

PART NO. EM1MS-1-1

HITACHI

Operator's Manual

ZAXIS

17U-2

Hydraulic Excavator

ZAXIS17U-2 HYDRAULIC EXCAVATOR OPERATOR'S MANUAL

 **Hitachi Construction Machinery Co., Ltd.**

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EM1MS-1-1

Serial No. 010001 and up

INTRODUCTION

Read this manual carefully to learn how to operate and service your machine correctly. Failure to do so could result in personal injury or equipment damage.

This standard specification machine can be operated under the following conditions without being modified.

Atmospheric Temperature: -20°C to 40°C (-4°F to 104°F)

Altitude: 0 m to 1500 m (0 ft to 4900 ft)

In case the machine is used under conditions other than described above, consult your nearest Hitachi dealer.

This manual should be considered a permanent part of your machine and should remain with the machine when you sell it.

This machine is of metric design. Measurements in this manual are metric. Use only metric hardware and tools as specified.

- SI Units (International System of Units) are used in this manual.

For reference MKS system units and English units are also indicated in parentheses after the SI units.

Example : 24.5 MPa (250 kgf/cm², 3560 psi)

Right-hand and left-hand sides are determined by facing in the direction of forward travel.

Write product identification numbers in the Machine Numbers section. Accurately record all the numbers to help in tracing the machine should it be stolen. Your dealer also needs these numbers when you order parts. If this manual is kept on the machine, also file the identification numbers in a secure place off the machine.

Warranty is provided as a part of Hitachi's support program for customers who operate and maintain their equipment as described in this manual. The warranty is explained on the warranty certificate which you should have received from your dealer.

This warranty provides you the assurance that Hitachi will back its products where defects appear within the warranty period. In some circumstances, Hitachi also provides field improvements, often without charge to the customer, even if the product is out of warranty.

Should the equipment be abused, or modified to change its performance beyond the original factory specifications, the warranty will become void and field improvements may be denied.

Setting fuel delivery above specifications or otherwise overpowering machines will result in such action.

Only qualified, experienced operators officially licensed (according to local law) should be allowed to operate the machine. Moreover, only officially licensed personnel should be allowed to inspect and service the machine.

Prior to operating this machine in a country other than a country of its intended use, it may be necessary to make modifications to it so that it complies with the local regulatory standards (including safety standards) and legal requirements of that particular country. Please do not export or operate this machine outside of the country of its intended use until such compliance has been confirmed.

Please contact Hitachi Construction Machinery Co., Ltd. or any of our authorized distributor or dealer if you have any questions concerning compliance.

All information, illustrations and specifications in this manual are based on the latest product information available at the time of publication. The right is reserved to make changes at any time without notice.

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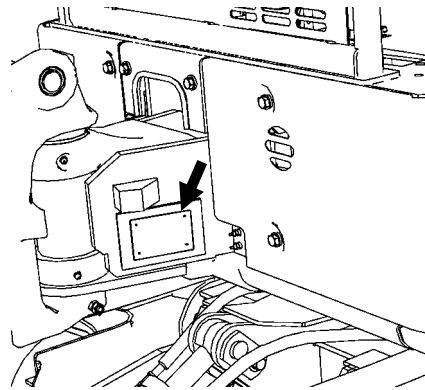
MACHINE NUMBERS


The manufacturing Nos. explained in this group is the individual number (serial No.) given to each machine and hydraulic components. These numbers are requested when inquiring any information on the machine and/or components. Fill these serial Nos. in the blank spaces in this group to immediately make them available upon request.

MACHINE

MODEL/TYPE: _____

PRODUCT
IDENTIFICATION
NUMBER: _____



 NOTE:

_____ Marks to indicate the start and end of the PIN
HCM1MS00X00010001

PRODUCT IDENTIFICATION
NUMBER (PIN)

M1MS-00-001

MACHINE NUMBERS

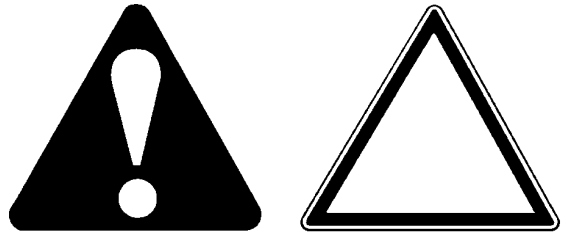
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SAFETY


RECOGNIZE SAFETY INFORMATION

- These are the **SAFETY ALERT SYMBOLS**.
 - When you see these symbols on your machine or in this manual, be alert to the potential for personal injury.
 - Follow recommended precautions and safe operating practices.



SA-688

UNDERSTAND SIGNAL WORDS

- On machine safety signs, signal words designating the degree or level of hazard - **DANGER**, **WARNING**, or **CAUTION** - are used with the safety alert symbol.
 - **DANGER** indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.
 - **WARNING** indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.
 - **CAUTION** indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.
 - **DANGER** or **WARNING** safety signs are located near specific hazards. General precautions are listed on **CAUTION** safety signs.
 - Some safety signs don't use any of the designated signal words above after the safety alert symbol are occasionally used on this machine.
- To avoid confusing machine protection with personal safety messages, a signal word **IMPORTANT** indicates a situation which, if not avoided, could result in damage to the machine.
-  **NOTE** indicates an additional explanation for an element of information.

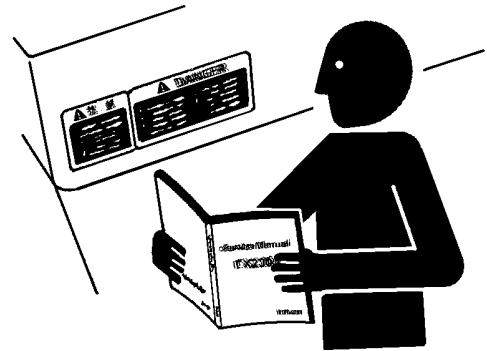


SA-1223

SAFETY

FOLLOW SAFETY INSTRUCTIONS

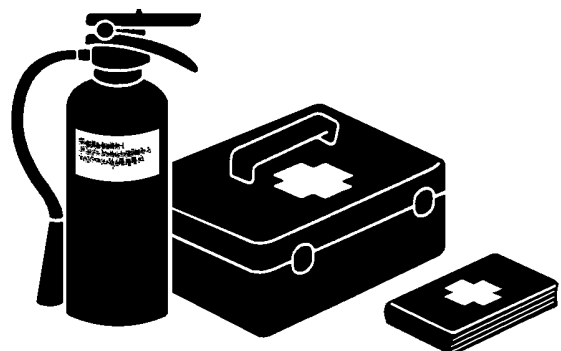
- Carefully read and follow all safety signs on the machine as well as all safety messages in this manual.
- Safety signs must be installed, maintained and replaced if damaged.
 - If a safety sign or this manual is damaged or missing, order a replacement from your nearest Hitachi dealer in the same way you order other replacement parts (be sure to state machine model and serial number when ordering).
- Allow only properly trained, qualified, authorized personnel to operate the machine.
- Learn how to correctly operate and service the machine.
- Keep your machine in proper working condition.
- Always operate the machine within the specification.
 - Unauthorized modifications of the machine may impair the functions and/or safety and affect machine life and the warranty will become void.
- The safety messages in this SAFETY chapter are intended to illustrate basic safety procedures of machines. However it is impossible for these safety messages to cover every possible hazardous situation you may encounter. If you have any questions concerning safety, you should first consult your supervisor and/or your nearest Hitachi dealer before operating or performing maintenance work on the machine.



SA-003

PREPARE FOR EMERGENCIES

- Be prepared if a fire starts or if an accident occurs.
 - Keep a first aid kit and fire extinguisher on hand.
 - Thoroughly read and understand the label attached on the fire extinguisher and use it properly.
 - To ensure that a fire-extinguisher can be always used when necessary, check and service the fire-extinguisher at the recommended intervals as specified in the fire-extinguisher manual.
 - Establish emergency procedure guidelines to cope with any fire or accidents which may occur.
 - Keep emergency numbers for doctors, ambulance service, hospitals, and fire department posted near your telephone.



SA-437

SAFETY

WEAR PROTECTIVE CLOTHING

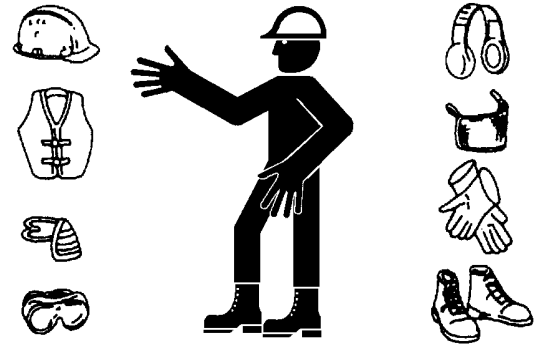
- Wear close fitting clothing and safety equipment appropriate to the job.

You may need:

- A hard hat
- Safety belt
- Safety shoes
- Safety glasses, goggles, or face shield
- Heavy gloves
- Hearing protection
- Reflective clothing
- Wet weather gear
- Respirator or filter mask.

Be sure to wear the correct equipment and clothing for the job. Do not take any chances.

- Avoid wearing loose clothing, jewelry, or other items that can catch on control levers or other parts of the machine.
- Operating equipment safely requires the full attention of the operator.
- Do not wear radio or music headphones while operating the machine.



SA-438

PROTECT AGAINST NOISE

- Prolonged exposure to loud noise can cause impairment or loss of hearing.
- Wear a suitable hearing protective device such as earmuffs or earplugs to protect against objectionable or uncomfortably loud noises.



SA-434

INSPECT MACHINE

- If any abnormality is found, be sure to repair it immediately before operating the machine.
- In the walk-around inspection, be sure to cover all points described in the “PRE-START INSPECTION” chapter in the operator’s manual.



SA-435

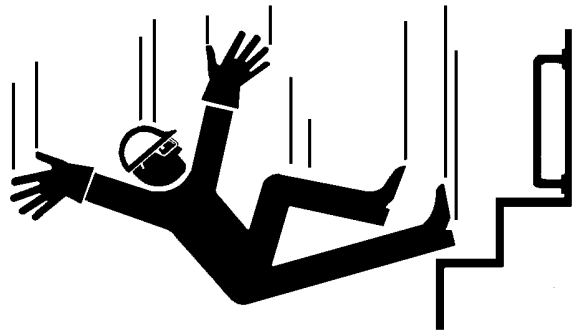
SAFETY

TIDY UP INSIDE OPERATOR'S SPACE

- Always keep inside the operator's space clean by observing instructions below, to prevent any personal accidents from occurring.
- Remove mud and/or oily material from the shoe soles before entering the operator's space. If pedals are operated without removing mud or oily matter, the foot may slip off the pedal, possibly creating a hazardous situation.
- Do not leave parts and/or tools around the operator's seat.
- Do not keep a transparent water bottle in the operator's space. The transparent water bottle may concentrate the sun light like a lens, possibly causing a fire.
- Do not wear radio or music headphones and do not use a cell phone while traveling or operating the machine.
- Never allow hazardous materials such as combustible and/or explosive material in the operator's space.
- Do not leave a lighter in the cab. If the temperature in the cab increases, the lighter may explode.

USE HANDHOLDS AND STEPS

- Falling is one of the major causes of personal injury.
 - When you get on and off the machine, always face the machine.
 - Maintain a three-point contact with the steps and handrails.
 - Do not use any controls as handholds.
 - Never jump on or off the machine. Never mount or dismount a moving machine.
 - In case adhered slippery material such as oil, grease, or mud is present on steps, handrails, or platforms, thoroughly remove such material.



SA-439

SAFETY

ADJUST THE OPERATOR'S SEAT

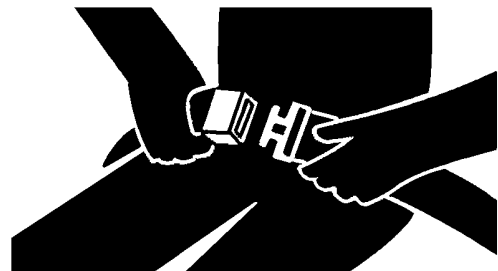
- A poorly adjusted seat for either the operator or for the work at hand may quickly fatigue the operator leading to mis-operation of the machine.
- The seat should be adjusted whenever the operator for the machine changes.
- The operator should be able to fully depress the pedals and to correctly operate the control levers with his back firmly against the seat back.
- If not, readjust the seat forward or backward, and check again.



SA-378

FASTEN YOUR SEAT BELT

- If the machine should overturn, the operator may become injured and/or thrown from the cab. Additionally the operator may be crushed by the overturning machine, resulting in serious injury or death.
- Be sure to remain seated with the seat belt securely fastened whenever operating the machine.
- Prior to operating the machine, thoroughly examine webbing, buckle and attaching hardware. If any item is damaged or worn, replace the seat belt or component before operating the machine. Replace the seat belt at least once every 3 years regardless of appearance

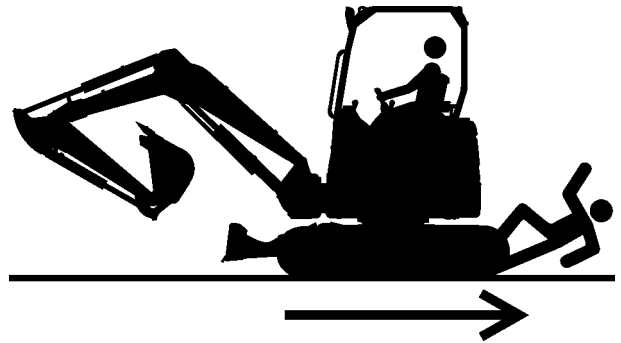


SA-237

SAFETY

MOVE AND OPERATE MACHINE SAFELY

- Always be aware that there is a potential danger around the machine while operating the machine.
- Take extra care not to run over bystanders. Confirm the location of bystanders before moving, swinging, or operating the machine.
- Always keep the travel alarm and horn in working condition (if equipped).
- Before starting to move or operate the machine, sound the travel alarm and horn to alert bystanders.
- Use a signal person when moving, swinging, or operating the machine in congested areas. Locate the signal person so that the operator can always witness the signal person.
- Coordinate the meanings of all safety signs, hand signals and marks before starting the machine. Appoint a person who is responsible to make a signal and/or guidance.
- Never allow any persons or obstacles to enter the machine operation areas.
- Use appropriate illuminations.



SA-1291

SAFETY

OPERATE ONLY FROM OPERATOR'S SEAT

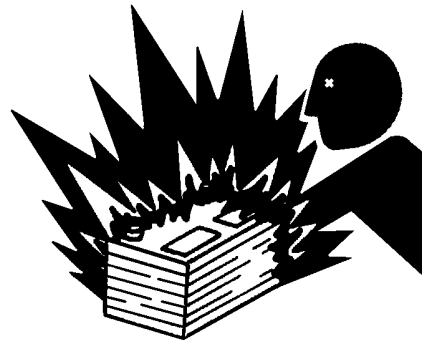
- Inappropriate engine starting procedures may cause the machine to runaway, possibly resulting in serious injury or death.
- Start the engine only when seated in the operator's seat.
- NEVER start the engine while standing on the tracks or on ground.
- Do not start engine by shorting across starter terminals. A hazardous situation may be created and/or possible damage to the machine may result.
- Before starting the engine, confirm that all control levers are in neutral.



SA-444

JUMP STARTING

- Failure to follow correct jump starting procedures could result in a battery explosion or a runaway machine.
- If the engine must be jump started, be sure to follow the instructions shown in the "OPERATING THE ENGINE" chapter.
- The operator must be seated in the operator's seat so that the machine will be under control when the engine starts. Jump starting is a two-person operation.
- Never use a frozen battery.
- Failure to follow correct jump starting procedures could result in a battery explosion or a runaway machine.



SA-032

KEEP RIDERS OFF MACHINE

- Riders on machine are subject to injury such as being struck by foreign objects and being thrown off the machine.
- Riders also obstruct the operator's view, resulting in the machine being operated in an unsafe manner.
- Only allow the operator is allowed on the machine. Keep riders off.

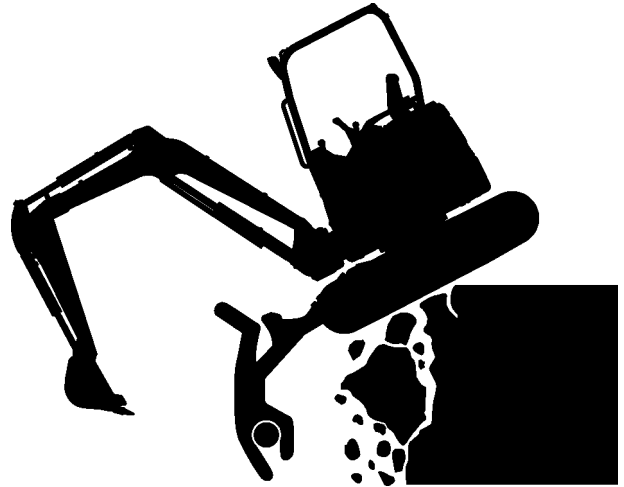


SA-1292

SAFETY

INVESTIGATE JOB SITE BEFOREHAND

- When working at the edge of an excavation or on a road shoulder, the machine could tip over due to collapse of the ground, possibly resulting in serious injury or death.
- Investigate the configuration and ground conditions of the job site beforehand to prevent the machine from falling and to prevent the ground, stockpiles, or banks from collapsing.
- Make a work plan. Use machines appropriate to the work and job site.
- Reinforce ground, edges, and road shoulders as necessary. Keep the machine well back from the edges of excavations and road shoulders.
- When working on an incline or on a road shoulder, employ a signal person as required.
- Never allow bystanders to enter the working area such as swing radius or traveling range.
- When the footing is weak, reinforce the ground before starting work.
- When working on frozen ground, be extremely alert. As ambient temperatures rise, footing may become loose and slippery.
- When operating the machine near open flame, sparks, and/or dead grass, a fire may easily break out. Use special care not to cause a fire.



SA-1293

SAFETY

PROVIDE SIGNALS FOR JOBS INVOLVING MULTIPLE NUMBERS OF MACHINES

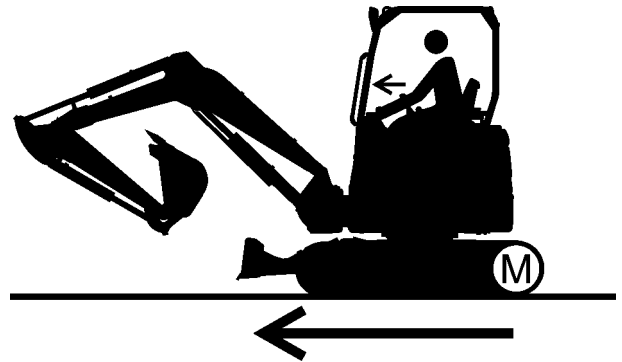
- In case more than one machine is operated in the same job site, accidental collision between machines may cause serious injury or death.
- For jobs involving multiple numbers of machines, provide signals commonly known by all personnel involved. Also, appoint a signal person to coordinate the job site. Make sure that all personnel obey the signal person's directions.



SA-481

CONFIRM DIRECTION OF MACHINE TO BE DRIVEN

- Incorrect travel pedal/lever operation may result in serious injury death.
 - Before driving the machine, confirm the position of the undercarriage in relation to the operator's position.
 - If the travel motors are located towards the front of the cab, the machine will move in the reverse direction when travel pedals/levers are operated.

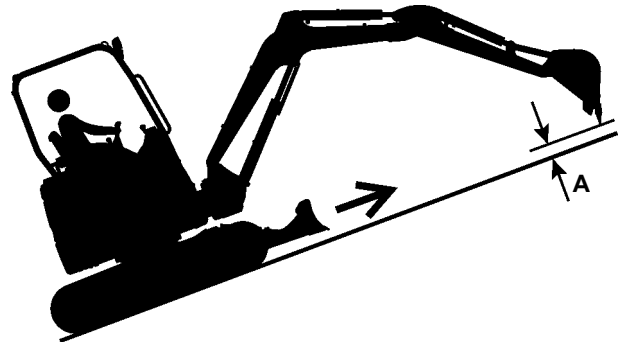


SA-1294

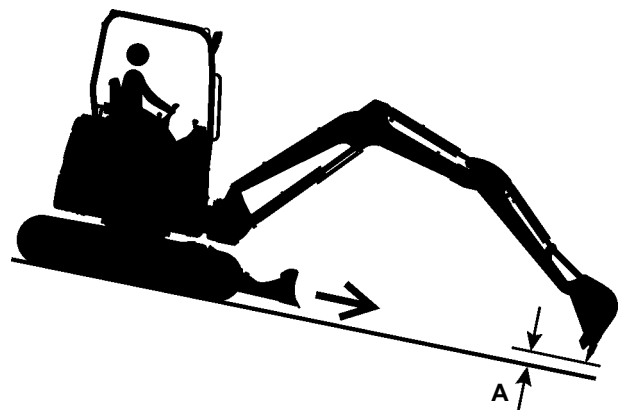
SAFETY

DRIVE MACHINE SAFELY

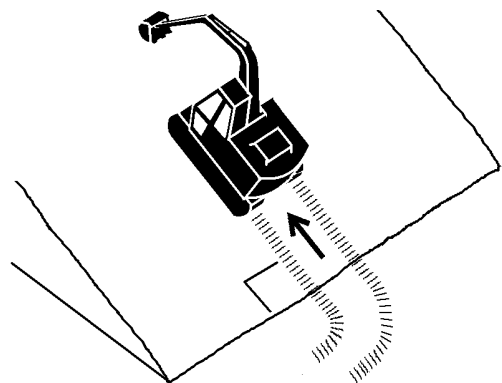
- Driving the machine in the incorrect direction may result in serious injury or death and/or severe damage to property.
- Before moving the machine, confirm which way to move travel pedals/levers for the corresponding direction you wish to travel.
- Avoid passing over any obstructions. Failure to do so may cause soil, rock fragments and/or metal pieces to be scattered around the machine. Keep bystanders away from the machine.
- Traveling on a grade may cause the machine to slip or to overturn, possibly resulting in serious injury or death.
- When traveling up or down a grade, keep the bucket in the direction of travel, approximately 200 to 300 mm (8 to 12 in) (A) above the ground so that lowering the bucket onto the ground can quickly stop the machine.
- If machine starts to skid or becomes unstable, lower the bucket immediately.
- Traveling across the face of slope or steering on a slope may cause the machine to skid or to turnover. If the direction must be changed on a slope, first move the machine to level ground, then, change the traveling direction to ensure safe operation.



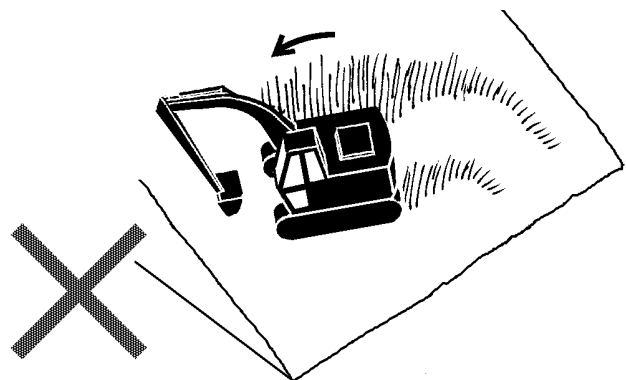
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SA-1296



SA-441

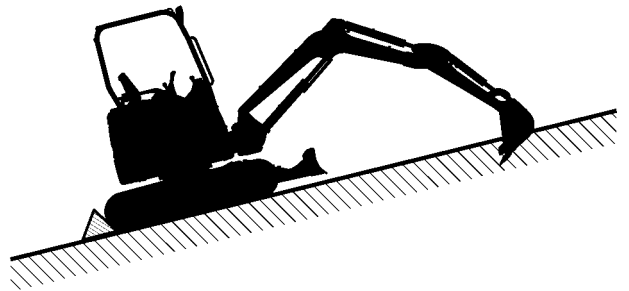


SA-442

SAFETY

AVOID INJURY FROM ROLLAWAY ACCIDENTS

- Death or serious injury may result if you attempt to mount or try to bodily stop a moving machine.
- Park the machine in compliance with the safe parking procedures described on page S-17 to prevent the machine from running away.
 - Block both tracks and lower the bucket to the ground, thrust the bucket teeth into the ground if you must park on a grade.
 - Park a reasonable distance from other machines.



SA-1297

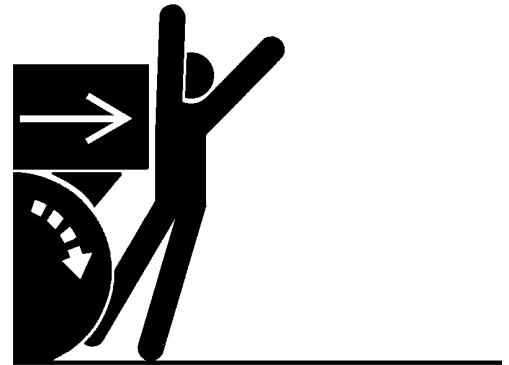
SAFETY

AVOID INJURY FROM BACK-OVER AND SWING ACCIDENTS

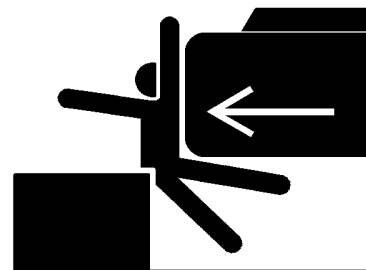
- If any person is present near the machine when backing or swinging the upperstructure, the machine may hit or run over that person, resulting in serious injury or death.

To avoid back-over and swing accidents:

- Always look around **BEFORE YOU BACK UP AND SWING THE MACHINE. BE SURE THAT ALL BYSTANDERS ARE CLEAR.**
- Keep the travel alarm in working condition (if equipped). **ALWAYS BE ALERT FOR BYSTANDERS MOVING INTO THE WORK AREA. USE THE HORN OR OTHER SIGNAL TO WARN BYSTANDERS BEFORE MOVING MACHINE.**
- **USE A SIGNAL PERSON WHEN BACKING UP IF YOUR VIEW IS OBSTRUCTED. ALWAYS KEEP THE SIGNAL PERSON IN VIEW.** Use hand signals, which conform to your local regulations, when work conditions require a signal person.
- No machine motions shall be made unless signals are clearly understood by both signalman and operator.
- Learn the meanings of all flags, signs, and markings used on the job and confirm who has the responsibility for signaling.
- Keep windows, mirrors, and lights clean and in good condition.
- Dust, heavy rain, fog, etc., can reduce visibility. As visibility decreases, reduce speed and use proper lighting.
- Read and understand all operating instructions in the operator's manual.



SA-383



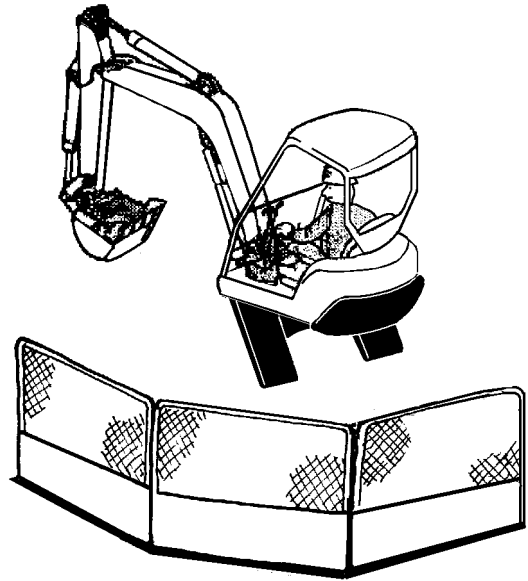
SA-384

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SAFETY

KEEP PERSONNEL CLEAR FROM WORKING AREA

- If a person is present near the operating machine, the person may come in contact with the swinging front attachment or counterweight and/or may be crushed against an other object, resulting in serious injury or death.
- Before operating the machine, set up barriers to the sides and rear area of the bucket swing radius to prevent anyone from entering the work area.
- Make sure that no personnel other than the signal person or no obstacles are present in the working area before operating the machine.



SA-667

NEVER POSITION BUCKET OVER ANYONE

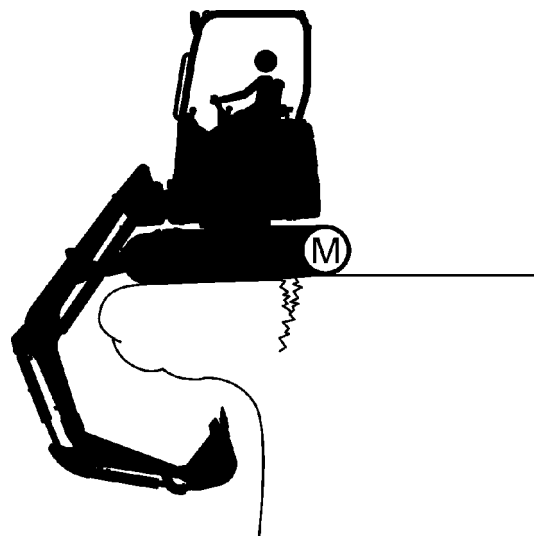
- Never lift, move, or swing bucket above anyone or a truck cab. Serious injury or machine damage may result due to bucket load spill or due to collision with the bucket.
- Never allow the bucket to pass over anyone to avoid personal injury or death.



SA-668

AVOID UNDERCUTTING

- In order to retreat from the edge of an excavation if the footing should collapse, always position the undercarriage perpendicular to the edge of the excavation with the travel motors at the rear.
- If the footing starts to collapse and if retreat is not possible, do not panic raise the front attachment with a panic. Lowering the front attachment may be safer in most cases.



SA-1300

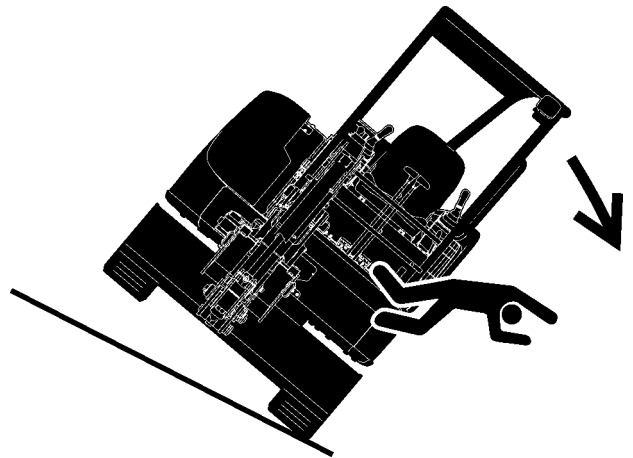
SAFETY

AVOID TIPPING

- The danger of tipping is always present when operating on a grade, possibly resulting in serious injury or death.

To avoid tipping:

- Be extra careful before operating on a grade.
 - Prepare machine operating area flat.
 - Keep the bucket low to the ground and close to the machine.
 - Reduce operating speeds to avoid tipping or slipping.
 - Avoid changing direction when traveling on grades.
 - NEVER attempt to travel across a grade steeper than 15 degrees if crossing the grade is unavoidable.
 - Reduce swing speed as necessary when swinging loads.
- Be careful when working on frozen ground.
 - Temperature increases will cause the ground to become soft and make ground travel unstable.

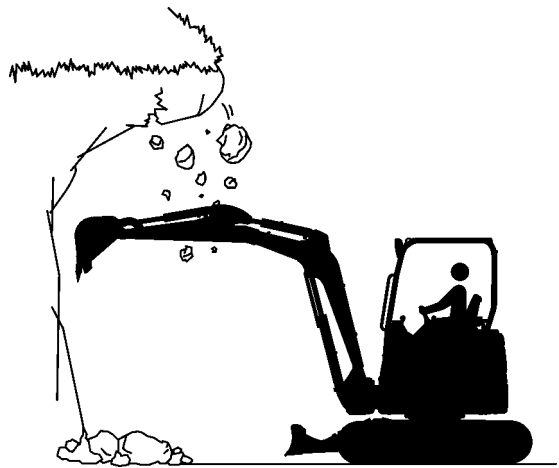


SA-1301

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NEVER UNDERCUT A HIGH BANK

- The edges could collapse or a land slide could occur causing serious injury or death.

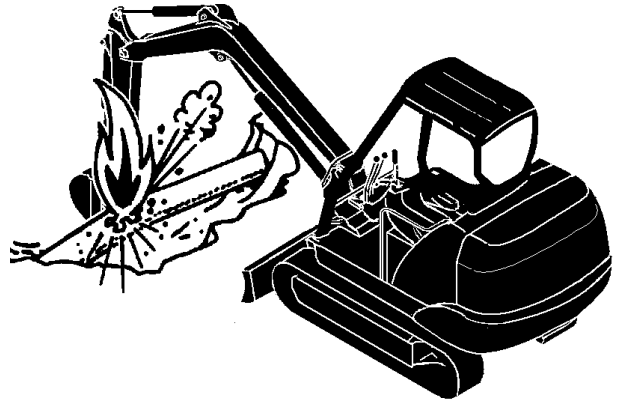


SA-1302

SAFETY

DIG WITH CAUTION

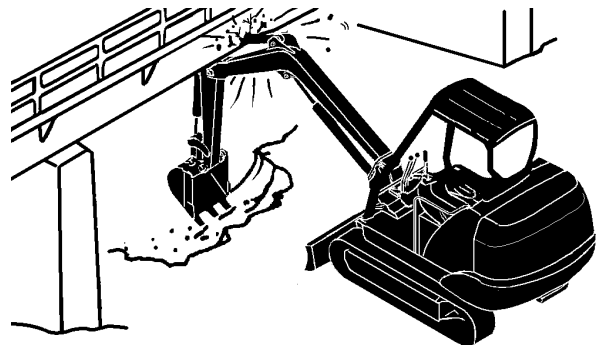
- Accidental severing of underground cables or gas lines may cause an explosion and/or fire, possibly resulting in serious injury or death.
 - Before digging check the location of cables, gas lines, and water lines.
 - Keep the minimum distance required, by law, from cables, gas lines, and water lines.
 - If a fiber optic cable should be accidentally severed, do not look into the end. Doing so may result in serious eye injury.
 - Contact your local “diggers hot line” if available in your area, and/or the utility companies directly. Have them mark all underground utilities.



SA-672

OPERATE WITH CAUTION

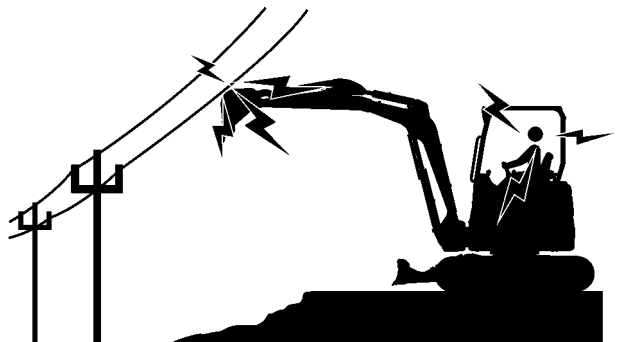
- If the front attachment or any other part of the machine hits against an overhead obstacle, such as a bridge, both the machine and the overhead obstacle will be damaged, and personal injury may result as well.
 - Take care to avoid hitting overhead obstacles with the boom or arm.



SA-673

AVOID POWER LINES

- Serious injury or death can result if the machine or front attachments are not kept a safe distance from electric lines.
 - When operating near an electric line, NEVER move any part of the machine or load closer than 3 m (10 ft) plus twice the line insulator length.
 - Check and comply with any local regulations that may apply.
 - Wet ground will expand the area that could cause any person on it to be affected by electric shock. Keep all bystanders or co-workers away from the site.

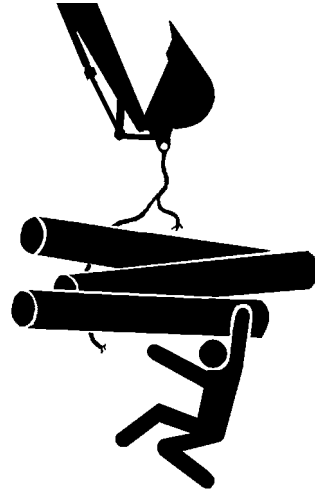


SA-1305

SAFETY

DO NOT USE FOR CRANING OPERATIONS

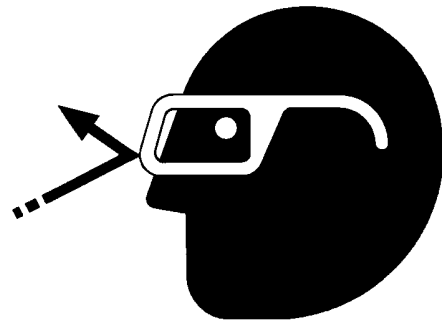
- NEVER use the machine for craning operations. If the machine is used for craning operations, the machine may tip over and/or lifted load may fall, possibly resulting in serious injury or death.
- This machine has been exclusively designed to engage in excavation and loading works.
- This machine is not equipped with any of the necessary safety devices that could allow the machine to be used for craning operation.



SA-014

PROTECT AGAINST FLYING DEBRIS

- If flying debris such as soil, rock fragments or metal pieces hit eyes or any other part of the body, serious injury may result.
 - Guard against such injuries when working in a job site where possibility of flying pieces of metal or debris exist, or when removing or installing pins using a hammer; wear goggles or safety glasses.
 - Keep bystanders away from the working area before striking any object.



SA-432

SAFETY

PARK MACHINE SAFELY

- Unless the machine is not correctly parked, any hazardous situations such as running away of the machine or damage by vandalism may result, causing the machine to operate unsafely when the engine is re-started. Follow instructions described below when parking the machine.
 - Park the machine on solid level surface to prevent the machine from running away.
 - Lower the bucket and/or blade to the ground.
 - Pull the lock lever to the LOCK position.
 - Run engine at slow idle speed without load for 5 minutes.
 - Turn key switch to OFF to stop engine. Remove the key from the key switch.
 - Before leaving the machine, close all windows, roof vent, and cab door. Lock all access doors and compartments



SA-1306

HANDLE FLUIDS SAFELY --- AVOID FIRES

- Handle fuel with care; it is highly flammable. If fuel ignites, an explosion and/or a fire may occur, possibly resulting in serious injury or death.
 - Do not refuel the machine while smoking or when near open flame or sparks.
 - Always stop the engine before refueling the machine.
 - Fill the fuel tank outdoors.
- All fuels, most lubricants, and some coolants are flammable.
 - Store flammable fluids well away from fire hazards.
 - Do not incinerate or puncture pressurized containers.
 - Do not store oily rags; they can ignite and burn spontaneously.



SA-018

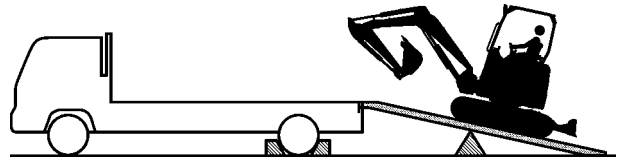


SA-019

SAFETY

SAFETY TRANSPORTING

- The danger of tipping is present when loading/unloading the machine onto/from a truck or trailer bed.
- Be sure to observe local regulations when transporting the machine on public roads.
- Provide an appropriate truck or trailer for transporting the machine.
- Be sure to have a signal person.
- Take the following precautions when loading/unloading the machine.
 1. Select firm level ground.
 2. Be sure to use a loading dock or ramp strong enough to support the machine weight.
 3. Ramps must be sufficient in width, length, and strength. Be sure that the incline of the ramp is less than 15 degrees.
 4. Loading docks must be sufficient in width and strength to support the machine and have a gradient of less than 15 degrees.
 5. Slowly drive the machine.
 6. Avoid steering while driving up or down the ramp as it is extremely dangerous. If steering is unavoidable, first move back to the ground or flatbed, modify traveling direction, and begin to drive again.
 7. The top end of the ramp where it meets the flatbed is a sudden bump. Take care when traveling over it.
 8. Wedge the front and rear of tracks. Securely fasten the machine to the trailer bed with chain or cables.
 9. Do not operate any levers besides the travel levers when driving up or down the ramp.
 10. Prevent possible injury from machine tipping while the upperstructure is rotating.
 11. Keep the arm tucked under and rotate the upperstructure slowly for best stability.



SA-1307

Refer to "transporting" chapter in this manual for details

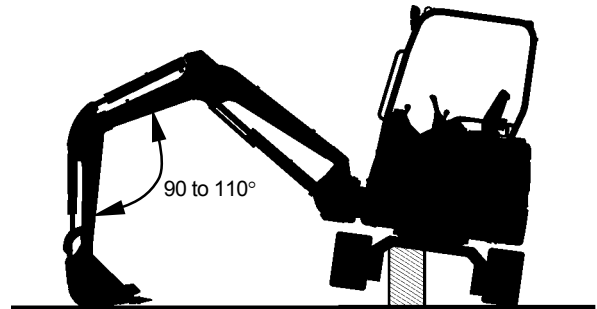
SAFETY

PRACTICE SAFE MAINTENANCE

- Inspection/maintenance work may produce hazardous situations by contacting and/or accessing a part of body to a moving, high pressure, and/or high temperature part of the machine. To avoid serious personal injury or death, follow the instructions described below.
 - Thoroughly coordinate the working procedures to be taken hereafter with the co-workers before beginning work such as inspecting/servicing the machine, or replacing the attachment .
 - Safely park the machine in accordance with the instructions for “Park Machine Safely.”
 - Keep the work area clean and orderly.
 - Attach a “DO NOT OPERATE” tag in an easy-to-see location such as on a door or a control lever.
 - If moisture permeates into the electrical system, malfunction and/or erroneous movement of the machine may result. Do not clean sensors, cable connectors, and the cab inside using water and/or steam.
 - Wait to begin to work until the engine and hydraulic oil temperatures have cooled down to the safety range.
 - In case inspection/maintenance must be performed with the engine running, be sure to appoint an overseer.
 - Never lubricate or service the machine while moving it.
 - Repair the cracked windowpane before servicing the machine. Failure to do so may cause personal injury.
 - Whe raising the machine above the ground using the front attachment function, maintain the angle between the boom and the arm in the range of 90 to 110°. Never allow anyone to enter under the machine raised with the front attachment function.
 - In case working under the machine raised above the ground is unavoidably required, securely hold the machine with stays or blocks strong enough to support the machine weight.
 - Never work under the raised bucket.
 - Keep all parts in good condition and properly installed.
 - Always use the specified tools correctly.
 - Always use a clean tool.
 - Fix any damage found immediately. Replace worn or broken parts.
 - Remove any buildup of grease, oil, or debris.
 - When cleaning parts, use a non-combustible cleaning solvent. Never use an inflammable fluid such as diesel fuel, or gasoline.



SA-028



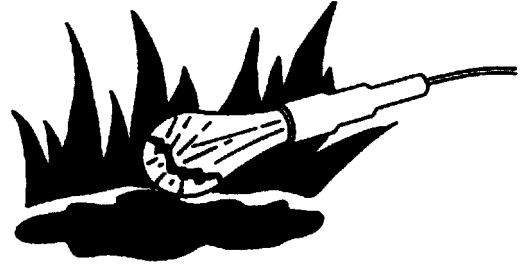
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SA-527

SAFETY

- Disconnect battery ground cable (–) before making adjustments to electrical systems or before welding on the machine.
- Sufficiently illuminate the work site. Use a maintenance work light when working under or inside the machine.
- Always use a work light protected with a guard. In case the light bulb is broken, spilled fuel, oil, antifreeze fluid, or window washer fluid may catch fire.



SA-037

WARN OTHERS OF SERVICE WORK

- Unexpected machine movement can cause serious injury.
- Before performing any work on the machine, attach a “Do Not Operate” tag in an easy-to-see place such as on the cab door or control lever.
- Never attempt to operate the machine with a “Do Not Operate” tag attached.
- Make it a rule for the inspection/service person to hold the engine start key during inspection/service work.



SA-287

SUPPORT MACHINE PROPERLY

- Never attempt to work on the machine without securing the machine first.
- Always lower the attachment to the ground before you work on the machine.
- If you must work on a lifted machine or attachment, securely support the machine or attachment with stays or blocks strong enough to support the machine and/or attachment weight.

