

Operator's Manual

ZW

180

220

250

310

Wheel Loader

 **Hitachi Construction Machinery Co., Ltd.**
URL:<http://www.hitachi-c-m.com>

INTRODUCTION

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

- SI Units (International System of Units) are used in this manual.
For reference MKS system units and English units are also indicated in parentheses after the SI units.
Example : 24.5 MPa (250 kgf/cm², 3560 psi)

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

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

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

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

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

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

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

The EC Declaration of conformity includes the machine without equipment unless fitted with equipments approved by Hitachi Construction Machinery France S.A.S. Refer to enclosed list for approved equipments. Hitachi Construction Machinery France S.A.S. will not cover conformity of machines fitted with OEM equipments.

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

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ENGINE EMISSION CONTROL LABEL

ZW180

CALIFORNIA

Proposition 65 Warning

Diesel engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects, and other reproductive harm.

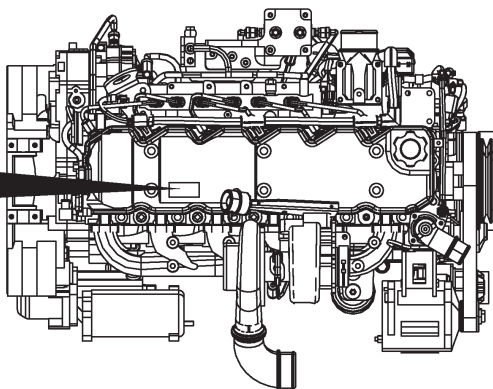
EMISSION CONTROL LABEL: ENGINE LABEL (FOR EPA)

Emission control label is attached on the cylinder head cover.

IMPORTANT ENGINE INFORMATION

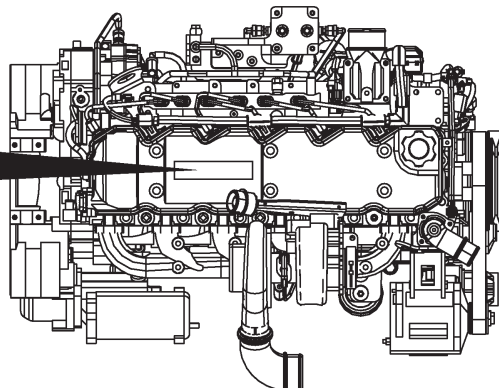
This engine conforms to XXXX U.S.EPA and California regulations for heavy duty non-road compression ignition diesel cycle engines as applicable.

THIS ENGINE IS CERTIFIED TO OPERATE
ON DIESEL FUEL 4936633



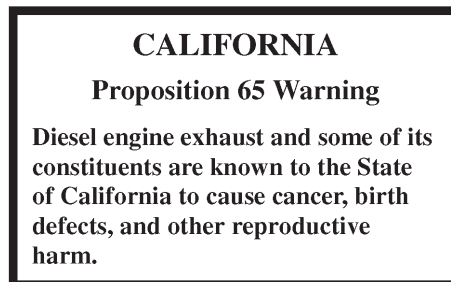
EC EMISSION CONTROL LABEL: ENGINE LABEL

CID/L XXX / XX	CPL XXXX	Engine Serial No. XXXXXXXX
Family XXXXXXXXXXXX		Cust. Spec.
e11#97/681A#2004/26#0232#00		Engine Model QSBXX
Inch X X Int. X X Exh.		Timing - TDC XXXXXXXXX
MM X X Int. X X Exh.		Fuel rate at rated HP/KW XX mm3/st
Firing Order X X X X X X		FR XXXXX Low Idle RPM XXX
Gross Rated HP/KW XXX / XXX	at XXXX RPM	



ENGINE EMISSION CONTROL LABEL

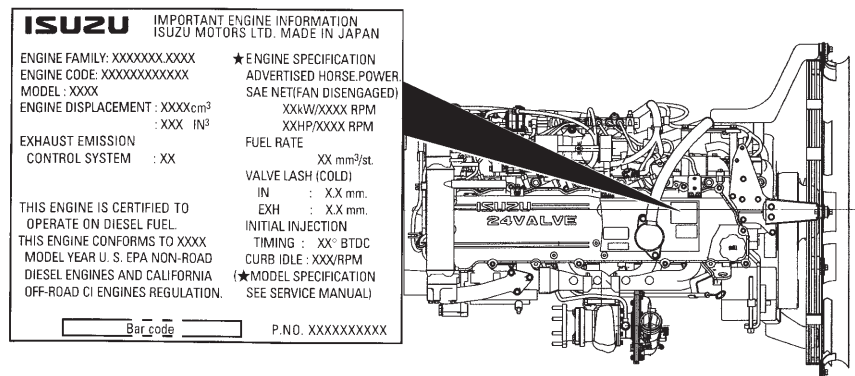
ZW220, ZW250



EMISSION CONTROL LABEL: ENGINE LABEL (FOR EPA)

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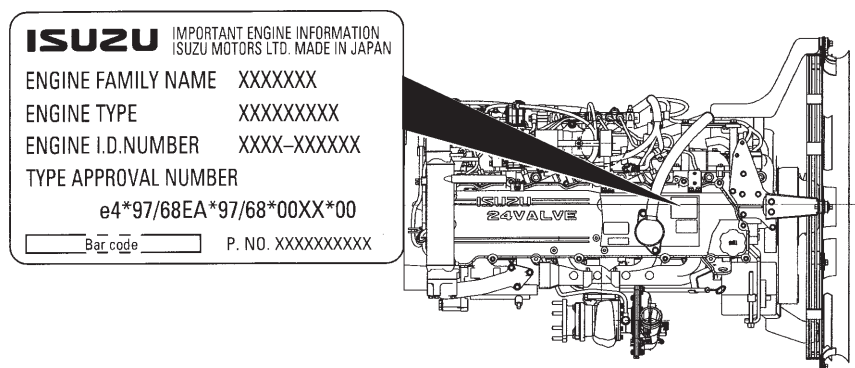
The following is the sample of a label required for engine emission control information, along with location.



EC EMISSION CONTROL LABEL: ENGINE LABEL

Emission control label is attached on the cylinder head cover.

The following is the sample of a label required for engine emission control information, along with location.



ENGINE EMISSION CONTROL LABEL

ZW310

CALIFORNIA

Proposition 65 Warning

Diesel engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects, and other reproductive harm.

EMISSION CONTROL LABEL: ENGINE LABEL (FOR EPA)

Emission control label is attached on the cylinder head cover.

XXXX IMPORTANT ENGINE INFORMATION

Daimler Chrysler AG

ENGINE MODEL : OM XXX XX

ENGINE FAMILY : XXXX.XXXXXXX

ENGINE SERIAL NO. : XXX.XXX-XX-XXXXXX

EXH. EMISSION CONTROL SYSTEM : XX;

ADV. HP: XXX (XXX KW); FUEL RATE (MH3/STR.) : XXX-XXX;

RATED SPEED (RPM) : XXX; LOW IDLE : XXX +/-XX;

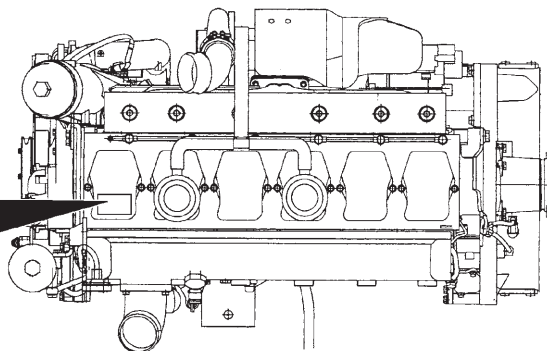
BASIC INJECTION TIMING (DEG.BTDC) : XX +/-XX;

VALVE LASH (MM) : X.X INT., X.X EXH;

This engine conforms to XXXX U.S. EPA, California and Canada regulations for large nonroad compression - ignition engines. This engine is certified to be operated on diesel fuel.

CODE: XXX XX.XX/XX

XX.XL



EC EMISSION CONTROL LABEL: ENGINE LABEL

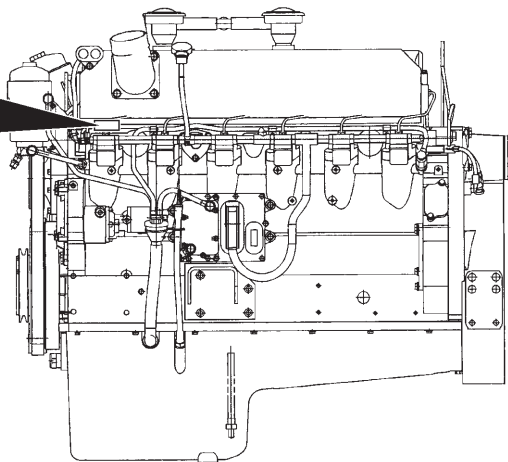
DaimlerChrysler AG

OM 460 LA e3A/1 B4C01

458.990-00-123456

e1*97/68EA*

00/000*0089*00



MACHINE NUMBERS

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

MACHINE

SAMPLE

	
Model/type	
Product Identification Number	Wheel Loader
Year of Manufacturing	
Engine Power(kw)	Mass(kg)
 Hitachi Construction Machinery Co., Ltd. 650, Kandatsu-machi, Tsuchiura-shi, Ibaraki-ken, 300-0013 Japan	

1. MODEL/TYPE
2. Product Identification Number
3. Year of Manufacturing
4. Operating mass (standard version)
5. Engine power in kW according to ISO9249

PRODUCT IDENTIFICATION NUMBER

PRODUCT IDENTIFICATION NUMBER: _____

 **NOTE:** Marks to indicate the start and end of the PIN

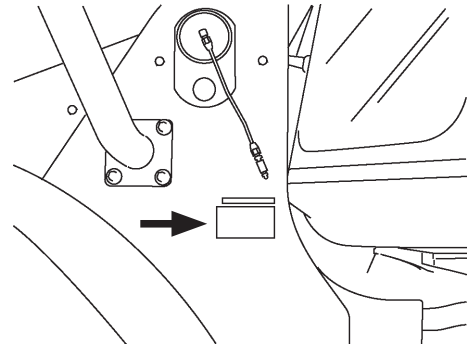
RYU4GF00H00005101

PRODUCT IDENTIFICATION NUMBER (PIN)

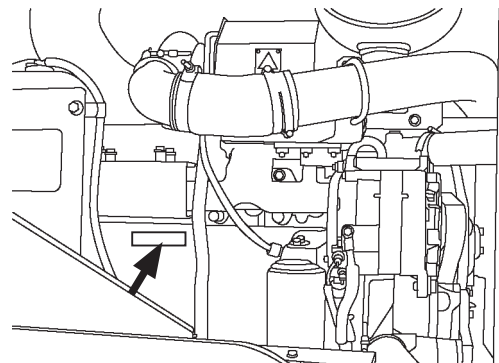
ENGINE

TYPE: _____

MFG. NO.: _____

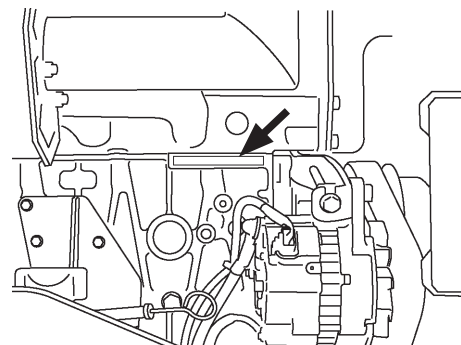


M4GB-00-001



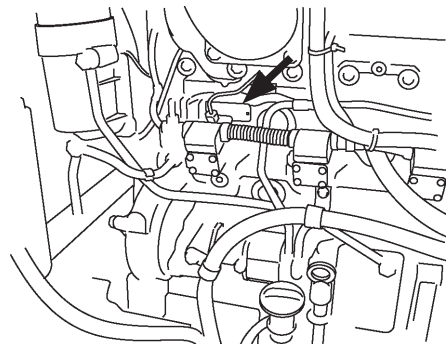
ZW180

M4GF-00-003



ZW220, ZW250

M4GB-00-002



ZW310

M4GB-00-003

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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 do not use any of the designated signal words above after the safety alert symbol are occasionally used on this machine.
- To avoid confusing machine protection with personal safety messages, a signal word **IMPORTANT** indicates a situation which, if not avoided, could result in damage to the machine.
-  **NOTE** indicates an additional explanation for an element of information.



IMPORTANT



SA-1223

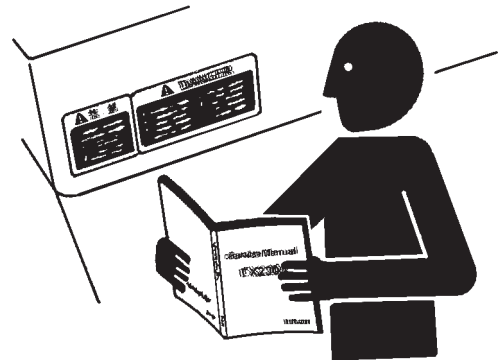
002-E01A-1223

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.
 - Do not modify any machine parts without authorization. Failure to do so may deteriorate the part safety, function, and/or service life. In addition, personal accident, machine trouble, and/or damage to material caused by unauthorized modifications will void Hitachi Warranty Policy.
 - Do not use attachments and/or optional parts or equipment not authorized by Hitachi. Failure to do so may deteriorate the safety, function, and/or service life of the machine. In addition, personal accident, machine trouble, and/or damage to material caused by using unauthorized attachments and/or optional parts or equipment will void Hitachi Warranty Policy.
- 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.

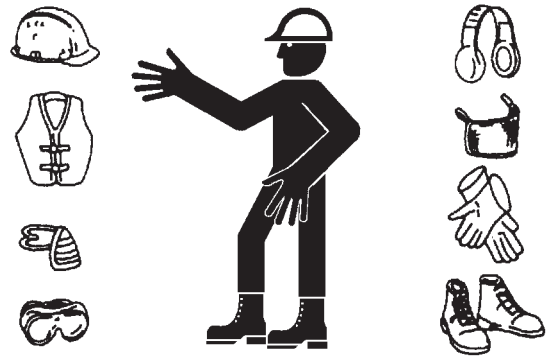
You may need:

- 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.

005-E01A-0438



SA-438

PROTECT AGAINST NOISE

- Prolonged exposure to loud noise can cause impairment or loss of hearing.
- Wear a suitable hearing protective device such as ear-muffs 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.
- Do not leave parts and/or tools lying around the operator's seat. Store them in their specified locations.
- Avoid storing transparent bottles in the cab. Do not 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.
- Do not 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 hand-holds.
 - 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.



008-E01A-0439

SA-439

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.
 - Adjust the rear view mirror position so that the best rear visibility is obtained from the operator's seat. If the mirror is broken, immediately replace it with a new one.



009-E01A-0462

SA-462

ENSURE SAFETY BEFORE RISING FROM OR LEAVING OPERATOR'S SEAT

- Before rising from the operator's seat to open/close either side window or to adjust the seat position, be sure to first lower the front attachment to the ground and then move the pilot control shut-off lever to the LOCK position. Failure to do so may allow the machine to unexpectedly move when a body part unintentionally comes in contact with a control lever, possibly resulting in serious personal injury or death.
- Before leaving the machine, be sure to first lower the front attachment to the ground and then move the pilot control shut-off lever to the LOCK position. Turn the key switch OFF to stop the engine.
- Before leaving the machine, close all windows, doors, and access covers and lock them up.

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.
- Use appropriate illumination. Check that all lights are operable before operating the machine. If any faulty illumination is present, immediately repair it.



SA-398

011-E01A-0398

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.



036-E01A-0293-3

SA-293

SAFETY

OPERATE ONLY FROM OPERATOR'S SEAT

- Inappropriate engine starting procedures may cause the machine to runaway, possibly resulting in serious injury or death.
- Start the engine only when seated in the operator's seat.
- NEVER start the engine while standing on the 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.
- Before starting the engine, confirm the safety around the machine and sound the horn to alert bystanders.



012-E01B-0431

SA-431

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 in the operator's manual.
- 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.



S013-E01A-0032

SA-032

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-447

015-E01B-0447

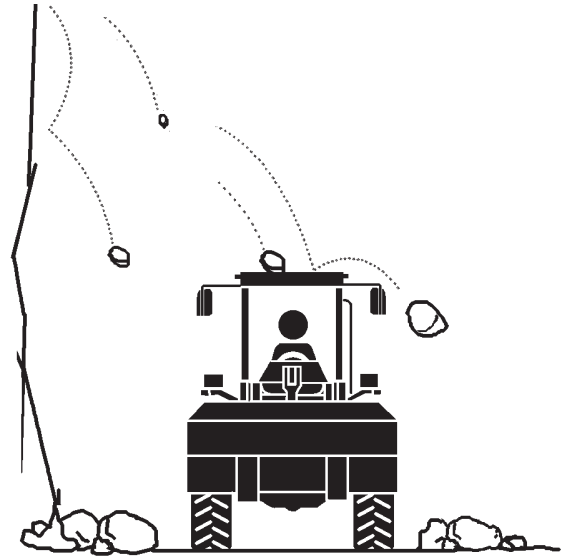
SAFETY

EQUIPMENT OF HEAD GUARD, ROPS, FOPS

In case the machine is operated in areas where the possibility of falling stones or debris exist, equip a head guard, ROPS, or FOPS according to the potential hazardous conditions. (The standard cab for this machine corresponds to ROPS and FOPS.)

ROPS: Roll-Over Protective Structure

FOPS: Falling Object Protective Structure



SA-521

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

SAFETY

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 the operator should be on the machine. Keep riders off.
- Riders also obstruct the operator's view, resulting in the machine being operated in an unsafe manner.

014-E01B-0427



SA-427

DRIVE SAFELY

- Beware of the possibility of slipping and/or turning over the machine when driving on a slope.
 - When driving on level ground, hold the bucket at mark (A) 400 to 500 mm above the ground as illustrated.
 - Avoid traveling over any obstacles.
 - Drive the machine slowly when driving on rough terrain.
 - Avoid quick direction changes. Failure to do so may cause the machine to turn over.
 - If the engine stops while driving, the steering function becomes inoperative. Immediately stop the machine by applying the brake to prevent personal accident.
-
- Even though the machine is equipped with the emergency steering system, if the steering function becomes inoperative during drive operation, press the emergency steering check switch on the right console to activate the emergency steering system. Then, immediately park and stop the machine in a safe location.

019-E07A-0448

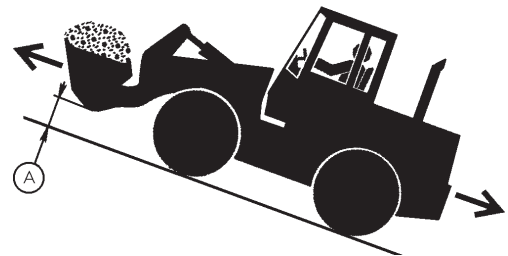


SA-448

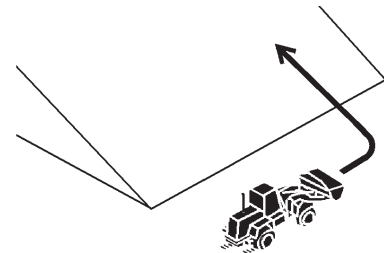
SAFETY

DRIVE MACHINE SAFELY (WORK SITE)

- Before driving the machine, always confirm that the steering wheel/F-N-R lever direction corresponds to the direction you wish to drive.
 - Be sure to detour around any obstructions.
- 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 200 to 300 mm (approximately 8 to 12 in) (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 overturn. If the direction must be changed, move the machine to level ground, then, change the direction to ensure safe operation.

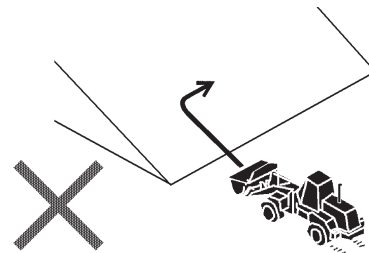


SA-449



SA-450

019-E05B-0515



SA-451

DRIVE SAFELY WITH BUCKET LOADED

- If the machine is incorrectly operated while driving with the bucket loaded, turning over of the machine may result. Be sure to follow all the instructions indicated below.
 - When driving the machine on a job site with the bucket loaded, hold the bucket as low as possible to keep the machine balanced and to have good visibility.
 - Do not exceed the rated load capacity. Always operate the machine within the rated load capacity.
 - Avoid fast starts, stops, and quick turns. Failure to do so may result in personal injury and/or death.
 - Avoid rapid drive direction changes which could possibly cause personal injury and/or death.



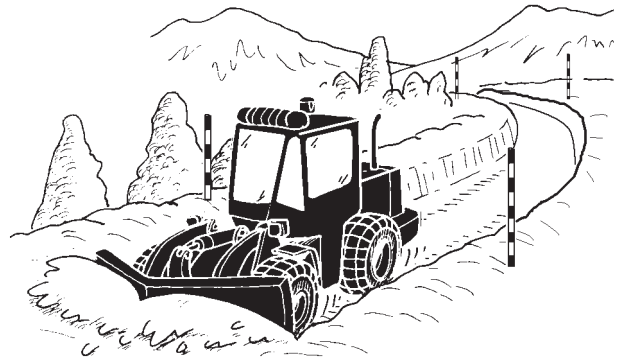
SA-400

051-E02A-0400

SAFETY

DRIVE ON SNOW SAFELY

- Beware of the possibility of slipping or turning over the machine when driving on frozen snow surfaces.
- The machine may slip more easily than expected on frozen snow surfaces even if the inclination is small. Reduce speed when driving. Avoid fast starts, stops and quick turns.
- Road shoulder and/or set-up utilities covered with snow are difficult to locate. Be sure where they are before removing snow.
- Be sure to use tire chains when driving on snow.
- Avoid applying the brake for quick stops on snow. If a quick stop is required, lower the bucket to the ground.



SA-452

052-E02A-0452

TRAVEL ON PUBLIC ROADS SAFELY

- This machine is not allowed to drive on public loads with the bucket loaded.
 - Be sure to empty the bucket.
 - Hold the bucket at mark (A) 400 to 500 mm above the road surface as illustrated.
- Even though the machine is equipped with the emergency steering system, if the steering function becomes inoperable during drive operation, press the emergency steering check switch on the right console to activate the emergency steering system. Then, immediately park and stop the machine in a safe location.



SA-453

053-E02A-0453

SAFETY

AVOID INJURY FROM ROLLAWAY ACCIDENTS

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

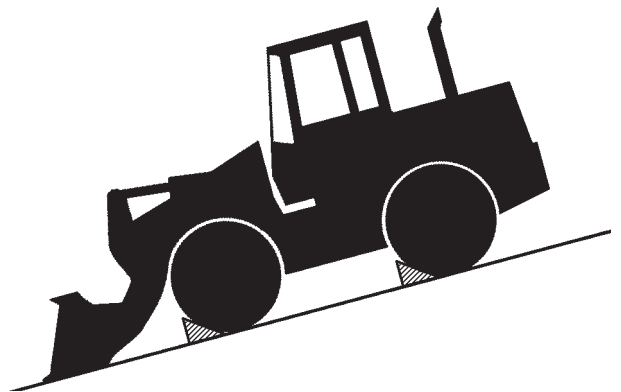
To avoid rollaways:

- Select level ground when possible to park machine.
- Do not park the machine on a grade.
- Lower the bucket to the ground.
- Place the F-N-R lever in neutral, and put the park brake switch in the ON (parking brake) position.
- 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 lock lever to LOCK position.
- Block both tires and lower the bucket to the ground.
- Position the machine to prevent rolling.
- Park a reasonable distance from other machines.



SA-457

020-E02A-0516



SA-458

SAFETY

AVOID ACCIDENTS FROM BACKING UP AND TURNING

- Make sure no one is working under or close to the machine before backing up or turning the machine to avoid personal injury and/or death by being run over or entangled in the machine.
- Keep all personnel away from the machine by sounding the horn and/or using hand signals. Use extra care to be sure no one is in from the articulation area before turning the machine.
- Keep windows, mirrors, and lights in good condition.
- Reduce travel speed when dust, heavy rain, fog, etc., reduce the visibility.
- In case good visibility is not obtained, use a signal person to guide you.

021-E02A-0517



SA-383



SA-312

SAFETY

AVOID POSITIONING BUCKET OVER ANYONE

- Never allow the bucket to pass over co-workers and/or the dump truck operator's cab. Falling soil from the bucket or contact with bucket may cause serious personal accidents and/or damage to the machine.
- Avoid carrying the bucket over the co-workers to ensure safe operation.



SA-518

023-E02A-0518

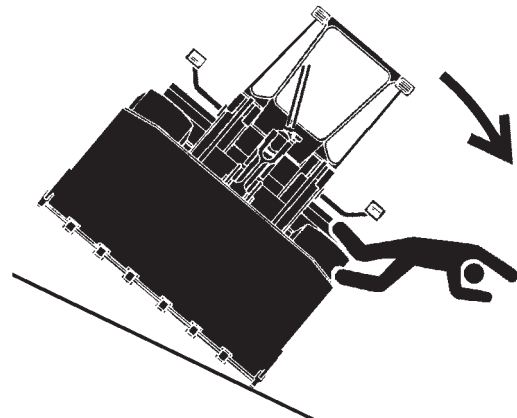
AVOID TIPPING

DO NOT ATTEMPT TO JUMP CLEAR OF TIPPING MACHINE. MACHINE WILL TIP OVER FASTER THAN YOU CAN JUMP FREE, POSSIBLY RESULTING IN SERIOUS PERSONAL INJURY OR DEATH. IF TIPPING OVER OF THE MACHINE IS PREDICTED, SECURELY HOLD THE STEERING WHEEL TO PREVENT YOUR BODY FROM BEING THROWN OUT OF THE MACHINE.

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 5 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-463

SAFETY

NEVER UNDERCUT A HIGH BANK

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

026-E01A-0519



SA-519

DIG WITH CAUTION

Before digging, check the location of cables, gas lines, and water lines.

027-E01A-0396



SA-396

PERFORM TRUCK LOADING SAFELY

- Do not operate the machine involuntarily. Unexpected machine movement may cause personal injury and/or death.
- Do not lower the bucket with the loader control lever in the FLOAT position. The bucket may free fall, possibly causing personal injury and/or death.
- Always select a level surface for truck loading.

028-E01A-397



SA-397

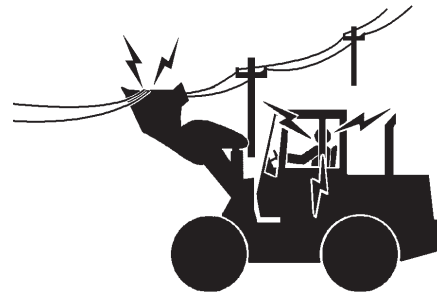
SAFETY

AVOID POWER LINES

Serious injury or death can result from contact with electric lines.

Never move any part of the machine or load closer to any electric line than 3 m (10 ft) plus twice the line insulator length.

029-E01A-0455



SA-455

PRECAUTIONS FOR OPERATION

- If the front attachment or any part of the machine comes in contact with an overhead obstacle, both the machine and the overhead obstacle may become damaged, and personal injury may result.
 - Take care to avoid coming in contact with overhead obstacles with the bucket or arm during operation.

PRECAUTIONS FOR LIGHTENING

- The machine is vulnerable to lightning strikes.
 - In the event of an electrical storm, immediately stop operation, and lower the bucket to the ground. Evacuate to a safe place far away from the machine.
 - After the electrical storm has passed, check all of the machine safety devices for any failure. If any failed safety devices are found, operate the machine only after repairing them.

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, cables, slings, or ropes.
 - Before craning, position the upperstructure with the position of the bucket support located on the chassis at the front.
 - Move the load slowly and carefully. Never move it suddenly.
 - Keep all persons well 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.

032-E01A-0132

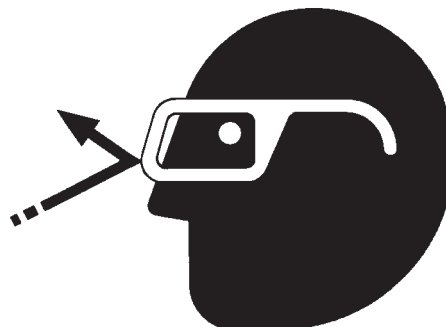


SA-132

SAFETY

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

PARK MACHINE SAFELY

To avoid accidents:

- Park machine on a firm, level surface.
- Lower bucket to the ground.
- Place the F-N-R lever in neutral, and put the park brake switch in the ON (parking brake) position.
- Run engine at slow idle speed without load for 5 minutes.
- Turn key switch to OFF to stop engine.
- Remove the key from the key switch.
- Lower the lock lever to the LOCK position.
- Close windows, roof vent, and cab door.
- Lock all access doors and compartments.



033-E07B-0456

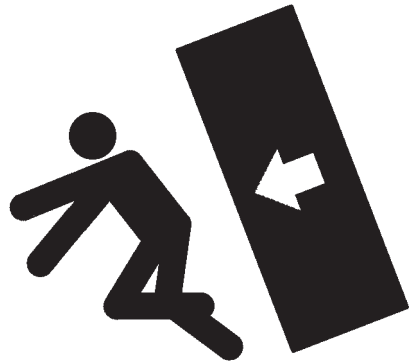
SA-456

SAFETY

STORE ATTACHMENTS SAFELY

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

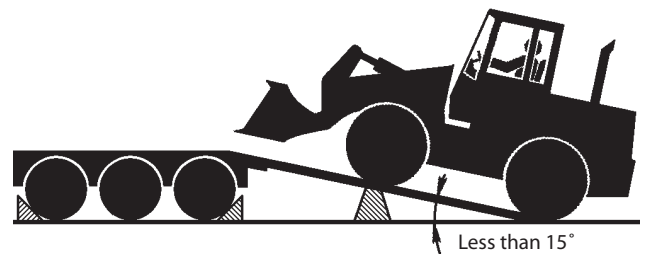
504-E01A-0034



SA-034

TRANSPORT SAFELY

- Take care the machine may turn over when loading or unloading the machine onto or off of a truck or trailer.
 - Observe the related regulations and rules for safe transportation.
 - Select an appropriate truck or trailer for the machine to be transported.
 - Be sure to use a signal person.
 - Always follow the following precautions for loading or unloading:
 1. Select solid and level ground.
 2. Always use a ramp or deck strong enough to support the machine weight.
 3. Use the low speed gear.
 4. Never steer the machine while on the ramp. If the traveling direction must be changed while the ramp, unload the machine from the ramp, reposition the machine on the ground, then try loading again.
 5. After loading, install the lock bar to securely hold the articulation mechanism.
 6. Wedge the front and rear of tires. Securely hold the machine to the truck or trailer deck with wire ropes.



SA-454

Be sure to further follow the details described in the TRANSPORTING section.

035-E07A-0454

SAFETY

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 starting 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. Lower the lock lever to the LOCK position.
10. Lock bar connects the front and rear frames.
11. Allow the engine to cool.

- If a maintenance procedure must be performed with the engine running, do not leave machine unattended.
- Never work under a machine raised by the lift arm.
- 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.

500-E02C-0520



SA-028



SA-312



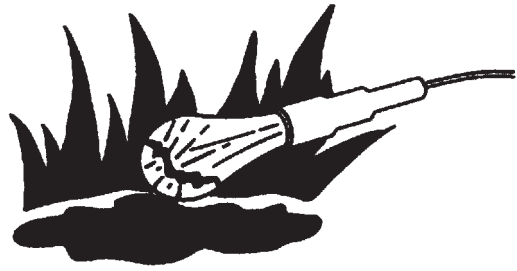
SA-134



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



SS2045102

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

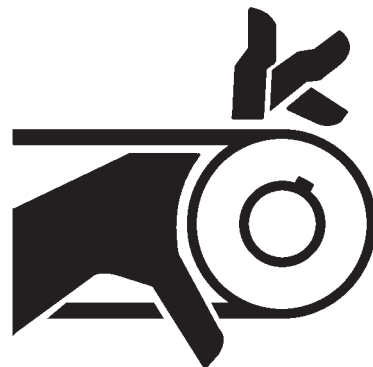


SA-527

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

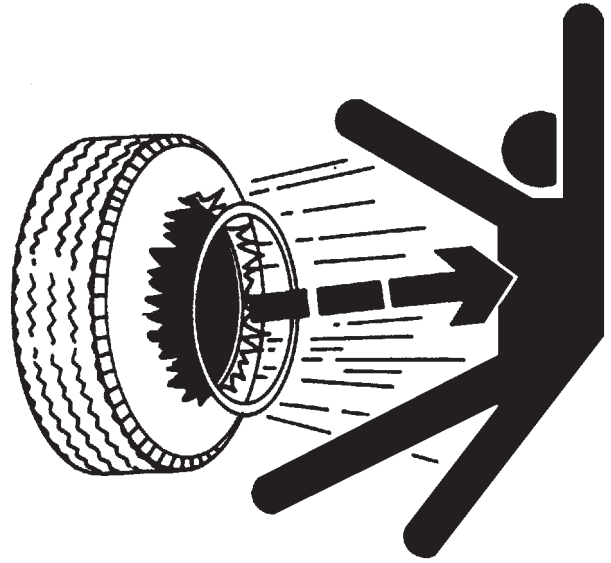


SA-026

SAFETY

SUPPORT MAINTENANCE PROPERLY

- Explosive separation of a tire and rim parts can cause serious injury or death.
 - Do not attempt to mount a tire unless you have the proper equipment and experience to perform the job. Have it done by your authorized dealer or a qualified repair service.
 - Always maintain the correct tire pressure. DO NOT inflate tire above the recommended pressure.
 - When inflating tires, use a chip-on chuck and extension hose long enough to allow you to stand to one side and not in front of or over the tire assembly. Use a safety cage if available.
 - Inspect tires and wheels daily. Do not operate with low pressure, cuts bubbles, damaged rims, or missing lug bolts and nuts.
 - Never cut or weld on an inflated tire or rim assembly. Heat from welding could cause an increase in pressure and may result in tire explosion.



SA-249

521-E02A-0249

PREVENT PARTS FROM FLYING

- 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-E03A-0344

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.



SA-039

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.

505-E01B-0498



SA-225

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.

S506-E01A-0019



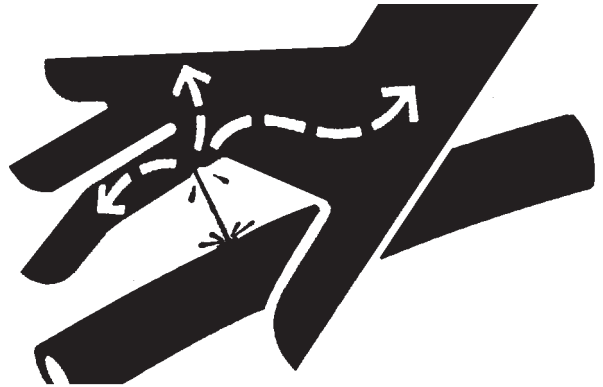
SA-019

SAFETY

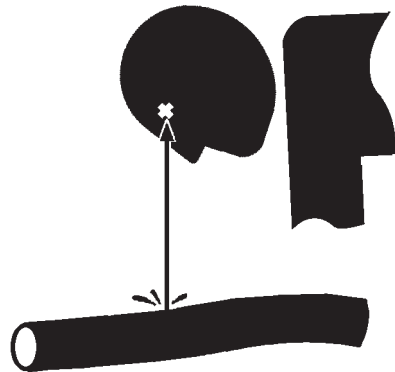
AVOID HIGH-PRESSURE FLUIDS

- 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.

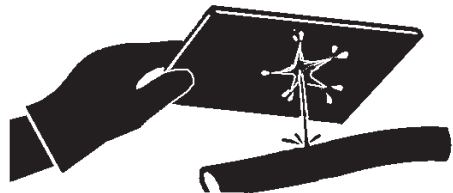
507-E03A-0499



SA-031



SA-292



SA-044

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 and oil, and trash, grease, debris, accumulated coal dust, and other flammables may cause fires.
 - Prevent fires by inspecting and cleaning the machine daily and by removing spilled or accumulated flammables immediately.

Check Key Switch:

- If a fire breaks out, failure to stop the engine will escalate the fire, hampering fire fighting.
Always check key switch function before operating the machine every day:
 1. Start the engine and run it at slow idle.
 2. Turn the key switch to the OFF position to confirm that the engine stops.
- If any abnormalities are found, be sure to repair them before operating the machine.

508-E02B-0019

Check Heat Shields:

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

508-E02A-0393

SAFETY

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.

518-E01A-0393

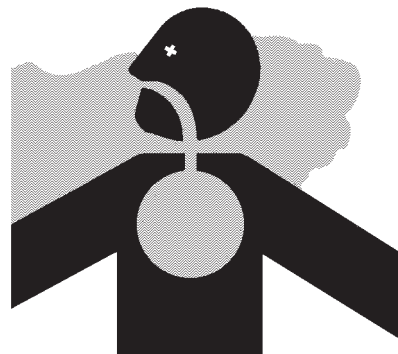


SA-393

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

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.

523-E01A-0818



SA-818

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

BEWARE OF ASBESTOS DUST

- Take care not to inhale dust produced in the work site. Inhalation of asbestos fibers may be the cause of lung cancer.
- Depending on the work site conditions, the risk of inhaling asbestos fiber may exist. Spray water to prevent asbestos from becoming airborne. Do not use compressed air.
- When operating the machine in a work site where asbestos might be present, be sure to operate the machine from the upwind side and wear a mask rated to prevent the inhalation of asbestos.
- Keep bystanders out of the work site during operation.
- Asbestos might be present in imitation parts. Use only genuine Hitachi Parts.



SA-029

PREVENT BATTERY EXPLOSIONS

- Battery gas can explode.
 - Keep sparks, lighted matches, and flame away from the top of battery.
 - Never check battery charge by placing a metal object across the posts. Use a voltmeter or hydrometer.
 - Do not charge a frozen battery; it may explode. Warm the battery to 16°C (60° F) first.
 - Do not continue to use or charge the battery when 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 instructions described on the container for proper use when handling the refrigerant.
- Use a recovery and recycling system to avoid leaking refrigerant into the atmosphere.
- Never touch the refrigerant.



513-E01A-0405

SA-405

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.

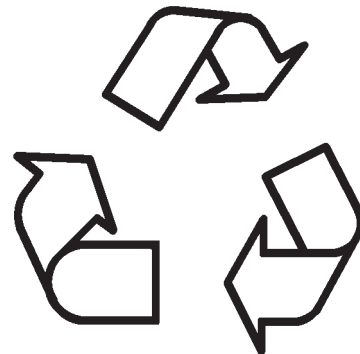


SA-309

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.

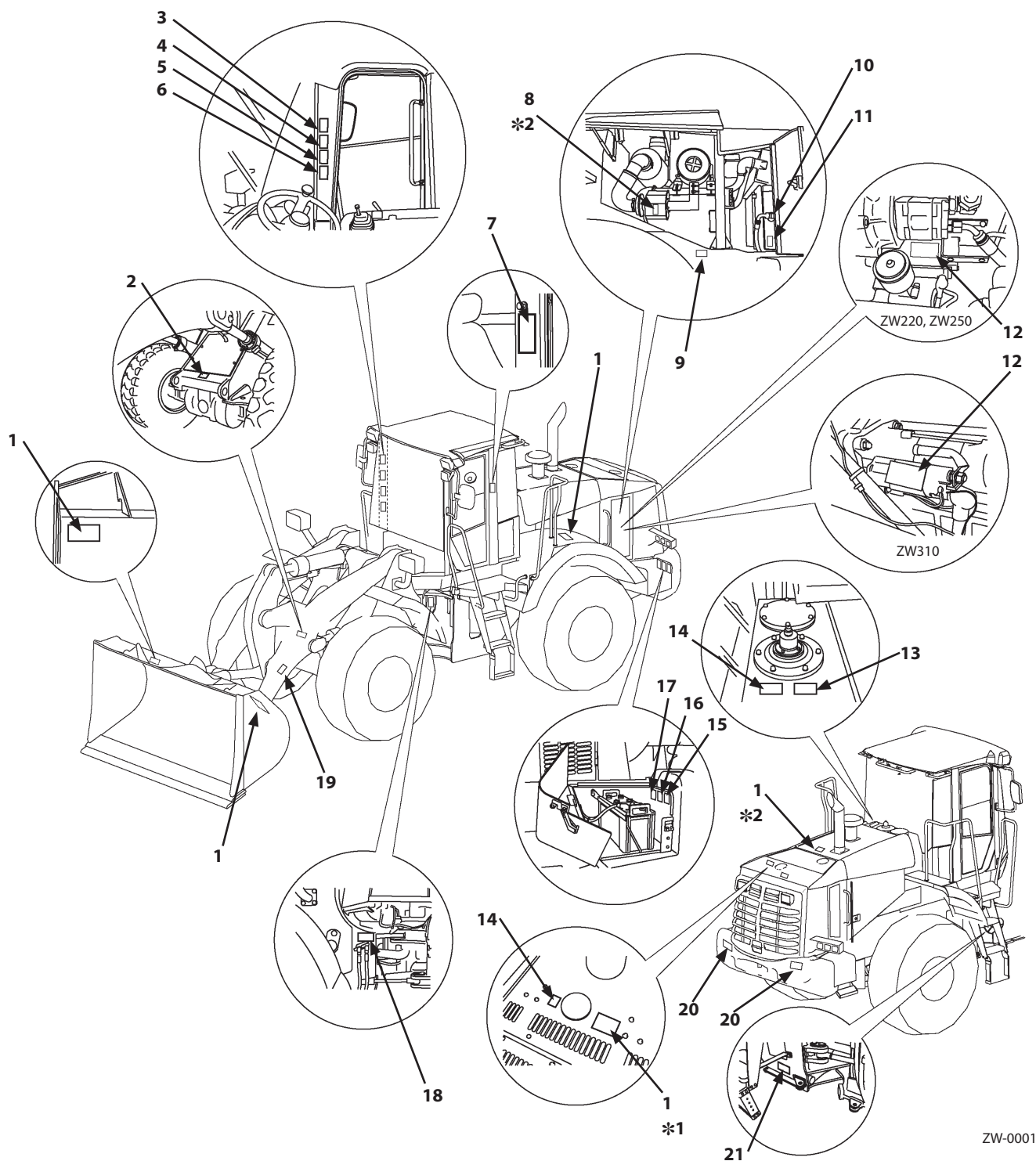


SA-226

516-E01A-0226

SAFETY SIGNS

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



ZW-0001

*1: Affixed on the ZW310 only.

*2: Affixed on the ZW180, ZW220 and ZW250 only.

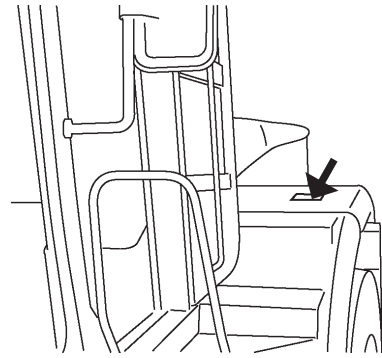
SAFETY SIGNS

1. Fender, Bucket and Hood

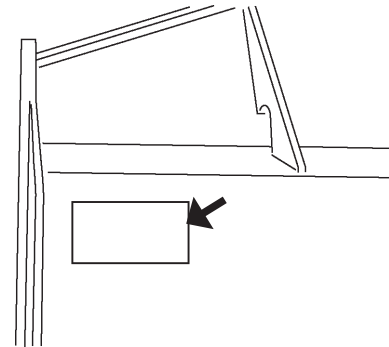


SS263G9-12081

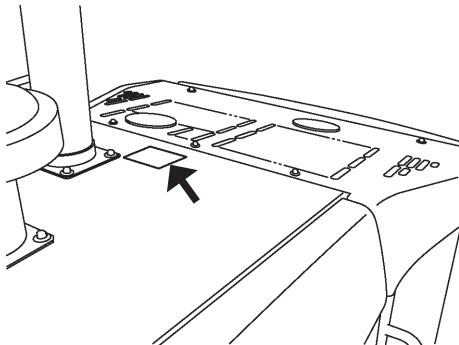
- Sign indicates a hazard of falling.
Do not stand on this place.



ZW-0002

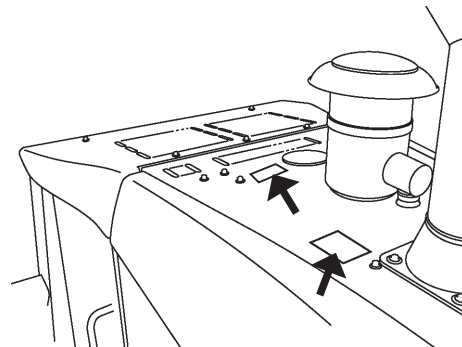


ZW-0003



ZW180, ZW220, ZW250

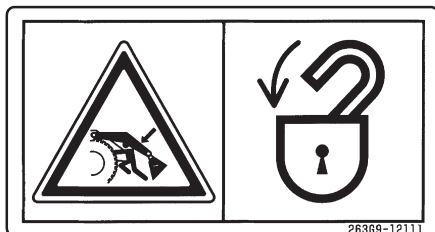
ZW-0004



ZW310

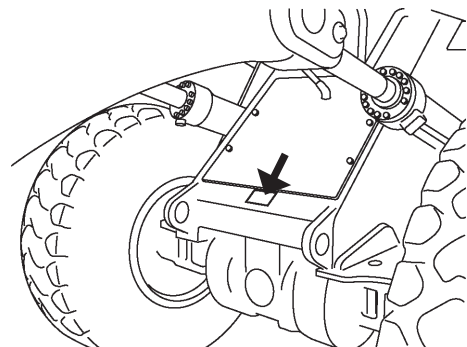
ZW-0005

2. Front Maintenance Access Cover for Front Frame



SS263G9-12111

- The front attachment may automatically be lowered, possibly resulting in personal injury. Lower the front attachment to the ground before inspecting/maintaining the machine. In case inspection and/or maintenance work must unavoidably be performed with the front attachment raised, lock the front attachment control levers in position. Then, securely support the front attachment with safety stays and/or blocks.



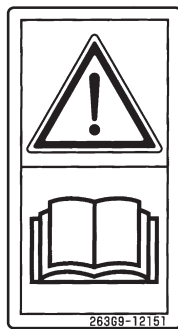
ZW-0006

SAFETY SIGNS

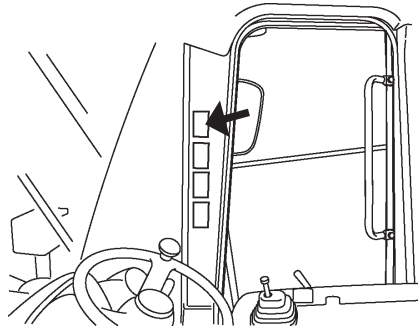
3. Cab Inside Right Front Column (First safety sign from the top)

• **WARNING**

Prior to operation, maintenance, disassembling, and transportation of the machine, be sure to read and understand the Operator's Manual.



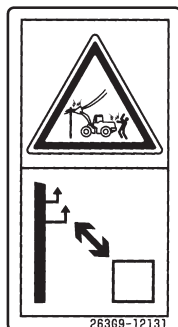
SS263G9-12151



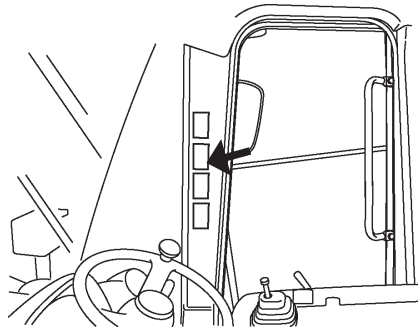
ZW-0007

4. Cab Inside Right Front Column (2nd safety sign from the top)

- Sign indicates an electrocution hazard if machine is brought too near electric power lines. Keep a safe distance from electric power lines.



SS263G9-12131



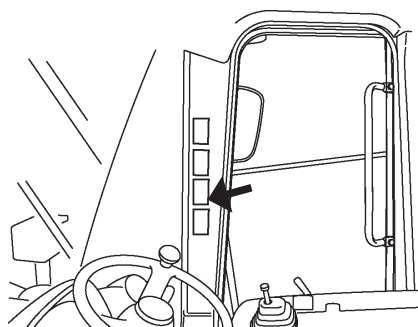
ZW-0007

5. Cab Inside Right Front Column (3rd safety sign from the top)

- If the parked machine starts moving unexpectedly, personal injury or death due to entanglement in moving parts or running over by the machine may result. Before leaving the machine, lower the front attachment to the ground, lock the control levers, and remove the key from the key switch.



SS263G9-12141



ZW-0007

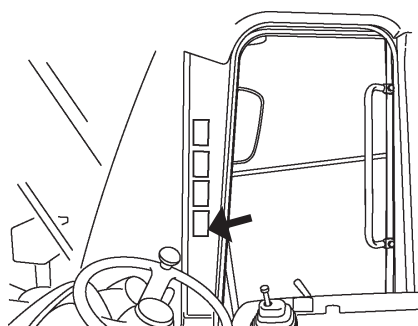
6. Cab Inside Right Front Column (4th safety sign from the top)

• **WARNING**

To minimize the injury due to an overturning accident, be sure to fasten the seat belt prior to operating the machine.



SS263G9-12161



ZW-0007

SAFETY SIGNS

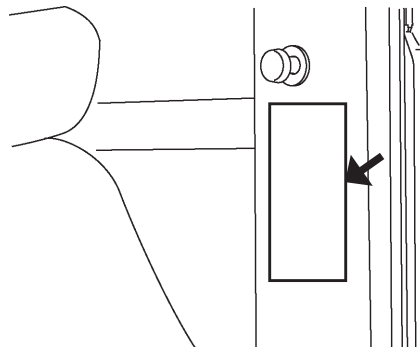
7. Cab Inside Left Front Column

**WARNING**

YOU MUST FOLLOW THESE RULES TO AVOID SEVERE INJURY OR DEATH TO YOURSELF AND OTHERS.

- Operate loader only if trained and authorized by your employer. Know Operation & Maintenance Manual and all work rules.
- Safety check loader every day. Do not start if damaged or faulty ; stop if problems start. Make sure ROPS and seatbelt are in place and used.
- Repair allowed only by trained, authorized mechanics. Use safety link, and parking brake for all repairs.
- Stay in seat when operating. keep hands and feet in cab. Use goggles, hard hat and work shoes.
- Turn, start, stop and handle boom smoothly and slowly. Carry boom low and bucket tilted back. Do not pick up unbalanced or over-capacity loads.
- Look where you are going. Watch for people, drop-offs, holes, and electrical wires. Check clearances all around, including rear, overhead, and boom swing.
- Do not carry passengers in or on the loader. Do not raise people with boom or bucket.
- Keep heavy end uphill on all inclines ; travel straight up or down, do not cross on an angle. Use low gear up and down inclines.
- Loader roll over can kill you. Slow for all turns and hazards even if unloaded. Stay clear of edges. Use seatbelt and ROPS. Stay with loader if it overturns.
- Avoid fires. Keep loader clean and remove all oil, grease, grass or other material from the engine or exhaust area. Repair all leaks immediately.
- Stop engine when refueling. Follow Operation & Maintenance Manual and employer's work rules about fuel, battery, tire maintenance hazards.
- Park only in authorized areas, never on inclines. Lower boom and bucket, put direction control in neutral, turn off key, set parking brake, block wheels, set safety link.

263G9-12231



ZW-0009

SS263G9-12231

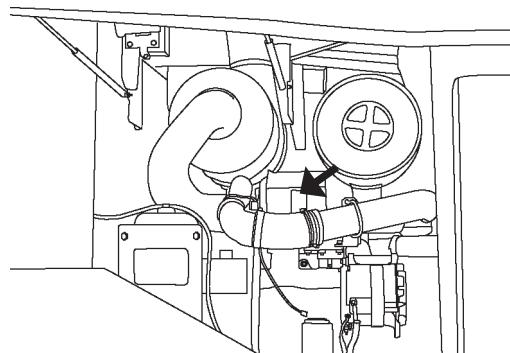
SAFETY SIGNS

8. Turbocharger Cover in Engine Compartment

- Avoid skin contact with highly heated parts such as the engine, muffler, etc. immediately after operation of the machine. Severe burns may result.

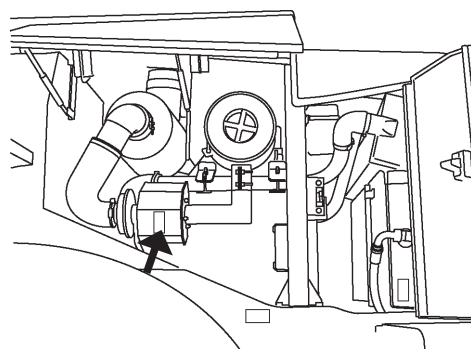


SSH4407874



ZW180

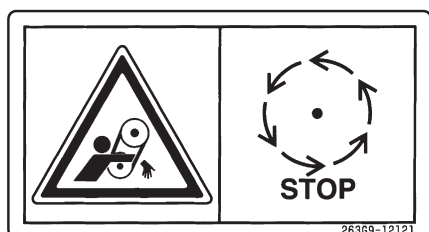
ZW-0020



ZW220, ZW250

ZW-0013

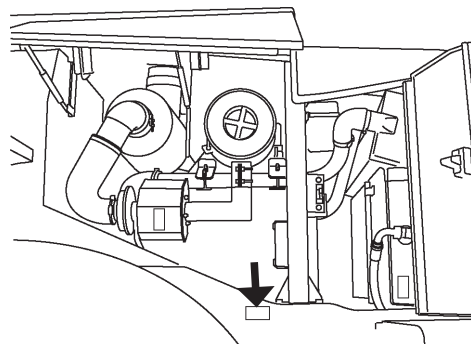
9. Bottoms at Both Right and Left Side Covers of Rear Frame



26369-12121

SS263G9-12121

- Sign indicates a hazard of rotating parts, such as belt. Turn off before inspection and maintenance.



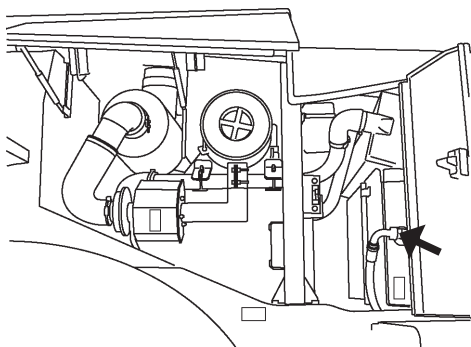
ZW-0013

10. Piping for Oil Cooler

- Avoid skin contact with highly heated parts such as the oil piping, etc. immediately after operation of the machine. Severe burns may result.



SS263G9-12601



ZW-0013

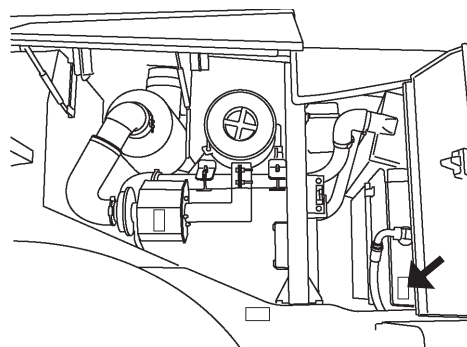
SAFETY SIGNS

11. Both Sides of Oil Cooler

- Avoid skin contact with highly heated parts such as the engine, muffler, etc. immediately after operation of the machine. Severe burns may result.

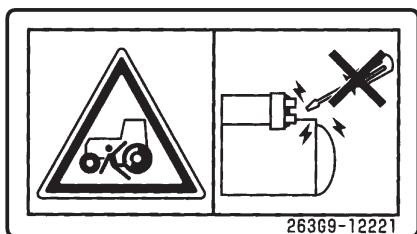


SS263G9-12571



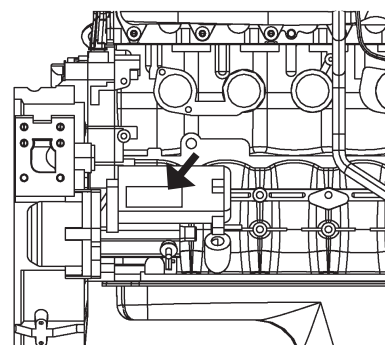
ZW-0013

12. Flank of Engine Starter



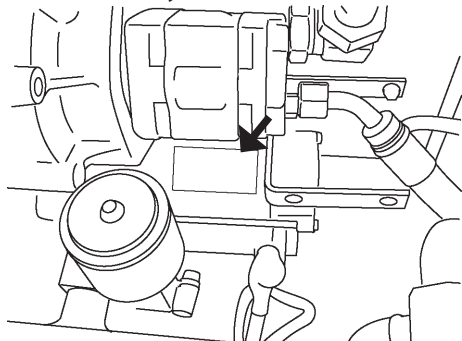
SS263G9-12221

- If the engine is started following an incorrect method, the machine suddenly may start to move. Start the engine from the operator's seat only.



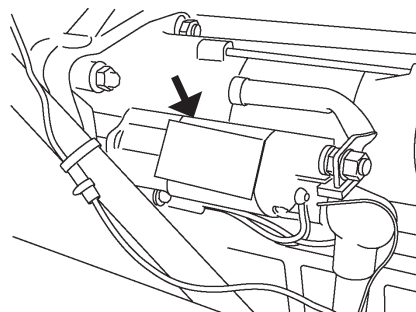
ZW180

ZW-0022



ZW220, ZW250

ZW-0014



ZW310

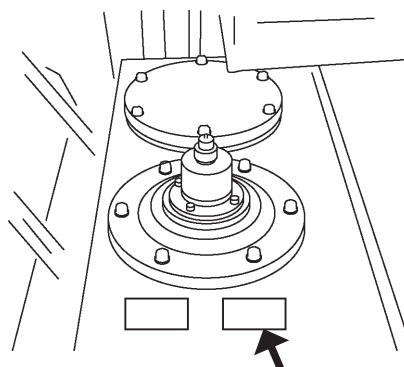
ZW-0015

13. Top of Hydraulic Oil Tank



SS263G9-12211

- Sign indicates a burn hazard from compressed air and spurt-ing hot oil if the oil inlet is uncapped during or right after operation. Read manual for safe and proper handling.



ZW-0016

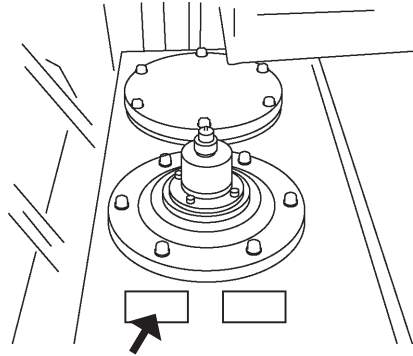
SAFETY SIGNS

14. Top of Hydraulic Oil Tank (Close to Radiator Cap)

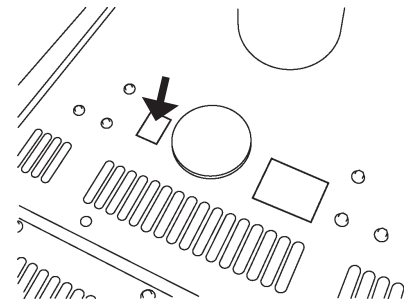


SS263G9-12201

- 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.



ZW-0016



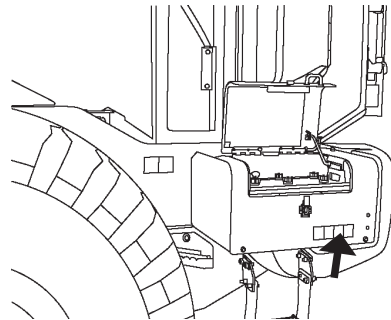
ZW-0017

15. Inside Battery Box (Outward)

- Skin contact with electrolyte will cause burns. Splashed electrolyte into eyes will cause blindness. Take care not to touch electrolyte.

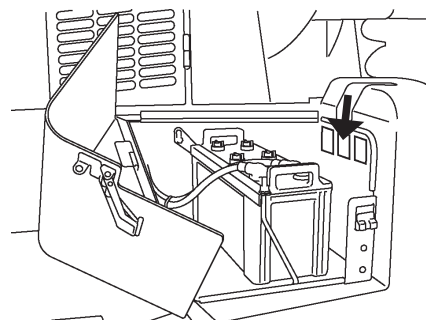


SS263G9-12191



ZW180

ZW-0021



ZW220, 250, 310

ZW-0008

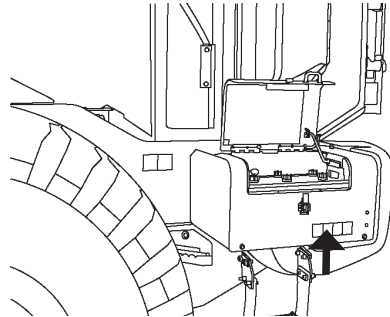
SAFETY SIGNS

16. Inside Battery Box (Center)

- Sign indicates an explosion hazard. Keep fire and open flames away from this area.

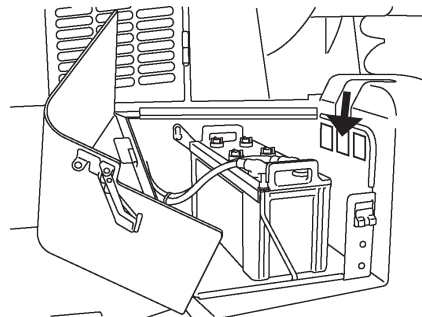


SS263G9-12181



ZW180

ZW-0021

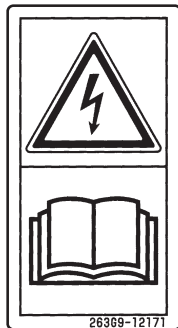


ZW220, 250, 310

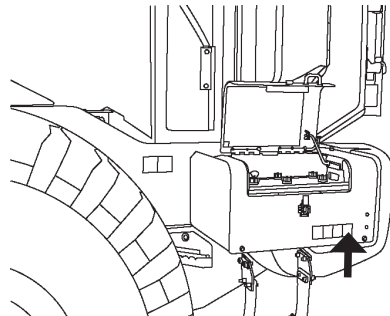
ZW-0008

17. Inside Battery Box (Inward)

- Sign indicates an electrical hazard from handling the cable. Read manual for safe and proper handling.

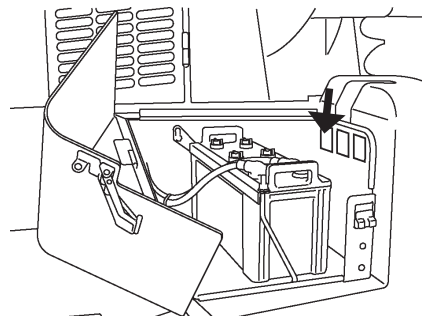


SS263G9-12171



ZW180

ZW-0021

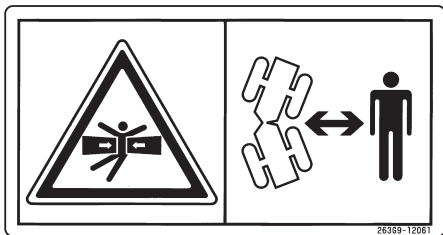


ZW220, 250, 310

ZW-0008

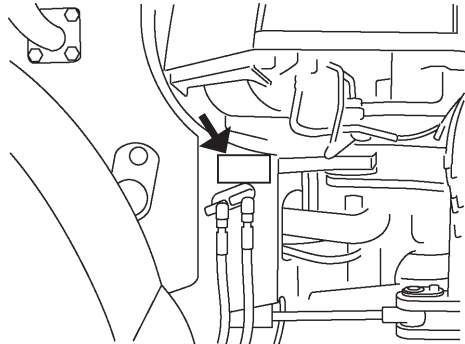
SAFETY SIGNS

18. Both Sides of Front Frame



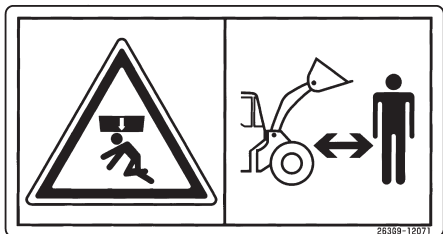
SS263G9-12061

- The articulation area becomes a pinch point when steering the machine. Keep all personnel away from the articulation area during operation of the machine.



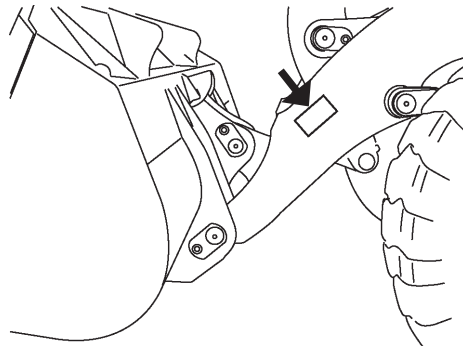
ZW-0011

19. Both Sides of Lift Arm



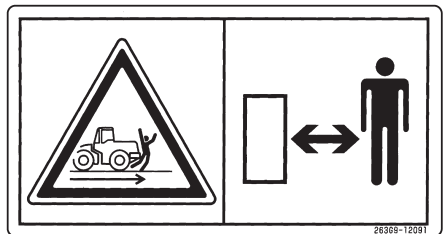
SS263G9-12071

- During operation, loads may spill from the bucket and/or the bucket may suddenly fall. Never allow anyone to approach close to the machine.



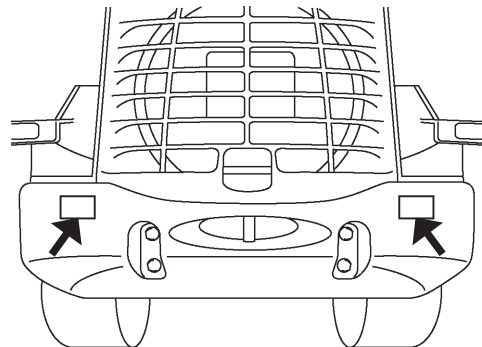
ZW-0012

20. Both Sides of Counterweight



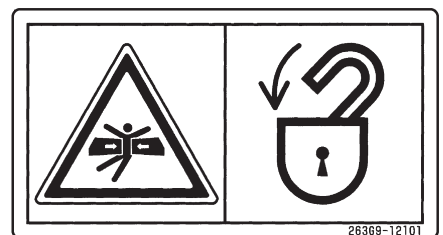
SS263G9-12091

- Avoid injury from backing-over accident. Keep everyone far away from the machine during operation.



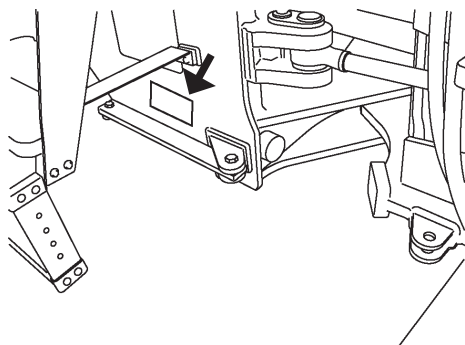
ZW-0018

21. Top of Right Rear Frame Lock bar



SS263G9-12101

- The articulation area becomes a pinch point when steering the machine. Be sure to install the articulate lock bar during the inspection/maintenance work and transportation of the machine.



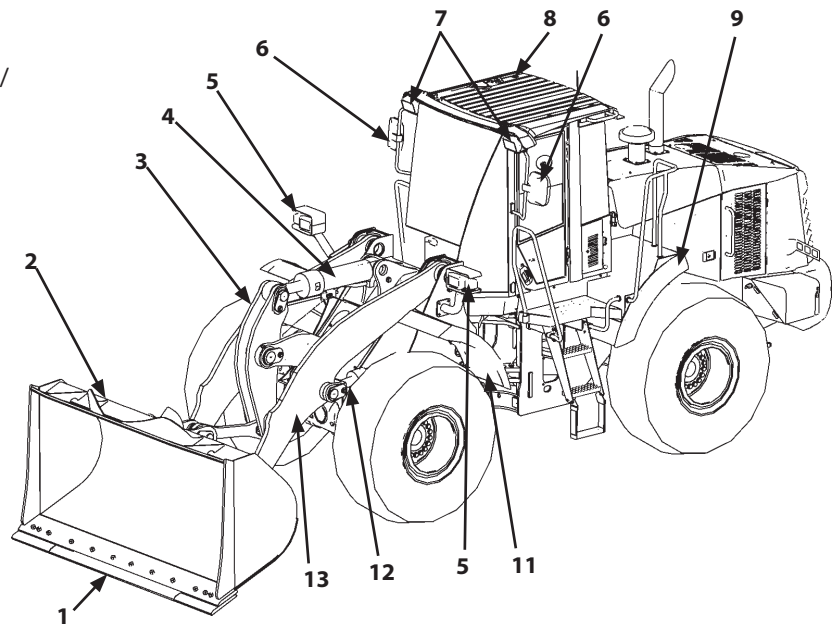
ZW-0010

[illegible]

COMPONENTS NAME

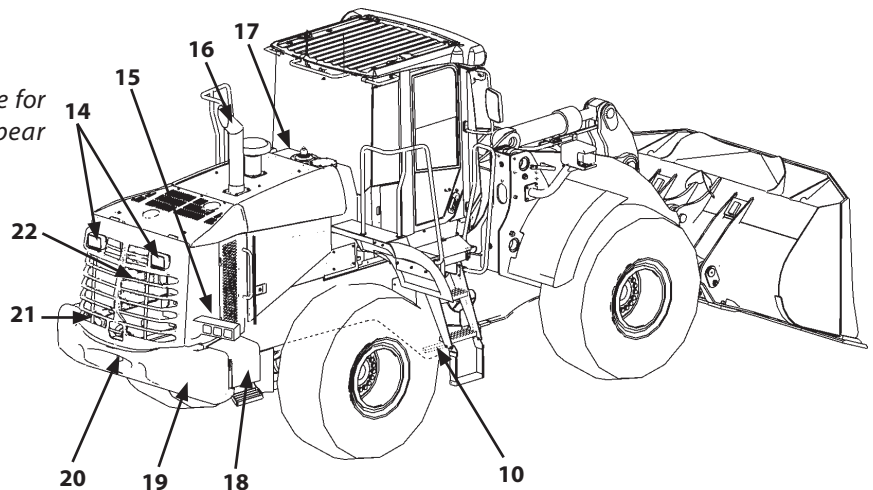
COMPONENTS NAME

- 1- Cutting Edge
- 2- Bucket
- 3- Bell Crank
- 4- Bucket Cylinder
- 5- Head Light/Turn Signal / Hazard Light / Clearance Light
- 6- Outside Rear View Mirror
- 7- Front Work Light
- 8- ROPS Cab
- 9- Rear Fender
- 10- Articulation Lock Bar (Right Side only)
- 11- Front Fender
- 12- Lift Arm Cylinder
- 13- Lift Arm
- 14- Rear Work Light
- 15- Combination Lamp (Turn signal / Hazard Light / Clearance Light / Brake Light)
- 16- Muffler Tail Pipe
- 17- Hydraulic Oil Tank
- 18- Battery (One each on both the right and left sides)
- 19- Counterweight
- 20- Towing Pin
- 21- Fuel Filler Port
- 22- Radiator / Oil Cooler



M4GB-01-001

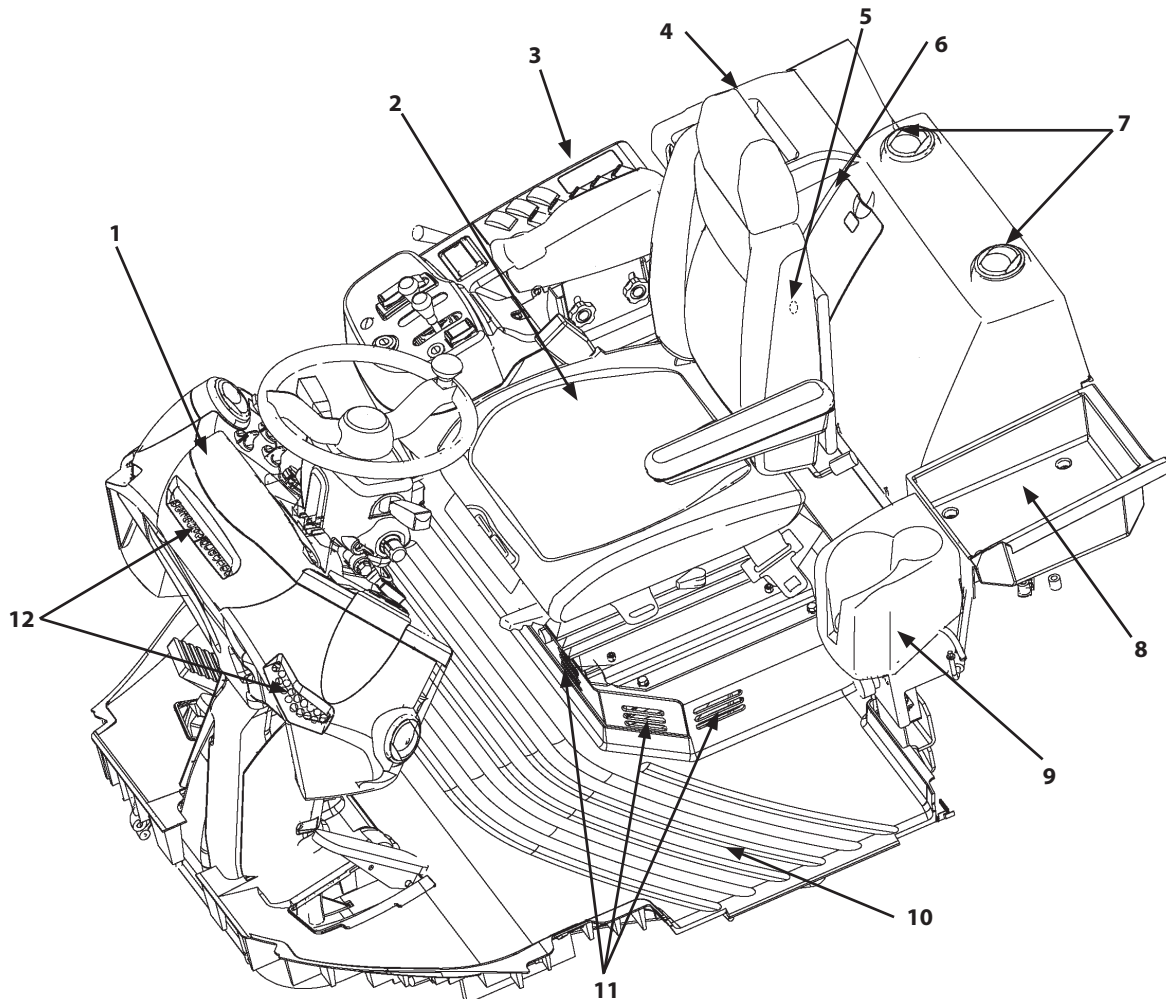
 **NOTE:** Illustrations on this page are those for the typical model. They may appear differently on other models.



M4GB-01-002

OPERATOR'S STATION

CAB FEATURES



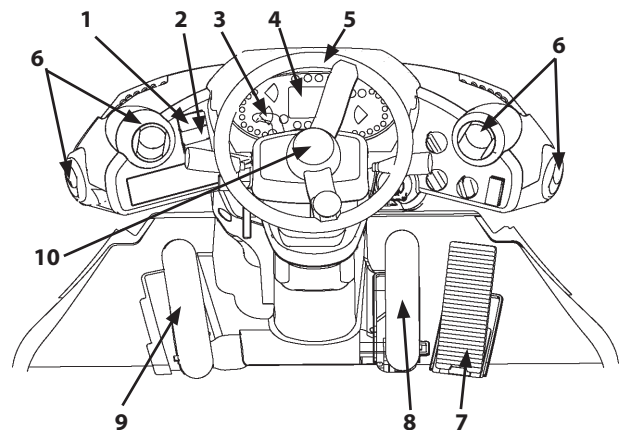
M4GB-01-003

- 1- Front Console
- 2- Operator's Seat
- 3- Right Console
- 4- Fuse Box
- 5- 12 V electric Power Output Terminal (Optional)
- 6- Hot & Cool Box
- 7- Rear Defroster
- 8- Tray
- 9- Cup Holder
- 10- Floor Mat
- 11- Air Conditioner Foot Vent
- 12- Front Defroster

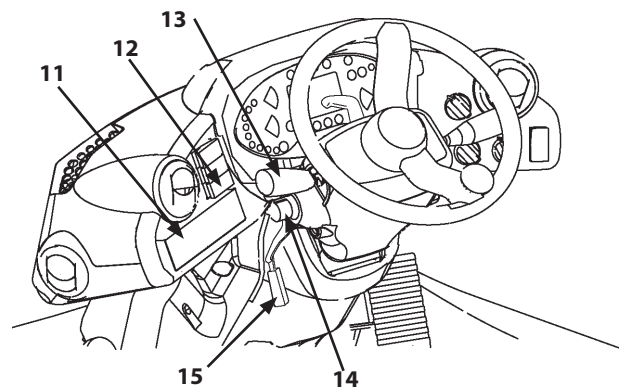
OPERATOR'S STATION

FRONT CONSOLE

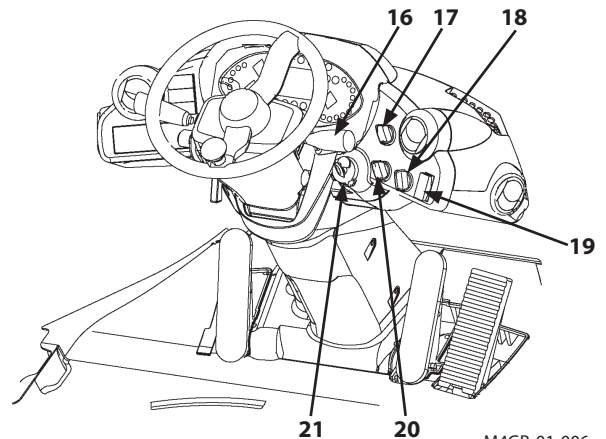
- 1- Hazard Switch
- 2- Work Light Switch
- 3- Neutral Lever Lock (Forward/Reverse Selector Lever)
- 4- Monitor Panel
- 5- Steering Wheel
- 6- Air Conditioner Front Vent
- 7- Accelerator Pedal
- 8- Brake/Clutch Cut-off Pedal
(Both right and left sides are interlocked.)
- 9- Brake/Clutch Cut-off Pedal
(Both right and left sides are interlocked.)
- 10- Horn Switch
- 11- Air Conditioner Switch Panel
- 12- Rear Window Wiper Switch
- 13- Forward/Reverse Lever/ Shift Switch
- 14- Windshield Wiper Switch
- 15- Steering Column Tilt Telescopic Lever
- 16- Turn Signal Lever/ Light Switch/ High-Low Beam Switch
- 17- Driving Mode Switch
- 18- Work Mode Switch
- 19- Parking Brake Switch
- 20- Clutch Cut Position Switch
- 21- Key Switch



M4GB-01-004



M4GB-01-005



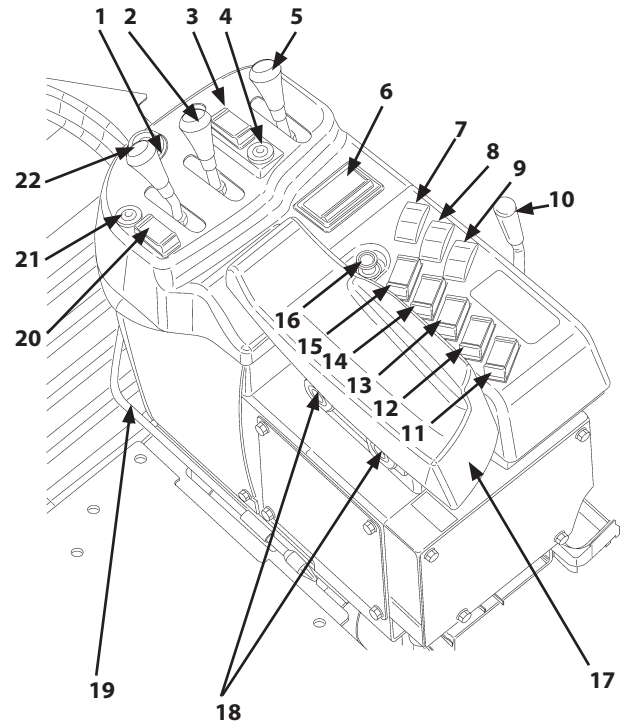
M4GB-01-006

OPERATOR'S STATION

RIGHT CONSOLE

Finger Type

- 1- Bucket Control Lever
- 2- Lift Arm Control Lever
- 3- Forward/Reverse Switch
- 4- Horn Switch
- 5- Auxiliary Control Lever (Optional)
- 6- Ashtray
- 7- Quick Coupler Switch (Optional)
- 8- Lift Arm Auto Leveler Downward Set Switch (Optional)
- 9- Lift Arm Auto Leveler Upward Set Switch (Optional)
- 10- Front Control Lever lock
- 11- Emergency Steering Check Switch (Optional)
- 12- Fan Reverse Switch
- 13- Fog Light Switch (Optional)
- 14- Ride Control Switch (Optional)
- 15- Forward/Reverse Selector Switch
- 16- Cigar Lighter
- 17- Armrest
- 18- Armrest Adjust Handle
- 19- Right Console Slide Lever
- 20- DSS/USS (Down Shift/ Up Shift) Selector Switch
- 21- Hold Switch
- 22- DSS (Down Shift) Switch

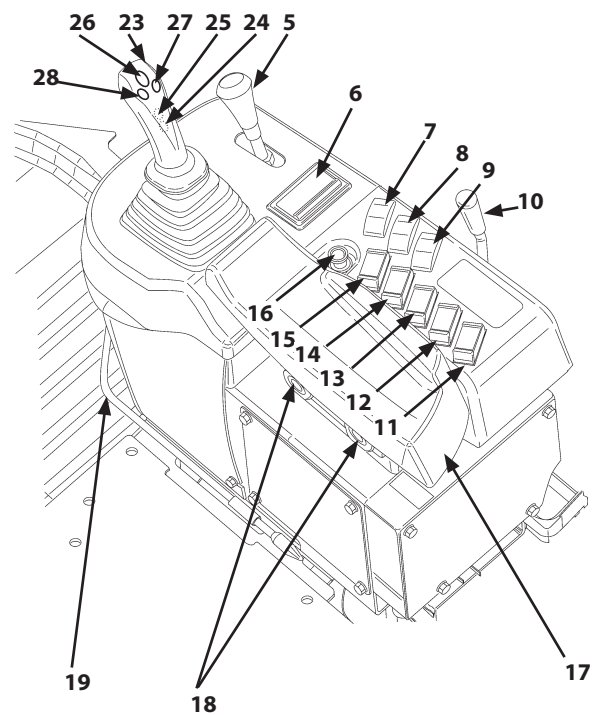


Finger Type

M4GB-01-007

Multi-Function Type

- 23- Multi-Function Lever
- 24- Horn Switch
- 25- Hold Switch
- 26- Forward/Reverse Switch
- 27- USS (Up Shift) Switch
- 28- DSS (Down Shift) Switch

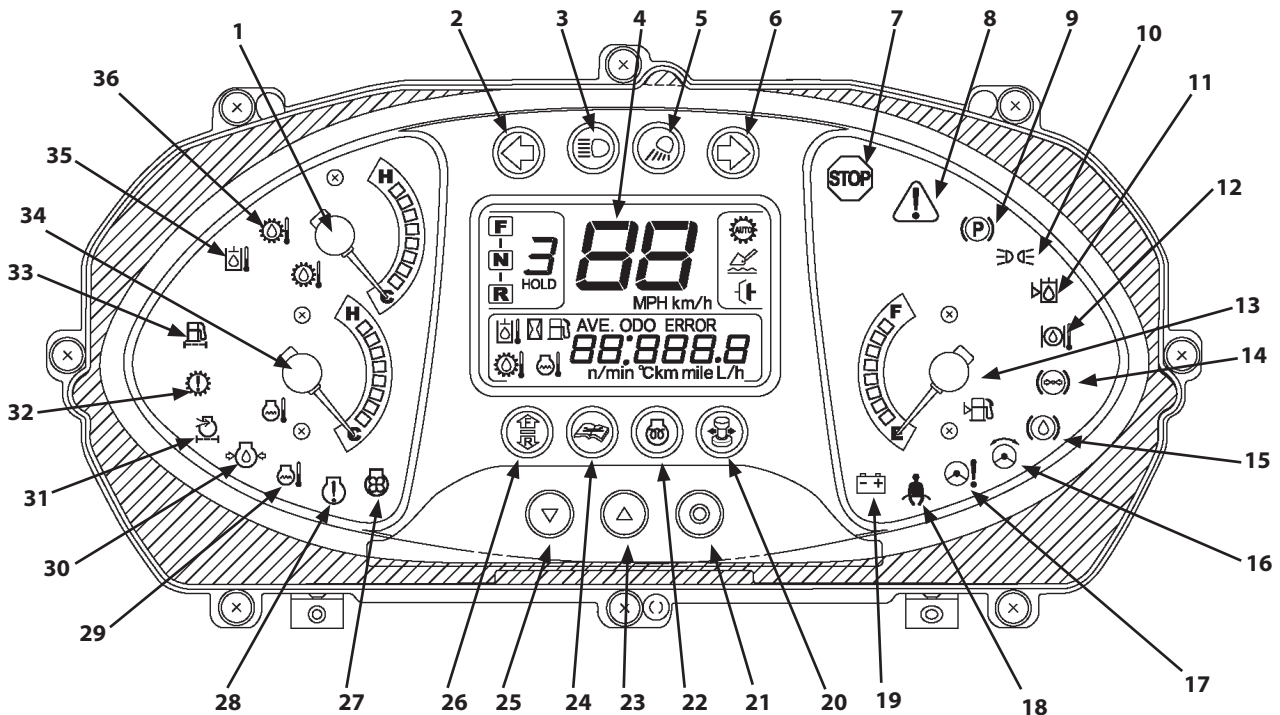


Multi-Function Type

M4GB-01-008

OPERATOR'S STATION

MONITOR PANEL



M4GF-01-001

- | | |
|--|---|
| 1- Transmission Oil Temperature Gauge | 19- Discharge Warning Indicator |
| 2- Right Turn Signal Indicator | 20- Lever Steering Indicator (Optional) |
| 3- High Beam Indicator | 21- Monitor Mode Selector |
| 4- Monitor Display | 22- Preheat Indicator |
| 5- Work Light Indicator | 23- Monitor Display Selector (Up) |
| 6- Left Turn Signal Indicator | 24- Maintenance Indicator |
| 7- Stop Indicator | 25- Monitor Display Selector (Down) |
| 8- Service Indicator | 26- Forward / Reverse Selector Switch Indicator |
| 9- Parking Brake Indicator | 27- Fan Reversal Indicator |
| 10- Clearance Light Indicator | 28- Engine Warning Indicator |
| 11- Hydraulic Oil Level Indicator | 29- Overheat Indicator |
| 12- Axle Oil Temperature Indicator | 30- Engine Oil Low Pressure Indicator |
| 13- Fuel Gauge | 31- Air Filter Restriction Indicator |
| 14- Brake Oil Low Pressure Indicator | 32- Transmission Warning Indicator |
| 15- Brake Oil Low Level Indicator | 33- Fuel Filter Restriction Indicator |
| 16- Emergency Steering Indicator (Optional) | 34- Engine Coolant Temperature Gauge |
| 17- Low Steering Oil Pressure Indicator (Optional) | 35- Hydraulic Oil Temperature Indicator |
| 18- Seat Belt Indicator | 36- Transmission Oil Temperature Indicator |

OPERATOR'S STATION

STOP INDICATOR



WARNING: Prevent possible casualty and/or machine damage. If the stop indicator flashes and the alarm buzzer sounds, immediately stop machine operation. Then, check and service the section displaying the trouble.

The stop indicator flashes and the alarm buzzer sounds if one of the following cases below occurs. Immediately, stop operating the machine. Move the machine to a safe area. Park the machine and stop the engine. Contact your nearest HITACHI dealer for machine inspection:

- If the engine oil pressure decreases,
- If the engine coolant temperature abnormally increases,
- If the brake oil level decreases,
- If the emergency steering system operates,
- If the FNR lever is moved to the F or R position with the parking brake applied,



M4GB-01-010

SERVICE INDICATOR

The service indicator comes ON if one of the following cases as described below occurs. Immediately, stop the engine. Check the cause of the trouble.

- If the alternator voltage decreases
- If engine air filter is restricted



NOTE: The monitor has a self-check function (indicator light check). Under normal conditions, when the key switch is turned ON, all indicators including the service required indicator "!" come and stay ON for approximately 2 seconds. The "STOP" indicator comes ON at the same time, and the buzzer sounds intermittently. If any indicator does not come ON, the indicator light may have burned out. Replace the burned out indicator light. In case the "STOP" indicator does not flash, the indicator light may have burned out. Replace the burned out indicator light. If the buzzer does not intermittently sound, contact your nearest HITACHI dealer for machine inspection.



