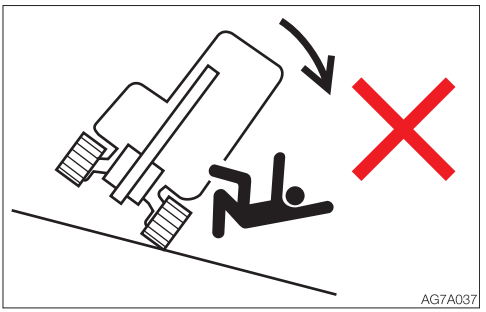


- Allowable water depth
  Use the machine in water only when the water is up to the middle of the shoe slide (1).
- For those parts used in water for a long time, apply enough grease until the old grease is expelled.
- Never submerge the slew bearing or main body in water or sand. If submerged, contact a Takeuchi service agent for inspection.

CAUTIONS ON TRAVELING ON SLOPES

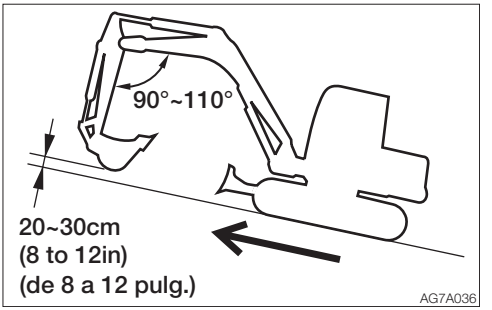
⚠ WARNING

- Never travel on slopes that are too steep for the machine to maintain its stability. Note that in reality, the machine's performance decreases on slopes due to its poor working condition.
- When traveling on slopes, lower the bucket to a height of 20 to 30 cm (8 to 12 in.) above the ground. When climbing a steep slope, extend the hoe attachment to the front. In emergencies, lower the bucket to the ground and stop the machine.
- When traveling on slopes or grades, drive slowly in 1st (low) speed.
- When climbing a hill, keep the operator's seat facing the hillside. When descending a hill, keep the operator's seat facing the downhill direction. In either case, travel must be done while paying attention to the ground in front of the machine.
- Do not descend slopes in reverse.



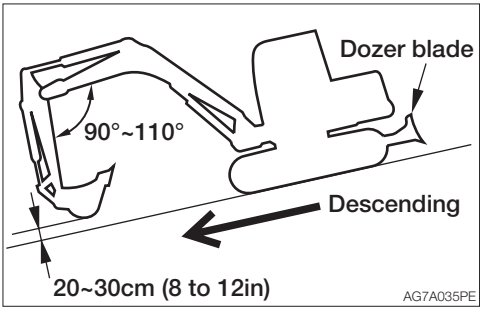
- Do not change directions on slopes or traverse slopes. First return to a flat surface, and then take an alternative path.
- The machine may slip sideways even on a slight slope if they are covered with grass or dead leaves, or when traveling on a wet metal plate or frozen surfaces. Do not allow the machine to position sideways to slopes.

Traveling posture on slopes
Climbing slopes



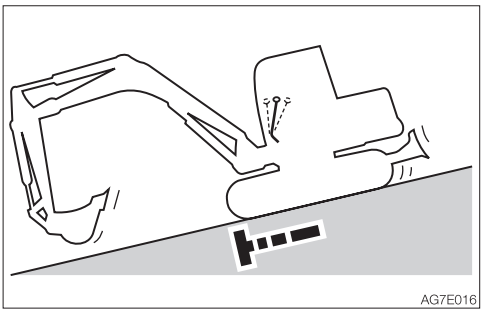
When climbing slopes of 15° or more, maintain the machine posture as shown in the figure above.

Descending slopes



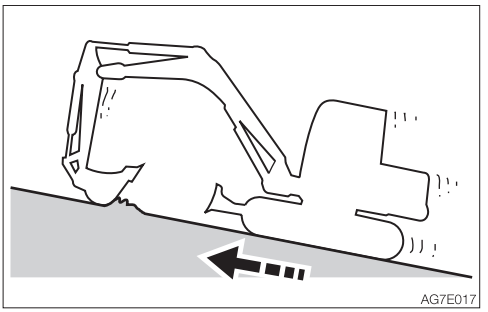
When descending slopes of 15° or more, slow down the engine speed and maintain the machine posture as shown in the figure above.