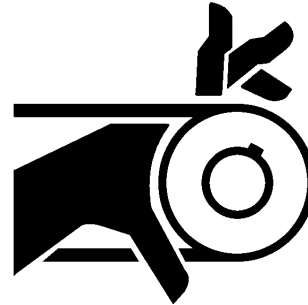


SA-527

SAFETY

STAY CLEAR OF MOVING PARTS

- Contact with moving parts can cause serious injury or death due to amputation or entanglement.
- To prevent accidents, care should be taken to ensure that hands, feet, clothing, jewelry and hair do not become entangled when working around rotating parts.



SA-026

PREVENT PARTS FROM FLYING

- Grease in the track adjuster is under high pressure. Failure to follow the precautions below may result in serious injury, blindness, or death.
 - Do not attempt to remove GREASE FITTINGS or VALVE ASSEMBLIES.
 - As pieces of parts may fly off, be sure to keep body and face away from the valve.
- Travel reduction gears are under pressure.
 - As pieces of parts may fly off, be sure to keep body and face away from AIR RELEASE PLUG to avoid injury.
 - GEAR OIL is hot. Wait for gear oil to cool, then gradually loosen the air release plug to release pressure.

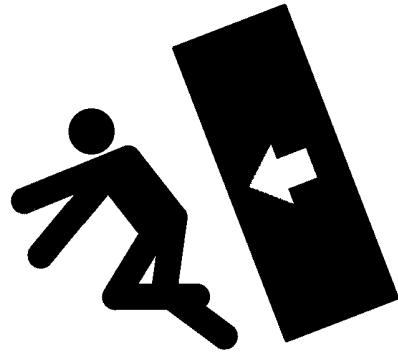


SA-344

SAFETY

STORE ATTACHMENTS SAFELY

- Stored attachments such as buckets, hydraulic hammers, and blades can fall and cause serious injury or death.
- Securely store attachments and implements to prevent falling accidents.
- Keep children and bystanders away from storage areas.

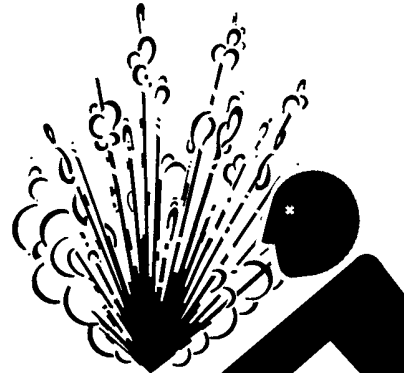


SA-034

PREVENT BURNS

Hot spraying fluids:

- After operation, engine coolant is hot and under pressure. Hot water or steam is contained in the engine, radiator and heater lines. Skin contact with escaping hot water or steam can cause severe burns.
- To prevent possible injury from hot spraying water, stop the engine. Begin to work after the engine and radiator are sufficiently cooled.
- DO NOT remove the radiator cap until the engine is cool. When opening, turn the cap slowly to the stop. Allow all pressure to be released before removing the cap.
- The hydraulic oil tank is pressurized. Again, be sure to release all pressure by slowly removing the cap.



SA-039

Hot fluids and surfaces:

- Engine oil, gear oil and hydraulic oil also becomes hot during operation. The engine, hoses, lines and other parts become hot as well.
- Wait for the oil and components to cool before starting any maintenance or inspection work.



SA-225

SAFETY

REPLACE RUBBER HOSES PERIODICALLY

- Rubber hoses that contain flammable fluids such as hydraulic oil or fuel under pressure may break due to aging, fatigue, and abrasion. It is very difficult to gauge the extent of deterioration due to aging, fatigue, and abrasion of rubber hoses by visual inspection alone.
 - Periodically replace the rubber hoses. (Refer to the Periodical Replacement Parts section.)
- Failure to periodically replace rubber hoses may cause a fire, fluid injection into skin, or the front attachment to fall on a person nearby, which may result in severe burns, gangrene, or otherwise serious injury or death.



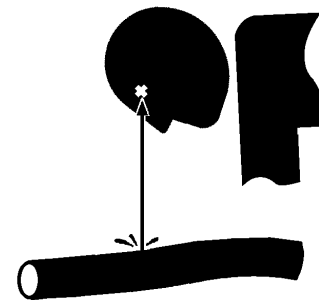
SA-019

AVOID HIGH-PRESSURE FLUIDS

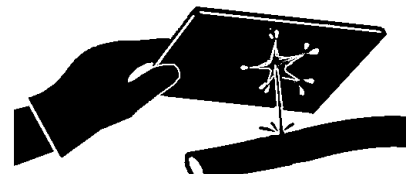
- Fluids such as diesel fuel or hydraulic oil under pressure can penetrate the skin or eyes causing serious injury, blindness or death.
 - Avoid this hazard by relieving pressure before disconnecting hydraulic or other lines. Make sure that all connectors are completely connected before applying pressure.
 - Search for leaks with a piece of cardboard; take care to protect hands and body from high-pressure fluids. Wear a face shield or goggles for eye protection.
 - If an accident occurs, see a doctor familiar with this type of injury immediately. Any fluid injected into the skin must be surgically removed within a few hours or gangrene may result.



SA-031



SA-292



SA-044

SAFETY

PREVENT FIRES

Check for Oil Leaks:

- Fuel, hydraulic oil and lubricant leaks can lead to fires, possibly resulting in personal injury or death.
 - Check for missing or loose clamps, kinked hoses, lines or hoses that rub against each other, damage to the oil-cooler, and loose oil-cooler flange bolts, for oil leaks.
 - Tighten, repair or replace any missing, loose or damaged clamps, lines, hoses, oil-cooler and oil-cooler flange bolts.
 - Do not bend or strike high-pressure lines.
 - Never install bent or damaged lines, pipes or hoses.



SA-019

Check for Shorts:

- Short circuits can cause fires.
 - Clean and tighten all electrical connections.
 - Check before each shift or after eight (8) to ten (10) hours operation for loose, kinked, hardened or frayed electrical cables and wires.
 - Check before each shift or after eight (8) to ten (10) hours operation for missing or damaged terminal caps.
 - DO NOT OPERATE MACHINE if cable or wires are loose, kinked, etc.

SAFETY

Precautions for Handling Flammables

- Spilled fuel and oil, and trash, grease, debris, accumulated coal dust, and other flammables may cause fires.
 - Prevent fires by inspecting and cleaning the machine daily, and by removing spilled or accumulated flammables immediately.
 - Do not store flammable fluid near open flames.
 - Do not burn or crush a pressurized container.
 - Do not store oily cloths. They are liable to catch fire.
 - Do not wind easy-to-absorb-oil asbestos or glass wool around high-temperature parts such as a muffler or exhaust pipe.

Check Heat Shield Covers around Engine Compartment

- If the engine compartment heat shield cover becomes broken or lost, fire may break out.
 - If the engine compartment heat shield cover becomes broken or lost, repair or replace it before operating the machine.

Check Key Switch:

- If fire breaks out, failure to stop the engine will escalate the fire, hampering fire fighting.
 - Always check key switch function before operating the machine every day:
 - 1) Start the engine and run it at slow idle.
 - 2) Turn the key switch to the OFF position to confirm that the engine has stopped.

If any abnormalities are found, be sure to repair them before operating the machine.

SAFETY

EVACUATING IN CASE OF FIRE

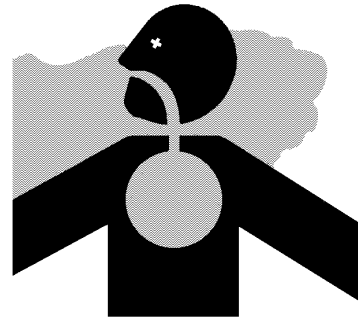
- If fire breaks out during machine operation, evacuate the machine in the following way:
 - Stop the engine by turning the key switch to the OFF position.
 - Use a fire extinguisher if there is time.
 - Exit the machine using handrails and/or steps.



SA-393

BEWARE OF EXHAUST FUMES

- Prevent asphyxiation. Engine exhaust fumes can cause sickness or death.
 - If you must operate the machine in a building, be sure there is adequate ventilation. Either use an exhaust pipe extension to remove the exhaust fumes or open doors and windows to bring enough outside air into the area.

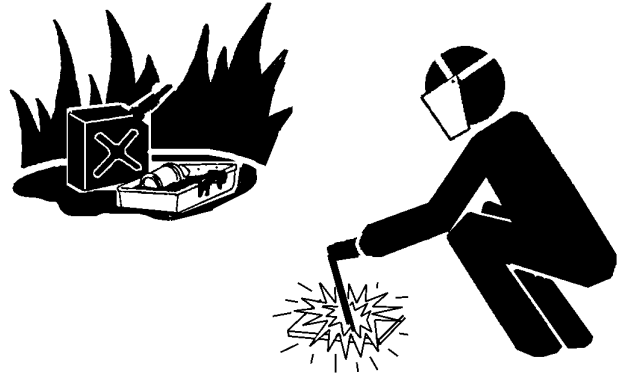


SA-016

SAFETY

PRECAUTIONS FOR WELDING AND GRINDING

- Welding may generate gas and/or small fires.
 - Be sure to perform welding in a well ventilated and prepared area. Store flammable objects in a safe place before starting welding.
 - Only qualified personnel should perform welding. Never allow an unqualified person to perform welding.
- Grinding on the machine may create a fire hazard. Store flammable objects in a safe place before starting grinding.
- After finishing welding and grinding, recheck that there are no abnormalities such as the area surrounding the welded area still smoldering.



SA-818

AVOID HEATING NEAR PRESSURIZED FLUID LINES

- Flammable spray can be generated by heating near pressurized fluid lines, resulting in severe burns to yourself and bystanders.
 - Do not heat by welding, soldering, or using a torch near pressurized fluid lines or other flammable materials.
 - Pressurized lines can be accidentally cut when heat goes beyond the immediate flame area. Install temporary fire resistant guards to protect hoses or other materials before engaging in welding, soldering, etc.



SA-030

AVOID APPLYING HEAT TO LINES CONTAINING FLAMMABLE FLUIDS

- Do not weld or flame cut pipes or tubes that contain flammable fluids.
- Remove flammable fluids thoroughly with nonflammable solvent before welding or flame cutting pipes or tubes that contained flammable fluids.

SAFETY

REMOVE PAINT BEFORE WELDING OR HEATING

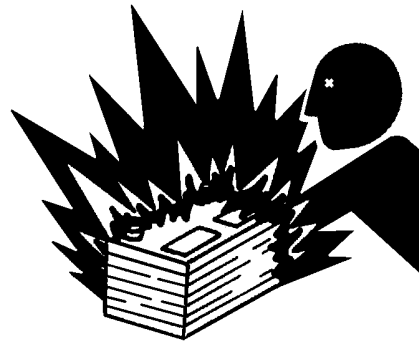
- Hazardous fumes can be generated when paint is heated by welding, soldering, or using a torch. If inhaled, these fumes may cause sickness.
 - Remove paint before welding or heating.
 - Avoid potentially toxic fumes and dust.
 - Do all such work outside or in a well-ventilated area. Dispose of paint and solvent properly.
 - Allow fumes to disperse at least 15 minutes after welding or heating.
 - Use attention to the following points when removing paint.
 1. If you sand or grind paint, avoid breathing the dust which is created. Wear an approved respirator.
 2. If you use solvent or paint stripper, remove stripper with soap and water before welding.
 3. Remove solvent or paint stripper containers and other flammable material from area.



SA-029

PREVENT BATTERY EXPLOSIONS

- Battery gas can explode.
 - Keep sparks, lighted matches, and flame away from the top of battery.
 - Never check battery charge by placing a metal object across the posts. Use a voltmeter or hydrometer.
 - Do not charge a frozen battery; it may explode. Warm the battery to 16 °C (60 °F) first.
 - Do not continue to use or charge the battery when the electrolyte level is lower than specified. Explosion of the battery may result.
 - When a terminal become loose, it may induce sparks. Securely tighten all terminals.
- Battery electrolyte is poisonous. If the battery should explode battery electrolyte may be splashed into eyes, possibly resulting in blindness. If electrolyte is splashed into eyes, flush your eyes continuously with water for about 15 minutes. Seek medical attention immediately.
 - Be sure to wear eye protection when checking electrolyte specific gravity.



SA-032

SAFETY

HANDLE CHEMICAL PRODUCTS SAFELY

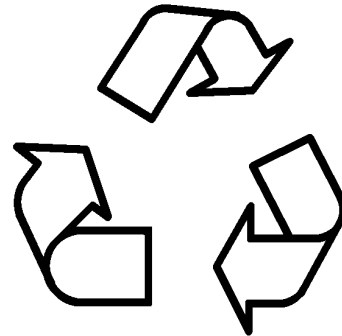
- Direct exposure to hazardous chemicals can cause serious injury. Potentially hazardous chemicals used with your machine include such items as lubricants, electrolyte, coolants, paints, and adhesives.
- A Material Safety Data Sheet (MSDS) provides specific details on chemical products: physical and health hazards, safety procedures, and emergency response techniques.
- Check the MSDS before you start any job using a hazardous chemical. Then follow the correct procedures and use recommended equipment.
- See your nearest Hitachi dealer for MSDS.



SA-309

DISPOSE OF WASTE PROPERLY

- Improperly disposing of waste can threaten the environment and ecology. Potentially harmful waste used with HITACHI equipment includes such items as oil, fuel, coolant, brake fluid, filters, and batteries.
- When draining fluid, use a leakproof container with a capacity larger than the drained fluid volume to receive it.
- Do not pour waste onto the ground, down a drain, or into any water source.
- Inquire on the proper way to dispose of harmful waste such as oil, fuel, coolant, brake fluid, filters, and batteries from your local environmental or recycling center.



SA-226

SAFETY SIGNS

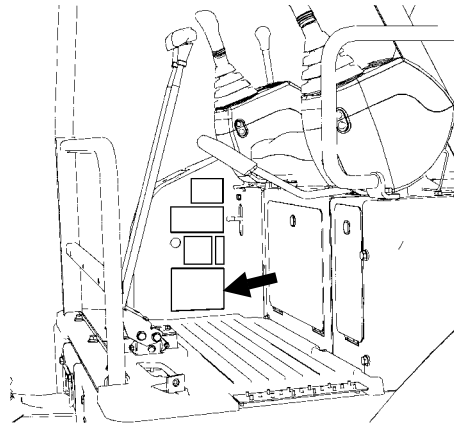
All safety signs and their locations affixed on the machine are illustrated in this group. Make sure of the contents described in the safety signs through reading actual ones affixed on the machine to ensure safe machine operation. Always keep the safety signs clean. In case a safety sign is broken or lost, immediately, obtain a new replacement and affix it again in position on the machine. Use the part No. indicated under the right corner of each safety sign illustration when placing an order of it to the Hitachi dealer.

⚠ CAUTION

- AVOID DEATH OR SERIOUS INJURY - READ AND UNDERSTAND THE OPERATOR'S MANUAL AND SAFETY MANUAL PRIOR TO OPERATING THIS MACHINE.
- Controls may be changed for attachment or operator preference. Try control pattern before operating.
- Always lower working tools to the ground and engage hydraulic control lockout lever before leaving operator's seat.
- Keep riders off machine.
- Avoid contact between boom/attachments and overhead obstacles whenever operating, traveling or transporting machine.
- Keep bystanders clear of machine, especially before moving boom, swinging upperstructure or traveling.
- Upperstructure position affects travel direction. Try pedals or levers to determine travel direction before moving machine.
- Avoid tipping - Do not lift or move objects that exceed machine stability.
- Avoid parking machine on an incline.

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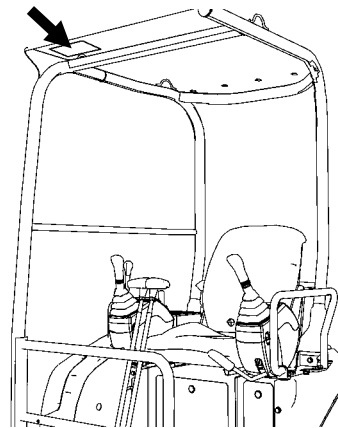
SS-2866

⚠ DANGER

Serious injury or death can result from contact with electric lines. Never move any part of unit or load closer to electric line than 3M (10 FT.) plus twice the line insulator length.

T144667

SS-259

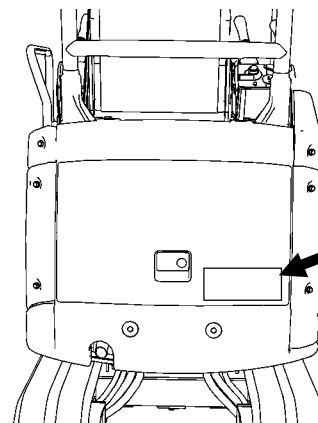


SS-2867

⚠ WARNING

Operator may swing or reverse machine
STAY CLEAR

SS-024

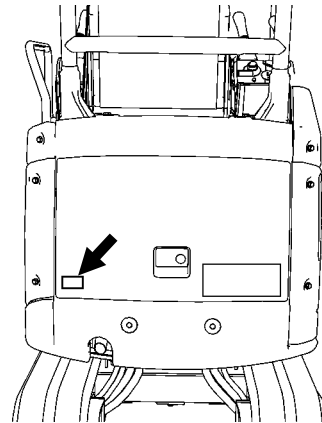


SS-2868

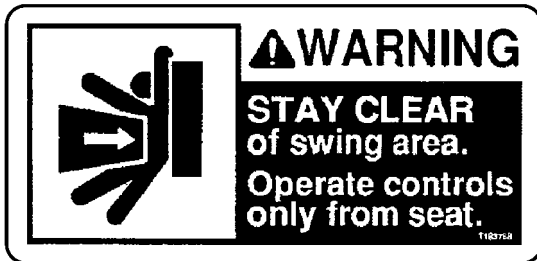
SAFETY SIGNS



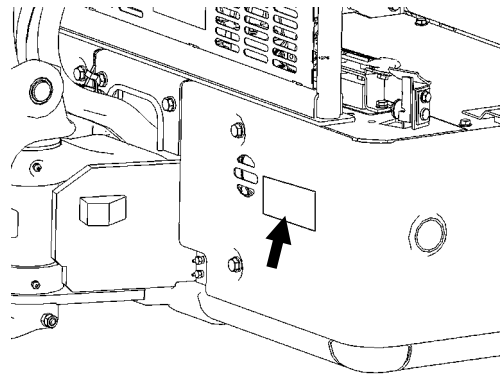
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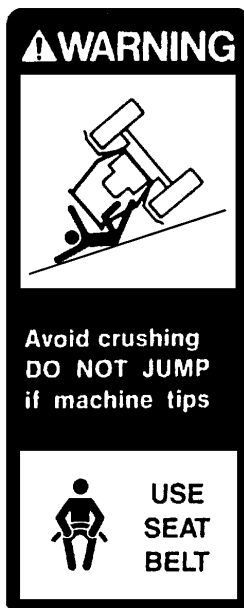
SS-2901



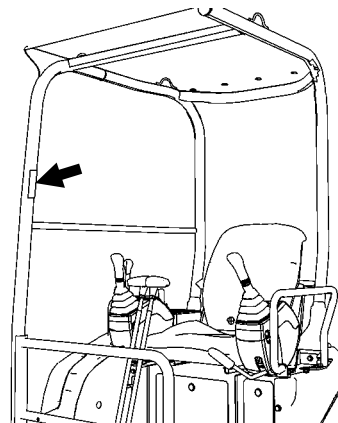
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SS-2869

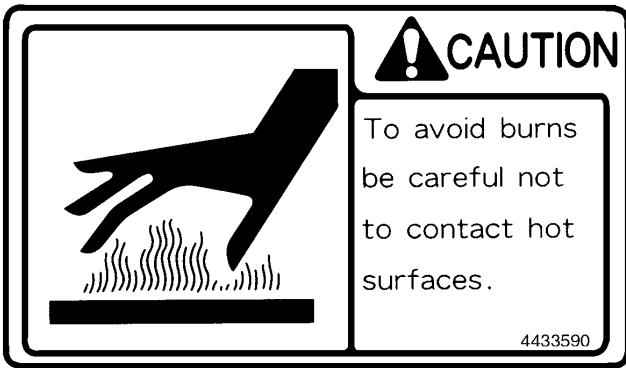


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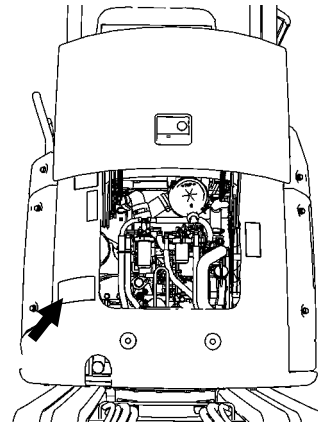


SS-2870

SAFETY SIGNS



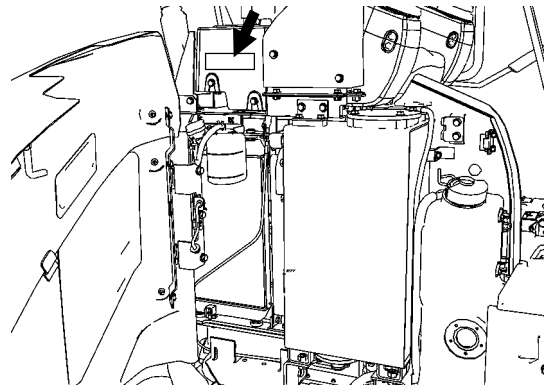
SS4433590



SS-2871



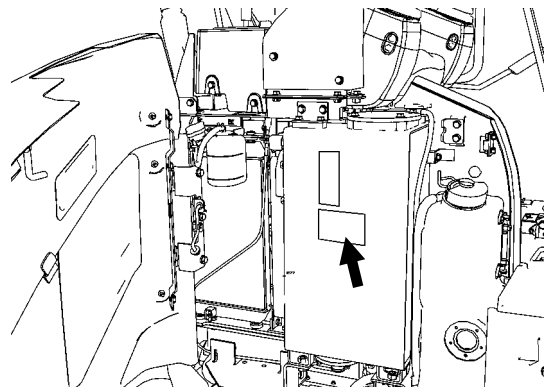
SS4604981



SS-2872

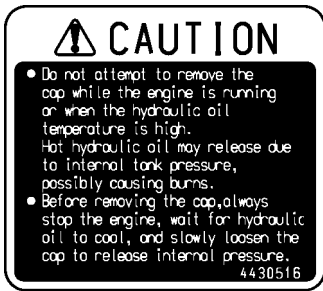


SS4642517

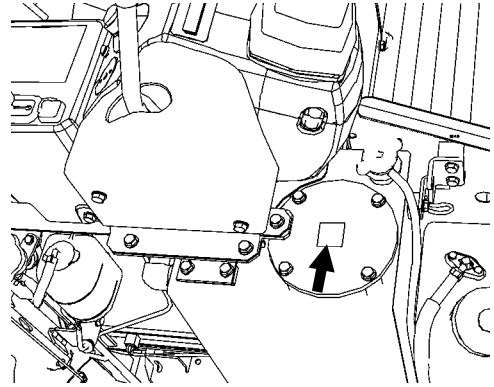


SS-2873

SAFETY SIGNS

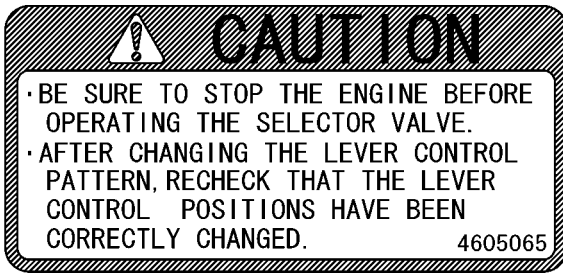


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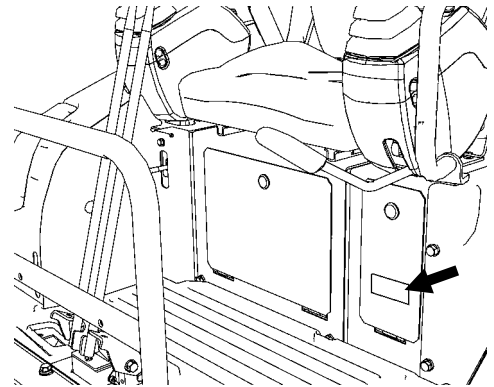


SS-2902

(2Way Multi Lever Equipped Machines)



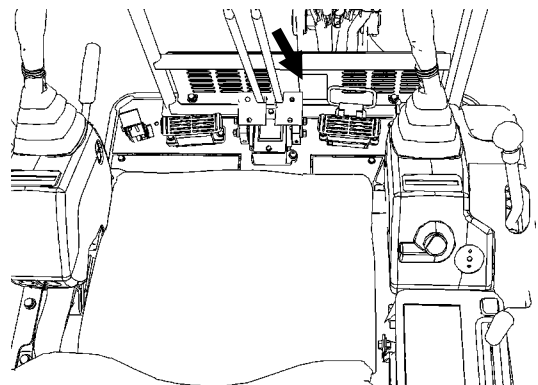
SS4605065



SS-2875



SS3110371



SS-2876

SAFETY SIGNS

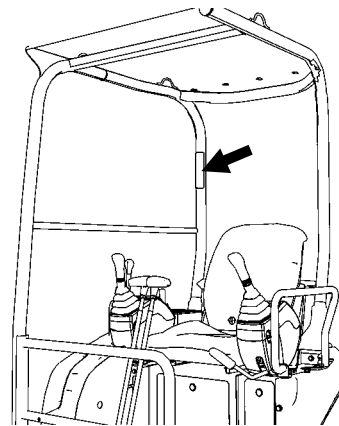
ROPS/TOPS/FOPS Canopy

- To maintain unimpaired operator protection and manufacturer's protective structure
 - Damaged Roll Over Protective Structure (ROPS), Tip Over Protective Structure (TOPS), Falling Object Protective Structure (FOPS) must be replaced, not repaired or revised.
- Any alternation to the ROPS or TOPS or FOPS must be approved by the manufacturer.



ROPS/FOPS

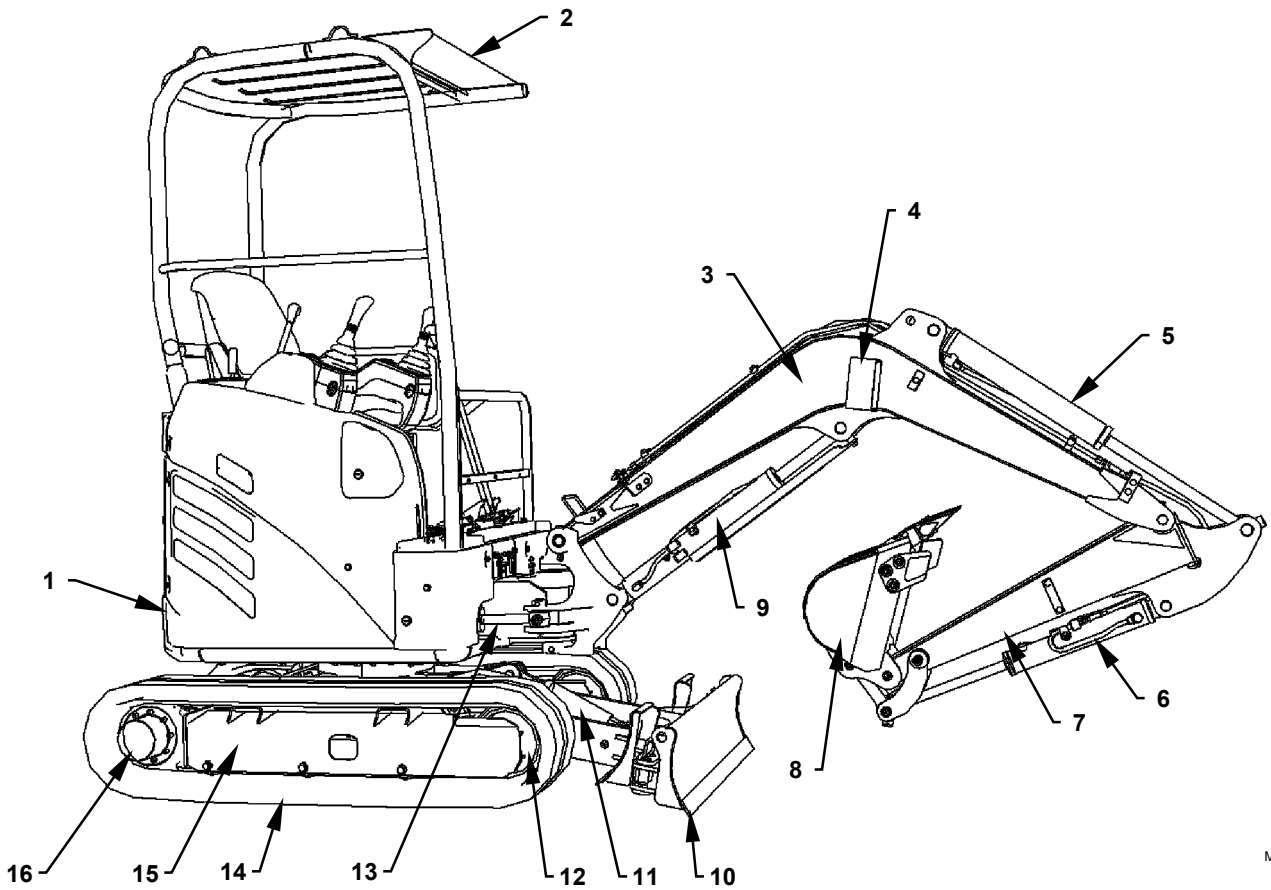
SS3109771



SS-2877

COMPONENTS NAME

COMPONENTS NAME



M1MS-01-001

- 1- Counterweight
- 2- Canopy
- 3- Boom
- 4- Work Light
- 5- Arm Cylinder
- 6- Bucket Cylinder

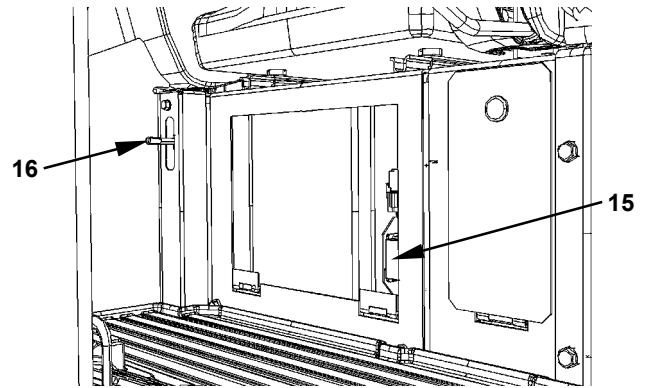
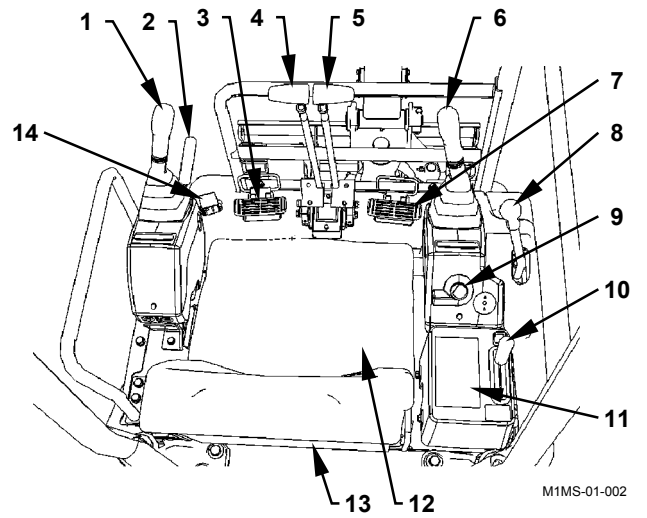
- 7- Arm
- 8- Bucket
- 9- Boom Cylinder
- 10- Blade
- 11- Blade Cylinder
- 12- Front Idler

- 13- Boom-Swing Cylinder
- 14- Track Shoe
- 15- Track Frame
- 16- Travel Device

OPERATOR'S STATION

PEDALS, LEVERS AND MONITOR PANEL

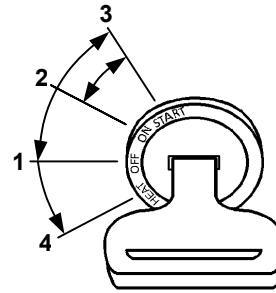
- 1- Left Control Lever
- 2- Pilot Control Shut-Off Lever
- 3- Attachment Pedal (Optional)
- 4- Left Travel Lever
- 5- Right Travel Lever
- 6- Right Control Lever / Horn Switch
- 7- Boom-Swing Pedal
- 8- Blade Lever
- 9- Key Switch
- 10- Engine Control Lever
- 11- Switch Panel / Monitor Panel
- 12- Operator's Seat
- 13- Operator's Manual Box
- 14- Travel Mode Pedal
- 15- Fuse Box
- 16- Side Frame Extend / Retract Lever



OPERATOR'S STATION

KEY SWITCH

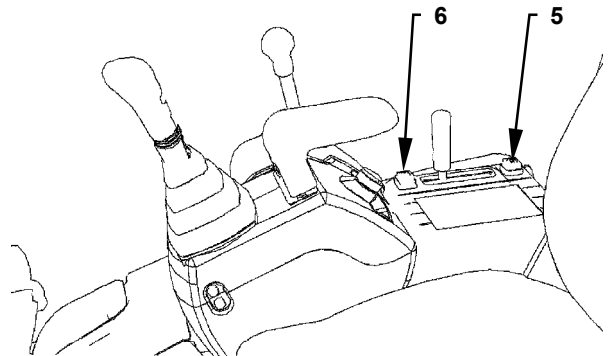
- 1- OFF (Engine OFF)
- 2- ON (Engine ON)
- 3- START (Engine Start)
- 4- HEAT (Engine Preheat)



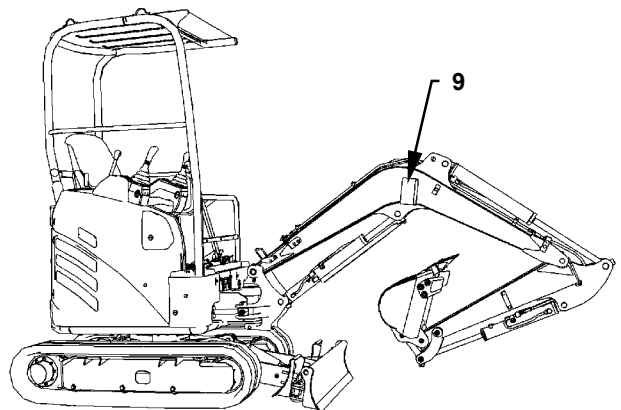
M1M7-01-007

SWITCH PANEL

- 5- Work Light Switch
Press the switch (5) to turn work lights (9) located on the boom ON.
- 6- Travel Alarm Deactivation Switch
Push the travel alarm deactivation switch (6) to stop the alarm.



M1MS-01-011

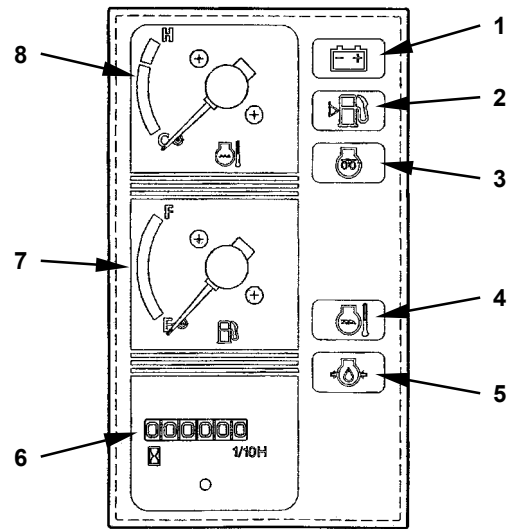


M1MS-01-001

OPERATOR'S STATION

MONITOR PANEL

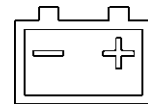
- 1- Alternator Indicator
- 2- Fuel Level Indicator
- 3- Preheat Indicator
- 4- Overheat Indicator
- 5- Engine Oil Pressure Indicator
- 6- Hour Meter
- 7- Fuel Gauge
- 8- Coolant Temperature Gauge



M1MS-01-005

Alternator Indicator

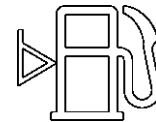
The red indicator will light when low alternator output is present. Check the electrical system such as the alternator and/or battery system.



M178-01-038

Fuel Level Indicator

When the fuel level indicator comes ON while the machine is operating on level ground, the remaining fuel amount in the fuel tank is 4.5 L (1.2 US gal). Refill the fuel as soon as possible.



M178-01-034

Preheat Indicator

When the key switch is turned to the HEAT position, orange indicator will light. Light will turn off after approx. 3 seconds have passed.



M178-01-041

Overheat Indicator

If the coolant temperature rises extremely high, this indicator operates. If the red light comes ON, the buzzer sounds at the same time. Immediately stop machine operation and reduce engine speed to the slow idle speed to lower the coolant temperature.

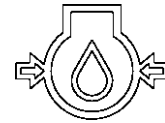


M178-01-036

OPERATOR'S STATION

Engine Oil Pressure Indicator

The red indicator will light when the engine oil pressure is low. If the red indicator comes ON, the engine oil pressure warning buzzer will sound at the same time. Immediately stop the engine. Check the engine oil pressure system and the oil level for any abnormality.



M178-01-037

Hour Meter

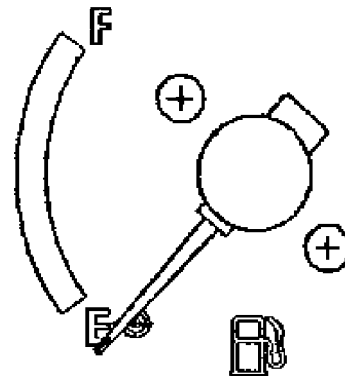
Total (accumulated) machine operation hours counted since the machine started working, are displayed in the unit of HOUR (h). One digit after the decimal point indicates the tenths of an hour (6 minutes).



M1MS-01-008

Fuel Gauge

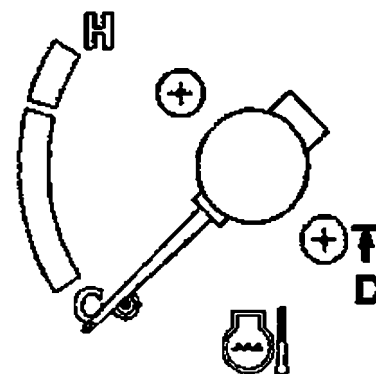
The gauge needle position indicates the fuel level. Refill the fuel before only the E-marked segment comes ON.



M1MS-01-007

Coolant Temperature Gauge

The gauge needle position indicates the engine coolant temperature. Coolant temperature is normal when the needle stays in white zone while operating.



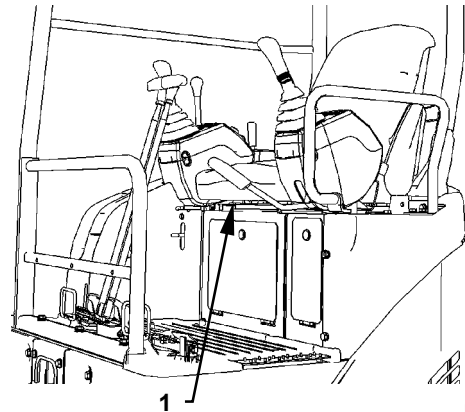
M1MS-01-006

OPERATOR'S STATION

ADJUSTING OPERATOR'S SEAT

Seat Fore-Aft Adjustment

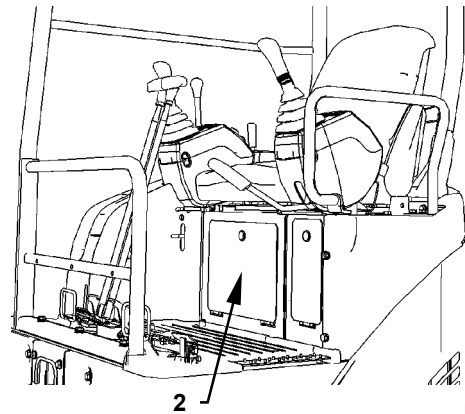
Operate seat fore-aft slide lever (1). Seat fore-aft position can be adjusted at the interval of 20 mm in 6 steps (120 mm in total).



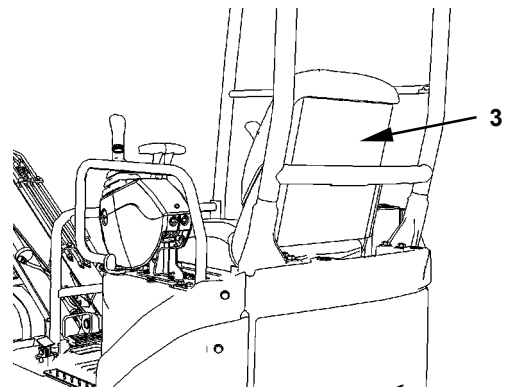
M1MS-01-009

TOOL AND OPERATOR'S MANUAL BOXES

Tool box (2) is located under the operator's seat and operator's manual box (3) is located behind the backrest of the operator's seat respectively.



M1MS-01-009



M1MS-01-010

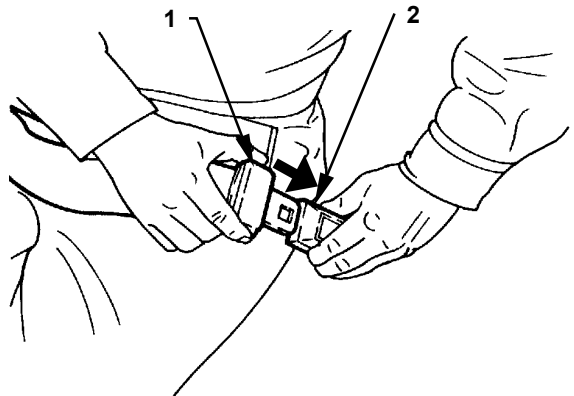
OPERATOR'S STATION

SEAT BELT

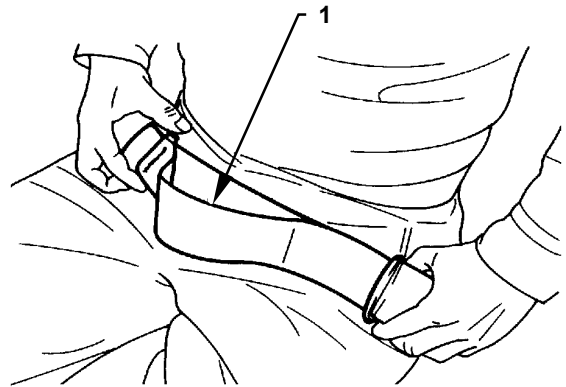
⚠ WARNING: Be sure to use the seat belt when operating the machine.
Before operating the machine, be sure to examine seat belt (1), buckle (2), or attaching hardware. Replace seat belt (1), buckle (2), or attaching hardware if they are damaged, or worn. Replace seat belt (1) every three years, regardless of appearance.

Seat Belt

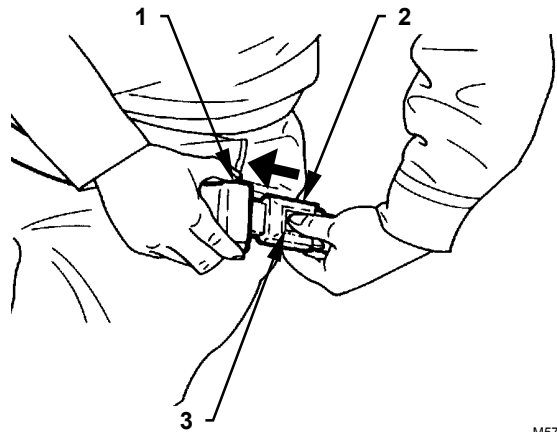
1. Confirm that seat belt (1) is not twisted and securely insert the end of seat belt (1) into buckle (2). Lightly pull on the belt to confirm that the buckle latches securely.
2. Adjust tightness of the seat belt (1) so that the belt is snug but comfortable.
3. Push button (3) on buckle (2) to unfasten seat belt (1).



M573-01-014



M107-01-045



M573-01-015

BREAK-IN

BREAKING IN NEW MACHINE

IMPORTANT: Operating a new machine at full load without first breaking in can cause scratches and/or seizures, consequently affecting the service life of the machine. Thoroughly perform break-in operation.

