

OPERATOR'S MANUAL

EX1900-5

HYDRAULIC EXCAVATOR

Serial No. 000101 and up

HITACHI

INTRODUCTION

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

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.

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 when defects occur 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.

Moreover, when replacement parts are required, be sure to use genuine Hitachi parts. Failure to do so may result in voiding the warranty and/or denial of field improvements.

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/service the machine.

The Yellow Pages in this operator's manual contain IMPORTANT SAFETY INFORMATION.

Read these pages thoroughly and familiarize yourself with the safety standards and recommendations set forth in these yellow pages of the manual. Follow all safety instructions prior to and while operating the excavator.

Prior to operating this machine, it may be necessary to make modifications to it so that it complies with the local standards (including safety standards) and requirements of your country. Please do not operate this machine until such compliance has been confirmed. Please contact Hitachi Construction Machinery Co., Ltd. or any of our authorized concerning compliance.



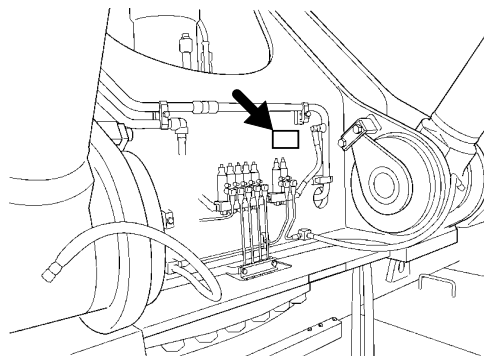
All information, illustrations and specifications in this manual are based on the latest product information available at the time of publication. The right is reserved to make changes at any time without notice.

MACHINE NUMBERS

MACHINE TYPE AND SERIAL NUMBER

TYPE: _____

PRODUCT
IDENTIFICATION
NUMBER: _____



M18C-01-001

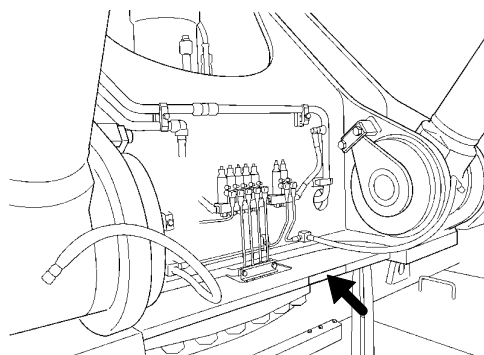
PRODUCT IDENTIFICATION NUMBER

PRODUCT
IDENTIFICATION
NUMBER: _____



NOTE:

18CP000101 Marks to indicate the start and end of the PIN
PRODUCT IDENTIFICATION
NUMBER (PIN)

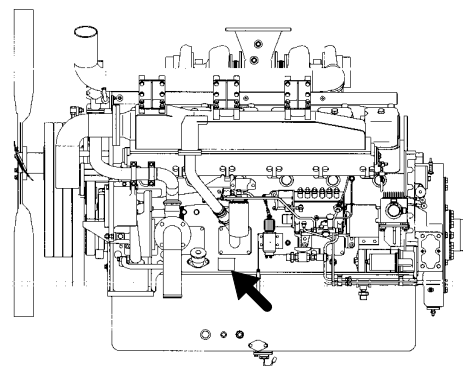


M18C-01-001

ENGINE TYPE AND SERIAL NUMBER

TYPE: _____

MFG. NO.: _____

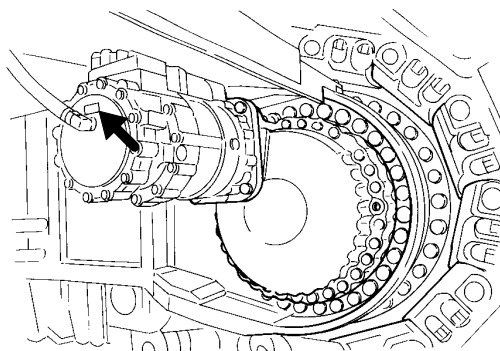


M18C-01-002

TRAVEL MOTOR TYPE AND SERIAL NUMBER

TYPE: _____

MFG. NO.: _____



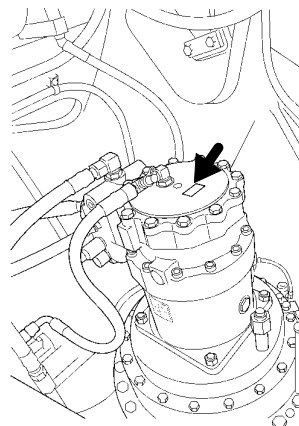
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MACHINE NUMBERS

SWING MOTOR TYPE AND SERIAL NUMBER

TYPE: _____

MFG. NO.: _____

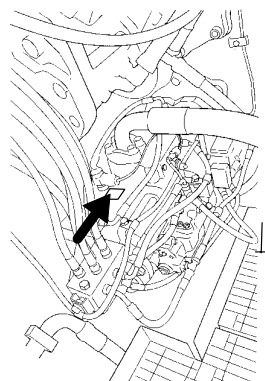


M18C-01-003

HYDRAULIC PUMP TYPE AND SERIAL NUMBER

TYPE: _____

MFG. NO.: _____

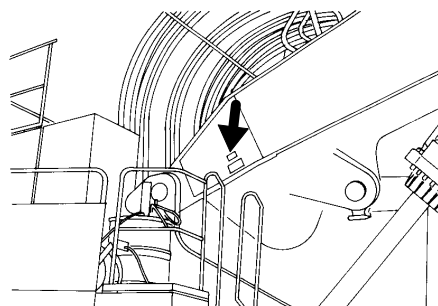


M18C-01-004

FRONT TYPE AND SERIAL NUMBER (Loading Shovel)

TYPE: _____

MFG. NO.: _____

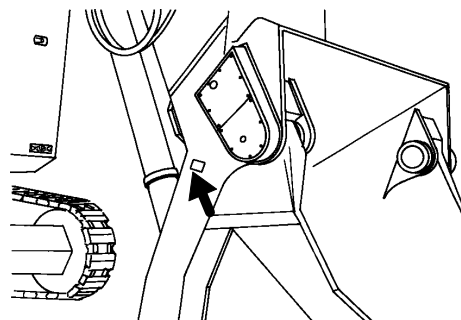


M117-12-001

BUCKET TYPE AND SERIAL NUMBER (Loading Shovel)

TYPE: _____

MFG. NO.: _____



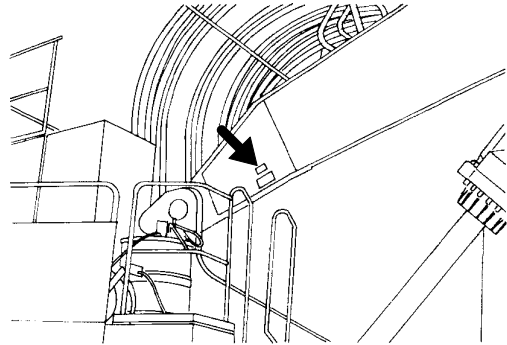
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MACHINE NUMBERS

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MFG. NO.: _____

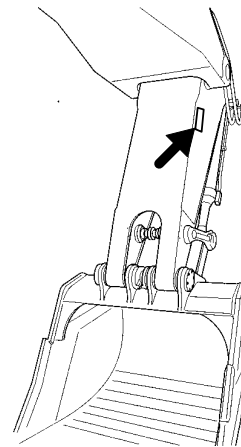


M18C-01-033

FRONT TYPE AND SERIAL NUMBER (Backhoe Arm)

TYPE: _____

MFG. NO.: _____

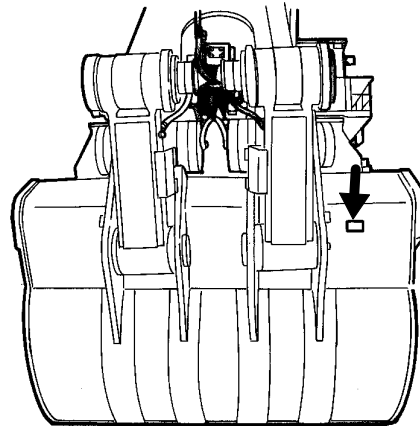


M18C-01-005

BUCKET TYPE AND SERIAL NUMBER (Backhoe)

TYPE: _____

MFG. NO.: _____



M146-01-020

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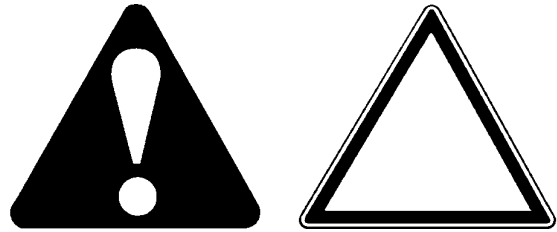
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SAFETY

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.



001-E01A-0001

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.
-
- **CAUTION** also calls attention to safety messages in this manual.
- 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.



IMPORTANT



SA-1223

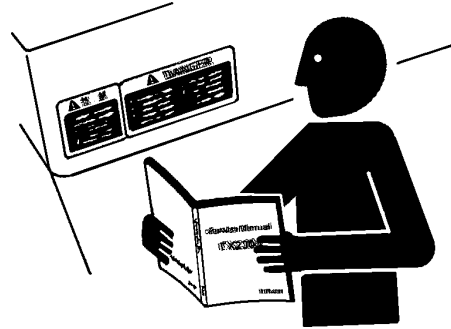
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SAFETY

FOLLOW SAFETY INSTRUCTIONS

- Carefully read and follow all safety signs on the machine and all safety messages in this manual.
- Safety signs should be installed, maintained and replaced when necessary.
 - If a safety sign or this manual is damaged or missing, order a replacement from your authorized dealer in the same way you order other replacement parts (be sure to state machine model and serial number when ordering).
- Learn how to operate the machine and its controls correctly and safely.
- Allow only trained, qualified, authorized personnel to operate the machine.
- Keep your machine in proper working condition.
 - Unauthorized modifications of the machine may impair its function and/or safety and affect machine life.
- 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 hazardous situation you may encounter. If you have any questions, you should first consult your supervisor and/or your authorized dealer before operating or performing maintenance work on the machine.

003-E01B-0003

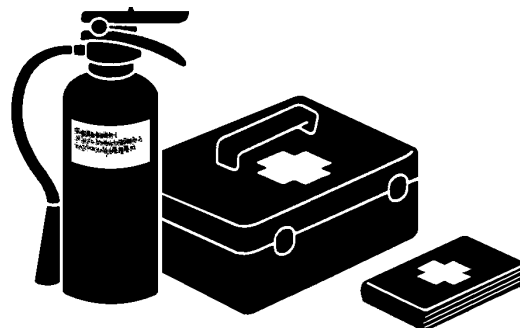


SA-003

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 to 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 fires and accidents.
- Keep emergency numbers for doctors, ambulance service, hospital, and fire department posted near your telephone.

004-E01A-0437



SA-437

SAFETY

WEAR PROTECTIVE CLOTHING

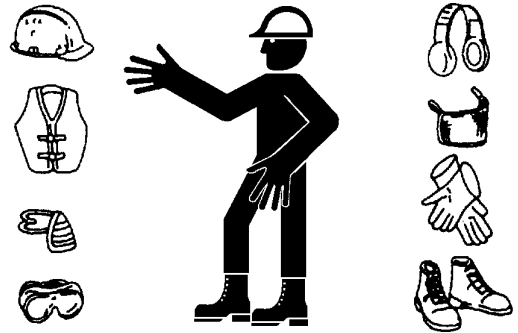
- Wear close fitting clothing and safety equipment appropriate to the job.

You may need:

- A hard hat
- 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

005-E01A-0438

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.



006-E01A-0434

SA-434

INSPECT MACHINE

- Inspect your machine carefully each day or shift by walking around it before you start it to avoid personal injury.
- In the walk-around inspection, be sure to cover all points described in the "PRE-START INSPECTION" chapter in the operator's manual.



007-E01A-0435

SA-435

SAFETY

GENERAL PRECAUTIONS FOR CAB

- Before entering the cab, thoroughly remove all dirt and/or oil from the soles of your work boots. If any controls such as a pedal is operated while with dirt and/or oil on the soles of the operator's work boots the operator's foot may slip off the pedal, possibly resulting in a personal accident.
- Don't leave parts and/or tools lying around the operator's seat. Store them in their specified locations.
- Avoid storing transparent bottles in the cab. Don't attach any transparent type window decorations on the windowpanes as they may focus sunlight, possibly starting a fire.
- Refrain from listening to the radio, or using music headphones or mobile telephones in the cab while operating the machine.
- Keep all flammable objects and/or explosives away from the machine.
- After using the ashtray, always cover it to extinguish the match and/or tobacco.
- Don't leave cigarette lighters in the cab. When the temperature in the cab increases, the lighter may explode.

524-E01A-0000

SAFETY

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 and 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.
 - Be careful of slippery conditions on platforms, steps, and handrails when leaving the machine.



SA-439

008-E01A-0439

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 misoperations.
 - The seat should be adjusted whenever changing the operator for the machine.
 - The operator should be able to fully depress the pedals and to correctly operate the control levers with his back against the seat back.
 - If not, move the seat forward or backward, and check again.



SA-378

009-E01A-0378

SAFETY

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.
- 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.
- Be sure to remain seated with the seat belt securely fastened at all times when the machine is in operation to minimize the chance of injury from an accident.
- We recommend that the seat belt be replaced every three years regardless of its apparent condition.

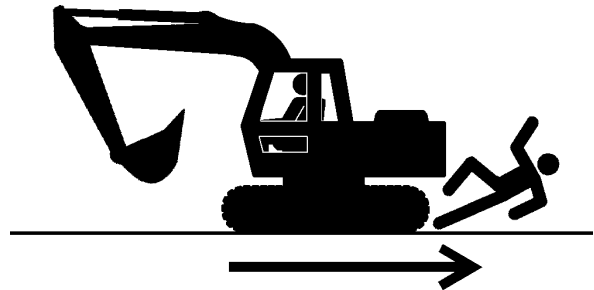


SA-237

010-E01A-0237

MOVE AND OPERATE MACHINE SAFELY

- Bystanders can be run over.
- 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). It warns people when the machine starts to move.
- Use a signal person when moving, swinging, or operating the machine in congested areas. Coordinate hand signals before starting the machine.



SA-426

011-E01A-0426

HANDLE STARTING AIDS SAFELY

Starting fluid:

- Starting fluid is highly flammable.
- Keep all sparks and flame away when using it.
- Keep starting fluid well away from batteries and cables.
- Remove container from machine if engine does not need starting fluid.
- To prevent accidental discharge when storing a pressurized container, keep the cap on the container, and store it in a cool, well-protected location.
- Do not incinerate or puncture a starting fluid container.



SA-293

036-E01A-0293-3

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 from the operator's seat.
- NEVER start the engine while standing on the track or on ground.
- Do not start engine by shorting across starter terminals.
- Before starting the engine, confirm that all control levers are in neutral.

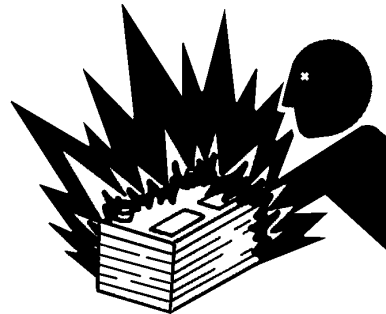


SA-444

012-E01B-0444

JUMP STARTING

- Battery gas can explode, resulting in serious injury.
- If the engine must be jump started, be sure to follow the instructions shown in the "OPERATING THE ENGINE" chapter.
- The operator must be 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.

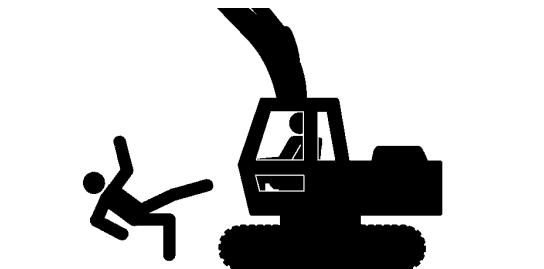


SA-032

S013-E01A-0032

KEEP RIDERS OFF MACHINE

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



SA-379

014-E01B-0379

SAFETY

INVESTIGATE JOB SITE BEFOREHAND

- When working at the edge of an excavation or on a road shoulder, the machine could tip over, 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.
- Confirm that your machine is equipped a FOPS cab before working in areas where the possibility of falling stones or debris exist.
- When the footing is weak, reinforce the ground before starting work.
- When working on frozen ground, be extremely alert. As ambient temperatures rise, footing becomes loose and slippery.
- Beware the possibility of fire when operating the machine near flammable objects such as dry grass.

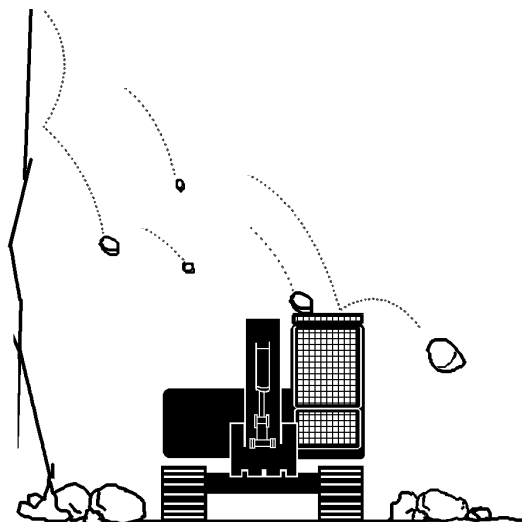


SA-380

015-E01A-0380

PROTECT AGAINST FALLING STONES AND DEBRIS

- Confirm that your machine is FOPS cab equipped before working in areas where the possibility of falling stones or debris exist.



SA-490

015-E01A-0380

SAFETY

PROVIDE SIGNALS FOR JOBS INVOLVING MULTIPLE NUMBERS OF MACHINES

- 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.

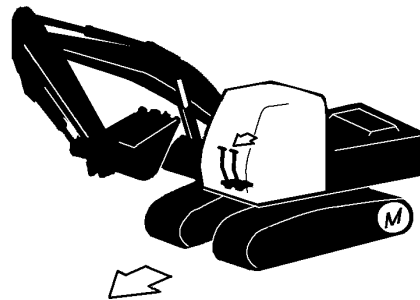


018-E01A-0481

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 in front of the cab, the machine will move in reverse when travel pedals/levers are operated to the front.



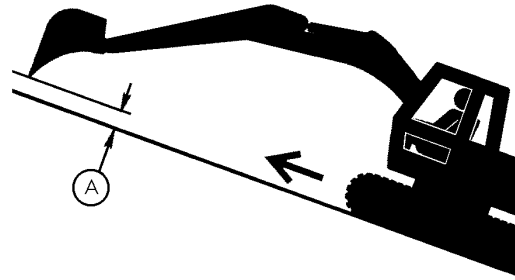
017-E01A-0491

SA-491

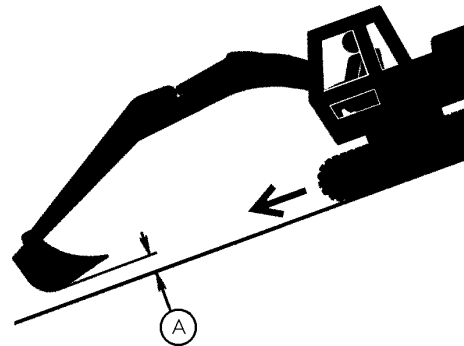
SAFETY

DRIVE MACHINE SAFELY

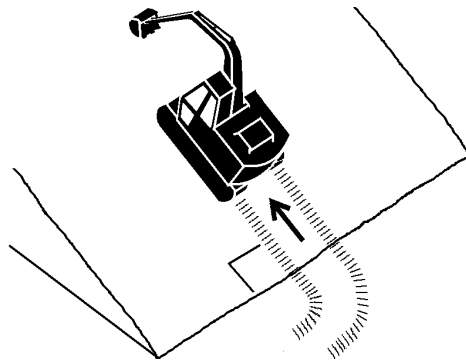
- Before driving the machine, always confirm that the travel levers/pedals direction corresponds to the direction you wish to drive.
- Be sure to detour around any obstructions.
- Avoid traveling over obstructions. Soil, fragments of rocks, and/or metal pieces may scatter around the machine. Don't allow personnel to stay around the machine while traveling.
- Driving on a slope may cause the machine to slip or overturn, possibly resulting in serious injury or death.
 - When driving up or down a slope, keep the bucket facing the direction of travel, approximately 0.5 to 1.0 m (approximately 1'8" to 3'3") (A) above the ground.
 - If the machine starts to skid or becomes unstable, immediately lower the bucket to the ground and stop.
- Driving across the face of a 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.



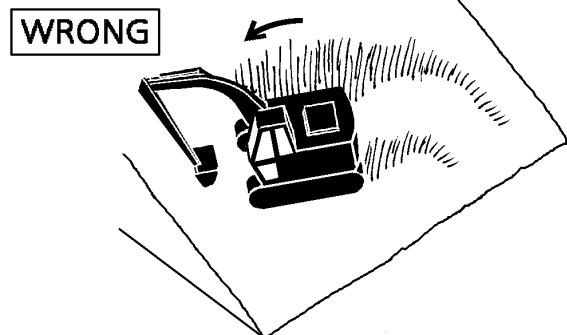
SA-387



SA-388



SA-441



SA-589

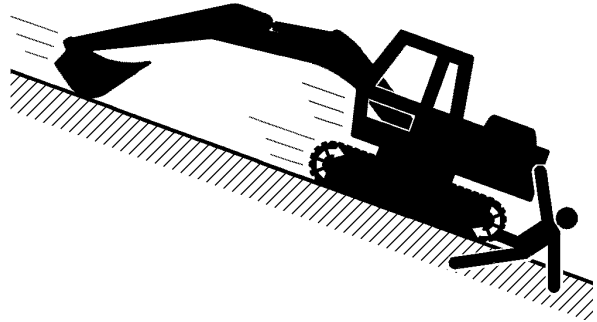
SAFETY

AVOID INJURY FROM ROLLAWAY ACCIDENTS

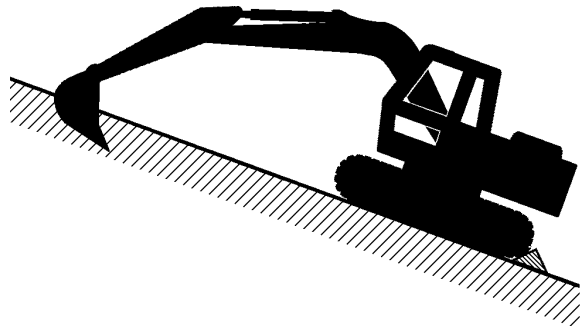
- Death or serious injury may result if you attempt to mount or stop a moving machine.

To avoid rollaways:

- Select level ground when possible to park machine.
- Do not park the machine on a grade.
- Lower the bucket and/or other work tools to the ground.
- Turn the auto-idle switch off.
- Run the engine at slow idle speed without load for 5 minutes to cool down the engine.
- Stop the engine and remove the key from the key switch.
- Pull the pilot control shut-off lever to LOCK position.
- Block both tracks and lower the bucket to the ground. Thrust the bucket teeth into the ground if you must park on a grade.
- Position the machine to prevent rolling.
- Park a reasonable distance from other machines.



SA-391



SA-392

020-E02A-0493

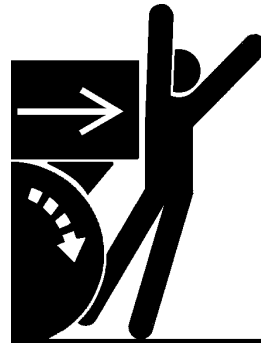
SAFETY

AVOID INJURY FROM BACK-OVER AND SWING ACCIDENTS

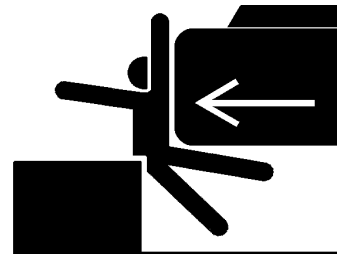
- If any person is present near the machine when backing or swinging the upperstructure, the machine may hit or run over that person, resulting in serious injury or death.

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



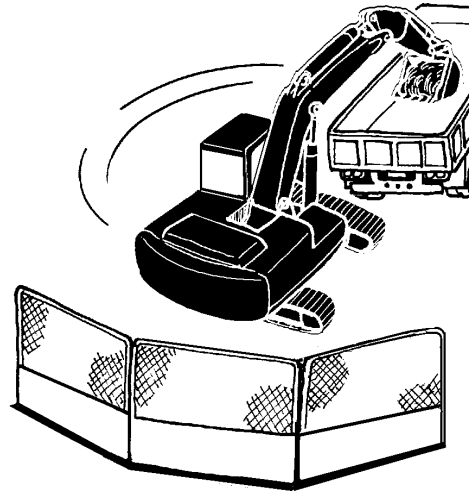
SA-384

021-E01A-0494

SAFETY

KEEP PERSON CLEAR FROM WORKING AREA

- A person may be hit severely by the swinging front attachment or counterweight and/or may be crushed against an other object, resulting in serious injury or death.
- Keep all persons clear from the area of operation and machine movement.
- 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.



022-E01A-0386

SA-386

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.

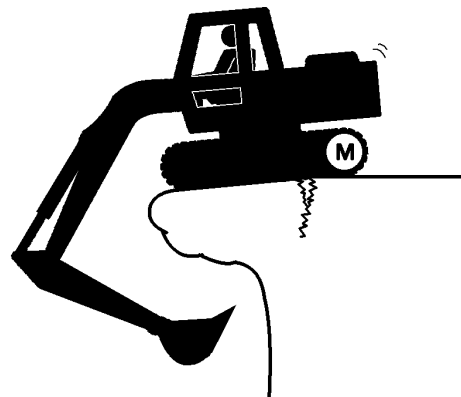


023-E01A-0487

SA-487

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. Often, the machine can be secured by lowering the front attachment, in such cases.



024-E01A-0488

SA-488

SAFETY

AVOID TIPPING

DO NOT ATTEMPT TO JUMP CLEAR OF TIPPING MACHINE --- SERIOUS OR FATAL CRUSHING INJURIES WILL RESULT

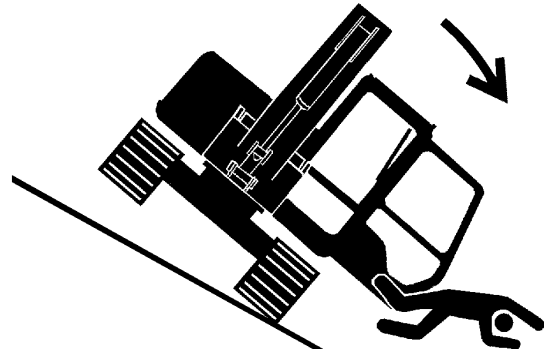
MACHINE WILL TIP OVER FASTER THAN YOU CAN JUMP FREE

FASTEN YOUR SEAT BELT

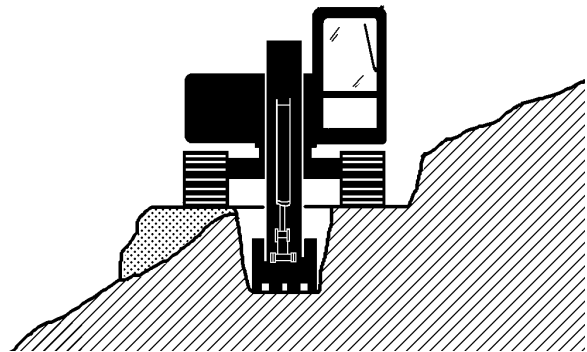
- The danger of tipping is always present when operating on a grade, possibly resulting in serious injury or death.

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-012

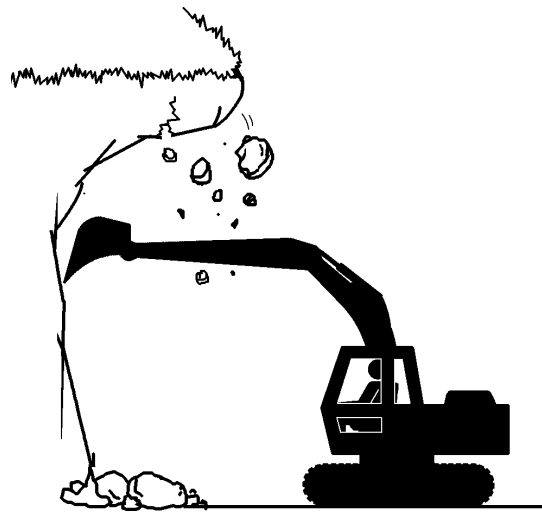


SA-440

025-E01B-0495

NEVER UNDERCUT A HIGH BANK

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



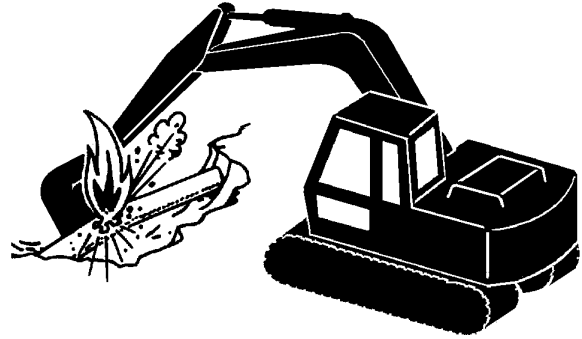
SA-489

026-E01A-0489

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-382

027-E01A-0382

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.



028-E01A-0389

SA-389

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 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.



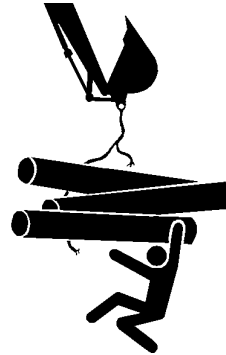
SA-381

029-E01A-0381

SAFETY

OBJECT HANDLING

- If a lifted load should fall, any person nearby may be struck by the falling load or may be crushed underneath it, resulting in serious injury or death.
- When using the machine for craning operations, be sure to comply with all local regulations.
- Do not use damaged chains or frayed cables, sables, slings, or ropes.
- Before craning, position the upperstructure with the travel motors at the rear.
- Move the load slowly and carefully. Never move it suddenly.
- Keep all persons will away from the load.
- Never move a load over a person's head.
- Do not allow anyone to approach the load until it is safely and securely situated on supporting blocks or on the ground.
- Never attach a sling or chain to the bucket teeth. They may come off, causing the load to fall.

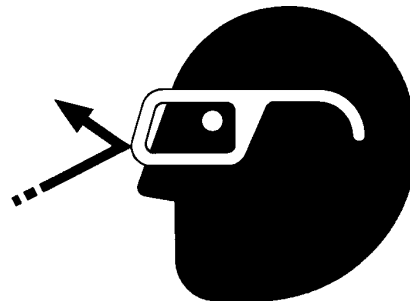


SA-014

030-E01A-0014

PROTECT AGAINST FLYING DEBRIS

- If flying debris hit eyes or any other part of the body, serious injury may result.
- Guard against injury from flying pieces of metal or debris; wear goggles or safety glasses.
- Keep bystanders away from the working area before striking any object.



031-E01A-0432

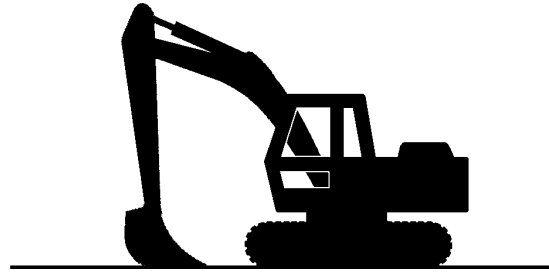
SA-432

SAFETY

PARK MACHINE SAFELY

To avoid accidents:

- Park machine on a level surface.
- Lower bucket to the ground.
- Turn auto-idle switch and H/P mode switch off.
- 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.
- Pull the pilot control shut-off lever to the LOCK position.
- Close windows, roof vent, and cab door.
- Lock all access doors and compartments.



SA-390

033-E08B-0390

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.
 - Securely tighten the fuel and oil filler cap.



SA-018



SA-019

034-E01A-0496

SAFETY

PRACTICE SAFE MAINTENANCE

To avoid accidents:

- Understand service procedures before doing work.
- Keep the work area clean and dry.
- Do not spray water or steam inside cab.
- Never lubricate or service the machine while it is moving.
- Keep hands, feet and clothing away from power-driven parts.

Before servicing the machine:

1. Park the machine on a level surface.
 2. Lower the bucket to the ground.
 3. Turn the auto-idle switch off.
 4. Run the engine at slow idle speed without load for 5 minutes.
 5. Turn the key switch to OFF to stop engine.
 6. Relieve the pressure in the hydraulic system by moving the control levers several times.
 7. Remove the key from the switch.
 8. Attach a "Do Not Operate" tag on the control lever.
 9. Pull the pilot control shut-off lever to the LOCK position.
 10. Allow the engine to cool.
- If a maintenance procedure must be performed with the engine running, do not leave machine unattended.
 - If the machine must be raised, maintain a 90 to 110° angle between the boom and arm. Securely support any machine elements that must be raised for service work.
 - Never work under a machine raised by the boom.
 - Inspect certain parts periodically and repair or replace as necessary. Refer to the section discussing that part in the "MAINTENANCE" chapter of this manual.
 - Keep all parts in good condition and properly installed.
 - Fix damage immediately. Replace worn or broken parts. Remove any buildup of grease, oil, or debris.
 - When cleaning parts, always use nonflammable detergent oil. Never use highly flammable oil such as fuel oil and gasoline to clean parts or surfaces.
 - Disconnect battery ground cable (–) before making adjustments to electrical systems or before performing welding on the machine.



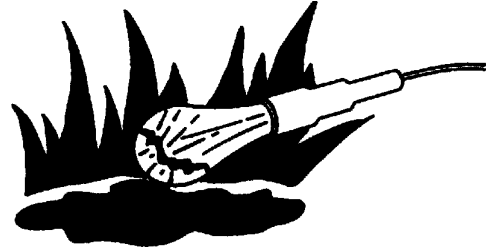
SA-028



SA-527

SAFETY

- 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 on the control lever. This tag is available from your authorized dealer.



501-E01A-0287

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. Do not support the machine on cinder blocks, hollow tires, or props that may crumble under continuous load. Do not work under a machine that is supported solely by a jack.

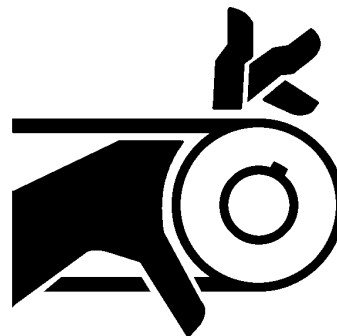


519-E01A-0527

SA-527

STAY CLEAR OF MOVING PARTS

- Entanglement in moving parts can cause serious injury.
- 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.



502-E01A-0026

SA-026

SAFETY

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 FITTING or VALVE ASSEMBLY.
 - As pieces may fly off, be sure to keep body and face away from valve.
- Travel reduction gears are under pressure.
 - As pieces 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 AIR RELEASE PLUG to release pressure.

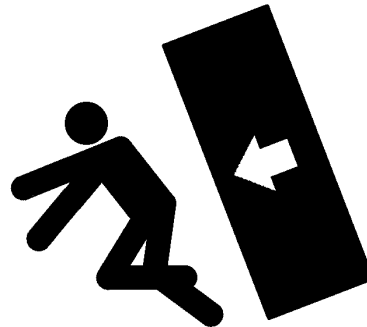


SA-344

503-E01B-0344

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. Keep children and bystanders away from storage areas.



504-E01A-0034

SA-034

SAFETY

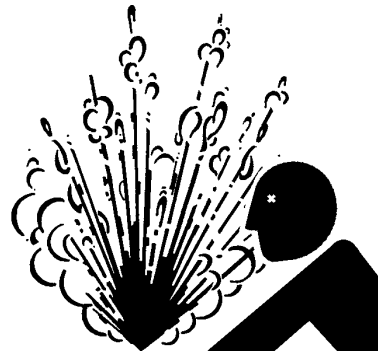
PREVENT BURNS

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 avoid possible injury from hot spraying water. 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 before removing the cap.

Hot fluids and surfaces:

- Engine oil, gear oil and hydraulic oil also become 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-039



SA-225

505-E01B-0498

REPLACE RUBBER HOSES PERIODICALLY

- Rubber hoses that contain flammable fluids 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 inspection alone.
- Periodically replace the rubber hoses. (See the page of "Periodic replacement of parts" in the operator's manual).
- 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

S506-E01A-0019

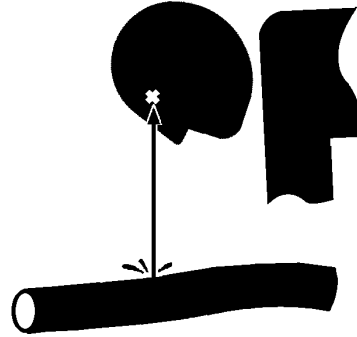
SAFETY

AVOID HIGH-PRESSURE FLUIDS

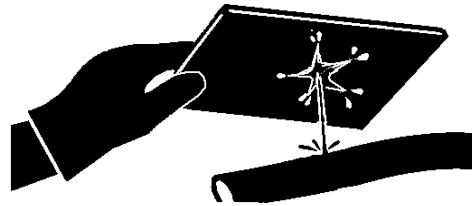
- Fluids such as diesel fuel or hydraulic oil under pressure can penetrate the skin or eyes causing serious injury, blindness or death.
- Avoid this hazard by relieving pressure before disconnecting hydraulic or other lines.
- Tighten all connections before applying pressure.
- Search for leaks with 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

507-E03A-0499

SAFETY

PREVENT FIRES

Check for Oil Leaks:

- Fuel, hydraulic oil and lubricant leaks can lead to fires.
 - Check for oil leaks due to 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.
 - 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..

Clean up Flammables:

- Spilled fuel, oil, antifreeze fluid and window washer fluid, 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.

Check Key Switch:

- If fire breaks out, failure to stop the engine will escalate 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 stops.
- If any abnormalities are found, be sure to repair them before operating the machine.

508-E02B-0019

SAFETY

Check Emergency Engine Stop Switch:

- If a fire breaks out, failure to release pressurized air inside the hydraulic tank will escalate fire, hampering fire fighting.
 - Check the emergency engine stop switch function every 250 hours:
 - 1) Start the engine and run it at slow Idle.
 - 2) Turn the emergency engine stop switch to the EMERG. STOP position.
 - 3) Confirm that both engines stop and that pressurized air inside the hydraulic oil tank is released (a hissing sound should be heard).
- If any abnormalities are found, be sure to repair them before operating the machine.

Check Heat Shields:

- Damaged or missing heat shield may lead to fires.
 - Damaged or missing heat shields must be repaired or replaced before operating the machine.

508-E02A-0393

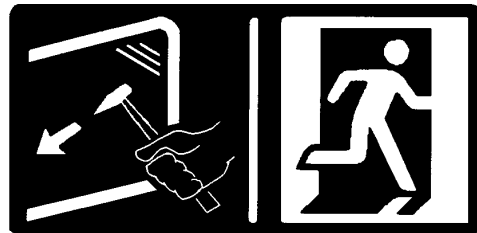
EVACUATING IN CASE OF FIRE

- If a fire breaks out, evacuate the machine in the following way:
 - Stop the engine by turning the key switch to the OFF position if there is time.
 - Use a fire extinguisher if there is time.
 - Exit the machine.
- In an emergency, if the cab door or front window can not be opened, break the front or rear window panes with the emergency evacuation hammer to escape from the cab. Refer the explanation pages on the Emergency Evacuation Method.

518-E02B-0393



SA-393

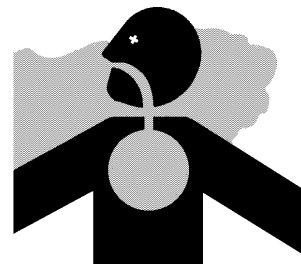


SS-1510

BEWARE OF EXHAUST FUMES

- Prevent asphyxiation. Engine exhaust fumes can cause sickness or death.
 - If you must operate 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.

509-E01A-0016

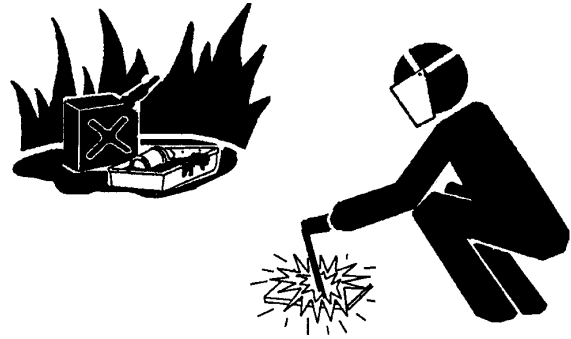


SA-016

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 fire hazards. 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

523-E01A-0818

SAFETY

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.
- Clean them thoroughly with nonflammable solvent before welding or flame cutting them.

510-E01B-0030

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.
 - Avoid potentially toxic fumes and dust.
 - Do all such work outside or in a well-ventilated area. Dispose of paint and solvent properly.
-
- Remove paint before welding or heating:
 1. If you sand or grind paint, avoid breathing the dust. Wear an approved respirator.
 2. If you use solvent or paint stripper, remove stripper with soap and water before welding. Remove solvent or paint stripper containers and other flammable material from area. Allow fumes to disperse at least 15 minutes before welding or heating.



SA-029

511-E01A-0029

SAFETY

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 electrolyte level is lower than specified. Explosion of the battery may result.
 - Loose terminals may produce 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.
 - Be sure to wear eye protection when checking electrolyte specific gravity.



SA-032

512-E01B-0032

SERVICE AIR CONDITIONING SYSTEM SAFELY

- If spilled onto skin, refrigerant may cause a cold contact burn.
 - Refer to the freon container for proper use when servicing the air conditioning system.
 - Use a recovery and recycling system to avoid venting freon into the atmosphere.
 - Never let the freon stream make contact with the skin.



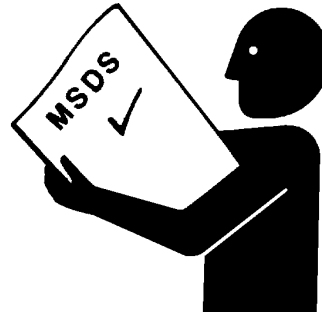
SA-405

513-E01A-0405

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, 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. That way you will know exactly what the risks are and how to do the job safely. Then follow procedures and use recommended equipment.
- See your authorized dealer for MSDS's (available only in English) on chemical products used with your machine.

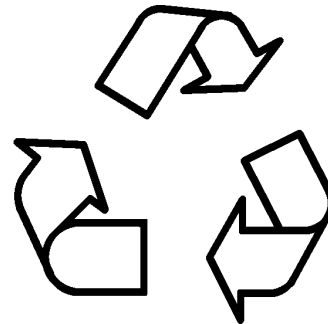


SA-309

515-E01A-0309

DISPOSE OF WASTE PROPERLY

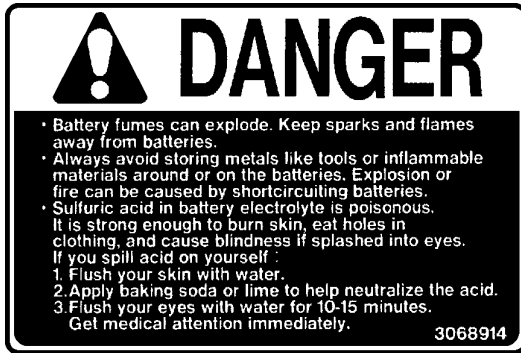
- Improperly disposing of waste can threaten the environment and ecology. Potentially harmful waste used with HITACHI equipment includes such items as oil, fuel, coolant, brake fluid, filters, and batteries.
- Use leakproof containers when draining fluids. Do not use food or beverage containers that may mislead someone into drinking from them.
- Do not pour waste onto the ground, down a drain, or into any water source.
- Air conditioning refrigerants escaping into the air can damage the Earth's atmosphere. Government regulations may require a certified air conditioning service center to recover and recycle used air conditioning refrigerants.
- Inquire on the proper way to recycle or dispose of waste from your local environmental or recycling center, or from your authorized dealer.



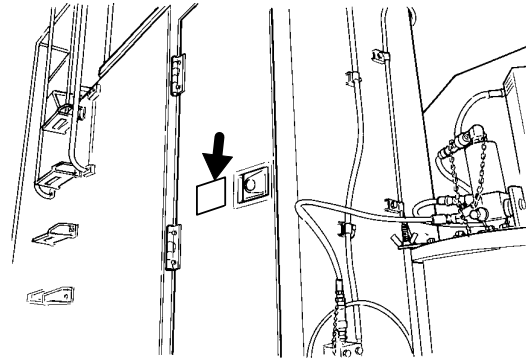
SA-226

516-E01A-0226

SAFETY SIGNS



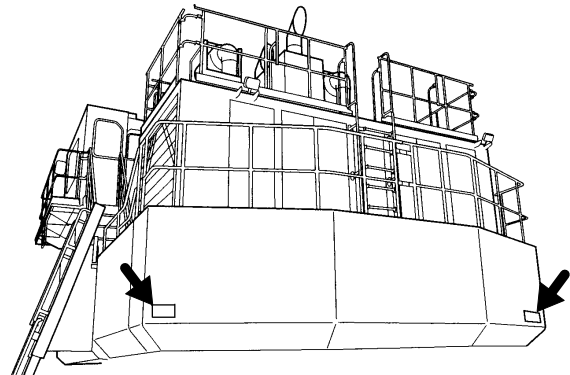
SS-411



SS-691



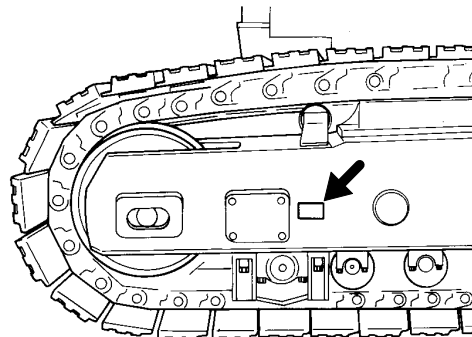
SS-442



M18C-01-006

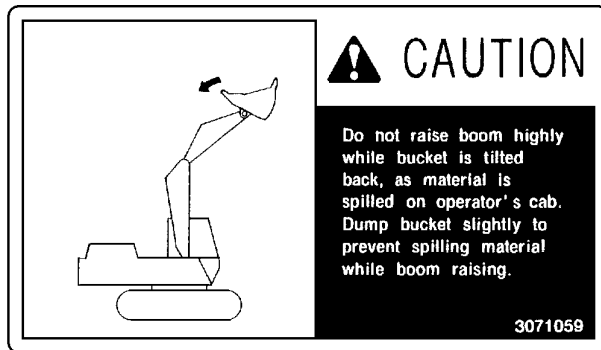


SS-445



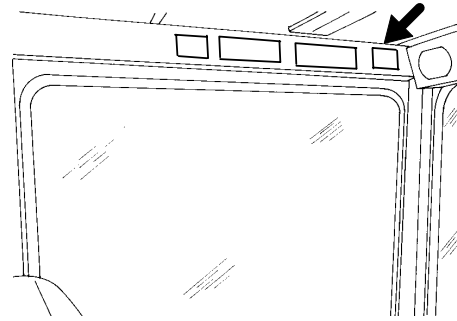
M144-07-107

SAFETY SIGNS

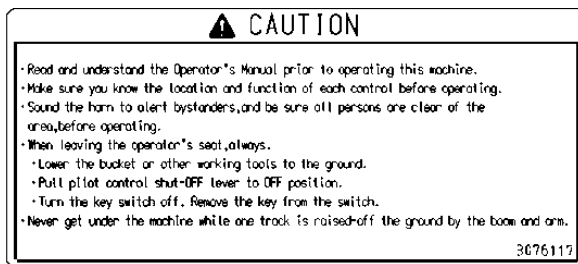


(Loading Shovel)

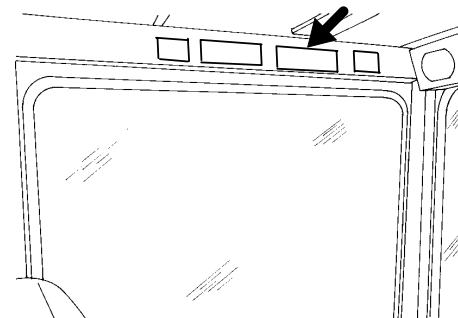
SS-446



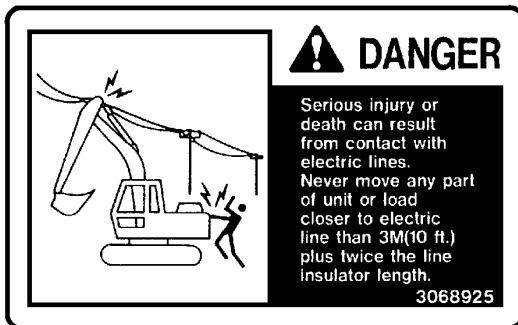
SS-723



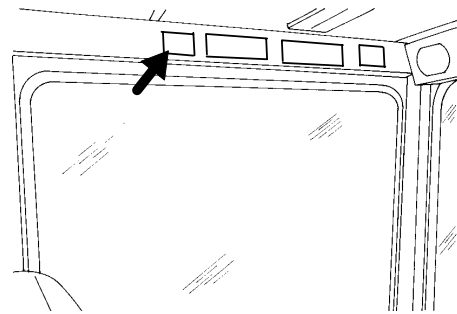
SS3076117



SS-723

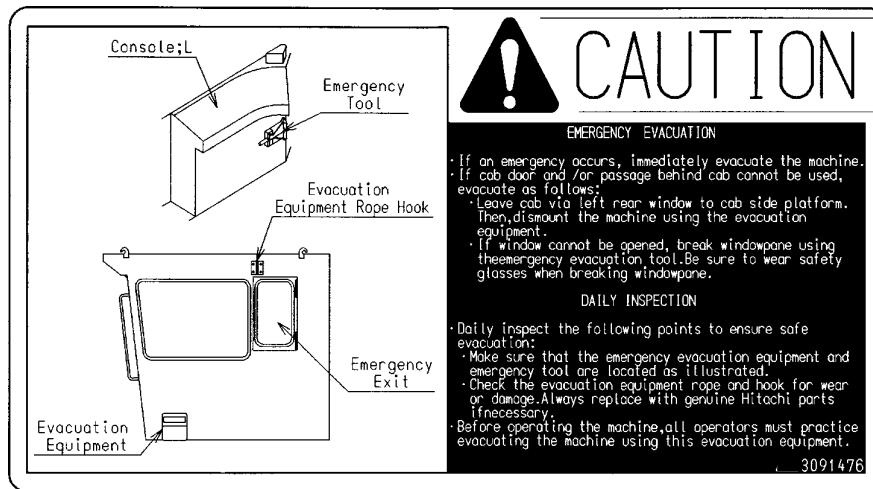


SS-410

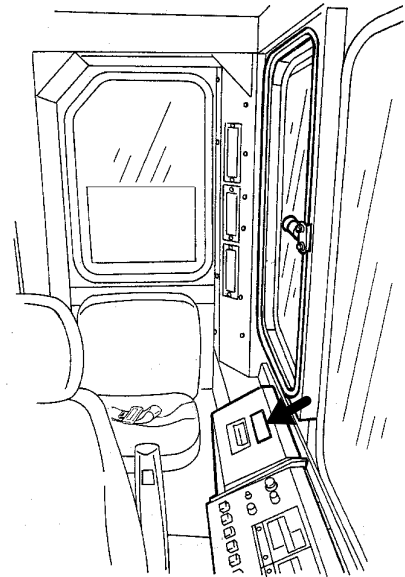


SS-723

SAFETY SIGNS

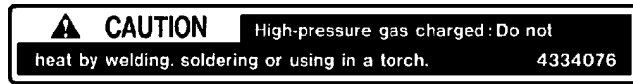


SS3091476

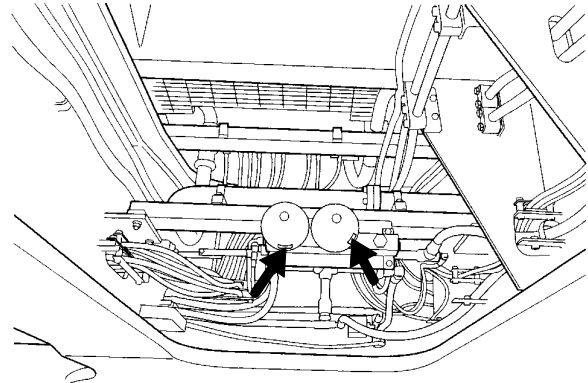


M146-01-035

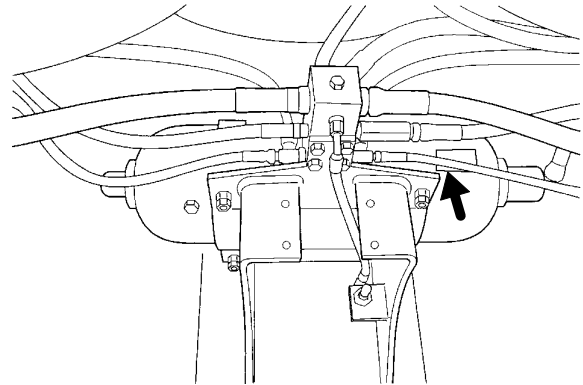
SAFETY SIGNS



SS-413

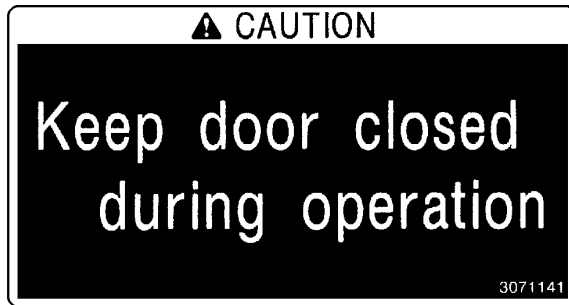


M18C-01-007

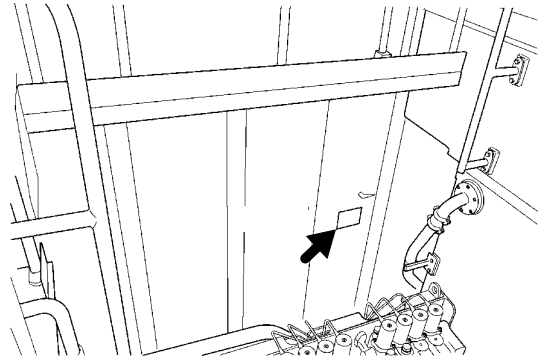


M18C-01-008

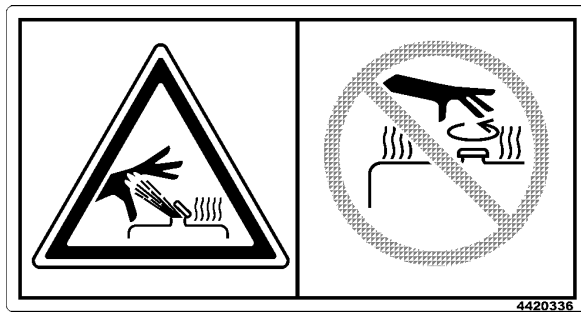
SAFETY SIGNS



SS-449

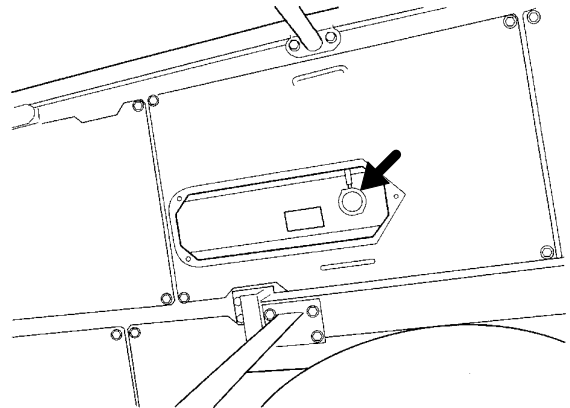


M18C-01-010



SS4420336

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



M18C-01-009

SAFETY SIGNS

MEMO

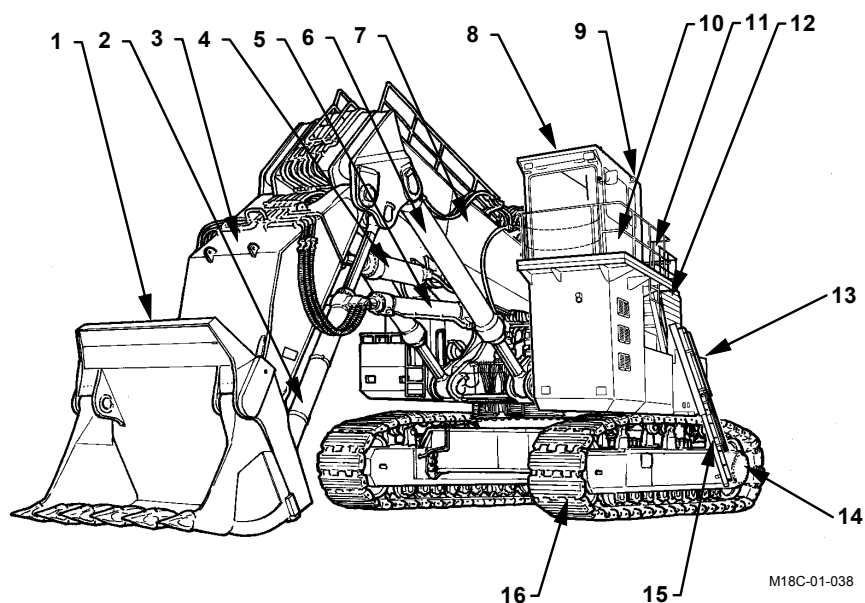
[illegible]

COMPONENTS NAME

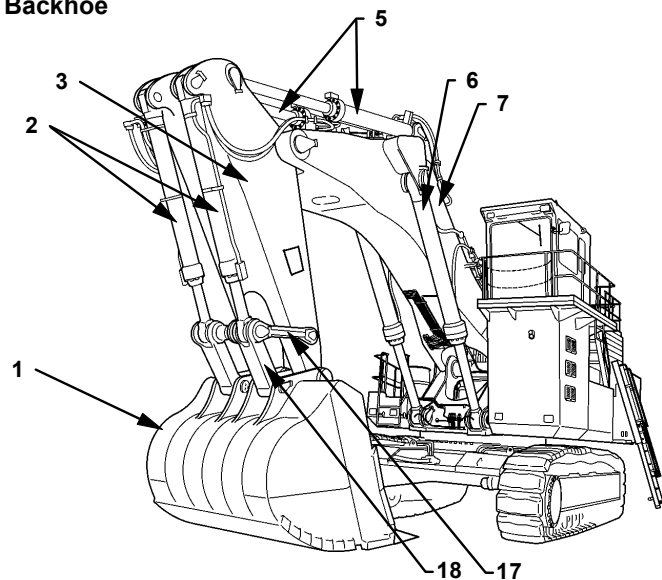
COMPONENTS NAME

Loading Shovel

- 1- Bucket
- 2- Bucket Cylinder
- 3- Arm
- 4- Level Cylinder
- 5- Arm Cylinder
- 6- Boom Cylinder
- 7- Boom
- 8- Cab
- 9- Emergency Escape Device Hanger
- 10- Emergency Escape Device Case
- 11- Fuel Tank
- 12- Radiator-Intercooler
- 13- Counterweight
- 14- Travel Device
- 15- Ladder
- 16- Track Shoe
- 17- Link B
- 18- Link A



Backhoe



HANDLING LADDER / EMERGENCY ESCAPE DEVICE

USING LADDER

Always use ladder (1) when getting on and off the machine. Do not attempt to climb onto or off the machine any other way.



CAUTION: Be sure to extend or retract ladder to locked position.

When you get on and off the machine, always maintain a three point contact with the steps and handrails and face the machine.

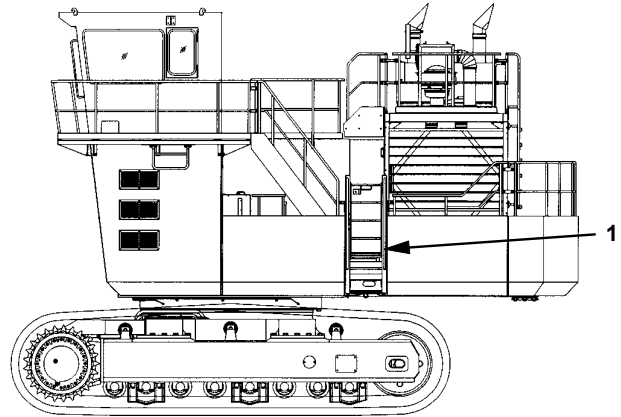
Never jump on or off the machine. Never mount or dismount a moving machine.

Be careful of slippery conditions on platforms, steps, and handrails when leaving the machine.

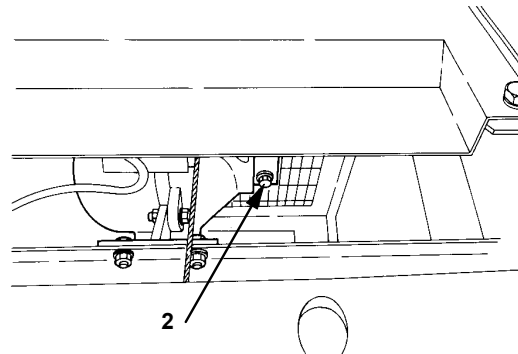
Ladder extending/retracting speed can be changed by adjusting bolt (2).

Clockwise Turn: Faster Extending/Retracting Speed

Counterclockwise Turn: Slower Extending/ Retracting Speed



M18C-01-012



M117-01-003

HANDLING LADDER / EMERGENCY ESCAPE DEVICE

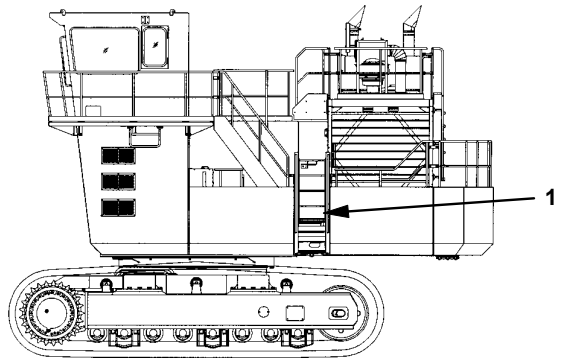
OPERATING LADDER ON THE GROUND

Extending

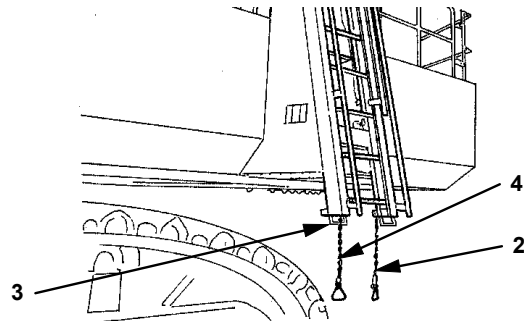
1. Pull down chain (4) to release lock.
2. Pull down handle (3) to lower ladder (1) to locked position.

Retracting

1. Pull down chain (2) to release lock.
2. Push up ladder (1) to locked position.



M18C-01-012



M18C-01-034

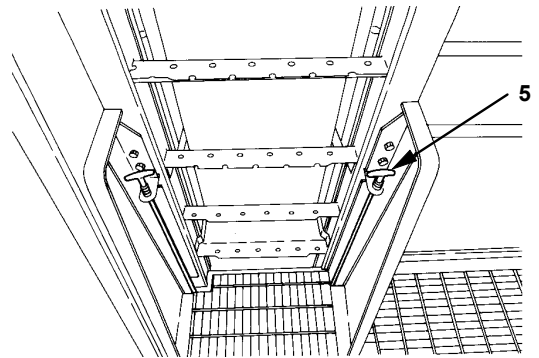
OPERATING LADDER ON THE UPPER-STRUCTURE



CAUTION: Step back immediately after releasing ladder lock as spring force slides the ladder up quickly, potentially causing injury.

Extending

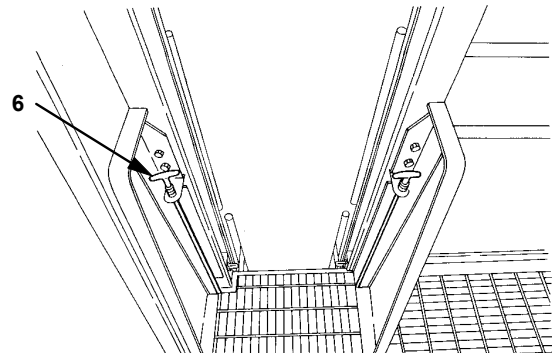
1. Pull up handle (5) to release lock.
2. Push down the ladder to locked position.



M117-01-001

Retracting

1. Pull up handle (6) to release lock.
2. Pull up the ladder to locked position.



M117-01-002

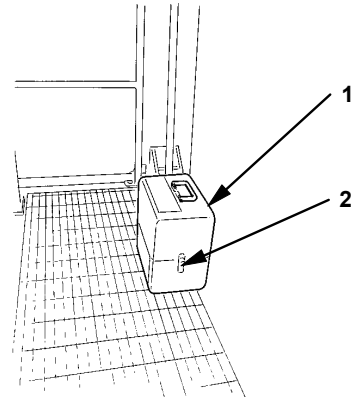
HANDLING LADDER / EMERGENCY ESCAPE DEVICE

EMERGENCY ESCAPE

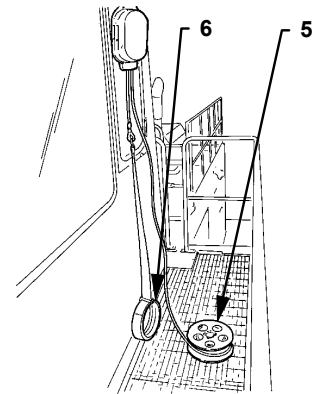
How to Use

Emergency escape device is provided in case (1) at the left outside the cab.

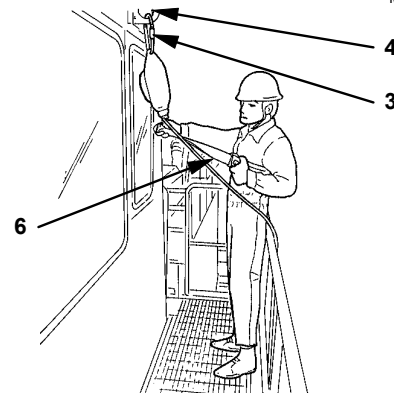
1. Unlock latch (2) on case (1) to open the cover.
2. Hang hook (3) onto the cab upper-left surface hanger (4).
3. Drop rope wound reel (5).
4. Fasten life belt (6) around your chest.
5. While holding two ropes, move to the outside fence and face toward the cab (as long as the two ropes are held, emergency escape device will not operate.)
6. As soon as the ropes are released, your body is slowly lowered. Descend while softly pushing the machine surface by hand to prevent the body from turning.
7. After landing, immediately take life belt (6) off and evacuate to a safe place.



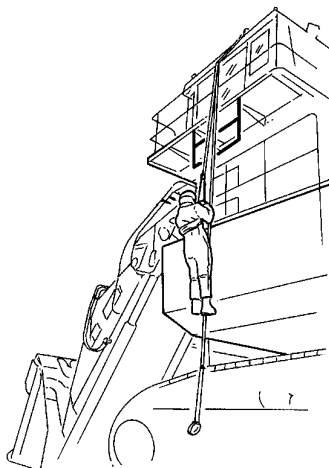
M118-07-102



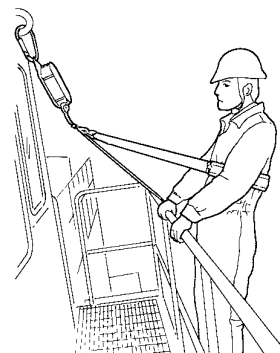
M118-07-104



M118-07-108



M146-07-005



M118-07-109

HANDLING LADDER / EMERGENCY ESCAPE DEVICE

EMERGENCY EXIT

If the operator's cab door should not open in an emergency, escape in the following methods:

1. Open left window (1). Escape through the window.

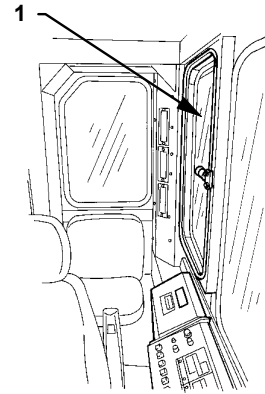


CAUTION: Be sure to wear a safety glasses before breaking the window glass.

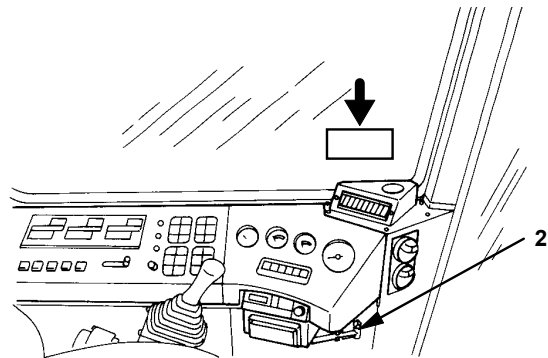
2. If left window (1) should be difficult to open, break the left window glass using emergency evacuation tool (2). Then, escape through the broken window.



NOTE: The emergency exit decals are applied to the left window, located near the front side on left console.



M146-01-023



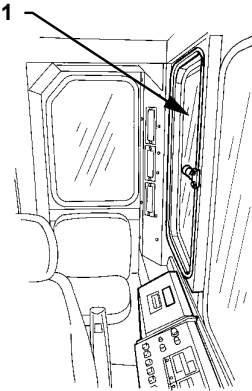
M117-01-082

EVACUATING IN CASE OF FIRE

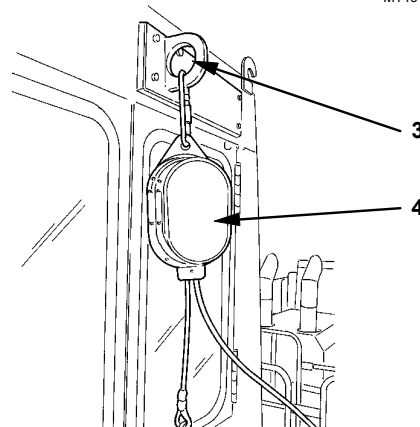
A fire on the machine can result in serious personal injury or death.

Avoid the risk of injury or death while evacuating from the machine during a fire by checking the following regularly:

- Always check if left window (1) can be opened and closed smoothly before starting the engine. If it fails to open or close smoothly, repair the window. Left window (1) can be used as an emergency exit.
- Malfunction of emergency escape device (4) worn rope or broken hanger may cause falling accident when evacuating. Before operating the machine, be sure to check if emergency escape device (4) or hanger (3) is not damaged. If any abnormalities are found, replace with new parts.
- Before operating the machine for the first time, all new operators must practice evacuating with this rope at least once.



