

PART NO. ENMDAS-HT1-2

HITACHI

Reliable solutions

Operator's Manual

ZAXIS

135US-6

Telescopic Arm (Hydraulic type)

[S-TC 120-A-7]

ZX135US-6 TELESCOPIC ARM (HYDRAULIC TYPE) OPERATOR'S MANUAL

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

URL:<http://www.hitachi-c-m.com>

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ENMDAS-HT1-2

Serial No.
ZX135US-6 102978 and up
Serial Front No. U3025 and up

INTRODUCTION

This Operator's Manual has been compiled for the Hydraulic Operated Telescopic Clamshell Equipped Machine (Parallel to the Backhoe) of ZX135US-6 Hitachi Hydraulic Excavator.

Only the parts that differ from those on the ZX135US-6 Hitachi Hydraulic Excavator are described in this manual. Refer to the Operator's Manual for ZX135US-6 Hitachi Hydraulic Excavator for other inquiries than described in this manual.

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 standard specification machine can be operated under the following conditions without being modified.
Atmospheric Temperature: -20 °C to 40 °C (-4 °F to 104 °F)
Altitude: 0 m to 2000 m (0 ft to 6600 ft)

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

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

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

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 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 actions.

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

Prior to operating this machine in a country other than a country of its intended use, it may be necessary to make modifications to it so that it complies with the local standards (including safety standards) and requirements of that particular country. Please do not operate this machine outside of the country of its intended use until such compliance has been confirmed. Please contact Hitachi Construction Machinery Co., Ltd. or any of our authorized distributor or dealer if you have any questions concerning compliance.

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.

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.

INDEX

MACHINE NUMBERS

SAFETY

VISIBILITY MAP

SAFETY SIGNS

COMPONENTS NAME

OPERATOR'S STATION

BREAK-IN

OPERATING THE ENGINE

DRIVING THE MACHINE

OPERATING THE MACHINE

ASSEMBLING/DISASSEMBLING

TRANSPORTING

MAINTENANCE

HYDRAULIC CIRCUIT

STORAGE

SPECIFICATIONS

CLAMSHELL BUCKET

ZOOM CAMERA (OPTIONAL)

INDEX

CONTENTS

MACHINE NUMBERS	1	Clock.....	1-9
SAFETY	S-1	Fuel Gauge	1-9
Recognize Safety Information	S-1	Switch Panel	1-10
Understand Signal Words.....	S-1	Auto-Idle Switch.....	1-12
Follow Safety Instructions.....	S-2	Travel Mode Switch.....	1-12
Use Handholds and Steps	S-3	Power Mode Switch	1-13
Adjust the Operator's Seat.....	S-3	Key Switch.....	1-13
Ensure Safety Before Rising from or Leaving Operator's Seat	S-4	Power Boost Switch	1-14
Fasten Your Seat Belt.....	S-4	Horn Switch.....	1-14
Move and Operate Machine Safely.....	S-5	Level Gauge.....	1-14
Investigate Job Site Beforehand	S-6	Switch Panel (for Optional Equipments).....	1-15
Equipment of OPG.....	S-7	Pilot Control Shut-Off Lever	1-16
Drive Machine Safely.....	S-8	Engine Stop Switch.....	1-16
Avoid Injury from Rollaway Accidents.....	S-10	Cab Door Release Lever	1-17
Avoid Injury from Back-Over and Swing Accidents.....	S-11	Work Mode	1-18
Keep Person Clear from Working Area.....	S-11	Attachment selection.....	1-18
Never Position Bucket Over Anyone	S-12	Installation and Adjustment of Mirrors	1-19
Avoid Undercutting.....	S-12	Mirror Installation Diagram.....	1-20
Avoid Tipping.....	S-13	BREAK-IN	2-1
Dig with Caution.....	S-14	Observe Engine Operation Closely.....	2-1
Operate with Caution	S-14	Every 8 Hours or Daily.....	2-1
Avoid Power Lines.....	S-14	After the First 50 Hours	2-1
Precautions for Lightning.....	S-15	After the First 100 Hours.....	2-1
Avoid Object Handling.....	S-15	New Machine or After Long Intermission.....	2-2
Avoid Quick Operation.....	S-16	OPERATING THE ENGINE	3-1
Never Operate Machine Beyond Specified Working Range	S-17	Inspect Machine Daily Before Starting	3-1
Avoid Underwater Digging.....	S-17	Before Starting Engine	3-4
Never Use Machine Beyond Its Specifications.....	S-18	Starting the Engine.....	3-4
Avoid Collision of Cab and Bucket	S-18	Stopping the Engine	3-4
Carefully Rotate Bucket.....	S-19	DRIVING THE MACHINE	4-1
Never Ride Attachment.....	S-19	Travel Levers and Pedals.....	4-1
Park Machine Safely.....	S-20	Traveling	4-3
Transport Safely	S-21	Towing Machine a Short Distance.....	4-4
Practice Safe Maintenance.....	S-22	Driving on Level Ground.....	4-5
Store Attachments Safely	S-24	Precautions for Traveling on Slopes.....	4-6
Stay Clear of Moving Parts	S-24	Parking the Machine on Slopes.....	4-7
Replace Rubber Hoses Periodically.....	S-25	Parking the Machine	4-7
Precautions for Communication Terminal Equipment ...	S-26	OPERATING THE MACHINE	5-1
Notes on Protection of Operator's Station when the Machine Rolls Over.....	S-28	Control Lever (ISO Pattern)	5-1
VISIBILITY MAP	S-29	Control Lever (HITACHI Pattern).....	5-2
SAFETY SIGNS	S-31	Attachment Pedal	5-3
COMPONENTS NAME	1-1	Warming Up Operation.....	5-4
Components Name	1-1	Precautions for Operations.....	5-5
General Inside Structure of Telescopic Arm.....	1-3	Increasing Counterweight	5-5
Cab Features.....	1-4	Operate the Machine Safely	5-6
OPERATOR'S STATION	1-5	Setting Up the Machine for Operation	5-7
Basic Screen.....	1-5	Boom Raise Control	5-8
How to Use Screens.....	1-6	Excavation and Loading.....	5-9
Displaying Basic Screen	1-6	Avoid Inclined Operation	5-10
Hour Meter.....	1-9	Avoid Quick Operation of the Arm Cylinder.....	5-10
		Do Not Swing the Bucket	5-10
		Operating the Machine After Storage	5-10
		Soil Backfilling	5-11

CONTENTS

Never Operate Machine Beyond Specified Working Range	5-11	D. Telescopic Arm	8-19
Avoid Digging Firm Ground	5-11	Check Hoses in Telescopic Arm.....	8-19
Operating Tips	5-12	Replace Hoses in Telescopic Arm	8-19
Avoid Heavy Load Operation.....	5-12	Check and Replace Slide Plate	8-19
Avoid Applying Loads Laterally to the Front Attachment	5-12	E. Level Gauge	8-20
Do Not Raise Base Machine Off the Ground.....	5-13	Check Level Gauge --- as necessary	8-20
Do Not Pull the Bucket Out of the Ground Forcibly.....	5-13	F. Others	8-21
Do Not Use Arm Stopper to Push Loads	5-14	Boom Raise Control System	8-21
Avoid Excavating/Loading Solid Material.....	5-15	Check Tightening Torque of Bolts and Nuts.....	8-22
Precautions for Excavation.....	5-16	HYDRAULIC CIRCUIT	9-1
Never Turn the Bucket by Hitting It	5-16	Hydraulic Circuit	9-1
Carefully Rotate Bucket	5-17	STORAGE	10-1
Never Use Bucket Beyond Specifications	5-18	Precaution for Machine Storage	10-1
Select Correct Track Shoes	5-18	SPECIFICATIONS	11-1
Shackle Hole Usage	5-19	Specifications.....	11-1
Precautions for After Operations	5-20	Working Ranges.....	11-2
ASSEMBLING/DISASSEMBLING	6-1	CLAMSHELL BUCKET	12-1
Precautions for Assembling and Disassembling.....	6-1	Components Name	12-1
Precautions for Installation/Removal Front Attachment	6-2	Precautions for Operations.....	12-2
Precautions for Position of Telescopic Arm without Bucket	6-3	Excavation Methods.....	12-2
Preparation for Work	6-4	Transporting by Road	12-3
Precautions for Slinging Work.....	6-5	Transportation.....	12-3
Lifting Procedure of Telescopic Arm.....	6-6	Bucket Lifting Procedure	12-4
Machine Dimensions and Weight Without Telescopic Arm and Bucket.....	6-6	Maintenance Guide Table	12-5
Installation of Telescopic Arm.....	6-6	Maintenance	12-7
Installation of Bucket	6-7	Allowance in Cylinder Stroke.....	12-8
Precautions For Handling Coupler (Self-Seal Joint)	6-8	Precautions for Repair Welding.....	12-9
TRANSPORTING	7-1	Check Bucket Teeth.....	12-10
Transporting by Road	7-1	Specifications.....	12-12
Loading/Unloading on a Trailer	7-1	ZOOM CAMERA (OPTIONAL)	13-1
Machine Lifting Procedure.....	7-4	Precautions on Use	13-1
MAINTENANCE	8-1	Name of Components	13-2
Correct Maintenance and Inspection Procedures.....	8-1	Name of Components	13-3
Check the Hour Meter Regularly.....	8-3	Monitor Switches.....	13-4
Maintenance Guide Table	8-4	Backlighting, Reflections or Poor Field of Vision.....	13-8
Preparations for Inspection and Maintenance	8-5	Inspection Items.....	13-9
Daily Inspection	8-6	Maintenance Items	13-9
Daily Check	8-8	Check the image	13-9
Maintenance Guide	8-9	Check the quality of the image.....	13-10
Periodic Replacement of Parts.....	8-11	Damage and installation state of camera and wiring harness	13-10
A. Greasing.....	8-13	Clean the camera lens and monitor	13-10
Front Joint Pins	8-13	INDEX	14-1
Telescopic Arm Sliding Surface.....	8-14		
B. Hydraulic System	8-16		
Check Hydraulic Oil Level --- daily	8-16		
C. Hose Reel	8-17		
Hose Replacement --- every 1000 hours	8-17		
Replace Spring --- every 1000 hours	8-18		
Replace Bearing --- every 1000 hours.....	8-18		
Replace Swivel Joint --- every 1000 hours	8-18		

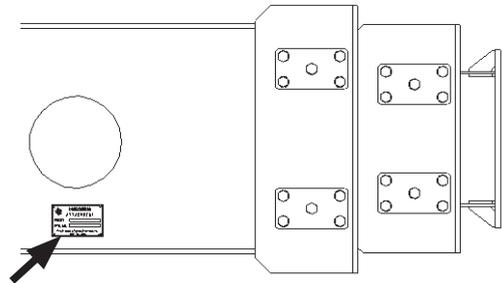
MACHINE NUMBERS

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.

Telescopic Arm

TYPE: _____

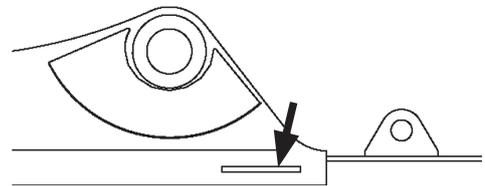
MFG. NO.: _____



MDAE-HT1-001

Product Identification Number

PRODUCT IDENTIFICATION NUMBER: _____



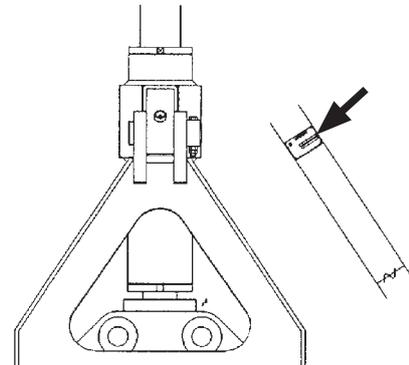
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Clamshell Bucket Serial No. to 510088

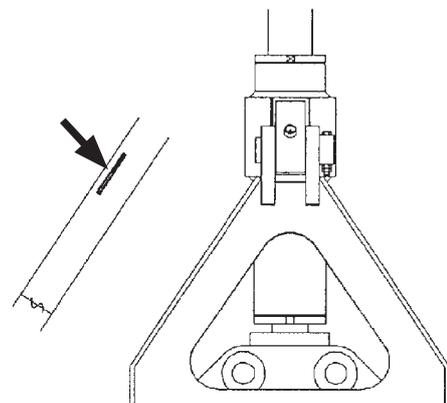
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PRODUCT IDENTIFICATION NUMBER: _____



M1GD-00-003



M1GD-00-004

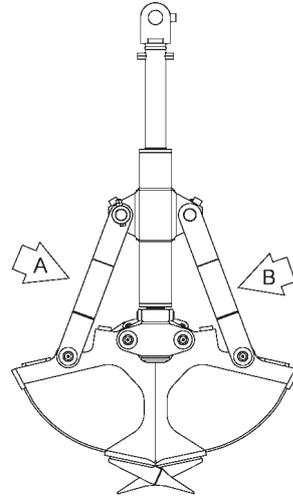
MACHINE NUMBERS

Clamshell Bucket Serial No. 510089 -

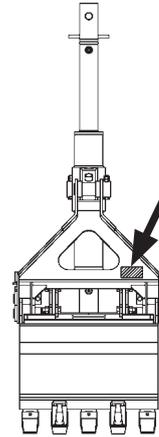
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MFG. NO.: _____

PRODUCT
IDENTIFICATION
NUMBER: _____

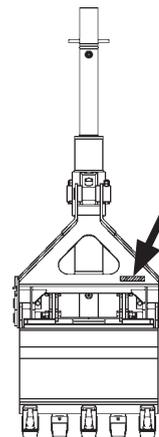


M1R4-00-003



View A

MDAS-HT1-032



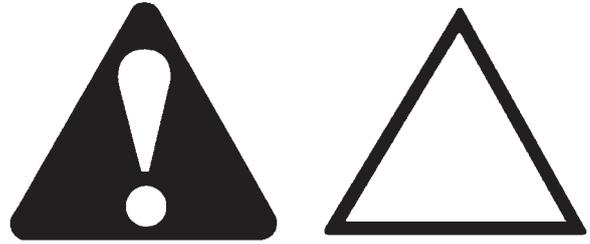
View B

MDAS-HT1-033

SAFETY

Recognize Safety Information

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



SA-2644

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.



SA-1223

SAFETY

Follow Safety Instructions

- This Operator's Manual has been compiled for the Hydraulic Operated Telescopic Clamshell Equipped Machine of Hitachi Hydraulic Excavator. Only the parts that differ from those on the standard hydraulic excavator are described in this manual.

Refer to the Operator's Manual for Hitachi Hydraulic Excavator for other inquiries than described in this manual. Descriptions in this manual have priority.

- 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.
 - Never attempt to modify or disassemble the inlet/exhaust parts and the aftertreatment device. Avoid shocks to the element of the aftertreatment device, such as striking or dropping objects onto the element. Failure to do so may affect the exhaust gas purifying device, possibly damaging it or lowering its performance.
 - 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.
 - Do not weld brackets etc. to the telescopic arm, as it is a thin plate structure and will cause deformation.
- 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.



SA-003

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.
 - Before getting on or off the machine, check the condition of the steps and handrails for sticking or slippery material like grease or mud. Thoroughly remove such material if stuck. In addition, repair the damage to the steps and/or handrails. Retighten loose bolts.
 - Never get on and off the machine with tools in your hands.



SA-439

Adjust the Operator's Seat

- A seat which is poorly adjusted for the individual operator, or the work to be undertaken, may quickly fatigue the operator leading to misoperation.
 - The seat should be adjusted whenever the operator of the machine changes.
 - 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.



SA-378

SAFETY

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 and/or pedal, 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.

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 is replaced every three years regardless of its apparent condition.

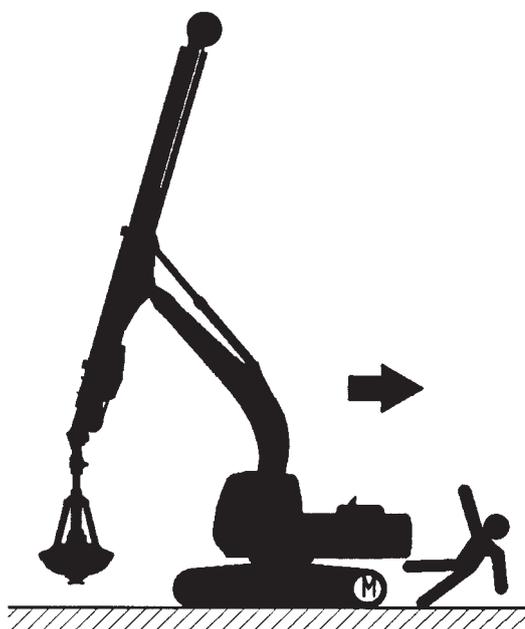


SA-237

SAFETY

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.
 - Ensure that the cab door, windows, doors and covers are locked.
 - Check that mirrors and the monitor in the cab operate normally. If any abnormality is found, clean the mirrors, camera and the monitor. If they are still abnormal, replace parts.Refer to "Hitachi Excavator Operator's Manual" for cleaning the camera and monitor.



SA-1743

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 a road shoulder, employ a signal person as required.
 - Confirm that your machine is equipped with 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.
- Make sure the worksite has sufficient strength to firmly support the machine.

When working close to an excavation or at road shoulders, operate the machine with the tracks positioned perpendicular to the cliff face with travel motors at the rear, so that the machine can more easily evacuate if the cliff face collapses.
- If working on the bottom of a cliff or a high bank is required, be sure to investigate the area first and confirm that no danger of the cliff or bank collapsing exists. If any possibility of cliff or bank collapsing exists, do not work on the area.
- Soft ground may collapse when operating the machine on it, possibly causing the machine to tip over. When working on a soft ground is required, be sure to reinforce the ground first using large pieces of steel plates strong and firm enough to easily support the machine.
- Do not operate the machine on an uneven surface or a slope. Failure to do so may cause the machine to tip over, possibly resulting in serious injury or death.



SA-1745

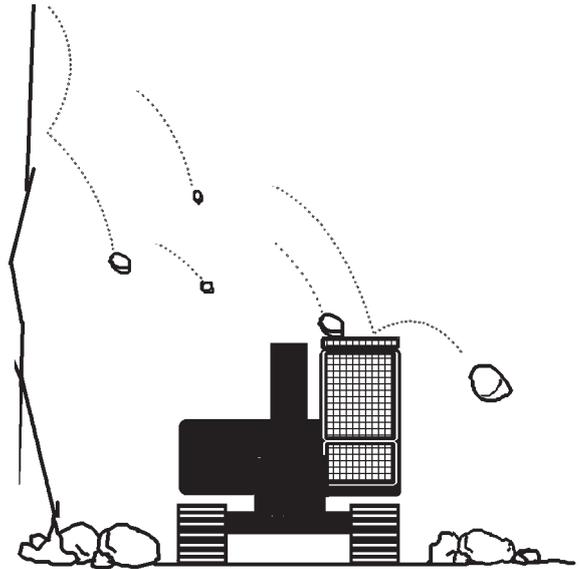
SAFETY

Equipment of OPG

- In case the machine is operated in areas where the possibility of falling stones or debris exists, equip genuine Hitachi OPG guard. Contact your nearest Hitachi dealer for installation method of the OPG guard. Depending on the specifications applied to your machine, modification of the machine to meet ROPS standards will be possible.
- To maintain unimpaired operator protection and manufacture's protective structure.
 - Damaged ROPS, OPG guard must be replaced, not repaired or revised.
 - Any alternation to the ROPS or OPG guard must be approved by the manufacturer.

ROPS : Roll Over Protective Structure

OPG : Operator Protective Guard

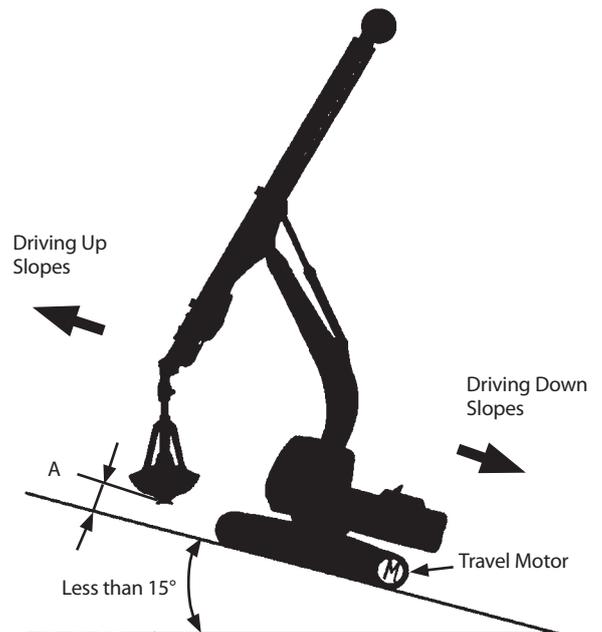


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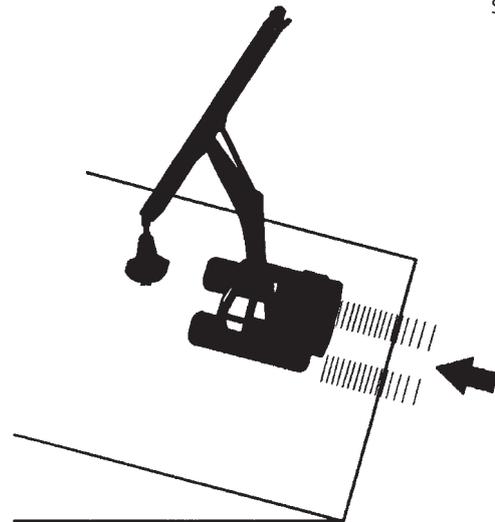
SAFETY

Drive Machine Safely

- Be sure to use a signal person when traveling the machine.
- Incorrect operation may cause damage to the surroundings or serious personal injury.
- Before driving the machine, always confirm that the travel levers/pedals direction corresponds to the direction you wish to drive.
 - Be sure to detour around any obstructions.
 - Avoid traveling over obstructions. Soil, fragments of rocks, and/or metal pieces may scatter around the machine. Do not allow personnel to stay around the machine while traveling.
- Driving on a slope may cause the machine to slip or overturn, possibly resulting in serious injury or death.
 - Never attempt to drive the machine on slopes and ramps, 15 degrees or steeper.
 - Slowly drive the machine so that the bucket does not come in contact with the cab.
 - Travel forward when driving up slopes. Travel in reverse when driving down slopes.
 - When driving up or down a slope, keep the bucket facing the direction of travel, approximately 0.2 m (A) above the ground.
 - If the machine starts to skid or becomes unstable, immediately lower the bucket to the ground and stop.
 - Driving across the face of a slope or steering on a slope may cause the machine to skid or turnover. If the direction must be changed, move the machine to level ground, then, change the direction to ensure safe operation.
 - Never attempt to swing the upperstructure on a slope. The machine may tip over.
 - If the engine stalls on a slope, immediately lower the bucket to the ground. Return the control levers to neutral. Then, restart the engine.
 - Be sure to thoroughly warm up the machine before ascending steep slopes. If hydraulic oil has not warmed up sufficiently, sufficient performance may not be obtained.



SA-1747



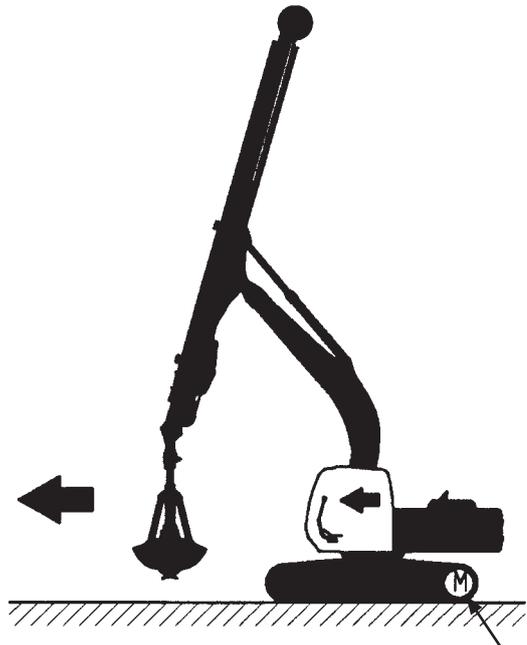
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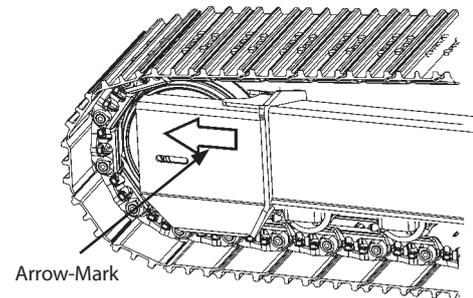
SA-2661

SAFETY

- Before moving machine, determine which way to move travel pedals/levers for the direction you want to go. When the travel motors are in the rear, pushing down on the front of the travel pedals or pushing the levers forward moves the machine forward, towards the idlers. An arrow-mark seal is stuck on the inside surface of the side frame to indicate the machine front direction.
- Select a travel route that is as flat as possible. Steer the machine as straight as possible, making small gradual changes in direction.
- Before traveling on them, check the strengths of bridges and road shoulders, and reinforce if necessary.
- Use wood plates in order not to damage the road surface. Be careful of steering when operating on asphalt roads in summer.
- When crossing train tracks, use wood plates in order not to damage them.
- Do not make contact with electric wires or bridges.
- Do not get into a river. If getting into a river, the machine may be stuck in the mud and leading to machine rollover.
- Avoid traveling on a rough ground. The bucket swings and the machine lose its balance, possibly resulting in machine rollover.
- Avoid operations that may damage the track and undercarriage components.
- During freezing weather, always clean snow and ice from track shoes before loading and unloading machine, to prevent the machine from slipping.



Travel Motor
SA-1746



Arrow-Mark

M178-03-001



SA-1748

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 the machine.
- Do not park the machine on a grade.
- Lower the bucket and/or other work tools to the ground. If it is equipped with the sliding cab, fully move the cab backward.
- Turn the auto-idle switch OFF. Push the mode selector to ECO.
- Run the engine at slow idle speed without load for 5 minutes to cool down the engine.
- Stop the engine and remove the key from the key switch.
- Pull the pilot control shut-off lever to LOCK position.
- Block both tracks and lower the bucket to the ground. Thrust the bucket teeth into the ground if you must park on a gradient.
- Position the machine to prevent rolling.
- Park at a reasonable distance from other machines.



SA-1749

SAFETY

Avoid Injury from Back-Over and Swing Accidents

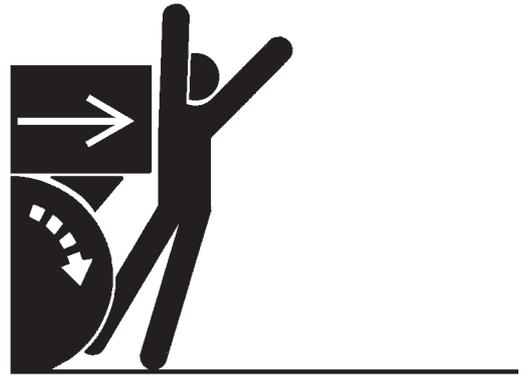
- If any person is present near the machine when backing or swinging the upperstructure, the machine may hit or run over that person, resulting in serious injury or death.

To avoid back-over and swing accidents:

- Always look around BEFORE YOU BACK UP AND SWING THE MACHINE. BE SURE THAT ALL BYSTANDERS ARE CLEAR.
- Keep the travel alarm in working condition (if equipped). ALWAYS BE ALERT FOR BYSTANDERS MOVING INTO THE WORK AREA. USE THE HORN OR OTHER SIGNAL TO WARN BYSTANDERS BEFORE MOVING THE MACHINE.
- USE A SIGNAL PERSON WHEN BACKING UP IF YOUR VIEW IS OBSTRUCTED. ALWAYS KEEP THE SIGNAL PERSON IN VIEW.

Use hand signals, which conform to your local regulations, when work conditions require a signal person.

- No machine motions shall be made unless signals are clearly understood by both signal person and operator.
- Learn the meanings of all flags, signs, and markings used on the job and confirm who has the responsibility for signaling.
- Keep windows, mirrors, and lights clean and in good condition.
- Dust, heavy rain, fog, etc., can reduce visibility. As visibility decreases, reduce speed and use proper lighting.
- Read and understand all operating instructions in the operator's manual.



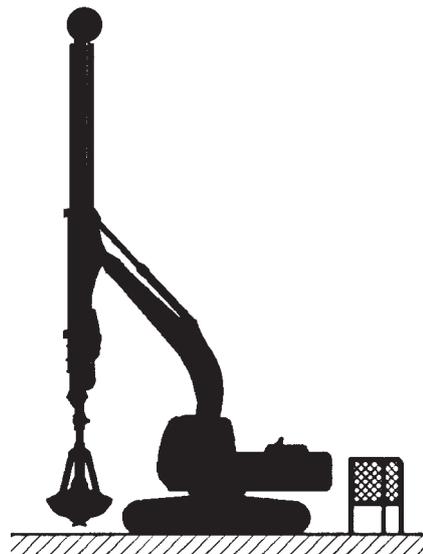
SA-383



SA-384

Keep Person Clear from Working Area

- A person may be hit severely by the swinging front attachment or counterweight and/or may be crushed against an other object, resulting in serious injury or death.
- Keep all persons clear from the area of operation and machine movement.
- Before operating the machine, set up barriers to the sides and rear area of the bucket swing radius to prevent anyone from entering the work area.



SA-1750

SAFETY

Never Position Bucket Over Anyone

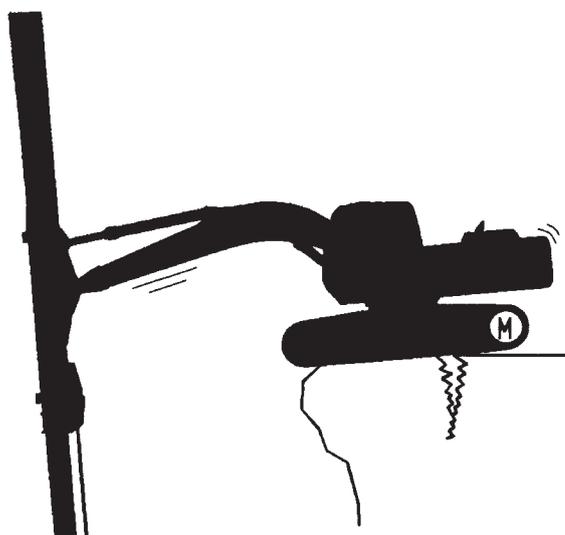
- Never lift, move, or swing bucket above anyone or a truck cab. Serious injury or machine damage may result due to bucket load spill or due to collision with the bucket.
- Never move bucket above anyone for safety.
- Never stand below bucket for safety.



SA-1751

Avoid Undercutting

- In order to retreat from the edge of an excavation if the footing should collapse, always position the undercarriage perpendicular to the edge of the excavation with the travel motors at the rear.
- If the footing starts to collapse and if retreat is not possible, do not panic. Often, the machine can be secured by lowering the front attachment, in such cases.

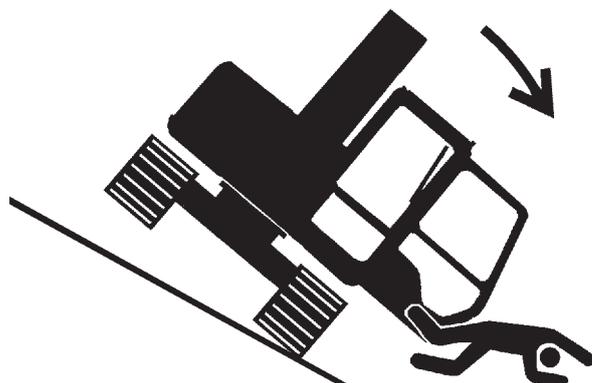


SA-1189

SAFETY

Avoid Tipping

- DO NOT ATTEMPT TO JUMP CLEAR OF TIPPING MACHINE --- SERIOUS OR FATAL CRUSHING INJURIES WILL RESULT
 - MACHINE WILL TIP OVER FASTER THAN YOU CAN JUMP FREE
 - FASTEN YOUR SEAT BELT
- The danger of tipping is always present when operating on a grade, possibly resulting in serious injury or death.
- The machine is unstable when operating on a soft ground. Before working, use plates in order to get enough strength of ground.
- The machine is unstable when the slide cab is in the extended position. Do not operate the machine quickly. Especially, avoid quick lowering or stopping the boom, sudden acceleration or stop of the machine. Failure to do so may result in machine rollover.



SA-1205

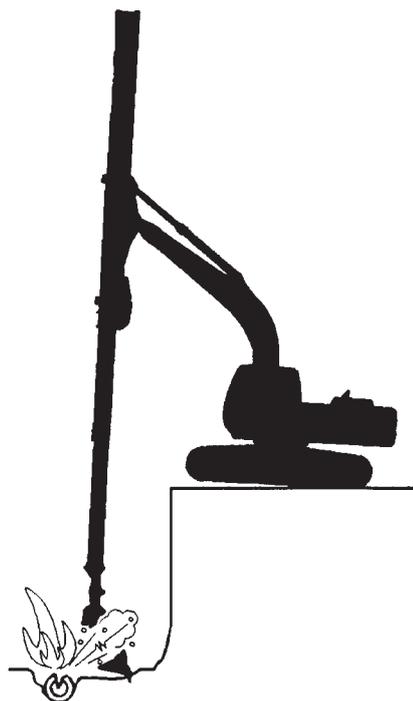


SA-1752

SAFETY

Dig with Caution

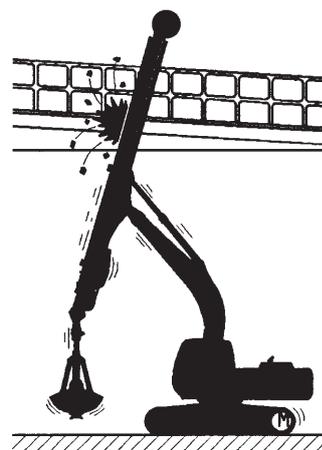
- Accidental severing of underground cables or gas lines may cause an explosion and/or fire, possibly resulting in serious injury or death.
- Before digging, check the location of cables, gas lines, and water lines.
- Keep the minimum distance required, by law, from cables, gas lines, and water lines.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



SA-1753

Operate with Caution

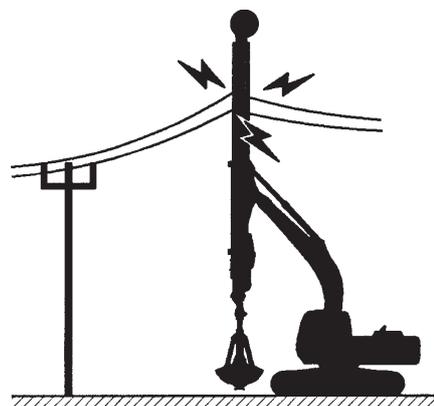
- If the front attachment or any other part of the machine hits against an overhead obstacle, such as a bridge, both the machine and the overhead obstacle will be damaged, and personal injury may result as well.
- Take care to avoid hitting overhead obstacles with the boom or arm.



SA-1748

Avoid Power Lines

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



SA-1755

SAFETY

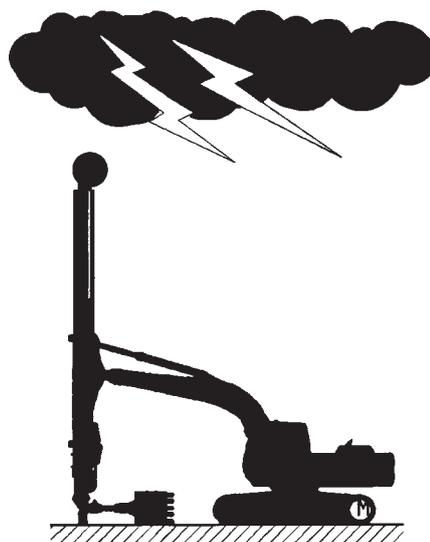
Precautions for Lightning

- Lightning may strike the machine.

If lightning comes close, immediately stop the operation, and take the following action.

- When you are around the machine or operating cab-less machine, evacuate to a safe place far away from the machine.
- When you are in the cab, stay in the cab until lightning has passed and safety is secured. Close the cab doors and windows. Lower the attachment to the ground, and stop the engine. Put your hands on your lap to avoid contact with any metal surfaces. Never go out of the cab.

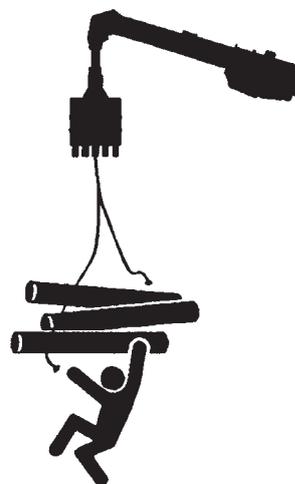
If lightning strikes the machine or near the machine, check all of the machine safety devices for any failure after lightning has passed and safety is secured. If any trouble is found, operate the machine only after repairing it.



SA-1756

Avoid Object Handling

- This machine has been designed exclusively for engaging in excavation and loading works, having no object-lifting and safety devices required for object handling. Therefore, object handling using this machine may create a very hazardous situation, possibly resulting in serious personal injury or death.

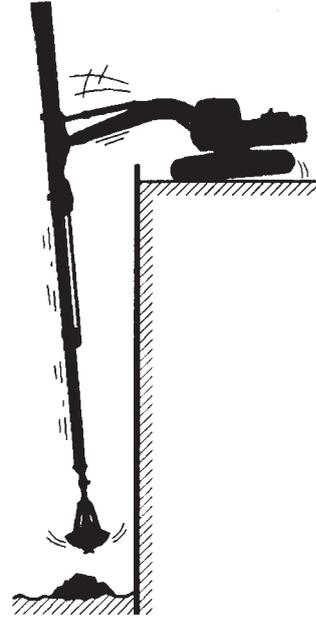


SA-1757

SAFETY

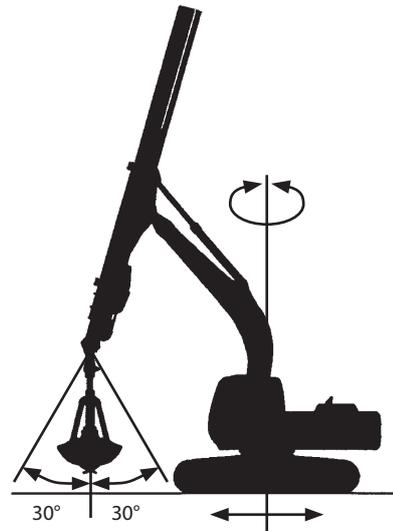
Avoid Quick Operation

- Quick operation may cause the machine to become unstable, possibly resulting in tipping over of the machine. Especially avoid excessive travel and/or boom lower operation.



SA-1195

- Avoid operation which causes the bucket to swing excessively, as this may cause tipping over of the machine. Do not swing the bucket beyond 30°.

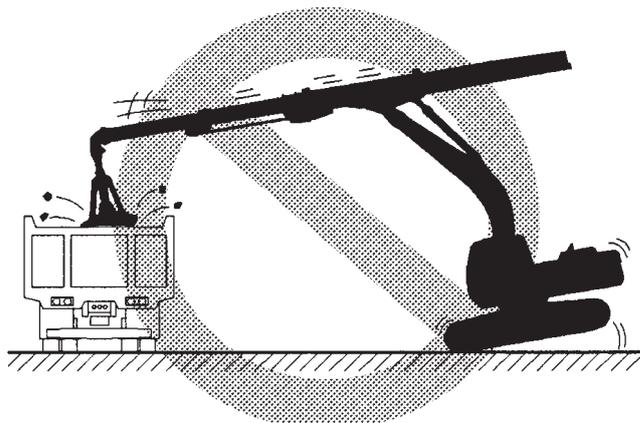


SA-2745

SAFETY

Never Operate Machine Beyond Specified Working Range

- Do not perform loading or unloading operation with the telescopic arm extended. Operation with the telescopic arm extended may cause the machine to tip over. Also, using telescopic arm extended may lead damage in the telescopic arm. Be sure to fully retract the telescopic arm when the machine is engaged in loading or unloading operation.



SA-2662

- Never excavate under ground with the telescopic arm tilted. Excavating under ground with the telescopic arm tilted may result in tipping over of the machine or damage to the telescopic arm.



SA-2663

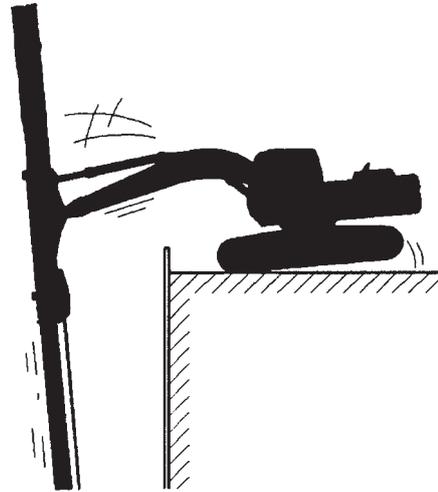
Avoid Underwater Digging

- Never perform underwater digging operation.
 - Underwater digging in stream of water such as river or sea may result in tipping over the machine.
 - Underwater digging may result in entering water including sand or sediment into the telescopic arm, and damage to the telescopic arm.
 - If underwater digging is required to perform, perform digging operation in shallow water area where only the bucket immerses in water. Use a submerged pump in deep area in order not to prevent water from entering into the telescopic arm.