M4GB-01-011

OPERATOR'S STATION

PARKING BRAKE INDICATOR

The parking brake indicator will light when the parking brake is applied. If the FNR lever is moved to either the forward (F) or the reverse (R) position when the parking brake is applied, the alarm buzzer will sound. Return the FNR lever to neutral (N) and release the parking brake.



M4GB-01-012

BRAKE OIL LOW PRESSURE INDICATOR

WARNING: Stop machine operation if the brake oil pressure decreases. Failure to do so may result in personal injury or death. If the indicator comes ON, immediately stop machine operation.

If the brake oil pressure decreases, the brake oil low pressure indicator will come ON, the stop indicator will flash, and the alarm buzzer will sound. Immediately stop the machine and inspect the brake system. When the brake oil pressure increases to specification, the buzzer stops sounding and the indicator goes OFF.

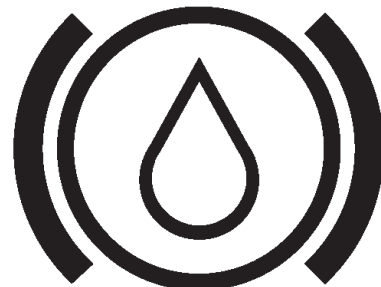


M4GB-01-013

BRAKE OIL LOW LEVEL INDICATOR

WARNING: Stop machine operation if the brake oil level decreases. Failure to do so may result in personal injury or death. If the red indicator comes ON, immediately stop machine operation.

If the brake oil level decreases, the brake oil low level indicator will come ON, the stop indicator will flash, and the alarm buzzer will sound. Immediately stop the machine operation and inspect the brake system for any brake oil leaks.

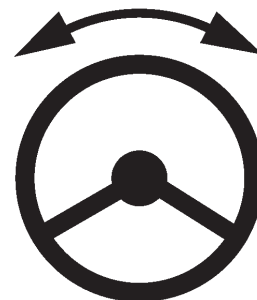


M4GB-01-014

EMERGENCY STEERING INDICATOR (OPTIONAL)

IMPORTANT: The emergency steering system shall be provisionally used. If continuously used, damage to the system may result.

If the emergency steering system operates, the emergency steering indicator will come ON, the stop indicator will flash, and the alarm buzzer will sound. Move the machine to a safe area and stop the machine.



M4GB-01-015

OPERATOR'S STATION

LOW STEERING OIL PRESSURE INDICATOR (OPTIONAL)

IMPORTANT: The secondary steering system shall be provisionally used. If continuously used, damage to the system may result.

If the secondary steering system operates, the low steering oil pressure indicator will come ON, the stop indicator will flash, and the alarm buzzer will sound. Move the machine to a safe area and stop the machine.



M4GB-01-016

SEAT BELT INDICATOR

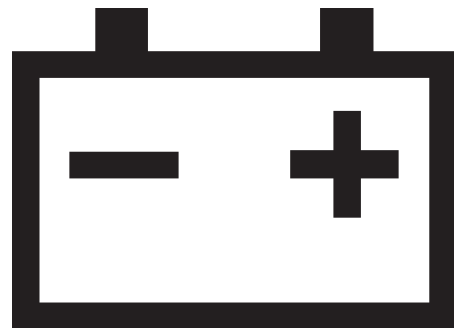
The seat belt indicator will light and stay ON for 5 seconds after the engine is started to warn that the seat belt must be fastened.



M4GB-01-017

DISCHARGE WARNING INDICATOR

If any abnormality occurs in the battery charging system such as low alternator voltage, the discharge warning indicator and the service required indicator will light. Inspect the alternator and the battery system. The alternator output voltage can be checked at the monitor in the operator's station.



M4GB-01-018

ENGINE WARNING INDICATOR

If any serious abnormality occurs in the engine and/or engine related parts, the red indicator will light. Immediately move the machine to a safe area and stop the engine. Contact your nearest HITACHI dealer for machine inspection.

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



M4GB-01-019

OPERATOR'S STATION

OVERHEAT INDICATOR

If the engine coolant temperature increases to the abnormally high range, the red indicator will light, the stop indicator will flash, and the alarm buzzer will sound. Stop machine operation and reduce the engine speed to the slow idle range to cool the coolant temperature.



M4GB-01-020

ENGINE OIL LOW PRESSURE INDICATOR

IMPORTANT: Immediately stop machine operation and stop the engine if the indicator lights. If the engine is kept running with the engine oil pressure low, damage to the engine may result.

If the engine oil pressure becomes low, the low engine oil pressure indicator will light, the stop indicator will flash, and the alarm buzzer will sound. Immediately stop machine operation and stop the engine. Inspect the engine oil pressure system and the oil level for any abnormality.

 **NOTE:** Cold oil temperature or operating on a steep slope may also cause the indicator to light.



M4GB-01-021

FUEL FILTER RESTRICTION INDICATOR

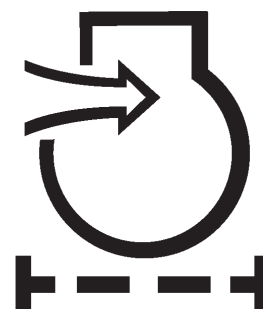
If the fuel filter is clogged, the fuel filter restriction indicator will light.



M4GF-01-002

AIR FILTER RESTRICTION INDICATOR

This indicator is not equipped on this machine.

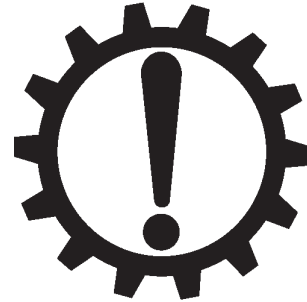


M4GB-01-023

OPERATOR'S STATION

TRANSMISSION WARNING INDICATOR

If the clutch in the transmission slips, the indicator lights and the transmission is returned to neutral. Once the key switch is turned OFF, the check transmission indicator will go OFF. However, if the clutch slips again, the indicator will light again.



M4GB-01-024

TRANSMISSION OIL FILTER RESTRICTION INDICATOR

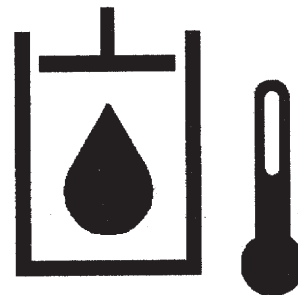
If the transmission oil filter becomes clogged, the transmission oil filter restriction indicator and the service required indicator will light. Replace the oil filter.



M4GB-01-025

HYDRAULIC OIL TEMPERATURE INDICATOR

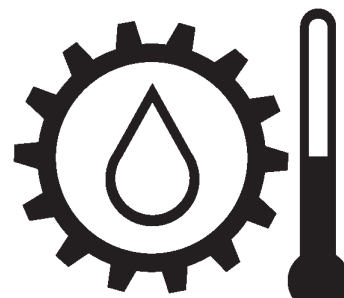
If the hydraulic oil temperature becomes higher than 104 °C, the hydraulic oil temperature indicator will light, the service required indicator will flash and the alarm buzzer will sound. Immediately stop machine operation and wait for the hydraulic oil to cool before continuing operation.



M4GB-01-026

TRANSMISSION OIL TEMPERATURE INDICATOR

If the transmission oil temperature becomes higher than 110 °C on the ZW220 and the ZW250, or 120°C on the ZW310, the transmission oil temperature indicator will light, the service required indicator will flash and the alarm buzzer will sound. Immediately stop machine operation and wait for the hydraulic oil to cool before continuing operation.

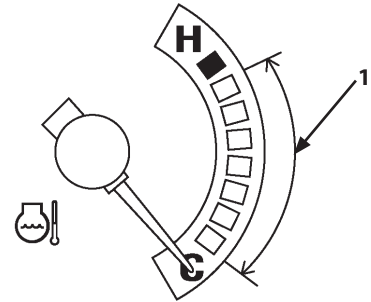


M4GB-01-027

OPERATOR'S STATION

ENGINE COOLANT TEMPERATURE GAUGE

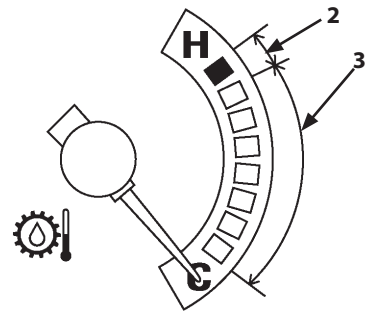
The engine coolant temperature is indicated with a needle. When the needle stays in the blue range (1) during operation, the coolant temperature is normal. If the engine coolant temperature becomes abnormally high, the stop indicator will flash and the alarm buzzer will sound. Stop machine operation and run the engine at slow idle to lower the coolant temperature. After the coolant temperature lowers, stop the engine for inspection. In case the needle doesn't swing at all, Error in the electrical system is suspected. Contact your nearest HITACHI dealer for machine inspection.



M4GB-01-028

TRANSMISSION OIL TEMPERATURE GAUGE

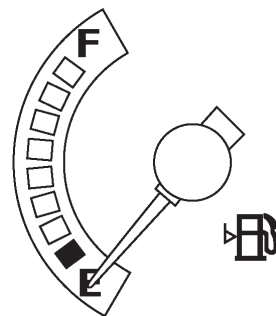
The transmission oil temperature is indicated with a needle. When the needle stays in the blue range (3) during operation, the oil temperature is normal. If the transmission oil temperature becomes abnormally high (in the red range (2)), the stop indicator will flash and the alarm buzzer will sound. Stop machine operation and run the engine at slow idle to lower the oil temperature. After the oil temperature lowers, stop the engine for inspection.



M4GB-01-029

FUEL GAUGE

The remaining fuel amount is indicated by the needle. Fuel the machine before the needle indicates the red range (E).



M4GB-01-030

OPERATOR'S STATION

PREHEAT LAMP

The engine is being preheated as long as the preheat lamp stays ON. When the preheat lamp goes OFF, engine preheating is completed.



M4GB-01-031

TURN SIGNAL INDICATOR

When the turn signal lever is operated, the turn signal and the indicator start flashing.



HIGH BEAM INDICATOR

When the head lights are used at the high beam position, the indicator will light.



M4GB-01-032

WORK LIGHT INDICATOR

When the work lights are turned ON, this indicator will come ON.



M4GB-01-033

CLEALANCE LIGHT INDICATOR

When the clealance lights are turned ON, this indicator will come ON.



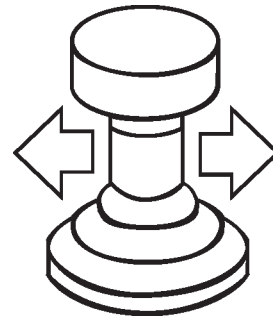
M4GB-01-034

M4GB-01-035

OPERATOR'S STATION

LEVER STEERING INDICATOR (Optional)

The lever steering is not used on this machine. The lever steering is optional. The lever steering indicator comes ON when the lever steering system is operable on the machine equipped with the lever steering equipped.



M4GB-01-036

MAINTENANCE INDICATOR

Indicates that the maintenance times for the following items are approaching. Each time the ignition key is turned ON, the indicator comes ON for 30 seconds. The indicator lights 20 hours before the specified maintenance time arrives.

Items to be indicated:

- Hydraulic oil change
- Hydraulic oil filter replacement
- Transmission oil change
- Transmission oil filter replacement
- Engine oil change
- Engine oil filter replacement
- Fuel filter replacement



M4GB-01-037

FORWARD/REVERSE SELECTOR SWITCH INDICATOR

Comes ON when the forward/reverse selector switch is operable.

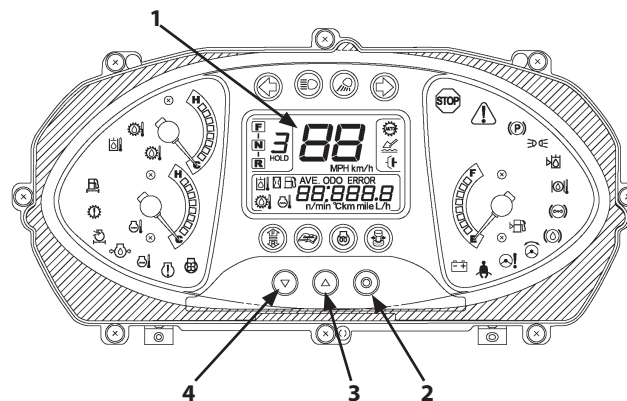


M4GB-01-038

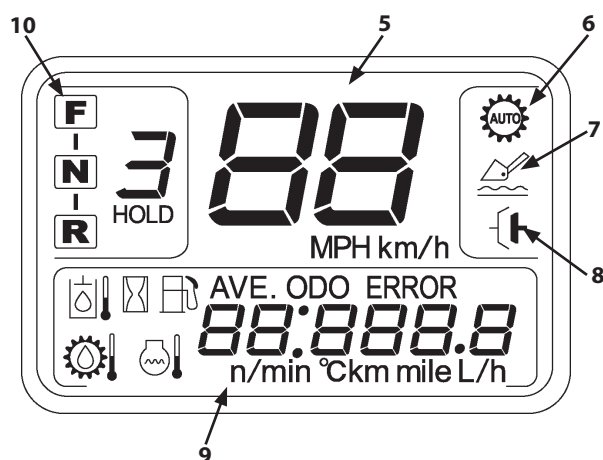
OPERATOR'S STATION

MONITOR DISPLAY

- 1- Monitor Display
- 2- Monitor Display Mode Selector
- 3- Monitor Display Selector (Up)
- 4- Monitor Display Selector (Down)
- 5- Speedometer
- 6- Automatic Mode Indicator
- 7- Ride Control Indicator
- 8- Clutch Cut Position Indicator
- 9- Information Display
- 10- Forward / Reverse and Shift Position Indicator



M4GF-01-001

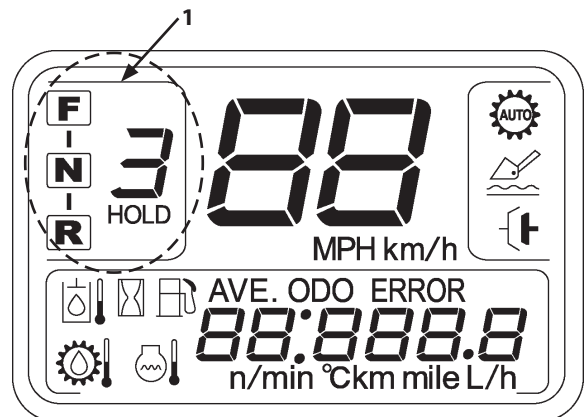


M4GB-01-040

OPERATOR'S STATION

FORWARD/REVERSE AND SHIFT POSITION INDICATOR

Forward/Reverse and Shift Position Indicator (1) displays the machine driving status (selected FNR lever and shift positions).

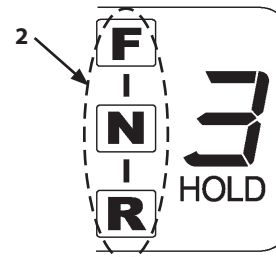


M4GB-01-040

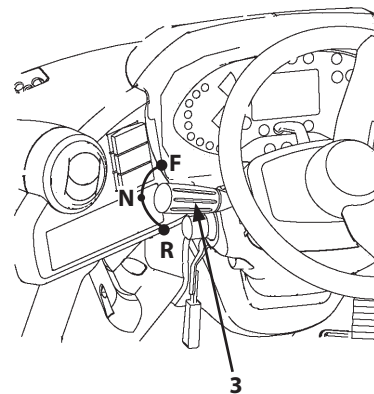
FNR (Forward/Reverse) POSITION INDICATOR

FNR position indicator (2) displays the selected position of forward/reverse selector lever (3).

- F: Lights when FNR lever (3) is in the forward position.
- N: Lights when FNR lever (3) is in the neutral position.
- R: Lights when FNR lever (3) is in the reverse position.



M4GB-01-041

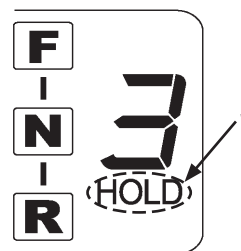


M4GB-01-042

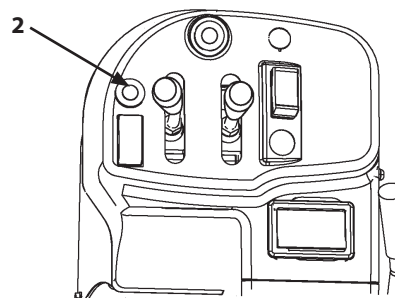
OPERATOR'S STATION

HOLD INDICATOR

When hold switch (2) is ON, hold indicator (1) lights.

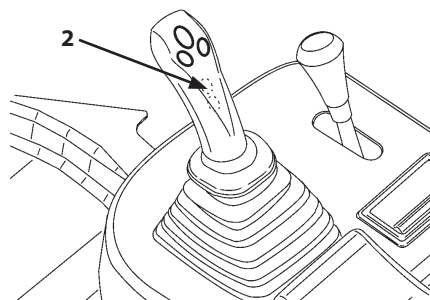


M4GB-01-041



Finger Type

M4GB-01-043



Multi-Function Type

M4GB-01-044

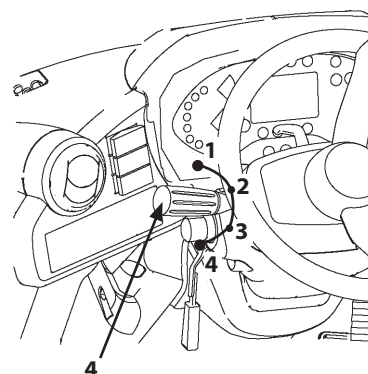
SHIFT POSITION INDICATOR

When forward/reverse selector lever (4) is in either the forward or reverse position, shift position indicator (3) displays the actually selected shift stage.

- Forward : 4 stages
- Reverse : 3 stages ZW220/ZW250 (ZW180/ZW310: 4 stages)



M4GB-01-041

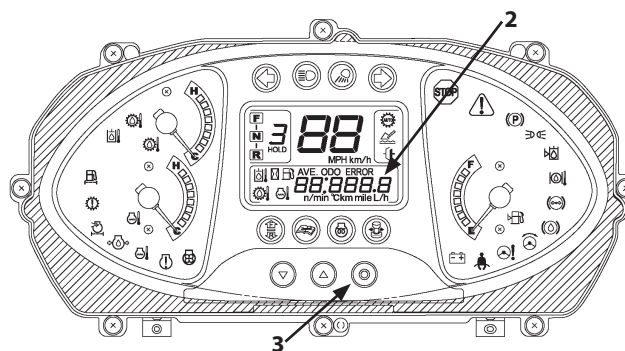


M4GB-01-042

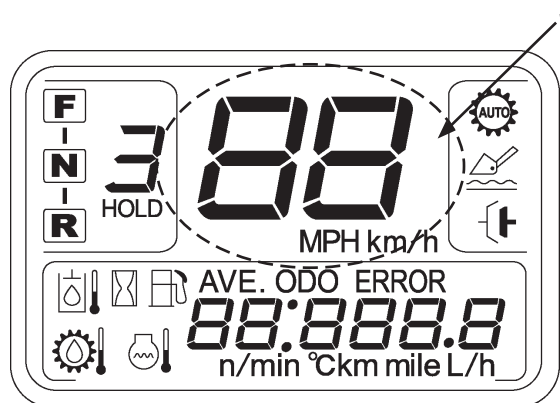
OPERATOR'S STATION

SPEEDOMETER

Speedometer (1) indicates the present machine driving speed. While information display (2) is indicating the drive distance, each time monitor mode selector (3) is pressed, the indicated speed unit alternates between "km/h" and "MPH."



M4GF-01-001

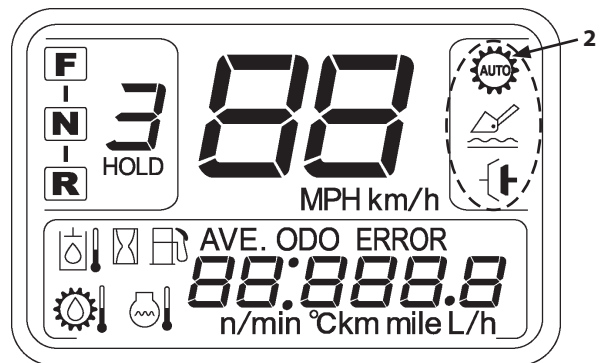


M4GB-01-040

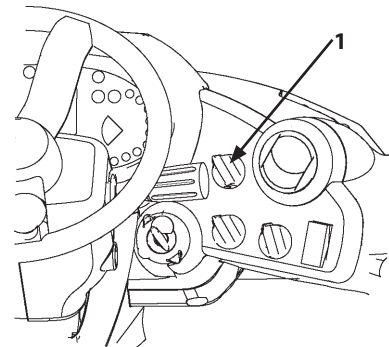
OPERATOR'S STATION

AUTOMATIC MODE INDICATOR

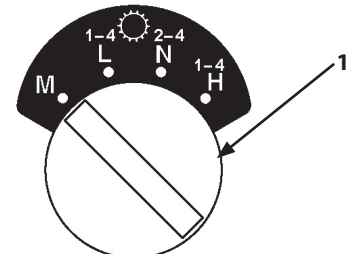
Automatic mode indicator (2) comes ON when the driving mode switch (1) is turned to the L, N, or H position.



M4GB-01-040

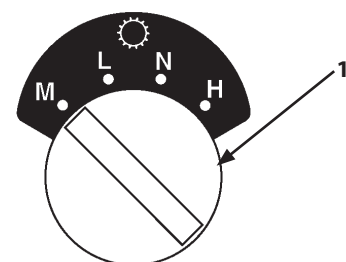


M4GB-01-046



ZW180

M4GF-01-003



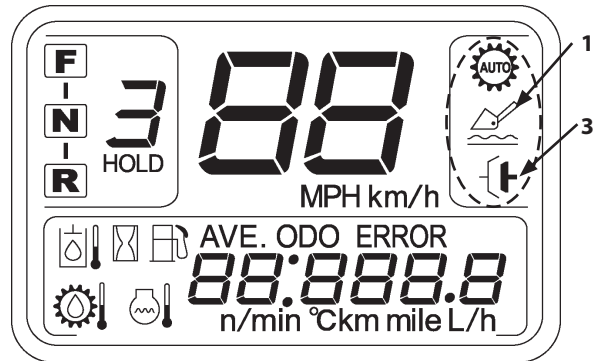
ZW220, 250, 310

M4GB-01-047

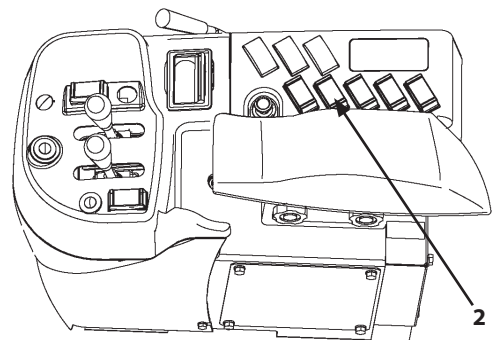
OPERATOR'S STATION

RIDE CONTROL INDICATOR

Ride control indicator (1) lights when ride control switch (2) is turned ON.



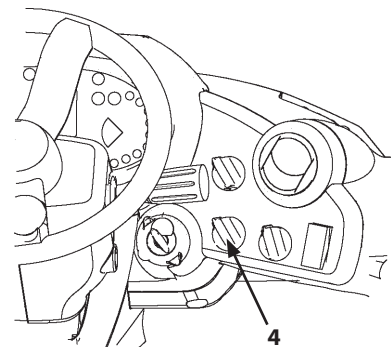
M4GB-01-040



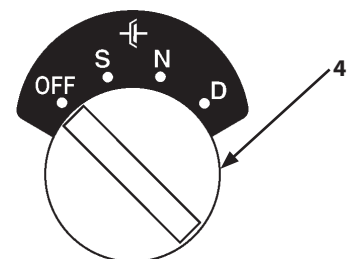
M4GB-01-050

CLUTCH CUT POSITION INDICATOR

Clutch cut position indicator (3) lights when clutch cut position switch (4) is turned to the S, N, or D position.



M4GB-01-046



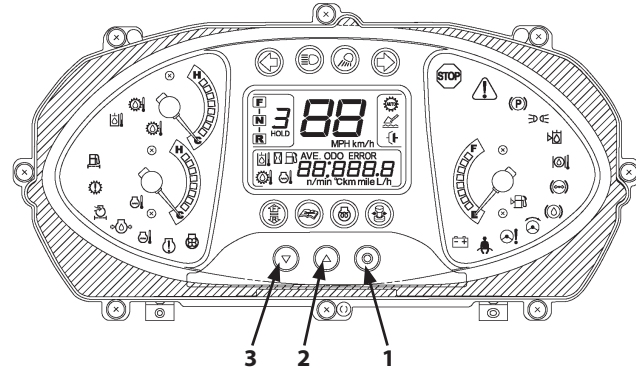
M4GB-01-051

OPERATOR'S STATION

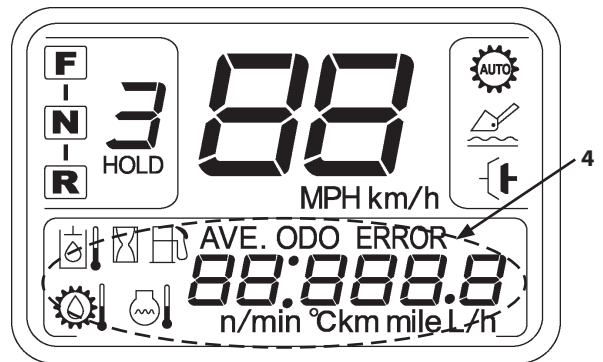
MACHINE INFORMATION DISPLAY

When the key switch is turned ON, the machine information area (4) displays the machine information.

When the key switch is turned ON, the machine information display indicates engine start-ready screen (5). The "zero" start up figures displayed on screen (6) are erased one by one from the left end side each time when 5 seconds pass. After all start up figures are erased, 24 H clock screen (7) is displayed. Display item on the machine information display can be shifted from clock display (7) in the order as described below by pressing display selector (2).



M4GB-01-001



M4GF-01-001

Display order of Items in the normal display mode

- Clock (24H)
- Hour Meter
- Odometer
- Fuel Consumption
- Hour Meter of Hydraulic Oil
- Hour Meter of Hydraulic Oil Filter
- Hour Meter of Transmission Oil
- Hour Meter of Transmission Oil Filter
- Hour Meter of Engine Oil
- Hour Meter of Engine Oil Filter
- Hour Meter of Fuel Filter

Engine Start-ready Screen (5)



Engine Start-ready Screen (6)



24H Clock Screen (7)

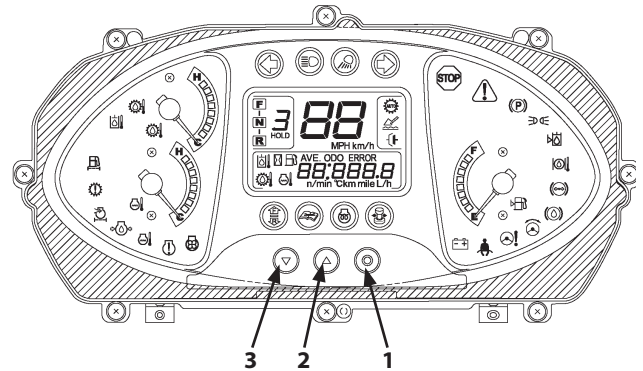


M4GB-01-052

OPERATOR'S STATION

Shifting Item to be Indicated on Machine Information Display

Press monitor display selector (2) to shift the display item one a time in order from the clock display on the machine information display.



M4GF-01-001

Clock (24H):

Indicates the present time. When this display is indicated, press monitor display selector (2) one a time to display the Hour Meter.

Hour Meter:

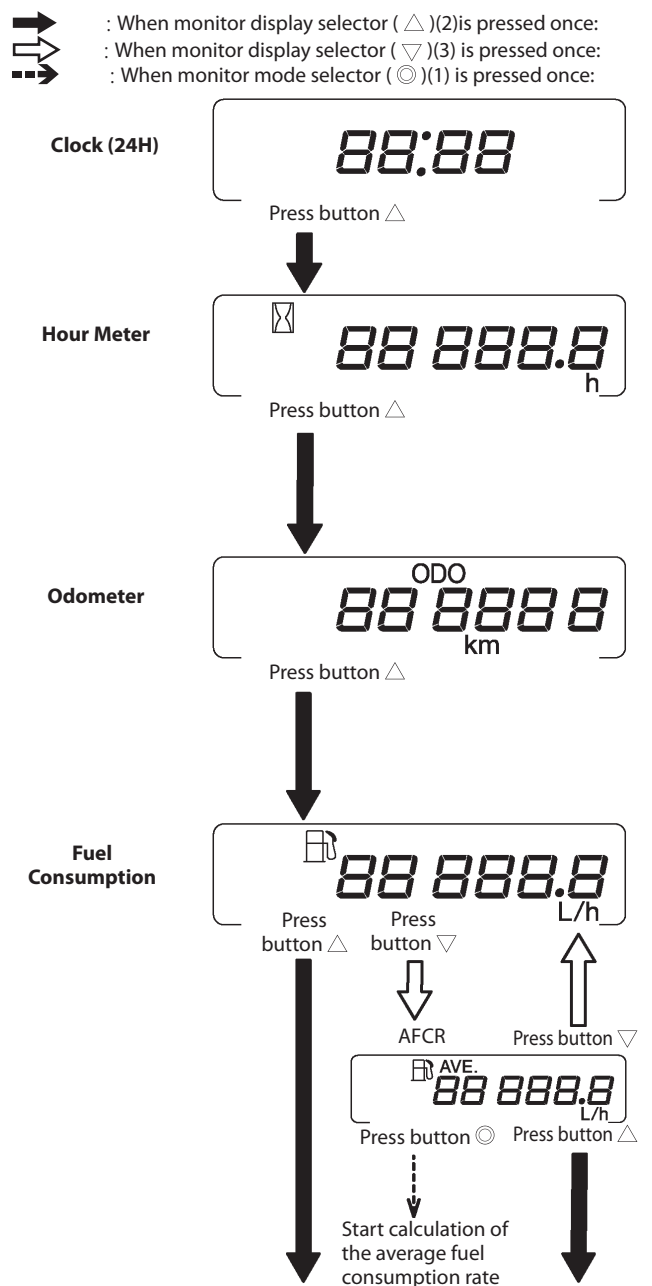
Indicates the total machine operating hours up to present. In case the operating hour exceeds 99999.9h, the meter restarts counting the hour from 0 hour. When this display is indicated, press monitor display selector (2) once at a time to display the odometer.

Odometer:

Indicates the total machine traveling distance up to present. Press monitor mode selector (1) to shift the unit indication km to mile or vice versa. When this display is indicated, press monitor display selector (2) once at a time to display the fuel consumption.

Fuel Consumption:

Indicates the real-time fuel consumption rate (liter values converted from the fuel consumption per hour). When this display is indicated, press monitor display selector (2) once at a time to display the INFO screen. Press monitor display selector (3) to indicate the average fuel consumption rate. When the average fuel consumption rate is displayed, press monitor mode selector (1) to start calculation of the average fuel consumption rate.

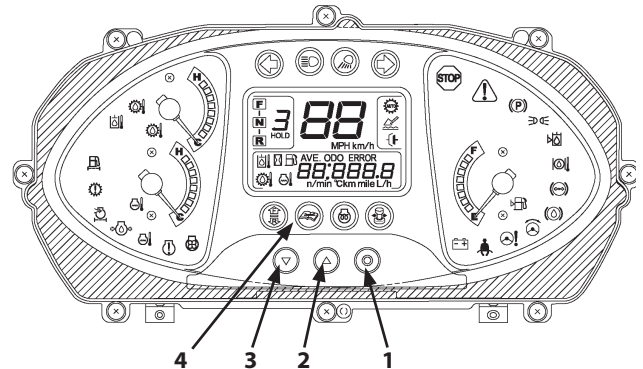


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OPERATOR'S STATION

IMPORTANT: After replacing any kind of the oil filter, press monitor mode selector (1) to reset the time of the clock.

Beware not to press display shift selector (1) when the display is indicating the time to change or replace. The display will not be able to indicate the correct time.



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INFO:

When this display is indicated, press monitor display selector (2) once at a time to return to the clock display screen. Then, when monitor display selector (3) is pressed, the screen is shifted to the hydraulic hour meter display.

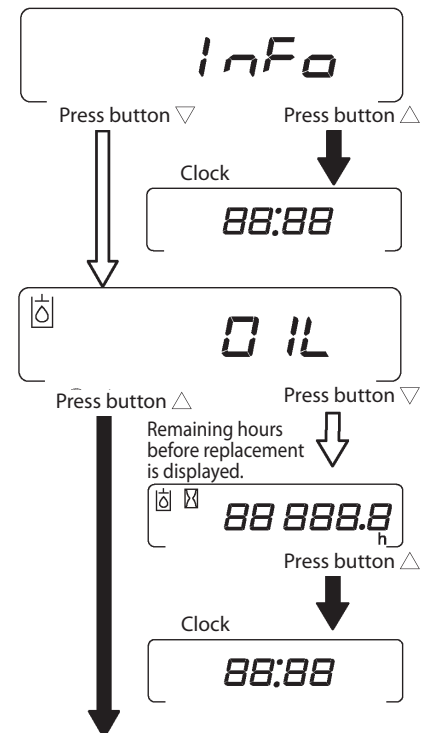


- : When monitor display selector (Δ)(2) is pressed once:
- : When monitor display selector (∇)(3) is pressed once:
- : When monitor mode selector ($\odot$)(1) is pressed once:

Hydraulic Oil Hour Meter:

When this display is indicated, press monitor display selector (3) to display the hours remaining before the hydraulic oil needs to be changed. When the remaining hour reading becomes lower than 0 hour, maintenance Indicator (4) will light. When the remaining hours is displayed, press monitor display selector (2) to return to the clock screen. When the remaining hours is displayed, press monitor display selector (3) to display the hydraulic oil filter hour meter.

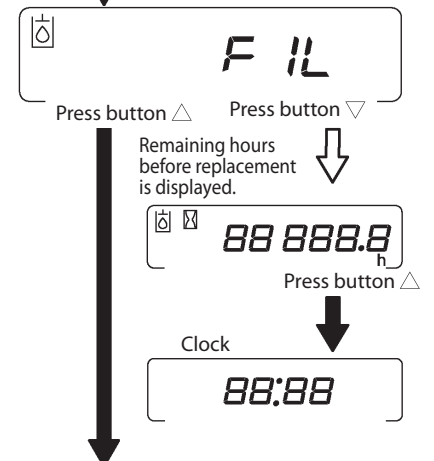
Hydraulic Oil Hour Meter



Hydraulic Oil Filter Hour Meter:

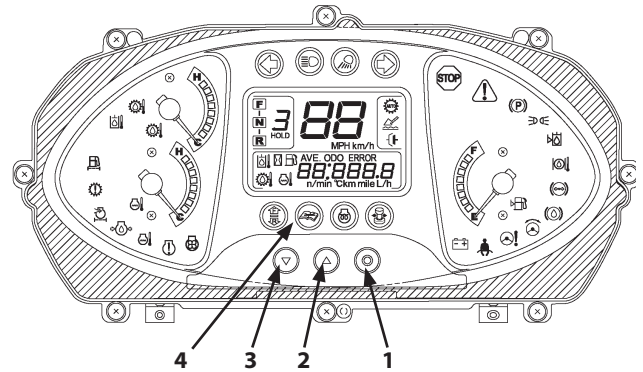
When this display is indicated, press monitor display selector (3) to display the hours remaining before the hydraulic oil filter needs to be changed. When the remaining hour reading becomes lower than 0 hour, maintenance Indicator (4) will light. When the remaining hours is displayed, press monitor display selector (2) to return to the clock screen. When the remaining hours is displayed, press monitor display selector (3) to display the transmission oil hour meter.

Hydraulic Oil Filter Hour Meter



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OPERATOR'S STATION



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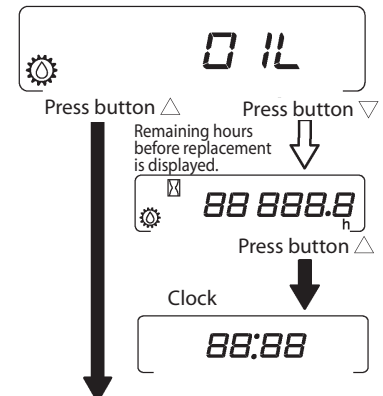
Transmission Oil Hour Meter:

When this display is indicated, press monitor display selector (3) to display the hours remaining before the transmission oil needs to be changed. When the remaining hour reading becomes lower than 0 hour, maintenance Indicator (4) will light. When the remaining hours is displayed, press monitor display selector (2) to return to the clock screen. When the remaining hours is displayed, press monitor display selector (3) to display the transmission oil filter hour meter.

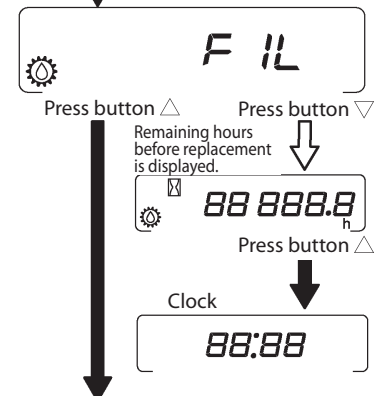


- : When monitor display selector (Δ)(2) is pressed once:
- : When monitor display selector (∇)(3) is pressed once:
- : When monitor mode selector ($\odot$)(1) is pressed once:

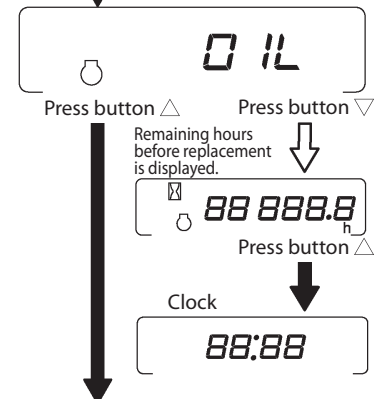
Transmission Oil Hour Meter



Transmission Oil Filter Hour Meter



Engine Oil Hour Meter



M4GB-01-055

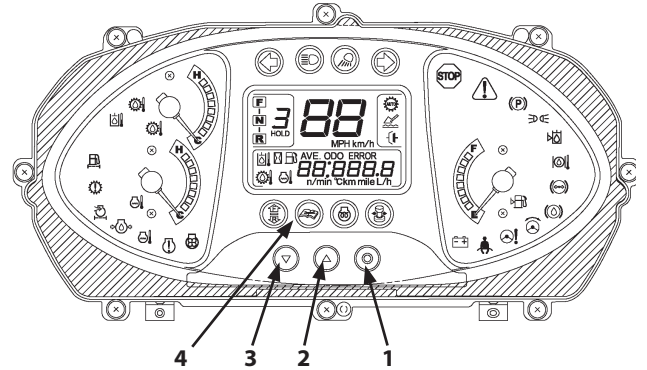
Transmission Oil Filter Hour Meter:

When this display is indicated, press monitor display selector (3) to display the hours remaining before the transmission oil filter needs to be changed. When the remaining hour reading becomes lower than 0 hour, maintenance Indicator (4) will light. When the remaining hours is displayed, press monitor display selector (2) to return to the clock screen. When the remaining hours is displayed, press monitor display selector (3) to display the engine oil hour meter.

Engine Oil Hour Meter:

When this display is indicated, press monitor display selector (3) to display the hours remaining before the engine oil needs to be changed. When the remaining hour reading becomes lower than 0 hour, maintenance Indicator (4) will light. When the remaining hours is displayed, press monitor display selector (2) to return to the clock screen. When the remaining hours is displayed, press monitor display selector (3) to display the fuel filter hour meter.

OPERATOR'S STATION



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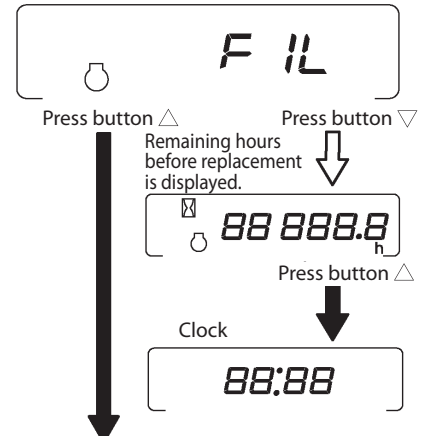
Engine Oil Filter Hour Meter:

When this display is indicated, press monitor display selector (3) to display the hours remaining before the engine oil filter needs to be changed. When the remaining hour reading becomes lower than 0 hour, maintenance Indicator (4) will light. When the remaining hours is displayed, press monitor display selector (2) to return to the clock screen. When the remaining hours is displayed, press monitor display selector (3) to display the engine oil filter hour meter.



- : When monitor display selector (Δ)(2) is pressed once:
- : When monitor display selector (∇)(3) is pressed once:
- : When monitor mode selector ($\bigcirc$)(1) is pressed once:

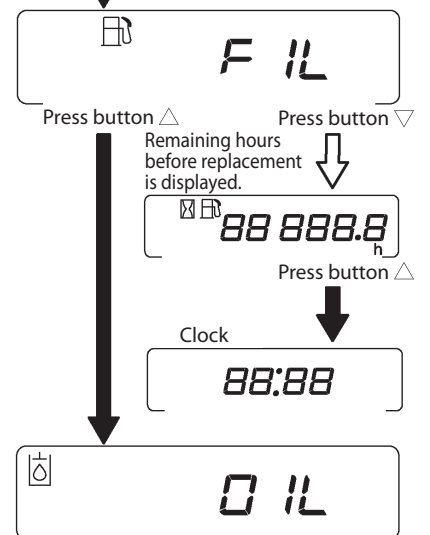
Engine Oil Filter Hour Meter



Fuel Filter Hour Meter

Fuel Filter Hour Meter:

When this display is indicated, press monitor display selector (3) to display the hours remaining before the fuel filter needs to be changed. When the remaining hour reading becomes lower than 0 hour, maintenance Indicator (4) will light. When the remaining hours is displayed, press monitor display selector (2) to return to the clock screen. When the remaining hours is displayed, press monitor display selector (3) to display the hydraulic oil hour meter.



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OPERATOR'S STATION

CLOCK SETTING MODE

The clock display on the information display screen can be set in the clock setting mode. After selecting the clock display on the information display screen, press and hold both selectors (1 and 2) at the same time for more than 1 second to shift the information display screen to the clock setting mode.

Clock (24H) Setting Procedures

1. Year Setting

Press monitor display selector (2 or 3) to increase or decrease the figure displayed on the screen respectively. After displaying the desired year, determine the displayed year by pressing monitor mode selector (1). Then, move to the next setting screen.

2. Month Setting

Press monitor display selector (2 or 3) to increase or decrease the figure displayed on the screen respectively. After displaying the desired month, determine the displayed year by pressing monitor mode selector (1). Then, move to the next setting screen.

3. Day Setting

Press monitor display selector (2 or 3) to increase or decrease the figure displayed on the screen respectively. After displaying the desired day, determine the displayed year by pressing monitor mode selector (1). Then, move to the next setting screen.

4. Hour Setting

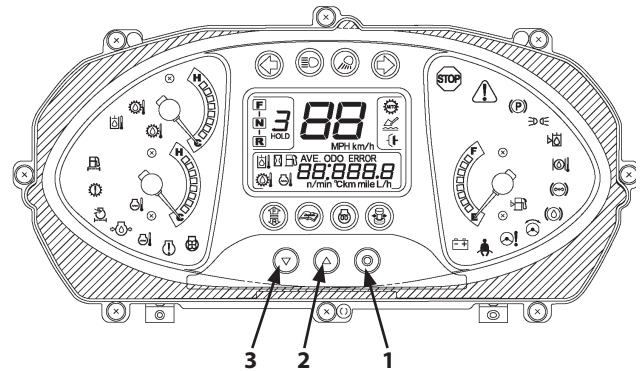
Press monitor display selector (2 or 3) to increase or decrease the figure displayed on the screen respectively. After displaying the desired hour, determine the displayed year by pressing monitor mode selector (1). Then, move to the next setting screen.

5. Minute Setting

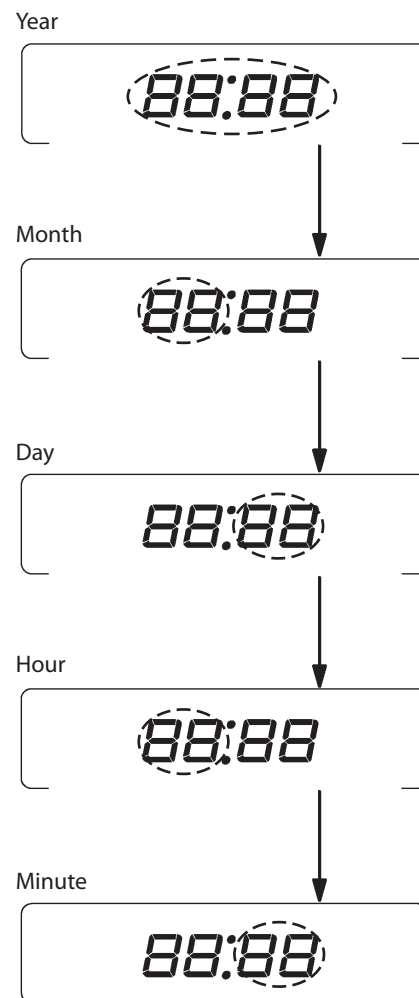
Press monitor display selector (2 or 3) to increase or decrease the figure displayed on the screen respectively. After displaying the desired minute, determine the displayed year by pressing monitor mode selector (1). Then, clock setting is complete.

Error Code

If the letters of "ERROR" are displayed, contact your nearest HITACHI dealer for machine inspection.



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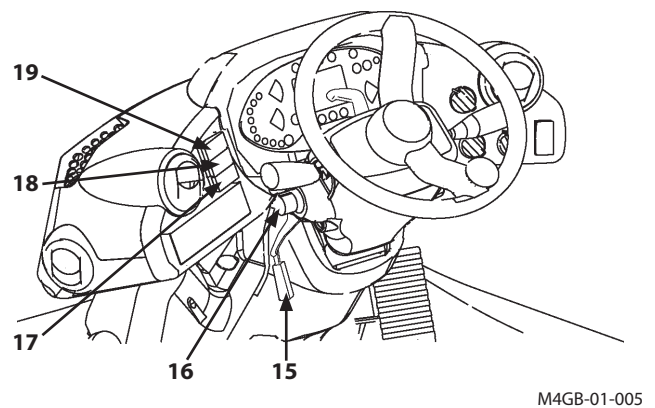
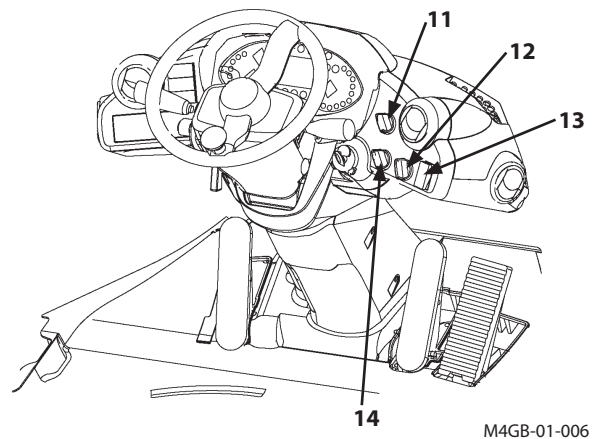
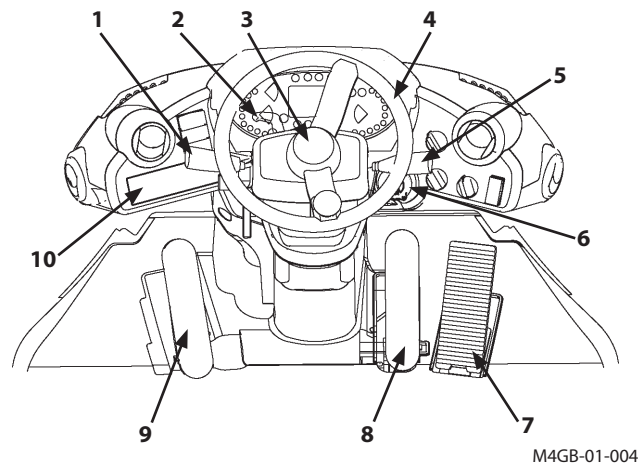


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OPERATOR'S STATION

SWITCHES, STEERING WHEEL AND PEDALS

- 1- Forward/Reverse Lever/ Shift Switch
- 2- Neutral Lever Lock (Forward/Reverse Lever)
- 3- Horn Switch
- 4- Steering Wheel
- 5- Turn Signal Lever/ Light Switch/ High-Low Beam Switch
- 6- Key Switch
- 7- Accelerator Pedal
- 8- Brake/Clutch Cut-off Pedal
(Both right and left sides are interlocked.)
- 9- Brake/Clutch Cut-off Pedal
(Both right and left sides are interlocked.)
- 10- Air Conditioner Switch Panel
- 11- Driving Mode Switch
- 12- Work Mode Switch
- 13- Parking Brake Switch
- 14- Clutch Cut Position Switch
- 15- Steering Column Tilt & Telesopic Lever
- 16- Windshield Wiper Switch
- 17- Rear Window Wiper Switch
- 18- Work Light Switch
- 19- Hazard Switch



OPERATOR'S STATION

FORWARD/REVERSE LEVER/SHIFT SWITCH

Forward/Reverse Lever

Changes the machine drive direction from forward to reverse and vice versa. Move forward/reverse lever (1) to the F position to travel the machine forward. Move forward/reverse lever (1) to the R position to drive the machine in reverse.

IMPORTANT: Do not shift forward/reverse lever (1) while driving the machine at high speed (in the third or fourth gear stage). Failure to do so may damage the transmission.

 **NOTE:** The engine will not be started if forward/reverse switch (3) and the forward/reverse lever (1) are not in the neutral position. Refer to page 1-56 for forward/reverse selector switch (4).

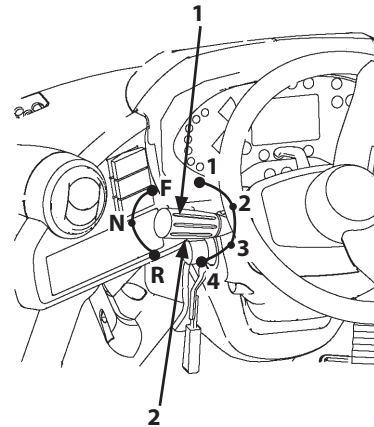
Shift Switch

A desired transmission gear stage can be selected by turning shift switch (2).

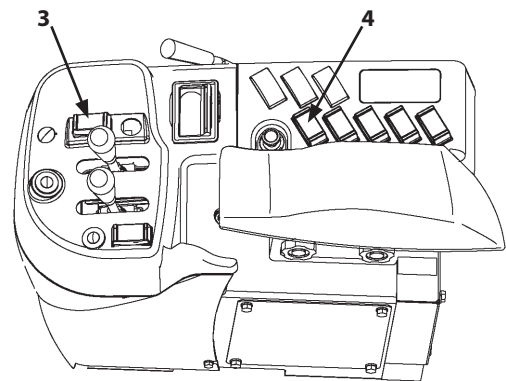
Forward: 4 Stages

Reverse: 3 Stages ZW220/ZW250 (ZW180/ZW310: 4 stages)

While driving the ZW220 or the ZW250 in reverse, even though shift switch (2) on the ZW220 or the ZW250 is turned to the forth gear position, the travel speed remains unchanged from that in the third gear stage. Select the drive gear stage matching the operational conditions.

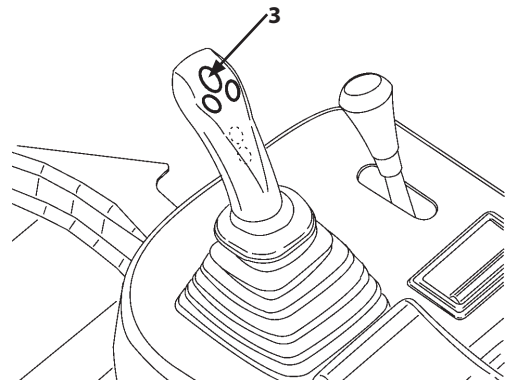


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Finger Type

M4GB-01-050



Multi-Function Type

M4GB-01-044

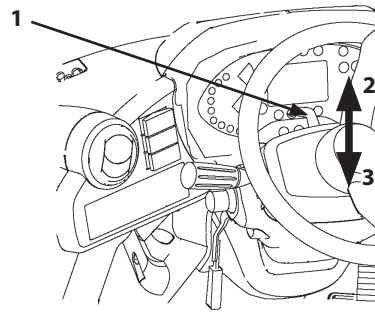
OPERATOR'S STATION

NEUTRAL LEVER LOCK (FORWARD/REVERSE LEVER)

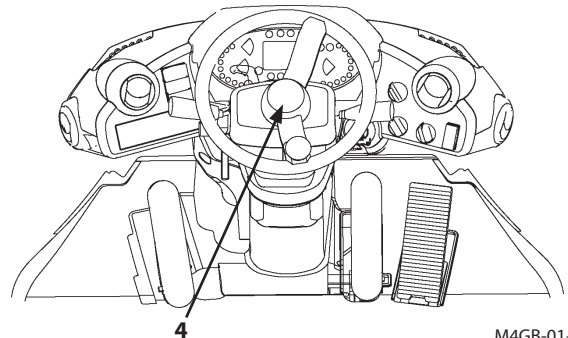
⚠ WARNING: When the machine is parked or serviced, be sure to place the neutral lever lock in the LOCK position.

The neutral lever lock makes the forward/reverse lever immovable so that the machine does not start moving even if a body part comes in contact with the forward/reverse lever by mistake. Before starting the engine, set neutral lock switch (1) in the LOCK position (3).

PULL (2): UNLOCK Position
PUSH (3): LOCK Position



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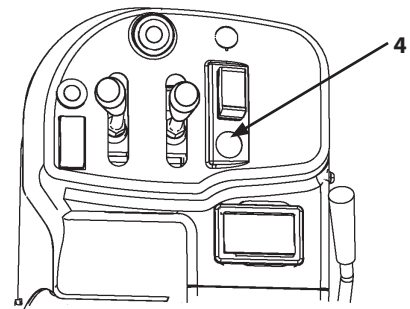


M4GB-01-004

HORN SWITCH

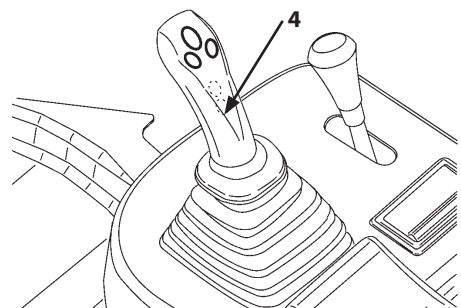
Press horn switch (4) to sound the horn.

On the finger control type machines, the horn button is also provided on the right console to make horn operation easy while operating the machine.



Finger Type

M4GB-01-043



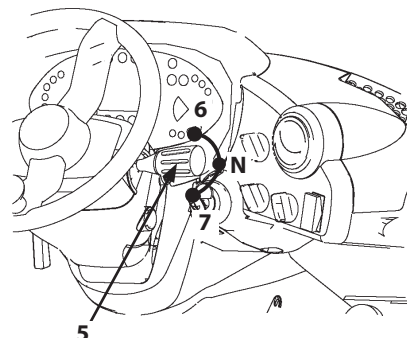
Multi-Function Type

M4GB-01-044

TURN SIGNAL LEVER

Indicates the drive change direction to persons and/or other vehicles by operating turn signal lever (5). Return turn signal lever (5) to neutral manually.

6- Left Turn
7- Right Turn



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OPERATOR'S STATION

LIGHT SWITCH

Light switch (1) has three positions, OFF, Small, and Main. As shown below, each light comes ON (☀) or OFF (✕) according to the selected position of the light switch.

2- Headlight / Clearance Light

3- Parking Light /Turn Signal

4- Clearance Light / Brakelight

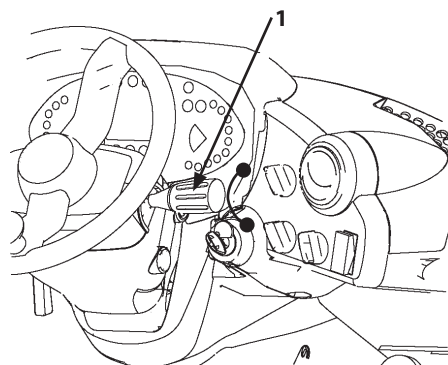
5- Number Plate Light

6- Turn Signal / Hazard Light

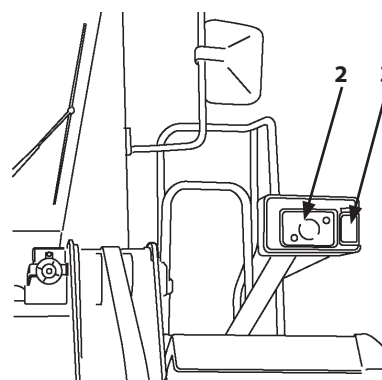
Light Switch Position	Headlight	Parking Light	Clearance Light	Number Plate Light	Monitor Panel Light
OFF	✕	✕	✕	✕	✕
☀	✕	☀	☀	☀	☀
☀	☀	☀	☀	☀	☀

 **NOTE:** Even though the key switch is turned OFF, as long as the light switch is in (the SMALL) position, all lights except the headlight stay ON.

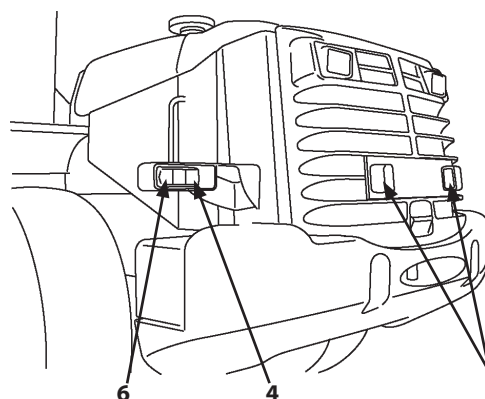
IMPORTANT: Take care not to use the above switch function for a long time. The batteries are discharged.



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M4GB-01-153



M4GB-01-061

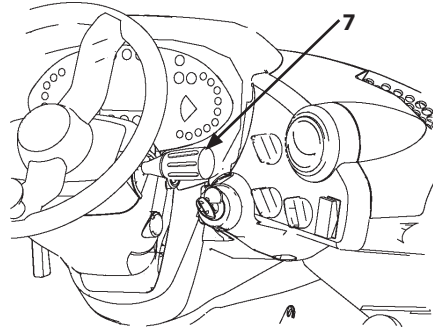
OPERATOR'S STATION

HIGH-LOW BEAM SWITCH

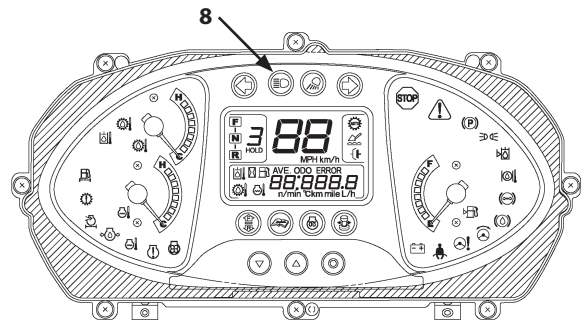
Shifts the direction of the headlight beam high and low.

CAUTION: Travel the machine with the headlight in the low beam position when other vehicles are present in the vicinity.

After turning the headlight ON, when turn signal lever (7) is lightly raised until a click sound is heard, the headlight beam is set in the high position and high beam indicator (8) comes OFF.



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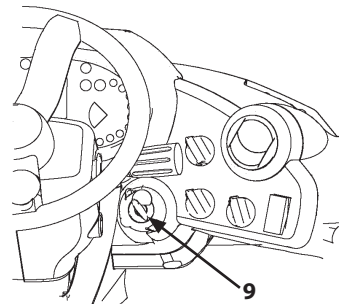


M4GF-01-001

KEY SWITCH

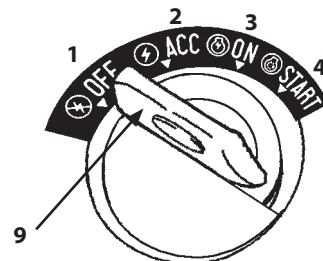
WARNING: Before starting the engine, return the forward/reverse selector lever and forward/reverse selector switch to neutral, apply the parking brake, and lock the control levers. Refer to the descriptions in the OPERATING THE ENGINE section for the detail information.

WARNING: Never turn key switch (9) OFF while traveling the machine. Failure in the electrical system and/or base machine may result.



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- 1- OFF (Engine Off)
- 2- ACC (Radio)
- 3- ON (Engine On)
- 4- START (Engine Start)



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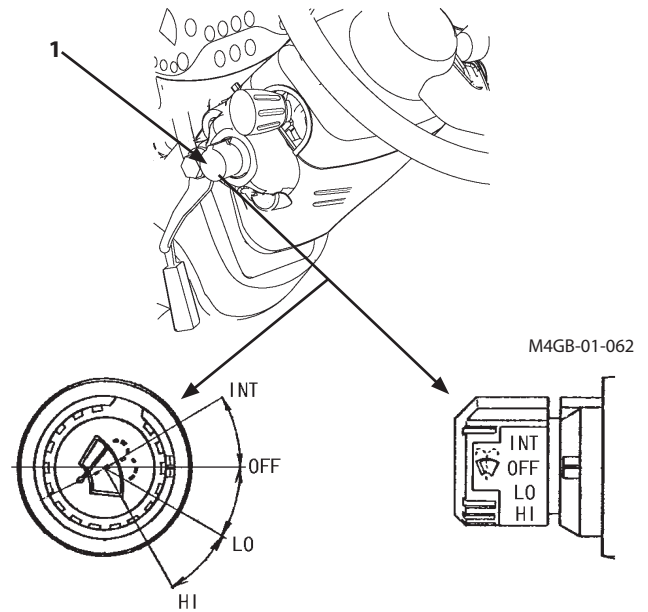
OPERATOR'S STATION

WINDSHIELD WIPER SWITCH

Operate wiper switch (1) to move the windshield wiper.

- INT: The wiper intermittently operates.
OFF: The wiper stops moving and the wiper blade is returned to the pre-start position.
LO: The wiper operates at slow speed
HI: The wiper operates at fast speed.
Washer: As long as wiper switch (1) is depressed, the washer fluid is dispensed.

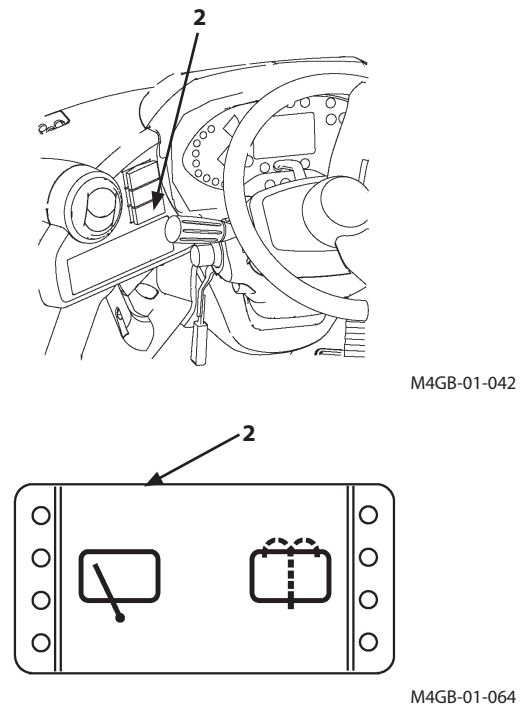
IMPORTANT: The washer motor may become damaged if washer fluid is continuously used for more than 20 seconds or the wiper switch is operated with no fluid in the washer tank. Take care about the switch operation time and the fluid level in the washer tank.



REAR WINDOW WIPER SWITCH

Press the button marked with (🚿) of rear window wiper switch (2) to move the rear window wiper.
Press the button marked with (🚿) of rear window wiper switch (2) to dispense the washer fluid.

IMPORTANT: The washer motor may become damaged if washer fluid is continuously used for more than 20 seconds or the wiper switch is operated with no fluid in the washer tank. Take care about the switch operation time and the fluid level in the washer tank.

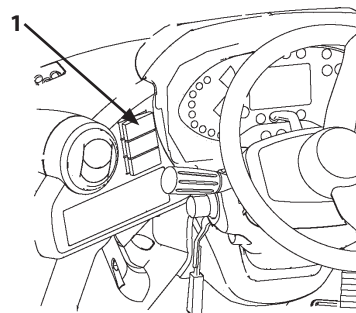


OPERATOR'S STATION

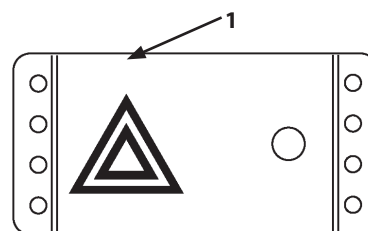
HAZARD SWITCH

IMPORTANT: Do not hold hazard switch (1) in the "▲" position for a long time with the engine stopped. The batteries will become discharged.

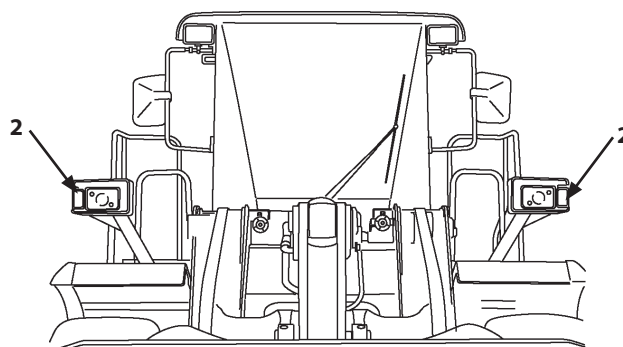
When a machine failure occurs, use this switch to inform other vehicles that the machine is in an emergency situation. When the position marked with "▲" on hazard switch (1) is pressed, front and rear turn signals (2) on both right and left sides starts flashing. Press the opposite side of hazard switch (1) to turn the hazard signals OFF.



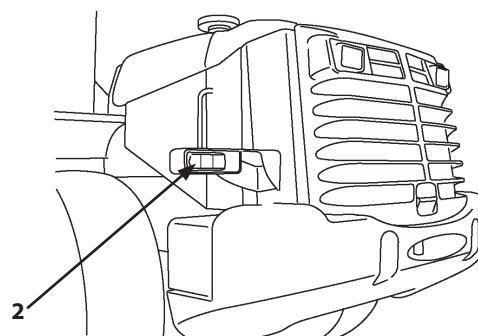
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M4GB-01-065



M4GB-01-060



M4GB-01-066

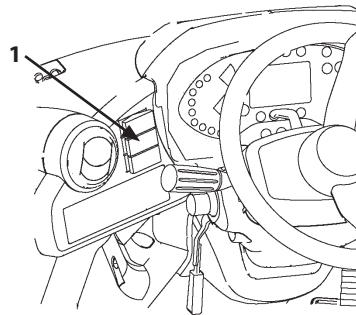
OPERATOR'S STATION

WORK LIGHT SWITCH

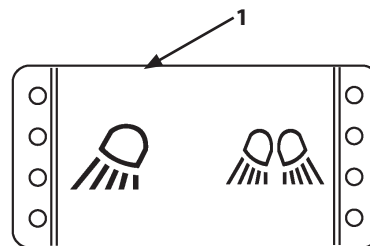
Press the  side of switch (1) to turn front work lights (2) ON. Rear work lights (3)  do not come ON. When the FRONT/REAR-mark side of switch (1) to turn both front work lights (2) and rear work lights (3) ON.



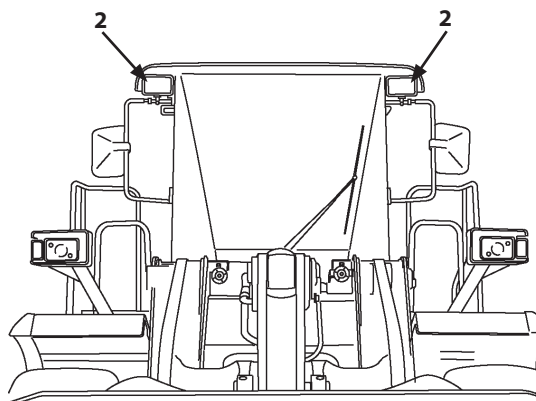
CAUTION: Do not drive the machine on a public road with the work lights (2), (3) ON.



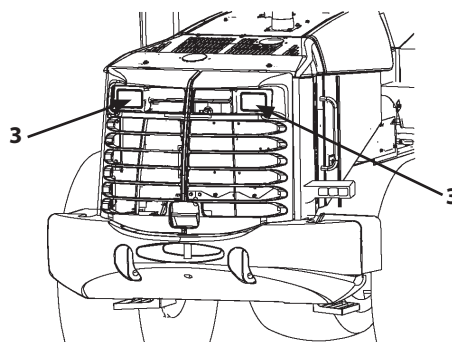
M4GB-01-042



M4GB-01-067



M4GB-01-060



M4GB-01-068

OPERATOR'S STATION

DRIVING MODE SWITCH (ZW180)

Shifts the transmission-driving mode. When driving mode switch (1) is in the M position, the transmission is set in the manual mode so that the transmission gears are shifted with the transmission gear selector. When driving the machine in the auto shift mode, select one of three auto shift points. According to the conditions encountered in drive/work operation, select the desired position. When operating driving mode switch (1), stop the machine. Then, after returning forward/reverse lever (2) to the N position, set driving mode switch (1).

Position M: Manual shift (The transmission gears are shifted with the shift switch.)

Position 1-4L: Shift change (up/down) is performed in the earlier stage with the engine running at slow speed. Start to drive the machine with the 2nd-gears. When the travel load increases, the gears are automatically shifted from the 2nd gear stage to the first gear stage. (Auto DSS function) This travel mode contributes to achieve energy-saving traveling since driving the vehicle with the accelerator pedal in the half stroke reduces the fuel consumption. (Applicable to general works such as excavation, and loading, long distance movement, climbing slopes and snow removal in the 2nd-gear stage)

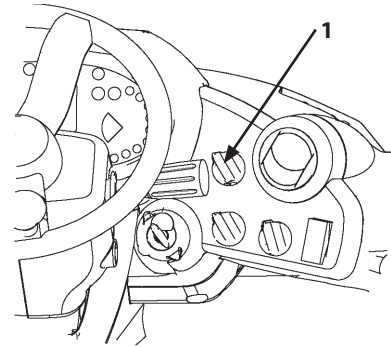
Position 2-4N: Shift change (up/down) is performed with the engine running at faster speed than the L mode. Shift-up from the 2nd to 3rd gear stage is performed at faster speed than the L mode. (Applicable to loading works and snow removal in the 3rd or 4th gear stage auto shift mode)

Position 1-4H: Start to drive the machine with the 2nd-gears. Shift change is performed at the same timing as the N mode. Shift change (up/down) is performed at faster engine speed than the L mode. When the travel load increases, the gears are automatically shifted from the 2nd gear stage to the first gear stage. (Auto DSS function) (Applicable to excavation, and loading works and climbing slopes in the 3rd or 4th gear stage auto shift mode)

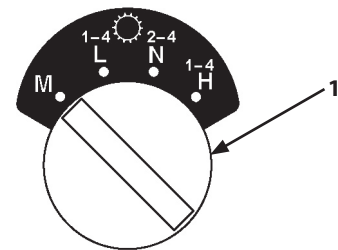
Refer to the DRIVING MACHINE section for more detailed information.



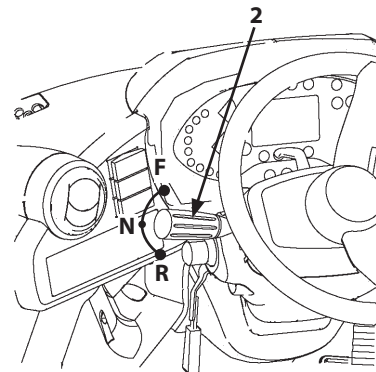
NOTE: When the machine is operated in the auto transmission mode, the travel speed is shifted up to the gear stage set by the transmission gear selector. When the 4th gear stage is selected, the travel speed is automatically shifted from the 2nd in to the 4th gears. When the 3rd gear stage is selected, the travel speed is automatically shifted from the 2nd in to the 3rd gears.



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OPERATOR'S STATION

DRIVING MODE SWITCH (ZW220/250/310)

Shifts the transmission-driving mode. When driving mode switch (1) is in the M position, the transmission is set in the manual mode so that the transmission gears are shifted with the transmission gear selector. When driving the machine in the auto shift mode, select one of three auto shift points. According to the conditions encountered in drive/work operation, select the desired position. When operating driving mode switch (1), stop the machine. Then, after turning shift switch (2) to the N position, set driving mode switch (1).

Position M: Manual shift (The transmission gears are shifted with the shift switch.)

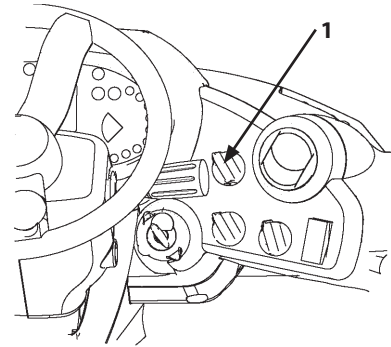
Position L: The drive speed range is shifted at slower drive speeds than the drive speeds in the N mode. (Suitable to operation performed with frequent long flat distant driving)

Position N: The drive speed range is shifted at the standard timing. (Suitable to normal loading work)

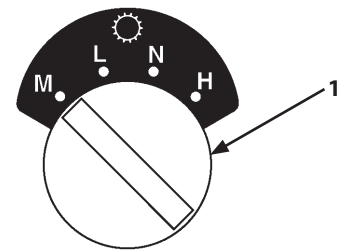
Position H: The drive speed range is shifted at the standard timing. However, the drive speed is automatically shifted down to the 1st gear stage depending on variation in loads. (Suitable to operation in a steep upslope work site)

Refer to the DRIVING MACHINE section for more detailed information.

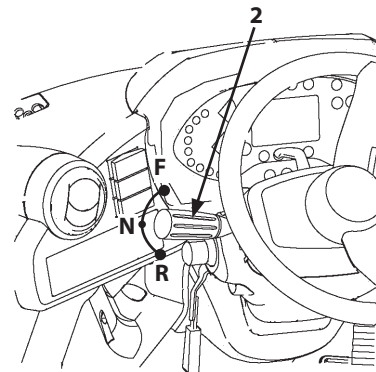
 **NOTE:** When the machine is operated in the auto transmission mode, the travel speed is shifted up to the gear stage set by the transmission gear selector. When the 4th gear stage is selected, the travel speed is automatically shifted from the 2nd in to the 4th gears. When the 3rd gear stage is selected, the travel speed is automatically shifted from the 2nd in to the 3rd gears. However the auto H position selected, the travel speed is automatically shifted down to the 1st gear stage depending on variation in loads. Start to move with the 2nd gear stage.



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M4GB-01-047



M4GB-01-042

OPERATOR'S STATION

CLUTCH CUT POSITION SWITCH

By operating switch (2), the right and left brake pedal clutch cut-off mode is selected as follows:

- S, N, or D Position (with clutch disengaged)

When either the right or left brake pedal is pressed, the transmission is moved to neutral so that the braking force is applied without transmitting driving force to tires.

S : The clutch is cut-off at a small stroke of the brake pedal. (Suitable to loading operation on flat ground)

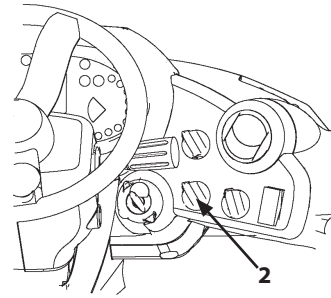
N : The clutch is cut-off at a medium stroke of the brake pedal. (Suitable to operation on gentle slopes)

D : The clutch is cut-off at a large stroke of the brake pedal. (Suitable to operation on steep slopes)

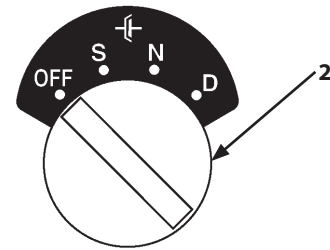
- OFF position (with clutch engaged)

When either right or left brake pedal is pressed, the braking force is transmitted to tires without disconnecting the driving force.

 **NOTE:** When starting to drive the machine on a slope, set the clutch cut position switch to the OFF position (with clutch engaged). While pressing the left brake pedal, depress the accelerator pedal. Then, slowly release the left brake pedal, so that the machine can easily start moving on a slope.



M4GB-01-046



M4GB-01-051

WORK MODE SWITCH

Three work modes are selected by operating work mode selector (3).

L : Loading and/or light duty work with less fuel consumption.

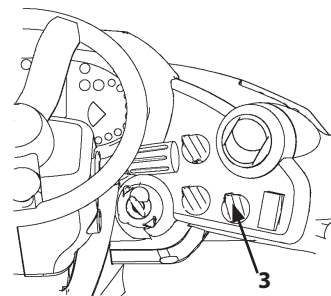
When swift movement of the front attachment is required more than traction force, apply this mode. Suitable to loading material such as gravel with less adhesiveness.

N : Normal loading work

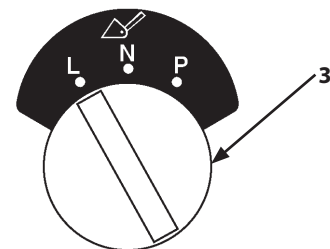
When both swift movement of the front attachment and traction force are required, apply this mode. Suitable to excavation and loading of soil product and/or industrial waste.

P : Heavy duty work

When traction force is required more than swift movement of the front attachment, apply this mode. Suitable to excavation of rude rocks and/or viscous soil.



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M4GB-01-069

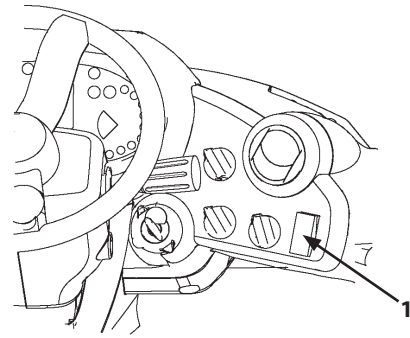
OPERATOR'S STATION

PARKING BRAKE SWITCH

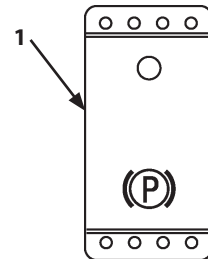
WARNING: To prevent accidents due to running away of the machine, after parking the machine or before leaving the machine, be sure to apply the parking brake. Never apply the parking brake while traveling the machine. Failure to do so may cause sudden deceleration of the machine travel speed, possibly creating a dangerous situation. Apply the parking brake only after the machine has stopped.

When parking brake switch (1) is turned ON, the parking brake is applied, lighting parking brake indicator (2). When releasing the parking brake, turn the switch OFF.

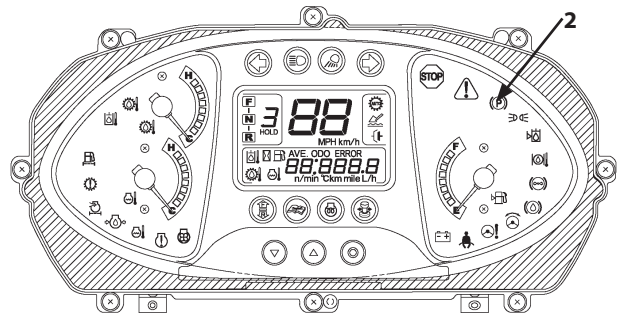
- NOTE:**
- The parking brake is released by hydraulic pressure only when the engine is running.
 - To ensure safe operation, when the parking brake is applied, even though the forward/reverse selector lever is moved to forward (F) or reverse (R) position, the machine does not travel.
 - To ensure safe operation, when the engine is stopped, the parking brake is applied even if parking brake switch (1) is in the OFF position. Before starting the engine, check that the forward/reverse selector lever and forward/reverse selector switch (3) are in the OFF position. Then, turn the parking brake switch (1) ON.



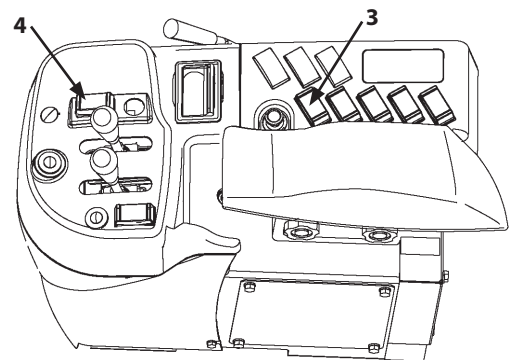
M4GB-01-046



M4GB-01-154



M4GF-01-001

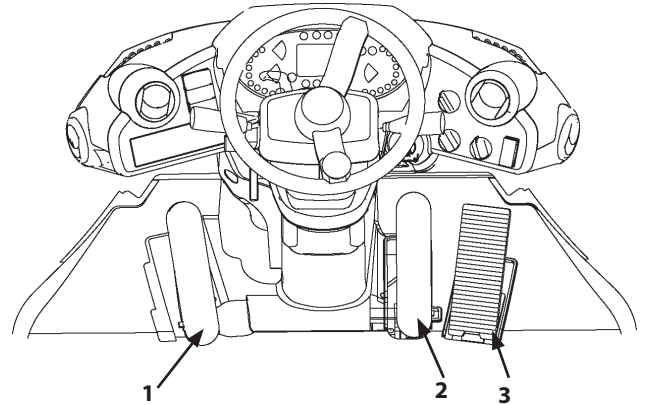


M4GB-01-050

OPERATOR'S STATION

ACCELERATOR PEDAL

When accelerator pedal (3) is stepped on, the engine speed increases. When released, the engine speed decreases.



BRAKE PEDAL

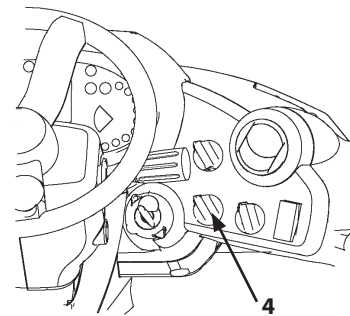
WARNING: Avoid sudden brake application during travel operation, possibly creating a hazardous situation. The machine may lose its balance. Unless necessary, do not place your foot on the brake pedal to prevent the brake pads, discs, and clutch from wearing out prematurely.

By operating clutch cut position switch (4), functions of right and left brake pedals (1 and 2) can be changed to the service brake or the inching brake.

Inching Brake

(In case clutch cut position switch (4) is turned to the S, N, or D position.)

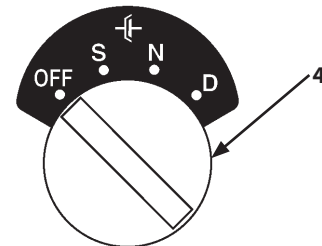
Brake pedals (1 and 2) function as an inching brake. Use to stop the machine in the specified position to engage the machine in loading/unloading work.



Service Brake

(In case clutch cut position switch (4) is turned to the OFF position.)

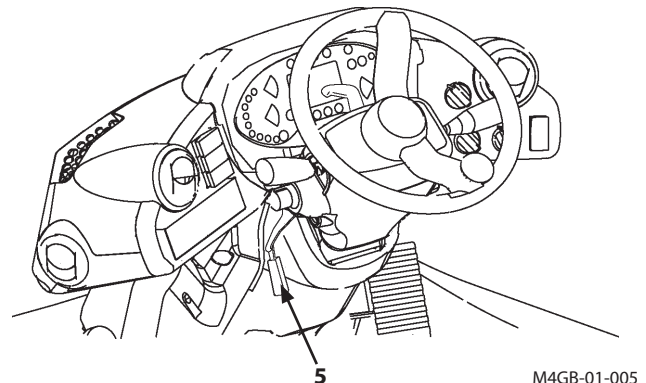
Brake pedals (1 and 2) function as a normal brake. Before ascending or descending slopes, turn clutch cut position switch (4) OFF.



STEERING COLUMN TILT & TELESCOPIC LEVER

WARNING: Do not operate the steering column adjuster lever during operation. Failure to do so may create a dangerous situation.

Before operating the machine, adjust the steering column height and inclination so as to match the operator's physical constitution. Press lever (5) to set the steering column height and inclination to the desired position. Pull lever (5) to secure the steering column in position and check that the steering column is correctly secured.

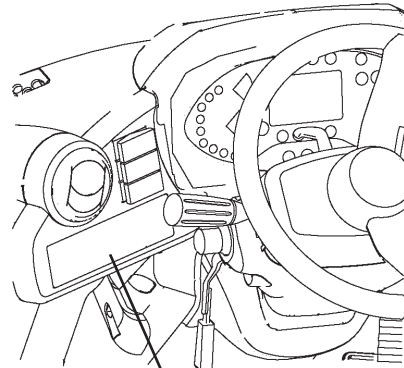


OPERATOR'S STATION

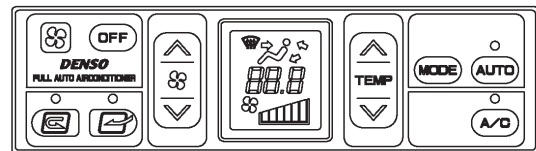
AIR CONDITIONER OPERATION

Features:

- **Full-Automatic Control**
Regardless of variations in atmospheric temperature and whether sun light is intense or not, the air temperature at the vent, blower speed, and air in/out vent locations are automatically controlled so that air temperature in the cab is maintained at the temperature set by the temperature control switch.
- **Highest and Lowest Temperature Control**
Using the temperature control switch, when the temperature is set at 32.0 °C or at 18.0 °C, the maximum heating or cooling performance is selected, respectively.
- **Heater Start-Operation Control System**
In winter or in cold weather, when starting the engine, the engine coolant is cool and air temperature inside the cab is low. Then, cool air is restricted not to flow in the cab to the minimum (LO) until the coolant is warmed when the front foot vent and /or foot vent is selected.



M4GB-01-042



M178-01-017

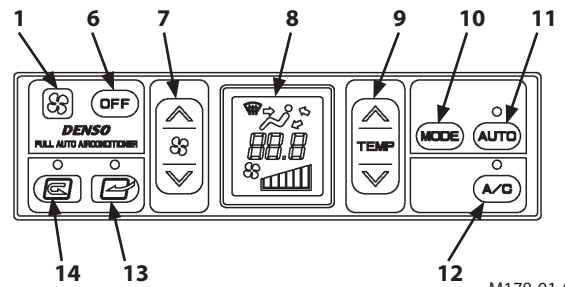
OPERATOR'S STATION

AUTO AIR CONDITIONER

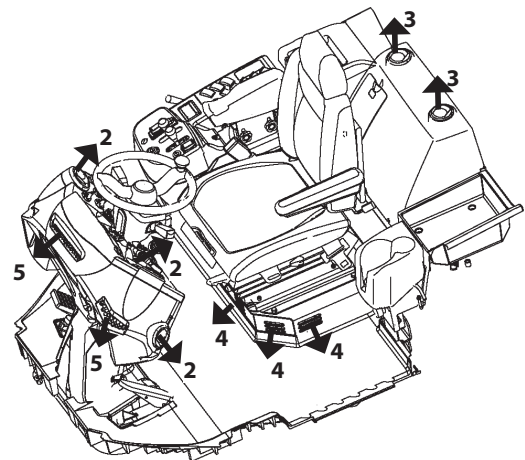
Distinctive Feature

- **Temperature Control:**
Automatically controls the cab temperature to maintain the temperature set by the temperature control switch regardless of outside air temperature and insolation.
- **Max. Cooling and Heating:**
Maximum cooling or heating can be obtained by moving the temperature control switch to the full right or left respectively.
- **Preheating:**
During preheating the cab in winter with the foot vent selected, the air volume is reduced to Low until the coolant temperature rises to prevent cool air from entering the cab.