Braking when descending slopes



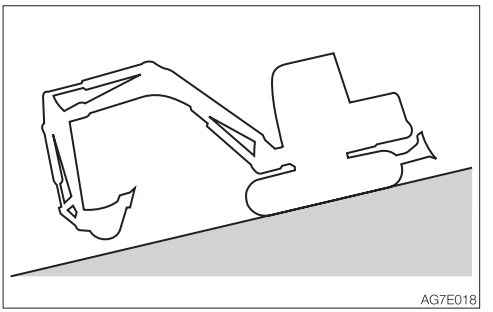
When descending slopes, the brakes are applied automatically once the travel levers are returned to the neutral position.

If the crawler slips



If the crawler slips while climbing a slope and impossible to travel, use the pulling force of the arm to climb the slope.

If the engine stops

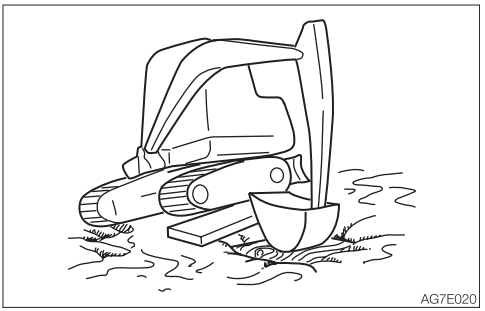


If the engine stops when descending a slope, set the travel levers to the neutral position, stop the machine, then start the engine.

GETTING OUT OF MUD

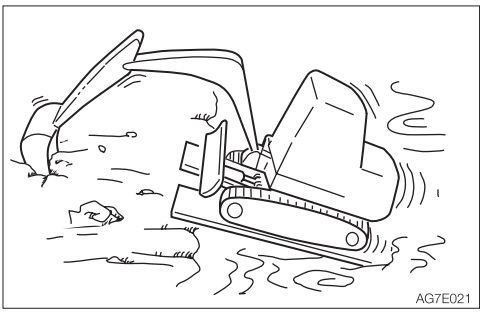
If the machine gets stuck in mud, use the procedure below to get it out.

If one crawler is stuck



1. Swing the bucket to the side of the crawler being stuck.
2. Set the arm and boom to an angle of 90 to 110°.
3. Press the bottom of the bucket (not the teeth) against the ground.
4. Place a plank or the like under the lifted crawler.
5. Lift the bucket and slowly move the machine out of the mud.

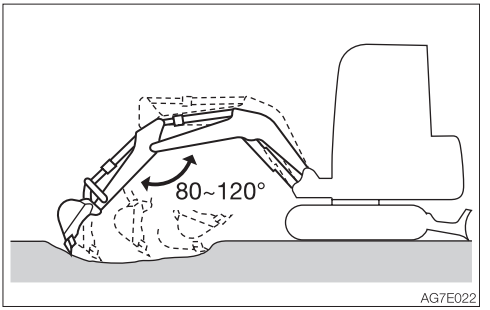
If both crawlers are stuck



1. Perform the steps 1 to 4 above for both crawlers.
2. Dig the bucket into the ground in front of the machine.
3. Pull with the arm while traveling forward to slowly move the machine out.

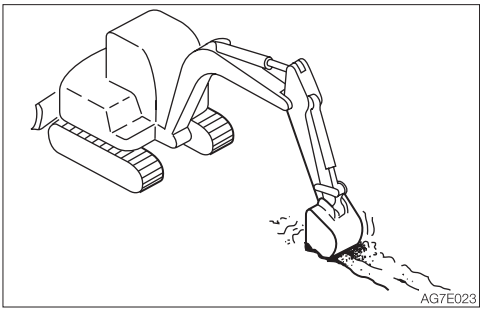
OPERATIONS POSSIBLE WITH THIS MACHINE

Excavating



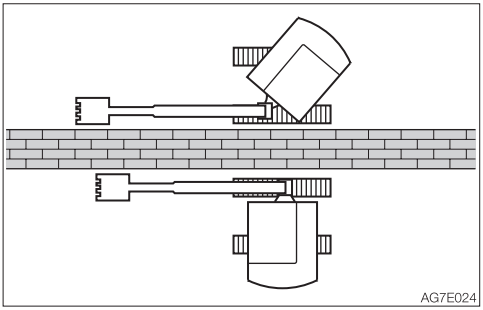
1. Set the dozer blade on the side opposite to the side you want to dig on.
2. Use the arm and bucket and dig with shallow, long strokes. The maximum digging force can be obtained when the boom and arm angle is 80 to 120°. Use this angle for effective digging.