SAFETY

Never Use Machine Beyond Its Specifications

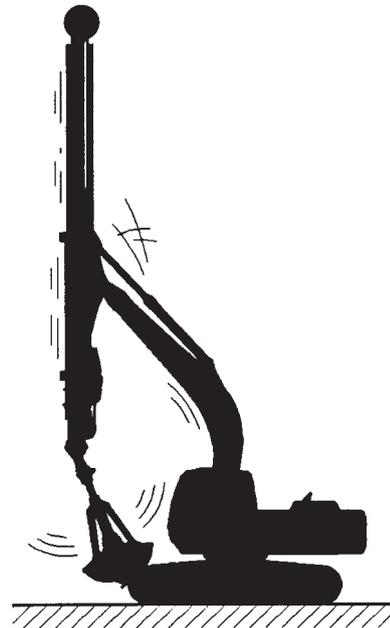
- This base machine is equipped with an extra counterweight and an exclusively designed hydraulic circuit to allow the machine to operate the telescopic arm. Therefore, the base machine is not interchangeable with that for a hydraulic excavator.
- Never install the front attachment for this machine on other machines or vice versa. Failure to do so may cause damage to the machine and/or serious personal injury or death.
- Do not use a bucket heavier or with capacity larger than specified. Failure to do so may cause break of the wire rope and fall off the bucket. Also, machine stability will be reduced and leading to machine rollover, which may result in accident causing death or serious injury. Always use the bucket with the specified capacity and weight. Also, using a bucket other than the specification may lead damage in the telescopic arm. The bulk density of soil shall be 1800 kg/m³ or less for this machine.



SA-1198

Avoid Collision of Cab and Bucket

When the telescopic arm is rolled in while raising the boom, the bucket can hit the cab. Take extra care when operating the telescopic arm and boom with the sliding cab extended in the foremost position. If the bucket hits the cab, serious injury or death may result.

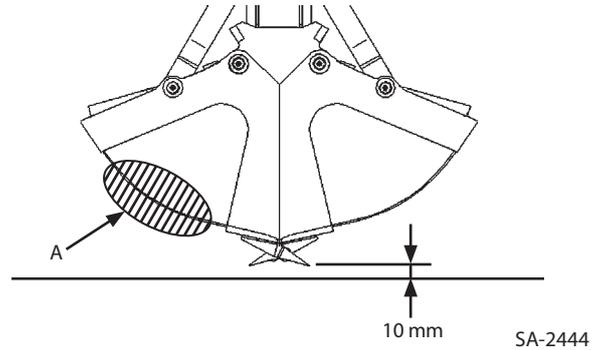


SA-1761

SAFETY

Carefully Rotate Bucket

- When manually rotating the bucket, use extra care.
 - Set the bucket 10 mm off the ground.
 - Slightly open the bucket to prevent the cylinder from being stroke end position.
 - Stop the engine.
 - Be sure to push in the vicinity of shell (A) to prevent the bucket pinching any limbs.
 - Keep your body away from the bucket as far as possible.



Never Ride Attachment

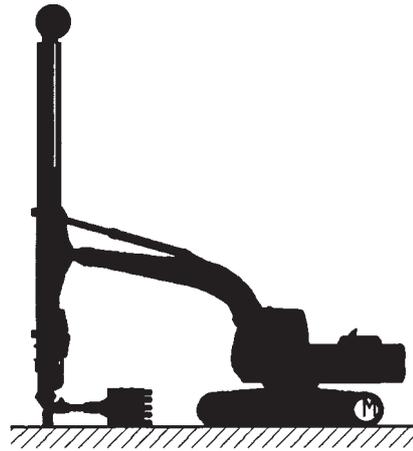
- Never allow anyone to ride attachments or the load. This is an extremely dangerous practice.

SAFETY

Park Machine Safely

To avoid accidents:

1. Park the machine on a firm, 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 the engine.
6. Remove the key from the key switch.
7. Pull the pilot control shut-off lever to the LOCK position.
8. Close windows, roof vent, and cab door.
9. Lock all access doors and compartments.



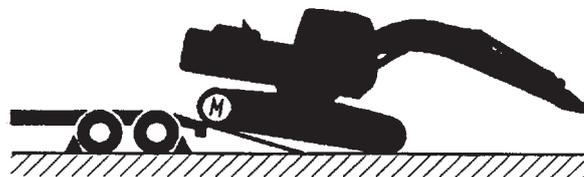
SA-1762

SAFETY

Transport Safely

- Be sure to transport the machine with the telescopic arm removed.
- 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.

Be sure that the incline of the ramp or deck is less than 15 degrees.
 3. Turn auto-idle switch OFF. Push the mode selector to ECO.
 4. Always select the slow speed mode with the travel mode switch.
 5. 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.
 6. The top end of the ramp where it meets the flatbed is a sudden bump. Take care when traveling over it.
 7. Place blocks in front of and behind the tracks. Securely hold the machine to the truck or trailer deck with wire ropes.



SA-1201

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

SAFETY

Practice Safe Maintenance

- The maintenance work involves many dangers such as approaching moving parts, high pressure or high temperature parts. In order to prevent serious injury or death, follow the precautions given below.
 - Before starting maintenance or changing attachments, check the work sequence and inform it to the co-worker.
 - Safely park the machine according to the instructions given on the "PARK MACHINE SAFELY" section.
 - Keep the work area clean and dry.
 - Attach "UNDER REPAIR DO NOT OPERATE" tag in a highly visible place such as on the door or the control lever.
 - Permeation of water into the electrical system may cause malfunction of the system, possibly leading to erratic operation of the machine. Never attempt to wash sensors, connectors and inside cab with water or steam.
 - Start work only after oil temperature cools.
 - If a maintenance must be performed with the engine running, use a watchkeeper who can stop the engine anytime.
 - Do not fill oil, lubricate and maintain the machine while the machine is operating.
 - Never attempt to work with the windshield glass is broken. Repair the glass.
 - If the machine must be raised for maintenance, remove the telescopic arm, and jack up the machine by using the boom tip. Never allow any person to enter the area below the machine when the machine is raised.
 - During maintenance work, if unavoidably required to enter under the raised machine, securely hold the machine with braces or blocks strong enough to support the machine weight.



SA-028



SA-527

SAFETY

- Sufficiently illuminate the work site. Use a maintenance work light when working under or inside the machine.
- Always use a work light protected with a guard. In case the light bulb is broken, spilled fuel, oil, antifreeze fluid, or window washer fluid may catch fire.

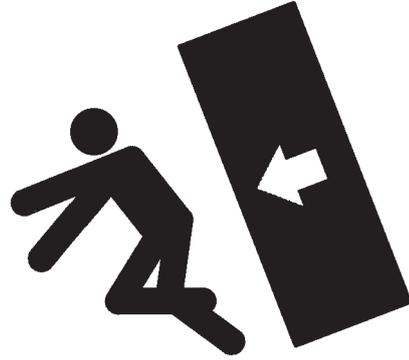


SA-037

SAFETY

Store Attachments Safely

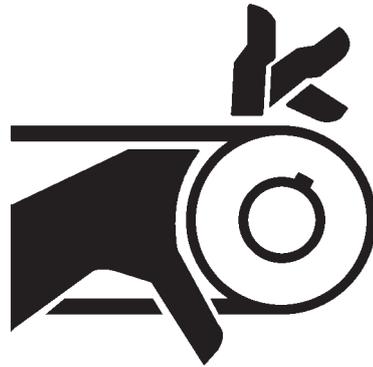
- Stored attachments such as buckets, hydraulic hammers, and blades can fall and cause serious injury or death.
- Securely store attachments and implements to prevent falling. Keep children and bystanders away from storage areas.



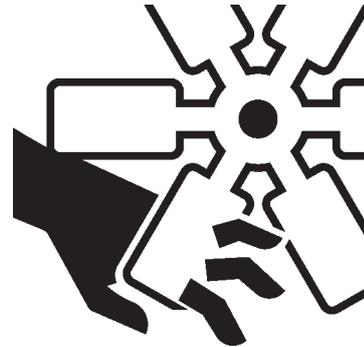
SA-034

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.



SA-026



SA-2294

SAFETY

Replace Rubber Hoses Periodically

- Rubber hoses that contain flammable fluids under pressure may break due to aging, fatigue, and abrasion. It is very difficult to gauge the extent of deterioration due to aging, fatigue, and abrasion of rubber hoses by inspection alone.
 - Periodically replace the rubber hoses. (See the page of "Periodic replacement of parts" in the operator's manual.)
- Failure to periodically replace rubber hoses may cause a fire, fluid injection into skin, or the front attachment to fall on a person nearby, which may result in severe burns, gangrene, or otherwise serious injury or death.



SA-019

SAFETY

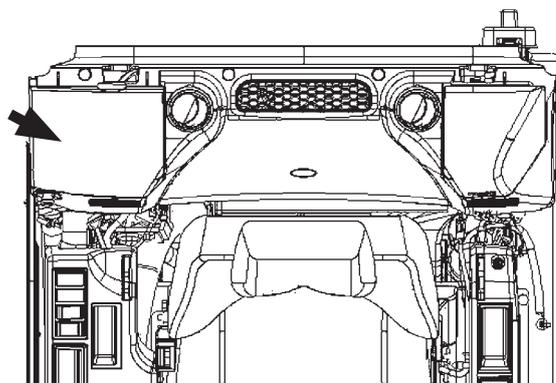
Precautions for Communication Terminal Equipment

This machine has a communication terminal equipment emitting electrical waves installed inside the rear tray situated at the back of the operator's seat. There is a possibility that a medical device, including an implantable device such as a cardiac pacemaker, could be affected and malfunction due the electrical waves emitted from the communication terminal equipment.

Any person fitted with a medical device such as the above should not use this machine, unless the medical device and the rear tray are at least 22 centimeters apart at all times. If this condition cannot be met, please contact your authorized dealer and have the person in charge stop the communication terminal equipment from functioning completely, and confirm that it is not emitting electrical waves.

This machine is equipped with a communication terminal type A or type B.

Consult your nearest authorized dealer for the type of communication terminal.



SA-2346

Specific Absorption Rate ("SAR") (measured by 10 g per unit) of communication terminal equipments:

	Type A	Type B
E-GSM900	0.573 W/kg (914.8 MHz)	0.12 W/kg (897.6 MHz)
DCS-1800	0.130 W/kg (1710.2 MHz)	0.06 W/kg (1748.0 MHz)
WCDMA Band I	0.271 W/kg (1950.0 MHz)	0.05 W/kg (1950.0 MHz)
WCDMA Band VIII	-	0.10 W/kg (892.6 MHz)

*This data was measured by having each type of communication terminal equipment, such as the communication terminal equipment used with this machine, and a human body set apart by 3 cm.

* SAR is a measure of the amount of radio frequency energy absorbed by the body when using a wireless application such as a mobile phone.

In Japan: *Under the Japanese Radio Act and other relevant Japanese regulations, the maximum SAR value is 2 W/kg (as of March 2010).

In EU Member nation: *Under the "Council Recommendation 1999/519/EC 12 July 1999"; the maximum SAR value is 2 W/kg (as of March 2010).

SAFETY

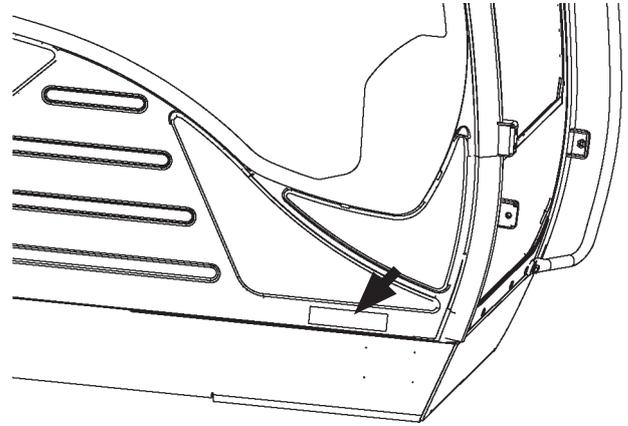
- Do not attempt to disassemble, repair, modification and displacement of the communication terminal, antenna and cables. Failure to do so may cause damage or fire on the machine and the communication terminal. (Before removing or installing the communication terminal, consult your authorized dealer.)
- Do not pinch or forcibly pull cables, cords and connectors. Failure to do so may cause damage or fire on the machine and the communication terminal due to short/broken circuit.

SAFETY

Notes on Protection of Operator's Station when the Machine Rolls Over

The cab corresponds to the structure to protect the operator by absorbing impact energy when the machine rolls over (Roll-Over Protective Structure (ROPS)).

However, when modifying the machine or installing a special attachment causing the machine mass to exceed the maximum operating mass described in the ROPS certification, the cab cannot fulfill its protective function, possibly causing serious injury or death.



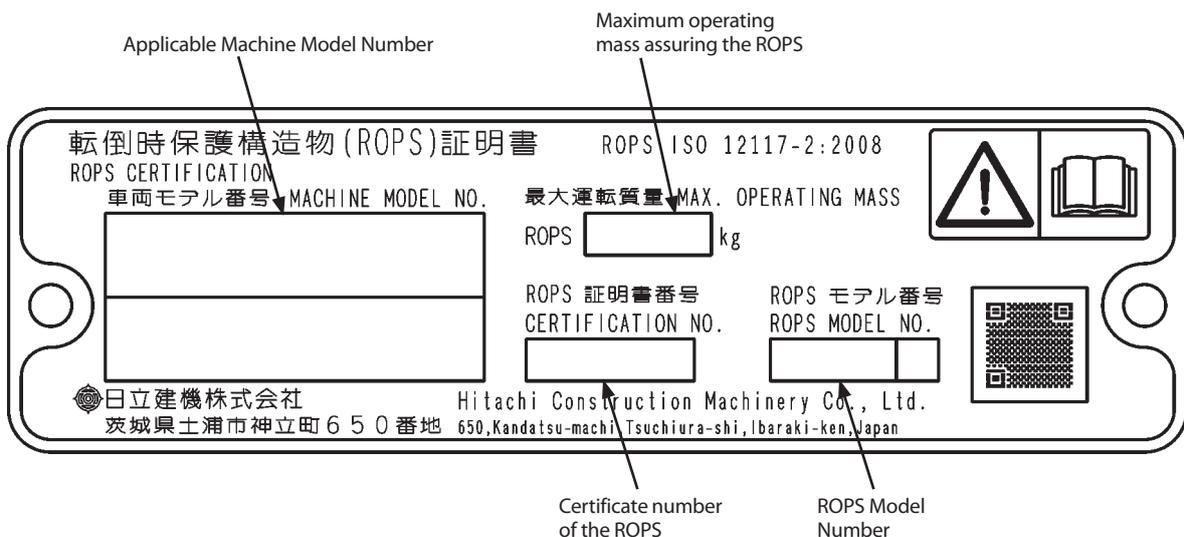
SS-3636

In order to safeguard the protective structure, follow the instructions below.

- Consult your authorized dealer before welding parts or drilling a hole on the cab, which possibly reduces the cab strength.
- Be sure to always fasten the seat belt when operating the machine. If the machine rolls over without operator fastening the seat belt, the operator may become injured, may be thrown out from the cab and/or may become crushed under the machine even though the cab has the protective structure.

The ROPS certification is valid under the following conditions.

- The machine mass is lower than the maximum operating mass described in the ROPS certification.
- The ROPS is properly installed.
- No modification is made to the ROPS.
- The ROPS is free from damage.



SS-3944

VISIBILITY MAP

Visibility Map for Machine Model ZX135US-6 series Personal Hazard

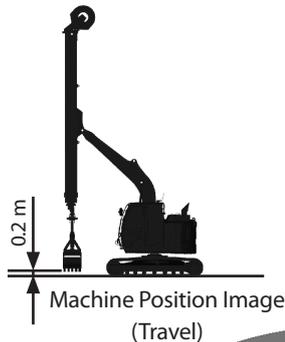
This machine complies with the essential health and safety requirements for visibility set out by Machinery Directive 2006/42/EC. This map is intended to provide information on the residual maskings (blind spots) applicable to the machine position(s) as shown, observed by a seated operator (wearing the recommended seat restraint) in the cab, using direct vision and the standard visual aids supplied with the machine. Operators are encouraged to adjust the mirrors installed on the machine to show the area as shown below.

Visibility maps provide an approximation of the residual masking to be anticipated. It can be used as a guide when conducting a site risk assessment, utilized for site management and to consider additional visual aids where needed.

Two mirrors, a1 and a2, are available for the right side visibility. Operators are encouraged to adjust mirror a1 as to have visibility shown in the visibility map for fully retracted position, while mirror a2 is to be adjusted to have the visibility shown in the map for fully extended position.

Conditions: Driver's visibility on 1mRB and VTC are evaluated under ISO 5006.

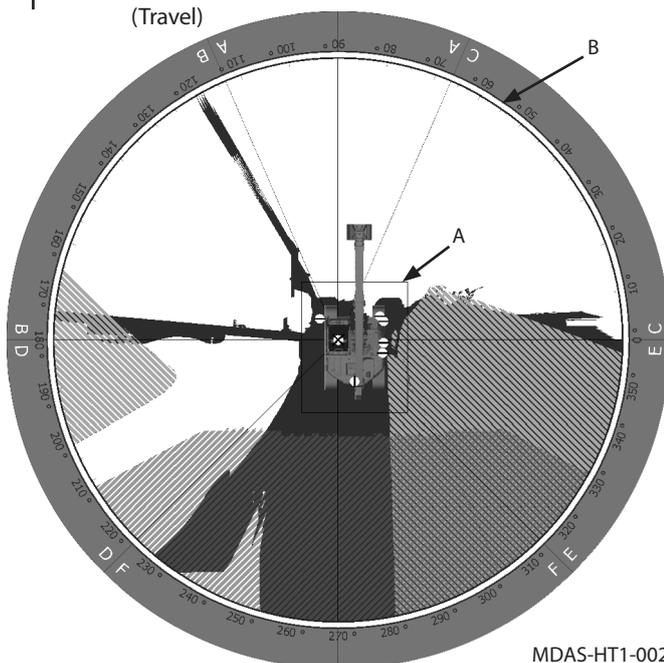
- | | |
|-------------------------|---|
| Test Height (on 1mRB): | 1.2 m to 1.5 m |
| (1mRB to VTC/on VTC): | Ground Level |
| Operator eye Height: | 1.2 m from the cab floor |
| Machine Configuration: | Monoblock Boom |
| Machine Position: | Travel Position (For the detail position, see the image below) |
| Applicable visual aids: | 1. standard mirror(s)
2. standard rear view camera
3. side view camera (Optional) |



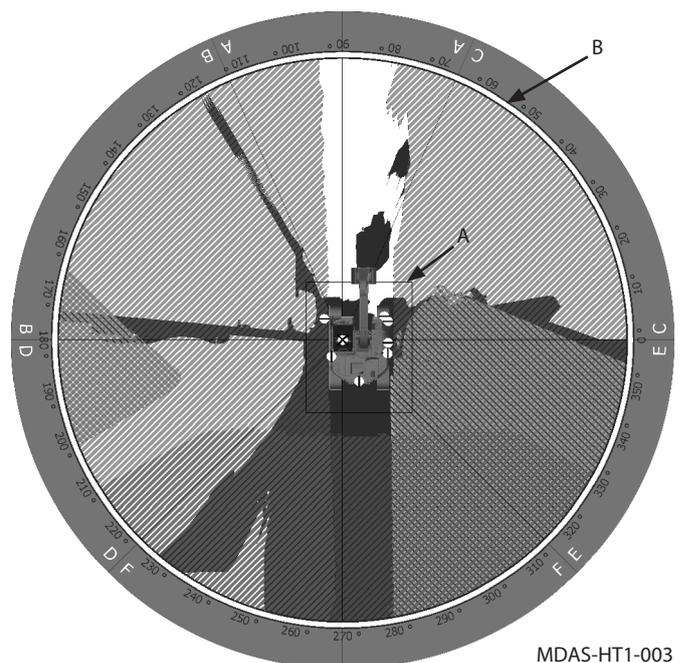
MDAS-HT1-001

- X: Operator's eye point
- A: 1 m Rectangular Boundary (1mRB)
- B: 12 m Visibility Test Circle (VTC)
- ⊖: Standard Mirror(s)
- ⊕: Standard rear view camera
- ⊙: Side view camera (Optional)

- : Masking area
- ▨ : Mirror visibility
- ▧ : Camera visibility
- : Masking on 1mRB / VTC



Visibility Map (without side view camera)



Visibility Map (with side view camera)

VISIBILITY MAP

Visibility Map for Machine Model ZX135US-6 series Personal Hazard

This machine complies with the essential health and safety requirements for visibility set out by Machinery Directive 2006/42/EC. This map is intended to provide information on the residual maskings (blind spots) applicable to the machine position(s) as shown, observed by a seated operator (wearing the recommended seat restraint) in the cab, using direct vision and the standard visual aids supplied with the machine. Operators are encouraged to adjust the mirrors installed on the machine to show the area as shown below.

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Conditions: Driver's visibility on 1mRB and VTC are evaluated under ISO 5006.

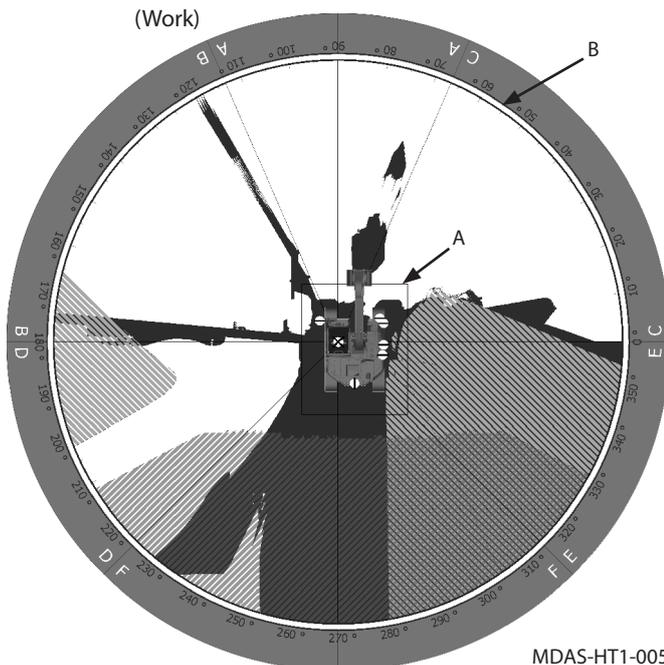
- | | |
|-------------------------|---|
| Test Height (on 1mRB): | 1.2 m to 1.5 m |
| (1mRB to VTC/on VTC): | Ground Level |
| Operator eye Height: | 1.2 m from the cab floor |
| Machine Configuration: | Monoblock Boom |
| Machine Position: | Work Position (For the detail position, see the image below) |
| Applicable visual aids: | <ol style="list-style-type: none"> 1. standard mirror(s) 2. standard rear view camera 3. side view camera (Optional) |



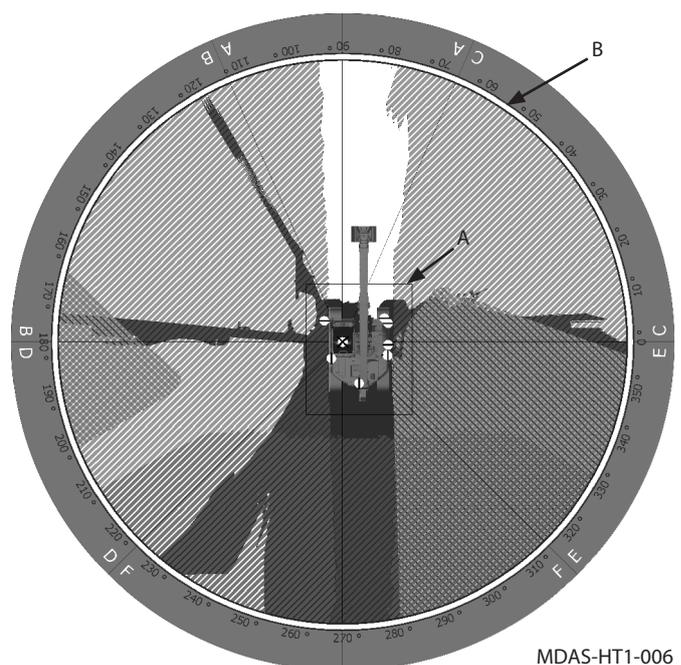
MDAS-HT1-004

- X: Operator's eye point
- A: 1 m Rectangular Boundary (1mRB)
- B: 12 m Visibility Test Circle (VTC)
- ⊖: Standard Mirror(s)
- ⊕: Standard rear view camera
- ⊙: Side view camera (Optional)

- : Masking area
- ▨: Mirror visibility
- ▧: Camera visibility
- : Masking on 1mRB / VTC



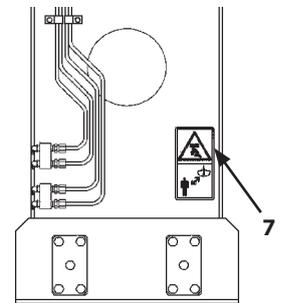
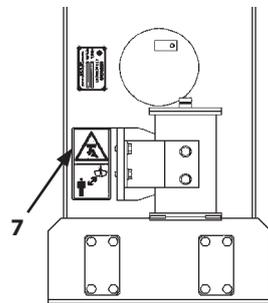
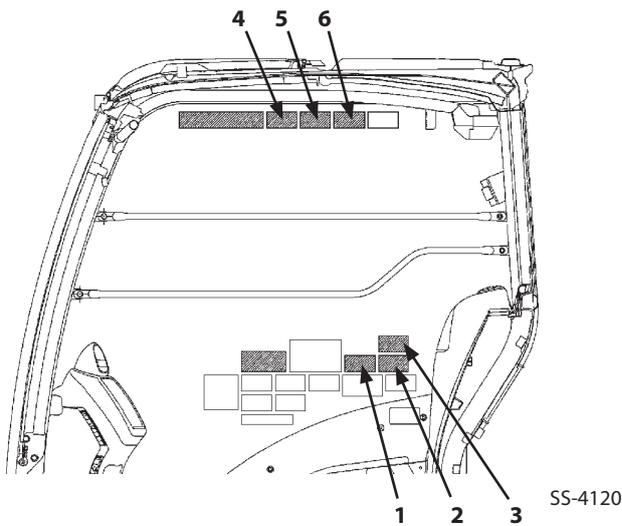
Visibility Map (without side view camera)



Visibility Map (with side view camera)

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.

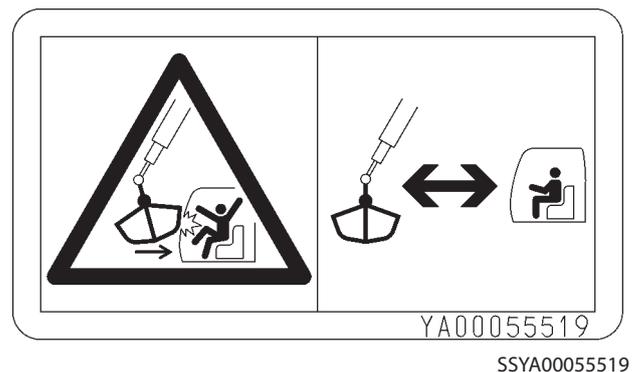


1. Do not allow any person under the bucket. The bucket or soil may fall and serious injury or death may result.



2. If the bucket hits the cab, serious injury or death may result. The bucket can hit the cab.

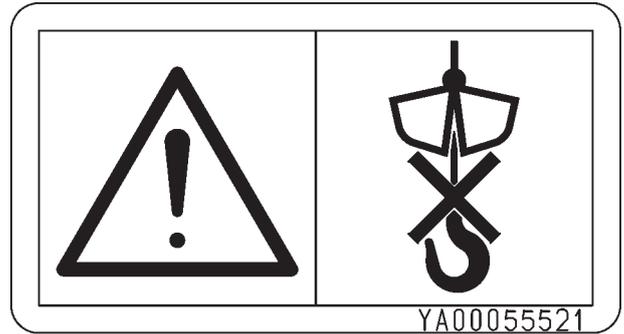
Keep a safe distance from the bucket to prevent the bucket from hitting to the cab even if it is swinging.



SAFETY SIGNS

4. WARNING!

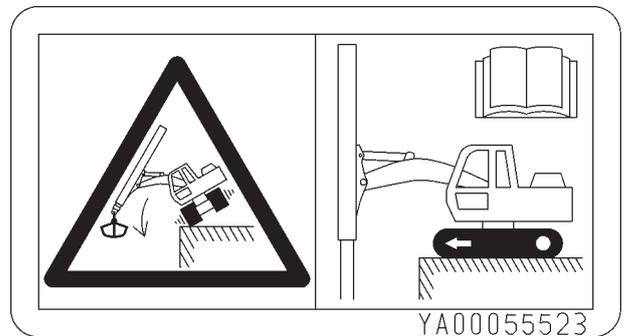
Never allow the machine to engage in crane work.
Failure to do so may result in serious injury or death.



SSYA00055521

5. If the machine loses its balance, it may tip over or fall down, possibly resulting in serious injury or death. Align the centerline of the front attachment with that of the crawler and position the travel motors in the rear.

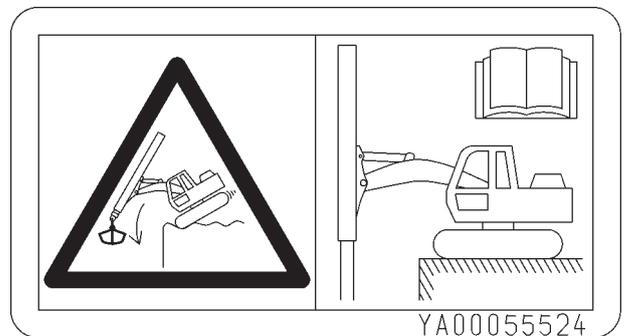
Thoroughly read the operator's manual and properly operate the machine.



SSYA00055523

6. If the machine loses its balance, it may cause machine tip over or fall down, possibly resulting in serious injury or death. Operate the machine on level and solid ground.

Thoroughly read operator's manual and properly operate the machine.



SSYA00055524

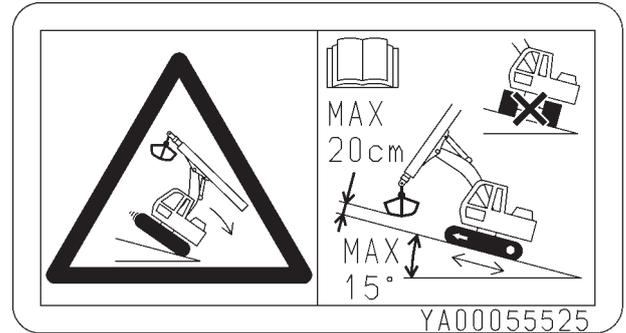
SAFETY SIGNS

7. Incorrect traveling on a slope may cause the machine tip over or fall down, possibly resulting in serious injury or death.

Do not travel diagonally across the face of a slope or attempt to change direction. Always face the front attachment toward the uphill side and the travel motor toward the downhill side whenever traveling on slopes.

Fully retract the telescopic arm and set the height of bucket tip to 20cm from the ground. Never attempt to ascend or descend slopes steeper than 15 degrees.

Thoroughly read the operator's manual and properly travel the machine.



SSYA00055525

8. Do not allow any person under the bucket. The bucket or soil may fall and serious injury or death may result.

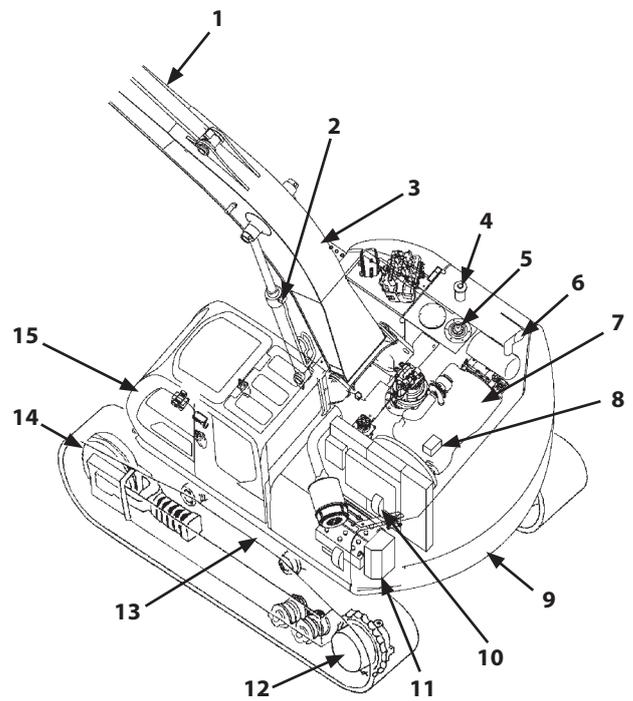


SSYA00055517

COMPONENTS NAME

Components Name

- 1- Arm Cylinder
- 2- Boom Cylinder
- 3- Boom
- 4- Fuel Tank
- 5- Hydraulic Oil Tank
- 6- Aftertreatment Device
- 7- Engine
- 8- Expansion Tank
- 9- Counterweight
- 10- Battery Disconnect Switch
- 11- DEF/AdBlue® Tank
- 12- Travel Device
- 13- Track
- 14- Front Idler
- 15- Cab

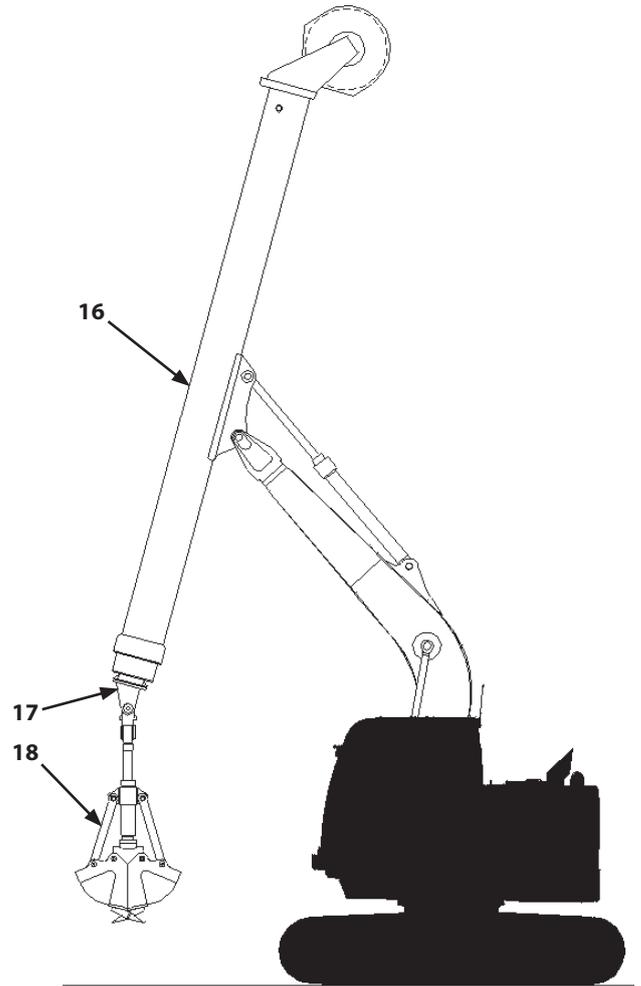


 **NOTE:** A typical model is shown in the right. Some parts may differ depending on the model of the machine.

MDAS-HT1-007

COMPONENTS NAME

- 16- Telescopic Arm
- 17- Bucket Hanger Bracket
- 18- Clamshell Bucket



MDAE-HT1-003

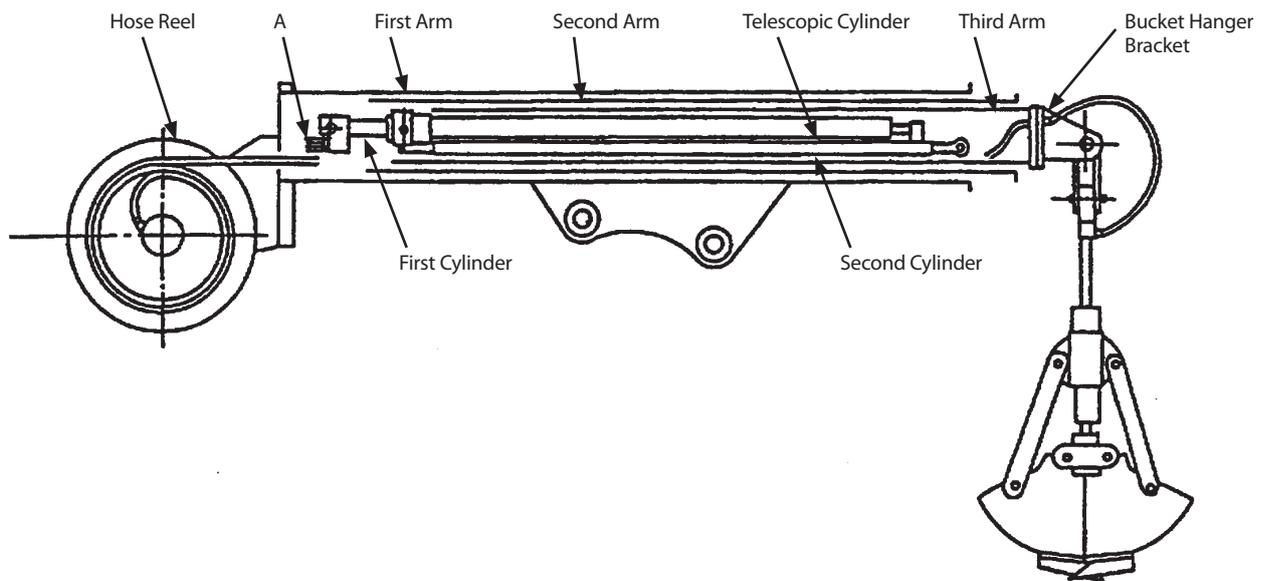
COMPONENTS NAME

General Inside Structure of Telescopic Arm

On the telescopic arm, the first cylinder supports the first arm and the second arm, and the second cylinder supports the second arm and the third arm. The arm extends/retracts by supplying oil pressure to (A) of the rod in the first cylinder. The bucket opens/closes by supplying oil pressure to the front end of the arm through the hose reel.

Also, in the extension movement of the arm, the third arm extends after the second arm extends to its limit.

In the retraction movement of the arm, the second arm retracts after the third arm retracts to its limit. In addition, while the retraction/extension movement, friction resistance may occur in each moving parts, which may counterchange the operation of the second arm and the third arm. This is not due to malfunction.