The service life and performance of the machine can be greatly affected by operation and maintenance of the machine during the initial stage of operation. Perform break-in operation with the engine output less than 80% of the maximum output for the first 50 hours.


OPERATING ENGINE

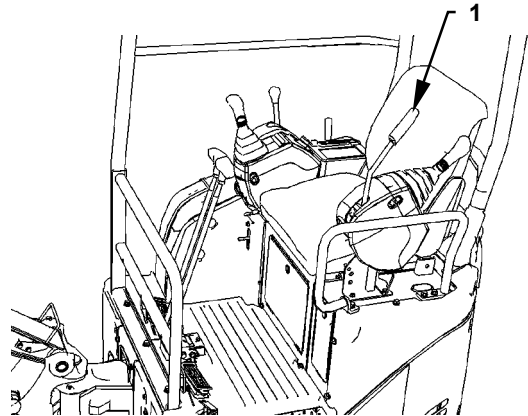
BEFORE STARTING ENGINE

1. Check that pilot control shut-off lever (1) in the LOCK position.
2. Confirm that all control levers are placed in neutral.
3. Check indicator bulbs as follows:
Turn key switch to the ON position. All indicator lights and warning lamps will come on. They will stay on for approximately 3 seconds, except for alternator (3) and engine oil pressure (4) indicator, which will continue to stay on further.

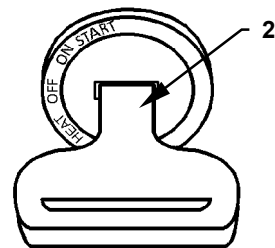
IMPORTANT: The monitor panel indicates the machine operating conditions. If the machine is operated with an indicator bulb or a warning lamp burned out, the alarm will not be displayed even if any abnormality occurs on the machine. Accordingly, in case any of the indicator bulbs or the warning lamps do not come ON, immediately contact your nearest Hitachi dealer for repair. If any of alternator (3) or engine oil pressure (4) fails to light after indicator light check is completed, the machine may have trouble. Immediately contact your nearest Hitachi dealer for repair.

4. Adjust the seat position so that all pedals and control levers can be fully stroked to any position when seated in the operator's seat with the operator's back kept in contact with the backrest. Fasten the seat belt.

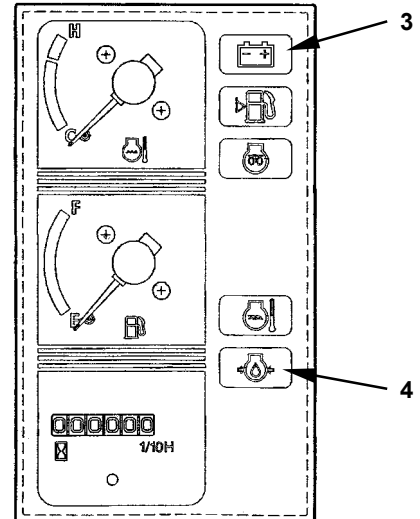
 **NOTE:** The monitor surfaces are resin. Wipe the surface only with a damp cloth when dusty to keep them clean. Never use an organic solvent.



M1MS-03-001



M1M7-01-007



M1MS-01-005

OPERATING ENGINE


STARTING ENGINE

Starting in Ordinary Temperature

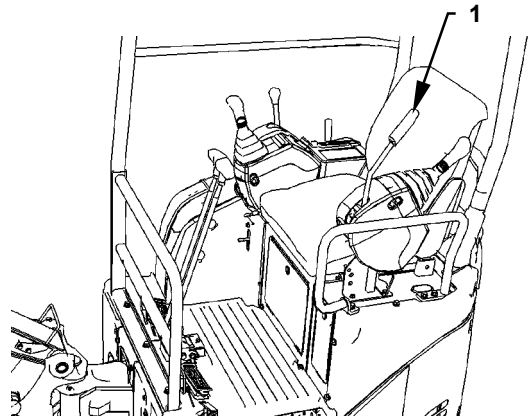
1. Check that pilot control shut-off lever (1) in the LOCK position.
2. Turn engine control lever (3) to the slow idle position.
3. Sound the horn to alert bystanders.
4. Turn key switch (2) to rotate the starter. The engine will be started.

IMPORTANT: Prevent starter damage and/or battery over discharge. Never run the starter for more than 20 seconds at a time. If the engine fails to start, return the key switch to OFF. Wait for more than 30 seconds, then try again.

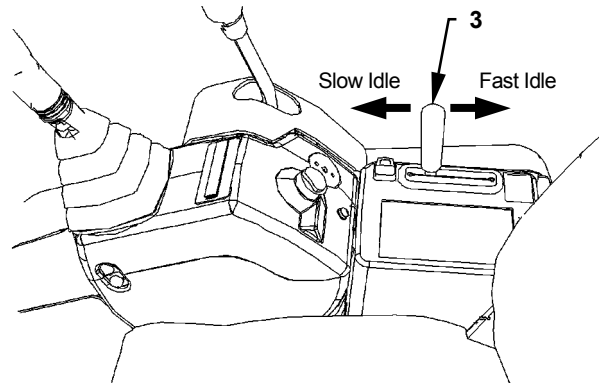
5. Release key switch (2) immediately after the engine has started. It will automatically return to the ON position.

 **NOTE:** The horn sounds even though the key switch is turned OFF. The engine does not start unless the pilot control shut-off lever is in the LOCK position.

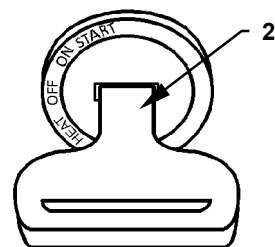
IMPORTANT: Avoid operating key switch (2) with stained hands or gloves.



M1MS-03-001



M1MS-01-004

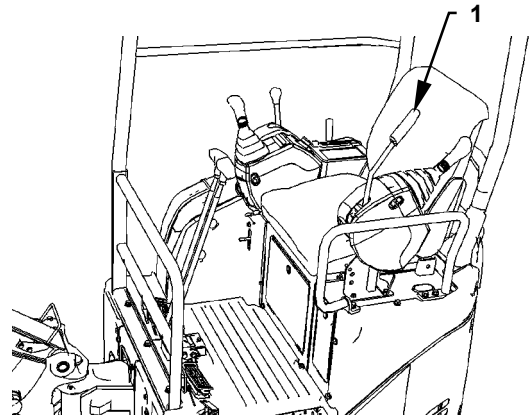


M1M7-01-007

OPERATING ENGINE

STARTING IN COLD WEATHER

1. Check that pilot control shut-off lever (1) is in the LOCK position.
2. Turn engine control lever (3) to around the middle between the slow and fast idle positions.
3. Turn key switch (2) to the HEAT position and hold it in that position for approx. 3 seconds until preheat indicator (4) goes OFF.
4. Sound the horn to alert bystanders.
5. As soon as preheat indicator (4) goes OFF, return key switch (2) to the START position to run the starter.

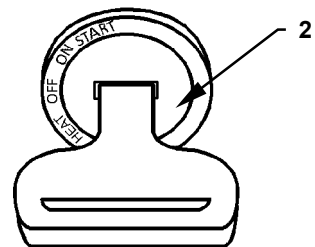


M1MS-03-001

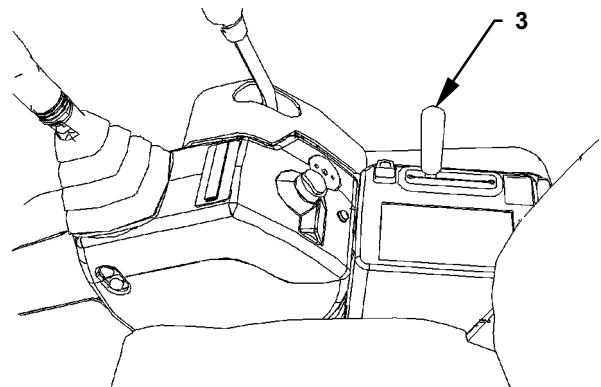
IMPORTANT: Prevent starter damage and/or battery over discharge. Never run the starter for more than 20 seconds at a time. If the engine fails to start, return the key switch to OFF. Wait for more than 30 seconds, then try again.

6. Release key switch (2) immediately after the engine has started. It will automatically return to the ON position.

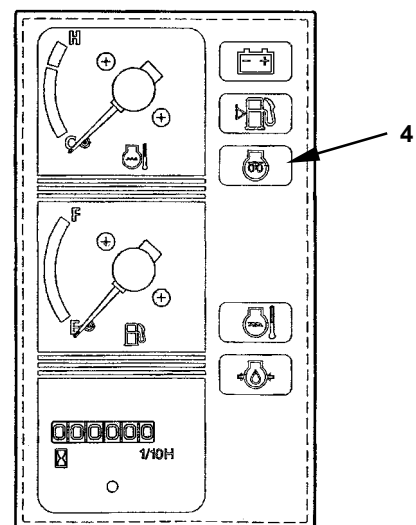
NOTE: Set the engine control lever to the fast idle position to start the engine in an extreme cold weather district. After the engine is started, gradually reduce the engine speed and perform warm-up operation at the medium speed range.



M1M7-01-007



M1MS-01-004



M1MS-01-005

OPERATING ENGINE

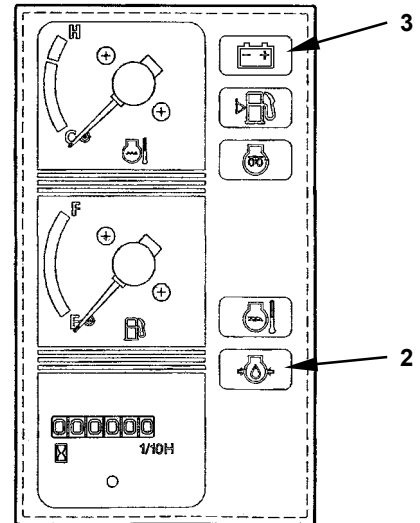
CHECK MACHINE AFTER STARTING ENGINE

IMPORTANT: In case any abnormality is found in the monitor, immediately stop the engine. Trace the cause of the problem.

Check Using the Monitor

After the engine has started, check the following points through the monitor.

1. Check that alternator indicator (3) is OFF.
In case alternator indicator (3) stays ON, immediately stop the engine. Then, check the alternator and/or battery system for any abnormality.
2. Check that engine oil pressure indicator (2) is OFF.
In case engine oil pressure indicator (2) stays ON, immediately stop the engine. Then, check the engine oil pressure system and/or the oil level for any abnormality.



M1MS-01-005

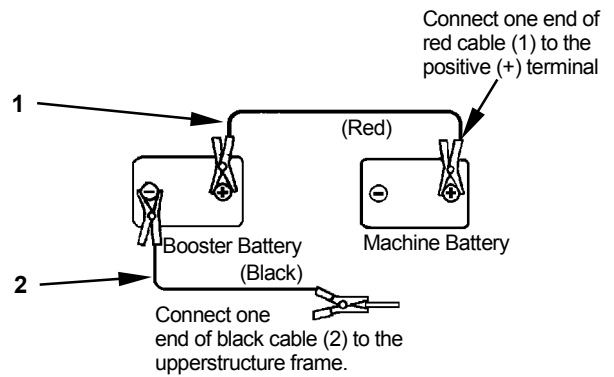
OPERATING ENGINE

USING BOOSTER BATTERIES

⚠ WARNING: An explosive gas is produced while a battery is in use or being charged. Keep flames or sparks away from the battery area. Park the machine and booster battery machine on a dry, firm or concrete surface, not on steel plates. If the machine and/or the booster battery machine are parked on steel plates, dangerous sparks may be unexpectedly created on the machine. Never connect a positive terminal to a negative terminal, as a dangerous short circuit will occur.

IMPORTANT: The machine electrical system is a 12 volt negative (-) ground. Use only 12 volt booster battery with the capacity enough to start this machine.

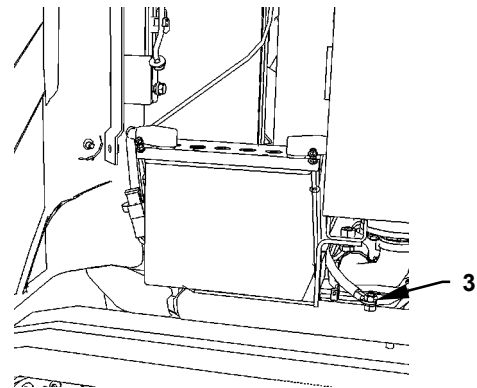
When the machine battery is exhausted, start the engine using a booster battery as shown below.



M503-03-002

Connecting Booster Cables

1. Stop the engine of the booster battery machine.
2. Connect one end of red cable (1) to the positive (+) terminal of the machine battery and the other end to the positive (+) terminal of the booster battery.
3. After connecting one end of the black cable (2) to the negative (-) terminal of the booster battery, connect the other end to upperstructure frame (3) on the machine. Be alert to sparks that may be produced in the last connection to the hydraulic oil tank cover hinge.
4. After securely connecting the booster cables, start the engine of the booster battery machine. Run the engine at a middle speed. Then, start the engine of this machine.
5. After the engine is started, disconnect booster cables (1 and 2) following the procedures below.



M1MS-03-002

Disconnecting Booster Cables

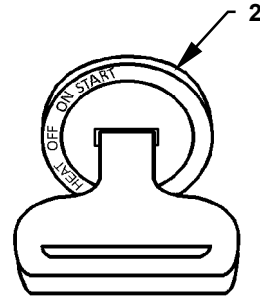
1. Disconnect black booster negative (-) cable (2) from upperstructure frame (3) first.
2. Disconnect the other end of black booster negative (-) cable (2) from the booster battery.
3. Disconnect red booster positive (+) cable (1) from the booster battery.
4. Disconnect red booster positive (+) cable (1) from the machine battery.

OPERATING ENGINE

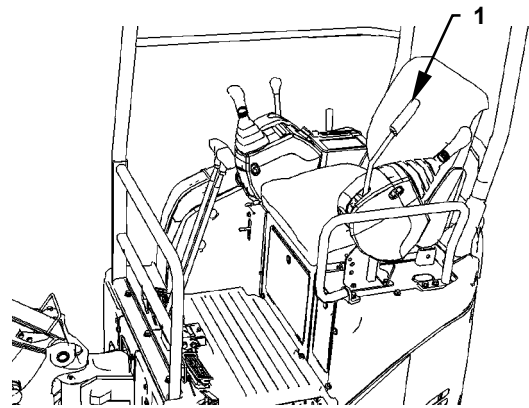
STOPPING THE ENGINE

Stop the engine following the steps below.

1. Before stopping the engine, lower the bucket and blade to the ground unless specified.
2. Return the engine control lever to the slow idle position and keep the engine running at slow idle speed for 5 minutes.
3. Turn the key switch (2) OFF to stop the engine.
4. Pull up pilot control shut-off lever (1) to the LOCK position.



M1M7-01-007



M1MS-03-001

DRIVING THE MACHINE

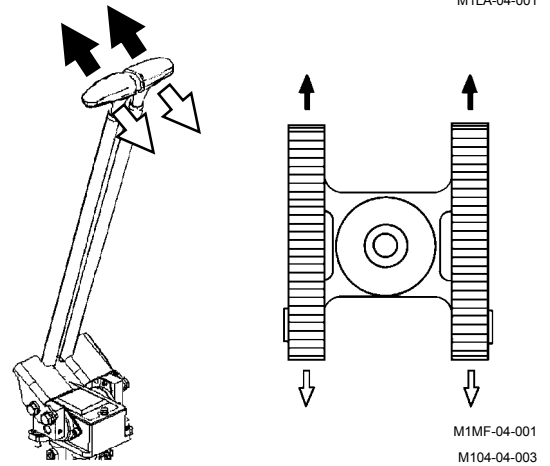
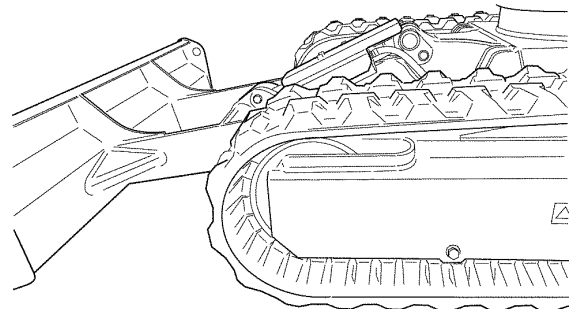
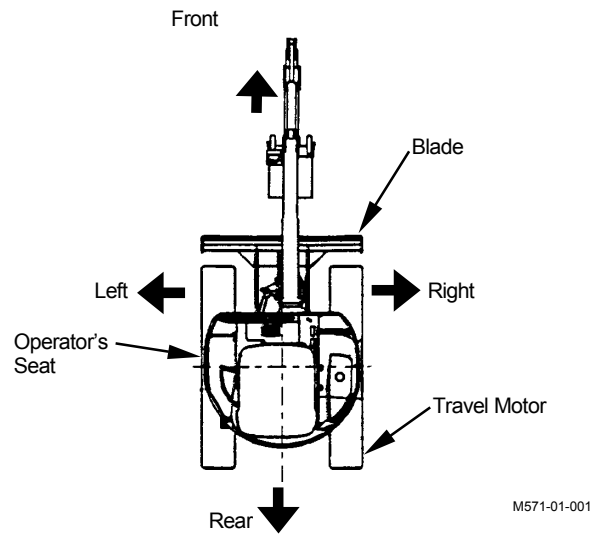
TRAVEL LEVERS

Travel operation can be performed with the mechanical levers.

WARNING: In the standard traveling position, the front idlers are located in front of the operator's seat and the travel motors at the rear. If the travel motors are positioned at the front of the machine, when the travel levers or pedals are operated in the direction as illustrated on the operation decals, the travel direction of the machine will be reversed. Be sure to confirm the position of the travel motors before traveling.

NOTE: Travel lever dampers are provided for smooth control. In extremely cold weather (lower than $-20\text{ }^{\circ}\text{C}$), the travel lever will become heavy to operate. This is caused by increase in oil viscosity which is not abnormal.

- Forward/Reverse Travel
Move both levers forward together to travel forward. Pull the levers back together to travel in reverse. The travel speed can be controlled by adjusting the lever operating stroke.
- Ascending/Descending Slopes
The machine gradeability is 30° (58%). Slowly operate the travel levers when descending a slope. When the travel levers are placed in neutral, the travel brakes are automatically applied to stop the machine.

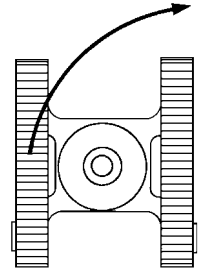
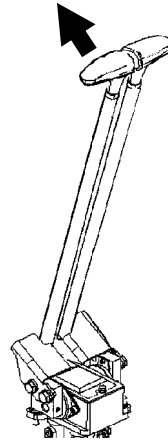


Forward/Reverse Travel Direction

DRIVING THE MACHINE

- Pivot Turn

Steer the machine by driving only one side crawler.
Operate either of the travel levers.



Pivot Turn

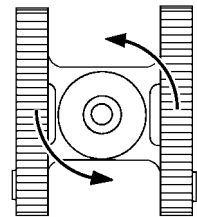
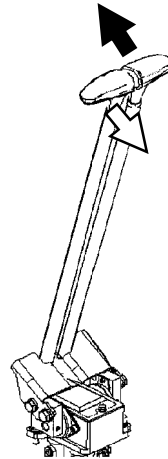
M1MF-04-001
M104-04-005

- Spin Turn

Steer the machine in a position by driving both side crawlers in opposite directions each other. Move one lever forward and pull the other back at the same time.



CAUTION: During pivot or spin turn machine operations, the base machine may shake. When turning the machine in a tight area, slowly operate the machine while taking care not to allow the machine to come in contact with the surrounding objects.



Spin Turn

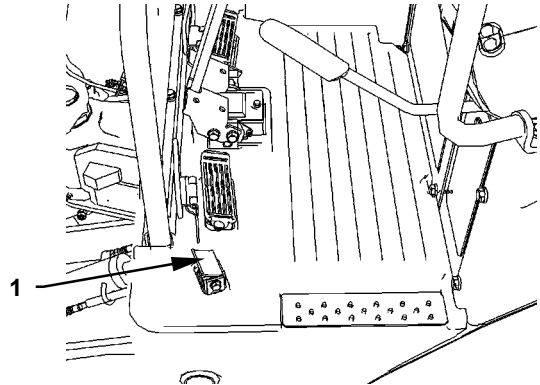
M1MF-04-001
M104-04-007

DRIVING THE MACHINE

TRAVEL MODE PEDAL

⚠ WARNING: Never attempt to shift the travel mode from the slow to fast while descending a slope. Return the travel levers to neutral once before shifting the travel mode.

Depress the travel mode pedal (1) to select the fast travel mode while depressing. When release the travel mode pedal (1), return to the slow travel mode.

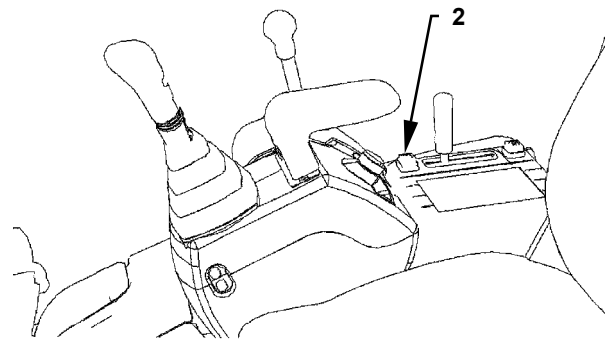


M1MS-04-002

TRAVEL ALARM

The travel alarm functions to alert co-workers and/or bystanders to movement of the machine, both forward and reverse. The travel alarm sounds when any travel lever is operated and will continue to sound as long as the tracks are moving.

⚠ WARNING: If the travel alarm does not sound when traveling, immediately stop the engine and contact your authorized dealer for repair. Operating the machine with a malfunctioning travel alarm may result in personal injury or death.



M1MS-01-011

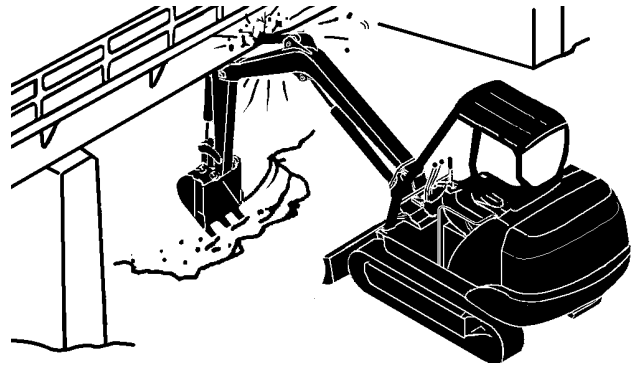
The alarm can be deactivated turning travel alarm deactivation switch (2).

DRIVING THE MACHINE

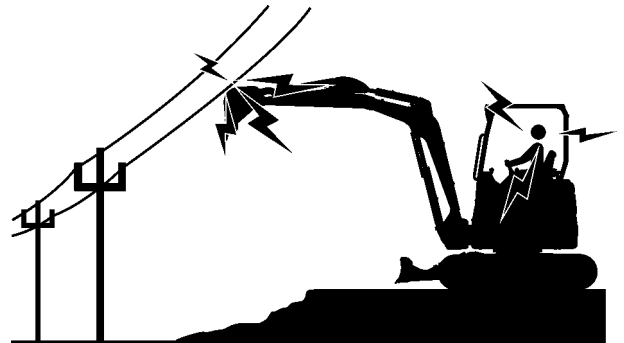
PRECAUTIONS FOR TRAVELING

⚠ CAUTION: Use a signal person when traveling the machine along road shoulders or in congested areas.

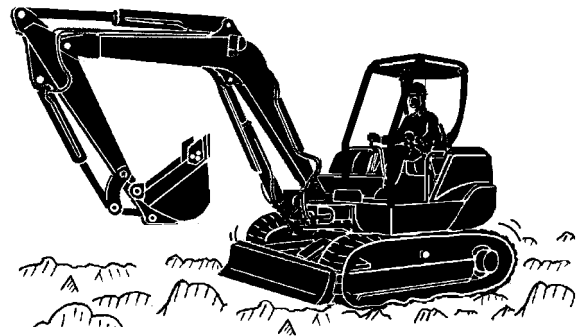
- Determine which way to move travel levers for the direction you want to go before moving machine.
- Select a travel route that is as flat as possible. Steer the machine as straight as possible, making small gradual changes repeatedly in direction.
- Check the strengths of bridges and road shoulders before traveling on them, and reinforce if necessary.
- When the machine is equipped with steel shoes, cover the road surface with wood plates in order not to damage the road surface. Be careful of steering when operating on asphalt roads in summer.
- When crossing train tracks, lay wood plates over the tracks not to allow the machine to ride on only the rails.
- Check that the machine can pass under a bridge and electric lines before driving the machine.
- When crossing a river, drive the machine slowly while measuring the depth of the river using the bucket. Do not cross the river when the depth of the river is deeper than the upper track shoe surface.
- Reduce the engine speed when traveling on rough terrains. Select slow a travel speed. Slower speed will reduce possible damage to the machine.
- Drive the machine so that the travel motors do not come in contact with loose rocks. If the machine crosses over an obstruction, abnormally large loads may be loaded on the machine. Avoid contact with an obstruction while traveling the machine.
- During freezing weather, always clean snow and ice from track shoes before driving the machine on snowy and/or frozen roads, or loading and unloading the machine for transportation, to prevent the machine from slipping.



SA-673



SA-1305



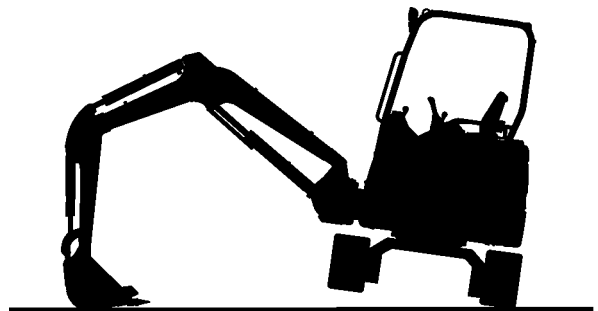
M586-05-002

DRIVING THE MACHINE

TRAVELING ON SOFT GROUND

Avoid traveling on soft ground as much as possible. If traveling on a soft ground is unavoidable, carefully operate the machine while observing the following points.

- Drive the machine as far as the machine can move by own propelling power. Towing machine may become necessary. Do not drive the machine to a deeper location than towing machine is possible.
- In case it becomes impossible for the machine to travel by own propelling power, lower the bucket to the ground. While supporting the machine weight with the boom and the arm, slowly pull the arm to evacuate the machine. Operate the boom, arm, and travel levers simultaneously at this time to prevent the machine from being loaded abnormally.
- If the track frame bottom come in contact with the ground, or if mud and/or grabbles are tightly packed into the undercarriage, the machine may become impossible to travel. Raise one side track above the ground with the boom and arm extended, remove mud and/or grabbles from the track. Then, evacuate the machine. Rotate the raised track in forward or reverse directions alternately to remove the packed rocks and/or mud from the track.
- Tow the machine with other machine if the machine becomes stuck in soft ground and impossible to evacuate by own propelling power. Refer to the descriptions for TOWING MACHINE on the next page for the correct rope attaching method.

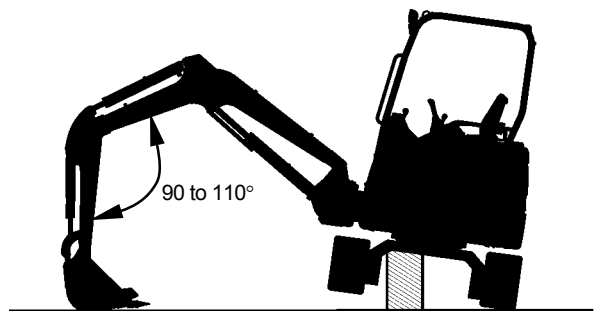


M1M7-04-005

RAISE ONE TRACK USING BOOM AND ARM

⚠ WARNING: Operate the machine carefully. The machine may slide. Keep the angle between boom and arm 90° to 110° and position the bucket's round side on the ground.

1. Swing the upperstructure 90°
2. Position the boom and the arm so that the angle between them becomes to 90° to 110° . Push the ground with the round bucket bottom to raise track off ground.
3. Do not raise the track with the boom and the arm when the boom is swung.



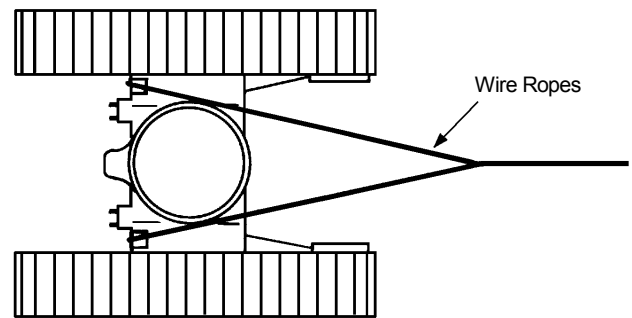
M1M7-04-006

DRIVING THE MACHINE

TOWING MACHINE

In case it is difficult for the machine to evacuate from a soft terrain by own propelling power, Attach wire ropes as illustrated to the right. Tow the machine using another machine. Be sure to attach the wire ropes around the track frames. To prevent the wire ropes from being damaged, place pieces of soft protective material between the wire ropes and the edge corners if the frame.

IMPORTANT: Do not tow the machine using the light-weight part towing holes provided on the blade. Damage to the towing holes may result.



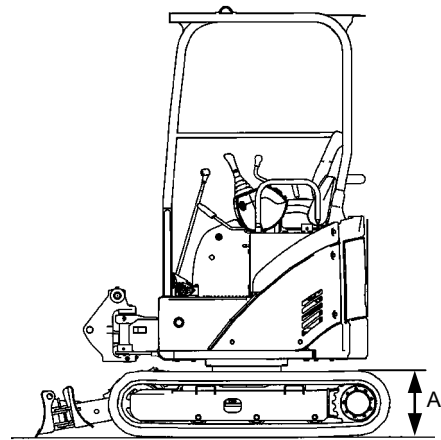
M585-05-035

DRIVING THE MACHINE

DRIVING IN WATER OR ON SOFT GROUND

1. If the footing is even and the water slow running, the machine can drive in water up to the upper track shoe surface (A) at the top of the front idler. In case the footing is uneven and the water is flowing fast, be careful not to submerge the swing bearing, swing pinion gears, and/or center joint in water or mud.
2. The machine may enter deeper areas gradually. Check the machine's position often. Reposition the machine if necessary.

IMPORTANT: If the swing bearing, swing gears and center joint are submerged in water or mud by mistake, premature wearing on parts such as the swing bearing may result. Grease must be changed or overhauling will be required immediately. Stop operating the machine as soon as possible, and contact your nearest Hitachi dealer.



M1MS-04-001

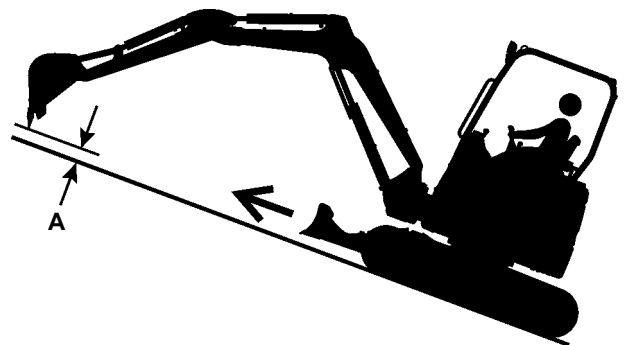
Operable Water Depth (A)
370 mm (1 ft 3 in)

DRIVING THE MACHINE

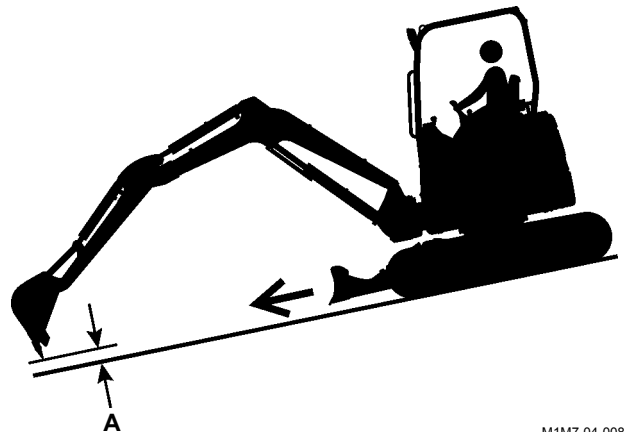
PRECAUTIONS FOR TRAVELING ON SLOPES

⚠ WARNING: Avoid possible injury from traveling on slopes. Tipping over or skidding down of the machine may result. Be sure to travel at slow speed on slopes. Never attempt to travel on slopes with the bucket loaded or any load suspended by the bucket.

- Never attempt to ascend or descend 25 degrees or steeper slopes.
- Be sure to fasten the seat belt.
(ROPS/TOPS canopy equipped machine)
- Keep the bucket pointed in the direction of travel, approximately 200 to 300 mm (8 to 12 in) (A) above the ground. If the machine skids or becomes unstable, immediately lower the bucket to the ground to stop traveling.
- Traveling across the face of slope or steering on a slope may cause the machine to skid or turnover. If the direction must be changed, move the machine to level ground, then, change the direction to ensure safe operation.
- Avoid swinging the upperstructure downhill. The machine may tip over. If swinging uphill is unavoidable, carefully operate the upperstructure and boom at slow speed.
- If the engine stalls on a slope, return the control levers to neutral. Then, restart the engine.
- Be sure to thoroughly warm up the machine before ascending steep slopes. If hydraulic oil has not warmed up sufficiently, sufficient driving power to ascend may not be obtained.



M1M7-04-007



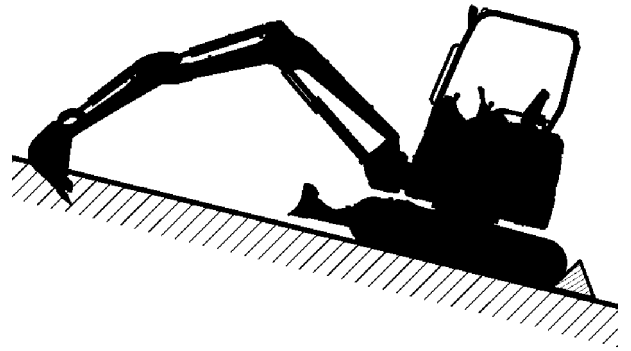
M1M7-04-008

DRIVING THE MACHINE

PARKING AND STOPPING ON SLOPES

⚠ WARNING: Parking and/or stopping on slopes is extremely dangerous. Avoid parking and/or stopping the machine on slopes.

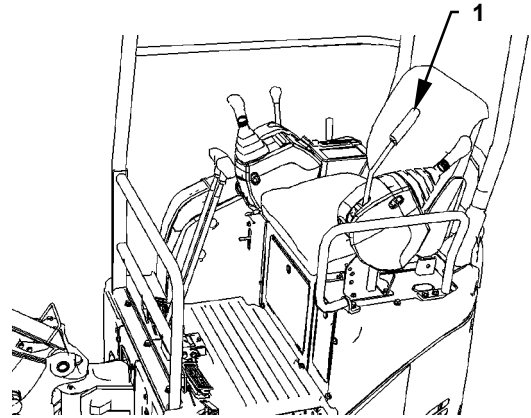
If parking and/or stopping on slopes is unavoidable, lower both the bucket and the blade to the ground, and place all levers in the neutral position. Also, put blocks at the downhill end of the tracks.



M1M7-04-009

PARKING ON SLOPES

1. Park the machine on a level, solid surface. Position the arm vertically and lower the bucket and blade to the ground.
2. Turn the engine control dial or the engine control lever to the slow idle position. Run the engine at the slow idle speed for approx. 5 minutes to cool the engine.
3. Turn the key switch to OFF to stop the engine. Remove the key from the switch.
4. Pull pilot control shut-off lever (1) into the fully LOCK position.



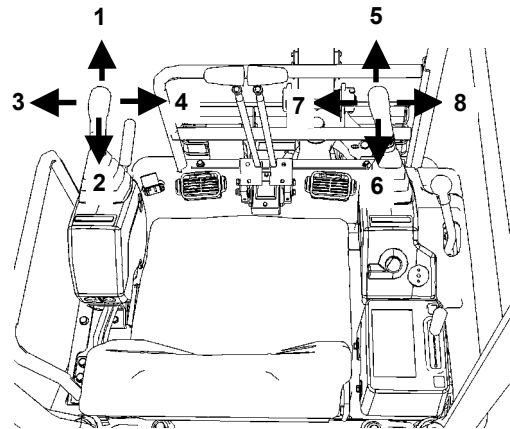
M1MS-03-001

OPERATION

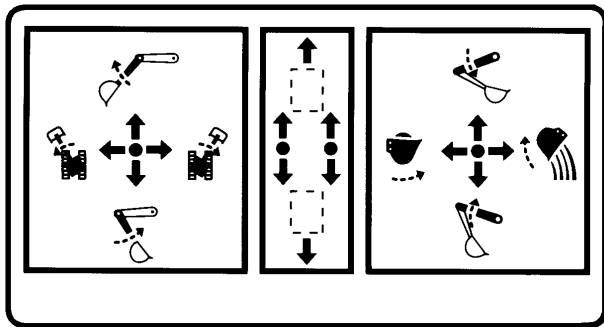
CONTROL LEVER (ISO EXCAVATOR PATTERN)

⚠ WARNING: Be sure to check the location and function of each control lever before operating. The upperstructure and/or front attachment may unexpectedly move when attempting to turn and look behind the machine as a part of operator's body may come into contact with the control lever(s). Take care not to come into contact with the control levers when turning and looking behind the machine.

Labels showing the lever control pattern are provided on the operator's right. As illustrated below, the labels indicate the ISO Excavator Pattern.



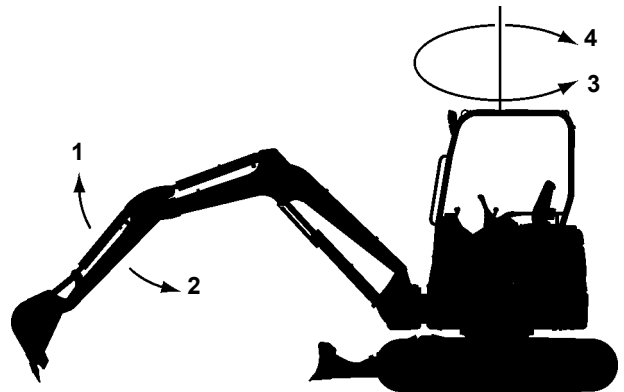
M1MS-05-003



M588-05-050

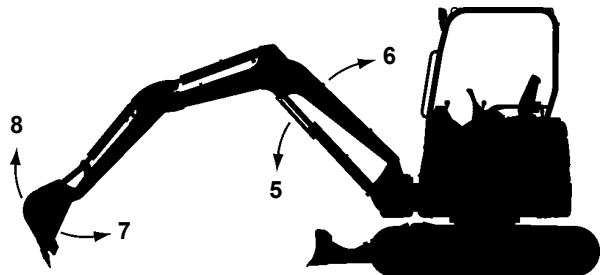
When a control lever is released, it automatically returns to neutral, stopping the function in that position.

- 1- Arm Roll-Out
- 2- Arm Roll-In
- 3- Swing Left
- 4- Swing Right



M1M7-05-001

- 5- Boom Lower
- 6- Boom Raise
- 7- Bucket Roll-In
- 8- Bucket Roll-Out



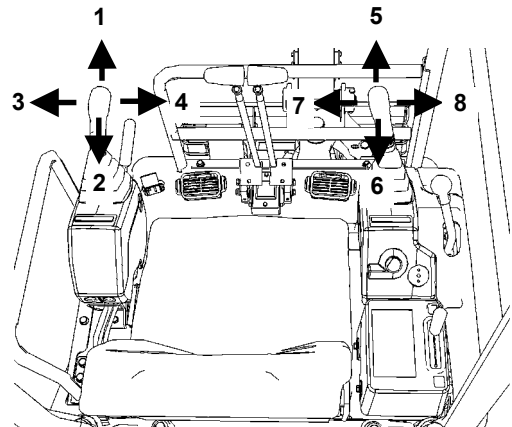
M1M7-05-002

OPERATION

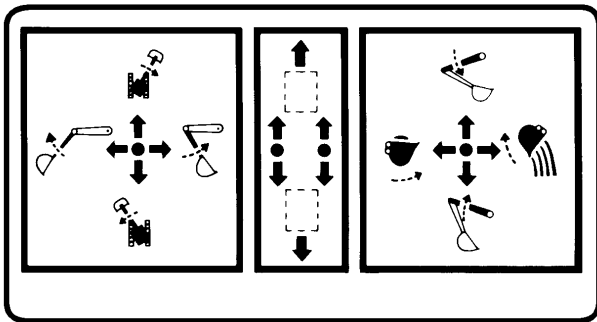
CONTROL LEVER (H-PATTERN: HITACHI EXCAVATOR PATTERN)

WARNING: Make sure to check the location and function of each control lever before operating. The upperstructure and/or front attachment may unexpectedly move in an attempt to look back because a part of operator's body may come into contact with the control lever(s). Take care not to come into contact with the control levers when looking back.

Labels displaying the available lever control patterns are provided at the right of the operator. As illustrated below, the labels with H pattern mark at the right bottom corner indicate the HITACHI Excavator Pattern.



M1MS-05-003

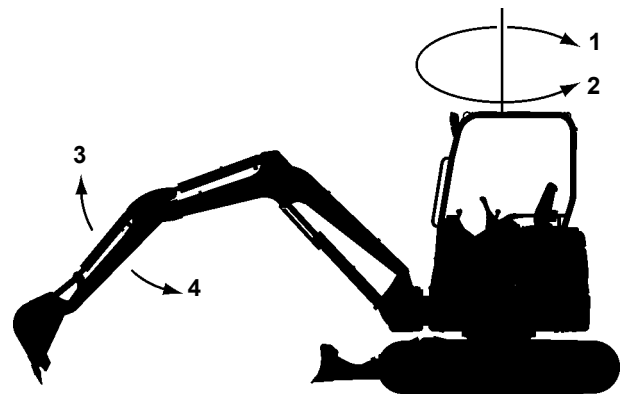


M1LA-05-014

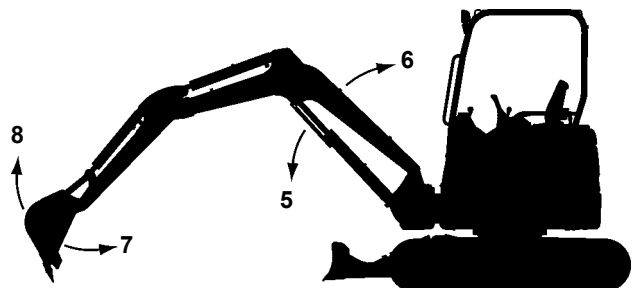
When a control lever is released, it automatically returns to neutral, stopping the function in that position.

- 1- Swing Right
- 2- Swing Left
- 3- Arm Roll-Out
- 4- Arm Roll-In

- 5- Boom Lower
- 6- Boom Raise
- 7- Bucket Roll-In
- 8- Bucket Roll-Out



M1M7-05-001



M1M7-05-002

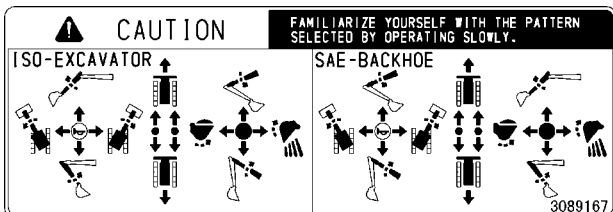
OPERATION

CONTROL LEVER (SAE-BACKHOE PATTERN) --- IF EQUIPPED (2 Way Multi Valve)

WARNING: Make sure you know the location and function of each control lever before operating. The upperstructure and/or front attachment may unexpectedly move in an attempt to look back because a part of operator's body may come into contact with the control lever(s). Take care not to come into contact with the control levers when looking back.

Labels showing the SAE-BACKHOE pattern are provided on the operator's right.