- 1- Control Panel
- 2- Front Vent
- 3- Rear Vent
- 4- Foot Vent
- 5- Defroster Vent
- 6- Blower OFF Switch
- 7- Blower Switch
- 8- Liquid-Crystal Display (LCD)
- 9- Temperature Control Switch
- 10- Mode Switch
- 11- AUTO Switch
- 12- Air Conditioner Switch
- 13- Fresh Air Mode Switch
- 14- Circulation Mode Switch



M178-01-017



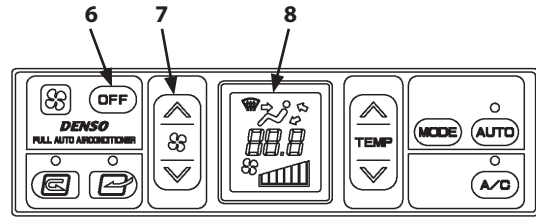
M4GB-01-070

NOTE: Except for the foot vent, all vents are provided with louvers to adjust the air flow direction. In addition, the louvers on the front vent and defroster vent can be completely opened and closed by hand.

OPERATOR'S STATION

Controller Part Name and Function

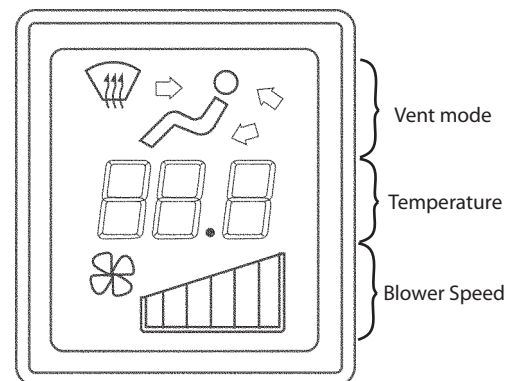
- Blower OFF Switch (6)
Stops the blower.
When the switch is pressed, all displays (vent mode, set-temperature, and blower speed) on the LCD (8) panel will disappear and the blower stops in both the auto and manual modes.
- Blower Switch (7)
Controls the blower speed from Low to High in 6 stages in the manual mode. The blower speed is displayed at the bottom on the LCD (8).
 - Increasing Blower Speed
Each time the top side mark “^” on blower switch (7) is pressed, the blower speed is increased by one increment.
 - Decreasing Blower Speed
Each time the bottom side mark “v” on blower switch (7) is pressed, the blower speed is decreased by one increment.



M178-01-017

NOTE: In the AUTO mode operation, the fan speed will be automatically controlled with the fan speed indicator flashing.

- LCD (8)
Displays the set-status of the air conditioner operating temperature, fan speed, and vent mode.
 - Temperature Display
Indicates the set-temperature (18 to 32.0 °C, 65 to 90 °F) by 0.5 °C (0.9 °F) increments at the panel center.
 - Blower Speed Display
Indicates the blower speed in 6 stages by lighting the segment at the panel bottom.
 - Vent Mode Display
Indicates the selected vent mode at the panel top.
The vent modes are as shown below:

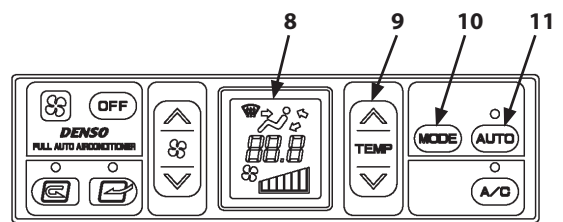


M4GB-01-071

- : Front/Defroster Vent Mode
- : Front/Rear/ Defroster Vent Mode
- : Front/Rear/Foot/ Defroster Vent Mode
- : Foot Vent Mode

OPERATOR'S STATION

- **Temperature Control Switch (9)**
Sets the air temperature in the range of 18 to 32.0 °C (65 to 90 °F) in the MANUAL and AUTO modes. Temperature can be set by 0.5 °C (0.9 °F) increments. The set-temperature is displayed on the LCD (8) center.
- **Increasing Temperature**
Each time the top side mark “^” on temperature control switch (9) is pressed, the set-temperature is increased by 0.5 °C (0.9 °F) increments.
- **Decreasing Temperature**
Each time the bottom side mark “v” on temperature control switch (9) is pressed, the set-temperature is decreased by 0.5 °C (0.9 °F) increments.
- **Temperature Control Switch**
Temperature Mode Change (Centigrade ↔ Fahrenheit)
Press both “^” and “v” marks on the temperature control switch for longer than 5 seconds at the same time to change the temperature mode (Centigrade ↔ Fahrenheit). (Unit in temperature mode is abbreviated.)

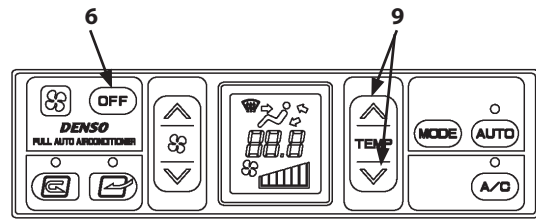


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Temperature Mode	Display on LCD
Centigrade	18.0 to 32.0
Fahrenheit	63 to 91

OPERATOR'S STATION

- **Diagnostic Function**
Functions of each sensor for the A/C and the air vent damper can be diagnosed using this function.
Press both “^” and “v” marks on temperature control switch (9) for longer than 3 seconds at the same time with the fan turned OFF (no air flow) to display the operating conditions of the sensors and dampers as shown below.



M178-00-017

Displays on LCD and Trouble Mode

Displays on LCD	Trouble Mode
E—	No fault
E11	Broken re-circulation air sensor
E12	Short re-circulated circulation air sensor
E13	Broken fresh air sensor
E14	Short circuited fresh air sensor
E15	Broken coolant temperature sensor
E16	Short circuited coolant temperature sensor
E18	Short circuited insolation sensor
E21	Broken air vent sensor
E22	Short circuited air vent sensor
E43	Abnormal air vent damper
E44	Abnormal air mix damper
E45	Abnormal both re-circulation and fresh air damper
E51	Abnormal refrigerant pressure

NOTE: In case more than one fault is detected, press either “^” or “v” mark on the temperature control switch button to change the fault code displayed on the LCD in order. Press fan OFF-switch (6) to complete the diagnosing function.

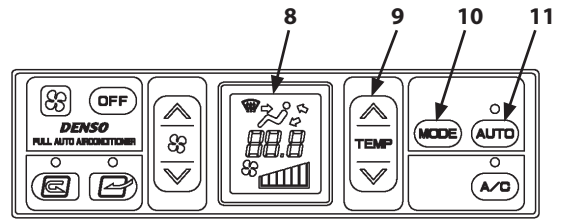
If any trouble has been found through operating the diagnostic function, contact your nearest Hitachi dealer for repair.

OPERATOR'S STATION

- Mode Switch (10)

Selects the air vent in the four modes as shown below:

-  : Front/Defroster Vent Mode
-  : Front/Rear/ Defroster Vent Mode
-  : Front/Rear/Foot/ Defroster Vent Mode
-  : Foot Vent Mode



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- AUTO Switch (11)

Selects the air conditioner operation mode in either AUTO or MANUAL.

- AUTO Operation Mode

Press AUTO switch (11). When the indicator comes ON, the AUTO operation mode is selected. In response to the set-temperature, the blower speed, vent mode, and ventilation mode are automatically controlled.

- MANUAL Operation Mode

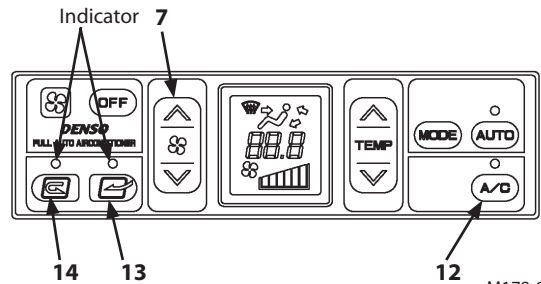
Press AUTO switch (11). When the indicator goes OFF, the MANUAL operation mode is selected. Air temperature, blower speed, vent mode, and ventilation mode can be selected as desired.

- Air Conditioner Switch (12)

The air conditioner will turn on and the air conditioner indicator will be lit when air conditioner switch (12) is pressed when blower switch (7) is also turned on (any of the blower indicators is ON).

- Fresh Air Mode Switch (13)

When fresh air mode switch (13) is pressed (indicator on), the fresh air vent will be opened and outside air will be routed into the cab.



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- Circulation Mode Switch (14)

When circulation mode switch (14) is pressed (indicator on), the fresh air vent will be closed.

Re-circulate the air inside the cab.

OPERATOR'S STATION

DEFROSTER OPERATION

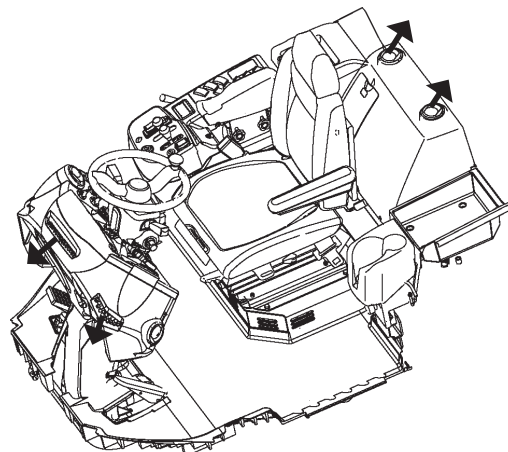
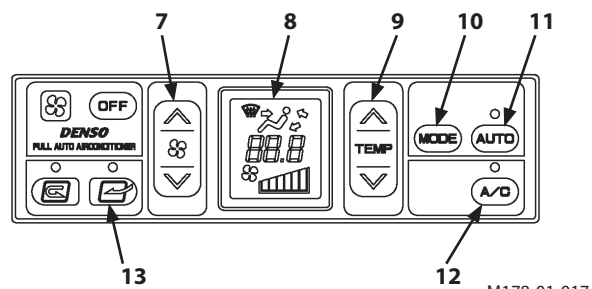
Select either the front/defroster vent mode  or the front/rear/defroster vent mode  by operating mode switch (10). Set the maximum heating temperature (32.0 °C, 90 °F) using temperature control switch (9). Press fresh air mode switch (13) to turn the indicator ON.

If AUTO switch (11) is pressed, air will blow out from front/defroster vent or front/rear/defroster vents.

Adjust the louvers on front vent (1) and defroster vent (3) as required.

The blower speed can be adjusted manually using blower switch (7).

Turn on air conditioner switch (12) (indicator will light) if the windows become clouded or if dehumidifying is required.



OPERATOR'S STATION

TIPS FOR OPTIMAL AIR CONDITIONER USAGE

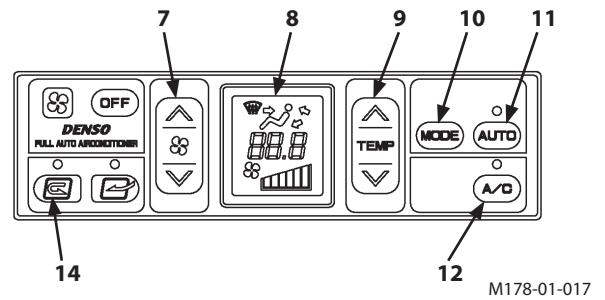
For Rapid Cooling

Temperature in the cab may rise over 80°C (176°F) when the machine is exposed to sun light in the summer. For rapid cooling, ventilate air in the cab first.

After starting the engine, set the temperature control to maximum cooling (18°C, 65°F) using temperature control switch (9). Then turn circulation mode switch (14) ON (the indicator lights).

Select the front/rear/defroster vent mode  by operating mode switch (10). Set the blower speed to the maximum flow rate (6 segments lit) by operating blower switch (7). Then, turn air conditioner switch (12) ON (the indicator lights).

After running the engine at a little over 1000 min⁻¹ for a few minutes, press AUTO switch (11) and close the windows.



When Windows Become Clouded

If the insides of the windows become clouded during rainy weather or on humid days, operate the air conditioner to aid in keeping the windows clear. When the atmosphere is very damp, and if the air conditioner has run excessively, the outside of the windows may become clouded. If this happens, turn off the air conditioner to adjust the temperature in the cab.

Off-Season Air Conditioner Maintenance

To protect each part of the compressor from a lack of lubricant, operate the air conditioner at least once a month for several minutes with the engine running at a slow speed during off-season. When the cab temperature is lower than 15°C (59°F), the air conditioner may not operate. If this happens, warm the cab using the heater first.

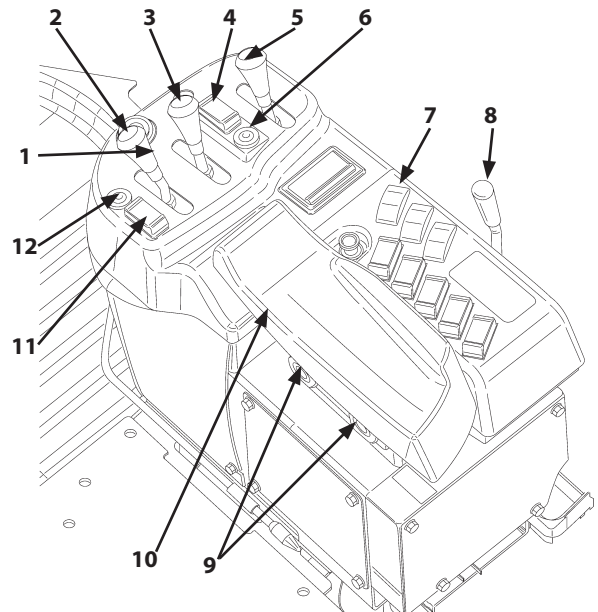
- IMPORTANT:**
- Do not suddenly increase the engine speed.
 - Keep any flames away from the control panel.
 - Refer to the item "Check Air Conditioner Filter" in the Maintenance Section for maintenance of the air conditioner filters.
 - Always clean the auto air conditioner sensor for effective air conditioner performance. Avoid placing any obstructions around the sensor.

OPERATOR'S STATION

RIGHT CONSOLE/SWITCHES

Finger Type

- 1- Bucket Control Lever
- 2- DSS (Down Shift) Switch
- 3- Lift Arm Control Lever
- 4- Forward/Reverse Switch
- 5- Auxiliary Control Lever (Optional)
- 6- Horn Switch
- 7- Quick Coupler Switch
- 8- Front Control Lever Lock
- 9- Armrest Adjust Handle
- 10- Armrest
- 11- DSS/USS (Down Shift/Up Shift) Switch
- 12- Hold Switch



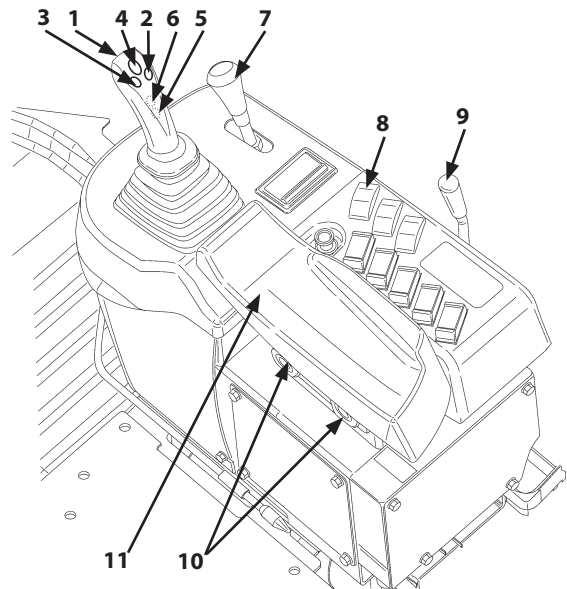
Finger Type

M4GB-01-007

RIGHT CONSOLE/SWITCHES

Multi-Function Type

- 1- Multi-Function Control Lever
- 2- USS (Up Shift) Switch
- 3- DSS (Down Shift) Switch
- 4- Forward/Reverse Switch
- 5- Horn Switch
- 6- Hold Switch
- 7- Auxiliary Control Lever (Optional)
- 8- Quick Coupler Switch (Optional)
- 9- Front Control Lever Lock
- 10- Armrest Adjust Handle
- 11- Armrest



Multi-Function Type

M4GB-01-008

OPERATOR'S STATION

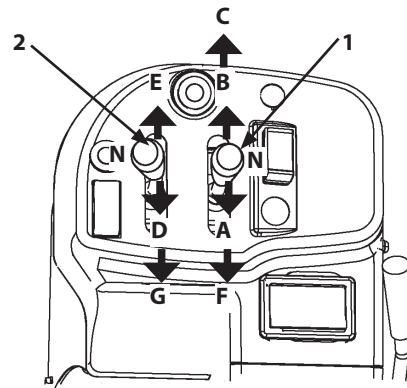
LOADER CONTROL LEVER

Finger Type

Is used to operate the lift arm and/or bucket.

Lift Arm Control Lever (1)

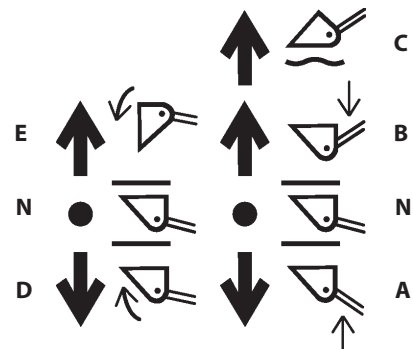
- (C) Float: The lift arm free falls and can be moved as loads are applied.
- (B) Lift arm Lower
- (N) Hold: The lift arm is stopped and held in that position.
- (A) Lift arm Raise
- (F) Detent: The lift arm is held in the raised position



M4GB-01-043

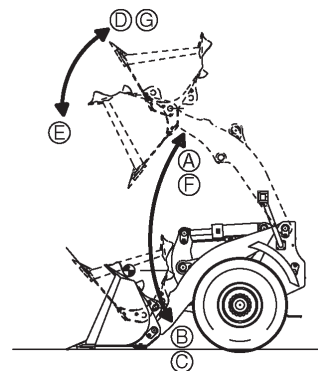
Bucket Control Lever (2)

- (E) Bucket Dump: The bucket is tilted forward to dump the bucket load.
- (N) Hold: The bucket is stopped and held in that position.
- (D) Bucket Tilt: The bucket is tilted back, taking the transportation attitude.
- (G) Detent: When the bucket control lever is moved from the bucket dump position to the bucket tilt position, the bucket control lever is maintained in this position.



M4GB-01-072

- NOTE:**
- When lift arm control lever (1) is pulled further from the RAISE position (A), the lever is held in that position (F). Then, as soon as the lift arm is raised up to the position set by the arm kick out system, the arm is automatically returned to the HOLD position (N).
 - After dumping the bucket, when bucket control lever (2) is pulled further from the TILT position (D), the lever is held in that position (G). Then, as soon as the bucket is tilted up to the position set by the bucket auto-leveler, the bucket is automatically returned to the HOLD position (N).

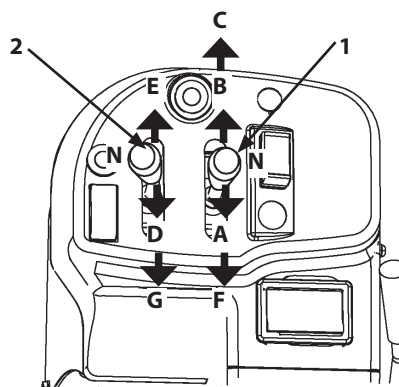


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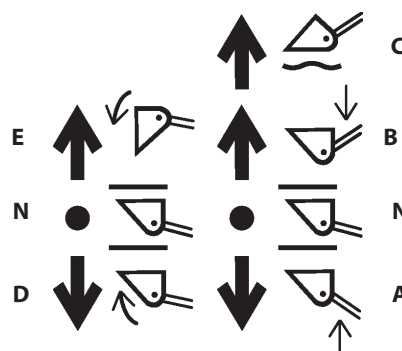
OPERATOR'S STATION

- When lift arm control lever (1) is pushed further from the LOWER position (B) to the FLOAT position (C), the lift arm is stopped in that position soon after the lift arm reaches the position set by the lift arm auto-leveler system. Then, the lever is automatically returned to the HOLD position (N). (Only machines equipped with the lift arm auto-leveler system)

 **NOTE:** When operating the machine with the lift arm held in the FLOAT position (C), first stop the lift arm in the float position. Then, again move the lift arm control lever to the FLOAT position (C) to allow the lift arm to come in contact with the ground.



M4GB-01-043



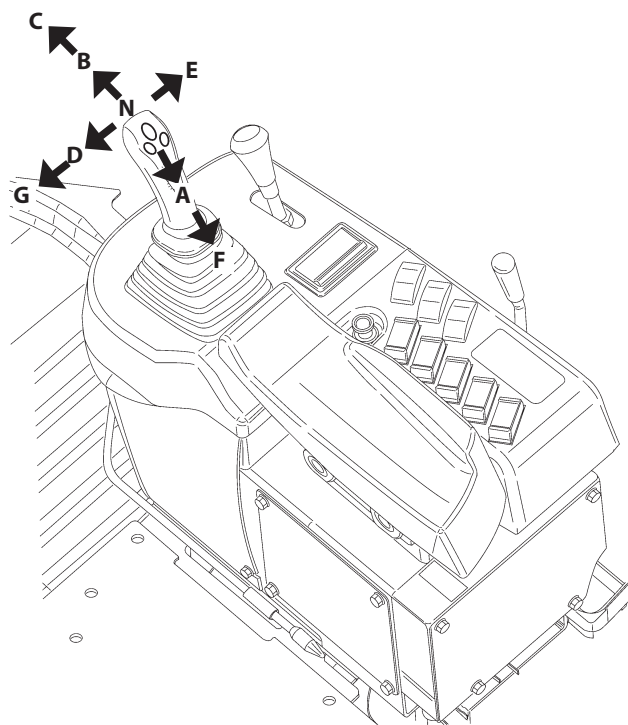
M4GB-01-072

OPERATOR'S STATION

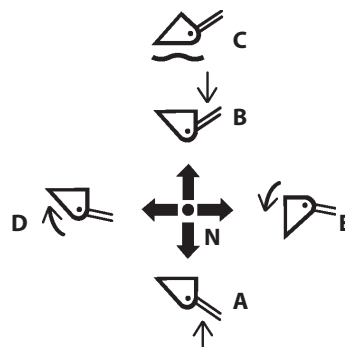
Multi-Function Type

Is used to operate the lift arm and the bucket.

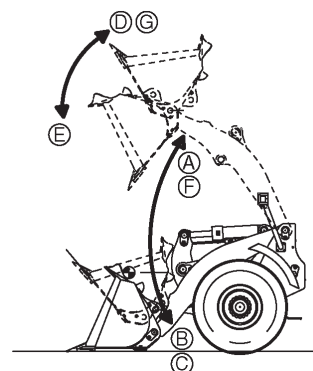
- (C) Float: The lift arm free falls and can be moved as loads are applied.
- (B) Lift arm Lower
- (N) Hold: The lift arm is stopped and held in that position.
- (A) Lift arm Raise
- (F) Detent: The lift arm is held in the raised position.
- (G) Detent: When the lever is moved from the bucket dump position to the bucket tilt position, the lever is held in that position.
- (D) Bucket Tilt
- (N) Hold
- (E) Bucket Dump



M4GB-01-008



M4GB-01-074



M4GB-01-073

OPERATOR'S STATION

FRONT CONTROL LEVER LOCK

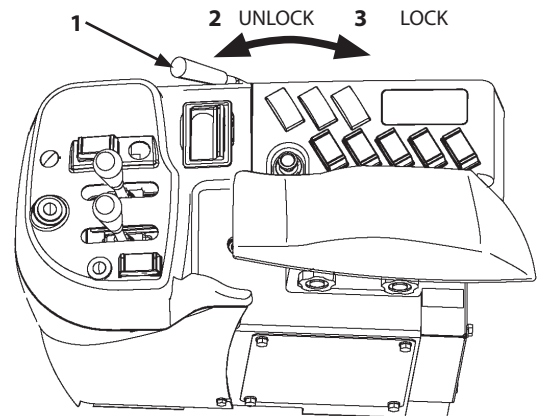
⚠ WARNING: When locking the front control lever, securely push front control lever lock (1) to the LOCK position (3). Unless front control lever lock (1) is fully moved to the LOCK position, the front control lever is not locked, possibly creating a hazardous situation.

Before leaving the operator's seat, be sure to stop the engine. Then, move front control lever lock (1) to the LOCK position (3).

After completing operation of the machine or transporting the machine, be sure to move front control lever lock (1) to the LOCK position (3).

Refer to section 5-4 for details.

Front control lever lock (1) is provided to prevent the machine is unexpectedly operated even if the operator mistakenly comes in contact with the bucket and/or lift arm control lever when getting on or off the machine. When the lever lock is placed to position (2), the front control lever becomes operable.



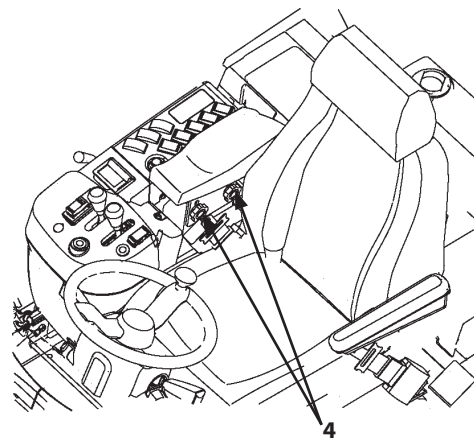
M4GB-01-050

ARMREST ADJUST HANDLE

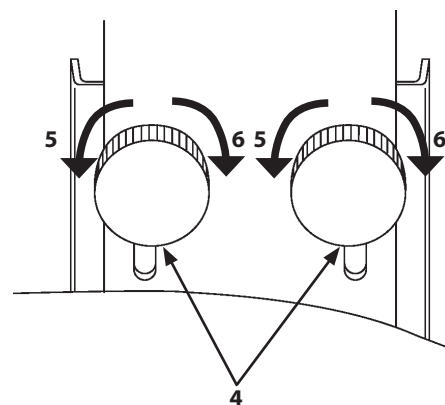
The armrest is used to support the operator's arm so that the arm force can be controlled when operating the loader control lever. Turn the handle counterclockwise to lose the armrest position. After setting the armrest to the desired position, turn the handle clockwise to hold the armrest in that position.

5- Lose

6- Tighten



M4GB-01-076



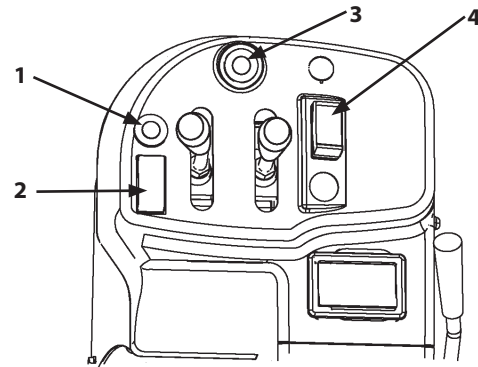
M4GB-01-077

OPERATOR'S STATION

FINGER TYPE

HOLD SWITCH

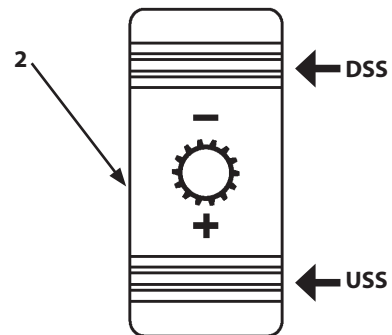
During transmission auto mode operation, when hold switch (1) is pressed, the speed gear stage displayed on the monitor is maintained. When deactivating the hold switch, press the hold switch again, shift the speed gear stage, change the travel mode, press the DSS switch, or press the USS switch.



M4GB-01-043

DSS/USS (DOWN SHIFT/ UP SHIFT) SWITCH

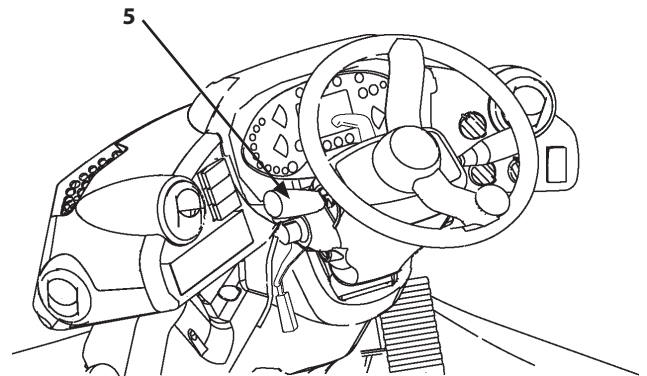
When the DSS side on DSS/USS switch (2) is pressed, the drive gear stage can be shifted down within the switch shifting range. When the USS side on DSS/USS switch (2) is pressed, the drive gear stage can be shifted up within the switch shifting range.



M4GB-01-078

DSS (DOWN SHIFT) SWITCH

When DSS switch (3) is operated, the drive speed range can be shifted within the switch shifting range. When the machine is engaged in a normal work, the 2nd drive gear stage is set. Then, when switch (3) is pressed during forward drive excavation, the drive speed is automatically reduced to the 1st gear stage so that excavation force is increased. When forward/reverse lever (5) is moved to the reverse position or when forward/reverse switch (4) is turned to the R position, the machine drive speed is automatically increased to the 2nd gear stage.



M4GB-01-005

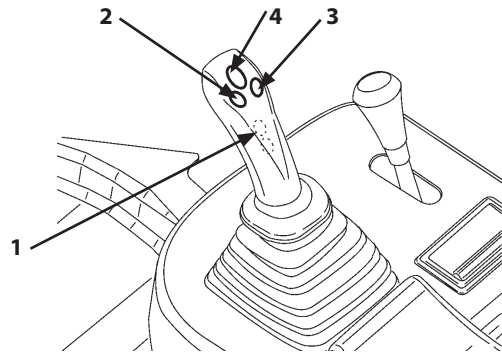
NOTE: When either the DSS or USS side is pressed on the DSS/USS switch once a time, the machine travel speed is changed by 1 stage within the switch speed shift range irrespective of the selected transmission mode, auto or manual. In case the auto transmission mode is selected, when the DSS switch is continuously pressed, the travel speed is shifted down from the 4th gear speed to the 2nd gear speed. In case the USS switch is concerned, continuous up shift operation is not achieved.

OPERATOR'S STATION

MULTI-FUNCTION TYPE

HOLD SWITCH

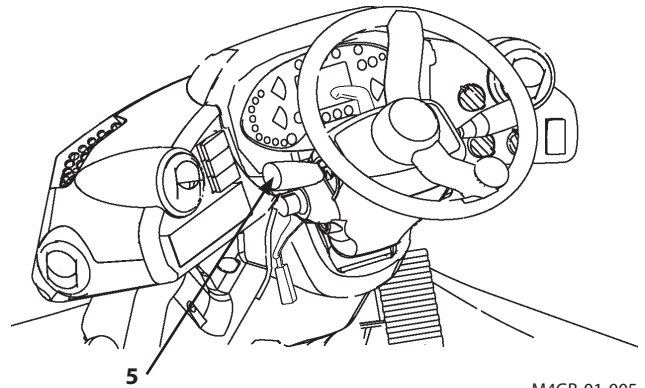
When hold switch (1) is pressed in the auto transmission mode, the drive speed gear stage displayed on the monitor is maintained. To deactivate the switch function, press hold switch (1) again, change the drive speed range, change the drive mode, or press either of the DSS or USS switch.



M4GB-01-044

DSS (DOWN SHIFT) SWITCH

When DSS switch (2) is operated, the drive speed range can be shifted within the switch shifting range. When the machine is engaged in a normal work, the 2nd travel gear stage is set. Then, when switch (2) is pressed during forward drive excavation, the drive speed is automatically reduced to the 1st gear stage so that excavation force is increased. When the forward/reverse lever (5) is moved to the reverse position or when the forward/reverse switch (4) is turned to the R position, the machine drive speed is automatically increased to the 2nd gear stage.



M4GB-01-005

USS (UP SHIFT) SWITCH

When USS switch (3) is pressed, the drive gear stage is up shifted within the switch shifting range.

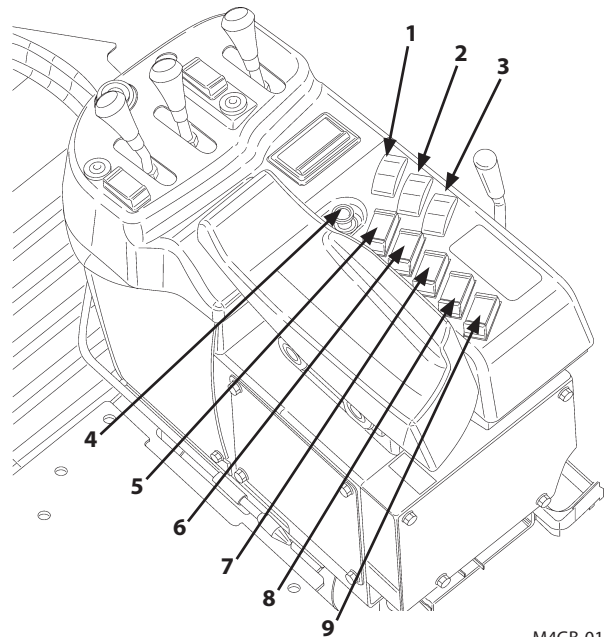
 **NOTE:** When USS switch (3) is pressed once at a time, the machine drive speed is changed by 1 stage within the switch speed shift range irrespective of the selected transmission mode, auto or manual. In case the auto transmission mode is selected,, when the DSS switch is continuously pressed, the drive speed is shifted down from the 4th gear to the 2nd gear. Continuous up shift operation with USS switch (3) is not achieved.

OPERATOR'S STATION

RIGHT CONSOLE SWITCH PANEL

- 1- Quick Coupler Switch (Optional)
- 2- Lift Arm Auto Leveler Downward Set Switch (Optional)
- 3- Lift Arm Auto Leveler Upward Set Switch (Optional)
- 4- Cigarette Lighter
- 5- Forward/Reverse Selector Switch
- 6- Ride Control Switch (Optional)
- 7- Fog Lamp Switch (Optional)
- 8- Fan Reversing Switch
- 9- Emergency Steering Operation Check Switch

 **NOTE:** Optional lift arm auto levelers are comprised of two units, each one of "LOWER" and "RAISE" switches.

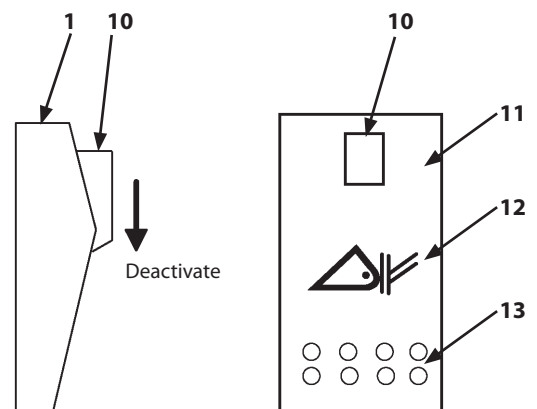


M4GB-01-007

QUICK COUPLER SWITCH (Optional)

This switch is used to remove or install the pins when replacing the attachment such as the bucket. While sliding lock switch (10) on switch (1) toward you, press switch near side (13) to remove the pins. Press switch distant side (11) to install the pins. When deactivating the switch function in the half way, press switch center (12).

- 11- Pin installation
- 12- Neutral
- 13- Pin removal



M4GB-01-080

OPERATOR'S STATION

LIFT ARM AUTO LEVER SWITCH (Optional)

Downward Set/Upward Set

Switches (2), (3) stops the downward or upward lift arm at the specified height.

IMPORTANT:

- When the lift arm auto leveler switch is activated with the bucket loaded, the arm may be stopped at a position lower than the preset position.
- Lowering lift arm stop position cannot be preset at a position higher than the arm level position.
- Raising arm stop position cannot be preset at a position lower than the arm level position.

Lift Arm Auto Leveler Function

Switch

SET (15 and 19): Presets the lift arm stop position.

ON (16 and 20): Stops the lowering lift arm at the specified height.

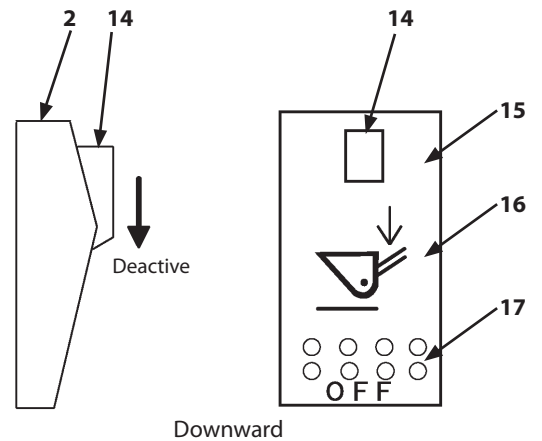
OFF (17 and 21): Deactivate the lift arm auto leveler function.

Presetting of lowering lift arm stop position

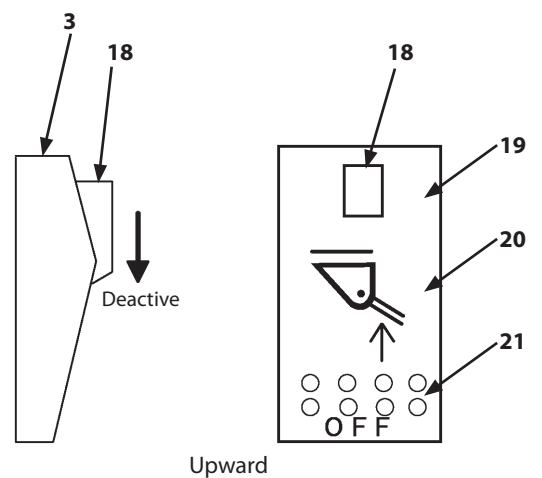
1. Hold the lift arm in the position at which the lowering lift arm is desired to stop.
2. While deactivating lock switch (14) on lift arm auto leveler switch (lowering) (2), press SET side (15).

Presetting of raising lift arm stop position

1. Hold the lift arm in the position at which the raising lift arm is desired to stop.
2. While deactivating lock switch (18) on lift arm auto leveler switch (raising) (3), press SET side (19).



M4GB-01-081



M4GB-01-082

OPERATOR'S STATION

FORWARD/REVERSE SELECTOR SWITCH

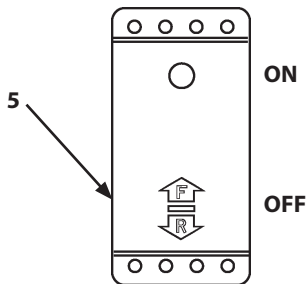
Forward / reverse selector switch (5) activates forward / reverse switch (23) located on the front control lever side. When forward/reverse selector switch (5) is ON, press the F or R position on forward/reverse switch (23) to drive the machine forward or in reverse.

Operation Procedures

1. Turn the parking brake OFF.

WARNING: To ensure safety, step on the brake pedal at this time.

2. Place forward/reverse lever (22) and forward/reverse switch (23) in the N position. Then, turn forward/reverse selector switch (5) ON. (When forward/reverse selector switch (23) is operable, indicator (24) on monitor panel lights.)

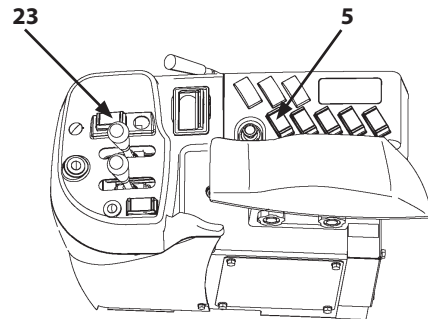


M4GB-01-083

NOTE: When forward/reverse switch (23) is activated on forward/reverse selector switch (5) comes ON.

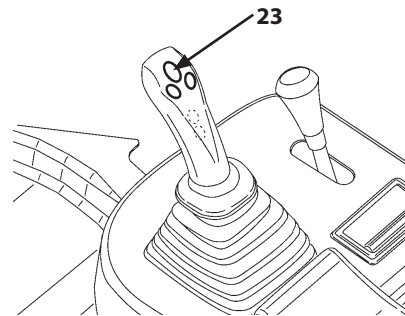
3. Press the F or R position on forward/reverse switch (23).

NOTE: If forward/reverse lever (22) is placed in the F or R position when forward/reverse switch (23) is in use, forward/reverse switch (23) will become inoperable. (Operation by the forward/reverse selector lever has the most priority.) When required to use forward/reverse switch (23) again, repeat step 2.



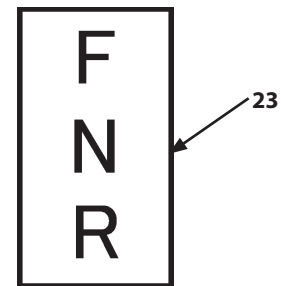
Finger Type

M4GB-01-050

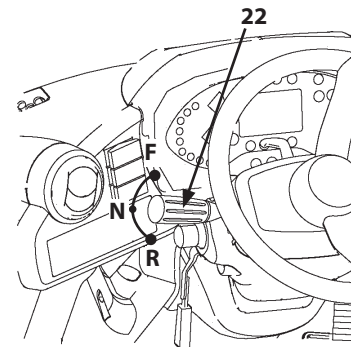


Multi-function Type

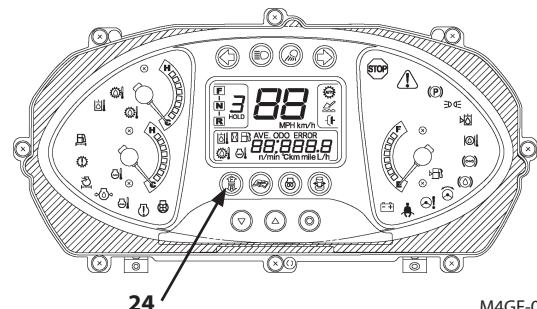
M4GB-01-044



M4GB-01-064



M4GB-01-042



24

M4GF-01-001

OPERATOR'S STATION

RIDE CONTROL SWITCH (OPTIONAL)

Damps the vertical vibration of the front attachment during drive operation so that comfortable machine ride quality is obtained. As stable drive operation is achieved, bucket load spill can be reduced.

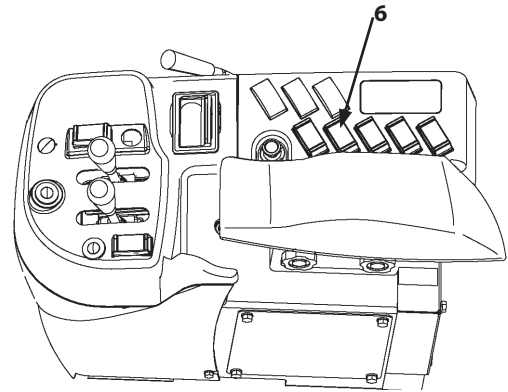
WARNING: Do not turn ride control switch (6) ON while driving the machine or raising the front attachment. As soon as the switch is turned ON, the hydraulic pressure oil is routed to the lift cylinder bottom circuit from the accumulator, causing the front attachment to move. Thereby, the machine stability may be reduced. Especially, never turn the switch ON when inspecting the machine. Failure to do so may result in personal injury or death.

WARNING: When operation the machine with the front attachment in the float position (scooping, grading, or snow removal), always turn the ride control switch OFF. Failure to do so may allow the front attachment to unexpectedly move up or down when the ride control system is activated.

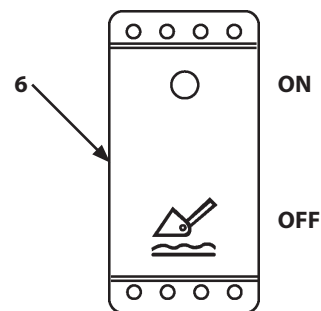
Ride Control Operation

WARNING: To ensure safety, operate ride control switch (6) only after parking the machine with the bucket lowered to the ground.

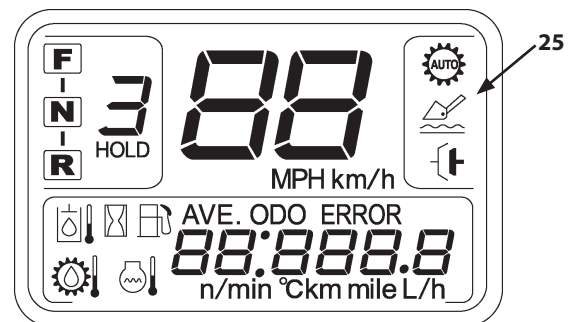
When the switch (6) is turned ON, the drive speed sensor and the controller is activated. Then, when the drive speed becomes faster than 5 km/h, the ride control system automatically operates. When the drive speed becomes slower than 3 km/h, the ride control system becomes inoperable. When the switch (6) is turned ON, the monitor indicator (25) comes ON. When the switch (6) is turned OFF, the monitor indicator (25) goes OFF so that the ride control system becomes inoperable. When the ignition switch is in the OFF position, the ride control system does not operate even if the ride control switch is turned ON.



M4GB-01-050



M4GB-01-085

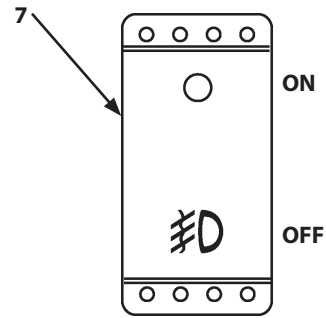


M4GB-01-040

OPERATOR'S STATION

FOG LAMP SWITCH (OPTIONAL)

Press the ON side of fog lamp switch (7) to light the fog lamps.
Press the OFF side of fog lamp switch (7) to extinguish the fog lamps.



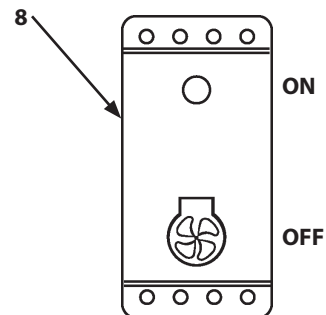
M4GB-01-086

FAN REVERSING SWITCH

Rotates the hydraulic driven fan in reverse direction. In case the radiator core is clogged with foreign matter, rotating the cooling fan in the reverse direction can blow off the foreign matter.

Operation Procedures

1. Close the side access cover, and the rear grille.
2. Turn the key switch OFF (the engine is stopped). Press the ON side of fan reversing switch (8). Then, start the engine.
3. After operation is complete, turn the key switch OFF. Then, press the OFF side of fan reversing switch (8).



M4GB-01-088

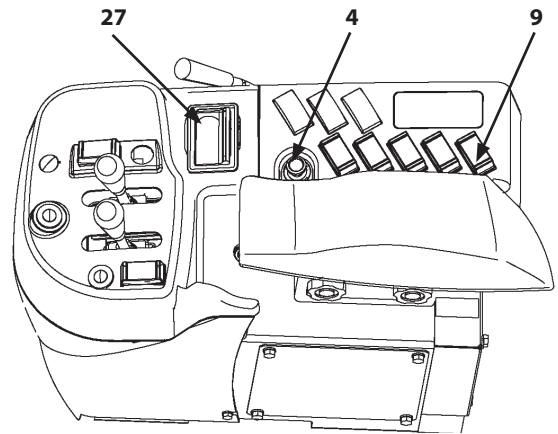
 **NOTE:** As long as the fan is rotating in the reverse direction, the machine cannot drive in both forward and reverse directions. Run the fan in the reverse direction at a regular interval to prevent the cooling devices such as the radiator core from being clogged.

OPERATOR'S STATION

EMERGENCY STEERING OPERATION CHECK SWITCH

Is used to check if the emergency steering pump is operable. When the ON side of switch (9) is pressed, emergency steering indicator (26) lights to indicate that the emergency steering pump is operating.

IMPORTANT: Since a plenty of electric power is needed to drive the pump, conduct checking within 2 seconds.



M4GB-01-050

CIGARETTE LIGHTER

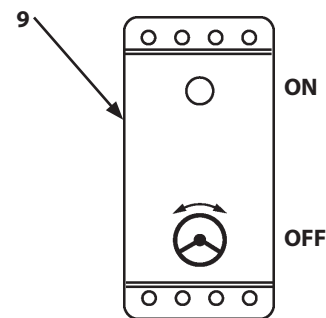
Operation

WARNING: Do not touch any part other than the knob. Burns may result.

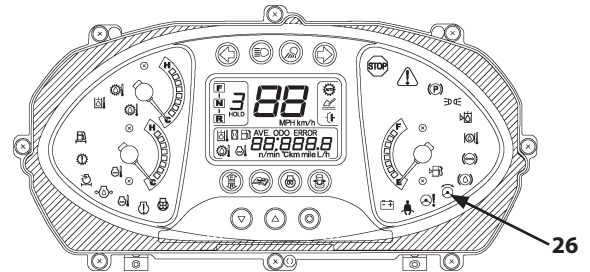
CAUTION: Do not put any object on the cigarette lighter.

IMPORTANT: If the cigarette lighter (4) is not returned within 30 seconds after cigarette lighter (4) is pushed in, pull out cigarette lighter (4) by hand. Then, consult your nearest HITACHI dealer.

1. Turn ignition switch (28) to the ON position (29).
2. Push cigarette lighter (4) in. Release cigarette lighter (4).
3. When the cigarette lighter becomes available, it will pop out to the original position. Pull the knob out to use it.
4. After using the lighter, push in cigarette lighter (4) until the knob is seated to the original position.



M4GB-01-088

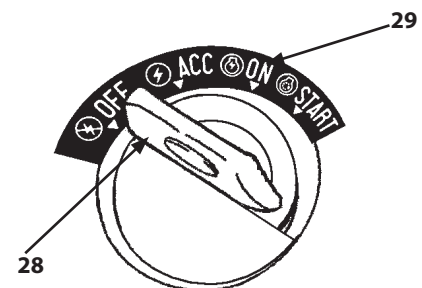


M4GF-01-001

ASHTRAY

WARNING: Fire disaster may break out. Take enough care to put out the fire.

Use this ashtray (32) when smoking in the cab.



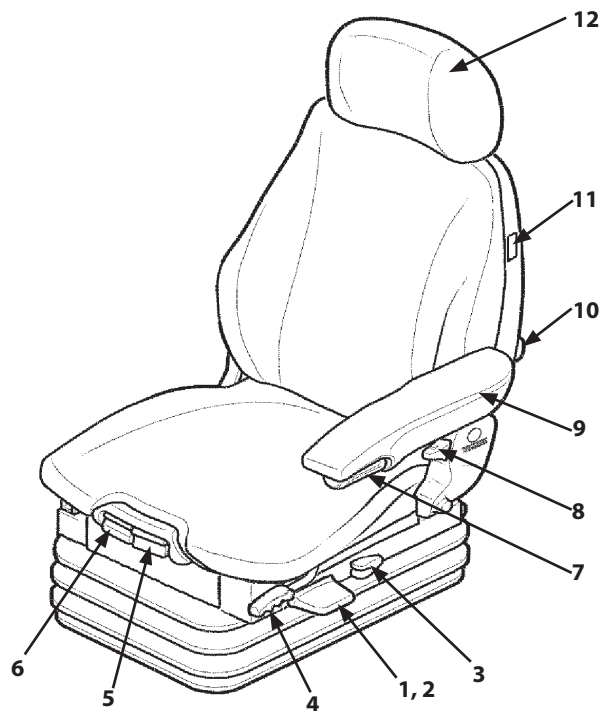
M4GB-01-089

OPERATOR'S STATION

ADJUSTING OPERATOR'S SEAT (Air Suspension Type Seat)

CAUTION: Adjust the seat position so that all the pedals, levers and switches can be easily and correctly operated. Adjust the seat position while the machine is parked.

- 1- Weight support adjustment
- 2- Height Adjustment
- 3- Damper Adjustment
- 4- Fore-Aft Position Adjustment
- 5- Inclination Adjustment
- 6- Seat Depth Adjustment
- 7- Armrest Angle Adjustment
- 8- Reclining Angle Adjustment
- 9- Armrest Adjustment
- 10- Lumbar Support Adjustment
- 11- Seat Heater
- 12- Headrest



M4GB-01-090

1- Weight support adjustment

Adjust the weight support to protect operator's body. Slightly pull up lever (1) to automatically adjust the weight support strength.

OPERATOR'S STATION

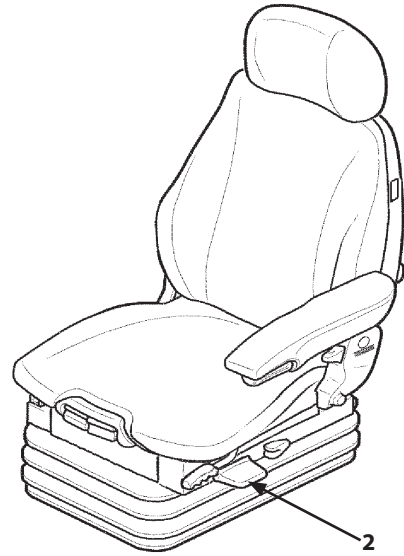
2- Height Adjustment

The seat height adjustment is an air pressure control type by which the seat height can be adjusted steplessly. Fully pull upward or push downward lever (2) until the desired seat height is obtained.

IMPORTANT: Do not continuously operate the lever for more than 1 minute. Damage to the suspension seat may result.

A position where the seat does not rise further even though the lever is continuously pulled is the highest position. When the seat reaches the highest position, the seat is automatically moved downward by a small stroke to provide the suspension stroke.

 **NOTE:** Conduct the weight and height adjustment with damper adjusting knob (3) set in the soft position.



M4GB-01-090

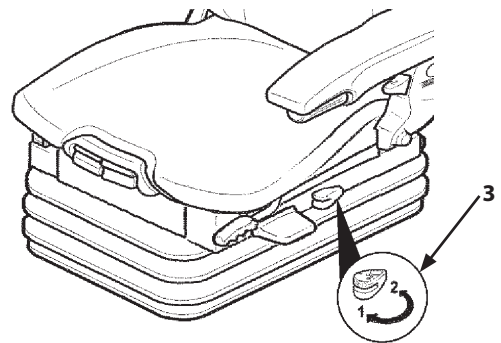
3- Damper Adjustment

The damper stiffness can be adjusted in accordance with the type of work engaged in or the conditions of the road surface.

1: Hard

2: Soft

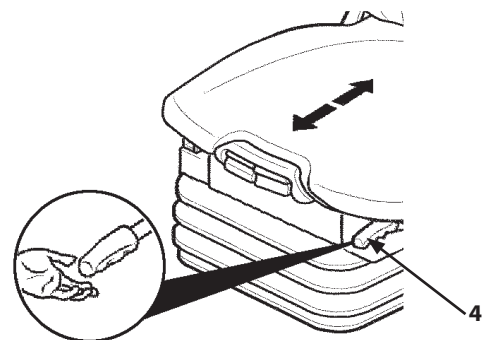
Be sure to adjust the seat height with the damper adjusting knob (3) set in soft position (2).



M4GB-01-091

4- Fore-Aft Position Adjustment

Pull up slide lever (4) to adjust the front/rear position of the seat assembly. Release the lever after the seat assembly is moved to the desired position. Check that the seat assembly desired position is locked.



M4GB-01-092

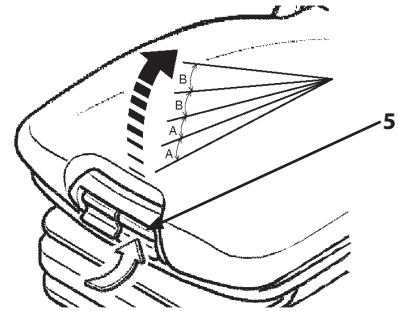
OPERATOR'S STATION

5- Inclination Adjustment

The inclination of the seat surface can be changed. While pulling up lever (5) provided in the front of the seat, press or release the seat surface to adjust the inclination of the seat surface from 3° to 11° in 4 steps.

A: 3°

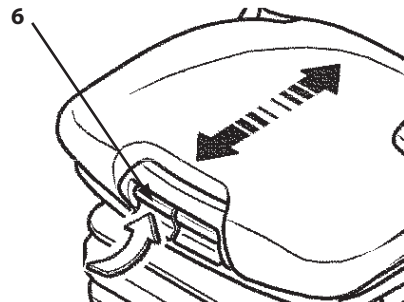
B: 2.5°



M4GB-01-093

6- Seat Depth Adjustment

The fore-aft position of only the seat surface can be changed. While pulling up lever (6) provided in the front the seat, slide the seat in the front or rear direction to adjust the seat depth up to 60 mm by 15 mm interval.



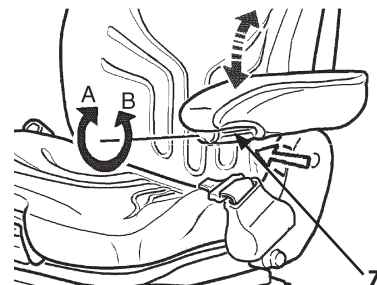
M4GB-01-094

7- Armrest Angle Adjustment

The angle of the armrest can be adjusted by turning knob (7) provided under the armrest.

A: Raise

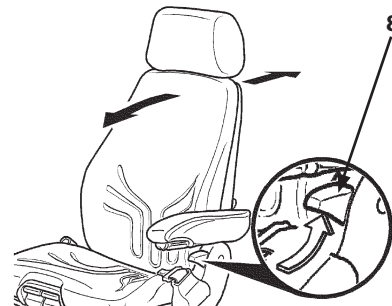
B: Lower



M4GB-01-095

8- Reclining Angle Adjustment

The reclining angle can be adjusted up to 10° forward and 34° backward by 2° intervals respectively by pulling up reclining adjusting lever (8). After moving the reclining to the desired position, return the reclining adjusting lever to the original position. Check that the reclining angle is locked in the desired position.



M4GB-01-096

OPERATOR'S STATION

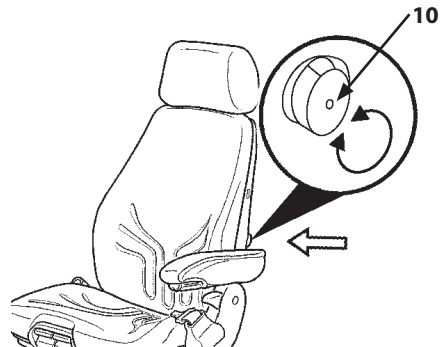
9- Armrest Adjustment

The armrest is a movable type. Keep the armrest in the up-right position unless required.

10- Lumbar Support Adjustment

A swelling on the backrest surface can be adjusted by turning knob (10) until the desired swelling is obtained.

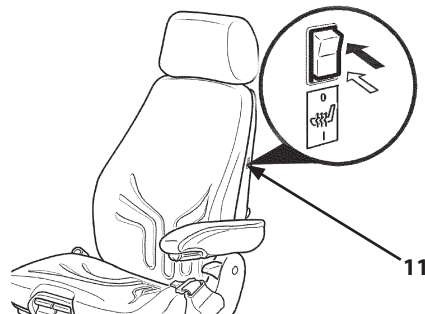
-  **NOTE:** • Turn the knob to adjust the swelling on the lumbar support. The lumbar support adjusting knob works irrespective of the turning direction.
- When the knob is continuously rotated, swell / shrink of the backrest is repeated.



M4GB-01-097

11- Seat Heater

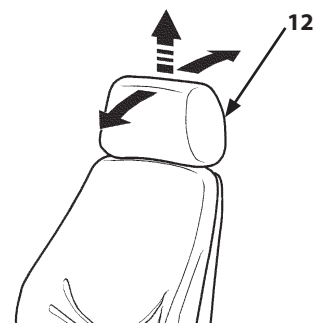
Turn the heater ON or OFF by operating switch (11) provided on the side of the backrest.



M4GB-01-098

12- Headrest

Adjust the headrest position by pulling up or pushing down the headrest. The headrest height adjusting stroke is 100 mm. In addition, the fore-aft angle of the headrest can be adjusted in the range of 30° in both sides by pulling forward or pushing backward the headrest. When required to remove the headrest, fully pull up the headrest.



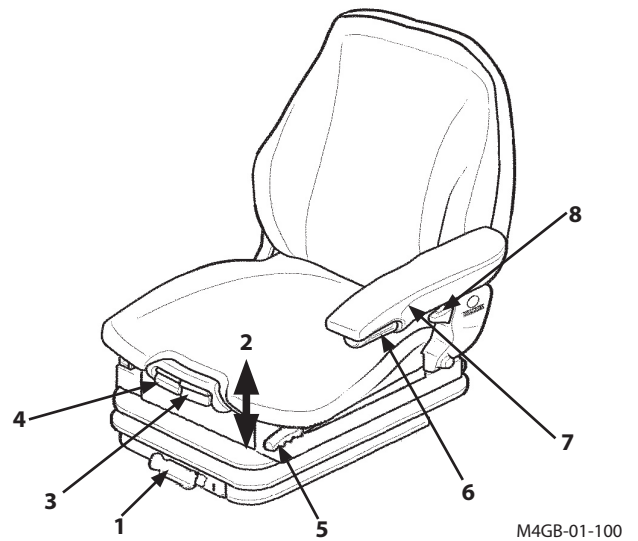
M4GB-01-099

OPERATOR'S STATION

ADJUSTING OPERATOR'S SEAT (Mechanical Suspension Type Seat)

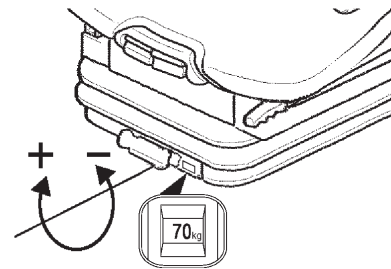
CAUTION: Adjust the seat position so that all the pedals, levers and switches can be easily and correctly operated. Adjust the seat position while parking the machine.

- 1- Weight support adjustment
- 2- Height Adjustment
- 3- Inclination Adjustment
- 4- Fore-aft Depth Adjustment
- 5- Fore-Aft Position Adjustment
- 6- Armrest Angle Adjustment
- 7- Armrest Adjustment
- 8- Reclining Angle Adjustment



1- Weight support adjustment

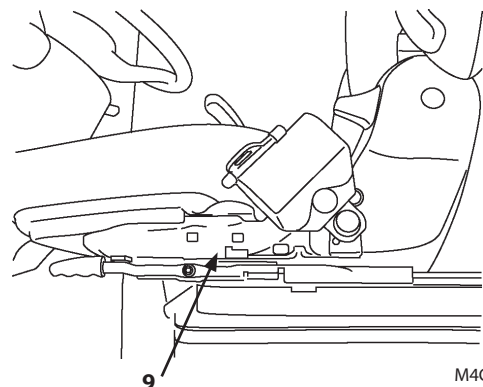
Adjust the weight support to protect the operator's body. Turn lever (1) to set the scale (10 kg intervals) to the correct operator's weight. Adjustment range: 50 kg to 130 kg



2- Height Adjustment

Lift both side bottom (9) of the entire seat to the desired height using your entire body force. After a click (locking) sound is heard, slowly release the seat. After the seat is lifted to the highest position beyond the adjustable range, it is possible to lower the seat to the lowest position. The seat height can be set in 3 steps in the 60 mm range between the highest and lowest positions.

NOTE: When adjusting the seat height, hold the seat with both hands and lift the seat using your entire body force.



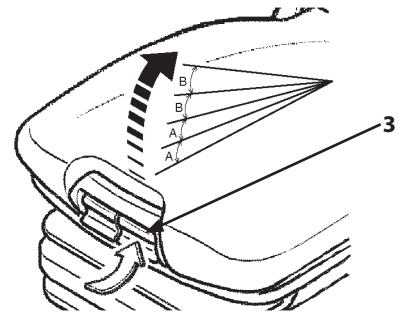
OPERATOR'S STATION

3- Inclination Adjustment

The inclination of the seat surface can be changed. While pulling up lever (3) provided in the front of the seat, press or release the seat surface to adjust the inclination of the seat surface from 3° to 11° in 4 steps.

A: 3°

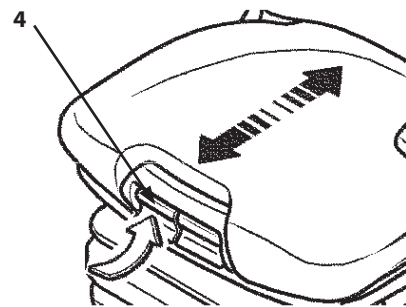
B: 2.5°



M4GB-01-093

4- Fore-aft Depth Adjustment

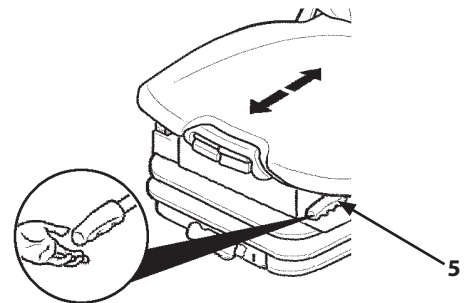
The fore-aft depth of the seat surface can be changed. While pulling up lever (4) provided in the front the seat, slide the seat in the front or rear direction up to 60 mm by 15 mm interval.



M4GB-01-094

5- Fore-Aft Position Adjustment

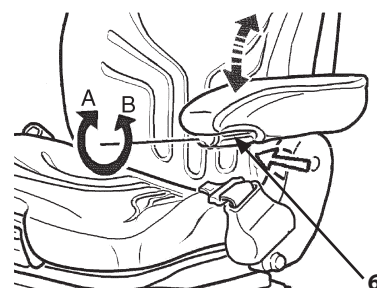
Pull up slide lever (5) to adjust the front/rear position of the seat assembly. The seat assembly position can be adjusted in the range of full stroke 210mm by 10 mm interval. Return the lever to the original position after the seat assembly is moved to the desired position. Check that the seat assembly is locked in the desired position.



M4GB-01-103

6- Armrest Angle Adjustment

The angle of the armrest can be adjusted by turning knob (6) provided under the armrest.



M4GB-01-095

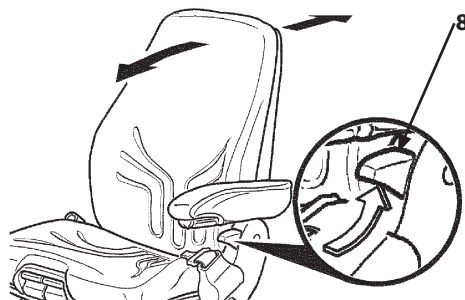
OPERATOR'S STATION

7- Armrest Adjustment

The armrest is a movable type. Keep the armrest in the up-right position unless change is required.

8- Reclining Angle Adjustment

The reclining angle can be adjusted by pulling up reclining adjusting lever (8). The reclining angle can be adjusted up to 10° forward and 34° backward by 2° intervals respectively. After moving the reclining angle to the desired position, return the reclining angle adjusting lever to the original position. Check that the reclining angle is locked in the desired position.



M4GB-01-104

OPERATOR'S STATION

SEAT BELT

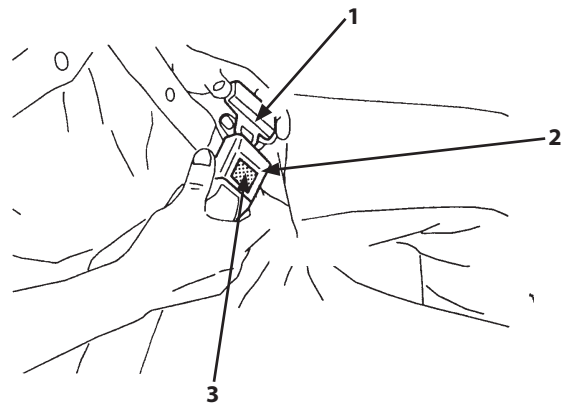
⚠ WARNING: Always use the seat belt when operating the machine. Before operating the machine, be sure to examine the seat belt and attaching hardware for any failure. If any damage and/or wear is found, replace the part concerned. Replace the seat belt every three years regardless of its appearance.

Seat Belt

1. Seat belt (1) on this machine is a recoiling type.
2. Confirm that seat belt (1) is not twisted. Securely insert the end of seat belt (1) into buckle (2).

✎ NOTE: When trying to insert seat belt (1) into buckle (2), in case the belt is suspended to extend and does not come out further, fully retract the belt to the original position and try to extend again.

3. Press button (3) on buckle (2) to unfasten seat belt (1).

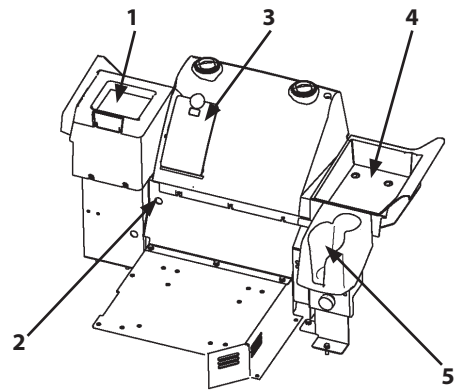


M4GB-01-105

OPERATOR'S STATION

REAR TRAY

1. Fuse Box
2. Electric Power Output (Optional)
3. Hot/Cool Box
4. Tray
5. Drink Holder



M4GB-01-106

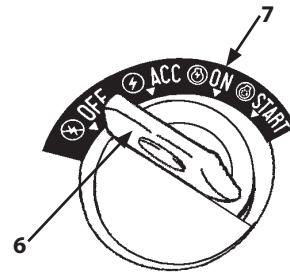
Electric Power Output (Optional)

Use the electric power output (Max. 60W) such as electric power to an instrument used for inspection/ maintenance work such as an illumination light.

IMPORTANT: DC 12 volt electric power can be utilized. Never use an accessory that needs an electric power other than 12 volts. Damage to the accessory may result.

Do not use the electric power output to activate the accessories for a long period of time without the engine running. The batteries may become overly discharged.

1. Remove the cover.
2. Insert the socket of the accessory to be used into the electric power output port.
3. Turn key switch (6) ON position (7). The connected accessory can now be operated.
4. After completing operation of the accessory, disconnect the accessory. Reinstall the cover.



M4GB-01-089

OPERATOR'S STATION

FUSE BOX

IMPORTANT: If a fuse blows, turn the key switch OFF. After checking and correcting the cause of the trouble, replace the fuse with a new one.

The fuses function as a safety valve to prevent excess current from flowing in the electrical system. Slow blow fuses (1, 2, 3, and 4) are used. Each fuse capacity varies depending on its corresponding circuit. Be sure to replace the blown fuses only with the specified ones. When checking fuses, check the slow blow fuses and (1 and 2) and fuses A and B in this order..

ZW180: 1- 120A

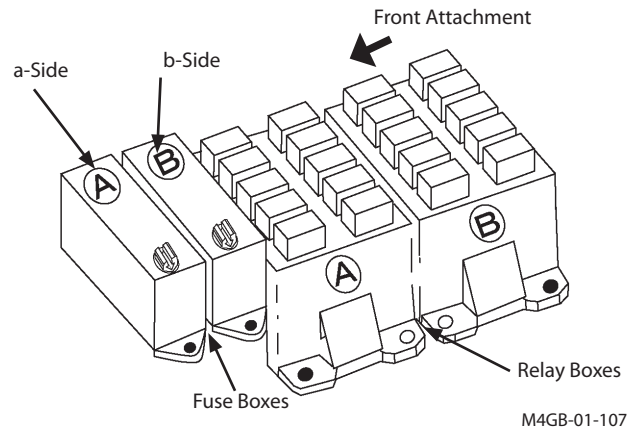
2- 65A

ZW220/ZW250: 1- 100A

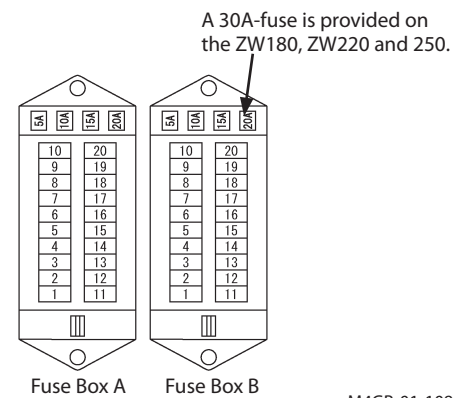
2- 65A

ZX310: 1- 120A

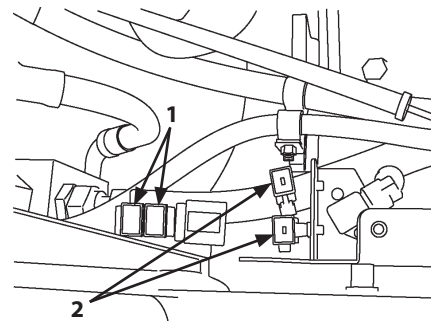
2- 65A



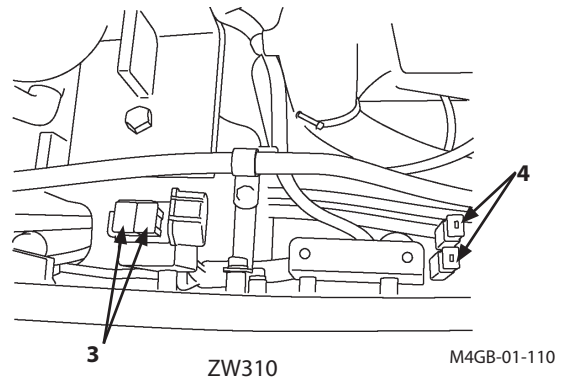
M4GB-01-107



M4GB-01-108



M4GB-01-109



M4GB-01-110

OPERATOR'S STATION

Fuse BOX A

NO.	ZW180		ZW220, ZW250		ZW310	
	Ampere	Corresponding Circuit	Ampere	Corresponding Circuit	Ampere	Corresponding Circuit
1	20	SEAT HEATER	15	SEAT HEATER*	15	SEAT HEATER
2	10	DC-DC UNIT	10	DC-DC UNIT	10	DC-DC UNIT
3	(10)	OPTION 1	(10)	OPTION 1	(10)	OPTION 1
4	15	WIPER FRONT	15	WIPER FRONT	15	WIPER FRONT
5	5	HEAD LAMP RH	5	HEAD LAMP RH	5	HEAD LAMP RH
6	10	LIGHTER	10	LIGHTER	10	LIGHTER
7	5	ECM POWER			5	ECU POWER
8	10	POWER ON	10	POWER ON	10	POWER ON
9	20	WORKING LAMP REAR	5	PARKING	5	PARKING
10	5	A/C 1	(10)	OPTION 2	(10)	OPTION 2
11	5	BACK BUZZER	5	BACK LAMP	5	BACK LAMP
12	10	STOP LAMP	10	STOP LAMP	10	STOP LAMP
13	20	WORKING LAMP FRONT	20	WORKING LAMP FRONT	20	WORKING LAMP FRONT
14	10	HORN	10	HORN	10	HORN
15	5	HEAD LAMP LH	5	HEAD LAMP LH	5	HEAD LAMP LH
16	(15)	WIPER SIDE 1	(15)	WIPER SIDE 1	(15)	WIPER SIDE 1
17	(15)	WIPER SIDE 2	(15)	WIPER SIDE 2	(15)	WIPER SIDE 2
18	(15)	GLASS HEATER FRONT	(15)	GLASS HEATER FRONT	(15)	GLASS HEATER FRONT
19	(20)	GLASS HEATER SIDE	(15)	GLASS HEATER SIDE	(15)	GLASS HEATER SIDE
20	(15)	GLASS HEATER REAR	(10)	GLASS HEATER REAR	(10)	GLASS HEATER REAR

* The seat heater is a standard equipment for the air suspension seat. () stands for optional.

Fuse BOX B

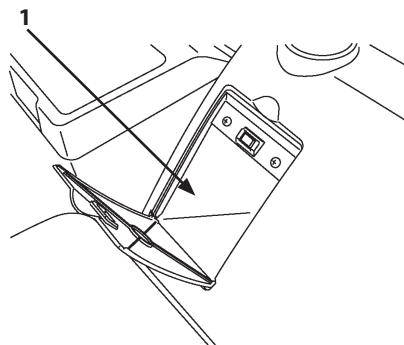
NO.	ZW180		ZW220, ZW250		ZW310	
	Ampere	Corresponding Circuit	Ampere	Corresponding Circuit	Ampere	Corresponding Circuit
1	(10)	WORKING LAMP YELLOW	(10)	FOG LAMP	(10)	FOG LAMP
2	5	PARKING	20	WORKING LAMP REAR	20	WORKING LAMP REAR
3	(10)	OPTION 2	5	AC 1	5	AC 1
4	20	AC 2	20	AC 2	20	AC 2
5	10	WIPER REAR	10	WIPER REAR	10	WIPER REAR
6	10	EMERGENCY STEERING	10	EMERGENCY STEERING	10	EMERGENCY STEERING
7	20	IGN	20	IGN	20	IGN
8	15	FLASHER	15	FLASHER	15	FLASHER
9	5	LOAD DUMP	5	LOAD DUMP	5	LOAD DUMP
10	5	RADIO	5	RADIO	5	RADIO
11	10	ROTALY BEACON	10	ROTALY BEACON	10	ROTALY BEACON
12	10	HI BEAM	10	HI BEAM	10	HI BEAM
13	(10)	OPTION 3	10	CONTEROLLER	15	FUEL HEATER
14	10	CONTROLLER			10	CONTROLLER
15	30	ECM	30	ECU	10	ECU
16	5	POSITION 1	5	POSITION 1	5	POSITION 1
17	5	POSITION 2	5	POSITION 2	5	POSITION 2
18	10	MCF	10	MCF	10	MCF
19	(10)	OPT C/U	(10)	OPT C/U	(10)	OPT C/U
20	5	MONITOR	5	MONITOR	5	MONITOR

() stands for optional.

OPERATOR'S STATION

HOT&COOL BOX

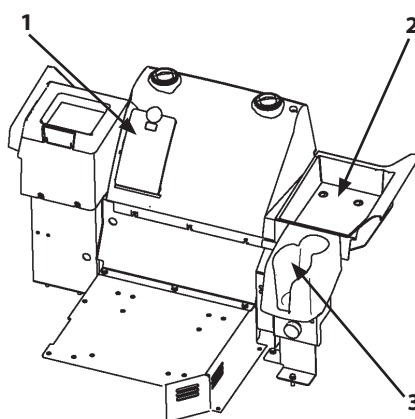
Cool or warm air from the air conditioner is routed to hot & cool box (1) so that food or a drink can be temporarily stored. Use a container with a tight cap in the hot/cool box.



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TRAY AND DRINK HOLDER

IMPORTANT: Tray (2) is not a waterproof type. Be careful not spill a liquid on the tray. Place a bottle with a plug or cap on drink holder (3).



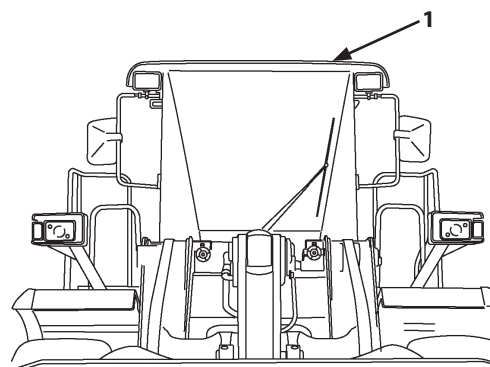
M4GB-01-106

OPERATOR'S STATION

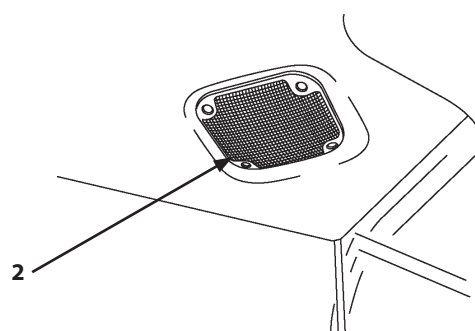
ROPS CAB

ROPS cab (1) is a standard equipment.

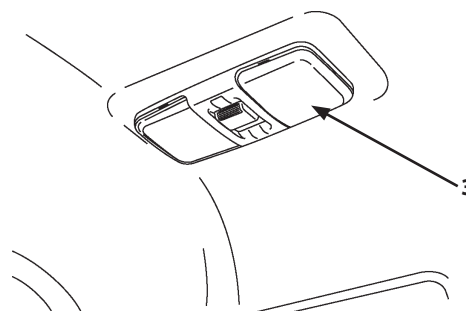
- 1- ROPS Cab
- 2- Speaker
- 3- Front Room Light
- 4- Sun Visor



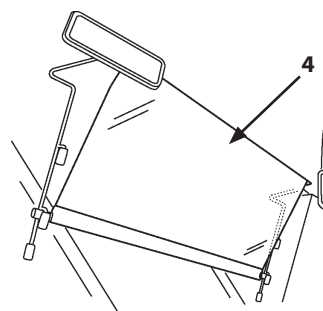
M4GB-01-060



M4GB-01-113



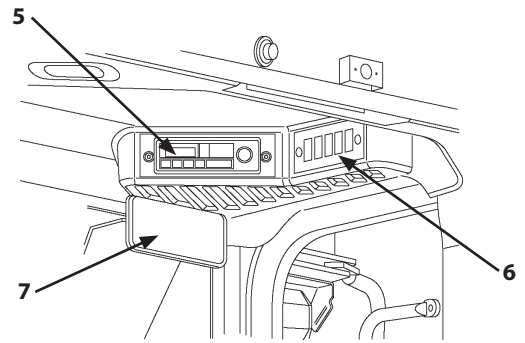
M4GB-01-114



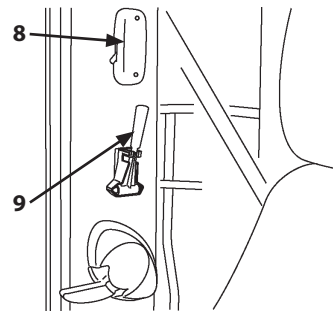
M4GB-01-121

OPERATOR'S STATION

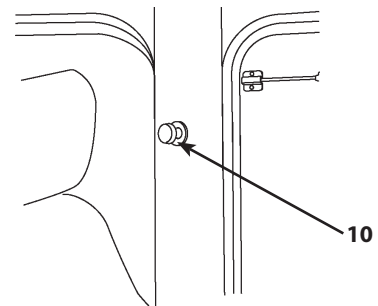
- 5- Radio
- 6- Cab Switch Panel (Optional)
- 7- Room Rear View Mirror
- 8- Rear Room Light
- 9- Emergency Evacuation Hammer
- 10- Coat Hook



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M4GB-01-117



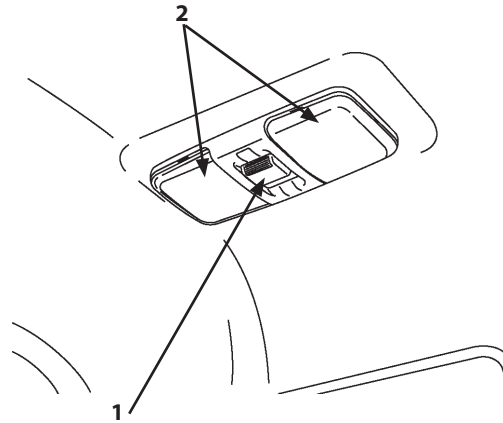
M4GB-01-118

OPERATOR'S STATION

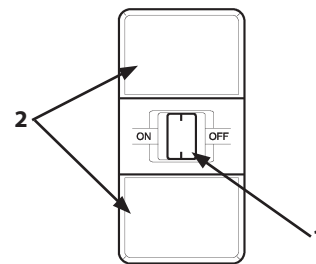
FRONT ROOM LIGHT

Press switch (1) to turn the room light ON. The front room light switch has three operation positions.

- ON: The light (2) comes and stays ON.
- Neutral: When the cab door is opened, the light (2) comes ON. When closed, the light (2) goes OFF.
- OFF: The light (2) goes OFF.



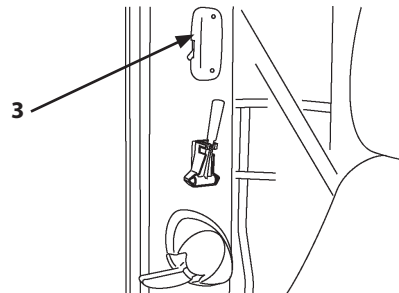
M4GB-01-114



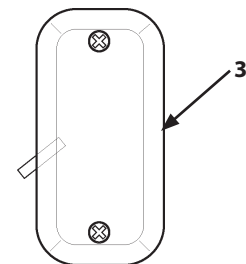
M4GB-01-119

REAR ROOM LIGHT

When the switch knob is in the ON position, rear room light (3) comes ON. When the switch knob is in the OFF position, rear room light (3) goes OFF.



M4GB-01-117

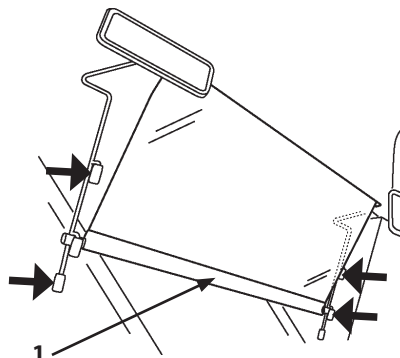


M4GB-01-120

OPERATOR'S STATION

SUN VISOR

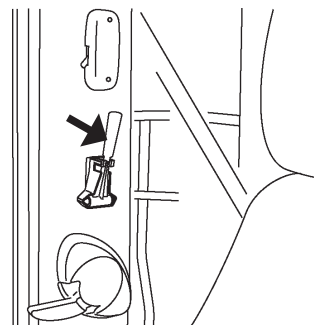
When sunlight is strong, use the sun visor (1) by hanging its edge from the cab top down to a desired hook preset in two positions.



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EMERGENCY EVACUATION HAMMER

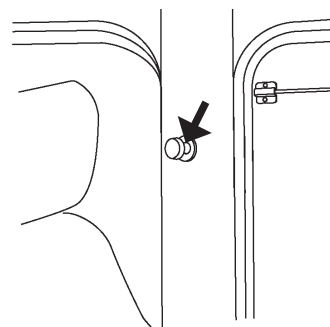
In case the cab door becomes difficult or impossible to open if an emergency situation occurs, evacuate from the machine by breaking the windowpane using the provided hammer.



M4GB-01-117

COAT HOOK

Use to hang your coat, hat, etc.



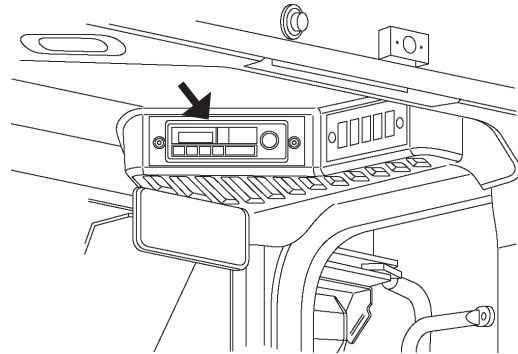
M4GB-01-118

OPERATOR'S STATION

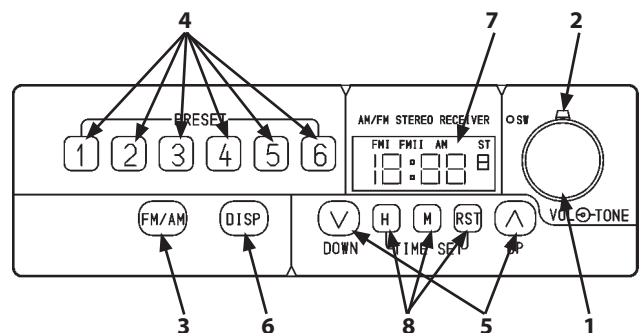
AM/FM RADIO OPERATION

Controls on the radio

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



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M4GB-01-122

Tuning Procedure

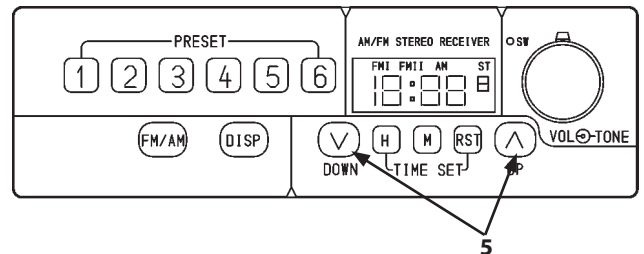
• Manual Tuning Procedure

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

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

Tap the tuning switch [UP] (∧) to increase the frequency.

Tap the tuning switch [DOWN] (∨) to decrease the frequency.



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• Automatic Search Function

Press and hold one tuning switch (5) for more than half a second, 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 [UP] (∧).

To go down to the next lower frequency station, press and hold the tuning switch [DOWN] (∨).