Digging ditches



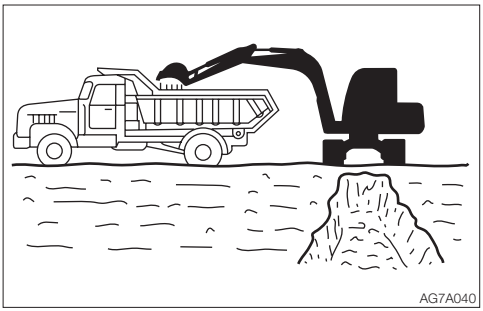
Install a bucket suited for digging ditches and set the crawlers parallel to the ditch to be dug for greater efficiency.
When digging wide ditches, dig the sides first, and then dig the center.

Digging side drains



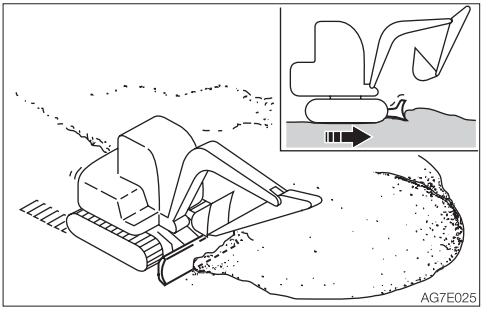
Use the boom swing function to dig side ditches as shown in the figure.

Loading



When loading dirt onto a truck bed, load from the back of the truck, as it is easier and able to load more load than doing it from the front.
Also, use a small slewing angle for greater efficiency.

Leveling

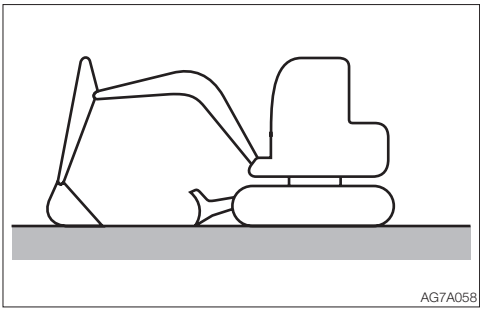


1. Bring the hoe attachment close to the body.
2. Gradually remove the dirt from the side of the mound.
3. Once the mound is low, remove the dirt from the top. If the load becomes too heavy for the machine body, adjust by raising or lowering the dozer blade.

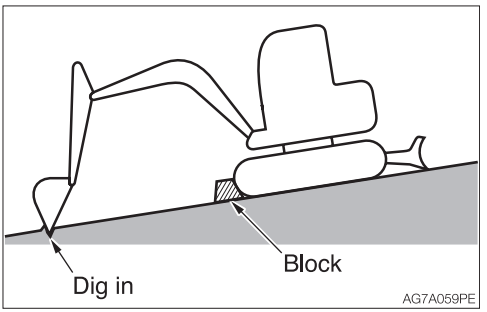
PARKING THE MACHINE

PARKING

⚠ WARNING



- **Park the machine on a flat, rigid and safe ground. Set the parking brake.**



If you must park on a slope or incline, park the machine securely and block the movement of the machine.

- **When parking on a street, use barriers, caution signs, lights, etc., so that the machine can easily be seen even at night to avoid collision with other vehicles.**
- **Before leaving the operator's seat, raise the safety lock lever to engage the lock and stop the engine. Also, be sure to remove the key, lock the door and covers, take it with you and store it in a specified place.**

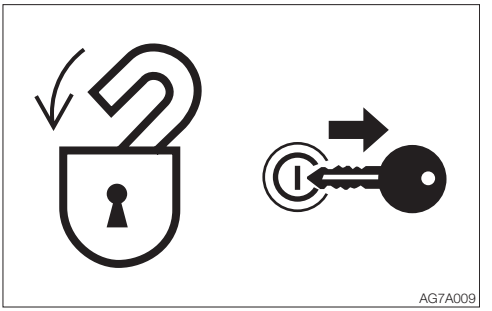
1. Set the left and right travel levers to the neutral position.
2. Return the throttle lever to idle the engine at low speed.
3. Lower the bucket and the dozer blade to the ground.
4. Raise the safety lock lever to the locked position.
5. Stop the engine and remove the key. Refer to "Stopping the engine" on page 3-5.

INSPECTION AND CHECKS AFTER STOPPING THE ENGINE

1. Check for oil or water leak and inspect the working equipment, covers and undercarriage. If any irregularities are found, repair.
2. Fill up the fuel tank. Refer to "Inspecting the fuel level" on page 5-20.
3. Remove any paper scraps or dirt from the engine room.
4. Remove any mud from the undercarriage.

