

PART NO. EM18J-EN1-9

HITACHI

Reliable solutions

Operator's Manual

EX 1200-6

Hydraulic Excavator

EX1200-6 HYDRAULIC EXCAVATOR OPERATOR'S MANUAL

 **Hitachi Construction Machinery Co., Ltd.**
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EM18J-EN1-9

Serial No 1558 and up

INTRODUCTION

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

This standard specification machine can be operated under the following conditions without being modified.
Atmospheric Temperature: -20 °C to 50 °C (-4 °F to 122 °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 authorized dealer.

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

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

- SI Units (International System of Units) are used in this manual.
For reference MKS system units and English units are also indicated in parentheses after the SI units.
Example : 24.5 MPa (250 kgf/cm², 3550 psi)

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

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

Use only diesel fuel with quality specified in JIS K-2204, EN-590 or ASTM D-975 which contents 15 ppm or lower sulfur.

Also use fuel that complies with solid contamination level of class 18/16/13 of ISO4406-1999 (solid contamination includes dust). If the fuel specified above is not used, exhaust gas that exceeds the regulation values may be discharged, causing serious problem on the engine. Consult your authorized dealer.

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

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

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

Setting fuel delivery above specifications or otherwise overpowering machines will result in such action. Moreover, when replacement parts are required, be sure to use genuine Hitachi parts. Failure to do so may result in voiding the warranty and/or denial of field improvements.

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

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

Only qualified, experienced operators officially licensed (according to local law) should be allowed to operate the machine.

Moreover, only officially licensed personnel should be allowed to inspect and service the machine.

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

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

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

GETTING ON/OFF MACHINE

HANDLING LADDER

OPERATOR'S STATION

BREAK-IN

OPERATING ENGINE

DRIVING MACHINE

OPERATING MACHINE

TRANSPORTING

MAINTENANCE

MAINTENANCE UNDER SPECIAL ENVIRONMENTAL CONDITIONS

STORAGE

TROUBLESHOOTING

SPECIFICATIONS

INDEX

CONTENTS

MACHINE NUMBERS	1	Avoid Applying Heat to Lines Containing Flammable Fluids	S-30
SAFETY	S-1	Precautions for Handling Accumulator and Gas Damper.....	S-30
Recognize Safety Information	S-1	Remove Paint before Welding or Heating	S-31
Understand Signal Words.....	S-1	Beware of Asbestos and Silicon Dust and Other Contamination.....	S-31
Follow Safety Instructions.....	S-2	Prevent Battery Explosions	S-32
Prepare for Emergencies.....	S-2	Service Air Conditioning System Safely	S-32
Wear Protective Clothing.....	S-3	Handle Chemical Products Safely.....	S-33
Protect Against Noise	S-3	Dispose of Waste Properly.....	S-33
Inspect Machine	S-3	Never Ride Attachment.....	S-33
General Precautions for Cab.....	S-4	Precautions for Communication Terminal.....	S-33
Use Handholds and Steps	S-5	Precautions for Communication Terminal Equipment (Optional).....	S-34
Adjust Operator's Seat.....	S-5	Machine Fire Suppression	S-36
Ensure Safety Before Rising From or Leaving Operator's Seat	S-5	VISIBILITY MAP	S-37
Fasten Your Seat Belt.....	S-6	SAFETY SIGNS	S-38
Move and Operate Machine Safely.....	S-6	COMPONENTS NAME	1-1
Handle Starting Aids Safely	S-6	Components Name	1-1
Operate Only from Operator's Seat	S-7	GETTING ON/OFF MACHINE	1-2
Jump Starting	S-7	Getting ON/OFF Machine.....	1-2
Keep Riders off Machine	S-7	HANDLING LADDER	1-3
Precautions for Operations	S-8	Using Ladder (Optional).....	1-3
Investigate Job Site Beforehand	S-9	Operating Ladder on the Ground.....	1-4
Install OPG Guard	S-10	Extending	1-4
Restriction of Attachment Installation	S-10	Retracting	1-4
Provide Signals for Jobs Involving Multiple Machines....	S-10	Operating Ladder on the Upper-Structure	1-4
Confirm Direction of Machine to be Driven	S-10	Extending	1-4
Drive Machine Safely.....	S-11	Retracting	1-4
Avoid Injury from Rollaway Accidents.....	S-13	OPERATOR'S STATION	1-5
Avoid Injury from Back-Over and Swing Accidents	S-14	Cab Features.....	1-5
Keep Person Clear from Working Area.....	S-15	Std. Model.....	1-5
Never Position Bucket Over Anyone	S-15	Multi Function Monitor	1-6
Avoid Undercutting.....	S-15	How to Use Screens	1-6
Avoid Tipping.....	S-16	Displaying Basic Screen	1-6
Never Undercut a High Bank.....	S-16	Outline.....	1-7
Dig with Caution.....	S-17	Menu Screen (19)	1-9
Operate with Caution	S-17	Hour Meter	1-10
Avoid Power Lines.....	S-18	Fuel Gauge	1-10
Precautions for Lightning.....	S-18	Clock.....	1-10
Object Handling	S-19	Back Monitor Selector	1-10
Protect Against Flying Debris and Falling Object.....	S-20	Menu Key	1-11
Park Machine Safely.....	S-21	Optional Function Key	1-11
Handle Fluids Safely – Avoid Fires.....	S-21	Return to Basic Screen Key	1-11
Practice Safe Maintenance.....	S-22	Alarm Light.....	1-11
Warn Others of Service Work	S-23	Optional Function Display	1-11
Support Machine Properly.....	S-23	Coolant Temperature Gauge	1-12
Stay Clear of Moving Parts	S-24	Operating Status Icon Display.....	1-12
Prevent Parts from Flying	S-24	Displaying Basic Screen by Password Input (Optional)	1-13
Avoid Injury from Attachment Falling Accident	S-24	In Case of Inputting an Incorrect Password	1-14
Prevent Burns.....	S-25	Extending Password Duration Time.....	1-16
Replace Rubber Hoses Periodically.....	S-25		
Avoid High-Pressure Fluids	S-26		
Prevent Fires.....	S-27		
Evacuating in Case of Fire.....	S-29		
Beware of Exhaust Fumes.....	S-29		
Precautions for Welding and Grinding	S-29		
Avoid Heating Near Pressurized Fluid Lines	S-30		

CONTENTS

Alarm Occurrence Screen.....	1-17	Sound Adjustment	1-59
Contents of Alarms	1-19	Digital Clock Setting Procedure	1-59
Clock Setting	1-22	Cab Door Release Lever	1-60
Time Adjustment	1-22	Opening Side Windows.....	1-60
Password Change (Optional)	1-23	Emergency Exit	1-61
Back Monitor Settings	1-26	Emergency Exit (Elevated Cab).....	1-62
Auto-Control: ON	1-26	Emergency Escape Rope (Elevated Cab).....	1-63
Auto-Control: OFF.....	1-27	Storing Emergency Escape Rope.....	1-63
Maintenance Settings.....	1-28	Adjusting Seat	1-64
Maintenance Information Display ON/OFF	1-28	Seat Height and Angle Adjustment	1-64
Change Interval Settings.....	1-29	Console and Seat Fore-aft Adjustment.....	1-64
Resetting Data.....	1-30	Seat Fore-Aft Adjustment	1-64
Screen Display when Maintenance Information		Backrest Adjustment	1-64
Display is ON	1-31	Armrest Adjustment	1-65
Language Settings	1-33	Adjusting Seat (Heater Seat Optional).....	1-66
Lists of Display Language	1-34	Seat Height and Angle Adjustment	1-66
Switch Panel.....	1-35	Console and Seat Fore-aft Adjustment.....	1-66
Engine Control Dial.....	1-36	Seat Fore-Aft Adjustment	1-66
Auto-Idle Switch	1-36	Backrest Adjustment	1-66
Power Mode Switch.....	1-37	Armrest Adjustment	1-67
Travel Mode Switch	1-37	Seat Heater Switch	1-67
Work Light Switch	1-38	Adjusting Air-Suspension Seat (Optional).....	1-68
Wiper/Washer Switch.....	1-39	Seat Height and Angle Adjustment	1-68
Switch Panel (Optional Included)	1-40	Console and Seat Fore-aft Adjustment.....	1-68
Travel Alarm Deactivation Switch (Optional).....	1-41	Seat Fore-Aft Adjustment	1-68
Seat Heater Switch (Optional)	1-41	Suspension Adjustment.....	1-68
Boom Mode Switch.....	1-42	Backrest Adjustment	1-68
Level Check Switch.....	1-42	Armrest Adjustment	1-69
Lubrication Mode Switch (Optional).....	1-42	Seat Heater Switch	1-69
Buzzer Deactivation Switch.....	1-42	Adjusting Console Height	1-70
Key Switch.....	1-43	Adjusting Procedures	1-70
Horn Switch	1-43	Installation and Adjustment of Mirror and Camera.....	1-71
Cigar Lighter.....	1-44	Seat Belt	1-72
Operation.....	1-44	Seat Belt.....	1-72
Cab Light Switch.....	1-45	Battery Disconnect Switch.....	1-73
Step Light Switch.....	1-45	How to operate the disconnect switch.....	1-73
Installing Fire Extinguisher (Optional)	1-46	BREAK-IN	2-1
Engine Fault Diagnostics Switch.....	1-46	Observe Engine Operation Closely	2-1
Pilot Control Shut-Off Lever	1-47	Every 10 Hours or Daily	2-1
Fuse Box 1	1-48	After the First 50 Hours	2-1
Fuse Box 2	1-48	OPERATING ENGINE	3-1
Air Conditioner Operation	1-49	Inspect Machine Daily Before Starting	3-1
Features:.....	1-49	Before Starting Engine	3-2
Auto Air Conditioner	1-50	Level Check.....	3-3
Distinctive Feature.....	1-50	Starting Engine in Ordinary Temperature	3-4
Controller Part Name and Function	1-51	Starting Engine in Cold Weather.....	3-5
Cab Heater Operation.....	1-55	Check Instruments After Starting.....	3-6
Cooling Operation	1-55	Using Booster Batteries.....	3-7
Defroster Operation	1-56	Stopping Engine.....	3-9
Tips for Optimal Air Conditioner Usage	1-57	Engine Stop Switch.....	3-10
For Rapid Cooling	1-57	DRIVING MACHINE	4-1
When Windows Become Clouded	1-57	Drive Machine Carefully.....	4-1
Off-Season Air Conditioner Maintenance.....	1-57	Steering Machine Using Pedals.....	4-2
AM/FM Radio Operation.....	1-58	Steering Machine Using Levers.....	4-3
Tuning Procedure	1-58	Travel Mode Switch	4-4
Station Presetting Procedure.....	1-58		

CONTENTS

Travel Alarm (Optional)	4-4	Lubricator	7-31
Operating on Soft Ground	4-5	Swing Internal Gear.....	7-33
Raise One Track Using Boom and Arm	4-5	Fan Pulley and Tension Pulley	7-34
Towing Machine a Short Distance.....	4-6	B. Engine.....	7-35
Operating in Ground Condition.....	4-7	Check Engine Oil Level.....	7-36
Parking Machine on Slopes	4-8	Change Engine Oil.....	7-37
Parking Machine	4-8	Replace Engine Oil Filter.....	7-37
OPERATING MACHINE.....	5-1	C. Transmission.....	7-39
Control Lever (ISO Pattern Backhoe).....	5-1	Pump Transmission	7-40
Control Lever (ISO Pattern Loading Shovel)	5-2	Swing Reduction Gear	7-43
Bucket Open-Close Pedals (Loading Shovel)	5-3	Travel Reduction Gear	7-45
Control Lever (Hitachi Pattern Backhoe) (Optional)	5-4	D. Hydraulic System.....	7-47
Control Lever (Hitachi Pattern Loading Shovel) (Optional).....	5-5	Inspection and Maintenance of Hydraulic Equipment	7-48
Pilot Control Shut-Off Lever	5-6	Check Hydraulic Oil Level	7-50
Warming-Up Operation	5-7	Drain Hydraulic Oil Tank Sump	7-51
Auto-Idle.....	5-8	Change Hydraulic Oil.....	7-52
Engine Speed Control.....	5-9	Suction Filter Cleaning.....	7-55
Power Mode	5-10	Replace Drain Filter	7-56
E (Economy) Mode.....	5-11	Replace Full-Flow Filter Element	7-58
P (Power) Mode.....	5-12	Replace Pilot Oil Filter.....	7-60
H/P (High Power) Mode	5-13	Replace High-Pressure Filter Element	7-62
Heavy Lift.....	5-14	Replace Tank Air Breather Element.....	7-63
Operating Backhoe.....	5-15	Check Hoses and Lines	7-64
Grading Operation.....	5-15	E. Fuel System	7-70
Avoid Abusive Operation	5-16	Drain Fuel Tank Sump.....	7-72
Avoid Side Load the Bucket.....	5-16	Drain Fuel Pre-Filter Sediment (Optional).....	7-73
Operating Tips	5-17	Replace Fuel Pre-Filter Element (Optional).....	7-74
Select Correct Track Shoes	5-17	Drain Fuel Filter Sediment	7-75
Operating Loading Shovel	5-18	Replace Fuel Filter.....	7-76
Prohibited Operation	5-18	Check Fuel Hoses	7-77
Object Handling --- If Equipped.....	5-21	Clean Fuel Cooler Core.....	7-79
Overnight Storage Instructions.....	5-22	F. Air Cleaner.....	7-80
TRANSPORTING	6-1	Clean Air Cleaner Outer Element	7-80
Transporting.....	6-1	Replace Air Cleaner Outer and Inner Elements.....	7-80
MAINTENANCE	7-1	G. Cooling System	7-82
Correct Maintenance and Inspection Procedures.....	7-1	Check Coolant Level	7-83
Check Hour Meter Regularly	7-2	Check DCA4 Concentration in Coolant.....	7-84
Use Correct Fuels and Lubricants	7-2	Replace Coolant Filter	7-92
Maintenance Guide Table.....	7-3	Change Coolant.....	7-93
Prepare Machine for Maintenance.....	7-6	Check Fan Belt for Wear	7-94
Hood and Access Covers.....	7-8	Clean Radiator, Inter Cooler and Oil Cooler Core	7-95
Use Electrical Outlet (Optional).....	7-8	Clean Inter Cooler Front Screen.....	7-95
Construction Outline	7-9	Clean Oil Cooler Front Screen.....	7-95
Hydraulic System.....	7-11	H. Air Conditioner.....	7-96
Loading Shovel.....	7-12	Recirculation Air Filter	7-96
Backhoe	7-13	Ventilation Air Filter	7-97
Electrical Circuit	7-14	Check Refrigerant Quantity.....	7-98
EX1200-6 Electrical Circuit Diagram	7-15	Check Compressor Belt Tension	7-99
Periodic Replacement of Parts.....	7-17	Clean Condenser Core	7-99
Periodic Replacement of Rubber Hoses.....	7-18	Check Tightening Torque	7-100
Maintenance Interval Guide.....	7-21	Seasonal Maintenance.....	7-101
A. Greasing.....	7-25	I. Electrical System.....	7-102
Front Joint Pins	7-26	Batteries	7-103
Swing Bearing	7-30	Replacing Fuses.....	7-107
		Check Power Source Terminal	7-109

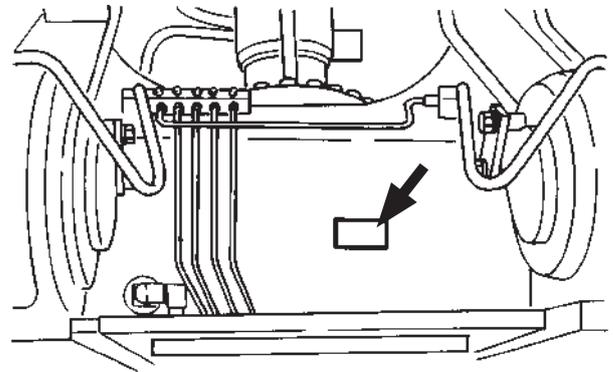
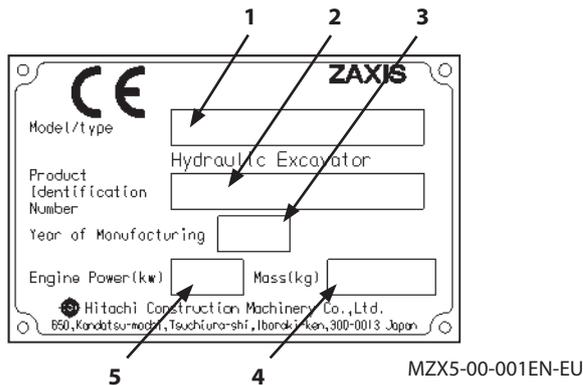
CONTENTS

Check Electrical Cables and Wire Harnesses for Short Circuits.....	7-110
J. Miscellaneous	7-112
Check Bucket Teeth	7-113
Change Bucket (Backhoe).....	7-118
Check and Replace Seat Belt.....	7-119
Check Windshield Washer Fluid Level	7-119
Check Track Sag	7-120
Auto-Lubrication System	7-122
Check Tightening Torque of Bolts and Nuts.....	7-126
Check O-rings in Bucket Joints	7-140
Check Handrails.....	7-141
MAINTENANCE UNDER SPECIAL ENVIRONMENTAL CONDITIONS	9-1
Maintenance Under Special Environmental Conditions...	9-1
STORAGE	10-1
Storing Machine.....	10-1
Removing Machine from Storage	10-2
Transporting Machine	10-2
TROUBLESHOOTING	11-1
Engine Troubleshooting	11-1
How to Read Engine Fault Codes.....	11-2
Engine.....	11-3
Electrical System.....	11-6
Mode Selection	11-8
Control Levers.....	11-8
Hydraulic System.....	11-9
SPECIFICATIONS	12-1
Specifications.....	12-1
Working Range (Backhoe).....	12-3
Working Range (BE Backhoe).....	12-4
Working Range (Loading Shovel).....	12-5
Backhoe Shoe Types and Applications.....	12-6
Sound Level Results.....	12-7
Electric Fans.....	12-7
INDEX	14-1

MACHINE NUMBERS

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

Machine



M142-12-001

1. MODEL/TYPE
2. Product Identification Number
3. Year of Manufacturing
4. Operating mass (standard version)
5. Engine power in kW according to ISO14396 ; 2002

MODEL/TYPE: _____

PRODUCT IDENTIFICATION NUMBER: _____

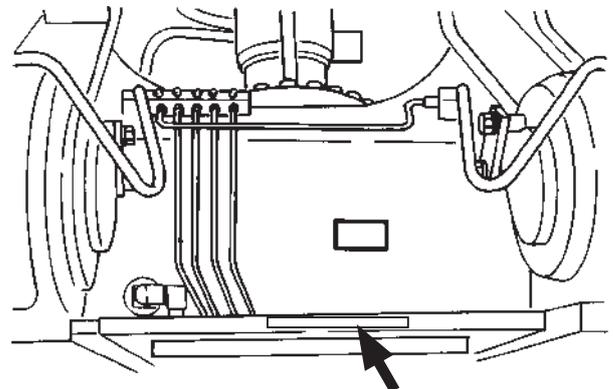
Product Identification Number

PRODUCT IDENTIFICATION NUMBER: _____

NOTE:

HCM18J00A00001001
Marks to indicate the start and end of the PIN

HCM18J00A00001001
PRODUCT IDENTIFICATION NUMBER (PIN)



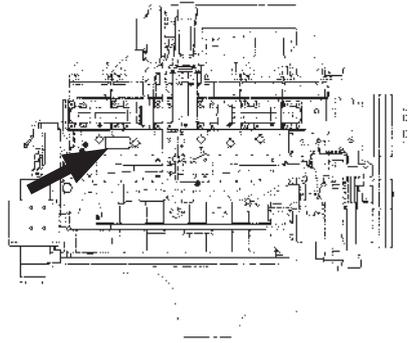
M142-12-001

MACHINE NUMBERS

Engine

TYPE: _____

MFG. NO.: _____



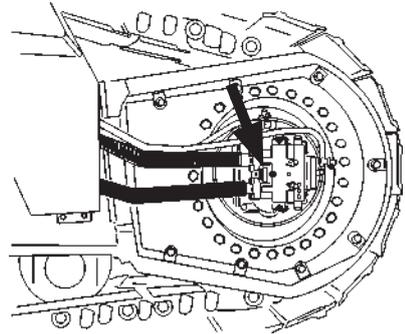
M18E-01-008

Travel Motor

TYPE: _____

MFG. NO.: (LEFT) _____

MFG. NO.: (RIGHT) _____



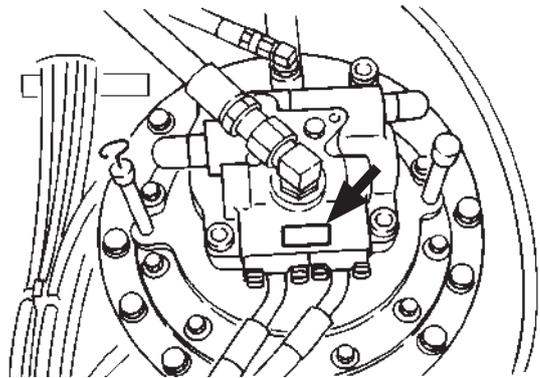
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Swing Motor

TYPE: _____

MFG. NO.: (FRONT) _____

MFG. NO.: (REAR) _____



M142-12-003

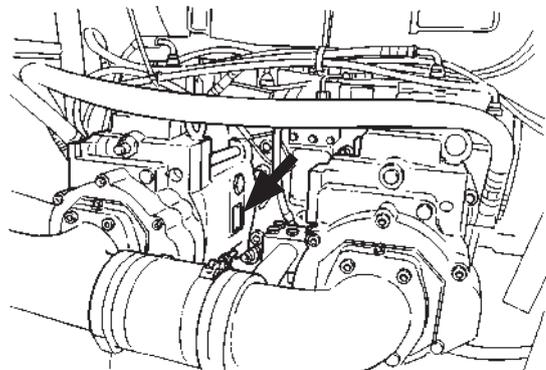
Hydraulic Pump

TYPE: _____

MFG. NO.: (NO.1) _____

MFG. NO.: (NO.2) _____

MFG. NO.: (NO.3) _____



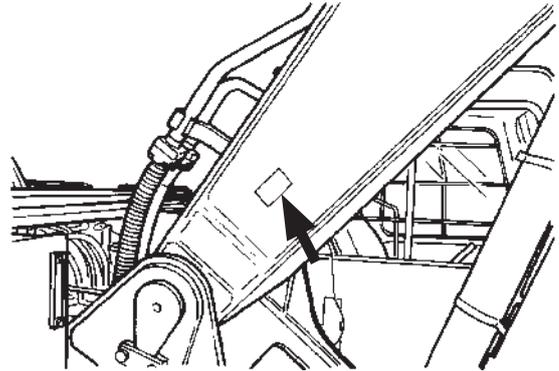
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MACHINE NUMBERS

Boom

TYPE: _____

MFG. NO.: _____

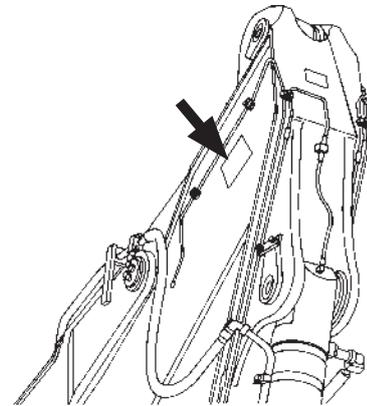


M111-12-005

Arm

TYPE: _____

MFG. NO.: _____

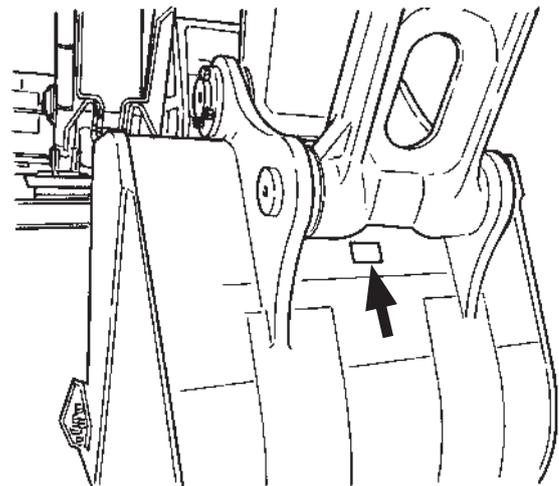


M17V-00-005

Bucket

TYPE: _____

MFG. NO.: _____

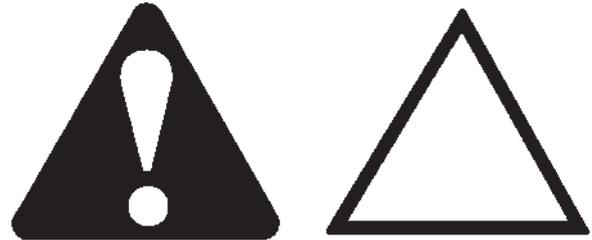


M116-12-004

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.

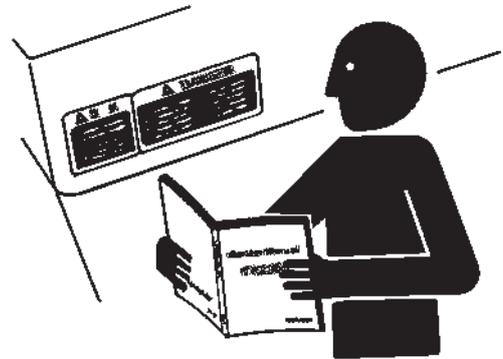


SA-1223

SAFETY

Follow Safety Instructions

- Carefully read and follow all safety signs on the machine and all safety messages in this manual.
- Safety signs should be installed, maintained and replaced when necessary.
 - If a safety sign or this manual is damaged or missing, order a replacement from your authorized dealer in the same way you order other replacement parts (be sure to state machine model and serial number when ordering).
- Learn how to operate the machine and its controls correctly and safely.
- Allow only trained, qualified, authorized personnel to operate the machine.
- Keep your machine in proper working condition.
 - Unauthorized modifications of the machine may impair its function and/or safety and affect machine life.
 - Do not modify any machine parts without authorization. Failure to do so may deteriorate the part safety, function, and/or service life. In addition, personal accident, machine trouble, and/or damage to material caused by unauthorized modifications will void Hitachi Warranty Policy.
 - Do not use attachments and/or optional parts or equipment not authorized by Hitachi. Failure to do so may deteriorate the safety, function, and/or service life of the machine. In addition, personal accident, machine trouble, and/or damage to material caused by using unauthorized attachments and/or optional parts or equipment will void Hitachi Warranty Policy.
- The safety messages in this SAFETY chapter are intended to illustrate basic safety procedures of machines. However it is impossible for these safety messages to cover every hazardous situation you may encounter. If you have any questions, you should first consult your supervisor and/or your authorized dealer before operating or performing maintenance work on the machine.



SA-003

Prepare for Emergencies

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



SA-437

SAFETY

Wear Protective Clothing

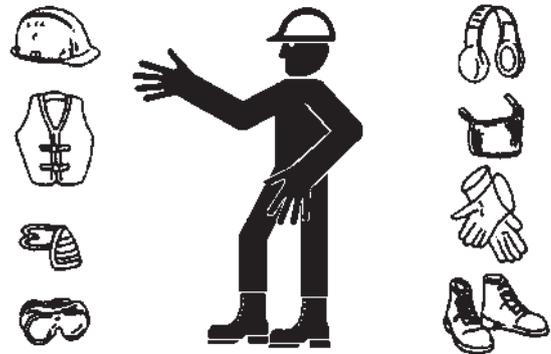
- Wear close fitting clothing and safety equipment appropriate to the job.

You may need:

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

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

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



SA-438

Protect Against Noise

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



SA-434

Inspect Machine

- Inspect your machine carefully each day or shift by walking around it before you start it to avoid personal injury.
- In the walk-around inspection be sure to cover all points described in the “MAINTENANCE” chapter in the operator’s manual.



SA-435

SAFETY

General Precautions for Cab

- Before entering the cab, thoroughly remove all dirt and/or oil such as mud, grease, soil or stones that may mess up the cab from the soles of your work boots. If any controls such as a pedal is operated while with dirt and/or oil on the soles of the operator's work boots, the operator's foot may slip off the pedal, possibly resulting in a personal accident.
- Do not mess up around the operator's seat with parts, tools, soil, stones, obstacles that may fold up or turn over, cans or lunch box. The levers or pedals become inoperable if obstacle jams in operation stroke of the travel levers/pedals, pilot control shut-off lever or control levers/pedals, which may result in serious injury or death.
- Avoid storing transparent bottles in the cab. Do not attach any transparent type window decorations on the windowpanes as they may focus sunlight, possibly starting a fire.
- Refrain from listening to the radio, or using music headphones or mobile telephones in the cab while operating the machine.
- Keep all flammable materials and/or explosives away from the machine.
- After using the ashtray, always cover it to extinguish the match and/or tobacco.
- Do not leave cigarette lighters in the cab. When the temperature in the cab increases, the lighter may explode.
- Use proper floor mat dedicated to the machine. If another floor mat is used, it may be displaced and contact with the travel pedals or control pedals during operation, resulting in serious injury or death.

SAFETY

Use Handholds and Steps

- Falling is one of the major causes of personal injury.
 - When you get on and off the machine, always face the machine and maintain a three-point contact with the steps and handrails.
 - Do not use any controls as hand holds.
 - Never jump on or off the machine. Never mount or dismount a moving machine.
 - Be careful of slippery conditions on platforms, steps, and handrails when leaving the machine.
 - Never get on and off the machine with tools in your hands.



SA-439

Adjust Operator's Seat

- A poorly adjusted seat for either the operator or the work at hand may quickly fatigue the operator leading to misoperations.
 - The seat should be adjusted whenever changing the operator for the machine.
 - The operator should be able to fully depress the pedals and to correctly operate the control levers with his back against the seat back.
 - If not, move the seat forward or backward, and check again.
 - Adjust the rear view mirror position so that the best rear visibility is obtained from the operator's seat. If the mirror is broken, immediately replace it with a new one.



SA-378

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 control levers/pedals, possibly resulting in serious personal injury or death.
- Before leaving the machine, be sure to first lower the front attachment to the ground and then move the pilot control shut-off lever to the LOCK position. Turn the key switch OFF to stop the engine.
- Before leaving the machine, close all windows, doors, and access covers and lock them up.

SAFETY

Fasten Your Seat Belt

- If the machine should overturn, the operator may become injured and/or thrown from the cab. Additionally the operator may be crushed by the overturning machine, resulting in serious injury or death.
- Prior to operating the machine, thoroughly examine webbing, buckle and attaching hardware. If any item is damaged or worn, replace the seat belt or component before operating the machine.
- Be sure to remain seated with the seat belt securely fastened at all times when the machine is in operation to minimize the chance of injury from an accident.
- We recommend that the seat belt is replaced every three years regardless of its apparent condition.



SA-237

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 the cab door, windows, doors and covers are securely locked.
- Check the mirror and the monitors in the CAB for problems. If there are, replace the problem parts or clean the mirror, camera and monitor.
Refer to Back Monitor Settings section on the cleaning of the camera and monitor.



SA-426

Handle Starting Aids Safely

Starting fluid:

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



SA-293

SAFETY

Operate Only from Operator's Seat

- Inappropriate engine starting procedures may cause the machine to runaway, possibly resulting in serious injury or death.
- Start the engine only when seated in the operator's seat.
- Do not start engine by shorting across starter terminals.
- Before starting the engine, confirm that all control levers are in neutral.
- Before starting the engine, confirm the safety around the machine and sound the horn to alert bystanders.



SA-444

Jump Starting

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



SA-032

Keep Riders off Machine

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

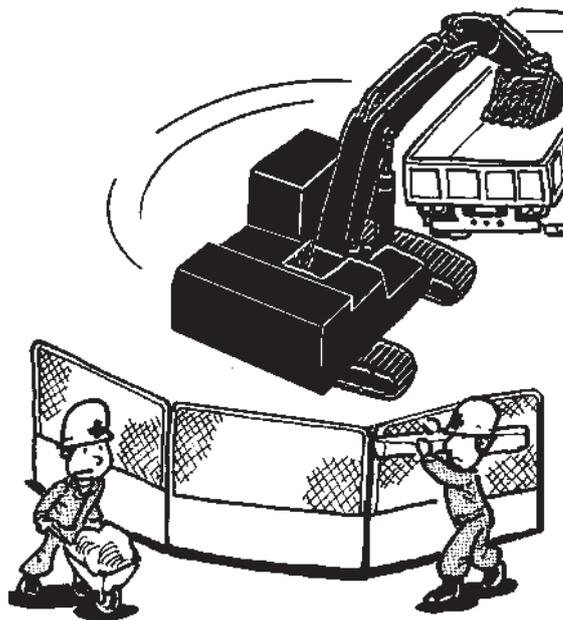


SA-379

SAFETY

Precautions for Operations

- Investigate the work site before starting operations.
- 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.
Do not permit persons other than the operator to enter areas where there is danger such as flying objects. Always beware of the surroundings while operating. When working in a small area surrounded by obstacles, take care not to hit the upperstructure against obstacles.
- When loading onto trucks, bring the bucket over the truck beds from the rear side. Take care not to swing the bucket over the cab or over any person.



M117-05-006

SAFETY

Investigate Job Site Beforehand

- When working at the edge of an excavation or on a road shoulder, the machine could tip over, possibly resulting in serious injury or death.
 - Investigate the configuration and ground conditions of the job site beforehand to prevent the machine from falling and to prevent the ground, stockpiles, or banks from collapsing.
 - Make a work plan. Use machines appropriate to the work and job site.
 - Reinforce ground, edges, and road shoulders as necessary. Keep the machine well back from the edges of excavations and road shoulders.
 - When working on an incline or on a road shoulder, employ a signal person as required.
 - 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 materials 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.
- Note that there is always a possibility of machine tipping over when working on rough terrain or on slopes. Prevent machine tipping over from occurring. When operating on rough terrain or on slopes:
 - Reduce the engine speed.
 - Select slow travel speed mode.
 - Operate the machine slowly and be cautious with machine movements.



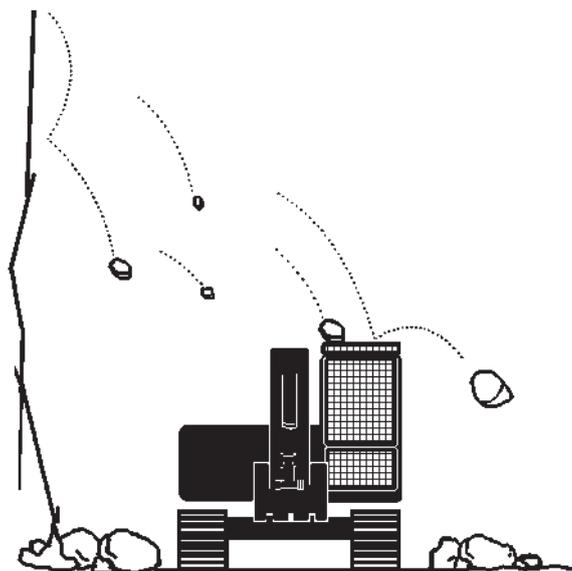
SA-380

SAFETY

Install OPG Guard

In case the machine is operated in areas where the possibilities of falling stones or debris exist, equip Hitachi OPG guard. Consult your authorized dealer for installing the OPG guard. In order not to impair operator protective structure: Replace damaged OPG guard. Never attempt to repair or modify the guard.

OPG: Operator Protective Guard



SA-490

Restriction of Attachment Installation

Do not install an attachment which exceeds specified weight for the machine structure.

Provide Signals for Jobs Involving Multiple Machines

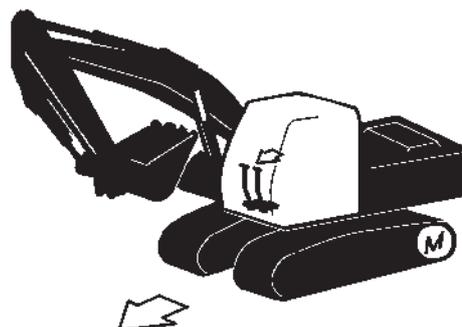
- For jobs involving multiple machines, provide signals commonly known by all personnel involved. Also, appoint a signal person to coordinate the job site. Make sure that all personnel obey the signal person's directions.



SA-481

Confirm Direction of Machine to be Driven

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

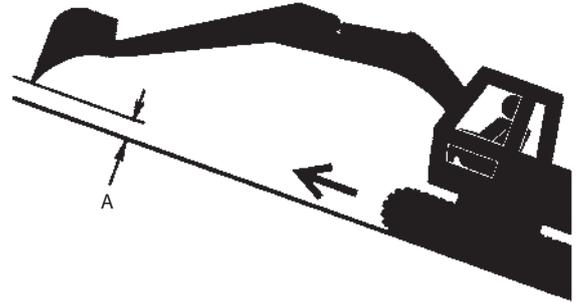


SA-491

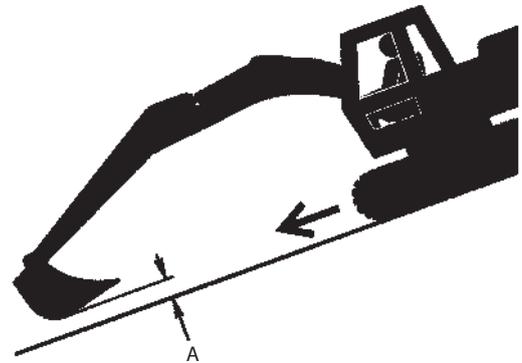
SAFETY

Drive Machine Safely

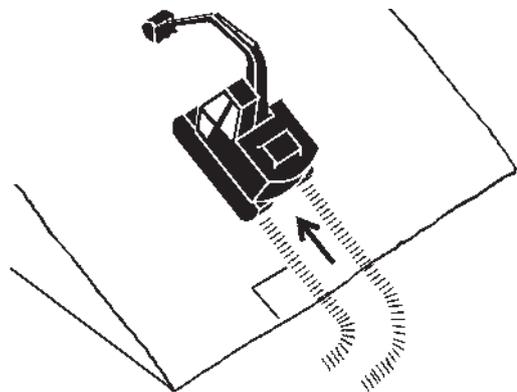
- Before driving the machine, always confirm that the travel levers/pedals direction corresponds to the direction you wish to drive.
 - Be sure to detour around any obstructions.
 - Avoid traveling over obstructions. Soil, fragments of rocks, and/or metal pieces may scatter around the machine. Do not 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 ascend or descend 35 degrees or steeper slopes.
 - Be sure to fasten the seat belt.
 - When driving up or down a slope, keep the bucket facing the direction of travel, approximately 0.5 to 1.0 m (A) above the ground.
 - If the machine starts to skid or becomes unstable, immediately lower the bucket to the ground and stop.



SA-657



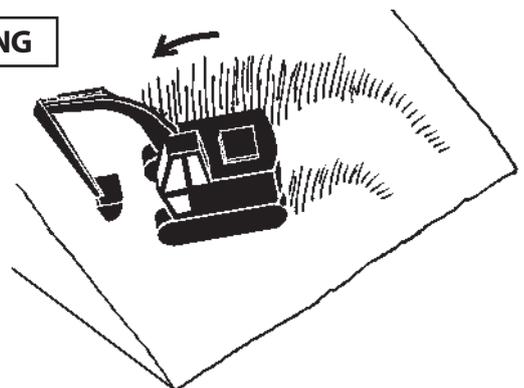
SA-658



SA-441

- 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.
- Avoid swinging the upperstructure on slopes. Never attempt to swing the upperstructure downhill. The machine may tip over. If swinging uphill is unavoidable, carefully operate the upperstructure and boom at slow speed.
- If the engine stalls on a slope, immediately lower the bucket to the ground. Return the control levers to neutral. Then, restart the engine.

WRONG



SA-442

SAFETY

- 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.
- Use a signal person when moving, swinging or operating the machine in congested areas. Coordinate hand signals before starting the machine.
- 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.
- 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.
- When crossing a river, measure the depth of the river using the bucket, and cross slowly. Do not cross the river when the depth of the river is deeper than the upper edge of the upper roller.
- When traveling on rough terrain, reduce engine speed. Select slow travel speed. Slower speed will reduce possible damage to the machine.
- Avoid operations that may damage the track and undercarriage components.
- During freezing weather, always clean snow and ice from track shoes, to prevent the machine from slipping.



Travel Mark

M104-05-008



SA-011

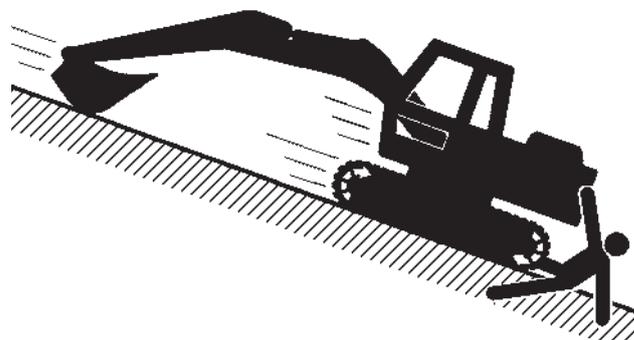
SAFETY

Avoid Injury from Rollaway Accidents

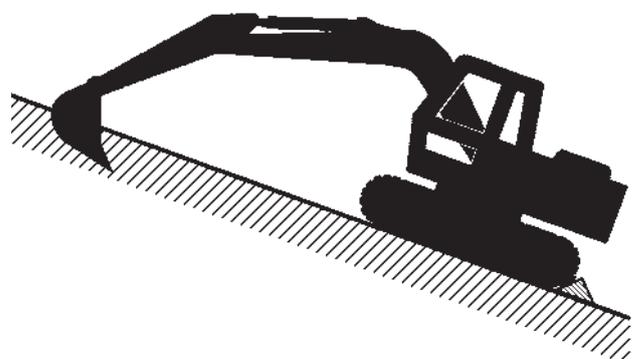
- Death or serious injury may result if you attempt to mount or stop a moving machine.

To avoid rollaways:

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



SA-391



SA-392

SAFETY

Avoid Injury from Back-Over and Swing Accidents

- If any person is present near the machine when backing or swinging the upperstructure, the machine may hit or run over that person, resulting in serious injury or death. To avoid back-over and swing accidents:
 - Always look around BEFORE YOU BACK UP AND SWING THE MACHINE. BE SURE THAT ALL BYSTANDERS ARE CLEAR.
 - Keep the travel alarm in working condition (if equipped). ALWAYS BE ALERT FOR BYSTANDERS MOVING INTO THE WORK AREA. USE THE HORN OR OTHER SIGNAL TO WARN BYSTANDERS BEFORE MOVING MACHINE.
 - USE A SIGNAL PERSON WHEN BACKING UP IF YOUR VIEW IS OBSTRUCTED. ALWAYS KEEP THE SIGNAL PERSON IN VIEW.
Use hand signals, which conform to your local regulations, when work conditions require a signal person.
 - No machine motions shall be made unless signals are clearly understood by both 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

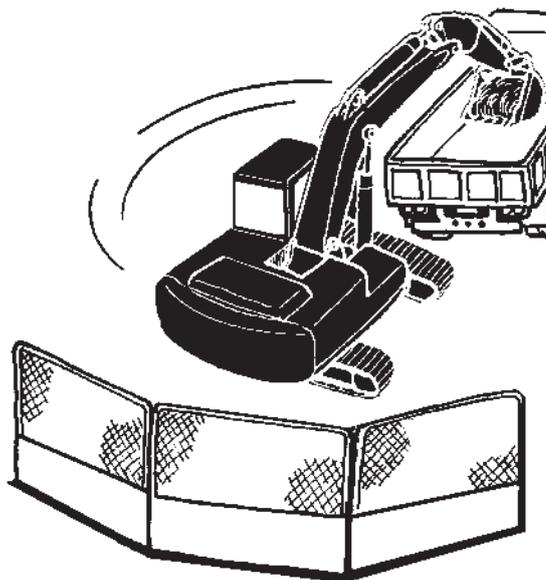


SA-384

SAFETY

Keep Person Clear from Working Area

- A person around the operating machine may be hit severely by the swinging front attachment or counterweight, be caught in other objects, and/or be struck by flying objects, resulting in serious injury or death.
- Set up barriers and/or put a "NO ADMISSION" sign at the machine operating site and areas exposed by flying objects to prevent anyone from entering the work area.
- 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-386

Never Position Bucket Over Anyone

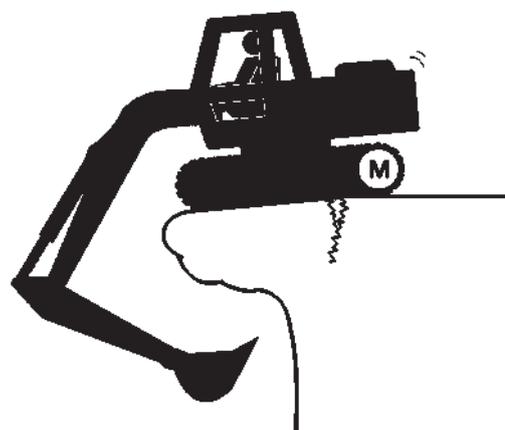
- Never lift, move, or swing bucket above anyone or a truck cab. Serious injury or machine damage may result due to bucket load spill or due to collision with the bucket.



SA-487

Avoid Undercutting

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



SA-488

SAFETY

Avoid Tipping

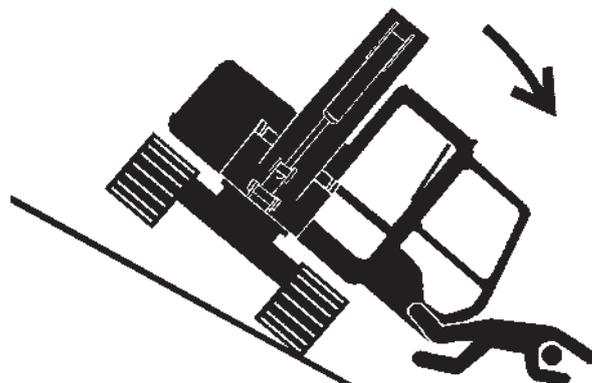
**DO NOT ATTEMPT TO JUMP CLEAR OF TIPPING MACHINE
--- SERIOUS OR FATAL CRUSHING INJURIES WILL RESULT
MACHINE WILL TIP OVER FASTER THAN YOU CAN JUMP
FREE**

FASTEN YOUR SEAT BELT

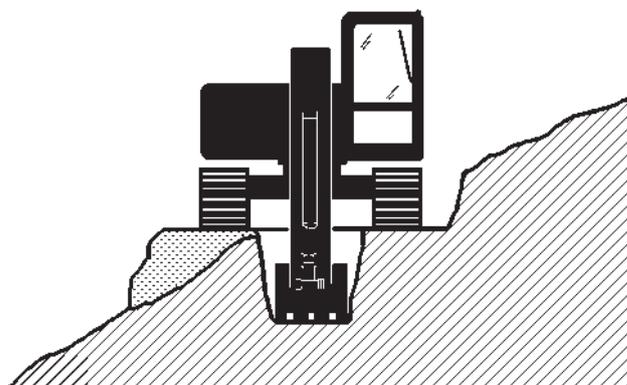
- The danger of tipping is always present when operating on a grade, possibly resulting in serious injury or death.

To avoid tipping:

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



SA-012



SA-440

Never Undercut a High Bank

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



SA-489

SAFETY

Dig with Caution

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



SA-382

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-389

SAFETY

Avoid Power Lines

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



SA-381

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 bucket 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.

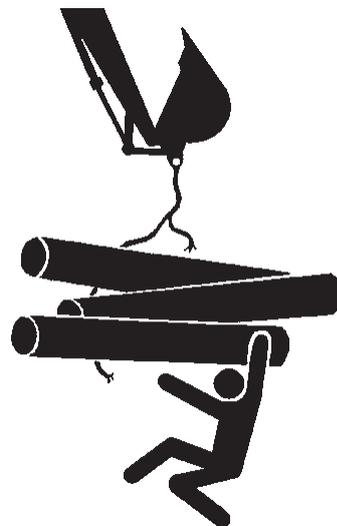


SA-2715

SAFETY

Object Handling

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

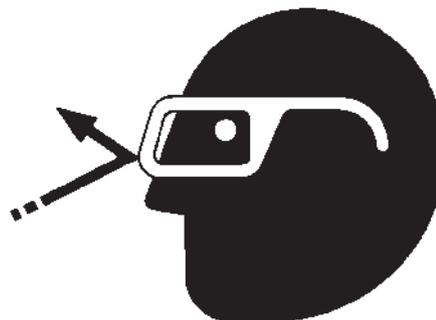


SA-104

SAFETY

Protect Against Flying Debris and Falling Object

- During hammer operation, debris from earth, rock or metal may fly in all directions, resulting in a serious personal injury or death.
- When driving the connecting pins in or out, wear goggles or safety glasses, hard hat and face shield.



SA-432

- During machine operation, debris from earth, rock or metal may fly off from the track and bucket, resulting in a serious personal injury or death.
- Ensure nobody presents in or around the work area while machine is operating.



SA-344

- Falling of accumulated earth or dirt onto people may result in a serious personal injury or death.
- Before performing maintenance or inspection under carriage, remove accumulated debris.



SA-527

SAFETY

Park Machine Safely

To avoid accidents:

1. Park the machine on a firm, level surface.
2. Lower bucket to the ground.
3. Turn auto-idle switch OFF and Power mode switch E or P.
4. Run the engine at slow idle speed without load for 5 minutes.
5. Turn key switch to OFF to stop engine.
6. Remove the key from the key switch.
7. Pull the pilot control shut-off lever to the LOCK position.
8. Close windows and cab door.
9. Lock all access doors and compartments.



SA-390

Handle Fluids Safely – Avoid Fires

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



SA-018



SA-019

SAFETY

Practice Safe Maintenance

To avoid accidents:

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

Before servicing the machine:

1. Park the machine on a 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. Relieve the pressure in the hydraulic system by moving the control levers several times.
7. Remove the key from the key switch.
8. Attach a "Do Not Operate" tag on the control lever.
9. Pull the pilot control shut-off lever to the LOCK position.
10. Allow the engine to cool.

- If a maintenance procedure must be performed with the engine running, do not leave machine unattended.
- If the machine must be raised, maintain a 90 to 100° angle between the boom and arm. Securely support any machine elements that must be raised for service work.
- Inspect certain parts periodically and repair or replace as necessary. Refer to the section discussing that part in the "MAINTENANCE" chapter of this manual.
- Keep all parts in good condition and properly installed.
- Fix damage immediately. Replace worn or broken parts. Remove any buildup of grease, oil, or debris.
- When cleaning parts, always use nonflammable detergent oil. Never use highly flammable oil such as fuel oil and gasoline to clean parts or surfaces.
- Turn the battery disconnect switch to the OFF position before adjusting the electrical systems or performing welding operation on the machine.



SA-028



SA-527

SAFETY

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



SA-037

Warn Others of Service Work

- Unexpected machine movement can cause serious injury.
- Before performing any work on the machine, attach a “Do Not Operate” tag on the control lever. This tag is available from your authorized dealer.



SS3076175



SS2045102

Support Machine Properly

- Never attempt to work on the machine without securing the machine first.
- Always lower the attachment to the ground before you work on the machine.
- If you must work on a lifted machine or attachment, securely support the machine or attachment. Do not support the machine on cinder blocks, hollow tires, or props that may crumble under continuous load. Do not work under a machine that is supported solely by a jack.



SA-527

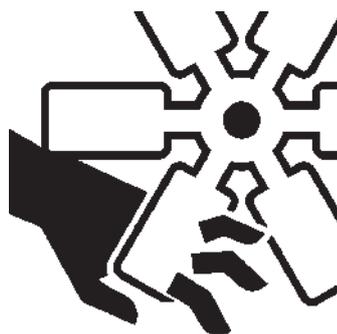
SAFETY

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

Prevent Parts from Flying

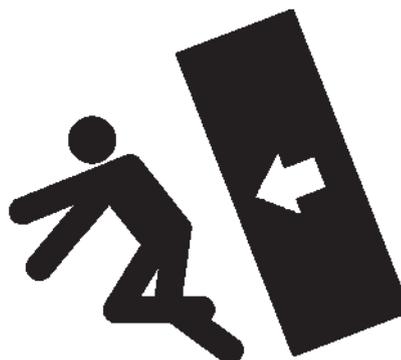
- Grease in the track adjuster is under high pressure. Failure to follow the precautions below may result in serious injury, blindness, or death.
 - Do not attempt to remove GREASE FITTING or VALVE ASSEMBLY.
 - As pieces may fly off, be sure to keep body and face away from valve.
 - Never attempt to disassemble the track adjuster. Inadvertent disassembling of the track adjuster may cause the parts such as a spring to fly off, possibly resulting in severe personal injury or death.
- Travel reduction gears are under pressure.
 - As pieces may fly off, be sure to keep body and face away from AIR RELEASE PLUG to avoid injury.
 - GEAR OIL is hot. Wait for GEAR OIL to cool, then gradually loosen AIR RELEASE PLUG to release pressure.



SA-344

Avoid Injury from Attachment Falling Accident

- Stored attachments such as buckets, hydraulic hammers, and blades can fall and cause serious injury or death.
 - To avoid possible personal injury from attachment falling accident, use a platform when replacing an attachment.
 - Securely store attachments such as a bucket, blade, breaker and other parts to prevent falling.
 - Keep children and bystanders away from storage areas.



SA-034

SAFETY

Prevent Burns

Hot spraying fluids:

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



SA-039

Hot fluids and surfaces:

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



SA-225

Replace Rubber Hoses Periodically

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



SA-019

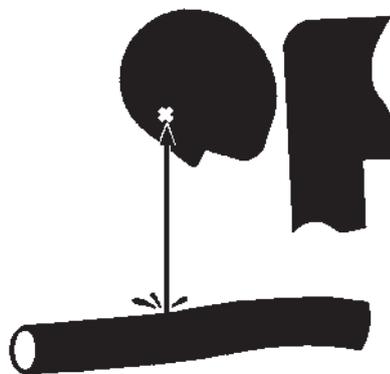
SAFETY

Avoid High-Pressure Fluids

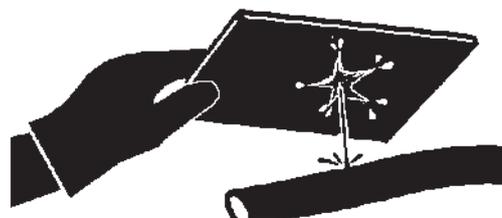
- Fluids such as diesel fuel or hydraulic oil under pressure can penetrate the skin or eyes causing serious injury, blindness or death.
- Avoid this hazard by relieving pressure before disconnecting hydraulic or other lines.
- Tighten all connections before applying pressure.
- Search for leaks with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



SA-031



SA-292



SA-044

SAFETY

Prevent Fires

Check for Oil Leaks:

- Fuel, hydraulic oil and lubricant leaks can lead to fires.
 - Check for oil leaks due to missing or loose clamps, kinked hoses, lines or hoses that rub against each other, damage to the oil-cooler, and loose oil-cooler flange bolts.
 - Tighten, repair or replace any missing, loose or damaged clamps, lines, hoses, oil-cooler and oil-cooler flange bolts.
 - Do not bend or strike high-pressure lines.
 - Never install bent or damaged lines, pipes, or hoses.
 - Replace fuel hoses and hydraulic hoses periodically even if there is no abnormality in their external appearance.



SA-019

Check for Shorts:

- Short circuits can cause fires.
 - Clean and tighten all electrical connections.
 - Check before each shift or after eight (8) to ten (10) hours operation for loose, kinked, hardened or frayed electrical cables and wires.
 - Check before each shift or after eight (8) to ten (10) hours operation for missing or damaged terminal caps.
 - **DO NOT OPERATE MACHINE** if cable or wires are loose, kinked, etc.
 - Never attempt to modify electric wirings.

Clean up Flammable Materials:

- Spilled fuel and oil, trash, grease, debris, accumulated coal dust, and other flammable materials may cause fires.
 - Prevent fires by inspecting and cleaning the machine daily, and by removing adhered oil or accumulated flammable materials immediately. Check and clean high temperature parts such as the exhaust outlet and mufflers earlier than the normal interval.
 - Do not wrap high temperature parts such as a muffler or exhaust pipe with oil absorbents.
 - Do not store oily cloths as they are vulnerable to catching fire.
 - Keep flammable materials away from open flames.
 - Do not ignite or crush a pressurized or sealed container.
 - Wire screens may be provided on openings on the engine compartment covers to prevent flammable materials such as dead leaves from entering. However, flammable materials which have passed through the wire screen may cause fires. Check and clean the machine every day and immediately remove accumulated flammable materials.

SAFETY

Check Key Switch:

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

Check Engine Stop Switch:

- Before performing maintenance on the machine, stop the engine. Failure to do so may result in serious injury or death.
 - Check the engine stop switch function every 250 hours:
 1. Turn the engine stop switch to the  STOP] position. Engine stop indicator will come ON.
 2. Confirm that the engine will not be started with key switch.
 - If any abnormalities are found, be sure to repair them before operating the machine.

Check Heat Shields:

- Damaged or missing heat shields may lead to fires.
 - Damaged or missing heat shields must be repaired or replaced before operating the machine.
 - If hydraulic hoses are broken while the engine room door is open, splattered oil on the high temperature parts such as muffler may cause fire. Always close the engine room door while operating the machine.

SAFETY

Evacuating in Case of Fire

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



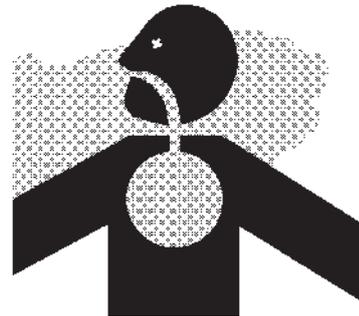
SA-393



SS-1510

Beware of Exhaust Fumes

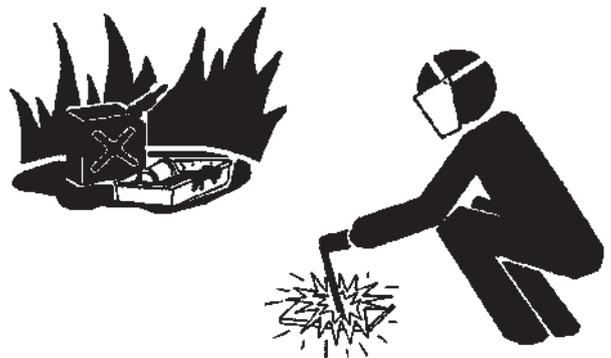
- Prevent asphyxiation. Engine exhaust fumes can cause sickness or death.
- If you must operate in a building, be sure there is adequate ventilation. Either uses an exhaust pipe extension to remove the exhaust fumes or open doors and windows to bring enough outside air into the area.



SA-016

Precautions for Welding and Grinding

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



SA-818

SAFETY

Avoid Heating Near Pressurized Fluid Lines

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



SA-030

Avoid Applying Heat to Lines Containing Flammable Fluids

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

Precautions for Handling Accumulator and Gas Damper

High-pressure nitrogen gas is sealed in the accumulator and the gas damper. Inappropriate handling may cause explosion, possibly resulting in serious injury or death.

Strictly comply with the following items:

- Do not disassemble the unit.
- Keep the units away from open flames and fire.
- Do not bore a hole, do not cut by torch.
- Avoid giving shocks by hitting or rolling the unit.
- Before disposing the unit, sealed gas must be released. Consult your authorized dealer.

SAFETY

Remove Paint before Welding or Heating

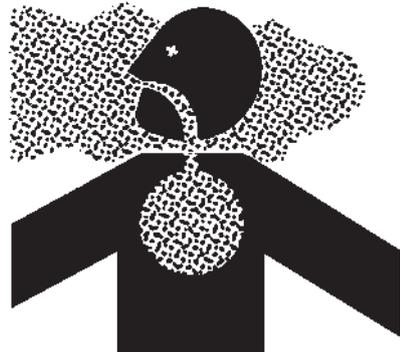
- Hazardous fumes can be generated when paint is heated by welding, soldering, or using a torch. If inhaled, these fumes may cause sickness.
 - Avoid potentially toxic fumes and dust.
 - Do all such work outside or in a well-ventilated area. Dispose of paint and solvent properly.
 - Remove paint before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



SA-029

Beware of Asbestos and Silicon Dust and Other Contamination

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



SA-029

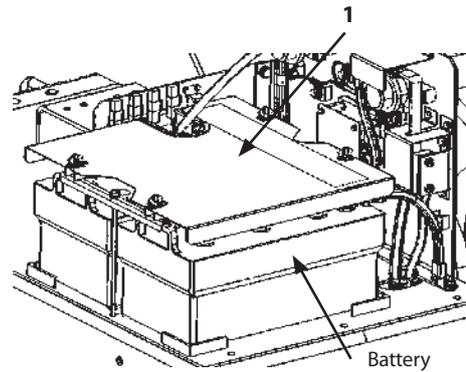
SAFETY

Prevent Battery Explosions

- Battery gas can explode.
 - Keep sparks, lighted matches, and flame away from the top of battery.
 - Do not leave cover (1) removed. Do not keep tools, metals or flammable materials around the battery or inside the battery room. If a metal tool is placed across the battery terminal, sparks may be created, possibly resulting in fire and/or explosion.
 - Never check battery charge by placing a metal object across the posts. Use a voltmeter or hydrometer.
 - Do not charge a frozen battery; it may explode. Warm the battery to 16 °C (60 °F) first.
 - Do not continue to use or charge the battery when electrolyte level is lower than specified. Explosion of the battery may result.
 - Loose terminals may produce sparks. Securely tighten all terminals.
 - Connect terminals to the correct electrical poles. Failure to do so may cause damage to the electrical parts or fire.
- Battery electrolyte is poisonous. If the battery should explode, battery electrolyte may be splashed into eyes, possibly resulting in blindness.
 - Be sure to wear eye protection when checking electrolyte specific gravity.



SA-032



M18J-03-006

Service Air Conditioning System Safely

- If spilled onto skin, refrigerant may cause a cold contact burn.
 - Refer to the instructions described on the container for proper use when handling the refrigerant.
 - Use a recovery and recycling system to avoid leaking refrigerant into the atmosphere.
 - Never touch the refrigerant.



SA-405

SAFETY

Handle Chemical Products Safely

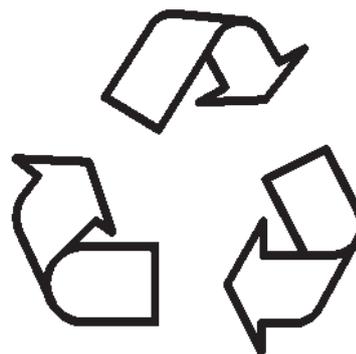
- Direct exposure to hazardous chemicals can cause serious injury. Potentially hazardous chemicals used with your machine include such items as lubricants, coolants, paints, and adhesives.
- A Safety Data Sheet (SDS) provides specific details on chemical products: physical and health hazards, safety procedures, and emergency response techniques.
- Check the SDS before you start any job using a hazardous chemical. That way you will know exactly what the risks are and how to do the job safely. Then follow procedures and use recommended equipment.
- See your authorized dealer for SDS's (available only in English) on chemical products used with your machine.



SA-2579

Dispose of Waste Properly

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



SA-226

Never Ride Attachment

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

Precautions for Communication Terminal

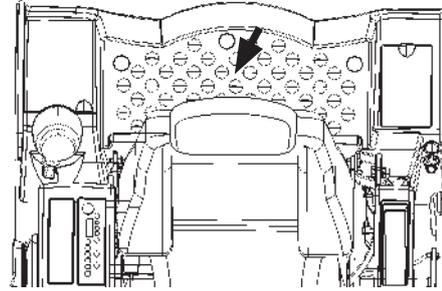
Electrical wave transmitted from the communication terminal may cause malfunction of other electronic devices. Inquire the device manufacturer for electrical wave disturbance upon using an electronic device near the communication terminal.

SAFETY

Precautions for Communication Terminal Equipment (Optional)

This machine has a communication terminal equipment emitting electrical waves installed inside a rear tray which is 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, would be affected and would malfunction by the electrical waves emitted from the communication terminal equipment.

Any person affixed 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 (8.7 inches) apart at all times. If such 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 authorized dealer for the type of communication terminal.



SA-2201

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 centimeters.
- 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.

In US: Under the "Federal Communications Commission (FCC) Guidelines (FCC 1997)", the maximum SAR value is 1.5 W/kg.

In Canada: Under the "Canada's Radio Standards Specification (RSS) -102", the maximum SAR value is 1.5 W/kg.

SAFETY

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

SAFETY

Machine Fire Suppression

What you should do:

This machine, like other large mobile machines that operate virtually nonstop, 24 hours per day, 7 days per week, generates considerable heat in close proximity to flammable fluids and is susceptible to fire.

Fires can result in expensive repair or replacement and more importantly serious injury to the equipment operator.

It is strongly recommended that you install a Fire Suppression System (FSS) on this machine and maintain it in good working condition. This machine is equipped with a communication link to ensure seamless operation of FSS with the operation of the machine. It is essential that whichever FSS you choose is compatible with the machine communication system. Before installation of FSS, contact your authorized dealer with installation details. We will provide any required documentation to the FSS supplier for optimum configuration.

What can the local supplier of FSS should provide:

- Commissioning expertise
- Operator and service training
- Service and performance contracts
- Support for preventative maintenance
- Strong spare parts availability

VISIBILITY MAP

Visibility Map for Machine Model EX1200-6 Personal Hazard

This machine complies with the essential health and safety requirements for visibility set out by Machinery Directive 2006/42/EC. The map shows the residual maskings (blind spots) 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. Additionally, operators are encouraged to adjust the mirrors provided to the machine to show the area as shown below.

This map shows an approximation of the residual masking. This can be used as a guide when conducting a site risk assessment, utilized for site management and to consider additional visual aids.

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

- Test Height (on 1 m RB) : 1.2 m to 1.5 m
- (1 m RB to VTC/on VTC) : Ground Level
- Operator Eye Height : 1.2 m from the Cab Floor
- Machine Configuration : Backhoe Front, Loading Front
- Machine Position : Travel Position (For the detail position, see the image below.)
- Applicable Visual Aids : 1. Standard Mirror
- 2. Camera Monitor (Optional)

Machine Position Image:



Backhoe Front

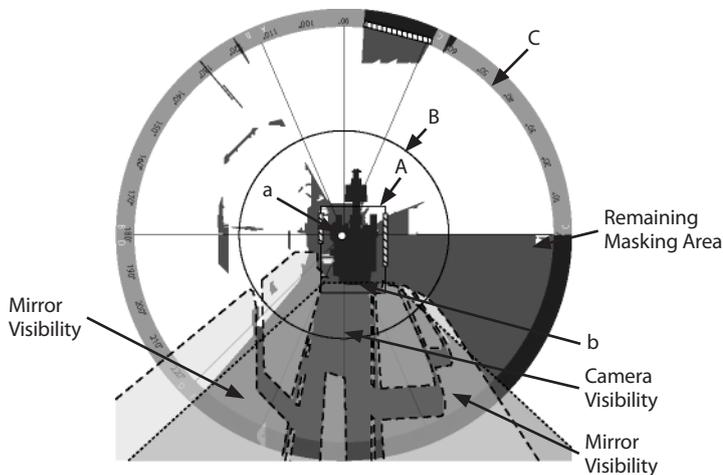
M145-05-027



Loading Front

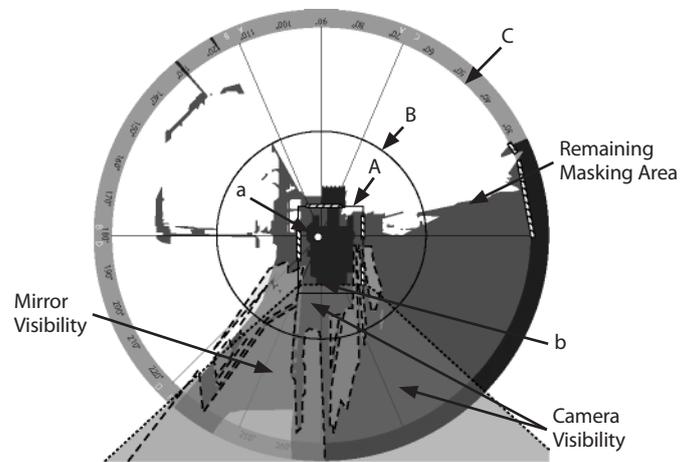
M145-05-022

Visibility Map



Backhoe Front

M18J-00-003



Loading Front

M18J-00-004

1 m Rectangular Boundary (1 m RB):

Reference to evaluate the operator visibility around the machine

12 m (24 m) Visibility Test Circle (VTC):

Reference to evaluate the operator visibility to the ground

○ : Operator's Eye Point

A : 1 m Rectangular Boundary (1 m RB)

B : 12 m Visibility Test Circle (VTC)

C : 24 m Visibility Test Circle (VTC)

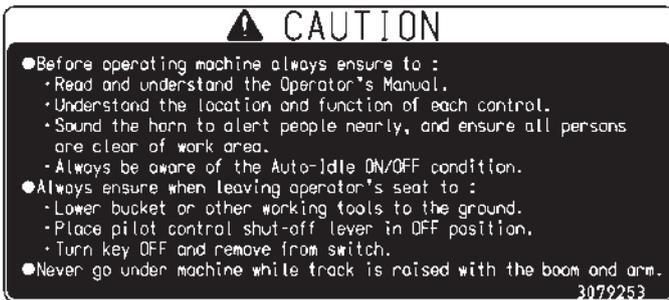
a : Standard Mirror

b : Camera Monitor (Optional)

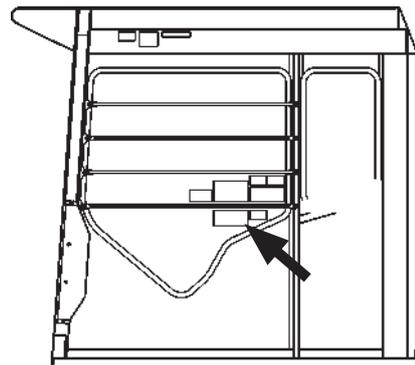
- : Masking Area
- : Mirror Visibility
- : Camera Visibility
- : Masking on 1mRB/VTC

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.

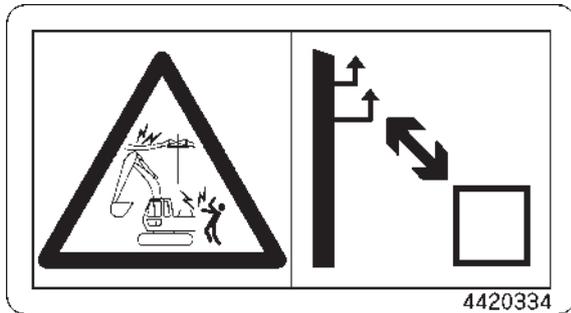


SS-977



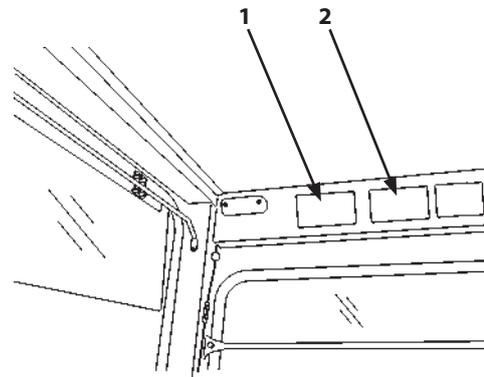
SS-3864

(1)



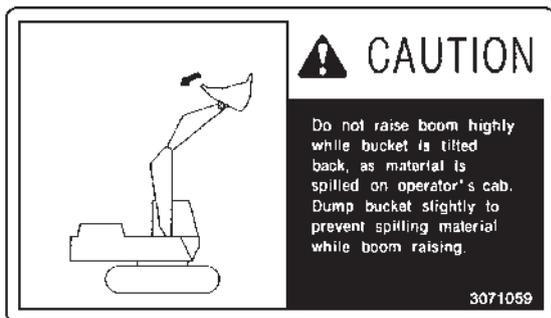
SS4420334-2

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



SS-2480

(2)



(Loading Shovel)

SS3071059

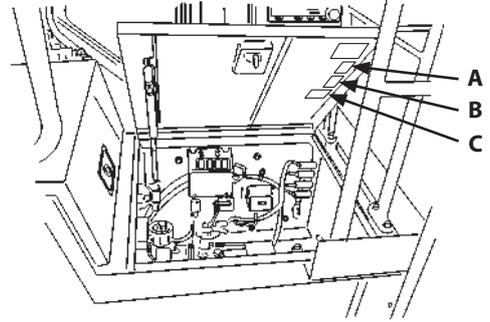
SAFETY SIGNS

A



SS4460067-1

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



SS-3500

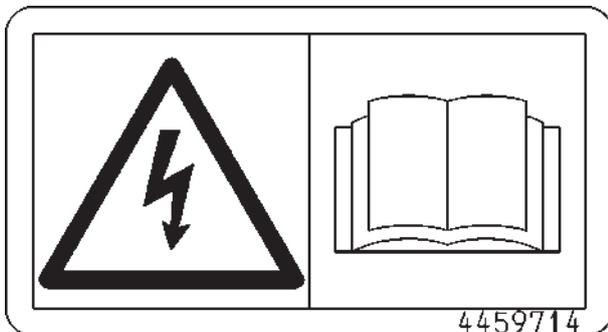
B



SS4460056-1.

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

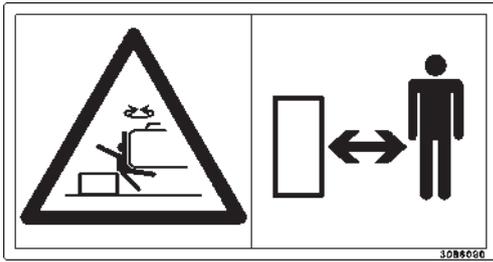
C



SS4459714-1

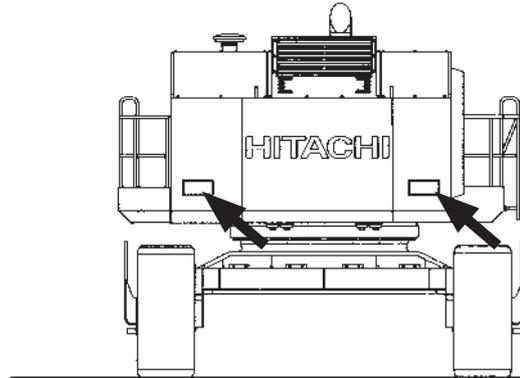
Sign indicates an electrical hazard from handling the cable.
Read manual for safe and proper handling.

SAFETY SIGNS

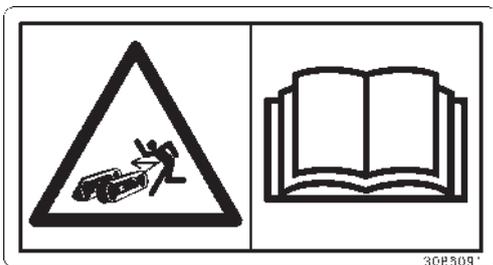


SS3086090-2

Sign indicates a crush hazard by rotation of upper structure of the machine. Keep away from swinging area of machine.

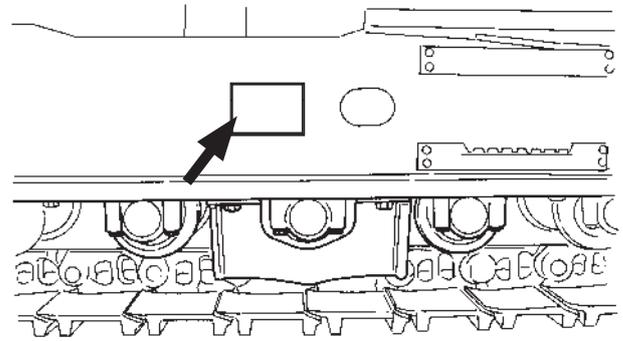


SS-2027



SS3086091-4

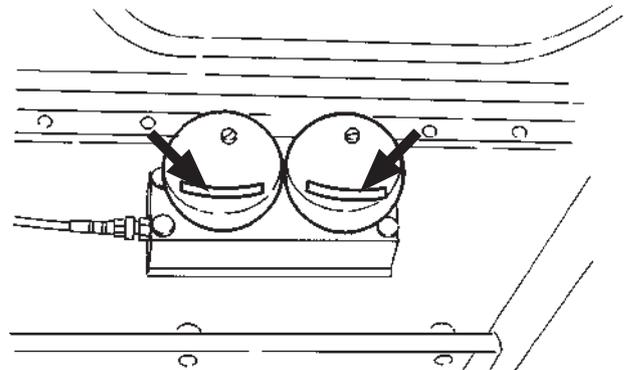
Sign indicates a hazard of a flying plug from track adjuster that could cause injury. Read manual before adjusting track for safe and proper handling.



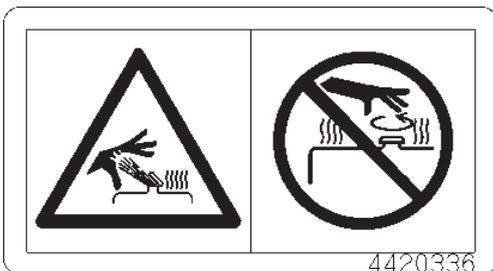
SS-2225



SS-413

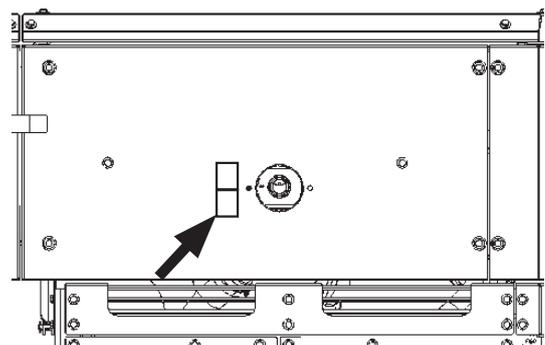


M142-07-109



SS4420336-2

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



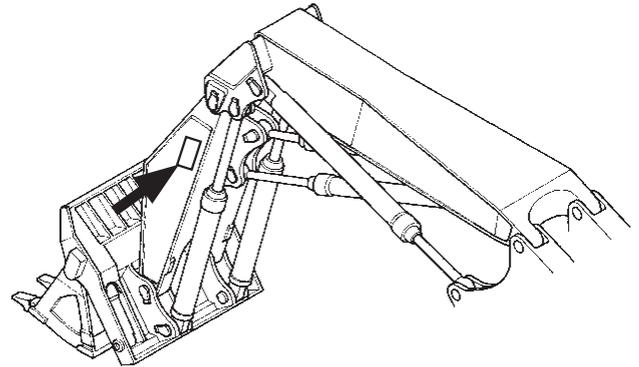
M18J-07-010

SAFETY SIGNS

Sign indicates a hazard of being hit by the working device of the machine. Keep away from machine during operation.

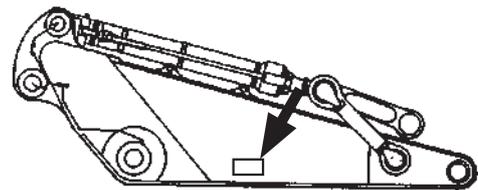


SS3092124-1



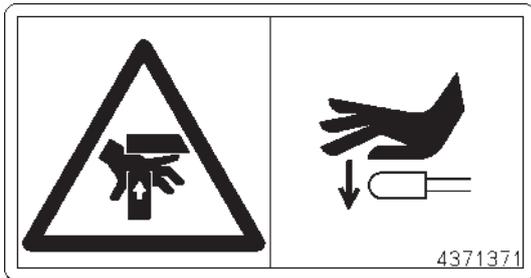
Loading Shovel

M183-01-058



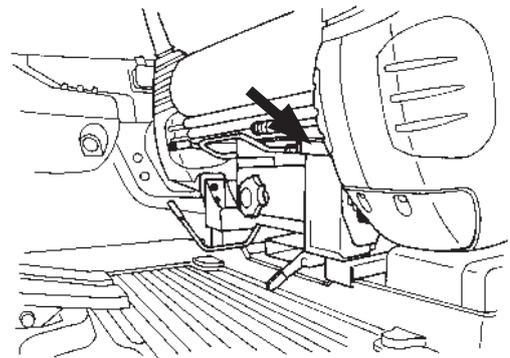
Backhoe

SS-3863

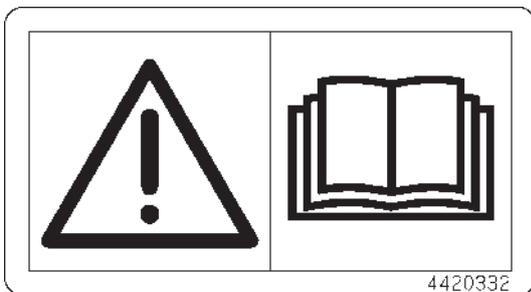


SS4371371-3

When moving the seat height/tilt lever downward, press the lever grip with a palm from the top side. Do not grasp the lever grip to operate the lever, possibly resulting in pinch of your fingers into the seat stand.

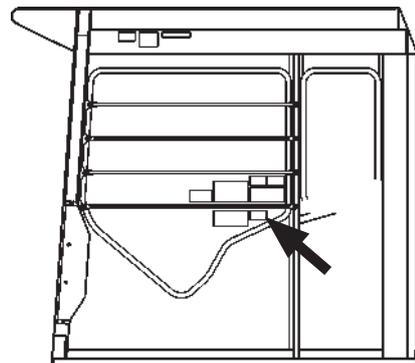


SS-969



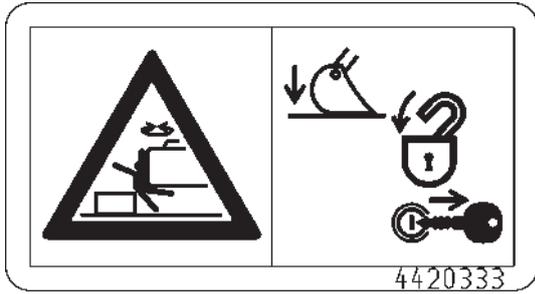
SS4420332-2

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

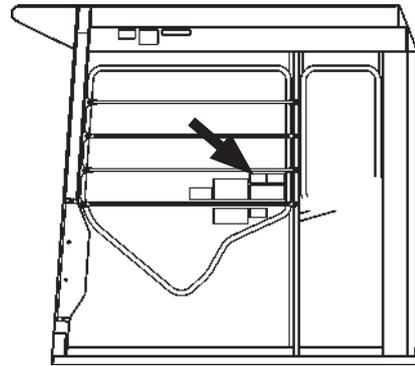


SS-3864

SAFETY SIGNS



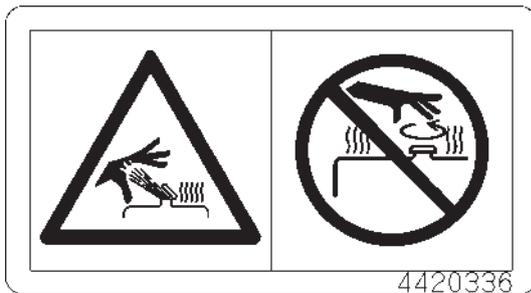
SS4420333-2



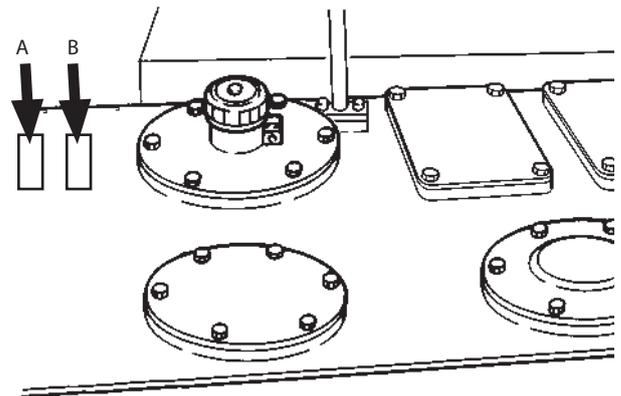
SS-3864

If the parked machine is unexpectedly moved, serious injury or death due to crushing may result. Be sure to lower the front attachment to the ground, lock the control levers, and remove the engine key before leaving the machine unattended.

A



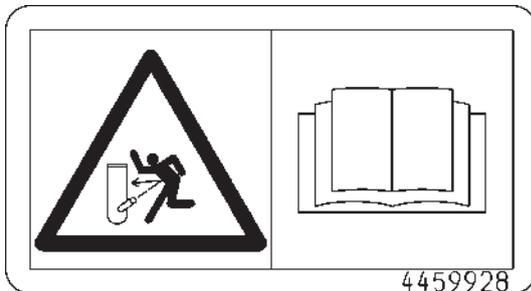
SS4420336-2



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

SS-3037

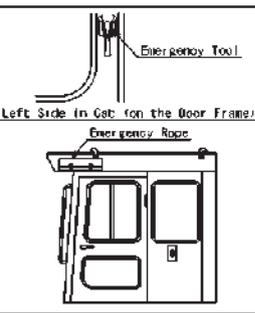
B



SS4459928-1

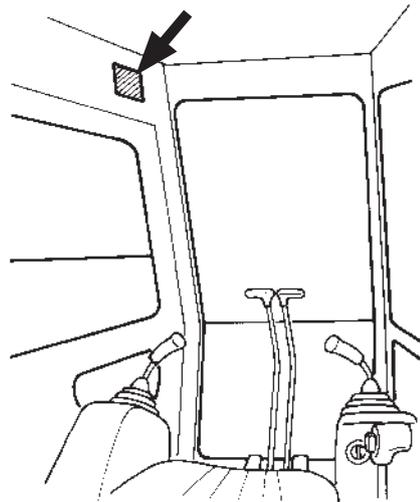
Sign indicates a burn hazard from compressed air and spurting hot oil if the oil inlet is uncapped during or right after operation. Read manual for safe and proper handling.

SAFETY SIGNS

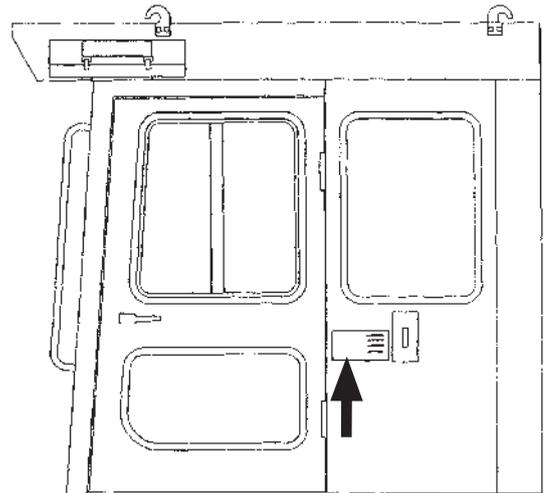
 <p style="font-size: small;">Emergency Tool</p> <p style="font-size: small;">Left Side in Cab, on the Door Frame</p> <p style="font-size: small;">Emergency Rope</p>	<p style="text-align: center; font-weight: bold; font-size: 1.2em;">CAUTION</p> <p style="text-align: center; font-weight: bold; font-size: 0.8em;">EVACUATING IN AN EMERGENCY</p> <ul style="list-style-type: none"> - In an emergency, immediately evacuate the machine. - In an emergency, if cab door can not be used, evacuate as follows: <ul style="list-style-type: none"> • Wear safety glasses. • Break windshields with emergency tool. • Leave cab via window to cab side platform. • Then, descend using emergency rope. <p style="font-size: 0.7em;">To safely evacuate in an emergency, always ensure that emergency rope is in place, as illustrated.</p> <ul style="list-style-type: none"> - Check rope and rope mounting hardware daily for wear or damage. - When replacing emergency rope, be sure to use genuine Hitachi parts. - Before operating the machine, all operators must practice evacuating with this rope at least once. <p style="text-align: right; font-size: 0.6em;">2048345</p>
--	--

(Loading Shovel)

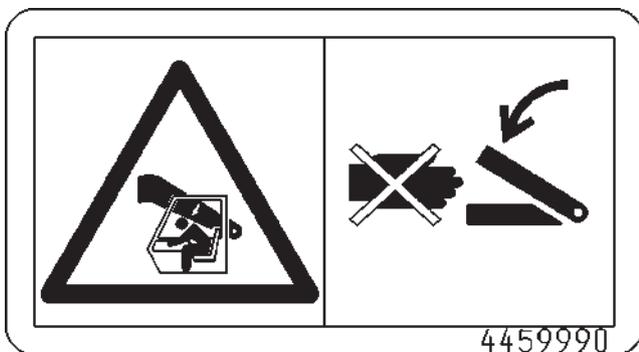
SS2048345-1



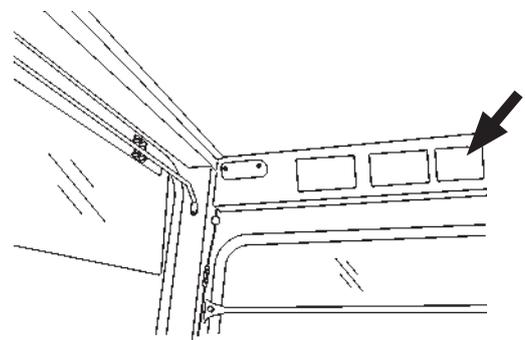
SS-277



SS-2479



SS4459990-2



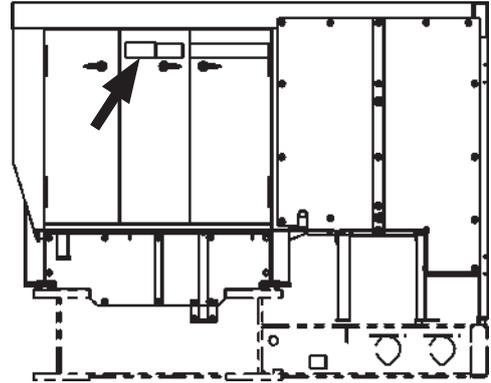
SS-2480

Do not extend your hands or head from the window. Your hands or head may come in contact with the boom.

SAFETY SIGNS

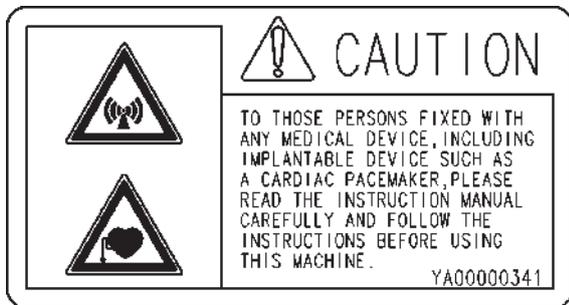


SS3092127-1

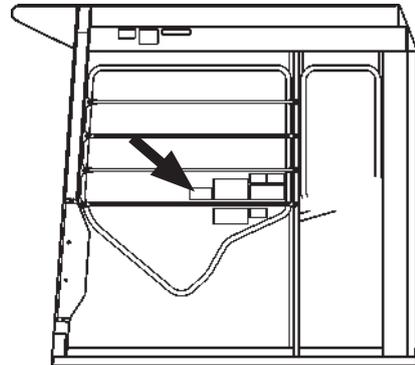


SS-3496

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

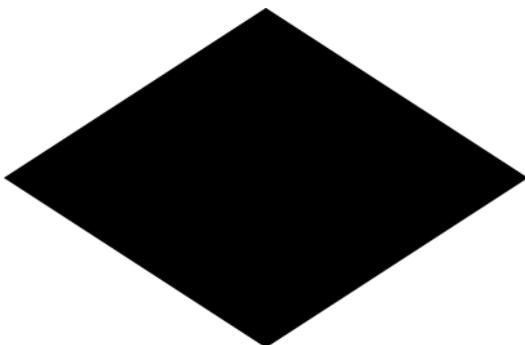


SSYA00000341-1



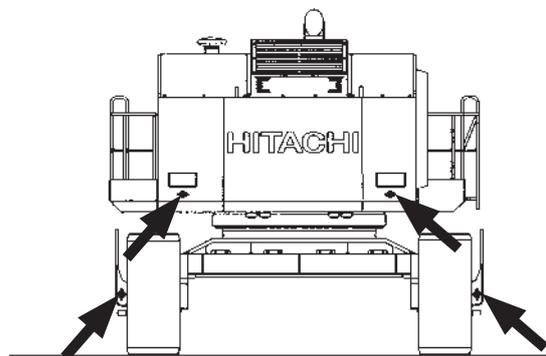
SS-3864

REFLECTOR



4040580

SS-1988



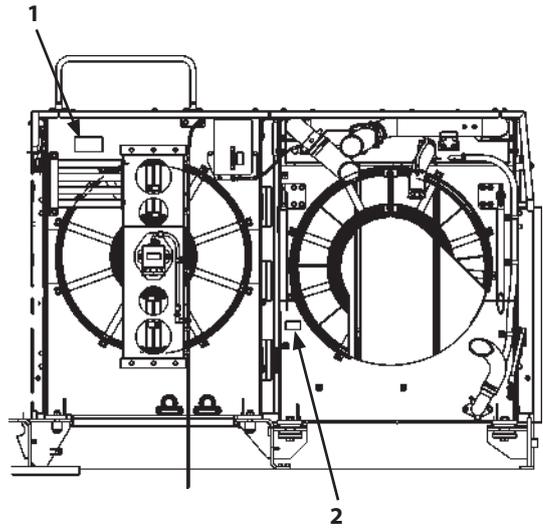
SS-2227

SAFETY SIGNS

(1)



SSYA00008776-2



SS-3544

(2)

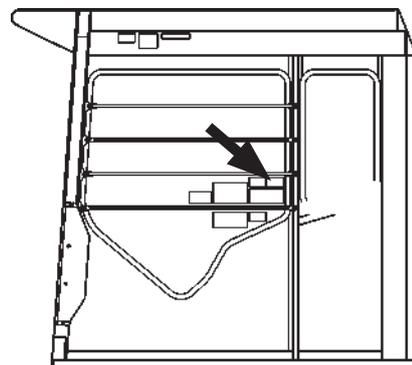


SS4408870-2

Sign indicates the hazard of rotating parts, such as fan, etc. that could cause injury by being caught. Turn off before inspection and maintenance.



SS4654287-1



SS-3864

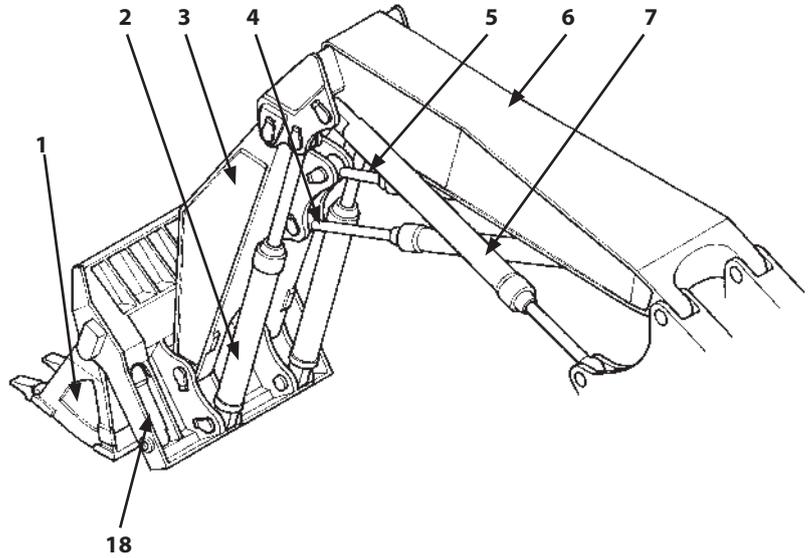
If the machine should overturn, the operator may become injured and/or thrown from the cab and/or crushed by the overturning machine.