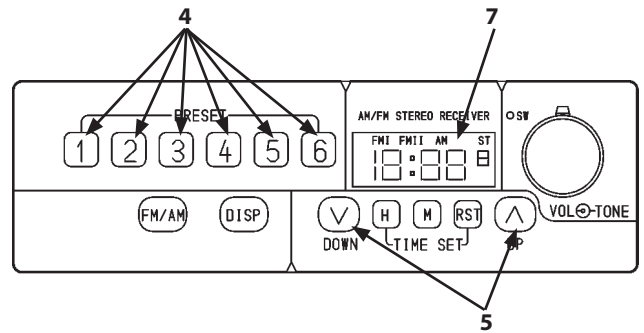
In order to deactivate the automatic search function while it is operating (while searching the next available frequency station), simply tap tuning switch (5) again.

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.

OPERATOR'S STATION

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 1 second 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).



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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 1 second).

DIGITAL CLOCK SETTING PROCEDURE

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

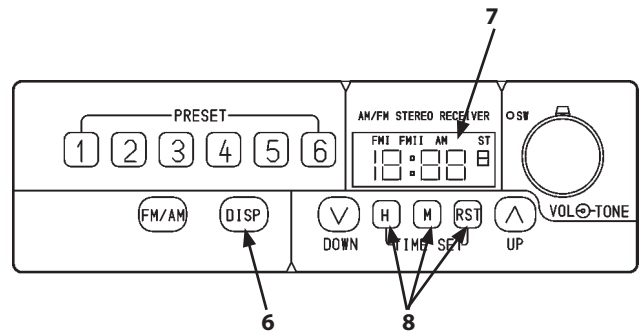
1. Press display mode button (6) to indicate the hour display on digital display (7).
2. Press and hold time set button (RST) (8) for longer than 1 second. The hour display will start flashing and the time set mode will be selected.
3. Press time set button (H or M) (8) to set the clock. Each time time set button (H or M) (8) is pressed, the time display will increase by one. If time set button (H or M) (8) is pressed and held, the time display will change continuously.

- When setting the hour, press time set button (H) (8).
- When setting the minute, press time set button (M) (8).

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.

4. When the hour display is "12," if time set button (H) (8) is pressed, the hour display will be reset to "1." When the minute display is "59," if time set button (M)(8) is pressed, the minute display will be reset to "00." However, the hour display remains unchanged in this case.
5. After the clock setting is complete, press and hold time set button (RST)(8) again for longer than 1 second, or turn the radio switch OFF to end the clock time setting procedure. Digital display (7) stops flashing and changes to stay ON.

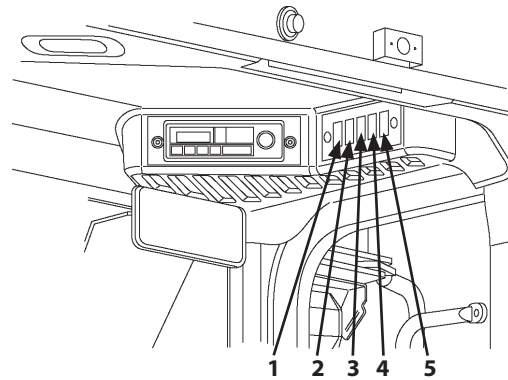


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OPERATOR'S STATION

UPPER SWITCH PANEL (Optional)

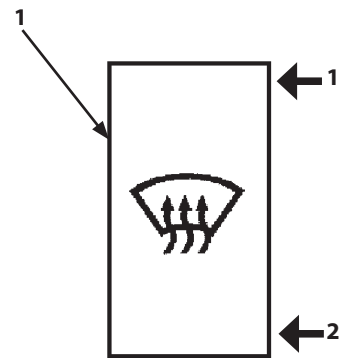
- 1- Front Hot-Wire Heater Switch
- 2- Rear Hot-Wire Heater Switch
- 3- Rotary Light Switch
- 4- Auxiliary
- 5- Auxiliary



M4GB-01-116

FRONT HOT-WIRE HEATER SWITCH (Optional)

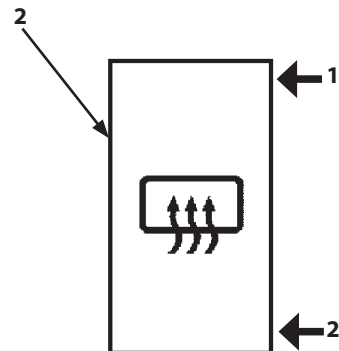
Press upper part (1) of the switch (1) to turn the hot-wire heater ON to remove fog present on the front windowpane. The heater continues to operate for 10 minutes. Press the lower part (2) of the switch to turn the hot-wire heater OFF.



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REAR HOT-WIRE HEATER SWITCH (Optional)

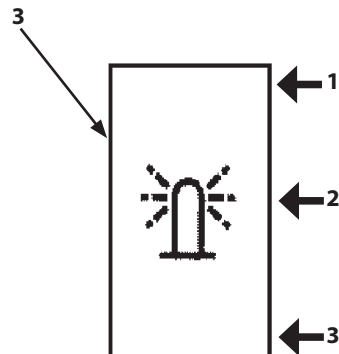
Press upper part (1) of the switch (2) to turn the hot-wire heater ON to remove fog present on the rear windowpane. The heater continues to operate for 5 minutes. Press the lower part (2) of the switch to turn the hot-wire heater OFF.



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ROTARY LIGHT SWITCH (Optional)

Press either upper part (1) or lower part (3) of the switch (3) to turn the rotary light ON. Press middle part (2) of the switch to turn the rotary light OFF.



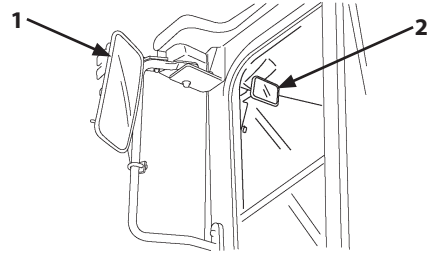
M4GB-01-125

OPERATOR'S STATION

REAR VIEW MIRROR

⚠ WARNING: Do not travel the machine in reverse by relying on only the range of vision the rear view mirror (1) provides. Use the rear view mirror only as an assistant during travel operation. Be sure to confirm the safety by using your own visibility when traveling the machine in reverse.

After taking the seat, adjust the rear view mirror so that the good rearward visibility can be obtained. Always keep the mirror clean.



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ROOM MIRROR

Always keep room mirror (2) clean.

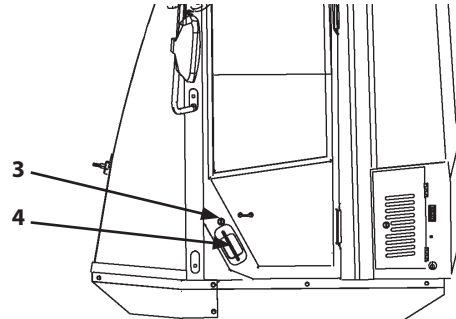
CAB DOOR

⚠ CAUTION: When closing the door, securely close the door. When leaving the operator's seat, securely close the cab door.

3- Door Lock

4- Door Open/Close Lever

🔧 NOTE: Unless the cab door is securely closed, the room light switch keeps the room light ON. Securely close the cab door.



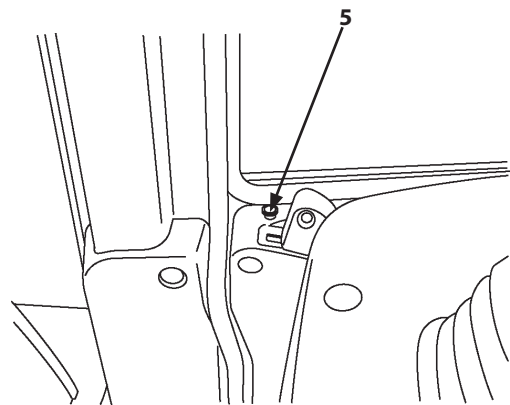
M4GB-01-127

OPERATOR'S STATION

DOOR LOCK KNOB

CAUTION: After closing the door, always check that the door lock is securely engaged.

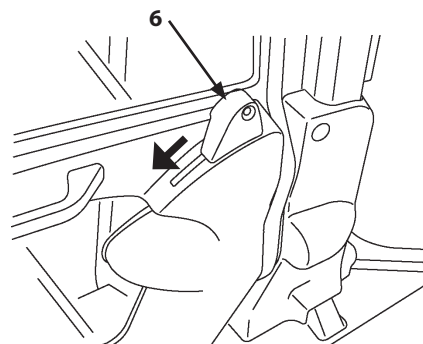
Depress door lock knob (5) to engage the door lock.



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DOOR OPEN/CLOSE LEVER

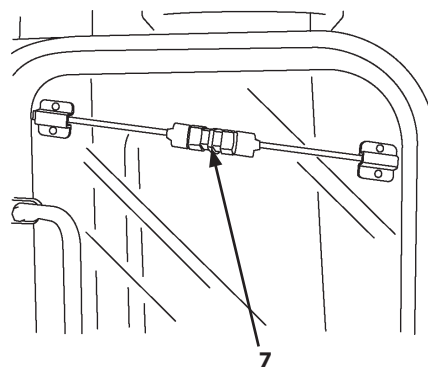
When opening the door, while lifting door lock knob (5), pull lever (6) to disengage the door lock.



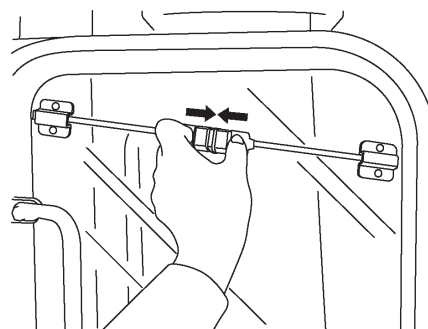
M4GB-01-129

WINDOW OPEN/CLOSE LEVER

Pick levers (7) on the both sides of the window frame from the vertical direction to disengage the lock so that the windowpane can be freely moved. Release both side levers (7) to allow the windowpane stopper to be engaged in the nearest step, locking the window in that position.



M4GB-01-130

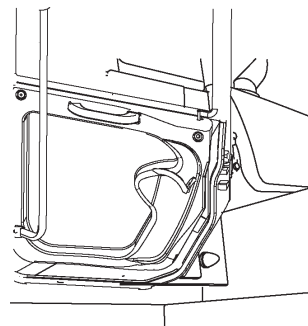


M4GB-01-131

OPERATOR'S STATION

WHEN FULLY OPENING THE DOOR

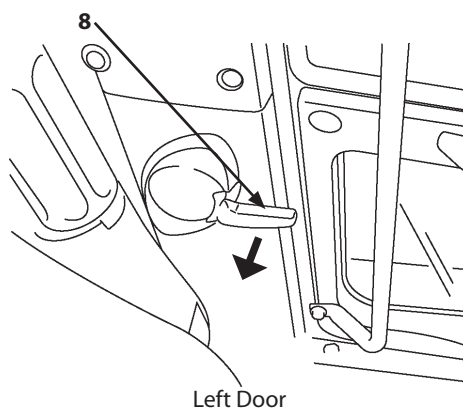
Push the door toward the outside of the cab to fully open the door (180°).



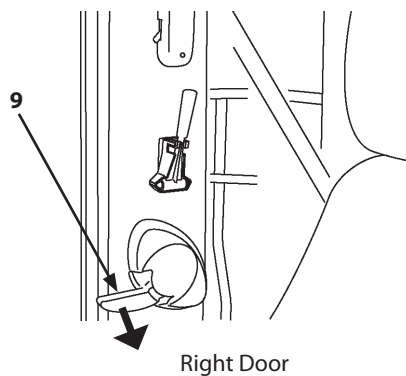
M4GB-01-132

DOOR LOCK DISENGAGE LEVER

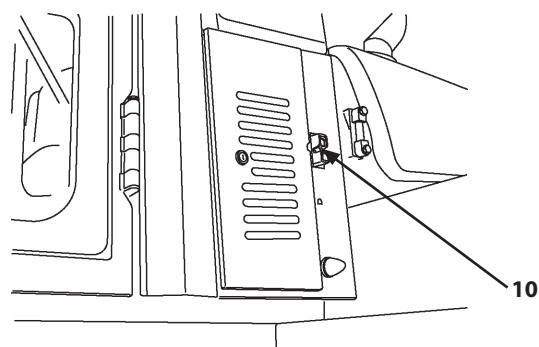
CAUTION: When keeping the door open, open the door until a latch (10) on the cab securely locks the door. When disengaging the door lock, push door lock disengage lever (8) (9) downward.



M4GB-01-133



M4GB-01-117



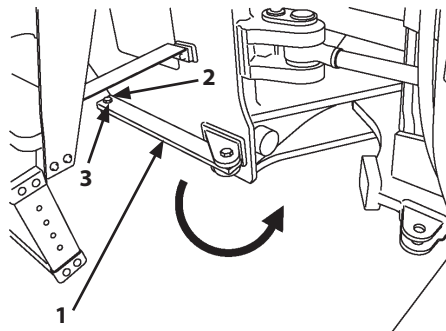
M4GB-01-134

OPERATOR'S STATION

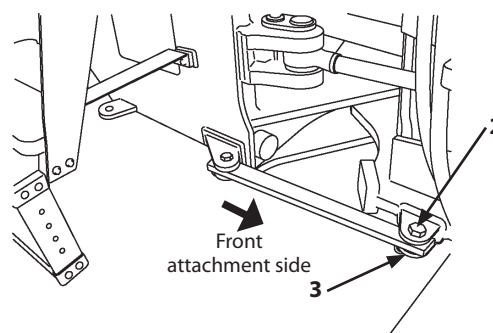
ARTICULATE LOCK BAR

⚠ WARNING: Before servicing or transporting the machine, be sure to engage lock bar (1). Before driving the machine, be sure to disengage the lock bar from the front frame and fasten the lock bar to the rear frame with pin (2) and β -form lock pin (3).

Locks the front and rear frames to prevent articulation between the front and rear frames when servicing or transporting the machine.



M4GB-01-135



M4GB-01-136

OPERATOR'S STATION

TOWING PIN

When towing other machine or fastening the machine on a trailer deck for transportation, use the pin equipped on the back end of the base machine.

Available towing forces by machine model are as follows. To prevent excessive wear of tires, avoid towing operation requiring more than the available towing force.

ZW180: 128.7 kN (13120 kgf)

ZW220: 155.5 kN (15870 kgf)

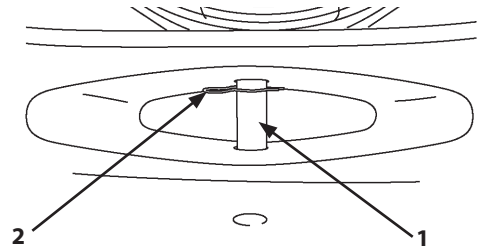
ZW250: 175.0 kN (17850 kgf)

ZW310: 194.0 kN (19800 kgf)

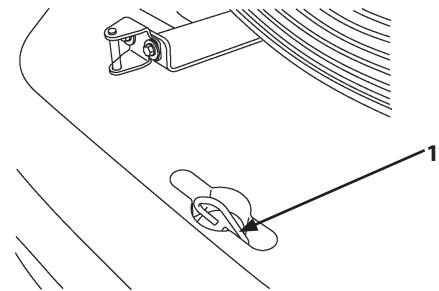


CAUTION: Be aware of the following points:

- Be sure to use only the equipped pin.
- After completely inserting the towing pin, be sure to install β -form lock pin (2).
- Slowly drive the machine during towing operation.



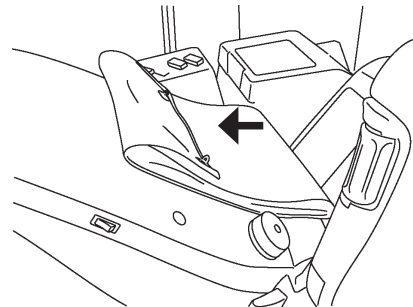
M4GB-01-137



M4GB-01-138

SEAT POCKET

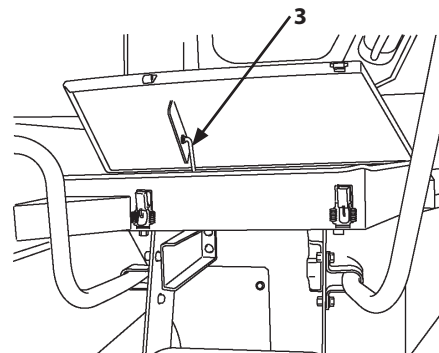
A pocket is provided on the back of the operator's seat. Store the Operator's Manual in this pocket.



M4GB-01-139

TOOL BOX

Use as a storage for tools, etc. Stopper (3) is provided inside the cover.



M4GB-01-140

OPERATOR'S STATION

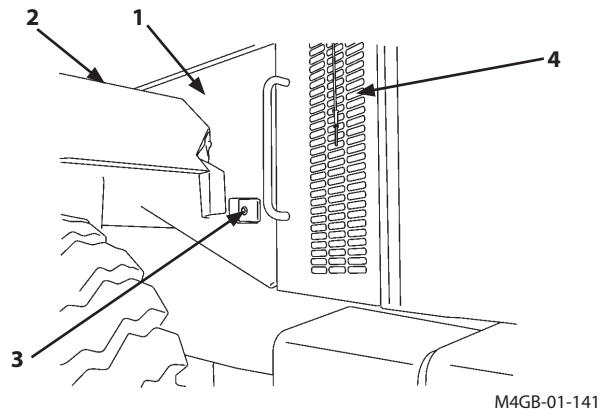
INSPECTION/ MAINTENANCE SIDE ACCESS COVER

WARNING: Be alert to the following points:

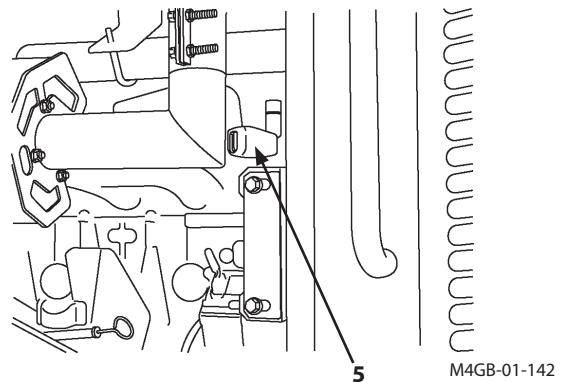
- **Always close side cover (1) during traveling and/or working operation.**
- **Do not keep the side cover open on a slope or when a strong wind is blowing. The cover may be suddenly closed, possibly creating a dangerous situation.**
- **When opening or closing side cover (1), be careful not to pinch your fingers.**
- **Before checking the engine, be sure to lock the cover in position.**
- **In case side cover (1) with fender (2) is installed on the machine, do not ride on the fender.**

Raise latch (3) to your side to open side cover (1). To open side cover (4), open side cover (1) and move down open/close lever (5) on the rear side of the base machine.

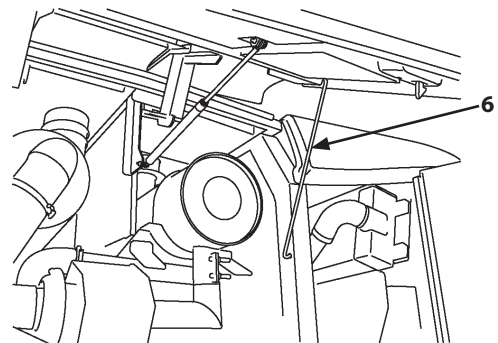
NOTE: When required to inspect the machine for a long time with side cover (1) kept open, lock the side cover in position with locking rod (6) provided inside the side cover.



M4GB-01-141



M4GB-01-142



M4GB-01-143

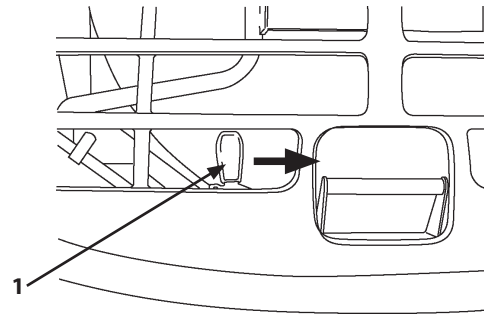
OPERATOR'S STATION

REAR GRILLE

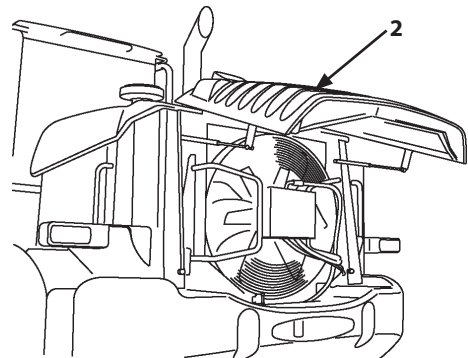
⚠ WARNING: Open or close rear grille only after the engine is stopped. If entanglement in the cooling fan were to occur, serious personal injury or death may result.

Before traveling the machine, check that the rear grille does not open.

Laterally move open/close lever (1) on rear grille (2) to allow the rear grille to open upward so that refilling the fuel tank or cleaning of the cooling fan can be conducted. When closing rear grille (2), while supporting the rear grille, slowly lower and push in the rear grille until a click sound is heard.



M4GB-01-144

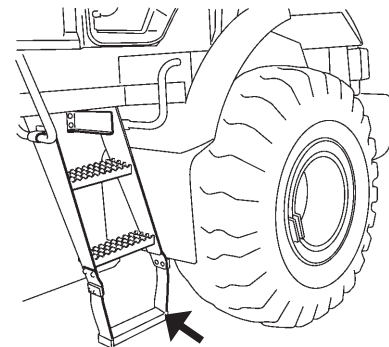


M4GB-01-145

STEPS

⚠ WARNING: When getting on and off the machine, always support your body with at least three points. Getting on and off the machine with less than three support points may cause you to slip, possibly resulting in a falling accident.

Although the steps are provided on both sides of the machine, mainly use the steps on the left side. The control levers are located on the right side, obstructing easy access.



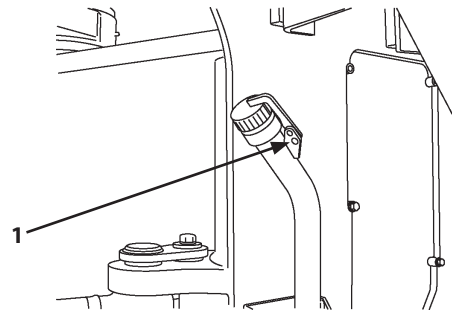
M4GB-01-146

OPERATOR'S STATION

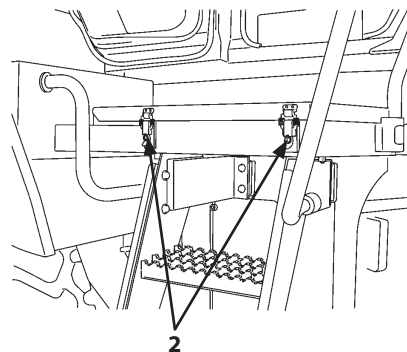
VANDAL-PROOF DEVICES

A lock key can be installed to transmission oil filter port cap (1), tool box (2), battery cover (3), and rear grill (4) respectively.

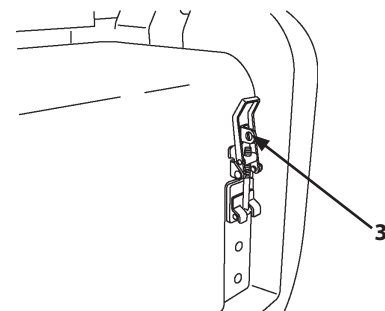
(Continue next page)



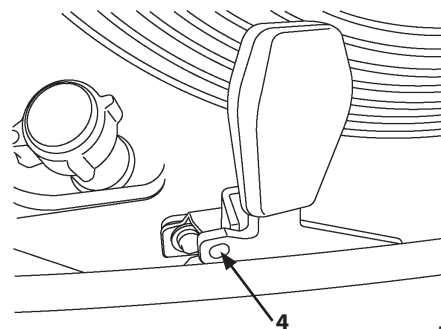
M4GB-01-147



M4GB-01-148



M4GB-01-149

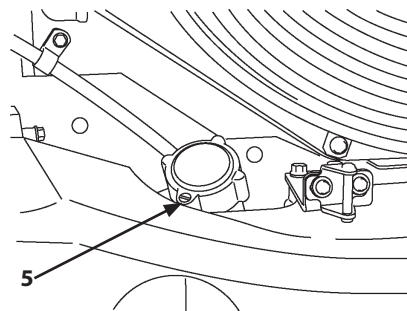


M4GB-01-150

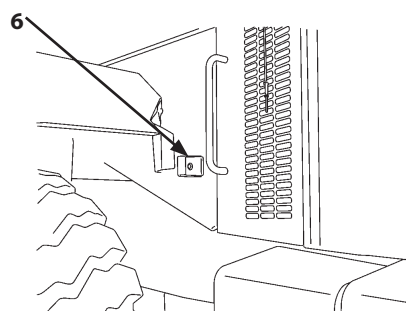
OPERATOR'S STATION

VANDAL-PROOF DEVICES

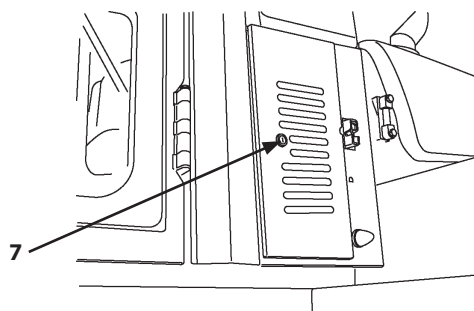
Fuel tank cap (5), side cover (6), and air conditioner fresh air suction filter (7) can be locked with the keys.



M4GB-01-151



M4GB-01-141



M4GB-01-134

This image shows a full page of a blank sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page, providing a guide for writing. There are no margins, text, or other markings on the paper.

BREAKE-IN

OBSERVE ENGINE OPERATION CLOSELY

IMPORTANT: Be extra cautious during the first 50 hours, until you become thoroughly familiar with the sound and feel of your new machine.

1. Operate the machine limit the engine horsepower up to about 80 % of full load.
2. Avoid excess engine idling.
3. Check indicator lights and gauges frequently during operation.

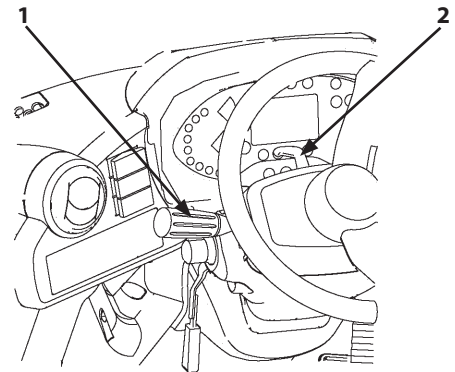
2-2

OPERATING THE ENGINE

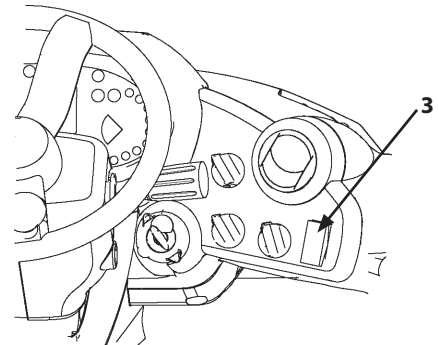
CHECK BEFORE STARTING

1. Check that forward/reverse lever (1) and forward/reverse switch (7) are in the neutral (N) position and that neutral lock (2) is in the lock position. Unless both forward/reverse lever (1) and forward/reverse switch (7) are in their neutral (N) positions, the engine will not start.

 **NOTE:** Unless both forward/reverse lever (1) and forward/reverse switch (7) are in neutral (N), the engine will not start. To ensure safe operation, after turning forward/reverse selector switch (8) OFF, start the engine.

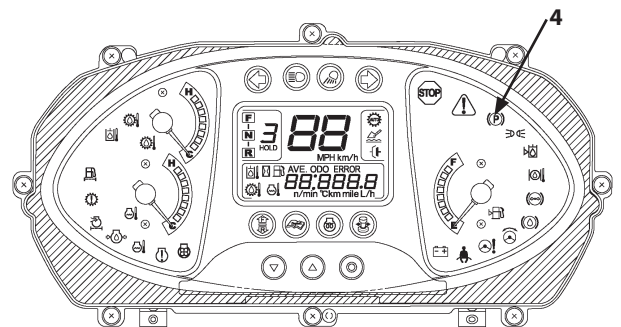


M4GB-01-042



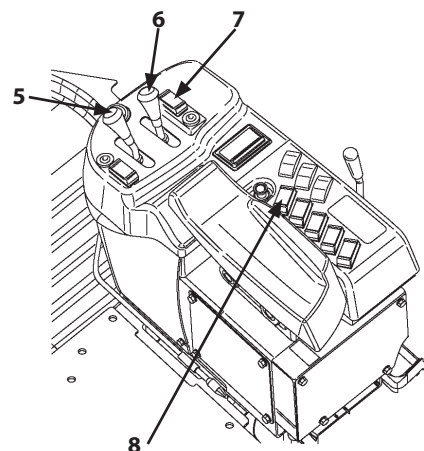
M4GB-01-046

2. Check that parking brake switch (3) is in the ON position and that parking brake indicator (4) is ON.



M4GF-01-001

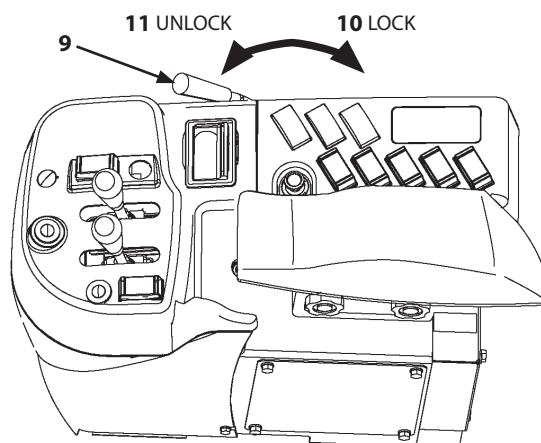
3. Check that both bucket control lever (5) and lift arm control lever (6) are in their neutral positions.



M4GB-03-001

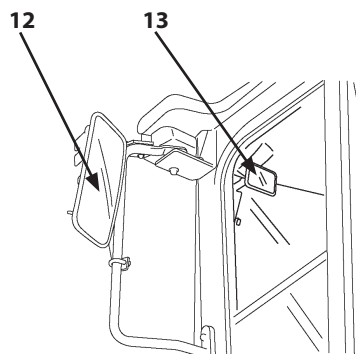
OPERATING THE ENGINE

4. Check that front control lock lever (9) is in the lock position (10). Position (11) is the released position.



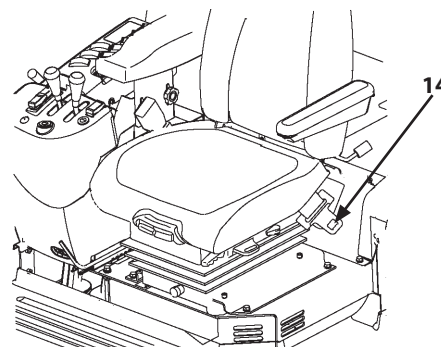
M4GB-01-050

5. Adjust the position of outside rear view mirror (12) and inside rearview mirror (13) so that the best rear visibility can be obtained.



M4GB-01-126

6. While seated on the operator's seat with your back in contact with the backrest, adjust each function of the seat so that the brake pedal can be fully stepped on.



M4GB-03-002

7. Fasten seat belt (14).

OPERATING THE ENGINE

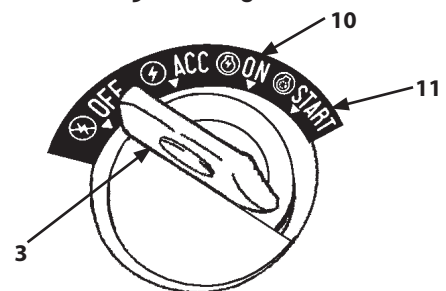
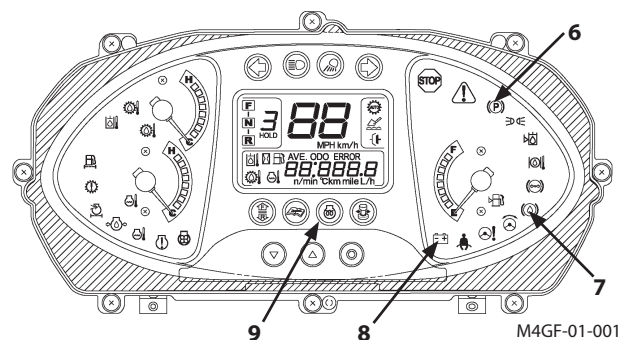
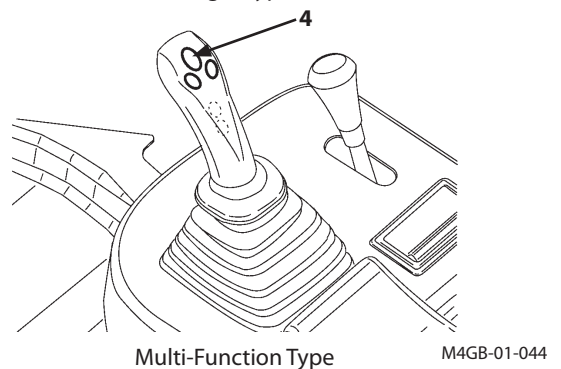
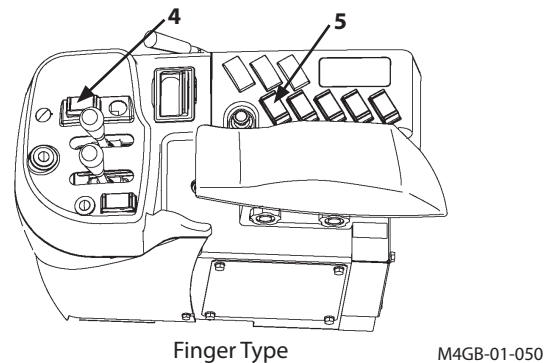
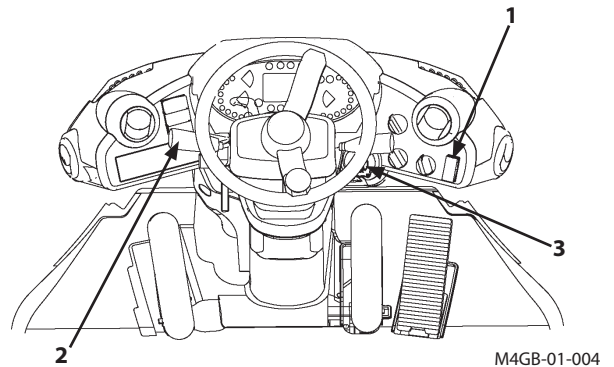
STARTING ENGINE

Follow the following steps to start the engine.

1. Check that parking brake switch (1) is ON, forward / reverse switch (4) is in neutral (N), and forward / reverse selector switch (5) is OFF.
2. Check that forward/reverse selector lever (2) is in neutral (N) position.
3. Check indicator bulbs
When key switch (3) is turned ON (10), all indicator and the warning lights come and stay ON for 2 seconds. Then, they go OFF afterward. Any indicator and/or warning light that fails to light at this time is a burned bulb. However, the indicators for parking brake (6), brake oil level (7) (when the brake oil level is reduced), and alternator (8) will continue to stay ON, and they will go OFF only after the engine is started.
4. Insert key (3) into the key switch. Turn the key switch to ON position (10). Preheating will automatically start with the key switch ON. The preheat indicator (9) will automatically come ON. At the same time, check that the six square segment marks displayed on the LCD will be sequentially erased one a time.
5. Sound the horn to clear any personnel away from the area surrounding the machine.

IMPORTANT: Prevent starter damage and/or battery discharge. Never operate the starter for more than 10 seconds at a time. If the engine fails to start, return the key switch to OFF. Wait for more than 30 seconds, then try again.

6. Turn the key (3) to START position (11) to rotate the starter. The engine will start.
7. As soon as the engine starts, release the key switch. The key switch will automatically return to the ON (10) position.



OPERATING THE ENGINE

Manual Starting in Cold Weather

Preheating

1. Turn the key switch ON (2). With the key switch ON, when the coolant temperature is lower than approx. 20 °C, the engine is automatically preheated.
2. Preheat indicator (1) comes ON. As long as preheat indicator (1) stays ON, the engine is being heated.

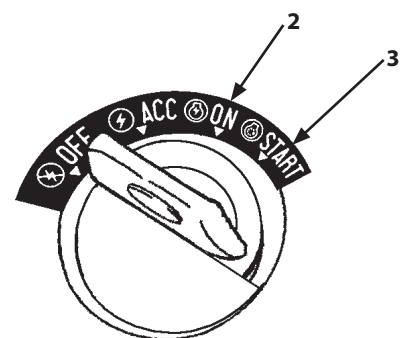
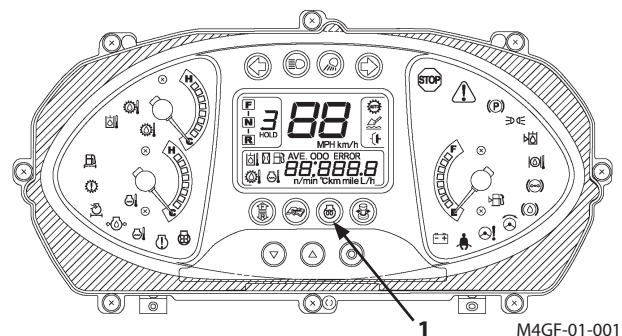
 **NOTE:** Preheating time varies depending on the coolant temperature.

Coolant temperature

Preheating time -5 °C Approx. 3 seconds
 -20 °C Approx. 20 seconds

3. As soon as the preheat indicator (1) goes OFF, turn the key switch to the START position (3) to rotate the starter. As soon as the engine starts, release the key switch. The key switch will automatically return to the ON (2) position.

After starting the engine, perform warm-up operation as described on page 3-8.



OPERATING THE ENGINE

CHECK AFTER STARTING

IMPORTANT: If any abnormality is found in the monitor functions, immediately stop the engine and investigate the cause of the trouble.

Check the monitor operation:

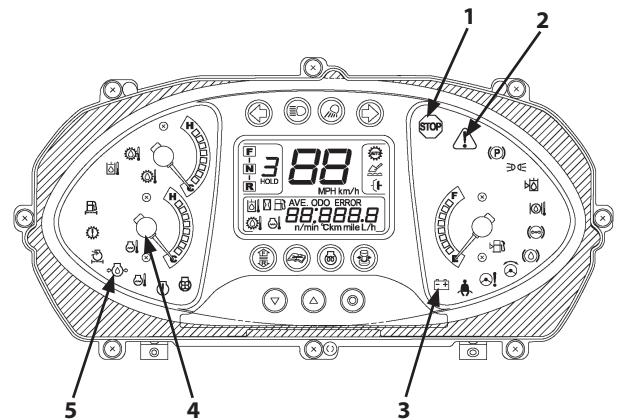
1. Check that stop indicator (1) is off.
2. Check that service indicator (2) is off.
3. Check that discharge warning indicator (3) is off. In case the discharge warning indicator stays ON, immediately stop the engine. Inspect the alternator and battery system for any abnormality.
4. Check that low engine oil pressure indicator (5) is off. In case low engine oil pressure indicator (5) stays ON, immediately stop the engine. Inspect the engine oil pressure system and the oil level.
5. Check that engine coolant temperature gauge (4) is within the blue range.

 **NOTE:** To check indicator bulbs and the buzzer function, when the key switch is turned ON, all monitor indicators including the service indicator, and stop indicator come ON and continue to stay ON for approx. 2 seconds.

Check engine noise and exhaust gas color:

Check that the engine noise and exhaust gas color is normal.

 **NOTE:** Check the exhaust gas color as follows. (After warm-up operation, run the engine with no loads.)



M4GF-01-001

Exhaust gas color	Engine operating condition
Clear or light blue	Normal (Perfect combustion)
Black	Abnormal (Imperfect combustion)
White	Abnormal (Oil is leaking into the combustion chamber.)

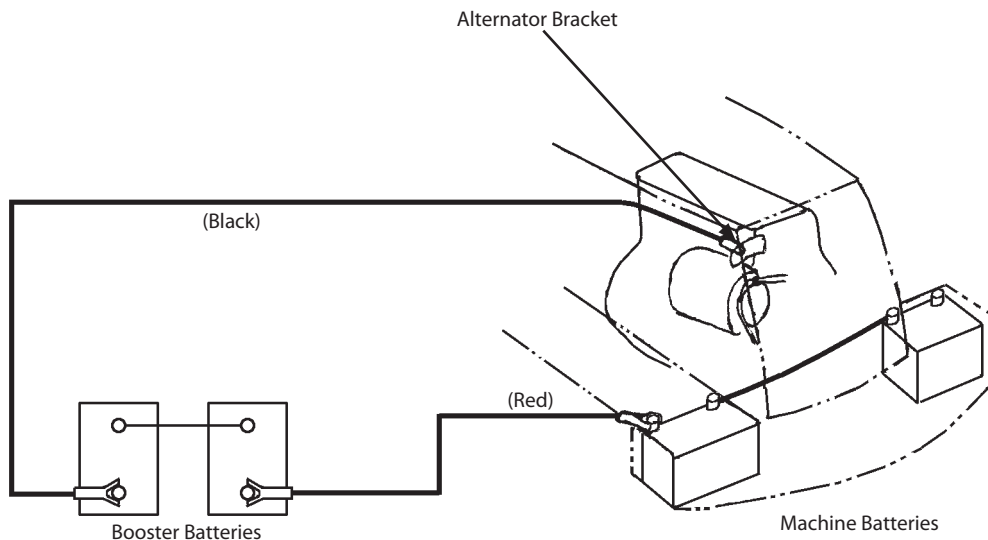
OPERATING THE ENGINE

USING BOOSTER BATTERIES

⚠ DANGER: An explosive gas is produced while batteries are in use or being charged. Keep open flames and sparks away from the battery area. Park the machine and a machine with the booster batteries on a dry or concrete surface, not on steel plates. If the machine is parked on steel plates, the machine is equivalent to a continuously grounded machine so that creating unexpected sparks may result. When connecting the booster cables, never connect a positive terminal to a negative terminal, as a dangerous short circuit may occur.

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

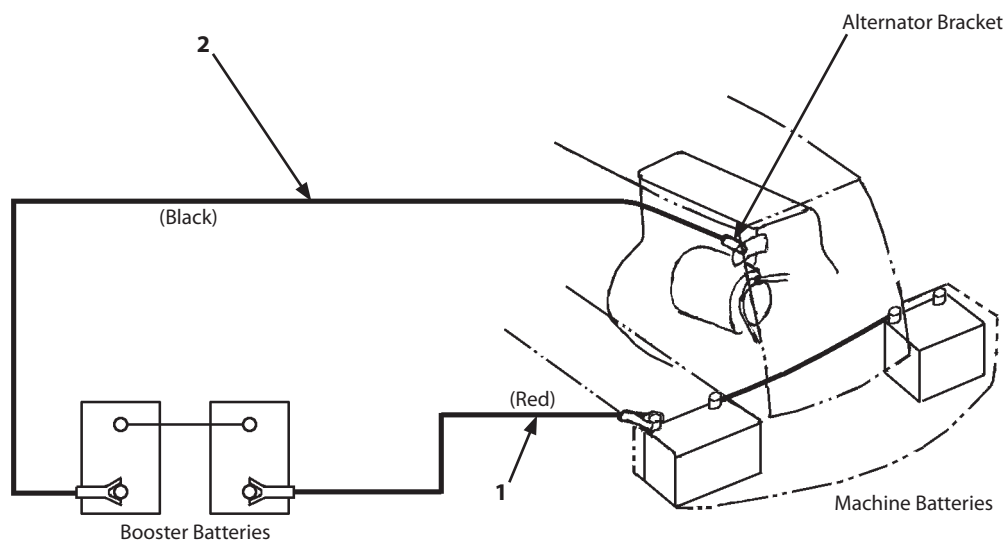
If the machine batteries are completely discharged so that when starting the engine using booster batteries is necessary, follow the procedures describe below.



M4GB-03-003

OPERATING THE ENGINE

1. Connecting the booster batteries
 - 1.1 Stop the engine on the booster battery mounted machine.
 - 1.2 Connect one end of red booster cable (1) to the positive (+) terminal of the machine batteries, and the other end to the positive (+) terminal of the booster batteries.
 - 1.3 Connect one end of black booster cable (2) to the negative (-) terminal of the booster batteries, and the other end to engine alternator bracket on the machine. In the last connection to the bracket, sparks may fly so keep the machine batteries as far away as possible from the bracket.
 - 1.4 After securely connecting the booster cables, start the engine on the booster battery mounted machine.
 - 1.5 Start the engine on the machine.
 - 1.6 After the engine starts, disconnect booster cables (1 and 2) in the following steps.
2. Disconnecting the booster cables
 - 2.1 Disconnect one end of black booster cable (2) from the engine alternator bracket.
 - 2.2 Disconnect the other end of black booster cable (2) from the negative terminal of the booster batteries.
 - 2.3 Disconnect one end of red booster cable (1) from the positive terminal of the booster batteries.
 - 2.4 Disconnect the other end of red booster cable (2) from the positive terminal of the machine batteries.



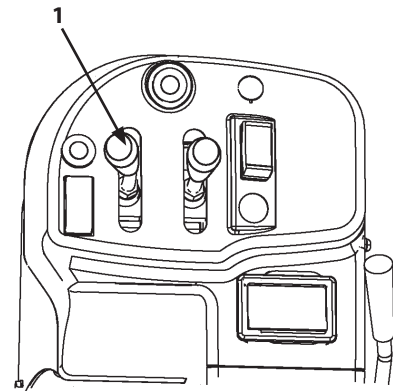
M4GB-03-003

OPERATING THE ENGINE

WARMING UP OPERATION

If the machine is excessively operated with the hydraulic oil temperature below 20 °C, damage to the hydraulic components may result. After starting the engine, sufficiently perform warm up operation as described below before operating the machine until the hydraulic temperature increases to higher than 20 °C.

1. While slightly depressing accelerator pedal, run the engine at medium speed for about 5 minutes with no load.
2. Increase the engine speed to the maximum. Raise the bucket above the ground and hold bucket control lever (1) in the tilt position for 10 seconds. (Do not operate controllers other than the bucket control lever at this time.)



Finger Type

M4GB-01-043

WARMING UP OPERATION IN COLD WEATHER

IMPORTANT: In case the hydraulic oil temperature is low, perform warm up operation. Operate the machine only after the loader front operating speed becomes normal. Be sure to perform warm up operation not only to protect the hydraulic components from being damaged but also to ensure safe operation.

1. Run the engine at slow idle speed for more than 5 minutes.
2. Run the engine at medium speed for 5 minutes.

 **NOTE:** Do not run the engine at slow or fast speed at this time.

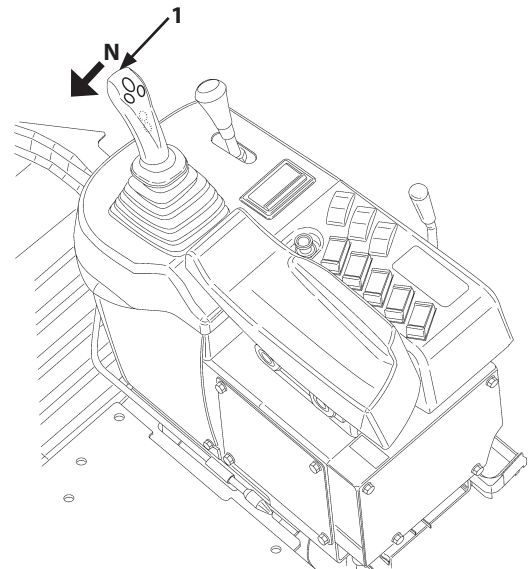
3. Fully extend the bucket cylinder.

 **NOTE:** Do not continuously operate the bucket control lever for more than 30 seconds at this time.

4. Fully retract extend the bucket cylinder.

 **NOTE:** Do not continuously operate the bucket control lever for more than 30 seconds at this time.

5. Repeat steps 2 to 4 above until the bucket operating cycle time becomes normal. When the atmospheric temperature is extremely low, extend the engine running time at medium speed.



Multi-Function Type

M4GB-01-008

OPERATING THE ENGINE

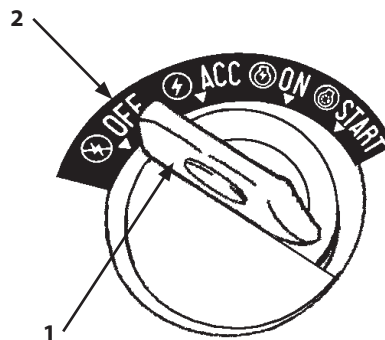
STOPPING ENGINE

Stop the engine in the following procedures.

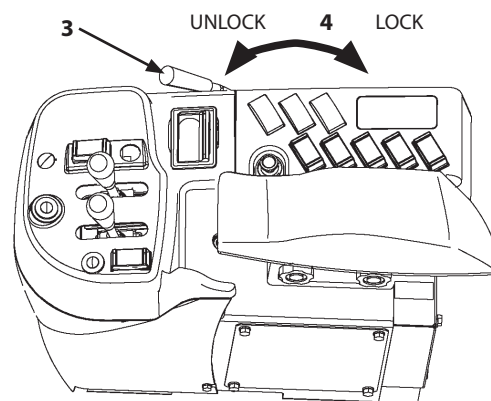
1. Lower the bucket before stopping the engine.
2. Run the engine at slow idle speed for 5 minutes to cool the engine.

IMPORTANT: If the engine equipped with a turbocharger is stopped without first performing the cool down operation, the lubricant on the turbocharger bearing surfaces may desiccate due to the intense heat present inside the turbocharger, possibly causing damage to the turbocharger.

3. Turn the key switch (1) to OFF position (2) to stop the engine.
4. Pull front control lever lock (3) to the LOCK position (4).



M4GB-01-089



M4GB-01-050

[illegible]

DRIVING THE MACHINE

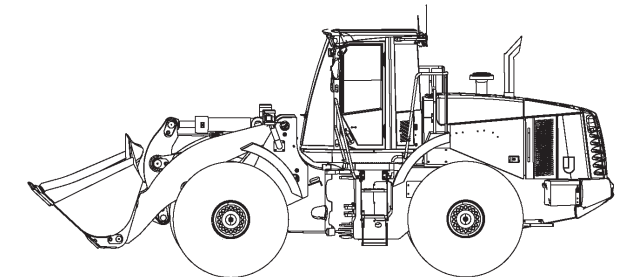
DRIVING MACHINE

Driving

Correct operation will result in extending the service life of each part and component as well as saving fuel and oil. Always be sure to safely and efficiently operate the machine while paying attention to the following points.

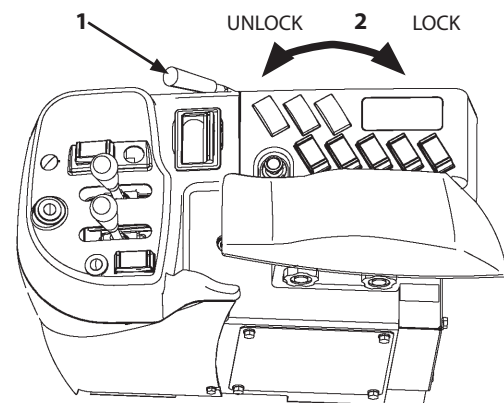
Precautions for starting to move

1. While checking the tires for abnormal air pressure and any obvious damage, make sure that there is no hazardous and/or obstacles in and around the vicinity of the machine.
2. After raising the lift arm set the machine to the driving attitude, ground, fully tilt the bucket backward.
3. Before driving on public roads, set the machine to the driving attitude as illustrated to the right. Be sure to place front control lever lock (1) in the LOCK position (2) so that the machine will not move even if the work tool control levers are accidentally operated.



Driving Attitude

M4GB-04-001



M4GB-01-050

DRIVING THE MACHINE

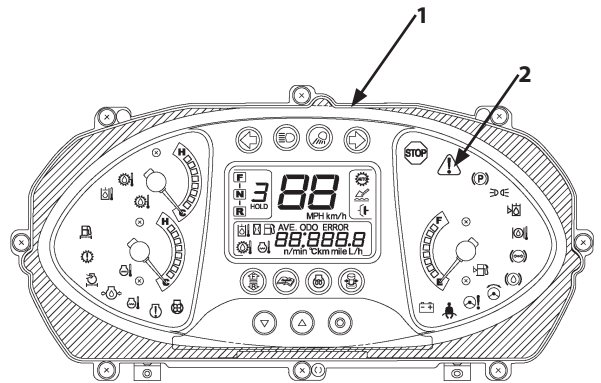
STARTING TO MOVE

WARNING: Start to move the machine only after checking that no personnel and/or obstacles are present around the machine.

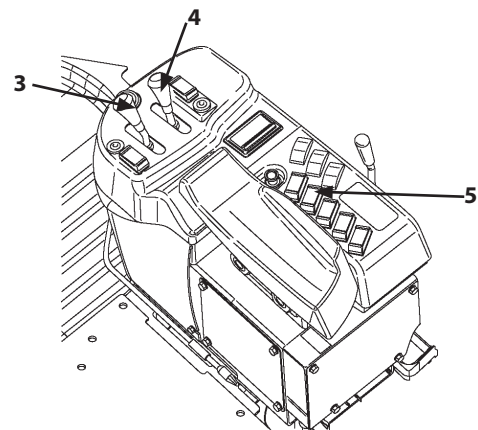
Do not turn ride control switch (5) ON while traveling the machine and/or raising the front attachment. Turn ride control switch (5) only after stopping the machine and ensuring safety around the bucket. Failure to do so will allow the lift arm to rise, possibly creating a dangerous situation.

Refer to page 1-56 for information about ride control switch (4).

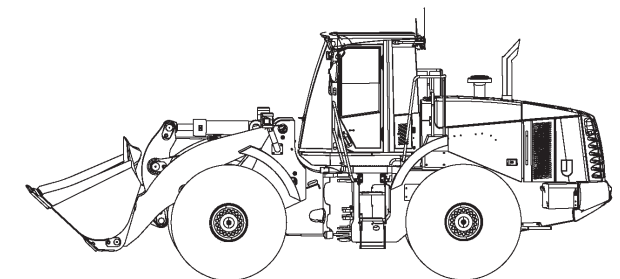
1. Check that none of the warning indicators except service indicator (2) on the monitor panel (1) are ON.
2. Set the front attachment in the driving attitude by operating bucket control lever (3) and lift arm control lever (4).
3. Press neutral lock switch (6) to the UNLOCK position (7).



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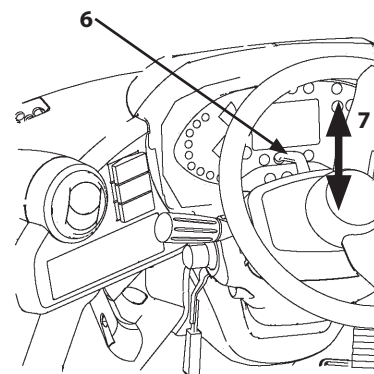


M4GB-03-001



Driving Attitude

M4GB-04-001



M4GB-01-042

DRIVING THE MACHINE

4. Step on brake pedal (8) and depress parking brake switch (9) to the OFF position to release the parking brake. Check that when depress parking brake switch (9) to the OFF position, the service indicator (2) goes OFF.

 **NOTE:** When starting to move on a slope, turn clutch cut position switch (14) to the OFF position (the clutch is engaged). While stepping on the brake pedal, depress the accelerator pedal (12). Slowly release the brake pedal (8) to allow the machine to easily start moving on a slope.

5. Manual transmission mode (M):
After moving forward/reverse lever (10) to either forward (F) or reverse (R) position, move the transmission gear switch (11) to the desired position. The transmission gear position can be shifted in 4 stages in the forward mode and 3 (or 4) stages in the reverse mode respectively. Select the most appropriate transmission gear position according to the type of the work engaged in or the driving road conditions.

6. Auto transmission mode (L, N, or H):
When operating the machine in the auto transmission mode (L, N, and H), move the forward/reverse selector lever to either the forward (F) or reverse (R) position. Select the gear stage in which the machine will mainly be operated in hereafter. Then, select the auto transmission mode by operating transmission mode selector (13).

Position M: Manual shift (The transmission gears are shifted with the shift switch.)

(ZW180)

Auto 1-4L: To increase work volume with less fuel consumption
(Applicable to general works such as excavation, and loading, long distance movement, climbing slopes and snow removal in the 2nd-gear stage)

Auto 2-4N: To primarily increase work volume
(Applicable to loading works and snow removal in the 3rd or 4th gear stage auto shift mode)

Auto 1-4H: To primarily increase work volume
(Applicable to excavation, and loading works and climbing slopes in the 3rd or 4th gear stage auto shift mode)

(ZW220, 250, 310)

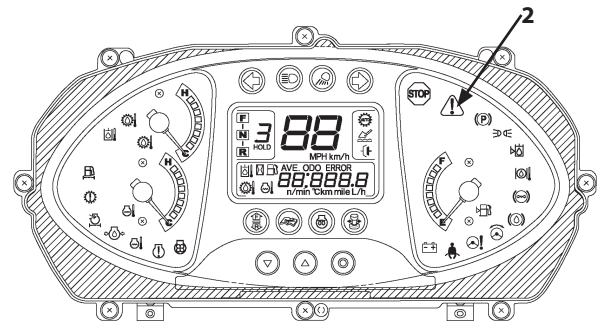
Auto L: To primarily save the fuel consumption
(Suitable to operation performed with frequent long flat distant driving)

Auto N: To increase work volume with less fuel consumption
(Suitable to normal loading work)

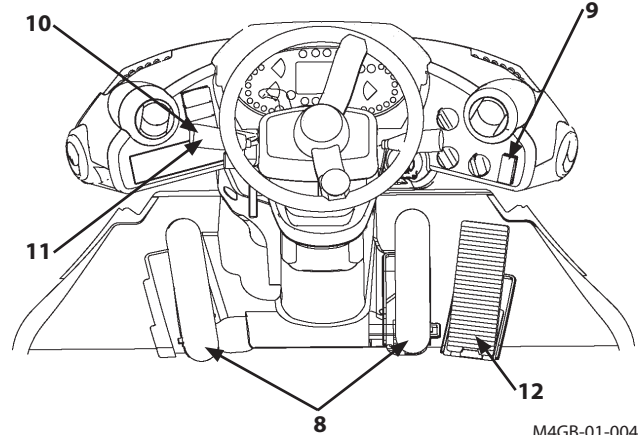
Auto H: To primarily increase work volume
(Suitable to operation in a steep upslope work site or in a work site where the first driving gear range is frequently used)

 **NOTE:** In case the machine is equipped with the 3-stage gearshift transmission in the reverse mode, even if the 4-stage gearshift position is selected, the drive speed remains unchanged from that of the 3-stage gearshift.

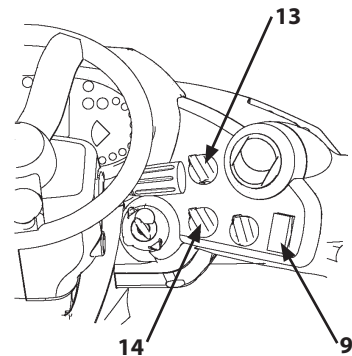
7. Release brake pedal (8) and step on accelerator pedal (12).



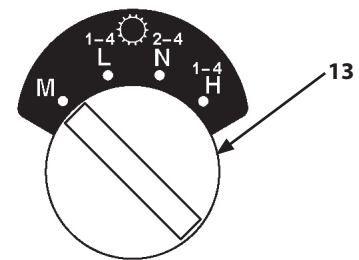
M4GF-01-001



M4GB-01-004

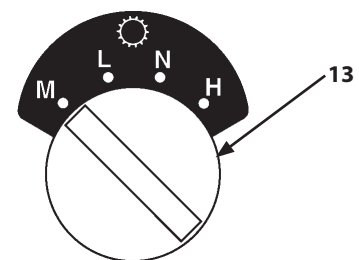


M4GB-01-046



ZW180

M4GB-01-047



ZW220, 250, 310

M4GB-01-047

DRIVING THE MACHINE

Traveling speed ranges chosen by auto transmission mode (1-4L, 2-4N, and 1-4H) (ZW180)

2-4N:

When the 1st gear stage is selected

→ drives in only the 1st gear.

When the 2nd gear stage is selected

→ drives in only the 2nd gear.

When the third gear stage is selected

→ drives in the 2nd and 3rd gears.

When the 4th gear stage is selected

→ drives in the 2nd, 3rd and 4th gears.

1-4L and 1-4H:

When the 1st gear stage is selected

→ drives in only the 1st gear.

When the 2nd gear stage is selected

→ drives in the 1st and 2nd gears.

When the third gear stage is selected

→ drives in the 1st, 2nd and 3rd gears.

When the 4th gear stage is selected

→ drives in the 1st, 2nd, 3rd and 4th gears.

 **NOTE:** When position (1-4L and 1-4H) is selected, the transmission is automatically shifted down to the first gear stage according to increase in load.

Traveling speed ranges chosen by auto transmission mode (L, N, and H) (ZW220, 250, 310)

L and N:

When the 1st gear stage is selected

→ drives in only the 1st gear.

When the 2nd gear stage is selected

→ drives in only the 2nd gear.

When the third gear stage is selected

→ drives in the 2nd and 3rd gears.

When the 4th gear stage is selected

→ drives in the 2nd, 3rd and 4th gears.

H:

When the 1st gear stage is selected

→ drives in only the 1st gear.

When the 2nd gear stage is selected

→ drives in the 1st and 2nd gears.

When the third gear stage is selected

→ drives in the 1st, 2nd and 3rd gears.

When the 4th gear stage is selected

→ drives in the 1st, 2nd, 3rd and 4th gears.

 **NOTE:** When position (H) is selected, the transmission is automatically shifted down to the first gear stage according to increase in load.

DRIVING THE MACHINE

PARKING BRAKE SWITCH

WARNING: To prevent the occurrence of accidents due to running away of the machine, be sure to apply the parking brake when parking the machine and before leaving the machine. Except in an emergency, never apply the parking brake by operating parking brake switch (1) while traveling the machine.

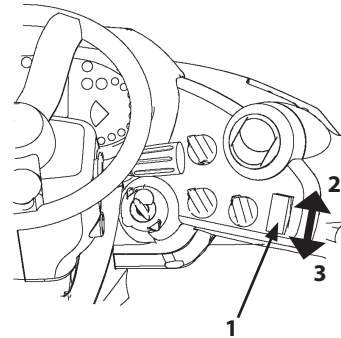
Parking brake switch (1) has three operating positions provided.

- Parking brake ON (2)
- Neutral: Level position (3)
- Parking brake OFF position (4): The switch is automatically returned to the original position

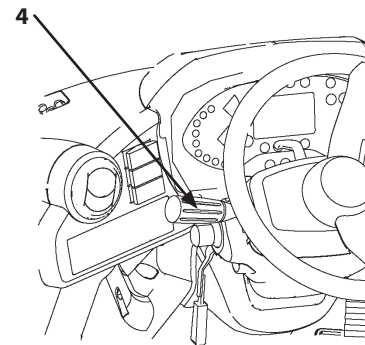
1. Press the OFF side (3) of parking brake switch (1) to release the parking brake. Check that parking brake indicator (7) goes OFF by pressing the switch twice with clicks. Press the ON side (2) of parking brake switch (1) to apply the parking brake.

NOTE: While running the engine, when the parking brake is applied with forward/reverse selector lever (4) in neutral, parking brake indicator (8) and service indicator (7) come ON.

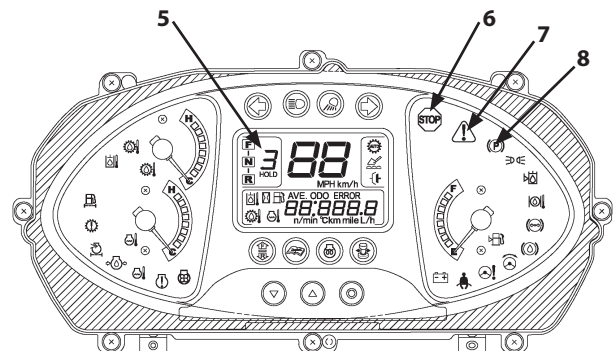
2. While running the engine, when the parking brake is applied with forward/reverse selector lever (4) in either the forward (F) or reverse (R) position, parking brake indicator (8) and service indicator (7) come ON, and the alarm buzzer sounds. The monitor display indicates (5) "N" not "R." The monitor display will not indicate "F" and "R" until the parking brake is released.
3. The parking brake is automatically applied when the engine is stopped even though parking brake switch (1) is OFF (3) to ensure safeoperation. In this case even after the engine is restated, the parking brake will not be released. After starting the engine, push ON position (2) of parking brake switch (1) once. Then, push OFF position (3) parking brake switch (1) to release the parking brake.



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M4GB-01-042



M4GF-01-001

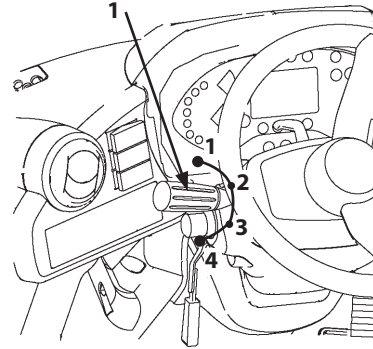
DRIVING THE MACHINE

DRIVE SPEED CHANGE

The transmission gear range from 1 to 4th stage can be selected by turning shift switch (1).

- 1st to 2nd gear range: To be used for excavation and loading work
3rd to 4th gear range: To be used for driving

 **NOTE:** Avoid rapid gear changes using shift switch (1) while traveling at high speed. Shift the gear range only after reducing the travel speed by releasing the accelerator pedal.



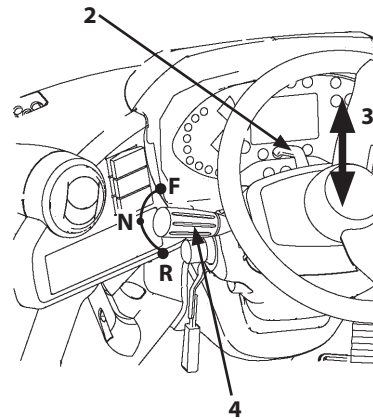
M4GB-01-042

CHANGING FORWARD/REVERSE DRIVE DIRECTION

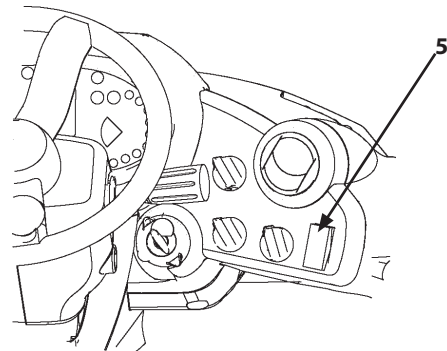
 **WARNING:** Before changing the drive direction, confirm that the drive direction is clear. To ensure operator's safety and ensure the longevity of the power train system, change the machine drive direction only after sufficiently reducing the drive speed. Shift the transmission gear position from the 3rd and/or 4th gear stage only after the driving speed is reduced to slower than 13 km/h.

1. Pull neutral lock switch (2) to the UNLOCK position (3).
2. Release parking brake (5) is OFF position.
3. Move forward/reverse selector lever (4) to the desired position.

F: Forward Driving
N: Neutral
R: Reverse Driving



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DRIVING THE MACHINE

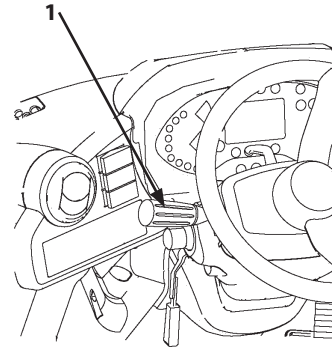
FINGER TYPE

DSS/USS (Down Shift/Up Shift) Switch

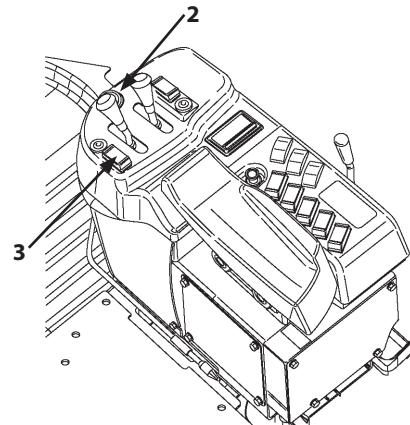
When DSS side (4) of DSS/USS selector switch (3) is pressed with shift switch (1) in the 2nd, 3rd, or 4th gear position, one stage slower drive speed range than the currently selected drive speed range is selected. When USS side (5) of DSS/USS selector switch (3) is pressed, one stage higher drive speed range than what is currently selected will be selected.

DSS (Down Shift) Switch

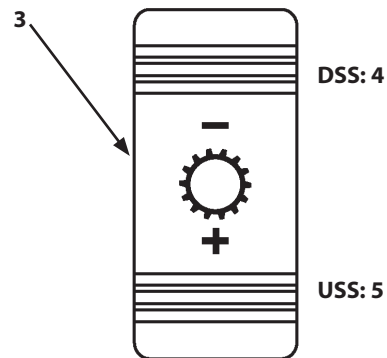
Each time DSS switch (2) is pressed, one stage lower drive speed gear range can be selected. Once the drive speed is shifted down by pressing the DSS switch (2), the drive speed cannot be shifted up unless the forward/reverse drive change or gearshift operation is made.



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M4GB-01-078

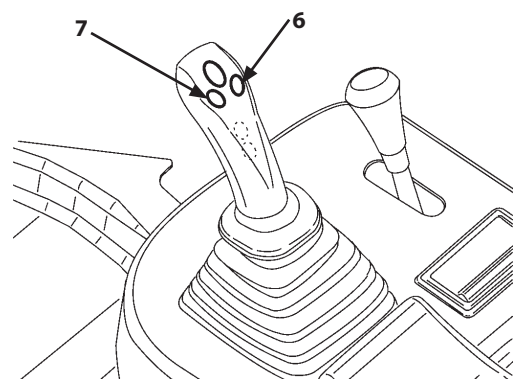
MULTI-FUNCTION TYPE

DSS (Down Shift) Switch

Each time DSS switch (7) is pressed, one stage lower drive speed gear range can be selected. Once the drive speed is shifted down by pressing the DSS switch (7), the drive speed cannot be shifted up unless the forward/reverse drive change or gearshift operation is made.

USS (Up Shift) Switch

When USS switch (6) is pressed with shift switch (1) in the 2nd, 3rd, or 4th gear position, one stage higher drive speed range than the currently selected drive speed range is selected. USS switch is pressed, one stage higher drive speed range than what is currently selected will be selected.



M4GB-01-044

DRIVING THE MACHINE

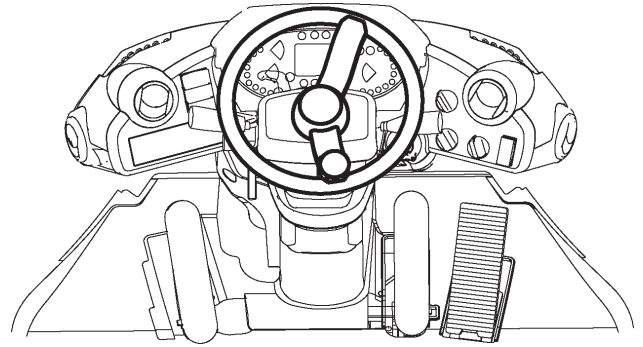
STEERING

WARNING: Avoid quick steering while driving the machine at high speeds, while driving on a steep slope, or while raising the lift arm to the maximum position. Failure to do so may cause the machine to turn over. Never attempt to stop the engine while steering the machine. If the engine is stopped, the steering wheel will lock and the parking brake will be applied so that the steering operation will become impossible.

IMPORTANT: When the steering wheel is fully turned, the front and the rear frames come in contact with the stoppers so that the steering wheel does not rotate further. If the steering wheel is forcibly turned moreover, the engine may stall or malfunction of the steering system may result.

Turn the steering wheel towards the direction you intend to steer the machine during drive operation.

NOTE: This machine has an articulated frame. The front and rear frames are coupled by a connection pin (center pin) so that the rear wheels follow the tracks of the front wheels. Turn the steering wheel smoothly so as to follow the motion of the machine.



M4GB-04-002

EMERGENCY STEERING

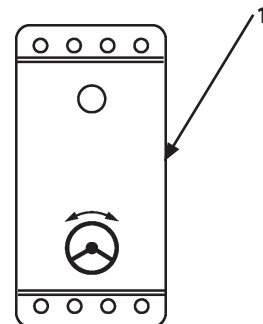
If the oil pressure in the steering system becomes abnormal, the emergency steering system is activated so that steering operation can be achieved. If the emergency steering system is activated, the emergency steering indicator lights and the buzzer sounds. Immediately park the machine in a safe location. Then, contact your nearest Hitachi dealer.

IMPORTANT: The emergency steering system is provided for a provisional use. If continuously used for more than 60 seconds, damage to the system may result.

Even though the machine is equipped with the emergency steering system, if the steering function becomes inoperable during drive operation, press the emergency steering check switch on the right console to activate the emergency steering system. Then, immediately park and stop the machine in a safe location.

NOTE: When the engine is started, the system activation sound (metallic clank) emits for approx. 2 seconds to automatically check the emergency steering system function.

NOTE: Before operating the machine, press emergency steering check switch (1) to confirm that the emergency steering pump normally operates.



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DRIVING THE MACHINE

PROVISIONAL STOP AND RESTART OF DRIVING

Follow the tips described below when required to provisionally stop or restart driving.

1. Slowly release the accelerator pedal. Depress the brake pedal to stop the machine.
2. Slowly depress the accelerator pedal to move the machine again.
3. In case the machine is required to park for a long period of time, make it a rule to return the forward/reverse selector lever to neutral, turn the brake switch ON, and apply the parking brake to ensure safety operation.
4. During drive operation, the machine drive attitude may be changed due to inner hydraulic oil leaks. When required to rectify the drive attitude, provisionally stop driving, return the forward/reverse selector lever to neutral, apply the parking brake by turning the parking brake switch ON. Then, after rectifying the drive attitude, begin driving the machine again. Always allow the machine to maintain the correct drive attitude.

Precautions for traveling

During drive operation, observe the general operating manners beside the precautions described below to ensure safe and correct operation.

WARNING: Use care to the following points:

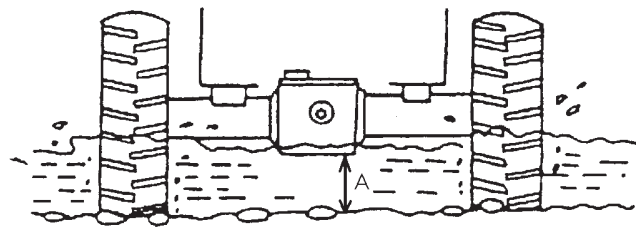
- **In case a tire becomes punctured while driving, securely hold the steering wheel and slowly reduce the drive speed. If the brake is suddenly applied by strongly depressing the brake pedal, the steering may become out of control, possibly creating a serious accident. Never apply the brake quickly if a tire becomes punctured.**
- **Never mount or dismount the moving machine. Never allow any personnel other than the operator to ride on the machine when driving.**
- Even after break-in operation is complete, avoid running the engine at fast speed under no load.
- If any abnormal condition such as an abnormal noise or smell is notified during drive operation, immediately stop the engine and inspect the machine for any trouble.
- Avoid using sudden steering or braking as much as possible because not only own machine but also other machines may become involved in a hazardous condition.
- Driving speeds of this machine are lower than most normal automobiles. Always give the right of way to automobiles.

DRIVING THE MACHINE

- Before approaching turning points, reduce the driving speed. Drive the machine while paying attention to the visibility ahead and in the opposite driving lane.
- Make it a habit to periodically scan the gauges and instruments. If any abnormality is recognized, immediately stop the machine and check the machine for the cause of the trouble.
- When required to drive on the road shoulder or in tight spaces, use a signal person.
- Slowly drive in or turn a crossing while paying attention to the visibility ahead and in the opposite driving lane.

Driving in Water or on Soft Ground

1. Do not submerge the front and rear axles, transmission, parking brake, or front and rear propeller shafts in water or mud. Avoid driving in water as much as possible.
2. If driving in water or mud is unavoidable, do not allow the machine to be submerged deeper than allowable depth (A) (up to the bottom of the axle housing). Reduce the allowable depth in case the river bed is feared to be rugged or water is flowing fast.
3. When driving/operating on muddy ground, mud can easily accumulate on the frame even if the frame is not heavily submerged in mud. Check regularly and clean as necessary.



M4GB-04-003

IMPORTANT: If the axles, parking brake, transmission, etc. should become submerged, they must be reconditioned immediately, otherwise the parking brake may become inoperable, inner gears may wear excessively, or the machine may become damaged. Contact your nearest HITACHI dealer.

 **NOTE:** After operation is complete, be sure to wash and lubricate all arrears which were submerged.

DRIVING THE MACHINE

PRECAUTIONS FOR DRIVING ON SLOPES

- IMPORTANT:**
- **Never allow the machine to descend a slope with the forward/reverse selector lever in neutral (N). Failure to do so will not only cause the engine braking to malfunction but also create the causes of various machine troubles.**
 - **When descending a slope, use engine braking. Apply the brakes only when absolutely required. If the brake is continuously used while descending a slope, the brake temperature will increase, possibly decreasing the braking performance. If overheating of the brake system is recognized, immediately park the machine in a safe location. Restart and drive the machine only after the brake system is sufficiently cooled.**

When steering on a slope, lower the loader front to increase the machine stability. Do not steer on a steep slope. Failure to do so may possibly cause the machine to turn over.

When descending a slope, travel the machine in the slow drive gear range using sufficient engine braking.

In case the engine stalls on a slope, immediately step on the brake pedal as strongly as possible, lower the loader front to the ground and stop the machine. After moving the forward/reverse selector lever to neutral, restart the engine.

The parking brake is automatically applied when the engine stops. Turn the parking brake switch ON before restarting the engine.

- Before descending a slope, confirm that the brake system works normally by operating the brake pedal.
- In case the hydraulic oil and lubricant temperatures are low, the machine gradeability may decrease. Before climbing a steep slope, sufficiently perform the warm up operation of the machine.

DRIVING THE MACHINE

PRECAUTIONS TO BE TAKEN IF THE MACHINE FAILURE OCCURS

- Keep your presence of mind. While paying attention to the vehicles following you, slowly reduce the travel speed and park the machine on the road shoulder as closely to the shoulder edge as possible. Turn the parking brake switch ON to apply the parking brake. When any machine failure is recognized in a short tunnel, park the machine outside the tunnel as long as possible.
- Indicate using a sign that the vehicle is disabled. Unless a sign is used, collision with a following vehicle from behind may result. Be sure to indicate the sign of the disabled vehicle using one of the following methods.
 - Use a parking signboard.
 - Turn the hazard lights ON.
 - Use an emergency signal instrument (emergency signal light).
 - Use a red flag or light.
 - Tie a piece of cloth like a handkerchief to an easy-to-see place such as the door or the rear end of the machine.
- Check the failed section. If possible, repair the machine by yourself while ensuring safety and paying attention to the traffic conditions of other vehicles.



WARNING: Do not spill oil on the road surface. Failure to do so may cause the following vehicle to slide, possibly creating a serious accident.

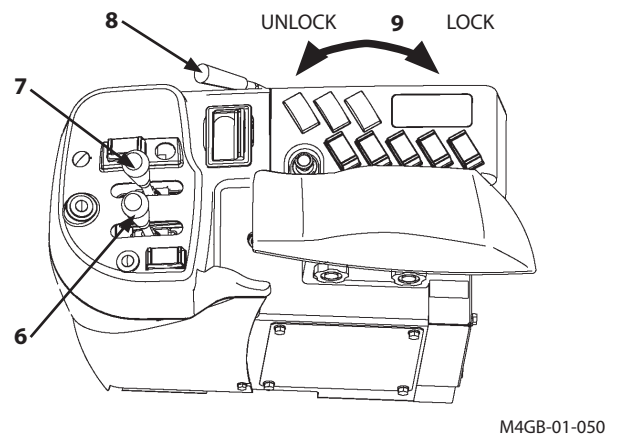
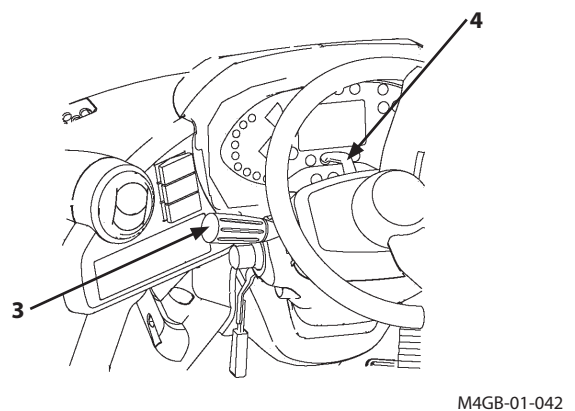
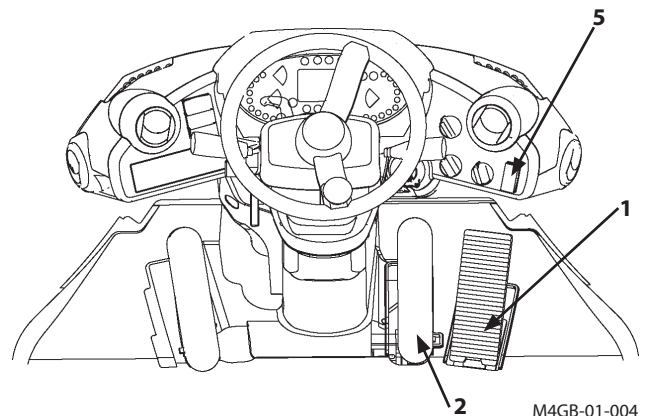
- In case the hydraulic oil leaks, immediately repair it. If the road surface is severely covered with oil, take the highest priority to notify the following vehicles of this danger. Then, recover the leaked oil as soon as possible.
- In case the repairing the machine by yourself is impossible, contact your nearest HITACHI dealer.
- Repair work in the tunnel is very dangerous. Avoid working outside the vehicle even simple tasks.

DRIVING THE MACHINE

STOP/PARKING

1. Avoid sudden deceleration. Smoothly reduce the drive speed. Release accelerator pedal (1) and step on brake pedal (2) to stop the machine.
2. Stop and park the machine on level surface. Lower the bucket to the ground.
3. Return forward/reverse lever (3) to neutral (N). Place neutral lock switch (4) to the LOCK position.
4. Press the ON position of parking brake switch (5).
5. After positioning the bucket level by operating bucket control lever (6) and lift arm control lever (7), lower the bucket to the ground.
6. Move the lock position (9) of front control lever lock (8).
7. Run the engine at slow idle speed to cool the engine for 5 minutes.

IMPORTANT: This machine is equipped with a turbocharged engine. Therefore if the engine is stopped without performing cooling down operation, the lubricant on the turbocharger bearing surfaces may desiccate due to the intense heat present, possibly causing damage to the turbocharger.



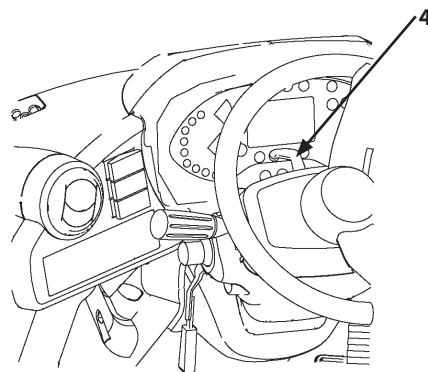
Stop and Parking Attitude

DRIVING THE MACHINE

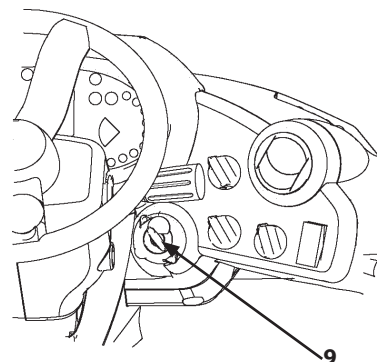
8. Turn the key switch (9) to OFF position (10) to stop the engine. Remove the key from the switch. Push neutral lever lock switch (4) down to the LOCK position.

IMPORTANT: If the key switch (9) is left in ACC position (11), the batteries may become discharged. Be sure to turn key switch to OFF position (10) before leaving the machine.

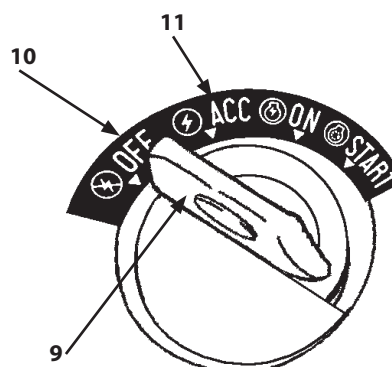
9. Before leaving the machine, close and lock all the windows, cab doors, and covers.



M4GB-01-042



M1GB-01-046



M1GB-01-089

DRIVING THE MACHINE

Emergency Evacuation

When the engine has stalled during driving:

The service brake will work when the brake pedal is stepped on since the pressurized oil in the accumulator acts on the brake. At this time, do not repeat to pat the brake pedal. The brake oil pressure is quickly reduced so that the brake becomes inoperable.

If the machine does not stop even if the brake pedal stepped on, press the parking brake switch ON side to stop the machine.

The steering wheel will become hard to rotate as the hydraulic system becomes inoperable.

In the event any symptom mentioned above occurs, immediately trace the cause of the problem. In case a complicate failure has occurred, consult your nearest Hitachi dealer.

DRIVING THE MACHINE

When the machine is impossible to drive forward and in reverse:

ZW310

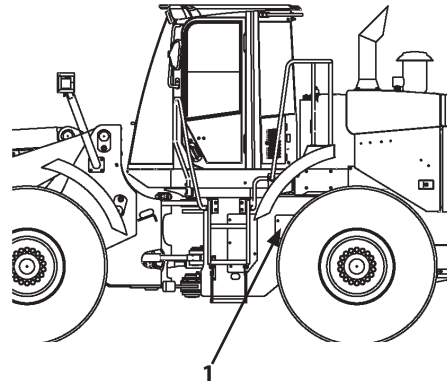
CAUTION: Before operating the emergency valve (spool), be sure to apply the parking brake so that the machine does not start moving.

Should the drive system become inoperable due to trouble in the electrical circuit such as a broken harness, the travel system can be resumed by the following procedures.

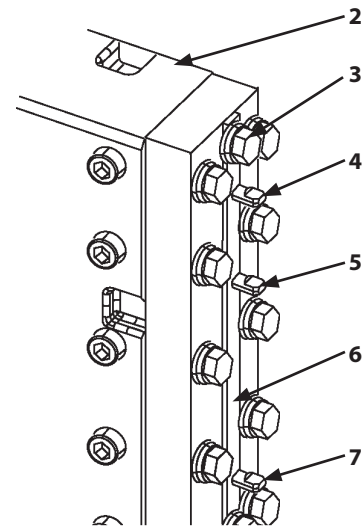
Procedures

1. Remove inspection cover (1) located at the frame left side.
2. Remove bolts (3) and lock plate (6) from the side surface of transmission control valve (2).
3. Press 2nd speed gear stage spool (7) 5 mm and rotate the spool 90° in either side. (When the spool is pressed, the machine is set to the drive mode.)
- 3.1 When traveling forward:
Press forward drive spool (4) 5 mm and rotate the spool 90° in either side in the same way as the 2nd speed gear stage spool is done.
- 3.2 When driving in reverse:
Press reverse drive spool (4) 5mm and rotate the spool 90° in either side in the same way as the forward travel spool is done. (When forward drive spool (4) is further rotated 90°, the spool returns to the original position [neutral].)
4. After setting either the forward drive spool or the reverse travel spool and the 2nd speed gear stage spool in the drive mode, start the engine.
5. Release the parking brake. As soon as the parking brake is released, the machine will start moving.
6. After moving the machine, return all spools (4, 5, and 7) to neutral, secure them in position with lock plate (6) and bolts (3).

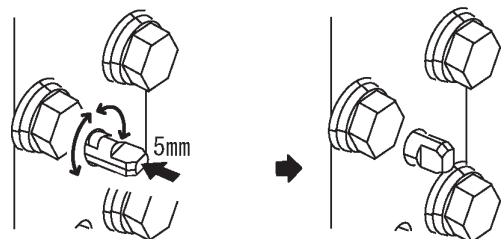
IMPORTANT: Never set both forward and reverse drive spools (4 and 5) in the drive mode at the same time. Failure to do so may result in damage to the clutch.