Locking

Be sure to lock the following places:



- Fuel lid
- Manual storage compartment
- Engine hood
- Covers

HANDLING IN COLD CLIMATES

PREPARING FOR COLD CLIMATES

Starting engine in cold climates is not easy, and it becomes more difficult if the coolant freezes. Prepare for cold-climate problems as follows.

Replacing the fuel and lubricant
Replace the hydraulic oil, engine oil and fuel with those intended for cold climates.
Refer to “Fuel and lubricant table” on page 5-4.

Engine coolant

⚠ WARNING

The engine coolant is combustible. Keep away from flame.
Use long-life coolant (antifreeze) and tap water for the engine coolant.

Note: New machines are delivered with JIS Type 2 long-life coolant (antifreeze) at a concentration of 50%.
Refer to “Fuel and lubricant table” on page 5-4.

Battery
As the temperature drops, the battery performance decreases.
Inspect the battery. If it is discharging, contact a Takeuchi service agent to have the battery recharged.
Refer to “Inspecting the battery fluid level and replenishing” on page 5-32.

CAUTIONS AFTER OPERATIONS

Observe the following cautions to prevent mud, water, or the undercarriage from freezing and making it impossible for the machine to move.

- Remove all mud and water from the machine body. In particular, wipe the hydraulic cylinder rod clean to prevent damage to the seal caused by mud or dirt on the rod surface getting inside the seal together with drops of water.
- Park the machine on hard and dry ground. If this is impossible, park the machine on a wooden board placed on ground.
- Drain any water in the fuel tank to prevent it from freezing.
  Refer to “Draining the water from the fuel tank” on page 5-31.
- As the battery capacity drops markedly in low temperatures, cover the battery or remove it from the machine and keep it in a warm place.
  If the electrolyte level is low, add distilled water in the morning before beginning work. To prevent the battery electrolyte from freezing in the night, do not add water after the day’s work.

AFTER THE COLD CLIMATE

When the climate becomes warmer, do as follows:

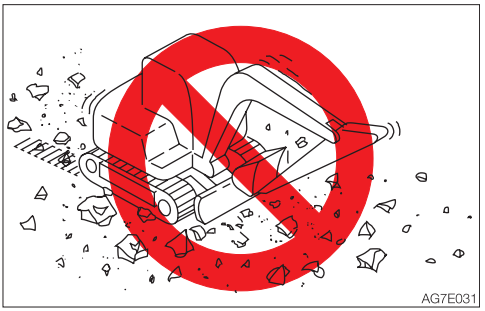
- Replace the fuel and oil for all parts with those specified in the “Fuel and lubricant table”.
  Refer to “Fuel and lubricant table” on page 5-4.
- If a coolant of “one season type” is used, drain the cooling system completely, clean out the inside of the cooling system thoroughly, and fill with tap water.
  Refer to “Cleaning the engine cooling system” on page 5-45.

HANDLING RUBBER CRAWLERS

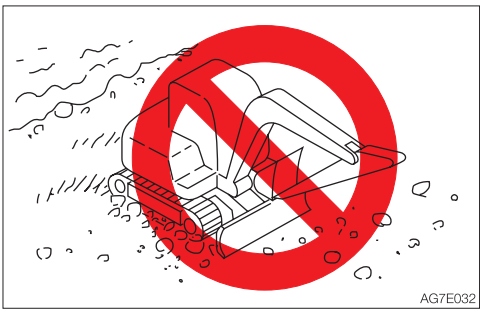
Rubber crawlers have an inherent weakness, lack of strength, due to their use of rubber. Be sure to observe the prohibitions and cautions below to prevent the crawlers from being damaged or coming off.

PROHIBITIONS

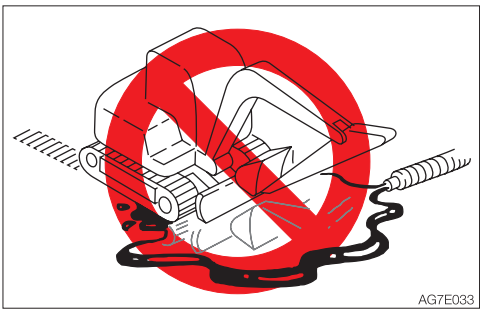
Do not travel or operate the machine in the following places:



- Traveling and slewing on crushed rock, extremely rough hard rock, steel beams, scrap iron, or near the edges of steel plates will cause damage to the rubber crawlers.