M146-01-023



M118-07-103

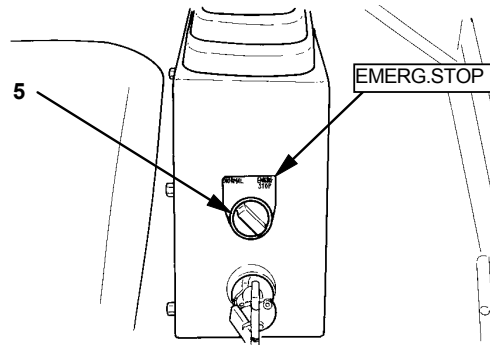
HANDLING LADDER / EMERGENCY ESCAPE DEVICE

If a fire breaks out, evacuate the machine in the following way:

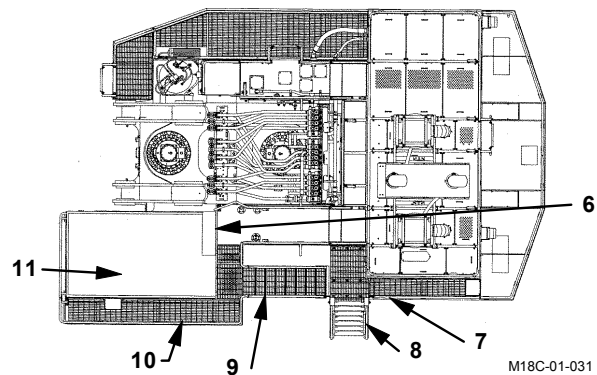
1. Stop the engines by turning emergency engine stop switch (5) to the EMERG STOP position if there is time.
2. Pull the pilot control shut-off lever to the LOCK position.
3. Use a fire extinguisher if there is time.
4. Exit the machine in the following manner, depending on the location of the fire.
 - If engine compartment sidewalk (7) is not on fire, evacuate from the machine to the ground through cab door (6), step (9), sidewalk (7) and lower ladder (8).
 - If the engine compartment sidewalk (7) is on fire, first evacuate from cab (11) through cab door (6) to cab side platform (10). Then, get off the machine using emergency escape device (4). Emergency rope (3) is provided in the case located on the left outside wall of the cab. (see the "EMERGENCY ESCAPE DEVICE" chapter)
 - If the fire is around cab door (6), evacuate the cab by opening left window (1), and stepping to platform (10). Then, get off the machine using the emergency escape device. If left window (1) cannot be opened, break the windowpane using emergency evacuation tool (2) to gain access to platform (10).



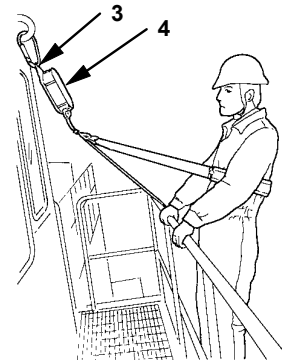
CAUTION: Avoid possible injury to your eyes. Wear a pair of safety glasses or goggles when breaking windowpane with emergency evacuation tool (2).



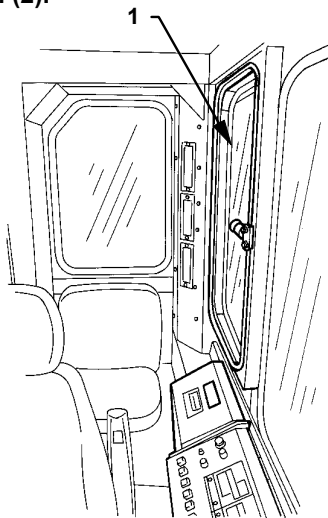
M117-01-093



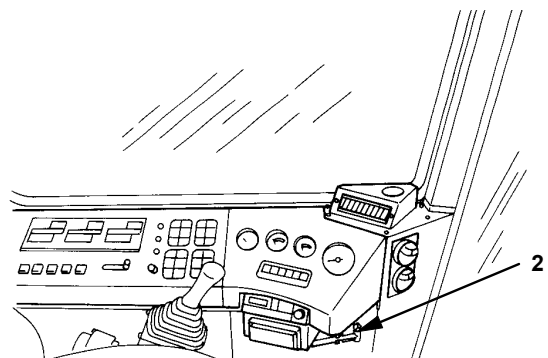
M18C-01-031



M118-07-109



M146-01-023

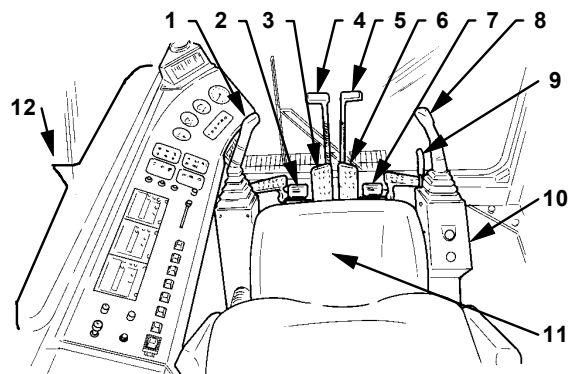


M117-01-082

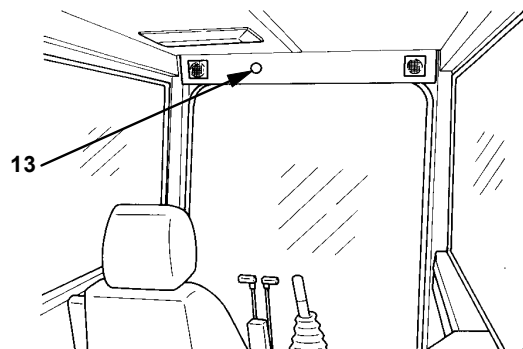
OPERATOR'S STATION

CAB FEATURES

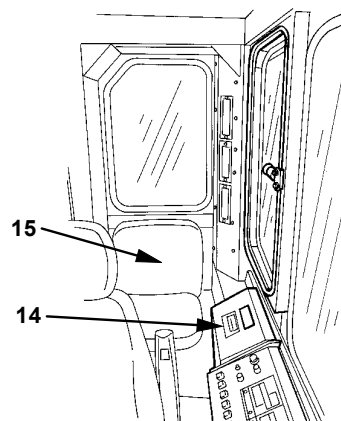
- 1- Left Control Lever/Horn Switch
- 2- Bucket Close Pedal (For Loading Shovel)
- 3- Left Travel Pedal
- 4- Left Travel Lever
- 5- Right Travel Lever
- 6- Right Travel Pedal
- 7- Bucket Open Pedal (For Loading Shovel)
- 8- Right Control Lever
- 9- Pilot Control Shut-Off Lever
- 10- Switch Panels (Right)
- 11- Operator's Seat
- 12- Monitor Panel and Switch Panels (Left)
- 13- Hour Meter
- 14- Glove Compartment
- 15- Trainer Seat
- 16- Fuse Box



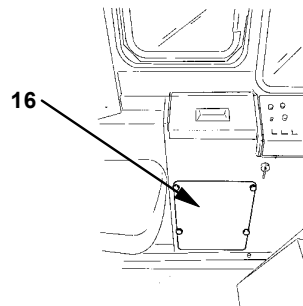
M146-01-002



M144-01-033



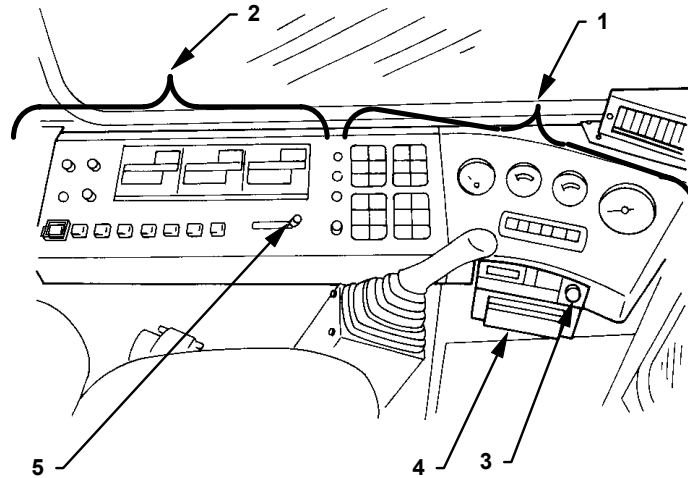
M146-01-023



M146-07-048

OPERATOR'S STATION

MONITOR PANEL AND SWITCH PANELS (LEFT)



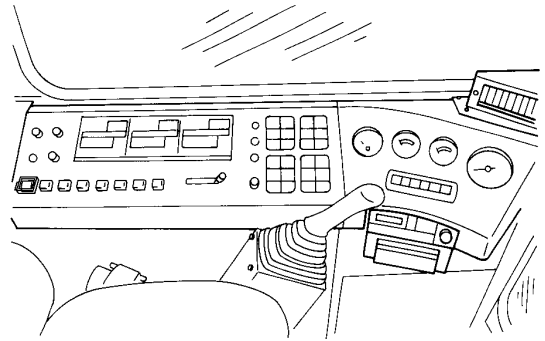
M146-01-039

- 1- Monitor Panel
- 2- Switch Panel
- 3- FM/AM Radio
- 4- Ashtray
- 5- Engine Speed Control Lever

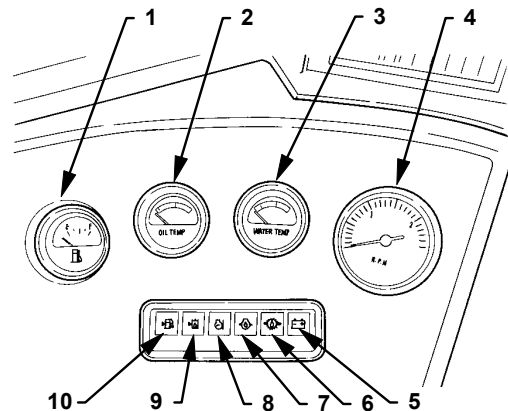
OPERATOR'S STATION

MONITOR PANEL

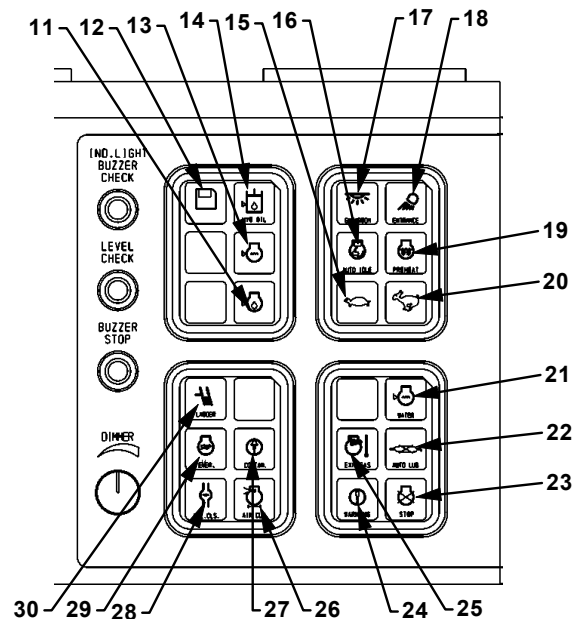
- 1- Fuel Gauge
- 2- Hydraulic Oil Temperature Gauge
- 3- Coolant Temperature Gauge
- 4- Tachometer
- 5- Alternator Indicator
- 6- Pump Transmission Oil Pressure Indicator (Warning)
- 7- Engine Oil Pressure Indicator (Warning)
- 8- Overheat Indicator (Warning)
- 9- Hydraulic Oil Level Indicator (Warning)
- 10- Fuel Level Indicator
- 11- Engine Oil Level Indicator
- 12- Download Indicator
- 13- Coolant Level Indicator
- 14- Hydraulic Oil Level Indicator
- 15- Travel Mode Indicator (Slow Speed)
- 16- Auto-Idle Indicator
- 17- Engine Room Light Indicator
- 18- Entrance Light Indicator
- 19- Preheat Indicator
- 20- Travel Mode Indicator (Fast Speed)
- 21- Coolant Level Indicator (Warning)
- 22- Auto-Lubrication Indicator
- 23- Engine Stop Indicator (Warning)
- 24- Engine Warning Indicator
- 25- Engine Exhaust Gas Temperature Indicator (Warning)
- 26- Air Cleaner Restriction Indicator (Warning)
- 27- Pump Contamination Indicator (Warning)
- 28- Stop Valve Indicator (Warning)
- 29- Emergency Engine Stop Indicator (Warning)
- 30- Ladder Position Indicator (Warning)



M146-01-039



M117-01-020

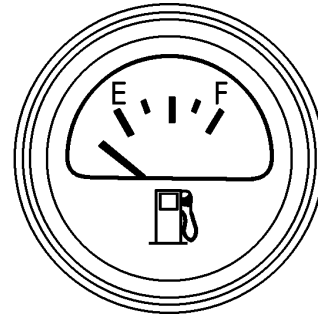


M18C-01-019

OPERATOR'S STATION

FUEL GAUGE

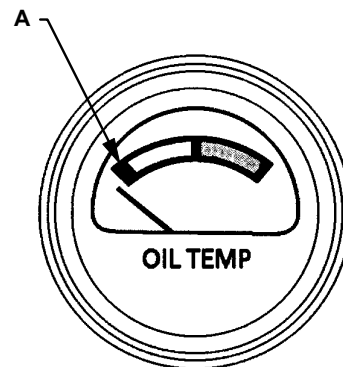
Fuel machine before needle reaches "E".
When the needle reaches "E", approximately 300 liters (79 US gal) of fuel remain.



HYDRAULIC OIL TEMPERATURE GAUGE

Start the engine. Run at slow idle until the needle enters white zone (A).
If needle enters the red zone, reduce the load immediately and run the engine at slow idle until needle returns the green zone. If the problem continues, contact your authorized dealer.

M117-01-055



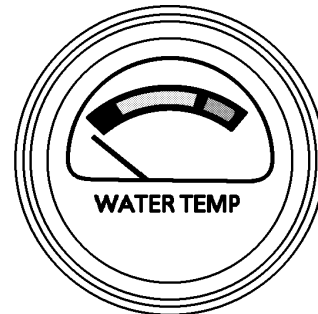
COOLANT TEMPERATURE GAUGE

Start the engine. Run at slow idle until the needle enters green zone, indicating normal operating temperature.

M146-01-013

IMPORTANT: Prevent possible engine damage.
Do not stop engine when needle enters red zone, as temperature will rise further.
Instead, reduce load and run engine at slow idle.

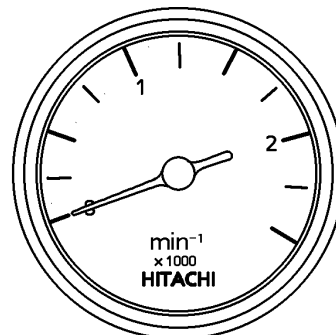
If the needle enters the red zone, reduce the load immediately and run the engine at slow idle. If problem continues, inspect for plugged radiator or coolant leakage.



TACHOMETER

Tachometer indicates engine speed in min^{-1} .

M117-01-032

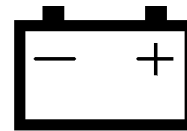


M146-01-034

OPERATOR'S STATION

ALTERNATOR INDICATOR

Red indicator will light when alternator output is low. Check electrical system.

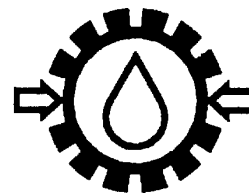


CHARGE

M144-01-023

PUMP TRANSMISSION OIL PRESSURE INDICATOR (WARNING)

Red indicator will light and buzzer will sound when pump transmission oil pressure is low. Stop the engine immediately. Take corrective action.



PUMP OIL

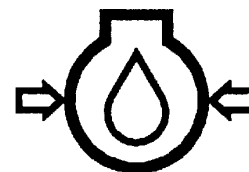
M144-01-024

ENGINE OIL PRESSURE INDICATOR (WARNING)

IMPORTANT: Prevent possible engine damage.
If engine oil pressure indicator comes on while operating, stop the engine immediately.

Red indicator will light and buzzer will sound when engine oil pressure is low. Stop the engine immediately.

 **NOTE:** Cold oil, low oil level, or operating on a steep slope may cause indicator to light.



ENG.OIL

M481-01-007

OVERHEAT INDICATOR (WARNING)

Red indicator will light and buzzer will sound when the engine coolant overheats.

Reduce load immediately and run engine at slow idle. Inspect for debris around radiator, also check for low coolant level in the radiator.

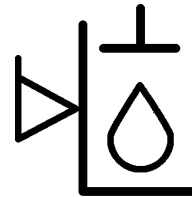


M424-01-012

OPERATOR'S STATION

HYDRAULIC OIL LEVEL INDICATOR (WARNING)

Red indicator will light and buzzer will sound when hydraulic oil level in the hydraulic oil tank is low. Stop the engine immediately. Take corrective action.

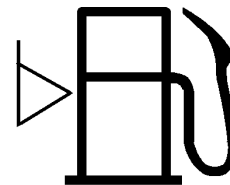


HYD.OIL

FUEL LEVEL INDICATOR

M117-01-049

When red fuel indicator lights, approximately 300 liters (79 US gal) of fuel remains.



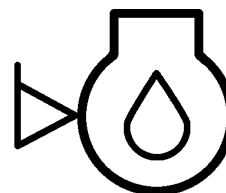
FUEL

ENGINE OIL LEVEL INDICATOR

M144-01-025

When level check switch is pushed, green indicator will light if level is adequate for operation.

 **NOTE:** *This check does NOT take the place of daily inspection.*

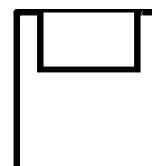


ENG.OIL

DOWNLOAD INDICATOR

M117-01-048

When the monitoring system (optional) is provided, the green indicator comes ON if the system memory is fully occupied. If the indicator comes ON, download the data. Ask your authorized Hitachi dealer for details.



DOWN LOAD

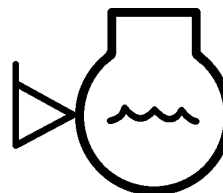
M118-01-012

OPERATOR'S STATION

COOLANT LEVEL INDICATOR

When level check switch is pushed, green indicator will light if coolant level is adequate for operation.

 **NOTE:** *This check does NOT take the place of daily inspection*



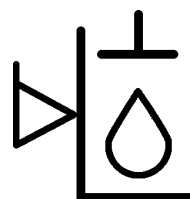
WATER

M117-01-035

HYDRAULIC OIL LEVEL INDICATOR

When level check switch is pushed, green indicator will light if hydraulic oil level is adequate for operation.

 **NOTE:** *This check does NOT take the place of daily inspection.*



HYD.OIL

M117-01-049

TRAVEL MODE INDICATOR (SLOW SPEED)

This indicator will light when the travel mode is shifted to the slow travel speed mode.



AUTO IDLE INDICATOR

This indicator will light when the auto-idle device is turned ON.



AUTO IDLE

M117-01-043

M117-01-044

OPERATOR'S STATION

ENGINE ROOM LIGHT INDICATOR

This indicator will light when the lights in the engine room, in the room under the cab, and in the pump room are ON.



ENG.ROOM

ENTRANCE LIGHT INDICATOR

This indicator will light when the entrance lights, located at the cab rear is ON.



ENTRANCE

M117-01-045

PREHEAT INDICATOR

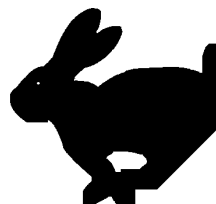
This indicator stays ON during preheating. When preheating is complete, the indicator goes OFF.



M117-01-046

TRAVEL MODE INDICATOR (FAST SPEED)

This indicator will light when the travel mode is shifted to the fast travel speed mode.



M157-01-013

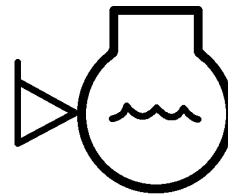
M585-01-010

OPERATOR'S STATION

COOLANT LEVEL INDICATOR (WARNING)

IMPORTANT: If the engine is operated with the coolant level lower than the recommended level, damage to the engine and/or radiator may result. As soon as the indicator comes ON, stop the engine.

If the coolant level is lower than the recommended level, the red indicator comes ON and the buzzer sounds. Immediately stop the engine. Check the coolant system for leaks and the coolant level. Refill the coolant as necessary. If the red indicator comes ON and the buzzer continues sounding for 120 seconds, the engine will stop automatically.



WATER

M117-01-035

AUTO-LUBRICATION INDICATOR

Red indicator will light when any trouble occurs in the auto-lubrication circuit. Also, red indicator will light when auto-lubrication toggle switch in battery compartment is in the MANUAL or OFF position.

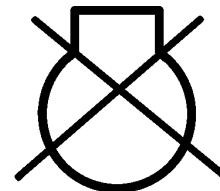


AUTO LUB

ENGINE STOP INDICATOR (WARNING)

If any serious abnormal condition occurs in the engine and/or engine related parts, the red indicator comes ON. (Automatically the engine speed may be reduced or the engine may be stopped depending on the extent of the abnormal condition.) Immediately, set the machine in the safety position and stop the engine. Then, contact your nearest Hitachi dealer.

 **NOTE:** When the key switch is turned ON, this indicator normally stays ON until the engine starts.



STOP

M117-01-036

ENGINE WARNING INDICATOR (WARNING)

The yellow indicator comes ON if any abnormal condition occurs in the engine and/or engine related parts. If the engine is operated with the yellow indicator ON, the engine performance will deteriorate. If the yellow indicator comes ON, stop the engine immediately and contact your nearest Hitachi dealer.

 **NOTE:** When the key switch is turned ON, this indicator normally stays ON for approx. 2 seconds and goes OFF.



WARN

M144-01-026

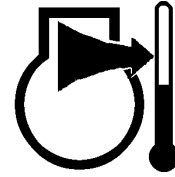
M144-01-028

OPERATOR'S STATION

ENGINE EXHAUST GAS TEMPERATURE INDICATOR (WARNING)

If the engine exhaust temperature increases abnormally, the yellow indicator comes ON. Reduce the engine speed to the slow idle speed to lower the exhaust temperature. After the indicator goes OFF, check the exhaust system for any failure.

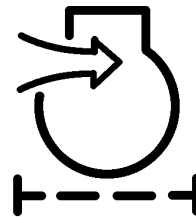
IMPORTANT: If the engine is operated with the exhaust temperature excessively high, damage to the engine may result. As soon as the indicator comes ON, reduce the engine speed to the slow idle speed to lower the exhaust temperature.



M146-01-037

AIR CLEANER RESTRICTION INDICATOR (WARNING)

Red indicator will light when the air cleaner elements are clogged. Clean or replace outer elements.

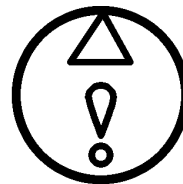


AIR CLN.

M117-01-038

PUMP CONTAMINATION INDICATOR (WARNING)

Red indicator will light when trouble occurs in any of the six pumps. Contact your authorized dealer.



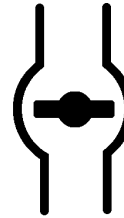
CONTAM.

M117-01-039

OPERATOR'S STATION

STOP VALVE INDICATOR (WARNING)

Red indicator will light and buzzer will sound when stop valve in the low pressure circuit is closed, and the engine cannot be started.



VAL. CLS

EMERGENCY ENGINE STOP INDICATOR (WARNING)

When the emergency engine stop switch is turned to the EMERG STOP position, red indicator will light and the starter cannot be operated. The indicator will remain staying ON under this condition.

The indicator will go off when the emergency engine stop switch is turned to the NORMAL position. The starter will operate.

Other engine emergency stop switches are located as follows:

Engine Compartment: Two Switches

Pump Compartments: Two Switches



EMER.

M117-01-041

M117-01-040

LADDER POSITION INDICATOR (WARNING)

While the ladder is extended, this red indicator will light and the machine will not be able to swing.

Check ladder and retract to the locked position.

When the ladder retracts to the locked position, red indicator will go off and the machine will be able to swing.

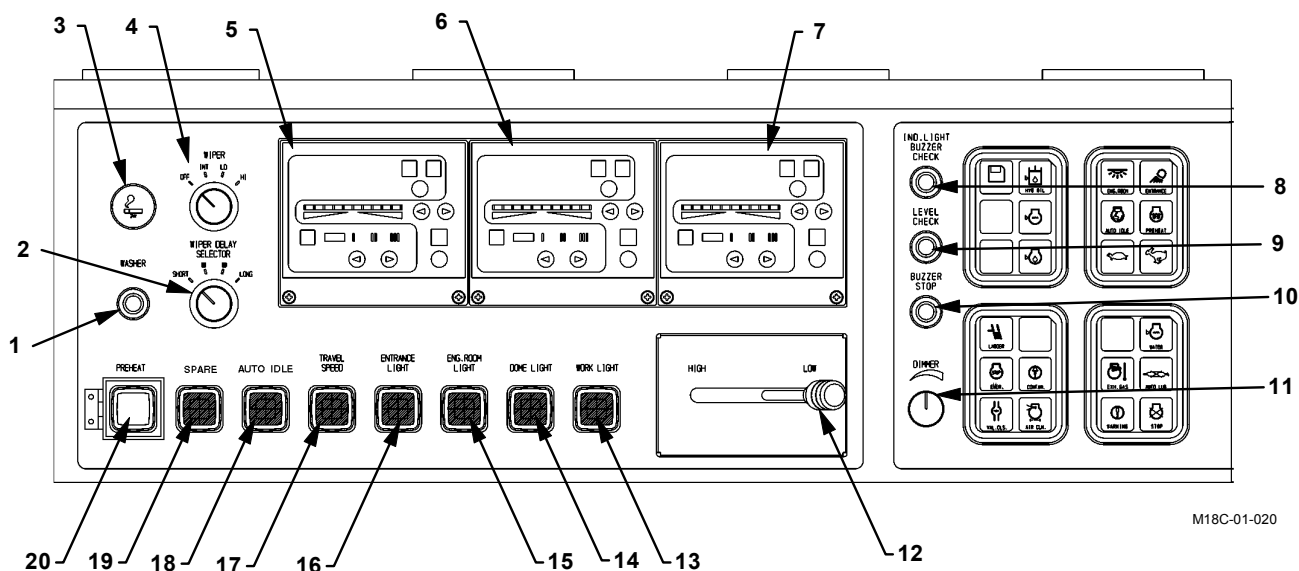


LADDER

M117-01-042

OPERATOR'S STATION

SWITCH PANEL



M18C-01-020

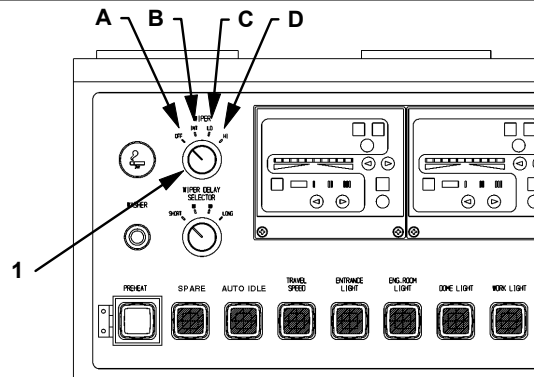
- 1- Washer Switch
- 2- Wiper Delay Selector Switch
- 3- Cigar Lighter
- 4- Wiper Switch
- 5- Air Conditioner Rear Panel
- 6- Air Conditioner Side Panel
- 7- Air Conditioner Front Panel
- 8- Indicator Light Check Switch
- 9- Level Check Switch
- 10- Buzzer Stop Switch
- 11- Dimmer Switch
- 12- Engine Speed Control Lever
- 13- Work Light Switch
- 14- Dome Light Switch
- 15- Engine Room Light Switch
- 16- Entrance Light Switch
- 17- Travel Speed Switch
- 18- Auto-Idle Switch
- 19- Spare
- 20- Preheat Switch

OPERATOR'S STATION

WIPER SWITCH

Wipers (2) can be operated using wiper switch (1) as follows:

- OFF position (A): Deactivated
- INT position (B): Wiper (2) operates intermittently.
- LO position (C): Wiper (2) continuously operates in slow speed.
- HI position (D): Wiper (2) continuously operates in fast speed.

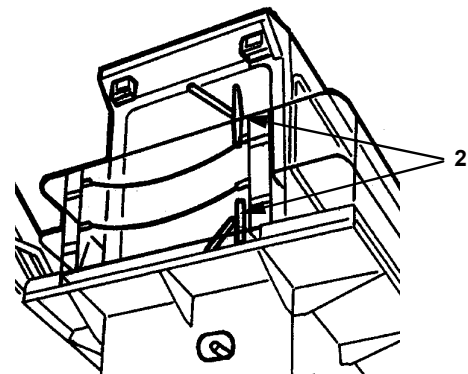


M18C-01-021

WIPER DELAY SELECTOR SWITCH

When the wiper switch is turned to the intermittent position, the interval between wiper operation can be adjusted in four stages using wiper delay selector switch (3) as follows:

- SHORT position (E): Wiper operates at approx. 4 second intervals.
- position (F): Wiper operates at approx. 8 second intervals.
- position (G): Wiper operates at approx. 15 second intervals.
- LONG position (H): Wiper operates at approx. 25 second intervals.



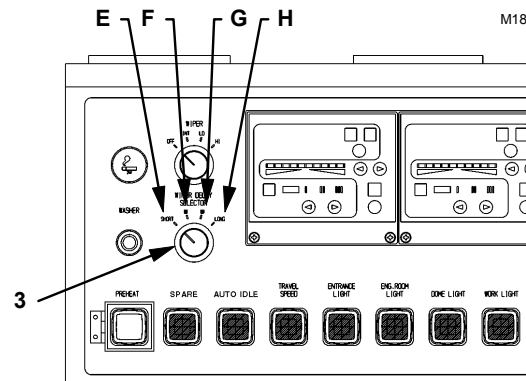
M18C-01-036

WASHER SWITCH

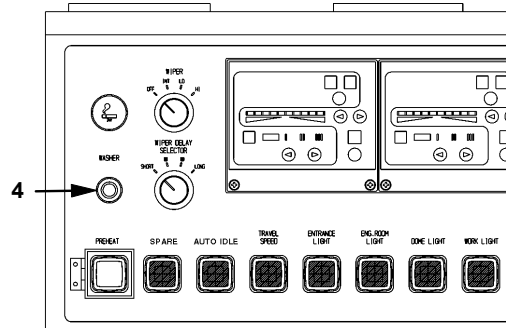
IMPORTANT: Washer motor may be damaged if washer switch (4) is held for more than 20 seconds, or continually operated with no fluid in the washer tank.

Press washer switch (4) to squirt windshield washer fluid on windshield.

Washer fluid will squirt and the wiper will operate as long as washer switch (4) is pressed. The wiper will operate four seconds more after washer switch (4) is released.



M18C-01-021



M18C-01-021

OPERATOR'S STATION

AIR CONDITIONERS

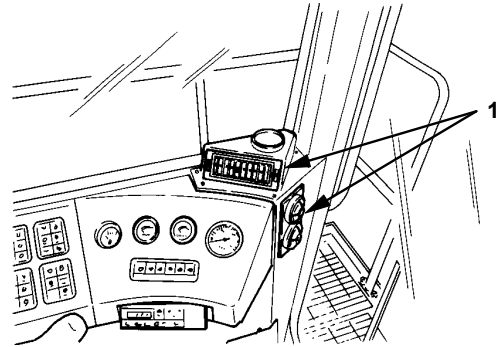
This machine is equipped with three air conditioners, all located in the room under the cab. Air flow vents for these air conditioners are located inside the cab at the front, side, and rear, respectively. Moreover, three air conditioner control panels are provided in the cab, each designated for one of the three air conditioners.

Component Designation

- 1- Front Air Flow Vents
- 2- Side Air Flow Vents
- 3- Rear Air Flow Vents

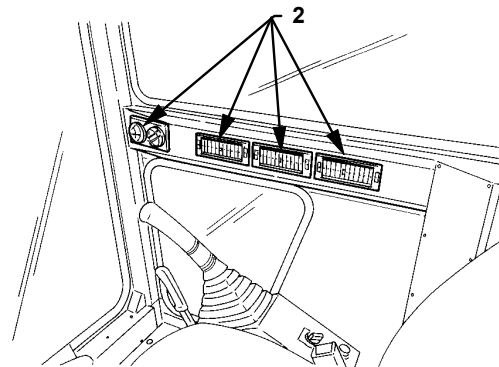
 **NOTE:** Direction of air flowing out of each vent can be changed by adjusting the louver.

- 4- Air Conditioner Front Panel
- 5- Air Conditioner Side Panel
- 6- Air Conditioner Rear Panel



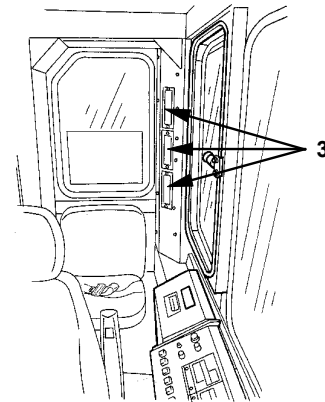
Front Air Flow Vents

M117-01-054



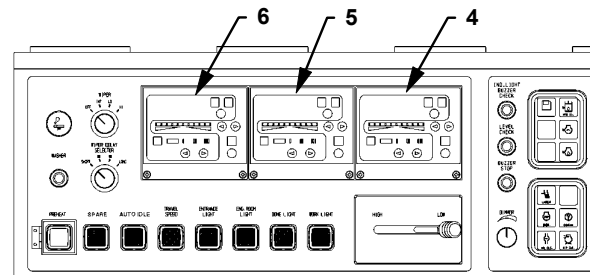
Side Air Flow Vents

M144-01-012



Rear Air Flow Vents

M146-01-035



M18C-01-022

OPERATOR'S STATION

Designations and Functions of Controls

- 7- Ventilation Shift Switch
- 8- Air Conditioner Switch
- 9- Air Conditioner Indicator
- 10- Temperature Control Switches
- 11- Temperature Indicator
- 12- Blower Control Switches
- 13- Blower Speed Indicator

Ventilation Shift Switch (7)

Each time ventilation shift switch (7) is pressed, ventilation mode is shifted between  and .

 Circulation

 Fresh Air

When the Fresh Air mode is selected, the cab is slightly pressurized, preventing dust from entering into the cab.

Air Conditioner Switch (8)

Press air conditioner switch (8) to turn ON the air conditioner. Press it again to turn it OFF.

Air Conditioner Indicator (9)

This indicator (9) will light when the air conditioner is turned ON.

Temperature Control Switches (10)

Press temperature control switch  (10) to increase the temperature.

Press temperature control switch  (10) to decrease the temperature.

Temperature Indicator (11)

The number of the lit LEDs indicates the relative temperature of the air blowing out. The higher the number of the lit LEDs, the higher the temperature of the air blowing out is.

Blower Control Switches (12)

Control blower speed using these switches.

Each time blower control switch  (12) is pressed, the blower fan speed is increased from OFF to low, to medium, and to high.

Each time blower control switch  (12) is pressed, the blower fan speed is decreased from high to medium, to low, then it will be turned OFF. Lit part of blower speed indicator (13) will move each time one of these switches is pressed.

Blower Speed Indicator (13)

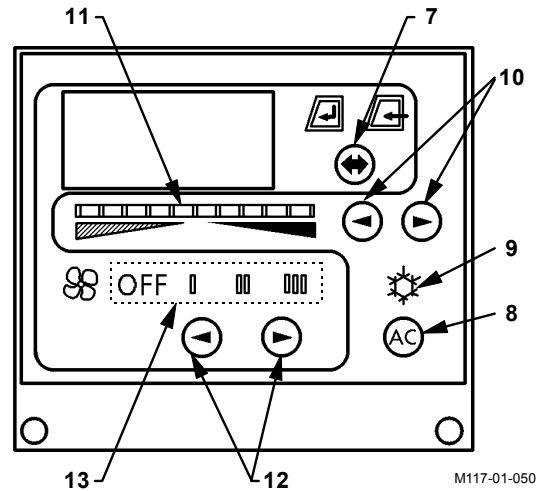
Each part of the indicator indicates blower fan speed as follows:

When the OFF is lit: OFF

When the  is lit: Low Speed

When the  is lit: Medium Speed

When the  is lit: High Speed

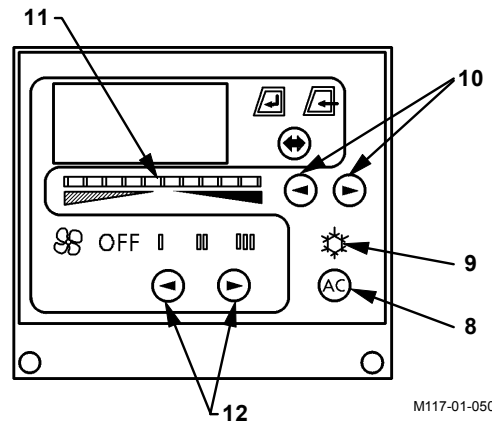


OPERATOR'S STATION

COOLING

Set the temperature to the lowest setting using temperature control switch (10). (Repeatedly press temperature control switch (10) until only the leftmost indicator (11) is on.)

Press blower control switch (12) to turn on the blower fan. Press air conditioner switch (8). (Air conditioner indicator (9) should turn on.) Cool air will flow from the vents. Use temperature control switch (10) and blower control switch (12) to adjust the temperature inside the cab.

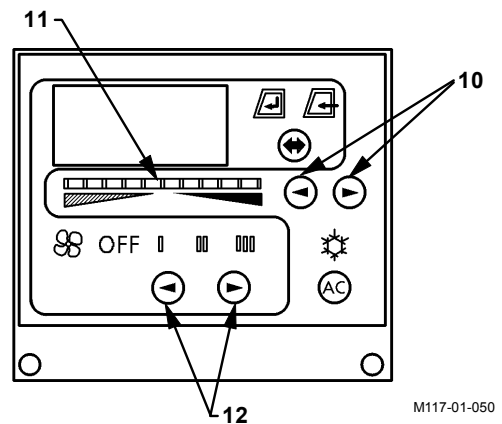


HEATING

Set the temperature to the highest setting using temperature control switch (10). (Repeatedly press temperature control switch (10) until all temperature indicators (11) turn on.)

Press blower control switch (12) to turn on the blower fan. Warm air will flow from the vents.

Use temperature control switch (10) and blower control switch (12) to adjust the temperature inside the cab.



OPERATOR'S STATION

DEHUMIDIFYING AND HEATING

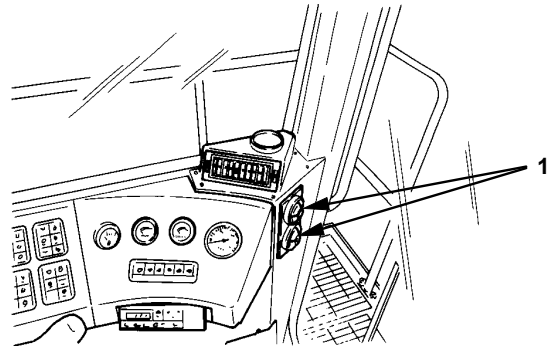
(To prevent the windshield from clouding)

Set the temperature to the highest setting using temperature control switch (10). (Repeatedly press temperature control switch (10) until all temperature indicators (11) turn on.)

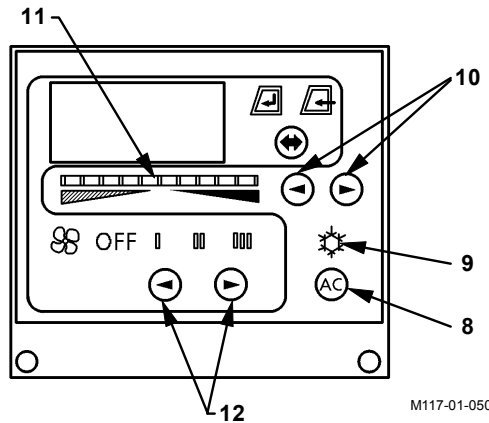
Press blower control switch (12) to turn on the blower fan. Press air conditioner switch (8). (Air conditioner indicator (9) should turn on.) Warm air will flow from the vents.

Adjust front air flow vents (1) and side air flow vents (2) so that the air flow is directed toward the windshield.

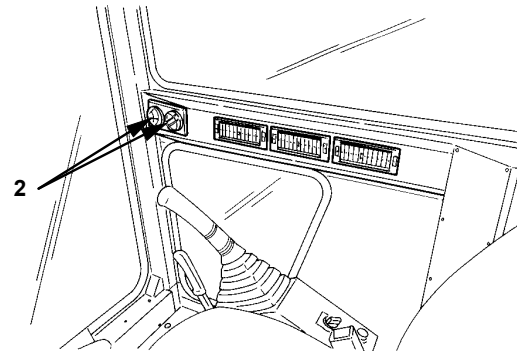
Use temperature control switch (10) and blower control switch (12) to adjust the temperature inside the cab.



M117-01-054



M117-01-050



M144-01-012

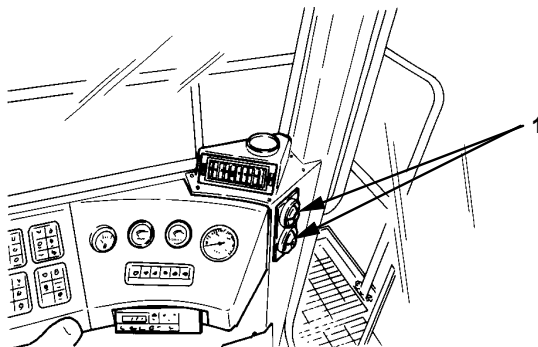
OPERATOR'S STATION

DEFROSTING

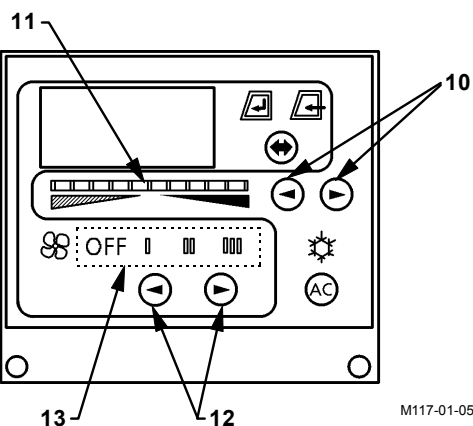
Set the temperature to the highest setting using temperature control switch (10). (Repeatedly press temperature control switch (10) until all temperature indicators (11) turn on.)

Repeatedly press blower switch (12) to the high speed position (until blower indicator (13) comes on).

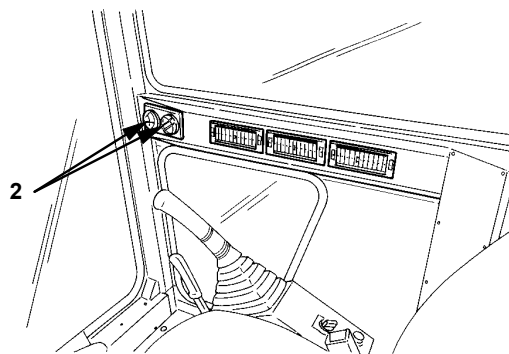
Adjust front air flow vents (1) and side air flow vents (2) so that the air flow is directed toward the windshield.



M117-01-054



M117-01-050



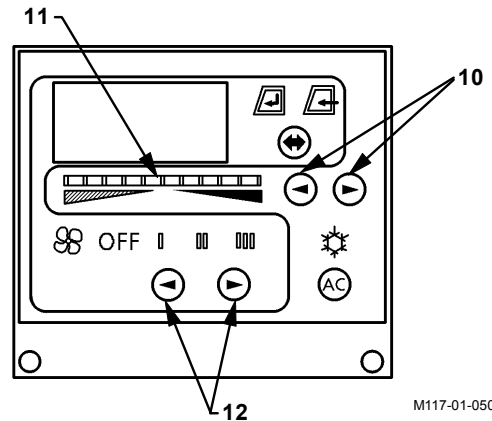
M144-01-012

OPERATOR'S STATION

BLOWER OPERATION WITHOUT COOLING OR HEATING

Set the temperature to the lowest setting using temperature control switch (10). (Repeatedly press temperature control switch (10) until only the leftmost indicator (11) is on.)

Press blower control switch (12) to turn on the blower fan. Air will flow from the vents.

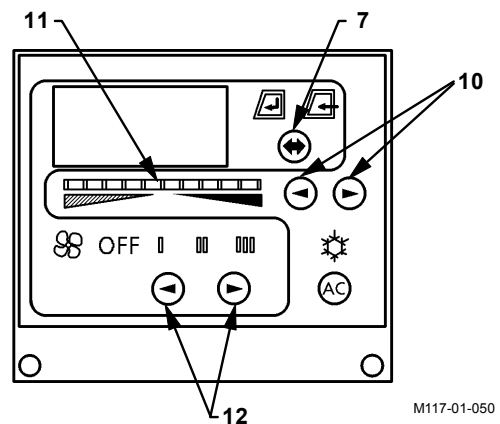


VENTILATION THE CAB

Turn on the fresh air indicator  using ventilation switch (7).

Set the temperature to the lowest setting using temperature control switch (10). (Repeatedly press temperature control switch (10) until only the leftmost temperature indicator (11) is on.)

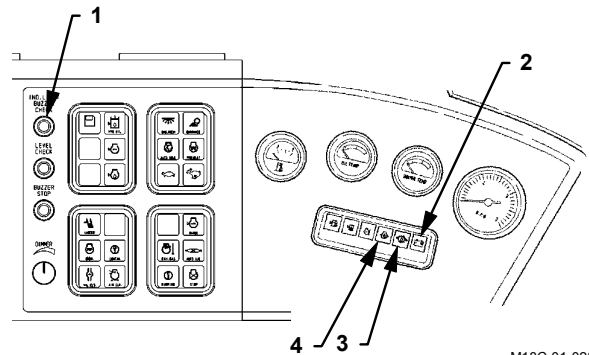
Press blower control switch (12) to turn on the blower. Fresh air will flow from the vents.



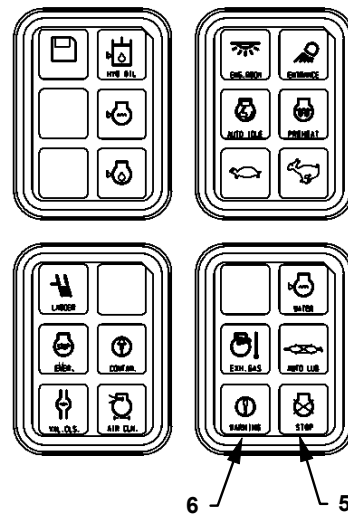
OPERATOR'S STATION

INDICATOR LIGHT CHECK SWITCH

1. Turn key switch to the ON position.
 - Alternator indicator (2), pump transmission oil pressure indicator (3), engine oil pressure indicator (4), engine stop indicator (5), and engine warning indicator (6) will come ON. If either indicator fails to light, the indicator bulb may be burned out. Engine warning indicator (6) will go OFF after staying ON for approx. 2 seconds.
2. When indicator light check switch (1) is pressed and held, all indicators will come ON and stay ON until the switch is released. If any indicator fails to light, the indicator bulb may be burned out.
3. The buzzer will sound as long as indicator light check switch (1) is depressed. If the buzzer doesn't sound, the buzzer is faulty.



M18C-01-023



M18C-01-024

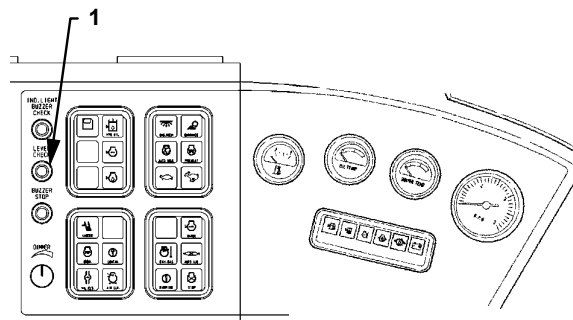
OPERATOR'S STATION

LEVEL CHECK SWITCH

Turn the key switch to the ON position.

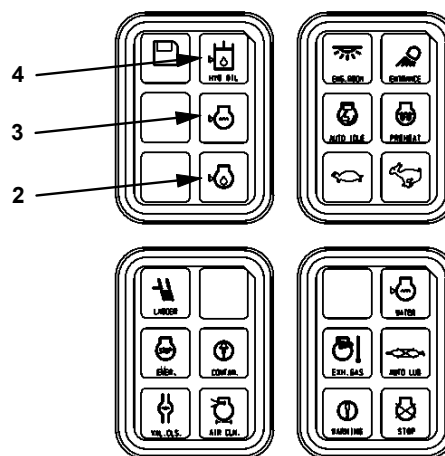
When engine oil levels (2), coolant level (3) and hydraulic oil level (4) are adequate for operation, these indicators on the monitor panel will light when level check switch (1) is pushed.

 **NOTE:** Use the level check switch only when the engine is stopped.



M18C-01-023

IMPORTANT: The monitor system on this machine is not intended to guarantee the complete machine condition. Don't rely only on the monitor indication. Be sure to perform visual checks such as oil levels at regular intervals to ensure using the machine safely.



M18C-01-024

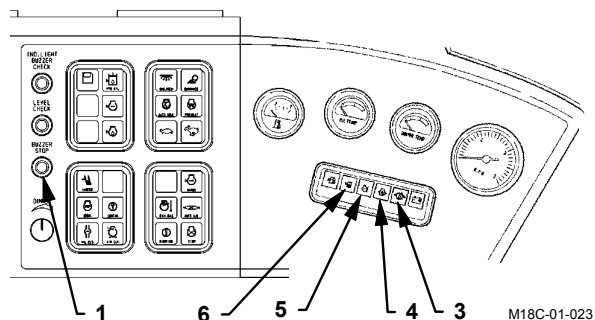
OPERATOR'S STATION

BUZZER STOP SWITCH

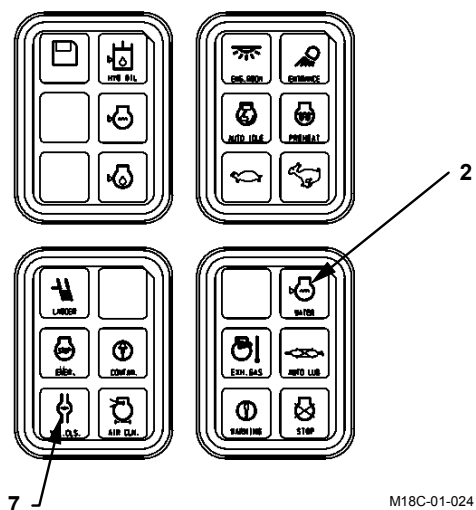
The buzzer will sound in the following cases.

1. Coolant level is low.
(Coolant level indicator (2) lights also.)
2. Pump transmission oil pressure is low.
(Pump transmission oil pressure indicator (3) lights also.)
3. Engine oil pressure is low.
(Engine oil pressure indicator (4) lights also.)
4. Engine coolant overheats.
(Overheat indicator (5) lights also.)
5. Hydraulic oil tank oil level is low.
(Hydraulic oil level indicator (6) lights also.)
6. Stop valve in the low pressure circuit is closed.
(Stop valve indicator (7) lights also.)

Depress buzzer stop switch (1) to stop buzzer. Buzzer is automatically reset after releasing buzzer stop switch (1). If the buzzer sounds again, recheck the above cases.



M18C-01-023



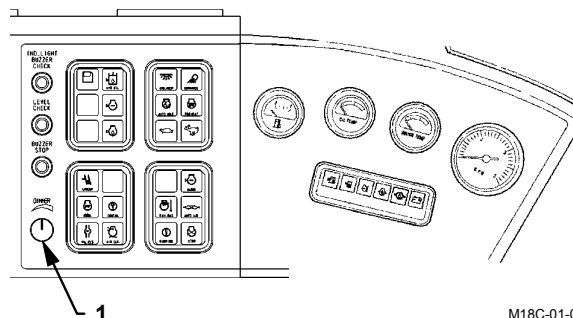
M18C-01-024

OPERATOR'S STATION

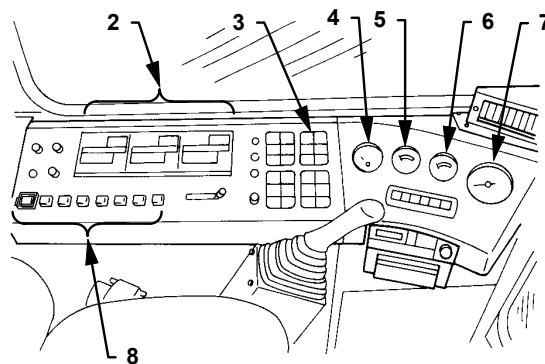
DIMMER SWITCH

Use dimmer switch (1) to adjust the air cond. panels (2), grouped pilot lamp (3), fuel gauge (4), hydraulic oil temperature gauge (5), coolant temperature gauge (6), tachometer (7), and switches (8) illumination.

Clockwise Turn: Brighter Illumination
Counterclockwise Turn: Darker Illumination



M18C-01-023

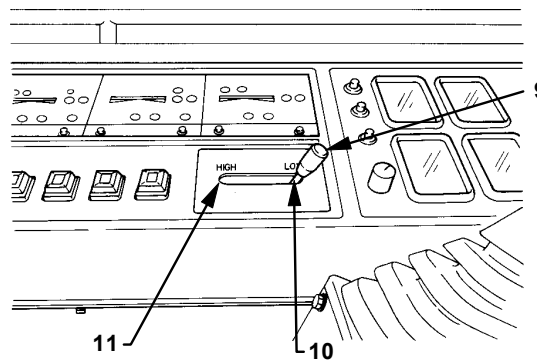


M146-01-039

ENGINE SPEED CONTROL LEVER

Use engine speed control levers (9) to adjust engine speed.

Slow Idle : Move lever (9) to the LOW position (10)
Fast Idle : Move lever (9) to the HIGH position (11)



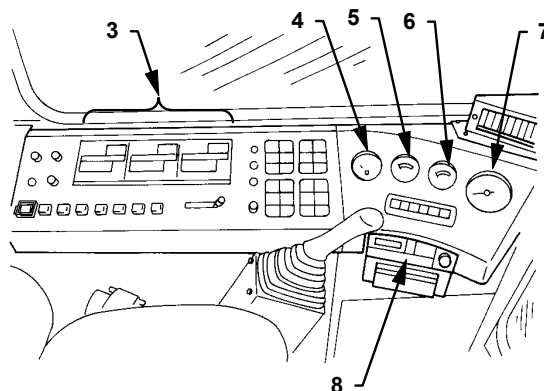
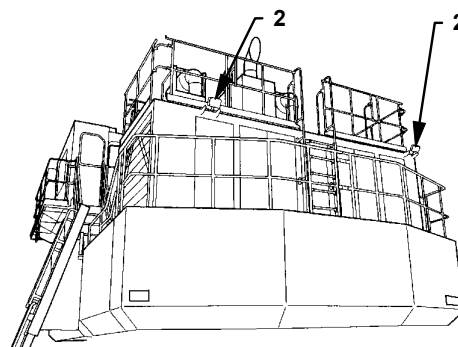
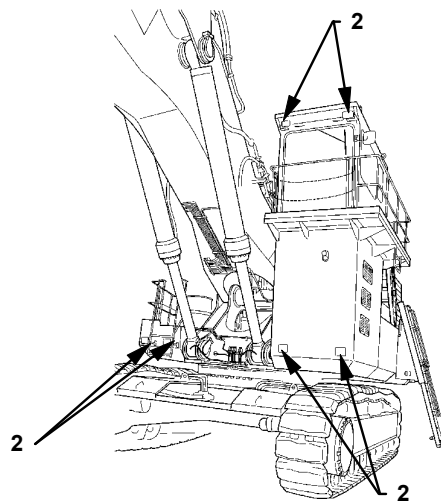
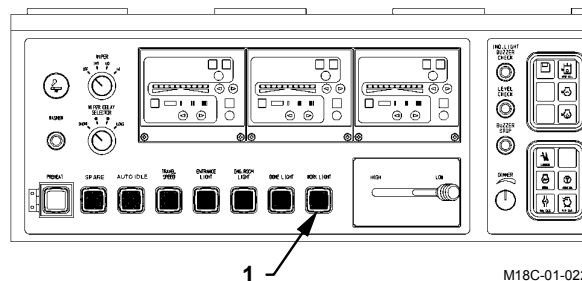
M117-01-013

OPERATOR'S STATION

WORK LIGHT SWITCH

Press work light switch (1) to turn on all work lights (2). In addition, illumination for air cond. panels (3), fuel gauge (4), hydraulic oil temperature gauge (5), coolant temperature gauge (6), tachometer (7), and radio (8) will be lit.

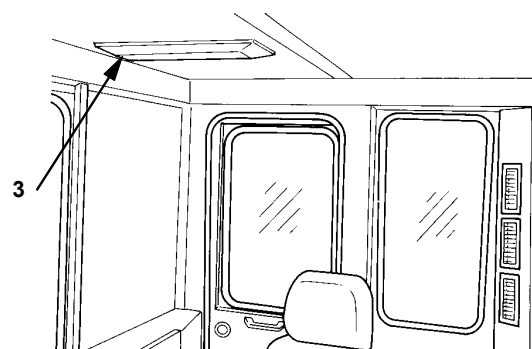
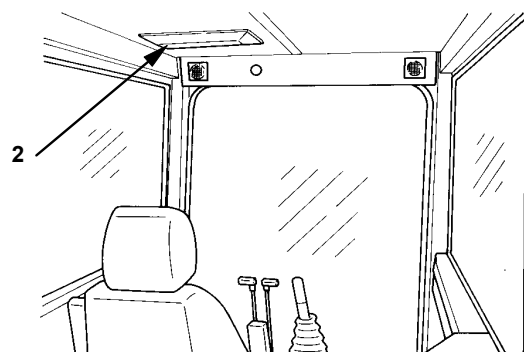
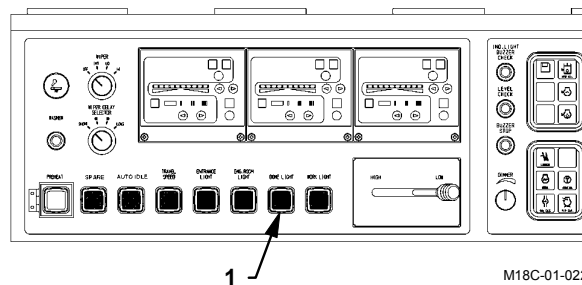
NOTE: Work light (2) will stay ON for approx. 1 minute and go OFF after the key switch is turned OFF with work light switch (1) ON.



OPERATOR'S STATION

DOME LIGHT SWITCH

Press dome light switch (1) to turn on dome lights (2) and (3), located on the front and rear parts of the cab ceiling.

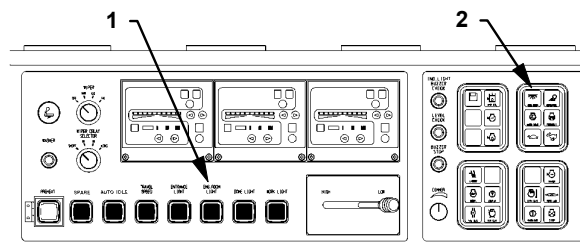


OPERATOR'S STATION

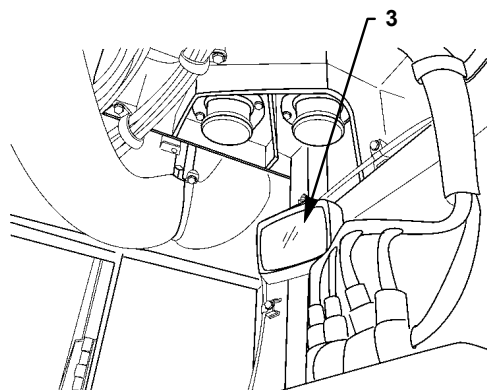
ENGINE ROOM LIGHT SWITCH

Press engine room light switch (1) to turn on lights (3), (4) and (5) located in the room under the cab, in the engine room, and in the pump room, respectively. Engine room light indicator (2) will also light.

NOTE: Engine room lights (3), (4) and (5) will stay ON for approx. 1 minute go OFF after the key switch is turned OFF with engine room light switch (1) ON.

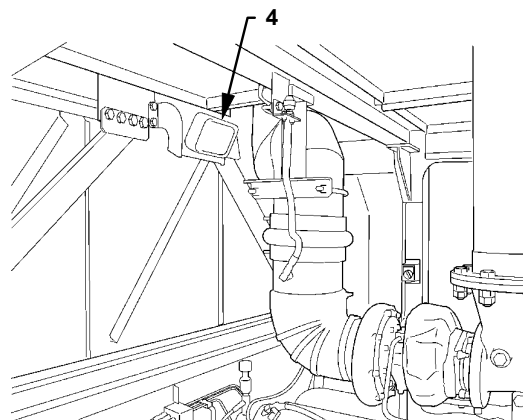


M18C-01-020



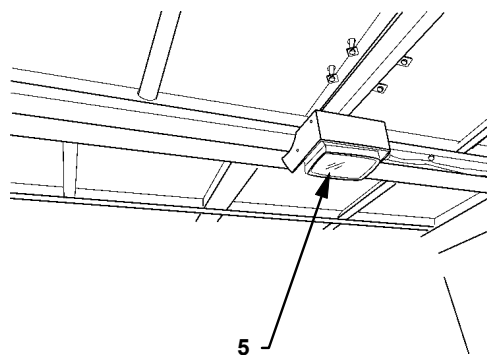
In Room Under the Cab

M141-01-017



In Engine Room

M18C-01-025



In Pump Room

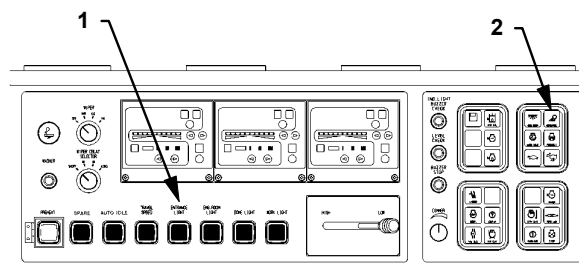
M141-01-019

OPERATOR'S STATION

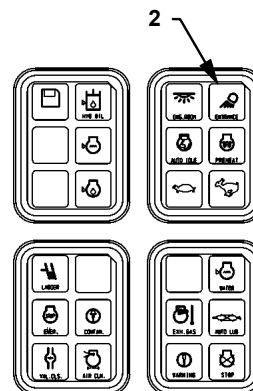
ENTRANCE LIGHT SWITCH

Press entrance light switch (1) to turn on entrance light (3). Entrance light indicator (2) will also light.

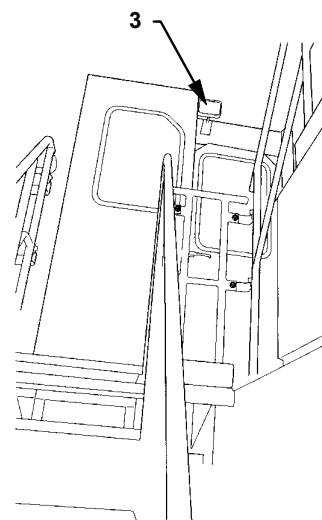
NOTE: Entrance light (3) will stay ON approx. 1 minute go OFF after the key switch is turned OFF with entrance light switch (3) ON.



M18C-01-020



M18C-01-024



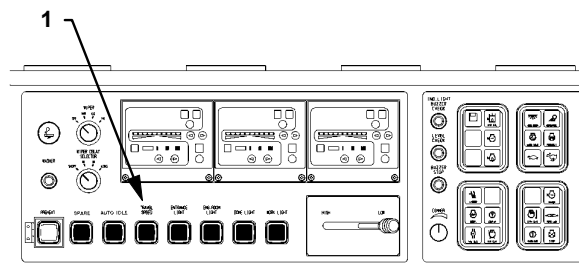
M18C-01-026

OPERATOR'S STATION

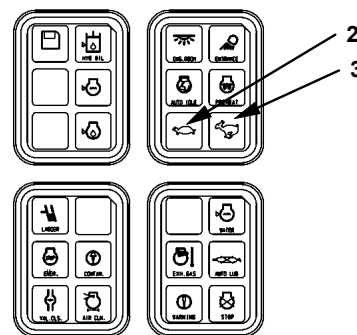
TRAVEL SPEED SWITCH

Fast speed (rabbit) and slow speed (turtle) can be selected by pushing travel speed switch (1).

- 2- Travel Mode Indicator (Slow Speed)
- 3- Travel Mode Indicator (Fast Speed)



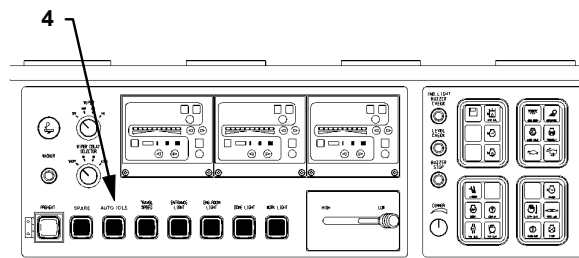
M18C-01-020



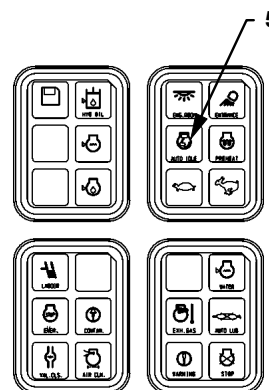
M18C-01-024

AUTO-IDLE SWITCH

While auto-idle switch (4) is turned on, engine speed decreases to the auto-idle setting from the engine speed control lever setting approximately 4 seconds after the control levers are returned to neutral. Auto-idle indicator (5) stays on while auto-idle switch (4) is turned on. Push auto-idle switch (4) again to turn off the auto-idle function. Auto-idle indicator (5) will also be turned off.



M18C-01-020

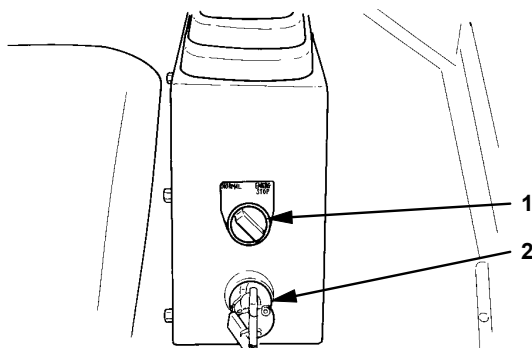


M18C-01-024

OPERATOR'S STATION

SWITCH PANEL (RIGHT)

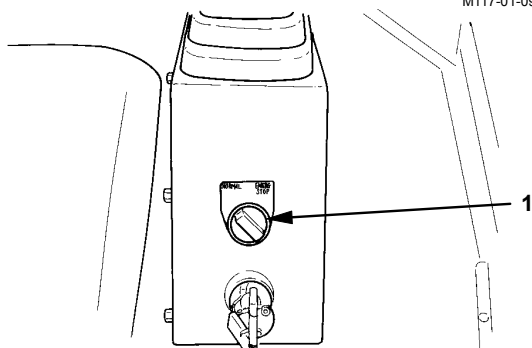
- 1- Emergency Engine Stop Switch
- 2- Key Switch



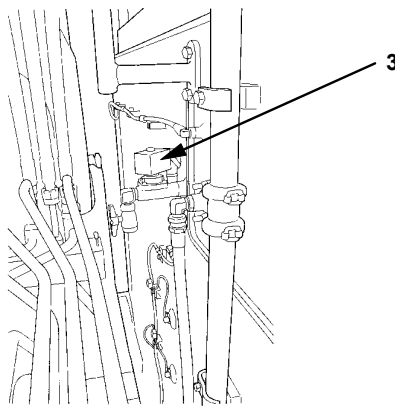
M117-01-093

EMERGENCY ENGINE STOP SWITCH

If an emergency engine stop is required or if the engine won't stop due to a failure of the key switch, turn engine emergency stop switch (1) to the EMERG STOP position to stop the engine. Air vent valve (3) located in front of the hydraulic oil tank will open at the same time to relieve pressure from the hydraulic oil tank. Turn engine emergency stop switch (1) to the NORMAL position to restart the engine.



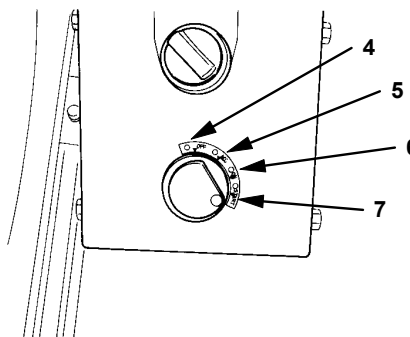
M117-01-093



M18C-01-027

KEY SWITCH

- 4- OFF (Engine Off)
- 5- ACC (Horn, Radio etc.)
- 6- ON (Engine On)
- 7- START (Engine Start)



M117-01-094

OPERATOR'S STATION

PREHEAT SWITCH

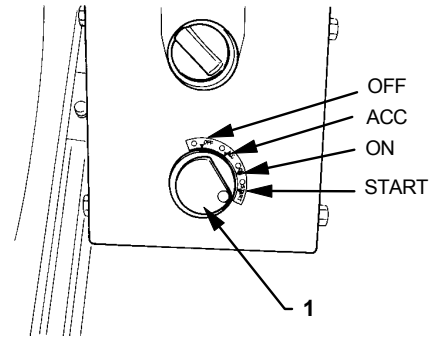
Turn key switch (1) to the ACC position. Open preheat switch cover (2) and press preheat switch (3). Preheat indicator (4) comes ON, starting preheating. When preheat switch (3) is pressed again within 30 seconds, the switch is turned OFF and preheat indicator (4) goes OFF, completing preheating.

Preheat indicator will automatically go OFF after 30 seconds pass, or key switch (1) is turned ON, completing preheating.

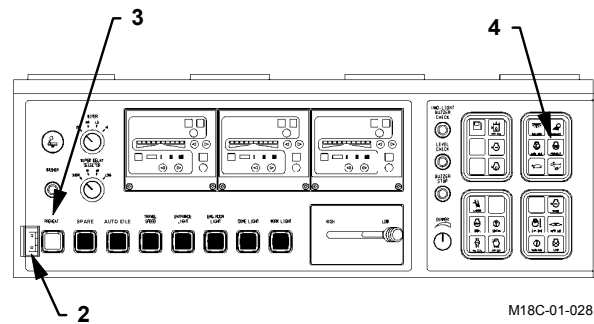
NOTE: Preheating starts only when key switch (1) is in the ACC position.

NOTE: After preheating for more than 15 seconds, if preheating is required again, turn preheat switch (2) OFF. Then, wait for more than 60 seconds before restarting preheating. Otherwise, preheating system will not operate.

After completing preheating, turn preheat switch (3) OFF and close cover (4). Operate preheat switch (3) when the engine is difficult to start when the ambient temperature is low. Refer to the STARTING IN COLD WEATHER on page 3-5 for the details.



M117-01-094



M18C-01-028

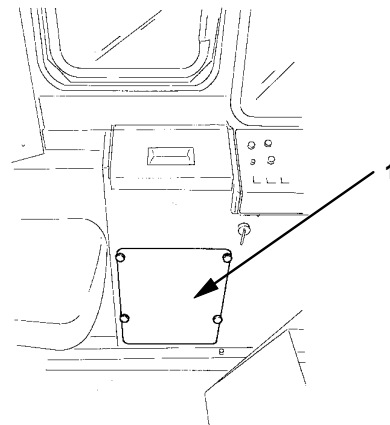
OPERATOR'S STATION

ENGINE TROUBLESHOOTING SWITCH

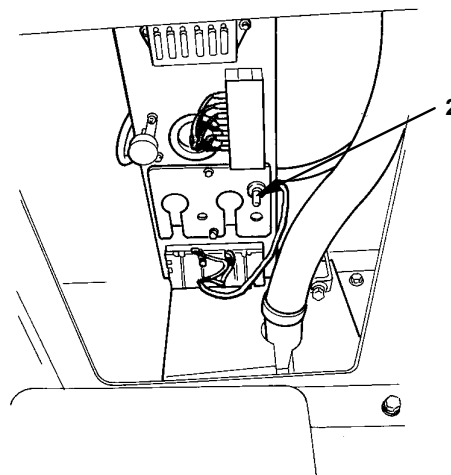
Engine troubleshooting switch is located behind side cover (1) of the left console in the cab.

If the engine and/or engine related parts fail, and either engine warning indicator (3) or engine stop indicator (4) lights or continues flashing, display fault codes (flashing the engine warning indicator) by operating engine troubleshooting switch (2). Don't operate engine troubleshooting switch (2) when the engine is normal.

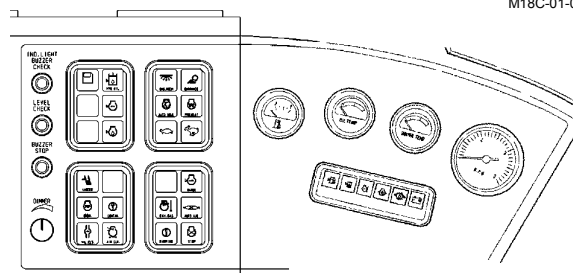
Refer to the ENGINE TROUBLESHOOTING on page 11-1 for the details.