M4GB-04-005



M1GB-04-006



M1GB-04-007

OPERATING THE MACHINE

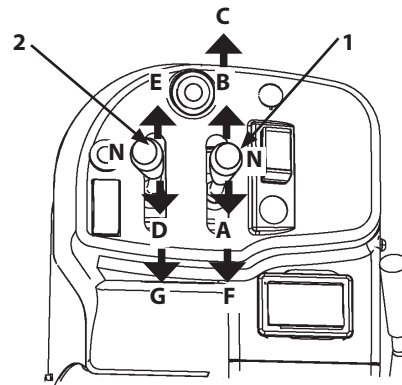
LOADER CONTROL LEVER

Finger Type

Is used to operate the lift arm and/or bucket.

Lift Arm Control Lever (1)

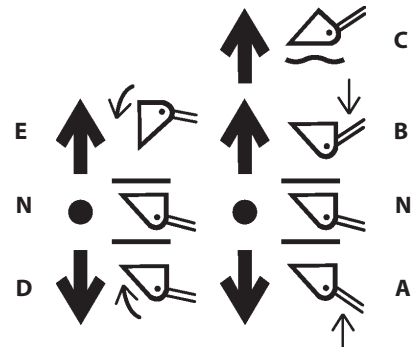
- (C) Float: The lift arm free falls and can be moved as loads are applied.
- (B) Lift arm Lower
- (N) Hold: The lift arm is stopped and held in that position.
- (A) Lift arm Raise
- (F) Detent: The lift arm is held in the raised position



M4GB-01-043

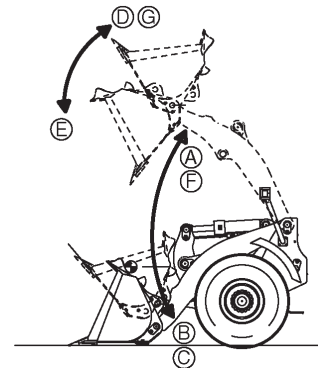
Bucket Control Lever (2)

- (E) Bucket Dump: The bucket is tilted forward to dump the bucket load.
- (N) Hold: The bucket is stopped and held in that position.
- (D) Bucket Tilt: The bucket is tilted back, taking the transportation attitude.
- (G) Detent: When the bucket control lever is moved from the bucket dump position to the bucket tilt position, the bucket control lever is maintained in this position.



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- NOTE:**
- When lift arm control lever (1) is pulled further from the RAISE position (A), the lever is held in that position (F). Then, as soon as the lift arm is raised up to the position set by the arm kick out system, the arm is automatically returned to the HOLD position (N).
 - After dumping the bucket, when bucket control lever (2) is pulled further from the TILT position (D), the lever is held in that position (G). Then, as soon as the bucket is tilted up to the position set by the bucket auto-leveler, the bucket is automatically returned to the HOLD position (N).

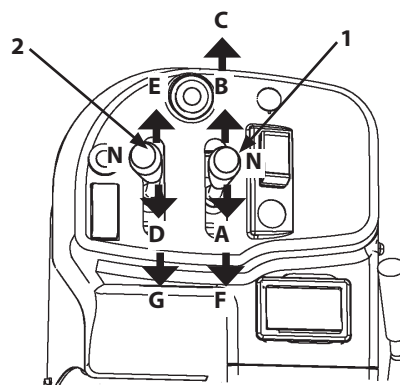


M4GB-01-073

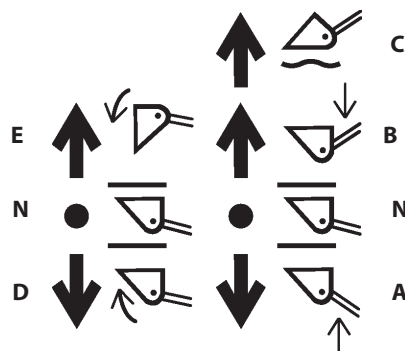
OPERATING THE MACHINE

- When lift arm control lever (1) is pushed further from the LOWER position (B) to the FLOAT position (C), the lift arm is stopped in that position soon after the lift arm reaches the position set by the lift arm auto-leveler system. Then, the lever is automatically returned to the HOLD position (N). (Only machines equipped with the lift arm auto-leveler system)

 **NOTE:** When operating the machine with the lift arm held in the FLOAT position (C), first stop the lift arm in the float position. Then, again move the lift arm control lever to the FLOAT position (C) to allow the lift arm to come in contact with the ground.



M4GB-01-043



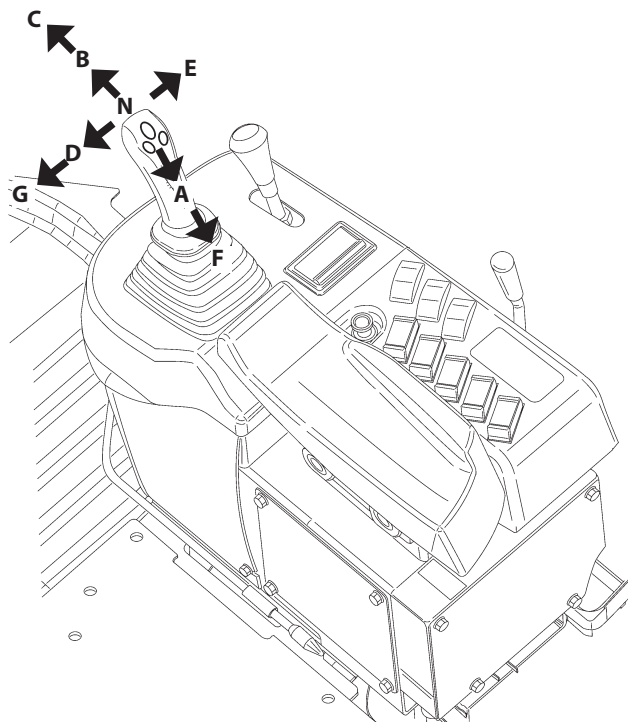
M4GB-01-072

OPERATING THE MACHINE

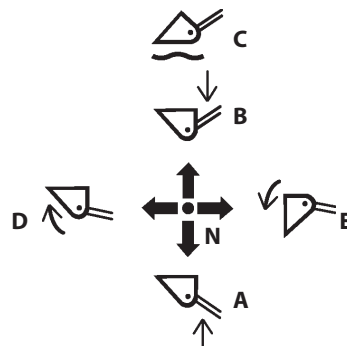
Multi-Function Type

Is used to operate the lift arm and the bucket.

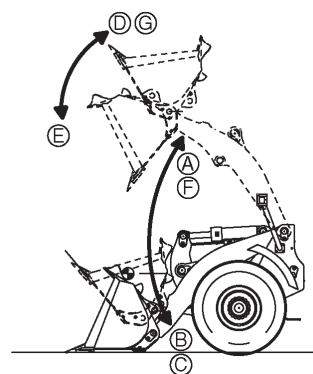
- (C) Float: The lift arm free falls and can be moved as loads are applied.
- (B) Lift arm Lower
- (N) Hold: The lift arm is stopped and held in that position.
- (A) Lift arm Raise
- (F) Detent: The lift arm is held in the raised position.
- (G) Detent: When the lever is moved from the bucket dump position to the bucket tilt position, the lever is held in that position.
- (D) Bucket Tilt
- (N) Hold
- (E) Bucket Dump



M4GB-01-008



M4GB-01-074



M4GB-01-073

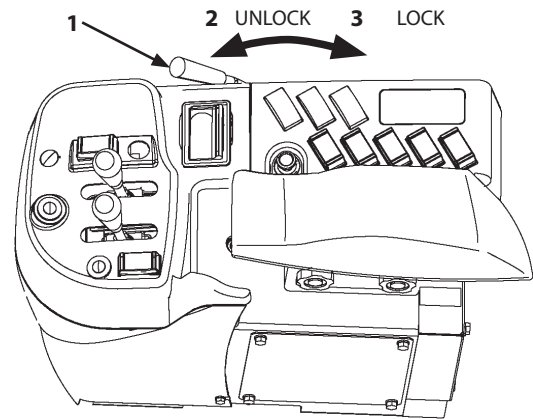
OPERATING THE MACHINE

FRONT CONTROL LEVER LOCK

⚠ WARNING: When locking the front control lever, securely push front control lever lock (1) to the LOCK position (3). Unless front control lever lock (1) is fully moved to the LOCK position, the front control lever is not locked, possibly creating a hazardous situation.

Before leaving the operator's seat, be sure to stop the engine. Then, move front control lever lock (1) to the LOCK position (3).

After completing operation of the machine or transporting the machine, be sure to move front control lever lock (1) to the LOCK position (3).



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Front control lever lock (1) is provided to prevent the machine is unexpectedly operated even if the operator mistakenly comes in contact with the bucket and/or lift arm control lever when getting on or off the machine. When the lever lock is placed to position (2), the front control lever becomes operable.

Front Control Lever Lock Operation

- When leaving the operator's seat:
 1. Park the machine on solid level ground. Lower the bucket to the ground. Return all levers to neutral. Stop the engine.
 2. Pull lock side (3) of front control lever lock (1) downward to move the front control lever lock to the LOCK position.
- When starting operation:
- Before starting operation:

Before starting operation, check that front control lever lock (1) is in the UNLOCK position (2).

OPERATING THE MACHINE

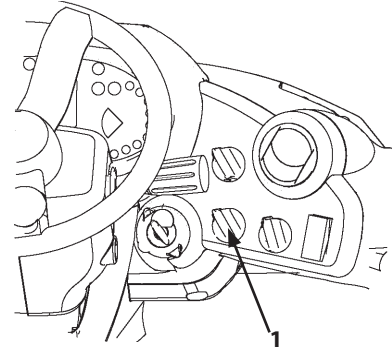
CLUTCH CUT POSITION SWITCH

When performing excavation and scooping work or loading work, operate clutch cut-off switch (1) to the desired position (S, N, or D). Use this switch to concentrate the engine power for excavation or to increase lift arm-raising speed.

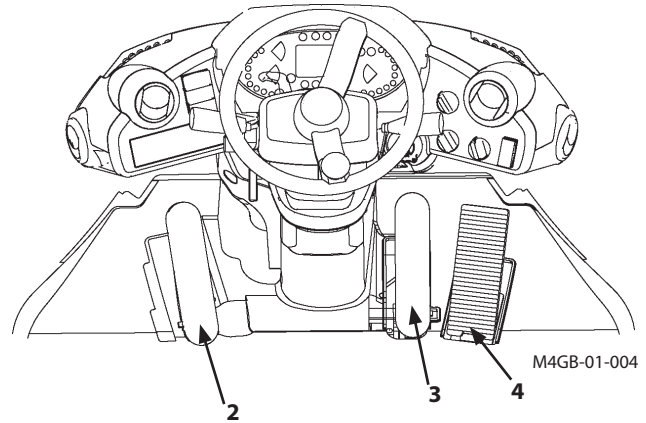
- S, N, or D Position (with clutch disengaged)
When either the right (3) or left brake pedal (2) is pressed, the transmission is moved to neutral so that the braking force is applied without transmitting driving force to the wheels.
 - S: The clutch is cut-off at a small stroke of the brake pedal. (Suitable to loading operation on flat ground)
 - N: The clutch is cut-off at a medium stroke of the brake pedal. (Suitable to operation on gentle slopes)
 - D: The clutch is cut-off at a large stroke of the brake pedal. (Suitable to operation on steep slopes)

- OFF position (with clutch engaged)
When either right (3) or left brake pedal (2) is pressed, the braking force is transmitted to the wheels without disconnecting the driving force.

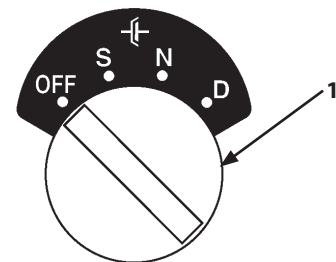
 **NOTE:** When starting to drive the machine on a slope, set the clutch cut position switch (1) to the OFF position (with clutch engaged). While pressing either right (3) or left brake pedal (2), depress the accelerator pedal (4). Then, slowly release either right (3) or left brake pedal (2), so that the machine can smoothly begin moving on a slope.



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M4GB-01-004

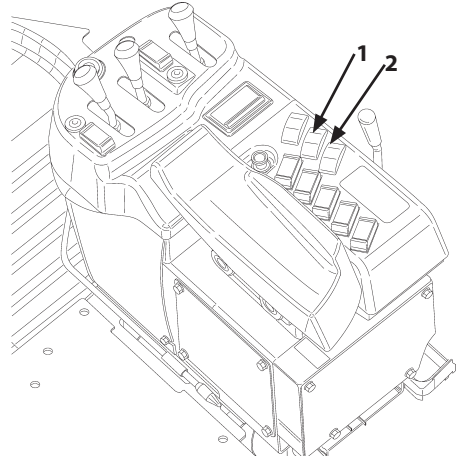


M4GB-01-051

OPERATING THE MACHINE

ADJUSTMENT OF LOADER FRONT

The bucket can be stopped at the desired height by means of lift optional arm auto leveler downward set switch (1) and arm auto leveler upward set switch (2), and at the desired digging angle by means of the bucket auto leveler. Adjust the bucket auto stop position according to the working requirements.



M4GB-01-007

OPERATING THE MACHINE

LIFT ARM AUTO LEVER SWITCH (Optional)

Downward Set/Upward Set

Switches (1), (2) stops the downward or upward lift arm at the specified height.

IMPORTANT:

- When the lift arm auto leveler switch is activated with the bucket loaded, the arm may be stopped at a position lower than the preset position.
- Lowering lift arm stop position cannot be preset at a position higher than the arm level position.
- Raising arm stop position cannot be preset at a position lower than the arm level position.

Lift Arm Auto Leveler Function

Switch

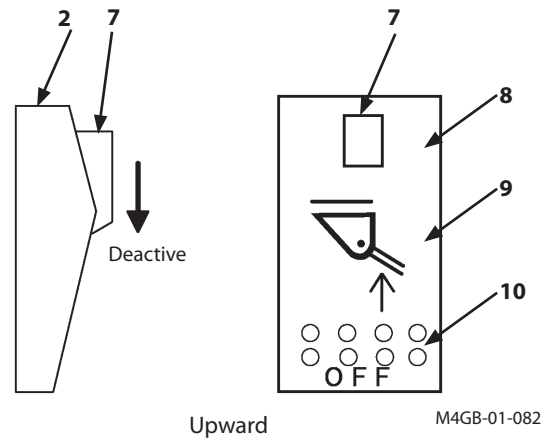
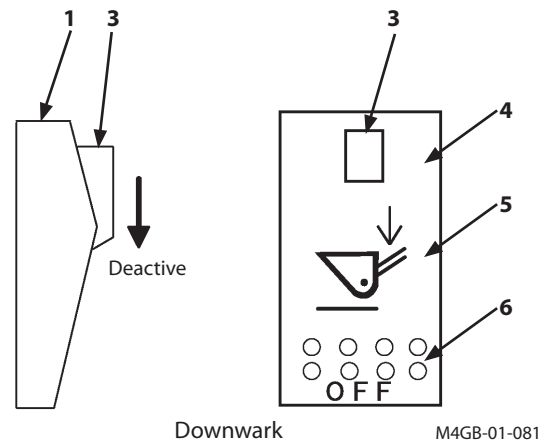
- SET (4 and 8): Presets the lift arm stop position.
ON (5 and 9): Stops the lowering lift arm at the specified height.
OFF (6 and 10): Deactivate the lift arm auto leveler function.

Presetting of lowering lift arm stop position

1. Hold the lift arm in the position at which the lowering lift arm is desired to stop.
2. While deactivating lock switch (3) on lift arm auto leveler switch (lowering) (1), press SET side (4).

Presetting of raising lift arm stop position

1. Hold the lift arm in the position at which the raising lift arm is desired to stop.
2. While deactivating lock switch (7) on lift arm auto leveler switch (raising) (2), press SET side (8).



OPERATING THE MACHINE

ADJUSTMENT OF BUCKET AUTO LEVELER

⚠ WARNING: Pay attention to safety to avoid personal injury and/or death when adjusting the bucket auto leveler. Stop the engine. Lower the loader front attachment to the ground to release the remaining pressure the hydraulic circuits. Apply the parking brake to prevent the machine from moving unexpectedly. Wedge the wheels with blocks. Keep bystanders away from the vicinity of the machine.

The bucket auto leveler automatically stops the bucket movement at the preset digging angle. (When the machine is shipped from the factory, the bucket positioner is preset so that the bucket is stopped with the bucket bottom parallel with the road surface.)

For example, after discharging the handling materials onto a truck or into a hopper, when bucket control lever (4) is placed to detent position (G), the lever is held in that position. Then, when the bucket is returned to the preset angle position, the bucket is automatically stopped and the lever is returned to neutral (N).

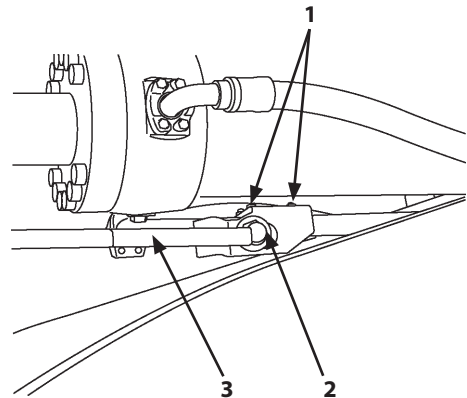
The bucket auto leveler is preset so that when the bucket bottom becomes parallel with the road surface, the bucket is stopped. Nevertheless, when required to tilt the bucket forward or backward more than level position, adjust the bucket auto leveler by moving the mounting position of the proximity switch.

Adjustment Procedures

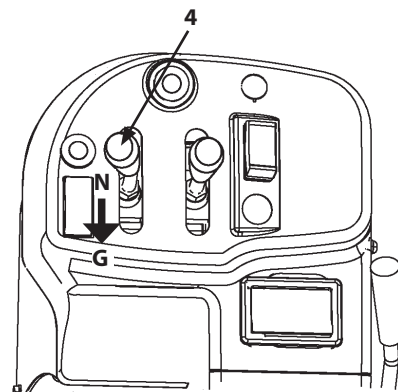
1. After moving the bucket to the desired digging angle, stop the engine.

IMPORTANT: Do not operate the machine with the bucket dumped more than 10°. Avoid applying great towing force to the bucket cutting edge.

2. Loosen lock nut (2) tightening the proximity switch to the base machine. Slide the end edge of positioner (3) up to the center of the sensitive area (orange color). Then, tighten lock nut (2).
3. When required to set the bucket digging angle more than the angle set at above step 2, loosen nuts for U bolts (1) (2 used). After moving the bracket, retighten the nuts.
4. After adjustment start the engine. Check that the bucket can be stopped at the preset angle position.



M4GB-05-001



M4GB-01-043

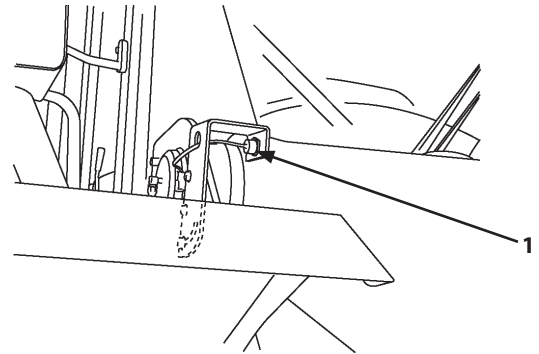
OPERATING THE MACHINE

ADJUSTMENT OF LIFT ARM KICK OUT

⚠ WARNING: Pay attention to safety to avoid personal injury and/or death when adjusting the lift arm kick out system. Stop the engine. Lower the loader front attachment to the ground to release the remaining pressure the hydraulic circuits. Apply the parking brake to prevent the machine from moving unexpectedly. Wedge the wheels with blocks. Keep bystanders away from the vicinity of the machine.

The arm kick out system automatically stops the arm at the preset height when raising the arm. (When shipping the machine from the factory, the kick out system is adjusted so that the bucket is stopped at a slightly lower position than the maximum height.)

Adjust the arm stop position by moving the position of proximity switch (1). When adjustment is required, consult your nearest Hitachi dealer.



M4GB-05-002

ADJUSTMENT OF LIFT ARM AUTO LEVELER (OPTIONAL)

⚠ WARNING: Pay attention to safety to avoid personal injury and/or death when adjusting the arm auto leveler. Stop the engine. Lower the loader front attachment to the ground to release the pressure remaining the hydraulic circuits. Apply the parking brake to prevent the machine from moving unexpectedly. Wedge the wheels with blocks. Keep bystanders away from the vicinity of the machine.

The lift arm auto leveler automatically stops the lift arm at the preset height when lowering the lift arm. When the machine is engaged in the loading/unloading work under the limited conditions, adjust the lift arm stop position so that the machine can be more efficiently operated. Contact your nearest Hitachi dealer when adjustment is required.

OPERATING THE MACHINE

BEFORE OPERATION

 **WARNING:** Be sure to install only authorized buckets and other work tools on the front attachment. Never modify or increase the capacity of the bucket or other work tools without first receiving authorization. Do not overload the machine by installing additional counterweights. Failure to do so may result in personal injury and/or machine trouble.

PRECAUTIONS FOR OPERATION

 **WARNING:** Confirm work site safety before starting any operations. Especially be sure to observe the points below:

- Use the machine equipped with FOPS and ROPS if the machine is to be operated in the areas where the possibility of falling stones exists.
- If operation on soft ground is required, operated the machine only after reinforcing the ground.

• Be sure to wear close fitting clothing and safety equipment appropriate for the job, such as a hardhat, etc. when operating the machine.

• Clear all persons and obstacles away from the area of operation and machine movement. Always be aware of the area around the machine while operating.

ENSURE SAFETY WHEN OPERATING ON ROAD SHOULDERS

 **CAUTION:** Reinforce the ground before operating the machine on soft road shoulders.

OPERATING THE MACHINE

AVOID OVERLOADING



WARNING: Do not penetrate the bucket into piles of soil and/or gravel at fast travel speed to avoid personal accidents. Avoid excavating or scooping loads when the machine is articulated, which could possibly cause the machine to turn over.

AVOID RAPID STEERING CHANGES AND/OR SUDDEN BRAKING



WARNING: Always maintain a flat work site surface. Avoid rapid steering changes and sudden braking while raising the lift arm with the bucket loaded to prevent the machine from turning over.

OPERATING THE MACHINE

EXCAVATION

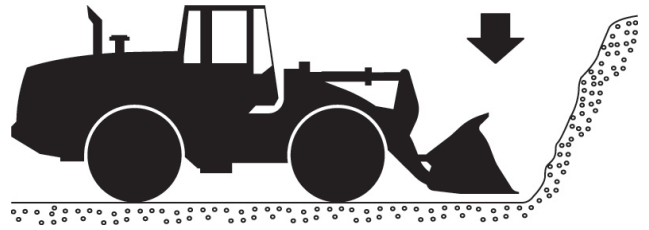
Loading Accumulated Soil

Scoop load while driving the machine forward as described below.

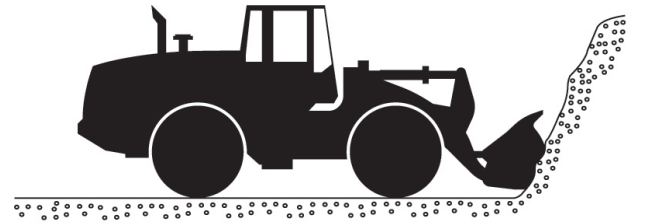
As load increases the wheels begin to slip, slightly raise the bucket to reduce the load.

1. Level the bucket with the surface of the ground. Penetrate the bucket into the accumulated soil while driving the machine forward.
2. After the bucket has sufficiently penetrated the soil, raise the lift arm while driving the machine forward further and occasionally tilt the bucket back to fill the bucket.
3. If it is difficult to penetrate the soil with the bucket, move the bucket back and forth and the bucket teeth up and down.
4. Drive the machine with the bucket tilted backward fully and held at the lowest possible position.

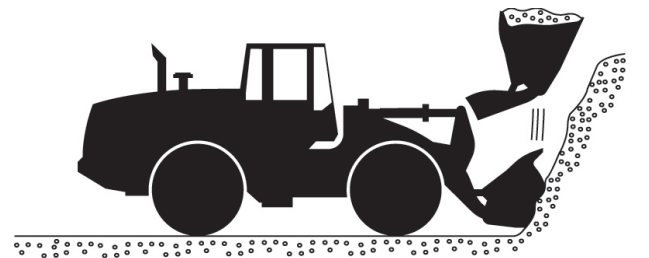
IMPORTANT: Avoid operating the machine with the front wheels raised off the ground. Machine traction force is reduced and excessive loads are applied to the undercarriage.



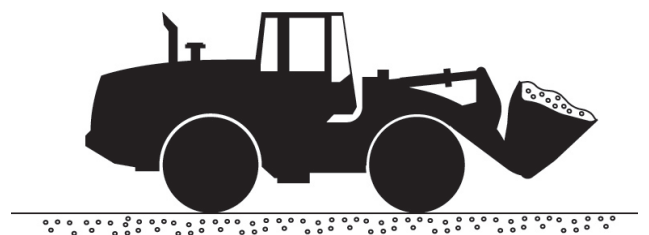
M4GB-05-003



M4GB-05-004



M4GB-05-005



M4GB-05-006

OPERATING THE MACHINE

DIGGING AND LOADING LEVEL GROUND

IMPORTANT: While excavating with the bucket or fork, never apply excessive traction force to the tooth tips with the bucket or fork tilted more than 10 degrees. Failure to do so may result in cracking or damaging the work tools.

Slightly position the bucket teeth downward (0 to 10 degrees) and dig the ground while driving the machine forward as described below. Always take care not to apply loads to only one side of the bucket.

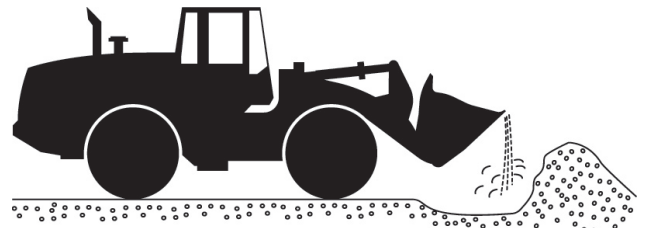
1. Position the bucket teeth slightly downward.
2. While driving the machine forward, tilt the bucket so that the ground surface is gradually separated.
3. Adjust the digging depth by operating the lift arm.
4. Drive the machine with the bucket tilted backward fully and held at the lowest possible position.



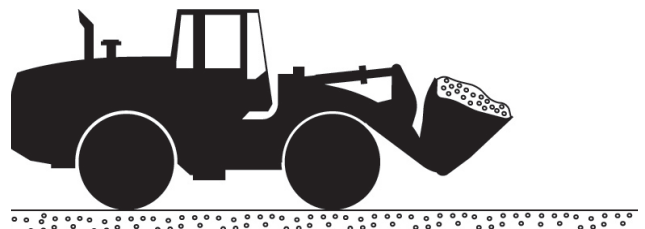
M4GB-05-007



M4GB-05-008



M4GB-05-009



M4GB-05-010

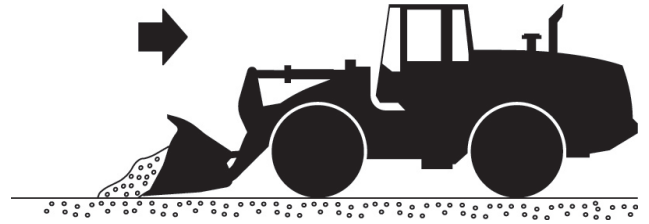
OPERATING THE MACHINE

GRADING

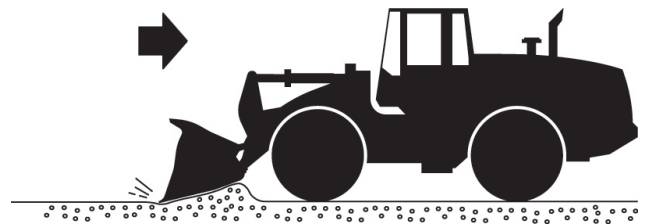
⚠ WARNING: When operating the ride control system equipped machine with the front attachment control lever in the float position when performing such works as soil scooping, land grading, or snow removal, be sure to turn the ride control switch OFF. Failure to do so may allow the ride control system to operate so that the front attachment may automatically move up and down.

IMPORATNT: Be sure to perform grading work while driving the machine in reverse. Failure to do so may result in overloading the machine.

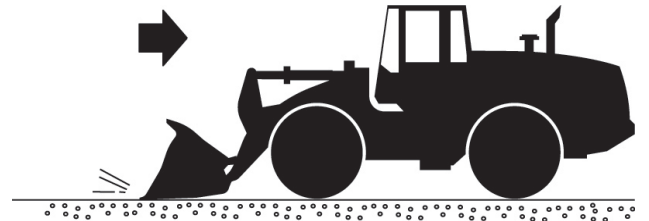
1. After filling soil into the bucket, dump the bucket gradually to disperse soil while driving the machine in reverse.
2. Lower the bucket teeth tips onto the ground. Grade and level the ground surface while driving the machine in reverse with the bucket teeth tips dragging
3. After filling the bucket with a load such as soil, position the bucket level with the ground surface. Finish the ground surface utilizing the bucket weight. At this time, drive the machine in reverse with the lift arm held in the FLOAT position.



M4GB-05-011



M4GB-05-012



M4GB-05-013

OPERATING THE MACHINE

LOADING

IMPORTANT: Always maintain the a clean driving surface. Cleaning of materials such as soil spilled on the driving surface will reduce wear and/or damage on tires.

IMPORTANT: When carrying loads in the bucket, pay attention to the travel road surface conditions. Drive the machine at such speed so that the load will not spill out of the bucket, while positioning the bucket at the lowest possible height.

IMPORTANT: Refrain from allowing the bucket to come in contact with the bucket stopper as much as possible when removing adhered material, like clay, from the bucket. Failure to do so may result in damage to the front attachment. Remove material stuck to the bucket by washing with water.

Loading is dumping the handling material onto a truck or into a hopper. Loading work is performed in either the load and carrying method or loader and dump truck method. Select either method depending on the work site conditions while taking the merits in cost and safety into account.

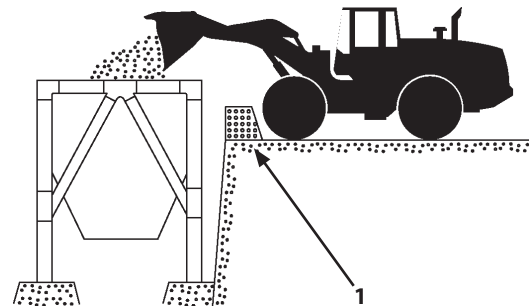
Load and Carrying Method

A wheel loader performs work process of loading, carrying, and dumping in sequence. Generally, when the carrying distance is 30 to 100 m, this method is employed. Make an up-grade slope of approx. 3 ° around a hopper when dumping into the hopper. Be sure to provide a level area 10 m apart from the dumping port and tire stopper (1) at the dumping port edge. Automatic reduction in travel speed will assist operator's braking operation effort.

WARNING: Be sure to provide tire stopper (1) in front of the dumping port.

WARNING: Before raising the lift arm, slightly tilt the bucket back and forth to stabilize the load in the bucket to avoid personal injury or damage to the machine due to falling of the load.

WARNING: When approaching the machine to the dumping port with the lift arm raised to a high enough position, slowly drive the machine. Never rapidly operate the machine to prevent turning over accident.



M4GB-05-014

OPERATING THE MACHINE

Loader and Dump Truck Combination Method

A loader carries out loading, and carrying and dumping is carried out by a dump truck. Either V- or I-shape loading method is employed in this method. Depending on the work site conditions encountered and matching with available trucks, select the most efficient method.

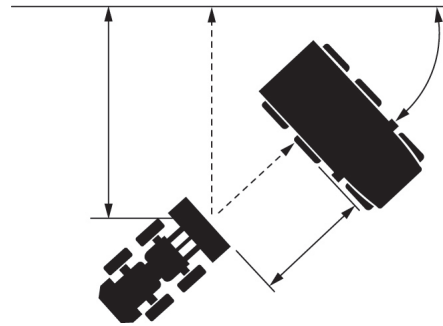


WARNING:

- **Always maintain a level work site surface. Avoid rapid swing and/or sudden braking while raising the lift arm with the bucket loaded to prevent the machine from tipping over.**
- **Do not penetrate the bucket into a loading face at fast travel speeds, possibly resulting in personal accident.**

V-Shape Loading

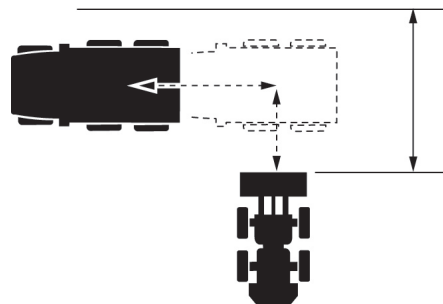
1. Park a dump truck in a spot located at approx. 60° angle toward the face of loading by the wheel loader. After loading material, travel the wheel loader in reverse and turns its direction so that the wheel loader faces the parked dump truck at a right angle. Then, travel forward to carry material onto the dump truck.
2. Position the wheel loader so that the material can be loaded around the center of the dump body. In case the dump body is longer than twice the bucket width, load from the front to rear position of the dump body in order.
3. When dumping sticky material such as clay, move the bucket lever back and forth to hit the bucket to the stoppers. Take a steering angle as small as possible to operate the machine efficiently.
4. Before raising the lift arm to the maximum height with the bucket full, vibrate the bucket on the ground to stabilize the material in the bucket to prevent the material from spilling off the backside of the bucket.



M4GB-05-15

I-Shape Loading

Park a dump truck in a direction parallel to the loading face. After loading material into the bucket, travel the wheel loader straight in reverse. Then, move a dump truck to a spot between the loading face and the wheel loader. Travel the wheel loader forward to load material onto the dump body. Loading times become shorter using this loading method, reducing the total working cycle time and increasing work efficiency. Position the machine down the wind as much as possible. The engine will not only inhale as little dust as possible but also operator's eyes will be protected from being contaminated.



M4GB-05-16

OPERATING THE MACHINE

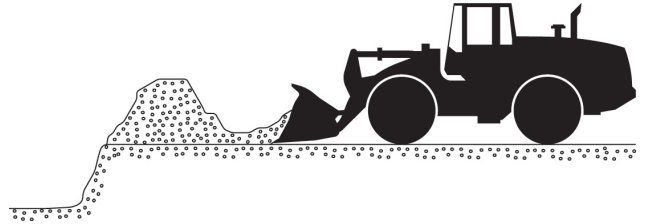
DOZING

Dozing stands for a working method performed by a wheel loader using the wheel loader bucket in place of the bulldozer blade. This operation method is employed when reclaiming land or dumping material into a hopper. Set the bucket bottom parallel with the ground surface and drive the wheel loader forward.

IMPORTANT: Never attempt to forcibly push piled material higher than the bucket capacity. Premature wear of the tires due to slipping and/or waste of fuel may result.

IMPORTANT: Do not perform dozing with the bucket dumped. Abnormal excessive stress will be reduced on the front attachment.

IMPORTANT: Never apply great traction force to the cutting edge with the cutting edge tilted forward more than 10°. Failure to obey so may result in damage such as cracks to the working tools and front attachment.



M4GB-05-017

SCOOPING

⚠ WARNING: Do not allow the machine to engage in piling up material on a soft ground. It is important to be aware that steering operation on a soft ground may easily cause tipping over of the machine.

Take care not to touch the ground with the counterweight while engaging in scooping work. Beware of tipping the machine over, as the machine is easy to lose balance while scooping.



M4GB-05-018

OPERATING THE MACHINE

REMOVING SNOW

⚠ WARNING: When operating the ride control system equipped machine with the front attachment control lever in the float position to perform such works as soil scooping, land grading, or snow removal, be sure to turn the ride control switch OFF. Failure to do so may allow the ride control system to operate so that the front attachment may automatically move up and down.

⚠ CAUTION: Remove snow in the same method as employed in general loading work. However, pay attention to slippage of tires and obstacles covered with snow.



M4GB-05-019

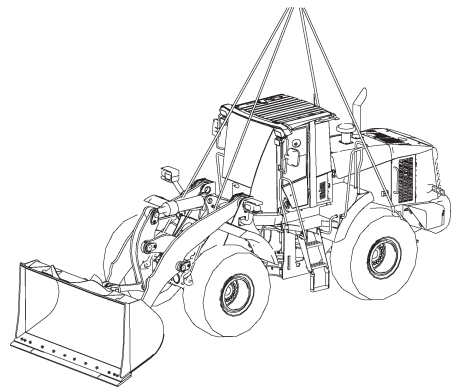
Precautions for removing snow

- Avoid sudden starting and stopping as well as rapid steering of the machine.
- Use tire chains on all four wheels.
- Pay attention to the presence of the utility facilities such as a fire hydrant, a manhole, edge stones, roadside drains, etc.

LIFTING WHEEL LOADER

⚠ WARNING: Be sure to use lifting tools (optional) and set the pilot control shut-off lever in the LOCK position. Never allow any person to ride on the machine to be lifted. Never allow any person to enter below the lifted machine. Before fully lifting the machine above the ground, check that the hooks are securely attached to the machine and the machine is well balanced while lifting the machine slightly above the ground. Refer to the "LIFTING MACHINE" in the TRANSPORTING section.

Lifting work of the machine will become necessary when loading the machine onto a ship or truck for repairing and/or transporting.



M4GB-05-020

OPERATING THE MACHINE

PRECAUTIONS FOR AFTER OPERATIONS

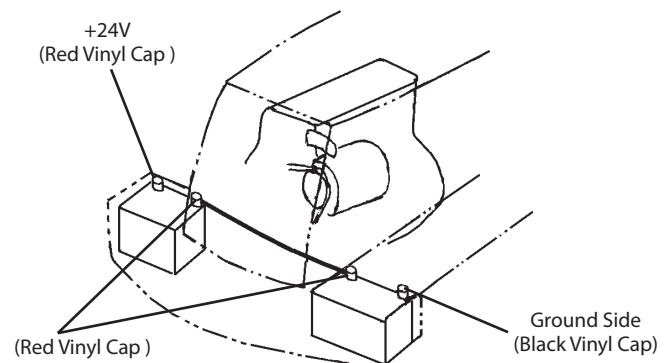
1. After finishing the day's operation, drive the machine to a firm, level ground where no possibility of falling stones, ground collapse, or floods are present.
Park the machine referring to the "PARKING THE MACHINE" in the "DRIVING THE MACHINE" section.
2. Refill the fuel tank.
3. Clean the machine.
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 after the coolant has been drained.
5. Maintenance for long term machine storage after engaging in snow removal
Anti-freeze agents such as salt (sodium chloride or calcium chloride) are scattered on snow roads. When the machine is stored for a long time after engaging in snow removal work, perform the following maintenance to protect the machine from being corroded and/or damaged by salt.
 - 5.1 Clean the machine thoroughly. Clean each cylinder rod (plated areas) and the radiator with extra care.

IMPORTANT: Take care not to spray water directly to electrical parts except for kinds of lights such as the headlights, work lights, and turn signal lights.

- 5.2 After positioning the machine for storage, carefully coat each cylinder rod (plated areas) and the control valve spools with rust-preventive oil.
- 5.3 Lubricate all pins while referring to A Greasing Section in the Maintenance Guide List.

⚠ CAUTION: When removing the batteries, first disconnect the ground cable from the battery terminal (covered with a black vinyl cap).

- 5.4 Remove the batteries and store them in a dry cool place. When the batteries are not removed, disconnect the ground terminal cable.



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TRANSPORTING

TRANSPORTING BY ROAD

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

- For transporting using a trailer, check the width, height, length and weight of the trailer when the machine is loaded.
- Investigate beforehand the conditions of the route to be traveled, such as dimensional limits, weight limits, and traffic regulations. In some cases, getting approval from the authority concerned, disassembling the machine to bring it within dimensional limits or weight limits of local regulations may become necessary.

TRANSPORTING BY TRAILER

Provide an appropriate trailer while referring to the weight and dimensions shown in the specifications. When transporting the machine within the weight and dimensions shown in the specifications by a trailer, it is possible to transport the machine without disassembling.

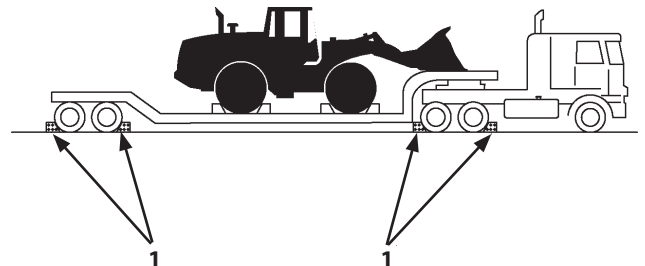
LOADING/UNLOADING ON TRAILER

⚠ WARNING: Be sure to use a loading dock or a ramp for loading/unloading.

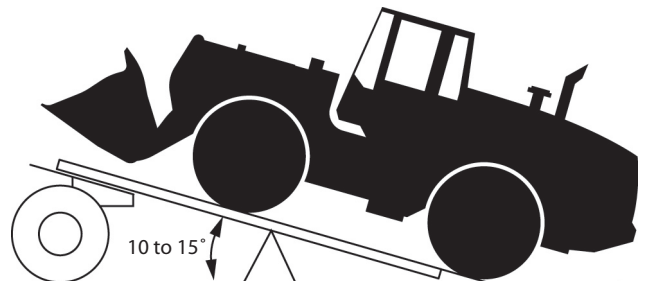
Always load and unload the machine on a firm, level surface.

Ramp/Loading Dock:

1. Before loading, thoroughly clean the ramps, loading dock and flatbed. Dirty ramps, loading docks, and flatbeds with oil, mud, or ice on them are slippery and dangerous.
2. Place blocks (1) against the trailer wheels so that the trailer does not move while using a ramp or loading dock.
3. Ramps must be sufficient in width, length, and strength. Be sure that the incline of the ramp is less than 15 degrees.
4. Loading docks must be sufficient in width and strength to support the machine and have an incline of less than 15 degrees.



M4GB-06-001



M4GB-06-002

TRANSPORTING

Loading/Unloading

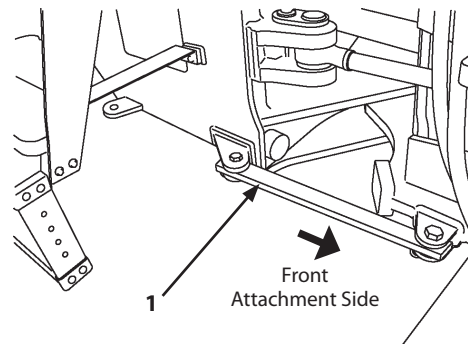


CAUTION: Pay attention to the following points.

- **Steering on a ramp is hazardous. Never attempt to steer the machine on a ramp. Personal injury or death may result due to loss of machine stability. If the travel direction must be changed on a slope, move back the machine to the flat ground of flat-bed. Then, after changing the travel direction, begin to drive again.**
- **Be sure to turn the travel F-N-R shift switch to the LOW position.**

Loading

1. Load the machine so that the machine width center aligns with the trailer deck width center.
2. Slowly drive the machine on the ramp.
3. Lower the bucket onto the trailer deck.
4. Stop the engine. Remove the key from the key switch.
5. Operate the loader control lever several strokes to relieve pressure in the cylinders.
6. Place the pilot control shut-off lever in the LOCK position.
7. Securely close the windows and cab door to protect the cab from rain. Put a cover over the opening of the exhaust pipe.
8. Install the articulation lock bar (1) to prevent the machine from articulating.



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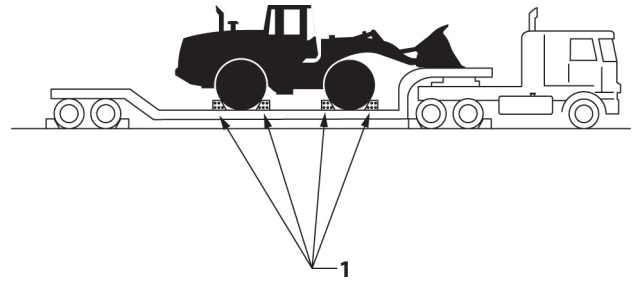
TRANSPORTING

TRANSPORTING

⚠ CAUTION: Securely fasten the machine to the trailer flatbed with wire ropes.

The machine may move back and forth and/or laterally during transportation.

1. Apply the parking brake. Slowly rest the bucket on the trailer deck or load-carrying platform.
2. Wedge wooden blocks (1) behind each tire to fasten the machine in position.
3. Securely fasten the base machine and the front attachment to the load-carrying platform with sufficient wire ropes.



M4GB-06-003

TRANSPORTING

TRANSPORTING WHEEL LOADER (URGENT SITUATION)

The following procedures shall only be applied to cases when urgently moving the wheel loader a short distance is required. When required to transport the wheel loader long distance, use a trailer.

Precautions for Self-Traveling

Avoid driving the wheel loader long distances at high-speed as much as possible as it may overheat the tires, possibly resulting in premature tire damage and/or wear. Keep the following points in mind when transporting the wheel loader by self-traveling.

- Observe the rules and regulations associated to this wheel loader, and travel carefully.
- Recommended tire pressures and traveling speeds may vary depending on the type of tires used and the road conditions. Consult your nearest Hitachi dealer.
- Check the tire pressure before self-traveling when the tires are cool.
- After driving the wheel loader for one hour, allow the wheel loader to park for 30 minutes and meanwhile, check the tires and every part of the machine for any abnormality, and also check the oil and coolant levels.
- Keep the bucket empty when traveling.
- Do not drive the machine with the tires containing calcium chloride or dry ballast, which accelerate heating.

TRANSPORTING

Precautions for Towing

⚠ WARNING: Never attempt to tow the machine if the brake system is in need of repair. Ask your nearest Hitachi dealer to repair the machine. Operate the machine only after repairs is completed.

Avoid towing the machine as much as possible. If the machine is to be unavoidably towed, beware of the following points.

IMPORTANT: Do not tow the machine with the parking brake applied. Damage to the parking brake may result.

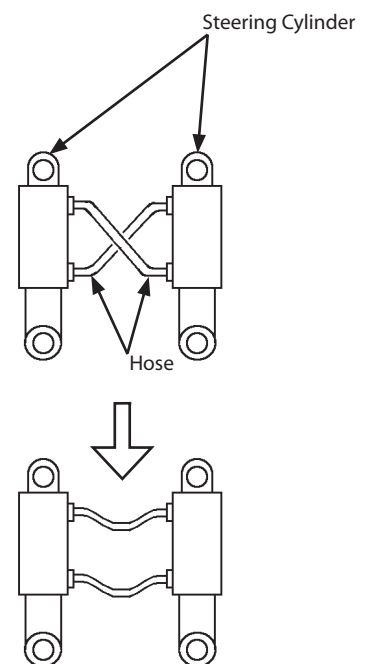
- **When the engine is operable:**

Keep the engine running so that the steering and brake system are operable. Release the parking brake. Disconnect the front and rear propeller shafts. Then tow the machine.

- **When the engine does not operate:**

Removing the propeller shaft

- Since the parking brake cannot be released, manually release the parking brake. Then, disconnect the front and rear propeller shafts. At this time, wedge wheel stoppers to all tires to prevent the machine from moving.
- The steering cylinders become inoperable. Switch the hydraulic hose connections between the rod end side and the head end side on one steering cylinder. Then, the steering cylinders become free to move.



M4GB-06-007

TRANSPORTING

Releasing Parking Brake

 **WARNING:** After the parking brake is released, the machine can not be stopped using the brake system, possibly creating a dangerous situation. Before releasing the parking brake or connecting the brake system, be sure to lock tires with wheel stoppers.

 **CAUTION:** As soon as the machine towing is complete, apply the parking brake. Use towing only when moving the machine to a place where the machine is inspected and/or serviced. Avoid towing to move the machine over a long distance.

The parking brake is manually released when the parking brake becomes impossible to be released even if the parking brake switch is operated due to occurrence of any abnormality or trouble in the brake system such as a pump failure.

TRANSPORTING

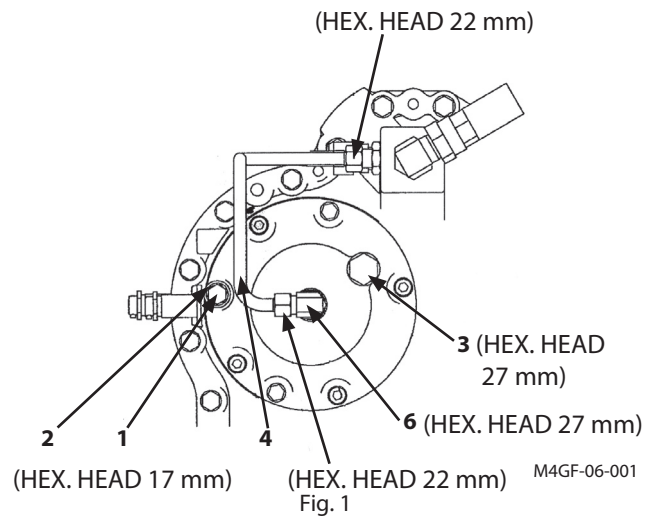
Procedures

ZW180

If the parking brake cannot be released with the parking brake knob due to a defective pump or for any other reason, manually move the brake piston by using the parking brake release bolt to release the parking brake.

Manually releasing the parking brake.

1. Remove Hydraulic oil tank cap.
2. Remove the plug (3) from the center of the cap.
3. Remove the both ends of the tube (4), oil is prevented from flowing out.
4. Remove the elbow (6).
5. Remove the orifice (7).
6. Remove the parking brake release bolt (1) and plane washer (2) from the parking brake cap of the transmission.

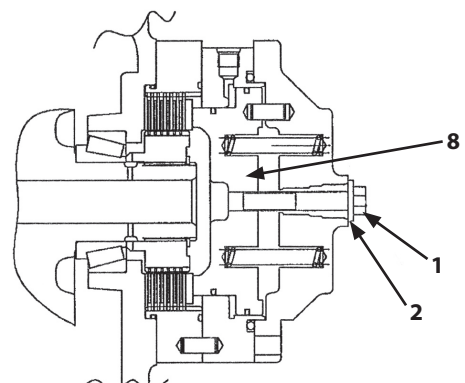
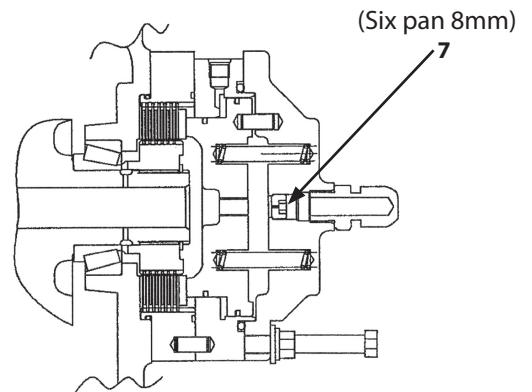


7. Insert the remove bolt (1) and plane washer (2) through the hole from where the orifice was remove in step 5, into the screw hole at the center of the brake piston (8) as shown in fig. 3.
8. Tighten the release bolt (1) to withdraw the brake piston (8), thus releasing the disc brake.

When the washer touch transmission cover, tighten about 2 – 3 total revolution of the bolt head (1) to release completely the disc brake.

Tool needed:

Spanner hex head	27mm (adjustable spanner)
	22mm
	17mm
six pan	8mm



TRANSPORTING

Procedures

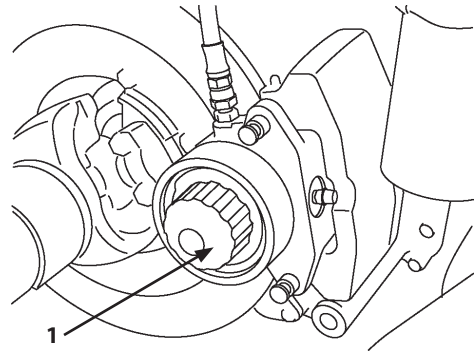


WARNING:

- After the parking brake is manually released, the machine brake system will be completely disabled.
- Be sure to wedge wheel stoppers to prevent the machine from moving.
- Before restarting to operate the machine, consult your nearest Hitachi dealer to have the parking brake adjusted.

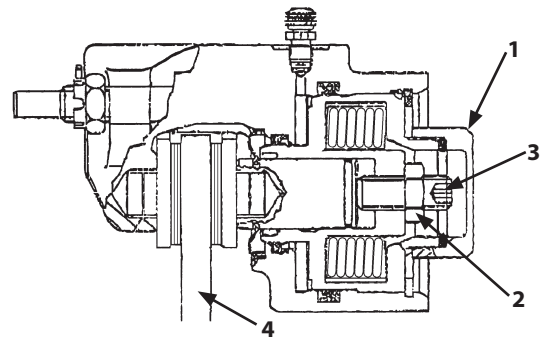
ZW220, ZW250

1. Turn to remove parking brake cap (1).
2. Remove lock nut (2). Turn adjuster screw (3) clockwise with a wrench until brake disc (4) becomes free to rotate.
3. Install lock nut (2). Tightly install parking brake cap (1) by hand.



ZW220, 250

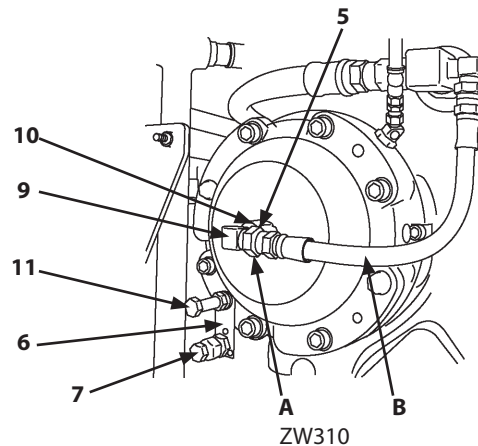
M4GB-06-004



M4GB-06-005

ZW310

1. Remove plug (7) from the bracket (6).
2. While preventing oil from spilling with a workshop towel, disconnect the A-side of hose (4) from elbow (5). Put plug (3) on the A-side end of hose (4) to stop oil leak.
3. Remove elbow (5) and bushing (6).
4. Remove releasing bolt/nut (11).
5. Insert bolt/flat washer (3) (excluding the nut) into plug hole (1). Tighten the bolt into the inside bolt hole.
6. When bolt (11) head touches the brake cover, tighten bolt (11) further approx. two turns (approx. 2 to 3 mm) to release the parking brake.



ZW310

M4GB-06-006

TRANSPORTING

When the machine is impossible to travel forward and in reverse:



CAUTION: Before operating the emergency valve (spool), be sure to apply the parking brake so that the machine does not start moving.

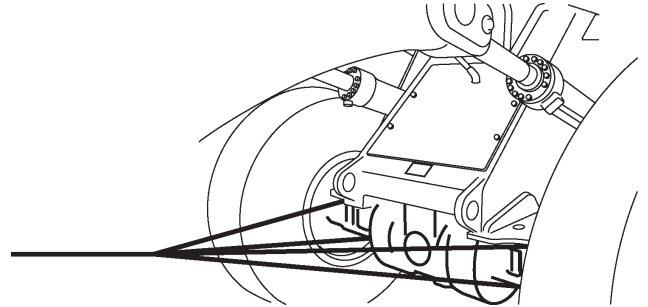
Should the drive system become inoperable due to trouble in the electrical circuit such as a broken harness, refer to section 4-16 for details.

TRANSPORTING

TOWING METHOD

⚠ CAUTION: Use wire rope having the strength more than approx. 150 % of the machine weight.

- **Towing from the front side of the machine**
When using wire ropes, be sure to attach wire ropes to the front axle. Always use soft material at the corners between the front axle and wire ropes to prevent damage to wire ropes.
- **Towing from the rear side of the machine**
Be sure to attach wire ropes to the drawbar pin. Always use the lock pin after completely inserting the drawbar pin to prevent the wire rope from coming off.



M4GB-06-011

Attach wire ropes to the machine as illustrated when the machine must be unavoidably towed, such cases when the machine can not be evacuated from soft ground by its own driving power.

TRANSPORTING

LIFTING MACHINE

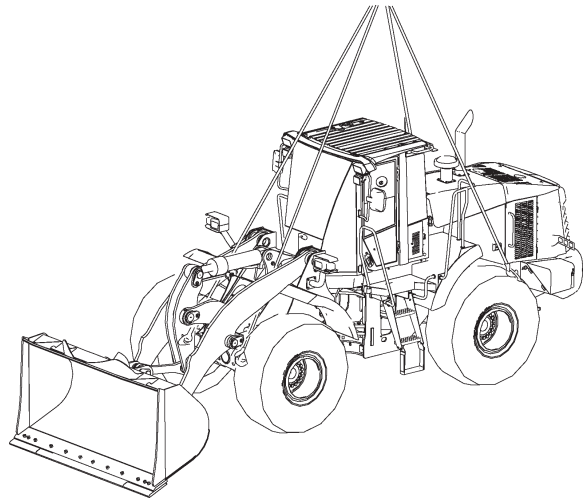


WARNING: Pay attention to the following points:

- Use lifting cables and other lifting tools being free from any damage and/or aging, and having sufficient strength.
- Consult your nearest Hitachi dealer for correct lifting procedures, and the size and types of lifting cable and tools.
- Before lifting the machine, move the front control lever lock to the LOCK position to prevent the machine from moving unexpectedly.
- Rigidly secure the front and rear frames using the lock bar so that the machine front and rear frames are not articulated.
- If the machine is incorrectly lifted or if lifting wire ropes are incorrectly attached to the machine, the machine may be move when lifted, possibly resulting in personal accident and/or damage to the machine.
- Never apply impact loads to the lifting cables and tools.
- Do not allow anyone to enter the area under the lifted machine.

Lifting

1. Position the front attachment as illustrated to the right.
2. Move the front control lever lock to the LOCK position.
3. Rigidly secure the front and rear frames using the articulation lock bar.
4. Stop the engine. Remove the key from the key switch.
5. Use cables long enough so that the cables come in contact with the machine body when the machine is lifted. Cover the cables with cloth as needed to protect the machine from being damaged. Be sure to use the specified lifting tools.
6. Set a crane in an appropriate position.
7. Attach the cable to the front attachment and the lifting tools.



M4GB-05-020

TRANSPORTING

MEMO

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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.**
 - **Be sure to use only genuine Hitachi parts. Failure to do so may result in serious injury or death and/or machine breakdown.**
 - **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 main controller, sensors, etc.**

MAINTENANCE

CHECK THE HOUR METER REGULARLY

- 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.
- Lubricate, make service checks and adjustments at intervals shown on periodic maintenance guide table (see page 7-5 and 7-6).

USE CORRECT FUELS AND LUBRICANTS

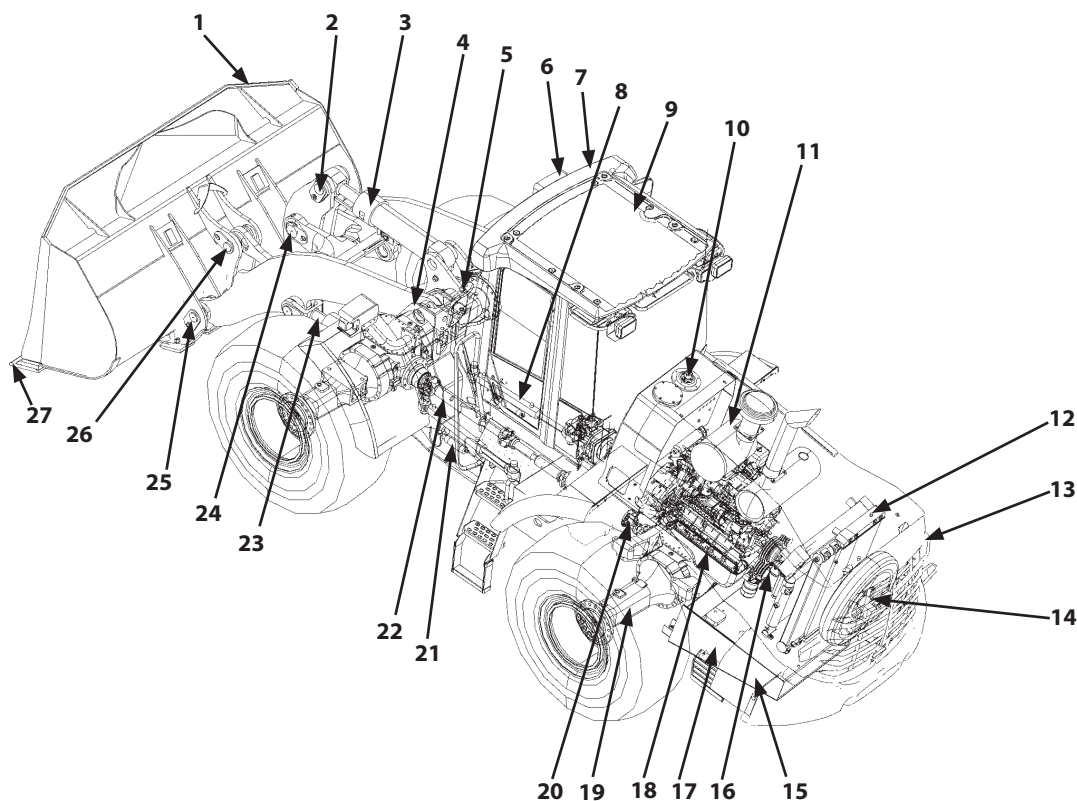
IMPORTANT: Always use recommended fuels and lubricants.

Failure to do so will result in machine damage and loss of Hitachi product warranty.

MAINTENANCE

LAYOUT

ZW180



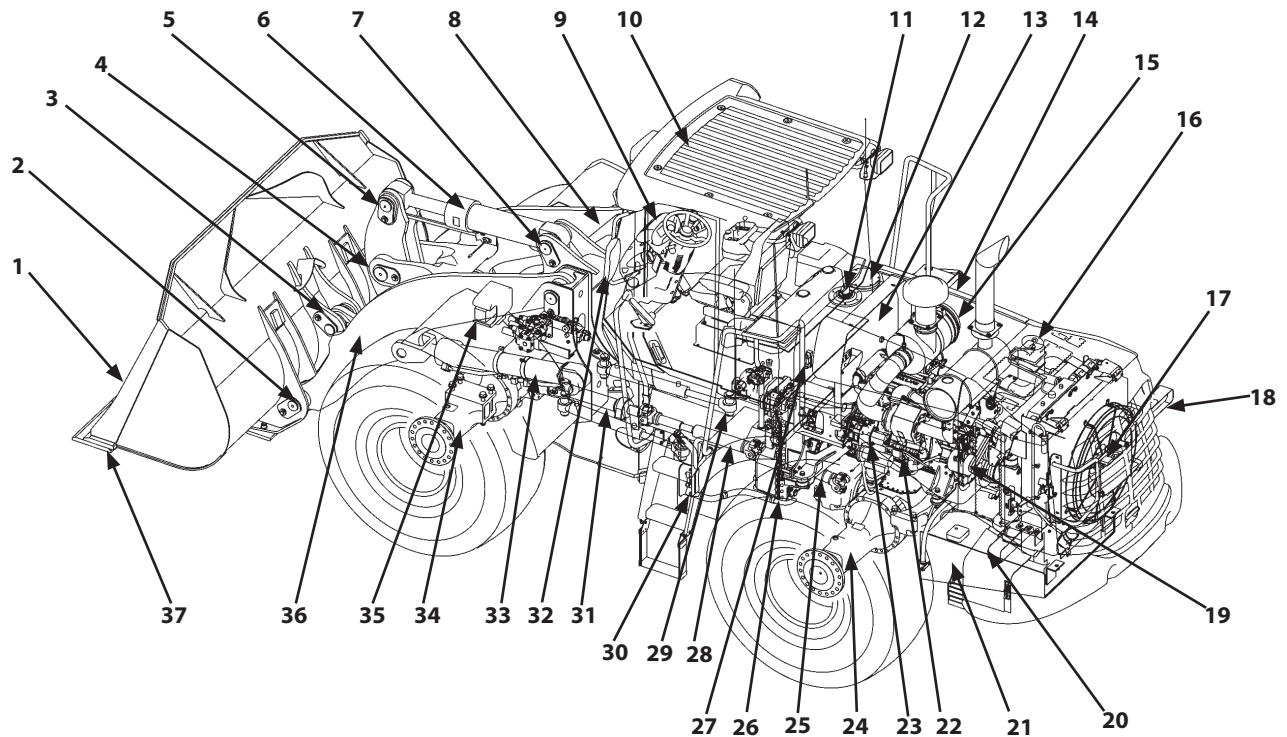
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- | | |
|--|---------------------------|
| 1- Bucket | 15- Battery |
| 2- Bucket Cylinder Rod Pin | 16- Alternator Drive Belt |
| 3- Bucket Cylinder | 17- Fuel Tank |
| 4- Front Axle | 18- Engine |
| 5- Outside Rear View Mirror | 19- Rear Axle |
| 6- Front Combination Lamp | 20- Rear Propeller Shaft |
| 7- Front Work Light | 21- Steering Accumulator |
| 8- Steering Cylinder | 22- Front Propeller Shaft |
| 9- ROPS Cab | 23- Lift Arm Cylinder |
| 10- Hydraulic Oil Tank/Suction Filter/Air Breather Element | 24- Bell Crank Pin |
| 11- Air Cleaner | 25- Bucket Pin |
| 12- Radiator, Oil Cooler | 26- Bucket Link Pin |
| 13- Rear Combination Lamp | 27- Cutting Edge |
| 14- Radiator Fan | |

MAINTENANCE

LAYOUT

ZW220, ZW250



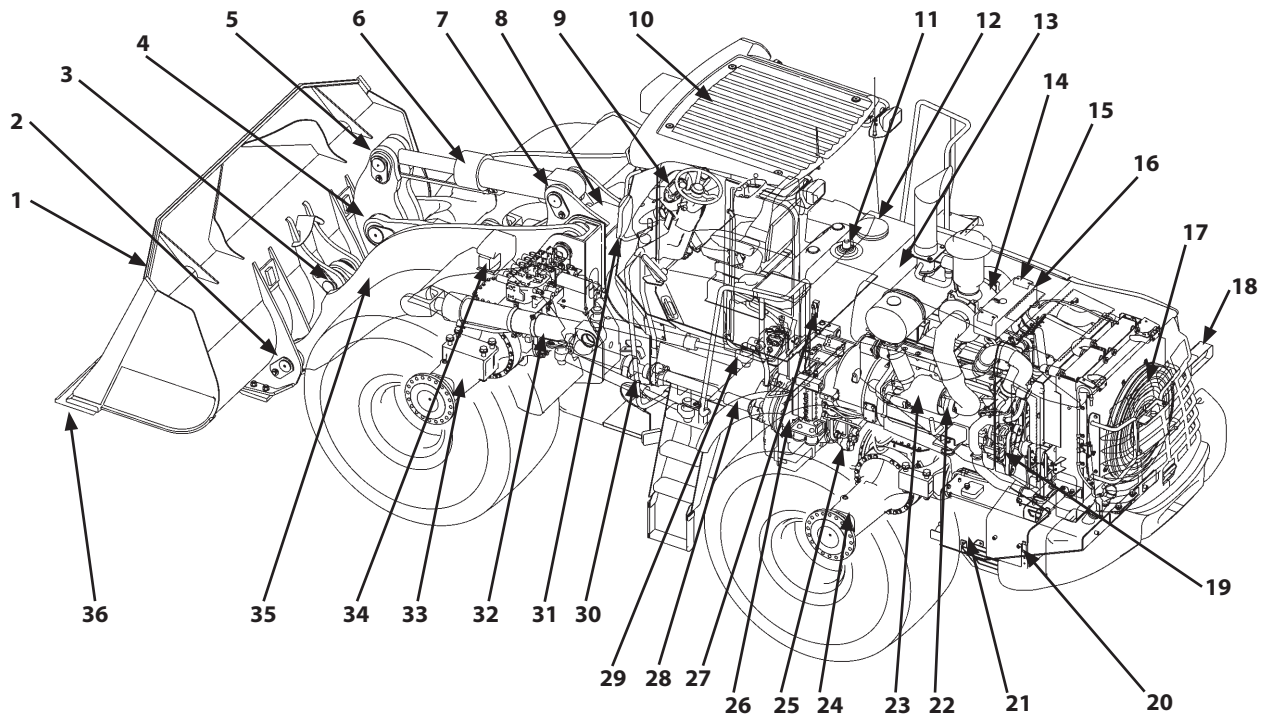
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- | | |
|-------------------------------------|----------------------------------|
| 1- Bucket | 20- Battery |
| 2- Bucket Pin | 21- Fuel Tank |
| 3- Bucket Link Pin | 22- Engine Oil Level Dipstick |
| 4- Bell Crank | 23- Engine |
| 5- Bucket Cylinder Rod Pin | 24- Rear Axle |
| 6- Bucket Cylinder | 25- Rear Propeller Shaft |
| 7- Bucket Cylinder Pin | 26- Transmission |
| 8- Horn | 27- Hydraulic Oil Level Gauge |
| 9- Monitor | 28- Center Propeller Shaft |
| 10- ROPS Cab | 29- Steering Cylinder Rod Pin |
| 11- Hydraulic Oil suction Filter | 30- Transmission Oil Level Gauge |
| 12- Hydraulic Oil Tank Filter | 31- Front Propeller Shaft |
| 13- Hydraulic Oil Tank | 32- Outside Rear View Mirror |
| 14- Washer Tank | 33- Lift Arm Cylinder |
| 15- Air Cleaner | 34- Front Axle |
| 16- Reserve Tank | 35- Front Combination Lamp |
| 17- Raditor,Oil Cooler,Radiator Fan | 36- Lift Arm |
| 18- Rear Combination Lamp | 37- Cutting Edge |
| 19- Alternator Drive Belt | |

MAINTENANCE

LAYOUT

ZW310



M4GB-07-003

- | | |
|-------------------------------------|-------------------------------|
| 1- Bucket | 19- Alternator Drive Belt |
| 2- Bucket Pin | 20- Battery |
| 3- Bucket Link Pin | 21- Fuel Tank |
| 4- Bell Crank | 22- Engine Oil Level Dipstick |
| 5- Bucket Cylinder Rod Pin | 23- Engine |
| 6- Bucket Cylinder | 24- Rear Axle |
| 7- Bucket Cylinder Pin | 25- Rear Propeller Shaft |
| 8- Horn | 26- Transmission |
| 9- Monitor | 27- Hydraulic Oil Level Gauge |
| 10- ROPS Cab | 28- Center Propeller Shaft |
| 11- Hydraulic Oil suction Filter | 29- Steering Cylinder Rod Pin |
| 12- Hydraulic Oil Tank Filter | 30- Front Propeller Shaft |
| 13- Hydraulic Oil Tank | 31- Outside Rear View Mirror |
| 14- Washer Tank | 32- Lift Arm Cylinder |
| 15- Air Cleaner | 33- Front Axle |
| 16- Reserve Tank | 34- Front Combination Lamp |
| 17- Raditor,Oil Cooler,Radiator Fan | 35- Lift Arm |
| 18- Rear Combination Lamp | 36- Cutting Edge |

MAINTENANCE

MAINTENANCE GUIDE TABLE

The maintenance guide table is affixed to the reverse side of the tool box cover. Lubricate and/or service the parts at the intervals as instructed in the table so that all necessary maintenance can be performed regularly.

- **Symbol Marks**
The following marks are used in the maintenance guide table.

	Grease (Front Joint Pin, Cylinder Pin, Propeller Shaft)		Hydraulic Oil
	Engine Oil		Hydraulic Oil Filter (Pilot Filter, Hydraulic Oil Tank Filter, Suction Filter)
	Engine Oil Filter		Gear Oil (Final Drive, Differential Gear)
	Coolant (Long-Life Coolant)		Fuel
	Transmission Oil (Transmission, Torque Converter)		Fuel Filter (Fuel Filter, Fuel Pre-Filter)
	Transmission Oil Filter		

The diagram illustrates the lubrication points and intervals for a wheel loader. It features a central illustration of the machine with various components labeled with numbers 1 through 19. Concentric arcs represent different lubrication intervals in hours: 10h, 100h, 500h, 1000h, 2000h, and 4000h. A legend on the right side of the diagram lists these intervals. The diagram also includes a 'Lubrication Interval' section with a list of intervals: 4000h, 2000h, 1000h, 500h, 100h, and 10h. A small icon of an open book is located in the bottom right corner of the diagram area.

	Item	Page		Item	Page
1	Grease (Front Joint Pin)	7-22	11	Grease (Rear Axle Support Pin)	7-25
2	Grease (Frame Hinge Pin)	7-24	12	Axle Gear Oil (Final drive, Differential gear)	7-36
3	Transmission Oil Filter	7-34	13	Grease (Front Axle Support pin)	7-25
4	Hydraulic Oil Filter (Suction)	7-45	14	Transmission Oil	7-34
5	Hydraulic Oil Filter (Main)	7-47	15	*Engine Oil Filter	7-30
6	Hydraulic Oil	7-42	16	Hydraulic Oil Filter (Pilot)	7-46
7	Coolant(Long-Life Coolant)	7-69	17	Grease (Steering Cylinder Pin)	7-23
8	*Fuel Filter, Fuel Pre-Filter	7-53 to 61	18	Grease (Propeller Shaft)	7-25
9	Fuel Oil (Diesel Fuel)	7-53	19	Grease (Propeller Shaft center support)	7-26
10	Engine Oil	7-28			

7-7

MAINTENANCE

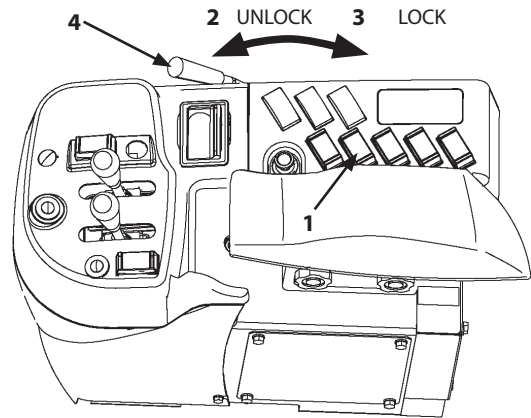
PREPARATIONS FOR INSPECTION AND MAINTENANCE

WARNING: If ride control switch (1) is kept ON, the lift arm may unexpectedly rise. To avoid an accident due to unexpected movement of the lift arm, always turn ride control switch (1) OFF before beginning the inspection and/or maintenance of the machine.

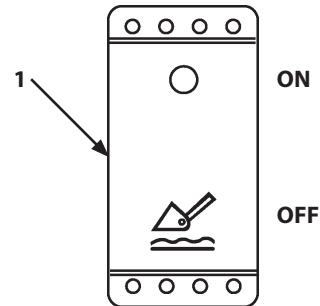
CAUTION: If the machine is unexpectedly moved, a serious accident may result in. Be sure to apply the parking brake when parking the machine.

Unless specially specified, park the machine by following the procedures below before beginning the inspection and/or maintenance work.

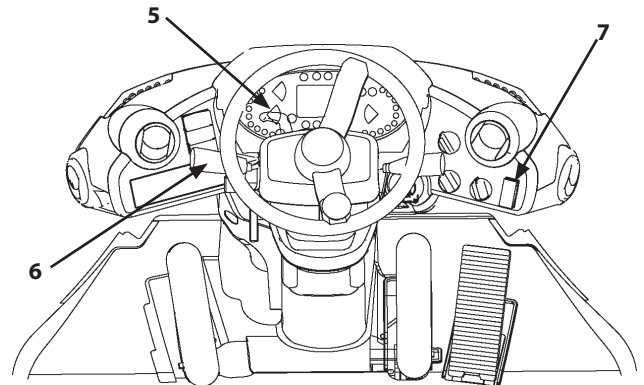
1. Park the machine on a solid level surface.
2. Lower the working tools such as the bucket to the ground.
3. Turn optional ride control switch (1) OFF.
4. Place forward / reverse lever (6) to neutral and apply neutral lock (5).
5. Apply the parking brake (Turn parking brake (7) ON.)
6. Wedge the tires.
7. Turn the key switch OFF to stop the engine. Remove the key from the switch. In case inspection and/or maintenance must be performed with the engine kept running, use an observer.
8. Be sure to place front control lever (4) lock to the LOCK position (3).
9. Start working only after putting an "UNDER INSPECTION/ MAINTENANCE" tag in a highly visible place such as as on the cab door or the control lever.



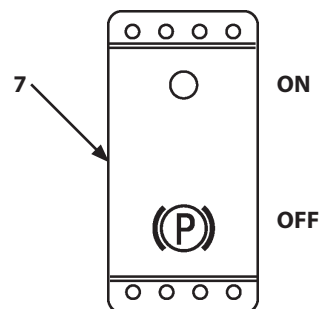
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M4GB-01-085



M4GB-01-004



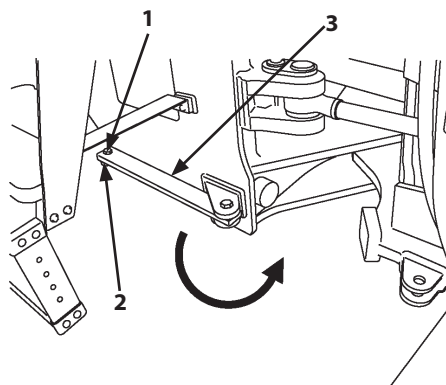
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MAINTENANCE

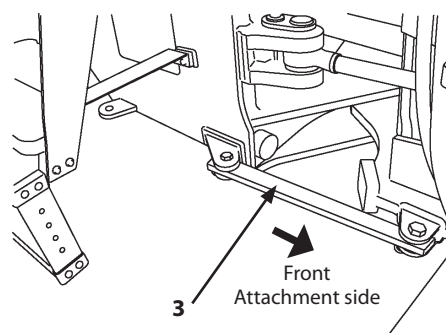
LOCK FRAMES

⚠ CAUTION: Before beginning to work near the frame axle, install articulation lock bar (3) to securely lock and prohibit movement between the front and rear frames. Avoid accidents due to unexpected movement of the machine.

1. Align the front and rear vehicle frame centers with each other.
2. Remove β -form pin (2) to remove set pin (1) from the hole.
3. Pull out and rotate articulation lock bar (3) to align it with the front frame hole.
4. Install set pin (1) into the front frame hole and the articulation lock bar (3) tip end hole. Install β -form pin (2) to lock the articulation lock bar (3) in position.



M4GB-01-135



M4GB-01-136

MAINTENANCE

INSPECTION/MAINTENANCE ACCESS SIDE COVER



CAUTION:

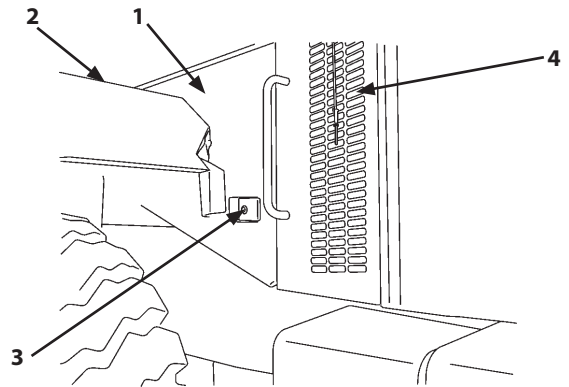
- Always close the side covers during driving and operation.
- Do not keep the side covers open on a slope or when a strong wind is blowing. Failure to do so may be dangerous because the side cover may unexpectedly close.
- Take care not to pinch your fingers when opening/closing the side covers (1) (4).
- Always lock the side covers before inspecting the vicinity of the engine.
- Before inspecting around the engine, be sure to secure the side cover with holding rod (6).
- In case the machine is equipped with the fenders (2) on side covers (1), never ride on the fenders (2).

When opening side cover (1), pull latch (3) upward.

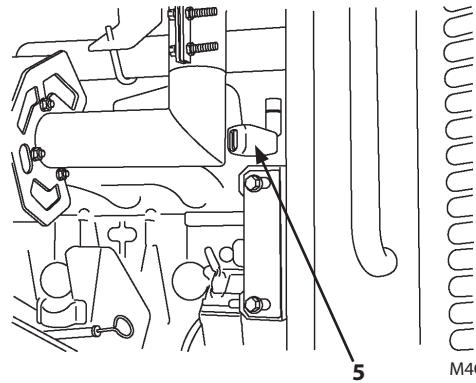
When opening side cover (4), after opening side cover (1), lower open/close lever (5) located at the rear of the machine.



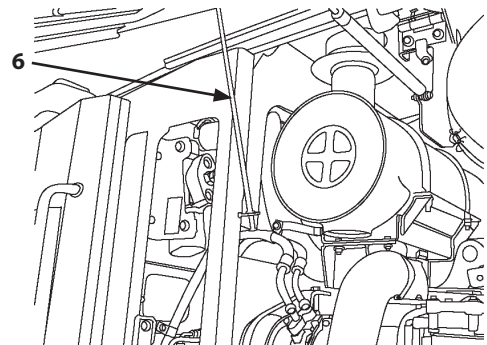
NOTE: When required to inspect the machine for a long time with the side cover kept open, lock the side cover using the locking rod (6) provided inside the side cover. Side cover (4) has a holding groove. Engage the holding rod in the holding groove beforehand.



M4GB-01-141

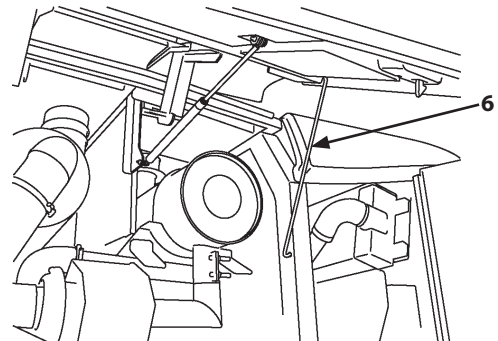


M4GB-01-142



ZW180

M4GF-07-001



ZW220, 250, 310

M4GB-01-143

MAINTENANCE

REAR GRILLE



CAUTION:

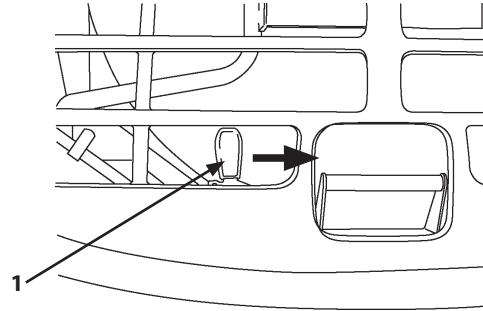
- Open or close rear grille (2) only after stopping the engine. Failure to do so may create a very dangerous situation as entanglement with the cooling fan may result.
- Before driving the machine, always check that rear grille (2) will not open.
- The rear grille (2) will spring open. Take care not to come in contact with the rear grille.

Opening the rear grille

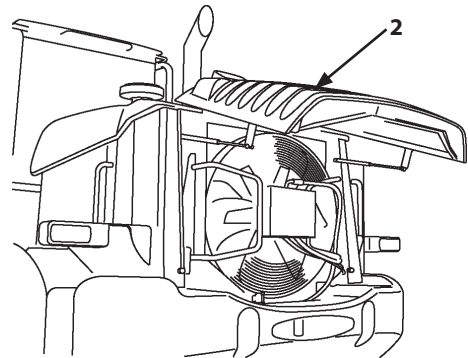
Move open/close lever (1) laterally to open the rear grille upward, allowing the fuel tank to be refilled and/or the cooling fan to be cleaned.

Closing the rear grille

While holding rear grille (2), slowly close the rear grille downward until a "click" sound is heard.



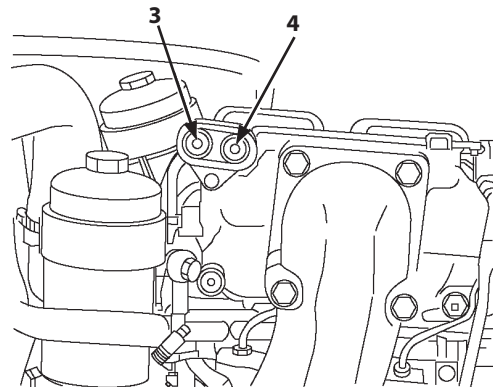
M4GB-01-144



M4GB-01-145

Engine Start and Stop Buttons

ZW310 is equipped with engine start and stop buttons by which the engine can be started or stopped from the ground during inspection and maintenance of the machine. When stop button (3) is pressed, the engine is stopped. When the key switch is ON, press start button (4) to start the engine. When both stop button (3) and start button (4) are pressed at the same time, the engine cranks. Use to adjust the crankshaft position when checking the valve clearance. When both stop button (3) and start button (4) are pressed at the same time, the engine does not start.



M4GB-07-152

MAINTENANCE

PERIODIC REPLACEMENT OF PARTS

To ensure safe operation, be sure to conduct periodic inspection of the machine. In addition, the parts listed below, if defective, may pose serious safety/fire hazards. It is very difficult to gauge the extent of deterioration, fatigue, or weakening of the parts listed below simply by visual inspection alone. For this reason, replace these parts at the intervals shown in the table below. However, if any of these parts are found to be defective, replace before starting operation, regardless of the interval.

Also, when replacing hoses, check the clamps for deformation, cracks, or other deterioration, and replace as necessary.

Be sure to perform periodic inspection of all hoses, as shown below, and replace or retighten any defective parts found, as necessary.

Consult your authorized dealer for correct replacement.

Periodic Replacement Parts		Replacement Intervals	
Engine	Fuel hose (Fuel tank to filter)	Every 2 years	
	Fuel hose (Fuel tank to injection pump)	Every 2 years	
	Oil filter hose (Engine to oil filter)	Every 2 years	
	Heater hose (Heater to engine)	Every 2 years	
Brakes	Breake valve seals (Rubber parts)	Every 1 years	
	Wet type brake (D-ring for piston)	Every 4 years	
	Breke hose	Every 2 years	
	Stop light switch	Every 2 years	
	Center joint seals (Rubber parts)	Every 2 years	
	Brake hose	Every 1 years	
Steering Machanism	Steering hose	Every 2 years	
	Steering cylinder seals (Rubber parts)	Every 4 years	
	Steering valve seals (Rubber parts)	Every 2 years	
Hydraulic System	Base Machine	Pump suction hose	Every 2 years
		Pump delivery hose	Every 2 years
	Front Attachment	Lift arm cylinder line hose	Every 2 years
		Bucket cylinder line hose	Every 2 years
		Pilot hose	Every 2 years
Cab		Seat belt	Every 3 years

 **NOTE:** Be sure to replace seals, such as O-rings and gaskets, when replacing hoses.

MAINTENANCE

MAINTENANCE GUIDE

A. GREASING (See Page 7-22)

Parts	Quantity	Interval (hours)						
		10	50	100	250	500	1000	2000
1. Bucket Pin	2	★			★★			
2. Bucket Link Pin	2	★			★★			
3. Bucket Cylinder Pin	2	★			★★			
4. Bell Crank Pin	2	★			★★			
5. Lift Arm Cylinder Pin	4	★			★★			
6. Lift Arm Pivot Pin	2	★			★★			
7. Steering Cylinder Pin	2	★			★★			
8. Steering Cylinder Rod Pin	2	★			★★			
9. Frame Center Hinge Pin	2							
10. Axle Support Pin	2							
11. Front Propeller Shaft Universal	1						★★★	
12. Propeller Shaft Center Support	1							
13. Center Propeller Shaft Universal	1						★★★	
14. Center Propeller Shaft Spline	1						★★★	
15. Rear Propeller Shaft Universal	2						★★★	
16. Rear Propeller Shaft Spline	1						★★★	

 **NOTE:** ★ Maintenance required when operating in water or mud and under extremely severe condition.
 ★★ Maintenance required only during first time check.
 ★★★ Check and add grease.

IMPORTANT: Grease bucket and link pivots every day until break-in operation (50 hours) is complete.

MAINTENANCE

B. ENGINE (See Page 7-28)

Parts			Quantity	Interval (hours)						
				10	50	100	250	500	1000	2000
1. Engine Oil	Oil Level Check		—							
2. Engine Oil	Change	ZW180	25 L				★			
		ZW220								
		ZW250								
		ZW310	39 L				★	★★		
3. Engine Oil Filter	Replacement		1				★	★★★		

 **NOTE:** ★ Change 250 operating hours, if the content of sulfur of fuel is 2000 ppm or more.
Consult your nearest Hitachi dealer for the details.

★★ Depending on DAIMLER standard, ZW310 use the engine oil MB228.5.

★★★ Replace the engine oil filter at the same time every time engine oil is changed.