- Traveling on riverbeds or places where there are large numbers of boulders may cause the stones to get caught and damage the crawler or make the crawler come off.
- Do not use the machine on the seashore. The salt may corrode the steel core.



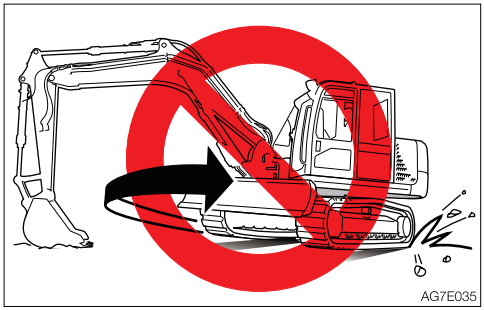
- Do not let fuel, oil, salt or chemical solvents get on the crawlers. These substances may corrode the bonding of the steel cores on the crawlers, resulting in rust or peeling. If any of these substances gets on the crawler, immediately clean it off with water.



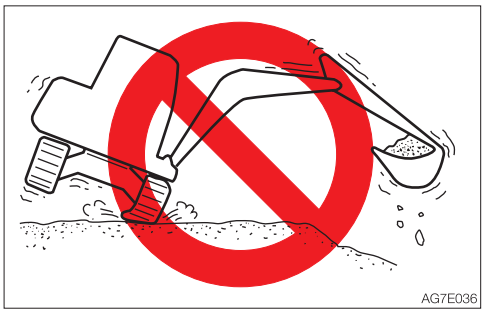
- It will cause an irregular wear or damage to the lugs, if the machine travels on irregular surfaces such as recently paved with asphalt, exposed to a bonfire or of hot iron sheets under the blazing sun.
- Do not move earth in places where the rubber crawlers may slip. Doing so may speed up lug wear.

CAUTIONS

Observe the following cautions when operating the machine:


AG7E035

- Do not turn the undercarriage with the front of the machine body lifted using the hoe attachment (the upperstructure is not turned). Doing so will twist the crawlers with the load concentrated on a single point on the crawler belt, causing rapid damage to the crawlers.
- Avoid changing course abruptly or spin-turning on concrete surfaces whenever possible. Doing so may wear or damage the rubber crawlers.
- Avoid drops that may expose the rubber crawlers to strong shocks.
- Salt, potassium chloride, ammonium sulfate, potassium sulfate, and triple superphosphate of lime can damage the crawler belts. If any of these substances gets on the crawler belts, wash if off thoroughly with water.
- Do not let the sides of the rubber crawlers rub against concrete or walls.
- Do not damage the rubber crawlers by hitting the bucket against them.
- Be especially careful on snowy or frozen surfaces in winter, as the crawler belts tend to slip in such conditions.
- Use rubber crawler belts at temperatures between –25°C to +55°C (–14°F to 131°F).
- When storing the rubber crawlers for long periods of time (three months or more), do so indoors in a place not exposed to direct sunlight or rain.

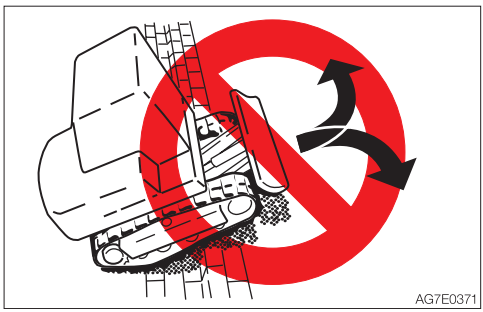

AG7E036

- Rubber crawler belts are not as stable as steel crawler belts since the entire lugs are made of rubber. Be very careful when slewing and swinging sideways.

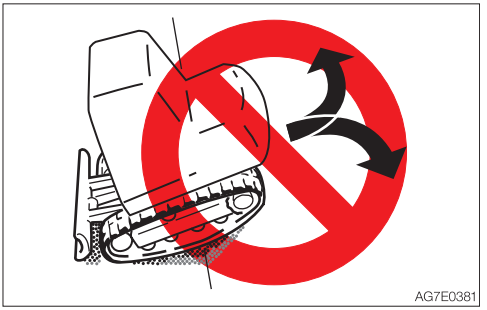
PREVENTING THE RUBBER CRAWLERS FROM COMING OFF

Observe the following cautions to prevent the crawler from coming off:

- Always keep the crawlers at the proper tension.