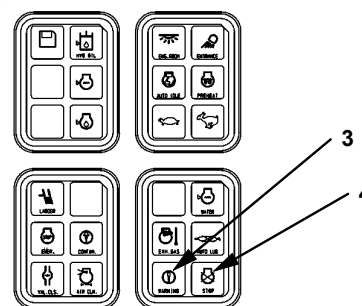
M146-07-048



M18C-01-029



M18C-01-023



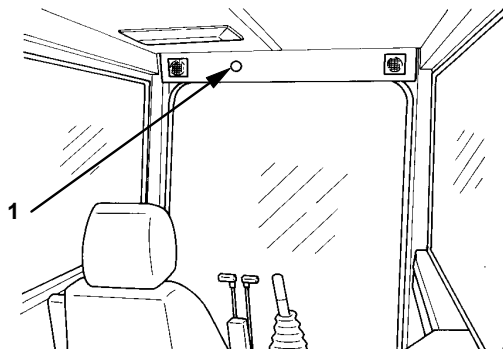
M18C-01-023

OPERATOR'S STATION

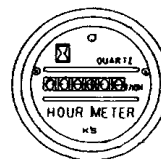
HOURLY METER

1- Hour Meter

The right hand number indicates tenths (six minutes) of an hour.



M144-01-033

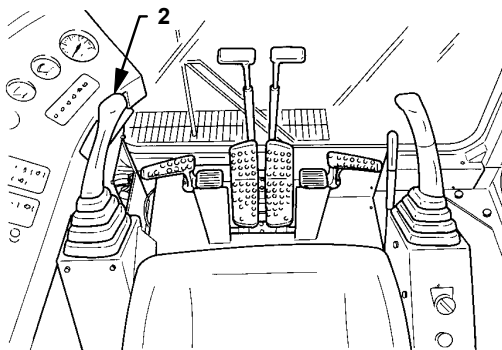


HORN SWITCH

Horn switch (2) is provided on the top of the left control lever. The horn continuously sounds as long as switch (2) is pressed.

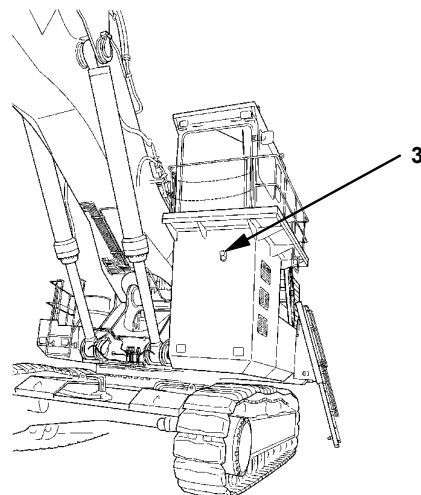


CAUTION: If horn (3) does not sound when pushed, immediately stop the engine and contact your authorized dealer for repair. Operating the machine with a malfunctioning horn may result in personal injury or death.



M177-01-057

M146-01-010



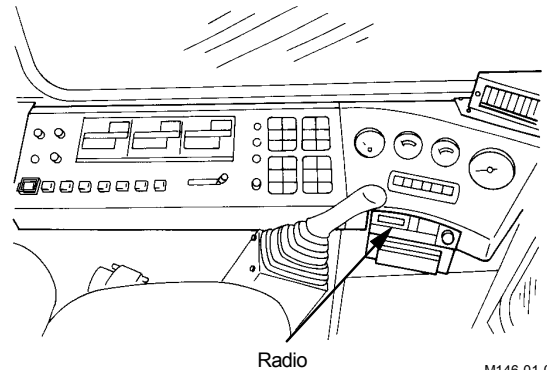
M18C-01-014

OPERATOR'S STATION

FM/AM RADIO OPERATION

1. Controls on the radio

- 1- Power Switch/Volume Control Knob
- 2- Tone Adjustment Ring
- 3- AM/FM Switch
- 4- Station Preset
- 5- Tuning Switch
- 6- Display Mode Change Switch
- 7- Digital Display
- 8- Time Set Switch
- 9- Set Switch



M146-01-039

2. Tuning Procedure

(1) Manual Tuning Procedure

Repeatedly tap one of tuning switch (5) until the desired station is reached.

Each time the tuning switch is pressed, the frequency changes at an interval.

- Tap the tuning switch (∧) to increase the frequency.
- Tap the tuning switch (∨) to decrease the frequency.

Digital display (7) will return to the setting (the clock or the frequency, whichever one is set by the display mode change switch) approximately 5 seconds after tuning switch (5) are no longer tapped or pressed.

(2) Automatic Search Function

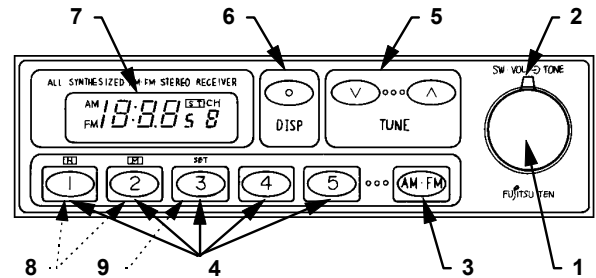
Press and hold one of tuning switch (5) for more than half a second until an electronic tone is heard, then release. The frequency display will move up to the next higher frequency station.

- To go up to the next higher frequency station, press and hold the tuning switch (∧).
- To go down to the next lower frequency station, press and hold the tuning switch (∨).

After displaying the next frequency station, digital display (7) will return to the setting (the clock or the frequency, whichever one is set by the display mode change switch) in approximately 5 seconds.

In order to deactivate the automatic search function while it is operating (while searching the next available frequency station), simply tap tuning switch (5) again.

If the receiving radio waves are weak, i. e. such as when the machine is located between high rising buildings, etc., use the manual tuning procedure to select the desired station.



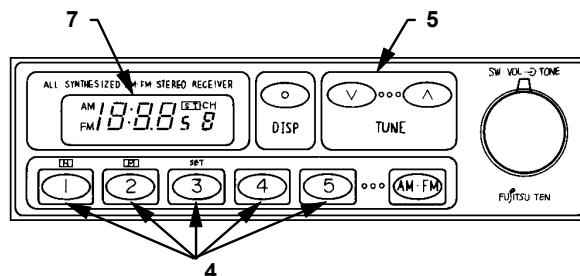
M157-01-027

OPERATOR'S STATION

3. Station Presetting Procedure

- (1) Select the desired station using tuning switches (5).
(Refer to the "Tuning Procedure" section.)
- (2) Press and hold one station preset (4) for more than 2 seconds until an electronic tone is heard. Now, the selected station is preset for the selected station preset. The frequency of the preset station will be indicated on digital display (7).

Once the presetting is complete for a station preset (4), the radio will be tuned to the preset station when station preset (4) is pressed (for less than 2 seconds).



M157-01-027

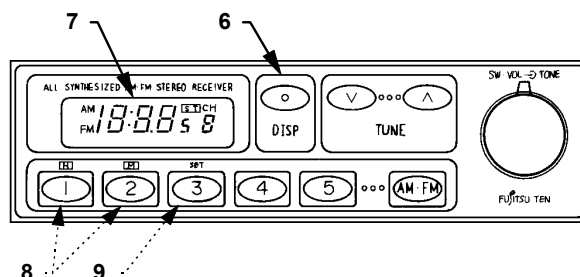
DIGITAL CLOCK SETTING PROCEDURE

NOTE: In order to set the clock, digital display (7) must be in the time display mode.

1. Press and hold display mode change switch (6).
While holding display mode change switch (6), use time set switch (8) and/or set switch (9) to set the clock.
The functions of time set switch (8) and set switch (9) are as follows:

- Time Set Switch (H): Each time set switch (H) is pressed, the hour display will increase by one.
 - Time Set Switch (M): Each time set switch (M) is pressed, the minute display will increase by one.
(The time is displayed in 12 hour standard.)
- If either of the switches (H) or (M) is pressed and held, the hour or minute display will change continuously until the switch is released.
- Set Switch (SET) (9): If set switch (SET) (9) is pressed, the minute display will be reset to "00".
 - If the minute display is "29" or smaller when set switch (SET) (9) is pressed, the display will be reset to "00" without changing the hour display.
 - If the minute display is "30" or larger when set switch (SET) (9) is pressed, the hour display will be increased by one and the minute display will be reset to "00".

For example, if the set switch (SET) (9) is pressed when the clock display is "10:29" and "10:30", the clock display will change to "10:00" and "11:00" respectively.



M157-01-027

OPERATOR'S STATION

OPERATOR'S SEAT ADJUSTMENT

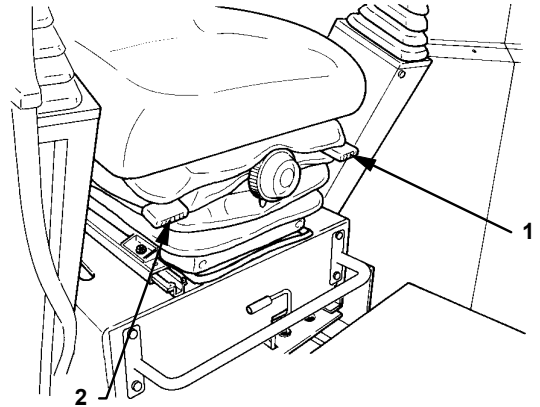
Seat Angle and Height Adjustment

- (1) The rear part of the seat height can be adjusted in 5 positions at 15 mm (0.6 in) intervals.
Pull up and hold lever (1) to adjust the height of the rear part of the seat, thus adjusting the angle of the seat setting in the rear part.
- a. The rear part of the seat will be positioned in its highest position by pulling and holding of lever (1) without applying any weight against the seat.
In practice, remove all weight from the seat until the rear part of the seat rises to the desired height while pulling and holding lever (1). Then, release lever (1) to obtain the desired height (angle) of the rear part of the seat.
- b. In order to lower the rear part of the seat, pull and hold lever (1), apply weight until the rear part of the seat lowers to the desired position, and then release lever (1).
- (2) The front part of the seat height can be adjusted in 5 positions at 15 mm (0.6 in) intervals.
Push down and hold lever (1) to adjust the height of the front part of the seat, thus adjusting the angle of the seat setting in the front part.
- a. The front part of the seat will be positioned in its highest position by pushing and holding of lever (1) without applying any weight against the seat.
In practice, lean back against the backrest to take weight off the front part while pushing and holding lever (1) until the front part of the seat rises to the desired height. Then, release lever (1) to obtain the desired height (angle) of the front part of the seat.
- b. In order to lower the front part of the seat, push and hold lever (1), apply weight until the front part of the seat lowers to the desired position, and then release lever (1).

Adjust the seat height by adjusting the rear and front heights of the seat alternately as desired. [adjustable height range: 60 mm (2.4 in) (5 positions at 15 mm (0.6 in) intervals)]

Backrest Adjustment

Pull up and hold lever (2) to adjust the backrest.
The backrest can be tilted 66 degrees forward and 72 degrees to the rear at 3 degree intervals.
Adjust the backrest angle with your back against the backrest. If the back is pulled away from the back rest, the backrest may hit your back when lever (2) is pulled.



M117-01-030

OPERATOR'S STATION

Seat Fore-Aft Adjustment

Pull up and hold handle (3) to unlock the seat for the seat fore-aft adjustment.

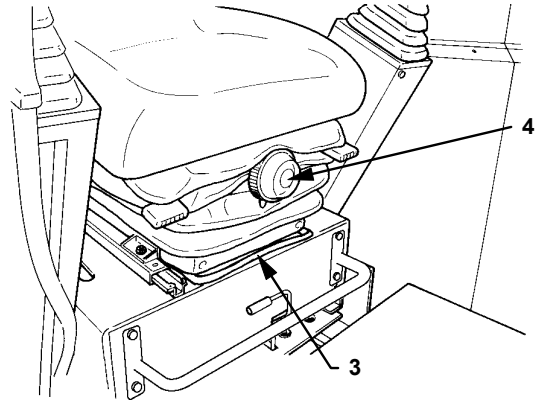
With handle (3) pulled up and held, slide the seat to the desired distance from the control levers. 17 positions at 10 mm (0.4 in) intervals (160 mm (6.3 in) range) are provided for the seat fore-aft adjustment.

Weight (Suspension) Adjustment

Turn knob (4) until the needle in the transparent part on knob (4) indicates your own weight in "kg".

Turn knob (4) counterclockwise to decrease the weight indication.

Turn knob (4) clockwise to increase the weight indication.



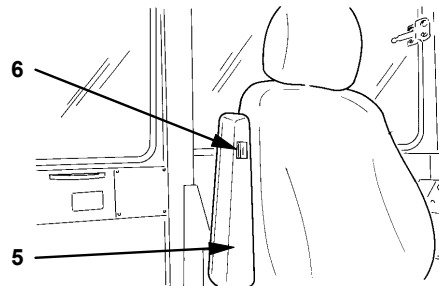
Armrest Adjustment

Armrest (5) can be raised upright by hand.

Also, the armrest angle can be adjusted by turning dial (6) located on the bottom of the armrest.

Positioning the armrest in front of the body:

- Turn the dial counterclockwise to raise the armrest angle.
- Turn the dial clockwise to lower the armrest angle.

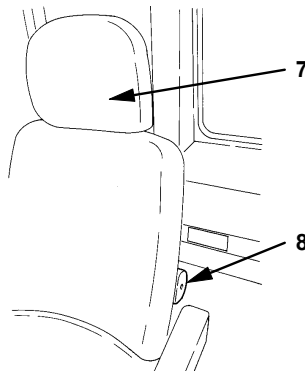


Headrest Adjustment

Headrest height and angle can be adjusted.

Pull headrest (7) upward or push downward to the desired position. (Height adjustment range: 50 mm (2.0 in))

Headrest (7) can be adjusted 60 degrees forward from the upright position. Move headrest by hands to the desired angle.



Lumbar Support

A lumbar support mechanism is installed in the backrest.

The lumbar support force can be adjusted in six steps.

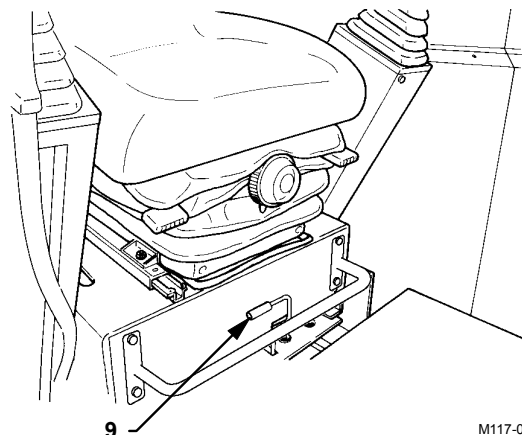
The furthest-clockwise-turned position of knob (8) is the standard position.

Turn knob (8) counterclockwise (the arrow-indicated direction) to increase the lumbar support force.

Console/Seat Unit Fore-Aft Adjustment

Pull lever (9) up to adjust both right and left consoles and the seat as an integral unit in fore-aft directions.

Release the lever to lock the unit into position. The fore-aft adjustment range of the unit is 120 mm (4.7 in) with steps every 20 mm (0.8 in).



OPERATOR'S STATION

SEAT BELT



CAUTION: 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.

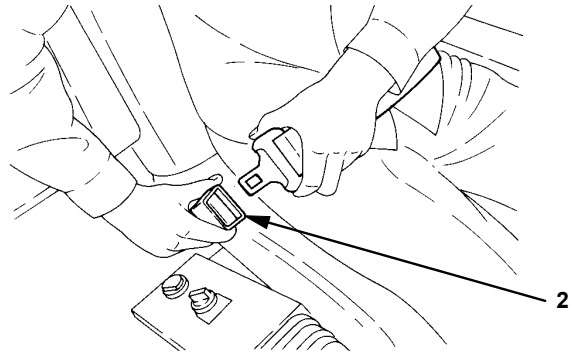
Seat Belt

1. This machine is equipped with a retractable seat belt (1).
2. Pull out the end of seat belt (1) and securely insert it into buckle (2). Confirm that seat belt (1) is not twisted.

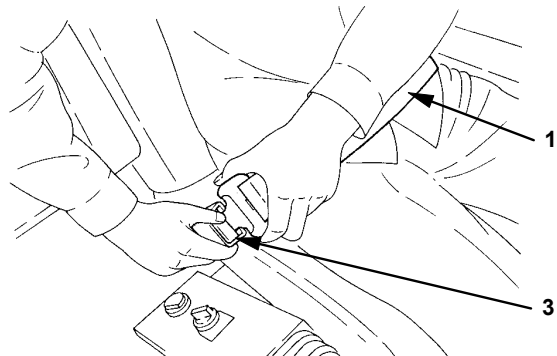


NOTE: If seat belt (1) is locked before the end is securely inserted into buckle (2), release the end of seat belt (1) to completely return it to the original position. Then, retry.

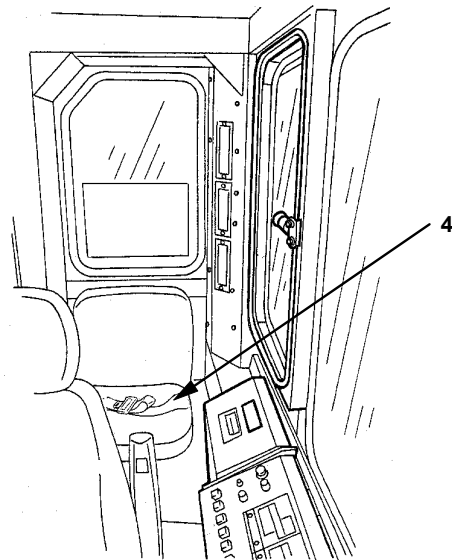
3. Push button (3) on buckle (2) to unfasten seat belt (1).
4. Seat belt (4) is also provided on the trainer seat.



M146-01-011



M146-01-012



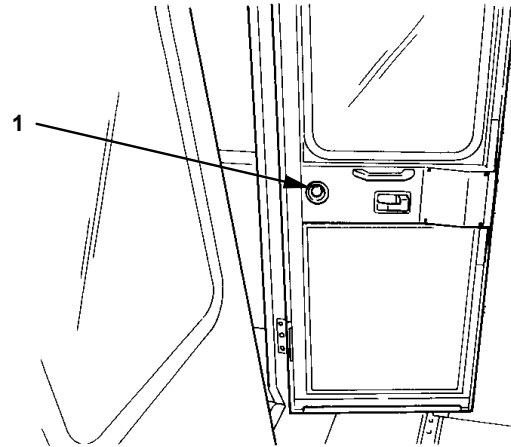
M146-01-035

OPERATOR'S STATION

CAB DOOR RELEASE BUTTON

When opening the cab door, lock it in the fully opened position. Open the door all the way until it locks in the latch on the side of the cab.

Push button (1) to unlock the door.

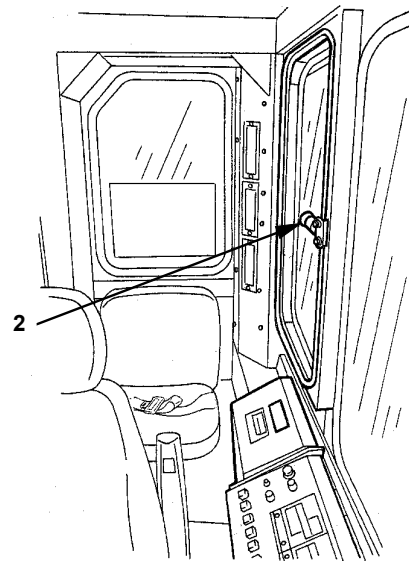


M146-01-019

OPENING CAB LEFT WINDOW

The cab left window can be opened.

Pull out lock pin (2) to unlock and open the cab left window.



M146-01-035

BREAK-IN

OBSERVE MACHINE CLOSELY

- IMPORTANT:**
1. Be extra cautious during the first 50 hours, until you become thoroughly familiar with the sound and feel of your new machine.
 2. Do not attempt to travel the machine at full speed before the break-in period is over, as the lower rollers and front idlers may seize. For the first 200 hours of operation, operate the machine with the travel speed switch set to the slow speed mode.
 3. When moving the machine to the jobsite after completion of local reassembly, be sure to operate the machine with the travel speed switch set to the slow speed mode.
Check lower rollers and front idlers every 10 minutes for excessively high temperature.
 4. Perform correct break-in procedures for the front-attachment pins.
-
1. Operate the engine horsepower up to about 80 % of full load.
 2. Avoid excessive engine idling.
 3. Check indicator lights and gauges frequently during operation.

EVERY 10 HOURS OR EACH SHIFT

1. Perform 10-hour or each shift service. (See Maintenance interval guide -- 10 hours.)
2. Watch for fluid leaks.
3. Lubricate working tool pivots every 10 hours for the first 50 hours and when working in mud and water.

BREAK-IN

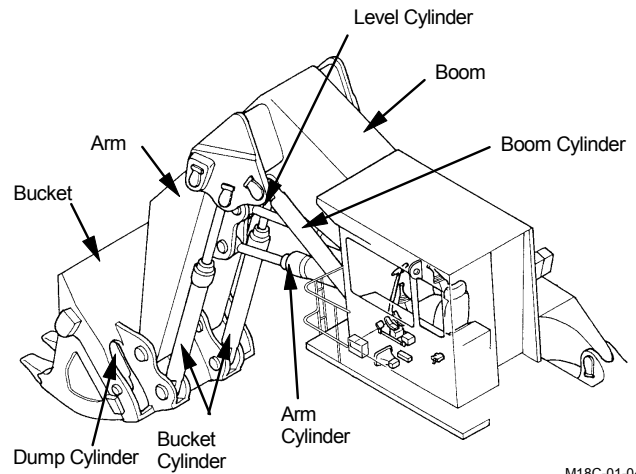
AFTER THE FIRST 50 HOURS

1. Check coolant, engine oil, and hydraulic oil level and for leaks every day. Refill with the recommended oils and coolant.
2. Check and grease the greasing points at the regular intervals. Grease the front attachment pins every day.
3. Retighten bolts at the regular intervals.
4. Re-drive in the tooth (point) holding wedges.
5. Check the monitor for any abnormality while operating the machine.
6. Operate the machine after thoroughly warming up the engine and hydraulic oil.
7. Check the machine for any abnormal operations while operating the machine.

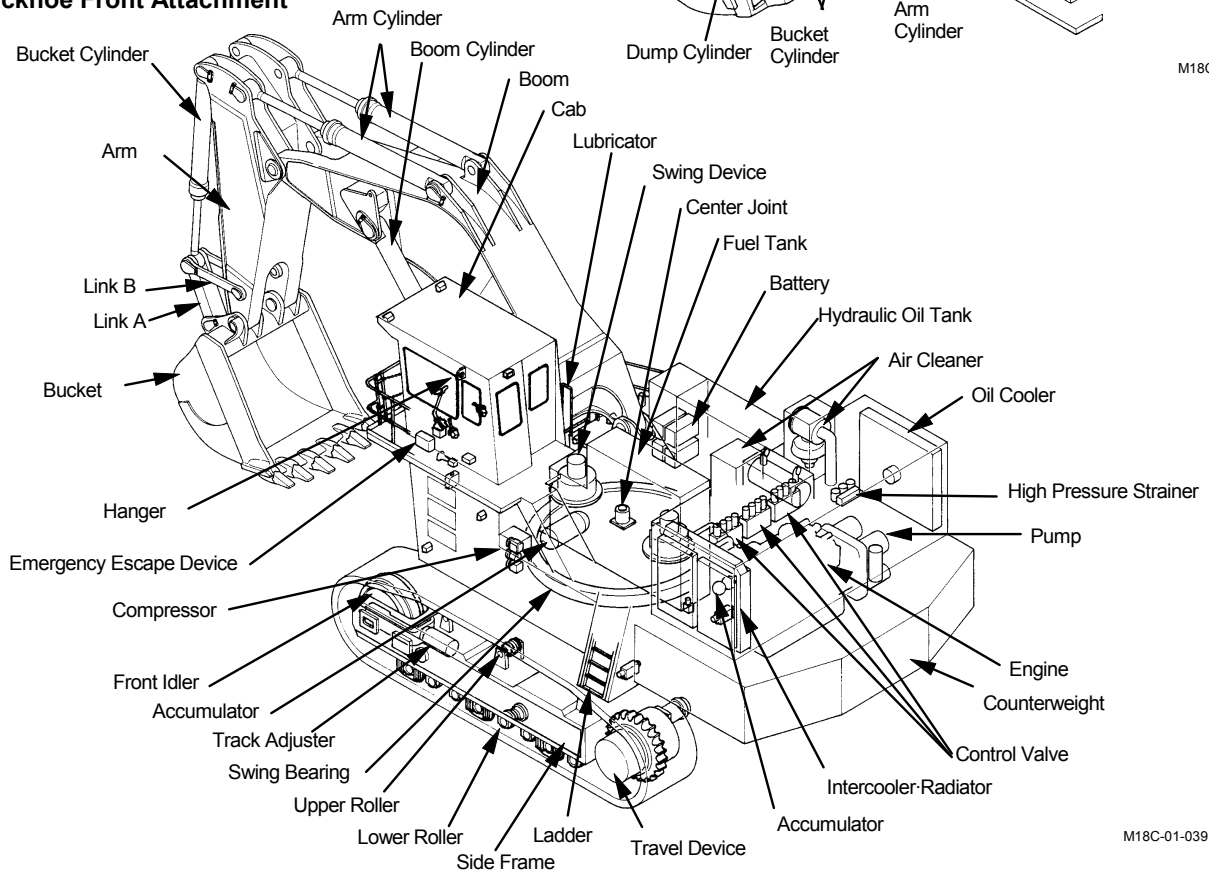
OPERATING THE ENGINE

INSPECT MACHINE DAILY BEFORE STARTING

Loading Shovel Front Attachment



Backhoe Front Attachment



For other inspection and maintenance procedures, refer to the MAINTENANCE Section.

ELECTRICAL SYSTEM: Check for worn or frayed wires and loose or corroded connections.

BOOM, BUCKET, SHEET METAL, TRACKS, HARDWARE: Check for bent, broken, loose, or missing parts.

HYDRAULIC SYSTEM: Check for leaks, missing or loose clamps, kinked hoses, and lines or hoses that rub against each other or other parts.

LUBRICATION: Check lubrication points.

PROTECTIVE DEVICES: Check guards, shields, and covers.

FIRE PREVENTION: Clean machine of debris.

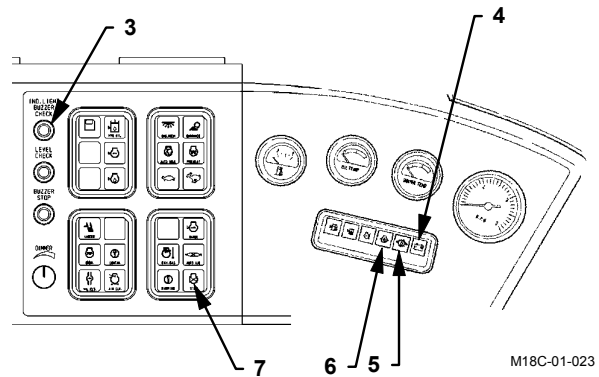
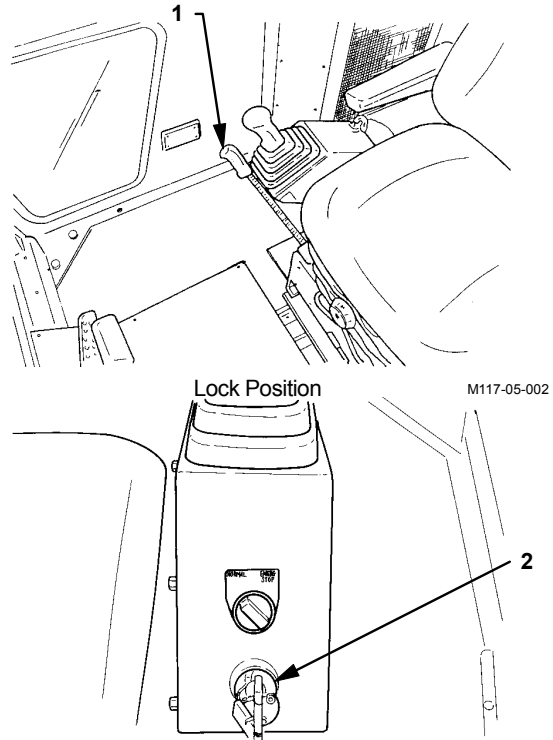
SAFETY: Walk around machine to clear all persons from machine area.

OPERATING THE ENGINE

CHECK INSTRUMENTS BEFORE STARTING

1. Place pilot control shut-off lever (1) in the LOCK position.
2. Check that all control levers are in neutral.
3. Indicator Light Check
 - (1) Turn key switch (2) ON. Alternator indicator (4), pump transmission oil pressure indicator (5), engine oil pressure indicator (6), and engine stop indicator (7) will come ON.
 - (2) Press indicator light check switch (3). As long as indicator light check switch (3) is pressed and held, all indicators stay ON. If any indicator fails to light, the bulb may be burned out.
4. Adjust the seat to allow full pedal and control levers stroke with operator's back against the backrest. Fasten the seat belt.

 **NOTE:** Use a damp cloth when wiping dust off monitor or switch panels to prevent damaging the panel face.

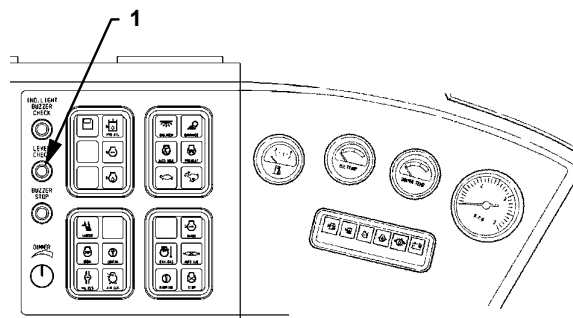


OPERATING THE ENGINE

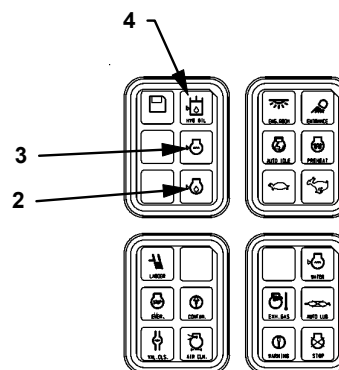
LEVEL CHECK

1. Turn key switch to the ON position.
2. Depress level check switch (1).
Hydraulic oil level (4), coolant levels (3) and engine oil levels (2) indicators will light if levels are adequate for operation.

IMPORTANT: Prevent possible machine damage.
Check fluid levels individually.
The level check does not take the place of daily inspection at hydraulic oil level window, engine coolant reserve tank and engine oil level dipstick.



M18C-01-023



M18C-01-024

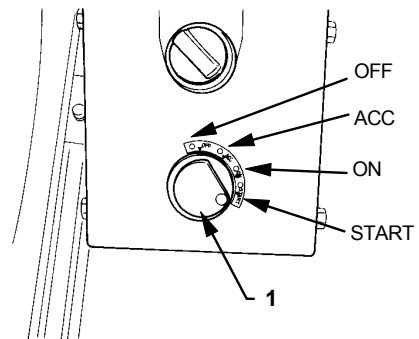
OPERATING THE ENGINE

STARTING IN COLD WEATHER

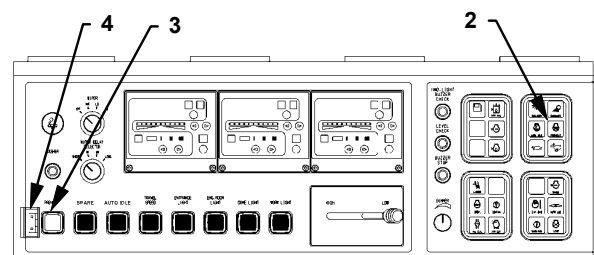
Follow these procedures if the engine is difficult to start in the usual starting method.

Preheating

1. Turn key switch (1) to the ACC position.
2. Open preheat switch cover (4). Turn preheat switch (3) ON. Preheat indicator (2) comes ON, starting preheating the engine intake air. At the same time, the engine governor is set so that the fuel injection amount is controlled to the most proper condition for starting in cold weather.
3. Within 30 seconds after starting preheating, turn key switch (1) ON and to the START position and hold it in that position until the engine starts. Preheating will automatically be complete and preheat indicator will go OFF.



M117-01-094



M18C-01-028



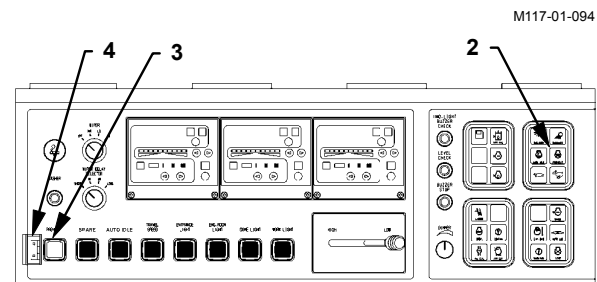
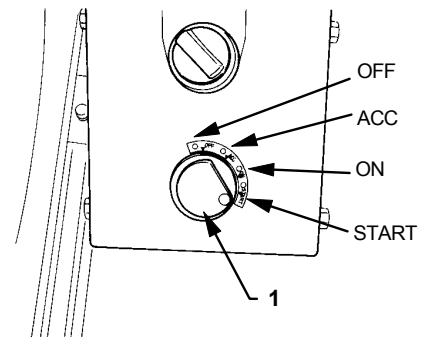
CAUTION: Preheating system doesn't operate unless key switch (1) is in the ACC position. When preheat switch (5) is turned ON, preheating is continuously performed for approx. 30 seconds with key switch (1) in the ACC position. If key switch (1) is turned to a position other than the ACC position before preheating is complete, preheating will be automatically completed, extinguishing preheat indicator (2). In case preheating is performed for longer than 30 seconds, preheat indicator goes OFF, automatically completing preheating. If preheating is required again, turn preheat switch (3) OFF. Wait for more than 1 minute, then turn preheat switch (3) ON again. The preheating system will not be activated unless the 1 minute interruption is performed to protect the engine.

OPERATING THE ENGINE

4. As soon as the engine starts, release key switch (1).
The key will automatically return to the ON position.
5. Close preheat switch cover (4).

IMPORTANT: Preheating uses a large amount of current so that the batteries will be quickly discharged if preheating is frequently performed. Perform proper preheating corresponding to the ambient temperature table below for proper preheating time when the atmospheric temperature is below -5°C .

Ambient Temperature	-5°C to -15°C	-15°C or less
	10 to 20 seconds	20 to 30 seconds



M117-01-094

M18C-01-028

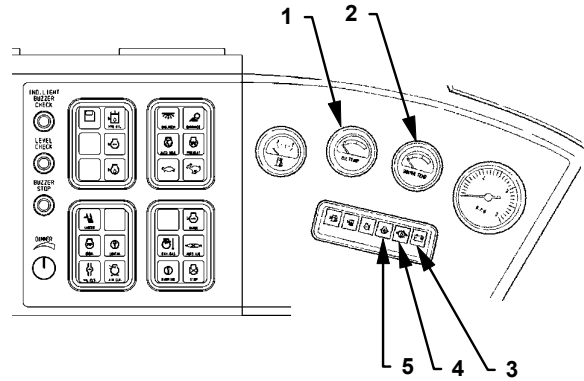
OPERATING THE ENGINE

CHECK INSTRUMENTS AFTER STARTING

IMPORTANT: If indicator lights do not go out after starting engine, **IMMEDIATELY STOP THE ENGINE** and correct the cause.

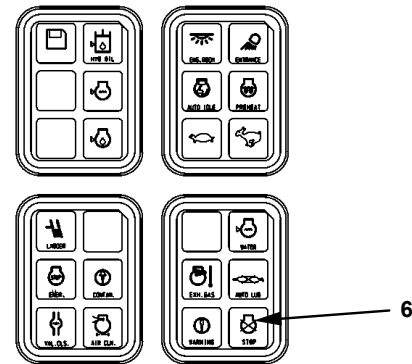
Check that

1. Hydraulic oil temperature gauge (1) is in the green or white zone.
2. Coolant temperature gauge (2) is in the green or white zone.
3. Alternator indicator (3) is off.
4. Pump transmission oil pressure indicator (4) is off.
5. Engine oil pressure indicator (5) is off.
6. Engine stop indicator (6) is off.
7. Engine noise and exhaust gas are normal.



M18C-01-023

 **NOTE:** Handy engine troubleshooting can be done by checking the exhaust gas color (Check with the engine running, with no load, after sufficient warm-up operation.)



M18C-01-024

Colorless

or faint blue : normal (proper combustion)

Black : abnormal (improper combustion)

White : abnormal (oil ring worn, or coolant leakage into cylinder)

OPERATING THE ENGINE

USING BOOSTER BATTERIES



CAUTION:

1. An explosive gas is produced while batteries are in use or being charged. Keep flames or sparks away from the battery area. Charge the batteries in a well ventilated area. Do not continue to use or charge the battery when electrolyte level is lower than specified. Explosion of the battery may result. Park the machine on a dry, firm or concrete surface, not on steel plates, if the machine is 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.
2. The operator must be in the operator's seat so that the machine will be under control when the engine starts. Jump starting is a two-person operation.



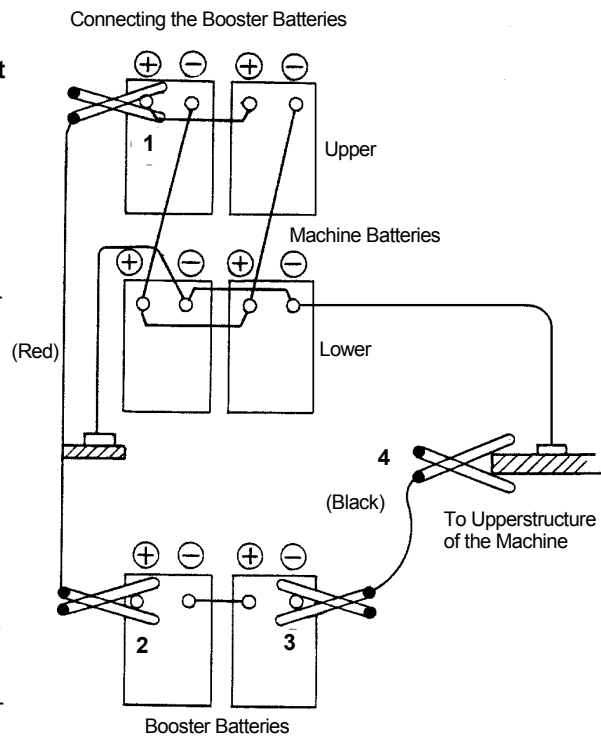
SA-032

IMPORTANT: The machine electrical system is a 24 volt negative (–) ground. Use only 24 volt booster batteries.

When the machine batteries are exhausted, start the engine using booster batteries as shown below.

Connecting the booster batteries

1. Stop the engine of the machine on which booster batteries are mounted.
2. Connect one end of red cable to the positive (+) terminal of machine batteries (1), and the other end to the positive (+) terminal of booster batteries (2).
3. Connect one end of black cable to the negative (–) terminal of booster batteries (3), and then make ground connection to the frame of the machine to be started with the other end of black (–) cable. In the last connection to machine frame (4), be sure to connect the cable end as far away from the machine batteries as possible.
4. Start the engine of the machine on which booster batteries are mounted.
5. Start the engine of the troubling machine.
6. After the engine starts, disconnect cables (1) and (2), following the procedure below.

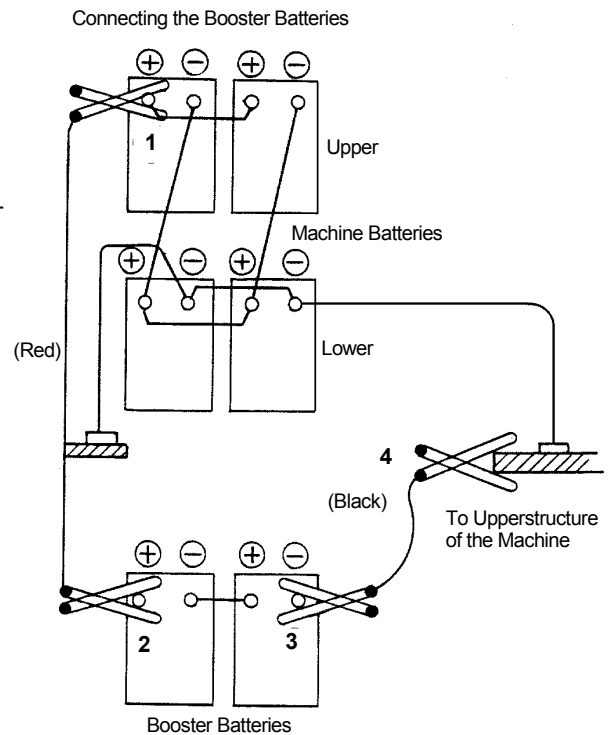


M117-03-002

OPERATING THE ENGINE

Disconnecting the booster batteries

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



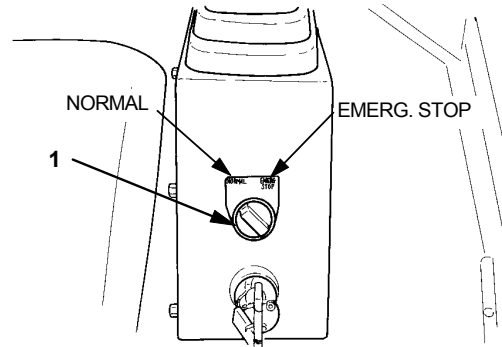
M117-03-002

OPERATING THE ENGINE

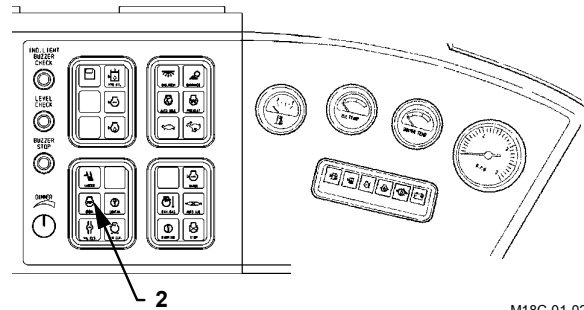
EMERGENCY ENGINE STOP SWITCH

IMPORTANT: Normally, use the key switch to stop the engine after running the engine at slow idle for five minutes. Use the emergency engine stop switch only for emergency stops, or if the key switch malfunctions. If the engine is shut off, without cooling down, the turbocharger free-wheels without receiving lubricant, resulting in serious damage to the turbocharger.

1. Turn emergency engine stop switch (1) in the cab from the NORMAL position to the EMERG. STOP position when emergency engine stopping is required.
2. Engine will stop and emergency engine stop indicator (2) on the monitor panel will come ON.
3. At the same time, air pressure is purged from the hydraulic oil tank.
4. Turn emergency engine stop switch (1) to the NORMAL position before attempting to restart the engines.



M117-01-093



M18C-01-023

NOTE: Do not use this switch when performing any inspection / service work.

OPERATING THE ENGINE

ENGINE STOP SWITCHES

Engine stop switches (1) are located as follows to ensure safe inspection work in the engine compartment.

Engine Compartment: Two

Pump, Compartments: Two

When engine stop switch (1) is turned to the EMERG.

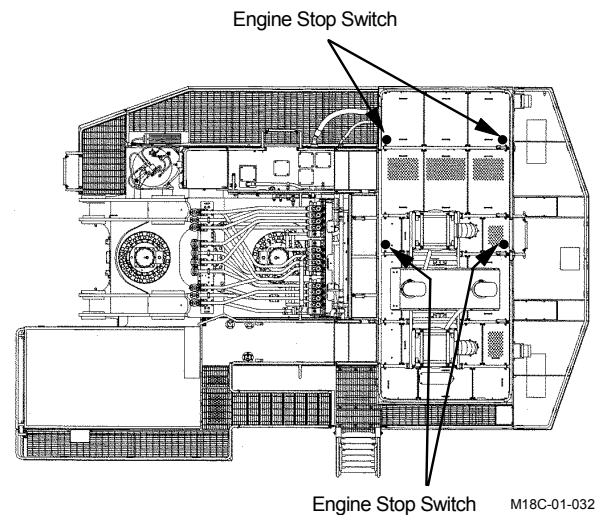
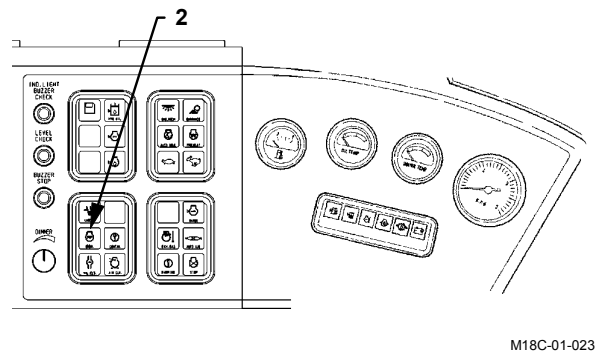
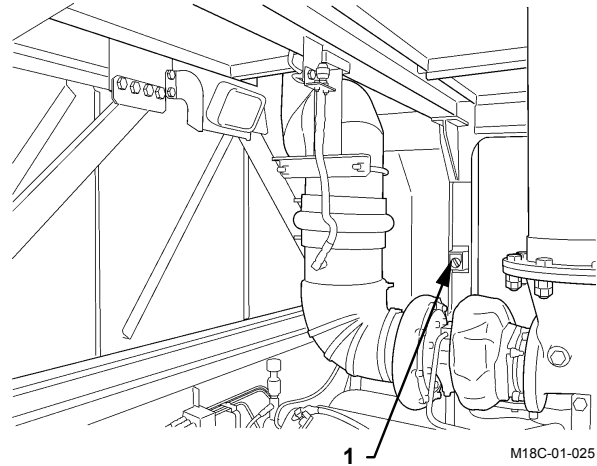
STOP position, the engine won't be started with key switch.

Engine emergency stop indicator (2) will come ON at this time.

When engine stop switch (1) is turned to the EMERG.

STOP position, the engine will be stopped. Turn engine stop switch (1) to the NORMAL position to restart the engine.

NOTE: Although the engine stops in case the engine stop switches are turned to the EMERG. STOP position, air pressure will not be purged from the hydraulic oil tank.



DRIVING THE MACHINE

DRIVE THE MACHINE CAREFULLY

IMPORTANT: During freezing weather, park machine on a hard surface to prevent tracks from freezing to the ground. Clean debris from tracks and track frame.

If tracks are frozen to the ground, raise tracks using boom, move machine carefully to prevent damage to drive train and tracks.

If engine stops under load, remove the load. Start engine immediately. Run the engine 30 seconds in slow idle speed before you add load.

Select a route that is as flat as possible. Steer machine as straight as possible making small, gradual changes in direction.

When driving over rough terrain, reduce engine speed to lessen the possibility of undercarriage damage.

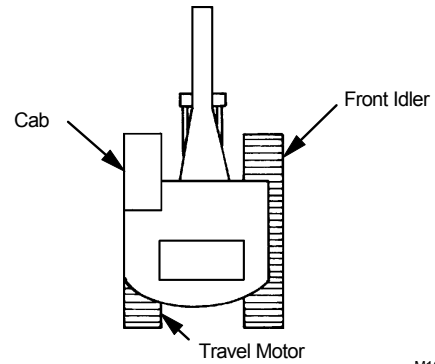
DRIVING THE MACHINE

STEERING THE MACHINE USING PEDALS

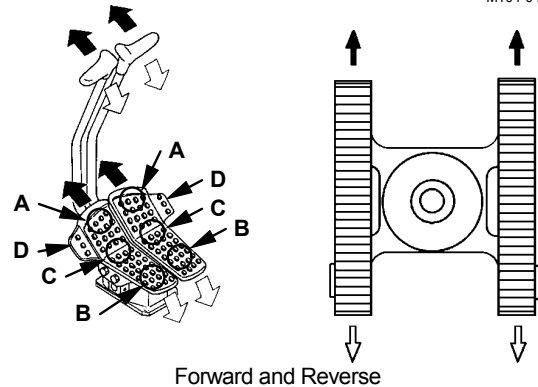
CAUTION: In the standard travel position, the idlers are positioned at the front of the machine and the travel motors at the rear. If the travel motors are positioned at the front of the machine, the control actions of the travel pedals will be reversed. Be sure to confirm the position of the travel motors before traveling.

- **FORWARD TRAVEL**
Push down on front (A) of both pedals.
- **REVERSE TRAVEL**
Push down on rear (B) of both pedals.
- **NEUTRAL POSITION (C)**
When the travel pedals are placed in neutral, travel brakes automatically will be applied to hold the machine.
- **RIGHT TURN**
Push down on front of left pedal.
- **LEFT TURN**
Push down on front of right pedal.
- **SHORT TURN (Spin turn)**
Push down the front of one pedal and the rear of the other.

NOTE: For long-term traveling, push down on pedal tabs (D) and rest feet on footrests. Travel lever dampers are provided for smooth control. In extremely cold weather, lever effort will increase. Operate levers several times with pilot control shut-off lever in the LOCK position.



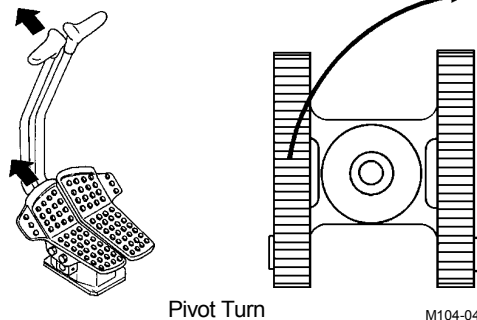
M104-04-001



Forward and Reverse

M104-04-009

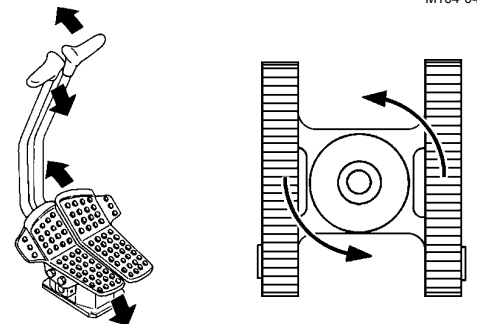
M104-04-003



Pivot Turn

M104-04-010

M104-04-005



Spin Turn

M104-04-011

M104-04-007

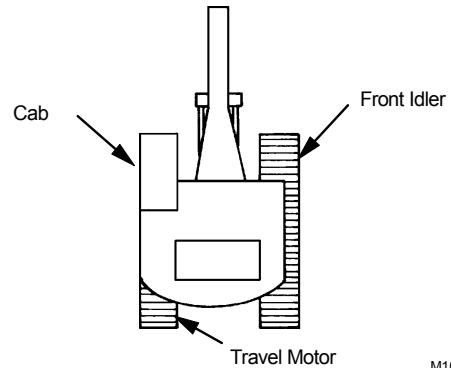
DRIVING THE MACHINE

STEERING THE MACHINE USING LEVERS

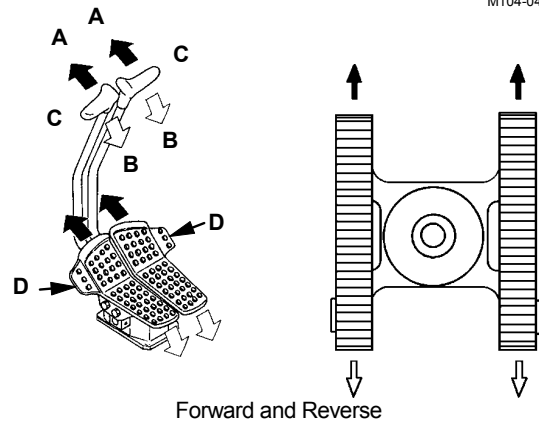
CAUTION: In the standard travel position, the idlers are positioned at the front of the machine and the travel motors at the rear. If the travel motors are positioned at the front of the machine, the control actions of the travel levers will be reversed. Be sure to confirm the position of the travel motors before traveling.

- **FORWARD TRAVEL**
Push both levers forward (A).
- **REVERSE TRAVEL**
Pull both levers rearward (B).
- **NEUTRAL POSITION (C)**
When the travel levers are placed in neutral, travel brakes automatically will be applied to hold the machine.
- **RIGHT TURN**
Push left lever forward.
- **LEFT TURN**
Push right lever forward.
- **SHORT TURN (Spin turn)**
Push one lever forward and pull the other rearward.

NOTE: For long-term traveling, push down on pedal tabs (D) and rest feet on footrests. Travel lever dampers are provided for smooth control. In extremely cold weather, lever effort will increase. Operate levers several times with pilot control shut-off lever in the LOCK position.



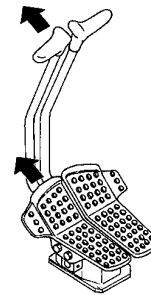
M104-04-001



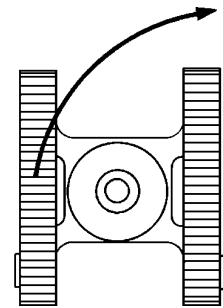
Forward and Reverse

M104-04-009

M104-04-003

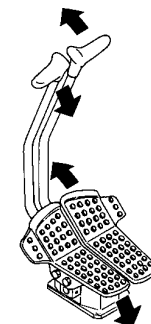


Pivot Turn

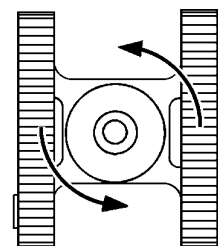


M104-04-010

M104-04-005



Spin Turn



M104-04-011

M104-04-007

DRIVING THE MACHINE

TRAVEL SPEED SWITCH

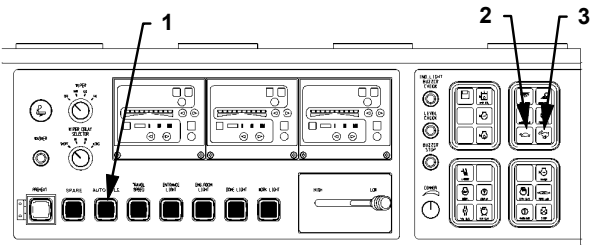
CAUTION: Tipping accidents can cause serious personal injury. Do not change travel mode while traveling; especially, changing speed to the fast mode when descending slopes will create a very dangerous situation. Always stop the machine before changing the travel mode speed. Confirm the travel mode using the indicators after changing modes.

When descending steep slopes, avoid quick acceleration and deceleration in the fast travel mode. Damage to the travel motors may result.

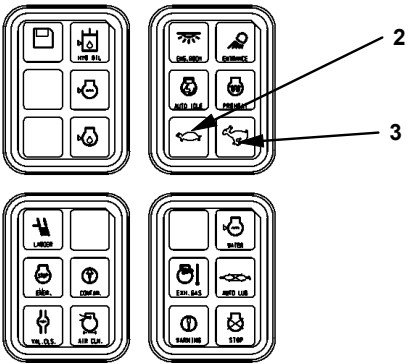
Fast speed (rabbit) or slow speed (turtle) can be selected by pushing travel speed switch (1) at any engine speed. Indicator lights (2) or (3) show mode selection.

To decrease travel speed, for traveling on a slope or in a tight space, press switch to turtle position.

- 1 – Travel Speed Switch
- 2 – Travel Mode Indicator (Slow Speed)
- 3 – Travel Mode Indicator (Fast Speed)



M18C-01-020



M18C-01-024

	Travel Speed	Selection Guide
	Slow	Use this mode to general operations such as excavation. Great travel power is obtained, making steering easy.
	Fast	Use this mode when traveling on a level ground. Although fast travel speed is obtained, travel power is small, resulting in weak steering power.

DRIVING THE MACHINE

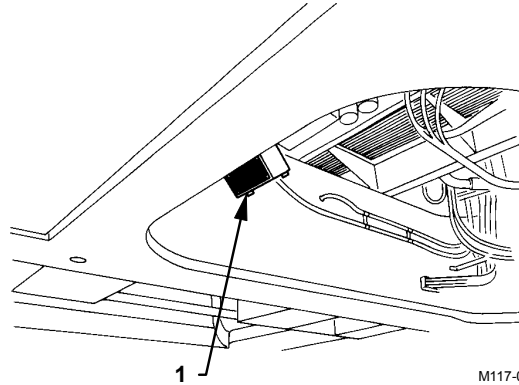
TRAVEL ALARM

The travel alarm functions to alert bystanders when the machine is traveling.



CAUTION: If the travel alarm does not sound when the travel levers or pedals are operated, immediately stop the engine and contact your authorized dealer for repair. Operating with the travel alarm malfunctioning may result in a serious accident.

1 – Travel Alarm



M117-04-001

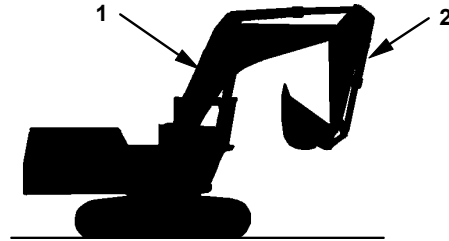
DRIVING THE MACHINE

TRAVELING

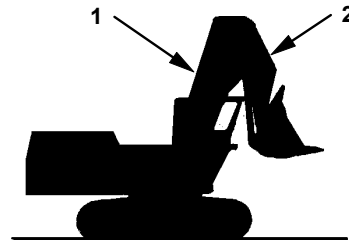


CAUTION: Use a signal person when moving, swinging or operating the machine in congested areas. Coordinate hand signals before starting the machine.

- Be sure to fully pull up the ladder before traveling.
- Before moving machine, determine which way to move travel pedals/levers for the direction you want to go. When the travel motors are in the rear, pushing down on the front of the travel pedals or pushing the levers forward moves the machine forward the idlers.
- Select a travel route that is as flat as possible. Steer the machine as straight as possible, making small gradual changes in direction.
- When traveling on a level surface, position the front with boom (1) fully raised, and arm (2) fully retracted, as illustrated, in order to apply the road as evenly as possible to all of the lower rollers.
- Examine strengths of bridges and road shoulders and reinforce if necessary.
- Use wood plates in order not to damage the road surface. Be careful of steering when operating on asphalt roads in summer.
- When crossing rail roads, use wood plates in order not to damage them.
- Do not make contact with electric wires or bridges.
- When crossing a river, measure the depth of the river using the bucket, and cross slowly. Do not cross the river when the depth of the river is deeper than the upper edge of the upper roller.
- When traveling on rough terrain, reduce engine speed. Select slow travel speed. Slower speed will reduce possible damage to the machine.
- Avoid operations that may damage the track and undercarriage components.
- During freezing weather, always clean snow and ice from track shoes before loading and unloading machine, to prevent the machine from slipping.



M145-05-027

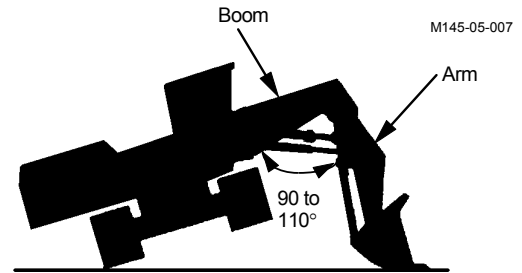
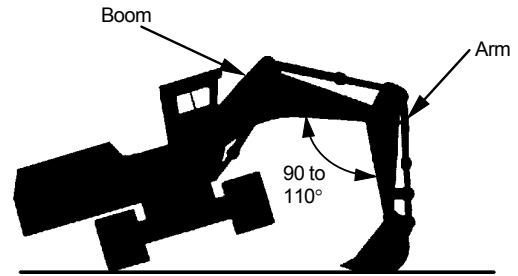


M145-05-022

DRIVING THE MACHINE

OPERATING ON SOFT GROUND

- Avoid traveling on very soft ground that does not have sufficient strength to firmly support the machine.
- If the machine is operated on very soft ground or becomes stuck, it may be necessary to clean the track frame area.
- Swing the upperstructure 90° and lower the bucket to raise one track off the ground. Make sure to keep the angle between the boom and arm 90 to 110° and position the bucket's round side on the ground.
- Rotate the raised track back and forth to remove mud and dirt.
- After lowering the track to the ground, move the engine speed control lever to the medium speed position and slow travel speed. Carefully move the machine to firm ground.
- Tow the machine if it becomes stuck but can still operate its engine. Be sure to attach a towing wire correctly.



M145-05-007

M145-05-025

RAISE ONE TRACK USING BOOM AND ARM

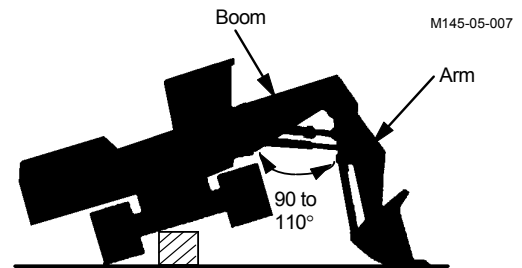
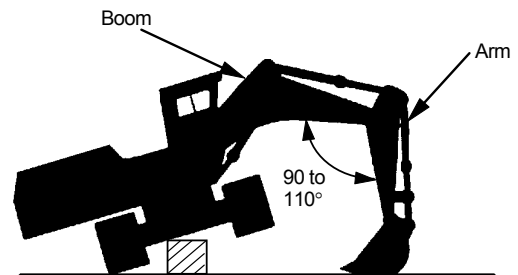


CAUTION: Keep the angle between boom and arm 90 to 110° and position the bucket's round side on the ground.

Swing the upperstructure 90° and lower the bucket to raise track off ground. Do not dig bucket teeth into the ground when using the loader bucket.

Place blocks under machine frame to support the machine.

IMPORTANT: When the machine is equipped with the loading shovel front attachment, don't raise the machine off the ground by bucket tooth force with the bucket cylinder fully retracted. Failure to do so will cause excessive loads to be applied to the bucket pins and cylinders so that damage to the pins may result.



M145-05-007

M145-05-025



M146-05-001

DRIVING THE MACHINE

TOWING MACHINE A SHORT DISTANCE

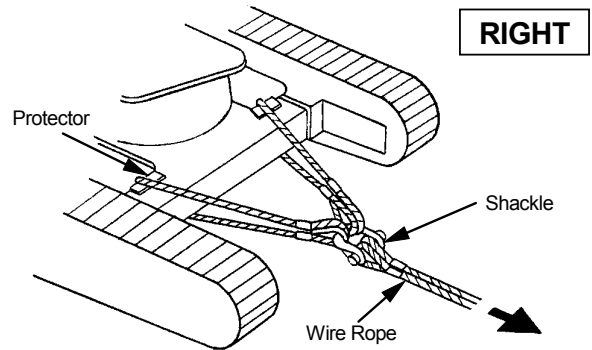


CAUTION: Cables, straps, or ropes can break causing serious injury. Do not tow machine with damaged chains, frayed cables, slings, straps, or wire ropes.
Always wear gloves when handling cable, straps or wire ropes.

When your machine becomes stuck but the engine is still operational, attach wire rope tow lines as illustrated at right, and slowly tow your machine to firm ground using another machine.

Be sure to attach the wire ropes around the track frames of both machines as illustrated.

To prevent the wire ropes from being damaged, place some protective material between the track frame and the wire ropes.



M114-05-100

- IMPORTANT:**
1. Slowly tow, keeping the tow line horizontal and in a straight line with the tracks.
 2. When the machine is towed, release parking brakes by operating the travel levers.

DRIVING THE MACHINE

OPERATING IN WATER OR MUD

The machine can be operated in water up to the upper edge of the upper rollers only if worksite footing has sufficient strength to prevent the machine from sinking past the upper edge of the upper roller, and only if the water is flowing slowly.

When operating in such conditions, check the machine's position often. Reposition the machine if necessary.

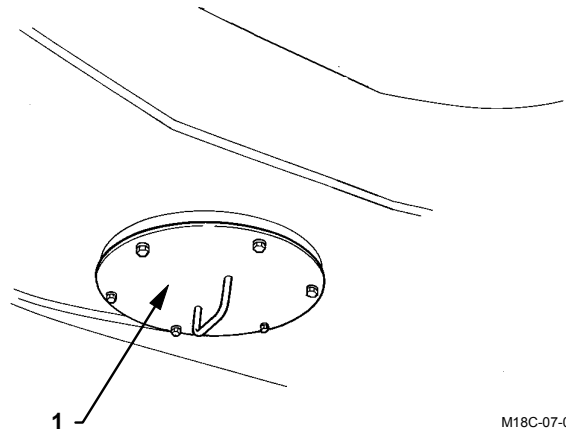
Avoid submerging the swing bearing, swing gears and center joint.

If the swing bearing, swing gears and center joint are submerged, remove the cover to drain mud and water. Clean swing area. Install cover. Lubricate swing internal gear and swing bearing.

Lubricate swing bearing. (See Maintenance Guide, GREASING)



M145-05-023



M18C-07-010

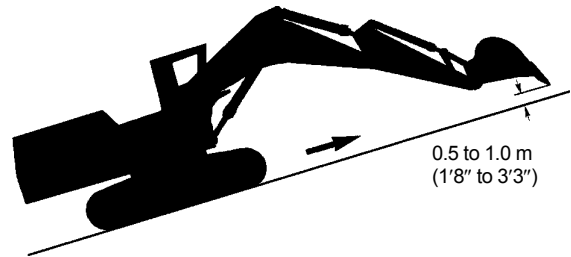
DRIVING THE MACHINE

PRECAUTIONS FOR TRAVELING ON SLOPES

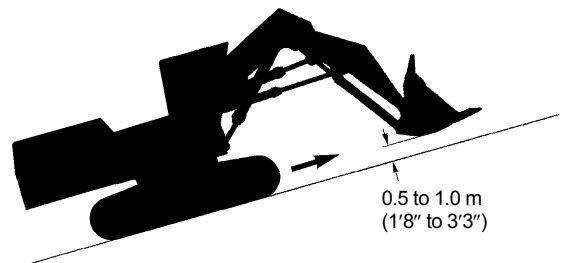


CAUTION: Avoid possible injury from traveling on slopes. Tipping over or skidding down of the machine may result. Thoroughly read and understand precautions below and be sure to travel at slow speed on slopes. Never attempt to travel on slopes with the bucket loaded or any load suspended by the bucket.

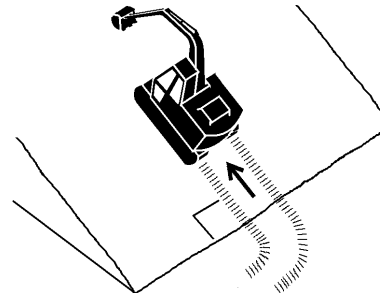
1. Never attempt to ascend or descend 30 degrees or steeper slopes.
2. Be sure to fasten the seat belt.
3. Keep the bucket pointed in the direction of travel, approximately 0.5 to 1.0 m (1'8" to 3'3") above the ground. If the machine starts to skid or becomes unstable, lower the bucket immediately.
4. Driving across the face of a 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.
5. Avoid swinging the upperstructure on slopes. Never attempt to swing the upperstructure downhill. The machine may tip over. If swinging uphill is unavoidable, carefully operate the upperstructure and boom at slow speed.
6. If the engine stalls on a slope, immediately lower the bucket to the ground. Return the control levers to neutral. Then, restart the engine.
7. Be sure to thoroughly warm up the machine before ascending steep slopes. If hydraulic oil has not warmed up sufficiently, sufficient performance may not be obtained.
8. Before descending a slope, turn the travel mode switch to the SLOW position on level ground. Don't operate the travel mode switch while descending a slope. The machine may slip, possibly causing safety accident.
9. When descending a steep slope, avoid quick start or stop traveling in the FAST mode. Failure to do so may result in damage to the travel motor.



M145-05-016

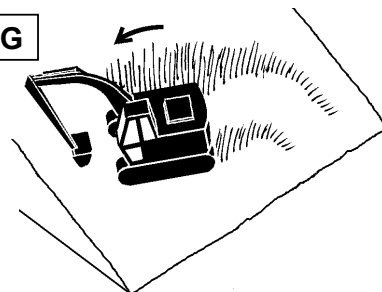


M145-05-024



SA-441

WRONG



SA-442

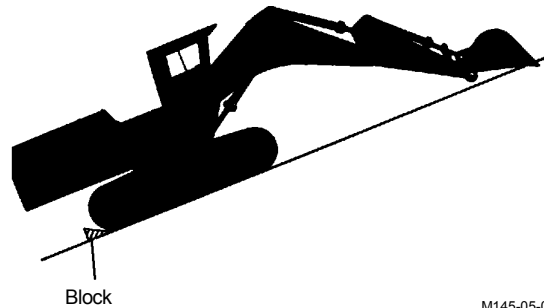
DRIVING THE MACHINE

PARKING THE MACHINE ON SLOPES

CAUTION: Avoid parking machine on slopes. The machine may tip over, possibly resulting in personal injury.

If parking the machine on a slope is unavoidable:

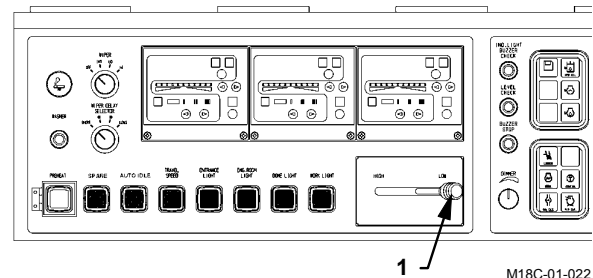
- Thrust the bucket teeth into the ground.
- Return the control levers to neutral and pull the pilot control shut-off lever to the LOCK position.
- Block both tracks.



M145-05-006

PARKING THE MACHINE

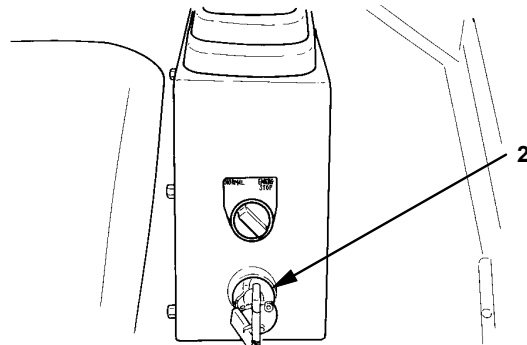
1. Park the machine on a level surface.
2. Lower the bucket to the ground.
3. Turn the auto-idle switch off.



M18C-01-022

IMPORTANT: Turbocharger may be damaged if the engine is not properly shut down.

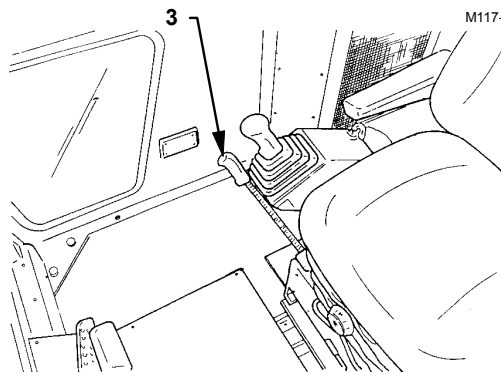
4. Move engine speed control lever (1) to the slow idle position. Run the engine approximately 5 minutes to cool the engine.
5. Turn key switch (2) to OFF. Remove the key from the key switch.
6. Pull pilot control shut-off lever (3) to the LOCK position.



M117-01-093

IMPORTANT: Protect cab electrical components from bad weather. Always close windows, roof vent and cab door when parking the machine.

7. Close windows, roof vent, and cab door.
8. Lock all access doors and compartments.



M117-05-002

[illegible]

OPERATING THE MACHINE

CONTROL LEVER (HITACHI PATTERN BACKHOE)



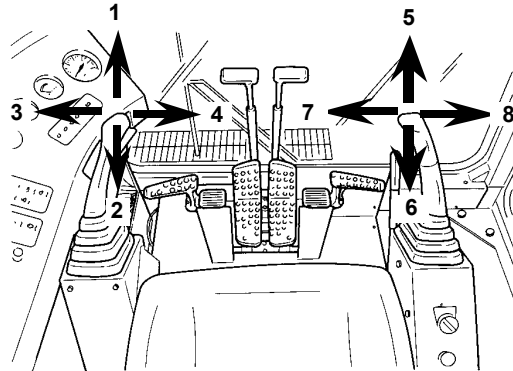
CAUTION: Never place any part of body beyond window frame. It could be crushed by the boom if boom control lever is accidentally bumped or otherwise engaged. If window is missing or broken, replace immediately. Prevent possible injury from unexpected machine movement. Make sure you know the location and function of each control before operating.