C. POWER TRAIN (See Page 7-33)

Parts			Quantity	Interval (hours)							
				10	50	100	250	500	1000	2000	
1. Transmission Oil	Oil Level Check		—		(When leaking oil)						
2. Transmission Oil	Change	ZW180	30 L			★					
		ZW220 ZW250	36 L			★					
		ZW310	36 L				★★				
3. Transmission Oil Filter	Replace	ZW220 ZW250	1			★					
		ZW310	1				★★				
		4. Transmission Oil Strainer	Clean	ZW310	1						
5. Axle Oil	Change (Front)	ZW180	28 L				★				
		ZW220	32 L				★★				
		ZW250	40 L				★★				
		ZW310	48 L				★★				
	Change (Rear)	ZW180	28 L				★				
		ZW220	32 L				★★				
		ZW250	40 L				★★				
		ZW310	48 L				★★				
6. Torque Converter Air Breather	Clean	1									
7. Axle Housing Air Breather	Clean	Each 1 (F/R)									

 **NOTE:** ★ Maintenance required only during first time 100 operating hours.

★★ Maintenance required only during first time 250 operating hours.

MAINTENANCE

D. HYDRAULIC SYSTEM (See Page 7-40)

Parts		Quantity	Interval (hours)								
			10	50	100	250	500	1000	1500	2000	4000
1. Check Hydraulic Oil Level		—									
2. Change Hydraulic Oil	ZW180	150 L									★
	ZW220	190 L									★
	ZW250	210 L									★
	ZW310	230 L									★
3. Suction Filter Cleaning		1	(When changing hydraulic oil)								
4. Replace Pilot Oil Filter		1									
5. Replace Hydraulic Tank Oil Filter		1									
6.	Check Hoses and Lines for leaks	—									
	Check Hoses and Lines for cracks, bend, etc	—									

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

E. FUEL SYSTEM (See Page 7-53)

Parts		Quantity	Interval (hours)						
			10	50	100	250	500	1000	2000
1. Check Fuel Level		—							
2. Drain Fuel Tank Sump		1							
3. Check Fuel Filter Sump		1							
4. Replace Fuel Main Filter	ZW180, ZW220, ZW250	1							
	ZW310	1							
5. Replace Fuel Pre-Filter	ZW180, ZW220, ZW250	1							
	ZW310	1							
6. Clean Fuel Solenoid Pump Strainer		1							
7.	Check Fuel Hoses for leak, cracks, etc	—							
	Check Fuel Hoses for cracks, bent, etc	—							

F. AIR CLEANER (See Page 7-64)

Parts		Quantity	Interval (hours)						
			10	50	100	250	500	1000	2000
1. Air Cleaner Outer/Inner Element	Cleaning	1	Indicator comes ON						
	Replacement	1	After cleaning 6 times or 1 year						

MAINTENANCE

G. COOLING SYSTEM (See Page 7-65)

Parts		Quantity	Interval (hours)						
			10	50	100	250	500	2000	4000
1. Check Coolant Level		—							
2. Check Fan Belt	ZW220, ZW250	—							
3. Check Fan Belt Tension	ZW220, ZW250	—							
4. Adjust Fan Belt Tension	ZW220, ZW250	—							
5. Change Coolant	ZW180	26 L						★	
	ZW220	38 L							
	ZW250	41 L							
	ZW310	59 L							★★
6. Oil Cooler and Radiator Core		1	(Or when the clogg)						

 **NOTE: ★** Use the coolant specified by CUMMINS for ZW180. When TMCR329 or TMC330 is used, change the coolant every 2000 hours or every 2 years whichever comes first.

 **NOTE: ★★** Use the coolant specified by DAIMLER for ZW310. When 325.2 or 325.3 is used, change the coolant every 4000 hours or every 3 years whichever comes first.

IMPORTANT: Use the specified LLC for ZW180 and ZW310. Failure to do so may cause malfunction of the machine and/or damage to the machine.

 **NOTE:** ZW220 and ZW250: When genuine Hitachi long life coolant (LLC) is used, change the coolant every 4000 hours or every 2 years whichever comes first.

H. ELECTRICAL SYSTEM (See Page 7-74)

I. BRAKE SYSTEM (See Page 7-82)

Parts		Quantity	Interval (hours)						
			10	50	100	250	500	1000	2000
1. Check Right and Left Brake Interlocking Performance		—							
2. Check Parking Brake Force		—							
3. Check Accumulator Function, Gas Leakage, Looseness, and Damage		—							
4. Check Gas pressure in Accumulator		—							★
5. Check Brake Disks (Service and Paring)		—							

 **NOTE: ★** Check the accumulator for the ride control system simultaneously when the machine is equipped with the ride control system.

MAINTENANCE

J. TIRE (See Page 7-85)

Parts		Quantity	Interval (hours)						
			10	50	100	250	500	1000	2000
1. Check and Replace Tire (Tire Pressure)	Inspection	4							
	Adjustment	4	As required						
2. Check Tire for Damage	Inspection	4							
3. Check Wheel Bolt Torque	Adjustment	4		★					

 NOTE: ★ 50 hours at only first time

K. AIR CONDITIONER (See Page 7-90)

Parts			Quantity	Interval (hours)						
				10	50	100	250	500	1000	2000
1. Check Air Conditioner Filter	Circulating	Cleaning	1			★				
	Air Filter	Replacement	1	After Cleaning 10 times or so						
	Fresh Air Filter	Cleaning	1			★				
		Replacement	1	After Cleaning 10 times or so						
2. Check Air Conditioner			—	Every six month						
3. Check Air Conditioner Piping			—	Every six month						
4. Check Air Conditioner Condenser			1	Every six month						
5. Check Air Conditioner Fan Belt			1	Every six month						
6. Check Refrigerant			1	Every six month						
7. Check Compressor and Pulley			1	Every one month						
8. Check Switch Operation			—	Every one month						

 NOTE: ★ Clean every 100 hours or ever week whichever comes first.
In case the machine is operated at a dusty job site, clean or replace the filter element earlier than the normal interval.

MAINTENANCE

L. MISCELLANEOUS (See Page 7-95)

Parts	Quantity	Interval (hours)							
		10	50	100	250	500	1000	2000	4000
1. Check Bucket Teeth and Cutting Edge	—								
2. Check and Replace Seat Belt	1		Every 3 years						
3. Check ROPS cab, Resin Cab Roof, and Roof Mounting Bolts	—								
4. Check Windshield Washer Fluid Level	—								
5. Check Play Amount in Steering Wheel Stroke	—								
6. Check Accelerator Pedal Operation, and Exhaust Gas Color and Noise	—								
7. Check Reaview Mirror and Inside Reaview Mirror	—								
8. Check Turbocharger Bearing *	—						★★★		
9. Check Engine Cylinder Head and Manifold *	ZW180	—							
	ZW220, ZW250, ZW310	—					★★★		
10. Check and Adjust Valve Clearance *	ZW180, ZW220, ZW250	—							
	ZW310	—				★★			
11. Check Fuel Injection Timing *	—						★★★		
12. Check Engine Compression Pressure *	—						★★★		
13. Check and Clean Starter and Generator *	—								
14. Retighen Front Axle and Rear Axle Support Mounting Bolts	—		★						



- NOTE:** ★ Maintenance required only during first time 50 operating hours.
 ★★ Maintenance required only during first 500 operating hours.
 ★★★ Change every one year or 1000 operating hours, which ever comes first.
 * Consult your nearest Hitachi dealer for maintenance.

MAINTENANCE

KIND OF OILS

Brand Names of Recommended Grease

Application	Front Joint Pin etc.
Manufacturer	-20~40°C (-4~104°F)
British Petroleum	BP Energrease LS-EP2
Caltex Oil	Multifax EP2
Idemitsu Kosan	Daphne Coronex Grease EP2
Mobil Oil	Mobilux EP2
Nippon OIL	Epinoc Grease AP2
Shell OIL	Shell Alvania
JAPAN ENERGY	*JOMO Lisonix Grease No. 2

 **NOTE:** Be sure to use a lithium-based grease. If other types of chassis grease are used, premature wear and/or a noise emission may result.

The machine shipped from factory is filled with lubricants marked with .

Brand Names of Recommended Engine Oil

ZW180, ZW220, ZW250

IMPORTANT: Use only genuine Hitachi engine oil as shown below or engine oil equivalent to DH-1 specified in JASO. Failure to do so may deteriorate the engine performance and/or shorten the engine service life. Please be noted that all engine failures caused by using engine oil other than specified are excluded from Hitachi Warranty Policy. Consult your nearest Hitachi dealer for the unclear points.

Kind of Oil	Engine Oil		
Application	Engine Crank Case		
Air Temp.	-20 to 30 °C (-4 to 86 °F)	-15 to 40 °C (5 to 104 °F)	
Manufacturer			JASO
Hitachi	Super wide DH-1 10W-30	Super wide DH-1 15W-40	DH-1

ZW310

	Kind of Oil	Engine Oil		
	Application	Engine Crank Case		
		-20 ~ 45°C		
	Manufacturer	DAIMLER Standard MB228.5		
Agip Petroli		Agip Sigma Ultra TFE (10W-40)		
British Petroleum		BP Vanellus E4 Plus (10W-40)	BP Vanellus E7 Plus (10W-40)	
Castrol		Castrol Dynamax (10W-40)	Castrol Enduron (10W-40)	
Esso		Essolube XTS 5 (10W-40)	Essolube XTS 501 (10W-40)	
Mobil Oil		Mobil Delvac XHP Extra (10W-40)		
Shell Oil		Shell Normina Extra (10W-40)	Shell Rimula Ultra (10W-40)	Shell Rimula Ultra (E5) (10W-40)
Caltex Oil		Caltex Dglo XLD (10W-40)		
Total		Total Rubia TIR 8600 (10W-40)		

IMPORTANT: Use DAIMLER recommendation engine oil.

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

MAINTENANCE

Brand Names of Recommended Transmission Oil

Application	Transmission
	Engine Oil or Gear Oil (API CD Class)
Manufacturer	–25°C
Idemitsu Kosan	APOLLOIL MOTIVE S310
Shell	Rimula X 10W
Mobil	Delvac Hydraulic 10W
Texaco	Delo 300 10W
Esso	Essolube Hydraulic 10W

 **NOTE:** • The machine shipped from the factory is filled with lubricants marked with .
• When the atmospheric temperature is below –25°C: Contact your authorized dealer.

Brand Names of Recommended Axle Oil

Kind of Oil	Gear Oil
Application	Axle
Manufacturer	
Shell	Spirax A 90LS
Cosmo	Hi-gear oil SP90TS
Mobil	Mobil Lube LS 85W-90

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

Brand Names of Recommended Hydraulic Oil

Kind of Lubricant	Hydraulic Oil					
Where to be applied	Hydraulic System					
Change Interval	4000 hours		2500 hours		1500 hours	
Manufacturer						
Hitachi	Super EX 46HN					
Idemitsu Kosan			Super Hydro 46 WRHU			
British Petroleum					Bartran HV46	
Caltex Oil						Rando Oil HD46
Texaco INC.						Rando Oil
Chevron U.S.A INC.						Chevron AW46
Esso						NUTO 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 lubricants marked with .
When the atmospheric temperature is between –40°C and +20°C: Use the proper hydraulic oil having high and low temperature characteristics by referring to the values shown below.
Low Temperature Viscosity: Less than 400cSt at –40°C
High Temperature Viscosity: More than 6.5cSt at +80°C
The above values are approximately equivalent to ISO viscosity grade #22. However, low temperature viscosity will differ depending on each product. Contact each hydraulic oil manufacture directly.
When the atmospheric temperature is below –40°C: Contact your authorized dealer.

MAINTENANCE

Recommended Coolant

ZW180

Application	LLC (Long-Life Coolant)	
	Radiator, cooler	
	CUMMINS Standard	
Manufacturer	TMCR329 or TMC330	
Fleetguard	Fleetguard Compleat	

LLC Mixing ratio %	ZW180	
	26.0 liters	
	LLC liters	Soft water liters
50	13.0	13.0

IMPORTANT: Use CUMMINS recommendation coolant.

 NOTE: The machines shipped from factory is filled with LLC mixing ratio 50 %.

ZW220, ZW250

Application	LLC (Long-Life Coolant)	
	Radiator, cooler	
	Hitachi Long Life Coolant	

Air temperature	Mixing ratio	ZW220		ZW250	
		38.0 liters		41.0 liters	
		LLC liters	Soft water liters	LLC liters	Soft water liters
-10°C	30 %	11.4	26.6	12.3	28.7
-20°C	40 %	15.2	22.8	16.4	24.6
-35°C	50 %	19.0	19.0	20.5	20.5

ZW310

Application	LLC (Long-Life Coolant)	
	Radiator, cooler	
	DAIMLER Standard	
Manufacturer	MB325.3 or MB325.2 or MB325.0	
Aral	Aral Antifreeze Silikatfrei	
	Aral Antifreeze T	
BASF AG	Glysantin Alu Protect	
	Glysantin G 30	
British Petroleunt	BP ProCool	
	BP anti-frost X 2270 A	
Chevron Texaco	Caltex Extended Life Coolant	
	Havoline Extended Life Antifreeze Coolant	
	Caltex Engine Coolant DB	
Castrol	Castrol Antifreeze SF	

ZW310		
LLC Mixing ratio %	59.0 liters	
	LLC liters	Soft water liters
50	29.5	29.5

IMPORTANT: Use DAIMLER recommendation coolant.

 NOTE: The machines shipped from factory is filled with LLC mixing ratio 50 %.

MAINTENANCE

A. GREASING

CAUTION: Apply the parking brake and rigidly hold the front and rear frames rigidly with the lock bar.

NOTE:

- Until break-in operation is performed for more than 50 hours, lubricate the machine every day to get initial operational concordance. In case excavation is made in mud, water or snow, lubricate the machine after operation is complete.
- Sufficiently add high quality grease through the grease fittings. After removing contamination around the grease fitting, add grease. After greasing, thoroughly remove the old grease that was pushed-out from the seals.

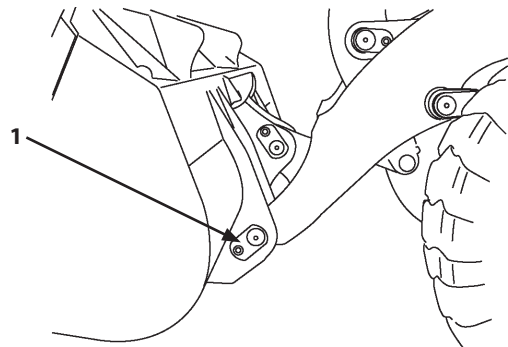
1. Bucket pins (1) (One point each to right and left) :
--- every 500 hours (250 hours at first time only)

2. One point each to bucket links pin (2 and 3):
--- every 500 hours (250 hours at first time only)

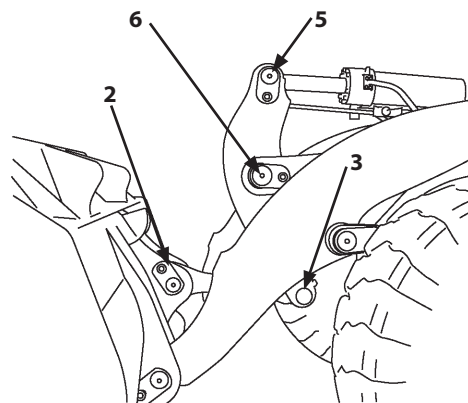
3. Bucket cylinder pin (4) One point
--- every 500 hours (250 hours at first time only)

Bucket cylinder rod pin (5) One point
--- every 500 hours (250 hours at first time only)

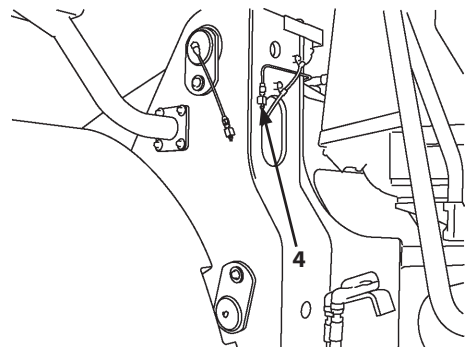
4. Bell crank pin (6) One point
--- every 500 hours (250 hours at first time only)



M4GB-07-004



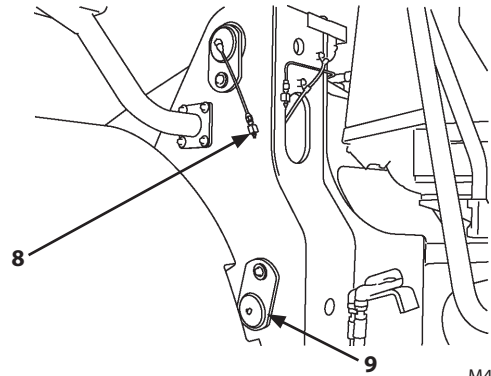
M4GB-07-005



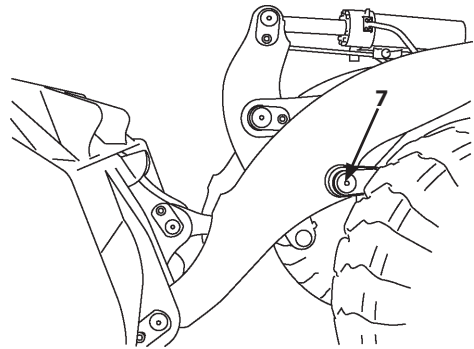
M4GB-07-006

MAINTENANCE

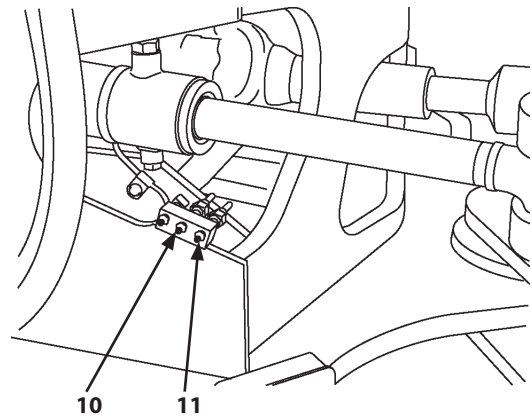
5. One point each to right and left lift cylinder pins (9)
--- every 500 hours (250 hours at first time only)



6. One point each to right and left lift arm pivot pins (8)
--- every 500 hours (250 hours at first time only)
- One point each to right and
left lift arm cylinder rod pins (7)
--- every 500 hours (250 hours at first time only)



7. One point each to front right and left steering cylinder
pins (11 and 10)
--- every 500 hours (250 hours at first time only)
- Left front (10)
Right front (11)



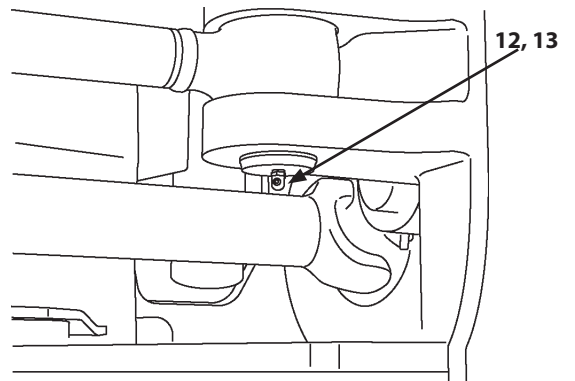
MAINTENANCE

8. One point each to rear right and left steering cylinder pins (13 and 12)

--- every 500 hours (250 hours at first time only)

Left front (12)

Right front (13)



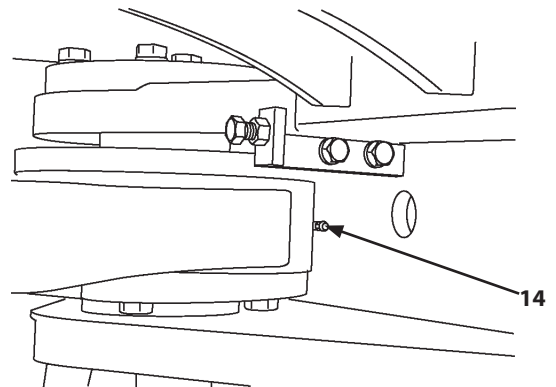
M4GB-07-008

9. One point each to upper and lower frame center hinge pins (14 and 15)

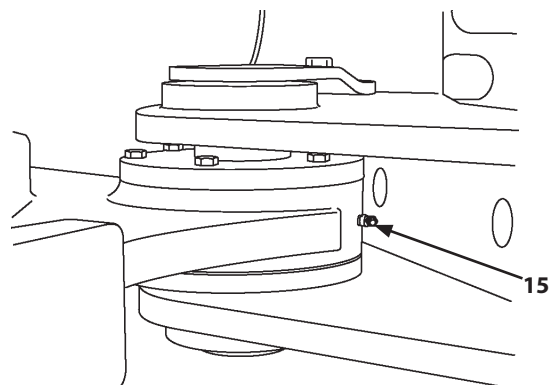
--- every 1000 hours

Upper (14)

Lower (15)



M4GB-07-009



M4GB-07-010

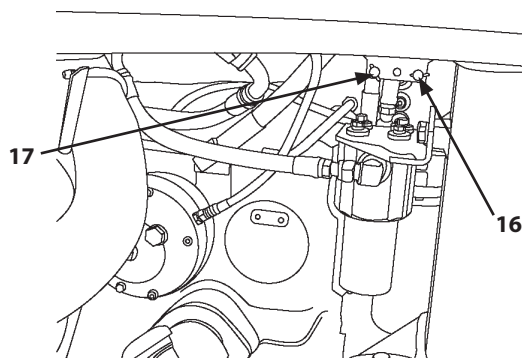
MAINTENANCE

10. One point each to front and rear axle support pins
(16 and 17)

--- every 100 hours

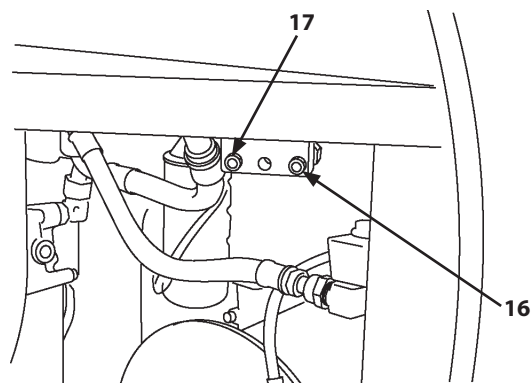
Front (16)

Rear (17)



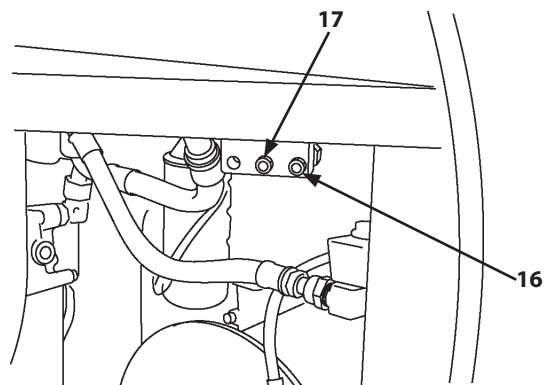
ZW180

M4GF-07-002



ZW220

M4GB-07-011



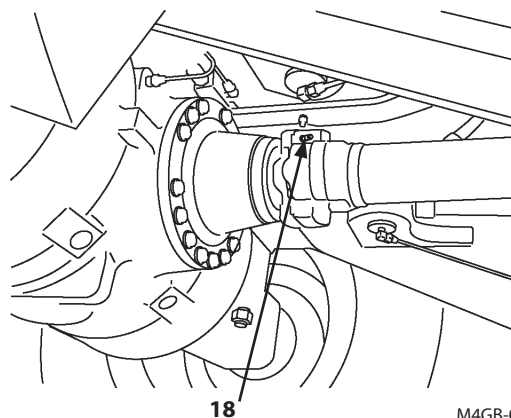
ZW250, ZW310

M4GB-07-012

11. One point to front propeller shaft universal (18)

--- every 2000 hours

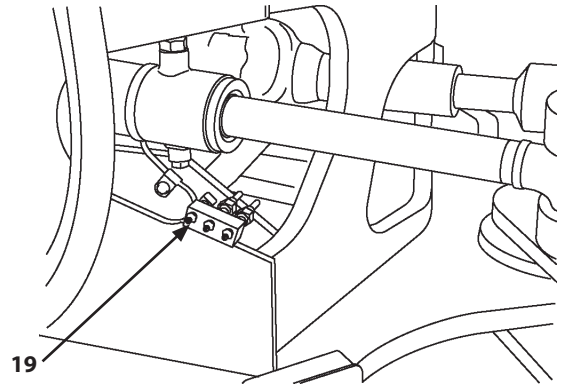
 **NOTE:** When the machine is continuously operated under severe conditions for a long time, shorten the greasing intervals.



M4GB-07-013

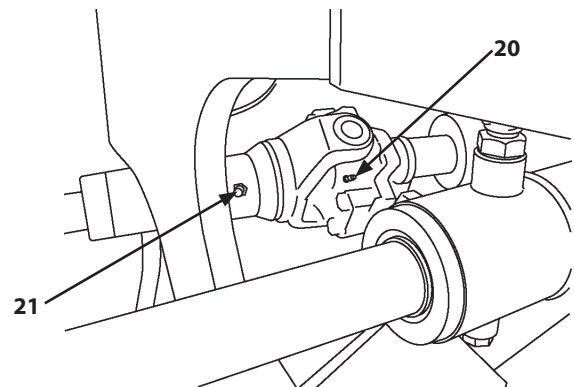
MAINTENANCE

12. One point to propeller shaft center support(19)
--- every 1000 hours



M4GB-07-007

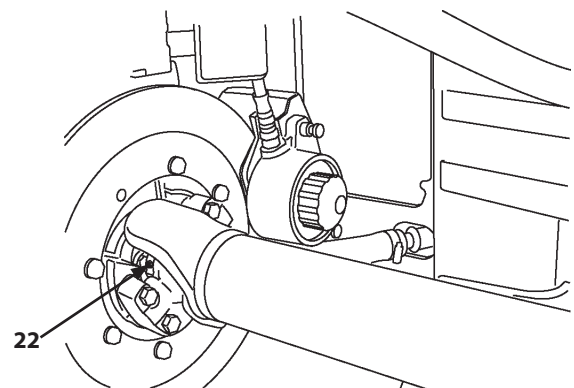
13. One point to center propeller shaft universal front (20)
--- every 2000 hours



M4GB-07-014

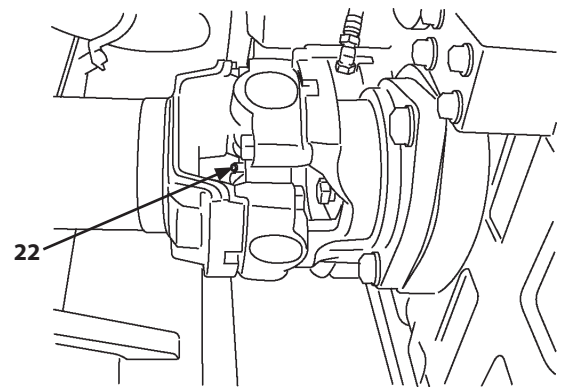
14. One point to center propeller shaft splines (21)
--- every 2000 hours

- One point to center propeller shaft universal rear (22)
--- every 2000 hours



ZW180, ZW220, ZW250

M4GB-07-015



ZW310

M4GB-07-016

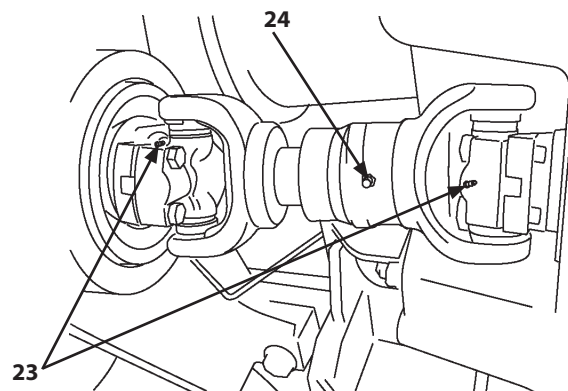
MAINTENANCE

15. Two points to rear propeller shaft universal (23)

--- every 2000 hours

16. One point to rear propeller shaft splines (24)

--- every 2000 hours



M4GB-07-017

MAINTENANCE

B. ENGINE

1 Check engine oil level --- every 10 hours (before starting the engine)

Check the oil level before starting the engine. Remove dipstick (1). Check for mixing of foreign matter or contamination in the oil. Wipe oil off the dipstick with a clean cloth. Reinsert dipstick (1) and remove it again. Read level. Oil level must be within the specified range on dipstick (1). If necessary, add the recommended engine oil via oil filler (2). Recheck oil level after adding the oil.



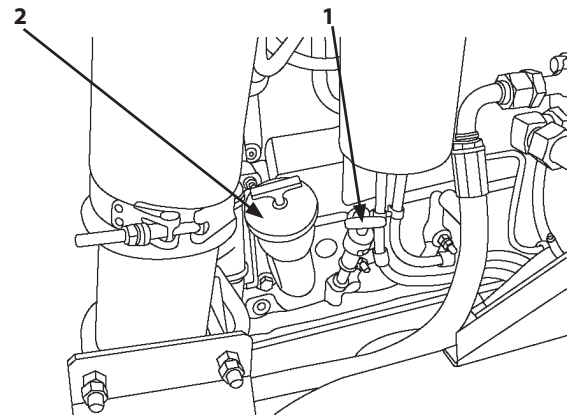
NOTE: Level the engine when adding oil or inspecting oil level. When required to check oil level after operating the machine, first stop the engine. Wait for more than 15 minutes. Then check oil level. (This means that the oil level will become stabilized after all oil delivered to respective lubrication area returns to the oil pan.) In case the oil color change, severe contamination, and/or mixing of foreign matter is found, change the oil.

2 Change engine oil --- every 500 hours

IMPORTANT: Change 250 operating hours, if the content of sulfur of fuel is 2000 ppm or more. Consult your nearest Hitachi dealer for the details.

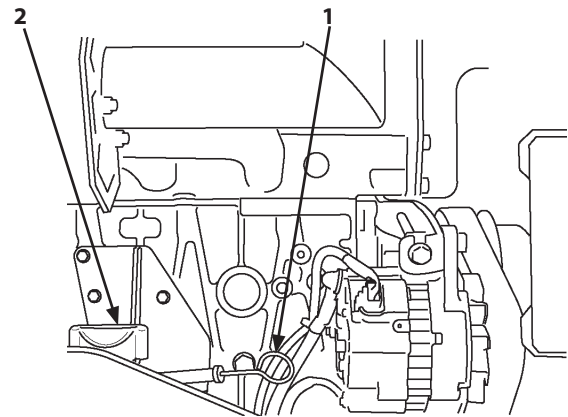
WARNING: Immediately after the machine was operated, all engine parts are hot. Wait for the engine to cool before starting any maintenance work. Failure to do so may cause severe burns.

NOTE: Improper disposition of waste oil can threaten the earth's environment and ecology. Dispose the waste oil in accordance with the local regulation and/or law. Be sure to replace the engine oil filter when changing the engine oil at the same time.



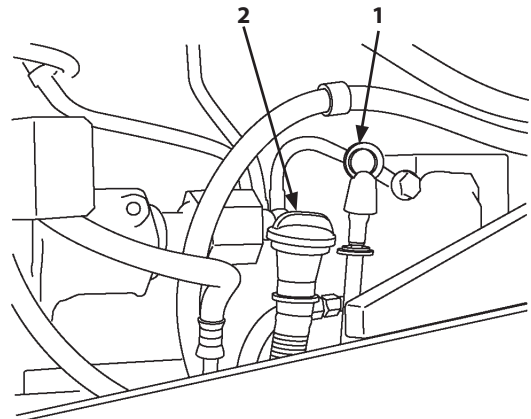
ZW180

M4GF-07-003



ZW220, ZW250

M4GB-07-018

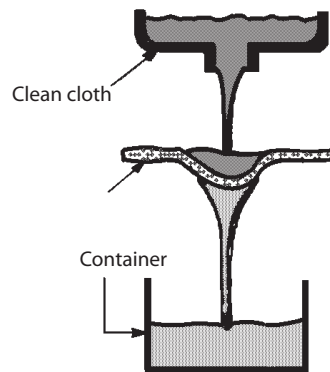


ZW310

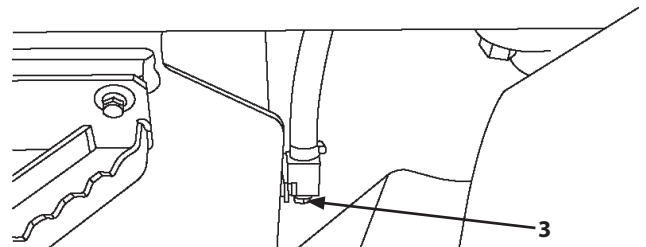
M4GB-07-019

MAINTENANCE

1. Clean the areas around the drain plug and the oil filter.
2. Arrange a 40 liter- capacity container to receive the drain oil.
3. Remove drain plug (3) provided on the fuel tank side to allow oil to drain.
4. Drain oil from the oil filter cartridge.
5. Allow oil to drain through a clean cloth to check if any foreign matters such as metal pieces are not included in the oil.
6. Install a new oil filter.
7. Securely tighten drain plug (3).
8. Remove the oil filler cap. Supply the specified amount of engine oil.
ZW180, ZW220, ZW250: 25 liters
ZW310: 39 liters
9. Check that the oil level is between the maximum and minimum level scales on the dipstick. Then, start the engine.
10. After starting the engine, check the sealing surfaces for any oil leakage.
11. Keep the engine running at slow idle speed for 5 minutes and stop the engine. About 15 minutes later, recheck the oil level. If necessary, add oil.

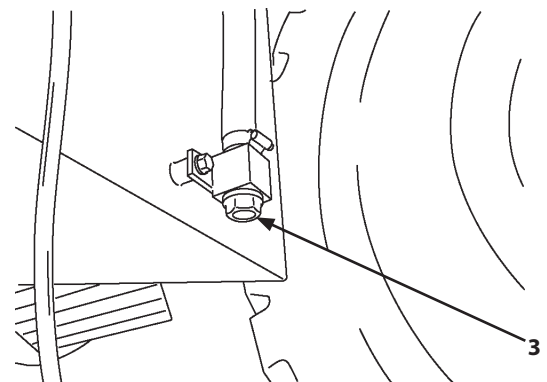


M4GB-07-020



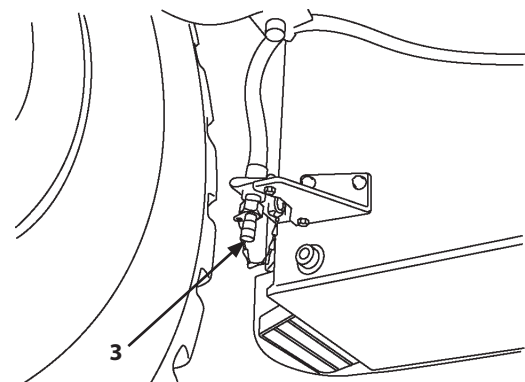
ZW180

M4GF-07-004



ZW220, ZW250

M4GB-07-021



ZW310

M4GB-07-022

MAINTENANCE

3 Replace Engine Oil Filter --- every 500 hours

⚠ WARNING: Immediately after the machine was operated, all engine parts are hot. Wait for the engine to cool before starting any maintenance work. Failure to do so may cause severe burns.

✎ NOTE: Be sure to replace the engine oil filter when changing the engine oil at the same time.

ZW180

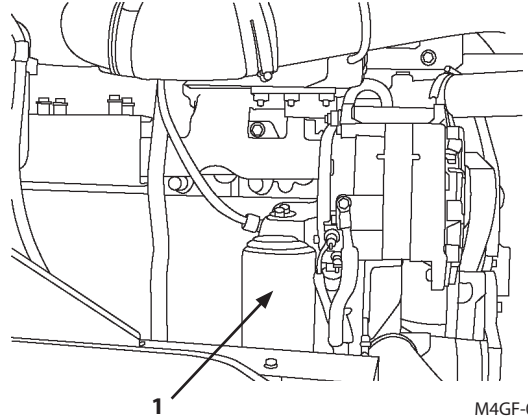
1. Clean the areas around the oil filter.
2. Before remove the oil filter (1), loosen drain plug (2) to drain oil from the oil filter. The oil is drained through the drain hose. After draining the oil, tighten the drain plug.
3. Remove the oil filter (1) from filter head with a filter wrench.

IMPORTANT:

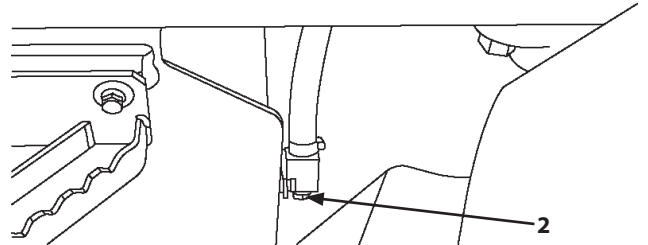
- Take care not to allow foreign matter such as dirt to enter the oil filter.
- Be careful not to damage the filter body when removing or installing the filter.
- Never reuse a oil filter.
- Be sure to use only recommended oil filter.

4. Fill the oil filter with clean engine oil.
5. After coating a new oil filter gasket with engine oil, turn the oil filter until the gasket comes in contact with the sealing surface. Take care that if the oil filter is excessively tightened, the oil filter may be deformed.

✎ NOTE: Install the oil filter with care so that the gasket is not damaged due to twist. Check for any oil leakage at the filter mounting area.



M4GF-07-005



M4GF-07-004

MAINTENANCE

ZW220, ZW250

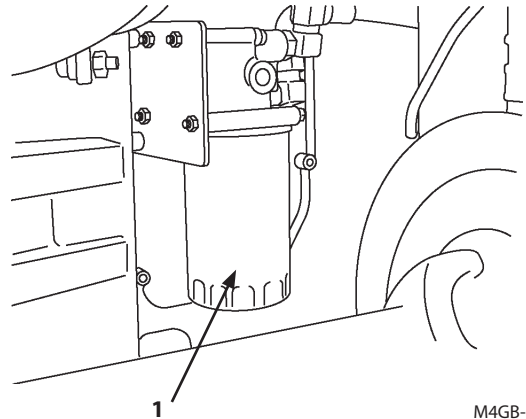
1. Clean the areas around the oil filter.
2. Before remove cartridge type element (1), loosen drain plug (2) to drain oil from the cartridge. The oil is drained through the drain hose. After draining the oil, tighten the drain plug.
3. Remove cartridge type element (1) by turning it counter-clockwise with a filter wrench.

IMPORTANT:

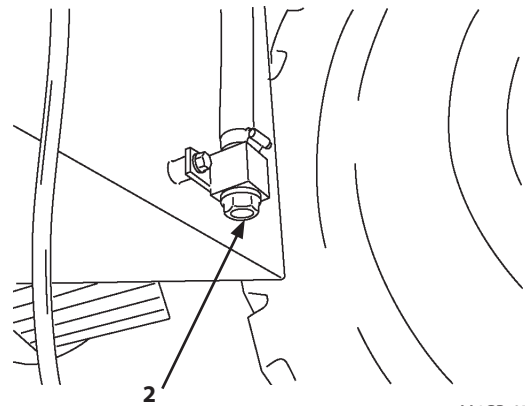
- **Take care not to allow foreign matter such as dirt to enter the oil filter.**
- **Be careful not to damage the filter body when removing or installing the filter.**
- **Never reuse a cartridge type element.**

4. After coating a new cartridge gasket with engine oil, turn the cartridge clockwise until the gasket comes in contact with the sealing surface.
5. Using the filter wrench, tighten the cartridge 3/4 to 1 turn more. Take care that if the cartridge is excessively tightened, the cartridge may be deformed.

 **NOTE:** Install the cartridge with care so that the gasket is not damaged due to twist. Check for any oil leakage at the filter mounting area.



M4GB-07-023

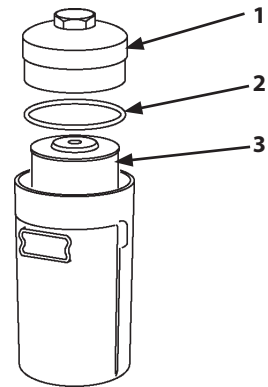


M4GB-07-021

MAINTENANCE

ZW310

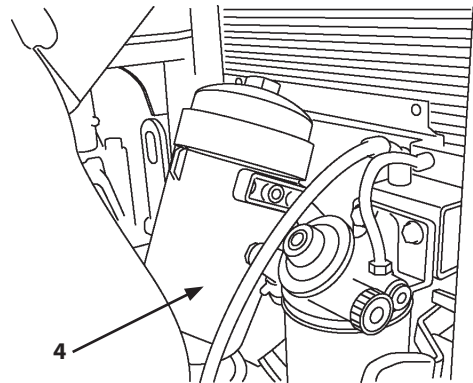
1. Clean the areas around the oil filter.
2. Before remove cartridge type element (4), loosen drain plug (5) to drain oil from the cartridge. The oil is drained through the drain hose. After draining the oil, tighten the drain plug.
3. Remove oil filter cap (1) and cartridge type element (3) using a filter wrench.
4. Holding the top side of oil filter cap (1) and the bottom side of cartridge type element (3), press the cartridge type element bottom to remove the cartridge type element.



M4GB-07-024

IMPORTANT:

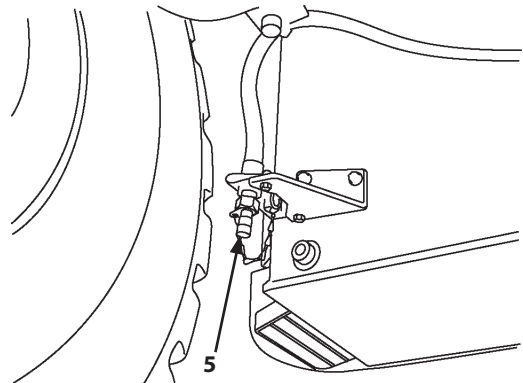
- **Take care not to allow foreign matter such as dirt to enter the oil filter.**
 - **Be careful not to damage the filter body when removing or installing the filter.**
 - **Never reuse a cartridge type element.**
5. Replace oil filter cap O-ring (2) with a new one. Coat grease to the O-ring.
 6. Install new cartridge type element (3) by pushing it into the oil filter cap.
 7. Install the cartridge type element and oil filter cap to the filter body.



M4GB-07-025

Tightening torque: 40 N•m (4.0 kgf•m)

 **NOTE:** Install the cartridge with care so that the O-ring is not damaged due to twisting. Check for any oil leakage at the filter mounting area.



M4GB-07-022

MAINTENANCE

C. POWER TRAIN

- 1** Check Transmission Oil Level
--- every 10 hours (daily)

WARNING: Check the oil level while running the engine with care about the following points.

- Move forward/reverse lever (2) to neutral and turn parking brake switch (3) ON.
- After leveling the bucket on the ground, move the pilot control shut-off lever to the LOCK position.
- Set the articulation lock bar.

IMPORTANT: Do not start the engine when the transmission oil level is low. Damage to the transmission may result. Do not use transmission oils other than those listed in the "Brand Names of Recommended Transmission Oil".

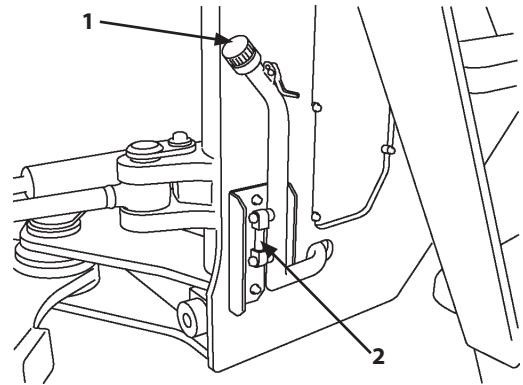
Before starting the engine, check the transmission oil level with oil level gauge (1). When the oil level is correct, the float in the oil level gauge shall be in the center with the oil cooled. Refill the oil as necessary from transmission oil filler port (2).

ZW180, ZW220, ZW250

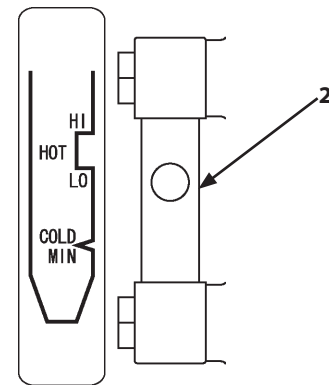
When checking oil level before operating the machine, normally the float in gauge (2) must be higher than the COLD MID position. In case the float is lower than the COLD MID position, add oil through transmission oil filler port (1). When the transmission oil temperature is in the normal range of 80°C to 90°C, the float in the gauge (2) shall be between the HI and the LOW notches at the HOT scale on the oil level indication decal. If the float is outside the appropriate range, add or drain oil so that the float enters the range between the HI and LO notches.

ZW310

Check oil level when the oil temperature is low before starting operation. The float in the gauge shall be normally in the center. If the float is not seen in the gauge and the oil level is lower than the specified level, add oil until the float is seen at the gauge center. Take care not to add oil excessively.

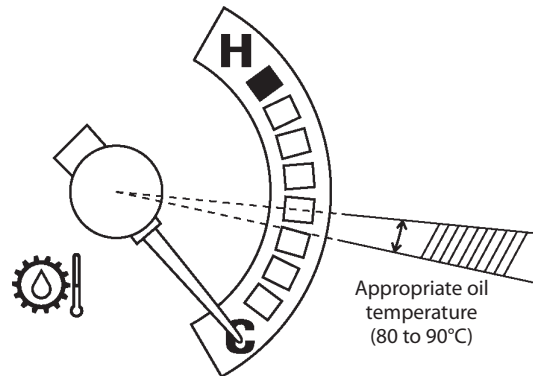


M4GB-07-026

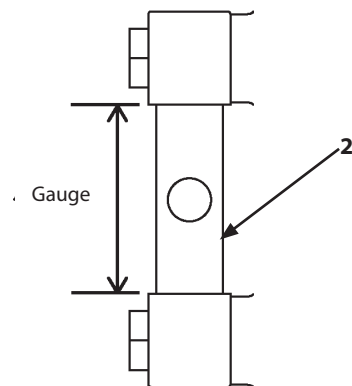


ZW180, ZW220, ZW250

M4GB-07-027



M4GB-07-028



ZW310

M4GB-07-029

MAINTENANCE

2 3 Change Transmission Oil and Transmission Oil Filter ZW180, ZW220, ZW250

--- every 1000 hours (100 hours at first time only)

ZW310 --- every 1000 hours (250 hours at first time only)

4 Clean Transmission Oil Strainer ZW310 --- every 1000 hours

WARNING: Unexpected machine movement may cause a serious accident. After stopping the machine, be sure to stop the engine or apply the parking brake. Do not only rely on the forward/reverse lever in neutral.

WARNING: Before changing oil, install lock bar (4) to securely hold the front and rear frames to avoid the occurrence of an accident due to unexpected machine movement.

IMPORTANT: Do not use transmission oils other than those listed in the "Brand Names of Recommended Transmission Oil"

NOTE: Be sure to replace the transmission oil filter when changing the transmission oil at the same time.

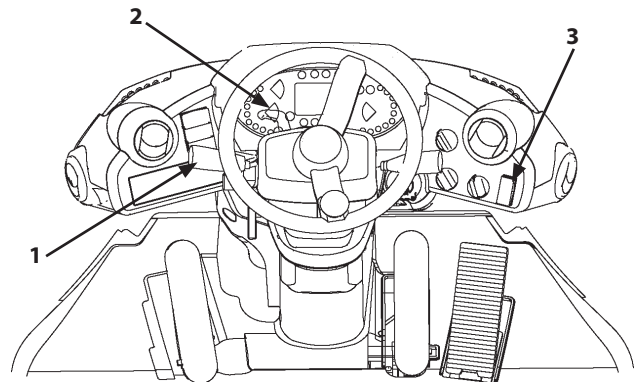
1. Operate the machine until the transmission oil is heated to the appropriate temperature.
2. Park the machine on solid level ground. Lower the bucket to the ground.
3. Move forward/reverse lever (1) to neutral. Press neutral lever lock (2) to the LOCK position.
4. Apply parking brake (3).
5. Install articulation lock bar (4) to the front and rear frames.

IMPORTANT: The machine is equipped with a turbocharged engine. Perform cool down operation before stopping the engine. Failure to do so may cause the lubricant on the turbocharger bearing surfaces to desiccate due to the intense heat present inside the turbocharger, possibly causing damage to the turbocharger.

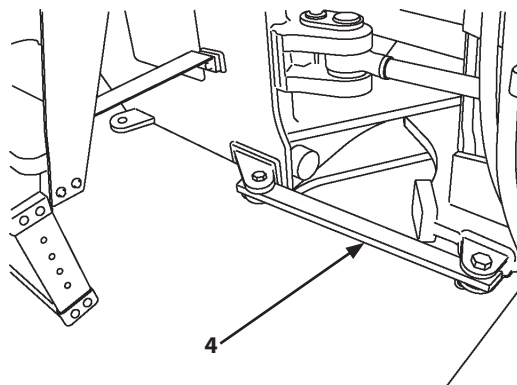
6. Turn the key switch OFF to stop the engine. Leave the machine untouched for 10 minutes.
7. Prepare a container of more than 50 L capacity to receive the drain oil.

NOTE: The drain plug is magnetized. If excessive amount of metal pieces are found adhered to the drain plug, contact your nearest HITACHI dealer.

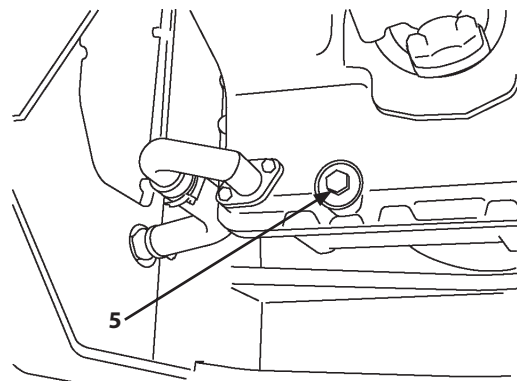
8. Remove drain plug (5) from the transmission bottom to drain the oil. Dispose of the drain oil in the proper way.



M4GB-07-004

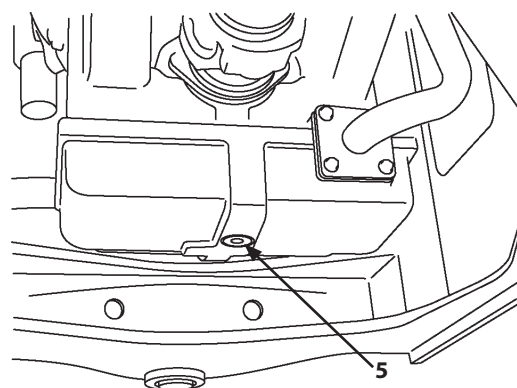


M4GB-07-136



ZW180, ZW220, ZW250

M4GB-07-030



ZW310

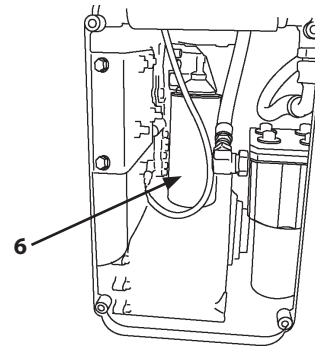
M4GB-07-031

MAINTENANCE

9. Securely tighten drain plug (5).
10. Using a filter wrench, turn cartridge filter (6) counter-clockwise to remove it.
11. Clean the filter-seating surface. After coating the new cartridge filter gasket surface with new oil, lightly turn the cartridge filter clockwise by hand until the cartridge filter sealing surface comes in contact with the filter-seating surface.
12. At this time, further tighten the cartridge filter 3/4 turns using a filter wrench. Take care not to excessively tighten the cartridge filter. The cartridge filter may become deformed if excessively tightened.
13. Clean transmission strainer (7) on the ZW310.
 - Remove the suction tube mounting bolts (4 used).
 - Take out strainer (7). Remove dirt and foreign matters from the strainer. Clean the strainer with cleaning oil. In case the strainer is broken, replace the strainer with a new one together with the gasket and O-ring.
 - Install the strainer, O-ring, and gasket. Tighten the suction tube mounting bolts.
14. Refill the specified amount of oil through transmission oil filler port (8).
 - ZW180: 30 liters
 - ZW220, ZW250: 36 liters
 - ZW310: 36 liters
15. Start the engine and keep it running for two minutes.
16. Check that the oil level is within the specified range in oil level gauge (6). Refill as necessary.

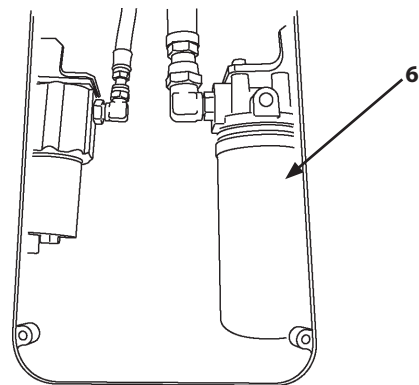


NOTE: Never reuse a cartridge type element. Install the cartridge with care so that the O-ring is not damaged due to twisting. Check for any oil leakage at the drain plug and the filter mounting area.



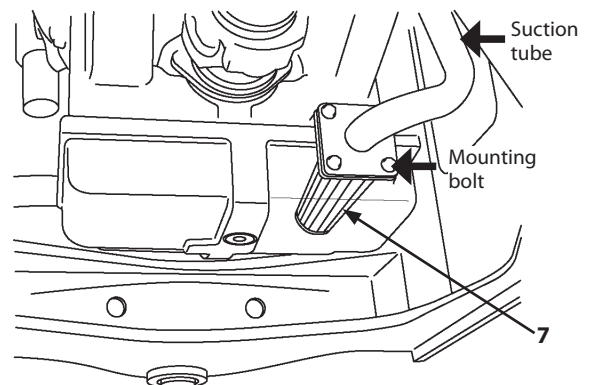
ZW180, ZW220, ZW250

M4GB-07-032



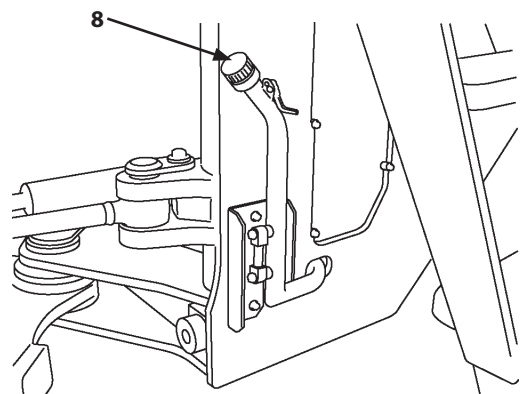
ZW310

M4GB-07-033



ZW310

M4GB-07-034



M4GB-07-026

MAINTENANCE

5 Change Axle Oil --- every 2000 hours (250 hours at first time only)



WARNING: Take care about the following points.

- Hydraulic oil becomes hot and pressurized during operation. Severe burns may result if skin comes in contact with escaping hydraulic oil immediately after operation. Wait for the oil to cool before starting any maintenance work.
- Lock the front and rear frames with the articulation lock bar.

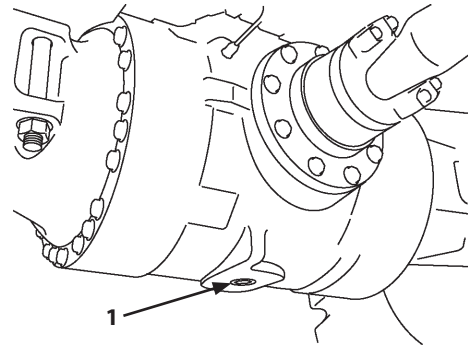
IMPORTANT: Do not use axle oils other than those listed in the "Brand Names of Recommended Axle Oil".

Change Axle Oil

1. Park the machine on a solid level surface. Lower the bucket to the ground. Stop the engine.
2. Clean the vicinity around drain plug (1) and the oil drain plug hole.
3. Arrange a container of 50 liters capacity to receive the drain oil.
4. Remove drain plug (1) to drain the oil.
5. Securely tighten drain plug (1).
6. Refill the specified amount of oil through oil level plug (2) hole.

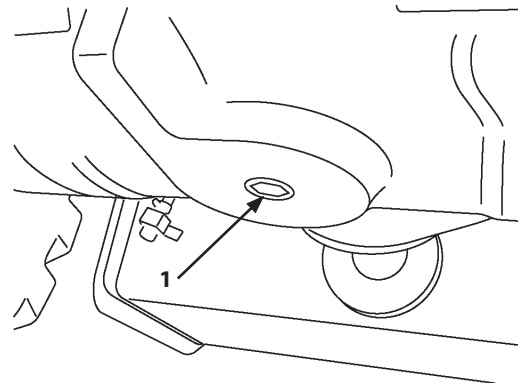
	Front	Rear
ZW180	28 liters	28 liters
ZW220	32 liters	32 liters
ZW250	40 liters	40 liters
ZW310	48 liters	48 liters

IMPORTANT: It takes time for oil to fully lubricate the overall front axle. After installing the plug, allow the machine to drive for several minutes. Then, stop the engine and check the axle for any oil leaks.



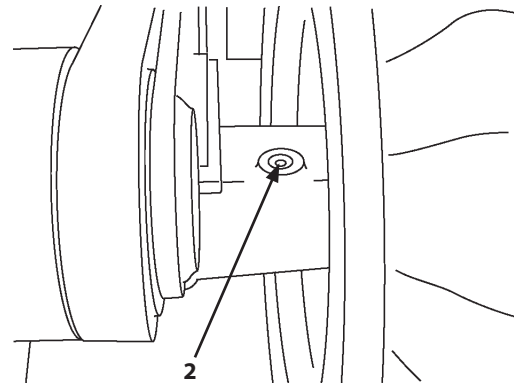
Front Axle

M4GB-07-035



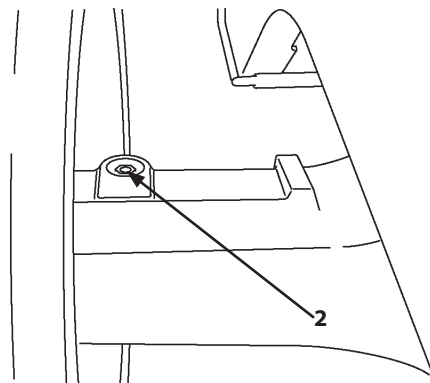
Rear Axle

M4GB-07-036



Front Axle

M4GB-07-037



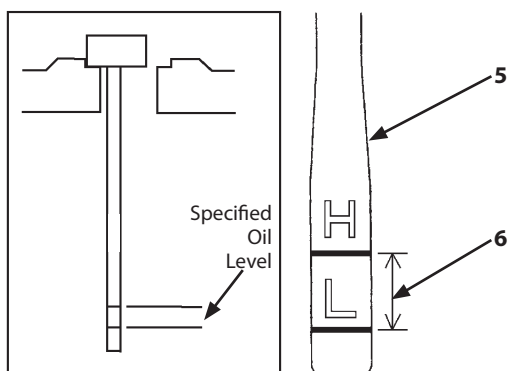
Rear Axle

M4GB-07-038

MAINTENANCE

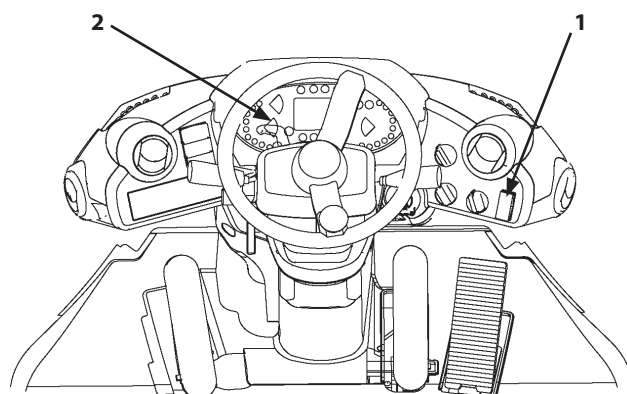
Check oil level

1. Park the machine on solid level ground. Lower the bucket to the ground. Stop the engine.
2. Turn parking brake switch (1) ON. Move neutral lever lock (2) to the LOCK position.
3. Block the front and rear frames with articulate lock bar (3).
4. Clean the vicinity of oil level plug (4).
5. Remove oil level plug (4). Clean the tip of dipstick (5) connected to oil level plug (4) with a clean cloth.

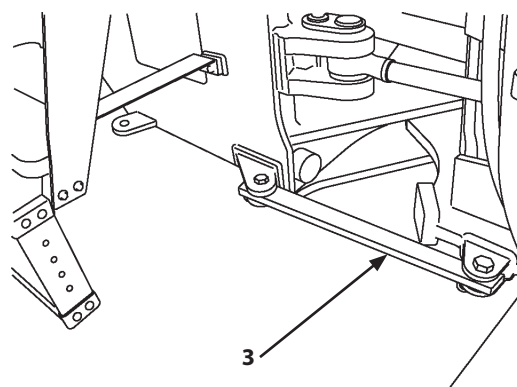


M4GB-07-039

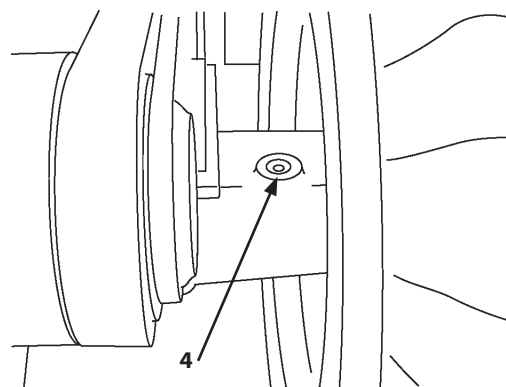
6. Make the plug lower surface contact to the axle seat face. Oil level must be between marks H and L on the dipstick (6). If necessary, add oil.



M4GB-01-004

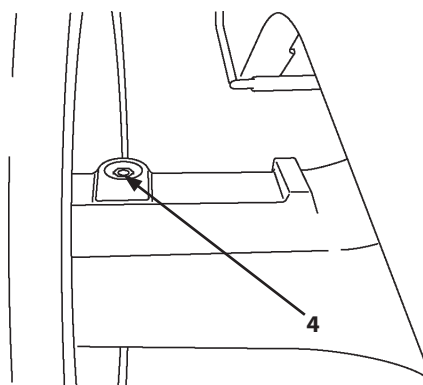


M4GB-01-136



Front Axle

M4GB-07-037



Rear Axle

M4GB-07-038

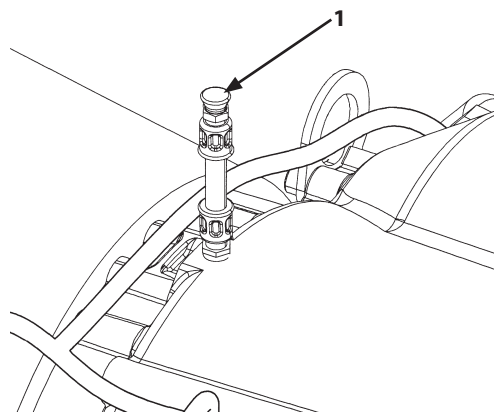
MAINTENANCE

6 Clean Torque Converter Air Breather --- every 1000 hours

WARNING: Be sure to wear safety glasses when cleaning the air breather with compressed air.

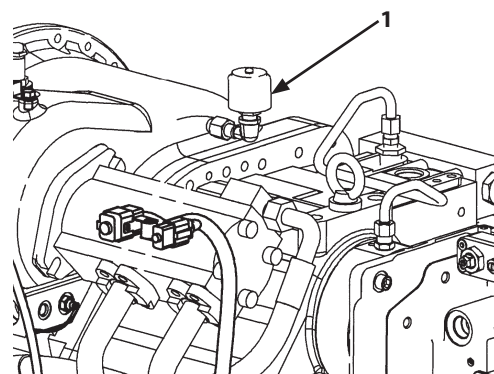
Air breather (1) is located inside the side cover.

1. Clean the vicinity around air breather (1) before removing the air breather.
2. Put a cover on the air breather port to prevent foreign matter from entering.
3. Clean air breather (1) using compressed air. If completely contaminated, wash the air breather with a cleaning solvent and reinstall it.
4. Take care not to allow foreign matter to enter into the torque converter when reinstalling the air breather.



ZW180, ZW220, ZW250

M4GB-07-040



ZW310

M4GB-07-041

MAINTENANCE

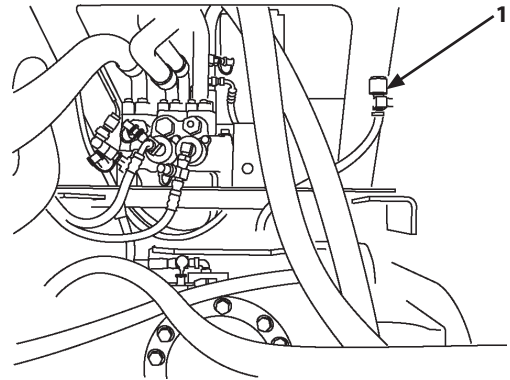
7 Clean Axle Housing Air Breather --- every 500 hours

WARNING: Be sure to wear safety glasses when cleaning the air breather with compressed air.

Front Axle Breather (1)

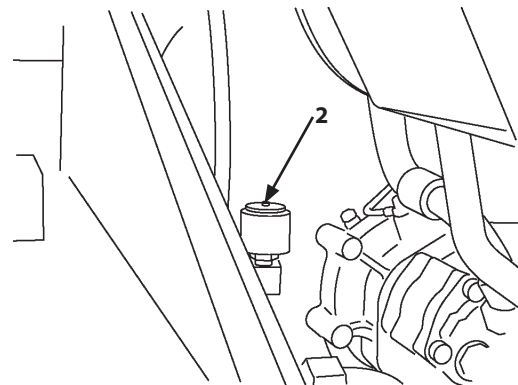
Rear Axle Breather (2)

1. Clean the vicinity around the air breather before removing the air breather.
Clean the areas around the air breathers before removing the air breathers. Open the base machine front cover. Front axle air breather (1) is located at the right side. Open the base machine side cover. Rear axle air breather (2) is located at the left side.
2. Put a cover on the air breather port to prevent foreign matter from entering.
3. Clean the air breather using compressed air. If completely contaminated, wash the air breather with a cleaning solvent and reinstall it.
4. Take care not to allow foreign matter to enter into the axle housing when reinstalling the air breather.



Front Axle Breathe

M4GB-07-042



Rear Axle Breather

M4GB-07-043

MAINTENANCE

D. HYDRAULIC SYSTEM

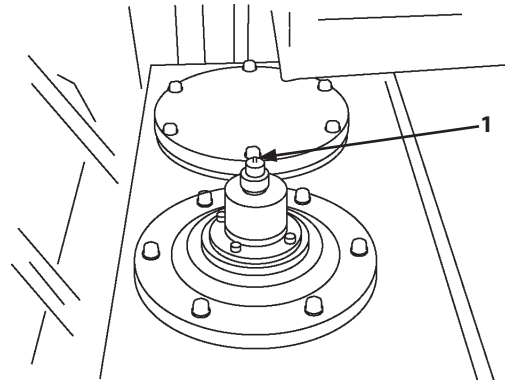
INSPECTION AND MAINTENANCE OF HYDRAULIC EQUIPMENT

⚠ 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 components only after components, hydraulic oil and lubricants are completely cooled, and after releasing residual pressure.
 - 3.1 Bleed air from the hydraulic oil tank to release internal pressure.
 - 3.2 Be sure to relieve the air pressure from the hydraulic oil tank by pressing air bleed valve (1).
 - 3.3 Allow the machine to cool down.
Note that servicing heated and pressurized hydraulic components may cause hot parts and/or oil to fly off or escape suddenly, possibly resulting in personal injury.
 - 3.4 Keep body parts and face away from plugs or screws when removing them.
Hydraulic components may be pressurized even when cooled.
 - 3.5 Never attempt to service or inspect the hydraulic circuits on slopes. They are highly pressurized due to self-weight.

IMPORTANT:

- 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:
- Wash hoses, pipes, and the tank interior with a washing liquid and thoroughly wipe it out before reconnecting them.
- Only use O-rings that are free of damage or defects. Be careful not to damage them during reassembly.
- Do not allow high pressure hoses to twist when connecting them. The life of twisted hoses will be shortened considerably.
- Carefully tighten low pressure hose clamps. Do not overtighten them.



M4GB-07-044

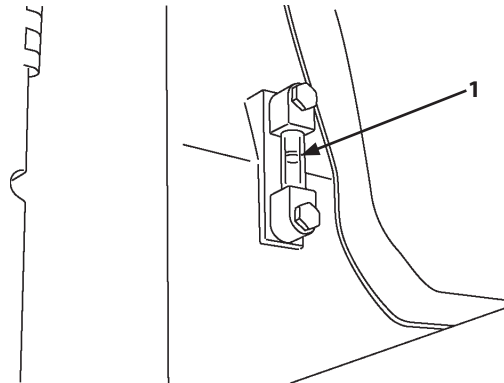
MAINTENANCE

- 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.
- Do not use hydraulic oils other than those listed in the table "Brand names of recommended hydraulic oil".
- Never run the engine without oil in the hydraulic oil tank.

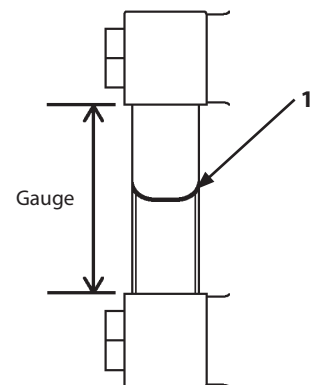
1 Check Hydraulic Oil Level --- every 10 hours (daily)

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

1. Park the machine on a level surface.
Lower the bucket to the ground.
2. Check oil level with level gauge (1) on hydraulic oil tank.
Oil must be between marks on the gauge. If necessary, add oil.



M4GB-07-045



M4GB-07-160

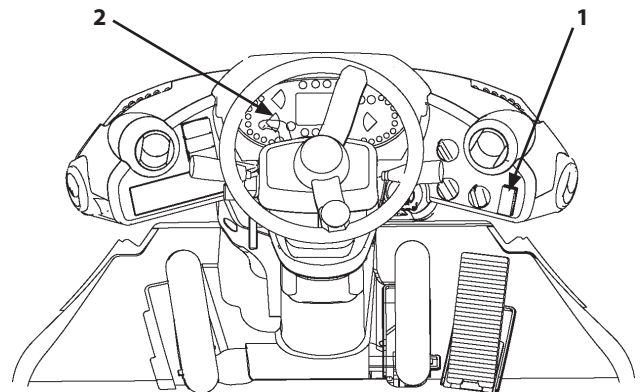
MAINTENANCE

2 Change Hydraulic Oil --- every 4000 hours

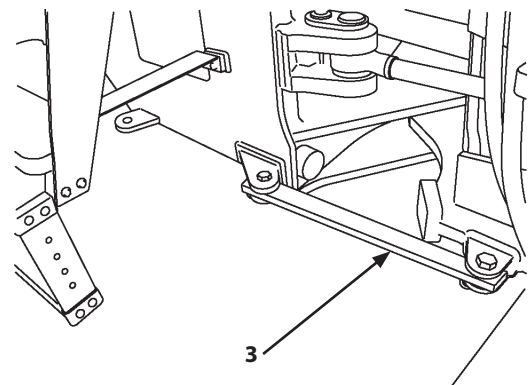
WARNING: Hydraulic oil becomes hot and pressurized during operation. Severe burns may result if skin comes in contact with escaping hydraulic oil immediately after operation. Wait for the oil to cool before starting any maintenance work.

IMPORTANT: Do not use hydraulic oils other than listed in the "Brand Names of Recommended Hydraulic Oil".

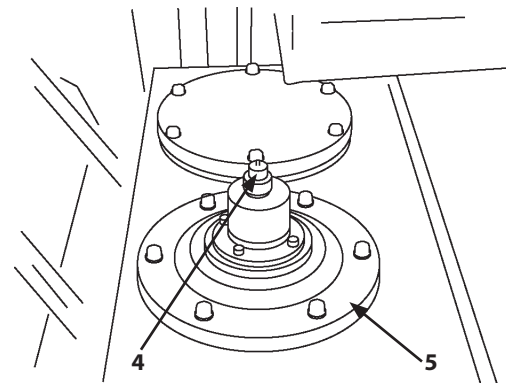
1. Park the machine on solid level surface. Lower the bucket to the ground. Stop the engine.
2. Turn the parking brake switch (1) ON. Press the neutral lever lock (2) to the LOCK position.
3. Lock the front and rear frames with the articulation lock bar (3).
4. Before changing the hydraulic oil, be sure to relieve the air pressure from the hydraulic oil tank by pressing air bleed valve (4). Remove cover (5).
5. Arrange a container of approx 150 liters. Remove hydraulic oil using an oil supply pump.



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M4GB-01-136



M4GB-07-044

MAINTENANCE

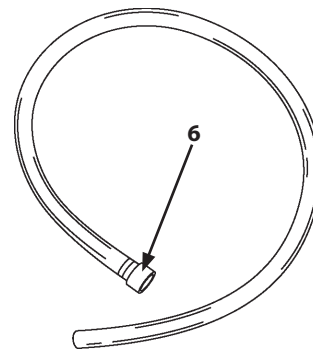
6. Remove the right side cover from the base machine. Connect attached drain hose (6) to drain valve (7) on the bottom of the hydraulic oil tank to drain oil.
7. Supply hydraulic oil through cover (5) hole on the top of the hydraulic oil tank while checking the oil level at level gauge (8).

	Capacity of hydraulic oil tank	Total oil capacity in the hydraulic system
ZW180	100 liters	150 liters
ZW220	114 liters	190 liters
ZW250	114 liters	210 liters
ZW310	128 liters	230 liters

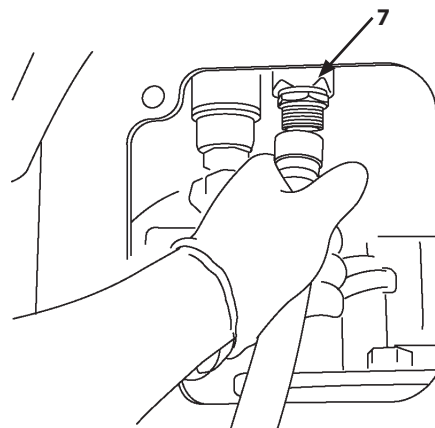
8. Install cover (5) with bolts (6 used).

IMPORTANT: When changing hydraulic oil, take care not to enter foreign matters such as dirt, water, and /or sand into the hydraulic oil tank.

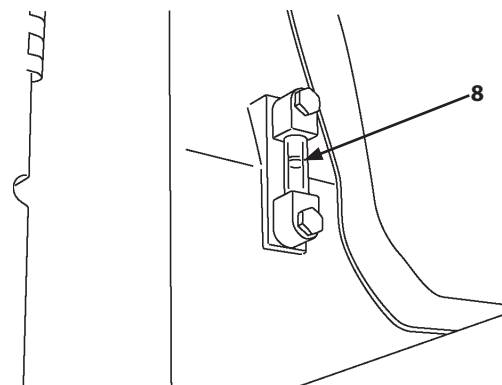
9. Start the engine. Slowly raise or lower the arm and tilt the bucket forward and backward. Stop the engine. Check for any oil leakage. Check the oil level using level gauge (8).



M4GB-07-046



M4GB-07-047



M4GB-07-045

MAINTENANCE

Bleed air from the hydraulic system.

After changing hydraulic oil or replacing the return filter, pilot filter and/or suction filter, bleed air from the hydraulic system following the procedures below:

Bleed air from the hydraulic circuit:

After supplying oil, start the engine. Move the bucket and lift arm cylinders several times to bleed air mixed in the hydraulic circuit.

Rest the bucket on the ground to resume the hydraulic oil level check position.

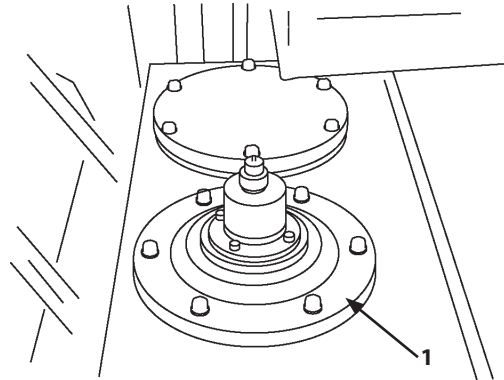
Stop the engine. Check the oil level. Add oil as needed.

MAINTENANCE

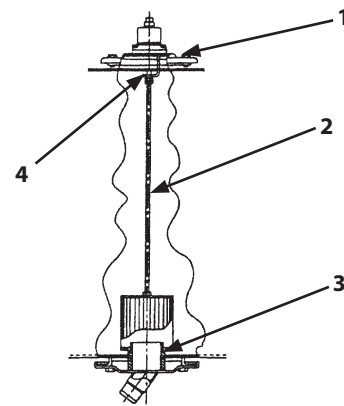
3 Clean suction filter --- each time the hydraulic oil is changed.

A suction filter is located on the bottom of the hydraulic oil tank. Clean the suction filter when changing hydraulic oil.

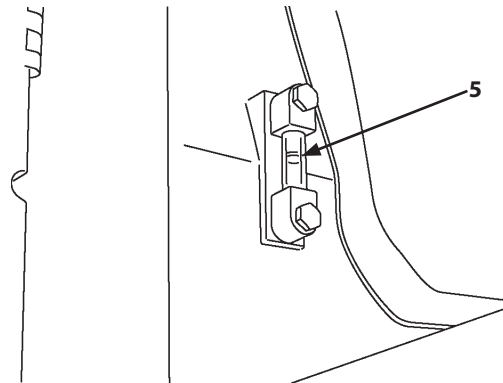
1. After draining hydraulic oil, remove cover (1). Lift to take out rod (2). Put a cover over the oil supply port to prevent foreign matter from entering.
2. Clean the suction filter and the hydraulic oil tank inside with cleaning oil.
3. Supply the specified volume of oil through the oil supply port while checking the oil level with the oil gauge.
4. Securely insert the suction filter into pipe (3) when installing the suction filter.
5. Before installing cover (1), check that the rod top is correctly inserted into support hole (4) on cover (1). Then, install cover (1) with bolts.
Tightening torque: 19.5 N•m (1.99 kgf•m)
6. Start the engine. While slowly raising or lowering the arm and tilting the bucket forward and backward, check for any abnormality. Stop the engine. Check the oil level using level gauge (5).



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M4GB-07-048



M4GB-07-045

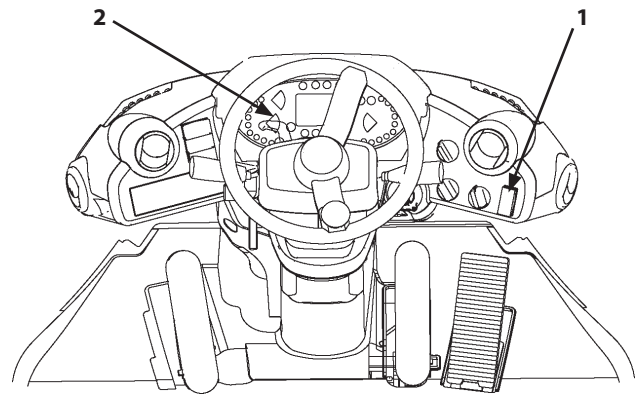
MAINTENANCE

4 Replace Pilot Oil Filter --- every 2000 hours

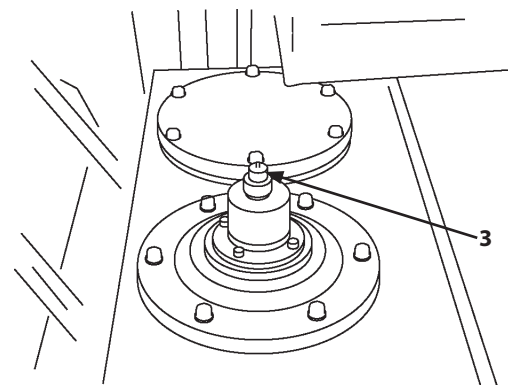
WARNING: Hydraulic oil becomes hot and pressurized during operation. Severe burns may result if skin comes in contact with escaping hydraulic oil immediately after operation. Wait for the oil to cool before starting any maintenance work.

1. Park the machine on solid level surface. Lower the bucket to the ground. Stop the engine.
2. Turn the parking brake switch (1) ON. Press the neutral lever lock (2) to the LOCK position.
3. Lock the front and rear frames with the articulation lock bar.
4. Before replacing the filter element, be sure to relieve the air pressure from the hydraulic oil tank by pressing air bleed valve (3).
5. Remove the inspection cover for left side rear frame.
6. Rotate the hexagonal section on the bottom of case (4) counterclockwise using a spanner to remove case (4) from head cover (5).
7. While turning element (7), remove the element downward.
8. Replace O-ring (6) with a new one.
9. Sufficiently seat O-ring (6) in the O-ring groove on head cover (5).
10. Coat the seal surface of new element (7) with hydraulic oil. While turning element (7), completely install element (7) into head cover (5) using care not to damage the element.
11. Take care never to allow water and/or dust to enter the filter case.
12. Install case (4) into head cover (5) while rotating case (4) clockwise.
Tightening torque: 39 N·m (4 kgf·m)
19.6 to 29.4 N·m (2 to 3 kgf·m)
13. After replacing the filter, bleed air from the hydraulic pump and check the oil level in the hydraulic oil tank.
[Refer to the descriptions for "Bleed air from the hydraulic system" in [2].] If the machine is operated without bleeding the air mixed in the hydraulic circuit, damage to the hydraulic pump may result.

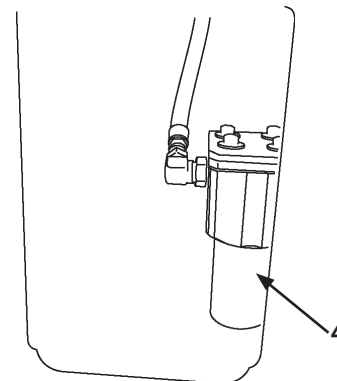
NOTE: Replace the element at the regular intervals to maintain the clean hydraulic oil and extend the service life-time of the hydraulic components.



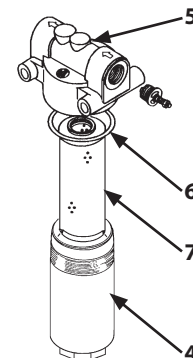
M4GB-01-0004



M4GB-07-044



M4GB-07-049



M4GB-07-050

MAINTENANCE

5

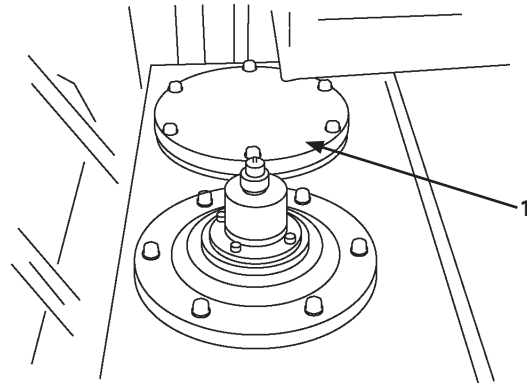
Replace Hydraulic Tank Oil Filter --- every 1000 hours

WARNING: Hydraulic oil becomes hot and pressurized during operation. Severe burns may result if skin comes in contact with escaping hydraulic oil immediately after operation. Wait for the oil to cool before starting any maintenance work. Especially when removing the filter, be aware that the remaining oil in the filter may spill. Use extra care.

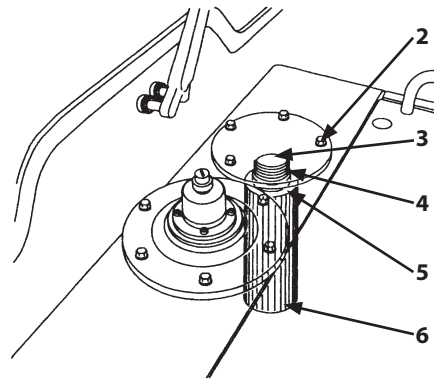
Replacement procedures

1. Park the machine on a solid level surface. Lower the bucket to the ground. Stop the engine.
2. Turn the parking brake switch ON. Press the neutral lever lock to the LOCK position.
3. Lock the front and rear frames with the articulation lock bar.
4. Clean the vicinity around cover plate (1).
5. Arrange a container and workshop towels to receive the spilled oil and the element.
6. Loosen bolts (2) (6 used) to remove cover (1) and O-ring (3). When removing cover (1), slowly remove the cover while pressing the cover downward so that spring (4) does not fly off.
7. Remove spring (4), valve (5) and element (6).
8. Replace element (6) and O-ring (3) with new ones. Install new element and O-ring in the hydraulic oil tank. Before installing element (6), make sure that rubber (7) is present.
9. Install cover (1) with bolts (2) (6 used). Tightening torque: 49.9 N·m (5.1 kgf·m)
10. After replacing the return filter element, bleed air from the hydraulic pump and check the oil level in the hydraulic oil tank. [Refer to the descriptions for "Bleed air from the hydraulic system" in item **2**.] If the machine is operated without bleeding the air mixed in the hydraulic circuit, damage to the hydraulic pump may result.

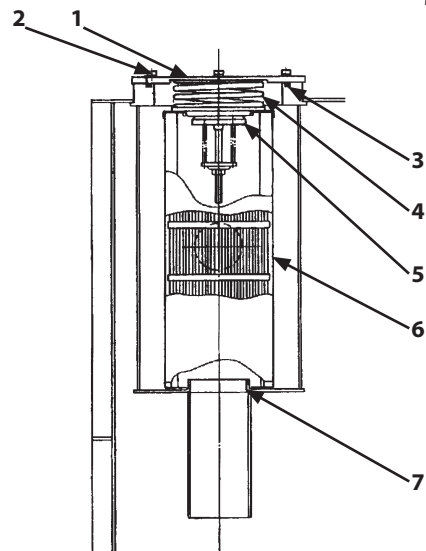
NOTE: Replace the element at the regular intervals to maintain the hydraulic oil clean and extend the service life-time of the hydraulic components.



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M4GB-07-051



M4GB-07-052

MAINTENANCE

6

Check Hoses and Lines

--- every 10 hours (daily)

--- every 250 hours

⚠ WARNING: 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

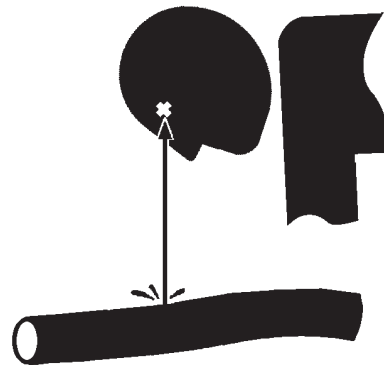
⚠ WARNING: Hydraulic oil and lubricant leaks can lead to fire that may result in serious injury.

To avoid this hazard :

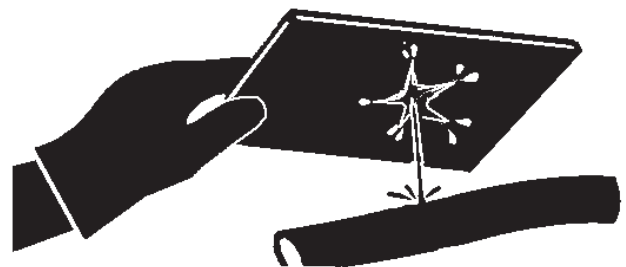
- Park the machine on a firm, level surface.
Lower the bucket to the ground.
Stop the engine. Remove key from the key switch.
Push the front control lever lock to the LOCK position.

- 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 1-2.

- 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 Hose ends Fittings	Leak (1) Leak (2) Leak (3)	Replace Replace Retighten or replace hose or O-ring
Every 250 hours	Hose covers Hose ends	Crack (4) Crack (5)	Replace Replace
	Hose covers Hose covers	Exposed reinforcement (6) Blister (7)	Replace Replace
	Hose	Bend (8)	Replace
	Hose	Collapse (9)	Replace (Use proper bend ra- dius)
	Hose ends and fit- tings	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.