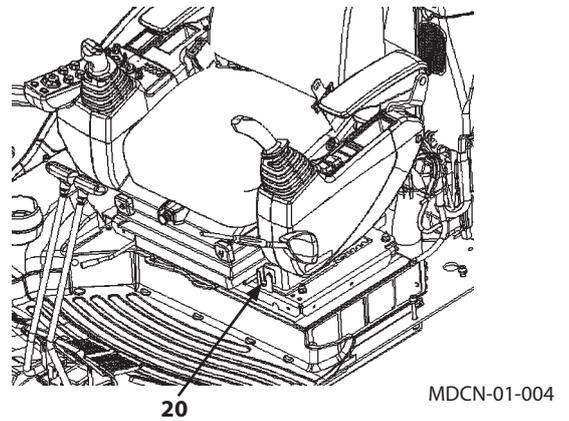
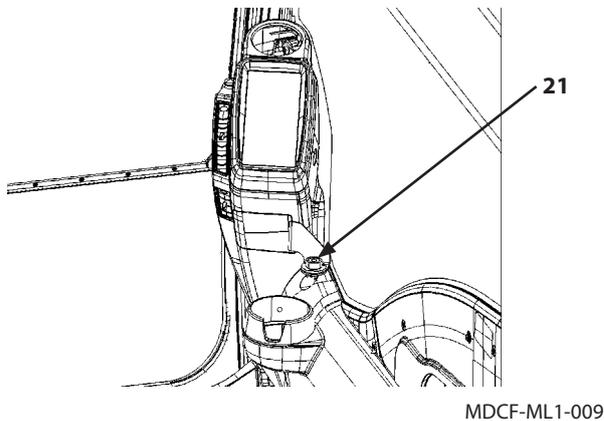
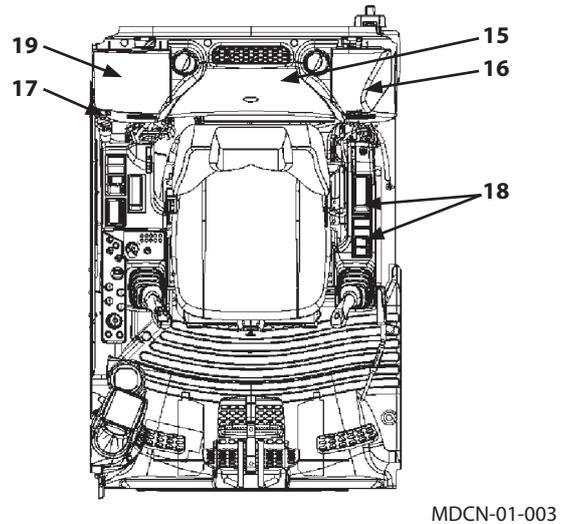
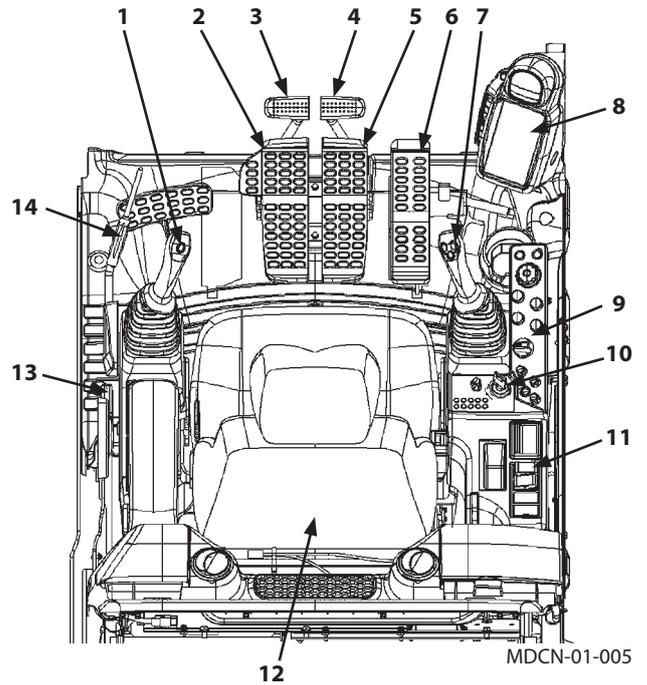


M1V7-HT1-002

COMPONENTS NAME

Cab Features

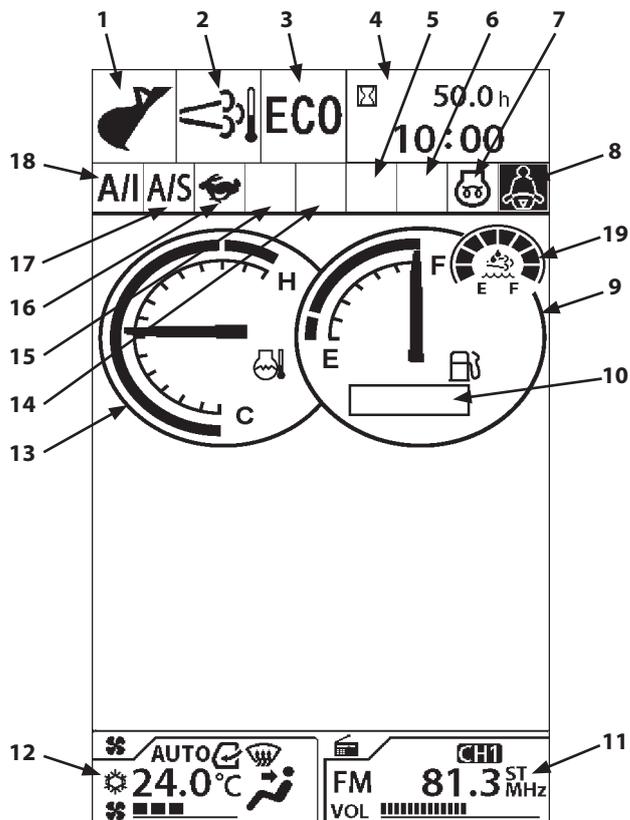
- 1- Left Control Lever/Horn Switch
- 2- Left Travel Pedal
- 3- Left Travel Lever
- 4- Right Travel Lever
- 5- Right Travel Pedal
- 6- Attachment Pedal
- 7- Right Control Lever/Power Boost Switch
- 8- Multi Function Monitor Panel
- 9- Switch Panel
- 10- Key Switch
- 11- Regeneration Switch
- 12- Operator's Seat
- 13- Cab Door Release Lever
- 14- Pilot Control Shut-Off Lever
- 15- Glove Compartment
- 16- Fuse Box
- 17- Cigar Lighter
- 18- Switch Panel (for Optional Equipment)
- 19- Glove Compartment (Hot and Cool Box)
- 20- Engine Stop Switch
- 21- Level Gauge



OPERATOR'S STATION

Basic Screen

- 1- Work Mode Display
- 2- Aftertreatment Device Display
- 3- Power Mode Display
- 4- Hour Meter, Clock
- 5- Auxiliary
- 6- Auxiliary
- 7- Preheat Display
- 8- Seat Belt Display
- 9- Fuel Gauge
- 10- Sub Meter Display
- 11- Radio Display
- 12- Air Conditioner Display
- 13- Coolant Temperature Gauge
- 14- Auxiliary
- 15- Auxiliary
- 16- Travel Mode Display
- 17- Auto Shut-Down Display
- 18- Auto-Idle Display
- 19- DEF/AdBlue® Gauge



MDC1-01-020

OPERATOR'S STATION

How to Use Screens

Displaying Basic Screen

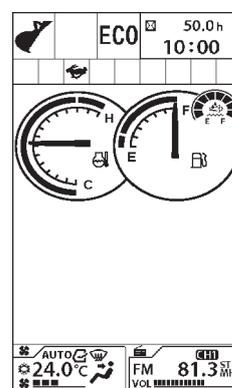
IMPORTANT: Start the engine after the basic screen is displayed.

When the key switch is turned to the ACC or ON position, the starting screen displays for about 2 seconds. When the key switch is kept in ACC position, only hour meter, clock and radio will be displayed. When the key switch is turned from ACC to ON position, the basic screen will be displayed.



Starting Screen

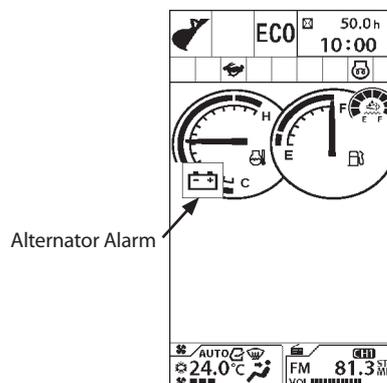
MDAA-01-003EN



Basic Screen

MDC1-01-001

IMPORTANT: When the key switch is turned to ON position, the alternator alarm will be displayed on the basic screen. Until the alternator starts generating power after the engine starts, the alternator alarm is displayed on the basic screen.



MDC1-01-042

OPERATOR'S STATION

- Display of Meters
Items to be displayed

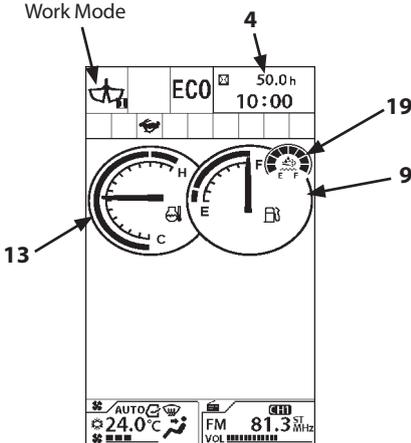
- 4- Hour Meter, Clock
- 9- Fuel Gauge
- 13- Coolant Temperature Gauge
- 19- DEF/AdBlue® Gauge

- Work Mode Display
The attachments being used are displayed.



This machine uses only the clamshell 1 2.

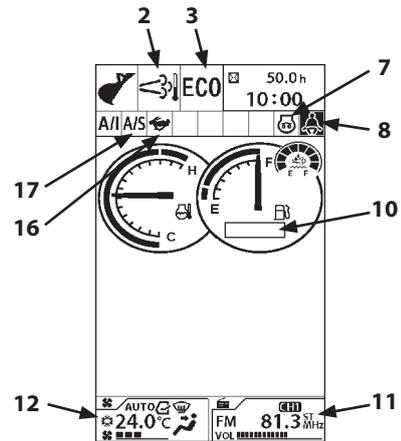
Clamshell



MDDQ-RTBH1-002

OPERATOR'S STATION

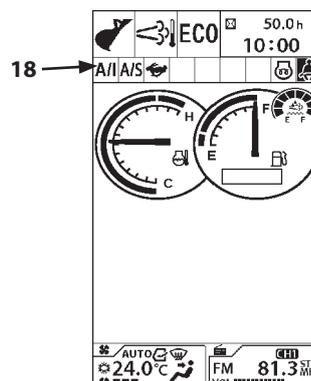
- Aftertreatment Device Display (2)
Displays condition of the aftertreatment device.
- Power Mode Display (3)
Displays the power mode selected from the switch panel.
- Preheat Display (7)
While the current is being supplied to the glow plug, indicator (7) is displayed.
- Seat Belt Display (8)
Turns ON when the key switch is in the ON position, and turns OFF 5 seconds after the engine starts.
- Sub Meter Display (10)
Fuel consumption or breaker hour meter is displayed.
- Radio Display (11)
Displays the radio panel.
- Air Conditioner Display (12)
Displays the air conditioner panel.
- Travel Mode Display (16)
Displays the travel mode selected from the switch panel.
- Auto Shut-Down Display (17)
Display auto shut-down display (17) when auto shut-down is turned ON from the menu screen.
When the key switch is turned ON while auto shut-down is enabled, auto shut-down display (17) blinks for 10 seconds.



MDC1-01-286

OPERATOR'S STATION

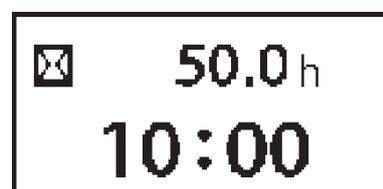
- **Auto-Idle Display (18)**
When the auto-idle is selected from the switch panel, auto-idle display (18) displays.
When the key switch is turned ON while the auto-idle switch is also ON, auto-idle display (18) blinks for 10 seconds.



MDC1-01-286

Hour Meter

The total accumulated operating hours since the machine started working, are displayed in hours (h).
One digit after the decimal point indicates tenths of an hour (6 minutes).



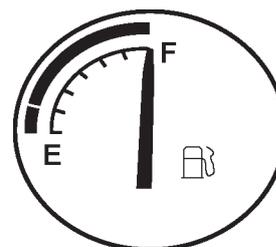
MDAA-01-021EN

Clock

Indicates the current time.
24-h/12-h display can be selected.
(Refer to "Date and Time" for switching the display mode.)

Fuel Gauge

The remaining fuel amount is indicated by the needle.
Refuel before the needle reaches "E".

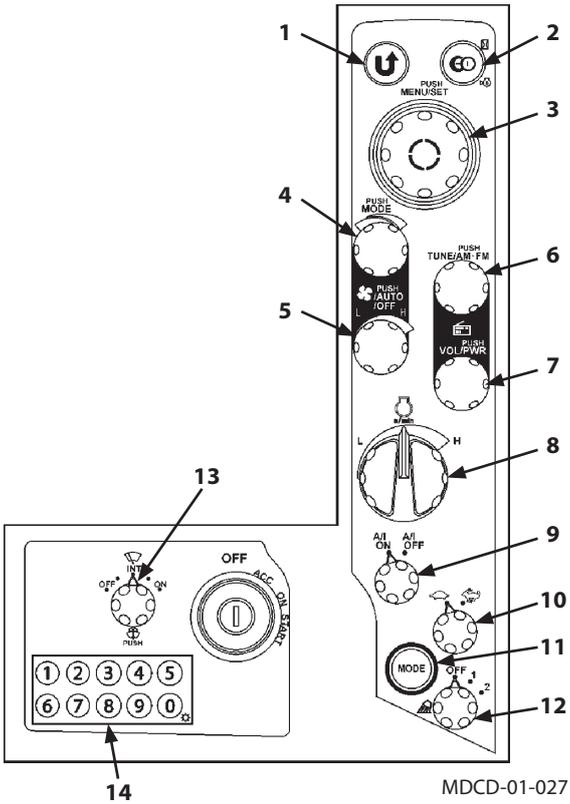


MDAA-01-276

OPERATOR'S STATION

Switch Panel

- 1- Return to Previous Screen
- 2- Return to Basic Screen
- 3- Selector Knob
- 4- Temperature Control Switch/Mode Switch
- 5- AUTO/OFF Switch/Fan Switch
- 6- AM/FM Selector/Tuning Switch
- 7- Power Switch/Volume Control Knob
- 8- Engine Control Dial
- 9- Auto-Idle Switch
- 10- Travel Mode Switch
- 11- Power Mode Switch
- 12- Work Light Switch
- 13- Wiper/Washer Switch
- 14- Numeric Keypad



OPERATOR'S STATION

Return to Previous Screen (Monitor)

Push this switch to return to the previous screen.



MDAA-01-010

Return to Basic Screen (Monitor)

Allows any screen to return to the basic screen.

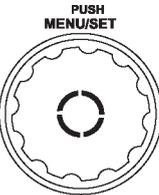


MDAA-01-011

Selector Knob (Monitor)

Push : Push this switch while the basic screen is displayed, the menu screen opens.
Push this switch after the menu screen, the action is confirmed.

Rotate : Cursor moves.

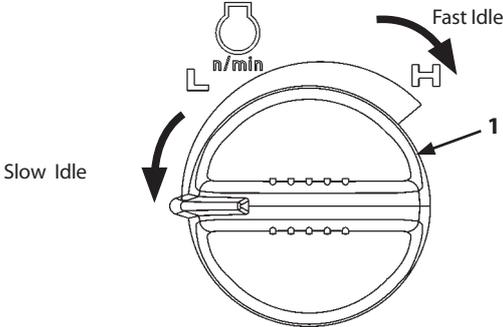


MDAA-01-012

Engine Control Dial

Use engine control dial (1) to adjust engine speed.

The fully clockwise position : Fast Idle
Counterclockwise : Slow Idle



M1P1-01-068

OPERATOR'S STATION

Auto-Idle Switch

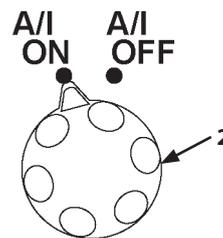
Auto-idle switch (2) sets the engine speed control mode to either Auto-Idle ON or OFF.

- Auto-Idle Speed

When auto-idle switch (2) is turned to ON position, the engine speed decreases to the idle after approximately 4 seconds at the state in which the control lever is turned to neutral.

This function reduces fuel consumption.

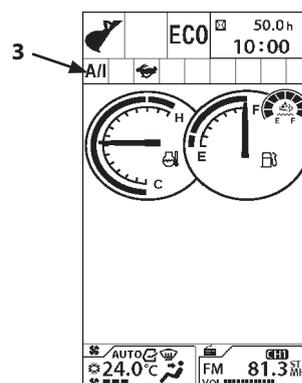
When the auto-idle mode is selected, auto-idle indicator (3) on the monitor panel lights.



MDAA-01-017

 **NOTE:**

- Auto-idle control may not work completely until the end of the warm-up.
- The auto-idle control function does not operate when the aftertreatment device is regenerating.



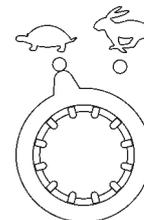
MDC1-01-314

Travel Mode Switch

Two travel modes, FAST and SLOW, are selected by turning the travel mode switch to either position.

 Mark (Fast Speed Mode)

 Mark (Slow Speed Mode)



MDCD-01-028

OPERATOR'S STATION

Power Mode Switch

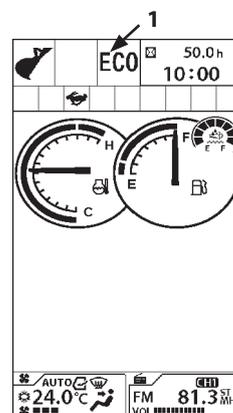
The two engine speed modes, ECO or PWR mode are selected by operating the power mode switch.

- ECO (Economy) Mode
Operate the machine in this mode when performing normal work.
ECO is displayed on Power Mode Display (1).
- PWR (Power) Mode
Use PWR (Power) mode when extra horsepower is needed.
PWR is displayed on Power Mode Display (2).

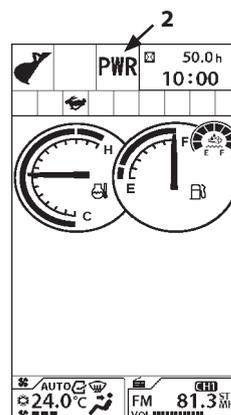
 **NOTE:** ECO mode is set automatically when starting the engine. Set PWR mode if necessary.



MDAA-01-274



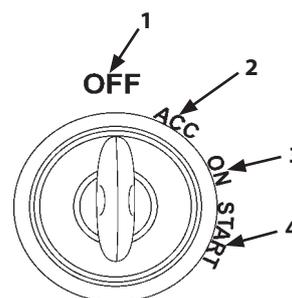
MDC1-01-001



MDC1-01-353

Key Switch

- 1- OFF (Engine Off)
- 2- ACC (Horn, Radio etc.)
- 3- ON (Engine ON)
- 4- START (Engine Start)

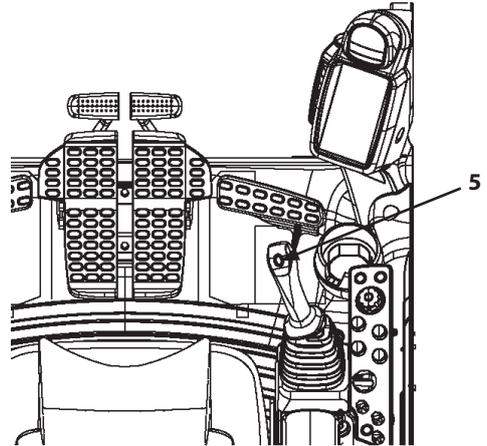


MDC1-01-502

OPERATOR'S STATION

Power Boost Switch

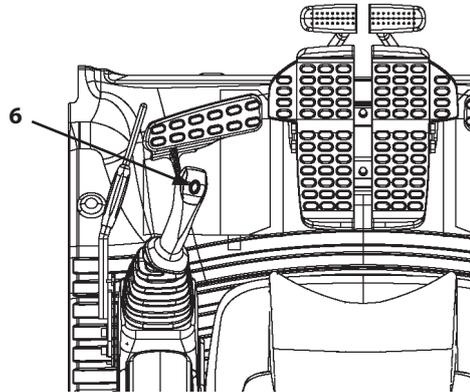
Power boost switch (5) is provided on the top of the right control lever. While pressing power boost switch (5), the maximum digging power is boosted within approximately 8 seconds to increase work capacity.



MDAA-01-292

Horn Switch

Horn switch (6) is provided on the top of the left control lever. The horn sounds continuously as long as switch (6) is pressed.

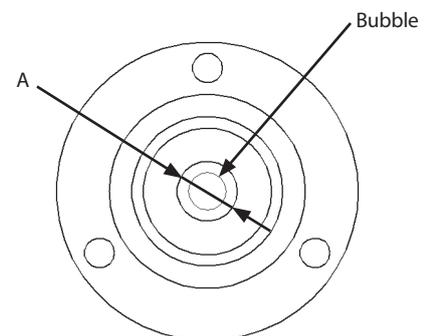


MDAA-01-293

Level Gauge

⚠ WARNING: If the bubble center is not within range A, the machine is tilting unsafely so that the machine may tip over.

When the bubble center is within range A, the machine is level.



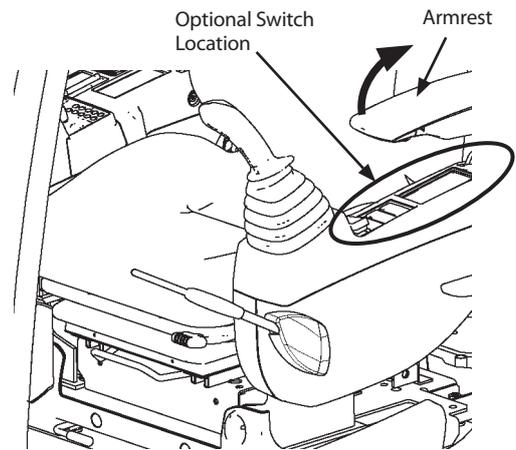
MDAE-HT1-005

OPERATOR'S STATION

Switch Panel (for Optional Equipments)

 **NOTE:** The optional switch locations differ, depending on the kinds of optional devices that the machine is equipped with. Before using the switches, confirm which types of optional devices the machine is equipped with. Raise the armrest when operating the optional switch. All available optional devices are shown below.

- Travel Alarm Deactivation
- Swing Alarm
- Rear Light
- Electrical Control



MDAA-01-327

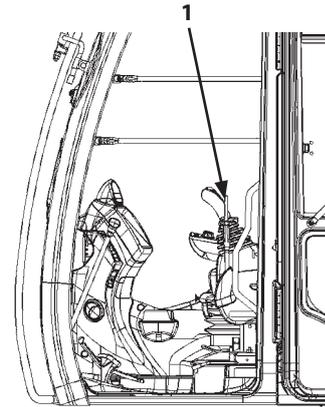
OPERATOR'S STATION

Pilot Control Shut-Off Lever

Pilot control shut-off lever (1) functions to prevent the machine from being mistakenly operated when the operator accidentally touches the control lever or pedals when getting on or off the machine.

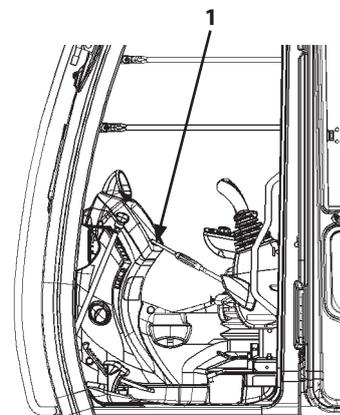
⚠ WARNING:

- **Always pull pilot control shut-off lever (1) into the full LOCK position. Unless pilot control shut-off lever (1) is fully moved to the LOCK position, the control lever is not locked, possibly creating a hazardous situation.**
- **When leaving the machine, always stop the engine. Then, pull pilot control shut-off lever (1) up to the LOCK position.**
- **Always pull pilot control shut-off lever (1) up to the LOCK position before transporting the machine and leaving the machine.**
- **Confirm that pilot control shut-off lever (1) is in the LOCK position before starting the engine. The engine will not start in any position other than the LOCK position.**



LOCK position

MDCN-01-008



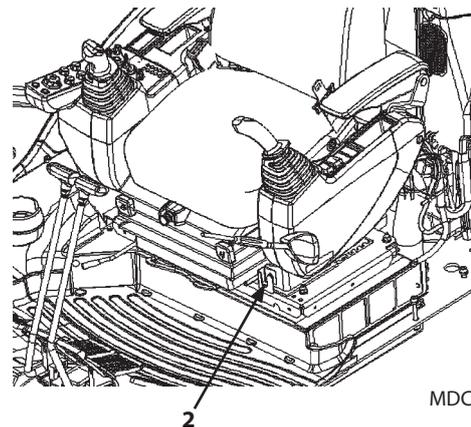
UNLOCK position

MDCN-01-009

Engine Stop Switch

In case the engine does not stop even if the key switch is turned OFF due to failure of the machine, move switch (2) located at the front-left side of the seat stand downward to stop the engine.

After operating switch (2), be sure to return switch (2) back to the upward position.



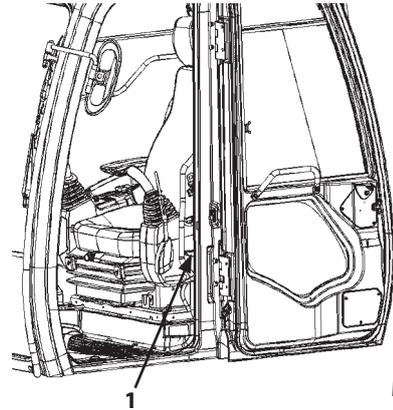
MDCN-01-004

OPERATOR'S STATION

Cab Door Release Lever

⚠ CAUTION:

- **Open the cab door all the way until it securely locks in the latch on the side of the cab.**
- **Do not unlock the cab door when the machine is parked on a slope or while the wind is strong. The cab door may close accidentally, possibly resulting in personal injury.**
- **When opening or closing the cab door, take extra care not to catch fingers between the base machine and the cab door.**



MDCN-01-012

To unlock the door, push down on lever (1).

OPERATOR'S STATION

Work Mode

IMPORTANT: Before changing the work mode, stop the machine, lower the working device such as a bucket on the ground and pull the pilot control shut-off lever to the LOCK position.

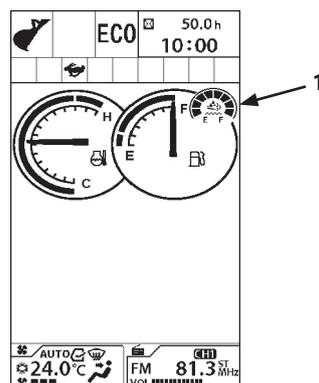
Front attachment is selected in Work Mode screen (5) under the Work Mode menu in the main menu.

The selected work mode will be kept even if the key switch is turned OFF.

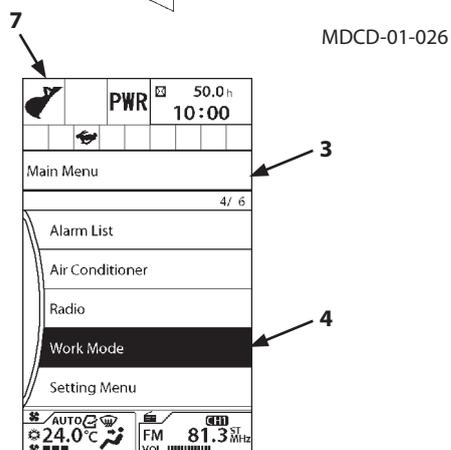
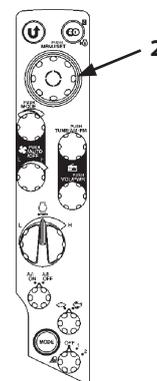
Attachment selection

1. Press selector knob (2) while displaying Basic Screen (1) to display Main Menu screen (3).
2. Rotate selector knob (2) to highlight Work Mode (4).
3. Press selector knob (2) to display Work Mode screen (5).
4. Rotate selector knob (2) to highlight the desired front attachment.
(In the right example, "Clamshell 1" (6) is highlighted.)
5. Press selector knob (2) to make the changes.

 **NOTE:** When the attachment pedal is operated while the work mode is set to the digging mode, work mode display (7) on the monitor screen starts flashing.

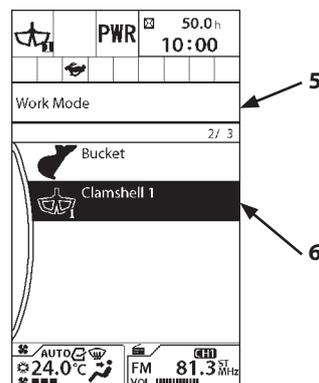


MDC1-01-001



MDCD-01-026

MDDE-RT1-008EN



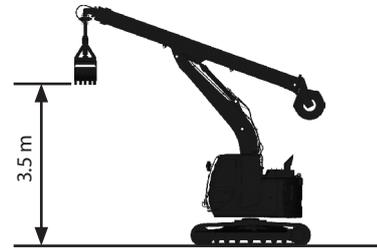
MDAS-HT1-031EN

OPERATOR'S STATION

Installation and Adjustment of Mirrors

⚠ WARNING:

- Adjust the mirrors, referring to the field of vision in the mirrors in the "VISIBILITY MAP" chapter. Perform adjustment with the machine position as shown.
- If the mirrors are adjusted improperly, the field of vision cannot be ensured and/or will be obstructed, which may result in serious personal injury.
- Check the field of vision in the mirrors every day before starting work.
- If any of the mirrors are dirty, clean them.
- Ensure appropriate footing when adjusting or cleaning mirrors.



Machine Position Image

MDAS-HT1-004

IMPORTANT: Mirrors and cameras only act as aids. Before operating the machine, always check the area around the machine thoroughly.

IMPORTANT: If a modification is made that could restrict the field of vision, it may result in an obstruction to the field of vision, so check the field of vision again.

OPERATOR'S STATION

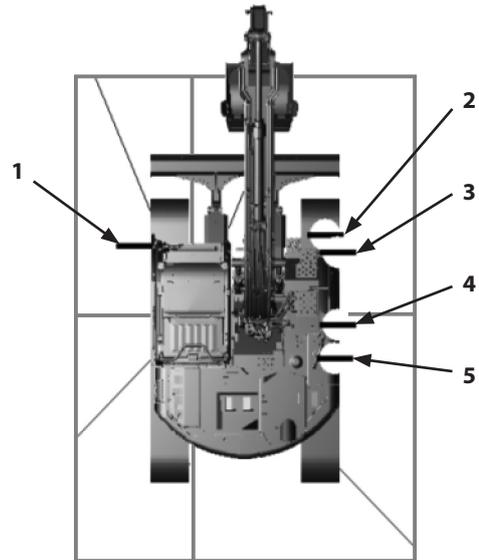
Mirror Installation Diagram

The mirror installation locations (1, 2, 3, 4, 5, 6) on this machine are shown in the right.

Adjust the installation locations of each mirror by following the instructions below to ensure safety.

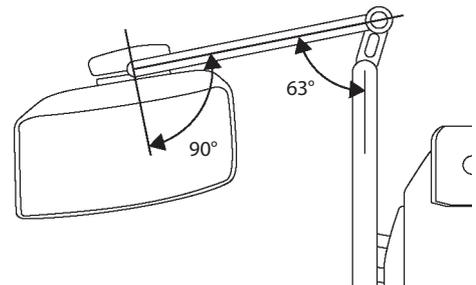
Installation angle and dimension varies depending on the model.

- 1- Operator's Seat Mirror
- 2- Handrail Mirror for Getting ON/OFF the Machine
- 3- Handrail Mirror for Getting ON/OFF the Machine
- 4- Oil Tank Handrail Mirror
- 5- Oil Tank Handrail Mirror



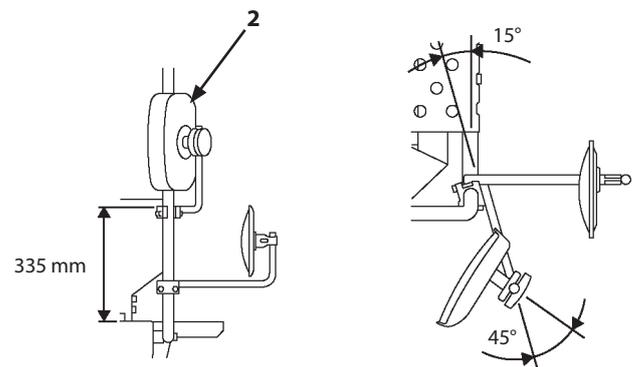
MDAT-01-248

- Operator's Seat Mirror (1)
Adjust the mirror to the specified position.



MDAT-01-249

- Handrail Mirror for Getting ON/OFF the Machine (2)
Adjust the mirror to the specified position.
Adjust the mirror so that a range of at least 1 m from the right side of the machine can be seen from the operator's seat.



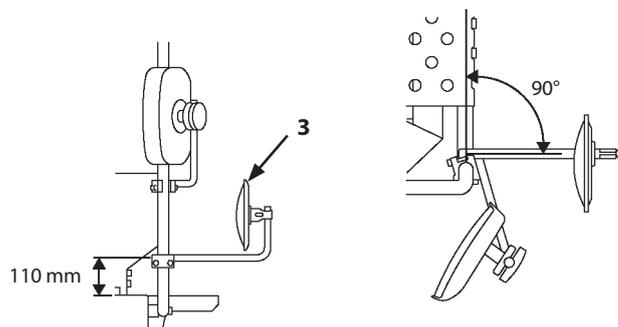
MDAT-01-250

OPERATOR'S STATION

- Handrail Mirror for Getting ON/OFF the Machine (3)

Adjust the mirror to the specified position.

Adjust the mirror so that a range of at least 1 m from the right side of the machine can be seen from the operator's seat.

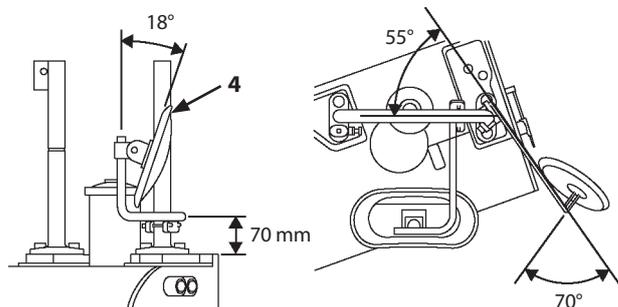


MDAT-01-263

- Oil Tank Handrail Mirror (4)

Adjust the mirror to the specified position.

Adjust the mirror so that a range of at least 1 m from the right side of the machine can be seen from the operator's seat.

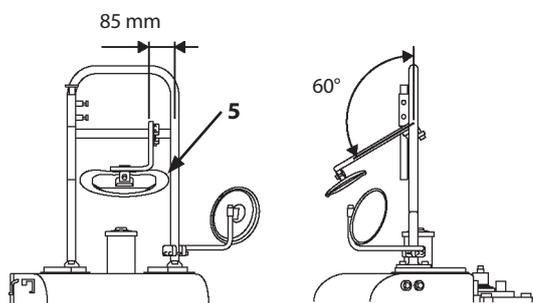


MDAT-01-251

- Oil Tank Handrail Mirror (5)

Adjust the mirror to the specified position.

Adjust the mirror so that a range of at least 1 m from the right side of the machine can be seen from the operator's seat.



MDAT-01-252

BREAK-IN

Observe Engine Operation Closely

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

1. Only operate the machine in economy (ECO) mode and limit engine horsepower to around 80 % of its full load.
2. Avoid excess engine idling.
3. Check indicator lights and gauges frequently during operation.

Every 8 Hours or Daily

1. Perform 8-hour or daily service.
2. Watch for fluid leaks.
3. Lubricate working tool pivots every 8 hours for the first 50 hours, and every 8 hours when working in mud and water.

After the First 50 Hours

1. Perform 50-hour service.
2. Check accessible hardware torque. (See Hardware Torque Specifications in Maintenance chapter.)

After the First 100 Hours

Perform 50-hour and 100-hour service.

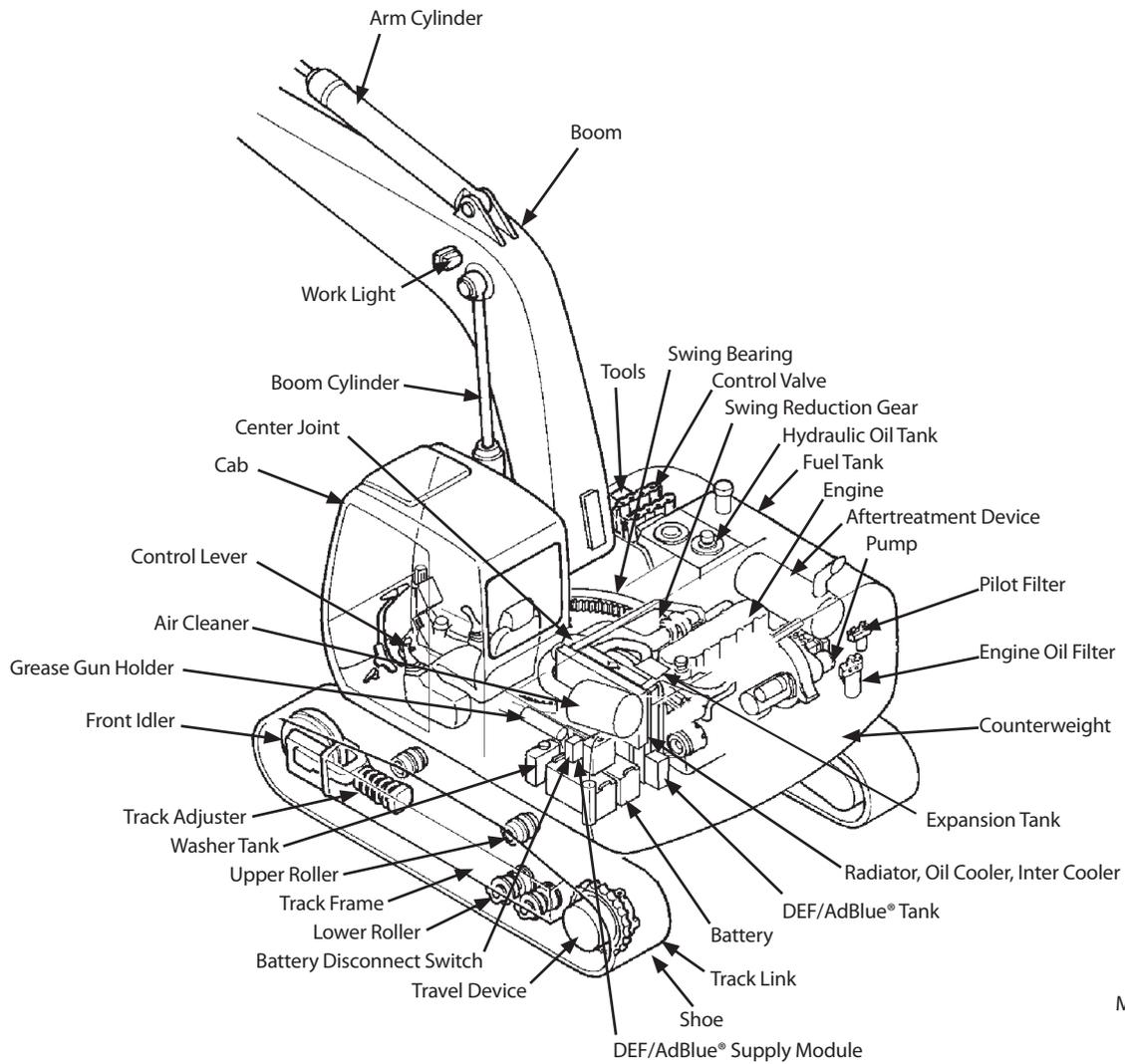
BREAK-IN

New Machine or After Long Intermission

The telescopic arm may not be operated smoothly (vibrated) when starting the machine. Aeration in the pipe causes this condition so that the machine is not abnormal. Slowly extend/retract the telescopic arm several times in order to release air from the pipe. Although air is not released completely, air is released during the work and the telescopic arm is operated correctly.

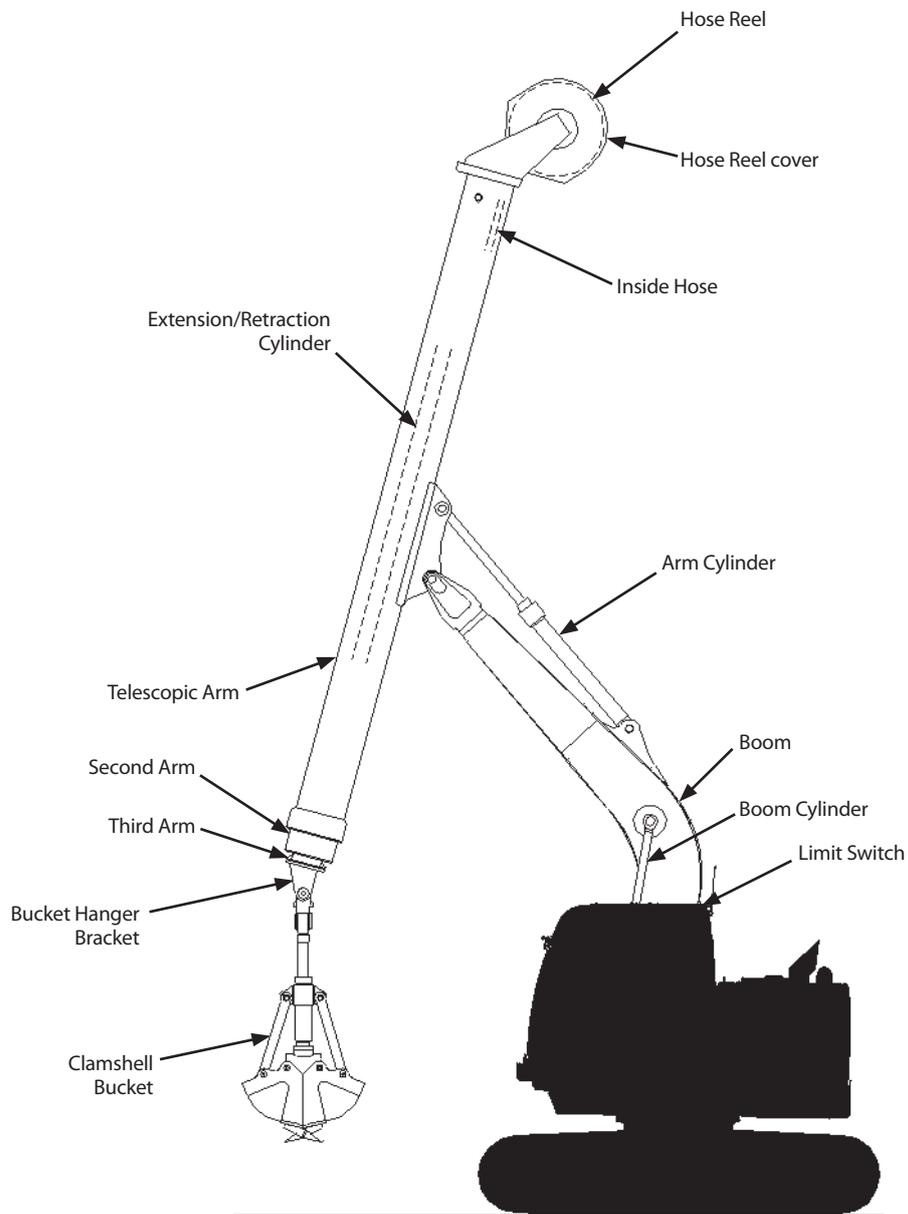
OPERATING THE ENGINE

Inspect Machine Daily Before Starting



MDAS-HT1-008

OPERATING THE ENGINE



MDAE-HT1-010

OPERATING THE ENGINE

- Refer to "Maintenance" section for detailed information.

Check Points		Check Points	
Engine	<ol style="list-style-type: none"> 1. Level and contamination of engine oil and coolant 2. Starting easiness, exhaust gas color, and noise 3. Oil and water leaks, damage to hoses and pipe lines 4. Clogging and damage to radiator, oil cooler and intercooler 5. Clean around muffler filter 6. Looseness and missing of mounting bolts and nuts 	Telescopic Arm	<ol style="list-style-type: none"> 1. Operation of the slide frame, abnormal noise 2. Looseness, short circuit and damages of harness connections 3. Deformation or damage of support sheave or pusher sheave bracket 4. Stretch and looseness of hoses in the telescopic arm 5. Oil leaks and damages of piping, hoses and stop valves 6. Looseness and missing of mounting bolts and nuts 7. Looseness, missing and damages of the lifting bracket mounting bolts and nuts 8. Deformation and break of the lifting bracket 9. Deformation and damages of the telescopic arm 10. Damages of pin anti-extraction pins, stoppers, rings and bolts 11. Operation and operating sound of the telescopic arm 12. Operation, oil leak or rod rust of the telescopic cylinder 13. Deformation and damages of covers and guards 14. Operation of the perpendicularity indicator 15. Greasing condition around the pins 16. Deformation or damage of support sheave, pusher sheave or movable sheave 17. Greasing condition of the slide plate
Upperstructure	<ol style="list-style-type: none"> 1. Level, leaks and contamination in DEF/AdBlue® tank 2. Indication of level vial, operation and damage 3. Fuel level, leaks and contamination of fuel in tank 4. Hydraulic oil level, leaks and contamination of hydraulic oil tank 5. Movement, play and operating force of all control levers 6. Operation of all hydraulic components, oil leaks and damage to pipe lines and hoses 7. Deformation, break and abnormal noise of upper structure 8. Looseness and missing of mounting bolts and nuts 9. Washer Fluid 10. Leaks from DEF/AdBlue® hoses 11. Dirt around the aftertreatment device 		
Undercarriage	<ol style="list-style-type: none"> 1. Sag, wear and break of crawler 2. Oil leaks and wear on upper/lower rollers and front idlers 3. Oil leaks from travel devices 4. Looseness and missing of mounting bolts and nuts 		
Boom	<ol style="list-style-type: none"> 1. Check cylinders, pipe lines and hoses for oil leaks and damage. 2. Wear and damage of the boom 3. Lubrication state of the working device 4. Check for pin anti-extraction pins, stoppers, rings and bolts for damage 5. Looseness and missing of mounting bolts and nuts 	Others	<ol style="list-style-type: none"> 1. Operation of instruments, switches, lights and buzzer/horn 2. Function of parking brake 3. Deformation and break of head guard 4. Abnormal outside appearance of machine 5. Wear and damage of the seat belt

OPERATING THE ENGINE

Before Starting Engine

Thoroughly read the Engine Start and Stop section in the Excavator Operator's Manual.