Whenever changing the pattern, stop the engine, rotate the selector valve (9), and set to the pattern position.

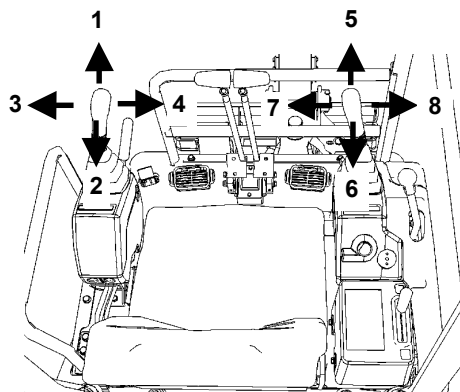


M1M7-05-028

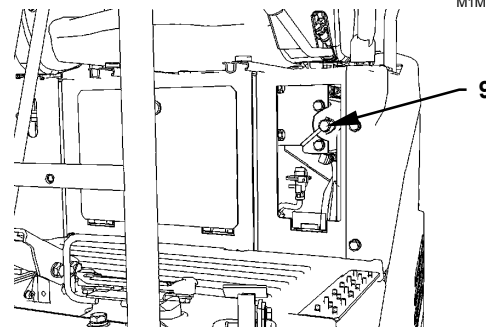
When a control lever is released, it automatically returns to neutral, stopping the function in that position.

- 1- Boom Lower
- 2- Boom Raise
- 3- Swing Left
- 4- Swing Right

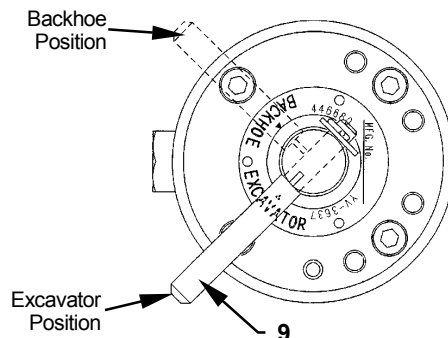
- 5- Arm Roll-Out
- 6- Arm Roll-In
- 7- Bucket Roll-In
- 8- Bucket Roll-Out



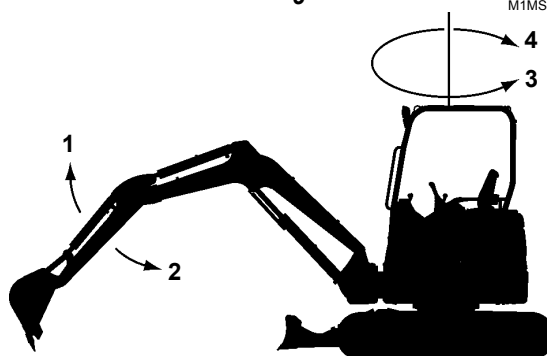
M1MS-05-003



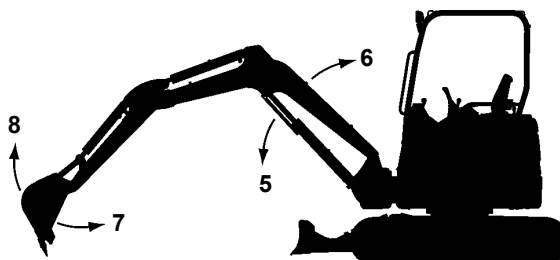
M1MS-05-010



M1MS-05-011



M1M7-05-001

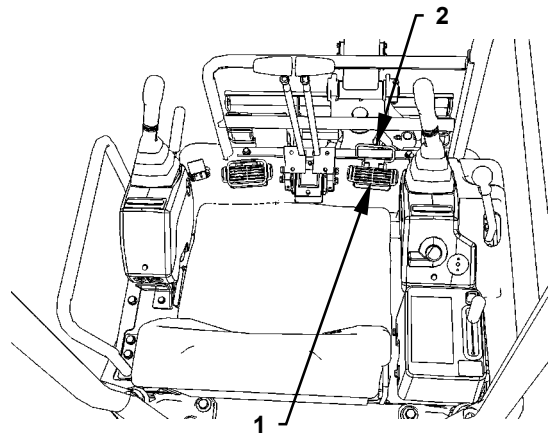


M1M7-05-002

OPERATION

BOOM-SWING PEDAL

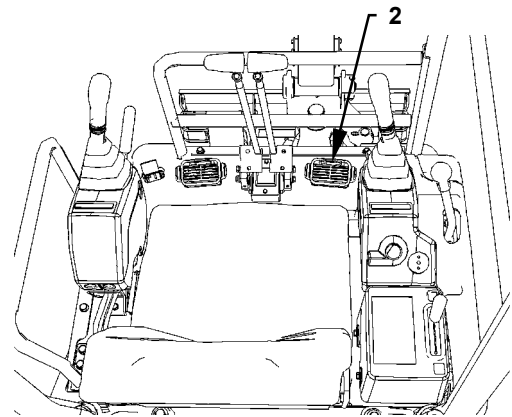
Use the boom swing function to efficiently operate the machine when excavating grooves along roadsides or near walls. The boom swing operation is performed using boom-swing pedal (1) located at the operator's right foot as illustrated to the right.



M1MS-05-004

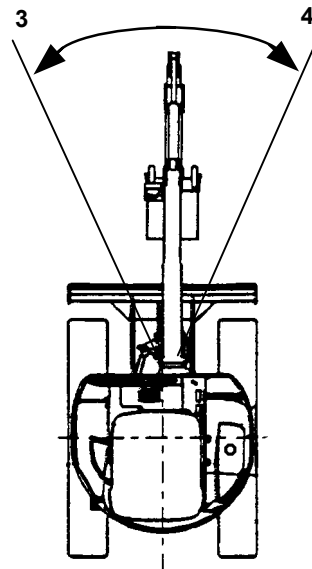
Boom-Swing Operation

1. Turn cover (2) for boom-swing pedal (1) forward.
2. Step on the left side of boom-swing pedal (1) to swing left. Step on the right side of the pedal to swing right.
3. Turn cover (2) backward over boom-swing pedal (1) when boom-swing operation is no longer required.



M1MS-05-003

- 3- Swing Left
- 4- Swing Right



M571-01-001

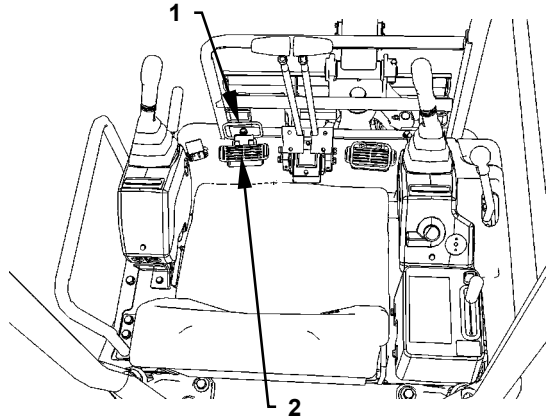
OPERATION

AUXILIARY PEDAL (OPTIONAL)

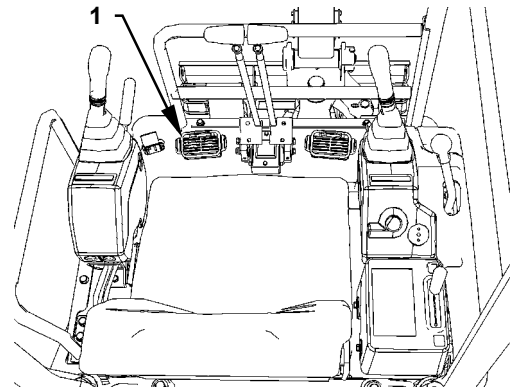
Use the auxiliary pedal (2) located at the operator's left front, as illustrated to the right, to operate hydraulic breaker, crusher, etc.

Operation

1. Turn auxiliary pedal cover (1) forward.
2. Step on the right or the left side of the auxiliary pedal (2) to operate the front-end attachment such as a hydraulic breaker
3. When the auxiliary pedal (2) is not used, turn cover (1) backward on the pedal.



M1MS-05-005



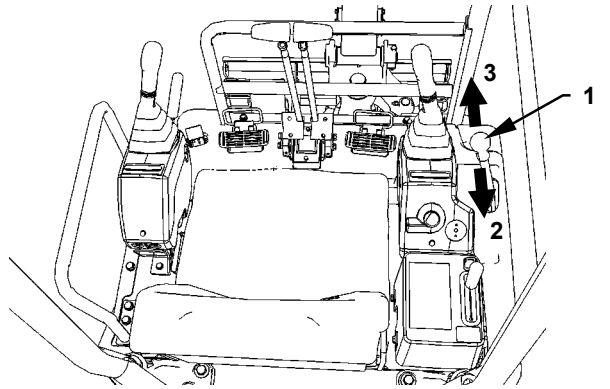
M1MS-05-003

OPERATION

BLADE LEVER

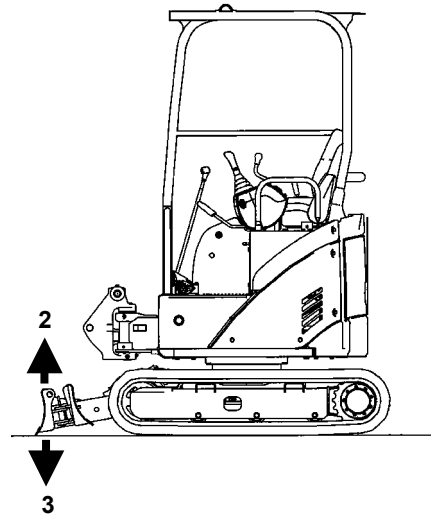
Use blade lever (1) on the operator's right to raise and lower the blade.

When the lever is released, it automatically returns to neutral, holding the blade in the present position until the lever is operated again.



M1MS-05-001

- 2- Blade Raise
- 3- Blade Lower



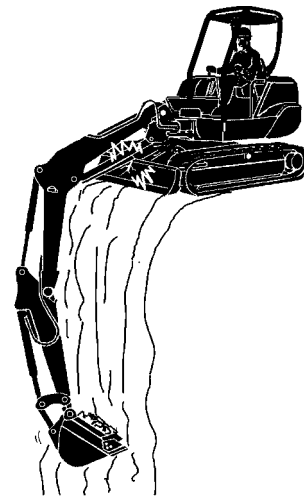
M1MS-04-001

OPERATION

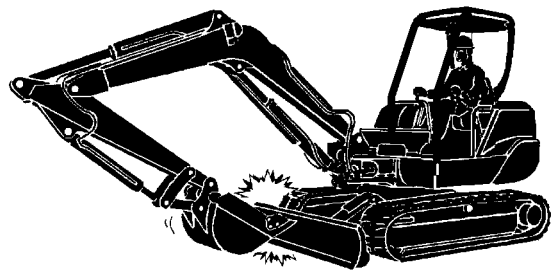
PRECAUTIONS FOR BLADE OPERATION

This blade is designed as a light service attachment of the hydraulic excavator. Please keep the following points in mind:

- This blade is designed for bull dozing work only. Do not attempt to dig deeply with the blade. Doing so may damage not only the blade but the undercarriage as well.
- Do not apply concentrated or uneven loads to the blade. Never allow the blade to forcefully collide with a load by running the machine into the load. Failure to do so may result in damage to the blade and the undercarriage.
- When jacking up the machine with this blade, the surface beneath the blade comes under high pressure, increasing the risk of surface collapse. Always be sure that the surface is strong enough to support the weight of the machine before jacking up the machine. Avoid dangerous uneven distribution of weight to the blade by maintaining even contact between the blade and the ground.
- While digging with the blade positioned in the front of the machine, take care not to allow the bucket to come into contact with the blade.
- When digging, take care not to allow the boom cylinder to come in contact with the blade.



M586-05-016



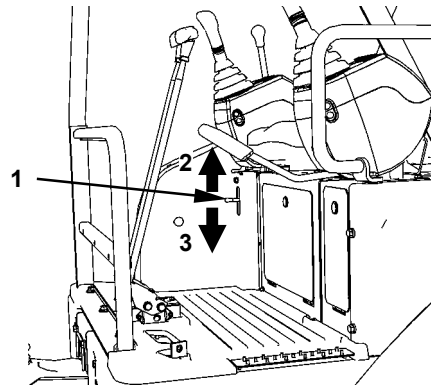
M586-05-017

OPERATION

SIDE FRAME EXTEND / RETRACT LEVER

To adjust the side frame width, operate side frame extend /retract lever (1) as illustrated to the right.

! **WARNING:** Operate the machine with the side frames fully extended (1280 mm) or retracted (970 mm). If the machine is operated with the side frames extended insufficiently, the extended side frames are not securely held, causing the upper structure to keep moving and constituting a safety hazard. Operate the machine with the side frames fully retracted only when traveling through a flat narrow work site. Except for this condition, whenever traveling the machine, performing excavation, or operating the blade, be sure to fully extend the side frames. Failure to do so may cause the machine to turn over.



M1MS-05-006

IMPORTANT: Before extending or retracting the side frames, park the machine on a level surface with no obstructions and remove packed mud or gravel from the side frame extend / retract mechanism if any.

Operating the side frame extend / retract lever.

1. Pull up side frame extend /retract lever (1) to extend the side frame.
2. Push down side frame extend /retract lever (1) to retract the side frame.

- 2- Extension
- 3- Retraction

OPERATION

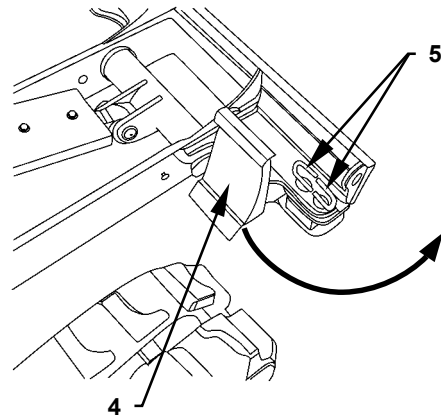
Extending / Retracting Blade Width

Change the blade width in accordance with the side frame extension / retraction.

When working with the blade contact to ground, there are some cases that it is difficult to remove the pins. Work after raising the blade, and stopping the engine.

When extending the blade width:

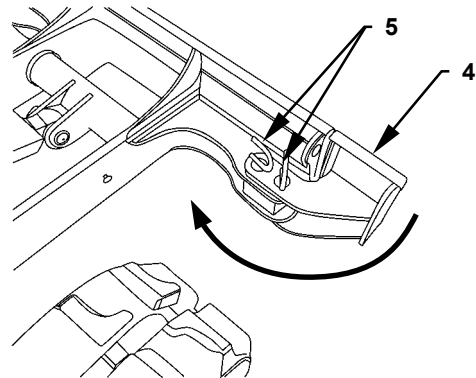
1. Remove blade pins (5).
2. Turn over the extension blade (4) and align the two pin holes.
3. Install blade pins (5).
4. Extend the left side following steps 1 to 3 above.



M1MS-05-008

When retracting the blade width:

1. Remove blade pins (5).
2. Turn over the extension blade (4) so that the cutting edge side may turn to the track shoe side. Align the two pin holes.
3. Install blade pins (5).
4. Retract the left side following steps 1 to 3 above.



M1MS-05-009

OPERATION

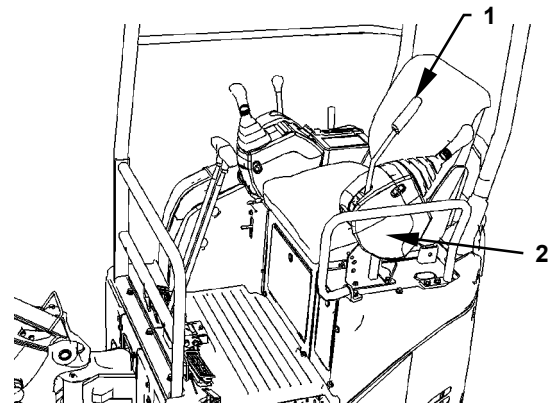
PILOT CONTROL SHUT-OFF LEVER

The pilot control shut-off lever is a device to prevent the machine from being unexpectedly operated even if the control levers are accidentally moved, such as with a part of the body or when the operator is getting in or out of the operator's station.

Pilot control shut-off lever (1) is linked to console (2) latch mechanism so that console (2) is raised in the LOCK position to aid in entering and exiting the operator's station and for maintenance.

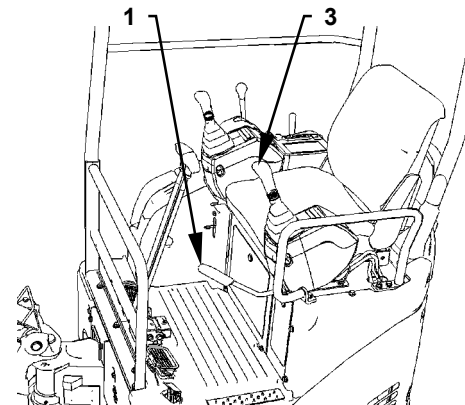
WARNING:

- To deactivate control lever and pedal functions, be sure to pull pilot control shut-off lever (1) and raise console (2) to the fully locked position. To reactivate control lever (3) function, always hold and push pilot control shut-off lever (1) down. Never attempt to lower raised console (2) or control levers (3) to reactivate control lever (3) function without holding pilot control shut-off lever (1).
 - Always stop the engine and pull pilot control shut-off lever (1) to the full LOCK position before exiting the operator's station, even when exiting temporarily.
 - Be sure to move the pilot control shut-off lever to the LOCK position before exiting the machine after each shift.
- Pilot Control Shut-off Lever Operation**



Lock Position

M1MS-03-001




Unlock Position

M1MS-05-007

Before Leaving the Machine:

1. Park the machine on a firm, level surface. Lower the bucket and blade to the ground. Return all control levers to neutral. Stop the engine.
2. To deactivate control lever (3) function, be sure to pull pilot control shut-off lever (1) and raise console (2) to the fully locked position.

Before Starting Operation:

-  **WARNING:** Never attempt to lower the raised console (to reactivate the pilot control shut-off function) by holding and pushing down control lever (3) and/or console (2). Always lower the console using pilot control shut-off lever (1).

Be sure to hold pilot control shut-off lever (1) in LOCK (raised) position when starting the engine.

Slowly lower pilot control shut-off lever (1) to UNLOCK position before starting operation.

After moving the pilot control shut-off lever to the UNLOCK position, check that no actuator move when all control levers and pedals are in neutral before starting operation. If any actuator moves after moving the pilot control shut-off lever to the UNLOCK position with all control levers and pedals in neutral, the machine may be experiencing trouble. Immediately return pilot control shut-off lever (1) to the LOCK position and stop the engine. Contact your nearest Hitachi dealer for repair.

OPERATION

WARMING UP OPERATION

The normal operating temperature of hydraulic oil is between 50 and 80°C (122 and 176°F). Hydraulic components may be seriously damaged if the machine is operated when the hydraulic oil temperature is below 20°C (68°F).

Before starting work, be sure to follow these warm-up procedures until the temperature of the hydraulic oil reaches above 20°C (68°F).

Warm-Up Procedures:

1. Run the engine at 100 to 200 min⁻¹ (rpm) above slow idle speed for 5 minutes.
2. With the engine speed control lever or the engine speed control dial at the medium position, run the engine for 5 to 10 minutes.
3. Extend and retract each cylinder several times and lightly operate the swing and travel motors to warm up them.

WARMING UP IN COLD WEATHER

IMPORTANT: In case the hydraulic oil temperature is low, never operate the machine until all actuator speeds become normal after warming up operation.

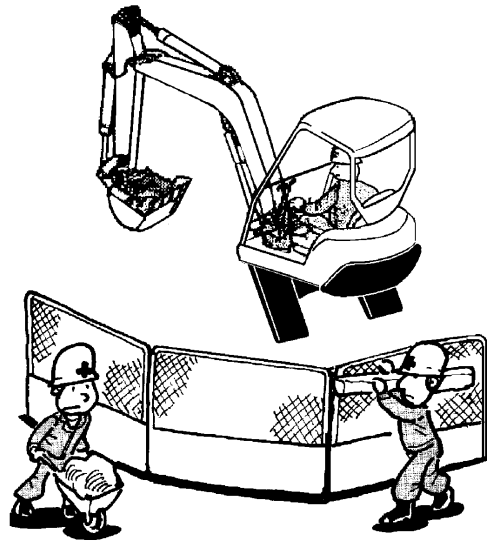
1. Run the engine at intermediate speed for 5 minutes (longer if the air temperature is extremely low).
2. Do not run the engine at either slow or fast speed during this time.
3. Extend and retract each cylinder several times and lightly operate the swing and travel motors to warm up them.
4. Extend the bucket cylinder to the stroke end. Be sure not to hold the bucket lever in this position for more than 30 seconds.
5. Retract the bucket cylinder to the other stroke end. Be sure not to hold the bucket lever in this position for more than 30 seconds.
6. Repeat steps 4 to 5 until the bucket cylinder cycle time becomes normal.

OPERATION

PRECAUTIONS FOR OPERATIONS

! **WARNING:** Thoroughly make certain safety at the work site before starting operations. Especially always observe the following points.

- Be sure to install the overhead cab guard before operating the machine in areas where the possibility of falling stones or debris exists.
- If operation on soft ground is required, sufficiently reinforce the ground beforehand.
- Be sure to wear close fitting clothing and required safety items, such as a hard hat, when operating the machine.
- Keep all bystanders and unnecessary objects out of and away from the machine working areas. Always beware of the surroundings while operating the machine. Take care not to allow the rear part of the upperstructure to come in contact with objects when swinging the machine in a small area.
- When loading a dump truck, bring the bucket from the rear side of the dump truck to avoid moving the bucket over the dump truck cab or over any co-workers.

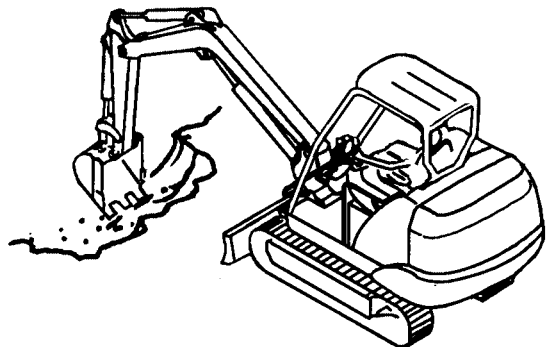


M586-12-012

OPERATE MACHINE SAFELY

! **WARNING:** Prevent the machine from tipping over and from being involved in a ground collapse. Take the following necessary precautions:

- Make sure the work site ground has sufficient strength to firmly support the machine. When working close to an excavation or on road shoulders, operate the machine with the tracks positioned perpendicular to the cliff face with travel motors at the rear and with the blade at the front, so that the machine can more easily evacuate if the cliff face collapses.
- If working at the bottom of a cliff or on a high bank is required, be sure to investigate the area first and confirm that no danger of the cliff or bank collapsing exists. If any possibility of cliff or bank collapsing exists, do not work in that area.
- Soft ground may collapse when operating the machine on it, possibly causing the machine to tip over. When working on a soft ground is required, be sure to reinforce the ground first using large pieces of steel plates strong enough and firm to easily support the machine.
- Note that there is always a possibility of machine tipping over when working on rough terrain or on slopes. Prevent machine tipping over from occurring. Operate the machine slowly to ensure safe operation.



M586-05-021

OPERATION

OPERATING BACKHOE

- Select an arm and bucket whose specifications match the working conditions. (Refer to “Kinds and Applications of Buckets” in the specification section.)
- Pull the bucket toward the machine using the arm as the main digging force.
- When soil sticks to the bucket, remove it by moving the arm and/or bucket rapidly back and forth a few times.
- While facing the bucket tooth tip toward the direction of excavation as straight as possible, excavate the ground with the teeth penetrating shallowly using the arm and bucket cylinder full strokes.
- Position the tracks parallel to the trench. After digging to the desired depth, move the machine backward to continue the trench.
- Operate each cylinder with a slight allowance left at both stroke ends.

IMPORTANT:

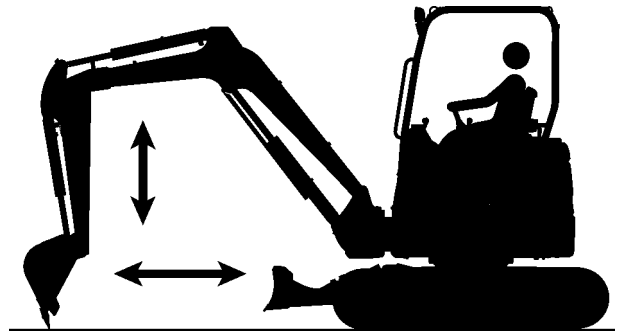
- **Do not dig the ground in the diagonal direction toward the track frame. Failure to do so may cause the bucket teeth to come in contact with the crawler.**
- **When lowering the boom, avoid sudden stops that may create shock load damage to the machine. Always smoothly lower the boom so that shock loads may not be created.**
- **When digging deep below the ground level, be careful not to allow boom cylinder, boom bottom, and/or bucket cylinder hoses to come in contact with the ground.**
- **When digging with the blade positioned towards the front or when digging at an angle, avoid hitting the blade.**
- **When the bucket load is dumped with the boom raised, falling material may hit the base machine and/or the canopy. Always be aware of loads in the bucket during operation.**

OPERATION

GRADING OPERATION

Use the blade for soil refilling and general grading operations after excavation. Grading operation can be also performed by operating the boom, arm, and bucket simultaneously.

IMPORTANT: When grading the ground with the bucket, do not pull or push dirt with the bucket while traveling the machine like a bulldozer. Every part of machine may receive excessively large loads, possibly resulting in damage to the machine.



M1M7-05-012

When grading by operating the boom, arm, and bucket simultaneously:

1. When grading from the forward to the backward, slowly roll in the arm while slightly raising the boom. As soon as the arm passes the vertical position, slowly lower the boom so that the bucket can be horizontally moved.
2. When grading from the backward to the forward, operated the arm and bucket rolled back, as shown.

Grading a slope surface can be performed by operating the machine in the same method as mentioned above.

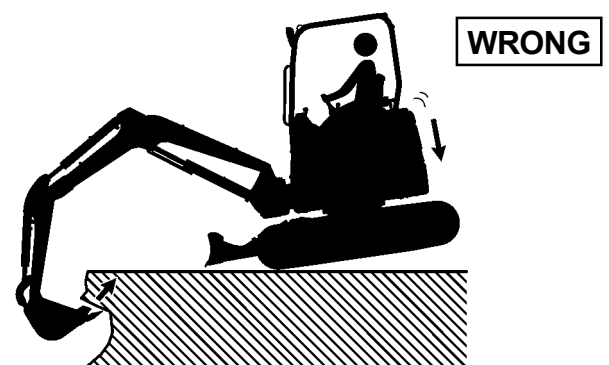
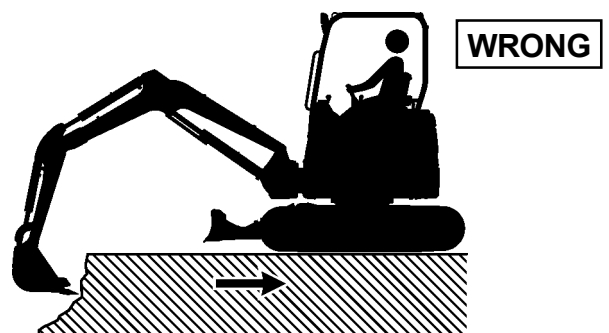
AVOID DRIVING BUCKET TEETH INTO GROUND

WARNING: If the bucket teeth are forcedly driven into the ground, crushed material may spatter, possibly resulting in injury of the operator and/or co-workers around the machine. Furthermore, the service lifetimes of all front attachment parts may be shortened.

If the bucket teeth are forcedly driven into the ground, the service lifetime of all front attachment parts (especially the bucket) may be severely shortened. When excavating tightly fastened gravelly soil, use the bucket digging out force. Operate the boom, arm, and bucket simultaneously so that the bucket teeth can be effectively penetrated into the excavation surface. Carefully operate the machine to prevent crushed material from spattering, possibly resulting in injury to the operator and/or co-workers around the machine.

AVOID ABUSIVE OPERATION

If digging force is increased by driving the machine while pushing the bucket into the ground, or by raising the rear of the machine to apply the machine weight to the bucket teeth, severe machine damage may result due to excessive overloading.



M1M7-05-013

OPERATION

AVOID STRIKING WITH BUCKET

⚠ WARNING: The bucket bottom is curved. Therefore, hammering or piling work with the bucket is very hazardous. In addition, damage to the bucket and the front attachment parts may result.

Hammering or piling work with the bucket may create hazardous situations. Never attempt to perform hammering or piling work with the bucket. Damage to the bucket and the front attachment parts may also result.



M1M7-05-014

AVOID EXCAVATION USING UPPERSTRUCTURE AND/OR BOOM SWING POWER

Never attempt to move rocks or excavate a cliff face by hitting the bucket using upperstructure and/or boom swing power. Damage to the front attachment, or shortening of the service life of the swing systems may result.

USE CORRECT TRACK SHOE

Never use rubber crawlers or wide track shoes on rough terrain with scattered rocks, gravel or boulders. Failure to do so may cause breakages of rubber crawlers, shoe bending, looseness of shoe bolts, or damage to track parts such as track links, or rollers. (Refer to the table for Types and Applications of Track Shoes in the specification section. Soil may easily become packed into the crawler during travel operation on sandy ground. If the machine is driven without removing the packed soil from the crawlers, the rubber crawlers will be overloaded, possibly resulting in breakage of the crawlers. Avoid causing the crawlers to become packed with soil by removing soil as often as possible.



M1M7-05-015

OPERATION

AVOID OTHER THAN SPECIFIED MACHINE OPERATIONS

This machine has been exclusively designed for excavation and loading works.

Do not apply this machine to works other than excavation and loading. Do not operate the machine under any conditions beyond these specifications.

Precautions for Lifting Work

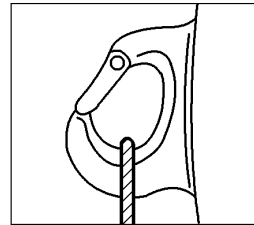
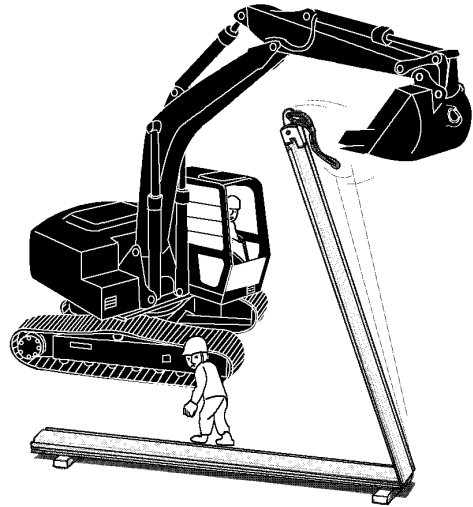
- **Operate the machine on level ground. Operating the machine on a slope may cause the machine to become unstable, possibly resulting in tipping accident.**
- **When lifting a load, carefully swing the machine not to cause the lifting load to come in contact with personnel working near the machine. Reduce the engine speed to slowly swing the machine. Failure to do so may cause the machine to tip over by swing centrifugal force.**
- **If traveling the machine with a load lifting is unavoidable, reduce the engine speed to slowly travel the machine.**
- **Never move the front attachment and/or swing the machine while traveling the machine with a load lifting. The lifted load may sway, possibly creating a hazardous situation.**

OPERATION

PRECAUTIONS FOR USING BUCKET HOOK

⚠ WARNING: Even though a hook equipped with a wire rope guide is used, wire rope may come off the bucket hook if the machine is improperly operated.

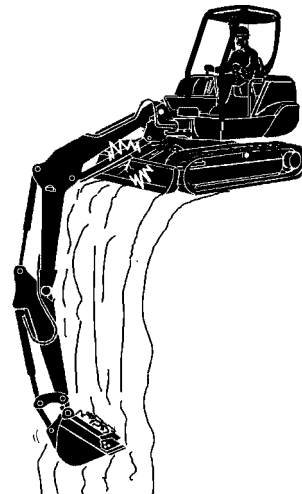
During lifting work of objects such as steel planks, steel building materials, or electric concrete masts, when the lifted object is lowered to the ground, the wire rope may come off the bucket hook. To prevent wire rope from coming off the hook, never allow the wire rope to slacken by operating the front attachment as slowly as possible. Do not allow anyone to enter below the lifted load or in the vicinity of the lifted load. Control the bucket angle so that the bucket hook mounting face remains vertical as illustrated to the right.



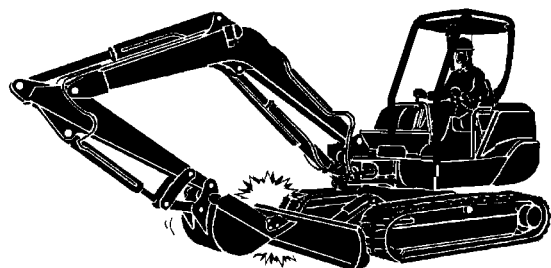
SA-525

BOOM CYLINDER MAY HIT BLADE

When digging deeply with the blade positioned at the front, the boom cylinder or bucket may accidentally hit the blade, causing damage. Take care to prevent this from happening.



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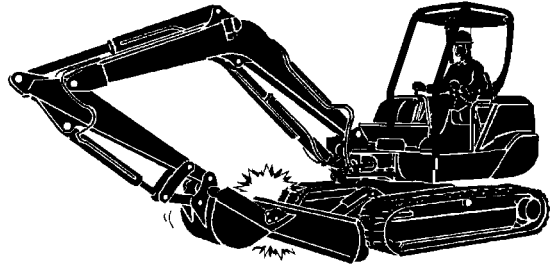


M586-05-017

OPERATION

AVOID HITTING BLADE WITH BUCKET

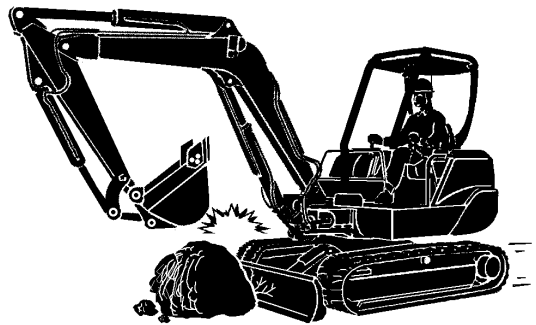
When rolling in the arm in a travel or transportation position, be careful not to hit the blade with the bucket.



M586-05-017

AVOID COLLIDING BLADE AGAINST ROCKS

Do not attempt to allow the blade to collide with rocks. Premature damage to the blade and the blade cylinders may result.



M586-05-035

AVOID COLLIDING BOOM CYLINDER WITH TRACK

When digging deeply with the front attachment positioned at an angle, as illustrated, the boom cylinder may accidentally collide with the track, causing damage. Take extra care to prevent this from happening.



M586-05-018

OPERATION

USING RUBBER CRAWLER

Rubber crawlers are designed to allow the machine to travel without damaging road surfaces such as paved road surfaces. Avoid damage to the rubber crawlers by following the precautions below:

Forbidden Operations

1. Do not operate or steer the machine on or near river-terrace, boulder and boulder mixed ground, crushed-stone ground, uneven hardpan surfaces, stumps, reinforcing bars, scraps, and steel plate edges. Failure to do so may shorten the service life of the rubber crawlers to a great extent.
2. Do not leave engine oil, fuel, and other kinds of lubricants remaining on the rubber crawlers, and avoid traveling on road surface covered with oil to reduce the danger of sliding.
3. Do not travel the machine while raising one side crawler off the ground with the front attachment. Shear or damage to the rubber crawler may result.



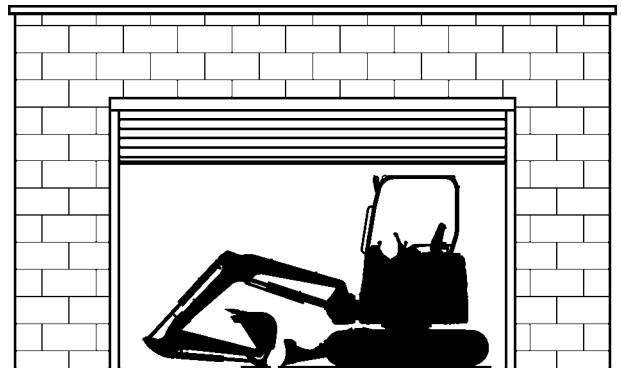
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Precautions for Using Rubber Crawlers



WARNING: The rubber crawler machine is less stable than the steel crawler machine, as the edge of the rubber crawler is easier to deform more than steel crawler. Pay attention when operating the machine at an angle to the tracks.

1. Do not store the rubber crawlers in a place where they will be exposed to direct sunlight for a period of more than three months.
2. Avoid unnecessary steering operations on concrete roads, possibly resulting in premature wear of shoe lugs and core metals. Also, avoid operating the machine on high temperature [over 60°C (140°F)] road surfaces during asphalt pavement work, possibly causing premature wear of the rubber crawlers as well as damage to the road surface.



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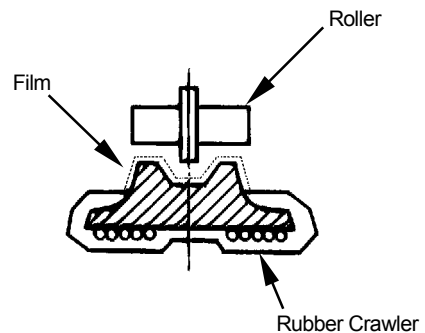
OPERATION

3. Operating the machine with rubber crawlers sagging on uneven surfaces can result in derailment of rubber crawler, possibly causing the rubber crawlers to be damaged.



M586-05-024

4. When lowering the machine raised above the ground using the front attachment, slowly lower the machine to the ground.
5. The new rubber crawler has a thin rubber film (shown in dotted line) on its roller tread. During operation of a new machine, or immediately after the rubber crawlers are replaced, the rubber film may come off due to contact with the rollers. This is not abnormal. (See the right illustration.)
6. If the rubber crawler is damaged and the rubber crawler core wire rusts, the service lifetime of the rubber crawler will become short. If damaged, the rubber crawler must be repaired. Contact your nearest Hitachi dealer.



M503-05-040

OPERATION

HYDRAULIC BREAKER (OPTIONAL)

Before installing a hydraulic breaker to the machine, change in machine stability, and the hydraulic pressure and flow rate to operate the hydraulic breaker must be checked. Consult your nearest Hitachi dealer for selection of the hydraulic breaker model to be installed. Refer to the Breaker Operation Manual for operation of the hydraulic breaker. Observe the following instructions to prevent the base machine and the hydraulic breaker from being damaged.

Precautions for Installing Hydraulic Breaker Pipe Lines

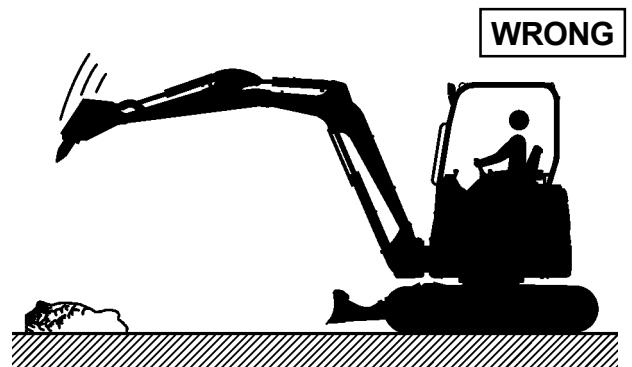
- When disconnecting or reconnecting the hydraulic breaker hoses from or to the hydraulic pipe lines at the arm tip, take care not to allow dust to stain or enter the inside of pipes and hoses.
- When the hydraulic breaker is not installed, be sure to put caps or plugs to the arm tip pipe open ends and the hydraulic breaker side hose ends to prevent the hydraulic system from being contaminated by dust. Be careful not to lose the caps and plugs. Always keep the auxiliary parts in the tool box.
- Check that the pipe clamp bolts are tight, and no oil is leaking from the pipe and hose joints before operating the hydraulic breaker.

Precautions for Hydraulic Breaker Operation

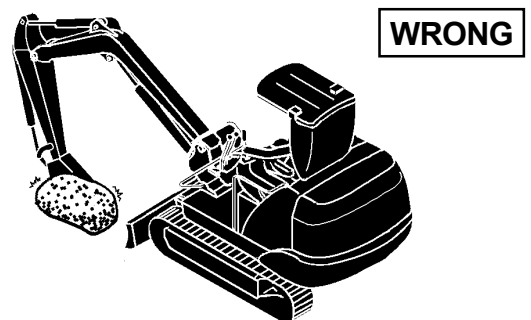


WARNING: When the hydraulic breaker is installed, machine stability is reduced as the breaker is much heavier than the bucket. In addition, soil, broken pieces of rock or metals may be scattered during breaker operation, potentially creating hazardous situation. Take protective measures against danger of machine tipping over and/or scattering of hard materials and observe the precautions described below to ensure safe operation.

1. Avoid crashing the breaker onto hard materials. The breaker is heavier than the bucket, causing the lowering speed of the breaker to become faster. If breaking hard materials by crashing the breaker onto hard materials is attempted, damage to the front attachment and/or the upperstructure may result due to accelerated crashing reaction force.
2. Do not move crushed materials using the breaker unit and/or the swing function. Damage to the boom, arm, and/or breaker may result.



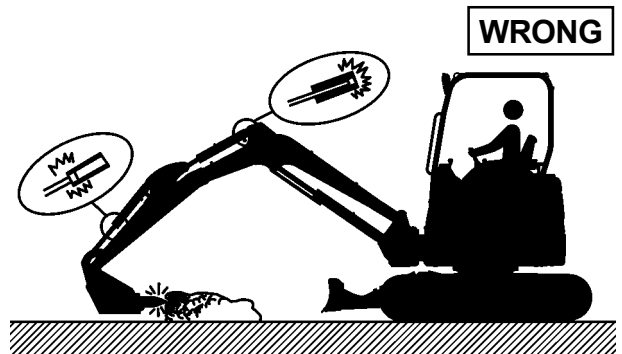
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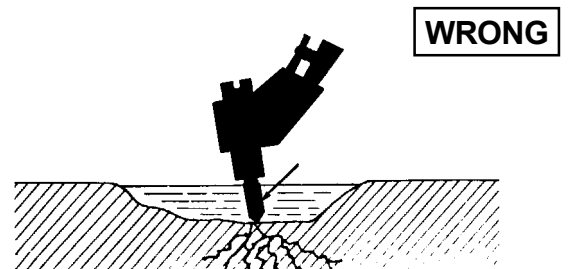
M585-05-020

OPERATION

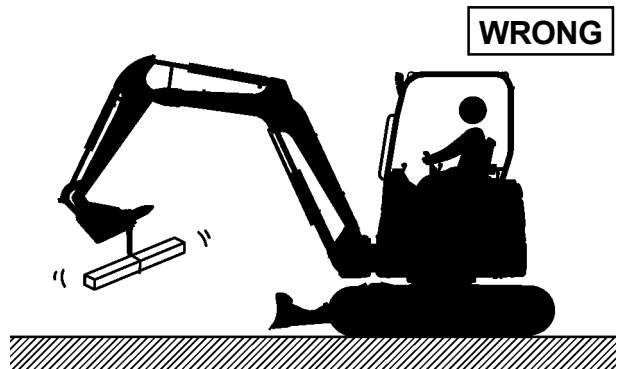
3. Do not operate the breaker with the hydraulic cylinders fully extended or retracted. When operating the breaker, position each hydraulic cylinder so that the allowance more than 50 mm from the stroke end can be given before the cylinder piston comes in contact with the cylinder head or bottom. Failure to do so may result in damage to the hydraulic cylinders, arm and/or boom.