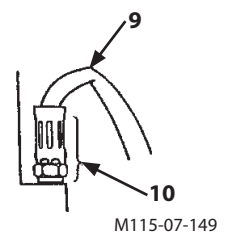
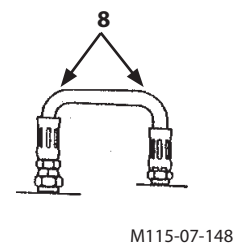
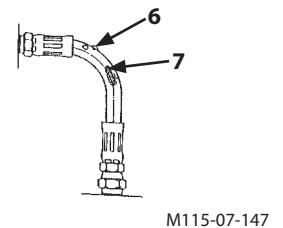
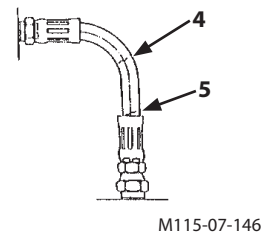
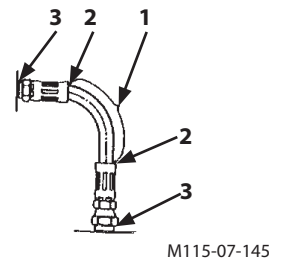
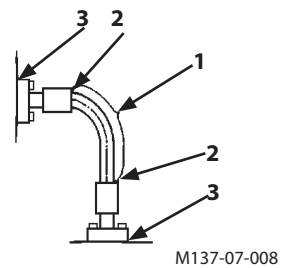
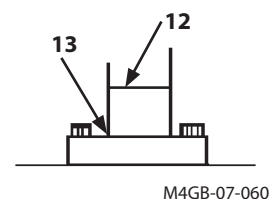
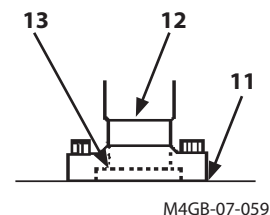


Fig.1

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
Every 250 hours	Joint neck Welded surfaces on joints Clamps	Crack (13)	Replace
		Crack (12)	Replace
		Missing	Replace
		Deformation	Replace
		Loose	Retighten



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

Fig.2

MAINTENANCE

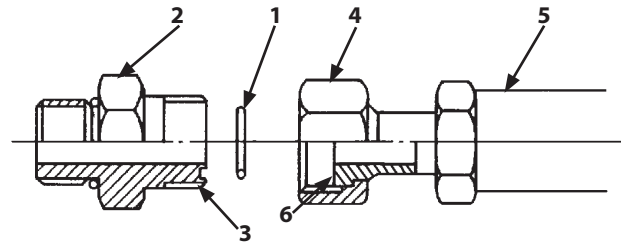
SERVICE RECOMMENDATIONS FOR HYDRAULIC FITTINGS

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.

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.



M104-07-033

Torque specifications ±10%

Width across flats (mm)		27	32	36	41, 46
Fastening torque	N•m	93	132	176	206
	(kgf•m)	(9.5)	(14)	(18)	(21)
	(lbf•ft)	(69)	(101)	(130)	(152)

MAINTENANCE

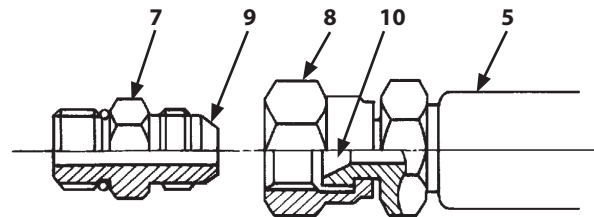
Metal Face Seal Fittings

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	36
Fastening torque	N•m	29	39	93
	(kgf•m)	(3)	(4)	(9.5)
	(lbf•ft)	(21.5)	(29)	(69)

MAINTENANCE

E. FUEL SYSTEM

- 1** Check Fuel Level --- every 10 hours (daily)

WARNING: Beware of fire Fuel is flammable. Keep fuel away from fire hazards.

Recommended Fuel

Use high quality DIESEL FUEL only (JIS K-2204) (ASTM 2-D). Kerosene must NOT be used.

IMPORTANT: Always fill the fuel tank with the specified diesel fuel. Failure to do so may cause engine trouble and also making it difficult for the engine to start.

Refueling

1. Park the machine on a level surface.
2. Lower the bucket to the ground.
3. Engage the park brake.

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 5 minutes.
5. Stop the engine. Remove the key from the key switch.
6. Pull the front control lever lock to the LOCK position.

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

7. Check fuel gauge (1) of the monitor panel. Add fuel if necessary.

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

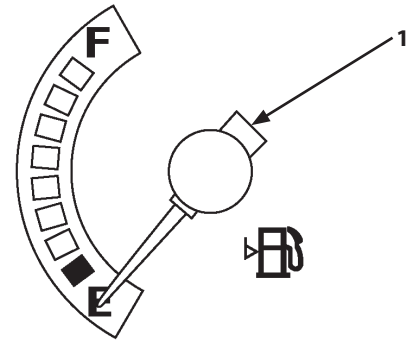
8. To avoid condensation, fill the tank at the end of each day's operation. Take care not to spill fuel on the machine or ground.

Fuel tank capacity

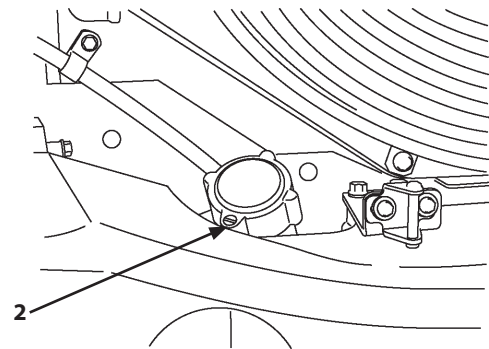
- ZW180: 230 liters
- ZW220: 285 liters
- ZW250: 340 liters
- ZW310: 382 liters

9. Install and lock fill cap (2) immediately after fueling.

IMPORTANT: After operating in dusty atmosphere or freezing weather, check and clean the fuel tank breather pipe open end.



M4GB-01-030

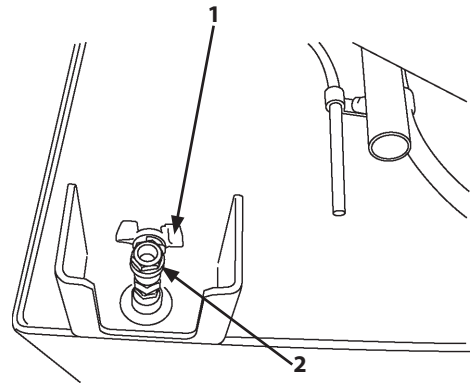


M4GB-01-151

MAINTENANCE

2 Drain water and sediment from fuel tank --- every 1000 hours

Before starting to operate the machine, remove plug (2) from the tip of drain valve (1) on the fuel tank bottom and open drain valve (1) to drain water and/or sediment from the fuel tank. Plug (2) is installed to protect drain valve (1) from vandalism.



M4GB-07-063

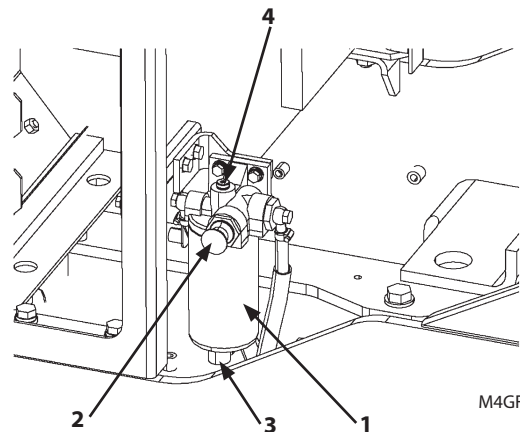
3 Check and drain water separator --- every 10 hours

ZW180

Water separator (1) is a device to separate water mixed in fuel. The water separator and the fuel pre-filter are comprised of one unit. When water accumulates, the engine warning indicator (5) and the service indicator (6) will flash. Be sure to drain water.

Drain procedures

1. Connect a transparent drain hose provided in the toolbox to drain plug (3).
2. Loosen air bleed plug (4) on the top of water separator (1). Loosen drain plug (3) on the bottom of the water separator case to drain water accumulated in the case.
3. After draining, be sure to tighten plugs (3 and 4). Store the used hose in the toolbox.

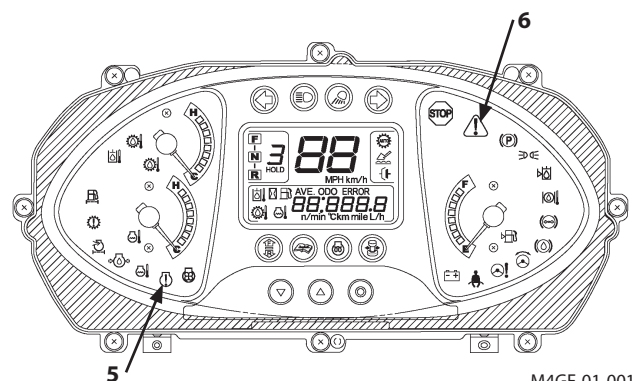


M4GF-07-011

Bleed air from the fuel system

NOTE: If air is mixed in the fuel system, the engine may become difficult to start or engine trouble may occur. After allowing the fuel tank to empty, draining the water separator, or replacing the fuel pre-filter element, be sure to bleed air from the fuel system. In case water content in the fuel is high, shorten the check and drain intervals.

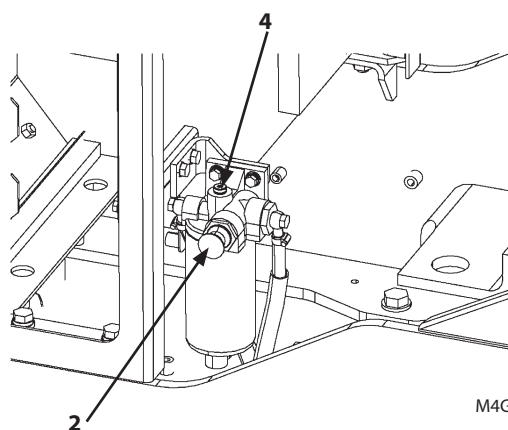
1. Turn the key switch ON. The electric fuel pump is driven, starting to bleed air.
2. Turn to the left to loosen the top (disk plate) of feed pump (2). The inner spring force raises the disk plate.



M4GF-01-001

MAINTENANCE

3. Loosen air bleed plug (4). Continue to press feed pump (2) until fuel including no air bubbles flows out through around the air bleed plug.
4. After air is bled, tighten air bleed plug (4). Press the feed pump until it becomes hard to move.
5. Install the disk plate of feed pump (2) to the original position.
6. Start the engine. Check the fuel system for fuel leaks.



M4GF-07-011

MAINTENANCE

ZW220, ZW250

Water separator (1) is a device to separate water mixed in fuel. The water separator and the main fuel filter are comprised of one unit. There is a float inside the case. When water accumulates, the float buoys up. Before the float buoys up to the top of the element, be sure to drain water.

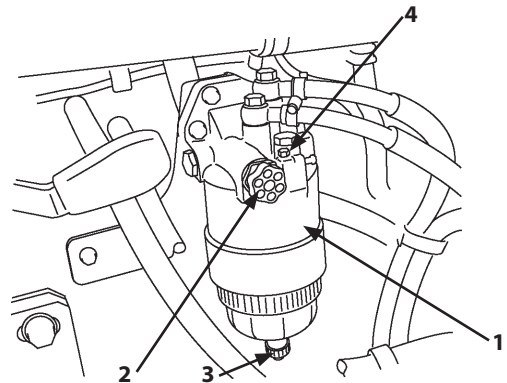
Drain procedures

1. Connect a transparent drain hose provided in the toolbox to drain plug (3).
2. Loosen air bleed plug (4) on the top of water separator (1). Loosen drain plug (3) on the bottom of the water separator case to drain water accumulated in the case.
3. After draining, be sure to tighten plugs (3 and 4). Store the used hose in the toolbox.

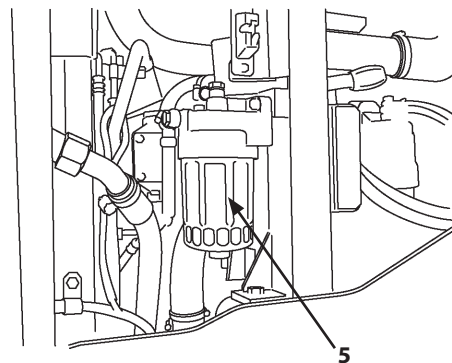
Bleed air from the fuel system

 **NOTE:** If air is mixed in the fuel system, the engine may become difficult to start or engine trouble may occur. After allowing the fuel tank to empty, draining the water separator, or replacing the fuel pre-filter (5) element, be sure to bleed air from the fuel system. In case water content in the fuel is high, shorten the check and drain intervals.

1. Turn the key switch ON. The electric fuel pump is driven, starting to bleed air.
2. Turn to the left to loosen the top (disk plate) of feed pump (2). The inner spring force raises the disk plate.
3. Loosen air bleed plug (4). Continue to press feed pump (2) until fuel including no air bubbles flows out through around the air bleed plug.
4. After air is bled, tighten air bleed plug (4). Press the feed pump until it becomes hard to move.
5. Install the disk plate of feed pump (2) to the original position.
6. Start the engine. Check the fuel system for fuel leaks.



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MAINTENANCE

ZW310

Water separator (1) is a device to separate water mixed in fuel. The water separator and the fuel main filter are comprised of one unit. The separated water accumulates in separator container (6). Before separator container (6) is filled with water, be sure to drain water.

Drain procedures

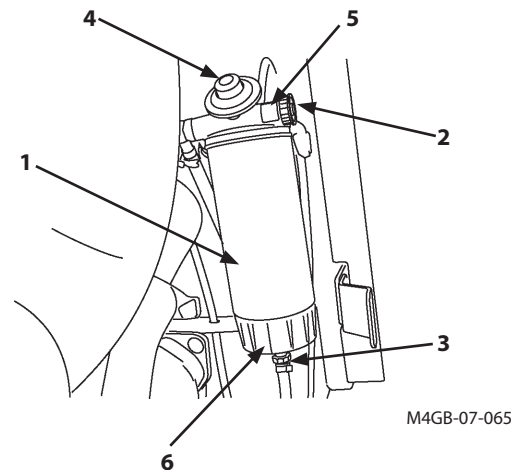
1. Loosen drain valve (3) at the bottom of the case. Then, press feed pump (4) to drain the accumulated water from the water separator.
2. After draining water, close drain valve (3).

Bleed air from the fuel system

 **NOTE:** If air is mixed in the fuel system, the engine may become difficult to start or an engine trouble may occur. After allowing the fuel tank to empty, draining the water separator, or replacing the fuel pre-filter element, be sure to bleed air from the fuel system. In case water content in the fuel is high, shorten the check and drain intervals.

1. Fill fuel in the fuel main filter by operating feed pump (4). Then, close vent valve (2) by turning it clockwise.
2. Loosen plug (5). Press and hold feed pump (4) until fuel with no air bubble included flows out of the plug.
3. Tighten plug (5). Open vent valve (2) by turning it counterclockwise.
4. Press in the feed pump until it becomes hard to move.
5. Start the engine. Bleed air from the fuel system.

 **NOTE:** Run the engine at slow idle speed for approx. 1 minute. Air will be automatically purged out of the fuel system.



MAINTENANCE

4

Replace Fuel Main Filter

ZW180, ZW220, ZW250 --- every 500 hours

ZW310 --- every 1000 hours

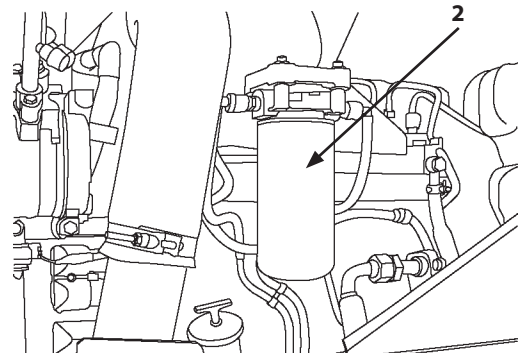
ZW180, ZW220, ZW250

⚠ WARNING: Beware of fire. Fuel is flammable. Keep fuel away from fire hazards.

IMPORTANT: Consult a professional waste collector or your nearest Hitachi dealer about disposal of waste oil and filters. Conduct disposal according to local regulations giving consideration to earth's ecology.

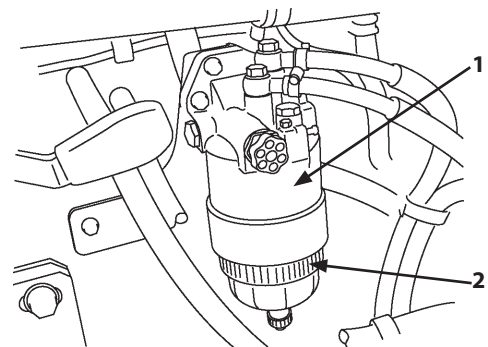
1. Remove cartridge filter (2) from fuel filter (1) with a filter wrench. Be sure to retain fuel with a container to ensure safety and to protect the ground against contamination
2. Coat fuel to the gasket surface on new cartridge filter element (2).
3. Install cartridge filter element (2) to water separator (1) by lightly turning the element by hand until the seal surface makes contact with the gasket.
4. Tighten the cartridge filter element more approx. 2/3 turns using the filter wrench. Take care not to overly tighten the cartridge filter element. Deformation of cartridge filter (2) may result.
5. Bleed air from the fuel system
After replacing the filter element, bleed air from the fuel system.

[Refer to the descriptions for "Bleed air from the fuel system" in item (3).]



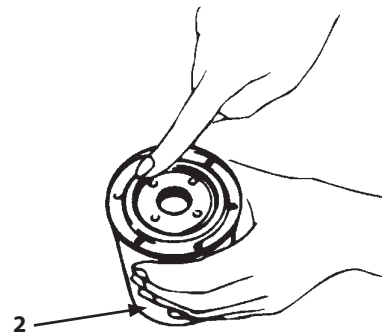
ZW180

M4GF-07-012



ZW220, ZW250

M4GB-07-064



M4GB-07-066

MAINTENANCE

ZW310

⚠ WARNING: Beware of fire. Fuel is flammable. Keep fuel away from fire hazards.

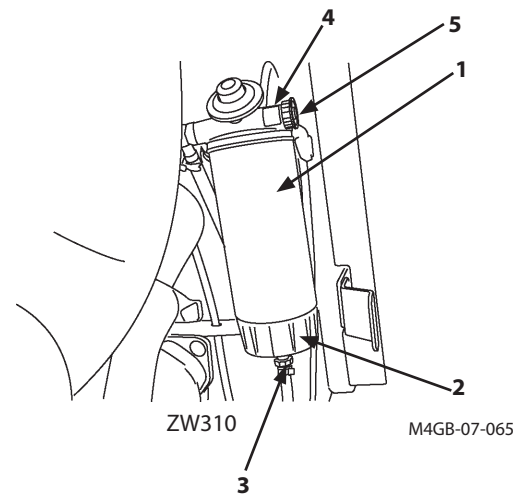
IMPORTANT: Dispose the waste filter element in accordance with the local regulation.

1. Close vent valve (5) by turning it clockwise.
2. Open plug (4) and drain valve (3). Drain fuel from the filter.
3. Turn to remove the filter element (1) with separator container (2).
4. Remove the separator container (2) from the filter element (1). Clean the element. Replace the element as needed.
5. Replace the O-ring with a new one.
6. Securely tighten the filter element to the filter head by hand.

IMPORTANT: When installing the filter element, do not use the tightening wrench. Failure to do so may damage the filter element. Be sure to install the filter element by hand.

7. Install the filter element in the reverse order of removal procedures.
8. After replacing the water separator filter, bleed air mixed in the fuel system.

[Refer to the descriptions for "Bleed air from the fuel system" in item **3**.]



MAINTENANCE

5

Replace Fuel Pre-Filter

ZW180, ZW220, ZW250 --- every 500 hours

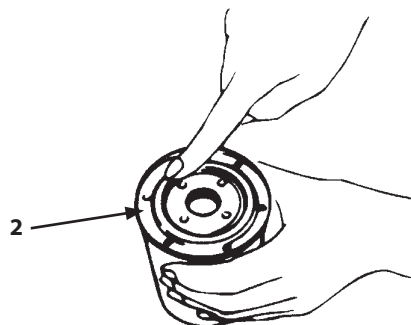
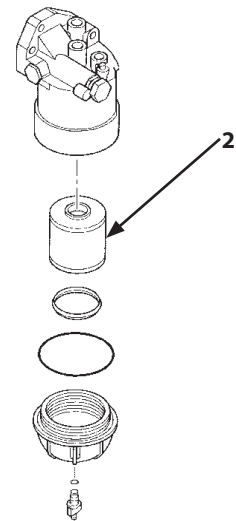
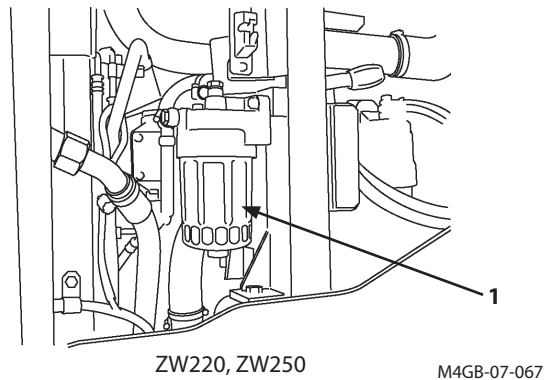
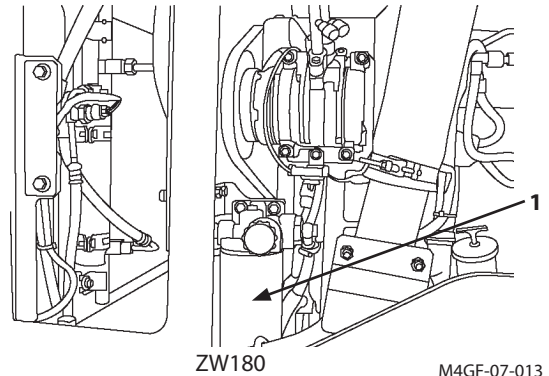
ZW310 --- every 1000 hours

ZW180, ZW220, ZW250

WARNING: Beware of fire. Fuel is flammable. Keep fuel away from fire hazards.

1. Remove cartridge filter (1) with a filter wrench. Be sure to receive fuel with a container to ensure safety and to protect the ground against contamination.
2. Coat fuel to the gasket surface on new cartridge filter element (2).
3. Install cartridge filter element (3) by lightly turning the element by hand until the seal surface come in contact with the gasket.
4. Tighten the cartridge filter element more approx. 2/3 turns using the filter wrench. Take care not to overly tighten the cartridge filter element. Deformation of cartridge filter (1) may result.
5. Bleed air from the fuel system
After replacing the filter element, bleed air from the fuel system.

[Refer to the descriptions for "Bleed air from the fuel system" in item **3**.]



MAINTENANCE

ZW310

⚠ WARNING: Beware of fire. Fuel is flammable. Keep fuel away from fire hazards.

IMPORTANT:

- Take care not to allow foreign matter such as dirt to enter the fuel pre-filter.
- Be careful not to damage fuel pre-filter housing (1).
- Take care not to allow water to enter the fuel pre-filter.

1. Remove fuel pre-filter cap (2).
2. Slowly remove filter element (4) and fuel pre-filter cap (2) from filter housing (1). Take care as the fuel may spill.
3. Holding the upper side of fuel pre-filter cap (2) and the lower side of filter element (4), press the bottom of filter element (4) to separate the element from the cap.
4. Replace O-ring (3) with a new one. Coat the new O-ring with grease.
5. Press new pre-filter element (4) in fuel pre-filter cap (2).
6. Install fuel pre-filter cap (2) and filter element (4) to filter housing (1).
Fuel pre-filter tightening torque: 25 N·m (2.5 kgf·m)
7. After replacing fuel filter element (4), bleed air from the fuel system.

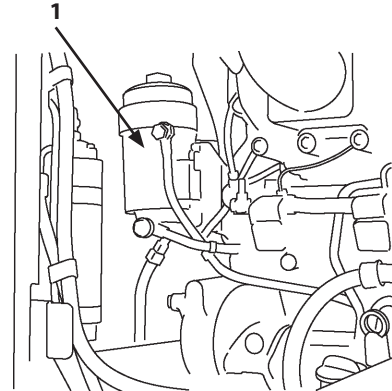
[Refer to the descriptions for "Bleed air from the fuel system" in item **3**.]

8. Close the fuel pre-filter port cap. Start the engine.

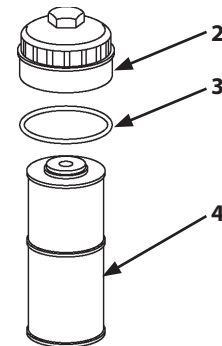
IMPORTANT:

- Run the engine at slow idle speed for approx. 1 minute. Air will be automatically purged out of the fuel system.
- If the engine won't start, manually bleed air.

9. Start the engine. Check fuel pre-filter (1) for fuel leakage.



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M4GB-07-070

MAINTENANCE

6

Clean fuel solenoid pump strainer --- every 500 hours

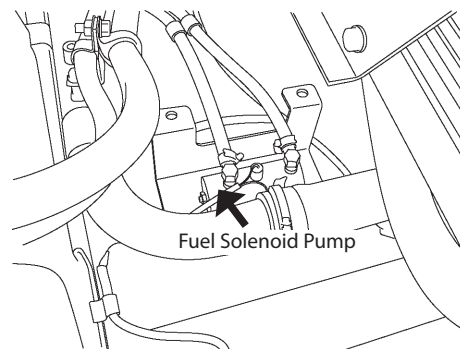
Replacement Prodedure

When the strainer is disassembled, be sure to replace the strainer together with the gasket. Install the cover and the magnet only after sufficiently cleaning them. After being assembled, closely check the air-tightness of the strainer.

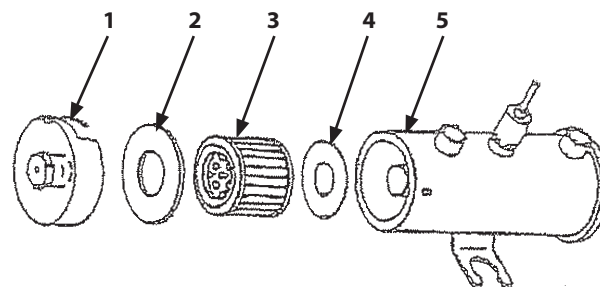
Disassembling/ Assembling

To remove cover (1) , loosen with a spanner. After the cover is removed, gasket (2), strainer (3), and gasket (4) are easily removed in order. Wash removed strainer (3) with light oil. Install the strainer in the reverse order of disassembling. At that time, install gasket (2) into cover (1) first. Then, securely tighten cover (1) to pump (5) using a spanner.

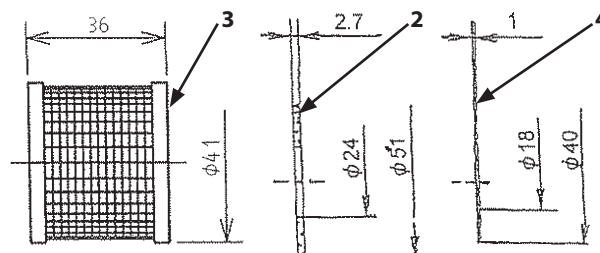
 NOTE: Wrench size: 17 mm



M4GB-07-153



M1GR-07-004



M4GB-07-155

MAINTENANCE

7

Check Fuel Hoses

- every 10 hours (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. Push lock 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.

Table 4. Hose

Interval(hours)	Check Points	Abnormalities	Remedies
Daily	Hose ends	Leak (1)	Retighten or replace
	Soutache braid hose	Friction (2) Crack (2)	Replace Replace
Every 250 hours	Soutache braid hose	Crack (3)	Replace
	Hose ends	Crack (4)	Replace
	Hose	Bend (5)	Replace
	Hose	Collapse (6)	Replace (Use proper bend radius)
	Hose ends and fittings	Deformation or Corrosion (7)	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.

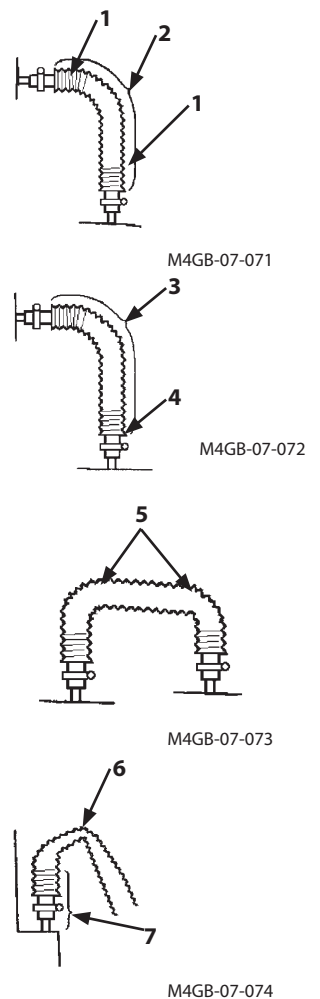


Fig.1

MAINTENANCE

F. AIR CLEANER

1

Clean and Replace Air Cleaner Element

Cleaning --- each time the monitor indicator lights.

Replacement --- after cleaning 6 times (or every 1 year)

Air cleaner (2) is comprised of double elements, outer element (7) and inner element (6). Normally, clean outer element (7). In case severely contaminated, remove inner element (6) and clean it in the same cleaning method as the outer element is cleaned.

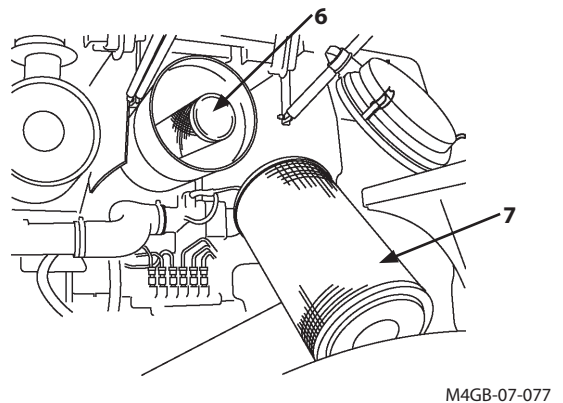
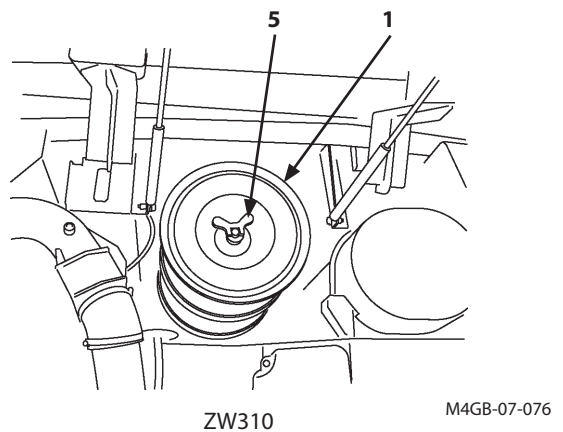
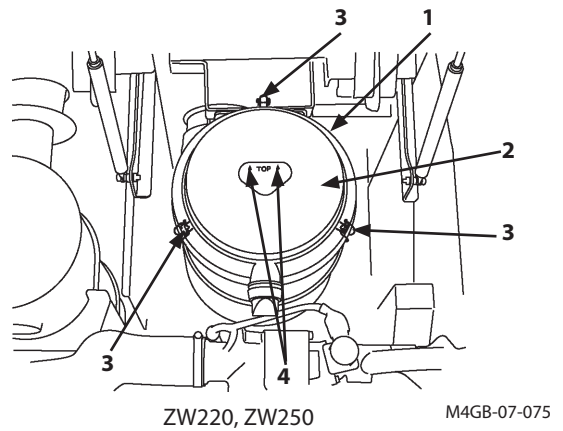
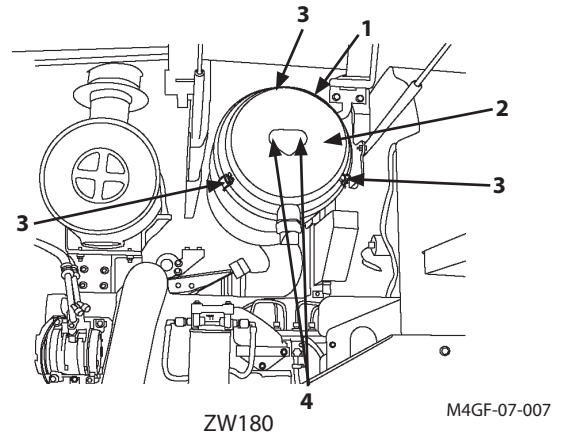
1. Be sure to stop the engine before cleaning or replacing element.
2. ZW180, ZW220 and ZW250:
Loosen clip band (3) and remove dust cap (1). Clean off dust inside the cap.
- ZW310:
Loosen wing nut (5) and remove outer element (7). Clean the outer element.



CAUTION: Wear goggles or safety glasses when using compressed air [less than 0.2 MPa (2 kgf/cm²)].

IMPORTANT: To clean element (6) (7), avoid giving shocks or striking element with other objects.

3. Clean outer element (7) by blowing compressed air [less than 0.2 MPa (2 kgf/cm²)] outward from the inside of the filter element. After cleaning, be sure to check element (7) for any damage. If any damage is found, replace the element with a new one.
4. In case the air cleaner restriction indicator lights soon after cleaning outer element (7) even if the cleaning times are less than 6 times, replace both outer and inner elements with new ones.
5. ZW180, ZW220 and ZW250:
Install dust cup (1) in the original position so that arrow marks (4) (↑TOP↑) point upward.
- ZW310:
Tighten wing nut (5) by hand to install outer element (7) in the original position.
6. After cleaning is complete, run the engine at slow speed. Then, check that the air filter indicator is not ON.



MAINTENANCE

G. COOLING SYSTEM

Coolant

Use fresh water or normal tap water as a coolant. Do not use strong acid or alkaline water. Use the coolant with genuine Hitachi Long-Life Coolant (LLC) mixed by 30 to 50 %.

If the air temperature is expected to fall below 0°C (32°F), fill the cooling system with an genuine Hitachi Long-Life Coolant (LLC) and soft water mix. As a general rule, the ratio of LLC 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.

1. Close vent valve (5) by turning it clockwise.
2. Open plug (4) and drain valve (3). Drain fuel from the filter.

LLC Mixing Table

Air temperature °C	Mixing ratio %	ZW220		ZW250	
		Coolant Capacity: 38.0 liter		Coolant Capacity: 41.0 liter	
		LLC (liter)	Soft Water (liter)	LLC (liter)	Soft Water (liter)
-1	30	11.4	26.6	12.3	28.7
-4	30	11.4	26.6	12.3	28.7
-7	30	11.4	26.6	12.3	28.7
-11	30	11.4	26.6	12.3	28.7
-15	35	13.3	24.7	14.35	26.65
-20	40	15.2	22.8	16.4	24.6
-25	45	17.1	20.9	18.45	22.55
-30	50	19.0	19.0	20.5	20.5

Air temperature °C	ZW180		ZW310	
	Coolant Capacity: 26.0 liter		Coolant Capacity: 59.0 liter	
	LLC (liter)	Soft Water (liter)	LLC (liter)	Soft Water (liter)
-1	13.0	13.0	29.5	29.5
-4				
-7				
-11				
-15				
-20				
-25				
-30				



WARNING:

- Antifreeze is poisonous; if ingested, it can cause serious injury or death. Induce vomiting and get emergency medical attention immediately.
- 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.
- If antifreeze is accidentally splashed into eyes, flush with water for 10 to 15 minutes and get emergency medical attention.
- When storing or disposing of antifreeze, be sure to comply with all local regulations.

MAINTENANCE

1

Check Coolant Level --- every 10 hours (daily)

ZW180, ZW220, ZW250

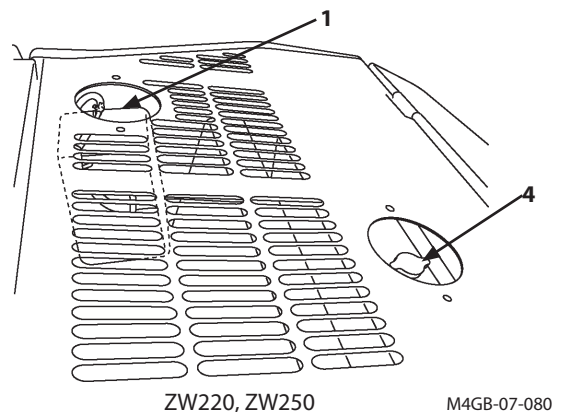
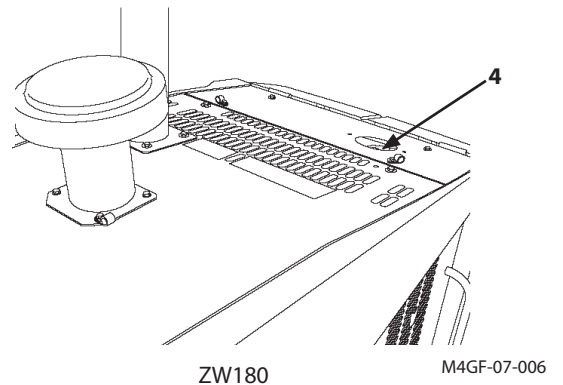
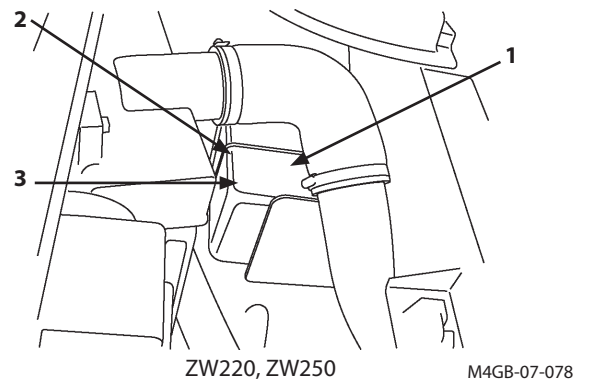
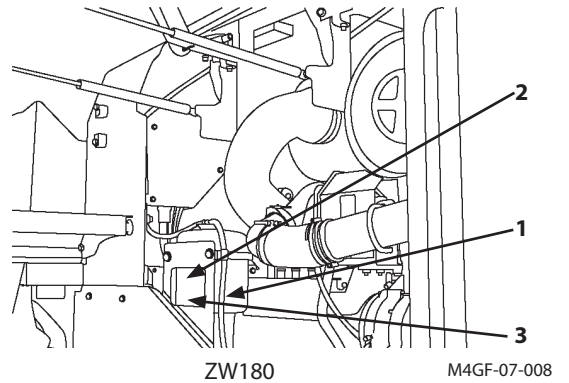


WARNING: Do not remove cap (4) until the coolant temperature in the radiator is cool. Hot steam may spout out, possibly causing severe burns. After the coolant temperature cools, slowly loosen cap (4) to release the inside air pressure before removing cap (4).

Check the coolant level at reservoir tank (1) on ZW180, ZW220 and ZW250. The normal coolant level on ZW180, ZW220 and ZW250 is between FULL (2) and LOW (3) marks on side surface of reservoir tank (1).

In case no coolant is present in reservoir tank (1) on ZW180, ZW220 and ZW250, supply the coolant via the cap hole on reservoir tank (1).

- When refilling a long life coolant (LLC), use the same brand product and the same mixture ratio as already used in the machine.
- If only water is refilled, the mixture ratio in the long life coolant (LLC) is diluted so that anti-rust and antifreeze effect in the coolant will become deteriorated.



MAINTENANCE

1

Check Coolant Level --- every 10 hours (daily)

ZW310

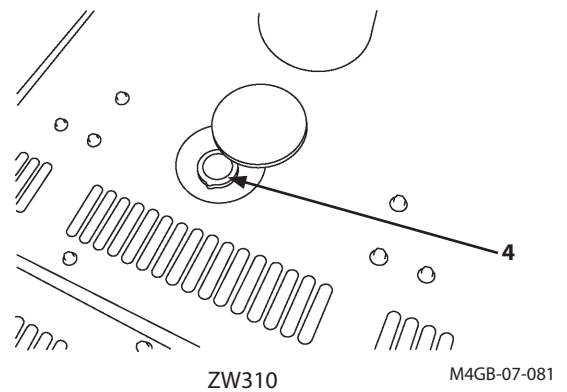
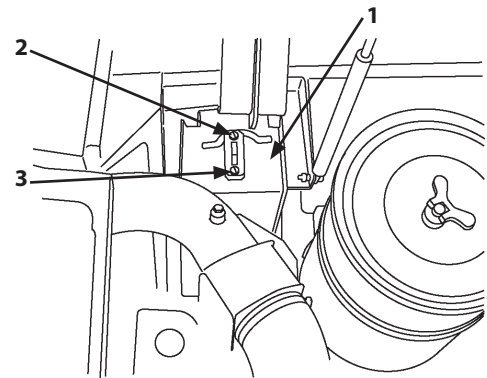


WARNING: Do not remove cap (4) until the coolant temperature in the radiator is cool. Hot steam may spout out, possibly causing severe burns. After the coolant temperature cools, slowly loosen cap (4) to release the inside air pressure before removing cap (4).

Check the coolant level at expansion tank (1) on ZW310. The normal coolant level on ZW310 is between FULL (2) and LOW (3) marks in the level gauge.

In case no coolant is present in expansion tank (1) on ZW310, supply the coolant via the cap hole on expansion tank (1).

- When refilling a long life coolant (LLC), use the same brand product and the same mixture ratio as already used in the machine.
- If only water is refilled, the mixture ratio in the long life coolant (LLC) is diluted so that anti-rust and antifreeze effect in the coolant will become deteriorated.



MAINTENANCE

2 Check Fan Belt --- every 10 hours

Check the fan belt for any abnormality. If any cracks are found, replace the belt with a new one.

3 Check Fan Belt Tension --- every 250 hours

ZW220 and ZW250

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

Check fan belt tension by depressing the midpoint between tension pulley (1) and alternator pulley (2) with the thumb. Deflection must be 8 to 12 mm with a depression force of approximately 98 N (10 kgf).

ZW180 and ZW310:

Fan belt tension on ZW180 and ZW310 is automatically adjusted.

4 Adjust Fan Belt Tension --- every 500 hours (or whenever the slack is found)

ZW220 and ZW250

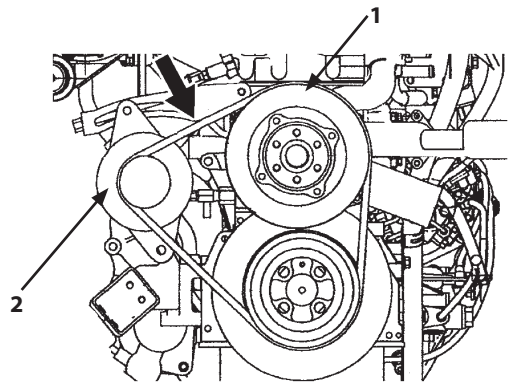
1. Loosen the adjustment plate of alternator (3) and the mounting bolt of alternator (4).
2. Move alternator (5) backward or forward until belt tension is correct.
3. Securely tighten the bolt.



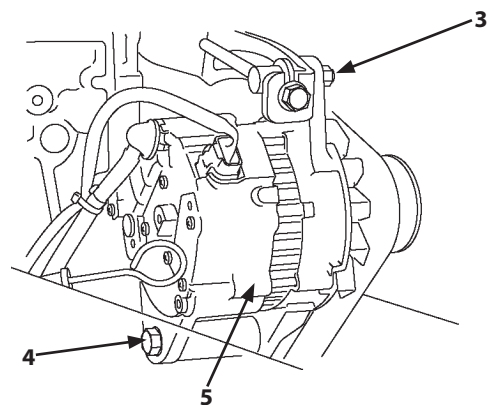
NOTE: When a new belt is installed, be sure to readjust the tension after operating the engine for 3 to 5 minutes at slow idle speed to be sure that the new belt is seated correctly.

ZW180 and ZW310

Fan belt tension on ZW180 and ZW310 is automatically adjusted.



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MAINTENANCE

5

Change Coolant

ZW180 --- every 2000 hours or two years

ZW220 and ZW250 --- every 4000 hours or two years

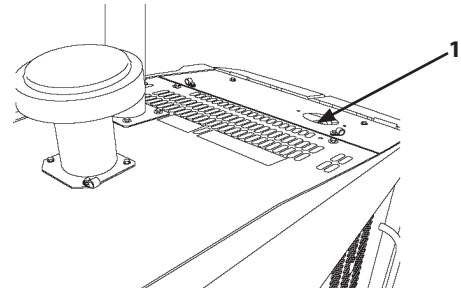
ZW310 --- every 4000 hours or three years

WARNING: Do not remove the radiator cap until the coolant temperature in the radiator is cool. Hot steam may spout out, possibly causing severe burns. After the coolant temperature cools, slowly loosen the cap to release the inside air pressure before removing the cap.

NOTE: ZW220 and ZW250: When genuine Hitachi long-life coolant is used, change the coolant every two years 4000 hours whichever comes first.

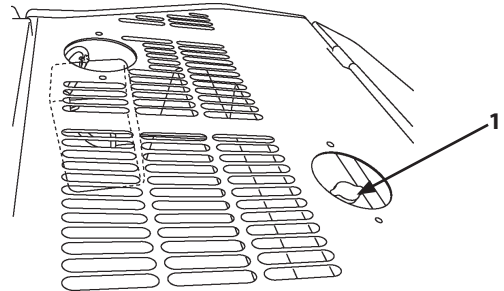
Procedures (ZW180, ZW220, ZW250)

1. Park the machine on solid level surface. Lower the bucket on the ground. Stop the engine
2. Turn the parking brake switch ON. Set the neutral lever lock in the LOCK position.
3. Block the front and rear frames with the articulate lock bar.
4. Remove radiator cap (1). Open radiator drain cock (2) and engine water jacket drain plug (3) to completely drain the coolant. Remove impurities such as scale at the same time.



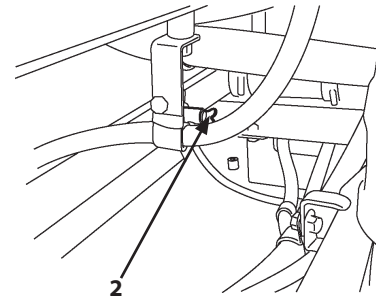
ZW180

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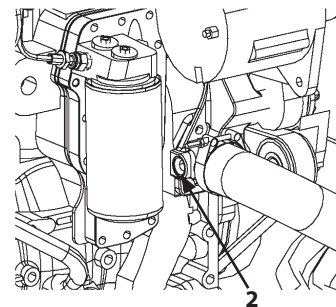
ZW220, ZW250

M4GB-07-080



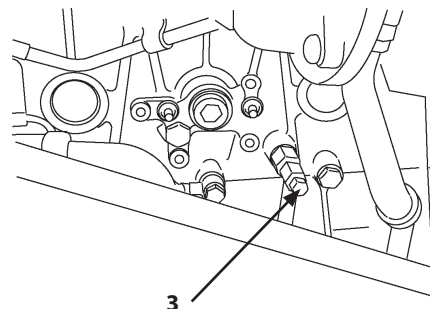
ZW220, ZW250

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ZW180

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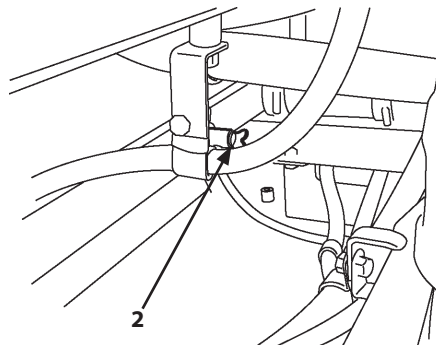
ZW220, ZW250

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MAINTENANCE

5. Stop the engine. Open radiator drain cock (2). Fill low impurity soft water or tap water. Supply water until clean water is drained to remove rust and scale.
6. Close radiator drain cock (2). Supply low impurity soft water or tap water together with the specified LLC up to the radiator filler port. When adding coolant, do so slowly to avoid mixing in the system. Start the engine and sufficiently bleed air from the cooling system.
7. After adding coolant, operate the engine for several minutes. Check the coolant level again and add coolant if necessary.

 **NOTE:** ZW180: When adding long-life coolant, supply with flow rate of 15 L/min or less.



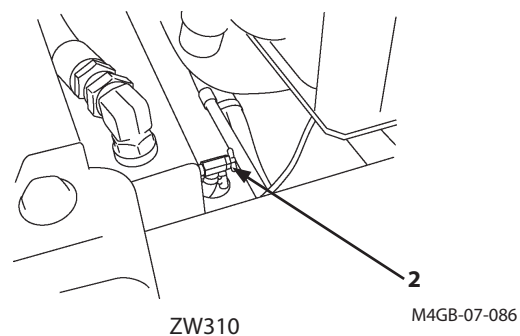
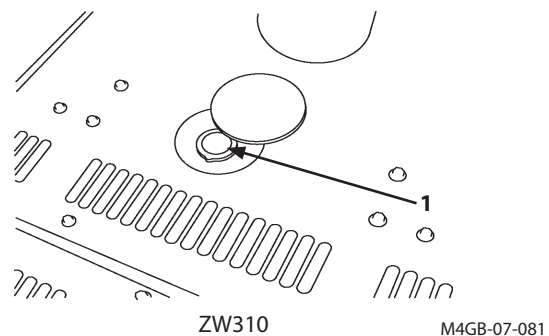
ZW220, ZW250

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MAINTENANCE

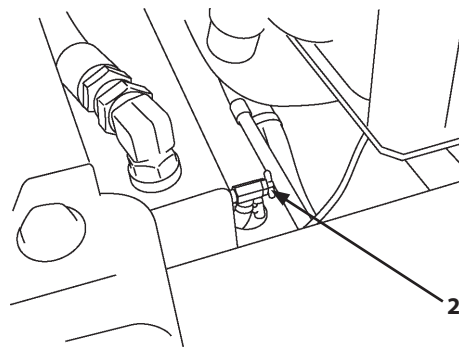
Procedures (ZW310)

1. Park the machine on solid level surface. Lower the bucket on the ground. Stop the engine
2. Turn the parking brake switch ON. Set the neutral lever lock in the LOCK position.
3. Block the front and rear frames with the articulate lock bar.
4. Remove radiator cap (1). Completely drain the coolant through the radiator drain cock. Close drain cock (2) and plug (3). Supply either low impurity soft water or tap water and cleaning agent (radiator cleaner). Run the engine at slightly faster speed than slow idle speed to increase the coolant temperature until the coolant gauge needle enters the blue range. Then, continue to operate the engine for approx. 10 more minutes.



MAINTENANCE

5. Stop the engine. Open radiator drain cock (2). Fill low impurity soft water or tap water. Supply water until clean water is drained to remove rust and scale.
6. Close radiator drain cock (2). Supply low impurity soft water or tap water together with the specified LLC up to the radiator filler port. When adding coolant, do so slowly to avoid mixing in the system. Start the engine and sufficiently bleed air from the cooling system.
7. After adding coolant, operate the engine for several minutes. Check the coolant level again and add coolant if necessary.



ZW310

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MAINTENANCE

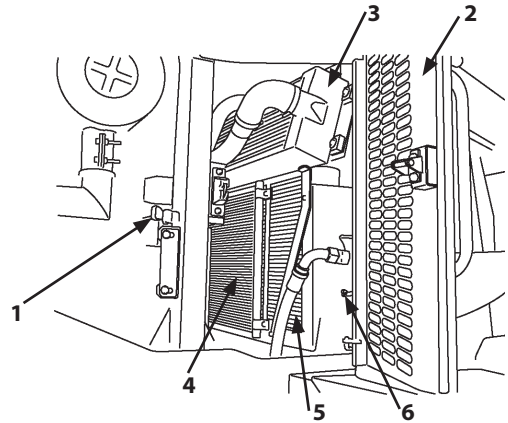
6

Clean Radiator/Oil Cooler Cores and Other Cooling System --- every 500 hours or when the core is clogged.



WARNING: When using compressed air pressure [less than 0.2 MPa (2 kgf/cm²)], wear safety glasses or goggles.

IMPORTANT: If compressed air with the pressure of more than 0.2 MPa (2 kgf/cm²) or tap water with high delivery pressure is used for cleaning, damage to the radiator/oil cooler fins may result. Keep the nozzle away from the core surface more than 500 mm.



M4GB-07-087

Push down open/close lever (1) inside the engine compartment. Side cover (2) at the radiator can be opened.

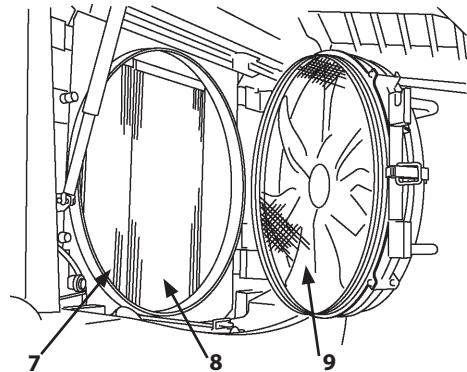
(Over the side cover)

Check and clean engine intercooler (3), air condenser (4), and torque converter oil cooler (5). Locations of catch lever (6) and other cooling equipment differ depending on machine models. When torque converter oil cooler (5) is dislocated by pushing down catch lever (6), clearance (10) in front of the radiator can be cleaned.

(Over the rear grille)

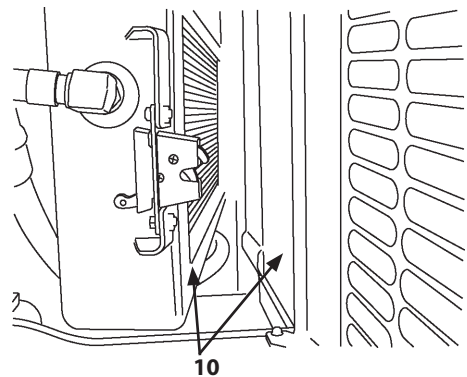
Check and clean radiator (7), hydraulic oil cooler (8), and hydraulic driven fan (9).

In case dirt or dust has adhered to the radiator/oil cooler cores, clean the radiator/oil cooler cores with compressed air pressure [less than 0.2 MPa (2 kgf/cm²)] or tap water to prevent the cooling system performance from being reduced.



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IMPORTANT: Before operating the fan reverse rotation switch, stop the engine. Then, after turning the fan reverse rotation switch ON, start the engine. When stopping the fan, first stop the engine. Then, turn the fan reverse rotation switch OFF. While the engine is running, never operate the fan reverse rotation switch. Damage to the fan motor may result.



M4GB-07-088

Operating the fan reverse rotation switch on the right console can conduct brief cleaning. Keep any personnel away from the vicinity.

MAINTENANCE

H. ELECTRICAL SYSTEM

IMPORTANT: Improper radio communication equipment and associated parts, and/or improper installation of radio communication equipment effects the machine's electronic parts, causing involuntary movement of the machine.

Also, improper installation of electrical equipment's may cause machine failure and/or a fire on the machine.

Be sure to consult your 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.

Batteries



WARNING: 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.

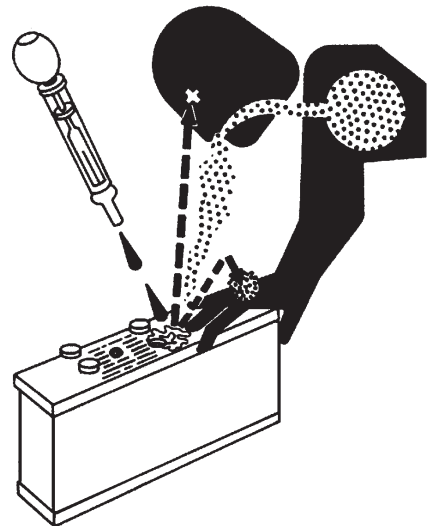
Sulfuric acid in battery electrolyte is poisonous. It is strong enough to burn skin, eat holes in clothing, and cause blindness if splashed into the eyes.

Avoid hazard by:

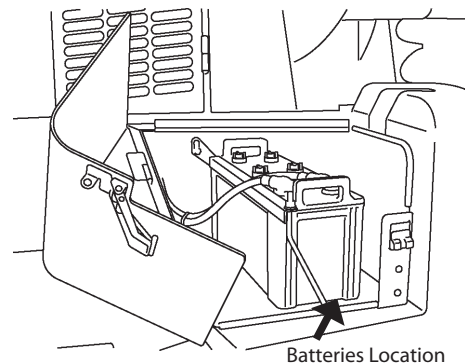
1. Filling batteries in a well-ventilated area.
2. Wearing eye protection and rubber gloves.
3. Avoiding breathing fumes when electrolyte is added.
4. Avoiding spilling or dripping electrolyte.
5. Using proper booster battery starting procedures.

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.



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

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

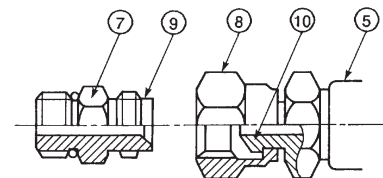
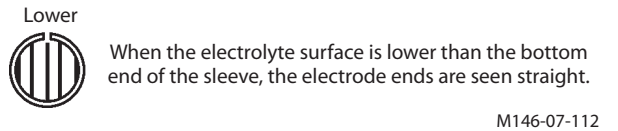
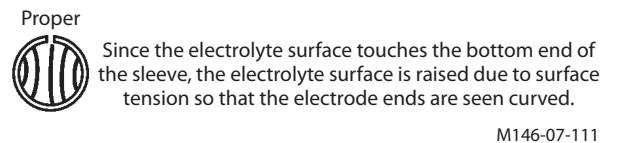
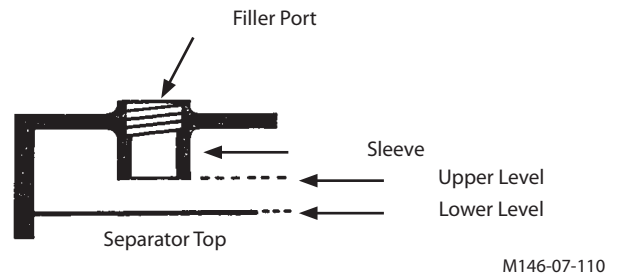
MAINTENANCE

Electrolyte Level Check --- every one month

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. Do not 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.



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.

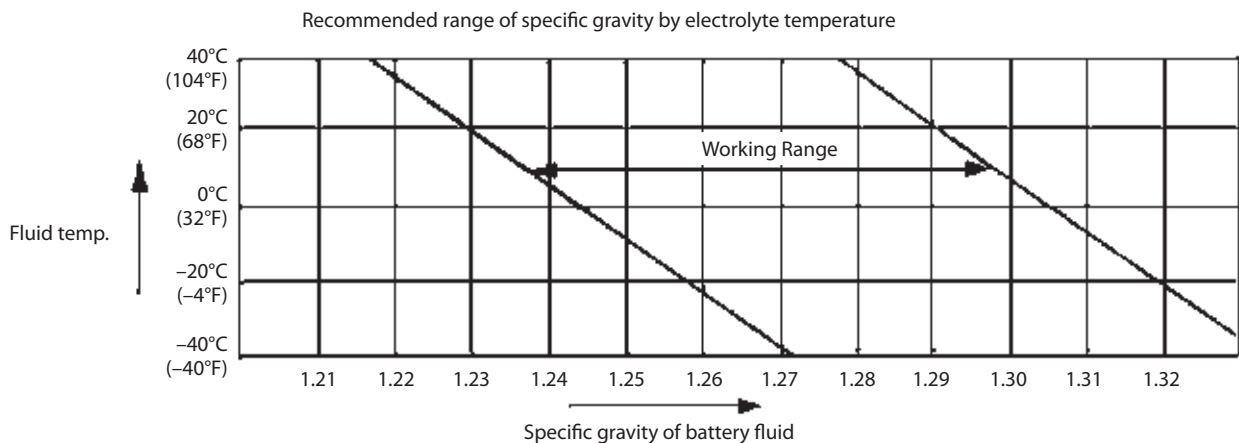
If acid is swallowed:

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 two 12-volt batteries with negative (–) ground.

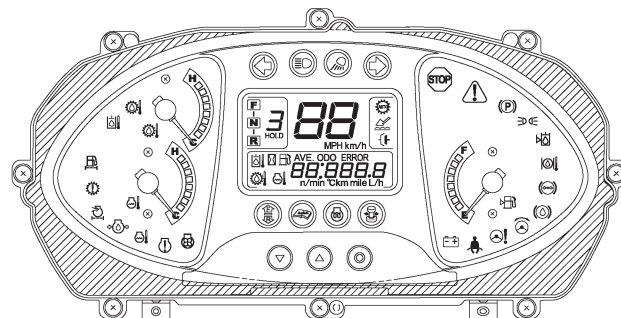
If one battery in a 24-volt system has failed but the other is still good, replace the failed battery with one of the same type. For example, replace a failed maintenance-free battery with a new maintenance-free battery. Different types of batteries may have different rates of charge. This difference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

MAINTENANCE

1

Check Monitor Functions and All Other Instrument Operation --- every 10 hours (daily)

Run the engine at slow idle speed when checking the instruments. The monitor indicates alarm, caution and confirmation status in red, orange, and normal operative condition in blue or green respectively. Check each gauge or meter if its needle is moved with the key switch ON. The needle shall be moved to the blue range when normal and to the red range when abnormal. Refer to the Group of Operator's Station in Section 1 for more information.



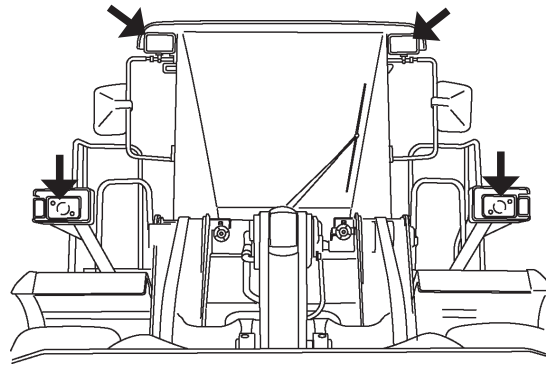
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MAINTENANCE

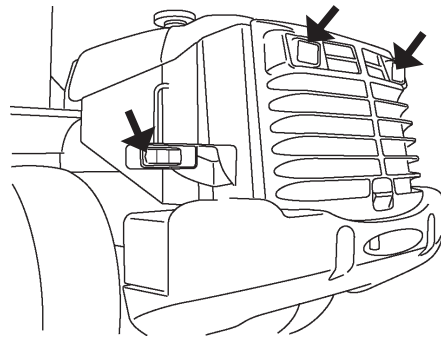
2 Check Work Lights --- every 10 hours (daily)

CAUTION: If any burned-out light is found, immediately replace it with a new one.

Visually check all work lights that they normally light and/or flash from the front and rear sides of the machine.



M4GB-01-060

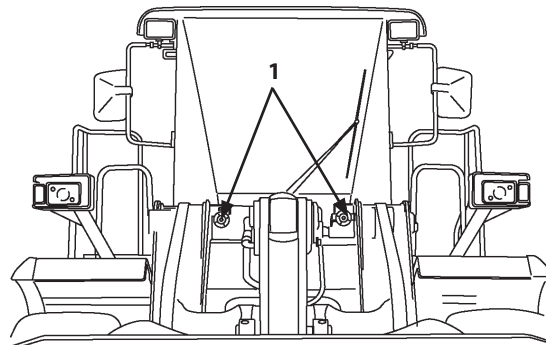


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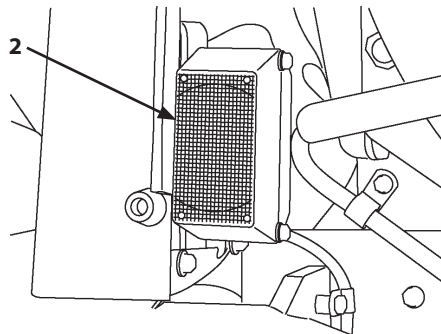
3 Check Horn and Reverse Buzzer --- every 10 hours (daily)

WARNING: Before checking the horn and/or the reverse buzzer, always apply the parking brake and clear other personnel the machine's vicinity.

The horn switch button is located at the steering wheel center and on the right console. In case the machine is equipped with a multi-function lever, the horn switch is located on the multi-function lever. Horn (1) is located on the front frame. Reverse buzzer (2) is located at the left side of the rear grille. Check that reverse buzzer (2) correctly sounds by operating either the forward/reverse selector lever or the forward/reverse selector switch to the reverse drive side.



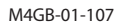
M4GB-01-060



M4GB-07-090

Check Electrical Harnesses and Fuses --- every 50 hours

ZW220/ZW250 : 1 – 100A
2 – 65A
ZW180/ZW310 : 1 – 120A
2 – 655A



Fuse Box A	Fuse Box B
15A	15A
20A	20A
25A	25A
30A	30A
35A	35A
40A	40A
45A	45A
50A	50A
55A	55A
60A	60A
65A	65A
70A	70A
75A	75A
80A	80A
85A	85A
90A	90A
95A	95A
100A	100A

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M4GB-01-109



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MAINTENANCE

Fuse BOX A

NO.	ZW180		ZW220, ZW250		ZW310	
	Ampere	Corresponding Circuit	Ampere	Corresponding Circuit	Ampere	Corresponding Circuit
1	20	SEAT HEATER	15	SEAT HEATER*	15	SEAT HEATER
2	10	DC-DC UNIT	10	DC-DC UNIT	10	DC-DC UNIT
3	(10)	OPTION 1	(10)	OPTION 1	(10)	OPTION 1
4	15	WIPER FRONT	15	WIPER FRONT	15	WIPER FRONT
5	5	HEAD LAMP RH	5	HEAD LAMP RH	5	HEAD LAMP RH
6	10	LIGHTER	10	LIGHTER	10	LIGHTER
7	5	ECM POWER			5	ECU POWER
8	10	POWER ON	10	POWER ON	10	POWER ON
9	20	WORKING LAMP REAR	5	PARKING	5	PARKING
10	5	A/C 1	(10)	OPTION 2	(10)	OPTION 2
11	5	BACK BUZZER	5	BACK LAMP	5	BACK LAMP
12	10	STOP LAMP	10	STOP LAMP	10	STOP LAMP
13	20	WORKING LAMP FRONT	20	WORKING LAMP FRONT	20	WORKING LAMP FRONT
14	10	HORN	10	HORN	10	HORN
15	5	HEAD LAMP LH	5	HEAD LAMP LH	5	HEAD LAMP LH
16	(15)	WIPER SIDE 1	(15)	WIPER SIDE 1	(15)	WIPER SIDE 1
17	(15)	WIPER SIDE 2	(15)	WIPER SIDE 2	(15)	WIPER SIDE 2
18	(15)	GLASS HEATER FRONT	(15)	GLASS HEATER FRONT	(15)	GLASS HEATER FRONT
19	(20)	GLASS HEATER SIDE	(15)	GLASS HEATER SIDE	(15)	GLASS HEATER SIDE
20	(15)	GLASS HEATER REAR	(10)	GLASS HEATER REAR	(10)	GLASS HEATER REAR

* The seat heater is a standard equipment for the air suspension seat. () stands for optional.

Fuse BOX B

NO.	ZW180		ZW220, ZW250		ZW310	
	Ampere	Corresponding Circuit	Ampere	Corresponding Circuit	Ampere	Corresponding Circuit
1	(10)	WORKING LAMP YELLOW	(10)	FOG LAMP	(10)	FOG LAMP
2	5	PARKING	20	WORKING LAMP REAR	20	WORKING LAMP REAR
3	(10)	OPTION 2	5	AC 1	5	AC 1
4	20	AC 2	20	AC 2	20	AC 2
5	10	WIPER REAR	10	WIPER REAR	10	WIPER REAR
6	10	EMERGENCY STEERING	10	EMERGENCY STEERING	10	EMERGENCY STEERING
7	20	IGN	20	IGN	20	IGN
8	15	FLASHER	15	FLASHER	15	FLASHER
9	5	LOAD DUMP	5	LOAD DUMP	5	LOAD DUMP
10	5	RADIO	5	RADIO	5	RADIO
11	10	ROTALY BEACON	10	ROTALY BEACON	10	ROTALY BEACON
12	10	HI BEAM	10	HI BEAM	10	HI BEAM
13	(10)	OPTION 3	10	CONTEROLLER	15	FUEL HEATER
14	10	CONTROLLER			10	CONTROLLER
15	30	ECM	30	ECU	10	ECU
16	5	POSITION 1	5	POSITION 1	5	POSITION 1
17	5	POSITION 2	5	POSITION 2	5	POSITION 2
18	10	MCF	10	MCF	10	MCF
19	(10)	OPT C/U	(10)	OPT C/U	(10)	OPT C/U
20	5	MONITOR	5	MONITOR	5	MONITOR

() stands for optional.

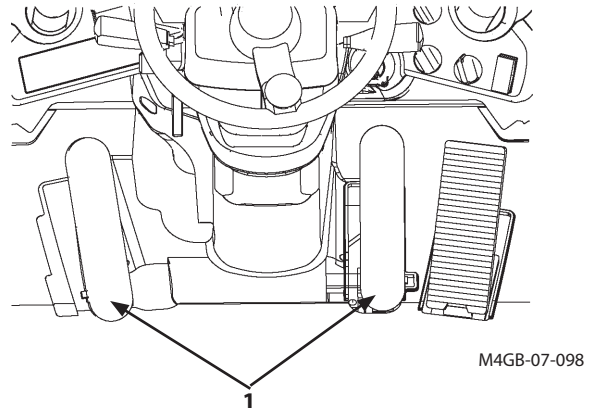
MAINTENANCE

I. Brake System

- 1 **Check Right and Left Brake Interlocking Performance --- every 10 hours (daily)**

WARNING: Put up a no admission notice for the range of 100 m ahead in the forward machine travel direction. Arrange a safety monitor person.

While stepping on brake pedal (1), check the pedal movement, the brake performance, and the play in the pedal stroke for any abnormality.



Check brake performance

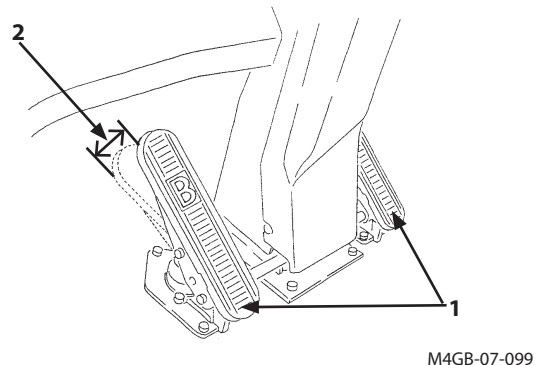
The machine must be stopped within 5 m range after the brake is applied while driving at the speed of 20 km/h on a flat dry paved surface road.

Check play in brake pedal stroke

Measure the pedal stroke at pedal tip (2) by pressing the pedal with hand until the hand feels an intermittent repulsion from the pedal.

Correct play (2): 12 mm to 20 mm

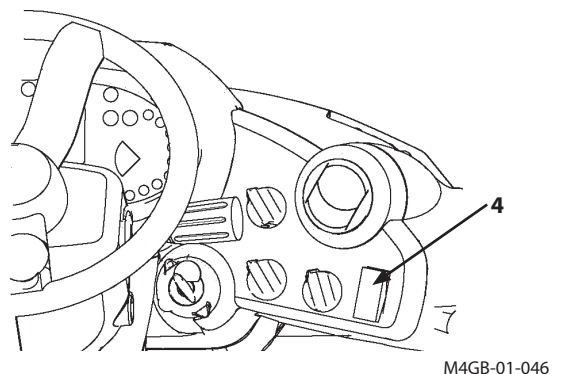
If the play is outside the specified range, consult your nearest Hitachi dealer. In case abnormal pedal operation and/or performance is noticed, consult your nearest Hitachi dealer. Get the machine checked and repaired.



- 2 **Check Parking Brake Force --- every 10 hours (daily)**

WARNING: Check the machine in a place where no person is present around or ahead the drive direction. Keep bystanders away from the machine.

Park the machine with no load applied on a 15° inclining dry surface slope. The machine must not move with the parking brake switch (4) ON. Should the machine move during inspection, consult your nearest Hitachi dealer. Get the brake system checked and repaired.



MAINTENANCE

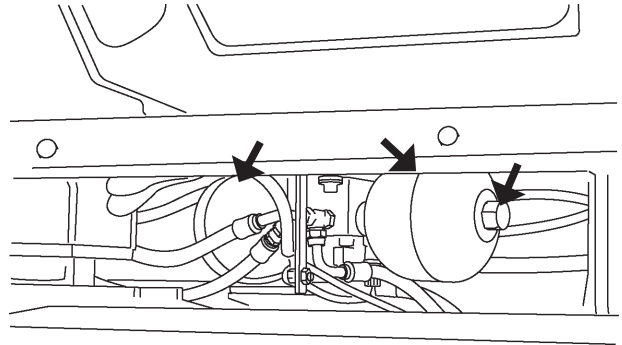
3

Check Accumulator Function, Gas Leakage, Looseness, and Damage --- ever 500 hours



WARNING: Allow only qualified personnel to handle the accumulator.

- High-pressure nitrogen gas is enclosed in the accumulator. Caution is required to prevent fires from occurring.
- Never strike the accumulator. Keep the accumulator away from sparks and/or flames.
- Do not directly heat the accumulator. Do not weld the accumulator housing.
- Be sure to release pressure before starting to work on the pipe lines.



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1. Precheck that alarm function is activated:
Precheck that when the brake pedal is strongly stepped more than 5 strokes with the key switch ON and the engine stopping, the monitor indicators come ON.
2. Precheck that alarm function is deactivated:
Start the engine. Run the engine at middle speed to pressurize the accumulator. Check that when the specified pressure is accumulated in the accumulator, the alarm buzzer stops sounding and the brake oil pressure indicator goes OFF.
3. Precheck how many times the brake pedal is stepped:
Check that the brake pedal can be stepped more than 5 strokes before the monitor indicators come ON with the key switch ON and the engine stopping.

Three points described above must be normally confirmed. Besides the above points, check the accumulator for gas leakage, looseness, and damage. If any abnormality is found, immediately consult your nearest Hitachi dealer.



NOTE: Check the accumulator for the ride control system simultaneously when the machine is equipped with the ride control system.

4

Check Gas pressure in Accumulator --- every 2000 hours

Check the gas pressure at a regular interval. In the machine is operated with the gas pressure lower than specified value, normal brake operation and/or loading operation may not be achieved, possibly creating very hazardous situations. Ask your nearest Hitachi dealer for checking.

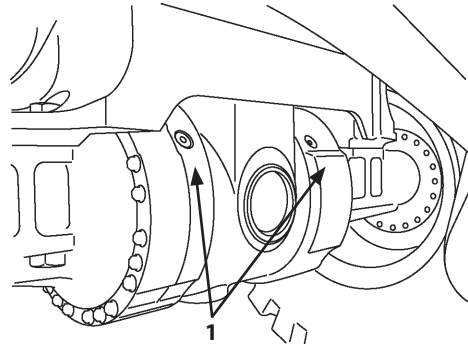
MAINTENANCE

5

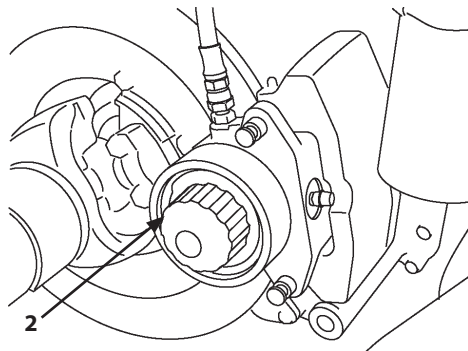
Check Brake Disks (Service and Paring)

--- every 2000 hours

Service brake (1) is a closed wet type brake. Parking brake (2) on ZW220 and ZW250 is a dry type disk brake. The parking brake on ZW180 and ZW310 is a wet type disk brake. Both parking brakes are mounted on the transmission side of the respective model. Consult your nearest Hitachi dealer for checking.

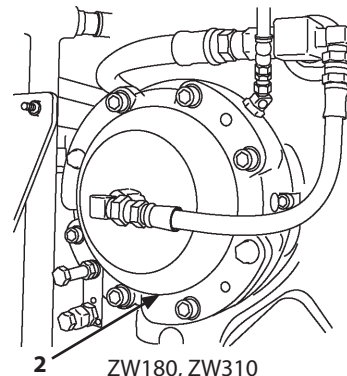


M4GB-07-101



ZW220, ZW250

M4GB-06-004



ZW180, ZW310

M4GB-06-006

MAINTENANCE

J. TIRE

1

Check and Replace Tire (Tire Pressure)

Check --- 10 hours (daily)

Replace --- As necessary

WARNING: Secure the front and rear frames with the lock bar and pins. When inflating tires, stand behind the tread and use the self-attaching chuck. Avoid welding near tires, which could potentially cause the tires to explode. Tires may explode if a tire is smoking such as if the machine catches fire, the tires become abnormally hot, or the air smells of rubber or tire bead burning.

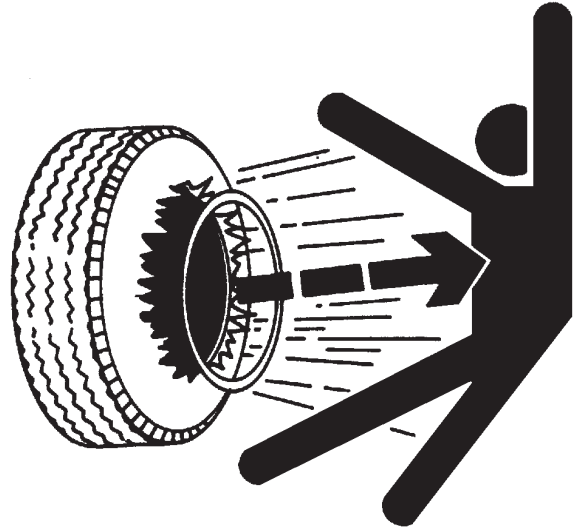
IMPORTANT: Always maintain the correct tire pressure. Even if only one tread pattern has worn out, replace the tire with new one. Before operating the machine, check the tires for any breaks, damage or foreign matter. When replacing one tire, use a new tire having the same tread pattern and specification as the other tires.

Check Air Pressure

1. Measure air pressure when the tires are cool before operating the machine.

	Standard Tire	Standard Air Pressure
ZW180	20.5R25	325 kPa (3.25 kgf/cm ²)
ZW220	23.5R25	325 kPa (3.25 kgf/cm ²)
ZW250	23.5R25	375 kPa (3.75 kgf/cm ²)
ZW310	26.5R25	425 kPa (4.25 kgf/cm ²)

2. Check tires for any damage and/or excessive wear.



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MAINTENANCE

2

Check Tire for Damage --- every 10 hours (daily)



CAUTION: If tire has external damaged such as a score, an accident due to puncture or burst of the tire may occur, possibly resulting in personal injury or death.

Check the external appearance of tires for any damage.

3

Check Wheel Bolt Torque --- every 500 hours 50 hours at fist time only

Be sure to check the wheel bolt torque by turning the bolt in the tightening direction.

Tightening Torque: 890 N·m (90.8 kgf·m)

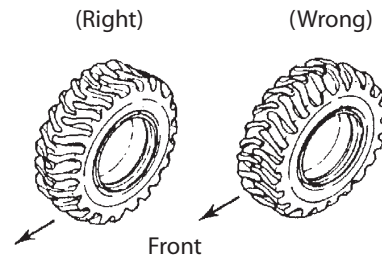
Replace Tire



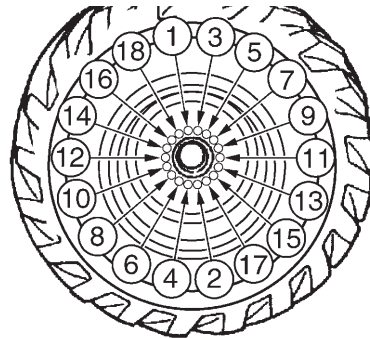
CAUTION: Secure the front and rear frames with the articulation lock bar and pins.

IMPORTANT: Allover height of the machine may change according to the types of tires to be installed. Do not change the specifications of the registered machine.

1. Lower the loader front to the ground. Apply the parking brake.
2. Secure the front and rear frames with the lock bar and pins.
3. Loosen all wheel bolts one turn. Note which way the tread pattern is facing.
4. After jacking up the machine, securely support the machine with blocks.
5. Remove the wheel bolts. Replace the tire.
6. With the tire raised off the ground, lightly tighten the wheel bolts in order as illustrated to the right.
7. Lower the machine. Retighten the wheel bolts to specification in the order as illustrated to the right.



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MAINTENANCE

Applicable Tire Size

	Manufacturer	ZW180	ZW220	ZW250	ZW310
Standard Size	-	20.5R 25	23.5 R 25	23.5 R 25	26.5 R 25
Standard Air Pressure	-	325 kPa (3.25 kgf/cm ²)	325 kPa (3.25 kgf/cm ²)	375 kPa (3.75 kgf/cm ²)	425 kPa (4.25 kgf/cm ²)
Standard Tire	Michelin	L3 20.5 R 25 (XHA)	L3 23.5 R 25 (XHA)	L3 23.5 R 25 (XHA)	L3 26.5 R 25 (XHA)
Optional	Michelin	L4 (XLDD1A)	L4 (XLDD1A)	L4 (XLDD1A)	L4 (XLDD1A)
		L5 (XLDD2)	L5 (XLDD2)	L5 (XLDD2)	L5 (XLDD2)
		L5 (MINE D2)	L5 (MINE D2)	L5 (MINE D2)	L5 (MINE D2)
	Bridgestone	L3 (VMT)	L3 (VMT)	L3 (VMT)	L3 (VMT)
		L5 (VSDL)	L5 (VSDL)	L5 (VSDL)	L5 (VSDL)

Adjusting air pressure according to the job site conditions

Tire sizes to be used

Adjust tire pressure in conformity with the work mode the machine is engaged in.

Consult your nearest Hitachi dealer for more detailed information.

Driving on public roads: Standard pressure

- Loading/excavation on normal ground surface: Standard or slightly higher than standard pressure
- Heavy-duty excavation: Higher pressure in the standard pressure range
- Operation on soft terrain or sandy territory: Slightly lower than standard pressure

ZW180: 275 kPa (2.75 kgf/cm²) to 325 kPa (3.25 kgf/cm²)

ZW220: 325 kPa (3.25 kgf/cm²) to 375 kPa (3.75 kgf/cm²)

ZW250: 375 kPa (3.75 kgf/cm²) to 425 kPa (4.25 kgf/cm²)

ZW310: 375 kPa (3.75 kgf/cm²) to 475 kPa (4.75 kgf/cm²)

 **NOTE:** Apply the same air pressure to snow tires.

MAINTENANCE

Tire Rotation

Rotate tires when uneven or abnormal wear is recognized on either front or rear, or right and left tire. Tire rotation is recommended to achieve uniformity of wear on tires or equalization of tire service life.

⚠ WARNING: Install tire with no external damage such as score and abnormal wear. Failure to do so may cause the puncture or the tire to blowout, possibly resulting in personal injury or death since tire load is increased when the machine is loaded or braked during operation.

Rotation Procedure

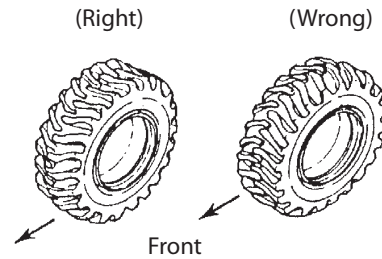
- Switch tires only between the front and rear positions. Do not switch the tires between diagonal positions.
- Align the tire rotation direction with the tire tread design pattern. Especially traction tread design pattern (optional) will affect not only economy of tire but also safety in operation.

How to check wear amount (tread design groove depth):

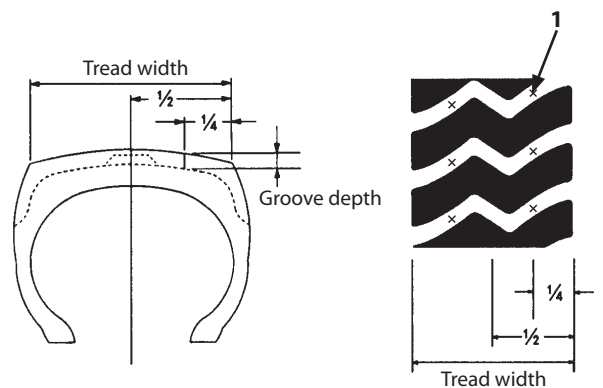
Measure the groove depth at 1/4 tread width position [shown with X mark (1) in the figure].

Use limit of the groove depth shall be approx. 85% of the new tire groove depth. In case extreme uneven wear or exposed rubbing strips are found, replace the tire even before reaching 85%.

IMPORTANT: If the machine is operated with such tires at either rear or front being extremely worn or different in type, construction, or size, the travel driving system such as axles or transmission will be adversely affected in their performance and/or endurance. Avoid operating the machine under such conditions. When replacing tires, be sure to use the same tires in type, construction and size to the four wheels. It is recommended to replace tires of the four wheels at the same time.



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MAINTENANCE

Removal and Installation of Tire



WARNING: Wheel with tire is a very heavy part so that removal and installation of tire is hazardous and difficult work. In addition, a crane to lift a tire is required when removing or installing the tire to the wheel. Consult your nearest Hitachi dealer or a professional tire sales shop for tire removal and installation work. In case jacking up the machine is required, be sure to observe the following points.

- Select dry, solid and flat ground for a work site.
- Work in a group of more than two personnel. One person shall mainly engage in practicing the work and others shall work as assistants and/or ensure safety.
- Do not use the bucket to raise the front wheels.
- Do not raise the machine off the ground more than necessary.
- When the front (rear) wheels are raised off the ground, wedge wheel stoppers under the rear (front) wheels.
- After the machine is raised off ground, be sure to block the machine using rigid supports. Never leave the machine to be supported only by jacks.
- The rear wheels oscillate. Insert wooden blocks between the axle and the frame to stop oscillation.
- When removing the wheel bolts, lift the wheel with a crane so that the wheel bolt remaining at the top position is finally removed.
- Wheel bolt tightening torque: 890 N•m (90.8 kgf•m)

Tire wheel:

When a tire wheel must be removed, ask a professional person to do so. Allow only an authorized person to inflate a tire after the tire was installed onto the wheel. Sufficiently remove rust from the wheel. Severe rust may cause the wheel to crack, possibly causing the machine and/or personal accidents.

MAINTENANCE

K. Air Conditioner

1

Clean/replace air conditioner circulation/fresh air filters

Clean filters --- every 100 hours (once a week whichever come first)

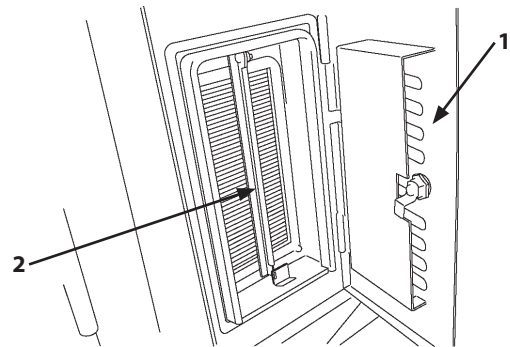
Replace filter --- after cleaning filters 10 times (or when the filters are severely clogged)

Clean fresh air filter

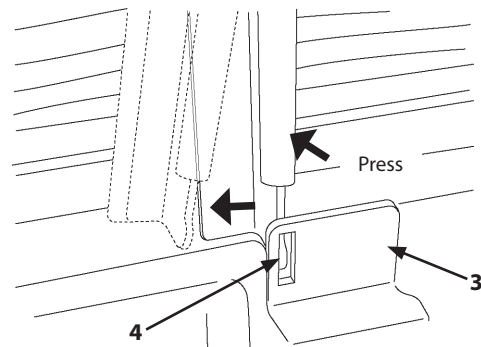
! WARNING: When using compressed air pressure, wear safety glasses or goggles.

IMPORTANT: If compressed air delivery pressure is high, damage to the filter fins may result. Always use compressed air at the lower pressure than 0.2 MPa (2kgf/cm²). Keep the nozzle more than 500 mm away from the core surface.

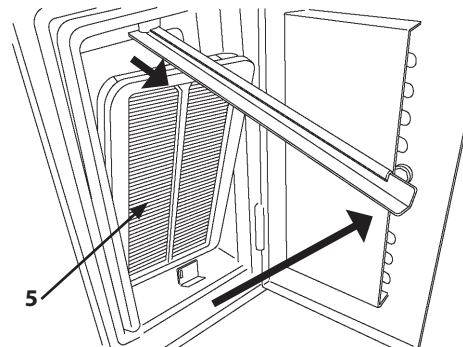
1. Remove the filter:
The fresh air filter is installed behind cover (1) on the left rear side of the cab exterior. Open cover (1) with the starter key. Press the under side of angle (2) and remove notch (4) from stopper (3). Slide the angle toward the left side. After raising angle (2), remove fresh air filter (5).
2. Clean fresh filter (5) using compressed air or by washing with water. Washing procedure with water is as follows:
 - 2.1 Use tap water.
 - 2.2 Submerge the filter in water containing a neutral detergent for about 5 minutes.
 - 2.3 Clean the filter with water again.
 - 2.4 Sufficiently dry the filter.
3. Install the cleaned fresh air filter or a new filter by following the filter removal procedure described in step 1 in the reverse order.