Starting the Engine

Thoroughly read the Engine Start and Stop section in the Excavator Operator's Manual.

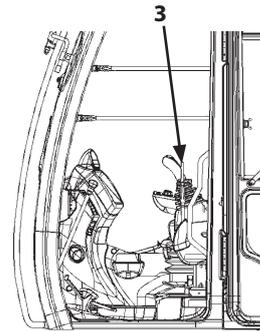


SA-1203

Stopping the Engine

Engine Stop Procedure

1. Except for special cases, before stopping the engine, lower the bucket to the ground.
2. Pull pilot control shut-off lever (3) to LOCK position.
3. Turn engine control dial (1) to the slow idle position and run the engine for 5 minutes to cool the engine.

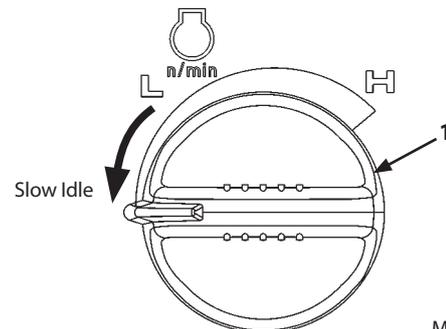


LOCK Position

MDCN-01-008

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.

4. Turn key switch (2) OFF to stop the engine.

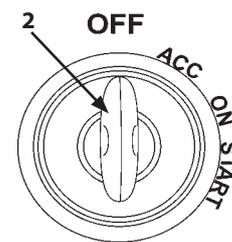


M1P1-01-068

If the engine does not stop, even if the key switch is turned to the OFF position. (Emergency Stop)

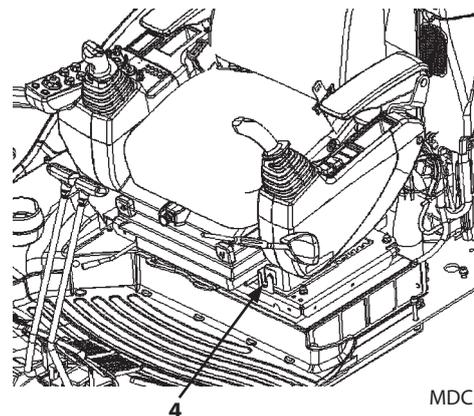
In case the engine does not stop even if key switch (2) is turned OFF due to failure of the machine, move engine stop switch (4) downward to stop the engine. The engine will stop. Return engine stop switch (4) to its original position (upward).

CAUTION: Do not use engine stop switch (4) unless absolutely necessary. When the machine stops due to machine failure, do not start the machine until repair is completed



MDC1-01-502

IMPORTANT: The DEF/AdBlue® pump runs for a while after the engine stops to return DEF/AdBlue® from piping to the DEF/AdBlue® tank. Do not turn battery disconnect switch to the OFF position during this time. Otherwise, the Urea SCR system may be damaged.



MDCN-01-004

DRIVING THE MACHINE

Travel Levers and Pedals

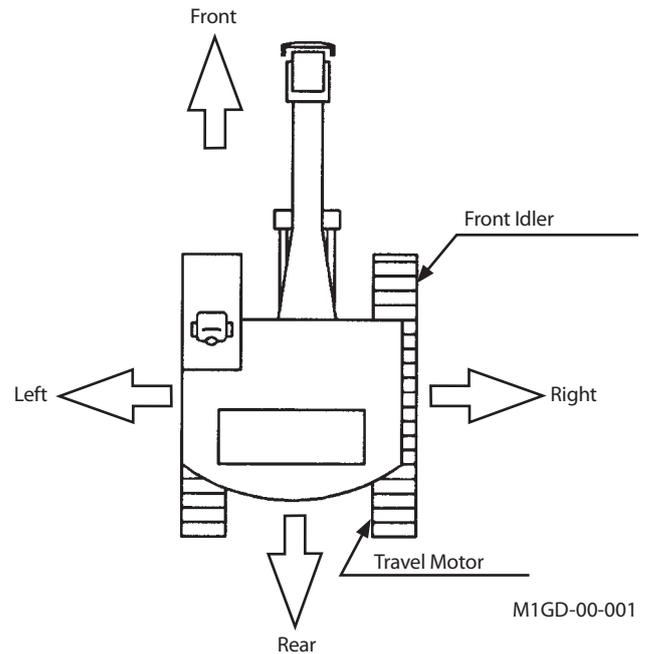
Travel Operation

Travel operation of this machine is controlled by using levers and pedals. (Travel operation of the sliding cab machine is controlled only by using a control lever.)

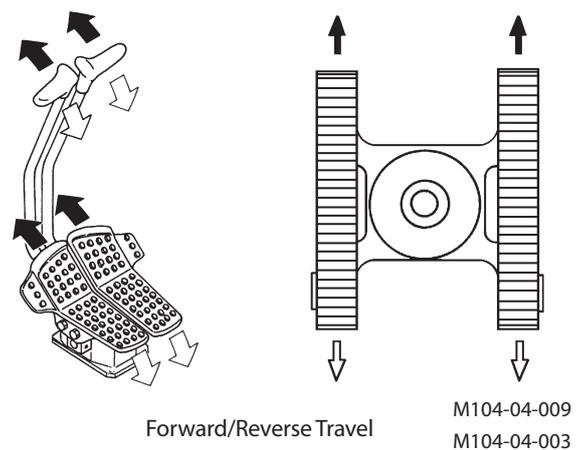
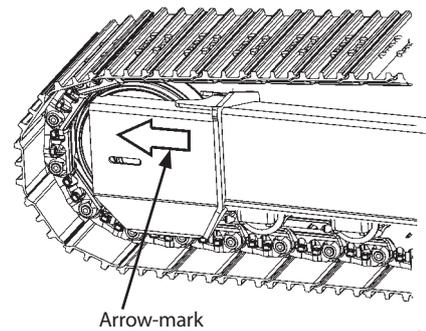
⚠ WARNING: If the travel motors are located at the front of the machine, the machine will move in the reverse direction to that shown on the operation instruction decal. Normal travel operation is when the travel motor is at the rear, and the front idler is at the front of the machine.

✎ NOTE:

- An arrow-mark seal is stuck on the inside surface of the side frame to indicate the machine front direction.
- A travel lever damper is provided on this machine to ensure smooth travel operation. Therefore, the travel lever or pedal may become heavier in extreme cold (-20 °C or below). This is caused by increase in oil viscosity, not a malfunction.



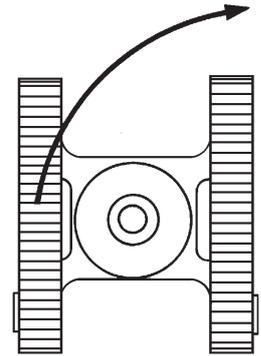
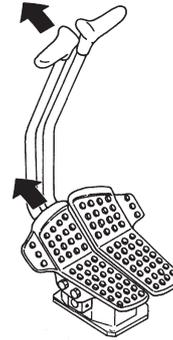
- **Forward/Reverse Travel**
Push down both left and right levers (or both pedals) forward to travel the machine forward. Pull down the two levers (or pedals) rearward to travel the machine in reverse. Travel speed can be controlled by the operation stroke of the travel levers and pedals.
- **Ascend/Descend Slopes**
Never attempt to ascend or descend slopes steeper than 15 degrees (26 %). Slowly operate the travel levers (or pedals) when descending a slope. When the travel levers are placed in the neutral position, brakes are automatically applied and the machine stops.



DRIVING THE MACHINE

- Pivot Turn

The machine direction is changed by driving one of two crawlers with either left or right travel levers (or pedals).

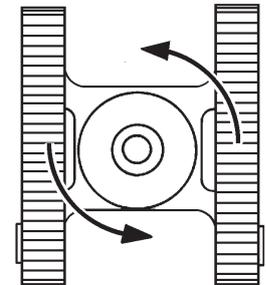
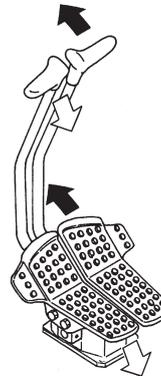


Pivot Turn

M104-04-010
M104-04-005

- Spin Turn

The machine direction is changed by driving two crawlers in opposite direction at a time by operating one lever (or pedal) to forward and another lever (or pedal) to reverse.



Spin Turn

M104-04-011
M104-04-007

DRIVING THE MACHINE

Traveling

CAUTION: Be sure to use a signal person when traveling the machine.

- Before moving the machine, determine which way to move the travel pedals/levers for the direction you want to go. When the travel motors are in the rear, pushing down on the front of the travel pedals or pushing the levers forward moves the machine forward, towards the idlers.

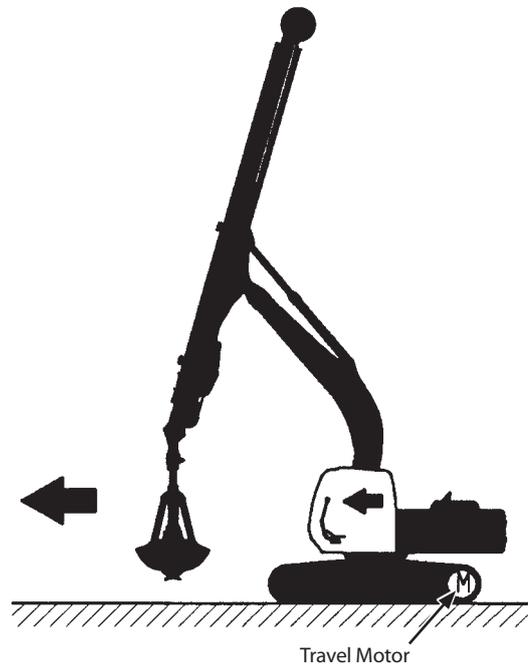
An arrow-mark seal is stuck on the inside surface of the side frame to indicate the machine front direction.

- Select a travel route that is as flat as possible. Steer the machine as straight as possible, making small gradual changes in direction.
- Before traveling on them, check the strengths of bridges and road shoulders, and reinforce if necessary.
- Use wood plates in order not to damage the road surface. Be careful of steering when operating on asphalt roads in summer.
- When crossing train tracks, use wood plates in order not to damage them.
- Do not make contact with electric wires or bridges.
- Do not get into a river.

If getting into a river, the machine may be stuck in the mud and leading to machine rollover.

- Avoid traveling on a rough ground. The bucket swings and the machine lose its balance, possibly resulting in machine rollover.
- Traveling on a rough ground may apply large impact to the machine, possibly resulting in damage.
- Avoid operations that may damage the track and undercarriage components.
- During freezing weather, always clean snow and ice from track shoes before loading and unloading the machine, to prevent the machine from slipping.
- Avoid traveling on very soft ground. When working on a soft ground is unavoidable, be sure to reinforce the ground by using steel plates which strong and firm enough to support the machine. Tow the machine if the machine becomes stuck in a soft ground.

Attach a tow lines by referring the "Towing Machine a Short Distance" section.



SA-1746



SA-1748

DRIVING THE MACHINE

Towing Machine a Short Distance

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

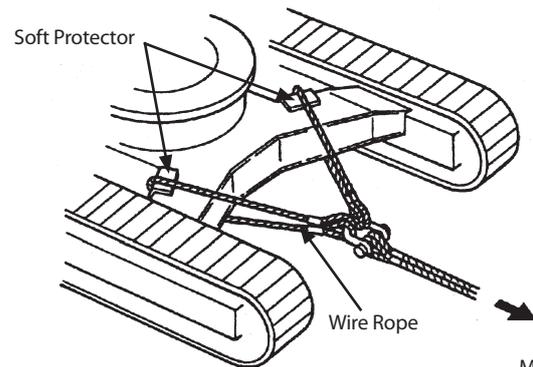
When your machine becomes stuck but the engine is still operational, attach wire ropes to the machine as shown on the right, and slowly tow your machine to firm ground using another machine.

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

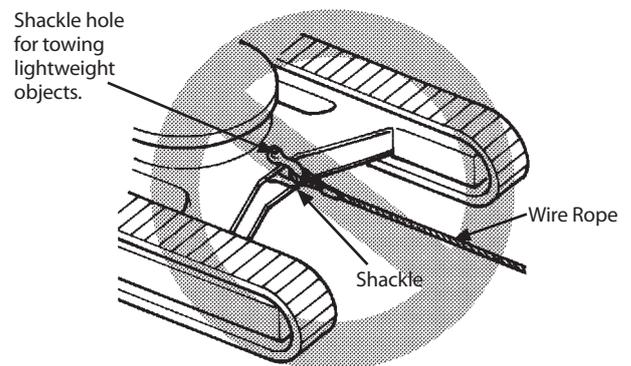
To prevent the wire ropes from being damaged, place protective material between the track frame and the wire ropes.

IMPORTANT: Do not use the shackle holes on the track frame for towing the machine.

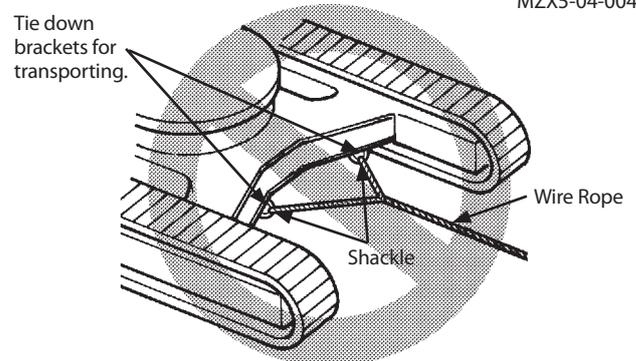
The center shackle hole on the track frame is provided to pull lightweight objects only. The shackle holes on the bottom of the track frame are used to secure the machine for transportation. Refer to the instructions on page 5-19 for using the center shackle hole appropriately.



M104-05-010



MZX5-04-004



MZX5-04-005

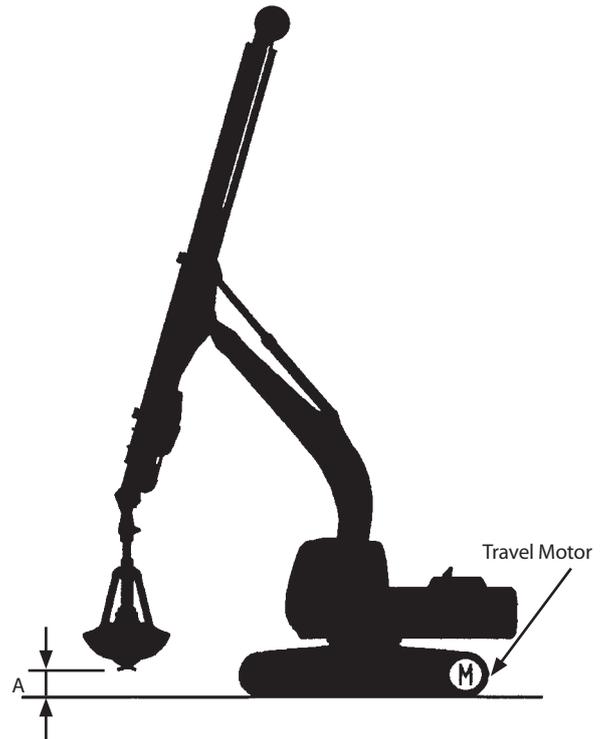
DRIVING THE MACHINE

Driving on Level Ground

CAUTION: Before driving the machine, select the **SLOW** mode at the travel mode switch. Then, slowly drive the machine with care. Be aware that the machine may become unstable depending on the positions of the front attachment. Pay attention not to allow the bucket to come in contact with the cab.

Drive the machine on level ground by following procedures below:

- Align the direction of the front attachment with the longitudinal direction of the crawlers. Place the travel motors at the rear.
- Fully retract the telescopic arm. Operate the boom and the telescopic arm cylinders so that the bucket bottom is raised above the ground by 0.2 m (A).
- Turn the travel mode switch to the SLOW position. Slowly begin to drive carefully.



SA-1754

DRIVING THE MACHINE

Precautions for Traveling on Slopes

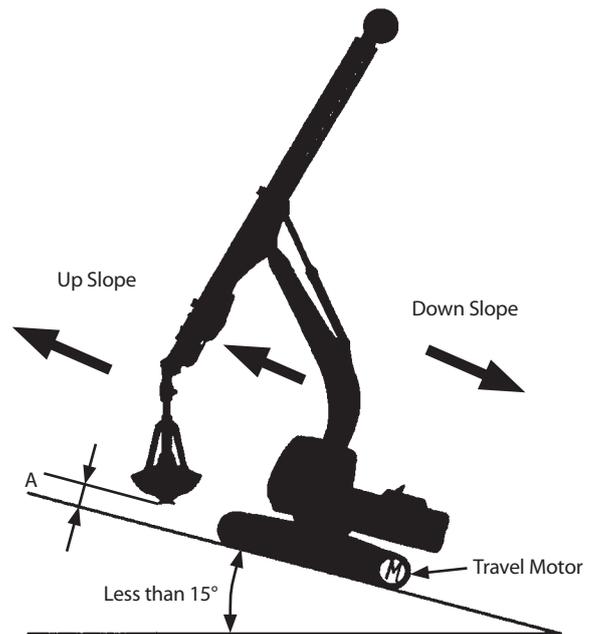
⚠ WARNING: Traveling on slopes is very hazardous. Reduce travel speed to prevent tipping over or skidding of the machine. Set the travel mode switch to the slow mode to ensure the machine travels at a slow pace.

Do not attempt to travel the machine when the bucket is loaded with soil or material, or lifting a timbering.

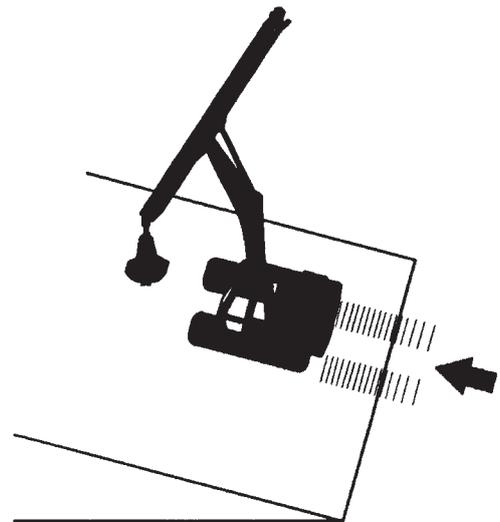
Slowly operate the machine in order not to hit the bucket with the cab.

When traveling on a slope, follow the below instructions.

- Align the center of the front attachment with the crawlers center. Position the travel motors in the rear.
 - Fully retract the telescopic arm. Keep the bucket at 0.2 m (A) above the ground by using the boom and telescopic arm.
 - Set the travel mode switch to the slow mode to ensure the machine travels at a slow pace.
- Travel the machine forward when ascending a slope, travel reverse when descending a slope.
 - Never attempt to ascend or descend 15° or steeper slopes.
 - Be sure to fasten the seat belt when traveling slopes.
 - If the machine starts to skid or becomes unstable, immediately lower the bucket to the ground and stop.
 - Traveling diagonally or across the face of a slope may cause the machine to skid or tip over. If steering on a slope is required, first move back to a flat ground and change direction to ensure safe traveling.
 - Never attempt to swing the upperstructure on a slope. The machine may tip over.
 - If the engine stalls on a slope, lower the bucket to the ground. After returning all control levers to neutral, restart the engine.
 - If the temperature of hydraulic oil is cool, the grade ability of the machine may be reduced. Before ascending steep slopes, thoroughly warm up the machine.



SA-1747



SA-1184



SA-2661

DRIVING THE MACHINE

Parking the Machine on Slopes

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

If parking the machine on a slope is unavoidable:

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

Do not push the front attachment when the bracket stopper is contacted. Failure to do so may damage the bracket and/or the clamshell cylinder.

Parking the Machine

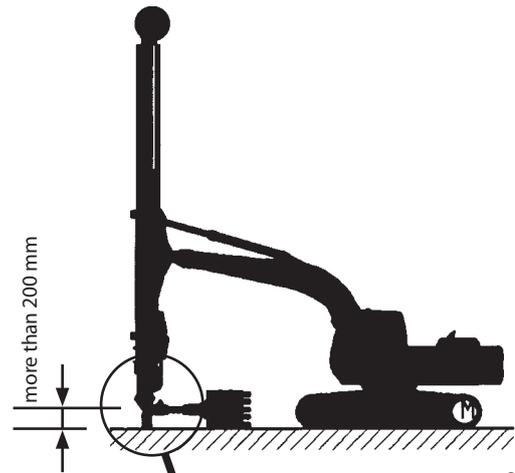
1. Park the machine on a firm, level surface.
2. Fully retract the telescopic arm perpendicular to the ground, lay the bucket inward so that the bucket teeth face the base machine. Lower the telescopic arm and place the end onto the ground. At this time, use wooden supports to protect the bracket, cylinders and hoses. Protect the bracket stopper from contacting the ground.
3. Turn the auto-idle switch off.

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

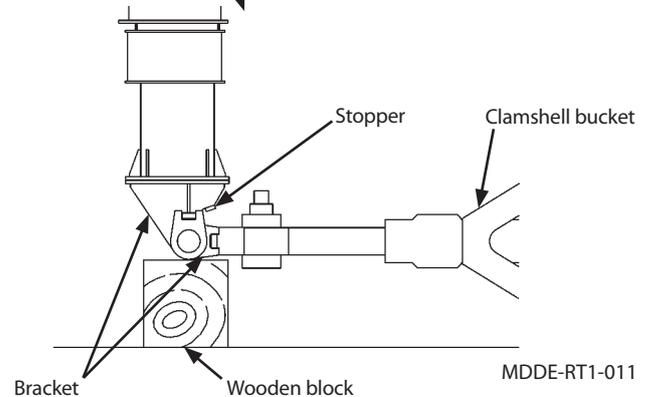
4. Turn engine control dial (1) counterclockwise to the stop (the slow idle position). Run the engine approximately 5 minutes to cool the engine.
5. Turn the key switch to OFF. Remove the key from the key switch.
6. Pull pilot control shut-off lever (2) to the LOCK position.

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

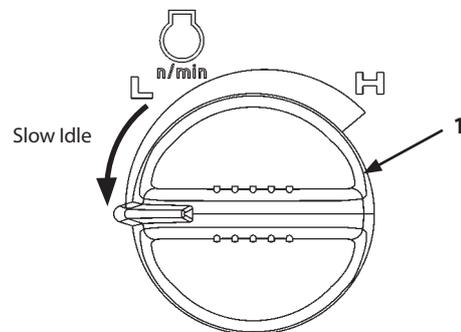
7. Close windows, roof vent, and cab door.
8. Lock all access doors and compartments.



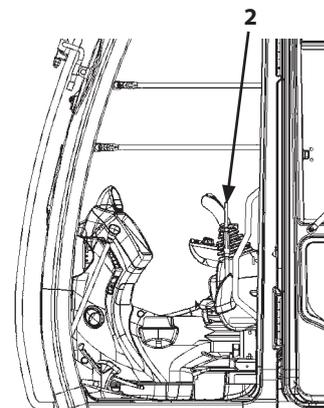
SA-1762



MDDE-RT1-011



M1P1-01-068



LOCK Position

MDCN-01-008

OPERATING THE MACHINE

Control Lever (ISO Pattern)

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

Prevent possible injury from unexpected machine movement.

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

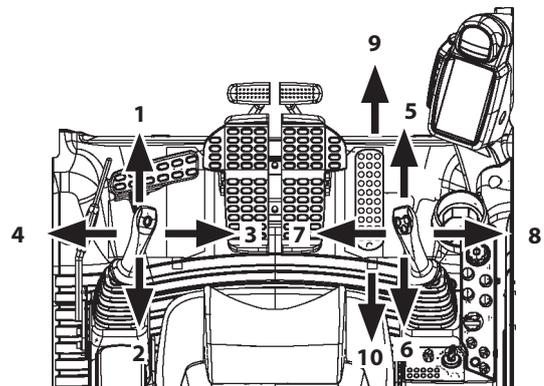
The machine is equipped with a label showing the control patterns of the levers and pedals.

IMPORTANT: When digging, avoid hitting the tracks with the boom cylinders.

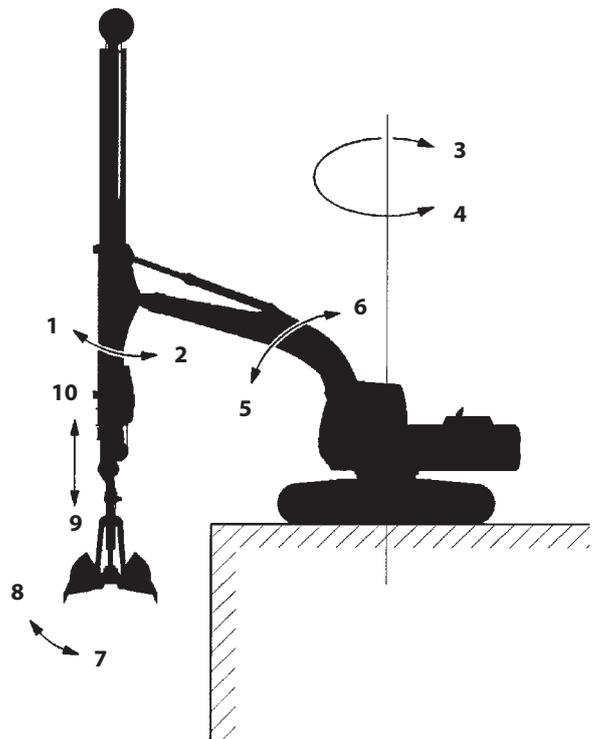
When digging over the end of the tracks, the travel motors should be at the rear to maximize machine stability and lift capacity.

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

- 1- Telescopic Arm Roll-Out
- 2- Telescopic Arm Roll-In
- 3- Swing Right
- 4- Swing Left
- 5- Boom Lower
- 6- Boom Raise
- 7- Bucket Close (Excavation)
- 8- Bucket Open (Dumping)
- 9- Telescopic Arm Extend
- 10- Telescopic Arm Retract



MDAA-05-001



M1V7-HT1-004

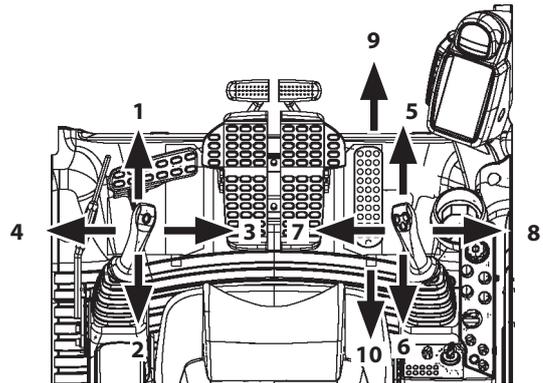
OPERATING THE MACHINE

Control Lever (HITACHI Pattern)

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

Prevent possible injury from unexpected machine movement.

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



MDAA-05-001

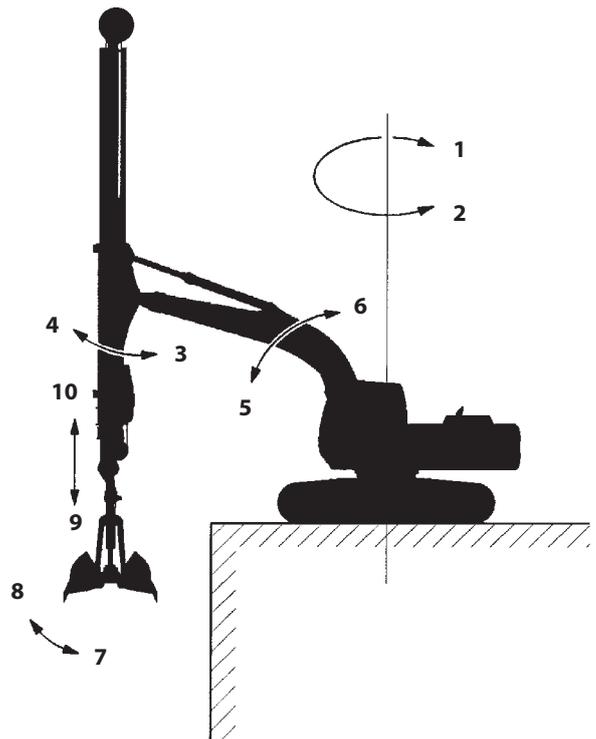
The machine is equipped with a label showing the control patterns of the levers and pedals.

IMPORTANT: When digging, avoid hitting the tracks with the boom cylinders.

When digging over the end of the tracks, the travel motors should be at the rear to maximize machine stability and lift capacity.

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

- 1- Swing Right
- 2- Swing Left
- 3- Telescopic Arm Roll-In
- 4- Telescopic Arm Roll-Out
- 5- Boom Lower
- 6- Boom Raise
- 7- Bucket Close (Excavation)
- 8- Bucket Open (Dumping)
- 9- Telescopic Arm Extend
- 10- Telescopic Arm Retract



M1V7-HT1-004

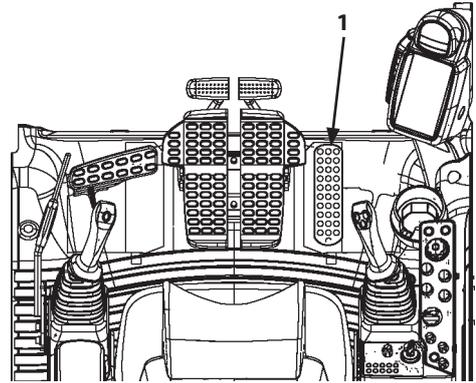
OPERATING THE MACHINE

Attachment Pedal

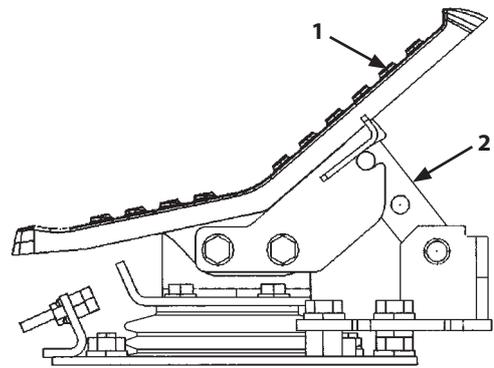
The telescopic arm can be operated using attachment pedal (1) located on the right front of the seat, as illustrated.

CAUTION: Be sure to lock attachment pedal (1) with pedal lock (2) when attachment pedal (1) is not in use. Do not allow your foot to rest on pedal (1) when attachment pedal (1) is not in use. When changing the position of pedal lock (2) pull the pilot control shut-off lever up to the LOCK position.

1. Move pedal lock (2) forward to the UNLOCK position.
2. Push down on attachment pedal (1) either forward or backward to extend or retract the telescopic arm.
3. Remove foot from attachment pedal (1) to stop the telescopic arm.
4. Always keep attachment pedal (1) locked with pedal lock (2) when attachment pedal (1) is not in use.

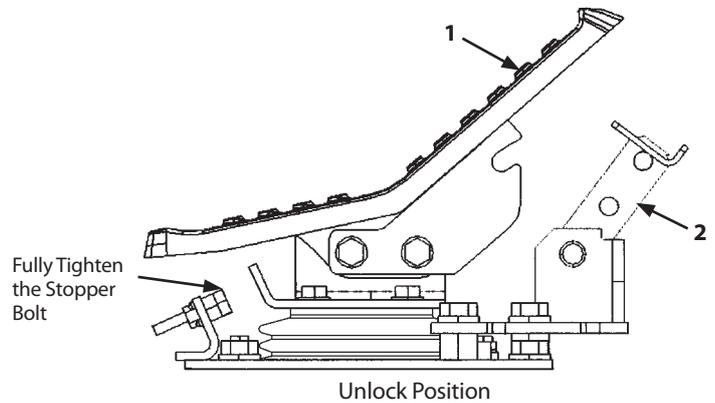


MDAA-05-001



Lock Position

M1J1-13-012



Unlock Position

M1J1-13-006

OPERATING THE MACHINE

Warming Up Operation

In cold weather, warm up the machine until coolant and hydraulic oil temperature increases to the appropriate operating temperature.

IMPORTANT:

1. The appropriate hydraulic oil operating temperature on this machine is 50 to 80 °C. Hydraulic components may be seriously damaged if the machine is operated with low temperature hydraulic oil. In case warming up the machine by relieving the hydraulic system, continuously relieve the relief valve for 10 to 15 seconds while taking a pause for 5 to 10 seconds.

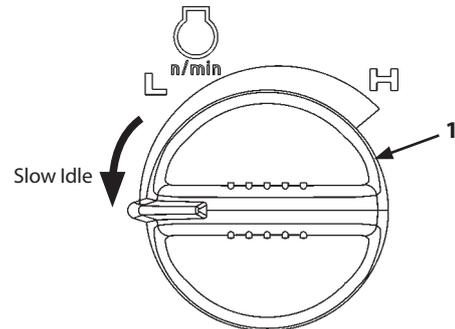
2. If the machine starts the digging operation without warm-up, oil pressure in the hydraulic cylinder of telescopic arm increases, which may lead to damage on the telescopic arm due to oil leak or seal breakage caused by deformation of the cylinder.

Even if the main body of the machine is sufficiently warmed up, the telescopic arm may still be cold. When warm pressure oil from the main body of the machine flows into the cold telescopic arm, pressure in the telescopic arm increases due to the difference in viscosity of the hydraulic oil, which may damage the telescopic arm.

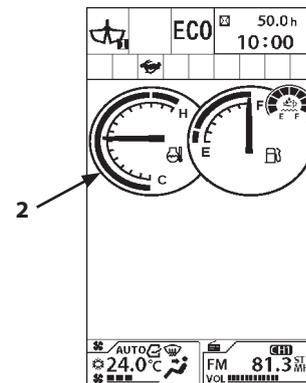
3. Always warm up the machine even when waiting for the dump truck.

1. Turn engine control dial (1) to the slow idle position.
(Do not operate the machine until the needle of coolant temperature gauge (2) starts swinging.)
2. After the needle of coolant temperature gauge (2) starts swinging, turn engine control dial (1) to approx. medium position.
3. Operate the boom, arm and bucket cylinders slowly to each stroke end several times.
4. Operate the travel and swing functions slowly to allow hydraulic oil to circulate through the systems.
5. The warming up operation ends after the above operation is completed.

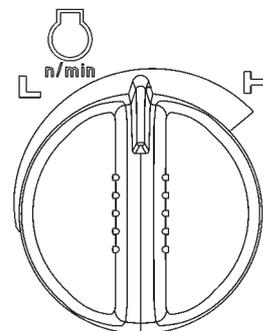
 **NOTE:** During cold weather season, the warm-up operation system automatically operates so that the engine speed increases for a moment even though the engine control dial is in the slow idle position.



M1P1-01-068



MDDQ-RTBH1-002

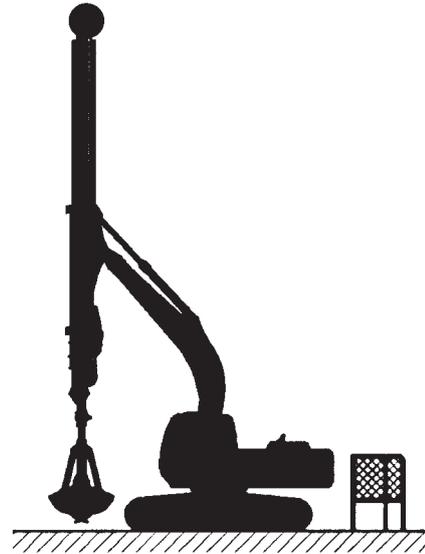


M1P1-05-003

OPERATING THE MACHINE

Precautions for Operations

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



SA-1750

Increasing Counterweight

- ⚠ WARNING:** As the telescopic arm is heavier than normal backhoe front attachment, this machine is equipped with a counterweight heavier than the standard type.
- If the additional counterweight is removed, or it is changed with a light counterweight, there is a risk of machine rollover.
- Do not apply a large shock on the machine with impractical operation. Failure to do so may damage the frame.

OPERATING THE MACHINE

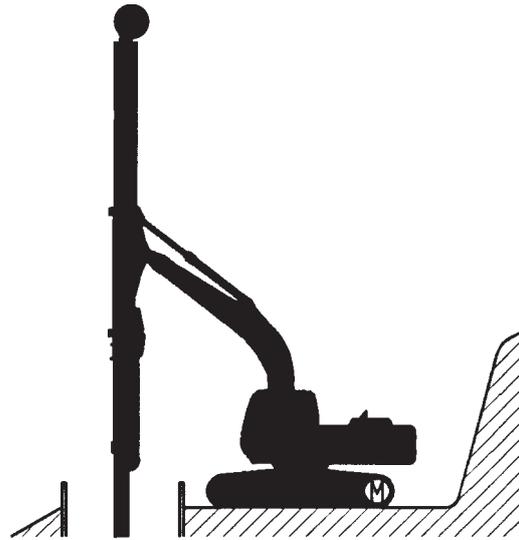
Operate the Machine Safely

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

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

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

- If working on the bottom of a cliff or a high bank is required, be sure to investigate the area first and confirm that no danger of the cliff or bank collapsing exists. If any possibility of cliff or bank collapsing exists, do not work on the area.
- Soft ground may collapse when operating the machine on it, possibly causing the machine to tip over. When working on a soft ground is required, be sure to reinforce the ground first using large pieces of steel plates strong and firm enough to easily support the machine.
- Note that there is always a possibility of machine tipping over when working on rough terrain or on slopes.
- Do not operate the machine on an uneven surface or a slope. Failure to do so may cause the machine to tip over, possibly resulting in serious injury or death.



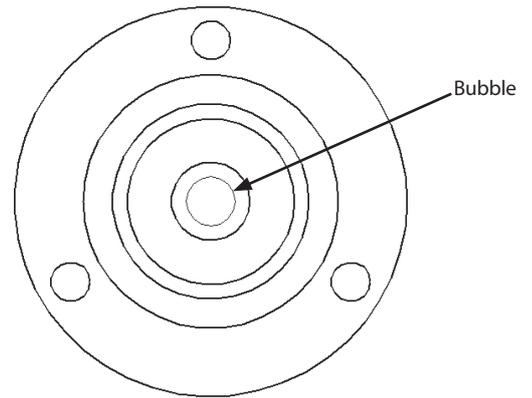
M1V7-HT1-005

OPERATING THE MACHINE

Setting Up the Machine for Operation

⚠ CAUTION: In case the bubbles in gauge are not in the gauge scale center, the machine is tilting unsafely so that the machine may tip over.

1. Face the crawlers toward the excavation site with the travel motors at the rear.
2. Set the front attachment in the level ground travel position.
3. Position the machine so that the bubbles in the level gauge come to the gauge center.



MDAE-HT1-005



SA-1754

OPERATING THE MACHINE

Boom Raise Control

The boom of this machine cannot be raised as high as that of the standard machine. When the boom is raised, the boom is automatically stopped before the highest position.

When boom cannot be raised (only machine with boom raise limit switch)

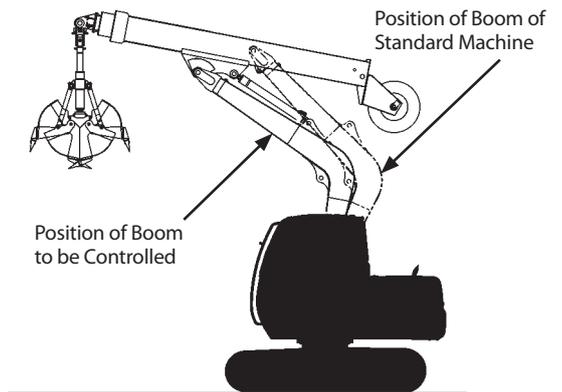
When the boom can be lowered and cannot be raised, set valve (1) to position B.

Valve (1) is installed to the inside of the right cover.

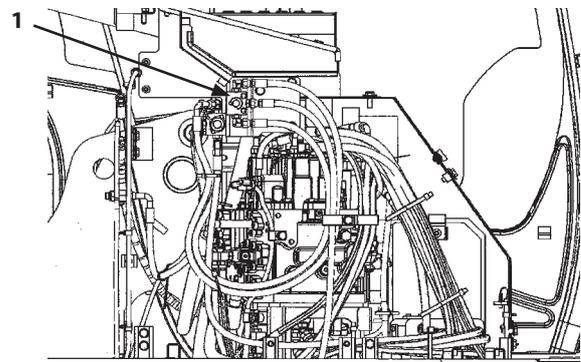
- Slowly raise the boom and place the bucket onto the ground.
- Resolve the problem on the operation.

After the problem is resolved, set valve (1) to position A.

IMPORTANT: When valve is set in position B, the boom raise control is released. When the boom is raised near the highest position at this time, the bucket may come in contact with the arm and they may be damaged.