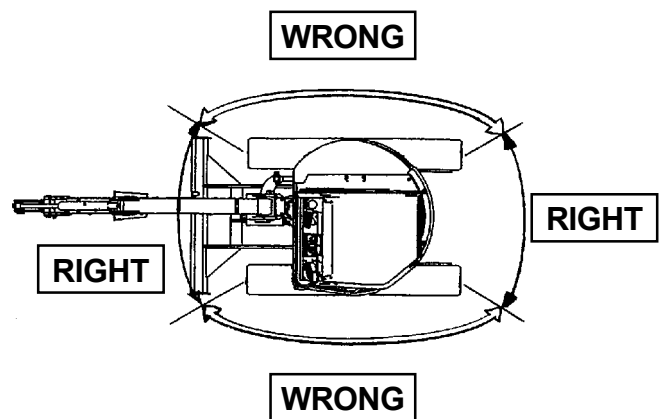
4. Do not operate the breaker in water. Seals may become broken due to rusting of the breaker, possibly allowing rust, dust, and/or water to enter the hydraulic circuit so that damage to the hydraulic components on the base machine may result.



5. Do not use the breaker to lift objects. Serious accidents may result due to tipping over of the machine and/or coming off of the lifted load.

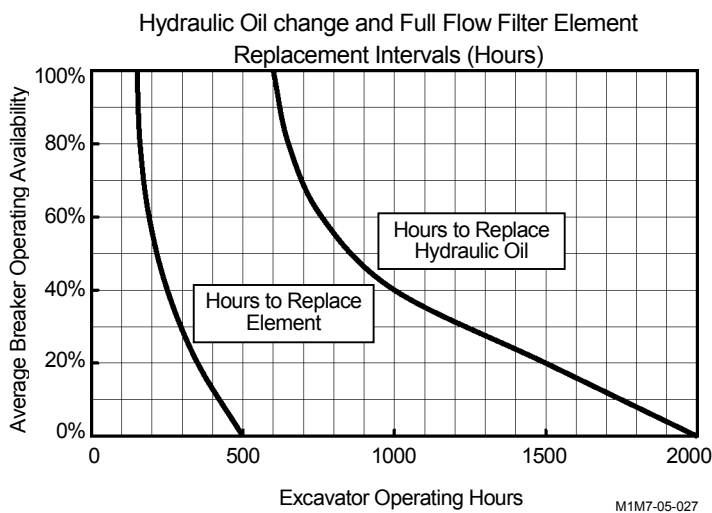
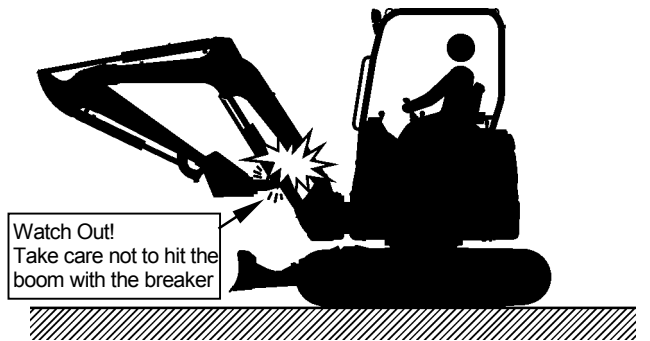


6. Do not operate the breaker over the side of the machine. The machine stability is reduced, possibly resulting in tipping over of the machine. In addition, the service lifetime of the undercarriage may become shorter due to receiving more severe breaker operation reaction force.



OPERATION

- Do not allow the breaker chisel to come in contact with the boom when rolling in the arm and the breaker.
- Change hydraulic oil and replace the full flow filter element at the regular intervals. Hydraulic breaker operation subjects hydraulic oil to become contaminated and/or deteriorated more quickly than bucket operation. Failure to perform proper maintenance of hydraulic oil may cause the base machine and/or the breaker to malfunction. Be sure to change hydraulic oil and replace the full flow filter element at the intervals as shown in the table below to especially extend the service life of the hydraulic pump. (Refer to the Hydraulic System group in the Inspection and Maintenance Section.)

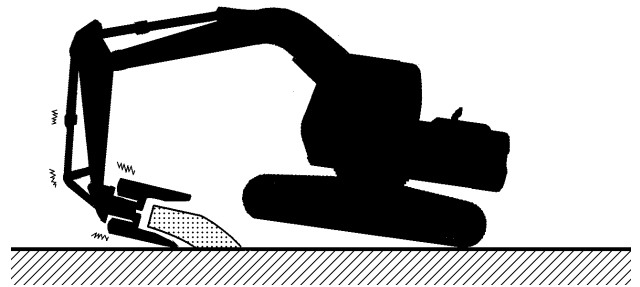


- Greasing Front Attachment**
When using a hydraulic breaker, grease all lubrication points on the front attachment every 50 hours of operation.

OPERATION

CRUSHER OPERATION (OPTIONAL)

Before installing a hydraulic crusher on the machine, machine stability, and the hydraulic pressure and flow rate to operate the hydraulic crusher must be checked. Consult your nearest Hitachi dealer for selection of the hydraulic crusher model to be installed. Refer to the Crusher Operation Manual for operation of the hydraulic crusher. Observe the following instructions to prevent the base machine and the hydraulic crusher from being damaged.



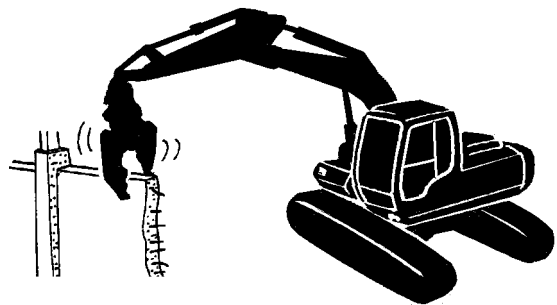
M107-05-046

Precautions for Hydraulic Crusher Operation



WARNING: When the hydraulic crusher is used in demolition work, machine stability is reduced as the crusher attachment is much heavier than the bucket. In addition, soil, broken pieces of rock or metals may be scattered during crusher operation, potentially creating hazardous situation. Take protective measures to prevent machine tipping over and/or scattering of hard materials and observe the precautions described below to ensure safe operation.

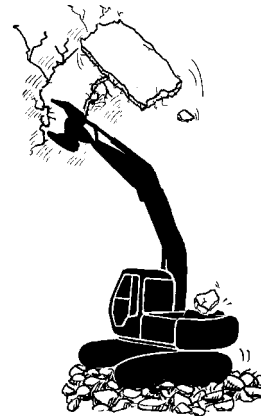
- Do not raise the base machine off the ground with the bucket cylinder fully retracted or extended. Damage to the front attachment may result. In particular, avoid operating the machine with the bucket cylinder fully extended. The bucket cylinder may easily become damaged under this condition. Use extra care to prevent the bucket cylinder from being damaged during demolition work of structure foundations.
- Operate the crusher over the front or rear side of the machine. Operating the breaker over the side of the machine will reduce the machine stability, possibly resulting in tipping over of the machine.



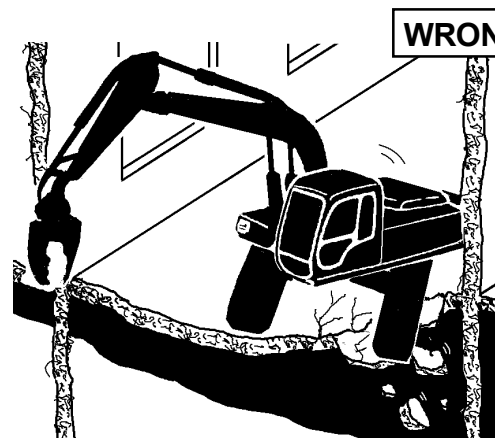
M107-05-047

OPERATION

- When crushing objects in high positions such as a ceiling, carefully operate the machine so that falling objects do not come in contact with the machine.
- Before operating the machine on a floor of structures, check that the strength of the floor is enough to support the machine weight. Depending on type of work the machine is engaged in, crushing reaction force may be added to the floor beside the machine weight.
- Start operation only after the machine is horizontally parked and the footing is stabilized. Never operated the machine positioned on stacks of rubble, or inclined grounds.
- Do not move or load crushed materials using the crusher.
- When replacing the crusher with other work tools such as a bucket or breaker, the hydraulic oil may easily become contaminated. Change the hydraulic oil and replace the full flow filter element at the same intervals as applied to the hydraulic breaker.
- Before transporting the machine on a trailer, remove the crusher from the front attachment. Position the bucket cylinder so that the cylinder is not fully extended during transportation. (During transportation, the machine may be raised off the trailer deck floor due to vibration as mentioned in Step 1, possibly resulting in damage to the front attachment.)



M107-05-048



M107-05-049

PRECAUTIONS FOR AFTER OPERATING THE MACHINE

1. After operating the machine, move the machine to a level solid ground where no possibility of falling stones, landslide, or flooding is present. (Refer to the Parking group in the Driving Machine section.)
2. Fully refill the fuel.
3. Clean the machine.
4. During cold weather season, remove the coolant from the radiator and the water jacket. Attach "No Coolant" tag in an easy-to-see place.



M1M7-05-024

TRANSPORTING

TRANSPORTING BY ROAD

When transporting the machine on public roads, be sure to first be aware of and then, follow all local regulations.

1. Before transporting the machine on a trailer, check the width, height, length, and weight of the trailer with the machine loaded.
2. Investigate the conditions of the route to be traveled, such as dimensional limits, weight limits, and traffic regulations, beforehand.

In some cases, disassemble the machine to bring it within dimensional limits, or weight limits of local rules and regulations.

TRAILER LOADING/UNLOADING

Always load and unload the machine on a firm level surface.



WARNING: Be sure to use a loading dock or a ramp when loading/unloading the machine.

Ramp/ Loading Dock

1. Thoroughly clean the ramp and flatbed. Dirty flatbed ramps contaminated with oil, mud, or ice can be slippery and dangerous.
2. Wedge the trailer wheels with blocks so that the trailer does not move.
3. Ramps must be sufficient in length, width, and strength. Secure the ramp with an inclination of less than 15 degrees.
4. Loading docks must be sufficient in length, width, and strength. Inclination of the loading docks must be less than 15 degrees.
5. When loading/unloading the machine on a trailer, be careful not to allow the blade to come in contact with the ramps or loading docks.

TRANSPORTING

LOADING



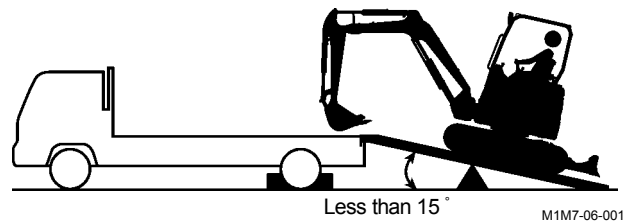
WARNING:

- Always travel the machine slowly.
- Steering on a ramp may create a danger of tipping over. Never attempt to change travel direction on a ramp, possibly causing the machine to become unstable. If steering is unavoidable, first move back to the ground, modify traveling direction, and begin to drive again.
- The top end of the ramp where it meets the flatbed, there is a sudden bump. Slowly drive over it.
- Use extra care when rotating the upperstructure on the flatbed to prevent possible injury from machine tipping. Slowly rotate the upperstructure with the arm fully rolled in under the boom to maintain the good machine stability.

1. Load the machine on the trailer so that the centerline of the machine aligns with the centerline of the flatbed.
2. Drive the machine onto the ramp slowly.
3. Position the bucket above the flatbed. Operate the front attachment so that the angle between the boom and the arm is maintained at 90 to 110°.
4. The machine tips forward when the machine travels over the top end of the ramp. Lower the bucket onto the flatbed before the machine begins to tip forward.
5. After the machine reaches the specified position, slightly lift the bucket up off the flatbed. Slowly rotate the upperstructure 180° while keeping the arm fully rolled in.
6. Lower the bucket on wooden blocks seated on the flatbed.
7. Stop the engine. Remove the key from the switch.
8. Move the pilot control shut-off lever to the LOCK position.
9. Cover the openings on the machine to prevent wind and/or rain from coming in.



NOTE: During cold weather season, be sure to sufficiently warm up the machine before loading or unloading the machine.



TRANSPORTING

SECURING THE MACHINE TO THE TRAILER FOR TRANSPORTATION

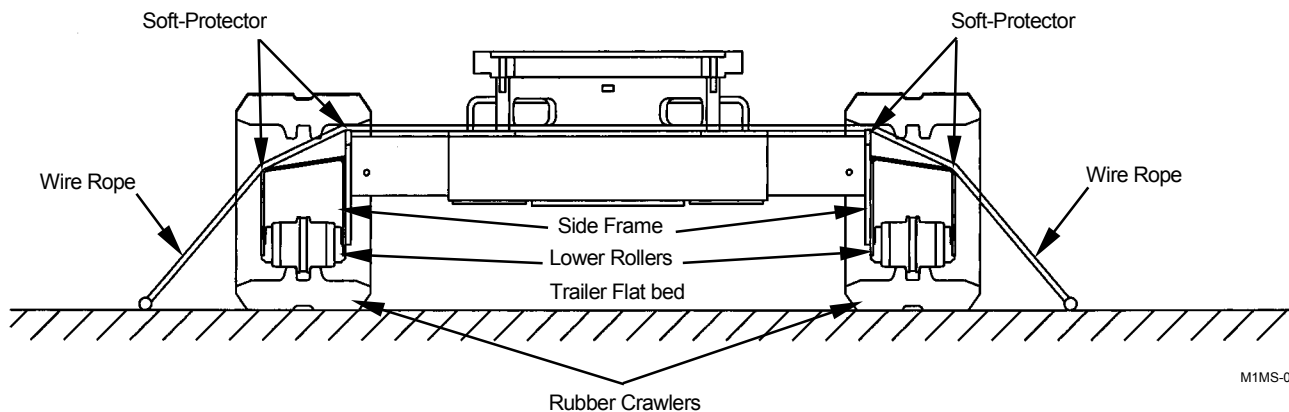
⚠ WARNING: Securely tighten the machine to the flatbed with wire ropes.

During transportation, the machine will be moved back and forth or laterally.

1. Wedge the front and rear of the crawlers to secure the machine in position.
2. Securely tighten the base machine and the front attachment to the flatbed with wire ropes.

Transporting the machine equipped with rubber crawlers

When securing the machine to the flatbed, do not directly tighten the rubber crawler with wire ropes. As illustrated below, place soft-protectors against left/right side frame respectively to securely tighten the machine to the flatbed before transporting the machine.



M1MS-06-001

TRANSPORTING

UNLOADING



WARNING:

- Always travel the machine slowly.
- Steering on a ramp may create a danger of tipping over. Never attempt to change travel direction on a ramp, possibly causing the machine to become unstable.
- The top end of the ramp where it meets the flatbed is a sudden bump. Slowly drive over it.
- Use extra care when rotating the upperstructure on the flatbed to prevent possible injury from machine tipping over. Slowly rotate the upperstructure with the arm fully rolled in under the boom to maintain the machine in good stability.

IMPORTANT: During loading operation, maintain the angle between the boom and the arm at 90 to 110°. If the machine is unloaded with the arm fully rolled in, damage to the base machine may result.

1. Before moving the machine from the flatbed rear end to the ramp, position the front attachment so that the angle between the boom and the arm becomes into the range of 90 to 110°. While allowing the bucket to be contacted on the ground, slowly move the machine.

IMPORTANT: When moving the machine over the end of the flatbed onto the ramp, take care not to allow the bucket to come in contact with the ground. Damage to the hydraulic cylinders may result.

2. Do not lift the bucket off the ground until the machine is completely moved onto the ramp.
3. Slowly move the machine forward while raising the boom and arm gradually until the machine is completely off the ramp.

TRANSPORTING

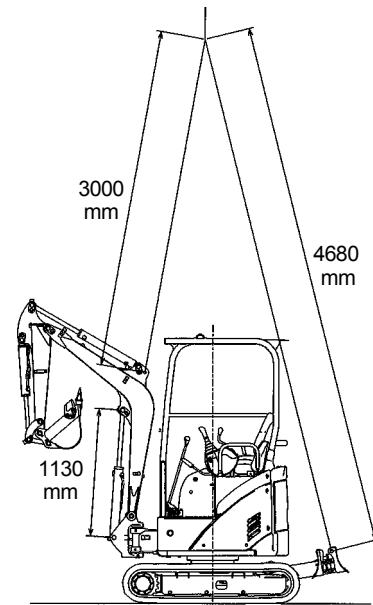
LIFTING MACHINE WITH CRANE



WARNING:

- Do not lift the machine with anyone riding on the machine.
- Use wire ropes and shackles strong enough to support the weight of the machine.
- Be sure to set the blade position with the engine running. Failure to do so may cause the blade to be moved from the set-position when lifted with a crane.

1. Swing the upperstructure so the blade is positioned at the rear of the counterweight.
2. Fully retract the blade cylinder.
3. Fully extend the boom, arm and bucket cylinders, as illustrated to the right. Pull the pilot control shut-off lever to LOCK position.
4. Position the boom straight ahead of the upperstructure. Apply the boom swing pedal lock.
5. Attach shackles to the boom and blade hooks. Securely thread wire ropes through the shackles.
6. Slowly lift the machine so that shock loads will not be applied to the machine. Take sufficient care not to lose the balance of the machine.



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MAINTENANCE

PROCEDURES

IMPORTANT: Never adjust the setting of the engine governor and/or hydraulic components.

Learn how to service your machine correctly. Follow the correct maintenance and inspection procedures shown in this manual.

Inspect machine daily before starting.

- Check controls and instruments.
- Check coolant, fuel and oil levels
- Check for leaks, kinked, frayed or damaged hoses and lines.
- Walk around machine checking general appearance, noise, heat, etc.
- Check for loose or missing parts.

If there is any problem with your machine, repair it before operating or contact your authorized dealer.

- IMPORTANT:**
- Use only recommended fuel and lubricants.
 - Use only genuine HITACHI parts.
 - Failure to use recommended fuel, lubricants, and genuine Hitachi parts will result in loss of Hitachi product warranty.
 - Never adjust engine governor or hydraulic system relief valve.
 - Protect electrical parts from water and steam.
 - Never disassemble electrical components such as sensors, etc.



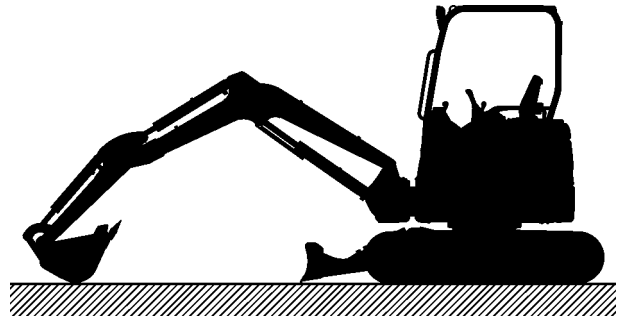
SA-435

MAINTENANCE

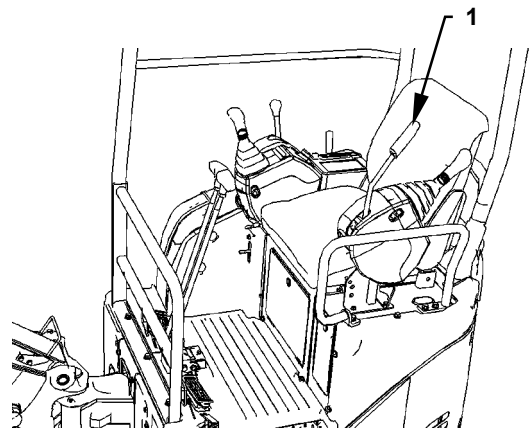
PREPARE MACHINE FOR INSPECTION/MAINTENANCE

Before performing inspection/maintenance of the machine, park the machine as described below unless otherwise specified.

1. Park the machine on a solid level surface.
2. Lower the working tools such as the bucket and/or blade to the ground.
3. Run the engine at slow idle speed without load for approx. 5 minutes to cool down the engine.
4. Turn the key switch OFF. Remove the key from the switch. If inspection/maintenance must be performed with the engine running, be sure to place a lookout to prevent the machine from being operated mistakenly by other personnel.
5. Be sure to place pilot control shut-off lever (1) in the LOCK position.
6. Attach an "UNDER INSPECTION/MAINTENANCE" tag to an easy-to-see place such as the cab door or one of the control levers.



M1M7-05-024



M1MS-03-001

MAINTENANCE

OPENING/CLOSING ENGINE ACCESS COVERS

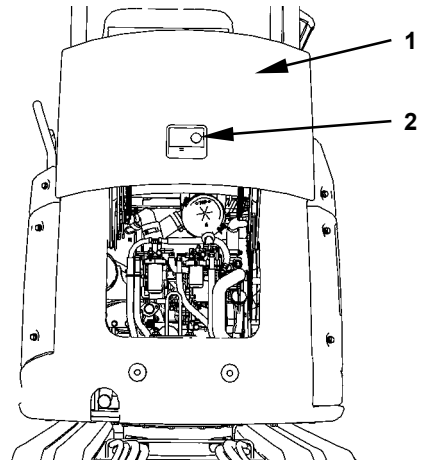


WARNING:

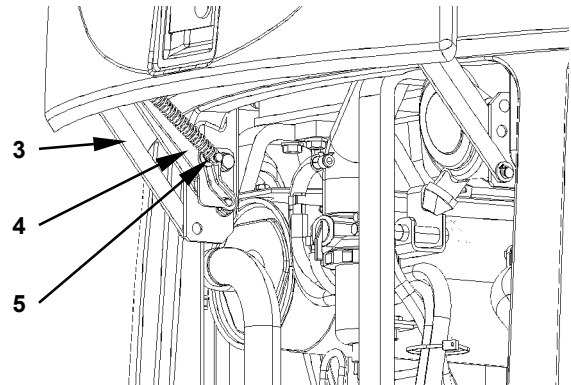
- Do not keep the engine access covers open when the machine is parked on a slope, or while the wind is blowing hard. The engine access covers may close accidentally, possibly resulting in personal injury.
- When opening/closing the engine access covers, take care not to allow your fingers to become pinched with the covers.

Pull up latch (2) to open cover (1). The cover is raised by link mechanism (3). Be sure to fully raise the cover. After checking that stopper (4) provided on the left link is placed in LOCK position (5), remove your hand from the cover. Cover (1) will be locked in place.

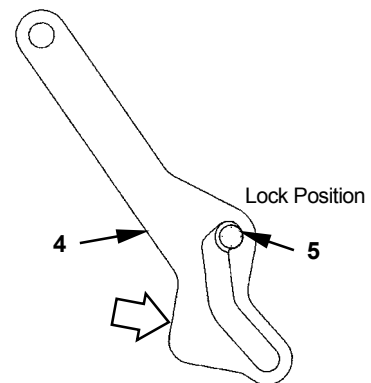
When closing cover (1), while raising cover (1), push stopper (4) at the arrowed position \Rightarrow to disengage the lock. While pushing stopper (4), lower the cover. When the cover is lowered by the 1/4 stroke, leave stopper (4). Then, lower cover (1) further to completely close it. Be sure to completely remove your hand, which is pushing stopper (4), out of cover (1) at this time. Failure to do so may cause your hand to be caught with cover (1), possibly resulting in severe injury.



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M1M7-07-010



M1M7-07-069

MAINTENANCE

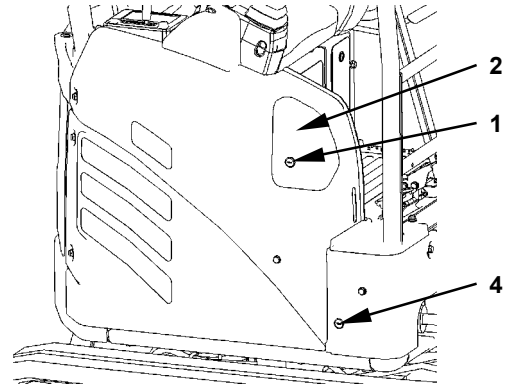
OPENING/CLOSING RIGHT SIDE COVERS



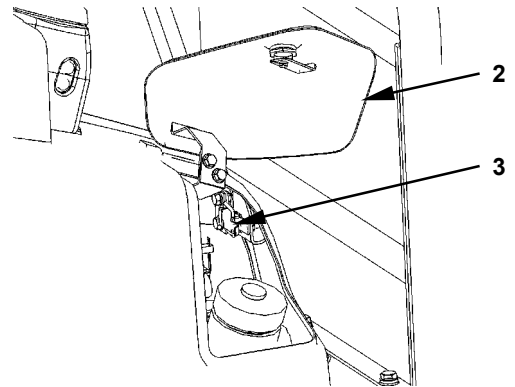
WARNING:

- Do not keep the right side cover (5) open when the machine is parked on a slope, or while the wind is blowing hard. The right side cover may close accidentally, possibly resulting in personal injury.
- When opening/closing the right side cover, take care not to allow your fingers to be pinched with the cover.

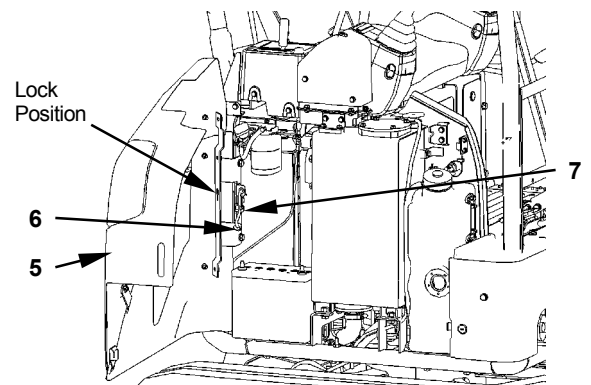
1. Unlock key (1), and open fuel refueling cover (2).
2. Release the lock (3) in the fuel refueling cover (2).
3. Unlock key (4), and open right side cover (5). Take stopper (6) out of holder (7). Install stopper (6) into the lock position.
4. When close right side cover (5), follow the reverse order of the above procedure.



M1MS-07-003



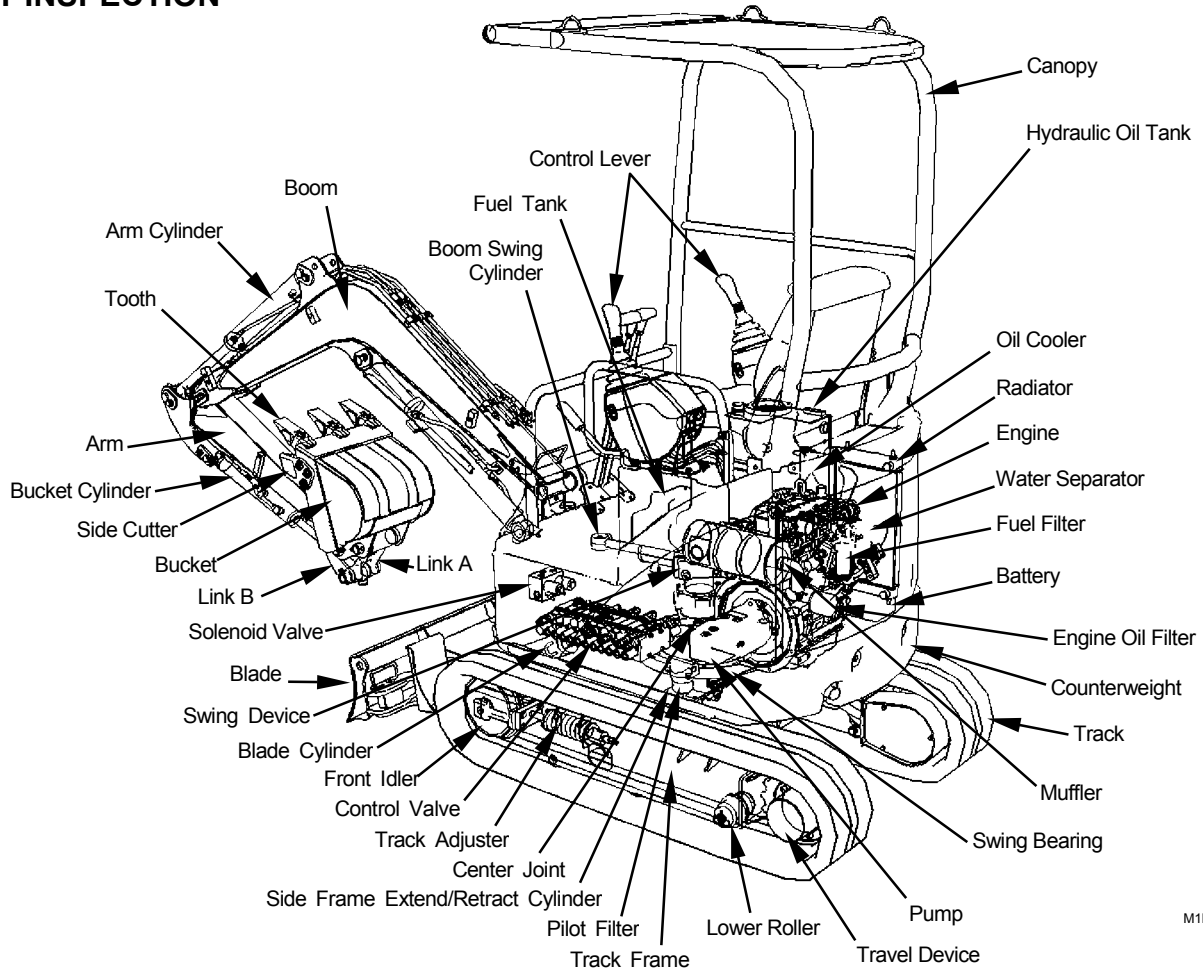
M1MS-07-004



M1MS-07-005

MAINTENANCE

DAILY INSPECTION



M1MS-07-006

	Checkpoint
Engine	<ol style="list-style-type: none"> 1. Quantity and contamination of engine oil and coolant 2. Ease of engine starting, exhaust gas color, abnormal noises 3. Oil and coolant leaks. Damage to hoses and pipes 4. Clogging of or damage to radiator/oil cooler 5. Loose or missing nuts and bolts
Upperstructure	<ol style="list-style-type: none"> 1. Fuel level, leak, and contamination of foreign material 2. Hydraulic oil level, leaks, and contamination of foreign material 3. Control lever stroke, lever play, operating force 4. Lock lever function or not. 5. Operating condition of hydraulic components, damage to and oil leaks in hoses and pipes 6. Damage to or deformation of components and structures, abnormal noises 7. Loose or missing nuts and bolts
Undercarriage	<ol style="list-style-type: none"> 1. Loose track sag, and wear on or damage to track components and structures 2. Wear on lower rollers, front idlers, and oil leaks 3. Oil leaks from travel devices 4. Loose or missing nuts and bolts
Front Attachment	<ol style="list-style-type: none"> 1. Damage to or oil leak from cylinders, hoses, and pipes 2. Damage to or wear on bucket and blade 3. Loose, worn or missing bucket teeth 4. Lubrication at greasing points 5. Damage to lock pins, stoppers, fastener rings and lock bolts for front joint pins 6. Loose or missing nuts and bolts
Miscellaneous	<ol style="list-style-type: none"> 1. Malfunction of gauges, switches, lights, buzzer 2. Deformation of or damage to canopy 3. Abnormalities in machine appearance

NOTE: The operator must perform the daily inspection before operating the machine.


MAINTENANCE

PERIODIC REPLACEMENT OF PARTS

To ensure safe and long trouble free operation, be sure to conduct periodic inspections of the machine. In addition, the parts as listed below are directly related to safety operation so that they are recommended to be periodically replaced. These part material properties will change due to aging, or repeated operation may cause deterioration, wear, and/or fatigue of these parts, possibly resulting in serious safety/fire hazards. It is very difficult to gauge the remaining service lifetime of these parts simply by visual inspection alone. For this reason, replace these parts at the intervals shown in the table below. If any of these parts are found to be defective by inspection, immediately replace it regardless of the recommended intervals.

Consult your nearest Hitachi dealer for correct replacement.

Periodic Replacement Parts		Replacement Interval	
Engine	Fuel hose (Fuel tank to filter)	Every 2 years or 4000 hours	
	Fuel hose (Fuel tank to injection pump)	Every 2 years or 4000 hours	
	Engine rubber vibration insulator	Every 5 years or 3000 hours	
	Pump coupling	Every 5 years or 3000 hours	
Hydraulic System	Base Machine	Pump suction hose	Every 2 years or 4000 hours
		Pump delivery hose	Every 2 years or 4000 hours
		Swing hose	Every 2 years or 4000 hours
		Auxiliary hose	Every 2 years or 4000 hours
		Oil cooler hose (C/V to oil cooler)	Every 2 years or 4000 hours
	Front Attachment	Boom cylinder line hose	Every 2 years or 4000 hours
		Arm cylinder line hose	Every 2 years or 4000 hours
		Bucket cylinder line hose	Every 2 years or 4000 hours
		Pilot hose	Every 2 years or 4000 hours
	Seat Belt		Every 3 years


 **NOTE:** When replacing a hose, be sure to replace seals, such as O-rings and gaskets, along with the hose.

MAINTENANCE

MAINTENANCE GUIDE


A. GREASING (See Page 7-11)

Parts	Quantity	Interval (hours)						
		8	50	100	250	500	1000	2000
1. Front Joint Pins (Incl. around the swing post)	9	★		★★				
2. Bucket and Link Pins	5	★						
3. Swing Bearing	1							
4. Swing Internal Gear	1							
5. Control Lever Universal Joint	2							

-  **NOTE:** ★ Grease all submerged pins after operating in water.
 Grease all pins daily during break-in operation for 50 hours.
 ★★ Grease all pins every 100 hours only during first time operation up to 500 hours.

B. ENGINE (See Page 7-17)

Parts	Quantity	Intervals (Hours)						
		8	50	100	250	500	1000	2000
1. Engine oil	Oil Level Check							
	Change	3.1 L (3.2 US qt)		★★		★		
2. Replacement of engine oil filter	1		★★					


-  **NOTE:** ★ The oil life is shortened more than normal under high temperature operating, shorten the maintenance interval.
 ★★ For the first time only.

C. TRANSMISSION (See Page 7-19)

Parts	Quantity	Interval (hours)						
		8	50	100	250	500	1000	2000
1. Travel Reduction Gear	Oil Level Check							
	Change	0.25 L × 2 (0.26 US qt) × 2						

D. HYDRAULIC SYSTEM (See Page 7-21)

Parts	Quantity	Interval (hours)						
		8	50	100	250	500	1000	2000
1. Check Hydraulic Oil Level	1							
2. Drain Hydraulic Oil Tank Sump	1							
3. Change Hydraulic Oil	30L (7.9Us gal)						★	★
4. Clean Suction Filter	1	When changing hydraulic oil						
5. Replace Full Flow Filter Element	1				★★			
6. Replace Pilot Filter Element	1							
7. Check Hoses and Lines	for leaks or looseness							
	for cracks, bend, etc.							


-  **NOTE:** ★ Hydraulic oil changing intervals differ according to kind of hydraulic oils used.
 See recommended oil chart.
 ★★ For the first time only.

MAINTENANCE

E. FUEL SYSTEM (See Page 7-34)


Fuel tank capacity: 19.5L(5.2US gal)

Parts	Quantity	Interval (hours)						
		8	50	100	250	500	1000	2000
1. Check Water Separator	1							
2. Drain Fuel Tank Sump	1	As needed						
3. Replace Fuel Filter	1							
4. Check Fuel Hoses	for leaks, cracks, etc.	-						
	for cracks, bend, etc.	-						

 **NOTE:** The fuel filter may become clogged earlier than normal due to contaminated fuel. In case the engine power is reduced, or black smoke increases, shorten the intervals of inspection/maintenance.


F. AIR CLEANER (See Page 7-38)

Parts	Quantity	Interval (hours)							
		8	50	100	250	500	1000	2000	
1. Air Cleaner Element	Cleaning	1				★	or clogged		
	Replacement	1							


 **NOTE:** ★ Shorten the interval in a dusty work site.

G. COOLING SYSTEM (See Page 7-39)

Parts	Quantity	Interval (hours)						
		8	50	100	250	500	1000	2000
1. Check Coolant Level	1							
2. Check and Adjust Fan Belt Tension	1		★★					
3. Change Coolant	2.7 L (2.9 US qt)	Once every two years (in autumn) or 2000 hours						
4. Clean Radiator Core	Outside	1				★		
	Interior	1	When changing coolant					

 **NOTE:** ★ Shorten maintenance interval in dusty work site.

★★ For the first time only.

 **NOTE:** When genuine Hitachi long life coolant (LLC) is used, replace it every two years (in autumn) or after 2000 operating hours, whichever comes first.


IMPORTANT: Use fresh water or tap water for the coolant. Avoid using strong acid or alkaline water. Be sure to use genuine Hitachi long life coolant (LLC).

MAINTENANCE

H. ELECTRICAL SYSTEM (See Page 7-44)

I. MISCELLANEOUS (See Page 7-48)

Parts	Quantity	Interval (hours)						
		8	50	100	250	500	1000	1500
1. Check Bucket Teeth	-							
2. Replace Bucket	1	As required						
3. Check Track Sag (rubber crawler) and damage	2							
4. Replace Rubber Crawler	2	As required						
5. Check Track Sag (steel crawler) (Optional)	2							
6. Check and Replace Seat Belt	1		Every 3 years (Replace)					
7. Check bucket hook (Optional)								
8. Check Fuel Injection Nozzles	-							◆
9. Adjust Valve Clearance	-						◆	
10. Check and Clean Injection Device	-							◆
11. Measure Engine Compression Pressure	-	◆ As required						
12. Check Starter and Alternator	-	◆ As required						
13. Check Radiator Cap	-	◆ As required						
14. Check Tightening Torque of Bolts and Nuts	-		★★					

 **NOTE:** Consult your nearest Hitachi dealer for inspection/maintenance of items with mark ◆. The recommended oil chart is affixed on the tank access cover.

★★ For the first time only.

MAINTENANCE

THE BRAND NAMES OF RECOMMENDED OILS AND LUBRICANTS

		Grease	Engine Oil			Gear Oil
Air Temp		-20 to 40°C (-6 to 104°F)	-20 to 0°C (-6 to 32°F)	-10 to 35°C (14 to 95°F)	25 to 40°C (77 to 104°F)	-20 to 40°C (-6 to 104°F)
Manufacturer						
For New Machine	Eneos EPNOC Grease AP2	Yanmar Genuine Engine Oil Super Royal (CD) 10W-30			Mitsubishi Diamond Hypoid Gear oil 90	
British Petroleum	BP Energrease LS-EP2	BP Vanellus C3			BP Gear oil SAE 90 EP	
		10W	30	40		
Caltex Oil	Multifax EP2	RPM DELO 300 C3			Universal Thuban SAE 90	
		10W	30	40		
Esso	Beacon EP2	Essolube D-3			Esso Gear oil 90	
		10W	30	40		
Idemitsu Kosan	Daphne coronex grease EP2	Apoll oil diesel motive			Apoll oil gear HE90	
		S-310	S-330	S-340		
		(-15 to 40°C) (5 to 104°F) Apoll oil custom wide 15W-40 Apoll oil super wide 15W-40				
Exxon Mobil	Mobilux EP2	Mobil Delvac			Mobilube HD80W-90	
		1310	1330	1340		
Eneos	Epinoc Grease Ap2	Hi-diesel S3			Hypoid gear 90	
		-20 to 35°C (-6 to 95°F) 10W-30	-10 to 40°C (14 to 104°F) 15W-40			
Shell Oil	Shell Alvania EP Grease 2	Rympla D			Shell Spirax EP 90	
		10W	30	40		
Remarks		API CD CLASS			API GL4 class	

		Hydraulic Oil				Fuel Oil
Change Interval		2000 hours		1000 hours		
Air Temp		-20 to 0°C (-6 to 32°F)	-10 to 40°C (14 to 95°F)	-20 to 0°C (-6 to 32°F)	-10 to 40°C (14 to 95°F)	
Manufacturer						
Hitachi		* Super EX 46 HN		Malti M		Use high quality Diesel Fuel only. ASTM2-D (JIS K-2204) Kerosene must not be used.
TOTAL				Equivis ZS 46		
Idemitsu Kosan				Dephne Superhydro LW46H		
British Petroleum				Bartran HV46		
Caltex Oil				Rando Oil HD46		
Texaco INC.				Rando Oil HD46		
Chevron U.S.A INC				Chevron AW46		
Esso				NUTO H46		
Mobil Oil					DTE 25	
Shell Oil			Tellus Oil S46	Tellus Oil R46		

NOTE: The machine shipped from the factory is filled with oil marked *.

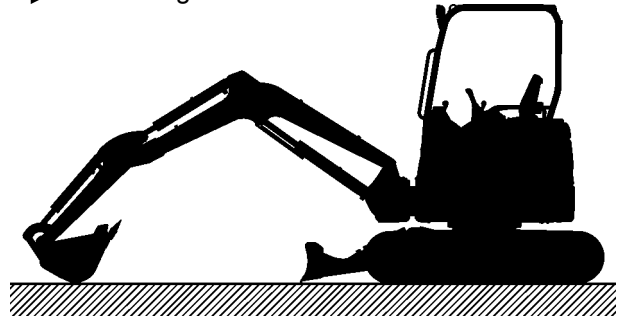
MAINTENANCE

A. GREASING

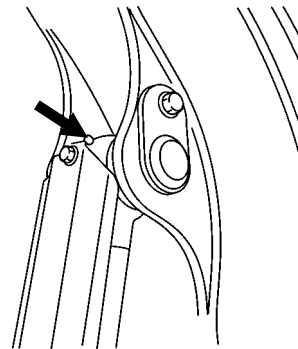
1 Front Joint Pins (Incl. Swing Post Joint Pins) --- every 500 hours or every year (every 100 hours up to 500 hours of operation)

1. Position machine with the arm cylinder fully retracted and the bucket cylinder fully extended. Lower bucket to the ground (the front attachment inspection position). All greasing points can be lubricated from the ground.
2. Grease all grease fittings illustrated below.
 - (1) Boom cylinder rod end

➔ : Greasing Point

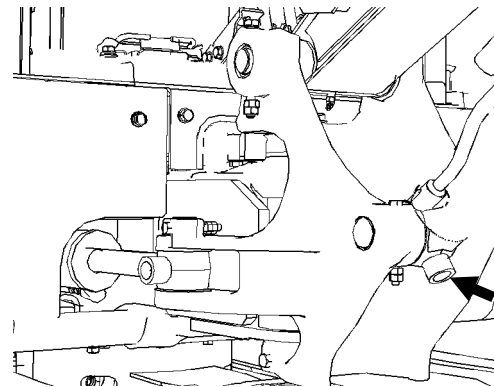


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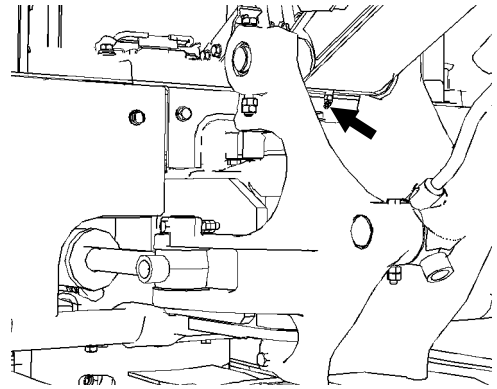
- (2) Boom cylinder bottom



M1MS-07-007

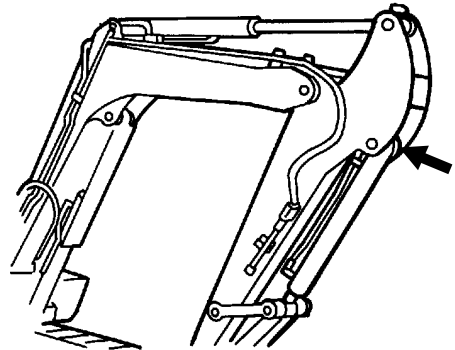
MAINTENANCE

(3) Boom foot



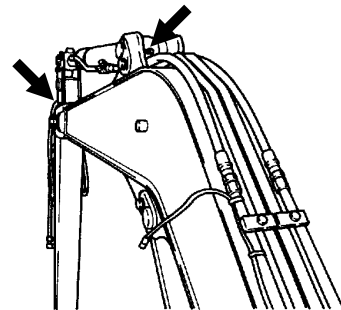
M1MS-07-007

(4) Arm cylinder rod end and bucket cylinder bottom



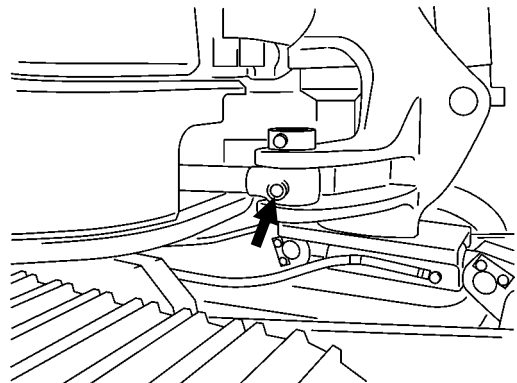
M571-07-006

(5) Boom and arm joint pin, and arm cylinder bottom



M585-07-046

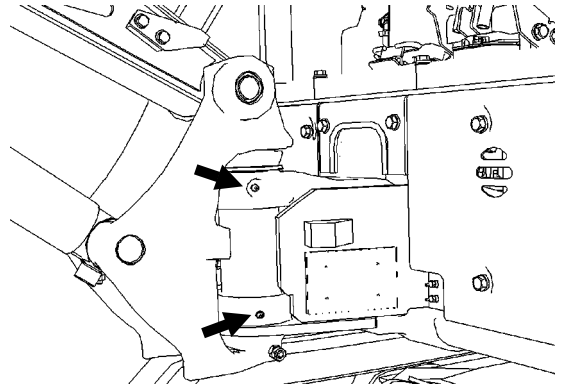
(6) Swing cylinder



M1M7-07-023

MAINTENANCE

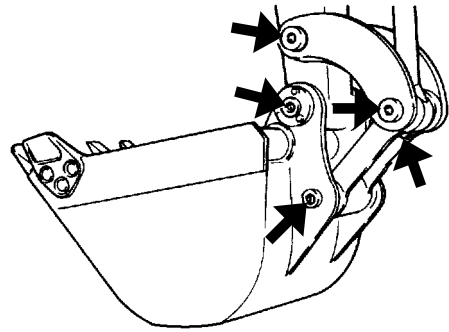
(7) Swing post



M1MS-07-008

MAINTENANCE

- 2** **Bucket and Link Pins**
--- every 100 hours
Grease all submerged pins after operating in water.