COMPONENTS NAME

Components Name

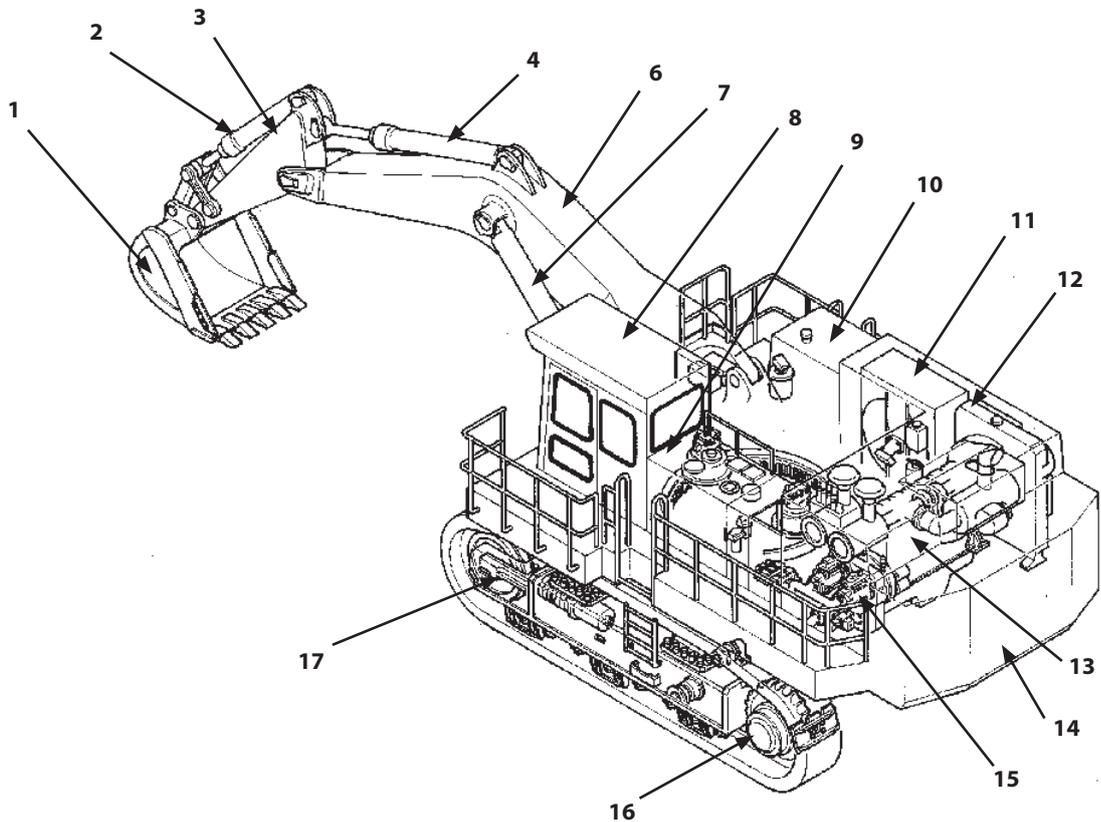
- 1- Bucket
- 2- Bucket Cylinder
- 3- Arm
- 4- Arm Cylinder
- 5- Level Cylinder
- 6- Boom
- 7- Boom Cylinder
- 8- Cab
- 9- Hydraulic Oil Tank
- 10- Fuel Tank
- 11- Oil Cooler
- 12- Radiator
- 13- Engine
- 14- Counterweight
- 15- Pump
- 16- Travel Device
- 17- Front Idler
- 18- Dump Cylinder

Loading Shovel



M183-01-058

Backhoe



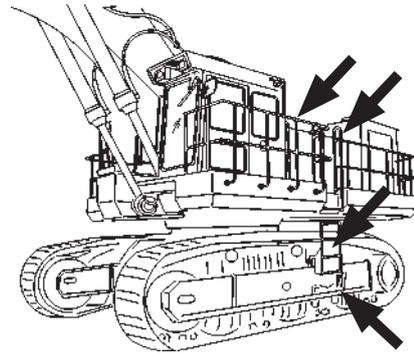
M18J-03-001

GETTING ON/OFF MACHINE

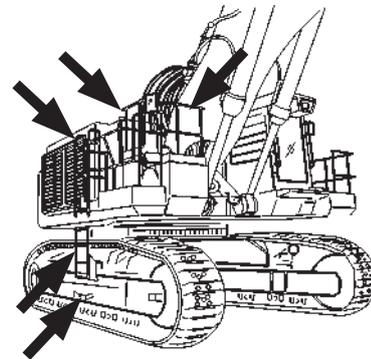
Getting ON/OFF Machine

For safety, steps and handrails are provided at various places on the machine. Use them when getting on/off the machine and when inspecting/servicing.

- ⚠ WARNING:**
When you get on and off the machine, always maintain a three point contact with the steps and handrails and face the machine.
Never jump on or off the machine. Never mount or dismount a moving machine.
Thoroughly remove and clean slippery materials such as mud and/or grease from the steps and/or hand rails.



M183-01-003



M183-01-004

HANDLING LADDER

Using Ladder (Optional)

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

⚠ WARNING: Be sure to extend or retract ladder (1) to locked position.

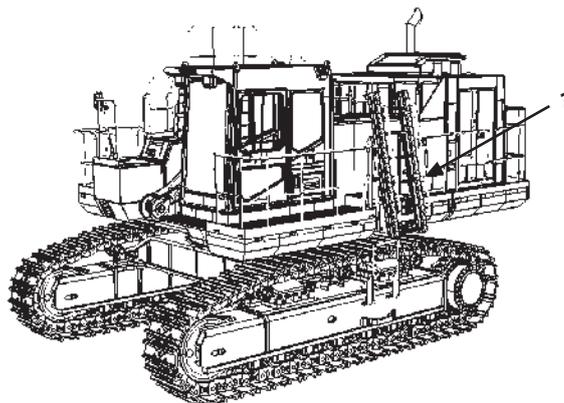
When you get on and off the machine, always maintain a three point contact with the steps and handrails and face the machine.

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

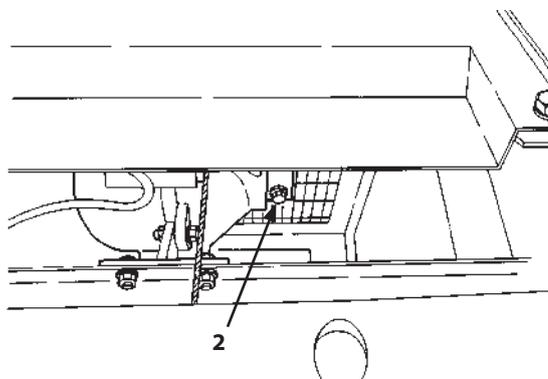
Thoroughly remove and clean slippery materials such as mud and/or grease from the steps and/or hand rails.

Ladder (1) extending/retracting speed can be changed by adjusting bolt (2).

Clockwise Turn:	Faster Extending/Retracting Speed
Counterclockwise Turn:	Slower Extending/Retracting Speed



M18J-01-001



M117-01-003

HANDLING LADDER

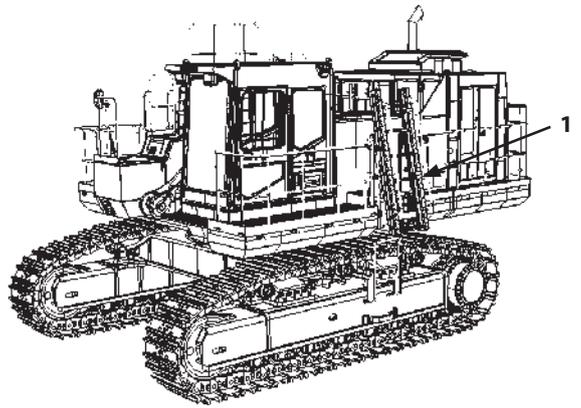
Operating Ladder on the Ground

Extending

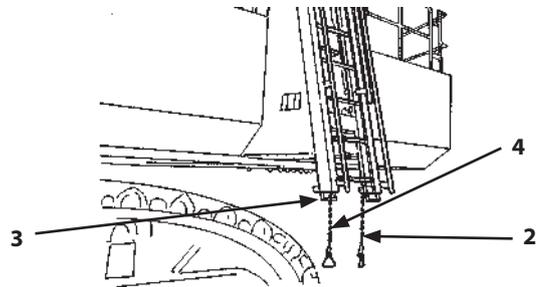
1. Pull down chain (4) to release lock.
2. Pull down handle (3) to lower ladder (1) to locked position.

Retracting

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



M18J-01-001



M18C-01-034

Operating Ladder on the Upper-Structure

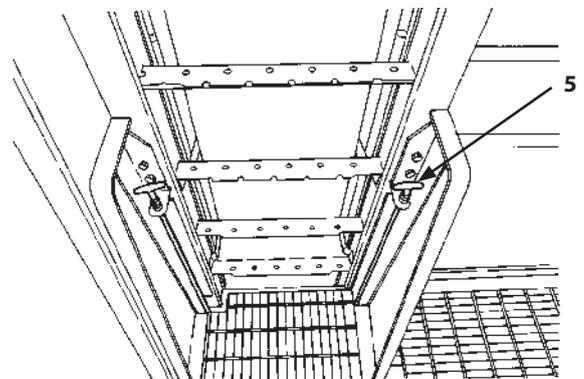
⚠ WARNING: Step back immediately after releasing ladder lock as spring force slides ladder (1) up quickly, potentially causing injury.

Extending

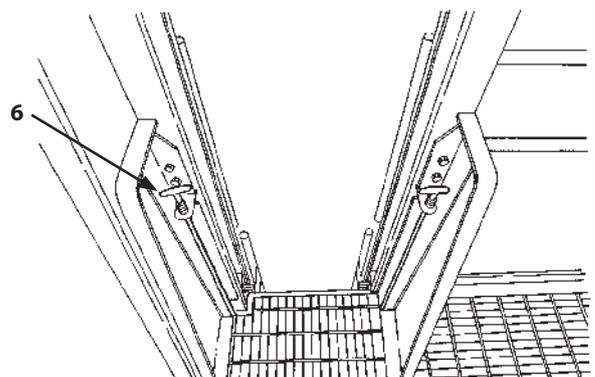
1. Pull up handle (5) to release lock.
2. Push down ladder (1) to locked position.

Retracting

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



M117-01-001



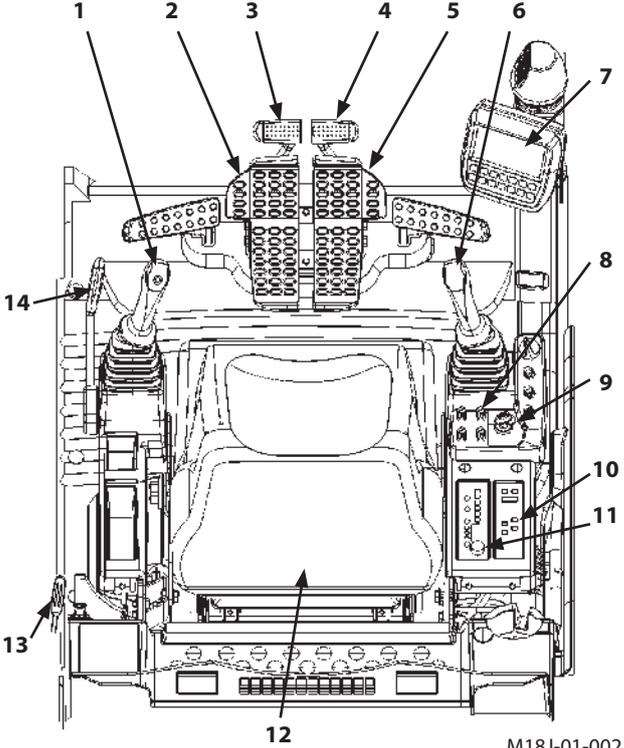
M117-01-002

OPERATOR'S STATION

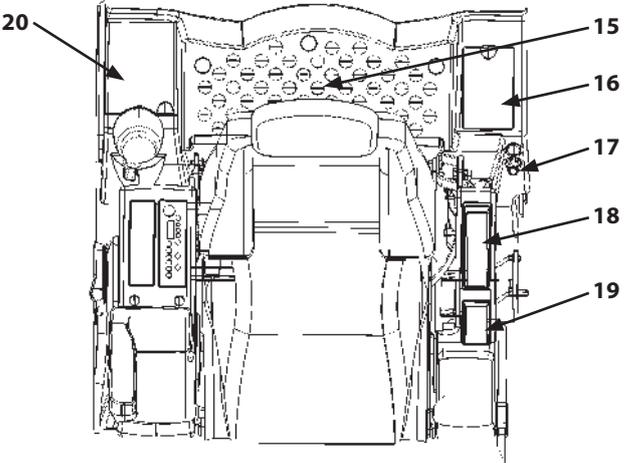
Cab Features

Std. Model

- 1- Left Control Lever/Horn Switch
(On Top of Lever)
- 2- Left Travel Pedal
- 3- Left Travel Lever
- 4- Right Travel Lever
- 5- Right Travel Pedal
- 6- Right Control Lever
- 7- Multi Function Monitor Panel
- 8- Switch Panel
- 9- Key Switch
- 10- Air Conditioner Panel
- 11- Radio
- 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 (Optional)
- 19- Switch Panel (Optional)
Glove Compartment (Not Optional Switch Equipped
Machine)
- 20- Hot & Cool Box



M18J-01-002



M18J-01-003

OPERATOR'S STATION

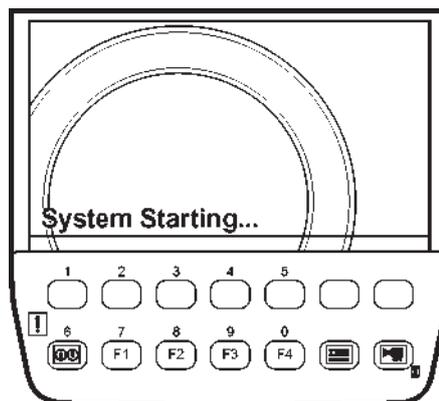
Multi Function Monitor

How to Use Screens

Displaying Basic Screen

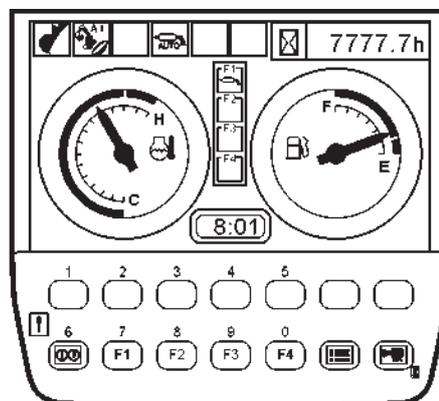
IMPORTANT: Start the engine after the basic screen is displayed.

When the key switch is turned to the ON position, the starting screen displays for about two seconds and the basic screen displays.



Key Switch: ON

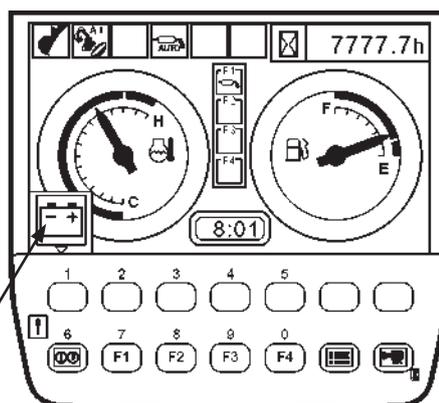
T1V1-05-01-115



Basic Screen

M18J-01-004

IMPORTANT: Until the alternator starts generating power after the engine starts, alternator alarm is displayed on the basic screen.



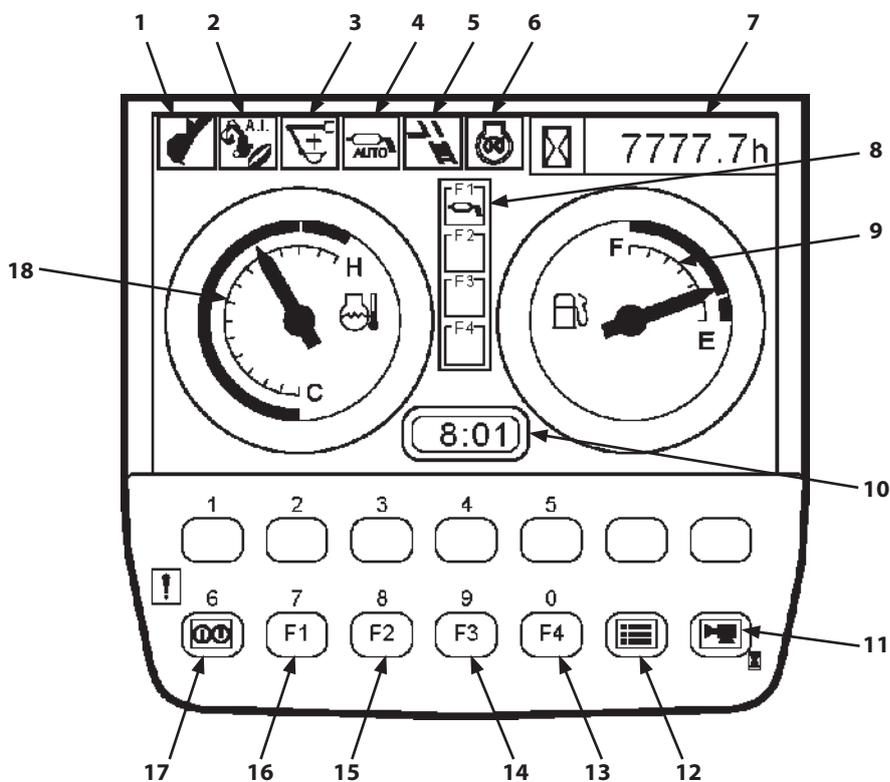
Alternator Alarm

M18J-01-005

OPERATOR'S STATION

Outline

- 1- Work Mode Display
- 2- Auto-Idle Display
- 3- Heavy Lift Display
- 4- Lubrication Mode Display
- 5- Ladder Display
- 6- Preheat Display
- 7- Hour Meter
- 8- Auto-Lubrication Display
- 9- Fuel Gauge
- 10- Clock
- 11- Back Monitor Selector
- 12- Menu
- 13- Auxiliary
- 14- Auxiliary
- 15- Auxiliary
- 16- Auto-Lubrication Selection
- 17- Return to Basic Screen Key
- 18- Coolant Temperature Gauge



M18J-01-049

OPERATOR'S STATION

- Display of Meters
Items to be displayed

- 7. Hour Meter
- 9. Fuel Gauge
- 10. Clock
- 12. Menu
- 18. Coolant Temperature Gauge

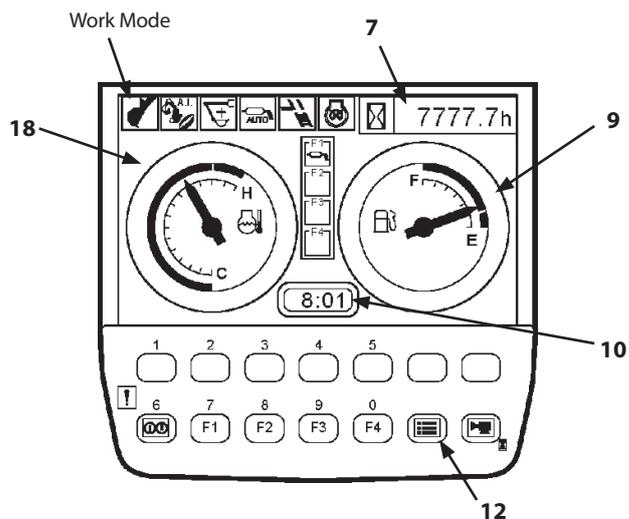
- Work Mode Display
The attachments being used are displayed.

Digging Mode

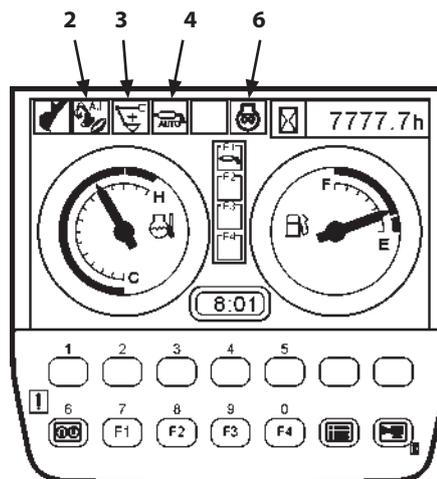


T1V1-05-01-108

- Auto-Idle Display (2)
When selecting auto-idle from the switch panel, auto-idle display (2) is displayed.
When the key is turned ON, the data blinks for 10 seconds.
- Heavy Lift Display (3)
When selecting heavy lift from the switch panel, heavy lift display (3) is displayed.
- Lubrication Mode Display (4)
When selecting lubrication mode from the switch panel, lubrication mode display (4) is displayed.
- Preheat Display (6)
While the current is supplying to the air heater, preheat display (6) is displayed.



M18J-01-049

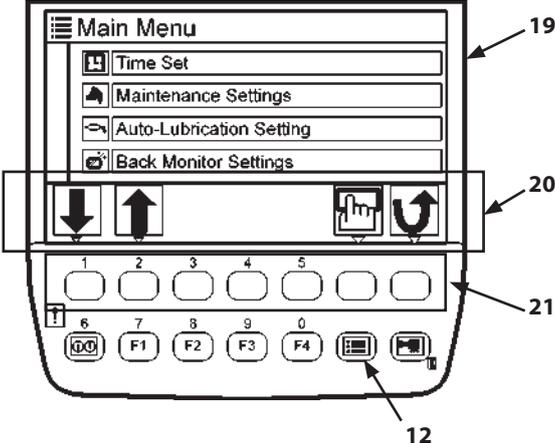


M18J-01-050

OPERATOR'S STATION

Menu Screen (19)

Press menu key (12) on the basic screen to display main menu screen (19). Select the desired menu by operating key (21) located under   keys on icon display area (20).



M18J-01-009E

OPERATOR'S STATION

Hour Meter

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

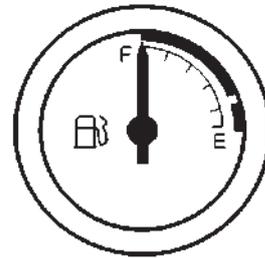


M81U-01-058

Fuel Gauge

The fuel amount in the fuel tank is indicated. Refuel before the needle reaches "E".

 **NOTE:** Fuel tank capacity is 1470 liter (388 US gal). When the fuel remains come to approximately 870 liter (230 US gal), the fuel gauge needle starts to move.



M1U1-01-039

Clock

Indicate the present time.



M1U1-01-040

Back Monitor Selector

Shift the monitor screen to the back view monitor screen and vice versa.

 **NOTE:** It is optional in some region.



M1U1-01-041

OPERATOR'S STATION

Menu Key

Shifts the basic screen to the menu screen.



M1U1-01-042

Optional Function Key

The desired preset optional function can be selected by operating these keys even though the menu key is not operated.

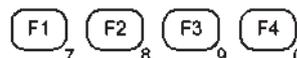
F1 : Auto-Lubrication Selection

F2 : Auxiliary

F3 : Auxiliary

F4 : Auxiliary

are the fixed function keys.



M1U1-01-043

Return to Basic Screen Key

Allows any screen to return to the basic screen.



M1U1-01-044

Alarm Light

Comes ON when any abnormality occurs.



M1U1-01-045

Optional Function Display

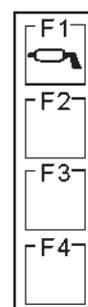
Displays the optional functions preset by the optional function key.

F1 : Auto-Lubrication Selection

F2 : Auxiliary

F3 : Auxiliary

F4 : Auxiliary

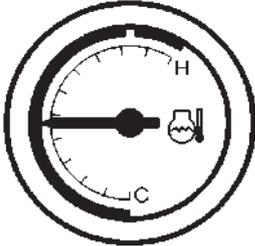


M18J-01-010

OPERATOR'S STATION

Coolant Temperature Gauge

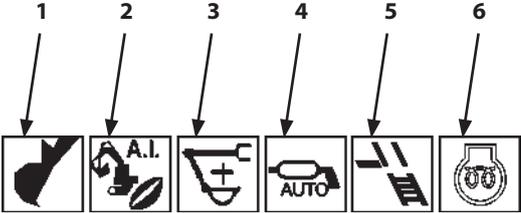
Indicates the engine coolant temperature. Normally the needle is around the center of the scale during operation.



M1U1-01-047

Operating Status Icon Display

Displays icons indicating the current status of attachment (1) and operation mode such as auto-idle system (2) and heavy lift (3) and auto-lubrication (4) and ladder position (5) and preheat display (6), when these systems are activated.



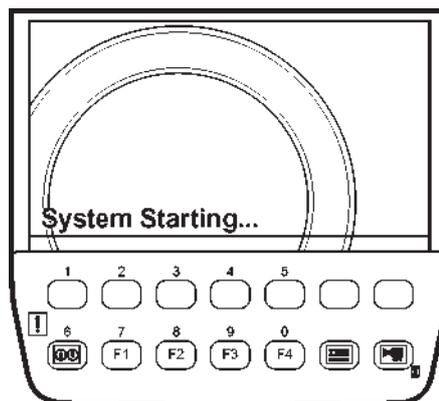
M18J-01-051

OPERATOR'S STATION

Displaying Basic Screen by Password Input (Optional)

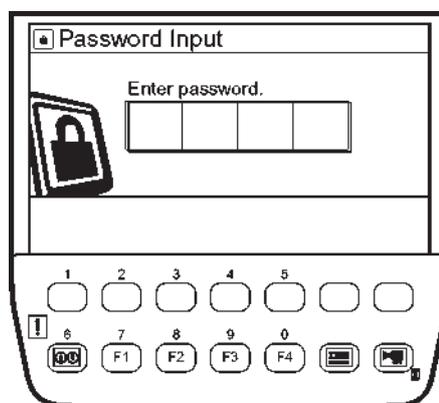
IMPORTANT: When required to activate the TEN-key function (ignition block system), consult your authorized dealer.
If the password ever escapes the customer's memory, the machine must be modified. Be extra careful not to forget the password.

1. Turn the key switch ON. After the starting screen is displayed, the password input screen will be displayed.



Starting Screen

T1V1-05-01-115

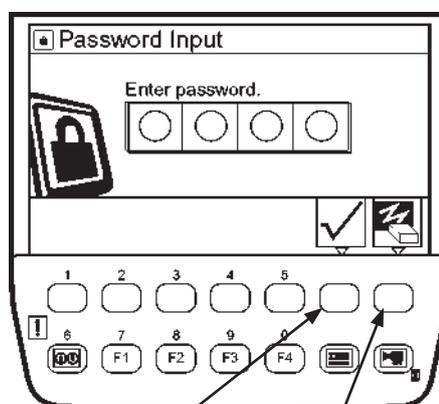


Password Input Screen

T1V5-05-01-093

2. Input a password by using the keys located under the screen. If pushing the determination key, the monitor unit matches the input password to the registered one. If they match, the basic screen displays.

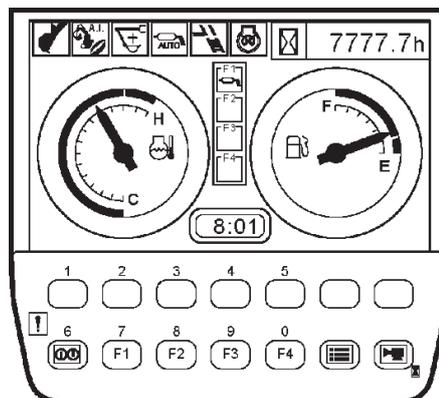
NOTE: When inputting the password again, the entered characters can be erased by pushing the delete key.



Determination Key

Delete Key

T1V5-05-01-002



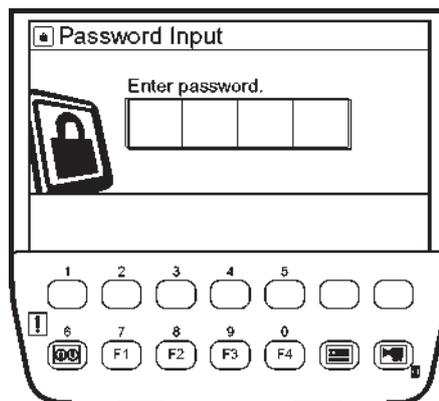
Basic Screen

M18J-01-049

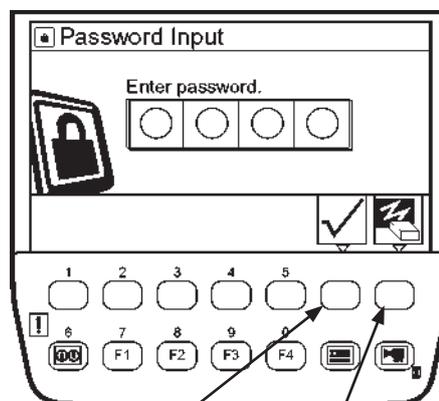
OPERATOR'S STATION

In Case of Inputting an Incorrect Password

1. If inputting an incorrect password, the message "Password is incorrect." displays by pushing the determination key.



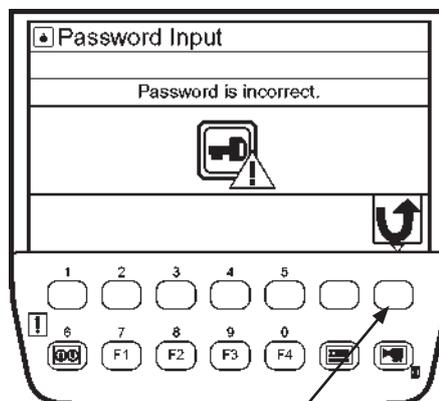
Password Input Screen T1V5-05-01-093



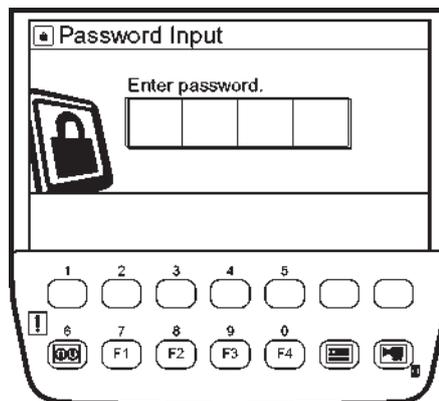
Determination Key Delete Key T1V5-05-01-002

2. Return to the password input screen by pushing the back key.

 **NOTE:** When inputting the password again, the entered characters can be erased by pushing the delete key.



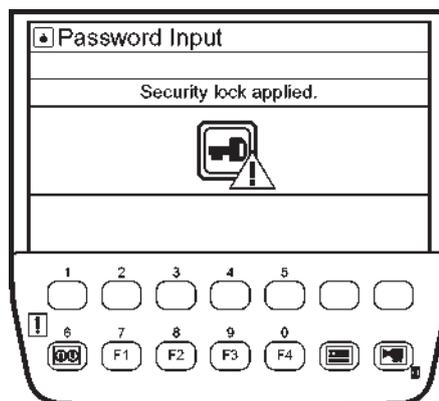
Back Key T1V5-05-01-004



T1V5-05-01-093

OPERATOR'S STATION

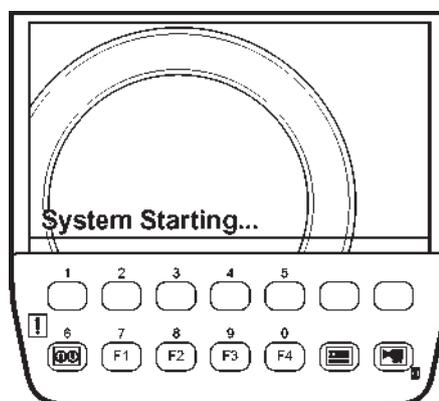
3. If inputting an incorrect password three times, a screen displays informing that the security lock has been applied, and a buzzer rings for thirty seconds. During that time, the buzzer does not stop ringing even if turning of the key switch ON/OFF.



Security Lock Screen

T1V5-05-01-005

4. After thirty seconds, if the key switch is turned to the ON position, the starting screen displays and the password input screen displays again. Then a password can be input again. If inputting an incorrect password even once this time, the security lock screen displays again and a buzzer rings for thirty seconds. The buzzer does not stop ringing for thirty seconds even if turning the key switch ON/OFF.

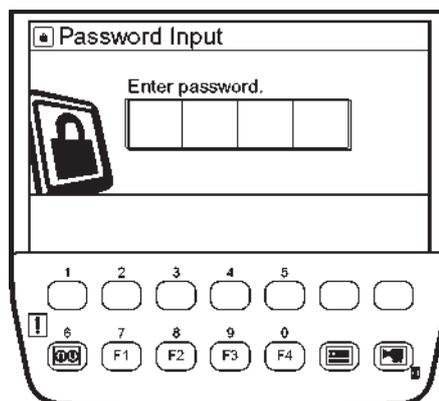


Starting Screen

T1V1-05-01-115

5. After the buzzer stops ringing, a password can be input again. Turn the key switch to the ON position and input a password after the password input screen displays. (Refer to page 1-13)

6. If inputting an incorrect password again, the security lock screen displays again. The buzzer does not stop ringing for thirty seconds even if turning the key switch ON/OFF.



Password Input Screen

T1V5-05-01-093

OPERATOR'S STATION

Extending Password Duration Time

IMPORTANT: This operation is applicable only to those machines that display the basic screen based upon password input.

By using the password duration screen, password duration time can be set. When you restarting the machine, a password need not be input within that timeframe.

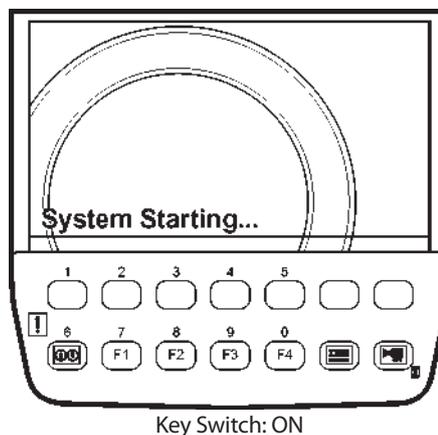
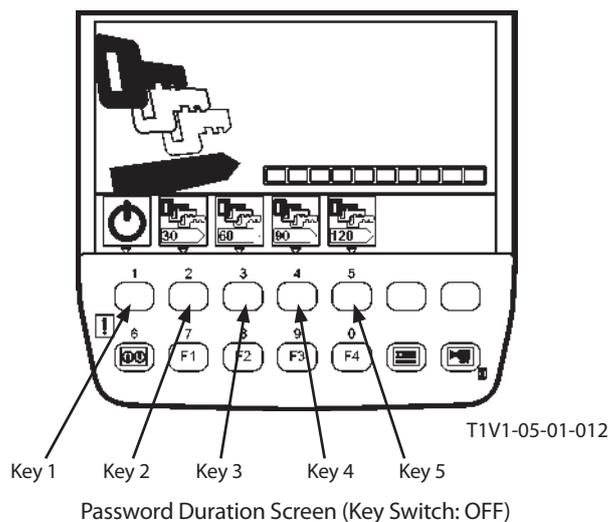
1. When turn the key switch to the OFF position, the monitor unit displays the password duration screen for ten seconds.
2. While the password duration screen is still displayed, push a relevant key, and password duration time is set.

Duration time assigned to each key is as follows:

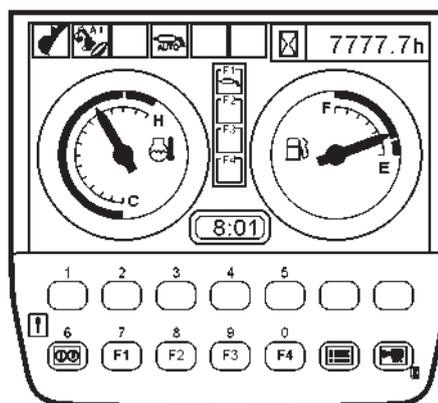
- key 1: 0 minute
- key 2: 30 minutes
- key 3: 60 minutes
- key 4: 90 minutes
- key 5: 120 minutes

 **NOTE:** If password duration time is not set explicitly, 0 minute on duration time is assumed.

3. If turning the key switch to the ON position within password duration time, the monitor unit displays the starting screen.



T1V1-05-01-115



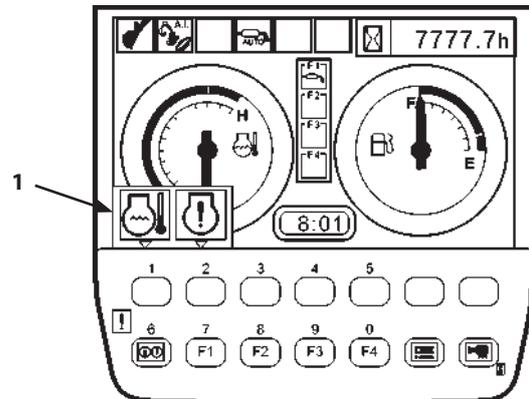
M18J-01-004

OPERATOR'S STATION

Alarm Occurrence Screen

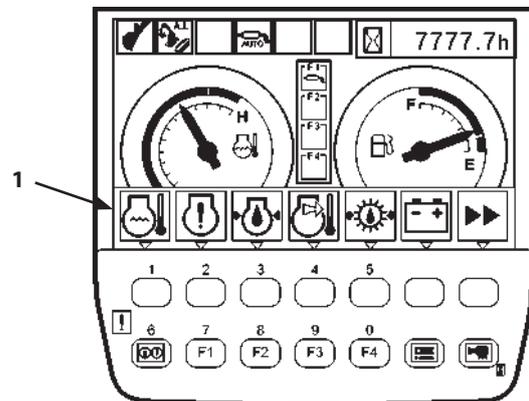
In case any abnormality occurs, alarm marks (1) are displayed on the basic screen.

- When the number of alarms is two or less



M18J-01-012

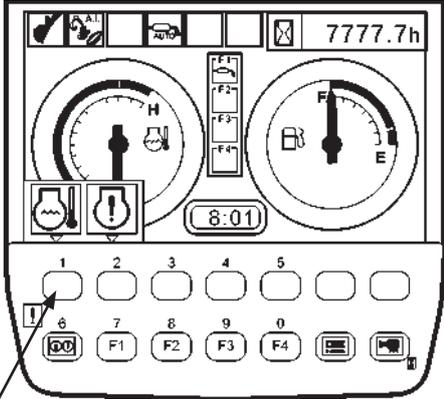
- When the number of alarms is three or more



M18J-01-013

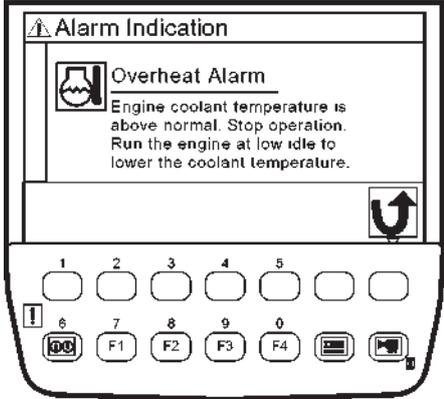
OPERATOR'S STATION

In case any abnormality occurs, push the key located under the alarm mark. The monitor displays the corrective action to the alarm situation.



Push a Relevant Key

M18J-01-012



T1V5-05-01-013

OPERATOR'S STATION

Contents of Alarms

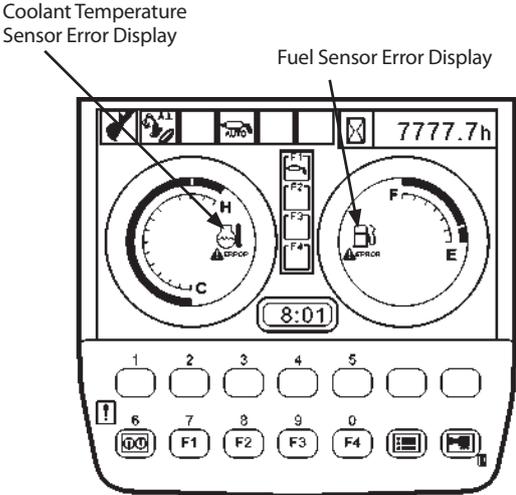
Display	Contents of Alarms	Remedy
 M178-01-036	Overheat Alarm	Engine coolant temperature has abnormally increased. Stop operation. Run the engine at slow idle speed and lower the coolant temperature.
 T1JB-05-02-001	Hydraulic Overheat Alarm	Hydraulic oil temperature is above normal. Stop operation, check hydraulic oil level, check for leaks etc.
 M183-01-080	Engine Warning Alarm	Engine or engine related parts are abnormal. Consult your nearest Hitachi dealer.
 M178-01-037	Engine Oil Pressure Alarm	Engine oil pressure has decreased. Immediately stop engine. Check engine oil system and oil level.
 M183-01-073	Pump Transmission Oil Level Alarm	Pump transmission oil level is low. Immediately stop engine. Check pump transmission oil system and oil level. <i>NOTE:</i> When key switch is turned ON position, this indicator will light until engine starts. This is normal.
 M183-01-077	Hydraulic Oil Level Alarm	Hydraulic oil level is low. Check hydraulic oil level and refill oil. <i>NOTE:</i> When operating on a slope, this indicator may light.
 M183-01-076	Coolant Level Alarm	Coolant level is low. Check coolant level and refill coolant.
 M18J-01-014	Engine Stop Alarm	Indicator will light on if an abnormality in the engine or engine-related parts occurs. (Depending on the severity of the trouble, engine speed may decrease or the engine may automatically stop.) If this indicator lights on, immediately position the machine in the park position, stop the engine and contact your authorized dealer.
 M183-01-075	Engine Oil Level Alarm	Engine oil level is low. Check engine oil level and refill oil.
 M183-01-071	Alternator Alarm	Electrical system is abnormal. Check the battery and alternator. <i>NOTE:</i> When key switch is turned ON position, this indicator will light until engine starts. This is normal.
 M178-01-034	Remaining Fuel Alarm	Fuel level is low 130 liter (34 US gal) of fuel remains. Refill fuel as soon as possible.

OPERATOR'S STATION

Display	Contents of Alarms	Remedy
 T1J1-05-01-005	Auto-Lubrication Alarm	This indicator will light when any trouble occurs in the auto-lubrication circuit. Consult your nearest Hitachi dealer. <i>NOTE: When the MANUAL lubrication mode is selected, this indicator will light.</i>
 M183-01-067	Air Filter Clogged Alarm	Air filter elements are clogged. Clean or replace air filter elements.
 T1V1-05-01-102	Work Mode Alarm	Work Mode system is abnormal. Consult your nearest Hitachi dealer.
 T1V1-05-01-103	Pilot Control Shut-Off Lever Alarm	Pilot control shut-off lever system is abnormal. Consult your nearest Hitachi dealer.
 M18M-01-037	Ladder Position Alarm (Optional)	While the ladder is extended, this indicator will light and when the pilot control shut-off lever is lowered to the UNLOCK position, alarm buzzer will sound. The machine will not be able to operate in this time. When the ladder is retracted to the locked position, this indicator will go off and the machine will be able to operate.

OPERATOR'S STATION

- Fuel Sensor Error Display
When the fuel sensor is faulty or if the harness between fuel sensor and monitor unit is broken, the fuel sensor error display is displayed on the fuel gauge.
- Coolant Temperature Sensor Error Display
When the coolant temperature sensor is faulty or if the harness between coolant temperature sensor and monitor unit is broken, the coolant temperature sensor error display is displayed on the coolant temperature gauge.



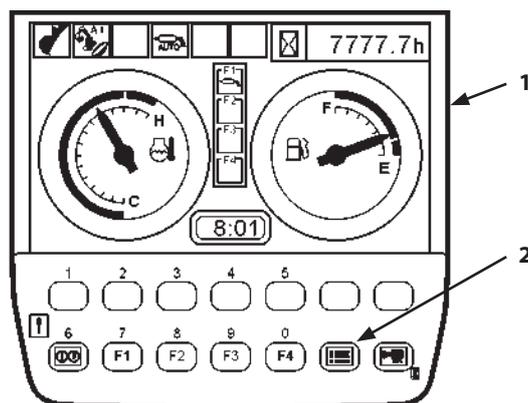
M18J-01-015

OPERATOR'S STATION

Clock Setting

Press menu key (2) on basic screen (1) to display main menu screen (3).

Select time set menu (4) by pressing the key located under 1 , 2  keys on icon display area and adjust the clock set.

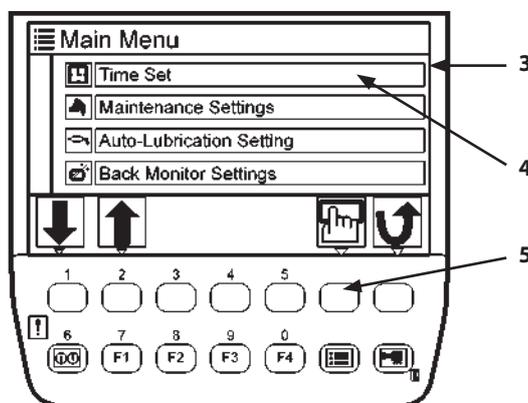


M18J-01-004

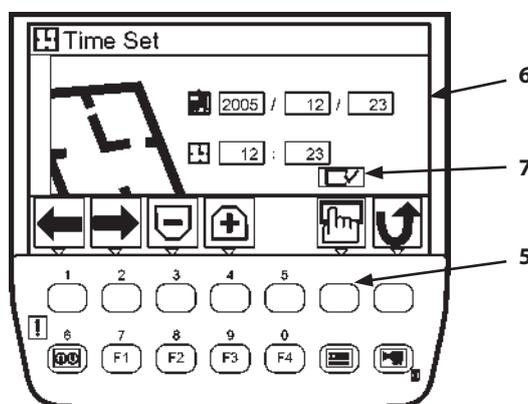
Time Adjustment

After selecting time set menu (4) by pressing the key located under 1 , 2  keys on icon display area, press determination key (5).

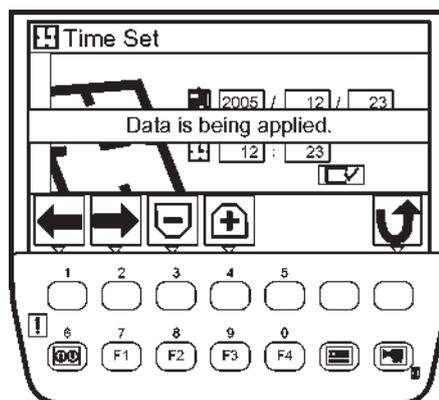
1. While pressing the key located under 1 , 2  and 3 , 4  keys on icon display area on time setting screen (6), select the figures for Year, Month, Day, and Time.
2. After moving the cursor to  position (7) by pressing the key located under 2  key, press determination key (5) to define the setting.



M18J-01-009E



T1V5-05-01-021

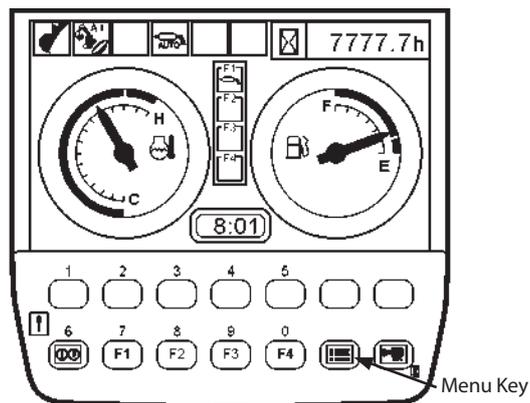


T1V5-05-01-022

OPERATOR'S STATION

Password Change (Optional)

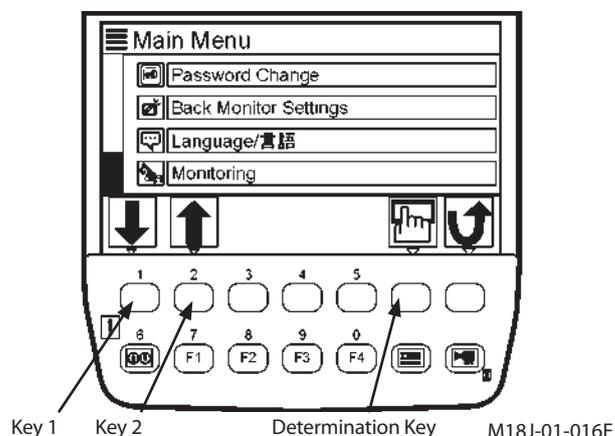
1. After the basic screen is displayed, push the menu key in order to display the main menu.



Basic Screen

M18J-01-004

2. Select password change from main menu by using keys 1 (↓) and 2 (↑). Push the determination key. Then, the password change screen displays.

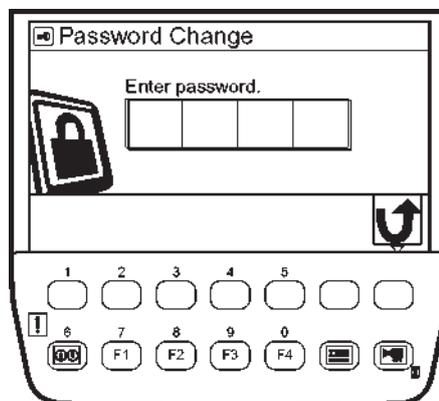


Key 1

Key 2

Determination Key

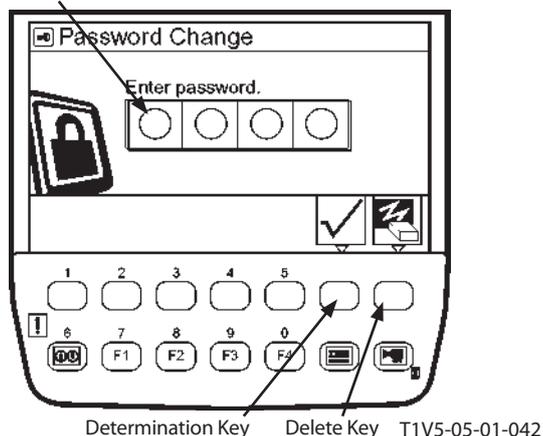
M18J-01-016E



Registered Password

T1V5-05-01-041

3. Input the registered password and push the determination key.
4. If inputting the password again, the entered characters can be erased by pushing the delete key.



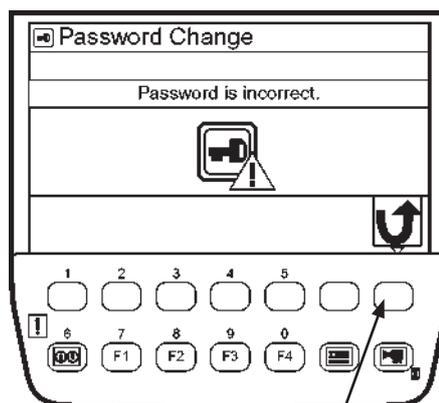
Determination Key

Delete Key

T1V5-05-01-042

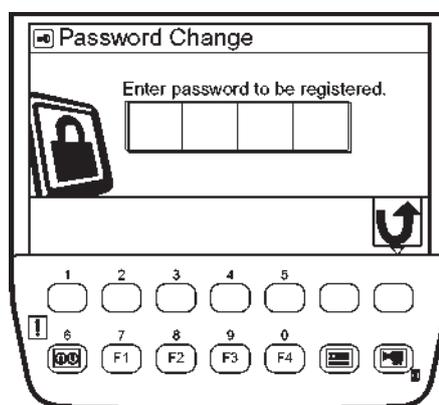
OPERATOR'S STATION

 **NOTE:** If inputting an incorrect password after pushing the determination key, the message "Password is incorrect." displays. Push the back key and go back to the previous screen, Input the password again.



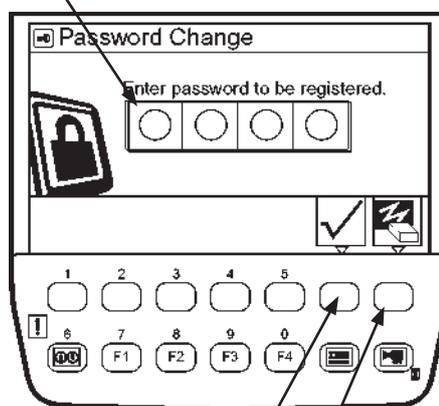
Back Key T1V5-05-01-044

5. The message "Enter password to be registered." displays. Then, input a new password with three or four digits and push the determination key.
6. If inputting the password again, push the delete key.



T1V5-05-01-130

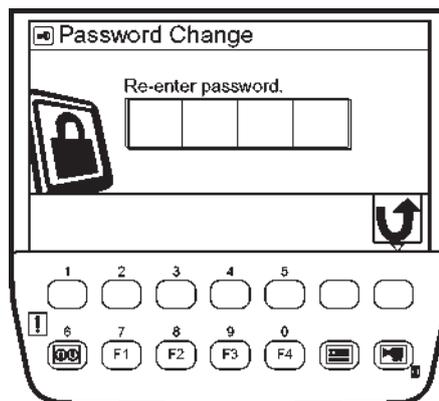
A New Password



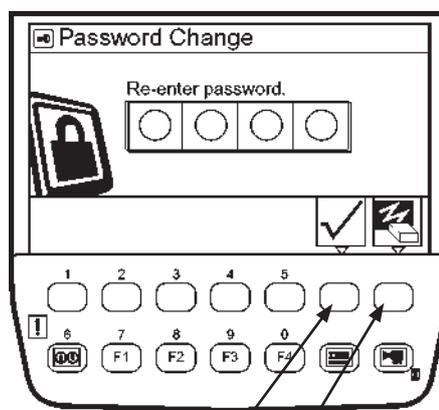
Determination Key Delete Key T1V5-05-01-131

OPERATOR'S STATION

7. The message "Re-enter password." displays. Then, input a new password again and push the determination key.
8. If inputting the password again, push the delete key in order to delete the entered characters.

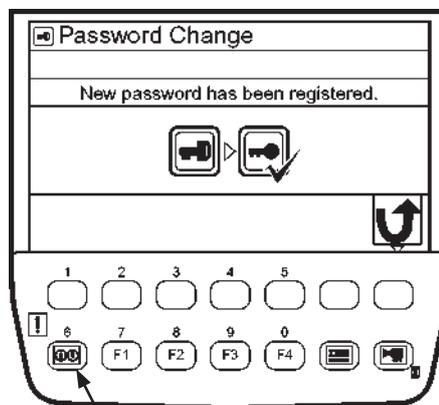


T1V5-05-01-132



Determination Key Delete Key T1V5-05-01-133

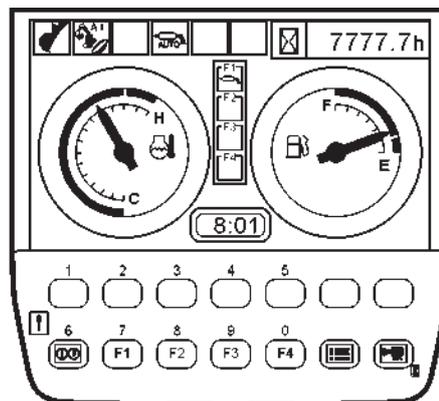
9. The message "New password has been registered." displays. This completes the password change process.



Key 6

T1V5-05-01-043

10. Push key 6 and the basic screen displays.



Basic Screen

M18J-01-004

OPERATOR'S STATION

Back Monitor Settings

IMPORTANT:

- The image displayed on the back monitor is to be used as an assist view. Drive the machine while paying thorough attention to the surroundings.
- In order to obtain a clear image, clean the lens and the monitor display before operating the machine.
- Never attempt to change the mounting position of the rear view camera.
- Consult your authorized dealer if any abnormality is found on the rear view image.

 **NOTE:** The monitor and camera lens surface is a resin product. Lightly wipe the surface with a wet clean cloth. Never use an organic solvent.

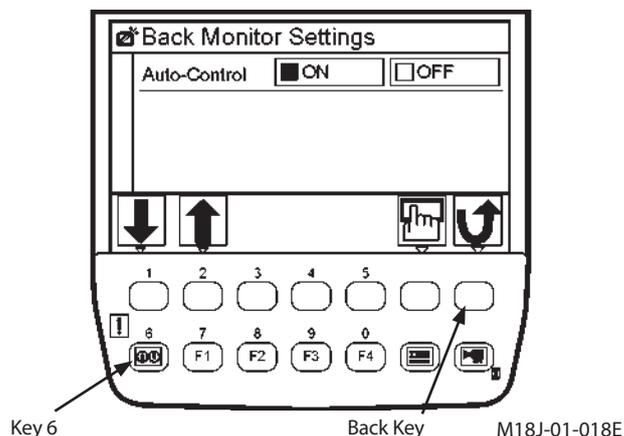
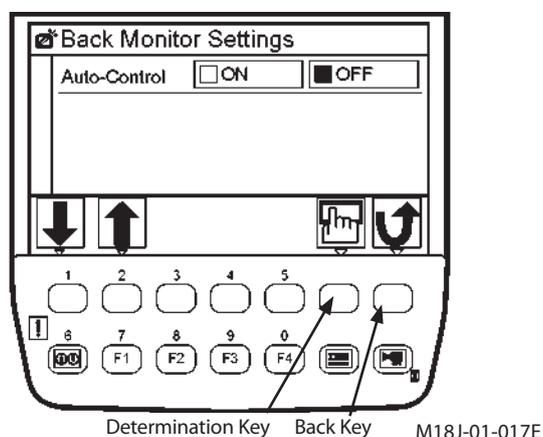
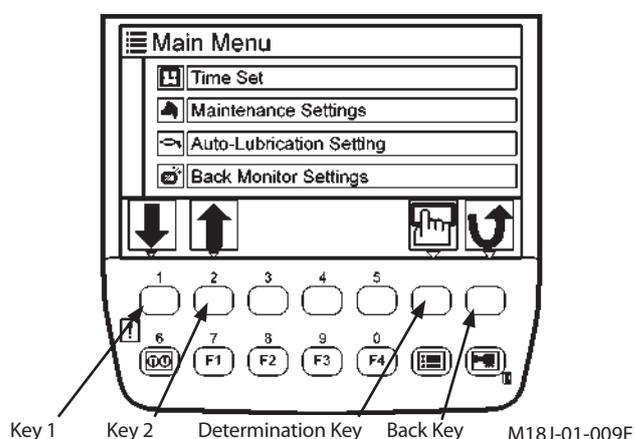
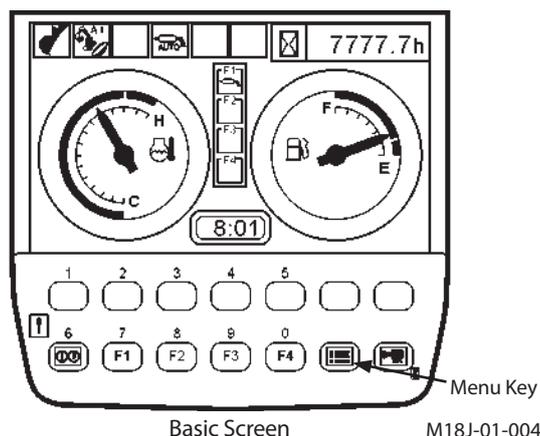
Auto-Control: ON

Image on the monitor unit when traveling is automatically switched to that of the back monitor.

1. When the basic screen displays, push the menu key and display main menu.
2. Select back monitor settings from main menu by using keys 1 (↓) and 2 (↑). Push the determination key. Then, the back monitor settings screen displays.
3. Push the determination key. Then, auto-control is set to ON.

 **NOTE:** When pushing the back key, return to the basic screen.

4. Push key 6 (⏏), and return to the basic screen.
5. If travel operation is done, backward image is displayed on the screen of monitor unit.

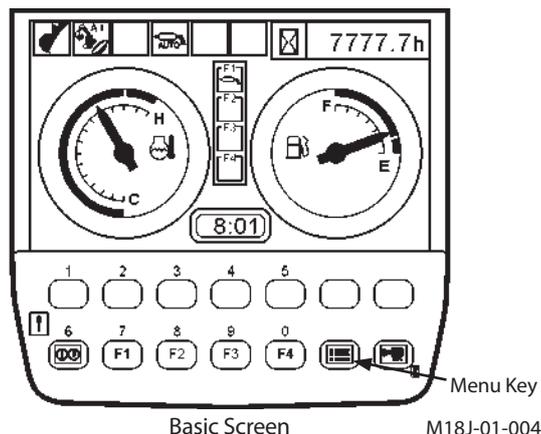


OPERATOR'S STATION

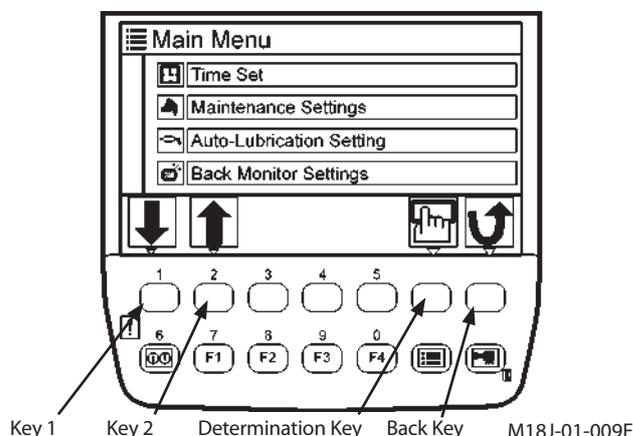
Auto-Control: OFF

Set automatic switching function of images between monitor unit and back monitor when traveling to OFF.

1. When the basic screen displays, push the menu key and display main menu.



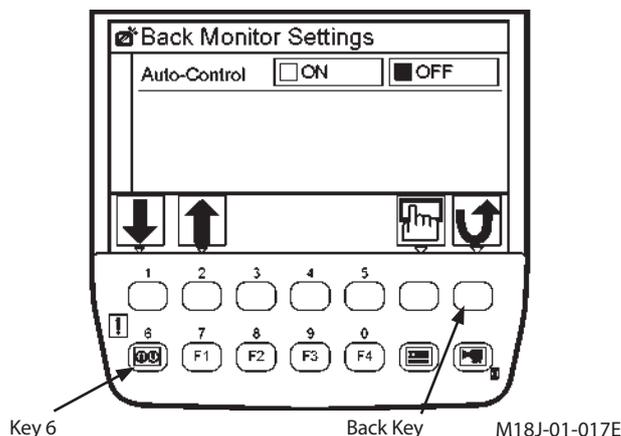
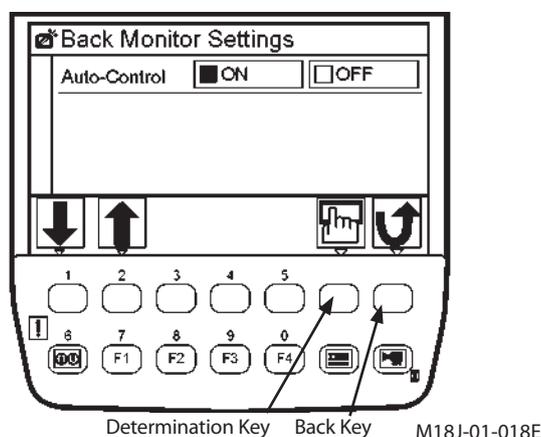
2. Select back monitor settings from main menu by using keys 1 (↓) and 2 (↑). Push the determination key. Then, the back monitor settings screen displays.



3. Push the determination key. Then, auto-control is set to OFF.

NOTE: When pushing the back key, return to the previous screen.

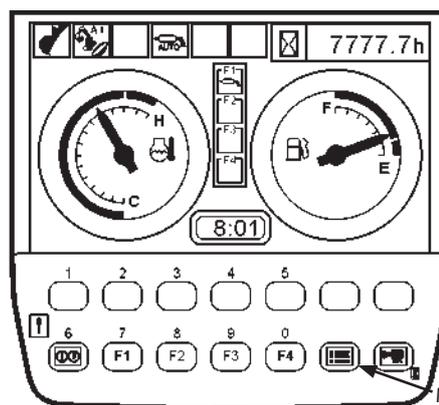
4. Push key 6 (☰), and return to the basic screen.



OPERATOR'S STATION

Maintenance Settings

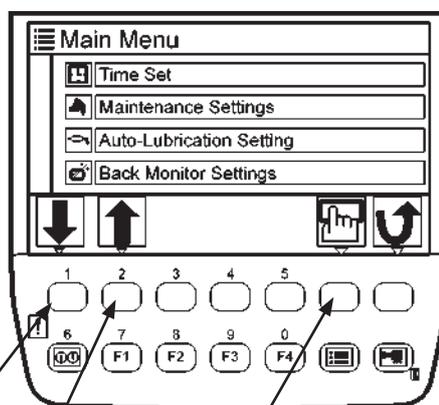
1. When the basic screen displays, push the menu key and display main menu.



Basic Screen

Menu Key
M18J-01-004

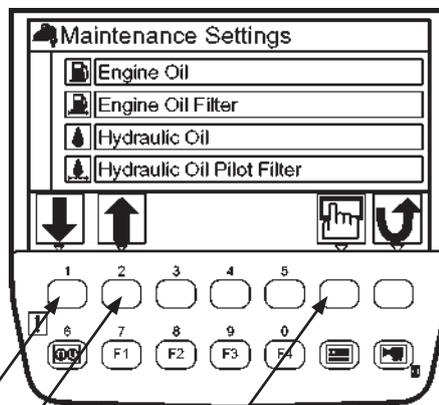
2. Select maintenance settings from main menu by using keys 1 (↓) and 2 (↑). Push the determination key. Then, the maintenance settings screen displays.



Key 1 Key 2 Determination Key

M18J-01-009E

3. Select an item to be set from among the list of maintenance settings screen by using keys 1 (↓) and 2 (↑). Push the determination key. Then, the Interval ON/OFF settings screen displays. (In the right example, Engine Oil is selected.)



Key 1 Key 2 Determination Key

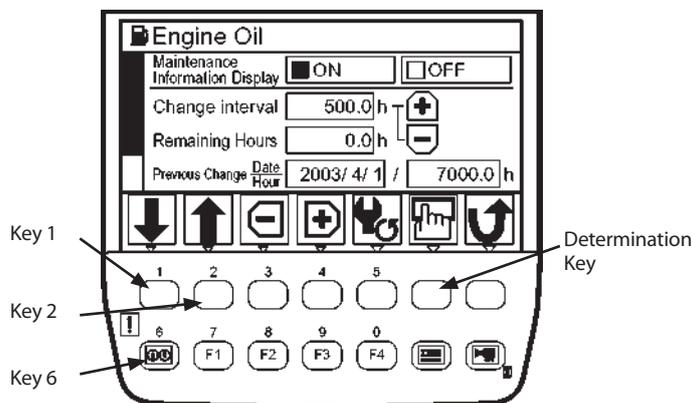
T1V5-05-01-049

Maintenance Information Display ON/OFF

1. Select ON or OFF for maintenance information display by using keys 1 (↓) and 2 (↑). Push the determination key.

ON: When time comes to change, a information message is displayed on the screen.
 OFF: No information message is displayed.

2. In order to complete setting, push key 6 (00). Then, the basic screen displays.



Interval ON/OFF Settings Screen

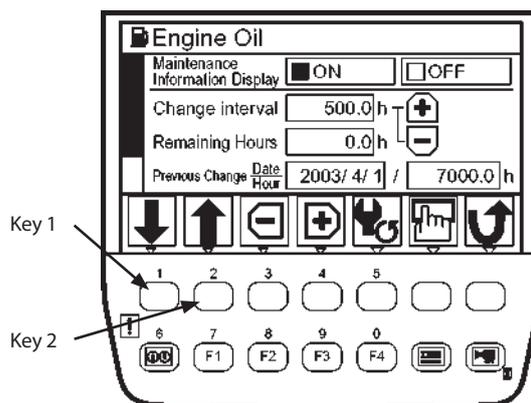
T1V5-05-01-052

OPERATOR'S STATION

Change Interval Settings

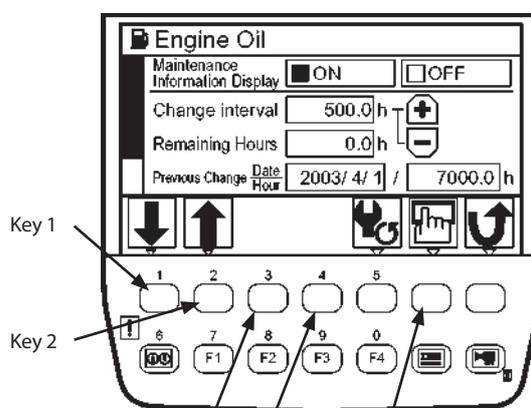
IMPORTANT: Change interval can only be set when maintenance information display is set to ON.

1. Select change interval by using keys 1  and 2 .
2. Set time for change interval by using keys 3  and 4 .
3. Select remaining hours by using keys 1  and 2 , and push determination key.
4. The message "Adjust remaining hours to new change interval. OK?" displays. Then, push the determination key.
5. Push key 6 , and the basic screen displays.



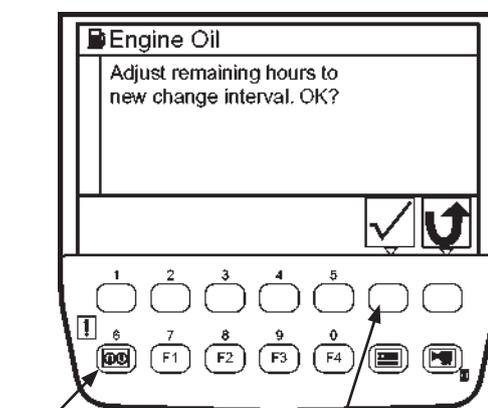
Interval ON/OFF Settings Screen

T1V5-05-01-052



Key 3 Key 4 Determination Key

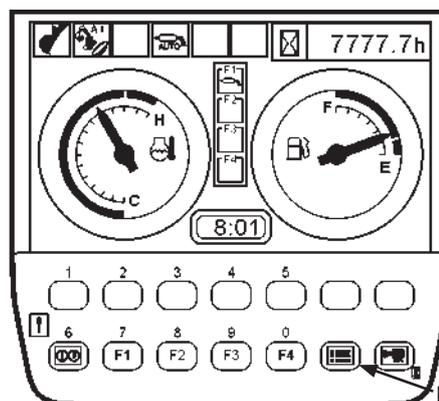
T1V5-05-01-138



Key 6

Determination Key

T1V5-05-01-139



Basic Screen

Menu Key

M18J-01-004

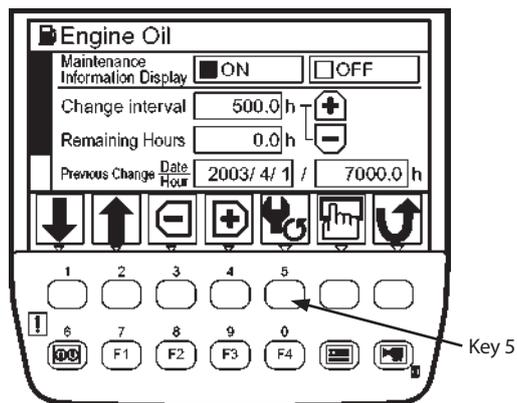
OPERATOR'S STATION

Resetting Data

If data is reset, push key 5  on the Interval ON/OFF settings screen.

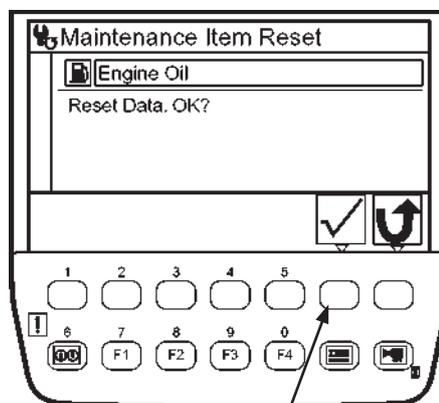
The message "Reset Data. OK?" displays. Then, push the determination key.

The value of remaining hours is reset to that of change interval. Previous change date/hour is updated with current date and time.



Interval ON/OFF Settings Screen

T1V5-05-01-052



Determination Key

T1V5-05-01-140

OPERATOR'S STATION

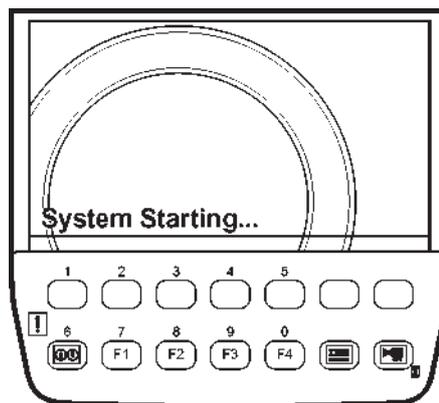
Screen Display when Maintenance Information Display is ON

- When only one item displays
 1. If turning the key switch to the ON position, the starting screen displays. Then, the scheduled maintenance screen for the item whose change interval has expired displays for three to ten seconds. Finally the basic screen displays. (In the right example, Hydraulic Oil applies.)

NOTE: For a machine which the basic screen is displayed according to a password on, the scheduled maintenance screen for the item whose change interval has expired displays for three to ten seconds, after the password is input successfully and the determination key is pushed. And then the basic screen displays.

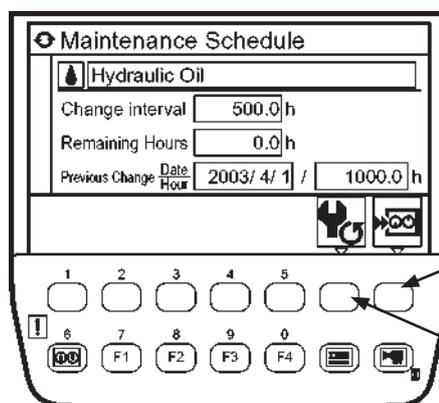
2. If data is reset, push the reset key while the scheduled maintenance screen is displayed. The message "Reset Data. OK?" displays. Then, push the determination key. The value of remaining hours is reset to that of change interval. Previous change date/hour is updated with current date and time.

- NOTE:**
- When pushing the back key while the maintenance information display screen is displayed, return to the basic screen.
 - When pushing the back key while reset screen is displayed, return to the maintenance information display screen.



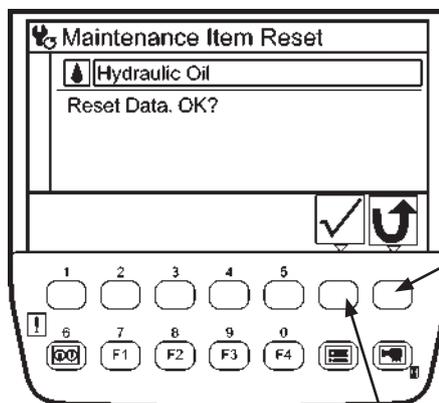
Starting Screen

T1V1-05-01-115



Maintenance Information Display Screen

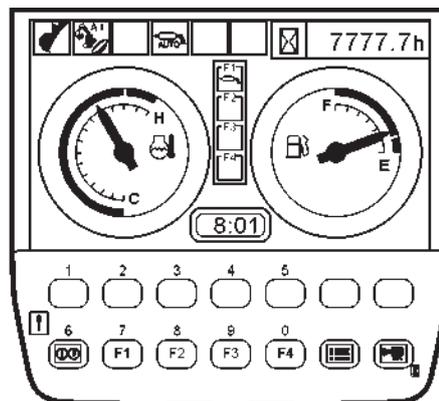
T1V5-05-01-170



Reset Screen

Determination Key

T1V5-05-01-171



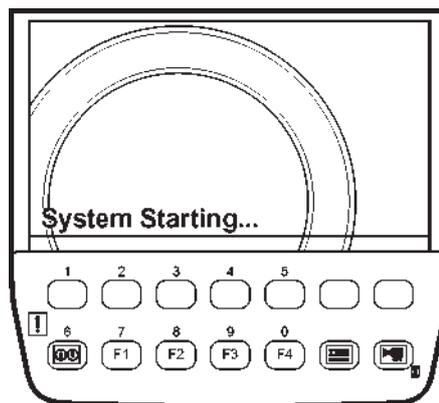
Basic Screen

M18J-01-004

OPERATOR'S STATION

- When more than two items apply
 1. If turning the key switch to the ON position, the starting screen displays. Then, the scheduled maintenance screen for the items whose change interval has expired displays for three to ten seconds. Finally the basic screen displays.

 **NOTE:** For a machine which the basic screen is displayed according to a password on, the scheduled maintenance screen for the items whose change interval has expired displays for three to ten seconds, after the password is input successfully and the determination key is pushed. And then the basic screen displays.

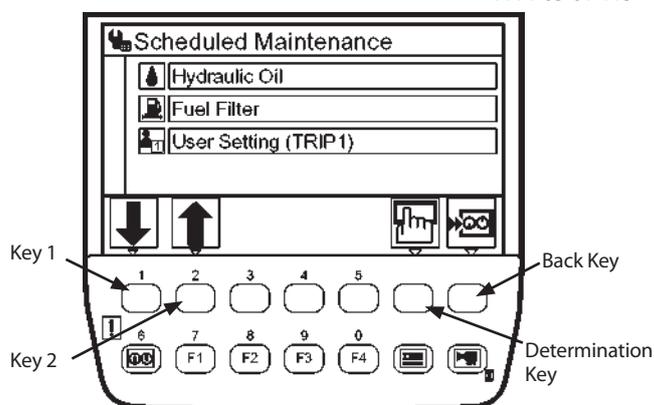


Starting Screen

T1V1-05-01-115

2. If data is reset, while the scheduled maintenance screen is displayed, select desired item by using keys 1 (↓) and 2 (↑). Push the determination key. Then, the maintenance information display screen for the selected item displays. (In the right example, Hydraulic Oil is selected.)

 **NOTE:** When pushing the back key while the scheduled maintenance screen is displayed, the basic screen displays.

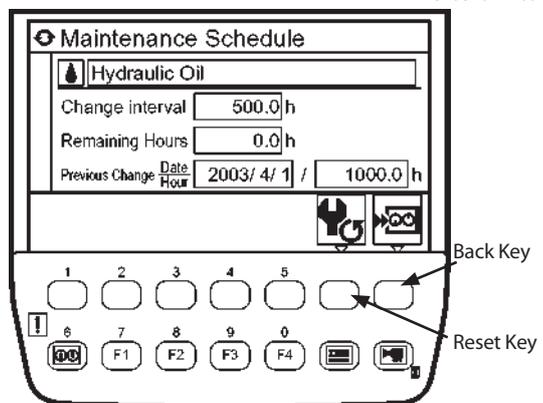


Scheduled Maintenance Screen

T1V5-05-01-169

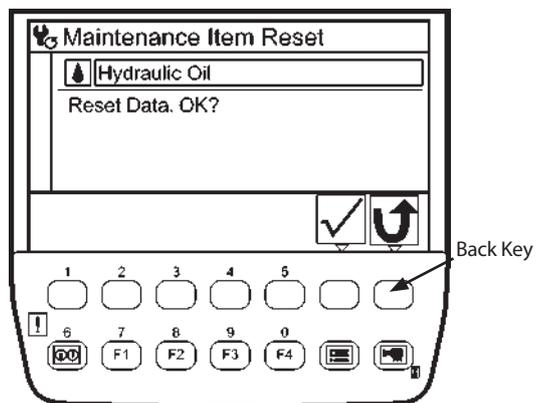
3. Push the reset key while the maintenance information display screen is displayed. The message "Reset Data. OK?" displays. Then, push the determination key. The value of remaining hours is reset to that of change interval. Previous change date/hour is updated with current date and time.

-  **NOTE:**
- When pushing the back key while the maintenance information display screen is displayed, return to the scheduled maintenance screen.
 - When pushing the back key while the reset screen is displayed, return to the maintenance information display screen.



Maintenance Information Display Screen

T1V5-05-01-170



Reset Screen

T1V5-05-01-171

OPERATOR'S STATION

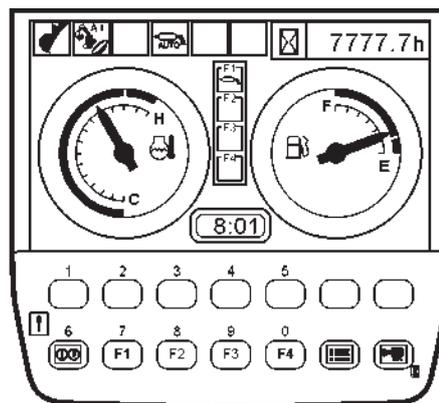
Language Settings

1. When the basic screen displayed, push the menu key and display main menu.
2. Select language from main menu by using keys 1 (↓) and 2 (↑). Push the determination key. Then, the language settings screen displays.
3. Select a desired language by using keys 1 (↓) and 2 (↑). Push the determination key.

NOTE:

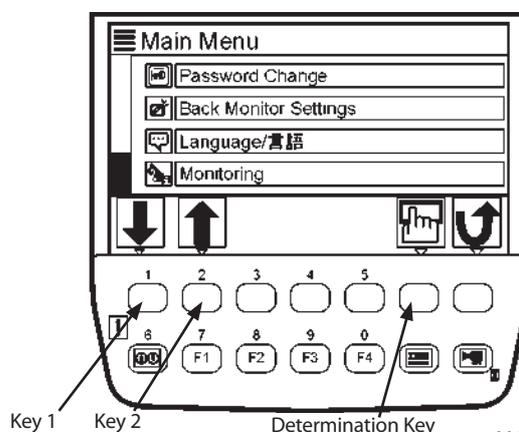
- Languages to be displayed on the screen of monitor unit have been selected from twelve languages, namely display languages 1 or 2, at the time of shipping from the factory. (Refer to the next section)
- When pushing the back key, return to the previous screen.

4. Push key 6 (☰), and the basic screen displays.



Basic Screen

M18J-01-004

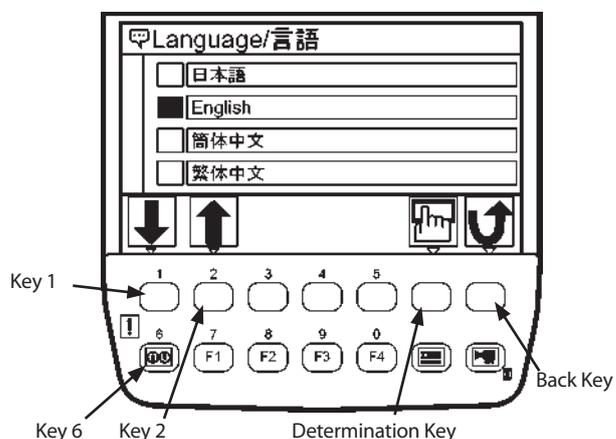


Key 1

Key 2

Determination Key

M18J-01-016E



Key 1

Key 6

Key 2

Determination Key

Back Key

T1V1-05-01-137

OPERATOR'S STATION

Lists of Display Language

Display Languages 1

Language	Screen Display	
Japanese	日本語	T1V1-05-01-141
English	English	T1V1-05-01-142
Chinese (Simplified)	簡体中文	T1V1-05-01-143
Chinese (Traditional)	繁体中文	T1V1-05-01-144
Korean	한국어	T1V1-05-01-145
Indonesian	Bahasa Indonesia	T1V1-05-01-146
Thai	ภาษาไทย	T1V1-05-01-147
Vietnamese	Tiếng Việt	T1V1-05-01-148
Myanmarese	မြန်မာဘာသာ	T1V1-05-01-149
Arabic	اللغة العربية	T1V1-05-01-150
Persian	اللغة الفارسية	T1V1-05-01-151
Turkish	Türkçe	T1V1-05-01-152

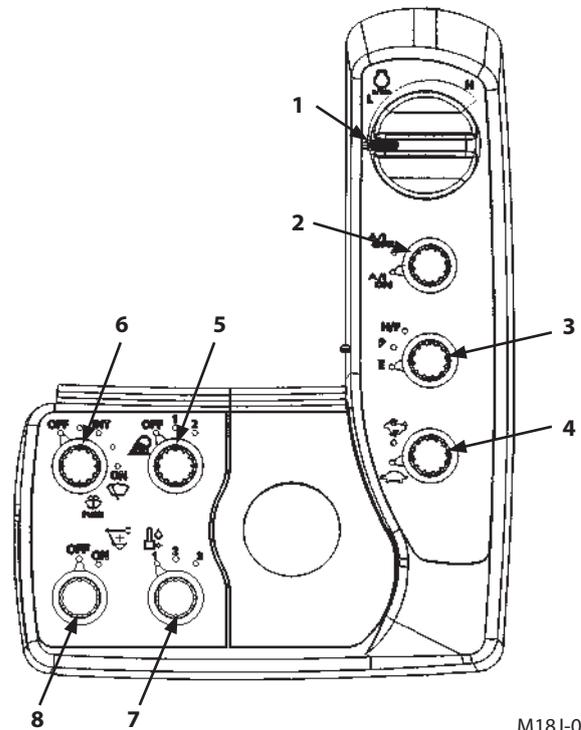
Display Languages 2

Language	Screen Display	
English	English	T1V1-05-01-142
Spanish	Español	T1V1-05-01-153
Italian	Italiano	T1V1-05-01-154
French	Français	T1V1-05-01-155
German	Deutsch	T1V1-05-01-156
Dutch	Nederlands	T1V1-05-01-157
Russian	Русский	T1V1-05-01-158
Portuguese	Português	T1V1-05-01-159
Finnish	Suomi	T1V1-05-01-160
Swedish	Svensk	T1V1-05-01-161
Norwegian	Norsk	T1V1-05-01-162
Danish	Dansk	T1V1-05-01-163

OPERATOR'S STATION

Switch Panel

- 1- Engine Control Dial
- 2- Auto-Idle Switch
- 3- Power Mode Switch
- 4- Travel Mode Switch
- 5- Work Light Switch
- 6- Wiper/Washer Switch
- 7- Swing/Boom Priority Mode Switch
- 8- Heavy Lift Switch



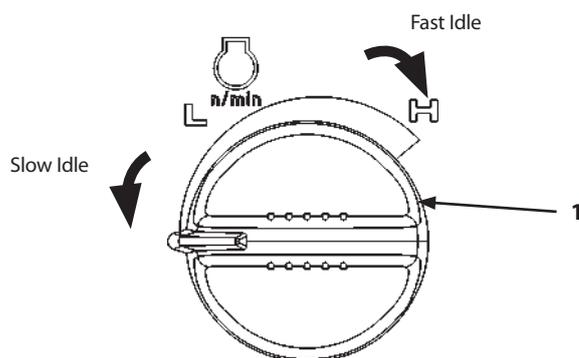
M18J-01-052

OPERATOR'S STATION

Engine Control Dial

Use engine control dial (1) to adjust engine speed. Turn it clockwise to increase engine speed or counterclockwise to decrease engine speed.

- The fully clockwise position : Fast idle
- The fully counterclockwise position : Slow idle

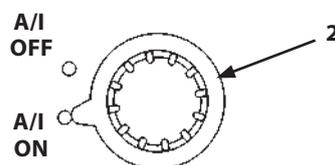


M1P1-01-068

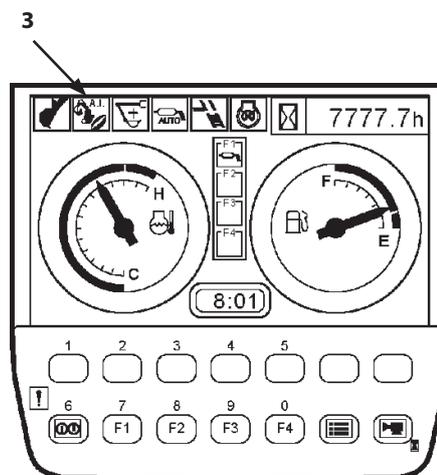
Auto-Idle Switch

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

- Auto-Idle Mode
When auto-idle switch (2) is turned to the A/I ON position, the engine speed is reduced to slow idle speed 4 seconds after releasing all control levers (neutral), reducing the fuel consumption. When the auto-idle mode is selected, auto-idle indicator (3) on the monitor panel lights.



M1U1-01-017



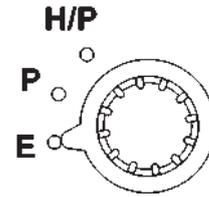
M18J-01-049

OPERATOR'S STATION

Power Mode Switch

Three engine speed modes, E, P, and H/P modes, are selected by operating the power mode switch.

- E (Economy) Mode
Although production is slightly reduced more than in the P mode, the fuel consumption and noise levels are reduced, allowing the machine to operate efficiently.
- P (Power) Mode
Use the P mode when general digging work is needed.
- H/P (High Power) Mode
Use the H/P mode when extra fast speed and/or heavy duty work is needed.



M178-01-013

Travel Mode Switch

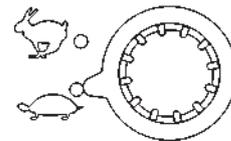
Two travel modes, FAST and SLOW, are selected by turning the travel mode switch to either position.



Mark (Fast Speed Mode)



Mark (Slow Speed Mode)



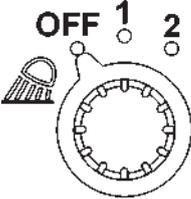
M178-01-096

OPERATOR'S STATION

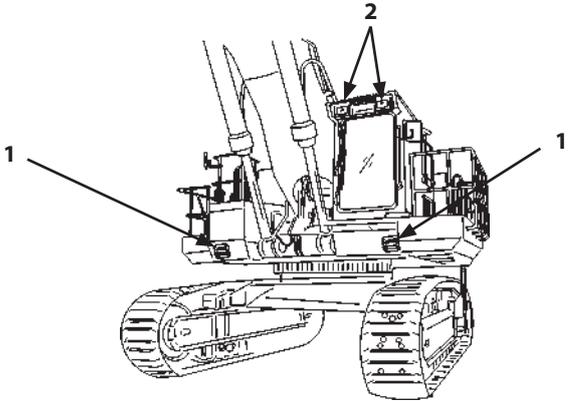
Work Light Switch

Work light switch has the following positions:

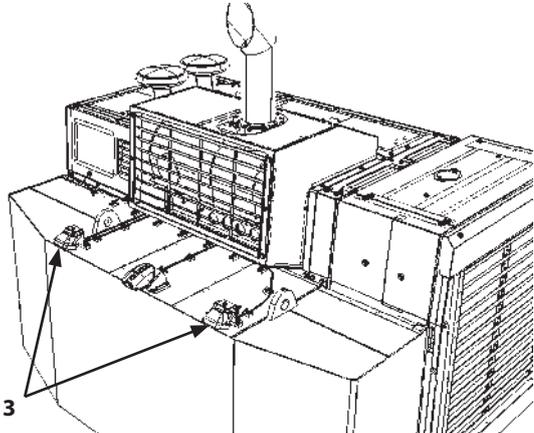
- 1 Position
Work lights (1) on the base machine and work lights (3) on the counterweight will light. Also, the instrument panel illumination will light.
- 2 Position
Work lights (1), (2) and (3) will light in addition. Also, the instrument panel illumination will light.
- OFF Position
Work lights (1), (2), (3) and the instrument panel illumination will turn OFF.



M18J-01-053



M18J-01-031



M18J-01-031

OPERATOR'S STATION

Wiper/Washer Switch

The wiper and the window washer are operated using the wiper/washer switch.

- Wiper
Turn the wiper/washer switch to the specified position to operate the wiper.

OFF Position: The wiper stops and is retracted.

INT Position: The wiper operates intermittently at the interval selected by the switch position as described below.

INT (Slow): The wiper operates at 8-second interval.

INT (Mid): The wiper operates at 6-second interval.

INT (Fast): The wiper operates at 3-second interval.

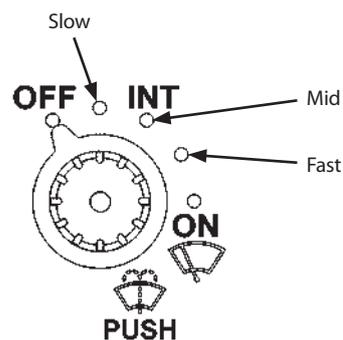
ON Position: The wiper operates continuously.

- Washer
Press and hold the wiper/washer switch to squirt washer fluid onto the front window. When the wiper/washer switch is pressed for more than 2 seconds, the wiper operates until the switch is released. When the wiper/washer switch is released, the wiper automatically retracts. While operating the wiper in the INT mode, when the wiper/washer switch is pressed, the wiper operation mode is changed to the continuous operation mode.

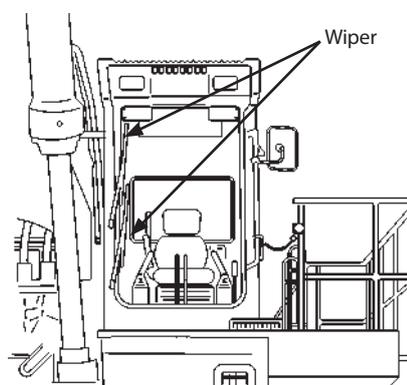
IMPORTANT: Washer motor may be damaged if wiper/washer switch is held for more than 20 seconds, or continually operated with no fluid in the washer tank.

- Swing/Boom Priority Mode Switch
The swing and boom raising speed balance are selected by this switch when operating swing and boom raising simultaneously.
 - 1...Use it when giving priority to the boom raising speed.
 - 2...Normal position.
 - 3...Use it when giving priority to the swing speed.

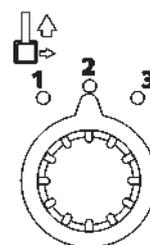
- Heavy Lift Switch
Boom and arm power will increase when heavy lift switch (1) is turned ON.
Boom and arm power will return to normal when heavy lift switch (1) is turned OFF.



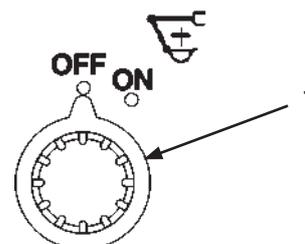
M18J-01-054



M18J-01-033



M18J-01-020



M18J-01-055

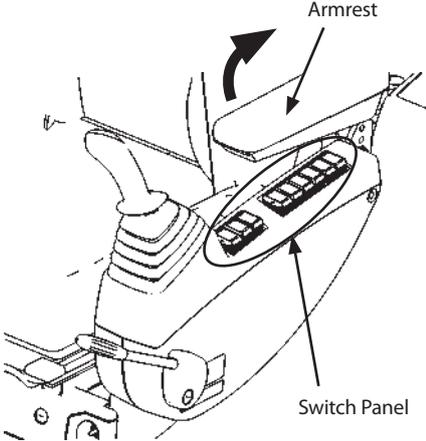
OPERATOR'S STATION

Switch Panel (Optional Included)

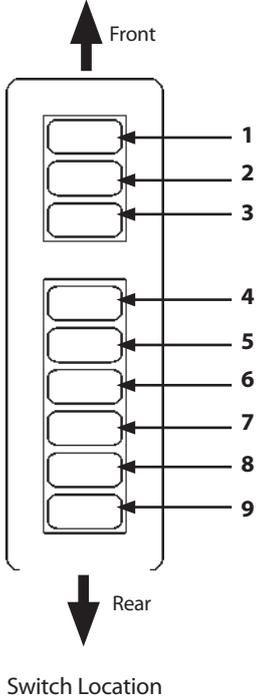
NOTE:

- There are switches for the standard and option. Before using the switches on the switch panel, make sure what kind of optional devices are equipped.
- Raise the armrest when you operate the switch.