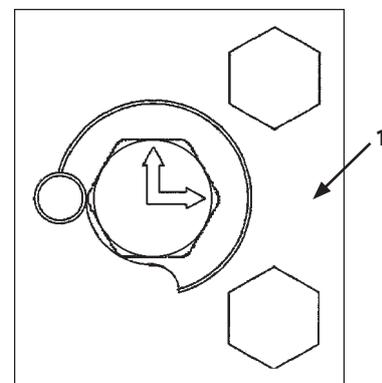


M1R4-HT1-006



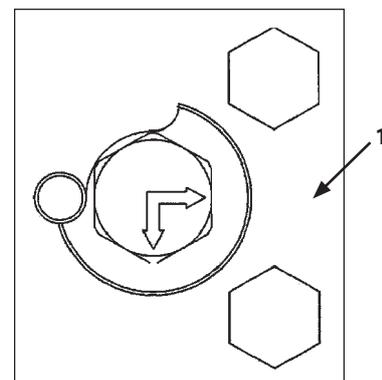
Right Cover

MDAS-HT1-014



Position A

MDAS-HT1-015



Position B

MDAS-HT1-016

OPERATING THE MACHINE

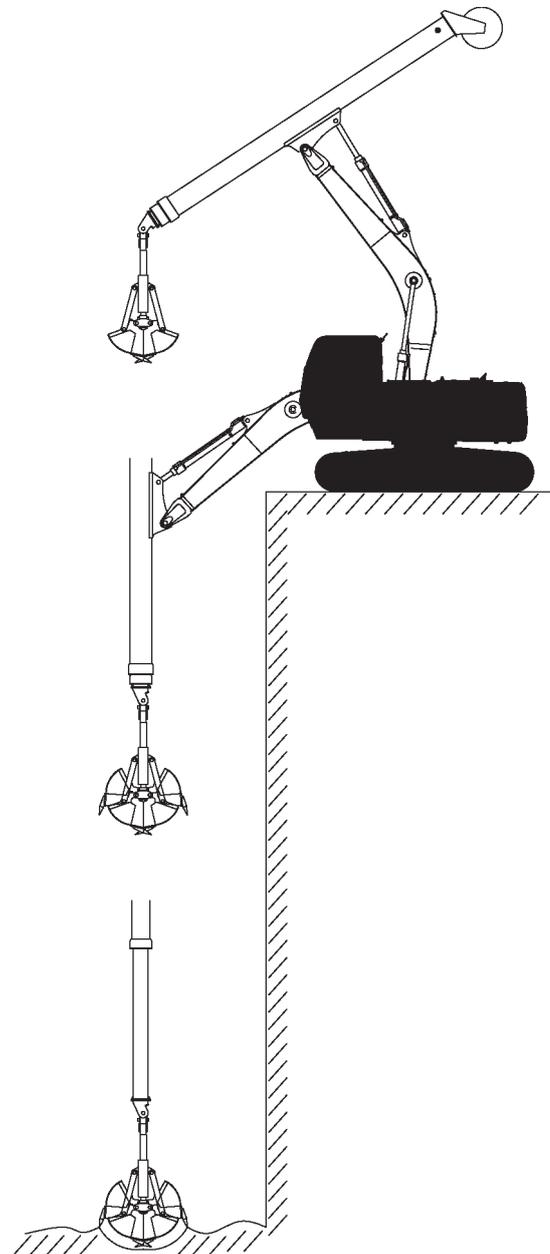
Excavation and Loading

⚠ WARNING:

- The machine stability varies depending on the directions of the machine, whether it is facing forward, backward, right side or left side. Slowly and carefully operate the machine.
 - Avoid abrupt operations. Abrupt operations will make the machine unstable, possibly resulting in tipping over of the machine.
 - If the surface below the ground level is to be excavated with the telescopic arm tilted, damage to the telescopic arm and/or tipping over of the machine may result. When excavating the surface below the ground level, always hold the telescopic arm perpendicularly.
 - Do not use a bucket heavier or with capacity larger than specified. Failure to do so may cause break of the hydraulic cylinder, fall off the bucket, and the machine rollover, which may result in accident causing death or serious injury. Always use the bucket with the specified capacity and weight. Also, using a bucket other than the specification may lead damage in the telescopic arm.
 - Beware that when the telescopic arm is rolled in with the boom raised, the bucket may come in contact with the cab.
 - While retracting/extending the telescopic arm, if other functions are operated simultaneously, the machine stability is reduced so that tipping over of the machine may result. Do not operate the telescopic arm together with other functions. Operate only the boom or the arm when aligning the bucket with the digging position.
 - A warning is generated when the boom cylinder is close to the fully retracted position. When the bucket is fully loaded, the boom may not be raised. Raise the boom to the area where no warning is generated, and then operate the machine.
1. While fully retracting the telescopic arm, operate the boom and arm cylinders so that the telescopic arm is positioned perpendicularly to align the bucket with the digging position.
 2. Extend the telescopic arm and land the bucket to excavate the ground.
 3. Fully retract the telescopic arm.
 4. While operating the boom and arm cylinders, and the swing function, move the bucket to the position where soil is discharged. Operate the bucket to discharge soil.
 5. In case the soil is difficult to discharge from the bucket, rotate the bucket two to three turns.

IMPORTANT:

- Pay attention not to allow the boom bottom surface to come in contact with the ground when digging deep below the ground surface.
- Do not attempt to dig firm ground vertically. Only dig and load a mound which is excavated by other excavators.



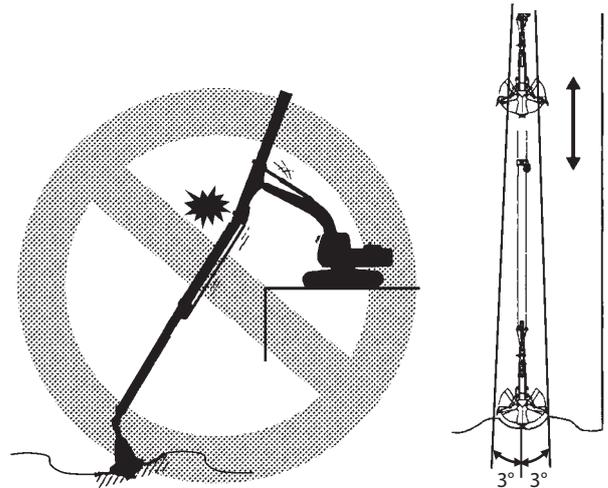
M1CD-HT1-011

OPERATING THE MACHINE

Avoid Inclined Operation

The telescopic arm does not have sufficient strength to perform inclined digging work. Never attempt to perform digging operation by pushing the bucket with boom cylinder or arm cylinder with inclining the arm. Failure to do so may cause damage to the arm.

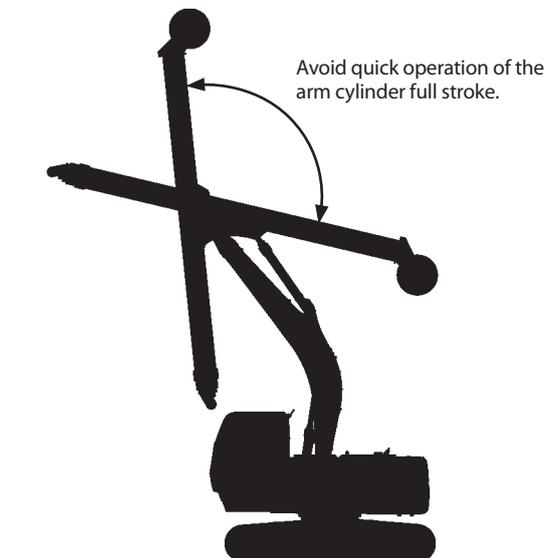
- Always set the telescopic arm vertically before starting digging operation. Allowable angle of the telescopic arm is fore-aft 3° or less.
- If it is difficult to set the vertical position from the operator's seat, use a signal person.
- Secure a work space where the telescopic arm can be set in vertical position.



MDDQ-RTBH1-005 MDDD-RTOP1-004

Avoid Quick Operation of the Arm Cylinder

⚠ WARNING: Never operate the arm cylinder full stroke at fast speed. Damage to the telescopic arm may result. Even though a bucket is not installed, avoid quick operation of the arm cylinder.



M1CD-HT1-012

Do Not Swing the Bucket

Avoid quickly starting or stopping the machine. Slowly operate the machine to prevent bucket from swinging. When the bucket swings widely, the bucket or arm may be damaged. Do not swing the bucket more than approximately 30 degrees.

Operating the Machine After Storage

When operating the new machine or after long storage, the telescopic arm may vibrate at the beginning of the operation. This is caused by air in the piping, not the malfunction of the machine. Slowly extend and retract the cylinder several times to release air. Even if air is not sufficiently released by the above operation, it will be released spontaneously during operation.

OPERATING THE MACHINE

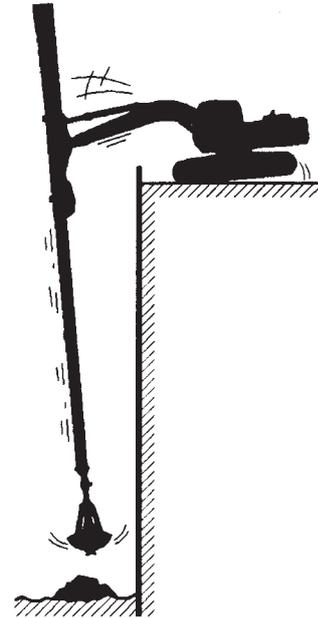
Soil Backfilling

⚠ WARNING:

- **Avoid quickly lowering the boom. The machine will be oscillated, possibly resulting in tipping over of the machine.**
- **Avoid abruptly stopping the boom. The machine will be oscillated, possibly resulting in tipping over of the machine.**
- **When stepping on the pedal slowly operated pedal. If the pedal is abruptly operated, the telescopic arm may shake. Be careful as the sand may fall.**

During backfilling work, the telescopic arm will be generally operated at faster speed than when loading and/or excavation. Use extra care to reduce the potentiality of tipping over because the machine will become much wobbly. Operate the bucket so that soil in the bucket does not exceed 70 % of the bucket capacity.

- Engage in backfill work with the engine speed set as slow as possible by operating the engine control dial.

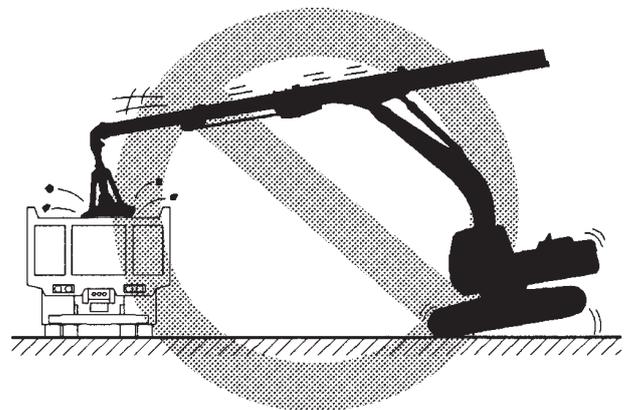


SA-1758

Never Operate Machine Beyond Specified Working Range

- #### **⚠ WARNING:** Loading or unloading operation with the telescopic arm extended may cause the machine to tip over. Be sure to operate the machine with the telescopic arm fully retracted when the bucket is above the ground. Also, using telescopic arm extended may lead to damage in the telescopic arm.

Be sure to position the telescopic arm perpendicularly whenever operating the telescopic arm except for a special case such as the inspection of the machine.



SA-2662

Avoid Digging Firm Ground

Digging a firm ground leads to damage in the front attachment.

1. When the ground is too firm to dig with the clamshell bucket, dig and load a mound which is excavated by other excavators.
2. Do not dig a firm ground with the clamshell bucket as the bucket becomes prone to turnover, leading to damage in the front attachment.

OPERATING THE MACHINE

Operating Tips

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

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

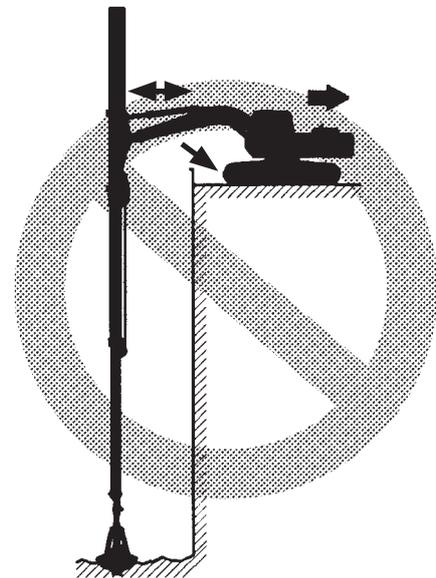


MDDQ-RTBH1-006

Avoid Heavy Load Operation

Do not perform heavy load operation. Failure to do so may damage the telescopic arm or bucket.

- Traveling the machine with the bucket kept buried in the ground, or excavation with the base machine raised off the ground may apply severe loads to every part of the machine. In addition this operation will create hazardous conditions. Avoid these kinds of operations.
- Never attempt to dig while pushing the bucket by using the boom or arm cylinder.

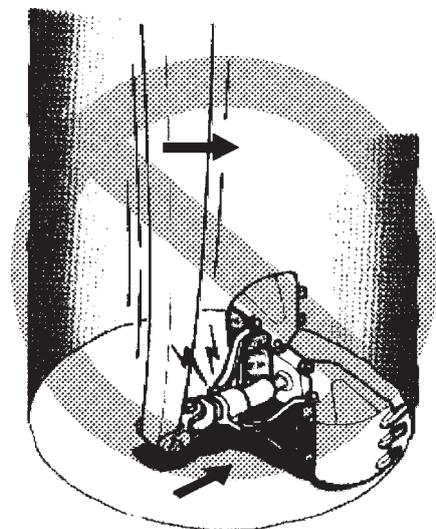


MDDQ-RTBH1-007

Avoid Applying Loads Laterally to the Front Attachment

Never attempt to excavate the ground from lateral direction. Damage to the telescopic arm and the bucket may result.

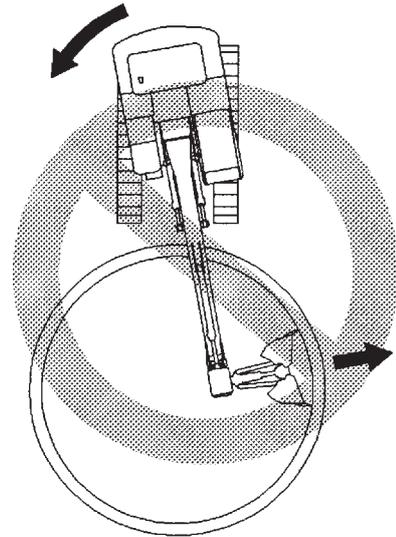
1. Always dig a ground with the bucket being erected.
2. Never press the bucket to the ground using arm cylinder force. Damage to every part of the front attachment may result.
3. When the bucket turned over, set the bucket in a vertical position before starting the digging operation.



MDDQ-RTBH1-008

OPERATING THE MACHINE

- Never press the bucket to the ground using the base machine swing power. Damage to every part of the front attachment as well as shortening service life of the swing system may result.



MDDQ-RTBH1-009

Do Not Raise Base Machine Off the Ground

Never raise the base machine off the ground using the boom cylinder power. Damage to every part of the front attachment may result.



MDDQ-RTBH1-010

Do Not Pull the Bucket Out of the Ground Forcibly

Even though it is difficult to raise the bucket by retracting the telescopic arm after excavation, never attempt to pull the bucket out of the ground forcibly by operating the boom cylinder. Tipping over of the machine may result.

In case a vacuum state is created between the bucket bottom face and the soil surface, after slightly opening the bucket, retract the telescopic arm. After releasing the vacuum, fully close the bucket.

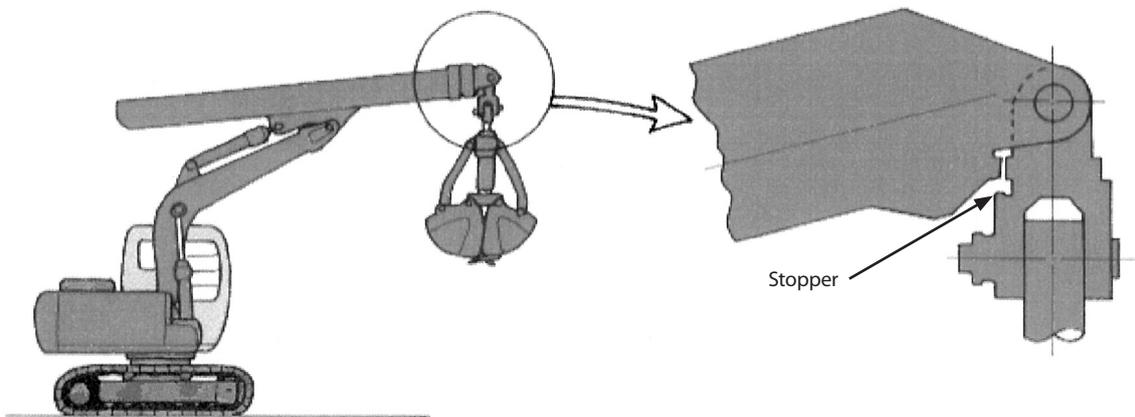


MDDQ-RTBH1-011

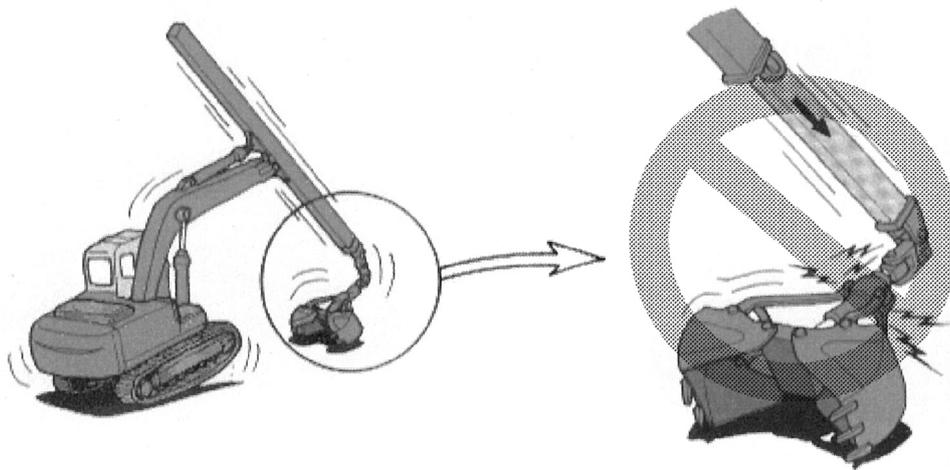
OPERATING THE MACHINE

Do Not Use Arm Stopper to Push Loads

A stopper is provided at the arm tip to prevent the bucket from swinging excessively. Do not push loads using this stopper. Damage to the vicinity of the stopper and/or to the bucket cylinder may result.



M1V7-OP1-017

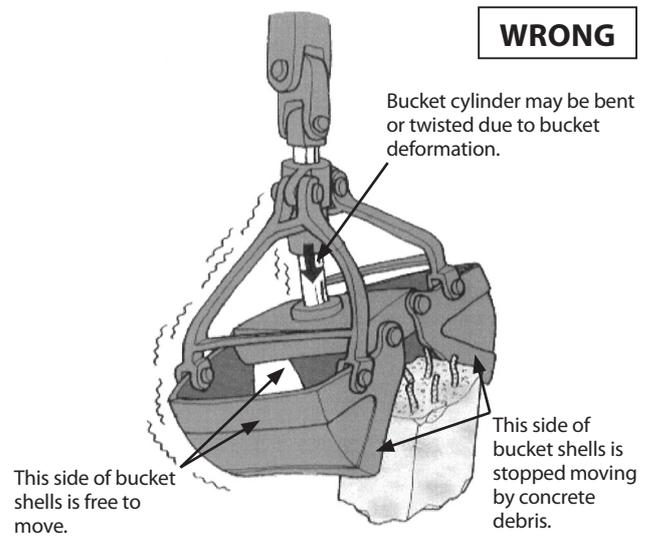


MDDQ-RTBH1-012

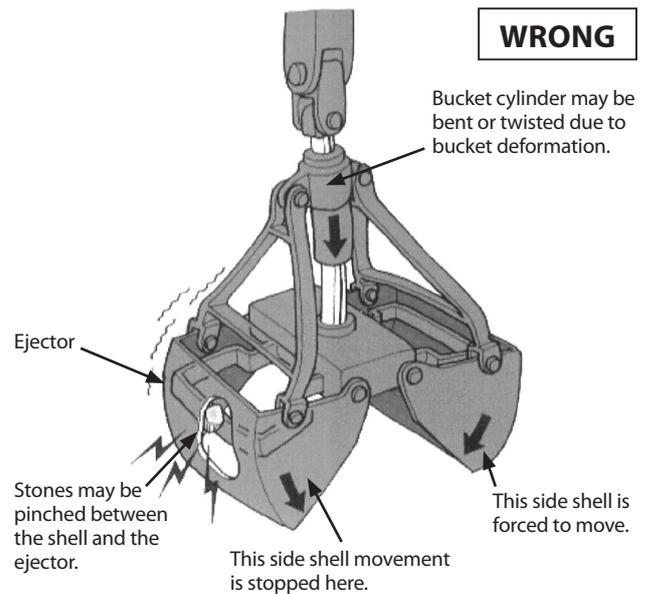
OPERATING THE MACHINE

Avoid Excavating/Loading Solid Material

1. Do not excavate and/or load large size concrete debris and/or macadam. If the bucket shells are not fully closed, a twisting load is applied to the bucket so that the bucket may be deformed.
2. When excavating ground mixing stones, remove the ejector. If pieces of stones are pinched into the ejector, a twisting load is applied to the bucket so that the bucket may be deformed or the frame may be damaged.
3. Never attempt to operate crushed concrete or rocks which is too firm to dig with the bucket. Otherwise large force may be applied, possibly resulting in damage to the telescopic arm.



M1V7-OP1-019

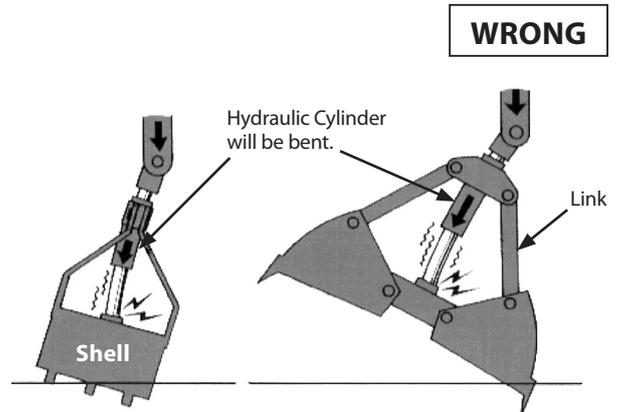


M1V7-OP1-020

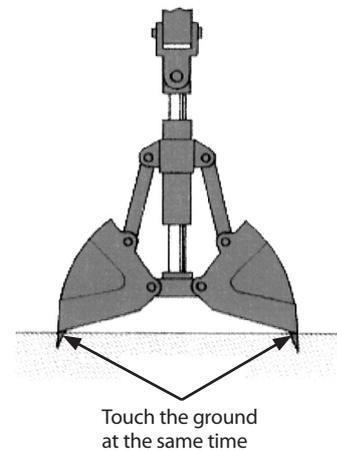
OPERATING THE MACHINE

Precautions for Excavation

1. Do not excavate the ground with the bucket tilted. The bucket may receive uneven loads from both sides. Therefore, the bucket may be deformed or the cylinder may be damaged. Operate the machine so that the both side bucket teeth can touch the ground at the same time.
2. Avoid pushing the bucket toward loads forcibly. Damage to the bucket may result. Do not insert the teeth into ground deeper than the bucket tooth length.
3. Do not pull loads sideways using machine travel and/or swing force. Damage to the bucket may result.



M1V7-OP1-021



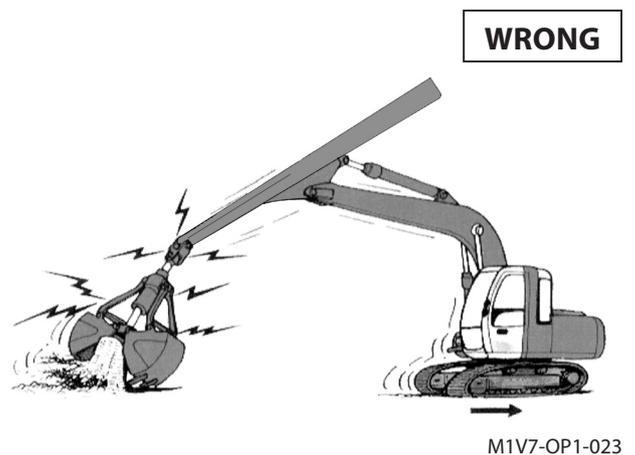
M1V7-OP1-022

Never Turn the Bucket by Hitting It

- Never try to force the bucket to turn by hitting it on something. In particular, the bucket cannot turn when it is at its open end as the pressure inside the cylinder is high. Trying to force the bucket to turn will damage parts of the bucket.
- To turn the bucket, first relieve the pressure in the cylinder with the bucket open and then turn it. The bucket can be turned once the pressure is relieved; do so when at the bucket open end or close end, by actuating the cylinder in the opposite direction.

When at open end: Relieve the pressure by closing it slightly

When at closed end: Relieve the pressure by opening it slightly

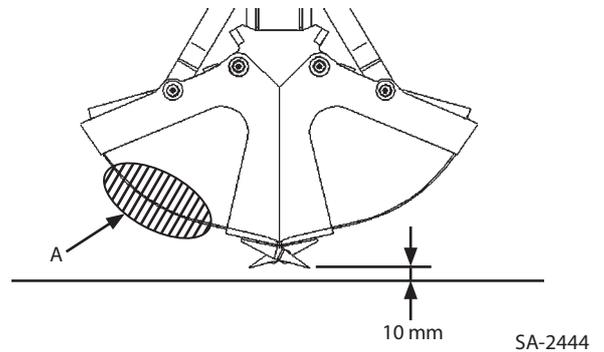


M1V7-OP1-023

OPERATING THE MACHINE

Carefully Rotate Bucket

- When manually rotating the bucket, use extra care.
 1. Set the bucket 10 mm off the ground.
 2. Slightly open the bucket to prevent the cylinder from being stroke end position.
 3. Stop the engine.
 4. Be sure to push in the vicinity of shell (A) to prevent the bucket pinching any limbs.
 5. Keep your body away from the bucket as far as possible.



IMPORTANT: When rotating the bucket with the cylinder stroke end (fully close or open the bucket) may damage the bucket and front attachment.

Do not rotate the bucket with the cylinder stroke end (fully close or open the bucket).

OPERATING THE MACHINE

Never Use Bucket Beyond Specifications

- If a bucket heavier and /or larger than specified is used, hydraulic cylinder may be broken, possibly causing the bucket to fall or the machine to tip over so that serious personal accidents or death may result.
Use Hitachi bucket or always carry out digging operation under allowable total weight of the bucket and loaded soil.
- The maximum allowable density of material (soil) to be loaded with this machine is 1800 kg/m³. In case soil with this density larger than the allowable value is loaded, reduce the soil volume in the bucket.
- Use the bucket with less than the allowable total weight.

Machine \ Bucket	Capacity	Weight
ZX135US-6	0.25 m ³ or less	630 kg or less
	0.28 m ³ or less	575 kg or less

Select Correct Track Shoes

IMPORTANT: Using wide track shoes on rough ground may result in shoe bending and/or loosening, and may damage other undercarriage components.

Never use wide track shoes on rough ground such as rocks, sand or gravel. Wide track shoes are designed for soft ground.

Track shoe bolts should be checked periodically for tightness.



M1V7-HT1-012

OPERATING THE MACHINE

Shackle Hole Usage

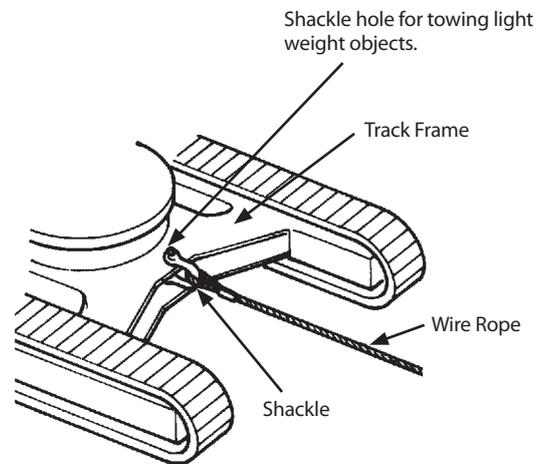
A shackle hole is provided on the track frame to tow light weight objects as specified below.

IMPORTANT: Be sure to conform to the restrictions and precautions stated below when towing a light weight object using the shackle hole provided on the track frame. The track frame and/or the shackle hole may be damaged otherwise.

- The maximum drawbar pull.

Model	Maximum Drawbar Pull
ZX135US-6	44100 N (4500 kgf) or less

- Be sure to remove the bucket before towing the machine.
- Be sure to use a shackle.
- Keep the tow line horizontal, straight, and parallel to the tracks.
- Select the slow travel mode. Slowly drive the machine when towing.



M104-05-011

OPERATING THE MACHINE

Precautions for After Operations

- 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.
(Refer to the section "PARKING THE MACHINE" in the DRIVING THE MACHINE chapter.)
- Fully refill the fuel in the fuel tank.
Fully refill the DEF/AdBlue® in the DEF/AdBlue® tank.
- Clean the machine.

ASSEMBLING/DISASSEMBLING

Precautions for Assembling and Disassembling

- Worker's Clothing
 - (1) Wear clothing appropriate for the job.
 - (2) Wear safety equipment such as a hard hat, and safety shoes.
- Conferring Work Process
Thoroughly confer with all related personnel on the entire work process, the role assigned to each, and precautions to ensure safety.
- Coordinating Signal System, and Appointing Signal Person
Before starting, be sure to coordinate the signal system to be used.
Appoint one qualified signal person (if a multiple number of signal persons are used, different signals may confuse the workers, possibly causing an accident). All workers should obey the signals only from one signal person.
- Secure a flat space more than 20 m (22 yd) square enough to assemble the machine.
- Check that the footing is strong enough to support the machine weight. If required, repair the footing sufficiently so that the machine can be kept in a horizontal position.
- Assembly work may potentially cause personal injury. Before starting, be sure to prepare completely, including arranging all necessary tools. Never fail to prepare the following equipment and tools.

Essential Equipment and Tools

- Auxiliary crane with sufficient lifting capacity
- Wire ropes to sling the machine
- Shackles
- Slings protectors (Soft Pads)
- Lumber: 200 mm square
- 10 pound hammer
- Standard tools
- Grease

Precautions for Tightening Bolts

- Tighten bolts to the specified torques using a torque wrench.
- After tightening the bolts to the respective specified torques, mark each bolt head to prevent bolts from not being tightened.
- Use only genuine Hitachi bolts. If too long or too short bolts are used instead of genuine Hitachi bolts, they will not be correctly tightened, possibly causing a serious accident. Refer to the "CHECK AND MAINTENANCE" section for bolt tightening torque values.

ASSEMBLING/DISASSEMBLING

Precautions for Installation/Removal Front Attachment

⚠ WARNING: Remove counterweight if swinging without the boom as toppling of the machine may result when swinging with counterweight attached.

1. Installation/removal of the front attachment on solid level and open ground.
2. Align the center of the front attachment with the crawler center. Position the travel motors in the rear.
3. Remove the front attachment only after removing the bucket.
4. The counterweight must be removed if swinging without the boom.

Be sure to remove the counterweight before rotating the upper structure as tipping is possible.

5. The order of installation is as follows: (1) Boom (only removed boom), (2) Counterweight, (3) Telescopic Arm, (4) Bucket.
6. Never allow any person to enter the area below the machine during the work.

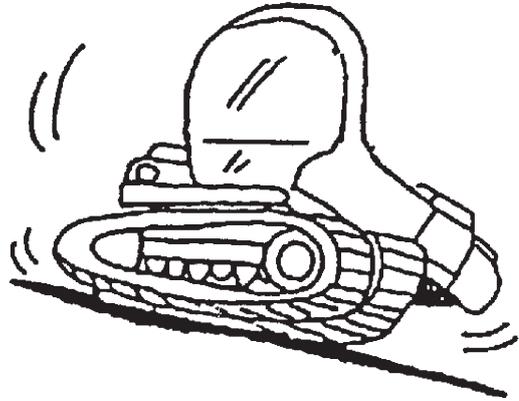
Always use blocks to securely support the machine in the case where work must be carried out under the machine.

7. Care should be taken not to let any part of your body become caught in the machine during operation.
8. There may be residual pressure remaining in the pipe lines. Before removing any plug from the pipe line, slowly loosen the plug to check that the residual pressure is completely relieved. Clean the removed plug and store it in the tool box.

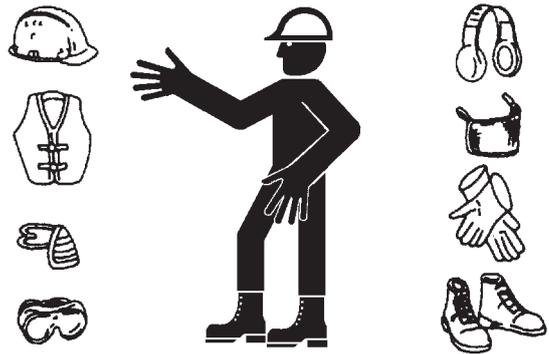
When the machine is hot immediately after use, hot oil may spurt out, possibly causing severe burns. Wait for the oil temperature to cool sufficiently before starting the procedure above.

9. Never insert your fingers into pin holes when aligning the pin holes.
10. Prevent personal injury. Confirm that no one is under the boom cylinder rod before inserting the pin.
11. When a hammer is used, metal pieces may fly off possibly causing injury. Wear safety glasses, a hard hat and any other necessary safety gear.
12. When the telescopic arm is stopped with the cylinder extended, the telescopic arm will slowly retract due to residual pressure in the piping.

Wait for the telescopic arm to completely stop before starting any work.



M16J-06-017



SA-438

ASSEMBLING/DISASSEMBLING

Precautions for Position of Telescopic Arm without Bucket

⚠ WARNING: As telescopic arm is long and heavy, there is a range where the arm cylinder can not support the telescopic arm when the bucket is not mounted. When the telescopic arm is rolled-in from the vertical position, the arm cylinder may not support the telescopic arm, which is dangerous.

1. Always position the telescopic arm vertically to the ground.
2. To place the arm horizontally for maintenance, fully roll-in the boom while positioning the telescopic arm vertically. Then, fully roll-in the telescopic arm, and lower the boom.
3. Be sure that all bystanders are clear from the vicinity of the machine before moving the machine.

ASSEMBLING/DISASSEMBLING

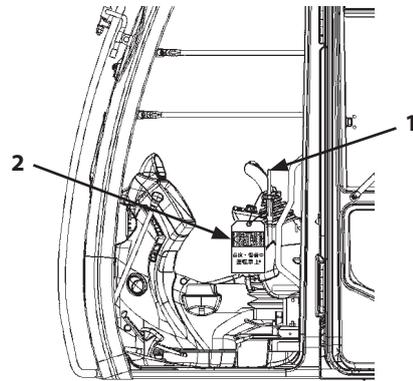
Preparation for Work

Except in special cases, park the machine by following the procedure before servicing the machine.

1. Refer to the removal procedure. Select and prepare a crane with sufficient lifting capacity.
2. Park the machine on a firm, level surface.
3. Lower the bucket to the ground.
4. Turn the auto-idle switch OFF.
5. Move the engine control dial to the idle position.

Perform cooling down operation of the machine for 5 minutes.

6. Turn the key switch OFF to stop the engine. Remove the key. In case the machine must be serviced with the engine kept running, use a signal person.
7. Be sure to place pilot control shut-off lever (1) to the LOCK position.
8. After putting tag (2) for "Under Serving" on the easy-to-see cab door or control lever, begin the work.



LOCK Position

MDCN-07-001



SS2045102-4

IMPORTANT:

- **Be sure to coat the pins with grease before installing them.**
- **Correctly close/open the stop valve and connect the piping. If the front attachment is operated with the stop valve kept closed or with the coupler loosened, damage to either the cylinders or the pipe lines may result.**
- **When installing the front attachment, if the front attachment is operated without installing the attached shims, damage to the pin holes may result.**
- **Be sure to clean the joints before connecting the pipes. Check if the O-ring to be installed in the joint is free from any damage and is seated correctly.**
- **Tighten the hose connector with the specified torque. Refer to the Operator's Manual for ZX135US-6 Series Excavator for tightening torque values.**
- **Securely put plugs into the separated hose and pipe ends so that dust does not enter the hydraulic system.**

ASSEMBLING/DISASSEMBLING

Precautions for Slings Work

- Coordinating Signal System, and Appointing Signal Person

Before starting, be sure to coordinate the signal system to be used. Appoint one qualified signal person only (if a multiple number of signal persons are used, different signals may confuse the workers, possibly causing an accident). All workers should obey signals only from one signal person.

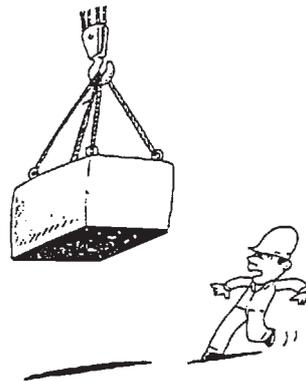


M324-07-171

- When attaching a wire rope to the lifting parts/components, always use slinging protectors between the wire rope and the lifting parts/components to prevent damage.

- Precautions for Lifting

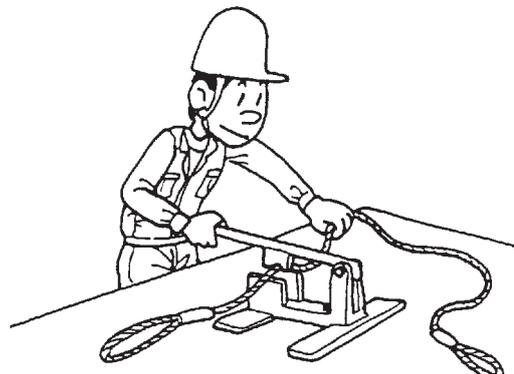
- Always use a hook with a latch.
- Use only slinging wire ropes and chains that are strong enough.
- Never allow the lifted load to pass over any persons.
- Never allow anyone under the lifted load.



M324-07-173

- Rectifying Twisted Wire Rope

Rectify the twist or bend of the wire ropes after the work. Store the wire ropes in a specified place.



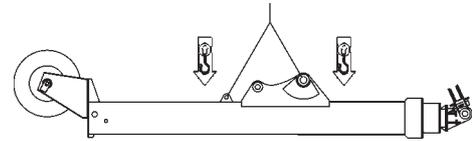
M324-07-174

ASSEMBLING/DISASSEMBLING

Lifting Procedure of Telescopic Arm

Lift the telescopic arm by following the procedures below.

1. Attach a wire rope to the telescopic arm. Use soft materials between the wire rope and the arm to protect the pipes from being damaged.
2. While lifting the arm slightly, check that the arm is balanced.
3. Slowly and carefully lift the telescopic arm.

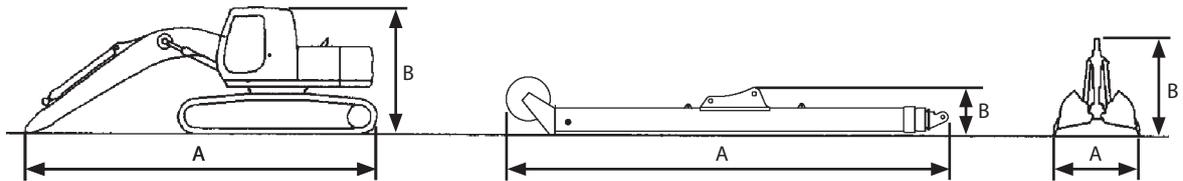


M1CD-HT1-013

Machine Dimensions and Weight Without Telescopic Arm and Bucket

Conditions	A mm	B mm	Width mm	Weight kg
Base Machine	6580	2790	2490	13700
Telescopic Arm	7740	1220	600	2190
Clamshell Bucket 0.25m ³	1500	1800	710	570
Clamshell Bucket 0.28m ³		1860	750	575

NOTE: The base machine is equipped with 500 mm grouser shoe and the boom.



M1V7-HT1-014

Installation of Telescopic Arm

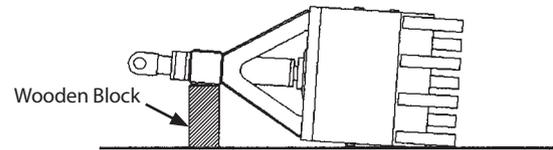
Contact your nearest Hitachi dealer.

ASSEMBLING/DISASSEMBLING

Installation of Bucket

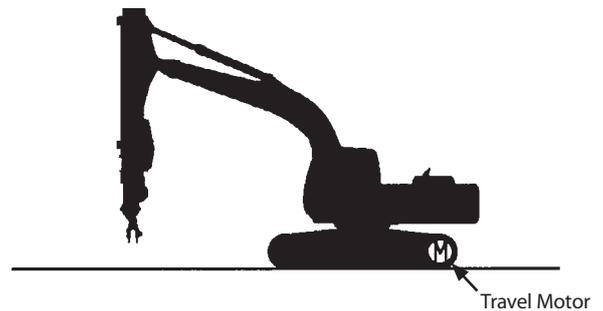
WARNING: Do not put fingers and/or hands into pin holes when aligning pin hole center.