M503-07-092

Precautions for Front Attachment and Blade Removal

1. When pins are removed to replace the front attachment or blade, do not attempt to clean the bore insides of the bushings.
2. Before installing the front attachment or the blade, apply grease sufficiently to the pin-boss ends or the dust seals of the cylinders.
3. Be sure to install at least one shim on both sides of front joint pins.
4. When the swing post is disassembled, coat the pins and the thrust plates with grease before reinstalling them.

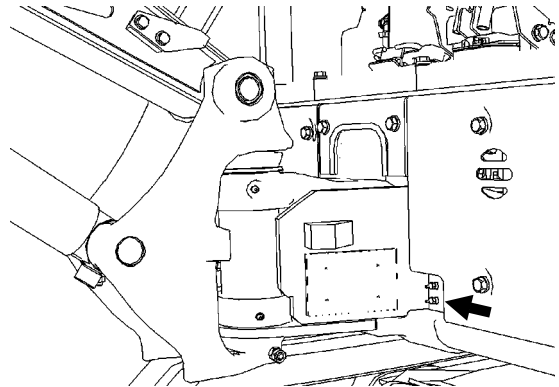
MAINTENANCE

3 Swing Bearing --- every 250 hours

WARNING: Before lubricating the swing bearing, lower the bucket and the blade to the ground, stop the engine, and place the pilot control shut-off lever to the LOCK position. Lubrication and rotation of the upperstructure must be done by one person only. Be sure to check that no personnel are present around the machine before starting to work.

Grease via grease fittings

1. Lower the bucket and the blade to the ground, stop the engine, and place the pilot control shut-off lever to the LOCK position. Add grease with a grease gun by two to three strokes. Lower the bucket and blade to the ground.
2. Raise the bucket approx. 200 mm (8 in) above the ground. While rotating the upperstructure, add grease in 8 places at approximately every 90° interval until the upperstructure is made two turns.



M1MS-07-008

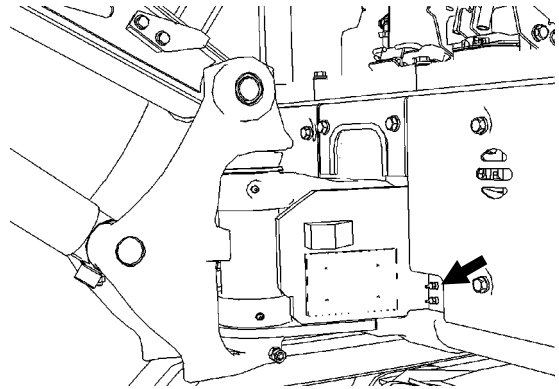
MAINTENANCE

4 Swing Internal Gear --- every 500 hours

⚠ WARNING: Before lubricating the swing bearing, lower the bucket and the blade to the ground, stop the engine, and place the pilot control shut-off lever to the LOCK position. Lubrication and rotation of the upperstructure must be done by one person only. Be sure to check that no personnel are present around the machine before starting to work.

1. Remove the cover from the bottom center of the undercarriage. Check if grease inside is cloudy due to mixing of water or dirt.
2. Apply grease via grease fittings by the quantity shown in the table
3. In order to apply grease evenly to the swing gear, raise the bucket approximately 200 mm (8 in) above the ground. While swinging the upperstructure at approximately 90° intervals until one full turn is made, add grease at each interval.

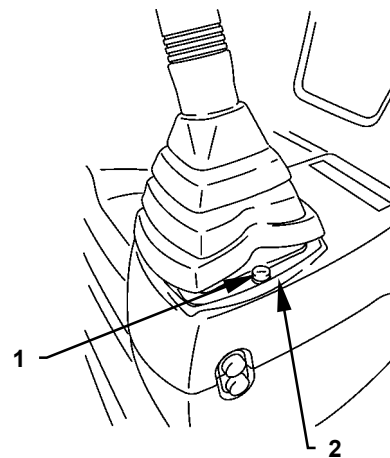
	Greasing Quantity	Total Grease Capacity
ZAXIS17U-2	0.2 L (0.2 US qt)	0.6 L (0.6 US qt)



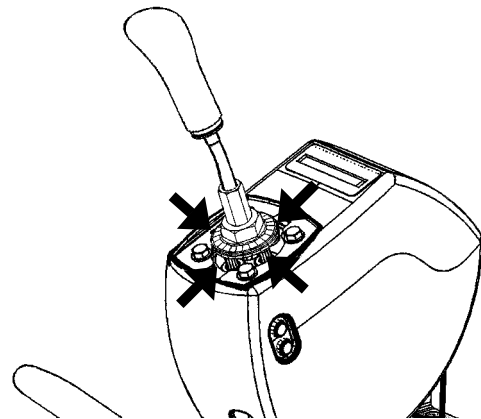
M1MS-07-008

5 Control Lever Universal Joint --- every 500 hours or yearly

Pull up the rubber boots under the right and left control levers, remove two screws (1) to remove bracket (2). After moving the rubber boots upward, add grease to the four places of the pilot valve pushers as indicated by arrows.



M1M7-07-026



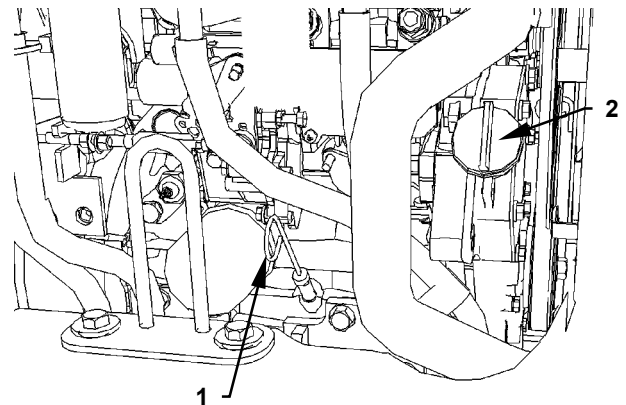
M1M7-07-016

MAINTENANCE

B. ENGINE

- 1 Engine Oil --- Level check daily
(Check before starting the engine.)**

Check the oil level every day before starting the machine. Oil level must be between the marks on oil level gauge (1). If necessary, add the specified engine oil via oil filler (2). Re-check the oil level after refilling.



M1MS-07-009

- 1 Change Engine Oil --- every 250 hours**

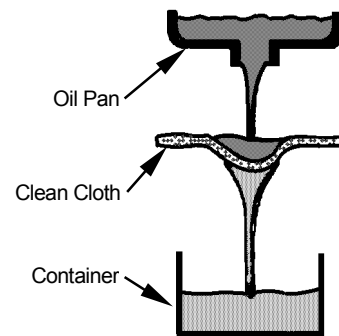
- 2 Replace Engine Oil Filter --- every 250 hours**

! WARNING: Each component of the engine may be hot immediately after operation. Allow components to cool before starting to work on them.

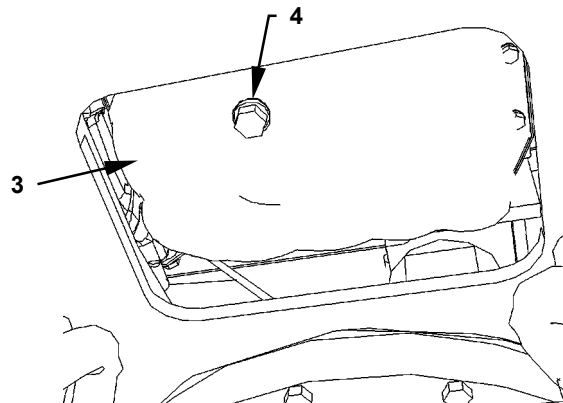
1. Prepare a 10-liter (2.6 US gal) container to receive the drain oil.
2. Remove drain plug (4) from engine oil pan (3) to drain the oil.
3. Allow oil to drain through a clean cloth to check if any debris such as small pieces of metal are present on the cloth.
4. After all oil has drained, re-Install and tighten drain plug (4).

Wrench size : 17 mm

Tightening torque : 29.4 N·m (3 kgf·m, 22 lbf·ft)




M104-07-010




M1MS-07-010

MAINTENANCE


5. Remove oil filter (5) from the engine by turning it counterclockwise using a filter wrench.
6. Coat the gasket of new filter (5) with engine oil. Turn the filter clockwise by hand until the gasket touches the sealing surface.
7. Tighten oil filter (5) 3/4 turns more using the filter wrench. Take care if oil filter (5) may become deformed if excessively tightened.

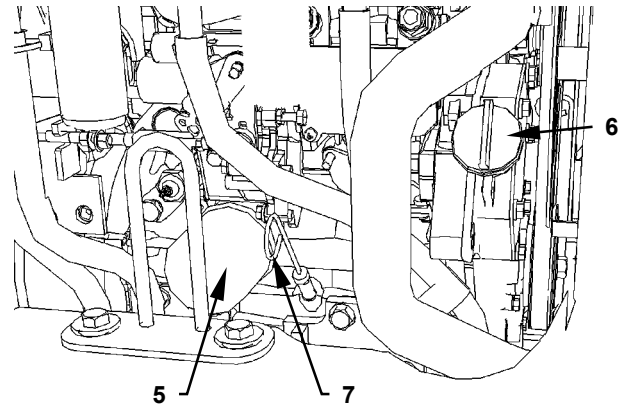
 **NOTE:** Tightening torque: 19.6 to 23.5 N·m (2.0 to 2.4 kgf·m, 14.5 to 17 lbf·ft)

8. Remove oil filler cap (6). Refill the engine.

 **NOTE:** Refer to the recommended oil and grease chart on page 7-10 for the brand names of oils.

9. Check that oil level is between the upper and lower limit marks on the dipstick (7). Start the engine.
10. Check that no oil is leaking from the sealing joints.
11. Run the engine at slow idle for 5 minutes. Stop the engine. After 15 minute later, recheck the oil level. Add as needed.

 **NOTE:** Do not re-use the engine oil filter (5).



M1MS-07-009

MAINTENANCE

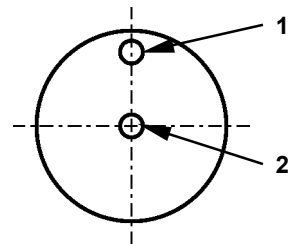
C. TRANSMISSION

1 Travel Reduction Gear



WARNING:

- Each component of the travel reduction gear may be hot immediately after operation. Allow components to cool before starting to work on them.
- The travel reduction gear may be pressurized. Be sure to release the internal pressure by slowly loosen the air bleed plug two to three turns before removing the plug. Failure to do so may cause the plug and/or gear oil to fly out, possibly resulting in personal injury. Keep body and face away from the air bleed plug.

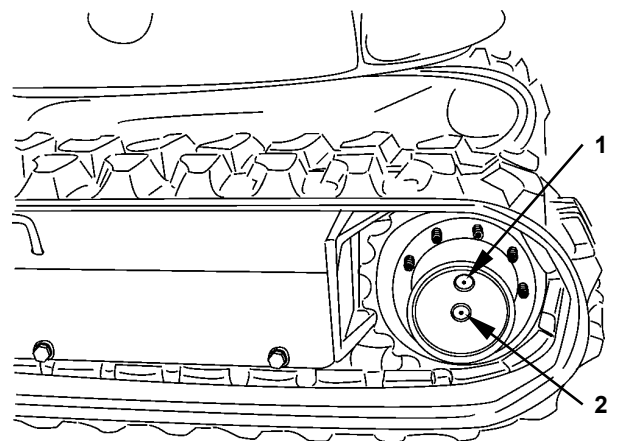


M577-07-013

Check Oil Level --- every 250 hours

1. Park the machine on a level surface.
2. Rotate the travel motor until plugs are positioned as illustrated on the right. Stop the engine.
3. Slowly loosen plug (1) to release pressure.
4. Remove plugs (1 and 2). Check that oil flows out of the thread hole for plug (2). If no oil flows out, add oil until oil flows out of the plughole.
5. After cleaning plugs (1 and 2), and install the plugs (1 and 2).

Tightening torque: 34.3 ± 4.9 N·m
(3.5 ± 0.5 kgf·m, 25.3 ± 3.6 lbf·ft).



M577-07-012


MAINTENANCE

Change Gear Oil --- every 1000 hours

1. Park the machine on a level surface.
2. Rotate the travel motor until plugs are positioned as illustrated on the right. Stop the engine.
3. Remove drain plug (2) and plug (1) to drain oil.
4. After draining oil completely, clean plug (1). Install plug (1).

Tightening torque: 34.3 ± 4.9 N·m
(3.5 ± 0.5 kgf·m, 25.3 ± 3.6 lbf·ft).

5. Supply oil through the thread hole for plug (2).

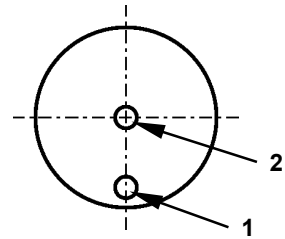
 **NOTE:** Refer to the recommended oil and grease chart on page 7-10 for the brand names of oils.

6. Add oil until oil flows out of the tread hole for plug (2).

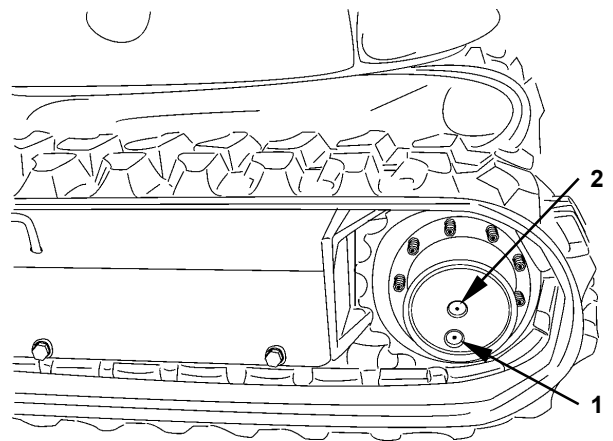
Oil Quantity: 0.25L (0.26US qt)

7. After cleaning plugs (2), reinstall the plugs.

Tightening torque: 34.3 ± 4.9 N·m
(3.5 ± 0.5 kgf·m, 25.3 ± 3.6 lbf·ft).



M577-07-014



M577-07-015

MAINTENANCE

D. HYDRAULIC SYSTEM

Inspection and Maintenance of Hydraulic Equipment



WARNING: When inspecting and/or maintaining hydraulic equipment, pay special attention to the following points.

1. Be sure to park the machine on a level, solid surface.
2. Lower the bucket and blade to the ground and stop the engine.
3. Begin servicing hydraulic components only after the components, hydraulic oil and lubricants are completely cooled, and after releasing residual pressure.
 - 3.1 Bleed air pressure from the hydraulic oil tank.
 - 3.2 Each component, hydraulic oil, and lubricant may be hot and/or pressurized immediately after operation. Allow the machine to cool down before beginning inspection or maintenance. Failure to do so may cause burns caused by contact with hot component and/or oil, or injury by contacting flying off of plugs and /or screws. Hydraulic components may be pressurized even when cooled. Keep body parts and face away from plugs or screws and slowly loosen them. Remove plugs and screws only after thoroughly releasing the residual pressure.
 - 3.3 Never attempt to service or inspect the travel and swing motor circuits on slopes. Even after air pressure is released from the hydraulic oil tank, the machine on a slope will create force to pressurize hydraulic oil in the travel and swing circuit by its own weight.

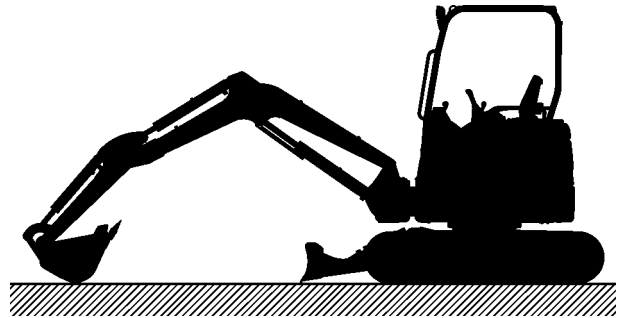
IMPORTANT:

- **Take special care to keep seal surfaces of hydraulic components free from dirt and to avoid damaging them.**
 - **Wash hoses, pipes, tank and their surrounding areas with a washing liquid and thoroughly wipe it out before reconnecting them.**
 - **Only use O-rings that are free of damage or defects. Never carelessly file O-ring seat surfaces. Do not allow high pressure hoses to twist when connecting them. Failure to do so may considerably shorten the service life of the hoses.**
- **Do not use hydraulic oils other than those listed in the table “Brand names of recommended hydraulic oil”. When adding hydraulic oil, always use the same brand of oil. Do not mix brands of oil. When selecting to use another brand of oil, be sure to completely replace the oil in the system.**
- **Never run the engine without oil present in the hydraulic oil tank.**

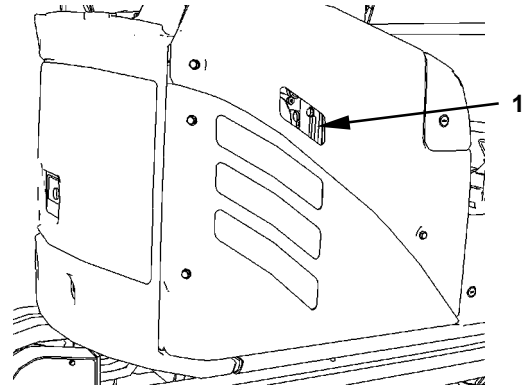
MAINTENANCE

1 Check Hydraulic Oil Level --- daily

1. Park the machine on a solid level surface. Position the machine with the arm cylinder fully retracted and the bucket cylinder fully extended. Lower the bucket and blade to the ground. Stop the engine.
2. Check oil level gauge (1) on the side of the hydraulic oil tank. Oil must be at the specified level on the gauge.



M1M7-05-024



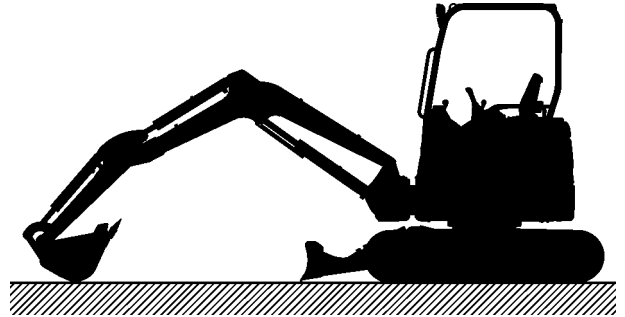
M1MS-07-011

MAINTENANCE

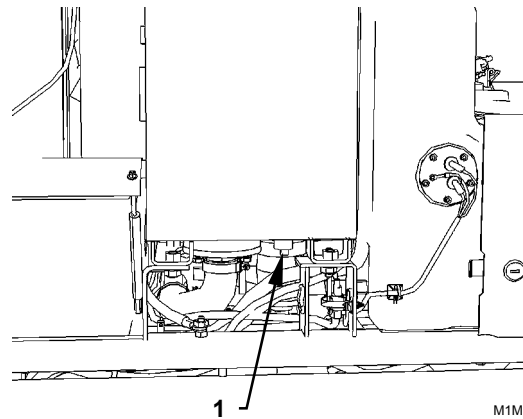
2 Drain Hydraulic Oil Tank Sump --- every 250 hours

! **WARNING:** Be sure to work only after oil temperature is low or before operation. Failure to do so may allow high temperature oil to spray, possibly causing severe burns.

1. Park the machine on a solid level surface. Position the machine with the arm cylinder fully retracted and the bucket cylinder fully extended. Lower the bucket and blade to the ground. Stop the engine.
2. Leave the machine without operating the machine until hydraulic oil becomes cool. Then, bleed air pressure from the hydraulic oil tank.
3. Slowly loosen drain plug (1) on the bottom of the hydraulic oil tank to drain water and sediment.



M1M7-05-024



M1MS-07-012

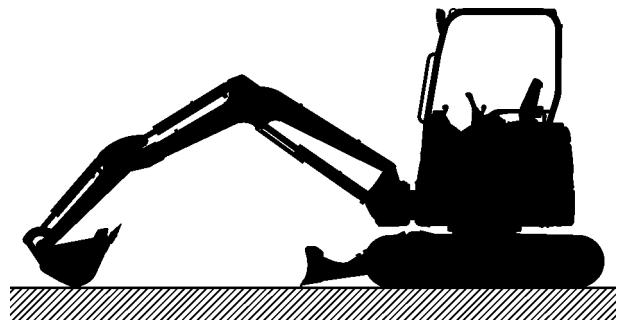
MAINTENANCE

3 Change Hydraulic Oil --- every 1000 hours or 2000 hours

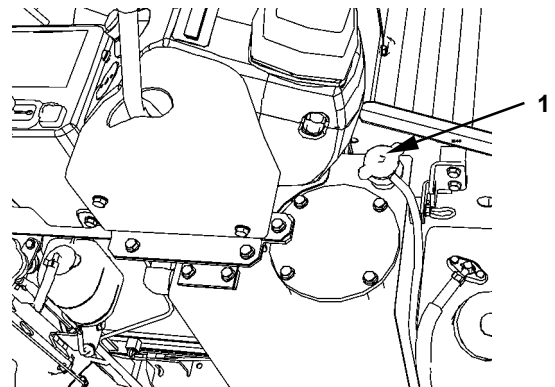
WARNING: Be sure to work only after oil temperature is low or before operation. Failure to do so may allow high temperature oil to spray, possibly causing severe burns.

IMPORTANT: When changing hydraulic oil, take care not to allow foreign matter such as dirt, water or soil to enter the hydraulic system. Hydraulic oil changing intervals differ according to kind of hydraulic oil used.

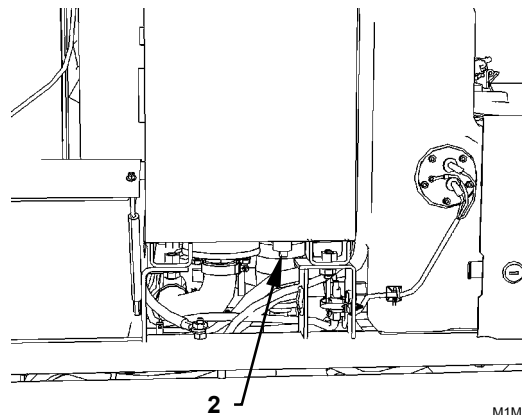
1. Park the machine on a solid level surface. Position the machine with the arm cylinder fully retracted and the bucket cylinder fully extended. Lower the bucket and blade to the ground. Stop the engine.
 2. Open the left side cover. Loosen filler cap (1) on the hydraulic oil tank to release air pressure from the hydraulic oil tank.
 3. Remove cap (1).
 4. Arrange a container with the capacity approximately 40 liter (11 US gal). Drain oil using a suction pump.
 5. Slowly loosen drain plug (2) on the bottom of the hydraulic oil tank. Allow oil to drain thoroughly
 6. Clean, install and tighten drain plug (2) to the original position.
- Wrench Size : 12 mm (PT3/8 Square Head Plug)
Tightening Torque : 49 N·m (5 kgf·m, 36 lbf·ft)
7. Supply hydraulic oil via the filler port on the top of the hydraulic oil tank while checking the oil level with level gauge (3).



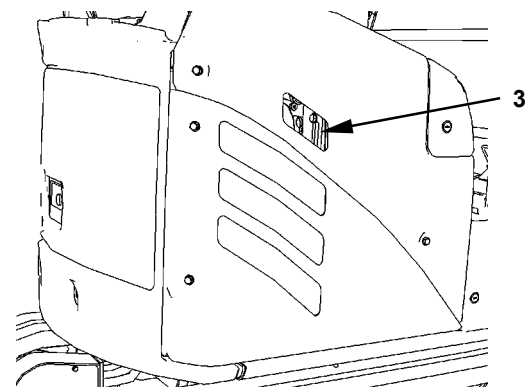
M1M7-05-024



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MAINTENANCE

Bleed Air from Hydraulic System

After changing hydraulic oil, bleed air from the hydraulic system by following the procedure described below.


Bleed Air from Pump

IMPORTANT: If the engine is started when the pump is not filled with hydraulic oil, damage to the pump may result.

1. Connect all hydraulic lines to the hydraulic pump. Fill the pump- casing, that can be filled with clean hydraulic oil, with as much as possible. Retighten the filler plug after refilling oil.

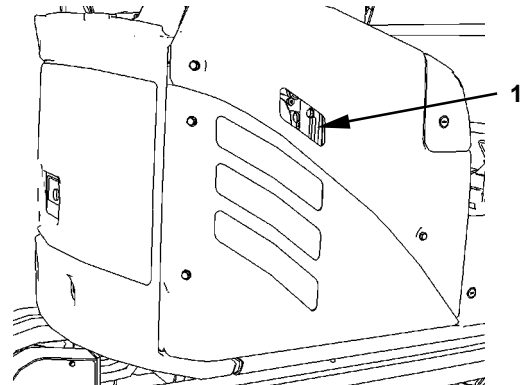
Wrench Size : 6 mm (G1/4 Hexagonal socket plug)
Tightening Torque: 35 to 40 N·m
(3.6 to 4.1 kgf·m, 25.8 to 29.5 lbf·ft)

2. Add hydraulic oil to the hydraulic oil tank to the specified level.
3. Check all line connections for any oil leaks. Set the engine control dial in the slow idle position.
4. Start the engine. Wait 5 to 10 seconds. Stop the engine.
5. Check the hydraulic oil level at the level gauge (1) located on the side of the hydraulic oil tank. Add hydraulic oil if necessary.
6. Restart the engine. Confirm that hydraulic oil level in the hydraulic oil tank is sufficient. Run the engine for approximately 1 minute.
7. This is the end of the hydraulic pump air bleeding procedure.

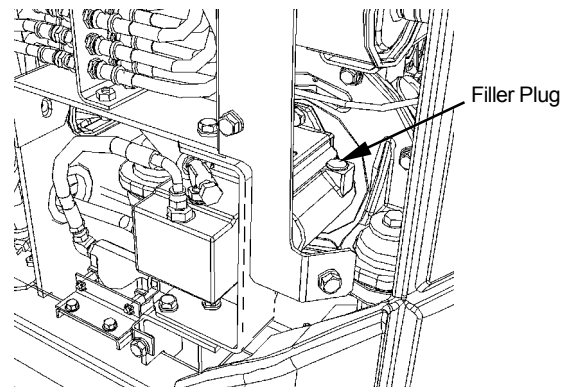
 **NOTE:** *If the hydraulic pump is left empty overnight or longer, be sure to fill the pump with clean hydraulic oil before performing the air bleeding procedure above.*

Bleed Air from hydraulic circuits

1. After filling hydraulic oil in the hydraulic oil tank, start the engine. Evenly operate each cylinder and swing motor repeatedly for 10 to 15 minutes to purge air from hydraulic system.
2. Position the machine in the hydraulic oil level checking position.
3. Stop the engine. Check hydraulic oil level. Add oil as necessary.



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M1MS-07-014

MAINTENANCE

4 Clean Suction Filter--- when changing hydraulic oil

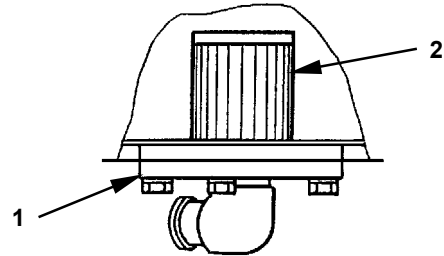
The suction filter (2) is located on the bottom side in the hydraulic oil tank. Clean the suction filter (2) when changing hydraulic oil.

1. After draining hydraulic oil, remove suction filter (2) together with cover (1).
2. Clean the hydraulic oil tank interior and the suction filter (2).
3. Install suction filter (2) together with cover (1) to the hydraulic oil tank.
4. Bleed air from the hydraulic system.

. (Refer to **3** "Bleed Air from Hydraulic System.")

Wrench Size : 17 mm

Tightening Torque: 49 N·m (5 kgf·m, 36 lbf·ft)



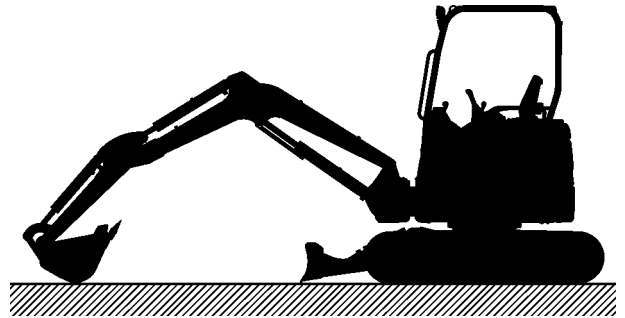
M503-07-027

MAINTENANCE

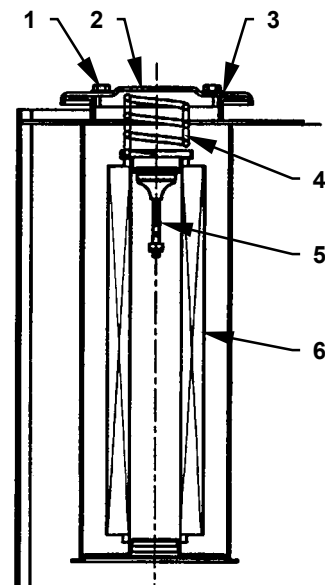
5 Replace Full Flow Filter --- every 500 hours (first time after 250 hours)

WARNING: Be sure to work only after oil temperature is low or before operation. Failure to do so may allow high temperature oil to spray, possibly causing severe burns.

1. Park the machine on a solid level surface. Position the machine with the arm cylinder fully retracted and the bucket cylinder fully extended. Lower the bucket and blade to the ground. Stop the engine.
 2. Before replacing the element, be sure to loosen the hydraulic oil tank cap to release the air pressure from the hydraulic oil tank.
 3. Loosen four bolts (1) to remove cover (2) and O-ring (3). While pressing cover (2) down, slowly remove cover (2) so that spring (4) doesn't fly out.
 4. Remove spring (4), valve (5) and element (6).
 5. Take care not to allow water and/or dirt to enter the filter case.
 6. Be careful not to damage element (6) and O-ring (3). Don't use a broken element.
 7. Install new element (6), and O-ring (3) in the hydraulic oil tank
 8. Install cover (2) with four bolts (1).
- Wrench Size : 17 mm
Tightening torque : 49 N·m (5 kgf·m, 36 lbf·ft)
9. After replacing the element, bleed air from the pump. Check the oil level in the hydraulic oil tank. (Refer to **3** "Bleed Air from Hydraulic System.") If the machine is operated without completely bleeding air from the hydraulic system, damage to the pump may result.
 10. Replace the element at the specified interval to keep hydraulic oil clean and extend the service life of hydraulic components.



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M1MS-07-001

MAINTENANCE

6 Replace Pilot Filter --- every 1000 hours

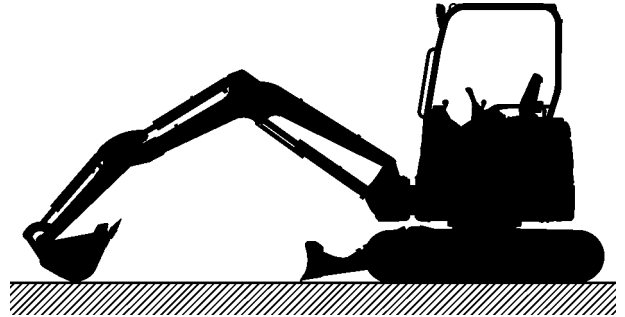


WARNING: Be sure to work only after oil temperature is low or before operation. Failure to do so may allow high temperature oil to spray, possibly causing severe burns.

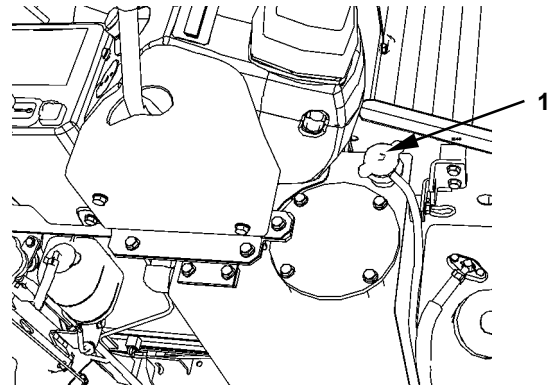
1. Park the machine on a solid level surface. Position the machine with the arm cylinder fully retracted and the bucket cylinder fully extended. Lower the bucket and blade to the ground. Stop the engine.
2. Before replacing the element, be sure to loosen the hydraulic oil tank cap to release the air pressure from the hydraulic oil tank.
3. Remove bolts (3) to remove under cover (2) from the rear left bottom side of the base machine.

Wrench size : 17 mm

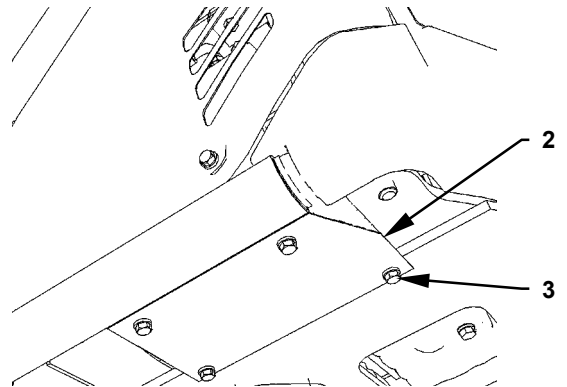
Tightening torque : 49 N·m (5 kgf·m, 36 lbf·ft)



M1M7-05-024



M1MS-07-013



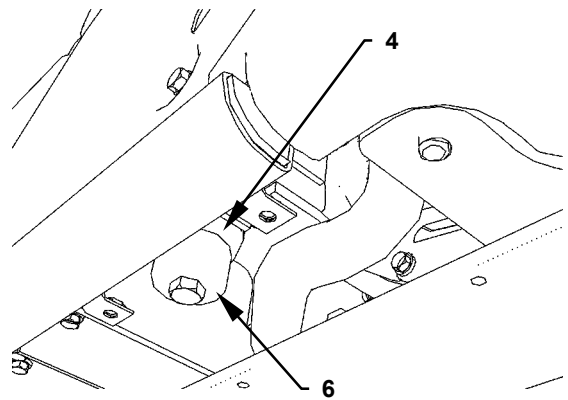
M1MS-07-015

MAINTENANCE

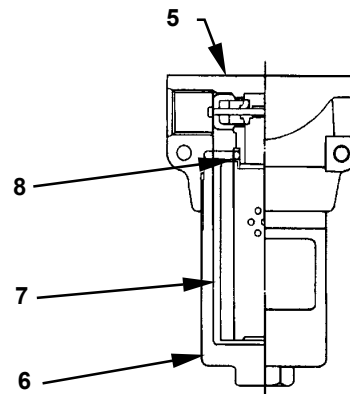
4. Rotate the hexagon section on the bottom of filter case (6) counterclockwise using a tool such as a wrench to remove filter case (6) from head cover (5).
5. While rotating filter element (7), pull to remove filter element (7) downward.
6. Replace O-ring (8) with a new one.
7. Securely install O-ring (8) in the O-ring groove on head cover (8).
8. Coat the seal on new filter element (7) with clean hydraulic oil. Completely install filter element (7) into filter head (4) while rotating filter element (7) taking care not to damage the filter element.
9. Take care not allow dust and/or water enter the filter case.
10. Install case (6) into head cover (5) while rotating the case clockwise.

Wrench size : 17 mm
 Tightening Torque : 25 to 34 N·m
 (2.5 to 3.5 kgf·m, 18 to 26 lbf·ft)

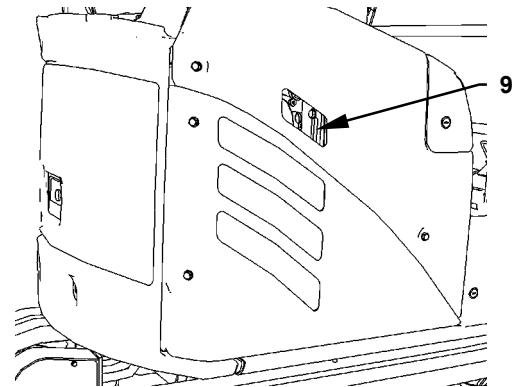
11. After replacing the filter element, bleed any remaining air from the hydraulic circuit while running the engine at a slow speed for approx. 3 minutes.
12. Check the oil level gauge (9) in the hydraulic oil tank. Add oil as needed.
13. Install under cover (2) with bolts (3).
14. Tighten the hydraulic oil tank cap.



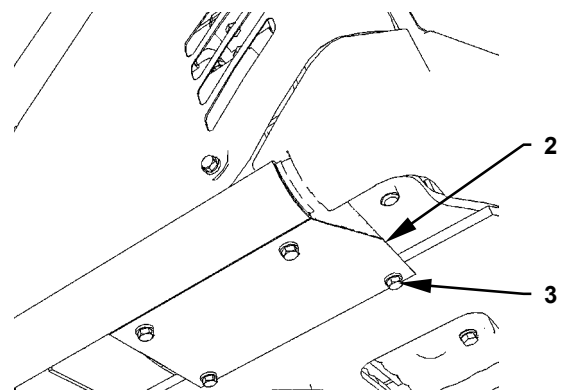
M1MS-07-016



M503-07-031



M1MS-07-011



M1MS-07-015

MAINTENANCE

- 7** Check Hoses and Lines
--- daily
--- every 250 hours



WARNING:

Escaping flammable fluid may cause fire. Check for missing or loose clamps, kinked hoses, lines or hoses that rub against each other and/or come in contact with other components, and any oil leaks.

Escaping fluid under pressure can penetrate the skin causing serious injury. To avoid this hazard, search for leaks with a piece of cardboard.

Take care to protect hands and body from high-pressure fluids.

If an accident occurs, see a doctor familiar with this type of injury immediately.

Repair or replace any missing, loose or damaged clamps, hoses, and lines.

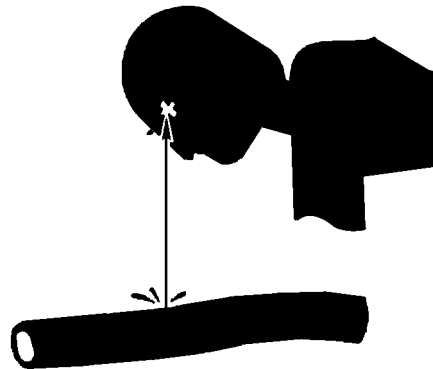
Do not bend or strike high-pressure lines.

Never install bent or damaged hoses or lines.

Check hoses and lines for oil leaks and/or damage while referring to the following tables. If any abnormality is found, repair it as instructed in the remedy column.



SA-031



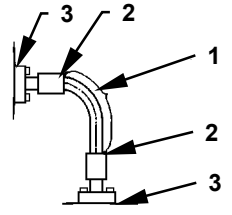
SA-292



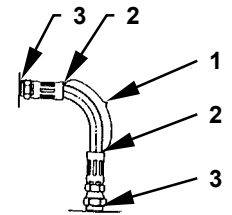
SA-044

MAINTENANCE

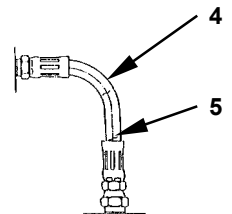
Hoses			
Interval (Hours)	Check Point	Abnormality	Remedy
Daily	Hose surface	Oil leak (1)	Replace
	Hose end	Oil leak (2)	Replace
	Hose connection	Oil leak (3)	Retighten or replace hose or O-ring
Every 250 hours	Hose surface	Oil leak (4)	Replace
	Hose end	Oil leak (5)	Replace
	Hose surface	Exposed reinforcement (6)	Replace
	Hose surface	Blister (7)	Replace
	Hose	Acute bend (8), Collapse (9)	Replace
Hose and hose fitting	Deformation or Corrosion (10)	Replace	



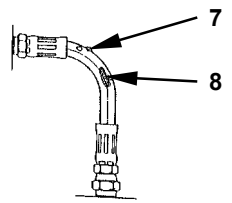
M137-07-008



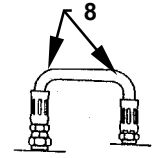
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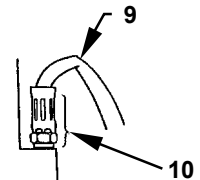
M115-07-146



M117-07-147



M117-07-148

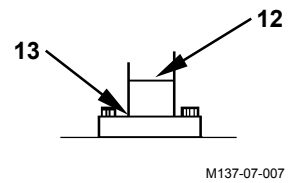
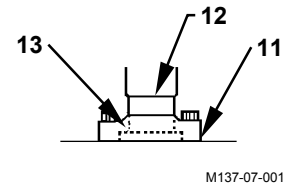


M117-07-149

MAINTENANCE

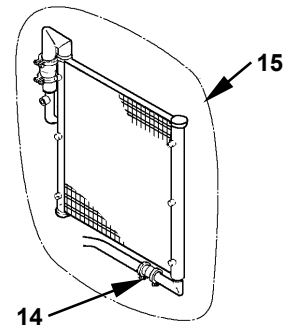
Lines

Interval (Hours)	Check Point	Abnormality	Remedy
Daily	Flange type fitting mating face and connection bolt	Oil leak (11)	Replace
		Looseness or oil leak (11)	Replace O-ring and/or retighten bolt
	Weld joint surface on flange type fitting	Oil leak (12)	Replace
Every 250 hours	Flange type fitting neck	Crack (13)	Replace
	Weld joint surfaces	Crack (12)	Replace
	On flange type fitting	Omission	Replace
	Clamp	Deformation	Replace
		Loose	Retighten



Oil cooler

Interval (Hours)	Check Point	Abnormality	Remedy
Every 250 hours	Hose and hose connection	Oil leak (14)	Retighten or replace
	Oil cooler	Oil leak (15)	Replace



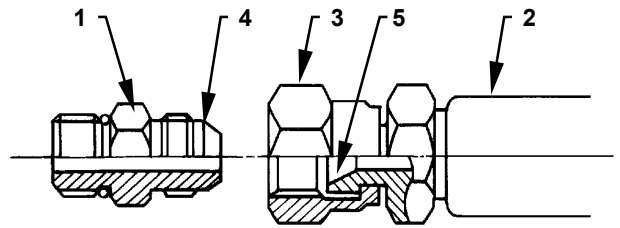
MAINTENANCE

Hose Fitting

- **Metal Face Seal Fittings**

(Width Across Flats of Union Nut: 17, 19, 22, and 27 mm)

Fittings are used on smaller size hoses. Metal flare seat (4) on adapter (1) and metal flare (5) on hose (2) ends seal pressure oil.