AG7E0371

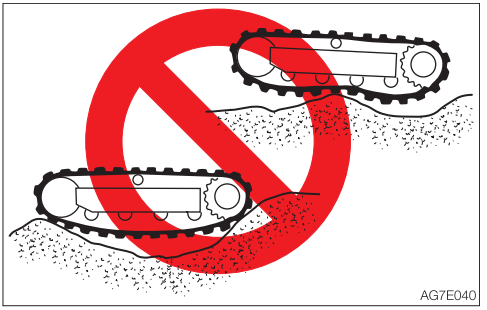
- When traveling over a large step such as a cobblestone or rock (20 cm (8 in.) or deeper), climb up the step at the right angle and do not change courses on top of the step.

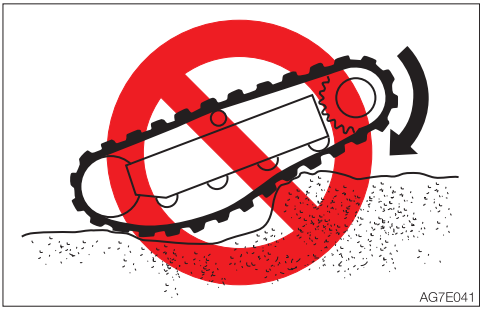


• When climbing in reverse, do not change directions at the point where the slope starts.

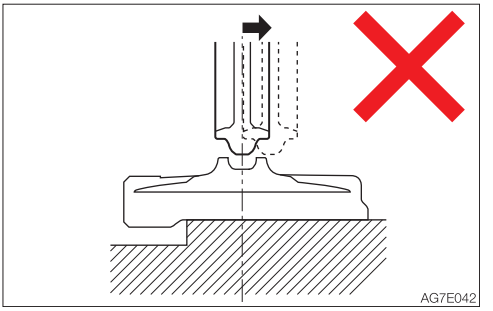


• Avoid traveling by setting one crawler on a slope or projecting portion and the other crawler on a flat surface (with the machine at a tilt of 10° or more). Travel with both crawlers set on flat surfaces.

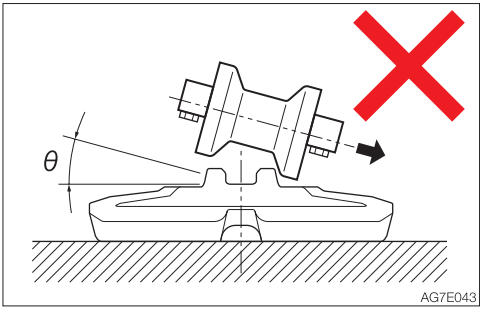




• Do not change directions when the crawler belts are slack as shown in the figure.



• The rubber crawler belts will come off if the machine travels backward in this condition.



• The rubber crawler belts will come off if the machine turns in this condition.

TRANSPORT



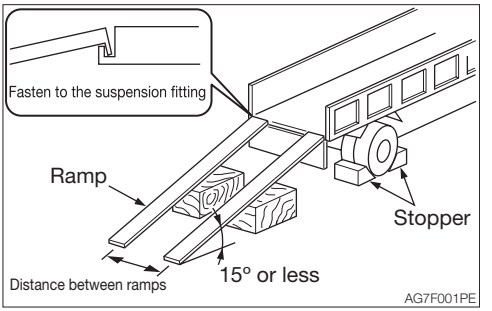
LOADING AND UNLOADING

⚠ WARNING

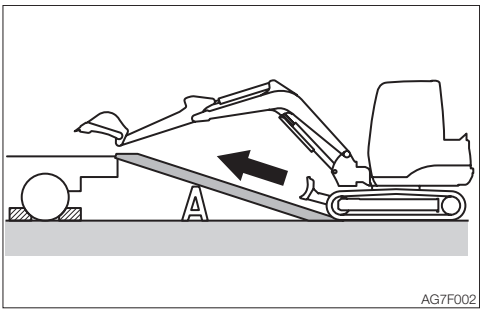
The machine may roll or tip over or fall while being loaded or unloaded. Take the following precautions:

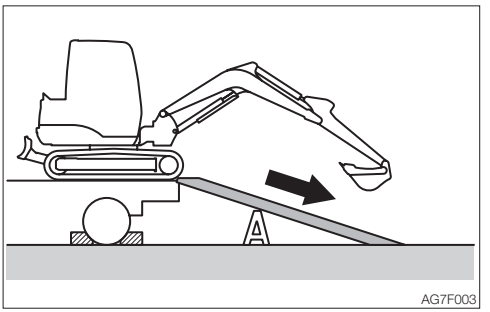
- **Select a firm, level surface and keep sufficient distance from road shoulders.**
- **Secure the ramps of adequate strength and size to the truck bed. The slope of the ramps must not exceed 15°. If the rumps are bowed down too low, support them with poles or blocks.**
- **Never use the working equipment to load or unload the machine. Doing so may result in tipping over or falling down of the machine.**
- **Keep the truck bed and loading ramps clean of oil, soil, ice, snow, and other materials to prevent the machine from sliding sideways. Clean the crawlers.**
- **Chock the transporter wheels to prevent movement.**
- **When being loaded or unloaded, travel slowly in 1st (low) gear by following the signal from the signal person.**
- **Never change courses on the ramp.**
- **Do not slew/swing on the ramp. The machine may tip over.**
- **When slewing/swinging on the truck bed, do it slowly as the footing should be unstable.**
- **Chock the tracks and secure the machine to the truck bed with wire rope or chain.**

When loading or unloading the machine, be sure to use ramps or a platform and follow the procedure below.



1. Set the parking brake on the transporter and chock the wheels.
2. Fix the ramps securely to the truck bed. The slope of the ramps must not exceed 15°.
3. Align the center of the truck bed with the center of the machine, and of the ramp with the center of the crawler.
4. Make sure the dozer blade does not hit the ramps.
5. Lower the hoe attachment as far as possible without letting it touch the transporter.
6. Decrease the engine speed.





7. Drive the machine straight toward the ramps and travel up or down the ramps at 1st (low) speed, by following the signal from the signal person.
8. Load the machine at the specified position on the transporter.
   Refer to “Transporting posture” on page 4-6.

HOISTING THE MACHINE

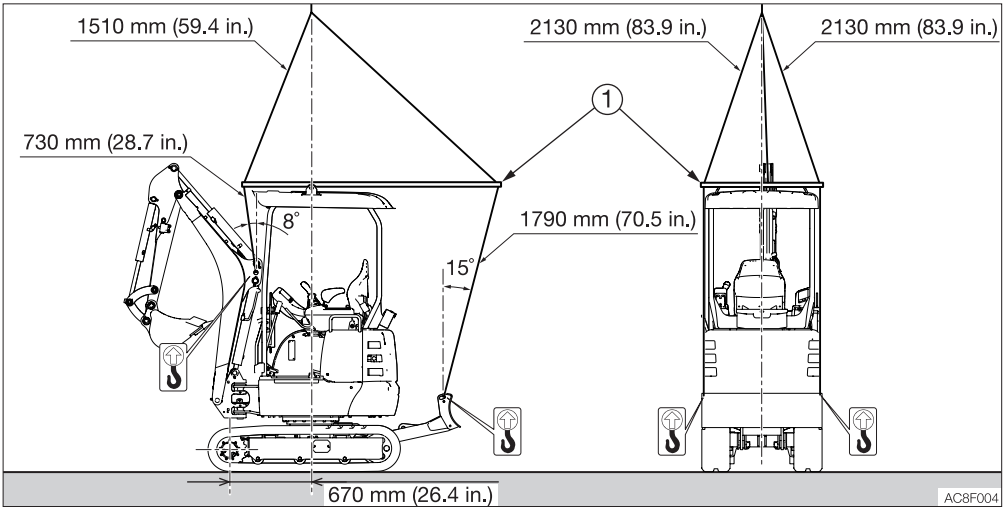
⚠ WARNING

- **Know and use the correct crane signals.**
- **Check the hoisting points for any damage or deformation on a daily basis and replace as necessary.**
- **Check the hoisting equipment for damaged or missing parts on a daily basis and replace as necessary.**
- **When hoisting, use a wire rope capable of lifting the machine mass.**
- **Hoist the machine in only as manner described in the procedure below. Do not do it in any other manner. Doing so is dangerous as it may result in the machine losing its balance.**
- **Do not hoist the machine with an operator on it.**
- **When hoisting, hoist slowly so that the machine does not tip.**
- **Keep everyone out of the area when hoisting. Do not move the machine over the heads of the persons.**

IMPORTANT: This hoisting method applies to machines with standard specifications. The center of gravity differs according to the attachments and optional equipment installed.
Contact your Takeuchi service agent for details.