1. Select level ground. Lay the bucket on wooden blocks.



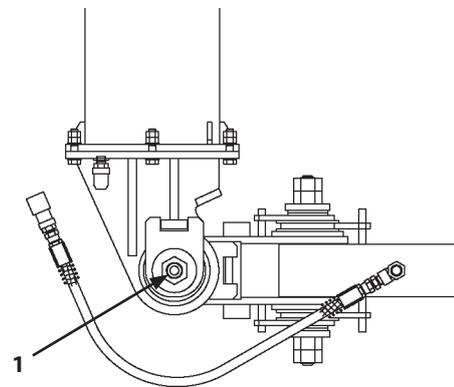
M1GD-06-004

2. Align the front attachment with the longitudinal direction of the crawlers with the travel motors at the rear.



M1GD-06-005

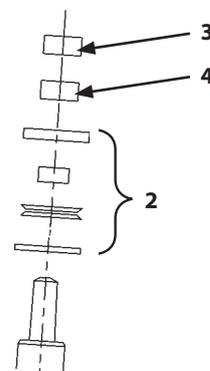
3. While holding the telescopic arm in nearly perpendicular position, operate the boom and the arm to align the bucket hanger bracket pin holes with the bucket pin holes.
4. Coat the pin holes with grease. Do not insert your fingers into the pin holes when coating with grease. Install pin (1).



M1V7-HT1-015

5. Install bucket play reduction parts (2). After tightening nut (3), tighten nut (4) (lock nut). As nut (3) is tightened, the bucket becomes tighter to move. Adjust bolt tightness as the operator's preferred values.

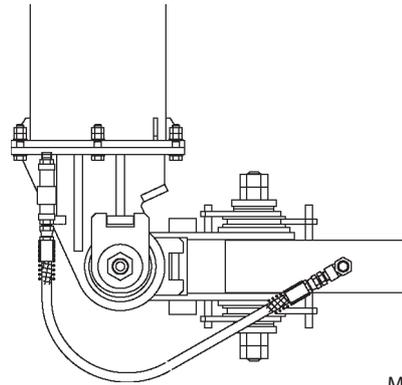
Wrench size: 55 mm



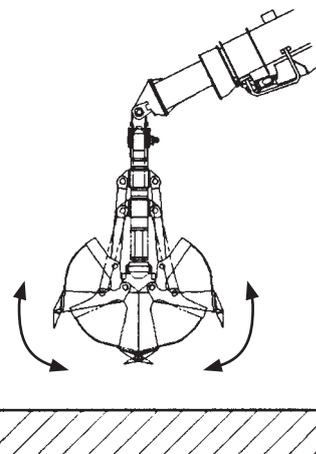
M1V7-HT1-016

ASSEMBLING/DISASSEMBLING

6. Connect two hoses.
7. Purge air from the bucket pipeline. Raise the bucket up to a position so that the bucket open/close operation can be done. Turn the engine control dial to the slow idle position. Slowly and repeatedly open and close the bucket 4 to 5 times.



M1V7-HT1-017

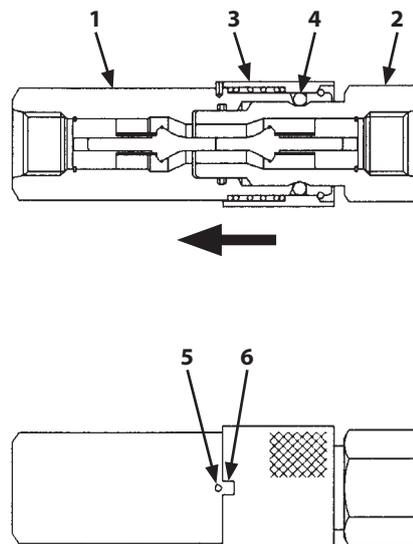


M1CD-HT1-014

Precautions For Handling Coupler (Self-Seal Joint)

1. Coupler

Generally, the coupler is composed of body (1), nose (2), collar (3), and the valve. The coupler is connected together by pulling the collar (3) to the axial direction to free steel ball (4) so that body (1) and nose (2) can be inserted. After inserting it, lock it by putting collar (3) back to the original position which will drop steel ball (4) to the groove of nose (2). At this time, collar (3) would be locked by turning groove (6) of collar (3) to shift it away from pin (5). After connecting it, turn collar (3) 180° to lock it. To disconnect, align groove (6) of collar (3) to the position of pin (5) and pull collar (3) to the axial direction. This procedure would free steel ball (4) and detach body (1) and nose (2).



M1V7-HT1-018

2. Caution of Coupler connection/disconnection

Before connecting/disconnecting the coupler, you must remove the pressure inside the hydraulic line. When there is a residual pressure, to disconnect the coupler would cause the coupler to be pushed out by the oil pressure. Please remove the residual pressure to avoid danger.

TRANSPORTING

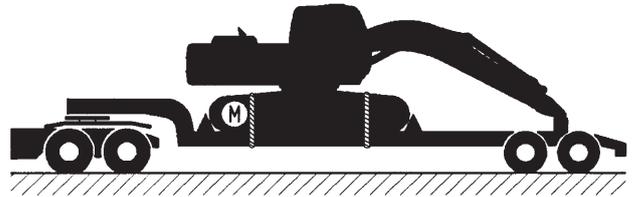
Transporting by Road

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

- When transporting using a trailer, check the width, height, length and weight of the trailer with the machine loaded.
Note that transporting the weight and dimensions may vary depending on the type of shoe or front attachments installed.
- Investigate beforehand the conditions of the route to be traveled, such as dimensional limits, weight limits, and traffic regulations.

In some cases it may be necessary to obtain permission from the local authority concerned, or to disassemble the machine to bring it within local regulation for dimensional or weight limits.

Notify your authorized dealer that you are transporting the machine.



MDAE-HT1-011

Loading/Unloading on a Trailer

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

CAUTION:

- **Be sure to use a loading dock or a ramp for loading/unloading.**
- **Remove the telescopic arm and counterweight before loading the machine on a trailer. Otherwise, the machine may overturn on the trailer.**

Ramp/Loading Dock:

1. Before loading, thoroughly clean the ramp and flatbed. Dirty ramps or flatbeds with oil, mud, or ice on them are slippery and dangerous.
2. Place blocks against the truck and trailer wheels 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.
5. When loading the machine equipped with pat crawler or rubber pad shoes, take sufficient care not to allow the machine to slip since the surface of the rubber pad shoe is flat. Load the machine only after removing soil or clay adhered to the machine.

TRANSPORTING

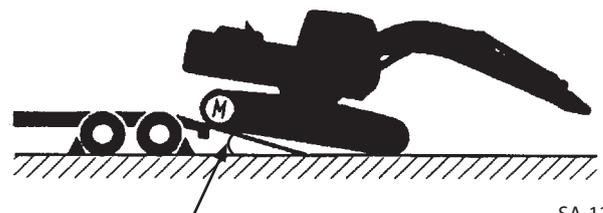
Loading/Unloading

WARNING

- Always turn the auto-idle switch OFF and the power mode switch in “ECO” mode when loading or unloading the machine, to avoid unexpected speed increase due to unintentional operation of a control lever.
- Always select the slow speed mode with the travel mode switch. In the fast speed mode, the travel speed may automatically increase.
- NEVER steer while driving up or down a ramp as it is extremely dangerous. If repositioning is necessary, first move back to the ground or flatbed, change traveling direction, and begin to drive again.
- The top end of the ramp where it meets the flatbed is a sudden bump. Take care when traveling over it.
- Never swing the upperstructure on a trailer deck. Failure to do so may cause the machine to tip over backwards.
- When required to load or unload the machine without installing the boom on a trailer, remove the counterweight.
- Prevent possible injury from machine tipping while the upperstructure is rotating. Keep the arm tucked under and rotate the upperstructure slowly for best stability.

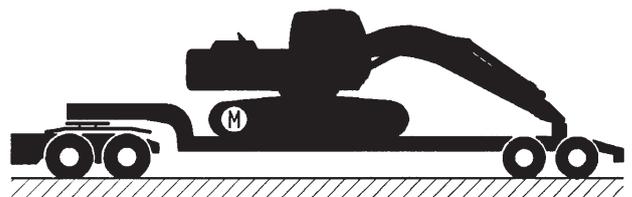
Loading

- Whenever the machine is transported, remove the telescopic arm from the boom.
- Load the machine onto a trailer by driving the machine backward
 1. Load the machine onto a trailer by driving the machine backward while aligning the machine center with the trailer bed center.
 2. Slowly drive the machine up the trailer bed ramp with the travel devices toward the front of the trailer and the boom tip height less than 1 m above the ground.
 3. Where the top end of the ramp meets the flatbed there is a sudden bump, causing the machine center of gravity to change abruptly so that the machine may become unbalanced. Slowly pass over the top end of the ramp.
 4. Slowly travel forward until the tracks are firmly on the trailer.
 5. Lower the boom onto blocks.



SA-1201

Less than 15°



M1GD-06-009

TRANSPORTING

6. Stop the engine. Remove the key from the switch.
7. Pull the pilot control shut-off lever to the LOCK position.
8. Close cab windows, roof vent and door, and cover the exhaust opening, to prevent entry of wind and water. Place a cover over the exhaust outlet. Lock all doors, covers and caps if they have a lock.
9. Store all mirrors and the radio antenna correctly.

CAUTION: In cold weather, be sure to warm up the machine before loading or unloading it.

Transporting

WARNING: Fasten chains or cables to the machine frame. Do not place chains or cables over or against the hydraulic lines or hoses.

Fasten chains or cables to the machine frame using lugs provided on the bottom of track frame. Take care not to allow the track shoes to come in contact with chains or cables.

Always transport the machine with the cab fully retracted (backward).

1. Place blocks in front of and behind the tracks.
2. Fasten each corner of the machine and front attachment to the trailer with a chain or cable.

Unloading

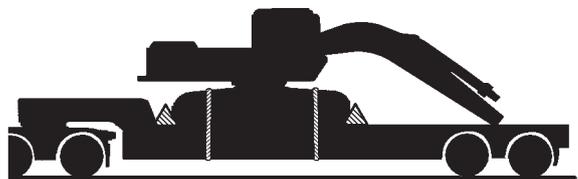
WARNING: The rear end of the flatbed where it meets the ramp is a sudden bump. Take care when traveling over it.

When unloading the machine, drive the machine with the front side facing forward.

1. Before driving the machine from the trailer end to the ramp, raise the boom tip approx. 2 m. Then, slowly move the machine onto the ramp at a constant speed.

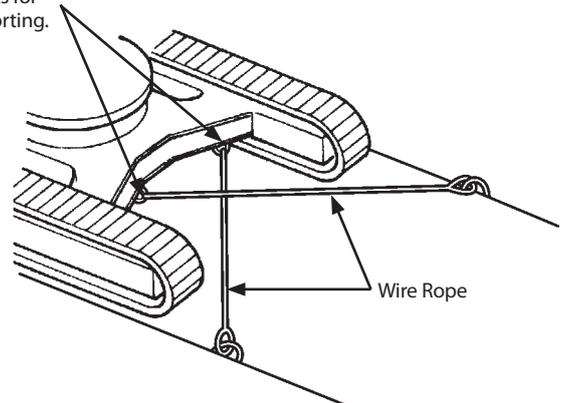
WARNING: Where the top end of the ramp meets the flatbed there is a sudden bump, causing the machine center of gravity to change abruptly so that the machine may become unbalanced. Slowly pass over the top end of the ramp.

2. When driving down the ramp, slowly drive the machine with the front side facing forward at slow speed until the machine completely leaves the ramp.

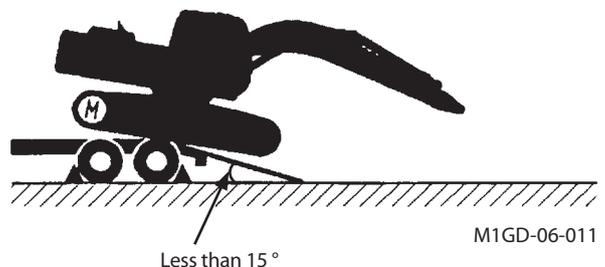


MDDE-RTOP1-028

Tie down brackets for transporting.



M1U1-06-001



M1GD-06-011

TRANSPORTING

Machine Lifting Procedure

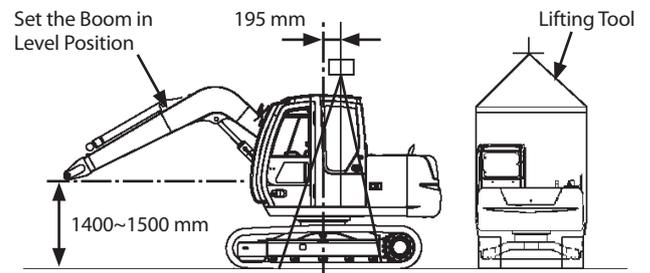
CAUTION:

- **Lifting wire ropes and other lifting tools can break, possibly causing serious personal injury. Do not use damaged or deteriorated wire ropes or lifting tools.**
- **Be sure to contact your authorized dealer for the correct lifting procedure, and size and kinds of lifting wire ropes and lifting tools.**
- **Pull the pilot control shut-off lever to the LOCK position so that the machine does not accidentally move while being lifted.**
- **An incorrect lifting procedure and/or incorrect wire rope attachment will cause the machine to move (shift) while being lifted, resulting in machine damage and/or personal injury.**
- **Do not lift the machine quickly. Excessive load will be applied to the lifting wire ropes and/or lifting tools, possibly causing them to break.**
- **Do not allow anyone to come close to or under the lifted machine.**
- **Remove the telescopic arm and counterweight.**
- **Fully retract the slide cab backward.**
- **The gravity center of the slide cab machine differs from the standard machine.**

1. Remove the telescopic arm and counterweight. Set the boom in level position.
2. Pull the pilot control shut-off lever to the LOCK position.
3. Stop the engine. Remove the key from the key switch.
4. Use wire ropes and a support bar of sufficient length so that they do not come in contact with the machine while lifting.

Wrap some protectors around wire ropes and/or support bar as required to prevent the machine from being damaged.

5. Drive a crane to an appropriate position for lifting.
6. Thread the wire rope through and under both sides of the track frames as illustrated. Attach the wire ropes to the crane.



M1CD-HT1-020

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.
- Level, leakage and contamination of coolant, fuel, DEF/AdBlue® and hydraulic oil
- Check for leaks, kinked, frayed or damaged hoses and lines.
- Walk around machine checking general appearance, noise, heat, etc.
- Check for loose or missing parts.

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

IMPORTANT:

- **Use only specified fuel, DEF/AdBlue®, lubricants and coolant.**
- **Be sure to use only genuine Hitachi parts. Failure to do so may result in serious injury or death and/or machine breakdown.**
- **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.**
- **Never adjust parts of engine fuel system or hydraulic equipment.**
- **Using bad quality fuel, drainage agent, fuel additives, gasoline, kerosene or alcohol refueled or mixed with specified fuel may deteriorate performance of fuel filters and cause sliding problem at lubricated contacts in the injector. It also affects the engine and aftertreatment device parts, leading to malfunction.**
- **Using bad quality DEF/AdBlue® may deteriorate performance of the engine and affect the aftertreatment device, leading to malfunction. Using improper density DEF/AdBlue® may derate the engine power.**
- **Use Hitachi genuine high performance filter.**



SA-005

MAINTENANCE

- **Body Information Controller**

This machine provides a body information controller that stores machine operation information for preventive maintenance.

When maintaining the machine, our authorized service man may download the stored information.

Consult with your authorized dealer for detailed function of this device.

- **Communication Terminal Operation**

It is not necessary to check or operate the communication terminal however if any abnormality is found, consult your authorized dealer.

Before installing any covering attachment such as a head guard, consult your authorized dealer.

Never spray water on the communication terminal and the wirings.

- **Inquire to your local environmental or recycling center or your authorized dealer, for the proper way to recycle or dispose of oil, fuel, coolant, filters, batteries, DEF/AdBlue® and other waste.**

MAINTENANCE

Check the Hour Meter Regularly

Refer to the List of Check and Maintenance for information about lubricants, check and adjustment intervals. The maintenance guide table is affixed to the telescopic arm. Refer to the next page.

This manual recommends grouping the intervals into three categories as follows:

- Daily check : To be conducted daily before operation
- Monthly check : To be regularly conducted once per month
- Annual check : To be regularly conducted once per year

Check and maintenance intervals shown in this manual are those for the machines to be operated under normal conditions. In case the machine is operated under more severe conditions, shorten the intervals.

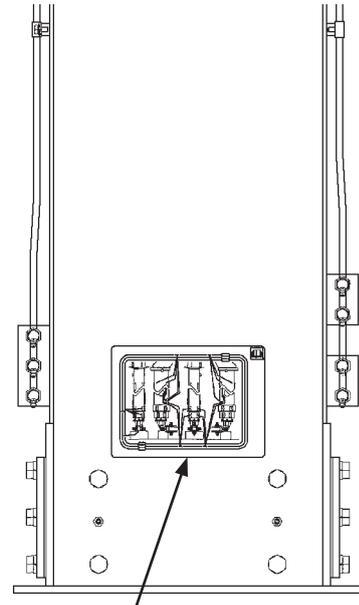
MAINTENANCE

Maintenance Guide Table

The maintenance guide table is affixed to the telescopic arm. 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.

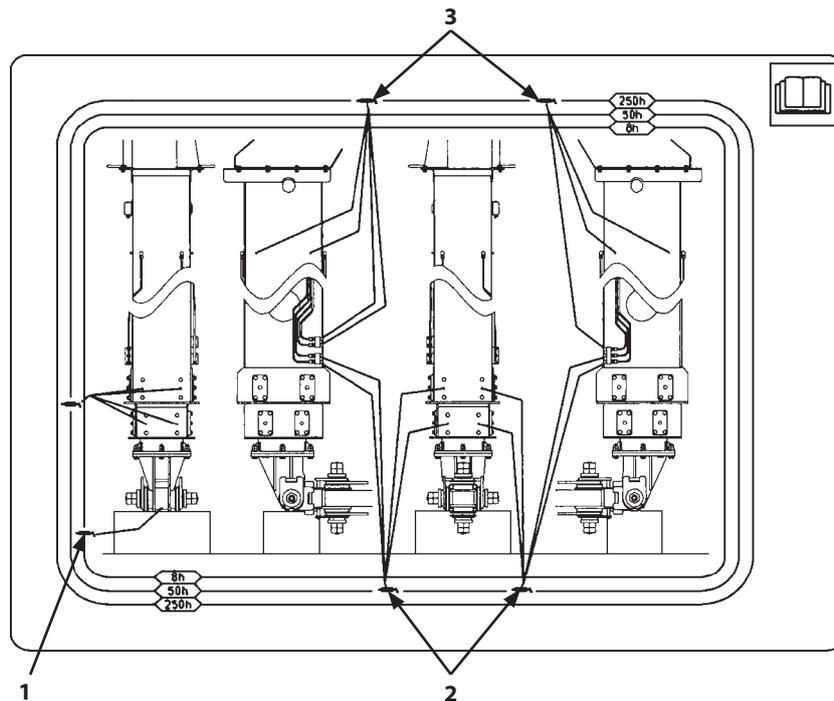
	Grease (Front Joint Pin, Swing Bearing, Swing Gear)
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Maintenance Guide Table

MDAS-HT1-018

- Maintenance Guide Table



MDAS-HT1-017

	Item
1	Grease (Every 8 hours.)
2	Grease (Every 50 hours.)
3	Grease (Every 250 hours.)

MAINTENANCE

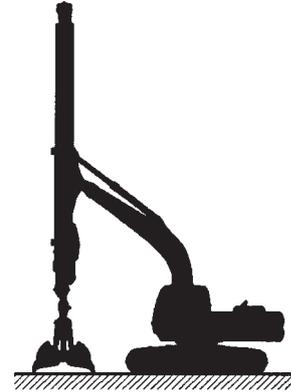
Preparations for Inspection and Maintenance

Except in special cases, park the machine by following the procedure before servicing the machine.

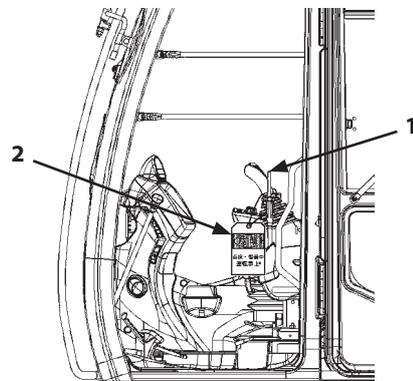
1. Park the machine on a firm, level surface.
2. Lower the bucket to the ground.
3. Turn the auto-idle switch OFF.
4. Turn engine control dial (1) to the slow idle position and run the engine for 5 minutes to cool the engine.
5. Turn the key switch OFF to stop the engine. Remove the key. Be sure to place pilot control shut-off lever (1) to the LOCK position.
6. After putting tag (2) for "Under Serving" on the easy-to-see cab door or control lever, begin the work.

⚠ WARNING: Never attempt to maintain the machine when the engine is running in order to prevent an accident. If maintenance work while engine running is unavoidable, strictly comply with the following items.

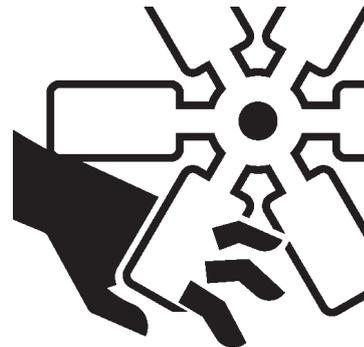
- One person should take the operator's seat to be ready to stop the engine any time while communicating with other workers.
- When working around moving parts is unavoidable, pay special attention to ensure that hands, feet, and clothing do not become entangled.
- If parts or tools are dropped or inserted into the fan or the belt, they may fly off or be cut off. Do not drop or insert parts and tools into the moving parts.
- Move pilot control shut-off lever (1) to the LOCK position so that the front attachment will not move.
- Never touch the control levers and pedals. If operating the control levers or pedals is unavoidable, signal co-workers to evacuate to a safer place.



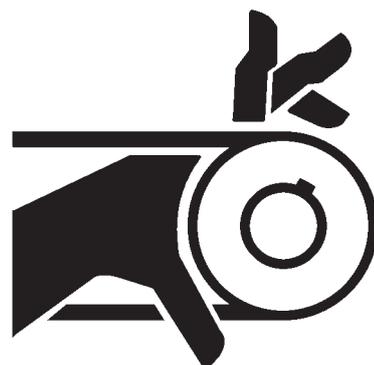
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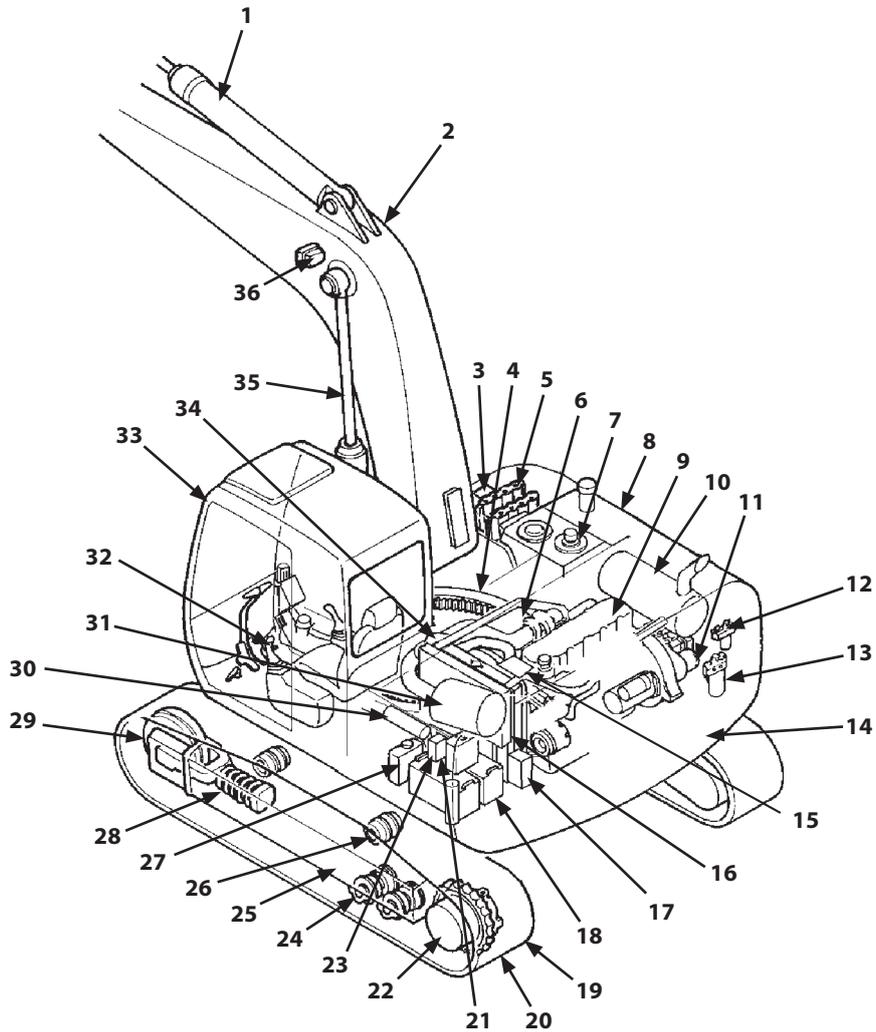
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SA-026

MAINTENANCE

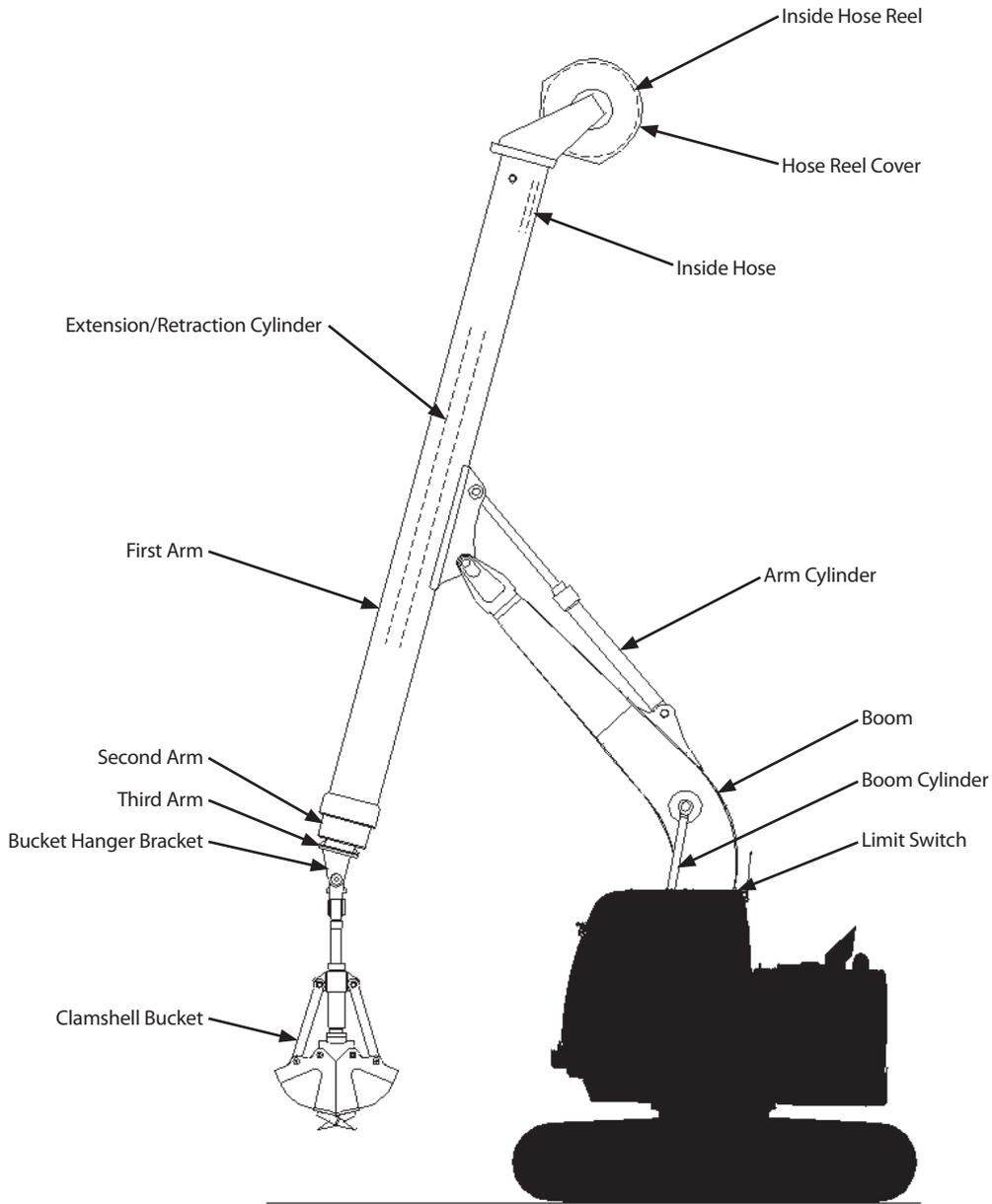
Daily Inspection



MDAS-HT1-008

- | | | | |
|-------------------------|--|-------------------------------|-----------------------|
| 1- Arm Cylinder | 10- Aftertreatment Device | 19- Track Link | 28- Track Adjuster |
| 2- Boom | 11- Pump | 20- Shoe | 29- Front Idler |
| 3- Tools | 12- Pilot Filter | 21- DEF/AdBlue® Supply Module | 30- Grease Gun Holder |
| 4- Swing Bearing | 13- Engine Oil Filter | 22- Travel Device | 31- Air Cleaner |
| 5- Control Valve | 14- Counterweight | 23- Battery Disconnect Switch | 32- Control Lever |
| 6- Swing Reduction Gear | 15- Expansion Tank | 24- Lower Roller | 33- Cab |
| 7- Hydraulic Oil Tank | 16- Radiator, Oil Cooler, Inter Cooler | 25- Track Frame | 34- Center Joint |
| 8- Fuel Tank | 17- DEF/AdBlue® Tank | 26- Upper Roller | 35- Boom Cylinder |
| 9- Engine | 18- Battery | 27- Washer Tank | 36- Work Light |

MAINTENANCE



MDAE-HT1-010

MAINTENANCE

Daily Check

Perform the required daily check before starting the engine.

- Refer to "Maintenance" section for detailed information.

Check Points		Check Points		
Engine	<ol style="list-style-type: none"> 1. Level and contamination of engine oil and coolant 2. Starting easiness, exhaust gas color, and noise 3. Oil and water leaks, damage to hoses and pipe lines 4. Clogging and damage to radiator, oil cooler and intercooler 5. Clean around muffler filter 6. Looseness and missing of mounting bolts and nuts 	Telescopic Arm	<ol style="list-style-type: none"> 1. Operation of the slide frame, abnormal noise 2. Looseness, short circuit and damages of harness connections 3. Stretch and looseness of hoses in the telescopic arm 4. Oil leaks and damages of piping, hoses and stop valves 5. Looseness and missing of mounting bolts and nuts 6. Looseness, missing and damages of the lifting bracket mounting bolts and nuts 7. Deformation and break of the lifting bracket 8. Deformation and damages of the telescopic arm 9. Damages of pin anti-extraction pins, stoppers, rings and bolts 10. Operation and operating sound of the telescopic arm 11. Operation, oil leak or rod rust of the telescopic cylinder 12. Deformation and damages of covers and guards 13. Greasing condition around the pins 14. Greasing condition of the slide plate 	
Upperstructure	<ol style="list-style-type: none"> 1. Level, leaks and contamination in DEF/AdBlue® tank 2. Indication of level vial, operation and damage 3. Fuel level, leaks and contamination of fuel in tank 4. Hydraulic oil level, leaks and contamination of hydraulic oil tank 5. Movement, play and operating force of all control levers 6. Operation of all hydraulic components, oil leaks and damage to pipe lines and hoses 7. Deformation, break and abnormal noise of upper structure 8. Looseness and missing of mounting bolts and nuts 9. Washer Fluid 10. Leaks from DEF/AdBlue® hoses 11. Dirt around the aftertreatment device 		Others	<ol style="list-style-type: none"> 1. Operation of instruments, switches, lights and buzzer/horn 2. Function of parking brake 3. Deformation and break of head guard 4. Abnormal outside appearance of machine 5. Wear and damage of the seat belt 6. Operation of boom raise control
Undercarriage	<ol style="list-style-type: none"> 1. Sag, wear and break of crawler 2. Oil leaks and wear on upper/lower rollers and front idlers 3. Oil leaks from travel devices 4. Looseness and missing of mounting bolts and nuts 			
Boom	<ol style="list-style-type: none"> 1. Check cylinders, pipe lines and hoses for oil leaks and damage. 2. Wear and damage of the boom 3. Lubrication state of the working device 4. Check for pin anti-extraction pins, stoppers, rings and bolts for damage 5. Looseness and missing of mounting bolts and nuts 			

MAINTENANCE

Maintenance Guide

A. Greasing

Greasing Points		Q'ty	Intervals (Hours)						Page	
			8	50	100	250	500	1000		2000
1. Front attachment joint pin	Boom, Telescopic arm joint pin, Arm cylinder rod joint pin	3								8-13
	Bucket hanger bracket joint pin	1	★							8-13
2. Telescopic arm sliding surface	Second arm sliding surface	Bucket Side	4							8-14
		Hose reel Upper and Lower	4							8-14
		Hose reel Side	4							8-15
	Third arm sliding surface	4								8-14

★: After the machine is used for excavation in water, grease all pins that have been immersed in water.

 **NOTE:** Grease all greasing points every 8 hours until the 50 hour break-in operation is complete. Then grease at the recommended intervals.

B. Hydraulic System

Parts	Q'ty	Interval (Hours)								Page	
		8	50	100	250	500	1000	2000	2500		5000
1. Check Hydraulic Oil Level	-										8-16

C. Hose Reel

Parts		Q'ty	Interval (Hours)						Page	
			8	50	100	250	500	1000		2000
1. Hose	Replace	1								8-17
2. Spring	Replace	1								8-18
3. Bearing	Replace	4								8-18
4. Swivel joint	Replace	2								8-18

 **NOTE:** Because it is difficult to determine the extent of damage of the hose reel parts by routine inspection, please replace the parts to new ones after use of given intervals even if no damage is detected.

MAINTENANCE

D. Telescopic Arm

Location		Q'ty	Intervals (Hours)						Page	
			8	50	100	250	500	1000		2000
1. Hose in the telescopic arm	Check	2								8-19
	Replace	4	*As necessary						8-19	
2. Check and replace slide plate		32	*As necessary						8-19	

 **NOTE:** Contact your nearest Hitachi dealer for maintenance shown with mark *.

E. Level Gauge

Location		Q'ty	Intervals (Hours)						Page
			8	50	100	250	500	1000	
1. Check level gauge		1	As necessary						8-20

F. Others

Location		Q'ty	Intervals (Hours)							Page	
			8	50	100	250	500	1000	2000		4000
1. Boom raise control system	Operation Check	1									8-21
	Check Limit Switch	1	As necessary							8-21	
2. Check tightening torque of bolts and nuts		-		★★							8-22

★★: Maintenance required only during first time check.

 **NOTE:** Contact your nearest Hitachi dealer for maintenance shown with mark *

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	
Hydraulic System	Base Machine	Pump suction hose	Every 2 years or 4000 hours whichever comes first
		Pump delivery hose	Every 2 years or 4000 hours whichever comes first
		Swing hose	Every 2 years or 4000 hours whichever comes first
	Front Attachment	Boom cylinder line hose	Every 2 years or 4000 hours whichever comes first
		Arm cylinder line hose	Every 2 years or 4000 hours whichever comes first
		Bucket cylinder line hose	Every 2 years or 4000 hours whichever comes first
		Pilot hose	Every 2 years or 4000 hours whichever comes first
		Telescopic arm extend/retract cylinder and line hose	Every 2 years or 4000 hours whichever comes first
		Hose reel winder hose (Double hose)	Every 2 years or 4000 hours whichever comes first
Hose Reel	Spring	Every 1000 hours	
	Bearing	Every 1000 hours	
	Swivel joint	Every 1000 hours	
Seat Belt		Every 3 years	

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

MAINTENANCE

Brand Names of Recommended Grease

Kind of Grease		Lithium Grease
Application		Front Attachment Joint Pins, Swing Bearing, Swing Internal Gear
Air Temp.		-20 to 40 °C (-4 to 104 °F)
Recommended Products		Hitachi Genuine Grease NLGI EP-2
Alternative Products	Specification	NLGI 2 EP

IMPORTANT:

- **Hitachi Genuine Greases are specially designed and tested to provide optimum performance for Hitachi construction machinery, hence we recommend to use Hitachi Genuine Greases.**
- **Do not use greases which do not meet the above specification or requirements. Use of unsuitable grease may lead to damage which is excluded from Hitachi Warranty Policy.**

Brand Names of Recommended Hydraulic Oil

Kind of Lubricant	Hydraulic Oil	
Where to be applied	Hydraulic System	
Change Interval	5000 hours	1500 hours
Environmental Temp.	-20 to 40 °C (-4 to 104 °F)	
Recommended Products	Hitachi Genuine Hydraulic Oil 5000	Hitachi Genuine Hydraulic Oil Multi
Alternative Product		Hydraulic Oil meeting JCMAS HK VG46W

IMPORTANT:

- **Hitachi Genuine Hydraulic Oils are specially designed and tested to provide optimum performance for Hitachi construction machinery, hence we recommend to use Hitachi Genuine Hydraulic Oils.**
- **Do not use oils which do not meet the above specification or requirements. Use of unsuitable oil may lead to damage which is excluded from Hitachi Warranty Policy.**

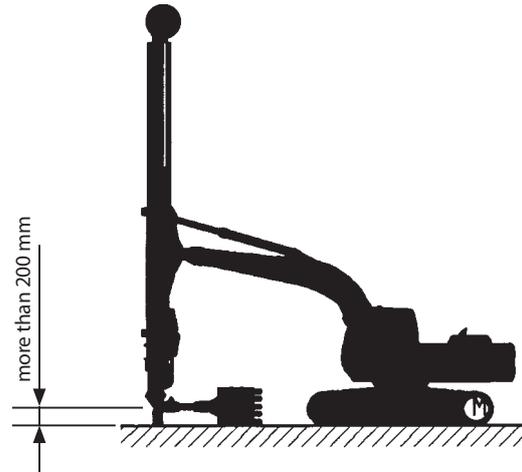
MAINTENANCE

A. Greasing

1 Front Joint Pins

Greasing Position of Machine

Park the machine on a level-solid ground. Set the machine in the parking position. (Refer to the descriptions for the PARKING MACHINE.)

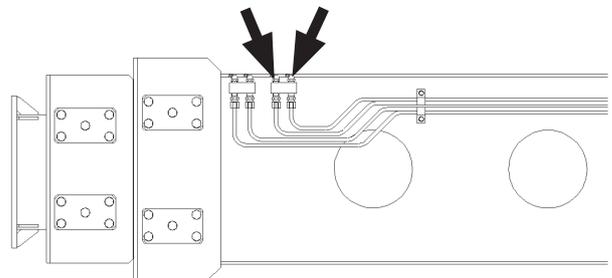
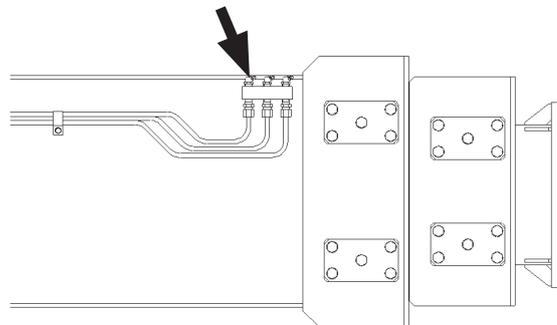


SA-1762

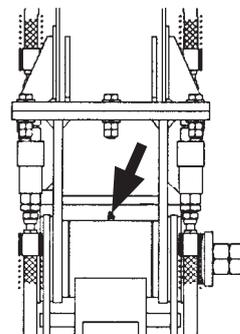
Greasing Points

Boom, Telescopic Arm Joint Pin --- every 250 hours

Arm Cylinder Joint Pin --- every 250 hours



Bracket Hanger Bracket Joint Pin --- every 8 hours

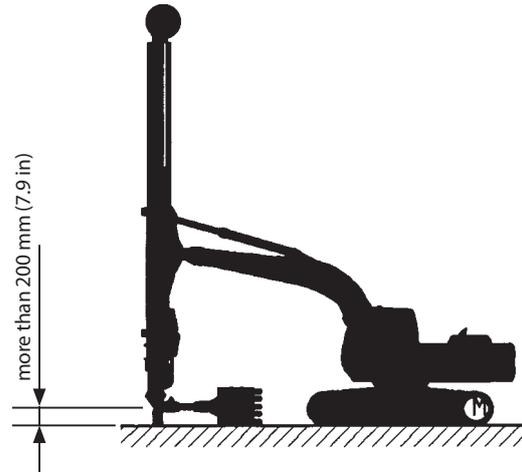


MAINTENANCE

2 Telescopic Arm Sliding Surface

Greasing Position of Machine

Park the machine on a level-solid ground. Set the machine in the parking position. (Refer to the descriptions for the PARKING MACHINE.)