- Travel Alarm Deactivation Switch (Optional) (1)
- Seat Heat Switch (Optional) (2)
- Auxiliary (3)
- Boom Mode Switch (4)
- Level Check Switch (5)
- Lubrication Mode Switch (6)
- Buzzer Deactivation Switch (7)
- Auxiliary (8)
- Auxiliary (9)



M1J1-03-001



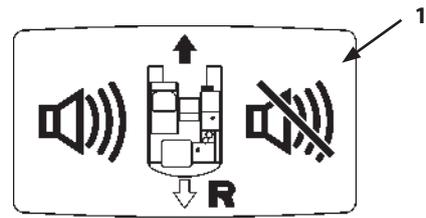
Switch Location

M1J1-01-027

OPERATOR'S STATION

Travel Alarm Deactivation Switch (Optional)

The travel alarm buzzer sounds during travel operation. When push travel alarm deactivation switch (1) to the off position [], the travel alarm buzzer function is deactivated.



M1U1-01-035

Seat Heater Switch (Optional)

When seat heater switch (2) is turned ON, the seat and/or backrest are heated to warm them up. When the temperature of the seat and/or backrest reaches its specified temperature, heating turns off automatically.



M1U1-01-011

WARNING:

- Use with seat wet or something poke into seat could cause electrical shock.
- Be careful when handling water or drinking water.
- Do not use if clothes are extremely wet.
- Do not poke the seat with a sharp object or put anything heavy with protruding parts on the seat.

CAUTION:

- Certain person as noted below, could be at risk of a low temperature burn, so should be careful during use.
- Person with delicate skin
- Person suffering from fatigue
- Person under excessive drinking or medication that could cause sleepiness (sleeping pills, cold medicines, etc.)
- Continuous use could cause low temperature burn to person.
- Use with blanket or cushion which may retain heat could cause abnormal heating of the seat.

IMPORTANT:

- To prevent damage, do not poke the seat with sharp objects or put anything heavy with protruding parts on the seat.
- If a liquid like water or a drink is spilled on the seat, wipe off with a soft cloth and make sure the seat is dry before using again.
- If the seat is abnormally hot, stop use and contact your authorized dealer.

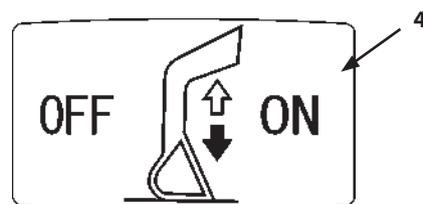
 NOTE: The point where heated varies with the type of seat.

OPERATOR'S STATION

Boom Mode Switch

When push boom mode switch (4) to the ON position, the machine cannot be raised off the ground with the front attachment, reducing machine vibration to be developed during excavation.

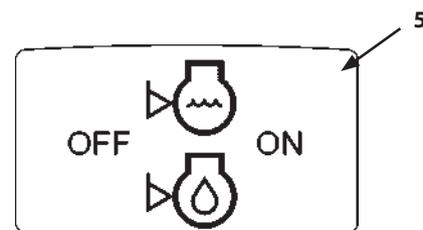
When turned OFF, the machine can be raised off the ground with the front attachment, allowing the machine to evacuate if the machine becomes stranded in a muddy area.



M1J1-01-020

Level Check Switch

While push level check switch (5) to the ON position, the engine oil level/coolant level indicator/hydraulic oil level indicator are displayed. When releasing level check switch (5), the indicator comes OFF.

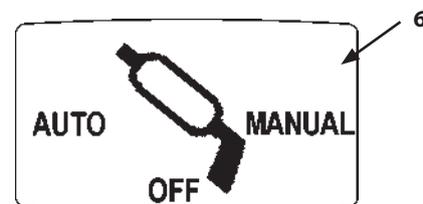


M1J1-03-002

Lubrication Mode Switch (Optional)

When push lubrication mode switch (6) to the AUTO position, the auto-lubrication device is activated so that all greasing points except for the bucket joint pins, swing bearing and swing gear are automatically lubricated at regular intervals.

When push switch (6) to the OFF position, the device is deactivated.

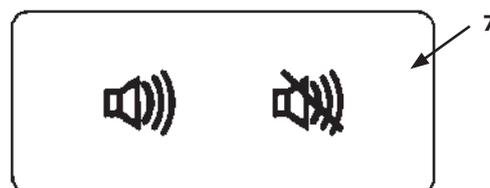


M18J-01-032

Buzzer Deactivation Switch

When engine oil pressure is low, when the engine overheats, or when engine coolant level is low, engine stop indicators will come on and a buzzer will sound.

If a buzzer sounds, push buzzer deactivation switch (7) to the off position []. The buzzer function will be automatically reset after releasing buzzer deactivation switch (7). (In other words, a buzzer will sound if an another trouble occurs.)

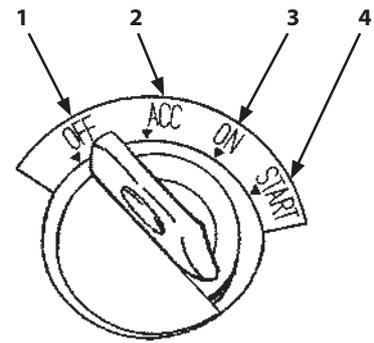


M18J-01-038

OPERATOR'S STATION

Key Switch

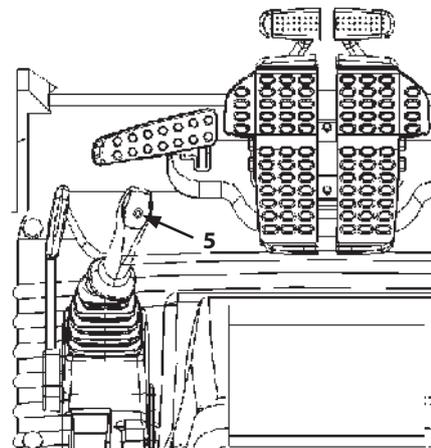
- 1- OFF (Engine Off)
- 2- ACC (Horn, Radio etc.)
- 3- ON (Engine On)
- 4- START (Engine Start)



M18J-01-056

Horn Switch

Horn switch (5) is provided on the top of the left control lever. The horn continuously sounds as long as switch (5) is pressed.



M1J1-01-025

OPERATOR'S STATION

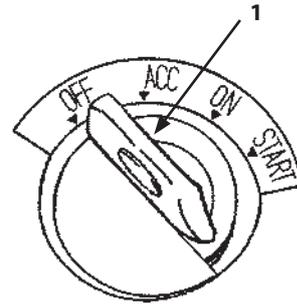
Cigar Lighter

Operation

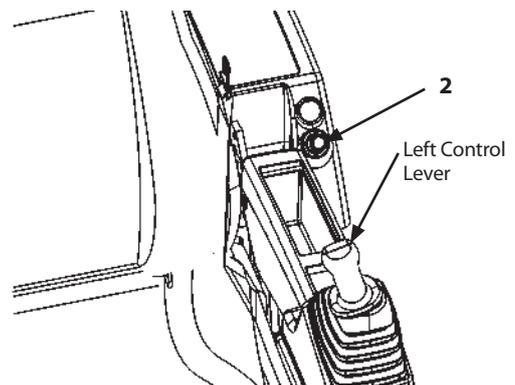
IMPORTANT: In case cigar lighter (2) does not pop out automatically 30 seconds after pushing cigar lighter (2) in, pull out cigar lighter (2) manually. Then, consult your authorized dealer.

1. Turn key switch (1) to the ACC or ON position.
2. Press and release cigar lighter (2) knob.
3. Cigar lighter (2) knob will return to the original position when cigar lighter (2) becomes usable. Pull cigar lighter (2) out to use.
4. After using cigar lighter (2), insert cigar lighter (2) into the panel until the knob is seated in the original position.

CAUTION: Do not power anything other than a genuine Hitachi Construction Machinery electrical device from the cigar lighter port.



M18J-01-056

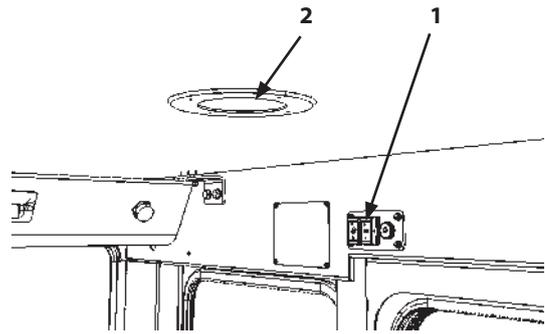


M1U1-01-021

OPERATOR'S STATION

Cab Light Switch

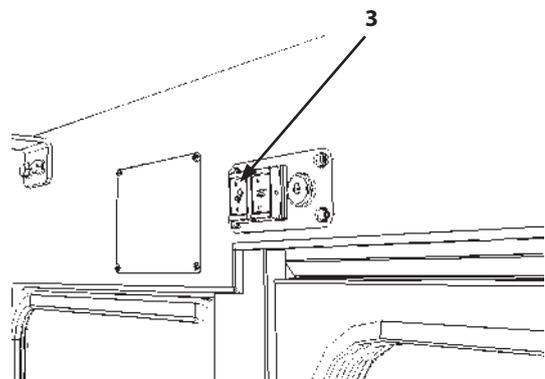
Turn the cab light (2) ON or OFF by using switch (1).



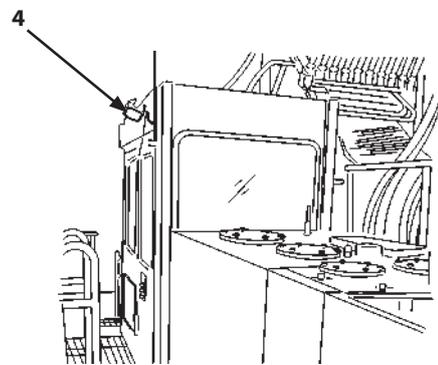
M18J-01-022

Step Light Switch

Press step light switch (3) to light step light (4) located on the top of the cab.



M18J-01-023

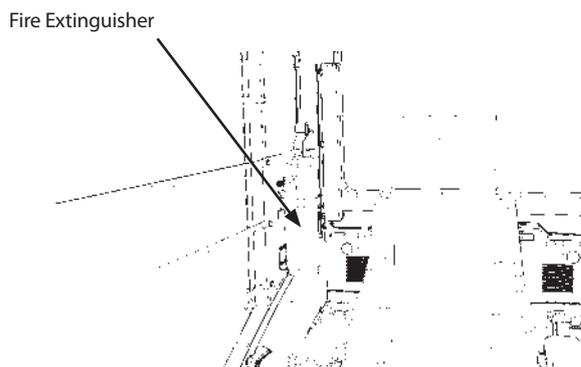


M183-01-036

OPERATOR'S STATION

Installing Fire Extinguisher (Optional)

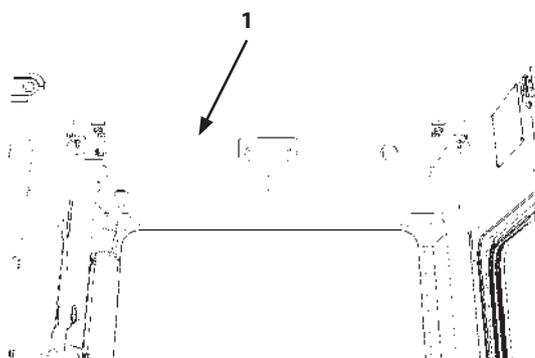
A fire extinguisher can be installed at the right rear corner inside the cab. Consult your authorized dealer to install a fire extinguisher.



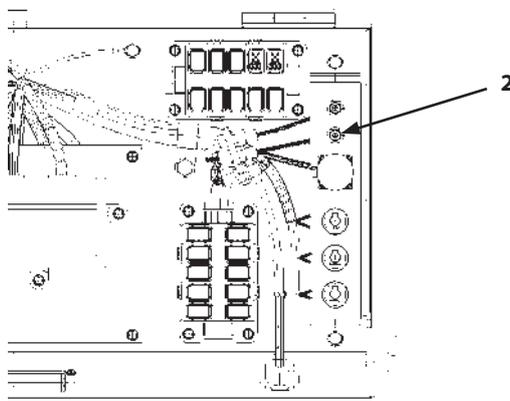
M18J-01-024

Engine Fault Diagnostics Switch

Engine fault diagnostics switch (2) is located inside electric equipment box (1) in the cab. If any trouble occurs in the engine and/or the engine related parts, and either engine warning indicator or engine stop indicator illuminates or flashes continuously, the fault codes (indicating an engine problem by flashing the engine warning indicator) can be displayed by operating engine fault. Normally it is not used. Refer to the chapter 11 "Troubleshooting" in detail.



M18J-01-025



M18J-01-026

OPERATOR'S STATION

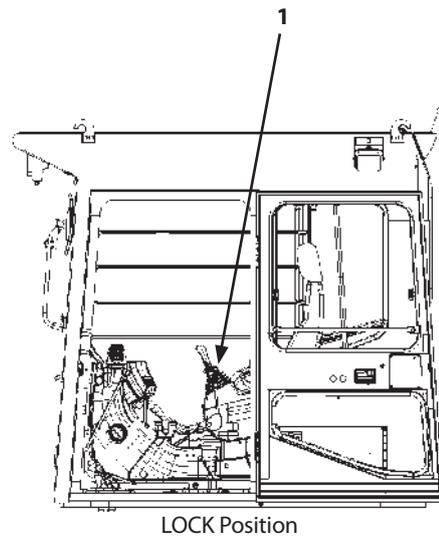
Pilot Control Shut-Off Lever

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

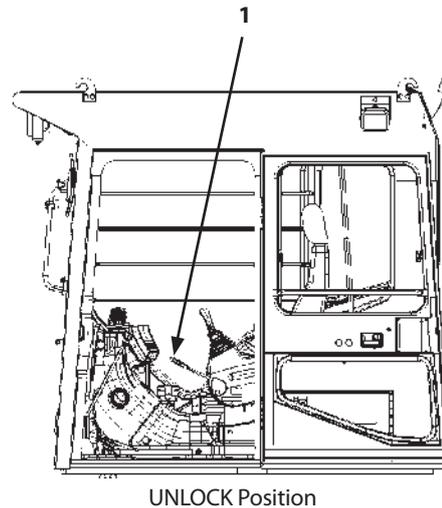


WARNING:

- Pilot control will not be shut-off unless pilot control shut-off lever (1) is completely pulled-up to the LOCK position.
- Before leaving the operator's seat, always stop the engine and pull pilot control shut-off lever (1) up to the LOCK position.
- Also, pull pilot control shut-off lever (1) up to the LOCK position when the day's work is complete.
- Confirm that pilot control shut-off lever (1) is in the LOCK position before starting the engine.



M18J-01-027

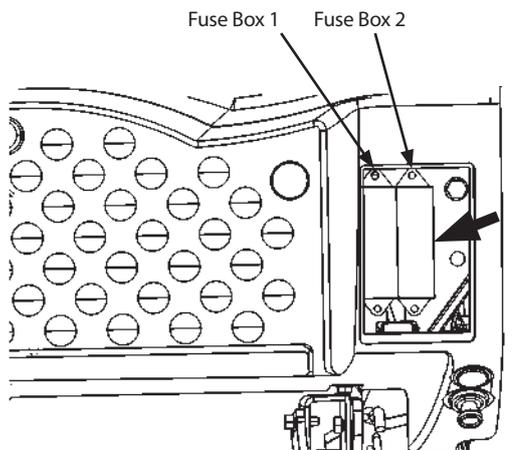


M18J-01-028

OPERATOR'S STATION

Fuse Box 1

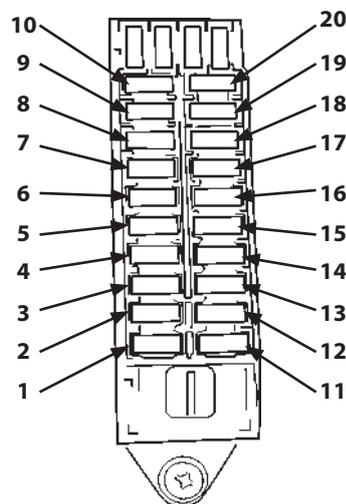
- | | |
|-----------------------|------------------------|
| 10- BACK LIGHT
10A | 20- ROOM LAMP
5A |
| 9- SAFETY RELAY
5A | 19- LIGHTER
10A |
| 8- OPT. 6
10A | 18- HORN
10A |
| 7- OPT. 5
10A | 17- RADIO
5A |
| 6- 12 V UNIT
15A | 16- PUMP. M. AR.
5A |
| 5- MCF PWM
20A | 15- AUTO LUB.
15A |
| 4- TRAVEL AR.
5A | 14- HEATER
20A |
| 3- STOP SOL.
5A | 13- WIPER
20A |
| 2- AIRCON
5A | 12- LIGHT 2
20A |
| 1- BATT. RELAY
5A | 11- LIGHT 1
20A |



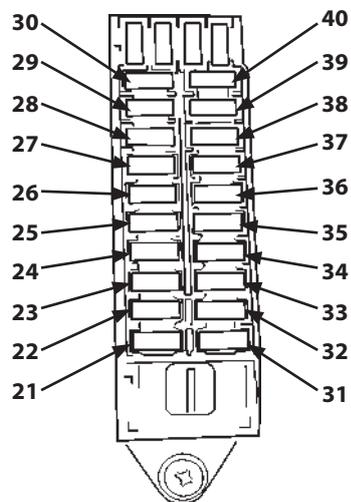
M1J1-01-021

Fuse Box 2

- | | |
|-------------------------|----------------------------|
| 30- DLU/DL.
5A | 40- SAT. MAIN
5A |
| 29- OPT. 1
20A | 39- RADIO BU
5A |
| 28- OPT. 2
20A | 38- ENTRANCE
5A |
| 27- OPT. 3
10A | 37- SAT. POW. ON
5A |
| 26- OPT. 4
10A | 36- MMS POW. ON
5A |
| 25- DLU MAIN
5A | 35- DLU POW. ON
5A |
| 24- MON. ICF MAIN
5A | 34- MON. ICF POW. ON
5A |
| 23- MCF MAIN
5A | 33- MCF POW. ON
5A |
| 22- MMS MAIN
5A | 32- ECM POW. ON
5A |
| 21- ECM MAIN
15A | 31- PREHEAT.
5A |



M1GR-01-003



M1GR-01-003

OPERATOR'S STATION

Air Conditioner Operation

Features:

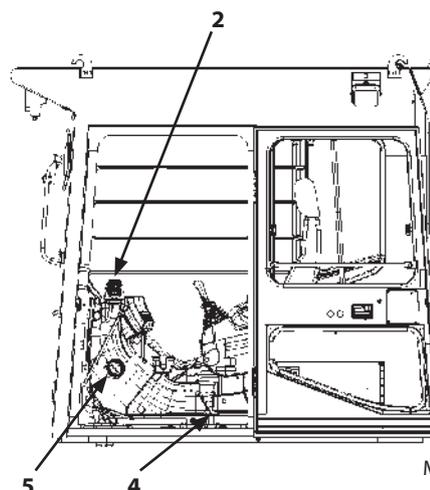
- Full-Automatic Control
Regardless of variations in atmospheric temperature and whether sun light is intense or not, the air temperature at the vent, blower speed, and air in/out vent locations are automatically controlled so that air temperature in the cab is maintained at the temperature set by the temperature control switch.
- Highest and Lowest Temperature Control
Highest or lowest air temperature in the cab is set by turning either the FH (Full-Heat) or FC (Full-Cool) indicator ON using the temperature control switch.
- Heater Start-Operation Control System
In winter or in cold weather, when starting the engine, the engine coolant is cool and air temperature inside the cab is low. Then, cool air is restricted not to flow in the cab to the minimum (LO) until the coolant is warmed when the front vent and /or foot vent is selected.

OPERATOR'S STATION

Auto Air Conditioner

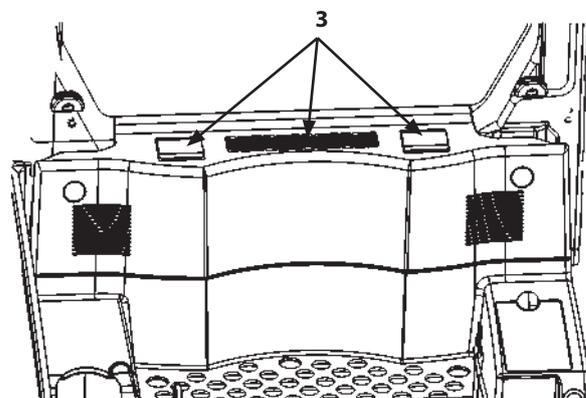
Distinctive Feature

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

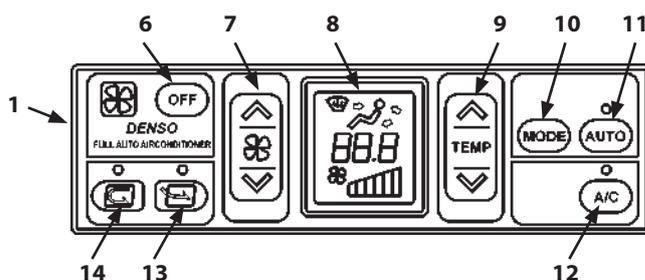


M18J-01-027

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



M1U1-01-027



M178-01-017

NOTE: Except for foot vent (4), all vents are provided with louvers to adjust the air flow direction. In addition, the louvers on front vent (2) and defroster vent (5) can be completely opened and closed by hand.

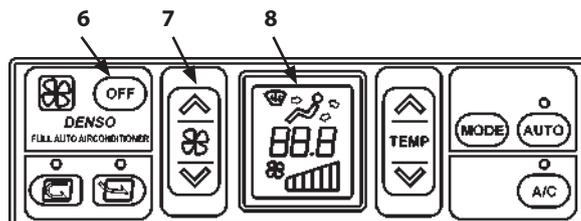
OPERATOR'S STATION

Controller Part Name and Function

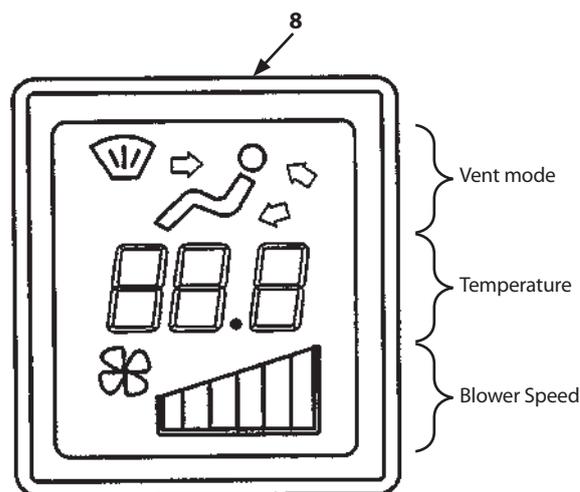
- Blower OFF Switch (6)
Stops the blower.
When switch (6) is pressed, all displays (vent mode, set-temperature, and blower speed) on LCD (8) panel will disappear and the blower stops in both the auto and manual modes.
- Blower Switch (7)
Controls the blower speed from Low to High in 6 stages in the manual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

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

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



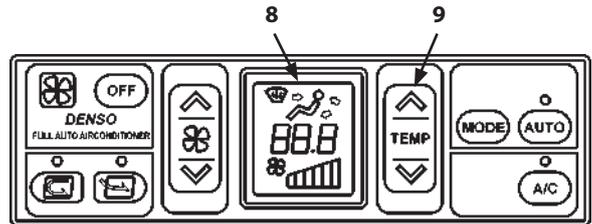
M178-01-017



M178-01-020

OPERATOR'S STATION

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

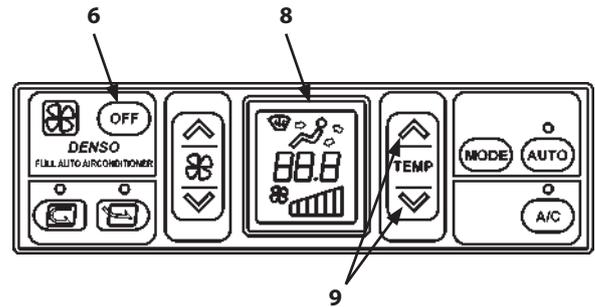


M178-01-017

Temperature Mode	Display on LCD
Centigrade (°C)	18.0 to 32.0
Fahrenheit (°F)	63 to 91

OPERATOR'S STATION

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



Displays on LCD and Trouble Mode

Displays on LCD	Trouble Mode
E ---	No fault
E 11	Broken re-circulation air sensor
E 12	Short re-circuited circulation air sensor
E 13	Broken fresh air sensor
E 14	Short circuited fresh air sensor
E 15	Broken coolant temperature sensor
E 16	Short circuited coolant temperature sensor
E 18	Short circuited insolation sensor
E 21	Broken air vent sensor
E 22	Short circuited air vent sensor
E 43	Abnormal air vent damper
E 44	Abnormal air mix damper
E 45	Abnormal both re-circulation and fresh air damper
E 51	Abnormal refrigerant pressure

M178-01-017

NOTE: *In case more than one fault is detected, press either “^” or “v” mark on temperature control switch (9) button to change the fault code displayed on LCD (8) in order. Press fan OFF-switch (6) to complete the diagnosing function.*

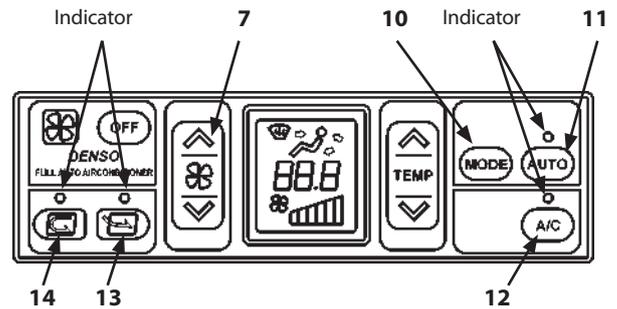
If any trouble has been found through operating the diagnostic function, contact your authorized dealer for repair.

OPERATOR'S STATION

- Mode Switch (10)

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

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



M178-01-017

- AUTO Switch (11)

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

- AUTO Operation Mode

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

- MANUAL Operation Mode

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

- Air Conditioner Switch (12)

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

- Fresh Air Mode Switch (13)

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

- Circulation Air Mode Switch (14)

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

OPERATOR'S STATION

Cab Heater Operation

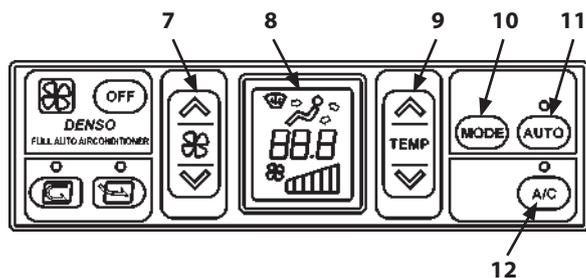
(Although warm air will flow out of the front/defroster vent , front/rear/defroster  vent, or front/rear/foot/defroster  vent, normally the foot vent is used for heating operation.)

After selecting the foot vent mode  by operating mode switch (10), set the desired temperature using temperature control switch (9).

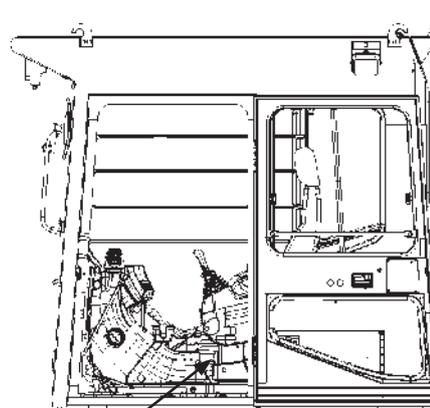
If AUTO switch (11) is pressed, warm air will blow out from foot vent (15).

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

In addition, if air conditioner switch (12) is turned on while using the cab heater, air in the cab will be also dehumidified.



M178-01-017



15

M18J-01-027

Cooling Operation

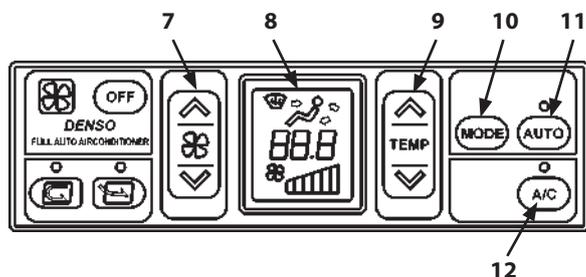
(Although cool air will flow out of the front/defroster vent , front/rear/defroster  vent, or front/rear/foot/defroster  vent, normally the front vent or front/rear/defroster vent is used for cooling operation.)

After selecting either the front/defroster vent mode  or the front/rear/defroster vent mode  by operating mode switch (10), set the desired temperature using temperature control switch (9).

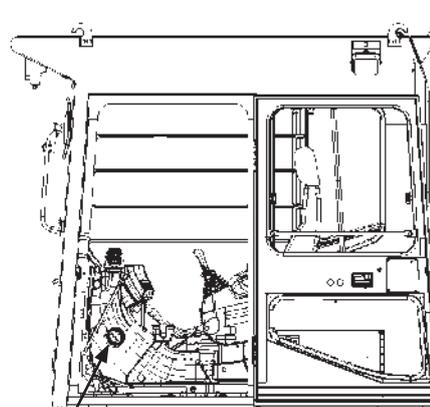
If AUTO switch (11) is pressed and air conditioner switch (12) is ON, cool air will blow out from front/defroster vent or front/rear/defroster vent.

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

In addition, if the outer surface of the lower front window becomes clouded, close defroster vent (3). (The louver on the defroster vent can be closed by hand.)



M178-01-017



3

M18J-01-027

OPERATOR'S STATION

Defroster Operation

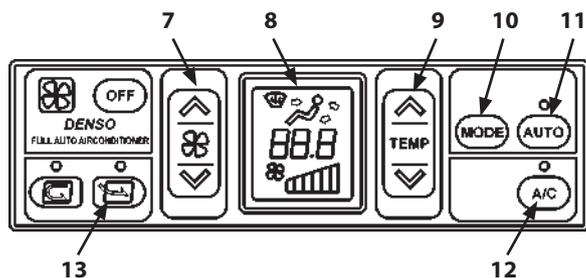
Select either the front/defroster vent mode  or the front/rear/defroster vent mode  by operating mode switch (10). Set the maximum heating temperature (32.0 °C, 90 °F) using temperature control switch (9). Press fresh air mode switch (13) to turn the indicator ON.

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

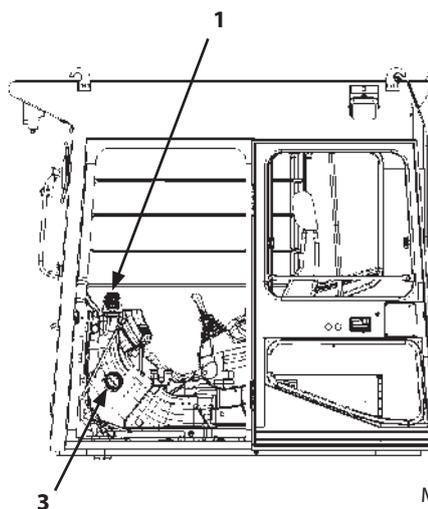
Adjust the louvers on front vent (1) and defroster vent (3) as required.

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

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



M178-01-017



M18J-01-027

OPERATOR'S STATION

Tips for Optimal Air Conditioner Usage

For Rapid Cooling

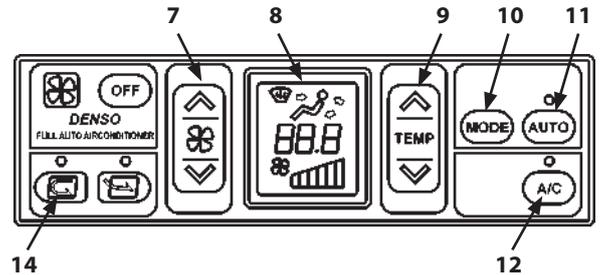
Temperature in the cab may rise over 80 °C (176 °F) when the machine is exposed to sun light in the summer. For rapid cooling, ventilate air in the cab first.

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

Select the front/rear/defroster  vent mode by operating mode switch (10). Set the blower speed to the maximum flow rate (6 segments lit) by operating blower switch (7).

Then, turn air conditioner switch (12) ON (the indicator lights).

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



M178-01-017

When Windows Become Clouded

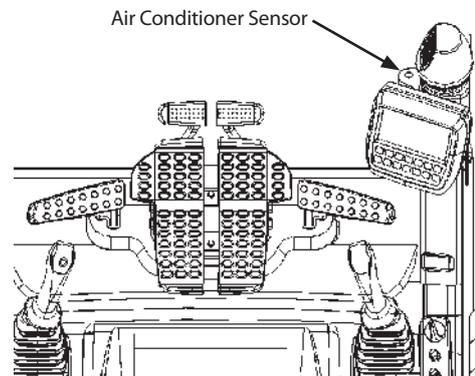
If the insides of the windows become clouded during rainy weather or on humid days, operate the air conditioner to aid in keeping the windows clear. When the atmosphere is very damp, and if the air conditioner has run excessively, the outside of the windows may become clouded. If this happens, turn off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

Off-Season Air Conditioner Maintenance

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

IMPORTANT:

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



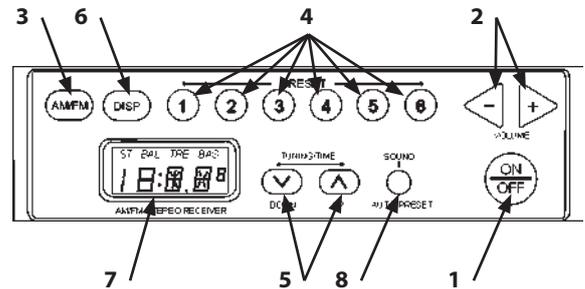
M18J-01-030

OPERATOR'S STATION

AM/FM Radio Operation

Controls on the Radio

- 1- Power Switch
- 2- Volume Control Switches
- 3- AM/FM Switch
- 4- Station Presets
- 5- UP/DOWN Switches
- 6- Display Mode Switch
- 7- Digital Display
- 8- Tone Adjustment Switch



M1NE-01-003

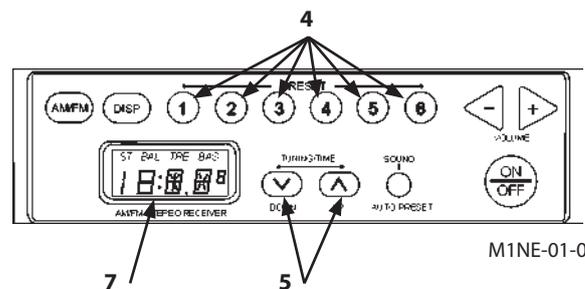
Tuning Procedure

- Manual Tuning Procedure
Repeatedly tap one of UP/DOWN switches (5) until the desired station is reached.
Each time UP/DOWN switch (5) is pressed, the frequency changes at an interval.
Tap UP switch (5) [UP] () to increase the frequency.
Tap DOWN switch (5) [DOWN] () to decrease the frequency.
- Automatic Search Function
Press and hold one UP/DOWN switch (5) for more than half a second, then release. The frequency display will move up to the next higher frequency station.
To go up to the next higher frequency station, press and hold UP switch (5) [UP] ().
To go down to the next lower frequency station, press and hold DOWN switch (5) [DOWN] ().

In order to deactivate the automatic search function while it is operating (while searching the next available frequency station), simply tap UP/DOWN switch (5) again. If the receiving radio waves are weak, i. e. such as when the machine is located between high rising buildings, etc., use the manual tuning procedure to select the desired station.

Station Presetting Procedure

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



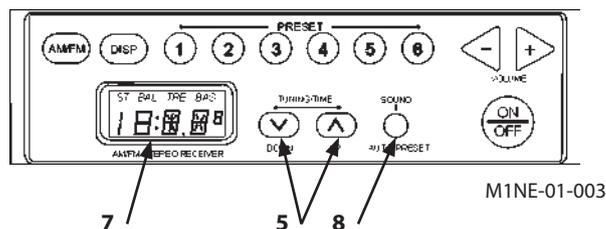
M1NE-01-003

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

OPERATOR'S STATION

Sound Adjustment

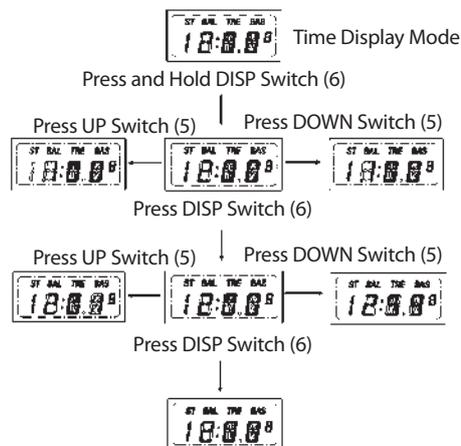
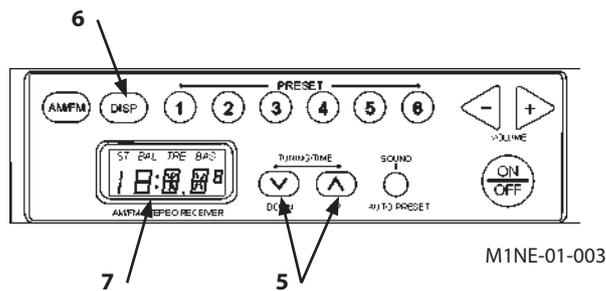
1. Press tone adjustment switch (8) to indicate "BAL" at the top side on digital display (7).
2. Power balance of left/right speakers can be adjusted by UP/DOWN switches (5).
When DOWN switch (5) [DOWN] () is pressed, left speaker output rises.
When UP switch (5) [UP] () is pressed, right speaker output rises.
3. Press tone adjustment switch (8) to indicate "TRE" at the top side on digital display (7).
4. Treble control can be adjusted by UP/DOWN switches (5).
5. Press tone adjustment switch (8) to indicate "BAS" at the top side on digital display (7).
6. Bass control can be adjusted by UP/DOWN switches (5).
7. Press tone adjustment switch (8) again to finish the sound adjustment.



Digital Clock Setting Procedure

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

1. Press display mode switch (6) to indicate the time display on digital display (7).
2. Press and hold display mode switch (6). The hour display will start flashing and the time set mode will be selected.
3. Press UP/DOWN switches (5) to set the clock. Each time UP/DOWN switch (5) is pressed, the time display will increase by one. If UP/DOWN switch (5) is pressed and held, the time display will change continuously.
- When the hour display is "12", if UP switch (5) [UP] () is pressed, the hour display will be reset to "1". The time is displayed in 12 hour standard.
More press display mode switch (6). The minute display will start flashing and time set mode will be selected.
When the minute display is "59", if UP switch (5) [UP] () is pressed, the minute display will be reset to "0". However, the hour display remains unchanged in this case.
4. After the clock setting is complete, press display mode switch (6) again to end the clock time setting procedure. Digital display (7) stops flashing and changes to stay ON.



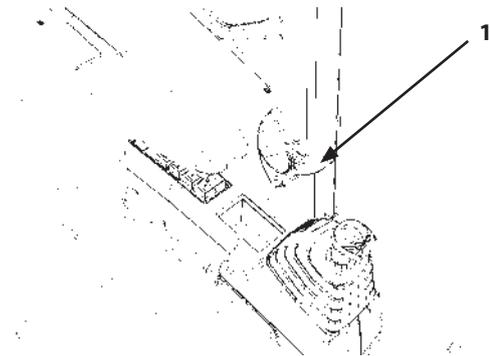
M1NE-01-007

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.

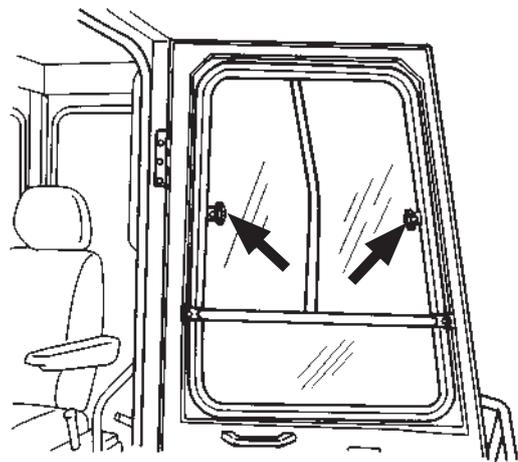
To unlock the door from this position, push down on lever (1).



M18J-01-029

Opening Side Windows

Opening Cab Door Window
Slide rear pane to the front.



M142-01-050

OPERATOR'S STATION

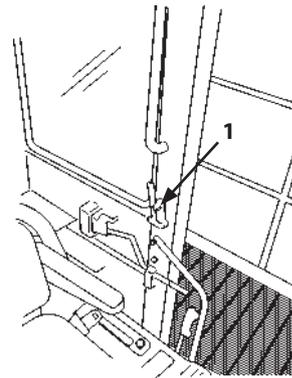
Emergency Exit

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

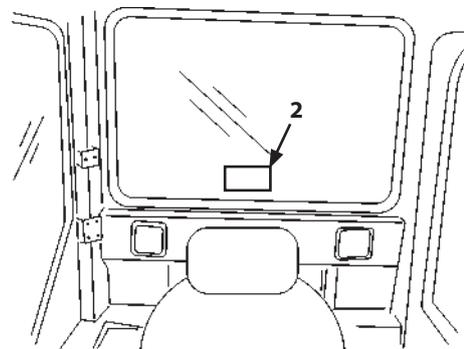
⚠ WARNING: Be sure to wear safety glasses before breaking the window glass.

Break the rear window glass using emergency evacuation tool (1). Then, escape through the broken window.

📌 NOTE: *Emergency exit decal (2) is affixed to the cab rear window.*



M183-01-005



M183-01-006

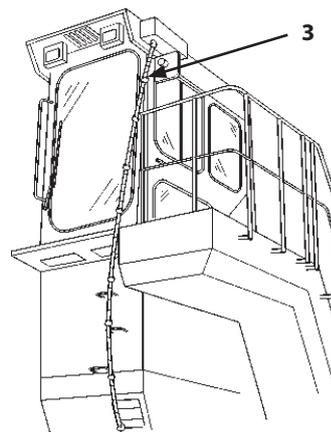
OPERATOR'S STATION

Emergency Exit (Elevated Cab)

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

⚠ WARNING: Be sure to wear safety glasses before breaking the window glass.

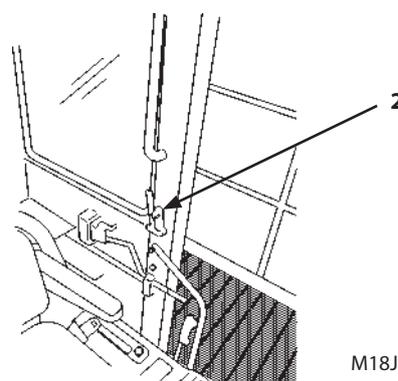
1. Open left window. Escape through the window.
2. If left window should be difficult to open, break the rear window glass using emergency evacuation tool (2). Then, escape through the broken window.



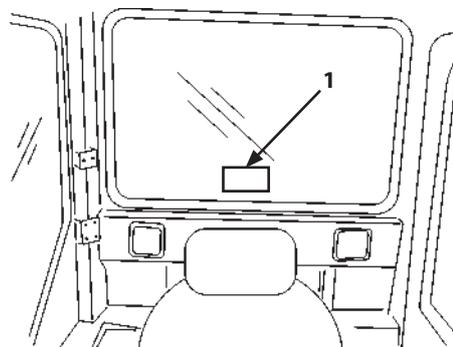
M17F-01-001

✎ NOTE: Emergency exit decal (1) is affixed to the cab rear window.

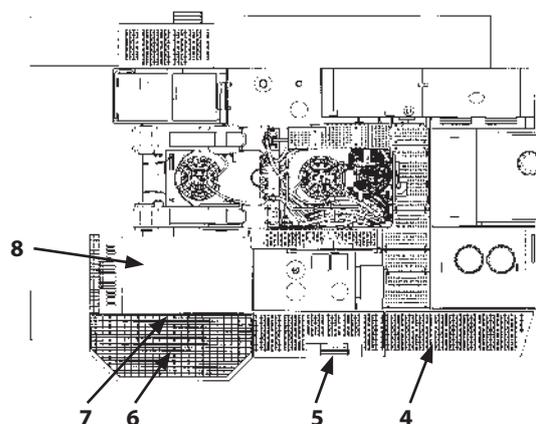
3. After escaping from the cab, escape from the machine depending on the situations described below.
 - If pathway (4) can be used, escape to the ground from pathway (6) or (4) via ladder (5).
 - If pathway (4) can not be used, escape to the ground by using escape rope (3) from pathway (6) on the left side of cab (8).



M18J-01-044



M183-01-006



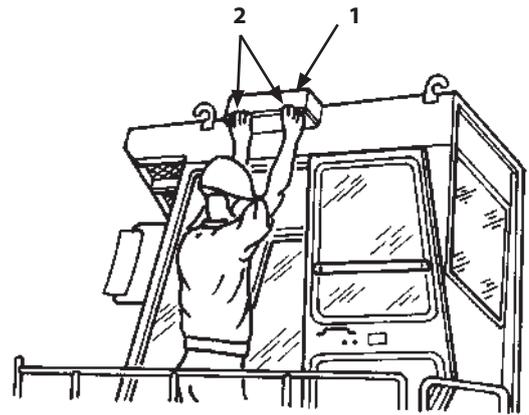
M18J-01-043

OPERATOR'S STATION

Emergency Escape Rope (Elevated Cab)

Emergency escape rope (3) is provided in case (1) located on the left outside wall of the cab.

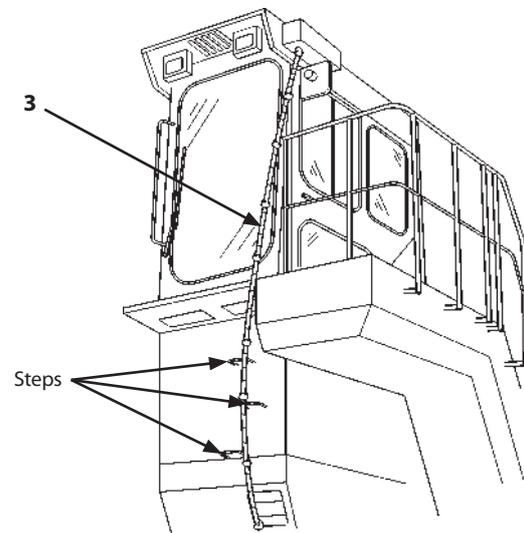
1. Unlock two latches (2) to open the hinged bottom cover.
2. Pull rope (3) out and lower it to the ground.
3. Lower yourself down rope (3) to the ground using the steps.
Rope (3) has knots to prevent slipping.



M142-01-022

Storing Emergency Escape Rope

Wind rope (3) in case (1) and lock cover latches (2).



M17F-01-001

OPERATOR'S STATION

Adjusting Seat

Seat Height and Angle Adjustment

Seat height adjustment range is 60 mm (2.4 in) with steps every 15 mm (0.6 in) (5 positions in total). Moreover, the height of the front part and the rear part of the seat are adjusted independently, thus allowing the angle of the seat to be adjusted.

⚠ WARNING: Avoid possible injury while operating lever (1). When pushing down lever (1), do not grab it. Fingers may be pinched between lever (1) and the seat stand. Be sure to push on the upper face of lever (1).

Use lever (1) to adjust the seat height and/or seat angle as follows:

- To adjust the front part of the seat:
Push down lever (1) while sitting on the seat, and apply or remove body weight to obtain the desired height. When the desired height is obtained, release lever (1).
- To adjust the rear part of the seat:
Pull up lever (1) while sitting on the seat, and apply or remove body weight to obtain the desired height. When the desired height is obtained, release lever (1).

Console and Seat Fore-aft Adjustment

Pull lever (2) to the right to adjust the seat and both right and left consoles to desired distance from the travel pedals and levers. Release lever (2) to lock seat and consoles into position.

✎ NOTE: Seat and console fore-aft adjustment range is 120 mm (4.7 in) with steps every 20 mm (0.8 in).

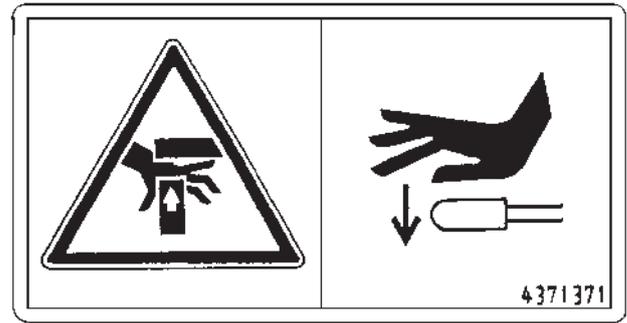
Seat Fore-Aft Adjustment

Pull lever (3) to unlock the seat from both consoles. With lever (3), slide the seat to the desired distance from pilot control levers. Release lever (3).

✎ NOTE: Seat fore-aft adjustment range is 160 mm (6.3 in) with steps every 16 mm (0.6 in).

Backrest Adjustment

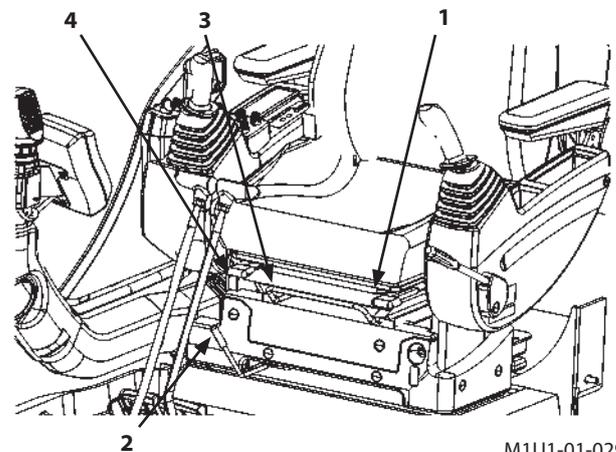
Pull up lever (4) to release backrest lock. Move backrest to the desired position and release lever (4).



Caution: Possibility of pinched fingers

Push down with the palm.

SS-955



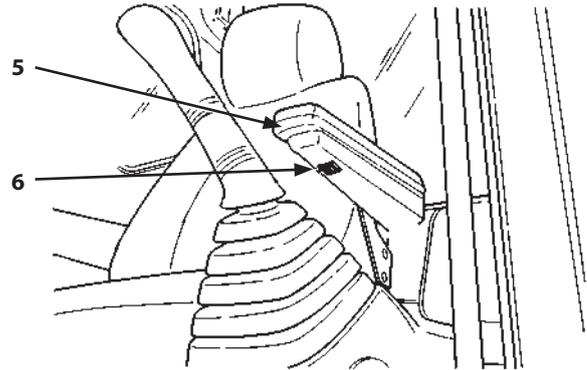
M1U1-01-029

OPERATOR'S STATION

Armrest Adjustment

Armrest (5) can be pulled upright by hand to get on and off the machine easily.

The angle of armrest (5) can be adjusted to the desired position by turning adjusting dial (6) located on the bottom of armrest (5).



M1G6-01-017

OPERATOR'S STATION

Adjusting Seat (Heater Seat Optional)

Seat Height and Angle Adjustment

Seat height adjustment range is 60 mm (2.4 in) with steps every 15 mm (0.6 in) (5 positions in total). Moreover, the height of the front part and the rear part of the seat are adjusted independently, thus allowing the angle of the seat to be adjusted.

⚠ WARNING: Avoid possible injury while operating lever (1). When pushing down lever (1), do not grab it. Fingers may be pinched between lever (1) and the seat stand. Be sure to push on the upper face of lever (1).

Use lever (1) to adjust the seat height and/or seat angle as follows:

- To adjust the front part of the seat:
Push down lever (1) while sitting on the seat, and apply or remove body weight to obtain the desired height. When the desired height is obtained, release lever (1).
- To adjust the rear part of the seat:
Pull up lever (1) while sitting on the seat, and apply or remove body weight to obtain the desired height. When the desired height is obtained, release lever (1).

Console and Seat Fore-aft Adjustment

Pull lever (2) to the right to adjust the seat and both right and left consoles to desired distance from the travel pedals and levers. Release lever (2) to lock seat and consoles into position.

✎ NOTE: Seat and console fore-aft adjustment range is 120 mm (4.7 in) with steps every 20 mm (0.8 in).

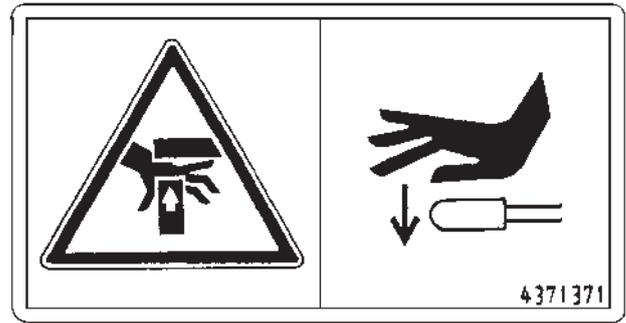
Seat Fore-Aft Adjustment

Pull lever (3) to unlock the seat from both consoles. With lever (3), slide the seat to the desired distance from pilot control levers. Release lever (3).

✎ NOTE: Seat fore-aft adjustment range is 160 mm (6.3 in) with steps every 16 mm (0.6 in).

Backrest Adjustment

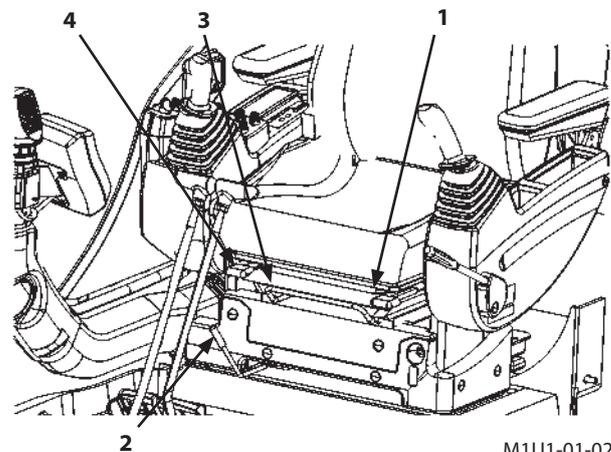
Pull up lever (4) to release backrest lock. Move backrest to the desired position and release lever (4).



Caution: Possibility of pinched fingers

Push down with the palm.

SS-955



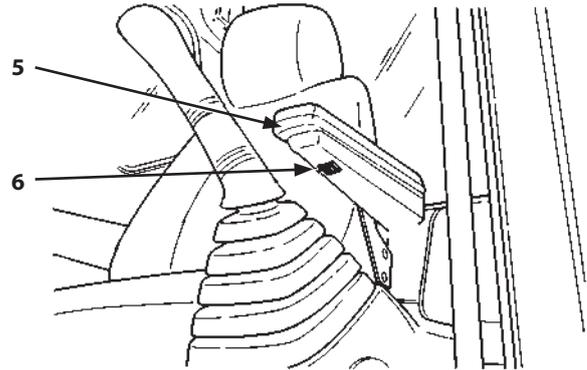
M1U1-01-029

OPERATOR'S STATION

Armrest Adjustment

Armrest (5) can be pulled upright by hand to get on and off the machine easily.

The angle of armrest (5) can be adjusted to the desired position by turning adjusting dial (6) located on the bottom of armrest (5).



M1G6-01-017

Seat Heater Switch

When seat heater switch (7) is turned ON, the seat and/or backrest are heated to warm them up. When the temperature of the seat and/or backrest reaches its specified temperature, heating turns off automatically.

! WARNING:

- Use with seat wet or something poke into seat could cause electrical shock.
- Be careful when handling water or drinking water.
- Do not use if clothes are extremely wet.
- Do not poke the seat with a sharp object or put anything heavy with protruding parts on the seat.

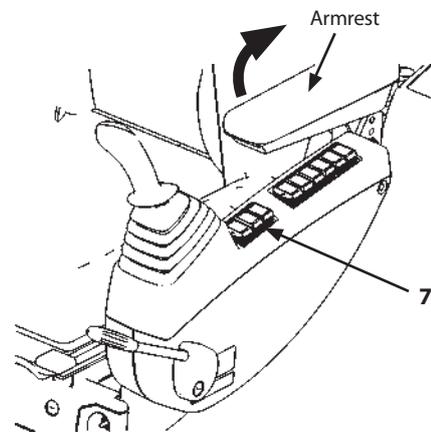
! CAUTION:

- Certain person as noted below, could be at risk of a low temperature burn, so should be careful during use.
 - Person with delicate skin
 - Person suffering from fatigue
 - Person under excessive drinking or medication that could cause sleepiness (sleeping pills, cold medicines, etc.)
- Continuous use could cause low temperature burn to person.
- Use with blanket or cushion which may retain heat could cause abnormal heating of the seat.

IMPORTANT:

- To prevent damage, do not poke the seat with sharp objects or put anything heavy with protruding parts on the seat.
- If a liquid like water or a drink is spilled on the seat, wipe off with a soft cloth and make sure the seat is dry before using again.
- If the seat is abnormally hot, stop use and contact your authorized dealer.

 NOTE: The point where heated varies with the type of seat.



M1J1-03-001



M1U1-01-011

OPERATOR'S STATION

Adjusting Air-Suspension Seat (Optional)

Seat Height and Angle Adjustment

Seat height adjustment range is 60 mm (2.4 in) with steps every 15 mm (0.6 in) (5 positions in total). Moreover, the height of the front part and the rear part of the seat are adjusted independently, thus allowing the angle of the seat to be adjusted.

⚠ WARNING: Avoid possible injury while operating lever (1). When pushing down lever (1), do not grab it. Fingers may be pinched between lever (1) and the seat stand. Be sure to push on the upper face of lever (1).

Use lever (1) to adjust the seat height and/or seat angle as follows:

- To adjust the front part of the seat:
Push down lever (1) while sitting on the seat, and apply or remove body weight to obtain the desired height. When the desired height is obtained, release lever (1).
- To adjust the rear part of the seat:
Pull up lever (1) while sitting on the seat, and apply or remove body weight to obtain the desired height. When the desired height is obtained, release lever (1).

Console and Seat Fore-aft Adjustment

Pull lever (2) to the right to adjust the seat and both right and left consoles to desired distance from the travel pedals and levers. Release lever (2) to lock seat and consoles into position.

✎ NOTE: *Seat and console fore-aft adjustment range is 120 mm (4.7 in) with steps every 20 mm (0.8 in).*

Seat Fore-Aft Adjustment

Pull lever (3) to unlock the seat from both consoles. With lever (3), slide the seat to the desired distance from pilot control levers. Release lever (3).

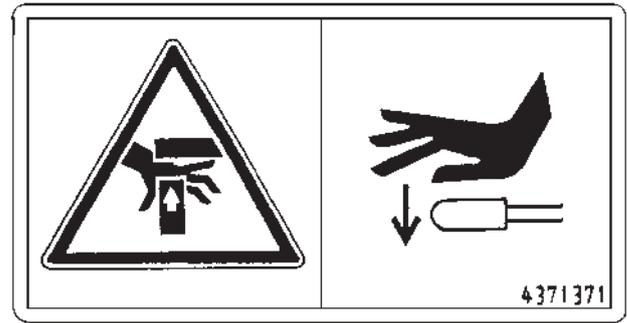
✎ NOTE: *Seat fore-aft adjustment range is 160 mm (6.3 in) with steps every 16 mm (0.6 in).*

Suspension Adjustment

Push knob (4) to increase suspension stiffness.
Pull knob (4) to decrease suspension stiffness.

Backrest Adjustment

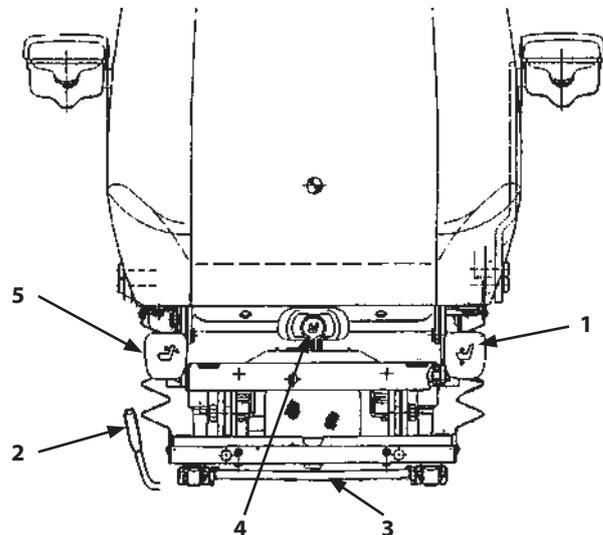
Pull up lever (5) to release backrest lock. Move backrest to the desired position and release lever (5).



Caution: Possibility of pinched fingers

Push down with the palm.

SS-955



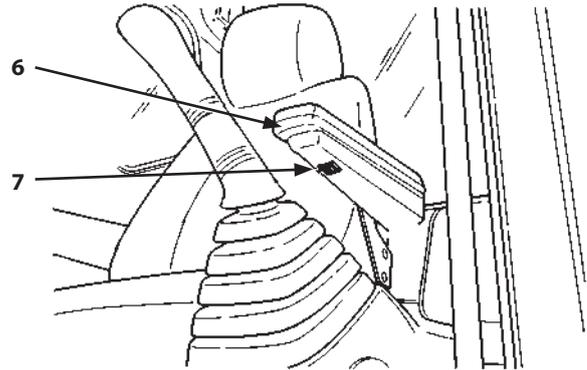
M1U1-01-014

OPERATOR'S STATION

Armrest Adjustment

Armrest (6) can be pulled upright by hand to get on and off the machine easily.

The angle of armrest (6) can be adjusted to the desired position by turning adjusting dial (7) located on the bottom of armrest (6).



M1G6-01-017

Seat Heater Switch

When seat heater switch (8) is turned ON, the seat and/or backrest are heated to warm them up. When the temperature of the seat and/or backrest reaches its specified temperature, heating turns off automatically.

! WARNING:

- Use with seat wet or something poke into seat could cause electrical shock.
- Be careful when handling water or drinking water.
- Do not use if clothes are extremely wet.
- Do not poke the seat with a sharp object or put anything heavy with protruding parts on the seat.

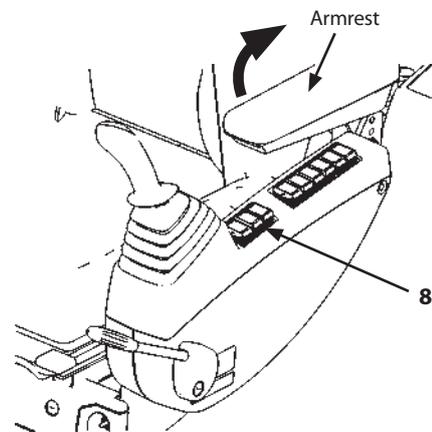
! CAUTION:

- Certain person as noted below, could be at risk of a low temperature burn, so should be careful during use.
 - Person with delicate skin
 - Person suffering from fatigue
 - Person under excessive drinking or medication that could cause sleepiness (sleeping pills, cold medicines, etc.)
- Continuous use could cause low temperature burn to person.
- Use with blanket or cushion which may retain heat could cause abnormal heating of the seat.

IMPORTANT:

- To prevent damage, do not poke the seat with sharp objects or put anything heavy with protruding parts on the seat.
- If a liquid like water or a drink is spilled on the seat, wipe off with a soft cloth and make sure the seat is dry before using again.
- If the seat is abnormally hot, stop use and contact your authorized dealer.

 **NOTE:** The point where heated varies with the type of seat.



M1J1-03-001



M1U1-01-011

OPERATOR'S STATION

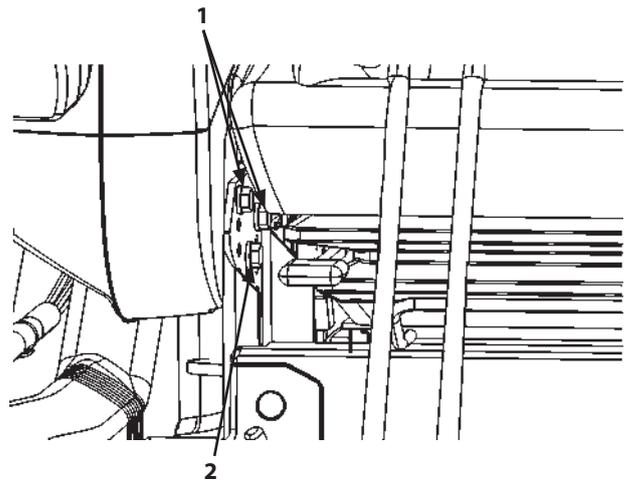
Adjusting Console Height

Adjust the console height to the operator's comfort and/or work conditions. Adjusting console height can be achieved using four positions provided vertically at 20 mm (0.8 in) intervals.

⚠ WARNING: Before loosening the console, support the console. Otherwise, the console may suddenly drop, possibly causing personal injury.

Adjusting Procedures

1. Lower the bucket to the ground. Stop the engine.
2. Move the pilot control shut-off lever to the LOCK position.
3. Remove left and right console holding bolts (1). Loosen bolts (2) to adjust the console height.
4. After adjusting, tighten bolts (1) and (2).
Tightening Torque: 50 N·m (5.0 kgf·m)



M1U1-01-030

OPERATOR'S STATION

Installation and Adjustment of Mirror and Camera

⚠ WARNING: Adjust the mirror and camera before operating the machine. Improper adjustment of the mirrors and camera provides poor visibility, which may cause serious human injury or death.

IMPORTANT: The image displayed on the rear view monitor is meant only as an aid. When operating the machine, pay thorough attention to the surrounding situation.

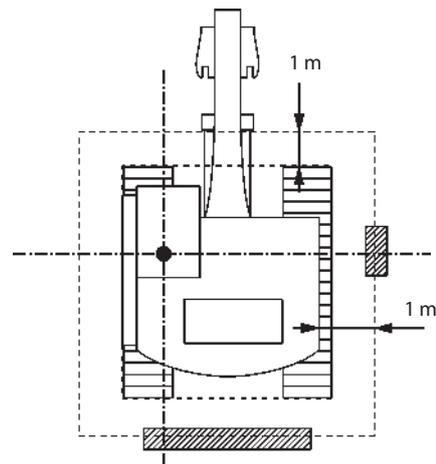
Adjust the mirrors so that persons standing within 1 m from the machine (or object with height of 1.5 m and 30 cm in diameter) can be recognized from the operator's seat.

1 m-Vicinity Visibility

The right illustration indicates the visibility from the operator's seat at 1.5 m high from the ground and 1 m apart from the outer edge of the machine. The hatched areas shown in the illustration are interrupted from visibility by the section of the machine equipped with the side and rear view mirrors.

Clear all persons and obstacles away from the area of operation and machine movement.

IMPORTANT: If machine modification results in restricting visibility, the area interrupting the visibility may change. Recheck the visibility from the operator's seat 1.5 m high from the ground and 1 m apart from the outer edge of the machine.



SA-2165

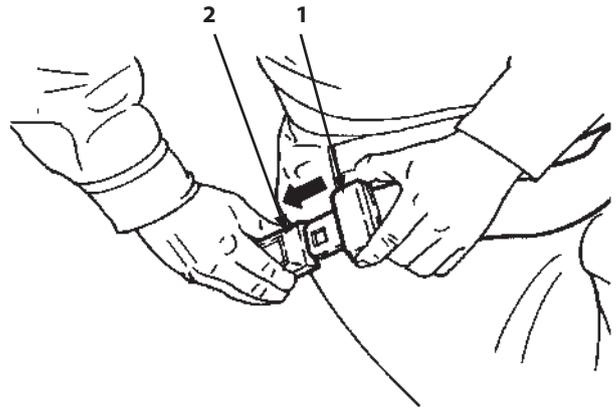
OPERATOR'S STATION

Seat Belt



WARNING:

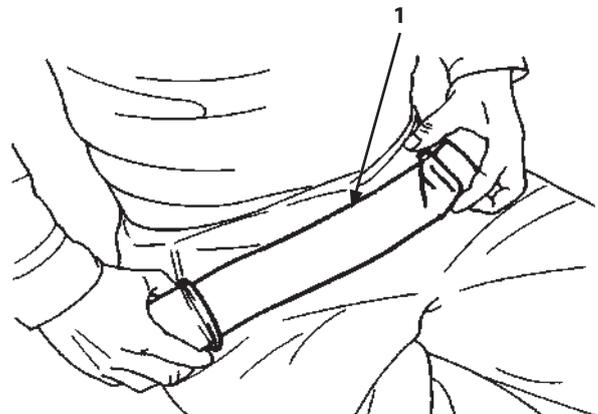
- Be sure to use seat belt (1) when operating the machine.
- Before operating the machine, be sure to examine seat belt (1), buckle (2), and attaching hardware. Replace seat belt (1), buckle (2), or attaching hardware if they are damaged, or worn.
- Replace seat belt (1) every 3 years, regardless of appearance.



M1U1-01-031

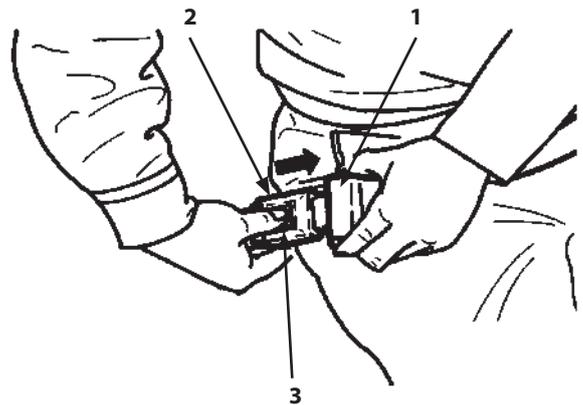
Seat Belt

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



M1U1-01-037

Replace the seat belt if they are damage or worn, or if the seat belt had external damaged such as an accident.



M1U1-01-032

OPERATOR'S STATION

Battery Disconnect Switch

IMPORTANT: Never turn disconnect switch (2) OFF while the engine is running or the key switch is in the position other than OFF. Failure to do so may damage the electrical system.

Battery disconnect switch (2) is different from the engine start key switch. When battery disconnect switch (2) is turned OFF, the electrical system will completely be isolated from the battery. No current will flow through the whole electrical system.

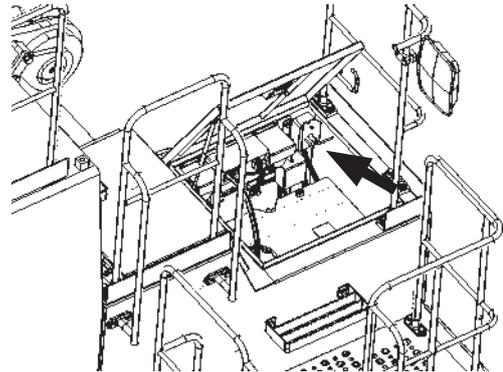
Before turning battery disconnect switch (2) OFF, be sure to turn the key switch OFF and wait 1 minute or more after the engine stops. If battery disconnect switch (2) is turned OFF within 1 minute after the engine stops, it may result in malfunction of the electrical system. When turning battery disconnect switch (2) from OFF to ON, preset radio station and the clock may be reset. Set them again.

Use battery disconnect switch (2) only for the following purposes; otherwise, turn it ON.

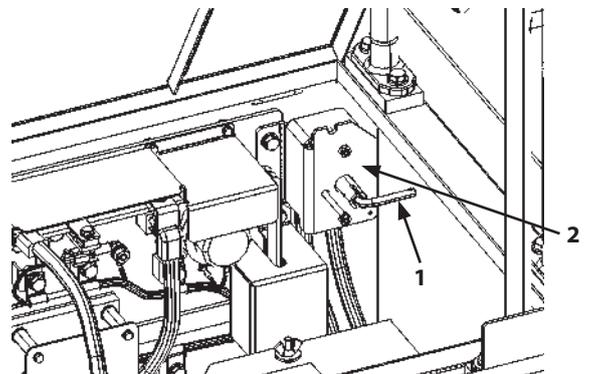
- Before maintaining and repairing the electrical system
- Before storing the machine for long period (Discharge prevention)
- Before performing welding operation on the machine
- Before replacing the batteries

How to operate the disconnect switch

1. Open the battery cover.
When lever (1) is set in a horizontal direction, disconnect switch (2) is turned ON. Lever (1) can not be removed from switch (2) in this condition.
2. When lever (1) is rotated counterclockwise to perpendicular direction, disconnect switch (2) is turned OFF. Lever (1) can be removed from switch (2) in this condition.
3. Remove lever (1) from disconnect switch (2) and keep lever (1) on holder (3).
4. Close the battery cover.

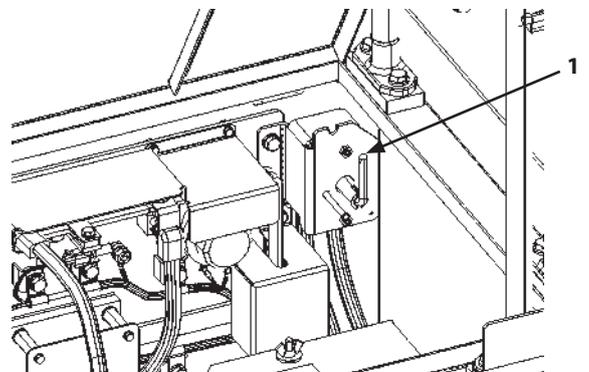


M18J-01-039



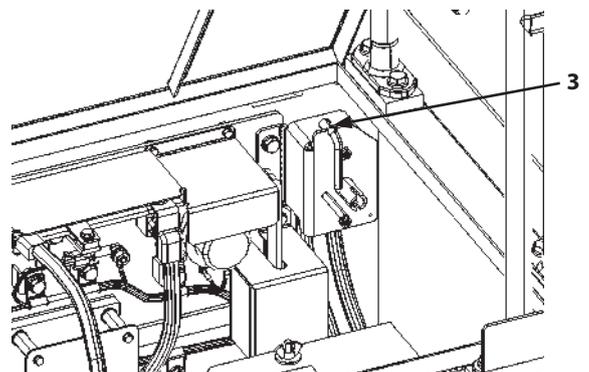
ON Position

M18J-01-040



OFF Position

M18J-01-041



Storing Lever

M18J-01-042

BREAK-IN

Observe Engine Operation Closely

IMPORTANT:

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

Every 10 Hours or Daily

1. Perform 10-hour or daily service. (See Maintenance guide -- 10 hours.)
2. Watch for fluid leaks.
3. Lubricate working tool pivots every 10 hours, and every 5 hours when working in mud and water.

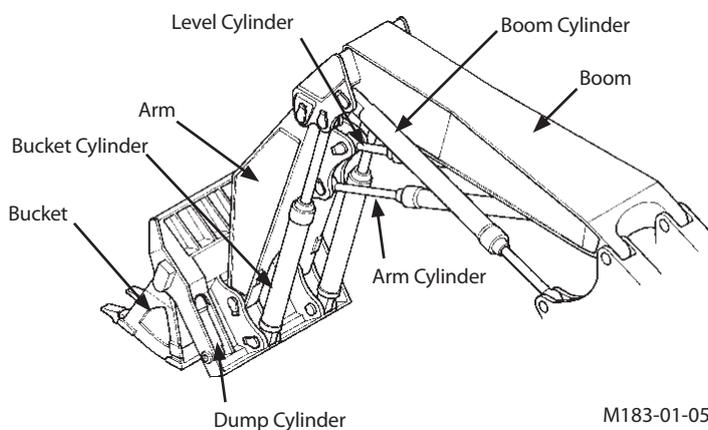
After the First 50 Hours

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

OPERATING ENGINE

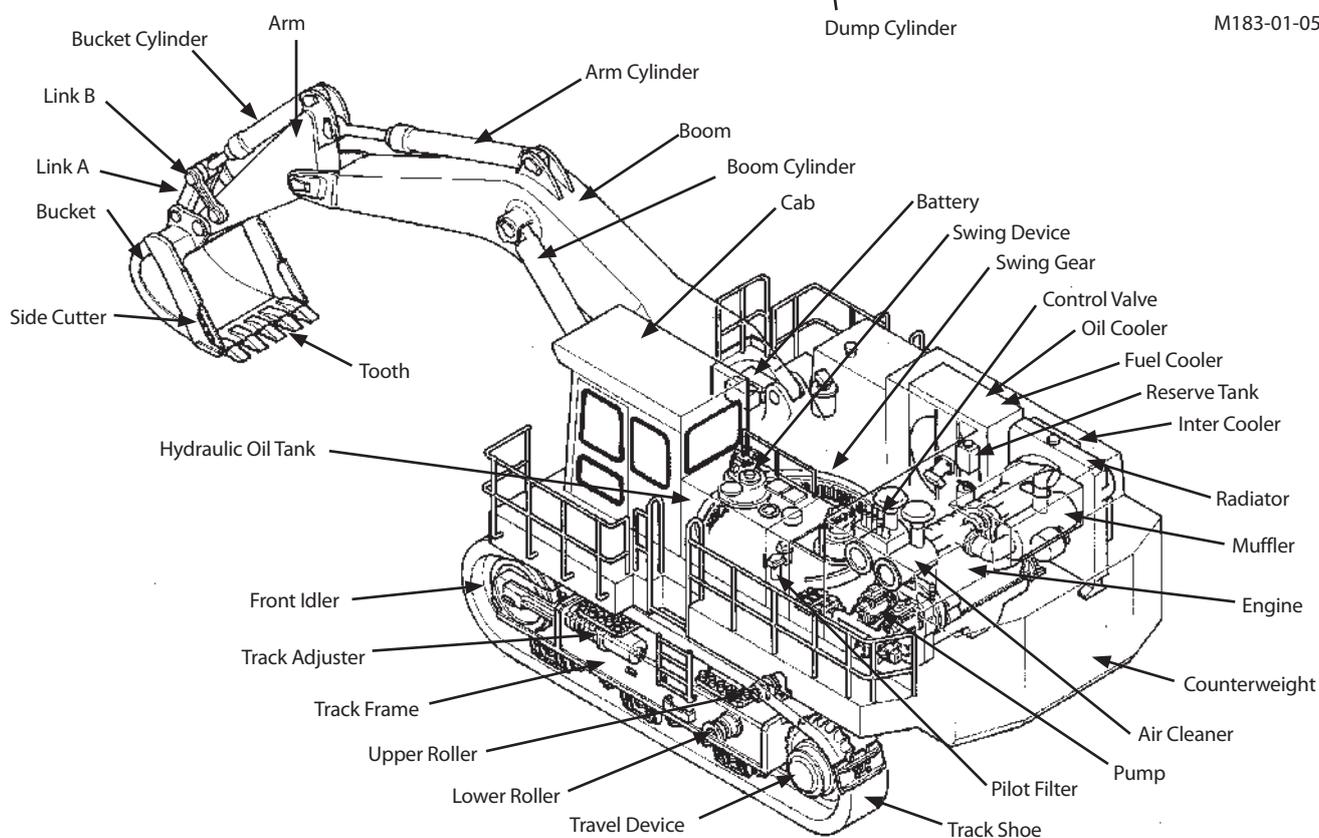
Inspect Machine Daily Before Starting

Loading Shovel



M183-01-058

Backhoe



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

M18J-03-001

ELECTRICAL SYSTEM

Check for worn or frayed wires and loose connections.

BOOM, BUCKET, SHEET METAL, TRACKS

Check for bent, broken or missing parts.

HARDWARE

Check for loose or missing parts.

FUEL SYSTEM

Drain water and sediments from fuel tank.

HYDRAULIC SYSTEM

Check for leaks, kinked hoses, and lines or hoses that rub against each other or other parts.

LUBRICATION

Check lubrication points on the Periodic Service Chart.

PROTECTIVE DEVICES

Check guards, fenders.

SAFETY

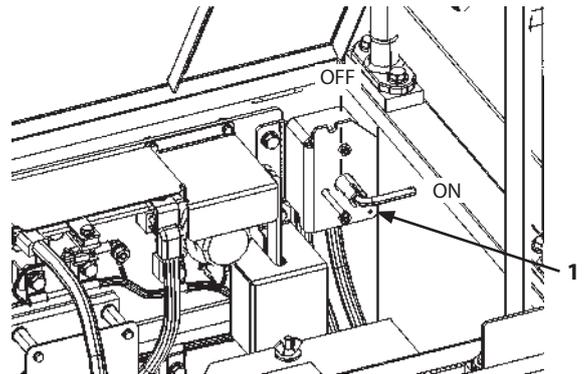
Walk around machine to clear all bystanders/obstacles from machine area.

OPERATING ENGINE

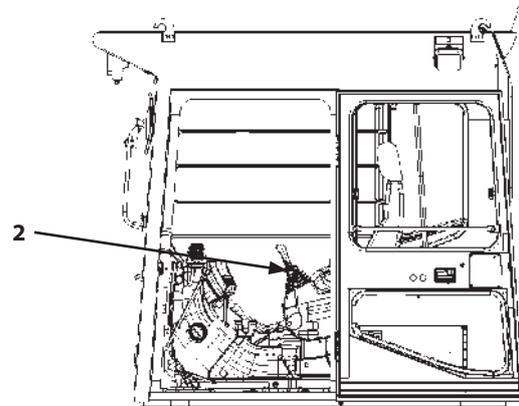
Before Starting Engine

1. Ensure that battery disconnect switch (1) is in the ON position.
2. Confirm that pilot control shut-off lever (2) is in the LOCK position.
3. Confirm that all control levers are placed in neutral.
4. Adjust the seat to allow full pedal and control levers stroke with operator's back against the backrest. Fasten the seat belt.

 **NOTE:** Use a wet cloth when wiping dust off monitor or switch panels to prevent damaging the panel face. Rubber is used on the switch parts. Take care not to tear the rubber-made parts with sharp-edged tool, such as a screwdriver.

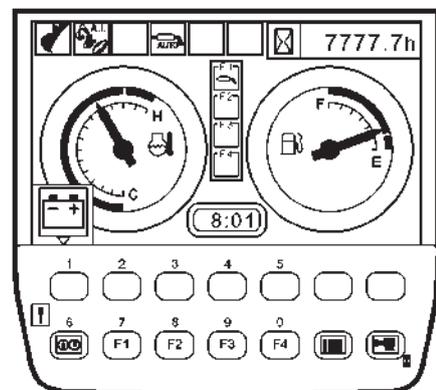


M18J-01-040



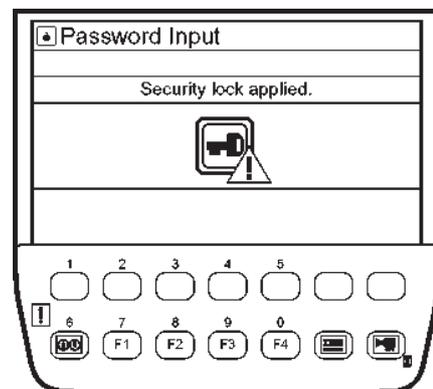
LOCK Position

M18J-01-027



M18J-01-005

IMPORTANT: If the security lock screen is displayed when turn the key switch to ON position, return key switch to OFF. Wait for more than 30 seconds (the buzzer stopped), then try again. If the security lock screen is displayed again, contact your authorized dealer.



T1V5-05-01-005

Security Lock Screen

OPERATING ENGINE

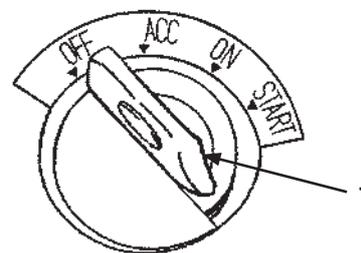
Level Check

1. Stop the machine on firm and surface level ground.
2. Turn key switch (1) to the ON position.

3. Raise the armrest, while press and hold level check switch (2), engine oil level indicator (4)/coolant level indicator (5) / hydraulic oil level indicator (6) are displayed on monitor (3).

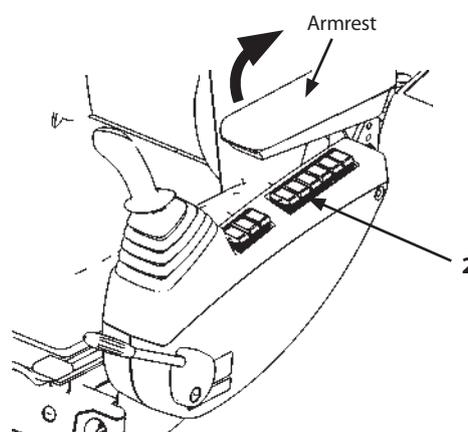
Green indicator will light respectively when the engine oil /coolant /hydraulic oil levels are adequate. Red indicator will light respectively when the engine oil / coolant /hydraulic oil levels are inadequate for operation. Check the engine oil /coolant /hydraulic oil levels and replenish them if necessary.

When release level check switch (2), engine oil level indicator (4) / coolant level indicator (5) / hydraulic oil level indicator (6) are not displayed on monitor (3).

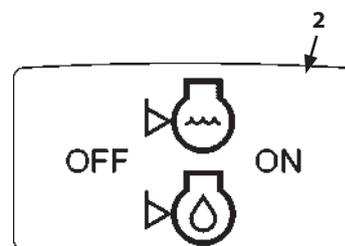


M18J-01-056

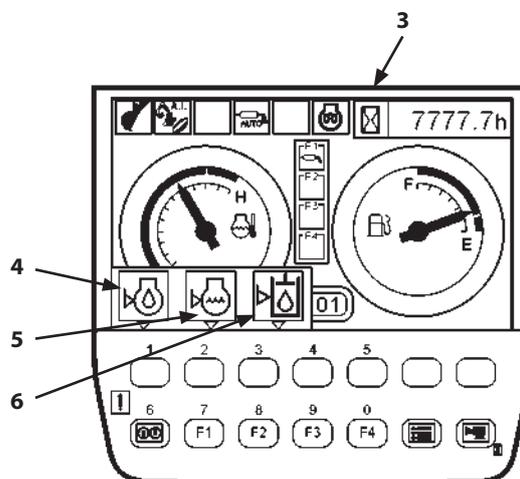
IMPORTANT: The monitor does not guarantee the machine conditions. Do not rely on the monitor alone. Check each fluid level visually at the regular intervals.



M1J1-03-001



M1J1-03-002

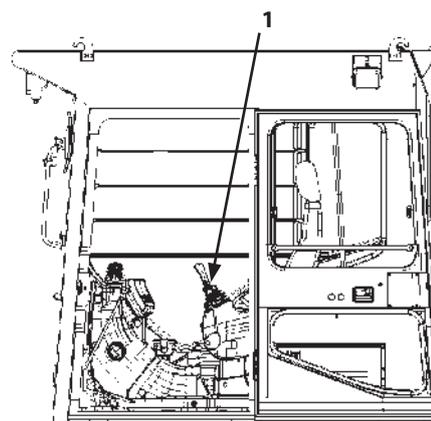


M18J-03-002

OPERATING ENGINE

Starting Engine in Ordinary Temperature

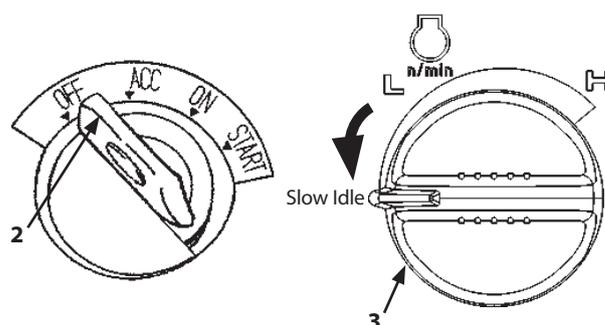
1. Pull pilot control shut-off lever (1) up to the LOCK position.
2. Turn engine control dial (3) to the slow idle position.
3. Sound horn to alert bystanders.
4. Insert key switch (2). Turn it ON position.
5. "Wait-screen (nothing is displayed)" is displayed on the monitor for 2 seconds. Regardless of pilot control shut-off lever (1) position, the engine can not be cranked during this duration.
6. When the password input screen is displayed on the monitor, input the password. Unless the TEN-key function (ignition block system) is activated, this screen is not displayed.



LOCK position

M18J-01-027

IMPORTANT: When required to activate the TEN-key function (ignition block system), consult your authorized dealer.



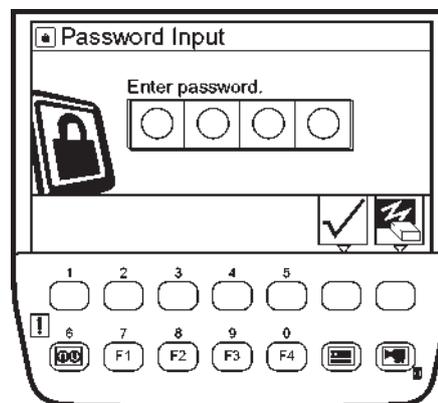
M18J-01-056

M1P1-01-068

7. The basic screen will be displayed on the monitor. Check that preheat indicator (4) is OFF at this time.
8. Turn key switch (2) to the START position to start engine.

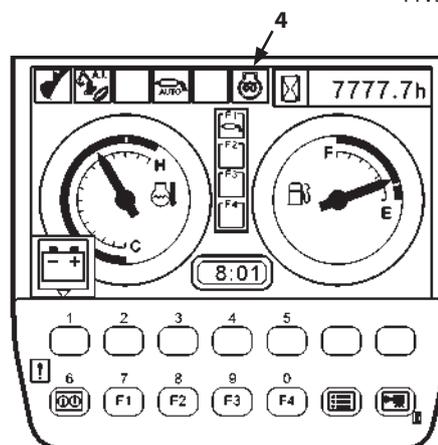
IMPORTANT: Prevent the starter damage. Never operate the starter motor for more than 10 seconds at a time. If the engine fails to start, return key switch (2) to OFF. Wait for more than 30 seconds, then try again. After a false start, do not turn key switch (2) until the engine stops or the starter may be damaged.

9. Release key switch (2) just after the engine has started. It will return to ON position.



Password Input Screen

T1V5-05-01-002



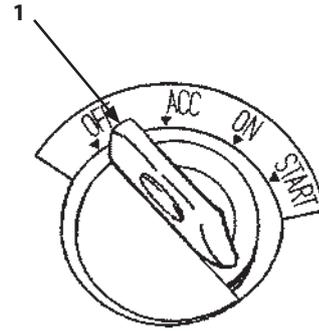
Basic Screen

M18J-03-003

OPERATING ENGINE

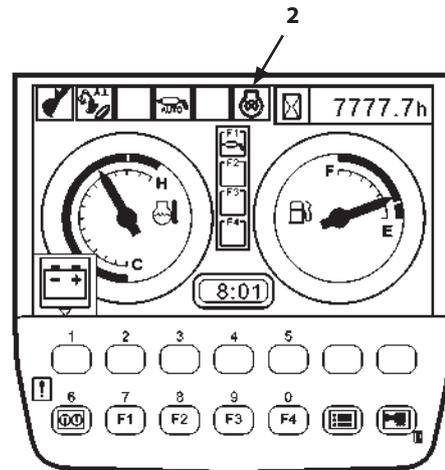
Starting Engine in Cold Weather

1. Turn key switch (1) to the ON position.
2. When air temperature is 0 degree C or less, preheat indicator (2) automatically comes ON, starting preheating the engine intake air.
3. Within 30 seconds after starting preheating, turn key switch (1) to the START position and hold it in that position until the engine starts. Preheating will automatically be complete and preheat indicator (2) will go OFF.



M18J-01-056

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



Basic Screen

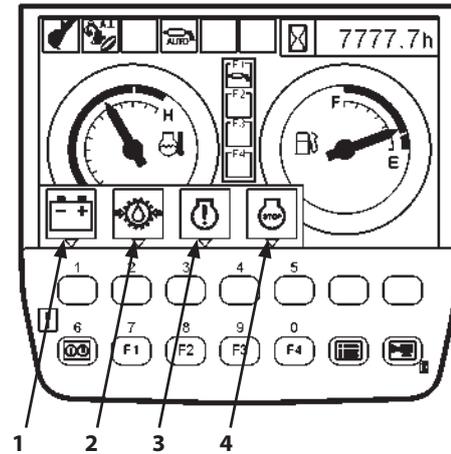
M18J-03-003

OPERATING ENGINE

Check Instruments After Starting

Checking instruments through monitor functions. After starting the engine, check the following points through the monitor functions.

IMPORTANT: Prevent possible damage to engine. If indicator lights do not go out after starting engine, IMMEDIATELY STOP THE ENGINE and correct the cause. Operate machine at less-than-normal loads and speeds until engine is at normal operating temperature.



Check that

1. Alternator indicator (1) is OFF.
2. Pump transmission oil pressure indicator (2) is OFF.
3. Engine warning indicator (3) is OFF.
4. Engine stop indicator (4) is OFF.
5. Engine noise and exhaust gas are normal.

M18J-03-004

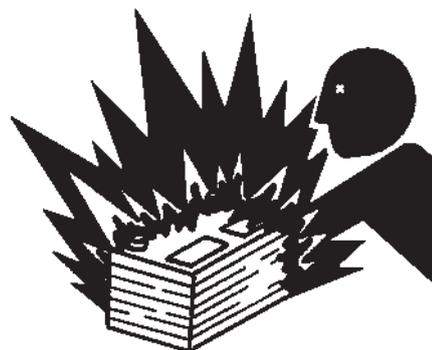
OPERATING ENGINE

Using Booster Batteries

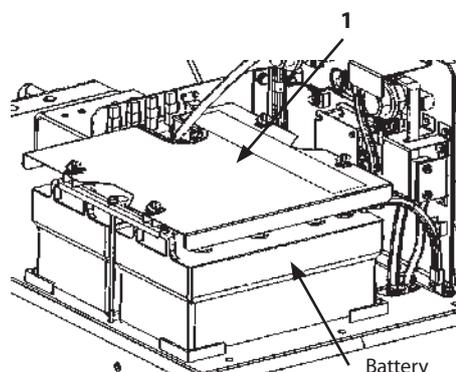


WARNING:

- An explosive gas is produced while batteries are in use or being charged. Keep open flames and sparks away from the battery area. Charge the batteries in a well ventilated area.
- Do not leave cover (1) removed. Do not keep tools, metals or flammable materials around the battery or inside the battery room. If a metal tool is placed across the battery terminal, sparks may be created, possibly resulting in fire and/or explosion.
- Park the machine on a dry, firm or concrete surface, not on steel plates, if the machine is parked on steel plates, dangerous sparks may be unexpectedly created on the machine. Never connect a positive terminal to a negative terminal, as a dangerous short circuit will occur.
- Do not continue to use or charge the battery when electrolyte level is lower than specified. Explosion of the battery may result.
- The operator must be in the operator's seat so that the machine will be under control when the engine starts. Jump starting is a two-person operation.