The machine is equipped with a label showing the control patterns of the levers and pedals.

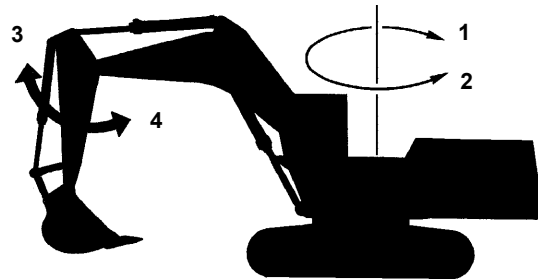
IMPORTANT: When digging, avoid hitting tracks with boom cylinders. When digging over the end of the tracks, travel motors should be at the rear to maximize machine stability and lift capacity.

When a lever is released, it will automatically return to neutral, and that machine function will stop.

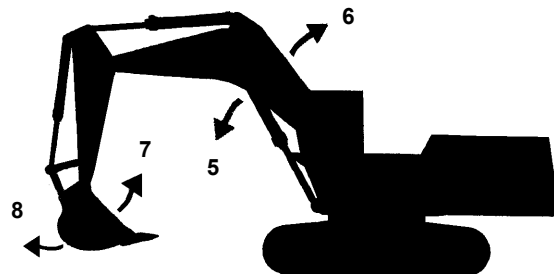
- 1- Swing Right
- 2- Swing Left
- 3- Arm Roll-Out
- 4- Arm Roll-In
- 5- Boom Lower
- 6- Boom Raise
- 7- Bucket Roll-In.
- 8- Bucket Roll-Out.



M146-01-010



M142-05-002



M142-05-003

OPERATING THE MACHINE

CONTROL LEVER (ISO PATTERN BACKHOE)



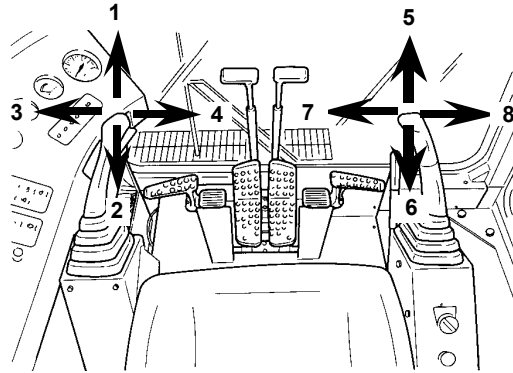
CAUTION: Never place any part of body beyond window frame. It could be crushed by the boom if boom control lever is accidentally bumped or otherwise engaged. If window is missing or broken, replace immediately. Prevent possible injury from unexpected machine movement. Make sure you know the location and function of each control before operating.

The machine is equipped with a label showing the control patterns of the levers and pedals.

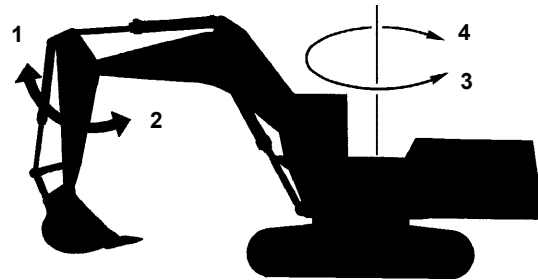
IMPORTANT: When digging, avoid hitting tracks with boom cylinders. When digging over the end of the tracks, travel motors should be at the rear to maximize machine stability and lift capacity.

When a lever is released, it will automatically return to neutral, and that machine function will stop.

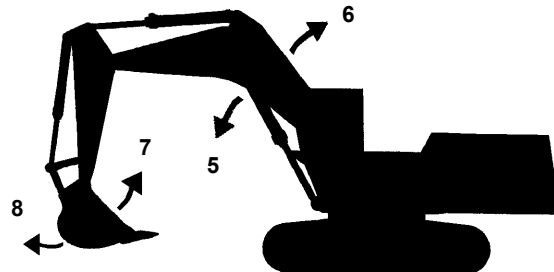
- 1- Arm Roll-Out
- 2- Arm Roll-In
- 3- Swing Left
- 4- Swing Right
- 5- Boom Lower
- 6- Boom Raise
- 7- Bucket Roll-In.
- 8- Bucket Roll-Out.



M146-01-010



M142-05-002



M142-05-003

OPERATING THE MACHINE

CONTROL LEVER (HITACHI PATTERN LOADING SHOVEL)



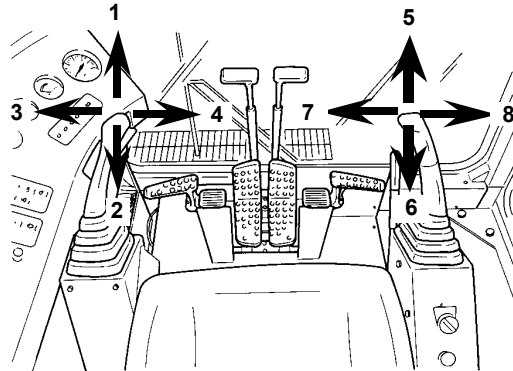
CAUTION: Never place any part of body beyond window frame. It could be crushed by the boom if boom control lever is accidentally bumped or otherwise engaged. If window is missing or broken, replace immediately. Prevent possible injury from unexpected machine movement. Make sure you know the location and function of each control before operating.

The machine is equipped with a label showing the control patterns of the levers and pedals.

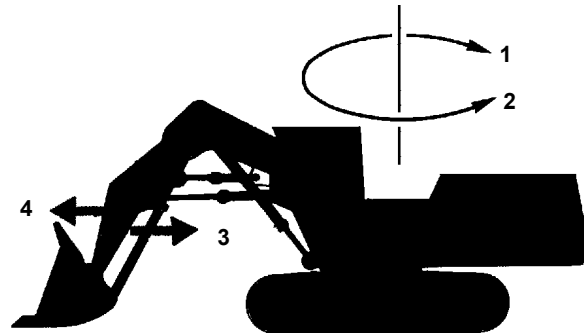
IMPORTANT: When digging, avoid hitting tracks with boom cylinders. When digging over the end of the tracks, travel motors should be at the rear to maximize machine stability and lift capacity.

When a lever is released, it will automatically return to neutral, and that machine function will stop.

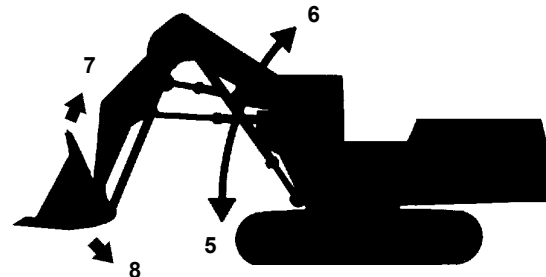
- 1- Swing Right
- 2- Swing Left
- 3- Arm Retract
- 4- Arm Extend
- 5- Boom Lower
- 6- Boom Raise
- 7- Bucket Tilt-In.
- 8- Bucket Tilt-Out.



M146-01-010



M117-05-027



M117-05-025

OPERATING THE MACHINE

CONTROL LEVER (ISO PATTERN LOADING SHOVEL)



CAUTION: Never place any part of body beyond window frame. It could be crushed by the boom if boom control lever is accidentally bumped or otherwise engaged. If window is missing or broken, replace immediately.

Prevent possible injury from unexpected machine movement.

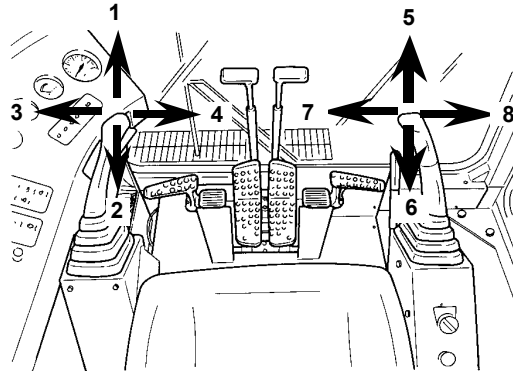
Make sure you know the location and function of each control before operating.

The machine is equipped with a label showing the control patterns of the levers and pedals.

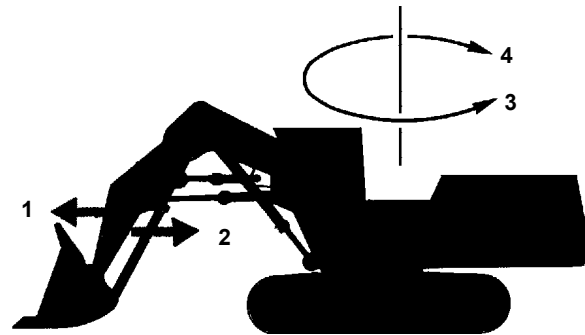
IMPORTANT: When digging, avoid hitting tracks with boom cylinders.
When digging over the end of the tracks, travel motors should be at the rear to maximize machine stability and lift capacity.

When a lever is released, it will automatically return to neutral, and that machine function will stop.

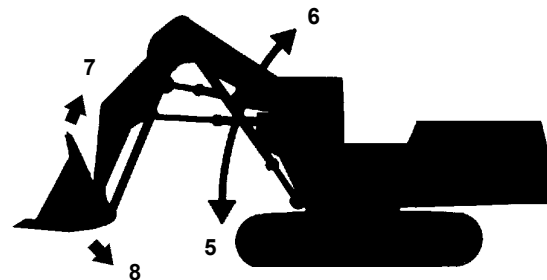
- 1- Arm Extend
- 2- Arm Retract
- 3- Swing Left
- 4- Swing Right
- 5- Boom Lower
- 6- Boom Raise
- 7- Bucket Tilt-In
- 8- Bucket Tilt-Out



M146-01-010



M117-05-027

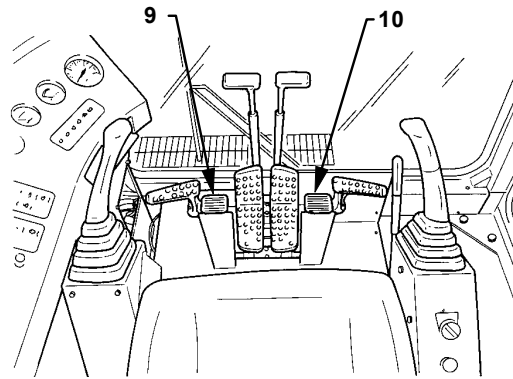


M117-05-025

OPERATING THE MACHINE

BUCKET OPEN-CLOSE PEDALS (LOADING SHOVEL)

- 9 – Bucket Closing
- 10 – Bucket Opening



M146-01-010



M117-05-031

OPERATING THE MACHINE

PILOT CONTROL SHUT-OFF LEVER

Pilot control shut-off lever (1) functions to prevent misoperation of the machine from occurring if the control levers are accidentally moved when leaving the operator's seat or when entering the cab.



CAUTION:

1. **Always pull pilot control shut-off lever (1) into the full LOCK position. The pilot control shut-off function will not be activated otherwise.**
2. **When leaving the machine:**
 - Stop the engine.
 - Then, pull the pilot control shut-off lever up to the LOCK position.
3. **Always check to be sure that the pilot control lever is pulled up to the LOCK position before:**
 - Transporting the machine.
 - Leaving the machine at the end of the shift.
4. **Take care not touch any control levers and travel levers before operating the pilot control shut-off lever. If any control levers are operated before moving the pilot control shut-off lever to the UNLOCK position, the machine may unexpectedly move when the pilot control shut-off lever is operated, possibly causing personal injury or death.**

Pilot Control Shut-Off Lever Operation

Before Leaving the Machine:

1. Park the machine on a firm, level surface. Lower the bucket to the ground. Return all control levers to neutral. Properly shut down the engine.
2. Pull pilot control shut-off lever (1) up into the full LOCK position.

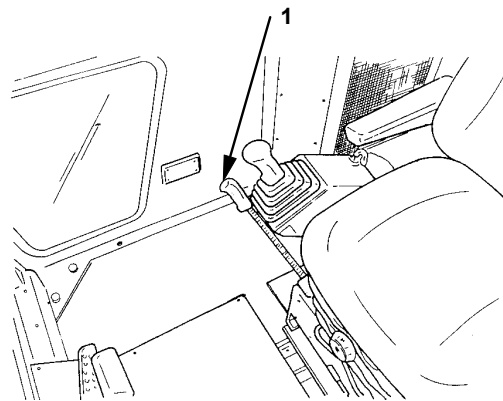
Before Starting Operation:

1. Confirm that pilot control shut-off lever (1) is pulled up to the LOCK position.

After starting the engine:

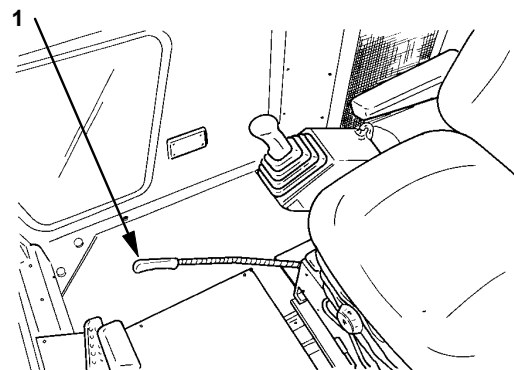
1. Confirm that all control levers and pedals are in neutral and that no part of the machine is in motion.
2. Lower pilot control shut-off lever (1) to the UNLOCK position.

If any part of the machine (any actuator) moves when the pilot control shut-off lever is lowered to the UNLOCK position despite the fact that all controls are placed in neutral, the machine is malfunctioning. Immediately pull the pilot control shut-off lever back to the LOCK position, and stop the engine. Then, see your authorized dealer.



LOCK Position

M117-05-002



UNLOCK Position

M117-05-003

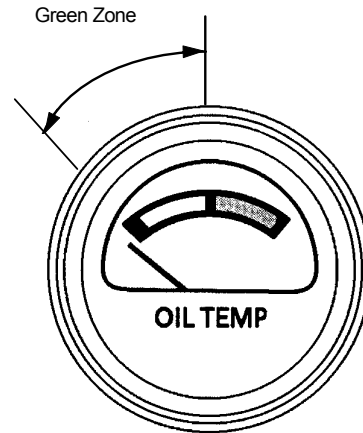
OPERATING THE MACHINE

Warming-up Operation

IMPORTANT: The proper machine operating hydraulic oil temperature is 50 to 80 °C corresponding to the green zone of the hydraulic oil temperature gauge on the monitor panel. If the machine is operated excessively when the oil temperature is lower than 20 °C, damage to the hydraulic components may result.

Start the engine and warm up the machine until the hydraulic oil temperature reaches 20 °C in the following procedures before starting to work.

1. Run the engine at slow idle speed for 5 minutes.
2. Increase the engine speed to middle speed by operating the fuel lever. Run the engine for 5 minutes with the bucket held in the rolled-out (tilted-out) position while relieving the hydraulic oil pressure for 10 to 15 seconds at an interval of 5 to 10 seconds.
3. Increase the engine speed to the middle speed. Run the engine for 5 to 10 minutes with the boom raised position while relieving the hydraulic oil pressure for 10 to 15 seconds at an interval of 5 to 10 seconds.

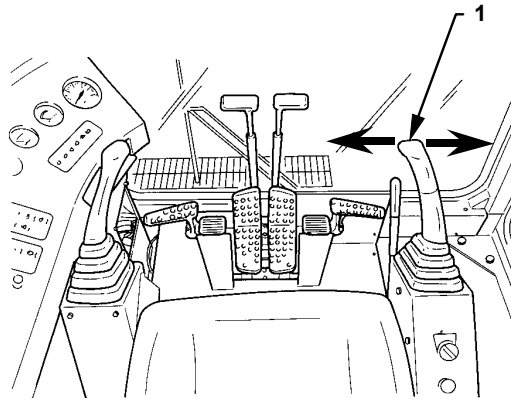


M146-01-013

OPERATING THE MACHINE

Warming-up the Motor and the Cylinders

IMPORTANT: 1. In cold weather, be sure to thoroughly warm-up the motors and cylinders.
2. If the hydraulic circuit is continuously relieved for a certain amount of time, the temperature in the control valve would rise excessively. Never operate to stroke end more than 15 seconds. After relieving any function, up to 15 seconds, be sure to have a 5–10 second intermission.



M146-01-010

1. Run the engine for at least 5 minutes on slow idle.
2. Run the engine for at least 5 minutes at medium speed. Extend the warming-up time when the atmospheric temperature is extremely low by running the engine at a middle speed.
3. As described above, warm the hydraulic oil by relieving the hydraulic oil pressure while rolling in the bucket and raising the boom.
4. While warming the hydraulic oil by the method mentioned above, circulate hydraulic oil by slowly operating each cylinder of the boom, arm, and bucket full stroke, and the swing motor in both directions, and traveling the machine approximately 5 m distance several times at an interval of 3 to 5 minutes.

IMPORTANT: If hydraulic oil is warmed only by relieving the relief valve, and/or if the warmed hydraulic oil is suddenly delivered to the cool hydraulic components such as motors and cylinders, damage to the hydraulic components may result. Be sure to occasionally circulate hydraulic oil through the motors and cylinders during warming-up operation.

5. Before beginning work with the machine, sufficiently operate each function of the front attachment, swing, and travel circuits without a load so that the hydraulic oil temperature in all the hydraulic circuits is equal.

OPERATING THE MACHINE

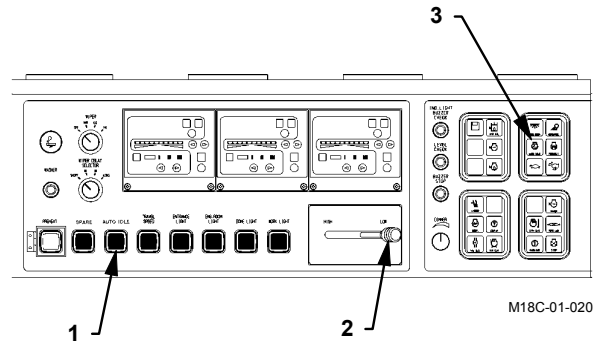
AUTO-IDLE

With auto-idle switch (1) turned on, approximately 4 seconds after all control levers are returned to neutral, the engine speed decreases to the auto-idle setting to save fuel consumption. The engine speed will immediately increase to the speed set by engine speed control lever (2) when any control lever is operated.



CAUTION:

1. Always check if auto-idle indicator (3) is turned on or off before starting operation. If the indicator is on, the auto-idle function will be activated.
2. Always be aware of engine speed control lever (2) setting when auto-idle switch (1) is turned on. If the engine speed is set high with engine speed control lever (2), and if the operator is not aware of the high engine speed setting, the engine speed will unexpectedly increase when any control lever is operated, causing unexpected machine movement, thus possibly resulting in serious personal injury.
3. Prevent the machine from unexpected movement. Be sure to turn off auto-idle switch (1) when unexpected machine movement is undesirable, especially when loading/unloading the machine for transportation.



M18C-01-020

Note that auto-idle function can be turned on or off only when the key switch is in ON position. Always check if the auto-idle function is turned on or off with auto-idle indicator (3).

Auto-Idle Function ON : Auto-Idle Indicator (3) ON
Auto-Idle Function OFF : Auto-Idle Indicator (3) OFF

- In order to deactivate the auto-idle function, simply press auto-idle switch (1) when auto-idle indicator (3) is turned on. Auto-idle indicator (3) will go out.



NOTE: When the engine speed set by the engine speed control lever is lower than that of the auto-idle level, auto-idle circuit will not work even if auto-idle switch (2) is turned ON.

OPERATING THE MACHINE

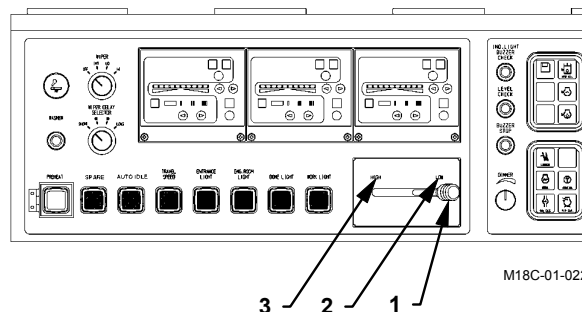
ENGINE SPEED CONTROL

Increase and decrease the engine speed using engine speed control lever (1) located on the left console, as illustrated.

Slow Idle : Move lever (1) to the LOW position (2)

Fast Idle : Move lever (1) to the HIGH position (3)

- Before stopping the engine, always move engine speed control lever (1) to the slow idle setting. Run the engine five minutes to cool the engine. Then, turn the key switch to OFF position to stop the engine.



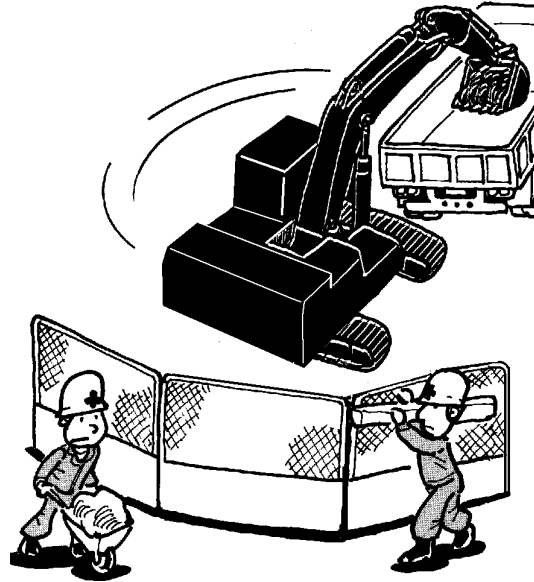
OPERATING THE MACHINE

PRECAUTIONS FOR OPERATIONS



CAUTION: Investigate the work site before starting operations.

1. Be sure to install an overhead cab guard when operating in a work site which has a possibility of falling objects.
 2. If operation on soft ground is required, sufficiently reinforce the ground beforehand.
- Be sure to wear close fitting clothing and safety equipment appropriate for the job, such as a hard hat, etc. when operating the machine.
 - Clear all persons and obstacles from area of operation and machine movement.
Always beware of the surroundings while operating. When working in a small area surrounded by obstacles, take care not to hit the upperstructure against obstacles.
 - When loading onto trucks, bring the bucket over the truck beds from the rear side. Take care not to swing the bucket over the cab or over any person.



M117-05-006



NOTE: The standard specification machine is equipped with the head guard integrated cab.

OPERATING THE MACHINE

OPERATE THE MACHINE SAFELY

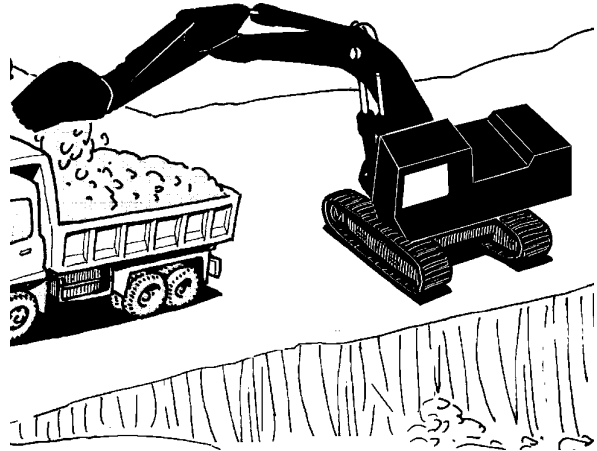


CAUTION: Prevent the machine from tipping over and from being involved in a ground collapse. Take the necessary precautions as follows:

1. Make sure the worksite has sufficient strength to firmly support the machine.

When working close to an excavation or at road shoulders, operate the machine with the tracks positioned perpendicular to the cliff face with travel motors at the rear, so that the machine can more easily evacuate if the cliff face collapses.

2. If working on the bottom of a cliff or 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 on the area.
3. 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 and firm enough to easily support the machine.
4. 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. When operating on rough terrain or on slopes:
 - Reduce the engine speed.
 - Select slow travel speed mode.
 - Operate the machine slowly and be cautious with machine movements.



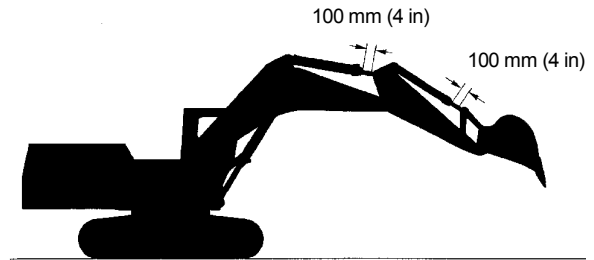
M117-05-007

OPERATING THE MACHINE

OPERATING BACKHOE

1. Place the bucket teeth on the ground with the bottom of the bucket at a 45 degree angle to the ground.
2. Pull the bucket toward the machine using the arm as the main digging force.
3. When soil sticks to the bucket, remove it by moving the arm and/or bucket rapidly back and forth.
4. When lowering the boom, avoid sudden stops that may cause shock load damage to the machine.
5. When operating the arm, avoid bottoming the cylinder to prevent cylinder damage.
6. When digging at an angle, avoid striking the tracks with the bucket teeth.
7. When digging a deep excavation, avoid striking the boom or bucket cylinder hoses against the ground.
8. When trenching a straight line, position the tracks parallel to the trench. After digging to the desired depth, move the machine as required to continue the trench.

 **NOTE:** When crowding the arm, it is normal for the arm to pause briefly at the lowest point of its curve, as shown. This is due to the fact that the force of gravity pulls the arm down quickly, and it takes a moment for the hydraulic force in the cylinder to catch up. This does not indicate machine trouble.



M145-05-008



M145-05-009

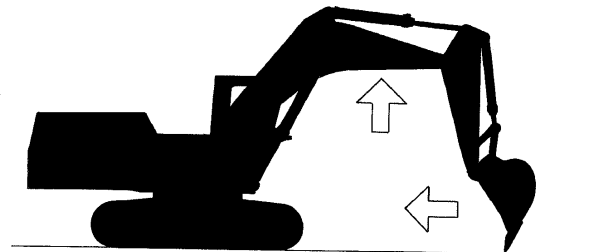
GRADING OPERATION

IMPORTANT: Do not pull or push dirt with the bucket when traveling.

Position the arm slightly forward of the vertical position with bucket rolled back, as shown.

Operate arm roll-in function while slowly raising the boom. Once the arm moves past, the vertical position slowly lower the boom to allow the bucket to maintain a smooth surface.

Grading operation can be more precisely done by operating the boom, arm and bucket simultaneously.



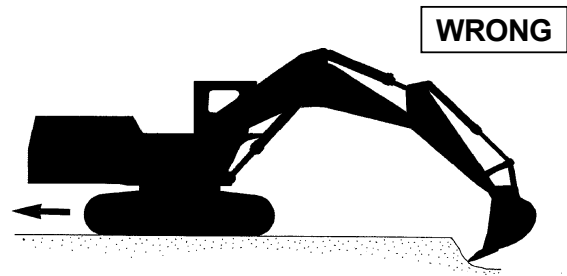
M145-05-010

OPERATING THE MACHINE

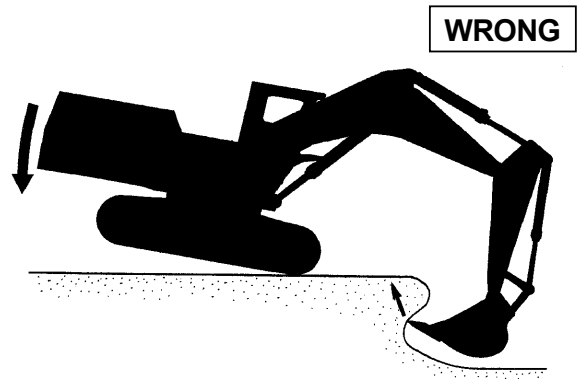
AVOID ABUSIVE OPERATION

Do not use travel as an additional digging force. Severe machine damage may result.

Do not raise rear of machine to use the machine's weight as additional digging force. Severe machine damage may result.



M145-05-011



M145-05-012

OPERATING THE MACHINE

OPERATING TIPS

Do not hit the track with the bucket when digging.
Whenever possible, position your machine on a level surface.
Do not use the bucket as a hammer or pile driver. Do not attempt to shift rocks and break walls using swing motion.

IMPORTANT: To avoid damaging cylinders, do not strike the ground with the bucket nor use the bucket for tamping with the bucket cylinder fully extended (the bucket completely curled under).

Adjust the length and depth of each cut to produce a full bucket with every pass.
Full loads on every pass is more productive than a faster cycle with a partially filled bucket.
Full load should be the first objective, followed by speed, to increase productivity.

IMPORTANT: Do not attempt to break ledge rock by extending the arm to maximum reach and dropping the front of the bucket on the bucket teeth for penetration. Serious damage to the machine can result.

Once the trench is open, ledge rock can be broken by pulling the bucket up under the layers. The top layers are pulled out first, with one or two layers being lifted at a time.



M145-05-013

AVOID SWINGING BUCKET TO MOVE OBJECTS

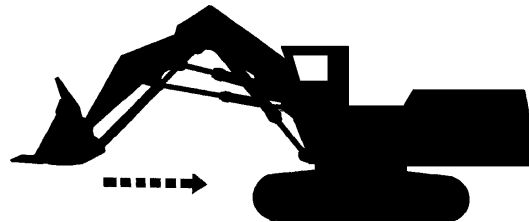
Do not use the bucket for shifting rocks, breaking walls, and etc. using the swing motion.
These uses will damage the front attachment.

OPERATING THE MACHINE

LOADING SHOVEL OPERATION

1. To dig, position the bucket bottom parallel to and touching the ground and extend the arm while crowding the bucket.
2. Digging force increases as the arm is extended. Try to dig with the arm extended where strong digging forces are required.
3. Straight Retraction
When the arm cylinder is retracted, the arm top moves horizontally, as oil escaping from the level cylinder flows to the bottom end of the boom cylinders, raising the boom.

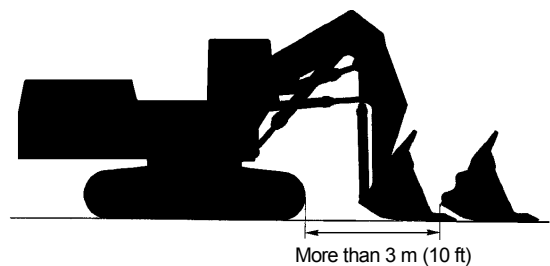
When the bucket cylinders are fully extended and the bucket comes into contact with the stopper, the straight retraction cannot be performed. To perform the straight retraction, retract the arm cylinder after dumping the bucket slightly.



M145-05-015

PROHIBITED OPERATION

1. Never dig with the bucket retracted too closely to the undercarriage, as the machine components will be subjected to excessive force.
2. Never dig with the bucket fully retracted and the bucket teeth stuck in the ground as the front attachment will be subjected to excessive force.



M117-05-017

WRONG

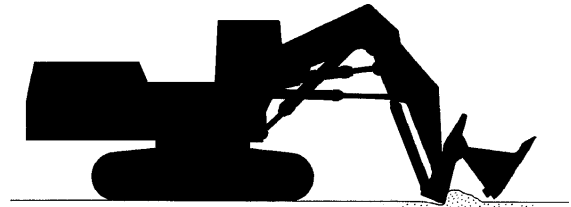


M117-05-018

OPERATING THE MACHINE

3. Do not use the rear of the bucket for grading operation, as this will damage it.

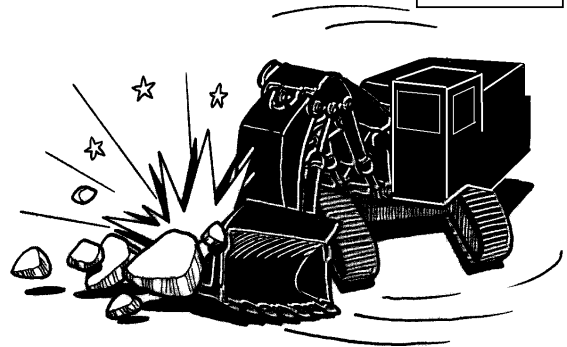
WRONG



M117-05-019

4. Do not push rocks or other heavy materials with the side of the bucket (using the swing movement of the upperstructure), as this may damage the front attachment. If such pushing is unavoidable, be sure to do it slowly and carefully.

WRONG



M117-05-020



CAUTION: When excavating with boom extended to high levels, do not tilt bucket back, as materials will spill on operator's cab. Dump bucket slightly to prevent spilling.

WRONG



M117-05-021

- IMPORTANT:**
1. When digging with the upperstructure at an angle to the undercarriage, avoid striking the tracks with the bucket.
 2. Avoid further extension of the bucket cylinder after the bucket comes into contact with the stopper, as the arm cylinder will be extended, moving the bucket forward.

WRONG



M145-05-026

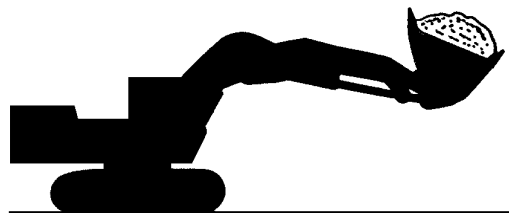
OPERATING THE MACHINE

5. Do not use the weight of the base machine to pry earth as illustrated. Doing so will damage the base machine and may cause personal injury.

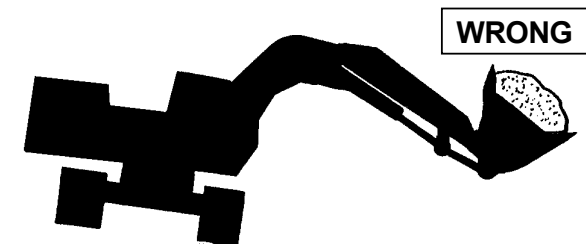


M117-05-009

6. Machine stability is greater when the load is positioned parallel with the tracks. Machine stability is reduced when the load is swung to the side and when operating the front attachment perpendicular to the tracks. Sudden stop of boom lowering movement is especially likely to cause tipping over. When working on weak/soft surfaces or when loading high-density materials, operate the machine at reduced bucket loads.



M117-05-010



M117-05-011

OPERATING THE MACHINE

OBJECT HANDLING --- IF EQUIPPED



CAUTION: When you use machine for object handling, be sure to comply with all local regulations.

Cables, straps, or ropes can break, causing serious injury. Do not use damaged chains, frayed cables, slings, straps, or ropes to crane.

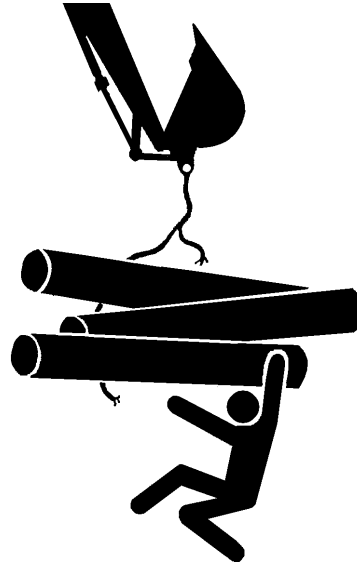
Never move the load quickly. Never move load over a person's head. Do not allow any persons near load.

Keep all persons away from wire-rope-attached load, lifted or sitting on the ground unless it is securely sitting on blocks or on the ground.

Position upperstructure so that the travel motors are at the rear.

Do not attach sling/chain to the bucket teeth.

- Secure sling/chain tightly to the load to be lifted. Wear gloves when securing sling/chain.
- Fasten sling/chain to bucket loop, with the bucket curled and arm retracted.
- Coordinate hand signals with your signal man before starting.
- Be aware of the location of all persons in the working area.
- Attach a hand line to load and make sure person holding it is well away from load.
- Before lifting, test your load.
 1. Park your machine close to load.
 2. Attach load to the machine.
 3. Raise load 50 mm (2 in) above the ground.
 4. Swing the load all the way to one side.
 5. While keeping load close to the ground, move it away from machine.
 6. If there is any indication of reduced stability of your machine, lower load to the ground.
- Lift load only as high as necessary.

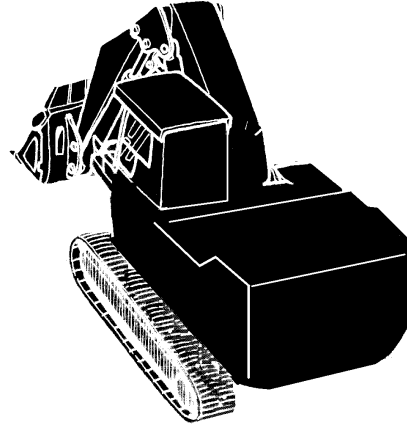


SA-014

OPERATING THE MACHINE

OVERNIGHT STORAGE INSTRUCTIONS

1. After finishing the day's operation, drive the machine to a firm, level ground where no possibility of falling stones, ground collapse, or floods. Park the machine referring to the "PARKING THE MACHINE" in the "DRIVING THE MACHINE" section.
2. Fill the fuel tank with fuel.
3. Clean the machine.
4. If anti-freeze or long life coolant is not used in cold weather, be sure to drain coolant from the radiator and the engine jacket. Also, be sure to put a "No Water in Radiator" tag in a visible place if the coolant has been drained.



M117-05-023

MAINTENANCE

CORRECT MAINTENANCE AND INSPECTION PROCEDURES

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.



SA-005

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

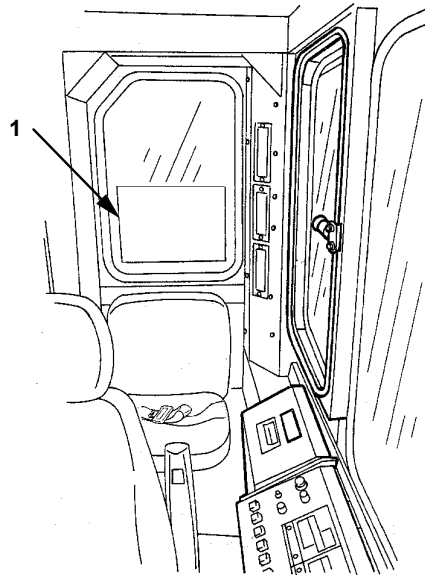
- IMPORTANT:**
- **Use only recommended fuel and lubricants.**
 - **Use only genuine HITACHI parts.**
 - **Failure to use recommended fuel, lubricants, and genuine Hitachi parts will result in loss of Hitachi product warranty.**
 - **Never adjust engine governor or hydraulic system relief valve.**
 -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

MAINTENANCE

SERVICE YOUR MACHINE AT SPECIFIED INTERVALS

Perform all service procedures described in this maintenance guide.

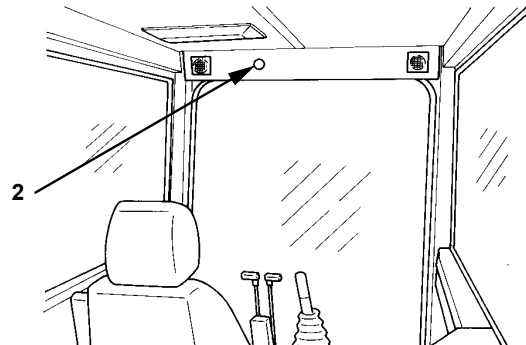
Lubricate, make service checks and adjustments at intervals shown on the periodic maintenance chart (1) located on the inside of the cab rear window (and on the following pages).



M146-01-035

CHECK THE HOUR METER REGULARLY

- Check hour meter (2) to determine when your machine needs periodic maintenance.
- Intervals on the periodic maintenance chart are for operating in normal conditions. If you operate your machine in more adverse conditions, you should service it at SHORTER INTERVALS.



M144-01-033

USE CORRECT FUELS AND LUBRICANTS

IMPORTANT: Always use recommended fuels and lubricants.
Failure to do so will result in machine damage and loss of Hitachi product warranty.

MAINTENANCE

PREPARE MACHINE FOR MAINTENANCE

Before performing the maintenance procedures given in the following chapters, park the machine as described below, unless otherwise specified.

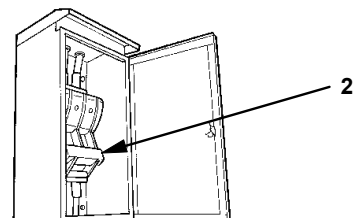
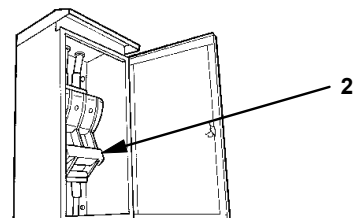
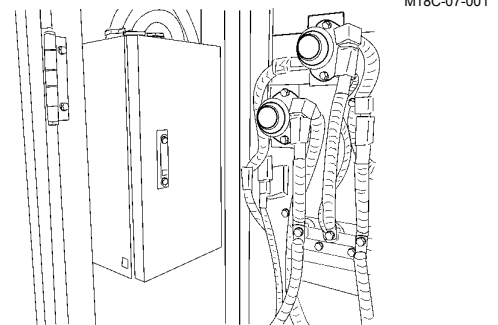
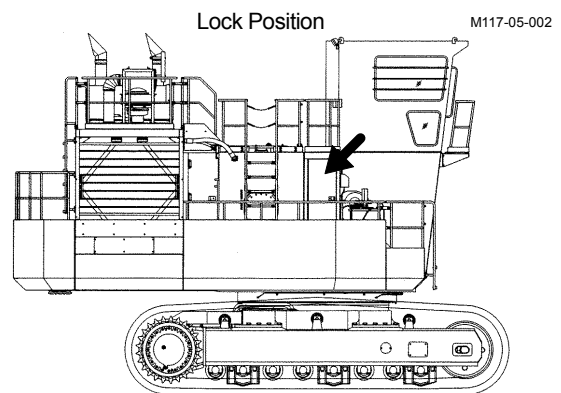
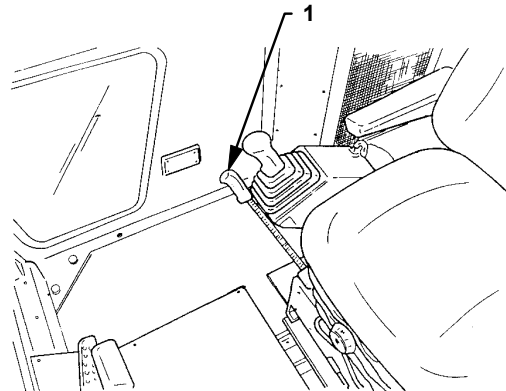
1. Park the machine on a level surface.
2. Lower the bucket to the ground.
3. Turn the auto-idle switch off.

IMPORTANT: The turbocharger may be damaged if the engine is not properly shut down.

4. Run the engine at slow idle speed without load for five minutes.
5. Turn the key switch OFF. Remove the key from the key switch. (If maintenance must be performed with engine running, do not leave machine unattended.)
6. Pull the pilot control shut-off lever (1) to the LOCK position.
7. Before performing any work on the machine, attach a "Do Not Operate" tag on the right control lever.
8. Ground Disconnect

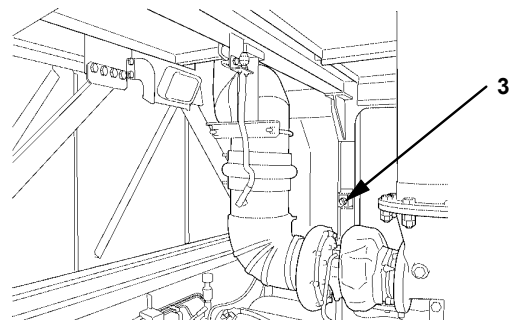
This machine is equipped with a battery ground disconnecter located outside of engine unit compartment on the right side. The battery ground circuit can be disconnected by pulling disconnecter lever (2) down before replacing the battery, checking the electrical system, or performing welding work on the machine.

IMPORTANT: Don't pull the ground disconnecter down while operating the machine.



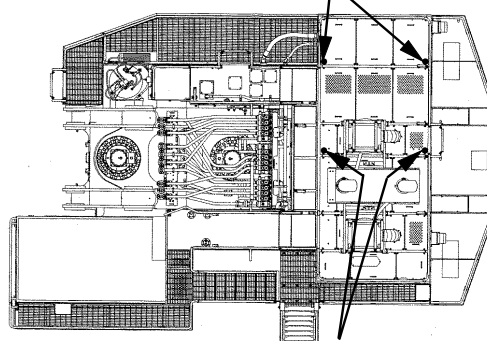
MAINTENANCE

9. Before starting to check and/or service the inside of the engine compartment, turn engine stop switch (3) located at the engine compartment entrance to the EMERG. STOP position to assure safety.
10. When using a vacuum pump to create negative pressure in the hydraulic oil tank while working on the hydraulic lines, close stop valve cock (4) on the hydraulic oil tank air bleed valve. Be sure to open cock (4) after completing the repair work.



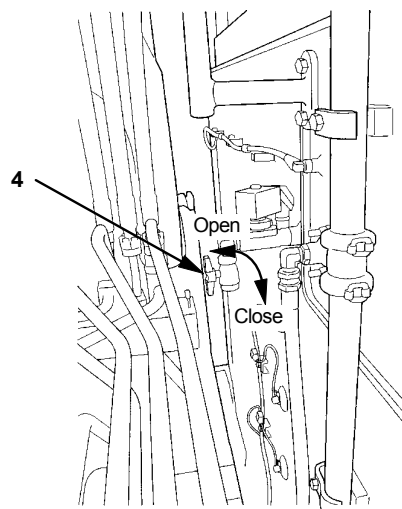
Engine Stop Switch

M18C-01-025



Engine Stop Switch

M18C-01-031



M18C-01-027

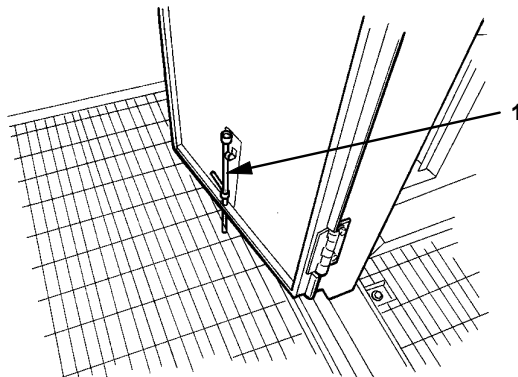
MAINTENANCE

OPEN ACCESS DOORS FOR SERVICE

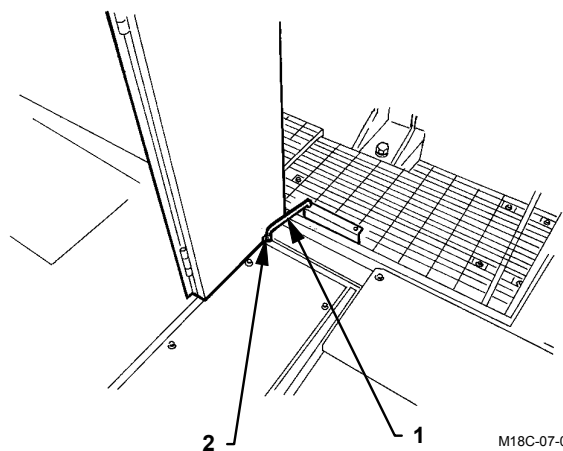


CAUTION:

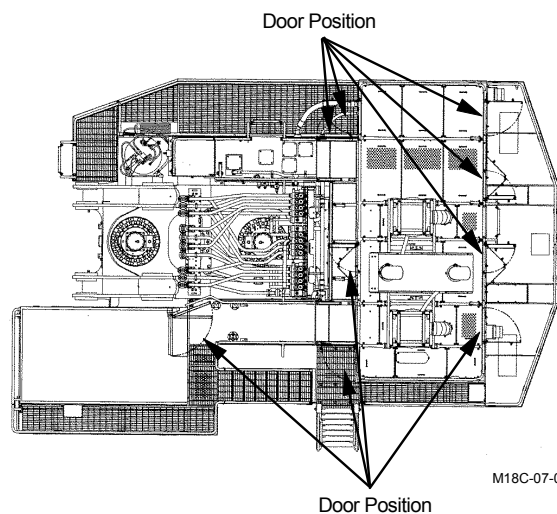
1. Do not keep the access doors open when the machine is parked on a slope, or while the wind is blowing hard. The access doors may close accidentally, possibly resulting in personal injury.
 2. When opening or closing the hood and the access doors, take extra care not to catch fingers between the base machine and the hood or the access doors.
- To keep the access door open, lower rod (1) into a gap on the platform or into locking hole (2), as illustrated.



M18C-07-002



M18C-07-003



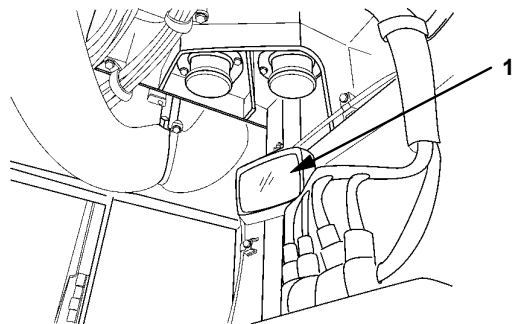
M18C-07-004

MAINTENANCE

INSPECTION/MAINTENANCE LIGHTS

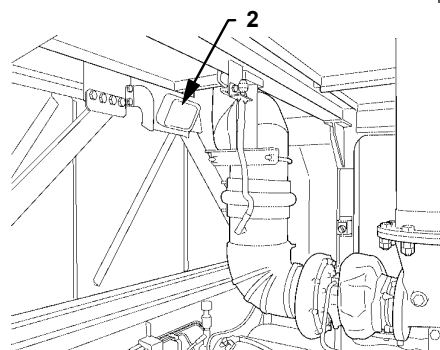
A light is provided for inspection/maintenance work in room (1) under the cab, in engine room (2) and in pump room (3).

Use engine room light switch (4), located on the switch panel in the cab, to turn on/off these lights.



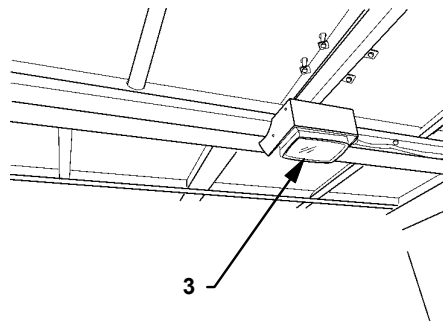
In Room Under the Cab

M141-01-017



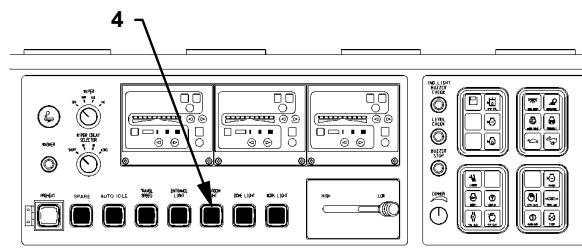
In Engine Room

M18C-01-025



In Pump Room

M141-01-019



M18C-01-020

MAINTENANCE

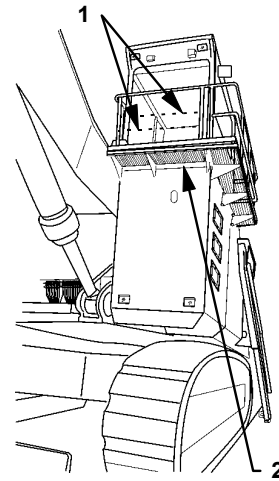
USE A CHAIN TO PREVENT FALLING ACCIDENTS

When inspection or maintenance is required on cab front step (2), tighten chain (1) as described below to prevent falling from cab front step (2).

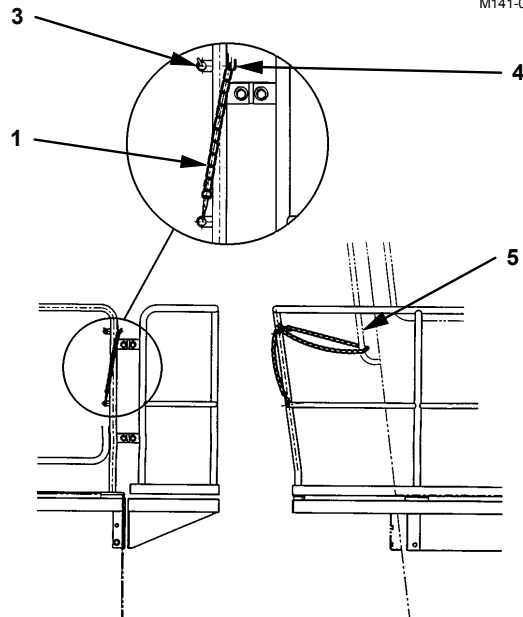


CAUTION: Before starting inspection or maintenance on the cab front step, be sure to attach the chain to the step handrail. Before attaching the chain, check to be sure that the chain has no damage. If any damage such as wear or breaks are found, replace with new one.

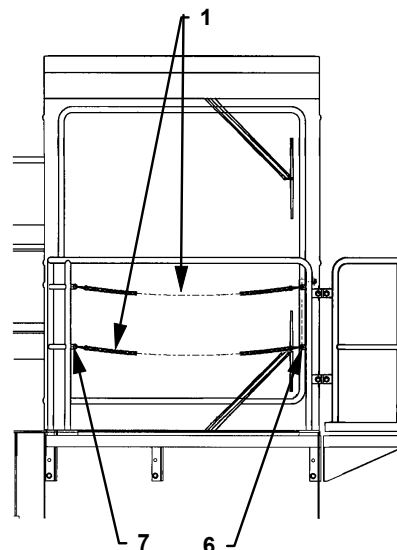
1. Remove chain (1) from hook (3) located on the left-upper front cab and from handrail (5).
2. Install the free end of chain (1) to right hook (7) to attach the chain.
3. Check that chain (1) is securely installed to both hooks (6) and (7).
4. Before re-starting machine operation, remove chain (1) from right hook (7). After hanging the chain on hook (4), let it wrap around handrail (5). Then, re-install the end of chain (1) to left upper hook (3).



M141-07-003



M117-07-151



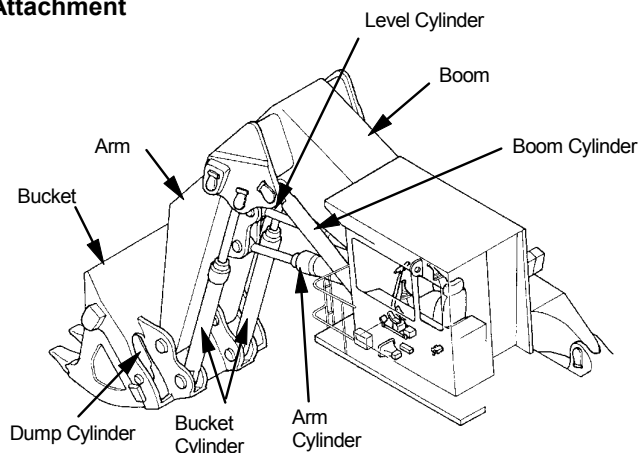
M141-07-004

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MAINTENANCE

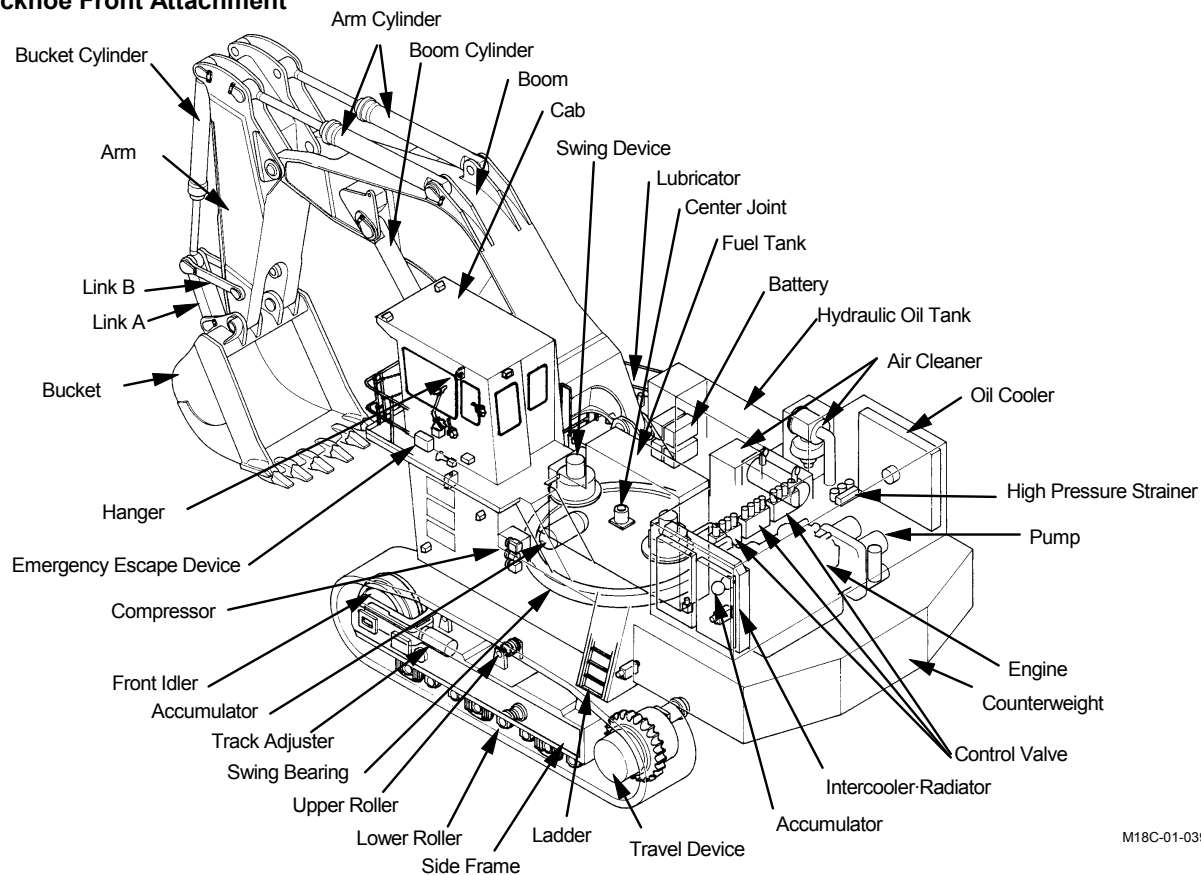
CONSTRUCTION OUTLINE

Loading Shovel Front Attachment



M18C-01-040

Backhoe Front Attachment



M18C-01-039

MAINTENANCE

HYDRAULIC SYSTEM

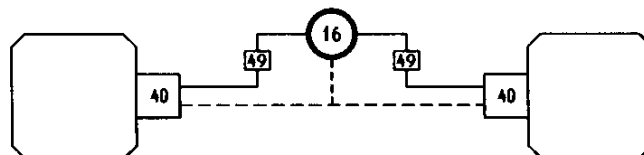
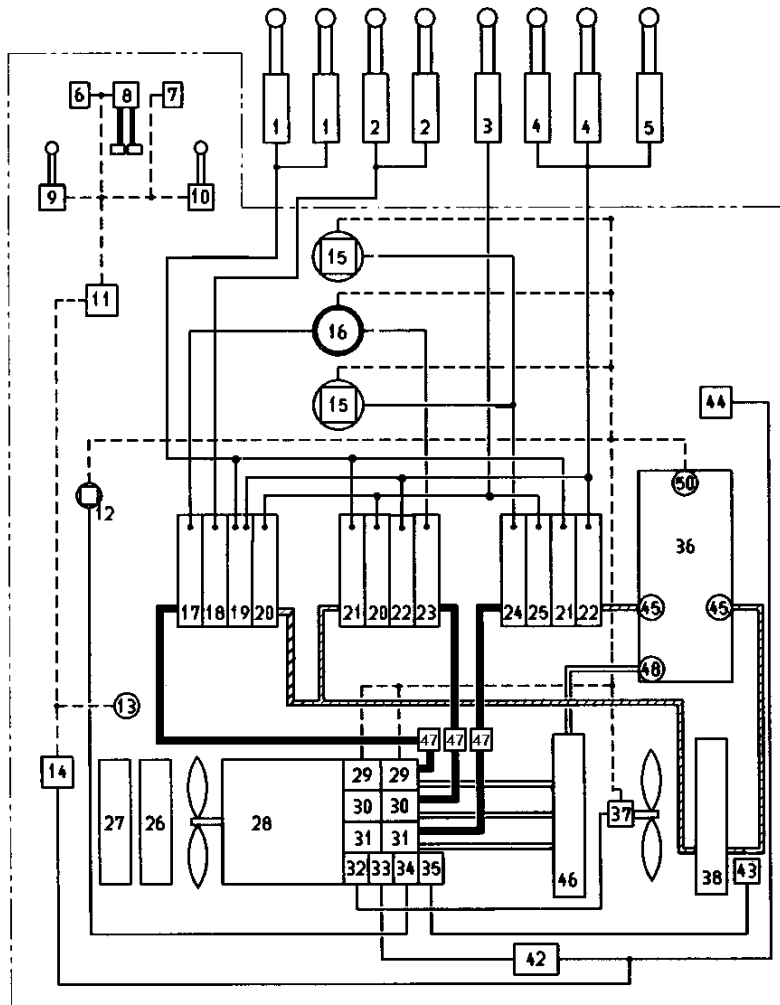
IMPORTANT: Hydraulic equipment such as hydraulic pumps, control valves, and relief valves have been adjusted at the factory. Do not attempt to disassemble or turn the adjusting screws, as they are very difficult to readjust. Consult your authorized dealer if any trouble should occur.

1. Oil from the main and swing pumps flows through the control valves to the cylinders and motors. Most return oil from the control valves flows back to the hydraulic oil tank via the full-flow filters; a small amount returns via oil coolers directly. High pressure strainers are provided in the pump delivery lines between the pumps (excluding the swing pumps) and control valves.
2. The pilot valves actuated by the control levers/pedals send pilot oil from the pilot pumps to the control valves, moving their spools. This spool movement routes the pump delivery oil to the cylinders and motors.
3. Relief valves of sufficient capacity are provided in the control valves, full-flow filters and the pilot and oil cooler circuits in order to protect each circuit from abnormally high pressure.
4. The excavator is equipped with an accumulator in the pilot oil line which makes it possible to operate the front attachment for a few seconds after the engine has stopped. The accumulator is charged with high pressure gas; do not attempt to remove or disassemble it, and do not expose the accumulator to flame.
5. The excavator is equipped with an independent oil cooler and circulation pump for the pump transmission, which functions to cool pump transmission oil.

MAINTENANCE

Loading Shovel

1. BUCKET CYLINDER
2. DUMP CYLINDER
3. ARM CYLINDER
4. BOOM CYLINDER
5. LEVEL CYLINDER
6. BUCKET CLOSE PEDAL
7. BUCKET OPEN PEDAL
8. TRAVEL PILOT VALVE
9. LEFT PILOT VALVE
10. RIGHT PILOT VALVE
11. PILOT SHUT-OFF VALVE
12. AIR-CON. COMP. MOTOR
13. ACCUMULATOR
14. CHECK VALVE
15. SWING MOTOR
16. CENTER JOINT
17. CONTROL VALVE: LEFT TRAVEL
18. CONTROL VALVE: BUCKET OPEN AND CLOSE
19. CONTROL VALVE: BOOM UP/BUCKET TILT-IN
20. CONTROL VALVE: ARM
21. CONTROL VALVE: BUCKET
22. CONTROL VALVE: BOOM
23. CONTROL VALVE: RIGHT TRAVEL
24. CONTROL VALVE: SWING
25. CONTROL VALVE: ARM EXTEND
26. RADIATOR
27. INTERCOOLER
28. ENGINE
29. MAIN PUMP No. 3, 4
30. MAIN PUMP No. 1, 2
31. MAIN PUMP No. 5, 6
32. FAN DRIVE PUMP
33. PILOT PUMP
34. AIR-CON. COMP. PUMP
35. TRANSMISSION OIL PUMP
36. HYDRAULIC OIL TANK
37. FAN DRIVE MOTOR
38. OIL COOLER
40. TRAVEL MOTOR
42. PILOT FILTER
43. TRANSMISSION OIL COOLER
44. GREASE PUMP
45. FULL-FLOW FILTER
46. SUCTION MANIHOLD
47. HIGH PRESSURE FILTER
48. SUCTION FILTER
49. BRAKE VALVE
50. DRAIN FILTER



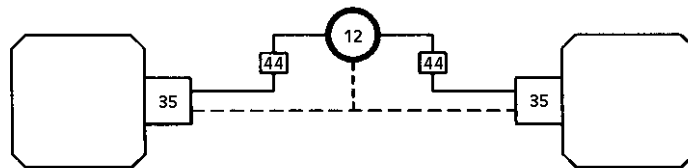
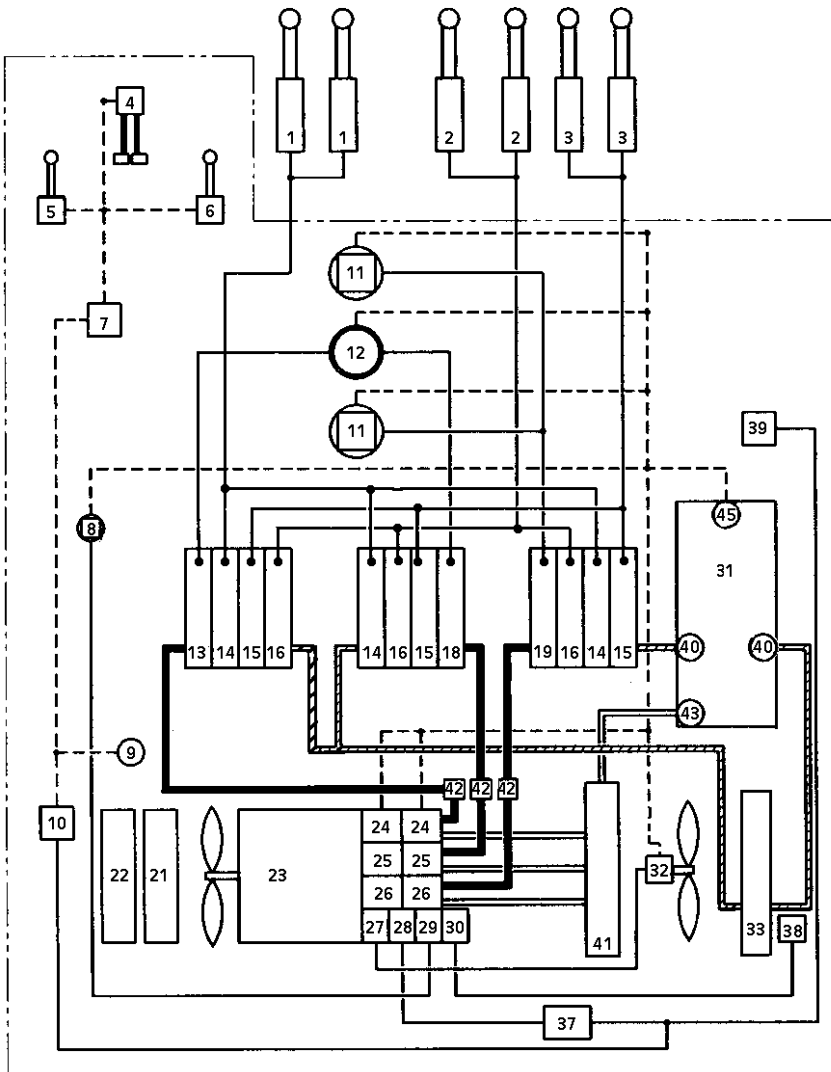
——— SUPPLY LINE FROM PUMPS
 - - - RETURN LINE
 ——— SUCTION LINE
 ——— ACTUATOR LINE
 - - - DRAIN AND PILOT LINE

M18C-07-065

MAINTENANCE

Backhoe

1. BUCKET CYLINDER
2. ARM CYLINDER
3. BOOM CYLINDER
4. TRAVEL PILOT VALVE
5. LEFT PILOT VALVE
6. RIGHT PILOT VALVE
7. PILOT SHUT-OFF VALVE
8. AIR-CON. COMP. MOTOR
9. ACCUMULATOR
10. CHECK VALVE
11. SWING MOTOR
12. CENTER JOINT
13. CONTROL VALVE: LEFT TRAVEL
14. CONTROL VALVE: BUCKET
15. CONTROL VALVE: BOOM
16. CONTROL VALVE: ARM
18. CONTROL VALVE: RIGHT TRAVEL
19. CONTROL VALVE: SWING
21. RADIATOR
22. INTERCOOLER
23. ENGINE
24. MAIN PUMP No. 3, 4
25. MAIN PUMP No. 1, 2
26. MAIN PUMP No. 5, 6
27. FAN DRIVE PUMP
28. PILOT PUMP
29. AIR-CON. COMP. PUMP
30. TRANSMISSION OIL PUMP
31. HYDRAULIC OIL TANK
32. FAN DRIVE MOTOR
33. OIL COOLER
35. TRAVEL MOTOR
37. PILOT FILTER
38. TRANSMISSION OIL COOLER
39. GREASE PUMP
40. FULL-FLOW FILTER
41. SUCTION MANIHOLD
42. HIGH PRESSURE FILTER
43. SUCTION FILTER
44. BRAKE VALVE
45. DRAIN FILTER



— SUPPLY LINE FROM PUMPS
- - - RETURN LINE
— — — SUCTION LINE
— — — ACTUATOR LINE
- - - DRAIN AND PILOT LINE

M18C-07-066

MAINTENANCE

PERIODIC REPLACEMENT OF RUBBER HOSES



CAUTION: Rubber hoses, such as hydraulic hoses, lubrication hoses, fuel hoses, and heater hoses, may break due to aging, fatigue, and abrasion, possibly resulting in serious injury or death.

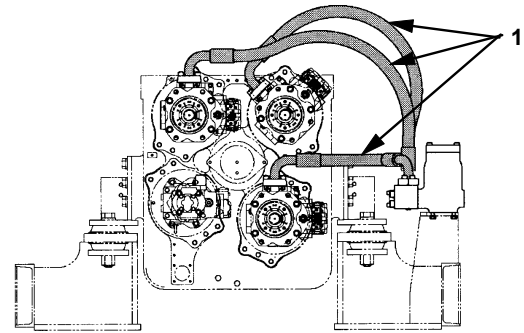
In order to avoid serious personal injury, be sure to replace the hoses listed in the following table every two years, or 8000 hours of operation, whichever comes first. Use genuine Hitachi parts.

It is very difficult to gauge the extent of deterioration due to aging, fatigue, and abrasion of rubber hoses by inspection alone. Thus, if rubber hoses are not replaced periodically, serious personal injury may result due to falls of the front, penetration of high pressure oil into the skin, or fire.

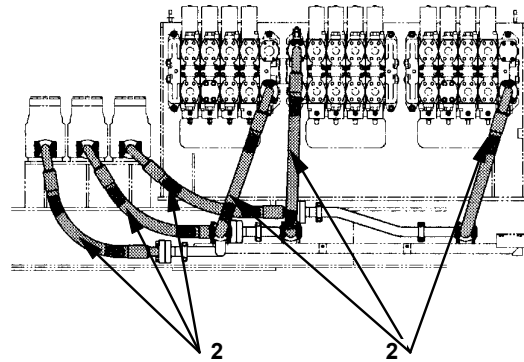
Regardless of regular replacement intervals, if hoses are found to be defective by periodic inspection (refer to pages 7-62 to 7-64), be sure to repair or replace them before operating the machine. Be sure to replace seals, such as O-rings and hose clamps along with replacing hoses. Consult your authorized dealer for correct hose replacement.