Precaution for Application

Take care not to damage flare seat (4) and flare (5) when disconnecting or connecting them.

M202-07-051

Tightening Torque

Tighten adapter (1) and nut (3) to the torque values shown in the table below.

		± 10%			
Width across flats (mm)		17	19	22	27
Tightening torque	N·m	24.5	29.5	39	64
	(kgf·m)	(2.5)	(3)	(4)	(6.5)
	(lbf·ft)	(18)	(21.5)	(29)	(47)

MAINTENANCE

E. FUEL SYSTEM

! WARNING: Fuel is highly flammable. Handle fuel with care. Keep open flame or sparks away from fuel.

Refueling

After parking the machine on a level surface, check the fuel level with fuel gauge (1) and level gauge (2). When necessary to add fuel, remove fuel tank cap (3) and refill fuel.

1. To avoid condensation, fill the tank at the end of each day's operation. Take care not to add more fuel than the specified level.

Fuel Tank Capacity: 19.5 L (5.2 US gal)

2. After refilling fuel, close filler cover (4). Be sure to lock the cover to prevent vandalism.

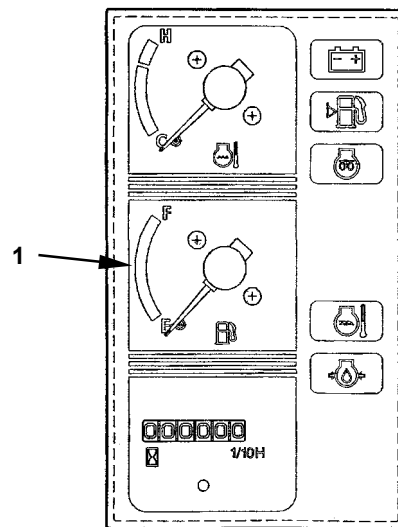
NOTE: Take care not to allow water and/or dirt to enter the fuel system when refilling fuel.

Bleed Air from Fuel System

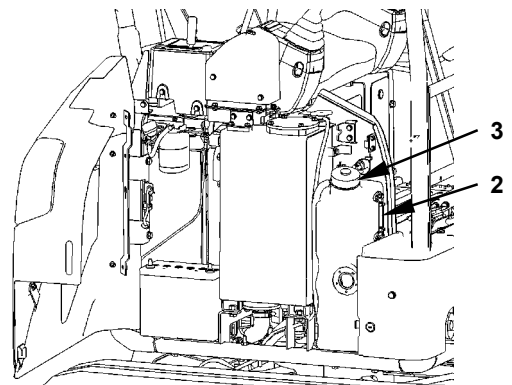
Air in the fuel system will cause the engine to start hard and/or run roughly. Be sure to bleed air from the system after replacing the fuel filter or draining the tank.

Automatic bleeding device is provided on this machine.

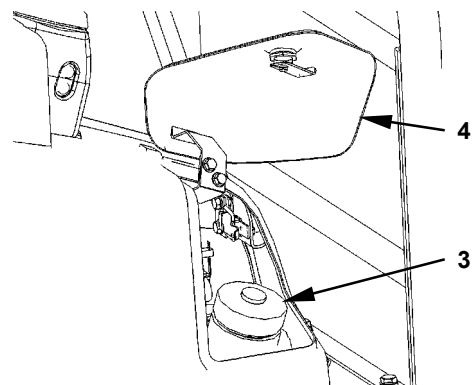
1. Confirm that the fuel level is more than one-half of the tank capacity. If the fuel level is lower, automatic bleeding device will not operate. Add fuel.
2. Turn the key switch ON and hold for 10 to 15 seconds.
3. Start the engine and check the fuel system for fuel leaks.



M1MS-01-005



M1MS-07-005

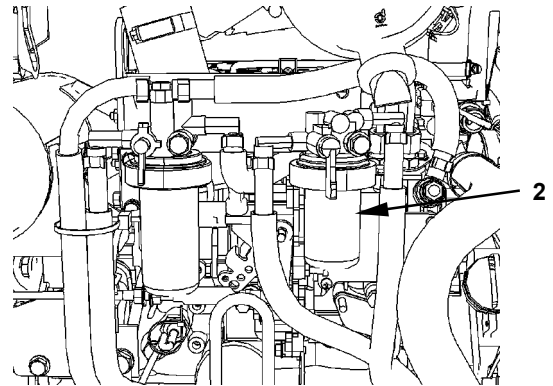


M1MS-07-004

MAINTENANCE

1 Check Water Separator --- daily

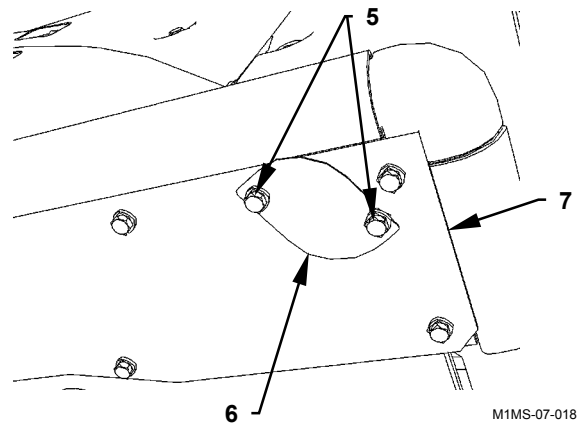
When water is accumulated in water separator (2), loosen transparent filter case to drain water and sediment.



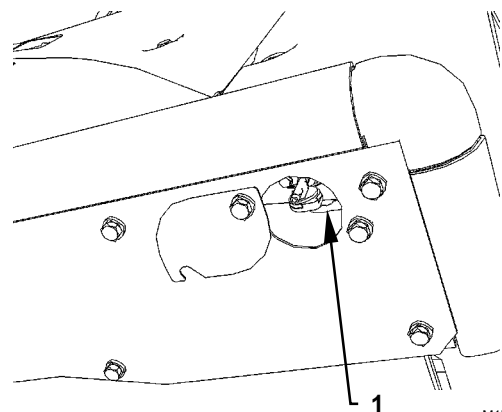
M1MS-07-017

2 Drain Fuel Tank Sump --- as required

Park the machine on a solid level surface. Loosen bolts (5) to remove drain valve cover (6) from right-front under cover (7). Rotate drain valve cover (6) to open the checking port. Open drain valve (1) on the bottom of the fuel tank and allow the water and sediments to drain from the fuel tank sump.



M1MS-07-018

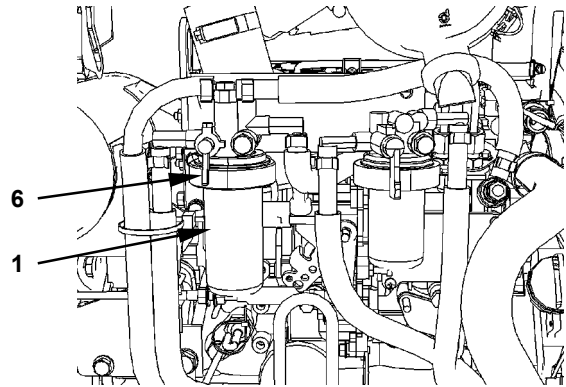


M1MS-07-019

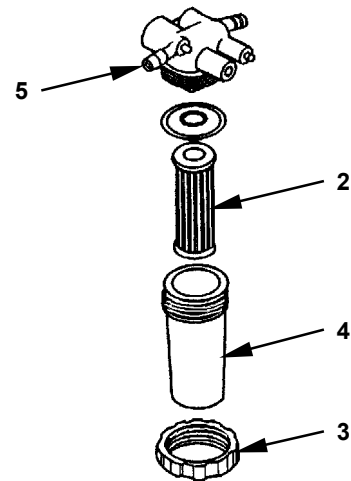
MAINTENANCE

3 Replace Fuel Filter --- every 500 hours

1. Close fuel cock (6)..
2. Loosen ring nut (3) of fuel filter (1) and remove filter cap (4).
3. Clean filter cap (4).
4. Install new filter element (2), filter cap (4) and retighten ring nut (3) securely.
5. Open fuel cock (6)
6. Loosen plug (5) to bleed air.
7. Tighten plug (5) when fuel flows from the plug hole.
8. Turn the key switch ON and hold for 10 to 15 seconds to engage automatic bleeding.
9. Start the engine and check for fuel leakage



M1MS-07-017



M503-07-038

MAINTENANCE

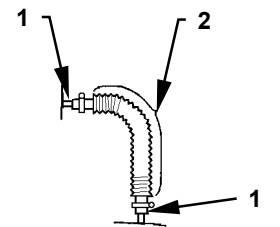
- 4** Check Fuel Hoses
 --- daily
 --- every 250 hours

- ! WARNING:**
- Escaping fuel may cause fire. Check for kinked hoses, or hoses that rub against each other and/or come in contact with other components, and any oil leaks.
 - Repair or replace any loose or damaged hoses.
 - Never install accurately bent or damaged hoses.

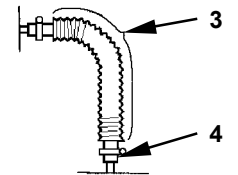
Check hoses for oil leaks and/or damage while referring to the following tables. If any abnormality is found, repair it as instructed in the remedy column.

Hoses

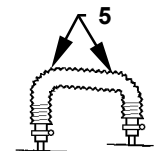
Interval (Hours)	Check Point	Abnormality	Remedy
Daily	Hose fittings	Leak (1)	Retighten or replace
	Soutache braid hose surface	Rubbed marks (2)	Replace
		Crack (2)	Replace
Every 250 hours	Soutache braid hose surface	Crack (3)	Replace
	Hose surface	Crack (4)	Replace
	Hose fittings	Crack (4)	Replace
	Hose	Acute bend (5)	Replace
		Collapse (6)	Replace
	Hose ends and fittings	Corrosion (7)	Replace



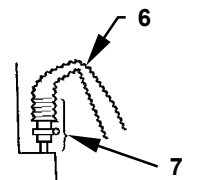
M137-07-003



M137-07-004



M137-07-005



M137-07-006

MAINTENANCE

F. AIR CLEANER

- 1** Clean the Air Cleaner Element
--- every 250 hours or when the air cleaner indicator comes ON.
Replace the Air Cleaner Element
--- every 500 hours

Clean and replace air cleaner element.

1. Before servicing element (1), be sure to stop the engine.

! **WARNING:** Be sure to wear safety glasses or goggles before removing cover (3).

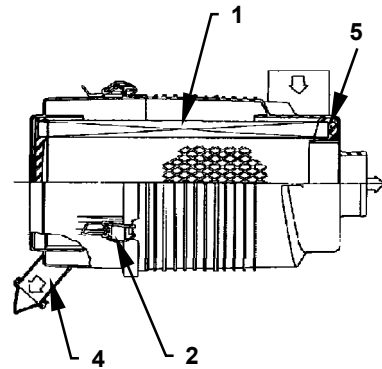
2. Loosen two clamps (2) to remove cover (3) and element (1).

! **WARNING:** Wear safety glasses or goggles when using compressed air pressure [less than 0.2 MPa (2 kgf/cm², 29 psi)].

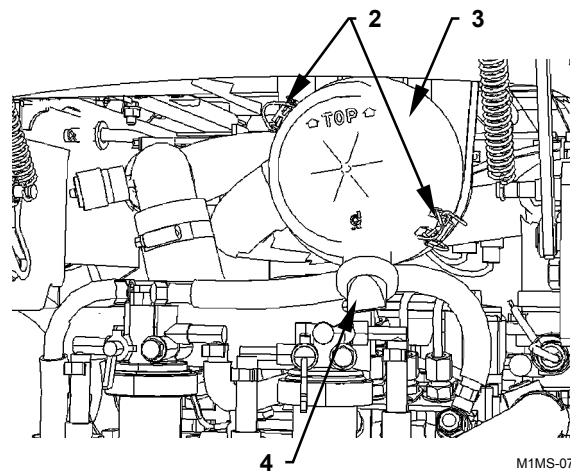
IMPORTANT:

- Clean cover (3) to prevent dirt or water from entering the air cleaner suction port. If water enters the air cleaner suction port, damage to the engine may result.
- When cleaning, do not hit element (1) or force the element to collide against other object.

3. Clean element (3) by blowing compressed air pressure [less than 0.2 MPa (2 kgf/cm², 29 psi)] from the inside of the element. After cleaning, be sure to check element (1) for damage. If any damage is found, replace the element with a new one.
4. If air filter indicator (5) comes ON immediately after cleaning the element even though cleaning is less than six times, replace the element with a new one.
5. When installing cover (3), position the cover so that valve (4) faces downward. Then, tighten the cover with clamps (2) in the specified position.




M555-07-023



M1MS-07-020

MAINTENANCE

G. COOLING SYSTEM

 **NOTE:** When a new machine is shipped from the Hitachi factory, the cooling system is filled with a mixture of water and genuine Hitachi Long-Life Coolant (LLC).

Coolant:

Use fresh water which includes fewer impurities or normal tap water for the coolant. Avoid using strong acid or alkaline water. Be sure to use genuine Hitachi long life coolant (LLC)

Long Life Coolant (LLC)

LLC has two functions, antifreeze and anti-rust agent. As a general rule, the ratio of antifreeze should range between 30% and 60%. If the ratio is below 30%, the system may develop rust, and if it is above 60% the engine may overheat.

LLC Mixing Ratio

Mixing ratio	%	30	35	40	45	50
Air temperature	°C	-10	-15	-20	-25	-30
	(°F)	(14)	(5)	(-4)	(-13)	(-22)

Precautions for Handling LLC

 **WARNING: LLC is poisonous.**

1. If ingested, Induce vomiting and immediately get emergency medical attention.
2. If antifreeze is accidentally splashed in the eyes, sufficiently flush the eyes with water and get emergency medical attention.
3. When storing antifreeze, be sure to keep it in a clearly marked container with tight closing lid. Always keep antifreeze out of the reach of children.
4. Keep open flame or sparks away from LLC.
5. When disposing LLC, comply with local regulations.

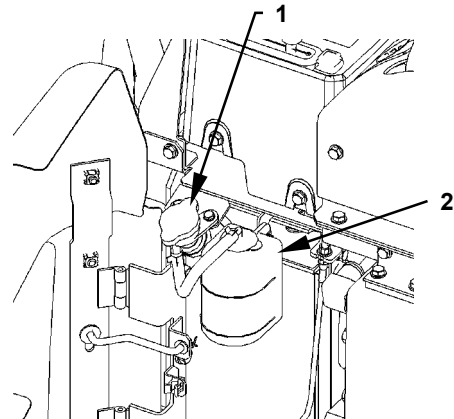
MAINTENANCE

1 Check Coolant Level --- daily

Check that the coolant level is between the FULL and LOW marks on coolant reservoir (2). If the coolant level is below the low mark, remove the reservoir cap (1) and add coolant to coolant reservoir (2).

WARNING: Do not loosen radiator filler cap (1) unless the system is cool. Hot steam may escape, possibly causing severe burns. Loosen the cap slowly to the stop after the coolant becomes cool. Release all pressure before removing the cap.

If coolant reservoir (2) is empty, add coolant through radiator cap (1).



M1MS-07-021

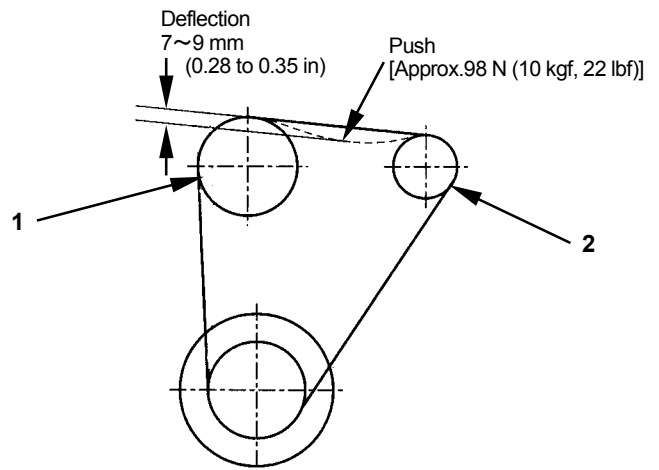
2 Check and Adjust Fan Belt Tension --- every 100 hours (first time after 50 hours)

IMPORTANT: Loose fan belt tension may result in insufficient battery charging, engine overheating as well as a rapid, abnormal belt wear. Belts that are too tight, however, can damage both water pump and alternator bearings, and belts.

Check:

Check fan belt tension by depressing the fan belt mid-point with the force [approx. 98 N (10kgf, 22 lbf)] of thumb. Deflection must be 7 to 9 mm at a mid point between fan pulley (1) and alternator (2).

In addition, check the fan belt for any damage. If the belt has any cracks, replace the belt with a new one.




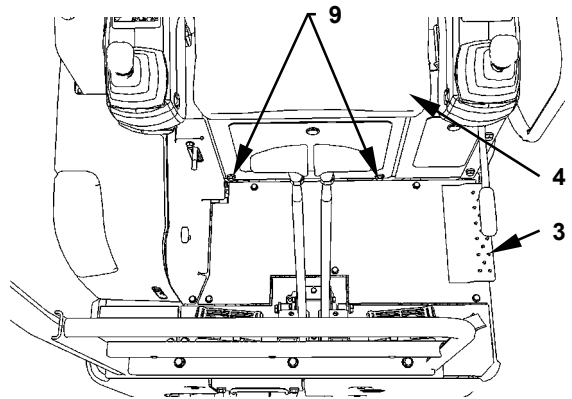
M569-07-014

MAINTENANCE

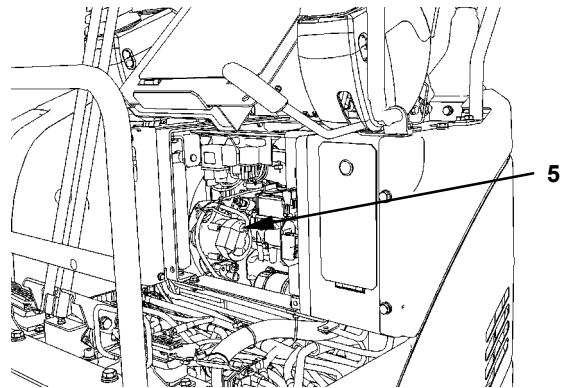
Adjustment of Fan Belt Tension

1. Remove the floor plate (3). Move the seat (4) ahead most by using seat backward and forward adjusting lever and incline the backrest to the forward position.
2. Remove the two installed bolts (9) under the seat base, and lift the seat base until the end of lock (7) inserts into locking position (8).
3. Loosen mounting bolts (6) of alternator (5).
4. Move alternator (5) to correctly adjust the fan belt tension.
5. Securely tighten bolts (6).
6. Reverse order of the above procedure. Return the seat base to previous position, reassemble the unites.

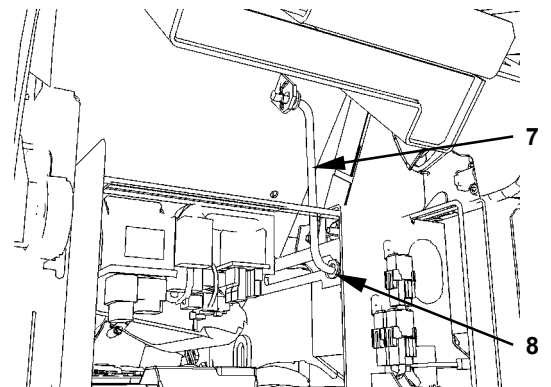
 **NOTE:** When a new belt is installed, the new belt is difficult to be correctly seated from the beginning. Be sure to readjust the tension after operating the engine for 3 to 5 minutes at slow idle speed.



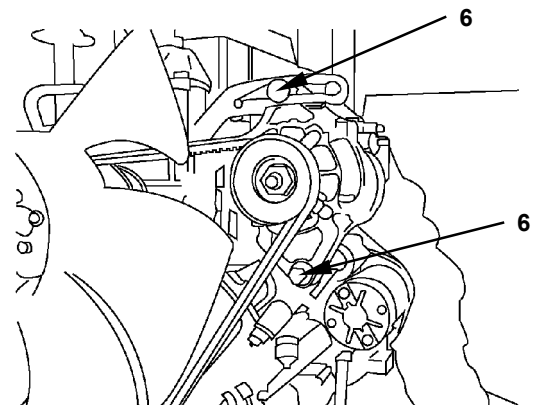
M1MS-07-022



M1MS-07-023




M1MS-07-024




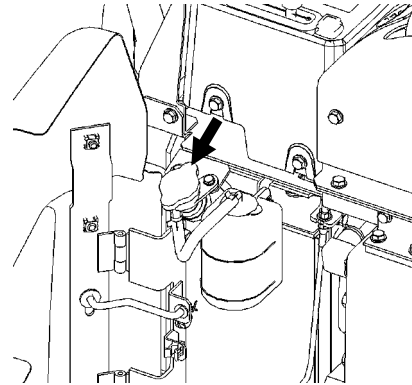
M1M7-07-047

MAINTENANCE

3 Change Coolant --- every two years or 2000 hours

 **NOTE:** In case genuine Hitachi Long-Life Coolant is used, change the coolant every two years (in autumn every other year), or every 2000 hours, whichever comes first.

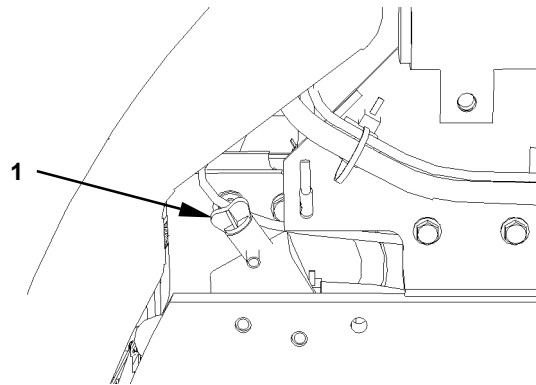
 **WARNING:** Do not loosen the radiator cap unless the system is cool. Hot steam may escape, possibly causing severe burns. Loosen the radiator cap slowly to the stop after the coolant becomes cool. Release all pressure before removing the cap.



M1MS-07-021

Procedure of Coolant Change

1. Remove the radiator cap. Open drain cock (1) on the radiator and drain the drain valve on the water jacket to allow the coolant to drain completely. Drain impurities such as water scale at the same time.
2. Close radiator drain cock (1) and the drain valve on the water jacket. Fill the radiator with fresh water including less impurity and a radiator cleaner agent. Start the engine and run it at a speed slightly higher than slow idle to raise the coolant temperature until the needle of the temperature gauge reaches the white zone. Then, run the engine further for about ten minutes.
3. Stop the engine and open radiator drain cock (1) to allow the coolant to drain. Flush out the cooling system with fresh water including less impurity, until draining water becomes clear. This helps remove water scale.
4. Close radiator drain cock (1). Fill the radiator with fresh water which includes fewer impurities and LLC at the specified mixing ratio. When adding coolant, do so slowly to avoid mixing air bubbles in the system. Run the engine to sufficiently bleed the air from the cooling system.
5. After adding coolant, operate the engine for several minutes. Check the coolant level again, and add coolant if necessary.



M1MS-07-025

MAINTENANCE

- 4** Clean Radiator
--- every 500 hours



WARNING: Always wear safety glasses or goggles when using compressed air [less than 0.2 MPa (2 kgf/cm², 29 psi)] to clean radiator core.

IMPORTANT:

- Cover air cleaner inlet opening to prevent entry of dust and water while cleaning the radiator.
- High-pressure air [less than 0.2 MPa (2 kgf/cm², 29 psi)] or water can damage radiator fins. Keep the pressure nozzle 500 mm (19.7 in) or more away from the core face.

The radiator and the oil cooler are arranged in series. In case dust or dirt should become stuck to the radiator core, clean the radiator with compressed air and/or water to maintain the cooling ability of the cooling system.

MAINTENANCE

H. ELECTRICAL SYSTEM

IMPORTANT:

- Improper radio communication equipment and associated parts, and/or improper installation of radio communication equipment effects the machine's electronic parts, causing involuntary movement of the machine. Also, improper installation of electrical equipment's may cause machine failure and/or a fire on the machine. Be sure to consult your nearest Hitachi dealer when installing s radio communication equipment or additional electrical parts, or when replacing electrical parts.
- Never attempt to disassemble or modify the electrical/electronic components. If replacement is required, consult your nearest Hitachi dealer.

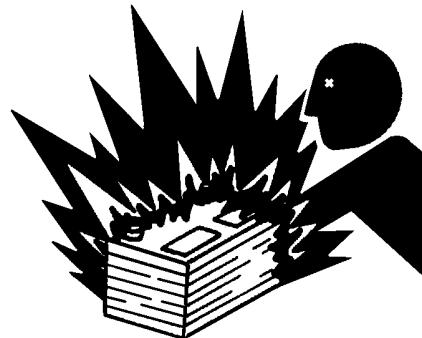
1 Battery



WARNING: Battery generates explosive gas during operation or charge. Keep sparks and flames away from battery.


Do not continue to use or charge the battery when the electrolyte level is lower than specified. Explosion of the battery may result.

Charge battery in a well-ventilated area. Sulfuric acid in battery electrolyte is poisonous. It is strong enough to burn skin, eat holes in clothing, and cause blindness if splashed into eyes.



IMPORTANT: If the battery is used with the electrolyte level lower than the specified low level, the battery may deteriorate quickly.

IMPORTANT: Do not refill electrolyte more than the specified upper level. Electrolyte may spill, damaging the painted surfaces and/or corroding other machine parts.

 **NOTE:** In case electrolyte is refilled more than the specified upper level line or beyond the bottom end of the sleeve, remove the excess electrolyte until the electrolyte level is down to the bottom end of the sleeve using a pipette. After neutralizing the removed electrolyte with sodium bicarbonate (Baking powder), flush with plenty of water, otherwise, consult the battery manufacturer.



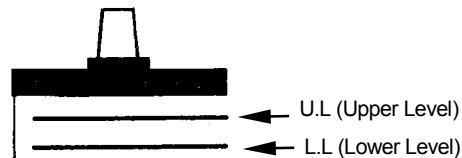
SA-032

SA-036

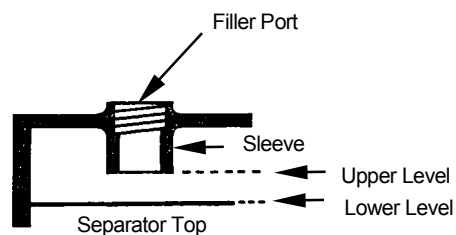
MAINTENANCE

Electrolyte Level Check

1. Check the electrolyte level at least once a month.
2. Park the machine on level ground and stop the engine.
3. Check the electrolyte level.
 - 3.1 When checking the level from the battery side:
Clean around level check lines with a wet towel. Don't use a dry towel. Static electricity maybe developed, causing the battery gas to explode. Check if the electrolyte level is between U.L (Upper level) and L.L (Lower level). In case the electrolyte level is lower than the middle level between the U.L and L.L, immediately refill distilled water or commercial battery fluid. Be sure to refill with distilled water before recharging (operating the machine). After refilling, securely tighten the filler plug.
 - 3.2 When it is impossible to check the level from the battery side or no level check mark is indicated on the side:
After removing the filler plug from the top of the battery, check the electrolyte level by viewing through the filler port. It is difficult to judge the accurate electrolyte level in this case. Check if the electrolyte surface touches the bottom end of the sleeve or not according to the right illustrations. When the electrolyte surface is lower than the bottom end of the sleeve, refill with distilled water or commercial battery fluid up to the bottom end of the sleeve. After refilling, securely tighten the filler plug.
 - 3.3 When an indicator is available to check the level, follow its check result.
4. Always keep the vicinity around the battery terminals clean to prevent battery discharge. Check battery terminals for looseness and rust. Coat terminals with grease or petroleum jelly to the terminals to prevent corrosion.



M146-07-109



M146-07-110

Proper



Since the electrolyte surface touches the bottom end of the sleeve, the electrolyte surface is raised due to surface tension so that the electrode ends are seen curved.

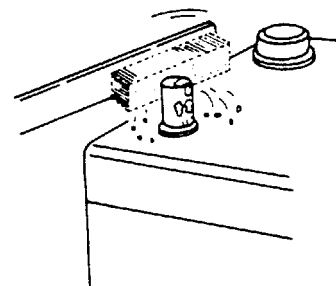
M146-07-111

Lower



When the electrolyte surface is lower than the bottom end of the sleeve, the electrode ends are seen straight.

M146-07-112

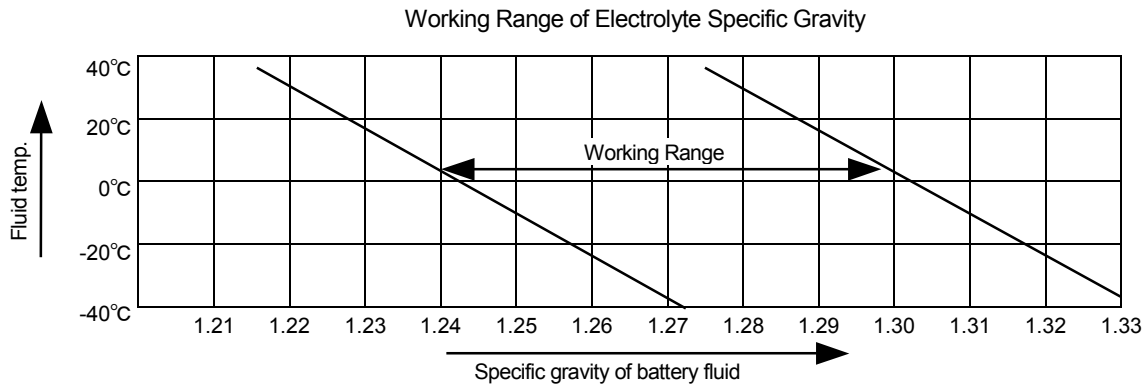


M409-07-072


MAINTENANCE

Check Electrolyte Specific Gravity

The specific gravity for electrolyte varies depending on electrolyte temperature. The specific gravity should be kept within the range shown below. Charge the battery if the specific gravity is below the limit.

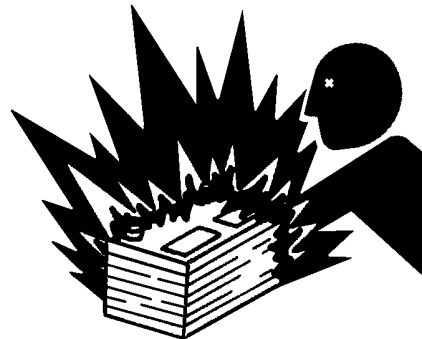


M104-07-054

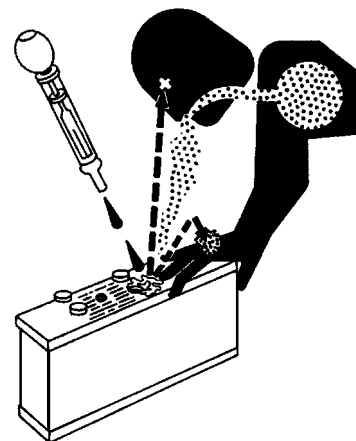
 **NOTE:** Check the specific gravity of electrolyte after it is cooled to air temperature. As electrolyte temperature changes immediately after operation, correct measurement can be difficult.

Precautions for Handling Batteries

- If electrolyte spills on your skin or clothes, immediately flush the spilled skin or clothes with water. Then, sufficiently wash them with soapy water. If electrolyte splashes in eyes, flush your eyes with water for 10 to 15 minutes. Get medical attention immediately.
- Do not use fire hazards such as matches or tobacco, or don't allow sparks to fly near the batteries.
- Perform battery maintenance only after turning the key switch OFF and removing the battery caps.
- Touching the batteries soon after operation is hazardous. Wait for the batteries to cool.
- During charging, batteries generate flammable hydrogen gas. Remove the batteries from the base machine. Then, charge the batteries in a well-ventilated area only after removing the caps.
- When disconnecting the battery terminals, be sure to disconnect the negative (ground) terminal first, and when reconnecting the battery terminals, reconnect the negative (ground) terminal last. If a conductor such as a metal tool is placed between the battery positive terminal and the vehicle frame with the battery negative terminal kept connected to the vehicle frame, electric short circuit may occur, possibly creating a hazardous situation.
- Loosely tightened terminals may cause sparks to fly. Securely tighten the terminals.



SA-032

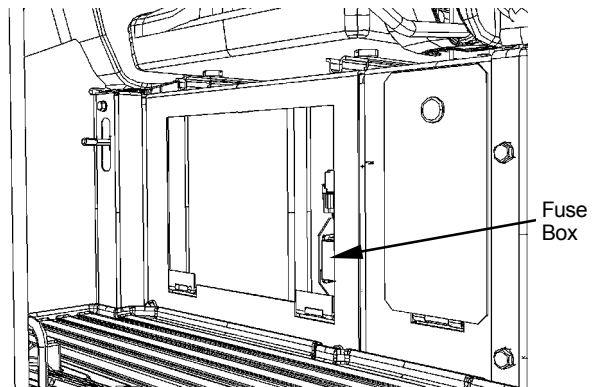


SA-036

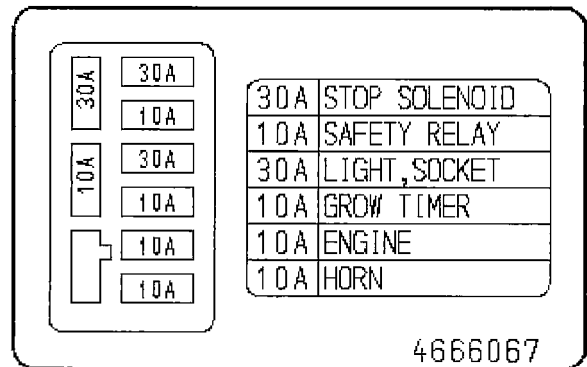
MAINTENANCE

2 Replacing Fuses

1. If any electrical equipment fails to operate, first check the fuses in the fuse box.
2. One each capacity of spare fuses are provided in the fuse box.



M1MS-01-003



M1MS-07-035

MAINTENANCE

I. MISCELLANEOUS

1 Check Bucket Teeth for Looseness and/or Wear
--- daily

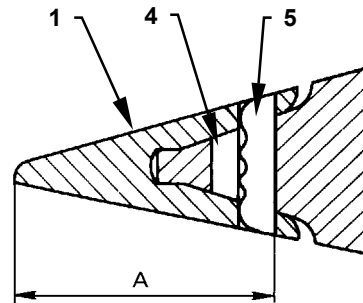
Check the bucket teeth for wear and looseness

Replace teeth (1) if tooth wear exceeds the service limit shown below.

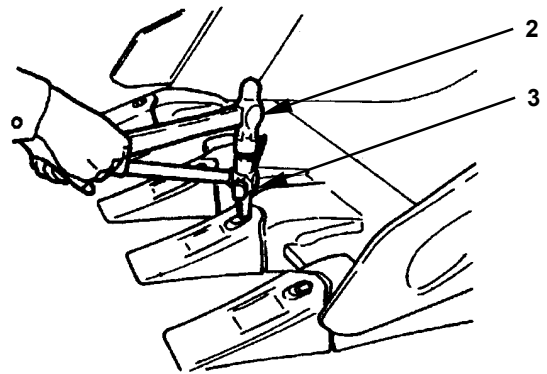
Dimension A in mm (in.)	
New	Limit of Use
128 (5.0")	65 (2.6")

! WARNING: Guard against injury from flying pieces of metal. Use safety equipment such as a hard hat and safety glasses.

1. Use hammer (2) and drift (3) to drive out locking pin (5). Be careful not to damage rubber pin lock (4) while removing locking pin (5).
2. Inspect locking pin (5) and rubber pin lock (4) for any damage. Replace short or damaged locking pins as illustrated below with new ones.

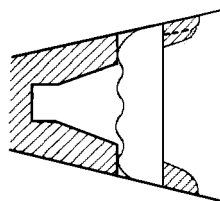


M104-07-056

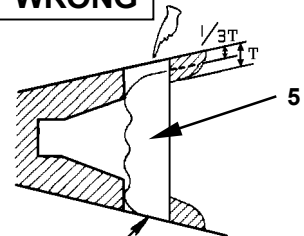


M589-07-017

RIGHT



WRONG

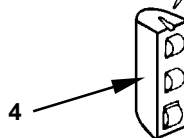


Level the bottom surfaces.
Lock pin length is too short.

M104-07-118

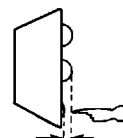
M104-07-058

WRONG



Steel balls almost come off due to damage to the lock rubber.

WRONG

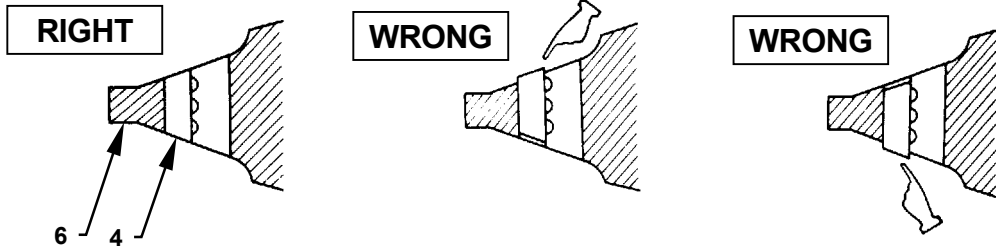


Steel balls can be depressed by finger force.

M104-07-059

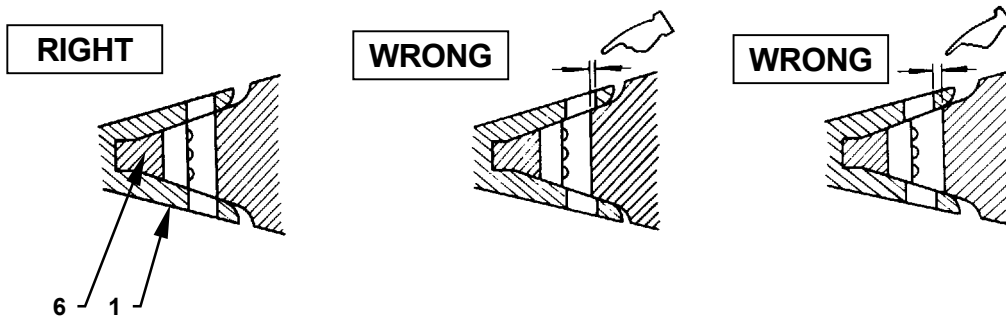
MAINTENANCE

- Clean shank (6) surface.
- Install rubber pin lock (4) into shank (6) hole as shown.



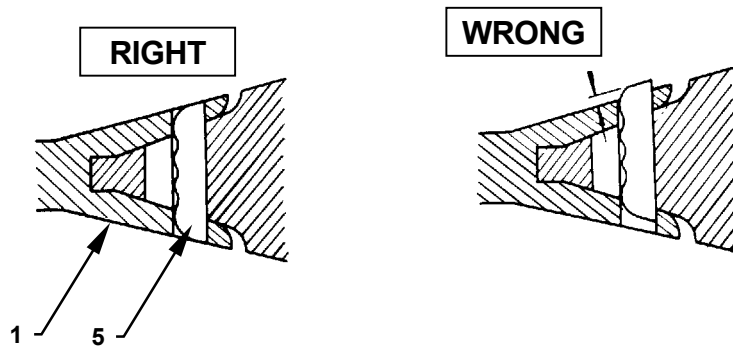
M104-07-060

- Position new tooth (1) over shank (6).



M104-07-061

- Drive locking pin (5) fully into the hole as shown.



M104-07-062

MAINTENANCE

2 Replace Bucket

WARNING: When driving the connecting pins in or out, guard against injury from flying pieces of metal or debris; wear a hard hat, goggles or safety glasses, heavy gloves and safety equipment appropriate for the job.

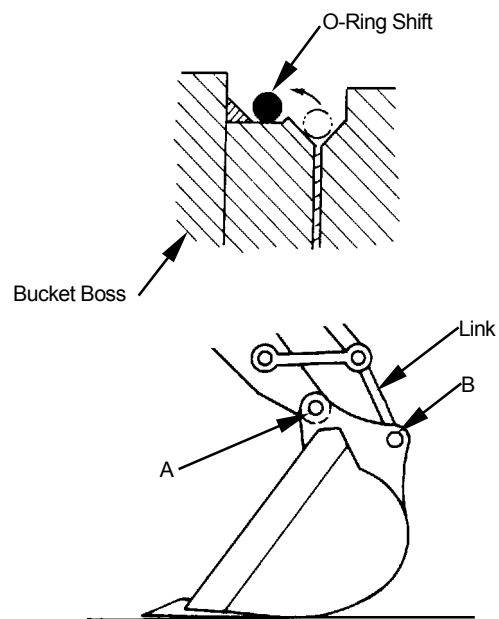
Select a spacious job site with good footing. Start working only after ensuring the safety of other personnel around the machine. Avoid quick operation of the front attachment. Give the highest priority to safety when engaging in teamwork by strictly exchanging safety signs.

Removal

1. Park the machine on a level surface. Lower the bucket to the ground and position it with the flat surface resting on the ground. Be sure the bucket will not roll when the pins are removed.
2. Slide the O-rings out of the specified position to the bucket boss side.
3. Remove bucket pins A and B to separate the arm and bucket.

Installation

1. Clean the removed pins and pin bores. Apply sufficient grease to the pins and pin bores.
2. Place a new bucket in a stabilized position.
3. Join the arm to hole A and the link to hole B with pins.
4. Securely install the lock washers to all pins.
5. Reinstall the sealing O-ring to the specified position.
6. Apply grease to all pin joints.
7. Start the engine and run it at slow idle. Slowly operate the bucket in both directions to check for any interference in bucket movement.



M104-07-063

MAINTENANCE

3 Adjust Track Sag (rubber crawler) and Check for Damage --- daily

Proper track sag adjustment is necessary to extend the service life of the rubber track and the travel device.

Check Track Sag

As illustrated to the right, raise the one side track which sag is to be measured, off the ground. Place blocks under machine frame to support the machine. Rotate the rubber track so that the track joint is positioned at the upper center of the track. Measure distance (A) from the bottom of the lower roller tread to the inner ridge of the rubber track.

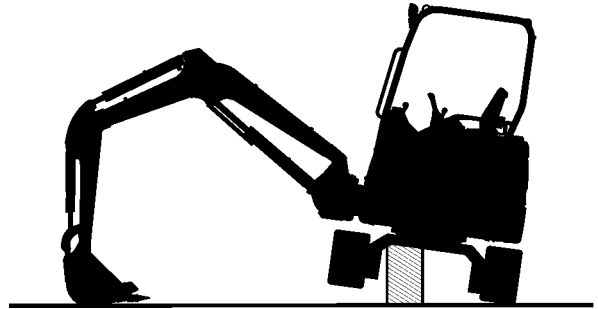
	Dimension
Track Sag Specifications A in mm (in.)	10 to 15 (0.39 to 0.59)

Adjusting Track Sag

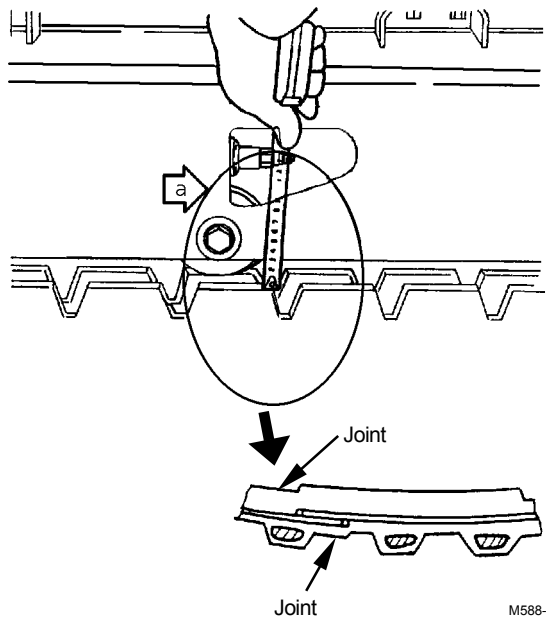
1. If track sag is not within specifications, loosen or tighten the track following the procedures shown on the next page.
2. Before adjusting track sag, lower the bucket and blade to the ground to raise both tracks off the ground. Be sure to place blocks under machine frame to support the machine.
3. After adjusting track sag of both tracks, run the tracks back and forth several times to equalize the track sag on both side tracks.
4. After doing so, check track sag again. If track sag is not within specifications, repeat adjustment until the correct sag is obtained.