SA-032



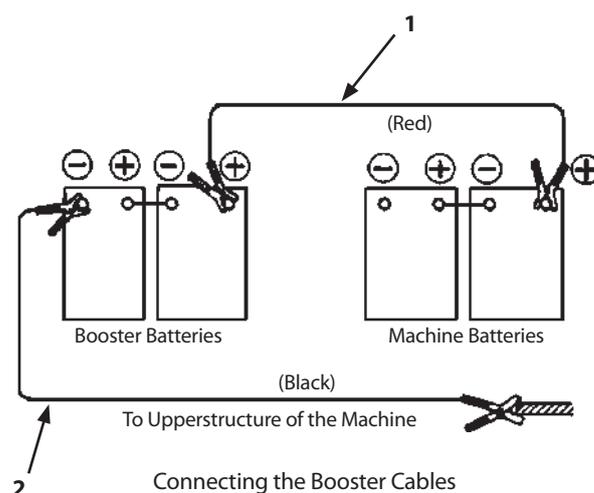
M18J-03-006

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

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

Connecting the Booster Cables

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

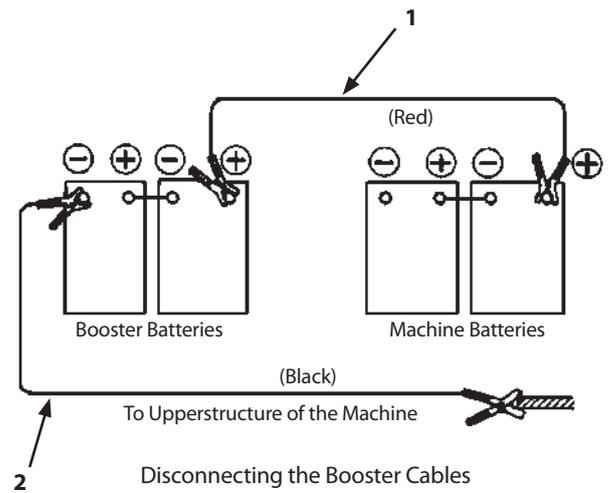


M104-03-002

OPERATING ENGINE

Disconnecting the Booster Cables

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



M104-03-002

OPERATING ENGINE

Stopping Engine

Engine stop procedure

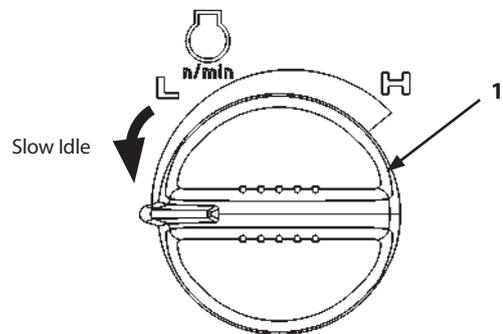
1. Park the machine on a firm, level surface.
2. Lower the bucket to the ground.
3. Turn engine control dial (1) to the slow idle position and run the engine for 5 minutes to cool the engine.

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

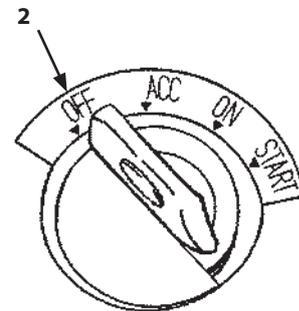
4. Turn key switch (2) OFF. Remove the key from key switch (2).
5. Pull pilot control shut-off lever (3) to the LOCK position.



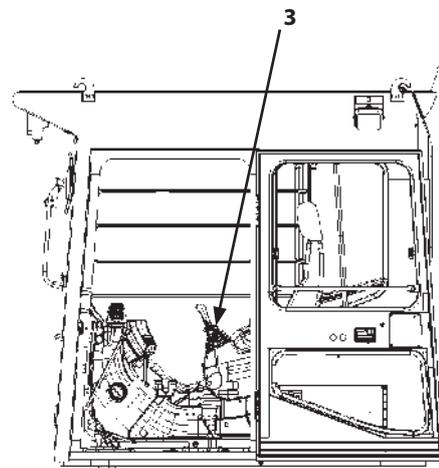
SA-390



M1P1-01-068



M18J-01-056



LOCK Position

M18J-01-027

OPERATING ENGINE

Engine Stop Switch

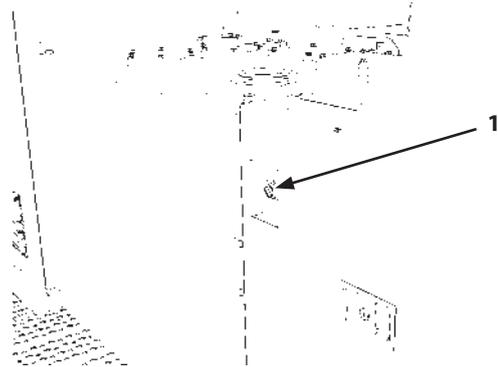
! **WARNING:**When performing any inspection/service work, use engine stop switch (1) at the area where any inspection /service work are performed to avoid possible personal injury.

Engine stop switch (1) is located on the utility cover.

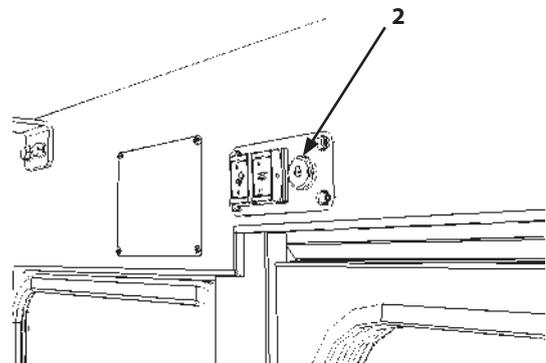
When engine stop switch (1) is turned to the "STOP" position, the engine will not be started with key switch. Engine stop indicator (2) will come ON.

When engine stop switch (1) is turned to the "STOP" position, the engine will be stopped.

Turn engine stop switch (1) to the "NORMAL" position to restart the engine.



M18J-03-005



M18J-01-023

DRIVING MACHINE

Drive Machine Carefully

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

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

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

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

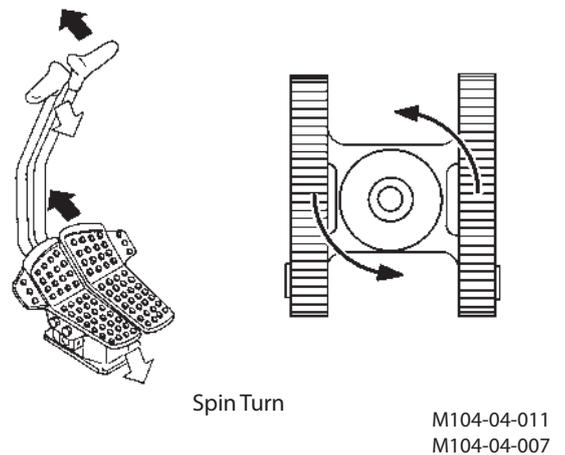
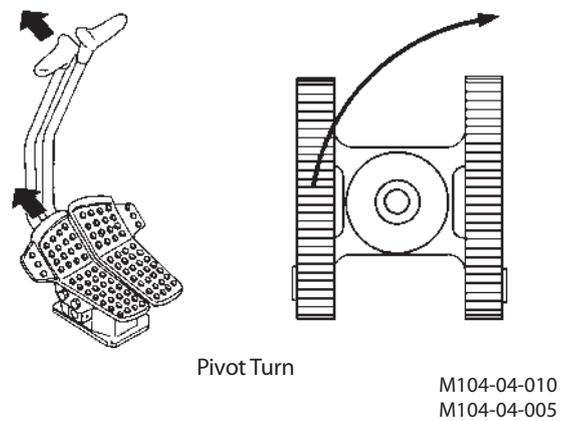
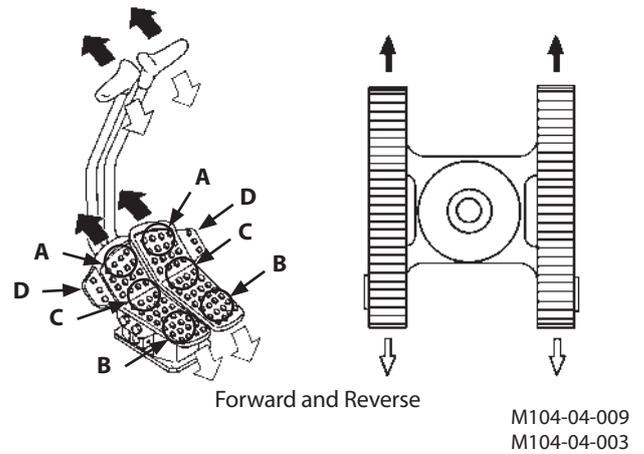
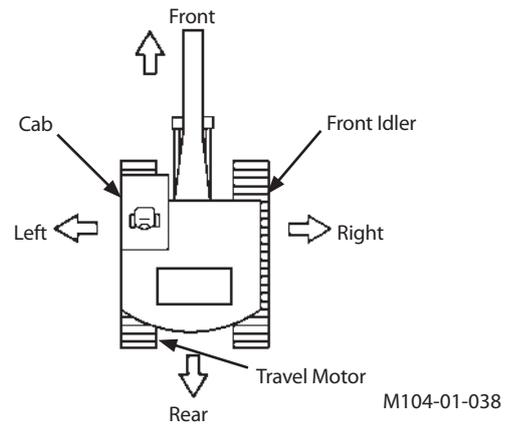
DRIVING MACHINE

Steering Machine Using Pedals

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

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

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



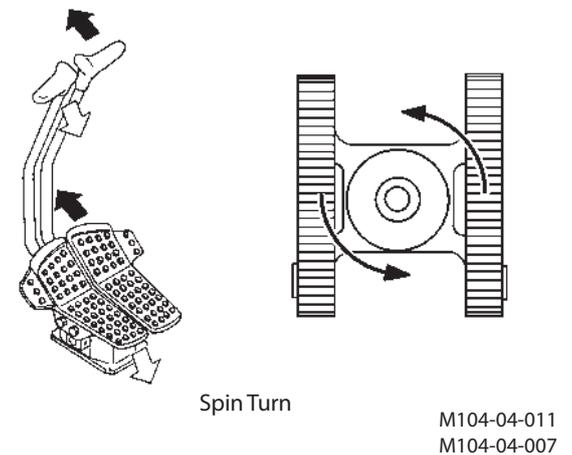
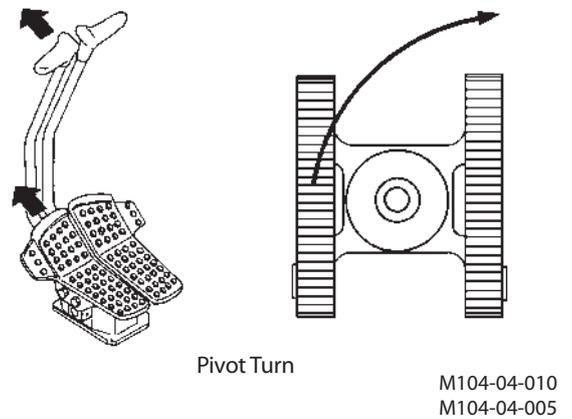
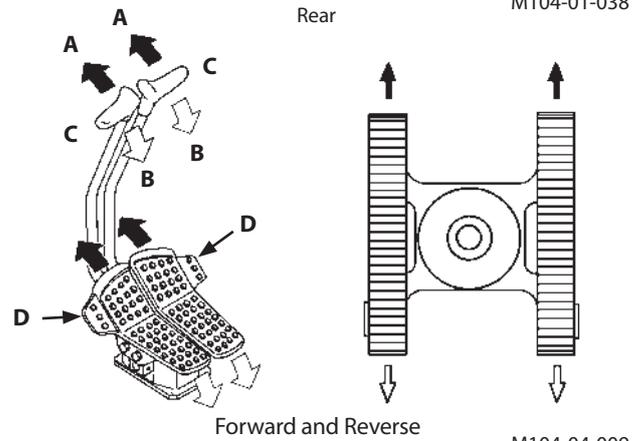
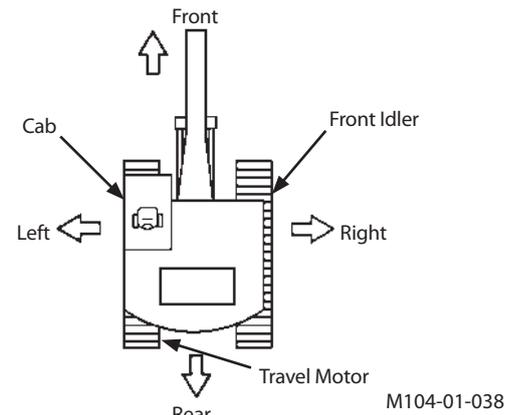
DRIVING MACHINE

Steering Machine Using Levers

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

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

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



DRIVING MACHINE

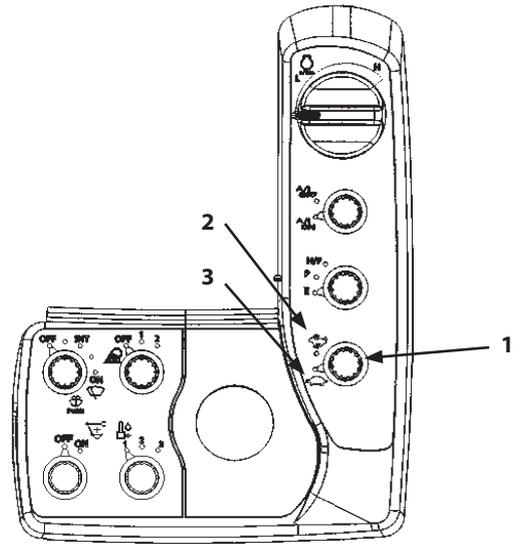
Travel Mode Switch

⚠ WARNING: Tipping-over accidents can cause serious personal injury. Do not change travel mode while traveling; especially, changing to the fast mode when descending slopes will create a very dangerous situation. Always stop the machine before changing the travel speed mode.

Turn travel mode switch (1) on the switch panel to the specified position to select the travel mode (Fast/Slow).

- Fast Mode: Turn travel mode switch (1) to  mark (2) position.
- Slow Mode: Turn travel mode switch (1) to  mark (3) position.

- 2:  Mark (Fast Speed Mode)
 3:  Mark (Slow Speed Mode)



M18J-01-052

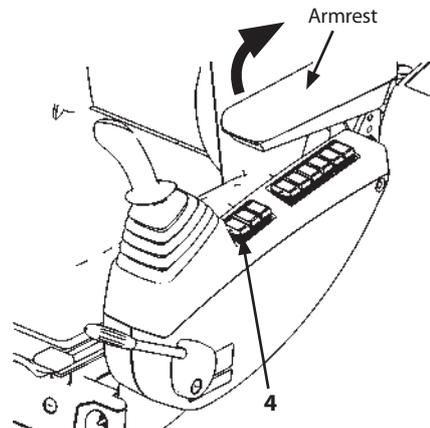
Travel Alarm (Optional)

The travel alarm functions to alert co-workers and/or bystanders to movement of the machine, both forward and reverse. Travel alarm (5) sounds when any travel pedal or lever is operated and will continue to sound as long as the tracks are moving.

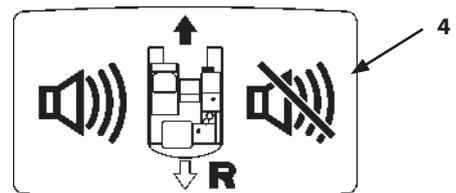
⚠ WARNING: If travel alarm (5) does not sound when traveling, immediately stop the engine and contact your authorized dealer for repair. Operating the machine with a malfunctioning travel alarm (5) may result in personal injury or death.

Alarm (5) can be deactivated after 13 seconds by pushing travel alarm deactivation switch (4) to the  position.

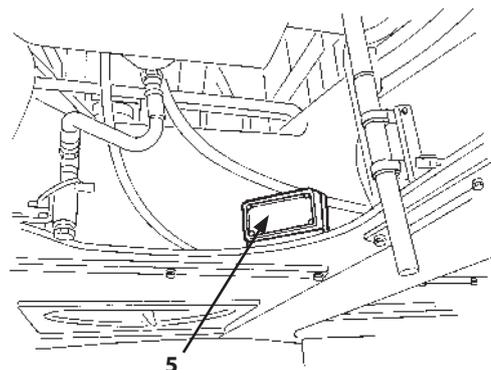
IMPORTANT: Alarm (5) can not be deactivated within the first 13 seconds of traveling, even when travel alarm deactivation switch (4) is pushed to the  position. Push travel alarm deactivation switch (4) to the  position again after 13 seconds.



M1J1-03-001



M1U1-01-035

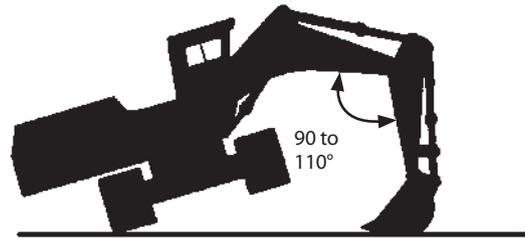


M183-01-090

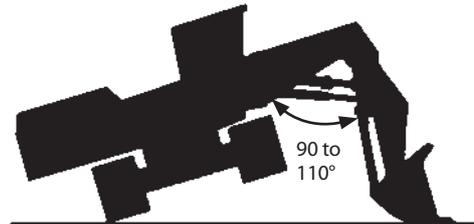
DRIVING MACHINE

Operating on Soft Ground

- Avoid traveling on very soft ground that does not have sufficient strength to firmly support the machine.
- If the machine is operated on very soft ground or becomes stuck, it may be necessary to clean the track frame area.
- Swing the upperstructure 90° and lower the bucket to raise one track off the ground. Make sure to keep the angle between the boom and arm 90 to 110° and position the bucket's round side on the ground.
- Rotate the raised track back and forth to remove mud and dirt.
- After lowering the track to the ground, select slow travel speed. Carefully move the machine to firm ground.
- Utilize the boom and arm functions to pull the machine toward firm ground.
- Tow the machine if the machine becomes stuck but only if the engine is still operating. Be sure to attach a tow line correctly. (Refer to the "Towing Machine a Short Distance" section on the next page.)



M145-05-007



M145-05-025

Raise One Track Using Boom and Arm

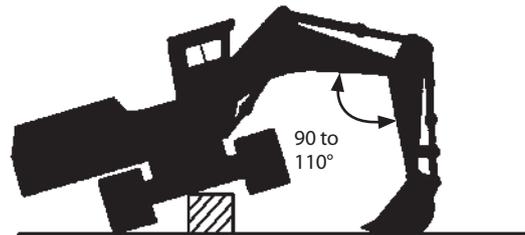
WARNING: Keep the angle between boom and arm 90 to 110° and position the bucket's round side on the ground.

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

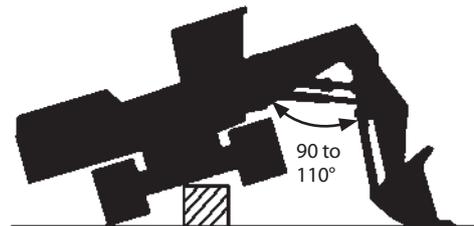
Place blocks under machine frame to support the machine.

IMPORTANT:

- Before raising the machine above the ground, turn the boom mode switch OFF.
- When the machine is equipped with the loading shovel front attachment, do not raise the machine off the ground by bucket tooth force with the bucket cylinder fully retracted. Failure to do so will cause excessive loads to be applied to the bucket pins and cylinders so that damage to the pins may result.



M18J-04-002



M18J-04-003



M18J-04-004

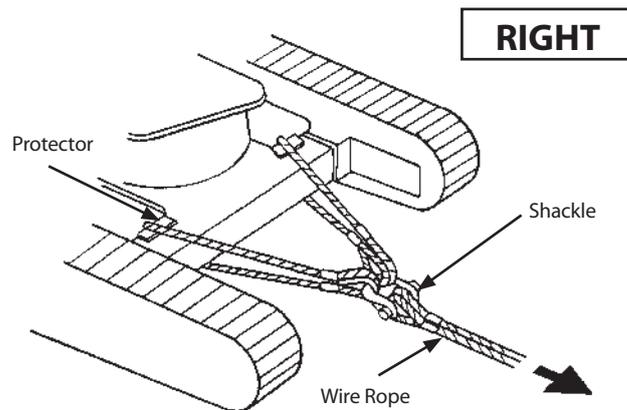
DRIVING MACHINE

Towing Machine a Short Distance



WARNING:

- Cables, straps, or ropes can break causing serious injury. Do not tow machine with damaged chains, frayed cables, slings, straps, or wire ropes.
- Always wear gloves when handling cable, straps or wire ropes.
- Be sure to check that the travel mode switch is in the TURTLE position.
- Be sure to turn the auto idle switch OFF.
- Always slowly drive the machine.
- Do not apply shock loads to the towing rope.
- Never allow anyone to enter between the towing machine and the towed machine while towing.



M114-05-100

Max. Traction Force: 707 kN (72100 kgf, 159000 lbf)

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

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

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

IMPORTANT:

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

DRIVING MACHINE

Operating in Ground Condition

Operate the machine on flat footing.

The machine should not be operated in water or mud.

There is a possibility that travel motors, travel reduction gears, and parts inside of the track frame damage with machine sinking.

In very soft footing, beware the possibility of the machine sinking gradually.

Always pay attention around the undercarriage.

If you must travel in water, check that towing will be possible.

The following conditions apply to travel across water;

- The bed of water is flat.
- The flow of water is slow.

While you cross in water, carefully confirm the depth and footing condition.

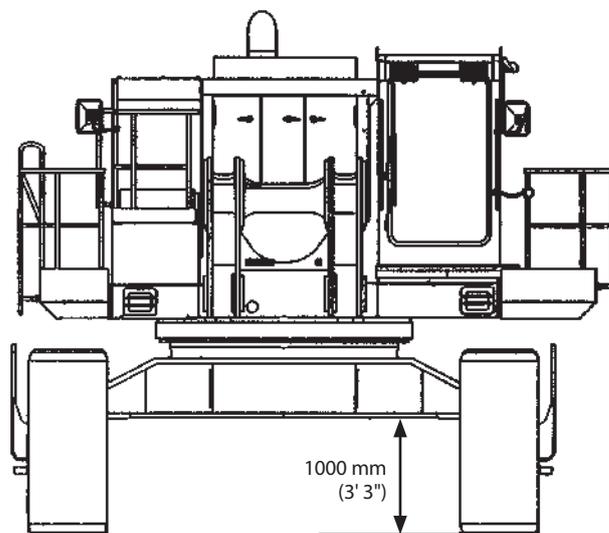
Do not move the machine into an area that has a water depth that is greater than 1000 mm (3 ft 3 in) from the ground.

If the footing is weak and water flow is fast, take special care not to submerge the swing bearing, swing pinion gears due to the machine sinking and the force of strong water current.

If submerge the swing bearing, swing pinion gears and center joint by mistake, do not operate the machine with such a condition continuously, it cause to wear swing bearing and swing pinion gears abnormally and may break swing bearing and gears.

Remove the drain plug to drain mud and water, and change grease in the swing bearing bath or disassemble the swing bearing area immediately.

Please stop the machine operation and contact authorized distributor or dealer when submerge the swing bearing, swing pinion gears and center joint.



M18J-04-001

DRIVING MACHINE

Parking Machine on Slopes

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

If parking the machine on a slope is unavoidable:

1. Thrust the bucket teeth into the ground.
2. Return the control levers to neutral and pull pilot control shut-off lever (2) to the LOCK position.
3. Block both tracks.



M104-05-014

Parking Machine

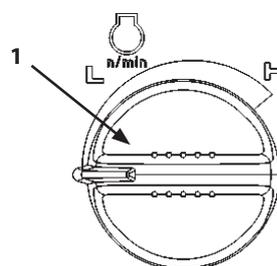
1. Park the machine on a firm, level surface.
2. Lower the bucket to the ground.
3. Turn the auto-idle switch off.

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

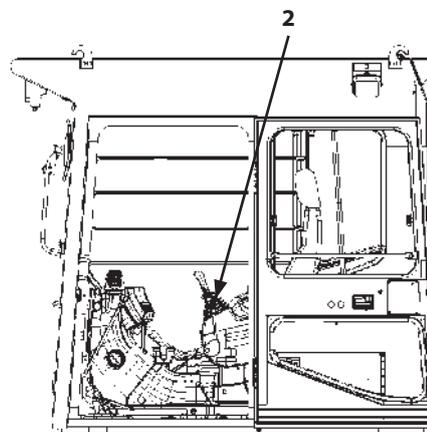
4. Turn engine control dial (1) counterclockwise to the stop (the slow idle position). Run the engine approximately 5 minutes to cool the engine.
5. Turn the key switch to OFF. Remove the key from the key switch.
6. Pull pilot control shut-off lever (2) to the LOCK position.

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

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



M1P1-01-068



LOCK Position

M18J-01-027

OPERATING MACHINE

Control Lever (ISO Pattern Backhoe)



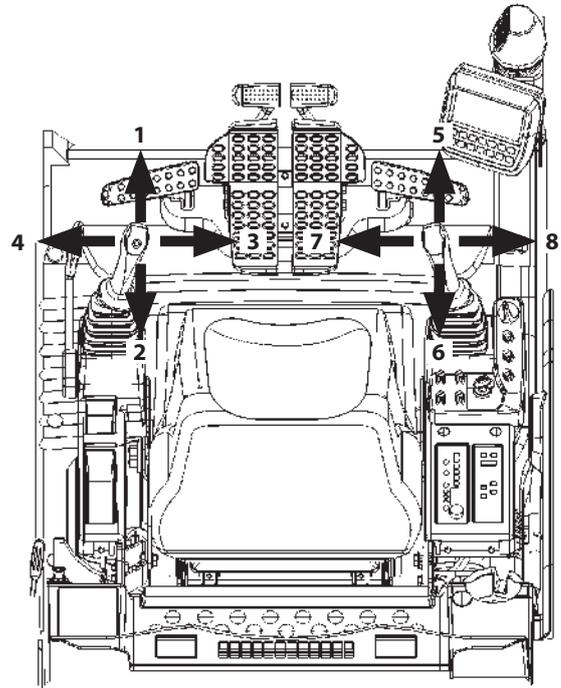
WARNING:

- Never place any part of body beyond window frame. It could be crushed by the boom if boom control lever is accidentally bumped or otherwise engaged. If window is missing or broken, replace it immediately.
- Make sure you know the location and function of each control before operating.
- Do not change the control lever operation pattern. Failure to do so may result in operation mistake of the machine.

A label showing the control patterns of the levers and pedals is attached on the upper side in the cab.

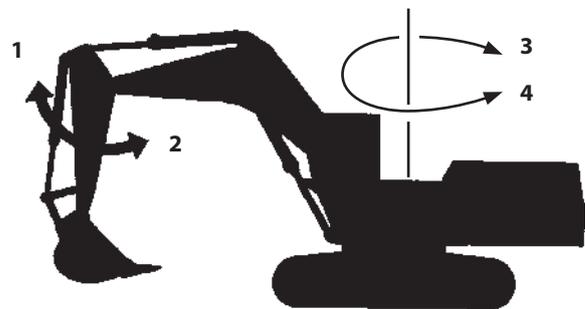
IMPORTANT: When digging, avoid hitting tracks with boom cylinders. When digging over the end of the tracks, travel motors should be at the rear to maximize machine stability and lift capacity.

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

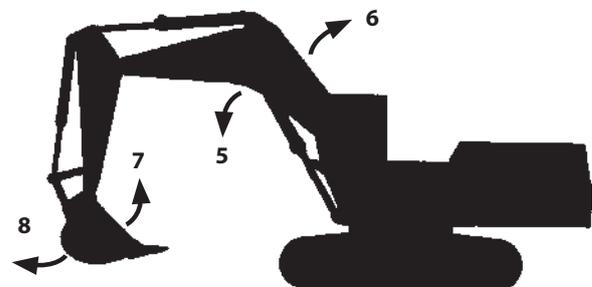


M18J-01-002

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



M142-05-002



M142-05-003

OPERATING MACHINE

Control Lever (ISO Pattern Loading Shovel)



WARNING:

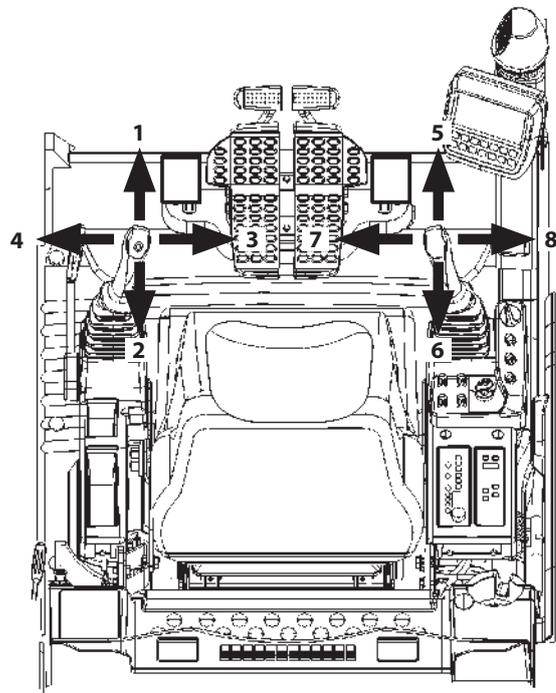
- Never place any part of body beyond window frame. It could be crushed by the boom if boom control lever is accidentally bumped or otherwise engaged. If window is missing or broken, replace it immediately.
- Make sure you know the location and function of each control before operating.
- Do not change the control lever operation pattern. Failure to do so may result in operation mistake of the machine.

A label showing the control patterns of the levers and pedals is attached on the upper side in the cab.

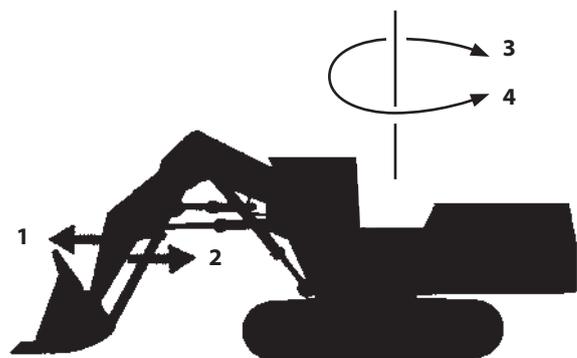
IMPORTANT: When digging, avoid hitting tracks with boom cylinders. When digging over the end of the tracks, travel motors should be at the rear to maximize machine stability and lift capacity.

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

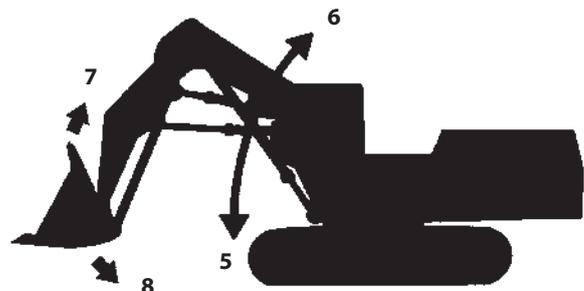
- 1- Arm Extend
- 2- Arm Retract
- 3- Swing Right
- 4- Swing Left
- 5- Boom Lower
- 6- Boom Raise
- 7- Bucket Tilt-In
- 8- Bucket Tilt-Out



M18J-05-001



M117-05-027

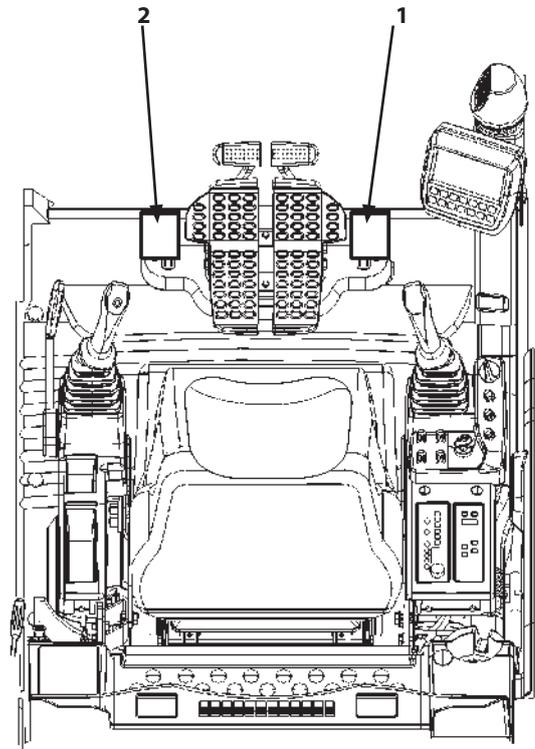


M117-05-025

OPERATING MACHINE

Bucket Open-Close Pedals (Loading Shovel)

- 1- Bucket Opening
- 2- Bucket Closing



M18J-05-001



M117-05-031

OPERATING MACHINE

Control Lever (Hitachi Pattern Backhoe) (Optional)



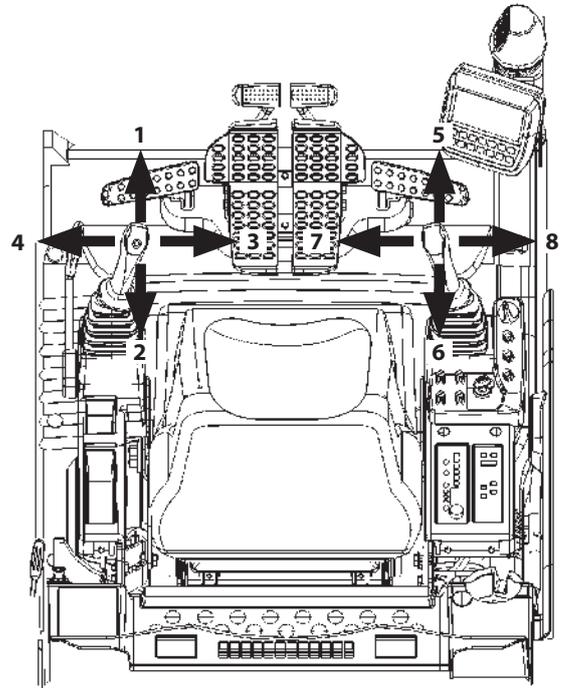
WARNING:

- Never place any part of body beyond window frame. It could be crushed by the boom if boom control lever is accidentally bumped or otherwise engaged. If window is missing or broken, replace it immediately.
- Make sure you know the location and function of each control before operating.

A label showing the control patterns of the levers and pedals is attached on the upper side in the cab.

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

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



M18J-01-002

1- Swing Right

2- Swing Left

3- Arm Roll-In

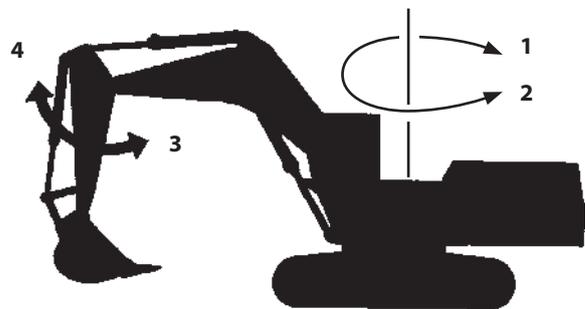
4- Arm Roll-Out

5- Boom Lower

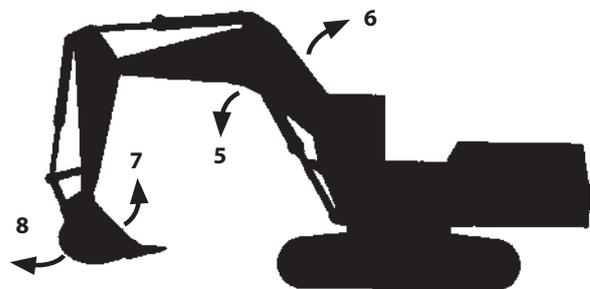
6- Boom Raise

7- Bucket Roll-In

8- Bucket Roll-Out



M142-05-002



M142-05-003

OPERATING MACHINE

Control Lever (Hitachi Pattern Loading Shovel) (Optional)



WARNING:

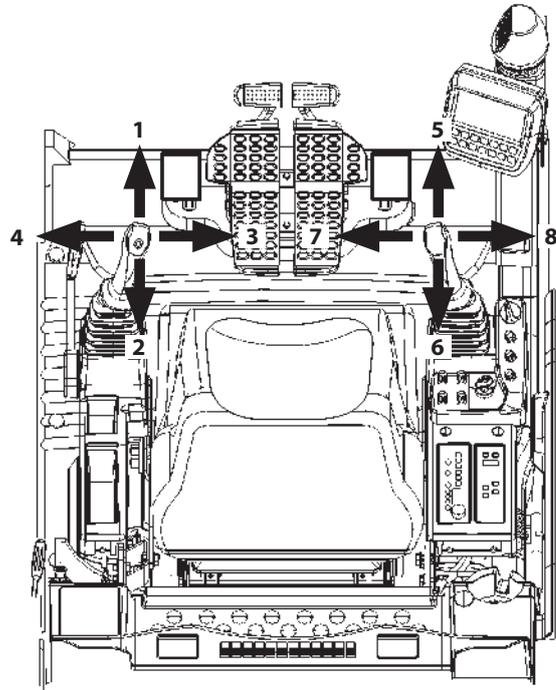
- Never place any part of body beyond window frame. It could be crushed by the boom if boom control lever is accidentally bumped or otherwise engaged. If window is missing or broken, replace it immediately.
- Make sure you know the location and function of each control before operating.

A label showing the control patterns of the levers and pedals is attached on the upper side in the cab.

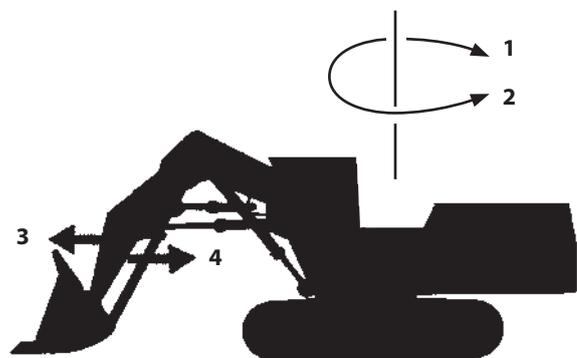
IMPORTANT: When digging, avoid hitting tracks with boom cylinders. When digging over the end of the tracks, travel motors should be at the rear to maximize machine stability and lift capacity.

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

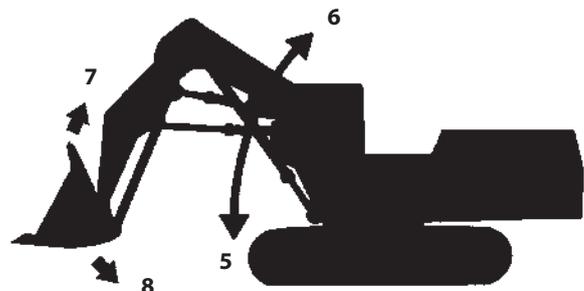
- 1- Swing Right
- 2- Swing Left
- 3- Arm Extend
- 4- Arm Retract
- 5- Boom Lower
- 6- Boom Raise
- 7- Bucket Tilt-In
- 8- Bucket Tilt-Out



M18J-05-001



M117-05-027



M117-05-025

OPERATING MACHINE

Pilot Control Shut-Off Lever

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



WARNING:

- **Always pull pilot control shut-off lever (1) into the full LOCK position. The pilot control shut-off function will not be activated otherwise.**
- **When leaving the machine:**
 - **Stop the engine.**
 - **Then, pull pilot control shut-off lever (1) up to the LOCK position.**
- **Always check to be sure that pilot control shut-off lever (1) is pulled up to the LOCK position before:**
 - **Leaving the machine at the end of the shift.**

Pilot Control Shut-Off Lever Operation



WARNING: If any part of the machine (any actuator) moves when pilot control shut-off lever (1) is lowered to the UNLOCK position despite the fact that all control levers/pedals are placed in neutral, the machine is malfunctioning. Immediately pull pilot control shut-off lever (1) back to the LOCK position, and stop the engine. Then, see your authorized dealer.

Before Leaving the Machine:

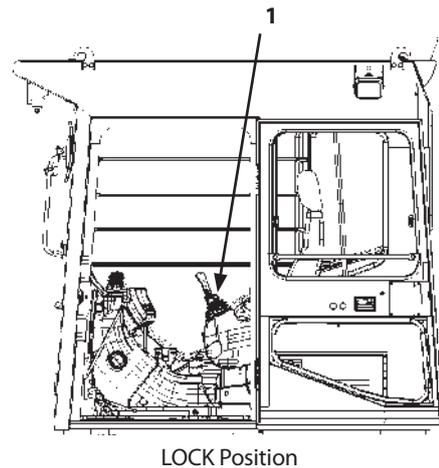
1. Park the machine on a firm, level surface. Lower the bucket to the ground. Return all control levers/pedals to neutral. Properly shut down the engine.
2. Pull pilot control shut-off lever (1) up into the full LOCK position.

Before Starting Operation:

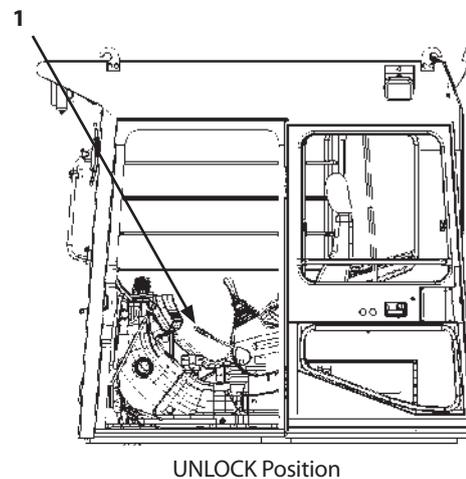
1. Confirm that pilot control shut-off lever (1) is pulled up to the LOCK position.

After starting the engine:

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



M18J-01-027



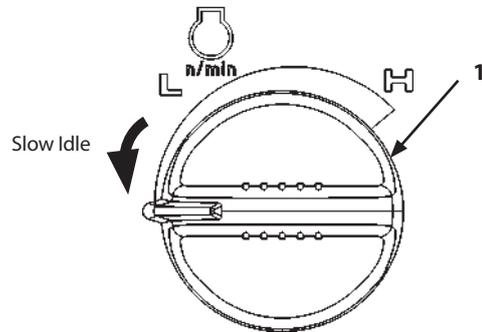
M18J-01-028

OPERATING MACHINE

Warming-Up Operation

Warm up the machine until coolant and hydraulic oil temperature increases to the appropriate operating temperature as follows:

IMPORTANT: 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 hydraulic oil temperature below 30 °C (86 °F). Always warm hydraulic oil to specifications before operating the machine. 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.



M1P1-01-068

Engine Warming-up Operation

1. Run the engine with engine control dial (1) turned to the slow idle position for 5 to 10 minutes.

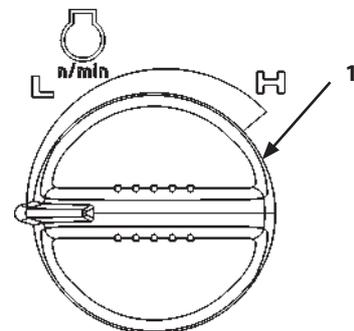
Hydraulic Oil Warming-up Operation

1. Increase the engine speed to middle speed by operating the control dial (1). Run the engine for 5 minutes with the bucket held in the rolled-out (titled-out) position. (Do not operate other functions than the bucket at this time)
2. Increase the engine speed to the maximum speed. Run the engine for 5 to 10 minutes with the bucket rolled-in (titled-in) or arm rolled-in (cylinder extend). (Do not operate other functions than the bucket or arm at this time)

Warming-up Motors and the Cylinders

IMPORTANT:

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



M1P1-01-068

1. Turn engine control dial (1) to the medium position.
2. Operate the boom, arm and bucket cylinders slowly to each stroke end several times.
3. Operate travel and swing functions slowly, initially moving only short distances.
4. Continue to repeat steps 2 and 3 until bucket cycle time is normal.

OPERATING MACHINE

Auto-Idle

With auto-idle switch (3) turned to the A/I ON position, approximately 4 seconds after all control levers are returned to neutral, the engine speed decreases to the auto-idle setting to save fuel consumption. The engine speed will immediately increase to the speed set by engine control dial (2) when any control lever is operated.

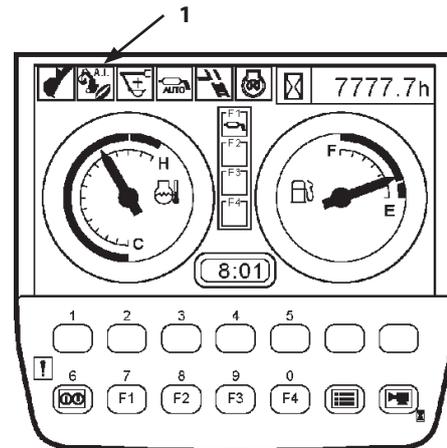
⚠ WARNING: Always be aware of engine control dial (2) setting when auto-idle switch (3) turned to the A/I ON position. If the engine speed is set high with engine control dial (2), and if the operator is not aware of the high engine speed setting, the engine speed will unexpectedly increase when any control lever is operated, causing unexpected machine movement, thus possibly resulting in serious personal injury. Prevent the machine from unexpected movement. Be sure to turn OFF auto-idle switch (3) when unexpected machine movement is undesirable.

IMPORTANT: Always check if auto-idle indicator (1) is turned on or off before starting operation. If indicator (1) is on, the auto-idle function will be activated.

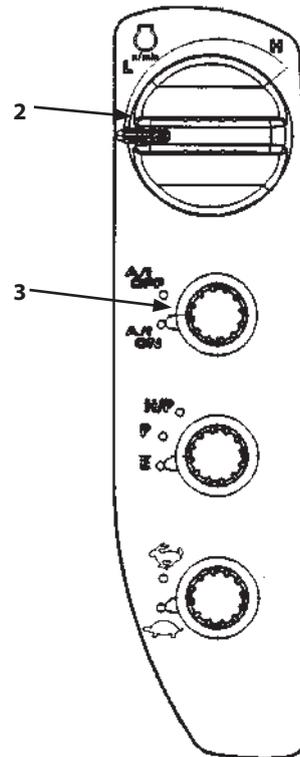
Note that auto-idle function can be turned on or off only when the key switch is in ON position. Always check if the auto-idle function is turned on or off with auto-idle indicator (1).

Auto-Idle Function ON : Auto-Idle Indicator (1) ON
Auto-Idle Function OFF : Auto-Idle Indicator (1) OFF

- When auto-idle switch (3) is turned OFF with auto-idle indicator (1) ON, indicator (1) will go OFF and the auto-idle system is deactivated.
- Even if the engine is stopped by turning the key switch with auto-idle switch (3) in the A/I ON position [indicator (1) ON], the auto-idle system is not deactivated. When the engine is restarted, the auto-idle system remains activated, allowing auto-idle indicator (1) to flash for 5 seconds and stay ON later.



M18J-01-049



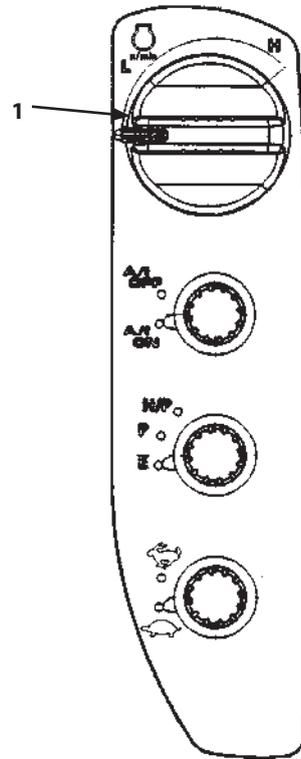
M1U1-05-013

OPERATING MACHINE

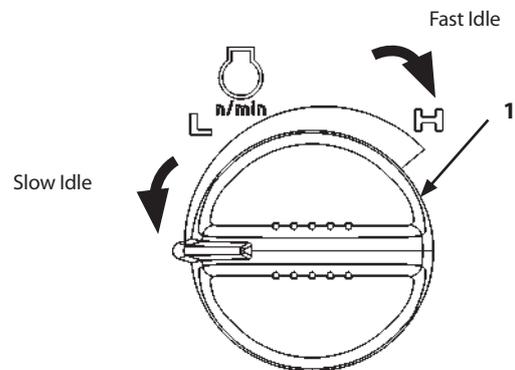
Engine Speed Control

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

- Turn engine control dial (1) clockwise to increase the engine speed. Turn engine control dial (1) counterclockwise to decrease the engine speed.
- Note that the auto-idle function will be deactivated if engine control dial (1) is operated while the engine is running at the auto-idle setting.
- Before stopping the engine, always turn engine control dial (1) counterclockwise to the stop (to the slow idle setting). Run the engine 5 minutes to cool the engine. Then, turn key switch to OFF position to stop the engine.



M1U1-05-013



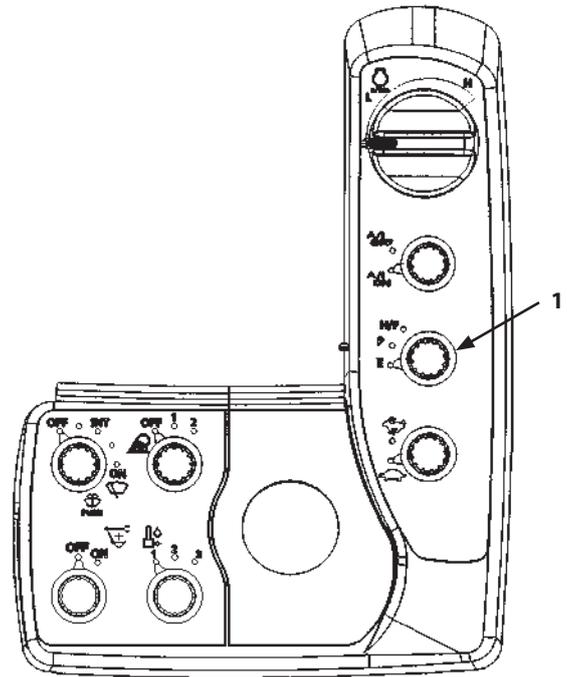
M1P1-01-068

OPERATING MACHINE

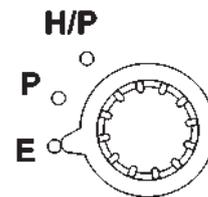
Power Mode

Three engine speed modes, E, P, and H/P modes, are selected by operating power mode switch (1).

- E (Economy) Mode
Although production is slightly reduced more than in the P mode, the fuel consumption and noise levels are reduced, allowing the machine to operate efficiently.
- P (Power) Mode
Use the P mode when general digging work is needed.
- H/P (High Power) Mode
Use the H/P mode when extra fast speed and/or heavy duty work is needed.



M18J-01-052



M178-01-013

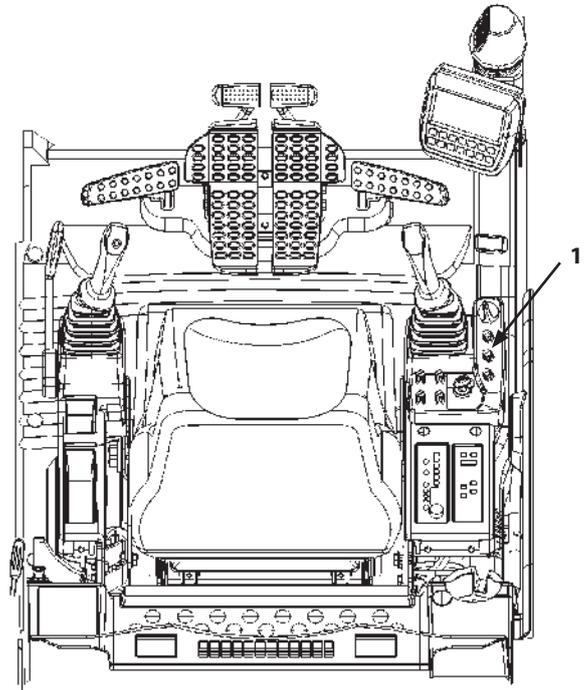
OPERATING MACHINE

E (Economy) Mode

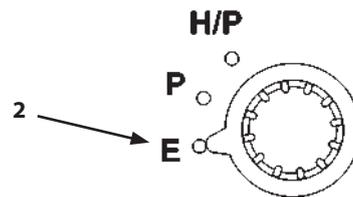
Use the E mode when the priority is given to fuel consumption performance rather than production.

Even if the engine speed is reduced in the E mode, digging force remains unchanged from that in the P mode. Although production is reduced slightly more than in the P mode, the fuel consumption and noise levels are reduced, allowing the machine to operate most efficiently.

When power mode switch (1) is turned to E position (2), the power mode will be changed to E mode.



M18J-01-002



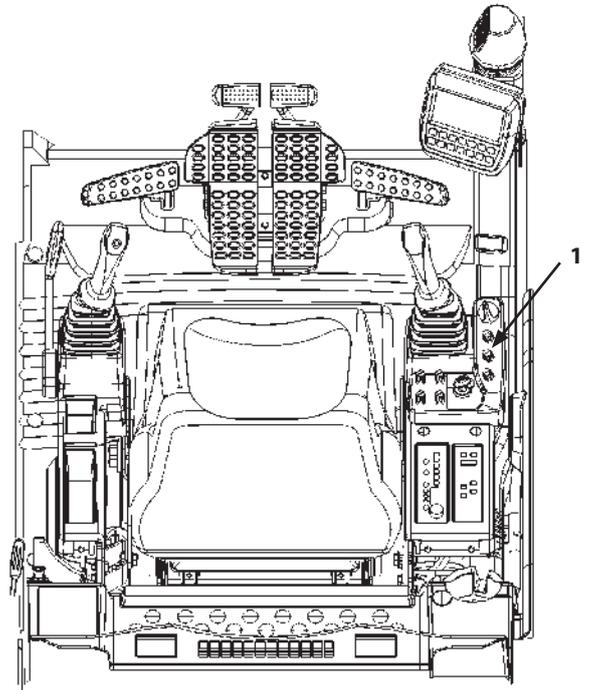
M178-01-013

OPERATING MACHINE

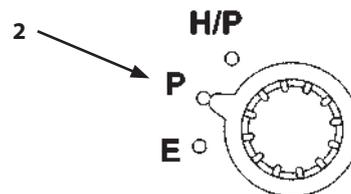
P (Power) Mode

Use the P mode for general digging work is needed.

When turn power mode switch (1) to P position (2), the power mode will be changed to P mode.



M18J-01-002



M18J-05-002

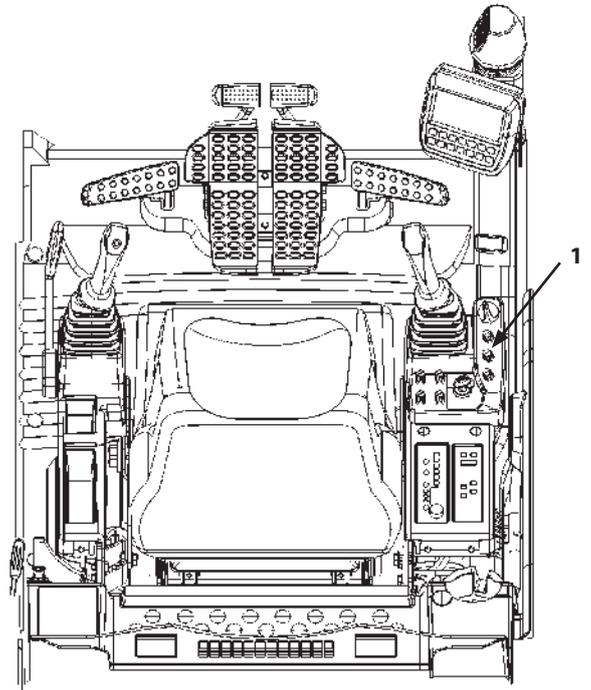
OPERATING MACHINE

H/P (High Power) Mode

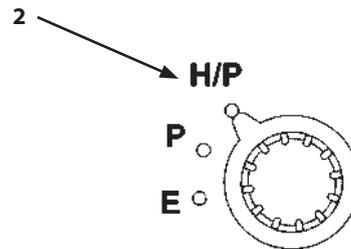
Use the H/P mode when extra fast speed and/or heavy duty work is needed.

When turn power mode switch (1) to H/P position (2), the power mode will be changed to H/P mode.

 **NOTE:** In the H/P mode, always turn the engine control dial clockwise to the stop (to the fast idle setting). H/P mode will not be changed below 1800 min⁻¹ (rpm) engine speed.



M18J-01-002



M18J-05-003

OPERATING MACHINE

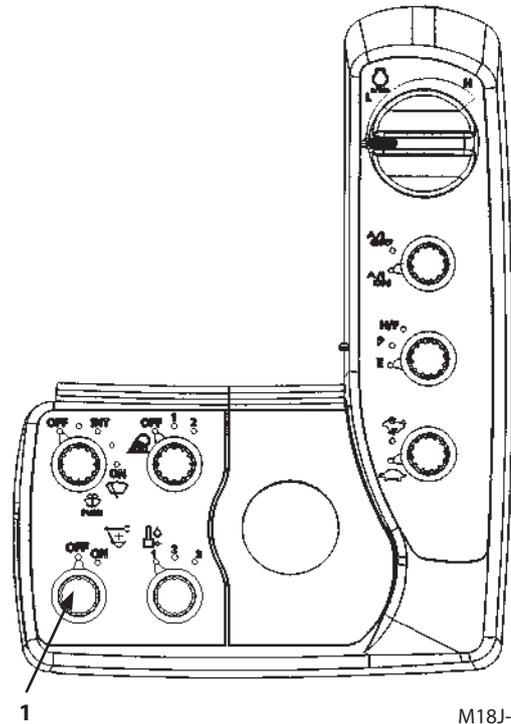
Heavy Lift

The heavy lift function reduces the front attachment speed to allow an increase of the arm and boom power.

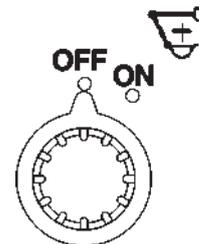
Use heavy lift switch (1) when a heavy load must be moved slowly.

⚠ WARNING: If heavy lift switch (1) is turned OFF while moving a load, the front operation speed is suddenly increased, causing possible personal injury. Be sure to turn heavy lift switch (1) OFF after the load is completely stopped.

1. Turn heavy lift switch (1) ON.
2. Operate either the boom or arm.
3. The front operation speed is automatically reduced to one third (1/3) of the normal operation speed.
4. Turn heavy lift switch (1) OFF. The front operation speed is restored to the normal one.



M18J-01-052



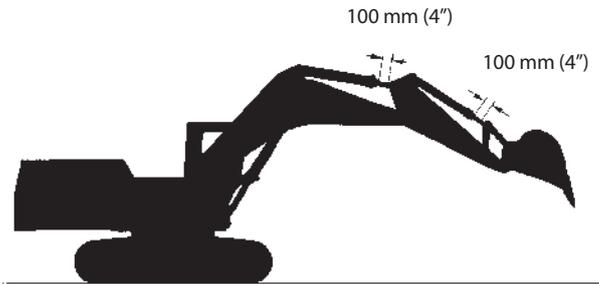
M18J-01-055

OPERATING MACHINE

Operating Backhoe

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

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



M145-05-008



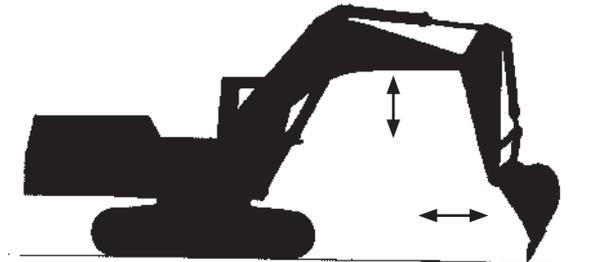
M145-05-009

Grading Operation

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

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

1. Operate arm roll-in function while slowly raising the boom. Once the arm moves past the vertical position, slowly lower the boom to allow the bucket to maintain a smooth surface.
2. Arm roll-out operation is performed in the reverse way of step 1.



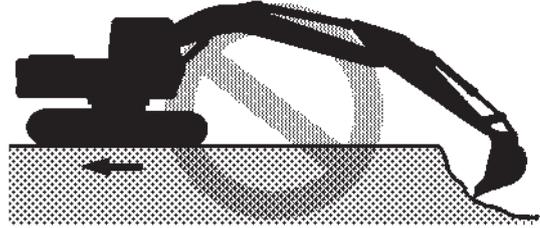
M145-05-010

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

OPERATING MACHINE

Avoid Abusive Operation

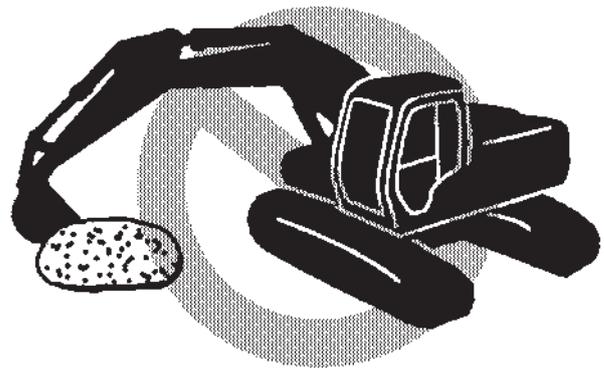
- ⚠ WARNING:** Do not use travel and do not raise rear of the machine to use the machine's weight as additional digging force. Severe machine damage may result.



MZX5-05-005

Avoid Side Load the Bucket

- ⚠ WARNING:** Do not side load the bucket. For example, do not swing the bucket to level material or do not strike objects from the side with the bucket. Doing so may damage the front attachment and the swing system.



MZX5-05-006

OPERATING 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.

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

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

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

Once the trench is open, ledge rock can be broken by pulling the bucket up under the layers. The top layers are pulled out first, with 1 or 2 layers being lifted at a time.

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.



MZX5-05-007

OPERATING MACHINE

Operating Loading Shovel

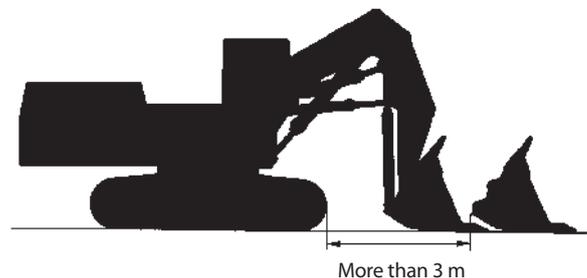
- To dig, position the bucket bottom parallel to and touching the ground and extend the arm while crowding the bucket.
- Digging force increases as the arm is extended. Try to dig with the arm extended where strong digging forces are required.
- Straight Retraction
When the arm cylinder is retracted, the arm top moves horizontally, as oil escaping from the level cylinder flows to the bottom end of the boom cylinders, raising the boom. When the bucket cylinders are fully extended and the bucket comes into contact with the stopper, the straight retraction cannot be performed. To perform the straight retraction, retract the arm cylinder after dumping the bucket slightly.



M145-05-015

Prohibited Operation

- Never dig with the bucket retracted too closely to the undercarriage, as the machine components will be subjected to excessive force. If closely retracted digging is unavoidable, keep a distance of at least 3 m between the rear end of the bucket and the front end of the undercarriage.



M117-05-017

- Never dig with the bucket fully retracted and the bucket teeth stuck in the ground as the front attachment will be subjected to excessive force.



MZX5-05-009

OPERATING MACHINE

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



MZX5-05-010

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



MZX5-05-011

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



MZX5-05-012

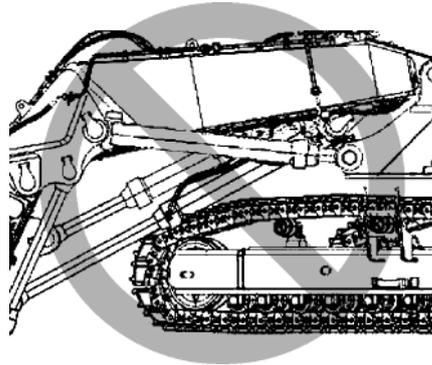
OPERATING MACHINE

IMPORTANT:

- When digging with the upperstructure at an angle to the undercarriage, avoid striking the tracks with the front attachment. Also when lowering the bucket under the ground level, avoid striking the tracks with the arm cylinder.
- Avoid further extension of the bucket cylinder after the bucket comes into contact with the stopper, as the arm cylinder will be extended, moving the bucket forward.



MZX5-05-013



MZX5-05-014

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

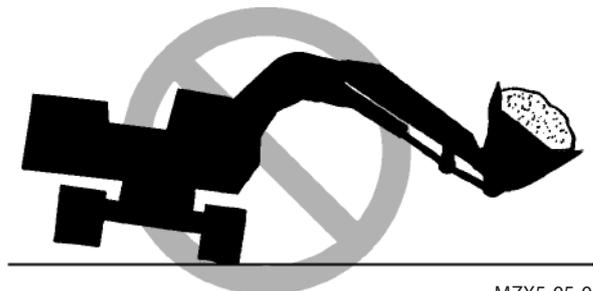


MZX5-05-015

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



MZX5-05-016



MZX5-05-017

OPERATING MACHINE

Object Handling --- If Equipped

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

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

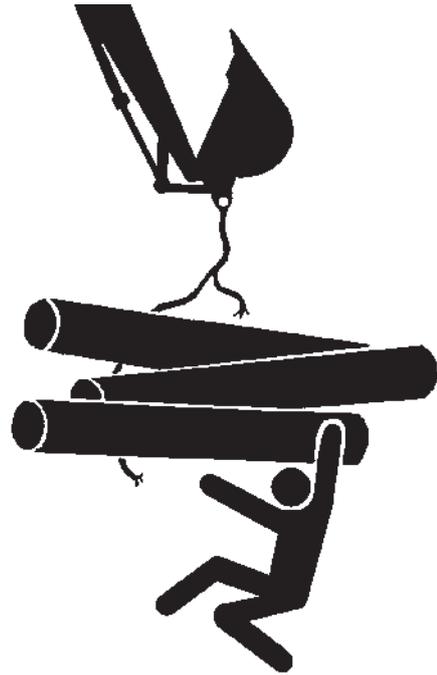
Never move the load quickly. Never move load over a person's head. Do not allow any persons near load.

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

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

Do not attach sling/chain to the bucket teeth.

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

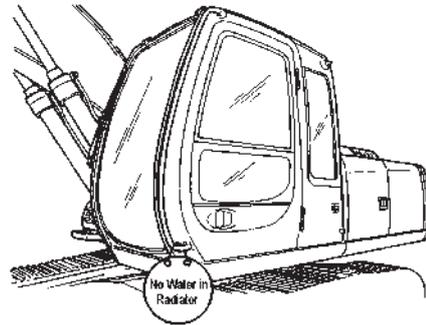


SA-014

OPERATING MACHINE

Overnight Storage Instructions

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



M157-05-151

TRANSPORTING

Transporting

This machine requires disassembly prior to transport. Consult your authorized dealer for disassembly, hoisting and loading for transport.

Follow the relevant regulations for transporting the machine, such as width, height, length and weight when the machine is loaded.

Investigate conditions on the route to be traveled in advance, such as road width, and limits on height and weight, as well as traffic regulations.

MAINTENANCE

Correct Maintenance and Inspection Procedures

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

Inspect machine daily before starting.

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



SA-005

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

- IMPORTANT:**
- **Use only recommended fuel and lubricants.**
 - **Be sure to use only genuine Hitachi parts. Failure to do so may result in serious injury or death and/or machine breakdown.**
 - **Failure to use recommended fuel, lubricants, and genuine Hitachi parts will result in loss of Hitachi product warranty.**
 - **Never adjust engine or hydraulic components.**
 - **Protect electrical parts from water and steam.**
 - **Never disassemble electrical components such as main controller, sensors, etc.**
 - **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 injector nozzles. It also affects the engine, leading to malfunction.**

- **Machine Information Controller**
This machine provides a machine 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 on the proper way to recycle or dispose of oil, fuel, coolant, filters, batteries and other waste from your local environmental or recycling center, or from your authorized dealer.**

MAINTENANCE

Check Hour Meter Regularly

- Intervals on the periodic maintenance chart are for operating in normal conditions. If you operate your machine in more adverse conditions, you should service it at SHORTER INTERVALS.
- Lubricate, make service checks and adjustments at intervals shown on periodic maintenance guide table.

Use Correct Fuels and Lubricants

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

MAINTENANCE

Maintenance Guide Table

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

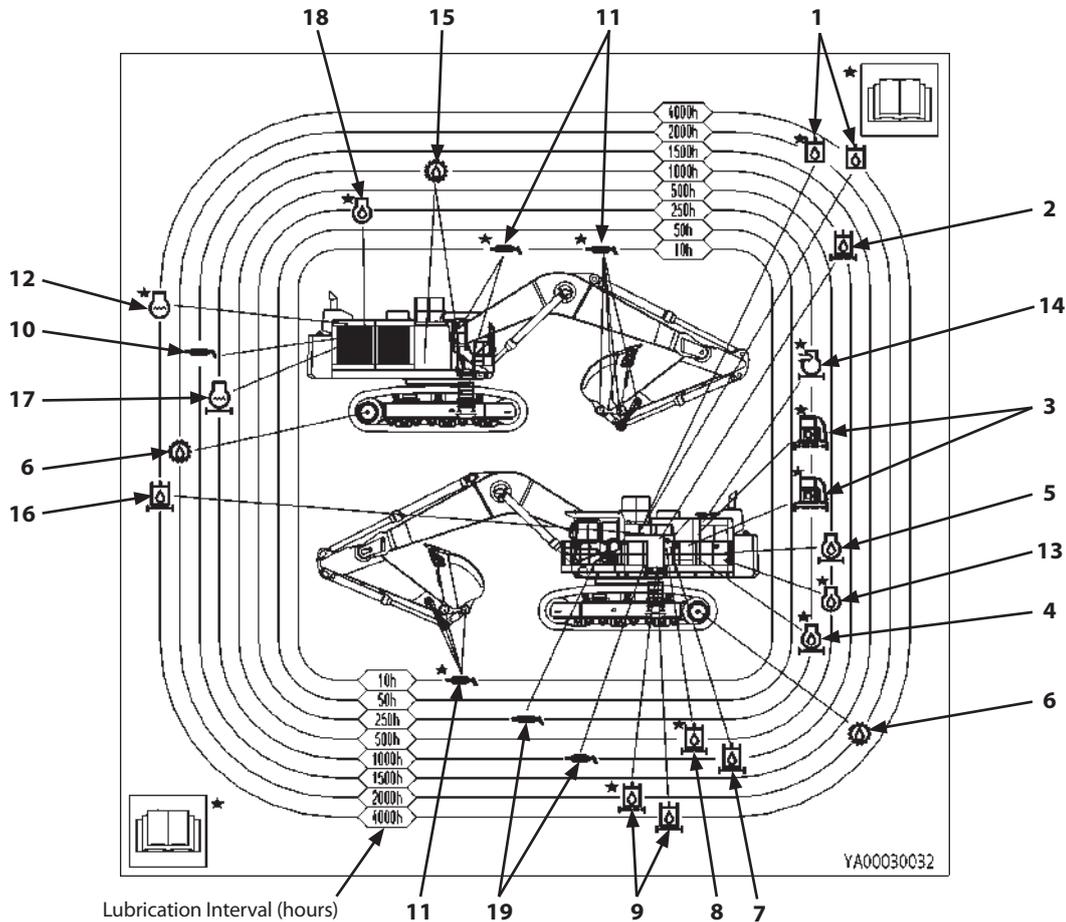
- **Symbol Marks**
The following marks are used in the maintenance guide table.

	Grease (Front Joint Pin, Swing Bearing, Swing Internal Gear, Fan Pulley, Tension Pulley)		Hydraulic oil filters (Pilot Filter, Full-Flow Filter, Suction Filter, Pump Drain Filter, Air Breather)
	Gear Oil (Swing Reduction Gear, Travel Reduction Gear)		Air Cleaner Element
	Engine Oil (Engine, Pump Transmission)		Coolant (Long-Life Coolant)
	Engine Oil Filter, Pump Transmission Oil Filter		Fuel Filter (Fuel Main Filter, Pre-Filter (Optional))
	Hydraulic Oil		Coolant Filter

MAINTENANCE

• Maintenance Guide Table

Backhoe

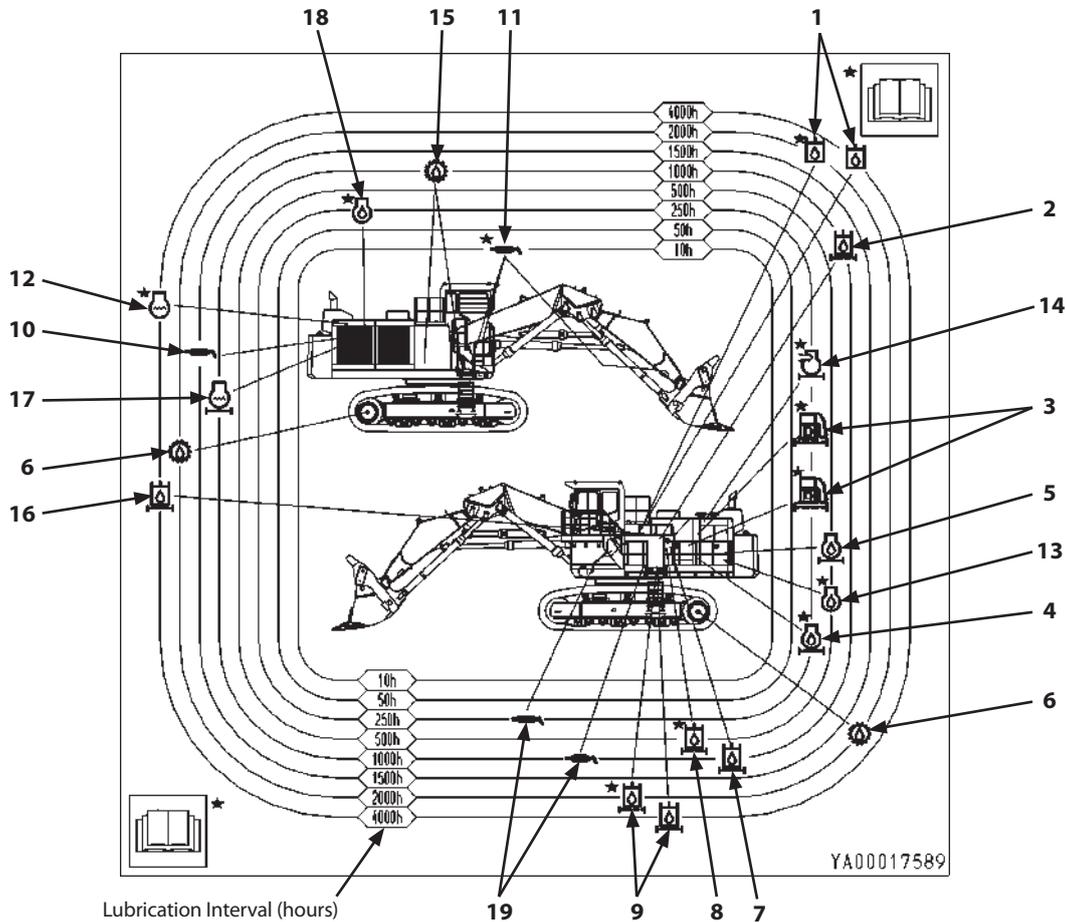


M18J-07-041

Item	Page	Item	Page
1 Hydraulic Oil	7-52	11 Grease (Front Joint Pin)	7-26
2 Hydraulic Oil Filter (Full-Flow)	7-58	12 Coolant (Long Life Coolant)	7-93
3 Fuel Filter (Main/Pre (Optional))	7-74, 76	13 Engine Oil (Pump Transmission)	7-41
4 Engine Oil Filter	7-37	14 Air Cleaner Element	7-96
5 Pump Transmission Oil Filter	7-41	15 Gear Oil (Swing Reduction Gear)	7-44
6 Gear Oil (Travel Reduction Gear)	7-46	16 Hydraulic Oil Filter (Air Breather)	7-63
7 Hydraulic Oil Filter (Pilot)	7-60	17 Coolant Filter	7-92
8 Hydraulic Oil Filter (Pump Drain)	7-56	18 Engine Oil (Engine)	7-37
9 Hydraulic Oil Filter (Suction)	7-55	19 Grease (Swing Bearing, Swing Gear)	7-30
10 Grease (Fan Pulley, Tension Pulley)	7-34		

MAINTENANCE

Loading Shovel



M18J-07-053

Item	Page	Item	Page
1 Hydraulic Oil	7-52	11 Grease (Front Joint Pin)	7-26
2 Hydraulic Oil Filter (Full-Flow)	7-58	12 Coolant (Long Life Coolant)	7-93
3 Fuel Filter (Main/Pre (Optional))	7-74, 76	13 Engine Oil (Pump Transmission)	7-41
4 Engine Oil Filter	7-37	14 Air Cleaner Element	7-96
5 Pump Transmission Oil Filter	7-41	15 Gear Oil (Swing Reduction Gear)	7-44
6 Gear Oil (Travel Reduction Gear)	7-46	16 Hydraulic Oil Filter (Air Breather)	7-63
7 Hydraulic Oil Filter (Pilot)	7-60	17 Coolant Filter	7-92
8 Hydraulic Oil Filter (Pump Drain)	7-56	18 Engine Oil (Engine)	7-37
9 Hydraulic Oil Filter (Suction)	7-55	19 Grease (Swing Bearing, Swing Gear)	7-30
10 Grease (Fan Pulley, Tension Pulley)	7-34		

MAINTENANCE

Prepare Machine for Maintenance

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

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



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

SA-390

4. Run the engine at slow idle speed without load for 5 minutes.
5. Turn the key switch OFF. Remove key from the key switch. (If maintenance must be performed with engine running, do not leave machine unattended.)

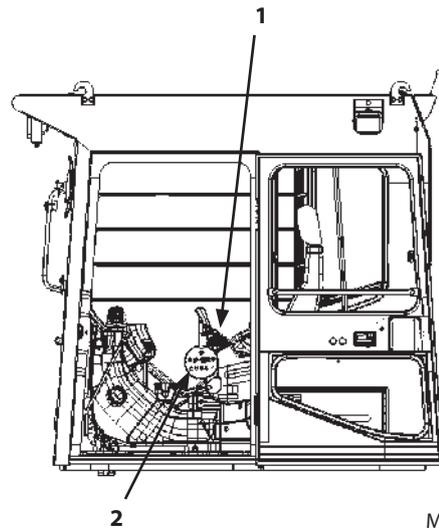
MAINTENANCE

6. Pull pilot control shut-off lever (1) to the LOCK position.
7. Before performing any work on the machine, attach a "Do Not Operate" tag (2) on the right control lever.



WARNING: Never attempt to maintain the machine when the engine is running in order to prevent the 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 LOCK position so that the machine 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 safer place.

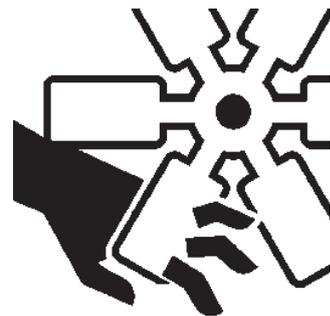


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SA-2294



SA-026

MAINTENANCE

Hood and Access Covers



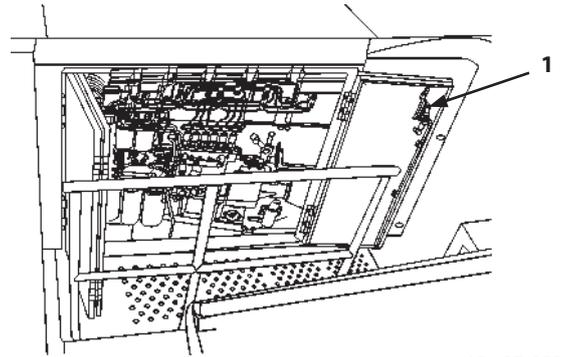
WARNING:

- Do not keep the hood and access covers open when the machine is parked on a slope, or while the wind is blowing hard. The hood or access covers may close accidentally, possibly resulting in personal injury.
- When opening or closing the hood and access covers, take extra care not to catch fingers between the base machine and the hood or access covers.
- If an access cover is damaged, missing, or kept open, hose (s) may become damaged, possibly causing fire. Be sure to repair or replace the damaged and/or missing access cover and always close the access covers before operating the machine.

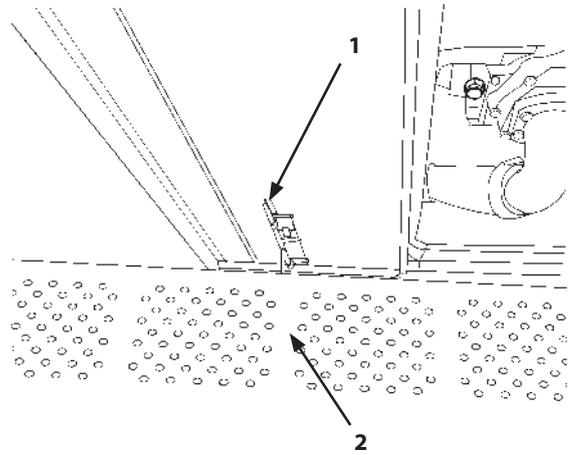
Secure Access Covers in Position

Open the each access cover. Insert the end of rod (1) into fender (2) to lock the access covers in position.

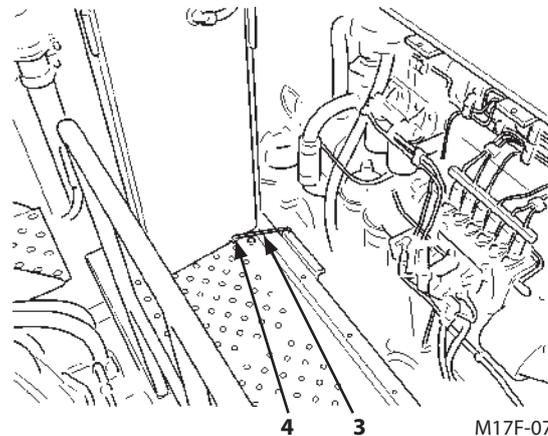
Open the each access cover. Insert the end of rod (3) into cover lock hole (4) to lock the access covers in illustration.



M18J-07-033



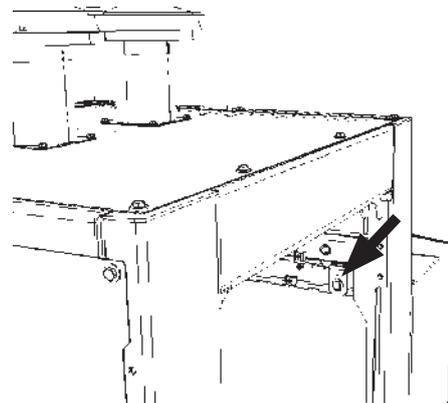
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M17F-07-004

Use Electrical Outlet (Optional)

When using an inspection lamp during maintenance work, use electrical outlet provided in the position shown in the illustration.

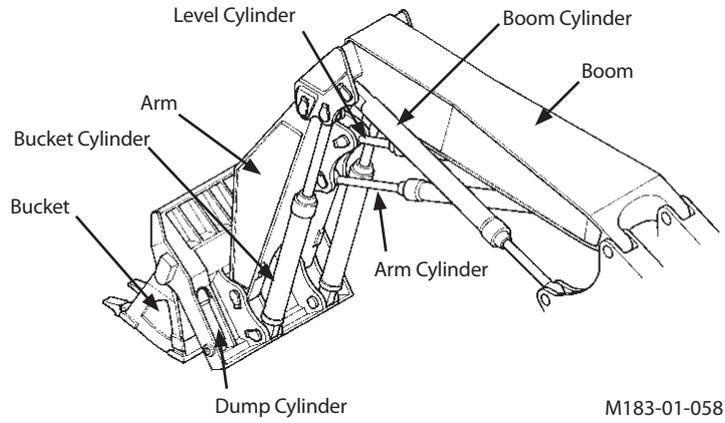


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MAINTENANCE

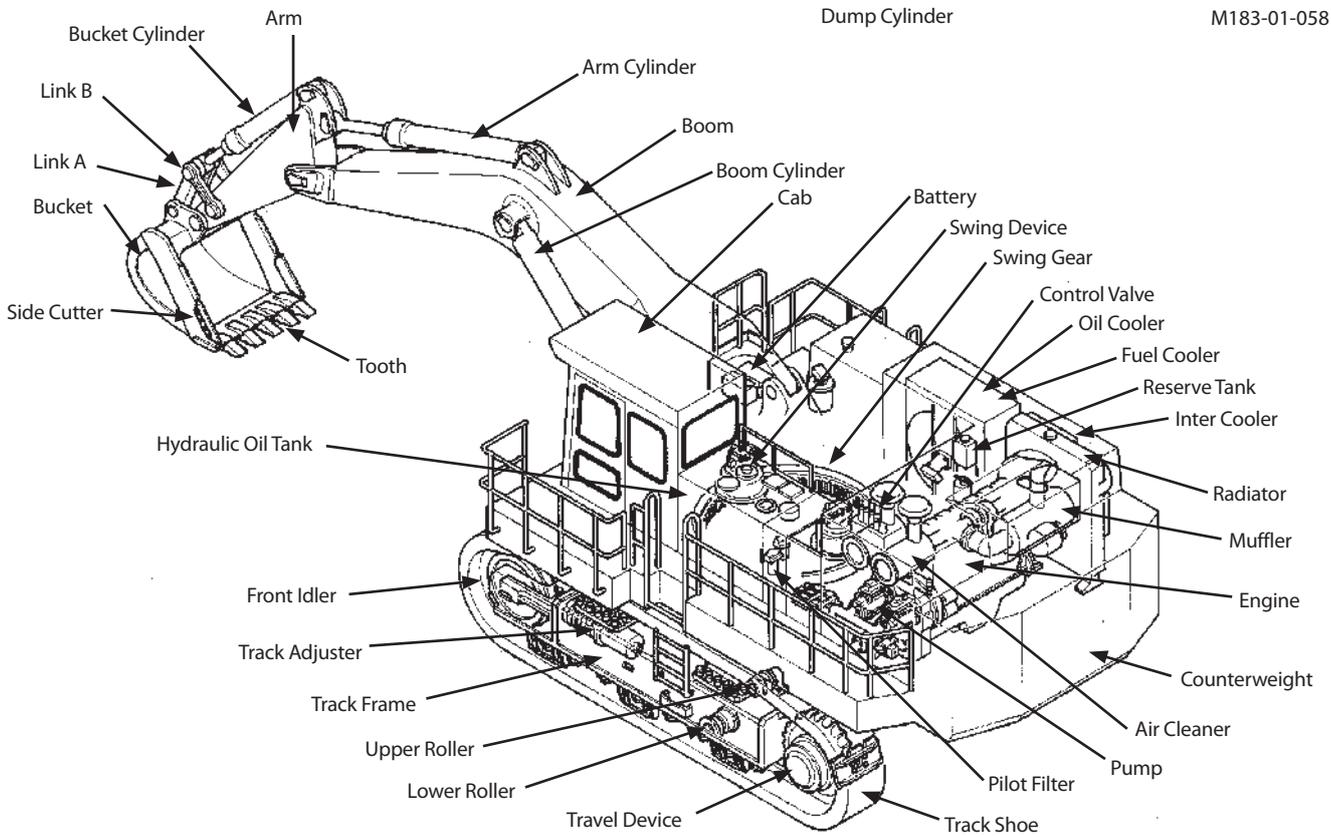
Construction Outline

Loading Shovel



M183-01-058

Backhoe



M18J-03-001

MAINTENANCE

Daily Check		
	Check Item	Reference Page
Engine	1. Level of engine oil and coolant	7-36, 83
	2. Starting easiness, exhaust gas color, and noise	
	3. Oil and water leak, damage of hoses and pipe lines	7-36, 77, 83
	4. Clogging and damage of radiator, oil cooler, after cooler and fuel cooler	7-79, 95
	5. Looseness and missing of mounting bolts and nuts	7-126 to 139
	6. Draining fuel filter	7-75
	7. Cleaning around engine and muffler	
	8. Deterioration or damage of engine blow-by hose, muffler and exhaust pipes	
Upperstructure	1. Fuel level, leak, contamination and draining in fuel tank	7-70 to 75
	2. Oil level, leak and contamination in hydraulic oil tank	7-50 to 51
	3. Movement, play and operational ability of all control levers	
	4. Operation of all hydraulic components, oil leak and damage of pipe lines and hoses	7-64 to 66
	5. Deformation, break and abnormal noise of Upperstructure	
	6. Looseness and missing of mounting bolts and nuts	7-124 to 139
	7. Windshield Washer Fluid Level	7-119
Undercarriage	1. Sag, wear and break of crawler tracks	7-120
	2. Oil leak and wear on upper/lower rollers and front idlers	
	3. Oil leak from travel devices	7-45
	4. Looseness and missing of mounting bolts and nuts	7-126 to 139
Working Device	1. Oil leak and damage of hydraulic cylinders, pipe lines and hoses	7-64 to 66
	2. Wear and damage of bucket	
	3. Looseness, wear and missing of bucket teeth	7-113
	4. Lubrication state of front attachment	7-26 to 29
	5. Damage of retainer pins, stoppers, rings and bolts	7-137 to 139
	6. Looseness and missing of mounting bolts and nuts	7-126 to 139
	7. Grease leak and damage of auto-lubrication piping and hoses	7-122 to 125
Others	1. Operation of instruments, switches, lights and buzzer/horn	1-7 to 73
	2. Function of parking brake	
	3. Deformation and damage of cab head guard	
	4. Abnormal outside appearance of machine	
	5. Wear and damage of seat belt	7-119

- Conduct daily check before the machine is operated.

MAINTENANCE

Hydraulic System

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

- The excavator is equipped with the "O. H. S" (Optimum Hydraulic System) developed by Hitachi.

The "O. H. S" features:

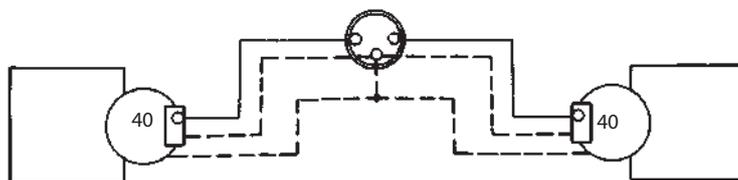
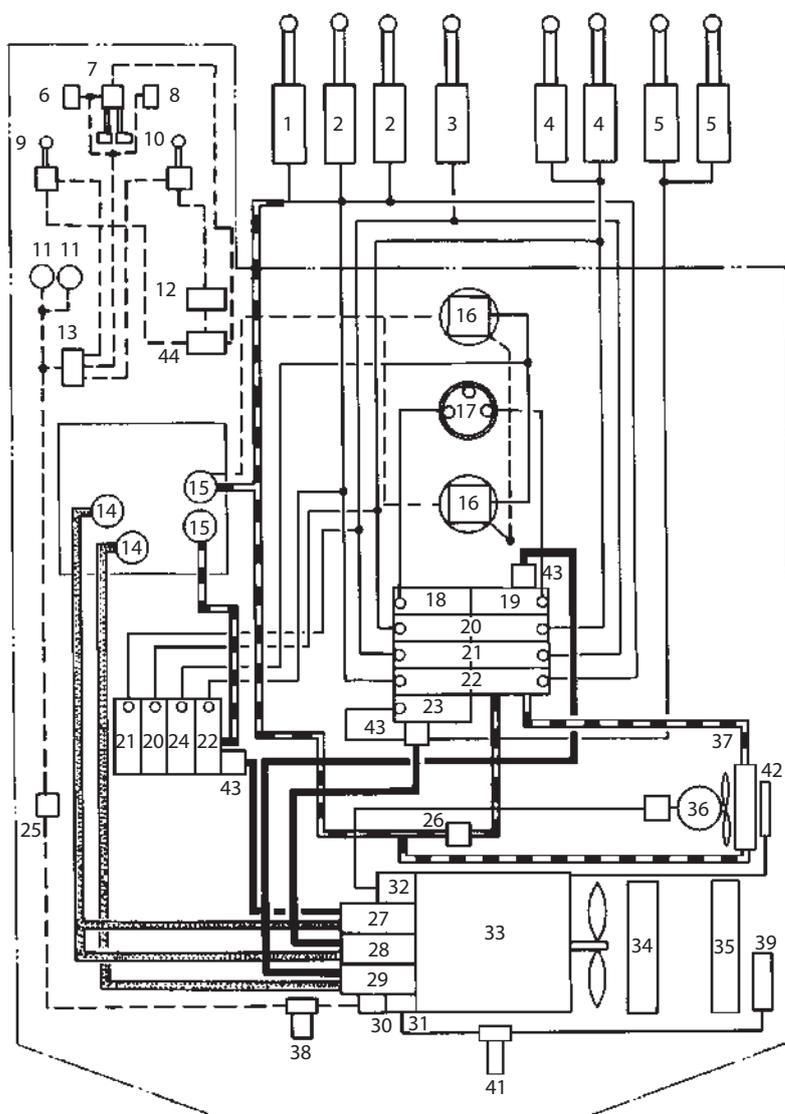
- Quick response of the actuators.
- Improved precise swinging.
- Improved combined operation of each function.

- The control valve and each circuit are provided with relief valves of sufficient capacity to protect the actuators and other equipment from damage caused by the surge pressure and filter plugging.
- Travel parking brake is automatically released when any control levers are operated. When the control lever is placed in NEUTRAL, the brake is automatically applied.
- Swing parking brake is automatically released when any control levers are operated. When the control lever is placed in NEUTRAL, the brake is automatically applied.
- The excavator is equipped with an accumulator in the hydraulic system in order to operate front attachment for a few seconds after the engine has stopped. The accumulator is charged with high pressure gas; do not attempt to remove or disassemble it, and do not expose the accumulator to flame.
- The excavator is equipped with an independent oil cooler and circulation pump for the pump transmission, which functions to cool pump transmission oil.