Hydraulic Hoses

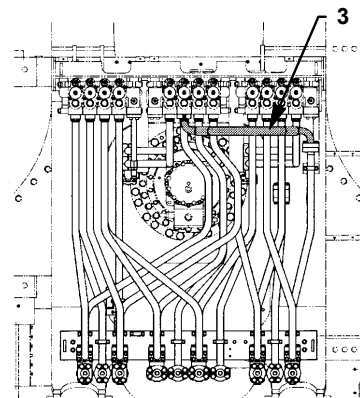
Hoses	Q'ty in Use
Pump to High Pressure Filter (1)	3
High Pressure Filter to Control Valve (2)	6
Control Valve to Front (3)	1
Oil Cooler to Hydraulic Oil Tank (4)	2



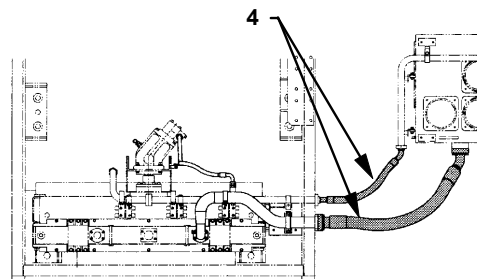
M18C-07-058



MOOOOOOO



M18C-07-059

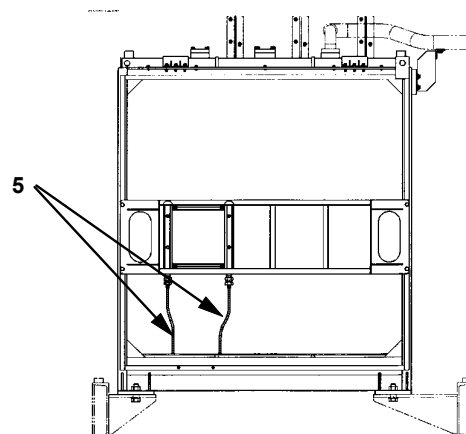


M18C-07-060

M18C-07-061

MAINTENANCE

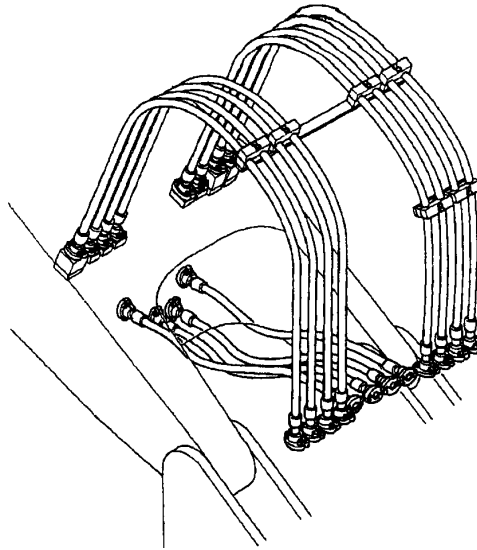
Hoses	Q'ty in Use
Transmission Oil Cooler Hose (5)	2



M18C-07-062

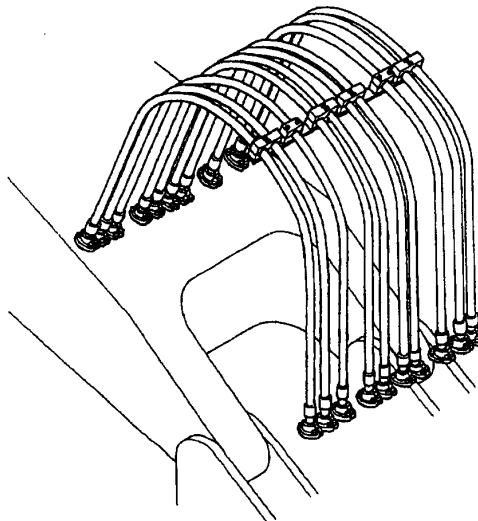
MAINTENANCE

Hoses		Q'ty in Use
Loading Shovel Front Hoses	Main Frame to Boom	12



M144-07-133

Hoses		Q'ty in Use
Backhoe Front Hoses	Main Frame to Boom	10

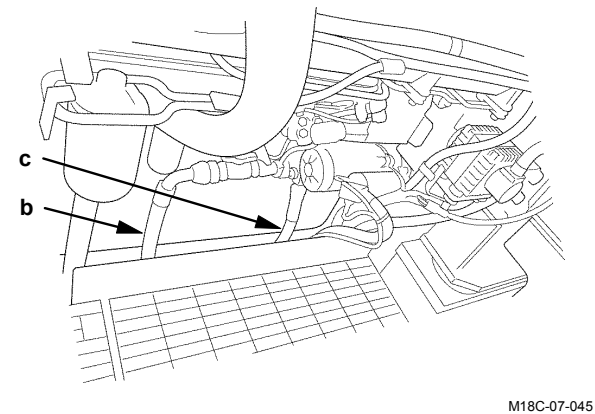
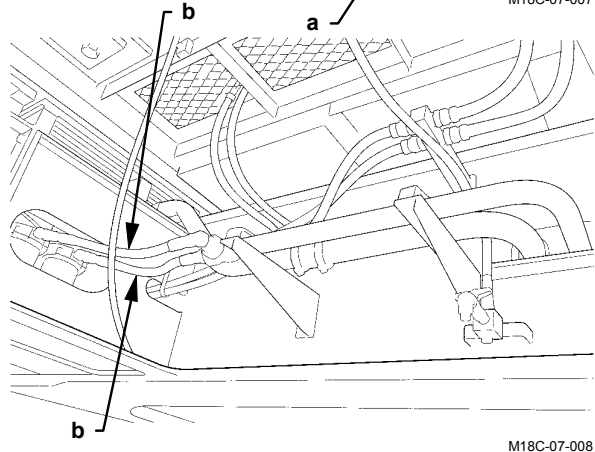
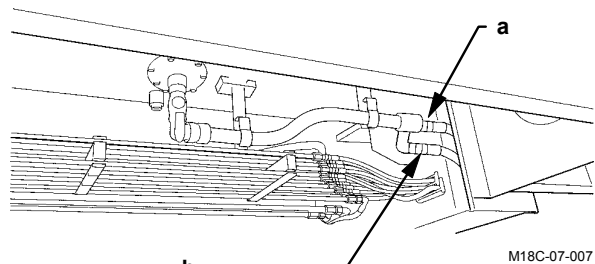


M144-07-134

MAINTENANCE

Fuel Hoses

Hoses	Q'ty in Use
Fuel Tank to Water Separator Filter (a)	2
Water Separator to Engine (b)	3
Engine to Fuel Tank (c)	1



MAINTENANCE

MAINTENANCE INTERVAL GUIDE

A. GREASING (See Page 7-21)

Parts		Quantity	Interval (hours)						
			5	10	250	500	1000	1500	2000
1. Loader Front Joint Pins	Bucket Pins	8 *	★★						
	Other Front Pins	11 *	★★						
2. Backhoe Front Joint Pins	Bucket and Link Pins	22 *	★★						
	Other Front Pins	14 *	★★						
3. Swing Bearing		4 *							
4. Swing Internal Gear		180 L (47.6 US gal)							
5. Center Joint		1 *							

 **NOTE:** ★★ Maintenance required when operating in water or mud.
* Auto-lubrication is available.

B. ENGINE (See Page 7-33)

Parts		Quantity	Interval (hours)							
			10	50	250	500	1000	1500	2000	4000 - 6000
1. Engine Oil	Check Oil Level	1								
2. Engine Oil	Change	172 L (45.4 US gal)								
3. Replace Engine Oil Main Filter		4								
4. Replace Engine Oil Bypass Filter		1								
5. Check Alternator Belt Tension		1		*						
6. Check Injection Nozzle		—							※	
7. Inspect Bolts and Nuts Outside Engine		—		*※					※	
8. Inspect and Adjust Valve Clearance		—							※	
9. Check Fuel Injection Timing		—							※	
10. Check Starter and Alternator		—								※
11. Check Turbocharger		—								※

 **NOTE:** * First time only.
※ See your authorized dealer.

C. TRANSMISSION (See Page 7-38)

Parts			Quantity	Interval (hours)						
				10	50	250	500	1000	1500	2000
1. Pump Transmission Gear	Engine Oil	Check Oil Level	1	*						
		Change Oil	26 L (6.9 US gal)		*					
		Replace Filter	1							
		Clean Breather	1							
2. Swing Reduction Gear	Gear Oil	Check Oil Level	2	*						
		Change Oil	67 L (17.7 US gal)×2		*					
		Clean Breather	2							
3. Travel Reduction Gear	Gear Oil	Check Oil Level	2							
		Change Oil	70 L (18.5 US gal)×2				*			

 **NOTE:** * First time only.

MAINTENANCE

D. HYDRAULIC SYSTEM (See Page 7-46)

Parts		Quantity	Interval (hours)							
			10	50	250	500	2000	2500	4000	12000
1.	Check Hydraulic Oil Level	1	*							
2.	Drain Hydraulic Oil Tank Sump	1								
3.	Change Hydraulic Oil	2200 L (580 US gal)					★	★	★	
4.	Replace Full-Flow Filter and Drain Filter	4		*						
5.	Replace Pilot Oil Filter	1		*						
6.	Suction Filter	Clean Filter	2	When changing hydraulic oil						
		Replace Filter	2							
7.	Replace High-Pressure Strainer	3								
8.	Clean Oil Cooler Core	1								
9.	Check Hoses and Lines (for leak, loose)	–								
	Check Hoses and Lines (for crack, bend, etc.)	–								

 **NOTE:** ★ Hydraulic oil changing interval differs according to the kind of hydraulic oil used. See recommended oil chart.

* First time only.

E. FUEL SYSTEM (See Page 7-67)

Tank capacity 3085 liter (815 US gal)

Parts		Quantity	Interval (hours)						
			10	50	250	500	1000	1500	2000
1. Drain Fuel Tank Sump		1							
2. Water Separator Filter	Drain	2							
	Replacement	2							
3. Replace Fuel Filter		2							
4.	Check Fuel Hoses (for leak, loose)	–							
	Check Fuel Hoses (for crack, bend, etc.)	–							

F. AIR CLEANER (See Page 7-74)

Parts		Quantity	Interval (hours)					
			10	50	250	500	1000	1500
1. Air Cleaner Outer Element	Cleaning	2	As required Replace per 6 cleaning when outer element is replaced					
	Replacement	2						
2. Air Cleaner Inner Element	Replacement	2						

MAINTENANCE

G. COOLING SYSTEM (See Page 7-76)

Parts		Quantity	Interval (hours)						
			10	50	250	500	1000	1500	2000
1. Coolant	Check Coolant Level	1							
	Change Coolant	195 L (51.5 US gal)	Twice a year, in spring and autumn *						
2. Clean Radiator		1	When changing coolant						
3. Clean Radiator Core		1							
4. Clean Intercooler Core		2							

 **NOTE:** * Before leaving the Hitachi factory, the cooling system is filled with a mixture of water and Genuine Hitachi Long-Life Coolant. As long as Genuine Hitachi Long-Life Coolant is used, the service intervals between changing the coolant is once every two years, or every 4000 hours, whichever comes first.

H. AIR CONDITIONER (See Page 7-81)

Parts		Quantity	Interval (hours)						
			10	50	250	500	1000	1500	2000
1. Recirculation Air Filter	Cleaning	3	As required						
	Replacement	3	Replace per 4 cleaning						
2. Ventilation Air Filter	Cleaning	3	As required						
	Replacement	3	Replace per 4 cleaning						
3. Check Refrigerant Quantity		3							
4. Check Compressor Belt Tension		3							
5. Clean Condenser Core		3							
6. Check Tightening Torque		—							
7. Seasonal Maintenance		—	Preseason (once a year), Off-season (once a week)						

MAINTENANCE

I. ELECTRICAL SYSTEM (See Page 7-88)

J. MISCELLANEOUS (See Page 7-99)

Parts		Quantity	Interval (hours)						
			10	50	250	500	1000	1500	3000
1. Check Bucket Teeth for Wear and Looseness		6							
2. Inspect Emergency Rope and Rope Mounting Hardware		1							
3. Check Auto-Lubrication System		1							
4. Seat Belt	Check	2							
	Replacement	2	At least once every 3 years						
5. Check Washer Tank		2	As required						
6. Check and Adjust Track Sag		2							
7. Check Accumulator and Track Adjuster Cylinder Circuit		2	Every year						
8. Clean Side Frame Area		2							
9. Check Tightening Torque of Bolts and Nuts		–		*					

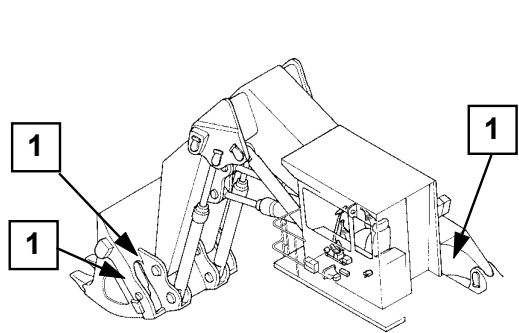
 NOTE: * First time only.

MAINTENANCE

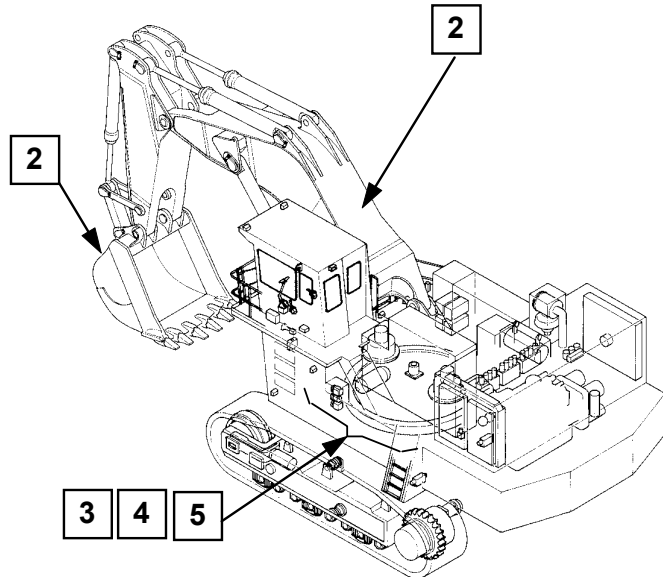
A. GREASING

Parts		Quantity	Interval (hours)						
			5	10	250	500	1000	1500	2000
1. Loader Front Joint Pins	Bucket Pins	8 *	★★						
	Other Front Pins	11 *	★★						
2. Backhoe Front Joint Pins	Bucket and Link Pins	22 *	★★						
	Other Front Pins	14 *	★★						
3. Swing Bearing		4 *							
4. Swing Internal Gear		180 L (47.6 US gal)							
5. Center Joint		1 *							

 **NOTE:** ★★ Maintenance required when operating in water or mud.
* Auto-lubrication is available.



M18C-01-040



M18C-01-039

Brand Names of Recommended Grease

Where to be applied	Swing Internal Gear		Front Joint Pins, Swing Bearing	
	−20 to 50 °C (−4 to 122 °F)			
Manufacturer				
British Petroleum	BP Energrease	LS-EP2	BP Energrease	LS-EP1
Caltex Oil	Multifax	EP2	Multifax	EP1
Esso	Beacon	EP2	Beacon	EP1
Idemitsu Kosan	Daphne Coronex Grease	EP2	Daphne Coronex Grease	EP1
Mobil Oil	Mobilux	EP2	Mobilux	EP1
Nippon Oil	Epinoc Grease	AP2	Epinoc Grease	AP1
Shell Oil	Shell Alvania EP Grease	2	Shell Alvania EP Grease	1

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

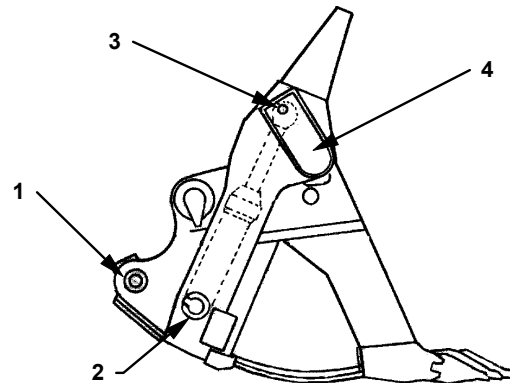
MAINTENANCE

1

Loading Shovel Front Joint Pins

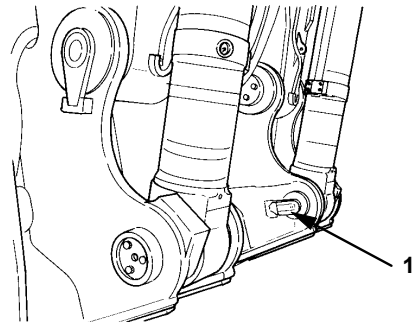
--- daily (every 10 hours)

Add grease to all fittings shown below daily. Most of the fittings are grouped, as shown, for quick and safe lubrication.



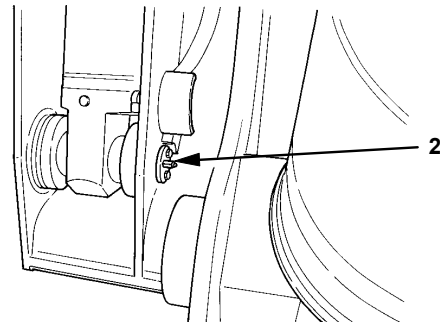
- Bucket Cylinder Bottom Pin (1)

M114-07-008



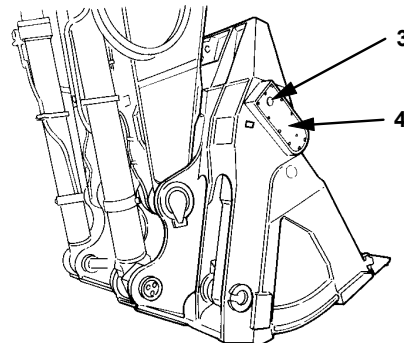
- Dump Cylinder Bottom Pin (2)

M144-07-002



- Dump Cylinder Rod Pin (3)
- Bucket Joint Pin (4)

M144-07-003

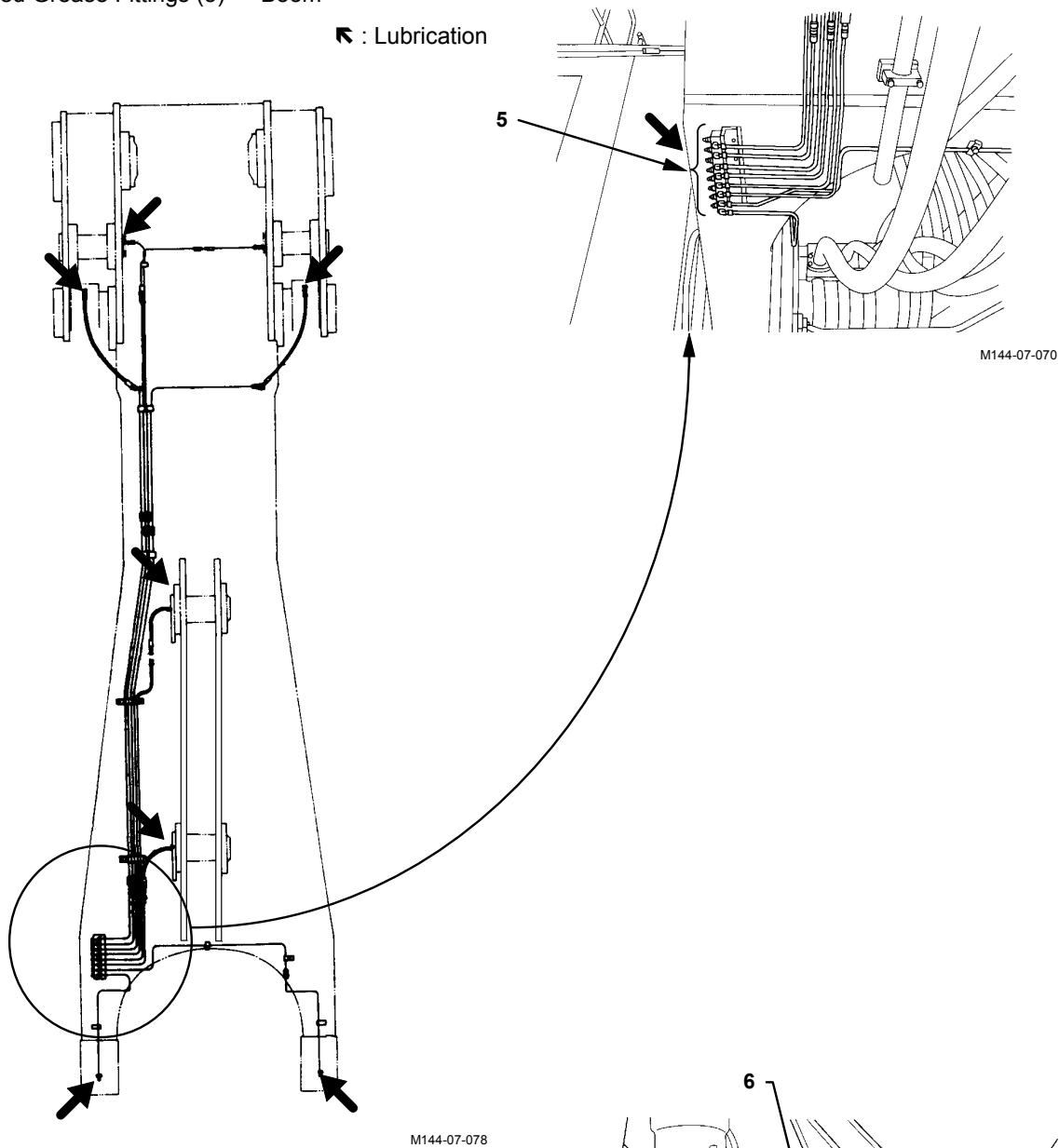


M144-12-005

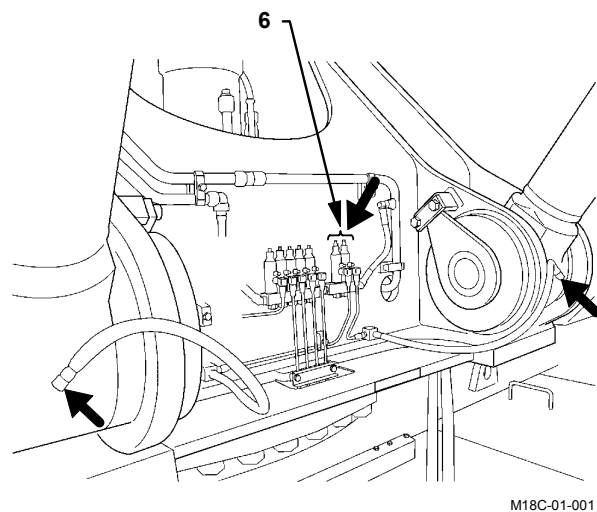
MAINTENANCE

2. Grouped Grease Fittings (5) --- Boom

↖ : Lubrication



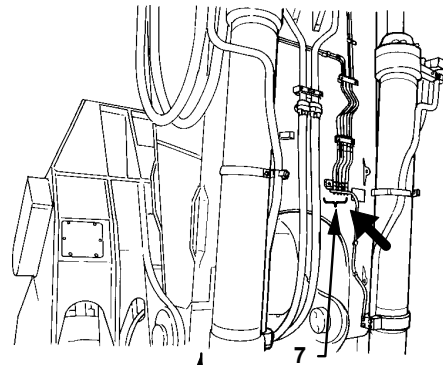
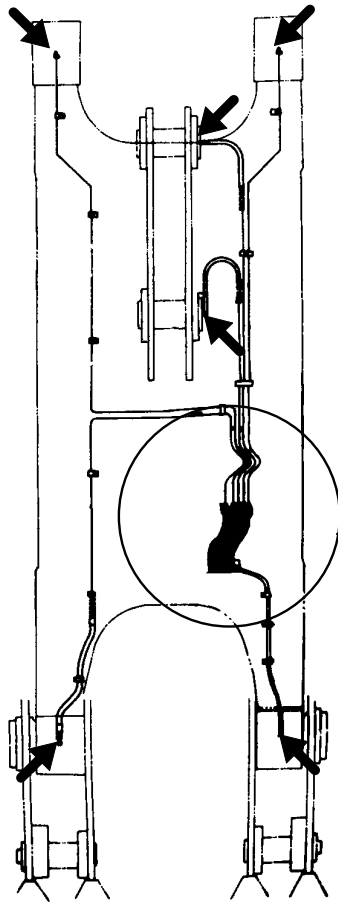
3. Boom Cylinder Rod Pins (6)



MAINTENANCE

4. Grouped Grease Fittings (7) --- Arm

↖ : Lubrication



M144-07-005

M144-07-079

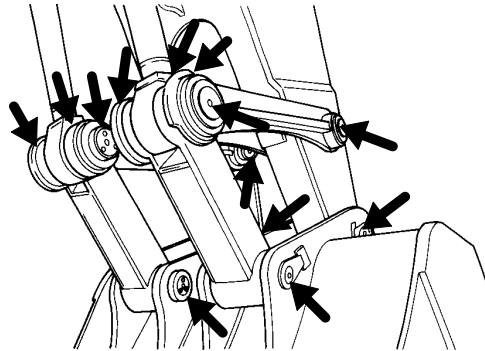
MAINTENANCE

2

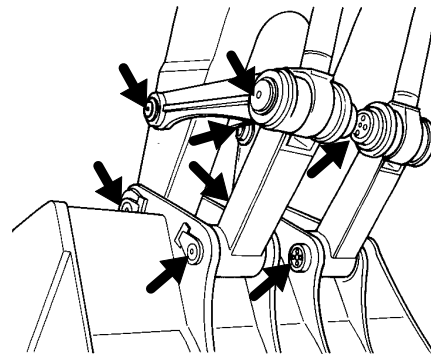
Backhoe Front Joint Pins --- daily

Add grease to all fittings shown below daily. Most of the fittings are grouped, as shown, for quick and safe lubrication.

1. Grease Fittings for bucket and link pins.



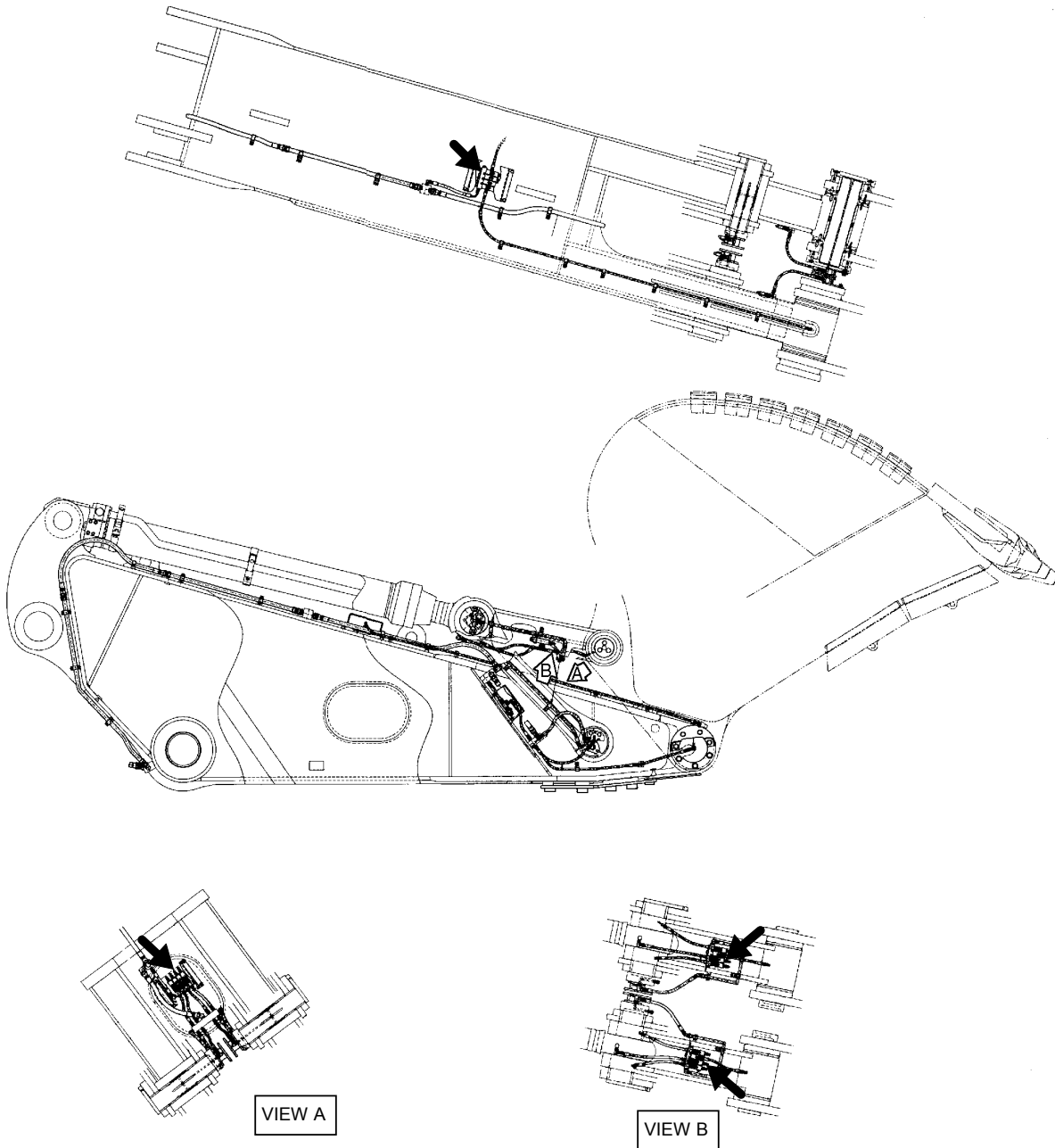
M144-07-081



M144-07-082

MAINTENANCE

- Grease Fittings for Bucket and Link Pins.
(Auto-lubrication system equipped)

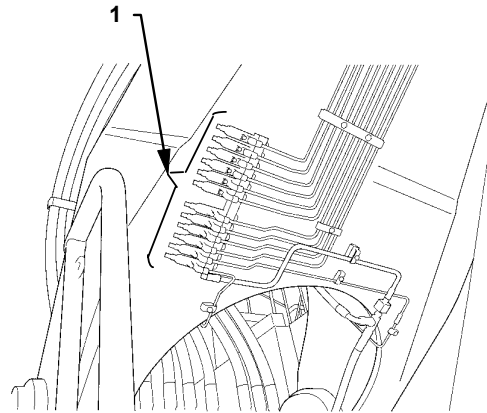


M18C-07-072

MAINTENANCE

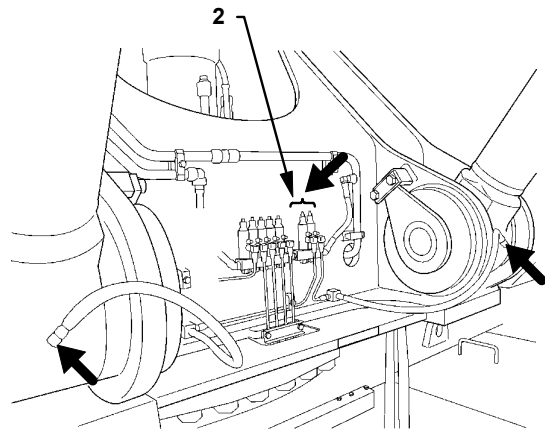
2. Grouped Grease Fittings (1) --- Boom/Arm

Fittings for boom foot pins and boom cylinder rod pins.



M18C-07-009

3. Boom Cylinder Rod Pin (2)



M18C-01-001

MAINTENANCE

3

Swing Bearing --- every 250 hours (Grouped Grease Fittings --- Main Frame)

 **NOTE:** Auto-lubrication can be used for the fittings on the swing bearing.



CAUTION: Lubricating both the swing bearing and gear and rotating the upperstructure must be done by one person. Before you lubricate the swing bearing, clear the area of all persons.

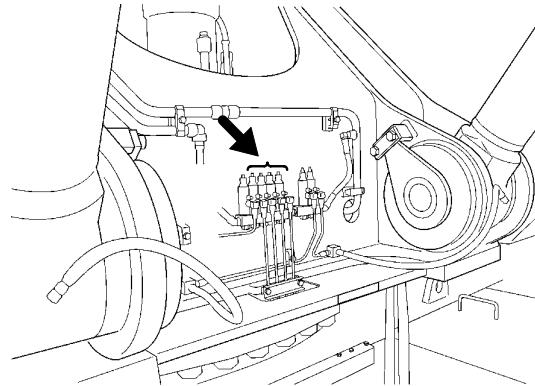
Each time you leave the cab

- Lower the bucket to the ground.
- Stop the engine.
- Pull the pilot control shut-off lever to the LOCK position.
- Use handrails.

1. Park the machine on a level surface.
2. Lower the bucket to the ground.
3. Turn the auto-idle switch off.

IMPORTANT: The turbocharger may be damaged if the engine is not properly shut down.

4. Run the engine at slow idle speed without load for five minutes.
5. Turn the key switch OFF. Remove the key from the key switch.
6. Pull the pilot control shut-off lever to the LOCK position.
7. With the upperstructure stationary, apply grease to the four grease fittings.
8. Start the engine. Raise the bucket several inches off the ground and rotate the upperstructure 45° (1/8 turn).
9. Lower the bucket to the ground.
10. Repeat the procedure three times, beginning with step 3.
11. Apply grease to the swing bearing until grease can be seen escaping from the swing bearing seals.
12. Total amount of grease to be applied is approximately 10 to 12 strokes by grease lubricator.
13. Take care not to supply excessive grease.



M18C-01-001

MAINTENANCE

4

Swing Internal Gear --- every 2000 hours



CAUTION: Adding or changing swing internal gear grease and rotating the upperstructure must be done by one person. Before you start, clear the area of all persons.

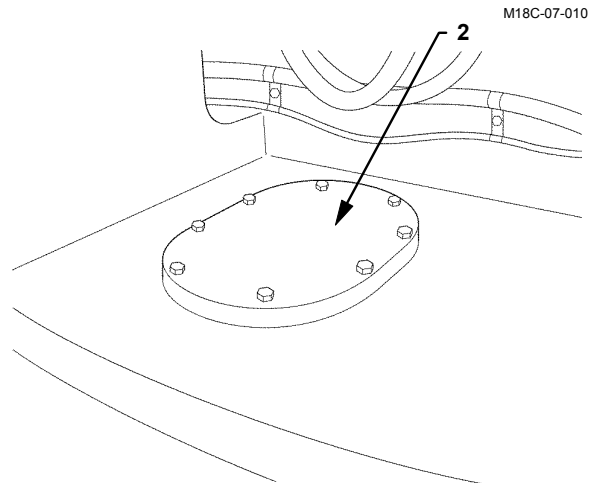
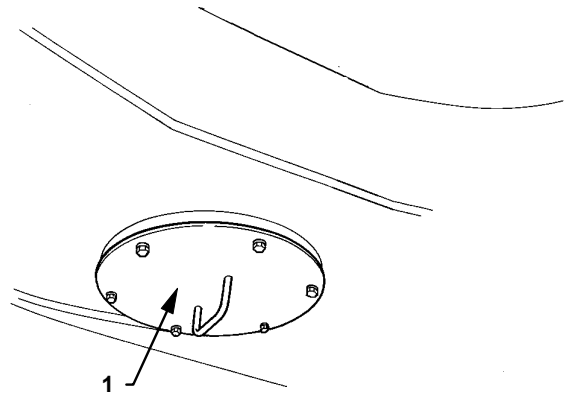
Each time you leave the cab

- Lower the bucket to the ground.
- Stop the engine.
- Pull the pilot control shut-off lever to the LOCK position.
- Use handrails.

1. Park the machine on a level surface.
2. Lower the bucket to the ground.
3. Turn the auto-idle switch off.

IMPORTANT: The turbocharger may be damaged if the engine is not properly shut down.

4. Run the engine at slow idle speed without load for five minutes.
5. Turn the key switch OFF. Remove the key from the key switch.
6. Pull the pilot control shut-off lever to the LOCK position.
7. Remove cover (2) on the left side of the upperstructure. In order to add new grease evenly to the swing gear, swing the upperstructure twelve 30° intervals (one full turn) and add grease at each interval using a putty knife.
8. In case the grease deteriorate and/or water becomes mixed in the grease, change grease by following the procedures below.
9. Remove cover (1) on the underside of the swing gear housing and thoroughly remove old grease from the swing gear.
10. Remove cover (2) on the left side of the upperstructure. In order to add new grease evenly to the swing gear, swing the upperstructure twelve 30° intervals (one full turn) and add grease at each interval using a putty knife.
Total amount of grease applied should be approximately 180 liter (47.6 US gal).



M18C-07-010

M18C-07-051

MAINTENANCE

5

Center Joint --- every 500 hours (Grouped Grease Fittings --- Main Frame)

 **NOTE:** Auto-lubrication can be used for the fittings on the center joint.

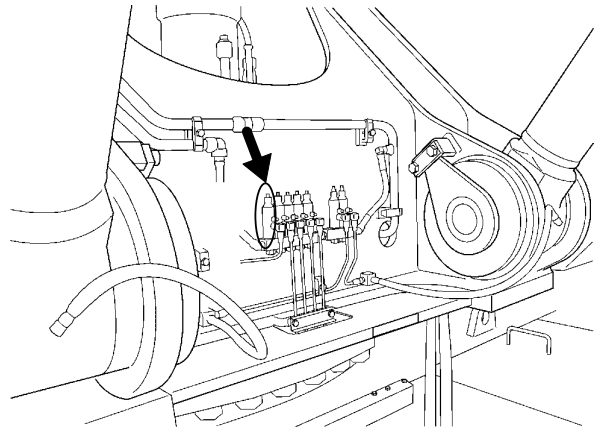
Each time you leave the cab

- Lower the bucket to the ground.
- Stop the engine.
- Pull the pilot control shut-off lever to the LOCK position.
- Use handrails.

1. Park the machine on a level surface.
2. Lower the bucket to the ground.
3. Turn the auto-idle switch off.

IMPORTANT: The turbocharger may be damaged if the engine is not properly shut down.

4. Run the engine at slow idle speed without load for five minutes.
5. Turn the key switch OFF. Remove the key from the key switch.
6. Pull the pilot control shut-off lever to the LOCK position.
7. With the upperstructure stationary, apply grease to the one grease fitting.
8. Total amount of grease to be applied is approximately 5 to 6 strokes by grease lubricator.



M18C-01-001

MAINTENANCE

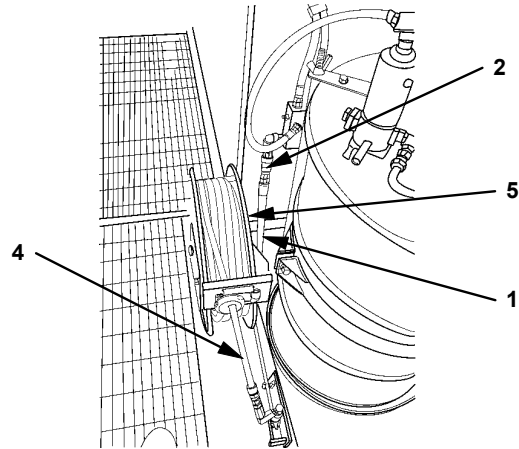
OPERATING THE LUBRICATOR

The machine is equipped with hose reel and the lubricator, including the grease pump. This device is used for adding grease to the grouped fittings on the main frame and front attachment.

Greasing

IMPORTANT: Run the engine at medium or higher speed whenever the lubricator is used.

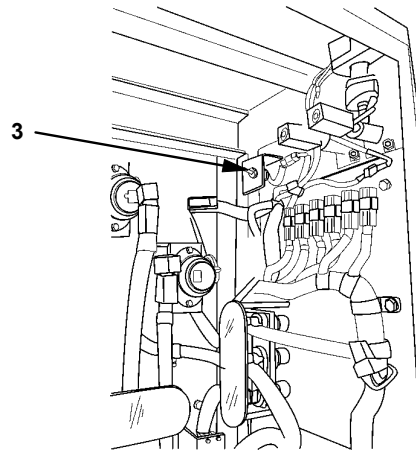
1. Connect hose (1) to coupler (2).
2. Move auto-lubrication toggle switch (3) located inside battery compartment to the MANUAL position.
3. Hold high-pressure grease gun (4) attached to the hose end and pull out the hose from reel (5).
4. Stop pulling hose at any desired position; reel (5) clicks and automatically locks the hose.
5. Insert the end of grease gun (4) in the desired fitting and pull gun lever; automatically adds grease to the fitting.



M141-07-017

Storing Grease Hose After Finishing Greasing

1. Slightly pull out the hose; reel (5) unlocks, automatically winds, and stores the hose.
2. Move auto-lubrication toggle switch (3) located inside battery compartment to the AUTO LUB position.
3. Disconnect hose (1) at coupler (2).
4. Pull gun lever to release residual pressure; a small amount of residual grease will escape from grease gun (4).



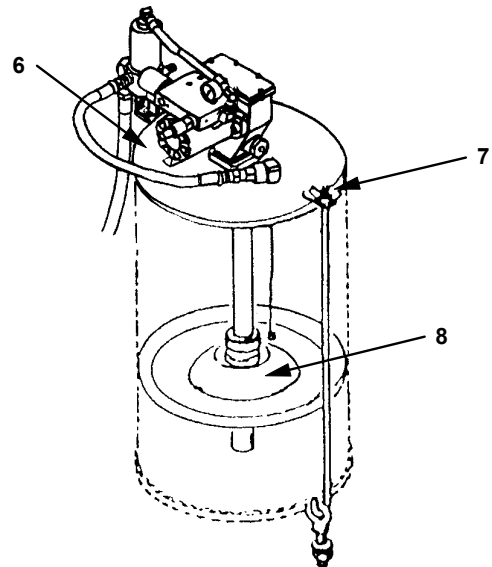
M18C-07-011

MAINTENANCE

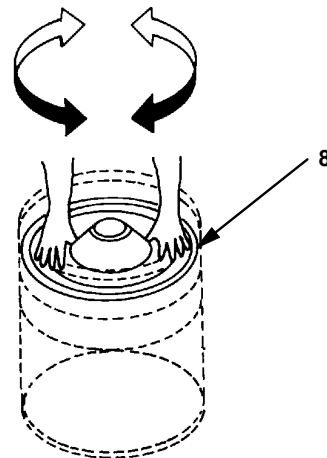
Replacing Grease

When the grease can is empty, replace it following the procedure shown below.

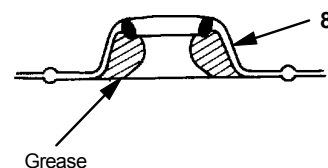
1. Remove wing nuts (7) to remove cover assembly (6) from the grease can.
2. Remove follower plate (8) from the grease can. Replace the grease can with a new one.
3. Install follower plate (8) into the grease can. While holding and rotating follower plate (8) level in both directions, push it downward so that an air pocket is not developed.
4. Install cover assembly (6) on the lubricator housing while aligning grease tube with the hole on the follower plate, in order not to push down the plate into grease when installing the cover. Tighten wing nuts (7).



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M113-07-025



M113-07-026

MAINTENANCE

B. ENGINE

Parts		Quantity	Interval (hours)							
			10	50	250	500	1000	1500	2000	4000 - 6000
1. Engine Oil	Check Oil Level	1								
2. Engine Oil	Change	172 L (45.4 US gal)								
3. Replace Engine Oil Main Filter		4								
4. Replace Engine Oil Bypass Filter		1								
5. Check Alternator Belt Tension		1		*						
6. Check Injection Nozzle		—							※	
7. Inspect Bolts and Nuts Outside Engine		—		*※					※	
8. Inspect and Adjust Valve Clearance		—							※	
9. Check Fuel Injection Timing		—							※	
10. Check Starter and Alternator		—								※
11. Check Turbocharger		—								※

 **NOTE:** * First time only.
 ※ See your authorized dealer.

Recommended Brands of Oils



CAUTION: Avoid mixing oils of different brands. In most cases, different brands are not compatible with each other and, when mixed, can seize parts such as piston rings, cylinders, etc., or abnormally wear moving parts. It is best to stick with one and the same brand of oil at successive service intervals.

Recommended brands of Class CD oils (API Service Classification) are shown in the chart below.

If any oil other than these recommended oils is used, the oil must be Class CD or CF (API Service Classification) and meet the MILL2104C specifications (US military specifications).

Recommended Brands of Oils (Reference)

Manufacturer	Brands
Nippon Mitsubishi Oil Co., Ltd.	Diamond HDS-3 Engine Oil Hi-Diesel S-3
Idemitsu Kosan	Apolloil Diesel Motive Custom
Japan Energy	JOMO Delstar DX
Cosmo Oil	Cosmo Diesel CD
Showa Shell Sekiyu	White Pallot Super S-3 Oil
Mobil Sekiyu	Mobil Delvac 1300
Esso Sekiyu	Exxon D-3
General Sekiyu	General Gemico Super S-3

 **NOTE:** The machine shipped from the factory is filled with Hi-Diesel S-3 15W-40

MAINTENANCE

Replenish Engine Oil



CAUTION:

- Shut down the engine when fueling. Do not smoke while fueling — or when handling fuel containers.
- Fuel leaked or spilled onto hot surfaces or electrical components can cause a fire.
- After fueling, secure filler cap.

Recommended Oil Viscosities

Two important considerations related to satisfactory engine operation under ambient temperature conditions — (1) the ability to crank the engine fast enough to assure starting, and (2) adequate lubrication of internal wearing surfaces during starting and warm-up.

Recommended oil viscosities are SAE15W-40 for all seasons, shown in the chart below:

Recommended Oil Viscosities

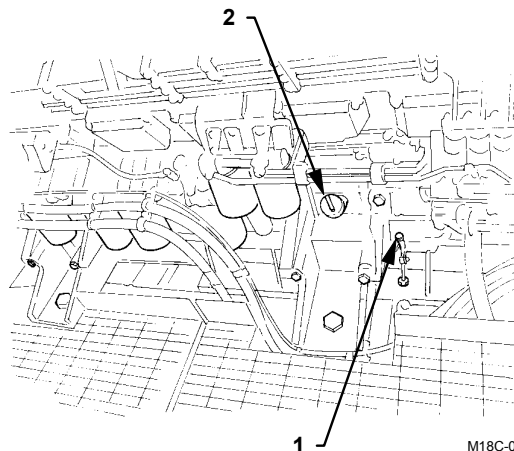
Starting temperature °C [°F]	[-22]	[-13]	[-4]	[5]	[14]	[23]	[32]	[41]	[50]	[59]	[68]	[77]	[86]	[95]	[104]	[113]	[122]
	-30	-25	-20	-15	-10	-5	0	5	10	15	20	25	30	35	40	45	50
Oil viscosities	SAE30																
	SAE40																
	SAE15W-40																
	SAE10W-30																
	SAE5W-20																

1

Engine Oil Level --- check daily

IMPORTANT: For most accurate readings, check the oil level every day before starting the machine. Be sure the machine is on a level surface.

1. Remove dipstick (1). Wipe oil off with a clean cloth. Reinsert dipstick (1).
2. Remove dipstick (1) again. Read level. Oil level must be between the circle marks.
3. If necessary, add oil via oil filler cap (2). Be sure to use only recommended oil (see Recommended Engine Oil Chart).



M18C-07-013



NOTE: Checking the oil level immediately after shut down will result in inaccurate readings. Be sure to allow the oil to settle for at least 10 minutes before checking.

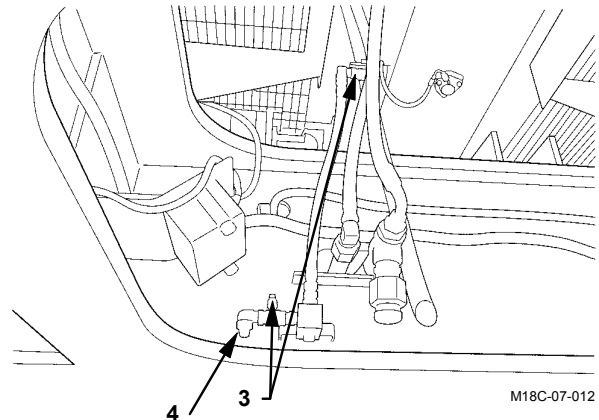
MAINTENANCE

2 Change Engine Oil --- every 500 hours

3 Replace Engine Oil Main and Bypass Filters

4 --- every 500 hours

1. Run the engine to warm oil.
DO NOT run the engine until oil is hot.
2. Park the machine on a level surface.
3. Lower the bucket to the ground.
4. Turn the auto-idle switch off.



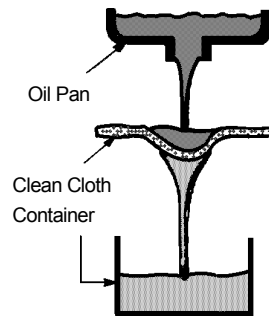
IMPORTANT: The turbocharger may be damaged if the engine is not properly shut down.

5. Run the engine at slow idle speed without load for five minutes.
6. Turn the key switch OFF. Remove the key from the key switch.
7. Pull the pilot control shut-off lever to the LOCK position.



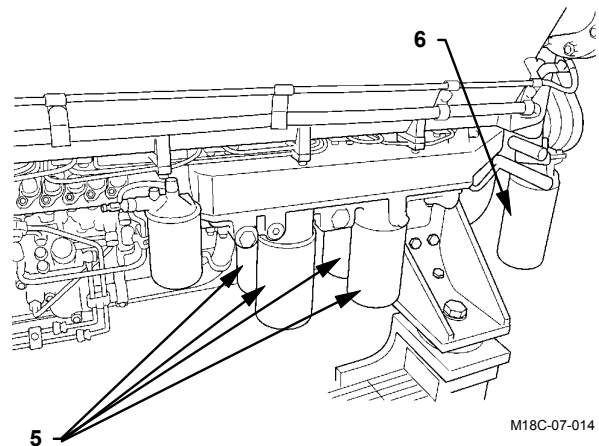
CAUTION: Engine oil may be hot. Use care to be sure you are not burned from hot oil.

8. Prepare a container of 200 L (52.8 US gal) or more capacity for the drain oil.
9. Remove drain plug (4) from the tee, located near the oil pan.
10. Loosen drain cock (3) to drain the engine oil.
11. Check if foreign material like metal particles are included in the drain oil by filtering it with a clean cloth.



IMPORTANT: Be sure to wipe off spilt oil on the fan belt when adding oil to prevent the fan belt from slipping and overheating.

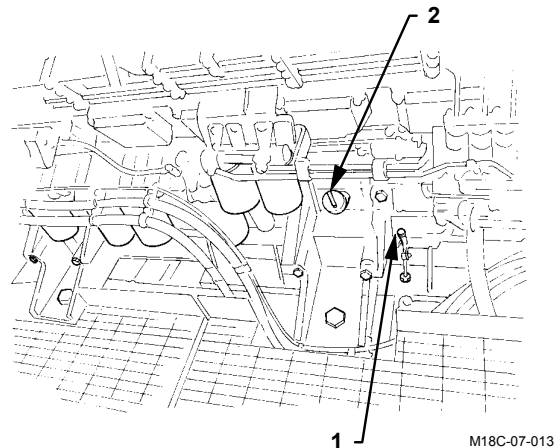
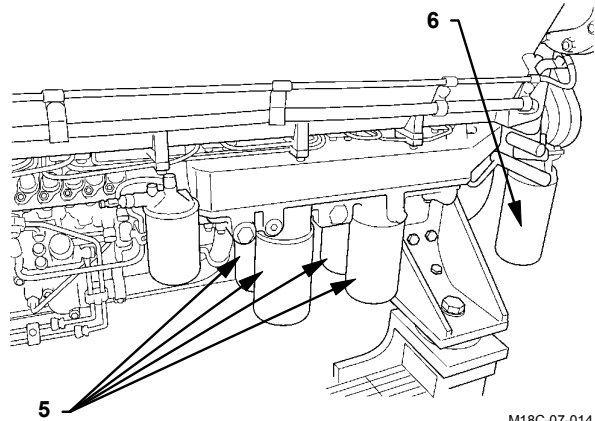
12. Tighten drain plug (4) and drain cock (3) securely.
13. Unscrew main filter cases (5) and elements; discard elements.
14. Unscrew bypass filter cases (6) and elements; discard elements.



MAINTENANCE

15. Fill the filters with lubricating oil to prevent crankshaft or bearing damage. Apply a light even coat of lubricating oil to the gasket sealing surface prior to installing the filters.
16. Position element to the filter head. Tighten by hand until the seal touches the filter head.
17. Tighten main filter cases (5) and bypass filter case (6) one-half to three-fourths turn more using filter wrench. Be careful not to over tighten.
18. Remove oil filler cap (2) and fill with 172 L (45.4 US gal) oil.
19. Confirm that the oil level is between the marks H and L on dipstick (1). Start the engine and run at slow idle speed for about 5 minutes. Stop the engine after confirming that engine oil pressure is rising. Ten to twenty minutes later, check oil level again and add oil if necessary.

 **NOTE:** Always allow oil to drain back to the oil pan before checking the level. This may require 15 minutes.



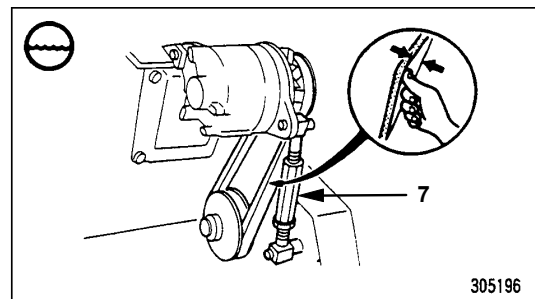
5

Check Alternator Belt Tension

--- every 250 hours

IMPORTANT: Loose alternator 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 pumps and bearings.

Check belt tension by depressing the midpoint of the belt with the thumb. Deflection must be 10 to 15 mm (0.39 to 0.59 in.) at a depressing force of approximately 98 to 147 N (10 to 15 kgf, 72 to 108 lbf). Adjust belt tension by turning buckle (7) if necessary.



M146-07-103

MAINTENANCE

6

Check Injection Nozzle
--- every 2 000 hours

See your authorized dealer.

7

Inspect Bolts and Nuts Outside Engine
--- every 2 000 hours (first time after 50 hours)

See your authorized dealer.

8

Inspect and Adjust Valve Clearance
--- every 2 000 hours

See your authorized dealer.

9

Check Fuel Injection Timing
--- every 2 000 hours

See your authorized dealer.

10

Check Starter and Alternator
--- every 4 000—6 000 hours

See your authorized dealer.

11

Check Turbocharger
--- every 4 000—6 000 hours

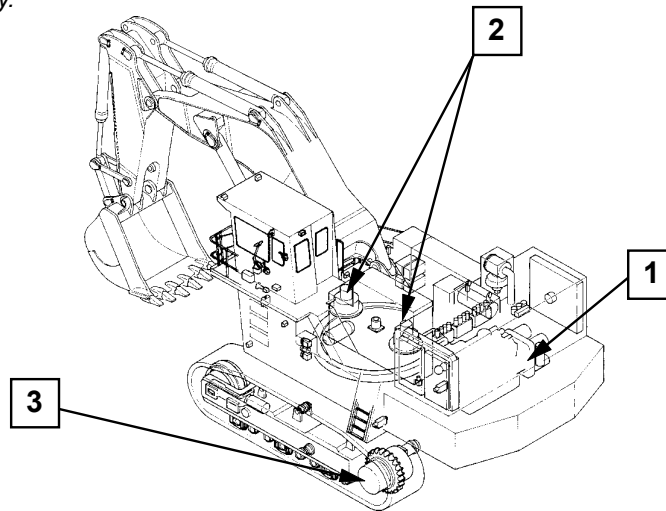
See your authorized dealer.

MAINTENANCE

C. TRANSMISSION

Parts			Quantity	Interval (hours)						
				10	50	250	500	1000	1500	2000
1. Pump Trans- mission Gear	Engine Oil	Check Oil Level	1	*						
		Change Oil	26 L (6.9 US gal)		*					
		Replace Filter	1							
		Clean Breather	1							
2. Swing Reduction Gear	Gear Oil	Check Oil Level	2	*						
		Change Oil	67 L (17.7 US gal)×2		*					
		Clean Breather	2							
3. Travel Reduction Gear	Gear Oil	Check Oil Level	2							
		Change Oil	70 L (18.5 US gal)×2				*			

 NOTE: * First time only.



M18C-01-039

Brand Names of Recommended Gear Oil

Kinds of Lubricants Where to be applied	Gear oil	
	Swing and Travel Reduction Gear	
Manufacturer	-20 to 50°C (-4 to 122°F)	
British Petroleum	BP Gear oil	SAE90EP
Caltex Oil	Universal Thuban	SAE90
Esso	Esso Gear Oil	GP80W-90 or GP85W-90
Idemitsu Kosan	Apolloil Gear	HE90
Mobil Oil	Mobilube	GX90
Nippon Oil	Gear Lube	SP90
Shell Oil	Shell Spirax	EP90
Remarks	API GL 4 Class	

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

Brand Names of Recommended Engine Oil

Kind of Oil Application	Engine Oil		
	Pump Transmission Gear and Oil Cooler Fan Drive		
Manufacturer	Air Temp.		
	-20 to 0°C (-4 to 32°F)	-10 to 35°C (14 to 95°F)	25 to 50°C (77 to 122°F)
British Petroleum	BP Vanellus C3		
	10W	30	40
Caltex Oil	RPM DELO 300 Oil		
	10W	30	40
Esso	Essolube D-3		
	10W	30	40
Idemitsu Kosan	Apoll oil diesel motive S-3		
	10	30	40
Mobil Oil	Mobil Delvac		
	1310	1330	1340
Nippon Oil	Hidiesel S3		
	10W	30	40
Shell Oil	Shell Rymia D		
	10W	30	40

 NOTE: Recommended Oil Viscosity Grade
Pump Transmission Oil: Straight 30 oils

MAINTENANCE

1

Pump Transmission

**Check Oil Level --- every 50 hours
(first time after 10 hours)**

1. Park the machine on a level surface.
2. Lower the bucket to the ground.
3. Turn the auto-idle switch off.

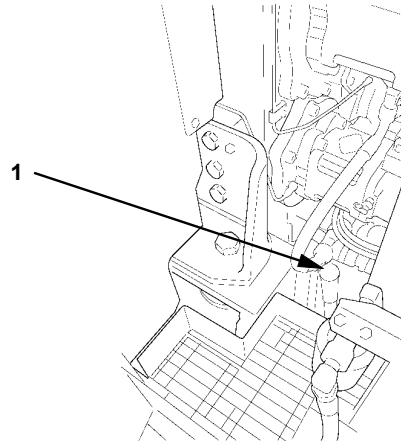
IMPORTANT: The turbocharger may be damaged if the engine is not properly shut down.

4. Run the engine at slow idle speed without load for five minutes.
5. Stop the engine. Remove the key from the key switch.
6. Pull the pilot control shut-off lever to the LOCK position.

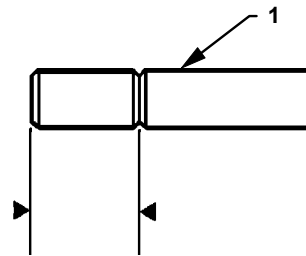


CAUTION: Oil may be hot. Wait for oil to cool before starting work.

7. Remove dipstick (1). Oil must be between the top and notch on the dipstick.
8. If necessary, remove dipstick (1) and add oil. (See oil chart)
9. Recheck oil level.



M18C-07-015



M114-07-181

MAINTENANCE

Change Oil --- every 500 hours (first time after 50 hours)

1. Park the machine on a level surface.
2. Lower the bucket to the ground.
3. Turn the auto-idle switch off.

IMPORTANT: The turbocharger may be damaged if the engine is not properly shut down.

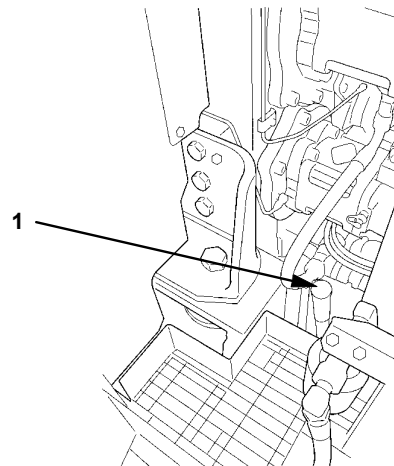
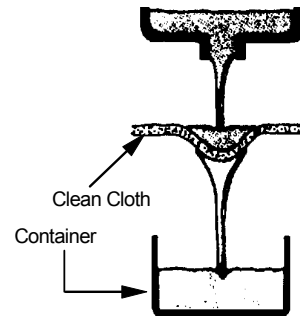
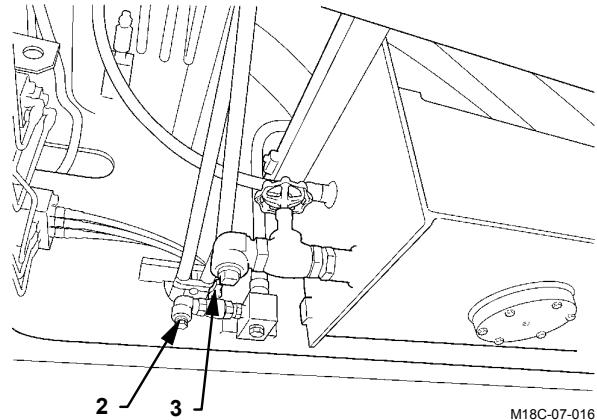
4. Run the engine at slow idle speed without load for five minutes.
5. Stop the engine. Remove the key from the key switch.

6. Pull the pilot control shut-off lever to the LOCK position.



CAUTION: Oil may be hot. Wait for oil to cool before starting work.

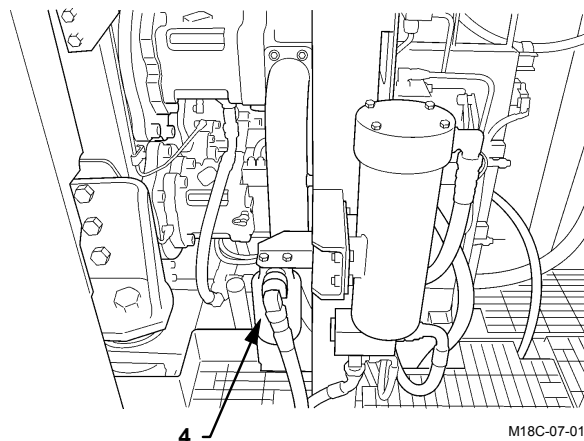
7. Prepare a container of 30 liter (7.9 US gal) or more capacity for the drain oil.
8. Remove drain plug (2) on the pump transmission housing, and loosen cock (3) to drain the oil.
9. Check if foreign material like metal particles are included in the drain oil by filtering it with a clean cloth.
10. Tighten drain plug (2) and cock (3) securely. Fill the pump transmission housing with 26 liters (6.9 US gal) oil.
11. Confirm that the oil level is between the top and notch on dipstick (1).



MAINTENANCE

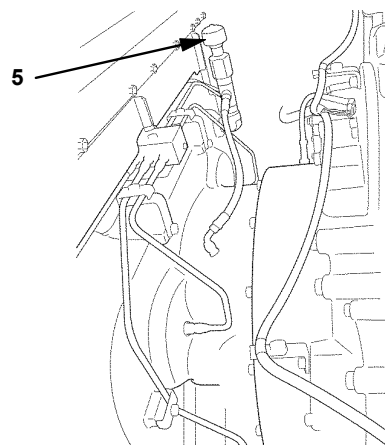
Replace Filter --- every 500 hours

1. Unscrew cartridge filter (4) from the filter head, discard the cartridge filter.
2. Fill the filter with oil. Apply a light even coat of lubricating oil to the gasket sealing surface prior to installing the cartridge filter.
3. Position cartridge filter (4) to the filter head. Tighten by hand until the seal touches the filter head, tighten an additional three-fourths turn.



Clean Breather --- every 500 hours

Remove breather cap (5) and clean the element.



M18C-07-018

MAINTENANCE

2

Swing Reduction Gear

**Check Oil Level --- every 50 hours
(first time after 10 hours)**

1. Park the machine on a level surface.
2. Lower the bucket to the ground.
3. Turn the auto-idle switch off.

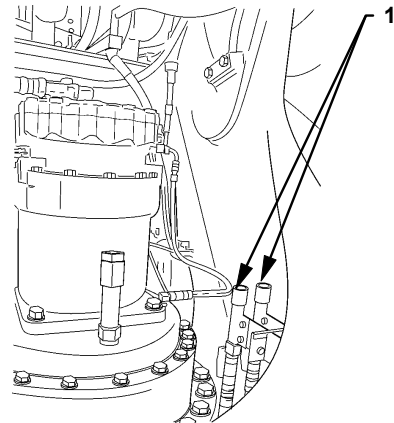
IMPORTANT: The turbocharger may be damaged if the engine is not properly shut down.

4. Run the engine at slow idle speed without load for five minutes.
5. Stop the engine. Remove the key from the key switch.
6. Pull the pilot control shut-off lever to the LOCK position.

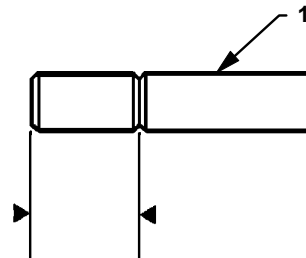


CAUTION: Gear oil may be hot. Wait for gear oil to cool before starting work.

7. Remove dipsticks (1). Oil must be between marks.
8. If necessary, add oil. (See oil chart)
9. Recheck oil level.
10. Install dipsticks (1).



M18C-07-019



M114-07-181

MAINTENANCE

Change Gear Oil --- every 1000 hours (first time after 50 hours)

1. Park the machine on a level surface.
2. Lower the bucket to the ground.
3. Turn the auto-idle switch off.

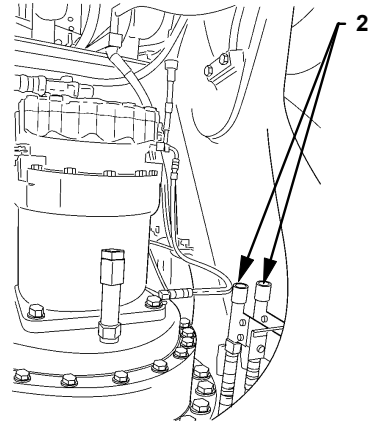
IMPORTANT: The turbocharger may be damaged if the engine is not properly shut down.

4. Run the engine at slow idle speed without load for five minutes.
5. Stop the engine. Remove the key from the key switch.
6. Pull the pilot control shut-off lever to the LOCK position.

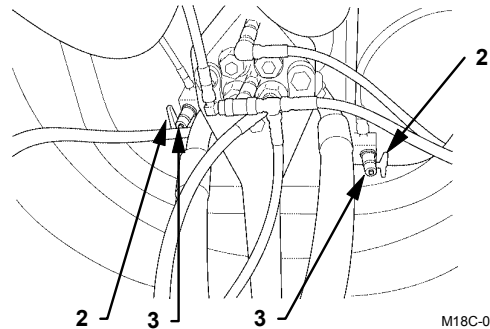


CAUTION: Gear oil may be hot. Wait for gear oil to cool before starting work.

7. Remove drain plug (3) and loosen drain cock (2) to drain oil.
8. Tighten drain cock (2) and drain plug (3).
9. Remove plug (4) and add oil until it is between marks on dipstick (1).



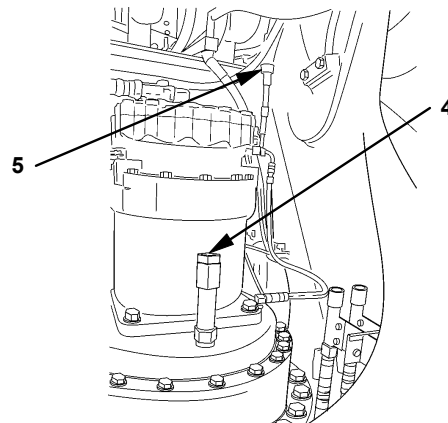
M18C-07-019



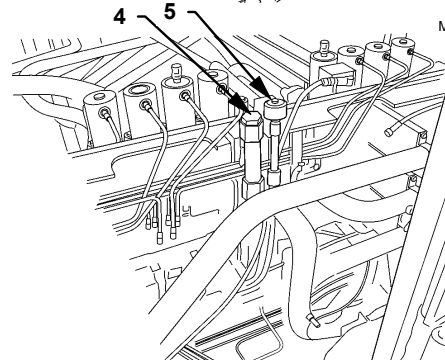
M18C-07-020

Clean Breather --- every 1000 hours

1. Remove cap (5) and clean the element.



M18C-07-019



M18C-07-077

MAINTENANCE

3

Travel Reduction Gear

Check Oil Level --- every 250 hours

1. Park the machine on a level surface.
2. Lower the bucket to the ground.
3. Turn the auto-idle switch off.

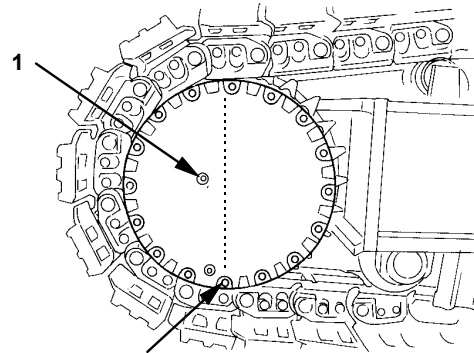
IMPORTANT: The turbocharger may be damaged if the engine is not properly shut down.

4. Run the engine at slow idle speed without load for five minutes.
5. Stop the engine. Remove the key from the key switch.
6. Pull the pilot control shut-off lever to the LOCK position.



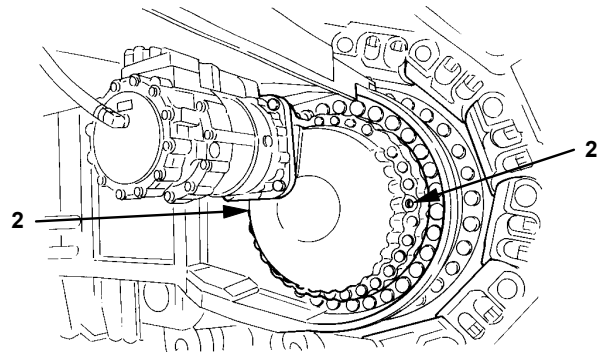
CAUTION: Keep body and face away from oil level check plug (air release plug) (1). Gear oil is hot. Wait for gear oil to cool and then gradually loosen oil level check plug (air release plug) (1) to release pressure.

7. After gear oil has cooled, slowly loosen oil level check plug (air release plug) (1) to release pressure.
8. Remove oil level check plug (1). Oil must be up to the bottom of hole.
9. If necessary, after oil supply plugs (2) have been removed, add oil until oil flows out of the oil level check plug hole. (See gear oil chart).
10. Wrap oil level check plug (1) threads with sealing-type tape. Install oil level check plug (1). Tighten the plug to 196 N·m (20 kgf·m, 145 lbf·ft).
11. Wrap oil supply plug (2) threads with sealing-type tape. Install oil supply plug (2). Tighten oil supply plug (2) to 69 N·m (7 kgf·m, 51 lbf·ft).
12. Check the gear oil level in the other travel reduction gear.



Park the machine so that this bolt is just at the bottom position.

M144-07-017



M144-12-002

MAINTENANCE

Change Gear Oil --- every 2000 hours (first time after 500 hours)

1. Park the machine on a level surface.
2. Lower the bucket to the ground.
3. Turn the auto-idle switch off.

IMPORTANT: The turbocharger may be damaged if the engine is not properly shut down.

4. Run the engine at slow idle speed without load for five minutes.
5. Stop the engine. Remove the key from the key switch.
6. Pull the pilot control shut-off lever to the LOCK position.

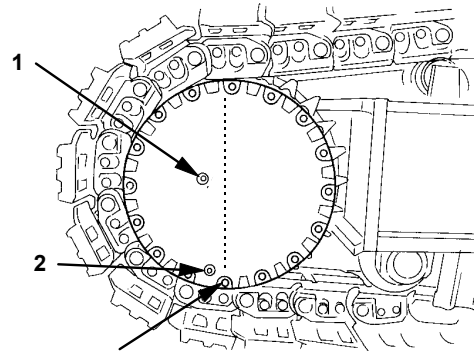


CAUTION: Keep body and face away from oil level check plug (air release plug) (1). Gear oil is hot. Wait for gear oil to cool and then gradually loosen oil level check plug (air release plug) (1) to release pressure.

7. After gear oil has cooled, slowly loosen oil level check plug (air release plug) (1) to release pressure.
8. Remove drain plugs (2) to drain oil.
9. Wrap the threads of drain plug (2) with sealing-type tape. Install drain plug (2). Tighten the plug to 69 N·m (7 kgf·m, 51 lbf·ft).
10. Remove oil level check plug (1).
11. After oil supply plug (3) has removed, add oil until oil flows out of the oil level check plug hole. (See gear oil chart)
12. Wrap the threads of oil level check plug (1) with sealing-type tape. Reinstall oil level check plug (1) and tighten it to 195 N·m (20 kgf·m, 145 lbf·ft).
13. Wrap the threads of oil supply plug (3) with sealing-type tape. Reinstall oil supply plug (3) and tighten it to 69 N·m (7kgf·m, 51 lbf·ft).
14. Repeat steps 7 to 13 for the other travel reduction gear.