Check Rubber Track for Damage

Check the rubber track for damage. If any, consult your nearest Hitachi dealer for repair.

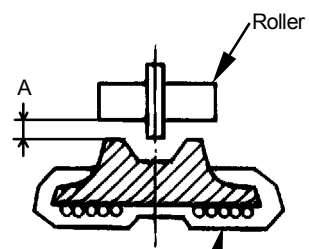


M1M7-04-006



M588-07-055

M102-07-075



Track Sag (rubber crawler)

Side a

M503-05-050

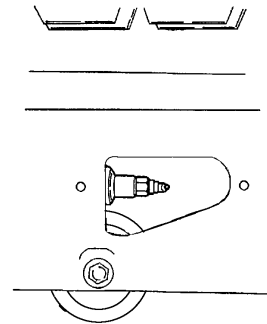
MAINTENANCE

Loosen Track (Rubber Crawler)

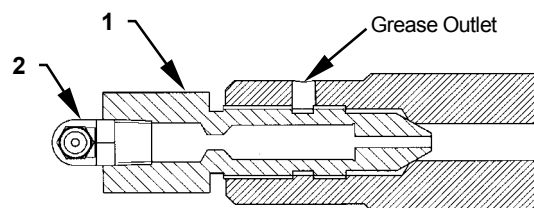
WARNING: Do not loosen valve (1) too quickly or too much as high-pressure grease in the adjusting cylinder may spout out. Loosen carefully, keeping body parts and face away from valve (1). Never loosen grease fitting (2).

IMPORTANT: When gravel or mud is packed around the components in the undercarriage, remove it before loosening valve (1).

1. To loosen track, slowly turn valve (1) counterclockwise using a socket wrench (long socket 19); grease will escape from grease outlet.
2. Between 1 and 1.5 turns of valve (1) are sufficient to loosen track. Never attempt to loosen the valve further.
3. If grease does not drain smoothly, raise the track to be loosed off the ground and slowly rotate the track.
4. When proper track sag is obtained, turn valve (1) clockwise and tighten it to 88 N·m (9 kgf·m, 65 lbf·ft).



M1LA-07-012

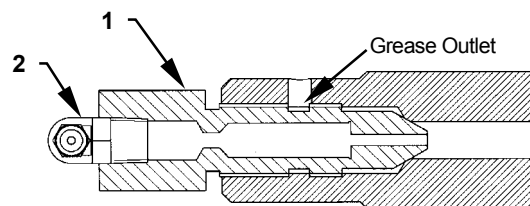


M1LA-07-036

Tighten Track (Rubber Crawler)

WARNING: In case the track sag is not adjustable, this is a very hazardous situation. Since the track adjuster spring is excessively loaded, the grease pressure inside the track adjuster cylinder is very high. Incorrect adjustment or disassembly may result in personal injury and/or death. Immediately consult your nearest Hitachi dealer for repair.

To tighten track, connect a grease gun to cylinder grease fitting (2) located inside the side frame and add grease until the sag is within specifications.



M1LA-07-036

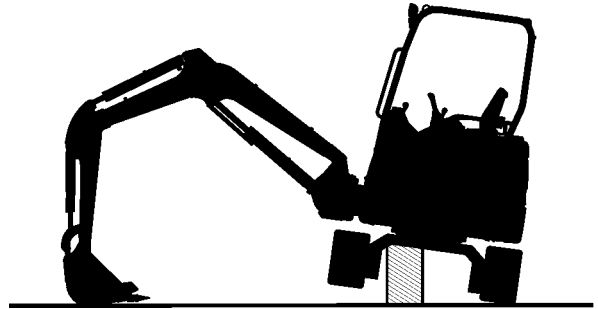
MAINTENANCE

4 Replace Rubber Track

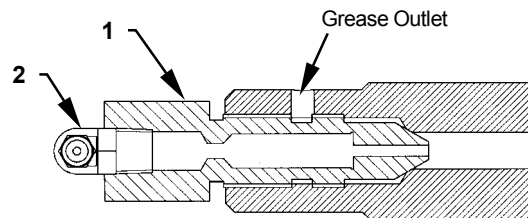


WARNING:

- Do not loosen valve (1) too quickly or too much as high-pressure grease in the adjusting cylinder may spout out. Loosen carefully, keeping body parts and face away from valve (1). Never loosen grease fitting (2).
- When removing the rubber track, do not allow anyone to stand in front of the front idler. During this procedure, the high power track adjuster may suddenly release the front idler with extreme force, potentially resulting in personal injury or death.
- After the rubber track is removed, the front idler will become free to remove. If the front idler comes off unexpectedly, personal injury and/or death may result. Be sure to remove the rubber track only after taking appropriate measures to prevent the front idler from coming off.



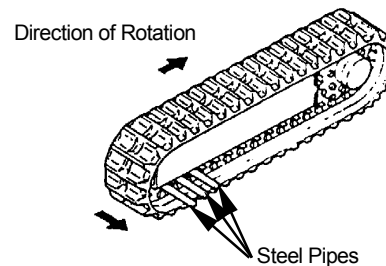
M1M7-04-006



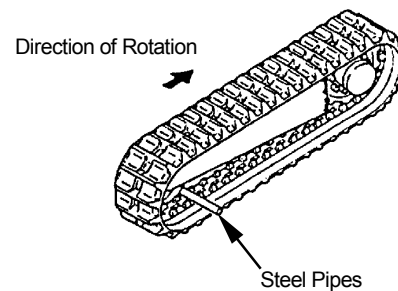
M1LA-07-036

Removing Rubber Track

1. Lower the bucket and blade to raise both tracks off ground, as shown. Place blocks under machine frame to support the machine.
2. Slowly turn valve (1) counterclockwise to allow grease to escape from the grease outlet.
3. Insert two or three steel pipes into the gaps among lower rollers, track frame and rubber track and slowly rotate the track in reverse to lift the rubber track off the idler. Apply horizontal force to pry the rubber track off the idler. Before completely removing the rubber track from the front idler, take an appropriate measure to prevent the front idler from coming off. Then, remove the rubber track.



M503-07-062

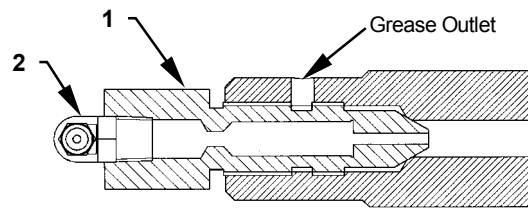


M503-07-063

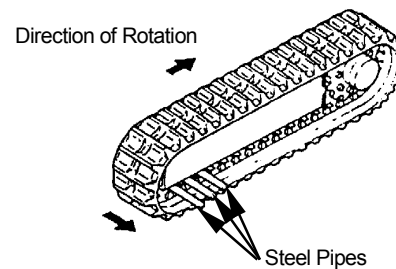
MAINTENANCE

Installing Rubber Track

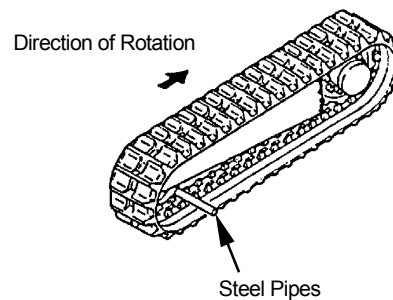
1. Lower the bucket and blade to raise both tracks off ground. Place blocks under machine frame to support the machine.
2. Slowly turn valve (1) counterclockwise to allow grease to escape from the grease outlet.
3. Engage the rubber track with the sprocket and position the other end of the rubber track on the front idler.
4. While rotating the sprocket in reverse, apply horizontal force to the rubber track to seat it on the idler.
5. Insert a steel pipe into gaps among lower rollers, track frame and rubber track and rotate the rubber track slowly to correctly seat the rubber track on the idler.
6. Confirm that the rubber track is correctly engaged with the sprocket and idler.
7. Adjust track sag. (See page 7-51.)
8. After checking that the rubber track is correctly engaged with the sprocket and idler and the track sag is correctly adjusted, lower the machine to the ground.



M1LA-07-036



M503-07-062



M503-07-063

MAINTENANCE


5 Check Track Sag (steel crawler) --- every 50 working hours

Proper adjustment of track sag is vital to extending the service life of the track and travel device.

Check Track Sag

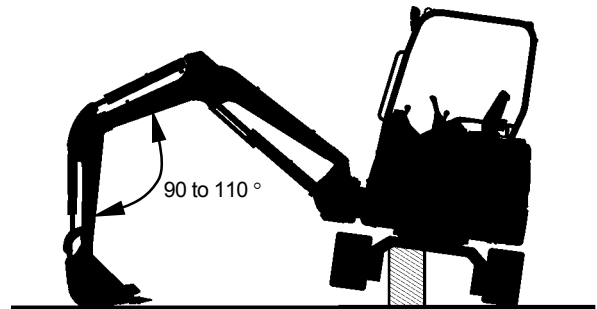
As illustrated to the right, raise the one side track, which sag is measured, off the ground. Place blocks under machine frame to support the machine.

Track Sag Specifications	Dimension
A in mm (in.)	85 to 100 (3.3 to 3.9)

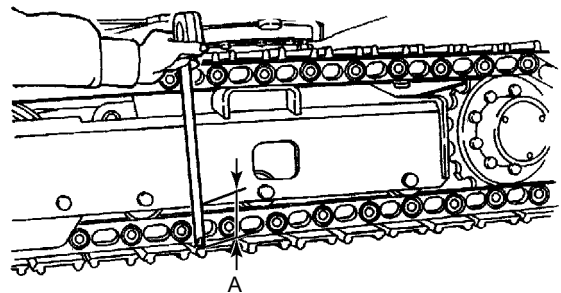
-  **NOTE:**
- Check track sag after thoroughly removing soil stuck on track area by pressure washing.
 - When operating the machine on ground such as mud or gravel, these materials may easily become packed into the undercarriage, adjust the track sag so that it is slightly loose.

Adjusting Track Sag

1. If track sag is not within specifications, loosen or tighten the track following the procedures shown on the next page.
2. When adjusting track sag, lower the bucket to the ground to raise one track off the ground. Repeat this procedure to raise the other track. Every time, be sure to place blocks under machine frame to support the machine.
3. After adjusting track sag of both tracks, move the machine back and forth several times to equalize the track sag on both side tracks.
4. After doing so, check track sag again. If track sag is not within specifications, repeat adjustment until the correct sag is obtained.



M1M7-04-006



M588-07-062

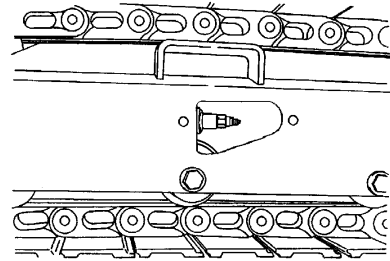
MAINTENANCE

Loosen Track (Steel Crawler)

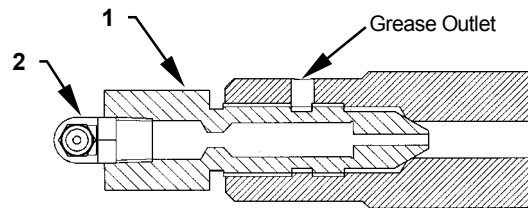
WARNING: Do not loosen valve (1) too quickly or too much as high-pressure grease in the adjusting cylinder may spout out. Loosen carefully, keeping body parts and face away from valve (1). Never loosen grease fitting (2).

IMPORTANT: When gravel or mud is packed around the components in the undercarriage, remove it before loosening valve (1).

1. To loosen track, slowly turn valve (1) counterclockwise using a socket wrench (long socket 19); grease will escape from grease outlet.
2. Between 1 and 1.5 turns of valve (1) are sufficient to loosen track. Never attempt to loosen the valve further.
3. If grease does not drain smoothly, raise the track to be loosed off the ground and slowly rotate the track.
4. When proper track sag is obtained, turn valve (1) clockwise and tighten it to 88 N·m (9 kgf·m, 65 lbf·ft).



M1LA-07-013

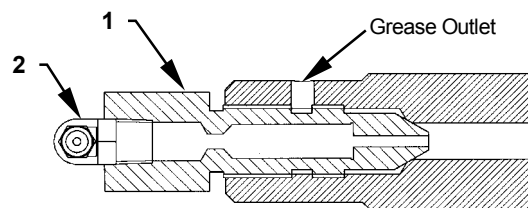


M1LA-07-036

Tighten Track (Steel Crawler)

WARNING: In case the track sag is not adjustable, this is a very hazardous situation. Since the track adjuster spring is excessively loaded, the grease pressure inside the track adjuster cylinder is very high. Incorrect adjustment or disassembly may result in personal injury and/or death. Immediately consult your nearest Hitachi dealer for repair.

To tighten track, connect a grease gun to cylinder grease fitting (2) located inside the side frame and add grease until the sag is within specifications.



M1LA-07-036

MAINTENANCE

Converting the Track



WARNING:

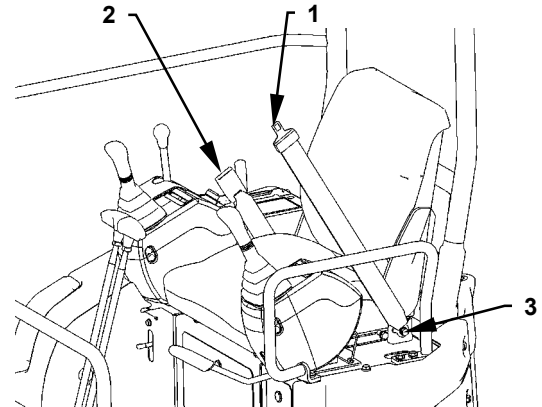
- **Consult your nearest authorized dealer for converting the track. Extremely strong force is being applied. Do not allow anyone to stand in front of the front idler.**
- **After the rubber track is removed, the front idler will become free to rotate. If the front idler comes off unexpectedly, personal injury and/or death may result. Be sure to remove the rubber track only after taking an appropriate measure to prevent the front idler from coming off.**

Consult your nearest authorized dealer for converting the track. Change the track adjuster whenever converting the steel or rubber track.

MAINTENANCE

6 Check and Replace Seat Belt Check --- daily Replace --- every 3 years

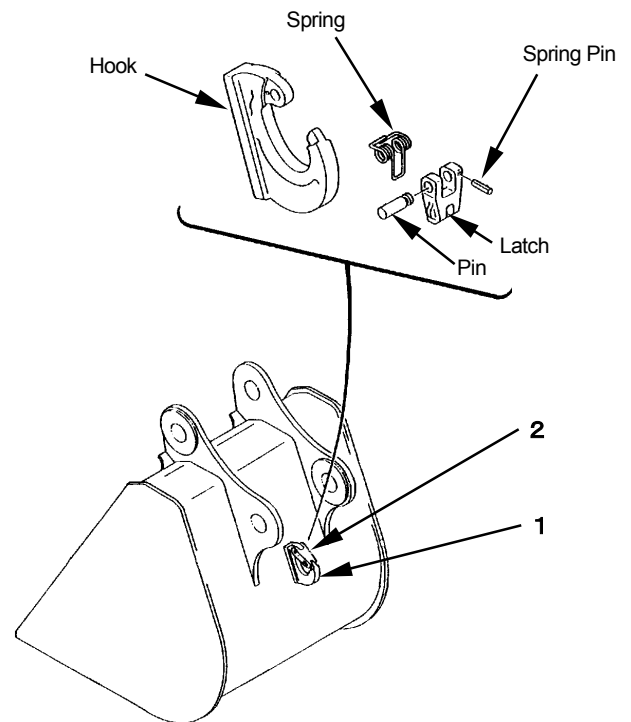
Prior to operating the machine, thoroughly examine belt (1), buckle (2) and attaching hardware (3). If any item is damaged or materially worn, replace the damaged or worn item(s) before operating the machine. Replace seat belt (1) every three years regardless of its apparent condition.



M1MS-07-026

7 Check Bucket Hook (Optional) --- daily

Perform lifting work only after checking hook (1) for wear, cracks, and deformations, the hook joint for cracks, and rope guide (2) (latch, spring, pin, and spring pin) for damage and malfunction.



M107-07-129

MAINTENANCE

8 Check Injection Nozzle

Cleaning-----every 1500 hours

Adjusting--- every 1500 hours

Consult your authorized dealer for inspection and repair

9 Adjust Valve Clearance--- every 1000 hours

Consult your authorized dealer for inspection and repair

10 Check and Clean Injection Device
--- every 1500 hours

Consult your authorized dealer for inspection and repair.

11 Measure Engine Compression Pressure
--- As required

Consult your authorized dealer for inspection and repair.

12 Check Starter and Alternator
--- As required

Consult your authorized dealer for inspection and repair.

13 Check Radiator Cap --- As required

Consult your authorized dealer for inspection and repair.

MAINTENANCE

14 Check Tightening Torque of Bolts and Nuts --- every 250 hours (first time after 50 hours)

Tighten or retighten all bolts and nuts to the torque values shown in the Table below. In addition, check bolts and nuts for looseness and omission. If any are loose or missing, be sure to retighten or supply new parts. Check tightness after the first 50 hours then every 250 hours.






No.	Descriptions		Bolt Dia. mm	Q'ty	Wrench Size mm	Torque		
						N·m	(kgf·m)	(lbf·ft)
1.	Engine cushion rubber mounting bolt		12	4	19	88	(9)	(65)
2.	Engine bracket mounting bolt (Front)		10	8	17	49	(5)	(36)
3.	Hydraulic oil tank mounting bolt		12	4	19	88	(9)	(65)
4.	Union joints for hydraulic hoses and pipes	Metal face seal fitting for hydraulic hoses and piping	7/16-20UNF		17	24.5	(2.5)	(18)
			9/16-18UNF		19	29.5	(3)	(22)
					22	39	(4)	(29)
			3/4-16UNF		27	93	(9.5)	(69)
		1-1/16-12UNF		36	175	(18)	(129)	
5.	Pump mounting bolt		12	2	19	88	(9)	(65)
6.	Pump cover mounting bolt		10	8	17	49	(5)	(36)
7.	Control valve mounting bolt		10	4	17	49	(5)	(36)
	Control valve base mounting bolt		10	4	17	49	(5)	(36)
8.	Swing device mounting bolt		12	4	19	88	(9)	(65)
9.	Battery mounting nut		6	4	10	5	(0.5)	(3.5)
10.	Canopy mounting bolt		10	3	17	49	(5)	(36)
			12	4	19	88	(9)	(65)
11.	Swing bearing mounting bolt	Upperstructure	10	16	17	49	(5)	(36)
		Undercarriage	10	18	17	49	(5)	(36)
12.	Travel device mounting bolt		10	16	8 (Socket)	64	(6.5)	(47)
13.	Sprocket mounting bolt		10	18	8 (Socket)	64	(6.5)	(47)
14.	Steel crawler guide mounting bolt		10	8	17	49	(5)	(36)
15.	Lower roller mounting bolt		14	12	22	177	(18)	(130)
16.	Cover mounting bolt		6		10	5	(0.5)	(3.5)
			8		13	9.8	(1)	(7)
			10		17	49	(5)	(36)
17.	Counterweight mounting bolt		20	3	30	400	(41)	(297)
18.	Front pin lock plate bolts		8		13	20	(2)	(14)
			10		17	49	(5)	(36)
			12		19	88	(9)	(65)
			14		22	137	(14)	(101)
			16		24	205	(21)	(152)

IMPORTANT:

- Before installing, clean the bolt and nut threads to remove soil, rust, and/or dust.
- When installing new bolts and/or nuts, apply lubricant (e.g. white zinc B solved into spindle oil) to the screw threads.
- Tighten bolts and nuts to the specifications. If tightened with excessively high or inadequate torque, missing or breakage of bolts and/or nut may result.
- In case the counterweight mounting bolts became loose, consult your nearest Hitachi dealer for retightening.

MAINTENANCE

Tightening Torque Chart

Nominal Size mm	Hexagon Head Bolt						Socket Bolt			
	  M552-07-091		  M552-07-090		 M552-07-092		Wrench Size mm	Socket Bolt		Wrench Size mm
	N·m	(kgf·m)	N·m	(kgf·m)	N·m	(Kgf·m)		N·m	(kgf·m)	
6					3,3 to 4.2	(0.3 to 0.4)	10			5
8	29.5	(3.0)	19.5	(2.0)	9.8	(1)	13	19.5	(2.0)	6
10	64	(6.5)	49	(5)	19.5	(2)	17	49	(5)	8
12	108	(11)	88	(9)	34	(3.5)	19	88	(9)	10
14	175	(18)	137	(14)	54	(5.5)	22	137	(14)	12
16	265	(27)	205	(21)	78	(8)	24	205	(21)	14
18	390	(40)	295	(30)	118	(12)	27	295	(30)	14
20	540	(55)	390	(40)	167	(17)	30	390	(40)	17
22	740	(75)	540	(55)	215	(22)	32			
24	930	(95)	690	(70)	275	(28)	36			
27	1370	(140)	1030	(105)	390	(40)	41			
30	1910	(195)	1420	(145)	540	(55)	46			
33	2550	(260)	1910	(195)	740	(75)	50			
36	3140	(320)	2400	(245)	930	(95)	55			

CONSUMABLE PARTS LIST


CONSUMABLE PARTS LIST

Filter Element

	Parts No
Full Flow Filter	4454705
Hydraulic Oil Suction Filter	4479355
Pilot Filter	4294130
Engine Oil Filter	4661289
Fuel Filter	4667073
Water Separator	4667074
Air Cleaner Element	4383875

Bucket Parts

		Part No.	Quantity
Tooth	Tooth	4339865	3
	Lock Pin	4339868	3
	Lock Rubber	4339867	3
Side Cutter	Side Cutter (R)	4626441	1
	Side Cutter (L)	4626442	1
	Bolt	J921440	6
	Spring Washer	A590914	6
	Nut	J950014	6
O-ring		4275463	(4)
Shim		4354264	2

 **NOTE:** The quantities shown in the above tables are those required for the one standard bucket. The quantities for an optional bucket may differ. The figures in () in the O-ring columns include the O-ring quantities used at the joints between the arm and the link. Shims are used to adjust the clearance at the joint between the arm and bucket.

MAINTENANCE UNDER SPECIAL ENVIRONMENTAL CONDITIONS

MAINTENANCE UNDER SPECIAL ENVIRONMENTAL CONDITIONS

Operating Conditions	Precautions for Maintenance	
Muddy Soil, Rainy or Snowy Weather	Before Operation: After Operation:	Check the tightness of plugs and all drain cocks. Clean the machine and check for cracks, damaged, loose or missing bolts and nuts. Lubricate all necessary part without delay.
Near the Ocean	Before Operation: After Operation:	Check the tightness of plugs and all drain cocks. Thoroughly clean the machine with fresh water to wash off salt. Service electrical equipment often to prevent corrosion.
Dusty Atmosphere	Air Cleaner: Radiator: Fuel System: Electrical Equipment:	Clean the element regularly, at shorter service intervals. Clean the oil cooler screen to prevent clogging of the radiator core. Clean the filter element and strainer regularly, at shorter service intervals. Clean them regularly, in particular, the commutator surface of the alternator and starter.
Rocky Ground	Tracks: Front Attachment:	Carefully operate while checking for cracks, damage and loose bolts and nuts. Loosen the tracks a little more than usual. Standard attachment may be damaged when digging rocky ground. Reinforce the bucket before using it, or use a heavy duty bucket.
Freezing Weather	Fuel: Lubricant: Engine Coolant: Battery: Tracks:	Use high quality fuel suitable for low temperature. Use high quality low viscosity hydraulic oil and engine oil. Be sure to use antifreeze. Fully charge the batteries regularly with shorter service intervals. If not charged fully, electrolyte may freeze. Keep the tracks clean. Park the machine on a hard surface to prevent the tracks from freezing to the ground.
Falling Stones	Cab:	Provide a cab guard to protect the machine from falling stones when necessary.
High Ground (Altitudes: Higher than 1500 m (4900 ft))	Engine oil: Engine oil filter: ※	Change at 1/2 normal service intervals. Replace at 1/2 normal service intervals. When the machine is operated at the altitudes of 2000 m (6600 ft) or higher, the ignition of the engine may be deteriorate, possibly resulting in significant reduction in durability or function. In case the machine is unavoidably operated under these conditions, consult your nearest Hitachi dealer in advance.

STORAGE

STORING THE MACHINE

1. Thoroughly wash the machine to remove dirt, soil and debris from the machine.
2. Inspect the machine. Repair worn or damaged parts. Install new parts if necessary.
3. Clean the primary air cleaner element.
4. Lubricate all grease points.
5. Retract all hydraulic cylinders, if possible. If not, coat exposed cylinder rods with grease.
6. Park the tracks on long stable blocks.
7. Remove the batteries and store them in a dry protected place after charging fully. If not removed, disconnect the negative battery cable from the (-) terminal.
8. Add an antirust agent to the coolant. In cold weather, add an antifreeze, or drain the coolant completely. Be sure to attach a "No Water in Radiator" tag on a clearly visible location if the system is drained.
9. Loosen the alternator belt and fan belt.
10. Paint necessary areas to prevent rust.
11. Store the machine in a dry, protected place. If stored outside, cover with a waterproof cover.
12. If the machine is stored for a long time, oil films on sliding surfaces may break down. Operate the travel, swing and digging functions, 2 to 3 cycles each, to lubricate the sliding surfaces, at least once a month. Be sure to check the coolant level and lubrication conditions before operating.

STORAGE

REMOVING THE MACHINE FROM STORAGE



WARNING: Start the engine **ONLY** in a well-ventilated place.

1. Remove grease from the cylinder rods if coated.
2. Adjust alternator and fan belt tension.
3. Fill the fuel tank. Bleed air from the fuel system. Check all fluid levels.
4. Start the engine.
Run the engine at half speed for several minutes before beginning full load operation.
5. Operate all hydraulic functions several cycles.
6. Carefully check all systems before operating the machine with a full load.



NOTE: *When the machine has been stored for a long time, be sure to perform the following steps as well:*

- (a) *Check the condition of all hoses and connections.*
- (b) *Warm up the engine.*
- (c) *Stop the engine.*
- (d) *Install new fuel filters. Replace the engine oil filter and fill the engine with oil.*

IMPORTANT: **If the machine is not used for a long time, oil films on sliding surfaces may have break down. Operate the travel, swing and digging functions, 2 to 3 cycles each to lubricate the sliding surfaces.**

TROUBLESHOOTING

TROUBLESHOOTING

If any problem is found, troubleshoot to pinpoint the cause and take appropriate action to prevent the problem from occurring again. If the cause cannot be pinpointed, contact your authorized dealer.



WARNING: Never attempt to adjust, disassemble, or repair hydraulic or electrical components by yourself.

1. Engine

Trouble	Cause	Solution
Engine does not start.	<ul style="list-style-type: none"> • Starter does not rotate • Engine is too cold • Incomplete air bleeding from the fuel system • No fuel in the fuel tank • Fuel filter restriction 	<ul style="list-style-type: none"> • If the battery power is low, recharge or replace the battery. • If the starter has failed, repair or replace. • If the connections are loose or corroded, clean and tighten. • Preheat the engine or warm up coolant. (Pour some hot water into the cooling system.) • Thoroughly bleed air. • Refuel. • Clean or replace the fuel filter.
Engine stalls.	<ul style="list-style-type: none"> • No fuel in the fuel tank • Air in the fuel system 	<ul style="list-style-type: none"> • Refuel. • Re-tighten connections and bleed.
Low engine oil pressure (Engine oil pressure indicator comes on)	<ul style="list-style-type: none"> • Insufficient engine oil • Oil leak at connections • Oil pressure switch failure 	<ul style="list-style-type: none"> • Add oil. • Repair. • Replace.
Engine knocks or runs irregularly.	<ul style="list-style-type: none"> • Fuel filter restriction • Air in the fuel system • Air cleaner restriction 	<ul style="list-style-type: none"> • Clean or replace the filter. • Re-tighten connections and bleed. • Clean or replace the element.
Engine overheats	<ul style="list-style-type: none"> • Insufficient coolant and/or coolant leak • Loose fan belt or oil on fan belt • Radiator fins are clogged or bent • Thermostat failure 	<ul style="list-style-type: none"> • Add coolant. Repair leak. • Adjust or replace the fan belt. • Clean and/or repair. • Replace.


2. Electrical System

Trouble	Cause	Solution
Starter does not rotate.	<ul style="list-style-type: none"> • Harness failure • Low battery power • Loose or corroded battery connections • Key switch failure 	<ul style="list-style-type: none"> • Inspect and repair. • Charge the battery. • Clean and tighten. • Replace.
Alternator indicator does not go off after engine is started.	<ul style="list-style-type: none"> • Alternator failure • Harness failure 	<ul style="list-style-type: none"> • Replace • Inspect and repair.
Monitor indicators do not come on or gauges do not operate.	<ul style="list-style-type: none"> • Blown fuse • Sensor failure • Harness failure • Burned indicator bulb(s) 	<ul style="list-style-type: none"> • Replace • Replace • Inspect and repair. • Replace
Travel mode does not shift from fast mode to slow mode and/or vice versa.	<ul style="list-style-type: none"> • Shift switch failure • Harness failure • Switch valve failure 	<ul style="list-style-type: none"> • Replace • Inspect and repair. • Replace

TROUBLESHOOTING

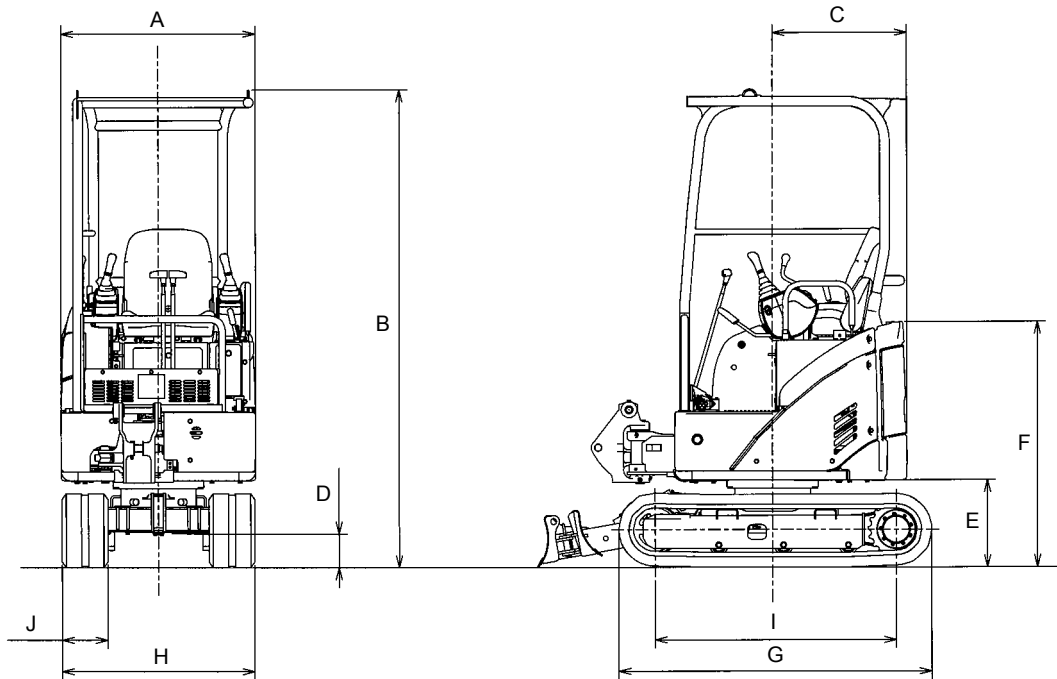
3. Hydraulic System

Trouble	Cause	Solution
Insufficient power: all actuators	<ul style="list-style-type: none"> • Insufficient engine power • Excessively worn hydraulic pump • Main relief valve failure • Hydraulic oil is low. • Suction filter restriction 	<ul style="list-style-type: none"> • Inspect and repair. • Replace. • Re-adjust pressure setting, or replace. • Add hydraulic oil. • Clean or replace.
Insufficient power: front attachment	<ul style="list-style-type: none"> • Failure or incorrect pressure setting of main or pilot relief valve • Damaged hydraulic cylinder packing • Damaged cylinder piston or cylinder tube 	<ul style="list-style-type: none"> • Re-adjust pressure setting, or replace. • Replace cylinder packing. • Replace cylinder piston, cylinder tube, or the cylinder.
Machine does not travel smoothly.	<ul style="list-style-type: none"> • Too tight track (sag) • Foreign matter, such as rocks, stuck in the tracks • Counterbalance valve failure • Travel motor performance drop 	<ul style="list-style-type: none"> • Adjust track sag. • Remove foreign matter. • Replace. • Replace.
Machine mistracks	<ul style="list-style-type: none"> • Track sag is not equal on both sides • Hydraulic pump performance drop • Oil leak inside control valve 	<ul style="list-style-type: none"> • Adjust track sag properly (and equally on both sides). • Replace. • Replace the control valve.
Insufficient swing power or jerky upperstructure swing	<ul style="list-style-type: none"> • Hydraulic pump performance drop • Low pressure valve setting • Swing motor performance drop • Swing bearing seizure • Foreign matter sticking in brake valve • Oil leak inside control valve 	<ul style="list-style-type: none"> • Replace. • Adjust pressure setting, or replace. • Replace. • Lubricate or replace swing bearing. • Clean the brake valve. • Replace the control valve.

 **NOTE:** Contact your authorized dealer for any inspection, adjustment, repair, and/or replacement as required.

SPECIFICATIONS

SPECIFICATIONS



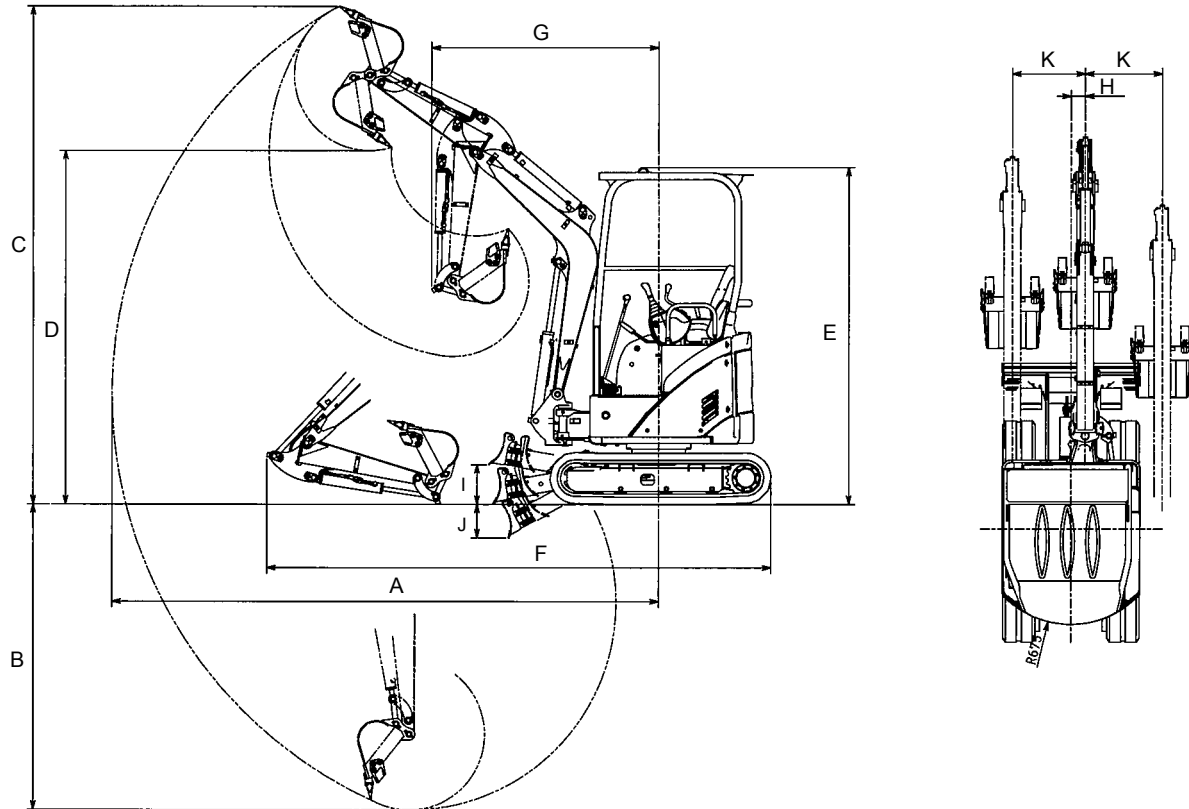
M1MS-12-001

Type		ZAXIS17U-2
		ROPS Canopy
Type of Front-End Attachment		Boom Swing Type
Bucket Capacity (Heaped)	m^3 (yd ³)	0.044 (0.058)
Operating Weight	kg (lb)	1770 (3900)
Basic Machine Weight	kg (lb)	1420 (3130)
Engine		Yanmar 3TNV70
	kW/min^{-1} (PS/rpm)	11.0/2400 (15.0/2400)
A: Overall Width	mm (ft-in)	980 (3'3")
B: Overall Height	mm (ft-in)	2400 (7'11")
C: Rear-End Swing Radius	mm (ft-in)	675 (2'3")
D: Minimum Ground Clearance	mm (ft-in)	165 (6")
E: Counterweight Height	mm (ft-in)	435 (1'5")
F: Engine Cover Height	mm (ft-in)	1230 (4'0")
G: Undercarriage Length	mm (ft-in)	1570 (5'2")
H: Undercarriage Width	mm (ft-in)	970 (3'2") / 1280 (4'2")
I: Sprocket Center to Idler Center	mm (ft-in)	1210 (3'12")
J: Track Shoe Width	mm (ft-in)	230 (9") (Rubber Crawler)
Ground Pressure	kPa (kgf/cm^2 , psi)	28.0 (0.29, 4.1)
Swing Speed	min^{-1} (rpm)	8.9
Travel Speed (fast/slow)	km/h (mph)	4.3/2.4 (2.7/1.5)
Gradeability		30° (tan $\theta = 0.58$)

NOTE: The dimensions do not include the height of the shoe lug.

SPECIFICATIONS

WORKING RANGES



M1MS-12-002

		ZAXIS17U-2
		Canopy
		ROPS Canopy
A: Maximum Digging Reach	mm (ft-in)	3900 (12'10") [4080 (13'5")]
B: Maximum Digging Depth	mm (ft-in)	2170 (7'1") [2370 (7'9")]
C: Maximum Cutting Height	mm (ft-in)	3560 (11'8") [3660 (12'0")]
D: Maximum Dumping Height	mm (ft-in)	2530 (8'4") [2630 (8'8")]
E: Transport Height		2380 (7'10")
(Rubber Crawler)	mm (ft-in)	2400 (7'11")
F: Overall Transport Length	mm (ft-in)	3590 (11'9") [3640 (11'11")]
G: Minimum Swing Radius	mm (ft-in)	1540 (5'1") [1630 (5'4")]
H: Boom-Swing Pivot Offset Distance	mm (ft-in)	100 (4")
I: Blade Bottom Highest Position		282 (11")
(above ground level)		
J: Blade Bottom Lowest Position		240 (9")
(above ground level)	mm (ft-in)	
K: Offset Distance	mm (ft-in)	L520 (L 1'9") / R550 (R1'10")
Maximum Boom-Swing Angle	Degree	L70° / R50°


NOTE: The dimensions do not include the height of the shoe lug.
The dimensions for the machine equipped with the long arm are shown in brackets [].

SPECIFICATIONS

SHOE TYPES AND APPLICATIONS

ROPS Canopy


Shoe Width	230 mm (1'0") Rubber Shoe	230 mm (1'0") Grouser Shoe
Application	For Paved Road (Standard)	For Ordinary Ground (Optional)
Operating Weight kg (lb)	1770 (3900)	1820 (4010)
Minimum Ground Clearance mm (ft-in)	165 (6")	160 (6")
Undercarriage Length mm (ft-in)	1570 (5'2")	1550 (5'1")
Undercarriage Width mm (ft-in)	970(3'2")/1280(4'2")	970(3'2")/1280(4'2")
Ground Pressure kPa (kgf/cm ² , psi)	28 (0.28, 4.0)	29 (0.29, 4.1)

 *NOTE: The specifications for the front-end attachment are for 0.93 m (3 ft 1 in) arm with ISO 0.044 m³ (0.058 yd³) bucket.*

SPECIFICATIONS

BUCKET TYPES AND APPLICATIONS

Bucket	Bucket Capacity m ³ (yd ³) ISO (Heaped)	Bucket Width mm		Front-End Attachment	
		(With side cutter) mm (in)	(Without side cutter) mm (in)	0.93 m (3'10") Arm	1.13 m (5'0") Arm
Hoe Bucket	0.02 (0.065)	300 (12")	250 (10")	⊙	⊙
	0.035(0.078)	350 (14")	300 (12")	⊙	⊙
	0.04 (0.092)	400 (16")	350 (14")	⊙	⊙
	0.044(0.105)	450 (18")	400 (16")	⊙	○
	0.05 (0.118)	500 (20")	450 (18")	○	□

 **NOTE:** (1) Symbols in the above table have the following meanings.

- ⊙: General excavating
- : Light duty excavating
- : Loading work

(2) Hoe bucket is applicable to the following types of work.

General excavating:

For digging and loading operation of sand, gravel, clay, ordinary earth and so on.

Light duty excavating:

For digging loading operation of dried, loosened earth, sand, mud so on.

Their bulk density shall be less than 1600 kg/m³ as a standard.

For loading operation of dried, loosened earth and sand.

Their bulk density shall be less than 1100 kg/m³ as a standard.

REFERENCE

ADDITIONAL COUNTERWEIGHT

The mass values of the additional counterweights are shown in the table below.

Model	Mass	Overhang from the end of the base machine
ZAXIS17U-2	80 kg (176lb)	80 mm (3.2 in)

Removal

Remove the additional counterweights by following the procedure below.

1. Suspend additional counterweight (1) using the lifting tools described below so that the counterweight doesn't fall.

Wire rope (2) × 2 : Breaking load: more than 7 kN

Pin Shackle (3) × 2 : JIS Nominal size: 8 or more

Eye bolt (4) × 2 : M16

2. Remove mounting bolts (5).



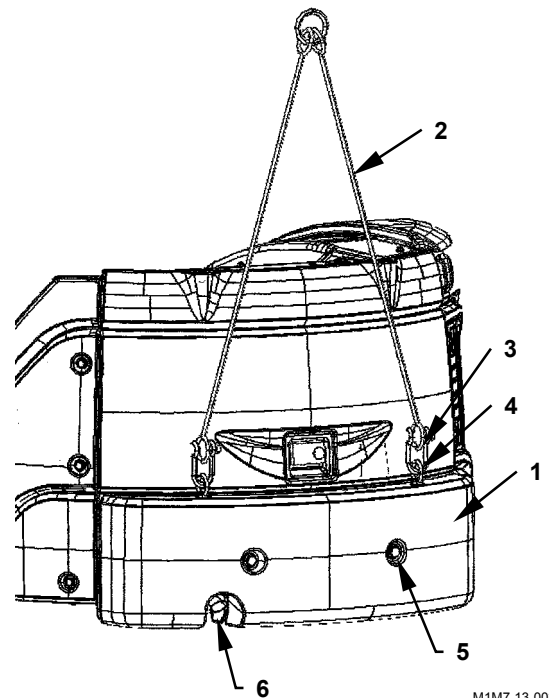
WARNING: Take care if the additional counterweight is eccentrically lifted, the lifted counterweight may widely sway. Place the removed additional counterweight on a level surface.

Installation

1. Lift the additional counterweight using the lifting tools described above. Mount the additional counterweight on the standard counterweight. Tighten mounting bolts (5).

Wrench Size : 24 mm

Tightening Torque : 265 N·m (27 kgf·m, 195 lbf·ft)



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REFERENCE

MEMO

Area with horizontal dotted lines for writing.

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