MAINTENANCE

Loading Shovel

- 1- Level Cylinder
- 2- Boom Cylinder
- 3- Arm Cylinder
- 4- Bucket Cylinder
- 5- Dump Cylinder
- 6- Bucket Close Pedal
- 7- Travel Pilot Valve
- 8- Bucket Open Pedal
- 9- Pilot Valve (L)
- 10- Pilot Valve (R)
- 11- Accumulator
- 12- Shock Less Valve
- 13- Lock Valve
- 14- Suction Filter
- 15- Full-Flow Filter
- 16- Swing Motor
- 17- Center Joint
- 18- Control Valve (left travel)
- 19- Control Valve (right travel)
- 20- Control Valve (bucket)
- 21- Control Valve (arm)
- 22- Control Valve (boom)
- 23- Control Valve (bucket open / close)
- 24- Control Valve (swing)
- 25- Check Valve
- 26- Bypass Check Valve
- 27- Main Pump (no. 3)
- 28- Main Pump (no. 1)
- 29- Main Pump (no. 2)
- 30- Pilot Pump
- 31- Oil Pump (pump transmission)
- 32- Fan Drive Pump
- 33- Engine
- 34- Radiator
- 35- Inter Cooler
- 36- Fan Drive Motor
- 37- Oil Cooler
- 38- Pilot Filter
- 39- Transmission Cooler
- 40- Travel Motor
- 41- Transmission Oil Filter
- 42- Fuel Cooler
- 43- High-Pressure Filter
- 44- Signal Control Valve



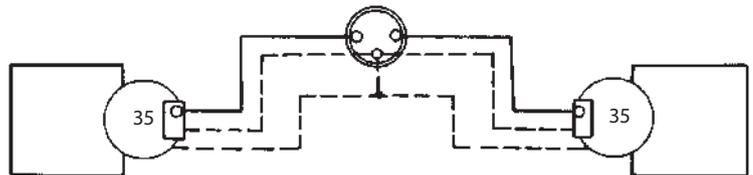
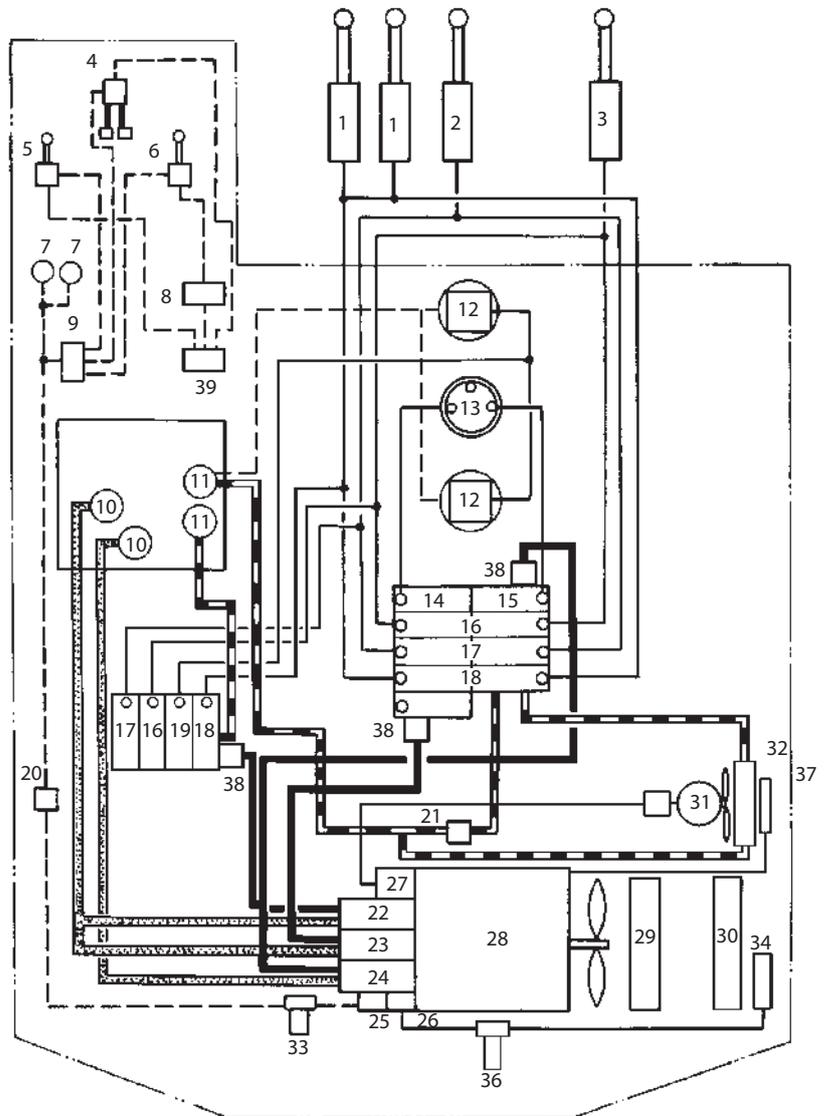
- Supply line from pumps
- Return line
- Suction line
- Actuator line
- Drain and pilot line

M18J-07-001

MAINTENANCE

Backhoe

- 1- Boom Cylinder
- 2- Arm Cylinder
- 3- Bucket Cylinder
- 4- Travel Pilot Valve
- 5- Pilot Valve (L)
- 6- Pilot Valve (R)
- 7- Accumulator
- 8- Shock Less Valve
- 9- Lock Valve
- 10- Suction Filter
- 11- Full-Flow Filter
- 12- Swing Motor
- 13- Center Joint
- 14- Control Valve (left travel)
- 15- Control Valve (right travel)
- 16- Control Valve (bucket)
- 17- Control Valve (arm)
- 18- Control Valve (boom)
- 19- Control Valve (swing)
- 20- Check Valve
- 21- Bypass Check Valve
- 22- Main Pump (no.3)
- 23- Main Pump (no.1)
- 24- Main Pump (no.2)
- 25- Pilot Pump
- 26- Oil Pump (pump transmission)
- 27- Fan Drive Pump
- 28- Engine
- 29- Radiator
- 30- Inter Cooler
- 31- Fan Drive Motor
- 32- Oil Cooler
- 33- Pilot Filter
- 34- Transmission Cooler
- 35- Travel Motor
- 36- Transmission Oil Filter
- 37- Fuel Cooler
- 38- High-Pressure Filter
- 39- Signal Control Valve



- Supply line from pumps
- Return line
- Suction line
- Actuator line
- Drain and pilot line

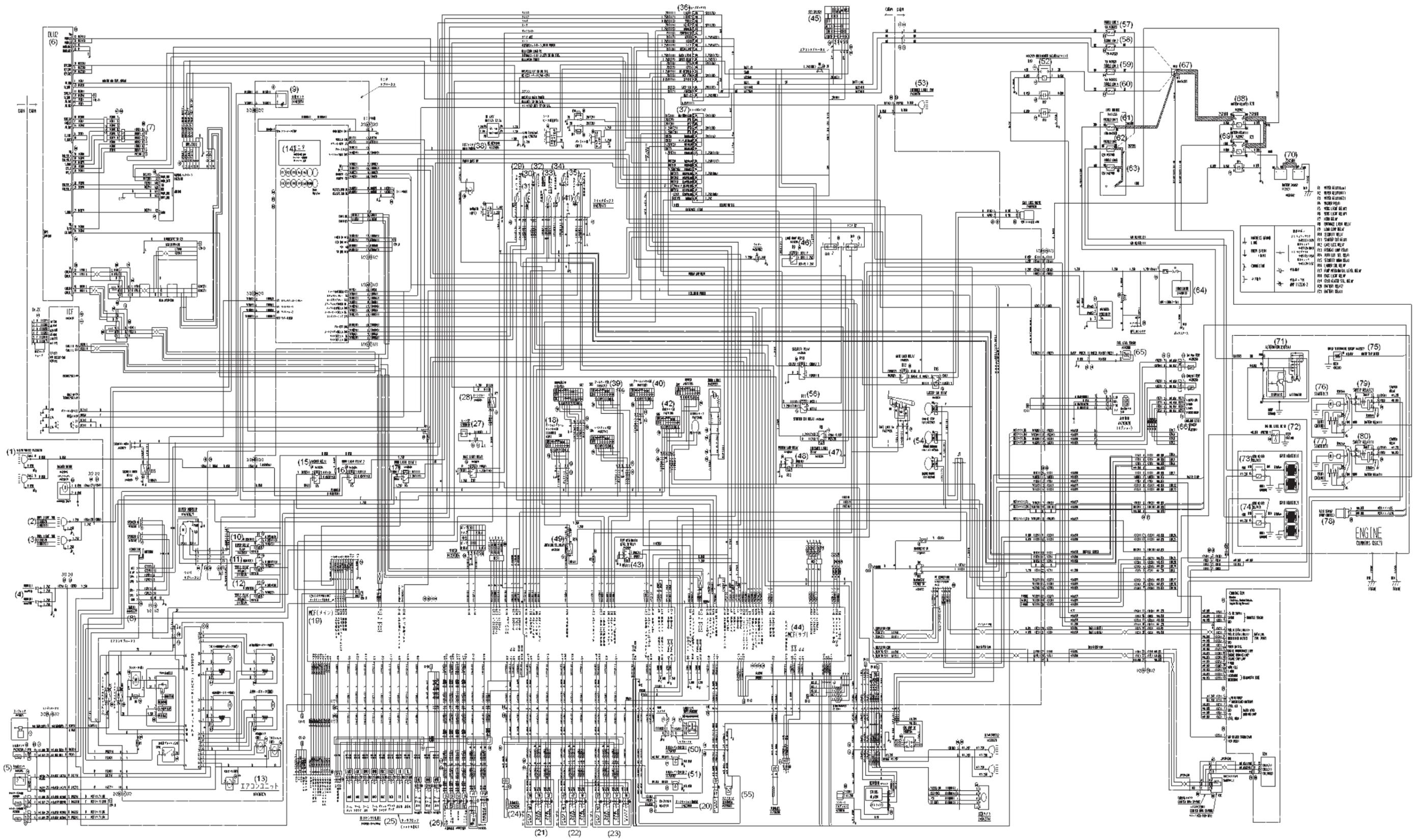
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MAINTENANCE

Electrical Circuit

1. WORK LIGHT (ON CAB ROOF)
2. WORK LIGHT (AT THE RIGHT SIDE OF FRAME)
3. WORK LIGHT (UNDER CAB FLOOR)
4. HORN
5. FRESH AIR SENSOR (AIR CONDITIONER)
6. DLU
7. DATA LINK CONNECTOR
8. RADIO
9. SUN EXPOSURE SENSOR
10. WIPER RELAY (LOW)
11. WIPER RELAY (HIGH 1)
12. WIPER RELAY (HIGH 2)
13. AIR CONDITIONER UNIT
14. MONITOR
15. WASHER RELAY
16. WORK LIGHT RELAY 2
17. WORK LIGHT RELAY 1
18. TRAVEL ALARM DEACTIVATION SWITCH (OPTIONAL)
19. MCF (MAIN)
20. OIL COOLER FAN CONTROL SOLENOID VALVE
21. DELIVERY PRESSURE SENSOR 3
22. DELIVERY PRESSURE SENSOR 2
23. DELIVERY PRESSURE SENSOR 1
24. HYDRAULIC OIL TEMPERATURE SENSOR
25. PILOT PRESSURE SENSOR
26. SOLENOID VALVE UNIT
27. HORN SWITCH
28. HORN RELAY
29. AUTO-IDLE SWITCH
30. WASHER SWITCH
31. WORK LIGHT SWITCH
32. WIPER SWITCH
33. ENGINE CONTROL DIAL
34. TRAVEL MODE SWITCH
35. POWER MODE SWITCH
36. FUSE BOX 1
37. FUSE BOX 2
38. DC/DC CONVERTER
39. BOOM MODE SWITCH
40. BUZZER DEACTIVATION SWITCH
41. HEAVY LIFT SWITCH
42. ENTRANCE LIGHT SWITCH
43. PUMP TRANSMISSION OIL LEVEL SWITCH
44. MCF (SUB)
45. KEY SWITCH
46. LOAD DUMP RELAY
47. ENTRANCE LIGHT RELAY
48. PREHEAT INDICATOR RELAY
49. AUTO-LUBRICATION RELAY
50. HYDRAULIC OIL LEVEL SWITCH 1
51. HYDRAULIC OIL LEVEL SWITCH 2
52. GRID HEATER SIGNAL RELAY
53. ENTRANCE LIGHT
54. CUMMINS INDICATOR PANEL
55. AIR CLEANER RESTRICTION SWITCH
56. STARTER CUT RELAY
57. FUSIBLE LINK 1 (45A)
58. FUSIBLE LINK 2 (75A)
59. FUSIBLE LINK 3 (75A)
60. FUSIBLE LINK 4 (45A)
61. FUSIBLE LINK 5 (100A)
62. FUSIBLE LINK 7 (125A)
63. FUSIBLE LINK 8 (125A)
64. AUTO-LUBRICATION DEVICE
65. FUEL SENSOR
66. COOLANT LEVEL SENSOR
67. 1 POLE JUNCTION
68. BATTERY RELAY 2
69. BATTERY RELAY 1
70. BATTERY
71. ALTERNATOR
72. ENGINE OIL LEVEL OK SWITCH
73. GRID HEATER RELAY 1
74. GRID HEATER RELAY 2
75. WATER TEMPERATURE SENSOR
76. STARTER 2
77. STARTER 1
78. PULSE SENSOR
79. STARTER RELAY 2
80. STARTER RELAY 1

EX1200-6 Electrical Circuit Diagram



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.

These parts may cause serious safety/fire hazards due to deterioration, wear, or fatigue being attributed to material aging or repeated operation. 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. Consult your authorized dealer for correct replacement.

Periodic Replacement Parts			Replacement Intervals
Engine		Fuel hose (Fuel tank to filter)	Every 2 years or Every 8000 hours of operation, whichever comes first
		Fuel hose (Fuel tank to injection pump)	
		Heater hose (Heater to engine)	
Hydraulic System	Base Machine	Pump suction hose	
		Pump delivery hose	
		Swing hose	
		Travel high pressure hose	
	Front-End Attachment	Boom cylinder line hose	
		Arm cylinder line hose	
		Bucket cylinder line hose	
		Pilot hose	
Other		Seat belt	Every 3 years

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

MAINTENANCE

Periodic Replacement of Rubber Hoses --- every 2 years or every 8000 hours



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

In order to avoid serious personal injury, be sure to replace the hoses listed in the following table every 2 years, or 8000 hours of operation, whichever comes first. Use genuine Hitachi parts.

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

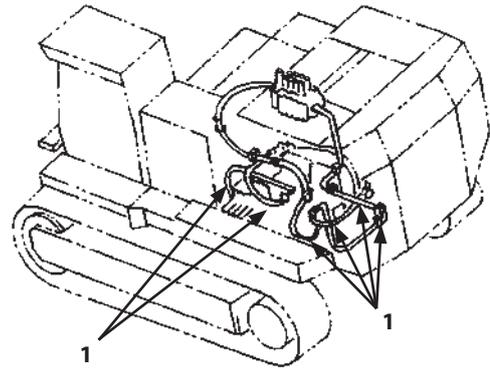
Regardless of regular replacement intervals, if hoses are found to be defective by periodic inspection (refer to pages 7-64 to 7-66), be sure to repair or replace them before operating the machine. Be sure to replace seals, such as O-rings and hose clamps along with replacing hoses.

Consult your authorized dealer for correct hose replacement.

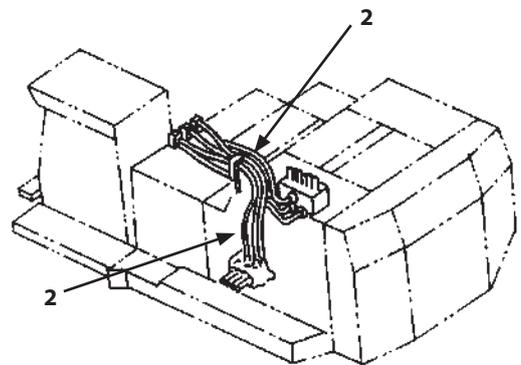
MAINTENANCE

1. Hydraulic Hoses

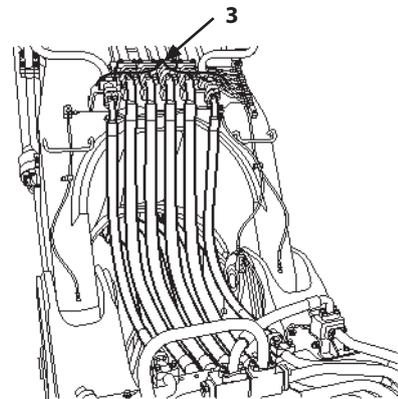
Kinds of Hoses	Q'ty in Use
Hydraulic Hoses:	6
Pump Delivery Hoses (1)	
(Pump to Control Valve 1)	
(Pump to Control Valve Pipes 2)	
(Pump to Brackets 3)	
Swing Motor Hoses (2)	6
(Control Valve to Blocks 2)	
(Blocks to Swing Motor 4)	
Loading Shovel Front Hoses (3)	12
(Main Frame to Boom)	
Backhoe Front Hoses (4)	10
(Main Frame to Boom)	



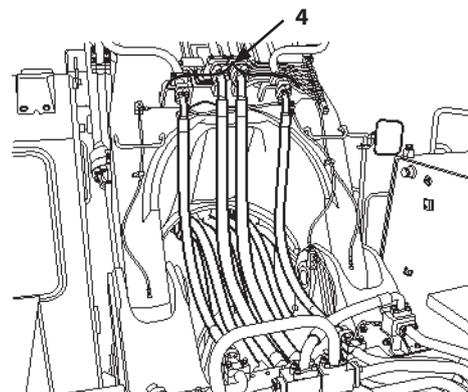
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M113-07-150



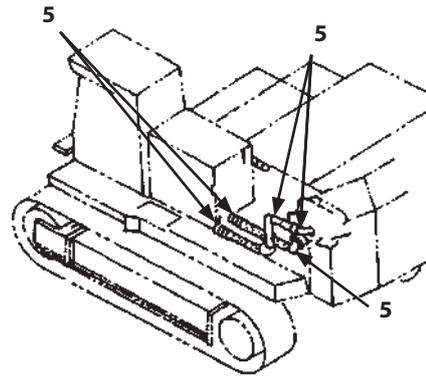
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MAINTENANCE

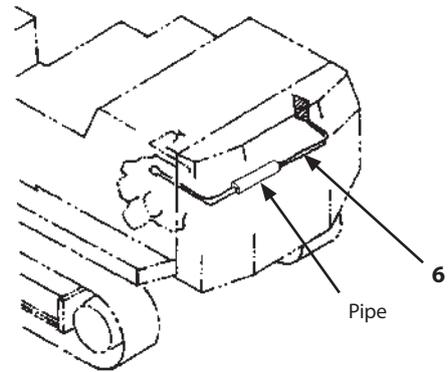
Kinds of Hoses	Q'ty in Use
Suction Hoses (5)	8



M113-07-153

2. Pump Transmission Gear Oil Hoses

Kinds of Hoses	Q'ty in Use
Pump Transmission Lubrication Hoses (6) (in the Engine Compartment) (Pump Transmission to Oil Cooler)	7



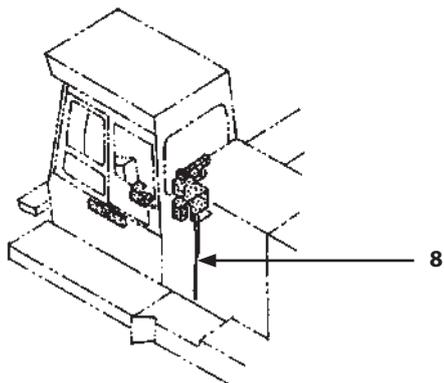
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3. Fuel Hoses

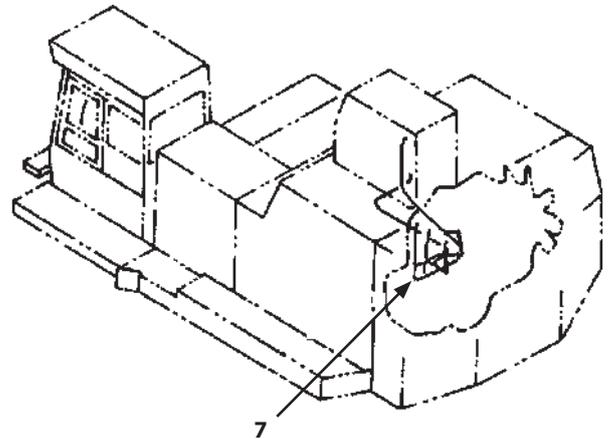
Kinds of Hoses	Q'ty in Use
Fuel Hoses (7) Fuel Tank to Fuel Cooler Engine to Fuel Tank	5

4. Heater Hoses

Kinds of Hoses	Q'ty in Use
Heater Hoses (in the Engine Compartment) (8) (Engine to Heater)	2



M113-07-157



M113-07-156

MAINTENANCE

Maintenance Interval Guide

A. Greasing (See Page 7-25)

Parts			Quantity	Interval (hours)						
				5	10	100	250	500	1000	1500
1. Front Joint Pins	LD	Bucket *	6	★						
		Others *	18							
	BH	Bucket	13	★						
		Others *	11							
2. Swing Bearing			4							
3. Swing Internal Gear			1							
4. Fan Pulley and Tension Pulley			2							

 **NOTE:** ★ Apply grease every 5 hours when operating in water or mud.
* Auto-lubrication is available. Greasing intervals shown in the above table are applied to manual lubrication.

B. Engine (See Page 7-35)

Parts		Classification of Oil (API Service Class)	Quantity	Interval (hours)				
				10	50	250 to 500	1000	2000
1. Engine Oil	Check Oil Level	-	1					
2. Engine Oil	Change	Premium CI-4 or Standard CH-4	70 L (18.5 US gal)		*			
3. Replace Engine Oil Filter		-	2		★	★		

 **NOTE:** * First time only (Before factory departure, the machine is filled with Hitachi PREMIUM ORANGE 15W-40.)
★ The engine oil filter should be replaced concurrently with the engine oil.

C. Transmission (See Page 7-39)

Parts		Quantity	Interval (hours)					
			10	50	250	500	1000	1500
1. Pump Transmission	Check Oil Level	1	*					
	Change Oil	15 L (4.0 US gal)		*				
	Replace Oil Filter	1						
	Clean Air Breather	1						
2. Swing Reduction Gear	Check Oil Level	2	*					
	Change Oil	25 L (6.6 US gal)×2						
3. Travel Reduction Gear	Check Oil Level	2						
	Change Oil	43 L (11.4 US gal)×2						

 **NOTE:** * First time only.

MAINTENANCE

D. Hydraulic System (See Page 7-47)

Parts	Quantity	Interval (hours)								
		10	50	250	500	1000	2000	2500	4000	12000
1. Check Hydraulic Oil Level	1									
2. Drain Hydraulic Oil Tank Sump	1									
3. Change Hydraulic Oil	1350 L (357 US gal)						★	★	★	
4. Suction Filter Cleaning	2	When changing hydraulic oil								
5. Replace Drain Filter	1		*							
6. Replace Full-Flow Filter Element	2									
7. Replace Pilot Oil Filter	1									
8. Replace High-Pressure Filter Element	3									
9. Replace Tank Air Breather Element	1									
10.	Check Hoses and Lines (for leak, loose)	–								
	Check Hoses and Lines (for crack, bend, etc.)	–								

 **NOTE:** ★ Hydraulic oil changing intervals differ according to kind of hydraulic oil used. See recommended oil chart.
* First time only.

E. Fuel System (See Page 7-70)

Tank capacity 1470 liters (388 US gal)

Parts	Quantity	Interval (hours)						
		10	50	250	500	1000	1500	2000
1. Drain Fuel Tank Sump	1							
2. Drain Fuel Pre-Filter Sediment (Optional)	1							
3. Replace Fuel Pre-Filter Element (Optional)	1							
4. Drain Fuel Filter Sediment	2							
5. Replace Fuel Filter	2			★				
6.	Check Fuel Hoses (for leak, loose)	–						
	Check Fuel Hoses (for crack, bend, etc.)	–						
7. Clean Fuel Cooler Core	1							

 **NOTE:** ★ Replace it every 250 hours or 6 months whichever comes first.

F. Air Cleaner (See Page 7-80)

Parts	Quantity	Interval (hours)							
		10	50	100	250	500	1000	2000	
1. Air Cleaner Outer Element	Cleaning					(Or when indicator lit)			
	Replacement	2	After cleaning 6 times or 1 year						
2. Air Cleaner Inner Element	Replacement	2	When outer element is replaced						

MAINTENANCE

G. Cooling System (See Page 7-82)

Parts	Quantity	Interval (hours)						
		10	50	250	500	1000	1500	2000
1. Check Coolant Level	1							
2. Check DCA4 Concentration in Coolant	1							
3. Replace Coolant Filter	1							
4. Change Coolant	139 L (37 US gal)	Twice a year, in spring and autumn *						
5. Check Fan Belt for Wear	1							
6. Clean Radiator, Inter Cooler, Oil Cooler Core	1							
7. Clean Inter Cooler Front Screen	1				★			
8. Clean Oil Cooler Front Screen	1				★			

 **NOTE:** * Before leaving the Hitachi factory, the cooling system is filled with a mixture of water and genuine Hitachi Long-Life Coolant. As long as genuine Hitachi Long-Life Coolant is used, the service intervals between changing the coolant is once every 2 years, or every 4000 hours, whichever comes first.

★ Shorten maintenance interval when the machine is operated in dusty areas.

IMPORTANT:

- Use fresh water or normal tap water as a coolant. Do not use strong acid or alkaline water.
- If mineral-rich water is used for coolant, water stain or scale may build up inside the engine or radiator, causing overheat due to deterioration of coolant performance.

H. Air Conditioner (See Page 7-96)

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

 **NOTE:** * First time only.

★ Shorten maintenance interval when the machine is operated in dusty areas.

I. Electrical System (See Page 7-102)

Parts	Quantity	Interval (hours)							
		10	50	100	250	500	1000	2000	
1. Battery	Check Electrolyte Level	2	Every month						
	Check Electrolyte Specific Gravity	2	Every month						
2. Replacing Fuses	-	As required							
3. Check Power Source Terminal	-	As required							
4. Check Electrical Cables and Wire Harnesses	-								

MAINTENANCE

J. Miscellaneous (See Page 7-112)

Parts		Quantity	Interval (hours)							
			10	50	100	250	500	1000	2000	4000
1. Check Bucket Teeth	L/D	6								
	B/H	5								
2. Change Bucket		1	As required							
3. Seat Belt	Check	1								
	Replacement	1	At least once every 3 years							
4. Check Windshield Washer Fluid Level		1	As required							
5. Check and Adjust Track Sag		2								
6. Check Auto-Lubrication System		1								
7. Check Tightening Torque of Bolts and Nuts		–		*						
8. Check O-rings in Bucket Joints		–								
9. Check Handrails		–								★

 NOTE: * First time only.

★ Replace it every 4000 hours or 2 years whichever comes first.

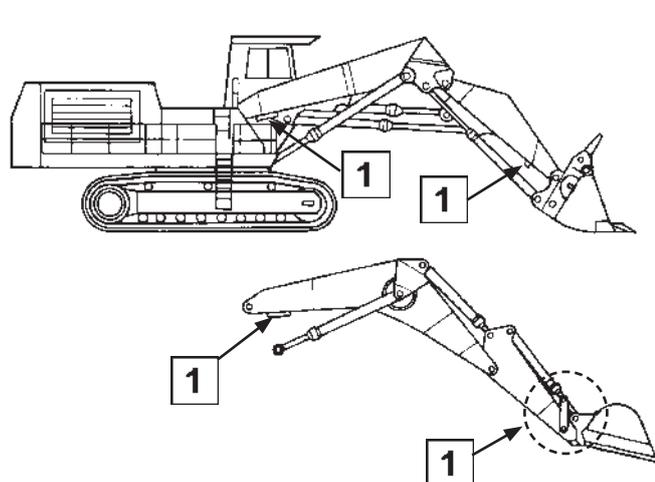
MAINTENANCE

A. Greasing

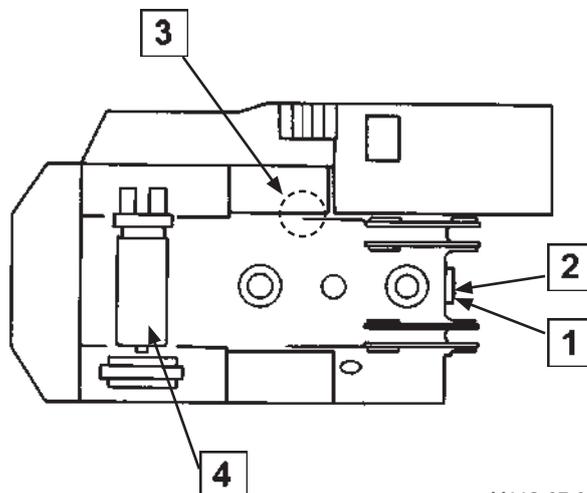
Parts			Quantity	Interval (hours)							
				5	10	100	250	500	1000	1500	
1. Front Joint Pins	LD	Bucket *	6	★							
		Others *	18								
	BH	Bucket	13	★							
		Others *	11								
2. Swing Bearing			4								
3. Swing Internal Gear			1								
4. Fan Pulley and Tension Pulley			2								

 **NOTE:** ★ Apply grease every 5 hours when operating in water or mud.

* Auto-lubrication is available. Greasing intervals shown in the above table are applied to manual lubrication.



M113-07-009



M113-07-010

Brand Names of Recommended Grease

Kind of Grease		Lithium Grease
Application		Front Attachment Joint Pins, Swing Bearing, Swing Internal Gear
Air Temp.		-20 to 50 °C (-4 to 122 °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 the machine, hence we recommend to use Hitachi Genuine Greases.
- If you do not use Hitachi Genuine Greases, use grease conforming to EP-2. Otherwise, the machine may suffer damage.
- 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.
- For details, contact your nearest authorized dealer.

MAINTENANCE

1 Front Joint Pins --- every 10 hours

Loading Shovel Front

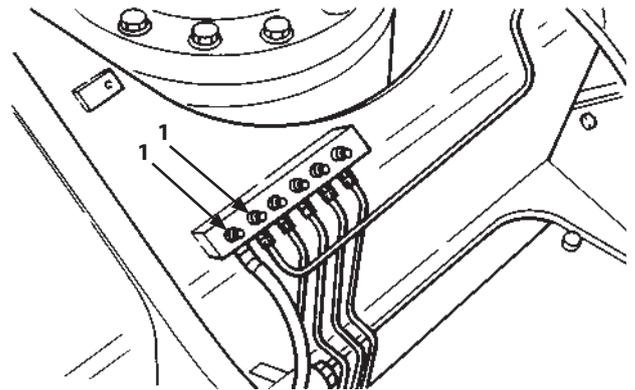
Add grease to all fittings show below every 10 hours. Most of the fittings are grouped, as shown, for quick and safe lubrication.

 **NOTE:** Auto-lubrication can be used for the fittings on the loading shovel front.

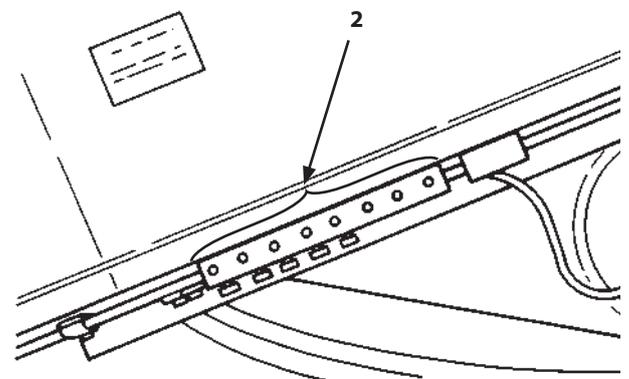
Manually greasing places are as illustrated below.

- Boom Cylinder Rod Pins (1)
- Grouped Grease Fittings (2) --- Boom

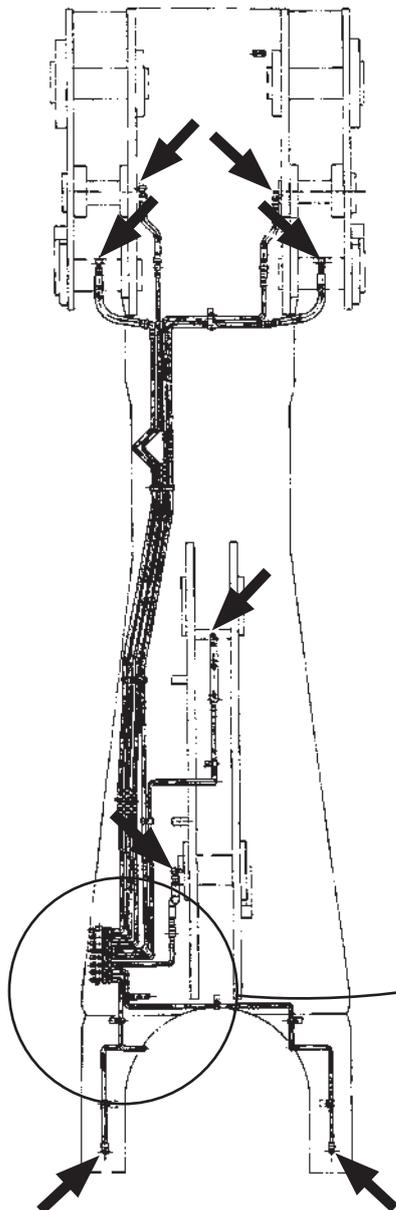
 : Lubrication



M142-07-046



M142-07-047

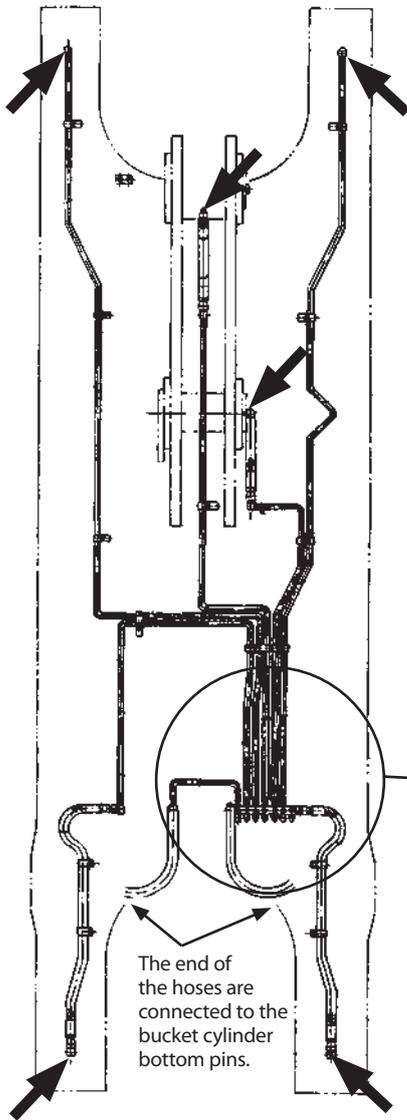


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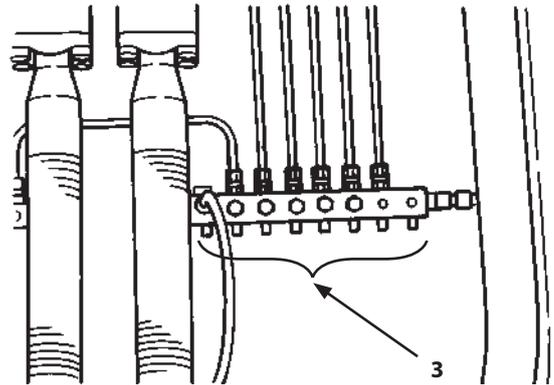
MAINTENANCE

• Grouped Grease Fittings (3) --- Arm

↖ : Lubrication



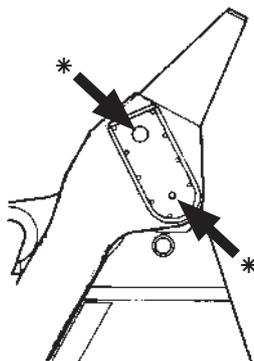
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M142-07-048

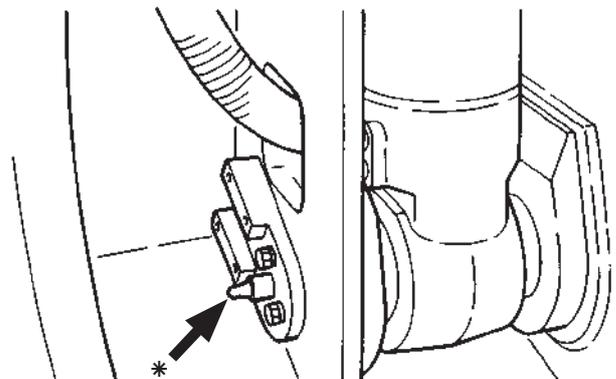
• Bucket Pins

*: One point each to right and left



Dump Cylinder Rod Pin
Bucket Joint Pin

M113-07-012



Dump Cylinder Bottom Pin

M142-07-042

MAINTENANCE

Backhoe Front

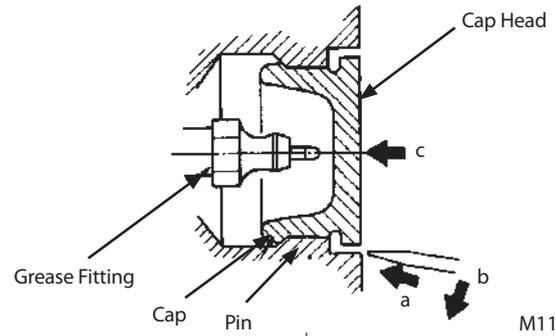
- Bucket and Link Pins

Each grease fitting is provided with a protective cap. Remove cap as shown below before greasing.

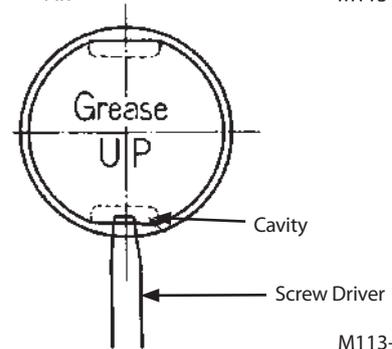
Removing/installing procedure:

Insert a screw driver into the cap cavity along the arrow "a" direction, and scoop out the cap by applying force in the arrow "b" direction.

When installing, push the cap by hand in the arrow "c" direction until it bottoms or tap using screw driver grip.



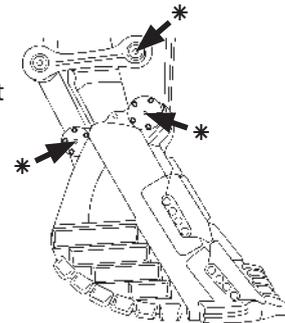
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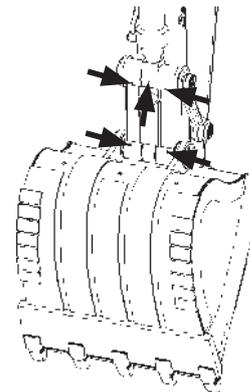
M113-07-014

↖ : Lubrication

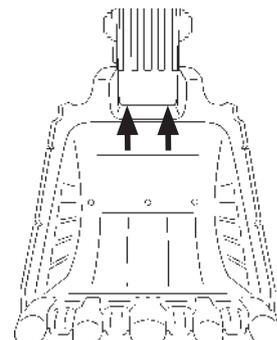
* : One point each to right and left



M18J-07-060



M18J-07-061



M18J-07-062

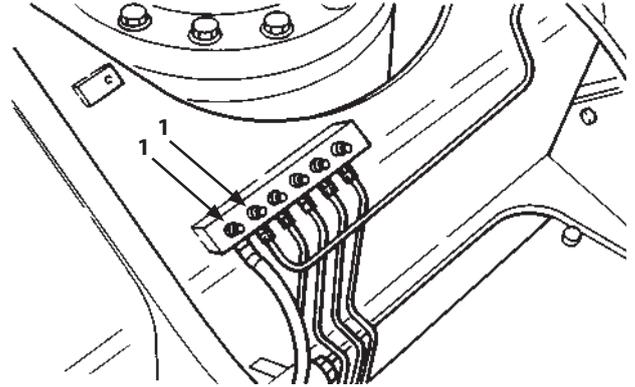
MAINTENANCE

Add grease to all fittings show below every 10 hours. Most of the fittings are grouped, as shown, for quick and safe lubrication.

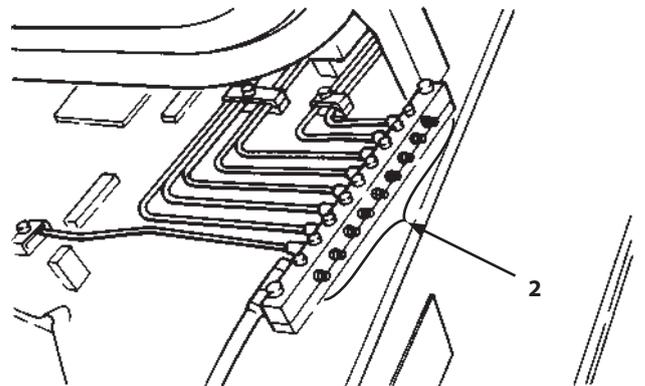
 **NOTE:** Auto-lubrication can be used for the fittings on the loading shovel front.

Manually greasing places are as illustrated below.

- Boom Cylinder Rod Pins (1)
- Grouped Grease Fittings (2) --- Boom/Arm



M142-07-046



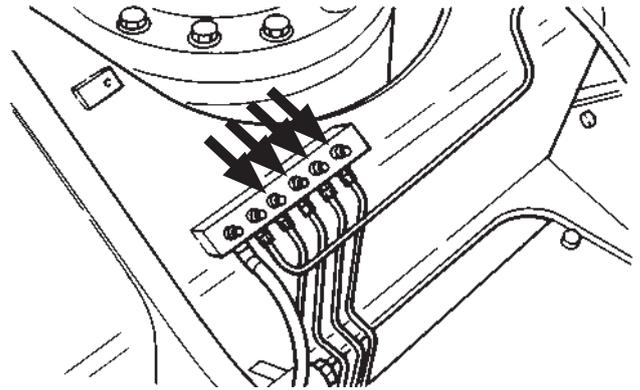
M142-07-049

MAINTENANCE

2 Swing Bearing --- every 250 hours

! WARNING: When lubricating swing bearing, lower the bucket to the ground and pull the pilot control shut-off lever to the LOCK position.

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. Pull the pilot control shut-off lever to the LOCK position.
6. With the upperstructure stationary, apply grease via the 4 grease fittings.
7. Apply grease to the swing bearing until grease can be seen escaping from the swing bearing seals.
8. Take care not to supply excessive grease.



M142-07-046

MAINTENANCE

Lubricator

Lubricator Operation

1. Turn power switch (8) ON to activate pump (1). Grease is sucked up and supplied to high-pressure grease gun (3).

IMPORTANT: When pump (1) begins to suck grease, any air inside pump (1) will be mixed in, making grease turn whitish. Open check valve cock (2) to bleed this air-mixed grease. Securely close check valve cock (2) when all air-mixed grease is bled out.

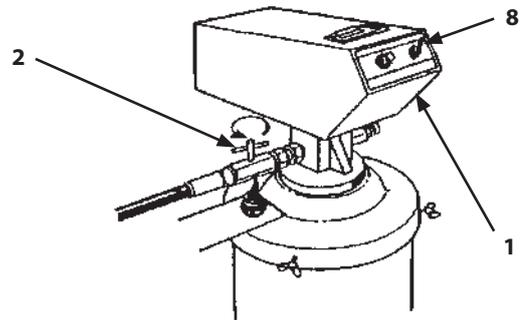
2. Grab high-pressure grease gun (3) and pay out the hose from hose reel (4) to the length required.
3. Press hydro-chuck (5) protruding from high-pressure grease gun (3) into a grease nipple (7) and pull the lever to discharge grease.
4. Release the lever when greasing is complete; grease discharge will stop.

IMPORTANT: When detaching hydro-chuck (5) from grease nipple (7), grease nipple (7) tip may break unless a special care, is taken, as follows:

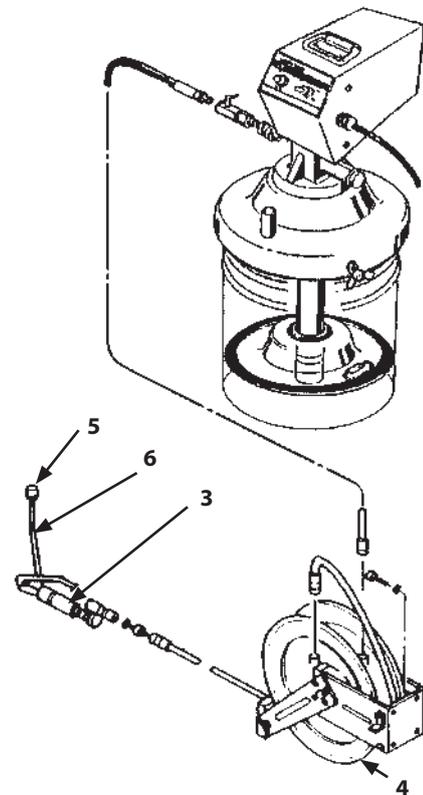
- Tip nozzle (6) a little so as to release the connecting pressure applied to hydro-chuck (5).
- Slowly detach hydro-chuck (5) from nipple (7).

5. When all greasing work is complete, turn power switch (8) OFF, then pull grease gun (3) lever to release remaining pressure from grease gun (3), pump (1), and the hose so as to ensure long life of the components. A little grease will be discharged at this time.

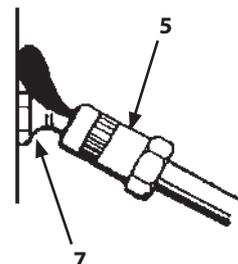
IMPORTANT: The hose has a limited service life. Periodically inspect the hose for cracks, grease leakage, or any other damage. If any damage is found, replace the hose.



M111-07-011



M111-07-012



M111-07-013

MAINTENANCE

Grease Container Replacement

when grease container (4) becomes empty, follow the procedure below to replace it:

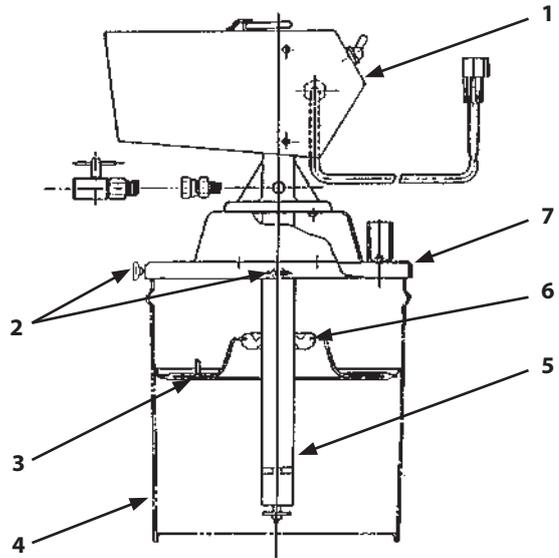
IMPORTANT: When replacing grease container (4), be sure that no sand or debris sticks to suction tube (5) or to follower plate (3). If foreign matter, such as sand, gets into grease, damage to pump (1) and to parts being lubricated will result. If follower plate (3) is not correctly positioned inside container (4), pump (1) may not suck grease, even with grease remaining in container (4). Reposition plate (3) correctly if this happens.

1. Loosen wing nuts (2) located on pail cover (7). Remove the pump assembly (pump (1), pail cover (7), and suction tube (5)) and follower plate (3) from empty grease container (4).

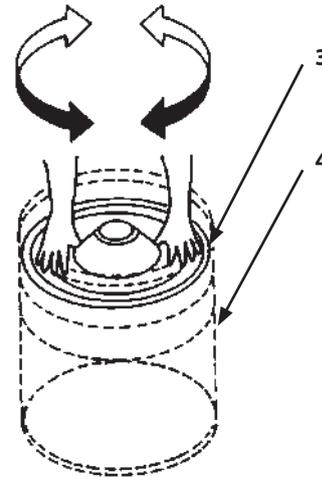
2. Remove cover (7) from new grease container (4).
3. Apply grease to the back of follower plate (3) to fill concaved sections; this will prevent air from mixing into the grease contents.
4. Place follower plate (3) flat on the grease contents in container (4). Using both hands, press follower plate (3) down while moving both hands back and forth along the periphery of container (4) inside, as illustrated, until grease comes out of seal packing (6) hole.

IMPORTANT: Be careful not to damage seal packing (6) by the end of suction tube (5) when inserting it.

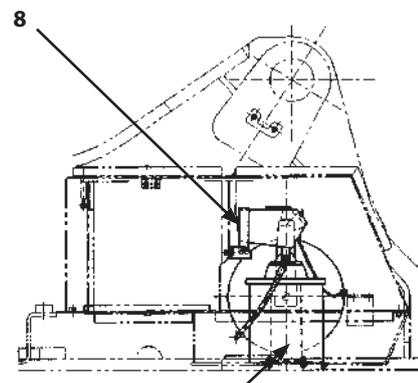
5. Slowly insert suction tube (5) (the pump assembly) into the grease contents via seal packing (6) hole.
6. Be sure that pail cover (7) correctly settles on container (4). Equally tighten each wing nut (2) to pail cover (7) to securely attach the pump assembly onto container (4).
7. After replacing grease container (4), secure the lubricator unit with bracket (8).



M111-07-014



M111-07-087



Grease Container

M166-07-103

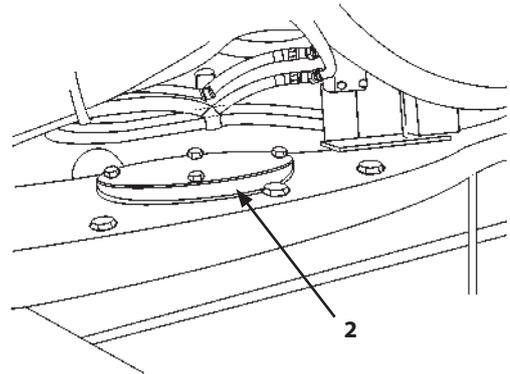
MAINTENANCE

3 Swing Internal Gear --- every 1000 hours

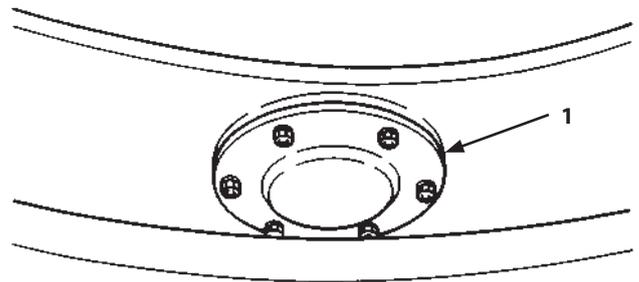
WARNING: When lubricating swing internal gear, lower the bucket to the ground and pull the pilot control shut-off lever to the LOCK position.

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. Pull the pilot control shut-off lever to the LOCK position.
6. Remove cover (2) on the upperstructure. In order to add new grease evenly to the swing internal gear, swing the upperstructure twelve 30° intervals (one full turn) and add grease at each interval using a putty knife. Install cover (2).
7. In case the grease deteriorates and/or water becomes mixed in the grease, change grease by following the procedures below.
8. Remove cover (1) on the underside of the swing gear housing and thoroughly remove old grease from the swing internal gear. Install cover (1).
9. Remove cover (2) on the upperstructure. In order to add new grease evenly to the swing internal gear, swing the upperstructure twelve 30° intervals (one full turn) and add grease at each interval using a putty knife. Install cover (2).

IMPORTANT: Excessive swing internal gear grease will contaminate the swing internal gear oil. Do not apply excessive grease. Apply the same quantity grease as removed.



M183-07-003



M142-07-050

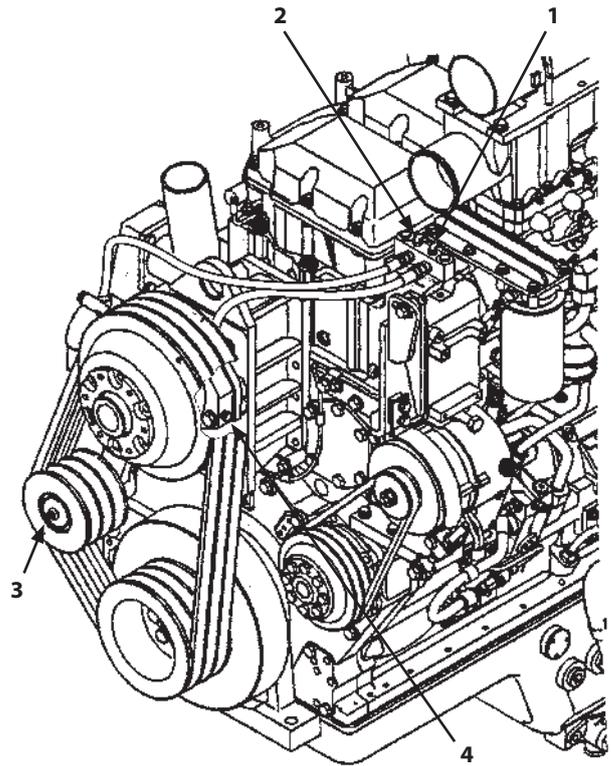
MAINTENANCE

4 Fan Pulley and Tension Pulley --- every 1500 hours

⚠ WARNING: Before beginning to lubricate the fan pulley and tension pulley, stop the engine.

1. Park machine on level ground.
2. Lower the bucket to the ground, turn the auto-idle switch off, stop the engine and pull the pilot control shut-off lever to the LOCK position.
3. Add grease to grease fitting (1) for the tension pulley until the grease flow out from overflow valve (3).
4. Add grease to grease fitting (2) for the fan pulley until the grease flow out from overflow valve (4).

IMPORTANT: Wipe off old grease from the fan pulley and tension pulley to prevent the fan belt from slipping while supplying grease.



M18J-07-037

MAINTENANCE

B. Engine

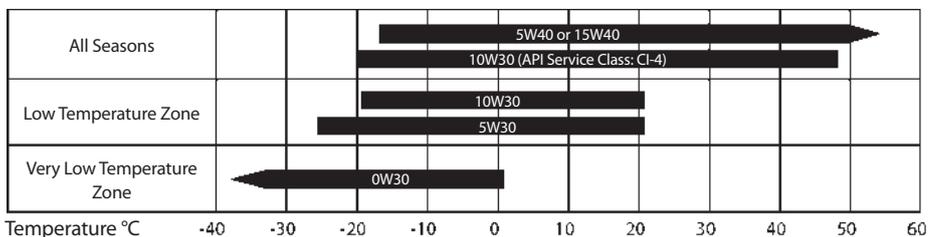
Parts		Classification of Oil (API Service Class)	Quantity	Interval (hours)				
				10	50	250 to 500	1000	2000
1. Engine Oil	Check Oil Level	-	1					
2. Engine Oil	Change	Premium CI-4 or Standard CH-4	70 L (18.5 US gal)		*			
3. Replace Engine Oil Filter		-	2		★	★		

 **NOTE:** * First time only (Before factory departure, the machine is filled with Hitachi PREMIUM ORANGE 15W-40.)

★ The engine oil filter should be replaced concurrently with the engine oil.

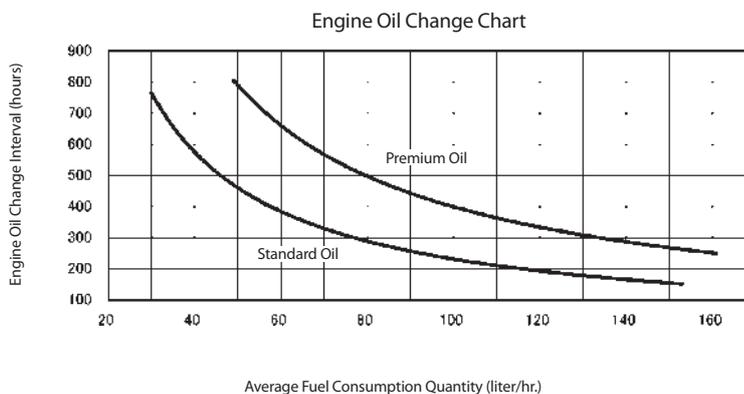
IMPORTANT: • The recommended engine oil and engine oil filter for replacement should be used. Doing otherwise could result in excess wear or damage.

• An engine oil of viscosity applicable to the outside temperature as stated below should be used.



MKCA-07-009

- The engine oil change interval varies according to the properties of the oil used, operation environment and situation. Refer to the engine oil change chart. If oil soiling and deterioration are conspicuous, change promptly regardless of usage hours.
- If engine oil continues to be used for 250 hours or more and an oil analysis is not conducted, Cummins warranty coverage may no longer apply.



M18J-07-039

For additional information on inspection and maintenance of engine, refer to the separate Cummins engine Operation and Maintenance Manual.

For the latest information, inquire with the closest Cummins engine service dealer.

MAINTENANCE

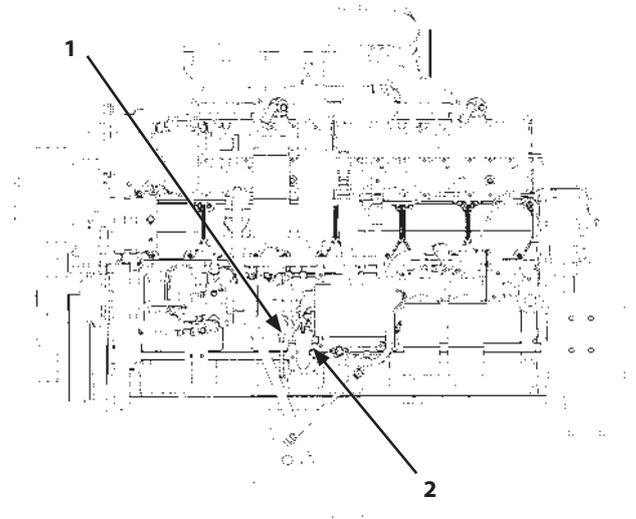
1 Check Engine Oil Level --- daily

IMPORTANT:

- For most accurate readings, check the oil level every day before starting the machine. Be sure the machine is on a level surface.
- Indications on the front and back of the oil level gauge are different. Measure the oil level on the side indicating "ENGINE STOPPED". Also, measure the oil level with "ENGINE STOPPED" side facing the engine.

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

IMPORTANT: Before checking the oil level, be sure to wait 15 minutes or longer after stopping the engine.



M18E-07-004

MAINTENANCE

- 2** Change Engine Oil
--- every 250 to 500 hours
(first time after 50 hours)

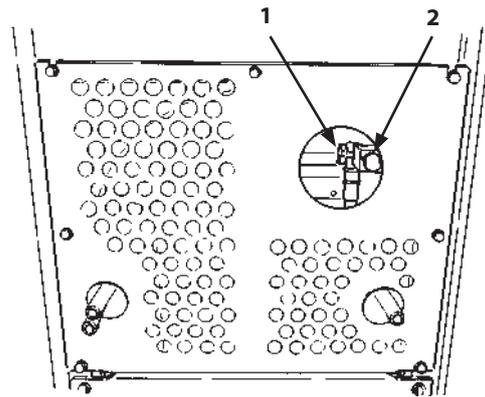
- 3** Replace Engine Oil Filter
--- when changing engine oil
(first time after 50 hours)

! **WARNING:** Engine oil may be hot just after operation.
Take extra care to avoid burns.

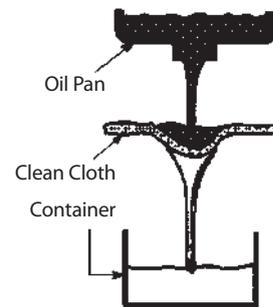
1. Run the engine to warm oil.
DO NOT run the engine until oil is hot.
2. Park the machine on a firm, level surface.
3. Lower the bucket to the ground.
4. Turn the auto-idle switch OFF.

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

5. Run the engine at slow idle speed without load for 5 minutes.
6. Turn the key switch OFF. Remove the key from the key switch.
7. Pull the pilot control shut-off lever to the LOCK position.
8. Remove drain plug (2).
9. Open drain cock (1). Allow oil to drain through a clean cloth into a container of 70 liters (18.5 US gal) or more capacity container.
10. After all oil has drained, inspect cloth for any debris such as small pieces of metal.



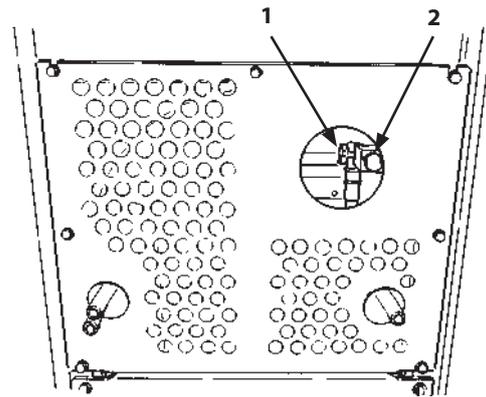
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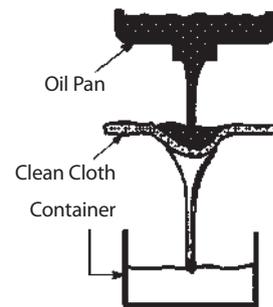
M104-07-010

MAINTENANCE

11. Install and tighten drain plug (2). Close drain cock (1).
12. Remove the filter cartridges of engine oil filters (5), by turning them counterclockwise with filter wrench.
13. Clean the filter gasket contact area on the engine.
14. Fill new filters (5) with lubricating oil to prevent crankshaft or bearing damage. Apply a thin film of clean oil to the gasket of new filters (5).
15. Install new filters (5). Turn filters (5) clockwise by hand until the gasket touches the contact area. Be sure not to damage the gasket when installing filters (5).
16. Tighten engine oil filters (5), 1/2 to 3/4 turn more using filter wrench. Be careful not to overtighten.
17. Remove oil filler cap (3). Fill the engine with recommended oil. Check that oil level is between the H and L marks on dipstick (4) after 15 minutes.
Engine oil capacity: 70 liters (18.5 US gal)
18. Install oil filler cap (3).
19. Start the engine. Run the engine at slow idle for 5 minutes.
20. Check that the engine oil pressure indicator on the monitor panel goes out immediately. If not, stop the engine immediately and find the cause.
21. Stop the engine. Remove the key from the key switch.
22. Check for any leakage at drain plug (2).
23. Check oil level on dipstick (4).



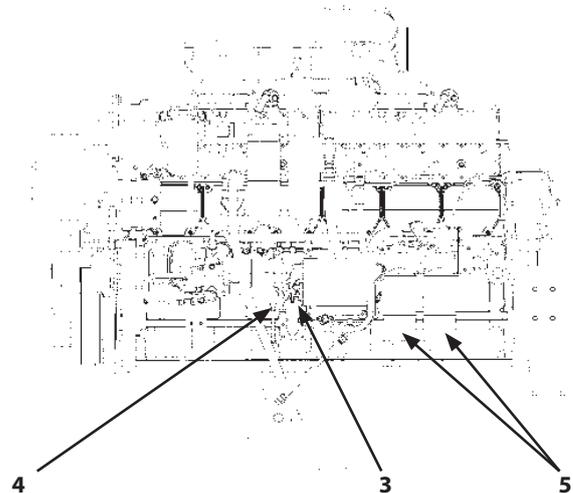
M142-07-110



M104-07-010

IMPORTANT: Do not re-use engine oil filters (5). Fill new filters (5) with engine oil before installing new filters (5).

 **NOTE:** Refer to the Operation and Maintenance Manual for Cummins Engine for further details except the filter replacement intervals, for which this manual has priority.



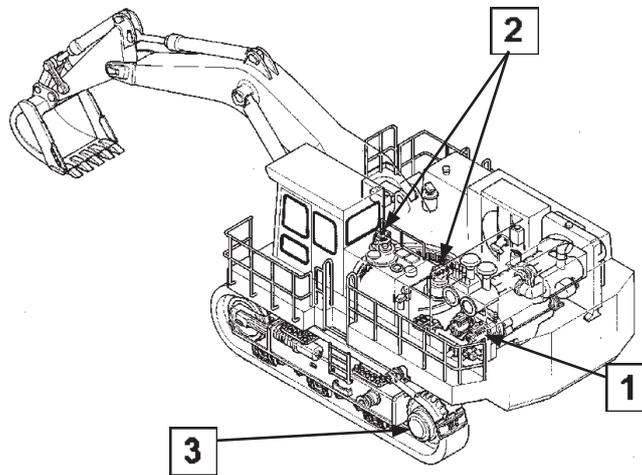
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MAINTENANCE

C. Transmission

Parts		Quantity	Interval (hours)						
			10	50	250	500	1000	1500	2000
1. Pump Transmission	Check Oil Level	1	*						
	Change Oil	15 L (4.0 US gal)		*					
	Replace Oil Filter	1							
	Clean Air Breather	1							
2. Swing Reduction Gear	Check Oil Level	2	*						
	Change Oil	25 L (6.6 US gal)×2							
3. Travel Reduction Gear	Check Oil Level	2							
	Change Oil	43 L (11.4 US gal)×2							

 NOTE: * First time only.



M18J-03-001

Brand Names of Recommended Oil

Application		Swing and Travel Reduction Gear	Pump Transmission
Kind of Oil		Gear Oil	Engine Oil
Air Temp.		-20 to 50 °C (-4 to 122 °F)	-20 to 50 °C (-4 to 122 °F)
Recommended Products		Hitachi Gear Oil GL-4 90	
Alternative Products	Specification	API GL-4	API CD

IMPORTANT:

- Hitachi Genuine Gear Oil and Hitachi Genuine Engine Oil are specially designed and tested to provide optimum performance for the machine, hence we recommend to use Hitachi Genuine Gear Oil and Hitachi Genuine Engine Oil.
- If you do not use Hitachi Genuine Gear Oil or Hitachi Genuine Engine Oil, use gear oil or engine oil conforming to specifications described above. Otherwise, the machine may suffer damage.
- Do not use oils which do not meet the above specification or requirements. Use of unsuitable oil may lead to engine damage which is excluded from Hitachi Warranty Policy.
- For details, contact your nearest authorized dealer.

MAINTENANCE

1 Pump Transmission

Recommended Brands of Engine Oil

IMPORTANT:

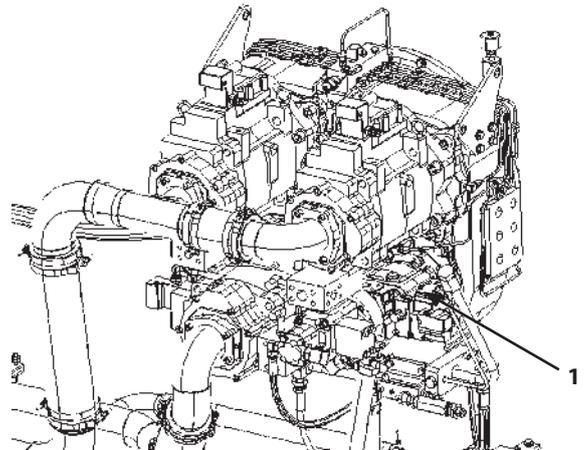
- **Avoid mixing oils of different brands. In most cases, different brands are not compatible with each other and, when mixed, can seize parts, or abnormally wear moving parts. It is best to stick with one and the same brand of oil at successive service intervals.**
- **Engine start at low temperature**

1. Warm up "pump transmission" and "pump transmission oil lubrication pipe" sufficiently by using jet heater, etc.

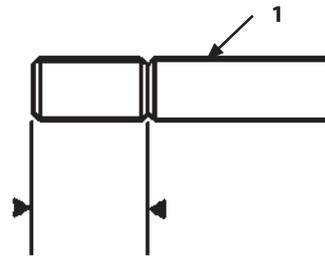
If engine is started when these components are cold, bearing and gear, etc. may be damaged.

After starting engine, perform warm up operation adequately.

2. To prevent lubrication failure at operation in cold region, warm up engine adequately after engine start even when single grade #10 is selected and used.



M18J-07-004



M114-07-181

Check Oil Level --- every 50 hours

(first time after 10 hours)

⚠ WARNING: Oil may be hot just after operation. Wait for oil to cool before starting work.

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

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

4. Run the engine at slow idle speed without load for 5 minutes.
5. Stop the engine. Remove the key from the key switch.
6. Pull the pilot control shut-off lever to the LOCK position.
7. Remove dipstick (1). Oil must be within the specified range.
8. If necessary, remove dipstick (1) and add oil. (See the Recommended Engine Oil chart.)
9. Recheck oil level.

MAINTENANCE

Change Oil --- every 500 hours

(first time after 50 hours)

Replace Oil Filter --- every 500 hours

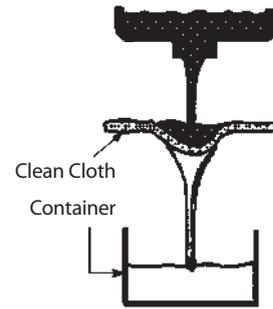
Clean Air Breather --- every 500 hours

⚠ WARNING: Oil may be hot just after operation. Wait for oil to cool before starting work.

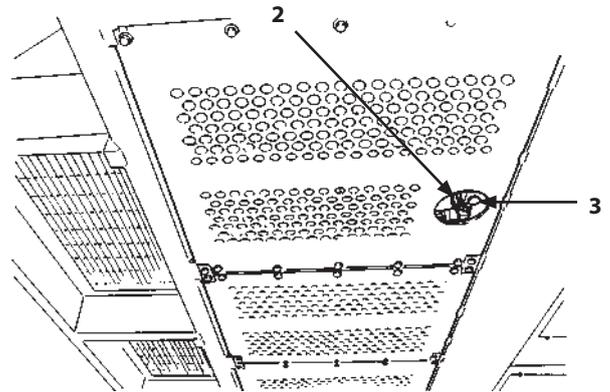
1. Park the machine on a firm, level surface.
2. Lower the bucket to the ground.
3. Turn the auto-idle switch OFF.

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

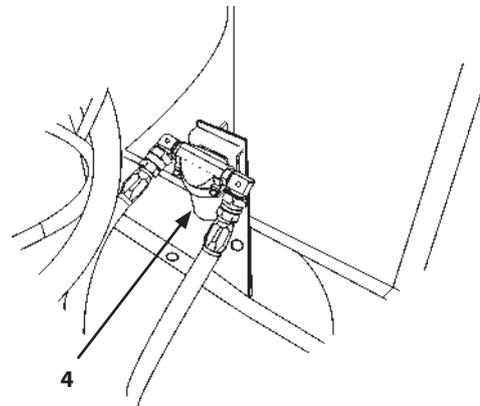
4. Run the engine at slow idle speed without load for 5 minutes.
5. Stop the engine. Remove the key from the key switch.
6. Pull the pilot control shut-off lever to the LOCK position.
7. Prepare a container of 15 liters (4.0 US gal) or more capacity for the drain oil.
8. Remove drain plug (3), and open cock (2) to drain the oil.
9. Check if foreign materials like metal particles are included in the drain oil by filtering them with a clean cloth.



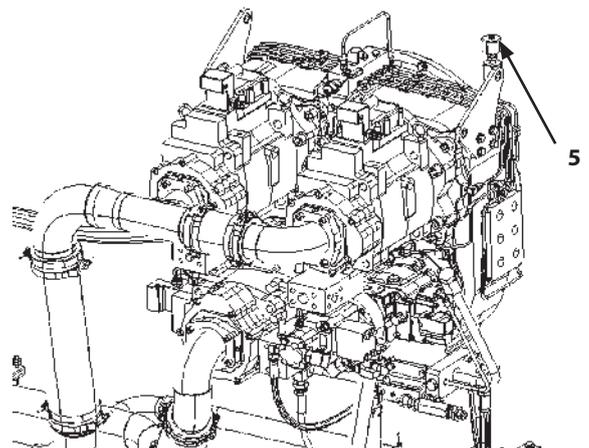
M104-07-010



M142-07-009



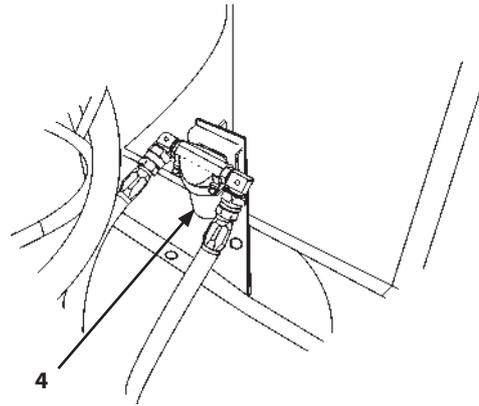
M183-07-005



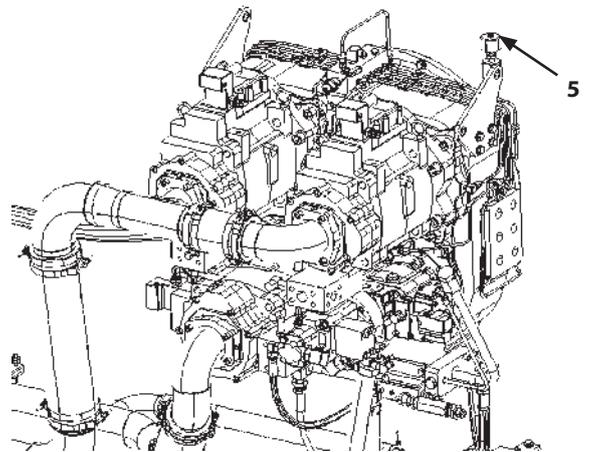
M18J-07-004

MAINTENANCE

10. Unscrew cartridge filter (4) from the filter head, discard cartridge filter (4).
11. Fill filter (4) with oil. Apply a light even coat of lubricating oil to the gasket sealing surface prior to installing cartridge filter (4).
12. Position cartridge filter (4) to the filter head. Tighten by hand until the seal touches the filter head, and tighten an additional 3/4 turn more using filter wrench.
13. Install drain plug (3) and close cock (2) securely. Fill the pump transmission housing with 15 liters (4.0 US gal) oil.
14. Confirm that the oil level is between the top and notch on dipstick.
15. Remove air breather cap (5) and clean the element. After cleaning, apply LOCTITE to the thread of air breather cap (5). Then tighten it.
16. Start the engine and check for any leakage at drain plug (3) and cartridge filter (4).



M183-07-005



M18J-07-004

MAINTENANCE

2 Swing Reduction Gear

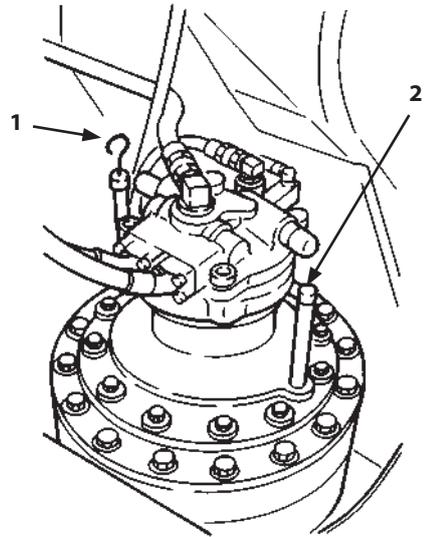
Check Oil Level --- every 50 hours
(first time after 10 hours)

⚠ WARNING: Gear oil may be hot just after operation.
Wait for gear oil to cool before starting work.

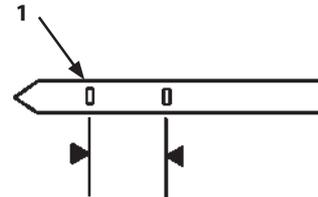
1. Park the machine on a firm, level surface.
2. Lower the bucket to the ground.
3. Turn the auto-idle switch OFF.

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

4. Run the engine at slow idle speed without load for 5 minutes.
5. Stop the engine. Remove the key from the key switch.
6. Pull the pilot control shut-off lever to the LOCK position.
7. Remove dipstick (1). Oil must be between marks.
8. If necessary, add oil via filler tube (2). (See the Recommended Gear Oil chart.)
9. Recheck oil level.
10. Check the gear oil level in the other swing reduction gear.



M142-07-051



M104-07-017

MAINTENANCE

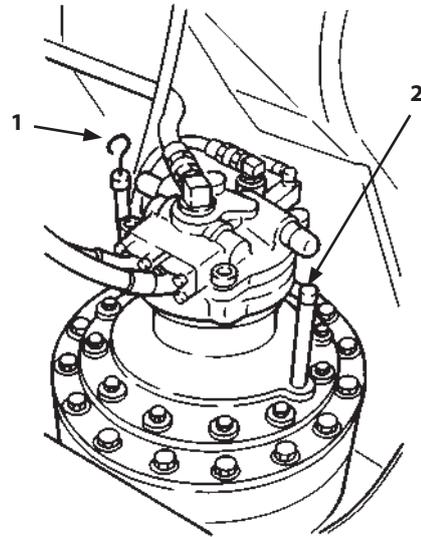
Change Gear Oil --- every 1000 hours

⚠ WARNING: Gear oil may be hot just after operation. Wait for gear oil to cool before starting work.

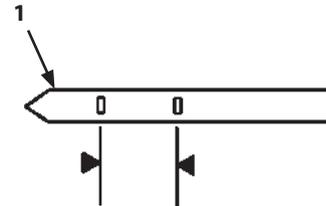
1. Park the machine on a firm, level surface.
2. Lower the bucket to the ground.
3. Turn the auto-idle switch OFF.

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

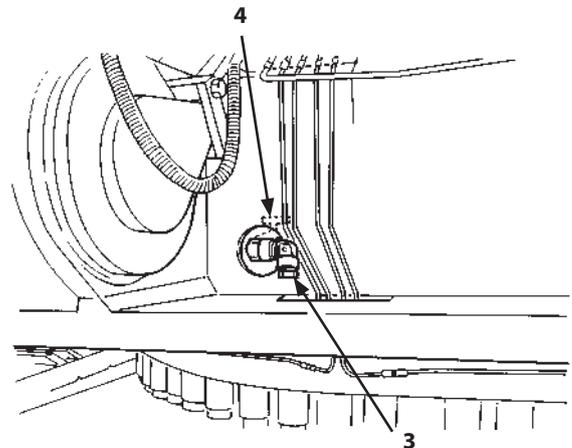
4. Run the engine at slow idle speed without load for 5 minutes.
5. Stop the engine. Remove the key from the key switch.
6. Pull the pilot control shut-off lever to the LOCK position.
7. Prepare 2 containers of 25 liters (6.6 US gal) or more capacity for the drain oil.
8. Remove two swing gear box drain plugs (3), located at boom foot and under the engine rear end and open drain cocks (4) to drain oil.
9. Install drain plugs (3) and close drain cocks (4).
Fill gear boxes with oil via filler tubes (2).
Oil capacity: 25 liters (6.6 US gal)×2
10. Confirm that the oil level is between the notches on dipstick (1). Add oil if necessary.



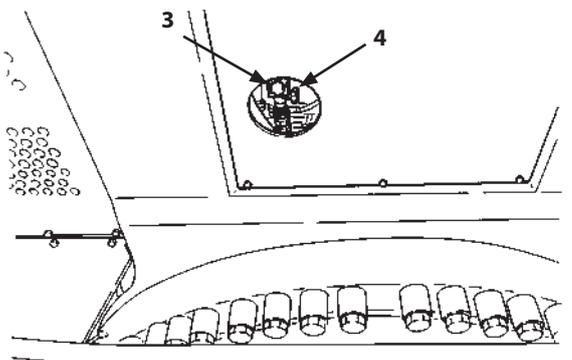
M142-07-051



M104-07-017



M142-07-012



M142-07-013

MAINTENANCE

3 Travel Reduction Gear

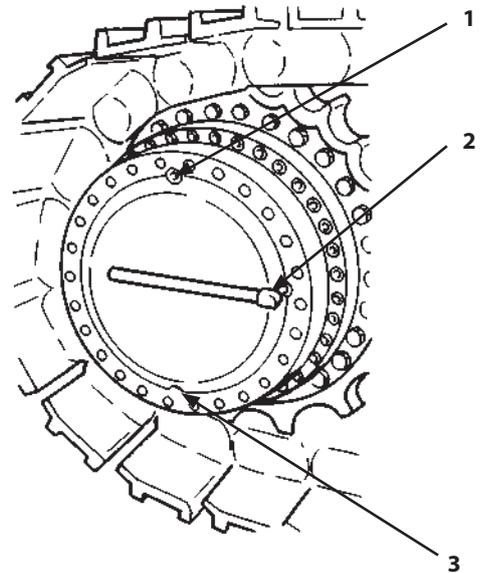
Check Oil Level --- every 250 hours

WARNING: Keep body and face away from air release plug (1). Gear oil may be hot just after operation. Wait for gear oil to cool and then gradually loosen air release plug (1) to release pressure.

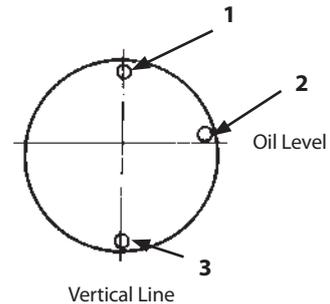
1. Park the machine on a firm, level surface.
2. Rotate the travel motor until the imaginary line through plugs (1) and (3) are vertical.
3. Lower the bucket to the ground.
4. Turn the auto-idle switch OFF.

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

5. Run the engine at slow idle speed without load for 5 minutes.
6. Stop the engine. Remove the key from the key switch.
7. Pull the pilot control shut-off lever to the LOCK position.
8. After gear oil has cooled, slowly loosen air release plug (1) to release pressure.
9. Remove oil level check plug (2). Oil must be up to the bottom of hole.
10. If necessary, after oil supply plug (1) has been removed, add oil until oil flows out of oil level check plug (2) hole. (See the Recommended Gear Oil chart.)
11. Wrap the plug threads with sealing-type tape.
Tighten plugs (1) and (2) to 70 N·m (7.0 kgf·m, 51 lbf·ft)
12. Check the gear oil level in the other travel reduction gear.



M142-07-052



M113-07-040

MAINTENANCE

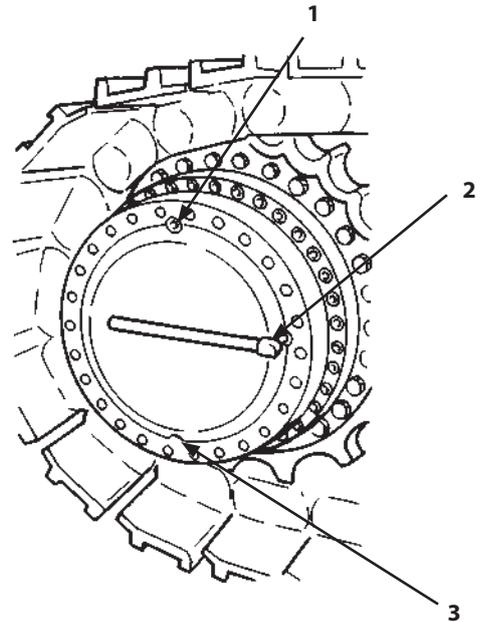
Change Gear Oil --- every 2000 hours

⚠ WARNING: Keep body and face away from air release plug (1). Gear oil may be hot after operation. Wait for gear oil to cool and then gradually loosen air release plug (1) to release pressure.

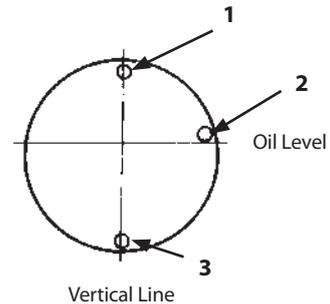
1. Park the machine on a firm, level surface.
2. Rotate the travel motor until the imaginary line through plugs (1) and (3) are vertical.
3. Lower the bucket to the ground.
4. Turn the auto-idle switch OFF.

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

5. Run the engine at slow idle speed without load for 5 minutes.
6. Stop the engine. Remove the key from the key switch.
7. Pull the pilot control shut-off lever to the LOCK position.
8. After gear oil has cooled, slowly loosen air release plug (1) to release pressure, and temporarily retighten plug (1).
9. Prepare 2 containers of 43 liters (11.4 US gal) or more capacity for the drain oil. Remove drain plug (3).
10. Clean drain plug (3). Wrap the threads of drain plug (3) with sealing-type tape. Install plug (3). Tighten plug (3) to 70 N·m (7.0 kgf·m, 51 lbf·ft).
11. Remove oil level check plug (2) and oil supply plug (1).
12. Add oil until oil flows out of oil level check plug (2) hole. (See the Recommended Gear Oil chart.)
Oil capacity: 43 L (11.4 US gal)×2
13. Clean plugs (1) and (2). Wrap the threads of oil level check plug (2) and air release plug (1) with sealing-type tape. Reinstall plugs (1) and (2). Tighten plugs (1) and (2) to 70 N·m (7.0 kgf·m, 51 lbf·ft).
14. Repeat steps 8. to 13. for the other travel reduction gear.



M142-07-052



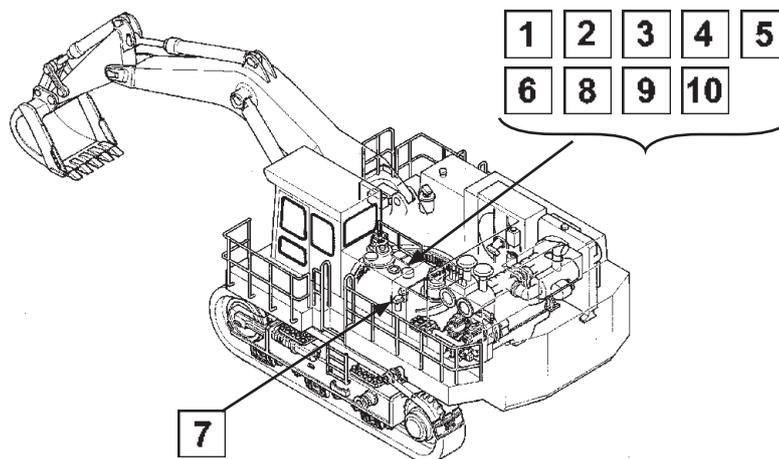
M113-07-040

MAINTENANCE

D. Hydraulic System

Parts	Quantity	Interval (hours)								
		10	50	250	500	1000	2000	2500	4000	12000
1. Check Hydraulic Oil Level	1									
2. Drain Hydraulic Oil Tank Sump	1									
3. Change Hydraulic Oil	1350 L (357 US gal)						★	★	★	
4. Suction Filter Cleaning	2	When changing hydraulic oil								
5. Replace Drain Filter	1		*							
6. Replace Full-Flow Filter Element	2									
7. Replace Pilot Oil Filter	1									
8. Replace High-Pressure Filter Element	3									
9. Replace Tank Air Breather Element	1									
10.	Check Hoses and Lines (for leak, loose)									
	Check Hoses and Lines (for crack, bend, etc.)									

 **NOTE:** ★ Hydraulic oil changing intervals differ according to kind of hydraulic oil used. See recommended oil chart.
* First time only.



M18J-03-001

Brand Names of Recommended Hydraulic Oil

Kind of Lubricant		Hydraulic Oil	
Where to be applied		Hydraulic System	
Environmental Temp.		-20 to 50 °C (-4 to 122 °F)	
Recommended Products		Hitachi Super EX 46HN	Hitachi Genuine Hydraulic Multi
Alternative Product	Specification		Product Conforming to JCMAS HK VG46W
Change Interval		4000 hours	1500 hours
			*

 **NOTE:** A different interval of oil change may be required for Alternative Products.
For details, contact your nearest authorized dealer.

IMPORTANT:

- Hitachi Genuine Hydraulic Oils are specially designed and tested to provide optimum performance for the machine, hence we recommend to use Hitachi Genuine Hydraulic Oils.
- If you do not use Hitachi Genuine Hydraulic Oil, use hydraulic oil conforming to JCMAS HK VG46W. Otherwise, the machine may suffer damage. For the information of JCMAS HK VG46W, refer to JALOS website.
- 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

Inspection and Maintenance of Hydraulic Equipment



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

1. Be sure that the machine is parked on a level, firm surface before servicing hydraulic equipment.
2. Lower the bucket to the ground and stop the engine.
3. Begin servicing hydraulic components only after components, hydraulic oil and lubricants are completely cooled, and after releasing residual pressure.
 - 3.1 Bleed air from the hydraulic oil tank to release internal pressure.
 - 3.2 Allow the machine to cool down.
Note that servicing heated and pressurized hydraulic components may cause hot parts and/or oil to fly off or escape suddenly, possibly resulting in personal injury.
 - 3.3 Keep body parts and face away from plugs or screws when removing them.
Hydraulic components may be pressurized even when cooled.
 - 3.4 Never attempt to service or inspect the travel and swing motor circuits on slopes. They are highly pressurized due to self-weight.
4. When connecting hydraulic hoses and pipes, take special care to keep seal surfaces free from dirt and to avoid damaging them. Keep these precautions in mind:
 - 4.1 Wash hoses, pipes, and the tank interior with a washing liquid and thoroughly wipe it out before reconnecting them.
 - 4.2 Only use O-rings that are free of damage or defects. Be careful not to damage them during reassembly.
 - 4.3 Do not allow high pressure hoses to twist when connecting them. The life of twisted hoses will be shortened considerably.

MAINTENANCE

IMPORTANT: Check oil leak from low pressure seal joints daily and tighten bolts or nuts every 250 hours.

- 4.4 When connecting screw type joints, apply sealing tape to the threads of male screw. Be sure to leave a couple of threads at the male screw top unwrapped, as shown. Do not overwrap. Apply sealing tape around threads as shown, so that the tape does not loosen when the female screw is tightened.
- 4.5 Carefully tighten bolts for flexible master coupling to following torque specifications. Do not overtighten.

Wrench Size (mm)		13	17
Tightening Torque	N·m	11 to 13	21 to 23
	(kgf·m)	(1.1 to 1.3)	(2.1 to 2.3)
	(lbf·ft)	(8.1 to 9.6)	(15 to 17)

- 4.6 Carefully tighten low pressure hose clamps to following torque specifications. Do not overtighten.

T Bolt Clamp: 10 N·m (1.0 kgf·m, 7.4 lbf·ft)

Jubilee Clamp: 6 to 7 N·m

(0.6 to 0.7 kgf·m, 4.3 to 5.1 lbf·ft)

- 4.7 Carefully tighten nut for bundy pipe to following torque specifications on the right side. Do not overtighten.

5. When adding hydraulic oil, always use the same brand of oil; do not mix brands of oil. As the machine is filled with Super EX 46HN when it is shipped from the factory, use it as a general rule. When selecting to use another brand of oil listed in the table "Brand names of recommended hydraulic oil", be sure to completely change the oil in the system.

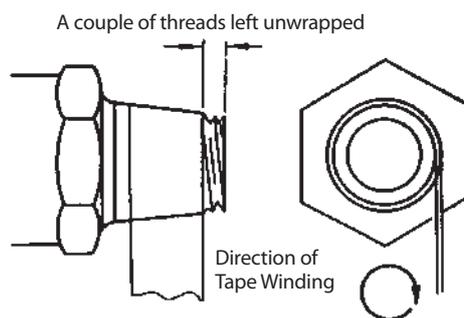
6. Do not use hydraulic oils other than those listed in the table "Brand names of recommended hydraulic oil".

7. Only 50 to 60 % of the total hydraulic circuit oil on a large size excavator can be changed at a time. Accordingly, conduct minimum flushing twice.

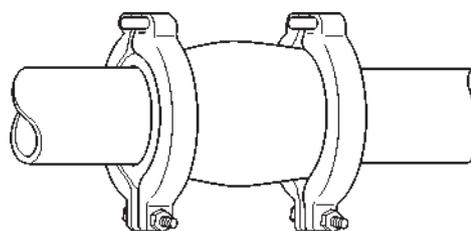
8. In case the machine is used for dredging operations, change the hydraulic oil at a 2000 hour interval regardless of the oil brand used.

9. If any other hydraulic oil (having a different change interval) is unavoidably used, change the oil in accordance with the individual change interval standard.

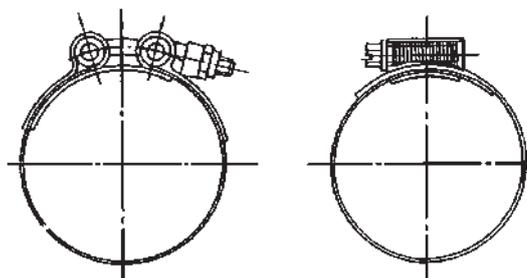
10. Never run the engine without oil in the hydraulic oil tank.



M114-07-041



M1G6-07-008



T Bolt Clamp

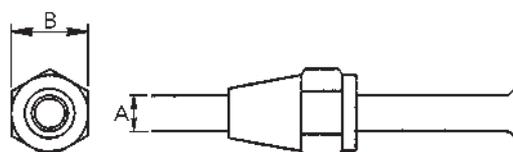
Jubilee Clamp

M114-07-042

M114-07-043

Bundy Pipe

Pipe Dia. (A)		Φ8	Φ10
Wrench Size (B) (mm)		17	19
Tightening Torque	N·m	35	50
	(kgf·m)	(3.5)	(5.0)
	(lbf·ft)	(26)	(36)



M117-07-149

MAINTENANCE

1 Check Hydraulic Oil Level --- daily

WARNING: The hydraulic oil tank is pressurized. Keep body and face away from cap (2). Turn cap (2) slowly and remove cap (2) only after releasing the internal pressure completely.

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

1. Park the machine on a firm, level surface.
2. Position the machine as illustrated on the right.
3. Lower the bucket to the ground as illustrated.
4. Turn the auto-idle switch OFF.

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

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

To add oil:

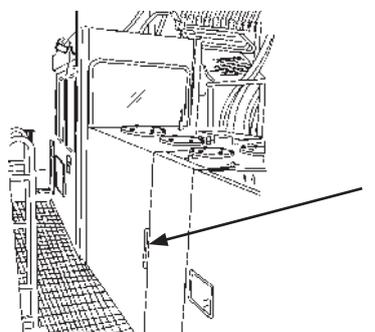
9. Insert the wrench as shown and turn the wrench clockwise and hold the wrench.
10. Turn cap (2) counterclockwise about 30°, at which point stop cap (2) to release the air.
11. Turn cap (2) further and remove cap (2).
12. Align the projected part of cap (2) with the projected part of the case and install cap (2).
13. Remove cover (3).
14. Add oil. Recheck oil level gauge (1).
15. Install cover (3).



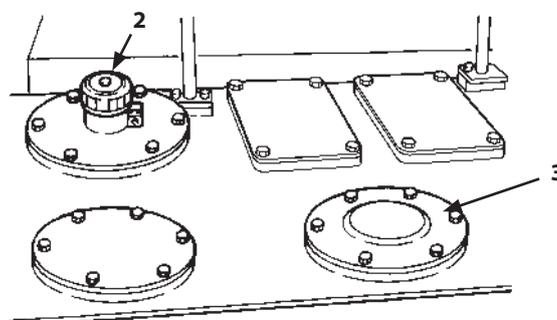
M142-07-093



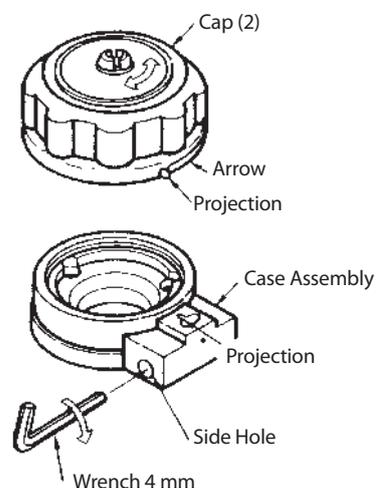
M117-07-127



M183-07-006



M183-07-052



M110-07-022

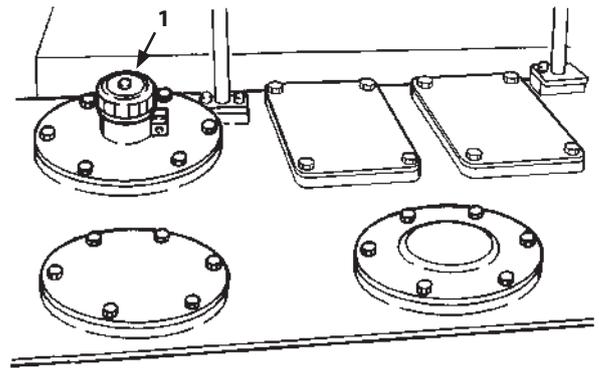
MAINTENANCE

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



WARNING:

- The hydraulic oil tank is pressurized. Keep body and face away from cap (1). Turn cap (1) slowly and remove cap (1) only after releasing the internal pressure completely.
- Do not loosen drain plugs (3) until oil is cool. Hydraulic oil may be hot just after operation, potentially causing serious injury.



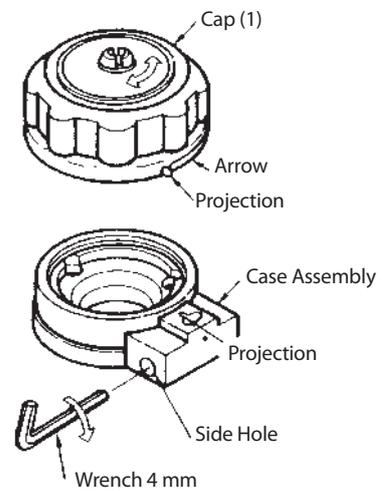
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IMPORTANT: Never run the engine without oil in hydraulic oil tank.

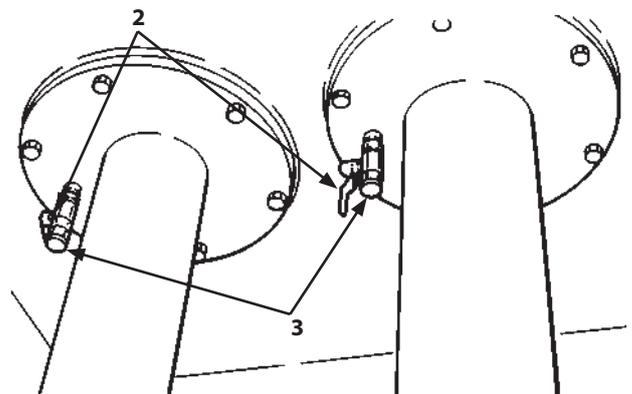
1. Park the machine on a firm, level surface with the upperstructure rotated 90° for easier access.
2. Lower the bucket to the ground.
3. Turn the auto-idle switch OFF.