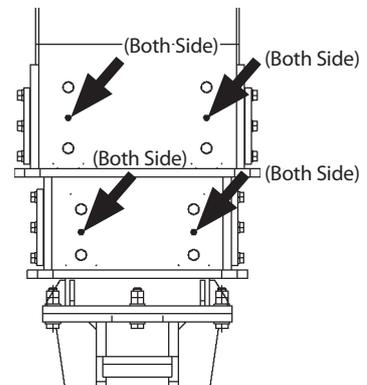


SA-1762

Second Arm Sliding Surface (Bucket Side)

--- every 50 hours

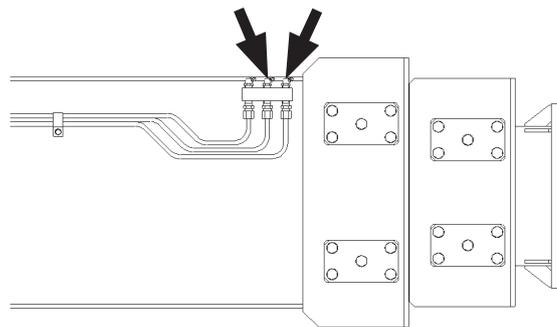
Third Arm Sliding Surface --- every 50 hours



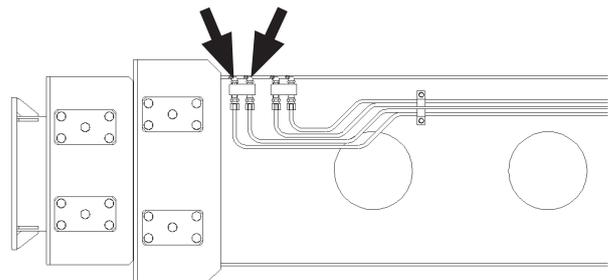
M1V7-HT1-028

Second Arm Sliding Surface (Hose Reel Upper and Lower)

--- every 250 hours



MDAE-HT1-012

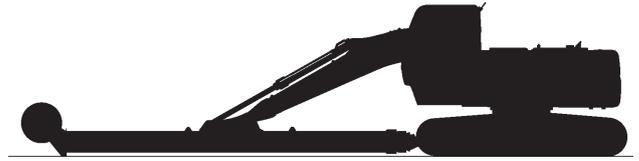


MDAE-HT1-013

MAINTENANCE

Greasing Position of Machine

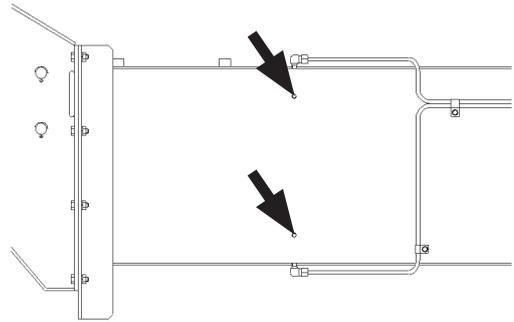
Park the machine on a level-solid ground, remove the bucket, retract the telescopic arm to the limits, and get it down on the ground.



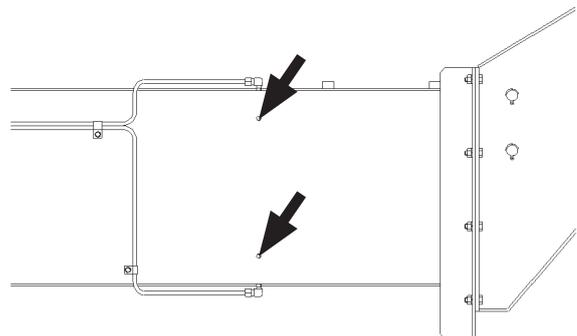
M1V7-HT1-019

Second Arm Sliding Surface (Hose Reel Side)

--- every 250 hours



MDAE-HT1-014



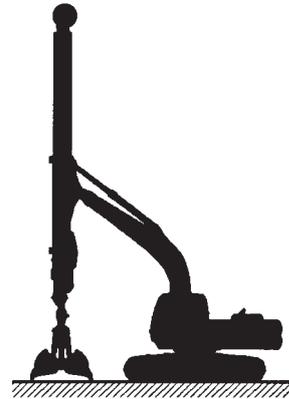
MDAE-HT1-015

MAINTENANCE

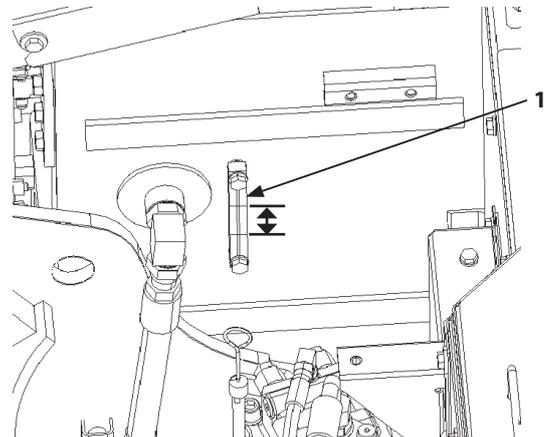
B. Hydraulic System

1 Check Hydraulic Oil Level --- daily

1. Park the machine on solid level ground. Fully retract the telescopic arm and hold it in the position as illustrated to the right. Open the bucket and place it on the ground. Stop the engine.
2. Open the access door in front of the main pump. Check oil level with level gauge (1) on hydraulic oil tank. Oil level will be at the upper line of the marking range on level gauge (1) in case oil is correctly filled. This machine is equipped with a long cylinder in the telescopic arm so that extra hydraulic oil is required more than the standard hydraulic excavator.



SA-1763



MDCN-07-020

MAINTENANCE

C. Hose Reel

1 Hose Replacement --- every 1000 hours

Replacement Position

Park the machine on a level-solid ground, remove the bucket, retract the telescopic arm to the limits, and get it down on the ground.

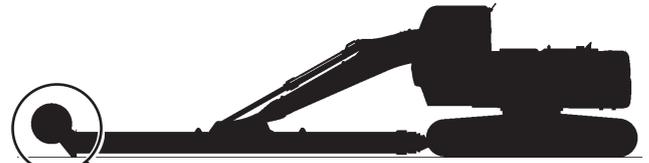
1. Detachment of the Double Hose

CAUTION: Watch out for the rapid rotation of the drum. The torque from the spring is operating on the drum, which causes coasting if it is not in the hold position. Therefore, please take care when doing replacement work. The replacement should be done in more than one person.

1. Securely fix the drum of the hose reel by wires to prevent the drum from rotating.
2. Detach telescopic arm side hose connection.
3. Hold the drum by two personnel and remove the fixed wires carefully.
4. Keeping the torque of the drum, slowly turn the drum about 9 times to the direction B shown in Fig. 22 until no tension is left.
5. Detach the double hose from the drum.

2. Installation of the Double Hose

1. Roll the double hose onto the hose reel of the drum.
2. Slowly turn the hose reel to direction B, and make the point where a clicking sound sounds the base point.
3. Turn the reel to direction A 9 times to provide torque to the drum as shown in Fig. 24.
4. If the connecting position of the hose does not align, turn the hose reel more (less than one turn) to direction A to align the position as shown in Fig. 25.



M1V7-HT1-019

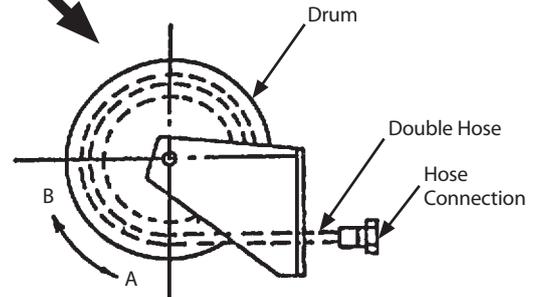


Fig. 22

M1V7-HT1-023

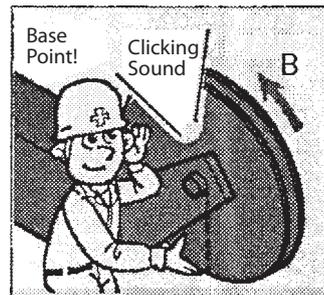


Fig. 23

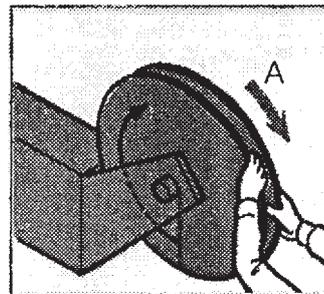


Fig. 24

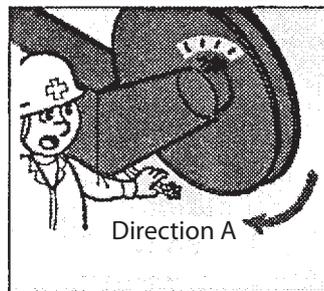
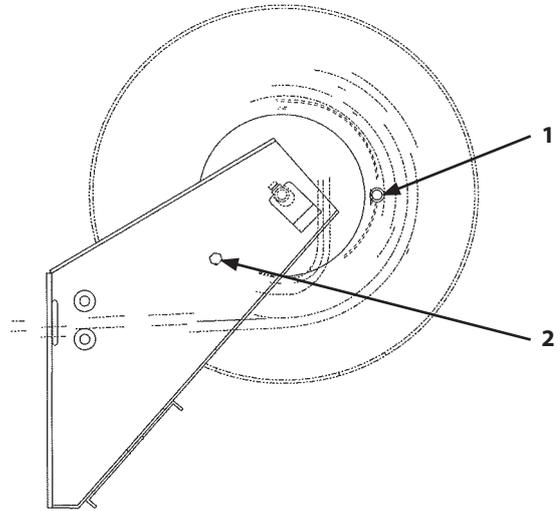


Fig. 25

M1V7-HT1-024

MAINTENANCE

5. Insert stopper bolt (2) to stopper (1) to prevent the drum from rotating.
6. Attach the hose to the connection part.
7. Remove the fixed stopper bolt (2) to prevent the rotation.
8. Slowly extend/retract the telescopic arm and check if there is no abnormality of the hose reel and the replaced hose.
9. Install the bucket, repeat the open/close movement to remove the air inside the line.



IMPORTANT: Turning the hose reel drum more than 8 times would break the hose reel spring by losing its extension amount. Please strictly avoid turning the drum more than 8 times.

2 Replace Spring --- every 1000 hours

Contact your authorized dealer.

MDAE-HT1-016

3 Replace Bearing --- every 1000 hours

Contact your authorized dealer.

4 Replace Swivel Joint --- every 1000 hours

Contact your authorized dealer.

Hose Reel Periodic Replacement Parts

Location	Parts No.	Quantity
Double hose	YA00037366	1
Spring	YA00047859	1
Bearing	4409101	2
	4048056	2
Swivel joint	4635010	2

MAINTENANCE

D. Telescopic Arm

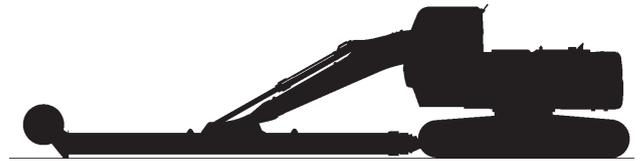
1 Check Hoses in Telescopic Arm --- every 250 hours

Park the machine on a level-solid ground, remove the bucket, retract the telescopic arm to the limits, and get it down on the ground.

Check the hoses for wear, damage, and/or looseness. Replace the hose if any abnormality is found.

Replace Hoses in Telescopic Arm --- as necessary

Contact your nearest Hitachi dealer for hose replacement.



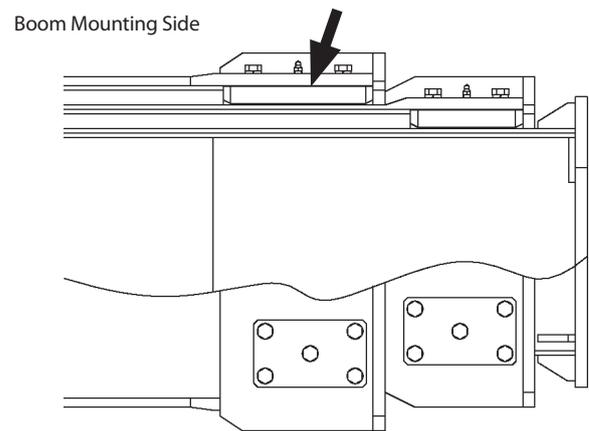
M1V7-HT1-019

2 Check and Replace Slide Plate --- as necessary

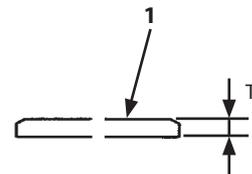
When the slide plate wears, the telescopic arm play will increase. If the telescopic arm is used without replacing the worn slide plate, damage to the telescopic arm may result. Remove the slide plate from the tip end of the first arm, measure the wear amount with vernier calipers. Replace the slide plate if the slide plate has worn more than allowable limit (T). Slide plates are installed in all sliding sections. Check all slide plates in all sections before replacing the slide plates. Contact your nearest Hitachi dealer for checking and replacing the slide plates.

Allowable Limit (T)

23 mm or Less



M1V7-HT1-025



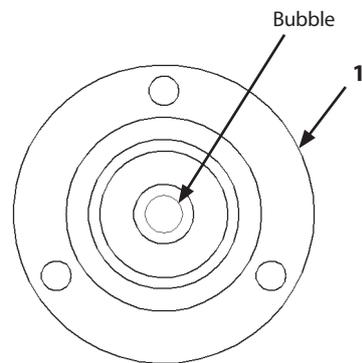
M1GD-07-018

MAINTENANCE

E. Level Gauge

1 Check Level Gauge --- as necessary

After parking the machine on solid level ground, check the level gauge (1). In case the bubbles in gauge are not in the gauge scale center, adjust the gauge.



MDAE-HT1-005

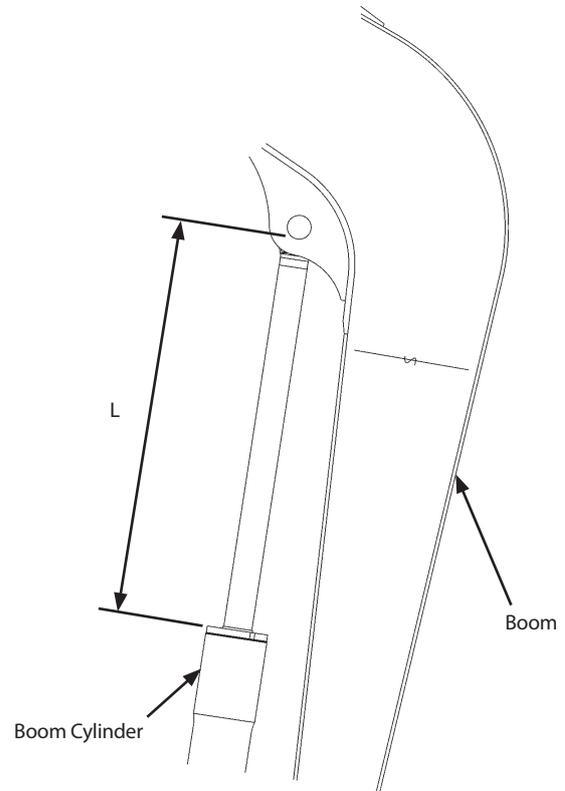
MAINTENANCE

F. Others

1 Boom Raise Control System --- every 50 hours

When the boom is raised to the highest position, check if boom cylinder length L is within specification. If boom cylinder length L is not within specification, adjust the position of the limit switch.

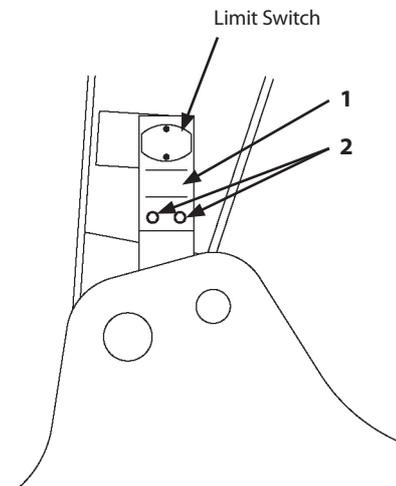
	Specification mm
ZX135US-6	1039 to 1049



M1CD-HT1-016

Adjustment of limit switch --- as necessary

When the boom is raised to the highest position, adjust the position of striker (1) so that boom cylinder length L should be within specification. For adjustment, lightly loosen bolt (2) and lightly tap by using a plastic hammer. The bolt (2) hole on striker (1) is the long hole. Also, make sure the buzzer sounds when the boom stops automatically.



M1S1-HT1-003

MAINTENANCE

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

Check tightness after the first 50 hours then every 250 hours. Tighten to torque shown if any are loose. Bolts and nuts should be replaced with those of the same or higher grade.

For tightening nuts and bolts other than specified in the table below, refer to the Tightening Torque Chart at the end of this section.

IMPORTANT: Check and tighten bolts and nuts using a torque wrench.

No.	Descriptions	Bolt Dia	Q'ty	Wrench Size (mm)	Torque	
		mm			N·m	(kgf·m)
1	Hose reel mounting bolt and nut	10	8	17	50	(5.0)
2	Bucket hanger bracket mounting bolt and nut	16	8	24	270	(27)
3	Bucket hanger bracket lock nut	16	8	24	210	(21)
4	Bucket swing lock nut	36	4	55	390	(40)
5	Sliding plate mounting bolt	12	56	19	90	(9.0)

MAINTENANCE

Tightening Torque Chart

Bolt Dia. mm	Hexagon Wrench						Socket Bolt			
	  		  		  		Wrench size mm	Socket Bolt		Wrench size mm
	N·m(kgf·m)		N·m(kgf·m)		N·m(kgf·m)			N·m	(kgf·m)	
6					3.3 to 4.2 (0.3 to 0.4)		10			5
8	30	(3.0)	20	(2.0)	10	(1.0)	13	20	(2.0)	6
10	65	(6.5)	50	(5.0)	20	(2.0)	17	50	(5.0)	8
12	110	(11)	90	(9.0)	35	(3.5)	19	90	(9.0)	10
14	180	(18)	140	(14)	55	(5.5)	22	140	(14)	12
16	270	(27)	210	(21)	80	(8.0)	24	210	(21)	14
18	400	(40)	300	(30)	120	(12)	27	300	(30)	14
20	550	(55)	400	(40)	170	(17)	30	400	(40)	17
22	750	(75)	550	(55)	220	(22)	32			
24	950	(95)	700	(70)	280	(28)	36			
27	1400	(140)	1050	(105)	400	(40)	41			
30	1950	(195)	1450	(145)	550	(55)	46			
33	2600	(260)	1950	(195)	750	(75)	50			
36	3200	(320)	2450	(245)	950	(95)	55			

⚠ CAUTION: If fixing bolts for counterweight are loosened, consult your nearest authorized dealer.

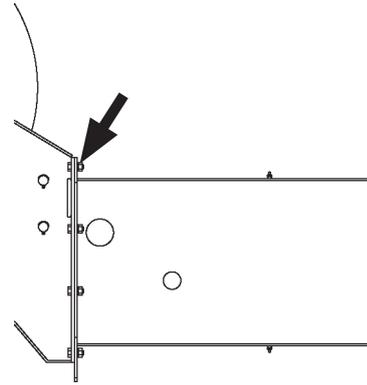
IMPORTANT:

- Apply lubricant (e. g. white zinc B solved into spindle oil) to bolts and nuts to stabilize their friction coefficient.
- Remove soil, dust, 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.

MAINTENANCE

1. Hose reel mounting bolt and nut

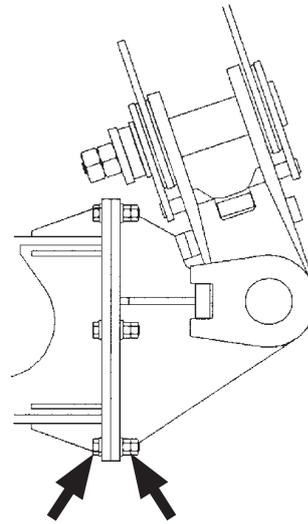
Wrench Size	17 mm
Torque	50 N·m (5.0 kgf·m)



M1V7-HT1-022

2. Bucket hanger bracket mounting bolt and nut

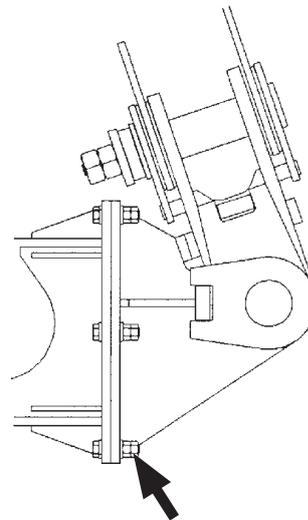
Wrench Size	24 mm
Torque	270 N·m (27 kgf·m)



M1GD-07-025

3. Bucket hanger bracket lock nut

Wrench Size	24 mm
Torque	210 N·m (21 kgf·m)

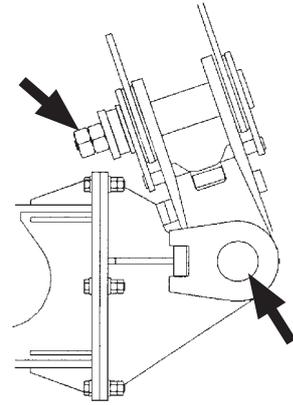


M1GD-07-025

MAINTENANCE

4. Bucket swing lock nut

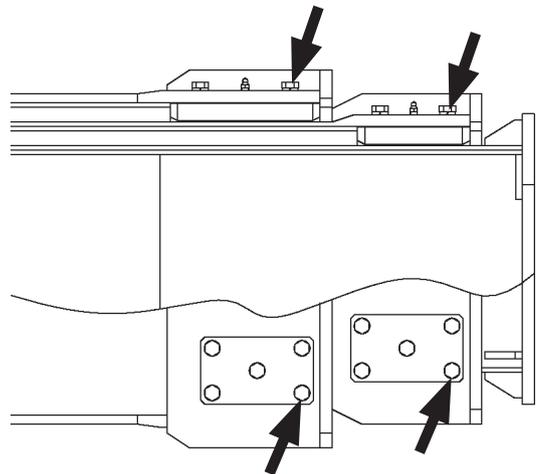
Wrench Size	55 mm
Torque	390 N·m (40 kgf·m)



M1GD-07-025

5. Sliding plate mounting bolt

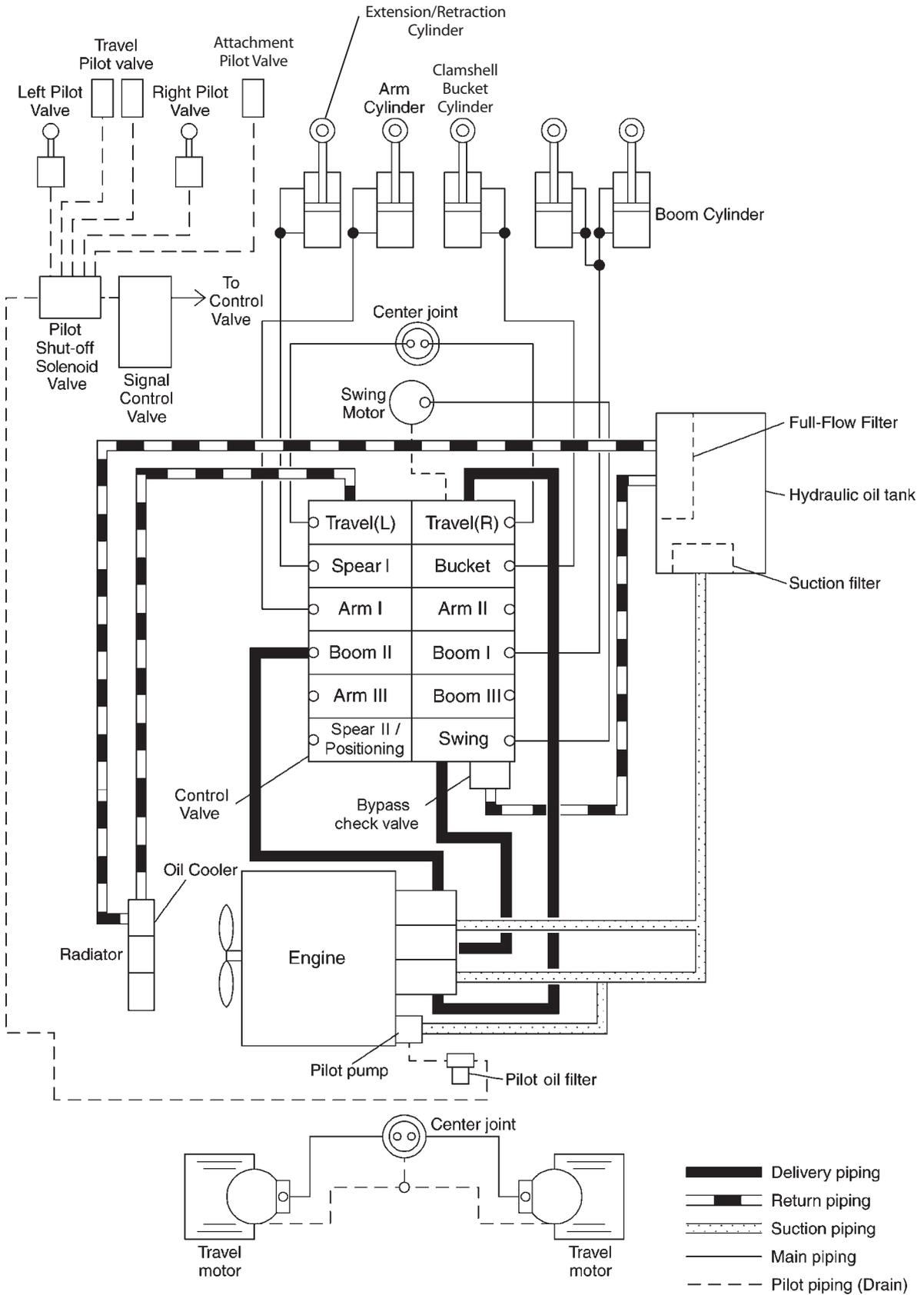
Wrench Size	19 mm
Torque	90 N·m (9.0 kgf·m)



M1V7-HT1-025

HYDRAULIC CIRCUIT

Hydraulic Circuit



MDDD-RT1-003

STORAGE

Precaution for Machine Storage

IMPORTANT: When the telescopic arm is retracted, the telescopic cylinder rod is exposed, possibly causing rust. Apply anti-rust compound on the cylinder rod before storing the machine.

In case the machine is to be stored for longer than one month, pay attention to the following points to prepare next operation.

In case the machine is stored under severe weather conditions, thoroughly carry out rust prevention measures.

Precautions for machine storage

Precautionary Point	Action to Be Taken
Machine Cleaning	After sufficiently cleaning the machine, remove any soil or other debris adhered to the machine.
Lubricants for Each Part	Check lubricants for level and contamination. Add or change as necessary. Grease each lubrication parts. Coat grease to exposed metal surfaces which are subject to rust. Coat the cylinder rod with rust-preventive oil with extra care.
Battery	Remove the batteries and store them in a dry protected place after charging fully. If not removed, disconnect the negative battery cable from the (-) terminal. Turn the battery disconnect switch to the OFF position.
Coolant	Add an antirust agent to the coolant. In cold weather, add an antifreeze, or drain the coolant completely. Be sure to attach a "No Water in Radiator" tag on a clearly visible location if the system is drained.
Protection Against Dust and Moisture	Store the machine in a dry storage area using a protective cover.
Tools	Store tools after cleaning and checking.
Operation for Lubrication	If oil film on the metal surfaces is lost, rust may begin, possibly causing abnormal wear of the machine when the machine operation is restarted. Perform lubrication operation once a month at a regular interval. Check the coolant and lubricant levels at this time as well.
Front Position of Long Term Storage	As illustrated below, remove the clamshell bucket and place the arm tip on the ground. Coat the remove clamshell cylinder rod with rust-preventive oil.
Telescopic Arm	Lubricate all grease points. Coat a film of oil to the surface of parts easy to rust. Coat the cylinder rod with anti-rust compound. Apply grease on the wire ropes.

 **NOTE:** Lubrication operation is a series of warm-up, travel, swing and front attachment operation to repeatedly cycle each function a few times.

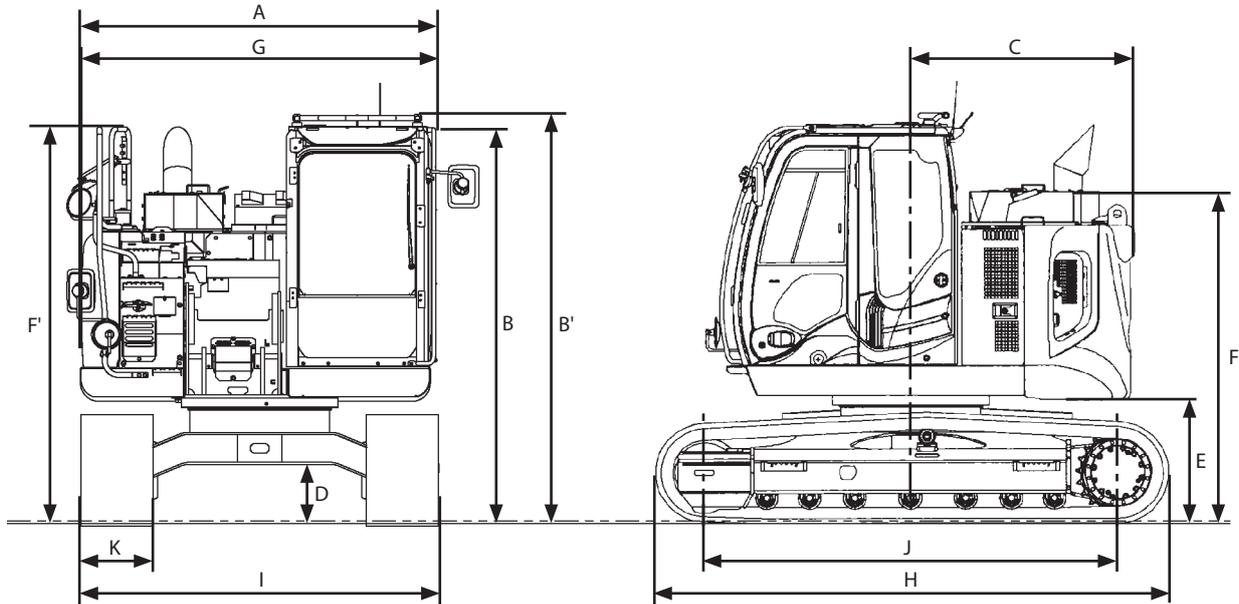
Lubricants will deteriorate during long term storage of the machine. Be sure to carefully check the lubricants before restarting operation of the machine.



MDAE-HT1-017

SPECIFICATIONS

Specifications



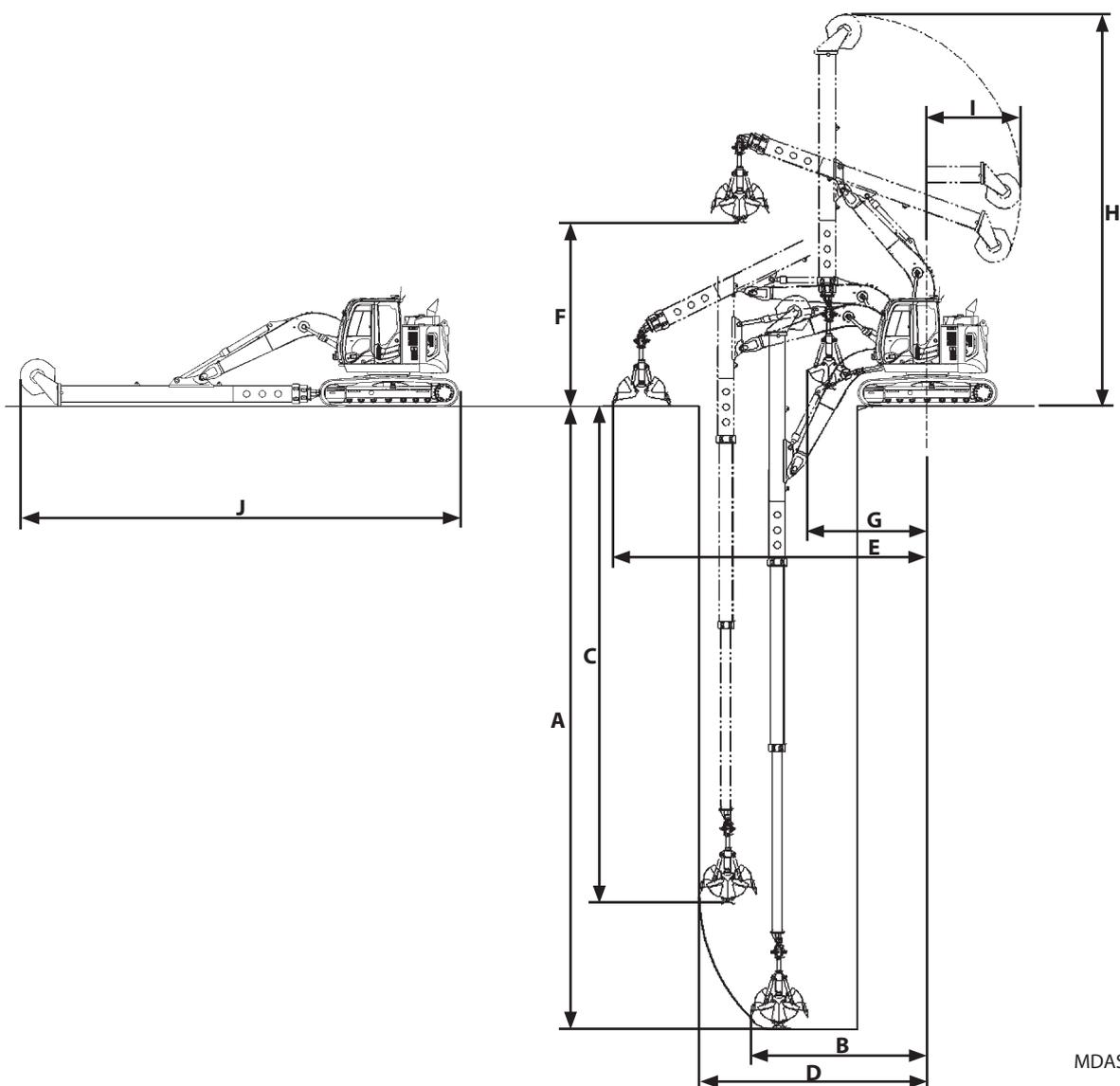
MDAS-HT1-019

Model	ZX135US-6
Type of Front-End Attachment	Hydraulic Type 3-stage Telescopic Arm
Bucket Capacity (Heaped)	PCSA 0.25 m ³ , CECE 0.23 m ³
	PCSA 0.28 m ³ , CECE 0.25 m ³
Counterweight Weight	4300 kg
Operating Weight	16500 kg
Basic Machine Weight	12000 kg
Engine Type	Isuzu AR-4JJ1
Engine Power	ISO 14396: 78.5 kW/2000 min ⁻¹
	ISO 9249: 74.9 kW/2000 min ⁻¹
A: Overall Width (Excluding back mirrors)	2490 mm
B: Cab Height	2790 mm
B': Cab Top Handrail Height	2870 mm
C: Rear End Swing Radius	1600 mm
D: Minimum Ground Clearance	* 410 mm
E: Counterweight Clearance	* 840 mm
F: Engine Cover Height	* 2320 mm
F': Body Top Handrail Height	2870 mm
G: Overall Width of Upperstructure	2480 mm
H: Undercarriage Length	3580 mm
I: Undercarriage Width	2490 mm
J: Sprocket Center to Idler Center	2880 mm
K: Track Shoe Width	500 mm (Grouser shoe)
Ground Pressure	52 kPa (0.53 kgf/cm ²)
Swing Speed	10.1 min ⁻¹ (rpm)
Travel Speed (fast/slow)	5.5/3.3 km/h
Gradeability	15° (tanθ = 0.26)

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

SPECIFICATIONS

Working Ranges



MDAS-HT1-020

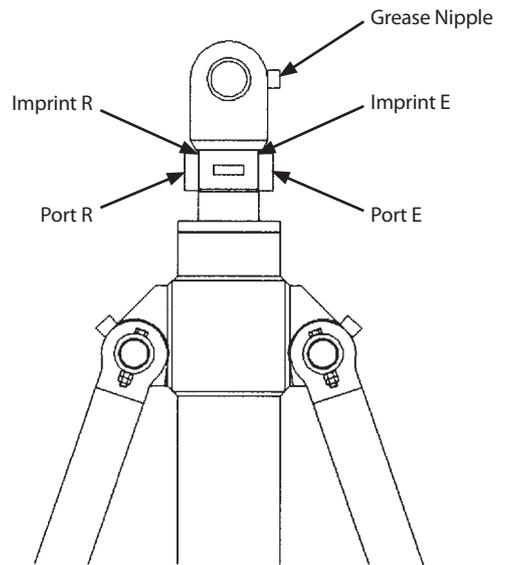
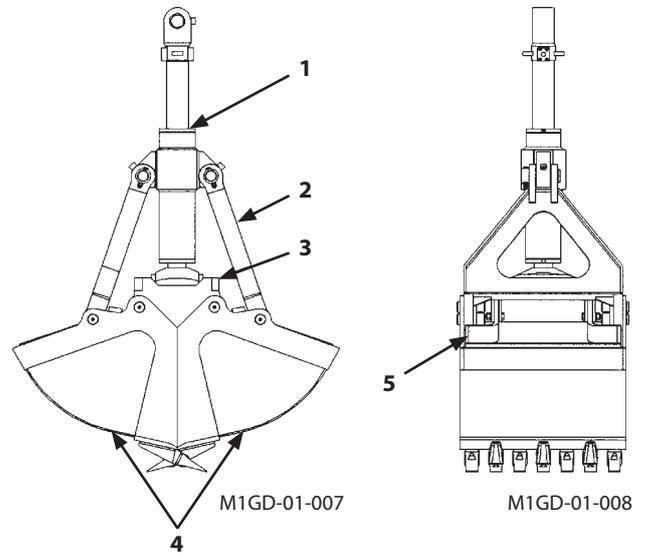
Model	ZX135US-6		
			Serial No. 510089 -
A: Maximum Vertical Digging Depth	mm	16450	16540
B: Radius at Maximum Vertical Digging Depth	mm	4630	4630
C: Depth at Maximum Vertical Digging Radius	mm	13120	13230
D: Maximum Vertical Digging Radius	mm	5970	5970
E: Maximum Digging Reach	mm	8230	8230
F: Dumping Height	mm	4830	4740
G: Minimum Swing Radius	mm	3120	3190
H: Minimum Swing Position Height	mm	10360	10360
I: Front Rear Radius	mm	2460	2460
J: Overall Length	mm	11220	11220

CLAMSHELL BUCKET

COMPONENTS NAME

Components Name

- 1- Open/Close Cylinder
- 2- Stay
- 3- Frame
- 4- Shell
- 5- Ejector



M1GD-01-009

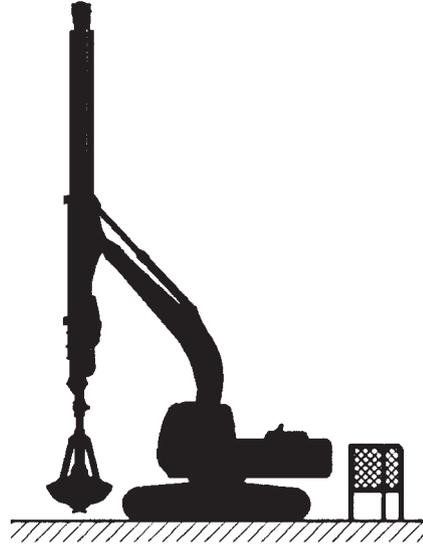
CLAMSHELL BUCKET

OPERATING THE MACHINE

Precautions for Operations

⚠ CAUTION: Investigate the work site before starting operations.

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



SA-1187

Excavation Methods

⚠ WARNING: Do not stop lowering the boom at the half way stroke. This will cause an impact on the base machine, possibly causing the machine to become unstable and tip over.

- Pay attention not to allow the bucket to sway during excavation.
- Operate all cylinders with a small allowance of stroke remaining so that the cylinders do not reach the stroke end.
- When soil in the bucket is difficult to dump, rotate the bucket 2 to 3 turns.
- Do not forcibly push the bucket in the ground more than tooth tips.

IMPORTANT: Remove the ejectors when excavating soil containing a lot of stones. If stones become wedged between the shell and the ejectors, damage to the bucket may result.

CLAMSHELL BUCKET

TRANSPORTING

Transporting by Road

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

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

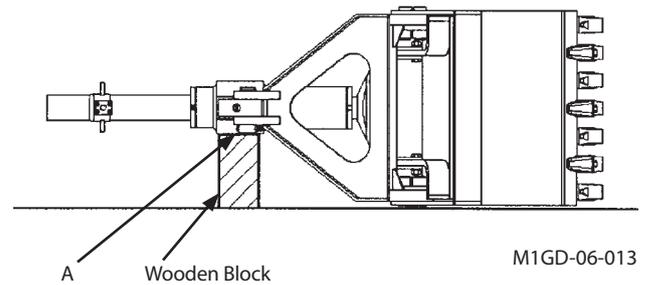
In some cases, disassemble the machine to bring it within dimensional limits or weight limits of local regulations.

Transportation

⚠ CAUTION: Be sure to secure the base machine to the trailer bed with wire ropes.

The machine is subject to vibrations and lateral stresses during transportation.

1. Fully close the bucket.
2. Securely plug all pressure ports.
Clean the pressure ports to keep dirt out of the hydraulic system.
3. Lay the bucket on the trailer bed. Support section (A) of the open/close cylinder with wooden blocks.
4. Securely tighten the machine to the trailer bed with wire ropes.