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MAINTENANCE

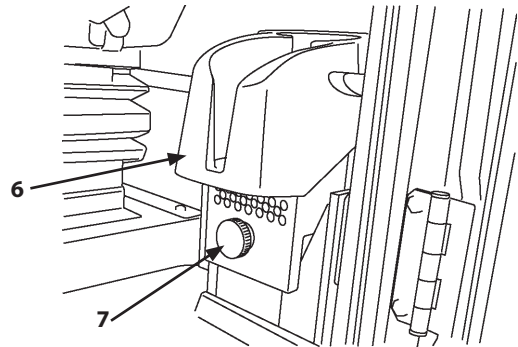
Clean Circulation Air Filter

1. Remove the filter:
Remove screw (7) under cup holder (6) and tilt the cup holder forward. While pushing circulation air filter (9) downward, remove circulation air filter (9) from stoppers (8).

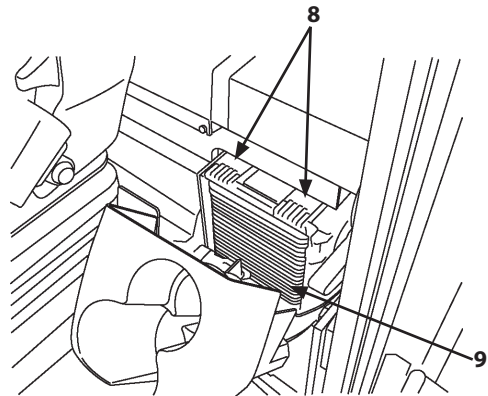
⚠ WARNING: When using compressed air pressure, wear safety glasses or goggles.

IMPORTANT: If compressed air delivery pressure is high, damage to the filter fins may result. Always use compressed air at the lower pressure than 0.2 MPa (2kgf/cm²). Keep the nozzle away from the core surface more than 500 mm.

2. Clean circulation air filter (5) using compressed air or by washing with water. Washing procedure with water is as follows:
 - 2.1 Use tap water.
 - 2.2 Submerge the filter in water containing a neutral detergent for about 5 minutes.
 - 2.3 Clean the filter with water again.
 - 2.4 Sufficiently dry the filter.
3. Install the cleaned circulation air filter or a new filter by following the filter removal procedure described in step 1 in the reverse order.



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M4GB-07-109

MAINTENANCE

2

Check Air Conditioner --- every 6 months

Check the air conditioner switch panel, air conditioner unit, and condenser mounting areas for any abnormality, and check hoses for any damage.

 **NOTE:** *When the season to use the air conditioner comes close, check the air conditioner to get it ready to use at all times. When not required to use the air conditioner for a long period of time, operate the air conditioner in the cooling mode once a week to prevent the lack of lubrication.*



WARNING: Avoid steam cleaning

Do not clean the compressor and receiver tank with steam. The refrigerant gas pressure will increase, possibly causing the hoses to break.

3

Check Air Conditioner Piping --- every 6 months

Check the piping for abnormal deformation and/or damage. If a pipe joint is contaminated with oil, refrigerant leakage may be suspected. Check for leakage using a gas leak detector.

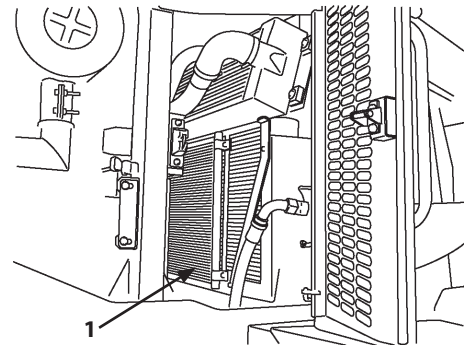


CAUTION: If any leakage is found, repair or replace the corresponding pipes. Tighten the joint bolts to specification.

MAINTENANCE

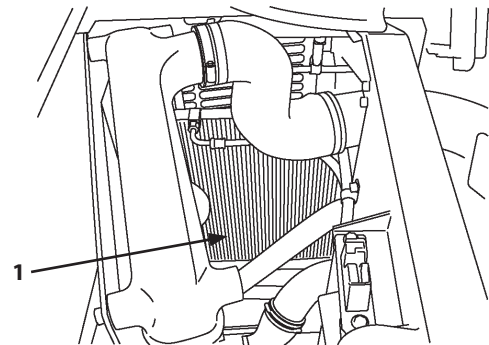
4 Check Air Conditioner Condenser --- every 6 months

If condenser (1) is covered with dirt and/or insects, air conditioner cooling performance will be reduced. Remove dirt or stain from fins of condenser (1) using tap water. In case the condenser has been severely contaminated, use a soft brush. Do not use a hard brush, which may damage the fins. Clean the condenser from the top side of the engine hood on ZW310.



ZW220, ZW250

M4GB-07-087



ZW310

M4GB-07-110

5 Check Air Conditioner Fan Belt --- every 6 months

Check the belt for abnormal deflection and damage. Check fan belt tension by depressing the midpoint shown with ↓ mark in the illustration with the thumb. Deflection must be as follows with a depression force of approximately 98 N (10 kgf).

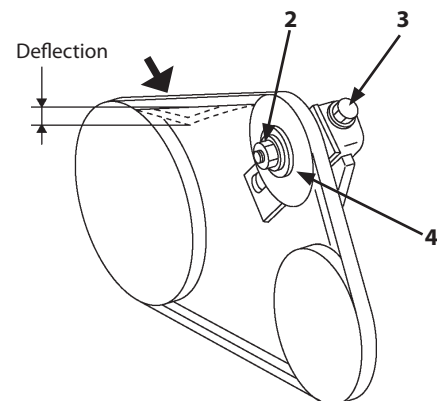
ZW180: approx. 7 mm

ZW220 and ZW250: approx. 6 mm

ZW310: approx. 7 mm

Belt tension adjustment procedure

1. Loosen lock nut (2) of tension pulley (4).
2. Move tension pulley (4) to adjust belt tension by turning belt tension adjustment bolt (3).
3. Securely tighten nut (2).



M4GB-07-111

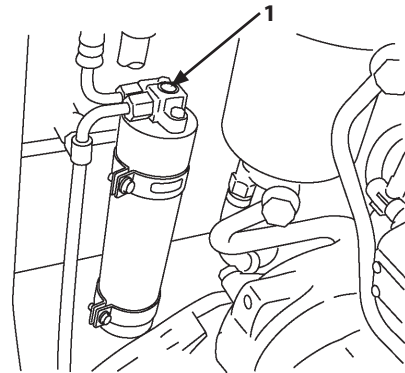
MAINTENANCE

6 Check Refrigerant --- every 6 months

After running the engine at 1500 min⁻¹ (rpm) for a few minutes, check the refrigerant quantity through sight glass (inspection port) (1). This machine uses new Freon R134a as the refrigerant. Before charging the refrigerant, first collect the entire refrigerant from the cooling system. Then, charge the refrigerant by the specified quantity. In case any abnormality is found in the air conditioner, consult your nearest Hitachi dealer.

	Type	Refrigerant No.	Quantity kg
ZW180	HFC	R134a	0.95 ± 0.05
ZW220			1.05 ± 0.05
ZW250			
ZW300			1.00 ± 0.05

CAUTION: Do not dispose FREON into the atmosphere to prevent depletion of ozone layer and global warming.



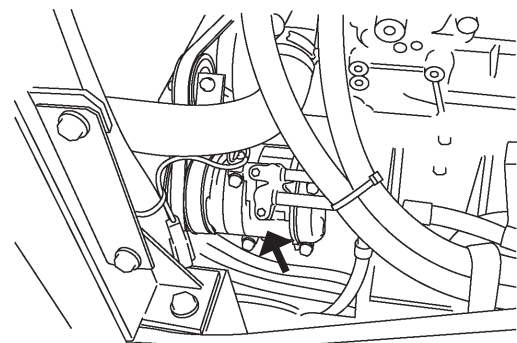
M4GB-07-112

7 Check Compressor and Pulley --- once a year

Check the compressor and its vicinity for abnormality in operation, oil stain, or refrigerant leakage. Check the pulley for an abnormal noise emitting.

Check compressor:

After operating the air conditioner for 5 to 10 minutes, touch both the high pressure pipe and the low pressure pipe. Normally, the high pressure pipe must be hot and the low pressure pipe must be cool.

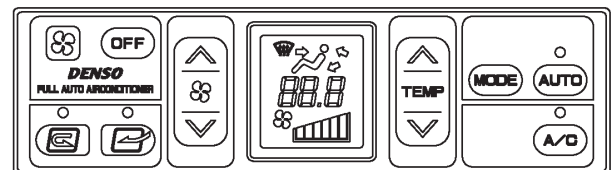


ZW310

M4GB-07-114

8 Check Switch Operation --- once a year

Check all air conditioner switch functions by operating the respective switch. To check the air conditioner function, operate plural numbers of the switches at the same time. (Refer to page 1-38.)



M178-01-017

MAINTENANCE

L. MISCELLANEOUS

1

Check Bucket Teeth and Cutting Edge --- every 10 hours (daily)

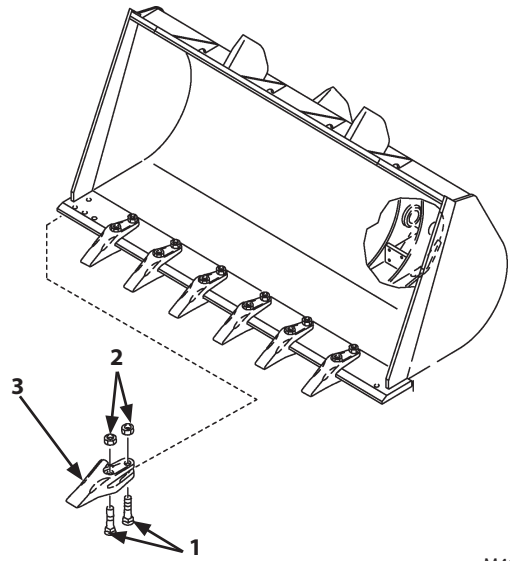
Check bucket teeth for wear and looseness.

Replace

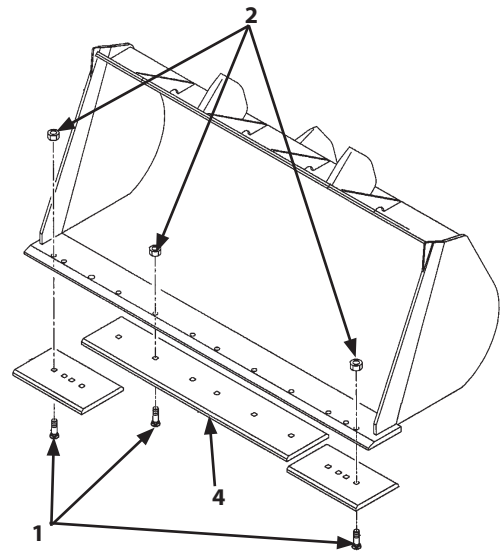


WARNING: Guard against injury from flying pieces of metal. Wear goggles or safety glasses, hard hat and face shield.

1. Raise the bucket to an appropriate height with the bucket bottom parallel to the ground. Insert blocks under the bucket to support it. Stop the engine.
2. Loosen bolts (1) and nuts (2). Remove bucket teeth (3) or cutting edge (4).
3. Install new teeth (3) or cutting edge (4). If the reverse side of a cutting edge is not worn much, use it again with the face reversed. If both sides are worn out, replace it with a new one.
4. Tighten nuts (2).
Tightening torque:
Bucket teeth: 1068 N·m (109 kgf·m)
Cutting edge: 1940 N·m (198 kgf·m)
5. Retighten mounting nuts (2) after a few hours of operation.



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M4GB-07-116

MAINTENANCE

2

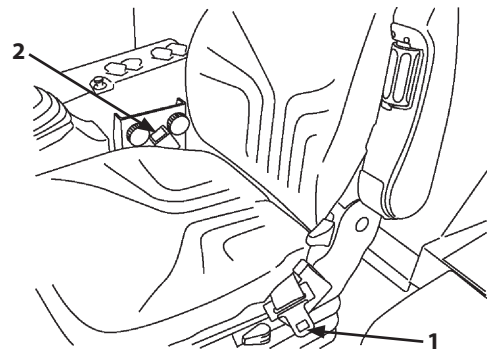
Check and Replace Seat Belt

Check --- every 10 hours (daily)

Replace --- every 3 years

Examine buckle (1), attaching hardware (2) and seat belt web. Replace the seat belt web, buckle, or attaching hardware if they are damaged, or worn.

Replace seat belt every 3 years, regardless of appearance.

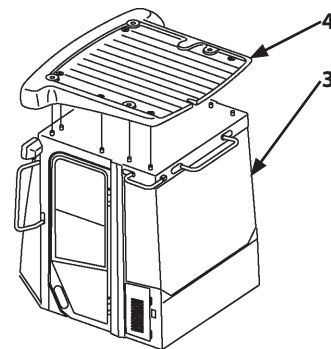


M4GB-07-117

3

Check ROPS cab, Resin Cab Roof, and Roof Mounting Bolts --- every 10 hours (daily)

Check the appearance of ROPS cab (3) and resin cab roof (4) for any abnormal damage or deformation.



M4GB-07-118

4

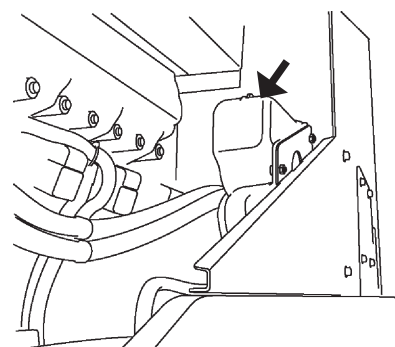
Check Windshield Washer Fluid Level

--- every 10 hours (daily)

Check the fluid level. If necessary, add the fluid.

 **NOTE:** The location of the windshield washer fluid tank differs depending on the machine models.

IMPORTANT: Keep all dirt, dust and other foreign materials out of the tank.



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MAINTENANCE

5

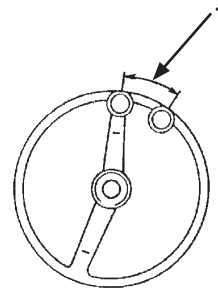
Check Play Amount in Steering Wheel Stroke

--- every 10 hours (daily)



WARNING: When the steering wheel is turned, the clearance between the front and rear frames becomes narrower, possibly creating a hazardous situation such as entanglement of limbs. Keep any personnel away from the frame articulation point during inspection.

Check that play (1) in steering wheel stroke is correct and that steering column tilt telescopic lever (2) is securely held. In addition, check that the steering wheel column normally comes in contact with the stopper when the steering wheel is fully turned and that the steering cylinder operates normally.



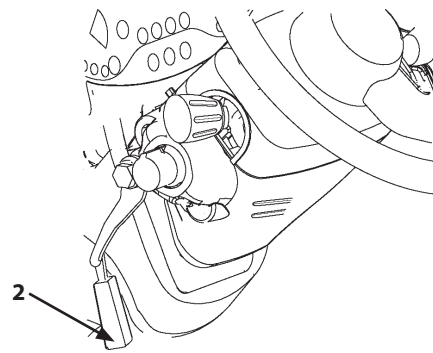
M4GB-07-120

1. Start the engine. Turn the parking brake switch ON.
2. Slightly lift the bucket above the ground. Place the control lever lock in the LOCK position.
3. While running the engine at slow speed, slightly rotate the steering wheel knob in both clockwise and counter-clockwise. Measure the moving distance along the steering wheel circumference until both right and left steering cylinders start moving (check the movement of the bucket and/or tires).

Play amount (1) on ZW180, ZW220, 250, and 310: 5 to 15 mm



NOTE: If too much play amount of the steering wheel is found or if the steering wheel does not move smoothly, consult your nearest Hitachi dealer for checking.



M4GB-01-062

MAINTENANCE

6

Check Accelerator Pedal Operation, and Exhaust Gas Color and Noise --- every 10 hours (daily)

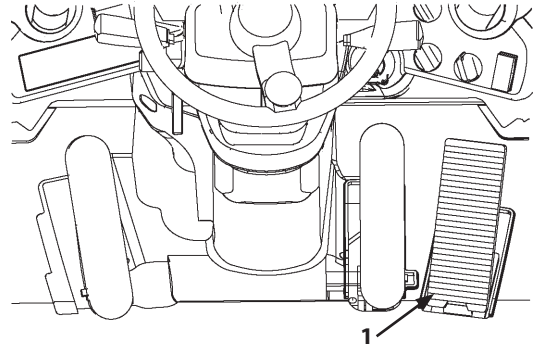
WARNING: Move the forward/reverse selector lever to neutral. Apply the parking brake. After horizontally resting the bucket on the ground, set the wheel stoppers.

While slowly stepping on accelerator pedal (1), check that the engine speed smoothly increases. Then, while slowly returning accelerator pedal (1), check that the engine speed smoothly decreases.

Exhaust gas color and noise:

DANGER: Sufficiently ventilate when carrying out warming up operation indoor. Failure to do so may cause intoxication by exhaust gas, possibly resulting in personal death accident.

Exhaust gas color is normally transparent or light blue. Although exhaust gas color slightly becomes black immediately after the engine is started or quickly accelerated, this symptom is not abnormal. If the exhaust gas color becomes black, white, blown, or gray, check the engine oil level and the fuel supply system for any abnormality. In addition, check that no abnormal noise is heard coming from the engine or the muffler.



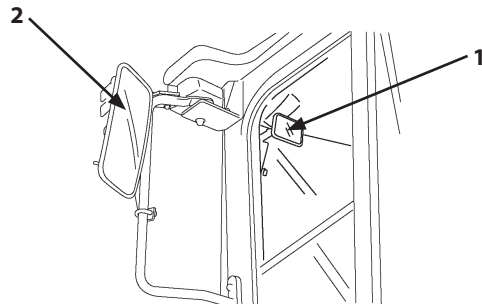
M4GB-01-098

MAINTENANCE

7

Check Rearview Mirror and Inside Rearview Mirror --- every 10 hours

Check that inside rearview mirror (1) and rearview mirror (2) are facing a correct direction. Check inside rearview mirror (1) and rearview mirror (2) for contamination or damage.



8

Check Turbocharger Bearing --- every 1000 hours (or once a year whichever comes first)

Consult your nearest Hitachi dealer for check and repair.

M4GB-01-126

9

Check Engine Cylinder Head and Manifold --- every 1000 hours (or once a year whichever comes first)

Consult your nearest Hitachi dealer for check and repair.

10

Check and Adjust Valve Clearance --- every 1000 hours

ZW310: only first time at 500 hours and every 1000 hours afterwards.

Consult your nearest Hitachi dealer for check and repair.

MAINTENANCE

- 11** **Check Fuel Injection Timing**
--- every 1000 hours (or once a year whichever comes first)

Consult your nearest Hitachi dealer for check and repair.

- 12** **Check Engine Compression Pressure**
--- every 1000 hours (or once a year whichever comes first)

Consult your nearest Hitachi dealer for check and repair.

- 13** **Check and Clean Starter and Generator**
--- every 1000 hours

Consult your nearest Hitachi dealer for check and repair.

- 14** **Retighten Front Axle and Rear Axle Support Mounting Bolts** --- every 2000 hours

Check front and rear axle support mounting bolts for looseness.

Tightening torques of the front axle and rear axle support mounting bolts

	Front Axle Mounting Bolt	Rear Axle Support Mounting Bolt
ZW180	785 N•m (80 kgf•m)	890 N•m (91 kgf•m)
ZW220	1128 N•m (115 kgf•m)	1128 N•m (115 kgf•m)
ZW250	1579 N•m (161 kgf•m)	1128 N•m (115 kgf•m)
ZW310	1579 N•m (161 kgf•m)	1579 N•m (161 kgf•m)

MAINTENANCE

Tightening and Retightening Torque of Nuts and Bolts

Tighten or retighten nuts and bolts used on this machine in accordance with the torque values shown in the following table. Check nuts and bolts for looseness and missing daily before and after operation. If any loose or missing nuts and/

or bolts are found , retighten or supply replacement parts. The nuts and bolts other than those shown in the table below shall be tightened in accordance with the torque values shown in the table on page 7-104.

No.	Locations	Model	Bolt Diameter	Quantity	Wrench Size	Torque N•m (kgf•m)
1	Front axle mounting bolt	ZW180	24	8	36	785(80)
		ZW220	27	8	41	1128(115)
		ZW250	30	8	46	1579(161)
		ZW310	30	8	46	1579(161)
2	Rear axle support mounting bolt	ZW180	24	8	36	890(91)
		ZW220	24	8	36	1128(115)
		ZW250	27	8	41	1128(115)
		ZW310	30	8	46	1579(161)
3	Wheel rim mounting bolt	ZW180	24	60	36	890(91)
		ZW220	24	72	36	890(91)
		ZW250	24	80	36	890(91)
		ZW310	24	80	36	890(91)
4	Propeller shaft mounting bolt	ZW180 ZW220 ZW250 ZW310	12	20	17	143(15)
5	Propeller shaft support bearing mounting bolt	ZW180 ZW220 ZW250 ZW310	20	2	30	206(21)
6	Transmission mounting bolt: Bracket	ZW180	16	8	24	204(21)
		ZW220	20	4	30	401(41)
			12	8	17	81.2(8)
		ZW250	20	4	30	401(41)
			12	8	17	81.2(8)
		ZW310	16	8	24	224(23)
7	Transmission mounting bolt: Cushion rubber	ZW180	18	4	27	315(32)
		ZW220	18	2	27	315(32)
		ZW250	18	2	27	315(32)
		ZW310	18	4	27	315(32)
8	Engine mounting bolt: Bracket	ZW180	12	6	17	81.2(8)
		ZW220	10	12	14	46.2(5)
		ZW250	10	12	14	46.2(5)
		ZW310	14	8	22	180(18)
9	Engine mounting bolt: Cushion rubber	ZW180 ZW220 ZW250 ZW310	18	2	27	315(32)

MAINTENANCE

No.	Locations	Model	Bolt Diameter	Quantity	Wrench Size	Torque N·m (kgf·m)
10	Muffler mounting bolt	ZW310	12	4	17	34.2(3)
			12	4	19	100(10)
			16	2	24	200(20)
			16	1	24	205(21)
11	Counterweight mounting bolt	ZW180 ZW220 ZW250 ZW310	30	4	46	1510(154)
12	Top center pin upper flange lock	ZW180	16	7	24	224(23)
		ZW220	16	7	24	224(23)
		ZW250	16	10	24	224(23)
		ZW310	16	10	24	224(23)
13	Bottom center pin lock	ZW180 ZW220 ZW250 ZW310	16	1	24	86.9(9)
14	Loader front pin lock	ZW180	12	4	17	34.2(3)
			16	9	24	86.9(9)
		ZW220 ZW250 ZW310	16	13	24	86.9(9)
15	Steering cylinder pin lock	ZW180 ZW220 ZW250 ZW310	16	4	24	86.9(9)
16	Radiator frame mounting bolt	ZW180	16	6	24	232(24)
		ZW220 ZW250 ZW310	16	6	24	154(16)
17	Radiator mounting bolt	ZW180	10	2	14	39~49(4~5)
		ZW220	8	4	12	17.6(2)
		ZW250	8	4	12	17.6(2)
		ZW310	10	4	14	39~49(4~5)
18	Intercooler mounting bolt	ZW180	10	2	14	39~49(4~5)
		ZW220	10	4	14	36.2(4)
		ZW250	10	4	14	36.2(4)
		ZW310	12	6	17	67~83(7~8)
19	Oil cooler mounting bolt	ZW180	14	4	22	60~75(6~7.5)
		ZW220	10	4	14	36.2(4)
		ZW250	10	4	14	36.2(4)
		ZW310	10	8	14	39~49(4~5)
20	Torque converter cooler mounting bolt	ZW180	12	4	17	60~75(6~7.5)
		ZW220	10	2	14	36.2(4)
		ZW250	10	2	14	36.2(4)
21	Air conditioner condenser mounting bolt	ZW180 ZW220 ZW250 ZW310	8	4	12	12.5(1)

MAINTENANCE

No.	Locations to be retightened	Model	Bolt Diameter	Quantity	Wrench Size	Torque N•m (kgf•m)
22	Air conditioner compressor mounting bolt	ZW180 ZW220 ZW250 ZW310	8	4	12	23~30 (2~3)
23	Cab cushion rubber	ZW180 ZW220 ZW250 ZW310	16	4	24	205(21)
24	Bucket tooth mounting bolt (Optional)	ZW180 ZW220 ZW250 ZW310	*11/4'	16	46	1940(198)
25	Cutting edge mounting bolt	ZW180 ZW220 ZW250 ZW310	*1'	12	37.47	1068(109)
26	Wear plate mounting bolt	ZW180	*1'	4	37.47	1068(109)
		ZW220	*1'	4	37.47	1068(109)
		ZW250	*1'	4	37.47	1068(109)
		ZW310	*1'	8	37.47	1068(109)

Figures with * mark are shown in Inch.

MAINTENANCE

Nuts and Bolts Tightening Torque

When checking the machine parts, if loose nuts and bolts are found, retighten them to the torque values shown in the table below.

IMPORTANT:

- Remove soil, rust, and/or dirt from the nut and bolt thread surfaces before tightening.
- Tighten nuts and bolts to specifications. If tightened with excessively low or high torque, missing or breakage of nuts and/or bolts may result.

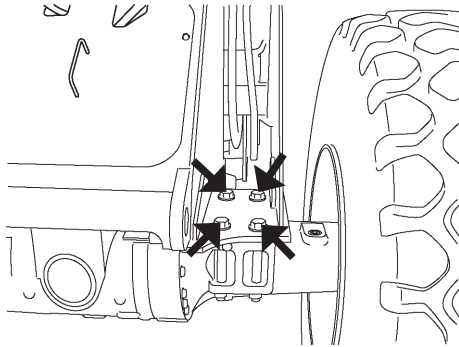
Tightening Torque Table

Bolt Dia. mm	Hexagon head bolt												
	 M4GB-07-121				 M4GB-07-122				 M4GB-07-123				Wrench size mm
	Standard torque		Allowable torque range		Standard torque		Allowable torque range		Standard torque		Allowable torque range		
	N•m	kgf•cm	N•m	kgf•cm	N•m	kgf•cm	N•m	kgf•cm	N•m	kgf•cm	N•m	kgf•cm	
4	1.15	11.7	0.92 to 1.38	9.4 to 14.1	3.06	31.2	2.45 to 3.67	25.0 to 37.4	4.49	45.8	3.60 to 5.39	36.7 to 55.0	7
5	2.36	24.1	1.89 to 2.82	19.3 to 28.8	6.30	64.2	5.03 to 7.55	51.3 to 77.0	9.24	94.2	7.40 to 11.1	75.5 to 113	8
6	4.98	40.6	3.20 to 4.79	32.6 to 48.8	10.6	108	8.50 to 12.7	86.7 to 130	15.6	159	12.6 to 18.7	128 to 191	10
8	9.81	100	7.84 to 11.7	79.9 to 119	26.1	266	20.9 to 31.0	213 to 319	38.3	391	30.7 to 46.0	313 to 469	13
10	19.5	199	15.6 to 23.4	159 to 239	52.1	531	41.6 to 62.5	424 to 638	76.5	780	61.2 to 91.8	624 to 936	17
12	34.2	349	27.5 to 41.1	280 to 419	91.2	930	73.1 to 109	745 to 1110	133	1360	108 to 161	1100 to 1640	19
14	55.0	561	43.9 to 65.9	448 to 672	146	1490	117 to 177	1190 to 1800	216	2200	173 to 258	1760 to 2630	22
16	86.9	886	69.5 to 104	709 to 1060	232	2370	185 to 279	1890 to 2840	341	3480	272 to 409	2770 to 4170	24
18	118	1200	94.6 to 142	965 to 1450	315	3210	252 to 379	2570 to 3860	463	4720	370 to 555	3770 to 5660	27
20	171	1740	136 to 204	1390 to 2080	452	4610	362 to 543	3690 to 5540	665	6780	534 to 797	5440 to 8130	30
22	234	2390	187 to 252	1910 to 2570	624	6360	499 to 749	5090 to 7640	918	9360	734 to 1100	7480 to 11200	32
24	293	2990	234 to 352	2390 to 3590	782	7970	626 to 938	6380 to 9560	1150	11700	919 to 1380	9370 to 14100	36
27	436	4450	349 to 524	3560 to 5340	1160	11800	931 to 1400	9490 to 14300	1720	17500	1370 to 2050	14000 to 20900	41
30	588	6000	471 to 706	4800 to 7200	1570	16000	1260 to 1880	12800 to 19200	2300	23500	1840 to 2770	18800 to 28200	46
33	810	8260	648 to 972	6610 to 9910	2160	22000	1730 to 2590	17600 to 26400	3170	32300	2540 to 3810	25900 to 38800	50
36	1030	10500	828 to 1250	8440 to 12700	2770	28200	2210 to 3310	22500 to 33800	4060	41400	3240 to 4860	33000 to 49600	55
39	1350	13800	1080 to 1140	11000 to 11650	3600	36700	2880 to 4320	29400 to 44100	5290	53900	4240 to 6350	43200 to 64800	60

MAINTENANCE

1. Front axle mounting bolt

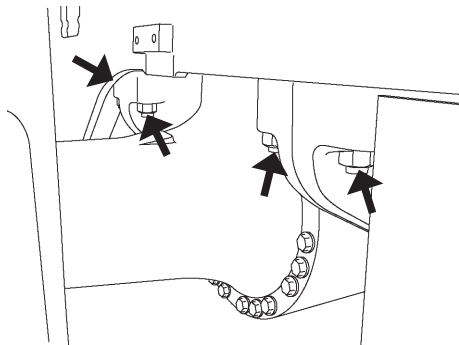
Model	ZW180	ZW220	ZW250	ZW310
Bolt dia. mm	24	27	30	30
Quantity	8	8	8	8



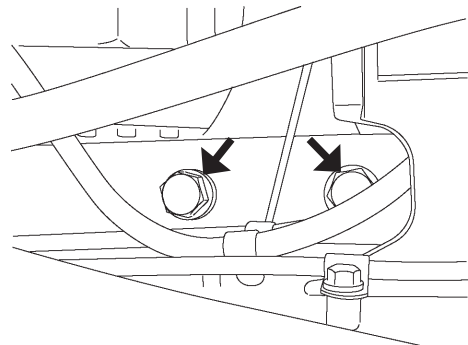
M4GB-07-124

2. Rear axle support mounting bolt

Model	ZW180	ZW220	ZW250	ZW310
Bolt dia. mm	24	24	27	30
Quantity	8	8	8	8



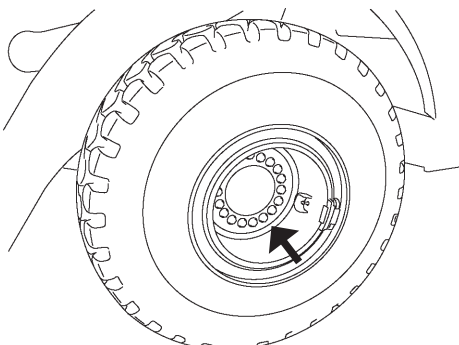
M4GB-07-125



M4GB-07-126

3. Wheel rim mounting bolt

Model	ZW180	ZW220	ZW250	ZW310
Bolt dia. mm	24	24	24	24
Quantity	60	72	80	80

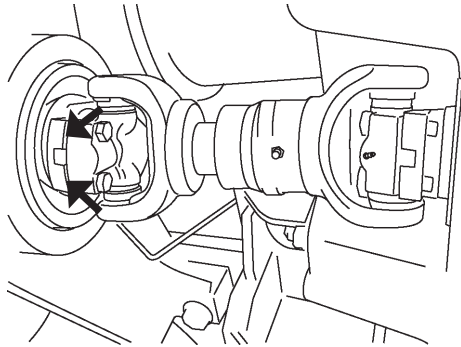


M4GB-07-127

MAINTENANCE

4. Propeller shaft mounting bolt

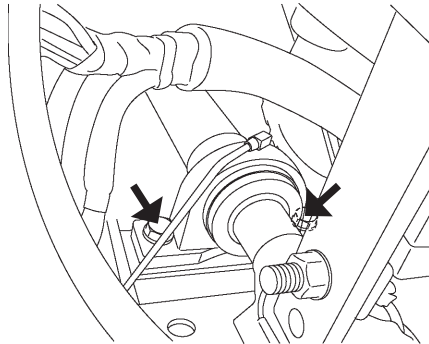
Model	ZW180	ZW220	ZW250	ZW310
Bolt dia. mm	12	12	12	12
Quantity	20	20	20	20



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5. Propeller shaft support bearing mounting bolt

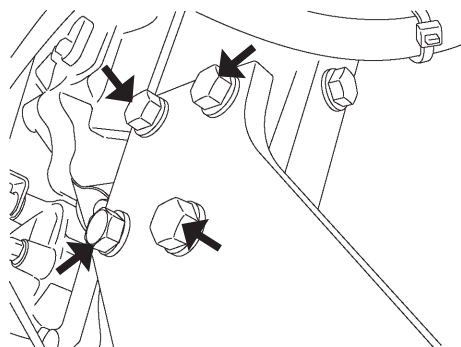
Model	ZW180	ZW220	ZW250	ZW310
Bolt dia. mm	20	20	20	20
Quantity	2	2	2	2



M4GB-07-128

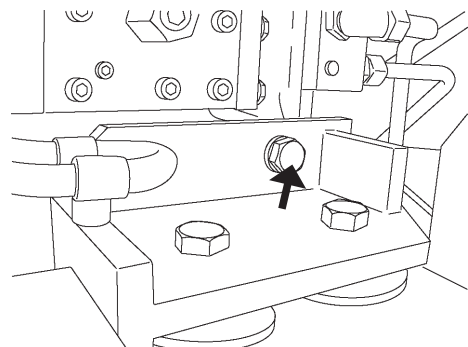
6. Transmission mounting bolt: Bracket

Model	ZW180	ZW220		ZW250		ZW310
Bolt dia. mm	16	20	12	20	12	16
Quantity	8	4	8	4	8	8



ZW220, ZW250

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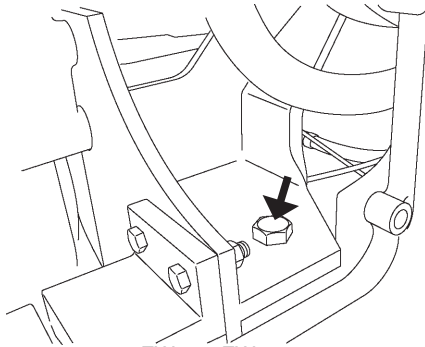
ZW180, ZW310

M4GB-07-130

MAINTENANCE

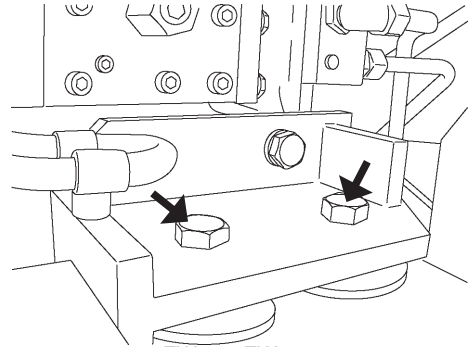
7. Transmission mounting bolt: Cushion rubber

Model	ZW180	ZW220	ZW250	ZW310
Bolt dia. mm	18	18	18	18
Quantity	4	4	2	4



ZW220, ZW250

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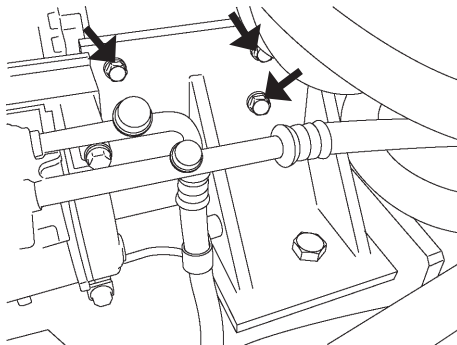


ZW180, ZW310

M4GB-07-130

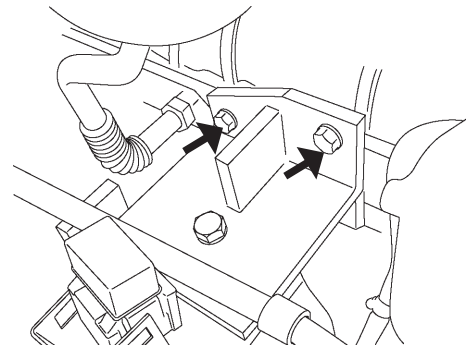
8. Engine mounting bolt: Bracket

Model	ZW180	ZW220	ZW250	ZW310
Bolt dia. mm	12	10	10	14
Quantity	6	12	12	8



ZW180, ZW220, ZW250

M4GB-07-131

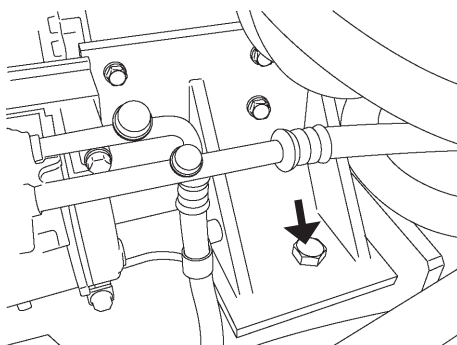


ZW310

M4GB-07-132

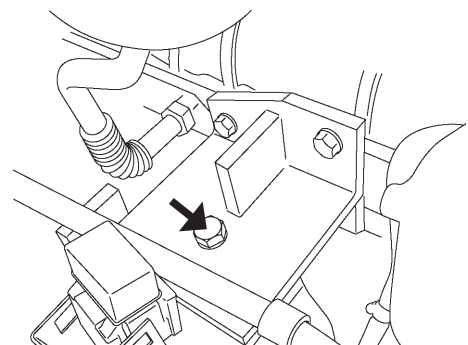
9. Engine mounting bolt: Cushion rubber

Model	ZW180	ZW220	ZW250	ZW310
Bolt dia. mm	18	18	18	18
Quantity	2	2	2	2



ZW180, ZW220, ZW250

M4GB-07-131



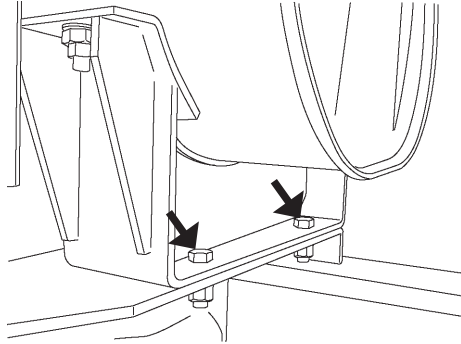
ZW310

M4GB-07-132

MAINTENANCE

10. Muffler mounting bolt

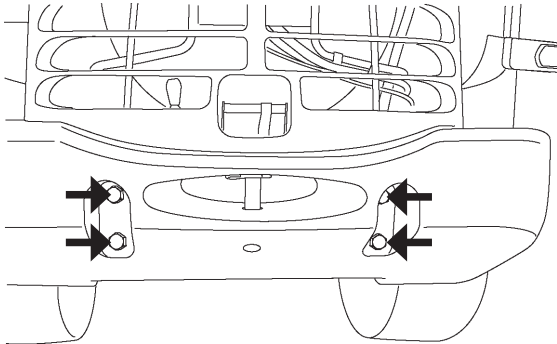
Model	ZW310			
Bolt dia. mm	12	12	16	16
Quantity	4	4	2	1



M4GB-07-133

11. Counterweight mounting bolt

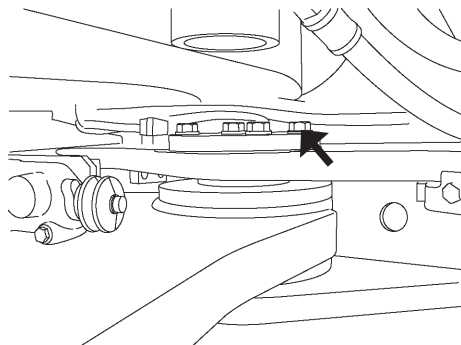
Model	ZW180	ZW220	ZW250	ZW310
Bolt dia. mm	30	30	30	30
Quantity	4	4	4	4



M4GB-07-134

12. Top center pin upper flange lock

Model	ZW180	ZW220	ZW250	ZW310
Bolt dia. mm	16	16	16	16
Quantity	7	7	10	10

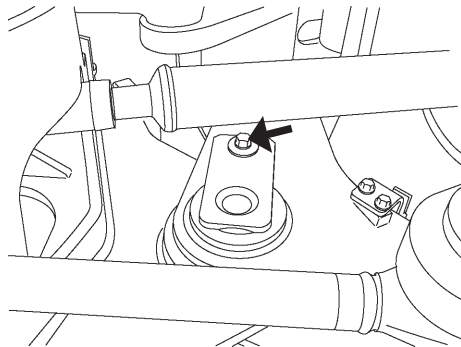


M4GB-07-135

MAINTENANCE

13. Bottom center pin lock

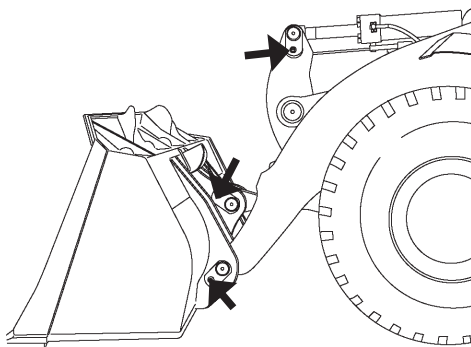
Model	ZW180	ZW220	ZW250	ZW310
Bolt dia. mm	16	16	16	16
Quantity	1	1	1	1



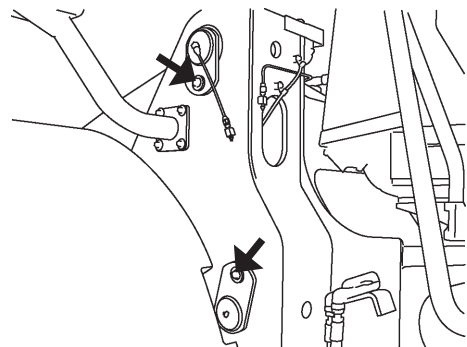
M4GB-07-136

14. Loader front pin lock

Model	ZW180		ZW220	ZW250	ZW310
Bolt dia. mm	12	16	16	16	16
Quantity	4	9	13	13	13



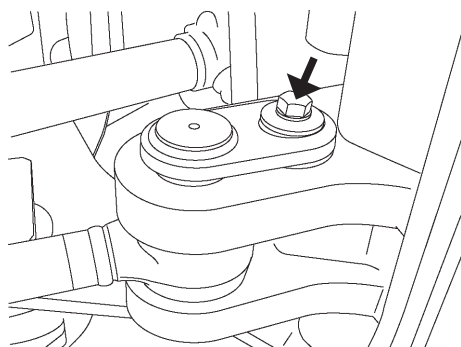
M4GB-07-137



M4GB-07-006

15. Steering cylinder pin lock

Model	ZW180	ZW220	ZW250	ZW310
Bolt dia. mm	16	16	16	16
Quantity	4	4	4	4

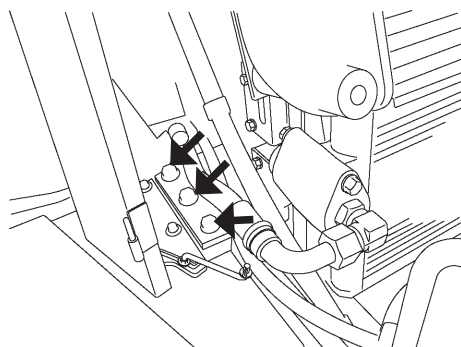


M4GB-07-138

MAINTENANCE

16. Radiator frame mounting bolt

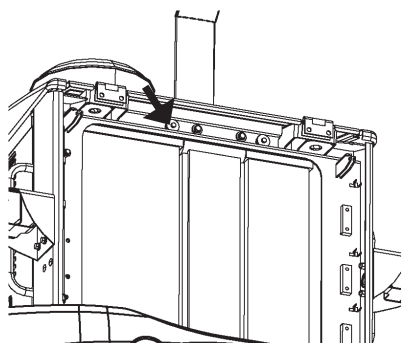
Model	ZW180	ZW220	ZW250	ZW310
Bolt dia. mm	16	16	16	16
Quantity	6	6	6	6



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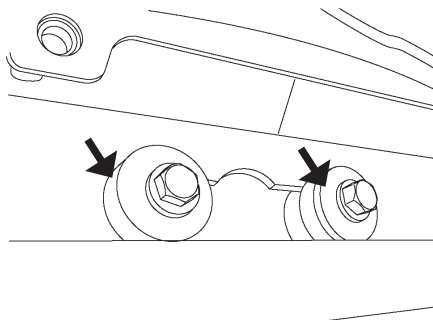
17. Radiator mounting bolt

Model	ZW180	ZW220	ZW250	ZW310
Bolt dia. mm	10	8	8	10
Quantity	2	4	4	4



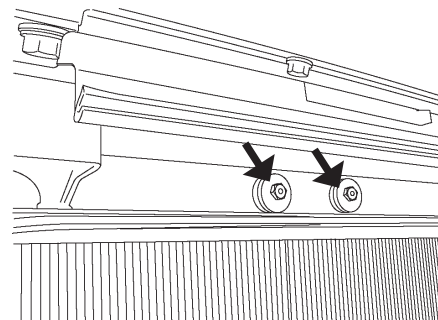
ZW180

M4GF-07-009



ZW220, ZW250

M4GB-07-139

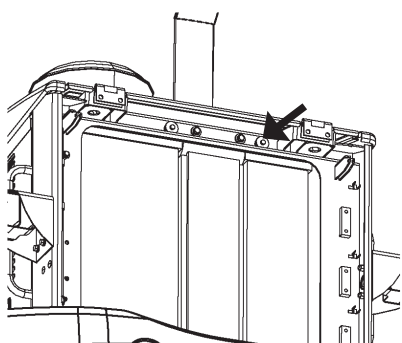


ZW310

M4GB-07-140

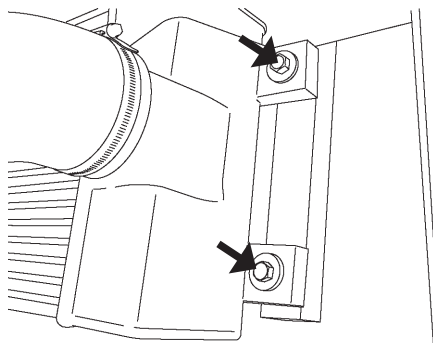
18. Intercooler mounting bolt

Model	ZW180	ZW220	ZW250	ZW310
Bolt dia. mm	10	10	10	12
Quantity	2	4	4	6



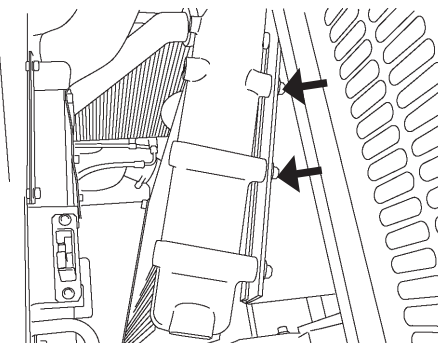
ZW180

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ZW220, ZW250

M4GB-07-141



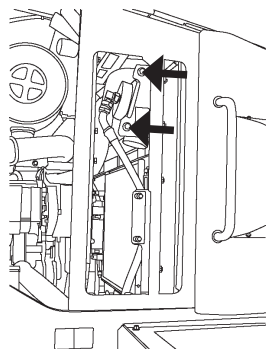
ZW310

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MAINTENANCE

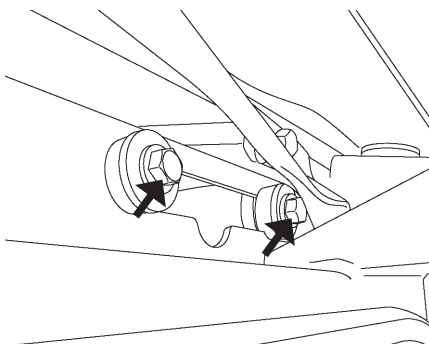
19. Oil cooler mounting bolt

Model	ZW180	ZW220	ZW250	ZW310
Bolt dia. mm	14	10	10	10
Quantity	4	4	4	8



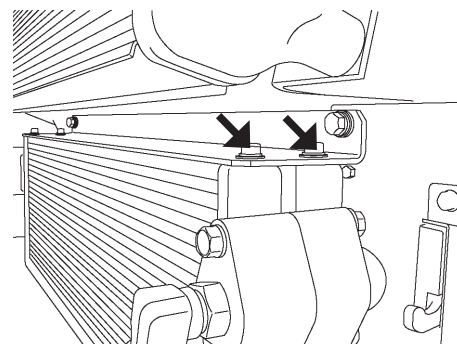
ZW180

M4GF-07-010



ZW220, ZW250

M4GB-07-143

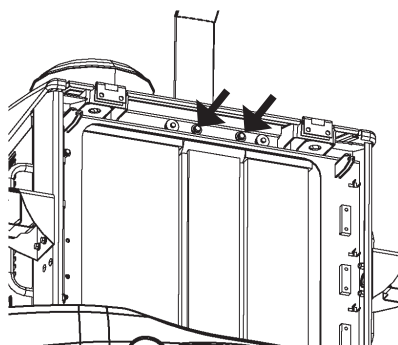


ZW310

M4GB-07-144

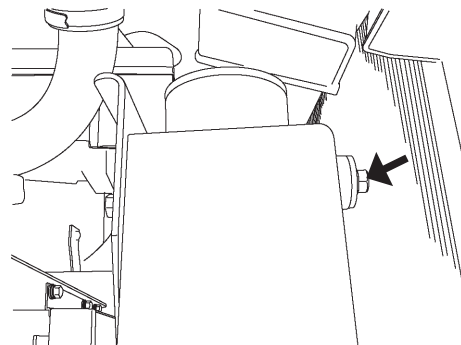
20. Torque converter cooler mounting bolt

Model	ZW180	ZW220	ZW250
Bolt dia. mm	12	10	10
Quantity	4	2	2



ZW180

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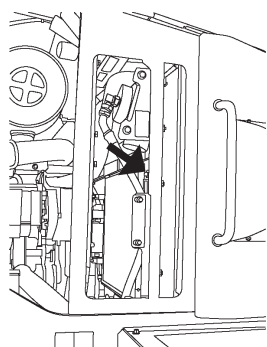


ZW220, ZW250

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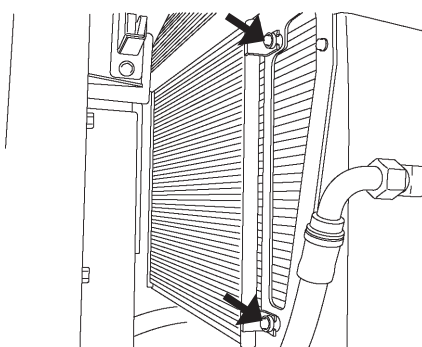
21. Air conditioner condenser mounting bolt

Model	ZW180	ZW220	ZW250	ZW310
Bolt dia. mm	8	8	8	8
Quantity	4	4	4	4



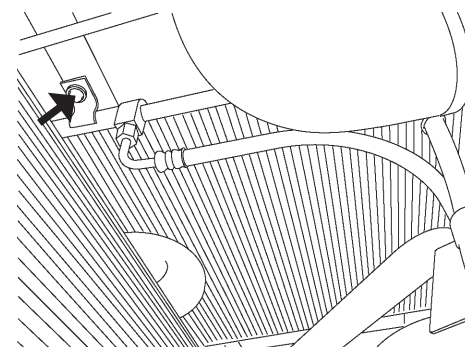
ZW180

M4GF-07-010



ZW220, ZW250

M4GB-07-146



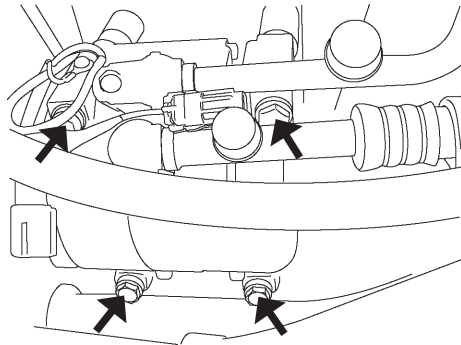
ZW310

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MAINTENANCE

22. Air conditioner compressor mounting bolt

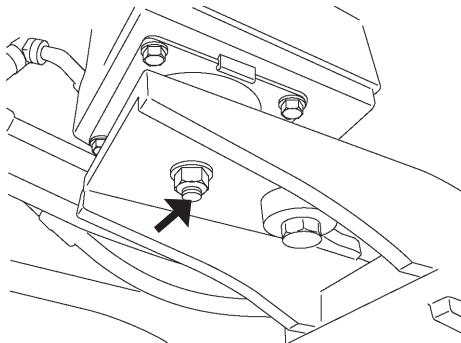
Model	ZW180	ZW220	ZW250	ZW310
Bolt dia. mm	8	8	8	8
Quantity	4	4	4	4



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23. Cab cushion rubber

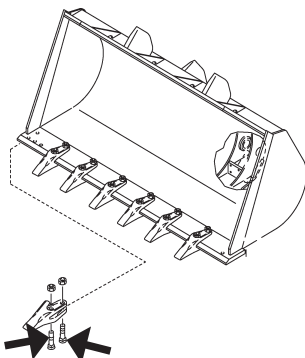
Model	ZW180	ZW220	ZW250	ZW310
Bolt dia. mm	16	16	16	16
Quantity	4	4	4	4



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24. Bucket tooth mounting bolt ((Optional))

Model	ZW180	ZW220	ZW250	ZW310
Bolt dia. in	11/4'	11/4'	11/4'	11/4'
Quantity	16	16	16	16

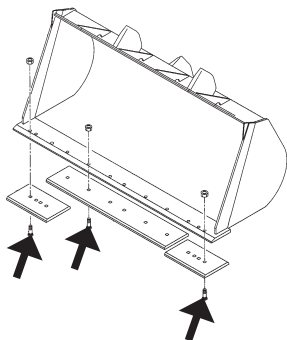


M4GB-07-115

MAINTENANCE

25. Cutting edge mounting bolt

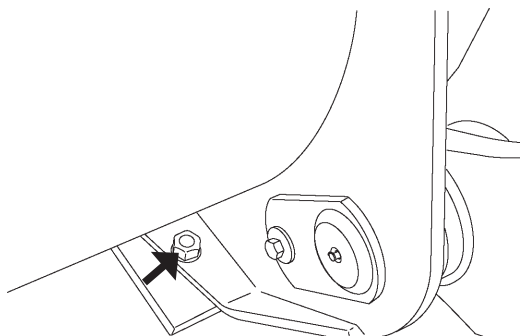
Model	ZW180	ZW220	ZW250	ZW310
Bolt dia. in	1'	1'	1'	1'
Quantity	12	12	12	12



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26. Wear plate mounting bolt

Model	ZW180	ZW220	ZW250	ZW310
Bolt dia. in	1'	1'	1'	1'
Quantity	4	4	4	8



M4GB-07-150

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MAINTENANCE UNDER SPECIAL ENVIRONMENTAL CONDITIONS

MAINTENANCE UNDER SPECIAL ENVIRONMENTAL CONDITIONS

Operating Conditions	Precautions for Maintenance	
Muddy Soil, Rainy or Snowy Weather	Before Operation:	Check tightness of plug and all drain cocks.
	After Operation:	Clean the machine and check for cracks and damage. Check for loose or missing bolts and nuts. Lubricate all necessary parts without delay. If the machine should be submerged in water more than approximately 450 mm water may get into the brake device (like the park brake), resulting in poor braking performance. Watch out when starting/stopping the machine.
Near the Ocean	Before Operation:	Check tightness of plugs and all drain cocks.
	After Operation:	Thoroughly clean the machine with fresh water to wash off salt. Service electrical equipment often to prevent corrosion.
Dusty Atmosphere	Air Cleaner:	Clean the element regularly at shorter service intervals.
	Radiator:	Clean the oil cooler screen to prevent clogging of the radiator core.
	Fuel System:	Clean the filter element and strainer regularly at shorter service intervals.
	Electrical Equipment:	Clean them regularly, in particular, the commutator surface of the alternator and starter.
Rocky Ground	Chassis:	Check for damage on tires, for loose, cracked, worn, and damaged bolts and nuts.
	Front Attachment:	Standard attachment may be damaged when digging rocky ground. Reinforce the bucket before using it, or use a heavy duty bucket.
Freezing Weather	Fuel:	Use high quality fuel suitable for low temperature. Check the fuel tank breather pipe freezing.
	Lubricant:	Use high quality low viscosity hydraulic oil and engine oil.
	Engine Coolant:	Be sure to use antifreeze.
	Battery:	Fully charge the batteries regularly at shorter service intervals. If not charged fully, electrolyte may freeze.
	Tires and Frames:	Keep tires and frames clean. Park the machine on a hard surface to prevent the tires from freezing to the ground.



WARNING:

- The machine owner should take responsibility for installing the roll-over protective structure (ROPS). Be sure to install the cab with ROPS if the machine is unavoidably operated in a job site where falling stones might occur to protect the operator from being involved in personal accidents as long as the seat belt is used. The ROPS cab type ZW220, ZW250 and ZW310 can comply with this requirement. Consult your nearest Hitachi.
- Before operating the machine in a river, check the riverbed conditions in advance. Avoid driving the machine into a river where the riverbed is steep and deep or the stream is rapid.

MAINTENANCE UNDER SPECIAL ENVIRONMENTAL CONDITIONS

Precautions for maintenance during cold weather season

Before the atmospheric temperature becomes down below -0° C, practice the following points.

- Water and oil in the machine will freeze.
- Road surfaces will freeze so that tires may slip.

Keeping the above points in mind, follow the advices below:

1. Refill fluids such as water and lubricants prior to operation. Avoid practices after operation (except fuel).
2. Mix LLC in the radiator (coolant). When this machine is shipped from the factory, LLC (long life coolant) is supplied. Therefore, this machine can operate normally without any problem.
3. Change the engine oil in the engine crankcase for a cold weather type oil.
4. Use fuel (diesel oil) of an antifreeze type. To prevent condensation of air into dew on the wall in the fuel tank, fully refill the fuel tank with an antifreeze type diesel fuel.
5. If the electrolyte in the battery case freezes, damage to the battery case may result. Maintain the batteries at fully charged condition. After completing work, turn all lights OFF. Perform cooling operation for five minutes. Or by other way, dismount the batteries and store them in a warm indoor place. When it is possible to measure and adjust the specific gravity of the electrolyte, increase the specific gravity of the electrolyte up to 1.280. Do not increase more than 1.280.

After taking measures and arrangement mentioned above, start operating the machine.

6. After preheating the engine, start the engine. Sufficiently perform warm-up operation.



WARNING: Sufficiently ventilate when carrying out warming up operation indoor. Failure to do so may cause intoxication by exhaust gas, possibly resulting in personal death accident.

MAINTENANCE UNDER SPECIAL ENVIRONMENTAL CONDITIONS

7. After warming up the engine, warm up the front attachment system. Slowly operate the control levers to move the cylinders full stroke several times.
8. Road surfaces covered with snow, especially when snow has been compacted, will become frozen. Use tire chains on four wheels.
9. Take anti-freeze measures after completing operation.
 - Cover the keyhole by sticking a tape on.
 - Rubber parts such as wiper may freeze. Keep other parts away from the rubber parts.
 - Remove packed snow from around the undercarriage and inside the machine with a bar or brush.
 - In case it is impossible to store the machine indoor, park the machine on a level dry surface and cover overall the machine with a large vinyl sheet.

MEMO

This image shows a full page of a document template designed for handwritten notes or essays. It features approximately 30 evenly spaced, thin horizontal grey lines across the entire width of the page. The margins are consistent on all sides, providing ample space for writing. There are no titles, headers, or other markings present on the page.

STORAGE

STORING THE MACHINE

If the machine is to be stored for more than one month, observe the following precautions so that its function will not be impaired during storage.

PRECAUTION ITEMS FOR LONG-TIME STORAGE

	Contents of Work
Wash Machine	Sufficiently wash the machine to remove stuck mud and/or dust.
Supply Oil and Grease	Check for low level/contamination of lubricating oil. Ref. II or change as necessary. Supply grease to greased parts. Apply a thin coat of oil to parts susceptible to rust (i.e. cylinder rods etc.)
Battery	Remove and fully recharge the battery, then store it.
Coolant	Supply a rust preventive agent without fail. If there is a possibility of freezing, also supply an antifreeze solution or fully drain the coolant. In this case, be sure to attach a "No Water in Radiator" sign in the operator's cab.
Prevention of Dust and Moisture	Store the machine in a relatively dry garage and cover it.
Tools	Inspect and repair, then store.
Lubrication Operation No-load Operation at a Slow Speed for Several Minutes	If the oil films of the parts are broken and parts are rusted, they will be worn abnormally when operated the next time. To prevent this, operate the machine at least once a month to lubricate the parts. At this time, check the coolant and lubrication oil levels.

Precautions for Disconnecting or Connecting

Batteries

In case the batteries are kept disconnected for more than one month or when the batteries are reconnected, contact your nearest Hitachi dealer.

 **NOTE** Lubrication operation means that a series of operations such as drive, and loader front operation are repeated a few times after performing the warm-up operation. Before operating the loader front attachment and steering wheel, remove rust-prevention oil coated on the hydraulic cylinder rods.

 **WARNING:** In case lubrication operation is unavoidably performed indoors, open windows and doors to maintain good air ventilation to prevent asphyxiation. Lubricant property will deteriorate even if the machine is kept stored. Check all lubricants before operating the machine after being stored. Apply the parking brake while storing.

STORAGE

REMOVING THE MACHINE FROM STORAGE

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.*

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

If the machine has not been used for a long time, oil films on sliding surfaces may have broken down. Cycling hydraulic functions for driving and loader front two to three times is necessary to lubricate the sliding surfaces.

Before starting operation, sufficiently check the machine in accordance with the descriptions on "Check before starting" on page 3-1 and perform warm-up operation.

TROUBLESHOOTING

TROUBLESHOOTING

If any machine trouble has occurred, immediately repair it. Make certain the cause of the trouble and take necessary measures to prevent the reoccurrence of the same trouble. In case troubleshooting is difficult, or measures marked with * must be taken, consult the nearest Hitachi dealer. Never attempt to adjust, disassemble, or repair the hydraulic and/or electrical/electronic parts/components.

1. Engine

Consult the nearest Hitachi dealer for the engine troubleshooting.

2. Engine Auxiliaries

Problem	Cause	Solution
Batteries will not be charged.	Broken battery separator Faulty regulator Faulty ground line Faulty alternator	Replace * Adjust and replace * Repair * Repair and replace
Batteries discharges quickly after being charged.	Shorted cable Shorted battery separator Increased sediment in battery	* Repair and replace * Repair and replace * Clean
Coolant temperature is too high.	Low coolant level Loose engine fan V-belt Damaged rubber hose Faulty thermostat Faulty coolant temperature gauge Cooling system passages dirty Radiator core or oil cooler core plugged Radiator screen plugged	Add Adjust * Replace * Replace * Replace Flush cooling system Clean radiator and oil cooler Clean screen

3. Engine does not Start.

Symptom	Cause	Solution
The starter does not rotate.	Reduced battery voltage Increased resistance in the starter circuit Faulty key switch Damaged wire harness Faulty battery relay Blown slow blow fuse link The forward/reverse selector lever is in either the forward or reverse position. Faulty starter	Charge the batteries. Replace * Clean and/or retighten the battery terminals and starter terminals * Replace * Repair or replace * Replace * Replace Return to neutral. * Repair or replace
Although the starter rotates, the engine does not start.	Use of poor quality fuel, insufficient fuel, lack of fuel Faulty glow plug Air mixed in the fuel supply line Faulty injection pump or nozzle Reduced compression pressure	Change fuel. Refill * Replace glow plug Bleed air * Repair or replace * Adjust
Although the engine cranks, running speed is low and easy to stall.	Deteriorated engine oil Contaminated injection nozzle Clogged fuel filter Clogged feed pump strainer Air mixed in the fuel supply line	Change engine oil * Replace Replace Clean Bleed air

Items with * mark: Consult your nearest Hitachi dealer.

TROUBLESHOOTING

4. Control Lever

Symptom	Cause	Solution
Hard to move	Rusted joint Worn pusher	* Lubricate or repair * Replace
Does not move smoothly	Worn pusher Faulty pilot valve	* Repair or replace * Replace
Does not return to neutral	Faulty pilot valve	* Replace
The lever is tilted in the neutral position due to increase in play	Worn joint Faulty pilot valve	* Repair or replace * Replace
The lever is not held with magnetic detent.	Faulty magnetic solenoid Faulty sensor	* Replace * Replace

Items with * mark: Consult your nearest Hitachi dealer.

5. Hydraulic System

After the machine has been kept stowed for a long time, air in the oil may be separated and accumulate in the upper section in the cylinder, causing slow response time in operation or reducing cylinder power. In case these symptoms appear, repeatedly operate all actuators several times.

Problem	Cause	Solution
Loader front and travel functions are inoperable (hydraulic pump noise level increases).	Faulty hydraulic pump Lack of hydraulic oil Broken suction pipe and/or hose	* Repair, Replace Refill * Repair, Replace
Loader front and travel functions are inoperable (hydraulic pump noise level remains unchanged).	Faulty solenoid valve FNR shift lever is in neutral.	* Replace * Operate
All actuators have no power.	Malfunction due to worn hydraulic pump Decrease in set pressure of main relief valve in control valve Lack of hydraulic oil Trapped foreign matter in hydraulic oil tank suction filter Aeration in suction side	* Replace * Adjust Refill Clean Retighten
Only one actuator is inoperable.	Broken control valve spool Trapped foreign matter in valve spool Broken pipe and/or hose Loose pipe line joint Broken O-ring at pipe line joint Broken actuator	* Replace * Repair, Replace * Repair, Replace Retighten * Replace * Repair, Replace
Only one cylinder is inoperable or has no power.	Broken oil seal in cylinder Oil leak due to damage to cylinder rod	* Repair, Replace * Repair, Replace
Oil overheats	Stained oil cooler Weak tension of engine fan belt	Clean Adjust
Oil leak from low pressure hose	Loose clamp Faulty suction manifold	Retighten * Repair, Replace

 NOTE: * Consult the nearest Hitachi dealer.

TROUBLESHOOTING

5. Drive Function

Problem	Cause	Solution
Steering wheel is heavy to operate.	Faulty steering pump Faulty steering device Malfunction of steering cylinder Relief valve set pressure reduction Faulty steering column Low tire air pressure	* Repair, Replace * Repair, Replace * Repair, Replace * Adjust * Inflate
Steering wheel is rotated in unexpected direction.	One side brake is applied or dragged.	* Adjust
Accelerator pedal is heavy to operate.	Rusted joint	* Lubricate, Repair
Accelerator pedal play is large.	Worn joint	* Replace, Repair
ZW220, ZW250 Parking brake Does not work properly	Worn brake disk and/or pads Faulty parking brake solenoid valve	* Replace * Repair or replace
ZW310 Parking brake The brake is not released (sticking, dragging).	Oil leak due to failure of D-ring on the parking brake piston Faulty brake disk	* Repair or replace * Repair or replace
ZW310 Parking brake Does not work properly	Damaged disk brake spring Faulty disk brake Scored or seized piston or worn disk	* Replace * Replace * Repair or replace
Service brake does not work properly	Malfunction of brake valve Oil leak from brake line, Air mixing	* Repair or replace * Repair. Bleed air
Service brake is dragged.	Malfunction of brake valve Faulty brake pedal	* Repair or replace * Repair or replace
Service brake fluid decreases (hydraulic oil).	Oil leak from brake line and/or hose connector Oil leak due to brake piston seal (inside axle)	* Retighten or repair * Retighten or repair
Transmission is noisy.	Lack or deterioration of gear oil Worn inner parts in transmission Broken gear or bearing	Refill, replace * Repair, Replace * Repair, Replace
Propeller shaft vibrates.	Bent propeller shaft Loosen parts, Loss of balance	* Repair, Replace * Retighten, Adjust
Propeller shaft is noisy	Excessively worn spline Worn or seized spider bearing Loosen parts Insufficient greasing	* Replace * Replace * Retighten Grease
Front and/or rear axle is noisy	Worn or broken gears Lack or deterioration of gear oil Worn bearings, Expanded play Expanded play on shaft spline	* Replace Refill, Replace * Replace * Repair, Replace
Front and/or rear axle does not transmit power.	Broken axle Broken gears	* Repair * Repair

 NOTE: * Consult the nearest Hitachi dealer.

6. Others

The machine may have a noise, excessive vibration, and abnormal smell when any trouble occurs. Always beware of the machine conditions during operation.

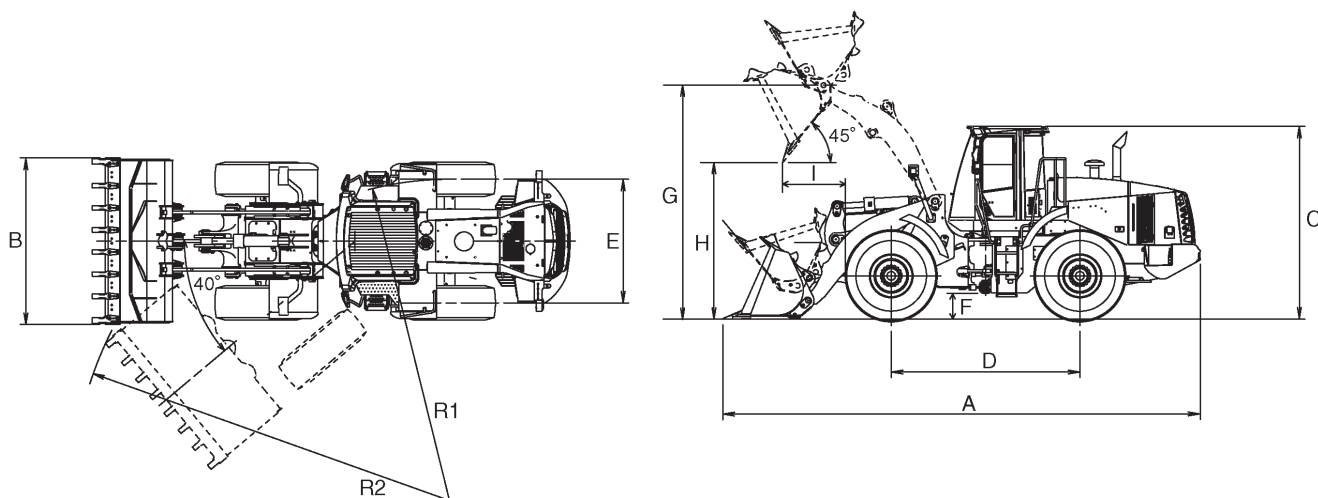
TROUBLESHOOTING

MEMO

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SPECIFICATIONS

SPECIFICATIONS



M4GB-12-001

Model		ZW180	ZW220	ZW250	ZW310
Bucket Capacity : heaped	m ³	2.8 (with BOC*)	3.1 (with Teeth)	3.4 (with Teeth)	4.2 (with BOC*)
Operating Weight	kg	14480	17830	20180	23350
Tipping Load	kg	11660	13000	14350	16600
Rated Loading Weight	kg	4500	5580	6120	7200
Engine		Cummins QSB 6.7 128 kW/2200 rpm (174 PS/2200 rpm)	ISUZU AH-6HK1 139 kW/2170 rpm (189 PS/2170 rpm)	ISUZU AH-6HK1 163 kW/2240 rpm (222 PS/2240 rpm)	Daimler Chrysler OM460LA 216 kW/2000 rpm (294 PS/2000 rpm)
A: Overall Length	mm	7660	8350	8525	8840
B: Overall Width (Bucket)	mm	2535	2910	2980	2980
C: Overall Height	mm	3285	3370	3400	3460
D: Wheel Base	mm	3050	3300	3350	3450
E: Tread	mm	1930	2160	2200	2230
F: Ground Clearance	mm	405	445	420	480
G: Bucket Hinge Height	mm	3920	4085	4190	4390
H: Dumping Clearance (45°)	mm	2760	2800	2850	3070
I: Dumping Reach (45°)	mm	1110	1240	1140	1240
R1: Minimum Rotation Radius	mm	5170	5620	5715	5860
R2: Minimum Rotation Radius	mm	6050	6640	6800	6920
Travel Speed Forward/Reverse	km/h	38.0/38.0	36.5/23.8	36.0/23.7	35.5/35.5
Transmission Speeds (F/R)	—	4/4	4/3	4/3	4/4
Articulation Angle (Left/Right) deg	(°)	40	40	40	40
Tire Size	—	20.5R25	23.5R25	23.5R25	26.5R25

NOTE: • * BOC (Bolt-On Cutting Edge)
• These specifications are subject to change without notice.

SPECIFICATIONS

SOUND LEVEL RESULTS (2000/14/EC)

LwA: sound-power level of airborne noise

Unit: dB(A)	
	LwA
ZW180	105
ZW220	106
ZW250	106
ZW310	107

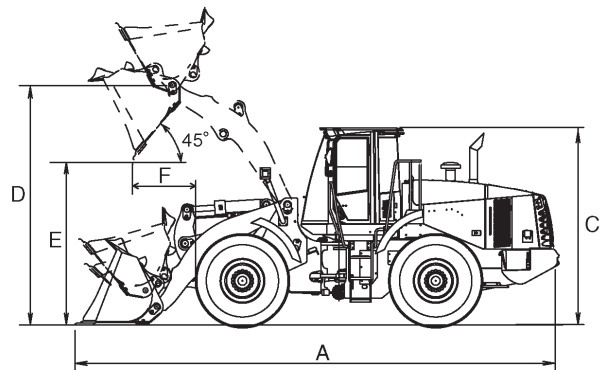
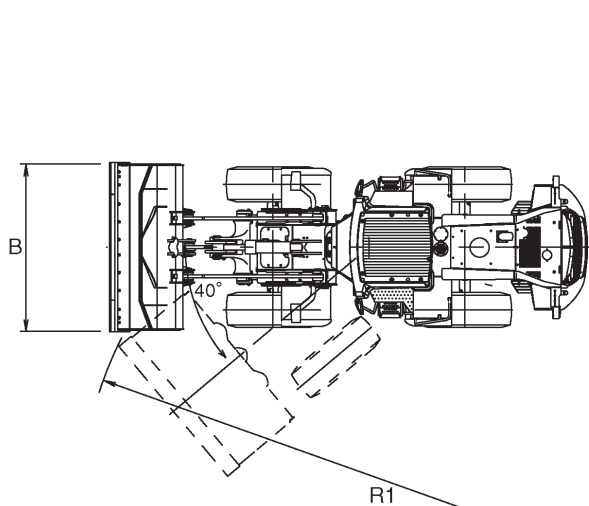
List of authorized attachments according to HCMF specifications

Model	Type of attachments	Weight (kg)	Width (mm)	Size (m ³)	Max. material density (t/m ³)
ZW180	General purpose	1290	2535	2.6	1.72
	Flat bottom	1390	2535	2.6	1.71
	Light material Round bottom	1380	2535	3.1	1.45
	Light material Flat bottom	1490	2535	3.1	1.41
	Rock bucket	1670	2535	2.1	2.08
ZW220	General purpose	1670	2910	3.3	1.67
	Flat bottom	1765	2910	3.3	1.64
	Light material Round bottom	1715	2910	3.5	1.56
	Light material Flat bottom	1805	2910	3.5	1.53
	Rock bucket	1915	2925	2.4	2.19
ZW250	General purpose	1915	2980	3.6	1.69
	Flat bottom	2000	2980	3.6	1.67
	Light material Round bottom	1957	2980	3.8	1.59
	Light material Flat bottom	2042	2980	3.8	1.57
	Rock bucket	2330	2985	2.8	2.00
ZW310	General purpose	2205	2980	4.2	1.71
	Flat bottom	2240	2980	4.2	1.70
	Light material Round bottom	2270	2980	4.5	1.58
	Light material Flat bottom	2305	2980	4.5	1.57
	Rock bucket	2450	2985	3.2	2.10

OPTIONAL ATTACHMENTS

SPECIFICATIONS

Bolt-On Cutting Edge



M4GB-13-001

Model		ZW180		ZW220	
Bucket Type		BOC260-63F	BOC310-63F	BOC330-63G	BOC350-63G
Bucket Capacity : heaped	m ³	2.6	3.1	3.3	3.5
Bucket Capacity : Struck	m ³	2.3	2.7	2.8	3.0
Operating Weight	kg	14450	14540	17950	17980
Tipping Load	kg	11700	11560	12750	12700
A: Overall Length	mm	7610	7760	8215	8265
B: Overall Width (Bucket)	mm	2535	2535	2910	2910
C: Overall Height	mm	3285	3285	3370	3370
D: Bucket Hinge Height	mm	3920	3920	4085	4085
E: Dumping Clearance (45°)	mm	2800	2690	2900	2870
F: Dumping Reach (45°)	mm	1070	1180	1130	1170
R1: Minimum Rotation Radius	mm	6030	6070	6600	6620

 NOTE: These specifications are subject to change without notice.

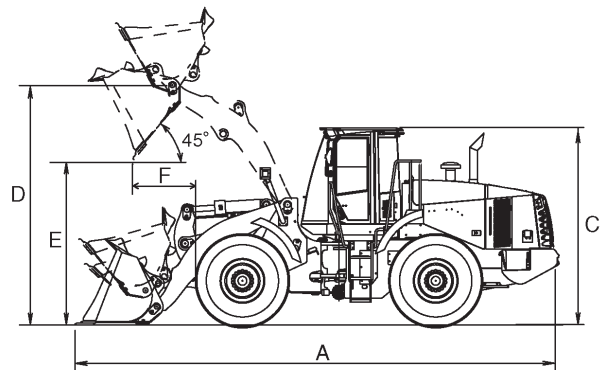
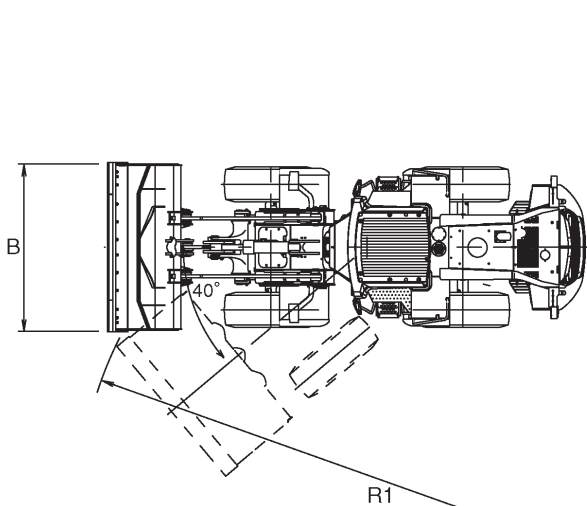
Model		ZW250		ZW310
Bucket Type		BOC360-63H	BOC380-63H	BOC450-63J
Bucket Capacity : heaped	m ³	3.6	3.8	4.5
Bucket Capacity : Struck	m ³	3.1	3.2	3.9
Operating Weight	kg	20290	20330	23520
Tipping Load	kg	14100	14000	16500
A: Overall Length	mm	8350	8395	8905
B: Overall Width (Bucket)	mm	2980	2980	2980
C: Overall Height	mm	3400	3400	3460
D: Bucket Hinge Height	mm	4190	4190	4390
E: Dumping Clearance (45°)	mm	2970	2940	3020
F: Dumping Reach (45°)	mm	1100	1130	1290
R1: Minimum Rotation Radius	mm	6740	6750	6930

 NOTE: These specifications are subject to change without notice.

OPTIONAL ATTACHMENTS

SPECIFICATIONS

Flat Bottom Type Bucket with Bolt-On Cutting Edge



M4GB-13-001

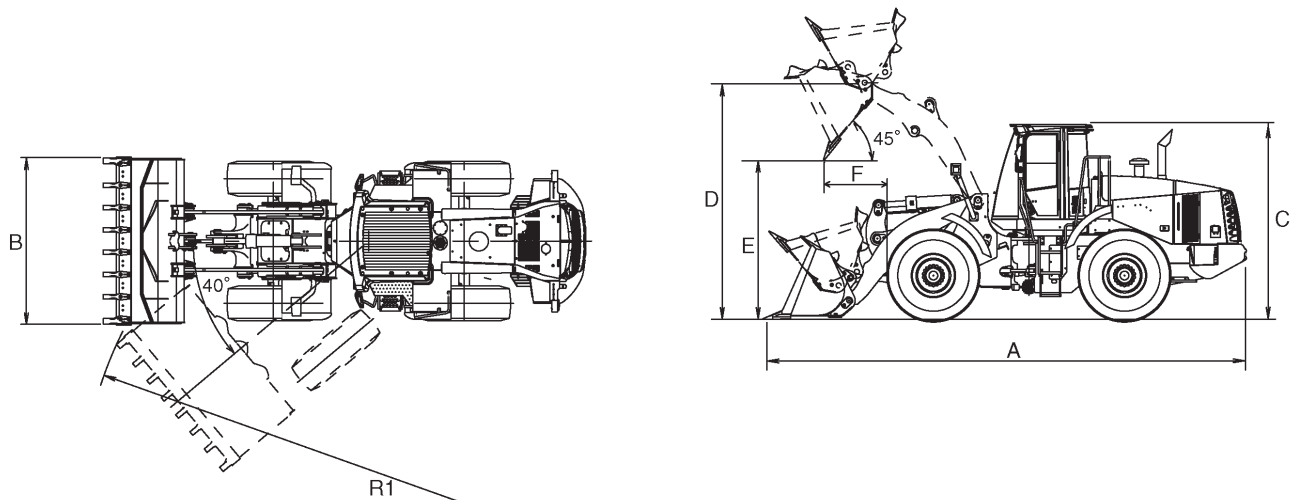
Model		ZW180		ZW220	
Bucket Type		FBD260-63F	FBD310-63F	FBD330-63G	FBD350-63G
Bucket Capacity : heaped	m ³	2.6	3.1	3.3	3.5
Bucket Capacity : Struck	m ³	2.3	2.7	2.8	3.0
Operating Weight	kg	14550	14650	18030	18070
Tipping Load	kg	11590	11440	12650	12600
A: Overall Length	mm	7610	7760	8215	8265
B: Overall Width (Bucket)	mm	2535	2535	2910	2910
C: Overall Height	mm	3285	3285	3370	3370
D: Bucket hinge Height	mm	3920	3920	4085	4085
E: Dumping Clearance (45°)	mm	2800	2690	2900	2870
F: Dumping Reach (45°)	mm	1070	1180	1130	1170
R1: Minimum Rotation Radius	mm	6030	6070	6600	6620

Model		ZW250		ZW310	
Bucket Type		FBD360-63H	FBD380-63H	FBD420-63J	FBD450-63J
Bucket Capacity : heaped	m ³	3.6	3.8	4.2	4.5
Bucket Capacity : Struck	m ³	3.1	3.2	3.6	3.9
Operating Weight	kg	20360	20410	23490	23560
Tipping Load	kg	13950	13900	16550	16450
A: Overall Length	mm	8350	8395	8840	8905
B: Overall Width (Bucket)	mm	2980	2980	2980	2980
C: Overall Height	mm	3400	3400	3460	3460
D: Bucket hinge Height	mm	4190	4190	4390	4390
E: Dumping Clearance (45°)	mm	2970	2940	3070	3020
F: Dumping Reach (45°)	mm	1100	1130	1240	1290
R1: Minimum Rotation Radius	mm	6740	6750	6920	6930

OPTIONAL ATTACHMENTS

SPECIFICATIONS

Bucket with Teeth



M4GB-13-002

Model		ZW180	ZW220	ZW250
Bucket Type		B3*270-63F	B3*330-63G	B3*360-63H
Bucket Capacity : heaped	m ³	2.7	3.3	3.6
Bucket Capacity : Struck	m ³	2.3	2.8	3.1
Operating Weight	kg	14380	17910	20330
Tipping Load	kg	11890	12900	13900
A: Overall Length	mm	7770	8400	8570
B: Overall Width (Bucket)	mm	2535	2910	2980
C: Overall Height	mm	3285	3370	3400
D: Bucket Hinge Height	mm	3920	4085	4190
E: Dumping Clearance (45°)	mm	2690	2770	2820
F: Dumping Reach (45°)	mm	1220	1270	1260
R1: Minimum Rotation Radius	mm	6070	6650	6820

NOTE: These specifications are subject to change without notice.

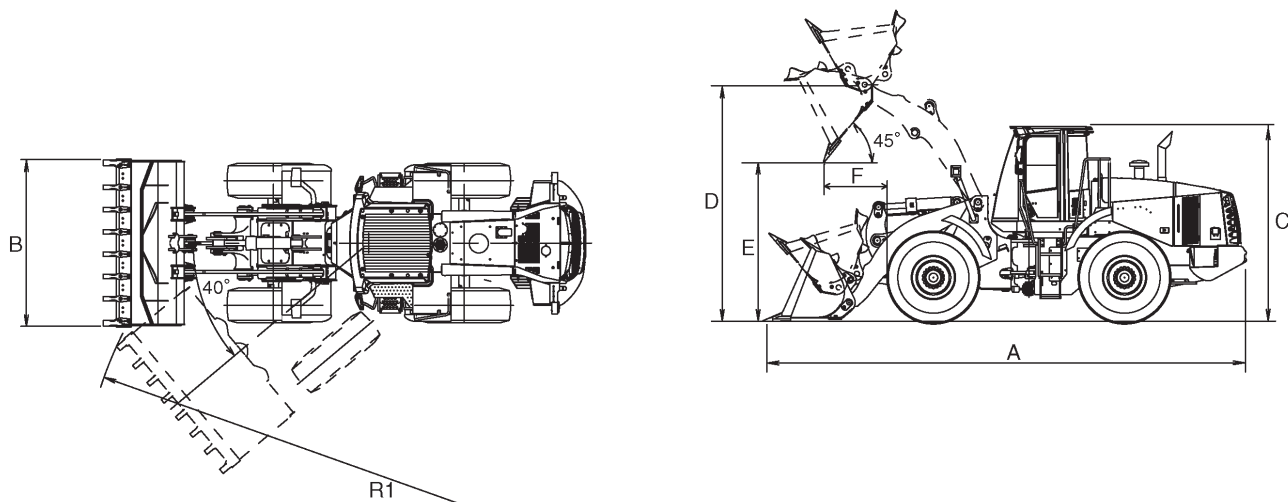
Model		ZW310	
Bucket Type		B3*400-63J	B3*430-63J
Bucket Capacity : heaped	m ³	4.0	4.3
Bucket Capacity : Struck	m ³	3.5	3.7
Operating Weight	kg	23350	23500
Tipping Load	kg	16850	16700
A: Overall Length	mm	9015	9080
B: Overall Width (Bucket)	mm	2980	2980
C: Overall Height	mm	3460	3460
D: Bucket Hinge Height	mm	4390	4390
E: Dumping Clearance (45°)	mm	2950	2900
F: Dumping Reach (45°)	mm	1380	1430
R1: Minimum Rotation Radius	mm	6960	6980

NOTE: These specifications are subject to change without notice.

OPTIONAL ATTACHMENTS

SPECIFICATIONS

Rock Bucket with Teeth



M4GB-13-002

Model		ZW180	ZW220	ZW250	ZW310
Bucket Type		RB3210-63F	RB3240-63G	RB3280-63H	RB3340-63J
Bucket Capacity : heaped	m ³	2.1	2.4	2.8	3.2
Bucket Capacity : Struck	m ³	1.8	2.0	2.4	2.8
Operating Weight	kg	14830	18180	20700	23700
Tipping Load	kg	11440	12600	13750	16500
A: Overall Length	mm	7630	8200	8435	8890
B: Overall Width (Bucket)	mm	2535	2910	2980	—
C: Overall Height	mm	3285	3370	3400	3460
D: Bucket Hinge Height	mm	3920	4085	4190	4390
E: Dumping Clearance (45°)	mm	2790	2910	2920	3040
F: Dumping Reach (45°)	mm	1120	1120	1180	1290
R1: Minimum Rotation Radius	mm	6040	6600	6760	6930

NOTE: These specifications are subject to change without notice.

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