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

4. Run the engine at slow idle speed without load for 5 minutes.
5. Turn the key switch OFF. Remove the key from the key switch.
6. Pull the pilot control shut-off lever to the LOCK position.
7. Insert the wrench as shown and turn the wrench clockwise and hold the wrench.
8. Turn cap (1) counterclockwise about 30°, at which point stop cap (1) to release the air.
9. Turn cap (1) further and remove cap (1).
10. Align the projected part of cap (1) with the projected part of the case and install cap (1).
11. After oil is cool, remove drain plugs (3) and open drain cocks (2) to drain water and sediment.
12. After draining water and sediment, close drain cocks (2) securely.
13. Install and tighten plugs (3).



M110-07-022



M142-07-053

MAINTENANCE

- 3** **Change Hydraulic Oil**
 --- every 4000 hours, 2500 hours
 or 2000 hours



- WARNING:**
- Hydraulic oil may be hot just after operation. Wait for oil to cool before starting work.
 - The hydraulic oil tank is pressurized. Keep body and face away from cap (1). Turn cap (1) slowly and remove cap (1) only after releasing the internal pressure completely.

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

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

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

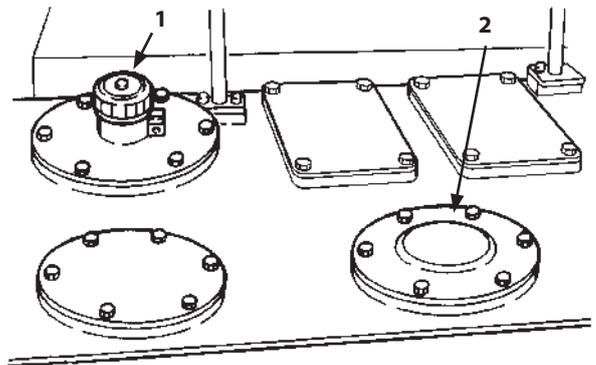
5. Run the engine at slow idle speed without load for 5 minutes.
6. Stop the engine. Remove the key from the key switch.
7. Pull the pilot control shut-off lever to the LOCK position.
8. Clean the top of the hydraulic oil tank to keep dirt out of the hydraulic system.
9. Insert the wrench as shown and turn the wrench clockwise and hold the wrench.
10. Turn cap (1) counterclockwise about 30°, at which point stop cap (1) to release the air.
11. Turn cap (1) further and remove cap (1).
12. Align the projected part of cap (1) with the projected part of the case and install cap (1).
13. Remove cover (2).
14. Prepare a container of 1350 liters (357 US gal) or more capacity for the drain oil.
15. Remove oil using a suction pump. The hydraulic oil tank capacity, up to specified oil level, is approximately 1350 liters (357 US gal).



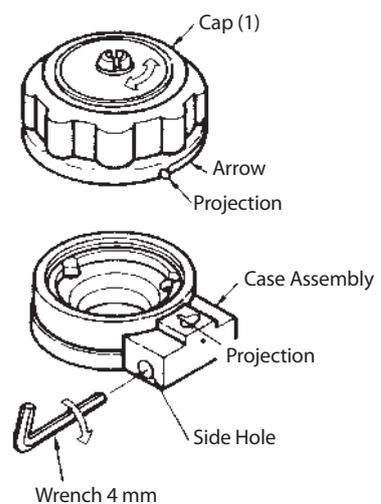
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M117-07-126



M183-07-052

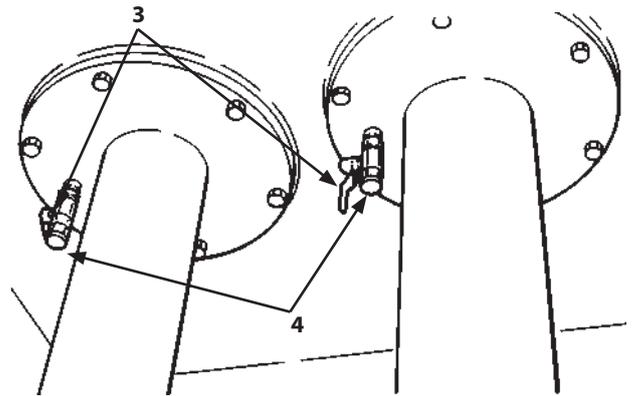


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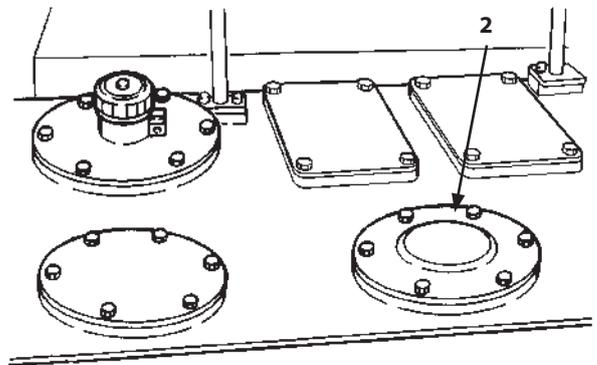
MAINTENANCE

IMPORTANT: Take care not to allow foreign matter such as dust, water, or sand to enter the hydraulic oil tank when changing the hydraulic oil.

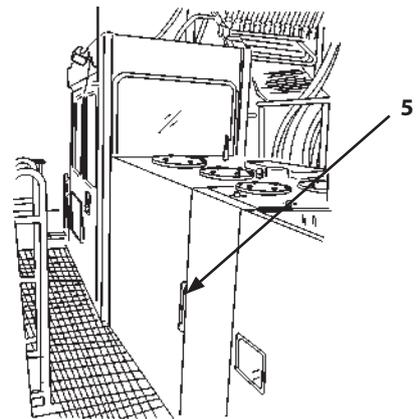
16. Remove drain plugs (4) on the underside of the hydraulic oil tank and loosen drain valves (3) to drain oil.
17. Tighten drain valves (3).
18. Install and tighten drain plugs (4).
19. Add oil via cover (2) hole until it is between the mark on level gauge (5).
20. Install cover (2). Tighten the bolts to 50 N·m (5.0 kgf·m, 36 lbf·ft).
21. Be sure to bleed air from the system following the procedures shown next page.



M142-07-053



M183-07-052



M183-07-006

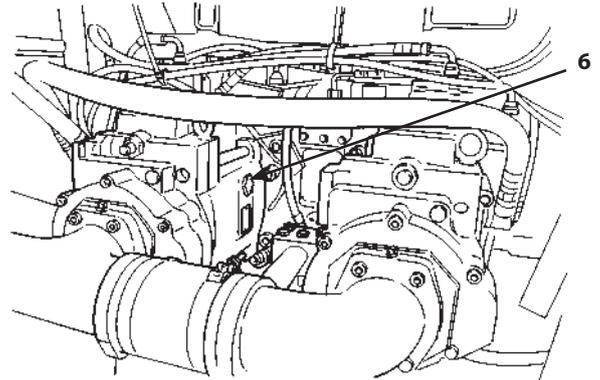
MAINTENANCE

Air Bleeding Procedures

IMPORTANT: If the pump is not filled with sufficient oil, it will be damaged when the engine is started. Bleed air and refill oil.

The machine is equipped with three main pumps. Bleed air from these pumps after changing hydraulic oil.

1. Remove air bleed plugs (6) (3 for upper pumps and lower pump) on side of each pump.
2. Fill the pump with oil through air bleed plugs (6) port on side of each pump until oil flows out of air bleed plug (6) hole.
3. Temporarily tighten air bleed plugs (6) on each pump, start the engine and run at slow idle. Loosen one of air bleed plugs (6) slightly until oil flows from plug port to release trapped air completely. Tighten air bleed plugs (6). Repeat this step for the rest of plugs (6).
4. Purge air from the hydraulic system by running the engine at slow idle and operating the control levers slowly and smoothly for 15 minutes.
5. Position the machine as illustrated in the oil level checking procedure.
6. Lower the bucket to the ground as illustrated.
7. Turn the auto-idle switch OFF.
8. Stop the engine. Remove the key from the key switch.
9. Pull the pilot control shut-off lever to the LOCK position.
10. Check the hydraulic oil tank gauge. Add oil if necessary.



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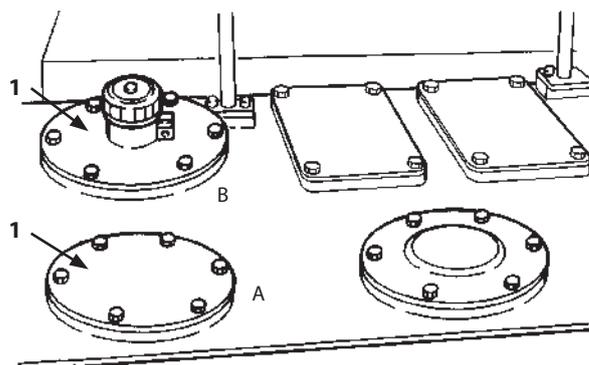
MAINTENANCE

4 Suction Filter Cleaning --- when changing hydraulic oil

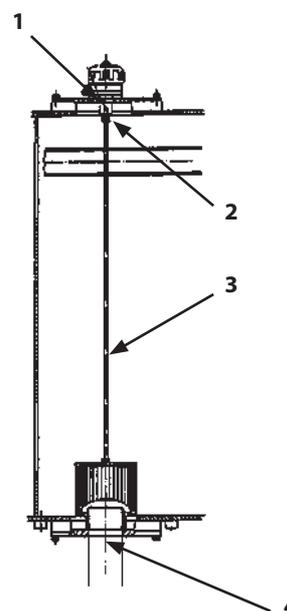
Two suction filters are provided in the bottom of hydraulic oil tank. Be sure to clean these filters when changing hydraulic oil.

1. After draining hydraulic oil, remove two tank top covers (1) positioned towards the upperstructure rear end.
2. Remove filter and rod assembly (3).
3. Clean filter and tank interior.
4. Install filter and rod assembly (3). Make sure the filter is positioned correctly in support (2).
5. Install covers (1). Make sure rod top is correctly inserted into cover center hole (4). Tighten the bolts.
6. Discriminate two filters referring to the dimensions shown below.
7. Be sure to bleed air from the hydraulic system.

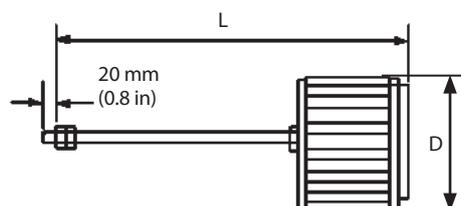
Type	D	L	Remarks
A	200 mm (8")	965 mm (3' 2")	The other one
B	150 mm (6")	975 mm (3' 2")	Located below breather cap



M183-07-052



M113-07-050



M18J-07-038

MAINTENANCE

- 5** Replace Drain Filter
 --- every 500 hours
 (first time after 50 hours)



- WARNING:**
- Hydraulic oil and components may be hot just after operation. Be sure to allow oil and components to cool before starting work.
 - The hydraulic oil tank is pressurized. Keep body and face away from cap (1). Turn cap (1) slowly and remove cap (1) only after releasing the internal pressure completely.

- Park the machine on a firm, level surface.
- Lower the bucket to the ground as illustrated.
- Turn the auto-idle switch OFF.



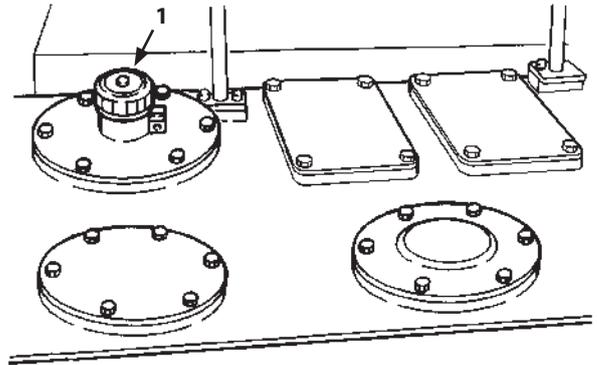
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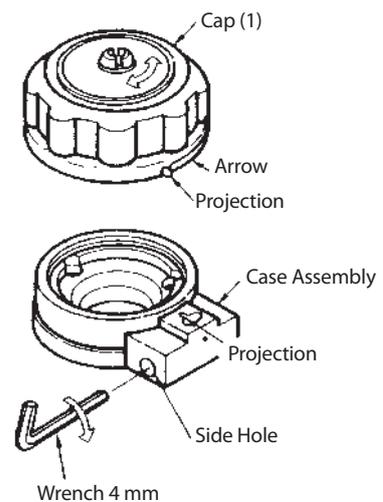
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IMPORTANT: The turbocharger may be damaged if the engine is not properly shut down.

- Run the engine at slow idle speed without load for 5 minutes.
- Stop the engine. Remove the key from the key switch.
- Pull the pilot control shut-off lever to the LOCK position.
- Insert the wrench as shown and turn the wrench clockwise and hold the wrench.
- Turn cap (1) counterclockwise about 30°, at which point stop cap (1) to release the air.
- Turn cap (1) further and remove cap (1).
- Align the projected part of cap (1) with the projected part of the case and install cap (1).



M183-07-052



M110-07-022

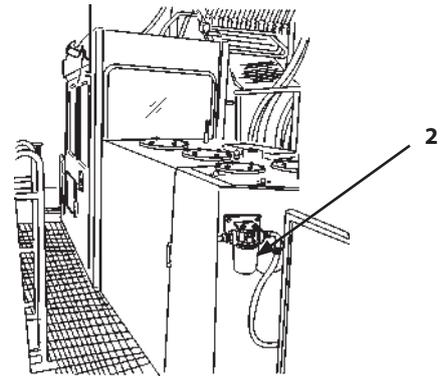
MAINTENANCE

IMPORTANT:

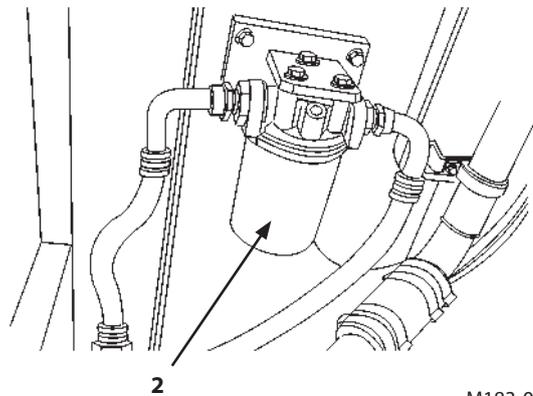
- When old filter (2) is removed, check it for any foreign matter, such as small pieces of metal.
- Replace filter (2) periodically.
- Clean drain filter (2) and the surrounding area.

11. Drain filter (2) is located behind the hydraulic oil tank.
12. Turn cartridge-type drain filter (2) counterclockwise using a filter wrench to remove it from the filter head. Take care not to damage the O-ring when removing filter (2).
13. Apply a thin film of clean oil to the gasket of new filter (2). Install new filter (2) onto the filter head by turning it clockwise by hand until it comes in contact with the filter head.
14. Turn new filter (2) 2/3 of a turn further using a filter wrench. Take care not to tighten excessively. Filter (2) may be deformed.
15. Start the engine. Check for any oil leakage.
16. Replace filter (2) regularly in order to maintain clean hydraulic oil, and, as a result, to lengthen the lifetime of the hydraulic equipment.

IMPORTANT: If any evidence of metal powder is found from drain oil in drain filter (2), consult your authorized dealer.



M183-07-007



M183-07-008

MAINTENANCE

6 Replace Full-Flow Filter Element --- every 1000 hours

WARNING: The hydraulic oil tank is pressurized. Keep body and face away from cap (1). Turn cap (1) slowly and remove cap (1) only after releasing the internal pressure completely.

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

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

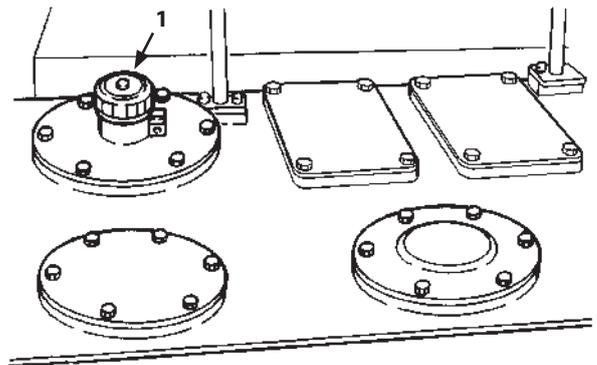
4. Run the engine at slow idle speed without load for 5 minutes.
5. Stop the engine. Remove the key from the key switch.
6. Pull the pilot control shut-off lever to the LOCK position.
7. Insert the wrench as shown and turn the wrench clockwise and hold the wrench.
8. Turn cap (1) counterclockwise about 30°, at which point stop cap (1) to release the air.
9. Turn cap (1) further and remove cap (1).
10. Align the projected part of cap (1) with the projected part of the case and install cap (1).



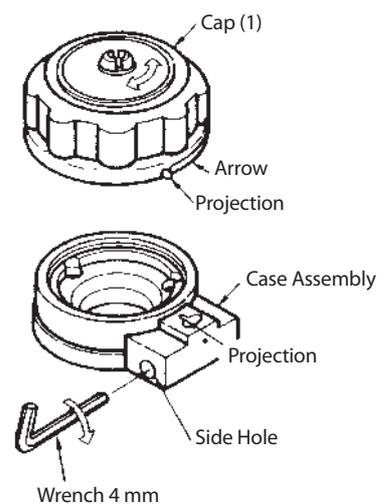
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M183-07-052



M110-07-022

MAINTENANCE

 **NOTE:** There is spring tension under cover (2). Hold down cover (2) when removing last two bolts (3).

11. Loosen bolts (3) (4 used) to remove cover (2) and O-ring (4).

When removing cover (2), slowly remove cover (2) while pressing cover (2) downward so that spring (5) does not fly off.

12. Remove spring (5), valve (6) and element (7).

IMPORTANT: Remove element (7) and inspect for metal particles and debris on element (7) and in bottom of filter housing. Excessive amounts of brass and steel particles can indicate a failed hydraulic pump, motor valve or failure in process. A rubber type of material can indicate cylinder packing failure.

13. When installing new element (7) into hydraulic tank, replace O-ring (4) with a new one at the same time.

Take extra care never to allow water or dust to enter the filter case.

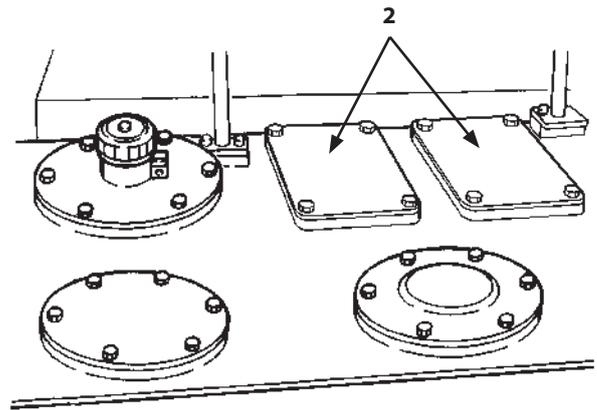
14. Install cover (2) with bolts (3) (4 used).

Tightening Torque: 50N·m (5.0 kgf·m, 36 lbf·ft).

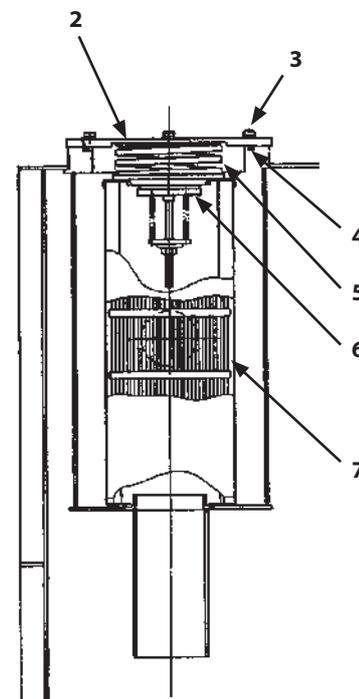
15. Repeat steps 11 to 14 for the other filter.

16. After replacing filter element (7), bleed air from the pump and check the oil level in the hydraulic oil tank. (Refer to the Bleed Air from Hydraulic System.) If the machine is operated with air remaining in the hydraulic system, damage to the hydraulic pump may result.

17. Replace filter element (7) regularly in order to maintain clean hydraulic oil, and, as a result, to lengthen the lifetime of the hydraulic equipment.



M183-07-052



M111-07-040

MAINTENANCE

7 Replace Pilot Oil Filter --- every 1000 hours



WARNING:

- Hydraulic oil and components may be hot just after operation. Be sure to allow oil and components to cool before starting work.
- The hydraulic oil tank is pressurized. Keep body and face away from cap (1). Turn cap (1) slowly and remove cap (1) only after releasing the internal pressure completely.

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

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

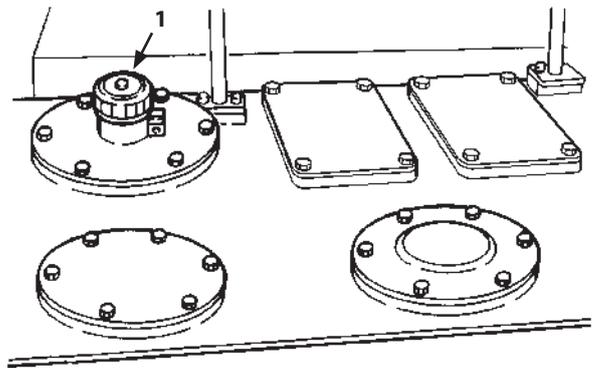
4. Run the engine at slow idle speed without load for 5 minutes.
5. Stop the engine. Remove the key from the key switch.
6. Operate the right and left control levers to release pressure from the pilot accumulator.
7. Pull the pilot control shut-off lever to the LOCK position.
8. Insert the wrench as shown and turn the wrench clockwise and hold the wrench.
9. Turn cap (1) counterclockwise about 30°, at which point stop cap (1) to release the air.
10. Turn cap (1) further and remove cap (1).
11. Align the projected part of cap (1) with the projected part of the case and install cap (1).



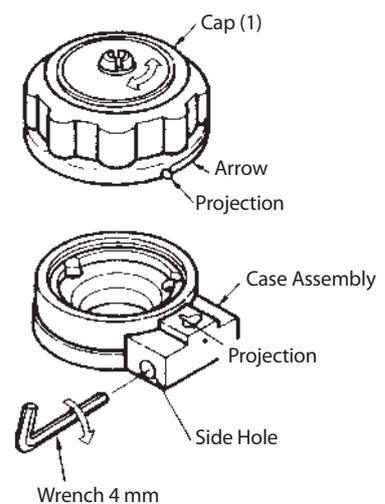
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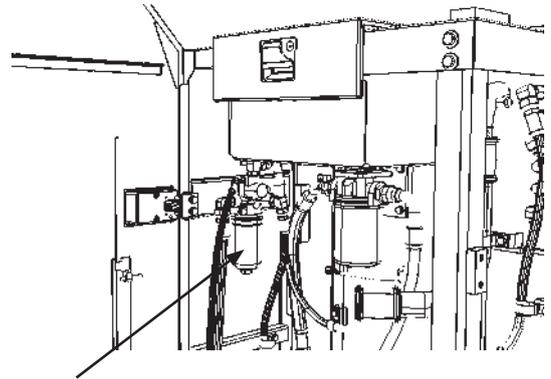
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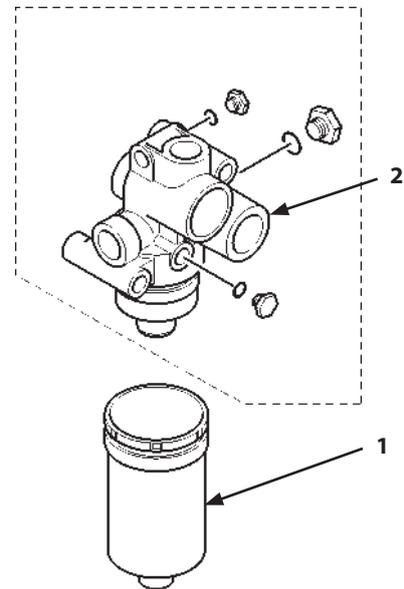
MAINTENANCE

12. Unscrew filter (1) and pull down to remove it.
13. Remove filter (1) by moving it back and forth while pulling down on it.
14. Before inserting new filter (1) into head cover (2), apply a film of clean hydraulic oil to the small ring that fits into head cover (2). Work filter (1) back into head cover (2).
15. Do not allow dirt, dust or water to enter filter (1).
16. Reinstall filter (1) to a torque of 20 to 30 N·m (2.0 to 3.0 kgf·m, 14 to 22 lbf·ft).
17. After replacing filter (1), check the oil level and purge air from the system. Failure to do so can damage the pump.
18. Replace filter (1) regularly in order to maintain clean hydraulic oil, and, as a result, to lengthen the lifetime of the hydraulic equipment.



Pilot Filter

M18J-07-005



M1U1-07-050

MAINTENANCE

8 Replace High-Pressure Filter Element --- every 12000 hours

The machine is equipped with 3 high-pressure filters.
Replace all of them at the same time.



WARNING:

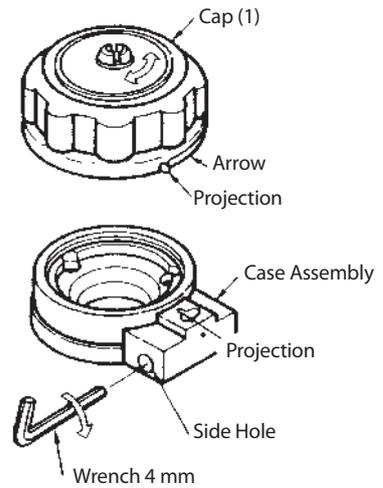
- Hydraulic oil and components may be hot just after operation. Be sure to allow oil and components to cool before starting work.
- The hydraulic oil tank is pressurized. Keep body and face away from cap (1). Turn cap (1) slowly and remove cap (1) only after releasing the internal pressure completely.

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

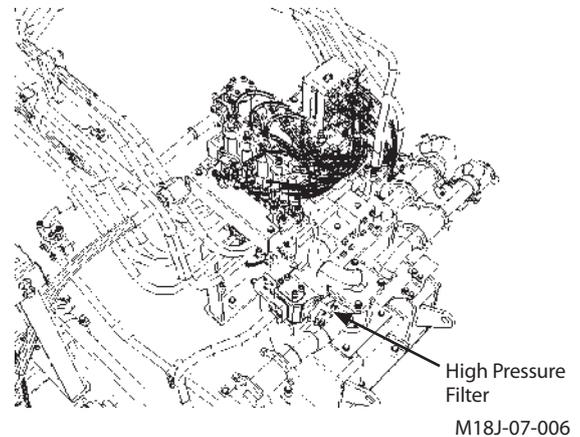
IMPORTANT: The turbocharger may be damaged if the engine is not properly shut down.

4. Run the engine at slow idle speed without load for 5 minutes.
5. Stop the engine. Remove the key from the key switch.
6. Pull the pilot control shut-off lever to the LOCK position.
7. Insert the wrench as shown and turn the wrench clockwise and hold the wrench.
8. Turn cap (1) counter-clockwise about 30°, at which point stop cap (1) to release the air.
9. Turn cap (1) further and remove cap (1).
10. Align the projected part of cap (1) with the projected part of the case and install cap (1).
11. Remove bolts (2), cover (3), O-rings ((4) and (5)) and filter element (6) from housing (7).
12. Discard O-rings ((4) and (5)) and filter element (6).
13. Install new filter element (6) into housing (7) with the rubber seal down and the welding bead line on filter element (6) away from the housing inlet.
14. Install cover (3) with new O-rings ((4) and (5)).
15. Install and tighten bolts (2) to 270 N·m (27 kgf·m, 195 lbf·ft).
16. Repeat steps 11 to 15 for the other filters.

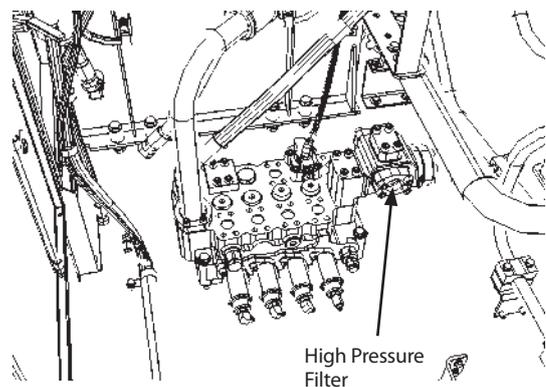
IMPORTANT: Replace element (6) regularly in order to maintain clean hydraulic oil, and, as a result, to lengthen the lifetime of the hydraulic equipment.



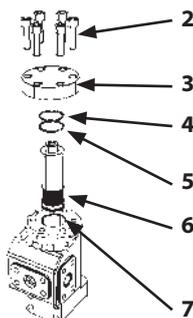
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M18J-07-006



M18J-07-007



M18J-07-008

MAINTENANCE

9

Replace Tank Air Breather Element

--- every 4000 hours



WARNING:

- Hydraulic oil may be hot just after operation. Wait for oil to cool before starting work.
- The hydraulic oil tank is pressurized. Keep body and face away from cap (1). Turn cap (1) slowly and remove cap (1) only after releasing the internal pressure completely.

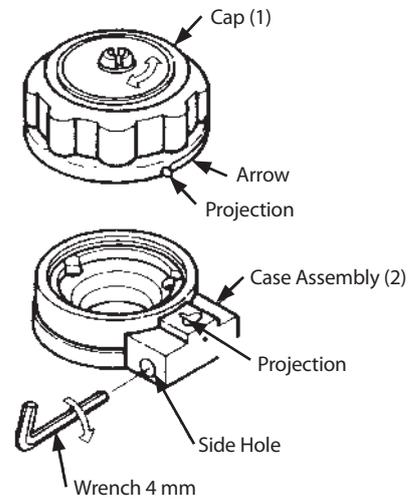
1. Place your machine at the maintenance position when checking hydraulic oil level and stop the machine.
2. After hydraulic oil is cool, release the internal pressure completely in the hydraulic oil tank.
3. Insert the wrench as shown and turn the wrench clockwise and hold the wrench.
4. Turn cap (1) counterclockwise about 30°, at which point stop cap (1) to release the air.
5. Turn cap (1) further and remove cap (1).
6. Loosen hexagon socket bolt (3) at the top of cap (1) and remove element (4).
7. After installing new element (4), align the interior salient region of cover (5) with the upper concave region of bayonet (6) and tighten them with hexagon socket bolt (3).

Tightening Torque: 7 to 9 N·m (0.7 to 0.9 kgf·m, 5 to 7 lbf·ft).

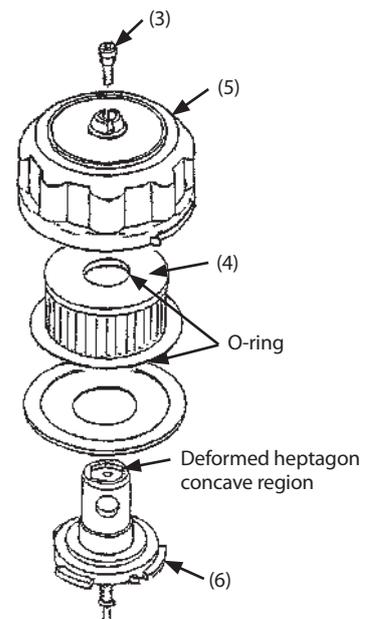
8. Align the projected part of cap (1) with the projected part of case (2) and install cap (1).

IMPORTANT: • Take care not to allow foreign matter such as water or dust to enter between cap (1) and case (2) (supply and exhaust air outlet).

- Replace element (4) regularly in order to maintain clean hydraulic oil, and, as a result, to lengthen the lifetime of the hydraulic equipment.



M110-07-022



M18J-07-040

MAINTENANCE

10 Check Hoses and Lines

--- daily

--- every 250 hours

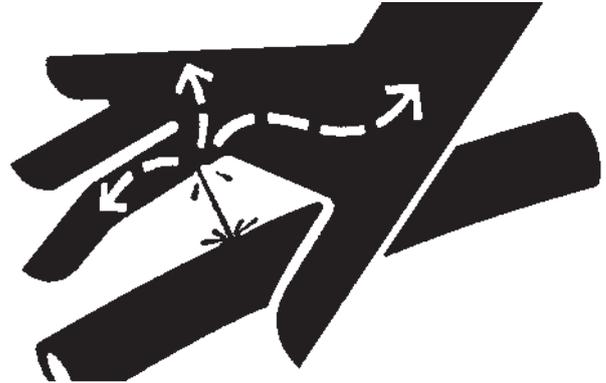


WARNING: Escaping fluid under pressure can penetrate the skin causing serious injury. To avoid this hazard, search for leaks with a piece of cardboard.

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

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

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



SA-031



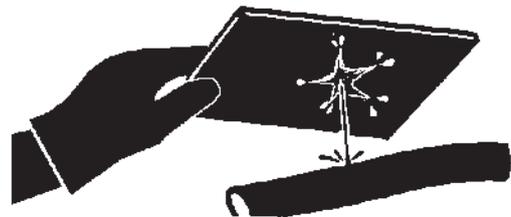
WARNING: Hydraulic oil and lubricant leaks can lead to fire that may result in serious injury.

To avoid this hazard:

- Park the machine on a firm, level surface.
Lower the bucket to the ground.
Stop the engine. Remove the key from the key switch. Pull the pilot control shut-off lever to the LOCK position.
- Check for missing or loose clamps, kinked hoses, lines or hoses that rub against each other, damaged oil cooler, and loose oil cooler flange bolts, for leaks.
Check hoses, lines and oil cooler at the check points indicated below for leaks and other damage that may result in future leaks.
If any abnormalities are found, replace or retighten them, as shown in Tables 1-4.
- Tighten, repair or replace any missing, loose or damaged clamps, hoses, lines, oil cooler, and loose oil cooler flange bolts.
Do not bend or strike high-pressure lines.
Never install bent or damaged hoses or lines.



SA-292

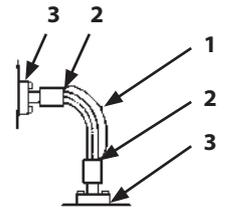


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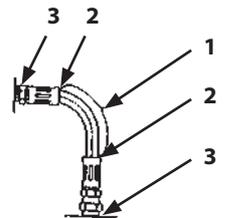
MAINTENANCE

Table 1. Hoses

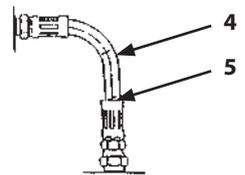
Interval (hours)	Check Points	Abnormalities	Remedies
Every 10 hours	Hose covers	Leak (1)	Replace
	Hose ends	Leak (2)	Replace
	Fittings	Leak (3)	Retighten or replace hose or O-ring
Every 250 hours	Hose covers	Crack (4)	Replace
	Hose ends	Crack (5)	Replace
	Hose covers	Exposed reinforcement (6)	Replace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



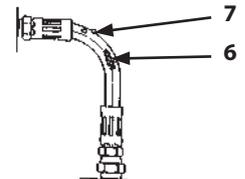
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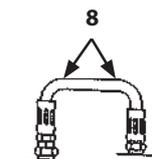
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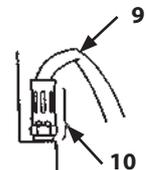
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M115-07-149

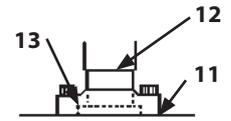
NOTE: Refer to the illustrations in Fig.1 for each check point location or for a description of the abnormality. Use genuine Hitachi parts.

Fig.1

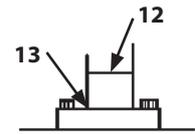
MAINTENANCE

Table 2. Lines

Interval (hours)	Check Points	Abnormalities	Remedies
Every 10 hours	Contact surfaces of flange joints	Leak (11)	Replace O-ring and/or retighten bolts
	Clamps	Loose	Retighten
	Welded surfaces on joints	Leak (12)	Replace
Every 250 hours	Welded surfaces on joints	Crack (13)	Replace
	Clamps	Missing	Replace
		Deformation	Replace
		Loose	Retighten



M137-07-001



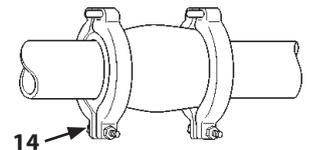
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Fig. 2

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

Table 3. Hose and Lines

Interval (hours)	Check Points	Abnormalities	Remedies
Daily Check	Flexible master coupling	Leak (14)	Replace or retighten

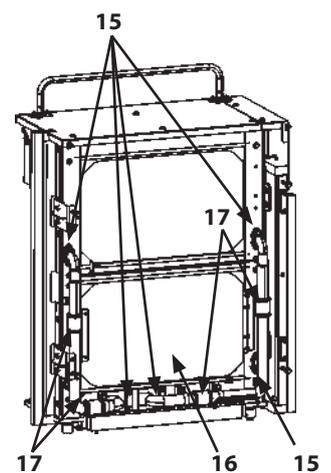


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Fig. 3

Table 3. Oil cooler

Interval (hours)	Check Points	Abnormalities	Remedies
Every 250 hours	Contact surfaces of flange joints	Leak (15)	Replace O-ring and/or retighten bolts
	Oil cooler	Leak (16)	Replace
	Coupling and rubber hose	Leak (17)	Retighten or replace



M1JB-07-048

Fig. 4

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

MAINTENANCE

Service Recommendations for Hydraulic Fittings

3 type of hydraulic fittings are used in this machine.

Flange Type

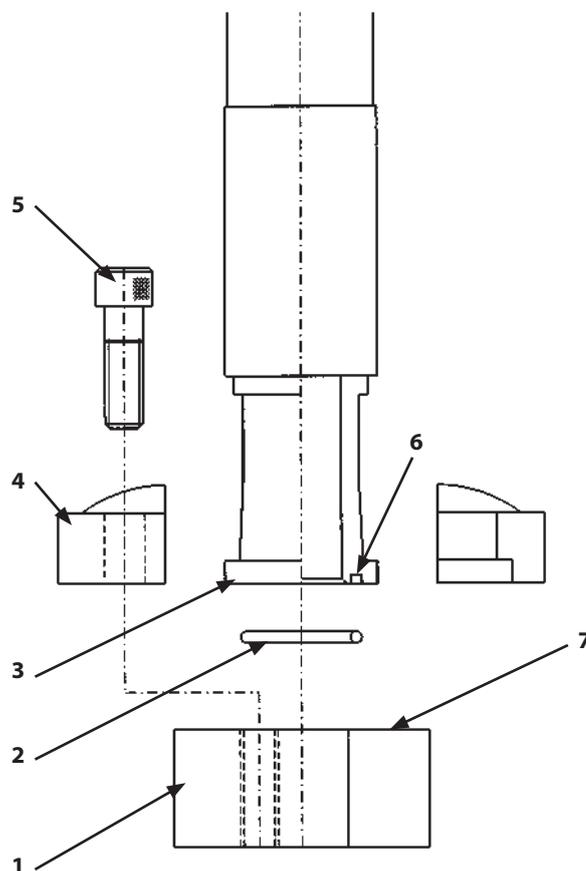
Hose connector (3) with O-ring (2) installed on the end face is secured with split flanges (4) (2 pieces used).

Precautions for Application

1. When reinstalling, be sure to replace O-ring (2) with new one.
2. Check that O-ring (2) is correctly installed in O-ring groove (6) first. Then, connect hose (3) to mating part (1) using split flanges (4) (2 pieces used) and socket bolts (5) (4 pieces used). If socket bolts (5) are tightened with O-ring (2) dislocated, damage to O-ring (2) may result, causing oil to leak.
3. When installing hose (3), take care not to damage O-ring groove (6) and sealing face (7) of mating part (1). If damaged, damage to O-ring (2) may result, causing oil to leak.
4. If oil leaks due to looseness of socket bolts (5), do not retighten as it is. Replace O-ring (2) with new one, check that O-ring (2) is correctly installed in O-ring groove (6). Then retighten socket bolts (5).

Tightening Torque:

Tighten socket bolts (5) according to the torque specifications shown in the table below.



±10%

M142-07-100

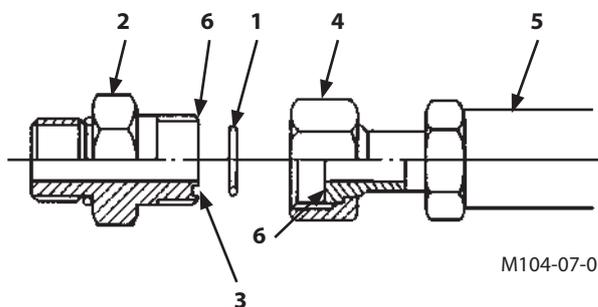
Bolt Dia.	Hexagon Bolt Wrench Size (mm)	Socket Bolt Wrench Size (mm)	Tightening torque		
			N·m	kgf·m	lbf·ft
M10	17	8	50	5.0	37
M12	19	10	90	9.0	66
M14	22	12	140	14	103
M16	24	14	210	21	155
M18	27	14	300	30	221
M20	30	17	400	40	295

MAINTENANCE

Flat Face O-ring Seal Fitting (ORS Fitting)

An O-ring (1) is used on sealing surfaces (6) to prevent oil leakage.

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



M104-07-033

IMPORTANT: Make sure fitting (2) and nut (4) are clean before installing. Apply lubricant to fitting (2) and nut (4) threads to stabilize their friction coefficient.

Torque Specifications ±10%

Hose Size	Screw Size	Width across flats (mm)	Fastening torque		
			N·m	kgf·m	lbf·ft
06(1/4)	9/16-18UNF	19	30	(3.0)	(22)
09(3/8)	11/16-16UN	22	70	(7.0)	(52)
12(1/2)	13/16-16UN	27	95	(9.5)	(70)
15(5/8)	1-3/16-12UN	36	180	(18)	(130)
19(3/4)	1-3/16-12UN	36	180	(18)	(130)
25(1)	1-7/16-12UN	41	210	(21)	(155)
32(1-1/4)	1-11/16-12UN	50	350	(35)	(260)

MAINTENANCE

Metal Face Seal Fittings

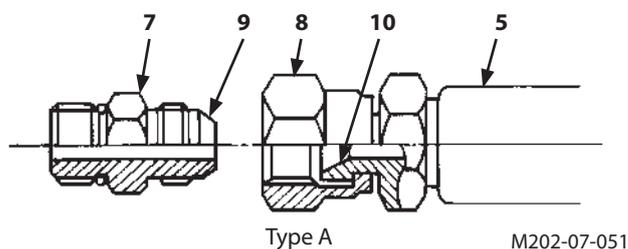
Fittings (7) are used on smaller hoses and consist of a metal flare (10) and a metal flare seat (9).

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

IMPORTANT: Defects in the tube flare cannot be repaired. Over tightening a defective flare fitting (7) will not stop a leak.

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

IMPORTANT: Make sure fitting (7) and nut (8) are clean before installing. Apply lubricant to fitting (7) and nut (8) threads to stabilize their friction coefficient.



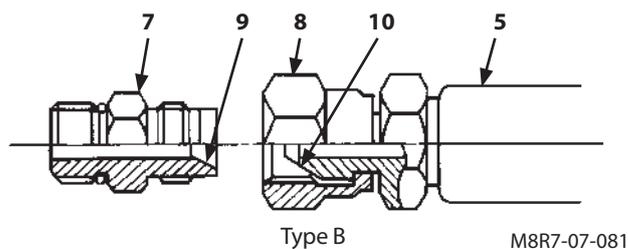
Type A Torque Specifications ±10%

Hose Size	Screw Size	Width across flats (mm)	Fastening torque		
			N·m	kgf·m	lbf·ft
06(1/4)	7/16-20UNF	★17	25	(2.5)	(18)
		19	30	(3.0)	(22)
09(3/8)	9/16-18UNF	★19	30	(3.0)	(22)
		22	40	(4.0)	(30)
12(1/2)	3/4-16UNF	27	80	(8.0)	(60)
15(5/8)	1-1/16-12UN	36	180	(18)	(130)
19(3/4)	1-1/16-12UN	36	180	(18)	(130)
25(1)	1-5/16-12UN	41	210	(21)	(155)
32(1-1/4)	1-5/8-12UN	50	350	(35)	(260)

★ Apply to under 7.0 MPa (70 kg/cm²) rated pressure hose.

Type B Torque Specifications ±10%

Hose Size	Screw Size	Width across flats (mm)	Fastening torque		
			N·m	kgf·m	lbf·ft
06(1/4)	G 1/4	19	30	(3.0)	(22)
09(3/8)	G 3/8	22	40	(4.0)	(30)
12(1/2)	G 1/2	27	80	(8.0)	(60)
15(5/8)	G 3/4	36	180	(18)	(130)
19(3/4)	G 3/4	36	180	(18)	(130)
25(1)	G 1	41	210	(21)	(155)
32(1-1/4)	G 1-1/4	50	350	(35)	(260)
38(1-1/2)	G 1-1/2	60 (55)	450	(45)	(330)



MAINTENANCE

E. Fuel System

Tank capacity 1470 liters (388 US gal)

Parts	Quantity	Interval (hours)						
		10	50	250	500	1000	1500	2000
1. Drain Fuel Tank Sump	1							
2. Drain Fuel Pre-Filter Sediment (Optional)	1							
3. Replace Fuel Pre-Filter Element (Optional)	1							
4. Drain Fuel Filter Sediment	2							
5. Replace Fuel Filter	2			★				
6.	Check Fuel Hoses (for leak, loose)							
	Check Fuel Hoses (for crack, bend, etc.)							
7. Clean Fuel Cooler Core	1							

 **NOTE:** ★ Replace it every 250 hours or 6 months whichever comes first.

 **WARNING: Beware of fire.**

Fuel is flammable. Keep fuel away from fire hazards.

Recommended Fuel

Use only super high quality or high quality DIESEL FUEL (JIS K-2204) (ASTM 2-D). Kerosene must NOT be used. Besides, 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 parts, leading to malfunction. For further details, refer to the Cummins engine Operation and Maintenance Manual.

MAINTENANCE

Refueling

1. Park the machine on a firm, level surface. Lower the bucket to the ground. Check the fuel level with fuel gauge (1).

If the fuel level is low, stop the engine. Refuel by removing cap (2) on the fuel tank.

2. Remove cap (2) of filler port.

[Cap (2) unlock procedures]

- Release the key lock.
- Pull up handle (3) and turn handle (3) counterclockwise for releasing cap (2) lock.
- Remove cap (2).

3. To avoid condensation, fill the tank at the end of each day's operation. Tank capacity is as follows.

Tank capacity 1470 liters (388 US gal)

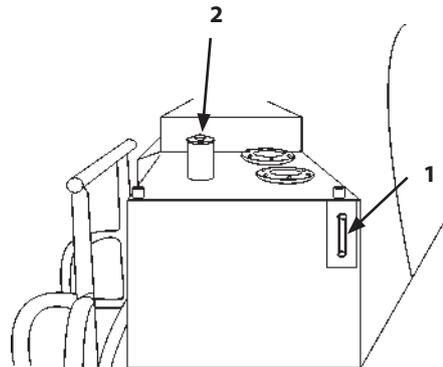
Do not fill the tank more than specified. Stop filling when fuel becomes visible in fuel level gauge (1).

4. Just after fueling, install and lock filler cap (2) to prevent vandalism and loss.

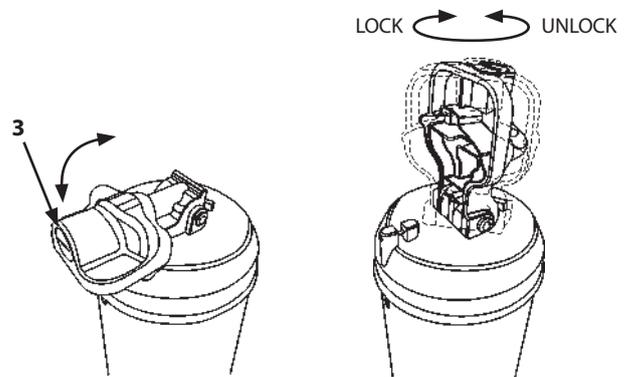
5. Install cap (2) of filler port.

[Cap (2) lock procedures]

- Install cap (2).
- Turn handle clockwise until cap (2) is locked, and push down handle (3).
- Lock the key.



M183-07-010



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IMPORTANT:

- **Take care not to allow dirt and/or water to enter the fuel tank.**
- **Wipe off any spilled fuel.**

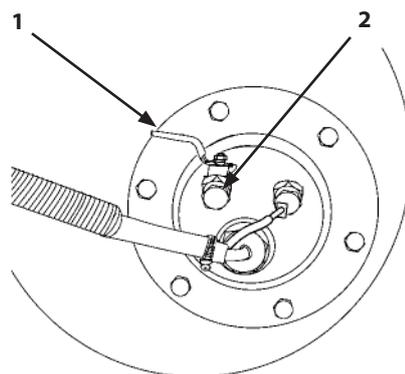
MAINTENANCE

1 Drain Fuel Tank Sump --- daily

1. Park the machine on a firm, level surface with the upperstructure rotated 90° for easier access.
2. Lower the bucket to the ground.
3. Turn the auto-idle switch OFF.

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

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



M18E-07-010

MAINTENANCE

2 Drain Fuel Pre-Filter Sediment (Optional)

--- daily

IMPORTANT:

- Drain fuel filter daily before starting operation. The engine may be damaged if you do not drain fuel filter daily.
- Be sure to prepare a container large enough to collect water when draining water to avoid ground contamination and for safety.

Fuel pre-filter contains a float (3) inside the sight glass which rises as water accumulates.

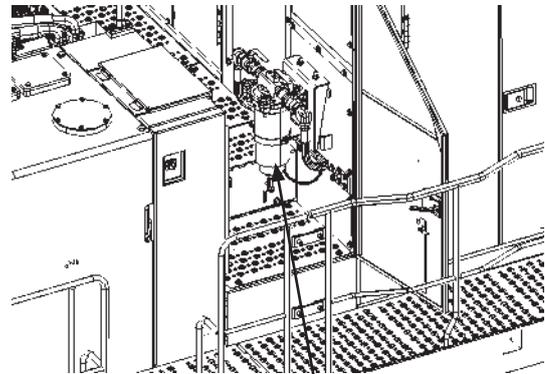
Be sure to drain daily the water accumulated in the pre-filter until float (3) goes to the bottom of case.

1. Stop the engine.
2. Place 1.5 liters or larger capacity container under drain plug (1) to collect the drained water.
3. Remove drain plug (1) under the fuel pre-filter. Open drain valve (2). Drain the water accumulated in the fuel pre-filter into the container until float (3) goes to the bottom of case. If it is difficult to drain, loosen air bleed plug (4) on the top of the fuel pre-filter.
4. After draining water, securely close drain valve (2) and install drain plug (1).
5. Start the engine. Increase engine speed to purge the air from the fuel system.
6. Check the fuel system for fuel leaks.

Wrench size:

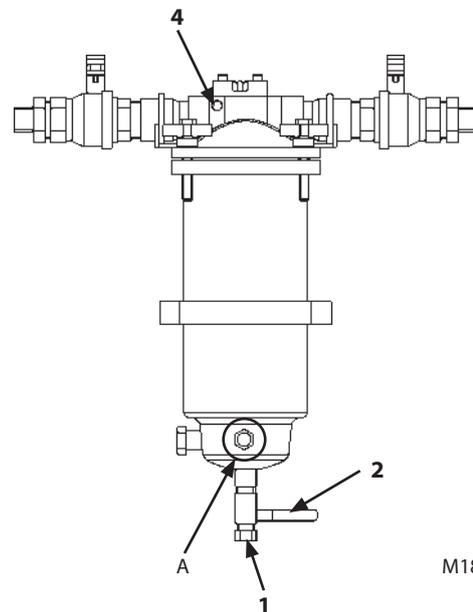
Plug (1): 22 mm

Plug (4): 11 mm

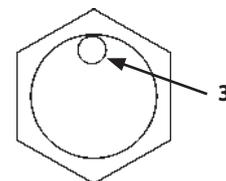


Fuel Pre-Filter

M18J-07-042



M18J-07-043



Detail A

M18J-07-044

MAINTENANCE

3 Replace Fuel Pre-Filter Element (Optional) --- every 250 hours



WARNING:

- Fuel may be hot just after operation. Be sure to wait for fuel to cool before starting work.

IMPORTANT:

- Be sure to prepare a container large enough to collect fuel when replacing the fuel pre-filter to avoid ground contamination and for safety.
- Replacement interval of the fuel pre-filter differs depending on the fuel quality. If poor fuel quality, replace it earlier than the standard interval.

1. Stop the engine.
2. Close valves (1) and (2).
3. Place a 1.5 liters or larger capacity container under drain plug (3) to collect fuel.
4. Loosen air bleed plug (4), remove drain plug (3) and open drain valve (5). Drain fuel until fuel does not flow out of filter case (11). After draining fuel, securely tighten air bleed plug (4), install drain plug (3) and close drain valve (5).
5. Remove fastening band (6) from the filter assembly.
6. Loosen hand knobs (7) (4 used) on the top of filter and remove filter case (11).

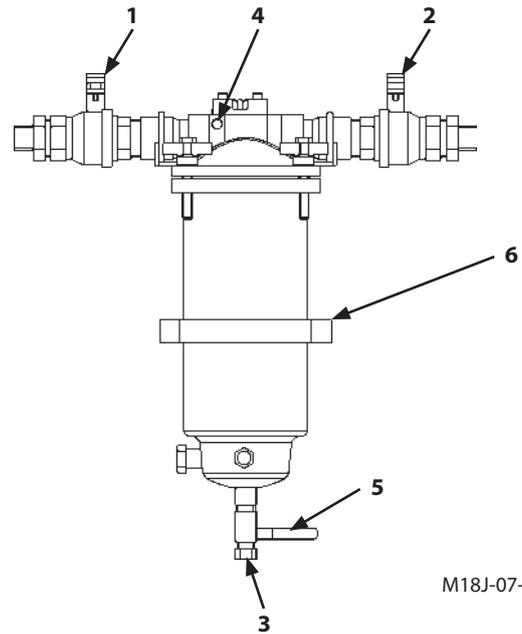
IMPORTANT: When filter case (11) is removed, spring (10) is removed simultaneously. Keep spring (10) for assembly.

7. Replace filter element (8) and O-ring (9) with new ones.
8. Fill fuel in filter case (11).
9. Install filter case (11) and spring (10). Tighten hand knobs (7) (4 used).
10. Secure the filter assembly by fastening band (6).
11. Open valves (1) and (2).
12. Start the engine. Increase engine speed to purge the air from the fuel system.
13. Check the fuel system for fuel leaks.

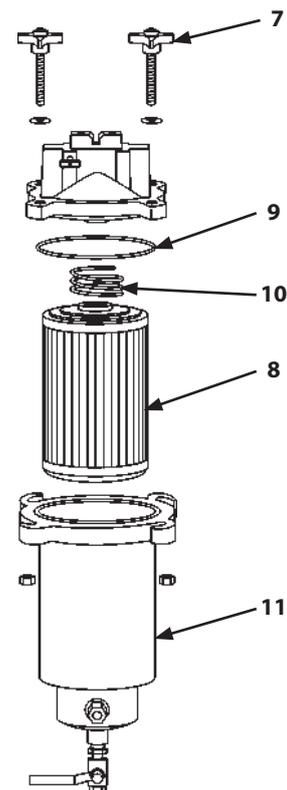
Wrench size:

Plug (3): 22 mm

Plug (4): 11 mm



M18J-07-043



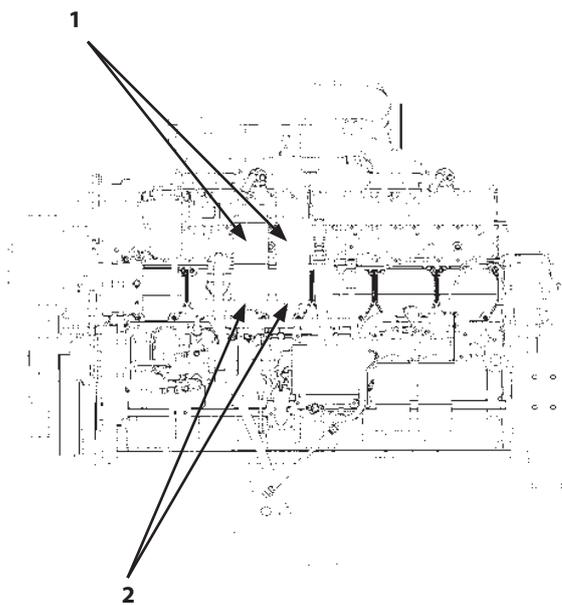
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MAINTENANCE

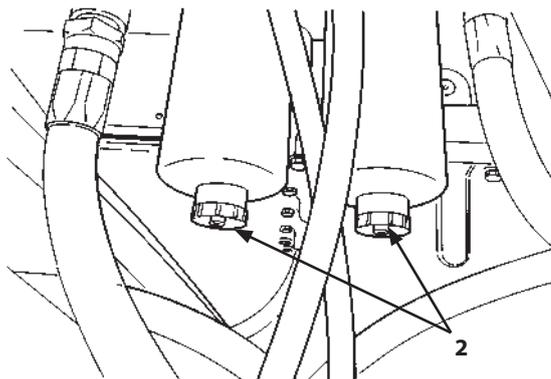
4 Drain Fuel Filter Sediment --- daily

IMPORTANT: When the drain plug is tightened too much, the threads may be damaged.
Refer to the CUMMINS Diesel Engine Operation manual for detailed information.

1. Stop the engine.
2. Loosen drain plugs (2) of filters (1) to drain water and sediment.
3. After draining, tighten drain plugs (2).



M18E-07-004



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MAINTENANCE

- 5** **Replace Fuel Filter**
--- every 250 hours or 6 months whichever comes first

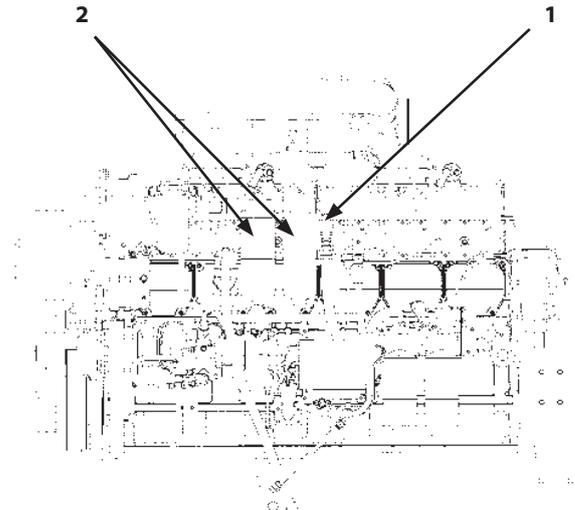
IMPORTANT:

- Shorten replacement interval when the used fuel quality is poor.
- Be sure to prepare a container large enough to collect fuel when replacing fuel filters (2) to avoid ground contamination and for safety.

1. Stop the engine.
2. Close cock (1) on the inlet line.
3. Unscrew spin-on filters (2) from the filter head, discard filters (2).
4. Fill filters (2) with clean fuel. Apply a light even coat of lubricating oil to the gasket sealing surface prior to installing filters (2).
5. Position filters (2) to the filter head. Tighten them by hand until the seal touches the filter head, tighten an additional 1/2 to 3/4 turn.
6. Open cock (1).
7. Start the engine. Check the fuel supply system for fuel leaks.

IMPORTANT: Be sure to tighten filters (2) by hand. If any tools are used for tightening, breakage or deformation of the filter head may arise.

Refer to the Cummins Engine Operation and Maintenance Manual for further details except filter (2) replacement intervals, for which this manual has priority.



M18E-07-004

MAINTENANCE

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

! **WARNING:** Fuel leaks can lead to fires that may result in serious injury.

To avoid this hazard:

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



SA-019

MAINTENANCE

Table 4. Hoses

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

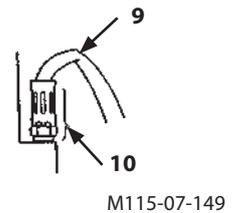
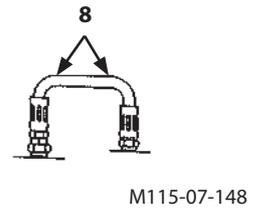
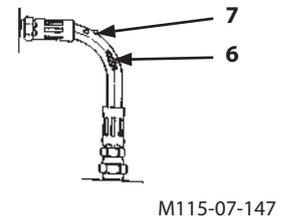
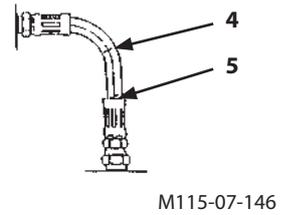
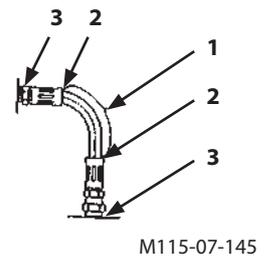


Fig.4

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

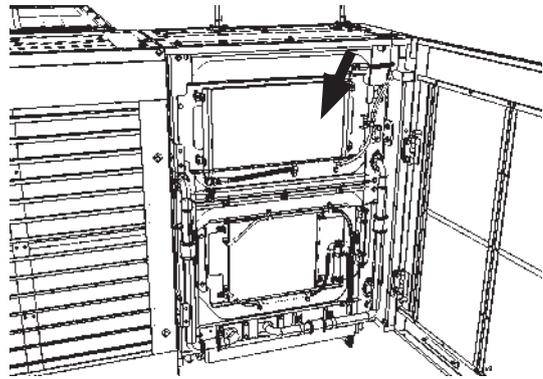
MAINTENANCE

- 7** Clean Fuel Cooler Core
--- every 500 hours

⚠ WARNING: Always wear safety glasses or goggles when using compressed air (Less than 0.2 MPa, 2 kgf/cm², 28 psi) to clean fuel cooler cores.

IMPORTANT: High-pressure air or water can damage fins. When cleaning the fuel cooler cores with high-pressure air or water, keep the nozzle 200 mm (8 in) or more away from the core face in order not to cause any damage.

Remove cover in front of the fuel cooler. Clean fuel cooler cores with compressed air (Less than 0.2 MPa, 2 kgf/cm², 28 psi) or water.



M18J-07-009

MAINTENANCE

F. Air Cleaner

Parts		Quantity	Interval (hours)							
			10	50	100	250	500	1000	2000	
1. Air Cleaner Outer Element	Cleaning	2								(Or when indicator lit)
	Replacement	2	After cleaning 6 times or 1 year							
2. Air Cleaner Inner Element	Replacement	2	When outer element is replaced							

1 Clean Air Cleaner Outer Element
 --- every 250 hours or when the restriction indicator comes ON

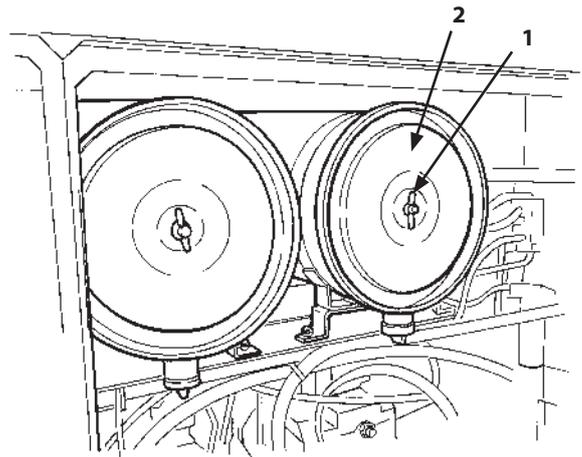
2 Replace Air Cleaner Outer and Inner Elements
 --- after cleaning 6 times or after 1 year

⚠ WARNING: Use reduced compressed air pressure. (Less than 0.2 MPa, 2 kgf/cm², 28 psi). Clear area of bystanders, guard against flying chips, and wear personal protection equipment including goggles or safety glasses.

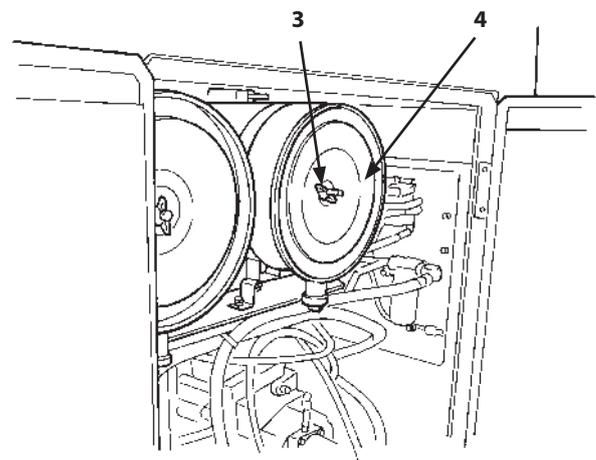
1. Park the machine on a firm, level surface.
2. Lower the bucket to the ground.
3. Turn the auto-idle switch OFF.

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

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



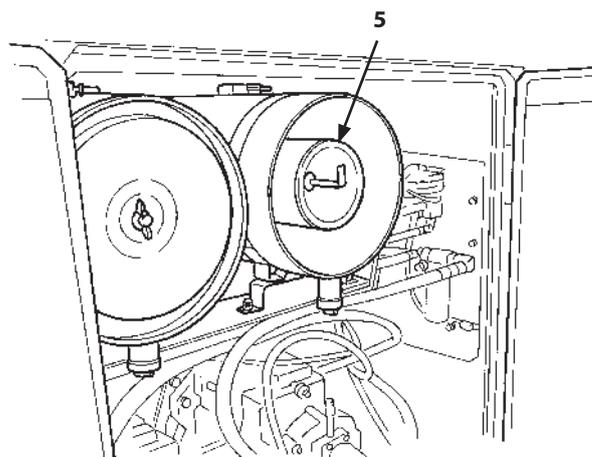
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M183-01-096

MAINTENANCE

10. Clean outer elements (4) using compressed air. Direct the air to the inside of outer elements (4), blowing out.
11. Clean the filter interior before installing outer elements (4).
12. Install outer elements (4) into the body to hold it in place, tighten wing nuts (3) by hand. After wing nuts (3) makes contact with the end face of outer elements (4), tighten them 3 to 4 turns by hand.
13. Install covers (2) and tighten wing nuts (1).
14. Start the engine and run it at slow idle.
15. Check the air filter restriction indicator on the monitor panel. If the air filter restriction indicator comes ON, stop the engine and replace outer elements (4).
16. When replacing the air cleaner filter element, replace both outer (4) and inner (5) elements together. Remove outer elements (4). Clean the filter interior before removing inner elements (5). Remove inner elements (5). First install inner elements (5) and then install outer elements (4).
17. Clean the body interior, every 250 hours or when air filter restriction indicator comes ON.



M183-01-097

MAINTENANCE

G. Cooling System

Parts	Quantity	Interval (hours)						
		10	50	250	500	1000	1500	2000
1. Check Coolant Level	1							
2. Check DCA4 Concentration in Coolant	1							
3. Replace Coolant Filter	1							
4. Change Coolant	139 L (37 US gal)	Twice a year, in spring and autumn *						
5. Check Fan Belt for Wear	1							
6. Clean Radiator, Inter Cooler, Oil Cooler Core	1							
7. Clean Inter Cooler Front Screen	1				★			
8. Clean Oil Cooler Front Screen	1				★			

 **NOTE:** * Before leaving the Hitachi factory, the cooling system is filled with a mixture of water and genuine Hitachi Long-Life Coolant. As long as genuine Hitachi Long-Life Coolant is used, the service intervals between changing the coolant is once every 2 years, or every 4000 hours, whichever comes first.

★ Shorten maintenance interval when the machine is operated in dusty areas.

Coolant

Use a proper coolant mix of water, antifreeze and anticorrosive agent DCA4.

 **NOTE:** DCA4 is a brand name of Dry Chemical Additive manufactured by the America Fleetguard Co.

1. Water

Use fresh water or normal tap water as a coolant. Do not use strong acid or alkaline water.

If hard water with many impurities is used, the anticorrosive agent DCA4 will be neutralized and lose its effect as an anticorrosive agent.

If mineral-rich water is used for coolant, water stain or scale may build up inside the engine or radiator, causing overheating due to deterioration of coolant performance.

2. Long-Life Coolant

Long-Life coolant protects the cooling system from rusting and freezing.

Long-life coolant can be used throughout the year without changing.

As long as genuine Hitachi Long-Life Coolant is used, the service interval between changing the coolant is once every 2 years, or every 4000 hours, whichever comes first.

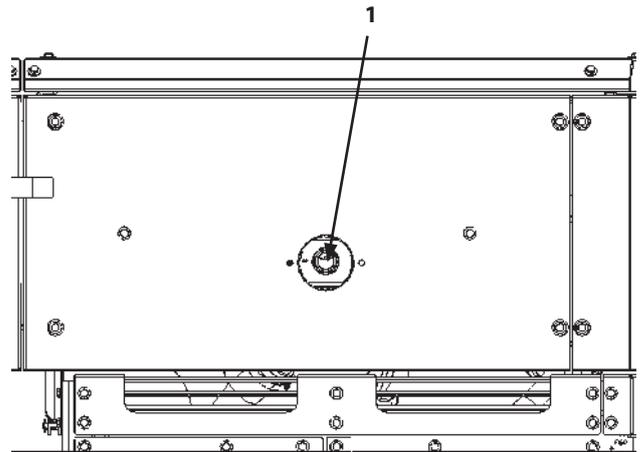
IMPORTANT: Long-Life Coolant concentration is usually 50 %. However Long-Life Coolant concentration should be changed for the cold weather range. Refer to the Cummins engine Operation and Maintenance Manual.

MAINTENANCE

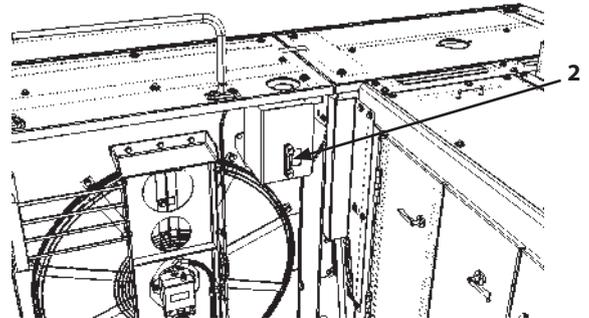
1 Check Coolant Level --- daily

⚠ WARNING: Do not remove radiator filler cap (1) until the coolant is cool; otherwise high-temperature steam may escape, potentially causing scalding. Slowly loosen cap (1) to release pressure after the system has cooled and then remove.

With the engine cold, the coolant level must be between the MAX and MIN marks. If the coolant level is below the MIN mark, add coolant to coolant reservoir (2). If coolant reservoir (2) is empty, add coolant to radiator filler cap (1) and then to coolant reservoir (2).



M18J-07-010



M18J-07-011

MAINTENANCE

2 Check DCA4 Concentration in Coolant

--- every 500 hours

Anticorrosive Agent DCA4

Be sure to use the anticorrosive agent DCA4 in your Cummins Cooling System. DCA4 protects the cooling system from rusting, makes an anticorrosive film on the cylinder liner to prevent the liner from corroding, and reduces sediments in the engine coolant passages. Ideal DCA4 concentration is 2.5 DCA units per 3.78 L (1 US gal) of coolant (LLC/soft water mix) (when LLC concentration is 50 %). Maintain the acceptable concentration range of 1.5 to 3 units per 3.78 L (1 US gal) of coolant.

DCA4 concentration is adjusted by replacing the DCA4-containing filter and/or adding DCA4 liquid.

- Coolant Filter

The following solid DCA4 containing coolant filter is available.

Application	Fleetguard Part No.	Cummins Part No.	Hitachi Part No.	Number of DCA Units
Check and Maintenance	WF-2076	4058965	4266063	23

- DCA4 Liquid

The following DCA4 liquid units are available for refill.

Application	Fleetguard Part No.	Cummins Part No.	Hitachi Part No.	Number of DCA Units
Refill	DCA60L	3305373	4275270	5
	DCA65L		4280278	20

MAINTENANCE

- Precautions for using DCA4



WARNING:DCA4 includes alkali. Avoid splashing DCA4 in your eyes or swallowing it. If DCA4 is splashed into your eyes or swallowed, follow the instructions shown below. Keep out of reach of children.

- **Exposure tolerances**
Slight skin exposure to DCA4 will cause no serious problems. However, longer or repeated exposure times, inhaling, swallowing or splashing DCA4 in your eyes will cause serious problems. Take the emergency measures shown below.

Cause	Symptoms	Emergency Measure
Inhaling	The nose smart.	Breathe fresh air.
Long or repeated exposure	The skin smart.	Wash with fresh water. Take off clothes contaminated with DCA4 and clean them thoroughly.
Splashing in eyes	The eyes smart.	Wash immediately with fresh water for 15 minutes and see a physician.
Swallowing		Drink a lot of carbonated beverages and see a physician.

- **Disposal**
Be careful not to spill DCA4 on machine or ground. If DCA4 is spilt, wipe it up and clean contaminated surface thoroughly.
Use a container to collect spilt DCA4 and consign it to professional disposers. Disposal of surplus DCA4 when changing coolant should also be assigned to professional disposers.

MAINTENANCE

Checking and Adjusting DCA4 Concentration

- Initial Charge (when replacing coolant totally)
Replace the coolant filter and add the DCA4 liquid for refill. Use coolant filter (WF-2076). One DCA65L unit is equivalent to four DCA60L units. The sample combinations of DCA65L and DCA60L are shown in the following table. Appropriately combine both DCA65L and DCA60L so that the required concentration can be obtained.

Antifreeze or LLC Concentration (%)	DCA Units per 1 gal of Water Plus Anti-freeze or LLC	Coolant Volume (L)	Required Concentration (Unit)	Filter (P/No.)	Nos. of Units (Unit)	Quantity	DCA4 Liquid for Refill (P/No.)	Nos. of Units (Unit)	Quantity	Total Units (Unit)
Over 50%	2.5	139	92 ($139/3.78 \times 2.5 = 92$ DCA Unit)	WF-2076	23	1	DCA60L DCA65L	5 20	2 3	93 DCA Unit ($23 \times 1 + 5 \times 2 + 20 \times 3$)

- Replacing Coolant Filter --- every 1000 hours
DCA4 deteriorates its function after being used for a long time. Normally replace it every 1000 hours. However, when the DCA4 concentration is measured:
- Checking Coolant Concentration
 - If a large quantity of coolant was added when repairing the engine or radiator, check the coolant concentration in accordance with Inspection Procedure in this manual and maintain the proper coolant concentration. (If the total coolant was changed, conduct the initial charge in accordance with Item above on this page.)
 - The coolant concentration may be outside the specification according to operation conditions or due to an unexpected failure. Then, it is recommendable to check the concentration every 500 hours.

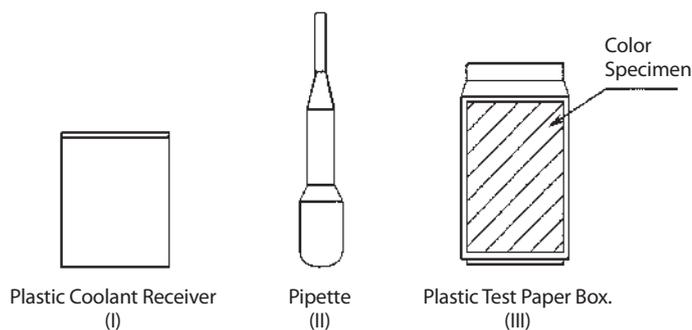
MAINTENANCE

Inspection Procedures of Coolant Concentration

- Check the concentration of DCA4 in coolant using the inspection kit shown below.

Name of Kit		Cummins Parts No.	Hitachi Parts No.
Inspection Kit	CC2602	-	4404083

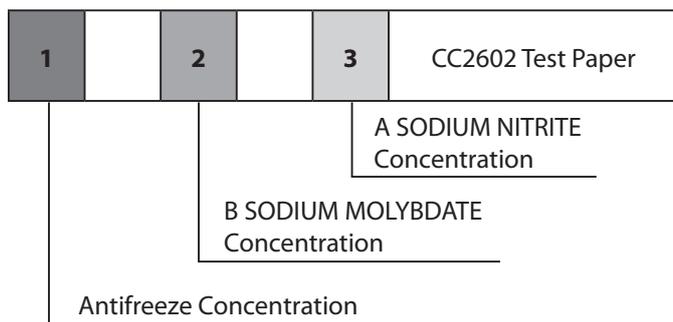
Contents of the Kit:



M162-07-077

- Outline

1. Both A and B reagents are coated on CC2602 test paper, allowing to measure the color changes on both A and B reagents.
2. At the same time, one more reagent is coated to easily determine the antifreeze concentration through color change. (The antifreeze concentration checked by this method should be just a guide line. When the exact antifreeze concentration is required, measure it using a specified equipment.)



3. Do not use diluted coolant for measurement. Collect coolant into the attachment beaker. Directly dip the test paper into the collected coolant. Compare the reagent color change on the test paper with the color specimen coated on the test paper box 45 seconds after desiccating.

MAINTENANCE

• Precautions for Using CC2602 Test Kit

Maintain coolant temperature to 10 to 54 °C while checking. Otherwise, incorrect color change may result.

Compare the reagent color with the color specimen to measure the concentration in daylight. In case it is difficult to specify the color concentration through the comparison of the reagent color with the color specimen, adopt the lighter side concentration as a safer value.

The reagents provided in the test kit are sensitive to light, heat, and excessive moisture so that they should be stored in a plastic container. Unless the test papers are used, be sure to close the container cover correctly.

Avoid to expose the test kit to the direct ray of the sun while storing and maintain the ambient temperature of the storing place to 32 °C or lower.

The effective life time of the reagent is printed on the upper section of the CC2602 container.

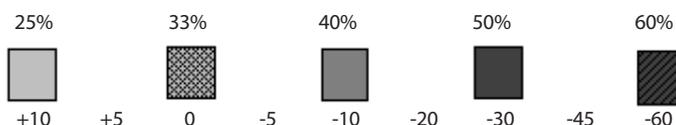
Do not use any reagents after the effective life time expires.

If the reagent color has changed to light brown or pink, avoid using such reagent.

If the color specimen was spoiled, wipe stain with a cloth. Do not use any soap or solvent.

The reagent color continues to change from soon after being dipped into coolant and stops after it is dried up. Therefore, measure the coolant concentration within the specified time range.

Concentration Check Table
% GLYCOL/FREEZEPOINT (°F)



DCA Unit/3.78L (1 US gal)
(DCA UNITS PER GALLON)

(SODIUM MOLYBDATE LEVEL)	 ROW 6	0.0	1.7	2.8	3.1	3.7	4.1	4.9	5.7
	ROW 5	0.0	1.7	2.3	2.7	3.1	3.5	4.3	5.1
	 ROW 4	0.0	1.4	1.8	2.0	2.4	2.8	3.6	4.4
	ROW 3	0.0	1.2	1.5	1.7	2.1	2.5	3.3	4.1
	 ROW 2	0.0	1.0	1.2	1.4	1.8	2.2	3.0	3.8
	 ROW 1	0.0	0.6	0.9	1.1	1.5	1.9	2.7	3.5
	 ROW 0	0.0	0.3	0.6	0.8	1.2	1.6	2.4	3.2
	A	 B	C	 D	E	 F	G	 H	
		(SODIUM NITRITE LEVEL)							

MAINTENANCE

- **How to Use Test Kit**

IMPORTANT: Measure time precisely to obtain the correct test results. Use a stop watch or watch with a second hand. If the reagent color change is checked too early or too late, correct measurement results will not be obtained. If coolant is maintained based on incorrect check data, damage to the engine may result.

1. Use coolant collected from the radiator or the engine drain cock for checking. Do not collect coolant from the reservoir. Wait to cool the collected coolant temperature to 10 to 54 °C before checking.
2. As soon as one test paper is taken out of the plastic container, close the cover correctly. Do not touch the area coated with the reagent. If the area has already changed to light brown use another test paper.
3. Dip the test paper into the collected coolant for one second. After taking up the test paper, desiccate the extra coolant.
4. Wait 45 seconds. Then, compare the changed reagent color on the test paper with the color specimen and determine the coolant concentration by following procedures.
 - (1) Take a record of the anti freeze concentration by comparing the color on reagent section (1) with the anti freeze color specimen printed on the test paper plastic box (III).
 - (2) Take a record of concentration by comparing the color on reagent section (2) with the SODIUM MOLYBDATE color specimen printed on the test paper plastic box (III).
 - (3) Take a record of concentration by comparing the color on reagent section (3) with the SODIUM NITRITE color specimen printed on the test paper plastic box (III).
5. Complete all color comparison check within 75 seconds after dipping the test paper into the coolant.

MAINTENANCE

- **Checking and Controlling Coolant**

Obtain the concentration value from the concentration check table. Concentration and its control are as follows.

Coolant Additive Agent DCA4 Control Standard

Concentration of Antifreeze or LLC	Concentration per 3.78 L (1 US gal) of Coolant Additive Agent DCA4	Control Method
50 %	1.5 or less	Replace the coolant filter. Add one (1) bottle of DCA60L (containing 5 DCA units) per 15 L (4 US gal) of coolant.
	1.5 to 3.0	Perform the normal maintenance service. Replace the coolant filter every 1000 hours.
	3.0 or more	Keep using the coolant until concentration is reduced to 3 units without replacing the filter. Use the filter up to the next 1000 hour replacement time. In case concentration is over 4.0 units, change the total coolant and conduct the initial charge in accordance with Item in this manual.
	Necessary DCA4 Volume to be Added When Change Total Coolant.	Add 2.5 DCA units per 3.78 L (1 US gal) of coolant.

IMPORTANT: Water with a lot of impurity or insufficient quantity of DCA4 will lead to corrosion of cylinder liners, which will result in engine damage.

MAINTENANCE

3 Replace Coolant Filter --- every 1000 hours

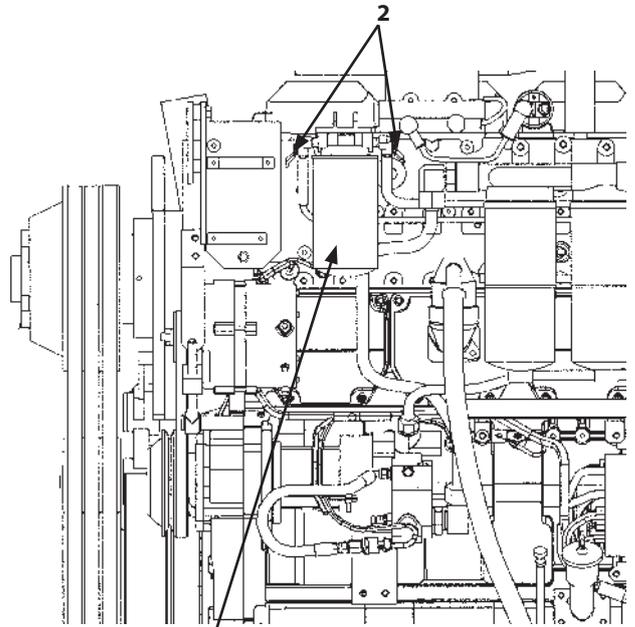
Check the DCA4 concentration every 500 hours. (Refer to page 7-84 for the checking procedure.) If the concentration is lower than the acceptable range, and if coolant filter (1) has to be replaced as a result (Refer to "Concentration Check Table" section on page 7-88.), replace WF-2076 coolant filter (1), following the procedure below:

WARNING: Do not attempt to loosen coolant filter (1) until the engine is cool.

IMPORTANT:

- Be sure to prepare a container large enough to collect coolant when replacing coolant filter (1) to avoid ground contamination and for safety.
- Be sure to tighten filter (1) by hand. If any tools are used for tightening, breakage or deformation of the filter head may arise. For details other than filter (1) replacement intervals, refer to the Cummins engine Operation and Maintenance Manual.

1. Move shut-off valves knob (2) to the OFF position.
2. Remove filter (1) and discard it.
3. Apply a thin film of lubricating oil to the gasket sealing surface prior to installing new filter (1).
4. Position new filter (1) to the filter head. Tighten until the seal touches the filter head; tighten an additional 1/2 to 3/4 turn.
5. Move shut-off valves knob (2) back to the ON position.



1

M18E-07-005

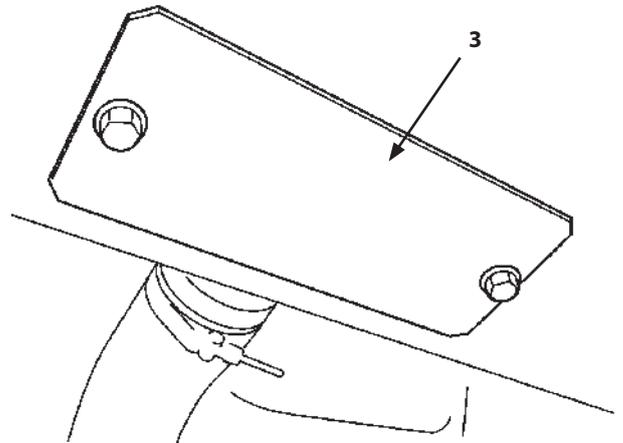
MAINTENANCE

4 Change Coolant --- twice a year (in spring and autumn)

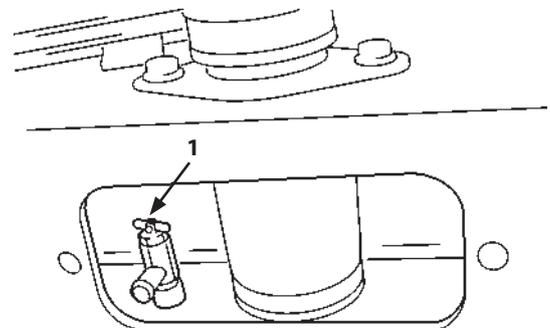
 **NOTE:** Before leaving the Hitachi Factory, the cooling system is filled with a mixture of water and genuine Hitachi Long-Life Coolant. As long as genuine Hitachi Long-Life Coolant is used, the service intervals between changing the coolant is once every 2 years, or every 4000 hours, whichever comes first.

 **WARNING:** Do not loosen the radiator cap until the system is cool. Otherwise, hot water and steam may spout, possibly causing severe burns. After coolant is cool, loosen the cap slowly to release all pressure before removing the cap.

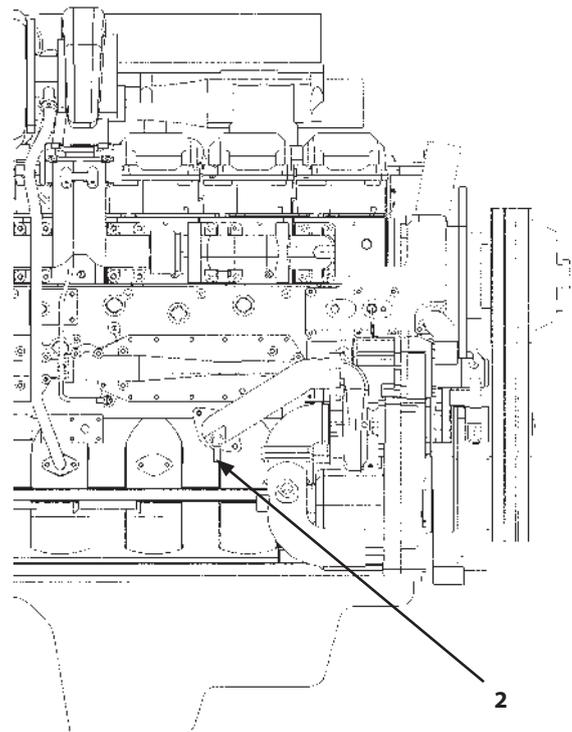
1. Park the machine on a firm, level surface. Lower the bucket to the ground. Stop the engine.
2. Remove cover (3) to access radiator drain cock (1).
3. Remove the radiator cap. Open drain cocks (1), (2) on the radiator and engine block to allow the coolant to drain completely. Remove impurity such as water scale at the same time.
4. Close drain cocks (1), (2). Fill the radiator with tap water and a radiator cleaner agent. Start the engine and run it at a speed slightly higher than slow idle; when the needle of the temperature gauge reaches the middle level of while zone, run the engine for approx. 10 more minutes.
5. Stop the engine and open radiator drain cock (1). Flush out the cooling system with soft water or tap water, until draining water is clear. This helps remove rust and sediment.
6. Close radiator drain cock (1). Fill the radiator with soft water or tap water. At that time, mix the antifreeze (or LLC) or anti-rust agent. The concentration of LLC is 50 %. Slowly add coolant to avoid mixing air bubbles in the system.
7. Add 1.5 to 3.0 DCA units per 3.78 liters (1 US gal) of coolant.
8. Start the engine. Sufficiently bleed air from the cooling system.
9. After adding coolant, operate the engine for several minutes. Check the coolant level again. Add coolant if necessary.



M1JB-07-014



M1JB-07-015



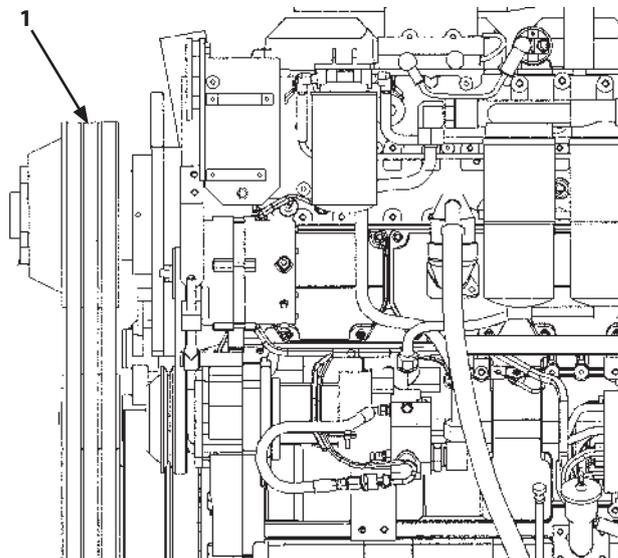
M18E-07-006

MAINTENANCE

5 Check Fan Belt for Wear --- daily

IMPORTANT: Loose fan belt (1) tension may result in insufficient battery charging, engine overheating as well as a rapid, abnormal belt wear. Belt (1) is too tight, however, can damage both bearing and belt (1).

1. Park the machine on a firm, level surface. Lower the bucket to the ground, pull the pilot control shut-off lever to the LOCK position, and stop the engine.
2. Visually check fan belt (1) for wear. Ask your authorized dealer for belt replacement if necessary.



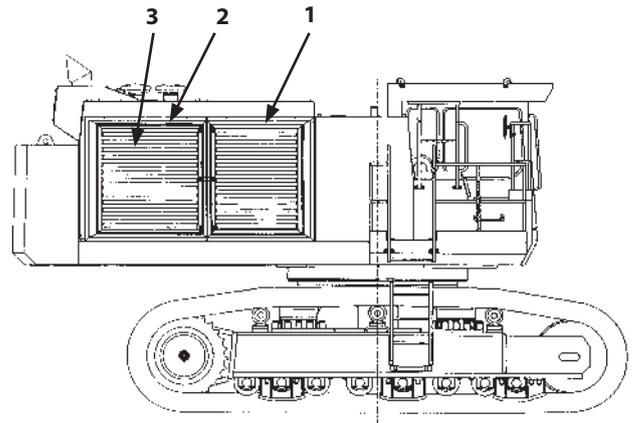
M18E-07-005

MAINTENANCE

- 6** Clean Radiator, Inter Cooler and Oil Cooler Core
--- every 500 hours

⚠ WARNING: Always wear safety glasses or goggles when using compressed air (Less than 0.2 MPa, 2 kgf/cm², 28 psi) to clean radiator (2), inter cooler (3) and oil cooler (1) cores.

IMPORTANT: High-pressure air or water can damage fins. When cleaning radiator (2), inter cooler (3) and oil cooler (1) cores with high-pressure air or water, keep the nozzle 200 mm (8 in) or more away from the core face in order not to cause any damage.



M183-07-019

Radiator (2) and oil cooler (1) are arranged in parallel and inter cooler (3) is arranged in series. Inter cooler (3) is located in the front side of radiator (2).

Clean radiator (2), inter cooler (3) and oil cooler (1) cores with compressed air (Less than 0.2 MPa, 2 kgf/cm², 28 psi) or water.

- 7** Clean Inter Cooler Front Screen
--- every 500 hours

IMPORTANT: When operating the machine in dusty environment, check the screen every day for dirt and clogging. If clogged, remove the screen and clean it.

- 8** Clean Oil Cooler Front Screen
--- every 500 hours

IMPORTANT: When operating the machine in dusty environment, check the screen every day for dirt and clogging. If clogged, remove the screen and clean it.

MAINTENANCE

H. Air Conditioner

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

 **NOTE:** * First time only.

★ Shorten maintenance interval when the machine is operated in dusty areas.

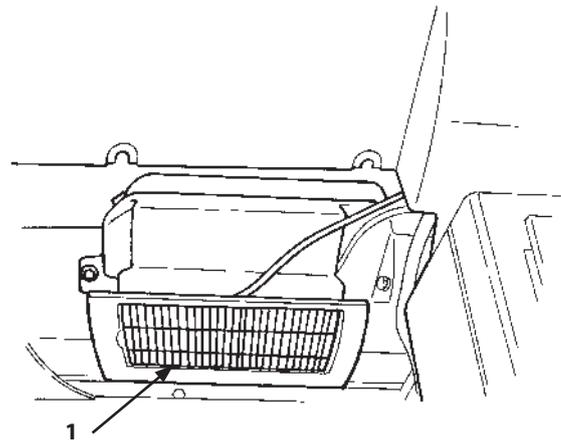
1 Recirculation Air Filter

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

IMPORTANT: Plugged recirculation air filter (1) will reduce cooling capacity of the air conditioner. Be sure to clean it periodically.

Cleaning --- as required

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



M183-01-094

Replacement --- replace per 4 cleaning

Replacement interval of recirculation air filter (1) differs depending on environmental conditions.

If the cooling capacity decreases after cleaning recirculation air filter (1), caused by filter plugging, replace it earlier than the standard interval.

MAINTENANCE

2 Ventilation Air Filter



WARNING:

- Always wear safety glasses or goggles when using compressed air (Less than 0.2 MPa, 2 kgf/cm², 28 psi) to clean filter (1).
- After installing filter (1), check that locks (2) have been engaged.

IMPORTANT: Plugged ventilation air filter (1) will reduce cooling capacity of the air conditioner. Be sure to clean it periodically.

Cleaning --- as required

1. Remove ventilation air filter (1).
2. Clean ventilation air filter (1) with compressed air (Less than 0.2 MPa, 2 kgf/cm², 28 psi) or a soft brush.
3. Engage locks (2) securely.

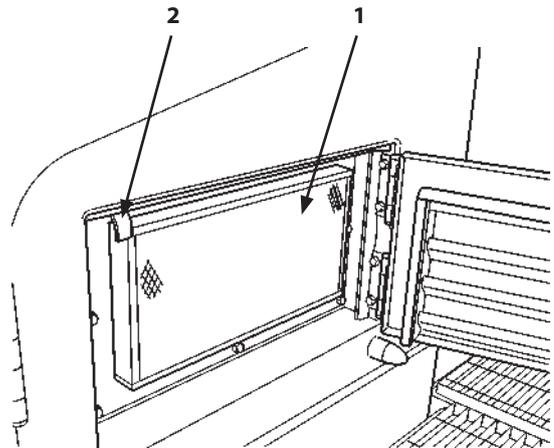
Replacement --- replace per 4 cleaning

IMPORTANT: Replacement interval of ventilation air filter (1) differs depending on environmental conditions. If the cooling capacity decreases after cleaning ventilation air filter (1), caused by filter plugging, replace it earlier than the standard interval.