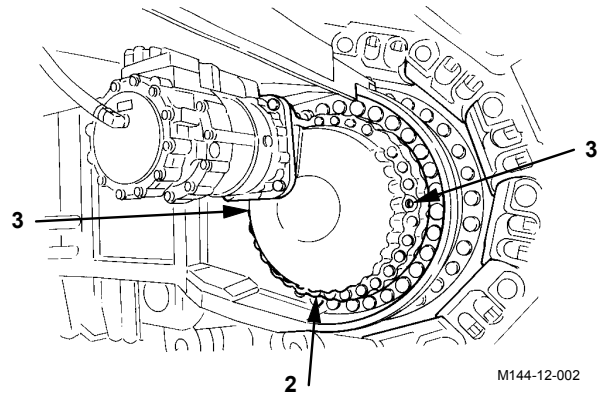


NOTE: Be sure to refill gear oil through both oil supply plugs (1 and 3).



Park the machine so that this bolt is just at the bottom position.

M144-07-017



M144-12-002

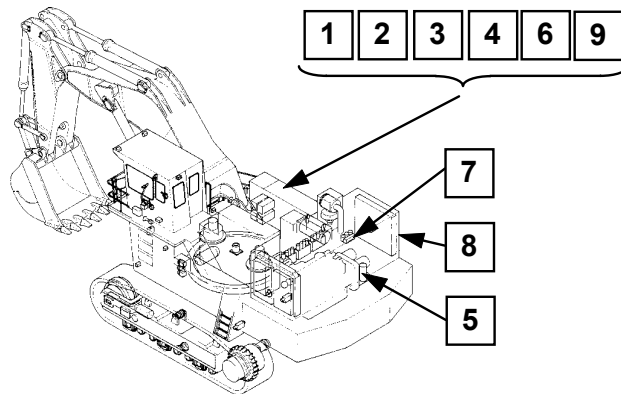
MAINTENANCE

D. HYDRAULIC SYSTEM

Parts	Quantity	Interval (hours)							
		10	50	250	500	2000	2500	4000	12000
1. Check Hydraulic Oil Level	1	*							
2. Drain Hydraulic Oil Tank Sump	1								
3. Change Hydraulic Oil	2200 L (580 US gal)					★	★	★	
4. Replace Full-Flow Filter and Drain Filter	4		*						
5. Replace Pilot Oil Filter	1		*						
6. Suction Filter	Clean Filter	When changing hydraulic oil							
	Replace Filter								
7. Replace High-Pressure Strainer	3								
8. Clean Oil Cooler Core	1								
9.	Check Hoses and Lines (for leak, loose)								
	Check Hoses and Lines (for crack, bend, etc.)								

 **NOTE:** ★ Hydraulic oil changing interval differs according to the kind of hydraulic oil used. See recommended oil chart.

* First time only.



M18C-01-039

Brand Names of Recommended Hydraulic Oil

Kind of Lubricant	Hydraulic Oil					
Where to be applied	Hydraulic System					
Change Interval	4000 hours		2500 hours		2000 hours	
Environmental Temp.	-20 to 50°C (-4 to 122°F)	-10 to 50°C (14 to 122°F)	-20 to 50°C (-4 to 122°F)	-10 to 50°C (14 to 122°F)	-20 to 50°C (-4 to 122°F)	-10 to 50°C (14 to 122°F)
Manufacturer						
Hitachi	Super EX 46HN					
Idemitsu Kosan			Super Hydro 46 WRHU			
British Petroleum					Bartran HV46	
Caltex Oil						Rando Oil HD46
Texaco INC.						Rando Oil HD46
Chevron U.S.A INC.						Chevron AW46
Esso						NU TO H46
Mobil Oil						DTE 25
Shell Oil				Tellus Oil S46		Tellus Oil 46
Remarks	Anti-wear type hydraulic oil					

 **NOTE:** Use proper hydraulic oil in accordance with the atmospheric temperature.
The machine shipped from the factory is filled with oil marked .

MAINTENANCE

INSPECTION AND MAINTENANCE OF HYDRAULIC EQUIPMENT



CAUTION: During operation the parts of the hydraulic system become very hot. Allow the machine to cool down before beginning inspection or maintenance.

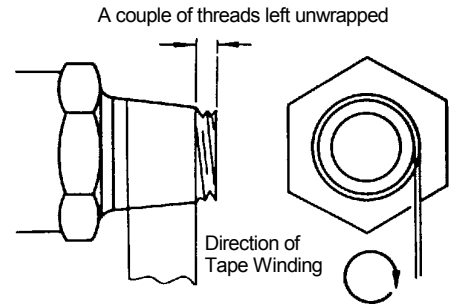
1. Be sure that the machine is parked on a level, firm surface before servicing hydraulic equipment.
2. Lower the bucket to the ground and stop the engine.
3. Begin servicing hydraulic equipment only after components, hydraulic oil and lubricant are completely cooled, as they will remain hot and pressurized soon after operation. While servicing heated and pressurized hydraulic equipment, hot parts or oil may fly off or escape suddenly with a potential of serious injury. Keep body parts and face away from plugs or screws when removing them as they may be pressurized even when cooled.
4. Before servicing hydraulic equipment, bleed air from the hydraulic oil tank to release internal pressure.
5. Even after bleeding the air from the hydraulic oil tank, pressure remains in the various circuits of the hydraulic system. Be sure to operate each control lever a few times to release residual pressure from the system.
6. Avoid inspecting and servicing the travel and swing motor circuits on slopes, as they are pressurized by gravity even after bleeding the hydraulic oil tank.

MAINTENANCE

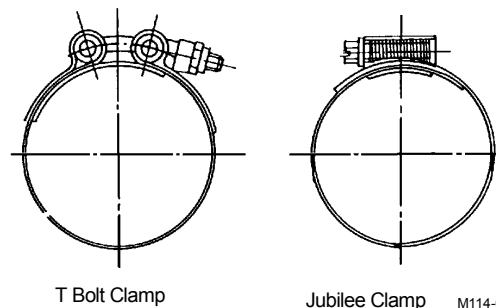
7. When connecting hydraulic hoses and pipes, take special care to keep seal surfaces free from dirt and to avoid damaging them. Keep these precautions in mind:
 - a. Wash hoses, pipes, and the tank interior with a washing liquid and thoroughly wipe it out before reconnecting them.
 - b. Only use O-rings that are free of damage or defects. Be careful not to damage them during reassembly.
 - c. Do not allow high pressure hoses to twist when connecting them. The life of twisted hoses will be shortened considerably.
 - d. When connecting screw type joints, apply seal tape to the threads of male screw. Be sure to leave a couple of threads at the male screw top unwrapped, as shown. Do not overwrap. Apply seal tape around threads as shown, so that the tape does not loosen when the female screw is tightened.
 - e. Carefully tighten low pressure hose clamps to following torque specifications. Do not overtighten.

T Bolt Clamp:
4.4 N·m (0.45 kgf·m, 3.3 lbf·ft)

Jubilee Clamp:
5.9 to 6.9 N·m
(0.6 to 0.7 kgf·m, 4.3 to 5.1 lbf·ft)
 - f. Carefully tighten nut for bandy pipe to following torque specifications on the right side. Do not overtighten.



M114-07-041

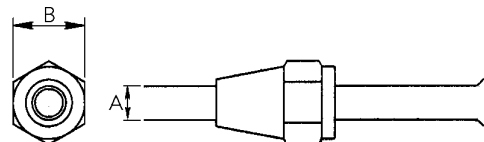


M114-07-042

M114-07-043

Pipe Dia. (A)		φ8	φ10
Width across flat (B) (mm)		17	19
Fastening Torque	N·m	34	40
	kgf·m	3.5	5
	lbf·ft	25.5	36

8. When adding hydraulic oil, always use the same brand of oil; do not mix brands of oil. As the machine is filled with Super EX 46HN when it is shipped from the factory, use it as a general rule. When selecting to use another brand of oil listed in the table "Brand Names of Recommended Hydraulic Oil", be sure to completely replace the oil in the system.
9. Do not use hydraulic oils other than those listed in the table "Brand Names of Recommended Hydraulic Oil".
10. Only 50 to 60% of the total hydraulic circuit oil on a large size excavator can be replaced at a time. Accordingly, conduct minimum flushing twice.
11. If any other hydraulic oil (having a different replacement interval) is unavoidably used, replace the oil in accordance with the individual replacement interval standard.
12. In case the machine is used for dredging operations, replace the hydraulic oil at a 2000 hour interval regardless of the oil brand used.
13. Never run the engine without oil in the hy-draulic oil tank.



M117-07-149

MAINTENANCE

1

Check Hydraulic Oil Level --- daily

IMPORTANT: Never run the engine without oil in hydraulic oil tank.

1. Park the machine on a level surface.
2. Position the machine with the front attachment positioned as illustrated on the right.
3. Lower the bucket to the ground.
4. Turn the auto-idle switch off.

IMPORTANT: The turbocharger may be damaged if the engine is not properly shut down.

5. Run the engine at slow idle speed without load for five minutes.
6. Turn the key switch OFF. Remove the key from the key switch.
7. Pull the pilot control shut-off lever to the LOCK position.
8. Check oil level gauge (1) on hydraulic oil tank. Oil must be between marks on the gauge. If necessary, add oil.



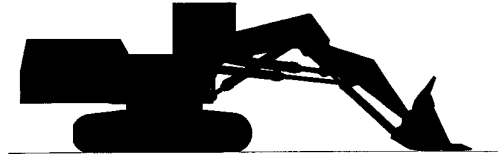
CAUTION: Keep body and face away from cap (2). Turn cap (2) slowly and remove the cap only after releasing the internal pressure completely.

To add oil:

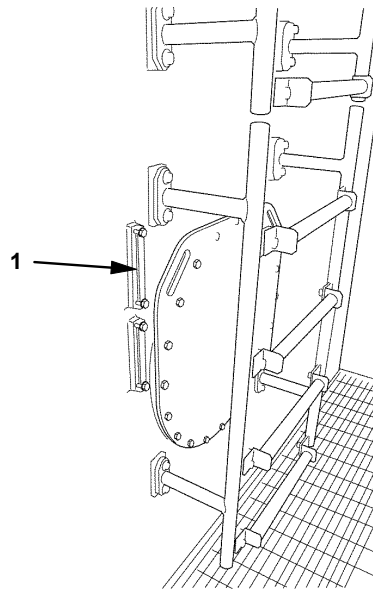
9. Insert the wrench as shown and turn the wrench clockwise and hold the wrench.
10. Turn cap (2) counterclockwise about 30°, at which point stop cap (2) to release the air.
11. Turn cap (2) further and remove cap (2).
12. Add oil. Recheck oil level gauge (1).
13. Align the projected part of cap (2) with the projected part of the case and install cap (2).



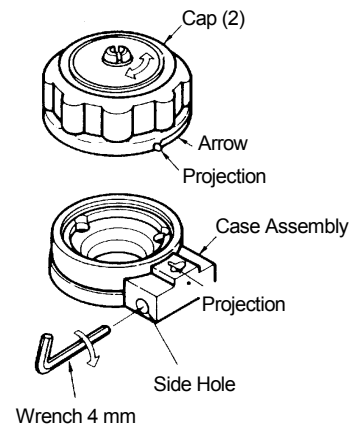
M142-07-093



M117-07-127



M18C-07-022



M110-07-022

MAINTENANCE

2

Drain Hydraulic Oil Tank Sump --- every 250 hours

IMPORTANT: Never run the engine without oil in hydraulic oil tank.

1. Park the machine on a level surface with the upper-structure rotated 90° for easier access.
2. Lower the bucket to the ground.
3. Turn the auto-idle switch off.

IMPORTANT: The turbocharger may be damaged if the engine is not properly shut down.

4. Run the engine at slow idle speed without load for five minutes.
5. Turn the key switch OFF. Remove the key from the key switch.
6. Pull the pilot control shut-off lever to the LOCK position.



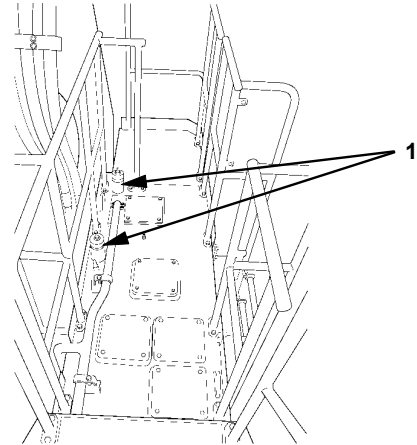
CAUTION: Keep body and face away from cap (1). Turn cap (1) slowly and remove the cap only after releasing the internal pressure completely.

7. Insert the wrench as shown and turn the wrench clockwise and hold the wrench.
8. Turn cap (1) counterclockwise about 30°, at which point stop cap (1) to release the air.
9. Turn cap (1) further and remove cap (1).
10. Align the projected part of cap (1) with the projected part of the case and install cap (1).

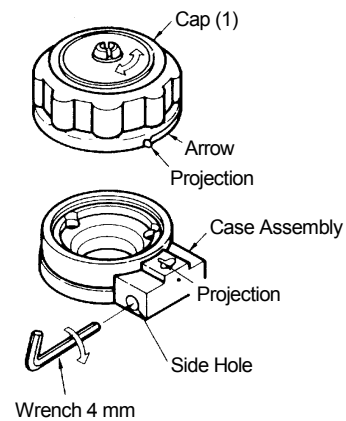


CAUTION: Do not loosen the drain cock until oil is cool. Hydraulic oil may be hot, potentially causing serious injury.

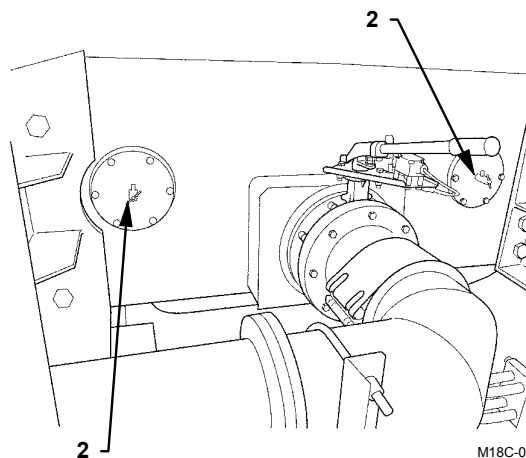
11. After oil is cool, open drain cock (2) to drain water and sediment.
12. After draining water and sediment, tighten drain cock (2) securely.



M18C-07-023



M110-07-022



M18C-07-024

MAINTENANCE

3

Change Hydraulic Oil

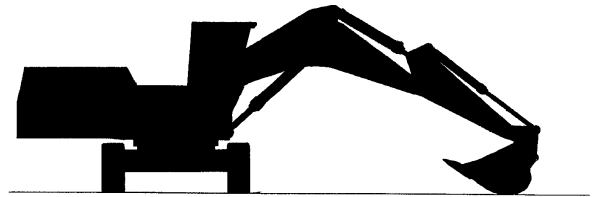
--- every 4000 hours, 2500 hours
or 2000 hours

IMPORTANT: Hydraulic oil changing intervals differ according to kind of hydraulic oils used. (See Recommended Oil Chart in this group)

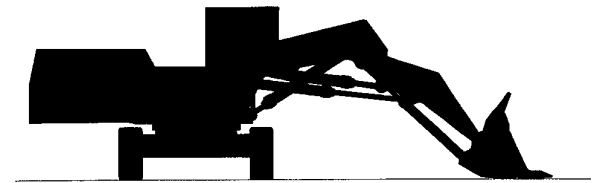


CAUTION: Hydraulic oil may be hot. Wait for oil to cool before starting work.

1. Park the machine on a level surface with the upper-structure rotated 90° for easier access.
2. Position the machine with the arm cylinder fully retracted and the bucket cylinder fully extended.
3. Lower the bucket to the ground as illustrated.
4. Turn the auto-idle switch off.



M142-07-092



M117-07-126

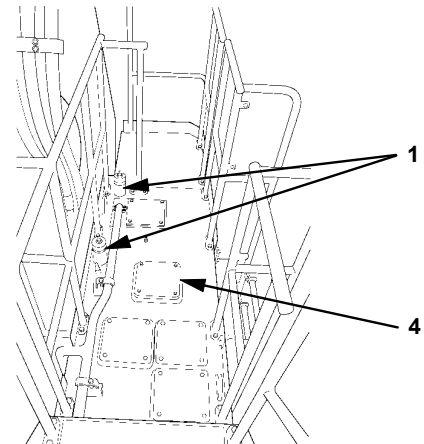
IMPORTANT: The turbocharger may be damaged if the engine is not properly shut down.

5. Run the engine at slow idle speed without load for five minutes.
6. Stop the engine. Remove the key from the key switch.
7. Pull the pilot control shut-off lever to the LOCK position.
8. Clean the top of the hydraulic oil tank to keep dirt out of the hydraulic system.

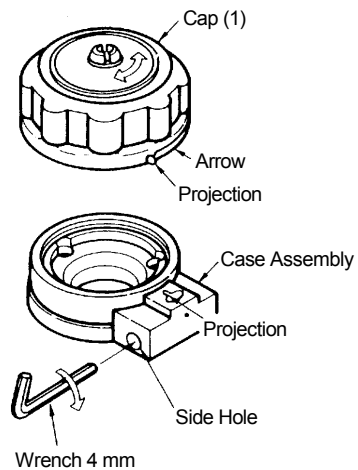


CAUTION: Keep body and face away from cap (1). Turn cap (1) slowly and remove the cap only after releasing the internal pressure completely.

9. Insert the wrench as shown and turn the wrench clockwise and hold the wrench.
10. Turn cap (1) counterclockwise about 30°, at which point stop cap (1) to release the air.
11. Turn cap (1) further and remove cap (1).
12. Align the projected part of cap (1) with the projected part of the case and install cap (1).
13. Remove cover (4).
14. Drain oil using a suction pump.
The hydraulic oil tank capacity, up to specified oil level, is approximately 2200 liters (580 US gal).



M18C-07-023

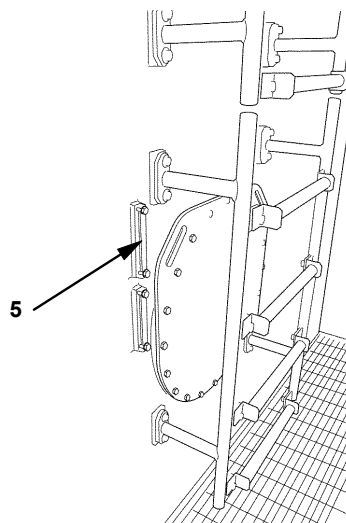
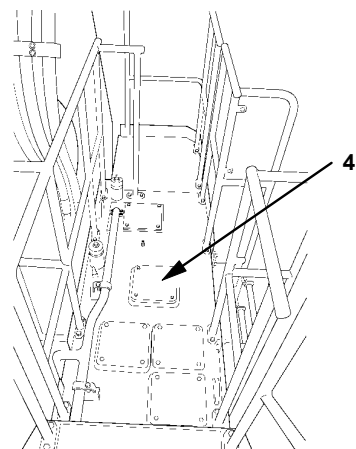
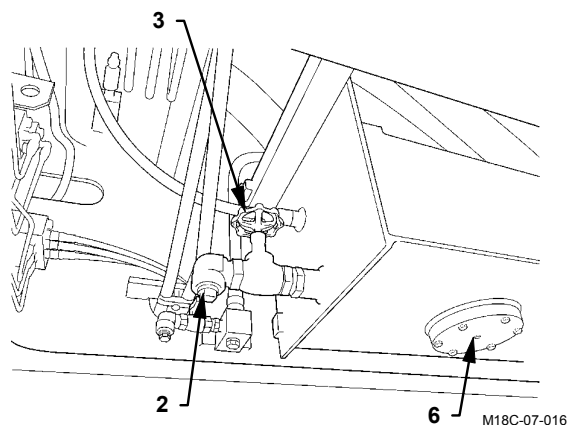


M110-07-022

MAINTENANCE

15. Remove drain plug (2) and loosen drain valve (3).
Allow oil to drain.
16. Remove drain plug (6) to drain water and sediment completely.
17. Tighten drain plug (6).
18. Tighten drain valve (3).
19. Clean, install and tighten drain plug (2).
20. Add oil via cover (4) hole until it is between the marks on sight gauge (5) of hydraulic oil tank.
21. Install cover (4).
Tighten the bolts to 50 N·m (5 kgf·m, 49 lbf·ft)

IMPORTANT: Never run the engine without oil in hydraulic oil tank.



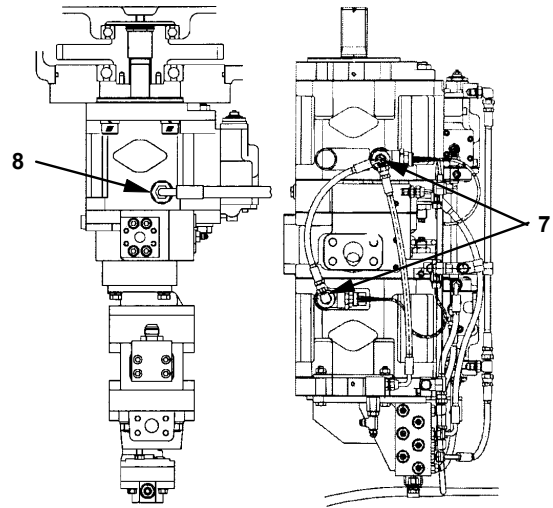
MAINTENANCE

Air Bleeding Procedures

Bleeding Air from Pump

IMPORTANT: If the hydraulic pump is not filled with oil, it will be damaged when the engine is started.

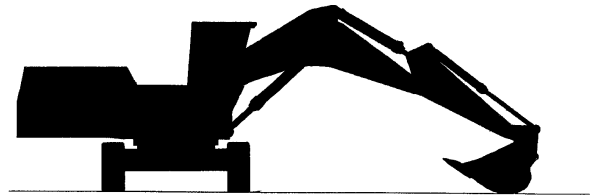
1. Loosen hoses (7) and (8) on the pump to release trapped air. Retighten hoses (7) and (8) after oil flows from the pump.



M18C-07-064

Bleeding Air from Hydraulic Circuit

2. Refill hydraulic oil.
3. Start the engine and run at slow idle.
4. Purge air from the hydraulic circuit while operating each cylinder and swing motor slowly for approx. 15 minutes.
5. Position the front attachment as illustrated in the oil level checking posture.
6. Check the hydraulic oil tank gauge. Add oil if necessary.



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MAINTENANCE

4

Replace Full-Flow Filter and Drain Filter --- every 500 hours (first time after 50 hours)

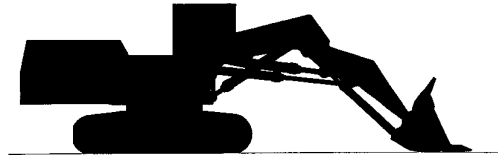
1. Park the machine on a level surface.
2. Lower the bucket to the ground as illustrated.
3. Turn the auto-idle switch off.



M142-07-093

IMPORTANT: The turbocharger may be damaged if the engine is not properly shut down.

4. Run the engine at slow idle speed without load for five minutes.
5. Stop the engine. Remove the key from the key switch.
6. Pull the pilot control shut-off lever to the LOCK position.

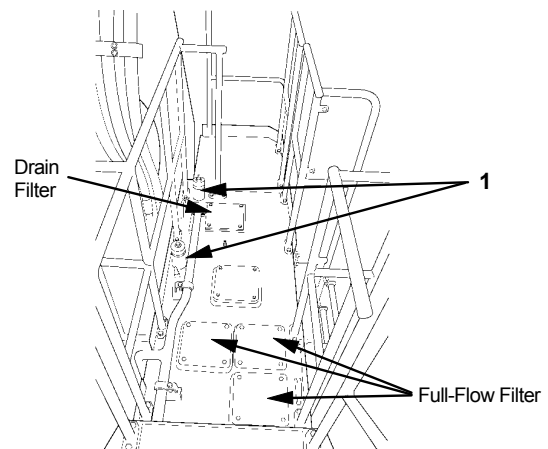


M117-07-127

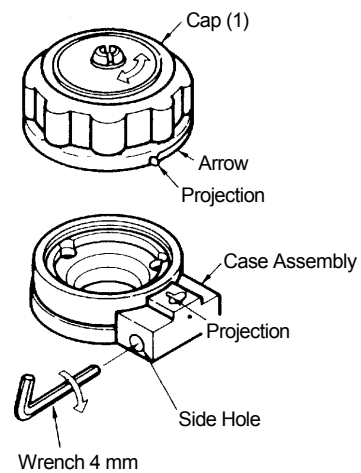


CAUTION: Keep body and face away from cap (1). Turn cap (1) slowly and remove the cap only after releasing the internal pressure completely.

7. Insert the wrench as shown and turn the wrench clockwise and hold the wrench.
8. Turn cap (1) counterclockwise about 30°, at which point stop cap (1) to release the air.
9. Turn cap (1) further and remove cap (1).
10. Align the projected part of cap (1) with the projected part of the case and install cap (1).



M18C-07-023

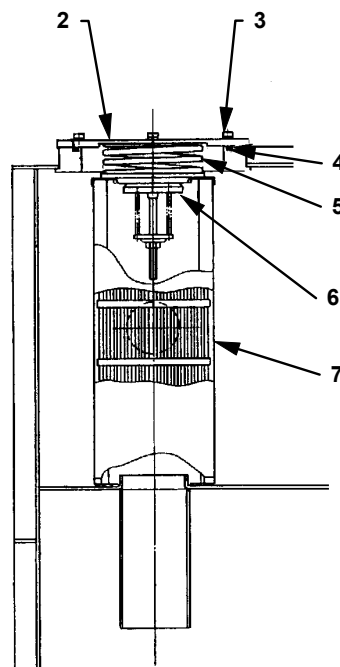


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MAINTENANCE

 **NOTE:** *There is spring tension under the cover. Hold down the cover when removing last two bolts.*

11. Hold down filter cover (2) against light spring load when removing the last two bolts. Remove filter cover (2).
12. Remove spring (5), valve (6), and element (7).
13. Discard element (7) and O-ring (4).
14. Install a new element (7), valve (6) and spring (5).
15. Install filter cover (2) with a new O-ring (4).
16. Install and tighten bolts (3) to 49 N·m (5 kgf·m, 36 lbf·ft).
17. Repeat steps 11 to 16 for the other filter.



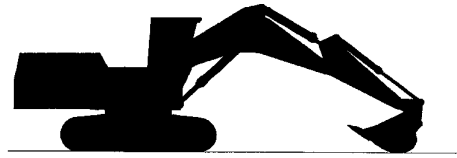
M18C-07-046

MAINTENANCE

5

Replace Pilot Oil Filter --- every 500 hours (first time after 50 hours)

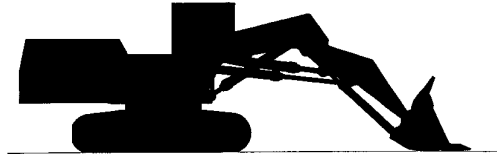
1. Park the machine on a level surface.
2. Lower the bucket to the ground as illustrated.
3. Turn the auto-idle switch off.



M142-07-093

IMPORTANT: The turbocharger may be damaged if the engine is not properly shut down.

4. Run the engine at slow idle speed without load for five minutes.
5. Stop the engine. Remove the key from the key switch.
6. Operate the right and left control levers to release pressure from the pilot accumulator.
7. Pull the pilot control shut-off lever to the LOCK position.

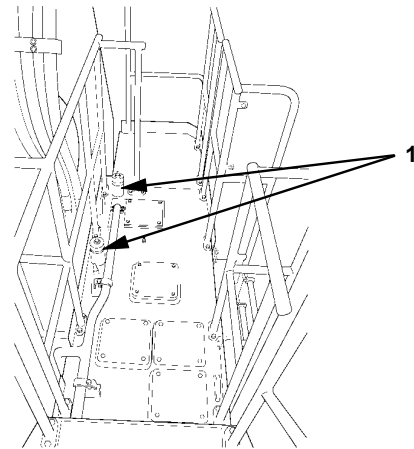


M117-07-127

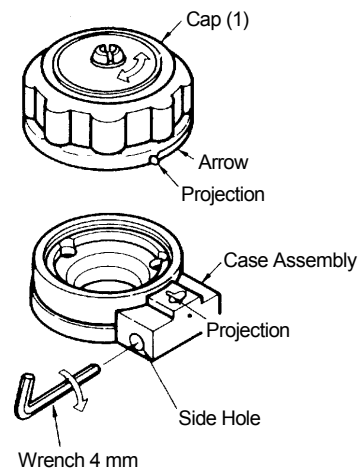


CAUTION: Keep body and face away from cap (1). Turn cap (1) slowly and remove the cap only after releasing the internal pressure completely.

8. Insert the wrench as shown and turn the wrench clockwise and hold the wrench.
9. Turn cap (1) counterclockwise about 30°, at which point stop cap (1) to release the air.
10. Turn cap (1) further and remove cap (1).
11. Align the projected part of cap (1) with the projected part of the case and install cap (1).



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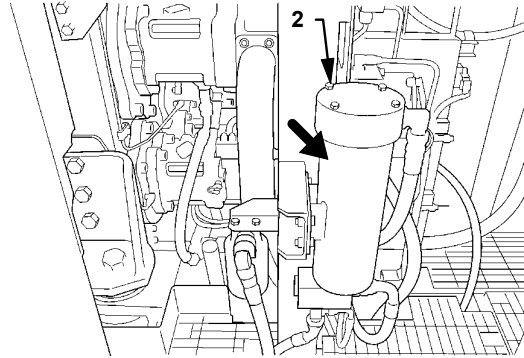
MAINTENANCE

12. Remove bolts (2). Hold down filter cover (4) when removing last two bolts.

 **NOTE:** *There is spring tension under filter cover (4). Hold down filter cover (4) when removing last two bolts (2).*

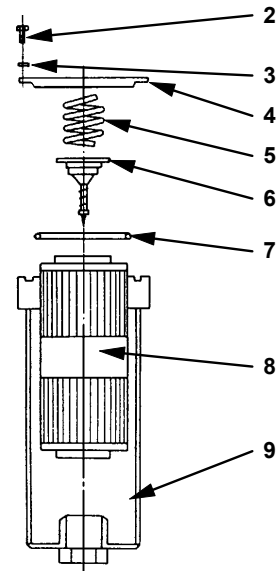
13. Remove spring (5), valve (6), O-ring (7) and filter element (8) from filter housing (9).

 **NOTE:** *Remove element and inspect for materials on element and in bottom of filter housing. Excessive amounts of foreign materials can indicate abnormalities in the system.*



M18C-07-017

14. Inspect filter element (8) and filter housing (9) for foreign materials.
15. Install new filter element (8), valve (6), and spring (5) into filter housing (9).
16. Install washer (3), cover (4) and new O-ring (7).
17. Tighten bolts (2) to 88 N·m (9 kgf·m, 65 lbf·ft).



M114-07-053

MAINTENANCE

6

Suction Filter

Cleaning Suction Filter

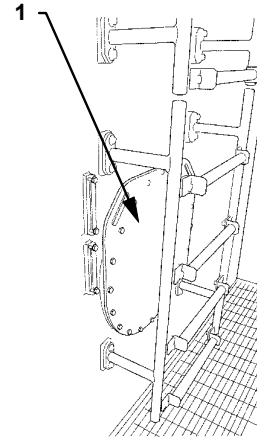
--- when replacing hydraulic oil

Six unit suction filters are provided in the hydraulic oil tank. Clean them when replacing hydraulic oil.

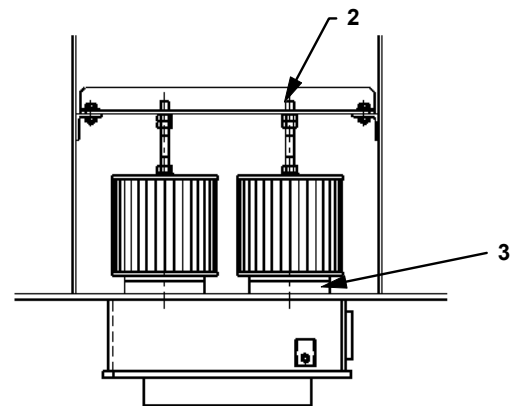


CAUTION: Sufficiently ventilate before entering the hydraulic oil tank after draining hydraulic oil.

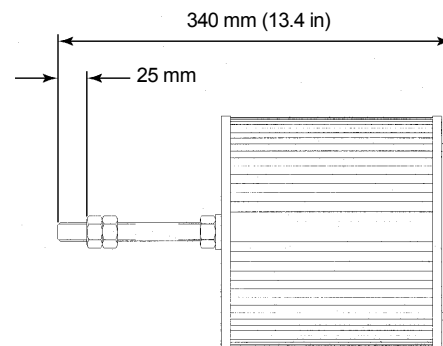
1. After draining oil, remove cover (1) to remove rod assembly (2).
2. Clean the inside of the hydraulic oil tank and the suction filters.
3. Before installing, check dimensions of rod assembly (2) by referring the figure below. Securely re-install the rod assembly into pipe (3).
4. Replace the O-ring with new one and check that it is correctly installed before re-installing cover (1). Secure cover (1) with bolts.
5. Bleed any air remaining in the hydraulic system (refer to [Air Bleeding Procedures] on page 7-53).



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M18C-07-056



Rod Assembly

M146-07-013

MAINTENANCE

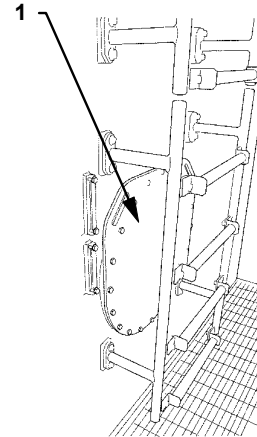
Replace Suction Filter --- every 12000 hours

Six unit suction filters are provided in the hydraulic oil tank. Clean them when replacing hydraulic oil. Replace all suction filters.

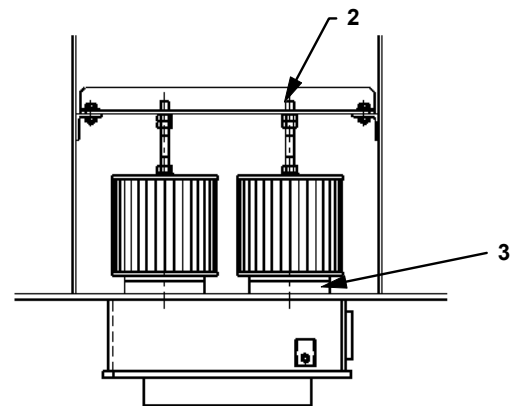


CAUTION: Sufficiently ventilate before entering the hydraulic oil tank after draining hydraulic oil.

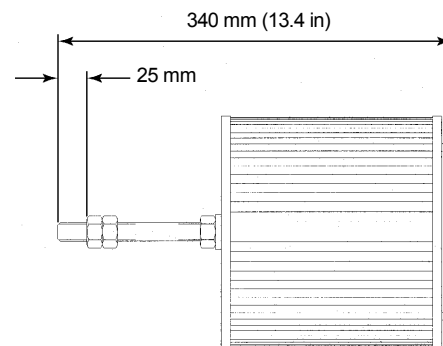
1. After draining oil, remove cover (1) to remove rod assembly (2).
2. Clean the inside of the hydraulic oil tank.
3. Replace the element of rod assembly (2).
4. Before installing, check dimensions of rod assembly (2) by referring the figure below. Securely re-install the rod assembly into pipe (3).
5. Replace the O-ring with new one and check that it is correctly installed before re-installing cover (1). Secure cover (1) with bolts.
6. Bleed any air remaining in the hydraulic system (refer to [Air Bleeding Procedures] on page 7-53).



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M18C-07-056



Rod Assembly

M146-07-013

MAINTENANCE

7

Replace High-Pressure Strainer --- every 12000 hours

1. Park the machine on a level surface.
2. Lower the bucket to the ground.
3. Turn the auto-idle switch off.

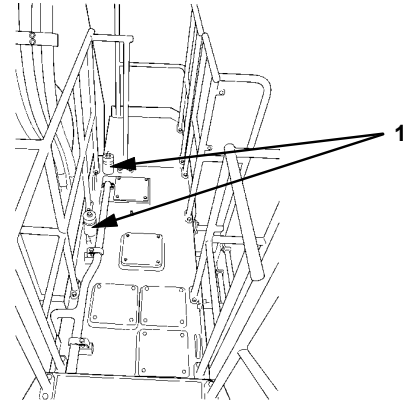
IMPORTANT: The turbocharger may be damaged if the engine is not properly shut down.

4. Run the engine at slow idle speed without load for five minutes.
5. Stop the engine. Remove the key from the key switch.
6. Pull the pilot control shut-off lever to the LOCK position.

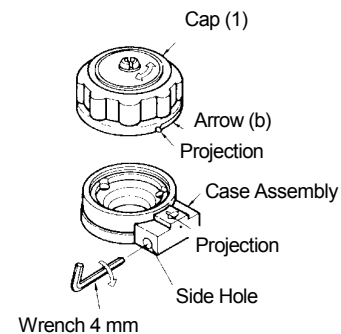


CAUTION: Keep body and face away from cap (1). Turn cap (1) slowly and remove the cap (1) only after releasing the internal pressure completely.

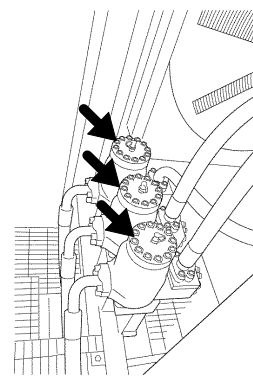
7. Insert the wrench as shown and turn the wrench clockwise and hold the wrench.
8. Turn cap (1) counter-clockwise about 30°, at which point stop cap to release the air.
9. Turn cap (1) further and remove cap (1).
10. Align the projected part of cap with the projected part of the case and install cap (1).
11. Remove bolts (2), cover (3) and strainer assembly (6) from housing (7).
12. Discard O-rings ((4) and (5)) and strainer assembly (6).
13. Install new strainer assembly (6) into housing (7) with the rubber seal down and the welding bead line on strainer assembly (6) away from the housing inlet.
14. Install cover (3) with new O-rings ((4) and (5)).
15. Install and tighten bolts (2) to 265 N·m (27 kgf·m, 195 lbf·ft).
16. Repeat steps 11 to 15 for the other strainer.



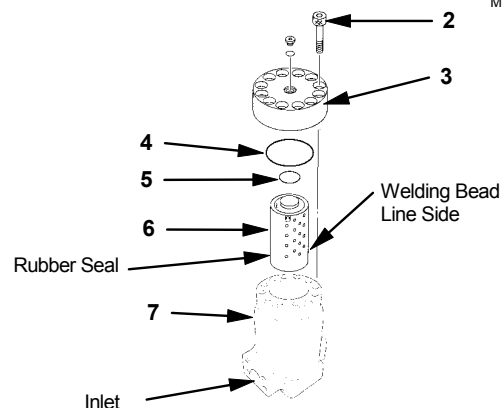
M18C-07-023



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M18C-07-025



M18C-07-047

MAINTENANCE

8

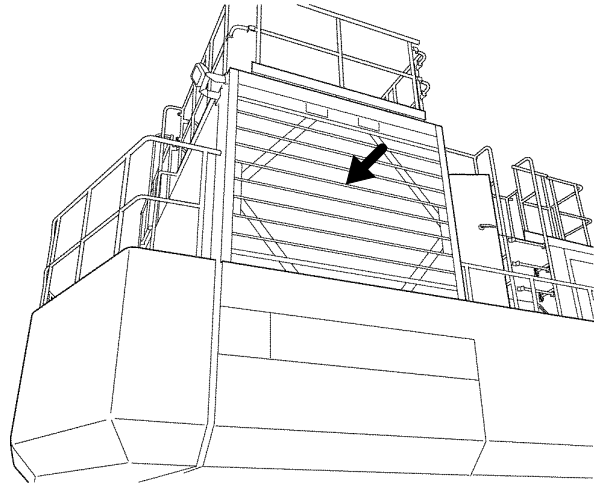
Clean Oil Cooler Core
--- every 500 hours



CAUTION: Wear safety glasses or goggles when using compressed air.

IMPORTANT: High pressure air or water can damage the cooler core fins. Use air pressure [0.2 MPa (2 kgf/cm²) or less] and keep the nozzle more than 500 mm away from the core surface.

Clean the oil cooler core using compressed air [0.2 MPa (2 kgf/cm²) or less] or tap water.



M18C-07-026

MAINTENANCE

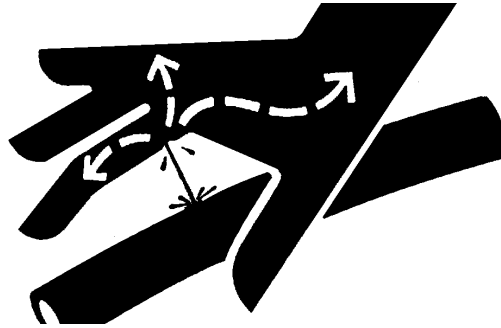
9

Check Hoses and Lines

- daily
- every 250 hours



CAUTION: 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. Any fluid injected into the skin must be surgically removed within a few hours or gangrene may result.

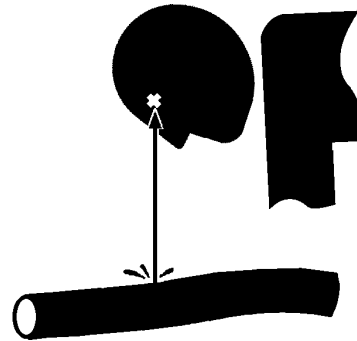


SA-031

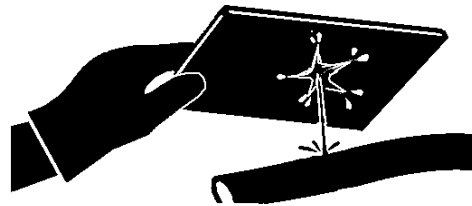


CAUTION: Hydraulic oil and lubricant leaks can lead to fire that may result in serious injury. To avoid this hazard :

1. Park the machine on a firm, level surface. Lower the bucket to the ground. Stop the engine. Remove key from the key switch. Pull the pilot control shut-off lever to the LOCK position.
2. Check for missing or loose clamps, kinked hoses, lines or hoses that rub against each other, damaged oil cooler, and loose oil cooler flange bolts, for leaks. Check hoses, lines and oil cooler at the check points indicated below for leaks and other damage that may result in future leaks. If any abnormalities are found, replace or retighten them, as shown in Tables 1-3.
3. Tighten, repair or replace any missing, loose or damaged clamps, hoses, lines, oil cooler, and loose oil cooler flange bolts. Do not bend or strike high-pressure lines. Never install bent or damaged hoses or lines.



SA-292



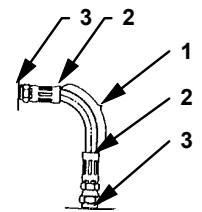
SA-044

MAINTENANCE

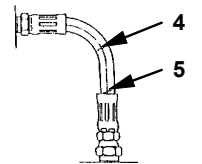
Table 1. Hoses

Interval(hours)	Check Points	Abnormalities	Remedies
Daily	Hose covers	Leak (1)	Replace
	Hose ends	Leak (2)	Replace
	Fittings	Leak (3)	Retighten or replace
Every 250 hours	Hose covers	Crack (4)	Replace
	Hose ends	Crack (5)	Replace
	Hose covers	Exposed reinforcement (6)	Replace
	Hose covers	Blister (7)	Replace
	Hose	Bend (8)	Replace
	Hose	Collapse (9)	Replace (Use proper bend radius)
	Hose ends and fittings	Deformation or Corrosion (10)	Replace

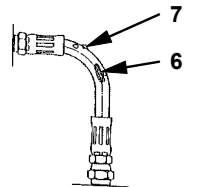
 **NOTE:** Refer to the illustrations in Fig.1 for each check point location or for a description of the abnormality. Use genuine Hitachi parts.



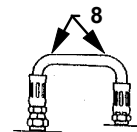
M115-07-145



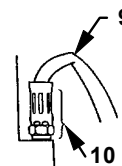
M115-07-146



M115-07-147



M115-07-148



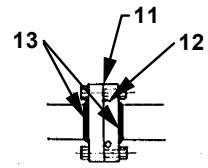
M115-07-149

Fig.1

MAINTENANCE

Table 2. Lines

Interval(hours)	Check Points	Abnormalities	Remedies
Daily	Contact surfaces of flange joints	Leak (11)	Replace O-ring and/or retighten bolts
	Welded surfaces on joints	Leak (12)	Replace
	Clamps	Loose	Retighten
Every 250 hours	Welded surfaces on joints	Crack (13)	Replace
	Clamps	Missing	Replace
		Deformation	Replace



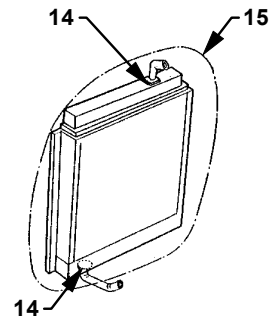
M115-07-150

Fig. 2

NOTE: Refer to the illustrations in Fig.2 for each check point location or for a description of the abnormality. Use genuine Hitachi parts.

Table 3. Oil cooler

Interval(hours)	Check Points	Abnormalities	Remedies
Every 250 hours	Contact surfaces of flange joints	Leak (14)	Replace O-ring and/or retighten bolts
	Oil cooler	Leak (15)	Replace



M115-07-151

Fig. 3

NOTE: Refer to the illustrations in Fig.3 for each check point location .

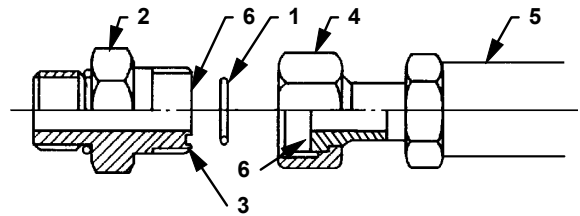
MAINTENANCE

SERVICE RECOMMENDATIONS FOR HYDRAULIC FITTINGS

Two hydraulic fitting designs are used on this machine.

Flat Face O-ring Seal Fitting (ORS Fitting)

An O-ring is used on the sealing surfaces to prevent oil leakage.



M104-07-033

1. Inspect fitting sealing surfaces (6). They must be free of dirt or defects.
2. Replace O-ring (1) with a new one when assembling fittings.
3. Lubricate O-ring (1) and install it into groove (3) using petroleum jelly to hold it in place.
4. Tighten fitting (2) by hand, pressing the fitting joint together to ensure O-ring (1) remains in place and is not damaged.
5. Tighten fitting (2) or nut (4) to the torque values shown. Do not allow hose (5) to twist when tightening fittings.
6. Check for leaks. If oil leaks from a loose connection, do not tighten fitting (2). Open the connection, replace O-ring (1) and check for correct O-ring position before tightening the connection.

Torque specifications		±10%			
Width across flats (mm)		27	32	36	41,46
Fastening torque	N·m	93	137	175	205
	(kgf·m)	(9.5)	(14)	(18)	(21)
	(lbf·ft)	(69)	(101)	(130)	(152)

MAINTENANCE

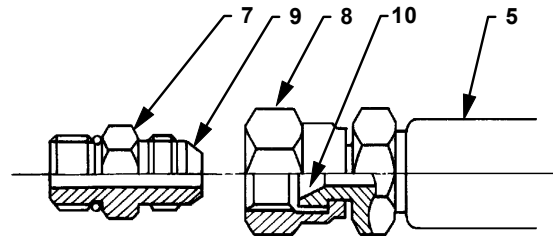
Metal Face Seal Fittings

Fittings are used on smaller hoses and consist of a metal flare and a metal flare seat.

1. Inspect flare (10) and flare seat (9). They must be free of dirt or obvious defects.

IMPORTANT: Defects in the tube flare cannot be repaired. Overtightening a defective flare fitting will not stop a leak.

2. Tighten fitting (7) by hand.
3. Tighten fitting (7) or nut (8) to the torque values shown. Do not allow hose (5) to twist when tightening fittings.



M202-07-051

Width across flats (mm)		19	22	27	36
Fastening torque	N·m	29.5	39	93	175
	(kg·m)	(3)	(4)	(9.5)	(18)
	(lbf·ft)	(21.5)	(29)	(69)	(130)

MAINTENANCE

E. FUEL SYSTEM

Tank capacity 3085 liter (815 US gal)

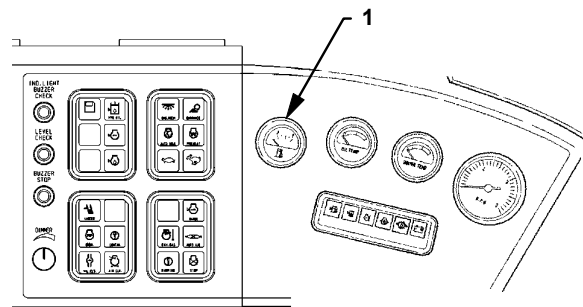
Parts	Quantity	Interval (hours)						
		10	50	250	500	1000	1500	2000
1. Drain Fuel Tank Sump	1							
2. Water Separator Filter	Drain							
	Replacement							
3. Replace Fuel Filter	2							
4.	Check Fuel Hoses (for leak, loose)							
	Check Fuel Hoses (for crack, bend, etc.)							



CAUTION: Use only recommended **DIESEL FUEL OIL (JIS K-2204 or ASTM2-D)**. Never use gasoline. If gasoline is used accidentally, fire will break out, resulting in serious personal injury or death.

Recommended Fuel

Use only high-quality **DIESEL FUEL OIL** in accordance with JIS K-2204, ASTM2-D, or equivalent. For further details, refer to the Cummins Engine Operation and Maintenance Manual.



M18C-01-023

Refueling

1. Park the machine on a firm, level surface.
2. Lower the bucket to the ground.
3. Turn the auto-idle switch off.
4. Check fuel gauge (1) on the monitor. Add fuel if necessary, as follows.
Fuel Tank Capacity: 3085 liters (815 US gal)



NOTE: Avoid condensation. Fill the tank at the end of each day's operation.

IMPORTANT: The turbocharger may be damaged if the engine is not properly shut down.

5. Run the engine at slow idle for five minutes.
6. Stop the engine. Remove the key from the key switch.
7. Pull the pilot control shut-off lever to the LOCK position.

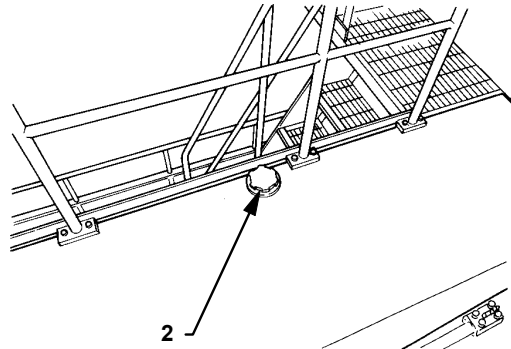
MAINTENANCE

CAUTION: Handle fuel carefully. Shut the engine off before fueling. Do not smoke while you fill the fuel tank or work on fuel system.

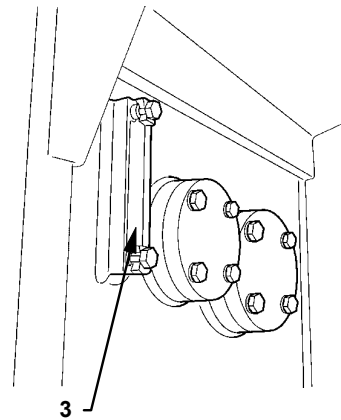
IMPORTANT: Keep all dirt, dust, water and other foreign materials out of the fuel system.

NOTE: Take care not to spill fuel on the machine or ground. Do not fill the tank more than specified.

8. Remove filler cap (2). Add fuel via the filler tube while checking gauge (3). Do not fill the tank more than specified.
Be sure to select a charging pump of appropriate capacity when fueling to avoid overflowing.
9. A filter is provided in the filler port. Clean the filter in light oil at the regular interval.
10. Reinstall filler cap (2).



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M141-07-020

MAINTENANCE

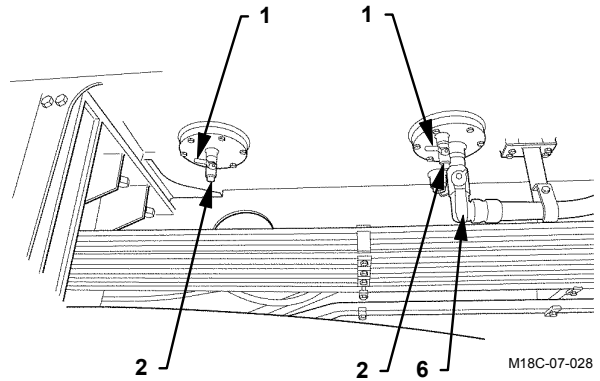
1

Drain Fuel Tank Sump --- daily

1. Park the machine on a level surface with the upper-structure rotated 90° for easier access.
2. Lower the bucket to the ground.
3. Turn the auto-idle off.

IMPORTANT: The turbocharger may be damaged if the engine is not properly shut down.

4. Run the engine at slow idle speed without load for five minutes.
5. Turn the key switch OFF. Remove the key from the key switch.
6. Pull the pilot control shut-off lever to the LOCK position.
7. Remove the drain plugs (2).
8. Open drain cock (1) for several seconds to drain water and sediment. Close drain cock (1).
9. Install the drain plugs (2).

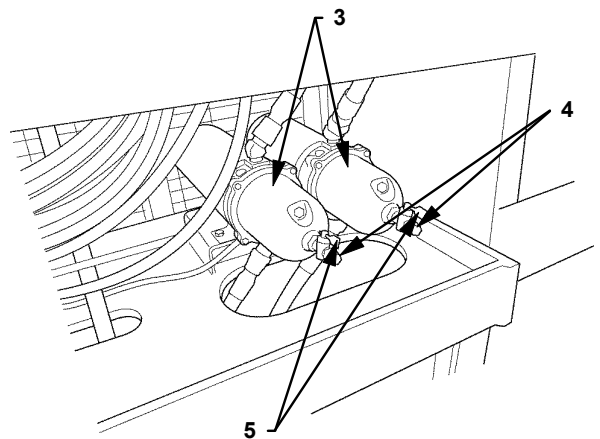


2

Water Separator Filter

Drain Fuel Filter Sediment --- daily

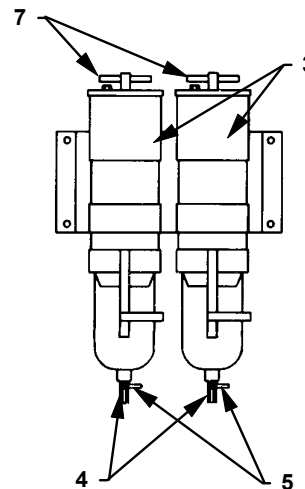
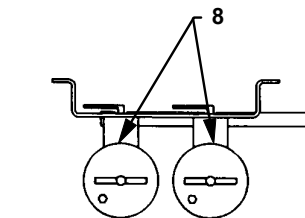
1. Stop the engine.
2. Remove drain plug (4) and loosen drain cock (5) on the underside of filter (3) to drain water and sediment.
3. After draining, install drain plug (4) and tighten drain cock (5).



Replace Water Separator Filter --- every 1000 hours

Be sure to catch the draining fuel using a container so as not to contaminate the ground and for safety.

1. Close stop valve (6) located on the bottom of the fuel tank.
2. Replace the water separator filter.
 - 1) Loosen handle (7) on the water separator filter to remove cover (8).
 - 2) Remove the filter.
 - 3) Install a new filter and fill with fuel.
 - 4) Install cover (8). Securely tighten handle (7).
 - 5) Two water separator filters are provided. Replace each filter following the same procedure.
 - 6) Open stop valve (6).



MAINTENANCE

3

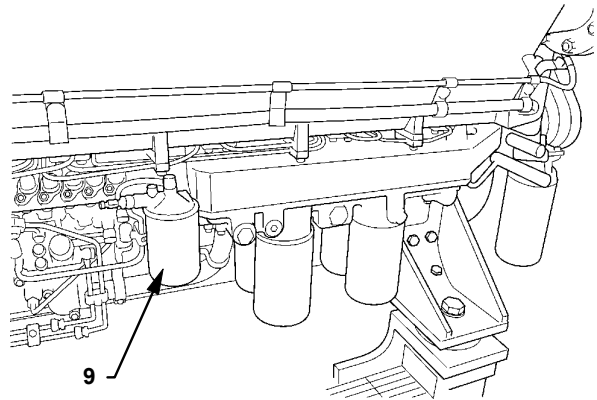
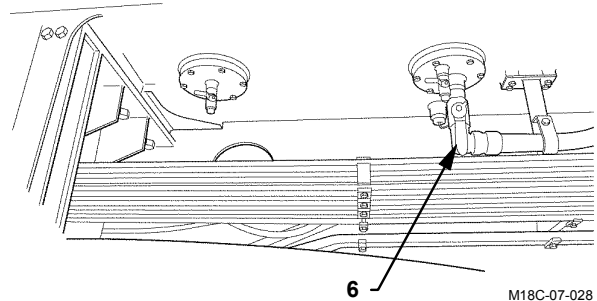
Replace Fuel Filter --- every 1000 hours

IMPORTANT: Be sure to prepare a container large enough to collect fuel when replacing fuel filter to avoid ground contamination and for safety.

1. Stop the engine.
2. Close cock (6) on the inlet line.
3. Unscrew filters (9) from the filter head, discard filters.
4. Fill the filter with clean fuel. Apply a light even coat of lubricating oil to the gasket sealing surface prior to installing the filter.
5. Position filter (9) to the filter head. Tighten by hand until the seal touches the filter head, tighten an additional one-half to three-fourths turn.

 **NOTE:** Be sure to tighten the filter by hand. If any tools are used for tightening, breakage or deformation of the filter head may arise.

6. Two fuel filters are located on either side of the engine. Four fuel filters in total are used. Replace each filter following the same procedure.
7. Open stop valve (6) at the bottom of the fuel tank.

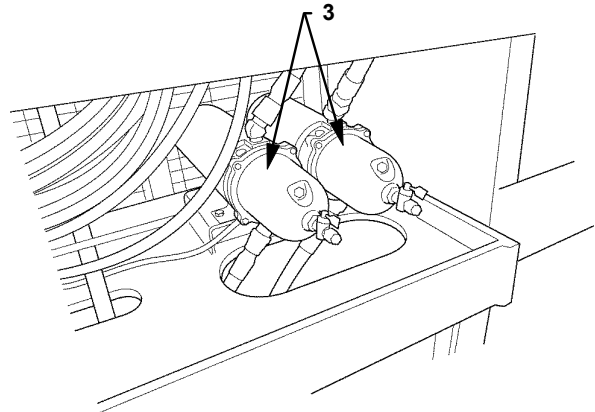


MAINTENANCE

Bleed Air From Fuel System

After refilling fuel to the FULL level, bleed air from the fuel system following the order of the water separator filter, fuel filter, and fuel injection pump. If air is mixed in the fuel system, the engine won't start easily and may have any other operational trouble.

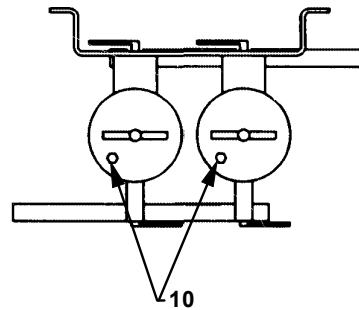
Be sure to bleed air after the fuel tank was run dry, after draining water from water separator filter (3) and/or fuel filter (9), or after replacing water separator filter (3) and/or fuel filter (9) and after working on any part of the fuel system.



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Water Separator Filter

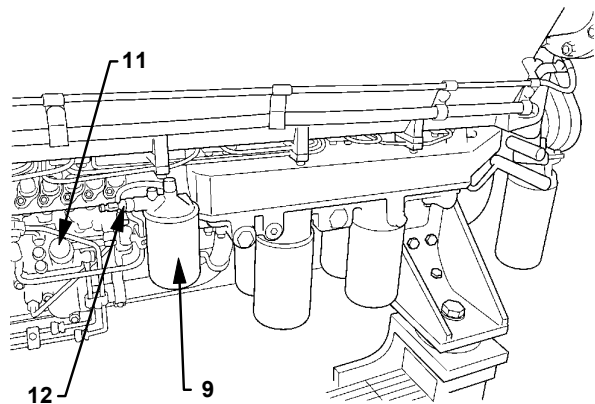
- 1) Loosen plug (10) on water separator filter (3).
- 2) Bleed air until fuel seeps out through the clearance around plug (10).
- 3) Each water separator filter has one plug (10). There are two plugs in total. Bleed air from each plug following the same method.



M18C-07-031

Fuel Feed Pump

- 4) Remove fuel pump cover.
- 5) Loosen air bleed plug (12) 1.5 turns approximately.
- 6) After rotating fuel pump (11) counterclockwise, move up and down.
- 7) After only fuel without air flows out of air bleed plug (12), tighten air bleed plug (12). At this time, while pressing fuel feed pump (11), rotate clockwise to lock in the original position. Tighten air bleed plug (12).



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IMPORTANT: Tighten plug (12) only after locking fuel pump (11). Otherwise, fuel pump (11) will not be locked in the original position as pressure in the fuel injection pump increases.

- 8) Install fuel pump cover.
- 9) One fuel pump is located on both front and rear sides of the engine. Bleed air from each fuel pump by following steps 4 to 8. Start the engine. Check the fuel system for any fuel leaks.

MAINTENANCE

4

Check Fuel Hoses

--- daily

--- every 250 hours



CAUTION: Fuel leaks can lead to fires that may result in serious injury.

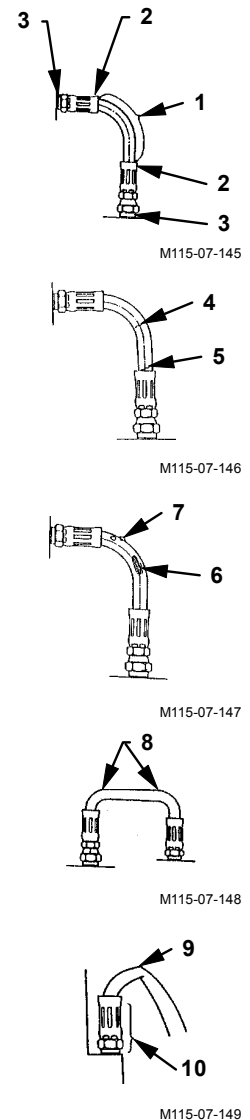
To avoid this hazard :

1. Park the machine on a firm, level surface. Lower the bucket to the ground. Stop the engine. Remove key from the key switch. Pull the pilot control shut-off lever to the LOCK position.
2. Check for kinked hoses, and hoses that rub against each other parts for leaks.
Check hoses at the check points indicated below for leaks and other damage that may result in future leaks. If any abnormalities are found, replace or retighten them, as shown in Table 4.
3. Repair or replace any loose or damaged hoses.
Never install bent or damaged hoses.

MAINTENANCE

Table 4. Hoses

Interval (hours)	Check Points	Abnormalities	Remedies
Daily	Hose covers	Leak (1)	Replace
	Hose ends	Leak (2)	Replace
	Fittings	Leak (3)	Retighten or replace
Every 250 hours	Hose covers	Crack (4)	Replace
	Hose ends	Crack (5)	Replace
	Hose covers	Exposed reinforcement (6)	Replace
	Hose covers	Blister (7)	Replace
	Hose	Bend (8)	Replace
	Hose	Collapse (9)	Replace (Use proper bend radius)
	Hose ends and fittings	Deformation or corrosion (10)	Replace



NOTE: Refer to the illustrations in Fig. 4 for each check point location or for a description of the abnormality. Use genuine Hitachi parts.

Fig. 4

MAINTENANCE

F. AIR CLEANER

Parts		Quantity	Interval (hours)						
			10	50	250	500	1000	1500	2000
1. Air Cleaner Outer Element	Cleaning	2	As required						
	Replacement	2	Replace per 6 cleaning when outer element is replaced						
2. Air Cleaner Inner Element	Replacement	2							

1

Clean Air Cleaner Outer Element
--- as required

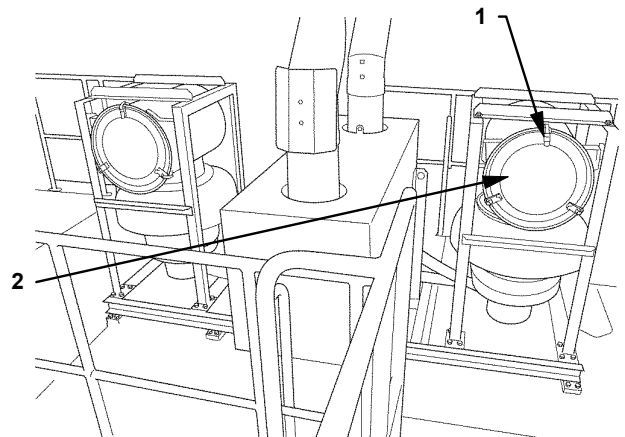
2

Replace Air Cleaner Outer and Inner Elements
--- per 6 cleaning or when outer element is replaced

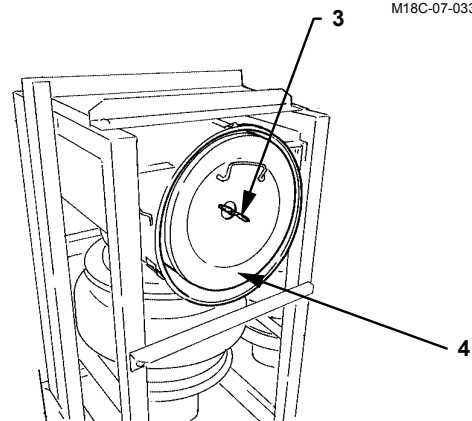
1. Park the machine on a level surface.
2. Lower the bucket to the ground.
3. Turn the auto-idle switch off.

IMPORTANT: The turbocharger may be damaged if the engine is not properly shut down.

4. Run the engine at slow idle speed without load for five minutes.
5. Stop the engine. Remove the key from the key switch.
6. Pull the pilot control shut-off lever to the LOCK position.
7. Loosen clamps (1) to remove cover (2).
8. Loosen wing nut (3) to remove outer element (4).
9. Tap outer element (4) with the palm of your hand, NOT ON A HARD SURFACE.



M18C-07-033



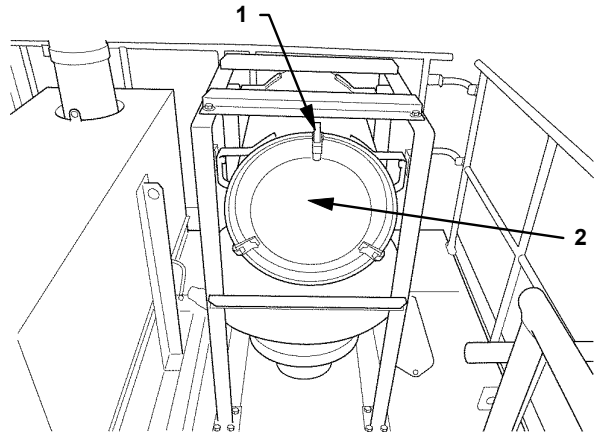
M18C-07-034

MAINTENANCE

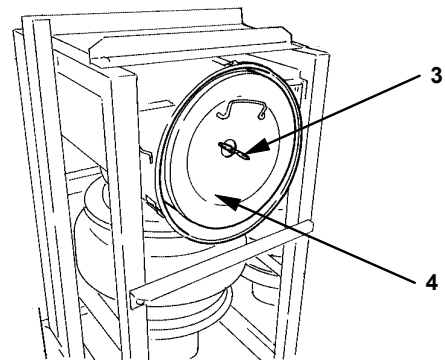


CAUTION: Use reduced compressed air pressure. (Less than 0.2 MPa, 2 kgf/cm²). Clear area of bystanders, guard against flying chips, and wear personal protection equipment including goggles or safety glasses.

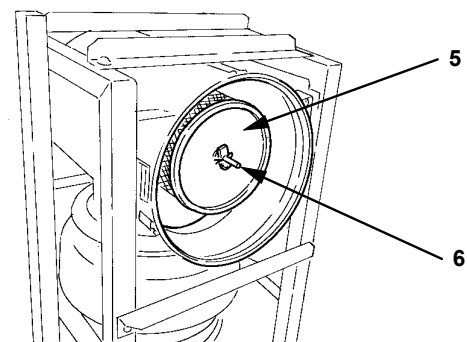
10. Clean outer element (4) using compressed air. Direct the air to the inside of the filter element, blowing out.
11. Clean the filter interior before installing outer element (4).
12. Install outer element (4) into the body to hold it in place, tighten wing nut (3) by hand. After wing nut (3) makes contact with the end face of outer element (4), tighten it to 5.9 ± 0.1 N·m (0.6 ± 0.1 kgf·m, 4.3 ± 0.1 lbf·ft) by hand.
13. Install cover (2) and tighten clamps (1).
14. Start the engine and run at slow idle.
15. Check the air filter restriction indicator on the monitor panel. If the air filter restriction indicator comes ON, stop the engine and replace the outer element (4).
16. When replacing the air cleaner filter element, replace both outer (4) and inner (5) elements together. Remove outer element (4). Clean the filter interior before removing inner element (5). Remove wing nut (6) and inner element (5). First install inner element (5) and then install outer element (4).
Wing nut (6) tightening torque:
 4.4 ± 1 N·m (0.45 ± 0.1 kgf·m, 3.25 ± 0.74 lbf·ft)



M18C-07-032



M18C-07-034



M18C-07-035

MAINTENANCE

G. COOLING SYSTEM

Parts		Quantity	Interval (hours)						
			10	50	250	500	1000	1500	2000
1. Coolant	Check Coolant Level	1							
	Change Coolant	195 L (51.5 US gal)	Twice a year, in spring and autumn *						
2. Clean Radiator		1	When changing coolant						
3. Clean Radiator Core		1							
4. Clean Intercooler Core		2							

 **NOTE:** * Before leaving the Hitachi factory, the cooling system is filled with a mixture of water and Genuine Hitachi Long-Life Coolant. As long as Genuine Hitachi Long-Life Coolant is used, the service intervals between changing the coolant is once every two years, or every 4000 hours, whichever comes first.

Coolant

Fill the radiator with soft, pure tap or bottled water.

Anti-rust agent

Add approximately 3.9 L (4.1 US qt) of anti-rust agent to the new coolant when the coolant is changed.
It is not necessary to add anti-rust agent when antifreeze is used.

Antifreeze

If the air temperature is expected to fall below 0°C (32°F), fill the cooling system with an antifreeze and soft water mix. As a general rule, the ratio of antifreeze should range between 30% and 50% as shown in the table below. If the ratio is below 30%, the system may develop rust, and if it is above 50%, the engine may overheat.

MAINTENANCE

Antifreeze Mixing Table

Air temperature		Mixing Ratio	Refill Capacities			
			Antifreeze		Soft Water	
°C	°F	%	L	US gal	L	US gal
-1	30	30	58.5	15.5	136.5	36.0
-4	25	30	58.5	15.5	136.5	36.0
-7	19	30	58.5	15.5	136.5	36.0
-11	12	30	58.5	15.5	136.5	36.0
-15	5	35	68	18.0	127	33.6
-20	-4	40	78	20.6	117	30.9
-25	-13	45	88	23.2	107	28.3
-30	-22	50	97.5	25.8	97.5	25.8



CAUTION:

1. Antifreeze is poisonous; if ingested, it can cause serious injury or death. Induce vomiting and get emergency medical attention immediately.
2. When storing antifreeze, be sure to keep it in a clearly marked container with a tight lid. Always keep antifreeze out of the reach of children.
3. If antifreeze is accidentally splashed into eyes, flush with water for 10 to 15 minutes and get emergency medical attention.
4. When storing or disposing of antifreeze, be sure to comply with all local regulations.