CLAMSHELL BUCKET

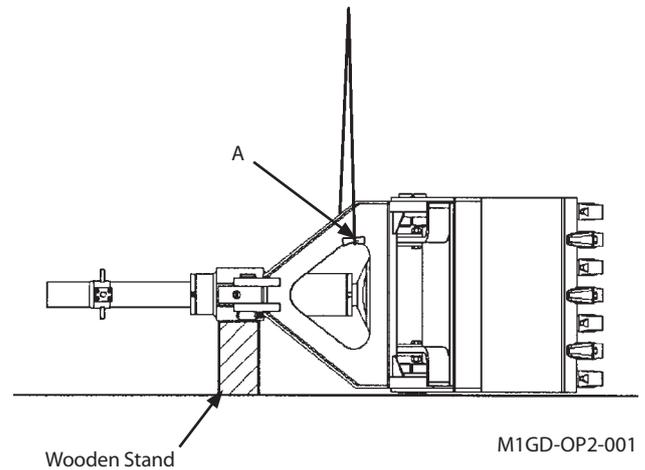
TRANSPORTING

Bucket Lifting Procedure

⚠ WARNING:

- **Lifting wire ropes and other lifting tools can break, possibly causing serious personal injury. Do not use damaged or deteriorated wire ropes or lifting tools.**
- **Be sure to contact your authorized dealer for correct lifting procedure, and size and kinds of lifting wire ropes and lifting tools.**
- **Incorrect lifting procedure and/or incorrect wire rope attachment will cause the machine to move (shift) while being lifted, resulting in machine damage and/or personal injury.**
- **Do not lift the machine quickly. Excessive load will be applied to the lifting wire ropes and/or lifting tools, possibly causing them to break.**
- **Do not allow anyone to come close to or under the lifted machine.**

1. Close the bucket.
2. Attach a wire rope to section (A).
3. Use soft material between the wire rope and the bucket frame at section (A).
4. Slowly and carefully lift the bucket



CLAMSHELL BUCKET

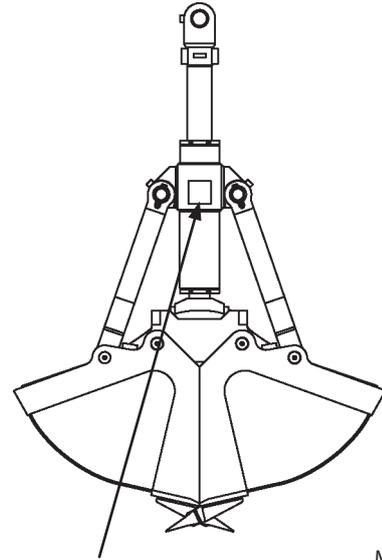
MAINTENANCE

Maintenance Guide Table

The maintenance guide table is affixed to the clamshell bucket. 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, Swing Bearing, Swing Gear)
---	--

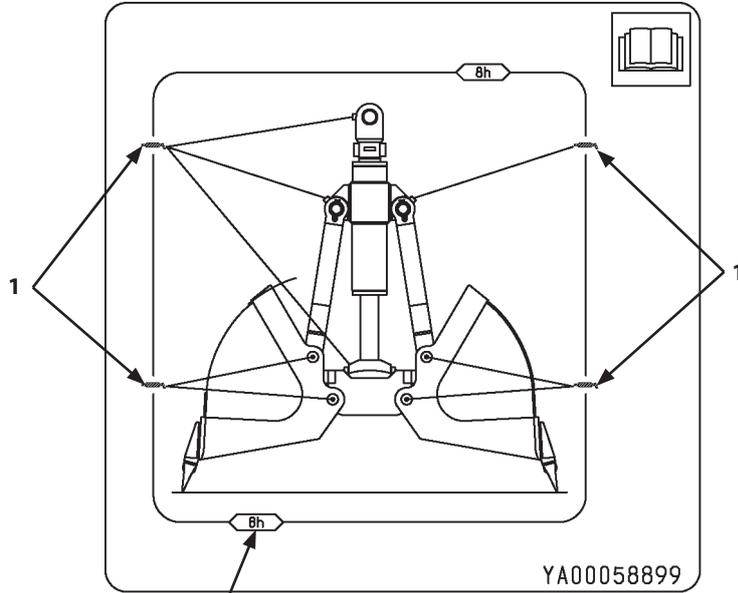


Maintenance Guide Table

MDAS-HT1-021

CLAMSHELL BUCKET MAINTENANCE

- Maintenance Guide Table



Lubrication Interval
(hours)

MDAS-HT1-022

	Item	Page
1	Grease (Every 8 hours.)	12-7

CLAMSHELL BUCKET MAINTENANCE

Maintenance

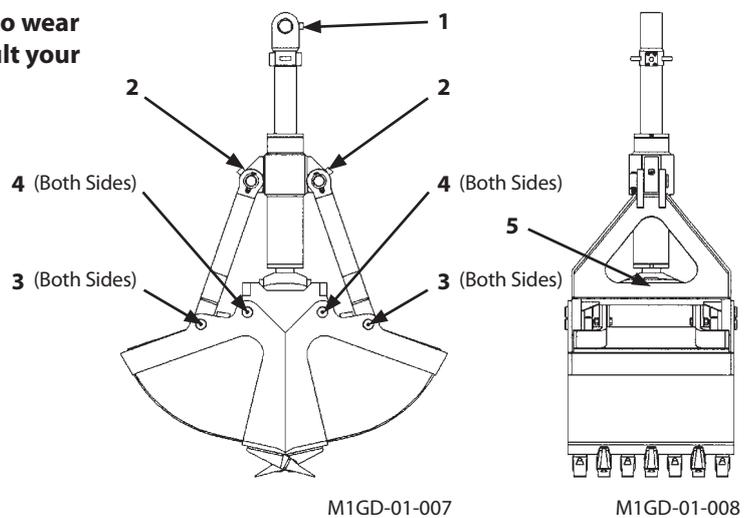
A. Greasing

Parts	Quantity	Interval (hours)							Page
		8	50	100	250	500	1000	2000	
1. Cylinder Rod	1								12-7
2. Cylinder Bracket	2								12-7
3. Stay Pin	4								12-7
4. Shell Holding Pin	4								12-7
5. Swivel Bearing	1								12-7

Brand Names of Recommended Grease

Kind of Grease	Lithium Grease
Application	Front Attachment Joint Pins, Swing Bearing, Swing Internal Gear
Air Temp.	-20 to 40 °C (-4 to 104 °F)
Recommended Products	Hitachi Genuine Grease NLGI EP-2
Alternative Products	Specification NLGI 2 EP

CAUTION: If play becomes 4 mm or more due to wear of the roller and frame, repair is required. Consult your authorized Hitachi dealer.



CLAMSHELL BUCKET MAINTENANCE

B. Miscellaneous

Parts		Quantity	Interval (hours)						Page	
			8	50	100	250	500	1000		2000
1. Allowance in Cylinder Stroke	Check	–								12-8
	Repair	–	As required						12-9	
2. Check Bucket Teeth	0.2 m ³	5								12-10
	0.25 m ³	5								12-10
	0.28 m ³	5								12-10

1 Allowance in Cylinder Stroke

Check --- daily

Repair --- as required

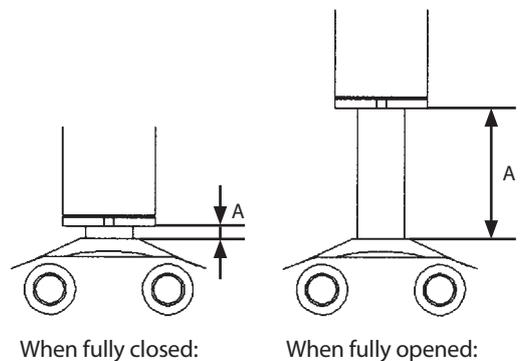
The machine has been designed to allow the open/close cylinder to mechanically stop moving before reaching the stroke end to prevent the open/close cylinder from being damaged. After long periods of operation, mechanical stoppers and shells will wear so that the allowance in the cylinder stroke may be reduced, resulting in damage to the cylinder. Check and repair the cylinder stroke as follows:

Checking Method

Measure dimension A with the bucket fully opened or closed. If dimension is reduced to less than the allowable limits, repair the shells and/or stoppers.

Dimension A in mm

Bucket	When fully closed		When fully opened	
	Standard	Allowable Limit	Standard	Allowable Limit
0.2 m ³	18	13	262	267
0.25 m ³	16	10	291	297
0.28 m ³	30	25	390	395



M1GD-07-030

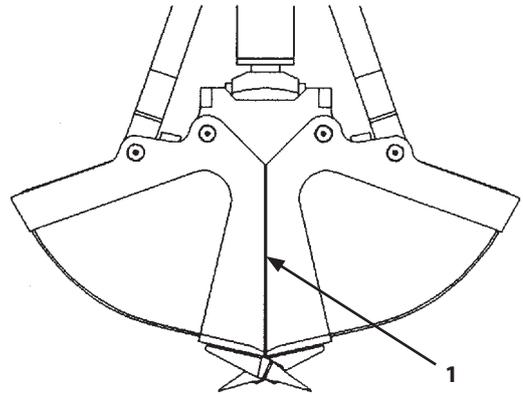
CLAMSHELL BUCKET

MAINTENANCE

Repairing Method

1. When the allowable limit is reached when fully closed:

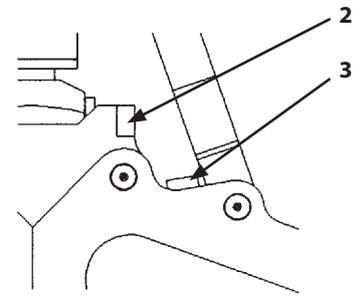
Repair contact surfaces (1) on both right and left shells with cladding by welding. Finish the cladding surface with a grinder so that the surface becomes flat.



M1GD-07-031

2. When the allowable limit is reached when fully opened:

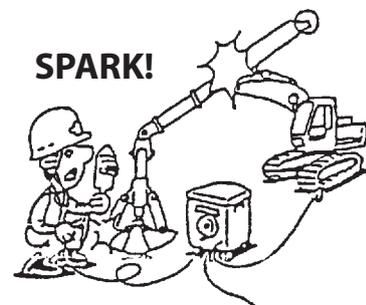
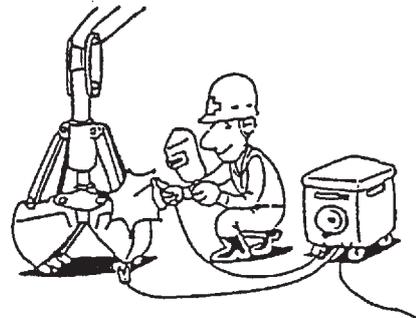
Repair contact surfaces (1) on stoppers (2) and (3) with cladding by welding. Finish the cladding surface with a grinder so that the surface becomes flat. In case repair with cladding by welding is impossible, replace stoppers (2) and (3).



M1GD-07-032

Precautions for Repair Welding

IMPORTANT: When repairing the machine by electric welding, connect the ground line of the welder as close to the welding section as possible. If the ground line of the welder is connected to the vehicle frame, boom or arm, electrical current may flow through the hydraulic cylinders, possibly generating sparks so that damage to the cylinder rods may result.



M1GD-07-033

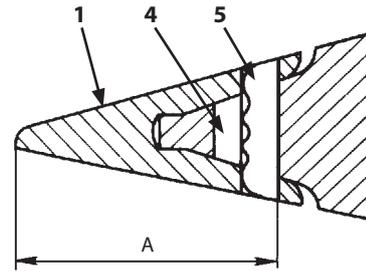
CLAMSHELL BUCKET MAINTENANCE

2 Check Bucket Teeth --- daily

Check the bucket teeth for wear and looseness

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

	New	Limit of Use
Dimension A in mm	165	100

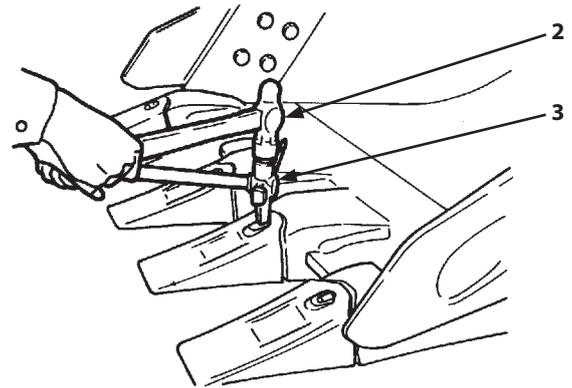


M104-07-056

Replacing procedure

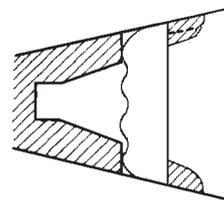
CAUTION: Guard against injury from flying pieces of metal. Wear goggles or safety glasses, and safety equipment appropriate to the job.

1. Use hammer (2) and drift (3) to drive out locking pin (5). Be careful not to damage rubber pin lock (4) while removing locking pin (5).
2. Remove tooth (1). Inspect locking pin (5) and rubber pin lock (4) for damage, replace if necessary. Short locking pins and damaged rubber pin locks must be replaced with new ones.



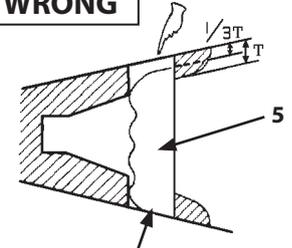
M104-07-116

RIGHT



M104-07-118

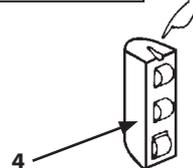
WRONG



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

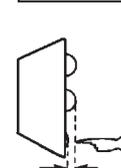
M104-07-058

WRONG



The steel ball projected section is almost coming off due to breakage of the rubber.

WRONG

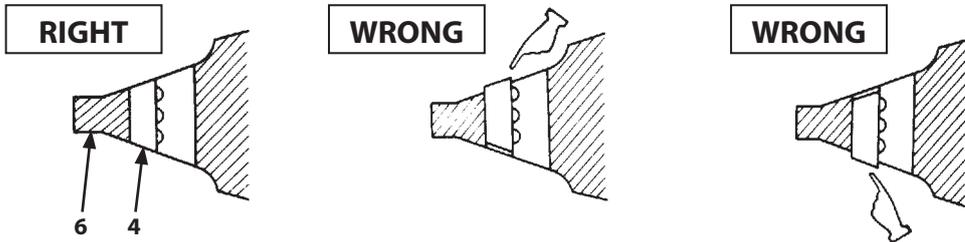


When the steel ball is pressed by fingers, the steel ball projected section is pushed into the rubber.

M104-07-059

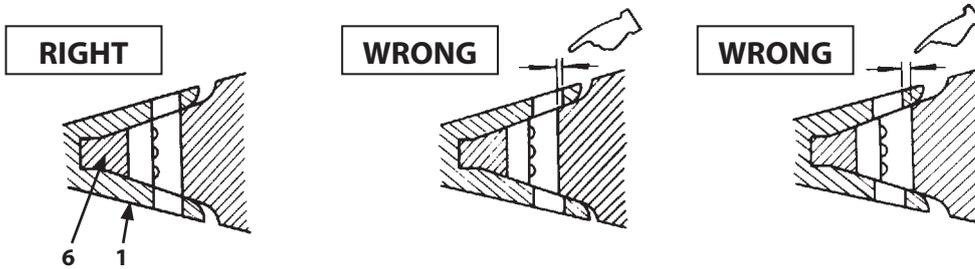
CLAMSHELL BUCKET MAINTENANCE

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



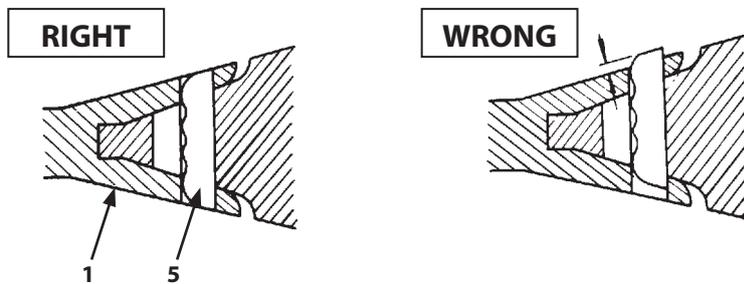
M104-07-060

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



M104-07-061

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

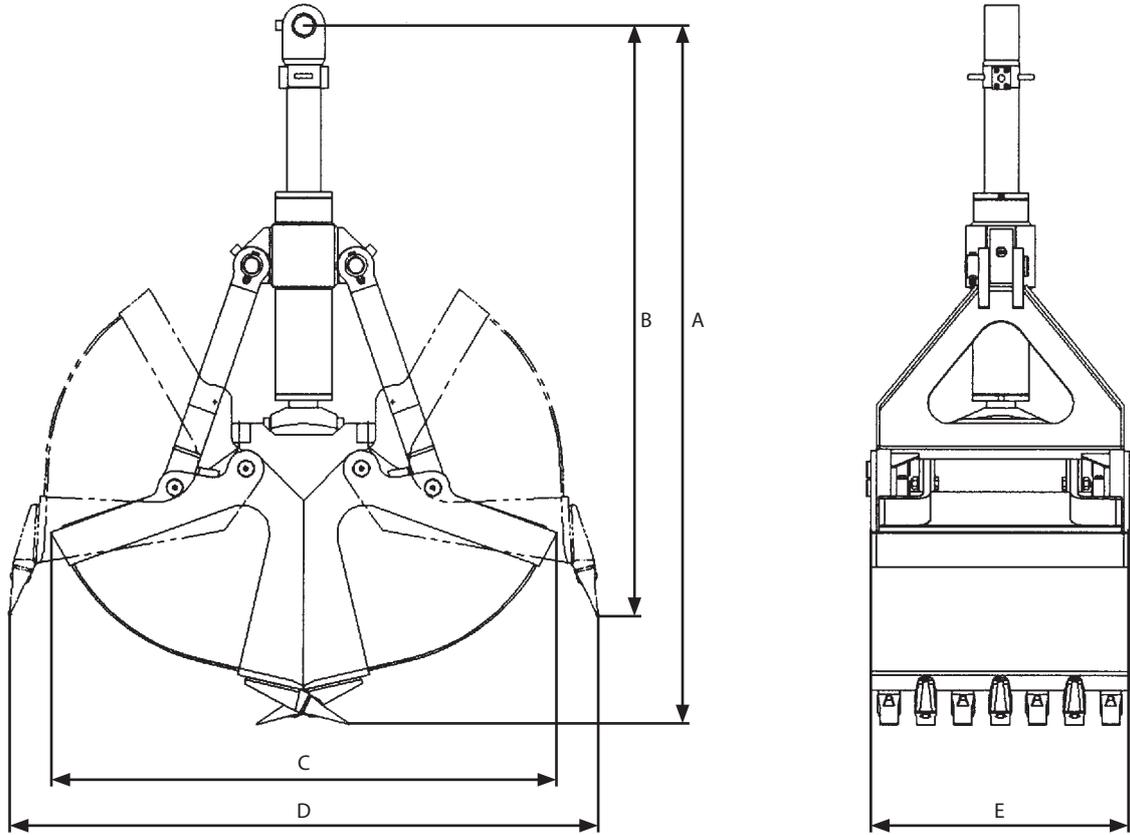


M104-07-062

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

CLAMSHELL BUCKET SPECIFICATIONS

Specifications



M1GD-12-004

Bucket		0.2 m ³	0.25 m ³	0.28 m ³
Description				
Weight	kg	390	570	575
Hydraulic Pressure	MPa (kgf/cm ²)	28 (285)	34.3 (350)	34.3 (350)
Maximum Bucket Open/Close Speed	Open sec	1.5	1.5	1.5
	Close sec	1.5	1.5	1.5
A: Overall Height	mm	1870	1985	2100
B: Height when fully opened	mm	1625	1735	1790
C: Width when fully closed	mm	1030	1100	1260
D: Width when fully opened	mm	1435	1495	1500
E: Shell Width	mm	590	685	685

- NOTE:**
- Adjust the set-pressure of the hydraulic relief valve on the base machine so that the hydraulic pressure does not become higher than the pressure value shown in the Table above.
 - Adjust the oil flow rate of the hydraulic pump on the base machine so that the bucket open/close speed does not become faster than the speed shown in the Table above.

ZOOM CAMERA (OPTIONAL)

PRECAUTIONS ON USE

Precautions on Use

- Zoom Camera for Use with Telescopic Clamshell Specifications Machines

This zoom camera is designed to be mounted on the telescopic arm of a machine with a telescopic clamshell specification to allow the operator to check what is being excavated and its surroundings.

The zoom camera is part of a system designed to assist in checking what is being excavated and obstacles around it; do not rely just on its images when operating the machine. Some areas cannot be captured by the camera and depicted on the monitor, and there may be differences in how the image appears and the actual situation. Failure to fully understand the nature of the image and use it accordingly may cause serious accident or injury.

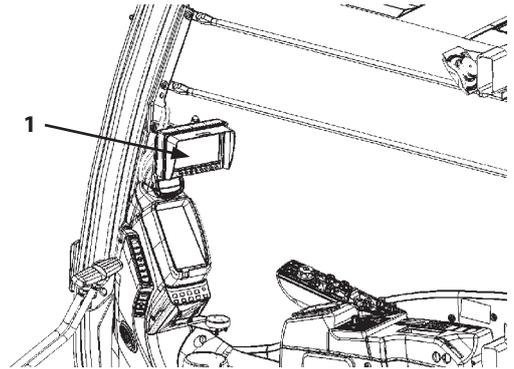
CAUTION:

- **The image on the monitor appears different from reality.**
- **Use the camera after fully understanding its characteristics.**
- **Before using this camera, thoroughly read and understand this user's manual and then use it accordingly.**
- **A clear image may not be shown on the monitor if the area around the machine is too bright or too dark. If the area is not suitably bright, either adjust the brightness or stop using the monitor.**

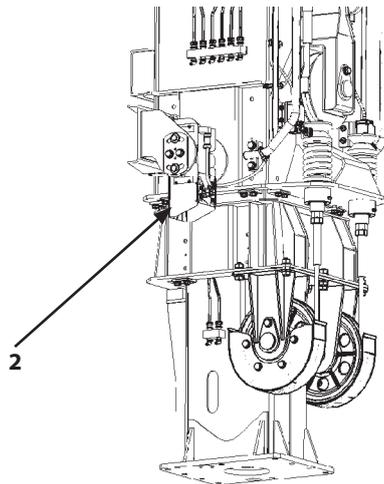
ZOOM CAMERA (OPTIONAL) COMPONENTS

Name of Components

- 1- Monitor
- 2- Zoom Camera



MDDE-RT2-001

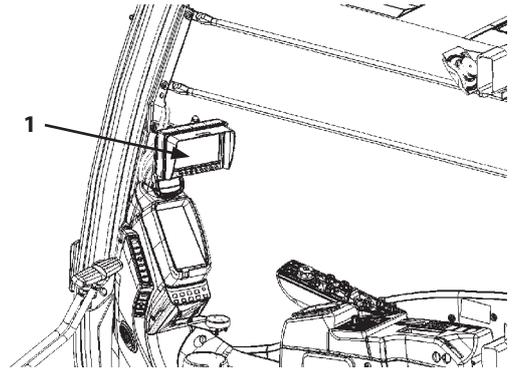


MDDE-RT2-002

ZOOM CAMERA (OPTIONAL) OPERATOR'S CAB

Name of Components

1- Monitor



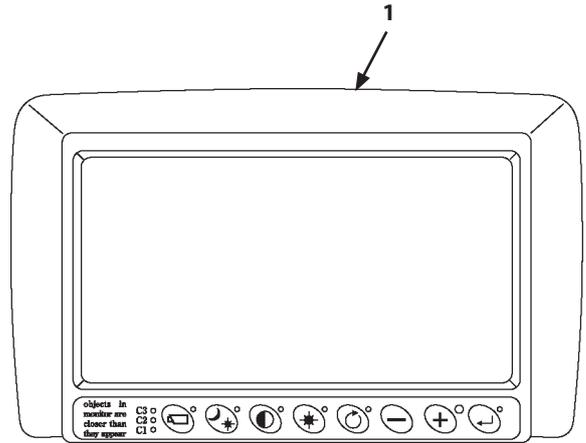
MDDE-RT2-001

ZOOM CAMERA (OPTIONAL) OPERATION GUIDE

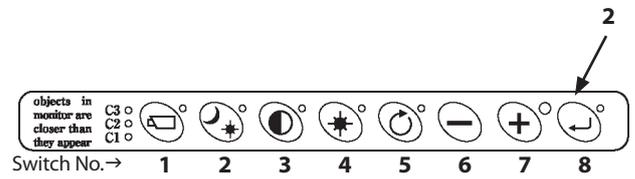
Monitor Switches

Switch panel (2) at the bottom of monitor (1) has 8 switches, numbered 1 to 8.

- Switch 1: Disabled



MQHA-OP01-001



MQHA-OP03-001

ZOOM CAMERA (OPTIONAL) OPERATION GUIDE

- Switch 2: Zero light and backlight switches
 - If switch 2 and then switch 6 (-) are pressed, "Z" is displayed at top-left and the night mode (Zero light function) is enabled.

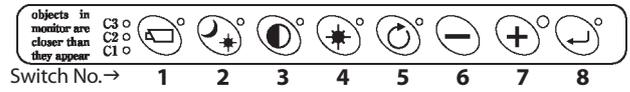
Pressing switch 6 (-) again cancels the mode.

※ Night mode (zero light function):

Although the function makes it possible to check the image even in a dark environment, the image appears in monochrome (black/white) in a bright environment as well.

- If switch 2 and then switch 7 (+) are pressed, "B" is displayed at top-left and the backlight of the monitor is enabled.

Pressing switch 7 (+) again cancels the mode.



MQHA-OP03-001

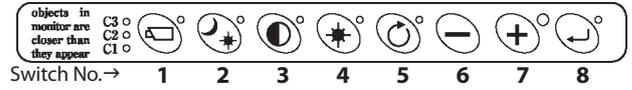
ZOOM CAMERA (OPTIONAL)

OPERATION GUIDE

- **Switch 3: Contrast adjustment**

Contrast refers due to the difference in brightness between the brightest and darkest parts of the image.

When the contrast is high the difference between dark and light becomes greater, so while the bright and dark parts are clearly defined, colors in between are not. Conversely, when the contrast is low the difference between dark and light shrinks, the color in the intermediate range increases, but the difference between bright and dark parts is not as clear.



MQHA-OP03-001

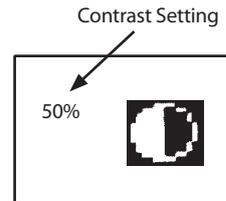
Adjusting the Contrast

1. Pressing contrast adjustment switch 3 once switches the system to the contrast adjustment screen.
2. Push switch 6 (-) to lower the contrast or switch 7 (+) to raise it.

Factory Default Setting:

Contrast setting 50 %

The contrast value is displayed as a percentage at top-left of the screen.



MQHA-03-012

- **Switch 4: Brightness adjustment**

Brightness means the level of brightness of the screen.

Increasing the brightness raises the brightness of each individual display element of the screen, while decreasing it lowers them.

It has a similar effect to that of the backlight effect of switch 2.

If the screen is too bright and bothers your eyes, use it with the brightness lowered.

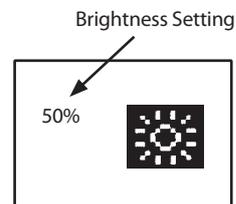
Adjusting the Brightness

1. Pressing brightness adjustment switch 4 once switches the system to the brightness adjustment screen.
2. Push switch 6 (-) to lower the brightness or switch 7 (+) to raise it.

Factory Default Setting:

Brightness Setting 50 %

The Brightness value is displayed as a percentage at top-left of the screen.



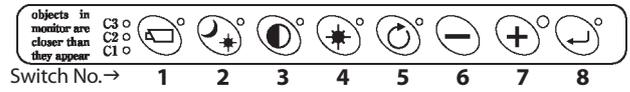
MQHA-03-013

ZOOM CAMERA (OPTIONAL)

OPERATION GUIDE

- Pressing switches 3 and 4 simultaneously: Saturation adjustment

Use the saturation adjustment to adjust the saturation of the screen. Increasing the saturation setting makes the screen more vivid, so the dark parts of the image become brighter, but raising it too high fixes the bright parts at the maximum value, making them completely white. Lowering the saturation makes the image less vivid, so the bright parts are not cropped at the maximum value and can be seen, but the dark parts become darker.



MQHA-OP03-001

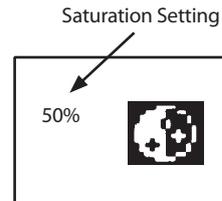
Adjusting the Saturation

- Pressing switches 3 and 4 simultaneously switches to the saturation adjustment screen.
- Push switch 6 (-) to lower the saturation or switch 7 (+) to raise it.

Factory Default Setting:

Saturation Setting 50 %

The saturation value is displayed as a percentage at top-left of the screen.



MQHA-03-014

- Switch 5: Zoom adjustment**
Pushing switch 5 displays "ZOOM" at the top-left of the monitor.
Pressing switch 7 (+) in that state zooms the camera in. In the same way, pressing switch 6 (-) zooms it out.
- Switch 6: Minus (-) switch**
- Switch 7: Plus (+) switch**
- Switch 8: Standby mode switch**
Pressing switch 8 once puts it in the standby mode and the screen goes dark. Pressing it again puts it in the normal mode and the image is displayed.

ZOOM CAMERA (OPTIONAL) OPERATION GUIDE

Backlighting, Reflections or Poor Field of Vision

If problems such as backlighting, reflections or poor field of vision exist during use, it may be difficult to see the image on the monitor.

- If the screen is hard to see because of backlighting or reflections, either adjust the angle of the monitor or stop using the device.
- If the problem is poor field of vision, stop using the monitor.

ZOOM CAMERA (OPTIONAL) INSPECTION AND MAINTENANCE

Inspection Items

Inspect and/or maintain the following items before use.

- [1] Check operation of the monitor
- [2] Check the quality of the image
- [3] Check for damage and installation state of camera and wiring harness
- [4] Clean the camera lens and monitor

Maintenance Items

Maintain the following items before use.

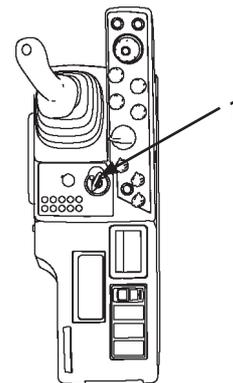
- 1** Check the image
---as needed

IMPORTANT: Check the image while on solid, level ground. The image cannot be checked reliably while on a slope or uneven ground.

Turn key switch (1) of the machine ON and check whether the initial screen is displayed or not. The initial screen is displayed after the key switch is turned ON.

Consult your authorized dealer for inspection and/or maintenance if the screen is in the following states.

- The initial screen is not displayed.
- The screen is frozen (The screen is locking up)
- When it is partly blue screen



MDAA-01-346

ZOOM CAMERA (OPTIONAL) INSPECTION AND MAINTENANCE

- 2** Check the quality of the image
---as needed

⚠ WARNING: Noise may occur due to problems with the camera. Check and make sure there are no problems with the image.

If the image on the screen is difficult to see, refer to the section Cleaning the Camera Lens and clean the lens.

- 3** Damage and installation state of camera and wiring harness
---as needed

Inspect for damage to the camera or wiring harness, and check for looseness to the mounting bracket of the camera.

- 4** Clean the camera lens and monitor
---as needed

⚠ WARNING: A clear image cannot be displayed if the lens of the camera is dirty. Check whether the lens is dirty.

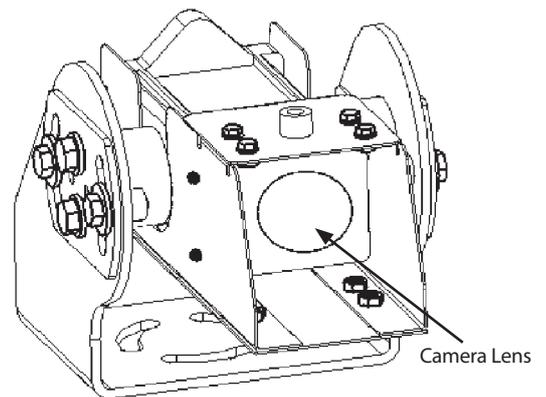
The image on the monitor becomes difficult to see if things like water drops, dust or oil are on the camera lens or monitor screen.

When the image is difficult to see, follow the steps below to clean the lens and/or the screen of the monitor.

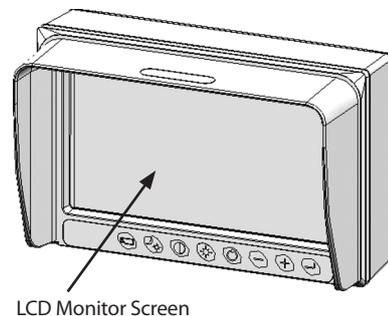
Carefully wipe the surface of the lens and/or the monitor screen with a soft cloth to avoid scratching them.

IMPORTANT: Never use an organic solvent for cleaning them.

Pressing hard while cleaning may damage the camera or the monitor.



MDDE-RT2-003



MDCK-OP3-029

INDEX

A		D	
ASSEMBLING/DISASSEMBLING	6-1	DRIVING THE MACHINE	4-1
Adjust the Operator's Seat	5-3	Daily Check	8-8
After the First 100 Hours	2-1	Daily Inspection	8-6
After the First 50 Hours	2-1	Damage and installation state of camera and wiring harness.....	13-10
Allowance in Cylinder Stroke	12-8	Dig with Caution.....	5-14
Attachment Pedal	5-3	Displaying Basic Screen	1-6
Attachment selection	1-18	Do Not Pull the Bucket Out of the Ground Forcibly.....	5-13
Auto-Idle Switch	1-12	Do Not Raise Base Machine Off the Ground.....	5-13
Avoid Applying Loads Laterally to the Front Attachment.....	5-12	Do Not Swing the Bucket	5-10
Avoid Collision of Cab and Bucket	5-18	Do Not Use Arm Stopper to Push Loads	5-14
Avoid Digging Firm Ground	5-11	Drive Machine Safely.....	5-8
Avoid Excavating/Loading Solid Material.....	5-15	Driving on Level Ground.....	4-5
Avoid Heavy Load Operation.....	5-12	E	
Avoid Inclined Operation	5-10	Engine Stop Switch.....	1-16
Avoid Injury from Back-Over and Swing Accidents	5-11	Ensure Safety Before Rising from or Leaving Operator's Seat	5-4
Avoid Injury from Rollaway Accidents.....	5-10	Equipment of OPG	5-7
Avoid Object Handling.....	5-15	Every 8 Hours or Daily.....	2-1
Avoid Power Lines.....	5-14	Excavation and Loading.....	5-9
Avoid Quick Operation.....	5-16	Excavation Methods	12-2
Avoid Quick Operation of the Arm Cylinder.....	5-10	F	
Avoid Tipping.....	5-13	Fasten Your Seat Belt	5-4
Avoid Undercutting.....	5-12	Follow Safety Instructions.....	5-2
Avoid Underwater Digging.....	5-17	Front Joint Pins.....	8-13
		Fuel Gauge.....	1-9
B		G	
BREAK-IN.....	2-1	General Inside Structure of Telescopic Arm.....	1-3
Backlighting, Reflections or Poor Field of Vision.....	13-8	Greasing.....	8-13
Basic Screen.....	1-5	H	
Before Starting Engine	3-4	HYDRAULIC CIRCUIT.....	9-1
Boom Raise Control	5-8	Horn Switch.....	1-14
Boom Raise Control System.....	8-21	Hose Reel.....	8-17
Bucket Lifting Procedure	12-4	Hose Replacement --- every 1000 hours.....	8-17
		Hour Meter.....	1-9
C		How to Use Screens.....	1-6
CLAMSHELL BUCKET	12-1	Hydraulic Circuit	9-1
COMPONENTS NAME.....	1-1	Hydraulic System	8-16
Cab Door Release Lever	1-17	I	
Cab Features.....	1-4	Increasing Counterweight	5-5
Carefully Rotate Bucket.....	5-19, 5-17	Inspect Machine Daily Before Starting	3-1
Check and Replace Slide Plate.....	8-19	Inspection Items	13-9
Check Bucket Teeth	12-10	Installation and Adjustment of Mirrors	1-19
Check Hoses in Telescopic Arm	8-19	Installation of Bucket	6-7
Check Hydraulic Oil Level --- daily	8-16	Installation of Telescopic Arm.....	6-6
Check Level Gauge --- as necessary	8-20	Investigate Job Site Beforehand	5-6
Check the Hour Meter Regularly.....	8-3	K	
Check the image.....	13-9	Keep Person Clear from Working Area.....	5-11
Check the quality of the image	13-10	Key Switch.....	1-13
Check Tightening Torque of Bolts and Nuts	8-22	L	
Clean the camera lens and monitor	13-10	Level Gauge.....	1-14, 8-20
Clock.....	1-9		
Components Name	1-1, 12-1		
Control Lever (HITACHI Pattern).....	5-2		
Control Lever (ISO Pattern)	5-1		
Correct Maintenance and Inspection Procedures.....	8-1		

INDEX

Lifting Procedure of Telescopic Arm.....	6-6	Precautions for Lightning.....	S-15
Loading/Unloading on a Trailer	7-1	Precautions for Operations.....	5-5, 12-2
M		Precautions for Position of Telescopic Arm without Bucket	6-3
MACHINE NUMBERS	1	Precautions for Repair Welding.....	12-9
MAINTENANCE	8-1	Precautions for Slinging Work.....	6-5
Machine Dimensions and Weight Without Telescopic Arm and Bucket.....	6-6	Precautions for Traveling on Slopes.....	4-6
Machine Lifting Procedure.....	7-4	Precautions on Use	13-1
Maintenance	12-7	Preparation for Work	6-4
Maintenance Guide	8-9	Preparations for Inspection and Maintenance	8-5
Maintenance Guide Table.....	8-4, 12-5	R	
Maintenance Items	13-9	Recognize Safety Information	S-1
Mirror Installation Diagram	1-20	Replace Bearing --- every 1000 hours	8-18
Monitor Switches.....	13-4	Replace Hoses in Telescopic Arm.....	8-19
Move and Operate Machine Safely.....	S-5	Replace Rubber Hoses Periodically.....	S-25
N		Replace Spring --- every 1000 hours	8-18
Name of Components	13-2, 13-3	Replace Swivel Joint --- every 1000 hours.....	8-18
Never Operate Machine Beyond Specified Working Range	S-17, 5-11	S	
Never Position Bucket Over Anyone	S-12	SAFETY	S-1
Never Ride Attachment.....	S-19	SAFETY SIGNS	S-31
Never Turn the Bucket by Hitting It	5-16	SPECIFICATIONS	11-1
Never Use Bucket Beyond Specifications	5-18	STORAGE.....	10-1
Never Use Machine Beyond Its Specifications.....	S-18	Select Correct Track Shoes	5-18
New Machine or After Long Intermission.....	2-2	Setting Up the Machine for Operation	5-7
Notes on Protection of Operator's Station when the Machine Rolls Over.....	S-28	Shackle Hole Usage	5-19
O		Soil Backfilling	5-11
OPERATING THE ENGINE	3-1	Specifications.....	11-1, 12-12
OPERATING THE MACHINE.....	5-1	Starting the Engine.....	3-4
OPERATOR'S STATION	1-5	Stay Clear of Moving Parts	S-24
Observe Engine Operation Closely.....	2-1	Stopping the Engine	3-4
Operate the Machine Safely	5-6	Store Attachments Safely	S-24
Operate with Caution	S-14	Switch Panel	1-10
Operating the Machine After Storage	5-10	Switch Panel (for Optional Equipments).....	1-15
Operating Tips	5-12	T	
Others.....	8-21	TRANSPORTING.....	7-1
P		Telescopic Arm	8-19
Park Machine Safely.....	S-20	Telescopic Arm Sliding Surface	8-14
Parking the Machine	4-7	Towing Machine a Short Distance.....	4-4
Parking the Machine on Slopes.....	4-7	Transport Safely	S-21
Periodic Replacement of Parts.....	8-11	Transportation.....	12-3
Pilot Control Shut-Off Lever	1-16	Transporting by Road	7-1, 12-3
Power Boost Switch	1-14	Travel Levers and Pedals.....	4-1
Power Mode Switch.....	1-13	Travel Mode Switch	1-12
Practice Safe Maintenance.....	S-22	Traveling	4-3
Precaution for Machine Storage	10-1	U	
Precautions for After Operations	5-20	Understand Signal Words.....	S-1
Precautions for Assembling and Disassembling.....	6-1	Use Handholds and Steps	S-3
Precautions for Communication Terminal Equipment ...	S-26	V	
Precautions for Excavation.....	5-16	VISIBILITY MAP	S-29
Precautions For Handling Coupler (Self-Seal Joint)	6-8	W	
Precautions for Installation/Removal Front Attachment.....	6-2	Warming Up Operation.....	5-4
		Work Mode	1-18
		Working Ranges.....	11-2

INDEX

Z

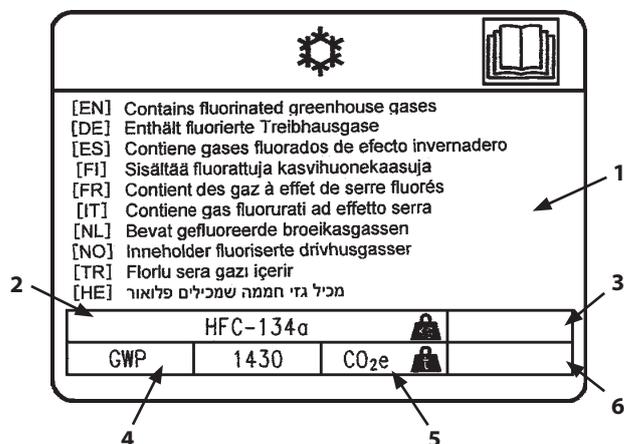
ZOOM CAMERA (OPTIONAL) 13-1

CONFORMITY

Information on the fluorinated greenhouse gas contained in the machine

Label on the machine

1. Text showing this machine contains fluorinated greenhouse gases.
2. Type of Refrigerant: HFC-134a
3. Amount of refrigerant in kilogram
4. Global Warming Potential (GWP) means a climatic warming potential of a greenhouse gas relative to that of carbon dioxide.
5. tonne(s) of CO₂ equivalent (CO₂e) means a quantity of greenhouse gases, expressed as the product of the weight of the greenhouse gases in metric tonnes and of their global warming potential.
6. CO₂e in tonnes



MPD8-00-001

* Immediately resolve any leakage to limit the environmental impact.

* For the refrigerant and CO₂e amount, please refer to the maintenance page for the Air Conditioner.

* Filling and retrieval should be performed by qualified personnel and waste refrigerant should be disposed in accordance with local regulations.

Telescopic Arm (Rope type) ZX135US-6

Operator's Manual (Original Instruction)

Manual part number : ENMDAS-HT1-2

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