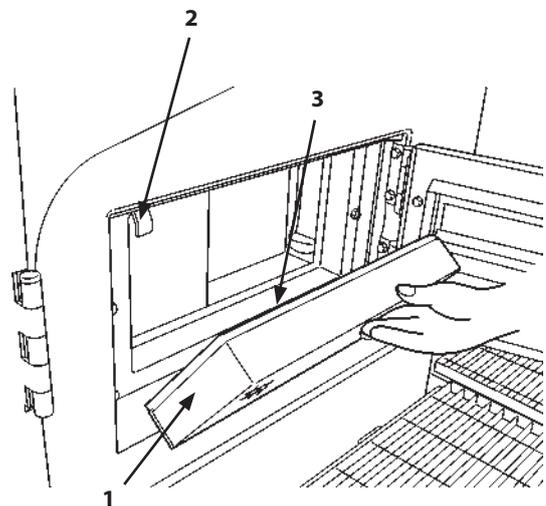
1. Remove ventilation air filter (1).

IMPORTANT: When installing filter (1), install urethane (3) inside.

2. Replace filter (1) with a new one.
3. Engage locks (2) securely.



M18E-07-001



M18E-07-002

MAINTENANCE

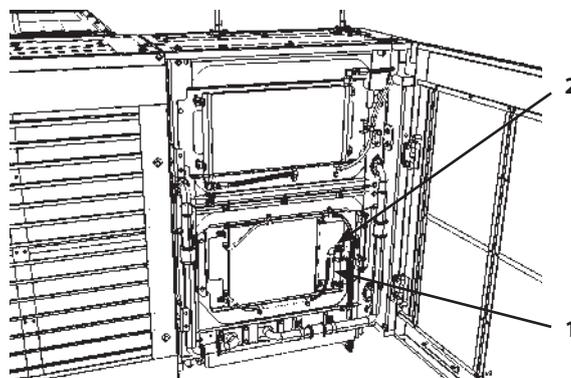
3 Check Refrigerant Quantity --- every 250 hours

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

IMPORTANT:

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

Insufficient refrigerant quantity lowers cooling effect of the air conditioner. Check the refrigerant quantity through sight glass (2) on liquid tank (1).

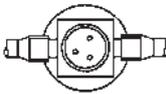
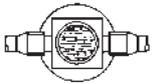


M18J-07-009

Kind of refrigerant and amount when shipping the machine

Type	Amount
HFC134a	1.15±0.05 kg

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

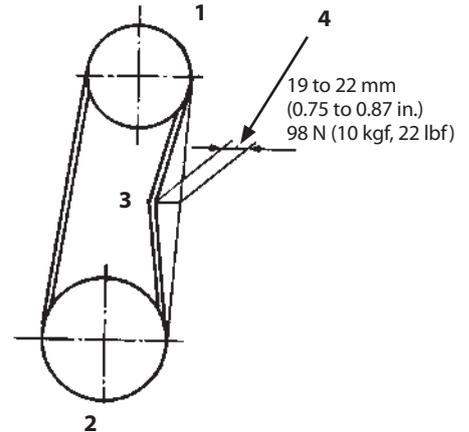
Refrigerant Quantity	Sight Glass	
Appropriate	 M114-07-090	Almost clear. Gas bubbles may be seen but will dis-appear by changing engine speed.
Insufficient	 M114-07-091	A steady stream of gas bubbles is seen in the liquid flowing from the receiver-dryer.
Scarce	 M114-07-092	No bubbles but misty.

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

MAINTENANCE

4 Check Compressor Belt Tension --- every 250 hours

Visually check belt (3) for wear. Replace it if necessary. Check belt (3) tension by depressing the midpoint between accessory drive (2) and compressor (1) pulleys with the thumb. Deflection (4) must be 19 to 22 mm (0.75 to 0.87 in.) at a depressing force of approximately 98 N (10 kgf, 22 lbf). If tension is not within specifications, loosen the bolts for the compressor mounting bracket to adjust belt tension.

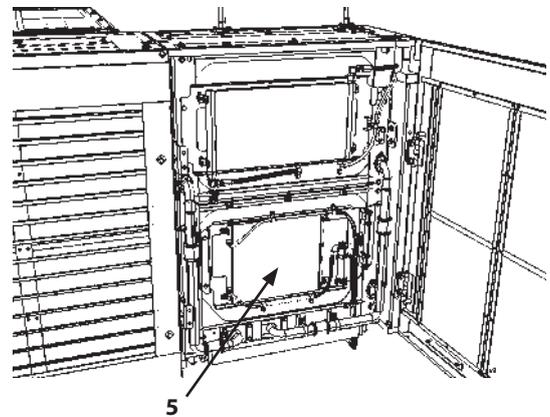


5 Clean Condenser Core --- every 500 hours

WARNING: Always wear safety glasses or goggles when using compressed air (Less than 0.2 MPa, 2 kgf/cm², 28 psi) to clean condenser (5) cores.

IMPORTANT: High-pressure air or water can damage fins. When cleaning condenser (5) cores with high-pressure air or water, keep the nozzle 200 mm (8 in) or more away from the core face in order not to cause any damage.

Open the cover. Condenser (5) is located in series with the oil cooler. Clean condenser (5) cores with high-pressure air or water.



M113-07-071

M18J-07-009

MAINTENANCE

6 Check Tightening Torque

--- every 250 hours

--- (first time after 50 hours)

Check the tightness of mounting bolts, hose connections and fittings after first 50 hours then every 250 hours. Tighten to torque specifications if any are loose.

Torque Specifications for Hose Connections:

Wrench Size (mm)	Tightening Torque		
	N·m	kgf·m	lbf·ft
19	12 to 15	1.2 to 1.5	9 to 11
24	20 to 25	2.0 to 2.5	15 to 18
27	30 to 35	3.0 to 3.5	22 to 26

Torque Specifications for Compressor Mounting Bolts:

Wrench Size (mm)	Tightening Torque		
	N·m	kgf·m	lbf·ft
10	25 to 29	2.5 to 2.9	18 to 21

Torque Specifications for Liquid Tank:

Wrench Size (mm)	Tightening Torque		
	N·m	kgf·m	lbf·ft
10	8 to 12	0.8 to 1.2	6 to 9

Torque Specifications for Hose Connections:

Connecting Parts	Tube Size or Bolt Size	Tightening Torque		
		N·m	(kgf·m)	(lbf·ft)
Nut Type	8 mm Dia Tube	12 to 15	(1.2 to 1.5)	(9 to 11)
	1/2 in. Dia Tube	20 to 25	(2.0 to 2.5)	(15 to 18)
	5/8 in. Dia Tube	30 to 35	(3.0 to 3.5)	(22 to 26)
Block Joint	Receiver M6 Bolt	4 to 7	(0.4 to 0.7)	(3 to 5)
	Others M6 Bolt	8 to 12	(0.8 to 1.2)	(6 to 9)

MAINTENANCE

7

Seasonal Maintenance

Preseason --- once a year

Off-season --- once a week



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

Preseason maintenance

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

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

Off-season maintenance

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

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

MAINTENANCE

I. Electrical System

Parts		Quantity	Interval (hours)					
			10	50	100	250	500	1000
1. Battery	Check Electrolyte Level	2	Every month					
	Check Electrolyte Specific Gravity	2	Every month					
2. Replacing Fuses		-	As required					
3. Check Power Source Terminal		-	As required					
4. Check Electrical Cables and Wire Harnesses		-						

⚠ WARNING: Improper radio communication equipment and associated parts, and/or improper installation of radio communication equipment effects the machine's electronic parts, causing involuntary movement of the machine. Also, improper installation of electrical equipment's may cause machine failure and/or a fire on the machine.

Be sure to consult your authorized dealer when installing a radio communication equipment or additional electrical parts, or when replacing electrical parts.

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

Never allow to wash the electric parts in the machine by water. Example: harness, control box and relay box etc.

MAINTENANCE

1 Batteries

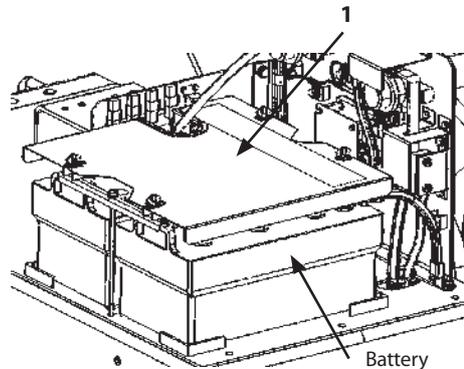


WARNING:

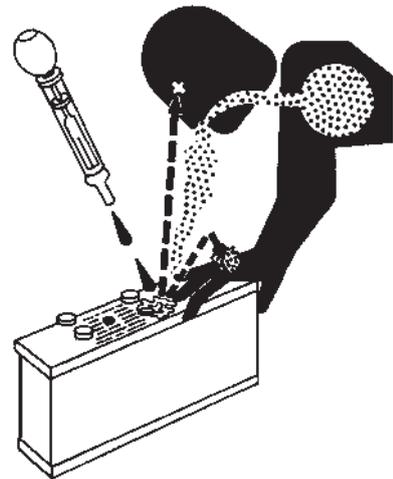
- Battery gas can explode. Keep sparks and flames away from batteries. Use a flashlight to check the battery electrolyte level.
 - Do not leave cover (1) removed. Do not keep tools, metals or flammable materials around the battery or inside the battery room. If a metal tool is placed across the battery terminal, sparks may be created, possibly resulting in fire and/or explosion.
 - Do not continue to use or charge the battery when electrolyte level is lower than specified. Explosion of the battery may result.
 - Sulfuric acid in battery electrolyte is poisonous. It is strong enough to burn skin, eat holes in clothing, and cause blindness if splashed into the eyes.
 - Never check the battery charge by placing a metal object across the posts. Use a voltmeter or hydrometer.
 - Always remove the grounded (-) battery clamp first and replace it last.
- Avoid hazard by:
- Charge batteries in a well-ventilated area.
 - Wearing eye protection and rubber gloves.
 - Avoiding breathing fumes when electrolyte is added.
 - Avoiding spilling or dripping electrolyte.
 - Using proper booster battery starting procedures.



SA-032



M18J-03-006



SA-036

MAINTENANCE

If you spill acid on yourself:

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

If acid is swallowed:

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

IMPORTANT:

- If the battery is used with the electrolyte level lower than the specified lower level, the battery may deteriorate quickly.
- Do not refill electrolyte more than the specified upper level. Electrolyte may spill, damaging the painted surfaces and/or corroding other machine parts.



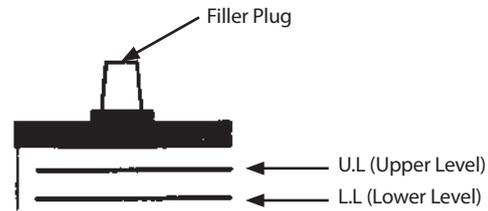
NOTE: In case electrolyte is refilled more than the specified upper level line or beyond the bottom end of the sleeve, remove the excess electrolyte until the electrolyte level is down to the bottom end of the sleeve using a pipette. After neutralizing the removed electrolyte with sodium bicarbonate,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

MAINTENANCE

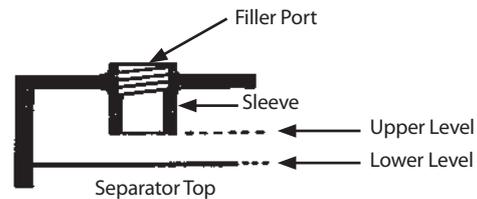
Electrolyte Level Check --- every month

Check the electrolyte level at least once a month.

1. Park the machine on a firm, level surface and stop the engine.
2. Check the electrolyte level.
 - 2.1 When checking the level from the battery side:
Clean around the level check lines with a wet towel. Do not use a dry towel. Static electricity may be developed, causing the battery gas to explode. Check if the electrolyte level is between U.L (Upper Level) and L.L (Lower Level). In case the electrolyte level is lower than the middle level between the U.L and L.L, immediately refill distilled water or commercial battery fluid. Be sure to refill with distilled water before recharging (operating the machine). After refilling, securely tighten the filler plug.
 - 2.2 When impossible to check the level from the battery side or no level check mark is indicated on the side:
After removing the filler plug from the top of the battery. Check the electrolyte level by viewing through the filler port. It is difficult to judge the accurate electrolyte level in this case. Therefore, when the electrolyte level is flush with the U.L, the level is judged to be proper. Then, referring to the right illustrations, check the level. When the electrolyte level is lower than the bottom end of the sleeve, refill with distilled water or commercial battery fluid up to the bottom end of the sleeve. Be sure to refill with distilled water before recharging (operating the machine). After refilling, securely tighten the filler plug.
 - 2.3 When an indicator is available to check the level, follow its check result.
3. Always keep around the battery terminals clean to prevent battery discharge. Check terminals for loose and/or rust. Coat terminals with grease or petroleum jelly to prevent corrosion build up.



M146-07-109



M146-07-110

Proper



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

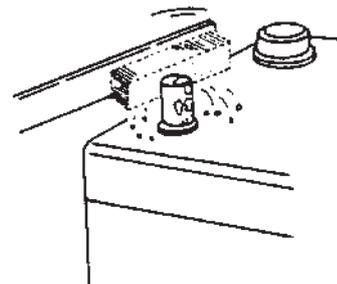
M146-07-111

Lower



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

M146-07-112



M409-07-072

MAINTENANCE

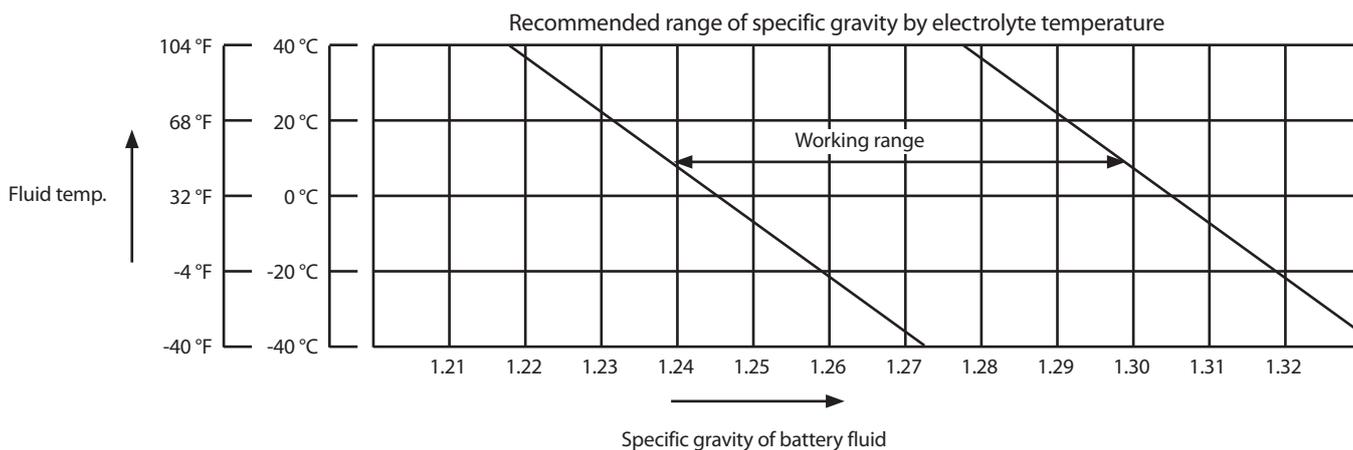
Check electrolyte specific gravity --- every month

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

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

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

Check the electrolyte specific gravity in each battery cell. The lowest limit of the specific gravity for the electrolyte varies depending on electrolyte temperature. The specific gravity should be kept within the range shown below. Charge the battery if the specific gravity is below the limit.



Replace Batteries

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

If 1 of 2 batteries in a 24-volt system has failed but the other is still good, replace all the batteries together with new ones of the same type. For example, replace a failed maintenance-free battery with a new maintenance-free battery. Different types of batteries may have different rates of charge. This difference could overload one of the batteries and cause it to fail.

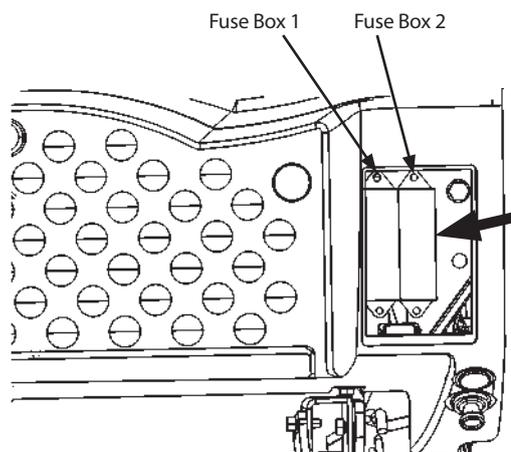
MAINTENANCE

2 Replacing Fuses --- as required

If any electrical equipment fails to operate, first check the fuses. The fuse box is located in the rear cover installed on the rear in the cab. A fuse location/specification decal is attached to the fuse box cover.

Remove the fuse box cover by lifting it upward. Spare fuses are located on the underside of the cover.

IMPORTANT: Be sure to install fuses with correct amperage ratings to prevent electrical system damage due to overload.



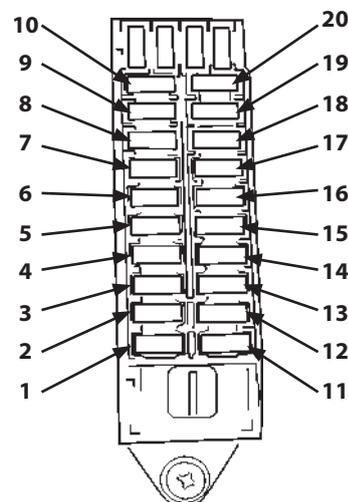
M1J1-01-021

FUSE BOX1

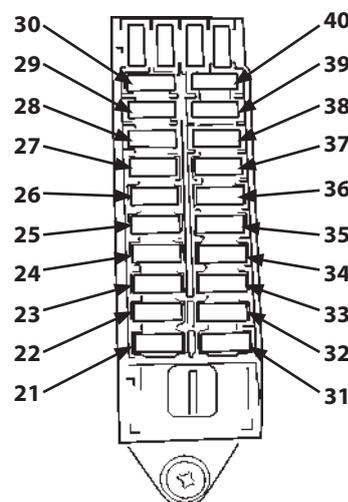
10- BACK LIGHT	10A	20- ROOM LAMP	5A
9- SAFETY RELAY	5A	19- LIGHTER	10A
8- OPT. 6	10A	18- HORN	10A
7- OPT. 5	10A	17- RADIO	5A
6- 12 V UNIT	15A	16- PUMP. M. AR.	5A
5- MCF PWM	20A	15- AUTO LUB.	15A
4- TRAVEL AR.	5A	14- HEATER	20A
3- STOP SOL.	5A	13- WIPER	20A
2- AIRCON	5A	12- LIGHT 2	20A
1- BATT. RELAY	5A	11- LIGHT 1	20A

FUSE BOX2

30- DLU/DL.	5A	40- SAT. MAIN	5A
29- OPT. 1	20A	39- RADIO BU	5A
28- OPT. 2	20A	38- ENTRANCE	5A
27- OPT. 3	10A	37- SAT. POW. ON	5A
26- OPT. 4	10A	36- MMS POW. ON	5A
25- DLU MAIN	5A	35- DLU POW. ON	5A
24- MON. ICF MAIN	5A	34- MON.ICF POW. ON	5A
23- MCF MAIN	5A	33- MCF POW. ON	5A
22- MMS MAIN	5A	32- ECM POW. ON	5A
21- ECM MAIN	15A	31- PREHEAT.	5A



M1GR-01-003

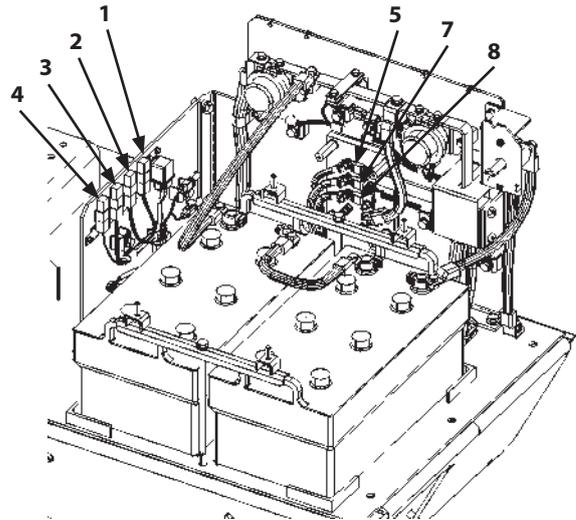


M1GR-01-003

MAINTENANCE

Fusible Link

Fusible link are located near by batteries.
 Fusible link protects electric main circuit against excessive current.
 If fusible link is melted and disconnected by short circuit, see your authorized dealer.



Fusible Link Connection Table

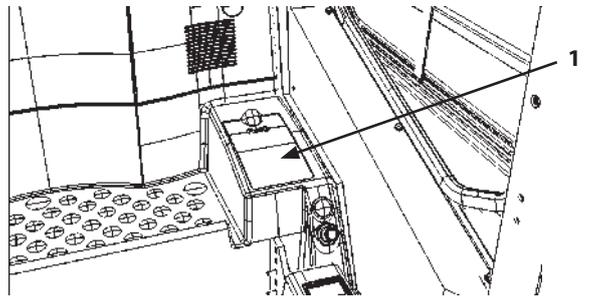
Fuse No.	Amp	
1	45A	Key Switch Fuse box ; Fuse No. 1, 2 , 21
2	75A	Fuse box ; Fuse No. 11 to 14, 24
3	75A	Fuse box ; Fuse No. 4 to 9, 25, 26
4	45A	Stop Solenoid Relay
5	100A	Alternator
7	125A	Air Heater Relay 2
8	125A	Air Heater Relay 1

M18J-07-057

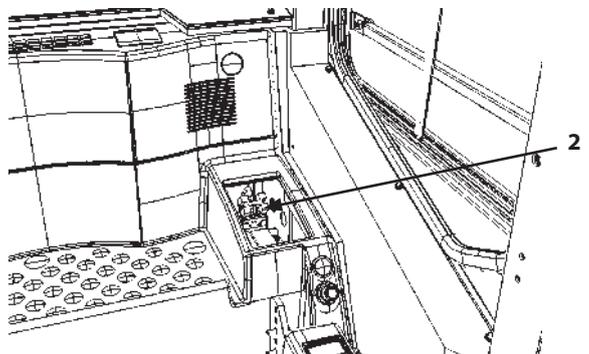
MAINTENANCE

3 Check Power Source Terminal --- as required

- 12 Volts Terminal
 1. Remove cover (1) located behind the operator's seat.
 2. 12 volts terminal (2) is located in cover (1). Use this terminal (2) to power electrical devices of 12 volts rating. Fuse for this terminal (2) is provided with a 5 ampere fuse.



M18J-07-012



M18J-07-013

MAINTENANCE

4 Check Electrical Cables and Wire Harnesses for Short Circuits

--- daily



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

To avoid this hazard:

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

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

MAINTENANCE

Table 1. Electrical Cables and Wire Harnesses

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

1



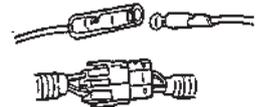
M115-07-152

2



M115-07-153

3



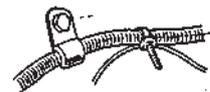
M115-07-154

4



M115-07-155

5



M115-07-156

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

Fig. 1

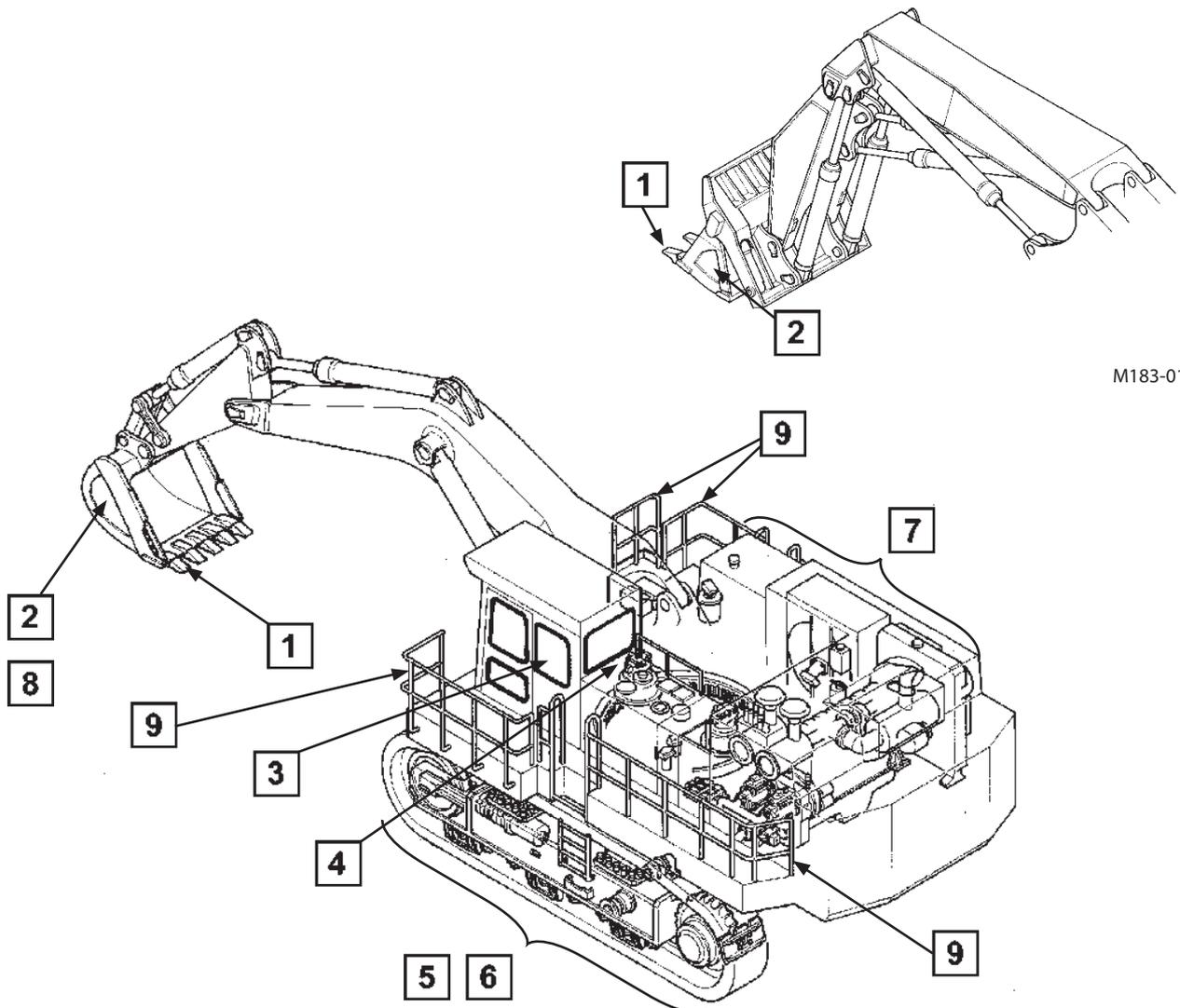
MAINTENANCE

J. Miscellaneous

Parts		Quantity	Interval (hours)							
			10	50	100	250	500	1000	2000	4000
1. Check Bucket Teeth	L/D	6								
	B/H	5								
2. Change Bucket		1	As required							
3. Seat Belt	Check	1								
	Replacement	1	At least once every 3 years							
4. Check Windshield Washer Fluid Level		1	As required							
5. Check and Adjust Track Sag		2								
6. Check Auto-Lubrication System		1								
7. Check Tightening Torque of Bolts and Nuts		—		*						
8. Check O-rings in Bucket Joints		—								
9. Check Handrails		—								★

 NOTE: * First time only.

★ Replace it every 4000 hours or 2 years whichever comes first.



M183-01-058

M18J-03-001

MAINTENANCE

1 Check Bucket Teeth --- daily

Backhoe

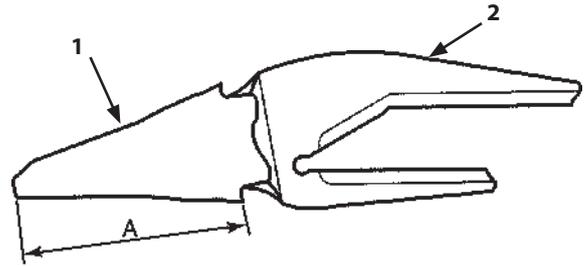
Check the bucket teeth for wear and looseness

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

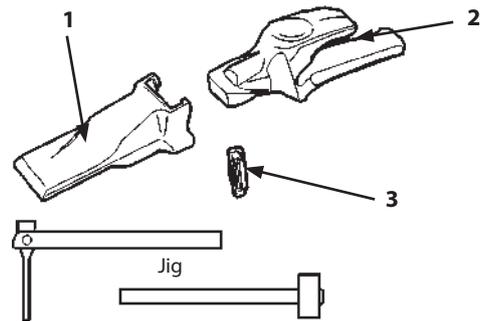
Dimension A in mm (in)

Type	Parts No.	Dimension A mm (ft, in.)	
		New	Limit of Use
Backhoe (Std.)	4255718	315 (1' 0")	153 (6")
Backhoe (BE, Rock)	4406319	359 (1' 2")	175 (7")

IMPORTANT: Be sure to replace a tooth point (1) before its wear exceeds the limit as the exposed adapter (2) nose caused by the worn point is worn out quickly, resulting in tooth point (1) breakage or slipping off.



M18C-07-073



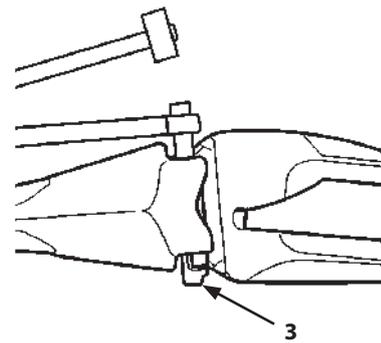
M113-07-102

Replacing Procedure

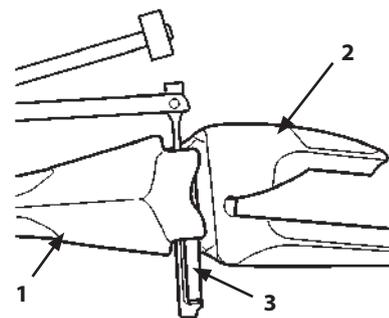
! WARNING: Guard against injury from flying pieces of metal. Wear goggles or safety glasses and safety equipment appropriate to the job.

Removal

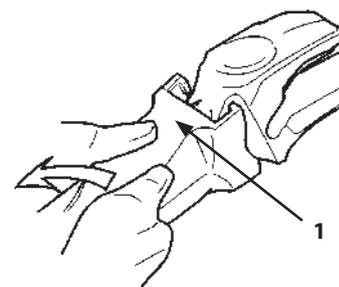
1. Preparations for removing tooth point (1)
Hit the left and right top ends and the left and right lugs of tooth point (1) alternately with hammer to knock off pebbles, soil, etc., stuck in the gap between tooth point (1) and adapter (2).
2. Removing lock pin (3)
Remove pebbles, dirt, etc., completely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



M113-07-103



M113-07-104

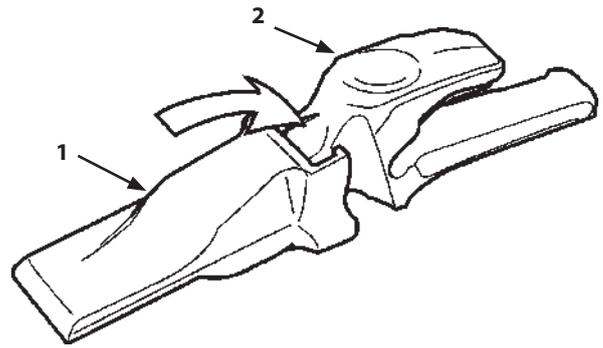


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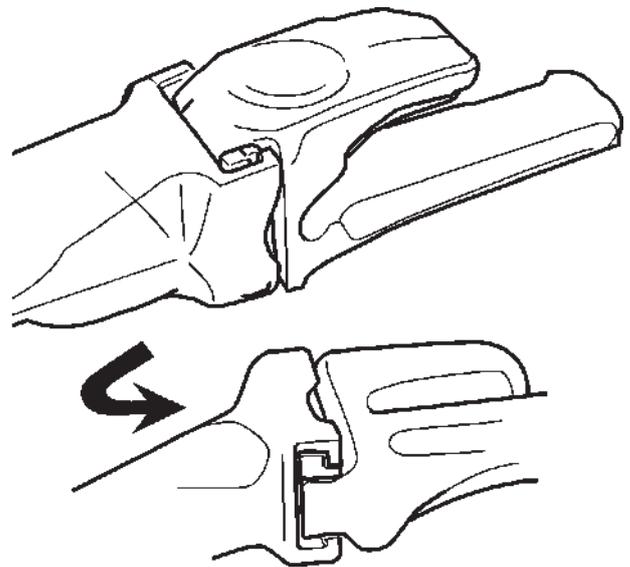
MAINTENANCE

Installation

1. Mounting tooth point (1)
Clean the top end of adapter (2) nose. If pebbles, dirt, etc., are stuck to adapter (2) nose, tooth point (1) will not insert properly and lock pin (3) cannot be driven in.
Also check that lock pin (3) has no cracks.
Insert tooth point (1) slowly while turning it to the right.
2. Insert lock pin (3).
Be sure to check the direction of lock pin (3).

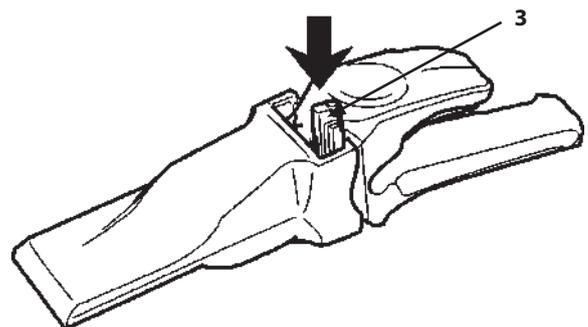


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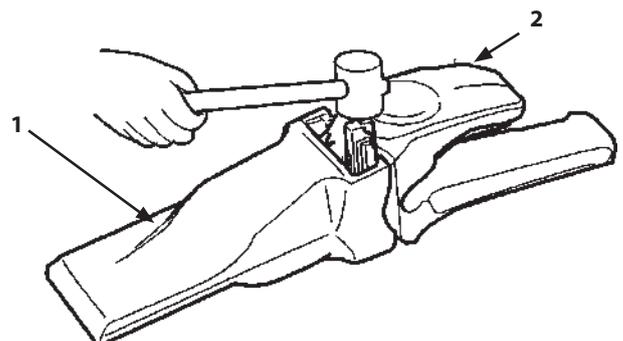


M113-07-107

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



M113-07-108



M113-07-109

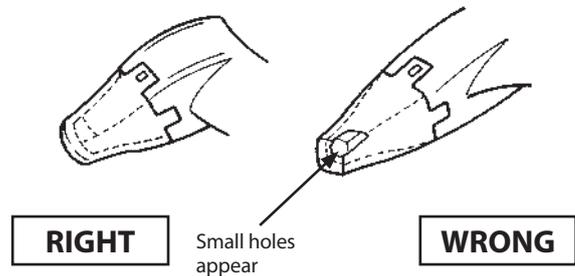
MAINTENANCE

Loading Shovel

Check bucket teeth for wear and looseness

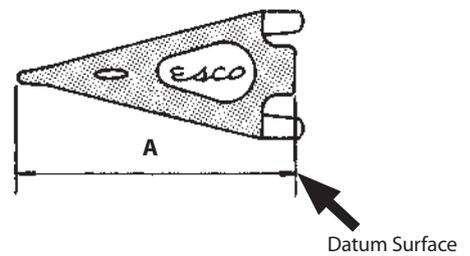
Replace teeth if tooth wear exceeds the designated service limit shown below.

Part No.	Dimension A in mm (ft-in)	
	New	Limit of use
4484175	440 (1'5")	236 (9.3")



M112-07-089

IMPORTANT: Be sure to replace a tooth point before its wear exceeds the limit as the exposed adapter nose caused by the worn point is worn out quickly, resulting in tooth point breakage or slipping off.



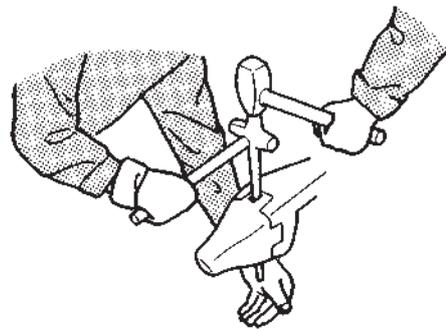
M112-07-090

Replacing procedure

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

⚠ CAUTION: Use thick gloves.

1. Use a hammer and pin removing tool to drive out locking pin.
2. Remove the tooth point.



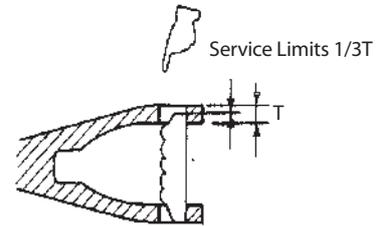
M112-07-091

MAINTENANCE

3. Check the pin lock and rubber lock for wear or cracks and replace with a new one if necessary.

(a) Pin lock

The wear limit of the pin lock is 1/3 the tooth point thickness, as illustrated in the right figure. Earlier replacement of the pin lock is recommended.



(b) Rubber lock

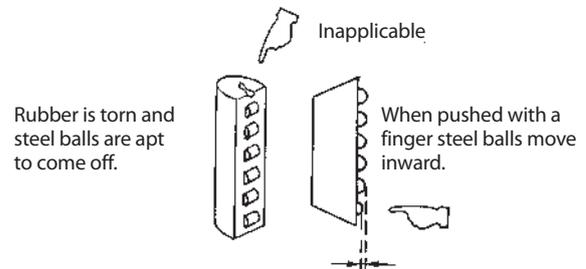
When a tooth point is removed, and if steel balls in the rubber lock come off or seem ready to come off, this indicates that the rubber lock has reached its service limit. Replace it with a new one.

M112-07-092

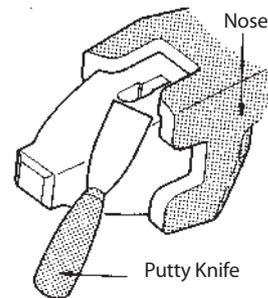
4. Check that the nose and tooth point joint surfaces are free from extrusions like scale, flash and so on. If found, remove extrusions from them with a putty knife, wire brush or chisel.

5. Insert the rubber lock into the nose hole.

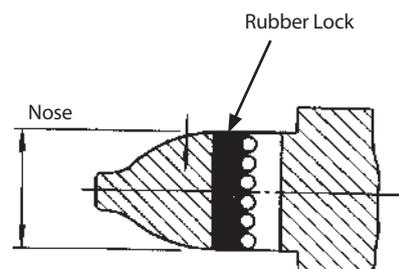
IMPORTANT: Do not apply grease onto the rubber lock. If grease is applied, the pin lock will slip out.



M112-07-093



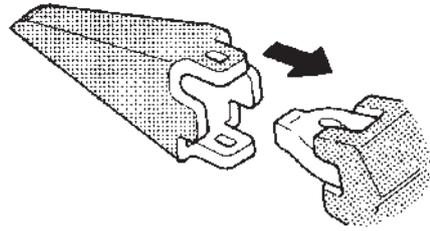
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M112-07-095

MAINTENANCE

6. Install the tooth point onto the nose.



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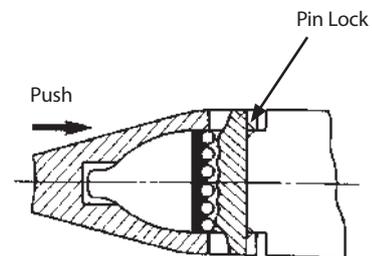
7. Drive in pin locks

Push the tooth point onto the nose as illustrated.

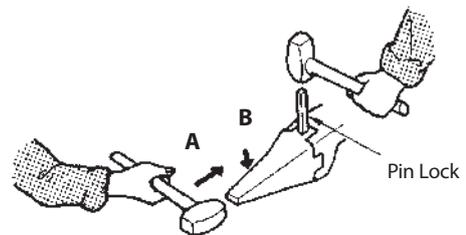
Drive in the pin lock with a sledge hammer.

Drive in the pin lock from the top until it is 4 to 5 mm below the tooth point surface. Then, hit it up from the reverse side to flatten both ends. If this process is not followed correctly, the rubber lock and pin lock may easily be knocked off pitch.

When the pin lock is hard to drive in, tap the tip end of the tooth point from A direction a few times. Then try to drive in the pin lock again. After the pin lock is seated, tap the tip end of the tooth point from direction B to check if the pin lock is securely seated.

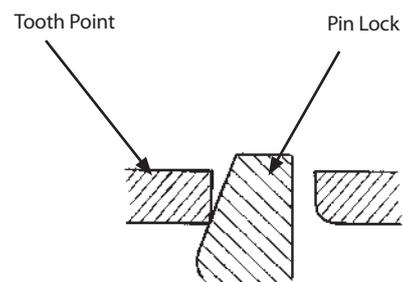


M112-07-097



M112-07-098

IMPORTANT: When the tooth point comes in contact with the pin lock, as shown in the right figure, the service life of the nose has finished. Consult your authorized dealer.



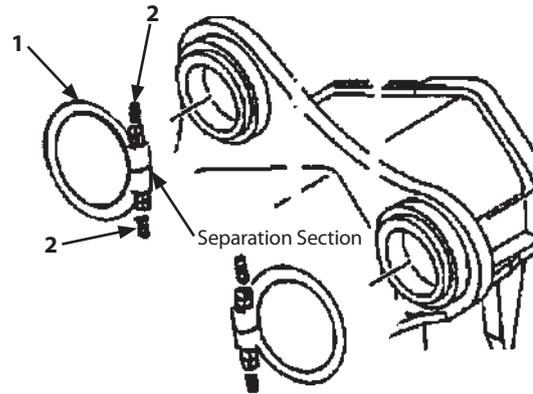
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MAINTENANCE

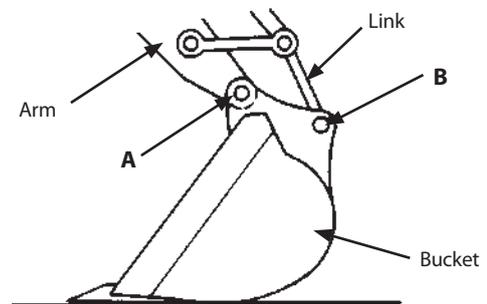
2 Change Bucket (Backhoe)

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

1. Park the machine on a firm, level surface. Lower the bucket to the ground and position it with the flat surface resting on the ground. Be sure the bucket will not roll when the pins are removed.
2. Remove O-rings (1) after loosening nut (2).
3. Remove bucket pins A and B to separate the arm and bucket. Clean the pins and pin bores. Apply sufficient grease to the pins and pin bores.
4. Align the arm and alternate bucket. Be sure the bucket will not roll.
5. Install bucket pins A and B.
6. Secure pins A and B with bolts and stoppers.
7. Adjust bucket linkage clearance for pins A. See the Adjusting Bucket Linkage procedure on the next page.
8. Tighten nut (2) after installing O-rings (1) on the bucket boss A and B. And cut off the bolt extended from the nut. Refer to the check O-rings (1) in bucket joints of Chapter 7.
9. Apply grease to pin joints A and B.
10. Start the engine and run at slow idle. Slowly operate the bucket in both directions to check for any interference in bucket movement. Do not operate a machine that has any movement interference. Correct interference problem.



M1J1-07-074



M104-07-063

MAINTENANCE

3 Check and Replace Seat Belt

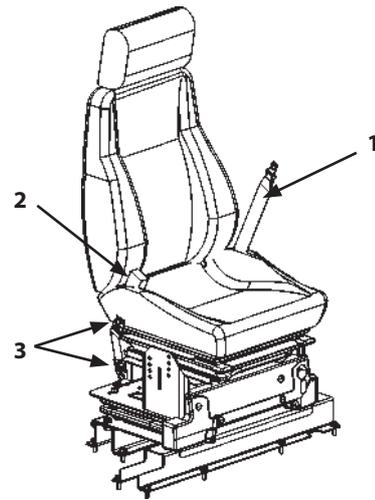
Check --- daily

Replacement --- every 3 years

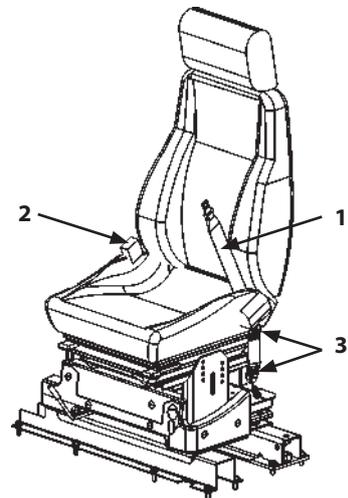
Always maintain seat belt (1) in a functional condition and replace when necessary to ensure proper performance.

Prior to operating the machine, thoroughly examine belt (1), buckle (2) and attaching hardware (3). If any item is damaged or materially worn, replace seat belt (1) or component before operating the machine.

We recommend that seat belt (1) is replaced every 3 years regardless of its apparent condition.



M1U1-07-008



M1U1-07-009

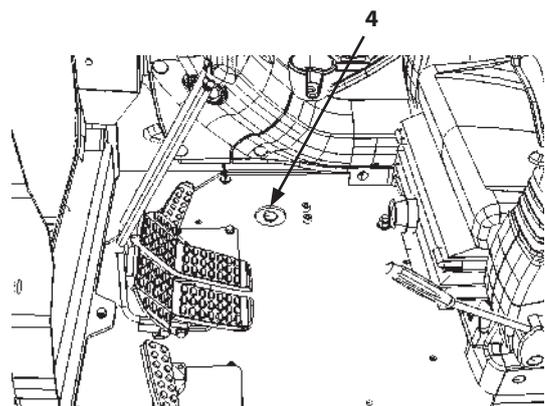
4 Check Windshield Washer Fluid Level

--- as required

Remove cap (4) and check fluid in windshield washer tank under the floor plate.

If the fluid level is low, remove cap (4) and add fluid via the opening.

During winter season, use all season windshield washer fluid which will not freeze.



M18J-07-014

MAINTENANCE

5 Check Track Sag --- every 50 hours

WARNING: Be sure to place blocks under the machine frame to support the machine when one track is raised off ground.

Swing the upperstructure 90° and lower the bucket to raise the track off the ground as shown.

Keep the angle between the boom and arm 90 to 110° and position the bucket's round side on the ground. Place blocks under the machine frame to support the machine. Rotate the raised track in reverse two full rotations and then forward two full rotations.

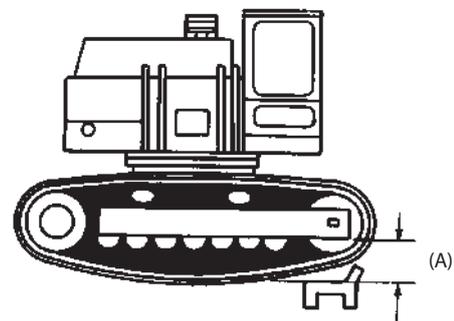
Measure distance (A) at the middle of the track frame from the bottom of the track frame to the back face of the track shoe.

Track sag specification 530 to 590 mm (1' 9" to 1' 11")

IMPORTANT: Check track sag after thoroughly removing soil stuck on the track area by washing.



M145-05-007



M113-07-083

Adjust Track Sag

Precautions for Adjusting Track Sag

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

When operating the machine after it has been stored for a long time or its track adjuster cylinder hose or piping has been replaced, first push the right travel lever forward to extend adjuster cylinder, and then add grease to the fitting to tighten the tracks.

MAINTENANCE

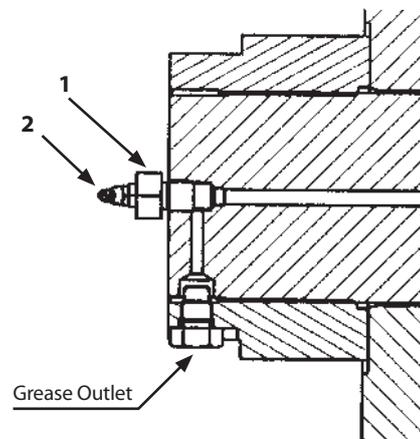
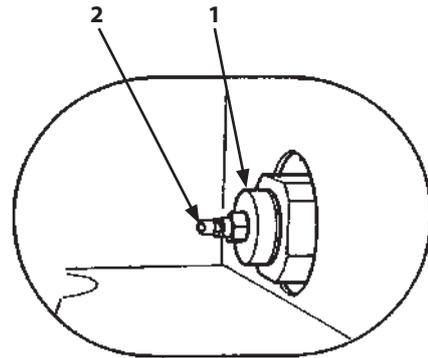
Loosen the Track

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

IMPORTANT: When gravel or mud is packed between sprockets and track links, remove it before loosening.

1. To loosen the track, slowly turn valve (1) counterclockwise using long socket 24 mm; grease will escape from the grease outlet.
2. Between 1 to 1.5 turns of valve (1) is sufficient to loosen the track.
3. If grease does not drain smoothly, slowly rotate the raised track.
4. When proper track sag is obtained, turn valve (1) clockwise and tighten to 90 N·m (9.0 kgf·m, 65 lbf·ft).

M116-07-093



M17F-07-002

Tighten the Track

- ⚠ WARNING:** It is abnormal if the track remains tight after turning valve (1) counterclockwise or if the track is still loose after charging grease to fitting (2). In such cases, NEVER ATTEMPT TO DISASSEMBLE the track or track adjuster, because of dangerous high-pressure grease inside the track adjuster. See your authorized dealer immediately.

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

Replace the Track

- ⚠ WARNING:** Special training and expertise are needed to replace the track.
NEVER ATTEMPT to replace the track yourself.
Be sure to ask your authorized dealer for track replacement.

MAINTENANCE

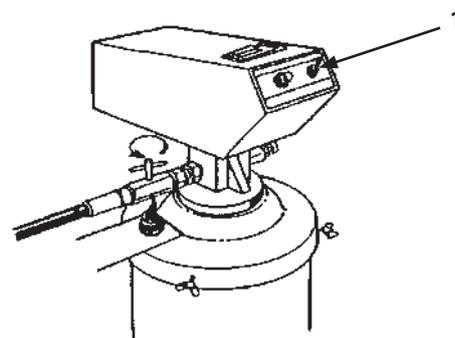
6 Auto-Lubrication System

The machine is equipped with lubrication system which automatically greases the front joint pins.

NOTE: *Automatic greasing is not applied to the backhoe bucket pins, swing bearing, fan pulley and tension pulley. Manually grease these fittings. (See "A. GREASING" in the MAINTENANCE section.)*

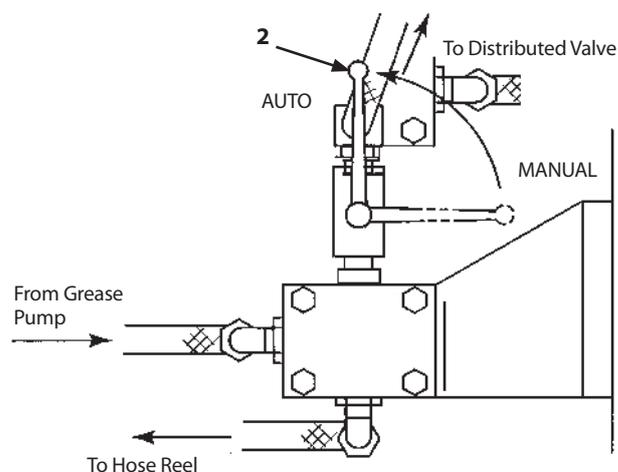
Automatic Greasing

M111-07-011



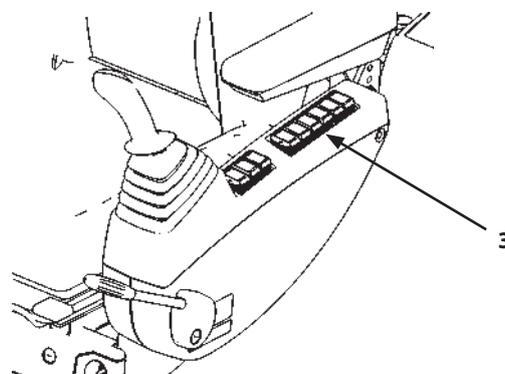
IMPORTANT:

- **The auto lubrication system does not operate unless switch (1) located on the grease pump is turned ON. If the system fails to operate, be sure to check if switch (1) is turned ON.**
- **Confirm that lubrication mode indicator (4) shows AUTO position before turning auto/manual selector valve lever (2) to the AUTO position. If lubrication mode indicator (4) shows MANUAL position, auto lubrication indicator (5), located on the monitor, will come on and the lubricator will continuously send grease (for a certain length of time), resulting in overcharging.**

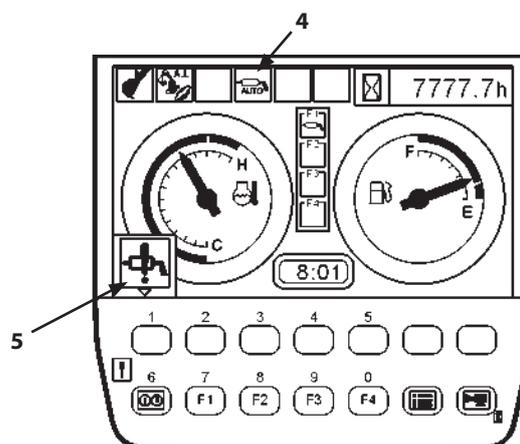


M18J-07-024

1. Pull auto/manual selector valve lever (2), located inside the greasing compartment, to the AUTO position.
2. Push lubrication mode switch (3), located on the left console, to the AUTO position.



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M18J-07-015

MAINTENANCE

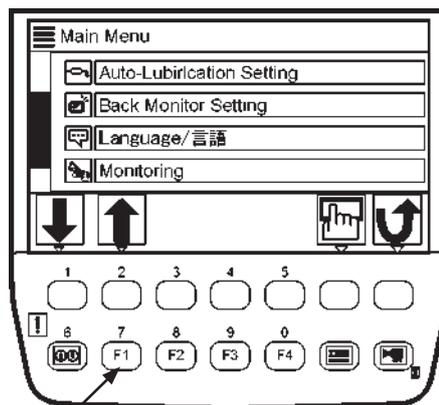
3. Press F1 key (7) on the monitor to display main menu screen. Select automatic greasing interval by using keys 1 and 2. The machine shipped from the factory is set with an interval of 20 minutes. Select the automatic greasing interval for your request. Auto lubrication indicator (5), located on the monitor, will come on if any of the following trouble occurs in the auto-lubrication line. Troubleshoot the auto-lubrication line in the order stated below.

- Grease can is empty.
If indicator (5) comes ON, first check if the grease can is empty. Replace the grease can as necessary.
- Lubrication mode switch (3) is in the MANUAL position.
Check if lubrication mode indicator (4) shows AUTO position. If not, change AUTO position using lubrication mode switch (3).
- Distribution valves and/or greasing lines are restricted.
If indicator (5) still does not go OFF, the probable cause is a restriction in the distribution valves and/or in the greasing lines. Stop auto lubrication and manually grease the fittings. Contact your authorized dealer for further inspection and repair.

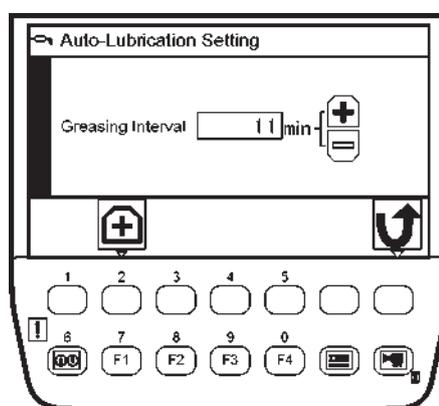
 **NOTE:** Auto lubrication indicator (5) comes ON for approximately 2 seconds when the key switch is turned to the ON position. If not, replace the bulb.

IMPORTANT: After the day's operation, release the remaining pressure from the grease pump to protect it from being damaged, as follows;

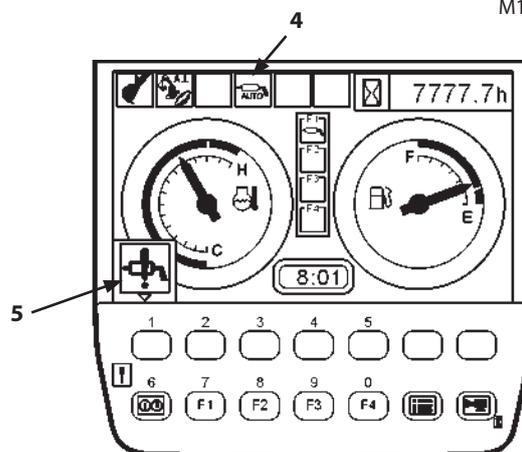
4. Loosen check valve (6) or pull the grease gun to release the remaining pressure from the grease pump and hose on the hose reel. Some pressurized grease will come out from check valve (6) or from the grease gun.



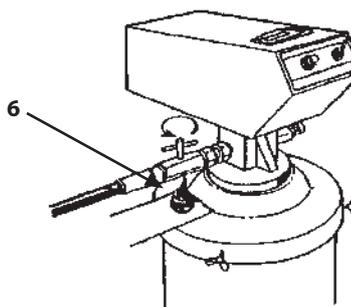
M18J-07-016E



M18J-07-017E



M18J-07-015



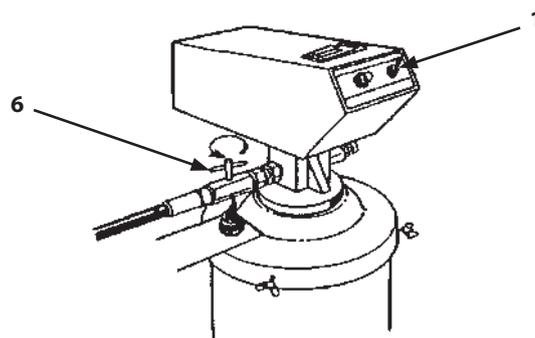
M111-07-011

MAINTENANCE

Manual Greasing

The lubricator is used in manual greasing. Manual greasing is used to grease the bucket pins, swing bearing, fan pulley, tension pulley, and to adjust track sag. It is also used to grease front joint pins in case the auto lubrication system fails.

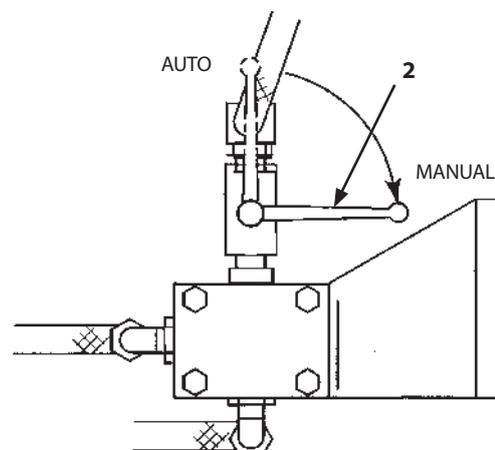
See "A. GREASING" in the MAINTENANCE section for greasing the bucket pins and swing bearing. See "J. MISCELLANEOUS" in the MAINTENANCE section.



M111-07-011

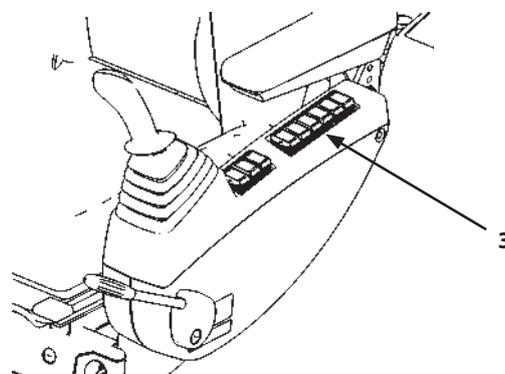
IMPORTANT: Manual greasing cannot be performed unless switch (1) located on the grease pump is turned ON. If manual greasing cannot be performed, be sure to check if switch (1) is turned ON.

1. Turn on switch (1) located on the grease pump.
2. Push down auto/manual selector valve lever (2), located inside the greasing compartment, to the MANUAL position.
3. Push lubrication mode switch (3), located on the left console, until lubrication mode indicator (4) shows the MANUAL position. Auto lubrication indicator (5), located on the monitor, will come ON. This is normal.

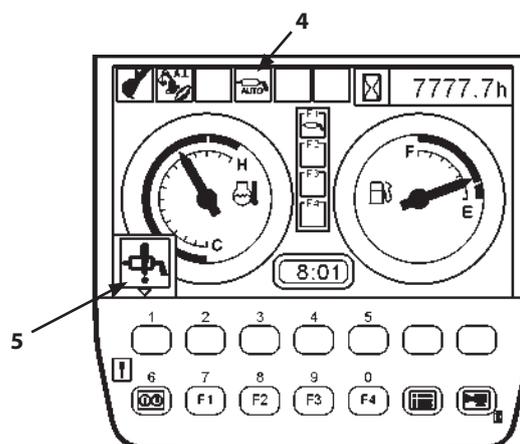


M18J-07-025

NOTE: Lighting of auto lubrication indicator (5) means that the auto lubrication system is deactivated because lubrication mode switch (3) is turned to the MANUAL position.



M1J1-03-001



M18J-07-015

MAINTENANCE

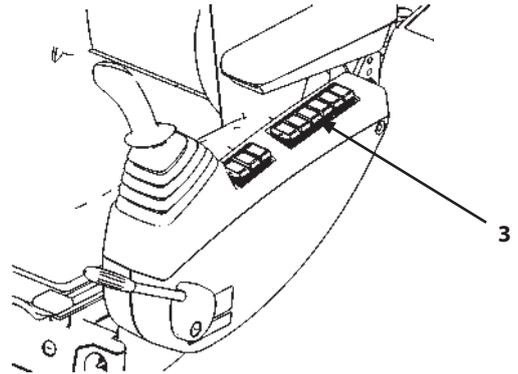
- Use the lubricator and grease gun to add grease to each greasing point.

 **NOTE:**

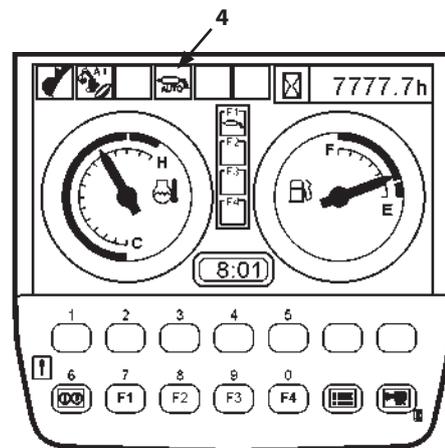
- See "A. GREASING" in the MAINTENANCE section for how to use the lubricator.
- Greasing points, other than bucket pins, swing bearing, and track adjusters, can be lubricated via the fittings provided on the greasing blocks located between the distribution valves and each greasing point.

IMPORTANT: After the day's operation, release the remaining pressure from the grease pump to protect it from being damaged, as follows:

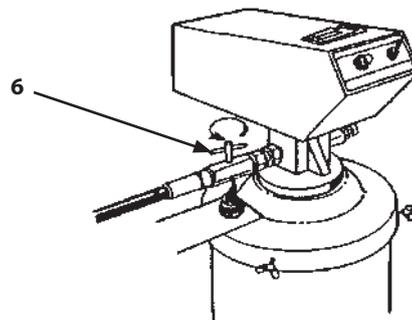
- Push lubrication mode switch (3) until lubrication mode indicator (4) shows OFF position.
- Loosen check valve (6) or pull the grease gun to release the remaining pressure from the grease pump and hose on the hose reel. Some pressurized grease will come out from check valve (6) or from the grease gun.



M1J1-03-001



M18J-01-004



M111-07-011

MAINTENANCE

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

Check tightness after first 50 hours then every 250 hours. Tighten to torque shown if any are loose. Bolts and nuts should be replaced with 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.

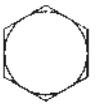
Torque Specifications

No.	Descriptions	Bolt Dia mm	Q'ty	Wrench Size (mm)	Torque			
					N-m	(kgf-m)	(lbf-ft)	
1	Engine cushion rubber mounting bolt (F)	22	2	32	750	(75)	(550)	
	Engine cushion rubber mounting bolt (R)	33	2	50	2600	(260)	(1920)	
2	Engine bracket mounting bolt (R)	27	12	41	1050	(105)	(770)	
3	Radiator mounting bolt	27	4	41	1050	(105)	(770)	
4	Hydraulic oil tank mounting bolt	20	8	30	550	(55)	(410)	
5	Fuel tank mounting bolt	24	8	36	950	(95)	(700)	
6	ORS fittings for hydraulic hoses and piping	1 - $\frac{7}{16}$ - 12UNF		41	210	(21)	(155)	
		1 - $\frac{11}{16}$ - 12UNF		50	350	(35)	(260)	
7	Pump transmission mounting bolt	$\frac{1}{2}$ - 13 UNC		19	120	(12)	(89)	
8	Pump mounting bolt (Main)	20	12	* 17	400	(40)	(295)	
	Pump mounting bolt (Fan)	16	4	* 14	210	(21)	(155)	
9	Gear pump mounting bolt	14	2	22	140	(14)	(103)	
10	Control valve mounting bolt (Main)	20	4	30	400	(40)	(295)	
	Control valve mounting bolt (Swing)	16	3	24	270	(27)	(200)	
11	Swing device mounting bolt	27	16x2	41	1400	(140)	(1030)	
12	Swing motor mounting bolt	12	12x2	19	90	(9.0)	(66)	
13	Battery mounting bolt	12	2	19	35	(3.5)	(26)	
14	Cab mounting bolt	16	6	24	210	(21)	(155)	
15	Cab-bed mounting bolt	12	27	19	110	(11)	(81)	
16	Swing bearing mounting bolt to upperstructure	36	52	55	2800	(280)	(2070)	
	Swing bearing mounting bolt to undercarriage	36	50	55	2800	(280)	(2070)	
17	Travel device mounting bolt	27	52	41	1400	(140)	(1030)	
18	Travel motor mounting bolt	18	8	27	300	(30)	(220)	
19	Sprocket mounting bolt	27	60	41	1400	(140)	(1030)	
20	Upper roller mounting bolt	22	24	32	750	(75)	(550)	
21	Lower roller mounting bolt	27	64	41	1400	(140)	(1030)	
22	Track shoe mounting bolt	33	392	41	3500	(350)	(2580)	
23	Track guard mounting bolt	27	28	41	1400	(140)	(1030)	
24	Side frame mounting bolt	42	52	65	4000	(400)	(2950)	
25	Low pressure piping	Flexible master coupling	8	3	13	11 to 13	(1.1 to 1.3)	(8.1 to 10)
			10	6	17	21 to 23	(2.1 to 2.3)	(15 to 17)
		T-bolt clamp	$\frac{1}{4}$ - 28 UNF	28	11	10	(1.0)	(7.4)
26	Counterweight mounting bolt	45	8	65	4000	(400)	(2950)	
27	Oil cooler mounting bolt	24	4	36	950	(95)	(700)	
28	Front pin lock bolt (Loading shovel)							
	A	Front pin lock bolt	20	14	30	400	(40)	(295)
	B	Bucket pin lock bolt	20	4	*17	400	(40)	(295)
	C	Bucket pin lock bolt	16	18	24	270	(27)	(200)
	D	Bucket pin lock bolt	12	6	19	90	(9.0)	(66)
29	Front pin lock bolt (Backhoe)							
	A	Front pin lock bolt	20	12	30	400	(40)	(295)
	B	Stopper bolt	20	12	30	400	(40)	(295)
30	Side cutter mounting bolt	33	12	50	2600	(260)	(1920)	

 NOTE: * Hexagon wrench

MAINTENANCE

Tightening Torque Chart

Bolt Dia.	Wrench Size	Hexagon Wrench Size	   M552-07-091			   M552-07-090 Socket Bolt			   M157-07-225		
			N·m	(kgf·m)	(lbf·ft)	N·m	(kgf·m)	(lbf·ft)	N·m	(kgf·m)	(lbf·ft)
M8	13	6	30	(3.0)	(22)	20	(2.0)	(15)	10	(1.0)	(7.4)
M10	17	8	65	(6.5)	(48)	50	(5.0)	(37)	20	(2.0)	(15)
M12	19	10	110	(11)	(81)	90	(9.0)	(66)	35	(3.5)	(26)
M14	22	12	180	(18)	(135)	140	(14)	(103)	55	(5.5)	(41)
M16	24	14	270	(27)	(200)	210	(21)	(155)	80	(8.0)	(59)
M18	27	14	400	(40)	(295)	300	(30)	(220)	120	(12)	(89)
M20	30	17	550	(55)	(410)	400	(40)	(295)	170	(17)	(125)
M22	32	17	750	(75)	(550)	550	(55)	(410)	220	(22)	(162)
M24	36	19	950	(95)	(700)	700	(70)	(520)	280	(28)	(205)
M27	41	19	1400	(140)	(1030)	1050	(105)	(770)	400	(40)	(295)
M30	46	22	1950	(195)	(1440)	1450	(145)	(1070)	550	(55)	(410)
M33	50	24	2600	(260)	(1920)	1950	(195)	(1440)	750	(75)	(550)
M36	55	27	3200	(320)	(2360)	2450	(245)	(1810)	950	(95)	(700)

IMPORTANT: Make sure bolt and nut threads are clean before installing.
 Apply lubricant (e. g. white zinc B solved into spindle oil) to bolts and nuts to stabilize their friction coefficient.

 **NOTE:** Tightening torque required is shown in N·m.
 For example, when tightening a bolt or nut with a wrench of 1 m length, turning the end of it with a force of 120 N, the torque produced will be:

$$1 \text{ m} \times 120 \text{ N} = 120 \text{ N}\cdot\text{m}$$

To produce the same torque with a wrench of 0.25 m:

$$0.25 \text{ m} \times \boxed{} \text{ N} = 120 \text{ N}\cdot\text{m}$$

Necessary force will be:

$$120 \text{ N}\cdot\text{m} \div 0.25 \text{ m} = 480 \text{ N}$$

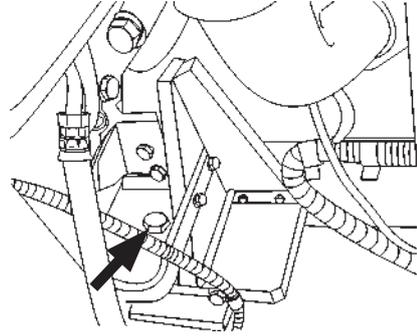
MAINTENANCE

1. Engine cushion rubber mounting bolts

(Front)

Tool: 32 mm

Torque: 750 N·m (75 kgf·m, 550 lbf·ft)

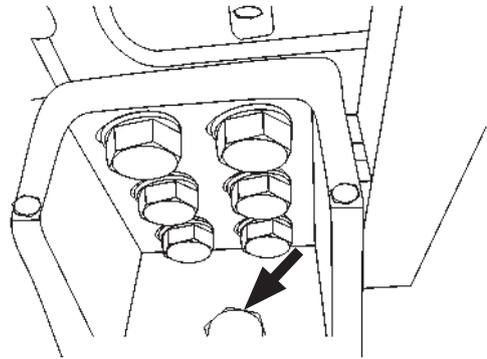


M183-07-026

(Rear)

Tool: 50 mm

Torque: 2600 N·m (260 kgf·m, 1920 lbf·ft)



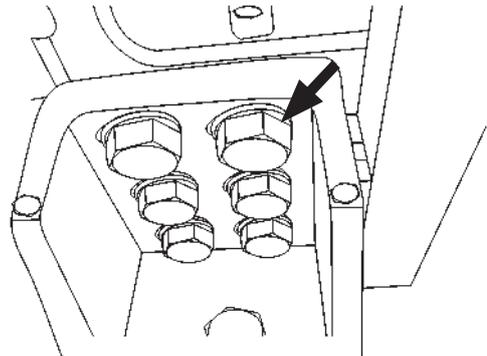
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2. Engine bracket mounting bolts

(Rear)

Tool: 41 mm

Torque: 1050 N·m (105 kgf·m, 770 lbf·ft)



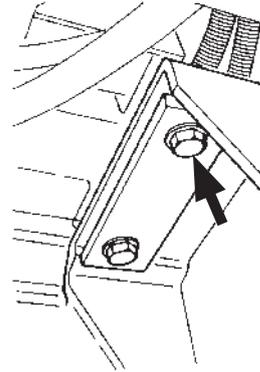
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MAINTENANCE

3. Radiator mounting bolts

Tool: 41 mm

Torque: 1050 N·m (105 kgf·m, 770 lbf·ft)

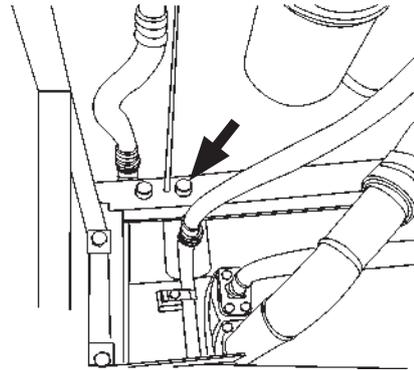


M142-07-059

4. Hydraulic oil tank mounting bolts

Tool: 30 mm

Torque: 550 N·m (55 kgf·m, 410 lbf·ft)

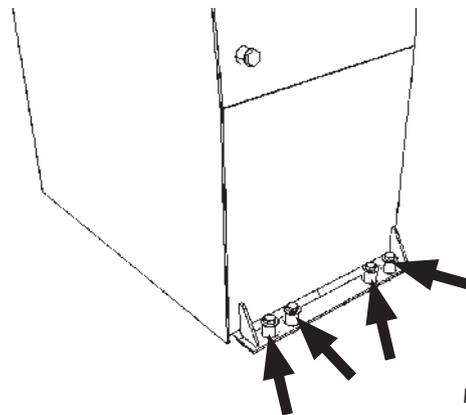


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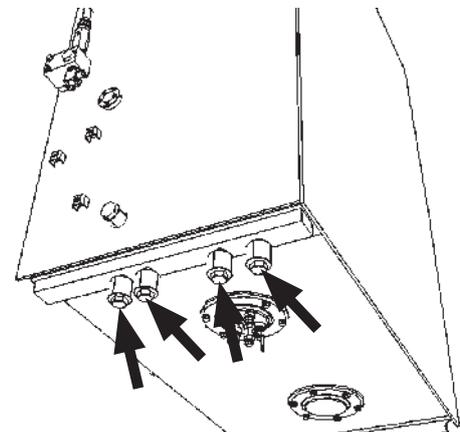
5. Fuel tank mounting bolts

Tool: 36 mm

Torque: 950 N·m (95 kgf·m, 700 lbf·ft)



M18J-07-018



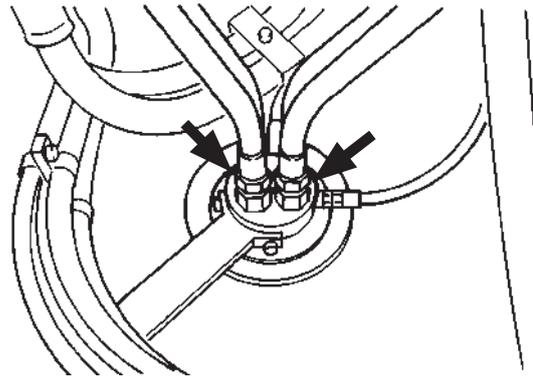
M18J-07-019

MAINTENANCE

6. ORS fittings for hydraulic hoses and piping

Tool: 41 mm

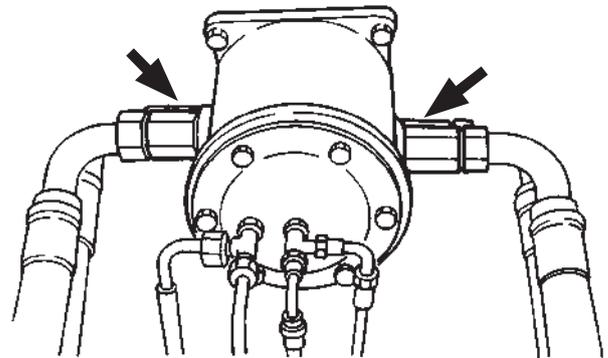
Torque: 210 N·m (21 kgf·m, 155 lbf·ft)



M142-07-060

Tool: 50 mm

Torque: 350 N·m (35 kgf·m, 260 lbf·ft)

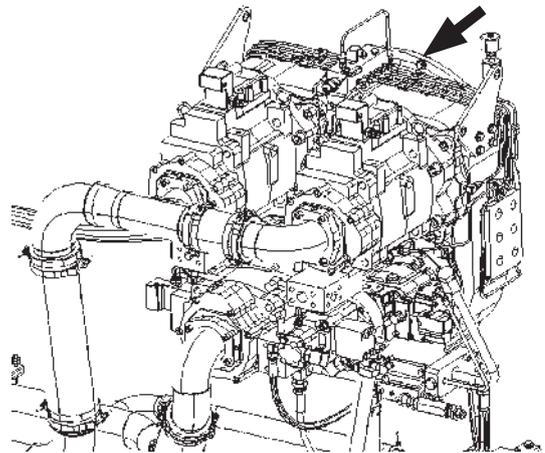


M142-07-061

7. Pump transmission mounting bolts

Tool: 19 mm

Torque: 120 N·m (12 kgf·m, 89 lbf·ft)



M18J-07-004

MAINTENANCE

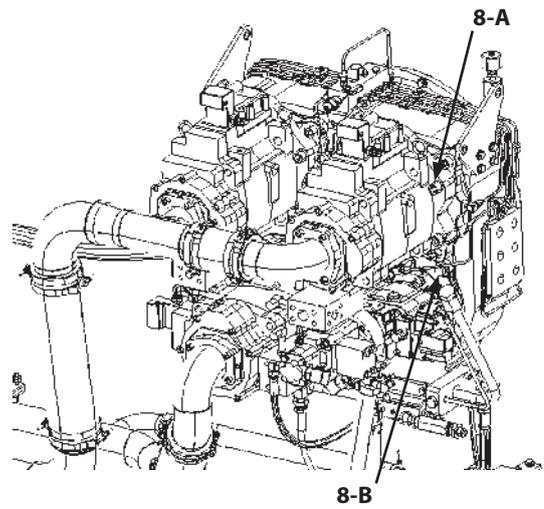
8. Pump mounting bolts

Main (A)

Tool: Hexagon wrench 17 mm
Torque: 400 N·m (40 kgf·m, 295 lbf·ft)

Fan (B)

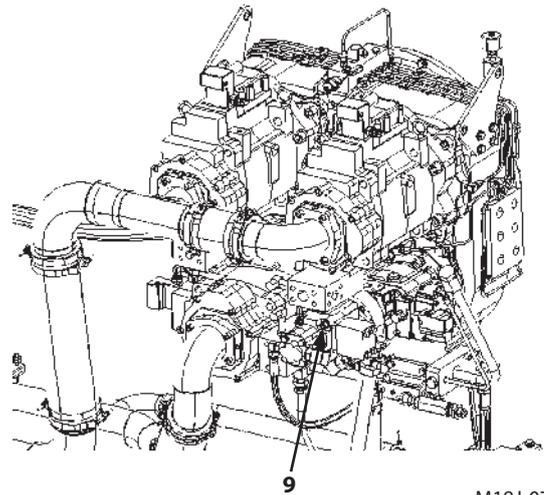
Tool: Hexagon wrench 14 mm
Torque: 210 N·m (21 kgf·m, 155 lbf·ft)



M18J-07-004

9. Gear pump mounting bolts

Tool: 22 mm
Torque: 140 N·m (14 kgf·m, 103 lbf·ft)



M18J-07-004

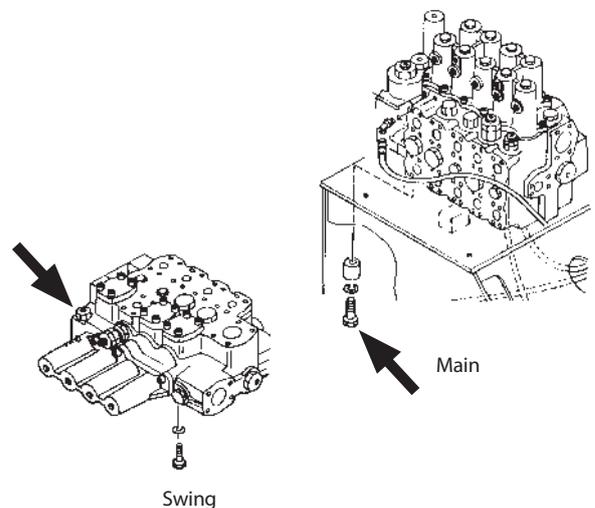
10. Control valve mounting bolts

Main

Tool: 30 mm
Torque: 400 N·m (40 kgf·m, 295 lbf·ft)

Swing

Tool: 24 mm
Torque: 270 N·m (27 kgf·m, 200 lbf·ft)



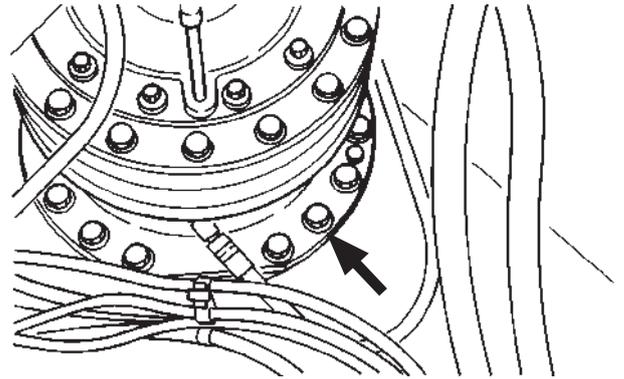
M183-07-031

MAINTENANCE

11. Swing device mounting bolts

Tool: 41 mm

Torque: 1400 N·m (140 kgf·m, 1030 lbf·ft)

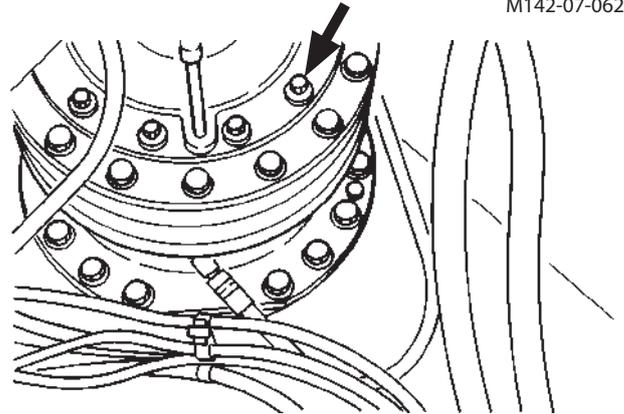


M142-07-062

12. Swing motor mounting bolts

Tool: 19 mm

Torque: 90 N·m (9.0 kgf·m, 66 lbf·ft)

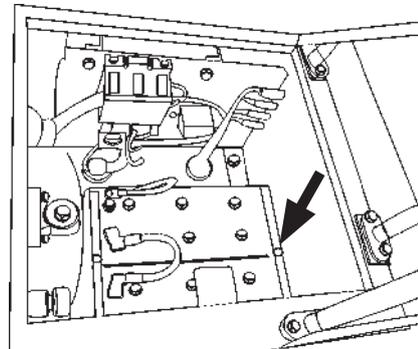


M142-07-062

13. Battery mounting bolts

Tool: 19 mm

Torque: 35 N·m (3.5 kgf·m, 26 lbf·ft)

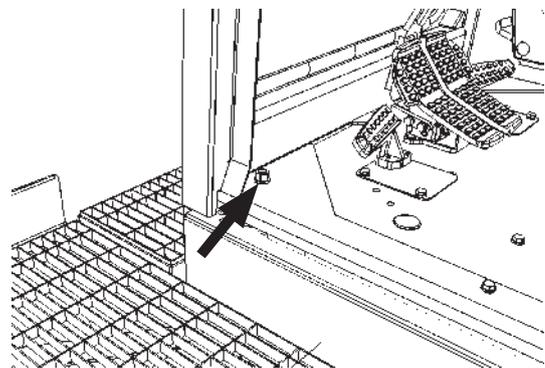


M183-07-024

14. Cab mounting bolts

Tool: 24 mm

Torque: 210 N·m (21 kgf·m, 155 lbf·ft)



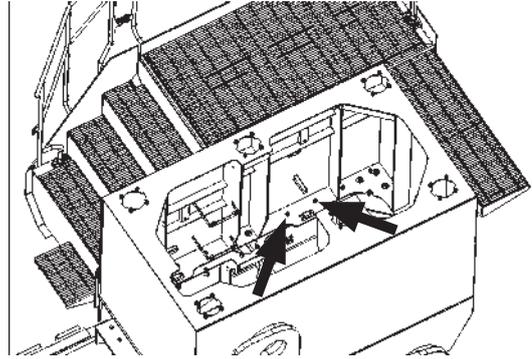
M18J-07-020

MAINTENANCE

15. Cab-bed mounting bolts

Tool: 19 mm

Torque: 110 N·m (11 kgf·m, 81 lbf·ft)

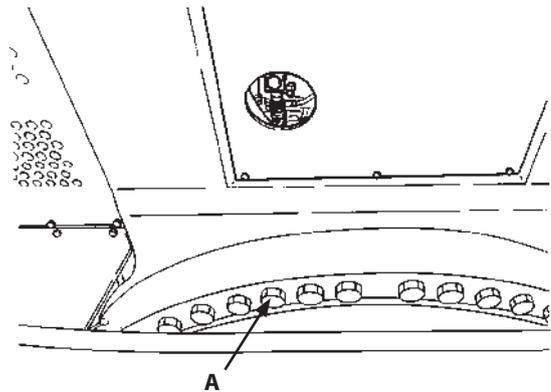


M18J-07-021

16. Swing bearing mounting bolts (A) to upperstructure

Tool: 55 mm

Torque: 2800 N·m (280 kgf·m, 2070 lbf·ft)

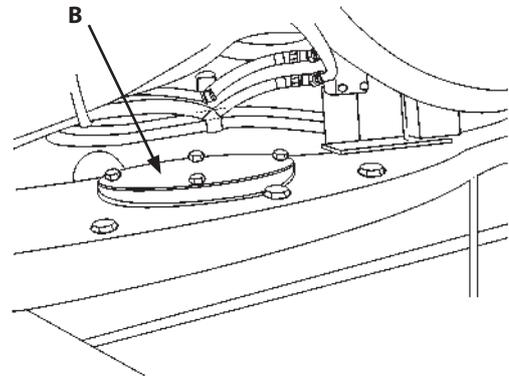


M183-07-032

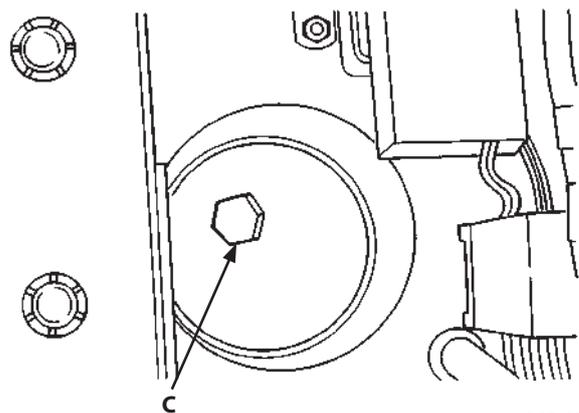
Swing bearing mounting bolts (C) to undercarriage
Remove cover (B) and retighten bolts (C).