MAINTENANCE

1

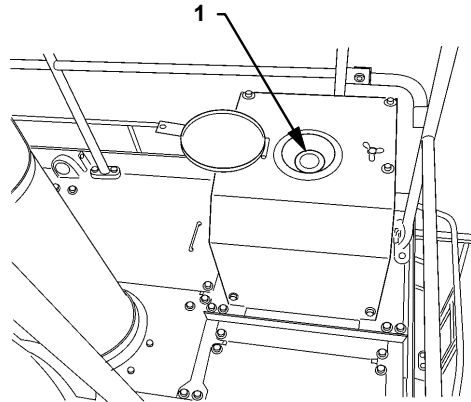
Check Coolant Level --- daily



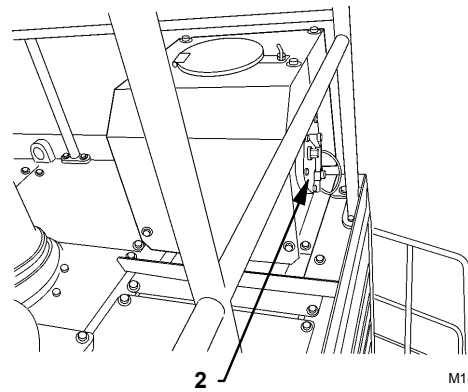
CAUTION: Be sure to supply coolant via the reservoir. Don't remove the radiator cap.

Check that the coolant level is between the HIGH and LOW marks on level gauge (2).

If the coolant level is below the LOW mark, remove cap (1) and add coolant via the opening.



M18C-07-078



M18C-07-079

MAINTENANCE

Change Coolant

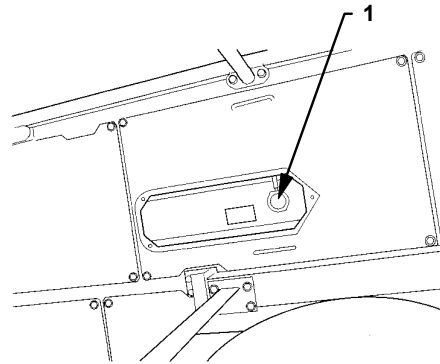
--- twice a year (in spring and autumn)

 **NOTE:** Before leaving the Hitachi Factory, the cooling system is filled with a mixture of water and Genuine Hitachi Long-Life Coolant. As long as Genuine Hitachi Long-Life Coolant is used, the service intervals between changing the coolant is once every two years, or every 4000 hours, whichever comes first.

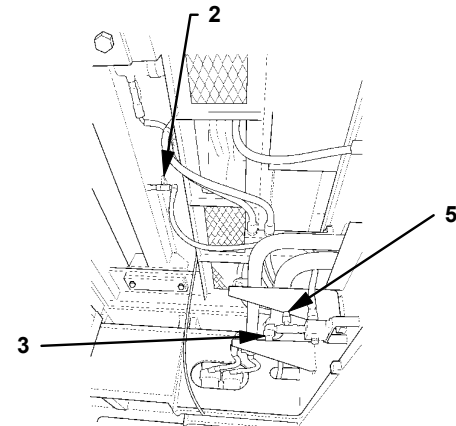


CAUTION: Do not loosen the radiator cap until the engine is cool. Loosen the radiator cap slowly to the stop. Release all pressure before removing the radiator cap.

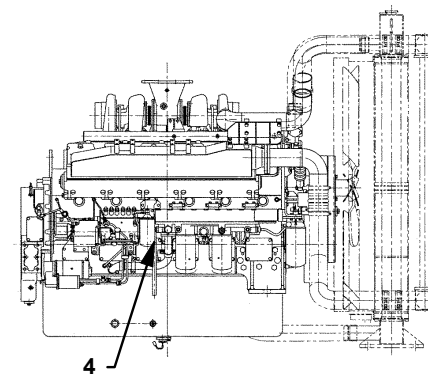
1. Park the machine on a solid and level surface. Lower the bucket to the ground. Stop the engine.
2. Remove plugs (3) and open drain cocks (2). Slowly open cock (2) to bleed air pressure. After the air pressure is released, open engine drain plug (4).
3. Close drain cock (2) and install plug (4). Open bleed air cocks (6). Remove radiator cap(1). Fill the radiator with soft water which contains less impurities or tap water and a radiator cleaner agent. Start the engine and run at a speed slightly higher than slow idle; when the needle of the temperature gauge reaches the white zone, run the engine for about ten more minutes.
4. Stop the engine and open radiator drain cock (2) and remove plugs (4). Flush out the cooling system with soft water or tap water, until the draining water is clear. This helps remove rust and sediment.
5. Close radiator drain cocks (2) and (5) install plugs (3) and (4). Fill the radiator with soft water or tap water. At that time, mix the antifreeze (or LLC) or anti-rust agent. Slowly add coolant to avoid mixing air bubbles in the coolant system. Close bleed air cocks (6).
6. Start the engine. Sufficiently bleed air from the cooling system.
7. After adding coolant, operate the engine for several minutes. Check the coolant level again. Add coolant if necessary.



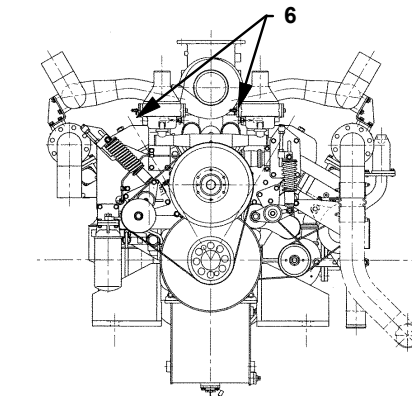
M18C-01-009



M18C-07-037



M18C-07-067



M18C-07-070

MAINTENANCE

2

Clean Outside of Radiator
--- twice a year (in spring and autumn)

Clean the outside of the radiator with radiator cleaner to remove built up rust and scale to extend the radiator life.

3

Clean Radiator Core
--- every 500 hours

4

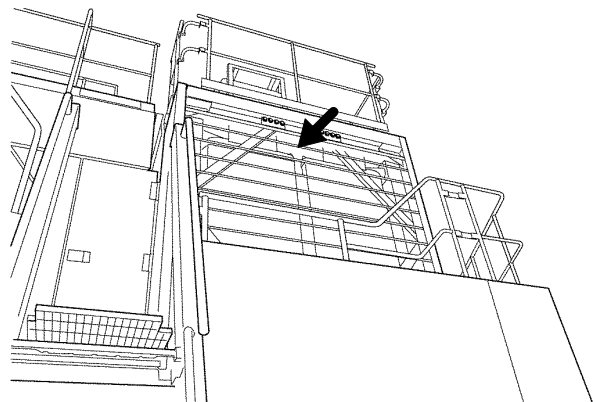
Clean Intercooler Core
--- every 500 hours



CAUTION: Always wear safety glasses or goggles when using compressed air (Less than 0.2 MPa, 2 kgf/cm², 28 psi) to clean radiator core.

IMPORTANT: Compressed air or water can damage fins. When cleaning the radiator core with compressed air or water, keep the nozzle 500 mm (20 in) or more away from the core face in order not to cause any damage.

The radiator is positioned along with the intercooler in series. In case the radiator/intercooler cores become obstructed with dust, dirt, or foreign material, clean the cores with compressed air [less than 0.2 Mpa (2 kgf/cm²)] or tap water to prevent a reduction in the cooling system performance.



M18C-07-038

MAINTENANCE

H. AIR CONDITIONER

Parts		Quantity	Interval (hours)						
			10	50	250	500	1000	1500	2000
1. Recirculation Air Filter	Cleaning	3	As required						
	Replacement	3	Replace per 4 cleaning						
2. Ventilation Air Filter	Cleaning	3	As required						
	Replacement	3	Replace per 4 cleaning						
3. Check Refrigerant Quantity		3							
4. Check Compressor Belt Tension		3							
5. Clean Condenser Core		3							
6. Check Tightening Torque		–							
7. Seasonal Maintenance		–	Preseason (once a year), Off-season (once a week)						

1

Recirculation Air Filter



CAUTION: Always wear safety glasses or goggles when using compressed air (Less than 0.2 MPa, 2 kgf/cm², 28 psi) to clean filters.

IMPORTANT: Plugged recirculation or ventilation air filter will reduce cooling capacity of the air conditioner. Be sure to clean them periodically.

Cleaning --- as required

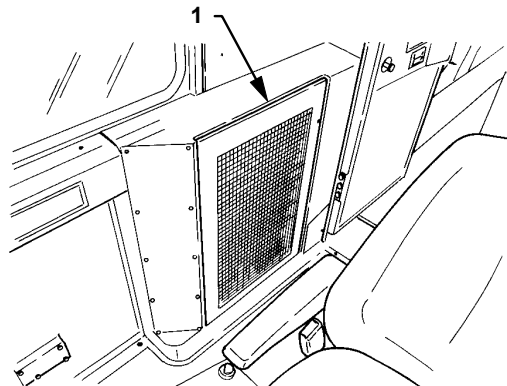
1. Open cover (1). Remove recirculation air filters (2).
2. Clean recirculation air filters (2) with compressed air (Less than 0.2 MPa, 2 kgf/cm², 28 psi) or a soft brush.

Replacing --- after cleaning 4 times

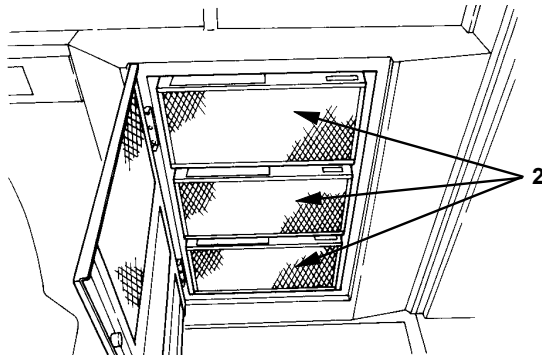
If the cooling capacity decreases even after cleaning recirculation air filters (2) due to filter clogging, replace them.



NOTE: Same filter elements are used for the air conditioner recirculation and ventilation air filters.



M117-07-069



M117-07-019

MAINTENANCE

2

Ventilation Air Filter



CAUTION: Always wear safety glasses or goggles when using compressed air (Less than 0.2 MPa, 2 kgf/cm², 28 psi) to clean filters.

IMPORTANT: Plugged ventilation or recirculation air filter will reduce cooling capacity of the air conditioner. Be sure to clean them periodically.

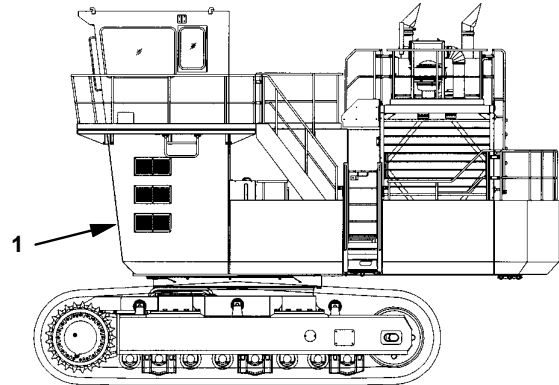
Clean Air Filter --- as required

1. Ventilation air filters (2) (three pieces) are located in room (1) under the cab.
Remove ventilation air filters (2).
2. Clean ventilation air filters (2) with compressed air (Less than 0.2 MPa, 2 kgf/cm², 28 psi) or a soft brush.

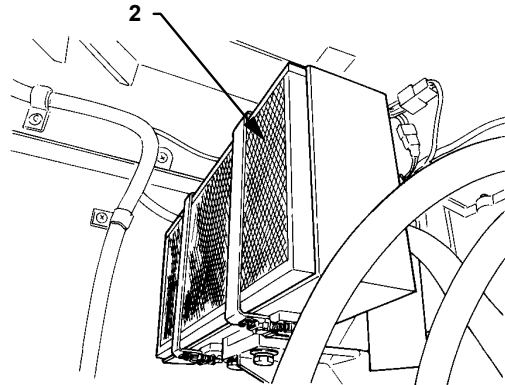
Replace Air Filter --- after cleaning 4 times

Changing interval of ventilation air filter (2) differs depending on environmental conditions.

If the cooling capacity decreases after cleaning ventilation air filter (2), caused by filter plugging, replace it earlier than the standard interval.



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M117-07-070

MAINTENANCE

3

Check Refrigerant Quantity --- every 250 hours

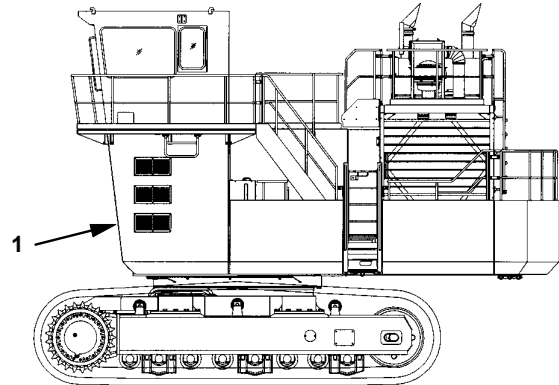


CAUTION: DO NOT allow liquid refrigerant to contact eye or skin. Liquid refrigerant will freeze eye or skin on contact. Be careful not to loosen connections in the air conditioner circuit.

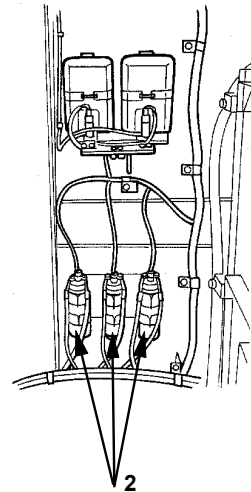
- IMPORTANT:** (1) Do not operate the compressor without refrigerant in the air conditioning circuit, as doing so may damage them.
- (2) Do not overcharge the system with refrigerant to avoid dangerous high pressure and low cooling effect.

Air conditioner liquid tanks (2) (three pieces) are located in room (1) under the cab. Insufficient refrigerant quantity lowers cooling effect of the air conditioner. Check the refrigerant quantity through sight glass on liquid tanks (2) (three pieces).

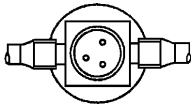
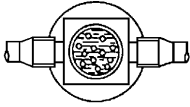
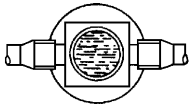
1. Start the engine and run at fast idle speed.
2. Turn the air conditioner and blower fan speed to the high speed.
3. Press temperature control switch repeatedly until the air temperature is maximum cool.
4. Check the refrigerant quantity through sight glass.



M18C-01-012



M146-07-009

Refrigerant Quantity	Sight Glass	
Appropriate	 M114-07-090	Almost clear. Gas bubbles may be seen but will disappear by changing engine speed.
Insufficient	 M114-07-091	A steady stream of gas bubbles is seen in the liquid flowing from the receiver-dryer.
Scarce	 M114-07-092	No bubbles but misty.

5. If the refrigerant level is low, consult your authorized dealer.

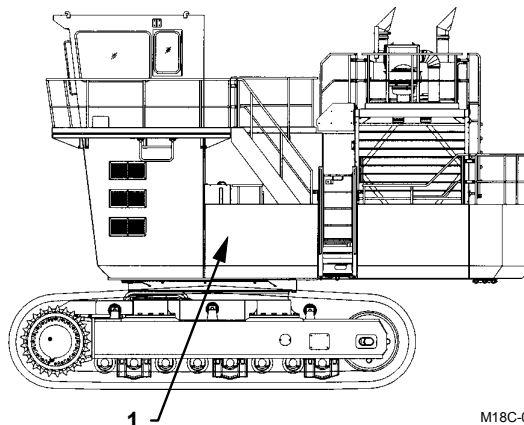
MAINTENANCE

4

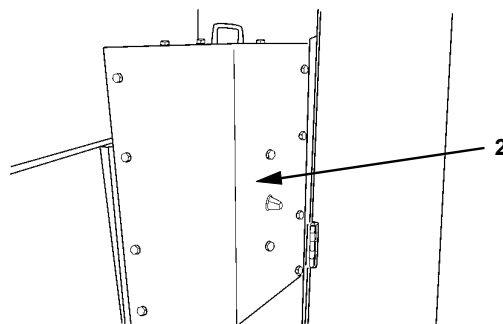
Check Compressor Belt Tension --- every 250 hours

Remove box-type cover (2), located on step (1) under the ladder, to gain access to the compressor belt (3). Visually check belt for wear. Replace if necessary. Start the engine and run for 10 minutes. Check belt tension by depressing the midpoint between the hydraulic motor and compressor pulleys with the thumb. Deflection must be 13 to 14 mm (0.5 to 0.6 in) at a depressing force of approximately 98 N (10 kgf, 22 lbf).

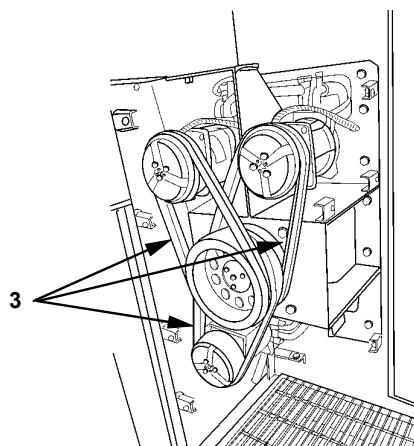
If tension is not within specifications, loosen the compressor mounting bolts to adjust belt tension.



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MAINTENANCE

5

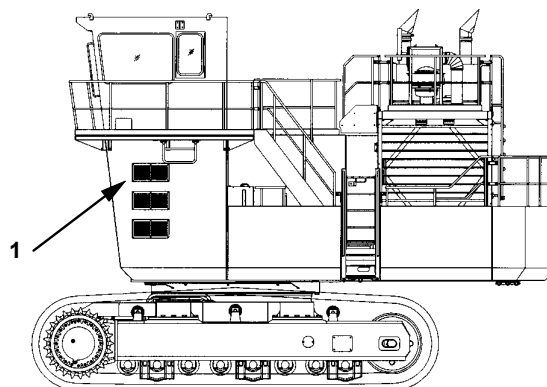
Clean Condenser Core --- every 500 hours



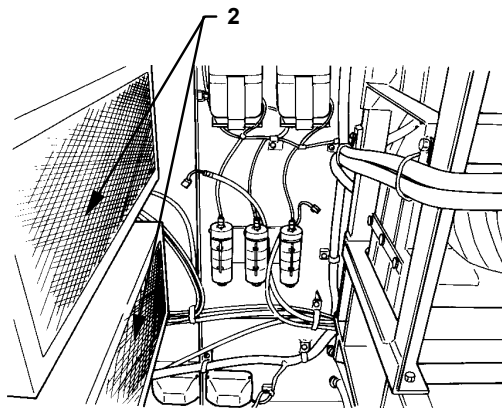
CAUTION: Always wear safety glasses or goggles when using compressed air (Less than 0.2 MPa, 2 kgf/cm², 28 psi) to clean condenser core.

Remove condenser cover (2) (three pieces), located in room (1) under the cab.

Use compressed air (Less than 0.2 MPa, 2 kgf/cm², 28 psi) to clean the condenser core (three pieces).



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MAINTENANCE

6

Check Tightening Torque --- every 250 hours

Check the tightness of mounting bolts, hose connections and fittings every 250 hours. Tighten to torque specifications if any are loose.

Torque Specifications for Hose Connections:

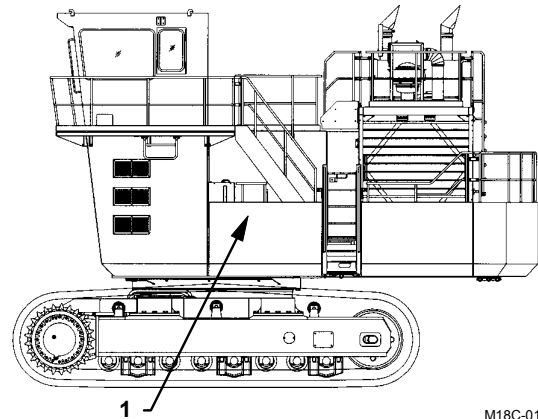
Wrench Size (mm)	Fastening Torque		
	N·m	(kgf·m)	(lbf·ft)
19	11.5 to 14.5	(1.2 to 1.5)	(8.7 to 10.5)
24	19.5 to 24.5	(2 to 2.5)	(14.5 to 18)
27	29.5 to 34	(3 to 3.5)	(21.5 to 25.5)

Torque Specifications for Compressor Mounting Bolts:

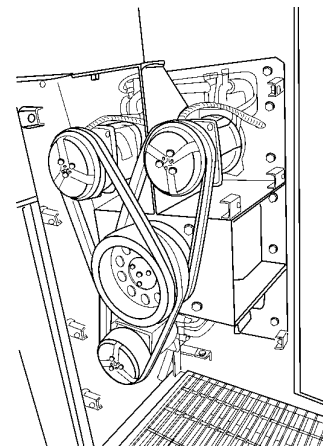
Wrench Size (mm)	Fastening Torque		
	N·m	(kgf·m)	(lbf·ft)
10	19.5 to 29.5	(2 to 3)	(14.5 to 21.5)

Torque Specifications for Liquid Tank:

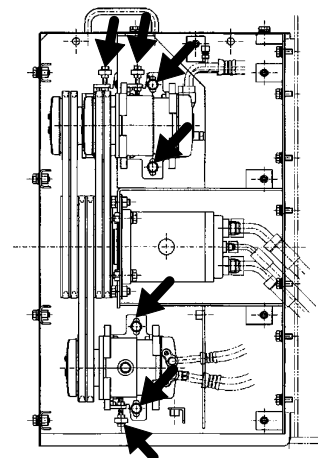
Wrench Size (mm)	Fastening Torque		
	N·m	(kgf·m)	(lbf·ft)
10	7.8 to 11.5	(0.8 to 1.2)	(5.8 to 8.7)



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MAINTENANCE

7

Seasonal Maintenance

--- preseason

--- off-season



CAUTION: Do not attempt to loosen connections in air conditioning circuit when the air conditioner malfunctions. Doing so may cause high pressure gas to spout, resulting in serious injury. Consult your authorized dealer immediately.

1. Preseason maintenance

Prior to the season, consult your authorized dealer for maintenance of the air conditioner in order to operate it in good condition during the season.

This maintenance includes replenishment of refrigerant, inspection and replacing (if necessary) of inner and outer air filters, line connections, pressure switches and inspection and cleaning of evaporator.

2. Off-season maintenance

- (1) Operate the compressor once a week at low speed for several minutes in order to maintain its parts in well lubricated condition. Be sure to run the engine at slow idle and air temperature to MEDIUM COOL. This operation also prevents refrigerant leakage caused by a dried up shaft seal.
- (2) Check for refrigerant leakage. If the refrigerant level is low during off-season, rust will form inside the circuit.



NOTE: Do not remove compressor belt from the compressor during off-season.

MAINTENANCE

I. 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 authorized dealer when installing a radio communication equipment or additional electrical parts, or when replacing electrical parts.

Never attempt to disassemble or modify the electrical/electronic components. If replacement or modification of such components is required, contact your authorized dealer.

1 Batteries



CAUTION: Battery gas can explode. Keep sparks and flames away from batteries. Use a flashlight to check the battery electrolyte level.

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

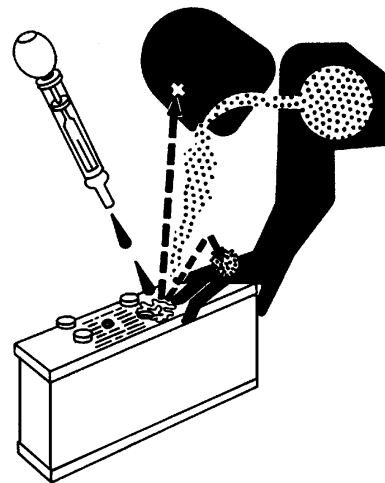
Sulfuric acid in battery electrolyte is poisonous. It is strong enough to burn skin, eat holes in clothing, and cause blindness if splashed into the eyes.

Avoid hazard by:

1. Filling batteries in a well-ventilated area.
2. Wearing eye protection and rubber gloves.
3. Avoiding breathing fumes when electrolyte is added.
4. Avoiding spilling or dripping electrolyte.
5. Using proper booster battery starting procedures.

If you spill acid on yourself:

1. Flush your skin with water.
2. Apply baking soda or lime to help neutralize the acid.
3. If splashed in eyes, flush with water for 10 to 15 minutes. Get medical attention immediately.



SA-036

MAINTENANCE

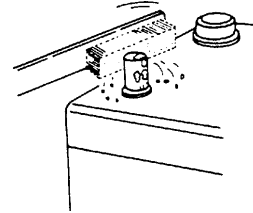
If acid is swallowed:

1. Drink large amounts of water or milk.
2. Then drink milk of magnesia, beaten eggs, or vegetable oil.
3. Get medical attention immediately.

IMPORTANT: Add water to batteries in freezing weather before you begin operating your machine for the day, or else charge the batteries.

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

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



M409-07-072

 **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, flush it with plenty of water, otherwise, consult the battery manufacturer.

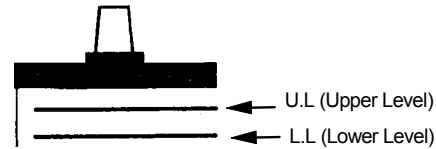
MAINTENANCE

Electrolyte Level Check

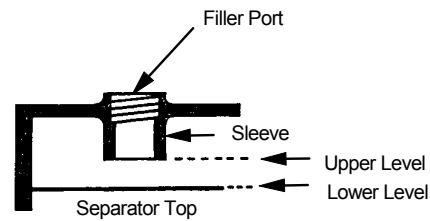
1. Check the electrolyte level at least once a month.
2. Park the machine on level ground and stop the engine.
3. Check the electrolyte level.
 - 3.1 When checking the level from the battery side:

Clean around the level check lines with a wet towel. Don't use a dry towel. Static electricity may be 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 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. Therefore, when the electrolyte level is flush with the U.L, the level is judged to be proper. Then, referring to the right illustrations, check the level. When the electrolyte level 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. Be sure to refill with distilled water before recharging (operating the machine). 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 around the battery terminals clean to prevent battery discharge. Check terminals for loose and/or rust. Coat terminals with grease or petroleum jelly to prevent corrosion build up.



M146-07-109



Proper

M146-07-110



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.

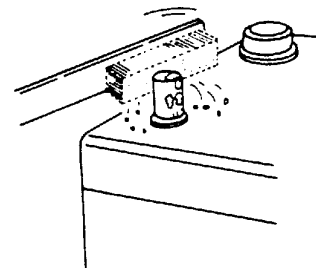
Lower

M146-07-111



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



CAUTION: Battery gas can explode. Keep sparks and flames away from batteries. Use a flashlight to check the battery electrolyte level.

Sulfuric acid in battery electrolyte is poisonous. It is strong enough to burn skin, eat holes in clothing, and cause blindness if splashed into the eyes.

Never check the battery charge by placing a metal object across the posts. Use a voltmeter or hydrometer.

Always remove the grounded (–) battery clamp first and replace it last.

Avoid hazard by:

1. Filling batteries in a well-ventilated area.
2. Wearing eye protection and rubber gloves.
3. Avoiding breathing fumes when electrolyte is added.
4. Avoiding spilling or dripping electrolyte.
5. Using proper booster battery starting procedures.

If you spill acid on yourself:

1. Flush your skin with water.
2. Apply baking soda or lime to help neutralize the acid.
3. If splashed in eyes, flush with water for 10 to 15 minutes. Get medical attention immediately.

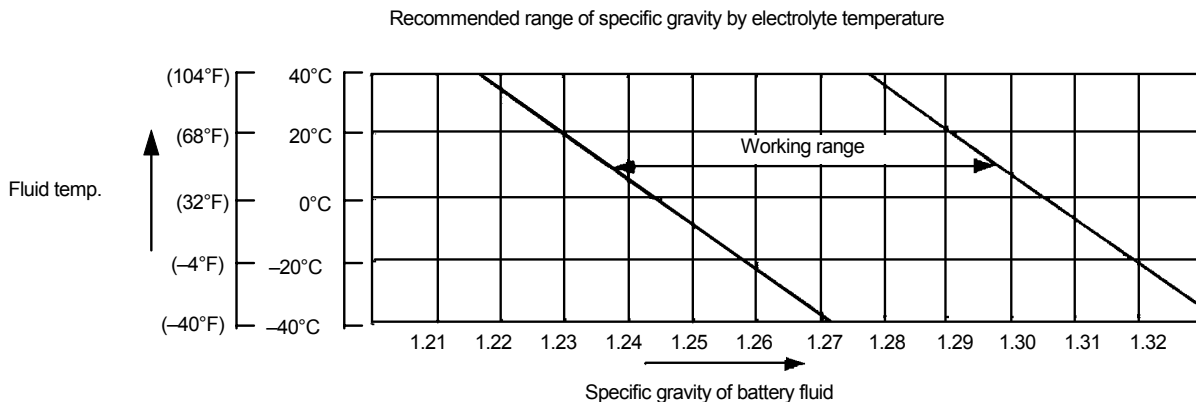
If acid is swallowed:

1. Drink large amounts of water or milk.
2. Then drink milk of magnesia, beaten eggs, or vegetable oil.
3. Get medical attention immediately.

IMPORTANT: Check the specific gravity of the electrolyte after it is cooled, not immediately after operation.

Check the electrolyte specific gravity in each battery cell.

The lowest limit of the specific gravity for the 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.



REPLACE BATTERIES

Your machine has four 12-volt batteries with negative (–) ground.

If one of four batteries in a 24-volt system has failed but the other are still good, replace all the batteries together with new ones of the same type. For example, replace a failed maintenance-free battery with a new maintenance-free battery. Different types of batteries may have different rates of charge. This difference could overload one of the batteries and cause it to fail.

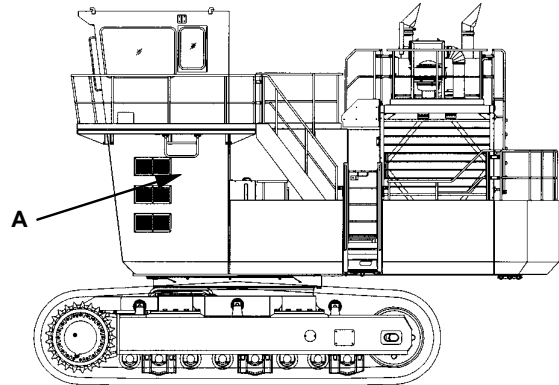
MAINTENANCE

2

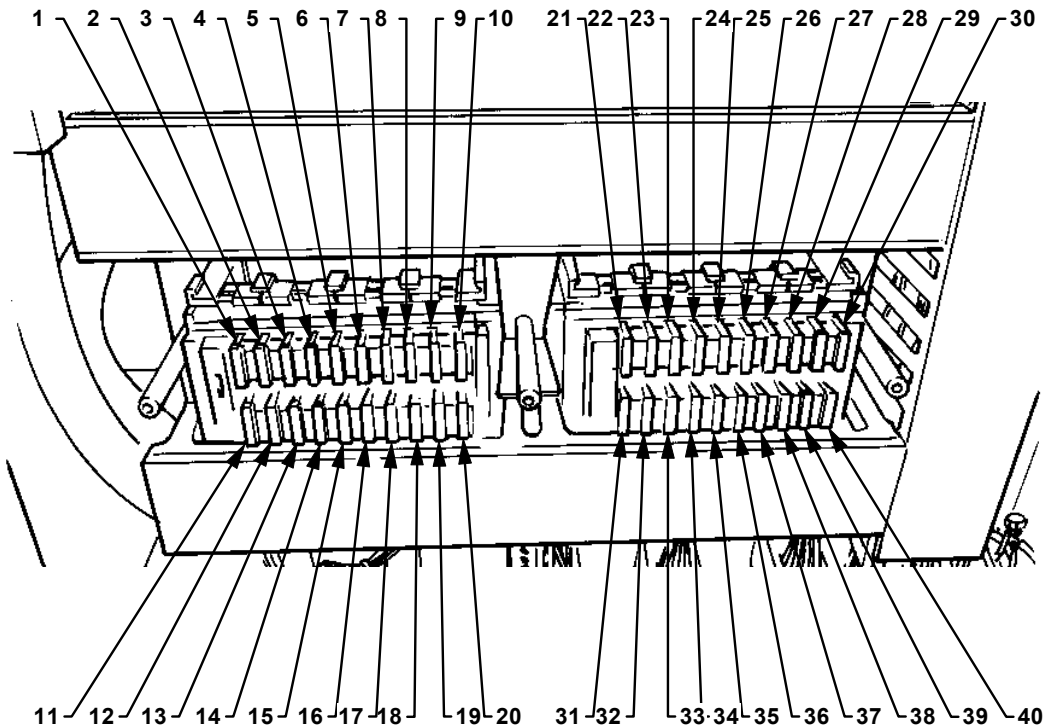
Replacing Fuses --- as required

If any electrical component fails, first check the fuses in the fuse box, located in room (A) under the cab. Remove fuse box cover and confirm that the fuses shown below are provided.

IMPORTANT: Install fuse with correct amperage rating to prevent electrical system damage from overload.



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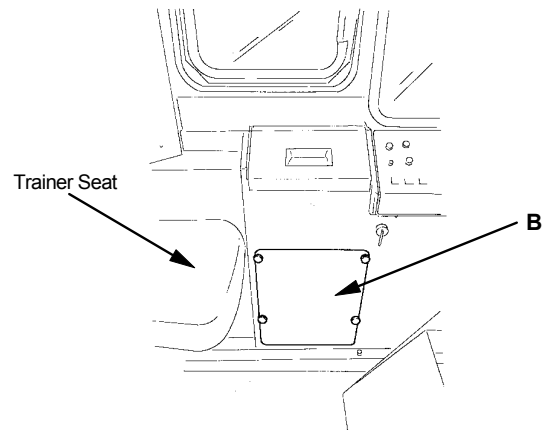
M146-07-011

- | | | | |
|------------------------------|-----------------------------|----------------------------|-----------------------------|
| 1 - MAIN CONTROL UNIT (A) 5A | 11 - ENG. ROOM LIGHT 5A | 21 - SOL. VALVE 15A | 31 - A/C MAIN (FRONT) 15A |
| 2 - MAIN CONTROL UNIT (B) 5A | 12 - PUMP ROOM LIGHT 5A | 22 - MOT. ALARM 5A | 32 - A/C MAIN (SIDE) 15A |
| 3 - LOAD DUMP RELAY 5A | 13 - WORK LIGHT (UPPER) 10A | 23 - DC/DC 15A | 33 - A/C MAIN (REAR) 15A |
| 4 - E.C.M. ENG. START 5A | 14 - WORK LIGHT (REAR) 10A | 24 - E.C.M. RELAY 5A | 34 - A/C ON SIG. (FRONT) 5A |
| 5 - STOP SOL. RELAY 5A | 15 - WORK LIGHT (RIGHT) 10A | 25 - C.S.U. BACK UP 5A | 35 - A/C ON SIG. (SIDE) 5A |
| 6 - BATTERY RELAY 5A | 16 - WORK LIGHT (LEFT) 10A | 26 - HORN 10A | 36 - A/C ON SIG. (REAR) 5A |
| 7 - POWER ON SIG. 5A | 17 - C.S.U. MAIN POWER 5A | 27 - ILLUMINAT. 5A | 37 - A/C BACK UP 5A |
| 8 - MONITOR LAMP 5A | 18 - WIPER MOT. (LOWER) 10A | 28 - CAB DOME LIGHT 5A | 38 - A/C C. FAN (FRONT) 30A |
| 9 - ENTRANCE LIGHT 5A | 19 - WIPER MOT. (UPPER) 10A | 29 - SWITCH VALVE RELAY 5A | 39 - A/C C. FAN (SIDE) 30A |
| 10 - CAB BED LIGHT 5A | 20 - MAIN C/U SOL. 10A | 30 - STARTER RELAY 5A | 40 - A/C C. FAN (REAR) 30A |

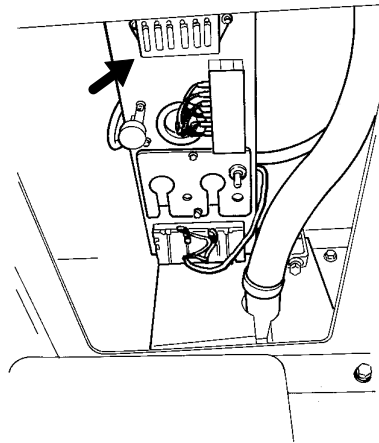
MAINTENANCE

Remove cover (B) on the side wall of the left console in the cab. Also, check the fuses.

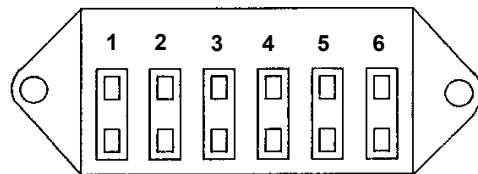
- 1- RADIO (BACK UP) 5A
- 2- RADIO (ACC) 5A
- 3- LIGHTER 10A
- 4- POWER TERMINAL (ACC) 10A
- 5- POWER TERMINAL 24V 15A
- 6- POWER TERMINAL 12V 15A



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M144-07-111

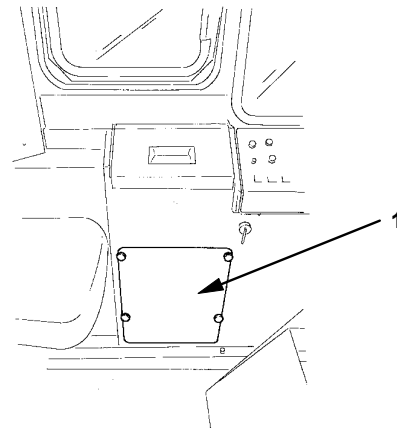
MAINTENANCE

3

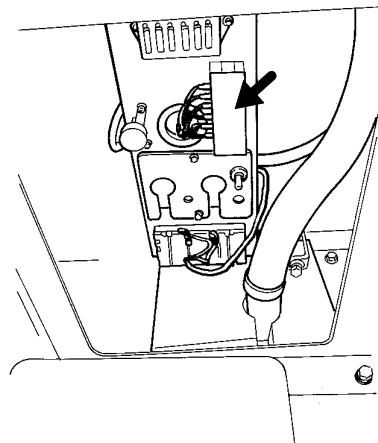
Power Source Terminal

- 12 Volts and 24 Volts Terminal

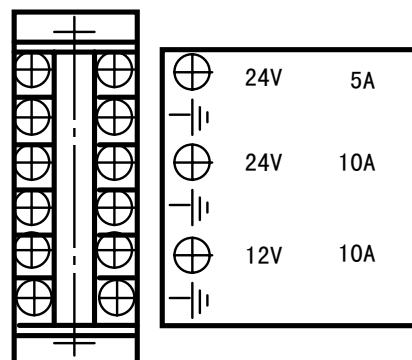
Remove cover (1) on the side wall of the left console in the cab. 12 volts and 24 volts terminal are located in the side wall of the left console. Use this terminal to power electrical devices of 12 volts and 24 volts rating. Fuses for this terminal are provided with 10 ampere and 15 ampere fuses.



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M18C-01-029



⊕	24V	5A
⊖		
⊕	24V	10A
⊖		
⊕	12V	10A
⊖		

M117-07-172

MAINTENANCE

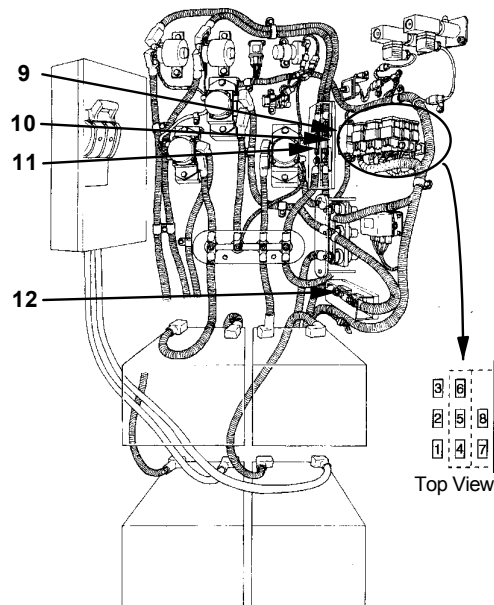
4

Fusible Link

Fusible links are located inside battery compartment (A). Fusible link protects electric main circuit against excessive current.

If fusible link is melted and disconnected by short circuit, see your authorized dealer.

- 1- Fusible Link 75 A (Fuse Box No. 31 to 33, and 38 to 40)
- 2- Fuse 75 A (Fuse Box No. 13 to 20, and 42)
- 3- Fusible Link 75 A (Fuse Box No. 21 to 23)
- 4- Fusible Link 75 A (Fuse Box No. 24, 27, 46, and power terminal)
- 5- Fusible Link 75 A (Fuse Box No. 9 to 12, and 27)
- 6- Fusible Link 45 A (Fuse Box No. 1 to 3, 25, 37, 41, and key switch)
- 7- Fusible Link 45 A (Engine Stop Solenoid)
- 8- Fusible Link 45 A (Optional Light Power)
- 9- Fusible Link 250 A (For Starter Relay)
- 10- Fusible Link 300 A (For Pre-heat Relay F)
- 11- Fusible Link 300 A (For Pre-heat Relay R)
- 12- Fusible Link 250 A (For Alternator)



M18C-07-057

MAINTENANCE

5

Check Electrical Cables and Wire Harnesses for Short Circuits



CAUTION: Short circuits can cause fires that may result in serious injury.

To avoid this hazard:

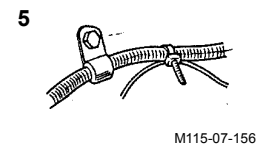
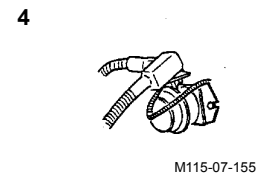
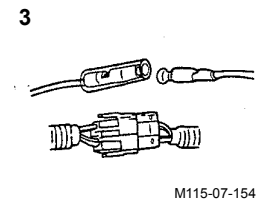
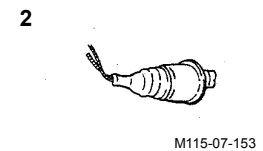
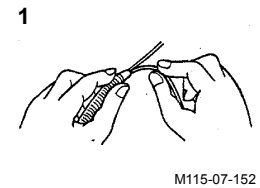
1. Park the machine on a solid, level surface. Lower the bucket to the ground. Stop the engine. Remove key from the key switch. Pull the pilot control shut-off lever to the LOCK position.
2. Clean and tighten all electrical connections.
3. Check before each shift or after ten (10) hours of operation for loose, kinked, hardened or frayed electrical cables and wires.
Check before each shift or after ten (10) hours of missing or damaged terminal caps.
DO NOT OPERATE MACHINE if cable or wire are loose, kinked, etc..

Check cables and harnesses at the check points indicated below for damage that may result in future short circuits. If any abnormalities are found, replace, retighten or reconnect them, as shown in Table 1.
4. Tighten, repair or replace any loose or damaged electrical cables, wires, and terminal caps before operating the machine.

MAINTENANCE

Table 1. Electrical Cables and Wire Harnesses

Interval (hours)	Check Points	Abnormalities	Remedies
Daily	Wire harnesses and cables (1)	Degree of hardening	Replace
		Cracks	Replace
		Worn tape	Replace
		Contact with part edge	Replace
		Missing cap (harness terminal)	Replace
		Loose screw terminal	Retighten
		Damaged at the contacting part with clamps	Replace
	Lead wires of sensor and solenoid valve (2)	Degree of hardening	Replace
		Cracks	Replace
		Worn tape	Replace
		Contact with part edge	Replace
	Connector (3)	Degree of Hardening	Replace
		Loose locking	Lock
		Contact with part edge	Replace
		Damaged and crushed parts	Replace
		Loose or worn part	Replace
	Terminal and terminal cover (4)	Degree of hardening of cover	Replace
		Cracks	Replace
		Worn cover	Replace
		Missing cover	Replace
		Loose locking	Reconnect
	Clamps of the harnesses or connectors (5)	Missing	Replace
		Clamping positions	Correcting
		Damage	Replace



 **NOTE:** Refer to the illustrations in Fig. 1 for each check point location. Replace the damaged parts with genuine Hitachi parts.

Fig. 1

MAINTENANCE

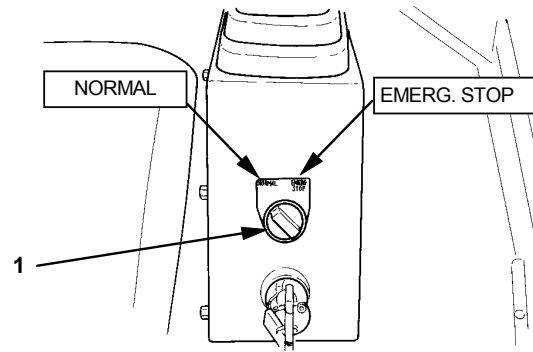
6

Check Emergency Engine Stop Switch --- Every 250 hours

Check the emergency engine stop switch function every 250 hours, following the procedures below:

1. Start the engine and run it at slow idle.
2. Turn emergency engine stop switch (1) to the EMERG STOP position.
3. Confirm that engine stop and relieve pressure from the hydraulic oil tank.

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



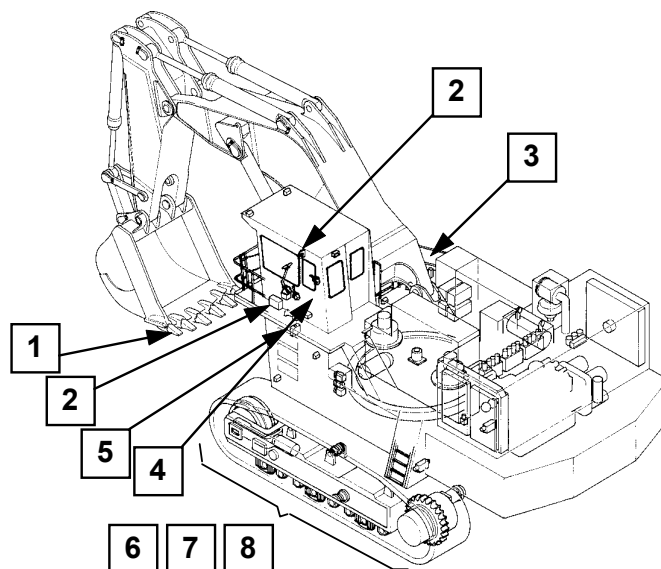
M117-01-093

MAINTENANCE

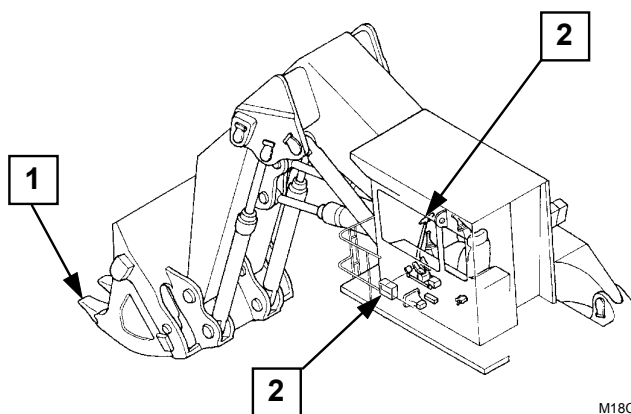
J. MISCELLANEOUS

Parts		Quantity	Interval (hours)						
			10	50	250	500	1000	1500	3000
1. Check Bucket Teeth for Wear and Looseness		6							
2. Inspect Emergency Rope and Rope Mounting Hardware		1							
3. Check Auto-Lubrication System		1							
4. Seat Belt	Check	2							
	Replacement	2	At least once every 3 years						
5. Check Washer Tank		2	As required						
6. Check and Adjust Track Sag		2							
7. Check Accumulator and Track Adjuster Cylinder Circuit		2	Every year						
8. Clean Side Frame Area		2							
9. Check Tightening Torque of Bolts and Nuts		–		*					

 NOTE: * First time only.



M18C-01-039



M18C-01-040

MAINTENANCE

1

Check Bucket Teeth --- daily

Loading Shovel, Backhoe Std.

Check the bucket teeth for wear and looseness

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

Dimension A in mm (in)

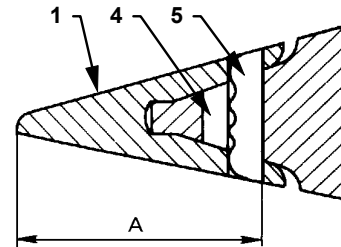
	Parts No.	New	Limit of Use
Loading Shovel Bucket PCSA 11.0 m ³ (14.4 yd ³)	4179918	469 (1' 6")	285 (11")
Backhoe Bucket PCSA 9.6 m ³ (12.6 yd ³) CECE 8.4 m ³	4083973	335 (1' 1")	180 (7")

Replacing procedure

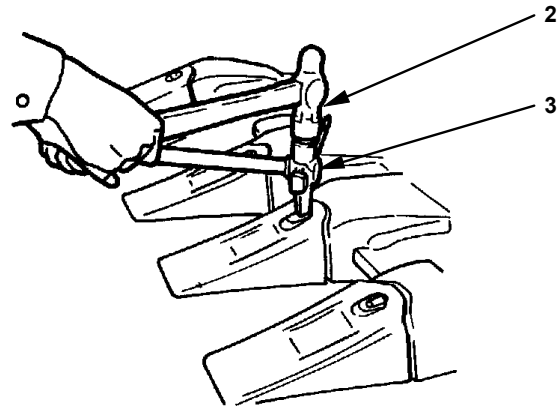


CAUTION: Guard against injury from flying pieces of metal. Wear goggles or safety glasses, and safety equipment appropriate to the job.

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. Remove tooth (1). Inspect locking pin (5) and rubber pin lock (4) for damage, replace if necessary. Short locking pins and damaged rubber pin locks must be replaced with new ones.

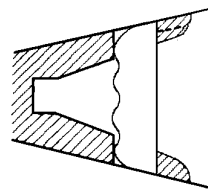


M104-07-056

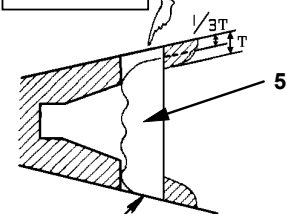


M104-07-150

RIGHT



WRONG

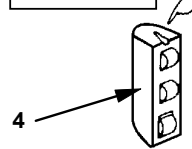


Flush one end of the locking pin to evaluate. In this instance, the locking pin is too short.

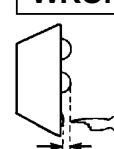
M104-07-118

M104-07-058

WRONG



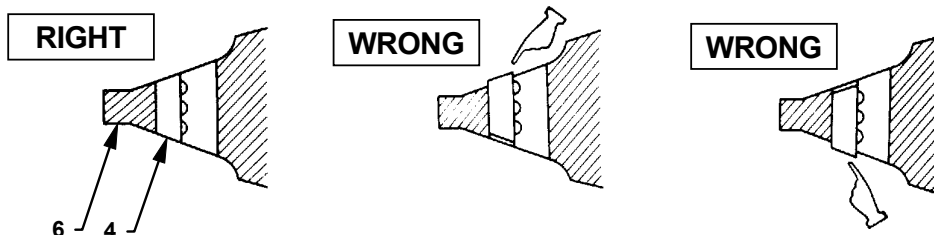
WRONG



M104-07-059

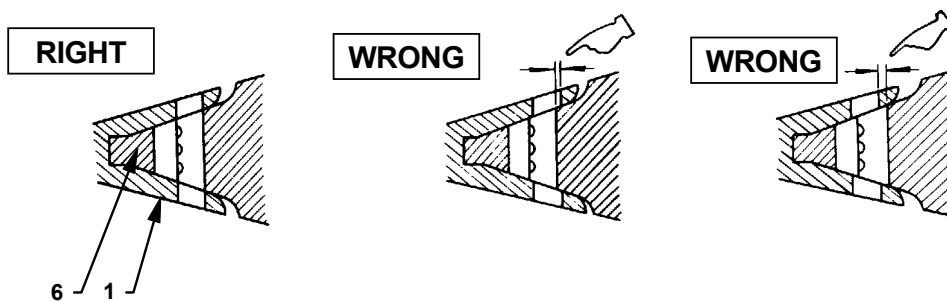
MAINTENANCE

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



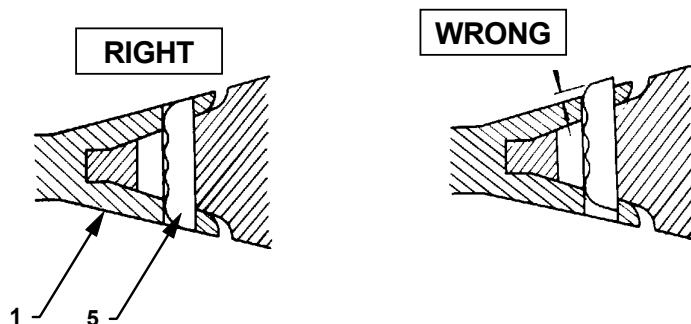
M104-07-060

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



M104-07-061

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



M104-07-062

 **NOTE:** Check the bucket teeth periodically to ensure that wear does not exceed the designed service limit.

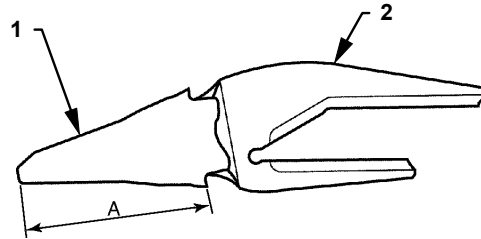
MAINTENANCE

Backhoe BE

Check the bucket teeth for wear and looseness

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

Dimension A in mm (in)			
	Parts No.	New	Limit of Use
Backhoe Bucket PCSA 12.0 m ³ (15.7 yd ³)	4376025	384 (1' 3")	200 (7.9")



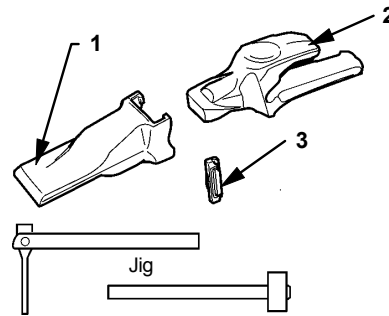
M18C-07-073

Replacing Procedure

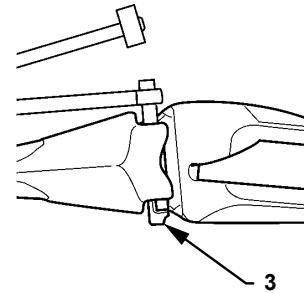
Removal

CAUTION: Guard against injury from flying pieces of metal. Wear goggles or safety glasses.

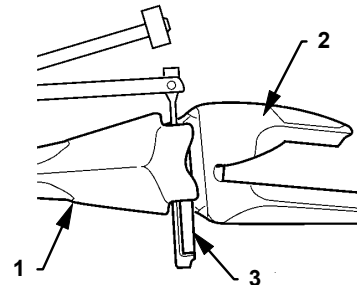
1. Preparations for removing tooth point.
Hit the left and right top ends and the left and right lugs of tooth point (1) alternately with hammer to knock off pebbles, soil, etc., stuck in the gap between tooth point (1) and adapter (2).
2. Removing the lock pin.
Remove pebbles, dirt, etc., completely from the gap between lock pin (3) and adapter (2).
Place pin-removing special tool on the top end of lock pin (3) and hit it with hammer to remove lock pin (3).
When driving out the pin, first hit with shorter jig.
3. When top end of lock pin (3) comes to the upper end position of the lug of tooth point (1), use the longer special tool to remove lock pin (3).
4. Removing the tooth point
Turn tooth point (1) to the left and pull it toward you to remove it.



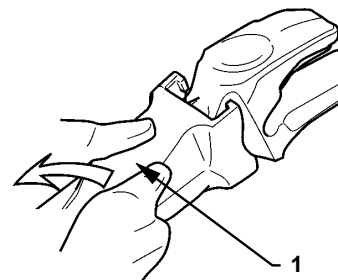
M113-07-102



M113-07-103



M113-07-104



M113-07-105

MAINTENANCE

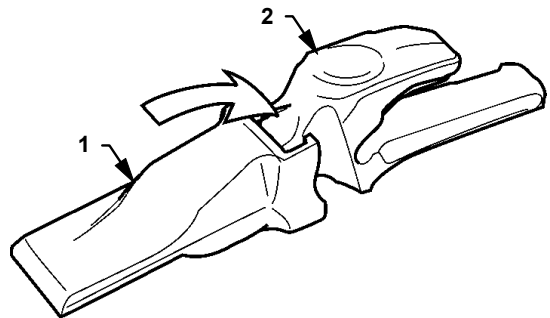
Installation

1. Mounting tooth point (1)

Clean the top end of adapter (2) nose. If pebbles, dirt, etc., are stuck to the adapter nose, tooth point (1) will not insert properly and the lock pin cannot be driven in.

Also check that lock pin has no cracks.

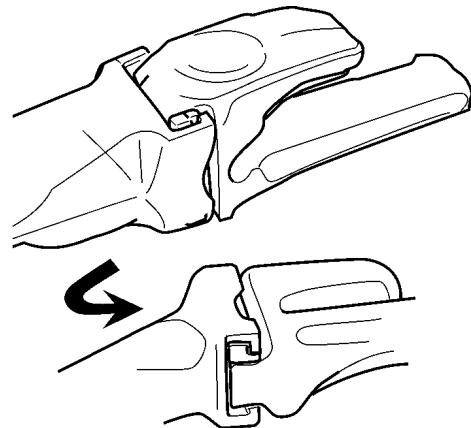
Insert tooth point (1) slowly while turning it to the right.



M113-07-106

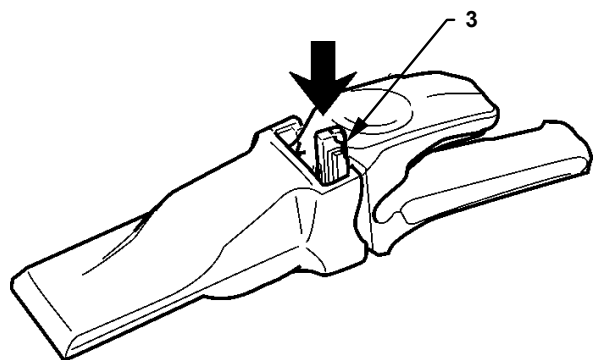
2. Insert lock pin (3).

Be sure to check the direction of lock pin (3).

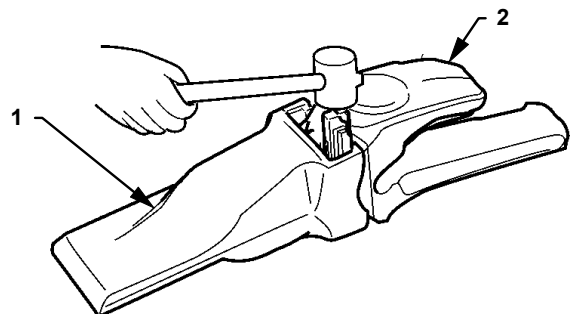


M113-07-107

3. With tooth point (1) fully inserted onto adaptor (2), tap lock pin (3) into tooth point (1) with a hammer until the top of lock pin (3) comes flat with the tooth point.



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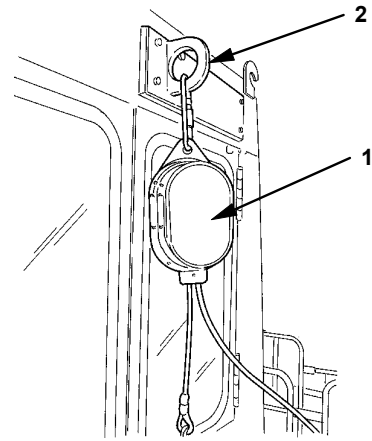


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MAINTENANCE

2 Inspect Emergency Escape Device and Hanger --- daily

Inspect emergency escape device (1) and hanger (2) before operating the machine. If any item is worn and/or damaged, replace the equipment and/or hanger with genuine Hitachi parts.



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MAINTENANCE

3

Auto-Lubrication System

The machine is equipped with auto-lubrication system for the front attachment joint pins, swing bearing and center joint.

Checking Indicator Pins

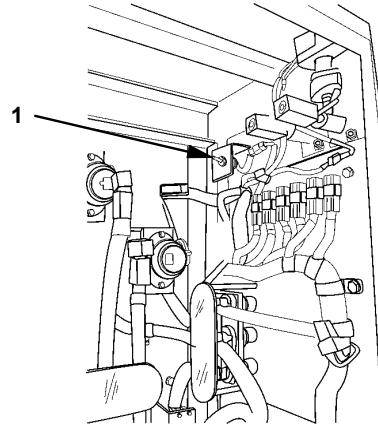
IMPORTANT: The auto-lubrication system is equipped with injectors (3) for greasing. Check indicator pins (2) of injectors (3) every day to confirm that greasing is done correctly. Also, check grease piping for leakage.

1. Move auto-lubrication toggle switch (1) to the MANUAL position. Check that the grease pump begins operating and indicator pins (2) retract.
2. Move auto-lubrication toggle switch (1) to the AUTO LUB. position. Indicator pin positions are as follows:

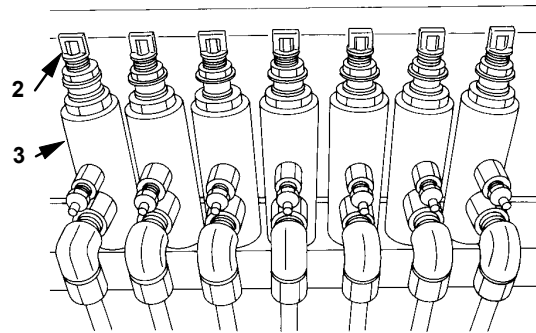
Indicator pins (2) are retracted while the grease pump is operating.

Indicator pins (2) are extended while the grease pump is stopped.

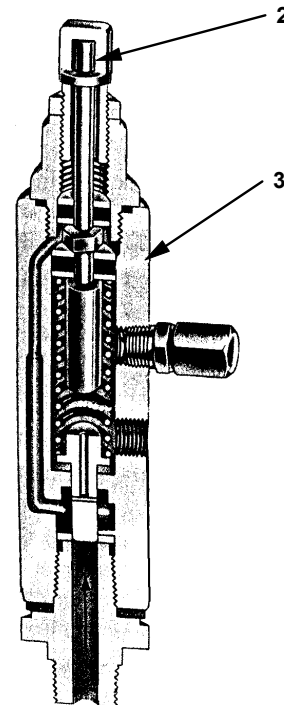
 **NOTE:** The stroke of pin movement differs depending on the greasing volume of injectors (3).



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M145-07-029



M117-07-173

MAINTENANCE

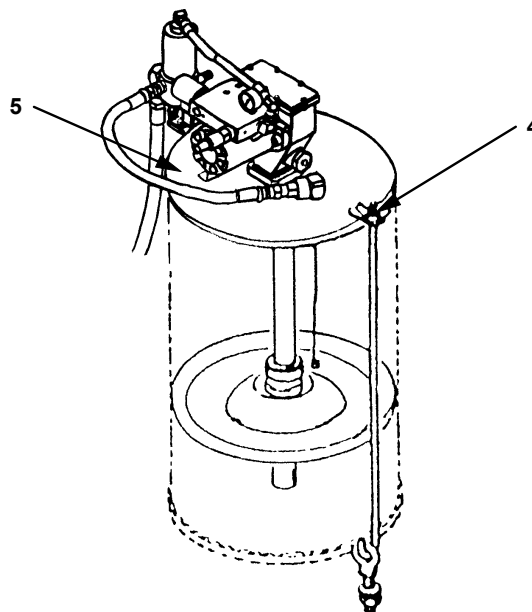
Check Grease Level --- daily

Remove two wing nuts (4). Open grease-can top cover assembly (5) to check quantity of grease inside. Add grease if necessary.

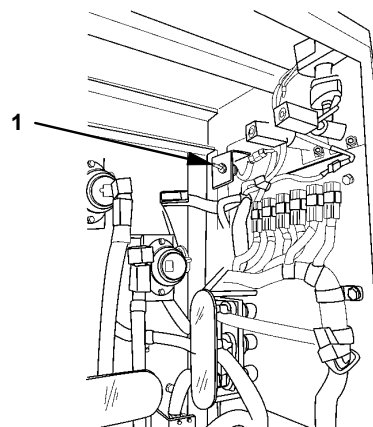
Automatic Greasing

Move auto-lubrication toggle switch (1) to the AUTO LUB. position. Disconnect hose (6) at coupler (7). The grease pump intermittently delivers grease for approximately one minute with an interval of 3 minutes according to the greasing schedule preset at the factory. The greasing schedule, interval and volume, can be adjusted as shown below.

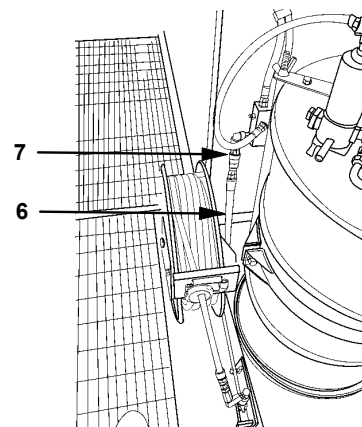
IMPORTANT: Do not adjust greasing interval to be too long or the greasing volume to be too small.



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M18C-07-011



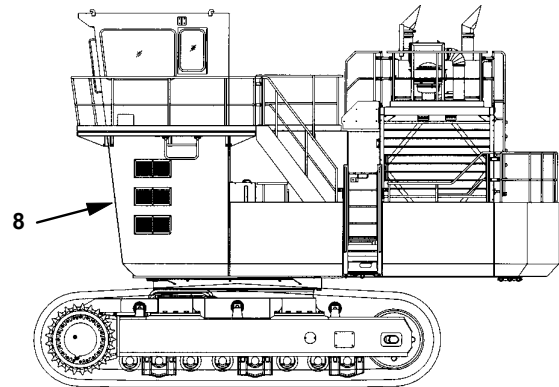
M141-07-017

MAINTENANCE

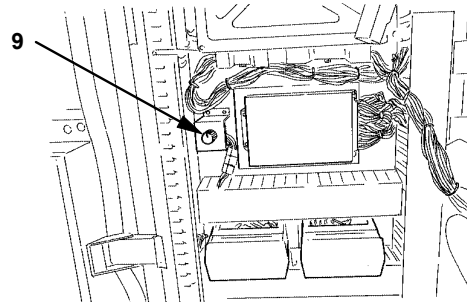
1. Adjusting Greasing Interval

Turn adjusting switch (9) located in room (8) under the cab to the desired position out of four possible positions: 3, 5, 10, and 15 minutes.

Greasing Interval (minutes)
3
5
10
15



M18C-01-012



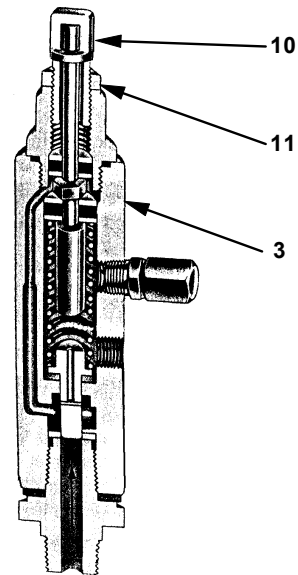
M146-07-050

2. Adjusting Greasing Volume

Loosen locknut (11) on injector (3). Turn adjusting nut (10) (indicator pin) clockwise until it stops. This is the minimum delivery position of 0.168 cm^3 (0.010 in^3). Turn adjusting nut (10) (indicator pin) counterclockwise approximately 10 turns. This is the maximum delivery position of 1.165 cm^3 (0.071 in^3). Select appropriate greasing volume between the maximum and minimum volumes. Tighten locknut (11).

NOTE: Injectors (3) have been adjusted as shown below at the time of shipment:

Front attachment joint pins: Maximum
Swing bearing: Minimum
Center joint: Minimum



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Model	SL-1	SL-11
Min. Volume	$0.168 \pm 40\%$	$1.165 \pm 15\%$
Max. Volume	$1.165 \pm 40\%$	$8.163 \pm 5\%$

NOTE: Use injector (SL-11) to the arm tip hinge pin on the loading shovel front attachment.

MAINTENANCE

Manual Greasing

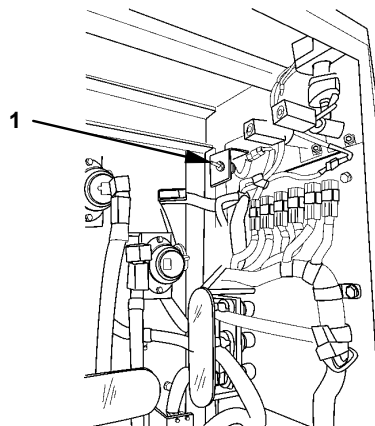
Connect hose (7) to coupler (6).

Move auto-lubrication toggle switch (1) to the MANUAL position.

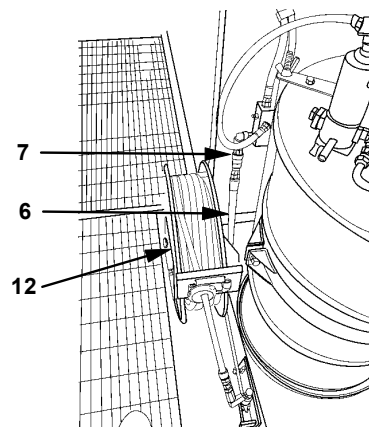
Apply grease using a grease gun. Refer to pages 7-22 to 7-30 of this manual.

After finishing greasing, disconnect hose (7) from coupler (6), release grease pressure in hose reel (12) via the grease gun.

 **NOTE:** When manual greasing is selected, the auto-lubrication indicator on the monitor panel will come on. This is not abnormal.



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MAINTENANCE

4

Check and Replace Seat Belt

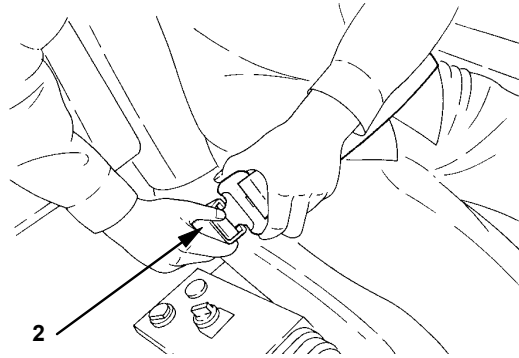
Check --- daily

Replace --- every 3 years

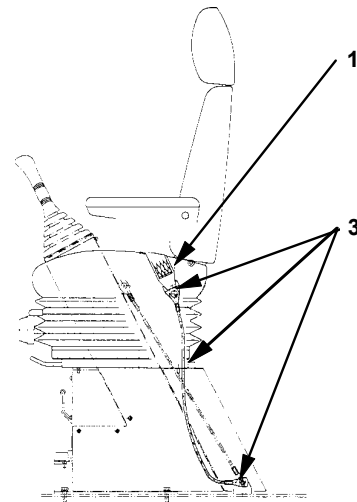
Always maintain the seat belt in a functional condition and replace when necessary to ensure proper performance.

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 seat belt or component before operating the machine.

We recommend that the seat belt be replaced every three years regardless of its apparent condition.



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M117-07-094

5

Check Windshield Washer Fluid Lever

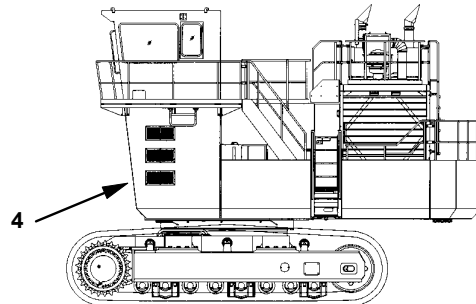
--- as required

Windshield washer tank (5) is located in room (4) under the cab.

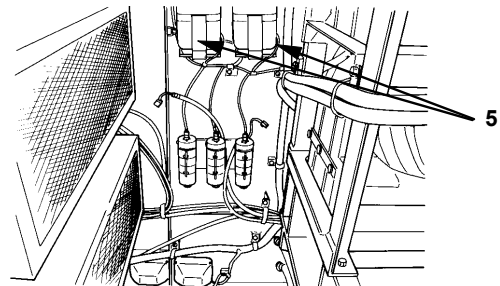
Check fluid in windshield washer tank (5).