Hoisting

1. Slew the upperstructure so that the dozer blade is at the rear of the machine (set the upperstructure parallel to the track frame).
2. Raise the dozer blade fully.
3. Extend the bucket cylinder and arm cylinder fully to raise the boom to its uppermost position.
4. If the boom is swung to either the left or right side, set it in the neutral position.
5. Raise the safety lock lever to the locked position.
6. Stop the engine, remove the starter key and get off the machine.
7. Install the wire ropes as shown on the figure below. The hoisting angle must be 60°; otherwise, the hook may be damaged.
8. Hoist the machine slowly until it leaves the ground.
9. Stop hoisting until the machine becomes stable, and then start hoisting the machine slowly again.



(1): Lifting tool

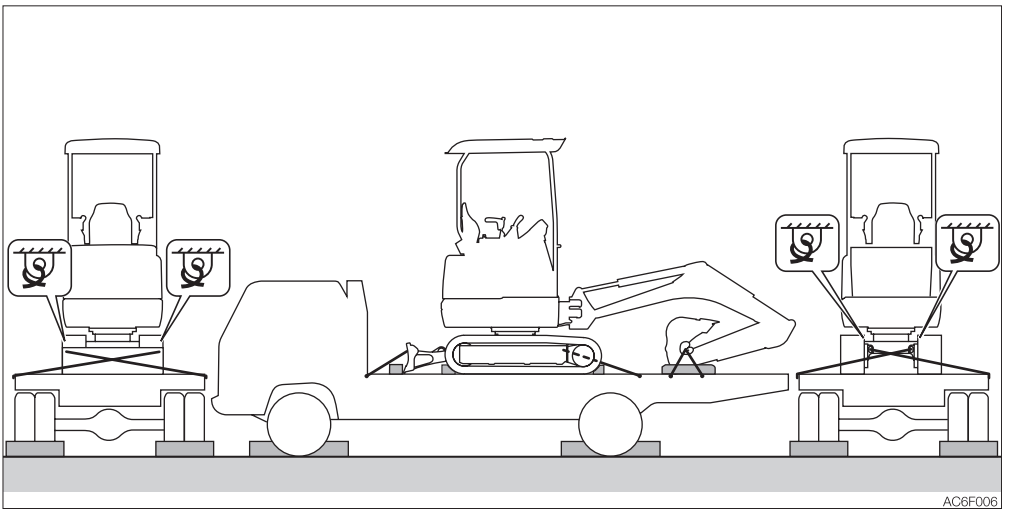
SECURING THE MACHINE

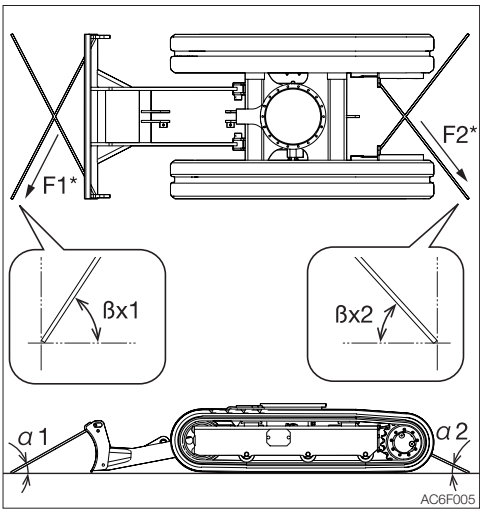
⚠ WARNING

Check the tie down point for any damage or deformation on a daily basis and replace as necessary.

After loading the machine at the specified position, secure it as described below.

Transporting posture





α1	30°
α2	26°
βx1	63°
βx2	52 to 58°
F1*	15.2 kN
F2*	13.3 kN

*: Distributed tying-down force

1. Lower the dozer blade.
2. Extend the bucket cylinder and arm cylinder fully, and then lower the boom.
3. Raise the safety lock lever to the locked position.
4. Stop the engine, remove the starter key and lock all locks.
5. Place the stoppers (chocks) in front and behind the crawlers.
6. Install a chain or wire rope over the lower frame of the machine and fasten it securely to prevent the machine from slipping sideways.
7. Secure the bucket with a chain or wire rope.

IMPORTANT: Place a wooden block under the bucket to protect the floor from damage caused by the bucket.

Precautions to be taken during transportation

⚠ WARNING

- **Know and follow the applicable safety rules, vehicle code and traffic laws when transporting the machine.**
- **Select the best transport route by considering the length, width, height and weight of the truck with the machine loaded on it.**
- **Never abruptly start or stop or run at a high speed at the sharp curves during transport. Doing so will move or lose the balance of the loaded machine.**

MAINTENANCE