Tool: 55 mm

Torque: 2800 N·m (280 kgf·m, 2070 lbf·ft)



M183-07-003

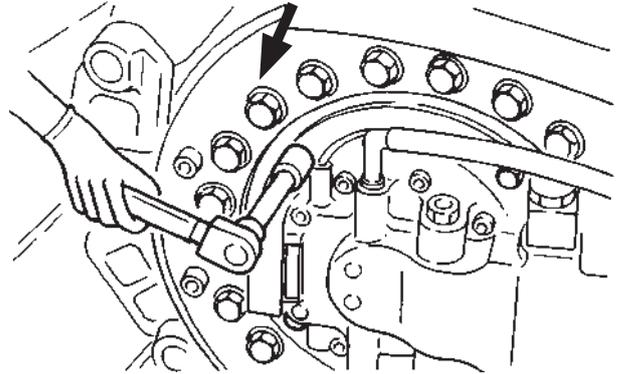


M142-07-067

MAINTENANCE

17. Travel device mounting bolts

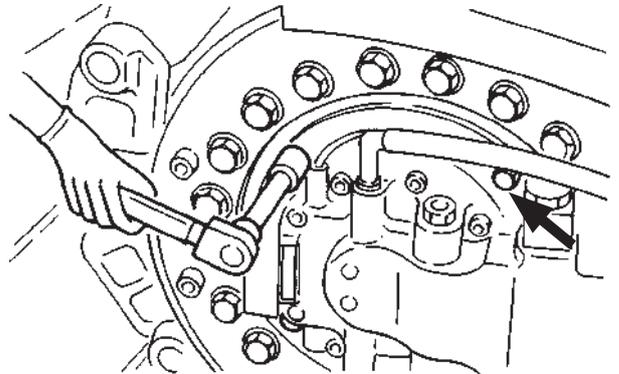
Tool: 41 mm
Torque: 1400 N·m (140 kgf·m, 1030 lbf·ft)



M142-07-069

18. Travel motor mounting bolts

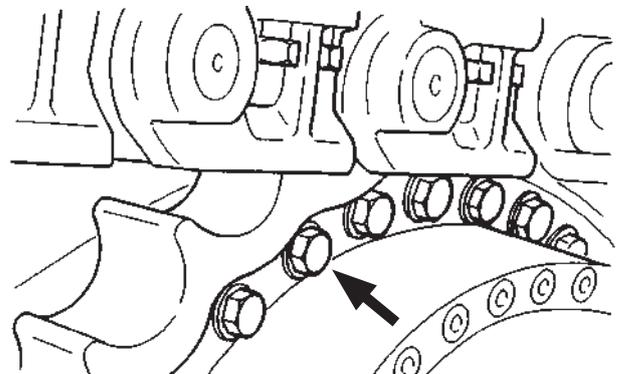
Tool: 27 mm
Torque: 300 N·m (30 kgf·m, 220 lbf·ft)



M142-07-068

19. Sprocket mounting bolts

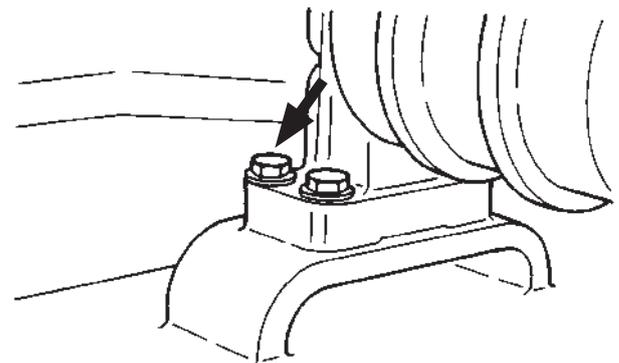
Tool: 41 mm
Torque: 1400 N·m (140 kgf·m, 1030 lbf·ft)



M142-07-070

20. Upper roller mounting bolts

Tool: 32 mm
Torque: 750 N·m (75 kgf·m, 550 lbf·ft)

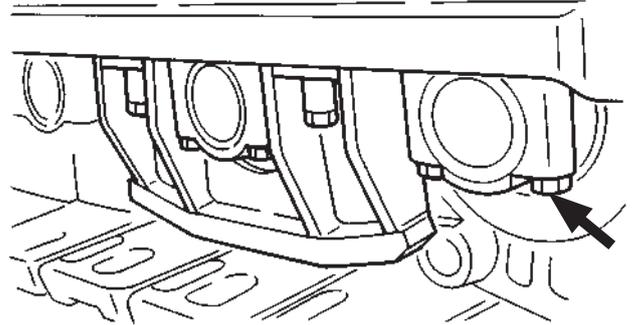


M142-07-071

MAINTENANCE

21. Lower roller mounting bolts

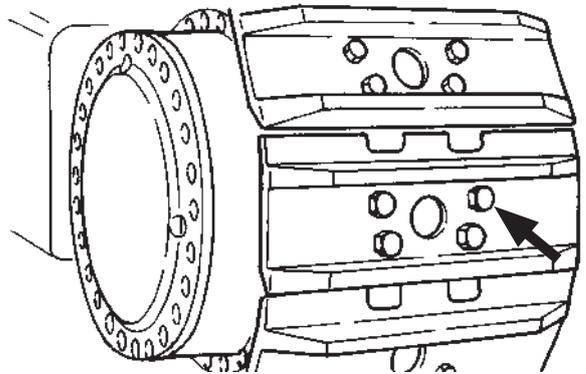
Tool: 41 mm
Torque: 1400 N·m (140 kgf·m, 1030 lbf·ft)



M142-07-072

22. Track shoe mounting bolts

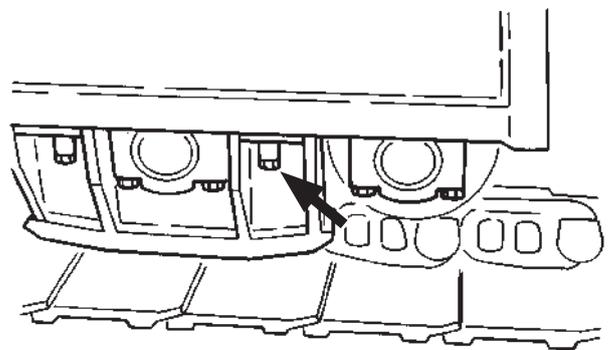
Tool: 41 mm
Torque: 3500 N·m (350 kgf·m, 2580 lbf·ft)



M142-07-073

23. Track guard mounting bolts

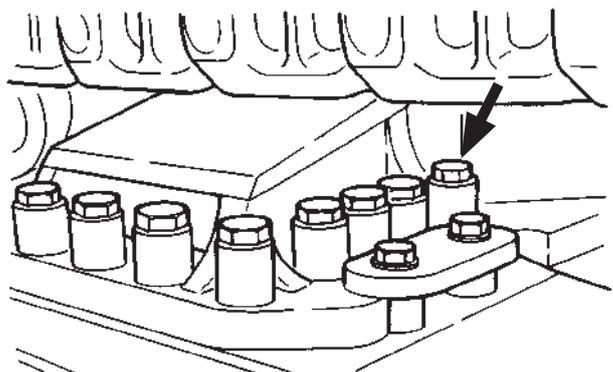
Tool: 41 mm
Torque: 1400 N·m (140 kgf·m, 1030 lbf·ft)



M142-07-074

24. Side frame mounting bolts

Tool: 65 mm
Torque: 4000 N·m (400 kgf·m, 2950 lbf·ft)



M142-07-075

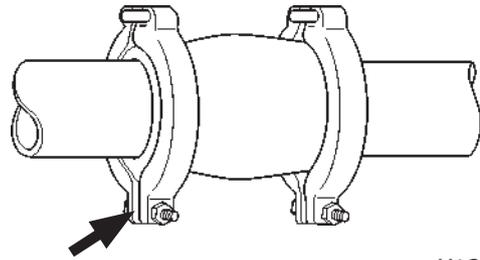
MAINTENANCE

25. Flexible master coupling and T-bolt clamp of low pressure piping

Flexible master coupling of low pressure piping

Wrench size: 13 mm
Tightening torque: 11 to 13 N·m
(1.1 to 1.3 kgf·m, 8.1 to 10 lbf·ft)

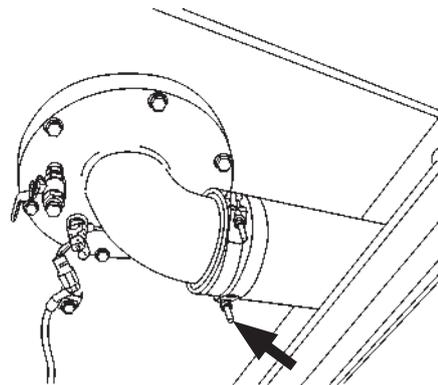
Wrench size: 17 mm
Tightening torque: 21 to 23 N·m
(2.1 to 2.3 kgf·m, 15 to 17 lbf·ft)



M1G6-07-008

T-bolt clamp

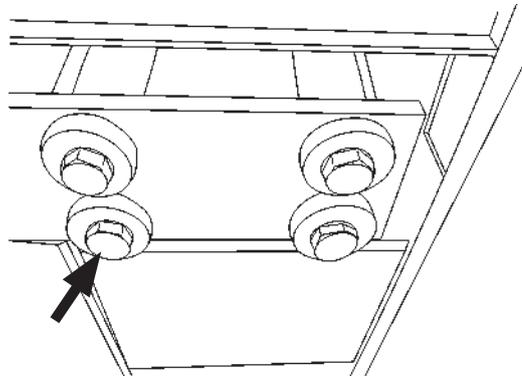
Wrench size: 11 mm
Tightening torque: 10 N·m (1.0 kgf·m, 7.4 lbf·ft)



M1J1-07-037

26. Counterweight mounting bolts

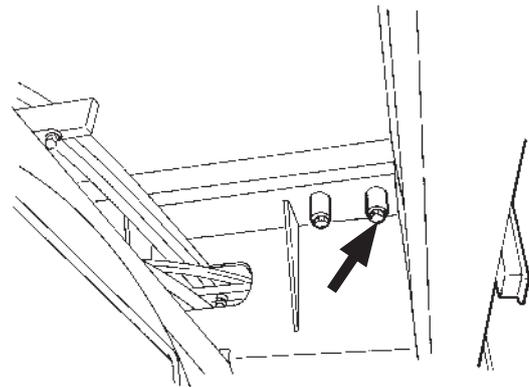
Tool: 65 mm
Torque: 4000 N·m (400 kgf·m, 2950 lbf·ft)



M183-07-033

27. Oil cooler mounting bolts

Tool: 36 mm
Torque: 950 N·m (95 kgf·m, 700 lbf·ft)



M183-07-060

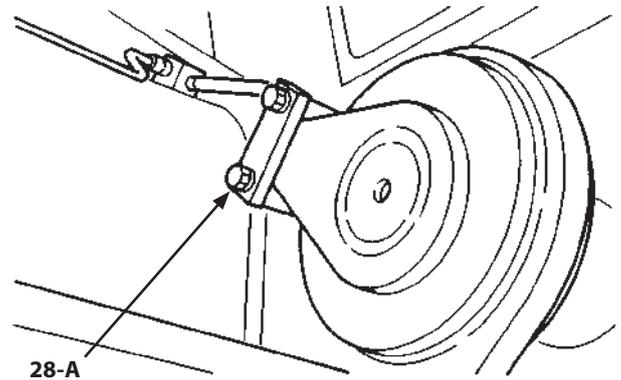
MAINTENANCE

28. Front pin lock bolts (Loading shovel)

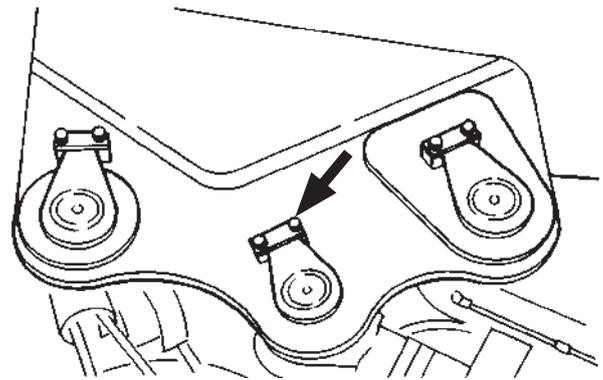
28-A. Front pin lock bolts

Tool: 30 mm

Torque: 400 N·m (40 kgf·m, 295 lbf·ft)



M142-07-077

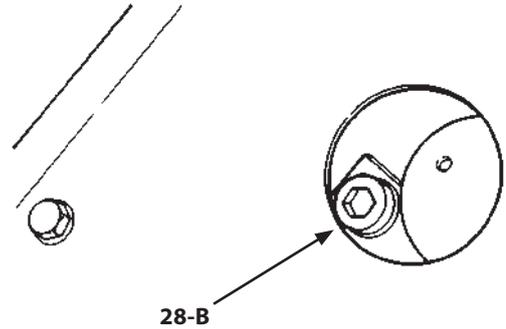


M142-07-078

MAINTENANCE

28-B. Bucket pin lock bolts

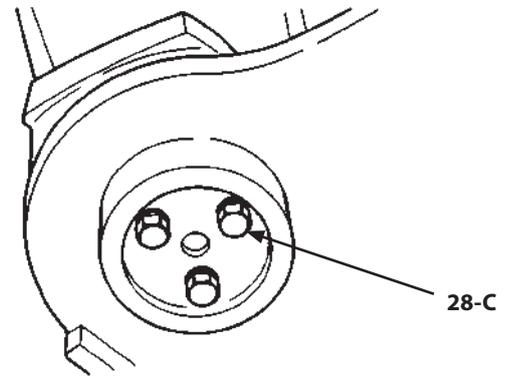
Tool: Hexagon wrench 17 mm
Torque: 400 N·m (40 kgf·m, 295 lbf·ft)



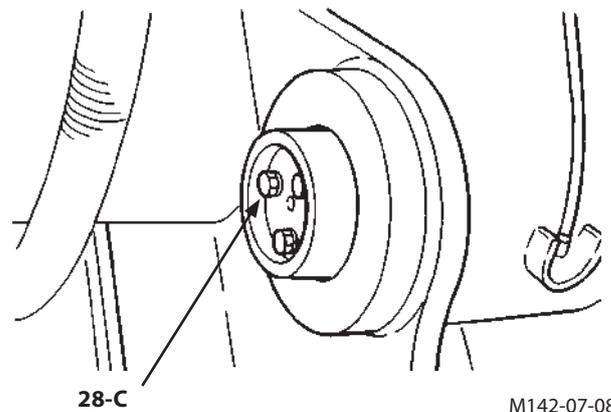
M142-07-079

28-C. Bucket pin lock bolts

Tool: 24 mm
Torque: 270 N·m (27 kgf·m, 200 lbf·ft)



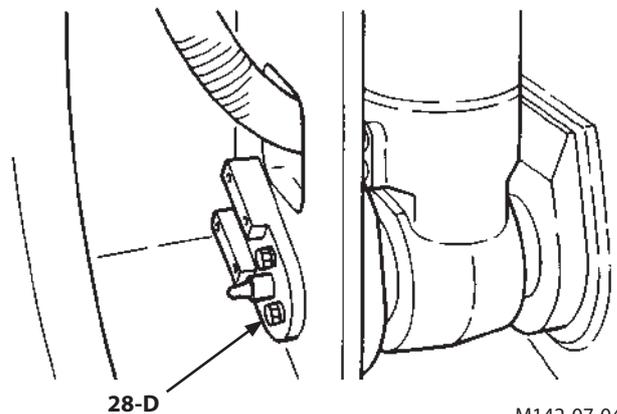
M142-07-080



M142-07-081

28-D. Bucket pin lock bolts

Tool: 19 mm
Torque: 90 N·m (9.0 kgf·m, 66 lbf·ft)



M142-07-042

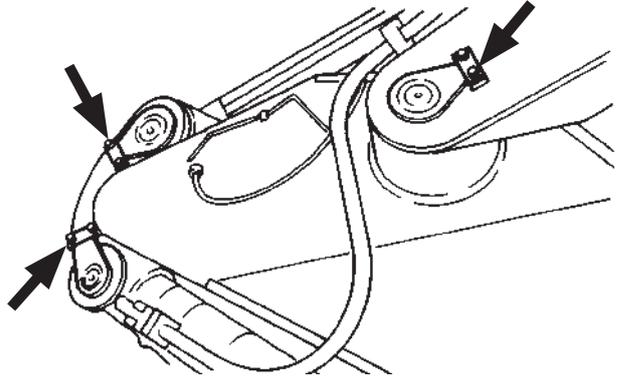
MAINTENANCE

29. Front pin lock bolts (Backhoe)

29-A. Front pin lock bolts

Tool: 30 mm

Torque: 400 N·m (40 kgf·m, 295 lbf·ft)

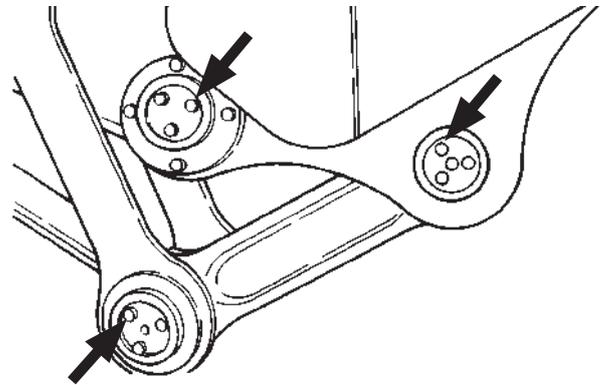


M142-07-082

29-B. Stopper bolts

Tool: 30 mm

Torque: 400 N·m (40 kgf·m, 295 lbf·ft)



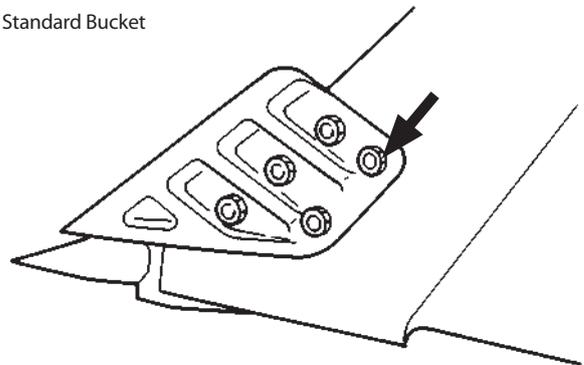
M142-07-044

30. Side cutter mounting bolts

Tool: 50 mm

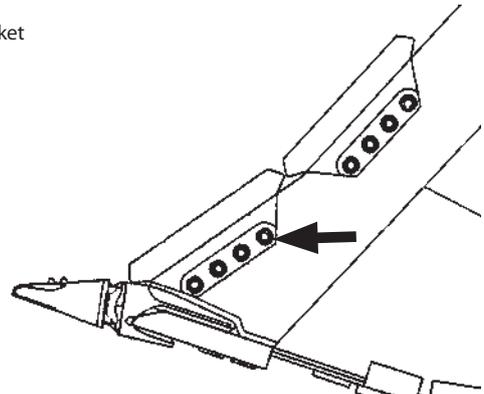
Torque: 2600 N·m (260 kgf·m, 1920 lbf·ft)

Standard Bucket



M142-07-084

Rock Bucket



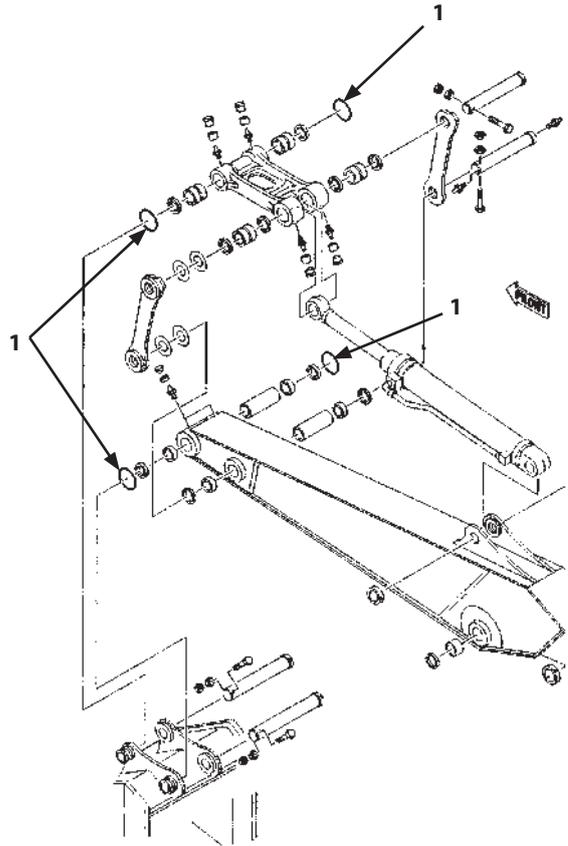
M18F-07-001

MAINTENANCE

8 Check O-rings in Bucket Joints

--- daily

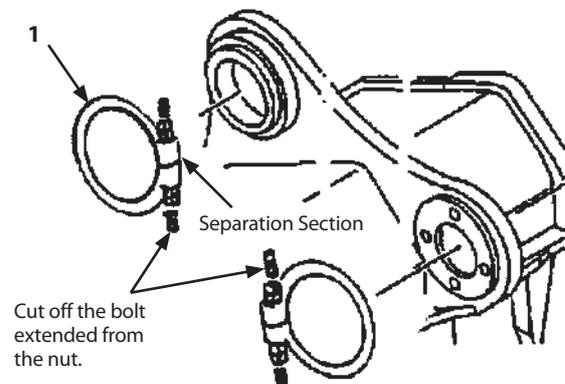
O-rings (1) are provided on both ends of the bucket joint pins as illustrated to the right, to prevent soil from entering the bucket joints and retain the grease in the bucket joints. Thereby, wear on the bucket joint parts such as the pins and the arm tip can be reduced. Check O-rings (1) for cracks or any damage. If any, replace O-ring (1) while referring to the separation type O-ring installation method described below.



M16J-07-085

Separation Type O-ring Installation Method

1. Install O-ring (1) in the direction as illustrated to the right so that the separation section of O-ring (1) does not directly come in contact with soil to protect O-ring (1) from being damaged quickly by soil or foreign matter.
2. Install O-ring (1) with care not to make a gap in the separation section of O-ring (1).
3. After installing O-ring (1), cut off the bolt extended from the nut so that O-ring (1) is not damaged by soil which may come in contact with the bolt.



M16J-07-086

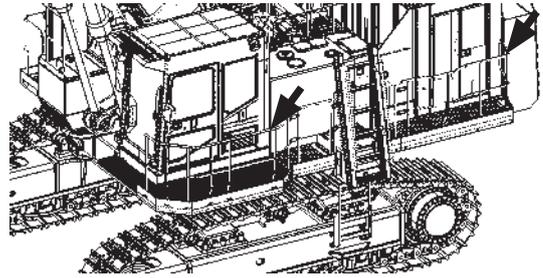
MAINTENANCE

9

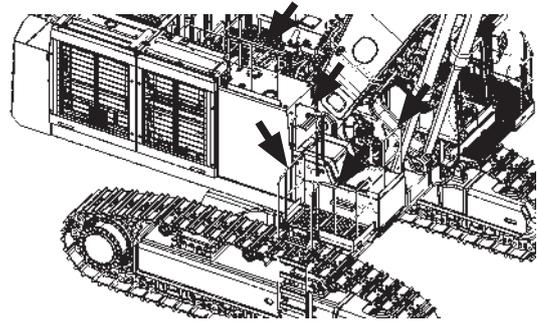
Check Handrails

--- every 2 years or 4000 hours, whichever comes first

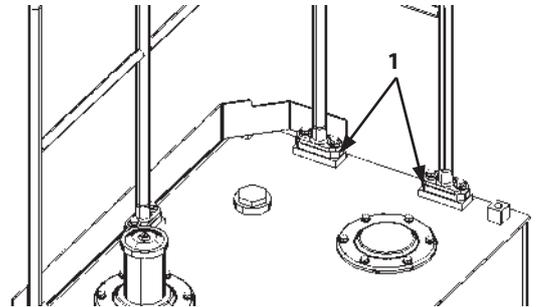
Cushion rubbers (1) (Optional) are attached to the handrails. If cracks or damage are found on cushion rubbers (1) (Optional), it may result in early damage of the handrail. Check the condition of cushion rubbers (1) (Optional); if there are cracks and/or damages, replace them.



M18J-07-054



M18J-07-055



M18J-07-056

MAINTENANCE UNDER SPECIAL ENVIRONMENTAL CONDITIONS

Maintenance Under Special Environmental Conditions

Operating Conditions	Precautions for Maintenance	
Muddy Soil, Rainy or Snowy Weather	Before Operation:	Check the tightness of plugs and all drain cocks.
	After Operation:	Clean the machine and check for cracks, damaged, loose or missing bolts and nuts. Lubricate all necessary parts without delay.
Near the Ocean	Before Operation:	Check tightness of plugs and all drain cocks.
	After Operation:	Thoroughly clean the machine with fresh water to wash off salt. Service electrical equipment often to prevent corrosion.
Dusty Atmosphere	Air Cleaner:	Clean the element regularly at shorter service intervals.
	Radiator:	Clean the radiator and oil cooler screen to prevent clogging of the cores.
	Fuel System:	Clean the filter element and strainer regularly at shorter service intervals.
	Electrical Equipment:	Clean them regularly, in particular, the commutator surface of the alternator and starter.
	Air Conditioner:	Clean filter regularly with shorter service intervals.
Rocky Ground	Tracks:	Carefully operate while checking for cracks, damage and loose bolts and nuts. Loosen the tracks a little more than usual.
	Front Attachment:	Standard attachment may be damaged when digging rocky ground. Reinforce the bucket before using it, or use a heavy duty bucket.
Freezing Weather	Fuel:	Use high quality fuel suitable for low temperature.
	Lubricant:	Use high quality low viscosity hydraulic oil and engine oil.
	Engine Coolant:	Be sure to use antifreeze.
	Battery:	Fully charge the batteries regularly at shorter service intervals. If not fully charged, electrolyte may freeze.
	Tracks:	Keep the tracks clean. Park the machine on a hard surface to prevent the tracks from freezing to the ground.
Falling Stones	Cab:	Provide a cab guard to protect the machine from falling stones when necessary.

STORAGE

Storing Machine

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

STORAGE

Removing Machine from Storage



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

1. Remove grease from the cylinder rods if coated.
2. Adjust alternator and fan belt tension.
3. Fill the fuel tank. Bleed air from the fuel system. Check all fluid levels.
4. If your machine is equipped with the battery disconnect switch (optional), turn the switch ON.
5. Start the engine.
Run the engine at half speed for several minutes before full load operation.
6. Cycle all hydraulic functions several times.
7. Carefully check all systems before operating the machine at full load.

IMPORTANT:

- **When the machine has been stored for a long time, be sure to perform the following steps as well:**
 - (a) **Check condition of all hoses and connections.**
 - (b) **Warm up the engine.**
 - (c) **Stop the engine.**
 - (d) **Install new fuel filters. Replace the engine oil filter and fill the engine with oil.**
- **If the machine has not been used for a long time, oil films on sliding surfaces may have broken down. Cycling hydraulic functions for travel, swing and digging 2 or 3 times is necessary to lubricate the sliding surfaces.**

Transporting Machine

IMPORTANT:

- **In case of transporting the machine with disassembling, contact your authorized dealer.**
- **In case of transporting the machine through public road, obey the traffic law in that region.**
- **In case of transporting the machine by carrier, fix the machine tightly with wire rope not to fall from the carrier.**

TROUBLESHOOTING

Engine Troubleshooting

When any trouble occurs in the engine or components regarding the engine, one of the following indicators comes ON on the monitor unit:

- Engine Stop Alarm Mark (1)
- Engine Warning Alarm Mark (2)

The engine troubleshooting device is also provided to check more detailed failure conditions.

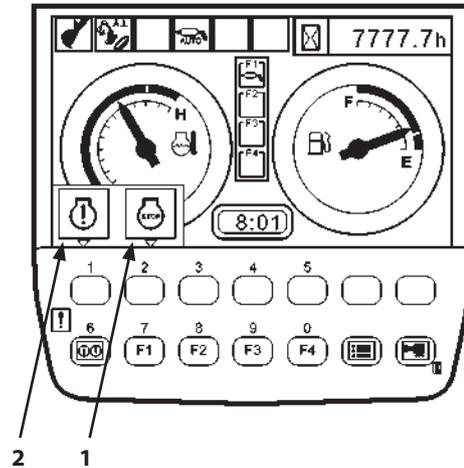
You can find the engine troubleshooting device in electrical component box (3) in the cab. Turn the key switch to ON. If there is any fault code, one of the following indicators that corresponds to the failure level lights.

- Engine Stop Indicator (red) (5)
If this indicator will light, immediately stop the engine and repair them.
- Engine Warning Indicator (orange) (6)
If this indicator will light, it is possible to operate for a while, but repair them within 24 hours.
- Engine Maintenance Indicator (yellow) (7)
If this indicator will light, it is possible to operate until next regular maintenance, but repair them at that time.

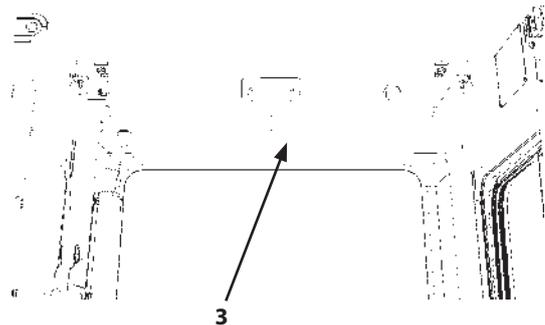
NOTE: In case engine maintenance Indicator (7) blinks, engine warning alarm mark (2) is displayed on the monitor unit.

IMPORTANT: When engine warning alarm mark (2) or engine stop alarm mark (1) illuminates, immediately contact your authorized dealer for inspection.

In addition, you can find engine diagnostic switch (4) in electrical component box (3) in the cab. You can let a failure code displayed (with a blinking warning indicator that indicates details of the engine) by using engine diagnostic switch (4).

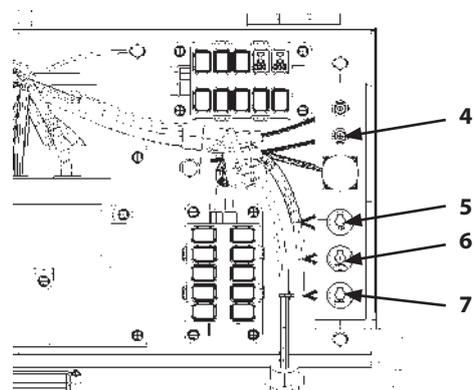


M18J-11-001



M18J-01-025

Engine Troubleshooting Device

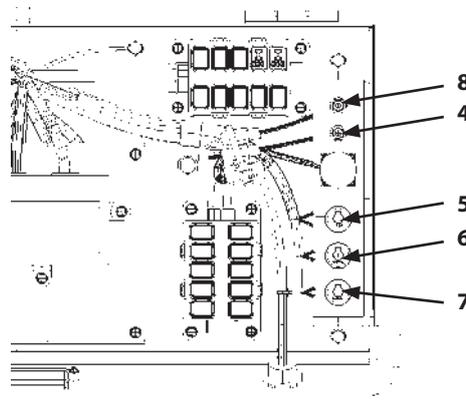


M18J-01-026

TROUBLESHOOTING

How to Read Engine Fault Codes

1. Stop the engine and turn the key switch to ON position.
2. When there is a fault code, a fault indicator that corresponds to the fault level lights. When there is no fault code, all indicators go off.
3. Turn Engine Diagnostic Switch (4) to ON position.
4. Engine Stop Indicator (red) (5) lights. Engine Maintenance Indicator (yellow) (7) blinks for once. Engine Warning Indicator (orange) (6) indicates the fault code for two times consecutively. The fault code is indicated repeatedly in the above sequence.
5. A number is indicated by a blinking count of Engine Warning Indicator (orange) (6). The indicator goes off for one second between each digit.
6. When Engine Diagnostic Switch (4) is turned to OFF, an indicated troubleshooting code goes off.

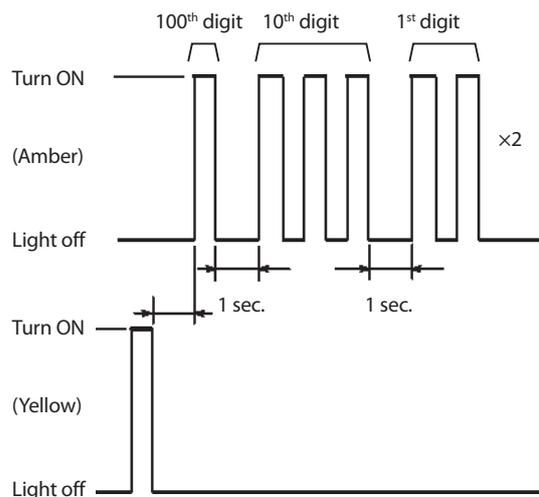


M18J-01-026

Example: Blinking condition of Engine Warning Indicator (amber) of Fault Code 132.

NOTE:

- When several fault codes are occurring, Engine Maintenance Indicator (yellow) (7) blinks for once between indications of each fault code. Engine Warning Indicator (orange) (6) indicates the next failure code for two times consecutively. The fault code is indicated repeatedly in the above sequence.
- After completing indication of all fault codes, Engine Maintenance Indicator (yellow) (7) blinks for once. Engine Warning Indicator (orange) (6) repeats indicating from the first fault code.
- When Engine Fault Code Selector Switch (8) is moved to INC side for once, the next fault code from a current fault code is displayed. When Engine Fault Code Selector Switch (8) is moved to DEC side for once, the previous fault code from a current fault code is displayed.



T18J-05-09-001

TROUBLESHOOTING

Engine		
Problem	Cause	Solution
Engine Cranks But Will Not Start or Hard to Start	Engine stop switch is ON	Turn switch OFF (to NORMAL position).
	No fuel	Add fuel. Bleed air.
	Wrong fuel	Drain tank. Use correct fuel.
	Contaminated fuel	Drain tank and add clean fuel.
	Low battery power	Charge or install new battery.
	Injection Pump	See your authorized dealer.
	Poor electrical connection	Clean and tighten battery and starter motor connections.
	Starter motor failure	Replace starter.
	Wrong engine oil	Drain oil. Use correct oil.
	Air filter plugged	Replace elements.
	Fuel filter plugged	Remove air from fuel system. Clean fuel tank strainer.
	Engine compression low	See your authorized dealer.
	Injectors dirty or not working correctly	See your authorized dealer.
	Leaks in fuel system	Check fuel system connections.
	Air in fuel system	Bleed air.
Faulty ECM (Engine Control Module)	See your authorized dealer.	
Engine Knocks, Runs Irregularly or Stops	Engine oil level low	Add oil.
	Plugged air intake system	Clean filter and system.
	Injection pump out of time	See your authorized dealer.
	Plugged fuel filters	Install new filters.
	Low coolant temperature	Thermostat not working correctly or too "cool".
	Water, dirt or air in fuel system	Bleed air from fuel system. Clean fuel tank outlet screen.
	Injectors dirty or faulty	See your authorized dealer.
Engine Not Developing Full Power	Air filters plugged	Replace filter elements.
	Fuel line restricted	Repair or replace fuel line.
	Contaminated fuel	Drain fuel tank and clean outlet screen. Refill.
	Fuel filters plugged	Replace filters.
	Plugged vent in fuel tank cap	Clean or install new cap.
	Injection nozzles dirty or malfunctioning	See your authorized dealer.
	Wrong fuel	Use correct fuel.
	Wrong oil	Use correct oil.
	Turbocharger failure	See your authorized dealer.
	Injection pump out of time	See your authorized dealer.
	Exhaust restriction	Remove muffler and run engine.
	Engine is too hot or cold	See below.
	Engine failure	See your authorized dealer.
	Valve clearance	Check and adjust valves.
Intake or exhaust system leakage	See your authorized dealer.	

TROUBLESHOOTING

Engine		
Problem	Cause	Solution
Engine Overheats	Low coolant level	Add coolant.
	Thermostat	See your authorized dealer.
	Engine overloaded	Check hydraulic relief valves.
	Radiator cap faulty	Install new cap.
	Radiator core or oil cooler core plugged	Clean radiator and oil cooler cores.
	Radiator screen plugged	Clean screen.
	Injection pump out of timing	See your authorized dealer.
	Fan damaged	Replace fan.
	Air cleaner plugged	Clean air cleaner.
	Alternator and fan belt loose	Tighten or install new belt.
	Pulley grooves worn	Replace pulleys.
Cooling system passages dirty	Flush cooling system.	
Temperature gauge or sending unit	See your authorized dealer.	
Coolant Temperature Too Low	Thermostat	See your authorized dealer.
	Temperature gauge or sending unit	See your authorized dealer.
Low Engine Oil Pressure	Engine oil pump or pump drive	See your authorized dealer.
	Low oil level	Add oil.
	Engine oil pressure regulation valve	See your authorized dealer.
	Plugged oil pump intake screen	See your authorized dealer.
	Plugged oil filter	Install a new oil filter.
	Oil leaks	Check for leaks.
	Oil diluted with fuel or coolant	See your authorized dealer.
	Engine temperature too high	Check cooling system.
Wrong oil	Drain oil. Use correct oil.	
Engine Uses Too Much Oil	Wrong oil	Drain oil. Use correct oil.
	Oil leaks	Check engine oil drain plug.
	Engine temperature too high	Check cooling system.
	Plugged air cleaner	Clean element or install new element.
	Internal engine component wear	See your authorized dealer.
Engine Uses Too Much Fuel	Plugged or dirty air intake system	Clean air intake system.
	Wrong fuel	Use correct fuel.
	Injectors	See your authorized dealer.
	Injection pump out of time	See your authorized dealer.

TROUBLESHOOTING

Engine		
Problem	Cause	Solution
Excessive Black or Gray Exhaust Smoke	Wrong fuel Plugged or dirty air intake or exhaust system Injection pump out of timing Injectors dirty or faulty Basic engine failures	Drain tank. Use correct fuel. Clean air intake and exhaust system. See your authorized dealer. See your authorized dealer. See your authorized dealer.
Nothing Works	Battery	Recharge or replace.
Nothing Works (Except clock)	Battery relay	Replace relay.
Batteries Undercharged	Loose or corroded connections Alternator belt loose Alternator not charging Fuse Key switch failure	Clean and tighten or replace batteries. Tighten or install new belt. See your authorized dealer. Replace fuse. Replace key switch.
Starting Motor Will Not Turn	Battery disconnect switch is OFF Battery undercharged or dead Battery cables making poor connections High current fuse Key switch Start relay Starter solenoid Starter Starter pinion jammed in flywheel gear Major engine failure	Turn the switch ON. Recharge or replace battery. Clean connections. Replace high current fuse. See your authorized dealer. See your authorized dealer. See your authorized dealer. Repair or replace start motor. Repair or replace starter. See your authorized dealer.
Starter Solenoid Chatters	Poor connections at batteries or starter Low battery charge Starter solenoid "hold-in" windings open	Clean connections. Recharge or replace batteries. See your authorized dealer.
Starter Motor Turns but Will Not Crank Engine	Starter pinion gear not engaging flywheel ring gear Pinion shift mechanism jammed or malfunctioning Faulty ECM (Engine Control Module) Pinion gear teeth broken Malfunction of fuel solenoid valve Flywheel gear teeth broken	See your authorized dealer. See your authorized dealer. See your authorized dealer. See your authorized dealer. See your authorized dealer.
Engine Cranks Slowly	Battery cables damaged or broken internally Battery or starter cable connections loose or corroded	Inspect and replace cables. Clean and tighten connections.
Exhaust Gas is White	Wrong fuel Cold engine Thermostat faulty or too "cool" Injection pump out of time Coolant leakage into engine cylinder	Drain tank. Use correct fuel. Run engine until warm. See your authorized dealer. See your authorized dealer. See your authorized dealer.

TROUBLESHOOTING

Engine

Problem	Cause	Solution
Turbocharger Excessively Noisy or Vibrates	Bearings not lubricated Worn bearings Air leak in engine, intake or exhaust manifold Improper clearance between turbine wheel and turbine housing Broken blades on turbine	Insufficient oil pressure. Check for restricted turbocharger oil line. See your authorized dealer. Inspect, repair. See your authorized dealer. Remove exhaust elbow and air inlet hose and inspect.
Oil Dripping from Turbocharger Adapter	Damaged or worn bearings and/or worn seals Excessive crankcase pressure Turbocharger oil return line carbon build up where line passes exhaust manifold	See your authorized dealer. Inspect and clean air cleaner. Check for proper engine service intervals or dirt enter into engine. Check vent tube to ensure tube is not plugged. Clean. Remove line. Inspect, clean.
Excessive Drag in Turbo-charger Rotating Members	Carbon build-up behind turbine wheel caused by combustion deposits Dirt build-up behind compressor wheel caused by air intake leaks Bearing seizure or dirty or worn bearings, caused by excessive temperature, unbalanced wheel, dirty oil, oil starvation, or insufficient lubrication	Inspect, clean. Inspect, clean. See your authorized dealer.

Electrical System

Problem	Cause	Solution
Engine Cranks Slowly	Battery discharged or will not hold a charge Starter "dragging" Low battery voltage	Replace battery. See your authorized dealer. Recharge or replace battery.
Starter Motor Continues to Run After Engine Starts	Start relay stuck Starter solenoid stuck Starter not disengaging Key switch	See your authorized dealer. See your authorized dealer. See your authorized dealer. See your authorized dealer.

TROUBLESHOOTING

Electrical System

Problem	Cause	Solution
Charging Indicator Light On-Engine Running	Loose or glazed alternator belt Engine speed slow Excessive electrical load from added accessories Loose or corroded electrical connections on battery, ground strap, starter, or alternator Battery voltage low Alternator or regulator Indicator circuit	Check belt. Replace if glazed, tighten if loose. Adjust speed to specification. Remove accessories or install higher output alternator. Inspect, clean, or tighten electrical connections. Recharge or replace battery. See your authorized dealer. See your authorized dealer.
Noisy Alternator	Worn drive belt Worn pulleys Pulley misaligned Alternator bearing	Replace belt. Replace pulleys and belt. Adjust alternator mount. Loosen alternator belts. Turn pulley by hand. If any roughness is felt, repair alternator.
No Monitor Panel Indicators Work	Fuse Wiring harness	Replace fuse. See your authorized dealer.
Individual Light in Monitor Panel is Not Working	Bulb Fuse Wiring harness	Replace bulb. Replace fuse. See your authorized dealer.
No Indicators in Gauge Panel Operate	Circuit board Wiring harness Fuse	See your authorized dealer. See your authorized dealer. Replace fuse.
Indicator Light in Gauge Panel is Inoperative	Bulb Fuse Sender Wiring harness failure	Replace bulb. Replace fuse. Do sender check. See your authorized dealer.
Coolant Temperature Gauge Does Not Work	Fuse Gauge Gauge sender Wiring harness	Replace fuse. See your authorized dealer. Do coolant temperature gauge sender check. See your authorized dealer.
Indicator Lights Do Not Operate Auto-idle	Fuse Bulb Auto-idle switch	Replace fuse. Replace bulb. See your authorized dealer.
Fuel Gauge Does Not Work	Fuse Gauge Wiring harness	Replace fuse. See your authorized dealer. See your authorized dealer.

TROUBLESHOOTING

Mode Selection

Problem	Cause	Solution
Fast/Slow Travel Speed Does Not Function	Travel mode switch	See your authorized dealer.
	Pilot pressure sensor (Travel)	See your authorized dealer.
	Pump delivery pressure sensor wire harness	See your authorized dealer.
	Main controller	See your authorized dealer.
	Solenoid valve unit	See your authorized dealer.
Auto-Idle Does Not Work	Damaged travel motors	See your authorized dealer.
	Fuse	Replace fuse.
	Switch panel	See your authorized dealer.
	Electrical connector	See your authorized dealer.
	Wire harness	See your authorized dealer.
	Pressure switches (Travel, Front)	See your authorized dealer.
Main controller	See your authorized dealer.	

Control Levers

Problem	Cause	Solution
Moves Hard	Corroded joint	See your authorized dealer.
	Worn out pusher	See your authorized dealer.
Does Nothing	Worn out pusher	See your authorized dealer.
	Pilot valve	See your authorized dealer.
Does Not Return to Neutral	Pilot valve	See your authorized dealer.
Too Much Play	Worn out pivot joint	See your authorized dealer.
Lever is Not Vertical in Neutral	Pilot valve	See your authorized dealer.

TROUBLESHOOTING

Hydraulic System

Problem	Cause	Solution
Hydraulic Functions are Slow	Low oil level Cold oil Wrong oil Engine speed too slow Pilot circuit Worn pump Restricted pump suction line	Fill reservoir to full mark. Warm up machine. Drain tank. Use correct oil. Increase speed or see your authorized dealer. See your authorized dealer. See your authorized dealer. See your authorized dealer.
Hydraulic Oil Overheats	Wrong oil Air leak in pump suction line Oil lines restricted Low oil level Plugged filters Worn pump Plugged oil cooler Oil cooler bypass Relief valve Contaminated oil Travel motors Improperly adjusted hydraulic components	Use correct oil. See your authorized dealer. See your authorized dealer. Fill reservoir to full mark. Install new filters. See your authorized dealer. Clean and straighten fins. See your authorized dealer. See your authorized dealer. Drain oil and refill. See your authorized dealer. See your authorized dealer.
Oil Foams	Air leak in line from reservoir to pump Kinks or dents in oil lines Wrong oil Water in oil High or low oil level	Repair leak or see your authorized dealer. Check lines. Use correct oil. Change oil. Correct level.
Low or No Oil Pressure	Wrong oil Improperly adjusted hydraulic components No oil in system Worn cylinder packing Relief valve	Use correct oil. See your authorized dealer. Fill with correct oil. See your authorized dealer. See your authorized dealer.
No Hydraulic Functions (Noise from pumps)	Hydraulic pump Lack of hydraulic oil Damaged suction line or hose Clogged suction filter	See your authorized dealer. Add oil. See your authorized dealer. Clean.
Hydraulic Cylinders Operate but Cannot Lift Load	Hydraulic pump worn Main relief valve pressure low Hydraulic oil level low Suction screen plugged Pump suction line leaking	See your authorized dealer. See your authorized dealer. Add oil. Clean strainer and system. Inspect suction line.

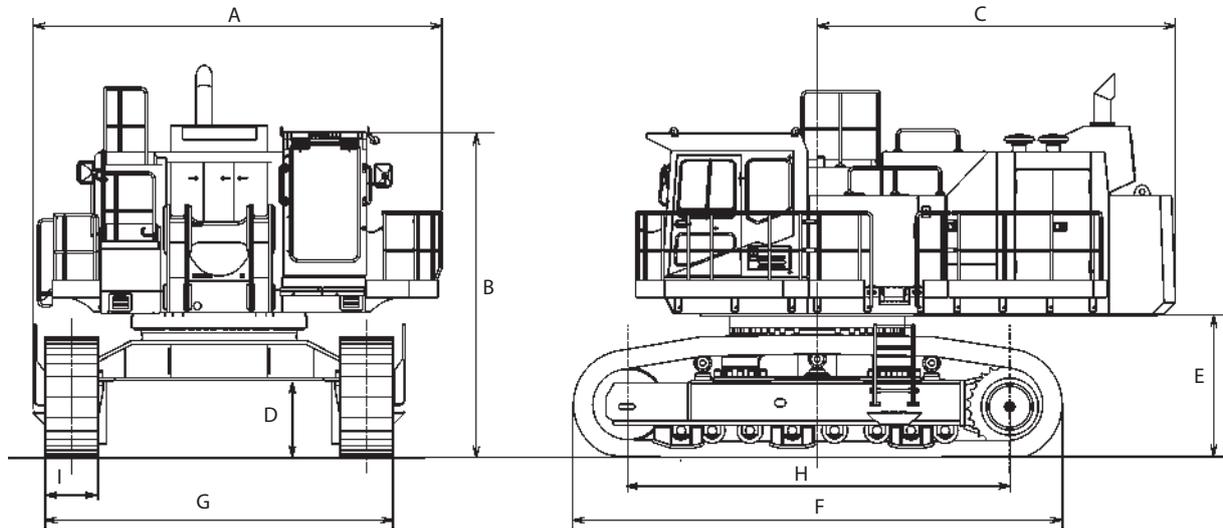
TROUBLESHOOTING

Hydraulic System

Problem	Cause	Solution
One Control Lever Does Not Work	Relief valve pressure low Tube or hose damaged Hydraulic fittings loose Damaged O-rings in fittings Hydraulic pump Pilot valve Pilot lines	See your authorized dealer. Repair or replace. Tighten. Install new O-rings. See your authorized dealer. See your authorized dealer. Repair or replace.
One Cylinder Does Not Work	Control valve spool damaged or contaminated with dirt Hydraulic lines damaged Fittings loose O-ring in fitting damaged Pilot valve Pilot lines	See your authorized dealer. Repair or replace. Tighten. Install new O-ring. See your authorized dealer. Repair or replace.
One Cylinder Does Not Work or Has Little Power	Piston seals leaking Cylinder rod damaged Pilot lines Pilot valve Failed wiring harness	See your authorized dealer. See your authorized dealer. Repair or replace. See your authorized dealer. See your authorized dealer.
Both Travel Motors Do Not Work	Center joint failure	See your authorized dealer.
One Travel Motor Does Not Work	Travel motor Parking brake not releasing Pilot valve Pilot lines	See your authorized dealer. See your authorized dealer. See your authorized dealer. Repair or replace.
Travel is Not Smooth	Track adjustment Front idler or rollers damaged Track frame bent Rocks or mud "jammed" in track frame Travel brake not releasing	Adjust tension. See your authorized dealer. See your authorized dealer. Remove and repair. See your authorized dealer.
Swing Does Not Work	Swing brake release valve Swing motor Pilot valve	See your authorized dealer. See your authorized dealer. See your authorized dealer.
Swing is Not Smooth	Swing gear Swing bearing Lack of grease	See your authorized dealer. See your authorized dealer. Apply grease.
Engine Stop When Travel or/and Control Lever Moved	Failure of connector contact Failed wiring harness Failed main controller	Repair or release. See your authorized dealer. See your authorized dealer.

SPECIFICATIONS

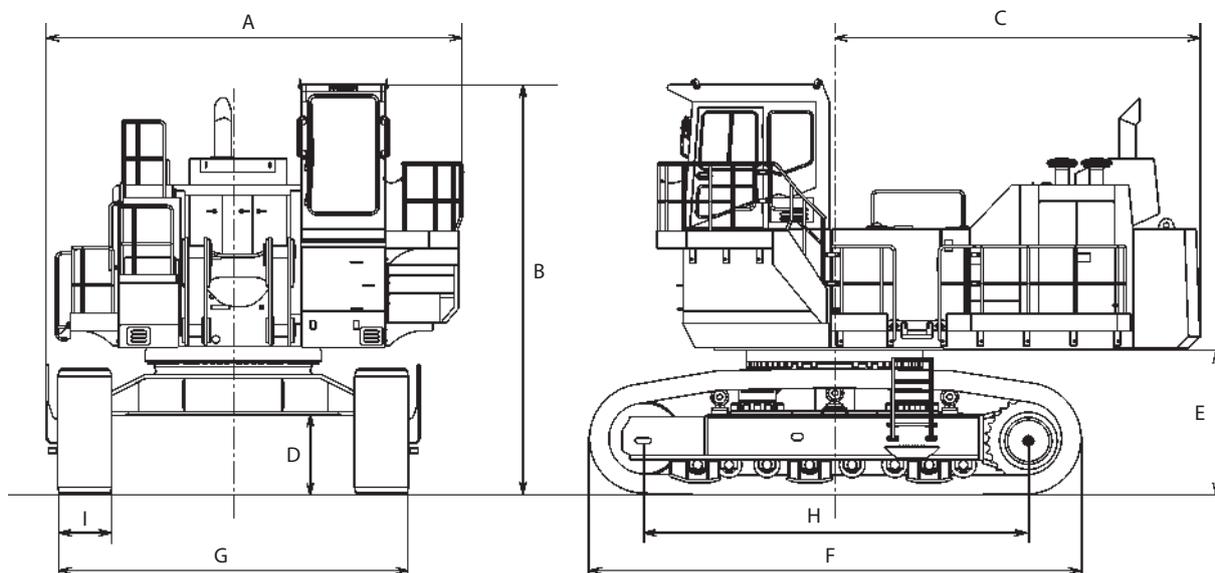
Specifications



M18J-12-001

Model	EX1200-6 Hydraulic Excavator	
Type of Front-End Attachment	Backhoe [9.0 m (29' 6") boom, 3.6 m (11' 10") arm]	BE Backhoe [7.55 m (24' 9") BE-boom, 3.4 m (11' 2") BE-arm]
Bucket Capacity (Heaped)	PCSA 5.2 m ³ (6.8 yd ³)	PCSA 6.7 m ³ (8.8 yd ³)
Operating Weight	111000 kg (245000 lb)	112000 kg (247000 lb)
Base Machine Weight	83400 kg (184000 lb)	
Engine Type	Cummins QSK23	
Engine Power	ISO 14396: 567 kW/1800 min ⁻¹ (760HP/1800 rpm)	
A: Overall Width	5430 mm (17 ft 10 in)	
B: Cab Height	4350 mm (14 ft 3 in)	
C: Rear End Swing Radius	4850 mm (15 ft 11 in)	
D: Minimum Ground Clearance	1020 mm (3 ft 4 in) (Excluding shoe lug)	
E: Counterweight Clearance	1820 mm (6 ft 0 in) (Excluding shoe lug)	
F: Undercarriage Length	6500 mm (21 ft 4 in)	
G: Undercarriage Width	4600 mm (15 ft 1 in)	
H: Sprocket Center to Idler Center	5090 mm (16 ft 8 in)	
I: Track Shoe Width	700 mm (28 in) (Grouser shoe)	
Ground Pressure	142 kPa (1.45 kgf/cm ² , 20.6 psi)	143 kPa (1.46 kgf/cm ² , 20.7 psi)
Swing Speed	5.2 min ⁻¹ (rpm)	
Travel Speed (Fast/Slow)	3.5/2.4 km/h (2.2/1.5 mph)	
Gradeability	35° (tanθ = 0.70)	

SPECIFICATIONS



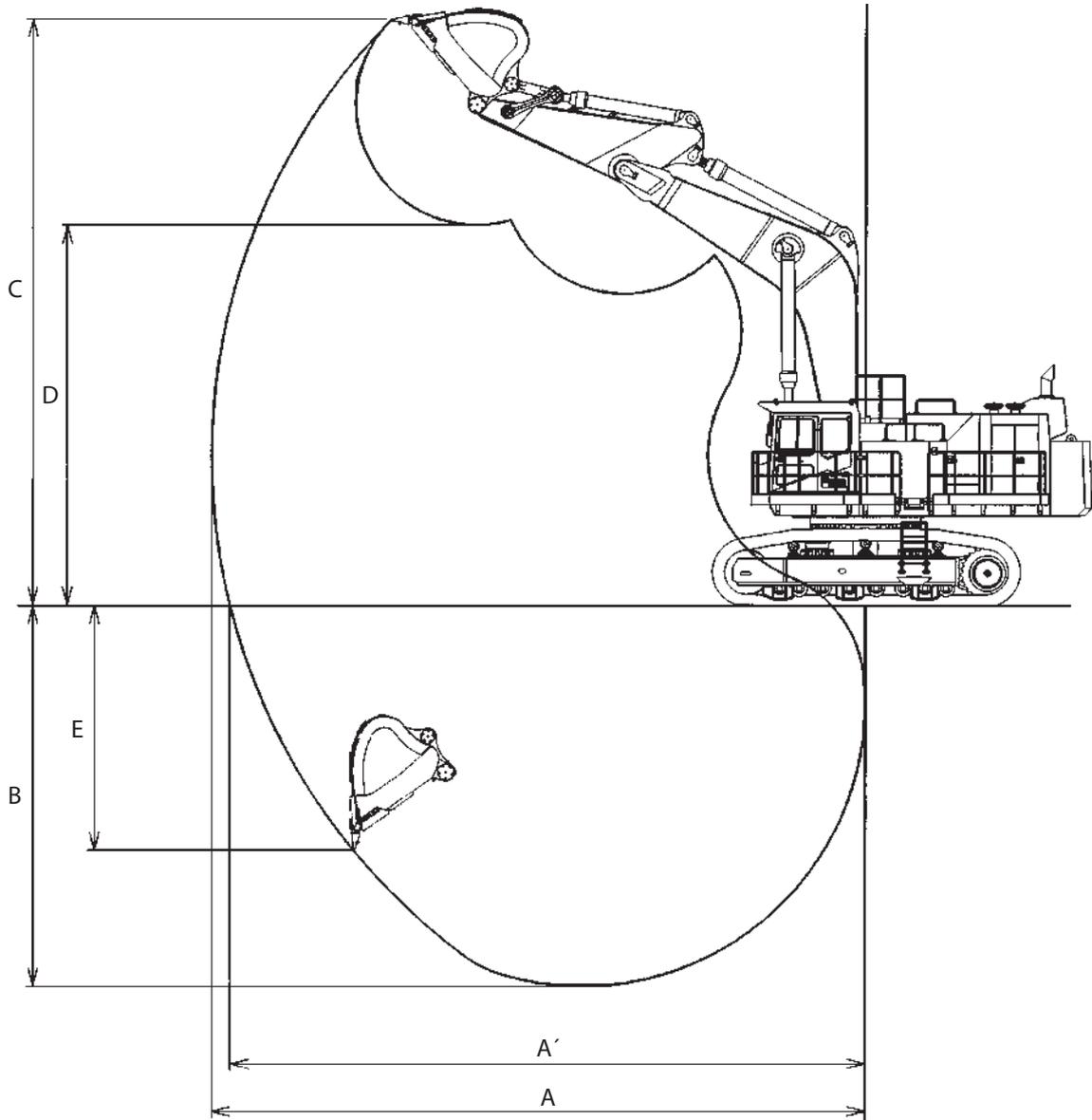
M18J-12-002

Model	EX1200-6 Hydraulic Excavator
Type of Front-End Attachment	Loading Shovel
Bucket Capacity (Heaped)	PCSA 6.5 m ³ (8.5 yd ³)
Operating Weight	114000 kg (251000 lb)
Base Machine Weight	83400 kg (184000 lb)
Engine Type	Cummins QSK23
Engine Power	ISO 14396: 567 kW/1800 min ⁻¹ (760HP/1800 rpm)
A: Overall Width	5430 mm (17 ft 10 in)
B: Cab Height	*5440 mm (17 ft 10 in)
C: Rear End Swing Radius	4850 mm (15 ft 11 in)
D: Minimum Ground Clearance	1020 mm (3 ft 4 in) (Excluding shoe lug)
E: Counterweight Clearance	1820 mm (6 ft 0 in)
F: Undercarriage Length	6500 mm (21 ft 4 in)
G: Undercarriage Width	4600 mm (15 ft 1 in)
H: Sprocket Center to Idler Center	5090 mm (16 ft 8 in)
I: Track Shoe Width	700 mm (28 in) (Grouser shoe)
Ground Pressure	146 kPa (1.49 kgf/cm ² , 21.2 psi)
Swing Speed	5.8 min ⁻¹ (rpm)
Travel Speed (Fast/Slow)	3.5/2.4 km/h (2.2/1.5 mph)
Gradeability	35° (tanθ = 0.70)

 NOTE: * The standard specification loading shovel is equipped with an elevated cab.

SPECIFICATIONS

Working Range (Backhoe)

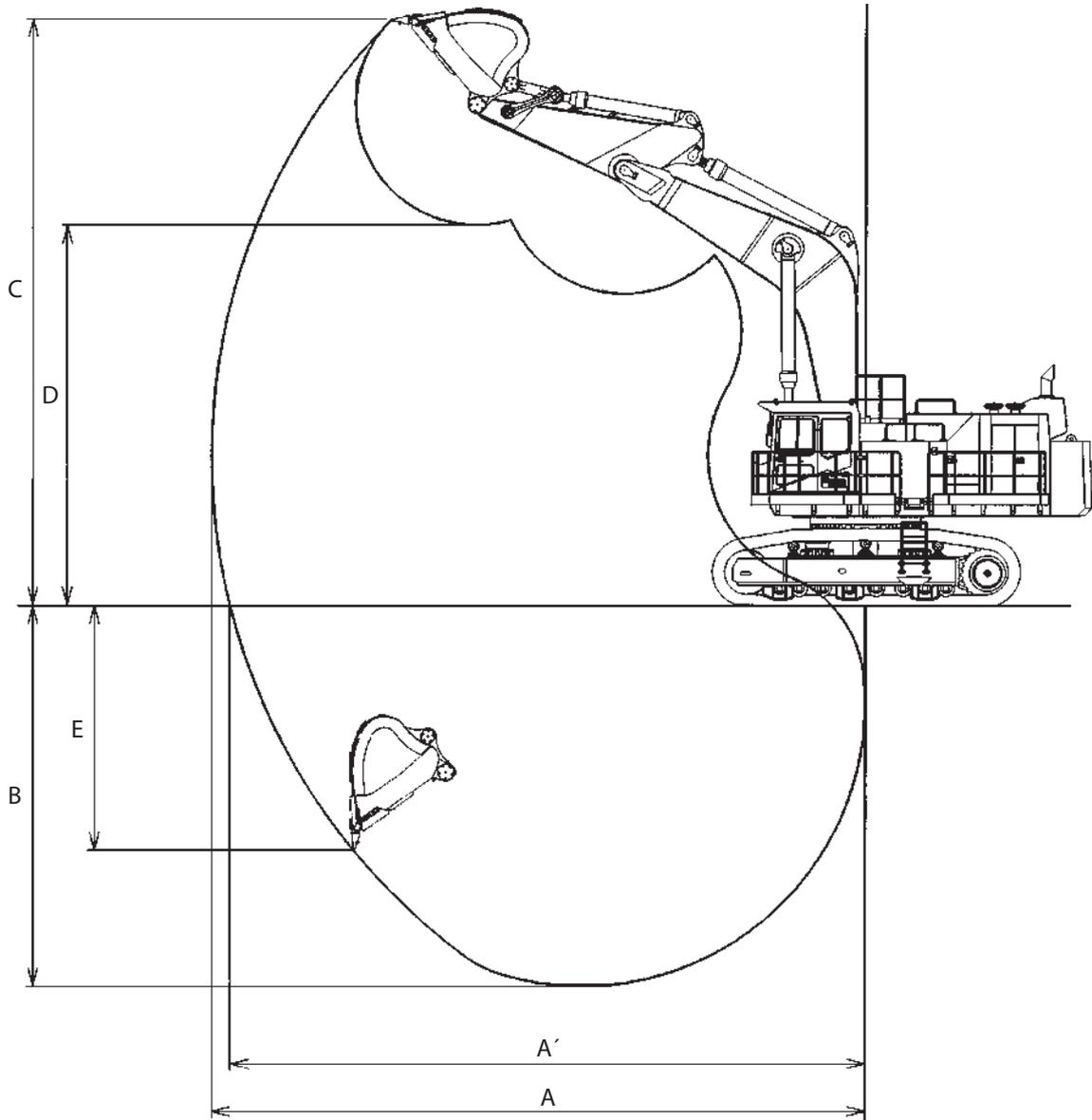


M18J-12-003

Boom Length	9.00 m (29'6")
Arm Length	3.60 m (11'10")
A : Maximum Digging Reach	15350 mm (50'4")
A' : Maximum Digging Reach (on ground)	15010 mm (49'3")
B : Maximum Digging Depth	9380 mm (30'9")
C : Maximum Cutting Height	13460 mm (44'2")
D : Maximum Dumping Height	9080 mm (29'10")
E : Maximum Vertical Wall	6450 mm (21'2")

SPECIFICATIONS

Working Range (BE Backhoe)

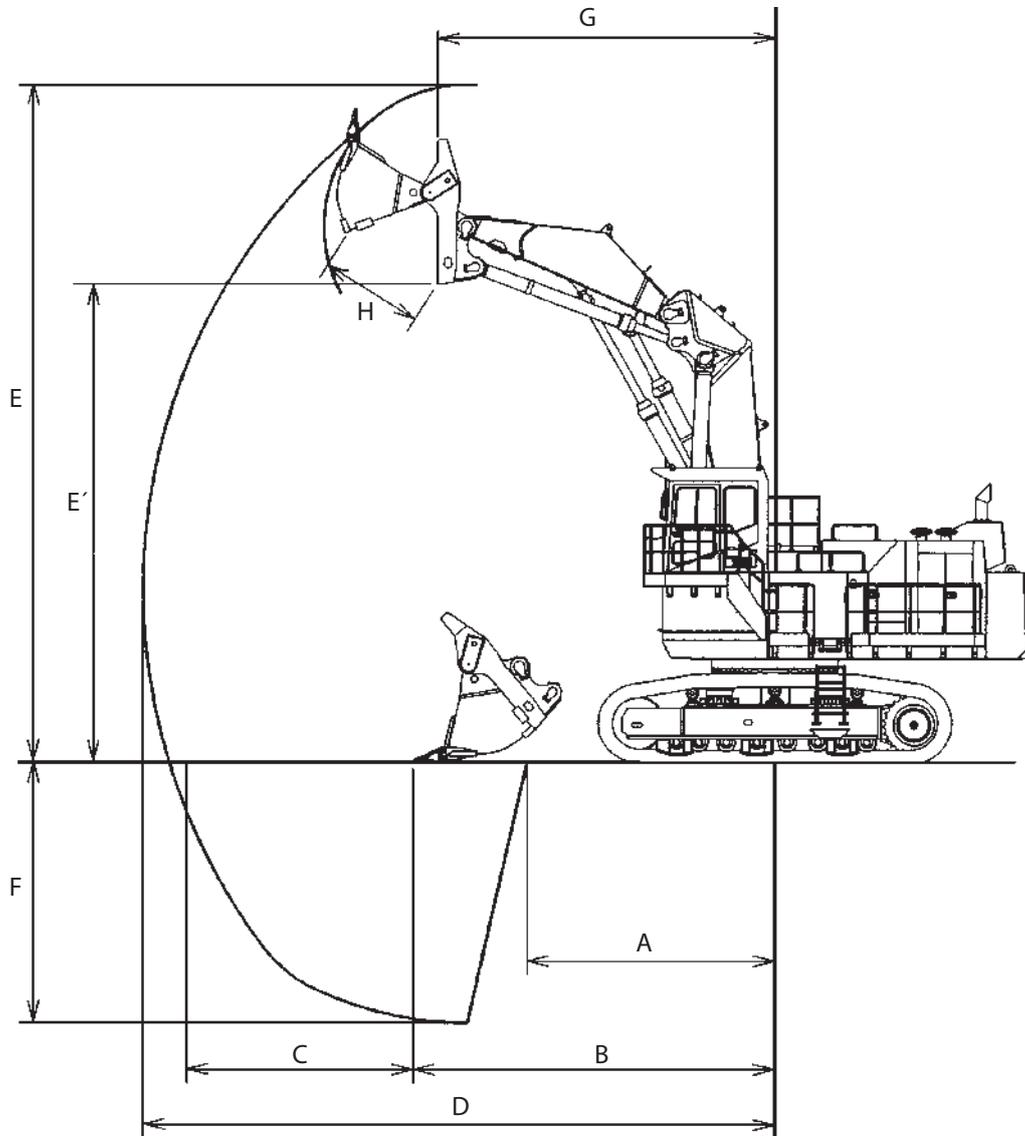


M18J-12-003

Boom Length	7.55 m (24' 9") BE-boom
Arm Length	3.40 m (11' 2") BE-arm
A : Maximum Digging Reach	13750 mm (45' 1")
A' : Maximum Digging Reach (on ground)	13360 mm (43' 10")
B : Maximum Digging Depth	8050 mm (26' 5")
C : Maximum Cutting Height	12410 mm (40' 9")
D : Maximum Dumping Height	8050 mm (26' 5")
E : Maximum Vertical Wall	5180 mm (17' 0")

SPECIFICATIONS

Working Range (Loading Shovel)



M18J-12-004

A : Minimum Digging Distance	4510 mm (14' 10")
B : Minimum Level Crowding Distance	6580 mm (21' 7")
C : Level Crowding Distance	4370 mm (14' 4")
D : Maximum Digging Reach	11500 mm (37' 9")
E : Maximum Cutting Height	12410 mm (40' 9")
E' : Maximum Dumping Height	8750 mm (28' 9")
F : Maximum Digging Depth	4780 mm (15' 8")
G : Working Radius at Maximum Dumping Height	6140 mm (20' 2")
H : Maximum Bucket Opening Width	1880 mm (6' 2")

SPECIFICATIONS

Backhoe Shoe Types and Applications

Shoe Types and Applications, and Machine Specifications When Employing Them

Shoe Width	700 mm (28 in) Grouser Shoe	900 mm (35 in) Grouser Shoe
Application	For Ordinary Ground (Standard)	For Weak Footing (Option)
Operating Weight	111000 kg (245000 lb)	113000 kg (249000 lb)
Base Machine Weight	83400 kg (184000 lb)	84900 kg (187000 lb)
Cab Height	4350 mm (14 ft 3 in)	4350 mm (14 ft 3 in)
Minimum Ground Clearance	*1020 mm (3 ft 4 in)	*1020 mm (3 ft 4 in)
Undercarriage Length	6500 mm (21 ft 4 in)	6500 mm (21 ft 4 in)
Undercarriage Width	4600 mm (15 ft 1 in)	4800 mm (15 ft 9 in)
Ground Pressure	142 kPa (1.45 kgf/cm ² , 20.6 psi)	112 kPa (1.14 kgf/cm ² , 16.2 psi)

 **NOTE:**

- *The machine specifications are when equipped with the front attachment of 9.0 m (29' 6") boom, 3.6 m (11' 10") arm and PCSA 5.2 m³ (6.8 yd³) backhoe bucket.*
- *Optional grouser shoes [900 mm] (35") are only for soft ground. If they are used on a rough ground with gravels and rocks, they may be bent and cause shoe bolt loosening or damaging track links and/or rollers.*
- *Use optional grouser shoes [900 mm] (35") only for the machine with backhoe front. Do not use them for the machine with loader front.*
- ** The dimensions do not include the height of the shoe lug.*

SPECIFICATIONS

Sound Level Results

(2006/42/EC)

LpA: sound level at operator's station (ISO 6396: 2008)

	Unit: dB(A)
	LpA
EX1200-6	75.9

Electric Fans

We consider our products exempted from EU regulation 327/2011, implementing EU directive 2009/125/EC, based on the fact that the fans are considered battery powered because the energy supply recharging the battery is not continuous nor at a constant level.

INDEX

A	
Adjust Operator's Seat	S-5
Adjusting Air-Suspension Seat (Optional).....	1-68
Adjusting Console Height	1-70
Adjusting Procedures.....	1-70
Adjusting Seat	1-64
Adjusting Seat (Heater Seat Optional).....	1-66
After the First 50 Hours	2-1
Air Cleaner	7-80
Air Conditioner	7-96
Air Conditioner Operation	1-49
Alarm Light	1-11
Alarm Occurrence Screen.....	1-17
AM/FM Radio Operation	1-58
Armrest Adjustment.....	1-65, 1-67, 1-69
Auto Air Conditioner	1-50
Auto-Control: OFF	1-27
Auto-Control: ON.....	1-26
Auto-Idle.....	5-8
Auto-Idle Switch	1-36
Auto-Lubrication System.....	7-122
Avoid Abusive Operation	5-16
Avoid Applying Heat to Lines Containing Flammable Fluids	S-30
Avoid Heating Near Pressurized Fluid Lines	S-30
Avoid High-Pressure Fluids.....	S-26
Avoid Injury from Attachment Falling Accident	S-24
Avoid Injury from Back-Over and Swing Accidents	S-14
Avoid Injury from Rollaway Accidents.....	S-13
Avoid Power Lines.....	S-18
Avoid Side Load the Bucket.....	5-16
Avoid Tipping.....	S-16
Avoid Undercutting.....	S-15
B	
BREAK-IN.....	2-1
Back Monitor Selector.....	1-10
Back Monitor Settings	1-26
Backhoe	7-13
Backhoe Shoe Types and Applications.....	12-6
Backrest Adjustment.....	1-64, 1-66, 1-68
Batteries.....	7-103
Battery Disconnect Switch.....	1-73
Before Starting Engine	3-2
Beware of Asbestos and Silicon Dust and Other Contamination	S-31
Beware of Exhaust Fumes.....	S-29
Boom Mode Switch	1-42
Bucket Open-Close Pedals (Loading Shovel)	5-3
Buzzer Deactivation Switch.....	1-42
C	
COMPONENTS NAME.....	1-1
Cab Door Release Lever	1-60
Cab Features.....	1-5
Cab Heater Operation.....	1-55
Cab Light Switch.....	1-45
Change Bucket (Backhoe)	7-118
Change Coolant	7-93
Change Engine Oil	7-37
Change Hydraulic Oil	7-52
Change Interval Settings	1-29
Check and Replace Seat Belt.....	7-119
Check Bucket Teeth	7-113
Check Compressor Belt Tension.....	7-99
Check Coolant Level.....	7-83
Check DCA4 Concentration in Coolant.....	7-84
Check Electrical Cables and Wire Harnesses for Short Circuits	7-110
Check Engine Oil Level	7-36
Check Fan Belt for Wear.....	7-94
Check Fuel Hoses.....	7-77
Check Handrails	7-141
Check Hoses and Lines.....	7-64
Check Hour Meter Regularly	7-2
Check Hydraulic Oil Level.....	7-50
Check Instruments After Starting.....	3-6
Check O-rings in Bucket Joints	7-140
Check Power Source Terminal.....	7-109
Check Refrigerant Quantity	7-98
Check Tightening Torque	7-100
Check Tightening Torque of Bolts and Nuts	7-126
Check Track Sag	7-120
Check Windshield Washer Fluid Level.....	7-119
Cigar Lighter.....	1-44
Clean Air Cleaner Outer Element.....	7-80
Clean Condenser Core.....	7-99
Clean Fuel Cooler Core	7-79
Clean Inter Cooler Front Screen	7-95
Clean Oil Cooler Front Screen	7-95
Clean Radiator, Inter Cooler and Oil Cooler Core.....	7-95
Clock.....	1-10
Clock Setting	1-22
Components Name	1-1
Confirm Direction of Machine to be Driven	S-10
Console and Seat Fore-aft Adjustment	1-64, 1-66, 1-68
Construction Outline	7-9
Contents of Alarms	1-19
Control Lever (Hitachi Pattern Backhoe) (Optional)	5-4
Control Lever (Hitachi Pattern Loading Shovel) (Optional).....	5-5
Control Lever (ISO Pattern Backhoe)	5-1
Control Lever (ISO Pattern Loading Shovel)	5-2
Control Levers.....	11-8
Controller Part Name and Function.....	1-51
Coolant Temperature Gauge.....	1-12
Cooling Operation	1-55
Cooling System	7-82
Correct Maintenance and Inspection Procedures.....	7-1
D	
DRIVING MACHINE.....	4-1
Defroster Operation	1-56
Dig with Caution.....	S-17

INDEX

Digital Clock Setting Procedure	1-59	Handle Fluids Safely – Avoid Fires	S-21
Displaying Basic Screen	1-6	Handle Starting Aids Safely	S-6
Displaying Basic Screen by Password Input (Optional).....	1-13	Heavy Lift.....	5-14
Dispose of Waste Properly.....	S-33	Hood and Access Covers.....	7-8
Distinctive Feature	1-50	Horn Switch.....	1-43
Drain Fuel Filter Sediment.....	7-75	Hour Meter.....	1-10
Drain Fuel Pre-Filter Sediment (Optional)	7-73	How to operate the disconnect switch	1-73
Drain Fuel Tank Sump	7-72	How to Read Engine Fault Codes.....	11-2
Drain Hydraulic Oil Tank Sump.....	7-51	How to Use Screens	1-6
Drive Machine Carefully	4-1	Hydraulic System	7-11, 7-47, 11-9
Drive Machine Safely.....	S-11	I	
E		In Case of Inputting an Incorrect Password	1-14
E (Economy) Mode	5-11	Inspect Machine	S-3
Electric Fans.....	12-7	Inspect Machine Daily Before Starting	3-1
Electrical Circuit	7-14	Inspection and Maintenance of Hydraulic Equipment... 7-48	
Electrical System.....	7-102, 11-6	Install OPG Guard	S-10
Emergency Escape Rope (Elevated Cab).....	1-63	Installation and Adjustment of Mirror and Camera	1-71
Emergency Exit	1-61	Installing Fire Extinguisher (Optional)	1-46
Emergency Exit (Elevated Cab).....	1-62	Investigate Job Site Beforehand	S-9
Engine.....	7-35, 11-3	J	
Engine Control Dial.....	1-36	Jump Starting	S-7
Engine Fault Diagnostics Switch.....	1-46	K	
Engine Speed Control	5-9	Keep Person Clear from Working Area.....	S-15
Engine Stop Switch.....	3-10	Keep Riders off Machine	S-7
Engine Troubleshooting	11-1	Key Switch.....	1-43
Ensure Safety Before Rising From or Leaving Operator's Seat	S-5	L	
Evacuating in Case of Fire.....	S-29	Language Settings	1-33
Every 10 Hours or Daily	2-1	Level Check.....	3-3
EX1200-6 Electrical Circuit Diagram	7-15	Level Check Switch	1-42
Extending	1-4	Lists of Display Language.....	1-34
Extending Password Duration Time	1-16	Loading Shovel.....	7-12
F		Lubrication Mode Switch (Optional)	1-42
Fan Pulley and Tension Pulley	7-34	Lubricator	7-31
Fasten Your Seat Belt	S-6	M	
Features:	1-49	MACHINE NUMBERS	1
Follow Safety Instructions.....	S-2	MAINTENANCE	7-1
For Rapid Cooling.....	1-57	MAINTENANCE UNDER SPECIAL ENVIRONMENTAL CONDITIONS	9-1
Front Joint Pins.....	7-26	Machine Fire Suppression	S-36
Fuel Gauge.....	1-10	Maintenance Guide Table.....	7-3
Fuel System.....	7-70	Maintenance Information Display ON/OFF	1-28
Fuse Box 1	1-48	Maintenance Interval Guide.....	7-21
Fuse Box 2	1-48	Maintenance Settings.....	1-28
G		Maintenance Under Special Environmental Conditions... 9-1	
GETTING ON/OFF MACHINE	1-2	Menu Key.....	1-11
General Precautions for Cab.....	S-4	Menu Screen (19)	1-9
Getting ON/OFF Machine.....	1-2	Miscellaneous	7-112
Grading Operation.....	5-15	Mode Selection	11-8
Greasing.....	7-25	Move and Operate Machine Safely	S-6
H		Multi Function Monitor	1-6
HANDLING LADDER.....	1-3	N	
H/P (High Power) Mode	5-13	Never Position Bucket Over Anyone	S-15
Handle Chemical Products Safely.....	S-33	Never Ride Attachment.....	S-33

INDEX

Never Undercut a High Bank.....	S-16	Pump Transmission.....	7-40
O			
OPERATING ENGINE.....	3-1	R	
OPERATING MACHINE.....	5-1	Raise One Track Using Boom and Arm	4-5
OPERATOR'S STATION	1-5	Recirculation Air Filter.....	7-96
Object Handling	S-19	Recognize Safety Information	S-1
Object Handling --- If Equipped.....	5-21	Remove Paint before Welding or Heating	S-31
Observe Engine Operation Closely.....	2-1	Removing Machine from Storage	10-2
Off-Season Air Conditioner Maintenance	1-57	Replace Air Cleaner Outer and Inner Elements	7-80
Opening Side Windows.....	1-60	Replace Coolant Filter.....	7-92
Operate Only from Operator's Seat	S-7	Replace Drain Filter.....	7-56
Operate with Caution	S-17	Replace Engine Oil Filter	7-37
Operating Backhoe.....	5-15	Replace Fuel Filter	7-76
Operating in Ground Condition.....	4-7	Replace Fuel Pre-Filter Element (Optional)	7-74
Operating Ladder on the Ground.....	1-4	Replace Full-Flow Filter Element.....	7-58
Operating Ladder on the Upper-Structure	1-4	Replace High-Pressure Filter Element.....	7-62
Operating Loading Shovel	5-18	Replace Pilot Oil Filter	7-60
Operating on Soft Ground	4-5	Replace Rubber Hoses Periodically.....	S-25
Operating Status Icon Display	1-12	Replace Tank Air Breather Element.....	7-63
Operating Tips	5-17	Replacing Fuses	7-107
Operation	1-44	Resetting Data	1-30
Optional Function Display	1-11	Restriction of Attachment Installation	S-10
Optional Function Key.....	1-11	Retracting.....	1-4
Outline.....	1-7	Return to Basic Screen Key.....	1-11
Overnight Storage Instructions.....	5-22	S	
P			
P (Power) Mode.....	5-12	SAFETY	S-1
Park Machine Safely.....	S-21	SAFETY SIGNS	S-38
Parking Machine	4-8	SPECIFICATIONS	12-1
Parking Machine on Slopes	4-8	STORAGE.....	10-1
Password Change (Optional).....	1-23	Screen Display when Maintenance Information	
Periodic Replacement of Parts.....	7-17	Display is ON.....	1-31
Periodic Replacement of Rubber Hoses.....	7-18	Seasonal Maintenance	7-101
Pilot Control Shut-Off Lever	1-47, 5-6	Seat Belt	1-72
Power Mode	5-10	Seat Fore-Aft Adjustment.....	1-64, 1-66, 1-68
Power Mode Switch.....	1-37	Seat Heater Switch.....	1-67, 1-69
Practice Safe Maintenance.....	S-22	Seat Heater Switch (Optional).....	1-41
Precautions for Communication Terminal.....	S-33	Seat Height and Angle Adjustment.....	1-64, 1-66, 1-68
Precautions for Communication Terminal Equipment		Select Correct Track Shoes	5-17
(Optional).....	S-34	Service Air Conditioning System Safely	S-32
Precautions for Handling Accumulator and Gas		Sound Adjustment.....	1-59
Damper.....	S-30	Sound Level Results.....	12-7
Precautions for Lightning.....	S-18	Specifications.....	12-1
Precautions for Operations	S-8	Starting Engine in Cold Weather.....	3-5
Precautions for Welding and Grinding	S-29	Starting Engine in Ordinary Temperature	3-4
Prepare for Emergencies.....	S-2	Station Presetting Procedure	1-58
Prepare Machine for Maintenance.....	7-6	Stay Clear of Moving Parts	S-24
Prevent Battery Explosions	S-32	Std. Model.....	1-5
Prevent Burns.....	S-25	Steering Machine Using Levers.....	4-3
Prevent Fires.....	S-27	Steering Machine Using Pedals.....	4-2
Prevent Parts from Flying	S-24	Step Light Switch.....	1-45
Prohibited Operation	5-18	Stopping Engine.....	3-9
Protect Against Flying Debris and Falling Object.....	S-20	Storing Emergency Escape Rope.....	1-63
Protect Against Noise	S-3	Storing Machine.....	10-1
Provide Signals for Jobs Involving Multiple Machines....	S-10	Suction Filter Cleaning	7-55
		Support Machine Properly.....	S-23
		Suspension Adjustment.....	1-68

INDEX

Swing Bearing.....	7-30
Swing Internal Gear	7-33
Swing Reduction Gear	7-43
Switch Panel.....	1-35
Switch Panel (Optional Included)	1-40

T

TRANSPORTING.....	6-1
TROUBLESHOOTING	11-1
Time Adjustment.....	1-22
Tips for Optimal Air Conditioner Usage	1-57
Towing Machine a Short Distance.....	4-6
Transmission	7-39
Transporting.....	6-1
Transporting Machine	10-2
Travel Alarm (Optional)	4-4
Travel Alarm Deactivation Switch (Optional)	1-41
Travel Mode Switch	1-37, 4-4
Travel Reduction Gear	7-45
Tuning Procedure.....	1-58

U

Understand Signal Words.....	S-1
Use Correct Fuels and Lubricants	7-2
Use Electrical Outlet (Optional).....	7-8
Use Handholds and Steps	S-5
Using Booster Batteries	3-7
Using Ladder (Optional).....	1-3

V

VISIBILITY MAP	S-37
Ventilation Air Filter	7-97

W

Warming-Up Operation	5-7
Warn Others of Service Work	S-23
Wear Protective Clothing.....	S-3
When Windows Become Clouded.....	1-57
Wiper/Washer Switch.....	1-39
Work Light Switch	1-38
Working Range (Backhoe).....	12-3
Working Range (BE Backhoe).....	12-4
Working Range (Loading Shovel)	12-5

CONFORMITY

The EU Declaration of Conformity includes the machine without accessory, unless fitted with accessories approved by Hitachi Construction Machinery.

The EU Declaration of Conformity will lose its validity for any modification of the machine without approval.

Legal Provisions;

The machine fulfills all relevant provisions of the following directives (and their amendments)

2014/30/EU EMC Directive

2006/42/EC Machinery Directive

Manufacturer;

Hitachi Construction Machinery Co., Ltd.
650 Kandatsu-machi Tsuchiura-shi Ibaraki-ken 300-0013
Japan

The person who can compile the technical file :
General Manager, Engineering
Hitachi Construction Machinery (Europe) N.V.

CONFORMITY

Vibration levels

The level of vibrations transmitted from the machine to the operator depends mainly upon the ground conditions on which the operations take place, the mode of operation of the machine and the equipment used. Exposure to vibrations can be considerably reduced when taking into account the following recommendations:

- Select the right type and size of machine. Use equipment and tools compatible with the machine and suitable for the type of work to be done;
- Adjust the seat to the weight and size of the operator and lock the seat in the correct position;
- Inspect regularly the suspension of the seat. Adjust and repair if necessary;
- Perform maintenance of the machine at the prescribed intervals;
- Operate the equipment in a smooth way, preventing, as far as possible, aggressive movements or excessive loads;
- Adapt travelling speed and –route if necessary and avoid, as far as possible, rough terrain or hitting obstacles to prevent bouncing.
- Keep the terrain in good condition. Remove large obstacles and fill any ditched and holes.

This machine is equipped with an operator's seat, limiting the exposure of the operator's body to vibrations in accordance with ISO 7096:2008 when the machine is used as intended. The operator's seat has been tested in accordance with EM6 input spectral class and a SEAT transmissibility factor <0.7.

- The average acceleration value to which the operator's arms are subjected does not exceed 2.5 m/s^2 .
 - The average acceleration value to which the operator's body is subjected does not exceed 0.5 m/s^2 . The results were obtained using an accelerometer during excavating operations.
-

CONFORMITY

 **NOTE:** *The vibration exposure values have been determined under particular operating and terrain conditions and therefore may not be representative for all possible operating conditions within the intended use of the machine. Consequently, this single Whole-Body vibration emission value is not intended to determine the Whole-Body vibration exposure as required by European Directive 2002/44/EC. For this purpose it is recommended to conduct measurements under actual working conditions. If this is not feasible, information provided in the table below, taken from ISO/TR 25398:2006(*1), to estimate the daily vibration exposure is recommended. For regular operating activities, use the typical vibration levels as the estimated level. With an experienced operator and/or smooth terrain, subtract the standard deviation from the typical vibration level in order to obtain the estimated vibration level. For aggressive operations and/or rough terrain, add the standard deviation to the typical vibration level in order to obtain the estimated vibration level.*

Operating activity	Typical vibration level [m/s ²]			Standard deviation [m/s ²]		
	1.4*a _{w,eqx}	1.4*a _{w,eqy}	a _{w,eqz}	1.4*s _x	1.4*s _y	s _z
Excavating	0.44	0.27	0.30	0.24	0.16	0.17
Hydraulic breaker application	0.53	0.31	0.55	0.30	0.18	0.28
Mining	0.65	0.42	0.61	0.21	0.15	0.32
Travelling	0.48	0.32	0.79	0.19	0.20	0.23

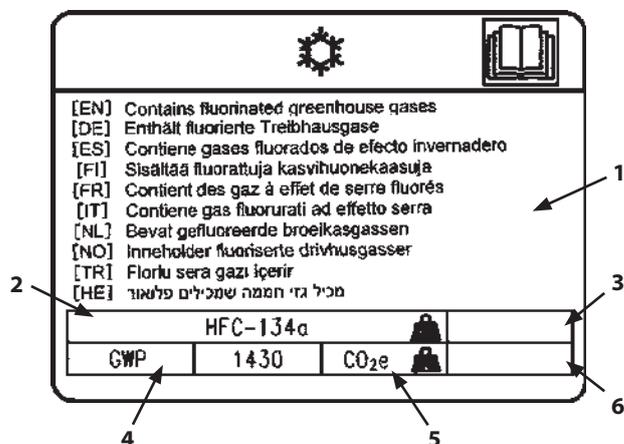
(*1) ISO/TR 25398:2006 Mechanical vibrations – Guidelines for assessment of exposure to whole-body vibration of ride-on machine – Use of harmonized data measured by international institutes, organizations and manufacturers.

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.

DECLARATION OF CONFORMITY

We, **Quake Global Inc. (previously Quake Wireless, Inc. up to January 2001)**
of **4933 Paramount Drive**
San Diego
CA 92123, USA

declare under our sole responsibility that the product
HPRO-100

to which this declaration relates, is in conformity with the following standards and/or other normative documents.

IEC 62368-1:2014

EN 60950-1:2006+A11:2009+A1:2010+A12:2011+A2:2013

EN 301 489-1:V2.1.1

EN301 489-3:V2.1.0

EN 301 489-52:V1.1.0

EN 62209-2:2010

EN 62311:2008

EN 301 908-1:V11.1.1

EN 50581:2012

EN 303 413 V1.1.0

We hereby declare that all essential radio test suites have been carried out and that the above named product is in conformity to all the essential requirements of Directive 2014/53/EU.

The conformity assessment procedure referred to in Article 3.1(b) and detailed in Annex [III] of Directive 2014/53/EU has been followed with the involvement of the following Notified Body:

TÜV SÜD BABT
Octagon House, Concorde Way,
Segensworth North Fareham,
PO15 5RL

Identification mark: **0168**

The technical documentation relevant to the above equipment will be held at:

Quake Global Inc. (previously Quake Wireless, Inc. up to January 2001)
4933 Paramount Drive
San Diego, CA 92123, USA



David Mitchell
Director, New Product Introduction

HITACHI

© Hitachi Construction Machinery Co., Ltd.

16-1, Higashiueno 2-chome, Taitou-ku, Tokyo, 110-0015, Japan

Telephone Tokyo (03) 5826-8124

Fax Tokyo (03) 5826-8187

DECLARATION of CONFORMITY

We, Hitachi Construction Machinery Co., Ltd., hereby declare, at our sole responsibility, that the following product conforms to the Essential Requirements of Radio Equipment Directive 2014/53/EU in accordance with the tests conducted to the appropriate requirements of the relevant standards, as listed herewith.

Product: ORBCOMM Data Terminal Equipment

Model/ Type Number: X4635318

Hardware version: 3.0

Software version: 3.06

Standards used:

EN 301 721 V2.1.1

EN 300 440 V2.1.1

EN 301 489-1 V2.1.1

EN 301 489-3 V2.1.0

EN 301 489-20 V1.2.1

EN 62368-1 2014 + AC 2015

EN 62311: 2008

The conformity assessment procedure referred to in Annex III of Directive 2014/53/EU has been followed with the involvement of the following Notified Body:

CTC advanced GmbH, Untertürkheimer Strasse 6- 10, D-66117 Saarbrücken, Germany

EC Identification number: 0682

EU-Type examination certificate: XXX

The technical documentation relevant to the above equipment will be held at:

Hitachi Construction Machinery Co., Ltd.

650 Kandatsu-machi, Tsuchiura-shi, Ibaraki, 300-0013, Japan

Name : Yutaka Watanabe

Function : General Manage

Signature :



5 / Jul / 2017

EU DECLARATION of CONFORMITY (DoC)

(No. 11604305)

This declaration of conformity is issued under the sole responsibility of the manufacturer:

Name: Tokai Rika Create Corporation
Address: 2-3-10Aoi,Higashi-ku,Nagoya,Aichi 461-0004,Japan

We declare that the DoC is issued under our sole responsibility and belongs to the following product.

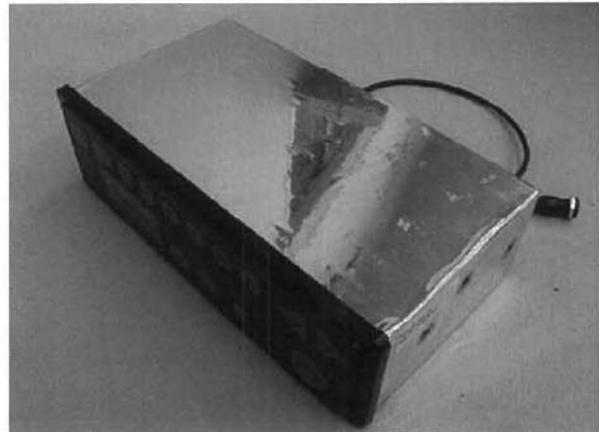
Object of the declaration:

Product Name Car audio Radio Receiver,
VATKI

Model Name 347-2122-000, 347-2111-000,
347-2159-000, 347-2161-000,
347-2233-000, 347-2236-000,
347-2238-000, 347-2243-000,
347-2506-000

Software Ver. FM: 1.0
AM: 1.0

Accessories N/A



The object of the declaration described above is in conformity with the relevant Union harmonization legislation:

Radio Equipment (RE) Directive (2014/53/EU)

The following harmonized standards and technical specifications have been applied:

Health & Safety (Article 3.1(a)):	EN 60065:2014
EMC (Article 3.1(b)):	EN 301 489-1 V2.1.1 EN 301 489-3 V2.1.0 (Draft)
Radio Spectrum (Article 3.2):	EN 303 345 V1.1.1 (Draft)

Notified Body performed an EU-type examination in accordance with the requirements of Annex III of RE Directive and issued the EU-type examination certificate.

Notified Body:

UL Japan, Inc. (No. 1731)
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021, Japan

Certificate No.: ULAR1703003

Signed for and on behalf of:

Aichi, Japan

Place of Issue:

March 13, 2017

Date of Issue:

Yoshimi Noro

YOSHIMI NORO
General Manager
Engineering Div.

HITACHI

EU DECLARATION of CONFORMITY (DoC)

(No. 11854059)

This declaration of conformity is issued under the sole responsibility of the manufacturer:

Name: Hitachi Construction Machinery Co., Ltd.

Address: 650 Kandatsu-machi Tsuchiura-shi Ibaraki-ken 300-0013 Japan

We declare that the DoC is issued under our sole responsibility and belongs to the following product.

Object of the declaration:

Product Name DLU:Data Logging Unit

Model Name DLU2

Accessories N/A



The object of the declaration described above is in conformity with the relevant Union harmonization legislation:

Radio Equipment (RE) Directive (2014/53/EU)

The following harmonized standards and technical specifications have been applied:

Health & Safety EN 60950-1: 2006 + A11: 2009 + A1: 2010 + A12: 2011 + A2: 2013
(Article 3.1(a)):

EMC EN 301 489-1 V2.1.1
(Article 3.1(b)):

Radio Spectrum EN 303 413 V1.1.1
(Article 3.2): EN 300 440 V2.1.1

Notified Body performed an EU-type examination in accordance with the requirements of Annex III of RE Directive and issued the EU-type examination certificate.

Notified Body:

UL Japan, Inc. (No. 1731)

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021, Japan

Certificate No.: ULAR1708327

Ibaraki, Japan

Place of Issue:

August 4, 2017

Date of Issue:

Toru Kurenuma

Toru Kurenuma
Division Manager
Control System Center

Hitachi Construction Machinery Europe N.V. (HCME) Limited Warranty

This limited warranty ("Warranty") applies only to the Product specified in this Operator's Manual.

This Warranty applies only to the Product manufactured and/or sold by Hitachi Construction Machinery (Europe) N.V. ("HCME") or through its authorized Distributor in the European Union, Switzerland, Iceland and Norway.

This Warranty does not apply to the Product operating in the countries outside the European Union with the exception of Switzerland, Iceland and Norway. (In other areas different warranties may apply. Copies of applicable warranties may be obtained by written request to Hitachi Construction Machinery Co., Ltd.)

HCME warrants the new Product will comply in all material respects with HCME's specifications thereof and will be free of defects proved to have been caused by defective materials and/or faulty workmanship, in the sole judgment of HCME during the following period:

Warranty Period

Twelve (12) months, unlimited hours of operation after the date of delivery to the first User.

This Warranty is subject to the following terms and conditions:

HCME's Obligations & Responsibilities

- Repair the Product in the sole judgment of HCME;
- Repair or provide replacement parts in the sole judgment of HCME (either new, remanufactured, repaired or by HCME approved parts) needed to correct the defects;
- The replaced parts become the property of HCME;
- The replaced parts provided under this Warranty are warranted for the remaining Warranty Period applicable to the Product in which they were installed;
- Provide reasonable and customary labour necessary for the Warranty works through its authorized Distributor at the place of business of HCME or its authorized Distributor during normal working hours.

User's Obligations & Responsibilities

- Operate the Product in accordance with the Operator's Manual and the designated specification of fuel and perform the required maintenance as indicated in the Operator's Manual;
- Provide proof of a delivery inspection to the first User, periodical maintenance compliance (receipts, copies of work orders, invoices and periodical inspection results);
- Pay for travel expenses of HCME or HCME's authorized Distributor (as the case may be) to a job site and transportation expenses;
- Labour costs in excess of those provided under "HCME Obligations & Responsibilities" including but not limited to premium or overtime labour costs;
- Pay for parts shipping charges in excess of those that are considered usual or customary;
- Pay for local taxes and duties if applicable;
- Pay for costs to investigate complaints, unless the problem is caused by a defect in HCME material or workmanship;
- Give a prompt notice (within five (5) working days) of a warrantable failure and/or potential problem;

- Promptly make the Product available for Warranty works;
- Permit HCME and/or its authorized Distributor to get access to all relevant information in order to investigate and/or repair the failure.

Limitations

This Warranty does not apply to service parts, wear parts, consumable parts such as lamps, fuses, V-belts, brake clutch lining, brake disc, clutch disc, ground engaging parts, track, tires, wire ropes, filter elements, oil, grease, grease nipples, etc., unless these parts fail as a result of a failure of a warranted part of the Product.

Moreover, this Warranty shall not be applicable in the following cases:

- Failures resulting from unauthorized repair or adjustments in the Product;
- Failures resulting from the attachments, and/or parts, not manufactured and/or sold or approved by HCME;
- Failures resulting from using fuel and/or lubricant other than the type designated by HCME;
- Failures resulting from operation in disregard of the Operator's Manual and/or catalogues and/or such instructions as are issued by HCME for the Product;
- Failures resulting from any abuse, neglect, improper handling and/or insufficient or erroneous maintenance of the Product;
- Failures resulting from floods, lightning, storms, fires, and other Acts of God;
- Failures resulting from the User's delay in prompt repair of the initial problem;
- Failures resulting from any use and/or installation that HCME judges improper;
- Minor change of colour and/or rust on the Product ascribable to normal wear and tear;
- Such phenomena as normal noise, vibration, etc. which will not affect the function of the Product;
- Minor adjustments such as re-torque and tightening of nuts, bolts, hoses, hydraulic lines, fittings and troubleshooting.

THIS WARRANTY IS EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES AND THERE IS NO IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. THIS WARRANTY CONSTITUTES USER'S SOLE RIGHT AND REMEDY AND HCME'S SOLE OBLIGATIONS & RESPONSIBILITIES IN RESPECT OF ANY DEFECTIVE OR MALFUNCTIONING PRODUCTS AND IS SUBJECT TO ANY LIMITATIONS OF LIABILITY THAT ARE PART OF ANY SALES AGREEMENT WITH HCME.

FOR THE AVOIDANCE OF DOUBT AND WITHOUT PREJUDICE TO THE FOREGOING, HCME WILL NOT BE LIABLE FOR ANY DIRECT OR INDIRECT DAMAGES (INCLUDING BUT NOT LIMITED TO ANY CONSEQUENTIAL DAMAGES, LOSS OF REVENUES, LOSS OF PROFITS OR BUSINESS INTERRUPTION LOSSES) UNLESS THE DAMAGE IS THE RESULT OF HCME'S WILFULL MISCONDUCT OR GROSS NEGLIGENCE.

EXCEPT AS EXPRESSLY STATED HEREIN, THERE ARE NO WARRANTIES, EXPRESS OR IMPLIED, BY OPERATIONS OF LAW OR OTHERWISE, PERTAINING TO THE PRODUCTS.

This version is in effect as of October 1, 2014.

Hitachi Construction Machinery Europe N.V. (HCME) Limited Warranty

IF THIS WARRANTY IS ALSO TRANSLATED INTO ANOTHER LANGUAGE, DIFFERENT FROM ENGLISH, IN CASE OF DISCREPANCIES BETWEEN THE TEXTS, THE TEXT IN ENGLISH LANGUAGE SHALL PREVAIL.

THIS WARRANTY SHALL BE GOVERNED BY AND IS CONSTRUED IN ACCORDANCE WITH THE LAW OF THE NETHERLANDS WITH THE EXCLUSION OF THE UN CONVENTION ON CONTRACTS FOR THE INTERNATIONAL SALE OF GOODS (CISG). ALL CLAIMS AND DISPUTES ARISING OUT OF OR IN CONNECTION WITH THIS WARRANTY SHALL BE SETTLED BY THE COMPETENT COURT IN AMSTERDAM, THE NETHERLANDS. HOWEVER, HCME SHALL HAVE THE RIGHT TO SUBMIT ANY CLAIM OR DISPUTE TO A COURT THAT WOULD HAVE JURISDICTION IN THE ABSENCE OF THE FOREGOING STIPULATION. AS AN EXCEPTION, IF THE USER IS DOMICILED OUTSIDE THE EUROPEAN UNION, SWITZERLAND, NORWAY OR ICELAND, UPON COMMENCEMENT OF PROCEEDINGS ALL CLAIMS AND DISPUTES ARISING OUT OF OR IN CONNECTION WITH THIS WARRANTY, SHALL BE FINALLY SETTLED IN ACCORDANCE WITH THE ARBITRATION RULES OF THE NETHERLANDS ARBITRATION INSTITUTE (NAI). THE ARBITRAL TRIBUNAL SHALL BE COMPOSED OF THREE ARBITRATORS WHO SHALL DECIDE IN ACCORDANCE WITH THE RULES OF DUTCH LAW. THE PLACE OF ARBITRATION SHALL BE AMSTERDAM, THE NETHERLANDS. THE ARBITRAL PROCEDURE SHALL BE CONDUCTED IN THE ENGLISH LANGUAGE.

Claims under this Warranty should be submitted to a place of business of an authorized HCME's Distributor or directly to HCME. For the information concerning either the address to submit the claims or HCME as the issuer of this Warranty, please write to: Hitachi Construction Machinery (Europe) N.V., Sicilieweg 5, 1045 AT, Amsterdam, The Netherlands.

Hydraulic Excavator EX1200-6

Operator's Manual (Original Instruction)

Manual part number : EM18J-EN1-9

Hitachi Construction Machinery Co., Ltd
Address :650 Kandatsu-machi Tsuchiura-shi Ibaraki-ken 300-0013 Japan
URL :<http://www.hitachi-c-m.com>

Hitachi Construction Machinery (Europe) N.V.
Address :Siciliëweg 5, 1045 AT, Amsterdam, The Netherlands
URL :<http://www.hitachi-c-m.com>