If the fluid level is low, remove cap of windshield washer tank (5) and add fluid via the opening.

During winter season, use all season windshield washer which will not freeze.



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MAINTENANCE

6

Check and Adjust Track Sag --- every 50 hours



CAUTION: Be sure to place blocks under the machine frame to support the machine when one track is raised off ground.

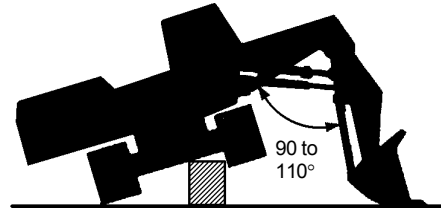
Swing the upperstructure 90° and lower the bucket to raise the track off the ground as shown.

Keep the angle between the boom and arm 90 to 110° and position the bucket's round side on the ground. Place blocks under the machine frame to support the machine. Rotate track one full rotation. Thoroughly clean track area to remove soil.

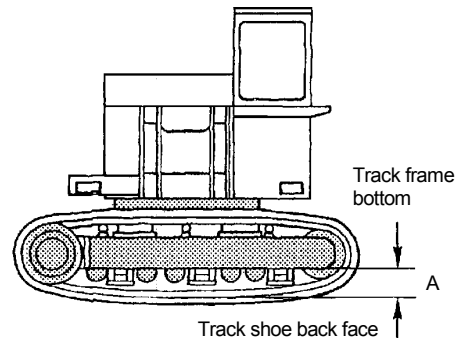
Measure distance (A) at the middle of the track frame from the bottom of the track frame to the back face of the track shoe.

Track sag specifications --- 570 to 640 mm
(22.4 in to 25.2 in)

 **NOTE:** When operating the machine on sand, gravel, snow or mud, providing longer track sag is recommended in the above-mentioned value range.



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M115-07-170

Precautions for Adjusting Track Sag

1. When measuring track sag after adjusting, be sure to rotate the raised track one full rotation.
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. Each time, be sure to place blocks under the machine frame to support the machine.
3. When operating the machine after it has been stored for a long time or its track adjuster cylinder hose or piping has been replaced, first push the right travel lever forward to extend adjuster cylinder, and then add grease to the fitting to tighten the tracks.

MAINTENANCE

Loosen the Track



CAUTION: Do not loosen valve (1) quickly or loosen it 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 between sprockets and track links, remove it before loosening.

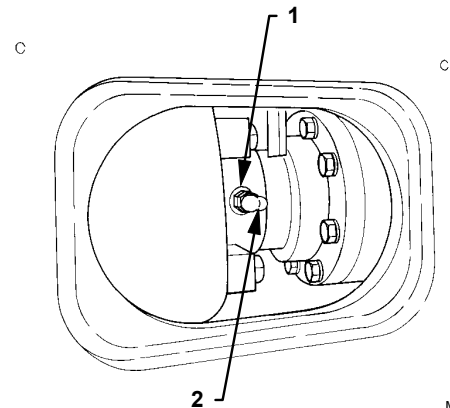
1. To loosen the track, slowly turn valve (1) counter-clockwise using long socket 24; grease will escape from the grease outlet.
2. Between 1 to 1.5 turns of valve (1) is sufficient to loosen the track.
3. If grease does not drain smoothly, slowly rotate the raised track.
4. When proper track sag is obtained, turn valve (1) clockwise and tighten to 147 N·m (15 kgf·m, 108 lbf·ft).

Tighten the Track

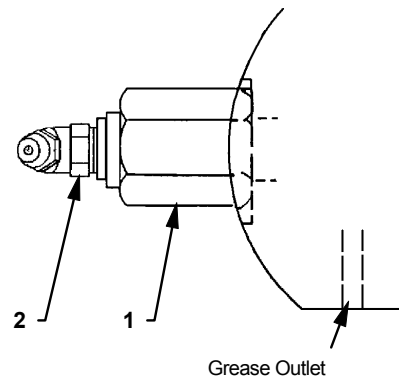


CAUTION: It is abnormal if the track remains tight after turning valve (1) counterclockwise or if the track is still loose after charging grease to fitting (2). In such cases, **NEVER ATTEMPT TO DIS-ASSEMBLE** the track shoes or track adjuster, because of dangerous high-pressure grease inside the track adjuster. See your authorized dealer immediately.

To tighten the track, connect grease lubricator or a grease gun to grease fitting (2) and add grease until the sag is within specifications.



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MAINTENANCE

7

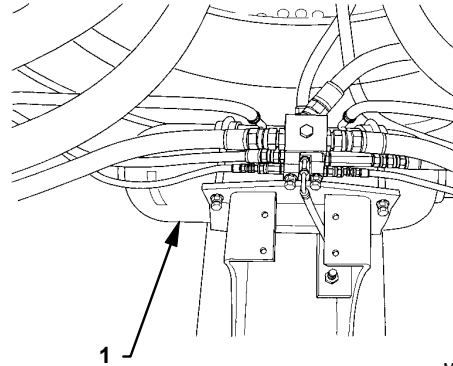
Check Accumulator and Track Adjuster Cylinder Circuit --- every year



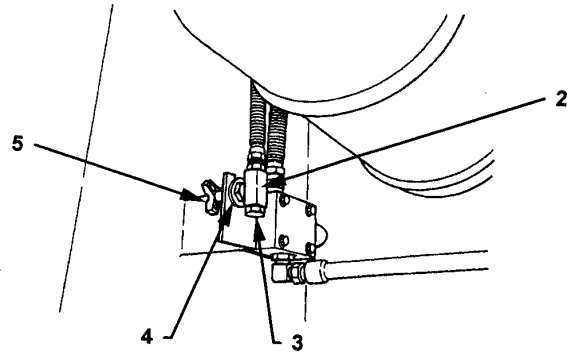
CAUTION: Accumulator (1) in the track adjuster cylinder circuit is charged with high-pressure nitrogen. Be sure to release pressure before servicing the hose between accumulator and track adjuster cylinder circuit, following the procedure shown below.

1. Loosen lock nut (4).
2. Confirm that handle (5) is sufficiently tightened by turning it clockwise. Remove plug (3).
3. Slowly turn handle (5) counterclockwise to open valve; pressurized oil escapes gradually.

IMPORTANT: Low pressure in the track adjuster cylinder circuit will cause damage to the track adjuster and travel device. Be sure to check the accumulator and adjuster cylinder circuit regularly to maintain correct circuit pressure. Consult your authorized dealer when checking accumulator.



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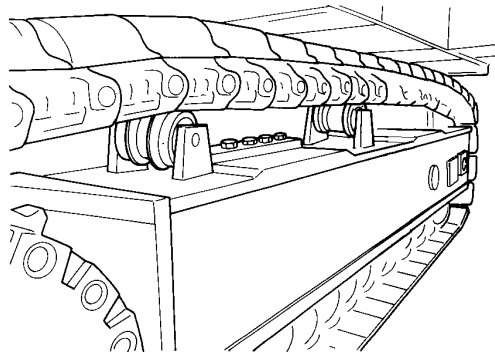
8

Check Side Frame Area --- daily

Soil or rocks stuck in the side frame area will disturb smooth rotation of the undercarriage components such as the lower rollers, upper rollers, sprockets or front idlers.

Remove soil and rocks from the area every day. In addition, clean the area at least once a week.

Be sure to thoroughly clean the area in cold seasons to prevent excessive wear of upper rollers due to freezing.



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MAINTENANCE

9

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

Check tightness after the first 50 hours then every 250 hours. Tighten to torque shown if any are loose. Bolts and nuts should be replaced with those of the same or higher grade.

IMPORTANT: Check and tighten bolts and nuts using a torque wrench.

Torque Specifications

No.	Descriptions	Bolt Dia (mm)	Q'ty	Wrench Size (mm)	Torque		
					N·m	(kgf·m)	(lbf·ft)
1	Engine cushion rubber mounting bolt	36	6	55	3140	(320)	(2320)
2	Engine bracket mounting bolt (Flywheel housing side)	27	12	41	1030	(105)	(760)
	Engine bracket mounting bolt (Fan side)	20	10	30	390	(40)	(290)
3	Hydraulic oil tank mounting bolt	30	8	46	1420	(145)	(1050)
4	Fuel tank mounting bolt	30	15	46	1420	(145)	(1050)
5	Pump transmission mounting bolt	12	16	19	88	(9)	(65)
6	Pump mounting bolt (Main pump)	20	12	30	540	(55)	(400)
	Pump mounting bolt (Fan pump)	20	4	17	540	(55)	(400)
7	Gear pump mounting bolt	12	4	19	88	(9)	(65)
8	Control valve mounting bolt	16	12	24	265	(27)	(195)
9	Swing device mounting bolt	33	48	50	2550	(260)	(1880)
10	Swing motor mounting bolt	20	8	30	390	(40)	(290)
11	Battery mounting bolt	10	16	17	49	(5)	(36)
12	Cab mounting bolt	18	10	27	295	(30)	(220)
13	Cab bed mounting bolt	16	40	24	265	(27)	(195)
14	Swing bearing mounting bolt (Upperstructure)	45	58	70	4700	(480)	(3470)
	Swing bearing mounting bolt (Track)	45	60	70	4700	(480)	(3470)
15	Counterweight mounting bolt	45	6	75	3920	(400)	(2890)
16	Engine bed mounting bolt	30	20	30	1420	(145)	(1050)
17	Oil cooler mounting bolt	27	4	41	1370	(140)	(1010)
18	Radiator mounting bolt	27	4	41	1370	(140)	(1010)
19	Fan motor mounting bolt	16	4	24	205	(21)	(152)
20	Fan motor bracket mounting bolt	12	6	19	88	(9)	(65)
21	Travel motor mounting bolt	20	8	30	390	(40)	(290)
22	Upper roller mounting bolt	20	25	30	390	(40)	(290)
23	Lower roller mounting bolt	30	64	46	1910	(195)	(1410)
24	Travel device mounting bolt (A)	22	32	32	740	(75)	(540)
	Travel device mounting bolt (B)	33	64	50	2550	(260)	(1880)
	Travel device mounting bolt (C)	30	60	46	1910	(195)	(1410)
25	Sprocket mounting bolt	30	30	46	1910	(195)	(1410)
26	Track guard mounting bolt	30	12	46	1910	(195)	(1410)
27	Track shoe bolt	33	392	50	3190	(325)	(2350)
28	Side frame mounting bolt	45	68	70	4710	(480)	(3470)
29	Front pin-retaining bolt (Loader)	20	32	30	390	(40)	(290)
	Front pin-retaining bolt (Loader)	16	4	24	205	(21)	(152)
	Front pin-retaining bolt (Loader)	24	4	36	690	(70)	(510)
30	Front pin-retaining bolt (Backhoe)	20	24	30	390	(40)	(290)
	Front pin-retaining bolt (Backhoe)	16	12	24	205	(21)	(152)

MAINTENANCE

Tightening Torque Chart

Bolt Dia.	Wrench Size	Hexagon Wrench Size	  M552-07-091			  M552-07-090			  M157-07-225		
			Socket Bolt								
			N·m	(kgf·m)	(lbf·ft)	N·m	(kgf·m)	(lbf·ft)	N·m	(kgf·m)	(lbf·ft)
M8	13	6	30	(3.1)	(22)	20	(2.0)	(15.0)	10	(1.0)	(7.4)
M10	17	8	65	(6.6)	(48)	50	(5.1)	(37)	20	(2.0)	(15.0)
M12	19	10	110	(11.0)	(81)	90	(9.2)	(66)	35	(3.6)	(26.0)
M14	22	12	180	(18.5)	(135)	140	(14.0)	(103)	55	(5.6)	(41)
M16	24	14	270	(27.5)	(200)	210	(21.5)	(155)	80	(8.2)	(59)
M18	27	14	400	(41.0)	(295)	300	(30.5)	(220)	120	(12.0)	(89)
M20	30	17	550	(56.0)	(410)	400	(41.0)	(295)	170	(17.0)	(125)
M22	32	17	750	(76.5)	(550)	550	(56.0)	(410)	220	(22.5)	(162)
M24	36	19	950	(97.0)	(700)	700	(71.5)	(520)	280	(28.5)	(205)
M27	41	19	1400	(143)	(1030)	1050	(107)	(770)	400	(41.0)	(295)
M30	46	22	1950	(200)	(1440)	1450	(148)	(1070)	550	(56.0)	(410)
M33	50	24	2600	(265)	(1920)	1950	(200)	(1440)	750	(76.5)	(550)
M36	55	27	3200	(325)	(2360)	2450	(250)	(1810)	950	(97.0)	(700)

IMPORTANT: Make sure bolt and nut threads are clean before installing.
Apply lubricant (e. g. white zinc B solved into spindle oil) to bolts and nuts to stabilize their friction coefficient.

 **NOTE:** Tightening torque required is shown in kgf·m.
For example, when tightening a bolt or nut with a wrench of 1 m length, turning the end of it with a force of 12 kgf, the torque produced will be:

$$1 \text{ m} \times 12 \text{ kgf} = 12 \text{ kgf} \cdot \text{m}$$

To produce the same torque with a wrench of 0.25 m:

$$0.25 \text{ m} \times \boxed{} \text{ kgf} = 12 \text{ kgf} \cdot \text{m}$$

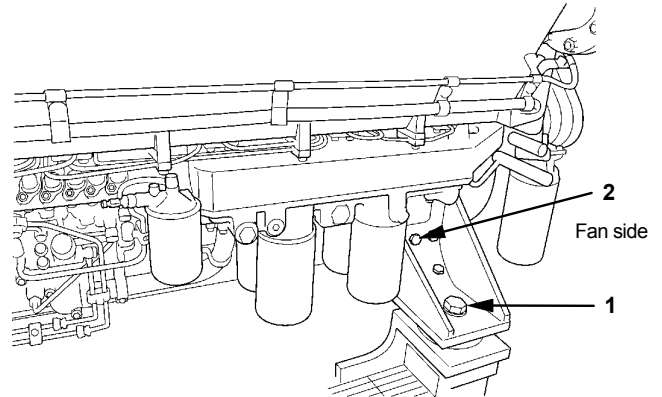
Necessary force will be:

$$12 \text{ kgf} \cdot \text{m} \div 0.25 \text{ m} = 48 \text{ kgf}$$

MAINTENANCE

1. Engine cushion rubber mounting bolt.

Tool: 55 mm
Torque: 3140 N·m (320 kgf·m, 2320 lbf·ft)

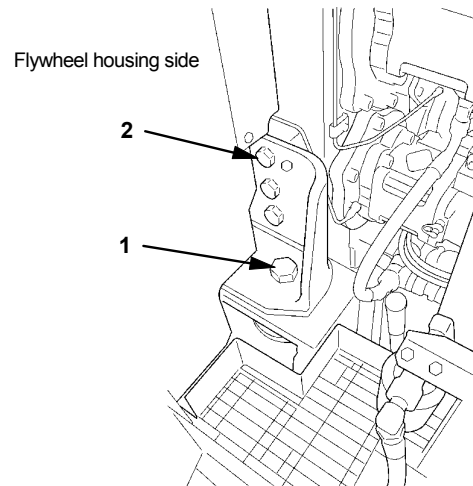


M18C-07-014

2. Engine bracket mounting bolt.

Flywheel housing side

Tool: 41 mm
Torque: 1030 N·m (105 kgf·m, 760 lbf·ft)



M18C-07-015

Fan side

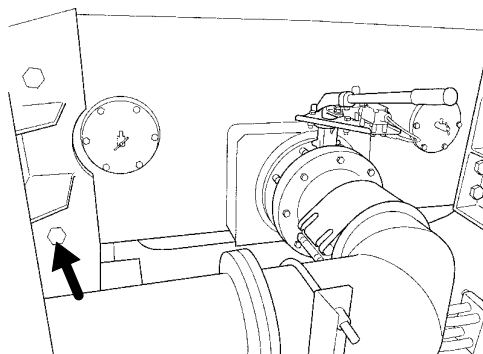
Tool: 30 mm
Torque: 390 N·m (40 kgf·m, 290 lbf·ft)

MAINTENANCE

3. Hydraulic tank mounting bolt.

Tool: 46 mm

Torque: 1420 N·m (145 kgf·m, 1050 lbf·ft)

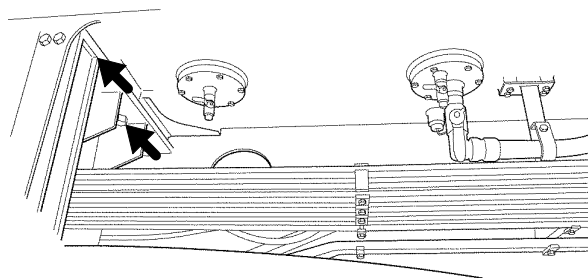


M18C-07-024

4. Fuel tank mounting bolt.

Tool: 46 mm

Torque: 1420 N·m (145 kgf·m, 1050 lbf·ft)

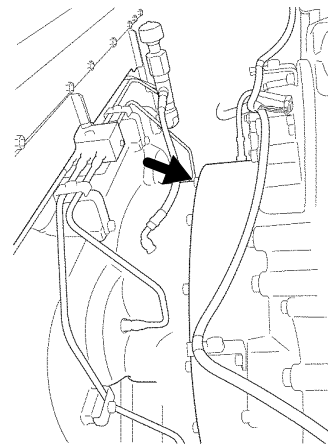


M18C-07-028

5. Pump transmission mounting bolt.

Tool: 19 mm

Torque: 88 N·m (9 kgf·m, 65 lbf·ft)



M18C-07-018

6. Pump mounting bolt.

Main pump

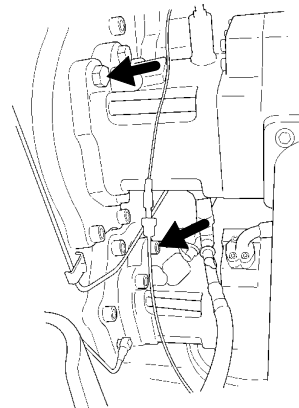
Tool: 30 mm

Torque: 540 N·m (55 kgf·m, 400 lbf·ft)

Fan pump

Tool: Hex. Wrench 17 mm

Torque: 540 N·m (55 kgf·m, 400 lbf·ft)



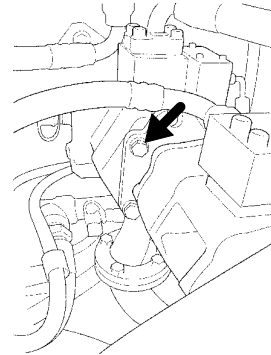
M18C-07-052

MAINTENANCE

7. Gear pump mounting bolt.

Tool: 19 mm

Torque: 88 N·m (9 kgf·m, 65 lbf·ft)

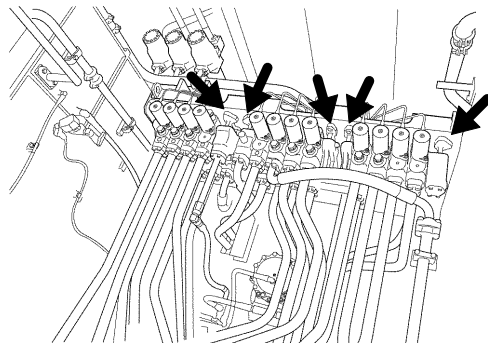


M18C-07-053

8. Control valve mounting bolt.

Tool: 24 mm

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

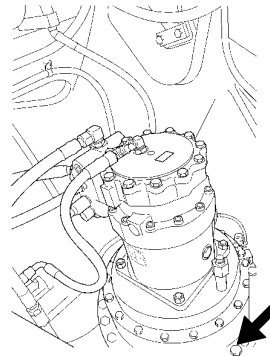


M18C-07-042

9. Swing device mounting bolt.

Tool: 50 mm

Torque: 2550 N·m (260 kgf·m, 1880 lbf·ft)

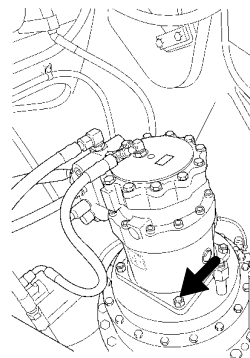


M18C-01-003

10. Swing motor mounting bolt.

Tool: 30 mm

Torque: 390 N·m (40 kgf·m, 290 lbf·ft)



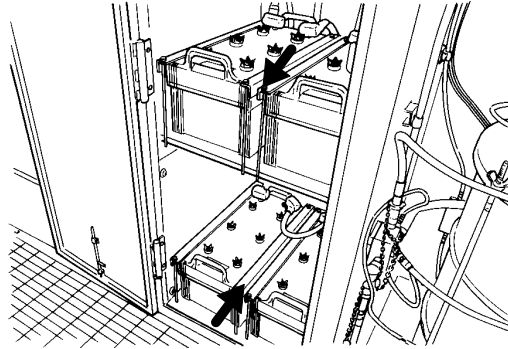
M18C-01-003

MAINTENANCE

11. Battery mounting bolt.

Tool: 17 mm

Torque: 49 N·m (5 kgf·m, 36 lbf·ft)

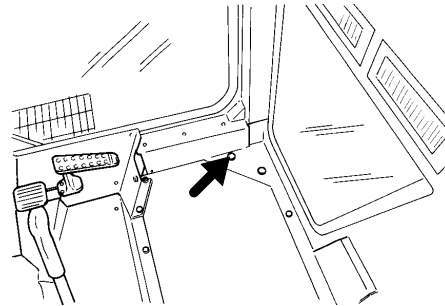


M117-07-083

12. Cab mounting bolt.

Tool: 27 mm

Torque: 295 N·m (30 kgf·m, 220 lbf·ft)

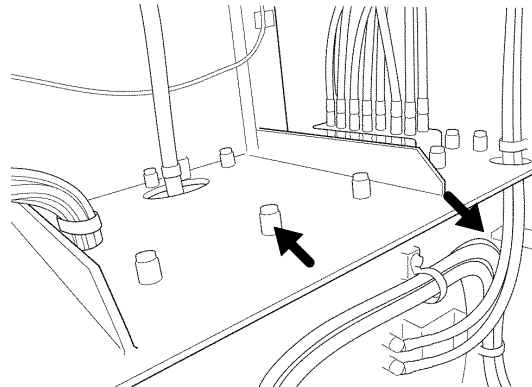


M117-07-084

13. Cab bed mounting bolt.

Tool: 24 mm

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



M18C-07-044

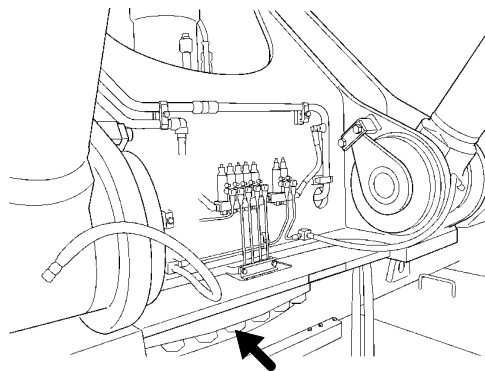
MAINTENANCE

14. Swing bearing mounting bolt.

Upperstructure

Tool: 70 mm

Torque: 4700 N·m (480 kgf·m, 3470 lbf·ft)



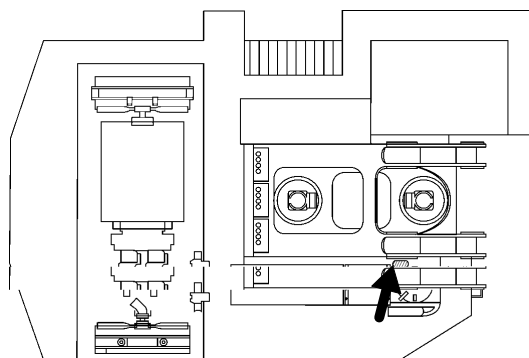
M18C-01-001

Track

Remove cover (A) and check the tightening torque.

Tool: 70 mm

Torque: 4700 N·m (480 kgf·m, 3470 lbf·ft)

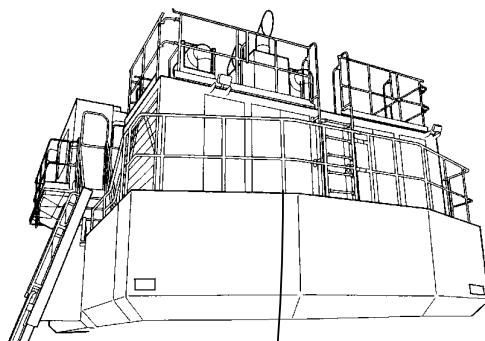


M18C-07-076

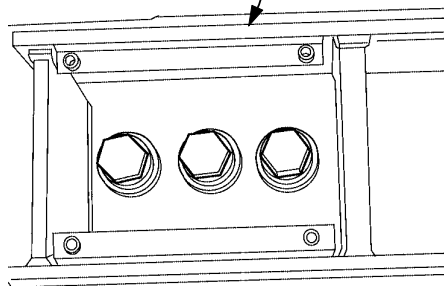
15. Counterweight mounting bolt.

Tool: 75 mm

Torque: 3920 N·m (400 kgf·m, 2890 lbf·ft)



M18C-01-006



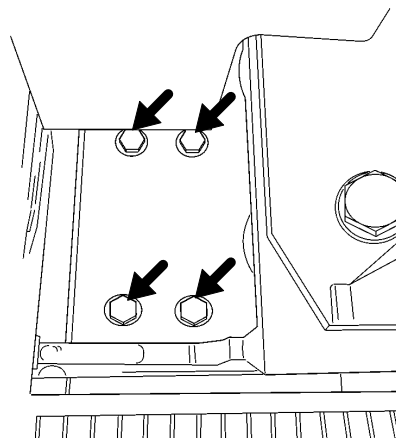
M18C-07-054

MAINTENANCE

16. Engine bed mounting bolt.

Tool: 30 mm

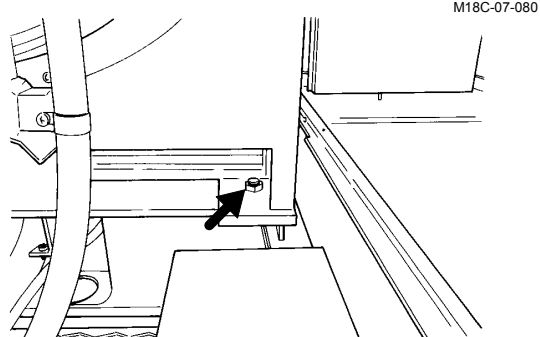
Torque: 1420 N·m (145 kgf·m, 1050 lbf·ft)



17. Oil cooler mounting bolt.

Tool: 41 mm

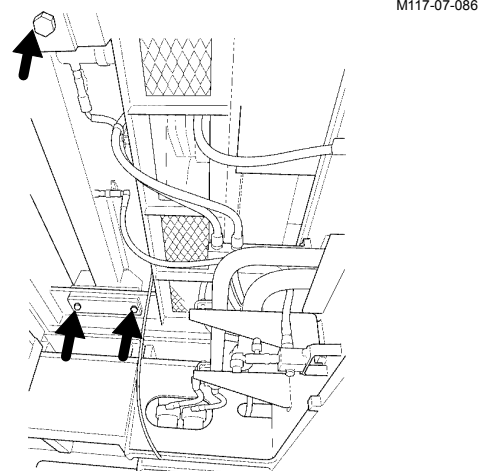
Torque: 1370 N·m (140 kgf·m, 1010 lbf·ft)



18. Radiator mounting bolt.

Tool: 41 mm

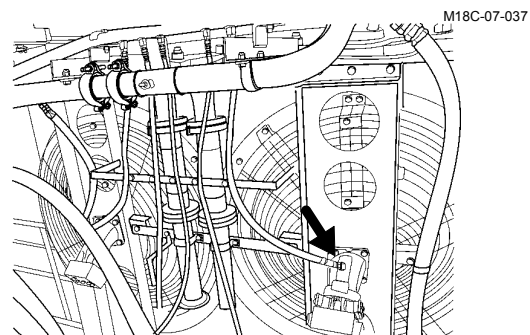
Torque: 1370 N·m (140 kgf·m, 1010 lbf·ft)



19. Fan motor mounting bolt.

Tool: 24 mm

Torque: 205 N·m (21 kgf·m, 152 lbf·ft)



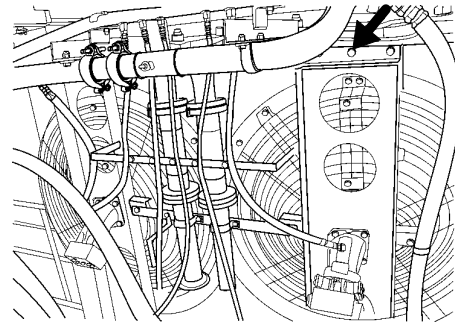
M141-07-036

MAINTENANCE

20. Fan motor bracket mounting bolt.

Tool: 19 mm

Torque: 88 N·m (9 kgf·m, 65 lbf·ft)

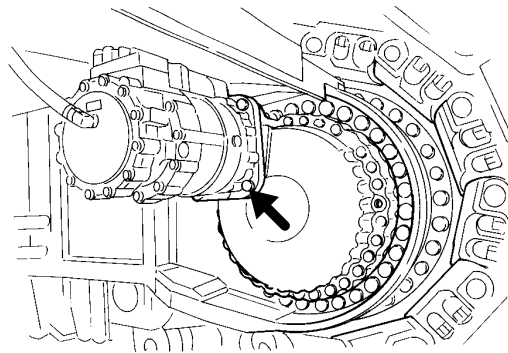


M141-07-036

21. Travel motor mounting bolt.

Tool: 30 mm

Torque: 390 N·m (40 kgf·m, 290 lbf·ft)

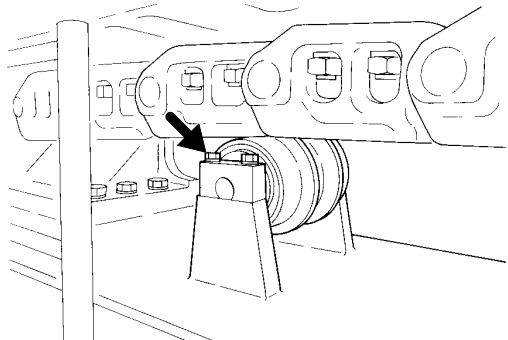


M144-12-002

22. Upper roller mounting bolt.

Tool: 30 mm

Torque: 390 N·m (40 kgf·m, 290 lbf·ft)

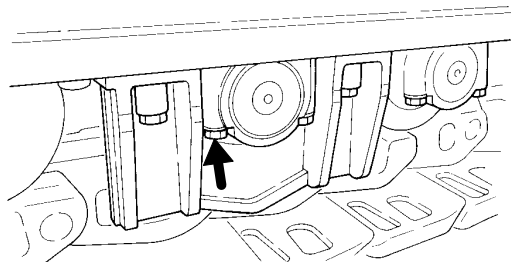


M144-07-062

23. Lower roller mounting bolt.

Tool: 46 mm

Torque: 1910 N·m (195 kgf·m, 1410 lbf·ft)

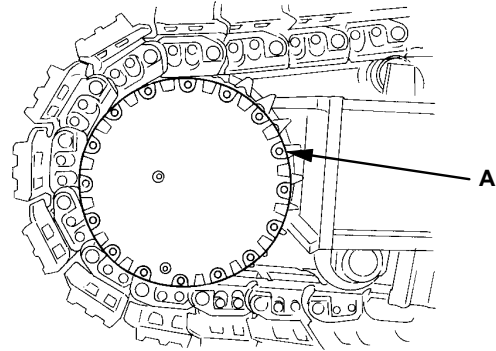


M144-07-063

MAINTENANCE

24. Travel device mounting bolt.

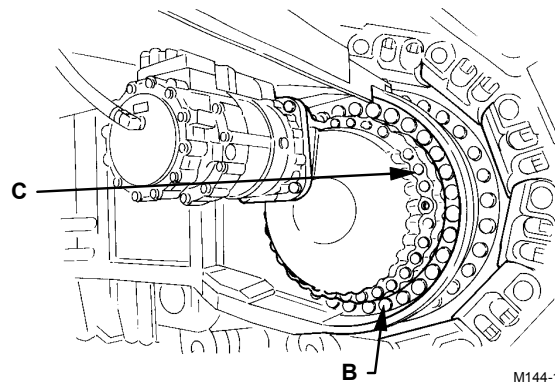
- A. Tool: 32 mm
Torque: 740 N·m (75 kgf·m, 540 lbf·ft)



M18C-07-081

- B. Tool: 50 mm
Torque: 2550 N·m (260 kgf·m, 1880 lbf·ft)

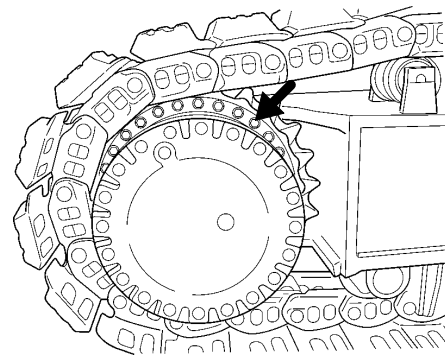
- C. Tool: 46 mm
Torque: 1910 N·m (195 kgf·m, 1410 lbf·ft)



M144-12-002

25. Sprocket mounting bolt.

- Tool: 46 mm
Torque: 1910 N·m (195 kgf·m, 1410 lbf·ft)



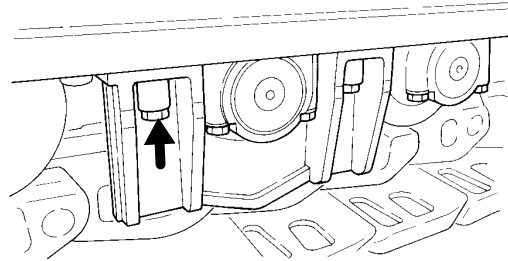
M18C-07-069

MAINTENANCE

26. Track guard mounting bolt.

Tool: 46 mm

Torque: 1910 N·m (195 kgf·m, 1410 lbf·ft)

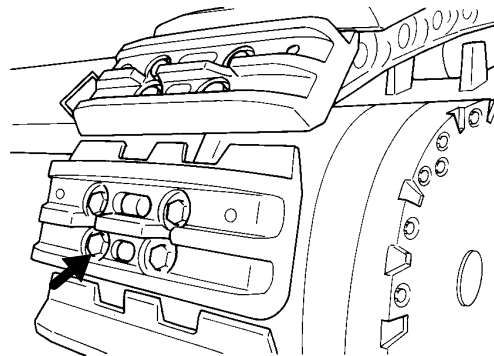


M144-07-063

27. Track shoe bolt.

Tool: 50 mm

Torque: 3190 N·m (325 kgf·m, 2350 lbf·ft)

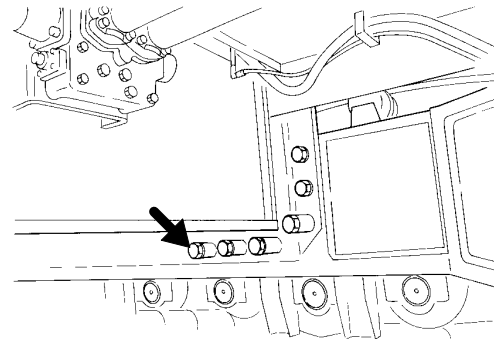


M144-07-101

28. Side frame mounting bolt.

Tool: 70 mm

Torque: 4710 N·m (480 kgf·m, 3470 lbf·ft)



M144-07-065

MAINTENANCE

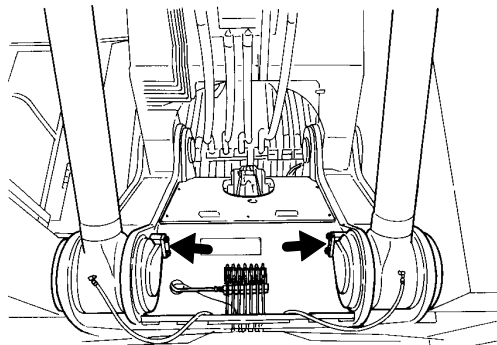
29. Front pin-retaining bolt.

(Loader)

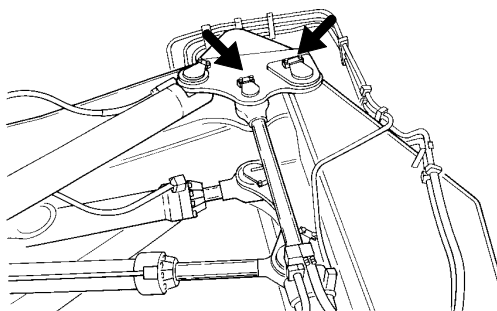
Tool: 30 mm
Torque: 390 N·m (40 kgf·m, 290 lbf·ft)

Tool: 24 mm
Torque: 205 N·m (21 kgf·m, 152 lbf·ft)

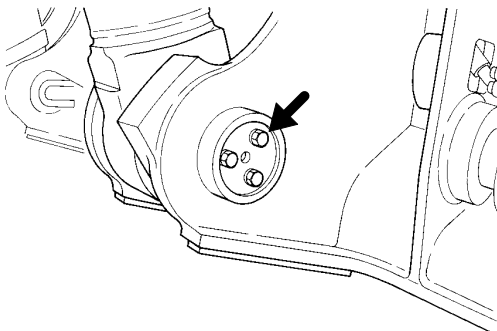
Tool: 36 mm
Torque: 690 N·m (70 kgf·m, 510 lbf·ft)



M144-07-004



M144-07-067



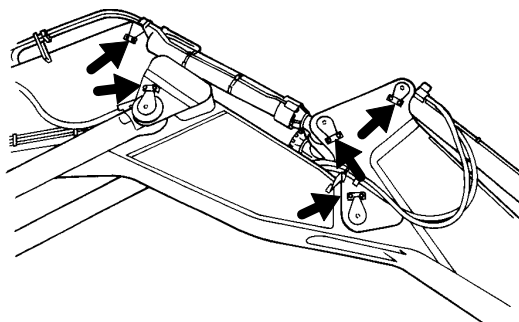
M144-07-066

30. Front pin-retaining bolt.

(Backhoe)

Tool: 30 mm
Torque: 390 N·m (40 kgf·m, 290 lbf·ft)

Tool: 24 mm
Torque: 205 N·m (21 kgf·m, 152 lbf·ft)



M117-07-170

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 parts 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 terminals 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 at shorter service intervals. If not fully charged, 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:	When operating in the area of possible falling rocks or other debris, be sure to work carefully, paying close attention to falling rocks, though the machine is equipped with the reinforced cab meeting SAE FOPS.

[illegible]

STORAGE

STORING THE MACHINE

1. Inspect the machine. Repair worn or damaged parts. Install new parts if necessary.
2. Clean the primary air cleaner element.
3. Retract all hydraulic cylinders, if possible. If not, coat exposed cylinder rods with grease.
4. Lubricate all grease points.
5. Park the tracks on long stable blocks.
6. Wash the machine.
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. Loosen the alternator belt and fan belt.
9. Paint necessary areas to prevent rust.
10. Store the machine in a dry, protected place. If stored outside, cover with a waterproof cover.

STORAGE

REMOVING THE MACHINE FROM STORAGE



CAUTION: 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 full load operation.
5. Cycle all hydraulic functions several times.
6. Carefully check all systems before operating the machine at full load.



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

- (a) Check 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 has not been used for a long time, oil films on sliding surfaces may have broken down. Cycling hydraulic functions for travel, swing and digging two to three times is necessary to lubricate the sliding surfaces.

TROUBLESHOOTING

ENGINE TROUBLESHOOTING

Engine troubleshooting switch (2) is located inside left console side cover (1) in the cab. If any trouble occurs in the engine and/or the engine related parts, and either engine warning indicator (4) or engine stop indicator (3) illuminates or flashes continuously, the fault codes (indicating an engine problem by flashing the engine warning indicator) can be displayed by operating engine troubleshooting switch (2).

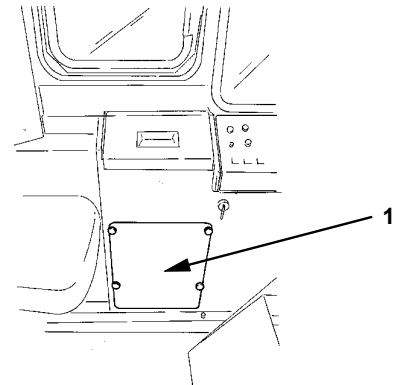
Turn engine troubleshooting switch (2) ON so that the engine controller makes the engine stop indicator or the engine warning indicator flash in the specified pattern (fault code) depending on the trouble encountered.

Trouble Status	Fault Code Display Indicator (Flashing Pattern)
Abnormal Throttle Sensor	Engine Warning Indicator *(2-5)
Abnormal Boost Pressure	Engine Warning Indicator (2-3)
Abnormal Engine Speed Sensor	Engine Stop Indicator (2-1)
Abnormal Actuator Power Source	Engine Stop Indicator (4-1)
Abnormal Actuator Sensor	Engine Stop Indicator (4-5)
Abnormal Sensor Power Source	Engine Warning Indicator (4-3)

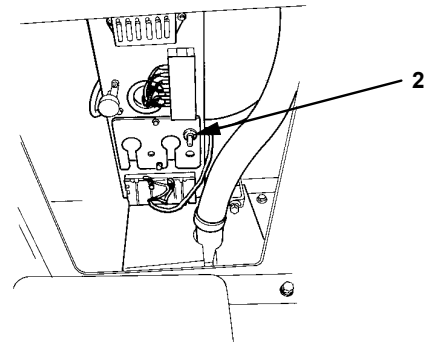
 **NOTE:** Flashing pattern (fault code) * (2-5) means that the engine warning indicator flashes twice, pauses for a short time, and flashes 5 more times.

IMPORTANT: When the engine warning indicator or the engine stop indicator illuminates, immediately contact your nearest Hitachi dealer for inspection.

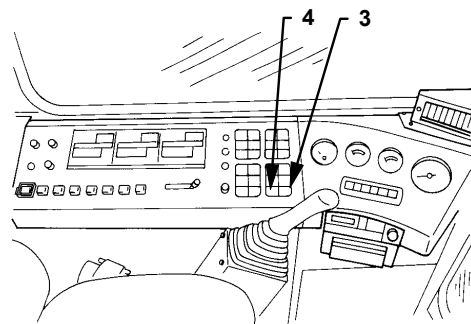
 **NOTE:** Depending on electrical signals arriving from the sensors described below, the engine controller drives the engine governor so that the fuel injection volume is regulated by the governor to meet the operating conditions.



M146-07-048



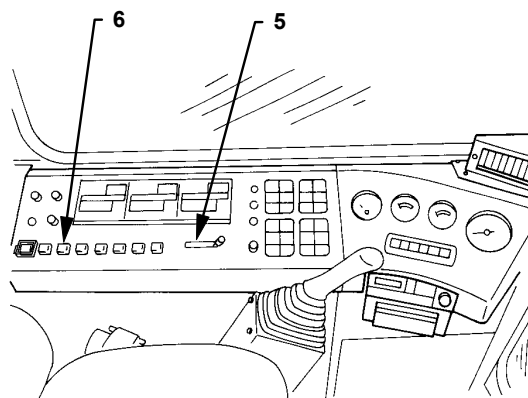
M18C-01-029



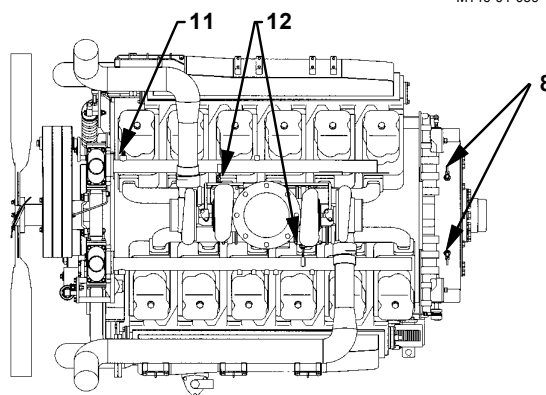
M146-01-039

TROUBLESHOOTING

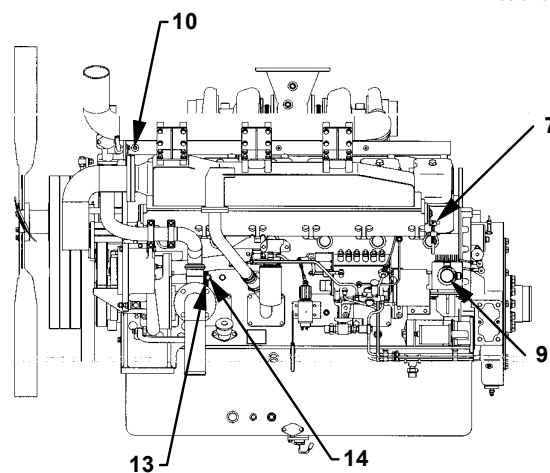
- 5- Fuel Lever (Throttle Sensor)
- 6- Auto-Idle Switch
- 7- Turbo Boost Pressure Sensor
- 8- Engine Speed Sensor
- 9- Actuator Sensor
- 10-Radiator Coolant Temperature Sensor
- 11-Radiator Coolant Temperature Switch
- 12-Exhaust Gas Temperature Sensor
- 13-Engine Oil Pressure Switch (Low)
- 14-Engine Oil Pressure Switch (High)
- 15-Radiator Coolant Level Switch



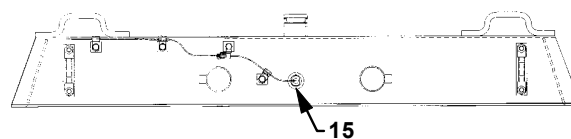
M146-01-039



M18C-07-074



M18C-01-002



M18C-07-075

TROUBLESHOOTING

ENGINE		
Problem	Cause	Solution
Engine Cranks But Will Not Start or Hard to Start	Emergency engine stop switch	Turn switch off (to NORMAL)
	No fuel	Add fuel. Bleed air.
	Wrong fuel	Drain tank. Use correct fuel.
	Contaminated fuel	Drain tank and add clean fuel.
	Low battery power	Charge or install new battery.
	Poor electrical connection	Clean and tighten battery and starter motor connections.
	Starter motor failure	Replace starter.
	Wrong engine oil	Drain oil. Use correct oil.
	Air filter plugged	Replace elements.
	Fuel filter plugged	Remove air from fuel system. Clean fuel tank strainer.
	Engine compression low	See your authorized dealer.
	Injection nozzles dirty or not working correctly	See your authorized dealer.
	Fuel shut-off solenoid valve failure	Replace solenoid valve.
	Leaks in fuel system	Check fuel system connections.
	Air in fuel system	Bleed air.
Engine Knocks, Runs Irregularly or Stops	Engine oil level low	Add oil.
	Plugged air intake system	Clean filter and system.
	Injection pump out of time	See your authorized dealer.
	Low coolant temperature	Thermostat not working correctly or too "cool".
	Water, dirt or air in fuel system	Bleed air from fuel system. Clean fuel tank outlet screen.
	Injection nozzles dirty or faulty	See your authorized dealer.
	Fuel shut-off solenoid valve failure	Replace solenoid valve.

TROUBLESHOOTING

ENGINE		
Problem	Cause	Solution
Engine Not Developing Full Power	Air filters plugged	Replace filter elements.
	Fuel line restricted	Repair or replace fuel line.
	Contaminated fuel	Drain fuel tank and clean outlet screen. Refill.
	Fuel filters plugged	Change filters.
	Plugged fuel tank breather	Clean or install new breather.
	Injection nozzles dirty or malfunctioning	See your authorized dealer.
	Injection pump linkage adjustment	See your authorized dealer.
	Wrong fuel	Use correct fuel.
	Wrong oil	Use correct oil.
	Turbocharger failure	See your authorized dealer.
	Exhaust restriction	Remove muffler and run engine.
	Engine is too hot or cold	See below.
	Engine failure	See your authorized dealer.
	Valve clearance	Check and adjust valves.
	Intake or exhaust system leakage	See your authorized dealer.
Engine Overheats	Low coolant level	Add coolant.
	Thermostat	See your authorized dealer.
	Engine overloaded	Check hydraulic relief valves.
	Radiator cap faulty	Install new cap.
	Radiator core or oil cooler core plugged	Clean radiator and oil cooler.
	Fan damaged	Replace fan.
	Air cleaner plugged	Clean air cleaner.
	Alternator belt loose	Tighten or install new belt.
	Pulley grooves worn	Replace pulleys.
	Cooling system passages dirty	Flush cooling system.
	Temperature gauge or sending unit	See your authorized dealer.

TROUBLESHOOTING

ENGINE		
Problem	Cause	Solution
Coolant Temperature Too Low	Thermostat Temperature gauge or sending unit	See your authorized dealer. See your authorized dealer.
Low Engine Oil Pressure	Engine oil pump or pump drive Low oil level Engine oil pressure regulation valve Plugged oil pump intake screen Plugged oil filter Oil leaks Oil diluted with fuel or coolant Engine temperature too high Wrong oil	See your authorized dealer. Add oil. See your authorized dealer. See your authorized dealer. Install a new oil filter. Check for leaks. See your authorized dealer. Check cooling system. Drain oil. Use correct oil.
Engine Uses Too Much Oil	Wrong oil Oil leaks Engine temperature too high Plugged air cleaner Internal engine component wear	Drain oil. Use correct oil. Check engine oil drain plug. Check cooling system. Clean element or install new element. See your authorized dealer.
Engine Uses Too Much Fuel	Plugged or dirty air intake system Wrong fuel Fuel injection nozzles	Clean air intake system. Use correct fuel. See your authorized dealer.
Excessive Black or Gray Exhaust Smoke	Wrong fuel Plugged or dirty air intake or exhaust system Injection nozzles dirty or faulty Basic engine failures	Drain tank. Use correct fuel. Clean air intake and exhaust system. See your authorized dealer. See your authorized dealer.

TROUBLESHOOTING

ENGINE

Problem	Cause	Solution
Exhaust Gas is White	Wrong fuel Cold engine Thermostat faulty or too "cool" Coolant leakage into engine cylinder	Drain tank. Use correct fuel. Run engine until warm. See your authorized dealer. See your authorized dealer.
Turbocharger Excessively Noisy or Vibrates	Bearings not lubricated Worn bearings Air leak in engine, intake or exhaust manifold Improper clearance between turbine wheel and turbine housing Broken blades on turbine	Insufficient oil pressure. Check for restricted turbocharger oil line. See your authorized dealer. Inspect, repair. See your authorized dealer. Remove exhaust elbow and air inlet hose and inspect.
Oil Dripping from Turbocharger Adapter	Damaged or worn bearings and/or worn seals Excessive crankcase pressure Turbocharger oil return line carbon build up where line passes exhaust manifold	See your authorized dealer. Inspect and clean air cleaner. Check for proper engine service intervals or dirt enter into engine. Check vent tube to ensure tube is not plugged. Clean. Remove line. Inspect, clean.
Excessive Drag in Turbocharger Rotating Members	Carbon build-up behind turbine wheel caused by combustion deposits Dirt build-up behind compressor wheel caused by air intake leaks Bearing seizure or dirty or worn bearings, caused by excessive temperature, unbalanced wheel, dirty oil, oil starvation, or insufficient lubrication	Inspect, clean. Inspect, clean. See your authorized dealer.

TROUBLESHOOTING

ELECTRICAL SYSTEM

Problem	Cause	Solution
Nothing Works	Battery	Recharge or replace.
Nothing Works (Except clock)	Battery relay	Replace relay.
Batteries Undercharged	Loose or corroded connections Alternator belt loose Alternator not charging Fuse Key switch failure	Clean and tighten or replace batteries. Tighten or install new belt. See your authorized dealer. Replace fuse. Replace key switch.
Starting Motor Will Not Turn	Battery undercharged or dead Battery cables making poor connections Fusible link Key switch Start relay Starter solenoid Starter Starter pinion jammed in flywheel gear Major engine failure	Recharge or replace battery. Clean connections. Replace fusible link. See your authorized dealer. See your authorized dealer. See your authorized dealer. Repair or replace start motor. Repair or replace starter. See your authorized dealer.
Starter Solenoid Chatters	Poor connections at batteries or starter Low battery charge Starter solenoid "hold-in" windings open	Clean connections. Recharge or replace batteries. See your authorized dealer.
Starter Motor Turns but Will Not Crank Engine	Starter pinion gear not engaging flywheel ring gear Pinion shift mechanism jammed or malfunctioning Pinion gear teeth broken Flywheel gear teeth broken	See your authorized dealer. See your authorized dealer. See your authorized dealer. See your authorized dealer.
Engine Cranks Slowly	Battery cables damaged or broken internally Battery or starter cable connections loose or corroded	Inspect and replace cables. Clean and tighten connections.

TROUBLESHOOTING

ELECTRICAL SYSTEM

Problem	Cause	Solution
Engine Cranks Slowly	Battery discharged or will not hold a charge	Replace battery.
	Starter "dragging"	See your authorized dealer.
	Low battery voltage	Recharge or replace battery.
Starter Motor Continues to Run After Engine Starts	Start relay stuck	See your authorized dealer.
	Starter solenoid stuck	See your authorized dealer.
	Starter not disengaging	See your authorized dealer.
	Key switch	See your authorized dealer.
Charging Indicator Light On-Engine Running	Loose or glazed alternator belt	Check belt. Replace if glazed, tighten if loose.
	Engine speed low	Adjust rpm to specification.
	Excessive electrical load from added accessories	Remove accessories or install higher output alternator.
	Loose or corroded electrical connections on battery, ground strap, starter, or alternator	Inspect, clean, or tighten electrical connections.
	Battery voltage low	Change or replace battery.
	Alternator or regulator	See your authorized dealer.
	Indicator circuit	See your authorized dealer.
Noisy Alternator	Worn drive belt	Replace belt.
	Worn pulleys	Replace pulleys and belt.
	Pulley misaligned	Adjust alternator mount.
	Alternator bearing	Loosen alternator belts. Turn pulley by hand. If any roughness is felt, repair alternator.
No Monitor Panel Indicators Work	Fuse	Replace fuse.
	Wiring harness	See your authorized dealer.
Individual Light in Monitor Panel is Not Working	Bulb	Replace bulb.
	Fuse	Replace fuse.
	Wiring harness	See your authorized dealer.

TROUBLESHOOTING

ELECTRICAL SYSTEM

Problem	Cause	Solution
No Indicators in Gauge Panel Operate	Circuit board Wiring harness Fuse	See your authorized dealer. See your authorized dealer. Replace fuse.
Indicator Light in Gauge Panel is Inoperative	Bulb Fuse Sender Wiring harness failure	Replace bulb. Replace fuse. Do sender check. See your authorized dealer.
Coolant Temperature Gauge Does Not Work	Fuse Gauge Gauge sender Wiring harness	Replace fuse. See your authorized dealer. Do coolant temperature gauge sender check. See your authorized dealer.
Fuel Gauge Does Not Work	Fuse Gauge Wiring harness	Replace fuse. See your authorized dealer. See your authorized dealer.

TROUBLESHOOTING

CONTROL LEVERS

Problem	Cause	Solution
Moves Hard	Corroded joint	See your authorized dealer.
	Worn out pusher	See your authorized dealer.
Does Nothing	Worn out pusher	See your authorized dealer.
	Pilot valve	See your authorized dealer.
Does Not Return to Neutral	Pilot valve	See your authorized dealer.
Too Much Play	Worn out pivot joint	See your authorized dealer.
Lever is Not Vertical In Neutral	Pilot valve	See your authorized dealer.

HYDRAULIC SYSTEM

Problem	Cause	Solution
Hydraulic Functions are Slow	Low oil level	Fill reservoir to full mark.
	Cold oil	Warm up hydraulic oil to normal cycle times.
	Wrong oil	Drain tank. Use correct oil.
	Engine speed too low	Increase speed or see your authorized dealer.
	Pilot circuit	See your authorized dealer.
	Worn pump	See your authorized dealer.
	Restricted pump suction line	See your authorized dealer.
Hydraulic Oil Overheats	Wrong oil	Use correct oil.
	Air leak in pump suction line	See your authorized dealer.
	Oil lines restricted	See your authorized dealer.
	Low oil level	Fill reservoir to full mark.
	Plugged filters	Install new filters.
	Worn pump	See your authorized dealer.
	Plugged radiator or oil cooler	Clean and straighten fins.
	Oil cooler bypass	See your authorized dealer.
	Relief valve	See your authorized dealer.
	Contaminated oil	Drain oil and refill.
	Improperly adjusted hydraulic components	See your authorized dealer.

TROUBLESHOOTING

HYDRAULIC SYSTEM

Problem	Cause	Solution
Oil Foams	Air leak in line from reservoir to pump Kinks or dents in oil lines Wrong oil Water in oil High or low oil level	Repair leak or see your authorized dealer. Check lines. Use correct oil. Change oil. Correct level.
Low or No Oil Pressure	Wrong oil Improperly adjusted hydraulic components No oil in system Worn cylinder packings Relief valve	Use correct oil. See your authorized dealer. Fill with correct oil. See your authorized dealer. See your authorized dealer.
No Hydraulic Functions (Noise from pumps)	Hydraulic pump Lack of hydraulic oil Damaged suction line or hose Clogged suction filter	See your authorized dealer. Add oil. See your authorized dealer. Clean.
Hydraulic Cylinders Operate but Cannot Lift Load	Hydraulic pump worn Main relief valve pressure low Hydraulic oil level low Suction screen plugged Pump suction line leaking	See your authorized dealer. See your authorized dealer. Add oil. Clean strainer and system. Inspect suction line.

TROUBLESHOOTING

HYDRAULIC SYSTEM		
Problem	Cause	Solution
One Control Lever Does Not Work	Relief valve pressure low Tube or hose damaged Hydraulic fittings loose Damaged O-rings in fittings Hydraulic Pump Pilot valve Pilot lines	See your authorized dealer. Repair or replace. Tighten. Install new O-ring. See your authorized dealer. See your authorized dealer. Repair or replace.
One Cylinder Does Not Work	Control valve spool damaged or contaminated with dirt Hydraulic lines damaged Fittings loose O-ring in fitting damaged Pilot valve Pilot lines	See your authorized dealer. Repair or replace. Tighten. Install new O-ring. See your authorized dealer. Repair or replace.
One Cylinder Does Not Work or Has Little Power	Piston seals leaking Cylinder rod damaged Pilot lines Pilot valve	See your authorized dealer. See your authorized dealer. Repair or replace. See your authorized dealer.
Both Travel Motors Do Not Work	Center joint failure	See your authorized dealer.
One Travel Motor Does Not Work	Travel motor Parking brake not releasing Pilot valve Pilot lines	See your authorized dealer. See your authorized dealer. See your authorized dealer. Repair or replace.
Travel is Not Smooth	Track adjustment Front idler or rollers damaged Track frame bent	Adjust tension. See your authorized dealer. See your authorized dealer.

TROUBLESHOOTING

HYDRAULIC SYSTEM

Problem	Cause	Solution
Swing Does Not Work	Swing motor	See your authorized dealer.
	Pilot valve	See your authorized dealer.
Swing is Not Smooth	Swing gear	See your authorized dealer.
	Swing bearing	See your authorized dealer.
	Lack of grease	Apply grease.

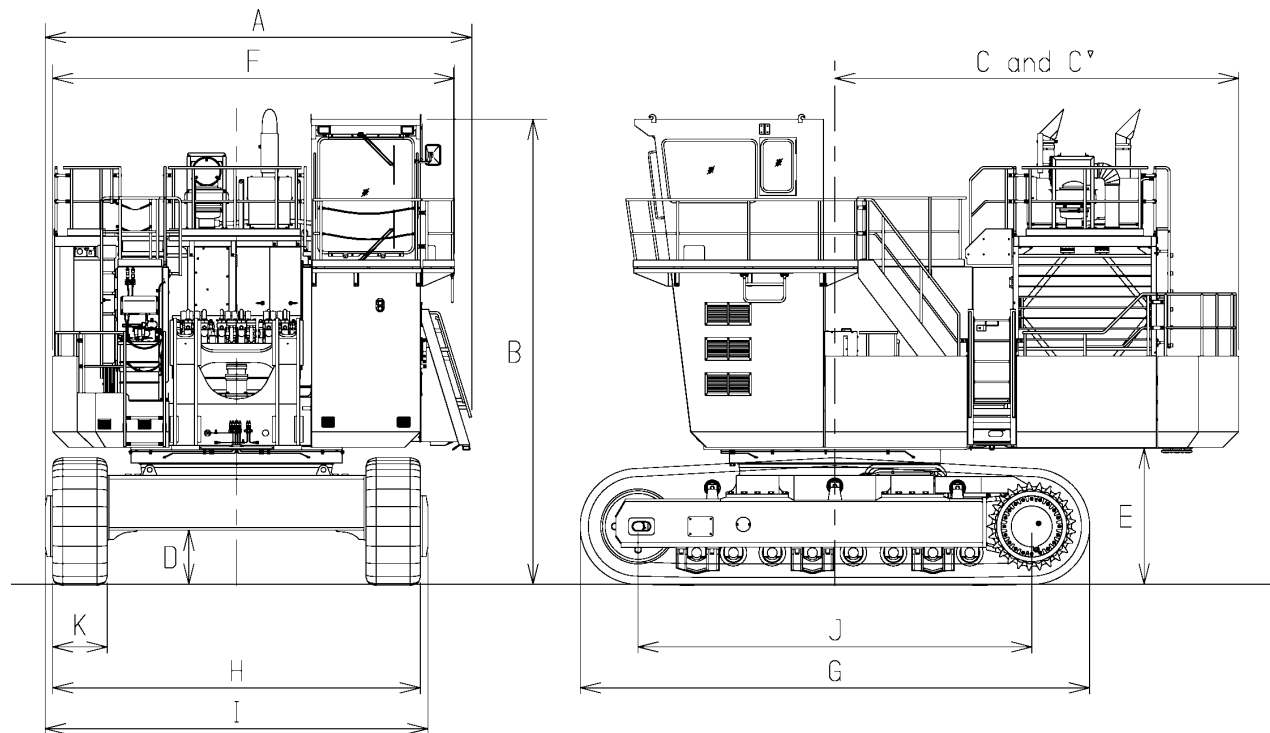
AUTO-IDLE

Problem	Cause	Solution
Auto-Idle Does Not Work	Fuse	Replace
	Auto-Idle switch	Replace
	Pilot pressure switch	Replace
	Failure of connector contact	Repair or replace
	Wiring harness	Repair or replace
	Engine speed control lever sensor	Replace
	Controller	Replace
	Controller on the engine	See your authorized dealer
Engine Speed Control Lever Does Not Function	Failure of connector contact	Repair or replace
	Wiring harness	Repair or replace
	Engine speed control lever sensor	Replace
	Controller on the engine	See your authorized dealer

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SPECIFICATIONS

SPECIFICATIONS



M18C-12-002

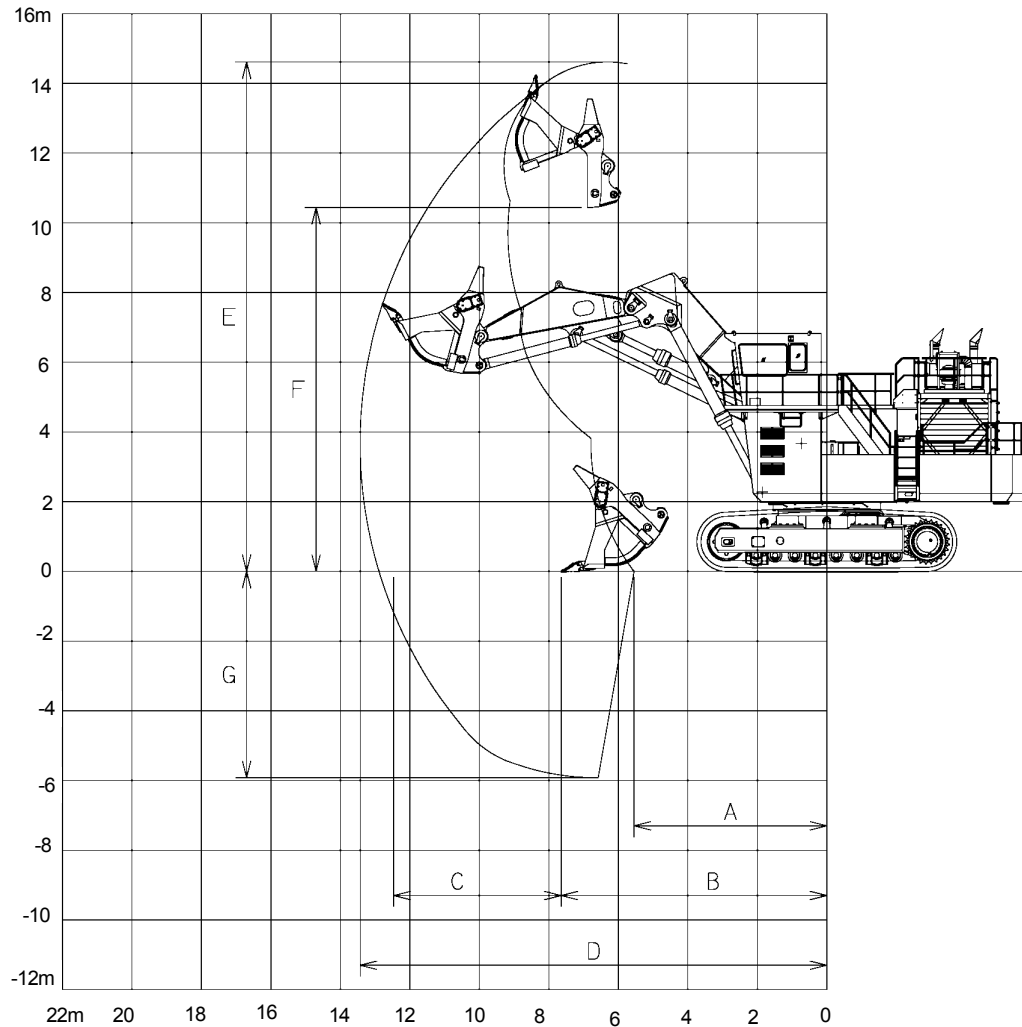
Model	EX1900-5 Hydraulic Excavator	
Type of Front-End Attachment	Loader Front	Backhoe BE Front
Bucket Capacity (Heaped)	PCSA 10.5 m ³ (13.7 yd ³)	PCSA 12 m ³ (15.7 yd ³)
Operating Weight	185900 kg (409800 lb)	186500 kg (411200 lb)
Engine	Mitsubishi S12A2-TAA 765 kW/1800 min ⁻¹ (1040 PS/1800 rpm)	
A: Overall Width	6260 mm (20 ft 6 in)	
B: Cab Height	*6820 mm (22 ft 5 in)	
C: Rear-end Swing Radius	6010 mm (19 ft 9 in)	
C': Rear-end Length	5930 mm (19 ft 5 in)	
D: Minimum Ground Clearance	*795 mm (2 ft 7 in)	
E: Counterweight Clearance	*1995 mm (6 ft 7 in)	
F: Overall Width of Upperstructure	5890 mm (19 ft 4 in)	
G: Undercarriage Length	7480 mm (24 ft 6 in)	
H: Crawler Width	5400 mm (17 ft 9 in)	
I: Undercarriage Width	5620 mm (18 ft 5 in)	
J: Sprocket Center to Idler Center	5780 mm (18 ft 12 in)	
K: Track Shoe Width	800 mm (2 ft 8 in) (Grouser shoe)	
Ground Pressure	178 kPa (1.81 kgf/cm ² , 25.7 psi)	
Swing Speed	4.7 min ⁻¹ (rpm)	
Travel Speed (Fast/Slow)	2.8/2.1 km/h (1.74/1.30 mph)	
Gradeability	30° (tanθ = 0.58)	

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

SPECIFICATIONS

WORKING RANGE

Loading Shovel



M18C-12-004

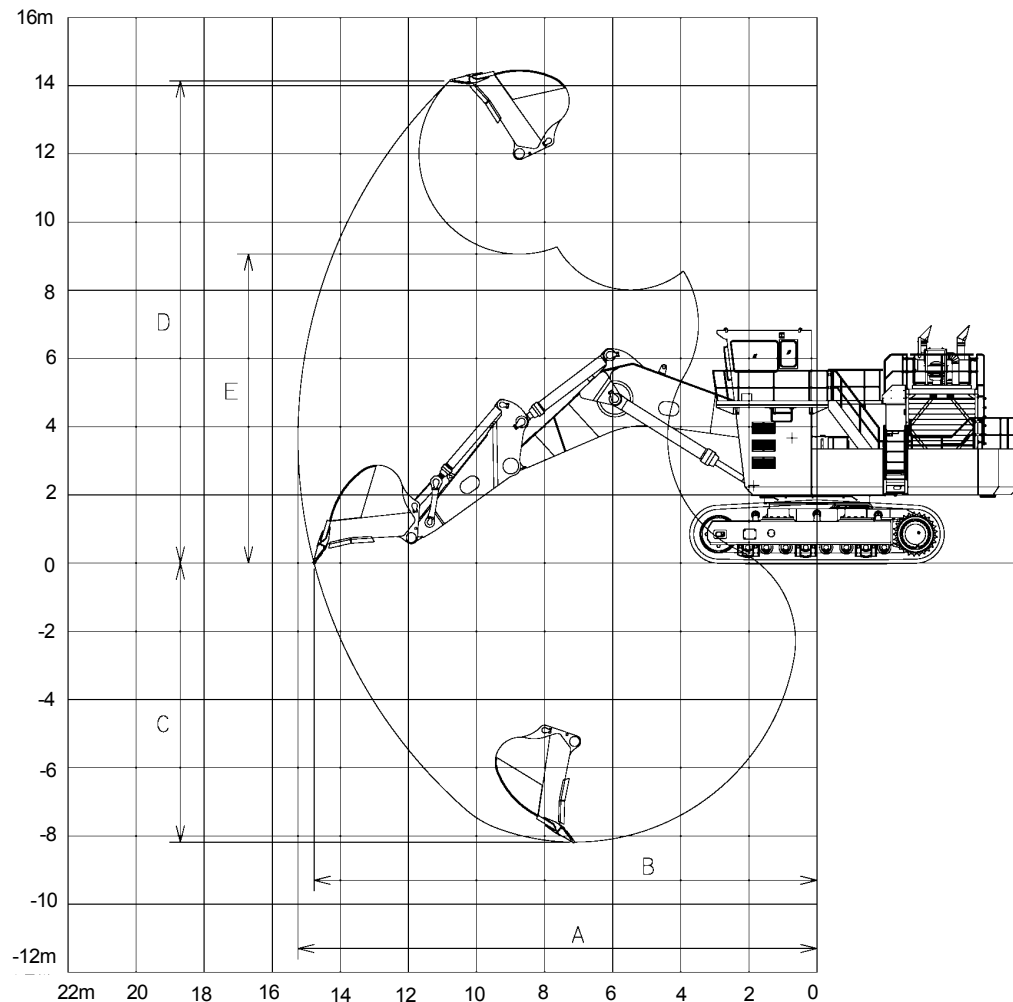
Category	Loading Shovel
Item	
A: Minimum Digging Distance	5550 mm (18 ft 3 in)
B: Minimum Level Crowding Distance	7650 mm (25 ft 1 in)
C: Level Crowding Distance	4820 mm (15 ft 10 in)
D: Maximum Digging Reach	13430 mm (44 ft 1 in)
E: Maximum Cutting Height	*14610 mm (47 ft 11 in)
F: Maximum Dumping Height	*10440 mm (34 ft 3 in)
G: Maximum Digging Depth	*5920 mm (19 ft 5 in)

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

SPECIFICATIONS

WORKING RANGE

Backhoe BE



M18C-12-003

Category	Backhoe
Item	
A: Maximum Digging Reach	15250 mm (50 ft 0 in)
B: Maximum Digging Reach (on ground)	14770 mm (48 ft 6 in)
C: Maximum Digging Depth	*8180 mm (26 ft 10 in)
D: Maximum Cutting Height	*14140 mm (46 ft 5 in)
E: Maximum Dumping Height	*9060 mm (29 ft 9 in)

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

SPECIFICATIONS

MEMO

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